

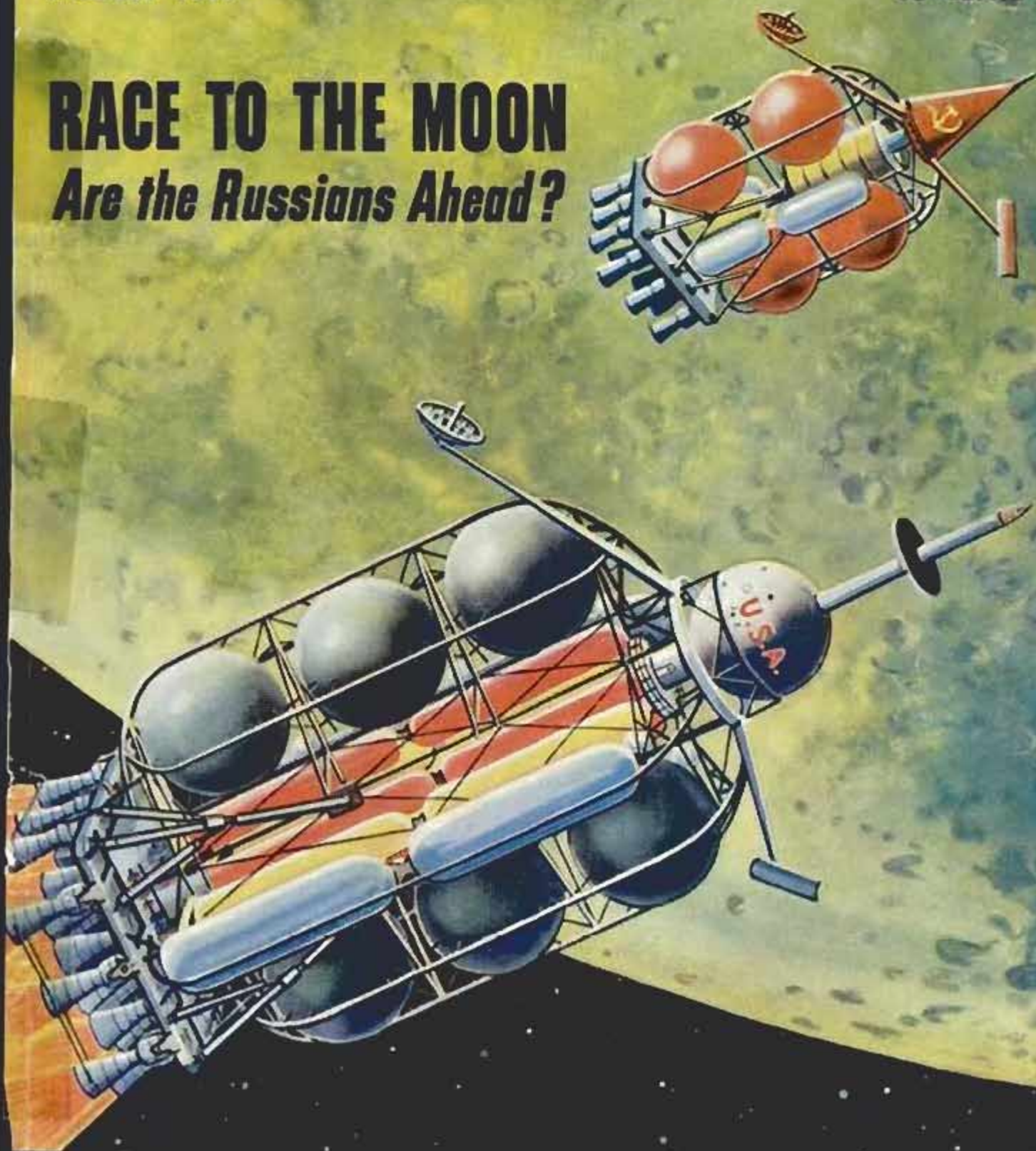
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AUGUST 1959

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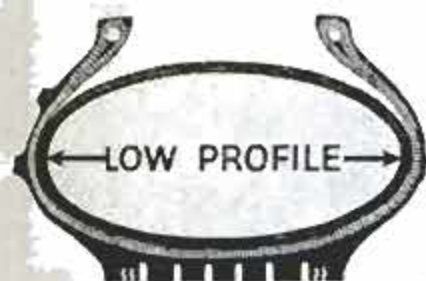
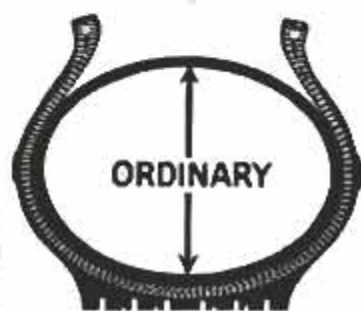
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AUGUST 1959



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Francisco: Russ Bldg., 235 Montgomery St.,
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Published monthly by Popular Mechanics Company,
200 E. Ontario St., Chicago 11, Ill. Richard E.
Berlin, President; Richard E. Deems, Executive
Vice-President; Fred Lewis, Vice-President and
General Manager; John R. Miller, Vice-President;
G. Harry Chamberlaine, Vice-President; G. O. Mar-
kuson, Treasurer; H. F. McAnby, Secretary. Single
copy in the United States and Canada, 35 cents;
subscription rates in the United States and pos-
sessions, Canada and countries of the Pan Ameri-
can Postal Union, 1 year \$3.50; 2 years, \$6.00;
3 years, \$8.00. To all other countries add \$1.00
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30 days in advance so you will not miss an
issue. Give both your old and new addresses.
Second-class postage paid at Chicago, Illinois,
and at additional mailing offices. Entered as
Second Class Matter at Post Office Dept., Canada.
Registered as second Class Matter at the Post
Office at Mexico, D.F., Mexico, June 20, 1950.
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FOREIGN EDITIONS:	MECANIQUE POPULAIRE (French)	MECANICA POPULAR (Spanish)	POPULAER MEKANIK (Danish)	POPULAR MEKANIK (Swedish)	POPULARE MECHANIK (German)
Volume 112	AUGUST 1959.			Number 2	

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Next Month...

WHICH FOREIGN CAR is best for you? Next month the second part of our survey (which begins on page 98 of this issue) analyzes mileage and other features of 10 cars . . . PM Salutes Sikorsky in September for 50 years in aviation—eight pages of fascinating pictures beginning with his first helicopter in 1909 . . . Don't miss "The Other Side of Paradise"—our report on Hawaii, the 50th state

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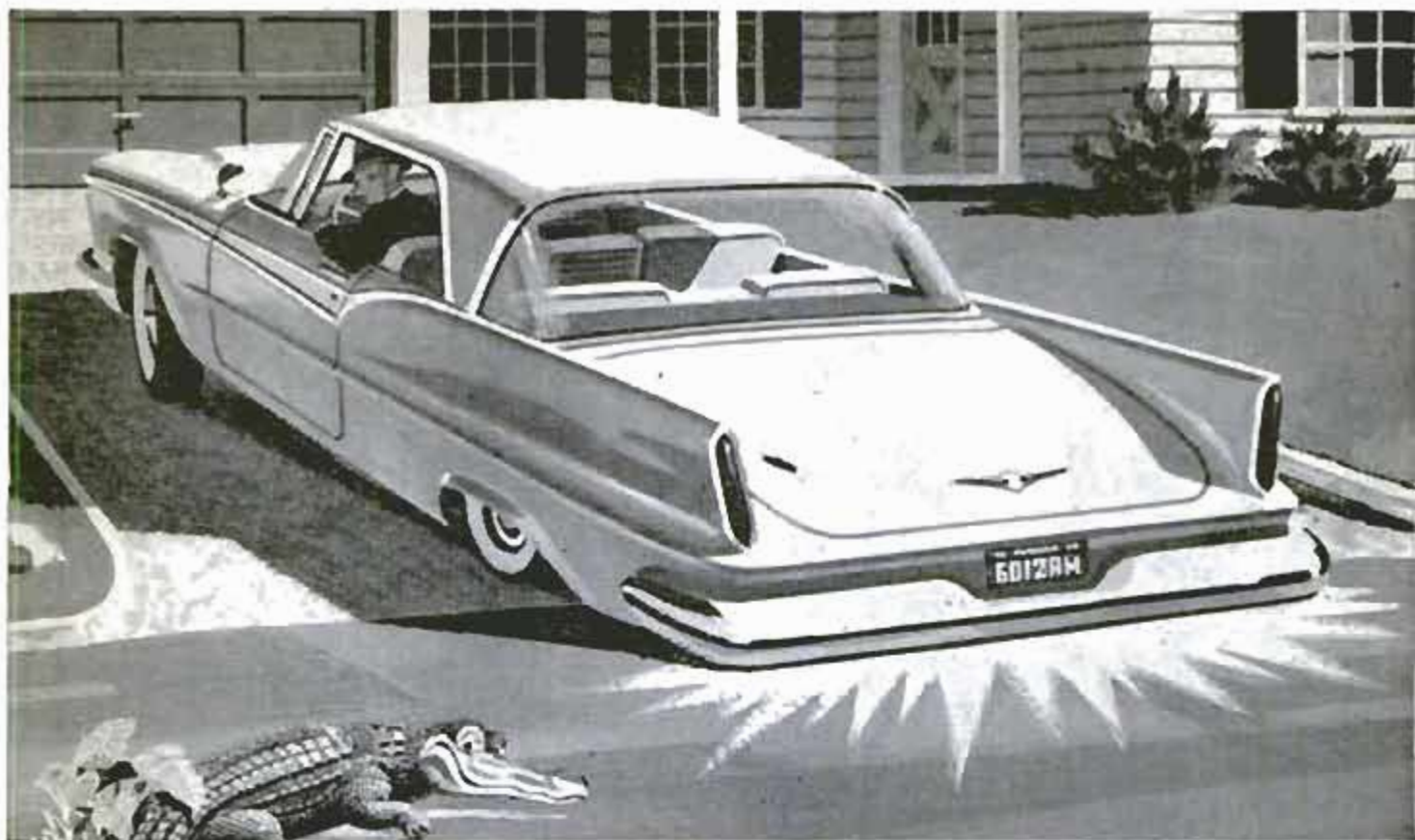
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Over the Editor's Desk



To the Editor:

In the summer of 1957 my younger son, who was then 11 years old, was enjoying an issue of *Popular Mechanics* when he came across an ad for a book on how to



Keith Chapman and violin made from PM book plans

make a violin. Its title is "You Can Make a Stradivarius Violin."

He started talking about it, and decided that he wanted very much to make a violin. . . . It took a long while, but the results have been amazing. I thought you would be interested to know that even a 13 year old boy could follow the directions in the book. The violin has a very good tone. He plays it in the school orchestra.

Mrs. Walker Chapman,
San Bruno, Calif.

Our compliments to 13 year old Keith Chapman, shown playing the violin he made from the book published by Popular Mechanics Co. So far as we can determine he is the youngest PM reader ever to build a violin, which he did with about \$45 worth of wood including Italian maple, plus a coping saw, chisel, plane, calipers, razor blade and glue. An article in the *San Francisco Call-Bulletin* reporting his feat said Keith would "like to be a concert pianist" rather than a violinist, attends an electronic course on Saturdays, and operates his own "ham" radio station over which he has talked to New York, Hawaii and Point Barrow, Alaska. Its call letters are WA-6-ALT, and "the ALT stands for 'A Lovely Transmitter,'" says Keith.

(Continued to page 10)

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3 IN THE HOSPITAL, I HAD PLENTY OF TIME TO THINK



4 I'D PASSED OVER DOZENS OF I.C.S. ADS IN POPULAR MECHANICS. BUT I SAW THIS ONE IN A NEW LIGHT



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I'M READY NOW, MR. WALSH

THEY GAVE ME SOME SIMPLE ASSIGNMENTS... AND I SURE SURPRISED THEM!

SAY, WHERE DID YOU LEARN ABOUT PUMPS?

SAME PLACE YOU DID, JOE... I.C.S.

THEN A FEW DAYS LATER, MR. WALSH CALLED ME IN...

JIM, I'M KEEPING YOU HERE AND PUTTING YOU ON SALARY. YOU'LL BE GETTING ABOUT \$20 MORE A WEEK. AND AT THE RATE YOU'RE GOING, I EXPECT I'LL HAVE TO RAISE THAT IN SIX MONTHS

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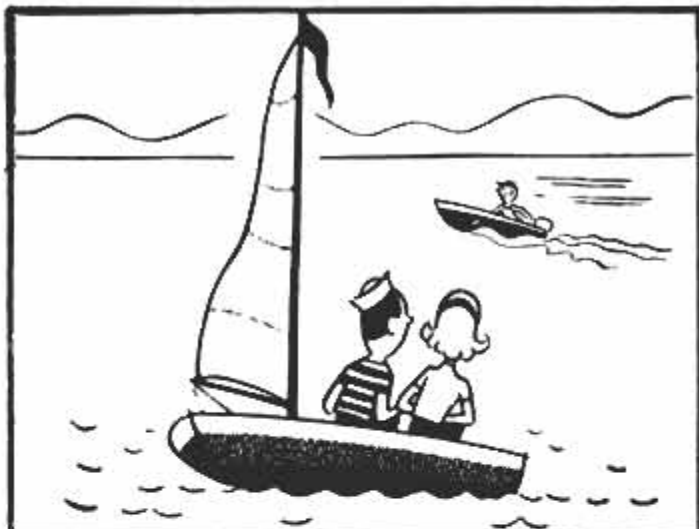
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Sorry, Wrong Number

After reading "Bailing Out for Fun," the lead article in our May issue, Ken Sisler, president of the Sport Parachute Club at Lincoln, Neb., wrote us that it was "one of the finest articles I have seen . . . will do a lot to help the fine sport"—but:

"One error which you must clear up right away is this: You mention pulling a ripcord between the 27th and 32nd second of free fall from 4300 feet. If you will check with anyone familiar with the free fall distance of a stabilized jumper you will find that your magazine thinks a man can pull a ripcord 700 feet underground. Please take immediate action to clear up this terrible misprint."

Mr. Sisler is right, our author erred. He says that "if we let our sky diver start his free fall at 7300 feet, we'll get him down safely with air to spare."

☆☆☆

To the Editor:

I have wanted to take time to write this letter for several years which may sound a little goofy, but I do believe in flowers to the living.

I have read *Popular Mechanics* since at least 1915 and, in those days, lived at Warren, Illinois, which is not too far from the crossroads town of Argyle, Wisconsin. Almost every month, you have a "Short-Cut on How to Do It the Easy Method" on some subject sent in by G. E. Hendrickson of Argyle, Wisconsin. The interesting thing is that almost everything he sends in is simple and common sense. He must be quite a handy individual and for his years of contribution to your magazine and type of suggestions he is giving you, I think you should recognize him with a plaque or loving cup of some kind.

Kenneth C. Zeigle,
President,
Electric Vendors, Inc.,
Minneapolis, Minn.

Mr. Hendrickson has been a contributor to our Craft pages for 30 years or longer.
—EDITOR.

☆☆☆

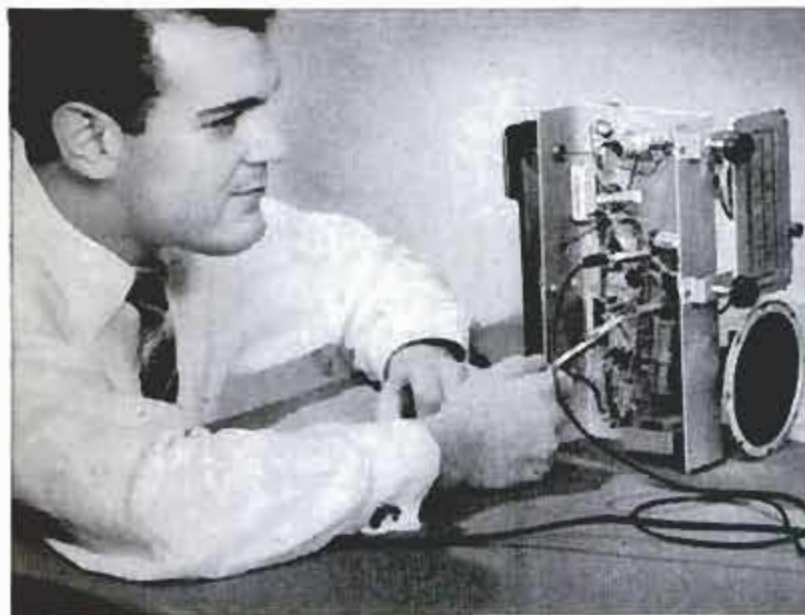
To the Editor:

My boy attends an expensive school here in England, yet I do not consider his education complete without reading your magazine every month, so highly do I rate your publication.

Dr. Sydney Alder,
Brighton, Sussex, England

(Continued to page 12)

in Radio-Television



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in Spare Time
with N. R. I.
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LARGEST
Home Study Radio-Television School

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PM's Roving Reporter Reports

The normal habitat of Thomas E. Stimson, Jr., as Western Editor of Popular Mechanics, is the Los Angeles area. Just recently we packed him off to Brazil on a story hunt and the first article appears on page 76 of this issue, his report on the new capital city of Brasilia. Here is Tom's private report to the editor on how he covered the big cities and the jungles of Los Estados Unidos do Brasil:



Counting the round trip from Los Angeles I flew some 19,000 miles covering assignments in Brazil and used eight different kinds of aircraft ranging from DC-7s to a little single-engine Cessna, in which a Brazilian pilot flew me from Belem to a dirt strip in the jungle to look at the construction of the road that is being built to connect the Amazon basin with the rest of the country.

All the flights were without incident except the overnight ride from Rio to Belem in an old Constellation operated by Panair do Brasil. On this trip I had a hard time getting my cigarette lighter to work and I finally asked the stewardess what our cabin altitude was. She checked with the pilot

and told me that the cabin pressure corresponded to 8000 feet altitude. Apparently the pressurization system wasn't working at all. From this altitude the pilot went downhill so fast on approaching Belem that my ears squeaked all through the next day.

Before I left Los Angeles I put a bug bomb in my luggage, a pressure bottle filled with mosquito repellent. Then I thought I'd check with Pan American by phone to learn whether the bomb was apt to leak and ruin my clothing during the flight. But I gave up the idea after I visualized the conversation. "I have a bug bomb in my suitcase and I want to check . . ." "You have WHAT in your suitcase, a BOMB?" It didn't seem worthwhile to start this. As it turned out, the bomb didn't leak.

It takes a while to get used to automobile traffic in the cities. There are few white lane lines to serve as guides, and traffic bunches up and swoops around corners fender to fender with little space between the cars. There's a long one-way tunnel, six cars wide, on the way from downtown Rio to the Copacabana beach section. It's one-way for automobiles, that is, but two-way for the street cars that also use the tunnel. This is disconcerting, when you first see a street car coming at you head

(Continued to page 16)

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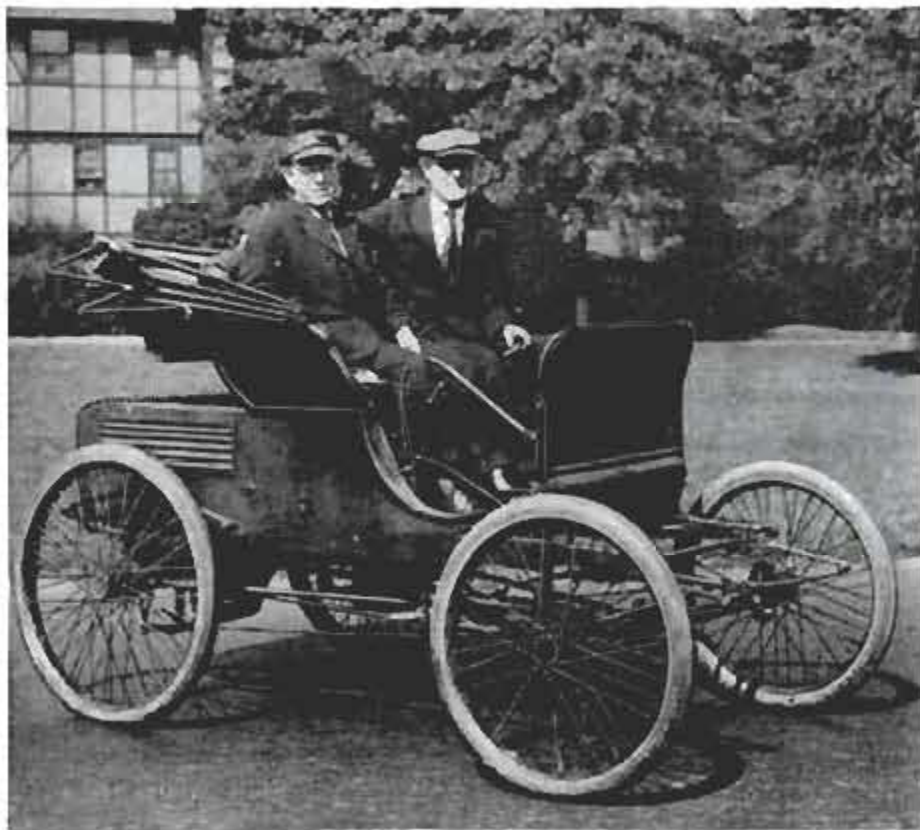
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on against the traffic. As is the case in most other parts of Latin America, automobiles may use only their parking lights for night driving in the cities. Headlamps are used only in the open country. I haven't gotten used to this yet. There was a pile-up of traffic one night on the high-speed super-highway between Sao Paulo and Santos, and cars were creeping one by one around a curve ahead of us. We supposed there was a major accident ahead but that wasn't it at all. Someone was changing a tire right on the pavement, and a highway patrolman with a flashlight was directing the traffic around this obstacle.

Brazilians are good drivers and the best one I rode with was the big chap who drove me over 50 miles or so of the unfinished jungle highway in a one-ton truck. Unpaved at the time, the road was rough, wet and slippery in spots and almost too narrow on some of the uncompleted fills. The driver pushed his truck at fairly high speed all the way with a sure touch, never faltering and never getting into trouble. As passengers on the truck were a group of cabocles, local farmers who subsist on the mandioca, corn and other products they grow in small jungle clearings. These people were going on a hunting trip and were using the truck to take them to an unexplored part of the jungle that had just been opened up by the new road. The pic of me



examining one of the muzzle-loading shot guns carried by the hunters was made while we were stopped by a tree that had fallen across the new road and was being

(Continued to page 29)

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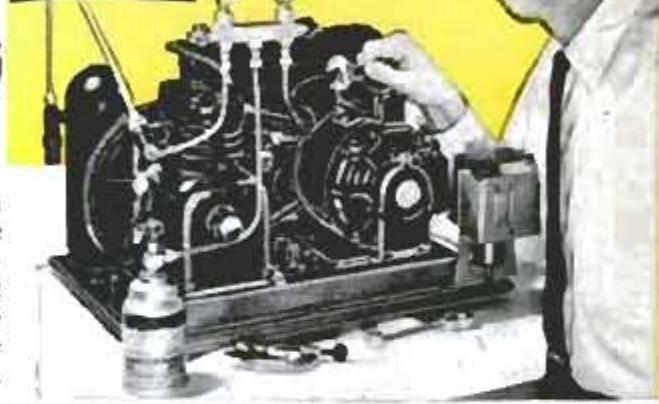
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He once said that all the views in his famous book, *The Origin of Species by Natural Selection* (1859), derived from facts collected during a hitch as naturalist on the HMS *Beagle* from 1831 to 1836. He attributed his success to a "love of science . . . and industry in observing."

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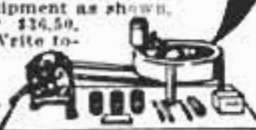
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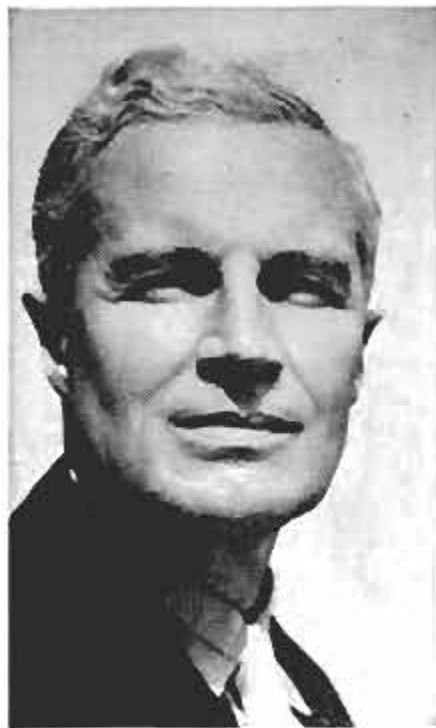
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summer home, my Cadillacs, my Winter-long vacations and my sense of independence—behind all the wealth of cash and deep inner satisfaction that I enjoy—there is one simple secret. It is this secret that I would like to impart to you. If you are satisfied with a humdrum life of service to another master, turn this page now—read no more. If you are interested in a fuller life, free from bosses, free from worries, free from fears, read further. This message may be meant for you.

By Victor B. Mason

I am printing my message in a magazine. It may come to the attention of thousands of eyes. But of all those thousands, only a few will have the vision to understand. Many may read; but of a thousand only you may have the intuition, the sensitivity, to understand that what I am writing may be intended for you—may be the tide that shapes your destiny, which, taken at the crest, carries you to levels of independence beyond the dreams of avarice.

Don't misunderstand me. There is no mysticism in this. I am not speaking of occult things; of innumerable laws of nature that will sweep you to success without effort on your part. That sort of talk is *rubbish!* And anyone who tries to tell you that you can *think* your way to riches without effort is a false friend. I am too much of a realist for that. And I hope you are.

I hope you are the kind of man—who you have read this far—who knows that anything worthwhile has to be *earned!* I hope you have learned that there is no reward without effort. If you have learned this, then you may be ready to take the next step in the development of your karma—you may be ready to learn and use the secret I have to impart.

I Have All The Money I Need

In my own life I have gone beyond the need of money. I have it. I have gone beyond the need of gain. I have two businesses that pay me an income well above any amount I have need for. And, in addition, I have the satisfaction—the deep satisfaction—of knowing that I have put more than three hundred other men in businesses of their own. Since I have no need for money, the greatest satisfaction I get from life, is sharing my secret of personal independence with others—seeing them achieve the same heights of happiness that have come into my own life.

Please don't misunderstand this statement. I am not a philanthropist. I believe that charity is something that no proud man will accept. I have never seen a man who was worth his salt who would accept

something for nothing. I have never met a highly successful man whom the world respected who did not sacrifice something to gain his position. And, unless you are willing to make at least half the effort, I'm not interested in giving you a "leg up" to the achievement of your goal. Frankly, I'm going to charge you something for the secret I give you. Not a lot—but enough to make me believe that you are a little above the fellows who merely "wish" for success and are not willing to sacrifice something to get it.

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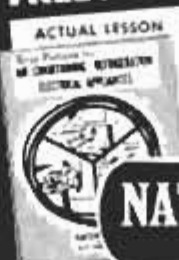
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Tom Stimson.

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Sorry — Our Error

In our June 1959 issue, page 199, the address of the Ferance Construction Co., manufacturers of the beam compass described on that page, was erroneously given as 28 Woodside Drive, Penfield, New Jersey. The correct address is Ferance Construction Co., 28 Woodside Drive, Penfield, New York.

☆☆☆

To the Editor:

I enclose a photograph of *Swish* [PM, March, 1958] which my friend and I constructed here in Australia. We thought that you may be interested in it to show how far your magazine stretches.



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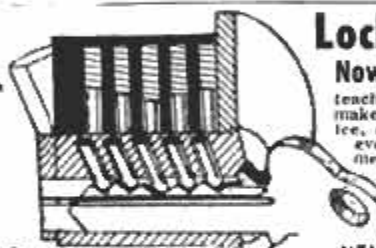
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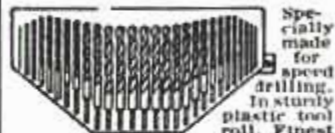
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dingy gray to matching blue in one afternoon



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

Cleveland man stops roof leaks with Masticote Colored Aluminum Coating

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

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

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

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

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

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

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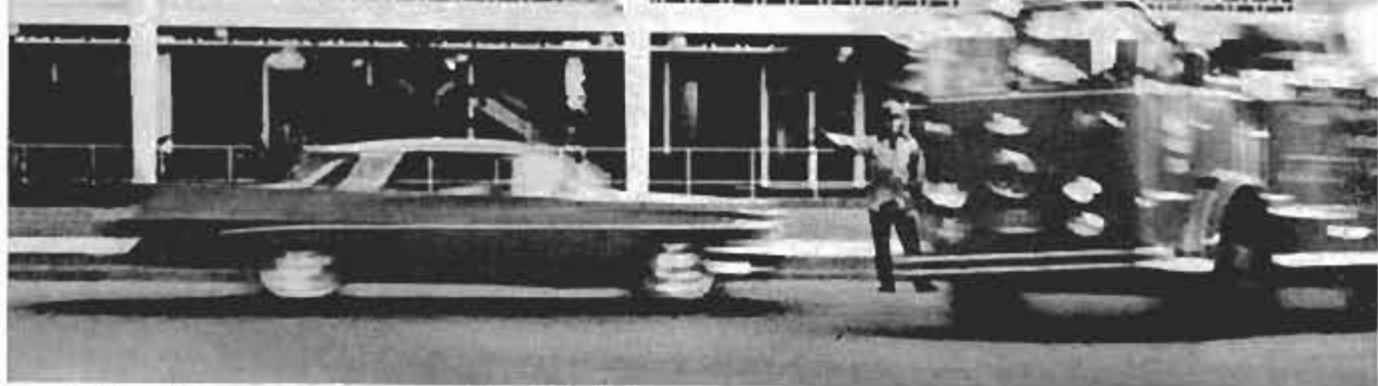
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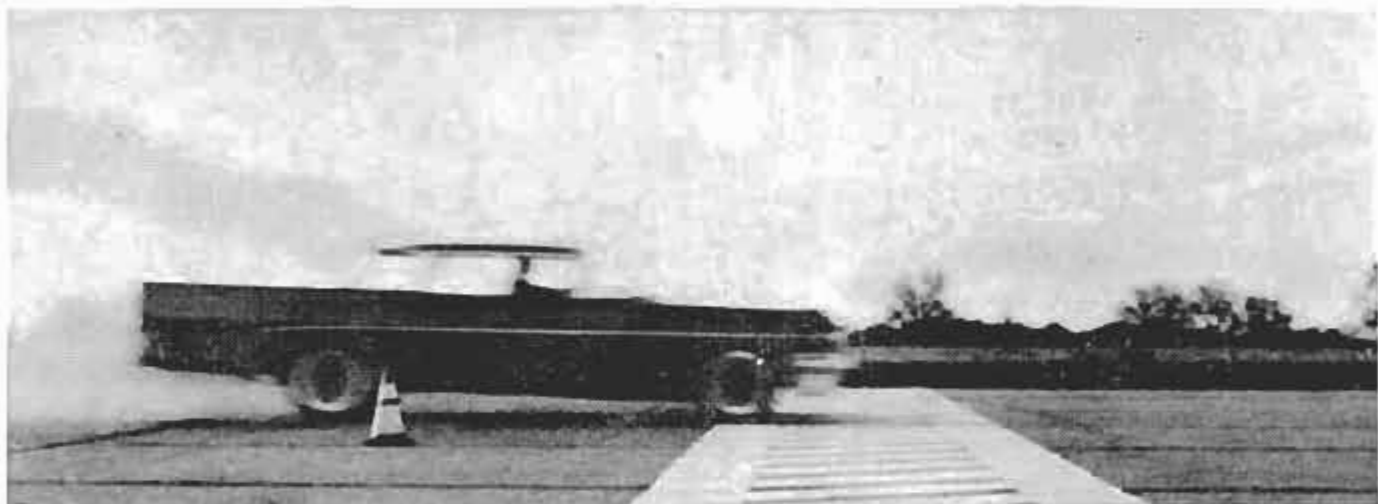
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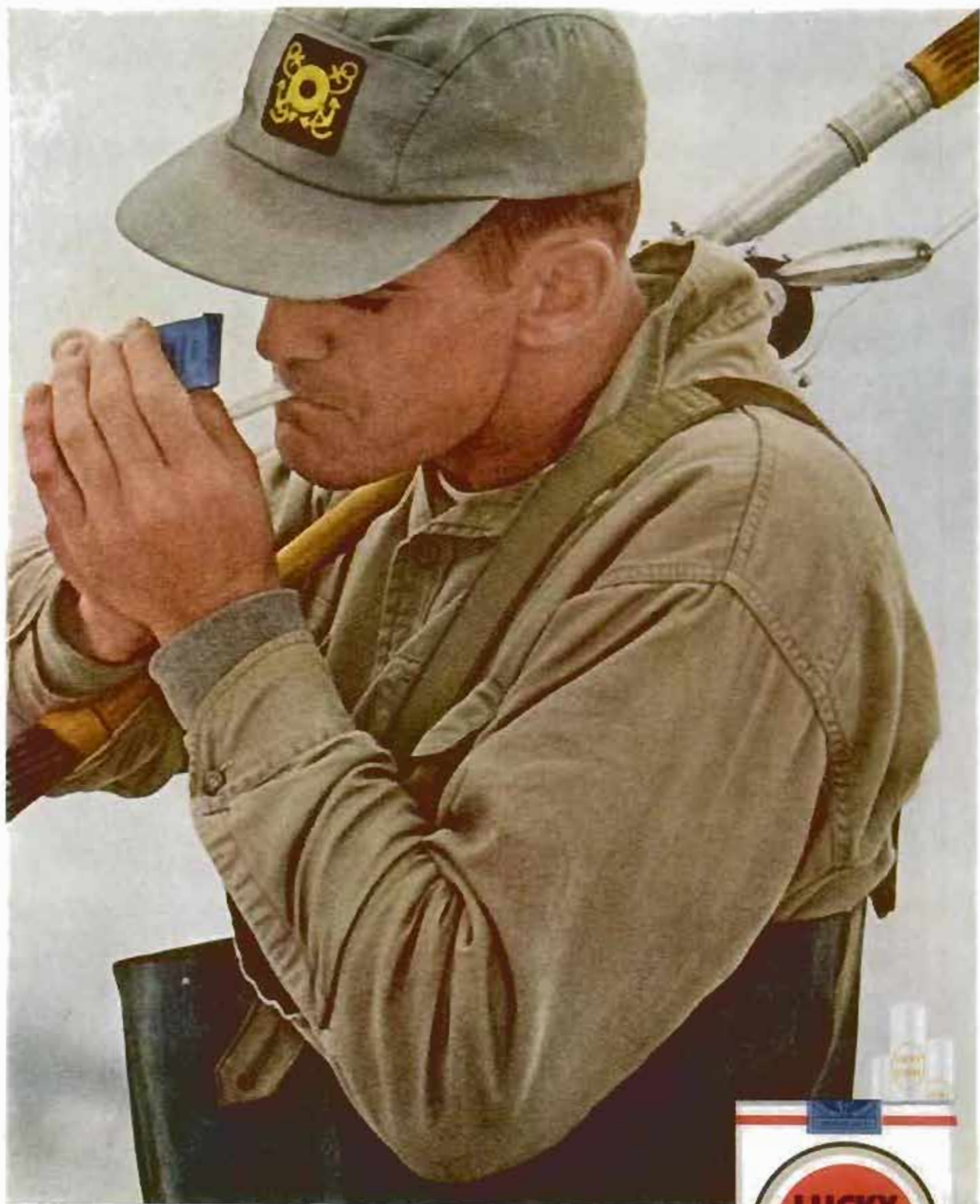
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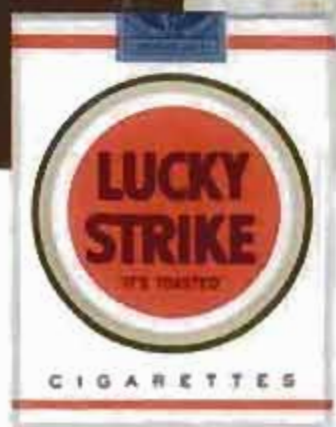
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Take Your Choice for Fun Afloat— **SNORKEL, SKI, SWIM OR SCUBA**

By Richard F. Dempewolff

ALONG A STRIP of sea off Nassau's beaches the water is alive with people—over it, on it, in it and under it. Behind the transoms of sleek outboards, water skiers and “saucer” riders cut foam trails. Prone “fish watchers,” using their hands as paddles, coast around on inflatable rafts, peering down through glass ports at formations below. Farther out over the coral heads, scores of glass-faced, flipper-footed skin divers, toting compressed-air tanks, cameras, spears and guns, go drifting among the striped angelfish and coral fans.

Most of this activity involves students in the bustling “aqua” school of a bronze, squarely built expert in water fun named Bruce Parker. Parker introduced water skiing to Long Island Sound with a pair of barn

Bruce Parker and Evie Wolfert, who made headlines by skiing from Miami to Nassau. Parker's aqua school has turned out over 50,000 skiers





Inflatable rafts with glass windows in the bottom let you paddle around and look at the ocean floor

boards in 1935 after watching a newsreel of the Prince of Wales skimming the wavelets at the Riviera. "For the first few years," he says, "I made all my own skis." By 1939 he was putting on exhibitions. A year later, he became National Champion and opened his first school in Miami. Today he is one of dozens of professionals coaching a growing army of Americans in a wide variety of nautical sports.

This summer, more than five million Americans will strap "scubas" (Self-Contained Underwater Breathing Apparatus) to their backs and fins to their feet. They'll

Watertight boxes for standard cameras let almost anybody take underwater photos of submarine scenes



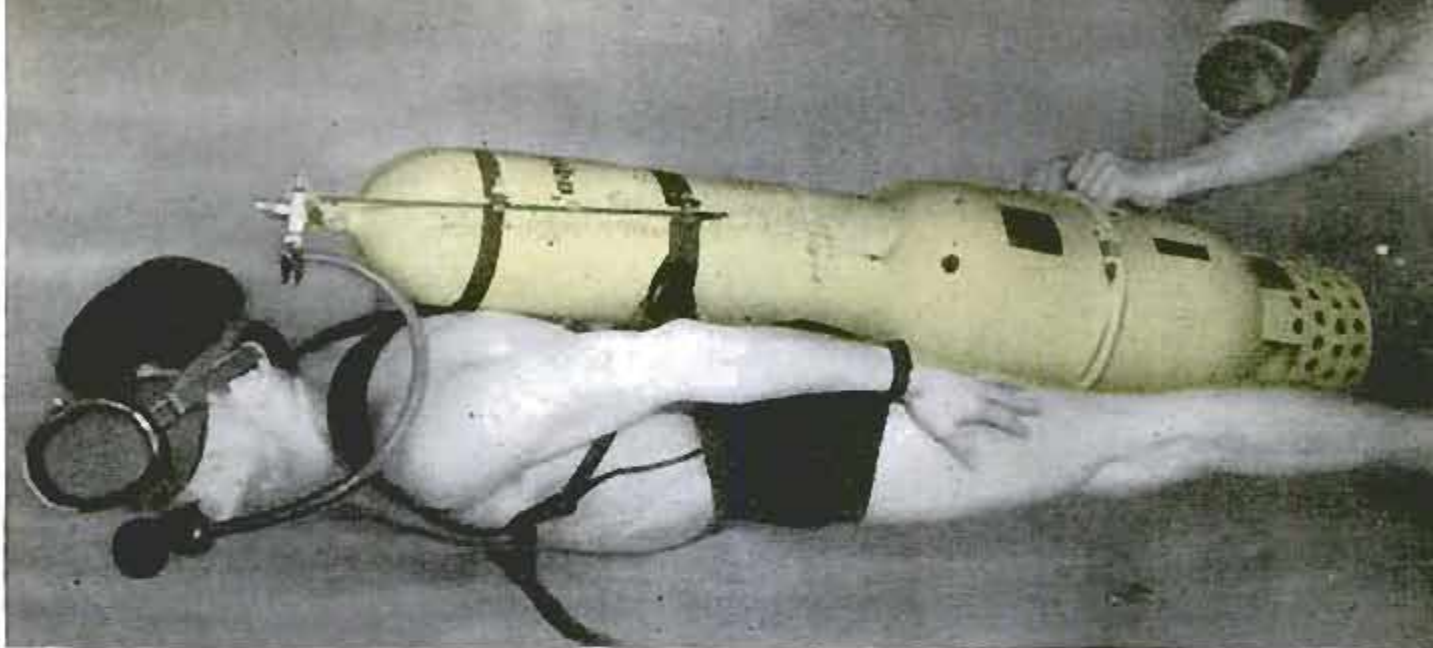
invade Neptune's domain from the Great Lakes to the warm Caribbean and Gulf. An equal number will skim the boiling wake behind whining outboards. These are two of the country's fastest growing sports.

Parker, who twice made headlines by skiing 175 miles from Nassau to Miami, estimates that his school alone has turned out 50,000 skiers and more than 5000 skin divers. "The beauty of these sports," he says, "is that anyone can learn them. I've taught children of kindergarten age and folks over 70. One 250-pounder learned to ski." A single 20-minute ski lesson, according to Parker, is enough to learn the fundamentals.

What do you need to join the fun? A boat, towline and skis. Powerful inboard speedboats used to be necessary to get water skiers up and keep them there. Today, a 25-horsepower outboard is plenty. "And buy good skis—they'll cost at least \$40," Parker advises.

Size of skis is important—both for the skier and the pulling power of the boat. One man complained to Parker that an outboard he'd said could pull four 120-pound girls on 5½-foot skis wouldn't even float a pair of men on the same skis. Parker investigated and found that the men, weighing 400 pounds total, were riding a surface of 1648 square inches, while the girls, totaling 480 pounds, rode 3296 square inches of ski area—much easier to lift and pull. If your boat has 25 horsepower or more and an average beam, the experts recommend these ski sizes: five feet six inches for skiers weighing up to 120 pounds; five feet nine inches for 120 to 160-pound skiers; six feet three inches for hefties up to 225 pounds.

Parker starts his beginners on the beach. "Put the skis on, and sit on them with



Electric power pack clamps on the end of a scuba diver's air bottle, will drive him for more than 60 miles

knees against the chest," he instructs them. Bracing a foot across the ski tips, he pulls up the beginner to a squatting position—repeating the process several times, emphasizing "knees bent, arms straight, body forward. It's the same motion as getting up from a low chair."

Later, on "wet runs," even shaky people soon find themselves skimming across the water. After a few "eggbeaters" they learn to lean into the turns, flexing knees like automobile shock absorbers to cross wake or heavy waves. In a short time nearly anyone can be jumping the wake, running with hands in the air and tow bar between the knees, and performing on a single ski.

Handling the boat properly plays a big part in successful water skiing—especially for beginners. "The boat should start at idling speed until the tow rope is taut," Parker advises. "When the skier is all set, he signals for full throttle. Once he's up, the skipper eases throttle and watches for the skier's signals—thumb up for more speed, down for less."

Wide turns are best for beginners, and the skier is advised to stay on the outside of the turn. "If he's inside," Parker cautions, "he'll sink due to lack of speed, then will be yanked off his feet when the boat straightens and the line becomes taut."

Parker stresses safety practices. Eye-bolts should be installed on the transom three inches from each side of the motor and three inches below the top for towing. He advises against using the lifting handles with which some outboard boats are equipped. "In a tight turn, the skier can flip the boat," he warns. Rules of the road are simple and sensible: "Give boats, obstacles and swimmers a wide berth; recover a fallen skier by circling him at idle

speed, which brings the tow line right past him; motor should be neutral or dead when recovering a skier from the water."

Once skiers attain a little proficiency, slalom courses and jump ramps are easily set up and the fun begins. In a water slalom, the boat rockets between two rows of buoys 50 yards apart. The skier weaves back and forth across the wake, swinging around alternately placed buoys on each side by shifting body weight sidewise, forward or back in proper coordination.

For pure thrills, soaring 50 to 90 feet from a jump ramp at 30 miles per hour is the ultimate in water-skiing fun.

In jumping, the boatman passes the floating ramp about 15 feet to one side. Parker teaches beginners to shoot diagonally across the jump as the boat turns away in the same direction. "Crouch low and freeze until you hit the water," he tells them. If the first-time jumper is lucky, he'll land skis first. More likely he's in for some spectacular but harmless splashes—skis going one way and jumper another. By the time he's completed 15 unspectacular jumps in a row, he's ready to run the ramp straight, in standing position, and start working for distance.

Of all water sports, skin diving has the fastest growing army of devotees. Some dive mostly to see the unworldly sights. These are the "fish watchers." Others explore wrecks, archeological ruins and uncharted waters. Sportsmen, armed with spear guns, hunt beneath the surface. Conservation-minded types find it more fun to trigger a camera shutter at passing fish. Plastic watertight boxes for many standard still cameras are readily available at low cost, but if you're fussy you can buy a 16-mm. underwater movie camera for about \$2000. One Bahamian



After passing her initial "beach training," ski student begins her first "wet run"

Right, Parker and friend ride a water saucer. Below, the coach demonstrates jumping form





Many skin divers hire out for special jobs; these are collecting bottom samples for an oil company

carries a sketch board and paints submarine scenes in oil.

Whatever his bent, a man usually becomes a confirmed addict on his first dive. Down into a silent world of green filtered sunlight the diver spirals. The gurgle of his air regulator sings a drumming tune. He swallows to relieve the pressure. At 30 feet he's in a blue-green garden spattered with muted color. Schools of rainbow-hued tropical fish scurry past. Big groupers eye him suspiciously from coral grottoes.

Although men toting breather tubes and air containers have been prowling the ocean bottom since Aristotle's time, it was Capt. J. Y. Cousteau's aqualung that sent everyone scurrying for the deep on the heels of the World War II frogmen.

Today the scuba—basically a controlled-

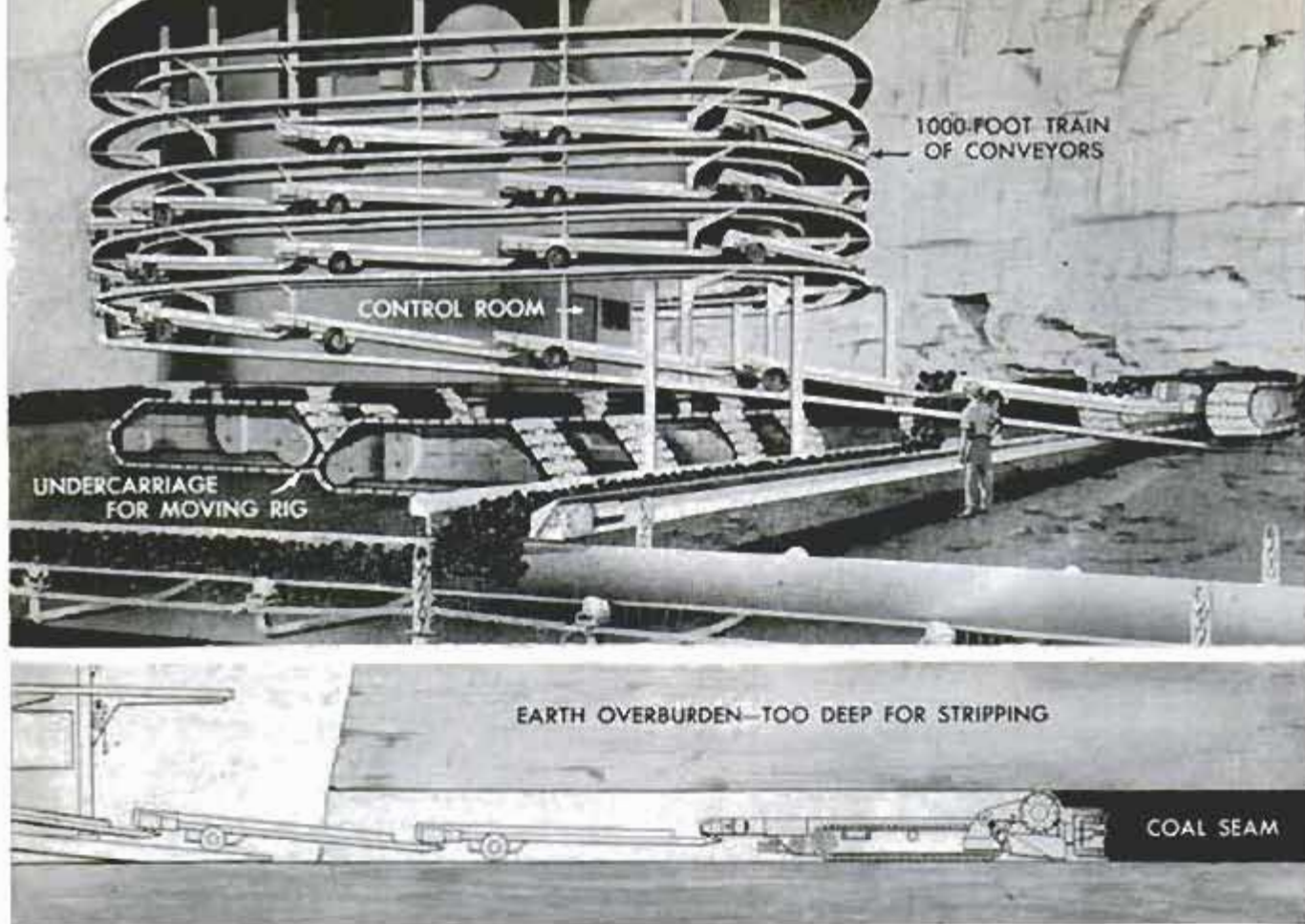
pressure breathing tube held in the mouth and attached to a tank of compressed air—comes in a wide variety of sizes and refinements. Most cost less than \$100. With one of these and a few basic instructions, a diver can glide independently for an hour or more in shallow waters. The deeper he goes (some divers exceed 200 feet), the faster he consumes his air supply. In cold northern waters the skier needs a \$35 to \$75 foam-rubber exposure suit.

More affluent divers go on to elaborate undersea sleds and propulsion units. One watertight battery-driven electric-propeller unit fastens to the end of the compressed-air tank and shoves the swimmer along like the pusher propeller on the back of an airplane. Other types, gripped by the diver, tow him through the depths.

(Continued to page 226)

One hazard of skin diving involves spearfishermen who get too far from home base when chasing game. One solution is this tiny raft, which can be tied to the diver by a light line. It follows behind him, always handy for a brief rest





Mining Machine Pulls Rack of Conveyors

Coal will be mined automatically by a huge machine operated by pushbutton from a control room. The machine is designed to recover coal that is too deep for stripping and cannot be mined economically with present equipment. It eliminates the costly steps of roof-supporting and un-

derground ventilation. The machine can be operated by one man. The artist's drawing above shows the robot miner pulling conveyors behind it as it digs 1000 to 1500 feet into a coal seam. Sensing devices on the machine report its actions to the operator through electrical signals.



Bag Eases Landing Shock By Stopping Flow of Air

Designed to overcome "bounce" characteristics, a landing-impact bag spreads the shock of hitting the ground by throttling the flow of air escaping from the bag. At the time of parachute deployment, a small electric blower inflates the bag to 0.5 pounds per square inch more than outside air pressure. Inward-pointing nozzles surround the bag. During the drop, diaphragms hold the pressure, but they burst when the bag hits the ground. Internal air pressure drives the nozzles out, and elastic rings on the ends of the nozzles throttle the flow of escaping air, thus easing the shock. The bag was developed by Radioplane, a division of Northrop Corporation. The bag is shown in shock-deceleration tests.



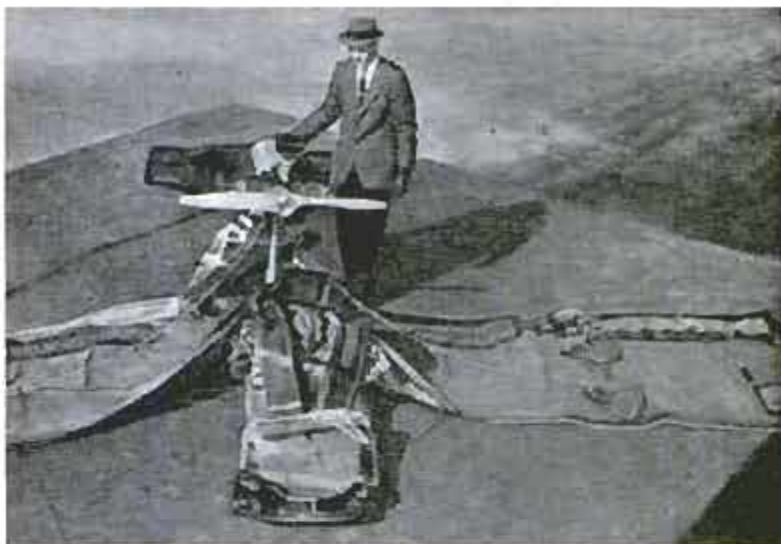
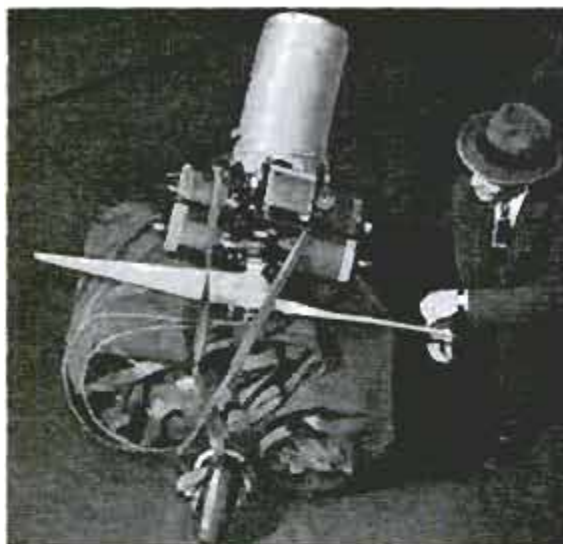
Inflatable Rubber Plane

IT TAKES just six minutes to un-pack and inflate a new rubber airplane and fly away in it. Powered by a 60-horsepower engine, the craft has a maximum speed of 70 miles per hour and can fly more than five hours without refueling. Goodyear Aircraft designed the plane for the Army and Navy.

Packed with engine, propeller and wheel, the aircraft is inflated by a pressure bottle

Pumped up, the inflatable plane is nearly 20 feet long and has a 28-foot wingspan. In package form it can be transported on land by a truck or Jeep trailer. On rescue missions it can be dropped from an aircraft to downed pilots

Craft's one-piece wing, tail assembly and cockpit are made of two walls of rubberized fabric connected by nylon threads



Shown below gaining speed for take-off, hydroski-mounted craft has proved that it can operate on water



RACE TO

By Dr. Dan Q. Posin

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



Sovfoto

THE RACE is on. Someday soon we will hear an announcement that a spaceship, bearing men, is on its way to the moon.

How soon? Will the men be Americans? Or will they be Russians?

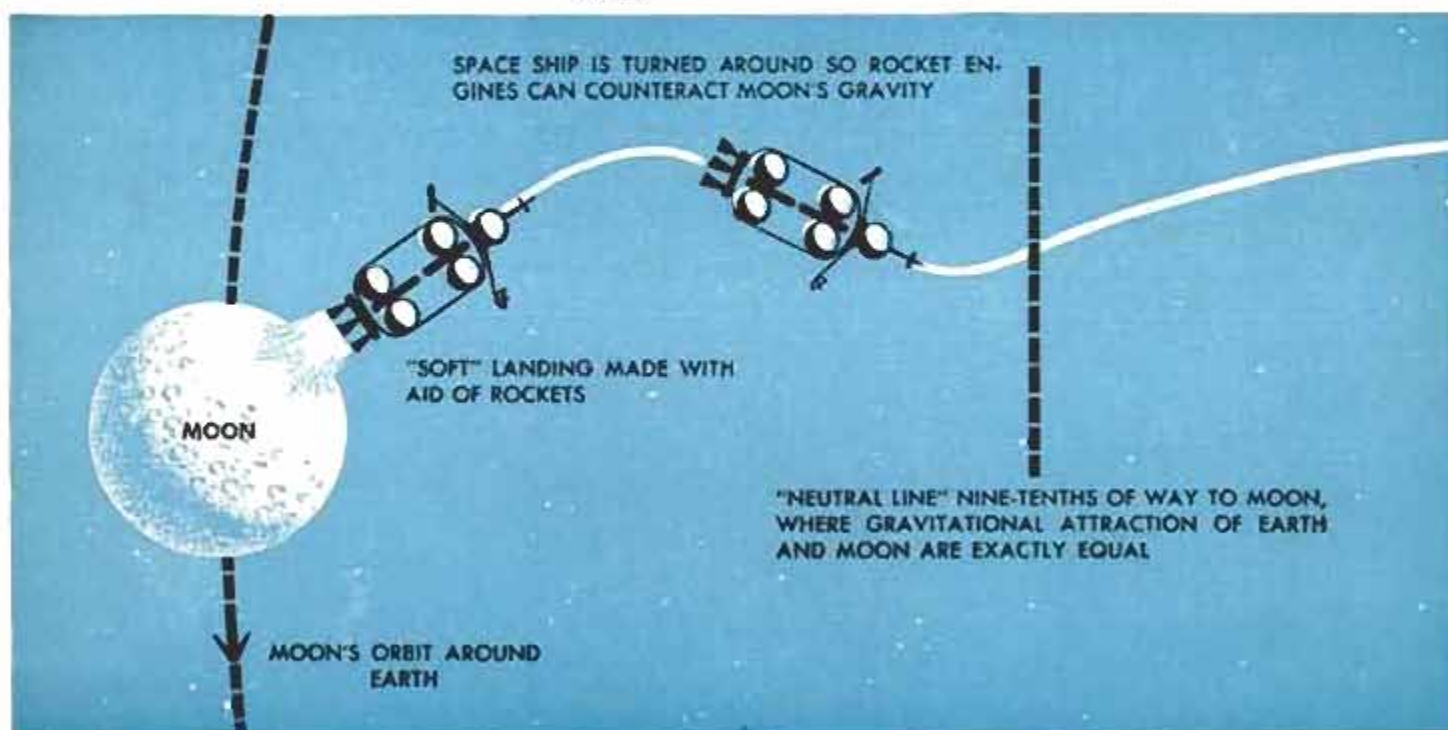
But why should men—Russian or American—go to the moon? Is there a purpose to this expensive and dangerous project?

Men will go to the moon simply because the Age of Space has come. There is no turning our backs on progress, on science, on the universe. The competition with the Russians, of course, whips us onward. But the moon itself has little to do with military needs. We're on our way—we hope—for prestige, because of the spirit of adventure, because the moon is "there" and we can get to it. Earthlings—Americans, Russians, and all other earthlings—have a rendezvous with the universe. The time has come. We are on our way.

Does it really matter who is first to the moon?

Some men, peering out into the majesty

RUSSIAN photo shows pressure suit developed to protect men who will be sent beyond the atmosphere. Below, author's conception of first trip to the moon



THE MOON

of space from this tiny planet, are tempted to look upon the universe as a further battleground for the tensions we suffer on earth. Others view the exploration of space as a challenging adventure, still others as an opportunity for tremendous strides in scientific research. Whatever their motives may be, let us listen to the protagonists in this race to the moon.

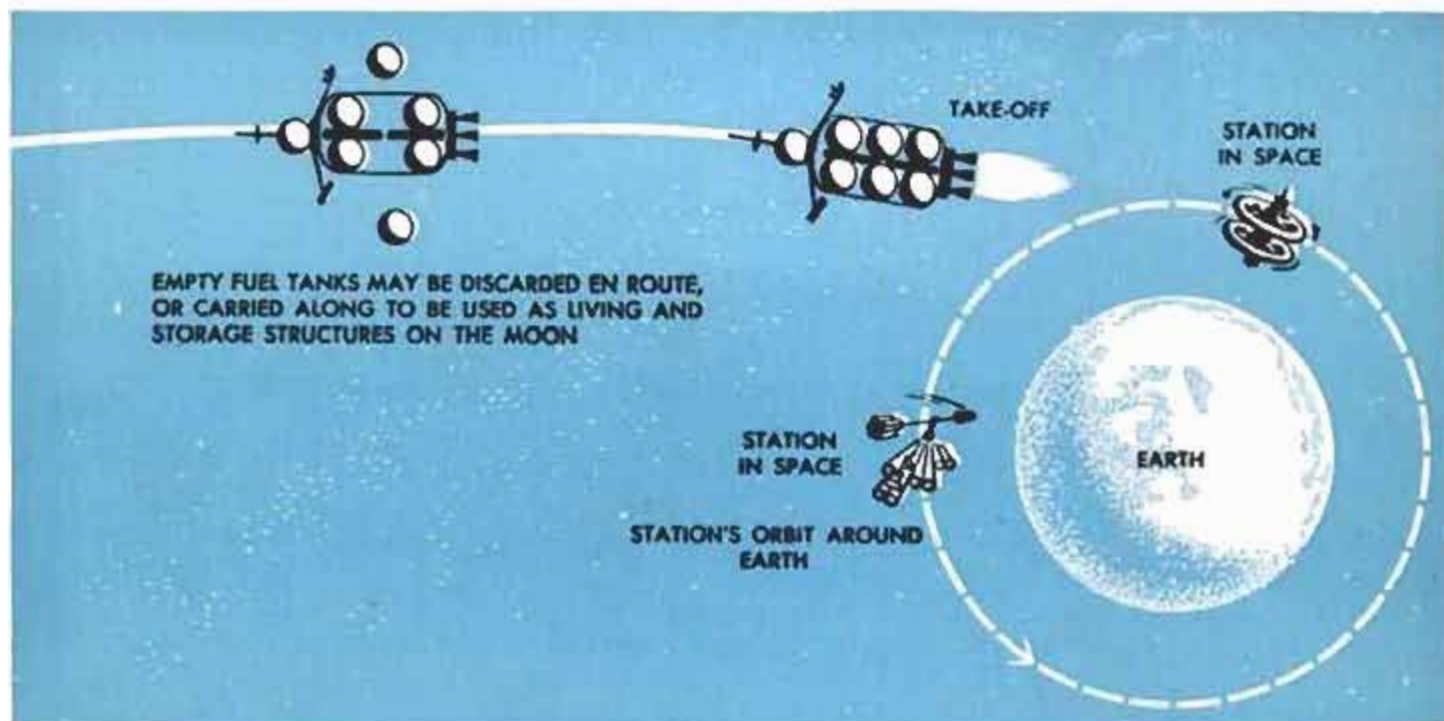
• Here is A. Dorodnitsin, member of the U.S.S.R. Academy of Sciences: "The creation of man's first artificial planet demonstrates that Soviet rocket engineering is well on the way to conquering the cosmos . . ."

• And here is A. Ilyushin, member of the U.S.S.R. Academy of Sciences: "The attainment of success by the rocket whose 3244-pound last stage is now in orbit around the sun, proves that Soviet science and technology have the necessary prerequisites for the next step ahead . . ."

• And Professor V. Dobronravov, Doctor of Science in Physics and Mathematics: "Some of the routes for a flight to the moon have already been worked out . . ."

Are these statements simply propaganda? Here is Wernher von Braun, the U. S. expert, testifying in January before a Senate committee: "It will

AMERICAN spaceman may wear this type of suit, which was recently tested in Litton Industries' high-vacuum lab where space conditions can be simulated





RUSSIAN father of space travel was the self-educated Tsiolkovsky



AMERICAN pioneer was Dr. Robert H. Goddard, who followed Tsiolkovsky by a quarter century. He predicted shot of multistage rocket to moon

take the United States five years to overtake Russia in the intercontinental ballistic missile field even if the United States would go all out . . . Russia's Mechta (fired past the moon into orbit around the sun) proves again that the Soviets have more powerful rockets than the U.S., and that the guidance was very accurate . . ."

In order to project developments into the near future—to judge the race to the moon—it is worthwhile to take a brief look at the past. Two great figures stand out in the history of rocketry, one Russian, the other American.

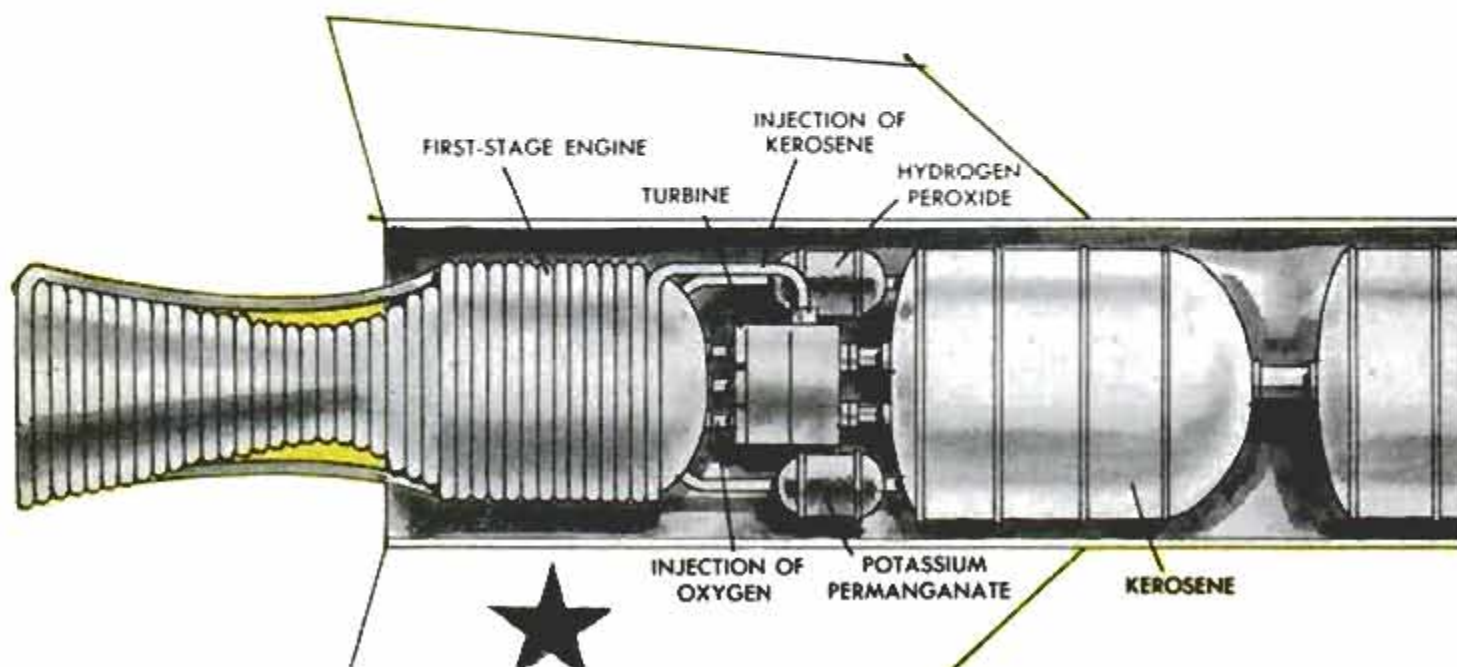
Tsiolkovsky—Russia's Pioneer

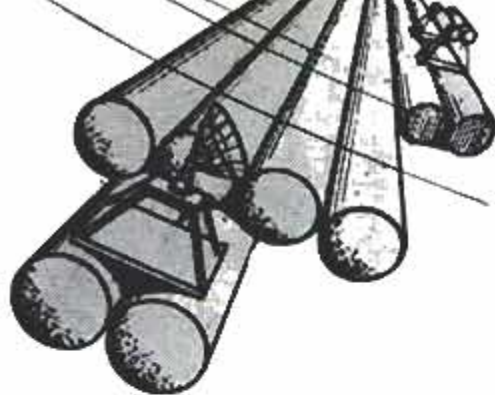
Russian spacemen revere Konstantin Eduardovich Tsiolkovsky. Born in 1857, he was a self-educated schoolteacher who, 80 years ago, started to think seriously and scientifically about man into space. He was shy and deaf, yet he set himself the cosmic task of using the laws of gravitation and planetary motion of the great Isaac Newton

as a springboard by which walking creatures of the planet Earth could soar into the heavens.

He succeeded. He demonstrated that the rocket was the only possible engine for space travel, and he obtained mathematically the speed which the exhaust gases would have to attain to shoot the rocket away from earth. He also concluded that the fuel should be liquid, and wrote this in 1898, when men had not even flown in airplanes. Thanks to Tsiolkovsky, Russia got in on the ground floor of rocketry and space travel. When the Battle of Stalingrad came, the Russians were ready with a blazing rocket barrage.

The United States had its bold man, too. He also was a teacher, a professor of physics. However, he had a strike against him: He was born a quarter of a century after Tsiolkovsky. Nevertheless, Robert Hutchings Goddard took mighty strides in both theoretical and experimental rocketry. Goddard predicted by theory that a multistage rocket weighing a mere 20,000 pounds





RUSSIAN conception of space station, above, has long arm which would whirl to produce sensation of gravity

AMERICAN conception, above right, consists of double wheel. Entire structure revolves to create "gravity"

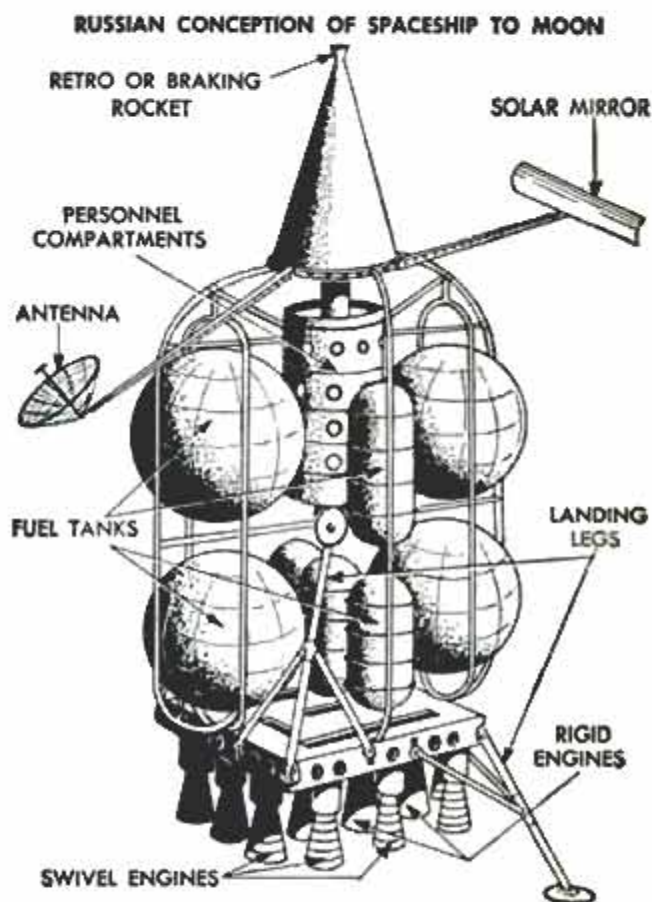


RUSSIAN moonship may be smaller than American→

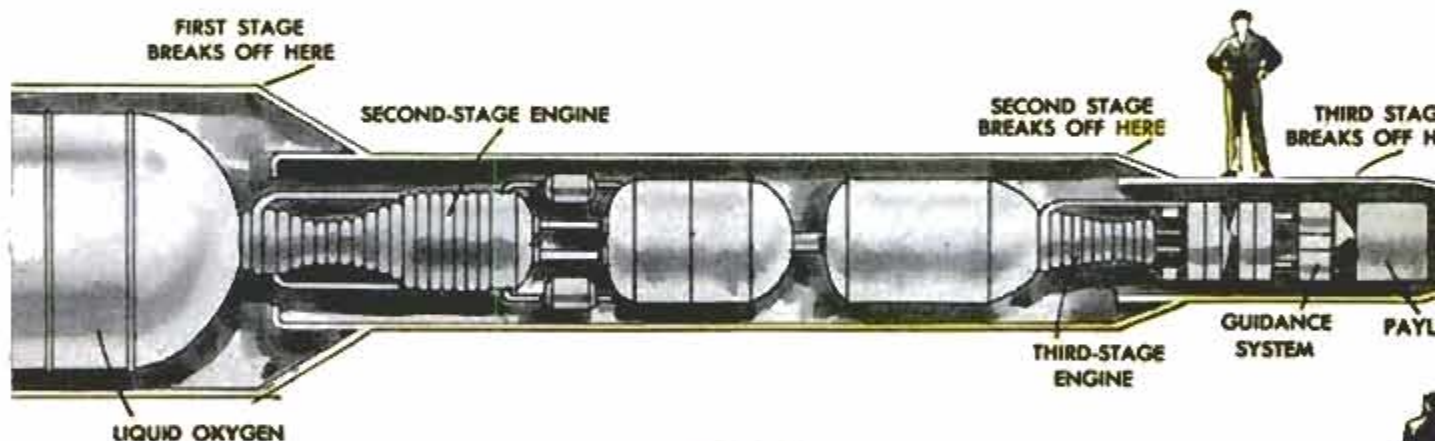
could land a small device on the moon. Newspapers ridiculed him for believing that a rocket could propel itself through a vacuum. Goddard, shy like Tsiolkovsky, drew within himself, but continued his work. In 1926 he made his first flight tests, but by 1929 he was badgered so much because of the noise of his rockets that he sought sanctuary in the deserts of New Mexico. There, under a blazing sun in 1935, Bob Goddard's rocket climbed 7500 feet into the sky. Across the United States, little groups of men began to gather with an out-of-this-world look in their eyes. They talked of a trip to the moon . . .

Age of Sputniks

Then, suddenly, came the Sputniks, the first in October, 1957. Russia: 184 pounds into orbit. Russia: 1110 pounds, with the first live traveler. Russia: 2925 pounds.



POSSIBLE BASIC HIGH-THRUST RUSSIAN ROCKET



100 FEET LONG
THRUST ABOUT 700,000 POUNDS



Proud Russians view duplicate of Sputnik III, the heaviest (2925 pounds) satellite hurled into space

The United States: three pounds. The United States: 31 pounds.

This country went into a frenzy of activity to catch up, but Russia refused to stand still. In January she shot off her Mechta weighing 3245 pounds (796 pounds payload, 2445 pounds final stage). It soared away from the earth, past the moon and out, out, out around the sun. Two months later we followed with a 13½-pound payload and the burned-out last stage.

Then up went Discoverer, a hefty 1300 pounds—though not all payload. And had we not shot an entire ICBM into orbit, a complete Atlas with its sustainer engine? What did it weigh? Eight thousand, eight hundred pounds! Eighty-five feet long!

“... But, Congratulations”

The Russians smiled. “We don’t count empty shells,” said Dr. Leonid Sedov, Chairman of the Commission on Astronautics of the U.S.S.R. Academy of Sciences. “We congratulate you, but we only count the payload—instruments and passengers. How much was your payload? Only 133 pounds. That is less than the payload of any of our three Sputniks. We didn’t count the shells. Shall we count, for example, the shell of Sputnik III’s third stage?”

It would be embarrassing to us to count that third stage. According to my calculations, it must have been about 100 feet long and weighed about 11,000 pounds!

Yet we are moving along. We no longer are flinging grapefruit into the heavens. The total thrust of the three-engine Atlas was 360,000 pounds. The Russians probably used a three-stage rocket to launch Mechta, and the first-stage thrust alone probably was about 700,000 pounds. Yet the gap seems to be closing. Prof. Herman Oberth, the Tsiolkovsky or Goddard of Germany, recently said: “The Russian space program is probably no more than three or four months ahead of the United States.”

But Krafft A. Ehricke, rocket expert for the Convair Division of General Dynamics Corporation, stated in January, “The present Russian lead is generally estimated to be about 18 to 20 months.”

Meanwhile, countless Americans want to be the first man to venture into space or make a trip to the moon. Some 25,000 Americans have volunteered. Letters have poured into every government agency even remotely connected with space projects. “We have stopped counting,” says Maj. William Coleman of the Air Force. Many of the men are married and have large families. In a number of instances, wives have volunteered their husbands.



RUSSIAN Mechta, above, 796 pounds, and U. S. Pioneer IV, 13.5 pounds, now orbit sun. American Vanguard, below, three pounds, is orbiting around the earth





AMERICAN Atlas, shown during booster separation, may be "workhorse" for carrying equipment into orbit

But the first seven men already have been selected amid much fanfare, and the man-carrying space capsule to lift the first man into orbit is now under construction. The target year is 1961.

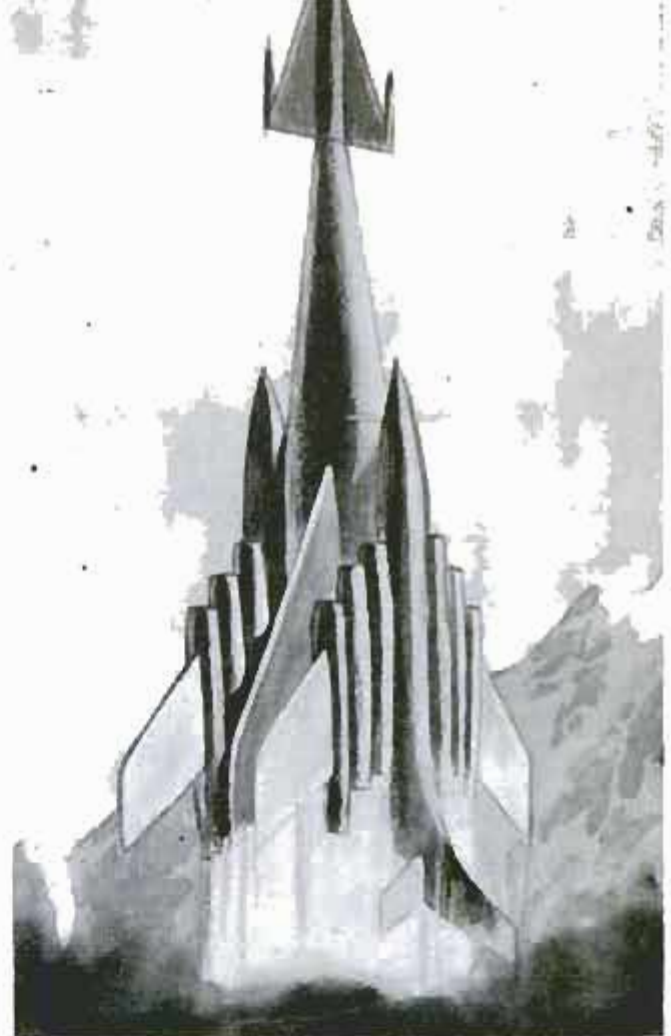
Lob Into Space

In addition, the United States is preparing a kind of lob into space—a large airplane releasing a piloted smaller one (the X-15) which will zoom 100 miles up, then descend by skimming in and out of the atmosphere. This project and many others are considered necessary probings before the journey to the moon can be undertaken by American astronauts.

Will the Russians make such probings? Or will they boldly declare: "To the moon! Now!"

They have talked about lobbing flights such as that of the X-15. Presumably, they too will orbit men—and probably women. But there is strong evidence that even now they are getting ready for the moon itself.

Both the Russians and the Americans are feverishly conducting research to discover how well man can withstand the rigors of the trip to the moon. Not only did the Russians shoot their famous Laika around the world, but on August 27, 1958, (and this is not too well known) they lobbed two



RUSSIAN conception of rocket ferry has boosters that glide back to earth, a return ship mounted on nose

other dogs to a height of 279 miles. The dogs and the instruments were recovered successfully. Many other shots with animals have been made. Only now are we beginning to have some success in lobbing animals. But Russian animals have been the real pioneers of space.

In view of this, I expect that we earthlings called Americans will hear within the next six months that Russia has hurled the first human passenger into space and returned him safely.

Recently Prof. G. V. Petrovich of the U.S.S.R. Academy of Sciences gave hints of still other projects. "The Soviet Union is pushing space research simultaneously in a number of directions: The creation of additional earth satellites, both manned and unmanned; intensive study of the moon; interplanetary flight, including the launching of additional satellites around the sun; manned stations in space tens of thousands of miles away from earth." These stations would be used as intermediate points on spaceship journeys from the earth to other planets.

Russia will also create artificial satellites around the moon, and will place "softly" upon the moon heavy containers with scientific instruments and television cameras.

(Continued to page 222)

Will This Hot Rodder Hit 400 Miles Per Hour?



Thompson sits far aft, his legs resting atop the rear axle, his eyes just an inch above the top body line

SINCE 1927, the World's Land Speed Record has been broken 15 times, all on American soil—first at Daytona, then, as speeds got too high for the beach sands, on the Bonneville Salt Flats of Utah.

But only once in those 52 years has an American held the record. That was in 1928 when Ray Keech hit 207.55 miles per hour in a three-engine, more muscle-than-science Triplex-White. His record stood for only one year. Presently, the record is held by the late John Cobb who, in 1947, averaged 394.20 miles per hour in the Railton Special.

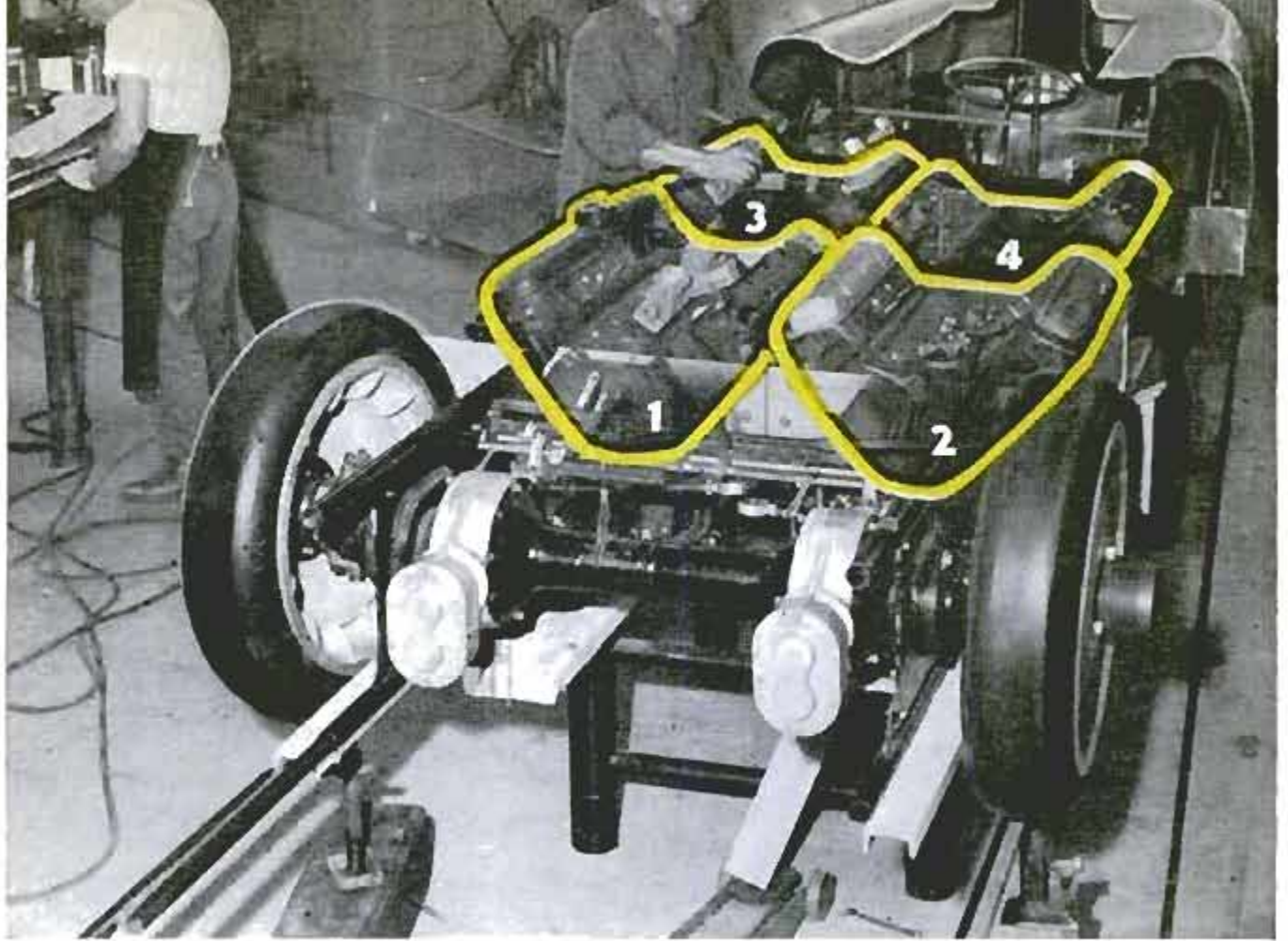


This month a California hot rodder, Mickey Thompson, hopes to bring the record back to America. Speed is no new experience for him. He drove his previous hot rod nearly 300 miles per hour at Bonneville last year.

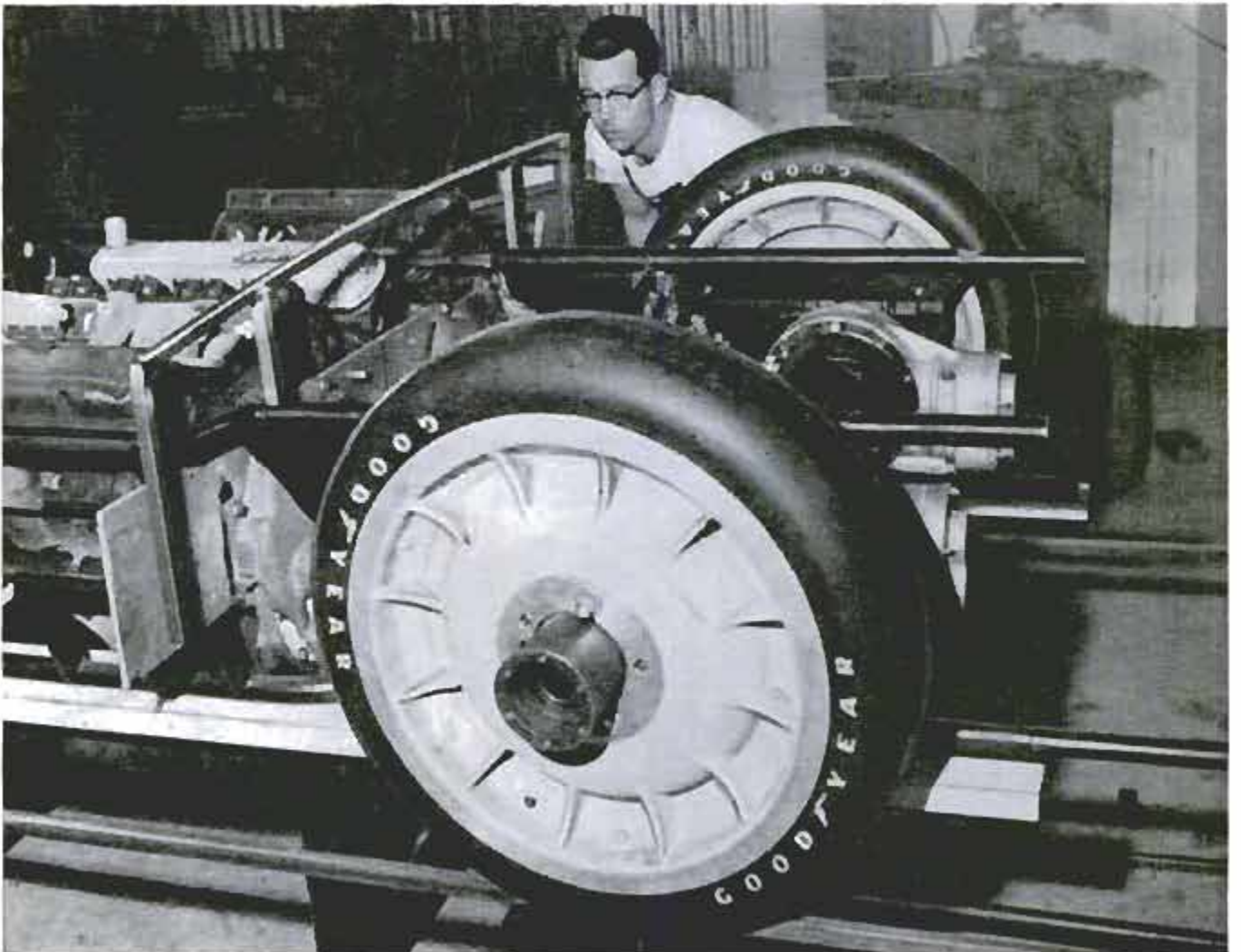
His new car, in which he intends to travel over 400, is powered on all four wheels by four highly modified Pontiac V8 engines, developing over 2000 horsepower. Thompson sits aft of the rear axle.

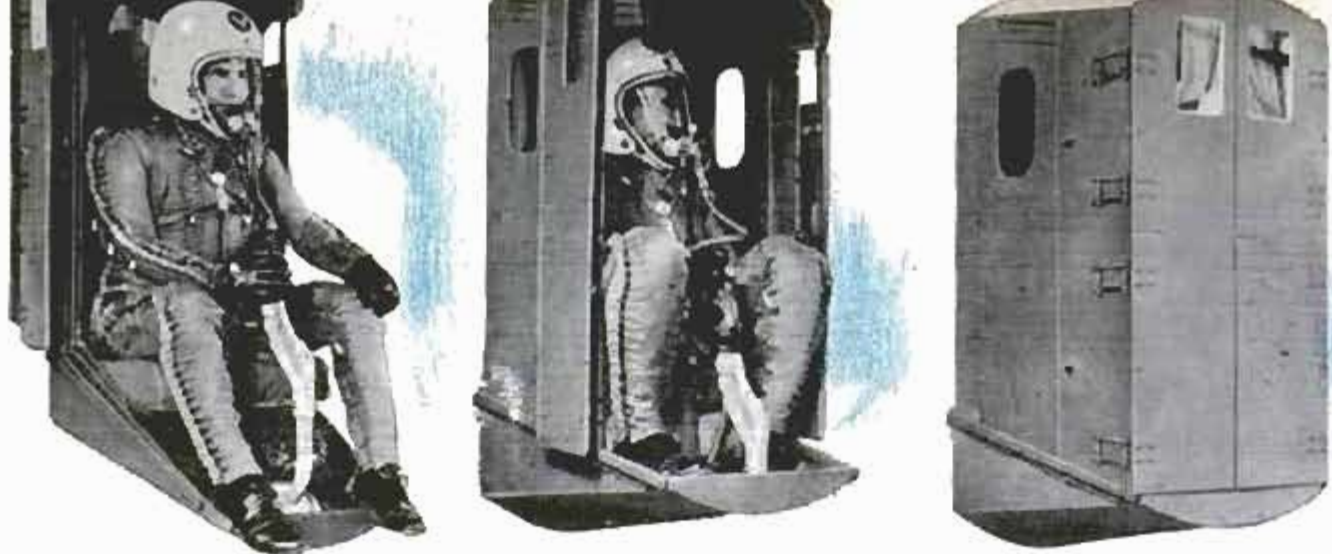
It's a small car by World's Speed Record standards, being eight feet shorter, three feet narrower than Cobb's and weighing under 5000 pounds (Cobb's weighed 6700). Compared to the leviathans that held the record before Cobb, it is a midget. The small, light package will accelerate faster, hit top speed sooner, an important point in the limits of the Bonneville Flats. ★ ★ ★

The aluminum body panels are arranged over the wooden mockup to give an indication of how the completed car will look



Four hopped-up Pontiac V8s (outlined) power the car. Below, Don Borth, bodybuilder, checks the structure. Goodyear designed the special 30-inch high-speed tires with just a thin layer of rubber over the fabric.





Rocket-Propelled Capsule Ejects Pilot in "Cocoon"

Jet pilots can be shot from high-speed planes in a new escape capsule that closes around the flier like a cocoon. The entire operation, as shown above from open, left, to closed, right, takes less than two seconds. As soon as the protective capsule closes, it is catapulted free of the plane by twin rocket blasts. A parachute brings it gently to earth. Designed primarily for Mach 2 and Mach 3 aircraft, the capsule functions as a seat during normal flight. To eject, the pilot pulls a handle. In split-second succession, restraining devices pull his feet and legs back into ejection position; his shoulder and body harness is locked; and his crash helmet is clasped to prevent twisting. His body also is locked to prevent damage to the spinal column. The bottom of the seat rises, the sliding doors and top close in, and the pilot is shot from the plane.



Infrared Viewer Gives Police Night Sight

Police have a new ally in their war against criminals—an infrared viewer that enables the user to make positive identifications of persons at night without being detected. Weighing only five pounds, the viewer can be carried by hand and aimed like a rifle. To convert invisible infrared light into visible light, the device has an electronic image-converter tube, telescopic lenses and a miniature high-voltage power supply. An infrared spotlight provides the source of light. This source can be powered by the patrol-car battery through a cigarette-lighter plug-in, or by a 12-volt rechargeable battery. The viewer can also be used in scientific research where visible light might affect the product being viewed.





Two-Control Scooter Has Automatic Drive

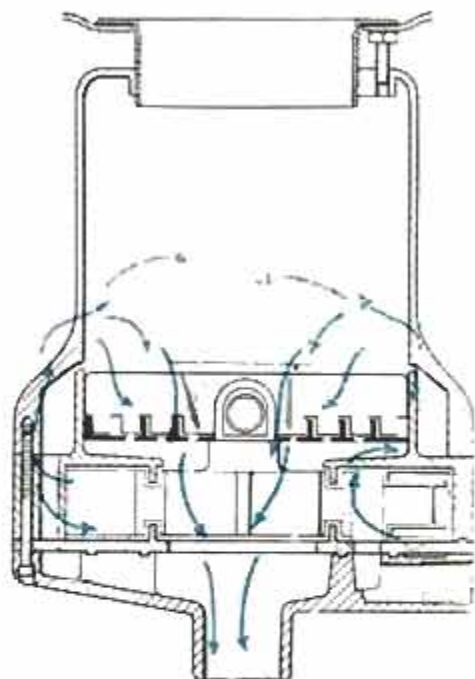
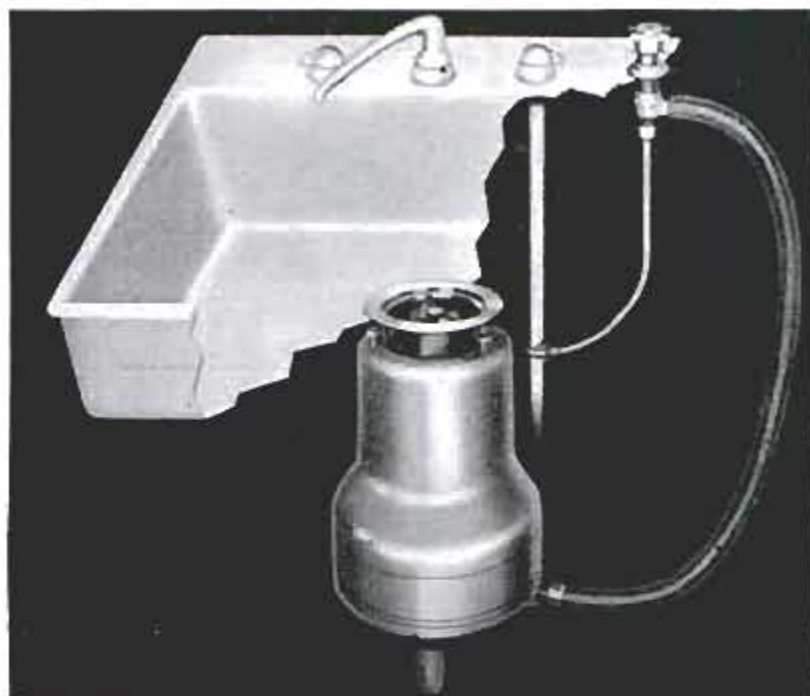
Harley-Davidson, famous for motorcycles has introduced its first motor scooter, which features an automatic transmission. The scooter has two controls, a hand-grip throttle and a brake. The forward-positioned engine places 42 percent of the scooter's weight on the front wheel for better balance and roadability. Among its features are the vibrationless mounting of the two-cycle engine between the wheels and a hydraulic shock absorber. Fuel economy ranges up to 100 miles per gallon.

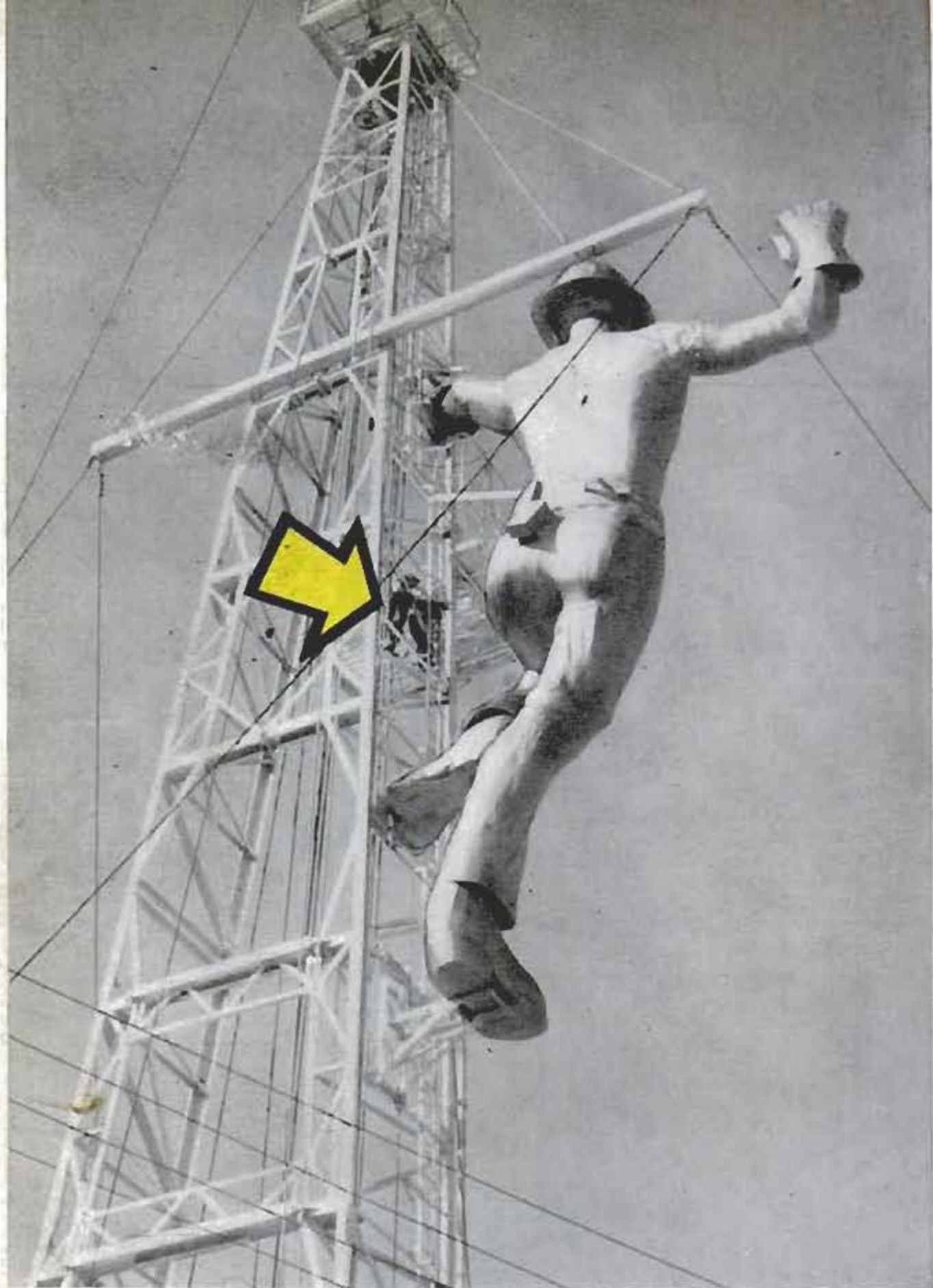


Water Power Operates Low-Cost Garbage Grinder

Water pressure provides all the power in a new garbage grinder. The disposer, which sells for less than half the cost of most electric models, has a powerful water motor which turns a pulverizer. The pulverizer grinds up most types of waste food except bones, and washes the shredded food down the drain. Virtually noiseless in operation, the grinder disposes of an aver-

age load of garbage in about three minutes. It is simple to install in any sink with a 3½-inch drain and with at least 10 inches clearance between the bottom of the sink and the wasteline connection. The valve which operates the disposer is installed in the spray-hose opening. The drawing below shows the path of the water, which operates the motor and flushes away garbage.

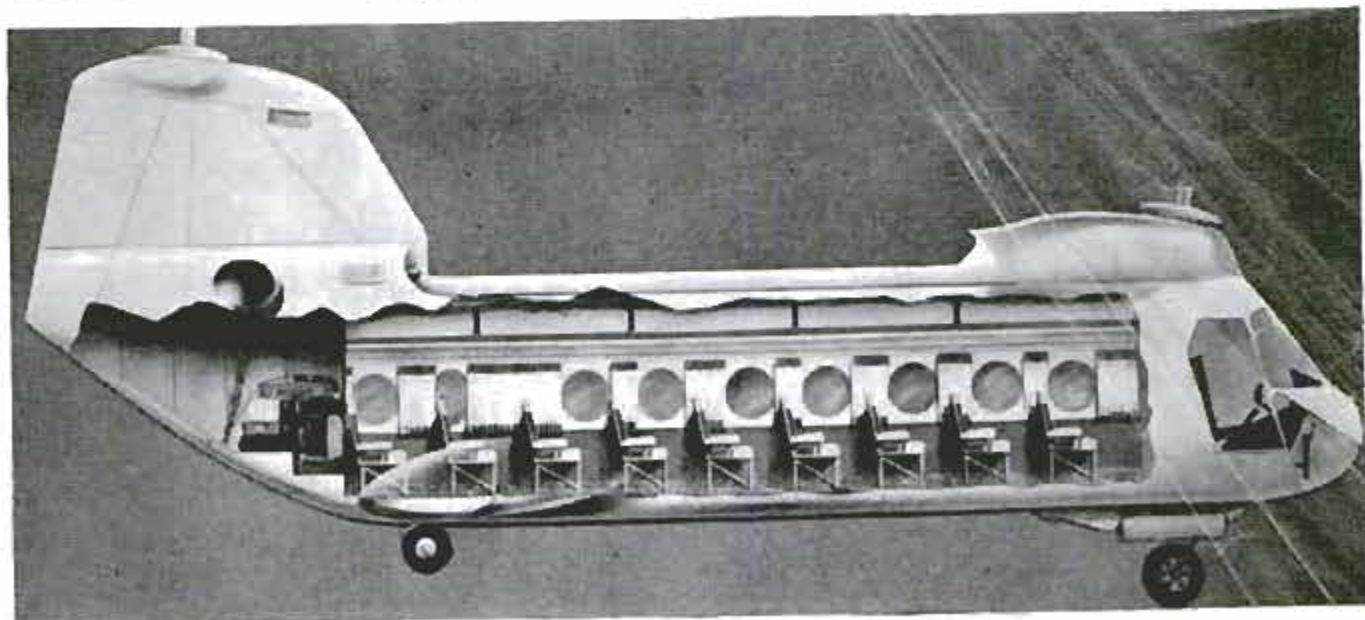




Giant Statue Greets Visitors

TEN TIMES LIFE SIZE, a 7500-pound papier-mache figure of "The Golden Derrickman" stands on a 136-foot derrick to greet visitors to a petroleum exposition in Tulsa, Oklahoma. Built up over a frame-

work of steel-and-wire mesh and painted a glowing gold, the figure represents an oil derrickman giving the thumb-and-forefinger "we're ready" signal. 1500 man-hours were required for construction.



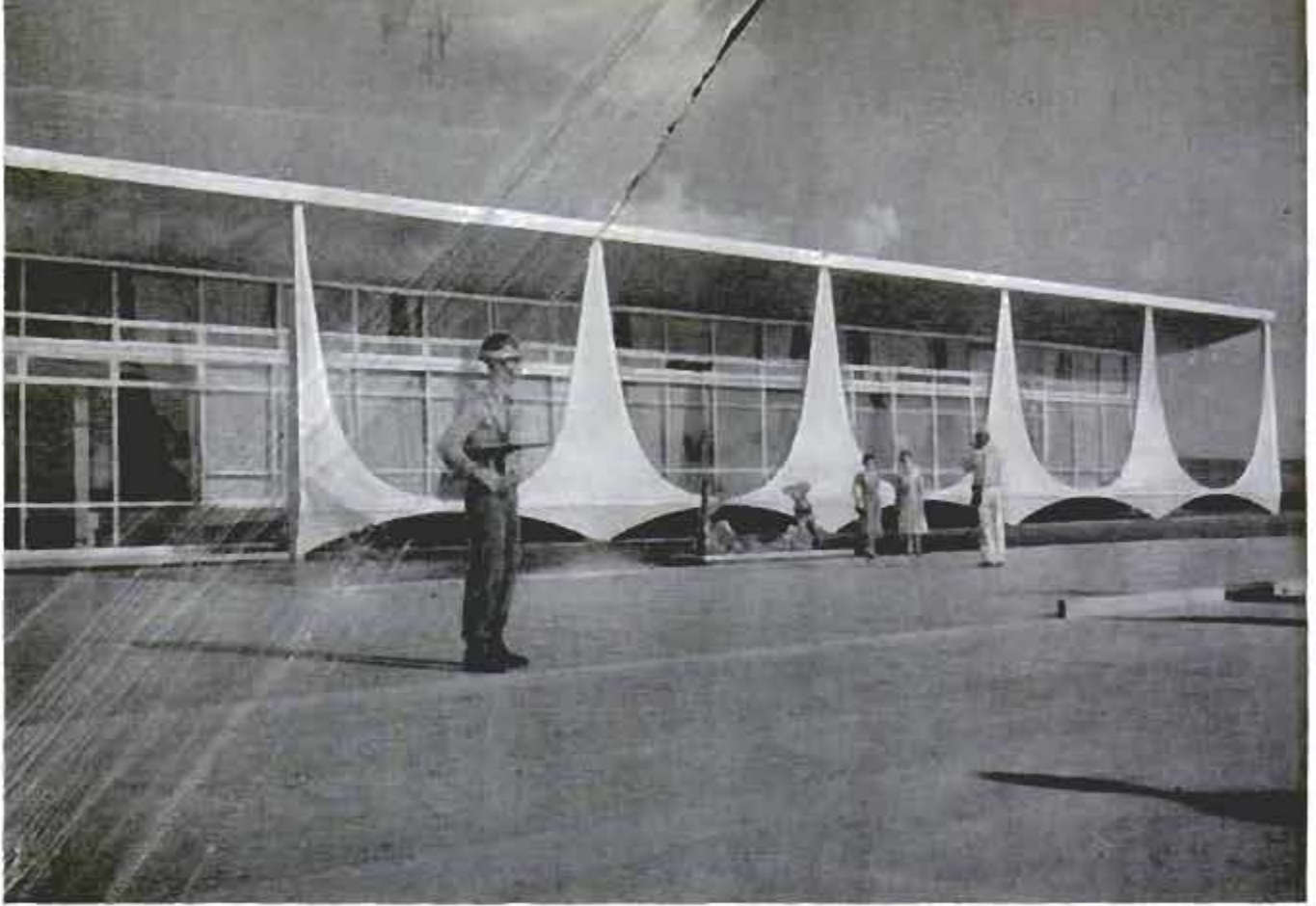
Big Twin-Turbine Copter Cuts Air Travel Time

Twenty-four passengers can be seated in a new commercial helicopter that promises to make intercity travel even faster than it is now. In a test flight, the Vertol 107 twin-turbine-powered amphibious craft traveled 82 miles from the center of New York City to the center of Philadelphia in 37 minutes. Current airline travel between the two cities, including ground time between airport and center, takes approximately 90 minutes.

Life Preserver Calls for Help

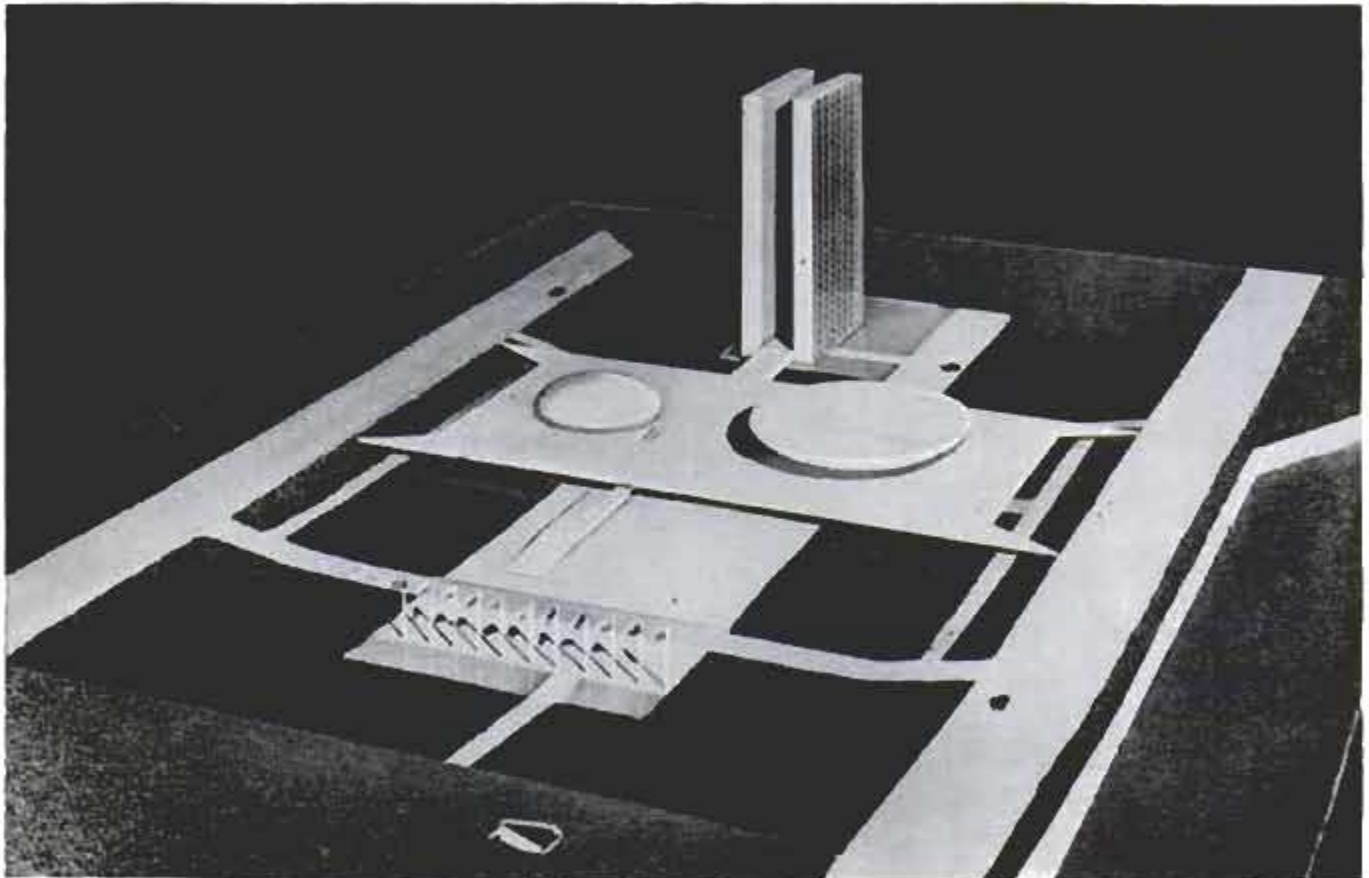
Shipwreck victims and downed aviators may be saved by a radio-beacon life preserver that sends out a preset code signal the moment it touches the water. Housed in a buoyant plastic cylinder, the one-watt transmitter has a range of 20 miles, enabling rescue ships within that radius to locate it with direction-finding equipment. The battery's life is three days.





Soldier stands guard in front of President's palace, magnificently simple outside, lavishly furnished inside

Congress will occupy flat double-dome structure (one dome inverted) and twin 28-floor office buildings





National cathedral will have boomerang-like ribs supporting glass walls. Map shows remote site of Brasilia

NEW WILDERNESS CAPITAL

Just three years ago, stray cattle were the only inhabitants of a remote plateau 600 miles northwest of Rio. Today that plateau is the site of spectacular Brasilia, the most modern city in the world

By Thomas E. Stimson, Jr.

A GREAT CITY, more modern than the day after tomorrow, is rising out of the bright red earth of Brazil's central plateau.

Three short years ago a few stray cattle were the only inhabitants of the brush-covered prairie. Today 25,000 construction workers are paving a network of streets and putting the final touches on groups of office buildings, government structures and apartments.

They are finishing Brasilia, the new national capital of the largest nation in Latin America.

When I visited this city in the wilderness recently I was amazed at the speed with which buildings were going up, at the rush

and bustle of construction. "What's all the hurry?" I asked.

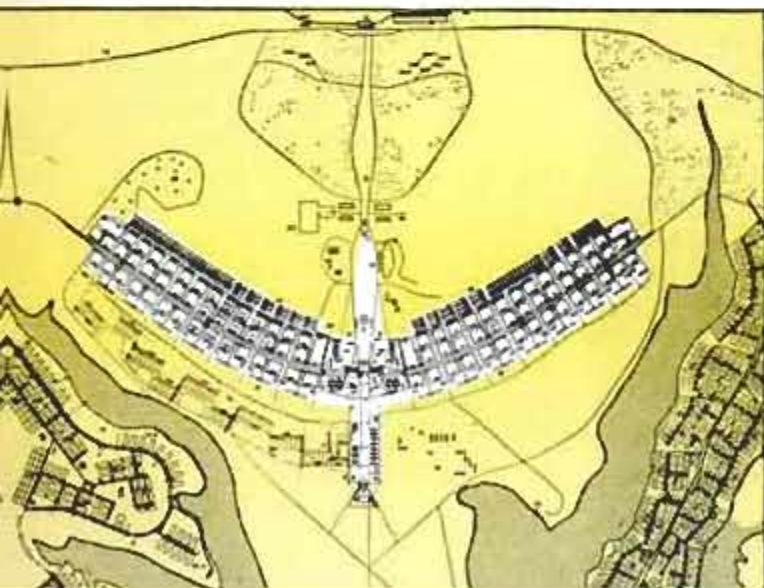
"Senhor," I was told, "this city is to be dedicated on April 21st of next year. On that date our President moves much of the government from Rio de Janeiro to this new site. By then, Brasilia must be complete to the last doorknob, to the last pane of glass!"

This is not strictly true, of course. Not all the buildings will be finished, and the entire government won't move at once to the new capital. But much of the city is scheduled to be occupied by next April.

On the last day of my stay I toured Brasilia in a Jeep driven by Tom McTernan, mechanical superintendent for Raymond



Focal point of Brasilia will be Plaza of the Three Powers at head of Avenida Monumental, the main thoroughfare



International. This American construction firm is erecting eleven 10-story, steel-frame buildings that will house the various ministries, or government departments, and the twin 28-story buildings that will serve as congressional offices.

Between technical explanations of the work McTernan told me of his delight at the high quality of Brazilian labor.

"See that riveting gang?" he asked. "Six months ago they were all chopping sugar cane in the Mato Grosso region. Unskilled

Plan has shape of swept-wing plane. "Fuselage" is five-mile avenue lined with government buildings



Master plan for city includes a big cultural center and university. Residences will fan out from avenue

farm labor. Now they are driving rivets without supervision. Sure, we run a close inspection but there are *da* few rejects."

I began to feel that in spite of the magnitude of the task and the hurry-up program, Brasilia would be built on schedule.

Most of the army of construction workers are living in *Cidade Livre*, or Free Town, several miles from the new capital. This temporary community will be torn down and its remains bulldozed back into the earth when the big construction job is over. Because of this, many of the workers live in simple shacks they built of saplings, with walls and roofs of paper cement sacks

that are flattened and tacked into place. The bags are more durable than they appear; they become stiff and waterproof as soon as rainwater penetrates to the cement dust.

Heroic in concept, daring in architecture, the new capital is a dream that Brazil has nurtured for centuries. It will help in the development of Brazil's vast and underpopulated interior. Most of Brazil's population is crowded along its seacoast. The interior remains relatively untouched, though it is rich in farmlands, timber and minerals.

The general site for Brasilia was selected



Enormous earth drill is used to bore holes for concrete piles that support tall steel-frame buildings

Twin buildings which will house congressional offices begin rising on the remote plateau. In background is one of the two domes of Congress and Senate building

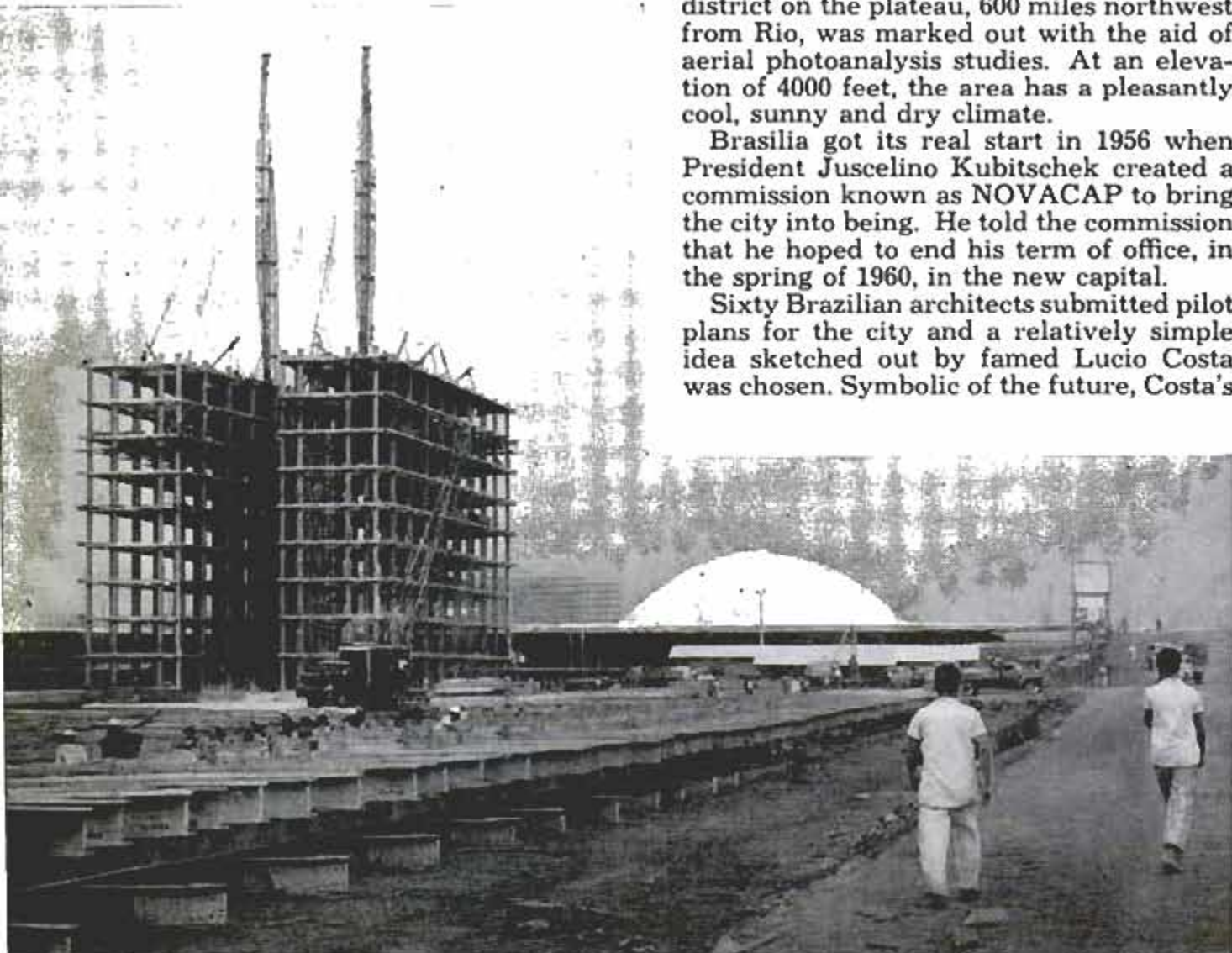


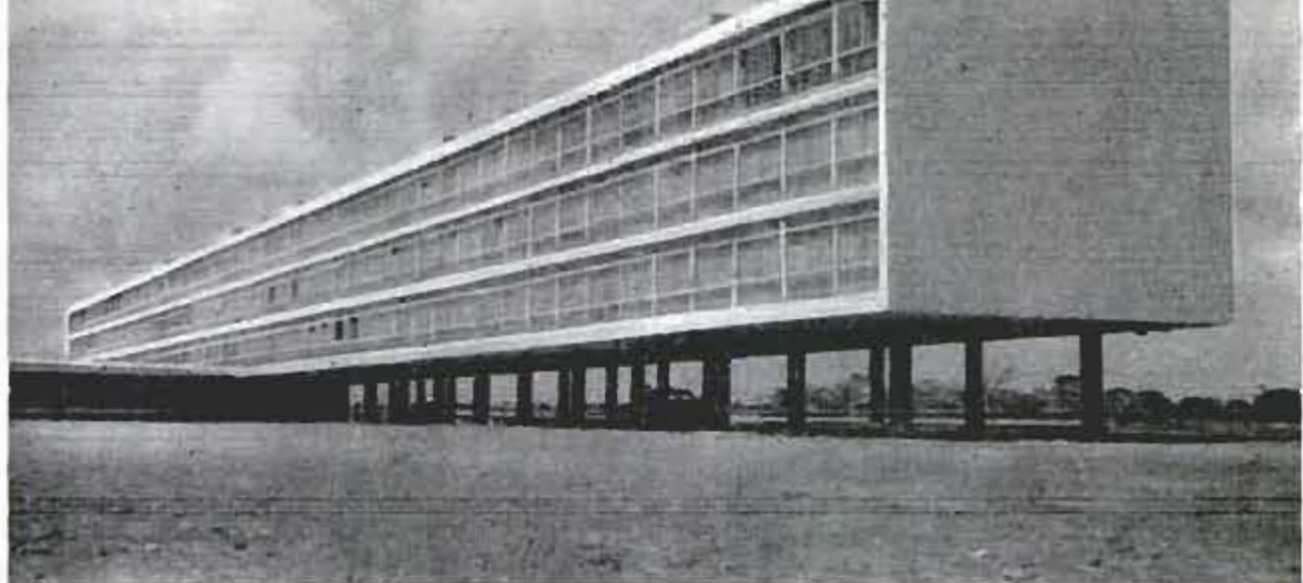
Drill has penetrated 120 feet to reach compact earth. Untrained Brazilians have become top-notch workers

70 years ago on the plateau from which parts of the country's three main river systems originate. More recently, a federal district on the plateau, 600 miles northwest from Rio, was marked out with the aid of aerial photoanalysis studies. At an elevation of 4000 feet, the area has a pleasantly cool, sunny and dry climate.

Brasilia got its real start in 1956 when President Juscelino Kubitschek created a commission known as NOVACAP to bring the city into being. He told the commission that he hoped to end his term of office, in the spring of 1960, in the new capital.

Sixty Brazilian architects submitted pilot plans for the city and a relatively simple idea sketched out by famed Lucio Costa was chosen. Symbolic of the future, Costa's





Typical of the daring architecture is this long hotel on stilts, one of first structures to be completed

plan has something of the shape of a jet airplane. The fuselage is represented by the five-mile-long boulevard and parkway known as Avenida Monumental, on which many of the government buildings are located. The wings of the jet are the residential and apartment-house areas that sweep back from either side of the avenue. This design for the city makes excellent use of the site, which is a tableland between two small valleys that will fill with water when a new dam is completed.

Brasilia is expected eventually to have a population of half a million, so its pilot plan is complete in layout for a city of that size. Locations are provided for hospitals and cemeteries, parks, golf and yacht clubs, a university, newspapers, radio and tele-

vision stations, a sports stadium, truck highways and a railroad station.

Construction of the city began in March, 1957. Meanwhile, a corps of engineers and architects under Oscar Niemeyer, regarded as Brazil's leading architect, worked night and day to keep ahead of the builders.

One of the first things to be completed was the 8800-foot concrete runway of a jet-age national airport, together with a temporary administration building. Today, airlines connect Brasilia with all the other important cities of Brazil.

Next to be completed was a 180-suite hotel that stands on stilts and is 600 feet long. At the same time the residential palace of the President was finished. The

(Continued to page 214)

Ultramodern office buildings seem to grow overnight, and provide startling contrast with shacks of workers

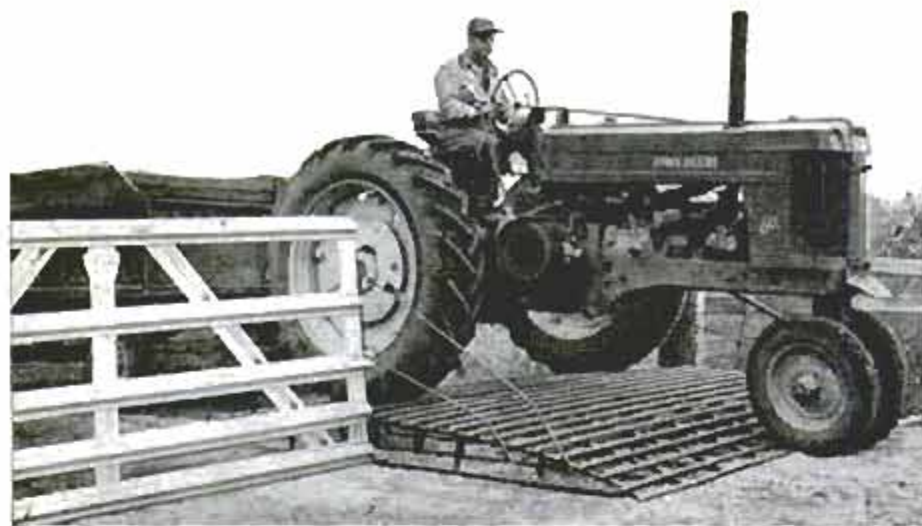




Big Aluminum Truck Can Be Parachuted to Troops

Here's something new in Army vehicles—an aluminum truck that can climb rugged hills, propel itself on water and be parachuted from the air. Designed and built by the Chrysler Corporation, the 2½-

ton vehicle weighs less with a full load than the current 2½-ton military truck does when empty. It has eight-wheel drive and remains steady while any wheel bumps over rocks, gullies or tree stumps.



"Drive Over" Gate Stops Livestock

With a new "drive over" gate that discourages livestock from passing through, farmers can drive in and out of an enclosure without unhooking the gate. When animals try to walk over the gate, their front hooves drop through open spaces and they are brought to their knees. They raise themselves by their hind legs and turn back.



Transparent Visor Cuts Glare

Drivers can protect their eyes against sun glare and yet have a full field of vision by replacing opaque visors with ones made of molded Plexiglas acrylic plastic. The blue glare-filters remove 87 percent of radiation but at the same time do not unduly distort the color of traffic lights. The glare guards can be installed with screwdriver.



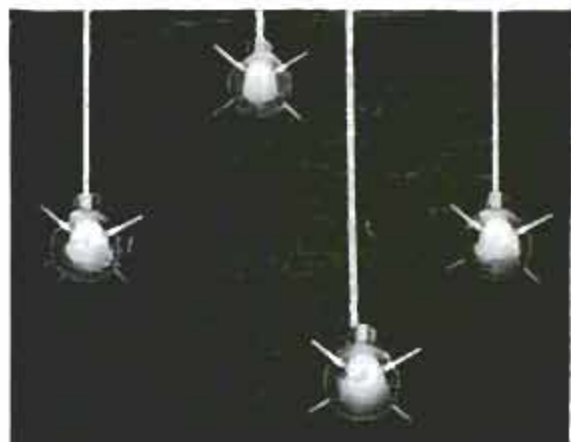
"Bobsled" for the Water

Combining the safety and ease of operation of an aquaplane with the flexibility of water skis, a water bobsled lets the rider sit much as he would on a sled. Made of light metal tubing and laminated wood, it planes easily, supports almost any weight, and will not sink. At the start, the tow rope is attached to a front frame member, but the rider can detach it and hold the tow rope after planing speed is reached.



"Sputnik" Fly Killer

Drawing on its own built-in supply of insecticide, a hanging insect killer attracts flies, then poisons them when they land on its wick. It works by capillary action, which draws the insecticide up the wick from which it hangs. It is sold with a six-month supply of insecticide contained in its "sputniklike" body, and works equally well indoors or out. It can be suspended from any overhead object and adjusted to hang at any height. Flies do not stick to the wick, but fly away before dying.



Extension for Downspout Waters Nearby Garden

Downspout-water discharge is effectively controlled through a 5½-foot envelope of perforated polyethylene plastic which absorbs the force of the water's fall, then allows it to escape through the holes, there-

by watering the garden or lawn. Quickly attached by its stainless-steel collar with just a screwdriver, the plastic envelope has a snap-closed end to allow cleaning out roof rubbish that collects inside.





DETROIT LISTENING POST

By Art Railton

CONFUSION REIGNS. And with reason. You, the buying public, have Detroit completely bewildered.

Take the Ford-Chevy duel, for example. One year ago, the people at Ford were long in the face. They knew that their 1959 car was conservative, almost staid, compared with the flashy 1959 Chevrolet. Nobody at Ford gave the car much of a chance against the spectacular, space-age Chevy.

So back to work, with abandon, the Ford stylists went. They rushed the 1961 models ahead a year. Pull out all stops, let's catch up, said Ford's top brass. Let's get rash again and recapture the image we had back when Chevrolet was just an old maid's car.

And they did. Ford designed itself a wild one for 1960.

But meanwhile, what is happening back at the ranch? You, the public, decided for 1959 you like conservative built-for-people cars and Ford sales are surprising even Ford sales managers. Yet coming down the road for 1960 they have the rash one. Instead of the squared-up look, the sensible look, Ford will have sleek, dartlike styling.

At the same time, Chevrolet (the 1959 space-wagon entry) will come down to earth for 1960 and it will probably be talking about its cars being built for people, while Ford talks about its new-as-tomorrow design. A complete turnabout of roles in one year—no wonder Detroit is confused.

But this isn't the only example. While one group shouts about those sensible new 1960 small cars, another group sings the praises of the 1960 big cars featuring the most stylish dashboards, most luxurious interiors, the biggest and most sun-letting-in rear windows you ever saw—even clocks that resemble a satellite in orbit. In many cases, it's the same people—one day they're promoting small cars, the next, big ones. Confusion reigns.

Here are some sensible developments:

Displacements are coming down or, at least, not getting any bigger. One new engine being introduced for 1960 actually has a smaller displacement than the engine it supersedes. Time and talent are being de-

voted to improving handsnuff transmissions. There's even a hint that floor-mounted shift levers might be on the way back.

Manual steering is being perfected to make it more effortless. Air suspension is being dropped. One company is even discontinuing overdrive, as the cost-cutting and belt-tightening continues.

But at the same time you'll be seeing more luxury items like powered vent windows, more seating gimmickry, more performance boosters. There will be plenty of ballyhoo this year also—crosscountry trips and all that, in abundance.

For 1960, Mercury has a fresh, new face—a clean, custom-car look. Its only recognizable part is the roof. The harsh sculpturing is gone.

Edsel, the most identifiable of all, has a new look, too. Seeing one go down the street you won't guess its identity. Even the much-joked-about vertical grille is gone—or almost. Vestigial remains are there, but only a perceptive eye will spot its ancestry.

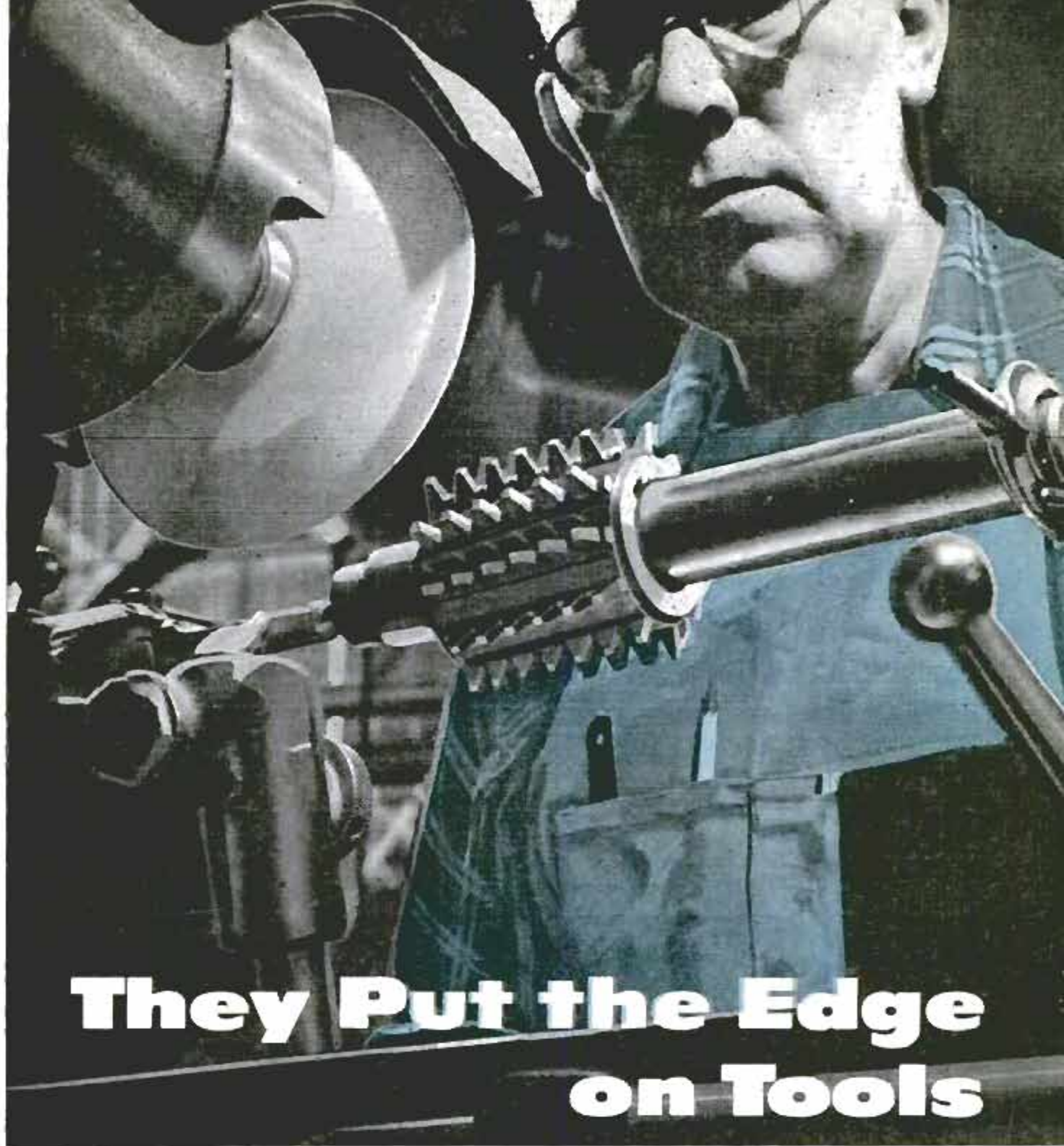
Lincoln continues its same body for one more year. If it doesn't catch on fire in 1961, the way may be clear for the four-door Thunderbird to replace it as the Ford Motor Company's prestige car. It could be called the all-new Lincoln Continental—stranger things have happened.

American Motors will continue on its merry way selling cars. Despite all the ballyhoo, there won't be any V4 engine at AM. There may be a new engine, but it will not be a four, more likely a new six later next year.

One big problem at American Motors is V8 business—it's virtually nonexistent. Yet, only a few years ago it spent millions of dollars in a new V8-engine line, incorporating the latest tools for automated production. So the new line sits idle while the old six-cylinder-engine line works overtime. Obviously, despite all the happy stories to the contrary, not even George Romney is always right.

The Plymouth Valiant (the small car) will be plenty hot in performance. Its new engine was originally planned for 1961, but was pushed up when the small-car trend rocketed. This car will have a lot of the Chrysler 300 in its front end, something of the Imperial in its rear end. However, tail-fins will be almost nonexistent.

Reports from England are that an all-new British Ford Anglia will be announced late this year. Even the engine will be fresh. Another clean break with the past, the rumor has it. Here is how Ford will protect its flank from the low-price imports. It is the only American company that will be ready to get in there and fight should the economy imports start price-cutting, as they may do when competition gets tough.



They Put the Edge on Tools

Gear-hob teeth of high-speed steel are polished to wearproof finish by aluminum-oxide grinding wheel

By Richard E. Dempewolff

TO THE TUNE of rumbling motors, the hiss of speeding wheels biting into the world's hardest metals and the flicker of sparks reaching across glass guard panels, a special breed of craftsmen keeps the edge on tools that today must cut and shape materials sometimes tougher than they are.

Tough, heat-resistant chrome-nickel, titanium and other granite-like metals that go into parts for modern missiles and jet engines must be drilled, reamed, shaped,

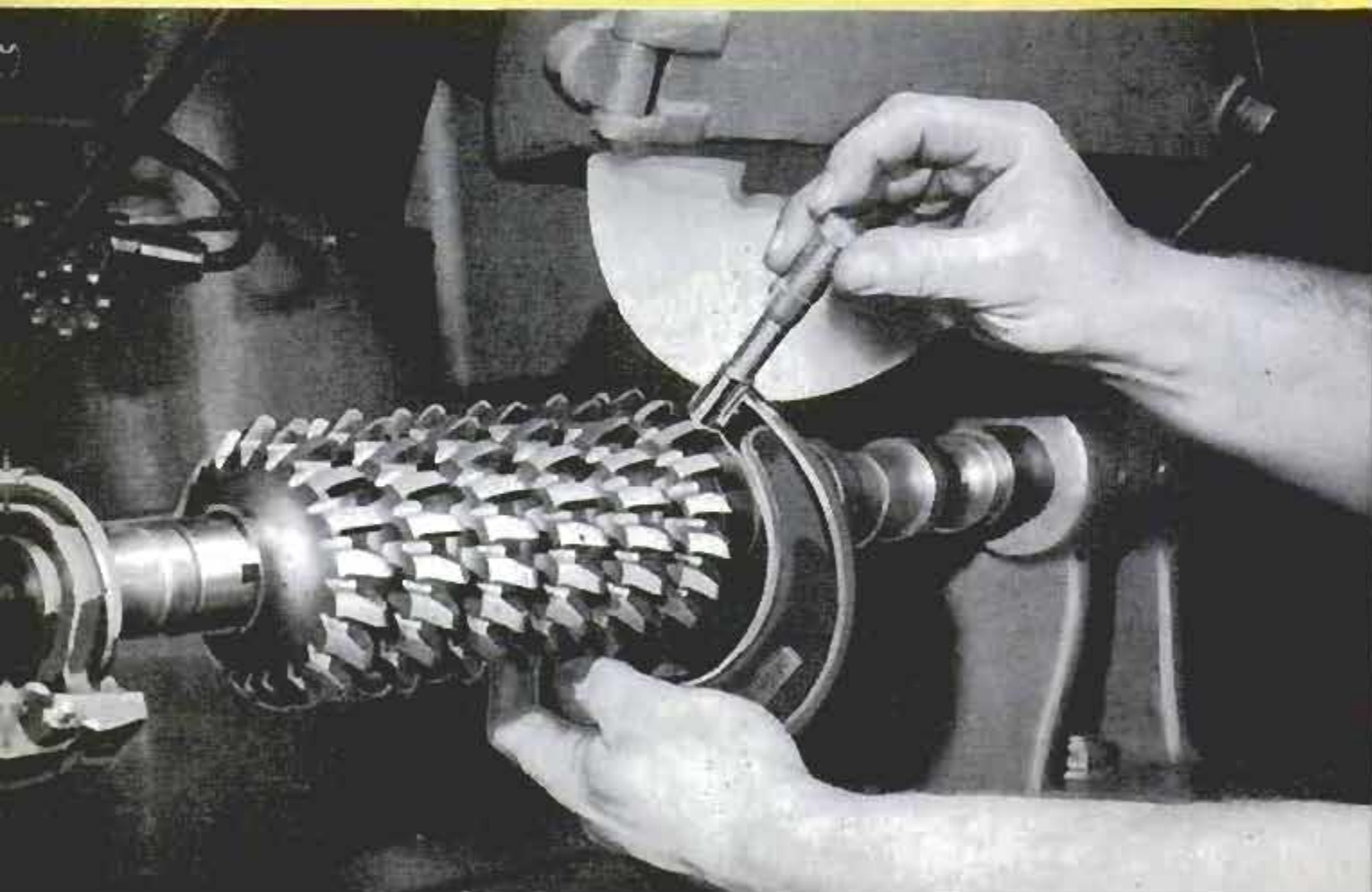
broached and milled to microscopic accuracy. A nick in one tooth of a precision tool can make the difference between usable parts and possible expensive discards.

The men who keep such cutting edges sharp to split-hair tolerances are known as "cutter grinders." At any jet-engine plant they're a busy crew. In the Pratt & Whitney Aircraft Division factory in East Hartford, Conn., 300 cutter-grinders work on a battery of machines sprawling



Final check for perfect alignment is given carbide-tipped saw blade, above left. Saw is used to slice cooling fins for engine pistons. Right, high-speed abrasive wheel files teeth of five-foot unit

Mass-production tool sharpening is performed on six hydrotel form cutters at once. The circular tools cut shapes to controlled dimensions in precise jet parts. Some cutters have as many as 56 teeth and each tooth must be identical. An error of a thousandth of an inch could result in destruction of cutter.

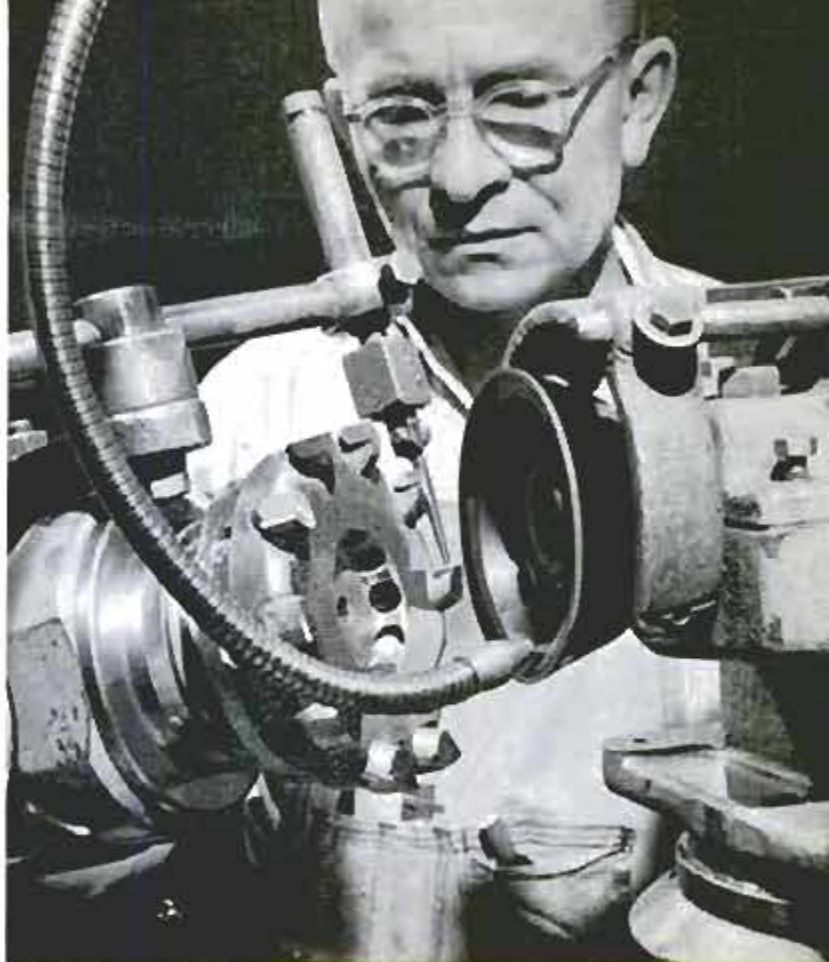


across nearly an acre of floor area. They're known as Department 36. But into their shop, from all over the plant, pours a deluge of fractured, chipped and worn tools. Last year they added up to 1,250,000 pieces. The "catch" runs from dulled "single point" hairline-thin boring bits a quarter inch long to glittering broaches six feet long and six inches across, bristling with chisel-like teeth that become scored or burned from being rammed through some rugged metal collar that the tool was designed to gouge out to size.

Hunched over the machines like jewelers, behind protective safety glasses, craftsmen work with micrometer, experienced eye and high-precision wheels that often must grind to tolerances of half a thousandth of an inch, on material so hard a sledge hammer blow wouldn't mark it. Diamond wheels polish sharp carbide edges, whirling disks of aluminum oxide put the bite back in high-speed steel. For some special pieces, Department 36 is now using a new electrolytic grinding process. Inside sealed cases, with one glass side through which the craftsman watches progress, a flood of electrochemical solution streams across the dull tool, removing metal as current feeds through the work. A diamond wheel takes off peaks and brushes away particles left by the chemical. According to the shop foreman, the new technique has greatly increased the life of diamond wheels that can wear down to the tune of \$300,000 a year.

How many parts can a sharp tool produce before it comes bouncing back to Department 36? One grey-haired cutter-grinder, peering over the top of his safety glasses, explains it this way: "I've seen a tool come in here and hardly take more than polishing up after making 1000 aluminum splines. The same one comes in nicked, burned and beat up after turning out 20 pieces in hard steel. You take a jet-engine stainless-steel compressor-wheel disk, with 150 slots in it, and you'll wear the bite clear off of three broaches just making one disk."

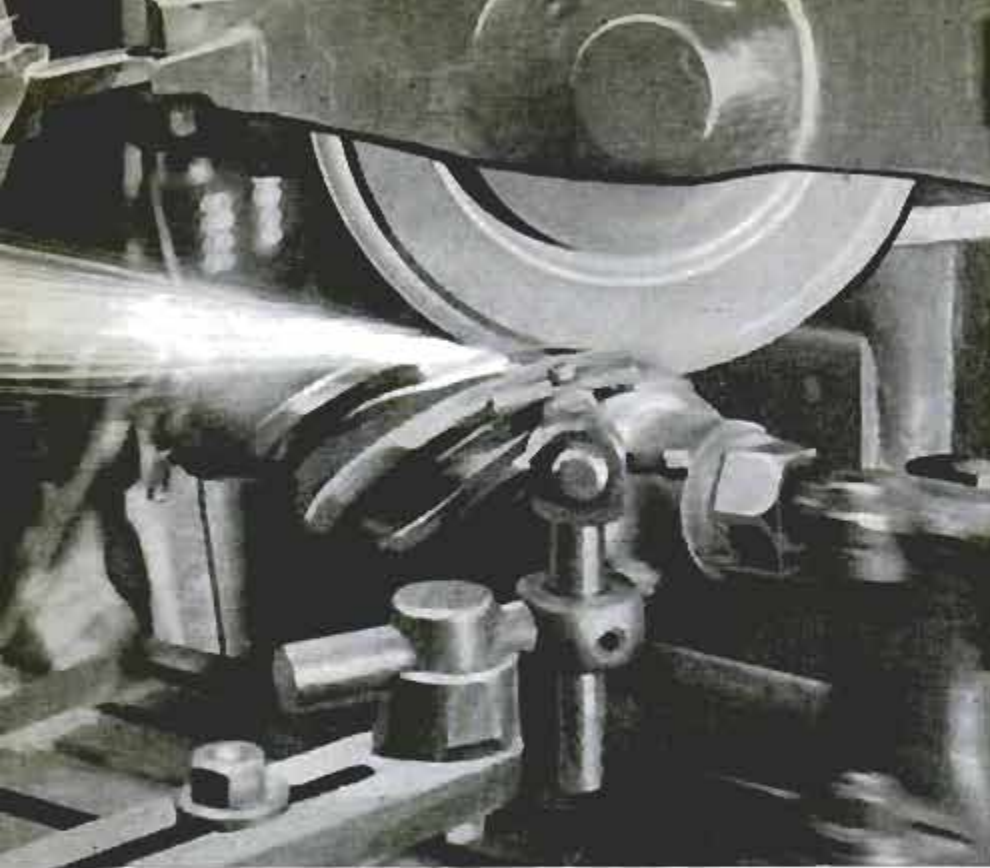
New, tougher exotic metals "raise Cain" with everything. "We nearly gave up on titanium," the foreman admits. "It was so tough and abrasive it broke the single-point turning bits. The shop couldn't grind it. Tools wore to a nubbin at one pass



Tungsten-carbide bit on a rotating tool gets its edge beefed up by cup-shaped diamond wheel. Wheel is kept cool by constant oil mist fed through flexible pipe

Slab-milling cutter, a sort of planing mill for metal, is checked for clearance on its heavy-duty roughing teeth. Grinders keep edges sharp to hairline tolerances





Fountain of sparks shoots from the business edge of a high-speed slab-milling cutting tool as the grinding wheel spins a new corner on its augerlike blades of tough steel. Cutter-grinders handle over a million chipped, worn tools each year

and created such surface tension on the titanium that the serviceability of the part was reduced. The high-pitched squeal of bits working the stuff made your ears ring. Tools went so fast we were swamped, and production slowed down."

Change Cutting-Edge "Geometry"

The tool sharpeners finally licked the problem by changing the "geometry" of their cutting edges. "It's like a shovel," explains the foreman. "In sand you can dig in at an angle. In hard rocky soil, you get farther faster by digging in straight—with less wear on the shovel, too. What we did was to change the angle of the blades on each tool. It worked."

Now, when something new like chrome-

nickel, molybdenum steel or other exotic harder steel alloys come along, the cutter-grinder experts move in on tool geometry and better tool materials. "One type of carbide might be best for high-shock tools (like a broach) on a new metal; another does better in finishing," they explain.

But it's still no picnic for the cutter-grinders when they hear the squeal of a hydrotel cutter dulling its 56 teeth on a complex titanium housing part across the building. They know that the high-tolerance circular cutter will be in for an overhaul shortly, and that if even one tooth is a thousandth of an inch off when they get through with it, the strain on the rest will burn it up all over again. ★ ★ ★



Single-point and multipoint tools are dipped in plastic after sharpening, to protect precision edges from nicks or mars in handling, until ready for use. Such tools may be used on tough new metal parts for modern missiles and jet engines

Compact Foam Pad Is Raft or Mattress

Beach-goers can now relax on a comfortable raft and mattress that is made of urethane foam. Compact for carrying, it weighs less than $2\frac{1}{2}$ pounds, is less than an inch thick and folds down to a 25-inch square. The foam structure makes the pad so buoyant that it can float on water, yet it also provides firm cushioning support on land. It can serve as a beach lounging pad, deck-chair cushion, boat bunk, station-wagon mattress, patio seat, sleeping-bag mattress and play-pen mat.



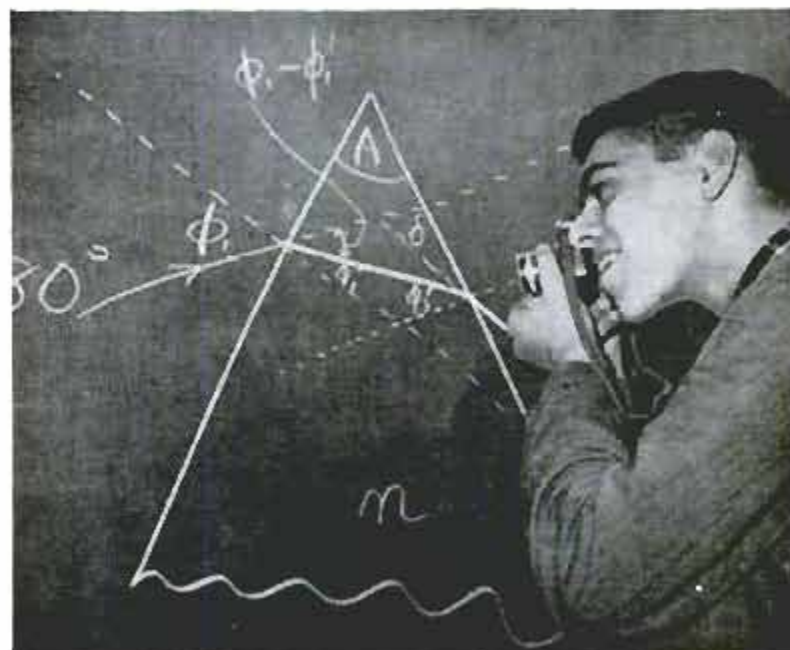
Biggest Tire Ever Built? Here's One 10 Feet High

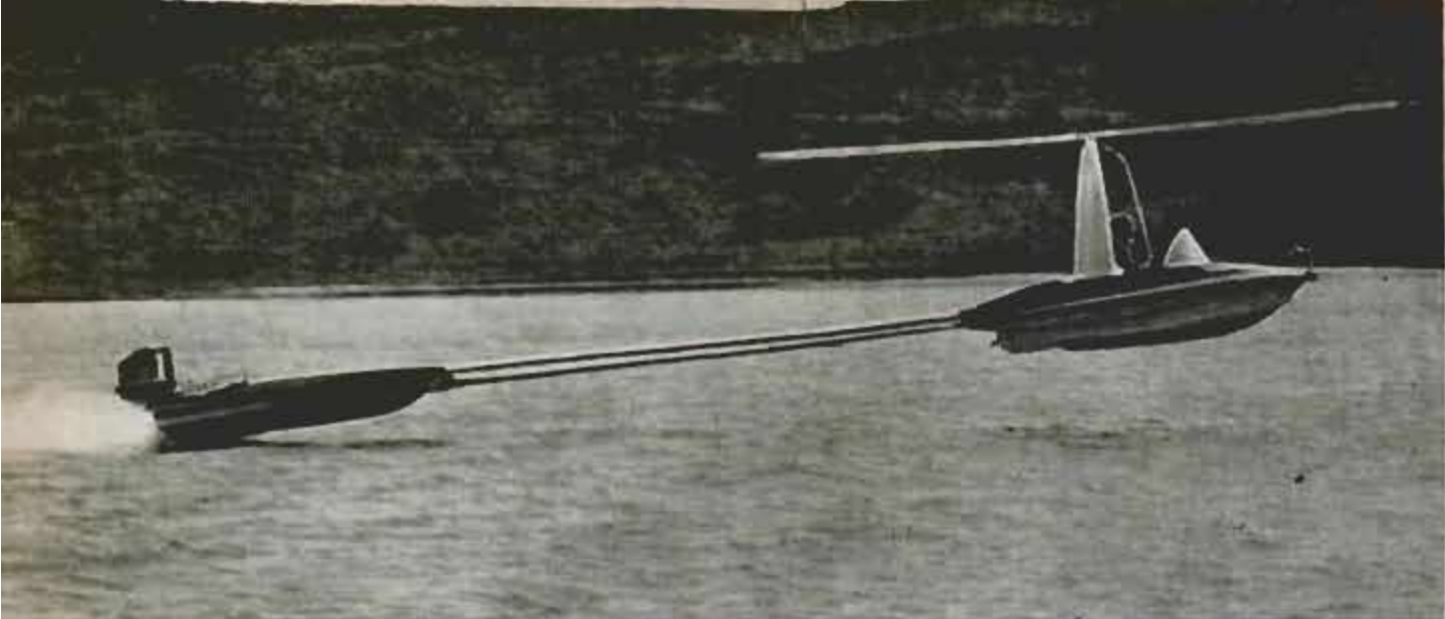
How big is the biggest tire in the world? It's 10 feet high, four feet wide and with its rim weighs three tons, according to Goodyear Tire & Rubber Co. Goodyear built the huge tire as a research model for a planned line of earth-mover and special-purpose tires that will go on huge construction machines and other vehicles still in design stages. Selling for \$14,000, the tire was constructed on a machine that covers 4500 square feet of floor space. Enough rubber went into the monster to produce 320 passenger-car tires. More than 7000 pairs of nylon hose could have been made from the tire cord used. The distance from sidewall to sidewall is $44\frac{1}{2}$ inches and the bead diameter is 45 inches.



Ingenious Student Sells Blackboard Photos

Taking photos of complex diagrams and formulas in physics class is less nerve-wracking and more accurate than copying them with pencil on paper. It's also profitable, a sophomore at Columbia College in New York has discovered. When class is over, Roger Field snaps the instructor's blackboard artistry with his 35-millimeter camera, then goes home and makes prints that are a popular sales item among fellow students.





Outboard goes 20 miles per hour in air. Rear unit stays in water. It carries fuel, batteries, engine

Outboard With Rotor Flies Over Water

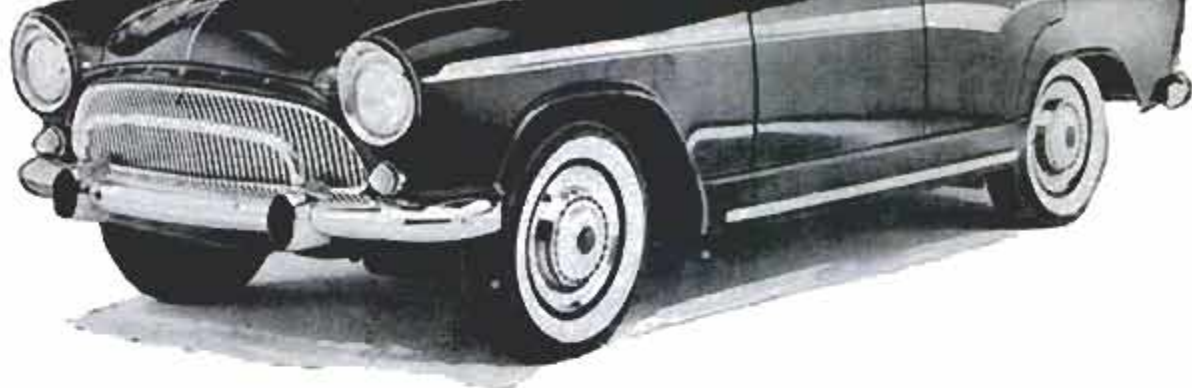


Stick in operator's hand changes attitude of blades. Engine is operated and steered by remote controls

EQUIPPED WITH a free-wheeling overhead rotor, an outboard boat now being tested in California literally rises and flies across the water. The rotor is hand-cranked at the start. Then the craft's forward speed causes the rotor to turn fast enough to produce lift. The operator can climb 10 feet above the water, fly straight and level or make turns, and descend at will, all by changing the attitude of the rotor with his control stick. The outboard engine that drives the hydrocopter is mounted on a rear unit at the end of 20-foot booms of aluminum tubing, and the operator steers on the surface and changes engine speed by means of remote controls that lead back to the engine.

For towing, 41-foot hydrocopter telescopes to 22 feet. Front unit engages hitch on car, rear rests on trailer





One Third More Glass Featured on Two New Simca Models

Restyled with an American touch, two deluxe models are being added to the Simca line. With one third more glass area than other Simcas, they are a four-door sedan and a two-door hardtop. Both have curved windshields and wrap-around rear

windows. Heater and reclining seats are standard equipment. This gives Chrysler nine Simca import models, ranging from the 96-inch-wheelbase Aronde to the 106-inch Vedette, including four and eight-cylinder models.

Test Polio Pills Taste Like Cherry Drops

Cherry-flavored polio vaccine that may be taken orally in the form of a pill is now under test by the Minnesota Department of Health. The "candy" vaccine is expected to be available for use early next year.



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Whistles That Emit Light Designed for Ocean Ships

Whistles that do more than whistle are being developed to reduce collisions by ocean-going vessels. In contrast to older whistles, the new signal will be visible as well as noisy, thus avoiding confusion of sounds in the dark or during bad weather. When the ship's whistle blows, the signal sends out light rays that can be seen for seven miles on a clear night. Passing vessels can see the light as well as hear the whistle, enabling them to locate the source accurately.



WHAT'S NEW FOR



CORN CUTTER removes fresh sweet corn from the cob for young or older corn fans who have trouble eating it off the cob. The ear is run through the troughlike cutter, which trims the kernels from the

cob and shreds them into a container. It's also handy for use when preparing large quantities of sweet corn for canning or freezing or for fritters

American Corn Cutter Co., 7110 Westlake Ave., Parma 29, Ohio

DUCTLESS RANGE HOOD can be installed by any handyman in any house, since it works through an activated charcoal filter that eliminates the need for vents, ducts or louvers. The unit's two-speed fan causes no backdraft, forced draft or heat loss over the range

Major Industries, Inc., 1030 W. North Ave., Chicago 14.

VACUUM-FREE NURSING BOTTLE features a valve in the bottom which relieves the vacuum created by baby as he drinks. It eliminates mixture of air with the milk, keeps the nipple from collapsing and helps prevent colic. The bottle is made of durable red plastic

No-Vac Corp., Paramount, Calif.





AERIAL HARNESS supports babies from three months up; lets them walk and jump in complete safety. It's adjustable for any size, hangs by spring from any high point. Jolly Jumper Corp., 106 Unity St., Bellingham, Wash.



KING-SIZED ICE CHEST moves on dolly wheels for easy handling when filled to its 62-quart capacity. Rolls like a two-wheeled cart, but rests level on a metal stand. Chest has insulation one inch thick, is easily drained. Wheels are of solid rubber. Knapp-Monarch Co., ^{Yend} Ave. and Putomac St., St. Louis 16, Mo.

BENT

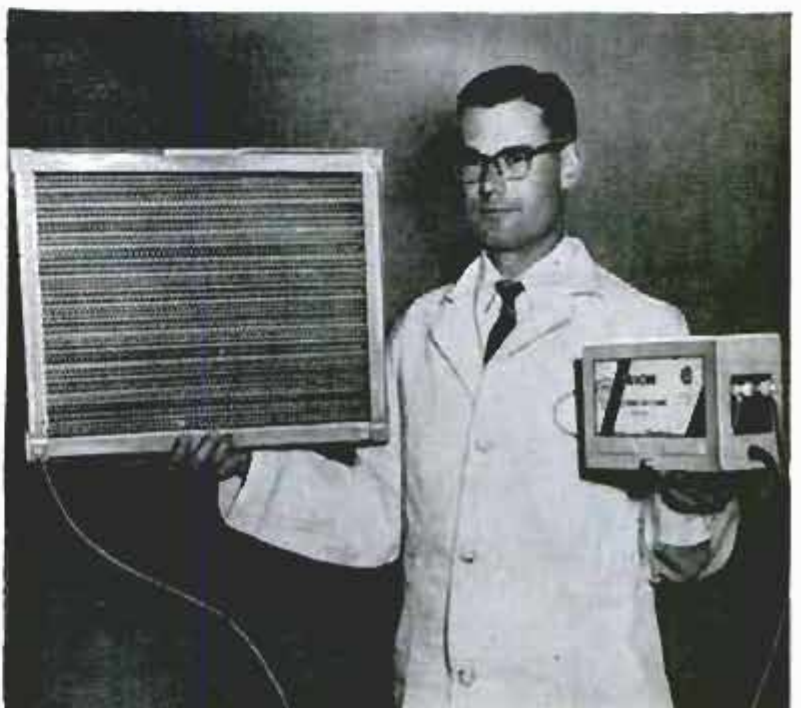
SCENTED SHOWERS are possible with a new shower head which has a compartment for a scented pellet. Water forced through the shower head whirls the pellet around. As it dissolves, it scents the shower.

3 E. 54th St. Elizabeth Arden Sales Corp., 501 Fifth Ave., New York City



ELECTRONIC AIR CLEANER is no larger than the ordinary furnace filter and only two inches deep; fits in the space designed for the disposable filter. Removes dust, dirt, smoke, pollen and germs; stops particles as small as 1/2,500,000-inch. Easily installed without special tools. Available in sizes for all furnaces.

Trion, Inc., McKees Rocks, Pa.

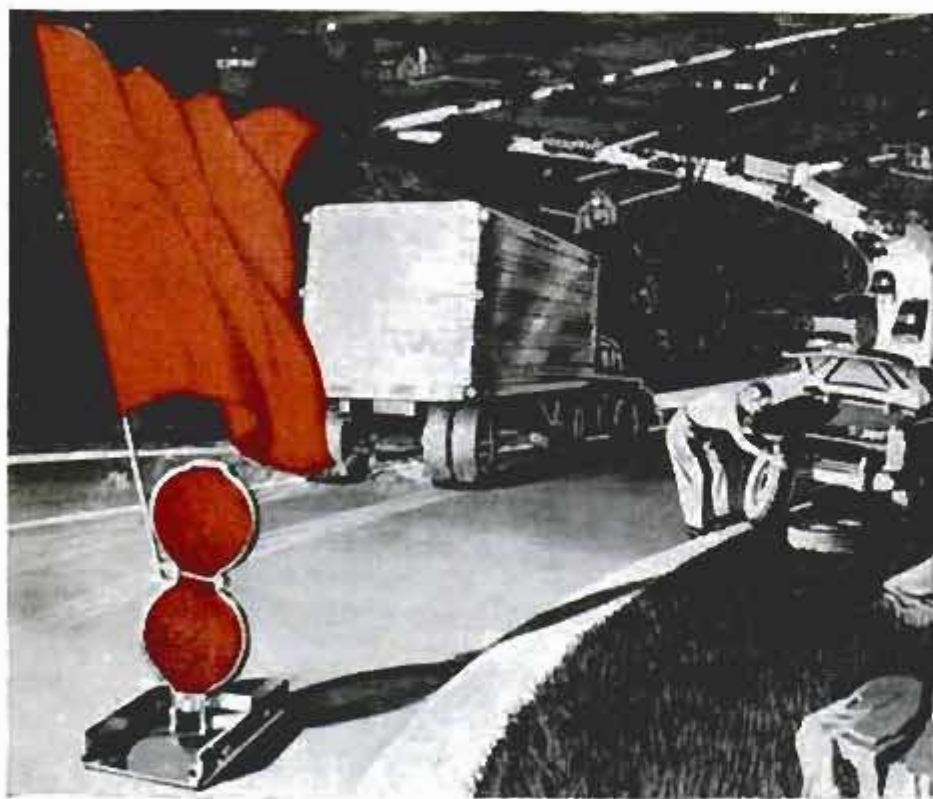


Toy Rocket Fired by Tire Pump



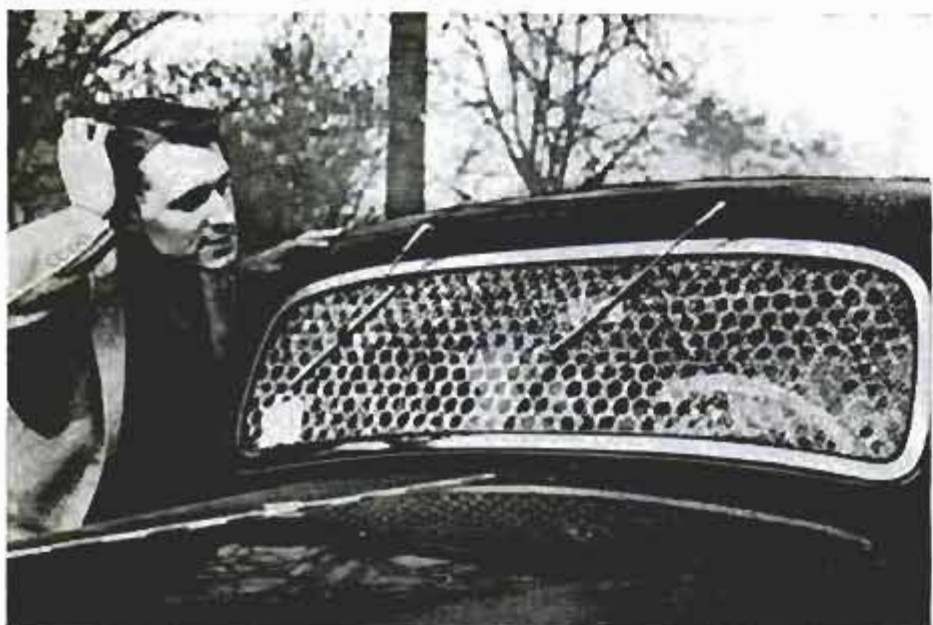
Eliminating the danger of chemically fueled homemade rockets, a toy missile is available now that can be thrust 300 feet into the sky by pressure from a tire pump. The two-foot missile is filled with water. When pressure builds up in the pump, the rocket takes off with a 250-pound thrust and water spouts in all directions, giving everyone a nice sprinkle. The missile also is equipped with a cap-firing warhead.

Day or Night Warning Light



Roadside warning signals consisting of two reflectors and a red flag comprise the latest protection for stalled motorists—day or night. The device fits in the glove compartment. In case of a flat tire or mechanical trouble at night, the signal can be placed a distance from the automobile. Lights from oncoming cars' headlights warn of trouble ahead. During the day, the flag on a folding staff can be erected as a signal.

Windshield Crack Takes Rare Form



Gene Terpstra, of Grand Rapids, Mich., probably wondered what the windshield of his automobile was made of when it suddenly changed before his eyes. Recently, while stationed in Wuerzburg, Germany, as a soldier, he was driving his car when the windshield mysteriously cracked into 319 little circles.

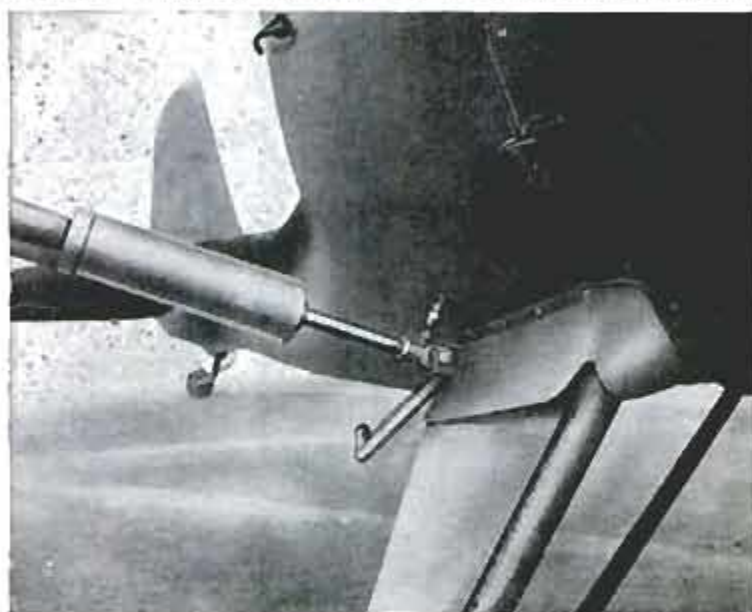


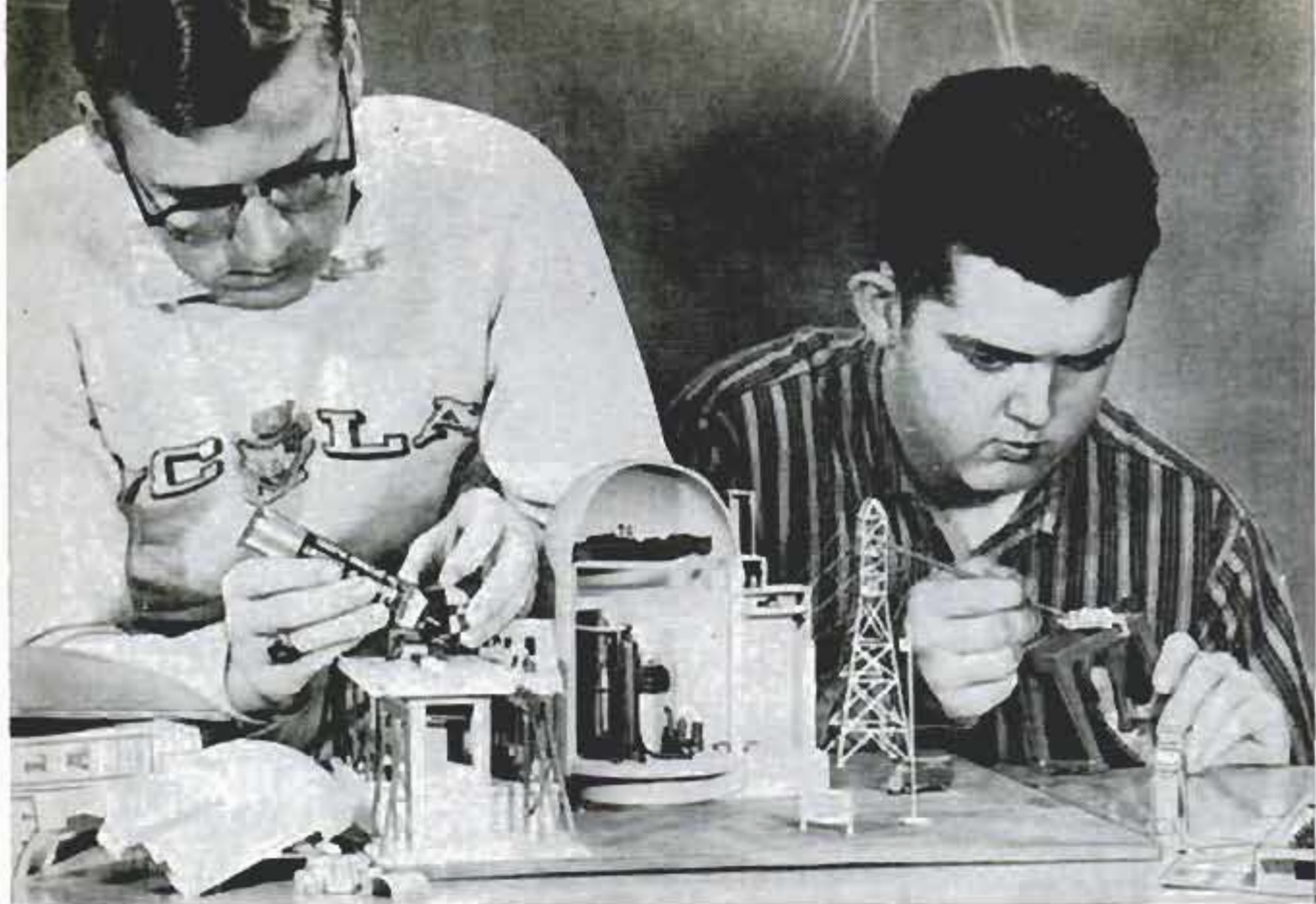
Plane's Wings Have "Springs" for Quick Takeoff

FASTER TAKEOFFS and smoother landings are possible when "springs" are added to the wings of light aircraft. The spring-like effect, made possible by 10-inch-long hydraulic cylinders affixed on each strut at the point where it joins the fuselage, enables the wing to move through a range of 30 inches. Inside each cylinder is a piston cushioned by oil and rubber. While the plane sits on the ground, the wing has no dihedral angle. On takeoff, this lack of dihedral catches the air faster and permits a quicker takeoff. In the air, normal turbulence is absorbed by the air-oil cylinders instead of the fuselage. Though the wings can move through a range of 30 inches, the body of the plane remains on an uninterrupted flight path. This produces exceptional stability and makes much slower landings possible. As the aircraft touches down, the wings immediately go from maximum dihedral to no dihedral, providing a flapping effect that cushions the landing. A drop of as much as 10 feet can be made without dam-

aging the gear. Under the seat in the cockpit are two air accumulators. There is also an air-pressure gauge to indicate strut loadings. The accumulators can be emptied by valve in the cockpit and refilled with an automobile tire pump.

Air-oil strut is fully extended. The strut permits wings to move through a range of 30 inches as turbulence is encountered





Scale-Model Reactor Teaches Nuclear Principles

Toy manufacturers are joining the educators in an effort to develop more scientists. One toymaker has designed three plastic-model atomic kits, scaled from actual blueprints of a nuclear-reactor. Complete with booklets describing aspects of atomic energy, the kits help teach both youngsters and adults principles of nuclear power as they build models. One kit is a scale model of a Westinghouse atomic-reactor plant, including the nuclear reactor, steam generator, pumps, turbine generator, lines and tower. Two other kits are models of the nuclear ship Savannah and the nuclear missile-firing submarine USS *George Washington*. The toy sub's launching tubes can fire a simulated Polaris guided missile.

Coin Operates Pump At Self-Service Gas Station

What next? In Sweden, a new idea is a coin-operated fuel pump. Such self-service pumps have been installed at many service stations and are made especially for motor scooters and other small vehicles. The driver simply pulls his scooter alongside the pump, deposits one or more coins and helps himself to as large a quantity of petrol-and-oil mixture as he needs.





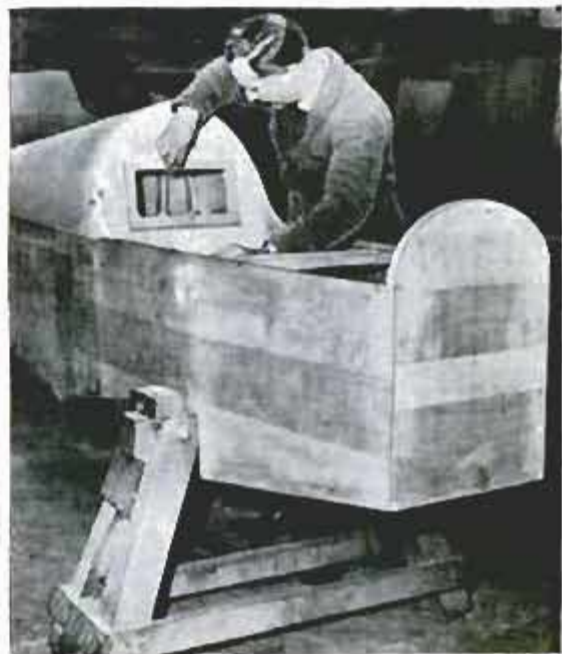
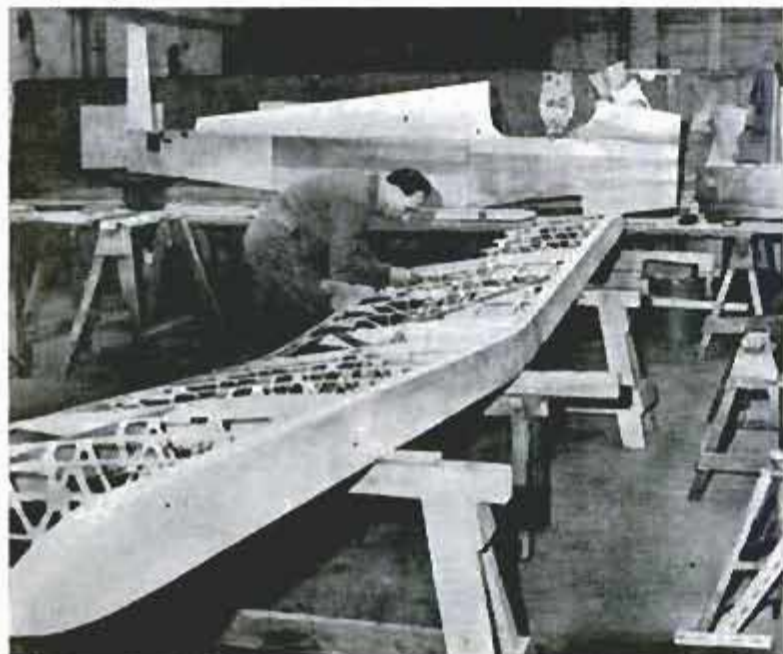
Sporty look of the Druine D31 has wide appeal. It takes about 10 to 12 weeks to build the handmade plane

ALL-WOOD AIRCRAFT STILL MADE BY HAND

WOODEN airplanes still are being made in England, and pilots say they handle as well as the best of metal sports planes. Made entirely by hand, a wooden plane costs less than some automobiles—\$2800. The all-wood flying flivver is the Druine D31 "Turbulent," named after its late designer, Roger Druine, a Frenchman. In a crowded hangar at Croydon Airport, outside London, skilled workmen build the Druine D31 not much differently from the

way a fine furniture maker turns out his handmade products. Except for a small bandsaw, only hand tools are used to shape and join the wooden fuselage, wings and tail. The finished plane is 17½ feet long and has a wingspan of less than 22 feet. Powered by a German four-cylinder engine, the little single-seater has a top speed of 88 miles per hour. One of the reasons fliers like the Druine D31 is the fact that it gets 50 miles to the gallon.

Left, employee works on 21-foot 7-inch wooden wing. Right, craftsman checks dimensions of tiny cockpit



Should You Buy A Foreign Car?

HOW ABOUT IT? Have you considered buying a foreign car? If you are typical of millions of Americans, you have probably thought about it. And you are probably trying to decide whether it would be a wise choice.

At present about 10 percent of all the new cars sold are imported. Not very long ago, it was generally believed that imported cars would never go over 5 percent of the total sales.

What has caused this spectacular jump in sales? Is it a fad? Are the people who own imported cars happy with them? What are the advantages and disadvantages of owning one of these cars? To answer these questions for its readers, *PM* surveyed 2000 owners of 10 popular imported economy cars.

Generally, imported-car owners are happy—happier than the average domestic-car owner. Over-all, 82.9 percent of the import owners rate their cars excellent, while 2.5 percent rate them poor. Among the eight 1959 American cars *PM* has surveyed, 70.6 percent of the owners rate their cars excellent, 3.9 percent rate them poor.

What about dealer service? Here, the import falls below the American average. Imported-car owners rate 53.4 percent of the dealers as excellent, while American-car owners rate 54.7 percent of their dealers excellent. Import owners rate 12.2 percent of the dealers poor, American-car owners rate 10.5 percent of the dealers poor.

Who is buying these imported cars? Not everybody who buys a foreign car is a free-spending playboy. Most are quite the opposite. In fact, more than half of them (52.1 percent) own only one car—their economy-type imported car. About 45 percent of the owners are in the working class (combined white-collar and blue-collar occupations). Among 1959 Rambler and Lark owners about 53 percent are in the same class, a slightly higher percentage.

The imported economy car attracts a



HILLMAN



MORRIS



RENAULT



SIMCA

**NEXT
MONTH**

PM presents Owners Reports on each of these 10 cars, discussing frankly the good and bad features of each. Also included will be Dale Kelly's test data.

Don't miss the September issue of *Popular Mechanics*



VOLVO



AUSTIN



SAAB

SWEDEN

ENGLAND



VOLKSWAGEN

GERMANY

FRANCE



DKW

ITALY



FIAT

What are the **ADVANTAGES** of owning an imported car?

ECONOMY say 81.9%

HANDLING EASE say 62.7%

EASY TO PARK say 28.1%

GOOD WORKMANSHIP say 21.2%

LOW FIRST COST say 13.5%



larger percentage of professional and highly trained people than domestic cars, but this may be due more to an interest in unusual engineering design than to snobishness or any status-making reason.

What are the advantages of the imported car? Obviously, and almost by definition, the most frequently mentioned feature is economy of operation, with 81.9 percent listing it. Second is ease of handling, third is ease of parking, fourth is workmanship and fifth is low first cost.

What are the disadvantages? Heading the list, and the only item mentioned by a large percentage, is the scarcity of parts and service—42.6 percent mention this. Second is the lack of room inside the small cars, third is the public criticism that comes to one who buys an imported product, fourth is the lack of power and fifth is the "bullying" that the little car gets from big-car drivers, especially in city traffic.

But the owners themselves can tell the story best. These quotes describe the ad-

vantages in order of frequency of mention:

"On a teacher's salary, there is no better car for the pocketbook than a foreign one. With the gas-and-oil eaters the American companies are producing, a teacher couldn't hope to own one."—New York teacher.

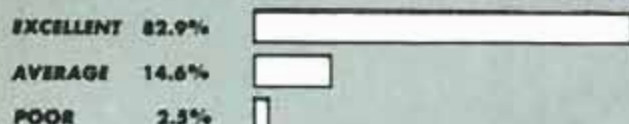
"Lifesavers when it comes to expenses out of your pocket. You can figure around one-cent-a-mile cost."—Iowa salesman.

"For little if any sacrifice in comfort, I can save in miles per gallon as well as losing less per year in depreciation."—District of Columbia police officer.

"We now have two imported cars for the price of one U.S. car."—Rhode Island physician.

"Handling ease makes it possible to arrive at the destination with nerves intact and without usual fatigue. My previous car had every power assist from automatic transmission to power steering and air conditioning. All this help was

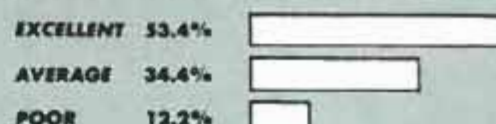
OVER-ALL, HOW DO OWNERS RATE THEIR IMPORTED CARS?



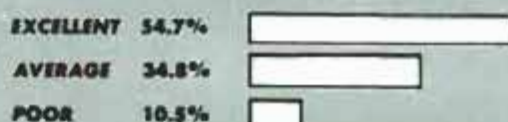
HOW DO OWNERS RATE EIGHT AMERICAN CARS OVER-ALL?*



HOW DO IMPORTED-CAR OWNERS RATE THEIR DEALER SERVICE?



HOW DO AMERICAN-CAR OWNERS RATE THEIR DEALER SERVICE?*



*Average of eight surveys made by PM among owners of 1959 U.S. cars and published in previous issues

What are the DISADVANTAGES of owning an imported car?

SCARCITY OF PARTS AND SERVICE say 42.6%

NOT ENOUGH ROOM say 9.2%

PUBLIC CRITICISM say 2.5%

INSUFFICIENT POWER say 2.0%

"BULLYING" BY BIG-CAR DRIVERS say 1.7%



lost on this over-40 female who loves to drive yet went fewer and fewer places until she got this foreign car."—California secretary.

"I'm still amazed at the performance and handling ease of this car. I drive 500 miles per week. On freeways I cruise between 65 and 75 miles per hour."—California salesman.

"You can turn around almost anywhere to get those precious city parking spaces."—District of Columbia airman.

"If a man ever owns a foreign car it will be hard to get him to buy another U.S. car. The public is getting fed up with the sloppy workmanship that American manufacturers are trying to cram down our throats. That is one reason why so many foreign cars are on the road."—North Carolina textile worker.

"It seems that foreign manufacturers build quality. As a policeman, I drive American cars many thousands of hard miles each year and I have a growing dis-

respect for their ability to take it."—Missouri police sergeant.

"When American manufacturers start putting quality and common sense back into their products, instead of useless gadgets and useless horsepower, I might try one again."—New York registered nurse.

"We have as much automobile for \$1700 as a lot of our friends have for \$3000 in a U.S. make. We would prefer to buy our own country's product but only when it's what we want."—Pennsylvania salesman.

"Rides like a baby carriage."—Arizona salesman.

"My wife, daughter and I took a 1200-mile trip in our new car. I think you can drive longer in a small car without tiring. I drove from 7 a.m. to 12 midnight one day."—Virginia printer.

"This small car does not bounce over bad roads or railroad crossings like the larger cars do."—Pennsylvania diemaker.

"These cars perform under the most adverse conditions. I drive on some of the

WHAT WILL NEXT CAR BE?

ANOTHER FOREIGN MAKE	54.8%	<input type="text"/>
AN AMERICAN MAKE	14.2%	<input type="text"/>
UNDECIDED RIGHT NOW	31.0%	<input type="text"/>

IS IMPORTED CAR ONLY CAR IN FAMILY?

YES, ONLY CAR	52.1%	<input type="text"/>
NO, SECOND CAR	47.9%	<input type="text"/>

WHO BUYS IMPORTED CARS?

<input type="text"/>	PROFESSIONALS AND ARTISTS	30.3%
<input type="text"/>	EXECUTIVES AND BUSINESSMEN	11.5%
<input type="text"/>	WHITE-COLLAR PEOPLE	20.7%
<input type="text"/>	BLUE-COLLAR PEOPLE	24.6%
<input type="text"/>	ALL OTHERS	12.9%

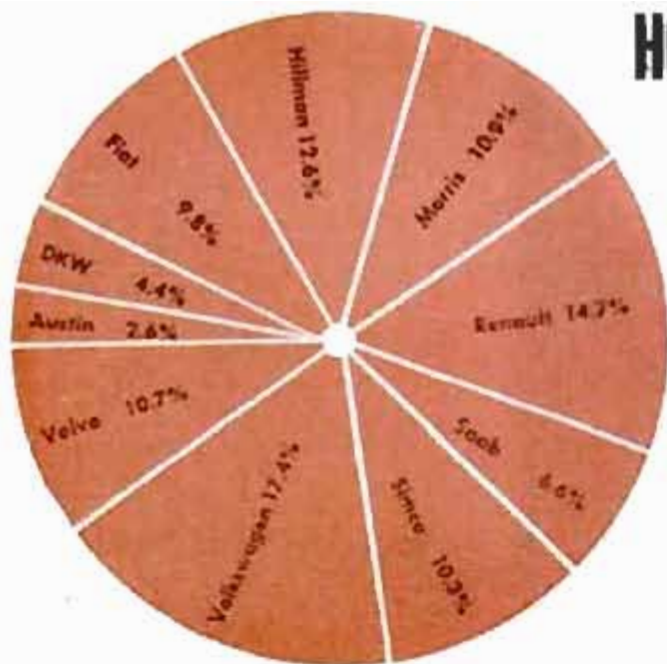
HOW PM'S SURVEY WAS MADE

PM asked 2000 imported-car owners to tell you about their cars (the second part of this article will appear next month). Owners' names were selected at random from all over the United States by R. L. Polk & Co.

The 10 makes surveyed are representative. Included are air-cooled engines, water-cooled engines, rear engines, front engines, rear-wheel drive, front-wheel drive, four-cylinder pancake, four-cylinder inline, three-cylinder inline, four-stroke and two-stroke designs.

Each of the five great car-exporting countries of Europe is represented (see map on page 99).

Chart at left shows percentages by make in the survey. These percentages approximate the relative position each make holds in the U.S. economy-car population.



toughest roads in Montana at full tilt all the time (about 60 or 65 on poor roads, 70 to 75 on pavement).”—Montana printer.

“Most foreign cars are easier to work on than U.S. cars if you use common sense. You don't have to take the whole engine apart to get at one thing.”—Arizona salesman.

“I like small cars. They are the answer to all my gripes of the past 25 years.”—New Jersey mechanical engineer.

What Are the Disadvantages?

Here, in order of frequency of mention, are quotations describing the disadvantages of the foreign car:

“My main concern is with repairs. If I took a trip beyond a 100-mile area of where the car was bought, would the average mechanic be able to make repairs or quickly find any motor trouble? That is the big question which I have yet to have answered.”—New York salesman.

“Getting service such as lube, oil change and tune-up is a problem when traveling around the country.”—Minnesota test engineer.

“The one thing that is turning me against foreign-car companies is their laxity in choosing responsible dealers who will take care of the product. The cars
(Continued to page 210)

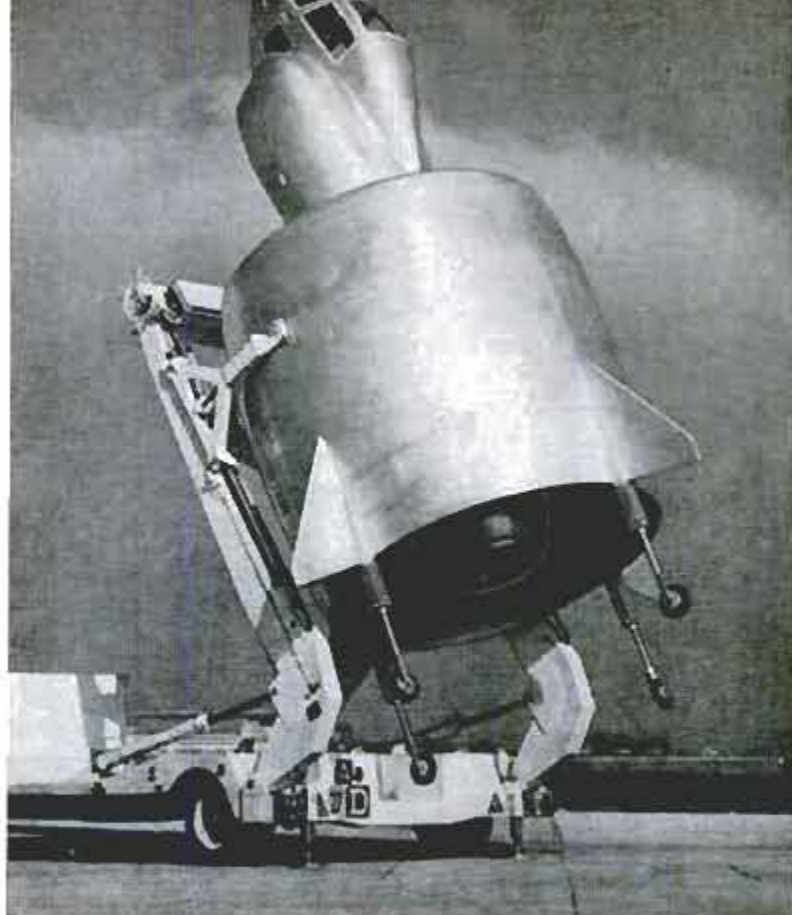
Estimates put 1959 imported-car sales at 600,000, of which almost 100,000 will be Volkswagens, below



"Flying Barrel" Takes Off Vertically

French aircraft designers have come up with a "flying barrel", an annular-winged plane that takes off vertically from a launching truck, then shifts to horizontal flight. Called the C-450 "Coleoptere," the tail-sitting plane has a one-man cockpit, flanked by air-intake ducts that feed the central jet engine. Fuel is contained in the surrounding wing. The experimental craft is expected to fly at speeds up to Mach 2 or 3. Manufactured in Paris, the strange plane is expected to be test-flown for the first time this summer.

☐ Aureomycin, the antibiotic used for several years to preserve fresh poultry, has now been approved by the U. S. Food and Drug Administration for use in preserving fresh fish.



Register Computes Change, Then Dispenses It

Customers as well as employees of self-service stores can save time when new change-dispensing registers are used at checkout counters. The clerk registers sales in the regular way. After the total is computed, she rings up the money handed to her by the customer. The register automatically computes the change due the customer and releases the coins into a chute. It also indicates to the clerk what amount is due in bills. When the coin supply is low, the register sounds a buzzer.



Carrier for Car Bumper Extends Trunk Space

Ever find you'd like to have an extension for the trunk of your automobile? A new bumper carrier extends from the trunk to increase the hauling capacity of the car. The carrier can be put on and taken off in a matter of minutes. It attaches to the rear bumper without bolts or screws. Off the bumper, the carrier can be used as a table, since its sides can be folded in. The carrier is 48 inches wide, 36 inches long and 8 inches high.



No industry faces such a promising future as does the automobile industry. The road ahead, no matter where it leads, is broad, unbroken and built for high speeds. But nobody is certain about its destination.

The essentiality of the motorcar has never been more certain. Only its ultimate form is in doubt.



How much influence will stylists have in next 10 years?

More than now: 5.6%
Less than now: 34.7%
About the same: 59.7%

IS THE STYLIST LOSING GROUND?

Quotations from the engineers' comments:

"We are at the peak of a styling cycle and the trend will swing toward more function."

"The public apparently has revolted against the stylists' nightmarish creations."

"The stylist is just as much a captive of management as the engineer who must also produce to specification. Future cars will be influenced by 'designers' rather than by 'stylists'."

"The customer will be best served if stylists are told to make an operating and functional package attractive, instead of continuing the present trend of telling engineers to make a styled package go."

"The public seems to have a 'why buy?' feeling since the flashiest style will be dead next year. The 'evolutionary' rather than the 'revolutionary' approach was less antagonistic to the buyer."

"Styling has become the most important factor in sales. Therefore it will have to have greater influence."



Do up-coming small cars mean a more common-sense era is ahead?

Yes, they do: 72.2%
No, they don't: 22.2%
Undecided: 5.6%

WILL THE NEW SMALLER CARS BE SENSIBLE?

Quotations from the engineers:

"The size of a car has little to do with its foolishness. There are and have been more foolish small cars than large ones."

"Chassis design is on a common-sense basis right now, but styling is based on mass-consumer demand."

"Majority will still be big, luxurious, high-styled."

"Small cars are fast becoming a status symbol. This and their current styling are not common sense."

"But it will be temporary, a fad. Public wants the comfort and convenience of today's Detroit cars."

"People want cheaper, not smaller cars."

"The smaller cars may grow larger and more complex, starting a new cycle."

"Smaller cars are being introduced reluctantly, representing public demand rather than factory promotion."

In an attempt to discover where the industry is going, what its future form will be, *Popular Mechanics* surveyed the men who know it best, the automotive engineers in national convention.

Here is a summary of their opinions and their speculations about tomorrow.

WHAT KIND OF ENGINES WILL BE COMMON IN 10 YEARS?

Quotations from the engineers:

"Perhaps one or more air-cooled cars, but they will not be common. Piston-type, gasoline-powered, liquid-cooled engine still has much potential."

"Air-cooled economy engines will have a short life span with General Motors."

"Turbines to be common in commercial vehicles only."

"Bearing costs for turbines are excessive. Electric cars have great potential for city driving. Steam cars have been lost in the shuffle."

"Electric cars, in my opinion, are out."

"Air-cooled engines in smaller sizes only."

"Turbine-car research is on the wane."

"A major breakthrough in battery design coupled with cheap, possibly atomic, electricity might see considerable use of electric cars in urban and suburban areas."



How likely are the following to become common in next 10 years!

TURBINE CARS

Likely: 17.1%

Unlikely: 75.7%

Impossible: 7.2%

ELECTRIC CARS

Likely: 21.7%

Unlikely: 69.6%

Impossible: 8.7%

STEAM CARS

Likely: 1.4%

Unlikely: 67.6%

Impossible: 31.0%

AIR-COOLED ENGINES

Likely: 75.7%

Unlikely: 24.3%

Impossible: 0.0%

WHAT ABOUT THE AUTOMOBILE 25 YEARS FROM NOW?

Quotations from the engineers:

"The vast majority of cars will have to become smaller, more maneuverable, and offer more usable space in comparison with over-all bulk."

"Most obvious change within the next few years will be refinement: Lightweight materials, better utilization of interior space, noise and vibration control, more responsive controls. Coming designs will weigh 2500 pounds, be smaller outside, larger inside, cost less to buy and operate. As for a 25-year prediction? Don't be silly!"

"More vehicles for specialized purposes, rather than our current general-purpose vehicle."

"Designs will fit the usage to which car is put. Two or three design types may be necessary. Station-wagon type for Suburbia; small car for to-work-and-back, parked most of time; plush car for display."

"Without knowing about city layouts, highways, etc., it is impossible to predict so far ahead."



There may be twice as many cars on the road in 25 years. What effect will this have!

Cars will be smaller: 44.4%

More safety features: 11.1%

More automatic equipment: 7.0%

Won't affect design: 8.4%



Is the automobile's role in society changing?

Yes, it is: 65.3%
No, it is not: 29.3%
Undecided: 5.4%

THE AUTOMOBILE'S ROLE IN SOCIETY IS CHANGING

Quotations from engineers:

"No longer the sole symbol of prestige, becoming more a means of transportation and losing some of its secondary roles."

"Instead of being something to outdo the Jones family with, the auto is now becoming a transportation piece and nothing more."

"Car is not the prestige factor that it has been in years past. People apparently prefer to spend available cash on other 'hard goods' items."

"Still primarily a needed means of transportation. The status symbol is shifting some, but certain cars still represent this."

"Cars are becoming more in the same category as furniture and appliances, chosen more for usage than for their prestige."

"Extremely large cars no longer denote position in life."

"Detroit and Los Angeles now use the automobile as it will be used in the near future. They have almost no other transportation system."

"It is more and more a necessity. It means less public transportation will be available."

"Workers are almost completely dependent on the automobile in many areas. Even men out of work need a car to look for a job."

"It may be less of a prestige item than it was, but I'm not sure this is a permanent thing."



Fewer cars have been sold in recent years than anticipated. Why?

Too expensive: 31.2%
Recession: 26.5%
Other items more important: 11.1%
Styling extremism: 9.7%
New car no longer success symbol: 5.6%

WHY HAVE DOMESTIC CAR SALES BEEN DISAPPOINTING?

Quotations from the engineers:

"Economic conditions and the reluctance of people to go into debt for an item they really don't need."

"The recession showed us that a car can be repaired."

"Repairs are not as costly as depreciation. The war taught us that a car has lots of miles in it."

"Too much of the average take-home pay is required for the cost of transportation."

"Competition of other items such as boats, vacations, high-fidelity gear, etc."

"Sales are down due to Detroit's inability to change fast enough."

"Not enough real advantage in making a change to a new model."

"Cars are too expensive, too many gadgets."

"Increased first cost as well as operating costs."

"High cost of living. More of the family income is required to cover other costs, especially taxes."

"The passing of the prestige part of ownership. The banning of racing by manufacturers, which took away most of the excitement of a new car. The complete irresponsibility of the UAW, making the product overpriced and shabby. The overstyling and oversizing of the product."

"Maybe a desire to prove to the neighbors that we are 'sensible' and will live conservatively. Conservatism may be 'fashionable' these days. Maybe we just aren't thrilled by the new models anymore."



Pusher Rams Pipe Beneath Pavement or Lawn

Pipes up to 36 inches in diameter can be installed underground without trenching or disturbing pavement or lawns with a hydraulic pipe-pusher which can literally shove pipe through solid earth at a speed up to two feet per minute. Powered by a 1.7-horsepower four-cycle gasoline engine, or hand-operated by levers on the hydraulic injectors, the pusher applies up to 75 tons of piston pressure to drive the capped pipe, conduit or duct between a starting trench and a finish trench. These are the only excavations necessary in the operation. The pipe-pusher is mounted on a firmly shored, ratcheted rail, and a section of pipe is placed in a clamp or against a pusher plate; the action is much like that of a calking gun. The machine is available in two sizes, one for pipe up to 4 inches, another for pipe up to 18 inches. Above 18 inches, two pushers are used.



Music Box Entertains Phone Callers While They Wait

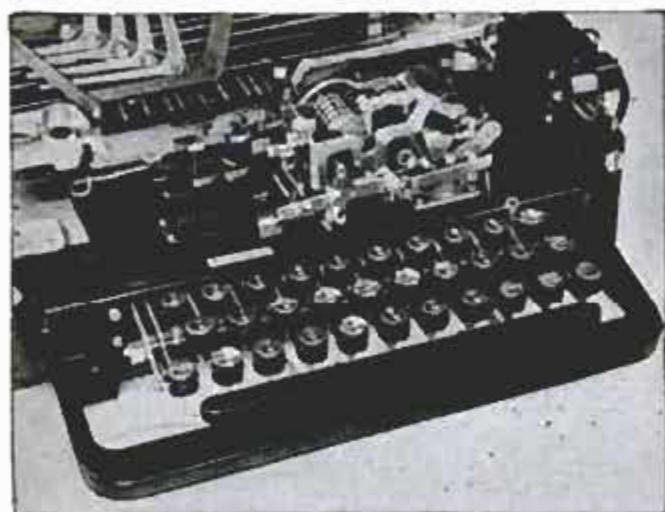
Designed to fit American telephones, a Japanese music box plays into the receiver when a caller must be kept waiting. Spring-wound and spring-mounted, the box starts playing when the handset is laid in the cradle. It's available in white, yellow, red, green or black plastic with a choice of 10 American or Japanese tunes, though each box plays only one tune.

☐ Experiments in Australia indicate gibberellic acid, the plant-growth-promotion substance, may prove a boon to livestock raisers in augmenting winter growth of pasture grass and clover.





Polaroid Camera in Plane Pinpoints Fires for Ground Crews



Mounted in a light plane, a modified Polaroid camera spots forest fires quickly for the ground fire fighters. Used by the Louisiana Forestry Commission, the camera has a grid-etched glass plate which divides the print into half-inch squares. The pilot snaps and develops the picture, then identifies the area for the ground crews.

Teleprinter Operator Can Dial Distant Receiver

Now operating between New York, Chicago and 24 Canadian cities, Western Union teleprinters let subscribers make connections by dialing the code number of the receiver. The receiving instrument verifies the connection; reception is automatic even if the called party is absent. The message is automatically typed in page form as it comes through on the receiver.



Number, Please!

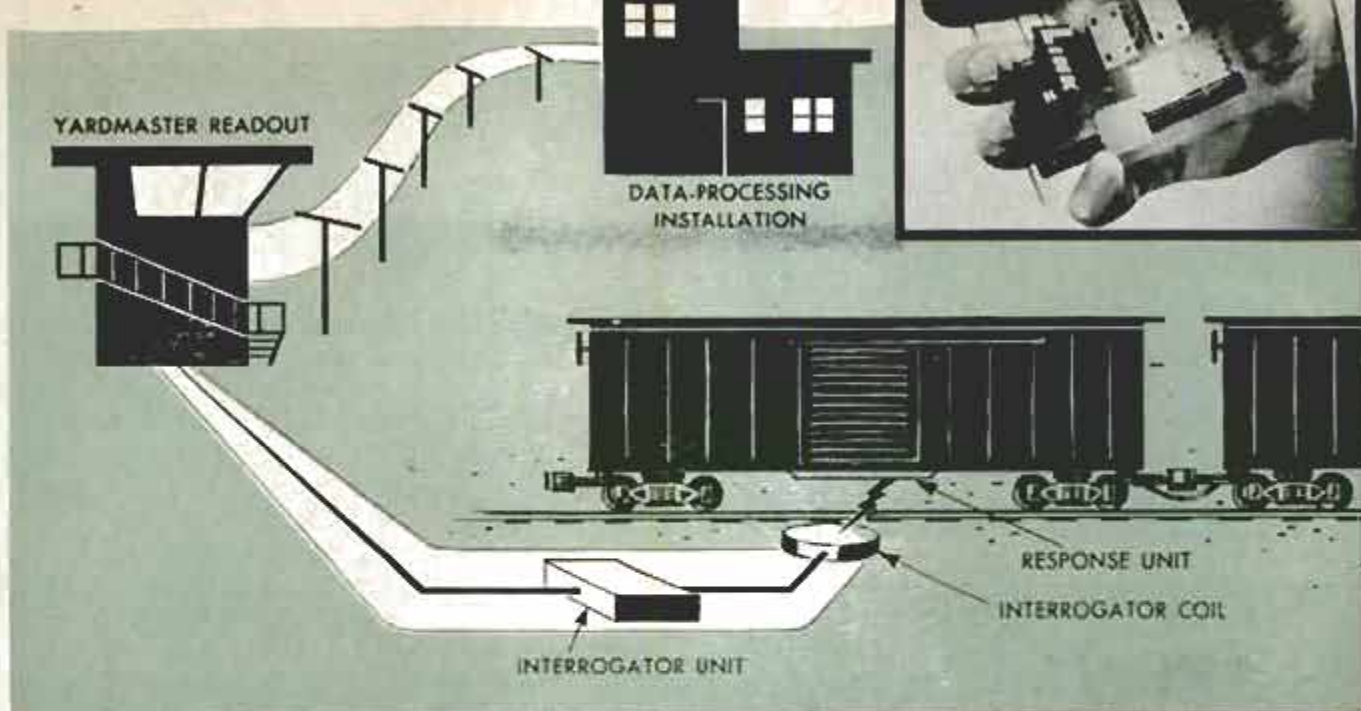
Whenever you write us to

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

. . . In fact, whenever you write us,

PLEASE INCLUDE YOUR CITY POSTAL ZONE NUMBER IN YOUR ADDRESS

*This insures better delivery.
It helps you and it helps the postman.*



Electronic System Traces Movements of Freight Cars

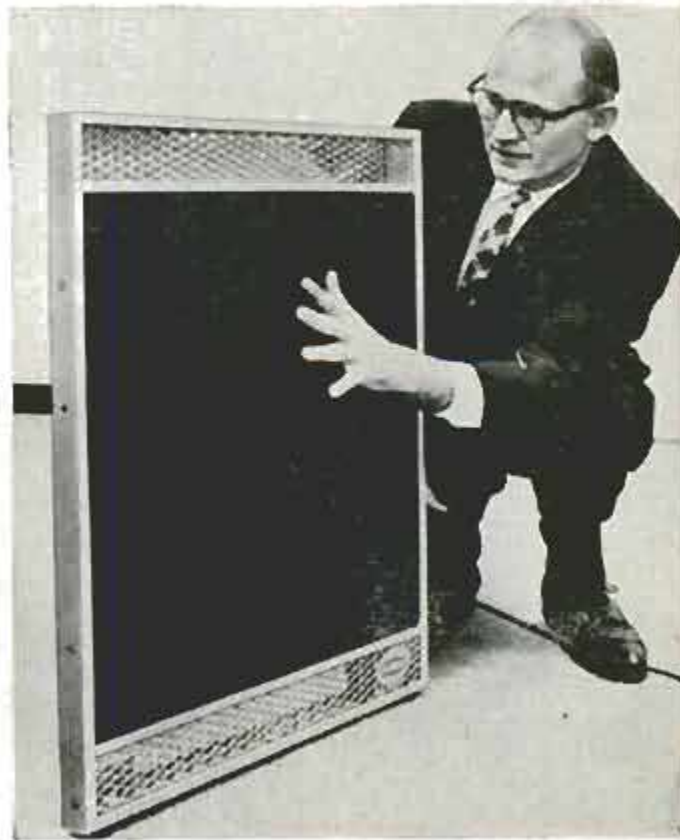
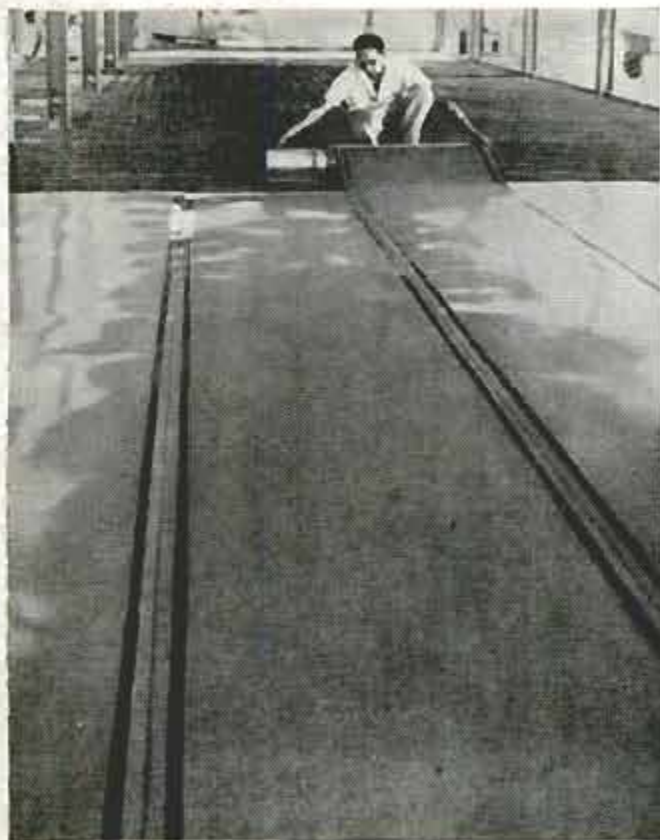
Identification of individual numbers on the cars of a fast-moving freight train can now be handled electronically. A small response unit (inset) is attached to each car. It transmits its individual identifying code upon demand. When the car moves

over an interrogator coil, even at speeds up to 100 miles per hour, the code number is registered in a local data-processing installation, which then can trace the movements and the location of any freight car at any time.

Radiant-Heating Paper Installed in Walls, Ceilings or Floors

When the copper-foil strips on the edges of a new building paper are energized with electricity, the paper gives off heat over its entire surface. The paper contains a colloidal silica, which makes it an excellent radiant-heat source with very low

heat inertia—it heats and cools off quickly. Applied to ceilings or walls, the paper provides quick, economical heat. Buried in concrete, it melts ice and snow accumulations. It can also be built into appliances as a heat source.



Faces



SEND US 20 Lawrence Welks. Rush. All Welks must talk."

This mysterious message was received recently by Don Post of Hollywood, probably the one man in the world who could do just what the telegram ordered—furnish 20 talking Lawrence Welks.

Post is the foremost rubber-mask maker in the world, and creating 20 Lawrence Welks is just an everyday job for him. The masks, ordered by Welk for organizations that sponsor fund-raising Lawrence Welk shows, were made with lips that would open when the mask-wearer wanted to talk.

Some people occasionally are unhappy with their facial expressions. Unfortunately, few are able to change them. But Post doesn't have to worry. If he doesn't like his looks all he has to do is put on one of the thousands of other faces hanging in his studio. He can don the face of Adolf Hitler, Neville Chamberlain, Joe Stalin or almost any movie or television star of today.



1. Don Post often works from pictures, modeling the face in clay. Here he makes a Lawrence Welk mask

2. After making the form, Post applies coat of casting plaster in the first step of making the mold

3. Form is filled with liquid latex which sticks to mold and forms mask, about 1/32 inch thick

4. After the mask is dusted and dried, all basic coloring is applied to the features with an airbrush



For Sale

By Jack B. Kemmerer

5. Post poses with a few of thousands of rubber masks he created on order and for mass production





"I believe that life masks offer one of the most satisfying means of expression," says Post. "The life mask was an ancient art carried on by Egyptian artisans thousands of years ago. Masks were chiefly used to carry out their religious beliefs by reproducing, on their coffins, life images of departed ones."

Today Post uses the life mask for many purposes. For example, just before World War II, the Chez Paree in Chicago staged an "Arms Conference" number in which the chorus wore the faces of Hitler, Stalin, Benito Mussolini, Edouard Daladier, Franklin Roosevelt and Chamberlain.

"Those were tense days, and feelings

6. For mass production, several masks are placed on conveyor belt, dusted, dried and colored by hand



A. Another method of making a face mask is by working directly from the subject so that an exact likeness is obtained. A rubber dam is placed around model's head, with area to be cast protruding. This determines extent of head to be molded

B. For direct application, a soft moulage coat is applied instead of casting plaster. The moulage is more comfortable and comes off easier when it dries. This is especially helpful if the subject has a moustache or beard. It also sets much more quickly than casting plaster does



C. When the coating has set for about three minutes and has hardened sufficiently, the cast and rubber dam are removed from the subject's face. Total time for setting and removing form is 30 minutes

ran high," Post recalls. "We had to take 'Hitler' off the floor after a plate of food was emptied on his head by a man at a ringside table.

"Various scripts are always calling for people of many different nationalities and they aren't always available," Post relates. "So we merely make a life mask of the type desired, and any actor or actress can then play the part. We made a dozen North Korean masks for a recent war picture."

Post does much more than just make rubber masks, however. A large amount of the work he and his specialists do concerns the designing and creating of studio and television props.

Post was a promising young sculptor in Chicago when he became interested in life masks. Starting in 1936, he experimented for several years to perfect his method of rubber-mask making.

The rubber shortages brought on by World War II forced Post to close his business, but in 1947 he reopened his studio in Hollywood. An almost immediate demand for his masks was created by movie studios and television producers.

The FBI once thought Brink's Express Company robbers in Boston got hold of some of Post's masks. Nobody knows for sure. Anyway, Post's job isn't making crime props; he just makes funny faces. ★ ★ ★

D. Casting plaster is then poured into the moulage model and steps for making a regular rubber mask are followed. Latex is poured into the cast and the mask is sent to the conveyor belt. In mass production many molds are filled with latex at one time

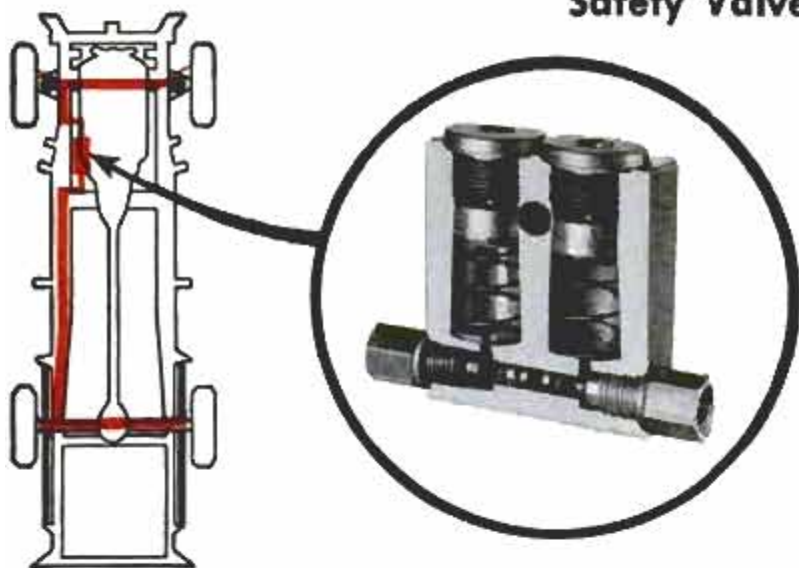




Stripe on Hose Spray Shows Right Side Up

Equipped with a white center guide stripe, a plastic hose sprinkler shows clearly when the right side is up. The hose lies flat and sprinkles a wide spray upward and to the side. It is reversible for use as a lawn soaker. The highly visible stripe eliminates the possibility of inadvertently laying the hose upside down. It also safeguards against accidental cutting by a mower when left on the lawn. Another new hose, made by the same company, is reinforced with nylon tire cord and guaranteed not to burst under high water pressure, even when turned off at the nozzle instead of the sill cock.

Safety Valve Prevents Total Brake Failure



Automobile accidents that result when brakes fail may be reduced with the development of a brake safety valve. The valve divides the brake system into two parts (front and rear), which operate as one brake. If a rupture in the hydraulic system occurs in the front part of the brake, the valve automatically shuts off the faulty section. If the failure develops in the rear, the valve blocks off that area, thus always assuring the driver of brakes on two wheels. The valves have been installed on 4000 cabs in New York City.



Iron Horses Retire in Parks

Steam locomotives may be losing their steam on railroad tracks, but they still will be around for a long time to come. Cities throughout the nation are placing them in their parks as historical markers. During 1958, eight locomotives, valued at \$50,000 in scrap metal, were donated by Union Pacific railroad. Requests have been coming in since 1954. So far the railroad has donated 27 engines worth \$200,000. Recent requests have been turned down, though, because right now there aren't any to give away.



Dr. Carl Austin prepares to set off shaped charge that uses bazooka firing principle to drill into hard rock

Bazooka at Work

The rocket-propelled "shaped charge" that blasted tanks and gun emplacements in wartime has found a peacetime job punching neat holes for industry

By Robert M. Hyatt

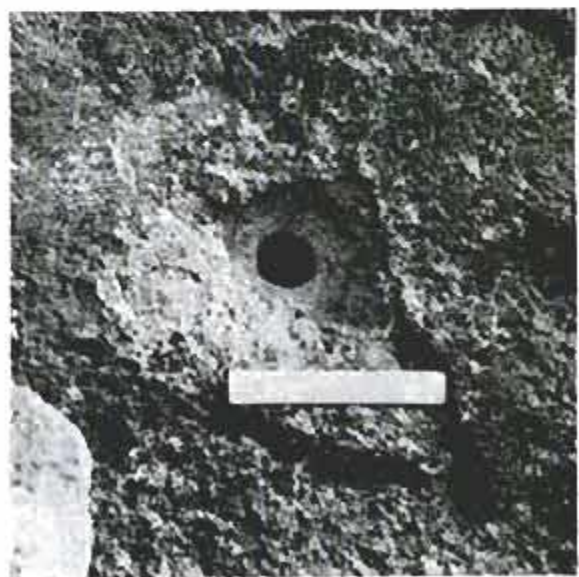
NOW THEY'VE put the bazooka—that fearsome weapon of World War II—to work as a precise, safe industrial tool.

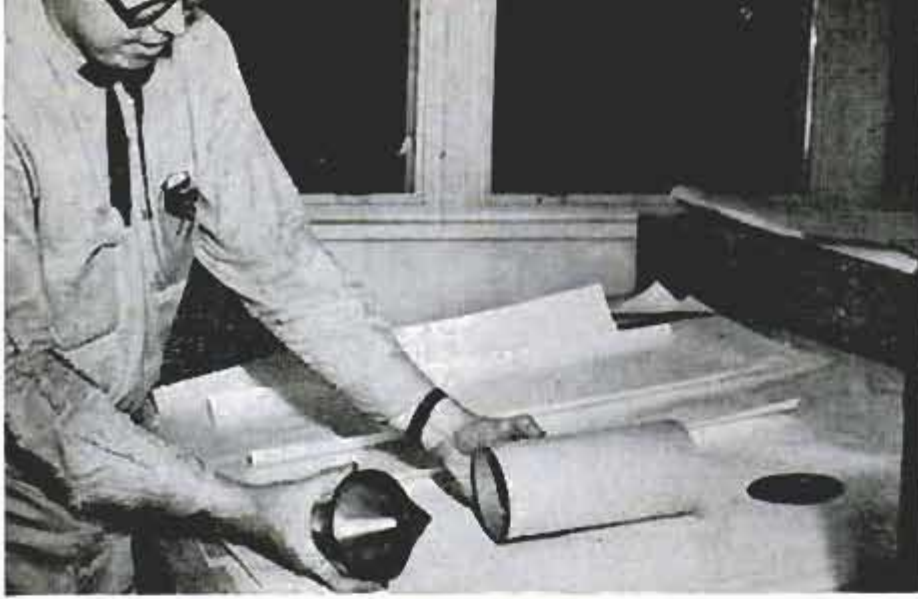
The bazooka-in-overalls is a shaped explosive charge which uses the same penetration principle that made the military bazooka so effective against steel tanks, concrete gun emplacements and other vital targets. The bazooka projectile is rocket-propelled and carries a shaped charge as its warhead. In short, this charge is a fast, cheap, safe method of shooting a clean hole into almost any substance.

Intensive research is going on in development of this little-known but highly efficient industrial tool at the New Mexico Institute of Mining and Technology in Socorro. Heading the project is Dr. Carl F. Austin, a young mining engineer.

Oddly enough, the field of mining reports fewer commercially successful experiments with this "hole punching" technique than do other

Head-on view of hole after explosion shows its size in relation to a six-inch ruler





Left, Dr. Austin fits steel cone into charge container. When exploded, pressure collapses cone and thin jet stream blasts forward to punch hole

Right, Dr. Austin measures depth of hole that can be made deeper by firing successive charges. Far right, result if rock is cracked before firing.

industries. Yet Austin is convinced that continued research will result in new uses in this and other fields. The oil and steel industries have been using the "bazooka" principle for some time.

What is a shaped charge and how does it work?

A shaped charge is any explosive charge which has been formed into a specific shape — cylindrical, beehive, cone, etc. However, the term is most commonly used to denote an explosive charge with a cavity at one end. There are three common types: flat end, unlined cavity and lined cavity.

The flat-end charge either dents or shatters the target. The unlined-cavity variety blasts a smooth, shallow crater. The lined-cavity charge creates a deep, narrow hole.

Since the lined-cavity charge lends itself to broader application, it's a good example of the functions of all shaped charges. The mechanism of the lined-cavity charge consists of a liner, a charge body, an explosive and a detonator. The detonation cycle begins with the firing of the explosive. When the detonation wave sweeps through the charge and slams against the liner, interesting developments occur.

As the detonation wave moves across the liner it creates pressures up to two million pounds per square inch. This enormous pressure collapses the liner. The vaporized fragments blast forward in a thin jet. This jet stream of liner particles punches the hole.

Here's an odd angle. When the explosion occurs only part of the liner material flows forward at high velocity. Most of it moves forward slowly, creating a "trailer" or slug which follows in a more leisurely manner.

Depth of the hole hinges on the shape and composition of the jet. To obtain the deepest hole, a long jet of high velocity and high density is required. The length of the jet is determined by the distance it

travels before striking the target. This distance is called the "standoff." If the standoff is too short the jet will be too short. If the standoff is too long, the jet loses its full penetrating power by spreading out much as a shotgun blast spreads.

The density of the jet depends upon the composition of the liner. And here is where the slug or "trailer" becomes a problem. Being larger than the jet, it often slams into the hole and plugs it. It has been found that cast-iron liners make clean holes with almost no solid slug. Glass liners give similar results but glass lacks high density, hence gives lower penetration. The same applies to zinc. Copper liners make a good hole but create an annoying slug.

A bimetallic liner is the solution in some cases. The inner part of the cone which forms the jet is made of copper, the outer portion of zinc. Result: a clean hole and no slug.

A lined-cavity shot produces a clean, smooth, slightly tapered hole in most substances—almost like that of a conventional drill. And most of the debris is blown out. In rock, only a little powdery dust is found in the bottom of the hole. Moreover, the rock is not appreciably shattered. Holes in metal are smooth-walled, since the entire penetration is accomplished by pushing aside the target material. A metal substance loses no weight as a result of the hole.

Successive shots can be fired to deepen holes. Dr. Austin tried two shots with four-inch cardboard-bodied charges in rhyolite; the first penetrated 14 inches, the second deepened the holes to 27 inches. The U. S. Bureau of Mines has penetrated 9¼ feet in epidosite, an extremely tough, hard rock, by using 17 successive shots in the same hole.

For mining, the shaped charge has a high potential. For example, a power or



trolley line is to be hung in an untimbered mine opening. Rather than bring in compressors, airlines, drills and other equipment, why not string out a series of shaped charges with lined cavities, connect them with primacord, and fire the works simultaneously? One or two men could do the job quickly by mounting the charges on sticks shoved into the ground, maintaining the proper "standoff." The result would be a series of holes ready for inserting hangers.

Holes at One Third Cost

In one test, two men worked three hours to dig a four-foot hole in hardpan. At \$1.50 an hour, the hole cost \$9.00. The shaped charge made an identical hole for about one third the cost, and in a few minutes.

Excellent shaped charges can be made of junk or makeshift materials, except for fuse and explosive. Liner material is almost unlimited: discarded glass or tin household funnels, beer or food cans, old

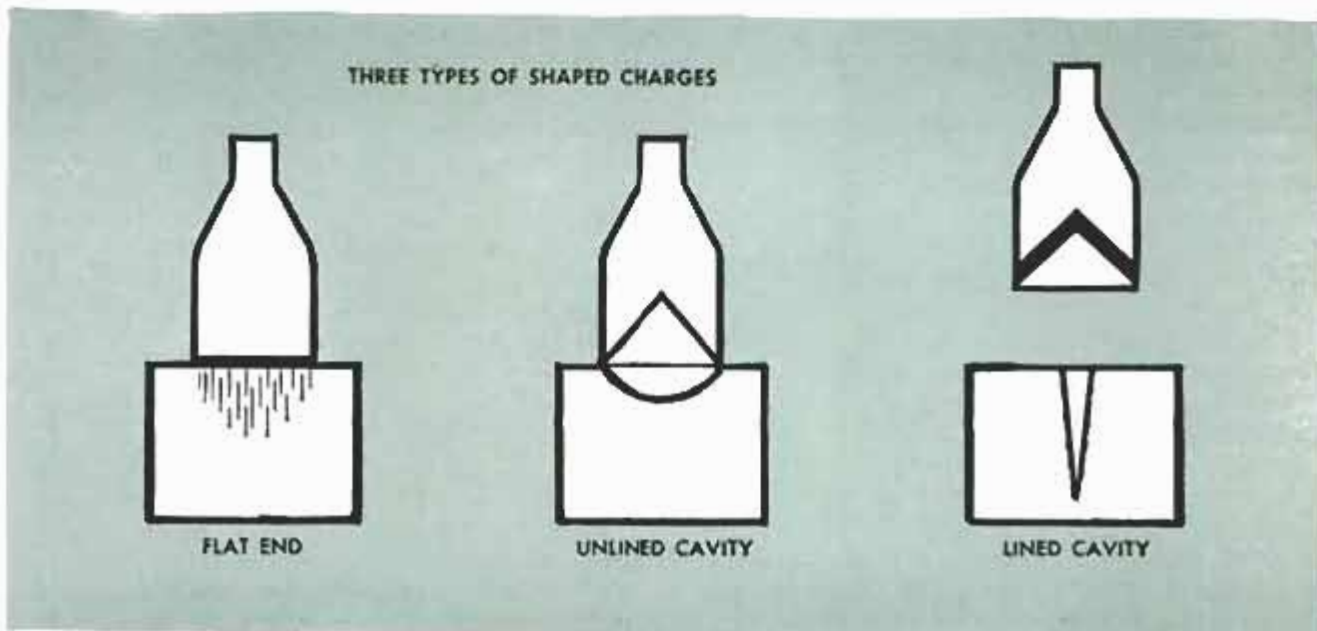
headlight reflectors, a scooped-out orange or grapefruit rind, or even mud. Explosive containers can be made of mailing tubes, round cereal cartons or tin cans. Experimentation with these materials in various shapes and sizes will provide the type of shot the job requires.

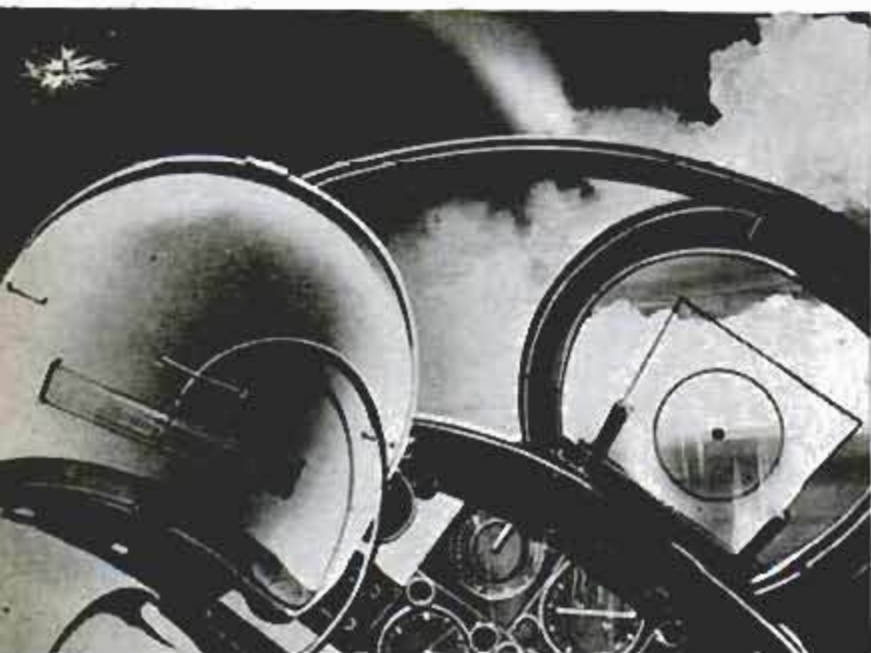
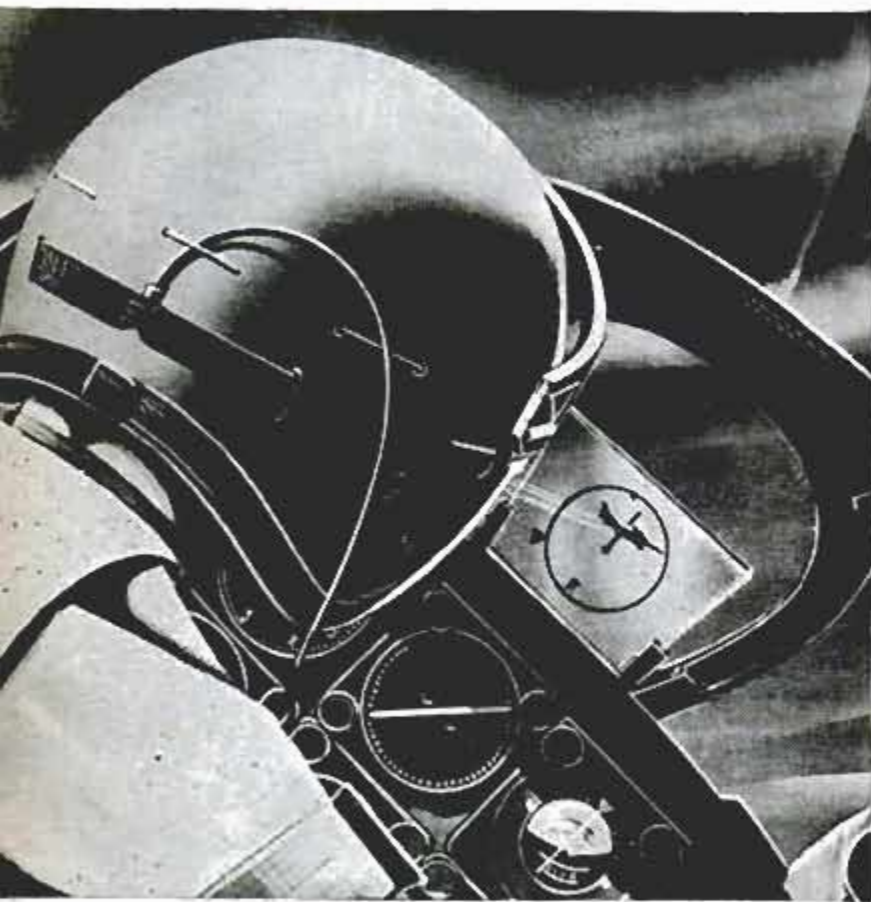
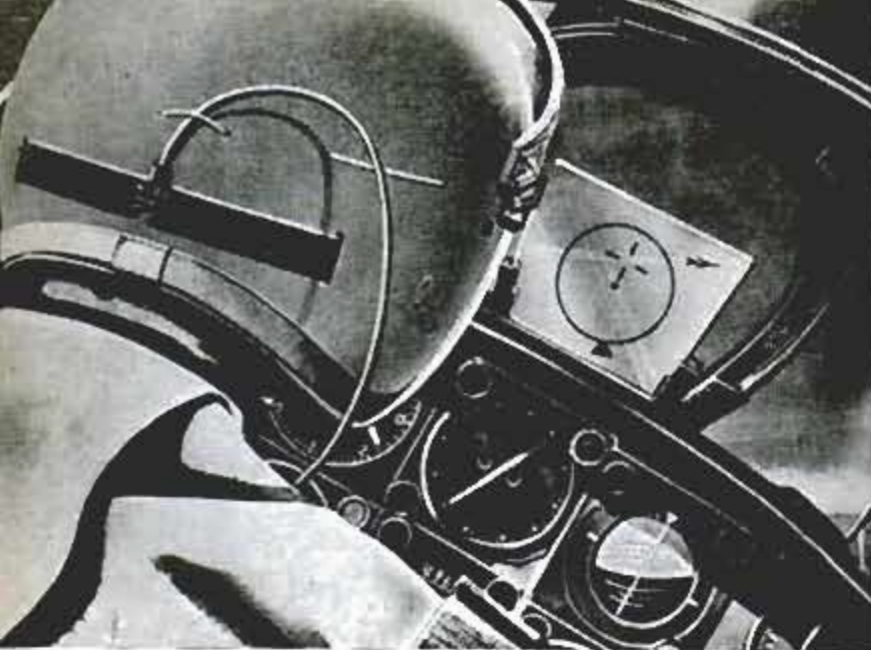
Many Uses Around the Farm

Around the farm or ranch there are many calls for drilling holes in the earth, through concrete, rock, metal, heavy timbers, or for dynamiting stumps. Ranch fencing is often difficult to install, but it becomes an easy, fast job by lining up a series—even a mile or more—of shaped charges, connecting them with primacord, and firing.

The portability of equipment for setting up shaped charges is an important factor. One man can carry materials for a dozen or more shots in a knapsack. This makes it easy to reach terrain that would be impossible with conventional equipment. A

(Continued to page 208)





Supersonic Fighter Has Computing Sight

SUPERSONIC F-104 Starfighters are equipped with an armament-control system that is comparatively simple. It has two parts: radar to detect and locate an aerial target, and measure the range to the target; and a computing gun-sight. After the target is located, the pilot maneuvers his plane to "kill" position with the aid of the optical sight, which automatically computes the direction in which the pilot should point the plane. In computing the aiming reference, the sight uses the range to the target, speed and altitude information obtained from the plane's instruments, and angular motion detected by the sight's gyroscope. The aiming reference is a circle with a dot in the center. The pilot attempts to superimpose this dot on the target as he closes in. The image is generated in the sight head mounted forward of the instrument panel and is projected upward onto a glass. When the system is ready for missile attack, a crosshair appears within the circle immediately above the dot. The pilot knows when he is within effective range by watching for a range "bug" or arrowhead that appears at three o'clock on the outside of the circle. When the arrowhead is between six and nine o'clock, a firing symbol — "F" — appears inside the circle. This is the span of time when the pilot may press the firing button. The arrowhead and symbol disappear at nine o'clock, alerting the pilot that he has reached minimum range. The system was developed by General Electric.

Top, Starfighter pilot maneuvers to align target with center of crosshair. Arrowhead moves clockwise around circle, telling pilot he is at maximum firing range

Middle, target is aligned with crosshair. Arrowhead is within maximum range and nears minimum range at 9 o'clock. Firing symbol "F" appears and pilot fires missile

If pilot does not break off his attack, crosshair disappears and pilot hears a warning sound, telling him he must turn plane to escape hitting destroyed target



Powered Railcar Has Dome for Sightseers

Self-powered, a new railcar built for the French National Railroad by Renault has a glass and plastic dome in the middle that gives its passengers an unobstructed

view of the countryside. The 58-ton car holds 88 passengers. It has an 800-horsepower diesel engine that operates a generator, providing power for motors.

Corrugated-Steel Shelter Below Ground Protects Against A-Weapons

Built for the Army for use overseas, an underground shelter made of corrugated steel is designed for protection against atomic weapons' effects. Tests with conventional explosives under high-explosive blast conditions show that the shelter can withstand blast pressures up to 60 pounds per square inch. Purpose of the tests was

to evaluate the entrance, blast arrestor and ventilation designs. Forty volunteers spent 24 hours in the shelter without difficulty. The heavy steel plates are bolted together in a parabolic arch seven feet high. The test unit, 68 feet long and 10 feet wide, was in an excavation 11 feet deep, and covered with four feet of soil.





Electric Door Has Power in Frame

Electric doors with power attachments that fit inside the door frame eliminate bulky hydraulic and pneumatic equipment. The all-electric mechanism fits into and is concealed in the 4½-inch transom bar that forms the top frame of the all-in-one-package door and frame. The door can be installed the same way as a standard, manually operated door. It can be used anywhere in a building and not just as an entrance door. The only requirement is that it be near a socket where it can be plugged into a 110-volt circuit. The compact electric assembly can be removed and replaced in about seven minutes. The door is designed to operate in all types of weather conditions, and will adjust its closing power to the speed of the wind, closing without difficulty against wind pressure. In case of emergency, the door can be opened manually in either direction.

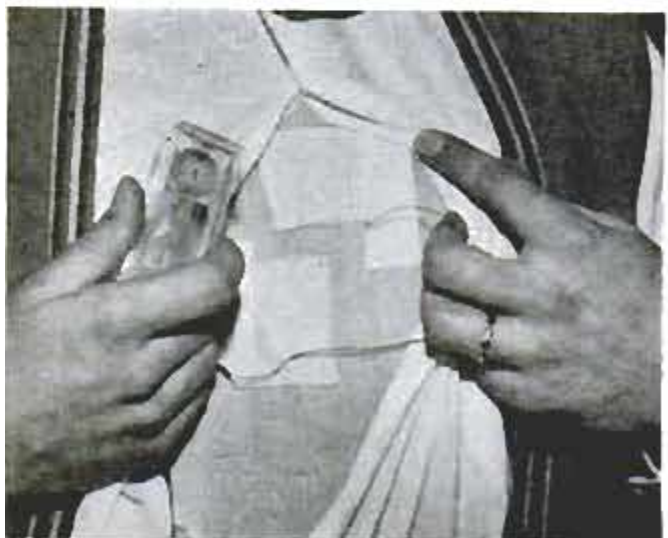
Guide Wheel for Collectors Tells Value of Old Coins

Values of old coins now can be determined quickly through use of a new guide wheel. By turning the wheel to the year the particular coin was minted, you can obtain the current value of the coin, whether it was minted in San Francisco, Denver or Philadelphia. Two types of wheels are available, one for pennies and nickels, the other for dimes and quarters. Each wheel has three photographic reproductions, showing coins in choice, fine and good condition, as a guide for the coin collector to judge the condition of his coins. Three separate values are listed for the coin, one for each condition.



Counter Taped to Chest Records Heartbeats

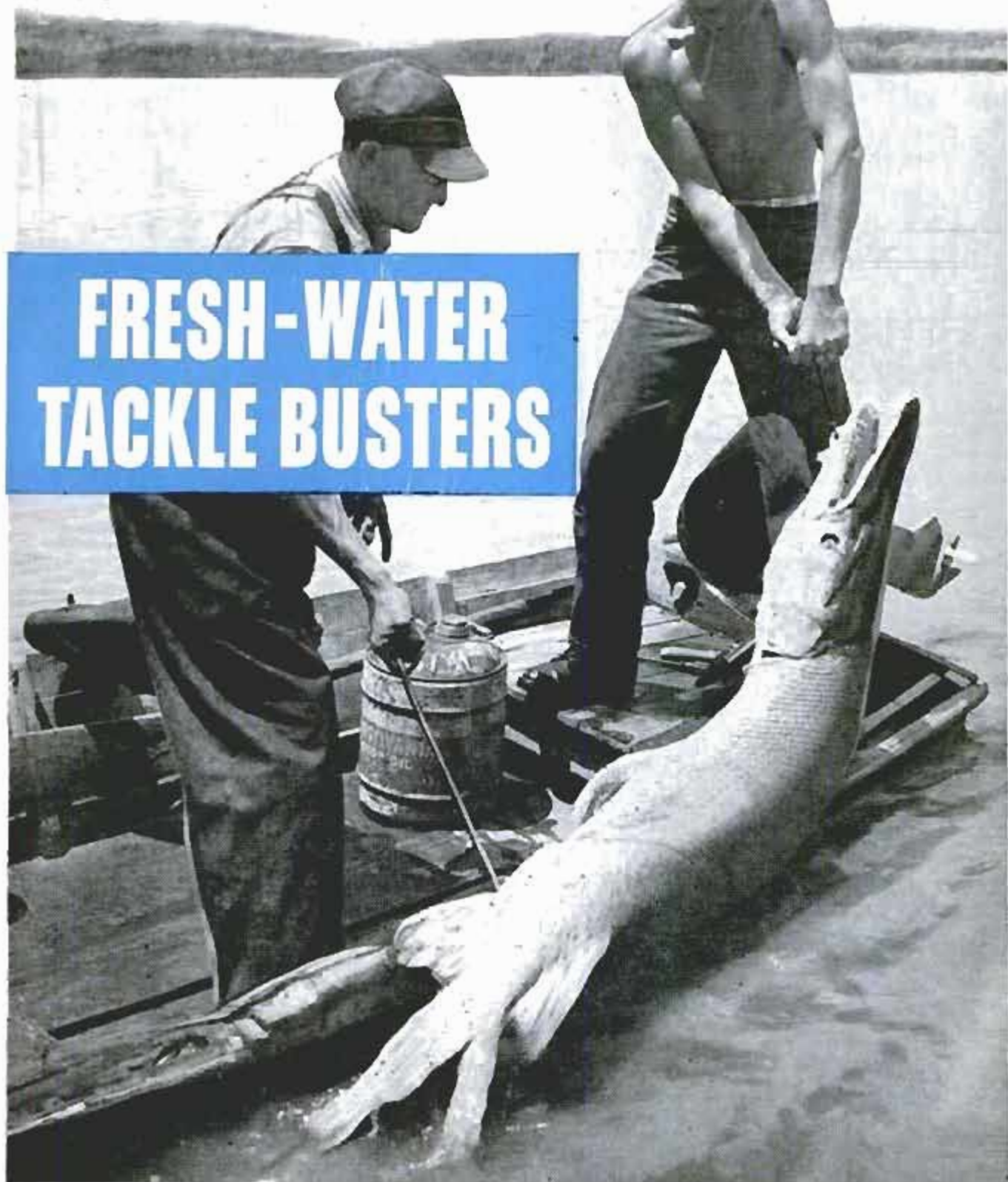
Expected to aid in the fight against heart disease, a tiny mechanism counts human heartbeats during a full day's activity. The instrument was developed by 35 volunteer engineers from Illinois Bell Telephone. Beats are counted by a watch connected to transistors in two plastic boxes. The boxes, carried in shirt pockets, are attached to the chest by taped wires. The instrument may help answer such questions as how hard the heart works, and the heartbeat differences between office workers and laborers, nonsmokers and smokers.



They're mean, ugly, obnoxious, and most fishermen hate them. But if you're spoiling for a battle, try gar

By L. A. Wilke

FRESH-WATER TACKLE BUSTERS



Big and vicious, the gar looks like he's half alligator. Commercial fishermen use hay hooks to land him

WANT TO SET A HOOK in the worst plug-ugly of the inland waters? Then try tangling with the gar, a rough fish that really is rough.

The gar is a prehistoric leftover. Science

says he hasn't changed during the millions of years since his creation. He's a tough, pugnacious, obnoxious monster of fish flesh that rips nets to shreds and busts tackle into splinters. Mean? Man, he's murderous.



Wire leader is a necessity in fishing for gar. If you fish for the big ones, you'll be wise if you use a heavy rod and reel. Gar don't tire easily; sometimes it is the fisherman that gives up first

Nobody but a thrill seeker would fish for him. Most anglers who consider fish a form of food wouldn't let a gar within miles of the kitchen.

Not rated as a game or sport fish, the gar is hated and rejected almost universally among fishermen. But if you are looking for a battle with a fish that might break up your tackle or toss you out of the boat, then try fishing for gar. It's fun—even though it's dangerous.

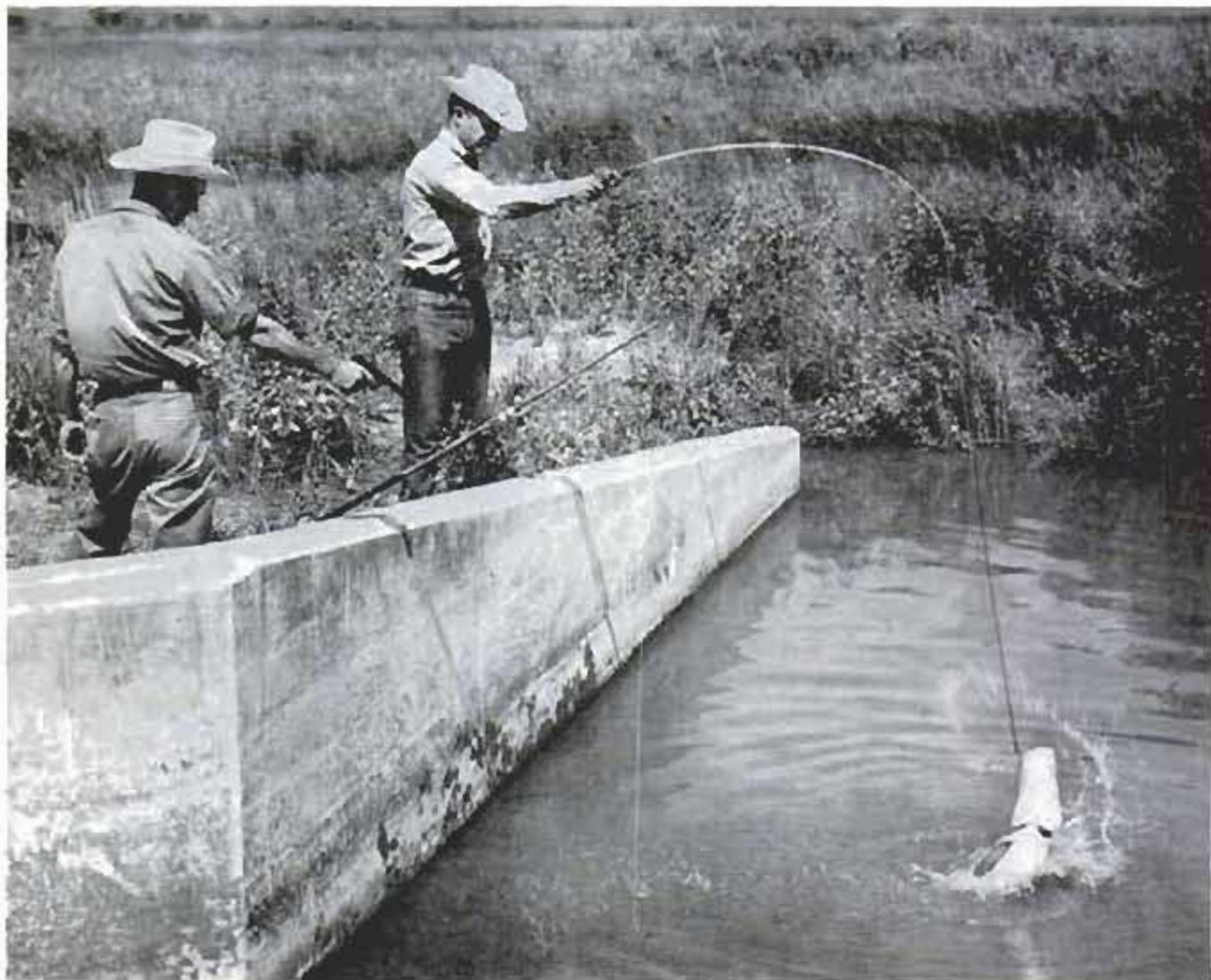
For tackle you can use whatever you want. Perhaps it might be more appropriate to say "what you don't want." The chances are good that the first gar you hook will leave you holding the butt end of a splintered rod.

There are four species of gar. The alligator gar is the most plentiful and the most dangerous. A voracious eater, it will consume its weight every day and grow meaner by the minute.

The alligator gar is found in the Mississippi and all its tributaries from their headwaters to the Gulf of Mexico.

Louisiana and Oklahoma have to contend with the alligator gar in their impoundments. It is one of the greatest predators of game fish, wild ducks and any-

In areas where it is permitted, gar fishermen frequently use pistols to finish off the fighting brutes



thing else that touches the water. Fishery biologists hate it. It destroys not only fish, but the water too.

Before setting out to catch the monsters, decide how far along you want to play them. I've landed them on light tackle, playing them back and forth until they're worn out. I've tried "horsing" them with heavy salt-water tackle (and came home with a stub of a rod).

Gar fishing is primarily a summer sport, but they also can be caught during the cold months, usually on bass p'ugs. Generally these are the smaller gar.

The big gar work in the summer and are easily found. When the water is hot they require frequent recharge of their oxygen bladder. To do this they roll on the surface. Usually you can locate them by the disturbance. Commercial fishermen on the river can tell you the exact spot where gar are likely to be found, and their advice is good to have when you start fishing.

Any bass rod with a 15-pound test line is adequate for landing gar if properly used. The method is simple. Use a wire leader, at least 18 inches long, with a large hook, about a No. 10 treble.

Bait this hook with a piece of smaller fish, or perhaps a fish head. Beef also can be used as bait, and beef heart is excellent.

Chicken viscera make quite tempting bait.

Use a large float, preferably a flat piece of cork. Put this float on your line a couple of feet from the hook. Toss the boiled hook into the gar-infested water. If the bait is large, small fish won't molest it too much. The big gar will nose the bait around for several minutes while you are impatient to set the hook. Don't try it. The gar is just teasing the bait, sometimes he'll cat-mouse it over an acre of water before he'll finally grab it in his long jaws.

This is the advantage of using a large float. It stays on the water easily and doesn't tip, like a cigar-shaped float. When the gar finally decides to take the hook, that's the signal to set it.

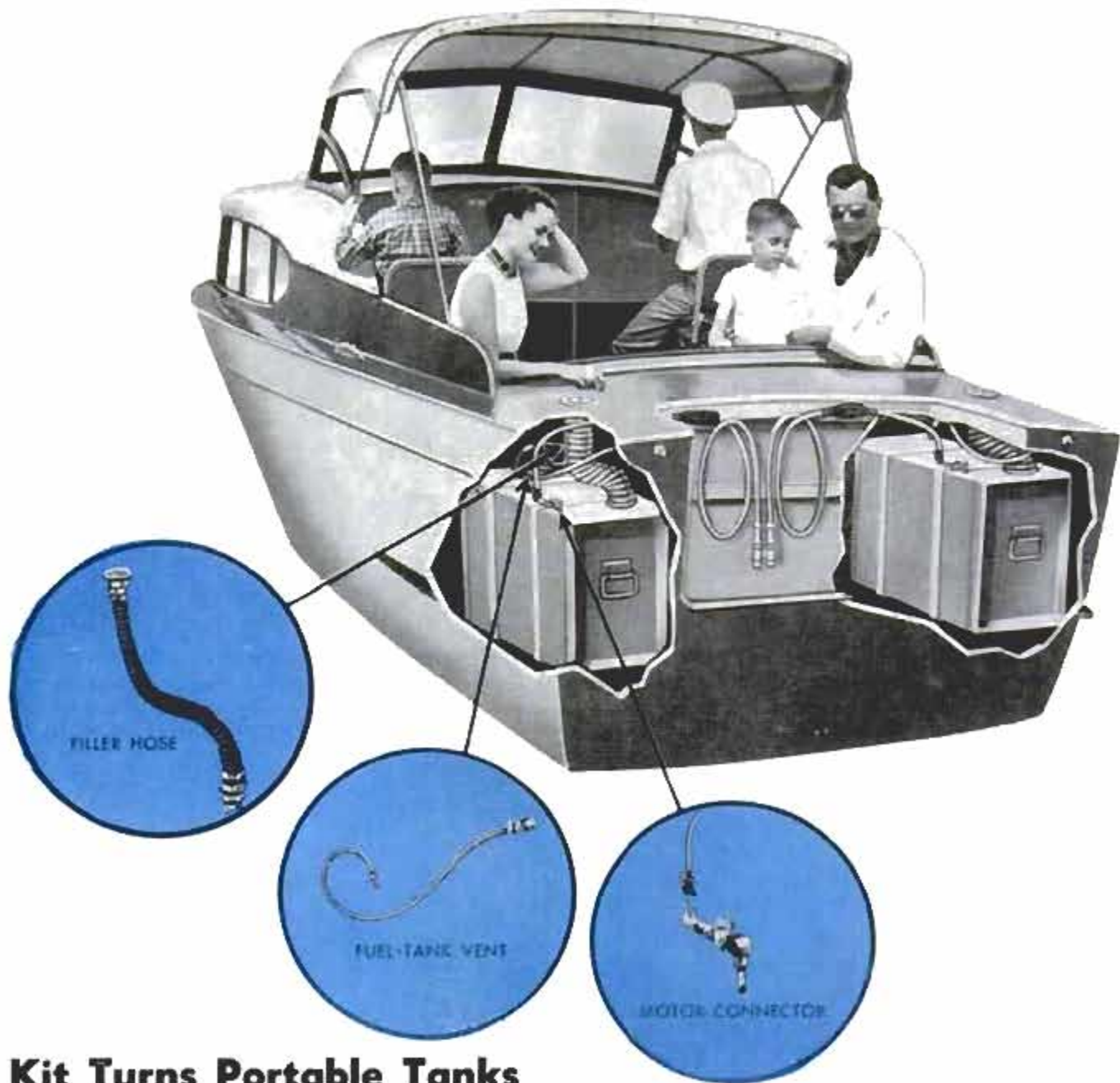
As soon as he feels the cold steel he'll start trying to throw the hooks. He'll lunge under water, jump out and sail through the air. Then he'll come roaring directly back toward you, and before you are ready for him he'll head out again.

Although you can have plenty of fun fishing from the bank, it's more thrilling to fish from a maneuverable boat. He'll pull you and the boat all over the place before you can finally subdue him. Of course if you are bank-fishing you also have an opportunity to pull him out on the bank if

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Beneath the ugly skin the meat is almost milk white. It is said to be fine eating—if you haven't seen the fish first. Right, smaller gar can be caught on bass tackle, landed with a gaff





Kit Turns Portable Tanks Into Permanent Ones

Outboard owners can now buy a kit that enables them to convert any portable large-capacity tank to a permanently installed one. The conversion saves the back-breaking work of lifting filled tanks, and eliminates the danger of spilling gas in the bilges when tanks are filled on board. The kit provides for venting to the outside of the hull. A flexible filler-hose incorporates grounding. Connectors are available for all outboards.

Pedestal Protects Policemen From Inclement Weather

Traffic policemen in Munich, Germany, no longer have to worry about directing automobiles and crowds in all kinds of weather. Hot sun or cold rain, they are sheltered from the elements by an umbrella-like pedestal that is fast gaining acceptance in other German metropolitan centers. The "traffic stands" are permanent fixtures in heavily traveled squares. Policemen mount them by ladder.





One of Hollywood's avid home craftsmen, Roy Rogers, gives sons, Dusty and Sandy, a hand with a shop project

Do It Yourself... Hollywood Does

By Bill Tusher

A TOURIST from Illinois once stopped outside the palatial Beverly Hills home of movie star Dick Powell and struck up a conversation with Powell's daughter, Pamela, who was playing on the front lawn.

"Does Dick Powell, the movie star, live here, little girl?" the visiting fireman asked.

"No movie star lives here," Pamela replied ingenuously. "We live here."

"But isn't your daddy Dick Powell?"
"Uh huh."

"Well, if he's not a movie star, what does your daddy do?"

"He fixes things!" Pamela exclaimed, and romped away.

Pamela Powell, then six years old, was not being smartalecky when she told the stranger that her illustrious daddy fixes things. Fixing things happens to be one

Don DeFore, popular movie-and-TV star, turns a child's sled into a coffee table in the workshop of his home

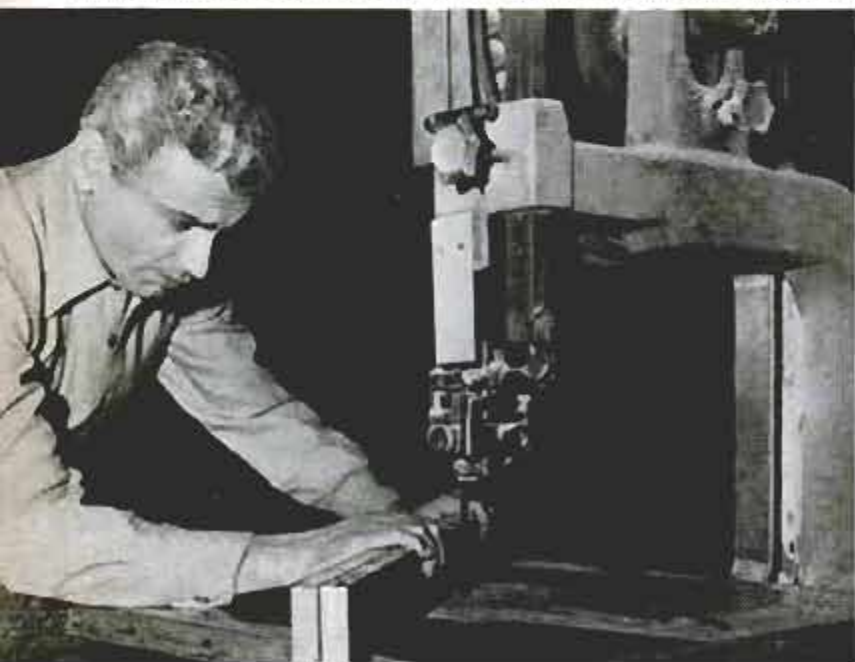




Don DeFore relaxes on a couch as he flips channels by remote control on homemade TV set. Shutters cover the set when it is not in use. Below, DeFore services built-in set without removing it from case. A panel behind set swings up to permit access



Jeff Chandler takes his workshop chores to the studio when he is making a picture. Here he uses equipment in studio workshop



of Dick Powell's numerous talents. And fixing things has become one of cinemaland's most popular pastimes, with Powell a charter member of Hollywood's thriving do-it-yourself colony.

Once known for wild parties and wild spending, Hollywood today has become the scene of a new kind of orgy—a mechanical orgy that finds the most glittering names of the screen climbing out of their glamorous occupational trappings into levis and becoming Mr. Fixits.

In addition to Powell, Hollywood's do-it-yourself cult numbers such varied personalities as Jerry Lewis, Don DeFore, Robert Ryan, Glenn Ford, Bill Williams, Roy Rogers, Jeff Chandler, Bob Cummings, Rod Cameron and Bob Stack, among others.

For some, the do-it-yourself idea is positive therapy. For others, it is an old habit. And for still others, such as George Montgomery, star of TV's "Cimarron City," it has become a vocational backstop against the insecurity for which show business is notorious.

In fact, Montgomery is a graduate do-it-yourselfer for whom that description is no longer adequate. He is a furniture-making whiz who parlayed his skills into a thriving custom-furniture factory bearing his name in Van Nuys. He has come a long and awesome way from his start as a resourceful Mr. Fixit around the house.

He personally was the architect and builder of the last three mansions in which he and his wife, Dinah Shore, have lived, including their current Beverly Hills home, and he has marketed these talents as the architect-builder of seven other homes. George doesn't simply oversee. He's the first one on the job in the morning, and the last to leave in the evening. He gets into blue jeans, literally rolls up his sleeves, and actually lays bricks, does carpentry and physically aids and abets the realization of his building concepts.

A recent example of his enthusiasm for build-it-yourself was afforded in the building spree he went on when he and Dinah decided it was time to get a horse for their daughter, Missy. This posed unexpected problems. They bought up some acreage in San



Dick Powell paints the playhouse he built for his children without any outside help. Dick's workshop activities date back to his childhood. Below, he cuts a strip of pine to be used for a picture frame

Fernando Valley with the intention of building a stable on the land, only to be informed that erection of a stable was not permitted unless there also was a house on the property.

Lesser men than Montgomery would have been discouraged. George forthwith built a \$50,000 house so that he would be entitled to put up the stable necessary to accommodate Missy's horse. He not only designed the house, but hired the crew and worked with them.

His Beverly Hills home is a glorified do-it-yourself shrine, alive with examples of George's know-how and imagination. Swimming pools may have become prosaic in Hollywood, but not the one George designed. The pool company insisted it couldn't be done, but George presented them with a set of blueprints proving it could. It consists of a children's shallow pool that serves as a platform for the adult's pool, which is set, stepladder-style, below it. He designed a special fountain that stands in front of his bedroom window and from which water spills into the children's pool, then rushes like a waterfall into the main pool.

Borrowing from old Chinese techniques, George set a chimneyless fireplace in the all-glass wall of the master bedroom he shares with wife Dinah. His purpose was to avoid obscuring their hilltop view of the city from the picture window of the bedroom. Visitors who see the fire blazing, with the smoke seemingly having no place





Hobbyhorse with its head in a vise is a project of cowboy star Bill Williams, an industrious do-it-yourselfer

Movie glamour boy Robert Stack admits that he's a grease monkey at heart. Here he hoists auto engine



to go, are mystified by the strange fireplace.

What George did was run a duct underneath the house, with a suction fan providing an auxiliary draft. The smoke is thereby channeled through the duct to an outside chimney located where it offers no obstruction to any window views. Another Montgomery touch was designing his home so that the dining room was built around a 60-foot avocado tree that was on the property before construction was begun.

George's talents as a Hollywood do-it-yourself alumnus, cum laude, have not been unnoticed. He was recently honored when the National Lumber Manufacturers Association, convening in Santa Barbara, presented him with the "Woodmaster of the Year" award (honoring public figures who display outstanding skill and interest in working with wood). The trophy, which George cherishes more than he would an Oscar, is a fine clock, fabricated of several species of hardwood and softwood.

Among the Hollywood luminaries who come by their mechanical bent naturally, Dick Powell is an outstanding example.

"I guess I'm a pretty good carpenter," Dick allowed. "I should be. By the time I was eight, my father had me building chicken pens."

At least once a week Dick puts on "any old shirt and any old pair of pants" and loses himself in a converted garage bulging with hand tools, a drill press, a combination power tool, routers and drills.

"My Sundays are murder," Dick said, re-



Bob Cummings, who builds models of old autos, has installed a cabinet workshop in wall of his bathroom

ferring to his only surcease from a back-breaking grind as a movie and TV star, a director and producer. "All I do is fix things."

His lavish home abounds with his handiwork—ladders, sawhorses and toys for his children, wigwam tables, a galaxy of picture frames made out of sandblasted plywood and pine, candlesticks carved of oak, and an elaborate sound system that Dick installed.

Dick has built a two-bedroom-and-bath addition to his beach home, and is constantly repairing things in fix-it binges that find him tinkering under the hood of his car or rebuilding a bed for his son, Ricky.

Dick's sound cabinet, consisting of three turntables, an amplifier, tuner and tape machine—it's so good "nobody believes I did it"—was a triumph of patience and craftsmanship. Dick painstakingly glued the whole thing together, resisting the temptation to use even one nail.

But perhaps his proudest if not his greatest triumph was the ingenious combination playpen and crib he made for his daughter while she still was a toddler. He used four-by-eight plywood for the floor, built 30-inch sides and joined them with 3/4-inch dowels to two-by-twos on the top. A gate inside the pen separated the crib from the play area. When the baby awoke, the gate swung open and latched, and the baby's five-by-four crib became an eight-by-four play area.

Both Jeff Chandler and Don DeFore got



Rod Cameron fashions a ship model. He has made a clipper, a slave ship, a revenue cutter and river boats

their first do-it-yourself yen in high school manual-training classes, and neither has lost his enthusiasm or aptitude for using his hands.

"I had shop class in P.S. 181 in Brooklyn," Jeff told me. "They were afraid we'd wind up in reform school if we didn't learn how to make things."

Jeff's garage workshop is outfitted with small saws, screwdrivers, hammers and a power tool featuring a five-way combination saw, a disk sander, lathe and a drill press.

"I always liked to fool around with tools and fix things," he acknowledged, but hastily added, "I took apart my Uncle Charlie's watch when I was a kid, and I never put it together again. I operate by guess and by hook."

Jeff has fashioned a wide variety of products of professional caliber. These include the bookcases, bookshelves, divan, settee and end tables at his home in Beverly Hills, which he recently bought from friends Tony Curtis and Janet Leigh.

He haunts second-hand stores for old furniture, which he later strips and refinishes. A sample of his ingenuity is the combination settee and storage-bin in his den.

"It seats three and a half people," he quipped.

Jeff used combination pine and plywood, sealed the storage area with two hinged doors, used foam rubber for cushions and

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Cable billboard is located along the Willow Run Expressway in Romulus, Mich., 300 feet from the road

Towering Aluminum Billboard Outwits Tollway Restrictions

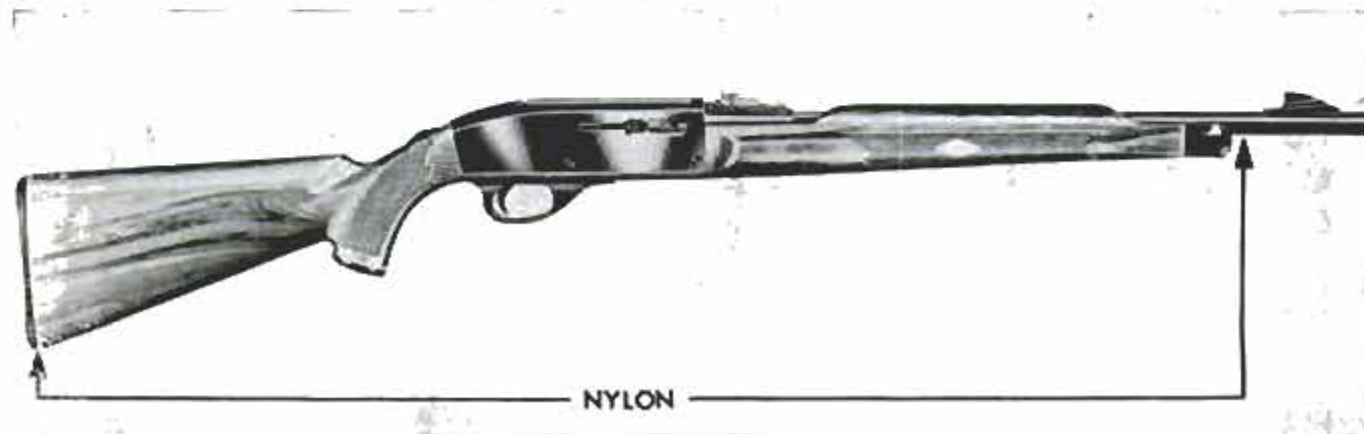
Designed to conform to distance restrictions for tollway billboards, a giant sign, 80 feet high by 100 feet long, can be placed half a mile from a roadway and still be read. Made of aluminum, its two

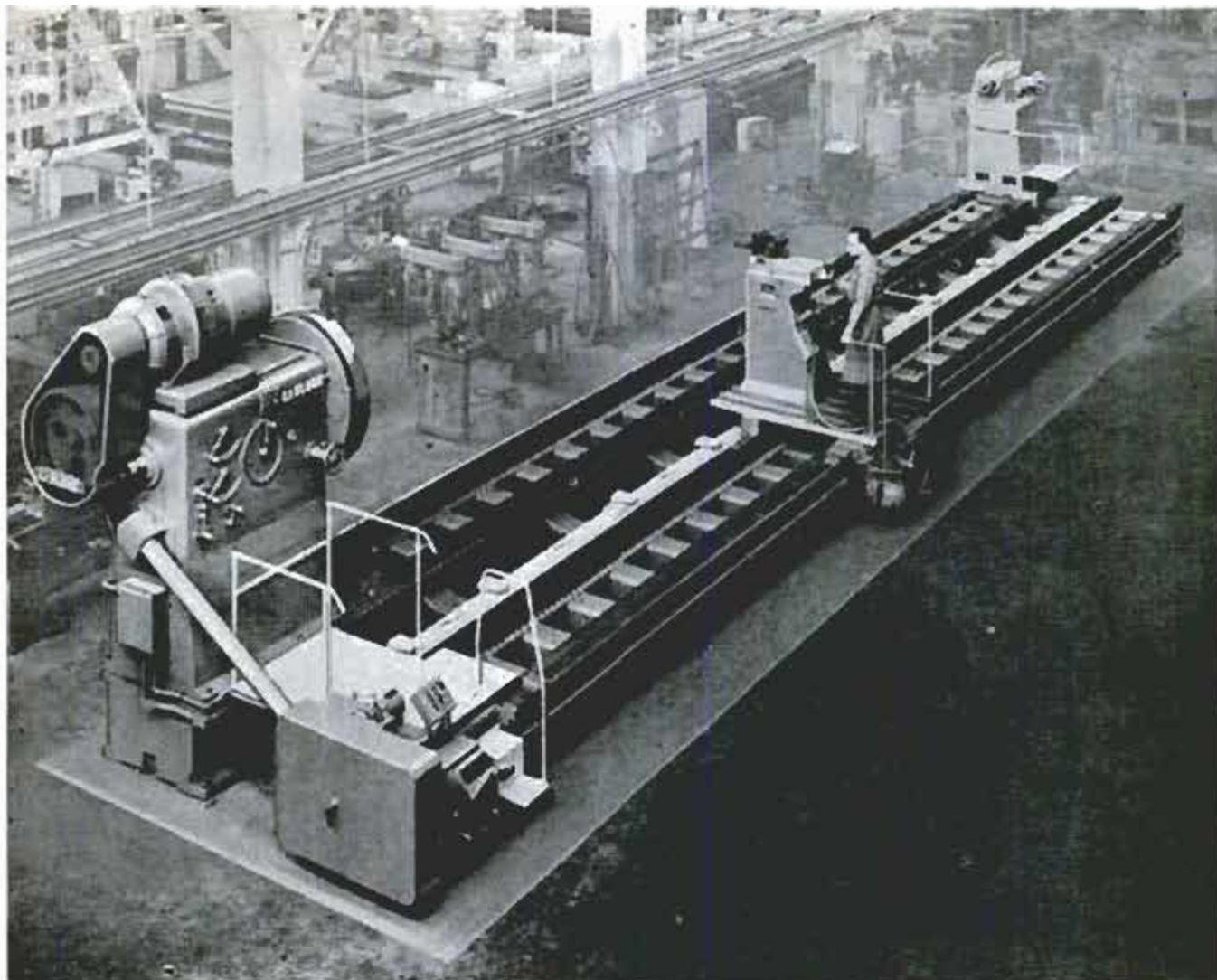
towers support a network of cables and sign panels on a suspension-bridge principle. Letters, fastened with clamps, can be changed at will. In wind, the sign billows either way as much as eight feet.

Nylon Rifle Withstands Rough Treatment

Unaffected by sunlight, water or insects, a .22-caliber rifle with many nylon parts is available to sportsmen for the first time. Its nylon components include complete stock, bolt handle, safety and trig-

ger. Said not to fade, crack or chip, the rifle was immersed in water, dust and mud in lab tests, yet accurately fired 5000 rounds. The rifle, with a 19½-inch barrel, weighs four pounds.





Huge Lathe Handles Rockets

Weighing more than 75 tons, a giant two-bed lathe, the first made in this country, may be used in rocket production. The lathe, 54½ feet long and 10 feet wide, can handle a workpiece 45 feet in length. Its 50-horsepower motor may seem small, but it will handle rocket workpieces which are large but light. The operator rides along on the lathe carriage.

Lights on Water Mark Seaplane Runway

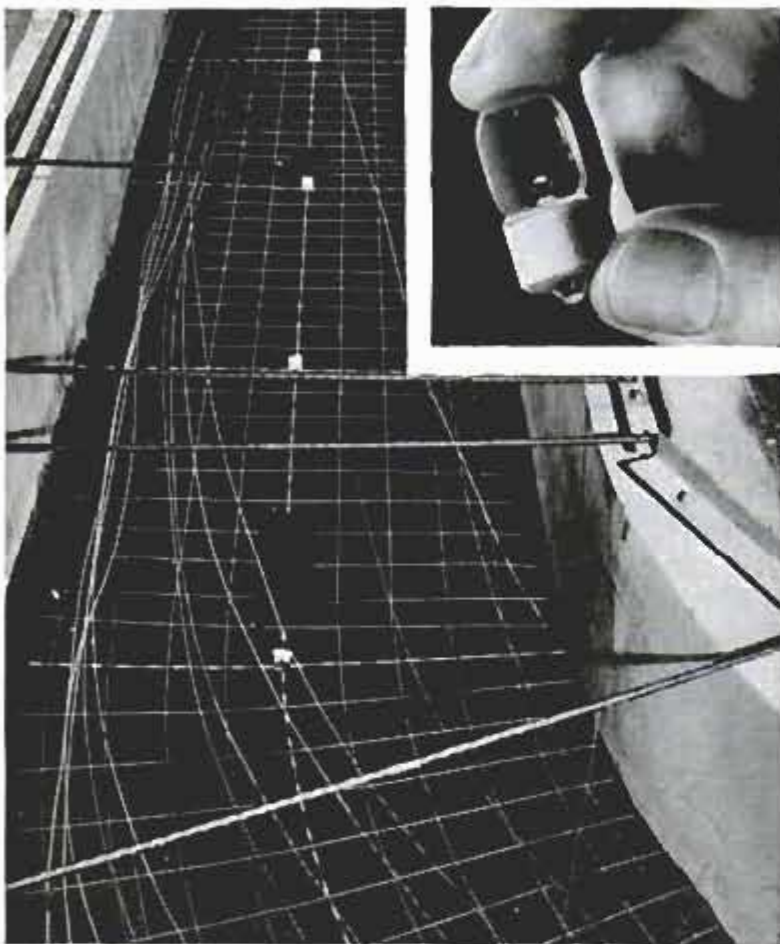
Brightly lighted ground runways have nothing on an illuminated water runway for seaplanes. Located at the Naval Air Station in Norfolk, Va., the runway has high-intensity lights that outline the beginning of a safe channel for landing planes. Floating lights later will be installed to make the channel 13,500 feet long.





Rubber-Covered Spring Holds Trunk Lid

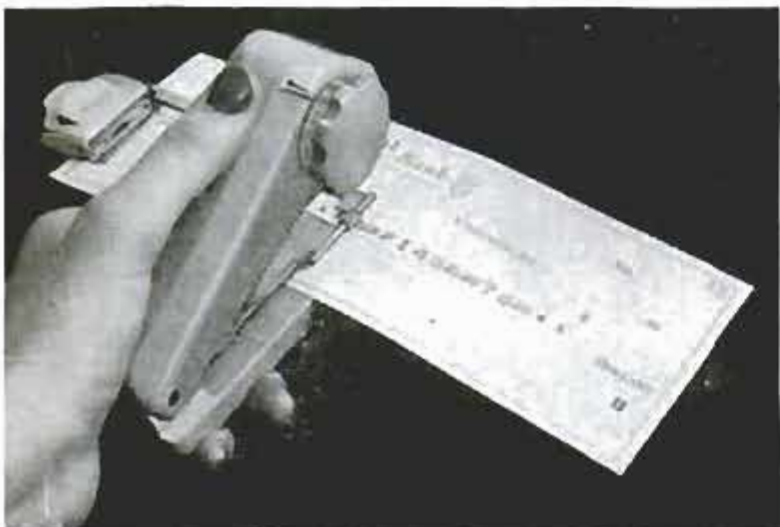
Sooner or later most motorists are faced with the problem of what to do with a flapping trunk lid when the rear compartment is so overloaded that the lid will not latch. A new rubber-covered spring, easily carried in the trunk, is one solution to the problem. One end of the spring hooks over the bumper, the other over the trunk latch. The spring is adjustable to hold the lid snug in any position.



Floating Light Bulbs Show Water Currents

Electric bulbs that float and light up when placed in water are being used to make picture studies of water-current activity. About $1\frac{1}{4}$ inches long and a half-inch wide, the bulbs have a built-in power supply. They last an hour, cannot be switched off and on, and are as bright as a flashlight bulb. They are being used in hydraulic studies by the Corps of Engineers Waterways Experiment Station at Vicksburg, Miss. During studies, bulbs are placed in an indoor water channel and allowed to float downstream. Pictures of the bulbs are taken as they follow the course of the water. As bulbs are recovered and released from various points, a number of light paths are photographed. This gives researchers sharp, clearcut pictures of water-current movements. Separation of water and light streaks is obtained by dyeing the water blue.

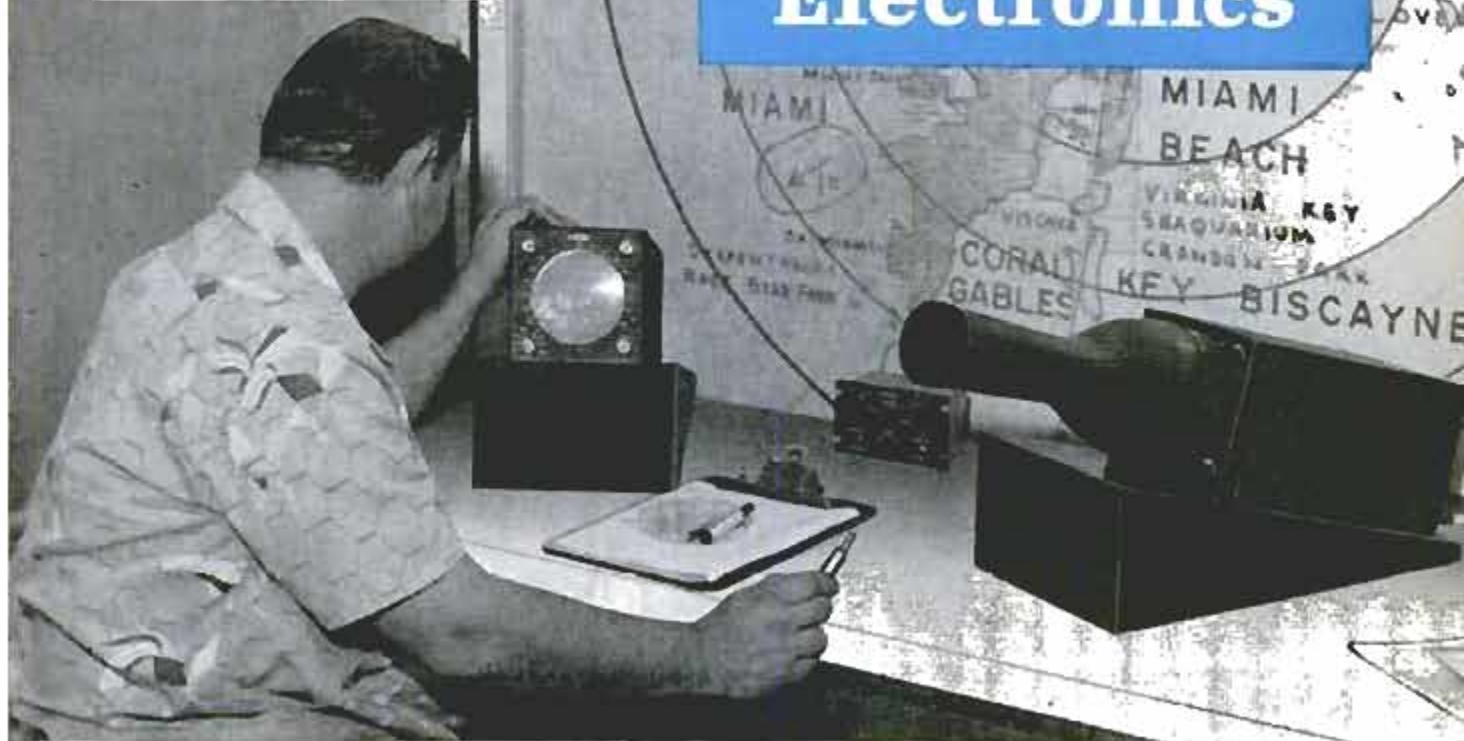
Curved lines mark paths of light bulbs. Horizontal lines are reference points on suspended grid. Insert shows bulb



Miniature Checkwriter Fits in Pocket

For protection against check alterations, a miniature checkwriter now can be carried with you at all times. The pocket-size model can produce an embossed check in the same manner as a full-size machine costing much more. The mechanism has an automatic inking pad and embossing attachment for insuring erasureproof checks. The moving parts of the little checkwriter are made of nylon and steel.

Radio Television Electronics



Radarscope provides data for plotting local weather conditions. Information is broadcast twice hourly

Back-Yard Radar Pinpoints Weather

By George X. Sand

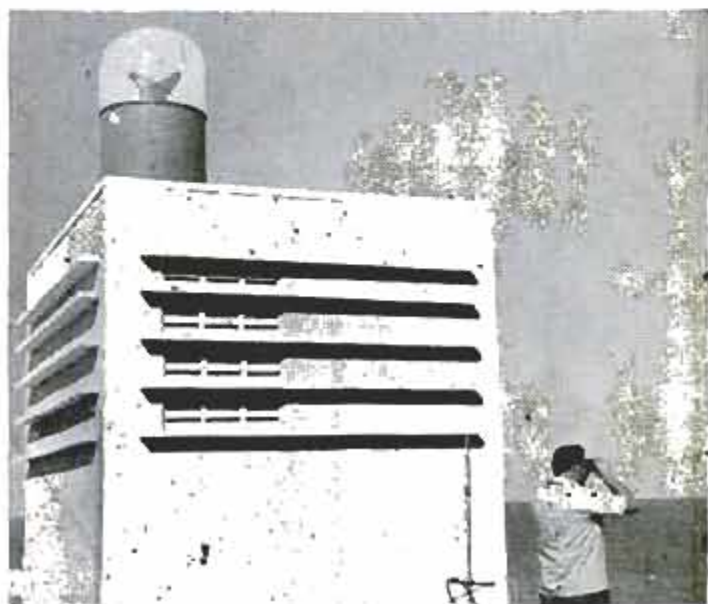
ATOP MIAMI BEACH'S Golden Gate Hotel is a radar studio which provides a unique service for residents of southern Florida. It plots the movement of weather on a local level and transmits short-range weather bulletins, twice hourly, over subscribing radio stations in Miami and Fort Lauderdale. As a result, small boats equipped only with a portable radio can now venture safely out onto the ocean when it is calm, secure in the knowledge of ample warning of the approach of sudden Florida squalls. Fishermen, golfers and other outdoor sports enthusiasts use the service to plan their daily activities, and even if they can't do anything about the weather, the information at least enables them to keep two jumps ahead of it.

Developer of the novel radar service is Arnold Dietz, an electronics enthusiast who is assisted in his work by a staff of some 15 persons—about half of whom are radar meteorologists. The equipment used for obtaining the weather data includes a radar system with a maximum effective range of 150 miles, two weather planes

and a 30-foot cruiser. The latter are employed for visual observations to back up the radar data.

The private radar station, said to be the first of its kind, may soon be joined in Florida and other areas by government stations providing similar information.

Atop oceanside hotel, radar antenna keeps vigilant eye on squalls and rain cells within 150-mile radius





BUILD A PICTURE RADIO

By Lou Garner

LOOKING FOR A construction project that's really different? One that is not only unusual, but easy to build, practical, and a conversation piece as well? If so, here's one that's made to order for you.

Outwardly it is an attractive but otherwise "dead" picture — just a decorative object which fills a blank space on your wall. But at the flick of a concealed switch it becomes a high-quality radio capable of excellent reception of broadcast-band stations.

At first thought, such a project might seem difficult. But it isn't. You don't have to be a whiz at electronics and you don't need a shop full of tools, or a lab full of test instruments to build this set. All you need is a little cash to buy the materials, some standard hand tools, enough skill to be able to use a soldering iron and, finally, a little spare time. The parts are relatively inexpensive and are readily available.

The Total Picture

A look behind the attractive exterior, Fig. A, reveals the components of the picture radio. Basically, it consists of a plywood panel which mounts a transistor-

radio chassis, a battery pack (made of eight ordinary flashlight cells), and a loudspeaker. The entire panel is surrounded by a boxed-in picture frame and the front surface of the panel is covered with a piece of loosely woven drapery material with a pattern to match the surroundings. The tuning capacitor and volume control (with on-off switch) are mounted on the side of the picture frame rather than on the receiver chassis so that these controls are accessible from the outside. The electronic heart of the project is a transistor receiver chassis assembled from a commercially available kit (see list of materials). The use of a kit presents a number of advantages. First, unless you already have some of the needed parts, it is less expensive to purchase the complete kit than it is to buy the various components separately. Then, when you buy a kit you receive a punched and drilled chassis which eliminates the most tedious and time-consuming part of any electronic project. Finally, the kit chosen for this project employs a tested and almost foolproof circuit; it can be purchased without a case, and all replacement parts can be purchased separately.

You needn't feel bound to using the

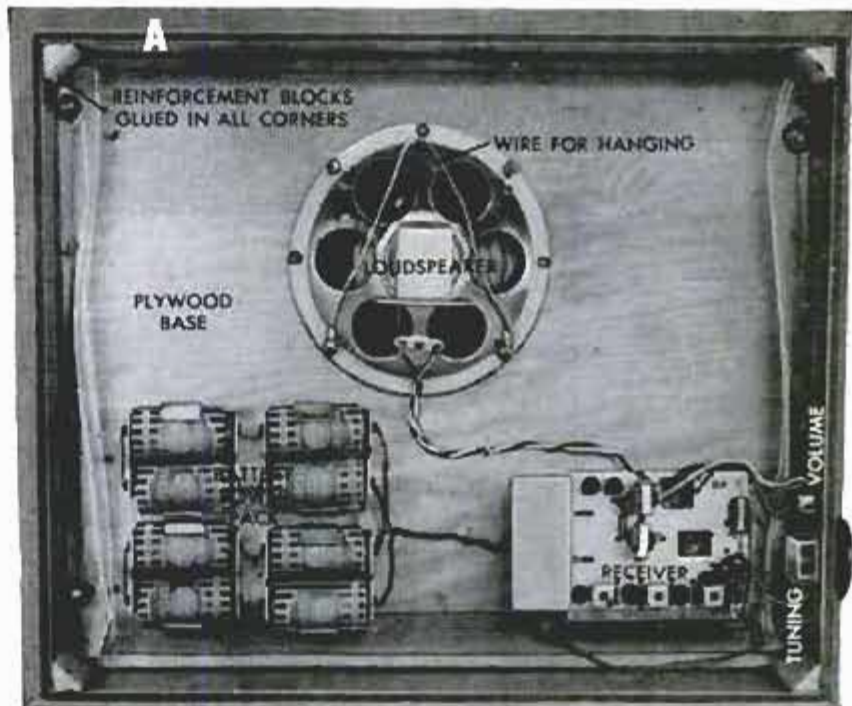
specified kit in your own project, however. If you prefer, you can purchase the individual parts and use a layout of your own design. You can even use the chassis of a commercial "factory built" receiver. But if you decide to use a different receiver chassis, pick a set having good sensitivity and capable of delivering good output volume. Preferably, the circuit should contain at least six transistors with a push-pull audio amplifier as its output stage.

Construction

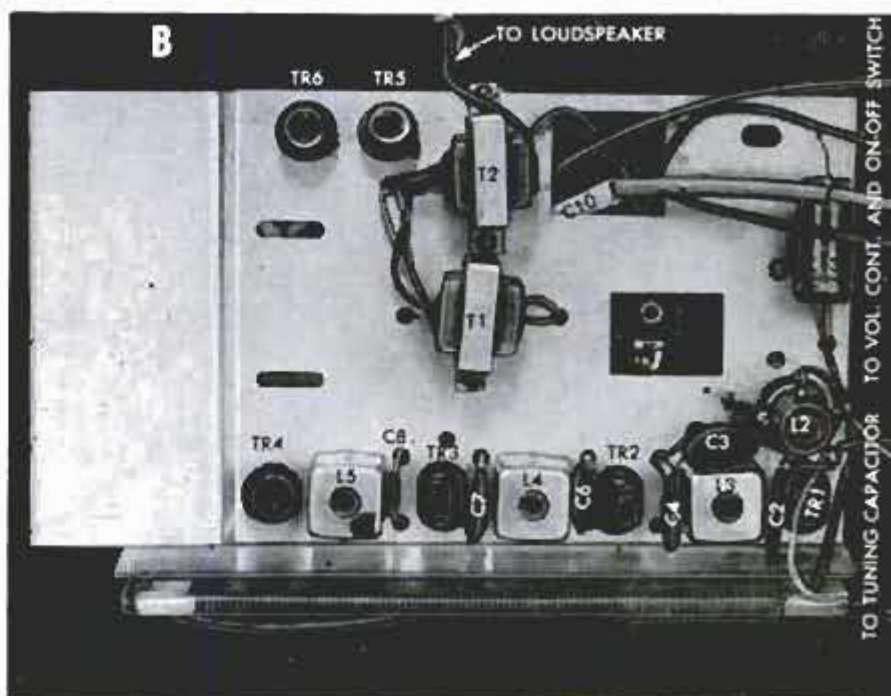
If you purchase the kit, you'll find that the receiver's assembly, in general, follows the step-by-step instructions furnished with the kit. If you decide to buy the individual parts, you can use the photographs in Figs. B and C as a guide for determining the physical layout. The schematic diagram on page 137 may then be followed for the actual wiring.

But even if you use the kit you'll have to deviate slightly from the furnished instructions manual. Being originally designed as a portable radio, the instructions call for mounting the tuning capacitor, the volume control, the speaker and the battery directly on the chassis. In this project, these parts will be mounted separately. In fact, the speaker originally supplied will be replaced with a larger unit, in the interest of better sound, and the originally recommended transistor battery is replaced with a battery pack composed of eight flashlight cells, for even longer battery life. The steps in the instructions manual dealing with the mounting of the speaker, volume control and variable capacitor should be omitted and the original battery snap-assembly wires should be replaced with two longer wires, capable of reaching the external battery pack.

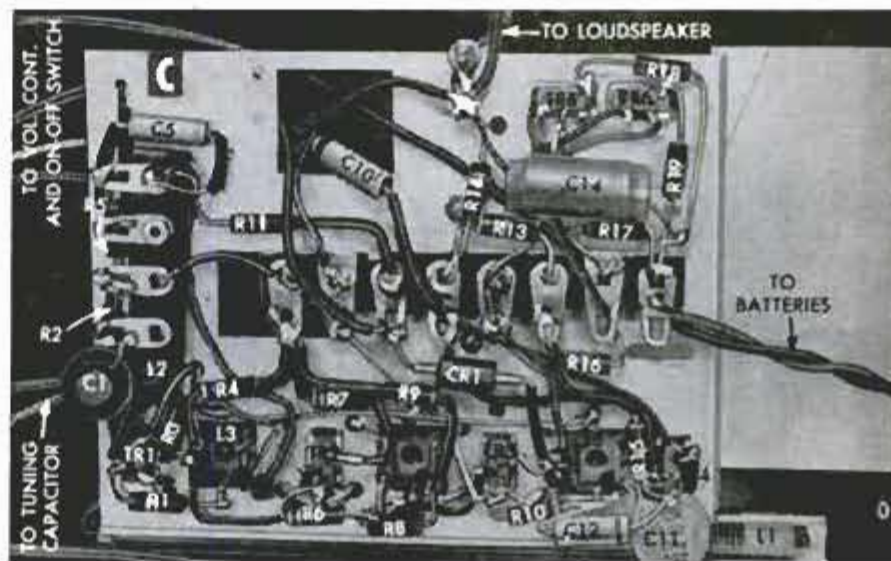
Similarly, the wires which connect the volume control and variable capacitor into the circuit must be long enough to permit the mounting of these parts separately from the chassis, Fig. G. Otherwise, except for the wiring of the phone jack supplied with the kit (the jack may be omitted altogether), all connections are as described in the manual. (The

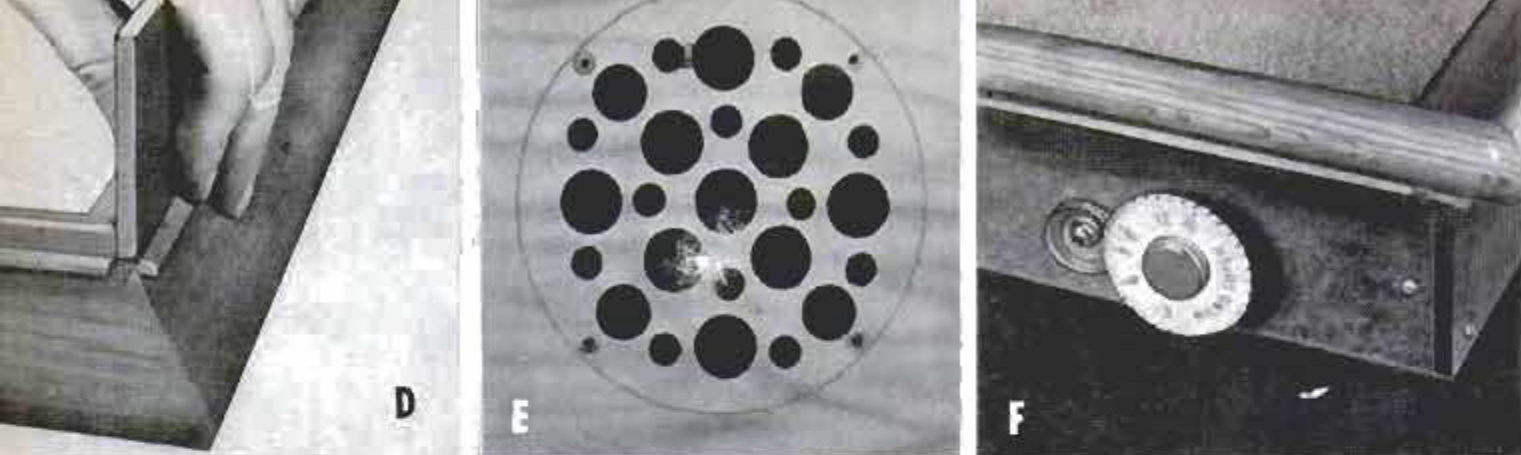


Rear view of complete picture radio. Arrangement of components should be balanced to minimize tendency of picture to tilt



Top view (above) and bottom view (below) of 6-transistor radio chassis used for this project. General assembly closely follows instructions supplied with kit but minor modifications must be made to permit separate mounting of some parts





D. Spacer strips are fastened to grooved picture frame. E. Hole pattern, rather than speaker cutout, prevents "picture" sag. F. Knobs are attached to protruding shafts of tuning capacitor and volume control

green wire from output transformer, T2, instead of being wired to the phone jack, must be connected directly to one of the speaker voice-coil lugs.)

Although the loudspeaker that comes with the kit could be used for this project (provided a wire is run from the speaker frame to the receiver chassis), a larger one will give far better results. Almost any permanent-magnet loudspeaker with a 4-8-ohm voice coil may be used. In general, the larger the speaker the better will be the resulting sound. A 6-in. or 8-in. round, or a 6 x 9-in. oval speaker will give excellent results. But choose one with a fairly shallow frame, since the loudspeaker, more than any other component, will determine the receiver's final depth and the distance the assembled "picture" will jut out from the wall.

When the receiver chassis is fully wired, all connections except those to the speaker and battery pack will have been made. The variable capacitor and volume control will be dangling at the ends of their inter-connecting wires, although these wires should not be excessively long since the parts will be mounted very near the receiver chassis in the final installation, Fig. G. The remaining unconnected wires—the green lead from output transformer, T2, and the two battery wires—will be connected during the final assembly. It is now time to tackle the picture frame.

The Picture Frame

Either a commercially assembled or a home-built picture frame may be used. Its size, shape and design are not critical. However, it should be sturdily constructed and, for best appearance, should have reasonably wide edges. For best sound, the frame should be large enough to act as a baffle for the loudspeaker. A 12 x 18-in. frame is a nice size for the average room, but a larger one may provide improved audio quality.

The basic picture frame must be "boxed in" with spacer strips made of 1/4-in.-thick hardboard or plywood. These strips are mounted on the back of the frame, as shown in Fig. D. To determine their exact width, measure the depth of the speaker and make the strips about 1/4 in. wider than this dimension.

For secure mounting, groove the back of the frame to accept the strips. Mount them with a good-quality cement, reinforcing with small wood screws driven in at an angle through frame and spacer. Corners should be reinforced with triangular wood blocks, glued in place, as shown in Figs. A and G.

Cut a 1/2-in.-thick plywood panel to fit snugly into the picture frame and drill a pattern of holes in the panel, see Fig. E, where the speaker is to be mounted. A pattern, rather than a single round cutout, is used so that the remaining wood will support the back of the "picture." Otherwise, an unsightly sag may develop

LIST OF MATERIALS FOR PICTURE-RADIO

6-transistor radio kit—Lafayette Radio Co. No. KT-119A; Separate PM loudspeaker—see text; Flashlight cells—Burgess No. 2. (8 required); Battery holders—Lafayette Radio Co. No. MS-176. (4 required); Material for picture frame—see text.

ELECTRICAL VALUES AND STOCK NOS. OF PARTS SUPPLIED WITH ABOVE KIT

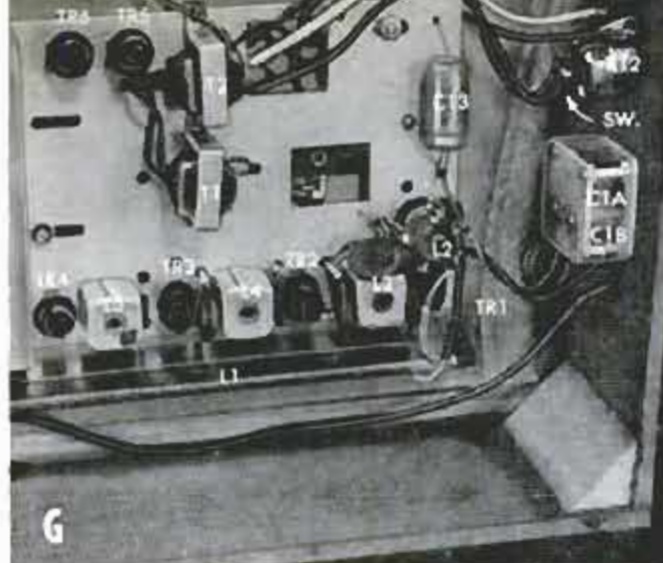
RESISTORS: (All 1/2-watt. K=1000 ohms) R1, R8=10K; R2=27K; R3=1.5K; R4, R10, R15=470 ohms; R5=68K; R6=330 ohms; R7=3.3K; R9=82K; R11=2.7K; R12=5K volume control with switch; R13=4.7K; R14=56K; R16=220 ohms; R17=33 ohms; R18, R19=10 ohms.

CAPACITORS: C1, C2, C3, C4, C6, C7, C8, C9=.01 mfd ceramic; C1A, C1B=Variable tuning capacitor, Lafayette No. MS-270; C5, C10, C12=10 mfd /15v electrolytic; C11=.005 mfd. ceramic; C13, C14=50 mfd./15v. electrolytic.

MISCELLANEOUS: L1=antenna loopstick, Lafayette MS-307. L2=Oscillator coil, Lafayette MS-422. L3, L4=transistor i.f. transformers (input and interstage) Lafayette MS-268A. L5=transistor i.f. transformer (output) Lafayette MS-269A. T1=driver transformer, impedance ratio—10,000; 2000 CT, Argonne AR-109. T2=output transformer, impedance ratio—400 CT. 11, Argonne AR-120.

TRANSISTORS AND DIODE: TR1=2N168A, TR2=2N293, TR3=2N169, TR4=2N192, TR5, TR6=2N188A, CR1=1N48

HARDWARE: Tuning dial=Lafayette No. 119-503. volume-control knob=Lafayette KN-23; variable capacitor mounting bracket=Lafayette 119-607; assorted screws, nuts, terminal strips.

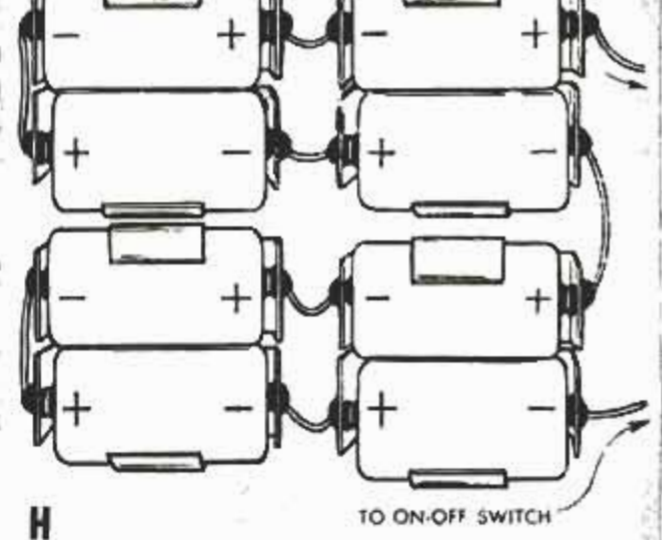


G Controls are fastened to spacer strip rather than to rectangular chassis cutouts as originally intended

as time goes by. Stain or paint the "front" of the panel some dark color.

Mount the speaker and battery holders on the back of this panel with wood screws. Now wire the four dual battery holders so that the individual flashlight cells, when inserted, will be connected *in series*, as shown in Fig. H. Be sure to observe the indicated polarity when inserting the cells. In fact, it is a good idea to mark the *positive* lug of each holder with a dab of fingernail polish to avoid errors when replacing the cells in the future.

Now select a suitable "picture" and fasten it to the front surface of the panel. In making your picture selection, make sure that the picture is printed (or painted) on *loosely woven* cloth to avoid muffling the sound from the speaker. A suitable design can often be obtained if you cut a single pattern from a piece of drapery material. Or, you can make your own. The design in the author's model was made by applying iron-on felt patterns to



H Battery holders wired for series operation of eight flashlight cells which replace suggested 9-v. battery

a piece of nylon marquisette. Since marquisette is sheer, a double layer was used.

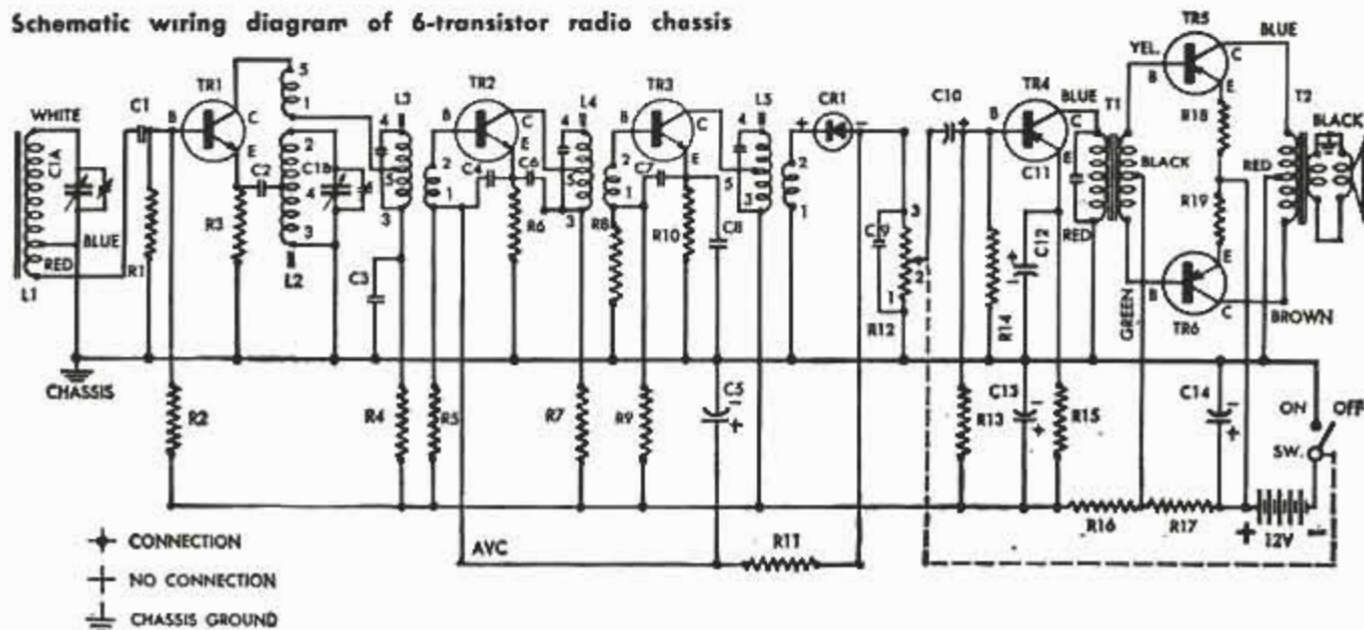
The picture is stretched over the front of the panel and secured to it with tape or staples around the edges or rear surface.

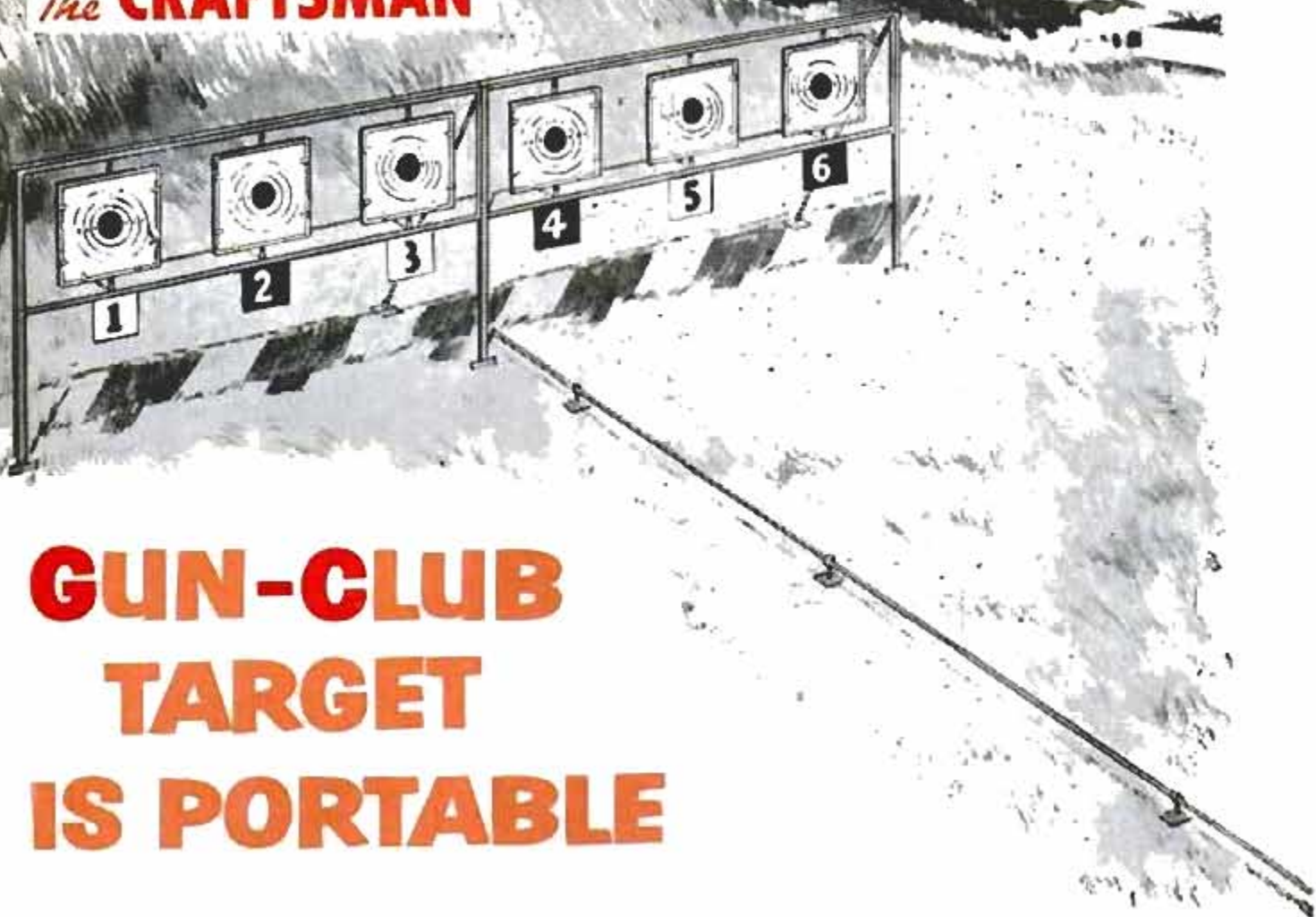
Fasten the panel, with speaker and battery holders mounted, to the prepared picture frame and secure it with wood screws and flat washers at various points around the circumference of the frame. Drill two holes in one of the spacer strips through which the shafts of the variable capacitor and volume control can be passed, and mount these two parts to the inside of the strip. If you have difficulty in mounting the capacitor directly to the spacer, fasten it first to the mounting bracket supplied with the kit and fasten the bracket to the strip

Final Assembly and Adjustments

You are now ready for the final phase of the project. Connect and solder the (Continued to page 206)

Schematic wiring diagram of 6-transistor radio chassis





GUN-CLUB TARGET IS PORTABLE

Small revolver clubs and other groups will want to build this unique rack which rotates as many as 30 or more targets simultaneously for slow, time and rapid-fire pistol practice. Easily dismantled for storing between matches

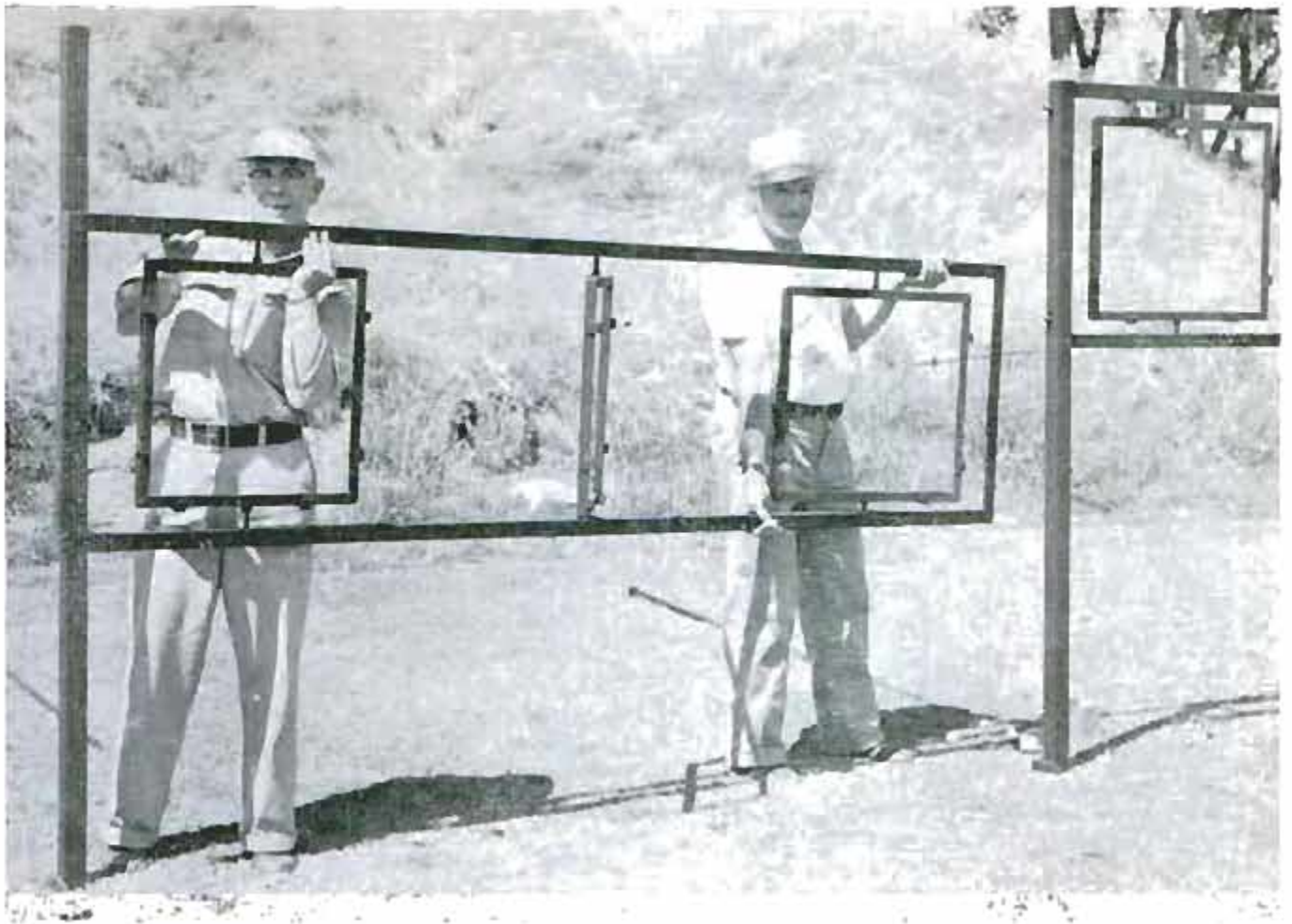
By Leo Rosenhouse

R EADY on the right, ready on the left, ready on the firing line," chants the range officer. A whistle blows, the targets pop up and members of the United Revolver Club of Sacramento, Calif., aim and fire at a novel pistol-target rack designed and built by members of the club. It consists of a row of pivoted holders that are ganged together to swing paper targets into view when a lever is moved. The target holders are mounted in groups of three in separate frames which are bolted together end to end and supported by braced posts. One, two, three or more sections can be made to suit the club's initial requirements, and additional sections added as needed. The original rack contained 10 sections, totaling 30 target holders. The complete rack bolts together, and the supporting posts, braced from the rear, merely stand

in holes in the ground. This means that the rack can be set up and dismantled in short order. In all cases, the rack should be erected in front of a knoll or dirt bunker to safely catch spent bullets. Clips on each holder permit standard paper targets to be inserted.

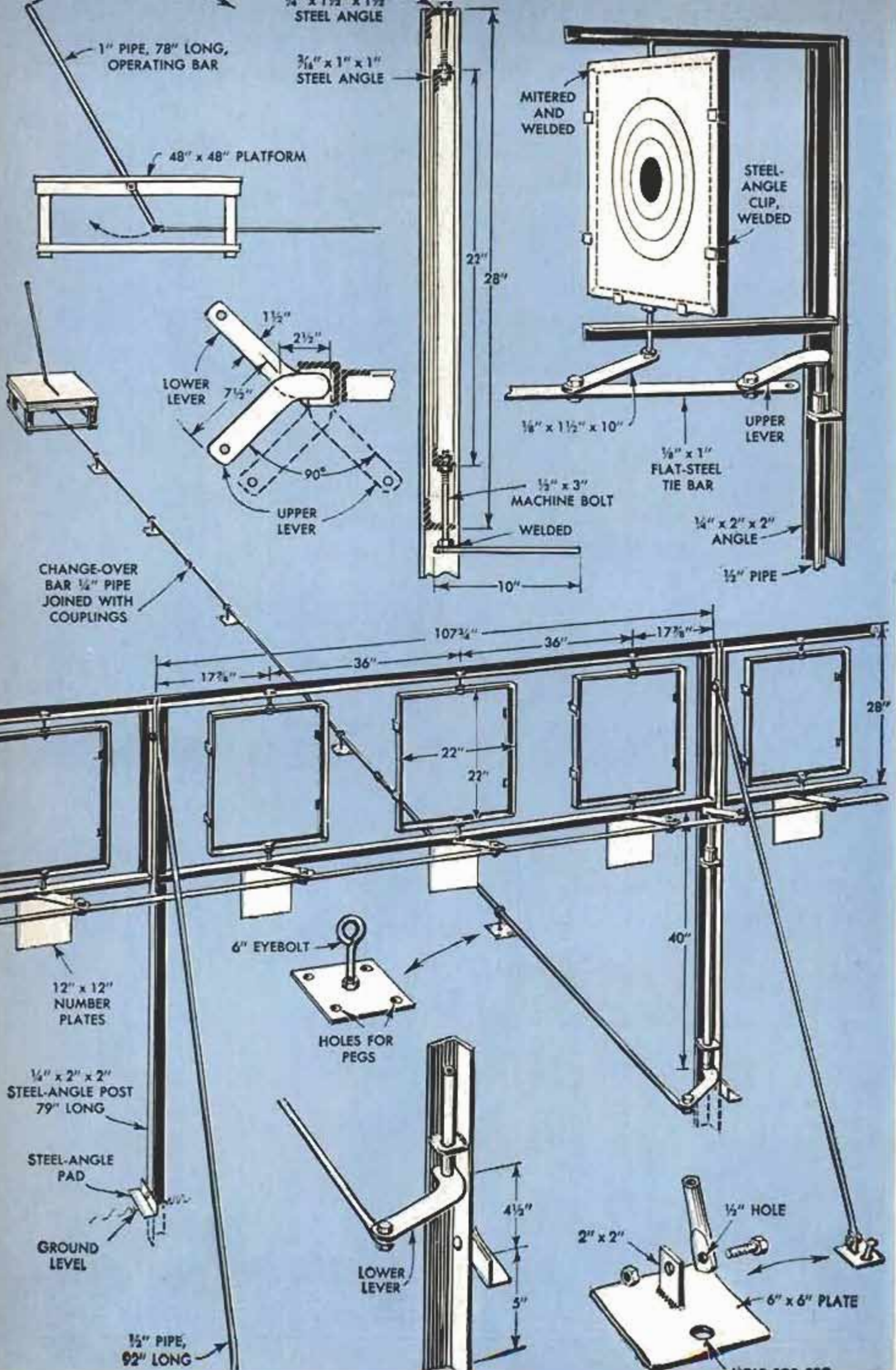
Flat steel, pipe and steel angle are used to make the rack, and a study of the details on page 140 will show how it works. A change-over bar, actuated by a lever pivoted in a platform located behind the firing line, moves a bell crank which, in turn, moves a horizontal tie bar to which the target holders are coupled. Throwing the lever rotates all target holders 90 deg. simultaneously at a given command.

The supporting posts of the rack are lengths of 2-in. steel angle which have 6-in. pads welded crosswise 5 in. from the lower



Erected in a row in front of an earth bunker, the sections of the rack, each of which contains three target holders, are bolted end to end between supporting posts. Standard paper targets slip into the holders



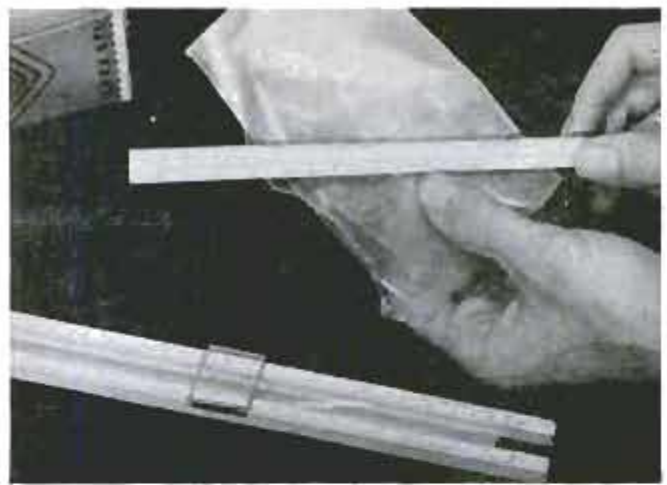


ends. These serve as stops in standing the posts in holes in the ground. All posts have $\frac{1}{16}$ -in. holes 3 in. down from the top and $1\frac{1}{4}$ -in. elongated holes 22 in. below the others for bolting the target sections to posts. You'll notice in the details that the post braces, which are pipe, are flattened at the ends and then drilled for bolts. The lower ends of the braces are bolted to anchor pads of flat steel which are staked to the ground with steel pegs.

Each target-holder section also is made of 2-in. steel angle, mitered and welded at the corners to form a rectangular frame $28 \times 107\frac{3}{4}$ in. Each frame is drilled at top and bottom at the points specified for $\frac{1}{2}$ -in. machine bolts which serve as pivots for the target holders. Holes are also drilled in the end members of the frames to match the spacing of the holes in the posts. The paper-target holders are all made the same size, 22×22 in., from 1-in. steel angle. These are likewise mitered and welded at the corners, after which short pieces of steel angle are welded to the sides and bottom members to hold the paper targets. A hole is drilled through the top and bottom member of each frame for the $\frac{1}{2}$ -in. pivot bolts which lock to the frames with double nuts. In the sectional view, you will notice that arms of flat steel are welded to the heads of the lower bolts. In their final position, the arms should be at a 90-deg. angle to the frames. Holes are drilled in the outboard ends of the arms for short bolts which pivot the arms to a flat-steel tie bar.

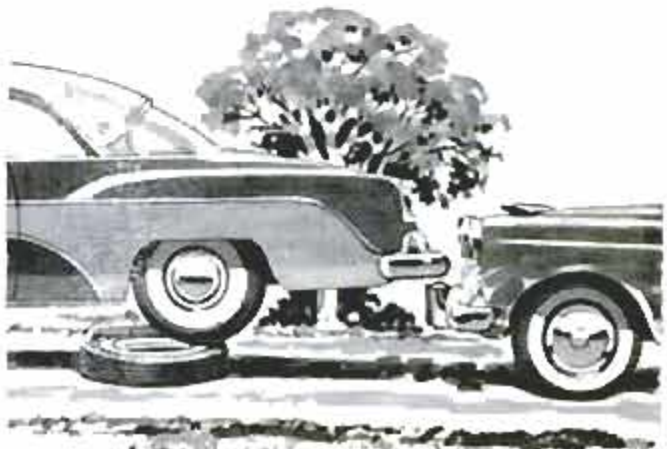
The tie bar, consisting of 10-ft. lengths, is shifted back and forth by a bell-crank assembly which pivots in one of the posts. This consists of a length of $\frac{1}{2}$ -in. pipe passing through holes in two brackets that are welded to the inside of the post. A coupling in the pipe provides a shoulder which rests on the upper bracket. Two offset levers of flat steel are welded to the ends of the pipe in a reverse pattern. The upper one is pivoted to the tie rod and the lower one to the change-over bar. A push-pull movement of the latter shifts the tie rod back and forth and, in turn, rotates the target holders all at the same time.

The long change-over bar is lengths of $\frac{1}{4}$ -in. pipe coupled together and supported in a series of eyebolt hangers anchored to the ground. Each end of the change-over bar is flattened and drilled for bolting it to the bell crank and to the operating lever. The latter is a length of 1-in. pipe pivoted in a wooden platform located behind the firing line. The range officer stands on the platform and works the lever. The latter works back and forth in a slot cut in the platform deck. A little grease applied to all pivot points will make the targets rotate freely. ★ ★ ★



Lubricating Slide Rule

When the sliding member of a slide rule becomes difficult to move, it can be lubricated by rubbing the edges with a piece of waxed paper. Wax rubbed from the paper will lubricate the slide.



Unlocking Car Bumpers

Use the spare tire from each of the two cars as "ramps" when bumpers are locked, to permit the car with the bumper on top to lift itself free. Both cars are driven slowly forward until the top bumper is lifted free as the car climbs the tires.

Glue Spreader

Applying glue uniformly is easy with this spreader. It is made by filing notches in the edge of a plastic windshield scraper.

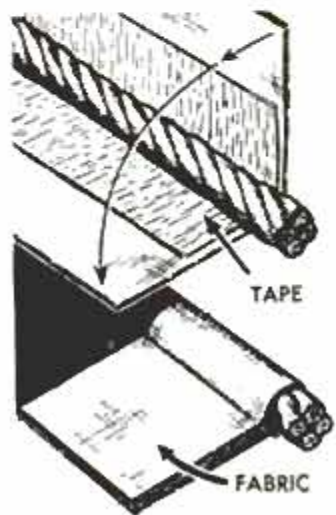


Shop Scratch Pad



More convenient than a pad of paper, a child's "Magic Slate" will come in handy in your workshop for jotting down details and dimensions. Notes are easily erased merely by lifting front overlay.

Tape Saves Sewing Welting



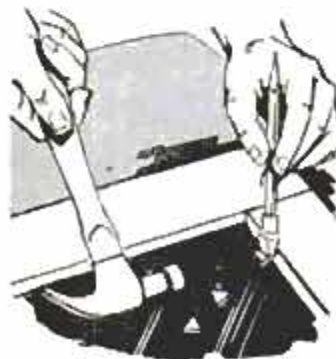
A neat way to make furniture welting is to use double-backed masking tape. The protective paper is removed from one side and the tape is stuck to the fabric. Then the second protective covering is peeled off and the welt cord is stuck to it. Finally the tape is folded over.

Slit in Cork Holds Recipe



Of the many different ways that have been suggested to hold a recipe card, a cork in a bottle is one of the simplest. Wedged in a slit cut in the cork, the recipe card is easily viewed and there is little chance of its getting soiled since it is held high, dry and safe.

Pencil Positions Glazier Points



Bruised fingers can be avoided when embedding glazier points in a sash if you use the eraser end of a pencil to hold them while driving. Lets you see what you are doing, too.

NEW LIFE

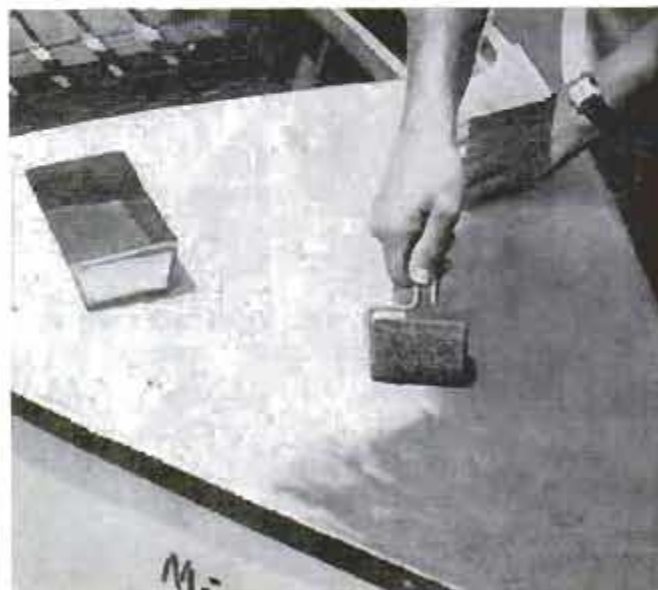


1. Above, after paint is removed from deck, voids and depressions are filled with non-oil-base putty



2. Above, hardened putty is sanded flush with deck. Remaining depressions are puttied and sanded again

3. Below, after coating deck with resin, glass-fiber cloth is placed on it and smoothed with paint roller



FOR OLD DECKS

TIRE D OF SANDING and painting or varnishing the deck on your wooden boat each season? Then cover it with glass fiber and polyester resin to pass up this hard job. The cost of materials and work involved are about the same as for a new paint job. Follow the simple steps as pictured and explained in this article and you will have maintenance-free decks.

As with any first-class surface-coating job, the first step is to remove all coatings and residual oils to expose the base material (plywood or lumber in this case). Use coarse-grit sandpaper, not paint remover or a blow torch, which leave oils on the surface that prevent proper adhesion of resin to wood. Next, fill all voids and depressions in the deck surface, using a non-oil putty as in Fig. 1. After the putty has hardened, it is sanded flush, Fig. 2.

When satisfied with the preparation of the deck, cut medium-weight glass-fiber cloth to cover it. If two pieces of cloth are used, they should be cut to provide a 3-in. overlap on the centerline of the boat as shown in the drawing at right. Then mix the resin and apply one coat to the deck, using a paint roller or brush. Place the cloth in position on the deck and work out wrinkles and bubbles with the roller as in Fig. 3. Follow with two or three additional coats of resin for a glass-smooth finish. Next, sand off any rough edges left by the hardened resin and give the deck two coats of paint, Figs. 4 and 5. For a permanent color, mix pigment with the last resin coat. ★ ★ ★

By
V. Lee
Oertle



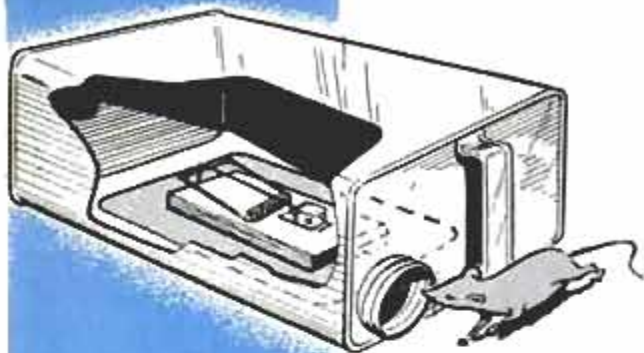
4. Rough edges of glass-fiber cloth are removed with disk sander, being careful not to penetrate cloth



5. Below, two coats of paint complete job. For permanent color, mix pigment with last coat of resin



Can Safeguards Mousetrap Set in Poultry House

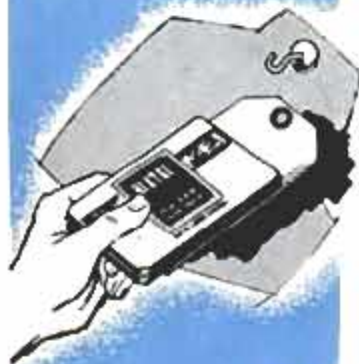


Here is a good way of setting a mousetrap on the floor of a poultry house and keeping it reserved "for mice only." Cut out one side of a 1-gal. rectangular-shaped oil or turpentine can and cover the baited trap with it as shown in the drawing at left. Of course, the cap must be left off to permit inquisitive mice to enter. Clean the can before using it so that the odor of the bait can be detected easily.



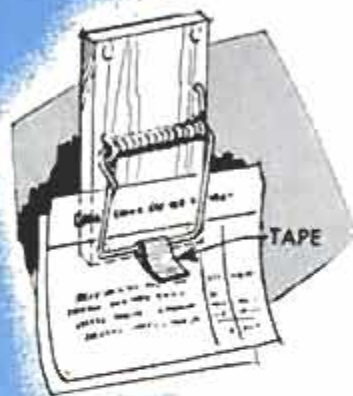
Wrench for Hard-To-Turn Screws

To ease the job of loosening or tightening hard-to-turn screws, make the slotted wrench shown at left, and use it to gain leverage. The wrench is made simply by cutting a slot in one end of a length of $\frac{1}{8}$ -in. flat steel to take the screwdriver blade. The handle portion of the wrench is bent up at about a 30-deg. angle from the slotted part to provide clearance for fingers.



Tagged Stamp Pad Can Be Kept on Hook

You can prevent a small rubber stamp pad from being mislaid or overlooked in a desk drawer by cementing a stiff shipping tag to the back of the case and hanging it on a hook within easy reach of your work table or desk as shown. If a stiff tag cannot be obtained, glue cardboard to the back of any available light-weight one.



Tape Tab Improves Mousetrap Bill Holder

Altered mousetraps are often used in the workshop or kitchen to provide a convenient means of holding receipted bills, material lists and other important data. To make it easier to raise the wire jaw when inserting slips, attach an adhesive-tape tab to the wire as shown in the drawing at left. Use colored tape for a trap that is decorated for use in a living area of the home.—G. E. Hendrickson, Argyle, Wis.



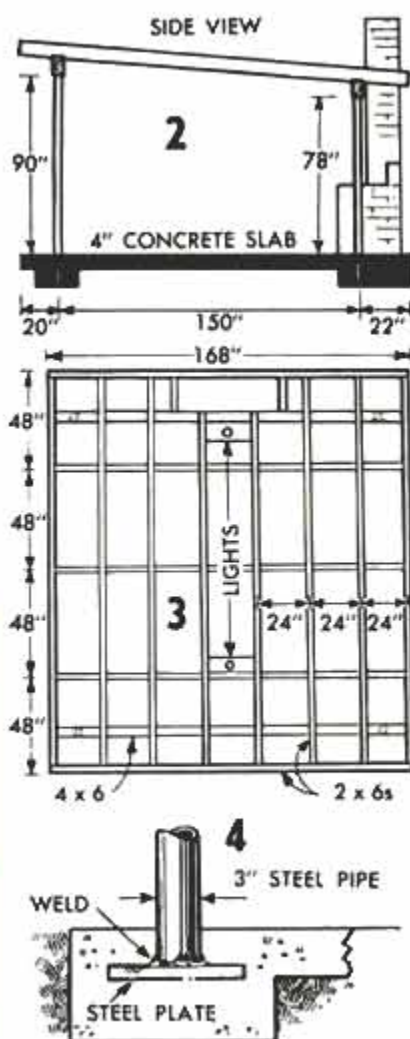
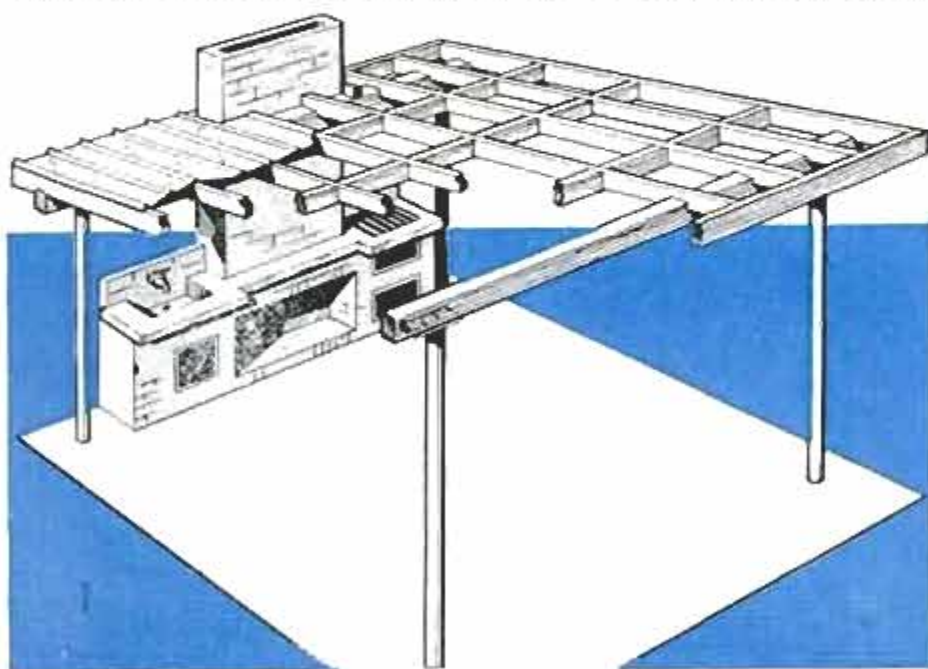
Key-Chain Tag From Credit Card

There is a better chance of having lost keys returned when a tag giving the owner's name and address is attached to the key ring or chain. To provide such identification for his key chain, one motorist cut the name and address off an old plastic gasoline credit card, punched a hole in one end and placed it on the chain as shown. Any durable unused credit card may be used.
Dr. W. Hayes, Santa Barbara, Calif.



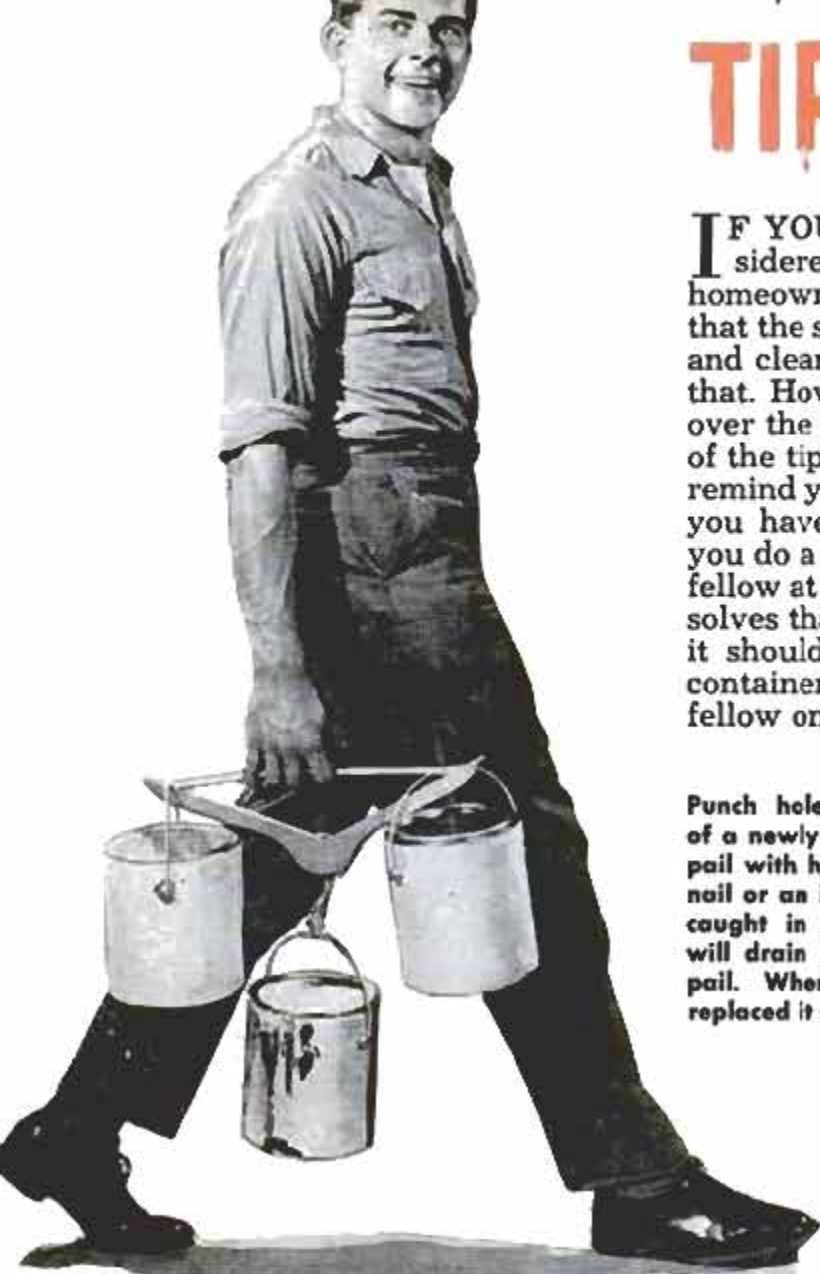
Free-Standing Patio Shelter

WITH THIS easy-to-build roof covering your patio, the caprices of summer weather need not be reckoned with to make a barbecue or lawn party a success. The roof may be added to an existing patio, or a combination patio-shelter-barbecue fireplace can be built as in Fig. 1. Although complete dimensions for the shelter are given, Figs. 2 and 3, the over-all size can be changed to suit individual needs. Rafters are spaced to take stock widths of aluminum roofing. Four steel posts to which plates have been welded top and bottom, Fig. 4, provide adequate support with minimum obstruction to view.—Hi Sibley, Nuevo, Calif.



TIPS FOR THE

IF YOU ARE not paid for a job, you are considered an amateur, which puts millions of homeowning painters in that class. You know that the surface to be painted must be dry, smooth and clean; instructions on the paint cans explain that. However, you have picked up painting tips over the years and forgotten a few. Perhaps some of the tips on these pages will be new; others will remind you of ideas forgotten. For example, when you have three open cans of paint to carry, do you do a balancing act or make several trips? The fellow at the left shows how a wooden coat hanger solves that problem. For thorough mixing of paint it should be "boxed," that is, poured from one container to the other, as is being done by the fellow on the far right. ★ ★ ★



Punch holes in the rim of a newly opened paint pail with hammer and a nail or an ice pick. Paint caught in the rim then will drain back into the pail. When the lid is replaced it seals the holes



When only a small amount of paint is required, a 1-lb. coffee can makes an ideal container. Because it costs nothing it can be discarded after use, saving the job of cleaning. To make the can more effective and assure less mess, fit a piece of wire near the edge as shown. The brush then can be wiped against it, keeping all the paint inside



Even with holes in the rim to drain the paint some will remain and splatter when the lid is replaced on a pail and tapped down to seal it. Eliminate this problem by placing a cloth over the lid while hammering. Paper towels also can be used, or a couple of thicknesses of ordinary newspaper, any of which can be discarded immediately



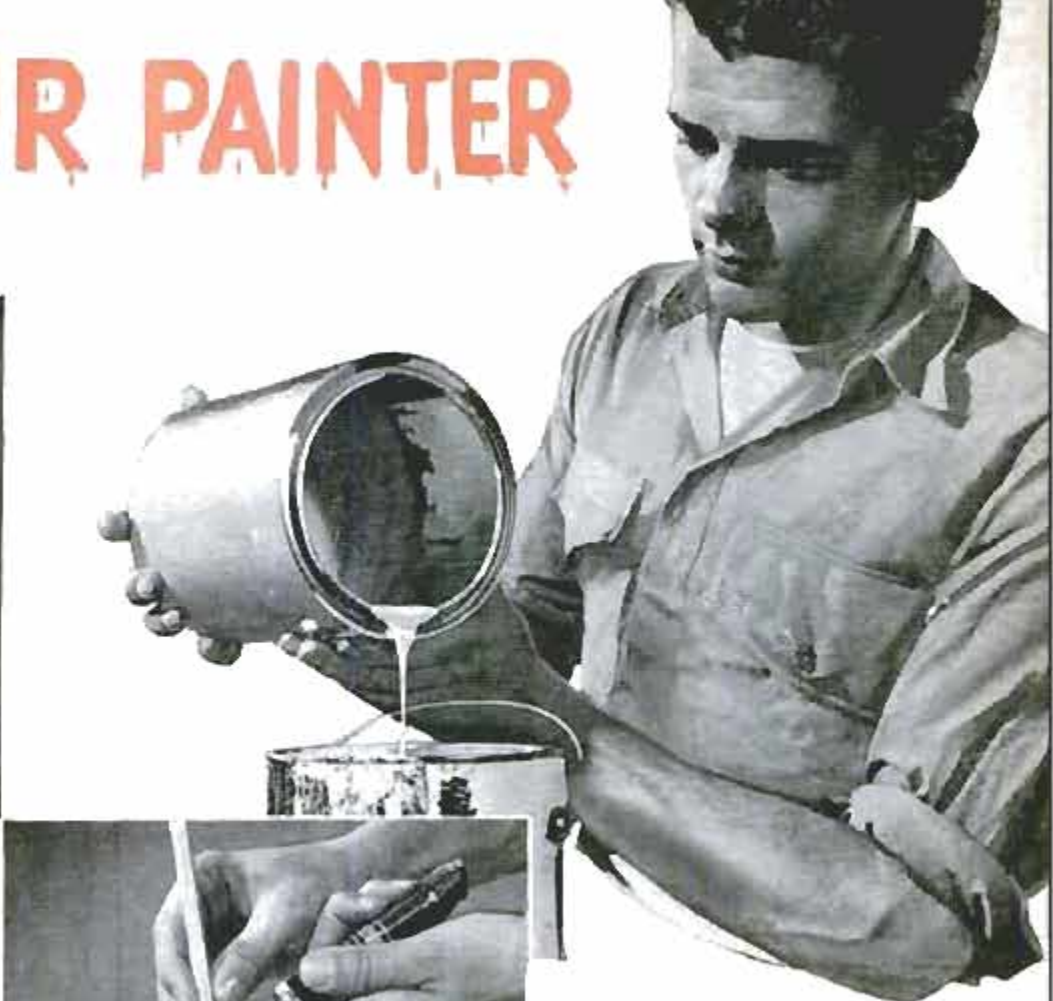
When paint has been stored for some time, any "skin" that has formed should be removed. Even more important, after the paint has been mixed it should be strained. A piece of window screening, cheesecloth or nylon stocking can be used as the filter material



AMATEUR PAINTER



Simplest type of rest to keep brush from dropping full length into the paint is a small nail or wood screw driven into the handle as indicated, so it can be hooked over the rim of the pail. Same rest can be used to suspend the brush in container of turpentine or other solvent or brush cleaner



If you cannot find color you want, compound your own. First dissolve color-in-oil in small quantity of turpentine, then add to paint. Make enough at one time for complete job, to avoid any color variations



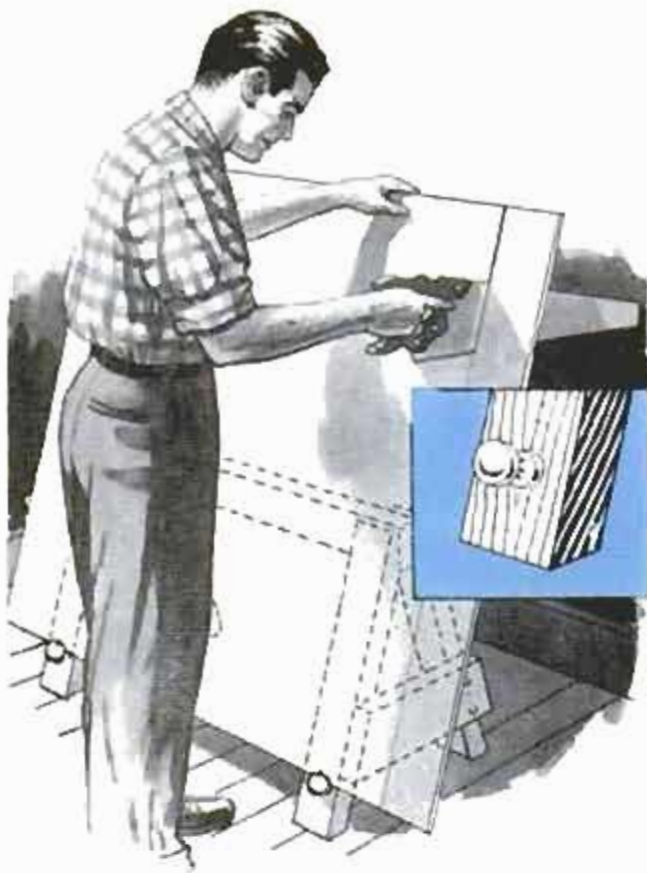
This is a rather well-known stunt for painters, but it is so effective for keeping paint mess at a minimum that it bears repeating. Place the paint pail in a paper plate so it catches any drippings. The plate can be cemented or taped to the pail so it stays in place when the pail is picked up and moved to another spot



To prevent skin from forming on oil-base paint that is stored away, slowly pour turpentine onto the surface so it provides a protective seal. When the paint is to be used, the turpentine is mixed into it



Cleaning hands after a paint job will be much less of a chore if you rub them thoroughly with linseed oil before starting. Scrape your finger nails over a bar of soft soap to seal them, and assure easy cleaning afterward



Knobs on Sawhorse Legs Help Steady Plywood Panel

When there is not enough room to lay it down, standing a sheet of wallboard or plywood on edge is sometimes the only way it can be held for sawing. This can be very awkward when working alone with thin material. What to lean it against is a problem. A carpenter solved the problem by adding a couple of drawer knobs to the legs of a sawhorse. The knobs let him lean the sheet against the latter by cradling and holding the lower edge of the material.

G. E. Hendrickson, Argyle, Wis.

It is easier to follow a pattern that is drawn on sheet copper if the metal is first painted flat white. This makes the design stand out as compared to being drawn directly on the brown-toned copper. The pattern is transferred with carbon paper, and after the design is tooled in the metal, the paint is wiped off with turpentine.

Disk Adhesive Always at Hand When Stored on Sander

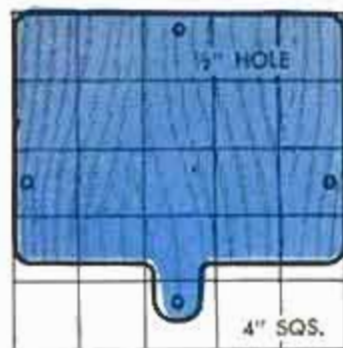
Stick-type sanding-disk adhesive, used only occasionally in the workshop, has a way of becoming misplaced when stored in a drawer. If it is stored on the machine, it will be right there when you need it. A spring tool clip, bolted to the machine stand, makes an ideal holder for keeping it handy. You can make your own clip from a strip of spring steel if you don't want to buy a regular tool holder.

Henry Hanscom, Elmhurst, Ill.

Scale Pasted in Catalog Gives Quick Measurement Check

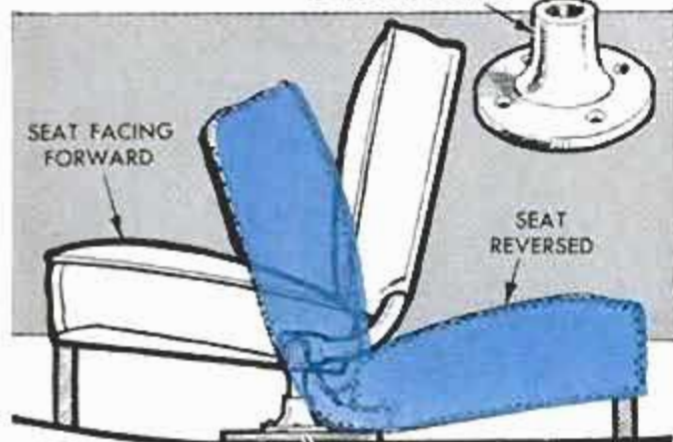
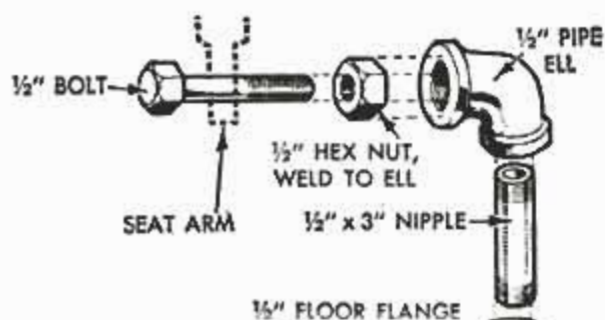
Frequent reference to measurements in a material or parts catalog will make it worthwhile to paste a measuring scale to the page most frequently referred to. Such a scale, which can be ruled on a strip of paper, not only permits reference at a glance but saves the need for a regular ruler each time. A metric scale is especially handy when pasted in a scientific catalog, and it is a simple stunt to transfer the markings on a steel rule by placing the scale under the page and rubbing with a pencil to bring out the calibrations.





Seats you'll like

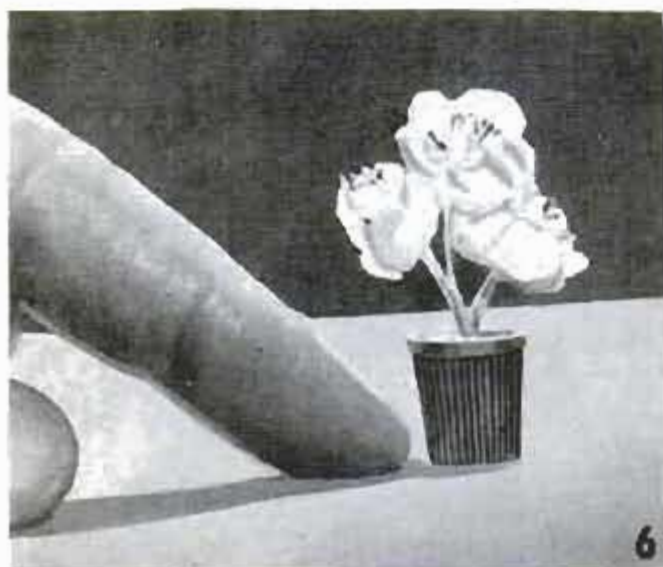
HERE ARE TWO SEATS to make fishing afloat more comfortable and enjoyable. The first one, shown above, doesn't even require a boat. In fact, the seat is the boat, consisting of 1/2-in. exterior plywood suspended from an inner tube by means of rope loops, in the manner shown. The reversible seat illustrated below is a rear seat from a 1951 Mercury station wagon. Mounted in the after end of a boat on an assembly of pipe fittings as shown in the detail, the seat can be tilted to face aft when trolling or forward when cruising.



1/2" PLYWOOD BASE BLOCK, CUT TO SUIT
AUGUST 1959



Solving Home Problems



1. WOODEN CLOTHESLINE PROPS will stay put in supporting your Monday wash if you fit each one with a wooden turn button to lock it to the line. Notches made in edges of props hook over the line

2. PIPE CLEANERS are far better than string for tying plastic food bags shut. A twist of the fingers does the trick without having to tie a bow or loosen a knot. Padding on cleaner protects plastic

3. STORED INSIDE a hollow rubber ball, thimbles will be easy to find in a cluttered sewing-machine drawer. The ball is slit about halfway through with a knife and "opened" by squeezing

4. BEST PLACE to keep spare faucet washers handy is on the underside of the lavatory itself. A "hot" and a "cold" replacement washer can be stuck temporarily with a strip of adhesive or masking tape

5. TEMPORARY DRAPERY RODS can be improvised from standard $\frac{3}{8}$ -in. wooden dowels. The dowels are drilled at three points to fit over L-hooks and the draperies are hung with regular metal curtain rings

6. PLASTIC CAPS from empty toothpaste tubes solve the problem of miniature flowerpots for dollhouse owners. Modeling clay pressed in the caps serves as earth to hold tiny flowers from old Easter bonnet

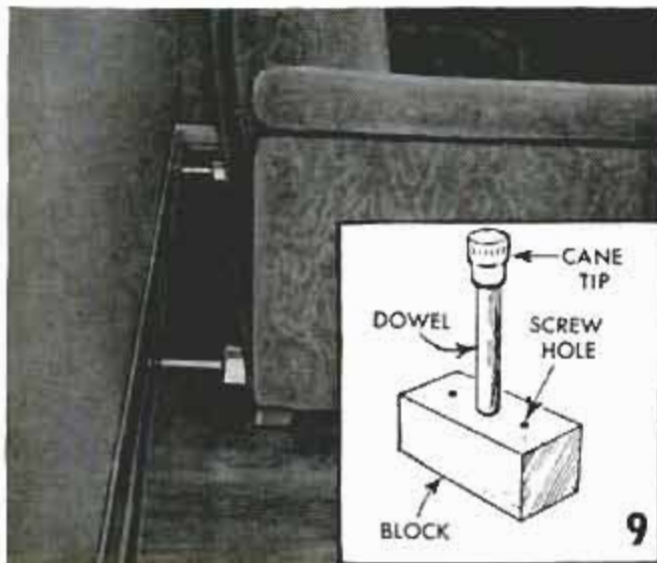
7. ADDING SMALL AMOUNTS of thinner to jars of paint is easy when pouring is done through a hole punched in the screw cap. Hole limits flow to dribbles. The hole can be plugged with sheet-metal screw

8. PLASTIC WADING POOLS can be inflated in a jiffy with a tank-type vacuum cleaner. The hose is switched from suck to blow, and a stopper with a hole in it for the stem is pressed in the end of the hose



9. RUBBER BUMPERS screwed to a sofa to bear against the baseboard will prevent the sofa from touching and marring the wall. Bumpers are made as shown in the detail and fitted with rubber tips

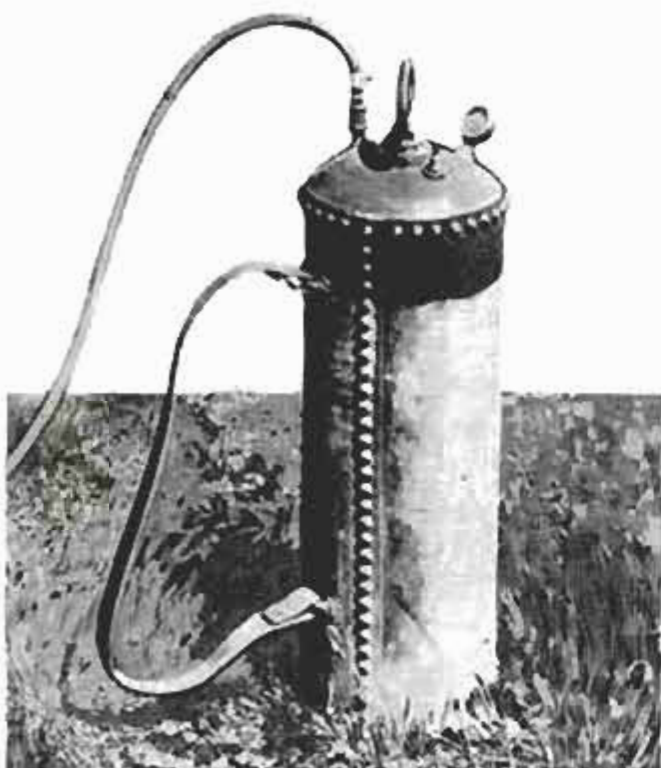
10. NOVEL TRIVETS, which are practically ready-made, can be fashioned from scraps of zigzag furniture spring. Natural coil of spring forms a ring, ends of which are butted and brazed, then painted





Self-Service Water Fountain For Livestock on Dry Pasture

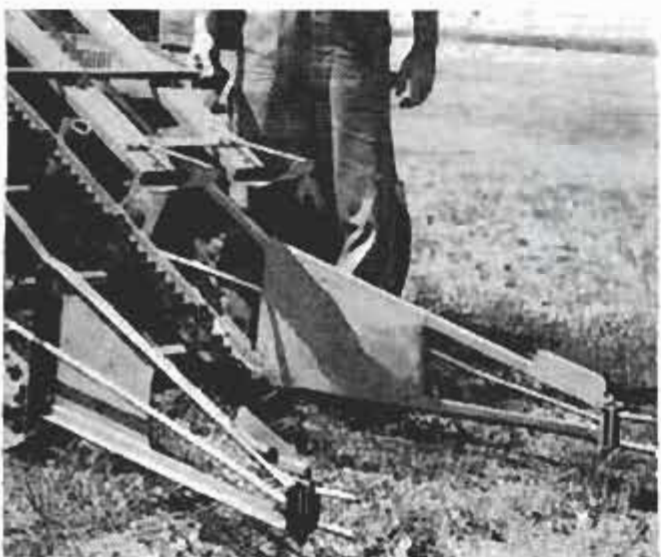
This self-service waterer takes care of the water supply for livestock on a distant pasture having no natural stream. The original unit pictured was assembled with a 500-gal. tank mounted on a low-wheeled trailer, an automatic individual watering cup of the type used in dairy barns, a shut-off valve and such pipe fittings as are necessary to attach the valve and cup permanently to the tank. After filling the tank at the farmstead water supply, the unit is hauled to the pasture and parked in a shady spot. If the pasture is open and no natural shade is available, a sunshade built over the tank will keep the water cool for longer periods of time. Insulating the tank also will help.



Improvised Knapsack Sprayer

A discarded 3-gal. hot-water tank of the type used with wood-burning kitchen ranges is just the right size to serve as a pressure tank for a knapsack sprayer. Fit the tank with tire valve, pressure gauge, filler cap and handle, carrying strap and hose connection and there you are. The tank will hold 2 gal. of liquid spray, and build up 50 to 80 lb. of air pressure with a tire pump or compressor. Fitted with the right nozzle, it will handle all common liquid insecticides and herbicides, also, just plain water when you need a means of controlling a bonfire that shows signs of getting out of hand.

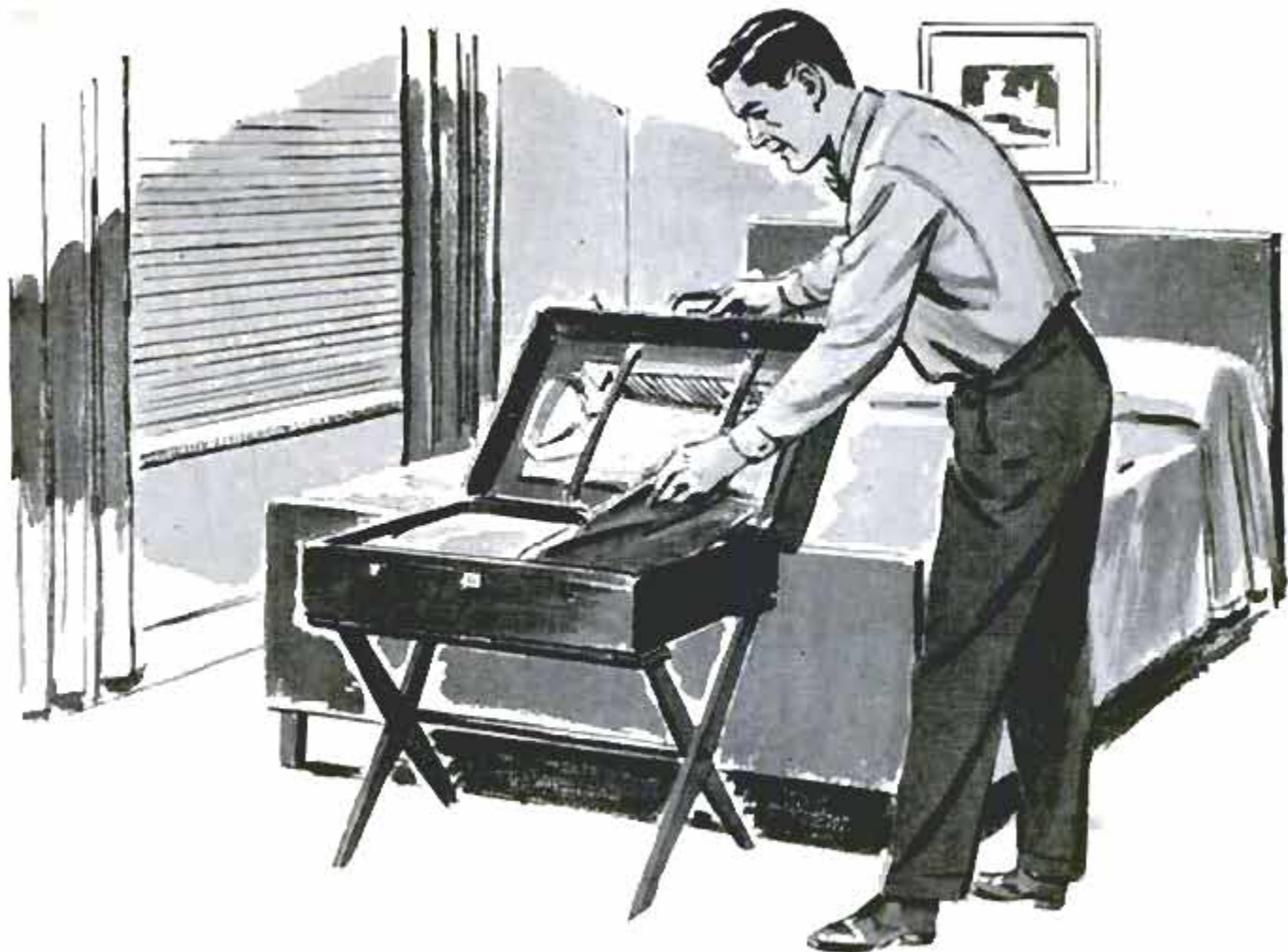
Ordinary peroxide solution is a good substitute for penetrating oil for loosening frozen bolts and screws. Usually it takes only a few drops to do the trick. Just apply it to the head of the bolt or screw and give it a few minutes to "work." Then take over with a wrench or screwdriver.



"Fingers" on Loader Align Bales

There's no need to pass up misaligned bales of hay or straw with this farm-built loader. Swiveling, spring-loaded fingers attached to the outer ends of the gatherers enable it to pick up bales dropped from the baler in almost any position. The fingers are pointed steel rods welded to U-shaped brackets which are bolted to the gatherers. The fingers engage the bale, nudge it into line with the approaching elevator chute and then release it as it is picked up by the elevator flights. The springs snap the fingers back into working position. The fingers do not tear the bales or break the ties.

A. M. Wettach, Mt. Pleasant, Iowa.

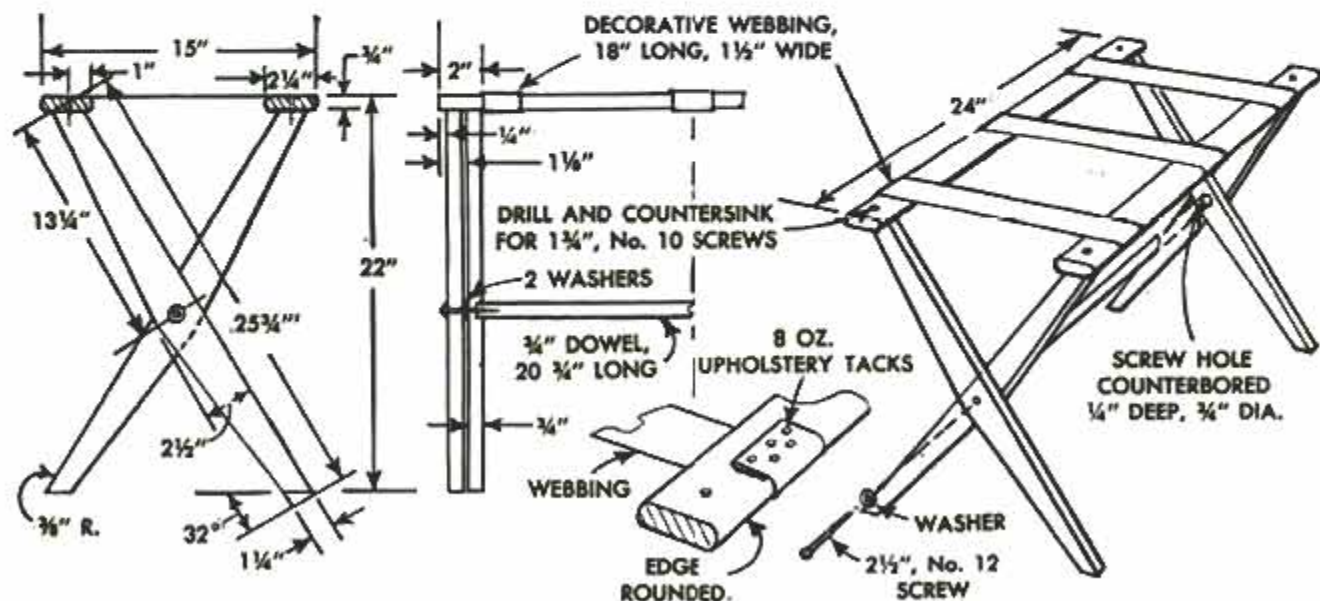


Luggage Rack For Your Guests

WEEK-END GUESTS will appreciate your thoughtfulness when you place a luggage rack at their disposal. Having a place to lay open a two-suitier, other than on the bed, is a real convenience. You can make a couple of these racks in a few hours, following the details given below. The legs can be mass-tapered by using a tapering jig in conjunction with the saw fence. You will notice that the legs taper only along one

edge. Since the rack must support a heavy load, it should be made of hardwood, such as birch or oak, and also glued and screwed securely together. Washers placed over the pivoting screws provide clearance between the legs. Three strips of decorative plastic webbing, stretched across the top, limit the spread of the legs. Tacking is done on the underside of the top members.

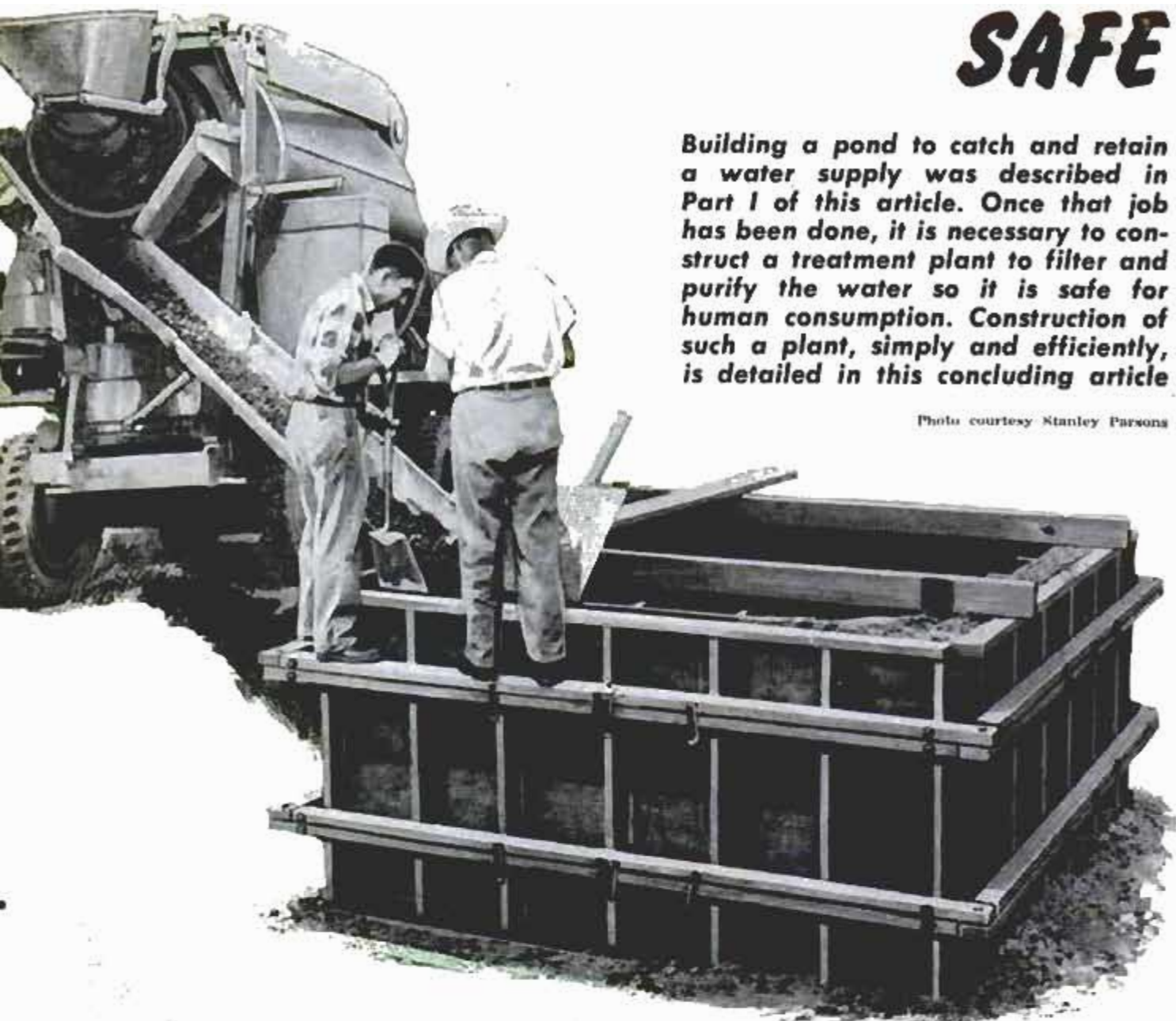
John Bergen, Glenbeulah, Wis.



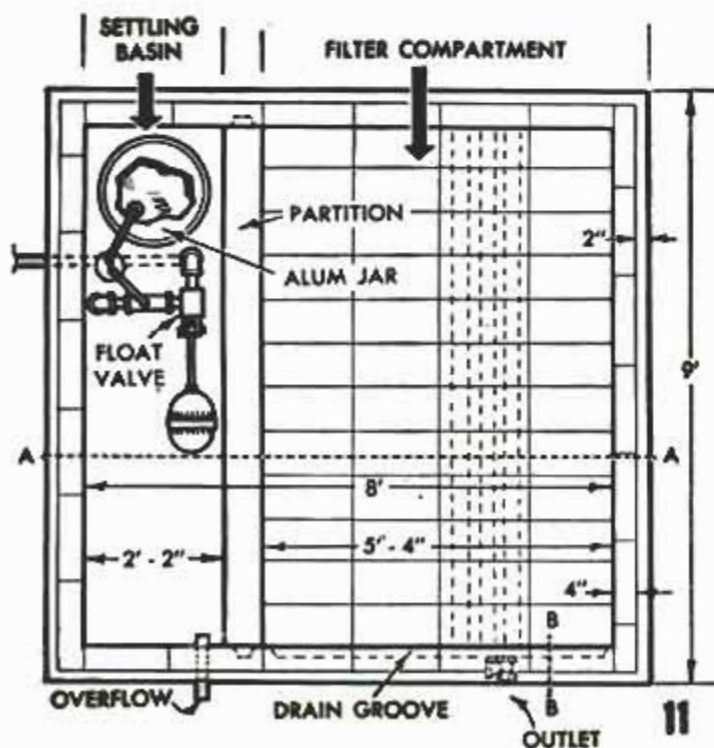
SAFE

Building a pond to catch and retain a water supply was described in Part I of this article. Once that job has been done, it is necessary to construct a treatment plant to filter and purify the water so it is safe for human consumption. Construction of such a plant, simply and efficiently, is detailed in this concluding article

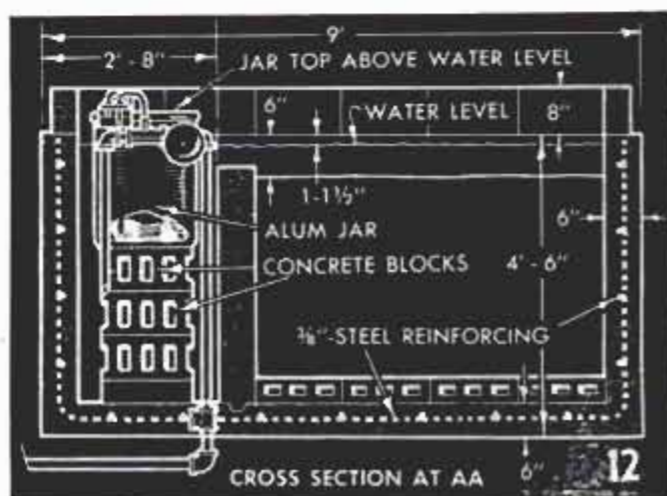
Photo courtesy Stanley Parsons



One set of forms is used for the settling basin and filter, and for the storage reservoir. Above is shown the pouring of walls and floor



At left and below is shown the arrangement of components in the settling basin and filter, including the sediment-precipitating alum feeder



WATER SUPPLY FROM PONDS

PART II

By E. R. Haan

WELL-BUILT PONDS of adequate size, plus simple water-purification plants provide a practical solution to water shortage in areas where this is a problem. In Part I of this article we described the building of a pond and the operational sequence of such a plant. In this concluding part of the article we show how to build and service a water-purification plant with a daily capacity of 1920 gal. Designed and tested by the Kansas State College of Agriculture and Applied Science, the plant consists of two concrete tanks, one a settling basin and filter, the other a storage reservoir.

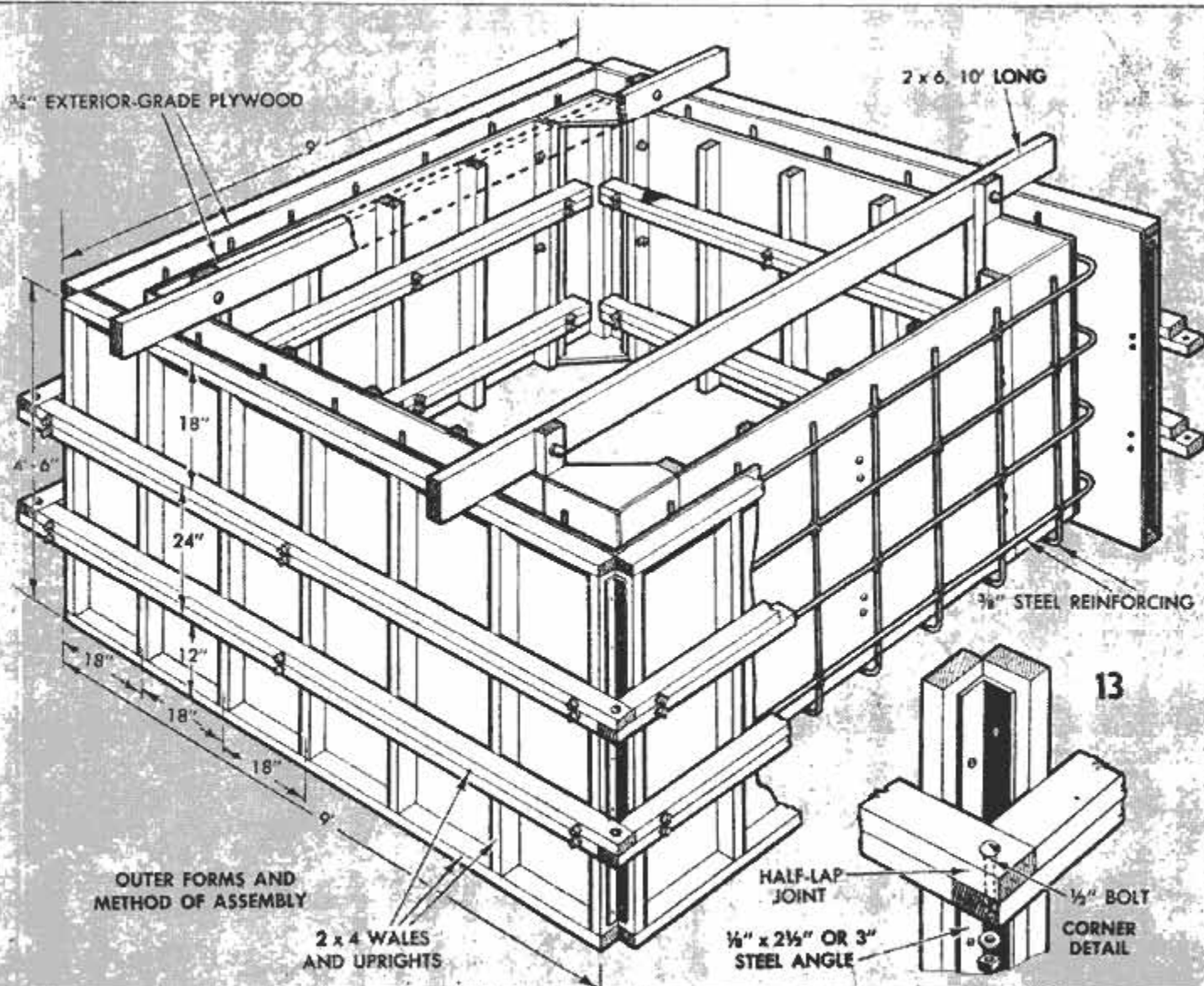
Settling-and-Filter Tank

Construction of this tank is shown in Figs. 11 through 15, and in 17 and 18. The completed unit is shown in the background

of Fig. 22. The forms are made of $\frac{3}{4}$ -in. plywood reinforced with uprights and double wales of 2 x 4s. Kraft paper is tacked over the vertical joints where form pieces meet.

Wooden strips are nailed to the inner forms to produce three tapered grooves, Figs. 11 and 15. Vertical grooves on opposite walls key the concrete partition added later. These are joined by a similar groove in the floor. A horizontal groove at the bottom of one wall of the filter compartments provides a drain. The partition must be watertight to prevent water in the settling basin from getting into the filter compartment without having passed through the full depth of the filter sand.

The inner forms consist of four side-pieces and four corner pieces detailed in Fig. 14. After bolting them together, the lower corners are set on 8-in. concrete blocks temporarily. Lengths of $\frac{3}{8}$ -in. reinforcing rod are run down each wall and



across the floor. These rods are spaced 12 in. apart as in Fig. 18, with horizontal rods wired to them to form a "basket" that is raised on pieces of concrete so it is positioned midway in the tank bottom. Tie wires are inserted through the inner forms and fastened to the rods, then the outer forms are set up. These are bolted together at the half-lapped corners of the wales, Fig. 12, and adjusted level. Two 2 x 6s are bolted to the extending uprights of the two opposite inner forms, Figs. 13 and 14, so the inner forms then hang on the outer ones after temporary supports are removed. Pipe tees with center outlets plugged and ends fitted with nipples are placed where pipes pass through the walls and floor, Figs. 15 and 17. The walls are poured first, the concrete being tamped to eliminate voids, and the floor is laid immediately afterward. Before the floor sets, a key-groove for the partition is formed to match and join those in the walls. After a few days the forms are removed and the partition cast. Its top edge should come 6 in. below the top edge of the walls.

A subfilter consisting of 4-in. light-weight-aggregate hollow concrete blocks covers the floor of the filter compartment. The cores are aligned and at right angles to the drain groove, Fig. 17. Upper joints between the blocks, and between blocks and walls, are sealed with mortar. Solid 4 x 8-in. blocks then are laid in mortar along the top of the tank, flush with the inside of the walls. A two-piece top is mounted on the concrete-block rim as in Fig. 16, and is locked to keep children out.

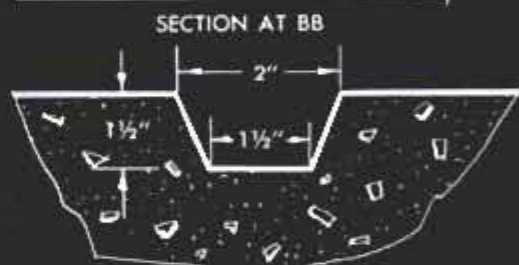
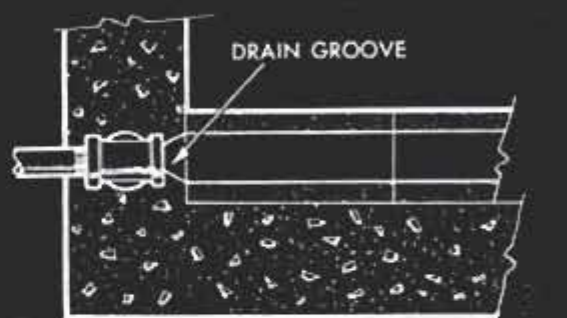
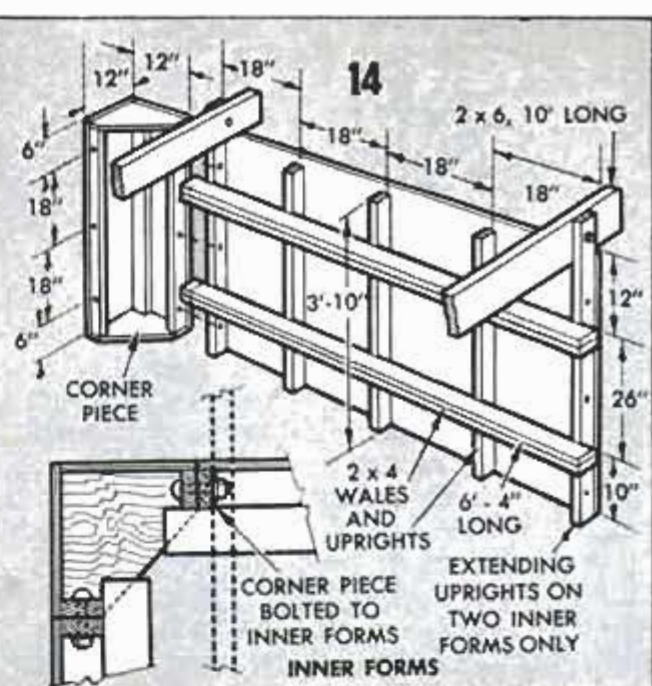
Valves and Filter Sand

A drainpipe and valve, Fig. 17, are recommended for the settling basin where the outlet can be lower than the bottom of the tank. Shutoff valves are located outside the tank in both inlet and outlet pipes. All underground valves are installed in frost-proof jackets with handles that project above ground. Water enters the settling basin through a float valve that maintains water level, and is treated with alum to settle sediment. The water then moves slowly over the partition into the filter compartment where it drops down through 3 feet of sand and into the subfilter.

Where a plant of larger capacity is required, the area of the settling basin and filter must be larger, but of the same depth. Settling-basin area should be 1 sq. ft. for every 5 gal. of water treated per hour, and filter-compartment area should be 1 ft. for every 2 gal. of water filtered.

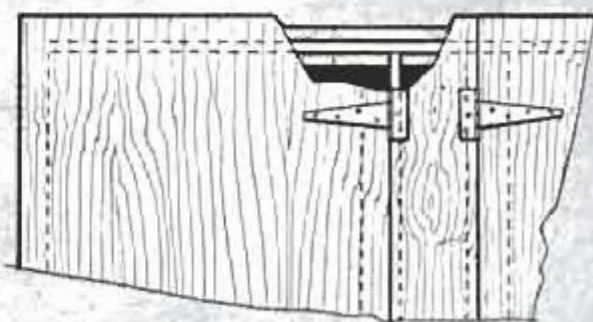
Alum Feeder

Fig. 19 gives details of the alum feeder. A 10-gal. glass or stoneware jar, weighted

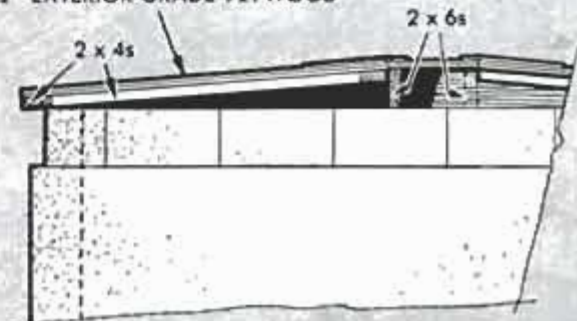


15

SIZE OF DRAIN GROOVE



3/4" EXTERIOR-GRADE PLYWOOD



16

DETAILS OF TWO-SECTION HINGED COVER

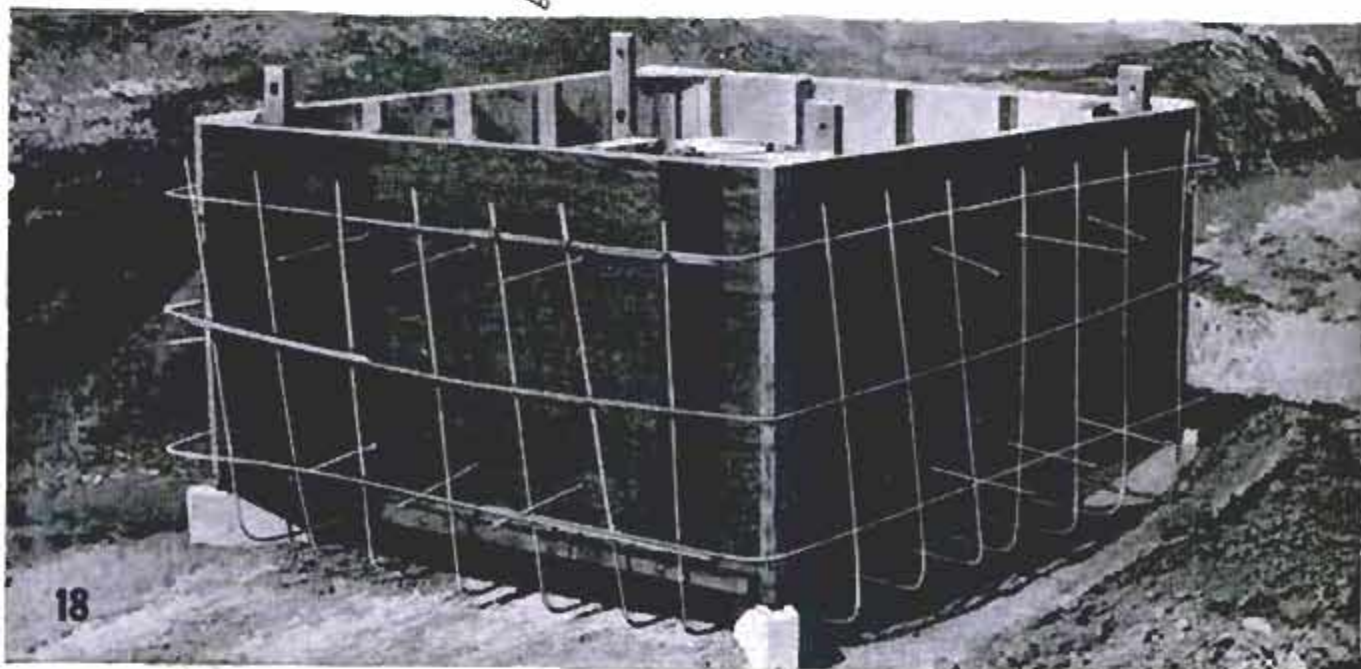
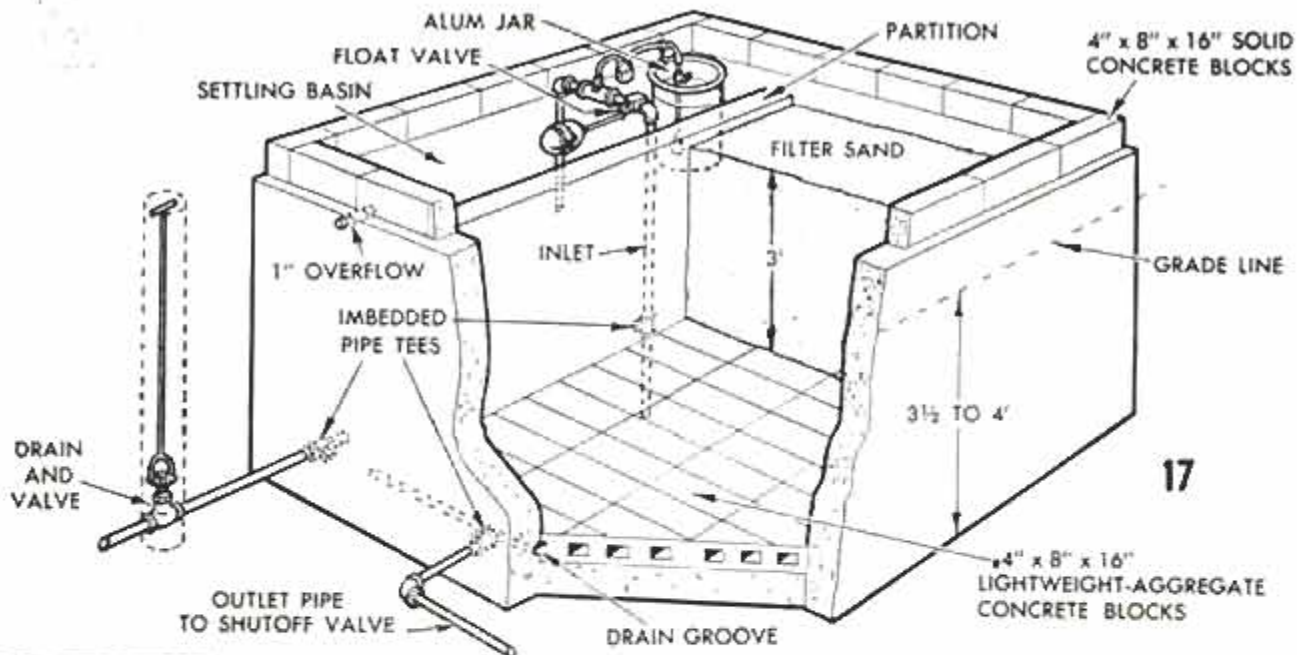
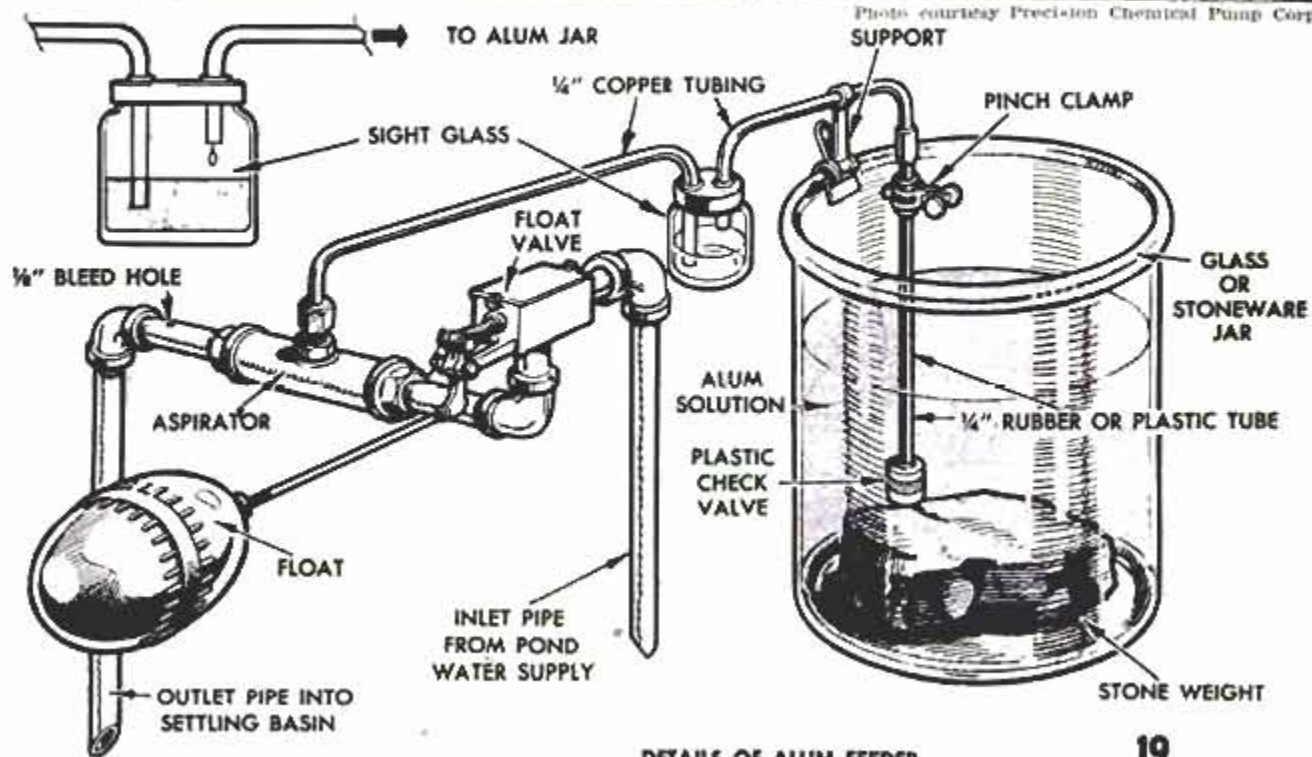
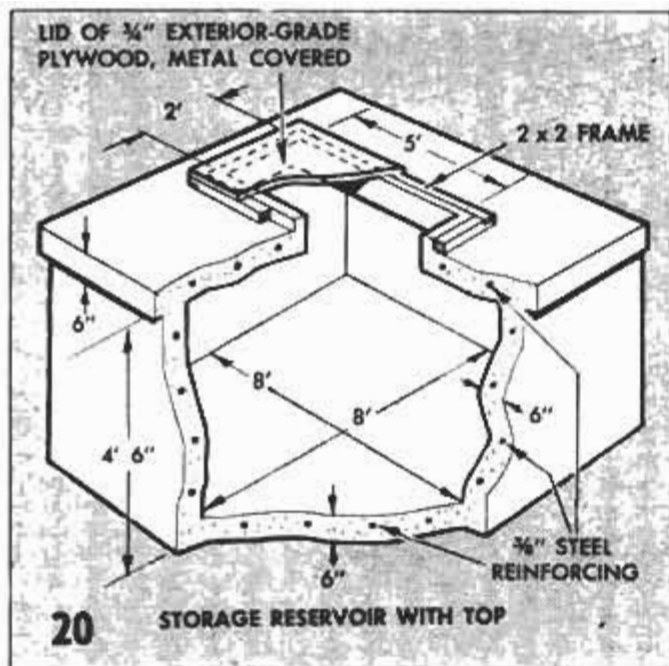


Photo courtesy Precision Chemical Pump Corp.



DETAILS OF ALUM FEEDER

Photo courtesy Stanley Phoons



to prevent its floating, is placed on stacked concrete blocks to project above the water level, Fig. 12. The solution consists of powdered alum (aluminum sulphate), 1 lb., dissolved in water, 5 gal. The solution is injected into the water-inlet pipe by means of an aspirator, the required amount depending on the turbidity of the water. When the plant is put into operation the feeder is adjusted to add about 25 drops per minute. If the water entering the storage reservoir is still turbid, the dosage is increased until the water clears.

Servicing Filter Unit

Regular servicing of the filter tank is important. If the settling chamber cannot

be drained from the bottom, a hand-operated bilge pump can be used to remove sludge. When the filter sand becomes clogged and passes less than a day's supply of water it must be cleaned. To do this, the valve in the inlet pipe is closed and the water in the filter allowed to drop just below the surface of the sand. The outlet valve then is closed and a 1-in. layer of sand is skimmed off and discarded. Next, the inlet valve is opened and water allowed to enter to normal height, after which the outlet valve is adjusted to pass a day's minimum supply of water in 24 hr. After three or four days the valve is opened to pass from 60 to 80 gal. of water per hour. From 50,000 to 100,000 gal. of water can be filtered before skimming must be repeated. When sand is reduced to a depth of 18 in., the remainder is removed and replaced with new to the original height.

Storage Reservoir

The storage reservoir should be the same size as, or larger than, the filter tank, and can be made of concrete, using the same forms. The reservoir top is cast separately, Fig. 20. The manhole rim is raised 2 in. to keep out foreign matter. An existing clean cistern of adequate size could be used instead. Where the water level in the reservoir is lower than in the filter, a float valve is used to control water level. When both tanks are the same height, no valve is necessary. The reservoir should be accessible through an opening in the top, which is kept closed. Fig. 21 shows three variations in the position of the plant units.

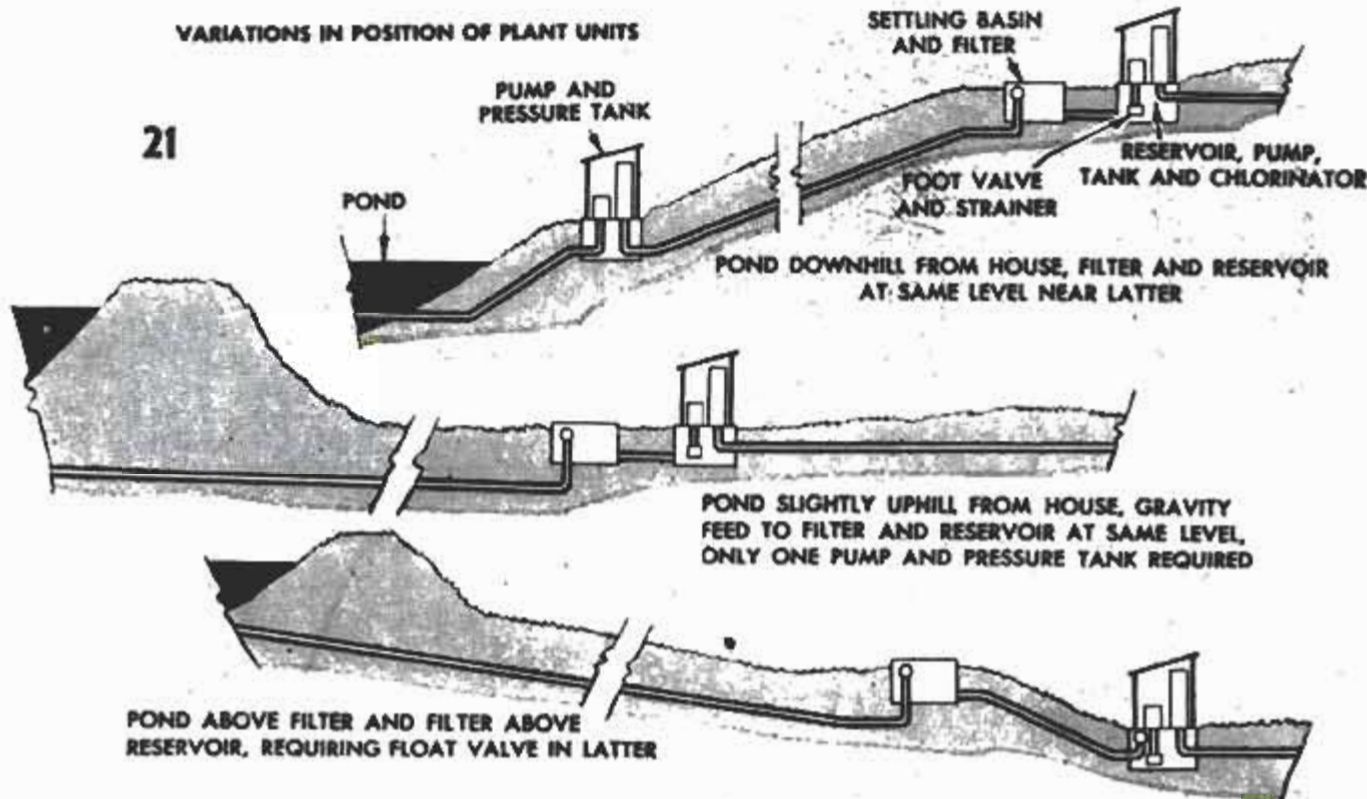




Photo courtesy Stanley Parsons

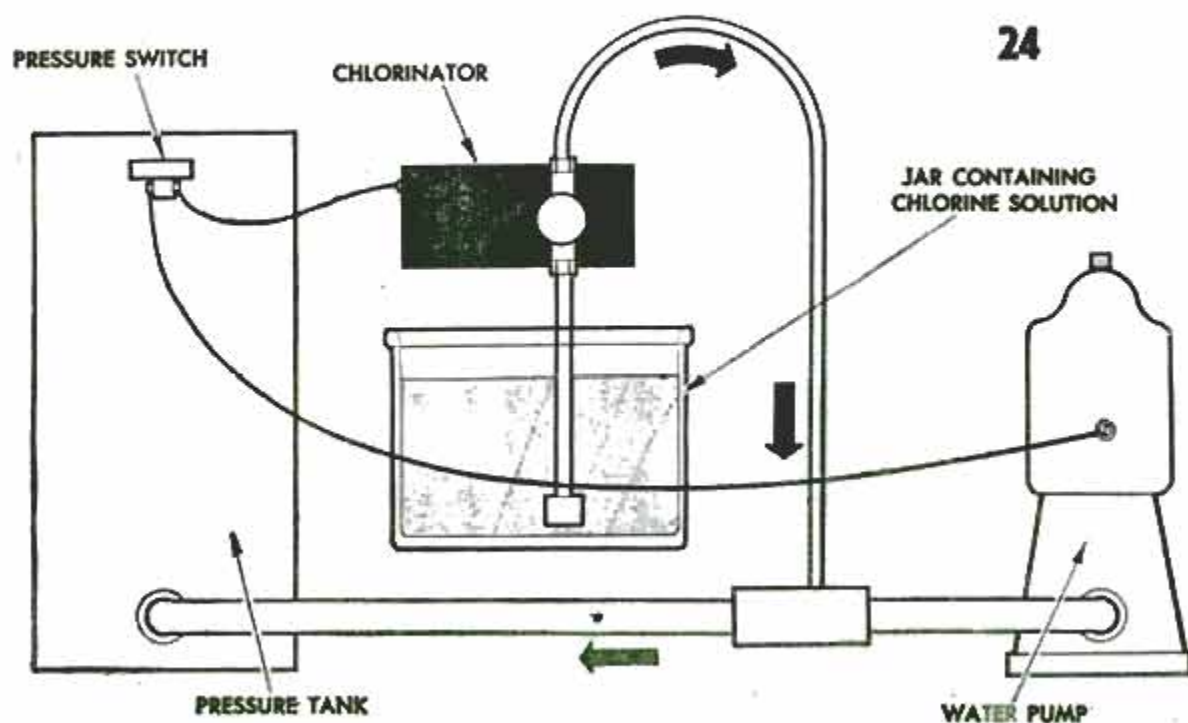


Photo courtesy Precision Chemical Pump Corp.

Pump, Chlorinator, Pressure Tank

A shallow-well pump and a pressure tank of not less than 120-gal. capacity are installed either in the basement or in a frostproof enclosure. The enclosure may be built directly over the storage reservoir, Fig. 21, or it may be located elsewhere. A chlorinator, Figs. 23 and 24, is essential for safe drinking water. This is installed between the pump and pressure tank so a small amount of chlorine is injected into the water line each time the pump operates. Chlorine should be in contact with water for a period of 10 min. before the water is consumed. Some chlorine is absorbed by

organisms and substances in the water; the remaining chlorine content should be not less than 0.2 to 0.3 parts per million of water. For some water this may have to be increased. Chlorine content should be tested daily, using simple kits available from chlorinator manufacturers. Chlorine is obtainable almost anywhere in the form of chlorine-type laundry bleach, which contains 5.25 percent sodium hypochlorite. Other types of laundry bleaches should not be used as they may be poisonous. Fresh chlorine solution should be made up and substituted for the old at intervals of no longer than two weeks. ★ ★ ★





Plywood Disk and Broomstick Make Birdbath Nontipping

The weight of a cat or squirrel perched on the rim of a birdbath often is enough to make the bowl topple from its narrow pedestal, and break. The answer to the problem is to increase the diameter of the pedestal at the top to give the bowl greater support. You can do this with a 1/4-in. plywood disk attached to the end of a broomstick stake. With the end pointed, the broomstick is driven into the ground through the hollow pedestal until the disk rests against the top. Then the bowl is set on the disk. An old kettle cover will also do for a disk.

Robert L. Sargisson, Berwyn, Ill.

Don't make the mistake of cleaning such aluminum parts on your car as the grille, headlamp doors, side inserts and others, with abrasive cleaners or steel wool. These parts are anodized and such cleaners would remove the protective coating and possibly scratch and discolor the finish. Use a mild detergent and a soft brush, instead.



Rubber Feet for Vibrating Jigsaw

Does your magnetic jigsaw give you the "creeps" when it is used? If so, you can cut down on the amount it travels from vibration by fitting the bottom of the machine with king-size rubber feet made from sink-drain stoppers. The original small button feet found on most tabletop saws are pried off and the stoppers substituted by trimming down the ring tabs to fit the machine holes. The cupped design of the stoppers provides a sort of suction grip when weighted by the machine.

Darkroom Trays Self-Dry When Coated With Liquid Silicone



A mere trace of liquid silicone wiped over the inside surfaces of darkroom graduates, trays and developing tanks is sufficient to make them drain completely and make wiping unnecessary. Apply a drop of silicone to a clean cloth or tissue and spread it evenly. If desired, a 5-percent solution of silicone in benzine may be used. Let the treated surfaces dry at least a day, or place in a warm oven for several hours. Developing trays treated in this manner will stay clean longer, as silicone is inert and will not stain.

Ken Murray, Colon, Mich.

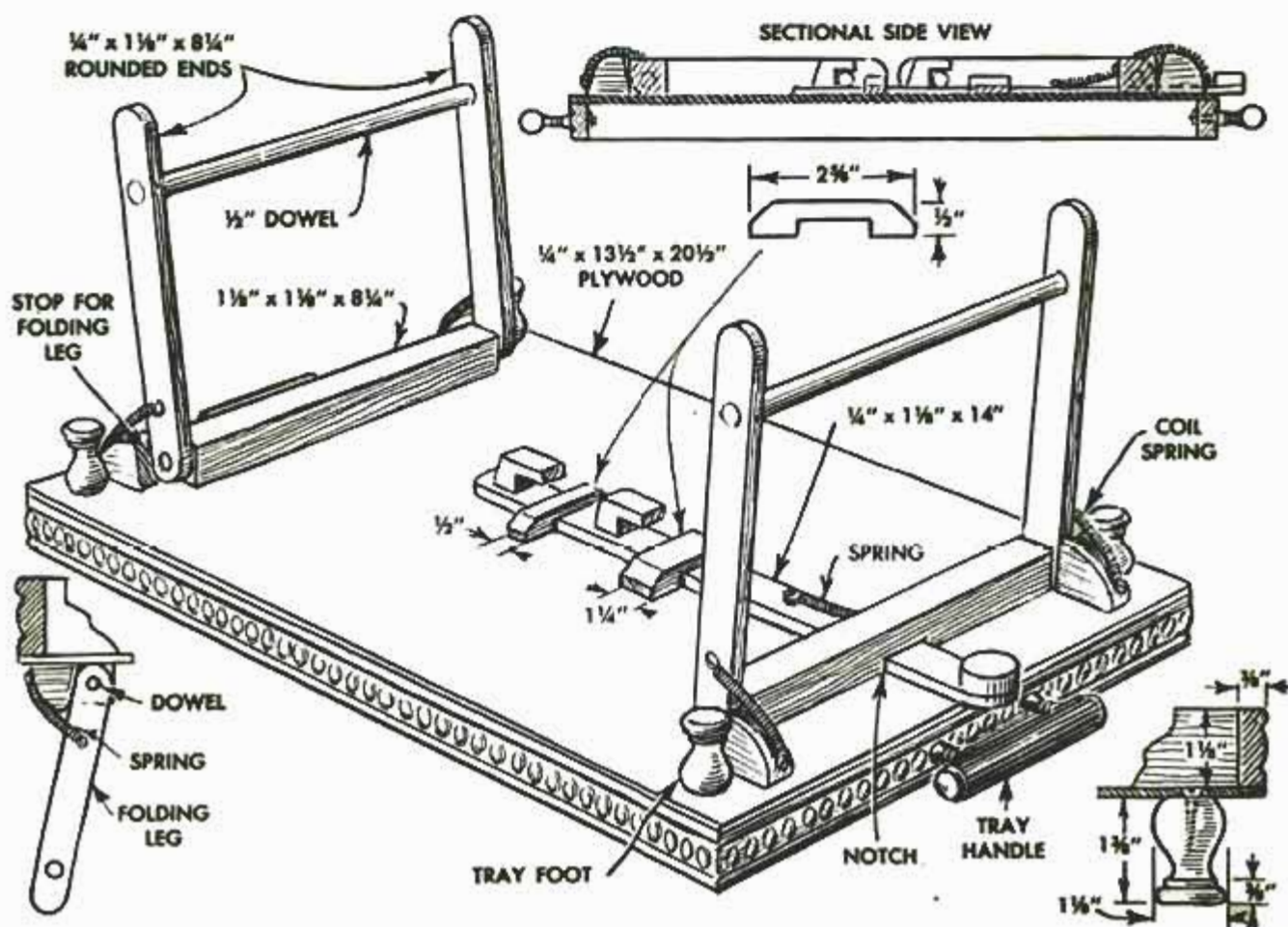
❑ Old auto tires, partially buried in a row in a trench, and painted, make an attractive fence along a driveway or lot line.

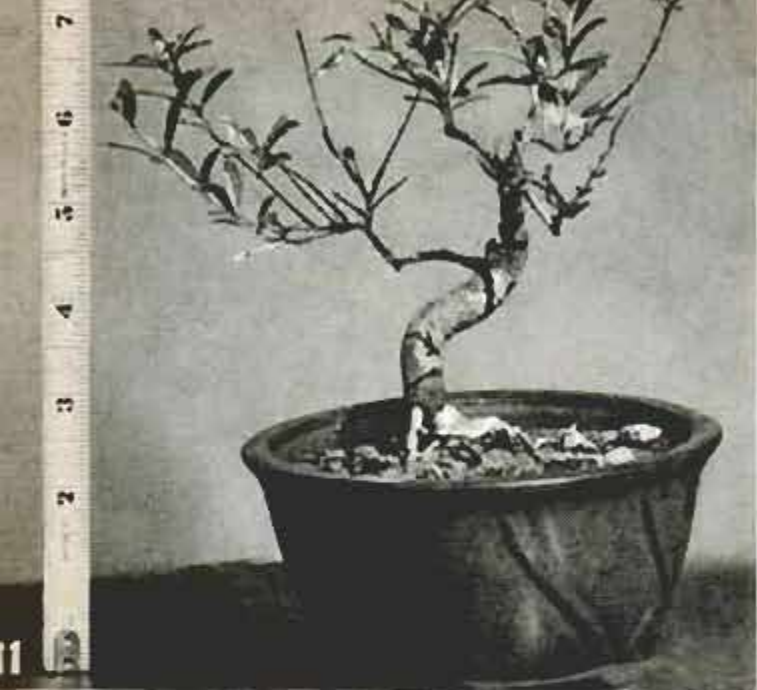
FOLDING BED TRAY

WITH THE LEGS FOLDED this bed tray rests on short "feet" that permit setting it on a counter or table in the kitchen. Then, when serving a bed patient, the "trigger" is pulled and the legs spring open—no need for fumbling with a loaded tray to open the legs. If you have a serving tray of the approximate size required, it is necessary only to add the feet and folding legs. Or, as shown in the detail, one can be assembled. For the bottom of the tray $\frac{1}{4}$ -in. plywood is used. The edges, or frame, of the tray can be $1\frac{1}{8}$ -in. solid stock, or wide picture framing or trim molding with a pattern can be used to add to its appearance. Handles for the tray can be purchased at hardware stores or at many lumberyards. The wooden blocks on which the folding legs pivot are glued and screwed in place, the screws being driven through the plywood into the



blocks. Four curved and angled blocks, against which the legs are held by light springs, are cut from 1-in. lumber. Note also that the trigger mechanism is spring-loaded to assure it will hold the folded legs against the underside of the tray despite the spring tension on the legs. For easier cleaning, the tray surface can be covered with plastic laminate, readily attached with contact cement. Feet for the tray can be doorstops.—Fred Simpson, Keighly, Yorkshire, England.







Learn age-old Japanese secrets for dwarfing trees and grow your own

TOOTHPICK FOREST

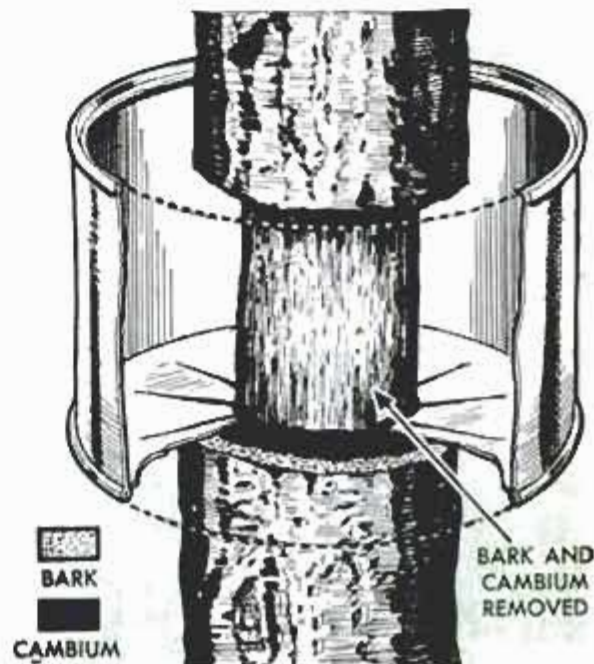
By Jack B. Kemmerer

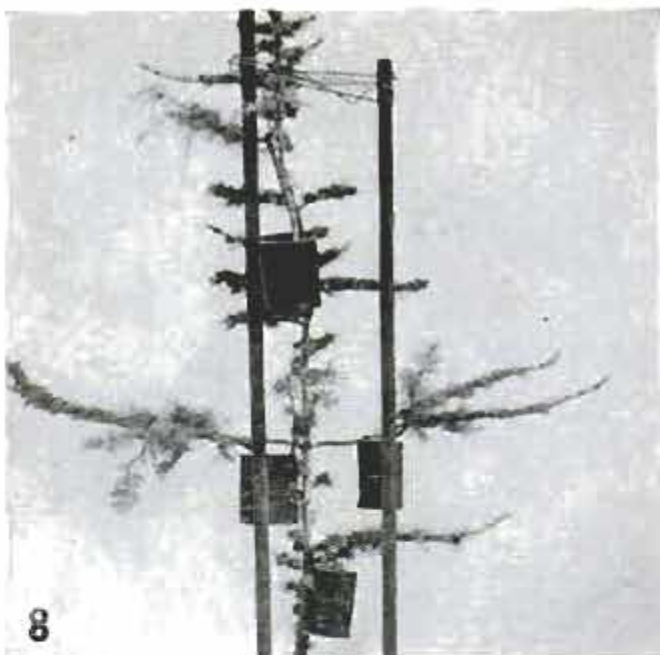
THERE IS NOTHING mysterious or difficult about growing dwarf trees. All it amounts to is pruning the roots of a small tree rather closely as in Fig. 5, and then confining them to a small soil base. The former reduces sharply the ability of the tree to promote new growth and the latter limits the supply of available food materials. Good results can be obtained from almost any tree stock. Aside from careful periodic pruning of roots and replacement of soil, care of dwarf trees is very much the same as for normal growth. Of course, tropical species must be protected from frost.

Some fine examples of dwarf trees are shown on the opposite page. The tree in Fig. 1 is a 20-year-old pomegranate. Fig. 2 shows a 15-year-old pinon tree. Since transplanting it as a seedling, the trunk has doubled in thickness with no increase in height. The tree shown in Fig. 3 is a Japanese juniper planted in a pot of a shape that enhances the tree form. An 80-yr.-old live oak, removed from a rocky hillside as a seedling, is shown in Fig. 4.

Regardless of the type of tree stock used, root pruning and other dwarfing procedures are the same. At the first transplanting, the terminal root is cut short and the branch roots are cut to fit

into a small pot. Since a given size of root system will permit a tree to grow only to a certain size, excess roots are removed periodically, keeping them about the same for the life of the tree. As a result, the trunk will increase its girth but remain about the same height. Branches also should be pruned to control the shape of the tree. To force a branch to grow in a certain direction, spiral insulated copper wire around it and then form the branch and wire to the shape desired. Remove

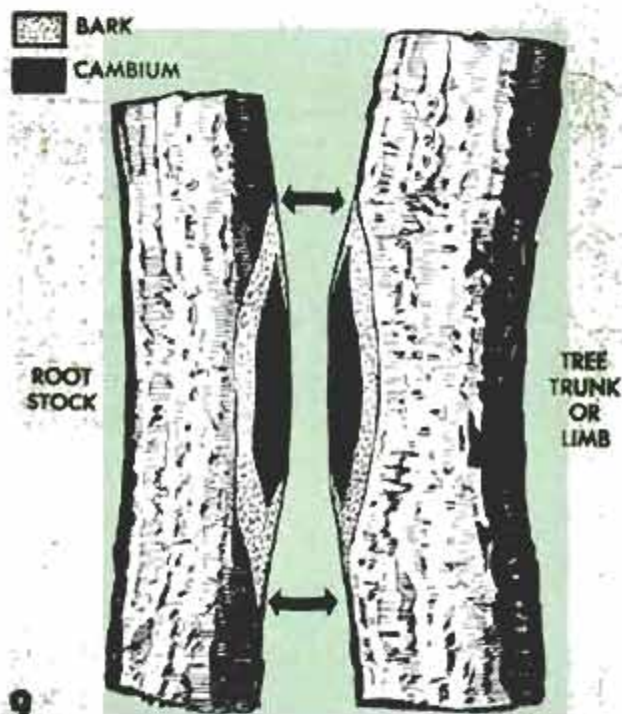


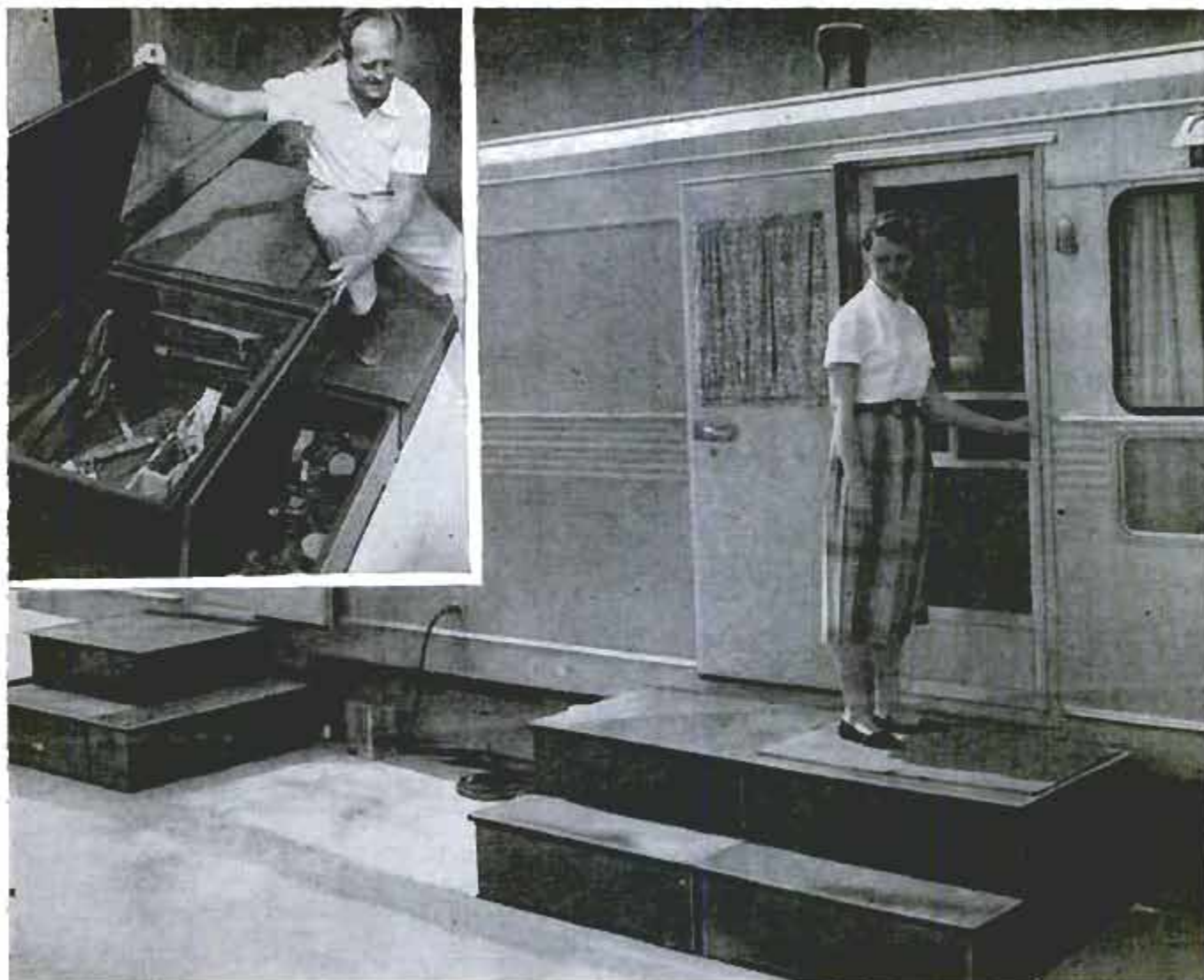


the wire when the branch becomes re-shaped permanently. Water dwarf trees lightly but frequently. Fertilize trees lightly with diluted liquid manure.

Tree stock for dwarf treatment can be obtained in five different ways: from seeds, seedlings, air layering, cuttings and grafting. Growing dwarf trees from seeds is the easiest method but it's also the slowest, since you have to wait about one year for seedlings to develop before actually starting the dwarfing process. The obvious answer to an earlier start is to obtain seedlings of 6 to 8 in in height that are ready for root pruning. Small trees under 3 ft. in height also may be used. When a tree with a thick trunk is desired quickly, the air-layering method is used. This involves inducing the upper part of a trunk or branch to take root. To do this, remove about 2 in. of bark and cambium (light-colored layer underlying the bark) at the point selected, as in Fig. 7. The exposed wood is then covered with moss or earth, which is held in place by a coffee can as in Figs. 6 and 7, or by a plastic sheet as in Fig. 11. The moss must be kept moist at all times. Fig. 10 shows the condition of the cut after several days of treatment. At the upper end of the cut note the formation of callus (tissue from which roots develop). Treatment of cuttings used for this purpose is the same as for general propagation.

To obtain more than one species on the same tree, or for a special shape, root stock is grafted to a branch of the desired shape as in Fig. 9. For best results, the root stock is potted and hung on the tree next to the branch that is to be joined to it as in Fig. 8. For grafting procedures, see "How to Shape Trees," *Popular Mechanics*, Sept. 1958. ★ ★ ★





House Trailer Tool Chests Double as Steps

To provide storage for tools needed for doing home-repair work as a part-time job, one house-trailer owner made tool chests in two sizes that also serve as door-steps when arranged as shown in the photos. The chests also provide ample storage for numerous bulky items that cannot be conveniently stored inside the trailer. When traveling, the chests are kept in a large carrier tray attached to the trailer top, located over partitions for proper support. All chests are 36 in. long. The small ones that form the first step are

11 in. deep by 12 $\frac{3}{4}$ in. wide. The large chests serve as the stoop and are 19 in. deep by 30 in. wide.

Materials used for making the chests include 1 x 1 $\frac{5}{8}$ -in. pine framing to which $\frac{1}{8}$ -in. tempered hardboard is nailed and glued for the sides, ends and bottoms. Lids for the chests are made of $\frac{5}{8}$ -in. exterior plywood. The completed chests are painted to match the color of the house trailer. Chest handles attached to the ends of the steps permit two persons to lift them.—W. Palmer, Washington, D. C.



Paint Tape Foot-Divisions Red For Better Legibility

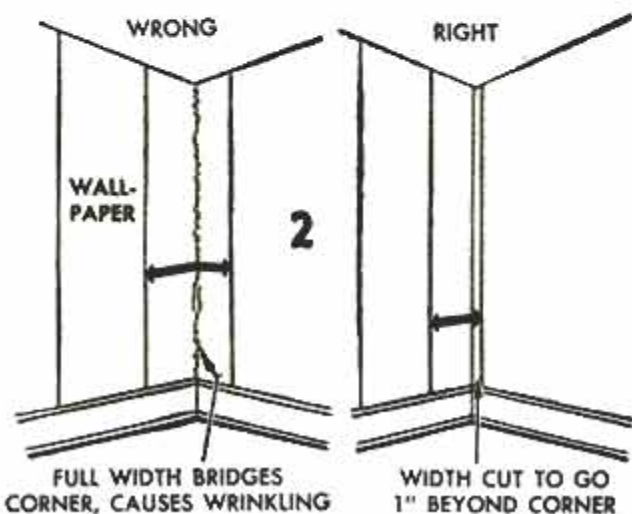
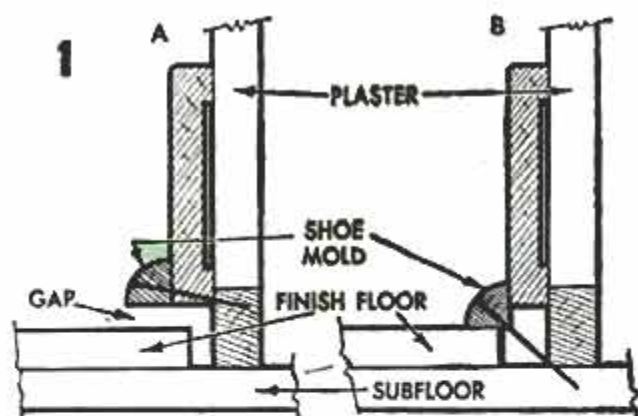
Here is a way of improving the legibility of numbers marking the 1-ft. divisions on a steel tape, when the numbers marking the 1-in. divisions are approximately the same size and color as the former numbers. Simply coat the 1-ft.-division numbers with bright-red enamel as shown in the photo. For best results, use a small artist's brush and thin the paint to the consistency of coffee cream.

H. Hanscom, Elmhurst, Ill.



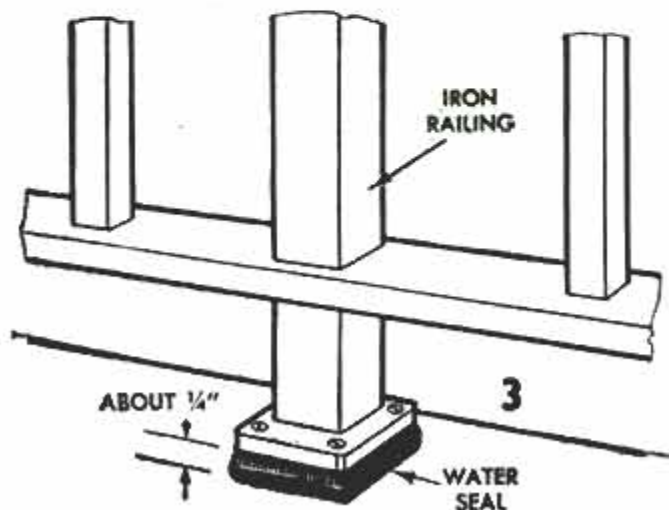
By E. R. Haan

HOME REPAIRS



KEEPING YOUR HOME shipshape without calling in professional help is easy when you know how to tackle the various jobs that arise. Illustrated in this article are several of the most common ones, with suggestions on how to do the work correctly.

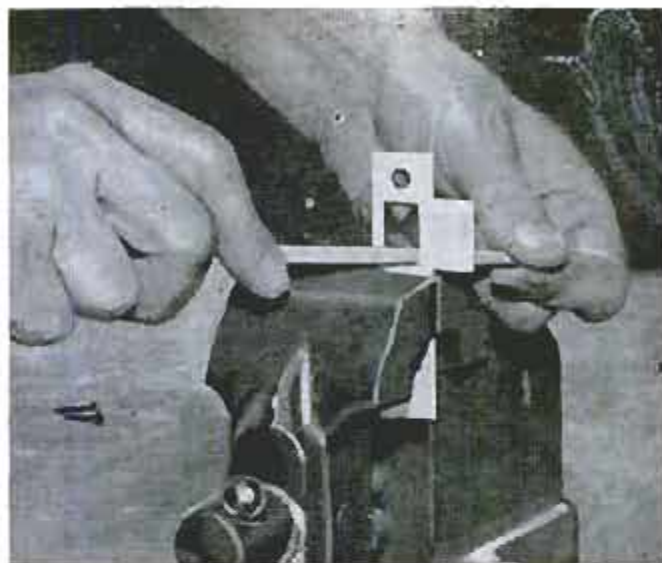
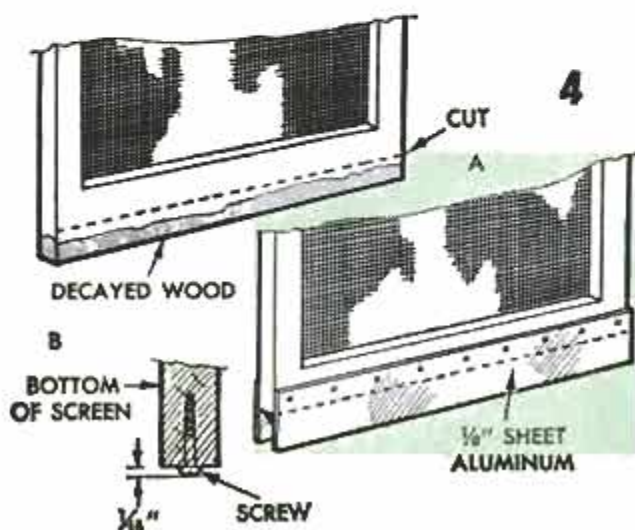
To screw a towel rack to ceramic tile, drill holes to take the mounts, using a carbide-tipped bit as shown above. Holes must be large enough to take screw anchors.



The best way of eliminating a wide gap between a baseboard shoe mold and the floor is to remove the shoe mold and re-nail it directly to the subfloor, as in detail B, Fig. 1. Most shoe molds are nailed to the baseboard as in detail A, and form a gap when shrinkage occurs in underlying members. A good way of handling corners when wallpapering a room is to cut the corner strip to a width that will go about 1 in. beyond the corner as in Fig. 2. Then, when wall expansion or shrinkage occurs, the paper will not pull away or wrinkle at the corner as when a full width of paper is centered on it.

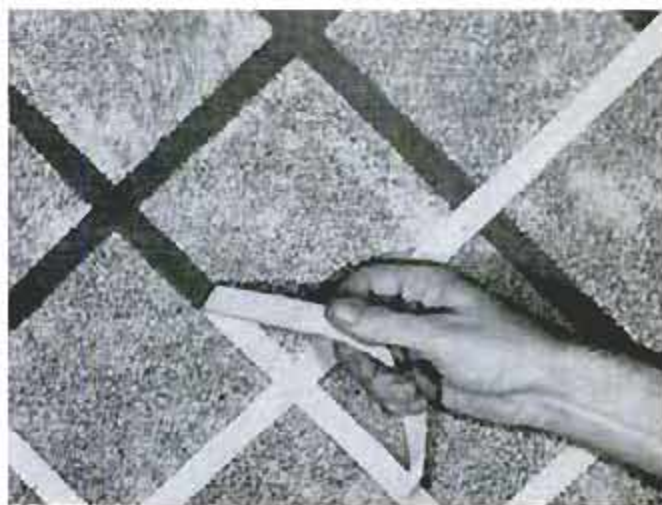
To prevent water from leaking through screw holes at points where an iron railing is attached to a metal-covered porch deck, cut gaskets from an inner tube and cement them between the railing mounts and deck as in Fig. 3. When a door catch fails to engage the strike plate opening properly, observe whether the opening is too high or too low. Then remove the plate and enlarge the opening with a file as necessary, Fig. 5. You can paint a pattern of squares in contrasting colors on walls by first applying a background color and then painting a contrasting color on top, after having applied masking tape on the wall between coats as in Fig. 6. The tape is removed as soon as the paint sets.

To repair a wooden screen having dry rot in the bottom member, cut off the decayed wood on a straight line and attach a strip of sheet aluminum to each side as in detail A, Fig. 4, to provide the correct length. To protect new wooden screens, drive screws into the bottom edge to raise them slightly for drainage, detail B. For an easy way of enclosing a screened porch to protect it during winter, make frames to duplicate the screens and cover them with plastic-coated screening. Fasten the "storm sash" with turn buttons as in Fig. 7. ★ ★ ★



5. Above, lock catch out of alignment with strike-plate opening is corrected by enlarging the latter

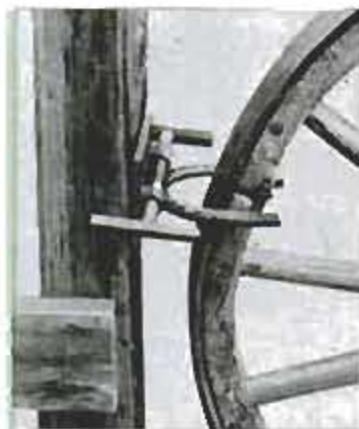
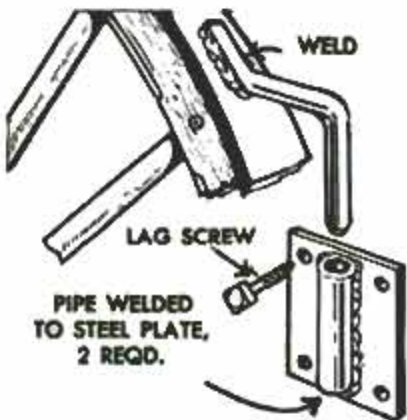
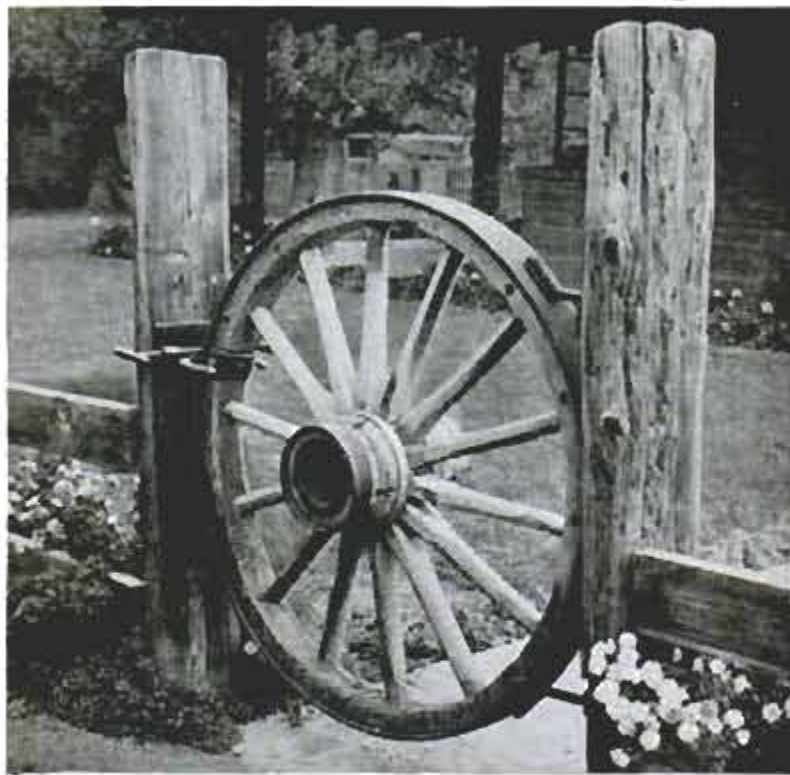
6. Below, wall is painted in two-color pattern by rolling paint over masking tape arranged in squares



7. Below, screen-enclosed porch, and furniture stored on it, are protected from winter weather by removable "storm sash" made from 1 x 2-in. furring strips to which durable plastic-coated screening is nailed



Wheel Becomes Useful Again as Farmyard Gate

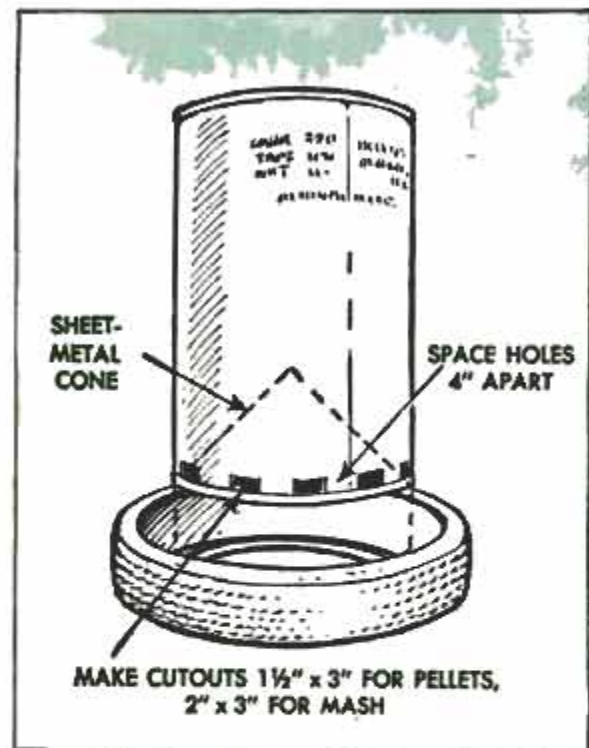


If you drive past the John Wheeler ranch near Courtland, Calif., this rustic farmyard gate is sure to catch your eye. Using an old farm-wagon wheel for the gate, "hinge pins" were welded to the steel rim to swing in brackets lag-screwed to a rough-hewn post. A novel latch was formed from a horseshoe by welding it to a 1 x 12-in. steel rod. The latter passes through lugs welded to a steel plate, which in turn is bolted to the gatepost. Cross handles, welded to the ends of the steel rod, are gripped to raise the horseshoe latch and unlock the gate. The latch cannot drop past a horizontal position since the heel of the shoe, in being welded to the underside of the rod, bears against the steel plate and serves as a stop. The gate blends with a wooded area when the wheel, gateposts and the fence are left unfinished and allowed to weather. The metal parts, including the tire, can be kept from rusting by giving them a coat of shellac or paint. In bending the hinge pins, make them long so they will extend far enough to provide ample space for the wheel to clear the post when it is swung open. You should use at least $\frac{1}{2}$ -in. steel rod for the pins.

Nontipping Holder Cradles Feed Container for Livestock



Stock can't upset their feed or water bucket when it is held in this off-the-ground holder. It is made from a steel wagon wheel, its hub removed and spokes bent down to suit and support the pail. Three steel-angle legs provide stakes for anchoring the holder in the ground. The spokes are cut through at the rim of the hub so there is ample length to bear against the side of the pail when the spokes are bent downward. The legs are welded to the outside of the wheel rim, and pointed to facilitate driving them into the ground. The legs should be of a length that will provide a convenient drinking or eating height when embedded solidly in the ground. You may find it necessary to heat the spokes to bend them.



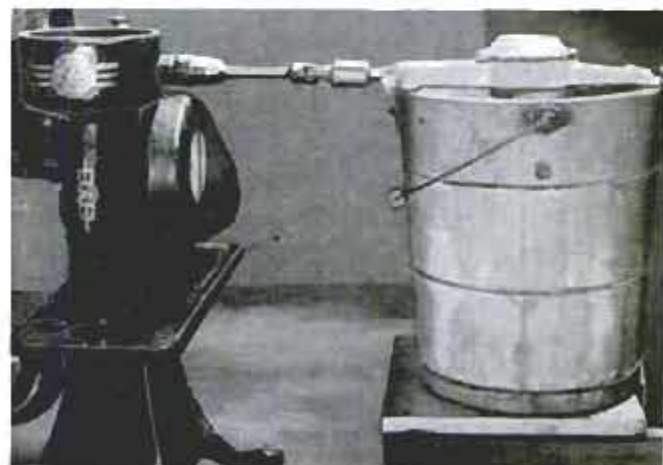
Auto Tire and Drum Make This Self-Feeder

When poultryman David L. St. John of Gervais, Ore., wanted a king-size feeder for his flock, he made a neat self-feeding one by standing a powdered-milk drum inside a tire casing. As shown in the detail, a series of holes spaced 4 in. apart, and of a size to suit the particular feed, was cut through the side of the drum around the bottom. For pellets, the holes should measure $1\frac{1}{2} \times 3$ in., whereas for mash they should be somewhat larger, 2×3 in. When the feeder is made for mash, a sheet-metal cone placed in the bottom of the

drum helps create a flow and direct the feed to the holes. The tire, which provides the feeding trough, is prepared by cutting off the bead from one side. This should be cut back far enough to form a $2\frac{1}{2}$ -in. opening all around between the tire and the drum. A saw, such as a keyhole saw, can be used to cut through the tire casing; a sharp knife also could be used. You'll find that there is sufficient lip on the bottom of the drum to let the latter fit down over the tire bead and center itself inside the tire.

Cream Separator Drives Freezer

Tired of cranking his ice-cream freezer by hand, an Iowa farmer used his cream separator to drive it. This was accomplished with power-takeoff affair which he made by welding a socket-wrench handle to the removable cap on the separator crankshaft, and a socket head to the freezer crankshaft. Since the drive is reversed in relation to hand cranking, the wooden blades of the freezer dasher must be switched. The speed of the separator is just about right for freezing ice cream.





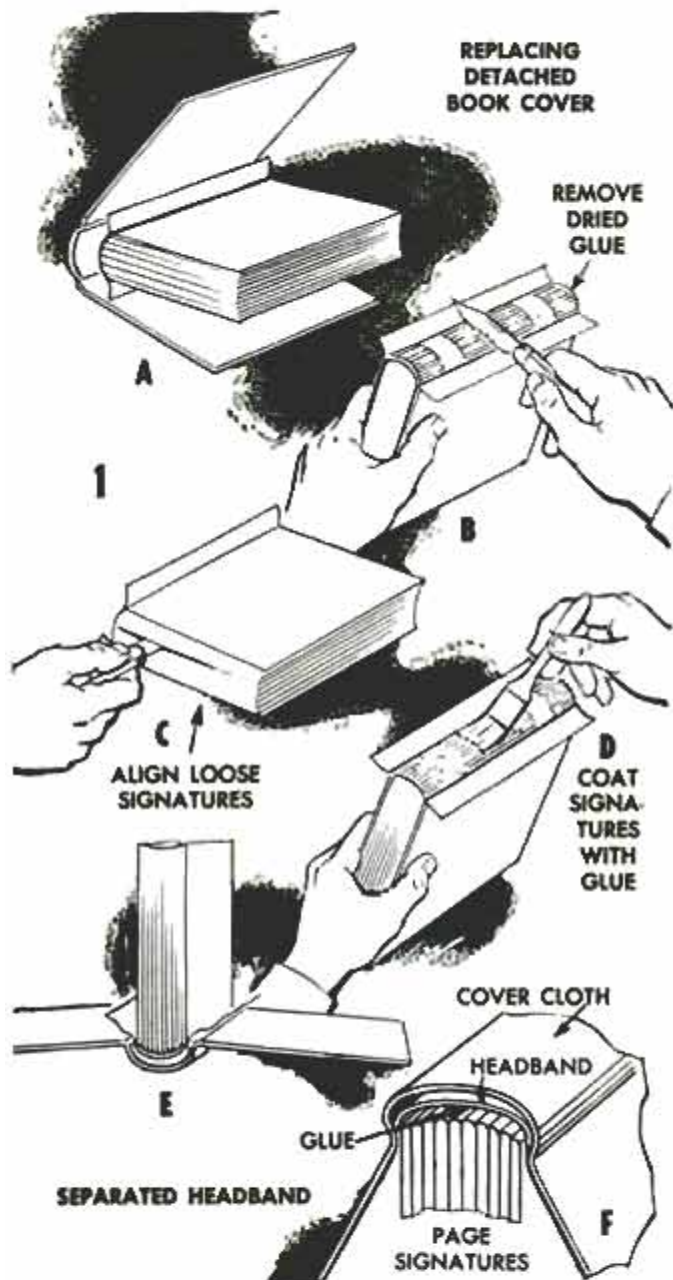
FIRST AID FOR AILING BOOKS

By David E. Roenigk

DO YOU HAVE a favorite cookbook or other reference book that you are thinking of replacing simply because it has torn or loose pages, or a badly damaged binding? Don't throw the volume away. In less time than it takes to order a new book you can repair the damage permanently. You also can bind issues of magazines for reference, make booklets, or even assemble your own book of clip-pings as illustrated in this article. No special skills or tools are required. Materials needed for most repair work and binding include a bottle of transparent plastic glue, stiff cardboard for covers and strong thread for tying loose pages into their original position.

Replacing loose pages and mending torn ones are the simplest and most frequent repair situations. When only a few pages are loose, coat the back edge of each with glue and insert it in the proper place in the book as in Fig. 2. When an entire signature (folded pages grouped together, Fig. 1, detail F) is loose, it should be retied into its original position with the rest of the signatures. The covers must be removed when doing the latter, to expose the spine of the book (backs of assembled signatures). To repair a torn page, apply a thin coat of glue on the torn edges and close the book, being sure to place a sheet of wax paper on each side of the glued page to prevent its sticking, Fig. 3.

To replace a detached book cover, first scrape glue fragments from the spine of the book, detail B. If the cover is only partly detached, remove it from the book



Drawings courtesy Delkote, Inc.



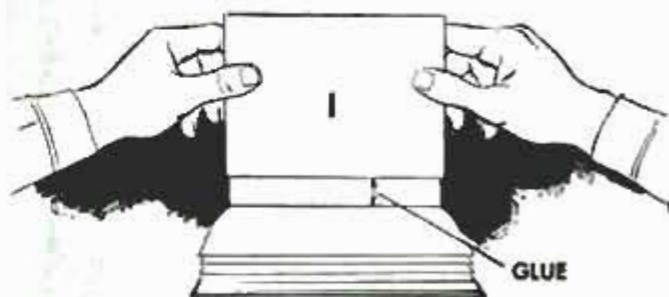


entirely, separating the two as in detail A. At this time, check the book for loose pages and signatures, realigning the latter by slipping a paper knife into the center of each and pushing it into place, detail C. After gluing loose pages in place and re-tying loose signatures as explained previously, coat the signatures with glue as in detail D. Then place them in the back of the cover as in detail E, close the book and place a heavy weight on it.

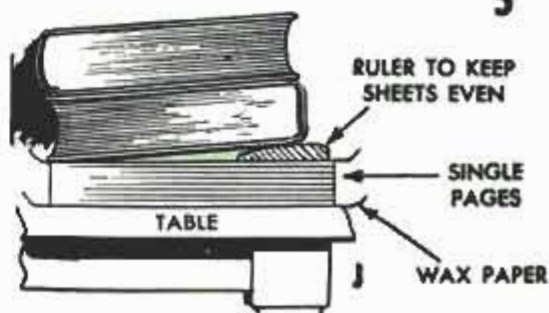
The pages of a saddle-style booklet are assembled in much the same way as the pages of a signature. Folded pages are simply inserted in one another as in details G, H and I. A thin coat of glue applied to the back of each folded page holds the booklet together. To make a book of your own, assemble single pages as in detail J. Apply 2 or more coats of glue to the page edges that are to form the back. Then cut two covers and secure them to the book with a strip of leatherette as in detail K. Back issues of magazines can be bound into volumes in the same way, or they simply can be joined together at the back by applying glue as in Fig. 4. ★ ★ ★



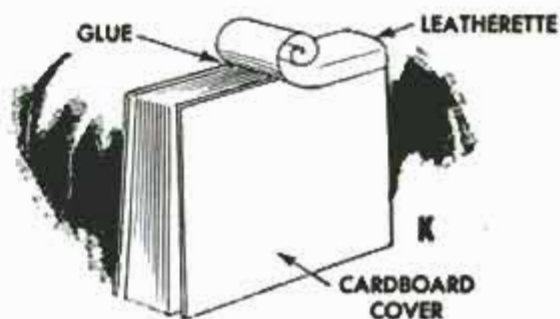
SADDLE-STYLE BOOKLET



5



MAKE YOUR OWN BOOK





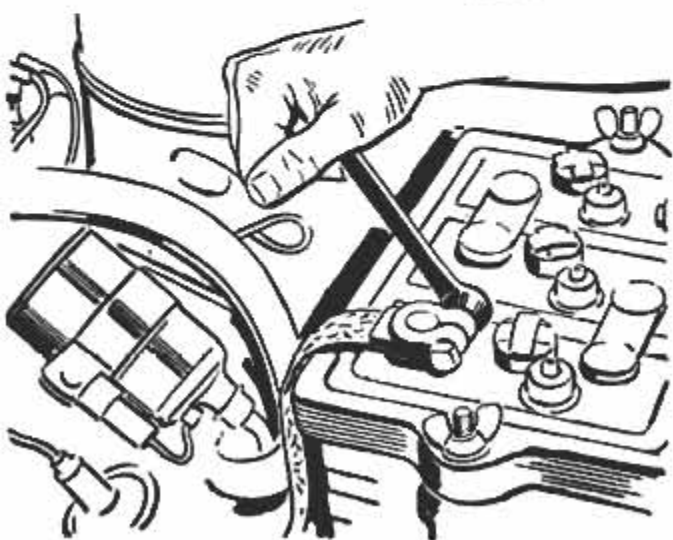
Knowing Direction of Threads Simplifies Wheel-Nut Removal

Before straining on the wrench to remove wheel nuts, determine if they have left or right-hand threads. In most cases they will be marked with a letter L or R that designates thread direction. If not marked, it generally can be assumed that the nuts on the right-hand wheels will be held with nuts that have left-hand threads. Wheel bolts also follow this rule.

Glenn F. Stillwell, Manhattan Beach, Calif.

Loose Electrical Connections Cause Sudden Engine Stalling

Most frequent cause of a car suddenly stalling on the road is a loose or broken electrical connection. Sometimes just twisting the cable clamps on the battery posts is effective in restarting an engine. If you have tools in the car, tighten the clamps and connections for ground and on the starter or solenoid. Repair primary wires on coil or distributor by scraping off insulation and twisting together or around connector posts. This will permit driving to a service station, where more permanent repairs can be made.



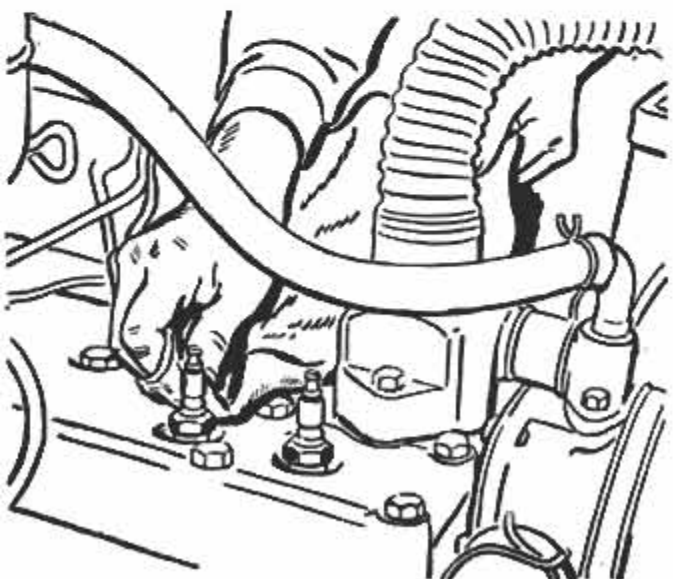
Protective Cardboard in Trunk Doubles as Traction Mat

Covering the floor in the trunk of your car with sheets of heavy corrugated cardboard will serve a dual purpose. Under normal conditions the cardboard will protect the mat in the trunk from dirt and damage. But, should the car become stalled in mud or snow, the cardboard sheets then can be used as "traction mats" to assist in driving out of the difficulty. The mats can be obtained by cutting apart large corrugated-cardboard cartons, obtainable at any grocery store.



Wiping Spark-Plug Porcelains Eases Hard-Starting Problem

Hard starting, especially on a damp day, often can be caused by moisture on the spark-plug porcelains, which allows the spark to ground out instead of jumping the electrode gaps of the plugs. Dirt and oil collect on the porcelains over a period of time, absorbing moisture, which causes the trouble. Simply wiping the porcelains with a dry cloth usually eliminates the hard-starting problem. Because the inside of the distributor cap is subject to the same dirt-and-oil problem, it also should be wiped dry to prevent sparks from the rotor grounding to the distributor.





Photos: Courtesy General Electric Co.

After electrical heating cables are positioned, the paving material—*asphalt* here—is poured over them

Electrically Heated Driveways

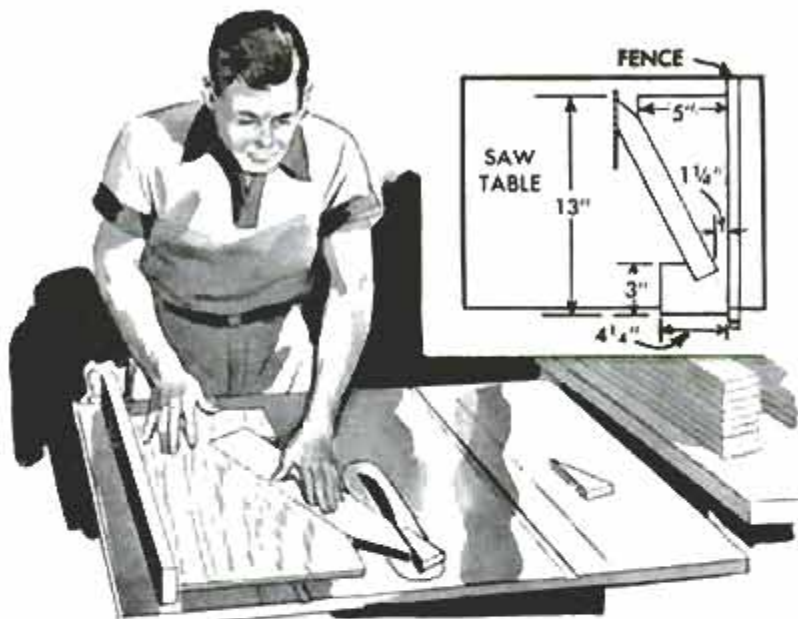
NOTING THE INCREASING acceptance of laborsaving devices as part of the cost of a home, a paving contractor in Bridgeport, Conn., now offers electrically heated snow-melting sidewalks and driveways as a "package." Heated paving is not, of course, a new idea. But having one contractor provide both paving and wiring is fairly unique, and the idea quite likely will spread to other areas where snow removal is a problem. Either concrete or

asphalt can be heated, as the electric cables simply are embedded in the paving material by pouring it over them. No thermostats are required—it is the amount of snow that determines when the cables are to be energized, not the temperature—which keeps the wiring simple. An off-on switch in the house is the only control required. If you are considering having a sidewalk or driveway installed, consider installing these cables.

Workman uses marked plank to space loops of cable properly so maximum heating efficiency is assured

Individual lengths of cable are spliced together in junction boxes that are buried in the paving



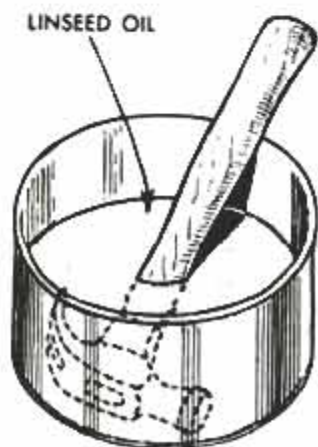


Jig for Cutting Pickets Permits Dual Operation

Cutting the points on pickets used for a low fence of the kind placed around flower beds is no problem when this jig is used on a table saw. The pickets need not even be cut to the correct lengths before the points are cut on them. One angle of each point is cut first, then the picket is turned over and run through the saw again, which does the double job of cutting points on the pickets and cutting them to the correct length.

Bernard Karsko, Columbus, Ohio.

Oil-Treated Hammer Handle Resists Shrinking



When installing a new handle in a hammer or hatchet, assure longer, trouble-free service from it by soaking it in a half-and-half solution of linseed oil and turpentine. This prevents drying out and shrinking that causes a hammer head to loosen.

Nylon Stocking Substitutes For Cheesecloth



Paint that has been standing for some time must be strained before it can be used. Cheesecloth may not always be available for the job, so a piece of nylon stocking held on the paint can with a rubber band is just as effective. — A. E. Fenn, Chicago.

"Renewing" Marks on Micrometer

After a micrometer has been used for a length of time, the metal on the barrel wears smooth and the engraved numbers and lines become difficult to see. To renew the legibility of the markings, paint the area with black paint, making sure the markings are well filled. Then wipe off the paint with a soft cloth backed with a flat piece of wood. The paint will remain in the recessed figures.

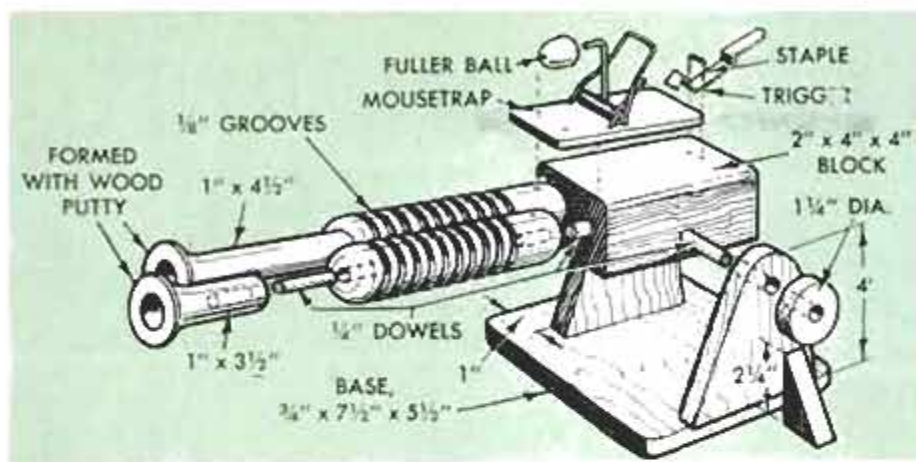


Chisel Rest for Metal Lathe

Turning wood on a metal-turning lathe requires that some sort of chisel support be improvised. A simple method of doing this is to clamp a length of steel flat in the tool post as shown. A single length can be adjusted back and forth in the post to provide full working range for the chisel, or several different lengths can be used if a longer one would interfere with the work or contact the faceplate.



Model Machine Gun Has Mousetrap Firing Mechanism



By R. W. Madden



Modeled after the famous Bofors 40-mm machine gun familiar to many servicemen in World War II, this gun has a firing mechanism built around an ordinary spring-type mousetrap. Projectiles fired by the gun are harmless rubber fuller balls. The platform and mounting in which the twin-barreled gun pivots vertically are cut from 1-in. lumber (approx. $\frac{3}{4}$ in. finished), or $\frac{1}{2}$ or $\frac{3}{4}$ -in. plywood, to the dimensions given in the detail. The "magazine" end of the gun is a 4-in. length of 2 x 4, fitted with short lengths of $\frac{1}{4}$ -in. dowel to provide shafts, on which it pivots. Barrels of the gun are formed from dowels of two different diameters or, if a lathe is available, turned from stock $1\frac{3}{8}$ in. in diameter shouldered to 1 in. at the forward end. Flares on the barrel ends are turned on a lathe, or shaped from wood putty and sanded smooth. Rear portions of both barrels are grooved to represent cooling fins and are $3\frac{1}{2}$ in. long. Forward portions of the barrels are $3\frac{1}{2}$ and $4\frac{1}{2}$ in. respectively, the shorter barrel simulating one that is

under recoil after firing a shell. If a lathe is not available, grooves can be turned on the rear portions of the barrels by holding them firmly against the miter gauge of a table saw and rotating them against the blade that is adjusted to project just slightly above the surface of the table. First step in making the firing mechanism is to remove the bait pan and locking lever of the mousetrap. It then is screwed to the gun as indicated. The trigger of the gun is bent from fairly heavy sheet metal to the shape shown, and is held on the gun by a staple, which is driven to permit a sliding fit by the trigger. When the loop of the trap is pulled back, the trigger is slipped forward to hold it down. Pulling back on the trigger releases the loop. The end of the trigger can be bent up, as indicated in the photo, so a youngster can grasp it more readily. An L-hook is driven into the mousetrap base, and is positioned so the loop of the trap just clears it. When a fuller ball is slipped on the hook it is struck by the loop and shot forward.

Comb Quickly Removes Loose Bristles From New Paintbrush

Even expensive, quality paintbrushes have a few loose bristles that will shed onto a newly-painted surface. To eliminate this problem, before you use the brush run a comb through the bristles

several times to disengage any loose strands. Then rub the brush against your hand to force out the released bristles that still might remain entangled with the others.

PRECAST CONCRETE STEPS

By Walter E. Burton

*1032 Florida Ave
Akron, Ohio*



REPLACE THOSE dangerous, dilapidated wooden steps that depreciate the value of your home with attractive cast-concrete steps and have them ready for use in 24 hours. No need to set up forms, and neither a concrete mixer nor a ready-mix concrete truck is necessary. If you would like distinctive wrought-iron railings, they can be installed at the same time as the steps.

Neither mystery nor miracle is involved in the one-day concrete steps. They are precast in metal molds and are fitted with steel reinforcing. Before being sold, the steps are thoroughly seasoned, which permits immediate use. The 24-hr. period is required to allow mortar used in the assembly of the steps to set properly. Made by local manufacturers under license, the steps sometimes can be ordered directly from them, or through a building-supply dealer or lumberyard that represents the manufacturer. When you place an order, a couple of men will come to your home and take measurements to determine if stairs kept in stock can be used, or if custom-made steps are required to permit clearance of pipes, or



Upper left, sidewalls are positioned and leveled as first step. Lower left, riser-tread casting is bolted to side walls with mortar between. Below, mortar along bottom edges of steps keeps out moisture





Precast concrete steps are attractive, easily cleaned and will not deteriorate due to rot and weathering

to fit building irregularities. The homeowner can install the steps himself, or have the manufacturer's workmen do the job. In either case a concrete slab or footing of some kind is required to support the concrete sidewalls. These walls are leveled and positioned as the first step in the installation. Treads and risers usually are cast as one piece, and they are bolted to the side walls by means of cast-in threaded inserts. Mortar is used

between the side walls and treads and risers. After the assembly is complete, mortar also is troweled along between the lower edges of the side walls and footings and along the lower edge of the bottom riser. If railings are to be used, stair treads with cast-in threaded inserts are furnished. The inserts match railings sold by the step manufacturer. Although colored-concrete steps sometimes are available, the steps also may be painted.

Bolts passed through eyebolts in side walls are turned into threaded inserts in tread casting during assembly

Weather will not affect these concrete steps and it will be years before they show any signs of wear



Block Clamped to Thin Stakes Permits More Positive Driving

Driving long, slender wooden stakes into the ground usually presents some problems. First, a ladder is required to reach the tops of the stakes and, second, because of their flexibility the stakes tend to bend when struck, preventing their receiving the full force of the blow. Here is a method that eliminates the need for a ladder and minimizes the flexing problem. Clamp a length of 2 x 4 block to each stake at a convenient height and hammer on that instead of the stake. As the stake is driven into the ground, move the block to a higher position. Repeat this until the stake is driven the desired depth. As indicated, one hand is used to keep the stake aligned while it is being driven, the hand being well clear of the hammer.



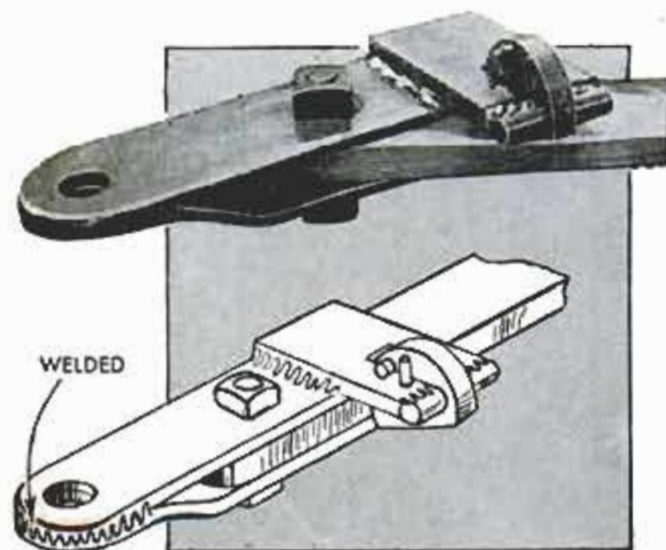
Modified Square Aids Planing

Slightly modified, a try square will provide the craftsman with a tool that will be a real aid in accurate edge-planing of lumber. A short section of the blade—about 2 in. is sufficient—adjacent to the head is filed or ground to a knife edge. Care must be taken to assure that the sharpened edge remains parallel with the rest of the blade edge. In use, the square is held firmly on the work and tapped with a mallet so a shallow groove is cut into the wood. Repeat this about every 6 in. the length of the work, tapping the square with about the same amount of force each time, so that the grooves are of equal depth. A quick glance at these grooves while planing will show whether or not you are planing parallel with the surface of the work, and just how much wood is being removed, as well as at what points along the surface.



Pivoting Drawbar Hitch

Designed by a farmer in Shelby County, Iowa, who has applied for a patent, this pivoting drawbar hitch takes much of the guesswork and labor out of aligning the holes in the tractor drawbar and implement clevis for inserting a pin. In the pivoting position, as in the photo, the drawbar end can be moved, aligning holes. When the tractor takes a strain, the hitch is pulled around to align with the drawbar and a weighted disk drops down to "lock" the hitch in position, as in the sketch. Not shown is a vertical bar on the opposite side of the hitch that prevents it from pivoting in the other direction when in the locked position.



SHOP NOTES



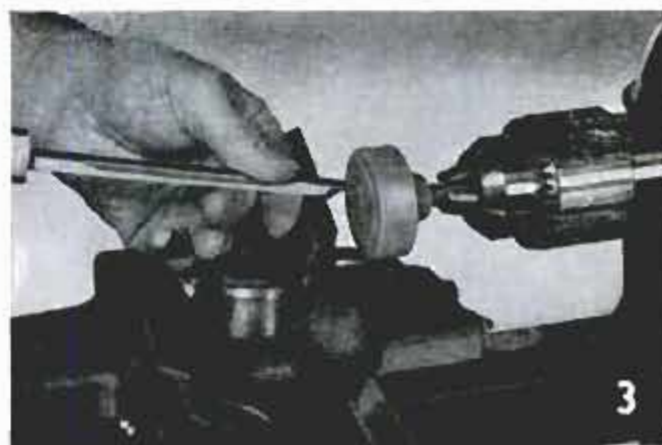
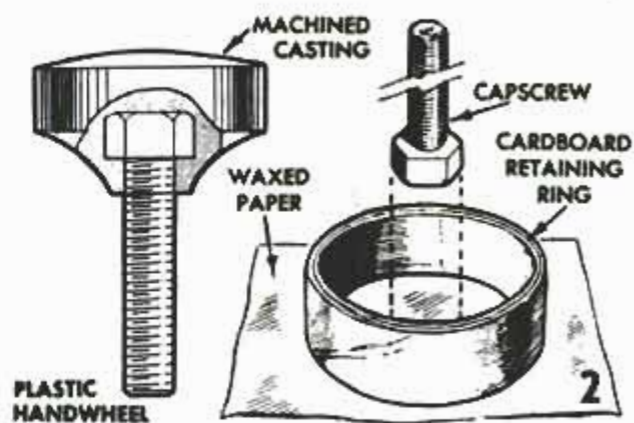
CAST MACHINE PARTS WITH PLASTIC

By Sam Brown

USING MUCH THE SAME methods followed in making novelties such as figurines, jewelry, paperweights and other ornaments from cold-casting plastics, you can make attractive machine parts such as handwheels, control knobs, bushings and other nonmoving parts. Cold-casting plastics generally come in a paste or liquid form, to which you add a hardener, or catalyst, the two being mixed immediately before use. The paste forms incorporate a filler such as iron, aluminum or fiber in a powdered form. The liquids can be changed to the paste form simply by adding an inert filler. As a rule, you'll get better results by using the prepared products rather than attempting to mix your own.

Although the cold-casting plastic in the liquid form does not ordinarily possess the adhesive properties of the ready-prepared paste forms, it is suitable for casting certain parts, such as bushings, or bearings, that will be supported in the form in which the part is cast.

The trick in mixing a paste plastic with the hardener is to follow instructions for mixing, in all details. After you add the measured amount of the hardener called for, the mixture should be worked thor-



oughly with a putty knife for at least two minutes before the material is worked into the form, Figs. 1, 14 and 15. If you fail to mix properly and sufficiently you will get soft spots in the mixture. That is, it will not harden uniformly.

A typical example of how casting plastic can be used in a practical application is the procedure in making the simple hand-



wheel detailed in Fig. 6. The material is pressed, or knifed, into the cardboard retaining ring, Fig. 2, before inserting the capscrew which forms the threaded shank of the handwheel. Of course, if the handwheel, or palmwheel, is to be used in some application not requiring a threaded shank, or spindle, then you would use a round rod or a length of drill rod. When placing the capscrew or the rod, be sure to get it as nearly centered as possible. Support it in the vertical position if necessary until the plastic hardens.

You can do rough forming, or modeling, of the plastic with a putty knife or, if you wait until the material is about half hard, you can work the plastic to form with the fingers kept wet with water. It should be noted that the half-hard plastic mix behaves very much like ordinary chewing gum and will stick to the fingers instantly unless you dip them in water frequently.

Normally it requires about two hours for a paste plastic mix to air-dry. Although the drying time can be shortened to about 30 minutes by use of a heat lamp, it usually is best to permit it to air-dry. Fig. 3 shows the plastic handwheel being turned to the finished shape after hardening. The material turns with a flaky and sometimes a powdery chip and, of course, will be more or less abrasive, depending on what type of filler it contains. For this reason it is best to use a carbide-tipped tool for turning on either a wood or metal-working lathe.

A good example of the bonding strength of an adhesive-type plastic is shown in

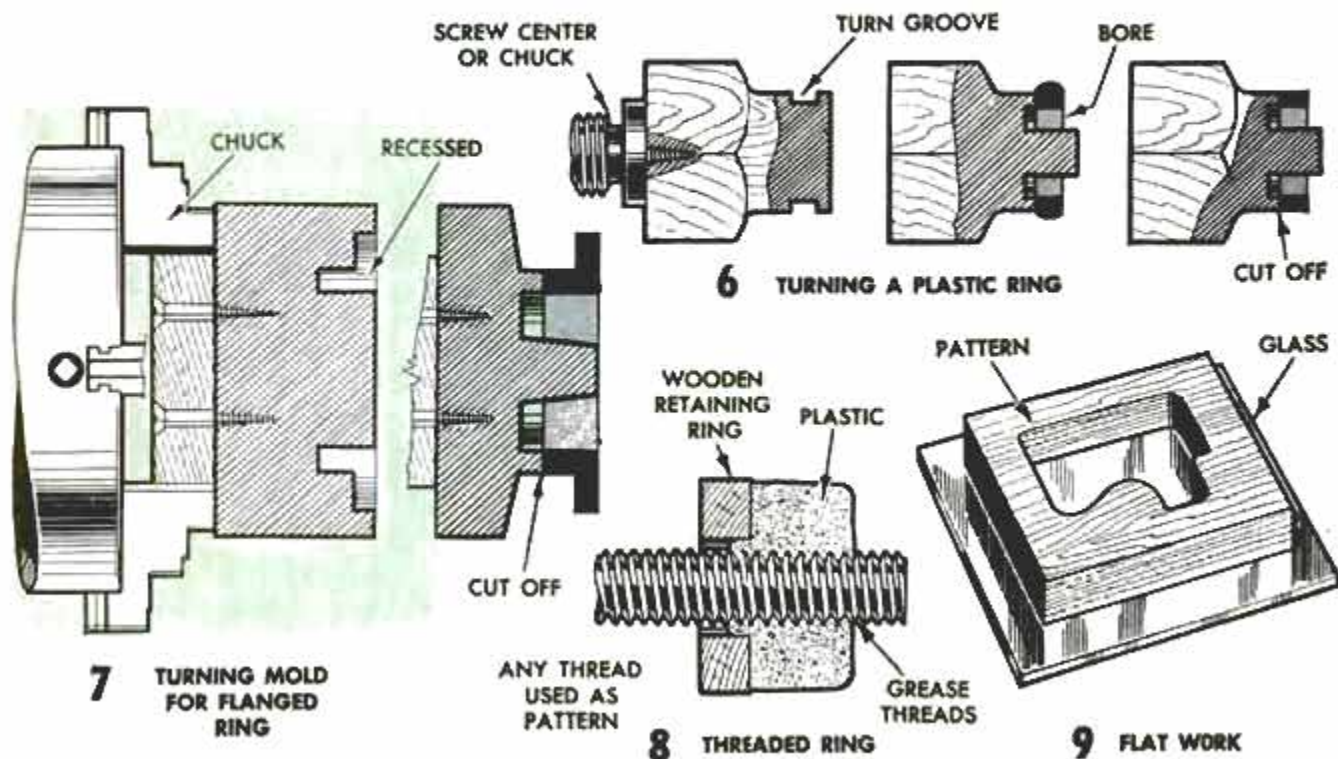
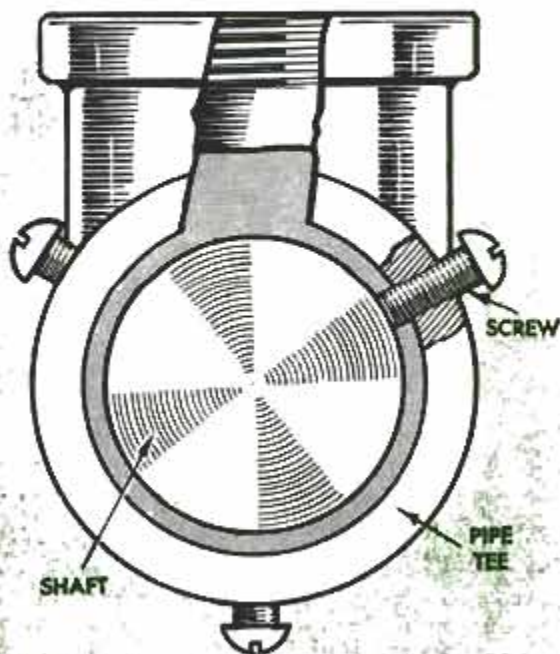
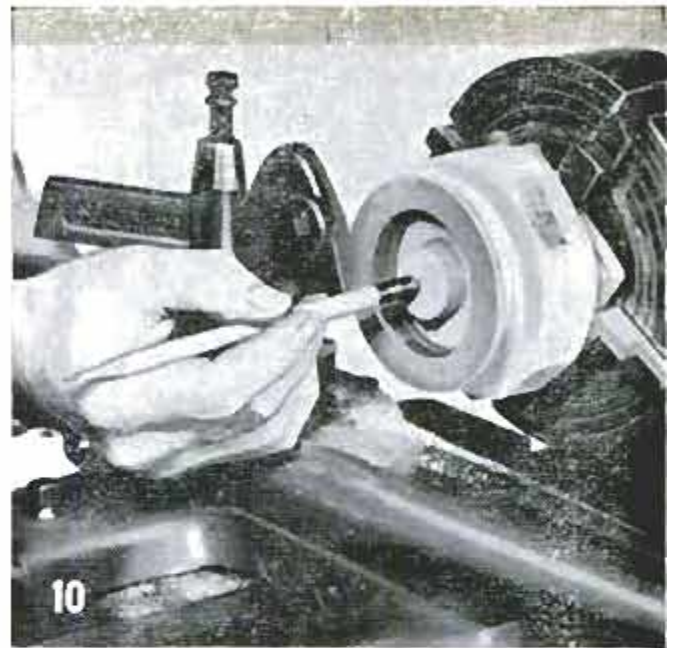


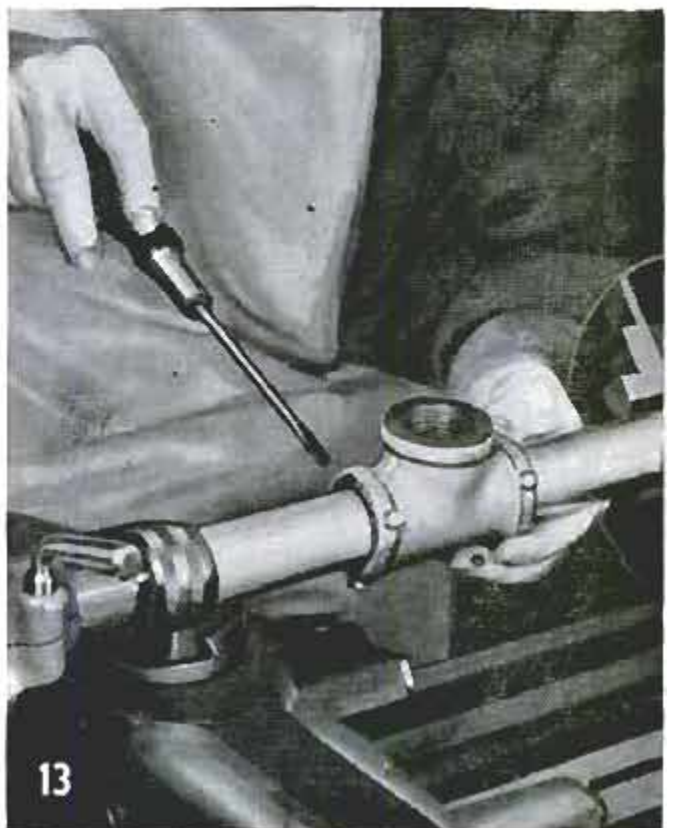
Fig. 4, which depicts a plastic knob rough-formed on one end of a 1/4-in. steel rod. The rod bends under the turning pressure of the wrench but the knob still holds tightly. If the surface is clean and is roughened somewhat by abrading or filing, the adhesive-paste plastic will bond to metal with a strength that will withstand any turning pressure normally applied to knobs or hand-wheels.

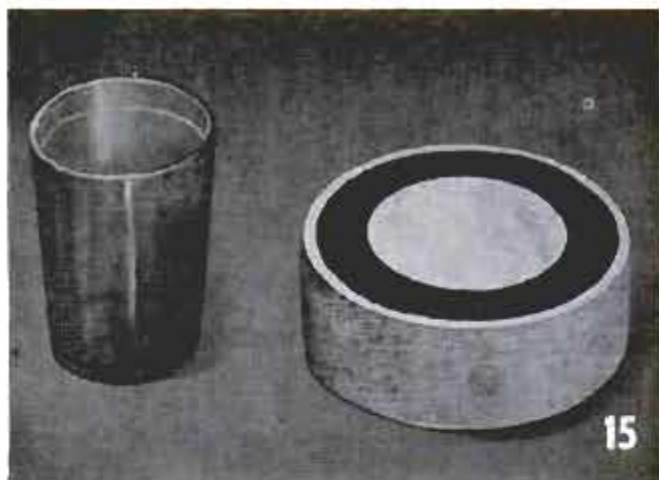
Another practical application of paste-plastic casting is in making a ring, Fig. 6. The required shape and size is determined and the pattern is cut into a wooden block mounted on the faceplate. After the plastic has hardened, the ring is turned down to the required outside diameter and the block is bored out to release it. Figs. 7 and 10 show how to form a similar ring with a flange. After the wooden pattern, or form, has been turned remove the mounted work (including the faceplate or screw chuck) from the lathe and fill the cavity with plastic. Use considerable pressure when forcing the plastic into place to insure that it takes the precise form of the pattern, or cavity.

On some types of work, such as the threaded ring, Fig. 8, it will be necessary to prevent the plastic casting from sticking to the wooden retaining ring and also to the threads of the bolt which is used to form the threads. This can be done by coating the parts with grease. Even when the ring is grease coated the plastic still will retain sufficient adhesion to permit turning with light cuts. The grease film



12 PLASTIC SLEEVE BEARING





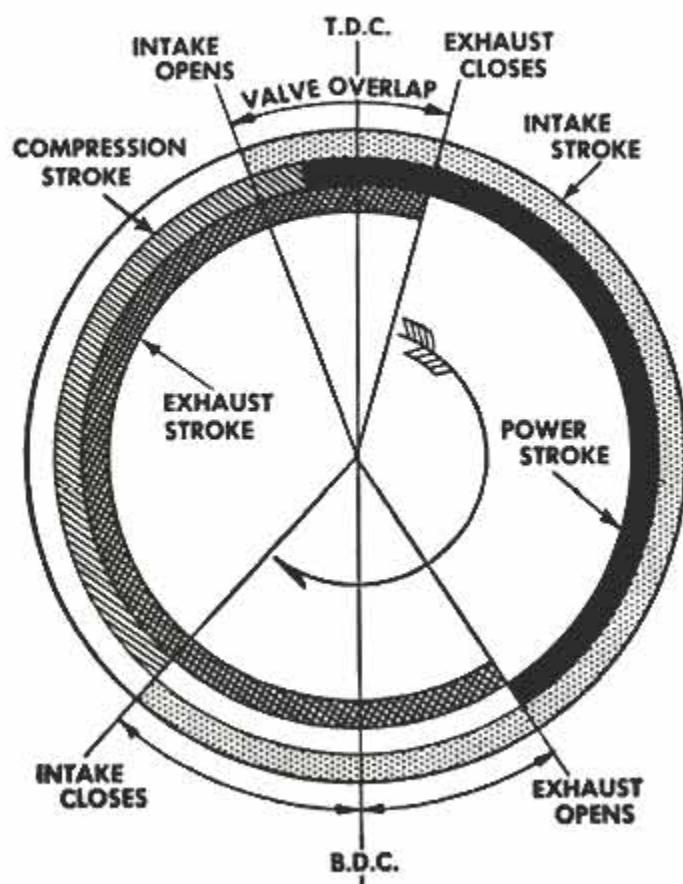
will allow the turned plastic ring and the wooden retaining ring to be parted without splintering the wood or chipping the plastic at the edges.

When casting a shape having one flat side, place the pattern or mold on a piece of glass which has been coated with grease, Fig. 9. In making castings of this type where the thickness exceeds a half inch or so, it is best to build up to the required thickness in stages, to prevent the formation of air pockets in the casting. Another trick that helps prevent voids is to allow the material to partially harden after mixing and then form it into the rough shape before pressing into the form. This delayed application reduces its bonding strength, to some extent, but the half-hard material still will retain

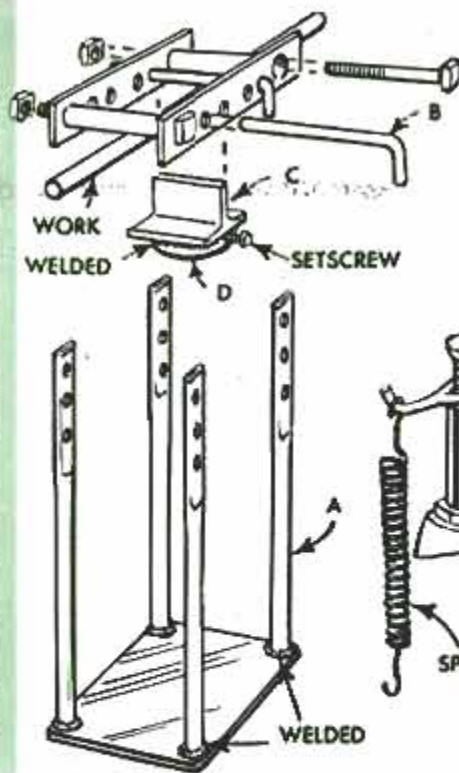
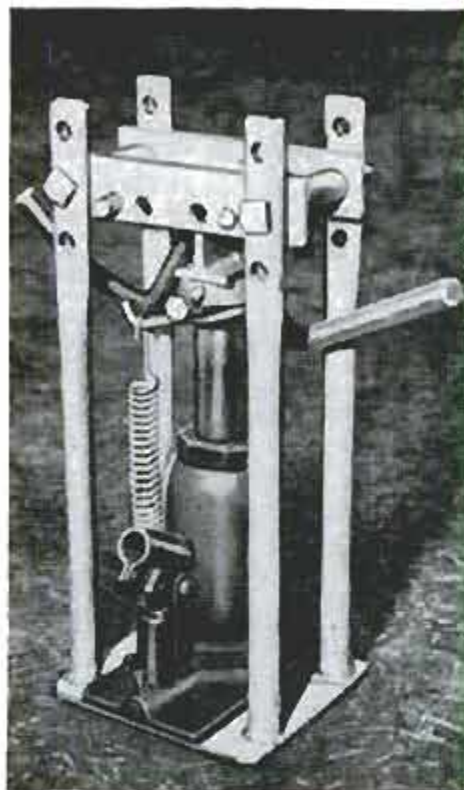
sufficient adhesion for turning jobs such as that pictured in Fig. 11, where a ribbon of half-hard plastic is being wrapped around a tube as the first step in turning a ring with a fixed inside diameter.

Still another application of paste plastic is the "pouring" of sleeve bearings for shop-made tools having frames made from steel pipe and fittings and also for experimental equipment. These bearings, made as in Figs. 12 and 13, will not carry high-speed shafting but do make smooth, shakefree bearings for slow-speed shafts. Liquid plastic also can be used for this purpose, if the load is light. The liquid plastic, which pours, eliminates the possibility of air pockets in casting but has the disadvantage of taking from 24 to 36 hours to air-dry.

Valve Overlap Affects Engine Performance at High Speeds



In the average auto engine both the intake and exhaust valves are open over a 30 to 40-degree angle. Note this area in the diagram. It's called valve overlap and, according to Champion Spark Plug Company, it is extremely important to efficient engine performance at the higher speeds. Only .001-in. variation in tappet clearance can change valve timing about 4 degrees. This may not be sufficient to cause noise, but it can greatly affect engine performance and it also can account for wide differences in individual cylinder power. Note in the diagram that the intake valve opens ahead of top dead center (TDC), and closes well after bottom dead center (BDC). This timing takes into account the inertia of the incoming fuel charge and permits a larger charge to enter the combustion chamber. Due to inertia of the fuel charge, higher engine speeds call for increased valve overlap. Although the increased overlap results in rough idling, it does give peak performance at the higher speeds. Always check clearance with a dial indicator.



Bender Made From Truck Jack and Simple Fixture

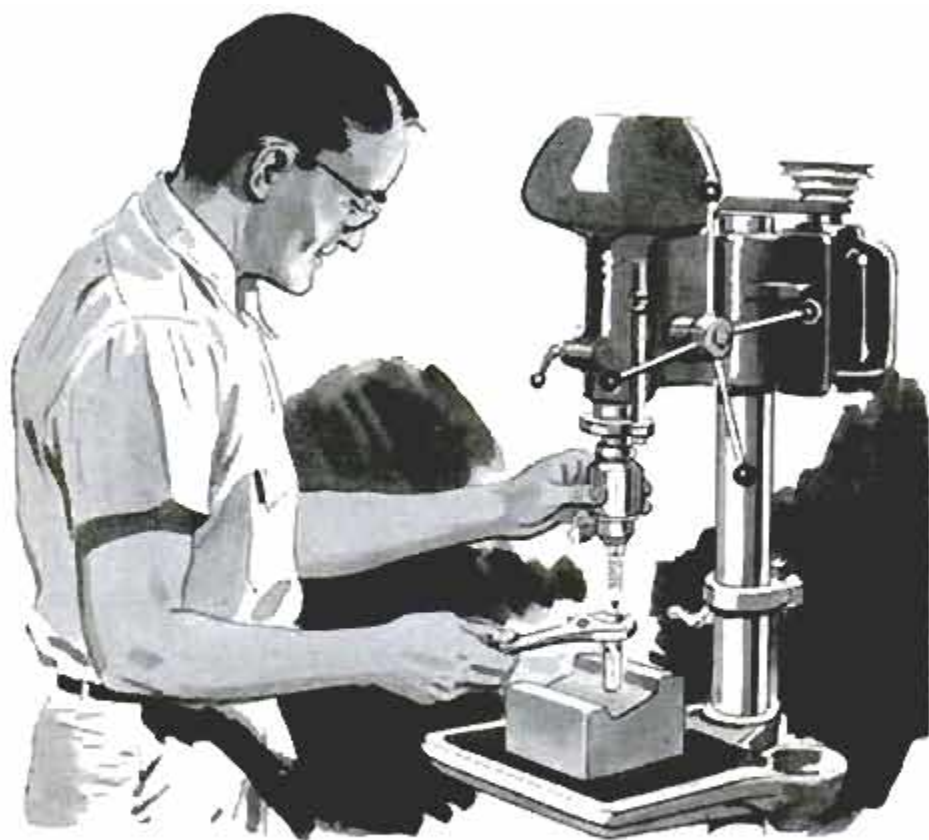
This bender can handle flat steel up to $\frac{1}{2}$ in. in thickness and 3 in. wide, also steel rods up to $\frac{1}{2}$ in. or more in diameter. It utilizes a hydraulic truck jack to supply the bending pressure. The jack is mounted in a fixture consisting of a base and four uprights, or posts, supporting the bending jig, which is adjustable to three positions. The posts, A in the detail, are cut from 1-in. pipe. Each post is welded to the base, the upper ends being flattened and

drilled to take $\frac{1}{2}$ -in. bolts and the bending pins, or anvils, part B in the detail. The wedge, C, is cut from steel tee and welded to a ring, D, flame-cut from $\frac{1}{2}$ -in. steel. The ring should fit snugly over the pad on the plunger of the hydraulic jack. The ring is locked in place with a set-screw. In use, the location and degree of each bend is determined by placement of the bending pins, the position of the jig and the travel of the plunger.

Adjustable Strap Levels Casting

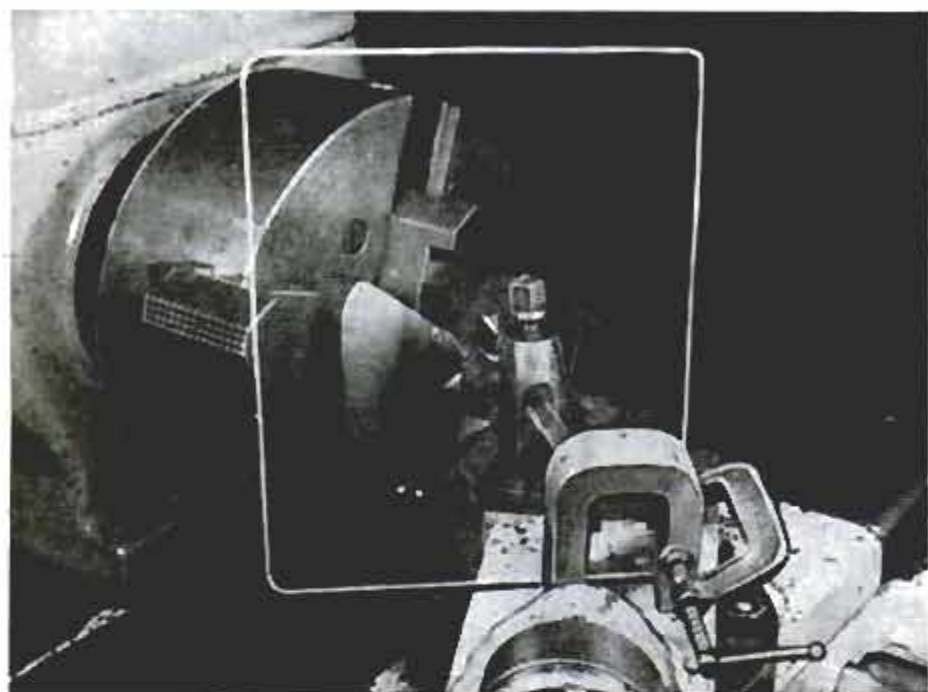
Handling heavy castings of irregular shape when snagging, transporting or assembling often poses the problem of balance. Machine assemblers solve the difficulty by making a special strap of heavy flat steel which can be screwed to the casting. The strap is fitted with a pad as in the detail and both strap and pad are drilled to take a heavy bolt. The opposite end of the strap is slotted to take a large eyebolt. When the strap is screwed to the casting the eyebolt can be positioned in the slot so that the casting is carried level when lifted.





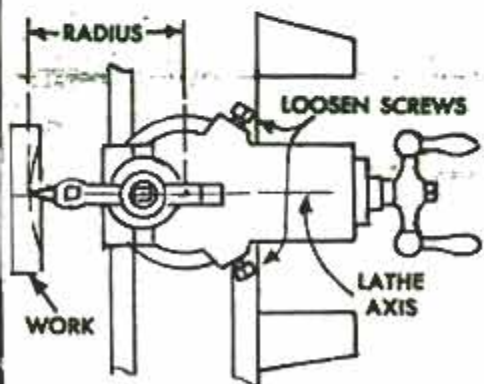
Drill Press Is Aid In Starting Tap

Start a hand tap straight and you'll get a true thread every time. Craftsmen use the drill press as a tapping machine, and this is how they set it up: Place a punch in the chuck, bring the drill spindle down and center the point of the punch in the hole to be tapped. Clamp the work in position, place the end of the tap in the hole and then bring down the punch again, its point entering the center hole in the squared end of the tap. Turn the tap with a wrench, applying a light downward pressure until the tap takes hold.



Clear Plastic Shield Stops Flying Chips

Lathe and shaper operations often produce fine, noncurling chips. These may be thrown for a considerable distance and even though the operator has face-shield protection the needle-sharp chips may become embedded in the skin of the unprotected hands, especially the palms and fingers. A clear-plastic shield clamped to a permanent magnet can be placed in any position on the machine to intercept the tiny flying chips.

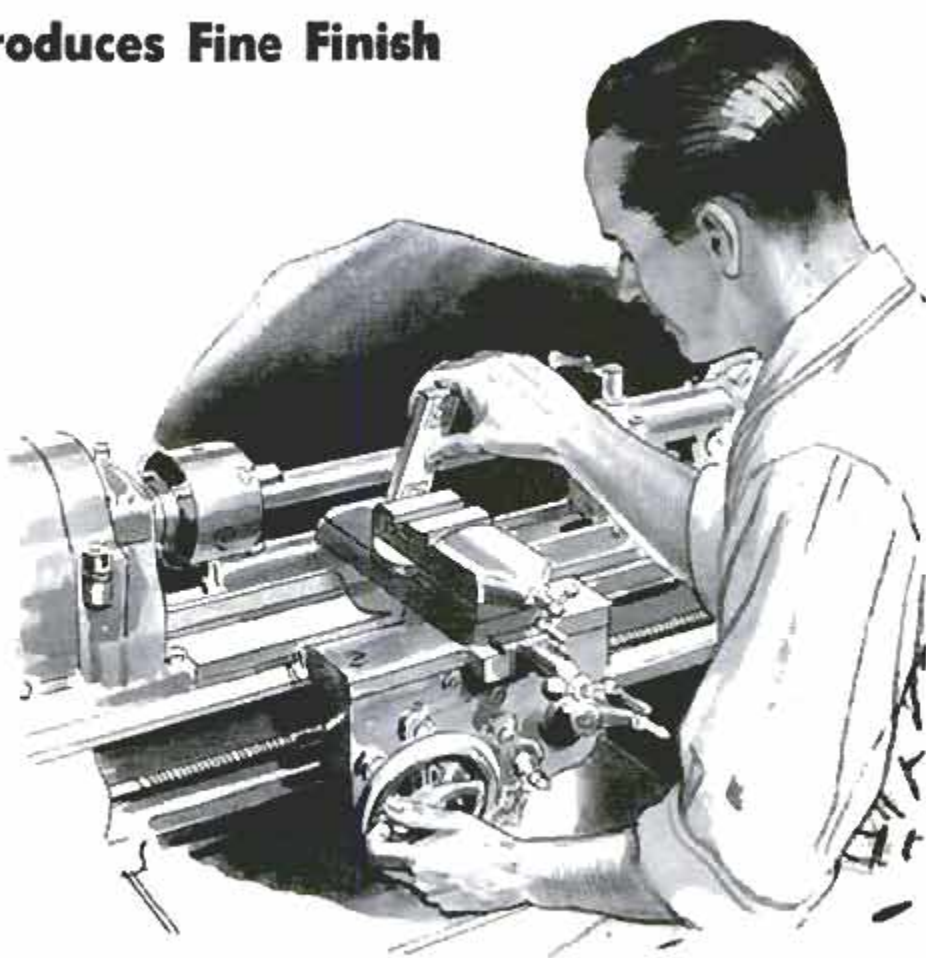


Turning a Concavity With Metal Lathe

An inside radius, or concavity, can be turned simply by swinging the compound of your metal lathe by hand. Turn the compound parallel to the lathe axis, and then center tool as detailed. Tighten the screws just sufficiently to prevent the compound from tilting on its seat. Then take very light cuts.

Polishing Stick Produces Fine Finish

After tool marks have been removed with file and medium abrasive, you can produce a mirror polish on metals with a softwood polishing stick carrying a fine, coated abrasive. Controlled pressure is obtained simply by removing the toolpost and using the forward end of the compound as a fulcrum. For most metals the lathe can be run at its highest speed with the back gears out. The carriage can be hand or power-fed, the procedure depending to some extent on the nature of the work. The surface of the work should always be coated with a light oil to prevent clogging of the fine abrasive.



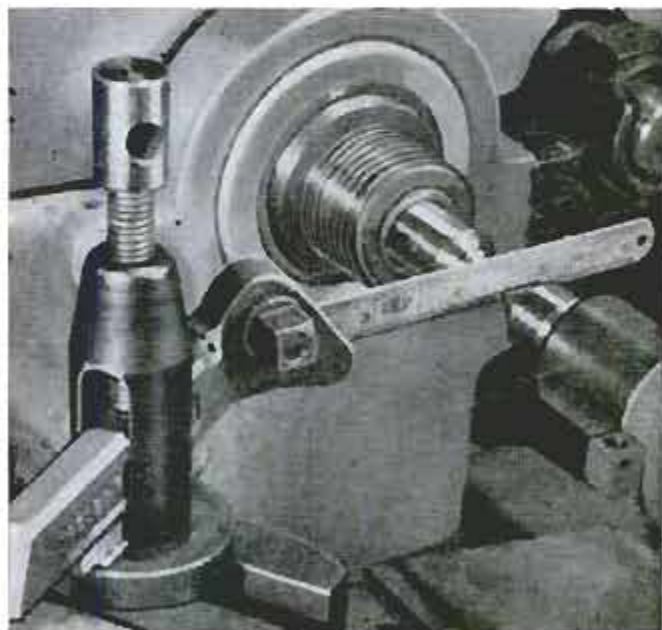
Foil Protects Chuck From Metal Dust

When doing a grinding job in the lathe or on a milling machine with the work chucked, you can save a lot of unnecessary wear on moving parts of the chuck by wrapping it with aluminum foil. Use a piece of foil of generous size, cut a hole at the center and slip the foil over the work as pictured. Wrap tightly around the chuck. This will prevent fine abrasive dust from working into wear parts such as the adjusting screws and jaw slides.



Scale Gives Accurate Check On Tailstock Setover

When turning a taper to close dimensions you need a means of checking tailstock setover accurately. No matter how steady your hand is, it's no simple trick to get an accurate reading by holding the scale freehand between the offset centers. But lock the scale in a cutoff-toolholder and you've got it made. Of course, you have to be sure that the scale stands perpendicular, or very nearly perpendicular, to the axis of the lathe.



Tips On Installing Copper Tubing

By Loyd Weaver



When vertical runs of tubing must be supported it's considered good practice to place padding under the straps to prevent any tendency of the tubing to vibrate. Local code may require copper straps



Above, where tubing runs are carried through holes in studs it often is best to place tubing in position before cutting to length. Below, when tapping into old work code may require insulating fitting



COPPER TUBING, now widely used in home-plumbing installations, is durable, corrosion resistant and rustproof. Seamless construction of the tubes and the smooth, easy turns of the fittings simplify installation and permit free flow of water throughout the system. Solder-joint and flare-joint fittings eliminate threading and reduce installation time. For ordinary work only a few simple tools are needed, a hacksaw with blade having 32 teeth per inch, a torch, a paste flux and 50-50 wire solder are the basic requirements. Resin-core and acid-core solders are not used.

Copper tubing suitable for home-plumbing installations is available in two types, designated as K and L. Type L is available in both flexible and rigid tubes for use indoors. Type K is available in flexible tubes for use underground. Flexible tubes in soft copper are quite easily bent, except to a comparatively short radius, by hand without the aid of a bender. Type L rigid tubing is generally recommended for use on long, straight runs where no bends are required.

Copper fittings of the solder-joint, or sweat-joint, type serve the same purpose and are of the same general shape as those used with conventional steel pipe. The copper fittings are, however, much lighter, the walls are thinner and the sleeves are machined, shouldered and grooved inside to take the ends of the tubing in a snug, sliding fit. A hole usually is drilled through the sleeve into the groove to form a port through which wire solder is fed when the fitting is heated to soldering temperature. Flare-type fittings, which do not require soldering, are for use only on flexible tubing. The sweat-type fittings are suitable for use on both rigid and flexible tubing and are made in copper-to-copper types for new work, also in copper-to-steel types for use when tapping new copper systems into old work. Sweat-type copper fittings must be handled carefully as they are easily dented or crushed out of round.

The procedure in soldering a sweat-type joint is quite simple. As the first step the tubing is cut to length, care being taken to cut the end square. The cut edge is then deburred and the outside of the tube near the end is cleaned with abrasive cloth or fine steel wool. The machined sleeve also



In many installations copper tubing also is used for waste lines. Even the larger sizes are light, easy to handle and install. Special fittings are available for joining the copper-tubing waste lines to soil-pipe hubs. When soldering, care must be taken to heat fitting uniformly to soldering temperature

is cleaned in the same manner and the meeting surfaces of tube and sleeve are coated with paste flux. The end of the tube is inserted in the sleeve and pressed tightly against the shoulder. Then the fitting is heated to soldering temperature with a torch and wire solder is fed into the joint through the hole in the sleeve. As the solder melts and flows it will follow the groove in the sleeve and fill the entire area of the joint. As soon as solder appears all the way around the outer end of the fitting the heat is withdrawn and the joint wiped clean with a damp cloth. When soldering, always apply the heat to the fitting, not the tubing.

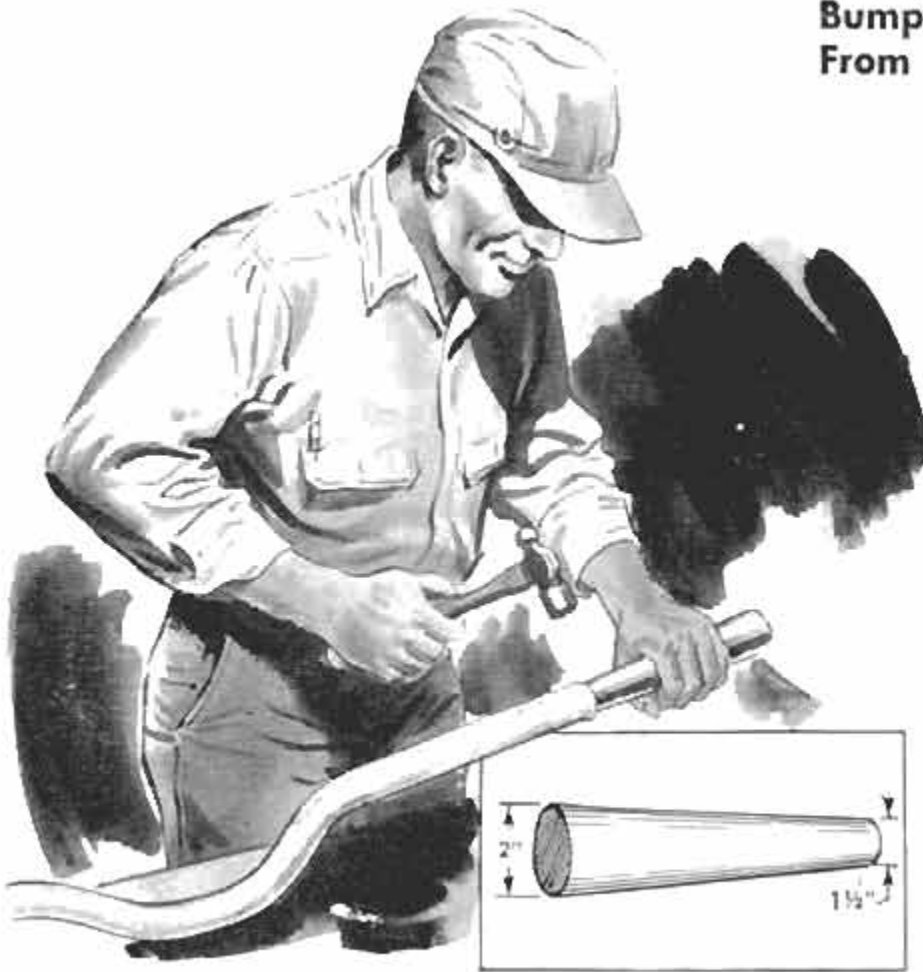
When copper tubing is installed in a new structure or is tapped into old work, all provisions of the local code must be followed. As an example, the code may call for installation of an insulating fitting to prevent corrosion, which may occur when dissimilar metals are joined as may be necessary when tapping new tubing into old work. The code also may require use of copper straps to support long runs of tubing and there may also be specifications as to where flexible and rigid tubing must be used in different types of installations. Be sure that all requirements are understood before work is started. ★ ★ ★

When dismantling fittings or sections of steel pipe always use a backing wrench on unanchored pipe to avoid loosening parts in walls or in the ground. The backing wrench serves the same purpose as a vise



Bumping Tool Removes Burrs From Auto Exhaust Pipe

Auto mechanics, plumbers and electricians can make good use of this tapered bumping tool, or mandrel, for straightening burrs and dents near the ends of auto exhaust pipes, copper tubing and thin-wall conduit. For occasional ordinary use, the tool can be turned from mild steel. It can be made more durable by hardening. The dimensions are optional, also the degree of the taper, and the length. The tool can be made any size or length to suit the work to be done. In use it is inserted in the pipe or tube and the burred or dented portions are tapped lightly, at the same time turning the work to "iron" out the defect.



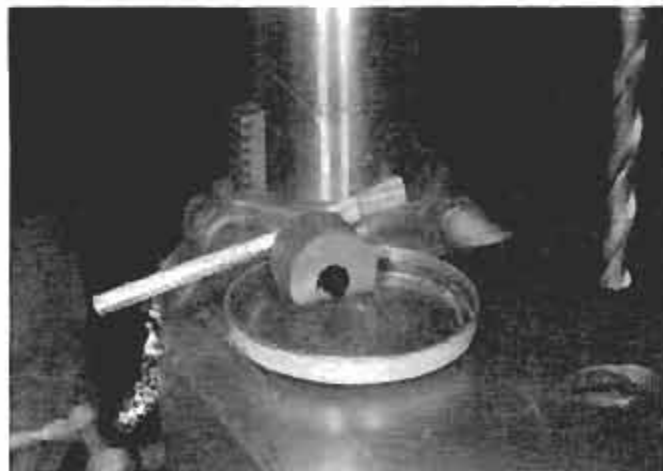
Carriage Bolt Can Serve as Emergency Flaring Tool

When confronted with an emergency repair that must be made without suitable tools, it's good to have in mind some improvisation that will turn the trick. Here's one to remember: Use a carriage bolt or an ordinary flatheaded wood screw as a

flaring tool. The head of a large bolt will flare tubing up to about 1/2 in. An average-size wood screw will do a passable job on small-diameter tubing. Use the head of the bolt and tap lightly. Insert the screw in the tubing and turn.

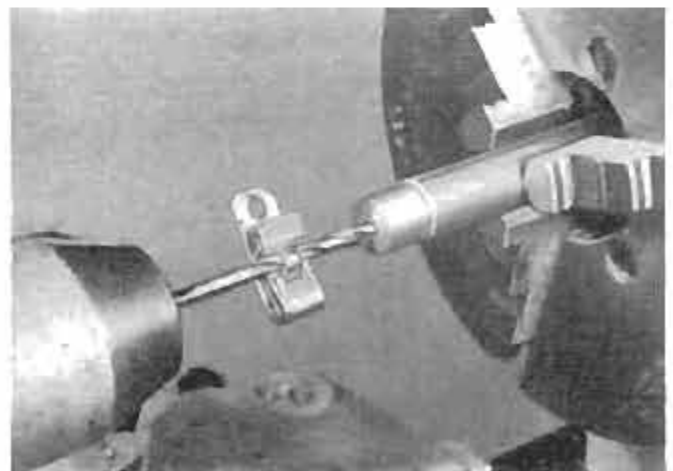
Magnet Holds Lubricant "Pan"

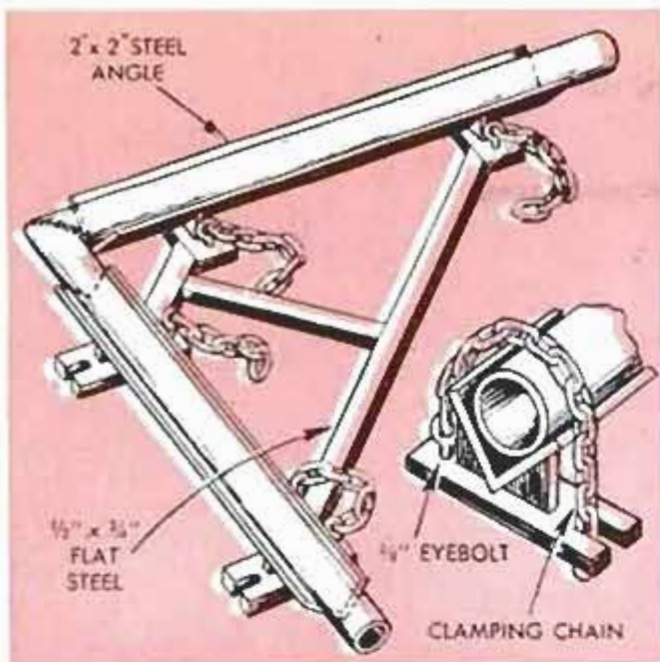
When you need a small quantity of lubricant or cutting oil handy to the drill press or lathe pour the lubricant in a can lid, place a permanent magnet in the lid and set on the drill-press table or the lathe ways. Magnet also acts as a keeper for the applicator.



Battery Clip Used as Depth Gauge

Battery clips of the spring-contact type (Fahnestock clip) make positive depth gauges for small twist drills, especially when drilling in the lathe, where it is sometimes difficult to gauge the depth precisely. The spring tension holds the clip firmly in place for accurate work.





Right-Angle Jig Saves Time in Welding Shops

This jig was originally designed to hold 1-in. pipe at a right angle for welding a mitered joint. After being put into use for this one purpose it was found that slight changes in placement of the parts would give it a much wider application. As an example, simply by relocating the angle-steel guides with one web up, the jig could be used for welding mitered ends of both square and rectangular stock of various sectional sizes. As detailed, the angle guides are welded into steel vees which, in turn, are welded to the T-frame members. The ends of these frame members are slotted, with open-end slots, to

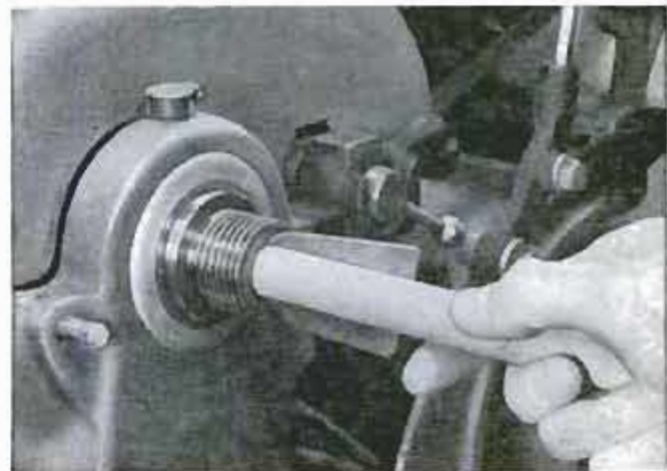
provide a means of anchoring the free ends of the clamping chains which hold the work in place once it has been positioned. When the jig is altered for use with flat stock the chains can be omitted and C-clamps used to hold the work. Sizes of the parts given in the detail are those of the original jig. Of course, these dimensions can be altered to suit individual requirements. If, for example, the jig is made larger, then the sectional sizes given should be increased proportionally to assure sufficient rigidity. When assembling the jig, care must be taken to locate the angle guides at 90 deg. before welding.

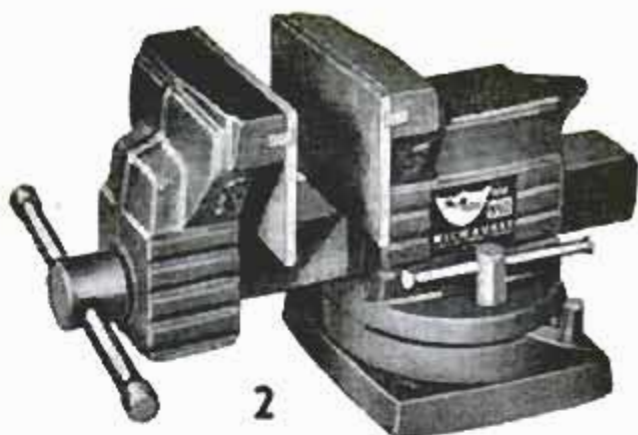
Store Oilcans in a Pan

Those oily rings on the bench top; smudges on shelves or in drawers — all these unsightly stains can be eliminated from your shop simply by keeping oilcans in an enameled baking pan when not in use. Not only are the stains eliminated entirely, you always know where the cans are when needed.

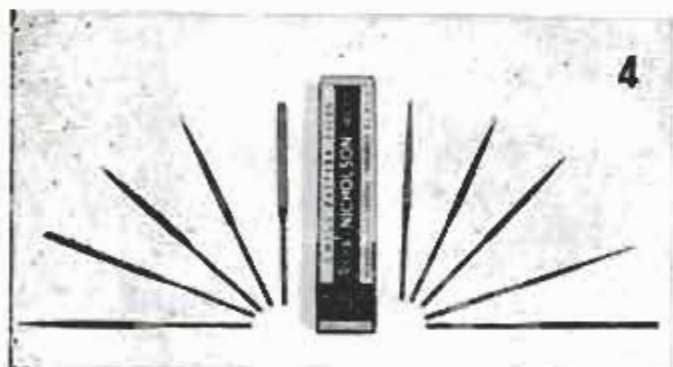
Felt Cleans Spindle Taper

Experienced machinists accustomed to working to close limits always clean up a lathe before starting a new job. One of the parts that gets special attention is the spindle-nose taper. To remove every tiny metal chip from the taper use a cleaner made by slotting a dowel and forcing a strip of clean felt into the slot.





SHOPPING FOR TOOLS



1. WHEELED SCAFFOLD makes those elevated jobs easier, faster. Unit rolls anywhere on four casters, two with brakes for holding scaffold steady in any desired position. Platform adjusts from 24 in. to 78 in. above floor. There are ladders at both ends.
Building Service Co., 4923 18th Ave., S. Minneapolis 17, Minn.

2. SWIVELING VISE serves any purpose of a bench-top vise. Screw has a special quick-release feature that permits adjusting movable jaw to any position without turning screw. Furnished in two sizes, one with 3 $\frac{3}{4}$ -in. jaws and a larger size with 5-in. jaws.
Milwaukee Tool & Equipment Co., Milwaukee, Wis.

3. MACHINE VISE features low height, only 2-5/16 in. from base to top of jaws. Sliding jaw locks with a camming action. Top, bottom and both sides are machined parallel, making vise adaptable for use in jig assemblies. Vise is 7 in. long and weighs 2 $\frac{1}{2}$ lb.
Chicago Tool & Engineering Co., 8383 S. Chicago Ave., Chicago 17

4. ROUND-HANDLED NEEDLE FILES for fine precision work on models, instruments, magnetos and other electrical equipment. Files are available singly, or in assorted sets of one dozen in a plastic container, the lower half of which forms rack when top is removed.
Nicholson File Co., Providence, R. I.

5. SHARPENER FOR ROTARY MOWERS fits any $\frac{1}{4}$ -in. portable electric drill. Consists of a spindle, a flanged guide which maintains a uniform bevel on the blade, and a vitrified grinding wheel. Sharpens blades of all rotary mowers, of standard make and model.
Mower-Mate Tool Co., Riverton, Kans.



6. ELECTRICALLY DRIVEN IMPACT WRENCH has simplified impact mechanism with built-in adjustable torque. Turning the calibrated nose cap adjusts torque to exact requirements of the job. Torque ranges from 105 to 275 ft. lb. Delivers 1600 to 1800 impacts per min. with less operator fatigue. Capacity is $\frac{3}{8}$ to $\frac{1}{2}$ in.

Portable Electric Tools, Inc., 1120 W. 83rd St., Chicago 20

7. FLEXIBLE RULE comes in an unbreakable nylon case having a clear-plastic window through which inside measurements can be read clearly. End of rule, or tape, is fitted with a sliding catch, or hook, for taking measurements from an end or from a vertical surface without error. Tape is white with black figures

James J. Matlack, 6024 Clifford St., Philadelphia 31, Pa

8. COMBINATION POWER TOOL is five power tools in one unit, driven by one motor. It's an 8-in. circular saw, a jigsaw, a 4-in. jointer, disk sander and a saber saw. Only change necessary to convert basic unit to any of the four other tools is to remove 8-in. circular blade. Abrasive disk replaces blade for sanding

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

9. HEAVY-DUTY DRILL PRESS has variable-speed, all-gear drive, from motor to spindle. Built in 18 and 24-in. sizes with a capacity of 1 and $1\frac{1}{4}$ in. in cast iron. A power-feed model is available in the 24-in. size. Lower spindle bearing is especially designed to take heavy combined thrust and radial loads

Botce-Crane Co., 913 W. Central Ave., Toledo 6, Ohio



(Continued on next page)

SHOPPING FOR TOOLS

(Continued)



10. HOLES IN CONCRETE at the rate of 1 in. per minute—that's average performance for this new concrete drill which combines rotary action with hammer blows. Drills holes from ½ to 4 in. in diameter without fracture damage to concrete adjacent to the holes being drilled. Unit is portable, weighs only 30 lb.

Bill Jack Scientific Instrument Co., Solana Beach, Calif.

11. CONE-SHAPED ABRASIVE WHEELS are made with machined aluminum cones which are faced with rubber segments. The latter lie flat when wheel is at rest, permitting easy placement of abrasive sleeve. When wheel rotates, segments expand to hold abrasive sleeve firmly in place. Available in several sizes

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

12. DRAFTSMAN'S TRIANGLE combines the functions of several drafting aids. Working with the triangle alone you can lay off baselines, perpendiculars, bisections, parallels and full isometric projections. Greatly reduces drafting time on common drawings involving regular angles and standard projections

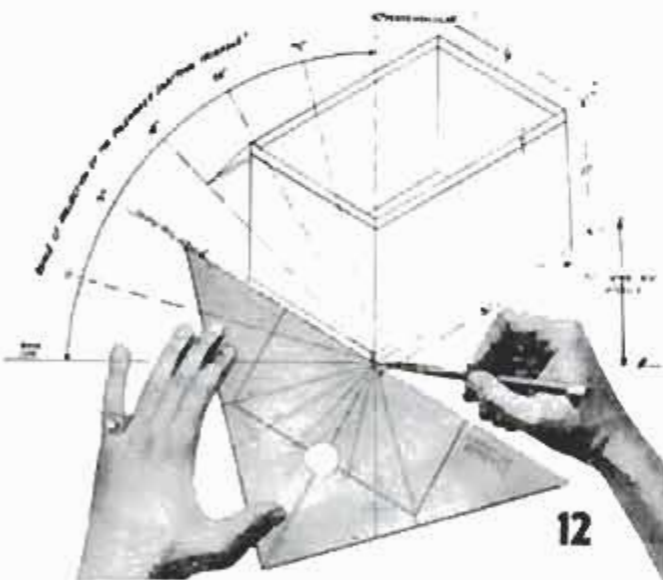
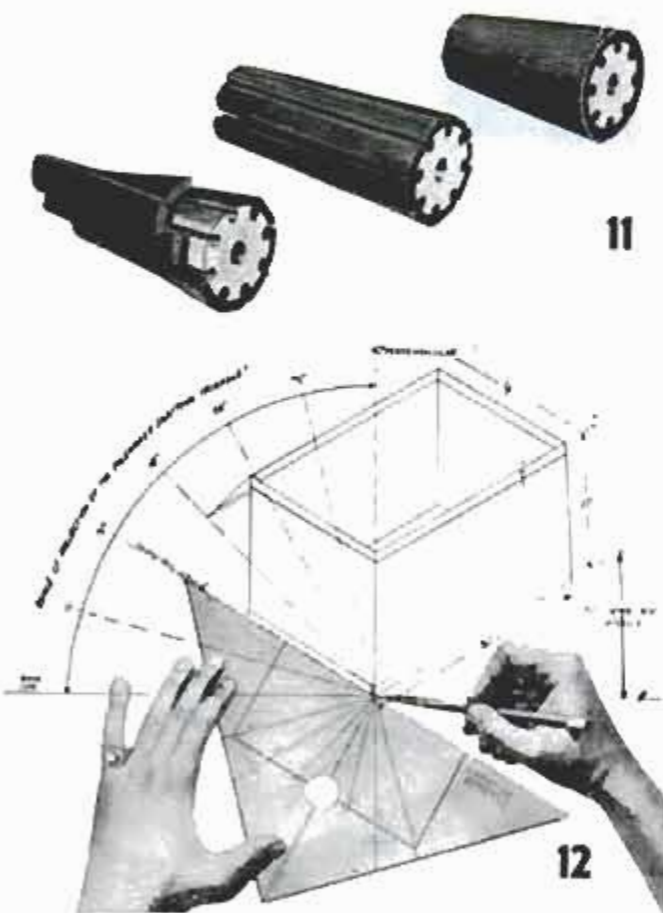
Cardnell Products Corp., Montclair, N. J.

13. PARTS CLEANER has built-in pump, operates on 3 gal. of solvent. Fluid is filtered, recirculated and forced through a fountain-type brush. Flow is adjustable to meet all ordinary requirements in cleaning intricate parts. Over-all size is 10 x 20 x 20 in. Has built-in soak tank with lifting handles

Nelson Saw & Mfg. Co., 7th Pl. & McKentley, Eugene, Ore.

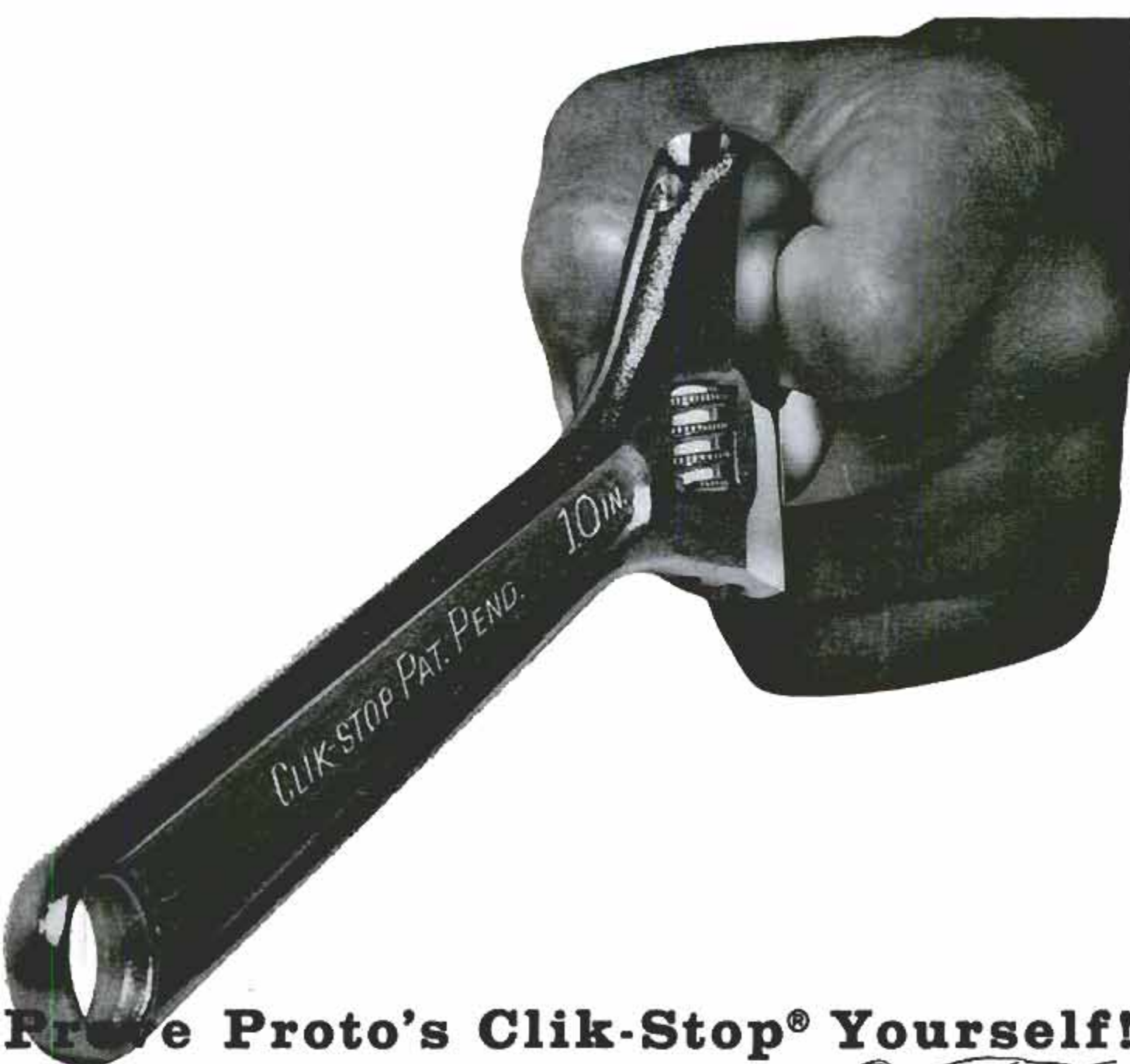
14. MINIATURE SPEED CHANGER has stainless-steel input and output shafts running in heavy-duty shielded ball bearings. Speed ratio is continuously variable from 1 to 5 up, 5 to 1 down, with a 25-to-1 over-all range and a torque output of 5 to 40 oz., depending on the ratio setting. Scale is large, easy to read

Metron Instrument Co., 432 Lincoln St., Denver 3, Colo.



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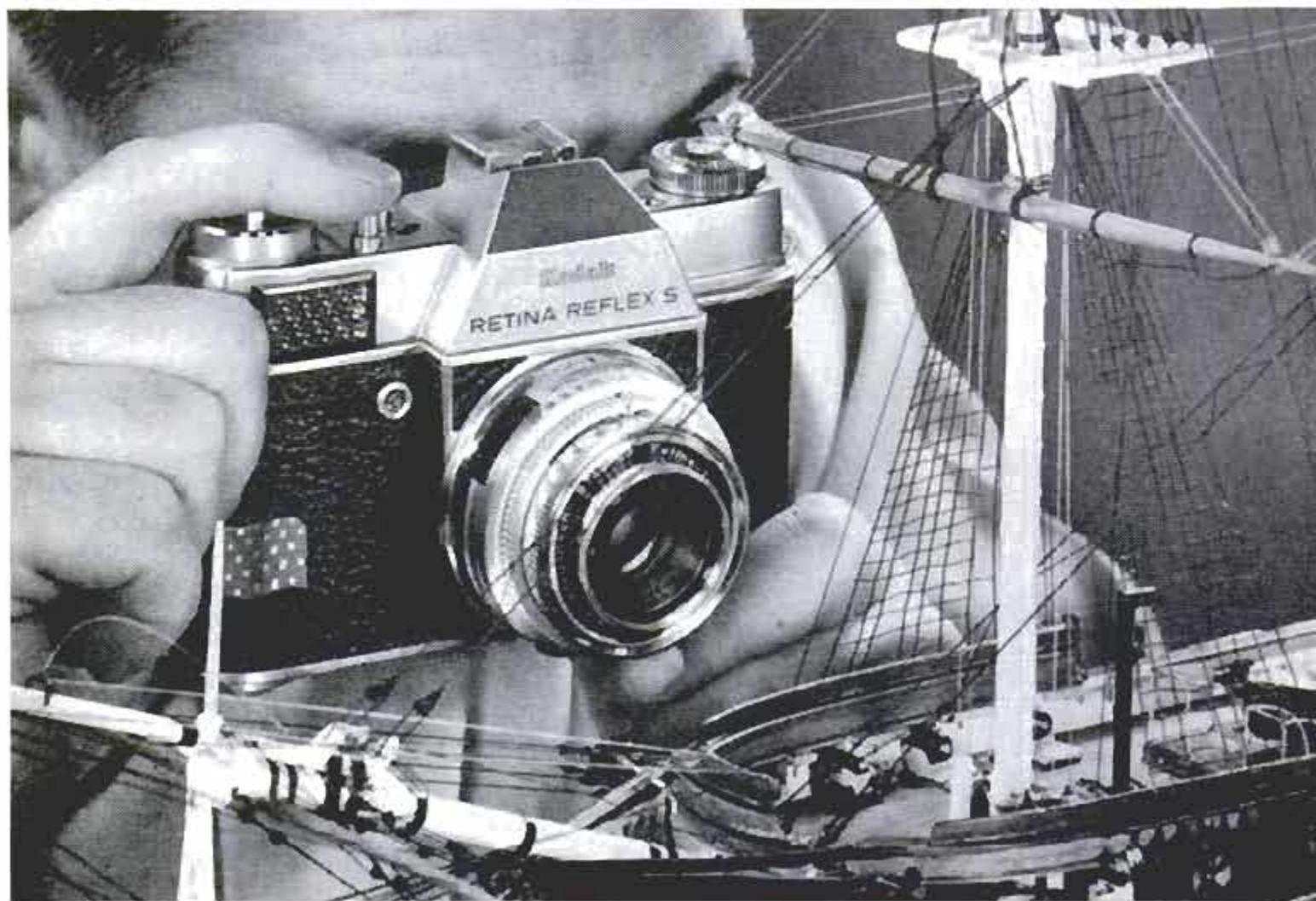
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Scene control? A superb family of wide-angle and telephoto lenses—for broad views in cramped areas, or to pull in distant scenes.

Speed? Fast-action shutter, rapid thumb-flick film advance . . . and a choice of razor-sharp 50mm *f*/2.8 and *f*/1.9 basic lenses.

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28mm

For cramped quarters—choose this 28mm extreme wide-angle lens for your Retina S.



35mm

For medium wide-angle, this 35mm. All lenses also fit budget-priced Retina IIIS Camera (below).



85mm

For pleasing half-figure portraits, medium telephoto work, interchange to this 85mm tele lens.



135mm

To reach out and pull in distant scenes, pick the 135mm. Lenses pictured, \$74.50 to \$87.50.



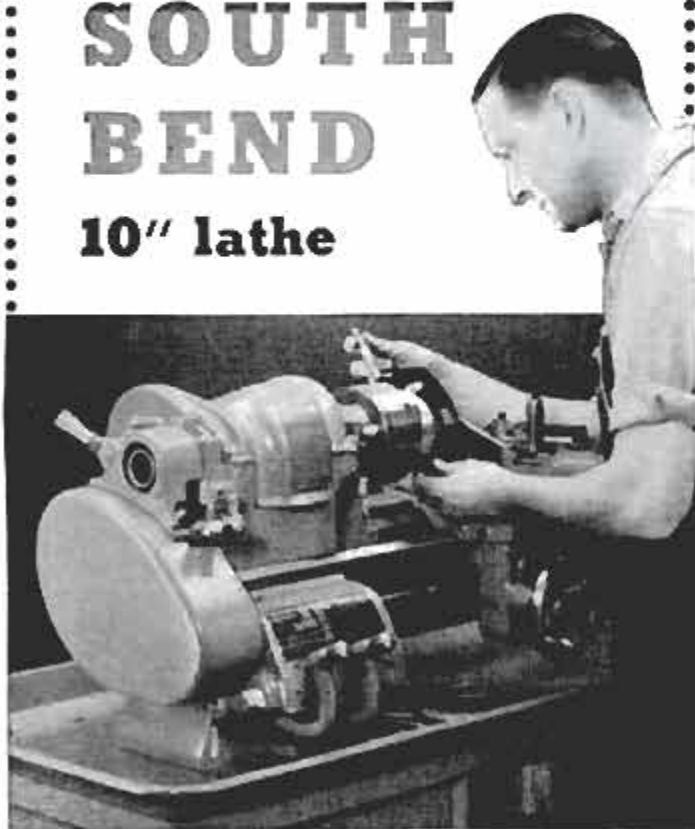
Rochester 4, N. Y.

Retina IIIS Camera: Handsome, budget-priced companion to the Retina Reflex S is the new Retina IIIS—with multi-frame finder, built-in meter, automatic exposure linkage, lens interchange, rangefinder direct-coupled for all lenses. With 50mm *f*/2.8 lens \$157.50. With *f*/1.9 \$193. Most dealers offer terms as low as 10% down. Prices are list, include Federal Tax, are subject to change without notice.

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

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Mildew in Closet

Q—I want to construct a cedar-lined clothes closet in my basement. It will be framed with 2 x 2s covered with wallboard and lined with regular 3/8-in. cedar closet lining. My basement is dry but I am warned that there is risk of mildew. Is this a possibility, in a dry basement?—A.H., Ohio.

A—Yes. It is more than a possibility unless you can provide adequate ventilation and a means of holding the humidity at a much lower level than that in the average basement during the summer months. If, by the term "wallboard" you mean plasterboard, then perhaps the use of this material is permissible as an outer wall covering. Otherwise we would suggest that you consider a wood paneling such as western red cedar or what is known as pecky cypress. Hardboard, or perforated hardboard might work out as a good substitute. You do not say where the closet is to be located, but if your plan is flexible, we would suggest that the closet be located at some point along the wall rather than in a corner. This location permits the area enclosed to be ventilated on three sides. Ventilators should be installed at the top and bottom on all three sides, and the door should be of the louver type. The humidity level in the room can be held to a normal level by using a dehumidifier. If you use chemicals for eliminating moths the ventilators and the louvers in the door can be covered with sheets of plastic.



New Floor Over Old

Q—My basement floor is 35 or more years old and the concrete seems to be failing. The floor is dusty and there is always a lot of sand on the surface. I'm told that the best thing to do is lay a new floor over the old. I'd like to do the job myself, but how does one go about it?—O.D., N. Dak.

(Continued to page 198)



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A. These experts know that Champion is the *performance* spark plug. To get top performance and economy in your car, put in new Champions every 10,000 miles.

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Genuine **CHANNELLOCK PLIERS**

A—Judging from your description we are rather doubtful about the advisability of laying a new floor over the old. We think it would be wise to get the opinion of an experienced mason contractor. He will be in a position to examine the floor closely and will be competent to judge whether it will be advisable to lay a new floor over it. Also, this is one job we could not recommend that you attempt yourself, especially if you are inexperienced in this type of work. The entire floor should be poured and leveled in one operation, not in sections from day to day. If the old floor is judged to be in condition for overflooring with new concrete, it is the usual practice to thoroughly clean the surface of the old floor and either coat it with hot asphalt or lay a plastic waterproofing membrane before pouring the new concrete. Of course, raising the drain outlets to the level of the new floor, new foundations, or piers, for the posts supporting the center beam, relocating or raising the furnace or boiler must be planned in advance of the pouring of the new floor. When the new floor is poured it usually is recommended that a waterproof, expansion joint material be placed along the walls. An alternative is to form a V-shaped opening along the four walls and fill with hot asphalt after the concrete has cured. In most cases it is recommended that the new floor be poured to a thickness of at least 3 in. and reinforced with welded wire.



Rock Garden

Q—A corner of my lot slopes to the southeast and I've been told this is an ideal spot for a rock garden. There are no rocks on the property so the whole thing would have to be built. I know what plants I want, but how do I build the "garden"?—L.H., Ind.

A—We assume you are referring to an upper corner of your lot as the location for the garden. Normally, rock plants, or alpine plants as they are sometimes referred to, thrive best in a rather damp, partially shaded location. Nearly all rock plants require a rather rich, loamy soil. How to provide and maintain these conditions calls for careful planning and a survey of the surroundings. If the slope continues for a distance above your property then the chances are that seepage of water from the higher levels will provide sufficient moisture during the average growing season. But if the location you are considering is near the crest of a ridge then growing conditions for rock plants are not likely to be so nearly ideal. You might find it necessary to provide some means of subsurface watering which would most nearly simulate the natural growing conditions of the common rock plants. Assuming that your location more nearly approaches the normal requirements it is a fairly common practice of gardeners to excavate the area selected to a depth of 18 to 20 in., add a fill of small irregular stones and gravel (the stones first and the gravel on top) and follow with a stone-and-earth fill to a depth of 12 in. The stones selected should be irregular in shape and size and should be set into the slope to form several narrow terraces, or benches, the soil above each row of stones leveled and held in place by the stones. The soil should be returned to the excavation by stages and each fill should be thoroughly hoed to settle it into the spaces between the stones at the bottom of the excavation. The plants should be placed on the terraces above each row of stones. The main problem in establishing the garden is erosion of the soil during heavy rains. One way to forestall this possibility is to locate the plants so the developing root systems will hold the soil in place. A rock garden should be mulched with wheat straw after the first hard freeze.



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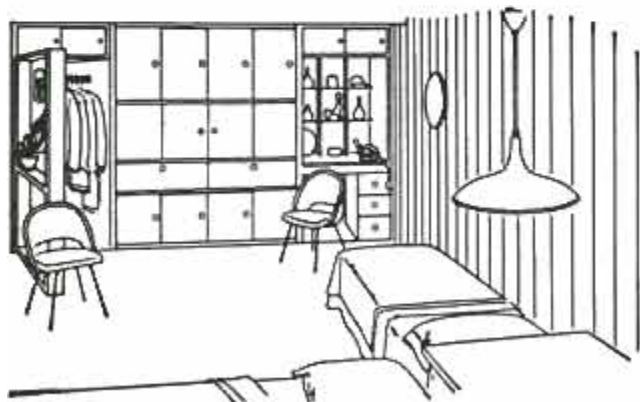
This multipurpose wall can be made in one, two, or three stages. Center unit is 6' wide; side units are each 3' wide; all are 2'6" deep. Behind the storage door at left is a full-length wardrobe. Above and below the entertainment center are more roomy cabinets, while at the right the vanity desk is a convenience for overnight guests.

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PIONEER IN MODERN LITTLE CIGARS

Do It Yourself . . . Hollywood Does

(Continued from page 129)

pressed varicolored floral-print draperies into service as seat covers.

"Upholstering," he said, "was new to me, so everything that had to be hidden I pushed against the wall."

Don DeFore is a good deal more serious—and admittedly more accomplished—in his Handy-Andying. The sprawling frame house that he himself built in Mandeville Canyon is filled with examples of his craftsmanship. The house is furnished from doorstep to rooftop with collector's items that reflect Don's endowment of Yankee ingenuity.

A hand-beaten copper plaque on the wall of his den carries this legend:

"Difficulties are a challenge, not a barrier."

When I had coffee with him in his den, I sat on a Dutch love seat he made with hand tools. He fashioned table lamps out of water pumps, wiring the pump and whittling out an antiqued pine base to give the impression of water dripping; and he converted the snouts into cigarette holders. He transformed an old blacksmith's bellows into a cocktail table. When his children scratch the surface of the table, he rubs it with steel wool and goes over it with lacquer.

"It gives it more character," he explained.

Wherever you turn in Don's house, you see further evidence of his do-it-yourself talent and resourcefulness.

He converted a butter churn into a floor lamp, using a rake handle as a lamp shaft, with the shade in the shape of a bonnet. He converted a railroad throttle, salvaged from a dismantled steam locomotive, into a damper for the fireplace in his den. He worked railroad bells into lamp shades. He installed a bell from an old schoolhouse on the roof, and every time his wife, Marion, wants to summon her brood, she pulls the rope.

DeFore's creations even spill over into the sprawling back yard. There he constructed a combination rocker and swing in the form of a miniature garden teahouse, with a copper top, a regular floor platform, wrought-iron curlicue arms, and wheels that act as pulleys for the supporting ropes.

His inventiveness likewise is evident in his garage workshop—a virtual do-it-yourself factory that started out with a hammer, saw, rasp and a drill, and now is rich with power tools. His equipment-crammed workshop has become headquarters for the neighborhood whenever there is a job to be done.

(Continued to page 202)

"MEN WHO DO-IT-YOURSELF" **YOUR
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CAN MEAN
AN
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IN THE
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If you like to build transmitters...or hot rods...or models...you can also build a real future for yourself by training in the U. S. Air Force. For in today's new Age of Space, it is the man with technical ability who will be the important man. *Only in the Air Force*, however, will you find so broad and complete a range of Space Age specialty training. In the Air Force, *the Age of Space* is now. For full details on your training opportunities see your local Air Force Recruiter now, or mail the coupon.



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Richard Widmark, who lives up the street, is a putterer-around-the-house, as distinguished from a do-it-yourselfer, so when Dick needed some swimming-pool chairs recanvassed, it was Don who cheerfully—and expertly—did the honors. And when Bob Mitchum's two sons—a couple of do-it-yourself whizzes, junior grade—once decided to make a small racing car with a half-horsepower motor from a power lawn mower, they invaded Don's workshop.

"This is the greatest shock absorber in the world," Don assured me. "It not only helps me get away from my work. It helps me *with* my work. Whenever I have to memorize lines for a movie or a television show, I tack my script on the wall and learn my lines while I'm working in the shop."

Being a television viewer as well as a television star, Don made an Early American wall cabinet for his 27-inch picture tube. He built the set into an old wood box, with an opening in the back so that the set may be serviced without being removed. He also has it installed so that the whole front of the set may be dismantled in less than a minute. Don built-in his own remote-control system so that he can change stations, control volume and adjust the picture from wherever he is sitting.

Although comedian Jerry Lewis is in dead earnest about being a Handy Andy, his conversion to the cult has not been without its comic aspects. Jerry is a fast learner, and today is quite competent. But at the outset he would pull such workshop bloopers as cutting miters backwards on the saw and laboriously using sandpaper to cut down a piece of wood instead of shaving it with a plane.

Now that he has settled down, Jerry turns out very creditable shelves, wall brackets and knickknacks that are in evidence all over his house. However, he is hopelessly spellbound by his two stapling guns, and goes around repairing screens and other things whether they need it or not.

Robert Ryan typifies many Hollywood stars who, like Jerry Lewis, are useful around the house, but who make no pretense of being in the same do-it-yourself league with Dick Powell, Don DeFore and Roy Rogers.

"Until I bought this house," Bob told me when I called on him at his ranch-type home in North Hollywood, "I'd never driven a nail or sawed a board. But I soon found you had to learn some of these things. I just do all these things a little faster and a little better now. It seems to me I've painted everything in the house twice."

(Continued to page 204)



TIPS FROM TEXACO

How to get thousands of extra miles from tires

1 Check tire pressure every week . . . or have your Texaco Dealer do it according to his accurate chart that indicates manufacturer's recommendations. Just one pound of consistent under-inflation can cut tire mileage by 1000 miles or more.

2 Make *sure* all tires have valve caps. They're not ornaments, but protect tire valve against dirt, grit and water. If one is missing, have your Texaco Dealer replace.

3 Don't let your spare rot in the trunk. Use it. Have your Texaco Dealer cross-switch all tires every 5000 miles to equalize wear.

4 Keep front wheels aligned and balanced. You'll get smoother, safer riding and steering in addition to increased mileage.

5 Accelerate, brake, and take curves gently. Otherwise you're scraping away precious rubber in *seconds* instead of over the miles.

6 When you drive with a heavy load, add a pound or two of *extra* pressure to each tire. This will reduce sidewall flexing, cut wear, let tires run cooler . . . safely.

7 Take advantage of the full riding comfort of properly inflated tires. Every 1000 miles have your car chassis lubricated with superior Marfak at your Texaco Dealer. This will give you a smoother, quieter, *cushiony* ride. At the same time, Marfak protects delicate chassis bearings against wear and corrosion. Seals out grit, road dirt and water.



Bob racked up his main do-it-yourself achievement in concert with fellow-movie-star Bill Williams. Bill helped Bob tear down a stable and corral on the rear of the Ryan grounds and build in its place a concrete-block structure that Bob calls, "The Brick House."

"Bill was the architect and foreman," Bob said modestly, "because I never knew what I was doing. Once, when Bill was gone, I started laying blocks like a madman. When he came back, he said, 'Where are we going to put the windows?' We had to knock the blocks out to make room for them."

Bob uses the brick house as a gymnasium and as a private rehearsal hall where, thanks to soundproof walls, he can emote to his heart's content without incurring the wrath of neighbors.

He has added bookshelves to his den, redesigned his son's bed so that it may be used by his daughter, and generally gets a lot of mileage out of his drills, hammers, saws, levels and chisels.

Some actors, such as Rod Cameron, restrict their do-it-yourself activity to hobbies. Rod carves model boats, tie-and-scarf clips in the shape of a tiny fist, and he does knife painting which is as much a manual accomplishment as an artistic one. Others, such as Robert Stack, are skilled grease monkeys when they are away from the sound stages. Stack has built his own automobiles since he was a youngster. He does all the mechanical repairs on his cars, and he can take a motor apart and put it together again with no trouble.

Aside from coming to Bob Ryan's rescue, blond Bill Williams is quite a handyman around his own house. He did most of the work himself when he added a children's wing to his U-shaped, rambling ranch home in Van Nuys. He built his own workshop in the back yard. He makes furniture and fixes the playthings of his three children. His most Herculean achievement not counting the trailer he built for his horse, Apache, is the swimming pool Bill constructed in the rear of his home.

Cowboy star Roy Rogers gallops in as one of the most inventive and most industrious in Hollywood's do-it-yourself sweepstakes. As much at home at a workbench as he is in a saddle, Roy has come up with more gadgets than you could shake a patent lawyer at. He has devised a children's tiltless swing, converted discarded Army bread pans into tool bins, built a nonwire pigeon loft, a home warning system that precludes four and five-hour vigils during pigeon races, a combination pigeon-loft door and landing board, a mechanical animal exerciser that enables him to walk his

hound dogs the equivalent of five miles within a radius of several yards, and he completely streamlined and redesigned his 16-foot outboard motorboat. He does all the electrical and plumbing repairs in his house, turns out model sailboats and wall brackets, has rebuilt his gun case and has even built a rabbit hutch.

His skill can be corrective as well as inventive. He took the tilt out of the swing used by his active daughter, after she survived several dangerous spills. He managed this by fastening eyebolts on each corner of the seat and hooking into the chain.

Roy's workshop is a veritable fix-it arsenal of lathes, jigsaws, drill presses, routers, all kinds of drills, wrenches, screw drivers, table saws, grinders, handsaws, cutters.

Roy, who keeps racing pigeons, has worked out a loft-to-home buzzer system that makes it possible for him to maintain his initiative in a race even though he is asleep inside the house. He ran a wire from the pigeon platform to a battery-operated buzzer in the house, so that the minute a pigeon settles on the platform the buzzer goes off.

Along with the buzzer system, Roy rigged up an equally clever method of releasing fresh birds with a minimum exertion of time and effort. Pigeons are supposed to be released at a fixed time in a race. This meant that Roy had to plan his activities, in the past, so that he would be on hand at the given moment to send them aloft. He licked this restriction with an alarm clock.

He tied a string to the top of the latch on the big spring door to the pigeon loft, and attached the string to the key of an alarm clock he had placed inside the loft. When the alarm went off at the given time, the string wound around the alarm key as it turned, thus pulling open the door and permitting the pigeons to fly out.

Like Dick Powell and Don DeFore, Roy comes by much of his aptitude as a result of fending for himself in such matters during his boyhood.

"I was raised on a farm," Roy explained to me. "My dad came home on week ends only, and I more or less had to run things. I used to build things, fix bikes and overhaul motors. When I was 12, I helped my dad build a house. I drove nails, put up boards, worked the chalk line, put on roofing and sawed. That was back in about 1923 or 1924, and that house is still standing."

"When I'm making something," he owned up, "I forget about everything else. My work is a mental strain. When I'm on the road, I can't even get out of the hotel to go shopping. When I get to work with my hands, I forget those things." ★ ★ ★

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Build a Picture Radio

(Continued from page 137)

"battery" wire from the on-off switch on the volume control to the *negative* end-terminal of the battery pack, and the other "battery" wire, from the terminal strip on the receiver chassis, to the positive lug of the battery pack. (Note: Accidental interchange of these wires will render the receiver inoperative and might damage the transistors.)

With the receiver chassis in its intended location, *but turned over so that the bottom of the chassis faces you*, splice a flexible wire to the green output transformer lead and solder the other end of this wire to a speaker voice-coil lug. Solder a wire from a chassis-mounted ground lug to the other voice-coil terminal. This completes the final wiring and will permit you to adjust the set.

Attach the knobs to the shafts of the variable capacitor and volume control and turn the receiver on. If the set has been properly wired you should be able to tune in some local stations immediately.

Rotate the knob of the tuning capacitor fully clockwise and press a brass indicator nail, or some similar indicator device, into the spacer strip directly above the number 53 on the dial knob.

Rotate the dial knob to indicate the number of the lowest-frequency radio station in your area and, with a fiber alignment-screwdriver, adjust the "slug" in the bottom of the oscillator coil, L2, until that station is heard through the speaker. Rotate the dial to indicate the highest-frequency station in the area and adjust the oscillator trimmer screw (on the rear of the variable capacitor) until that station is heard. Adjust the antenna screw on the rear of the variable capacitor for maximum volume of that station. All other stations should then come in at the proper point of the dial.

To complete the alignment, tune in some station near the center of the band and slightly adjust the screws in the bottom of the i.f. transformers for maximum volume. It may be necessary to repeat this entire alignment procedure two or three times for optimum results.

With the adjustment finished, turn the chassis over and fasten it in place with wood screws through some of the unused chassis holes. You'll have to use short spacer washers to keep the parts on the bottom of the chassis from being pressed against the panel.

Finally, attach a length of fairly strong picture wire, and the completed picture-radio is ready for hanging. ★ ★ ★

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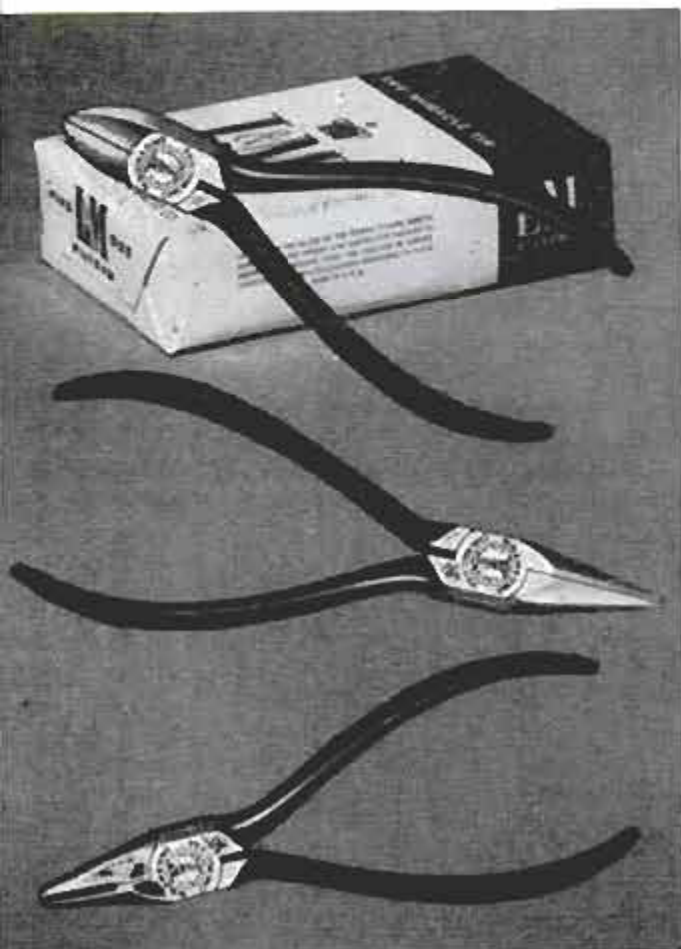
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Bazooka at Work

(Continued from page 117)

helicopter crew can land on a mountain-top for drill-sampling operations, burdened with little extra weight.

Safety is a big factor, too. Casualties are all too frequent in mining, and often they are caused by faulty blasting methods or the necessity of having workmen too near the scene of the firing. Use of shaped charges would remove much or all of the danger since personnel need not be exposed.

Not long ago a Michigan copper mine was faced with the problem of opening a stuck valve in a bulkhead under water. Divers were hired at great expense to perform this job. It is certain that a shaped charge, easily and safely fired under water, would have opened the valve or punched a new hole in the bulkhead at a fraction of the cost.

Steel mills right now use the jet to tap open hearth furnaces, thus eliminating dangers to workmen.

In oil-well completion, bimetallic charges are used as perforation guns, lowered to any depth in the casing. The charges are made in various shapes and sizes, ranging from a single charge to four-direction guns in a bank.

Research on the shaped charge is in its infancy, even though historically the theory goes back to 1888. In that year, Charles E. Munroe found that an explosive charge with an indentation in it would reproduce this indentation on a metal surface. Inadvertently, Munroe discovered the unlined-cavity effect, from which all subsequent investigations were to stem.

Results obtained with the Army bazooka touched off modern research. Much yet remains to be found out. There are countless variables. But the shaped charge—the bazooka turned civilian—is rapidly becoming an important industrial tool. ★ ★ ★

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Experiments with an indestructible airless tire forecast the day when motorists no longer will have to worry about blowouts. During initial tests, a plastic foam-filled tire was shot with a dozen various rifle bullets. A 3-in.-wide, 3-in.-deep, pie-shaped wedge was cut out of the tire; yet, despite mutilation, its performance was unchanged and riding qualities were the same. The airless tire is filled with poly-rubber, a substance able to withstand extreme conditions and treatment.

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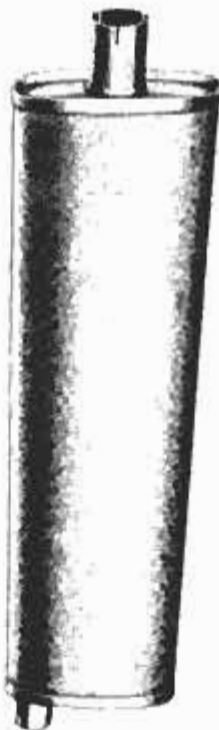
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AUGUST 1959



Read the truth about why all mufflers wear out...

AND WHY
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MONEY

It's true that mufflers wear out in many ways. They can blow out, fall off, vibrate apart, or get punctured. But the vast majority of mufflers simply *rust* away. This is due to acid condensation inside the muffler and the acids eating away at the inner parts and outer shell.

Good internal design minimizes condensation by causing hot exhaust gases to heat all the chambers evenly, eliminating the cold chambers where condensation occurs.

To be additionally sure the muffler you buy will stand up longer, buy a muffler made of heavier steel.

The Silentone double shell has up to 33% heavier steel than other mufflers use and is zinc coated as well. Outer heads are heavier, too—made of 16 gauge steel, spun-locked into place to eliminate blowouts. Even the inner parts are heavier.

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Should You Buy A Foreign Car?

(Continued from page 102)

are fine, but if you need service or parts sometimes the dealers don't care."—Texas student.

"I have owned six foreign cars. This is the first I have purchased from a 'domestic' dealer and service is far below par. I'll never buy another foreign car from anyone carrying it as a 'second' line."—Georgia sales manager.

"There's a lack of space for extra passengers, but I'll gladly take this disadvantage for design and economy."—Louisiana librarian.

"You can't haul a truckload of people, but who needs to?"—Ohio tool attendant.

"Greatest disadvantage is lack of a great deal of luggage space."—Oklahoma salesman.

"Biggest disadvantage is the feeling of guilt in not supporting home industry."—South Carolina sales manager.

"It saddens us to know the U.S. merchandise is inferior to imports. We don't like the feeling we get as we realize that this car can't be built in the land we love."—Michigan retail merchant.

"I'm bothered by the personal criticism from flag-waving morons who can't distinguish between a car and a rocking chair."—Delaware financial analyst.

"Unpleasant attitude of American service-station people toward anything foreign."—Virginia government worker.

"Not enough power to keep it from slowing down on hills."—Missouri machine operator.

"Poor power for passing."—Virginia soldier.

"Smaller cars are shoved around in town and open-road driving. This occurs especially at two-lane turns and in passing situations."—South Carolina student.

"Complete lack of driving courtesy on the part of drivers of big American cars who expect you and your little car to get out of their way."—Minnesota insurance agent.

"Positively the only complaint I have is that the ride is rougher than in American cars."—California sheet-metal worker.

"Hard to handle on windy days at high speeds. Give the foreign cars back to the foreigners."—Indiana electrician.

How Dependable Are They?

Although we do not have any statistics on American cars for comparison, our foreign-car survey does show the degree of dependability of the various imports. The most reliable of the import makes has 3.6 percent of its owners reporting that their cars broke down on the highway at some

time, the least reliable has an 11.1 percent rating.

As far as failure to start is concerned the range is much greater. The most reliable car has a 4.9-percent rating and the poorest a 37.2-percent rating. (In next month's Owners Report, *PM* will list the percentages by makes.)

Many owners praise the reliability of their imported cars, usually mentioning the car's simplicity as a factor.

"I will buy another foreign car because they are more dependable, have fewer automatic devices to give trouble."—Colorado student.

"This is my second import. I drove the first one 30,000 miles with no expense other than gas, oil, plugs and one set of points. It never refused to start even in below-zero temperatures."—Wisconsin state employee.

"After 24,190 miles my tires show very little wear. I have spent nothing on any mechanical part other than points and plugs. Not once has it failed me."—Georgia textile worker.

"Reliability and freedom from mechanical defects are outstanding. I drove my previous import 49,000 miles with no mechanical failures."—New York retired owner.

"My 1955 import was trouble-free for more than three years. Made the mistake of trying to keep it a year too long. First breakdown came at approximately 60,000 miles when the timing gear wore out. Shortly after this, a manifold burned out and at 65,000 miles the engine was wrecked by a broken valve."—Wyoming engineer.

"They tell me the main trouble with foreign cars is service. But the way my car is built, who needs service?"—Pennsylvania salesman.

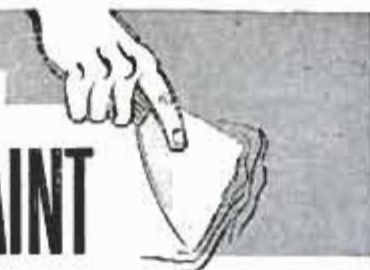
What About Safety?

One continuing argument about the smaller cars involves safety. Are these smaller cars safer than the big ones? There is no scientific data to settle the argument, but the owners have few doubts about it. Most feel their small cars are safer. Depending upon the make, the percentages of owners who feel safer than in big cars range from 80 to 95 percent. Here are some owners' opinions:

"The old argument as to which car is safer, the big car or the small car, is still going on. Personally, I don't know. However, I can control my imported car much better and quicker than my previous American car. And weight distribution seems to be better."—Michigan salesman.

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SYMPTOMS OF BEARING WEAR

Your car will tell you when it needs new engine bearings. Is it sluggish or slow; does it miss, knock or ping? Is your gas mileage low; do you need oil *again*? Are spark plugs fouled with sludgy black oil and carbon? Then it's time for an overhaul—and new Federal-Mogul bearings.

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ever the foreign car should be safer since the response is practically instantaneous."—Kentucky mechanical engineer.

"I feel safer because there is so much less overhang to be hit. I feel there is at least a third less likelihood of being hit."—South Carolina executive.

"A truck sliding sideways down the road would have killed me had I been in a larger car. The small car's maneuverability saved my life as I did not need as much room and as it reacted immediately."—Alabama investigation officer.

"I am able to slow down quicker than in a larger car. Maneuverability is much safer. And seats don't permit you to be thrown around as much."—Illinois book salesman.

"A semitrailer coming around a curve turned left, right in front of me. Because my small car turned so sharply, I was able to avoid a head-on collision. But I slid into the trailer and bounced off into the ditch. The car was completely wrecked, but it didn't turn over. The doors didn't come open and I escaped with a deep gash in the chin. The car's maneuverability saved me from hitting the truck head-on."—Illinois salesman.

"This small car had made me a better driver. I watch the other fellow more, knowing that a showdown with a big car might be bad for me."—Washington technician.

"When there is a collision, usually someone gets hurt, regardless of the size of the car."—Michigan farmer.

What About Small U.S. Cars?

Coming out this fall will be three all-new American small cars. Although these cars will not be as small, nor as inexpensive as most of the 10 economy cars surveyed, there are some experts who feel they will cut into foreign-car sales. What do the owners say about this?

"If the U.S. companies come out with a small, plain automobile that gives you over 20 miles per gallon over-all and sells for around \$1800, the present foreign cars will become a drug on the market."—Michigan teacher.

"Along with other factors, part of owning a foreign car is probably some feeling for being somewhat unique. The American small cars will have little to offer therein."—Colorado art director.

"I will buy American if Detroit produces an economy car with good workmanship. Shoddy, slapped-together merchandise will cause a continued swing to foreign cars."—Tennessee TV manager.

"I would prefer an American product, but my income is such that I have to take cost into consideration. I want a car to

work for me, I do not wish to work for a car."—Tennessee researcher.

"If the Big Three small cars are the size of the 1939 to 1947 models, which I suspect they are, I will not buy one. I want and need a small car."—New Mexico engineer.

"I would rather have an American car, but I will not buy what I believe to be an inferior product just because Detroit won't produce a better one. Detroit is capable, if it will do it."—Virginia securities representative.

"If one of the Big Three had made a small rear-engine economy car and had protected my investment by not changing models every couple of years I would never have considered a foreign car."—Texas sales engineer.

"The Big Three is going to have to get off that \$2000 price."—Tennessee musician.

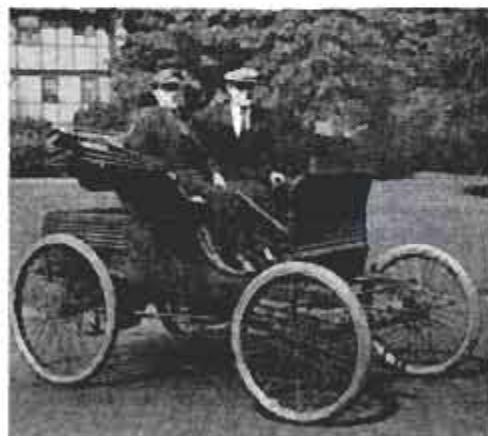
"I do not believe Detroit will be able to produce a car of comparable quality at the same price as Europe. In the beginning, the small cars may hurt imported-car sales, but after a time they will help them."—Kentucky analyst.

"If American companies go ahead with the plans we have read about, I will be satisfied. In the past, the small cars have been more or less cheaply built. The only one that was nicely done was the Hudson Jet and it had two strikes against it when it came out."—Colorado instrument engineer.

There it is, the story of imported cars as told by the people who know them best—the owners. Next month, *PM* presents test data on each of 10 imported cars with a detailed breakdown of owners' opinions of each make to help you judge which car would be best for you. ★★

Do You Know This Old-Timer?

(answer to quiz, page 14)



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PM Visits Brazil's New Wilderness Capital

(Continued from page 81)

palace is characterized by a long row of exterior columns that flare out above their bases, kite-like, to touch adjoining columns. The purpose is to convey an impression of lightness and rhythm, and the structure already has been compared to the Taj Mahal for architectural beauty.

Walls Surfaced With Gold

Inside the palace are floors of rare Brazilian hardwoods, walls of mirrors, and other walls of ceramic tile surfaced with gold. Sloping ramps instead of stairs lead from one elevation to another.

The focal point of Brasilia is to be the Plaza of the Three Powers at the head of Avenida Monumental. Here the executive, legislative and judicial branches of the government are to have their headquarters.

The national congress, or legislative branch, will occupy a long, low structure with a roof platform that supports two domes. One of the domes rests on its base, conventionally, while the other is inverted. Nearby are the two 28-story administrative buildings containing offices for senators and congressmen, libraries, restaurants and

other facilities. Attached to this group is to be a television hall where 5000 people may watch the senate or house in action.

The President's executive offices and Brazil's supreme court will occupy the two other buildings of the plaza area.

Probably the most remarkable building in Brasilia is to be the national cathedral, a structure that is completely unconventional. It has somewhat the shape of a flaring volcano. The frame of the cathedral consists of 21 boomerang-like buttresses or ribs spaced around a 210-foot circle. Overhead, the ribs come together, then bend outward again. Glass walls will fill the spaces between the ribs. The sunken floor of the cathedral will have seats for 4000 worshippers.

No city can exist without water and electricity, yet today there are only a few wells and a few temporary power plants in Brasilia. But 12 miles below the city engineers are completing a 150-foot-high dam across the Paranao River, together with a hydroelectric plant that will deliver 18,000 kilowatts of power, with an additional 9000-kilowatt capacity planned for the future.

These days trucks are rolling into the capital at all hours of the day and night, delivering the materials that are needed to complete the city. Few materials exist at the site or even nearby. The 18,000 tons of

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steel used for the taller buildings, for instance, were fabricated in the U.S.A.

There is nothing novel about a country building a new national capital for itself; Washington, D.C., was an early example of a city that was created for that purpose. But nothing ever done in the past matches in size and scope the new capital that Brazil is building today.

Tremendous Period of Growth

It almost seems that Brasilia is being built just in time, for Brazil has started a period of growth in which population and industry are expanding enormously. One estimate is that the present 63-million population will have increased to 110 million by 1980. This population build-up comes in part from Brazil's lenient immigration policy, by which well-intentioned emigrants from all parts of the world are welcomed.

To develop more power for industry, a new dam across the Rio Grande 140 miles northwest of Rio was completed recently. Together with adjacent facilities on the same river it is producing a total of 110,000 kilowatts. Much more important, however, is another dam known as the Tres Marias that is being built across the Sao Francisco River in Brazil's eastern bulge. The dam will not only permit the development of power, it will make many hundreds of miles of channel navigable for small cargo vessels, and will provide water for irrigating several hundred square miles of rich but arid land.

The rest of the world still knows comparatively little about Brazil aside from the fact that it is a source of rubber and coffee. Few realize that it occupies almost half of South America and has more than a third of that continent's population. Many people aren't even aware that Brazilians speak Portuguese instead of the Spanish of the rest of Latin America. But the world is going to be hearing more and more about this giant country. Brazil is on the march and is preparing to take its place among the most important nations on earth. ★ ★ ★

Radio Waves Emitted by Ammonia May Power Russian Clocks

Radio waves given off by ammonia molecules are the basis of a new molecular generator reported in a recent Soviet article. The generator is said to be so stable that it could power an electric clock accurate within one second in 300 years. The Russians plan to use the new generators in precision timepieces, for radar and improved radio transmission, and possibly in artificial Earth satellites.

ARE YOU SEARCHING FOR SUCCESS?



THE NEXT FEW moments may be among the most important of your life.

By sending for this FREE "Skills for America" booklet, you're indicating that you are a man looking for an opportunity; a man feeling the stirrings of ambition; a man with his eyes toward the future.

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You want prestige, increased income, job security, an assured future. Everyone wants these things that represent a better life.

And they can be yours. You can *earn* success. All you need to do is *take action*.

Success follows naturally from two steps, which are equally important:

1. *You must make the basic decision to succeed.*

You already are well on your way to making this decision. You are far ahead of some people, who simply aren't willing to earn success. Really, they say, it's much easier to drift along in this old rut. It may not be a comfortable rut, but why change? We're getting by. Besides, we're "too busy" to make any extra effort.

The lives of thousands of successful men—those who have climbed out of the "rut"—show an amazingly similar pattern. They weren't satisfied—so *they made a decision*. In each man's life there was a moment—perhaps the same as this moment in yours—when he *decided to succeed*. From somewhere deep inside himself he drew an overwhelming determination. He *would* succeed. From that moment he focused all his energies in a single direction—to succeed in his chosen career.

In most cases, once he had made this all-important decision, he found that the sacrifices were small compared to the rewards. Indeed, most of these successful men found that there were no real sacrifices, that work toward their goal became

fun, that every new step upward brought a new challenge.

But first they had to make the decision to succeed. Only you can make this basic decision for yourself. No one can make it for you. And it must be made without any reservations.

Sure you want to succeed. You can—if *you decide to!*

2. Once you've made this decision, only one thing remains to be done: *You must take action.*

The key to success is *action*. Only by *doing something* can you succeed. The world is made up of many people who "get by" in their less-than-comfortable rut, and a few people who *perform* to lead the others. You can be one of these leaders.

What sort of action? Obviously the first step is to *train yourself for your career*. No one ever has enough training. It is a recognized phenomenon that the more training and education a person gets, the more eager he is to learn. Whether you dropped out of high school or earned a doctor's degree in college, the best action you can take toward your goal in life is to obtain still more intensive training.

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Fresh-Water Tackle Busters

(Continued from page 123)

it slopes gradually to the water. Otherwise it is almost impossible to land him.

A good gaff is a necessity in gar fishing. It shouldn't be too light. I've seen a gar straighten out an ordinary fish gaff.

Use Heavy Equipment

Fishing with a good heavy reel equipped with a drag, you have a much better chance of landing the big ones. In fact, if you are fishing water that is known to have large gar, you should fish with heavy equipment by all means. You won't be able to "horse" the gar, but occasionally you can turn him to your satisfaction. Gar don't tire easily. They'll fight you until one of you gives up.

Down in Texas, archers have fun hunting gar. The Texas legislature recently removed the ban on shooting and spearing rough fish. Gar fishermen equipped with crossbows and reels shoot arrows into the fish as they roll in warm water.

A gar thus hooked is difficult to handle unless the arrow is made so the point will disengage. A barbed arrow sent deeply into the body of a big gar will hold him well. Usually only a light line is used.

Other successful gar fishermen use a noose of steel wire. The wire is formed into a 12-inch circle. In the center of this, rigged to a trigger, is a baited hook. When a gar grabs the bait he finds his long dangerous bill snared in the steel wire. The harder he pulls against the line the tighter the wire binds him.

The loops are made of No. 30 wire. You still use the float two feet above the snare.

Oklahoma fishermen are using another simple device to catch gar which infest many of the numerous lakes in the Sooner state. It is a foolproof and hookless method using nylon rope. Run a piece of nylon, about 15 inches long, through a ring and knot it in the center. Attach the line to the ring. After you've tied the knot, unravel the nylon rope at both ends. Fluff up the ravelings to simulate a huge jig.

It is best to locate a concentration of gar. When you toss the nylon ball among them, they'll start fighting for it. When they snap into the fluff it becomes entangled in their teeth. It soon becomes so matted they can't open their mouths. The more they fight the more securely they are held.

If there is no apparent concentration of gar, then drag the lure across the bottom of the lake or stream. It will attract their attention.

The main problem in this type of fishing is to release or remove the fish after you've

(Continued to page 220)

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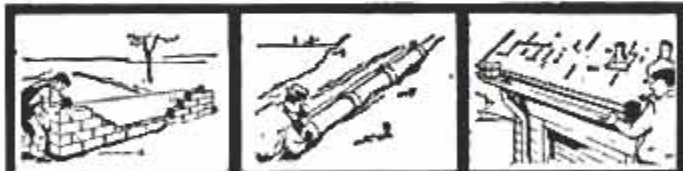
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landed him. It's a good idea to have a pick handle along, with which to bash in his head. Then use a pair of pliers to open his jaws, and extricate the nylon by knocking out his teeth.

Word of Caution

A word of caution: Don't go gar fishing alone. Take along a good partner.

Experienced gar fishermen like a good square-end, flat-bottom boat. There are some 8-foot alligators in Caddo Lake, which straddles the Texas-Louisiana border. Almost every summer one or more will upset a boat by jumping into it, or coming up under the boat.

Most fishermen have learned not to leave their strings of bass hanging over the side of the boat in waters where gar are plentiful. The gar will surface at the boat, and rip off the fish. They frequently grab a fish as it is being reeled in by a fisherman.

The gar's teeth are sharp and its jaws are strong enough to sever a man's hand. Never handle a live gar with bare hands.

Some Fishermen Use Pistol

Fighting a belligerent gar in the bottom of the boat with a paddle is foolhardy. In fact it is dangerous to take a gar into the boat with you. If you have a good gaff or spear, use it outside the boat and then tow the gar ashore. Some gar fishermen use a pistol or rifle to stop a fighting gar. Whether you may do this depends on the local laws.

The best way to learn to gar fish is to go out with someone who knows how. Up and down the principal streams there are commercial fishermen or boatmen who know the waters and what the gar will do. Check with them before you take off.

In some brackish waters between Florida and the southern tip of Texas, a few commercial fishermen catch gar for definite markets in St. Louis and Kansas City. They go behind the concrete revetments that hold back fresh water from the canals. Gar seem to thrive in this brackish water, although there are times when they are caught in the bays and estuaries along the coast.

Frequently the commercial fishermen load a towboat with gar. They bring them into camp, slash down through the armored skin with an ax to remove beautiful white flesh.

The meat is said to be delicious (if a person hasn't seen the fish first). It finds a ready market among fish eaters.

A gar will give you as many jumps as a sail, and more fight. A sail will finally quit. A gar never gives up until he's out. That's why he's been around since before the dawn of history. ★★★



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The Race to the Moon

(Continued from page 69)

"Then," goes on Professor Petrovich, "we will land men on the moon and will also return them to earth." Manned moonships may be sent off in pairs by the Soviets, so that if one ship is damaged on landing, all the moon explorers may still return in the other ship. "In interplanetary flight, the Soviet Union already has rockets capable of flights to Mars and Venus," the Professor states flatly.

Frequently, public figures in this country are tempted to say that, though the Russians may have developed greater rocket power, their guidance system and scientific instruments in general are inferior. This conclusion, as von Braun pointed out, is not borne out by facts. Russia's Mehta and our Pioneer IV were both aimed at the moon; Mehta missed by some 4000 miles, Pioneer missed by 35,000 miles.

Good Guidance Systems

Furthermore, consider the perigees (minimum altitudes) of the three Sputniks. These were 140.7 miles, 139.5 miles and 140 miles. These figures indicate that a good guidance system was operating.

Accomplishments in space, of course, are related to general scientific advances on the ground below. We delude ourselves if we think the Russians are good only at popping something into the sky, and are bums in electronics, nuclear research, theoretical physics and chemistry. It just isn't so. They have, for one thing, an atom smasher that is the wonder of the West—a device of 10 billion electron-volt power. They have an intense geophysical-research program; their chemistry is outstanding, led by Professor Semenov who recently received the Nobel Prize; their physics is sparkling, with three men recently receiving the Nobel Prize for the Cerenkov Effect; their mathematics has always been exceptional; and Russian scientists pour out innumerable papers on pure research.

"Impressive Sight"

Dr. J. W. Townsend, Jr., of the U.S. Naval Research Laboratory saw a spare Sputnik III and its instruments at the IGY Conference in Moscow. This is what he had to say: "This was an impressive sight. From what I saw I came to the conclusion that this satellite was a major scientific accomplishment. . ."

Professor R. E. Marshak, chairman, Department of Physics, University of Rochester, who attended the Moscow Conference on High Energy Particles, says:

"The U.S.S.R. is sparing no effort to provide the necessary financial support for sci-

entific research. This effort consists of providing both financial and prestige incentives to qualified students in science and engineering and also of providing funds for a very large technical and educational plant. The stipend of a Soviet graduate student exceeds the salary of an unskilled worker, and the salary of a distinguished scientist in the Soviet Union is as much as 50 times the salary of an unskilled worker. Prestige incentives are equally as great... It seems to me that the financial and prestige incentives in this country (U.S.) are not such as to persuade the scientist or engineer to remain in the university where most of the basic research is done and where all the training of new scientists and engineers takes place..."

What'll We Find on Moon?

The Russians are on their way to the moon, and so are we. I have little doubt that we both will reach it. What will we find? Did Russian astronomer Kozyrev really sight a volcanic burst on the moon? Does the moon have a magnetic field? Is it made of the same materials as earth? Will the study of moon dust give us clues to the biochemical origin of life? Can the moon be inhabited by earthlings? What is the nature of the thin lunar atmosphere?

These, obviously, are scientific questions common to all men. Scientists, at least, are much more interested in answers to these questions than the question of who reaches the moon first.

Shall we go directly from earth to the moon? This is possible, but not very practical. All evidence indicates that the United States will send not just a man to the moon, but an expedition to the moon. For an earth-to-moon expedition, of, say, 25 men, we would need a spaceship many times larger than the Empire State Building. It would be much more efficient to use a fleet of rockets which go into orbit at perhaps 500 miles above the earth. There, men would construct a space station and one or more spaceships for the moon trip.

Could Visit Moon Now

It is possible even now, of course, to send a man to the moon the hard way; a single man cramped into a tiny shell with just enough fuel to reach the moon, land and fire himself back toward the earth. At the present time his chances of surviving would be slim (which is why we will not make such an attempt).

So the United States, at least, will not send a single man directly from earth. Our program is set, and does not include anything so wild and frantic. We will build

(Continued to page 224)

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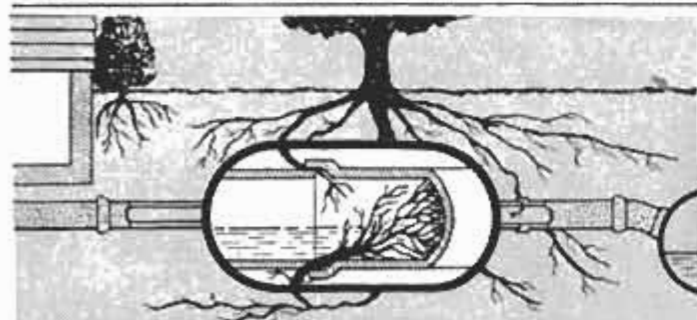
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an elegant space station to accommodate about 50 men, then set out in perhaps two personnel ships and a cargo ship. The front cover this month (merely symbolic) shows both Russian and American personnel ships. Some of the large fuel spheres would probably be discarded to lighten the load. The Russians have a basic, relatively unpretentious moonship. The American ship is more elegant, larger and has a much bigger crew.

This, perhaps, is the crux of the whole problem of the U.S. vis-a-vis Russia in space. We have a big, fat, luxurious and comfortable plan, while the Russians simply will up and go.

The stakes are large. The Russians think the stakes are nothing less than the cosmos. The Americans say, "Okay, the cosmos. But with safety, comfort, the dignity of man, showers in our space liners, big crew, togetherness, psychological adjustment, compatibility, friendship." The Russians whip something durable together and shout "Davai! Give, lads!" And off they go.

In fact, there is a good chance that the Russians will not wait to build a space station, but will set out from earth in a group of small one-man spaceships, each about 15 feet long and six feet wide. This would be the payload, of course, after the rocket left the atmosphere. It would be a tough trip, a mighty tough trip. But, as the Russians say, the stakes are the cosmos.

The race to the moon is on. I am certain in my own mind that the first spaceship will land on the moon within five years. And the way things are going at present, the men who emerge to put the first footprints into the ancient lunar dust will not be Americans. ★★★

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TOM HENDERSON

"You should hear her tell me off!"

Snorkel, Ski, Swim or Scuba

(Continued from page 61)

Such units cost upward of \$200. But for a lot of fun, \$90 will buy an unpowered sled with vanes like the wings on an airplane. Towed by a motorboat, the diver can manipulate his undulating craft to any depth within reason and, at moderate cruising speed, skim over fabulous distances of sea bottom. Similar underwater sleds powered by electric propellers soar to thousands of dollars. One Italian model carries two passengers for 60 miles at a speed of eight knots. It will cruise at a 60-foot depth, limited only by the snorkel tube for its nine-horsepower air-breathing engine. When the passengers, wearing separate scubas, want to submerge they flood a pair of ballast tanks. Down they go, leaving the craft at will to explore the bottom. Compressed air forces water from the tanks when they're ready to surface.

Fortunately, you don't have to go broke to skin dive. Bruce Parker's classes consist largely of snorkelers. All you need to "snorkel" is a mask, fins and snorkel tube—total cost about \$15. Snorkelers float prone, peering through their masks at the scene beneath them and breathing through the snorkel tube. When they see anything worth diving for, they take a deep breath and jackknife to the depths. With practice, a good snorkeler can stay submerged for 60 to 120 seconds—long enough to spear a fish, snap a picture or soak up submarine scenery.

Almost any boat can serve as "home base" for a skin-diving foray. For scuba work, Parker uses an outboard runabout. The boat is rigged with a rack behind the stern bench for rows of compressed-air tanks and diving gear. Snorkelers operate over nearby reefs from an assortment of outboard runabouts, large and small, shepherded by Parker's wife, Diana. Even a 12-foot Sailfish—a sort of floating surfboard with jaunty, striped sail—serves as a diving platform. "It gets two men out to the reefs quickly," says Bruce, "and there's no danger of tearing out the bottom on a coral head. We can tow it around while swimming from place to place. And to keep our gear and the fish we catch from slipping overboard, we just tie them to the mast."

Parker insists diving is entirely safe if safety rules are followed: "No one should dive alone—always use the buddy system," he says. "Stay away from fire coral, which stings, and sea urchins whose painful, brittle spines break off in the skin. Keep clear of seaweed. Gloves are a good idea."

(Continued to page 228)



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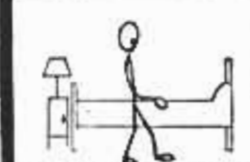
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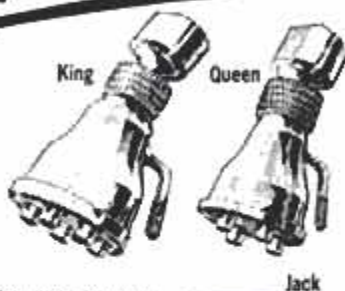
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Parker's first-time snorkelers are advised not to stay down more than 30 seconds to a minute. Scuba beginners are warned not to come up with the last lungful of air they've breathed from the tank. "That scuba," he points out, "supplies air pressure equal to the water at any depth. If you surface with a lungful of air at pressures existing at 15 feet or deeper, you can burst your lungs."

Biggest problem with novice spearfishermen, according to Parker, is their tendency to concentrate on trailing a particular fish, then surface, find themselves half a mile from any boat—and panic. "Stick to the area," he cautions. "There'll be more fish around in a minute."

About one third of America's skin divers spearfish. Using scubas, and lead-weighted belts for negative buoyancy, they glide through reefs with an impressive array of underwater weapons. Purists incline to daggers (for shark protection) and straight spears, used like a lance. Fish, the submarine nimrods insist, soon learn to hover just beyond range and to dodge spear thrusts and missiles. Devotees of rubber and spring-powered guns usually shorten the bands of coiled wire and lengthen the barrel for more distance and faster hits.

Gas guns are considered cannons by some skin divers. But they're effective. Most operate on tiny gas cartridges. One of the newest, the Crossman Rocket Spear held in one hand like a pistol, has a range of 450 feet. It sends a harpoon and line zipping through the depths so fast you can't see it. One enthusiast made a gas-powered spear gun out of a 2½-pound fire extinguisher by attaching a shoulder stock to the trigger handle and welding a metal tube to the nozzle for a barrel. The high-powered gun shoots 50 rounds on one gas load.

Parker's instructor, Denis Binks, a snorkeler and straight-spear devotee, claims his system is much cheaper, more sporting and more fun. "You snorkel along until you see a big one," he says. "Then take a few quick breaths to clear your lungs, dive and glide in so as not to startle the fish. You'll seldom miss."

What about sharks and other "man killers"?

"We've trained 5000 skin divers in shark-infested waters, with no accidents," says Parker. "Our theory is that sharks and barracuda won't attack a moving skin diver without provocation." That doesn't mean a spearfisherman won't have some moments. Parker himself, standing on the bottom with a freshly speared fish on his

(Continued to page 232)



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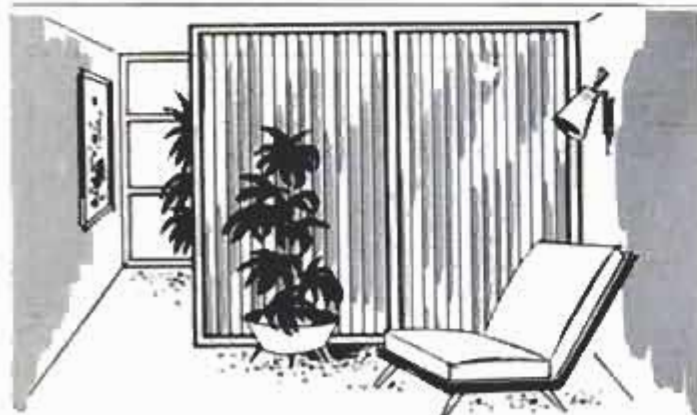
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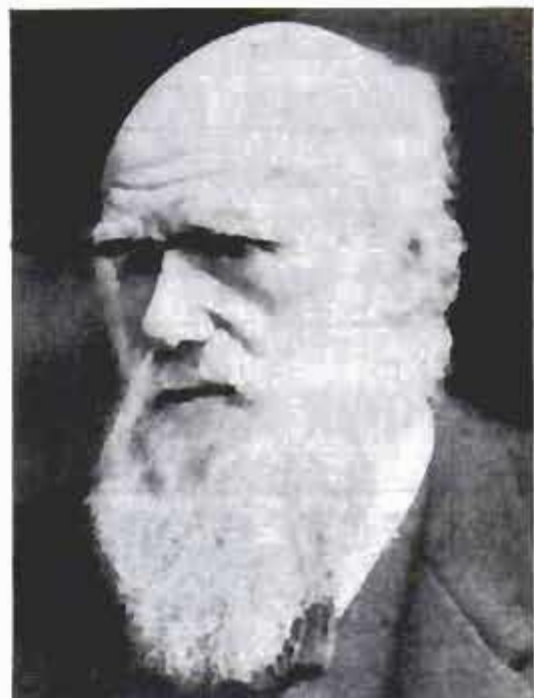
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This Month's "Great Pioneer in Science"

(Page 20)



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harpoon shaft, has had sharks zip between his legs from behind and make off with spear and catch. "First time it happened," he says, "I let go everything and got out of there."

The next time he held on. "Why lose a good spear?" he says. "This shark shook the fish, tore out a chunk and circled around to look me over. They always do this. As soon as I moved, he took off. I've had lots of sharks sneak up and bump me with their noses. You get used to them, but there's always a tingle when one of those gray ghosts coasts in on you."

Barracuda, Parker claims, usually keep their distance and watch you. "If you move, so will the barracuda," he says. "It's spooky, but they seldom bother anyone."

If the idea of sharks and barracuda bothers you, there's hope on the way. One California skin diver has invented an electronic prod which he claims will send threatening creatures scoting. The U. S. Navy is hard at work on an underwater ultrasonic device designed to make things so uncomfortable for sharks that they'll stay away. Trouble is that all the other fish will, too.

For those who still don't hanker to tackle open sea, there's still fun with skin-diving gear in less populated waters. Enterprising snorkelers and scuba divers have discovered their talents can be utilized commercially in land-locked waterways. One Miami scuba fan keeps himself in spears and gear by retrieving golf balls and tantrum-thrown clubs from the water holes of a local golf course. Skin divers also saved the day for a Florida housing developer by putting a sewer line in a water-filled trench after three contractors failed at it. New York skin divers helped a contractor lay 45,000 feet of cable across Jamaica Bay recently.

There's something for everyone in skin diving, Parker points out—whether for pleasure or business. ★ ★ ★

Strange Chemical Smells Make Pleasing Coffee Aroma

Instant coffee can be given the pleasing aroma of fresh coffee by blending tiny amounts of chemicals with the product. The synthetic odor is a combination of essences that by themselves produce fruity, sulfurous and cheese-like smells, among others. In all, 36 compounds have been identified as being responsible for the aroma of coffee, including acetone (a solvent useful in varnishes), isoprene (a component of rubber) and furfural (a derivative of cornco-

drinker, 35" hose and race tank, 800g. Wt. 20 lbs. Tested, checked and filled. Approx. GOVT. COST \$250. NEW. \$39.95.

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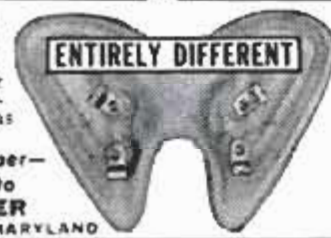
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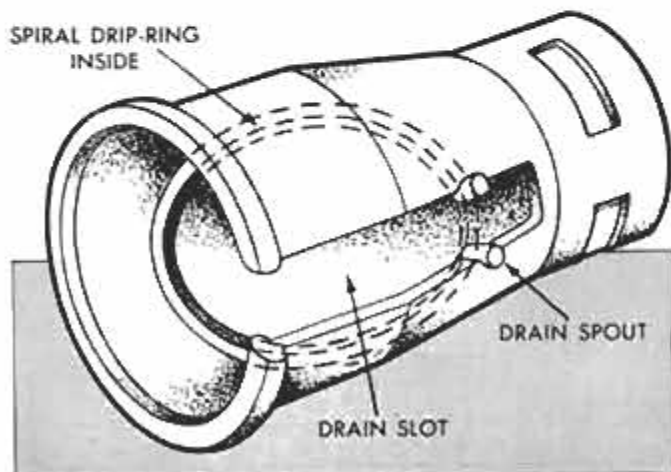
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Additive for Gasoline Boosts Octane Rating

Higher-octane gasolines can be produced at very little extra cost with a new chemical additive that increases the antiknock effect of tetraethyl lead. Leaded gasoline of 106-octane rating jumps to 108½-octane when the substance, a petrochemical known as tertiary butyl acetate, is added to the fuel. Unlike some other antiknock agents, the new additive is inexpensive and does not increase engine wear. It burns completely and leaves no deposits; has no effect on spark-plug life or mufflers, nor does it change the composition of exhaust gases. In theory the additive will mean lower relative costs for tomorrow's superfuels, because refinery costs for producing higher octane gasolines will not be increased. Developed by The Texas Company, the additive has been tested in 20 million miles of automotive use, in over 100,000 miles of heavy truck service, and in outboards and other small motors. Tests in aviation gasolines are not yet complete. Texaco will market the compound to others for blending with leaded gasoline.

Which Foreign Car Is Best for YOU?

Next month we present the gasoline mileage figures of 10 imports as revealed by the "Owners Report"—along with the comments, good and bad, of the folks who drive them. Don't miss Part II of the article that begins in this issue.

Watch for September PM



J. H. Sharf Mfg. Co., 6120 Binney St., Omaha, Neb.

Purifier Makes Good Water Out of Bad Wherever You Are

Thirsty sportsmen, campers, boatmen and tourists can dip into any lake, stream or puddle with impunity when they carry their own purifying plant. A new portable purifier, about the size of an office wastebasket and weighing only 10 pounds empty, will make drinkable water from almost any source. Container is dipped into the water, lid clamped into place, pressure is pumped into the unit by means of built-in pump, and the tap is opened for a cool, clear drink. The device cleans water by passing it through porous silver-impregnated walls of a diatomaceous earth filter with activated-carbon core.

Radiation Detector For Every Home?

If the Atomic Energy Commission and the Office of Civil and Defense Mobilization have their way, every home will eventually be equipped with a device to detect radioactive fallout. Both groups are convinced that a battery radio should be in each home, and they are now testing radiation-detection units that might be combined with the battery radio at an additional cost of no more than \$5 to \$10. The radio-radiation detector would carry out two essential survival services. It would receive Civil Defense instructions, and it would determine the presence and degree of radioactive contamination.

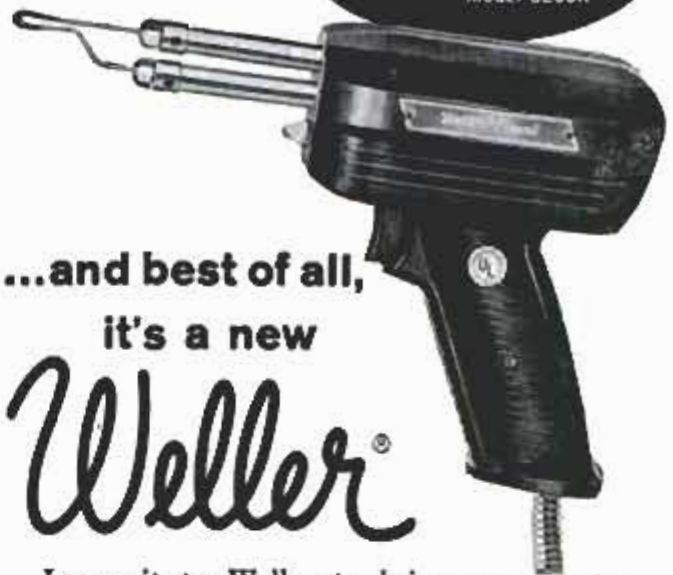
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Chemical on Hands Repels Salmon

If you're going salmon fishing you'll be wise to keep your hands out of the stream. Researchers report that a rinse prepared by submerging the hands for two minutes in a little more than a quart of water is enough to send migrating salmon scotting back downstream. Five to ten minutes pass before the salmon return. It has been found that the chemical compound serine is one of the active components. Serine solutions added to the stream set off a typical alarm-reaction in the salmon, but the response is not as dramatic or long-lasting as when the hand rinse is used.

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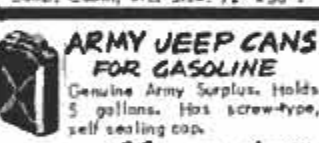
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Gov't Surplus Bargain! Packed in steel 30 cal. Ammo box. Includes 1500' of No. 10 line, A box each of 100 hooks; No's 3, 6 and 9. Plus streamer flies, Tarpon line, shark hooks, assemblies, etc. SAVE!



ARMY JEEP CANS FOR GASOLINE. Genuine Army Surplus. Holds 5 gallons. Has screw-type, self sealing cap. ONLY 1.98 EA. 3 FOR \$5.00

NEWLY manufactured, porcelain lined WATER CANS—\$5.95

NEW 10 TO 1 BOSTON GEAR REDUCTOR



One of the famous 'Boston' Gear Reductors. When used with a 1/3 HP motor at 1800 RPM this unit will deliver an output torque of 90 inch pounds at 100 RPM. Output and input shafts are 1/2" diameter. Has a four hole foot mount. Sold elsewhere at approximately \$50.00 22.49



BLOWER/EXHAUST FAN. Miniature type. 4" diam. fan forces air thru 3 inch long housing. Has 1/100 HP, 27.5 VDC electric motor, tandem mounted behind fan blade. Lifetime bearings. For ventilating closed compartments, storeroom, etc. 4.88



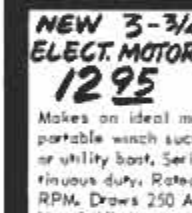
HYDRAULIC CYL. New 1500 PSI Dbl. Action Cylinder. Ideal for clutch or throttle control when used on a master & slave. Has 5/8" bore, 4-1/8" stroke, 7/16" shaft, 9-5/8" closed length. Ports are 1/4" tube (7/16-20 thread). No. H-60 3.75



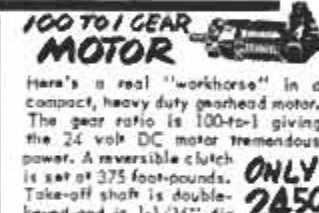
SPECIAL SURPLUS BLOWER-MOTOR UNIT. No. EM-BL3. Operates on 24 volts DC or 1.35 amps. Direct drive fan blade turns 4700 RPM. Fan has central intake and two opposed exhaust ports. Fan housing is 8" in diameter. Motor is 3" x 3" 3.88



4 SPEED HOBBY OR BARBECUE MOTOR. Extra rugged, precision built electric motor for your home workshop, barbecue, lab, etc. Uses 110 volt, 60 cycle current. Has 4 take-off shafts turning at 5, 25, 150 and 4000 RPM. Another Palley Extra Value. Worth \$14.95—NOW 8.88



NEW 3-3/4 HP ELECT. MOTOR 12.95. Makes an ideal motor to operate a portable winch such as on tow truck or utility boat. Series wound for continuous duty. Rated 3.75 HP at 2300 RPM. Draws 250 Amps on 24 V. DC. Has 5/8" diameter drive shaft.



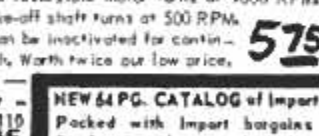
100 TO 1 GEAR MOTOR. Here's a real "workhorse" in a compact, heavy duty gearhead motor. The gear ratio is 100-to-1 giving the 24 volt DC motor tremendous power. A reversible clutch is set at 375 foot-pounds. Take-off shaft is double-keyed and is 1-1/16" dia. ONLY 24.50



18 TO 1 RATIO MIDGET HOIST. May be used for opening doors or wherever a low HP winch is needed. Will operate on 100-115 volt AC current when used with transformer (shown below) to step-down the voltage to 24 volts. The reversible motor runs at 9000 RPM. Gear Box has an 18 to 1 ratio. Power take-off shaft turns at 500 RPM. Limit switch sets length of travel or can be inactivated for continuous use. Has a magnetic built-in clutch. Worth twice our low price. 5.75



115 VOLT TRANSFORMER for above — Steps down voltage on above hoist for 110 volt current 3.45



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BIG JOB BOOM FORECAST!

Can You Get Ready in Time?

Right now job opportunities are tight all along the line. Economists now predict a period of mild ups and downs. Look for the "big break" to come in the next three years, they say. That's when good jobs will open up as never before. And men who are preparing themselves now will ride the crest of the boom.

DARK OUTLOOK FOR UNSKILLED WORKERS

Those with little or no training will find the going tough. Fewer openings. More competition for existing jobs. The tide is against the unskilled worker. It's getting stronger. Nor will the boom help. The new opportunities will go first to the skilled, next to the semi-skilled.

BIGGEST DEMAND IN THESE FIELDS

What's ahead? According to the best estimates, here are the industries due for the sharpest employment rise: Heavy transportation equipment. Mechanical, electrical, chemical, aeronautical and highway engineering. Industrial electronics.

All metals. Business services. Natural gas and oil. Paper products. On the other end of the scale, employment may lag in agriculture and leather. Check the trends in *your* field. Are you prepared to switch, if necessary?

GETTING YOURSELF READY—NOW

All the experts agree: Education, skill, specialized training will net the greatest rewards in the coming boom. The time you spend improving yourself is perhaps the wisest investment you can make *right now*. Your future success and happiness could hinge on your mastering a certain subject or acquiring a special skill. But there are obstacles. You may have a family to support. Or a job to hold down. You may feel you're too old to learn.

HOW I.C.S. CAN HELP YOU

For the man who can take his training hard and fast—without time off from his job or heavy expense—I.C.S. offers real advantages. A total of 259 courses to choose from (see partial list below). A spare-time

method that lets you progress as rapidly as you're able. Up-to-date, authoritative text material. Thorough, personalized instruction. Industry-recognized diploma to graduates. I.C.S. is the oldest and largest school accredited by the Accrediting Commission of the National Home Study Council. Its long list of successful graduates reads like "Who's Who."

Can you be ready for the next job boom? You can if you act quickly. Your first step: mark and mail the coupon below. What you do right this minute may determine how you make out in the coming boom!

THREE FREE BOOKS TELL HOW TO MEET NEXT JOB BOOM

Get the details on the fields that offer the best jobs in the immediate future. Get these three valuable books free—(1) "How to Succeed"—pocket-size guide to advancement, (2) Sample lesson (Math.) demonstrating the I.C.S. method, (3) Opportunity catalog on the subject you check in the coupon. Just mail the coupon.

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(Partial list of 258 courses)

Without cost or obligation, send me "HOW TO SUCCEED" and the opportunity booklet about the field BEFORE which I have marked X (plus sample lesson):

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Blueprints</p> <p>ART</p> <p><input type="checkbox"/> Commercial Art</p> <p><input type="checkbox"/> Magazine Illus.</p> <p><input type="checkbox"/> Show Card and Sign Lettering</p> <p><input type="checkbox"/> Sketching and Painting</p> <p>AUTOMOTIVE</p> <p><input type="checkbox"/> Automobile</p> <p><input type="checkbox"/> Auto Body Rebuilding and Refinishing</p> <p><input type="checkbox"/> Auto Engine Tuneup</p> <p><input type="checkbox"/> Auto Technician</p> | <p>AVIATION</p> <p><input type="checkbox"/> Aero-Engineering Technology</p> <p><input type="checkbox"/> Aircraft & Engine Mechanic</p> <p>BUSINESS</p> <p><input type="checkbox"/> Accounting</p> <p><input type="checkbox"/> Advertising</p> <p><input type="checkbox"/> Business Administration</p> <p><input type="checkbox"/> Business Management</p> <p><input type="checkbox"/> Cost Accounting</p> <p><input type="checkbox"/> Creative Salesmanship</p> <p><input type="checkbox"/> Managing a Small Business</p> <p><input type="checkbox"/> Professional Secretary</p> <p><input type="checkbox"/> Public Accounting</p> <p><input type="checkbox"/> Purchasing Agent</p> <p><input type="checkbox"/> Salesmanship</p> <p><input type="checkbox"/> Salesmanship and Management</p> <p><input type="checkbox"/> Traffic Management</p> <p>CHEMICAL</p> <p><input type="checkbox"/> Analytical Chemistry</p> <p><input type="checkbox"/> Chemical Engineering</p> <p><input type="checkbox"/> Chem. Lab. Technician</p> <p><input type="checkbox"/> Elements of Nuclear Energy</p> <p><input type="checkbox"/> General Chemistry</p> <p><input type="checkbox"/> Natural Gas Prod. and Trans.</p> <p><input type="checkbox"/> Petroleum Prod. and Engr.</p> <p><input type="checkbox"/> Professional Engineer (Chem)</p> <p><input type="checkbox"/> Pulp and Paper Making</p> | <p>CIVIL ENGINEERING</p> <p><input type="checkbox"/> Civil Engineering</p> <p><input type="checkbox"/> Construction Engineering</p> <p><input type="checkbox"/> Highway Engineering</p> <p><input type="checkbox"/> Professional Engineer (Civil)</p> <p><input type="checkbox"/> Reading Struc. Blueprints</p> <p><input type="checkbox"/> Sanitary Engineer</p> <p><input type="checkbox"/> Structural Engineering</p> <p><input type="checkbox"/> Surveying and Mapping</p> <p>DRAFTING</p> <p><input type="checkbox"/> Aircraft Drafting</p> <p><input type="checkbox"/> Architectural Drafting</p> <p><input type="checkbox"/> Drafting & Machine Design</p> <p><input type="checkbox"/> Electrical Drafting</p> <p><input type="checkbox"/> Mechanical Drafting</p> <p><input type="checkbox"/> Sheet Metal Drafting</p> <p><input type="checkbox"/> Structural Drafting</p> <p>ELECTRICAL</p> <p><input type="checkbox"/> Electrical Engineering</p> <p><input type="checkbox"/> Elec. Engr. Technician</p> <p><input type="checkbox"/> Elec. Light and Power</p> <p><input type="checkbox"/> Practical Electrician</p> <p><input type="checkbox"/> Practical Lineman</p> <p><input type="checkbox"/> Professional Engineer (Elec)</p> <p>HIGH SCHOOL</p> <p><input type="checkbox"/> High School Diploma</p> | <p><input type="checkbox"/> Good English</p> <p><input type="checkbox"/> High School Mathematics</p> <p><input type="checkbox"/> High School Science</p> <p><input type="checkbox"/> Short Story Writing</p> <p>LEADERSHIP</p> <p><input type="checkbox"/> Industrial Foremanship</p> <p><input type="checkbox"/> Industrial Supervision</p> <p><input type="checkbox"/> Personnel-Labor Relations</p> <p><input type="checkbox"/> Supervision</p> <p>MECHANICAL and SHOP</p> <p><input type="checkbox"/> Diesel Engines</p> <p><input type="checkbox"/> Gas-Elec. Welding</p> <p><input type="checkbox"/> Industrial Engineering</p> <p><input type="checkbox"/> Industrial Instrumentation</p> <p><input type="checkbox"/> Industrial Metallurgy</p> <p><input type="checkbox"/> Industrial Safety</p> <p><input type="checkbox"/> Machine Shop Practice</p> <p><input type="checkbox"/> Mechanical Engineering</p> <p><input type="checkbox"/> Professional Engineer (Mech)</p> <p><input type="checkbox"/> Quality Control</p> <p><input type="checkbox"/> Reading Shop Blueprints</p> <p><input type="checkbox"/> Refrigeration and Air Conditioning</p> <p><input type="checkbox"/> Tool Design</p> <p><input type="checkbox"/> Tool Making</p> <p>RADIO, TELEVISION</p> <p><input type="checkbox"/> General Electronics Tech.</p> | <p><input type="checkbox"/> Industrial Electronics</p> <p><input type="checkbox"/> Practical Radio-TV Eng'g</p> <p><input type="checkbox"/> Practical Telephony</p> <p><input type="checkbox"/> Radio-TV Servicing</p> <p>RAILROAD</p> <p><input type="checkbox"/> Car Inspector and Air Brake</p> <p><input type="checkbox"/> Diesel Electrician</p> <p><input type="checkbox"/> Diesel Engr. and Fireman</p> <p><input type="checkbox"/> Diesel Locomotive</p> <p>STEAM and DIESEL POWER</p> <p><input type="checkbox"/> Combustion Engineering</p> <p><input type="checkbox"/> Power Plant Engineer</p> <p><input type="checkbox"/> Stationary Diesel Engr.</p> <p><input type="checkbox"/> Stationary Fireman</p> <p>TEXTILE</p> <p><input type="checkbox"/> Carding and Spinning</p> <p><input type="checkbox"/> Cotton Manufacture</p> <p><input type="checkbox"/> Cotton Warming and Weaving</p> <p><input type="checkbox"/> Loom Fixing Technician</p> <p><input type="checkbox"/> Textile Designing</p> <p><input type="checkbox"/> Textile Finishing & Dyeing</p> <p><input type="checkbox"/> Throwing</p> <p><input type="checkbox"/> Warming and Weaving</p> <p><input type="checkbox"/> Worsted Manufacturing</p> |
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Name _____ Age _____ Home Address _____

City _____ Zone _____ State _____ Working Hours _____ A.M. to P.M. _____

Occupation _____

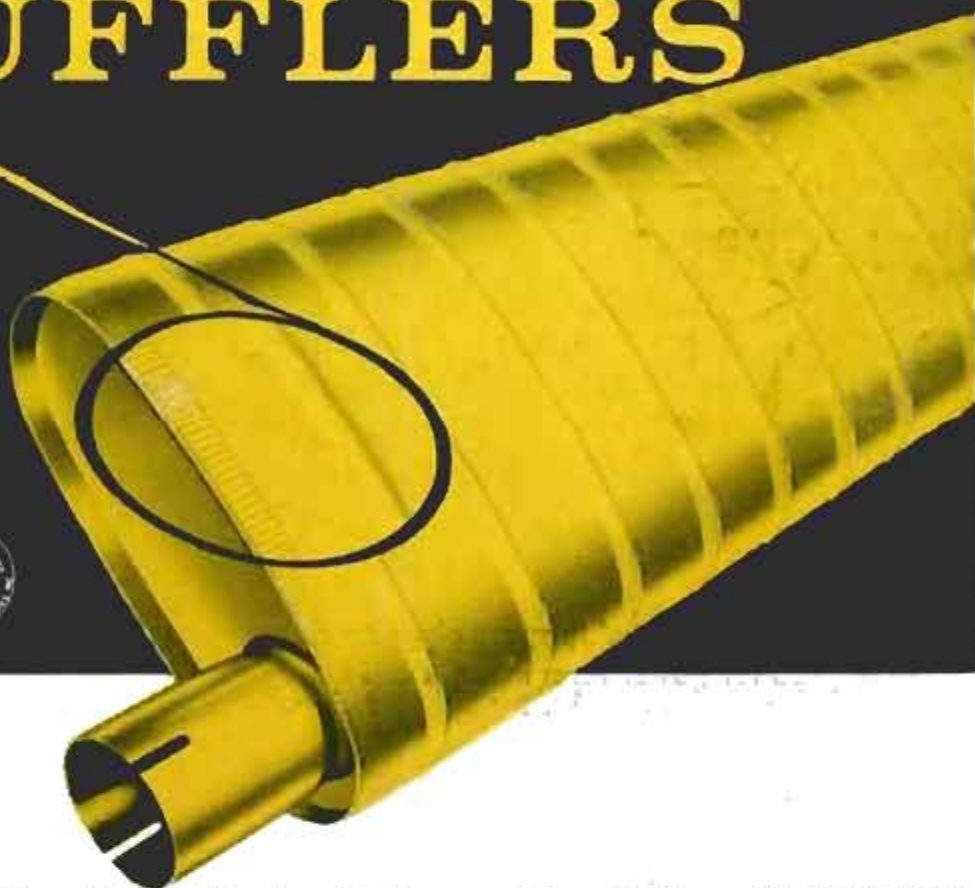
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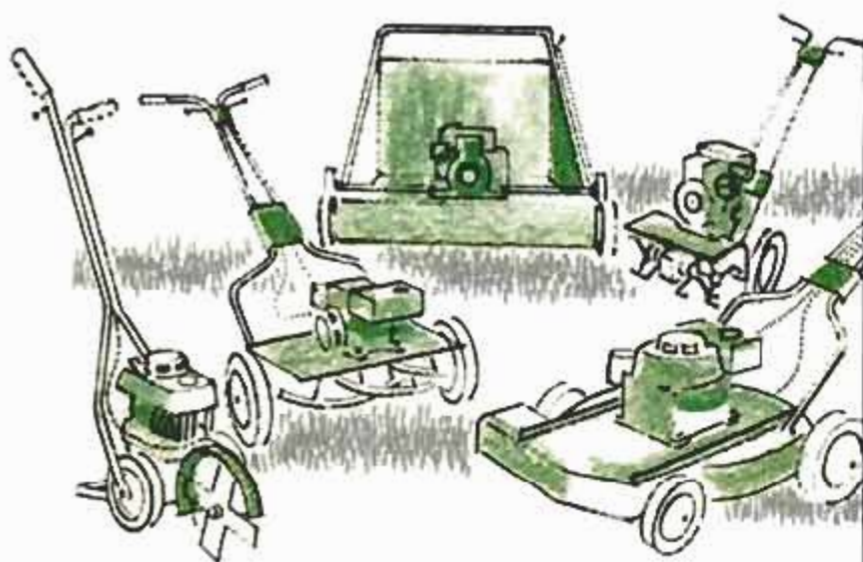
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