

Save money! Simple checks for radio-TV tubes

# POPULAR MECHANICS

JULY, 1961  
35 CENTS

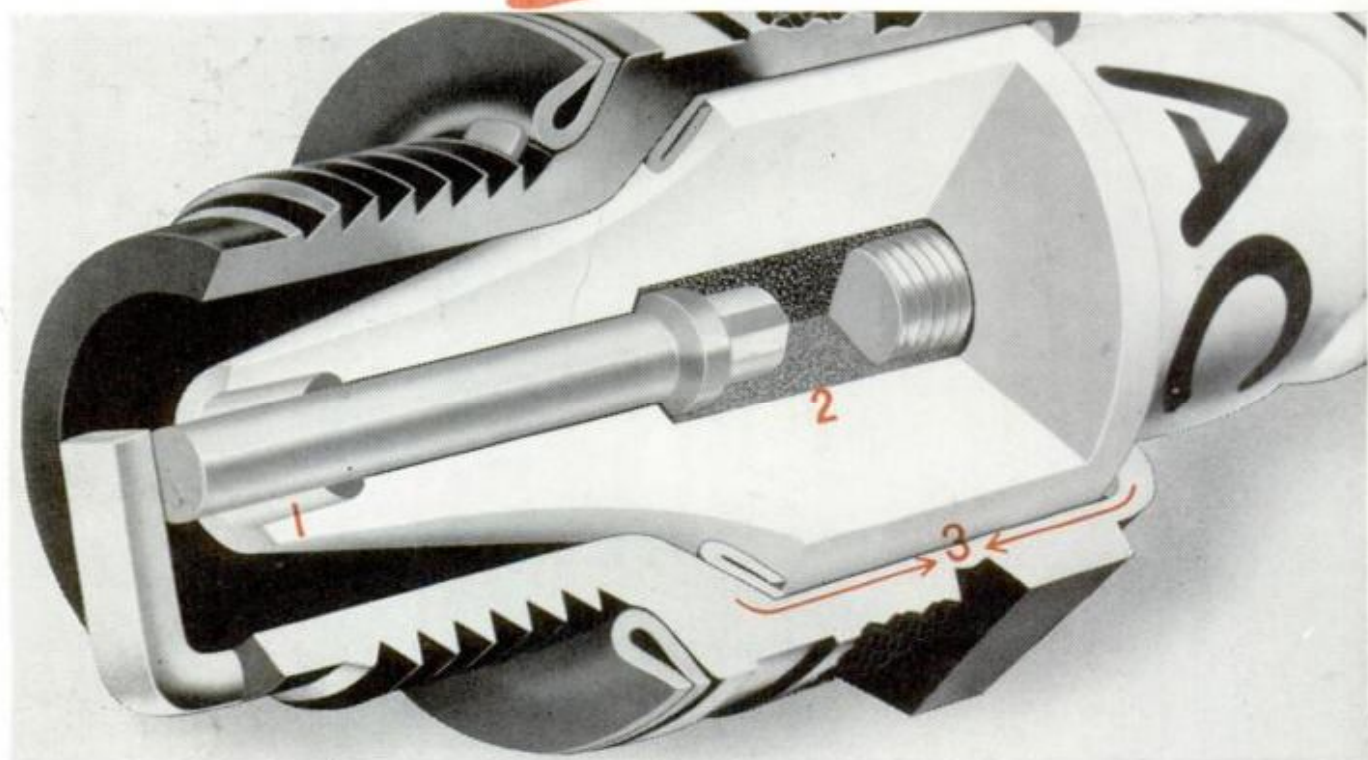
**DO YOU HAVE THE SAFETY GLASS  
YOU PAID FOR?** — see page 65



- **LEARN TO WATER SKI THIS SUMMER**
- **Million-mile Owners Report on the Olds F-85**



know the  
advantages of  
AC's superior  
design



you get "self-cleaning" action  
from AC's long, thin insulator tip

AC Fire-Ring Spark Plugs give you maximum useful life because of the "self-cleaning" action of their long, thin insulator tip design.

AC's insulator tip length provides high resistance to electrical leakage and shorting. Extra thinness near the firing end (1) means faster heating and cooling to burn away fouling deposits and maintain proper firing.

These features are possible because ACs handle combustion heat better through their copper-glass inner seal (2) and their presurized insulator-shell construction (3).

AC Fire-Ring Spark Plugs in your engine give you self-cleaning, sure-firing action. Try a set now for smoother summertime motoring.

AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

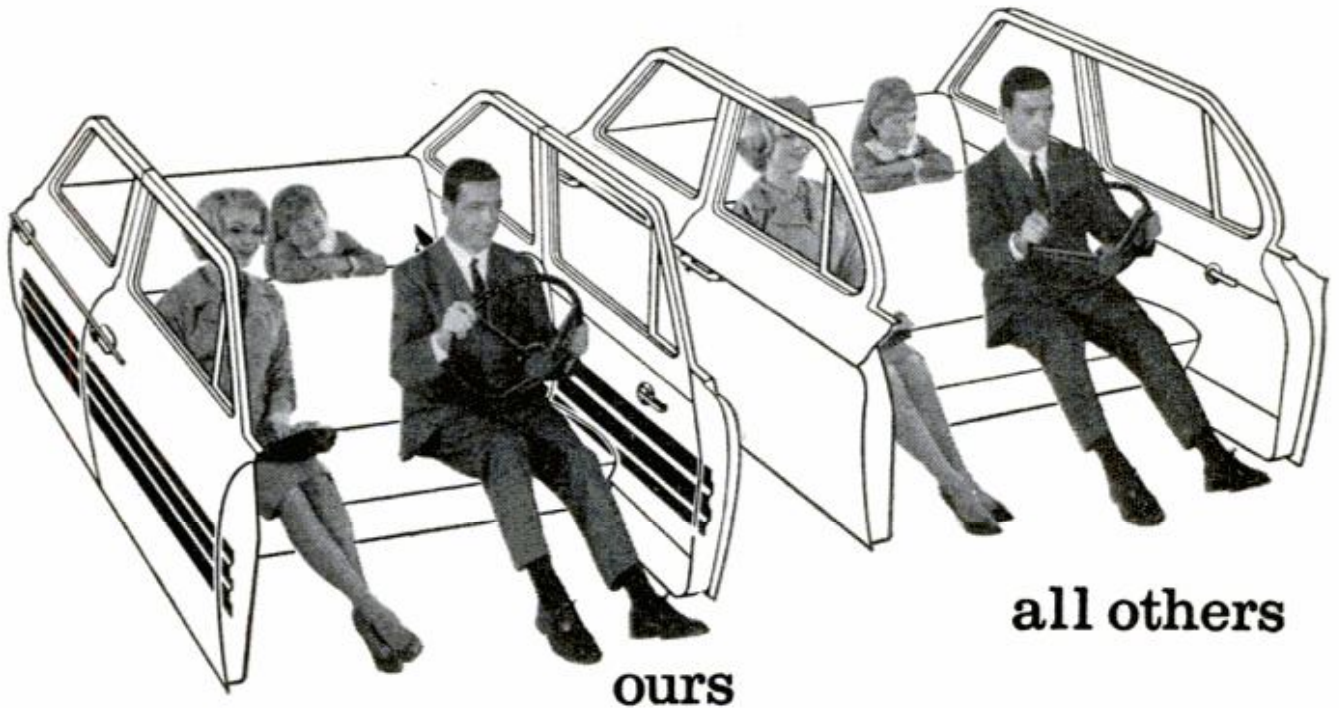


**Fire-Ring spark plugs**

BUILT BEST FOR EVERYTHING YOU OWN  
THAT RUNS ON GASOLINE



# Which doors are stronger?



Only in the 1961 Ford Family of Fine Cars are doors reinforced with steel beams

## *Ford Motor Company builds better bodies*

- Doors in the Ford Family of Fine Cars are stronger. They are braced with steel ribs. This means they are more rigid and therefore close tighter and quieter. They are less subject to distortion, reducing the likelihood of developing squeaks and rattles.

- Also adding to the silence of the ride is extra sound insulation. In the Ford Family of Fine Cars there is up to 57% more area

covered with sound absorption material.

- Millions of car frames are shaped like an "X." Weak in the middle, they lack the strength of strong side rails. Guardrail frames in our cars curve out. They are strong in the middle. This is true of Ford and Mercury. Guard rails also protect passengers in the unitized bodies of Falcon, Thunderbird, Comet and Lincoln Continental.

- Rubber body mounts are used to seal out road and engine noise. They prevent it from being trans-

mitted into the car. The more rubber body mounts, the more effective the sound barrier. In the Ford Family of Fine Cars, with 50% more insulating body mounts, you get a remarkably quiet ride.

*These are 4 of the many reasons we think you will find (upon comparing our cars with other cars) that Ford Motor Company builds better bodies.*



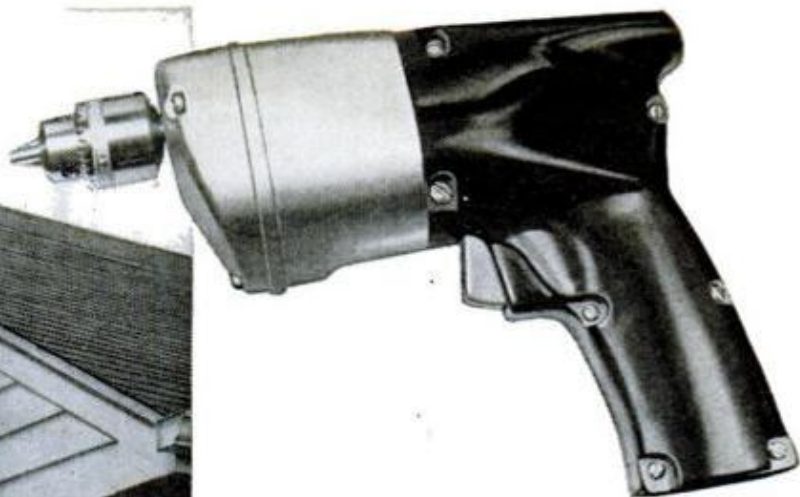
American Road, Dearborn, Michigan

FORD • FALCON • THUNDERBIRD • COMET • MERCURY • LINCOLN CONTINENTAL

JULY 1961

1





## NOW—A Cordless Portable Drill

CRAFTSMEN, builders, farmers and do-it-yourselfers have been wishing hard and waiting long for a portable drill without a cord, an electrically powered tool you could take anywhere, use miles from any electric power source. Here it is.

Developed and recently introduced by Black & Decker this new portable drill has the same heft and feel of the conventional cord drill except that there's no fishline snarl of cord to unroll and roll up, plug in and unplug every time you use the tool. Instead you simply chuck a drill bit in this new unit, point the bit at the work, press the switch and you're in business.

Although it's designed only as a supplementary power tool and is not intended for continuous operation, there's nothing slowpoke or light duty about it. It pops holes through  $\frac{1}{2}$ -in. hardwood with the speed and power of a cord drill.

What makes it go? A tiny, rechargeable

wet cell—housed out of sight and out of mind in the body of the tool—furnishes the power to drill about seventy-five  $\frac{1}{2}$ -in. holes of average depth before it needs recharging. The cell takes a quick charge in about five hours. Normal charging to full takes overnight. The cell will take as many as 400 rechargings before replacement.

What does this new tool weigh? About four pounds without any attachment and that's light weight when you consider that the unit has its own self-contained power supply. Note in the photos that the forward half of the body, or housing, of the tool is metal, but the rear half which includes the handle, is of a nonbreakable material. And, of course, it's shockproof.

What's the price? About \$50 for the drill only. The charger will be priced at \$10 and sold separately for use with the drill and with other cordless portable power tools, which are to be introduced later on. ★ ★ ★





# A close look tells why!

## New **Firestone**

### Transport-100 truck tire

# boosts mileage 50% (yet costs no more)

Take a look at this totally new 3-rib truck tire! Totally new, yet already proved in over 109,000,000 miles of fleet tests to bring you 50% more original tread mileage and much greater drive wheel traction. With its completely new Rubber-X compound and Shock-Fortified cord body, the Transport-100 can give you an extra tire mile for every two you run . . . stops in 2/3 the distance most other truck

Copyright 1961, The Firestone Tire & Rubber Company

tires require on wet, slick or snow covered pavement . . . and it is *noise-treated* for quieter running. You'd expect to pay more, but the big news is this: *You can start running on Firestone Transport-100 tires now at no extra cost!* Available in nylon or Tyrex<sup>®</sup> rayon cord, tubed or tubeless, at your Firestone Dealer or Store. Always Specify Firestone Tires on New Trucks.

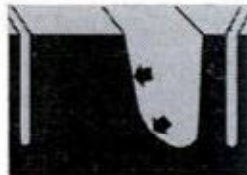
®T.M. of Tyrex, Inc. Transport<sup>®</sup> T.M. Firestone



**NEW** flatter tread crown to give tires greater contact with the road for more even wear and added truck tire mileage.



**NEW** unique "stone guards" built right into the tread keep it free of damaging gravel and pebbles to lengthen tire life.



**NEW** deep tapered grooves are contoured to clean out larger stones. Offer more resistance to tread cracking.



**NEW** 3-rib tread design with broad stable center rib boosts mileage, reduces tread squirming and costly scuffing wear.



**NEW** deep bladed slots boost traction for full tread life. Braced design gives even wear, surer steering on curves.



# POPULAR MECHANICS®

JULY 1961  
VOL. 116 NO. 1

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## Next Month . . .

LET a family that survived for weeks in the wilderness—on 10 minutes' notice—tell you their rugged but rewarding experiences, in "10 Minutes to Survival" . . . ENJOY an expert behind-the-scenes "Preview of the '62 Cars" that is not based on gee-whiz rumors . . . MEET the animated Venetian blind that shortly may prove to be "The World's Safest Plane." All in the August issue.

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This One



C17T-5CO-7XFP

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### Short-Haul Jetliner With Three Rear Engines

Production has started on the Boeing 727 jetliner, which has its three turbofan engines in the tail section. Eastern Airlines and United Air Lines each has ordered 40 of the new short-to-medium range transports.

The 727 will carry up to 144 passengers

at a normal cruising speed of about 600 miles per hour. It will be able to operate from 5000-foot runways, about average for existing airports.

First deliveries are expected in 1963, replacing present piston-engine airliners.

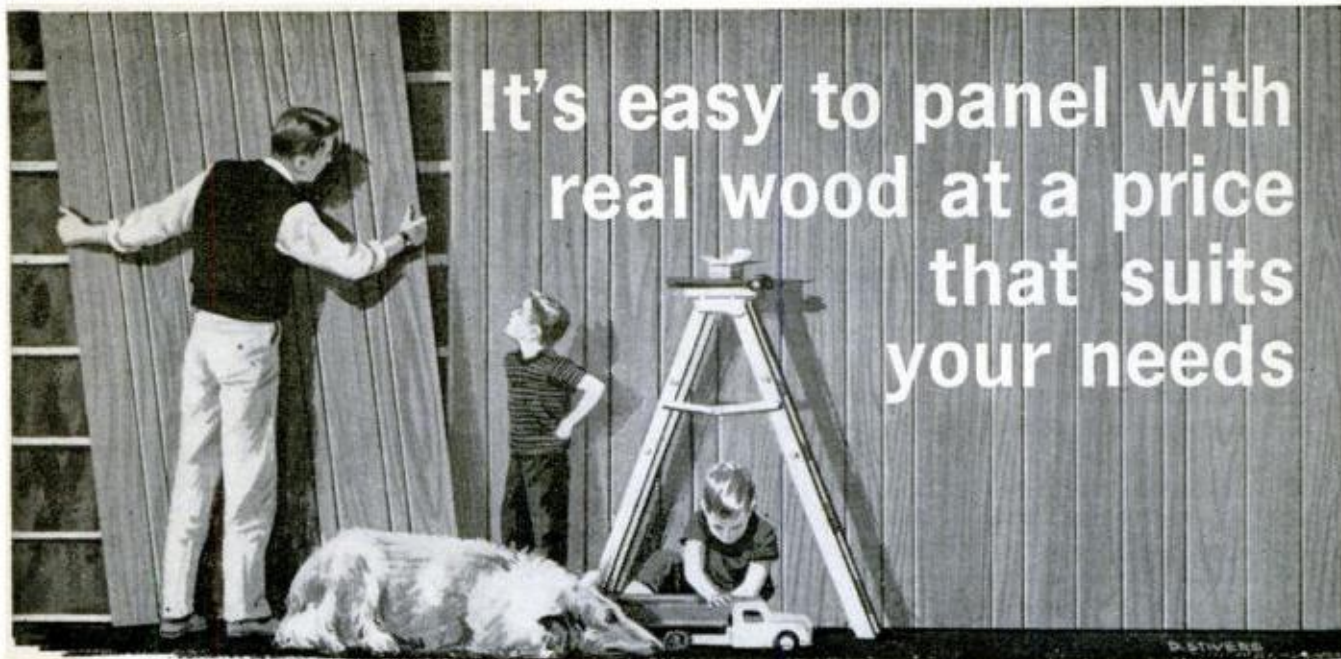


*"Now get the picture, Emile. It's opening day at Santa Anita...29,000 cars in the parking lot...and there you are with your bottles of rusting agent. And there I am with 29,000 cans of Mac's No. 13\*. We'll clean up."*

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**Cottage Paneling** Hardwood with natural growth characteristics. Family-Proof finish\* 4' x 7', 8', 9', 10' panels. Walnut; Oak; American Elm; Antique Elm; Birch in Natural, Cherrytone, Greytone, Mapletone, Antique. .49 - .66¢ per sq. ft.; \$47.04 - \$63.36 for 8' x 12' wall.

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## How the dip-stick spots engine trouble!

Does the dip-stick in your engine crank case show up costly oil loss?

If it does, better have an experienced engine mechanic check your engine for bearing wear.

More than likely, he'll find that dropping oil levels on the stick are linked to poor engine performance. And here's why: once bearings wear beyond the engineered clearance point, oil pressures drop. Surplus oil splash goes wild. Uniform lubrication is lost. Excessive oil flies onto the cylinder walls. It is pumped into the combustion chamber where it burns into carbon. It fouls plugs. Deposits pile up on valves and piston rings. Rings cease to flex and menace compression.

Your mechanic knows the best method of correcting these troubles. You'll find in most cases he'll suggest Federal-Mogul engine bearing replacements to restore perfect performance.

Federal-Mogul engine bearings are the world's standard for quality. And world-wide distribution brings them as close as "next door" for leading imported and domestic car engine replacements.



## FEDERAL-MOGUL SERVICE



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## OVER THE EDITOR'S DESK



### Delighted Knight Owner

After building your boat *Sea Knight* (PM, May-August 1957) and using it for two months, must say I am delighted with its performance. She is fiberglassed all over.



Many thanks for a first-class design and plans and instructions which were well written and very complete, right down to the trailer.

Los Altos, Calif.

B. R. CHAMBERS

*The pleasure's ours. Hope your well-behaved Knight gives you many years of enjoyment.*

### 80 Miles Per Gallon

It took us only a few hours to mount the 2½-hp. engine, remove the pedals and put a large pulley on one side and small sprocket on the other side of this racer bike.



Using English bike gears, we can climb steep hills in low and average 35 m.p.h. in high gear. Test runs show we are getting around 80 miles per gallon.

Oconomowoc, Wis.

BUTCH BIVENS  
GEORGE GODFREY

*How many PM readers would like to have us publish some projects similar to this?*

(Continued to page 10)



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## Home-Crafted Pontooner



Have enjoyed your magazine and enclose a picture of a pontoon boat I built, using plans you published in the spring of 1959. Hurst, Tex.

H. L. BENNER, D.O.

## Matching Birthdays

I've been reading *PM* for many years but your May issue told me something I never knew. Our birth dates are the same—I was born in St. Cloud, Minn., on January 11, 1902.

*PM* and I have seen a lot of changes in this old world and can rightly begin to think of ourselves as old-timers. Here's wishing *PM* many more years of useful service.

Everson, Wis.

WILBUR F. HUBBARD

*Somehow we don't feel old, Wilbur. Must be the association with all the new ideas we work with on every issue.*

## Wet-World Photography

The man doing the seaweed cha-cha in the photo below is *PM* editor Earl Wobeck, hard at work on an article you'll see in the next issue. It will tell you which camera is



best for underwater photography work, give you tips on how to use it most effectively, and show you how to make a water-tight case for the camera.

*The Editors*

POPULAR MECHANICS

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—Grover Squires



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# HOW TO MAKE YOUR BOSS SIT UP AND TAKE NOTICE



Best way we know of is to come up with the right answers on the job. Show him you have the drive and ambition it takes to get ahead.

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Without the right training you're just another one of the millions competing for the same, dull routine jobs, the same low salary.

But—when you have the right kind of training your boss can't help but sit up and take notice of you. He can see you're a man who is prepared to move ahead.

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- Reading Arch. Blueprints

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- Sign Painting and Design's
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- Surveying and Mapping
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- TV Technician

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- Power Plant Engineer
- Stationary Diesel Engr.
- Stationary Steam Engines

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- General

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## Report From a Missile Worker

(EDITOR'S NOTE: The following letter is one of many received in response to PM's May article, "Are We Licking Our Missile Fizzle?" by Tom Stimson. Tom's article detailed various human errors which have plagued our missile program, and the steps being taken to prevent them. Reader Pointner, in the letter below, gives additional examples from his own experience.)

The picture which emerges suggests that the real fizzle may not be in missiles, but—on the part of some Americans—in a once-fierce pride in one's ability to get a job done, the best and quickest way possible.)

DEAR TOM STIMSON:

Good boy, Tom—writing that article on our space problems. I do not know where you gathered the information but it certainly may wake up some dreamers in our missile program. If not, they may soon be awakened by a Russian soldier.

I see some close resemblances between my experiences and the ones in your article. I received a chewing out for getting a missile launcher part fabricated. It seems I was working for the Army and they had to order the part but I knew the nearby Air Force base could fabricate it immediately. So I got

the vital part made at the Air Base. The Air Force was glad to help, but my Supervisor and the Army Ordnance Officer where I worked were not pleased. If we were attacked by an enemy, I wonder if the American public would have been mad at me, knowing I obtained the part needed to put the launcher back into operation.

Well, Tom, I was launched right out of the Civil Service. You see, I would not follow written and verbal regulations by so-called competent supervision. Yet I thought we were all working for the same boss—Uncle Sam—which is everyone in America.

This competent Supervisor caused 16 men to transfer and others to drag along in hopes of a change. At last report, he was still there, saying "Don't worry, everything is lovely." It may be for him.

The Supervisor over him is a bright boy, too. He suggested I fix a 3000 lb./psi hydraulic system valve as follows: "Just get a little graphite cord and pack the valve like we did down on the farm on the old steam tractor."

Mr. Stimson, I do believe we are finally overcoming this sort of thing. However, much is yet to be done, and let's hope men are free enough to do it or to suggest freely how to help do it.

Smyrna, Del.

Sincerely,

RAYMOND A. POINTNER



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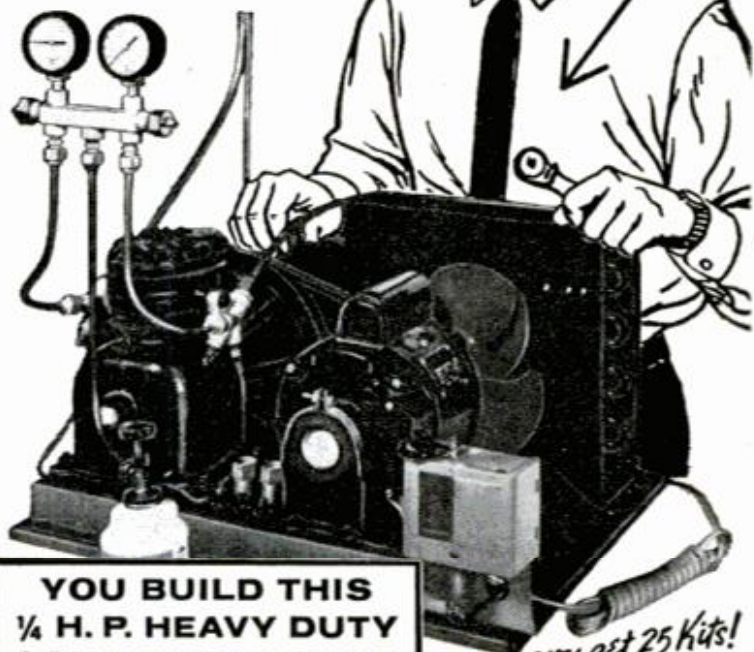


### Letters prove efficiency of training



"I have a business of my own servicing domestic and commercial refrigerators."—*Paul Humphrey, Colo.* "I made \$1,000 while training, and am now a refrigeration man for a dairy."—*Giles Minton, N. C.* "I opened a little shop and am swamped with work."—*Charles Corley, Kan.* "Doing service work on a part-time basis the past 10 months, I earned \$2,400. Have a nice business."—*Renos Johnson, Ind.* "My firm advanced me to field superintendent."—*Milburn Dougan, Ark.* You can do as well as these graduates!

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# SIDELIGHTS FROM THE PENTAGON



By William R. Kreh

MEASURING UP to modern standards, the Army has found, means it can no longer stand on its feet—or even inches. It has all but scrapped the old English system— inches, feet, yards, miles—in favor of the metric system of centimeters, meters and kilometers.

Main reason for the change is a common system of measure with its allies in NATO. The new system will be phased in gradually during the next five years.



**The hide of a C-47 yielded** a bit of history recently.

The vintage "Gooney Bird," built in 1943, had a landing gear that was acting up. When the wing was opened up to repair it, 48 flak holes and several pieces of shrapnel were discovered in the main spar. The C-47's records don't show whether she suffered the wounds in Korea or during World War II.



**To blow its own horn,** Coast Guard built a special room.

The room is full of the deadest space this side of outer space because it's built without an echo. Located at Curtis Bay, Md., the 10 by 24 by 36-foot room is used to get scientific measurements of the amount and kind of sound put out by foghorns, without getting them mixed with exterior noises or its own echoes (or complaints from nearby residents).

The special walls absorb every decibel of sound and throw none at all back. Thus the measuring instruments receive the pure sound of the foghorns and nothing else.



**Dummy "submarines"** that look like torpedoes will be used by the Navy for target practice.

Up to now the Navy has had to use regular submarines during antisubmarine maneuvers. The new devices can dive, turn and run about like the real thing and, more important, can be launched from ships and helicopters and even through another submarine's torpedo tubes.

They send out engine noises and sonar signals for the attacking ships to home in on and, after their runs, they rise to the surface and pour out dye and send radar signals so they can be located and reused.

A Texas-size television tower — that means BIG, son — is performing double duty near Dallas. It's doing its regular chores for local television, and it's also helping the Air Force do some meteorological research.

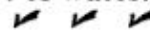
The tower—1428 feet high—has 12 platforms at various heights with instruments to automatically measure and record winds and temperatures. It's part of an investigation into a weather phenomenon known as the "low-level jet."

It seems that special winds develop after sunset, gradually increasing in intensity until a few hours after midnight, then dying down until shortly after sunrise.

The tall tower came in handy for placing the instruments at strategic levels. Top speed of the wind, up to 60 m.p.h., is believed to be reached at the 1000 to 1500-foot levels.



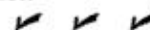
**The exclusive "10-Grander" Club** includes five Navy submarines — the Piper, Spikefish, Sarda, Toro and Conger. Each has dived more than 10,000 times which, according to submarine experts, is the equivalent of driving a car 500,000 miles. About 3,780,000 tons of water pass through the flood ports of a sub during this span, almost equal to the amount of water that flows over Niagara Falls every nine minutes. That's a lot of water.



**An infrared "eye"** that will flash a warning light and sound a horn when a very small amount of contamination is in the air as much as a quarter-mile away has been developed by the Army Chemical Corps.

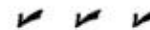
It will detect contaminants that are colorless and completely invisible to the naked eye. Called "Iopair," it's intended primarily for use of field troops, but a wide range of civilian uses has been outlined, including air-pollution tests and control of stack gases from factories.

The system is set to detect one specific substance and will not be set off by other materials present.



**Wearing money** on his shoulders is the style set by Air Force Brig. Gen. Tarleton H. Watkins.

His stars were once a handful of coins which were melted down and cast into the five-pointed insignia, a gift from his men. He led a recent airlift to the Congo and the men made the presentation when he was promoted.



**An antisatellite missile** could be developed within 18 months, the Navy has told Congress. ★ ★ ★



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# BULLETINS FROM THE WORLD OF SCIENCE

Bothered by mosquitoes? No wonder. Entomologists at the U. S. Department of Agriculture labs in Orlando, Fla., have discovered that the carbon dioxide we exhale attracts them as surely as a picnic will bring ants.

Cosmic rays that bombard Earth and make space travel hazardous come from great flares of energy from some 16 billion stars in our galaxy, the Milky Way. Dr. J. N. Tandon of the University of Delhi, says the cosmic particles—which have been known for more than 40 years—are accelerated in space by moving electric fields. Other theories state that rays originate outside our galaxy.

Another popular theory—that suddenly one day, thousands of years ago, the woolly mammoths roaming Siberia were buried under a glacier—is getting holes shot in its hoary hide.

Columbia University geologist William R. Farrand says the 39 mammoths we've discovered, compared to a probable total population of more than 50,000, is about what scientists would expect from accidental burial.

The poor condition of the meat of the frozen giants, he says, shows that death did not occur quickly. Probably they died by drowning and were later frozen.

Mankind may be around today only because animals of an earlier time did not find him tasty. Dr. L. S. B. Leakey of the Coryndon Memorial Museum, Nairobi, Kenya—the discoverer of an early man who lived more than 600,000 years ago in East Africa—reports seeing wild animals such as lions sniff at sleeping humans and then go away without attacking. He says they attack humans only when wounded, threatened, or are too old to hunt other game.

Sign of the times: "Trip to Mars" is the name of a course offered by Michigan State University's college of engineering.

James Biery





*Career-minded William A. Shaw of Royal Oak, Michigan, asked...*

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## **U. S. Air Force**



**Airman 2C Shaw** is now an electronics specialist at a base in England. He has completed a technical training course at Keesler Air Force Base, Mississippi. He is learning a valuable skill in his first year in the Air Force.



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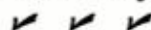


LOTS OF INVENTORS read *Popular Mechanics*—we know that from the volume of mail that goes across this desk every month. And nothing pleases us more than to hear from a successful reader-inventor. Here are three:



**W. Lewis Seward**, of Tampa, Florida, has filed his application for a patent on an ingenious combination can opener and dispensing device for use on cans of pourable materials like coffee, soap flakes, or cooking oil. The user inserts the inexpensive device in the top of the can, much as a service station attendant uses an opener-spout on a can of motor oil. It locks into place after piercing the top, but a built-in seal keeps air from the contents. To pour, you simply raise the opener's handle, which opens the valve and allows the contents to pour out.

Like many of our inventor-readers, Mr. Seward would like to find a manufacturer to market his device. Any ideas?



**Edgar H. Purdy**, of Red Bank, N. J., has been granted patent No. 2,977,903 for a garbage disposal apparatus that will multiply the capacity of a garbage truck by grinding and incinerating the refuse automatically right inside the truck. Ashes, unburned refuse, and unburnable objects are dropped into a compartment at the bottom. The contents of the ash compartment are all that's left to be dumped.



**William Preising**, of Escondido, Calif., reports that he has patents pending on a new machinists' edge gauge which he hopes to manufacture himself under the name of Preising Engineering Co. The gauge, which looks like a steel letter "h" about an inch and three-quarters high and wide, will allow quick and easy alignment of a boring or milling machine spindle with the face or edge of the workpiece, eliminating the usual pins and construction holes. The gauge also will work on many surface plate operations, and could be used in lieu of parallels on some jobs. Ground to a guaranteed tolerance of .0002, the gauge can be made to sell for less than \$18, and is a real shop timesaver.

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



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PRIVATE PILOTS may get a dream airplane—one designed from the inside out.

The Federal Aviation Agency, in a joint venture with the Army (which flies many of the same small planes used by private pilots), hopes to develop an aircraft starting with the "average pilot," building an operating system around him, with controls and instruments in the most logical places, then getting an engine and airframe to fit.

It's an attempt to reverse the tradition of deciding on the engine and airframe first, then putting the cockpit and instruments wherever they happen to fit, which can often result in an inefficient arrangement.

∨ ∨ ∨

Air Force fighters now have an electronic system that enables them to fly missions in all kinds of weather, even hedge-hopping missions, and seek out targets either on the ground or in the air without the pilots ever seeing them.

Called TARAN (for tactical attack radar and navigator), the system will automatically navigate out to a target and back and continually show the pilot his position on a moving map displayed on a screen in the cockpit; it will also, with high-resolution radar, pick out ground targets through dense fog or overcast; and it will perform search-and-track aerial missions, locating enemy aircraft even in overcasts, and launch air-to-air missiles against them.

∨ ∨ ∨

Ever so quietly (despite loud cries from ear-shattered residents near airports), jetliners have taken the lead over piston-powered aircraft in airline operations, even though they still compose only one-fourth of the total airline fleet of about 1800 planes.

Nearly 500 turbojets and turboprops flew 19,500,000 passenger miles in 1960, or more than half the total flown by all planes.

∨ ∨ ∨

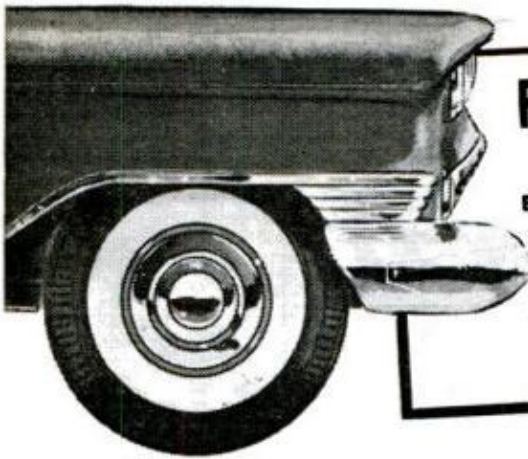
The Navy has discovered the quickest—and almost infallible—method of selecting future astronauts. Just ask for volunteers.

In processing its Naval air trainees, the Navy asked each man whether he would be interested in space training. About 25 percent said they would. These men, in both intellectual and technical abilities, compared favorably with the seven Astronauts in the Mercury space program, and were far superior to the remaining 75 percent.

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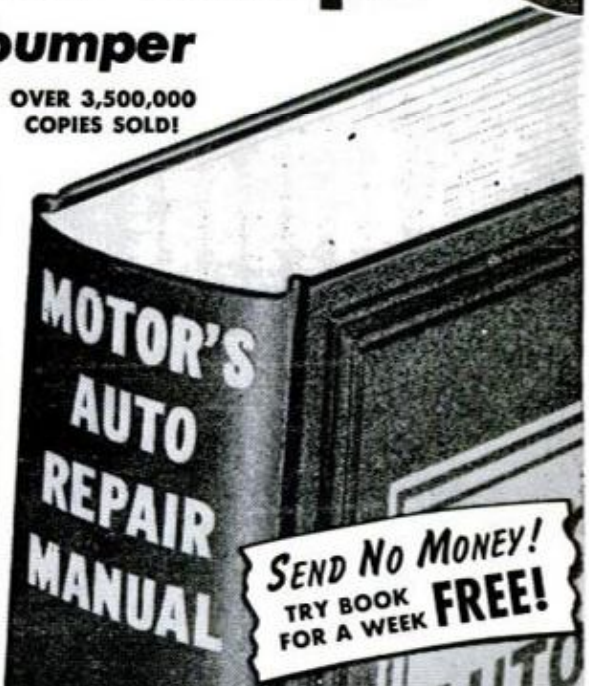
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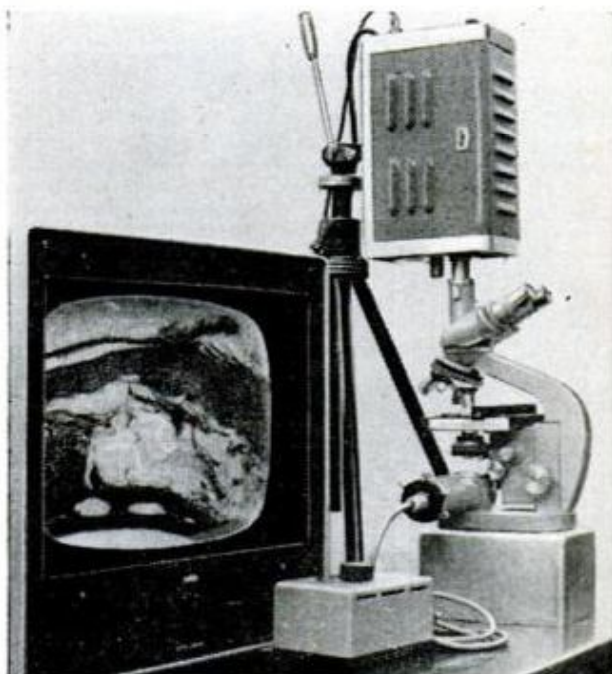
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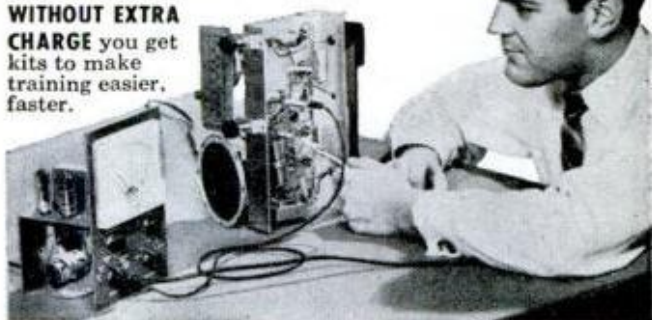
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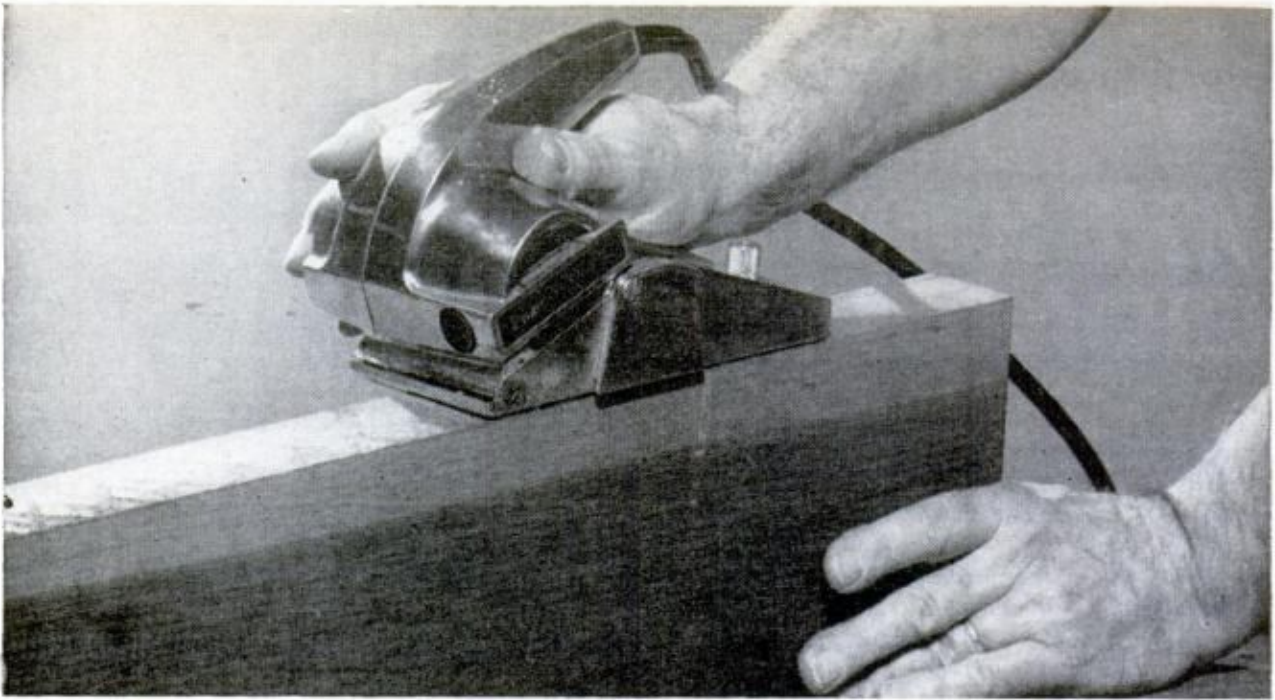
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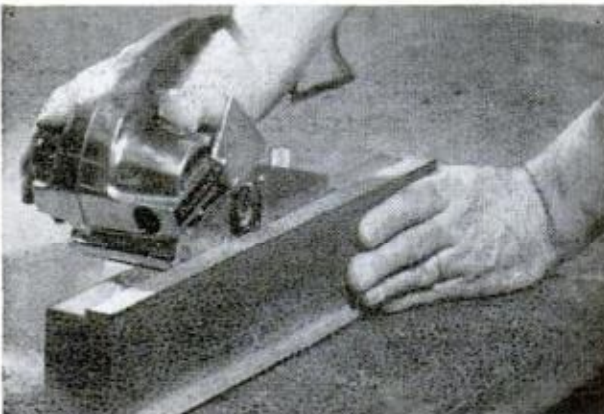


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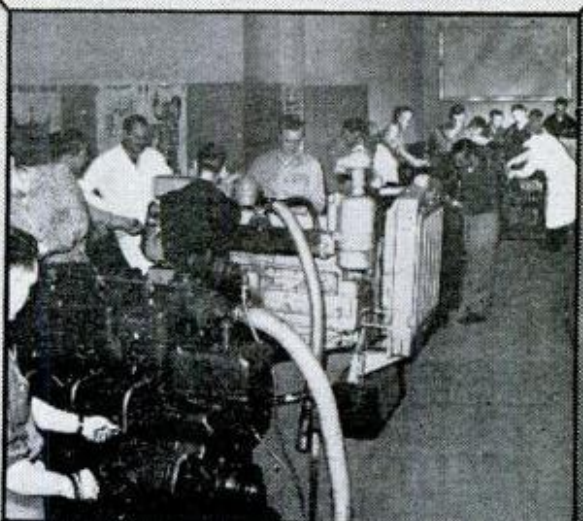


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# ITEMS FROM ALL OUTDOORS

THE FREEZE-DRIED foods which our last August column described, being carried into the Hamalayas for Sir Edmund Hillary's expedition, are now available to us ordinary mortals.

While Hillary and his troops were enjoying the goodies, the Armour people finished their development work and are now coming out with a line of freeze-dried foods under the name Armour Star Lite.

Campers, boaters, or any outdoor types who are likely to be carrying their food where light weight, simple preparation, and preservation are a problem, should really like them. Not only do the freeze-dried foods lose from 60 to 90 percent of their normal weight, but they can be packaged in simple plastic and foil bags, so the total weight saving is even better.

And it's good chow, too. Once rehydrated and cooked (a matter of a few minutes), the foods are hard to tell from freshly prepared meals. The beef stew I had for dinner last night came out of a Star Lite envelope, and tasted as good as, if not better than, the similar stews being marketed in cans. There were 34 ounces of stew, but the package only weighed six ounces.

Best shooter's publication across the outdoors desk this month is the third edition of "How To Convert Military Rifles," put out by the Williams Gun Sight Company, 7300 Lapeer Road, Davison, Mich. This is one of those rare good publications that's half wishbook catalog and half good how-to reading. It sells for fifty cents.

This new edition covers every phase of converting surplus military arms into sporting rifles, with step-by-step instructions for reworking and installing accessories. It covers the 1903 Springfield, the U.S. 30 M1 Carbine, the 1917 Enfield, the 1898 Krag, the .30 M1 Garand, the Model 95 Winchester, the .303 British S.M.L.E. (Lee Enfield), the German 98 Mauser, the Argentine Model 91 Mauser, the 6.5mm Carcano, the 6.5mm and 7.7mm Arisakas, the 6.5mm Norwegian Krag, and the 7.62mm Russian M91. All put together by real pros who know and make the conversion equipment and tools.

*Dick Liechpatrick*

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# Venetian Blind That Flies?

That's not a bad description of an unusual new aircraft you will see in the August issue. What's more, it may well turn out to be the world's safest plane, and an ideal design for a commuter's special.

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## Mapping an Astronaut in Orbit Around Earth

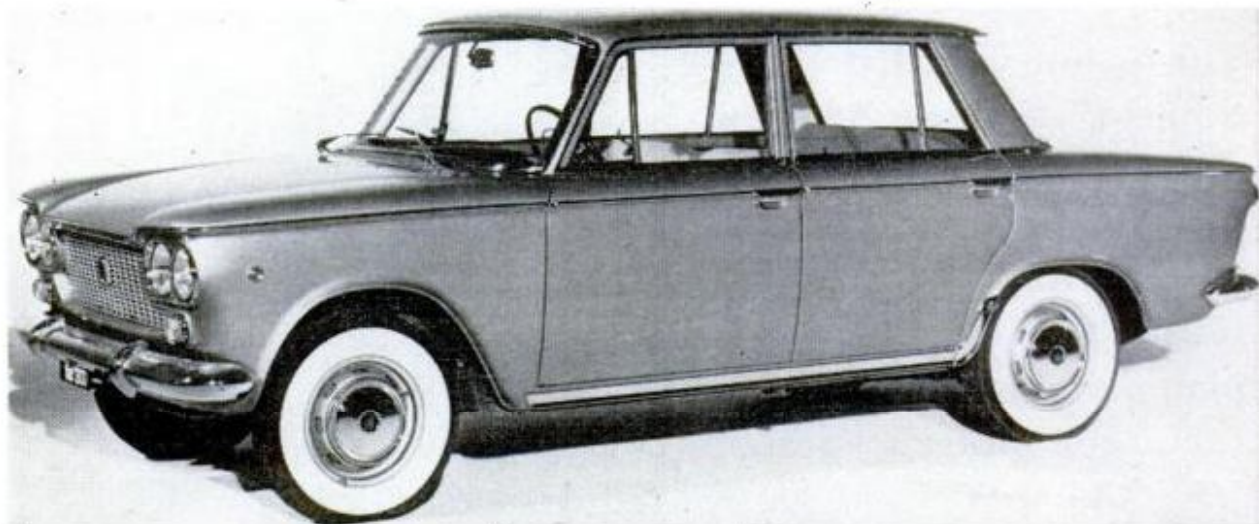
When an American astronaut circles Earth his path will be electronically etched over a map of the world which is displayed in Project Mercury's Control Center at Cape Canaveral, Fla.

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## New Fiat 1300, a Four-Door Compact

Latest addition to Fiat's growing family is the 1300 sedan. Powered by a four-cylinder, air cooled, 80-horsepower engine it rides along on 95 inches of wheelbase.

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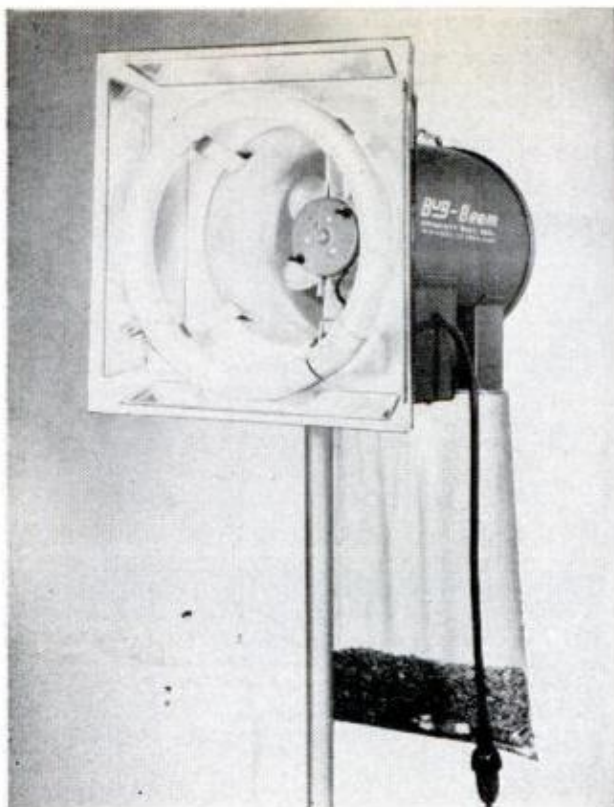
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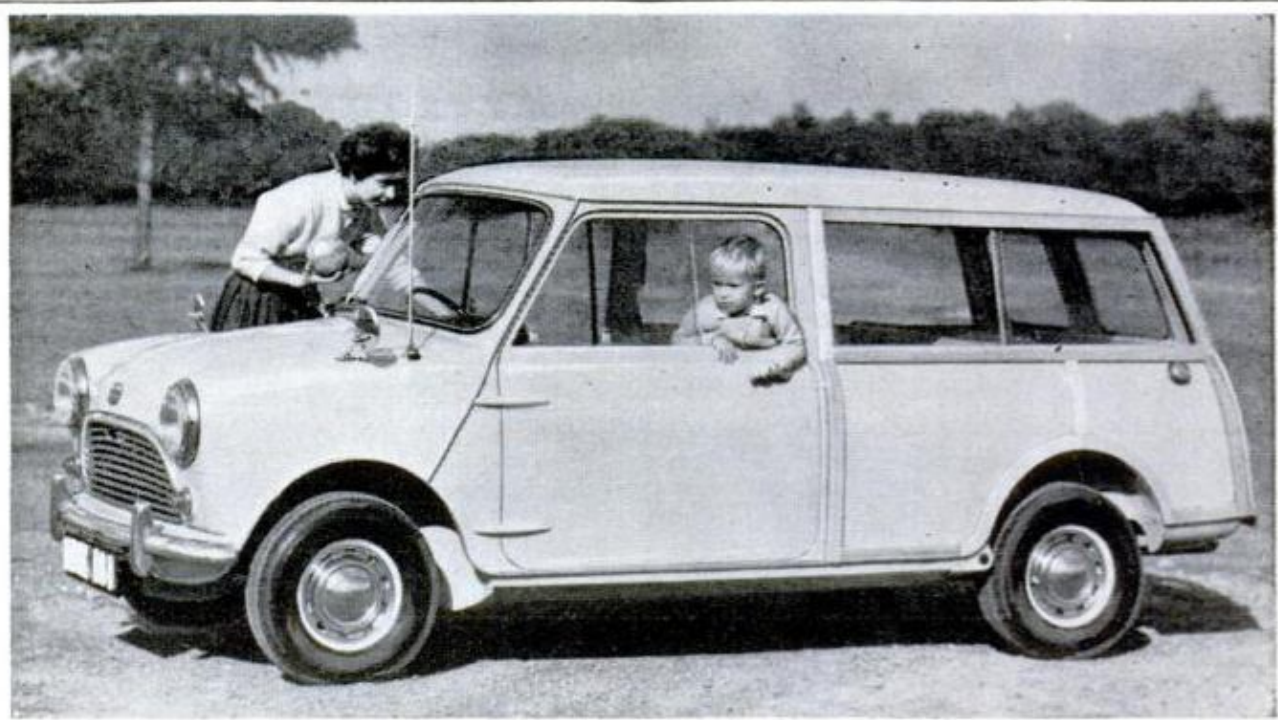
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## British Offer Big Wagon on Small Wheelbase

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power engine which is mounted transversely as part of the engine-transmission-front-drive assembly. Double side-hinged doors allow easy loading, and the spare wheel and battery are recessed under the floor and out of the way.



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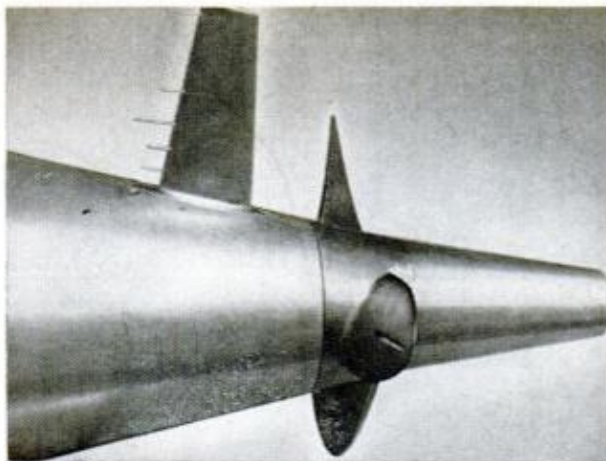
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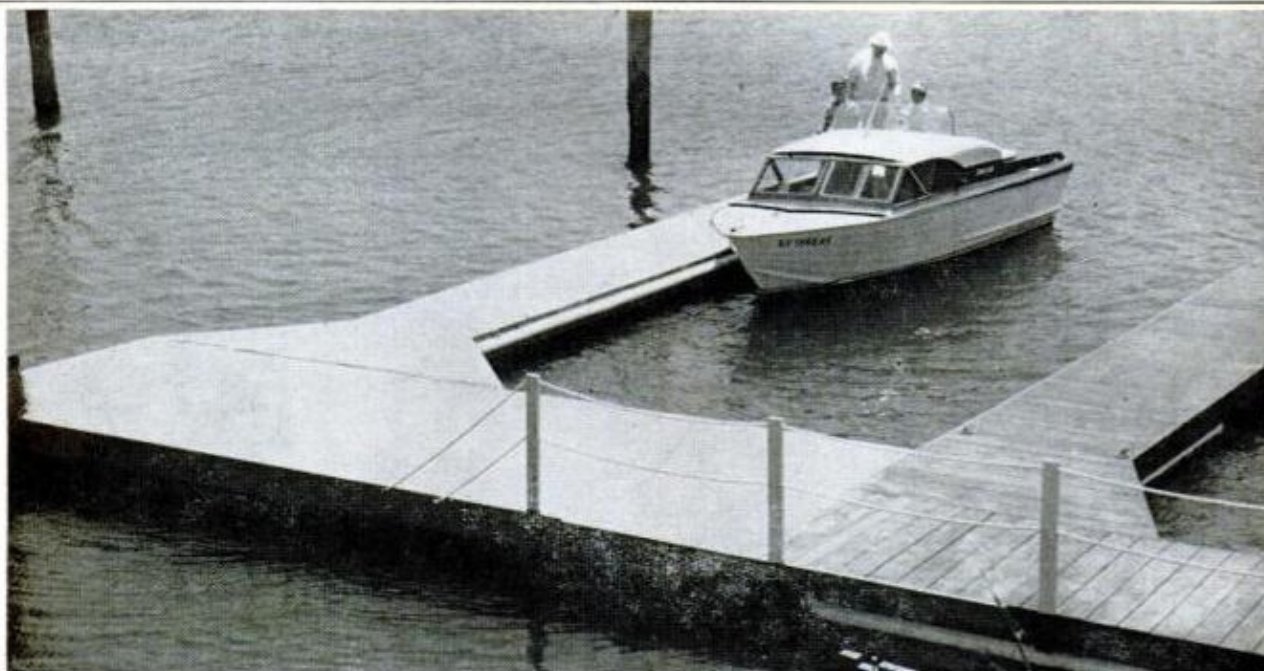
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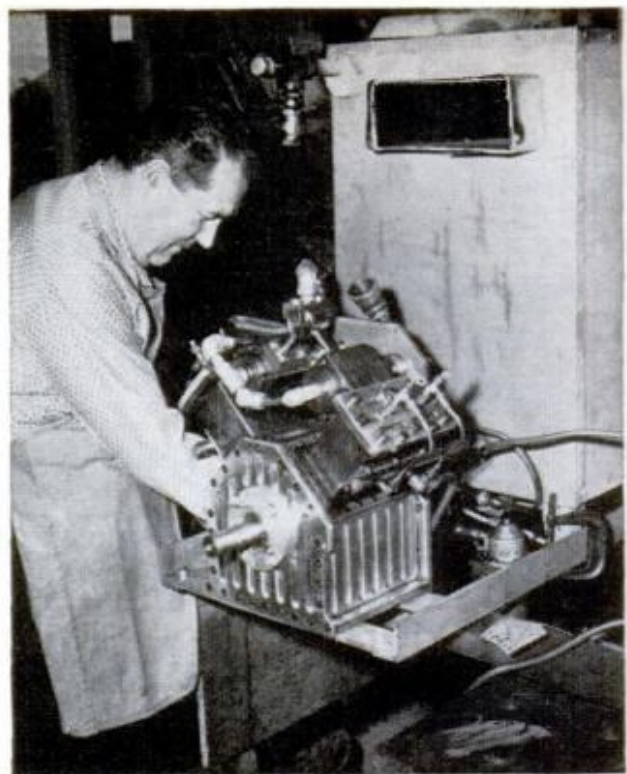
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**CIVIL War Centennial official medals.** Bronze \$4.25; Silver \$30.00. Brilliant proof sets—1956 \$7.25; 1957 \$4.75; 1958 \$9.00; 1959 \$4.75; 1960 \$3.75; 1961 \$3.75; all six \$31.00. Bebee's, 4515 North 30th, Omaha 11, Nebr.

**DIFFERENT Nickels.** Liberty 6, \$1.00; 14, \$2.90. Buffalo 8, \$1.00. Doktor, P.O. Box 35151, Los Angeles 35, Calif.



**\$650,000,000.00 SEARCH** For rare coins. You may have coins in your possession that are worth thousands of dollars! Look in your pocket change, attic, piggy bank, anywhere around the house. We pay over \$30,000.00 for certain rare dates. Our large, illustrated catalog lists prices we pay and tells how to find valuable coins. For certain dates we pay up to: \$3,500 for certain half cents; \$4,800.00 for certain large pennies; \$600.00 for certain Flying Eagle pennies; \$2,000.00 for certain Indian pennies; \$250.00 for certain Lincoln pennies before 1932; \$1,500.00 for certain two-cent pieces; \$250.00 for certain three-cent pieces; \$16,000.00 for certain nickels before 1927; \$2,000.00 for certain half dimes; \$4,750.00 for certain dimes before 1932; \$4,250.00 for certain twenty-cent pieces; \$4,500.00 for certain quarters before 1938; \$5,500.00 for certain half dollars before 1939; \$11,750.00 for certain silver dollars; up to \$35,000.00 for certain gold coins, and up to \$2,500.00 for certain Canadian coins. We have thousands of customers just waiting to buy these rare coins and we want to buy yours now! Millions of dollars are spent each year for rare coins. Only \$1 will bring you our valuable catalog. It may mean a fortune to you. Catalog also contains information on U. S. paper money, confederate paper money, tokens, etc. We refund your dollar when you sell us coins. Absolutely guaranteed! Many thousands of people have dealt with us. Send your dollar now! Jaymar Corporation, Johnson City 151-A, N. Y.

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**COIN** Collecting supplies. Free list. Hansan's, 415 Wyandotte, Kansas City 5, Missouri.

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GIANT Illustrated catalog featuring thousands of movie star photos from 1920 to 1961, only 10¢. Movie Star News, 212 East 14th Street, Dept. IK, New York 3, New York.

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BRAZILIAN Color slides 10 beautiful assorted Copacabana, Brasilia, etc. U.S. \$5.00 cash. Mallord, C.P. 4371, S. Paulo, Brazil.

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ACCORIONS—Save 1/2. Standard or electronic models. Easy terms. Free home trial. Free catalog. Accordion Warehouse, Dept. 71-R, 2003 Chicago, Chicago.

SONGS And songpoems wanted for our summer and fall program. Sincere writers only. Colonna Enterprises, Box 886M, Burbank, Calif.

HARMONICA Chromatic Hohner, 40 reeds length 5 1/4 inches, key of C or key of G. Send remittance with order (we pay postage) \$7.00. Emkay Music Sales, 2063 West Central, Toledo 6, Ohio.

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FIX Your own TV. Save 80%! Send for free illustrated chart showing how! We'll include giant electronics catalog. Zalytron, 220-M West 42 St., New York City.

TAPE Recorders hi-fi components. Sleep learning equipment, tapes. Unusual values. Free catalog. Dressner, 1523M Jericho Tpke, New Hyde Park, N. Y.

WORLD'S Tiniest transistor radio—many others. Send stamp for catalogue. Western Radio, Dept. 6P, Kearney, Nebr.

GOVERNMENT Surplus radios, parts. Picture catalog 10¢. Meshna, Malden 48, Mass.

DON'T Buy hi-fi components, kits, tape, tape recorders until you get our low, low return mail quotes. "We guarantee not to be undersold." Wholesale catalog free. Hi-Fidelity Center, 220-M E. 23 St., New York 10, N. Y.

HEAR Russia, Europe, the whole world! Short-wave adapter works on any radio—no hookups. Send stamp for catalogue. Western Radio, Dept. 6P, Kearney, Nebr.

### BUSINESS OPPORTUNITIES

INTERNATIONAL Mailorder business made easy. Individual setup service. Not just instructions. Hermes, 152 West 42, New York City 36.

FRANCHISES Make profits! Operate your own exclusive franchised business. Write today for free interesting details. National Franchise Reports, W-528, 333 North Michigan, Chicago 1.

IMMEDIATE Profits with no capital or experience. Take orders for all magazine subscriptions. Friends and neighbors are your prospects. Write now for complete, free kit. McGregor Magazine Agency, Dept. 116B, Mount Morris, Illinois.

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

UNIQUELY Different magazine. \$4,500 profit possible! Dignified business. Operate from home! Sample, complete instructions \$1.00. Free details. HBD, GPO, Box 972-PM, New York 1.

WANT To make big money at home? \$10.00 profit in an hour possible with invisible mending. Make tears, holes disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 6234 Broadway, Chicago 40, Ill.

LEARN Sewing machine repairing. To \$125 weekly. Sparetime. Supplies. Add to present business. Write today! Taylor Service, Box 2126, San Bernardino, Calif.

FREE Picture folder, "How to Make \$3,000 Yearly, Sparetime, Backyard, Raising Earthworms!" Oakhaven-38, Cedar Hill, Texas.

VENDING Machines. No selling. Operate a route of coin machines and earn amazing profits. 32-page catalogue free. Parkway Machine Corporation, Dept. #27, 715 Ensor Street, Baltimore 2, Maryland.

BUSINESSES, Resorts, motels, investment property, ranches. Our special service dept. at your disposal. No obligation. World's largest. 58 years' service. Strout Realty, 7-MB S. Dearborn, Chicago 3, Ill.

BIG Money raising fishworms and crickets. Free literature. Carter Farms, Plains, Georgia.

TO \$100.00 Weekly. Sparetime, home operated mailorder business. Successful beginner's plan. Everything supplied. Lynn, 10420-M National, Los Angeles 34.

PIANO Tuning learned quickly at home. Tremendous field! Musical knowledge unnecessary. Information free. Empire School of Piano Tuning, Champaign, Ill. (Founded 1935).

I Want to send you proof of the wonderful pulling power of Popular Mechanics classified pages. What's your proposition? Write me today. Include literature if possible. F. W. Johnson, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

COPUBLISH Mail Sale Advertiser, leading mail order paper. Details, latest copy, dime. Vanroy Shirk, Lebanon, Penna.

BRONZE Baby shoes: Instructions, equipment and mountings for genuine electroplating process. Largest supplier of all plating equipment, supplies. Free catalog. Hollywood Bronze Supply, Dept. B-3, 1624 East First, Los Angeles 33, Calif.

OPERATE Profitable mail order business. Write Walter Service, 4159A East 112th, Cleveland 5, Ohio.

BAKE New greaseless doughnuts in kitchen. Sell stores. Free recipes. Montgomery, 3605 South 15th, Minneapolis 7, Minnesota.

\$3.00 HOUR—Home, sparetime, assembling pump lamps. Easy. Free details. Ougor, Caldwell, Arkansas.

RAISE Rabbits on \$500 month plan. Free details. White's Rabbitry, Mt. Vernon, Ohio.

RECAST Junk batteries into new. Latest achievements. Battery Laboratories, Bayou LaBatre, Alabama.

BUY Direct from factories. Appliances, cameras, watches! Free details! Cam Co., 6810PM-20th Ave., Brooklyn 4, N. Y.

PLASTERCRAFT Molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Blue Rapids Supply, Blue Rapids, Kansas.

OPERATE Home mailorder business. Vosacek Distributors, 4444A Ute, San Diego 17, Calif.

EXCEPTIONALLY Profitable opportunity in tape recording! Free information. Baron's, Lynden, Washington.

JAPAN Directory. 145 Japanese manufacturing exporters. Japan and Hong Kong trade journal information. Asia opportunities. Just \$1.00 today. Nippon Annai, Box 1150-P, Spokane 10, Wash.

MONEYMAKING Franchise can be exclusively yours. For free current franchise reviews information write Franchise Newsletter, F, 9 South Clinton, Chicago 6.

COLORGLAZED Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries Company, Grand Rapids, Minnesota.

MARKETS Everywhere. Make artistic concrete birdbaths, pottery. Best coloring. Home workshop. Hundred varieties. Free pictures. Hollywood Cementcraft, 8527-S Wonderland, Hollywood 46, California.

MAKE Durable building plastic easily. Waterproof, fireproof, economical. Bays Laboratory, Chinle, Arizona.

MAKE \$46 From square foot plywood: jigsaw necessary. Free details. Woodart, Bridgewater, Mass.



**MAILORDER.** Beginners plans. Free information. Armstrong's, 154 Darrington S.W., Washington 24, D. C.

**SIMPLIFIED "Bookkeeping System"** for mailorder beginners. \$1.00. Neil H. Tasker, Shamokin, Pennsylvania.

**FREE!** Name brands catalog! Your own high profit business. Sell name brands, full or part time. No inventory, no investment. More than 2,000 name brand items; lowest wholesale prices. Watches, jewelry, cameras, hi-fi, stereo radios-phonos, appliances, housewares, hardware, power tools, luggage, musical instruments, garden equipment, sporting goods, toys, many others. 8 floors of name brands. Million dollar inventory. Orders shipped complete in 24 hours! Send for free, beautifully illustrated catalog now! Separate wholesale price list. H. B. Davis Corp., Dept. PM, 145 W. 15 St., New York 11, N. Y.

**AMAZING Profits** in home mimeographing! We've retired. Now showing others. Paradise, Lanoka Harbor, N. J.

**OFFICE Work—home, sparetime.** Refundable moneymaking instructions \$06. Interstate, 37-1 Besch, Albany 9, N. Y.

**MAKE Money** from old tires. Operators clearing \$400 weekly. Equipment costs \$800. Get facts. S & S Patents, Inc., 3511 N. Lincoln Ave., Chicago 13, Ill.

**MANUFACTURE Beautiful, lightweight** vases, patio stones, wall panels, artistic room dividers, etc., with new foam-crete plastic. Amazingly fast, easy, moneymaking system. Complete formulas and instructions only \$2.00. Or free details. Plasticon Company, Box 105, Grove City, Penna.

**NATURAL Molding rubber, extra thick.** Free samples. W. Wooley, 2801-A Latrobe, Peoria, Illinois.

**FREE Report: "609 Unusual, Successful Businesses."** Box 1001-PMD, Evanston, Illinois.

**NEW Snow cone machines.** All prices. Box 7803, Dallas, Texas.

**EARN \$3 Hourly, spare, full time,** looking up information at your local library. Details free. Service, 81C, Knickerbocker Station, N.Y.C.

**FREE Book "990 Successful, Little-Known Businesses."** Work home! Plymouth-472R, Brooklyn 4, New York.

**SELL Greeting cards.** Make extra money. Christmas, all occasion assortments. Stationery, jewelry, gifts, name imprinted Christmas cards. Experience unnecessary. Write for salable samples on approval, details. Hedenkamp, 361 Broadway, Dept. PM-67A, New York.

**LEARN Landscaping** and the growing of plants. Start a profitable business part or full time. Free information without obligation. National Landscape Institute, Dept. MC-71, 11826 San Vicente Blvd., Los Angeles 49, Calif.

**START Your own business** on credit (U.S. and Canada). Your own boss. 1344 dealers sold \$5,000 to \$25,500 in 1960. We supply stock, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. G-U-PPM, Freeport, Illinois.

**MAKE Extra money—Big cash commission** plus premiums for you and your customers. Sell advertising book matches. Sensational new tenorana, glamour girls, hillbillies; dozens others. All sizes. Quick daily sales; big repeat business. Free master kit makes selling easy. No experience necessary. Superior Match, Dept. MX-761, 7530 Greenwood, Chicago 19.

**LEARN Professional TV servicing** in one week! Fabulous new simplified system. No big expense. No studying. No tools or equipment. Spare, full time. Own your own big profit business! Save! Amazing but true! Free! Write, TV Systems, Dept. EC-177, 1038 So. LaBrea, Los Angeles 19, Calif.

**FREE Gift, opportunity mail, personalized jewelry catalog** \$06. Wilson, 2506 W. Lloyd, Pensacola, Florida.

**\$250.00 WEEK Spare time profit** possible. Earn at home with new fascinating printing method. \$5 starts you—send no money now. Free confidential facts and valuable sample. Screen-Print, JY, Los Angeles 61.

**INCREDIBLE New "table-top" machine** manufactures over 15,000 saleable products. Also laminates, encases, moulds and plates in bronze, chrome, or copper in 30 seconds. 20¢ materials produce \$3.00 products. Free confidential details and home-business plan. Plasti-Form, Dept. PM-7, Gardena, Calif.

**IMPORT-Export opportunity, profitable,** world-wide, mail-order business from home, without capital; or travel abroad. Established world trader ships instructions for no-risk examination. Experience unnecessary. Free details. Mellinger, T707, Los Angeles 24.

**BOOKKEEPERS — Exclusive franchise** operating bookkeeping service. Simplified system. Kern, 5633-A Cahuenga Blvd., North Hollywood, California.

**BIG Money — Operate own fix-it shop.** Service household appliances, motors, mowers, saws, skates, etc. Free book. Christy Trades School, A-903, 3214 Lawrence, Chicago 25.

**DOLLS! Dolls! Dolls!** We teach you to repair, make, sell all kinds of dolls and accessories including clothing. Study at home. Earn while you learn. Free booklet. Doll Hospital School, Studio MC-71, 11826 San Vicente Blvd., Los Angeles 49, Calif.

**BIG Money. Exotic imports** sell on sight. Free details! Davis Imports, 1204G Alamo, Anaheim, California.

**FLASHLIGHTS, \$7.50 Dozen, dealers** needed. Flash Division, P.O. Box 96, Toledo 14, Ohio.

**REPAIR Hydraulic jacks.** Easy and profitable. Write: Hydraulics, Box 4104, El Paso, Texas.

**\$1.00 BRINGS You \$18.00 spare-full** time home business opportunity! Amazing new velvet-spray transforms old cheap lamps, TV-radios, figurines, furniture, anything, into valuable products! Free samples. 50 business opportunities booklet. Send no money. Flok-Kraft JY, Los Angeles 61.

**OPERATE Profitable mail order business.** Write Holmes Service, Box 39001-P, Cincinnati 39, Ohio.

**\$400.00 MONTHLY Raising giant fish-**worms. Soilless method. Charlie Morgan, Bushnell, Florida.

**MONEY Making Acme saw and lawn-**mower sharpeners. Finest made. Easiest and most profitable to operate. Thousands of satisfied users. Terms. Free literature. Made and guaranteed by Max Manufacturing Co., 138 Stockton Ave., San Jose 26, Calif.

**25¢ TO \$25.00. 1001 Money-making plans,** formulas, ideas. Catalog free. Charles Company, 42-GNF, Norwood, Ohio.

**\$34.70 TWO Hours. Manufacturing concrete** products. No selling. Castings #3, Box 1721, Rapid City, South Dakota.

**GROUND Floor opportunity. Exclusive** county franchise available. A profitable mail order or direct sales plan. Build future by joining our national team. Long range security. No merchandise investment. Repeat sales protected. \$2.00 for complete information. McNelly, 12 Susan Drive, Reading, Massachusetts.

**YOUR Own Bible business. Exclusive** Protestant, Catholic, illustrated, family-reference editions. Margaret's, Box 92, Hazleton, Penna.

**EXTRA Dollars** for you with "Information Research." Copyright manual \$2. Guaranteed. Free particulars. MacKenzie's, 3240 Southport, Dept. 17, Chicago 13, Illinois.

**SHARPIT Sharpens knives, scissors,** tools factory sharp. 98% profit! Free circular. Snellenberger, 1100 Cleveland, East St. Louis, Illinois.

**DRIED Mushrooms \$4.50 pound** for large canning company. Receiving warehouse in United States. Growers wanted on contract, everything supplied. Mushroom Salt Co., No. 651, Calgary, Alberta, Canada.

**FORTUNES In formulas. 10,000 formulas** for home, farm, workshop. Guaranteed. Only \$4.75 postpaid. Colen, 7731-PM Yates, Chicago 49.

**I Want a man who wants a business** of his own. I will train you, supply the equipment, help finance you, start you rolling. This is not a risky get-rich-quick scheme. It is a legitimate business, an exclusive protected franchise, proved successful by hundreds throughout the country. Send name, address and phone number to Marion Wade, 2117 North Wayne, Dept. 103M, Chicago 14, Illinois.

**MAIL Order. Earn extra money, part or** full time. Lowest priced wholesale catalog in U.S.A. Holliday, 914 Burnside Rd., Sharon Hill, Penna.

**EVERYBODY Likes candy and popcorn** specialties. Learn to make professionally home. (Our 50th year.) Ragsdale Candies, B-107, East Orange, New Jersey.

**HOW I retired at 47, simple plan-home!** Free "Profits 1935-1968." Free book "711 Bizarre, Successful Ventures." Haylings-F5, Carlsbad, Calif.

**LIQUID Molding rubber, free sample.** Shellcraft supplies. Chaney's, 1907-A East Road, Jacksonville 16, Fla.

**EARN \$200.00 Monthly, tablesaw, jigsaw** sparetime. Mac-Dan, Bcx 457, Stanton, Calif.

**HOW And where to obtain capital.** Write: Reliable Service, Rome City, Ind.

**FIRST Time ever!** Simply obtain permission for us to deliver men's or women's guaranteed hosiery on free trial! Nothing to pay or obligation to buy unless delighted after wearing. We pay you to \$1.25 each sale. Easily done personally—telephone—mail. Also openings to appoint agents. Outfit, instructions free. No obligation. Kendex, Lindenhurst 17, N. Y.

**MAIL Order opportunities. Beginners,** dealers. Details free. Southern Service, Box 914A, Islamorada, Florida.

**FREE Cards** with your name, address and phone. For sample, ask One-Stop Flea Killer, H., Jessup, Md.

**BECOME Tax consultant. Graduates** earn \$1,000-\$3,000 every tax season preparing returns evenings. State approved. Union Institute, Lakewood A-2, N. Y.

**FREE: "How to Win Contests."** Contestar, Box 51-PCA, Des Plaines, Ill.

### MONEYMAKING OPPORTUNITIES

**FREE, Newsletter** reporting unusual moneymaking ideas. File E, Box 76254, Los Angeles 5.

**CAN You crank a crank?** Then you can earn mimeographing dollars. Home mimeographers, lettershops. Write: Mimeographing Dollars, 1012-M Center Street, Evanston, Wyoming.

**\$200.00 MONTHLY. Spare time.** With tablesaw, bandsaw or jigsaw. Write, Holiday House, A3800 Harney, Vancouver, Washington.

**SELL Yourself aluminum siding, awnings,** shutters. Factory-wholesale! Save. Write Groff, Box 10446, Tampa, Florida.

**CIGARETTES—Make 20 plain or filter-**tip for 9¢. Facts free. Moberly, Box 4012, Owensboro, Kentucky.

**MINK Raising information free. Complete.** Lake Superior Mink Farm, Superior, Eel, Wisconsin.

**VENDING Machines. No selling. Operate** a route of coin machines and earn amazing profits. 32-page catalogue free. Parkway Machine Corporation, Dept. #26, 715 Ensor Street, Baltimore 2, Maryland.

**GROW Mushrooms. Cellar, shed and** outdoors. Spare, full time, year round. We pay \$4.50 lb. dried. We have 29,000 customers. Free book. Mushrooms Dept.: 173, 2954 Admiral Way, Seattle, Wash.

**EARN Money evenings** copying and duplicating comic cartoons for advertisers. Adservice, Argyle 1, Wisconsin.

**YOUR Own, easy-to-start, home mail-**order business, sparetime. Fascinating; profitable! Information free. Alfano, 19-PM Pine. Closter, N. J.

**BIG Money raising fishworms and** crickets. Free literature. Carter Hatchery, Plains, Georgia.

**READ "Progressive Mailtrade."** The magazine that tells how to make money by mail. Quarter brings sample and special offer. Progressive Mailtrade, Box 357, Sheboygan, Wisconsin.

**\$600.00 PROFIT! Mailing catalogs!** Sample, instructions 25¢. GPO, Box 972, New York 1.

**AMAZING Successes** through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, MP-528, 333 North Michigan, Chicago 1.

**FABULOUS Franchise profits** available. For current franchise review information, write Franchise Newsletter, F3, 9 S. Clinton, Chicago 6.



**LEARN** The secrets of repairing junk batteries, generators, starters, profitable, easy, at home. Free particulars. Battery-man, 3465 Forrest, Santa Clara, Calif.

**UNUSUAL** Newsletter reporting exciting moneymaking ideas. Includes franchise reports, overseas opportunities, unique business plans. Free from File E, Box 76254, Los Angeles 5.

**\$25-\$50 WEEKLY** Possible. re-writing news items, jokes, poems, recipes, for publishers. Some worth \$10 each. Details free. Service, 81-D, Knickerbocker Station, N.Y.C.

**PROFITABLE** Mailorder business started easily. Our easy to understand, instructive manuscripts teach how. Details free. Easco, Box 323-A, Grand Rapids 1, Mich.

**BIG Money!** Making 8mm movies, spare time. Free details. Lagene's, Pocasset 4, Mass.

**DEALER** Wanted. (Friendly man or woman.) Quality apparel. High earnings. New friends. New car possible. Full or spare time. Wilknet Inc., 1717 Wash., Greenfield, Ohio.

**NEW:** Build fountains, waterfalls, parts supplied. Details. Box 3003, Pasadena, Calif.

**EASY** To start rubber stamp business at home in spare time. Make up to \$9.80 an hour without experience. Facts free. Write Roberts, 1512 Jarvis, Room CR-2H, Chicago 26.

**LEARN** Plastics fabrication for extra income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-3, Portland 12, Oregon.

**MAILORDER.** Dealers, beginners, jobbers, income details. Sterling, Box 626-P, Dania, Florida.

**ELEPHANT** Luck charm. From mystic India, tiny bean containing 12 ivory elephants. Sample \$1.00. Three for \$2.00. Bazaar, 1646 Lawrence, Denver, Colorado.

**NEW** Ideas in mail order. All phases. Details free. Henderson-Hines, Box 448, Colton, California.

**500% PROFIT** In your own mail order business. Write: Arch, 614 West Twelfth, Gastonia 1, N. C.

**UNUSUAL** Moneymaking opportunity. Free details. Surway, 714 W. Mulberry, Springfield, Ohio.

**MEN—Women!** Start money-making plastic laminating business at home in spare time. Material that costs 11¢ brings back \$2.58. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars free. Rush name on postcard to Warner, Room CL-2-H, 1512 Jarvis, Chicago 26, Ill.

**FABULOUS** Profits raising earthworms! Picture folder free. Excello, Kosciusko, Mississippi.

**GET** Free money making offers, samples, opportunities! Your name "listed for life" for 25¢! Hamilton's, 1374, Las Cruces, New Mexico.

**RAISE** Nightcrawlers, redworms, indoors. New odorless soilless method. Three Oaks Ranch, Dresden, Tenn.

**YOUR** Own baby shoe bronzing business, instructions, equipment, supplies for metalizing, glassing, bronzing. "Pearl-Kote." Kiktavi, Dept. 1, Box 5036, Inglewood, Calif.

**\$5.00 EVERY** Hour full or part time. Sell new Handee sponge mops. 100% profit. Write Handee, 1212 Vandever Ave., Wilmington, Delaware.

**MONEY-Making** ideas from Alaska. Booklets loaded with opportunities. Send 35¢. Eve's, Box 757, Juneau, Alaska.

**LIKE** Lots o' mail? Special offers? World-wide money-making opportunities? Get listed for life 25¢. Allen, Box 3547-G71, El Monte, Calif.

**CONTESTS.** Contest news, brainteasers. 10¢. Spence, Box 11569, St. Petersburg, Florida.

**PROFITABLE** Home business. Details free. Epsco, 59-M Beverly Drive, Springfield, Illinois.

**NEW!** Wonderful new sign maker kit. Makes signs, showcards, banners, streamers in colors in seconds. No skill. A child can make a professional looking sign in seconds. Send \$1.00 for sample signs (your name on one). Complete instructions. Refundable on first order. Variety Advertising Company, Dept. 14, 1219 Douglas Street, Alton, Illinois.

**10,000 VALUABLE** Formulas! Processes for starting your own business. 900 pages. Illustrated circular free. Berthoff's, 739 Sylvania Avenue, Toledo 12, Ohio.

**EARN** Extra money coloring photos. New easy method. Introductory set \$1.75. Details free. Rayborg's, 810 West 18th, Erie, Penna.

**BONANZA** Of information. Over 100 business ideas, mail order trade secrets, wholesale sources, formulas. \$1.00. Penmar, 1398 Alta Vista, Corvallis, Oregon.

## EXPORT — IMPORT

**INTERNATIONAL** Trade advertiser. Huge world-wide circulation. World trade offers and inquiries. Send 40¢ (coins) for sample copy to ITA, 27, Maldon Road, Colchester, Essex, England.

**SHOP** Round the world from your armchair. Send for free literature. Braun's Imports, Box 6565, Dept. PM-1, Cleveland 1, Ohio.

**NEW—1961** Foreign wholesale directory lists sources of 100,000 low cost imports, \$2.00. Tech Publications, Box 821, Logan, W. Va.

**RECEIVE—Import** catalogs! Foreign offers! Business opportunities! Get listed—25¢. Importico, Enka, N. C.

**EARN \$50 Daily!** Write now! No capital needed; no risk. Representative for David Teel International, 217 Christopher, Clovis, N. M.

**JAPAN:** Direct mail-order 26 page catalogue: dolls, novelties, business information, manufacturers' names, addresses, \$1.00; Japan's Trade Directory, 3000 companies, \$3.00. Send cash. Clarence Yamagata, 814 Toginbiru, Marunouchi, Tokyo.

## SCIENCE & CHEMISTRY

**ROCKETEERS!** High power rocket kits, supplies, chemicals. Catalog 25¢. Rocket Model Research, Box 716, Newark 1, N. J.

**AMAZING** New book of science experiments, formulas, and catalogue of laboratory supplies. Only 35¢. National Scientific Co., 13 S. Park Avenue, Dept. PM-7, Lombard, Illinois.

**ILLUSTRATED—Pyrotechnics** Manual. Contains formulas and data on fulminates, explosives, fuses, and other fireworks including stars. \$1.00 postpaid. Kel-Tec Laboratory, Box 194, Brockton 69, Massachusetts.

**PERIODIC** Chart. Pocket size! Atomic weights, densities, valences, etc. Send \$1.00. R. and S. Laminating Company, Box 111, White Plains, N. Y.

**SCIENCE** Treasure chest. Do hundreds of experiments. Order No. 70,342-CZ—\$5.00 postpaid. Request free Catalog—CZ. Edmund Scientific Co., Barrington, New Jersey.

**ROCKET** Model supplies, fuel chemicals, engines. New catalog 25¢. Central Rocket Company, Box 89, Waupaca, Wis.

**ROCKET** Test equipment for safe static firings. Catalog 25¢. Rocket Development Corporation (formerly C-W Products) 445 East Second South, Salt Lake City, Utah.

**NEW** Concept of atomic structure. Nuclear theory challenged. 30 pages. 25 cents ppd. C. F. Krafft, 4809 Columbia Road, Annandale, Virginia.

**FREE!** Write for unusual catalog, soon available. Ultra-violet kits, solar energy, electronics, anatomy, space optics, science fair materials. Send only \$2.25 for illustrated 4-color periodic wall chart. 32" x 45". A basic education in atomic theory. Satisfaction guaranteed. Frey Scientific, 273 N. Orange, Mansfield, Ohio.

**ROCKET** Supplies. 1961 list, 25¢. Mervin Hill Company, R.D. #1, Seward, Penna.

**SPECTACULAR!** Laboratory supplies catalogue and "Experiments Booklet." Only 25¢. Hagenow Laboratories, Manitowoc, Wisconsin.

**CHEMICALS** And apparatus for industrial, analytical, and private laboratories. Catalog 25¢. Dept. M-50, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N. Y.

**ILLUSTRATED** Catalog: Chemistry, mineralogy, biology 25¢. Tracey Laboratories. Evanston, Illinois.

**UNUSUAL** Chemistry books, courses, kits! Rare chemicals, cheap! Catalog 25¢. NSC, Box 11133, Palo Alto, Calif.

## FORMULAS, PLANS, ETC.

**FORMULAS** For latest money-making discoveries. New! Good! Valuable literature free! Miller, Chemist, 1517-D, Tampa, Florida.

**ANY** Formula. Satisfaction guaranteed! Jack, Chemist, P.O. Box 25157, Los Angeles 25, California.

**FORMULAS—All** kinds. Amazing big catalog. 10¢. Kemixal, Park Ridge, Ill.

**LATE.** Modern manufacturing formulas. List free. Moon Chemical, Martville, New York.

**EXPERIMENTERS!** Waterproof safety fuse. Sample free! Magic-Sci, 2936 Emerson, Altadena, California.

## PLASTICS

**BOXES.** Plastic. 200 sizes. Free list. Author, 170 Bay 23 Street, Brooklyn, N. Y.

**PLASTIC** Vacuum forming machines. Hobby. Easy. Profitable. Details. Burr, 330 East Center, Kalamazoo, Mich.

**LAMINATING** Supplies. Price list free. Solomonson, 4 Beacham, Everett 49, Mass.

**PLASTICS** For casting, molding, embedding and jewelry. Send 25¢ for catalog. Castacraft Corp., Dept. M-761, P.O. Box 555, Palo Alto, Calif.

## AGENTS WANTED

**BIBLES,** 130% Profit. Sample \$2.49. R. Price, 4813A Hurford, Chester, Penna.

**BATHROOM** Necessity. Whirlwind seller. Amazing profits. Free details. The D Company, 117 N. Cayuga Rd., Williams-ville 21, N. Y.

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

**FREE!** Beautiful Mexican curios! Send 14¢ stamps mailing. Sylviak, Apartado 9036, Mexico City.

**YOUR** Own business—Used suits \$1.50; overcoats 65¢; mackinaws 35¢; shoes 12½¢; ladies' coats 30¢; dresses 15¢. Enormous profits. Catalog free. Nathan Portnoy Associates, 2109-AA Roosevelt Road, Chicago 8, Ill.

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

**CHRISTMAS** Cards—the easy way to that extra income you need. Personal and business designs, with customer's name imprinted, all in one album. These deluxe cards pay deluxe commissions. Earn \$300 to \$500 (plus bonuses) easily this season, even in spare time. Sales experience unnecessary. Free sales kit includes our outstanding 40th Anniversary sample album and easy-to-follow selling instructions. Send for kit now; pocket profits next week! Write Process Corp., Dept. D-1, 3450 S. 54th Ave., Chicago 50, Ill.

**FREE** Offers of \$1.25 Christmas card assortment, \$5 in gifts introduce sensational, new spare-time money-makers. Over 300 fast-sellers at \$1 up. Many exclusives. Free personal album. Request samples on approval and free offers. Cardinal, 1400 State, Dept. 31-K, Cincinnati 14.

**WANT** To make \$25.00 or more in a day for part or full time route work? Man or woman. Write McNess Co., Freeport 24T, Illinois.

**SELL** Greeting cards. Make extra money. Christmas, all occasion assortments. Stationery, jewelry, gifts, name imprinted Christmas cards. Experience unnecessary. Write for salable samples on approval, details. Hedenkamp, 361 Broadway, Dept. PM-67, New York.

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

**FLORAL** Lights. Information. Lazard Cabrera, 1821 Davidson Ave., New York 53, N. Y.



**MAKE \$50-\$75-\$100 Extra money.** Run greeting card, gift shop at home, visit friends. Show thrilling Evans Christmas card assortments, gifts, exclusive 25 for \$1.50 personals. Experience unnecessary. Write for sample boxes on approval. Free imprint albums. Surprise gift offers. New England Art Publishers, North Abington 70, Mass.

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

**NEW Bathroom deodorizer.** Hangs on wall. Banishes odors bathroom, kitchen. Lightning seller. Samples sent on trial. Kristee 84, Akron, Ohio.

**RUN A spare-time greeting card and gift shop at home.** Show friends samples of our new 1961 Christmas and all occasion greeting cards and gifts. Take their orders and earn to 100% profit. No experience necessary. Costs nothing to try. Write today for samples on approval. Regal Greetings, Dept. 5, Ferndale, Mich.

**IF You sell Christmas cards,** make most extra cash with lines of all leading companies from one firm. World's biggest line. Over 150 Christmas, everyday box assortments, 600 big money-makers. Make up to 50% profit plus big cash bonus. Free giant color catalog of all lines; samples on approval. Arrow Greetings, 513 Fourth Ave., S. Dept. 83-C, Minneapolis, Minn.

**GET Terrific money-making catalog free!** Take orders for toys, jewelry, all occasion cards, collector's items and household gadgets. Generous cash profits for you on everything you sell. Work your own hours. No experience necessary. No obligation. For free catalog just write: North Star, Dept. 1-721, 251 East Fifth Street, St. Paul 1, Minnesota.

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**START Your own business,** selling the "World's Most Usable Bible." Sales quick, easy, and profitable. Extra bonuses; free insurance; other benefits. Write International Book Company, Department M, Box 118, Wichita 1, Kansas.

**EXCLUSIVE Territories** for much talked about Swiss Fondue accessories — other Swiss-quality gifts. John C. Schoop, 512 Crest Ave., Philadelphia 26, Penna.

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

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

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**LARGE Name brands wholesale catalog** \$1.00, refundable: Robert Celaya, Brownsville, Texas.

**WHOLESALE Catalog \$1.00 refundable.** General merchandise. JMS Associated, 1010 Stone, Great Bend, Kansas.

**SPECIAL Bargain catalog.** Huge discounts, free gifts, 25¢ refundable. Baldwin's, Box 257-P, Norristown, Penna.

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**MAKE Big money taking orders** for Stark dwarf fruit trees. Everybody can now grow giant size apples, peaches, pears in their yards. Also shade trees, shrubs, vines, roses, etc. Outfit free. Stark Bros., Desk 30172, Louisiana, Mo.

**SENSATIONAL New longer-burning light bulb.** Amazing free replacement guarantee—never again buy light bulbs. No competition. Multi-million dollar market yours alone. Make small fortune even spare time. Incredibly quick sales. Free sales kit. Merlite (Bulb Div.), 114 E. 32nd, Dept. C-74G, New York 16.

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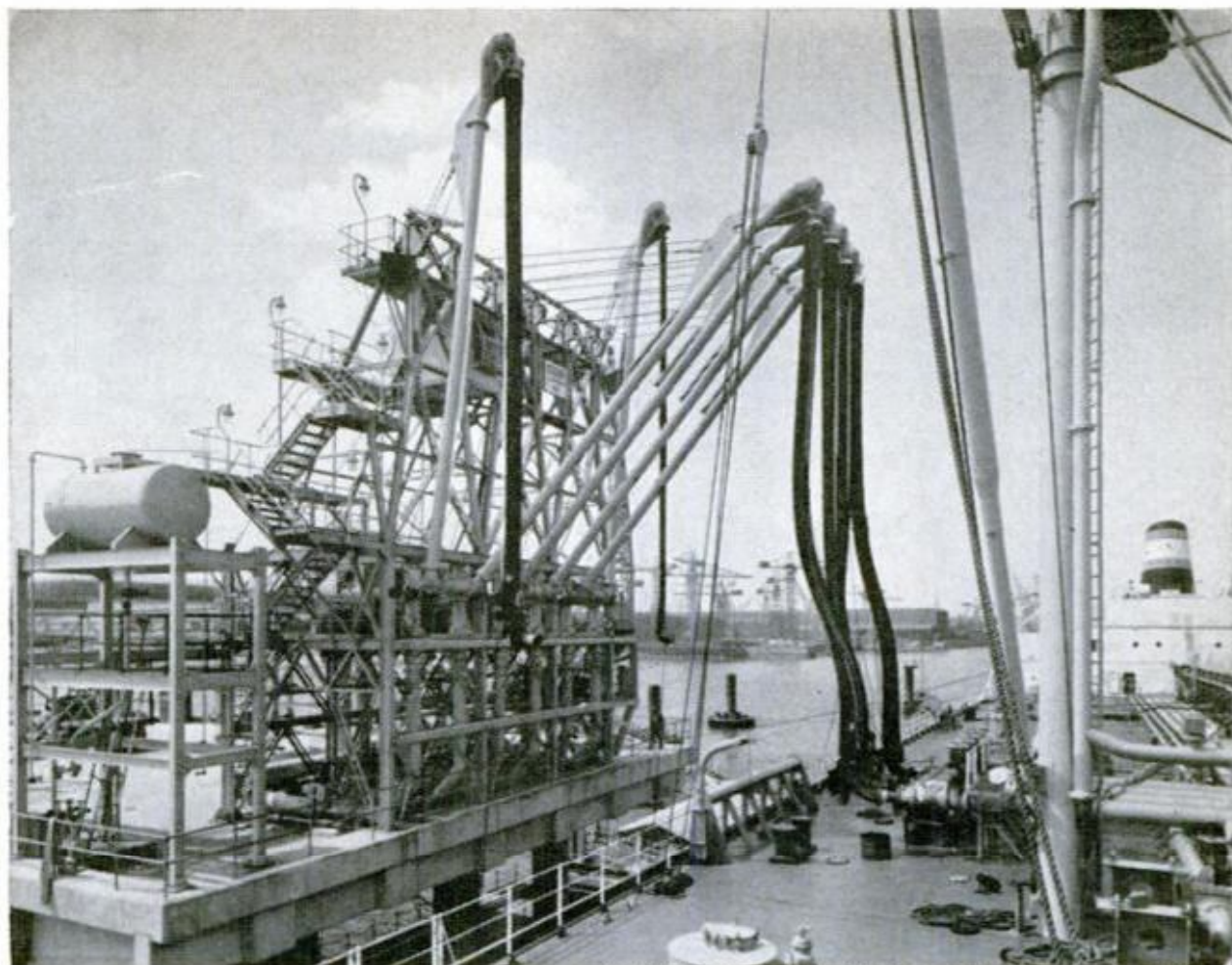
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## Spotlight on the PLYMOUTH DIESEL

By Jim Whipple

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You guessed it. That "pocketa-pocketa" noise betrayed the presence of a diesel engine. The bright yellow sedan was one of more than 200 diesel-powered Plymouth cabs hacking around in six U.S. cities.

A look under the hood disclosed a husky four of 204-cubic-inch displacement, rated at 72 horsepower. This power plant, a four-cycle job operating on No. 2 fuel oil, was made by Perkins of Peterborough, England, shipped to Detroit and placed in the standard 1961 Plymouth chassis. It uses a stock manual transmission.

What's it like to drive America's only diesel-powered production automobile? Well, *PM* got behind the wheel and found

out, to the tune of \$18.75, which was what the taxi meter read when we concluded our test, conducted in and near Detroit.

Driving a Plymouth Diesel is not especially difficult; however, it is different from driving a standard, gasoline-powered car.

The diesel is started just by turning a key—if the engine is already warm. When starting a cold engine, you must press a switch to energize glow plugs in the combustion chambers, wait a few seconds, and then turn the key.

One characteristic of diesel operation, and particularly of four-cylinder engines, is the vibration. Engine mountings take a good deal of it out of the car, so that at cruising speeds from 35 to 55 m.p.h. range vibration is noticeable but not objectionable. At low speeds, however, the car throbs somewhat like a cold, wet puppy dog.

**HERE'S THE PAYOFF.** Driver need fill up with diesel fuel about half as often as he does with gasoline cab

**A SOLID FOUR,** British-built Perkins Diesel turns up 72 horsepower, weighs 200 lb. more than Plymouth 6





However, there's a plus characteristic of this type of diesel which nearly makes up for the vibration, and that is its high power at low engine speeds. The torque peak of 170 lb. ft. comes in at 1000 r.p.m. which means that you can really lug this car. Start at a traffic light in second, and by the time that you've crossed the intersection you can drop into high at 8 m.p.h. and pull smoothly on up to cruising speed.

It takes over 22 seconds to reach 60 m.p.h.—slower than our mildest compact. But our diesel had no trouble in keeping up with the stream of city traffic.

Maximum speed of the car is an honest 75 miles per hour, but practical cruising speed for turnpikes is 55 to 60 m.p.h. The engine is just not designed for continuous flat-out, top r.p.m. operation.

The Perkins-Plymouth's trump card, however, is economy. Recently a '61 Plymouth Diesel cab was driven from Detroit to St. Petersburg, Florida, at a total fuel cost of \$9.48. The car was cruised at approximately 55 m.p.h. At this speed the engine delivers between 28 and 33 miles per gallon—and this is for an automobile weighing over 3500 lb., about 200 more than the gas-powered Plymouth Six.

#### Thermally Efficient

Secret of the diesel's economy lies in its higher thermal efficiency resulting from higher compression—16.5 to 1 compared to 8.8 to 1 for a gasoline-powered Plymouth.

Some 38 percent of the fuel's energy is transmitted into power at the engine's crankshaft compared to 32 percent efficiency for a gasoline engine.

This difference of six percent doesn't seem like much until you translate it into miles-per-gallon and dollars and cents.

We talked with Charlie Ross, operator of Detroit Checker, a 70-cab fleet in that city. Charlie's mileage on his Diesels runs from 19 to 22 miles per gallon and this compares with the 10 to 12 m.p.g. with comparable gas-powered Plymouths. Fuel costs about two cents per gallon less than gasoline.

According to Ross, this means that he can save enough to make up for the \$795 extra cost of the Perkins Diesel in nine months on a cab that runs 30,000 or more miles per year. Beyond that point the Diesel's noise is drowned out by the jingle of extra profits.

What about a Plymouth Diesel for you? Plymouth sells Perkins-powered cars only to taxi operators at the present time. They feel, and we must agree, that the savings would justify the higher cost and plodding performance only if your transportation needs involve high mileage and short trips where high cruising speeds were not essential. In short, it makes an ideal taxi!



## TURTLE WAX

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who demand  
the best

GOES ON EASIER  
STAYS ON LONGER  
GIVES A GLEAMING  
"HARD-SHELL"  
FINISH THAT  
LASTS UP TO ONE  
FULL YEAR



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# SHOPPING FOR TOOLS

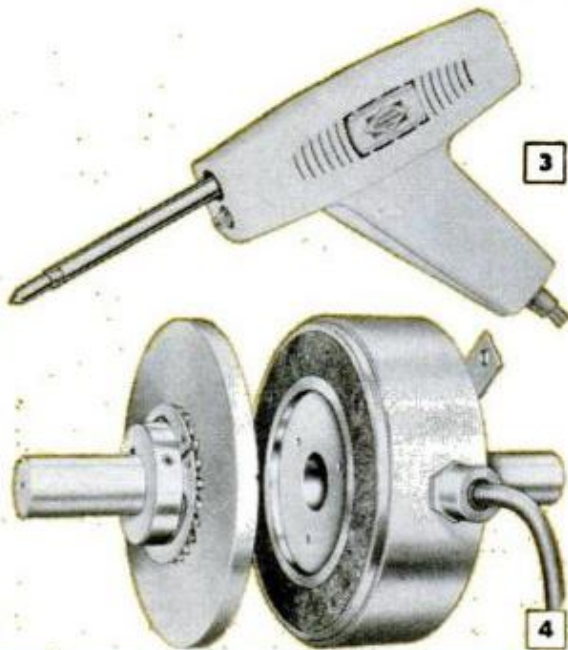


1



2

**1. ELECTRIC MARKING TOOL** prevents loss or theft of shop, garden or household tools, school supplies, cameras and sports equipment. Easy to use as a pencil, it engraves identification with a fine, medium or coarse stroke on any hard or semihard material. Retail at \$12.95 from manufacturer or retail appliance stores. Burgess Vibrocrafters, Inc., Grayslake, Ill.



3

**2. FACE AND UNDER-CHIN GUARD** protects workers from metal chips, sawdust, liquids, sparks and other occupational hazards. More comfortable than safety goggles and shields a greater area. Made of clear plastic .040-in. thick for fastening around the edge of safety helmets. General Scientific Equipment Co., Limekiln Pike & Williams Ave., Philadelphia 50, Pa.

**3. FAST-HEATING SOLDERING GUN** with a sturdy single-pole tip is ready to work in seconds. Tip length can be increased up to 12 in. for its many uses in hard-to-reach places. Powerful beam of light insures accuracy, and fatigue is lessened with hand-grip trigger the length of the handle. Price \$7.95. Portable Electric Tools, Inc., 1200 E. State St., Geneva, Ill.

**4. STATIONARY MAGNETIC CLUTCH** is ball-bearing mounted for ease in assembly and alignment. Torque is transmitted through a splined armature to the driven hub. Clutch has a torque rating of 45 lb. ft. and can be converted to a magnetically set brake by securing the rotor to the magnet body. Stearns Electric Corp., 120 N. Broadway, Milwaukee 2, Wis.



5

**5. CALIPER ACCURATELY MEASURES** brake lining to show car owner its condition as easily and quickly as he reads the oil level on a dipstick. Color indicator shows green when remaining lining is satisfactory, yellow for caution and red when it is dangerously thin. For bonded or riveted linings. Raybestos Div. of Raybestos-Manhattan, Inc., Bridgeport, Conn.



## AMPLIFIES YOUR VOICE TO 1000 FEET!

**Also amazing distant hearing amplifying feature \$15.95**

New all-transistorized RANGERHORN amplifies voice to 1000 ft. Boating, camp leaders, scout-masters, football, baseball coaches, cheerleaders, fairs, picnics, construction—complete public address system. With simple instructions, RANGERHORN can also be used to hear distant sounds and voices beyond normal earshot. Weighs 2 lbs., 10½" long. Replaces \$60 to \$125 instruments. High quality, molded body and grip, microphone, speaker, latest printed circuits, all transistor, U.S. made, standard batteries. 10-day unconditional money-back guarantee.

**TO ORDER:** Enclose check, cash or money order. \$2 deposit for C.O.D. Calif. resid. add 4% state tax. Dealers inquire.

**ELECTROSOLIDS CORP.** 13745 Saticoy Street, Panorama City 4, Calif.



### Extra! Read All About It— Via Satellite Newspaper

Newspapers of the future may be delivered around the globe by a satellite communications system. It will be possible to reproduce a complete facsimile in Paris within six minutes after a newspaper has been printed in the United States, predicts E. T. Clare of Cohn Electronics, San Diego, Calif.

Operating like a wirephoto machine, which transmits photographs from place to place by scanner, the satellite newspaper will be sent, page by page, on 8½ by 11-inch sheets. Each page will be scanned by a band of light which feeds the image, both print and photographs, into an encoder which "breaks up" the page into digitalized video impulses and feeds them into a transmitter.

From there the impulses are transmitted to the satellite which bounces them off on their way to the destination where the process is reversed. To assure transmission at any time, eight satellites surrounding the globe would be needed.

### Barley Seeds Will Adapt To Any Growing Condition

When barley seed being distributed throughout the world by the United Nations' Food and Agriculture Organization is tossed to the ground anywhere, it thrives. The unique seed was developed at the University of California to adapt itself to any of the world's grain-growing areas and to improve its own production by a process of quickened evolution.

The self-improving barley came from using two unusual approaches to plant breeding. One was the random intercrossing of 7500 types of barley; the second was planting this mixed-ancestry seed in as many areas as possible. During this time, plant characteristics fitting the various environments multiplied; the weak or unsuitable characteristics dropped out. The U.N. organization is distributing the seed in four-pound lots to barley breeders throughout the world. The barley, according to its breeder, Coit A. Suneson, is a "potential giant step to provide more food for the world."

JULY 1961



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- \* STAY SOFT
- \* WEAR LONGER
- \* LEATHER

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work gloves  
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## WOLVERINE GLOVES



100  
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140-Pound, CHROME DELUXE Barbell-Dumbbell set only \$19.80.

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Easy to build, inexpensive, simple to fly. Order 3-view drawings, specs, photo of Glider \$1 or motor powered Gyro-Copter \$2. Factory kits available.

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An indispensable optical tool for technicians, students, hobbyists, collectors, etc. Radial illumination through translucent body insures even illuminated magnification with precision two element lens-system (see cross section). A million uses for home, office, laboratory, school, workshop and factory. A truly amazing optical buy, manufactured by Europe's leading optical industry. Send only \$2.98 Ppd. (Calif. residents add 4% tax.)

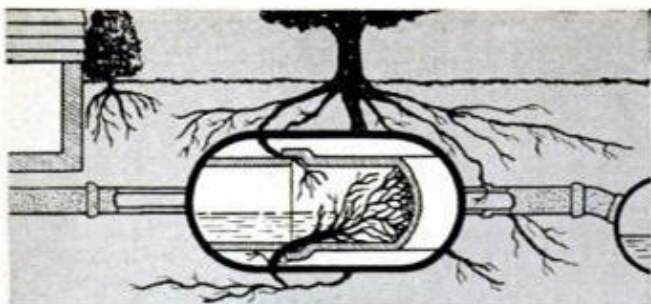


\$2.98

**Micr-Optics Co.**

P. O. Box 61,  
Palmdale 21, California





## END SEWER-LINE ROOT MESS, SAVE ON COSTLY REPAIRS!

**Roots are just naturally thirsty.** They force their way through joints in your sewer line, eventually clog it. Toilets and sinks "back up", soon overflow. Now you can avoid costly digging or mechanical cleaning this easy, permanent way.



Pour one box of revolutionary Hercules R-D into toilet bowl. R-D kills and decomposes roots permanently, often overnight. To keep sewer lines root free, apply R-D twice a year. Safe to handle. Safe in septic tanks. Don't wait for trouble. Get R-D now from your plumbing or hardware dealer. It works, or your money back. Only \$3.95 for 2 lb. box. Send for literature.



**HERCULES CHEMICAL CO., INC.**  
416 Broadway, New York 13, N.Y.

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\$41.95 Up: EASY TERMS  
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## LUGER BOAT KITS

Dept. B-7, 9200 Access Road, Minneapolis 20, Minn.

## "MAKE MONEY THE EASY WAY

... the Foley Way,"

says F. Irving Holt of Connecticut Mr. Holt earns \$1.25 in less than 15 minutes with a Foley Model 200 Automatic Saw Filer. "I have bought many wonderful things," writes Mr. Holt. You too can start a profitable saw filing business—no experience needed. Every saw makes money, brings new customers. Free "Money Making Facts" booklet tells you how. Write today!



FOLEY MFG. CO., 743-1 Foley Bldg. Minneapolis 18, Minn.

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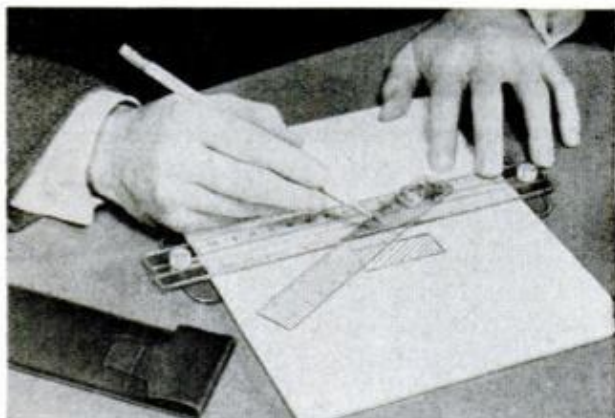
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City \_\_\_\_\_ State \_\_\_\_\_



# SHOPPING FOR TOOLS

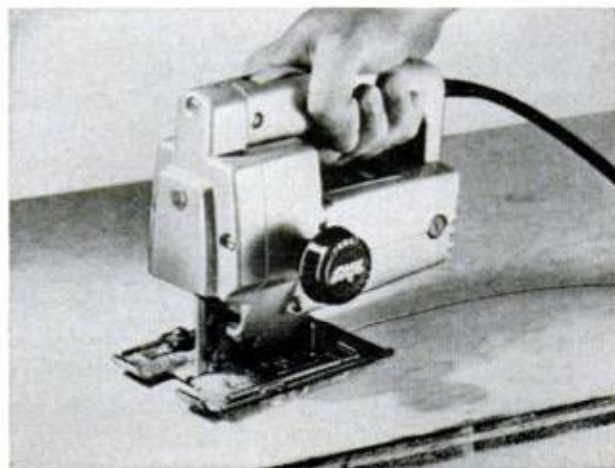


**DRAWING TOOL CONVERTS** ordinary pad of paper into drafting table. Make complete drawings anywhere. Sells for \$1.95 with carrying case. Country Engineering Inc., 20 Blueberry Lane, Darien, Conn.



**ACCURATE ANGLE DRILLING** is done with new 3/8-in. electric drill. Determine required angle set bubble (as on a level) and drill hole. Priced at \$22.95. Speed-Way Div., Thor Power Tool Co., LaGrange Park, Ill.

**HEAVY DUTY JIGSAW** features two speeds for wood or metal. Also 3-position foot for smooth cuts in plywood, general purpose and up to 45° bevel. Priced at \$99.50. Skil Corp., 5033 Elston Ave., Chicago 30







# DEMPSEY

By the man himself, as told to  
Bob Considine and Bill Slocum

An Avon Book **50c**

Jack Dempsey recounts his classic fights against Carpentier, Firpo and Gene Tunney, and the unforgettable years as Heavyweight Champion of the World.

For a complete catalog of Avon Books in print, write: Avon Book Division, The Hearst Corporation, Dept. C, 250 West 55th Street, New York 19, N. Y.

## BUSTING OUT?



Where to put the 101 things that go with owning a home and raising a family is today's real space problem. Outdoor store rooms are the answer to conquering outer space at home. See how to build them in the

### AUGUST ISSUE

JULY 1961

59

## "Lazy Sam" REVOLVING DRILL STAND

Keeps Drills Where You Want Them



... 2-in-1 ...  
Easiest and fastest way to locate and replace drills. Always out of the way. "LAZY SAM" revolves freely on sturdy, tip-proof stand... also, brackets available for wall or drill press mounting.

Compact, only 5 1/2" in diameter, yet holds two complete drill sets... numbered 1 to 60 and 1/16 to 1/2 by 64ths. Sized holes permanently stamped for each drill. Durable all metal construction.

Order direct from Mfr.

Complete with Revolving Stand... **\$5.95**

Drill Press Bracket (extra)... \$2.95  
Wall Bracket (extra)..... 1.95



**KNIGHT MFG. CO.** 630 NW First Ave., Gresham, Oregon



## BEST PUMP BUY! \$8.95

UP TO 5000 GAL. PER HR.  
UP TO 60 FT. HEAD  
THREADED  
1 1/4" INTAKE  
1" DISCHARGE

Quickly drains cellars, pools. Fills tanks. Irrigates. Sprays. 1000 uses. Rust free aluminum castings — superior design — quality. Fits any motor. Satisfaction guaranteed or money refunded. \$8.95 ppd. Send check or m.o. \$1 deposit on C.O.D.'s.

Flexible drive coupling \$1.00 extra

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from \$134.95

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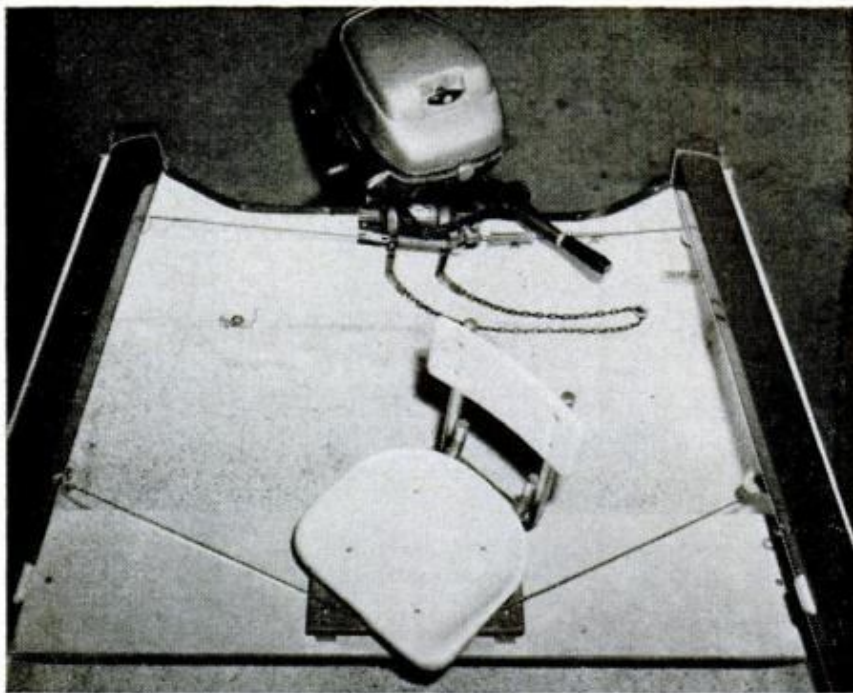
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VIKING  
*Messenger*



**E. F. JOHNSON CO.**  
1403 10 Av. SW, Waseca, Minn.





## Swivel Pilot Seat Gives Anglers A (Third) Hand

Steering an outboard motor while both hands are occupied with other things is a traditional problem among fishermen, especially trollers. One answer is a new swivel pilot seat mounted on a metal turntable which is in turn connected to a conventional outboard pulley-and-cable steering system. With the seat facing forward, the

motor steers dead ahead, but turning the seat turns the motor and steers the boat in the direction the fisherman is facing.

The frame will clamp on standard seats or over deep flotation seats; a free-wheeling latch frees it to turn without moving the motor. It's made by the Eschbach Co., 1557 Placentia Ave., Newport Beach, Calif.



"Oh, shut up!"

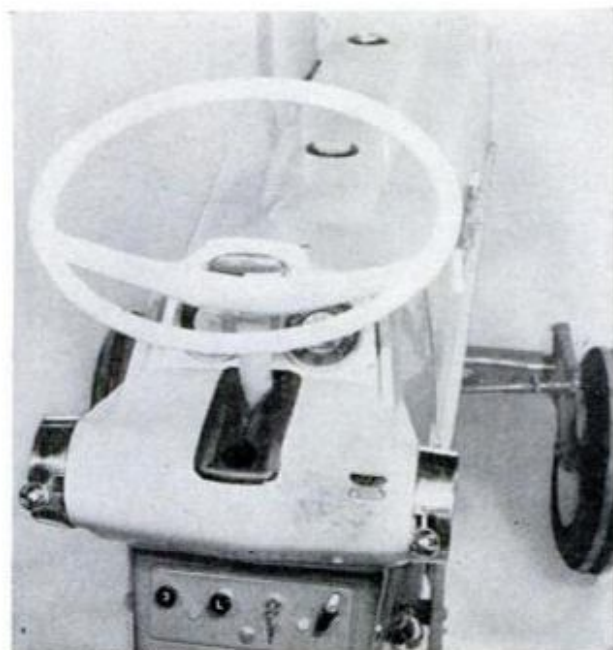




## 10,000-Pound Tractor

Called the largest and most powerful tractor ever built by Ford, the Ford 6000 weighs 10,000 pounds and delivers 60 drawbar horsepower. It has new built-in easy-operating features such as hydraulic power brakes, power steering, power shifting and other hydraulic controls. The control panel is made to be operated from either standing or sitting positions.

Within easy reach are the throttle at the left, the speed selector at the right and a two-position steering wheel which can be tilted up or down for standing or sitting. The luminescent instrument panel reduces night glare. Hydraulic power brakes for each rear wheel are operated by individual twin pedals.



The lamp you've always wanted...  
now at a sensationally  
low price!

Now . . . perfect lighting where needed. Lamp is spring counter-balanced—moves up, down, side-ways—stays where you put it. Extends to 3' radius—swings to illuminate any area 6' long, 3' wide when clamped in central position. Uses low cost standard-type lamp bulb. (Not supplied)

Use for office desk—work bench—machine tools—draftsmen—philatelists—numismatics—artists—assembly, inspection—sewing—reading—anywhere in home or business. Attractive, blending gray finish.

In kit form to save you more than half the cost of a fully assembled lamp! Clear, step-by-step assembly instructions. Have fun and end up with a wonderful lamp!

**ZACK ELECTRONICS**  
1422 Market St. San Francisco 2, Calif.



**TECH-LYTE  
KIT**

Complete  
kit  
(less bulb)  
**\$9.95**  
ea.

Another **NEW** Taft Kit!  
**"2 SEASON" AIR BOAT & Snow Sled KIT**  
(not shown)  
with surplus aircraft engine  
**\$223.75** Down **\$38.04** Per Mo.  
**FREE** Catalog of many models  
**TAFT MARINE WOODCRAFT**  
Dept. PM-761, 636 39th Ave. N.E.  
Minneapolis 21, Minnesota

With 10 minutes' warning, what would you take with you to survive in the wilderness? Read what one family took—and how they fared—in the August issue.

**EARN MORE INSURED** **5%** PER YEAR  
COMPOUNDED SEMI-ANNUALLY  
EACH ACCOUNT INSURED TO \$20,000  
BY SECURITY FINANCIAL INSURANCE CORP.

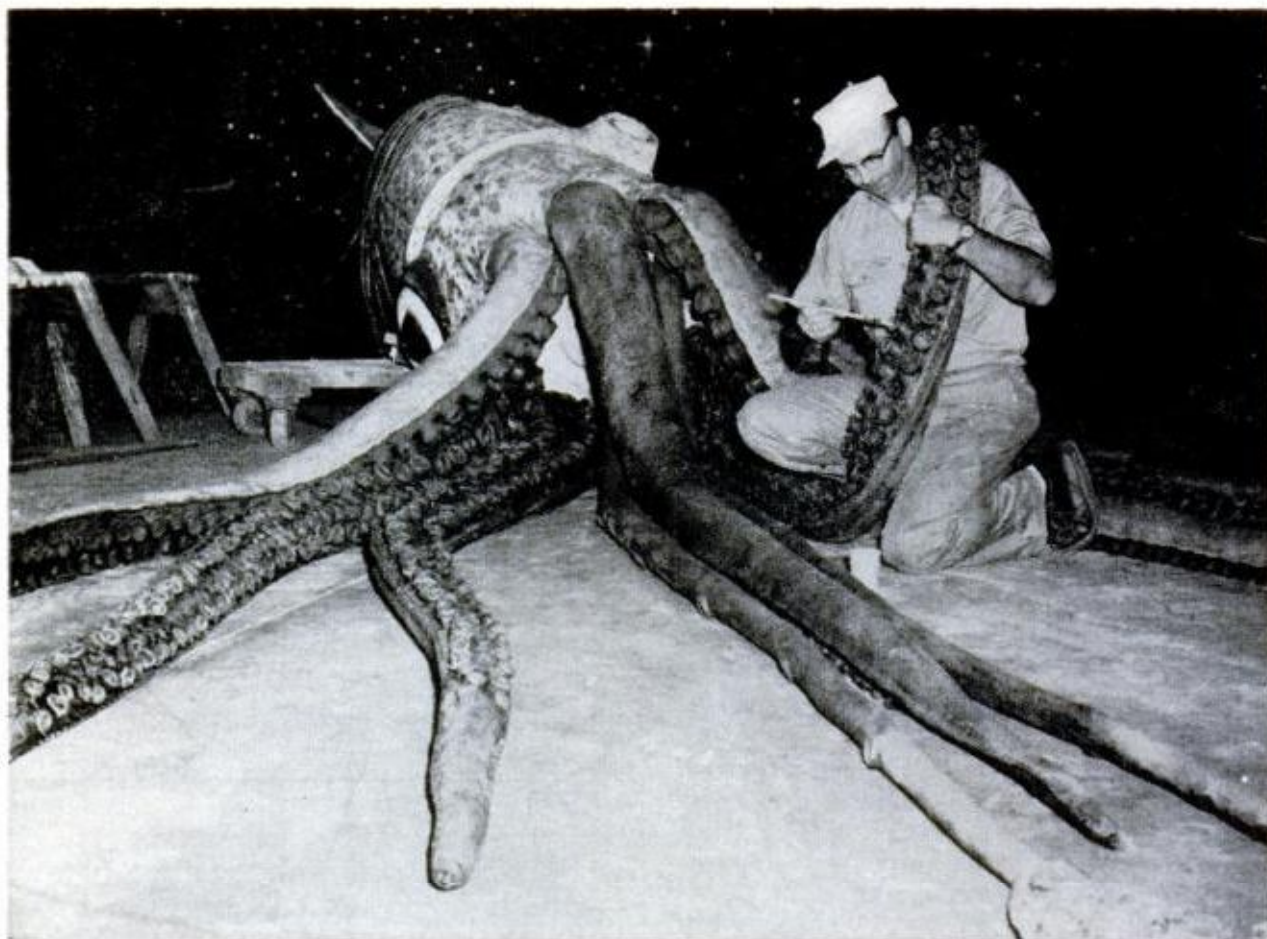
### FREE GIFTS

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- \$ 100 TO \$ 249.99—PARKER PEN OR PENCIL
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Earn from July First!
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## What Big Arms You Have . . . and So Many

It's in Disneyland, of course. Being prepared for underwater duty is the giant squid that "terrorizes" passengers of the huge park's submarine ride.

Composed of rubber, the lengthy tentacles are operated by a system of compressed air and interior wires. They reach out at the excited kiddies as they ride by.

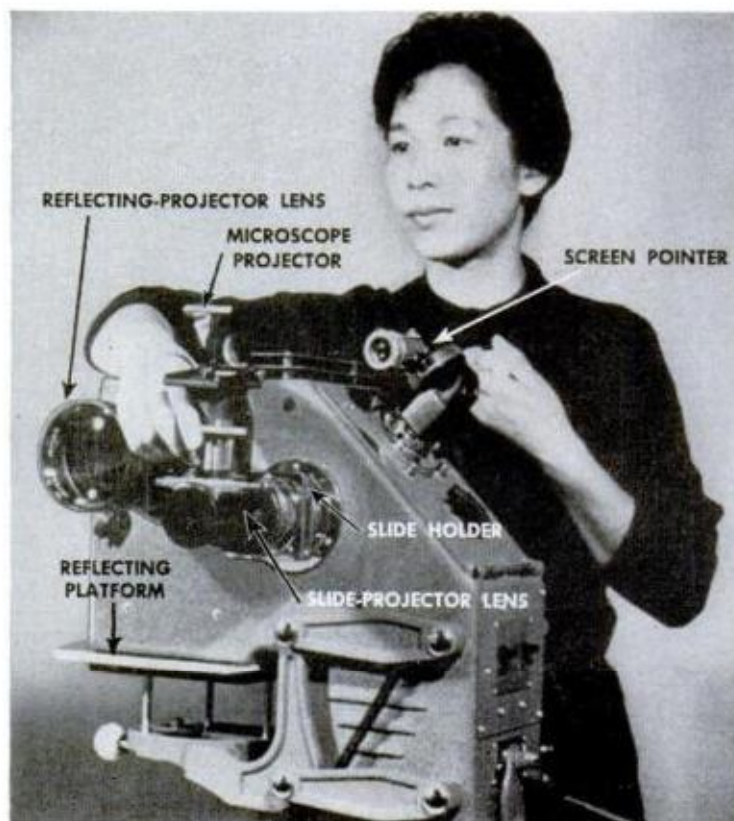
## All-In-One Projector

This versatile machine projects slides, microscopic subjects including microfilm, and printed matter, and it has a built-in pointer that operates with whatever is on the screen.

The slide projector accepts 35-mm. or superslides. Microscope slides or microfilm is handled by the microscope projector. Any kind of printed matter may be placed on the reflecting platform for projection. The pointer is operated by the left hand with all three projecting lenses.

The projector uses a single fan-cooled 1000-watt bulb. The accessory lenses can be removed and stored in a case (furnished) for traveling. The projector housing is carried in a second case.

The all-in-one projector is manufactured by Aikon Koki Co., Ltd., of Tokyo, Japan.



POPULAR MECHANICS





**DINNER FOR 8?** Sure—with room to spare in today's mobile home. Ten feet wide by fifty feet long—many models even larger. Look inside the popular Nashua mobile home shown here. Lots of room to work or relax, lots of room for storage—a perfect setting for comfortable, convenient, Care-free living.

Mobile living is just as Care-free outside . . . exteriors of many mobile homes, like Nashua, are made with colorful Alcoa \* Tone-Cote. This durable covering of Alcoa Aluminum stays new looking longer because it resists corrosion, fading and peeling. Just occasional washing with water is all the care Alcoa Tone-Cote ever needs.

Whet your appetite for more information on today's mobile home? Send the coupon for more details.

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For exciting drama watch "Alcoa Presents" every Tuesday evening—ABC-TV



Aluminum Company of America  
886-G Alcoa Building, Pittsburgh 19, Pa.

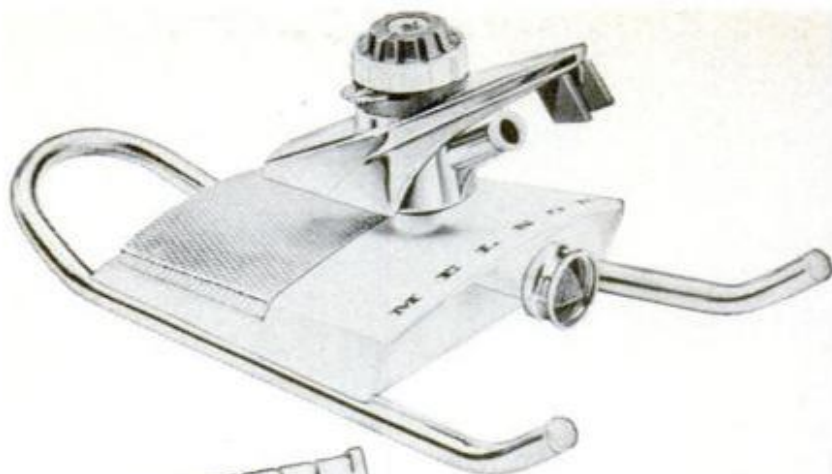
YES, I'd like more information about Nashua mobile homes . . . and a copy of your free booklet, Home Is Where You Take It.

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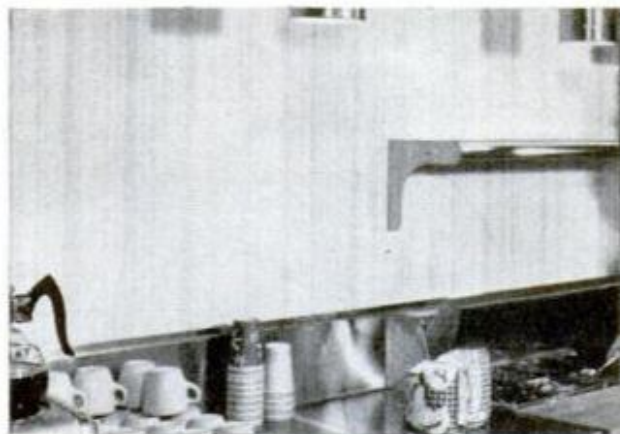




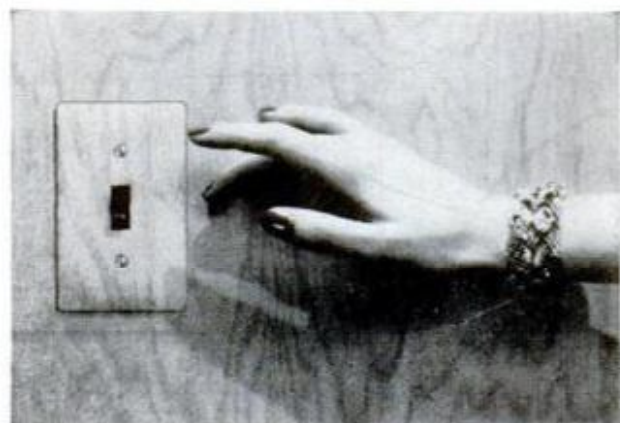
## ON THE MARKET

**SELECTIVE SPRINKLER**, upper left, will water any part of a circle from a 30-degree segment to a full circle 90 ft. in dia. Or place sprinkler at edge of lot and set the dial at 180 degrees. Sprinkling will stop right at the property line. Sells for \$7.95 at garden and hardware stores. Melnor Industries, Moonachie, N. J.

**RUST-PREVENTIVE PAINT**, above, is formulated for use on all metal surfaces, and especially on metal lawn furniture, ornamental ironwork, gutters and downspouts. Dries dustfree in 1 to 2 hr. Seals against rust. Offered in 16-oz. aerosol can at \$1.89. Woodhill Chemical Co., 1390 E. 34th St., Cleveland, Ohio



**LEATHERLIKE WEBBING** looks and feels just like genuine leather. Attractive when used as seat and back on chairs like that above left, but can be used anywhere as a rugged seating material. Wipe clean with a damp cloth. Comes in 2-in. widths in decorator colors at 39¢ yd. Webcraft, Box 6082, Bridgeport 6, Conn.



**LAMINATES** having ribbon stripes running across panel instead of lengthwise offer time and material savings in such common installations as that at left center. Come in five colors and in panel widths from 24 to 48 in., lengths from 60 to 120 in. General Electric Co., Laminated Products Dept., Coshocton, O.

**WOOD-FACED SWITCH PLATES**, left, are made by bonding genuine woods to metal. Available in eight styles and nine wood coverings to match wood-paneled walls. Fit standard wall switches and convenience outlets. Wood is unfinished. Priced from 49¢ to 79¢ each. Elliott Bay Lbr. Co., Seattle 4, Wash.





American Airlines' new Champion-equipped Astrojet

Every major U.S. airline  
uses Champion spark plugs  
—or Champion jet igniters—  
because Champions give the  
ultimate in dependability.  
Why settle for less in your car?



**CHAMPION**



Taste PALL MALL...  
 so **GOOD!**  
**GOOD!**  
**GOOD!**

*You can light  
 either end!*



## Good-looking, Good-tasting, Good-smoking Pall Mall!



Why does Pall Mall taste so good, good, good? Because Pall Mall's famous length of fine, good-tasting tobacco travels and gentles the smoke naturally—makes it mild—but does not filter out that satisfying flavor. That's why Pall Mall tastes so good! good! good! Never too strong. Never too weak. Always just right!



HERE'S WHY SMOKE "TRAVELED" THROUGH FINE TOBACCO TASTES BEST

- 1 You get Pall Mall's famous length of the finest tobaccos money can buy.
- 2 Pall Mall's famous length travels and gentles the smoke naturally. Travels it...
- 3 Over, under, around and through Pall Mall's fine, good-tasting tobaccos—and makes it mild!

Outstanding...and they are Mild!

Enjoy satisfying flavor...so friendly to your taste!





**SOME TEMPERED** glass fragments, gathered up after the shattering of tempered window you see at right

# Do You Have the Safety Glass You Paid For?

*How the quiet change from laminated to tempered glass in car windows may affect you*

By  
**Paul W. Kearney**

Author of "How to Drive Better"  
and "I Drive the Turnpikes"

**T**HE WINDOW SHATTERED like an explosion and glass flew into my face, cracking the lens of my sunglasses."

That is how one man describes an incident which occurred on a road in Kansas, when gravel spilling from a passing truck flew up and struck the left vent window of his car.

And a Williamsville, N.Y. motorist reports: "My car was parked at a refreshment stand on a crushed stone surface. Another vehicle pulling up caused

**LAMINATED** glass fragments which were collected from the breaking of the laminated window shown at right

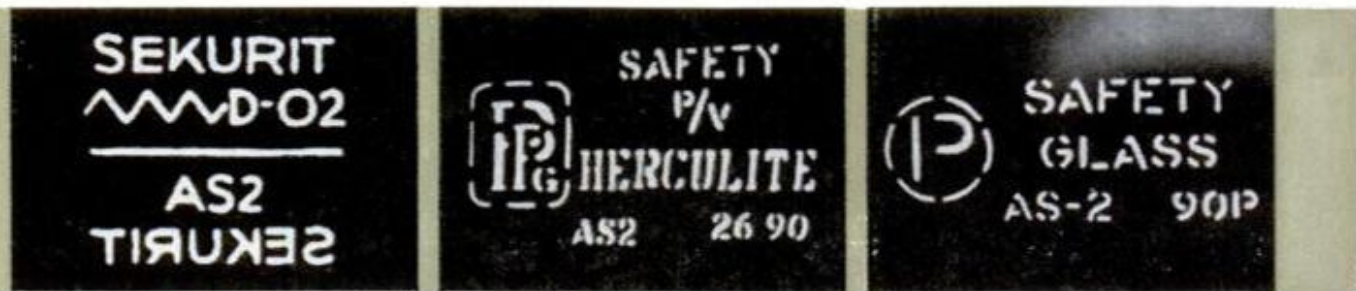




# The Labyrinth of Labels . . . . .



PHOTOS of labels from 1961 Comet tempered vent pane, and 1961 Pontiac laminated vent and tempered window. AS-2 means either tempered glass, or laminated which doesn't have to pass windshield optical tests



LABELS from 1960 Volkswagen left door window, 1961 Rambler Classic rear door vent and front door vent pane on the same Rambler. All are tempered glass and they are designated AS-2 on the glazing label

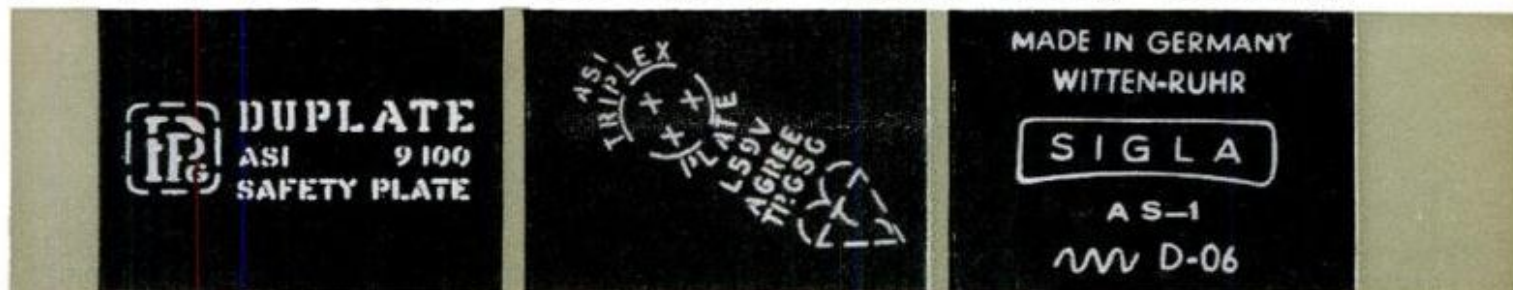
CENTER seam line on edge of this 1953 Mercury vent pane shows it is laminated. Smooth edge of vent pane below it signifies tempered

LAMINATED windows of car former Vice President Nixon used during riot in Venezuela may have kept out small sharp stones thrown at it





# Do You Know What They Mean?



**WINDSHIELD** glass labels from (left to right) Rambler Classic, Austin Healey and Volkswagen all carry AS-1 designation which shows that they meet the U.S. safety code tests which are required for windshield glass



**WINDOW** from new Rambler (left) is frankly labeled tempered. Center and right, AS-1 laminated windshield and laminated replacement sidelight both have passed optical distortion and laminated glass impact tests

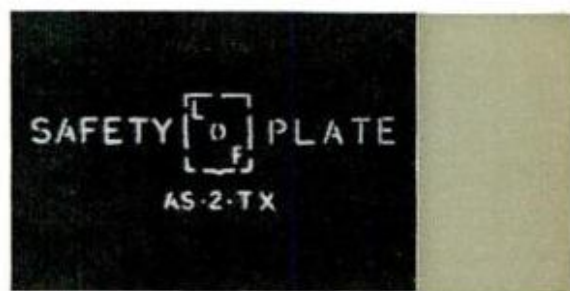
stones to fly against my car. The window was completely shattered and small particles of glass lodged in the eyes of two girls sitting in the rear. They required medical treatment."

Similar incidents are being reported from elsewhere in the country. And the reaction of the bewildered car owners involved is usually: "But I thought I had shatterproof safety glass in this car."

Actually, the little advertised fact is that there are *two* different types of safety glass commonly accepted for automobiles under the safety code of the American Standards Association. They are: laminated and tempered. Your car very probably has some of each type in it.

*Laminated* safety glass is a sandwich of two panes of glass held together by one or more intervening layers of plastic. When bonded together, the plastic (polyvinyl butyral) will tend to hold most of the glass in place when the glass is fractured. Hence the term "shatterproof" which has commonly been applied to this type of glass, but which is not given any official sanction in the American Standards Association's safety code.

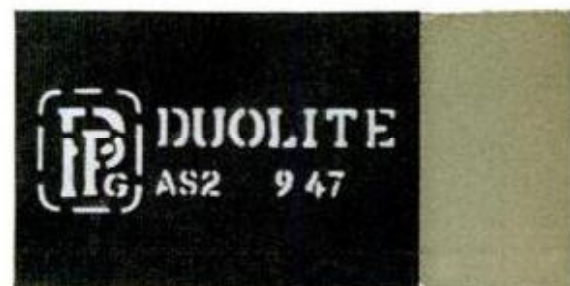
*Tempered* safety glass consists of a single piece of heat-treated or case-hardened glass. After heating, it is blasted with cold air which cools and shrinks its outer surface rapidly, creating considerable tension between the soft inner glass and its hard outer skin. This tension makes tempered glass from three to eight times stronger than laminated glass of the same



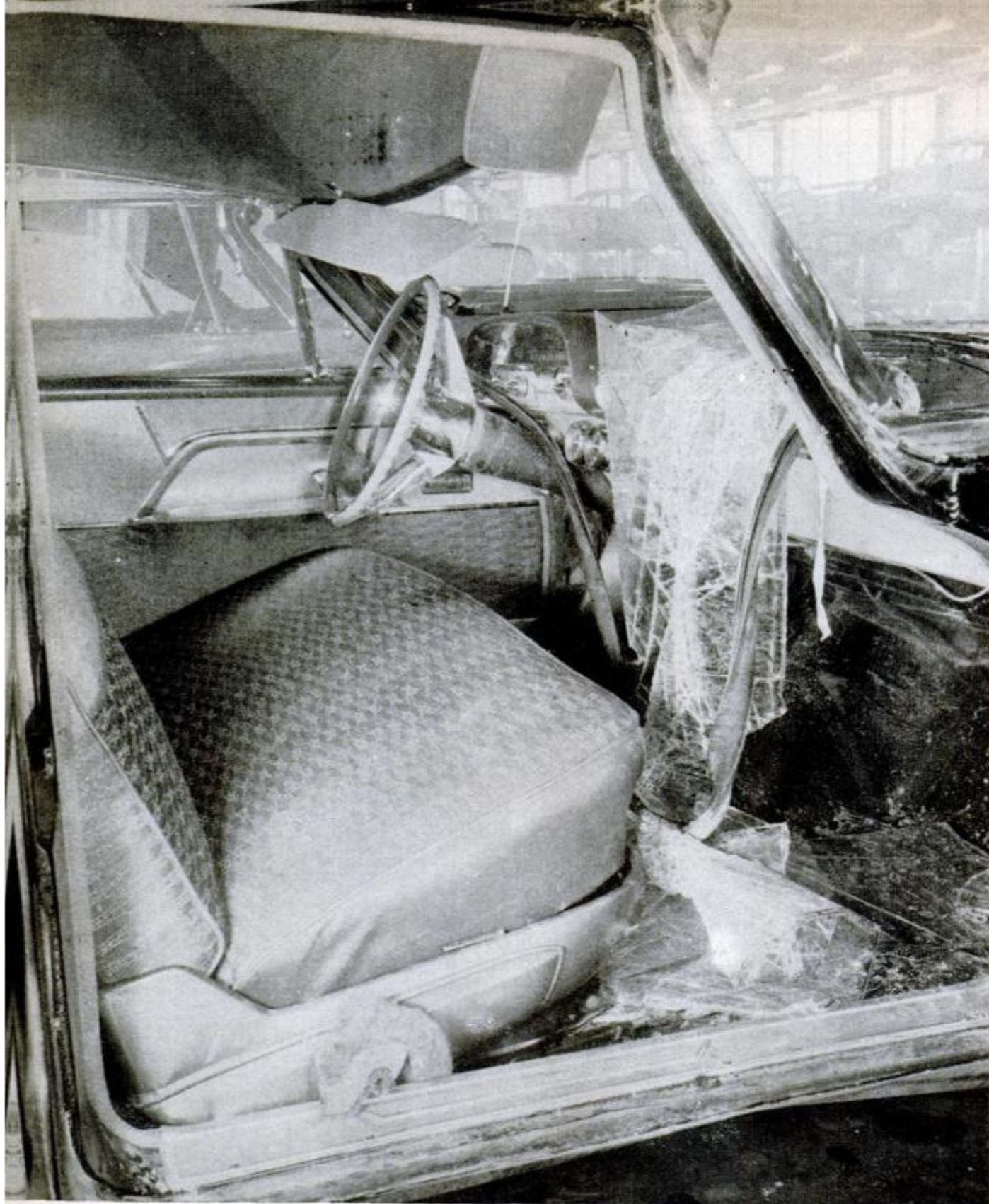
1955 Olds (above) and 1959 Ford (below) sidelights were laminated but were not given AS-1 optical tests. Hence the AS-2 labels shown



1957 Plymouth sidelight was laminated but not windshield optical quality, so label (below) is AS-2





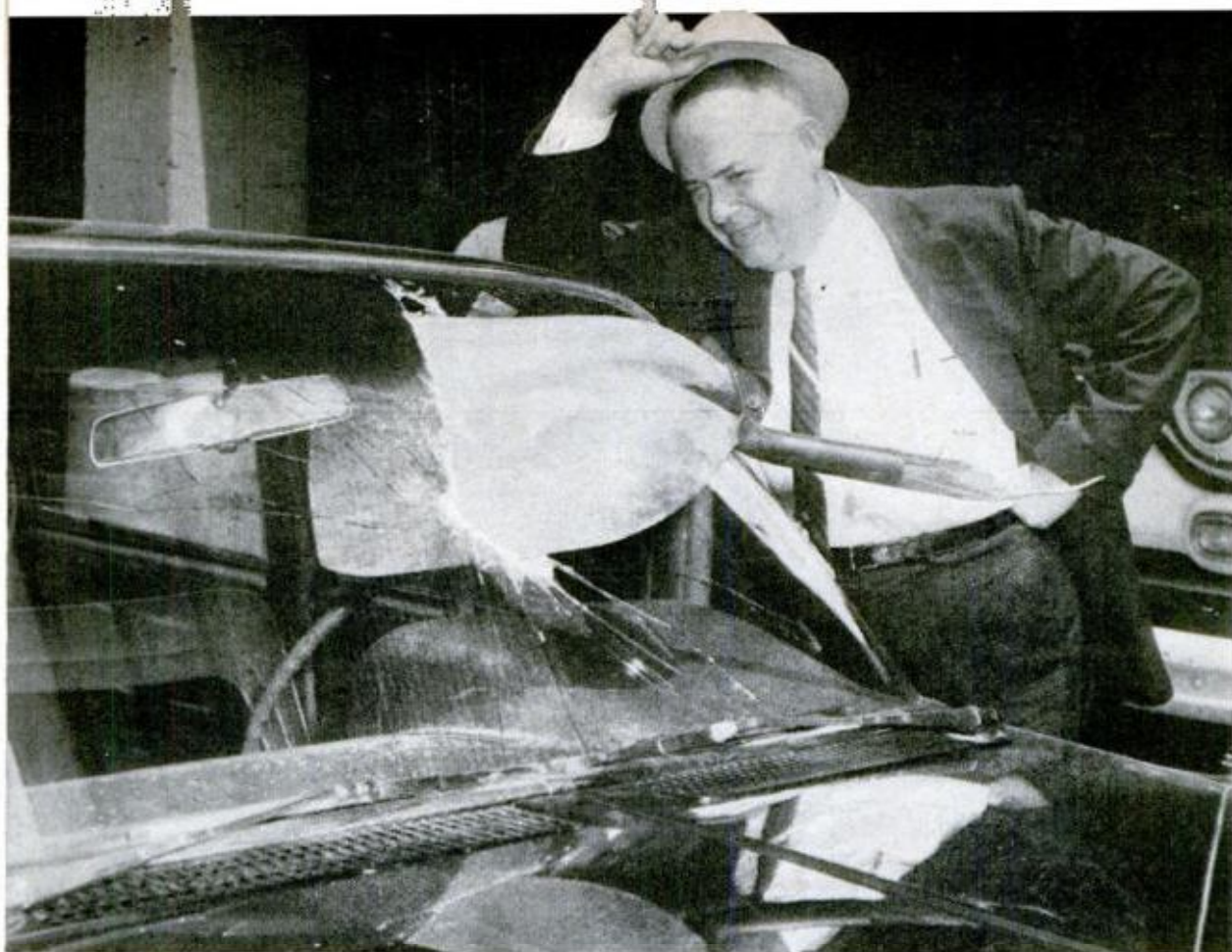


**NOTE** almost complete break-out of this laminated windshield after the completion of a roll-over test. Laminated is required in windshields because it is less likely to obscure forward vision when broken



**BROKEN** laminated glass in front window compared with broken tempered in rear. Although easier to break, laminated is more likely to stay put





**SHOVEL** from truck hit laminated windshield of car owned by W. L. Toll of Cuyahoga, Ohio. Laminated glass' resistance to penetration by sharp objects stopped the shovel just short of the driver's head

thickness. Yet it also tends to make it more vulnerable to piercing blows which puncture its compressed outer skin.

Thus a blow from a baseball might have no effect on a tempered glass window, while a sharp pebble thrown up by a passing car could shatter it. The same baseball might crack a laminated window, but the pebble would probably put only a roundish, star-ray chip in it, perhaps with some cracks radiating from the chipped area.

Fragments fly from either type of glass when it breaks. As accompanying photos show, more fragments fly from shattered tempered glass, but they are usually in the form of granulated chunks ("glass gravel") with relatively few very sharp edges. There are some edges which can cut, however. A Missouri State Highway patrolman was cut on the second finger of his left hand. A 12-year-old girl from Ann Arbor received irregular "slicing" injuries on her upper lip. A "sliver" embedded itself in a woman's arm in an accident near Manhattan, Kans. In each instance, tempered glass was the offender, although none involved serious injuries.

Fewer fragments are projected from breaking laminated glass, whose plastic interlayer tends to confine the area of breakage. But the fragments which do come loose are frequently thin slivers or chips with sharp edges. They may not fly as far or

with as much force. But, in severe smash-ups, the sharp edges of broken laminated glass which tend to be held in place cut and lacerate severely, several studies by crash researchers have shown.

By the same token, the fact that so much laminated glass remains in place when broken means that it will do a more effective job of keeping sharp stones and other road missiles from penetrating the interior of the car.

If tempered glass is rigidly framed (as it is in safety goggles and the back windows of cars), it may remain in place when cracked until subjected to further pressure or vibration. But the framing on side windows and vent panes on today's cars is not rigid enough to prevent shattering and penetration by sharp objects projected with considerable force.

**EDITOR'S NOTE:** In PM's window-smashing efforts, made for the purpose of obtaining the photos you see on the cover and the first page of this article, the "model," PM editor Dick Kirkpatrick, was repeatedly hit by fragments of both tempered and laminated glass. His only protection was a plastic shield over his left eye and cotton in his left ear. His only injury was a slight surface scratch on top of his left ear—made by tempered glass. Fragments of the tempered glass showered a photographer stationed in the far corner of the rear seat, but prac-





**LAMINATED** glass backers say it is easier to break and remove it with your hands (left) if you should be trapped inside by an accident. Right, laminated glass may provide more cushioning when impacted by head



**SHATTERED** tempered windshield (left). Glass from circular area was found to be not tempered. Cars sold in U.S. have laminated windshields. At right, note fragments of shattered tempered glass on seat

*tically no fragments of laminated traveled beyond the front seat.*

The fact that tempered glass when shattered can instantly block adequate vision is the reason why American safety codes forbid its use in windshields. Your car, therefore, should have a laminated glass windshield. But there are owner-imported foreign cars with tempered windshields which do not meet the requirements of American safety codes.

#### How to Tell What You have

If the label on your windshield glass includes the designation AS-1, you have laminated glass which has passed American Standards Association tests for both impact resistance and lack of optical deviation and visibility distortion.

The designation AS-2 found on vent windows and sidelights can mean that you either have: 1. *Tempered* glass which has passed the ASA fracture, ball and shot bag impact tests required for tempered glass,

or: 2. *Laminated* glass which has passed the ball and dart impact tests required for AS-1 laminated glass, but is not required to pass windshield glass optical tests.

A look at the edge of the vent pane or side window glass will show you whether the AS-2 glass in it is laminated (with a laminate seam line down the center) or tempered (with a plain surface—see photos, page 66). Backlights or rear windows of modern cars are usually AS-2 tempered.

#### The Quiet Switchover

Up to about 1957, most American cars used laminated safety glass in all window openings except the rear window. Since then, there has been a quiet trend to substitute tempered for laminated glass in vent panes and side windows, at a savings to manufacturers variously estimated at from \$1.50 to \$14 per car.

Now, with the 1961 models, every domestic car except Cadillac has completed

(Continued to page 228)



## Electronic "Spectacles" Record Brain Blood Flow

It's not an eye test — though that's what it looks like — but a new machine that measures the blood pressure in a patient's brain to help in the treatment of certain disturbances and diseases of the cerebral circulation.

Called a Pulsensor, the machine was developed by the Decker Corp., of Bala-Cynwyd, Pa., in conjunction with Dr. Melvin Thorner of the University of Pennsylvania. In use, the "spectacles" fit closely over the eye sockets, temporarily converting the sockets into pressure chambers. A sensitive "pressure transducer" measures the pressure in the ophthalmic arteries in the socket, and the information is recorded by an electronic apparatus.



## Shampoo-Applicator Kit Cleans Car Upholstery

When pressed, the squeeze-bottle handle of this applicator releases upholstery shampoo through a sponge-and-brush cleaning face mounted on a chrome-plated metal head.

Since the shampoo cleans through foaming action, it eliminates the need for scrubbing. According to the manufacturer, the foam cleans mohair, fiber, acetate, plastic and leather upholstery.

Made by Bissell Inc., of Grand Rapids, Mich., the complete kit costs \$3.98.



☐ The Mariana Trench in the western Pacific plunges 36,198 feet and is the deepest known hole on earth.

### A New Book From Popular Mechanics Press . . .

## THERE'S ADVENTURE IN ASTRONAUTICS

Behind the thrilling successes of our man-into-space program are thousands of scientists and technicians busily plotting their knowledge and skill against the mysteries of the universe. Bit by bit, they are piecing together the framework of the new science of astronautics.

Young people will get special insight into this fascinating field through a new book by Julian May, **There's Adventure in Astronautics** (Popular Mechanics Press, \$2.95). The book blends the exciting adventures of Randy Morrow with scientific knowledge and career information.

This is the 10th book in a series introducing boys and girls to careers in science. Says **Education Magazine**: "These books provide excellent reading for secondary-school youngsters who are thinking ahead to the day when they will select and prepare for a career."

Available at most bookstores or direct from Popular Mechanics Press.





# SCIENCE OVERSEAS

By William Kreh

**CHICKENS IN JAPAN** are looking at the world through rose-colored glasses.

Poultry farmers in Shizuoka found they could end the constant pecking and fighting among their hens by wiring red celluloid spectacles on their beaks. One result: Since the hens can't see well enough to fight, they lay more eggs.

**BRIDGE WORKERS** in Great Britain may soon be wearing buoyant overalls to keep them afloat should they fall. One of the new work suits, no bulkier than conventional overalls, was tested recently in London's Thames River.

**THE FRENCH** are using disinfected dough. All new bank notes are being printed on paper treated with a disinfectant which, according to the Bank of France, "renders inoffensive microbes and bacteria with which it could become infested while in the course of circulation."

**ELEPHANTS ARE WANDERING** around the wild game-packed valley of the Semliki River in Uganda, near the Congo, with large, white letters and numbers painted on their broad backs. The letters were put there by scientists studying animal migration habits.

**SEAS UNDERNEATH DESERTS** may offer a way to turn nearly lifeless wastes into productive farm land.

The United Nations Educational, Scientific and Cultural Organization, reporting on Russian experiments in the desert republic of Kazakhstan, said more than 70 freshwater lakes were found beneath large expanses of desert. No signs of their presence showed on the surface.

"According to Soviet scientists, they are formed by vast layers of water-clogged gravel which has the characteristics of a sponge. If 'squeezed,' these sponges would yield nearly twice as much water as the Aral Sea. In all, they cover half the total area of the republic."

**IN NORTHERN IRELAND**, paper has been put to use as an unusual substitute for metal. Jumbo-size paper bags treated with wet-strength resins are replacing traditional garbage cans. The bags, of course, are thrown away. About \$2.80 buys a year's supply.

**THE GENERAL BELIEF** that bacteria cannot survive in the extreme cold of the polar regions has been debunked by Rear Admiral Rodolfo Panzarini, president of the Argentine Antarctic Institute.

"Out of 75 sterilized test tubes which one of our teams of scientists took to the Antarctic," he reports, "no less than 69 developed micro-organisms. What is more important, eight of these micro-organisms can live only in polar conditions. They were unknown in the rest of the world and tests showed that they became inactive when cultivated at temperatures of around 20 degrees C. (68 degrees F.)."

**THERE'S A MEMBER** of the rattlesnake family in Brazil whose name alone makes strong men pause. It's called *crotalus terrificus terrificus*, or terrible terrible snake, and it has a much more deadly poison than others of its kind. This is caused by tiny amounts of toxic protein called crotamine.

With some relief, scientists from the University of Sao Paulo found that whether a snake is super-poisonous or not seems to depend on heredity. They found the effect in rattlers living only in a particular jungle area. Beyond this area, the snakes did not have crotamine.

**NATURE, ITSELF**, may have developed the first cloud-seeding technique to make rain.

An Australian radiophysicist claims meteor showers cause some rainfall, for he found a correlation between heavy falls and dates when Earth regularly passes through trails of meteor particles—the remains of expired comets.

Attracted by Earth's gravity, the particles (which range in size from fine dust to marbles) spray into the atmosphere. Bigger particles burn up. Smaller ones sift slowly down and, when they hit a cloud, could seed it and touch off a shower.

**SCIENTISTS AT Australia's** guided missile range in Woomera don't have it so easy anymore when they go out to locate fallen nose cones. After several fruitless and hard digs into ground that bore the depression of the cones, they found they were digging in places kangaroos had swished their tails across. They made the same sort of depression. Now scientists use geiger counters to locate the cones. ★ ★ ★





HAJJAR HOUSE has two "air wall" stories; top floor has a conventional glass wall for study control

## Glass "House" Tames Solar Heat

EXCEPT for people who throw stones, the biggest problem in glass buildings is heating. While glass does a fine job of letting the sun heat the building, the solar heat is uneven. The structure is hot on the sunny side and cold on the shady side. The cost of keeping the inside at an even temperature negates the saving in solar heat.

Working to solve that problem, Professor A. William Hajjar at Pennsylvania State University designed an "air wall" building for the Pittsburgh Plate Glass Co. In the Hajjar structure, double layers of glass are used. However, instead of an air space of less than an inch (as in the familiar dual-pane window), the inner and outer panes are separated by three feet, and curtains are hung between them. The solar heat comes through the outer pane, but heats the curtain instead of the interior. The collected heat fills the three-foot airspace, and the entire wall becomes a radiator. In summer, vents carry off the unwanted heat. The system proved so successful that "any supplementary heating or cooling system would need to be only a minor one."

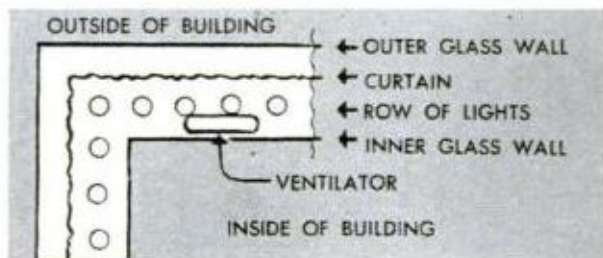


DIAGRAM of air wall layout, above. Below, student checks vents that control temperature between panes





# Owners Praise Olds F-85's Pep, Ride, Handling . . . Want Better Economy

Marginal and boldface comments by Jim Whipple, *PM's* Auto Editor



F-85 STRADDLES A 15-INCH-DEEP DITCH without a belly scrape, despite its low clearance and 13-inch wheels

**There are cases on record of nearly bugfree first-year cars—and F-85's sister car, the Buick Special is one of them.** →

**All three cars were supposedly checked out and prepared for delivery and yet there were differences in operation and condition.** →

**T**O A CONSIDERABLE DEGREE the F-85 delivered what its new owners were looking for as most items in the car and its road behavior won approval. Almost two-thirds of those reporting mentioned handling ease, over 40 percent praised performance, one-third commented on the riding comfort, while 25 percent lauded F-85's clean, simple styling.

However, perfection is hard to reach, especially in the first year of a totally new car, so there are inevitable problems.

Chief causes of dissatisfaction were fuel economy below expectations, operation of the automatic transmission and various flaws resulting from some unfortunate quality-control troubles.

To backstop this report, *PM* drove three different F-85's, two sedans and a station wagon, all with automatic transmission. Our experience mirrored that of various owners closely.

The wagon's transmission operated smoothly and it delivered satisfactory mileage at high speeds with a heavy load. But there was considerable drive-shaft vibration. One sedan had a jerky transmission, rear-end rattles and gave poor mileage although lightly loaded. The other sedan was flawless and topped 17.5 miles per gallon, although driven hard with average loads.

Results of *PM* fuel meter tests at constant speeds on sedan with automatic, corrected for speedometer error, were as



# BASED ON 1,556,898 OWNER-DRIVEN MILES



IN SPITE OF SLOW STEERING, F-85 sedan handles well even when thrown into broad slide on loose gravel

## OWNERS COMMEND F-85 FOR...

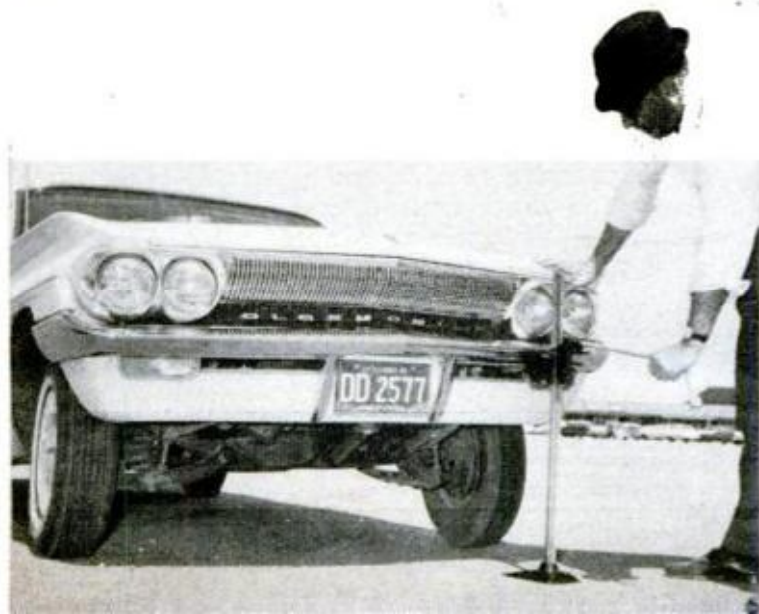
Smooth, easy handling  
Ready power, nimble performance  
Big-car riding comfort  
Clean, uncluttered lines

## AND CRITICIZE IT FOR...

Disappointing gas mileage  
Stiff, troublesome Hydra-Matic  
Cramped entry-exit  
Small wheels, low clearance

**SLIM, FRAIL-LOOKING BUMPER** takes jacking strain without a murmur. But owner objects to exposed parking lights, splash pan

**OWNERS COMPLAIN** of difficult entry-exit and seats narrowed by curved corners







**SOME OWNERS CONSIDER** exposed fuel tank and ill-protected splash pan unsightly in appearance. They also complain of compact's road clearance which leaves five inches at lowest point—the shock absorbers

follows: **24.7 miles per gallon at 30 m.p.h.**  
**22.6 miles per gallon at 40 m.p.h.**  
**20.5 miles per gallon at 50 m.p.h.**  
**18.1 miles per gallon at 60 m.p.h.**  
**15.8 miles per gallon at 70 m.p.h.**

**Over-all mileage was 16.4 miles per gallon.**

The owners gave the F-85 an Excellent rating of 67.6 percent. It was labeled Average by 30.1 percent of owners and Poor by a creditably small 2.3 percent.

*Now let's see what F-85 owners think of their new cars. Here in order of frequency of mention are the first six best-liked features.*

"Car is very easy to handle both in traffic and on the highway."—Massachusetts sales engineer.

"One of the best handling cars I have ever driven—just as nice as any large-sized car."—New Jersey photographer.

"It handles like a baby carriage. My wife likes it better than I do."—Illinois salesman.

"It drives and feels like a big Olds—has very good pickup and top speed."—Texas serviceman.

"I travel all over the Southern Kentucky mountains and I have never had occasion to need any more power."—Kentucky salesman.

"Has *zoom and go* qualities and responds with ease."—California office manager.

"Found it very comfortable on a long drive. The car was doing 85 and 90 miles per hour steadily and it held the road better than expected."—Indiana grocer.

"Easy ride, springs take the bumps well."—Washington barber.

"The general lines are good—especially station wagon's rear end and taillight treatment."—Illinois professor.

"Clean lines, no fins, torpedoes, etc., no big grille or extra chrome."—California psychologist.

"I like the minimum of chrome and the smooth look of the hood and trunk."—Florida teacher.

"A good compromise in size and power between small European cars and large Detroit standard models. It's a logical-size car."—California physician.

"Just the right size—large enough to take on a trip and small enough for getting around town."—S. Carolina doctor.

"Roominess in so small a car—my six-foot, 240-pound husband finds it just as easy to drive as I do and I'm only five feet tall."—Illinois housewife.

"It handles like a full-sized car, and is a full six-passenger car, not a so-called six passenger car."—Florida housewife.

**As a matter of fact it's better than some of the larger cars.** →

**It is more responsive than the standard V-8 versions of some low-priced full-size cars, answers performance needs of compact-car buyers.** →

**F-85's styling is like a breath of fresh air, a wonderful contrast to the gauche, chrome-spangled "Detroit Baroque" of recent memory.** →

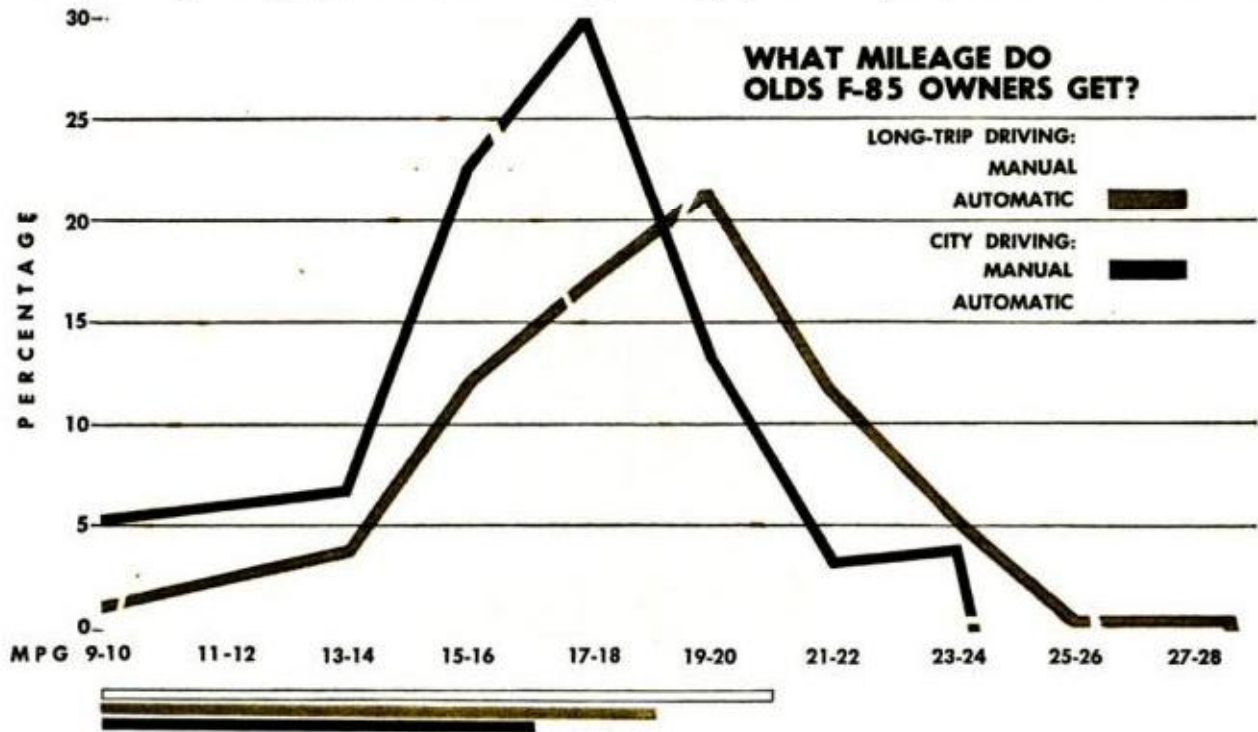
**The doctor gives the prescription for many people's transportation ills—a "practical-sized" car.** →





**SWING-UP TAILGATE** won owner applause. Wagon's "tuck-away" spare leaves room for third seat. It would also be a great idea applied to sedan, right, where flat-mounted spare gobbles up prime luggage space

**LINE GRAPH SHOWS** what percentages of drivers got what mileages: highest, 30 percent, 17-18 m.p.g. manual, city driving. Bar graph, bottom, shows mileages most people are likely to get under various conditions



**BETWEEN THE METERS** and with plenty of swinging room left to pull out, the F-85 is the city dweller's delight







PM's FUEL METER mounted on window, ready for the road test

The owners have a really legitimate gripe here. The best of three automatics PM tested had noticeable shift points, the worst was a real neck-snapper. →

It's hard to avoid step-down floors these days, the dictates of styling demand them to provide low silhouettes. His problem isn't 13-inch wheels but lack of helper springs. →

Now, in order of frequency of mention are the five most common complaints.

"Very poor gas mileage—certainly not up to advertised claims, it is no better than my previous 88 with 260 hp."—N. Carolina secretary.

"I'd like this car better than any I have ever owned if I could get them to improve gas mileage. I bought it expecting at least 18 miles per gallon."—West Virginia welder.

"Gas mileage is not good enough to compensate for the room you give up in an average-sized auto like Ford or Chevy."—N. Carolina engineer.

"In city driving it changes to lower gears so quickly that it naturally consumes a large amount of gasoline."—Georgia personnel man.

"Bad transmission, does not shift smoothly, will not last a year."—Illinois truck driver.

"There is quite a bit of room for improvement in the automatic transmission operation. Engine revs up too high and too long before change to second gear (12 m.p.h.). Has plenty of power to change at about 8 m.p.h. which would result in better mileage."—Texas chemist.

"The length of time it takes to correct a transmission malfunction is irritating. Have complained since November 1960. Transmission has been apart twice since, and still does not operate properly."—New York telephone repairman.

"It is hard to get in and out of and there is no headroom when one is wearing a hat."—Ohio fireman.

"Difficulty of entry and exit, particularly for passengers in the rear seat."—New York editor.

"I don't like the step-down floor and the 13-inch wheels. Too low on the ground when carrying passengers."—Alabama farmer.

"The trunk is oversized at the expense of both seats."—New York chemist.

(Continued to page 224)

## SUMMARY OF OWNERS REPORT:

EXCELLENT 67.6% AVERAGE 30.1% POOR 2.3%

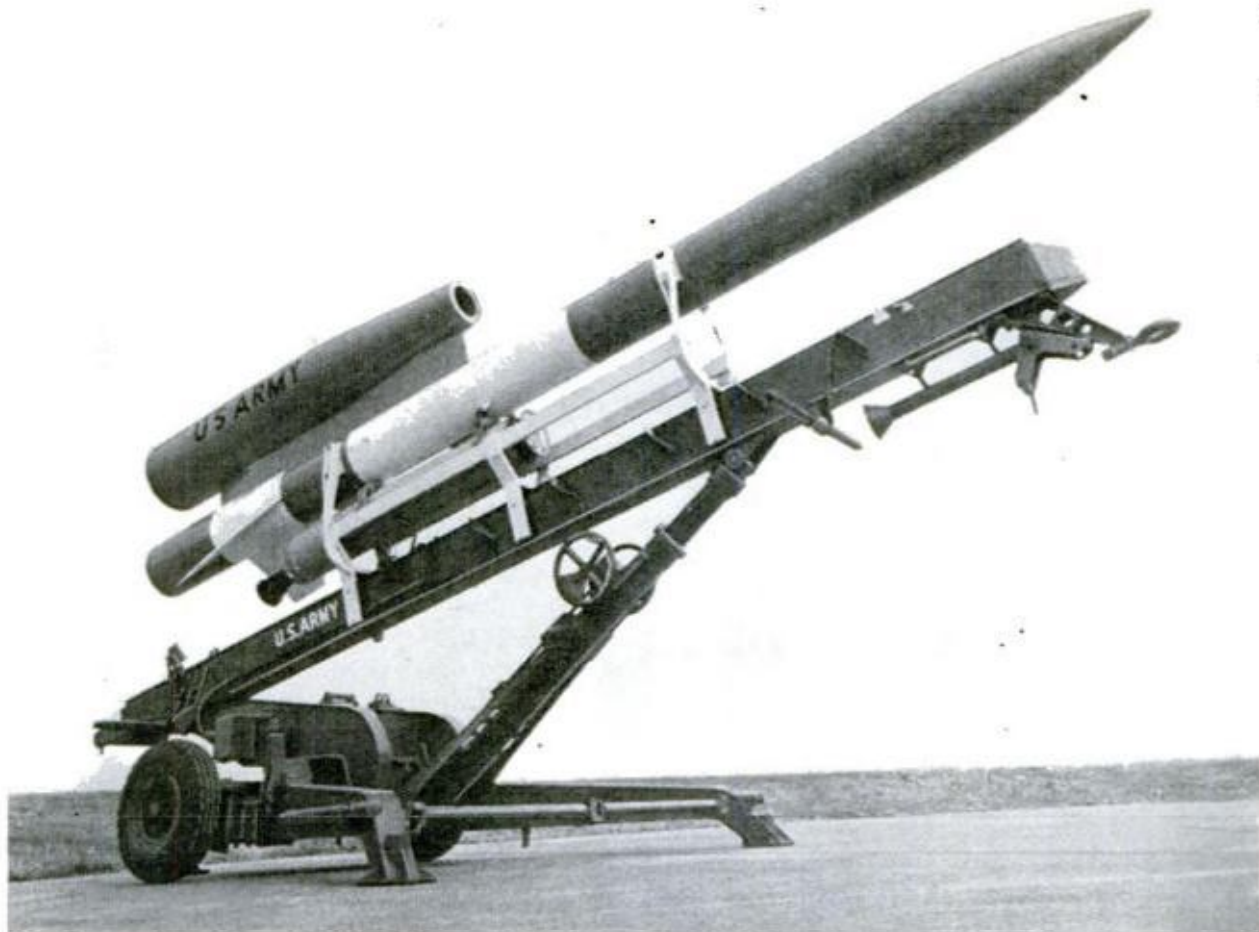


<b>Satisfied with automatic economy?</b>	
Yes, satisfied	46.8%
No, not satisfied	53.2
<b>Satisfied with manual economy?</b>	
Yes, satisfied	69.7
No, not satisfied	30.3
<b>Best-liked features</b>	
Handling ease	61.4
Power, performance	41.6
Riding comfort	34.6
Styling	24.4
Size, compactness	22.9
Roominess	20.5
Ease of parking	16.1
<b>Most-frequent complaints</b>	
Poor gas economy	20.3
Automatic transmission woes	15.8
Difficult entry, exit	7.4
Small wheels, low clearance	8.1
Lack of head, legroom	5.7
<b>Had mechanical trouble?</b>	
No trouble	59.6
Some trouble	34.4
Considerable trouble	6.0
<b>What was trouble?</b>	
Transmission	11.5
Electrical system	4.2
Radiator, overheating	3.1
Carburetor	3.1
Clutch	2.3
Driveshaft	1.8

<b>Best-liked exterior features</b>	
Clean, simple lines	20.5%
Front end	10.1
No excessive chrome	9.1
Grille	6.8
Lowness	5.2
Absence of fins	3.9
<b>Least-liked exterior features</b>	
Rear end	8.1
Bumpers	4.9
Tail lights	3.4
Sculptured sides	2.3
Windshield	1.8
<b>Best-liked interior features</b>	
Upholstery	20.8
Instrument panel	14.6
Comfortable seats	13.8
Easy to clean	2.6
<b>Did consider low-priced "big" car?</b>	
Did consider	39.1
Did not consider	56.5
<b>What make?</b>	
Chevrolet	59.4
Ford	18.0
Oldsmobile	12.7
Plymouth	4.7
Dodge	4.0
Pontiac	2.6
<b>Did consider low-priced compact?</b>	
Did consider	56.5
Did not consider	31.2

<b>What make?</b>	
Faicon	25.8%
Corvaire	23.5
Comet	16.6
Valiant	10.1
Tempest	8.8
Rambler	7.8
Lark	1.4
<b>Is Olds F-85 only car in family?</b>	
Yes, it is	57.0
No, it is not	43.0
<b>Make of other car</b>	
Oldsmobile	10.7
Chevrolet, other G.M. make	13.8
Ford, other Ford Co. make	6.5
Chrysler Corp. make	5.7
<b>How is dealer service?</b>	
Excellent	50.0
Average	38.7
Poor	11.3
<b>Would you buy from him again?</b>	
Yes, would buy again	62.0
No, would not	10.7
<b>Make of car traded in</b>	
Oldsmobile	25.3
Chevrolet, other G.M. make	25.2
Ford, other Ford Co. make	12.2
Plymouth, other Chrysler make	11.5
<b>Would buy another Olds F-85?</b>	
Yes, would buy again	72.1
No, would not buy again	15.1





## Telephone Poles Stand In for Missiles in Tests

Trimmed to the size and shape of missiles, telephone poles are making dandy—and inexpensive—stand-ins.

While building a supersonic target-missile system for the Army, the North Amer-

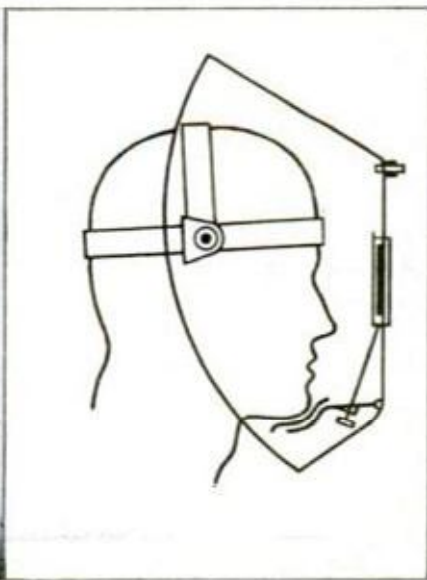
ican Aviation Co. had to test booster rockets for it. Rather than waste production missiles in the tests, telephone poles were cut to shape, weighted and painted to resemble the missiles.

## Welder Opens His Mouth to See Better

By opening his mouth, a welder snaps up the light filter in his helmet out of view. In its place is a clear protective shield which gives him a better look at his work. When he closes his mouth again, the light

filter snaps back into place.

This "no hands" helmet, which operates from a chin lever, frees both hands for work. It is made by Auto-View Welding Helmet Co. of Santa Monica, Calif.







By Jim Whipple



## Cast iron stages a comeback in lighter engines New economy aid—overdrive for your automatic

**The Iron Age Returneth.** Don't be surprised when 1962's batch of brand-new engines (a four, a V-6, two straight sixes and a V-8), turn out to be made of cast iron, not aluminum. This doesn't mean that aluminum is a flop or that existing aluminum engines will be replaced. But industry engineers have discovered that aluminum isn't all shining perfection.

When aluminum is cast in sand at atmospheric pressure, it cools unevenly and hard and soft spots may develop in the structure. This makes for a casting that's tough on tools, a bit bulky, and liable to have hidden flaws.

**Die casting, where the molten aluminum** is forced into precisely-machined steel molds at 8000 lbs. per square inch, eliminates scrappage, as the molds are tightly filled before the metal cools. This denser metal makes lighter, stronger castings that are highly precise and require very little machining. The cylinder blocks of **Dodge-Plymouth** and **Rambler** aluminum sixes are die-cast.

Die-casting is quick, too, with less than a minute from injection of molten metal to ejection of finished casting. Die-casting sounds like the answer to an engineer's prayer, but tooling up is very expensive and, coupled with the higher price of the metal itself makes the cost of an engine so high, that the weight and machine time savings are barely worth it.

**But the iron mongers met the rising challenge** with brilliant foundry practices and brought out a cast-iron engine, the **Falcon-Comet Six**, nearly as light as its aluminum counterparts. In simple terms the secret is controlling of the sand cores so that the engine designers can achieve thickness where it is needed for strength yet keep other areas thin to save weight.

At 356 lb., complete with accessories and flywheel, the 170-cubic-inch **Falcon Six** which was a triumph for **Ford's** iron founders, has paced the comeback of an "obsolete" metal from whence came such 19th-century artifacts as flatirons, sash weights and ornamental deer.

**There's good news ahead for those who** are disenchanted with gasoline mileage of their automatic-transmission cars. They will soon be able to have both "shiftless" ease and the economy of overdrive to boot.

The E.J.B. Co. of San Gabriel, Calif. is about to market an overdrive for automatics. Called "Honamatic," it's a power-controlled planetary gearset that bolts on to the rear end of your automatic transmission without major modification.

**The flip of a switch** puts you in or out of a .75 to 1 reduction ratio regardless of throttle opening. At the moment the makers have Honamatics for big **Fords** and **T-Birds**, but it's expected that a **Falcon-Comet** unit will be ready soon. If these first installations meet with success in the marketplace, more will surely follow.

An experimental unit on a 144-cubic-inch **Falcon** with 4.11 axle ratio provided that low ratio for much-improved performance and a 3.08 to 1 "high" for maximum gasoline mileage.

Although Honamatic is a dealer-installed unit made by an outside firm, it has **Ford's** unofficial blessing, much as the old **Columbia** two-speed axle did back in the late 1940s.

**Don't expect a wholesale swing** to unit construction bodies in 1962. A couple of new semicompact cars (115-inch wheelbase) are expected to be unitized, but the "full-sized" cars, i.e. **Ford**, **Chevy** and larger, will retain the traditional separate body insulated from the frame construction. (**Chrysler Corporation** will stick with its unique—and successful—unitary body plus front stub frame.)

**The reason for sticking** with separate frame construction is that as a car gets larger and heavier it becomes more difficult to "tune out" vibrations induced by engine, driveline and suspension.

At the same time the advantage of unitary construction's lighter weight shrinks as it becomes necessary to use heavier gauge steel for many body stampings. ★★



## New Volkswagen 1500 Will Hit 81 M.P.H.

FROM THE specifications it appears that the new VW 1500 is based on the chassis of the familiar, beetle-shaped '61 model. Wheelbase is unchanged at 94.5 inches, although the new car is six inches longer over-all at 166.3.

The larger body (rated as four to five-passenger capacity) with front and rear luggage compartments, has increased car's weight from 1631 to 1896 lb. Performance will not suffer however, as the new version of familiar four-cylinder, horizontally opposed, air-cooled engine develops 53 horsepower versus the current engine's 40 (SAE rating).

New engine displaces 91 cubic inches compared to 72.7 of the current car. Increase was achieved by enlarging bore and stroke from 3.03 x 2.52 to 3.3 x 2.7 inches. Gear ratios of the 4-speed synchromesh transmission are unchanged.

Space for the rear luggage compartment was created by relocating the cooling fan from its pedestal on top of the engine to direct drive from the end of the crankshaft. Carburetor was changed from vertical to horizontal type.

Suspension remains four-wheel independent by torsion bars and trailing arms. Tire size has been upped from 5.60x15 to 6.25x15. Electrical system remains 6-volt.

**USABLE, LOCKABLE LUGGAGE SPACE** directly over the famed VW air-cooled engine

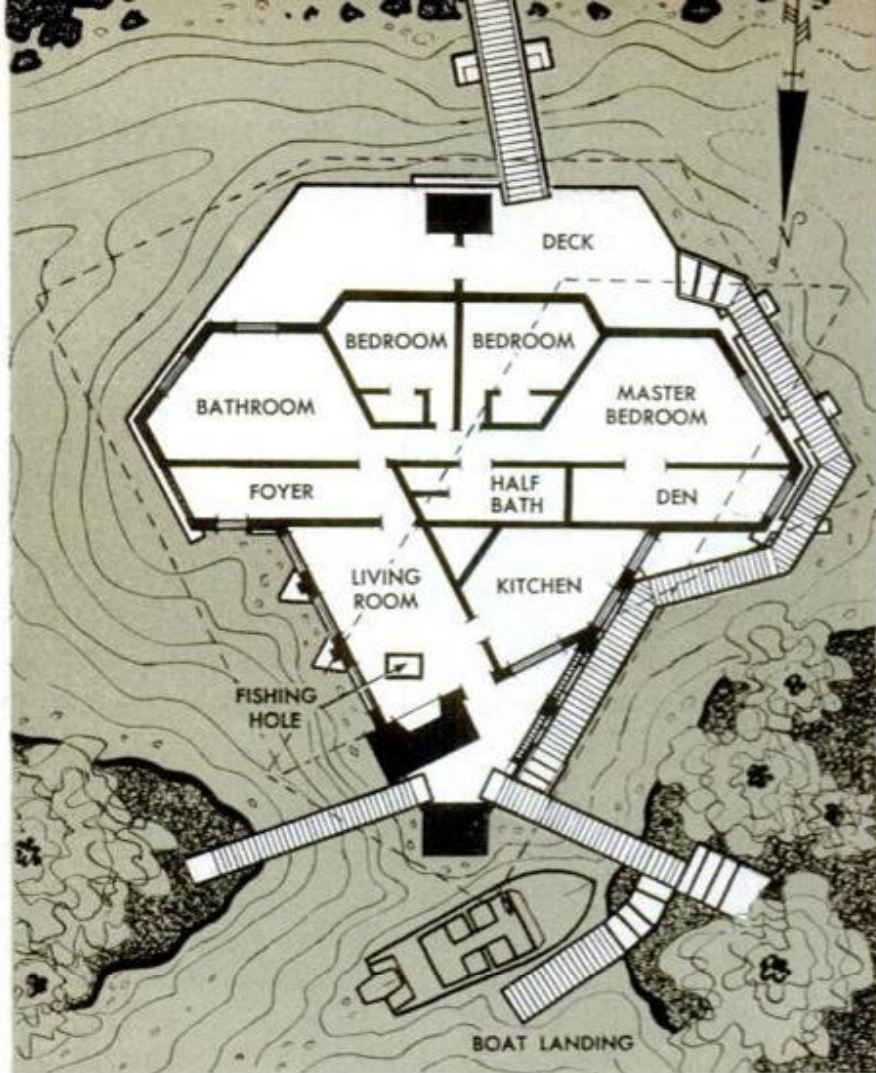
**LONGER, LOWER LOOK** on the same 94.5-inch wheelbase. Note the new sedan's wider windshield, and cowl fresh-air intake



FLOCK OF THE NEW 1500's push 81 m.p.h. on a test track outing







**TRIANGULAR HOME**, with walls made of wood bricks, sits on concrete piers over a lake near Wichita, Kans. Ramps provide access to the building

**WOOD BRICKS**—first conceived in South America for low-cost housing—form the walls of a striking three-bedroom home built on concrete piers over a Kansas lake.

The solid redwood bricks, laid up in much the same fashion as conventional bricks (though glued and nailed rather than mortared), do triple duty as a building material. They compose not only the structure of the wall, but the finished exterior and interior as well.

The show-place home is a project of Private Enterprise, Inc., of Wichita, Kans. It sits over an artificial lake near Wichita on the farm of William Graham, president of the firm. Most of the house was built before the lake was filled.

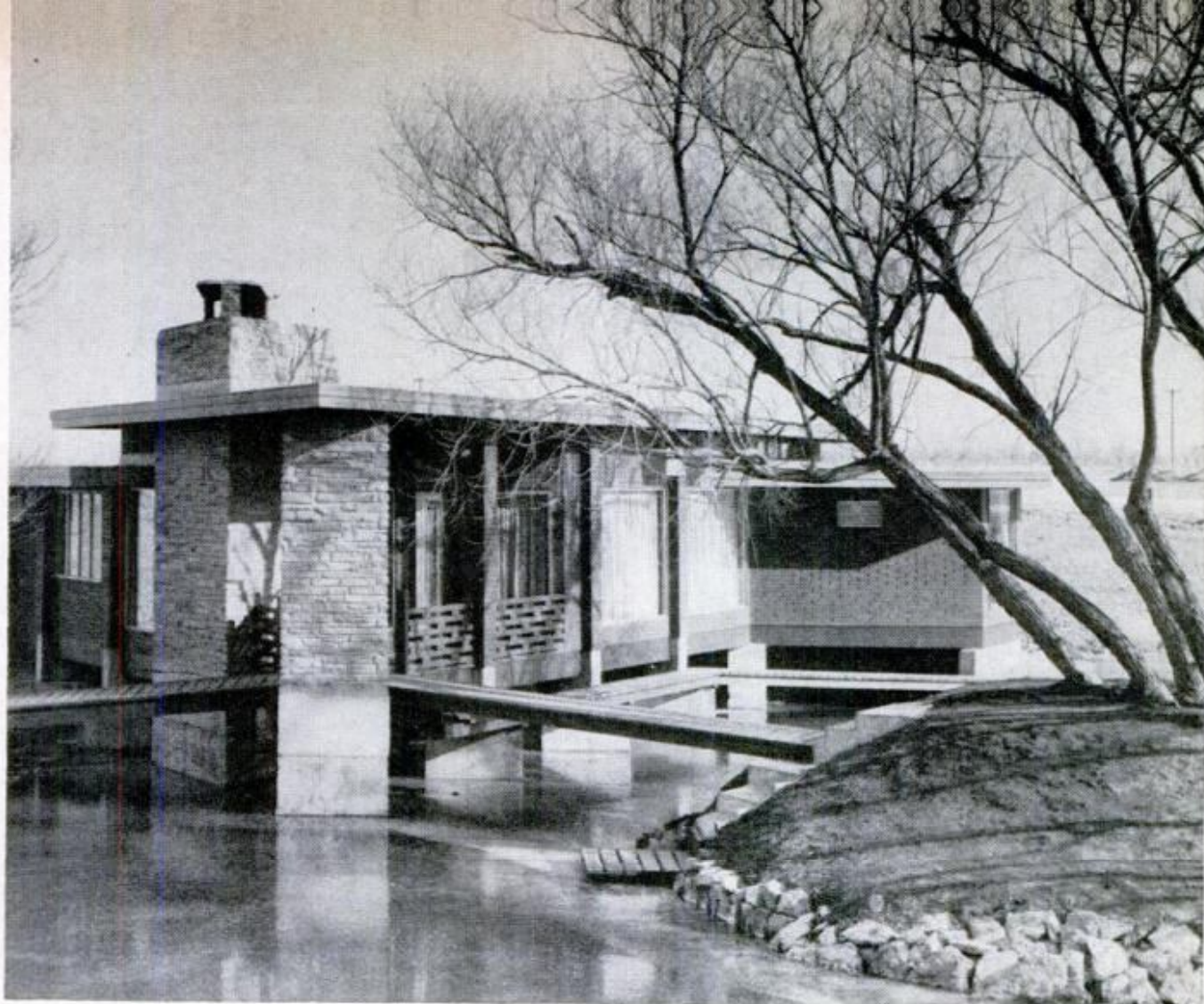
The wood bricks are 2½ inches in height and 3½ inches wide. Length may vary; standard length is 24 inches. Tops and bottoms of the bricks are a modified tongue-and-groove so that they form a weathertight joint. Ends are also tongue-and-groove.

Cost of the brick is \$1.25 per square foot of wall, Graham figures. This compares, in his area, to \$1.30 for frame and \$1.55 for conventional brick. In addi-

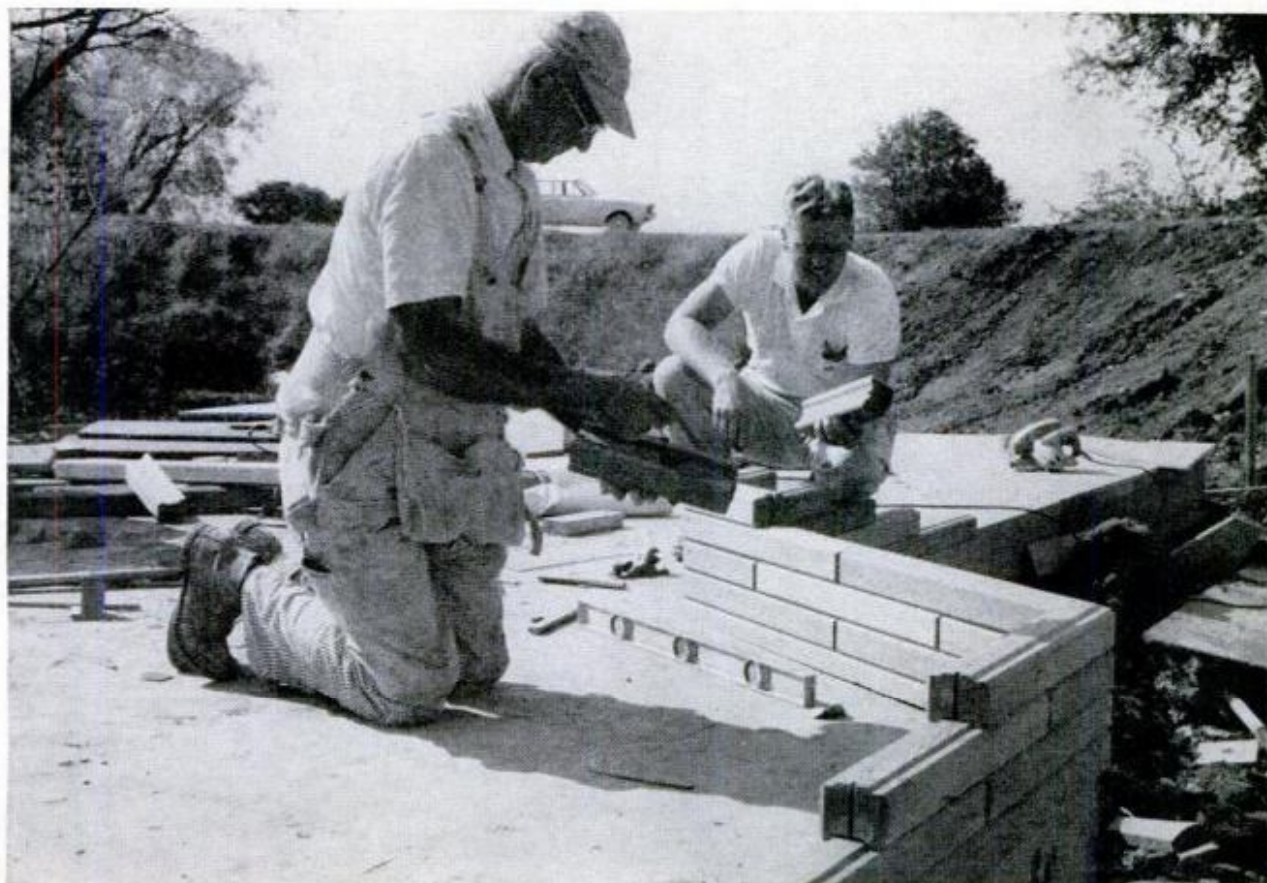
# BRICK HOUSE MADE OF WOOD

By  
**John  
Linkletter**





**WOOD BRICKS**, sealed at the time they're manufactured, are varnished to provide weatherproof exterior wall. **NAILS AND GLUE** bond the bricks securely together. The bricks form the finished wall both inside and outside







**TRAP DOOR** to lake yields fish for William Graham, right, president of Private Enterprise, Inc., and guest

tion, he sets the labor cost at one-third that of conventional construction.

Graham, who founded Private Enterprise, Inc., to encourage development of businesses in low-economy countries through private American loans, sees wood bricks as his greatest project. He is now building inexpensive wood-brick houses in South America (some owners build them as do-it-yourself projects), explaining, "There's no better way of making a capitalist than by making it possible for a man to own his own home." In addition, the firm is now manufacturing and selling the bricks in the U.S. ★ ★ ★

**BEDROOM** illustrates how attractive the inside face of the wood bricks can be in the decor of a home





Capt. William R. Anderson has served in the submarine service of the U. S. Navy for most of his adult life, including World War II and the Korean conflict. He is 40 years old and is author of *Nautilus 90 North*, a chronicle of the achievement described below



## My Most Exciting Moment

FOR 1100 nautical miles due north from Point Barrow, Alaska, *Nautilus* had traveled a route no man had traveled before. Steaming deeply submerged beneath the great Arctic ice pack, we had seen the remarkable features of an unexplored ocean floor unfold before us—a previously unknown undersea plateau as large as the state of Connecticut, an unexpected and incredibly rugged mountain range and many others. I had spent hours at the periscope and upward-beamed television, completely fascinated by the awesome beauty of the ice overhead, while the more precise eyes of modern sonar traced out for the first time its exact profile.

For centuries seafaring men had dreamed of sailing to the North Pole. Then, on Sunday, August 3, 1958, thanks to nuclear power, American engineering skill and the best submarine crew in the business, instruments for the first time in history were clicking off the last few yards that separated a ship from that goal. A chain reaction of excitement swept through the 115-man crew, and I must admit that their skipper too thought it was pretty fantastic that 4000 tons of ship had been navigated to the very top of the world. I started the countdown.

"Ten, nine . . ."

I remember the early explorers who had sought their goal over the ice. They had endured incredible hardships; nearly 200 had lost their lives on the ice floes above us. Only Robert Peary and a party of five had succeeded.

". . . eight, . . . six, five . . ."

I gave thanks to Him who had guided us so truly.

". . . four, three, . . ."

With immense pride, I thought how glad I was that it was a United States ship and crew first reaching the Pole. When Sputnik I went up, Russia gained the first victory in outer space; this was an *American* victory in *inner* space, right in the Soviet's own back yard.

". . . two, one . . ."

Observing stations reported readings—water depth 13,410 feet, water temperature 32.4 degrees F, draft of the ice overhead, 25 feet.

". . . Mark!"

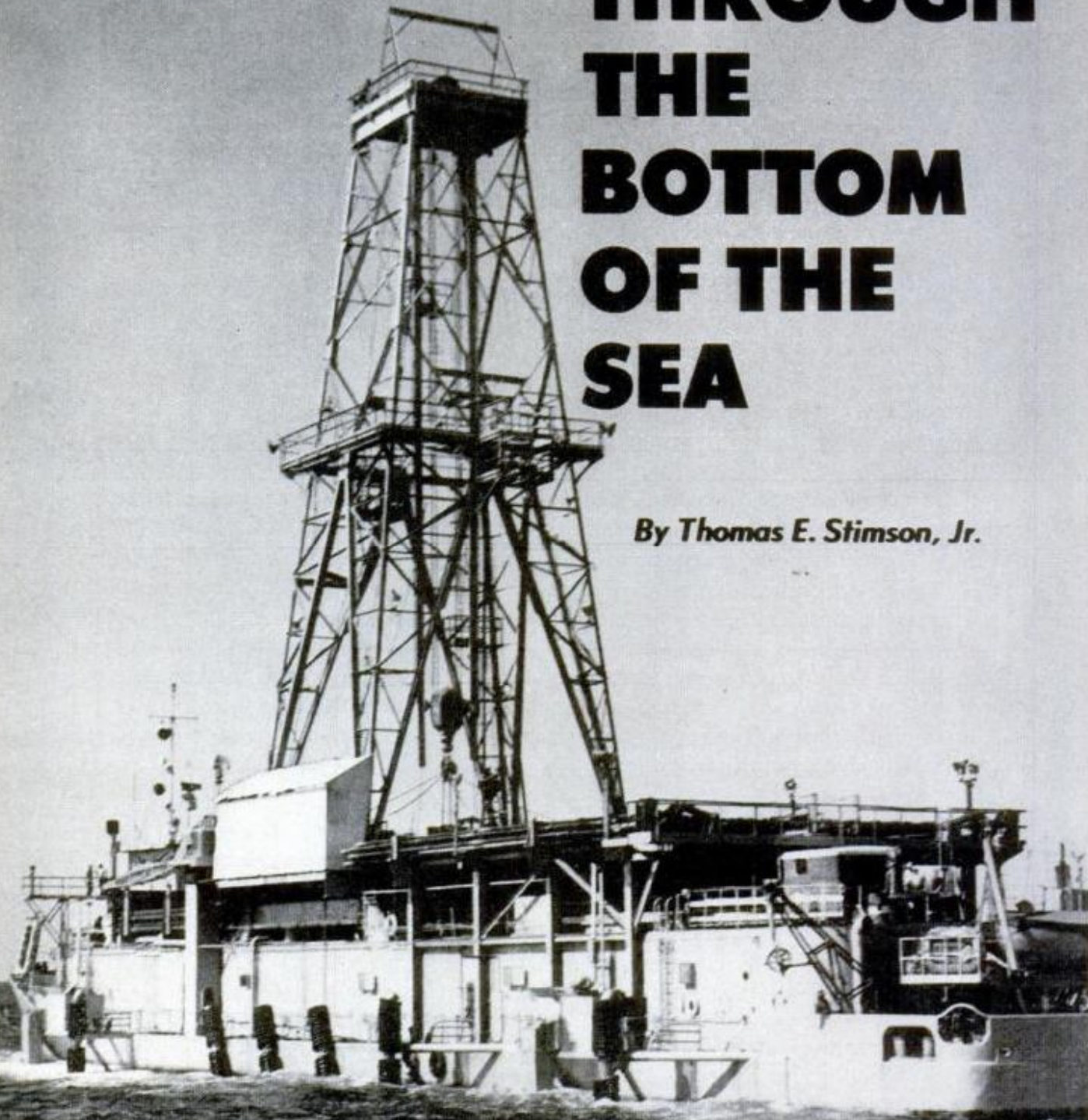
"For the U.S.A. and the U. S. Navy, the North Pole!"

A handwritten signature in cursive script, reading "William R. Anderson".



# Drilling a **HOLE THROUGH THE BOTTOM OF THE SEA**

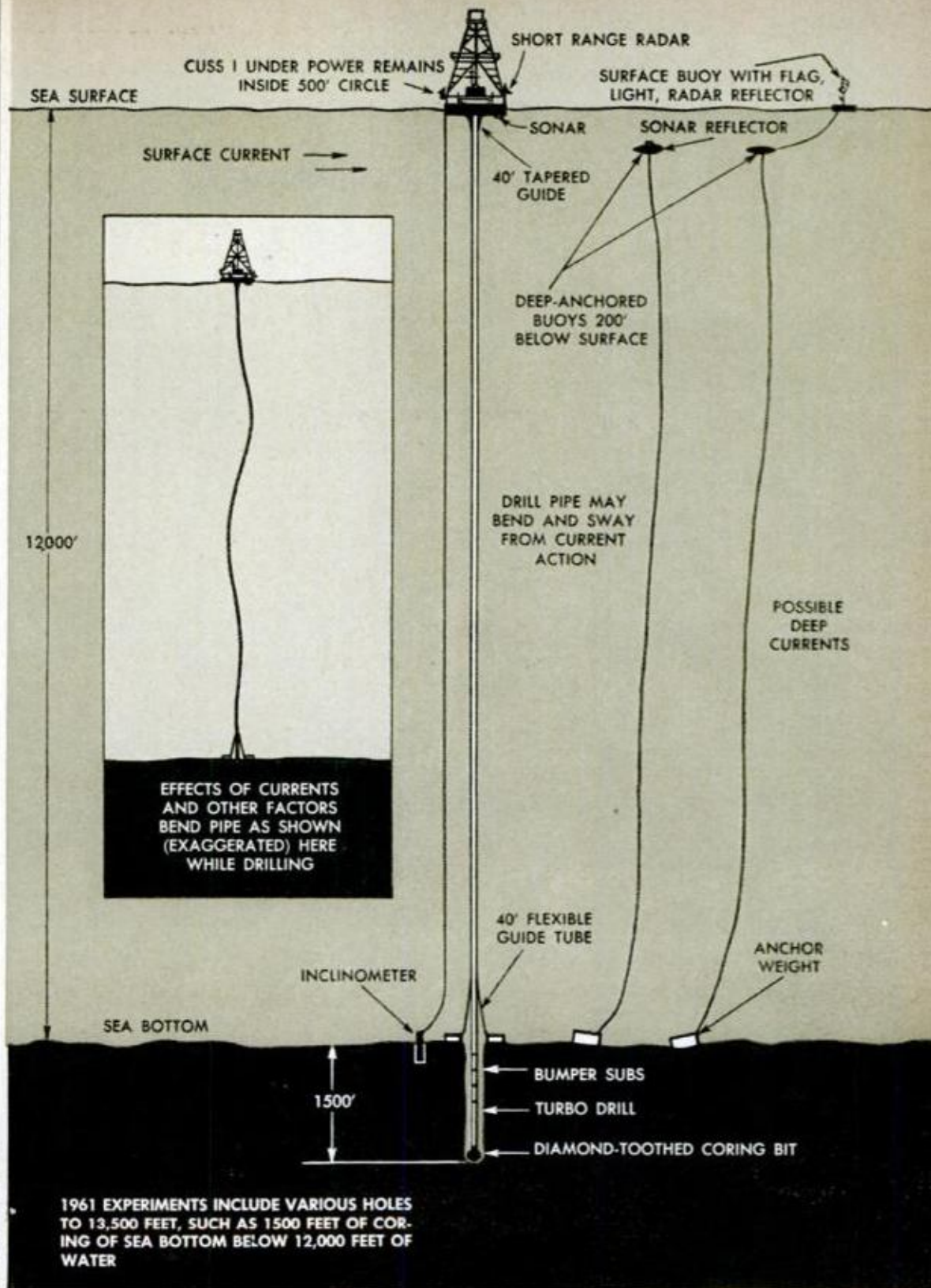
*By Thomas E. Stimson, Jr.*

A black and white photograph of a large offshore drilling rig mounted on a ship. The rig is a complex metal structure with a tall derrick in the center. The ship is white with various equipment and structures on deck. The sea is visible in the foreground, and the sky is clear.

**A**MERICAN SCIENTISTS are drilling holes in the bottom of the sea as part of a program to learn more about the history of Earth and its interior. If the techniques they are testing prove successful, they hope in about three years to drill a hole all the way through Earth's crust and into the underlying mantle. The program is known as Project Mohole.

No one knows what kind of rock makes up the mantle. Some suspect that it formed the original surface of Earth and that





the present crust is material that was later spewed up by volcanos. The crust is only a few miles thick, a thin outer skin that covers the 1800-mile-thick mantle.

The rock of the mantle may differ chemically from that of the crust. It may have a different structure because of intense heat and pressure. Probably the temperature at its outer edge is about 2000 degrees F.

A sharp discontinuity is known to exist between it and the





**ENOUGH PIPE** was on board "CUSS 1" to twist through 12,000 feet of water and 1500 feet into ocean floor

crust. This boundary is called the Moho after the Yugoslavian scientist, Mohorovicic, who first discovered it in seismograms. The Moho boundary appears to lie from 20 to 30 miles under the continents but no more than 4 to 9 miles under the ocean bottoms.

That's why the scientists have gone to sea. It's easier to drill through 8 miles of sediment and rock under an ocean than straight down through 20 miles of continental rock. The deepest oil well ever drilled penetrated less than 5 miles below the surface.

The preliminary drilling in March and April plunged through some 12,250 feet of

water and 576 feet into the ocean floor. It produced first heat measures at this depth—75.2 degrees F. at about 500 feet down—and cores lifted out for examination showed ancient sea life was prolific for a period of 7,000,000 years, though the same region is, comparatively, an ocean desert today.

The drill penetrated 20 feet into the mysterious second layer of the oceanic crust. This, according to Willard Bascom, project director, has been found to be of basalt, a lava-like rock.

Drilling deep into the earth—an old dream of science—seemed a physical impossibility until an informal group called



the American Miscellaneous Society broke the problem down into each of its parts. Sparkplugged by Willard Bascom, the group came up with such ingenious solutions that the National Academy of Sciences became excited about the research possibilities.

An AMSOC committee of the Academy was established and, in cooperation with the National Science Foundation, \$1,500,000 was provided for an experimental drilling program. Industrial firms donated such expensive items as motors, drillpipe and diamonds for the drilling bits. The drilling barge *CUSS I* (from the initials of the oil companies that financed it, Continental, Union, Shell, Superior) was chartered from Global Marine Exploration Co.

It's impractical to anchor in the deep ocean and, besides, the slack necessary in the anchor cables could pull *CUSS I* out of position while drilling. Bascom proposed a new deep-sea mooring principle called "dynamic positioning." Four big outdrive motors, two on each side, were installed on *CUSS I*. Each is driven by a 200-hp. diesel on deck, each has a 32-inch propeller that can be swiveled in any direction. These move the ship bodily to the left or right, ahead or astern, or even rotate it on its own axis. The force of winds and surface currents is overcome and the ship can be held inside a circle no more than 500 feet in diameter.

Several kinds of reference points to steer by have been tested. Some use a deep-anchored buoy—a hollow aluminum buoy six foot in diameter held 200 feet below the surface by a wire line attached to an anchor on the sea bottom.

Some of the buoys carry sonar reflectors so that sonar signals emitted by a trans-

ponder suspended from the ship are reflected back to it. Others have a line leading to a surface buoy that carries a flag for daylight sighting, a lamp for after-dark sighting, and a radar reflector for the special short-range radar transmitter on *CUSS I*. Such a buoy can be watched 24 hours a day, with the radar reflector serving as the reference point in case of heavy fog. The first tests used a number of radar and sonar buoys for comparison purposes.

Another way of determining position is by lowering an inclinometer into the sea bottom close to the drilling point and from which the angle of the drillpipe where it enters the sea floor can be continuously indicated on a wheelhouse instrument.

To operate the outboard engines a central steering console was installed in the wheelhouse. It has a short vertical control handle something like a small aircraft's control stick. It can move in any direction. A movable metal ring surrounds the hemisphere on which the handle is mounted.

On station, the pilot watches the inclinometer and his other positioning indicators and jockeys the ship simply by moving the control handle in the direction he wishes the ship to move. He rotates the ship by moving the metal ring in the desired direction. An adjustable "trim tab" built into the rotation mechanism automatically counteracts any torque produced by the drill bit.

Even with this advanced equipment the ship is rarely directly over the hole being drilled. Subsurface currents may bow the drillpipe away out of line. "Magnus lift," the tendency of a rotating column to move at an angle in a current, may be a problem. And, meanwhile, wave action may be raising and lowering the drilling vessel.

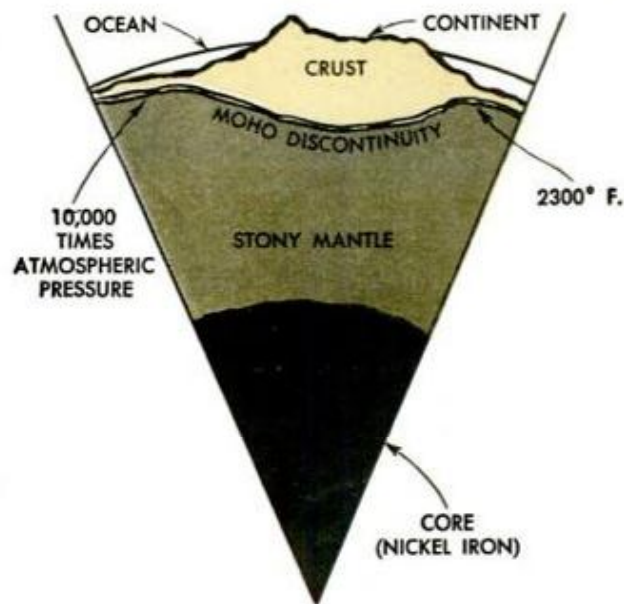
(Continued to page 208)

**OPERATOR** holds ship over hole by positioning four outboard motors with this stick in the wheelhouse



JULY 1961

**MOHO** discontinuity rises from 20 to 30 miles below a continent to from 4 to 9 miles below sea bottom





# Living Room Shrinks to Tom Thumb Size

By Jack B. Kemmerer

JOSEPH COOPER of Hollywood, Calif., is a dentist by profession and a perfectionist by avocation. Years ago, when pricing a ship model, he was appalled by the poor workmanship and the high cost. He decided he could do a better job with his own dental tools and equipment.

The episode started him on a hobby of making miniatures. His current project is duplicating his living room on a 1-to-12 scale, even down to using the same materials as the originals. He works in wood, marble, gold, silver, brass, copper and silk, and the miniature replica includes real logs in the fireplace, lights in the lamps, drawers that open and candles in the candelabra.

**LIVING ROOM**, duplicated precisely on 1-to-12 scale, has lights that light, logs in fireplace

**SCALE SIZE** is shown vividly by placing miniature lamp alongside full-size original which it duplicates



DR. COOPER made all miniatures functional. Model lamp lights up with 1½-volt grain-of-wheat bulb



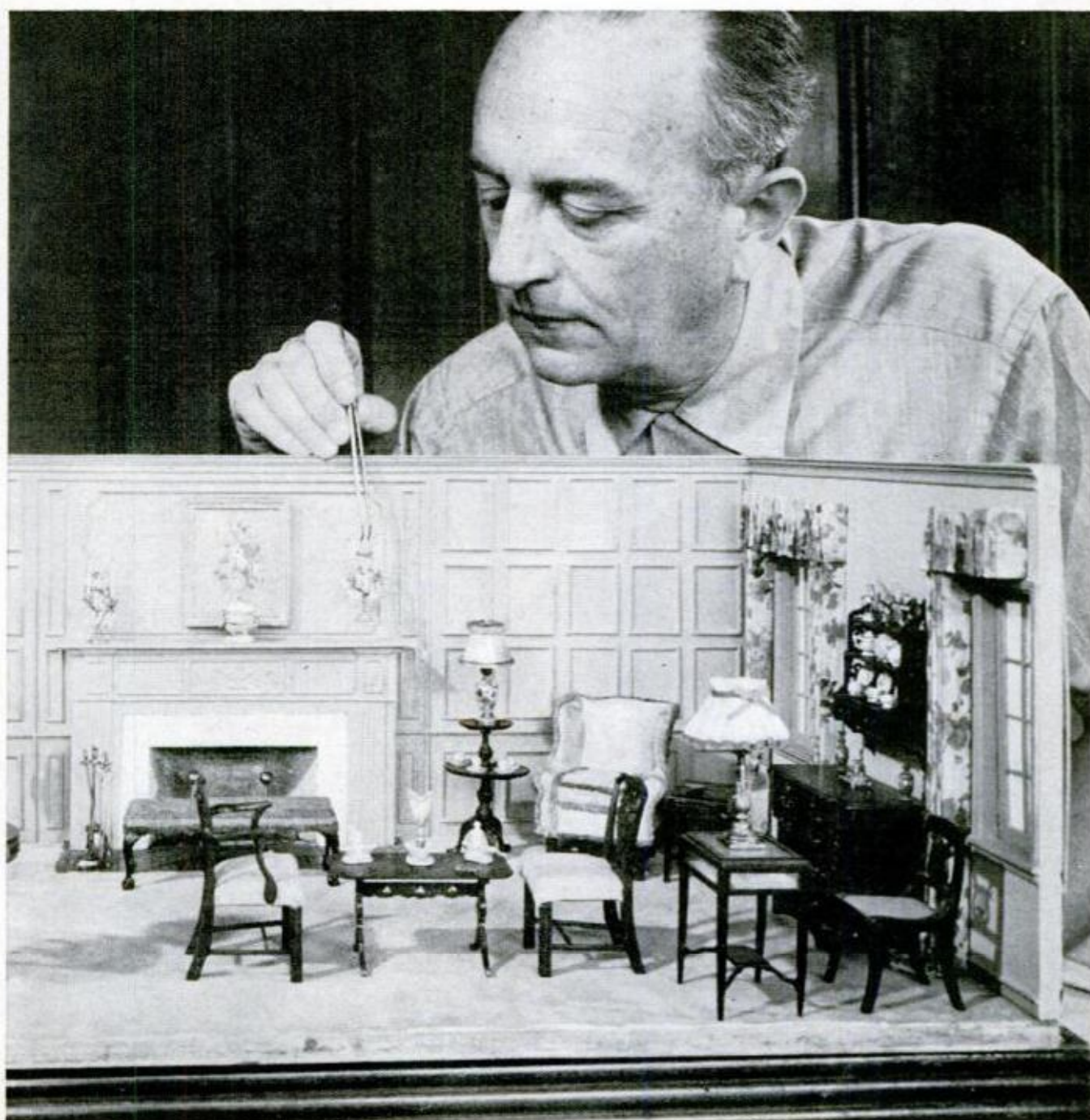




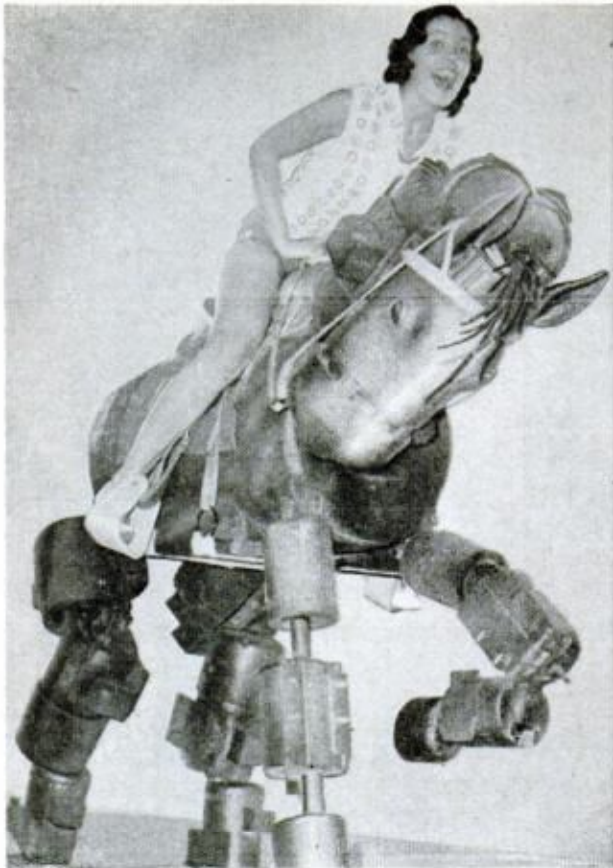
**DENTAL TOOLS** were used on all models. Tiny plaster molds of figurines were cast in his office denture casting machine



**EXACT REPLICAS** were made more exact by using same wood, fabrics as in original







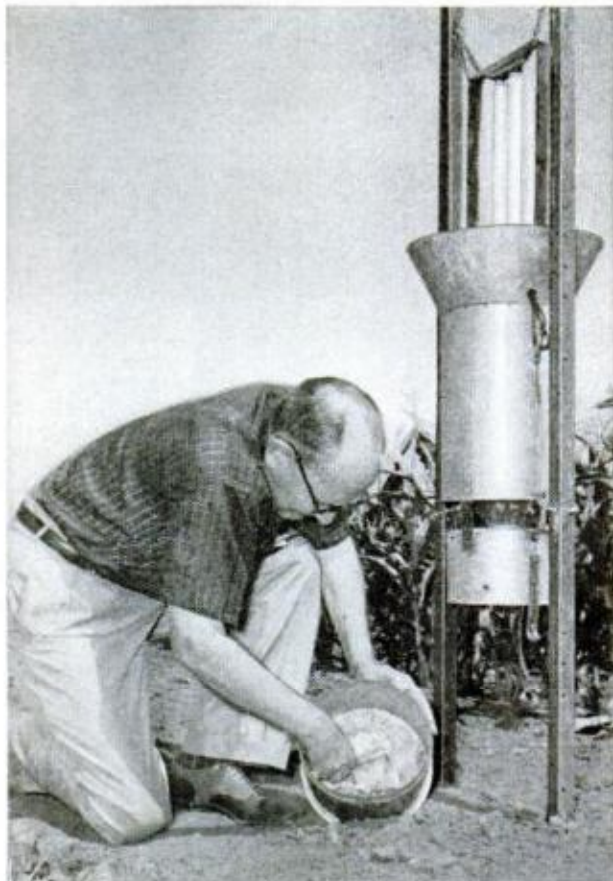
### Horse Made of Motors

To promote the idea that motors put out more horsepower, a manufacturer has cobbled up a horse made entirely of motors—except for its mane. It does not run.



### Minute-A-Day Gym

Eliminating weights, springs and elastic, the Minute-Gym develops strength by momentary muscular contraction. It's made by Minute Home-Gym, Yonkers, N.Y.



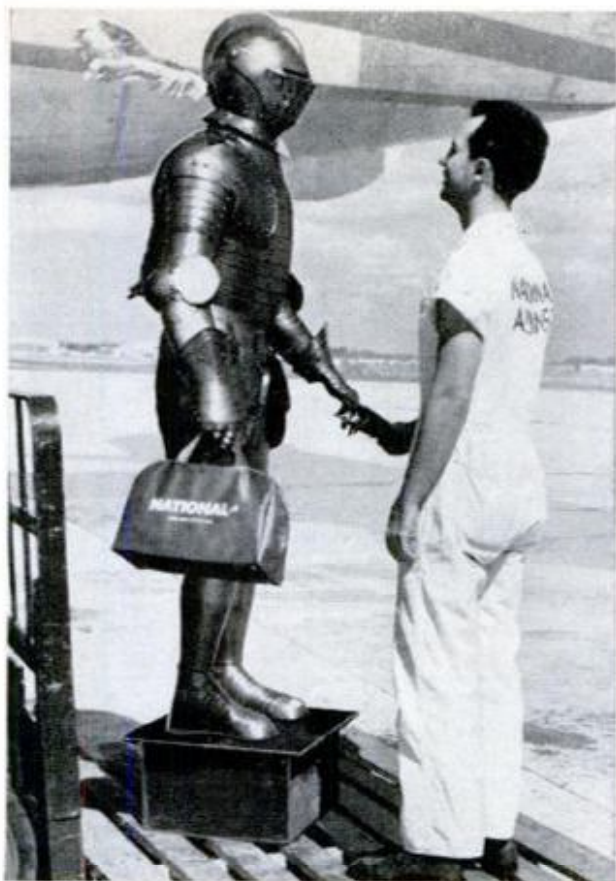
### Trap Attracts Insects With Ultraviolet Light

Glowing an eerie green in the dark, Purdue University's new insect traps use ultraviolet light to attract night fliers. They have proved irresistible to a host of different insect species ranging from cucumber beetles (which are usually not night fliers), to the moths of leaf hoppers and cabbage loopers.

In addition to its value as a control device, this type of trap is proving valuable in insect surveys conducted to determine the best time for spraying or dusting.

Set up early in the year before the moths have a chance to lay eggs, its nightly catch serves as a constant indicator of the pending onslaught of different crawlers and borers during the course of the year. Thus, sprays and dusts can be used with greater discretion and economy, reducing considerably the amounts ordinarily used. Once installed, operation of the traps is "automatic" in that the weather and soil-moisture schedules needed for insecticides are unnecessary.





### Fly Now, Slay Later

Not an astronaut but a 17th-century suit of armor, this iron "passenger" gets a send-off in Miami Fla., as it boards a plane for Mexico City.

### Amplifier Snaps Onto Phone

Completely self-contained in a snap-on cover, a new telephone amplifier operates at the flick of the switch at its side. An adjustable tone control helps eliminate outside interference.

Said to be a boon to the hard-of-hearing, the unit can be carried easily in a pocket and snapped in place on whatever telephone the owner happens to be using. The larger clip seen at the top of the unit is an induction pickup which amplifies both sides of the conversation with no connections to the telephone itself. The amplifier weighs only two and four-tenths ounces.

Using transistor amplifiers operated from replaceable mercury cells, the unit delivers up to 1600 three minute calls.

The Manufacturer is Multitone of Canada, Ltd., 130 Merton St., Toronto 7, Ontario.

☐ The aurora borealis, or northern lights, occurs most frequently in a belt that passes north of Norway, south of Iceland and Greenland, then westward across Hudson Bay to Point Barrow, Alaska, and through Northern Siberia. Up to 243 auroras have been observed in one year over Hudson Bay.



### Portable Heat-Generating Gun

Able to reach temperatures of 30,000 degrees F., Plasmadyne Corporation's Plasmatron gun is used chiefly for depositing coatings of high-melting point materials.





# Scramble For a Wild Boar

By George X. Sand

**D**OWN IN FLORIDA a group of rugged individuals — Pacific veterans all — “unwind” by catching large and dangerous wild boars barehanded in the Everglades swamps. No guns are permitted.

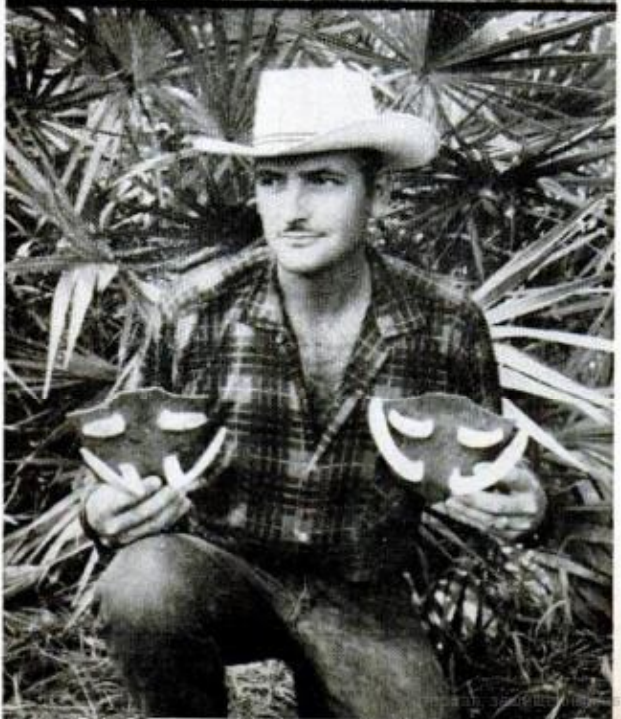
The men prefer to hunt at night, often crashing through low spots waist deep in stagnant water. Moonlit nights are particularly good, when the big pigs feed upon acorns and root up young trees on the higher hummocks. The hunters arrive in four-wheel-drive vehicles, turn loose their eager hounds, then wait for the rangy animals to give tongue. Once these Walker, redbone and sundry breeds of trail dogs announce that a boar has been “bayed up,” the men release “catch dogs” (pit bulls and airedales) from mobile truck-body kennels and race in the direction of the action.

The catch dogs leap in fearlessly to catch the snarling, cornered tusker by its ears. This momentary diversion of the squealing beast's attention permits the men to wrestle it to earth. Often neither operation is complete without injury. The long, knife-sharp tusks of the boar are self-sharpening (the upper curved teeth rub constantly against matching lowers) and are capable of cutting deep, sidewise slashes in man or beast.

Frequently the cornered pig manages to cause sufficient confusion to make good a temporary escape. Then the wild melee of the swamp chase begins all over again.

The Everglades boars weigh up to 400 pounds. They were introduced to Florida centuries ago by the early Spanish *conquistadors*, but escaped to the impenetrable saw-grass swamps where they reverted completely to the wild. Thoroughly unpredictable and without fear of man, these swift beasts are regarded by many experienced hunters as the most dangerous animal on this continent.

Captured boars are either released or eaten. This one was given to a landowner in return for hunting privileges. Used for breeding, it will before long convert to the status of a docile domestic porker.





**HURRYING** in to help the dogs, hunter leaps from moving truck to join the fight. Left alone, the enthusiastic catch dogs are no match for the boar, and can be badly hurt

**TOUGH AIREDALE** catch dog is thrown out of the fight by a toss of the boar's head. Men's faces reflect concern for the dog. But he whirled, unhurt, and returned to the fray only to be tossed again

**GRABBING** an angry boar by the hind leg is about like grabbing a bull by the tail except that the boar can whip around and get you anyway. But it's good way to get him down

**MEN, DOGS AND BOAR** scramble in the swamp. Downed man is in trouble—lightning-fast boar can charge quicker than he can get up. Some Airedale is on bottom of the pile this time

**WICKED**, self-sharpening tusks, two of dozens of sets taken by the hunters. Tusks rub together every time boar moves his jaw, keeping them worn to a knife-sharp cutting edge

**END OF THE FIGHT.** Captured uninjured, this boar went to the hunters' rancher host, who will rehabilitate him into a domestic hog again. Once-wild pigs make fine domestic breeding stock







# ***Have We Reached the Limit in Land Speeds?***

*By Frank A. Tinker*

**H**OW FAST WILL A CAR—any car—go? This question aroused more interest during the last year than at any time since the 1930s. The interest is likely to grow even more intense now that American competition has risen to challenge successfully the present



**MPH**

1900 1910 1920 1930 1940 1950 1960 1970

1947 JOHN COBB 394.19 ●

?

1938 JOHN COBB 350.20 ●

1935 SIR MALCOLM CAMPBELL 301.12 ●

1932 SIR MALCOLM CAMPBELL  
253.96 ●

1927 MAJ. H.O.B. SEGRAVE ●  
203.79

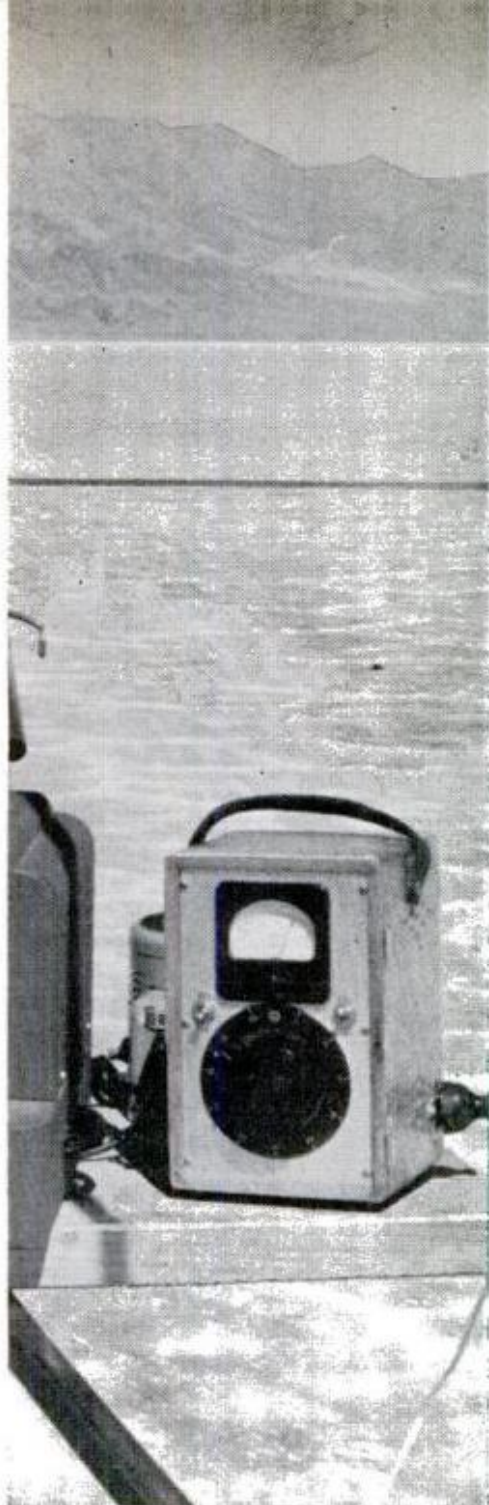
1920 TOMMY MILTON ●  
156.04

● 1904 BIGOLLY  
103.56

● 1899 HENATZY 65.79

● 1898 CHASSELOUP-  
LAUBAT 39.23

**LAND SPEEDS** may have reached saturation level, as shown in graph. In 40 years, from 1898 to 1938, speed records increased nearly 1000 percent. Since then, only 12 percent. In last 14 years, not at all. Body design, engine power, available tracks are all factors



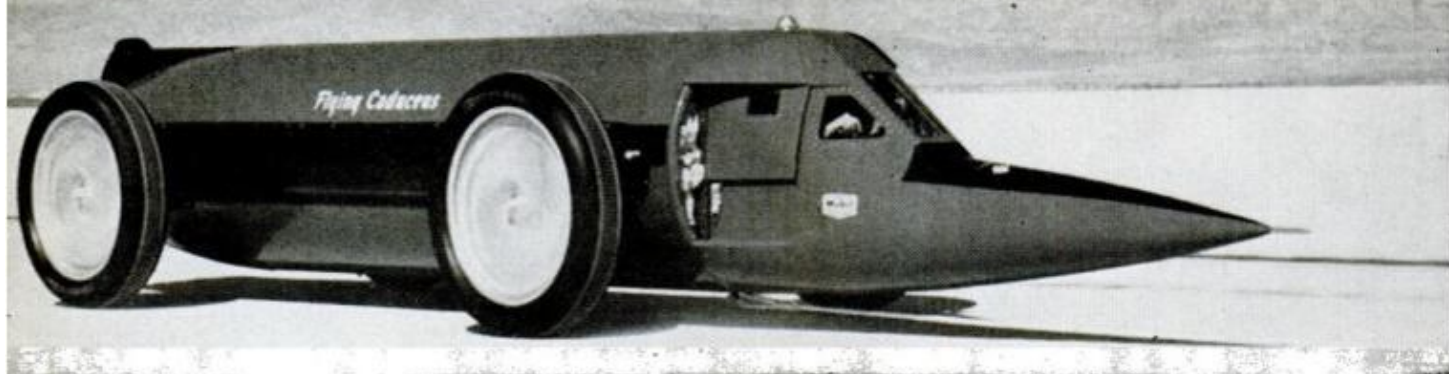
**SALT FLATS** at Bonneville, Utah, have been scene of all speed records over 300 m.p.h. But even they have their limitations

**SURFACE TEMPERATURE** of track is crucial. George E. T. Eyston tests damp Salt Flats which remain cool in blazing desert sun

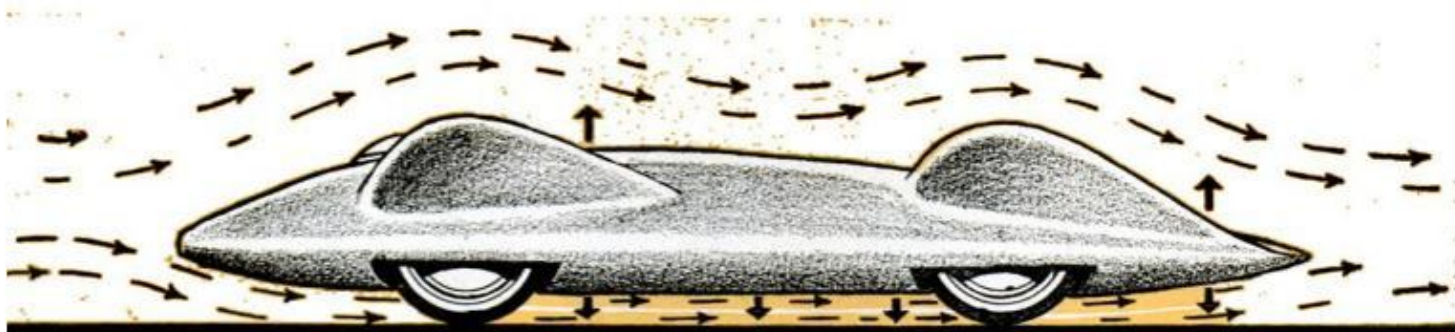
**BLACK LINE** on Flats is all drivers have to guide them. At 400 m.p.h., it's like "being in space" which moves with them







**FLYING CADUCEUS**, with jet engine, made recent attempt at world speed mark. Novel design includes tank-like cockpit and exposed wheels and tires which stand shoulder-high to normal man. Doc Otich drove it

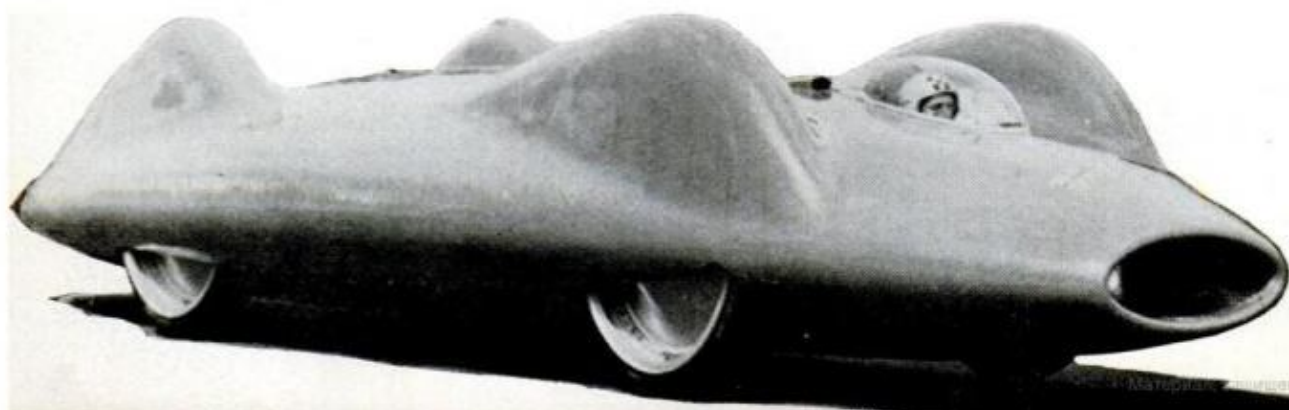


**PHYSICAL FORCES** which tend to keep car at equilibrium during speed runs are illustrated here. With body acting as airfoil, upper side produces lift and lower side produces downward force, keeping car in balance

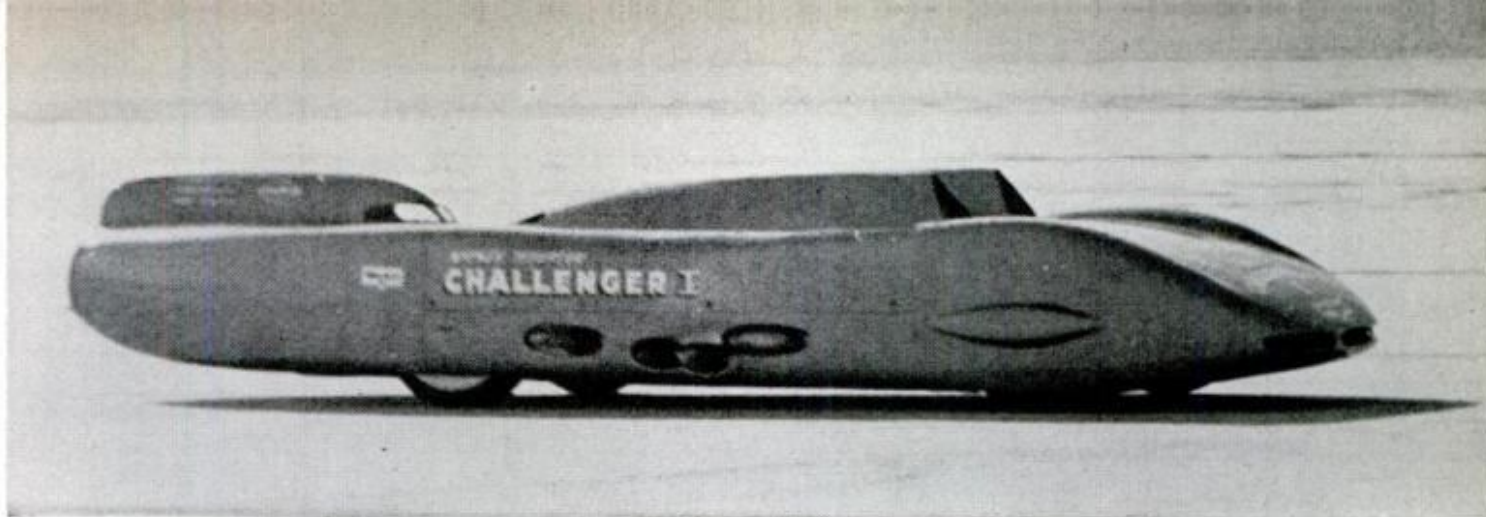


**CAMPBELL'S BLUEBIRD**, most promising of recent cars to try for record at Bonneville, lies bent and torn after 350-m.p.h. skipping slide along Salt Flats. More than 70 companies invested \$4,500,000 in it, and supplied 20 support vehicles

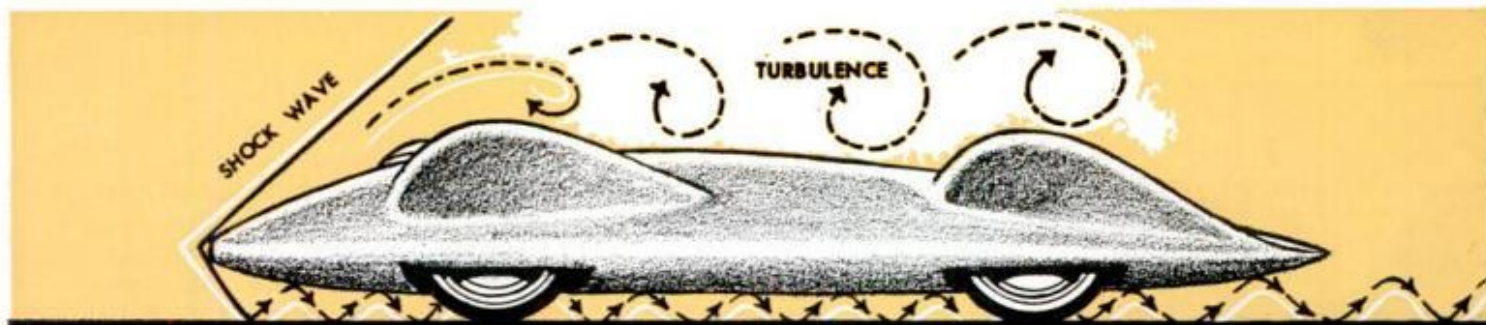
**DONALD CAMPBELL** tests Bluebird prior to crash. Designed to go 500 m.p.h., it was tested by both electronic means and personal driving, much the same way new aircraft are static tested in wind tunnels before putting them into final production







**CHALLENGER I**, Mickey Thompson's monster with four supercharged Pontiac engines, unofficially broke existing world speed mark for one-way run, hitting 406 m.p.h. Broken drive shaft killed chance for return run



**SHOCK WAVE** will disrupt normal flow of air over body if cars are ever built fast enough to break sound barrier. Resulting turbulence and buffeting will seriously impair driver's chances for surviving run intact

land-speed record for the measured mile.

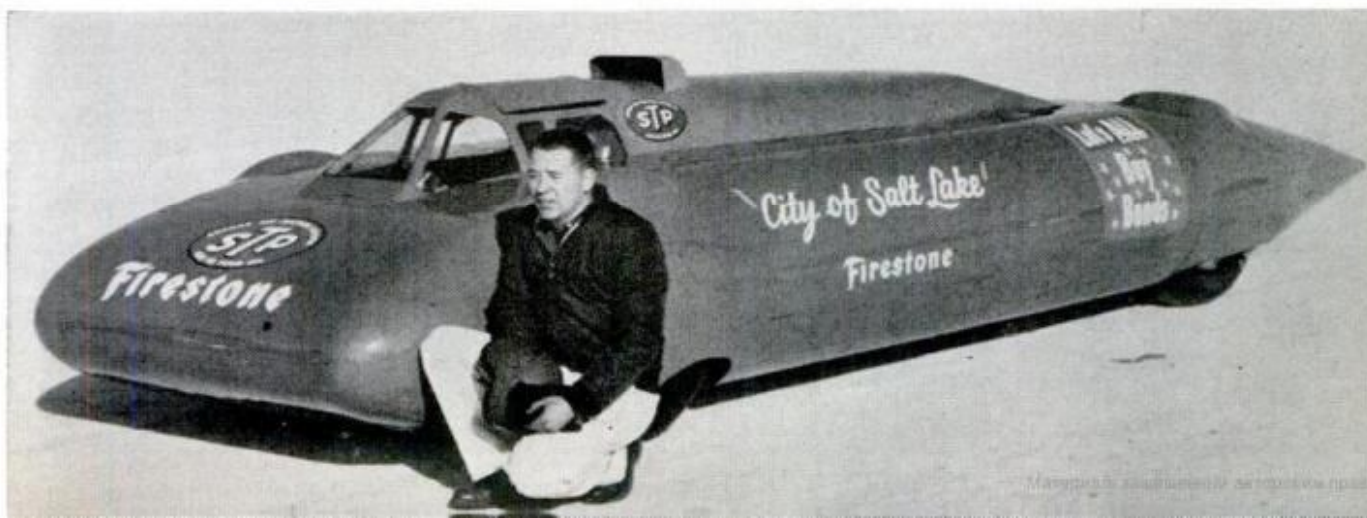
Many observers' reaction to the recent runs on Utah's shimmering salt flats, however, is a suspicion that a rough limit to auto speed is being approached or has been reached. Beyond some such limit, perhaps the current 400-m.p.h. record, the effort, expense and risk involved simply become prohibitive.

The term "car" on the Bonneville straightaway usually refers to vehicles once described by Ab Jenkins as "freaks," which they are by ordinary automotive standards. To keep the very definition of an auto within limits, the governing Federation Internationale de l'Automobile has decided that the machine must be propelled and guided

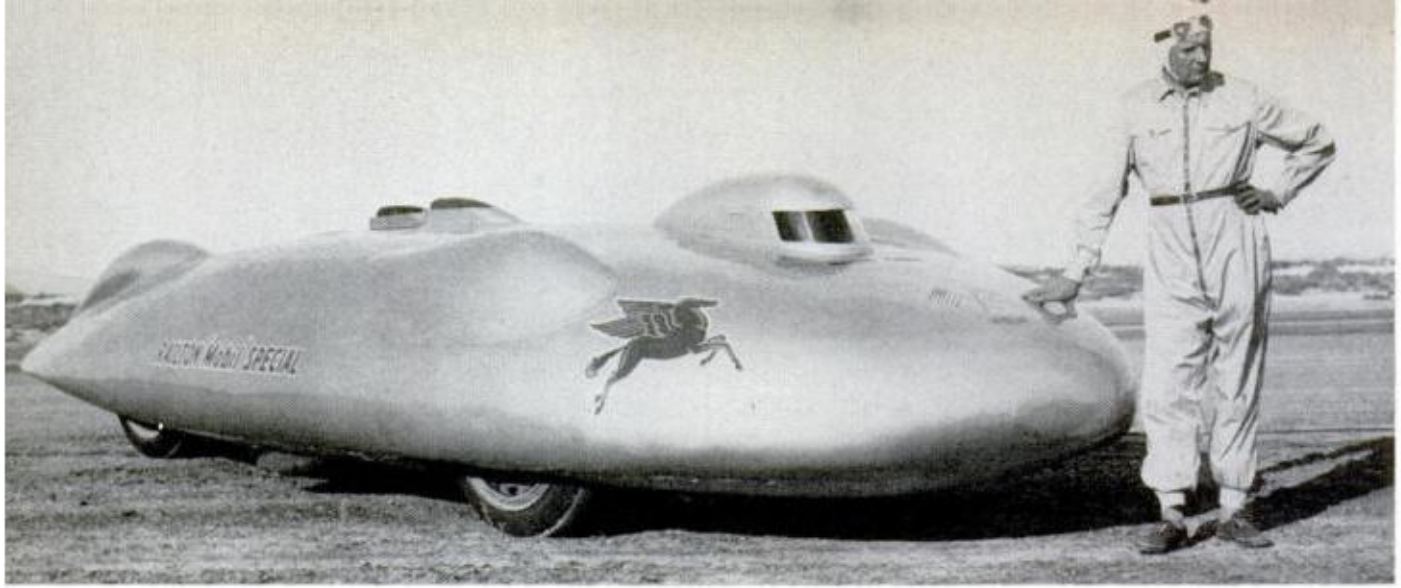
through the contact of wheel upon earth. This becomes meaningful today, when rocket-driven sleds, confined to a track, are carrying man twice the speed of sound. But the man in that sled does not operate it, and such rockets or jets are not officially classifiable as cars.

To propel a *true* car faster was once simply a matter of applying more and more power to wheels mounted on a suitable frame. In one man's lifetime, that of Capt. George E. T. Eyston, this concept transformed the world's fastest auto from a sputtering two-lunger to a ten-wheeled, 7½-ton giant, in which Eyston roared across the desert at 358 m.p.h. But then a brief revolution — a refinement — set in, which has

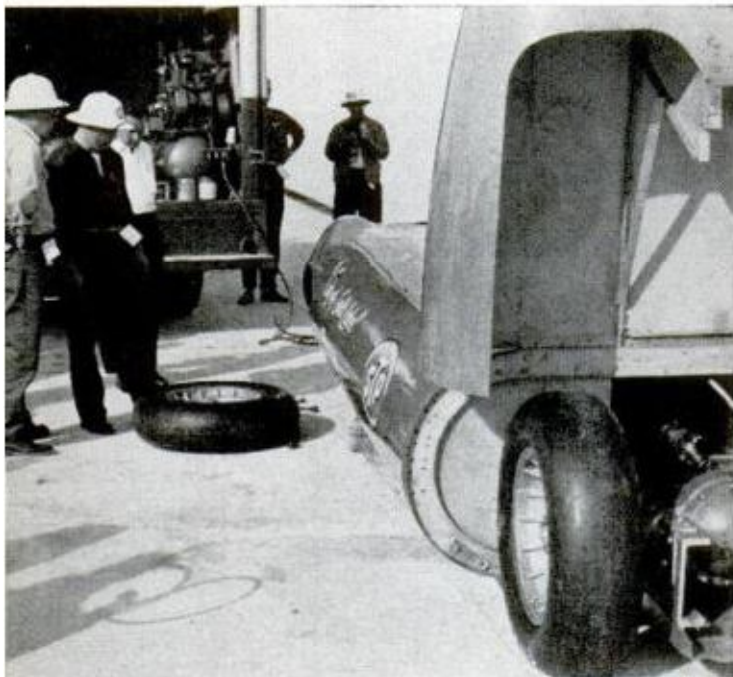
**ATHOL GRAHAM**, tragic figure of Salt Flats runs, poses beside ill-fated "City of Salt Lake" just prior to speed run that resulted in his death. Real reason for fatal crash is unknown because of mangled condition of car





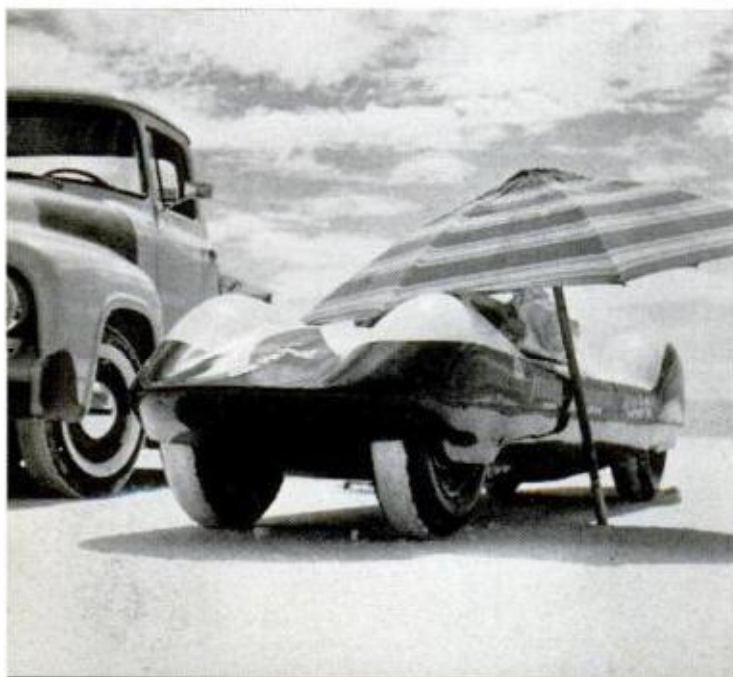


**RAILTON SPECIAL**, probably finest car ever taken to Bonneville, still holds world mark of 394.19 m.p.h. for two-way run. Many claim it could beat its own record today if resurrected. That's John Cobb beside it



**SPECIAL TIRES** for Bonneville "freaks" are usually built for one car only, with wheels built to fit

**ULTIMATE SPEED** depends on power vs. drag. This one is extreme example of huge engine in slim body



lasted until the present and which has carried piston-driven cars, in Eyston's opinion, almost to their ultimate speed.

This revolution was a reshuffling of the power-vs.-drag ratio which determines the speed of any moving object. A lighter car is obviously easier to accelerate and stop, but air resistance is an even more serious hindrance than weight at speeds above 300 m.p.h. Reasoning thus, British sportsman John Cobb and designer Reid Railton reversed the trend by cutting the size of their *Mobil Special* until it had only half the weight of Eyston's *Thunderbolt* and only 2860 hp. compared to *Thunderbolt's* 7000.

To support their action and Eyston's opinion, the record of 394.196 m.p.h. which Cobb set in this car 14 years ago had not been seriously challenged before last summer. It may be significant that this speed is roughly the same as that achieved by the best piston-driven aircraft. Mickey Thompson recently carried that same process of reducing size at the sacrifice of power even further, cutting the frontal area of his *Challenger I* from Railton's 30 square feet to 13.777 and the power to approximately 2000 hp. With this machine he drove to a one-way record of 406 m.p.h.

Without detracting a whit from Thompson's achievement, an outstanding personal triumph, it is generally agreed that the design of his *Challenger I* is not as aerodynamically clean as Railton's, due to the unavoidable requirements imposed by the power package and the wheels. Further, although Thompson averaged three m.p.h. faster than Cobb through half the required course, Cobb ran under difficult wind and track conditions and did not push the Railton car to its maximum.

Reid Railton, standing knee-deep in the flood water which halted further runs in 1947, commented that there probably was

(Continued to page 210)



## Rickshaw Rolls Along On One-Playmate Power

Toys, too, are showing the influence of the Orient.

Built in Indiana, but bearing the spell of the East, is the Rick-Shaw, in which youngsters can ride beneath a candy-striped canopy while propelled by a playmate or two.

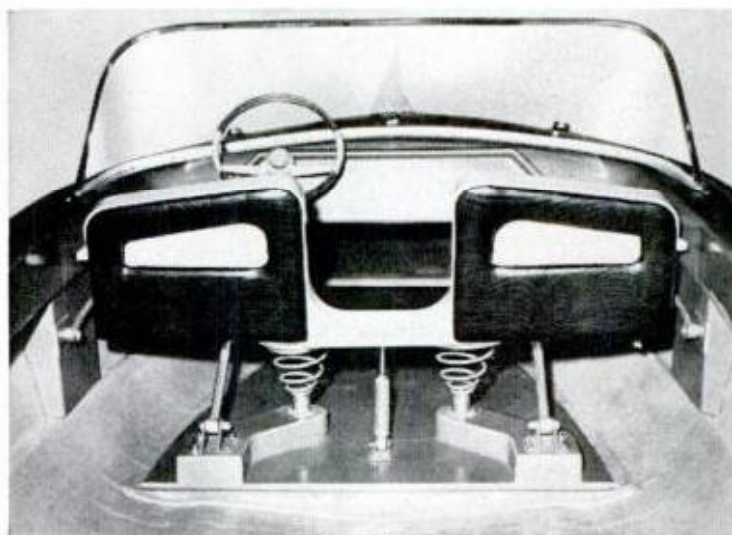
The large-wheeled toy has semi-pneumatic tires for easy pulling. Its wide axle wards off accidental tips, and curled steel rear bumpers halt backward tilt at a safe angle. The armrests can be gripped by tiny hands and help hold the rider in place. It is made by the Goshen Mfg. Co., Goshen, Ind.



## Hydraulic Boat Seat Irons Out Rough Water

Boating involves less of a beating with a new hydraulically controlled, suspended seat that works with an automotive shock absorber to keep the seat steady and level even though the boat is bouncing in rough water.

The seat is suspended by hinged braces at the back only; the front is supported by the shock absorber, augmented by variable rate coil springs. It's made for boat manufacturers by Monroe Auto Equipment Co., Monroe, Mich.

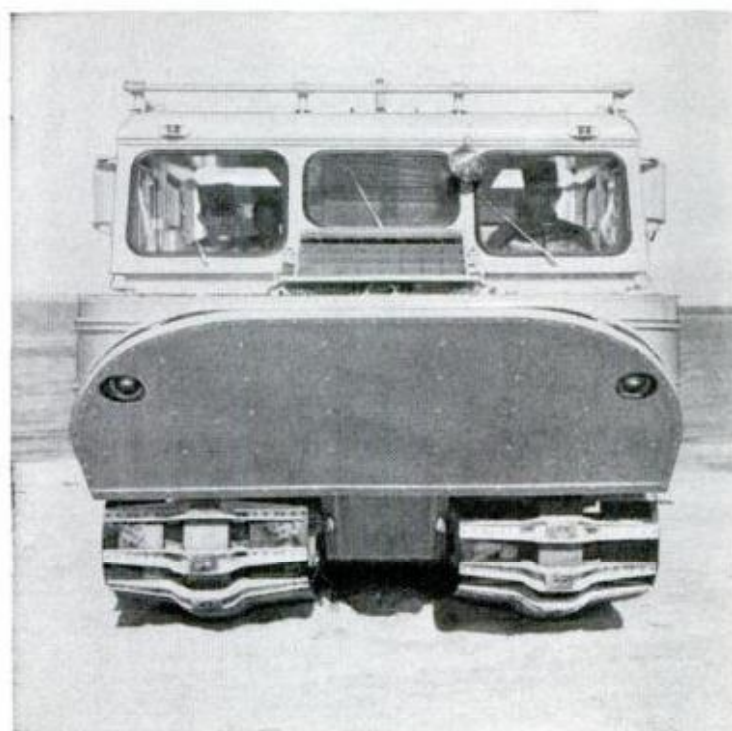


## All-Terrain Dynamometer Tests Army Scale Models

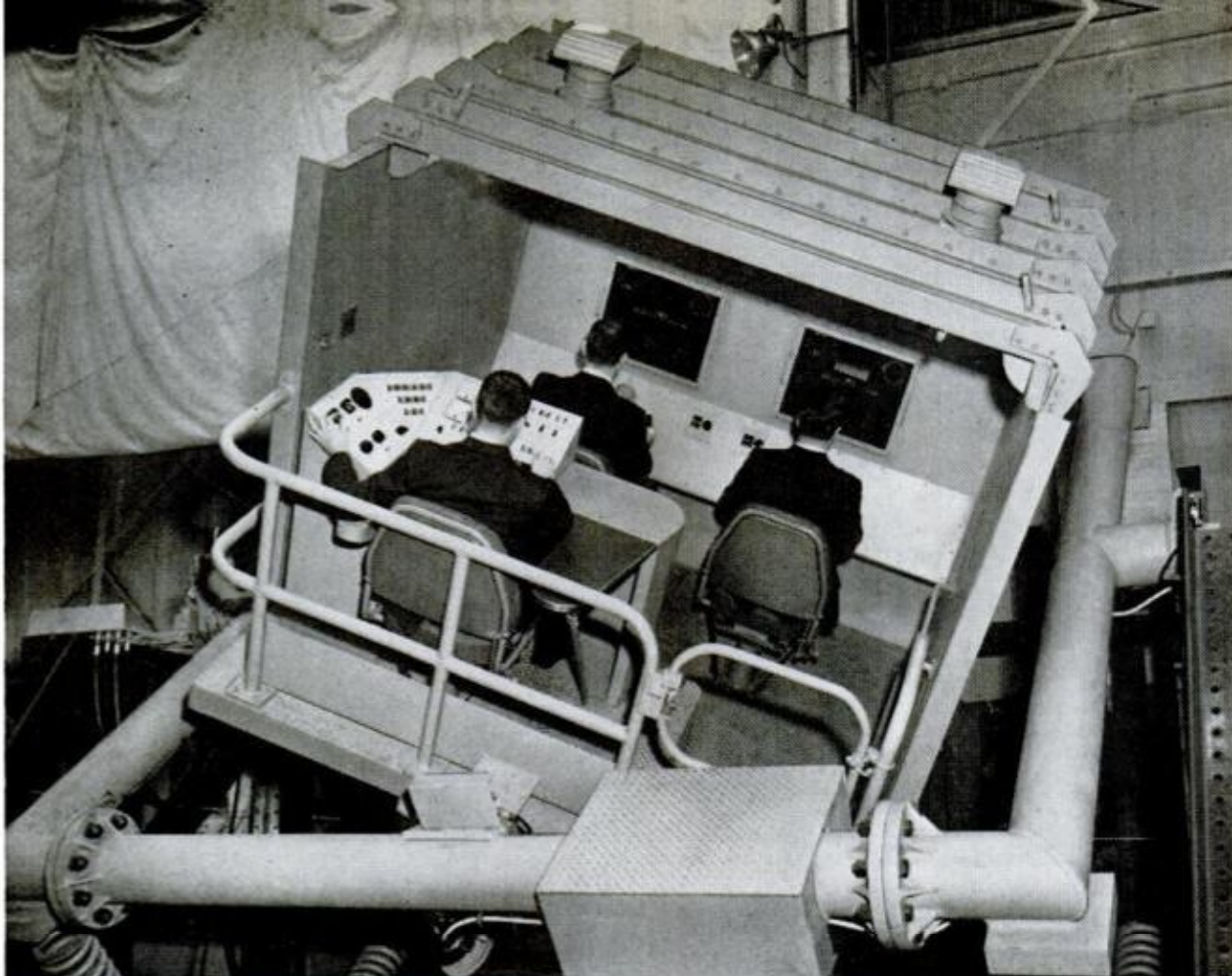
With tracks three feet wide, the Army's newly christened Terrapin, an all-terrain dynamometer vehicle, will be used to gather data on scale models under all conditions, including mud, marsh, muskeg, deep snow and loose sand.

A dynamometer is an apparatus used to measure force. Specifically, the Terrapin will test such factors as sinkage and draw-bar pull of scale models of full-size vehicles under consideration for army use.

A narrow rubber center pad on the Terrapin's tread cushions it on hard surfaces, reducing noise and protecting highways from the usual damage from crawler tractors. While it can float, the Terrapin will not see much sea duty since it becomes unwieldy in surf.







## Atomic Sub Crews Train in Land-Based Simulator

High-speed atomic submarines must be "flown" as much as piloted, so to help train crews for the subs, Republic Aviation has

designed a simulated control room. The two-man control team studies the controls and meets problems created by the instructor.

## No "Do Not Touch" Signs in This Museum

Visitors to the Museum of Art for the Blind in Daytona Beach, Fla., get the feel of the greatest sculpture in the world. On display for them to handle are reproduc-

tions of pieces from such famous museums as the Louvre in Paris and the Museum of Modern Art in New York. The Museum was created by Henry Saltman, an artist.







### Lad Has Mower Fun Barreling Around the Yard

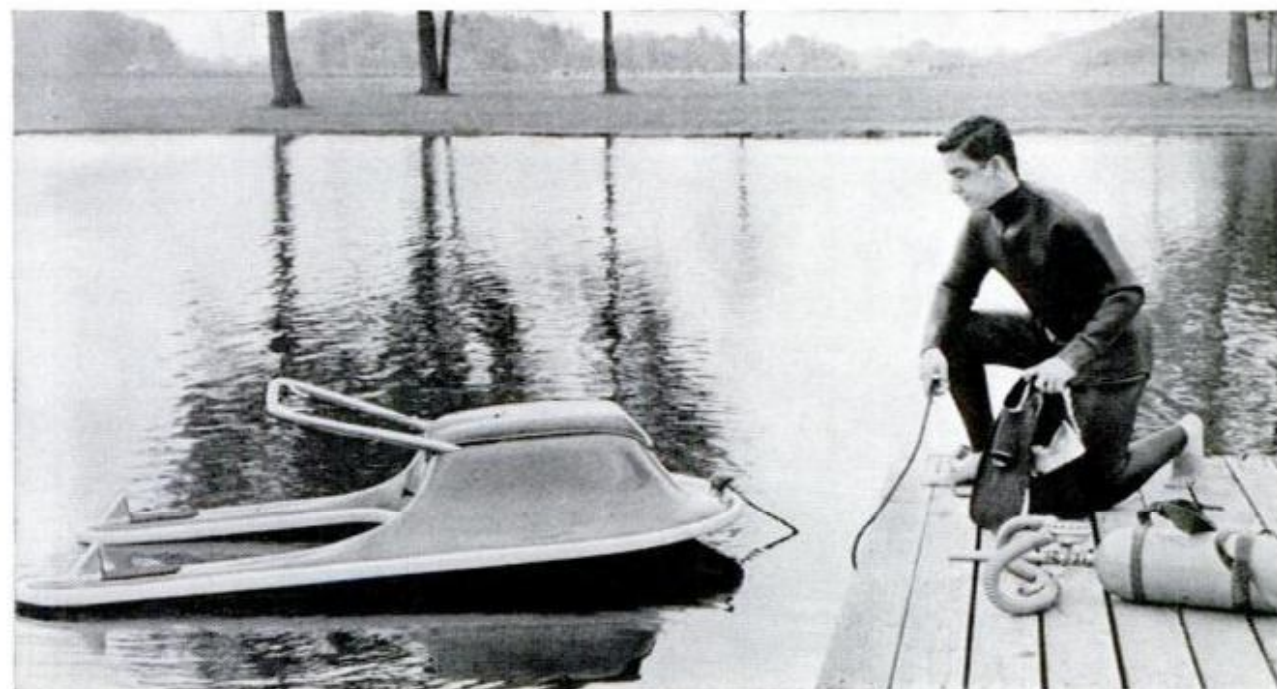
Tired of walking around the lawn behind the family power mower, 10-year-old Richard Bregan of Bookham, Surrey, England, rigged his own riding sulky.

Young Richard used an old baby carriage for the sulky's wheels and frame and added a keg for a seat—with a cushion on top for a touch of luxury.

### There's Standing Room Only on the Ski-Horse

With the operator standing on the two footrests on the stern projections, this trim little vehicle is ridden like water skis. The motor is mounted in the forward section,

and controls are in the handle. The out-board-powered Ski-Horse, designed by S. Jack Magri while a student at Syracuse University, won an Alcoa award for design.







## Marines Get Dunked to Practice Ditching Maneuvers

Airborne troops practice the emergency evacuation methods used in downings at sea with a specially built helicopter that

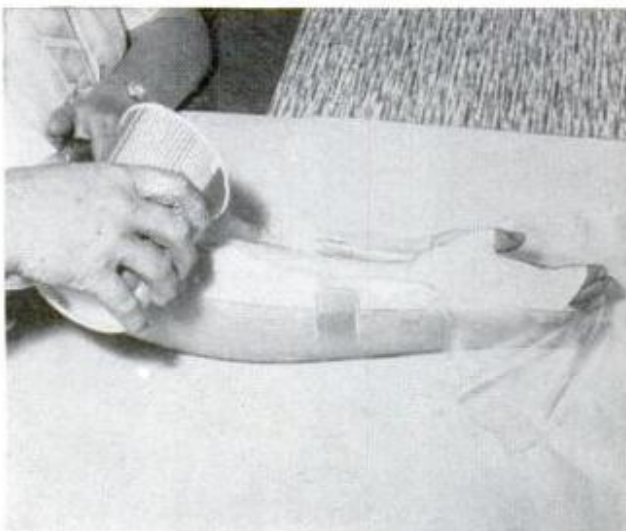
dunks them into a swimming pool of water.

The training device, unlike a conventional fixed-wing plane whose wings act as

## Plastic Cast Sets Around Fracture in Three Minutes

Foam-in-place plastic has been used experimentally to make fracture casts that are one-eighth the weight of conventional casts. The limb, with the bone set, is placed in a fibreglas mold and the plastic poured

around it. The material swells to 35 times its original size and sets in three minutes. Later, wires in the plastic cut open the cast when they are pulled. The plastic is manufactured by Marvel Plastics, Orange, Calif.







floats, will submerge rapidly and flop over on its side, providing a realistic emergency.

In operation at Camp Pendleton, Calif., it handles 10 fully equipped men at once,

all strapped in place. A safety factor is built in to allow the mechanism to lift the dummy helicopter within 10 seconds at any point in the cycle.

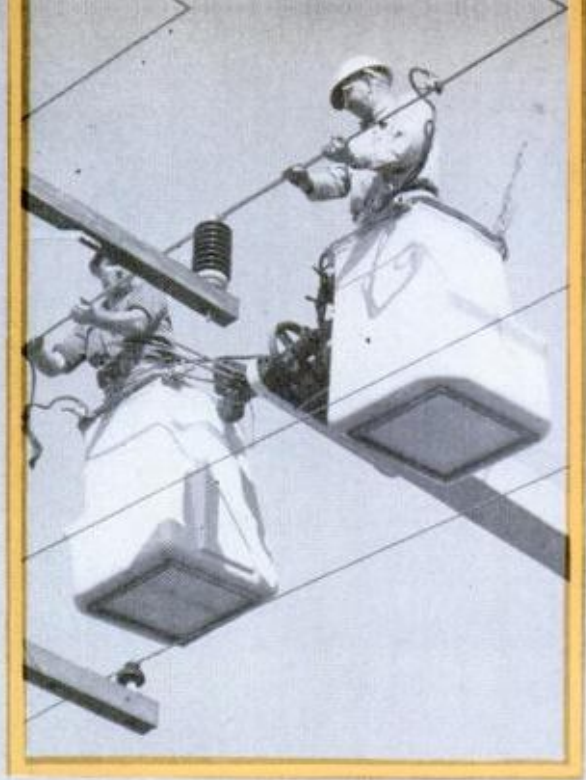
## Levers Help Bus Convert From Road to Rail

Two levers—one that sets the iron wheels in place and another that allows the vehicle to be turned around—enable this Volkswagen to be converted readily to a railroad utility car.

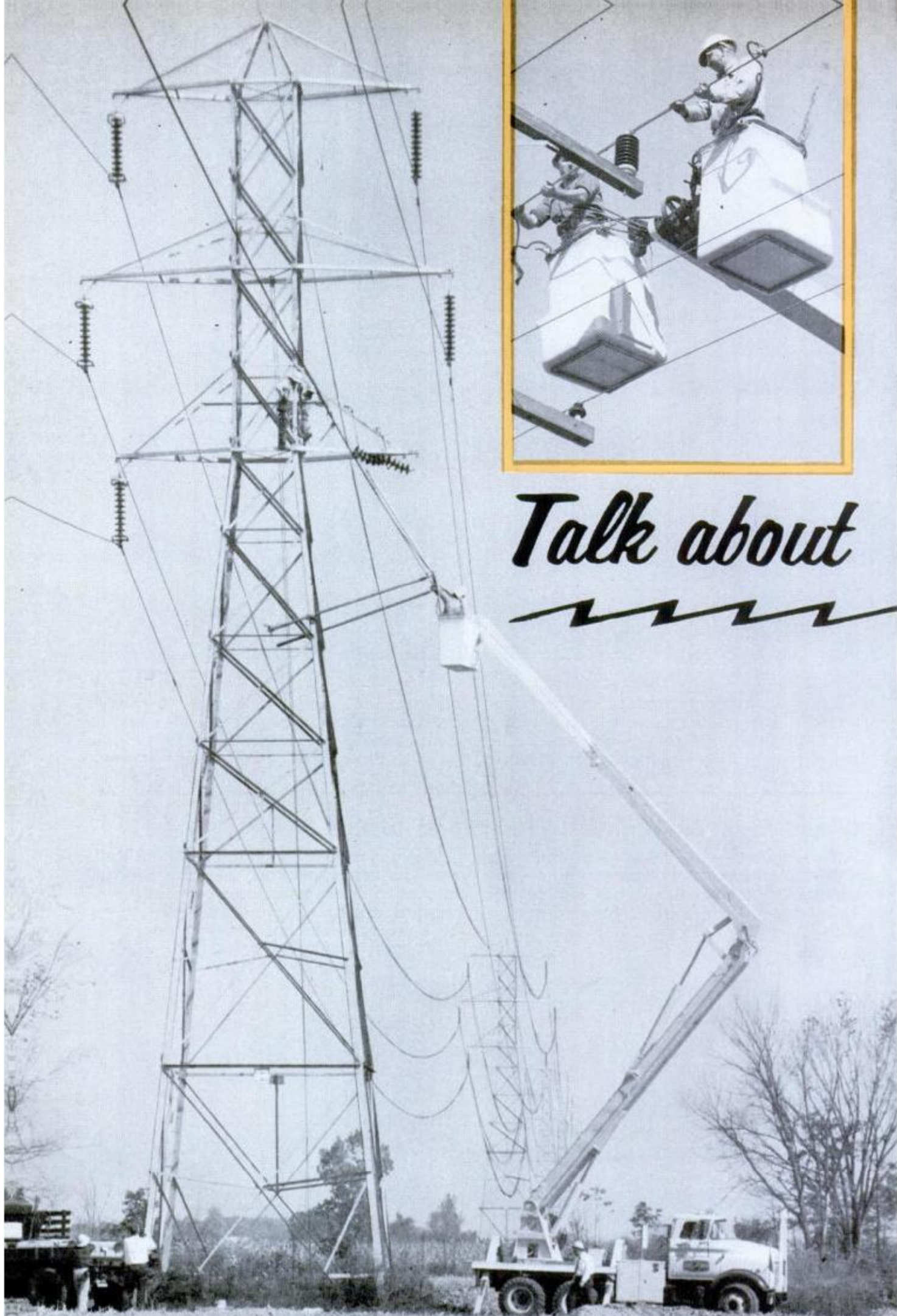
The bus is used on the Long Island Railroad for such tasks as carrying railroad inspectors, delivering small packages to stations and transporting workers to trouble spots to make emergency repairs.







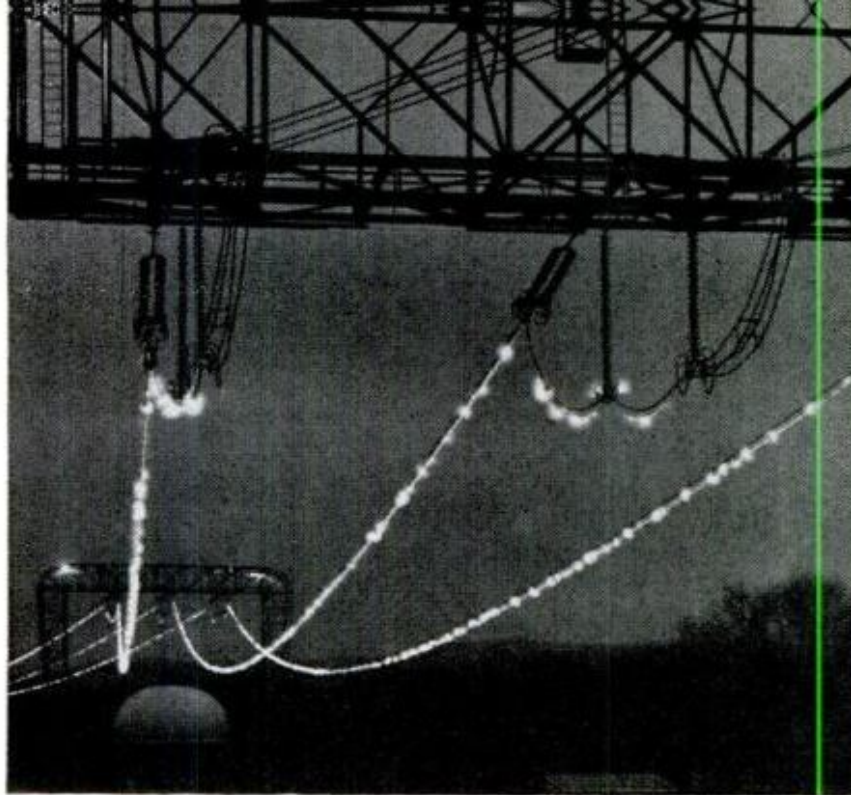
*Talk about*





← **WORKING BAREHANDED** on 34,500-volt live wires, two linemen stand in nonconducting glass-fiber buckets that are lifted into place by insulated boom. Bare-hands technique is new

**CORONA GLOW**, eerie but harmless phenomenon, resulted when three conductors, arranged for 460,000 volts, were energized at record 750,000 volts →



*high-tension jobs!*

# These Men Work the New Superhot Lines

By Theodore Berland

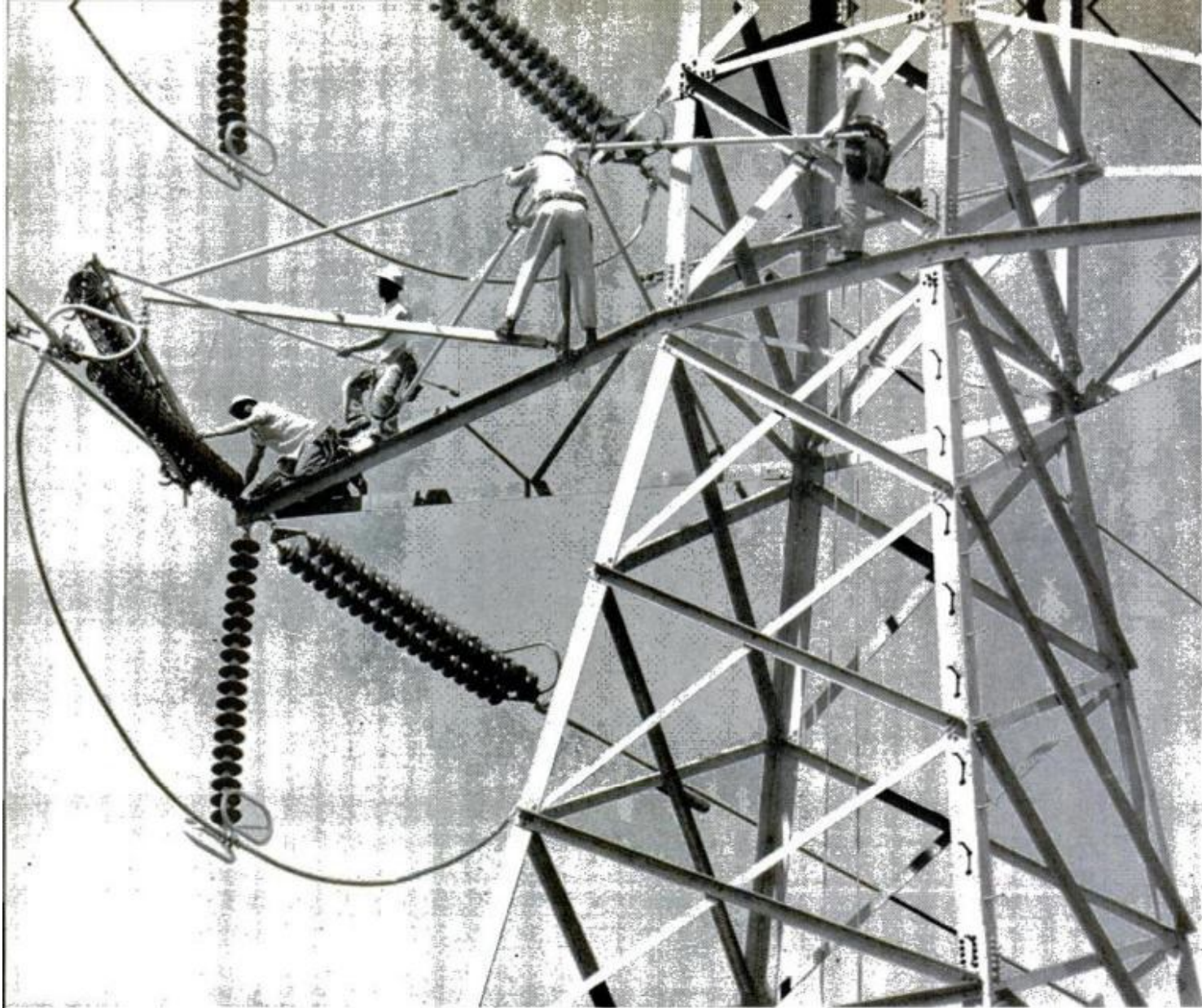
**O**N A CLEAR morning last October spectators gasped as 46-year-old Lewis "Whitey" White, 65 feet above them, wrapped his bare fingers around a live 34,500-volt power line. But nothing happened!

Whitey, a general inspector with the Ohio Power Co., was demonstrating what, oddly enough, is today's safest new technique for working on the "hot lines," as linemen call live power wires.

**HOT-WIRE TOOLS** used by linemen are sometimes installed on end of "hot sticks," poles up to 16 feet long







**LINEMEN SCRAMBLE** like monkeys over tower girders, making repairs while lines are hot. Voltage on this American Electric Power system is 345,000, believed to be one of nation's highest operating voltages

It is quite a problem, explained Whitey, to teach an experienced lineman the new method. Years of training have taught him that the one thing you must **never** do is touch a live wire with your hands or any other part of your body. So his first reaction, Whitey notes, is "to make an awful face, then reach out for the line and stop short. After about three or four tries, he'll finally grab it."

The bare-hands technique is just one new development in the lineman's growing art. Many more are being invented in response to the need for maintaining the nation's growing spiderweb of higher-and-higher voltage lines.

According to Sherman R. Knapp, president of the American Electric Institute, this country's electrical output in 1960 was 764,800 **million** kilowatts — or about 4716 kilowatt-hours for every man, woman and child.

In 1962, electrical production will hit a trillion kilowatt-hours. By 1970, last year's

production will be doubled. By 1980 it will nearly quadruple.

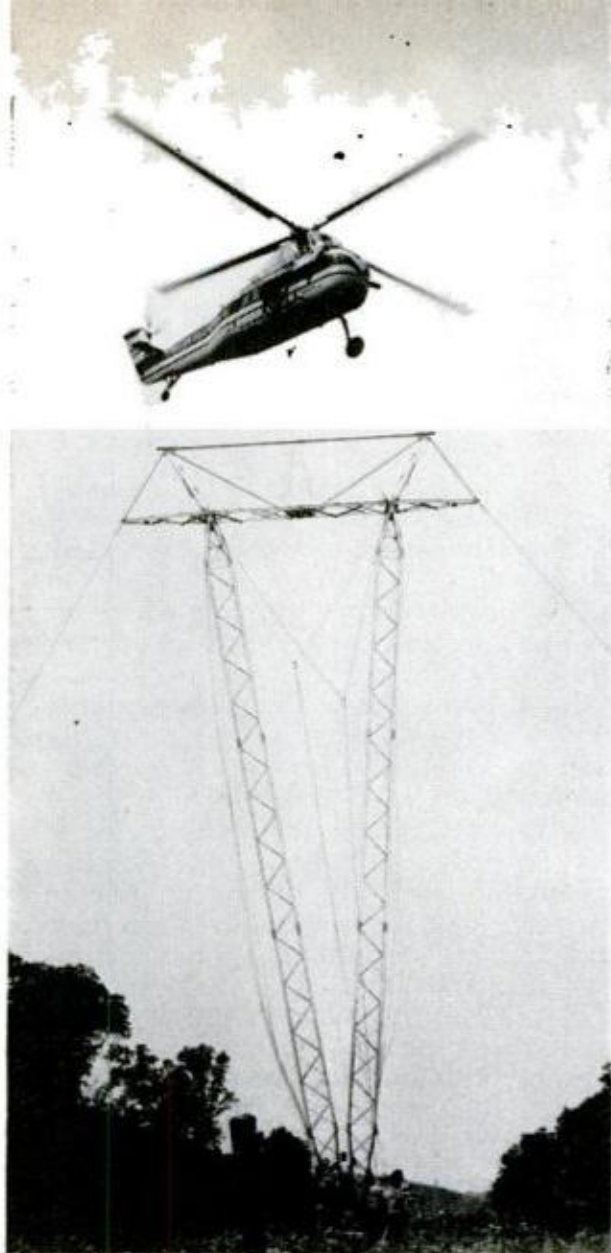
Today, the vast majority of our high-tension transmission lines can carry only 138,000 volts or lower. What's more, rights-of-way are getting harder to acquire as suburbs grow. To meet new power demands, today's lines are being beefed-up to carry 230,000 and 345,000 volts.

Even higher voltages are planned. In December, General Electric opened a four-mile line that will carry 750,000 volts to Pittsfield, Mass. Similarly, Westinghouse and American Electric Power Service Corp. (which built a 500,000-volt line in Ohio in 1946) are building their own 750,000-volt line at Apple Grove, Va.

GE's Dr. Pier A. Abetti, young manager of the Pittsfield project, explains "higher voltage is a sensible, economical way to help supply America's demands for twice as much power in the next 10 years."

The reason is simple: the more voltage a line handles, the more electric power it can





**HELICOPTER HAULS** power tower into place, pinpointing it above its concrete base. Ground crew does rest

provide. But, too, the more headaches for the linemen who must work on them.

### "Pole Monkeys" Go to School

At the beginning of the century, when wages and voltages were considerably lower (linemen earned 45 cents an hour), "pole monkeys" had little specialized equipment to work with. Likewise, because they were less cautious, they frequently tasted live electricity.

Now, newer and newer tools and techniques appear every day and linemen who never cracked a book after training are now studying hard just to keep up.

What's it like to be a lineman today? Ask 55-year-old Barthol H. Zehren of Evanston, Ill., father of six children and grandfather of one. A graying, wiry man with steel-colored eyes and a soft confident voice, he was an underground cable splicer for 18 years, then climbed poles as a lineman for 15. Today he is a line-crew leader for the Public Service Co. in the Chicago suburbs.

JULY 1961



**SAFETY SMOCK** of asbestos includes rubber gloves and plexiglass window. They are used in manholes

According to Zehren, a lineman must be a combination athlete, acrobat, electrician, mechanic, carpenter, tree surgeon, meteorologist and perfectionist. He also must have some of the skills of a surgeon.

Luck? Zehren tells the story of a friend who was repairing a line during a storm. The job finished, the lineman came down the pole. As soon as he stepped away, lightning struck the top where he had been working seconds before.

But linemen never trust to luck. "You have to keep your mind on what you're doing at all times," Zehren explains. "You have to be aware of where all parts of your body are." Feet are most apt to be forgotten as the lineman concentrates on the wire his gloved hands are repairing. But touch a live wire with your leg and you're in trouble.

Linemen constantly study safety. Electric-power companies hold regular meetings for them, and crews hold their own tailgate safety meetings weekly. From the

109





**WELL-DRESSED LINEMAN** will look something like an overdone science-fiction character. When fully equipped, he will carry up to 30 pounds of equipment

**FIRST FEAR** lineman must overcome is not fear of hot wires, but of heights. He spends year of on-the-ground training just learning hot-wire techniques



**LIFE-SAVING DEVICES** used by linemen today include rubber line protectors that look like rubber hoses, rubber boots and sleeves, and rubber blankets that are thrown over dangerous areas

moment he is in training, a lineman is thinking safety. And in cases where safety has failed, he learns how to revive a victim on the pole.

Most linemen start training when they are 20 years old. The rookie first learns to climb poles and get used to heights. If he passes this, he spends about a year on the ground aiding linemen and learning their methods. Finally, he is sent up to work on the wires.

He can still wash out at this point. He may, for instance, find he needs to hold on to something firm with one hand while he's working. This shows he isn't confident. And, if there's anything a lineman must have, it's confidence.

"Fear of height is one of the first things that separates the men from the boys," says Zehren. "Next comes working with live wires."

### The Glove Test

Like the surgeon, a lineman has to be able to work in rubber gloves. And he must test them before he puts them on. The tiniest hole can be the pathway for a bolt of killing current. A lineman will test each glove by grasping it by the wrist, giving it a quick twist to trap air inside, and then squeezing it to see if any of the air escapes. (Good or bad, all gloves are periodically replaced.)

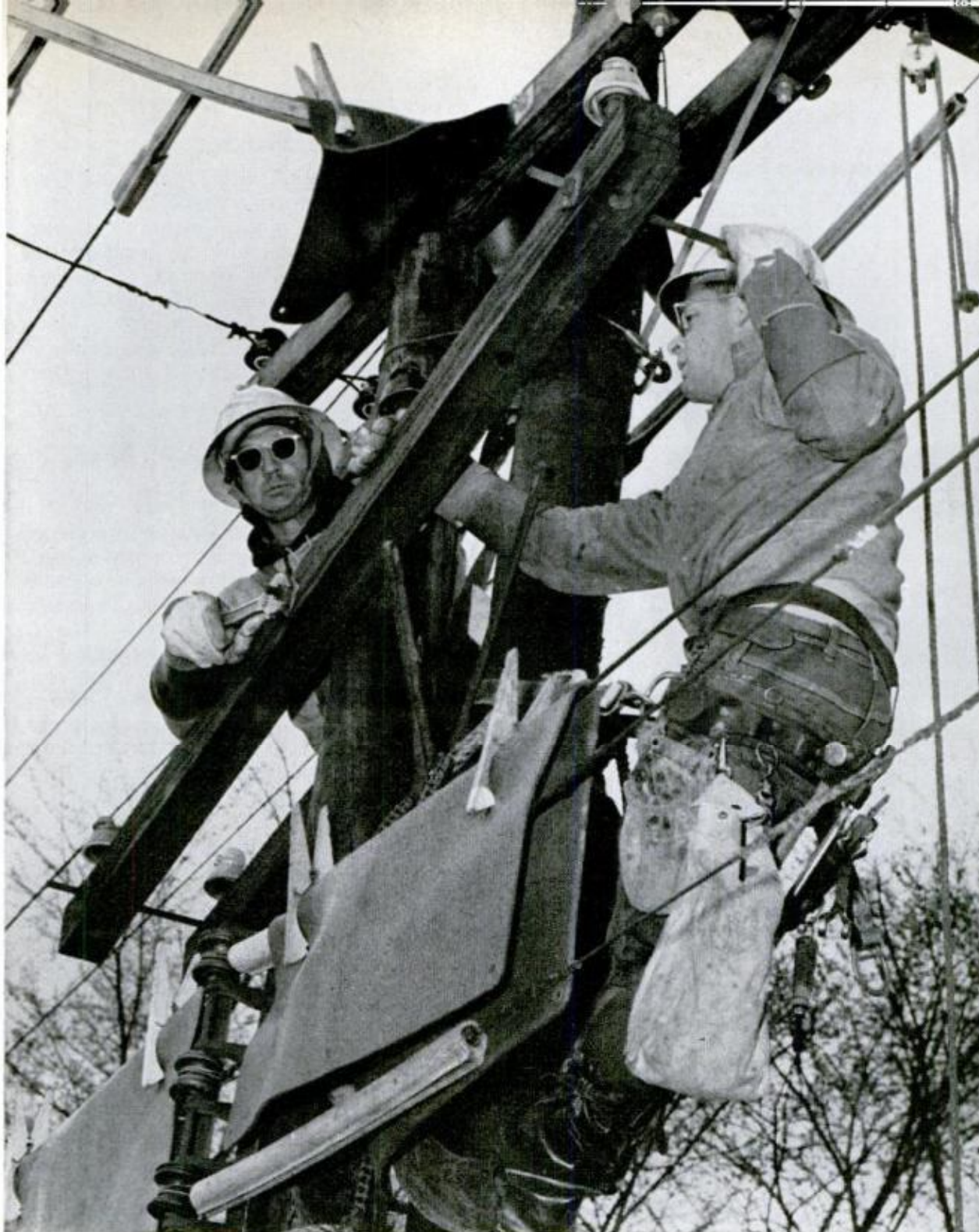
Also like a surgeon, the lineman must cover everything in reach except what he is working on. This is just as important in dank manholes, where the very walls are electrically dangerous, as on top of a high-voltage line pole. In both cases, he is grounded. And power stations use the earth as one of their conductors.

If the lineman touches a live wire, he completes a circuit with his body, and thousands of volts of electricity burn through him.

Can a wooden pole conduct deadly voltage? Here's an actual case. A crew of linemen replacing a damaged pole on a 34,000-volt line, had some difficulty guiding the new pole into its hole. One lineman dug his feet firmly into the ground on each side of the hole, encircled the pole with his arms

(Continued to page 220)





## WHEN YOU'RE NEAR POWER LINES

1. Never fly a kite on a wet day or use a fine wire instead of string.

2. Don't fly U-control model airplanes.

3. Don't show off by climbing power poles or towers.

4. If a tree branch (or anything else) falls across a line and dangles near the ground, don't try to remove it.

5. Don't string up house-to-house personal telephone lines or radio or TV antennas near or across lines or between power poles.

6. Don't use insulators, lines or poles for target practice. Besides making a nuisance of yourself, you may drop a live line, put out

electric service and endanger yourself and others.

7. When hunting, be sure there are no poles, towers, lines or linemen in your line of fire.

8. If a live line ever falls on your car while you're in it, don't touch any metal; sit there until help comes.

9. If you spot anything that looks like trouble on a power line, call your power company.

10. If you see someone "frozen" to a live line, don't touch him unless there is plenty of insulation between you. Get quick help, instead. If he does get free, start mouth-to-mouth artificial respiration immediately.





## Jeep Wind Machine Is Fire Starter

Equipped with an airplane-type propeller and a barrel of oil, a jeep is used as a wind machine on contracting jobs where a great deal of brush must be burned.

The propeller, driven by a power takeoff, quickly whips a blaze through combustible material. If the brush is damp, a spray of oil starts the fire.



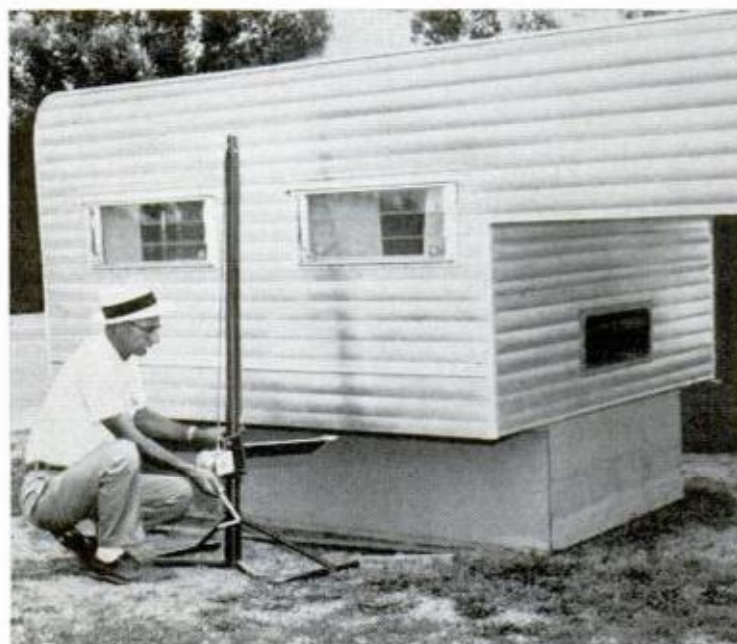
## Heated Metal Plates Produce Electricity

Popped into a toaster like pieces of bread, two thin iron plates coated with enamel produce enough electricity to drive a small electric motor and its propeller.

The plates were constructed by B. O. Austin, an engineering consultant for the Westinghouse Electric Corporation's aero-space department. The flow of current from such plates is known as the "Austin effect."

He coated pieces of iron with vitreous enamel which in turn has a thin silver covering. At temperatures from 250 to 650 degrees C., the plates produce power at the rate of 16 milliwatts per square inch of the silvered surface for approximately two hours.

During this period, if the source of heat is removed from the plates, they continue to provide electric current for several minutes—as long as stored heat remains.



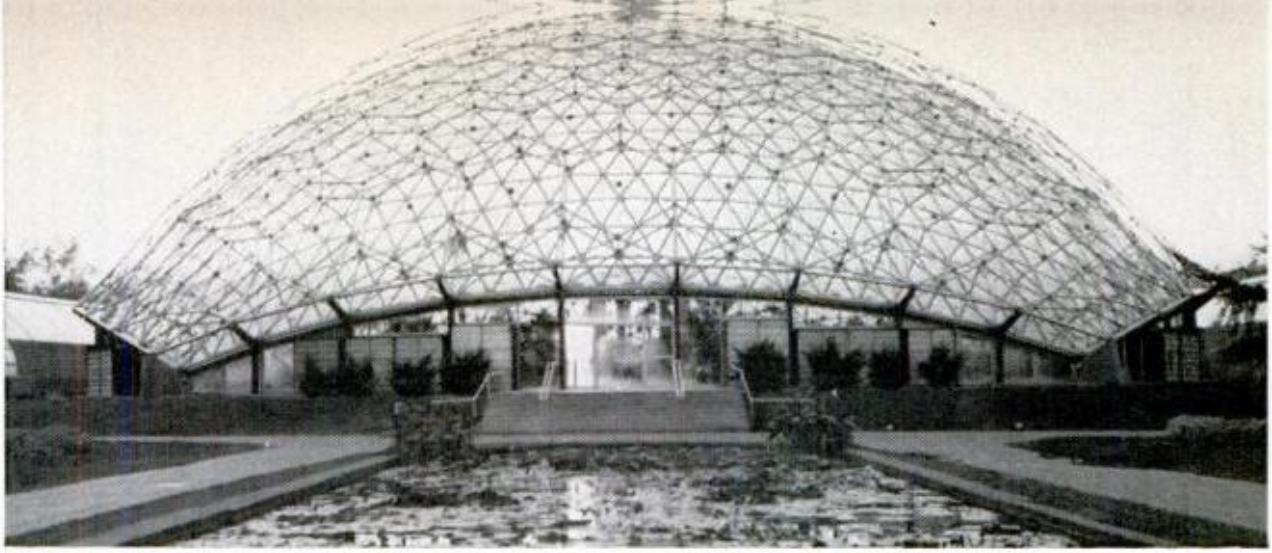
## Pair of Jacks Raises Full House

Truck-mounted coaches can be raised and lowered on a set of two jacks that have been developed for that purpose.

Lifting power comes from a 20-to-1 ratio worm gear winch. The carriage of each jack, lifted by flexible airplane cable, moves on rollers. The winch will hold the load in any position without the use of a brake. Each jack weighs 50 pounds and will support a load of 1500 pounds.

The manufacturer of the jacks is Hawkeye Iron Works, Longmont, Colo., and the price is \$89.50 for a set of two.



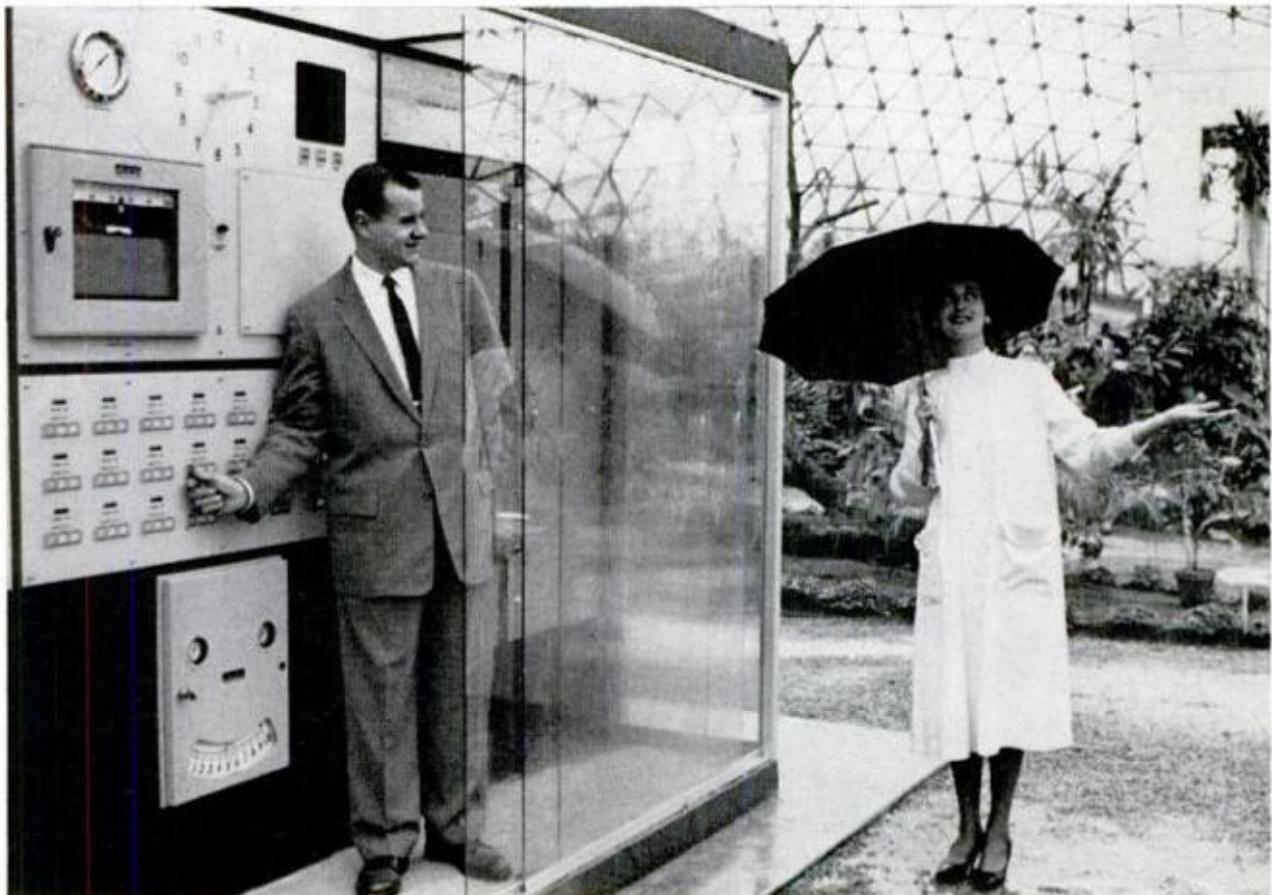


## *St. Louis Climatron* **Tropics on the Half Shell**

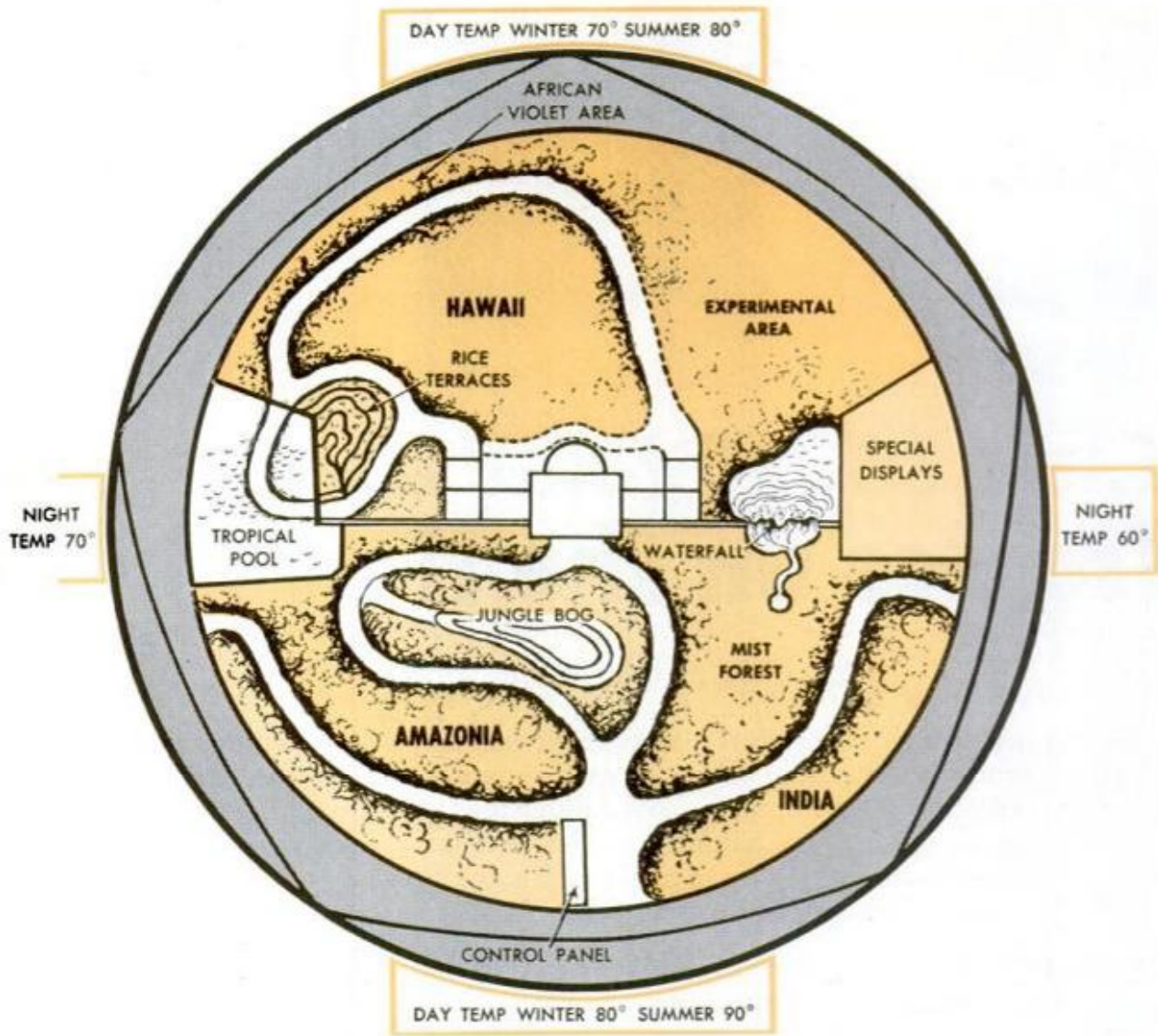
**T**HE CLIMATRON, a transparent hemisphere filled with thousands of plants, is a miniature of the geography and climates of the world's tropic areas. This revolutionary St. Louis greenhouse is a lace-work of aluminum tubing stretched over a clear plexiglass dome. From a distance the Climatron looks like a giant mushroom floating above the park's greenery. Diameter of the circular greenhouse is 175 feet; the great dome curves up to a 70-foot height.

Based on geodesic principles developed by Buckminster Fuller,

**CONTROL CENTER** at front entrance regulates various climates under dome—and can even produce a rainstorm

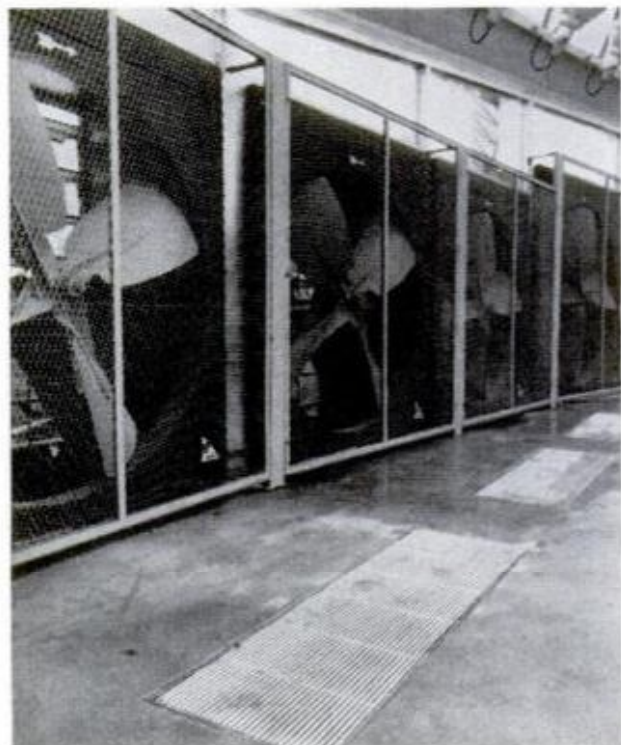




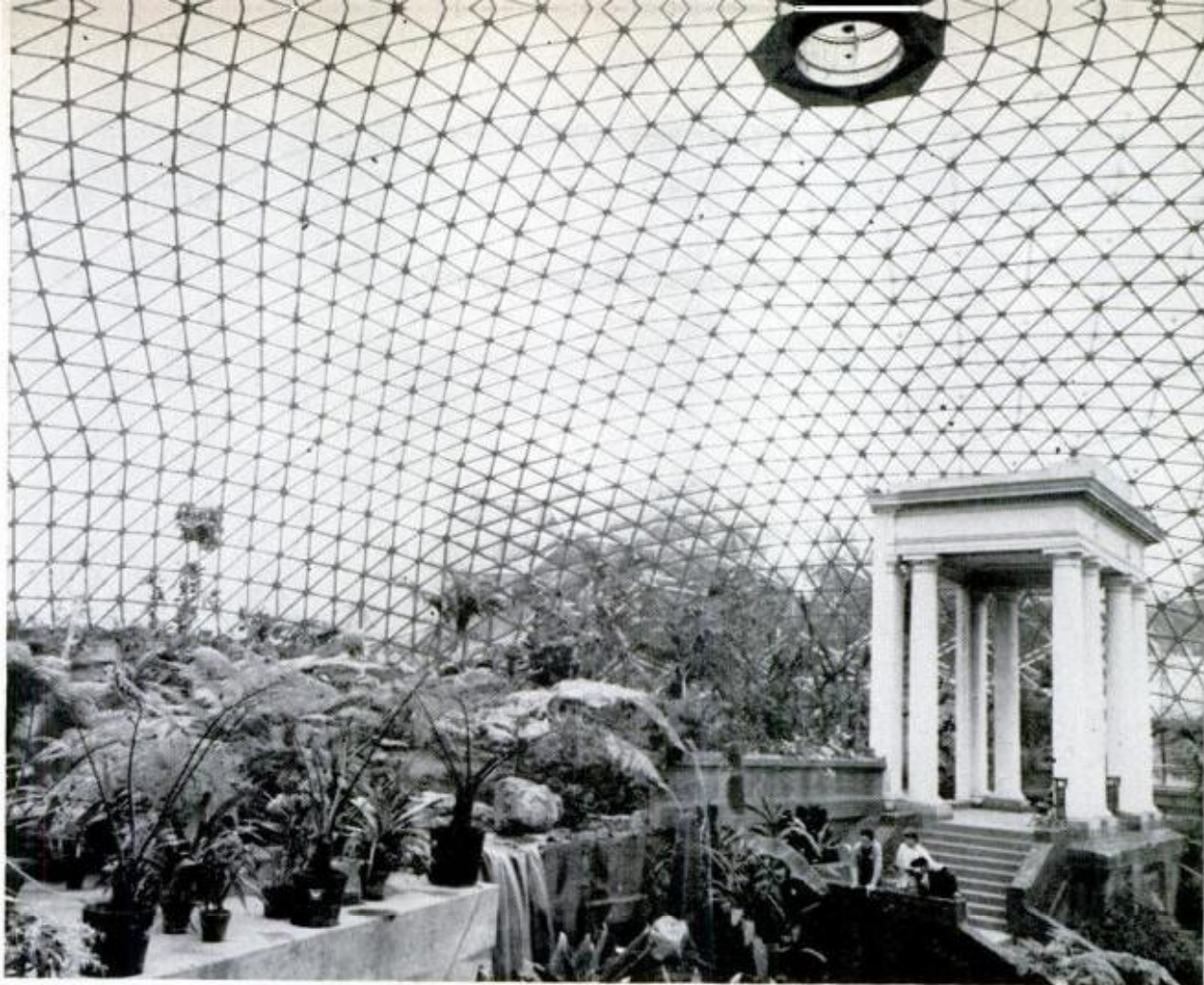


**PINK FAN FLOWER** is shown by Supt. Ladislaus Cutak in "Little Hawaii." Flower is related to pineapple

**CLIMATRON LAYOUT**, above. Below, exhaust fans which automatically control flow of air through dome







**VIEW TOWARD CENTER** of the dome over the special display area and the waterfall. Columned loggia is a relic of an old structure of the Shaw Gardens

*Photos by Jack Dennison*

**ONLY ORCHID TREE** in America, metal and fiber "tree" shows orchids as they grow in their native areas



the tubular aluminum framework was built by North American Aviation. The framework rests in five concrete bearing piers spaced along the Climatron's circular base; there are no columns or supports on the inside. The frame curves down to rest on each pier; at the midpoints between piers the lunes, or spherical sections, curve up to a maximum nine-foot height. Some 4000 clear plexiglass triangles are set in neoprene-lined aluminum channels that hang from the frame.

On the inside the Climatron is even more unusual. The glistening dome covers a splashing waterfall, a miniature mountain, a mist forest, an aquarium (with a transparent underwater passageway so visitors and fish can watch each other), rice paddies and lily ponds, a swamp, and, at the touch of a push-button, manmade indoor rain.

Focal point of the Climatron is its magnificent collection of spectacular and exotic tropical plants—rare insect-eating flowers, coffee and tea plants, chocolate trees, bananas, jungle cactus, figs, palms, ginger, pineapples, rice plants, mangoes . . .

To get an idea of the plant variety, consider the orchids which flourish like weeds in the Climatron's tropical temperatures. Orchid curator Robert Gillespie figures he will have 20,000 plants representing more than 3000 varieties—just of orchids. In all, Climatron horticulturist Ladislaus Cutak

(Continued to page 218)



# ***Science Takes the Measure of Man***





## Strange instruments are pointing the way to the shapes of tomorrow—from hats to space cabins



**SWING CHAIR** works just like baby's, but is used to determine the exact center of gravity of the body



**STIPPLED** with paint for contrast, this test subject poses for pictures before a stereoscopic camera

By S. David Pursglove

**F**URNITURE for your future house, seats for next year's cars, desks for new schools—all are being designed by scientists who specialize in studying man's past. The Air Force is leading the way and business and industry are following close behind—in using anthropology to make clothing fit better, seats more comfortable and working conditions safer and more efficient.

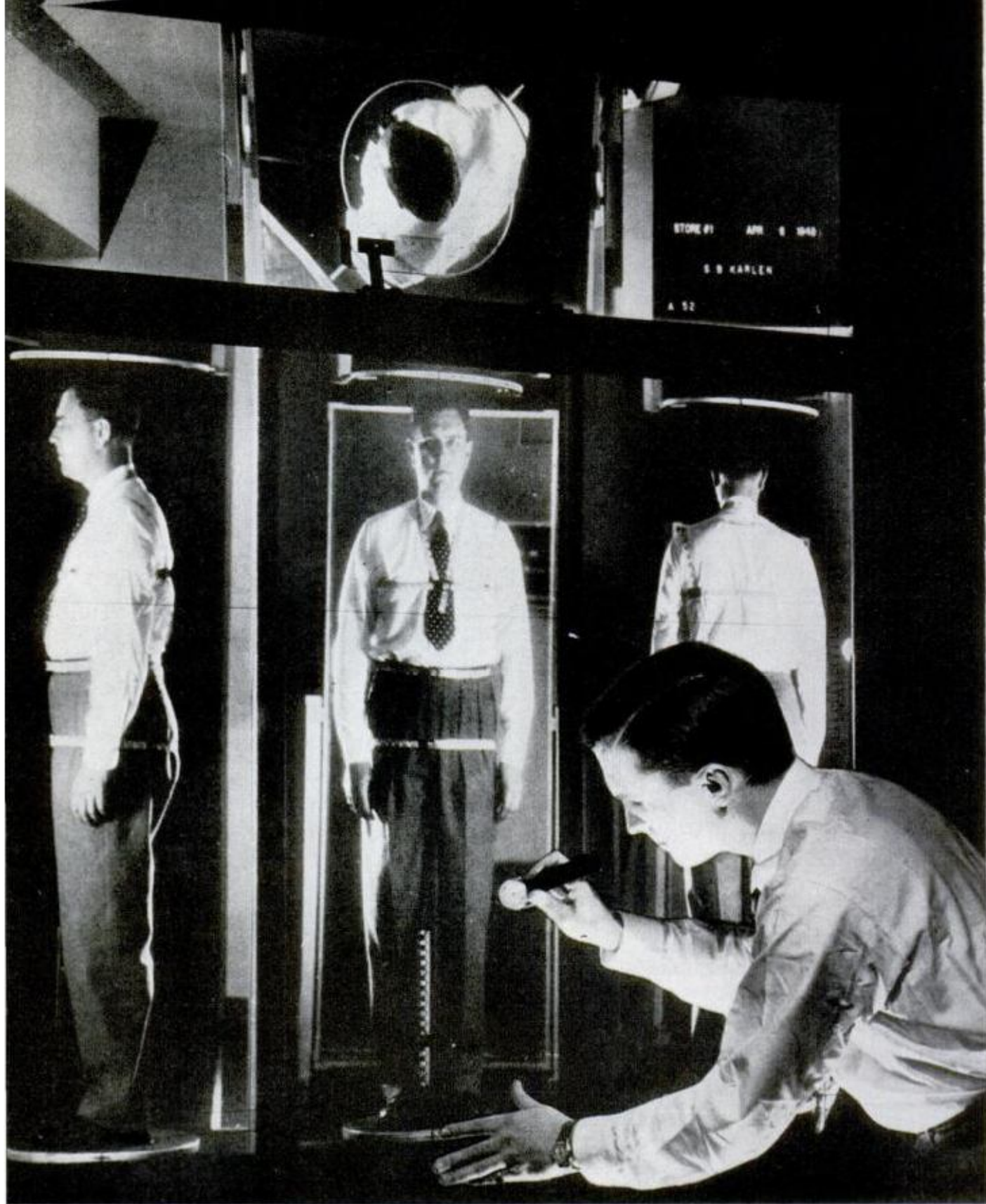
The Air Force started using anthropology, the science that led to reconstruction of Neanderthal and Cro-Magnon man, to design pressure suits and other space-age clothing and equipment. Man has been changing his shape constantly through the centuries. Today's average male would not be able to squeeze into a suit of medieval armor. Modern suits of armor are airplanes and spaceships. Designing them to fit today's warriors properly is an immense problem. Anthropology solves this by using new tools to measure changing man.

Stationed at the massive Wright Air Development Division near Dayton, Ohio, is a group of Air Research and Development Command anthropologists. In determining the "shape" of things to come they still depend on the tape measure, calipers and other hand tools used by nonmilitary anthropologists. For the modern touch they have added torque wrenches, strain gauges, pediscopes, special measuring boards, palm-measuring instruments, finger-sizing charts and other special techniques. Faster and more accurate stereophotogrammetry, X ray, anthropo-photogrammetry and contourometry complete the new instruments for an old science.

These studies have helped the Air Force set up guides for clothing, cockpits, work space requirements and control designs. Newer studies go beyond body measurements. Biomechanical factors, such as muscle strength, human center-of-gravity

◀ **ZEBRA-STRIPED PROFILE** of a young airman came from contourmeter. Picture was taken with series of electronic-flash slit exposures. Lines give scientists exact "map" of the contour lines of the subject's head





**FOUR-WAY PHOTO** from anthropo-photogrammetry camera, projected half-life size, allows 100 measurements

variables, mobility and other data are used to design future equipment. Through these studies, airman effectiveness is improved by providing sufficient room in a cockpit or space cabin where space is at a premium. Flyers can easily reach and operate their controls without extraordinary strength or physical discomfort.

Among their measurements are a few samples that might be used to evaluate

your own physique against a modern fighter pilot. His height runs from 65 to a little over 73 inches. A seat for him must measure from  $12\frac{3}{4}$  to  $15\frac{1}{2}$  inches. His total body width, including arms, requires from  $18\frac{7}{8}$  to  $22\frac{7}{8}$  inches. From seat to shoulders he measures from  $21\frac{3}{8}$  to a little over 25 inches. His legs cover a  $39\frac{1}{2}$  to 46-inch span, and his arms vary from 31 to 35 inches measured from the backbone. The width of





**ARM'S REACH** of a potential spaceman is measured photographically by a series of multiple exposures

his head is from  $5\frac{3}{4}$  to  $6\frac{1}{5}$  inches and measures from 9 to 11 inches from his chin to the top of his head.

If you measure 18 inches across the shoulders you would compare to the average Air Force pilot today. This is about one-half inch more shoulder than the average World War II pilot, and almost two inches greater than the estimated average for World War I pilots.

These are only a small portion of the measurements, but they represent countless hours in the laboratory with tools. And findings of this sort are important to clothing manufacturers, too.

Anthropology studies provided a basis for some of the new reclining seats used in modern passenger jets which allow passengers to sit, relax, or sleep in comfort. To do

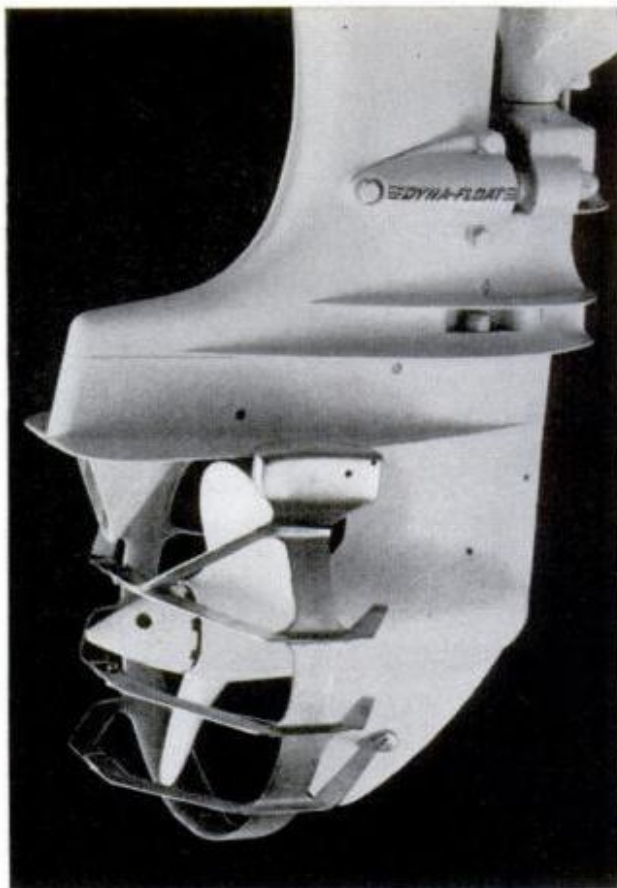
(Continued to page 226)





### No-Lens Goggles

By distributing the force of a blow over the face, a guard gives protection without interfering with visibility. Made by M-K Products, 617 Queen Anne Ave., Seattle.



### Guard Shields Outboard Prop

Boaters likely to operate in shallow water or near swimmers can now get an outboard prop guard from the Manley Co., 12754 Ventura Blvd., Studio City, Calif.

### Tiny Turboprop Engines Produced for Small Planes

Developing 60 and 90 horsepower respectively, two British-made turboprop engines will fit most light planes without major changes in the craft's airframe. Vibration

free, the engines are 30 inches long and weigh only 235 pounds, and they operate on kerosene or diesel fuel. Rover Co. of Solihull, Warwickshire, England, is the maker.







### Golfer's Timepiece

If a golfer *really* wants an accurate count of his strokes, a Swiss watch which calculates and totals the score—when a button is pressed for each stroke—will do the job.



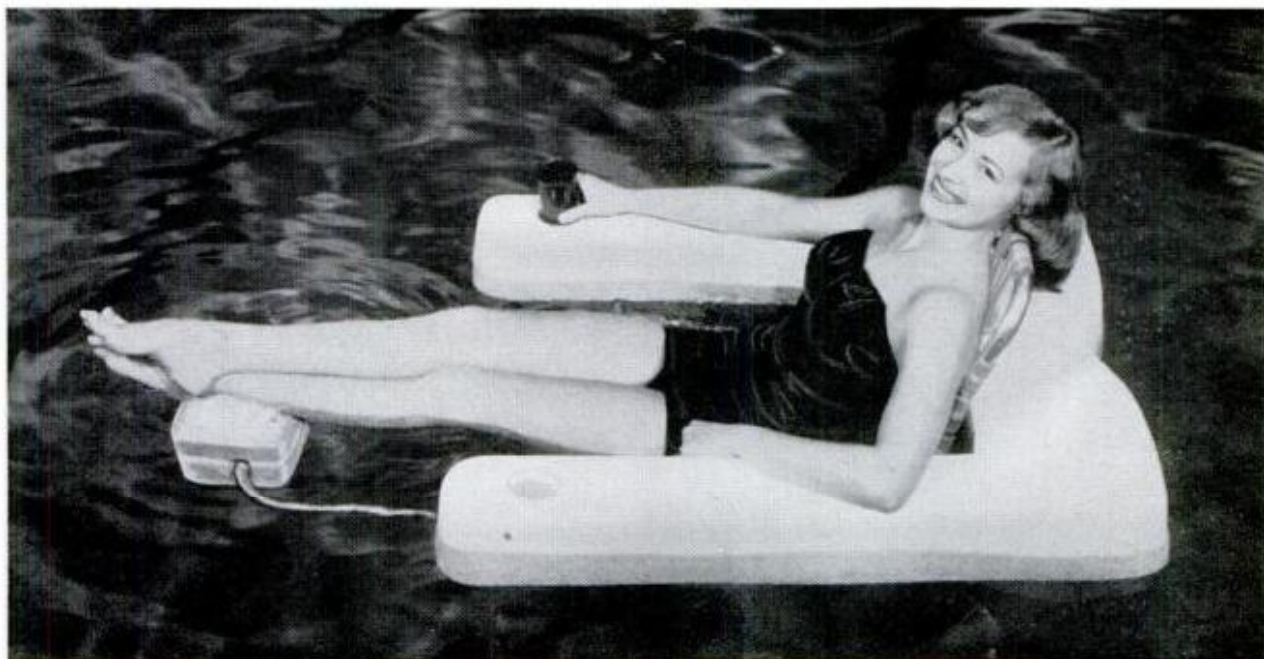
### Push-Button Talker for Jets

Fast communication between a jet pilot and his base may be accomplished on the push-button Digikey, which instantaneously relays frequently used messages.

### Old Inner Tubes Were Nothing Like This

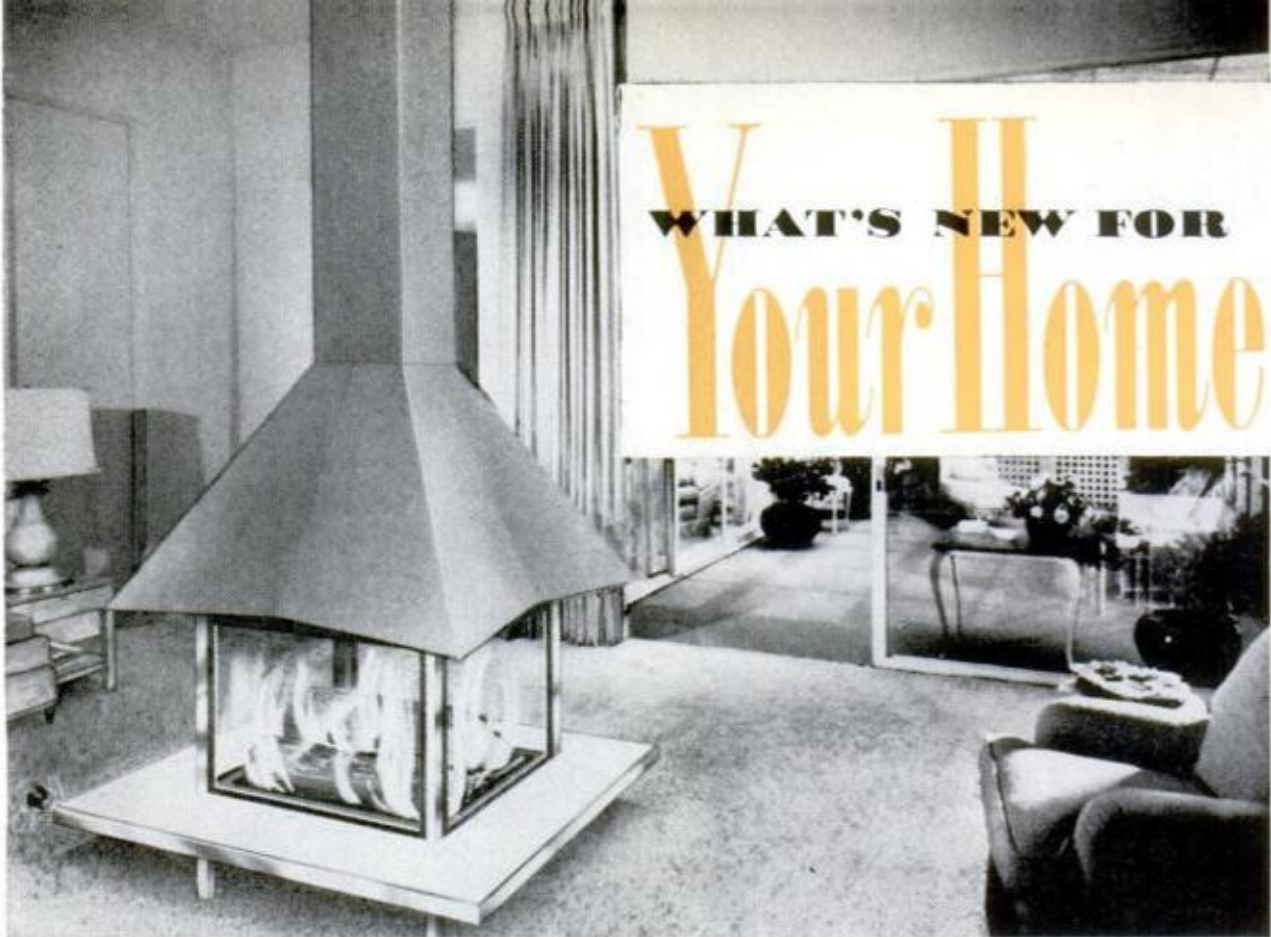
Latest piece of equipment for doing nothing on the water is a floating lounge chair. An aluminum-and-plastic seat is suspended in a "U" of thick plastic foam; it'll float a

big adult with no danger of tipping and has holes countersunk in the arms to hold a beverage. There's even a floating footstool. It's made by Formex Corp., Elkhart, Ind.





# WHAT'S NEW FOR Your Home

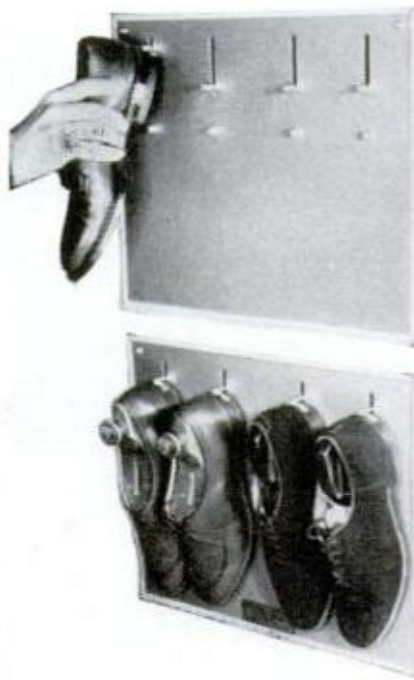


**TRANSPARENT FIREPLACE** is a freestanding unit with quarter-inch heat-resistant glass on three sides. The raised hearth is made of ceramic-coated steel. A star-shaped sloping hood covers the firebox area and rises to join a 10-inch flue housing. Venting attachments and extensions are available to accommodate most room heights. The fireplace, which can be painted to match room, is made by Majestic Co., Huntington, Ind.

**ELECTRIC COFFEE MILL** has 16 settings that enable it to grind beans extra fine for vacuum pot up to very coarse for open-pot coffee maker. It holds 1¼ pounds of whole beans. Hobart Manufacturing Co., Troy, Ohio, makes it



**SHOES ARE PROTECTED** and out of the way on a shoe valet. It consists of two panels with spring-tensioned grips that grasp shoes firmly by the heels. A product of Glido Mfg. Co., Gardena, Calif., the wall-mounted valet sells for \$4.95



**RUN WATER** through the cylinder filled with resin compound, and the result is deionized water for cooking, steam appliances, batteries, etc. Deionizer is made by Illinois Water Treatment Co., Rockford, Ill. It sells for 98 cents





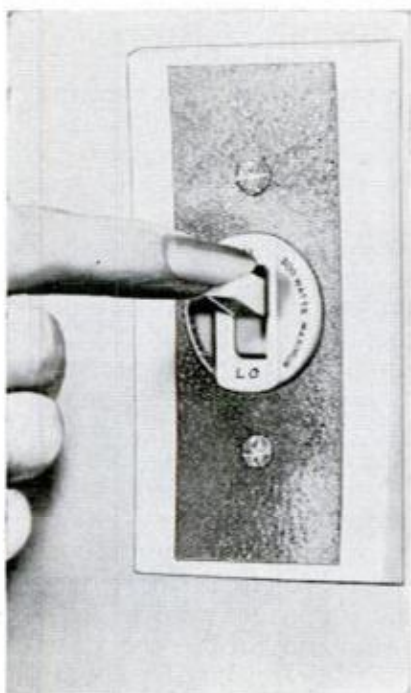
**SAFE EXERCISING** and easy feeding are features of a folding, adjustable table for babies. A strap keeps the baby safe while he jumps or (with the foot rest folded) learns to walk. Made by Master Juvenile Products, Walker Valley, N. Y., the versatile Baby Den sells for \$29.98



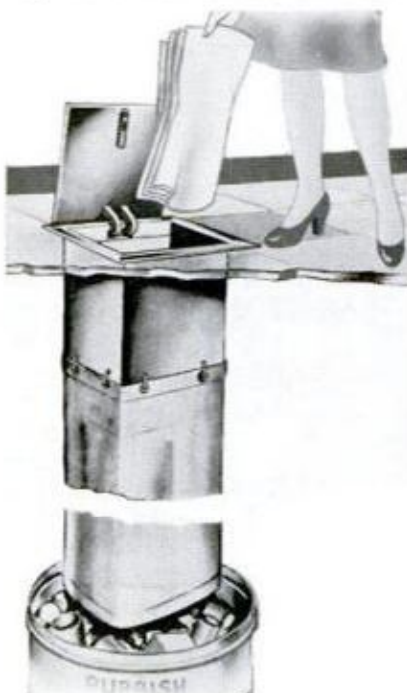
**KITCHEN CORNER SINK** is made of stainless steel. Double-bowl unit saves counter space, allows unique kitchen layouts. Measuring 43¼ inches corner to corner and 22 inches front to back, compact design lends itself to use in small apartments, trailers, boats, etc. Manufacturer is Jensen-Thorsen Corp., 239 Interstate Road, Addison, Ill.



**HIGH-LOW SWITCH** that turns room lights bright or dim is intended for nurseries, bedrooms, etc. Single-pole, three-position switch allows dimming to 30 percent of full brightness. Made by General Electric, it sells for \$4.98



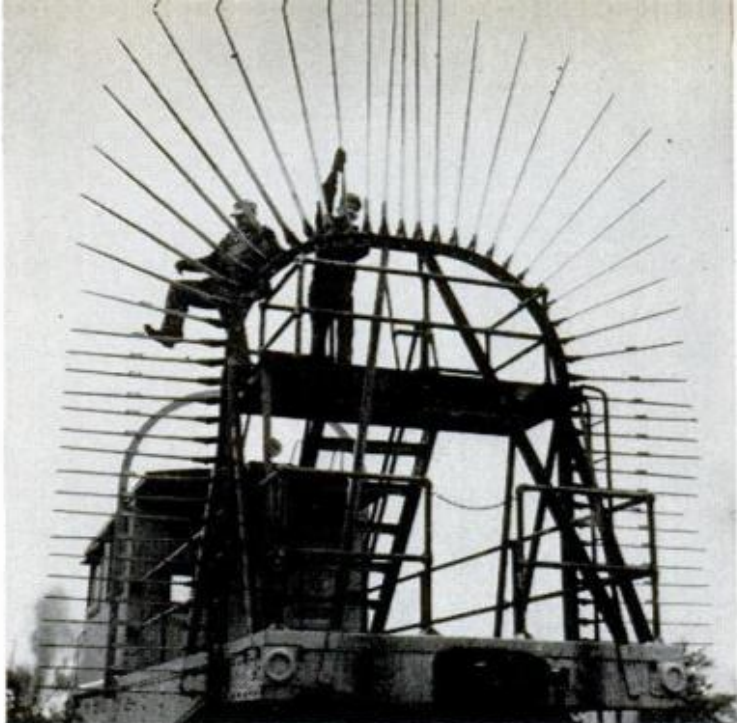
**HIDDEN TRASH DISPOSER** needs only touch of the toe to open aluminum lid; refuse goes down six-foot chute into suspended metal casing. Eliminates endless trips to basement or trash can. It's made by Ketch-All Mfrs. of Akron, Ohio



**COMBINATION** flour container and sifter eliminates the need to store two separate items. To use, housewife just unsnaps cover, turns the small crank—and finely fluffed flour issues forth. Made by Bliss of Hollywood, Los Angeles





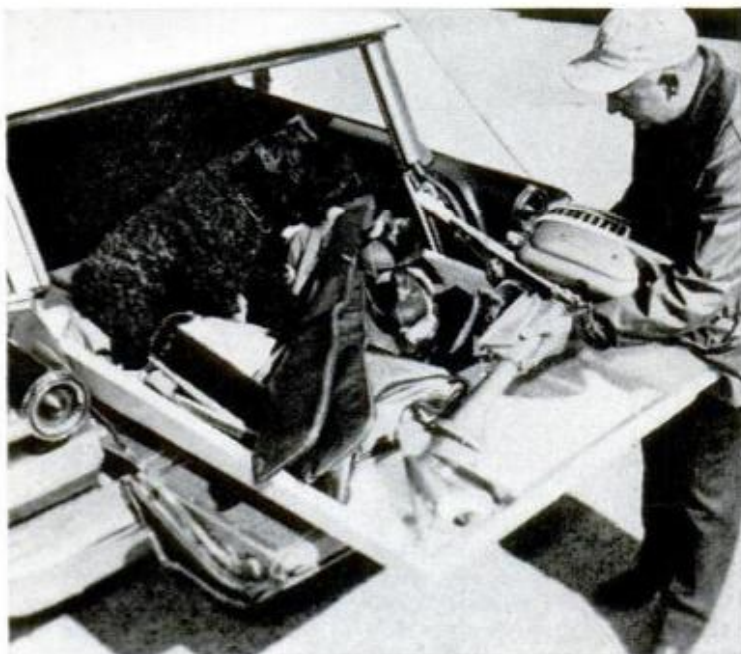


## It's the Cat's Whiskers For Railroad Freight

Sent under bridges and through tunnels in advance of shipments of large, awkward pieces of freight, a special car with metal feelers measures clearance on the Chesapeake & Ohio Railroad.

These "cat's whiskers" of varying sizes check the height and width of overhead passages to insure the safe shipment of mammoth structures which are frequently sent by rail.

The cargo can be measured first for maximum height and width, and the feelers set accordingly. Then the car can be sent through to see if it clears all passages.

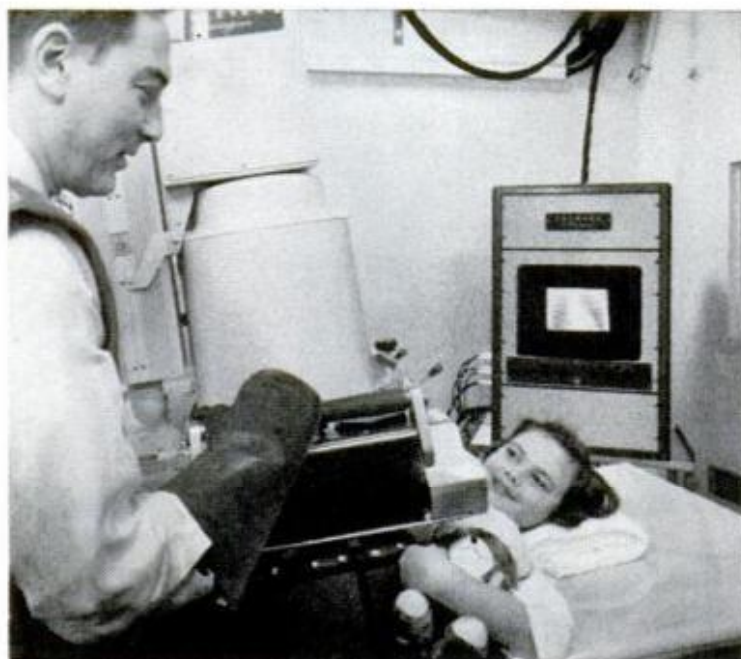


## Station-Wagon Tray

Sliding in and out of a station wagon's cargo area, a giant tray makes loading a relatively easy matter. You just pull the tray out, fill it, slide it in—and the wagon's loaded and ready to go.

The tray is moulded of lightweight heavy-gauge plastic and measures  $41\frac{3}{4}$  by  $55\frac{5}{8}$  inches. It will fit all standard station-wagon models. Ready for mounting, the tray requires no fittings, cutting, or complex adaptation of the wagon's interior.

The manufacturer is Hazelhurst Products, Wausau, Wis. Price is \$42.95 postpaid.



## X Rays Televised

Television and X ray combine in a new system that provides doctors with a visible and recordable image while minimizing the patient's radiation exposure.

Until now, when a doctor wished to watch internal body functions he would use the fluoroscope and work in a darkened room.

In the new Westinghouse system, an X-ray beam passes through the patient and is picked up by an amplifier tube that intensifies the motion-study image some 1500 times.

The image is carried by optical system to a TV tube which transmits a picture to one or more monitors. The image may be taped—for repeated showings—and transferred to film for lasting record.





# Adventure Road

**For vacation thrills, drive the new Trans-Canada Highway. It has everything from fine French restaurants to grizzly bears and dinosaurs!**

**By James Montagnes**

**T**HIS SUMMER you can travel on the first Trans-Canada Highway. The new road is almost 5000 miles long, stretching from the Atlantic to Pacific Oceans. It has been more than a decade in the building.

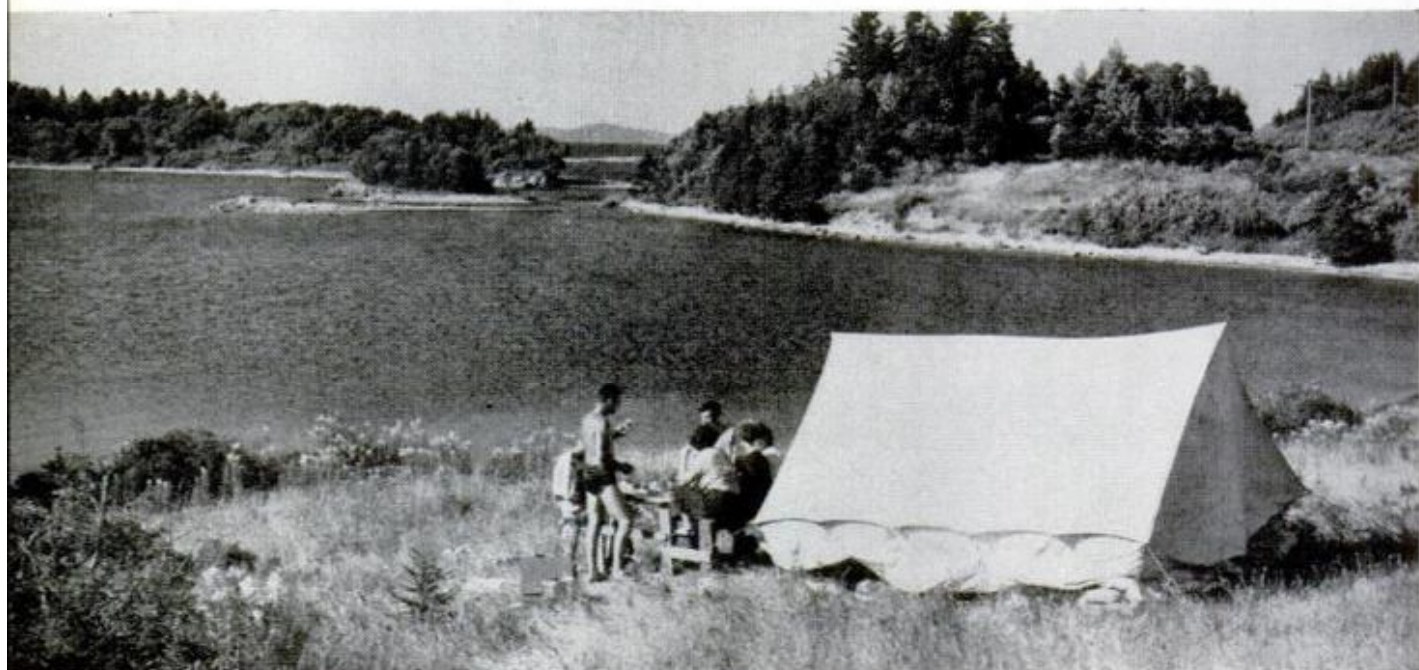
Vacationers will find variety along its route through some of the oldest settled areas of Canada, as well as through virgin forest, lakeland and







**PRINCE EDWARD ISLAND** is actually a detour from Trans-Canada Highway. Located north of Nova Scotia, it may some day be connected with mainland by bridge. Historic island is smallest of 10 Canadian provinces



**NOVA SCOTIA** is second province along highway which begins in Newfoundland. Along with other provinces, it offers good camping sites. Alexander Bell once sponsored aerial experiments near Baddeck



**NEW BRUNSWICK**, which follows Nova Scotia along highway, connects with Prince Edward by car ferry

mountain areas accessible previously to only the adventurous sportsman by canoe or by air. Motorists will drive over stretches of the road which required the most ingenious engineering.

For example, near Terrace Bay, the east shore of the Little Pic River consisted of shifting heavily-watered soil, which made construction of bridge piers impossible by usual methods. Every attempt resulted in soil shifts which tumbled cranes and concrete forming materials down the slope.

Consultant engineers suggested using electro-osmosis — the setting up of direct current between electrodes placed in soil to induce flow of water. Its effect is to control direction of seepage forces, develop tension in pore water, reduce water content of the soil and in some cases change the basic chemical composition of the soil.

After putting a three-foot blanket of sand





**QUEBEC** is heart of French-speaking Canada, but only province which is not officially part of Trans-Canada Highway. Good roads, however, assure easy passage through it from New Brunswick to Ontario

**ONTARIO** has 1500 miles of Trans-Canada Highway. At capital, Ottawa, you may watch changing of guards

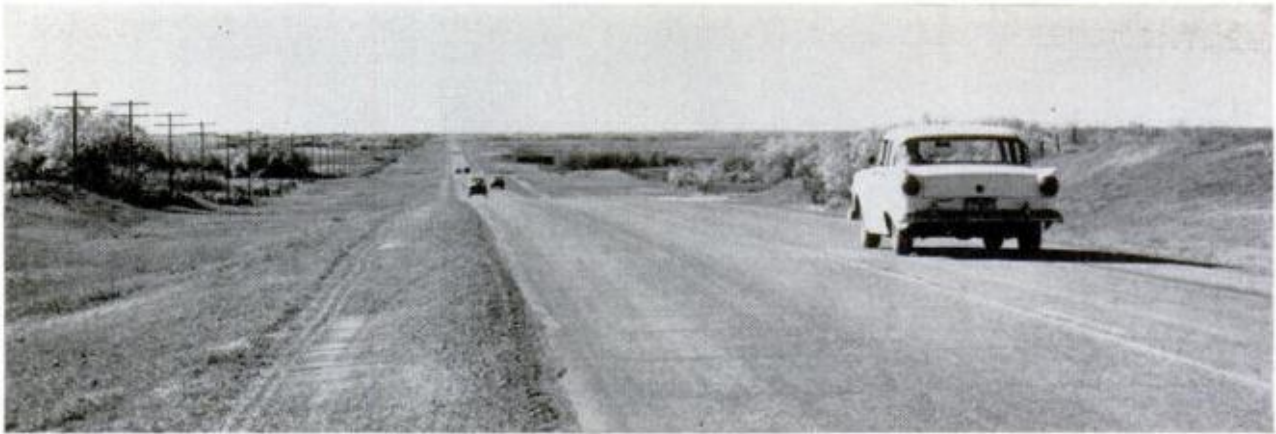
and gravel on the east bank, lines were driven 40 to 140 feet deep into the silt at 50-foot intervals. In winter, with temperatures ranging from 10 to 35 degrees below zero, electricity up to 150 volts was applied between the rows of electrodes. The water level of the silt dropped appreciably, making it possible to drive steel piles into the stabilized soil to bedrock, for the three piers supporting the highway bridge.

In western Canada other problems cropped up. For example, your shortest route through the Rocky Mountains and four of Canada's national parks, Banff, Yoho, Glacier and Revelstoke, is through Rogers Pass at an elevation of 4360 feet between mountains 10,000 feet high.

**340 inches of snow** is the average fall on this route, with a record of almost 54 feet of snow in the winter of 1953-54. During the winter it snows almost daily. To pre-







**SASKATCHEWAN**, just as upper Midwest in United States, has miles and miles of rolling prairies. Saskatchewan and Manitoba are grain-growing areas of Canada. Hudson's Bay Company started fur business here in 1670

vent the avalanches which would normally close the highway for at least 2½ months a year, earth mounds 12 to 25 feet high and 60 to 75 feet wide were built, resembling somewhat the "dragon's teeth" antitank devices used in World War II. Snow fences up to 1000 feet long and 150 feet wide have been built at five locations to stop or break up snowslides. Earth and masonry dams were constructed along the avalanche route to deflect the thousands of tons of snow as

they come tumbling down the mountains. The road through Rogers Pass is protected by steel and concrete snowsheds built on concrete foundations. The snowsheds have sloping roofs to direct snowslides over the roadway into the valley.

All these safety precautions have made this section, at about \$1,000,000 a mile, one of the most expensive on the entire Trans-Canada Highway.

(Continued to page 214)

**ALBERTA** offers motorists magnificent views of Canadian Rockies. Mount Eisenhower (left) is located at famed Banff National Park, one of scenic highspots along entire route. Highway is now nearing Pacific







**BRITISH COLUMBIA**, where snow-capped mountains are always in view, is last province along Trans-Canada Highway. Areas in Alberta and British Columbia gave engineers biggest obstacles to overcome in building road

**LAST LINK** on Trans-Canada is car ferry from Vancouver to Victoria. If you complete entire journey, you will have traveled close to 5000 miles and experienced sights and thrills available nowhere else on continent







## Office Putting Course Is a Rug in Its Spare Time

Golfing executives who practice putting in the office can really go first class with the new "Cocktail Golf" rug.

The miniature three-hole golf course is a textured rug made of nylon with a putting course laid out in different colors and pile depths. The holes are three soft rubber practice cups. There's a built-up rough

around the edge, a smooth, flat fairway, depressed sand traps and even a water hazard in the center.

With the cups removed, it's an attractive rug in an abstract pattern. At-home golfers could use it as well in a den or living room. It's made by Carter Bros. Rug Co., Chattanooga 5, Tenn.



## Radar Shows Ground Traffic

Air-traffic controllers now have a radar that gives them a detailed picture of aircraft on the ground, moving or still. It enables them to speed up landings and takeoffs and increase safety.

Since visible light is not needed to produce a picture on the airport-surface detection equipment (ASDE), it is just as effective in darkness or fog as in daylight.

At present, traffic control can be limited by the ability of the controller to see airport traffic. Now he sees it by radar.





## Servo-Servant

Answer to a housewife's — or fireman's — prayer is a life-size, remote-controlled servomechanical robot built by Vienna engineer Claus Scholz.

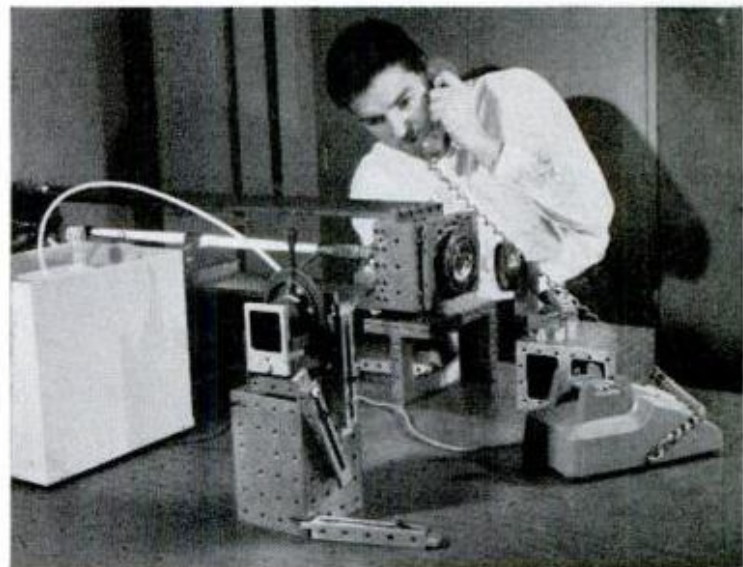
The MM47 can do almost anything from housework to handling radioactive materials or fighting fires from the inside while the operator stays at a safe distance. The 105-pound plastic robot cost about \$760 to build.



## Telephone by Light Wave

Telephone calls, TV programs, and data messages by the millions may one day be transmitted by light. They can be sent from outer space, between air and space craft, and on the ground through long conduits on a coherent beam of infrared light generated by a continuously operating optical maser developed by Bell Telephone Labs.

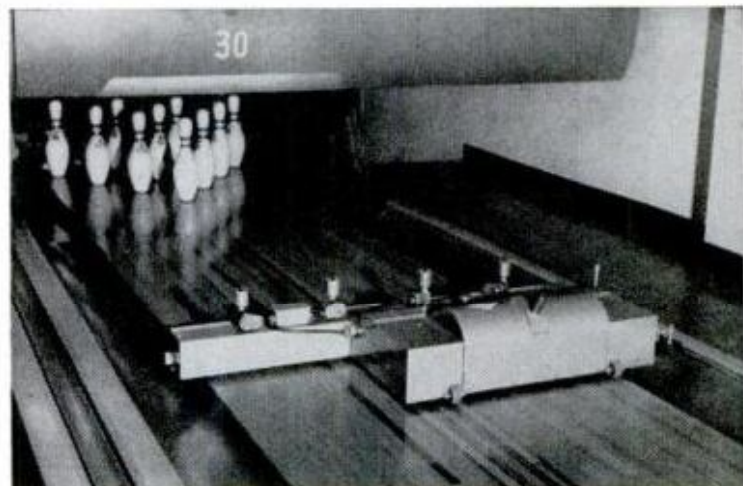
The light beam is so directional that a half-inch beam spreads to only one foot over a mile's distance. Its information-handling capacity will be millions of times greater than radio waves.



## Automatic Lane Dresser

Manual dressing of bowling lanes is eliminated by a new automatic dressing machine that cleans, buffs and polishes a lane in two minutes without an operator.

The machine is started at the foul line, cleans the lane on its way down, then turns around and comes back to the line, dressing and buffing as it returns. It shuts itself off when it's finished. Forty lanes can be dressed in two hours. It's made by Contract Machine Works in San Francisco, Calif.







OFF AND ROARING, a miniature hydroplane taking a test run on Green Lake circles on a 52-foot steel cable

# Buzz-Bombs on a String

By Bob Karolevitz



ROARING ALONG at 90 miles an hour, sleek, model hydroplanes each summer tear a lake in Seattle, Wash., into a frenzy of foam.

The occasion is the Miniature Seafair Trophy Regatta. Model builders who have been tuning up one and two-cylinder engines, designing and building the 12 to 18-inch boats vie for trophies in tight-lipped competition.

They wade in to start their entries. So fast are the tiny buzz-bombs that they kick off the stands and skimp into the water with engines doing 18,000 r.p.m.

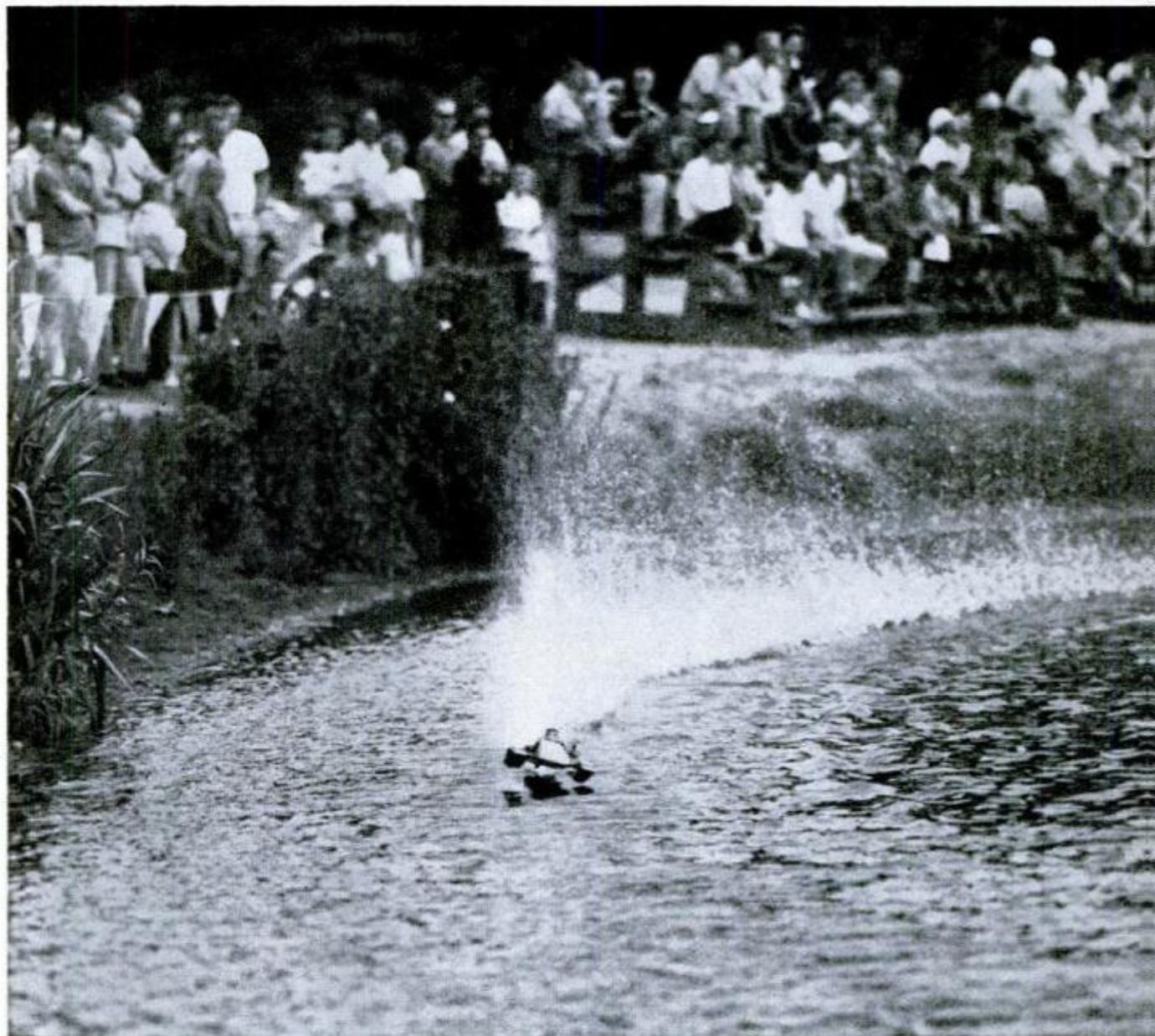
Too fast for free action, they hurtle around on braided, stainless-steel cable.

Fuels for the most part are those used for model airplanes; a mixture of methynol, nitromethane and castor oil is a favorite.

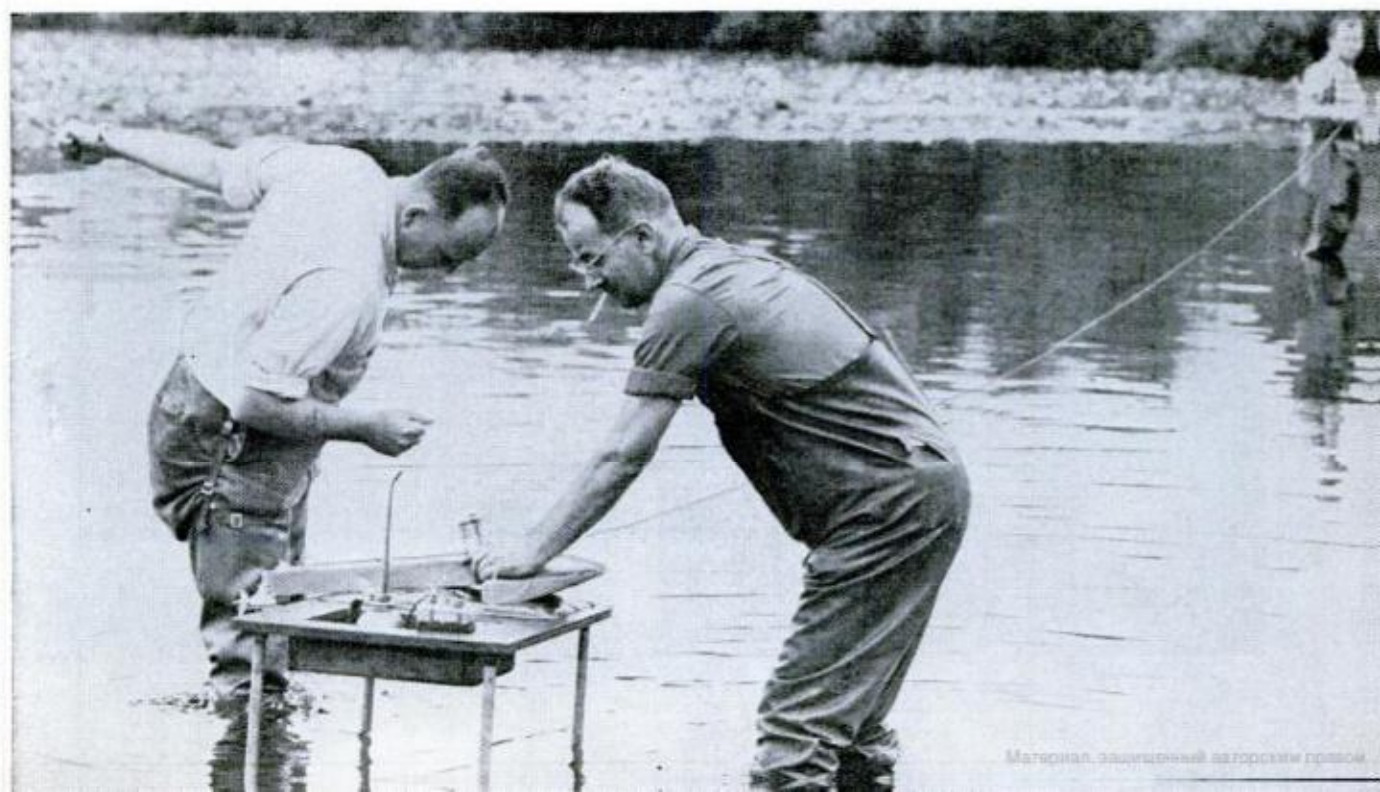
Seattle, site of the Gold Cup races for large, unlimited hydroplanes, has set aside a miniature boat basin for racing the models.

BOATS AND BUILDERS entered in the annual regatta are lined up for trophy awards

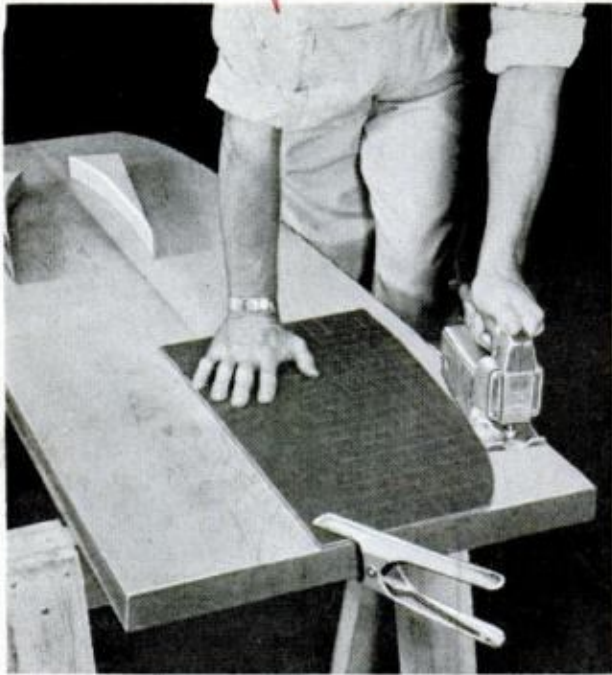




**WAKE AND WADERS.** Approaching 80 miles per hour, 18-inch hydroplane, above, spews the same foaming rooster-tail as does a 30-foot racer. Three builders, below, crank up an engine that is capable of 18,000 r.p.m.







**HARDBOARD TEMPLATE** is guide for shaping the corners



**ROUND OFF** bottom edges and ends of the cart top

## ROLLING PATIO SERVER

**S**ERVING A SNACK to a dozen patio guests calls for careful planning, even when they all turn up on time. That's when you can use this rolling server. One loading in the kitchen and there are no more trips to be made. Handles make it easy to lift in and out, and casters let you roll it around the patio.

Redwood is best for the top. Two 2 x 12s are edge-glued to get the required width. Bottom and edges are then rounded off with

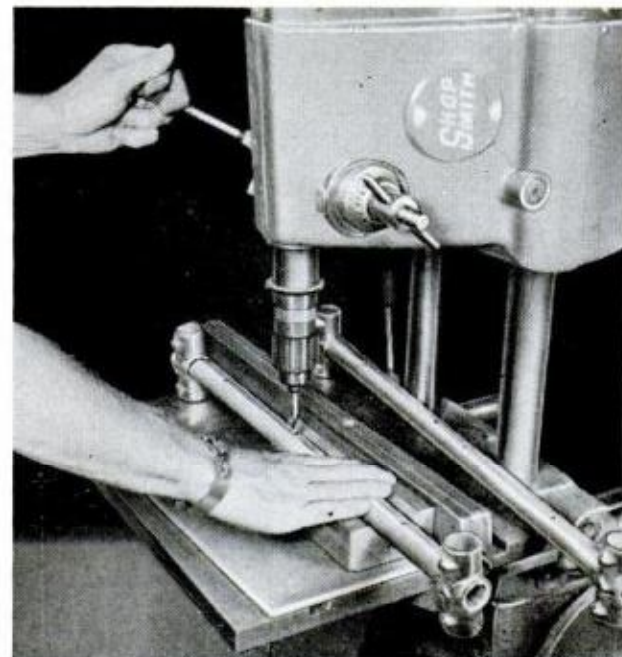
a plane or belt sander to the shape shown. Then strips of matching wood are glued and nailed along the edges of the top. The removable 1/4-in. plywood dividers are edge-lapped as detailed.

Standard slip-on fittings, held by set-screws, simplify assembling the frame. No threading is required. All that's needed is to cut the tubing to the correct lengths and insert the ends of the pieces into the slip fittings. Four metal plugs are used to cap

**GLUE AND NAIL** matching wood strips along top edges

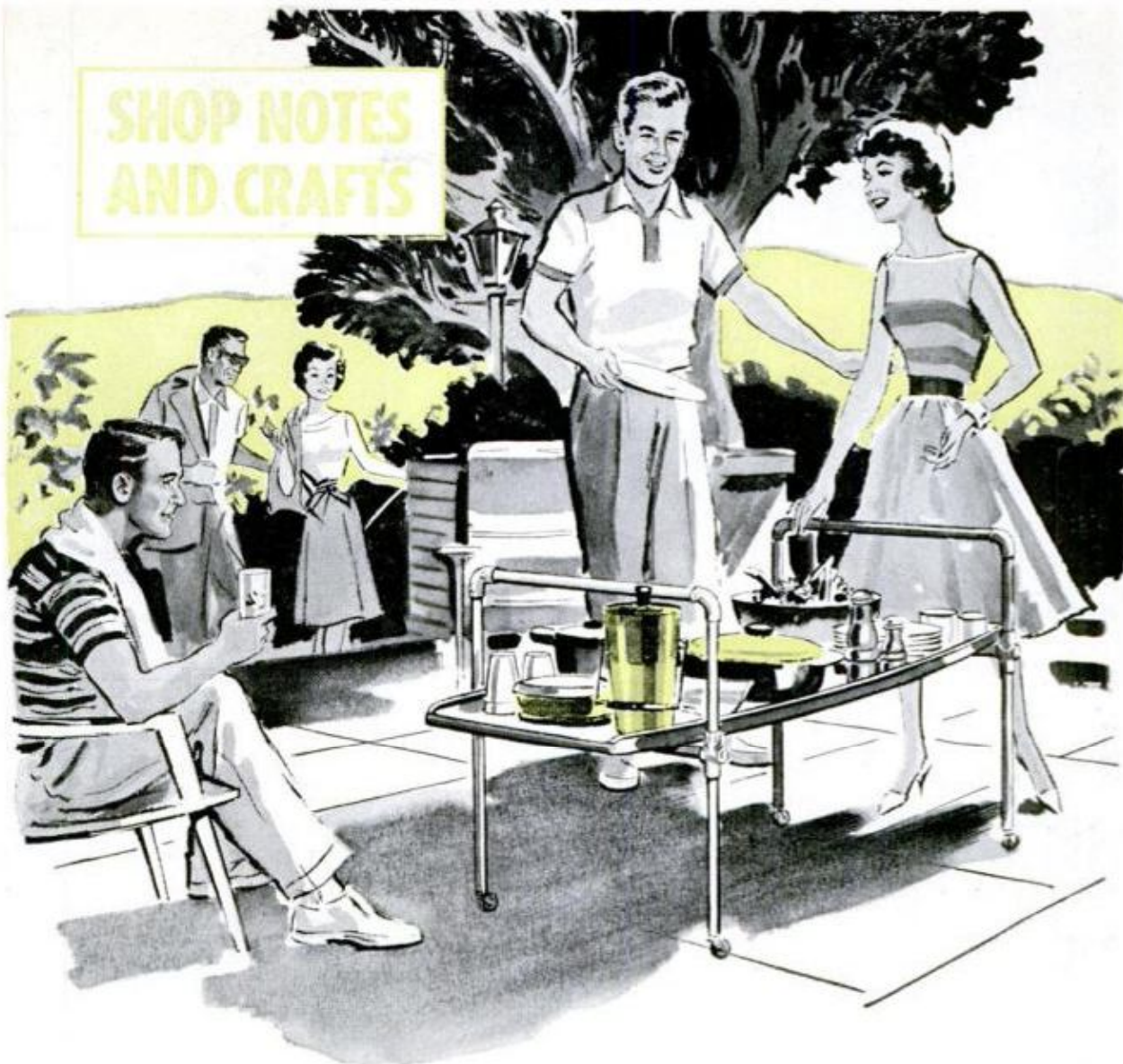


**DRILL HOLES** through pipe supports before assembling

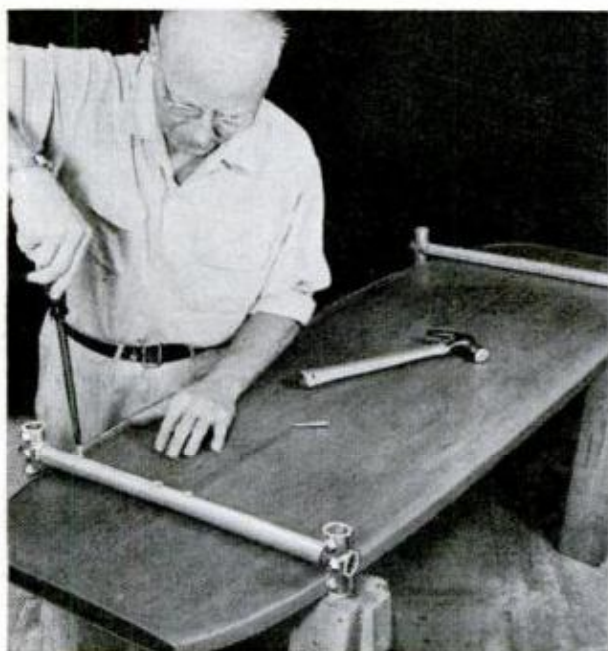




## SHOP NOTES AND CRAFTS

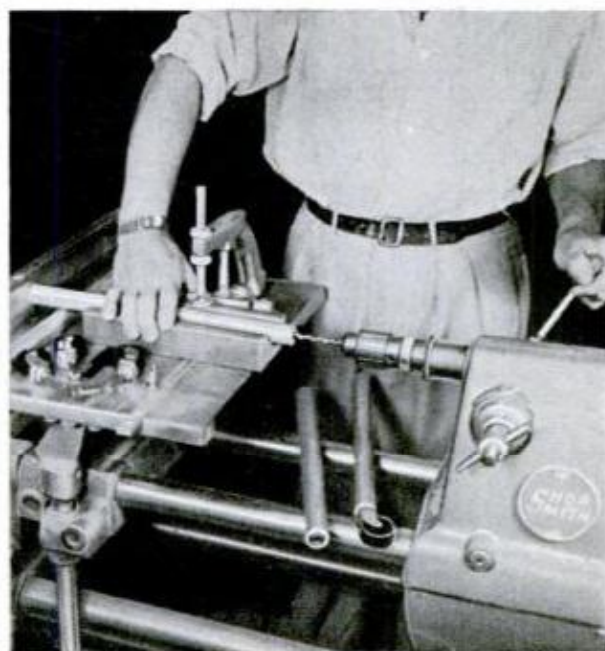


**SCREW PIPE SUPPORTS** to bottom surface of top and insert legs in fittings before tightening setscrews



JULY 1961

**DRIVE WOODEN PLUG** into one end of each leg and then drill hole into the plug to accept a removable caster



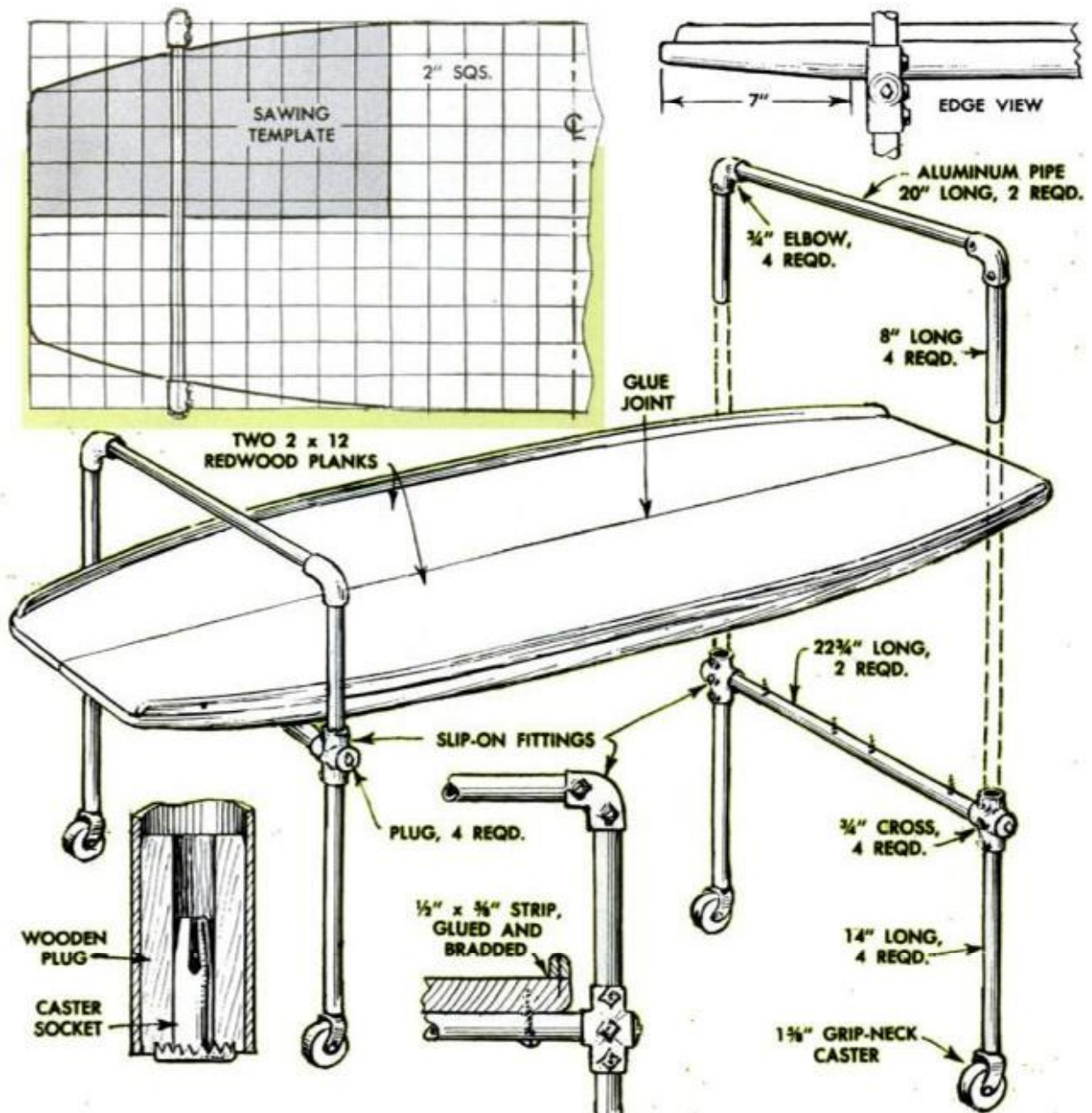
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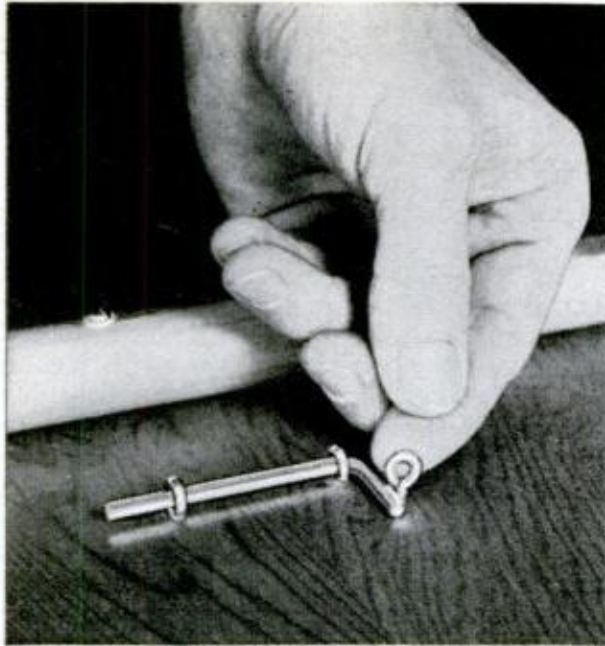


PIPE HANDLES provide means of lifting loaded cart

LEG EXTENSIONS and slip-on elbows form the handles





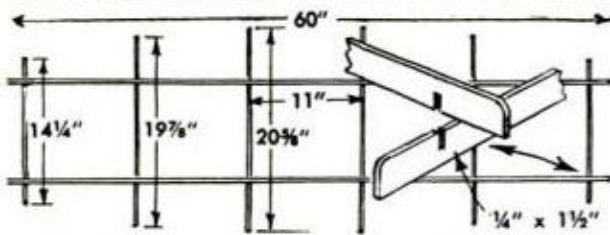


**WRENCH FOR ASSEMBLING** cart will always be handy if it is fastened to underside of cart with screw eyes

the unused openings in the four cross fittings. Hardwood plugs driven into the lower ends of the four legs are drilled to accept grip-neck caster sockets.

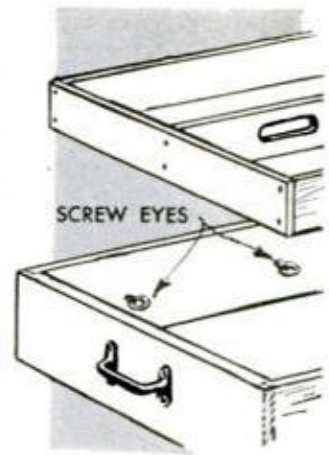
Finish the wood with a primer and two coats of clear lacquer or some other suitable finish, lightly sanding between coats. Metal parts may be waxed and polished or given a coat of flat, black enamel. If the server is used only outdoors during the summer months, it can be disassembled quickly and stored away compactly at the end of the season.—*Paul Corey*

**DIVIDERS** partition top into convenient compartments



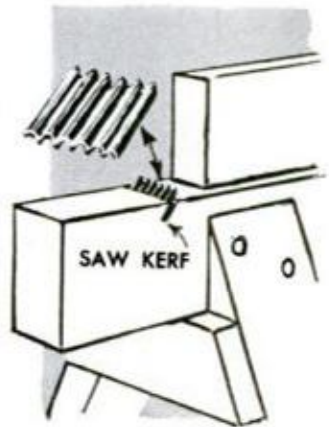
## Tray Cleats

Screw eyes make easily removable "cleats" for supporting a tray in a deep drawer. Turn two or more into each side of the drawer and space them equally two ways to support the tray level and allow it to slide.



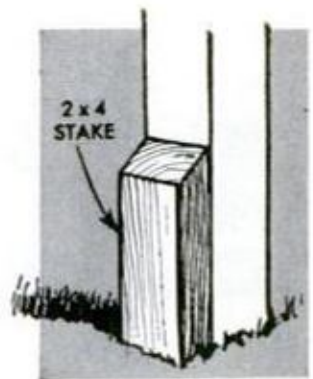
## Planing Stop

Cut a shallow saw kerf at 45 degrees in the top edge of your sawhorse, insert a corrugated fastener and you have a handy, removable stop for planing short pieces of stock on the job.



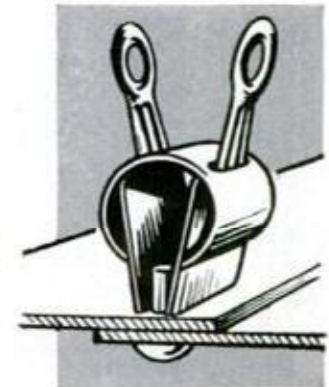
## Post Brace

When a fence post shows signs of rotting at ground level, it can be temporarily supported by driving a stake flush against the post and nailing the supporting stake and post together. Cut the brace at an angle to shed water.



## Rivet Holder

A spring-type paper clip makes a suitable clamp for holding a rivet in place until you can get the loose assembly to an anvil or stake. Be sure the rivet head bears on the anvil before releasing the clamp.





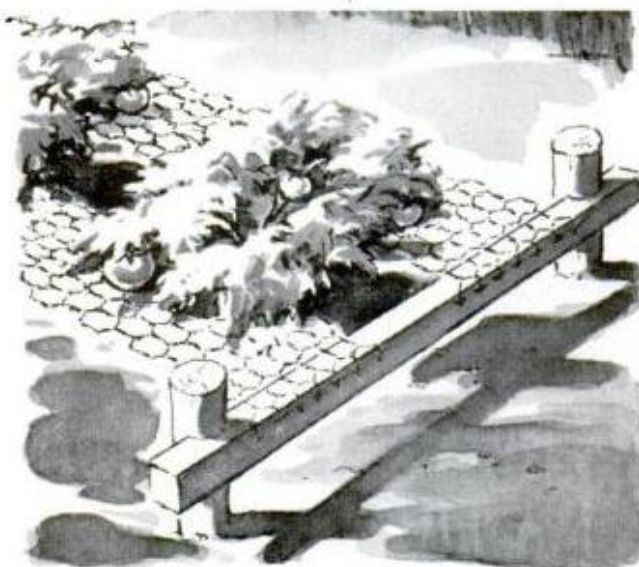
## GARDEN HELPERS



### Blackboard Keeps Box Tally

By coating one side of the tote trays with blackboard paint, one grower of bramble fruits simplified the problem of keeping track of the number of boxes of fruit turned in daily by his pickers. It became a simple matter to chalk the number of boxes turned in on the side of the tote tray and then total up at the end of the work day. The idea worked out very well even though some pickers used tote trays holding as many as six or eight 1-quart containers, while others preferred those holding only four containers. At the end of the work day all chalk marks are removed, of course. The sides of all the trays should be smoothed with fine sandpaper and primed before applying blackboard paint, as otherwise the marks will be indistinct and will rub off easily.

—G. E. Hendrickson



### Up Off the Ground

Perfectly formed fruits and uniform ripening result from supporting tomato vines in such a way that the fruits do not contact the ground during the development and ripening periods. One grower reports the procedure illustrated gives the best year-to-year results. Stakes are driven between the rows to a height of about 12 in. and spaced about 6 ft. apart. Cross members are notched into the stakes and nailed as indicated. Strips of poultry netting about 12 in. wide are then placed on the cross-members, stretched tight and stapled, the space between the strips of netting being about equal to the width of one of the strips.

—Joseph Federico



### Seedling Transplanter

Moving tiny seedlings from flats into a cold frame or the open row can result in a large percentage of loss unless you have the right tool for the job. This can be made from an 8-in. length of 1 in. diameter aluminum tubing. Just saw into the tube on an easy curve to the center, then along the axis for about 3 in., and finally finish with a curved cut of approximately the same radius. This gives you the narrow trowel point illustrated—just the right size for lifting a tiny seedling, roots, soil and all, from the flat. By plugging the handle end of the tool you can use it as a seed drill. Just pour the seeds into the handle and then use your thumb to feed them uniformly into the furrow.



**HANDY FOR MOVING  
A HEAVY SHRUB**



**FOR MIXING  
BATCH OF CONCRETE**



**NO REST FOR  
SAUCER  
SLEDs**



**FOR CATCHING OIL**

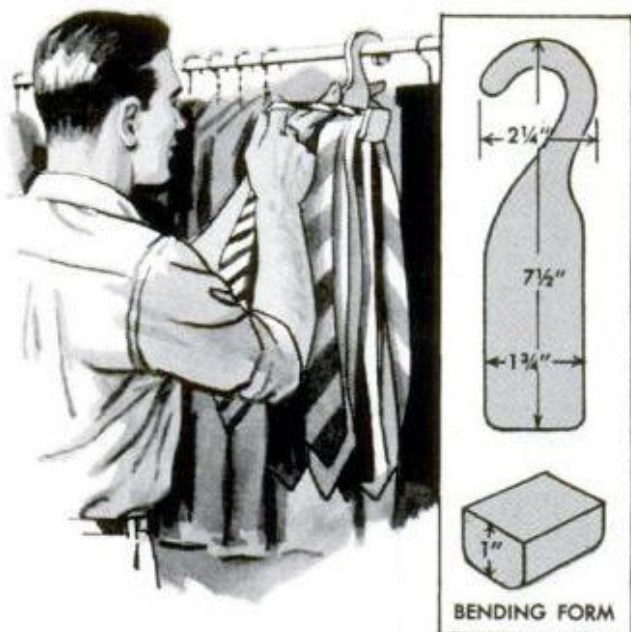
**FOR TOTOING WASH**



**FOR SIDE LIGHTING SUBJECT**





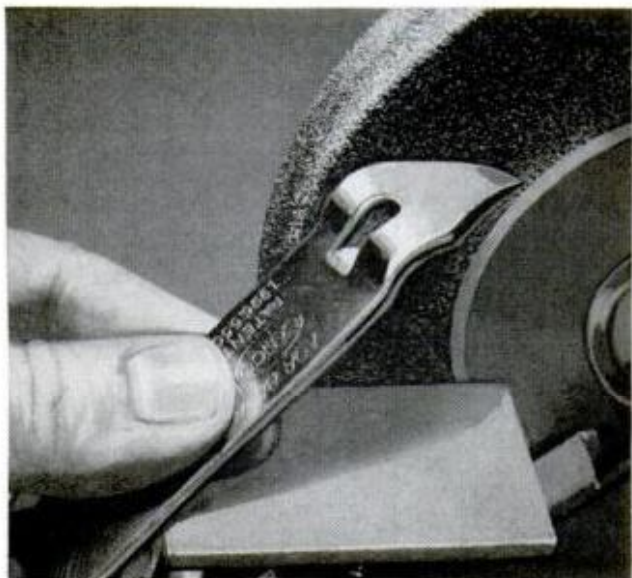


## Designed for Neckties

There are tie holders and holders for ties but this one you can't beat. It hooks over the pole in your clothes closet, holds a round dozen ties for quick selection. To make it, cut a piece of  $\frac{1}{4}$ -in. clear plastic to the shape and size indicated. Then make a bending jig from wood over which to bend the hook after first placing the plastic in hot water to make it pliable.—*Tom Rogers*

## Sharp Party Trick

Party getting dull? Maybe it's your can opener. Stamped-out, beer-can openers work okay when new but after a while they sometimes require a healthy tug to puncture the can. If you want to make it easier for everyone, including the gals, make a quick trip to the basement shop and hold the opener against the grinding wheel a few seconds. Ground with a slight inward bevel, the new edge will cut as easy as pie.

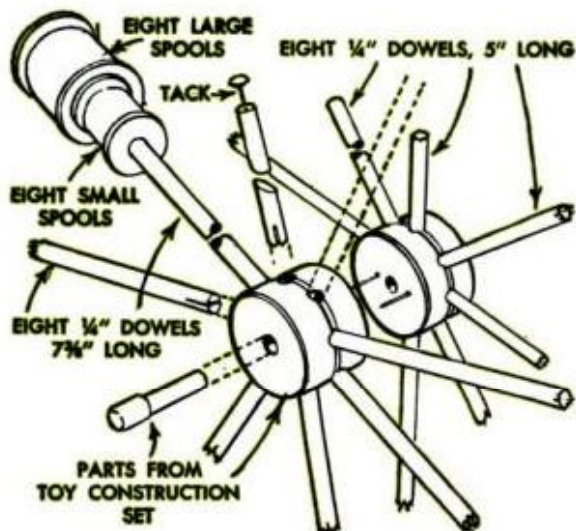


# DECOR WITH

ARE YOU A spool saver? You're in luck, for look what you can make with common everyday thread spools, plus a little imagination. The ideas on the facing page are but a few of the many decorative things you can dream up and make from big and little spools for almost nothing.

**Abacus Wall Plaque:** Done in gold, black and Chinese red this striking wall decorator provides a colorful accent for a room in the oriental motif. Consisting of spools of several sizes and shapes threaded on loose-fitting dowels, various patterns can be worked out by arranging the spools in groupings to suit your fancy. Some of the spools are painted gold, some red and some black. Assemble the outer frame first, mitering it to the size given from standard doorstop material. Then miter the pieces that form the inner frame from regular screen molding. Opposite side pieces of the latter are drilled, both at one time, with rows of holes equally spaced to receive the ends of  $\frac{3}{16}$ -in. dowels. Final assembly is done with all the spools and dowels in place in the inner frame members before inserting and gluing them inside the outer frame. All parts should be painted before assembly, and the detail shows how hangers can be bent from sheet metal.

**Sunburst Decorator:** Discarded Tinker-toy parts were used to make the original but similar disks can be sawed out and drilled to suit the purpose. The double-thick hub is glued and nailed together, back to back, the holes in each being positioned offset. The center hole is plugged only at the front so it can be used to hang the affair on a nail. The spools are forced over lengths of snug-fitting dowels which are stuck in the hubs and capped with brass upholstery

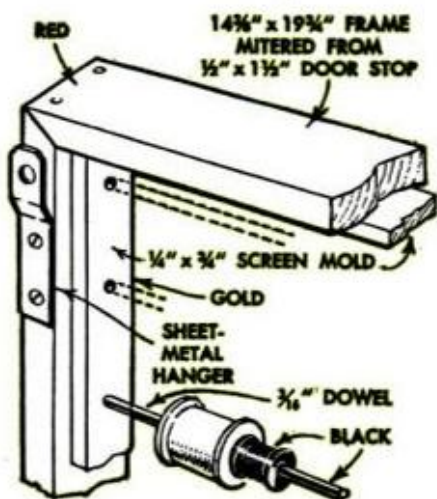
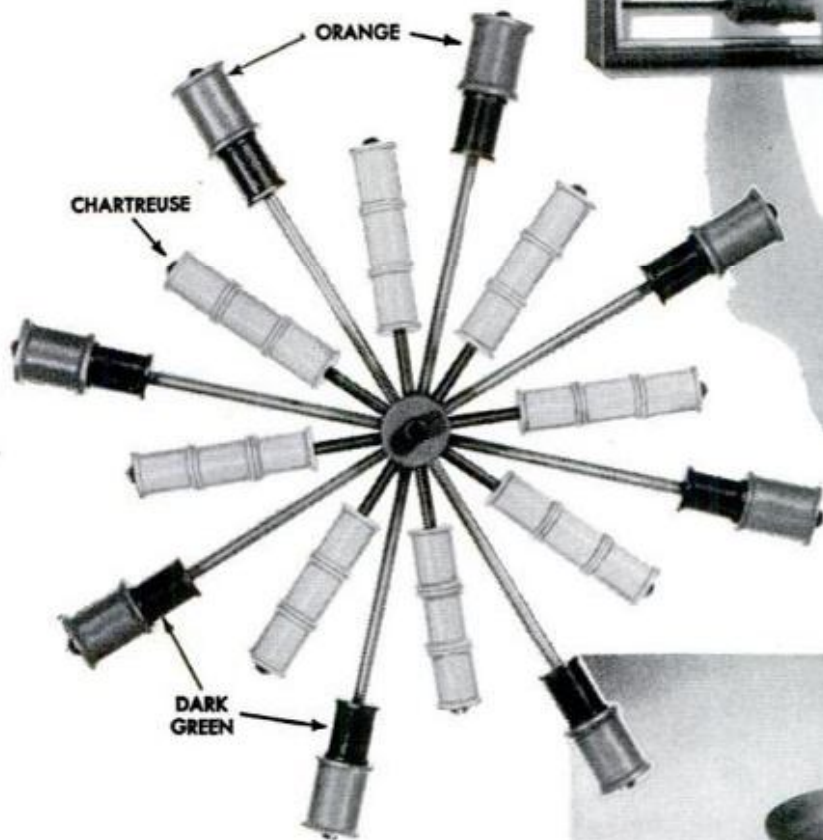
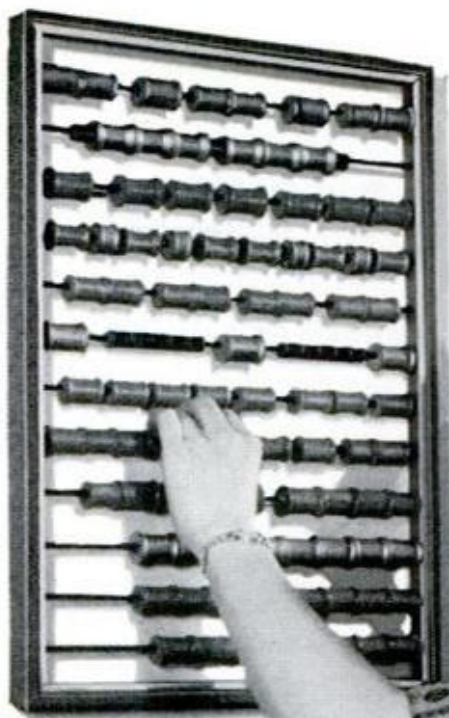




# SPOOLS

nails. Finish by painting the parts in bright colors.

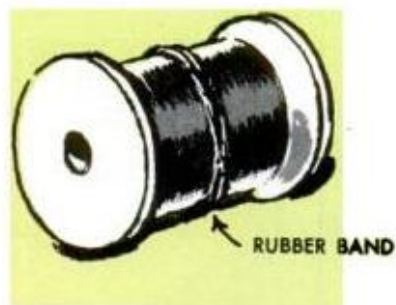
**Table Trivet:** A really practical hot-pot holder with its rapid cooling spool surface, this novel trivet uses 25 spools of the same size. Set within a square frame, the spools rotate on loose-fitting dowels inserted in blind holes equally spaced in the frame members. The trivet shown was finished in black enamel and bronze paint.—*Bob Joslyn*





# Solving HOME PROBLEMS

**TO AVOID REPLACING THE CAP** each time on a squeeze bottle when using small amounts of glue repeatedly, drive a nail through a block of wood and use it as a stopper to keep the spout from clogging



**WHEN THE NOTCH** for securing loose end of thread on spool breaks off, above, thread can be prevented from unwinding by slipping small rubber band over it on spool

**TO PREVENT** soil from being washed away when watering newly planted shrub, slit heavy aluminum-foil pie tin radially and center it on shrub trunk as shown at right. Holes in bottom let water drain slowly



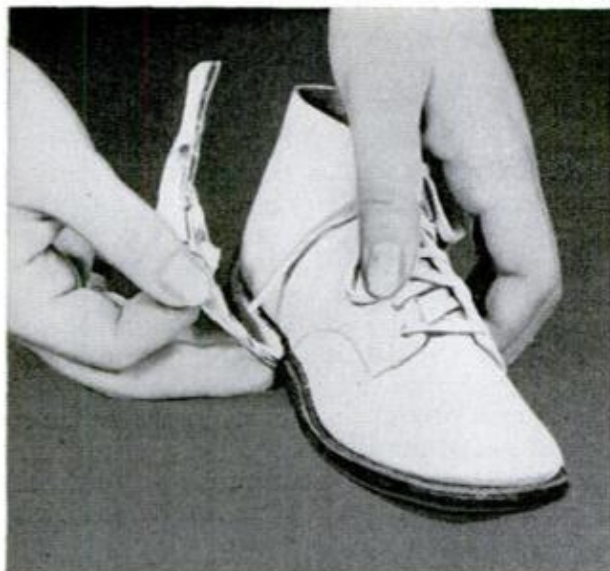
**MAN'S BELT** lends helping hand, above, when placing dry-cleaning bag over garment. Buckle end of belt is dropped through hole at top, hanger hooked onto it and garment pulled into bag



**NONTIP CADDY** for can of paint, above, is detergent carton with cutout made in center of one side to receive can. Carton also serves as brush rest and catches paint drips from the can







**YOU'LL FIND** white shoes easier to polish, above, if sole edges are first covered with strip of cellophane tape. Tape is easily peeled off when done. If sole edges are to receive polish, this is done first after applying tape strip to uppers next to sole

**EMPTY SPICE BOTTLES** having an inner snap-on plastic cover as pictured at right, make excellent salt and pepper shakers for picnics and cookouts. The tight fitting screw-on metal cover helps to keep the salt dry when not in use and prevents spilling

**A CORKING GOOD IDEA** is to use a large cork as a "tackcushion" to keep stray thumbtacks in tow. The tacks are easy to pull out of the cork, and it makes a safe way to carry a supply of thumbtacks in an apron pocket when using them about the house



**SQUEEZING THE CONTENTS** from a tube of toothpaste or shaving cream is neatly done with a turn key formed from a length of stiff wire. Bent to the shape of a hairpin, the turn key is placed over the crimped end of the tube. Winds tube in tight roll



**GLASS DOOR KNOB** that becomes loose in its ferrule, above, is easy to make tight again. Simply remove knob from door, pour sand into gap between ferrule and glass. Then flow glue on top of sand, being careful to keep knob straight until glue hardens

**GOOD GUTTER-CLEANING** tool, left, is discarded fan belt from car. Being flexible yet firm, belt is easily formed to shape of any gutter, enables muck and leaves to be scraped out without scratching paint from inside of gutter as is often done with a trowel



## WORKSHOP HELPERS

### Dip Painting

I make pull toys for my kids and my problem was how to run a neat ring of lacquer around the rim of a wooden-wheel disk so it would look like a rubber tire. Due to the short radius, masking proved impractical. One day I got an idea. I cut a half-gallon milk carton all the way around about 3 in. above the bottom. I notched the opposite edges, slipped a disk onto a length of dowel and placed the dowel in the notches as you see in the illustration. I poured just enough lacquer into the container to come up  $\frac{3}{8}$  in. on the disk. Then I turned the disk one revolution—the result, a perfect tire.

—Joseph J. Zyla



### See-Into Containers

Many a shop has solved a storage problem with fruit jars and other glass containers in which food is packed. But what about those small items of which you have only a few of a kind? The answer to this one is the glass jars in which baby foods are packed. Some of these jars have screw tops and are just the right size to hold a couple of dozen large screws or twice as many small ones. They'll also hold a handful of nails, brads, escutcheon pins, any small parts you want to keep where they're quickly located when wanted. Screw the tops of the jars to the edge of a floor joist in a neat, spaced row. Fill the jars and twist into the tops. You always can see the contents from any angle.—G. E. Hendrickson



## COMING UP NEXT . . .

**How to Build a Garden Pool.** Now you can have a beautiful pool with a circulating pump, a rockery where there can be ferns, rock plants, the cool soft sound of a waterfall. It's as easy as covering a scooped out hole and a mound of dirt with fiberglas. Learn next month how to build this pool that comes to you as a kit.

**Where to Put It.** "It" meaning the power mower, lawn sweeper, garden cart, bicycles, the hundred and one items that require storage. It's a question that can completely baffle owners of modern, compact homes. But questions have answers and next month **PM** comes up with ideas for outdoor storage structures.

**8-mm. Movies With Sound.** You've always wanted to make your 8-mm. movies talk back, tell your guest audience about that vacation trip, relive with words the family reunion, and so on for the record. Now voices, sound effects, background music, can be added to 8-mm. films. **PM** reports next month.

**Double Checks With a Dial Indicator.** The dial indicator is one instrument that can be used when making a setup on the lathe and then made use of again when checking the machined work for accuracy. Next month's **PM** shop feature describes shop practices with this sensitive measuring instrument.





## FENCING LESSON

**S**TAPLE THESE STRIPS of colored plastic webbing to square posts, weave in 1 x 2 strips and there's your basket-weave fence, any height you need, any color you want. The strips are translucent, admit sunlight to bordering flower beds, filter a gale to a cooling breeze inside the enclosed outdoor living area and give you the complete privacy of your indoor family room.

To build the fence, set treated 4 x 4 posts in concrete and 8 ft. apart on centers. Saw off the top ends to a uniform height above grade level and screw on a 2 x 4 cap rail, using lagscrews of sufficient length to hold securely in the end grain of the posts. Then cut the weaving strips from 1 x 2 stock, each to a length approximating the distance from the ground to the cap rail.

Paint or stain posts, cap rail and weaving strips and wait until they are dry. Then staple the webbing strips alternately on each side of each post, being careful to staple the strips with the edges in line. Draw taut, but not too tightly. Then weave in the 1 x 2s as in the photo at the right spacing the strips equally between the line posts. Colored webbing is available from the manufacturer, Weblite, Inc., 24 Jericho Turnpike, Mineola, Long Island, N. Y.

**OUTDOOR FAMILY ROOM** with colored walls in basket-weave can be yours for a few hours' work with colored plastic webbing. Below, weaving is done with 1 x 2 wooden "shuttles" inserted between strips







1

## "SOUP UP" YOUR STICK PLANES

By Harry McDougall

**S**URPRISINGLY good flights, straight from the box, often can be obtained from stick-model planes. However, with a little knowhow and some practice in trimming, the performance of these simple models can be greatly improved. Moreover you can learn a great deal about aerodynamics just from watching the improvement in the performance as you make various modifications and adjustments.

Initially the wing should be positioned so that the model balances in a level position when it is raised by finger tips placed under the wing, one third of the distance from the leading edge. Start "flight trials" by gliding it, pointing it slightly downward, Fig. 1, and launching it gently forward, preferably over long grass.

Move the wing forward to make it climb. If it climbs too steeply and stalls, move the wing back. Mark the position with a pen rather than a pencil which may indent the

wood and re-check the position of the wing before each flight. It may shift after a rough landing and unless it is readjusted, the results on the next flight can be disastrous.

Lubricate the rubber-band motor with a mixture of 50 percent soft soap and 50 percent glycerine. Then wind about 50 turns and launch the model almost into the wind, standing with the wind blowing on your left cheek. The propeller torque (the force which causes the model to twist in the opposite direction to the propeller) will make it climb in a left turn, which will bring it directly into the wind when it has gained a few feet of altitude.

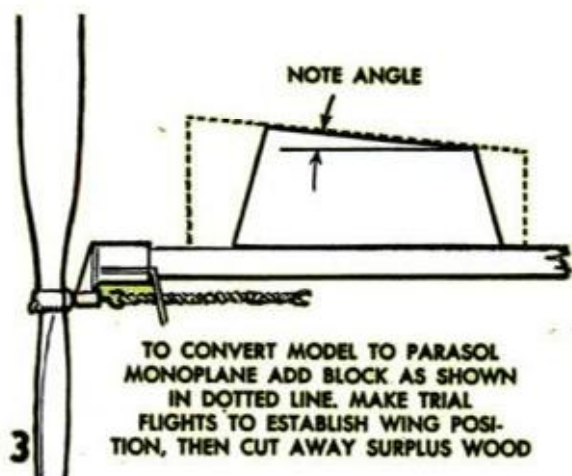
The propeller shaft has a built-in "down thrust" so that when properly adjusted for the glide, powered flight does not usually require any change in trim. The propeller torque will always tend to make the model turn to the left on the climb but as the rubber motor runs down, the model's flight





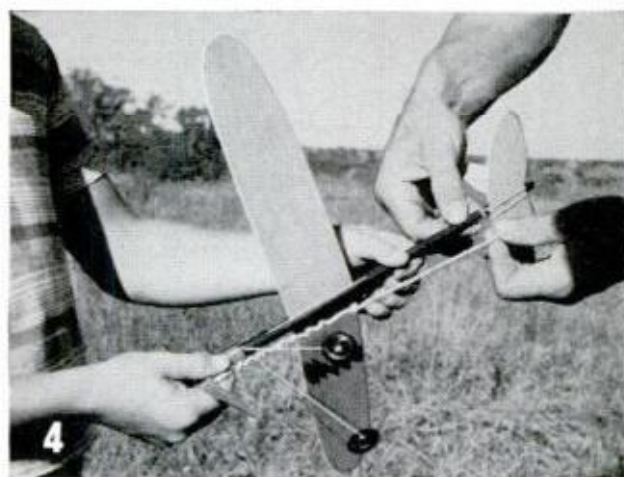
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**BALSA BLOCK** glued to stick fuselage converts plane to parasol monoplane to improve lateral stability

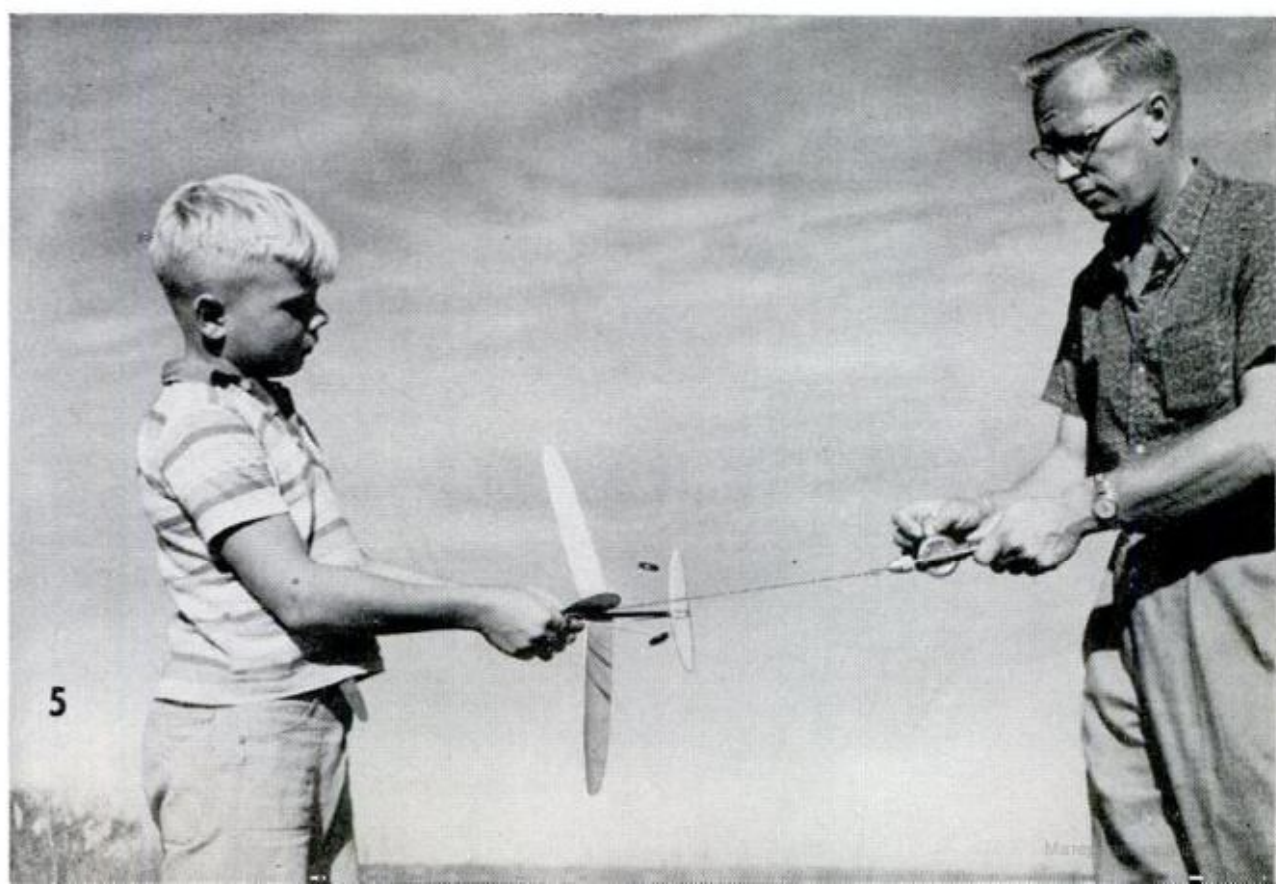


TO CONVERT MODEL TO PARASOL MONOPLANE ADD BLOCK AS SHOWN IN DOTTED LINE. MAKE TRIAL FLIGHTS TO ESTABLISH WING POSITION, THEN CUT AWAY SURPLUS WOOD

3



4



5



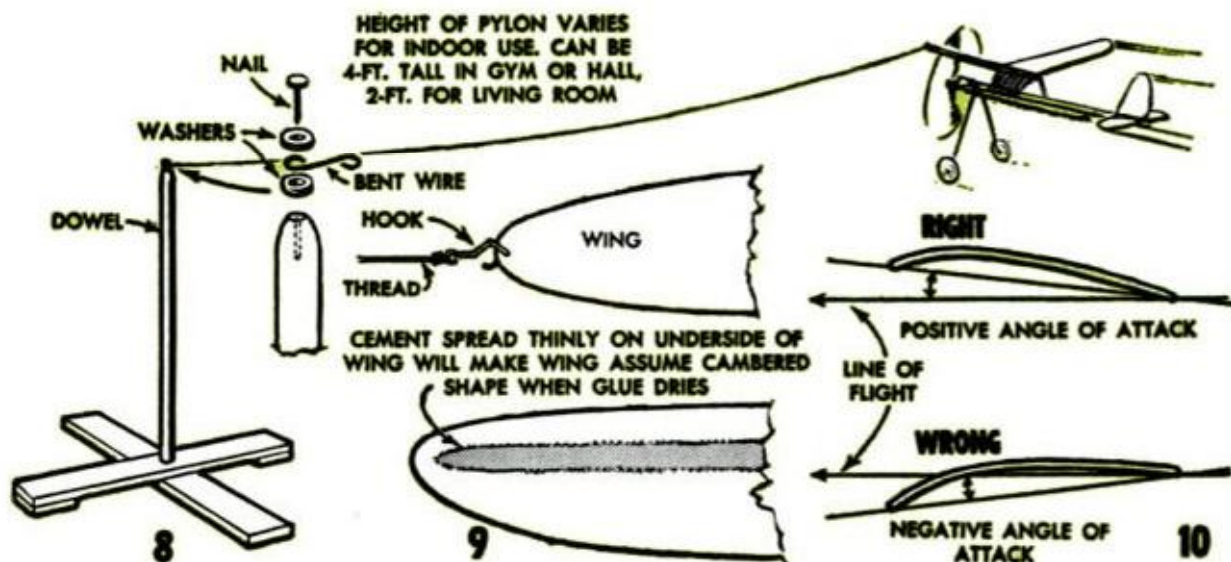


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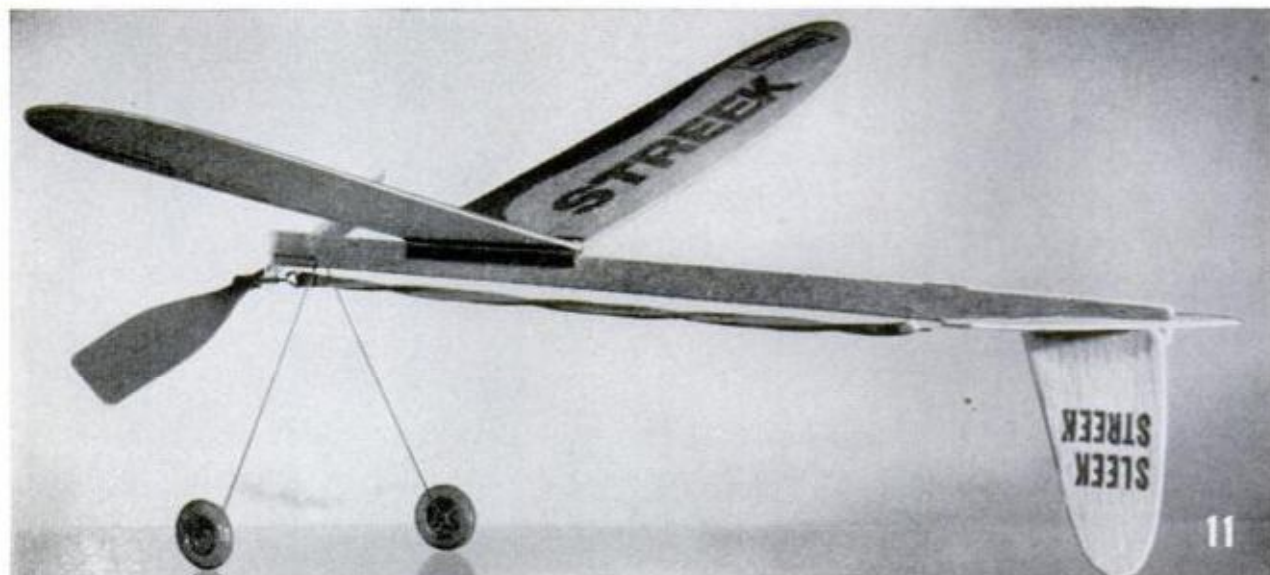


7

AS ORIGINALLY DESIGNED model usually has little or no sweepback to wings, as shown at the left, above. However, you can increase the longitudinal stability considerably by cutting the wing roots at an angle for added sweepback. This will require positioning the wings a little more forward to compensate for the angle

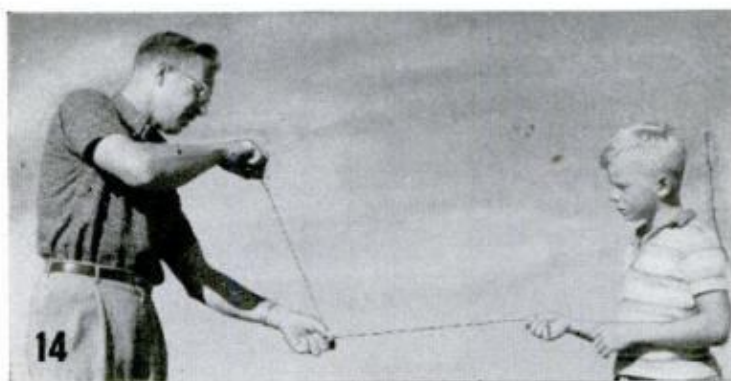


FOR INDOOR FLIGHTS rudder fin is underslung as shown below to prevent steep climbing and for better takeoff and landing. In this position rudder also makes for long, level flights around pylon. The detail at the left, above, shows how a simple pylon can be made by driving a dowel or broomstick in a hole in a cross base



11





will tend to straighten as the rudder assumes full control. Adjust the rudder by bending it forcibly or, better still, by steaming it. As this may not be possible without returning from the flying field, it is a good plan to cut several rudders from a sheet of balsa and steam and warp them to various shapes. Then they can be substituted as desired. Another alternative is to adjust for the turn by advancing one side of the wing. This causes the advanced side to lift earlier, puts the model into a bank and thus turns it in the desired direction.

Check after each flight to see that all the surfaces are symmetrical when viewed from the front. The tailplane should always be flat, but the wing tips should have slight "wash-out" (the angle of attack should be less at the tip than in the center). The wing should never have "wash-in."

Once you have mastered the art of trimming, you can begin to modify the model to get maximum performance. First be sure that the tail surfaces are of a lightweight grade of balsa. If they are not, buy a sheet of lightweight balsa and cut out new surfaces, using the originals as patterns. The greatest improvement in performance can be obtained by experimenting with various rubber motors. Normally, a single rubber band, forming a two-strand motor, is supplied with the model, but a longer motor, having four strands can be used quite safely. Measure the distance from the propeller shaft to the rear hook and add one half the distance. This will be the approximate length of the ideal rubber skein for any particular model. You can make up a four-strand motor quite easily as one large loop,

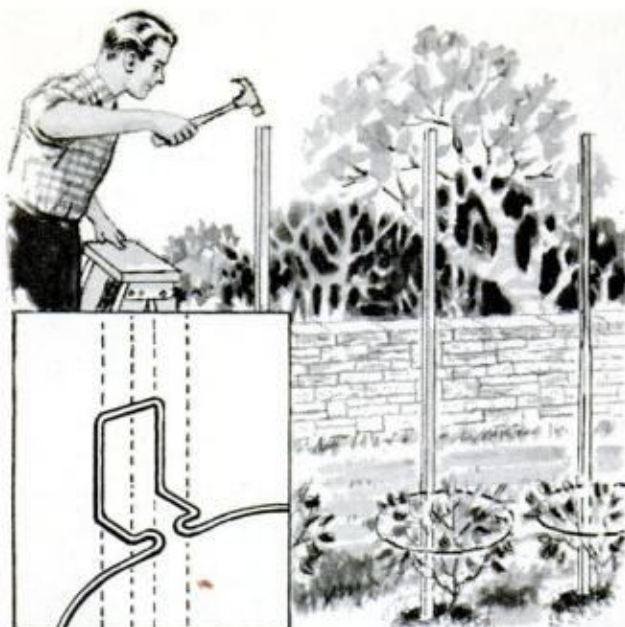
doubled. Knot the ends together, then bind with thread to prevent the knots coming undone when the rubber is lubricated.

Using a long motor enables you to increase the number of turns proportionately, so it is best to use a geared winder adapted from a hand drill, Fig. 5. The very cheapest hand drill is quite adequate. Fashion a hook from a paper clip as in Fig. 12, and clamp it very firmly into the chuck. Make another hook in the form of a letter "S" with the ends almost closed and use this at the rear of the motor. To wind the motor, slip the hook of the winder through the S-hook and stretch the motor to twice its normal length. Begin winding, gradually shortening the length until, when the last turns have been added, you can slip the S-hook off the winder and onto the rear hook of the model, Fig. 4, and you are ready for a long flight.

Since the rubber skein is so long, there will be a tendency for it to flop about when

(Continued to page 198)

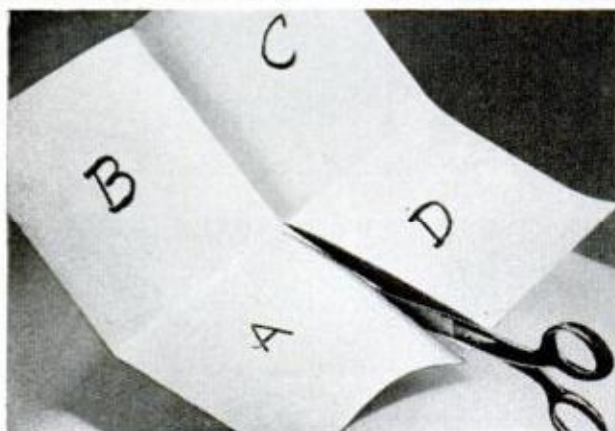




## KEEP THESE IN MIND

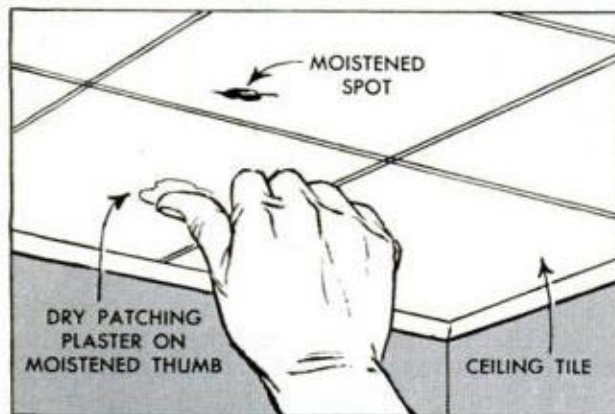
### All-Season Plant Crutch

Use this sliding ring and stake to support peonies, tomatoes and any spreading plants that may require support throughout the growing season. Stakes are cut from 1 x 2 stock to a length of 4 to 6 ft. and one end of each is pointed so that it will drive easily. The sliding ring is formed from heavy wire and normally should be about 15 in. in diameter. Opposite the splice a self-locking loop is formed in the wire as detailed, the size of this loop being such that when the final right-angle bend is made it will slide onto the stake and lock at any point. As the plant grows the loop is lifted to provide support.—*Grover C. Barth*



### Four-in-One Sanding Pad

Don't waste sandpaper by tearing the sheet and using the pieces separately. Here's a way to fold the sheet to four thicknesses and form a pad with four fresh sanding surfaces. Lay the sheet with the abrasive side up and crease it at the center. Then cut to the center along the fold. Turn the sheet over and fold the A section over the B section. Then fold A and B over section C and finally fold the section D over the first three. After the exposed sides are worn, refold again, beginning with the D section.—*Bil Toman*



### Dry-Powder Ceiling Patch

You can patch a dig or scratch in ceiling tile by using dry plaster or talcum powder. Just dampen the damaged area with a sponge or wet cloth and then thumb the dry powder into the depression. Brush away the excess with a flick or two of a whisk broom. Repeat if necessary to bring the patch to the level of the surrounding area. A patch made in this way will dry without any sheen, matching the surface finish of tile perfectly.—*Victor J. Lamoy*



### Flies in Safe Storage

Trout and bass flies won't get their hooks into you if they're kept in a left-over spectacle case. Or, maybe you'd just like to keep those choice flies separate for use as a last resort when the fish refuse the bugs you've been feeding them. The case should be of the metal type with a leatherette covering. The spring cover should close with a snap, just as it did when new. You can divide the case into compartments by making separators of stiff cardboard, cutting them so that they fit the curvature snugly and cementing in place.—*Charles Carroll*







# LEARN TO SKI THIS SUMMER



**1. DRY-LAND INSTRUCTION** helps beginning skier to learn coordination and balance. Pupil is reminded to flex knees, keep arms straight with firm grip in towing handle and let boat do most of work



**2. SKI BINDINGS** should fit skier's feet snugly. If too tight, they will cause discomfort and won't come off readily in event of a fall. If too loose, skis will not give feeling of security and may slide off



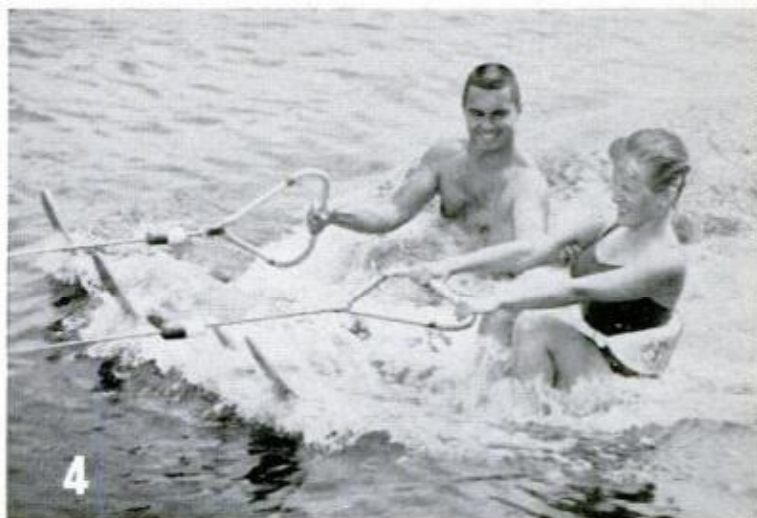
**Here's how you can "get up" and skim over the water on your first try, with tips on how to get in on ski club and tournament fun**

**O**NE OF THE SECRETS of water skiing's phenomenal growth is the fact that anyone can learn the basics of skiing in one afternoon. Many of the 300,000 newcomers to the sport each year experience the thrill of skimming over the water behind a fast-moving boat on their first try. For others, it may take one or more flips or "plops" before they "get up" in skiing position. After takeoff, it is an easy matter to make turns, jump the wake of the towing craft and skim along as though you've always known how to ski. To stop, you simply let go of the tow-rope handle and glide to a stop. As with any other sport or skill, improvement in form and learning the more difficult jumping, slalom and trick skiing comes with practice coupled with expert instruction.

Since a pair of water skis are essential to learning and enjoying this sport, the first step is to select skis of the proper size. Persons weighing 50 to 120 lb. should use skis 5½ ft. long; 120 to 160 pounders, 5 ft.-9 in. long; and for those above 160 lb., 6 ft.-3 in.-skis. Ski width should be between 4 and 6 in. The lengths given are intended only as a guide for beginners. Accomplished skiers usually use shorter and narrower ones than beginners, for better



**3. BEFORE STARTING**, ski boat observer makes sure rope is secured to tow bar and won't foul on motor



**4. INSTRUCTOR** and pupil are about to "get up" on water. Note correct sitting position while starting

**5. ONCE UP**, skier simply hangs on for ride, balancing against tow pull and flexing knees to absorb shock







**6. SKIS ARE** easier to control on dock start since they get into planing position almost immediately



**7. SIDE SLIDE** is easiest skiing trick to learn, a preparatory step to skiing backwards. Ski-Talkie on towing handle permits coaching of skier from boat

maneuverability and control. Foot bindings should be adjustable to permit proper fit, Fig. 2, and made of flexible material such as gum rubber, so that they will yield in case of a fall. Also, they should be open at the toe for best comfort.

The standard towline is 75 ft. long and may be made of manila rope or plastic. The handle may be double or single, though the latter is recommended for beginners and is used by most advanced skiers, except for slalom and some skiing tricks. A life belt, such as the one shown in Fig. 1, is a must since it enables an injured or unconscious skier to remain afloat until rescued. It's also a good idea to fly a ski safety flag from a stern pole as in Fig. 10. As another point of safety, the tow rope should be firmly attached to the boat by means of a ski bridle as in Fig. 14, or a hitch of the type shown in Fig. 3. The latter type is preferred since its higher point of towing-pull tends to reduce skidding and motor cavitation on tight turns. Further, the rope is kept in sight of the driver at all times. An ideal tow boat has a fairly wide transom (54-in. minimum), has low freeboard for easy boarding by fallen skiers and has a fairly fast planing hull that rides quite flat to the water. Power should be adequate to make 35 m.p.h. or better with two adult skiers under tow, although a speed of 20 to 25 m.p.h. is adequate for beginning skiers.

For those who have the skis, but not a proper boat, joining a local ski club is the logical next step. Even if you do have a boat and a friend to drive it, club membership is a practical way of getting expert instruction on skiing, tow-boat driving and boating, most of it free, or at nominal cost.

**8. SAFETY** is primary reason for inspecting ski-tournament contestants' equipment. Missing binding screw, or cracked ski may result in serious injury





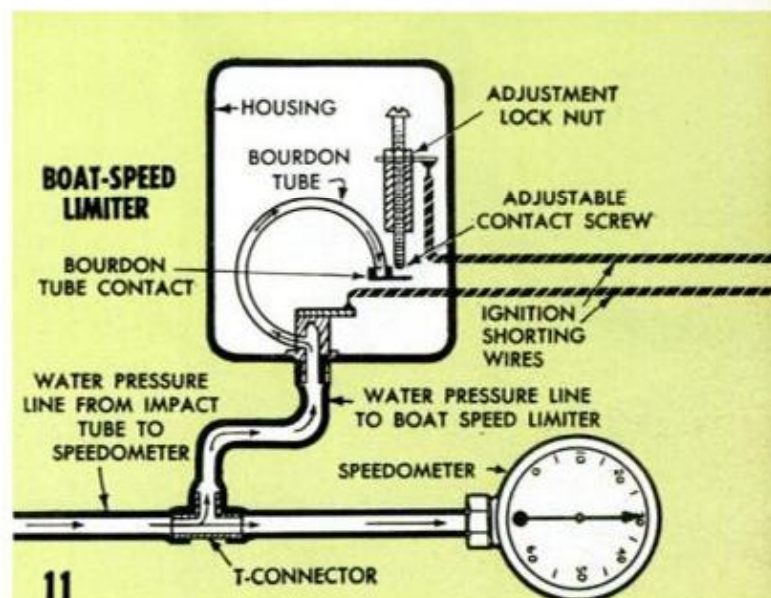
Clubs usually have a ski jump for members' use, slalom course and other facilities and equipment which is more suited to group ownership because of cost and storage problems. Some own clubhouses on waterfront property, in which regular meetings are held and water-sports movies shown. The clubhouse also serves as a rallying spot for many other related activities, including ski tournaments. Tournaments afford those who are serious about skiing a chance to perform competitively in slalom skiing, jumping, tricks on skis and mixed doubles skiing. If the club is affiliated with the American Water Ski Association, the winners in each event, or category, are groomed by the club experts for appearance in regional and national tournaments which are held each year.

To find out the name of the club nearest you, write AWSA for their directory of ski clubs. Located at Winter Haven, Fla., AWSA also has available to members (membership fee is \$5 per year) construction plans for jumps, safety rules, national rating system for skiing skills, assistance in organizing ski clubs and many other services and information. A monthly magazine on water skiing also is included with the membership fee.

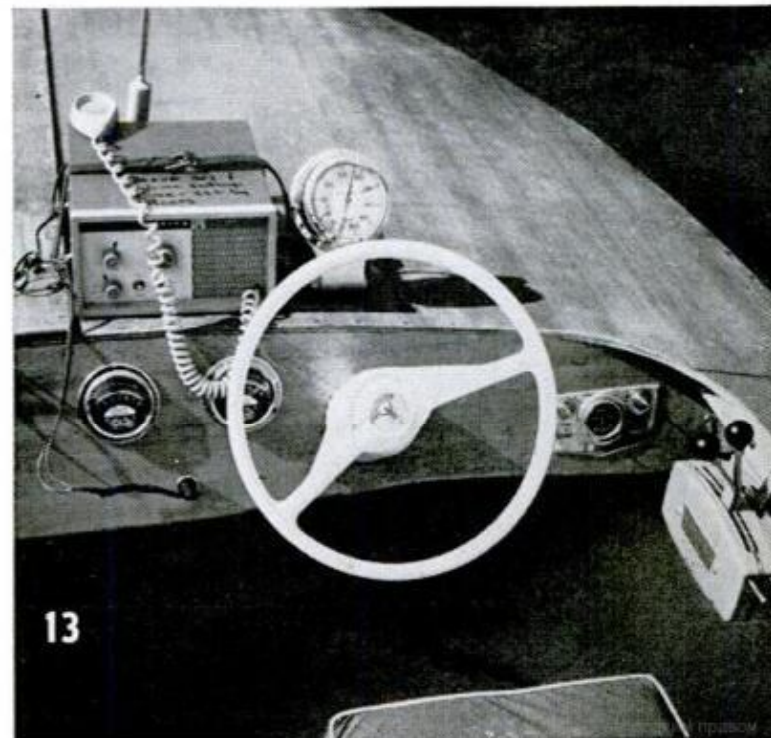
Most ski instructors feel it is important to give some dry-land instruction before the beginner takes to the water. This is what Tom Dorwin, former champion skier and now ski advisor for Evinrude Motors, is shown doing in Fig. 1. After the bindings have been adjusted to fit snugly on the skier's feet, the rubber parts are wetted. This cuts down on friction and permits the skis to be slipped on without danger of



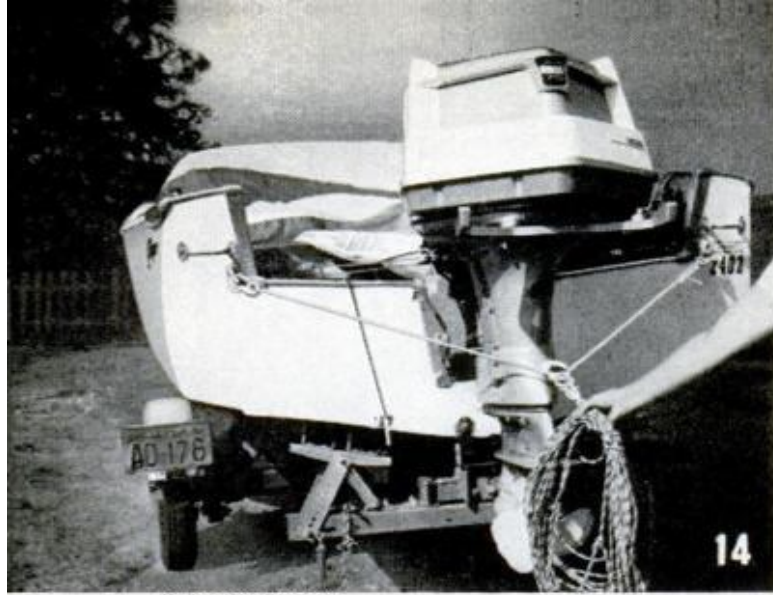
**10. FALLEN SKIER** receives towline handle at side of boat to avoid danger from propeller. New ski safety flag on stern pole signifies, "skier in tow"



**12-13. TOURNAMENT SKI BOAT** must have well-anchored towing pylon and guard to keep rope off motors. Special speedometer rig helps driver to hold required speeds, while radio permits communication with judges







V. Lee Oertle photo



**16. JUMPING** not only requires perfect timing and balance on part of skier but also demands that boat driver keep slack out of tow rope to prevent skier from submerging upon landing, and continuing on course

tearing the bindings. The proper way to put on a ski is to push your foot forward into the front part of the binding while pulling up on the heel part, Fig. 2. With skis properly fitted to the feet, you should sit back on the skis, bend the knees and keep the arms straight. Your instructor, or helper, then takes the tow rope and pulls you slowly into an upright position, just as the boat will do when pulling you up on the water. Remember to flex the knees, keep the arms straight and let the boat do the work. After you have practiced this several times and have learned to react correctly to the pull on the rope in a simulated start, you are ready for the water.

Moving out into about 3 ft. of water, put on your skis in the same manner as described previously. After the tow boat has moved into starting position and you have the tow-rope handle in both hands, raise the tips of the skis above the surface, remembering to sit back on the skis, with knees tight against the chest, arms straight out. As you signal the driver to go ahead and he starts accelerating, allow the tightening rope to bring you slowly to standing position as you did when practicing on dry land. At the same time, balance your weight directly over the feet and hold the skis about 6 in. apart. The crouched position should be held until the skis start to plane since it maintains center of gravity to the rear, so ski tips remain above the water in planing attitude, Fig. 4.

When coming out of the crouch, do so by straightening the legs, not the back. Keep the arms straight and waist bent. You should ride along in this position until you feel confident the skis are running well. Then, assume an erect riding posture. In the latter position the body is held straight, except for a slight bend in the knees which allows the upper body to lean back to balance the pull of the rope. Shoulders are held well back, arms straight and no bend at hip or waist, as in Fig. 5. Boat speed should be held to 15 to 20 m.p.h. until skiing fundamentals are learned.







17

V. Lee Oertle photo



18

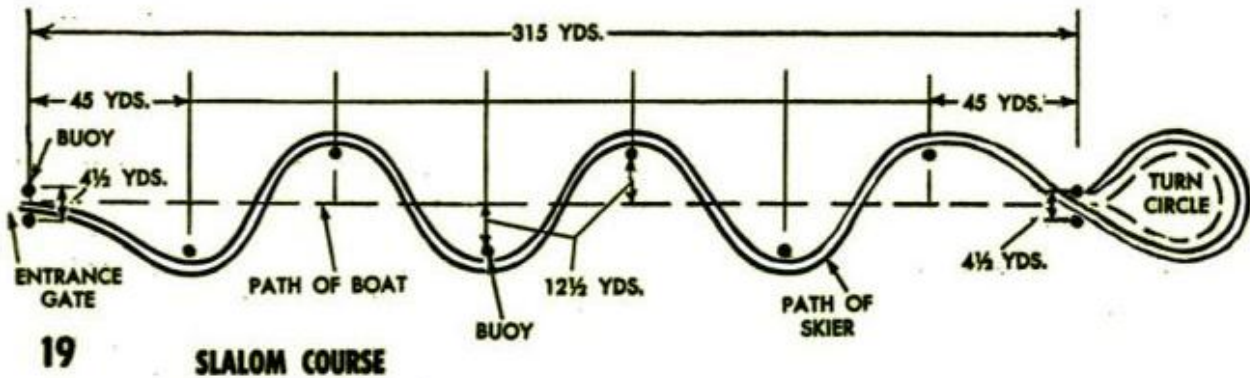
Once you are "up," skiing along on smooth water is a snap. Your first maneuver will be the turn, which is simply enough executed even for the first time. To change directions, lean toward the side to which you want to go and bank the skis in that direction. At the same time, apply pressure on the ski opposite the direction of turn. Go easy at first, curving from one side of the smooth part of the wake to the other while the boat goes on a straight course.

When you've gained a little confidence doing this, you are ready for a second skiing thrill, that of jumping over the waves formed by the boat's wake. If you want to ski out to the right side, first steer out to the left inside the wake. Then, turn sharply

to the right and hit the wake squarely. As you go over the first wave, arms should be extended forward, waist bent slightly and knees cocked a bit though relaxed. When you get the feel of this, practice jumping up when crossing the wake to relieve the skis of some body weight.

To return to the center of the wake, pull out to the side about 20 ft. and then cut back quickly so as to head into the wake squarely again. Having succeeded in this, you should now be able to follow the boat in fairly sharp turns, whipping around on the smooth water outside of the boat's wake and cutting from side to side almost at will. Turns, of course, must be attempted only on the outside of the turn made by the

(Continued to page 204)



19-20. SLALOM SKIING, usually done on one ski with extra toe piece behind binding, requires skier to pass on outside of line of anchored buoys positioned in zigzag 315-yd. course, while boat travels straight course



20



# Automated Watering

*Set it and forget it. That's automatic lawn and garden sprinkling*

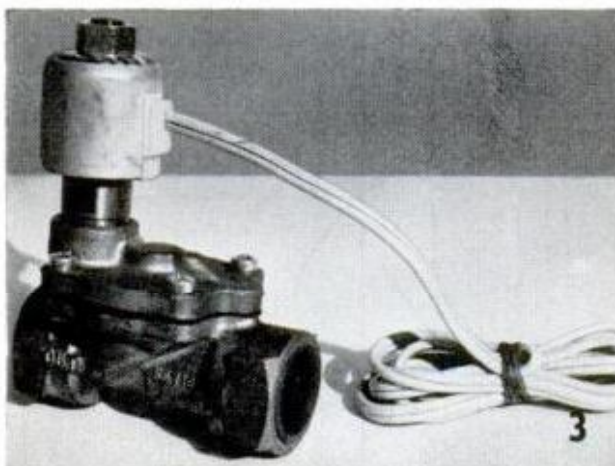


**TIMER IS SET** by inserting pins in slots. External manual switch may be used to shut off the system



**MECHANISM OF SEQUENCE VALVE** is completely sealed and will function regardless of the valve position

**SOLENOID CONNECTS** to system between timer and sequence valves. Timer controls water flow to system



**T**IMED SEQUENCE watering of your lawn and garden is here to take over the chore you've always grudgingly carried out on evenings and week ends when you really wanted to leave the old—or new—homestead. Now you simply set a timer and the watering is done while you're gone. Even on a vacation, there's no need to ask the neighbors to look after the flowers and lawn. Just give 'em the cat and the canary, adjust the timing gadget to a repeat cycle and watering will be carried out at regular intervals, right on time, even though you may be gone a month.

The basic control kit of this underground system consists of a timer, Fig. 1, a solenoid valve, Fig. 3, a sequence valve, Fig. 2. These cost you about \$80. The three units control two sprinkling circuits. For every circuit beyond this you invest about \$12.

Here's how the system works: At the time of day you select, the timer activates the solenoid, which opens the intake valve and allows water to flow to the first sequence valve and the set of sprinkler heads that it controls. The sequence valve in turn prevents water from flowing to the remainder of the system until the cycle for that circuit is completed. Then the timer again activates the solenoid to stop the water flow for about 15 seconds.

Lowering of water pressure in the sequence valve for this period of time triggers the mechanism and stops water from flowing to its family of sprinkler heads. This interval permits water to pass along to the next valve, where the cycle is repeated.

Settings on the timer control the amount of water that each of the sequence valves sends to its set of sprinkler heads. Thus the watering time for any given area is automatically controlled. When all watering has been completed, the system shuts itself off until the day arrives when you want the cycle to repeat.

Called the Sequa-matic control system, the parts can be incorporated into an existing system by replacing the manual valves with sequence valves and adding the timer and solenoid. Of course, it also can be planned as a new installation, utilizing standard plastic pipe. Only a few household tools are needed for ordinary installations.

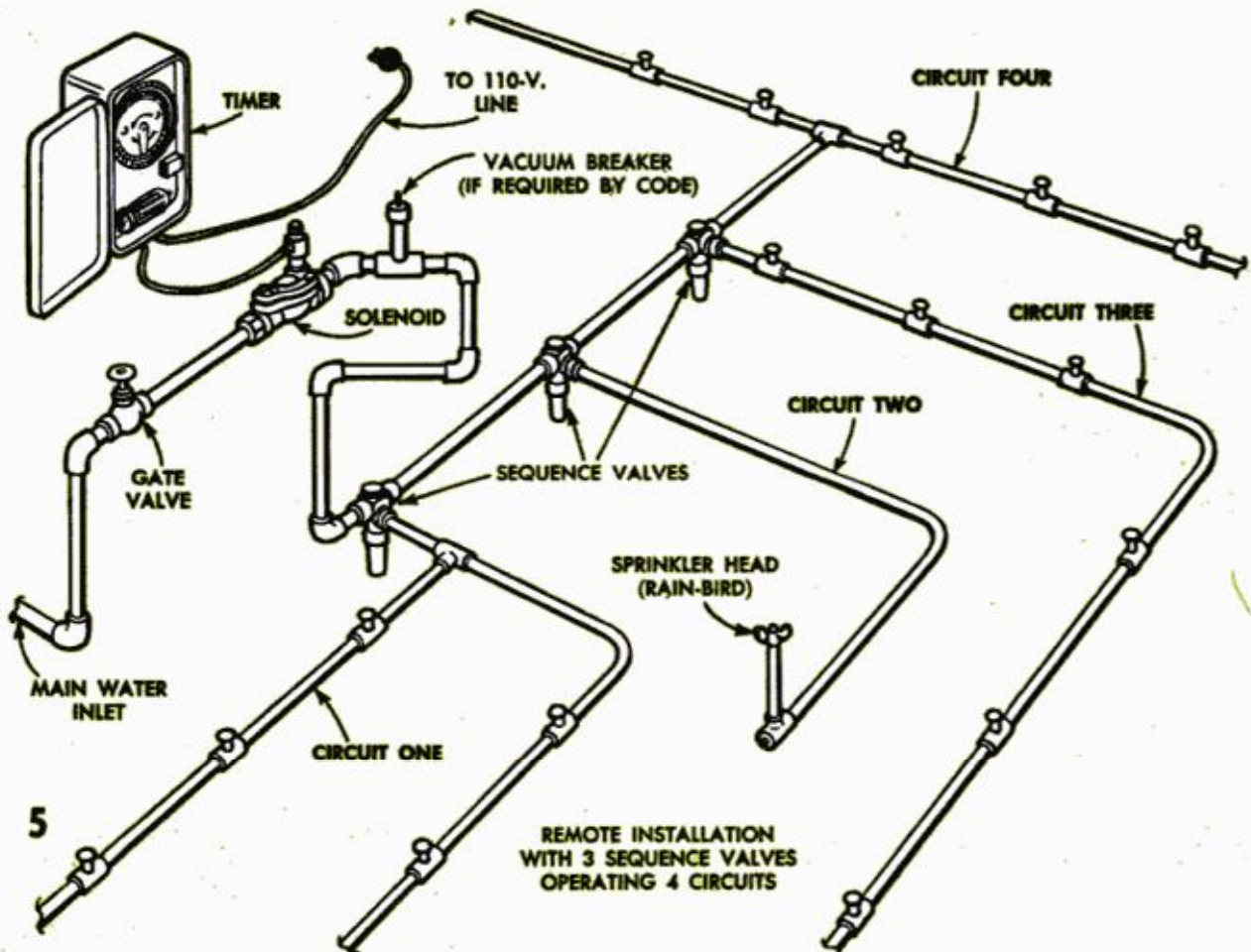
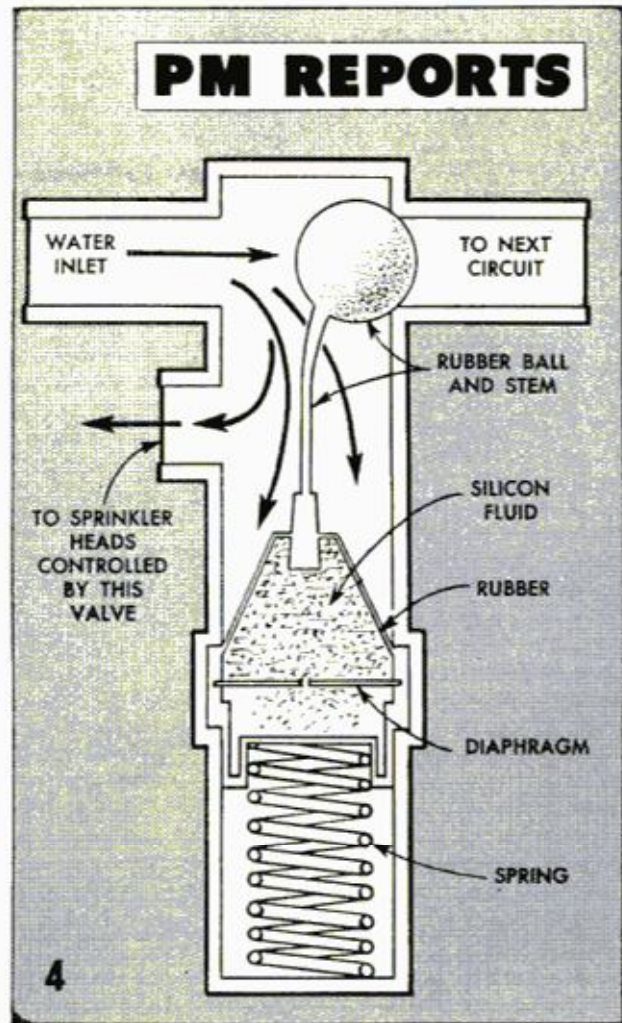


A special adhesive is used to fasten the plastic pipe and fittings together. A plastic pipe installation can be laid in a day on an average-sized lot.

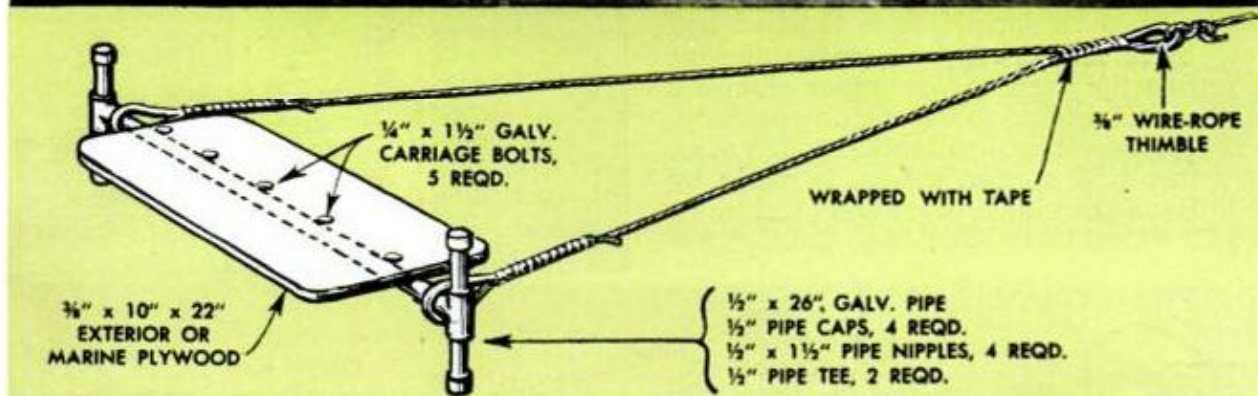
The sequence valve, Figs. 2 and 4, operates when water pressure pushes the rubber ball against the outlet opening and allows the water to flow to one of the circuits. Also, the water pressure collapses the rubber ball, Fig. 5, putting the stem under tension and forcing the transfer of the viscous silicon fluid to the lower chamber.

The fluid, which takes about three minutes to transfer, is held in the lower chamber by water pressure, even though the spring is now under tension. Water continues to flow to all the sprinkler heads controlled by the valve until the solenoid, activated by the timer, halts the water flow for the 15-sec. interval mentioned. Lowering of the water pressure causes the stretched stem to snap the rubber ball down, sealing the outlet opening and permitting water to flow through to the next valve. When all sprinkling is finished and water shuts off, spring pressure is sufficient to return the fluid to the upper chamber and the ball returns to the starting position.

This new system, available through most hardware and garden stores, is made by John Bean Division of the Food Machinery and Chemical Corp., San Jose, Calif. ★★







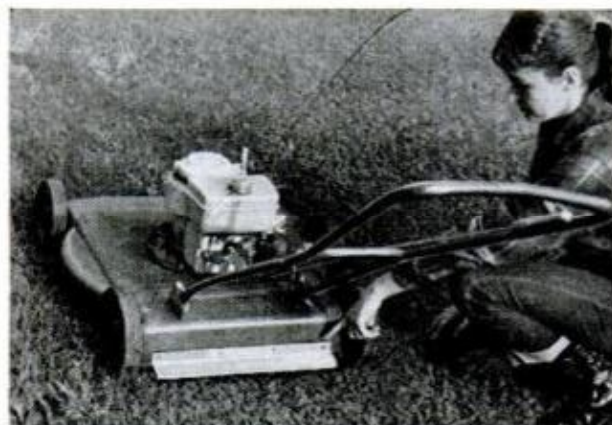
## Undertow Board Is Loads of Fun

Tired of kicking while skin diving? Then try this rig. You'll go farther on your air supply and there's always the additional safety of the towboat just in case. The 50 ft. towline should be  $\frac{5}{16}$  to  $\frac{3}{8}$ -in. ski rope or similar, and it should be rigged with a shackle connecting it to the bridle. Slip thimbles around the pipe spreader before assembling the fittings. Drill bolt holes

through the pipe. Cut out the plywood seat, round the edges, drill registering holes and bolt in place. A 15-ft. length of chain just ahead of the bridle helps to keep you planing on the level. By tilting the board you can go down or come up fast. Towboat should hold speed to four knots, and it's best for diver to use fins for better control.—*Mart Toggweiler*

## Mower Toe Guard

I was lucky. I only lost the toe of my shoe when I absent-mindedly stuck it under the housing of my rotary mower. Just to make sure this didn't happen again, I made a simple extension guard that assures safety. I drilled four small holes in the edge of the housing to accept sheet-metal screws. Then I drilled four corresponding holes in a strip of sheet metal and attached it to the rear edge of the mower. Now the toe of a shoe can't pass under to contact the blade.—*John Krill*





# NEW FOR SHUTTERBUGS

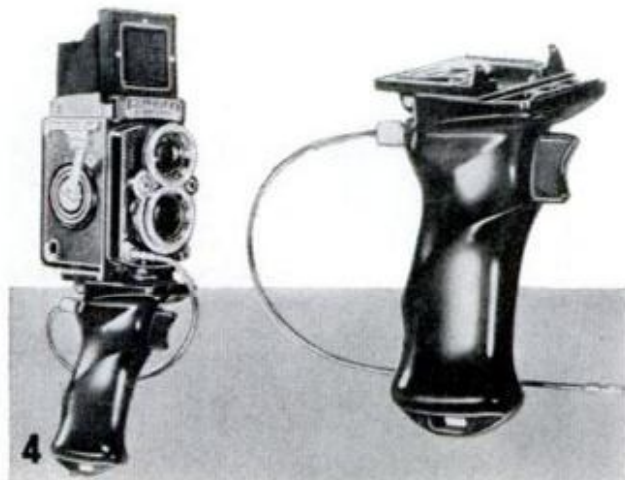
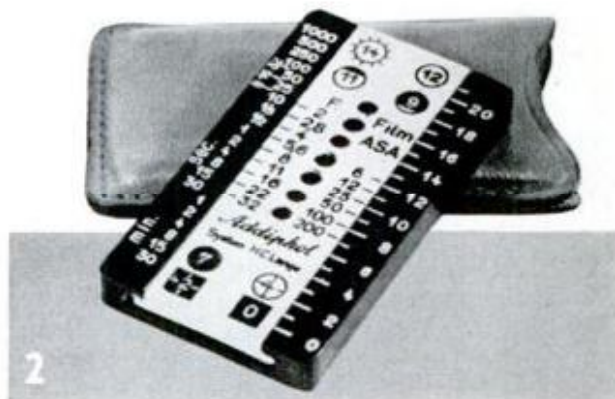
**1. NEXT BEST THING** to a tripod is a shoulder pod. Designed for the miniature camera, Minigrip, with its special shoulder brace, may be adjusted to fit any small camera. Cable release is also adjustable to any pressure photographer wishes. Price: \$19.95. Kling Photo Corp., 257 Park Ave., New York 10, N. Y.

**2. ADDIPHOT IS A SIMPLE** exposure meter utilizing a sliding scale to read the light value and weather indicator and combine them into the correct exposure reading. Price, including leather case, instructions and light-index reference table, is only \$3.98. Silver Bells Limited, Box 982, Carmel, Calif.

**3. SUNSET 88 VIEWER-PROJECTOR** is a completely self-contained table-top viewer, which projects picture on built-in screen. Automatic slide changer handles 36 slides in readymounts without tray. Unit is built into plywood case. Intercontinental Marketing Corp., 45-17 Pearson St., Long Island City 1, N. Y.

**4. PISTOL-GRIP HANDLE** is shaped to fit hand and mount under all Rollei models provided with groove on edge of tripod socket. Handle makes valuable new addition for action shots and eye-level focusing. Flash bracket attaches to handle. Distributed by Burleigh Brooks, Inc., 5 W. 46 St., New York 36, N. Y.

**5. PHOTO PRINTS IN SECONDS** without a darkroom—that's what the new Rollaprint can do. It makes permanently finished photographic prints on a special paper for less than a nickel per print. Rollaprint sells for \$19.95. Distributed by U.S. Photo Supply Co., Inc., 6478 Sligo Mill Rd., Washington 12, D. C.





see correction - Oct. 61, p. 8

# SEE YOURSELF THREE WAYS

**Head on it looks like any picture. But view it from an angle and you are in for a surprise. An old but new idea to intrigue your friends**

**By Theodosia Carpenter**

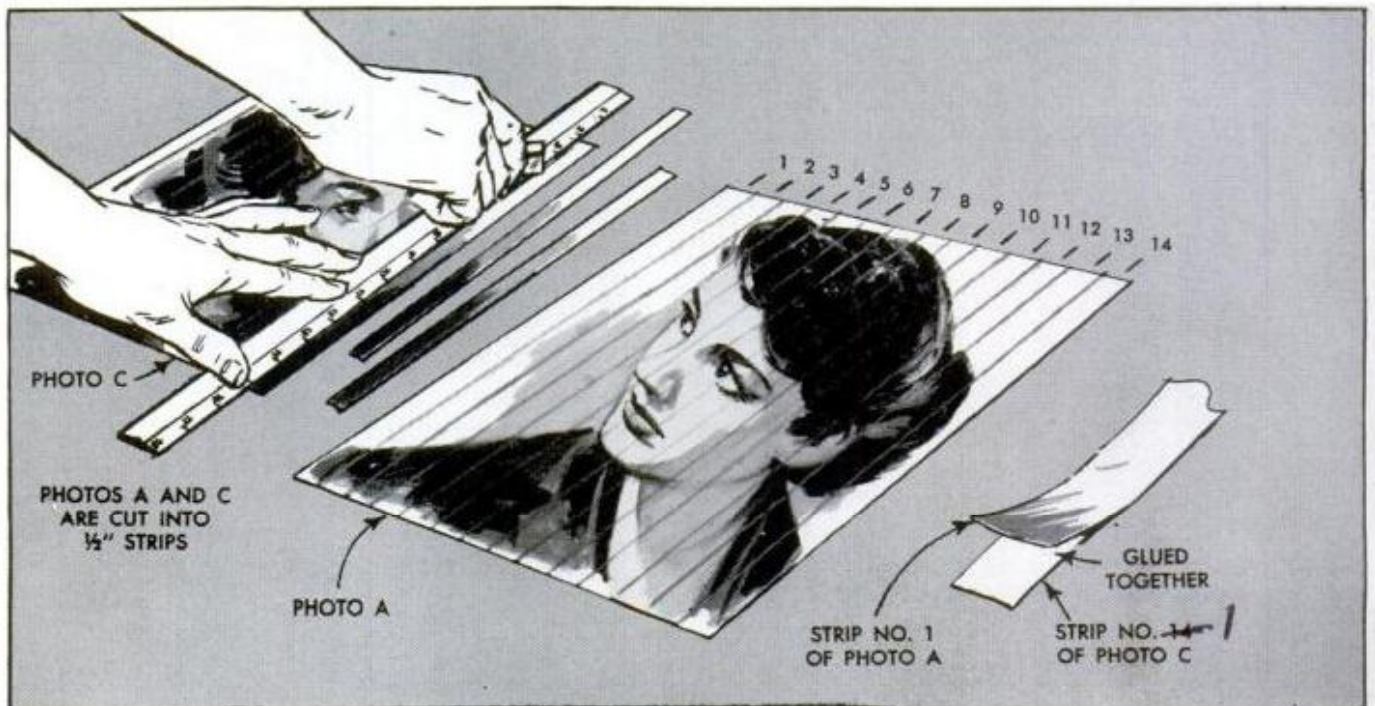


**S**EEING DOUBLE and even triple is to be expected when you look at this novel three-in-one picture. Viewed from one angle (A) you see one image. Viewed from the front (B) you see another image. And viewed from still another angle (C) you see a third image—all three of the same person in a single frame. You can't help but wonder how it's done.

Actually, no mirrors are involved. The effect is produced by three separate pic-

tures, or prints, two of which are cut into strips and held in the frame edgewise, much like the slats in a window louver.

While such novelty pictures can be assembled from cartoon drawings, as well as three unrelated photos, the best illusion is obtained by using three posed portraits, a left profile, a right profile and a front view, all taken of the same person and enlarged to suit the frame you choose. Any frame from the dime store will do. Make a shal-



Shop Projects 1961





B



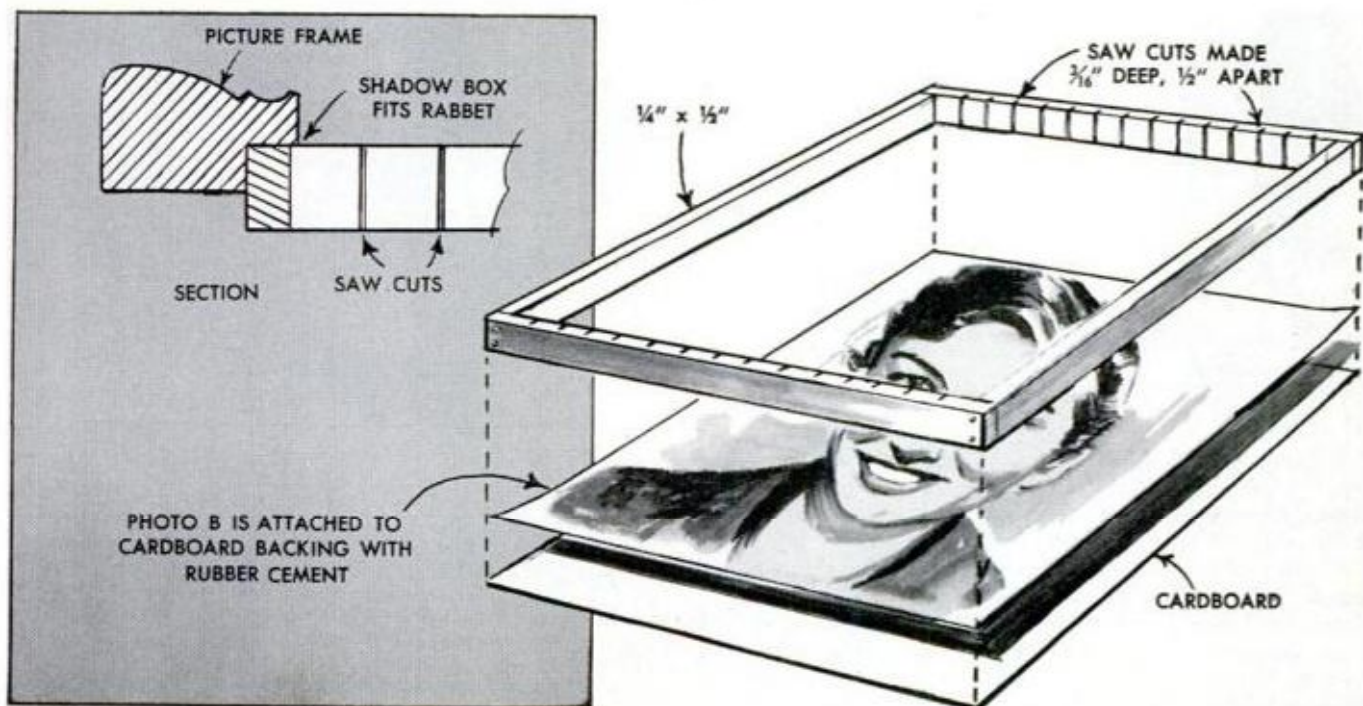
C

low shadow box of  $\frac{1}{4}$ -in. stock to fit into the glass rabbet. A series of saw cuts  $\frac{1}{2}$  in. apart are made in opposite ends of the shadow box as shown and then the front-view print (B) is glued to the edge of the box after first cementing it to cardboard.

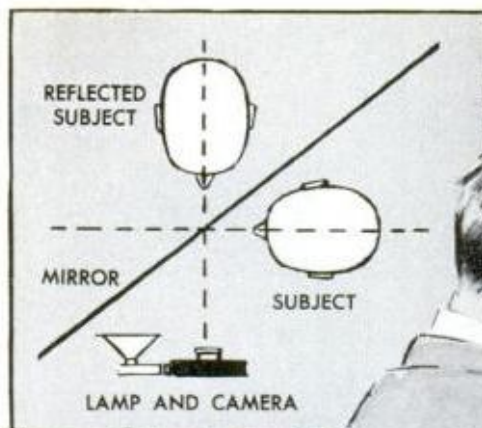
Now cut both profile prints into  $\frac{1}{2}$ -in.-wide strips and number the strips consecutively from 1 to 14 respectively. Next glue the strips back to back, but remember to glue strip 1 to strip ~~14~~<sub>1</sub>, strip 2 to strip ~~13~~<sub>2</sub>

and so on. If you don't, you'll be in trouble. You should have fourteen back-to-back strips when finished.

Now insert them in order in the saw cuts in the shadow box, cutting them slightly shorter than required and gluing them in place with dabs of glue applied only to the upper ends of the strips. Let the lower ends remain free to shrink and stretch with humidity changes. Finally, glue the shadow box in the glass rabbet of the frame. ★ ★ ★







# TIPS ON FLASH

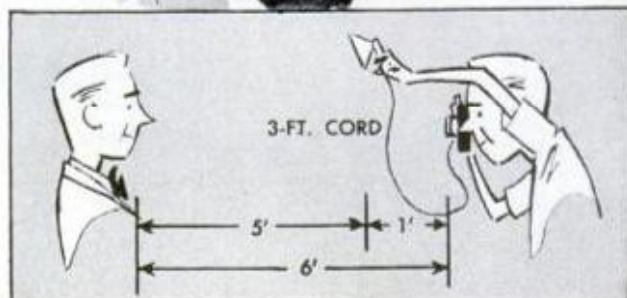
# PHOTOGRAPHY

WITH THIS SETUP you'll get a full-face portrait, a profile view and a two-lamp lighting effect with one bulb near the camera. Pose subject in front of mirror and take position 45 deg. from mirror to line up profile view and full-face reflected image. Focus on subject and stop down to cover reflected image. Disregard mirror

**HAVE TROUBLE LIGHTING EDGES** of your flash shots? Maybe your lens covers a wider area than reflector and makes the corners too dark. By using a bare flash bulb you can light the whole area and make the shadows softer. Figure exposures at  $\frac{1}{2}$  of reflector guide numbers. Protect against shattering bulb by dropping cellophane cigarette cover over it



**GUIDE NUMBERS ARE FINE** as a general rule, and they work out on the button in an average-size living room painted medium to light tones. But if bulb is six ft. or less from subject, its size is relatively large so that light can no longer be figured as a point-source of illumination. Reflected light from the walls is relatively so far away that it is lost. To compensate, use the regular guide number to figure the exposure and, with the reflector in one hand, hold it one ft. closer to the subject





## KEEP THESE IN MIND

### Bundling Dowels

A sponge-rubber ball will keep the cord tight around your bundle of dowels. Drill two holes through the ball and thread a piece of strong cord through one hole then double it back through the second hole to form a loop. Knot the end to keep the cord from pulling out of the hole, then slip the bundle of dowels through the loop. A slight pull on the free end will cinch the cord and friction of the rubber keeps it taut.

### Razor-Edged File

In fine work on some of the softer metals such as brass there are times when you should make a very smooth cut with a new file, one that has never been used. You'll get a much smoother cut if you take time to go over one face of the file lightly with a fine oilstone. This puts a slight bevel on the teeth and also levels any high tooth that may be present. Mark this face of the file with a drop of paint or a square of tape so that it is easily identified and used only for special jobs in the future.—*H. J. Gerber*

### Drumtight Floor

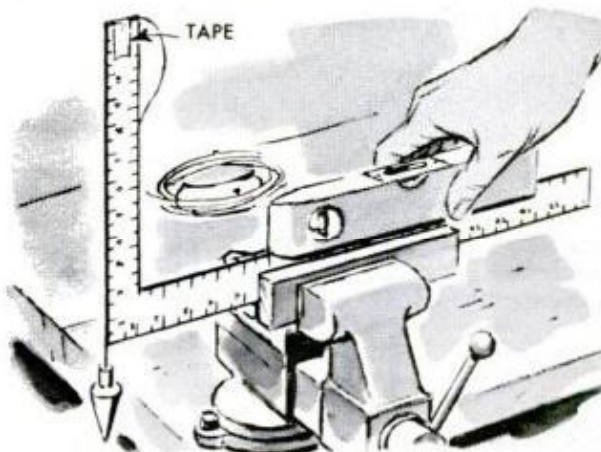
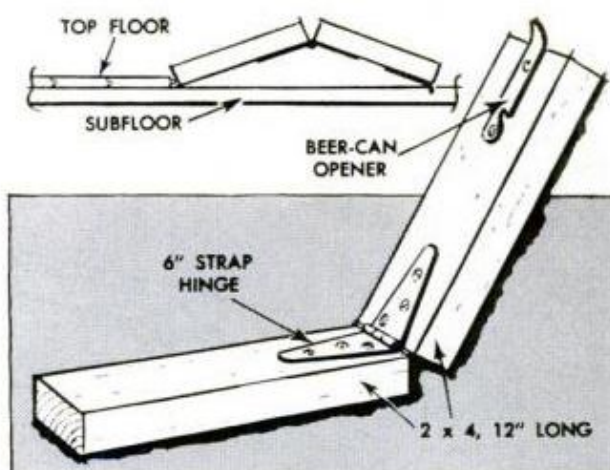
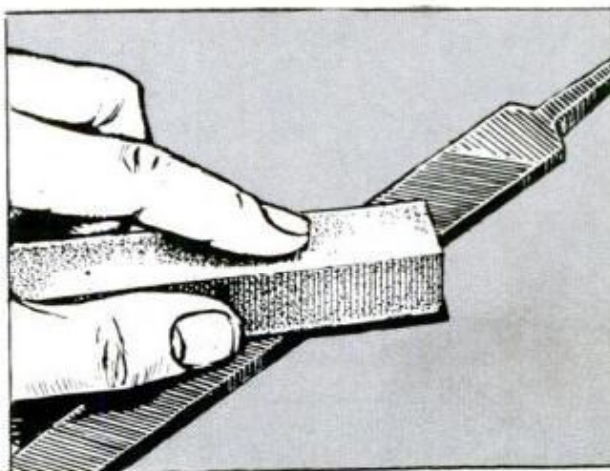
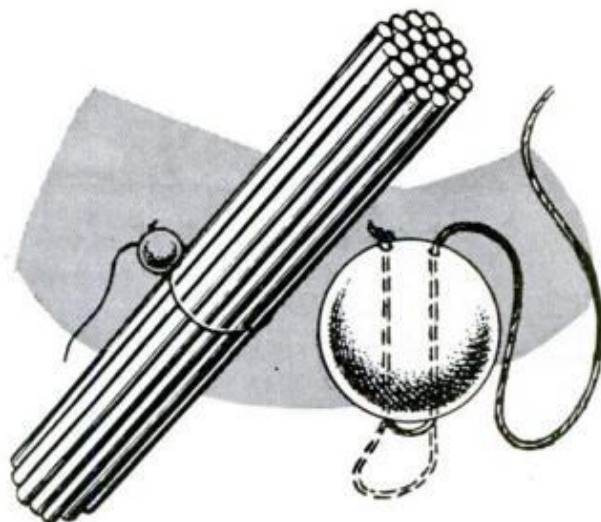
In nearly every bundle of hardwood flooring there will be at least one or two boards that are warped or bowed slightly, just enough to make it difficult, if not impossible, to get a tight joint when laying. But if you have the simple floor-board jack detailed, these pieces are no problem. The jack consists of two 12-in. lengths of 2 x 4, a strap hinge and a beer-can opener assembled as detailed. In use, you place the jack as shown in the side view with the point of the opener engaging the subfloor. Pressure at the hinge point forces the floor board tightly in place for nailing.

—*Burton L. Wollenzein*

### Check for Square

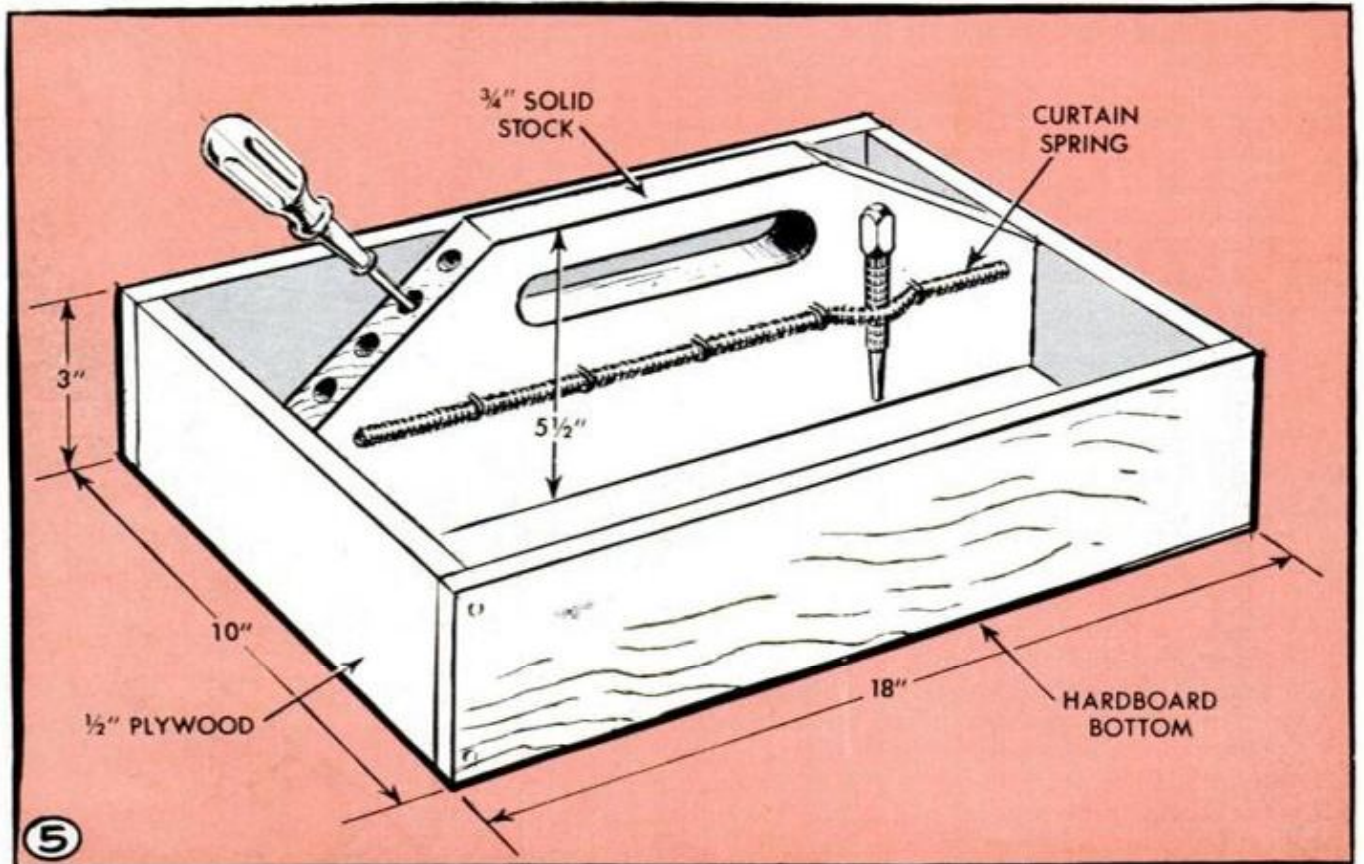
If a carpenter's framing square is dropped accidentally and you question its accuracy, here is one way to check it before putting it to use on a job where work must be accurate. Clamp the beam of the square lightly in a vise, padding each jaw with a short piece of soft wood to protect the beam. Fasten a plumb line with a piece of tape to the upper end of the tongue of the square and let this drop over the vertical edge as in the drawing. Now place a level on the beam of the square and tilt the square until level. If the plumb line remains in contact, the beam and tongue are at right angles and no harm has been done.

—*Walter E. Hastings*



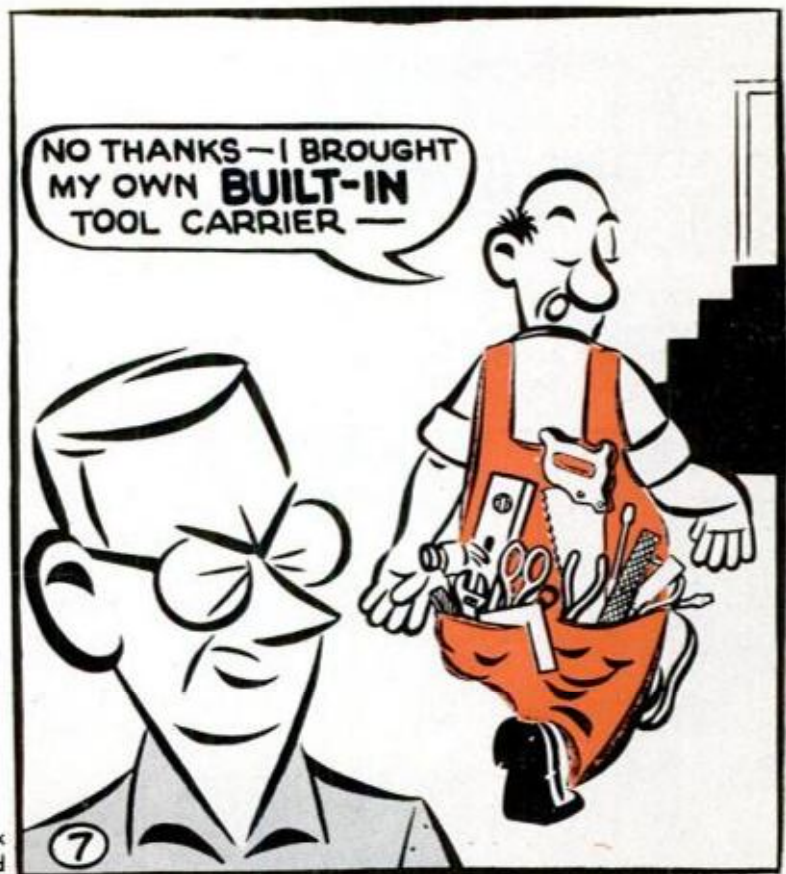


# MR. DO-IT AND BUNGLE





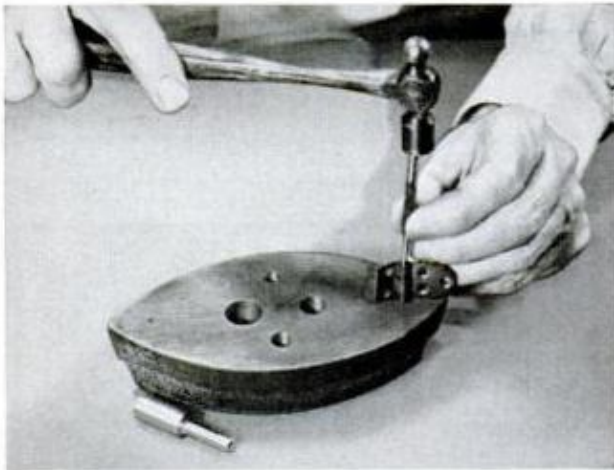
For those never-ending minor repairs that plague the happy suburbanite, there's nothing as handy as a journeyman carrier to tote the tools required



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Shop  
Projects  
1961



**HANDY SIZE STAKE PLATE** can be made from an old sadiron, above. It's heavy enough and hard enough for peening rivets, setting hinge pins and light work as a surface anvil. Below, drilling shouldered stakes



# STAKE PLATE

has many uses in shops  
for repair of appliances

**B**ENCH-TYPE stake plates can be of almost any size required and can be adapted to a wide variety of uses in a home workshop and in appliance repair shops. Photos at the left and on the opposite page show a plate made from an old sadiron, just right for the home shop. If you don't have the sadiron and can't locate one, then a square of steel will do just as well and will serve the same purpose.

## Home-Shop Plate

The one pictured, made from the sadiron, has only round holes. But if you go to the extra trouble of squaring several holes, you can use any number of anvil heads and stakes of the type used in the art metal crafts. Blind round holes can be drilled to take various sizes of dapping punches and the sadiron can serve as an anvil on which to bed a doming stake or perhaps a dapping die. By machining suitable mandrels for insertion in a hole pattern in the plate you can improvise a bender for forming the more common bends used in light ornamental ironwork.

## Hollow Anvils

For the more practical household and appliance-shop uses you can make the anvils needed from drill rod, which, for light work, need not be hardened. The photo and details on the opposite page show a representative selection. Note that both stakes detailed have holes centered all the way through. The holes also can be counterbored, the smaller hole coming in about halfway from the shouldered end. In this way the stake is self cleaning. As a rule holes in the plate should be drilled clear through whether counterbored or one diameter all the way.

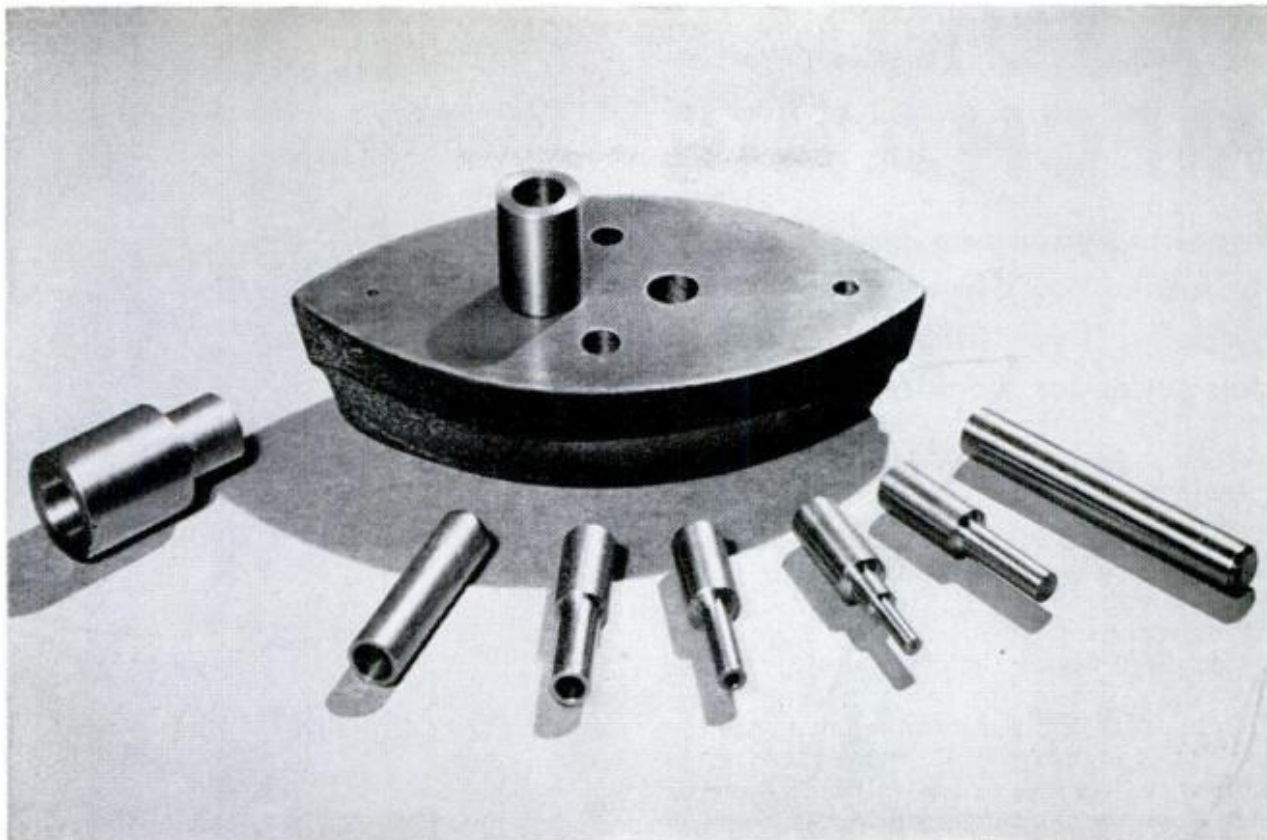
## Solid Anvils

It's always handy to have a number of solid anvils of different diameters and lengths. These fit the counterbored holes in the plate and are useful for a variety of operations involving hammering and peening. There's no need to turn these or have them shouldered at a machine shop. They can be cut from drill rod and the holes drilled in the plate to the given diameters.

## Anvil and Plate Sizes

Make the plate any size to suit the purpose, using 1-in. flat steel if you require something larger than the sadiron pictured.





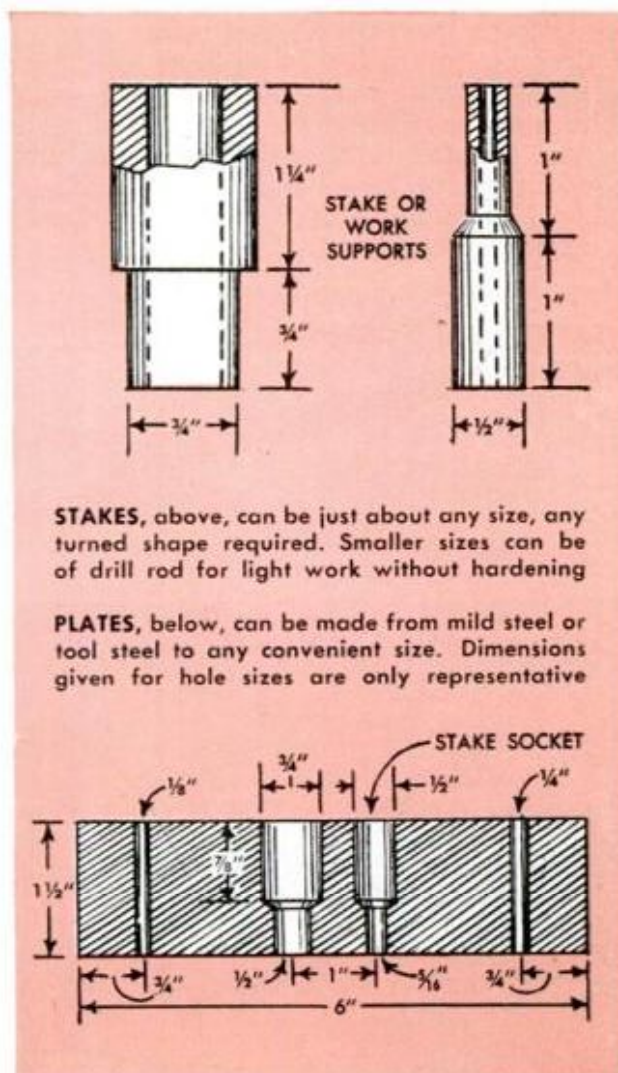
**SADIROn PLATE** with a representative selection of both solid and hollow anvils is handy for appliance repairs

The more holes in the plate of various sizes the greater the extent of its usefulness, especially in a repair shop. On large plates it's a good idea to leave an area clear of anvil holes so that this area can be used as a surface anvil or even as a surface plate for simple layout operations with a surface gauge. The dimensions of the through holes and counterbores in the plate, as well as its overall size, given in the detail at the right are only representative. The holes and hole arrangement can be anything the job requires, or is likely to require. When shouldered down the anvils should always be machined to a close fit in the counterbores.

### Uses of Stake Plate

With an assortment of anvil sizes and types at hand a stake can be used for riveting, peening, setting or tightening hinge pins, pattern punching for hole arrangement, driving various sizes of pins in or out with pin punches, straightening wire, round and square rods, bending sheet metal and light band iron. Also the units can be adapted for punching holes in sheet metal with a hardened punch, and many other operations with punch and hammer that may be required in repair work. Of course, many types and sizes of anvils other than those pictured and detailed can be made for special work. If necessary, you can have these hardened so that they will withstand hard usage for longer periods.

—Walter E. Burton





# SATURDAY MECHANIC

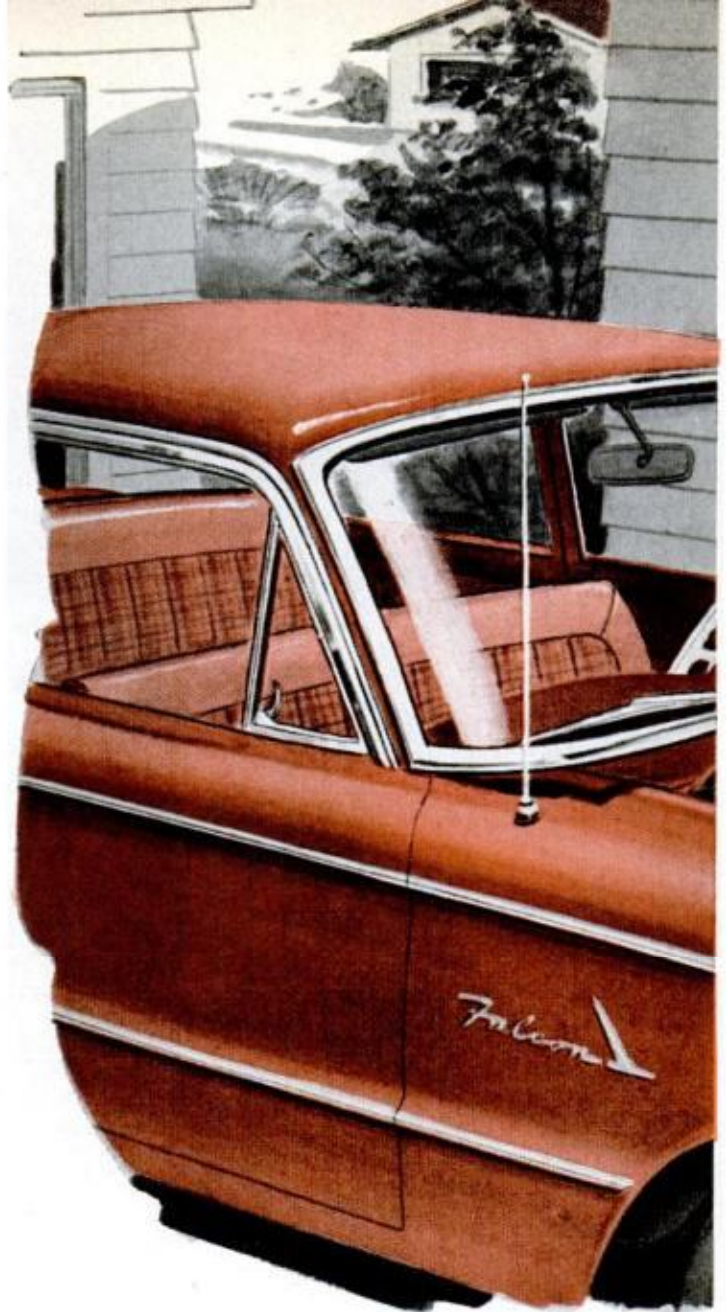
Repairing your own car is money in the bank. You'll have fun and learn by doing if you follow this new repair series for week-end mechanics

By William Hector

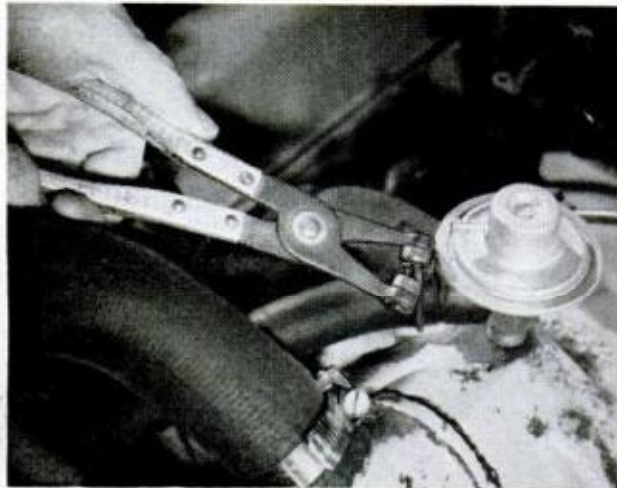
**W**ITHOUT THE right tools for the job you would find it difficult or impossible to repair anything. This is doubly true when repairing your car. So, before you think about taking the car apart, give some thought to the tools you'll need.

In addition to the kit that comes with the car you can use regular wrenches, pliers and screwdrivers you may already have on many simple car-repair jobs. But some of the important take-apart-and-put-together jobs call for use of the special tools used by professionals. Adding these to your repair kit only as they are needed is wisest.

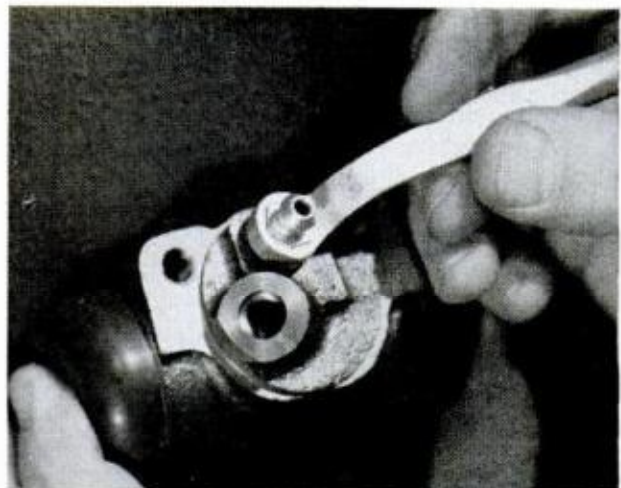
Special-application tools have been developed to take over on the repair work where standard tools are not applicable, or cannot be used at all. As an example, note the four special tools pictured below and on page 171. Heater-hose pliers snap those tricky hose clamps on and off in seconds



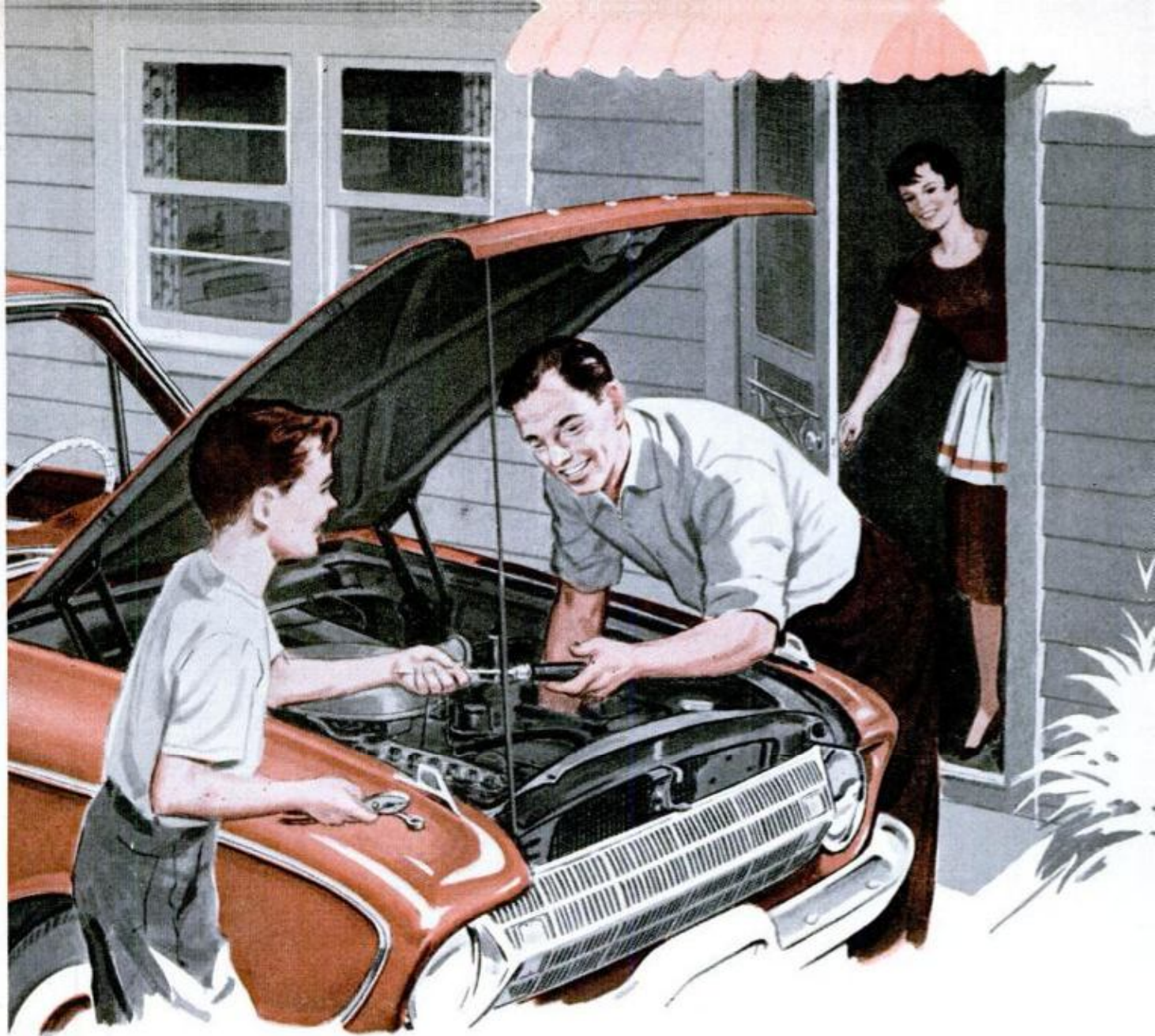
**HEATER-HOSE PLIERS**



**BRAKE CYLINDER BLEEDER WRENCH**



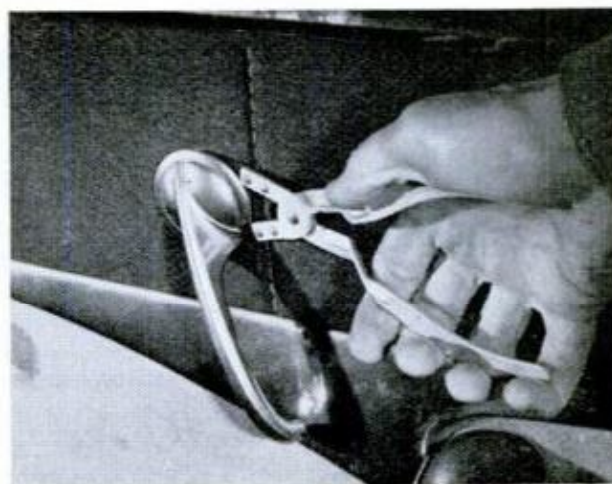




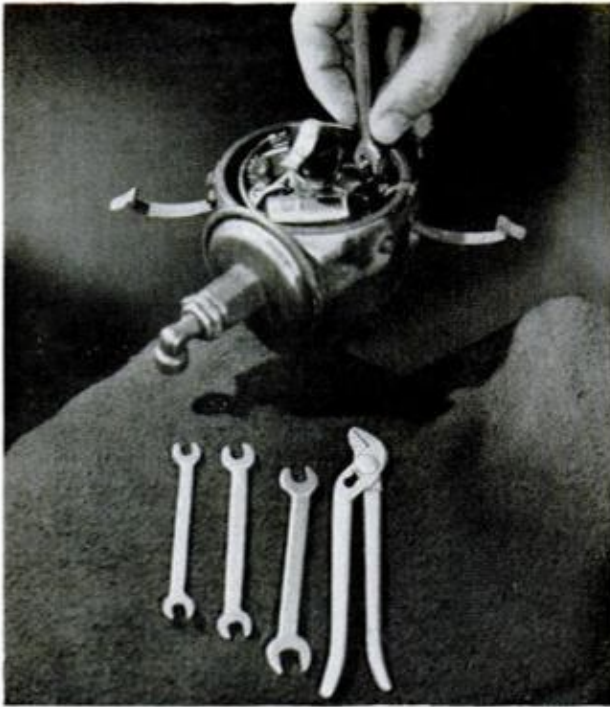
**VALVE-LASH ADJUSTER**



**DOOR-HANDLE PLIERS**





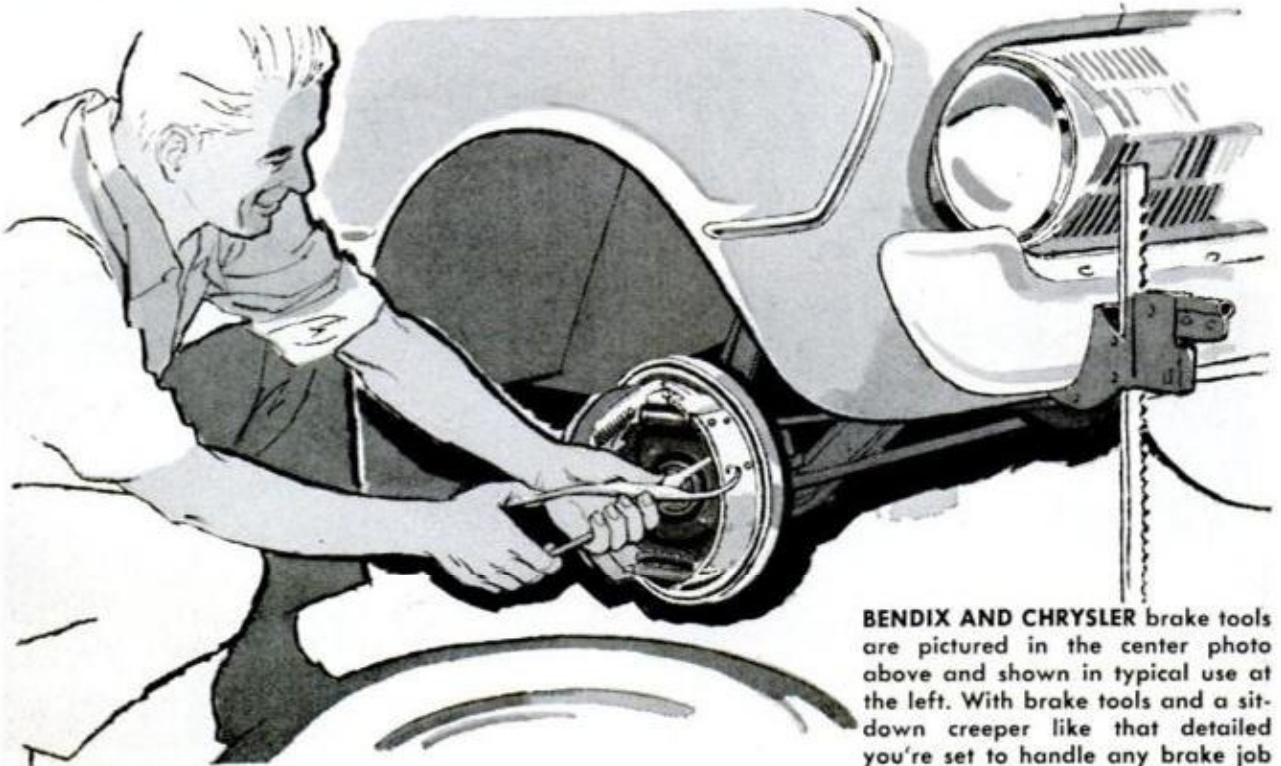
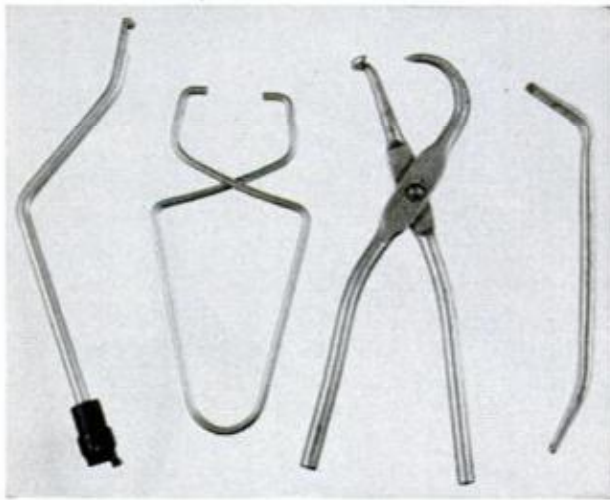


**IGNITION TOOL SET**, left, consists of tiny, thin box-end wrenches and pliers patterned and designed to be used where working space is reduced to the minimum

without any damage to hose or clamp. But try the same thing with ordinary pliers, and you'll see why this tool is essential. Or, try a brake bleeding job without the special bleeder wrench. The same thing is true of the two special tools pictured on page 171. Buy such tools only when the job comes up. But don't try to makeshift without them, as they will prove well worth their nominal cost on just one repair job.

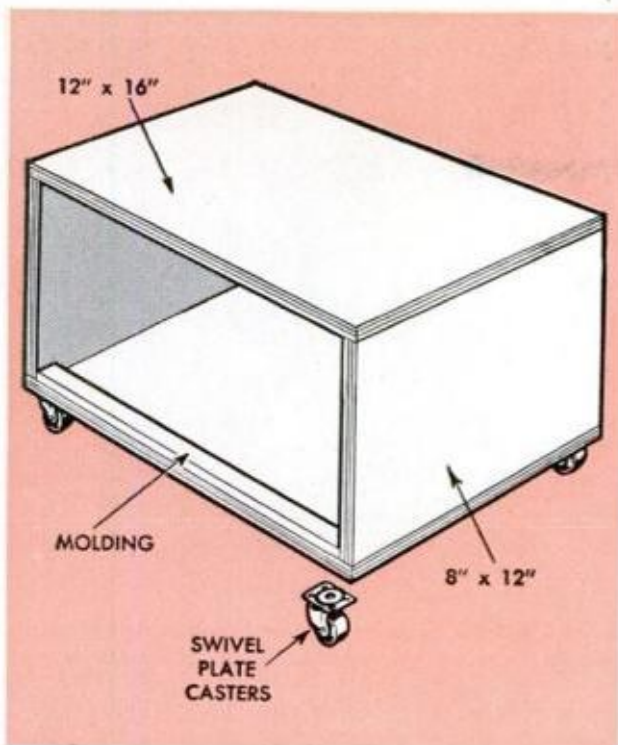
When you work on ignition or brakes you'll do well to have at hand the kits pictured at the left and below. The ignition set pictured consists of tiny open-end wrenches and a thin adjustable plier, all sized to permit working where space is restricted to the minimum and where special requirements must be met in both disassembly and assembly. The brake tools in the center photo at the left consist of a Bendix brake spring tool, a brake-cylinder clamp, a Chrysler brake retracting spring tool and a Bendix brake spoon. Uses of these special tools will be covered in coming issues.

In some instances tools can be shop-made or regular tools altered and adapted to special jobs, but as a rule this means going to machine operations and perhaps heat treating. In the long run it usually will prove cheaper to purchase the tools ready-made. Ordinary box-end wrenches will prove useful for many repair jobs and where applicable they should always be used rather than open-end wrenches or adjustable



**BENDIX AND CHRYSLER** brake tools are pictured in the center photo above and shown in typical use at the left. With brake tools and a sit-down creeper like that detailed you're set to handle any brake job





wrenches, both of which have a tendency to slip in cramped quarters. Combination box and open-end wrenches are finding favor with many mechanics as they combine two types in one unit. And of course, a set of ratchet-type socket wrenches is indispensable for involved repair work.

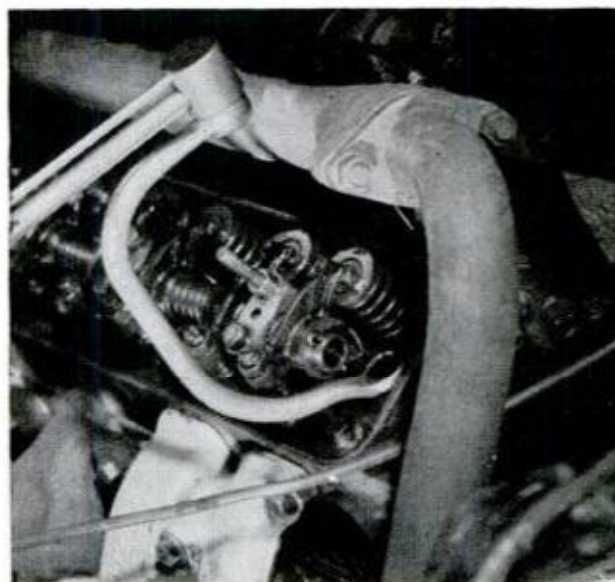
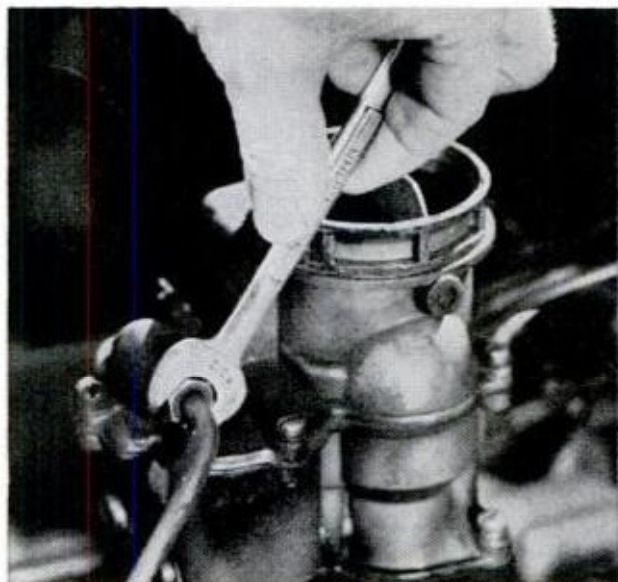
Then there's the torque wrench, a most important tool where bolts, capscrews and nuts have to be tightened to a specified tension. Auto manuals list the correct tension for cylinder-head bolts and for fasteners of other parts of a car where uniform tension is important. When you draw up a nut or screw with a torque wrench you read to the correct tension on an indicator built into the wrench handle. Apply torque

**OPEN-END WRENCHES** are necessary on compression fittings. Otherwise always use box-end wrenches

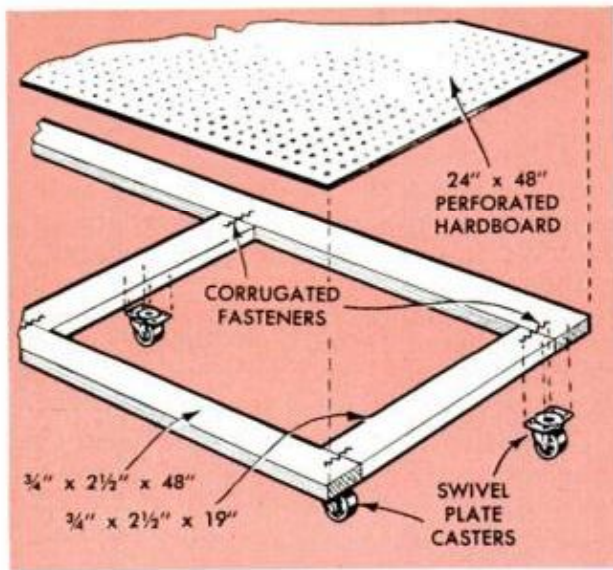
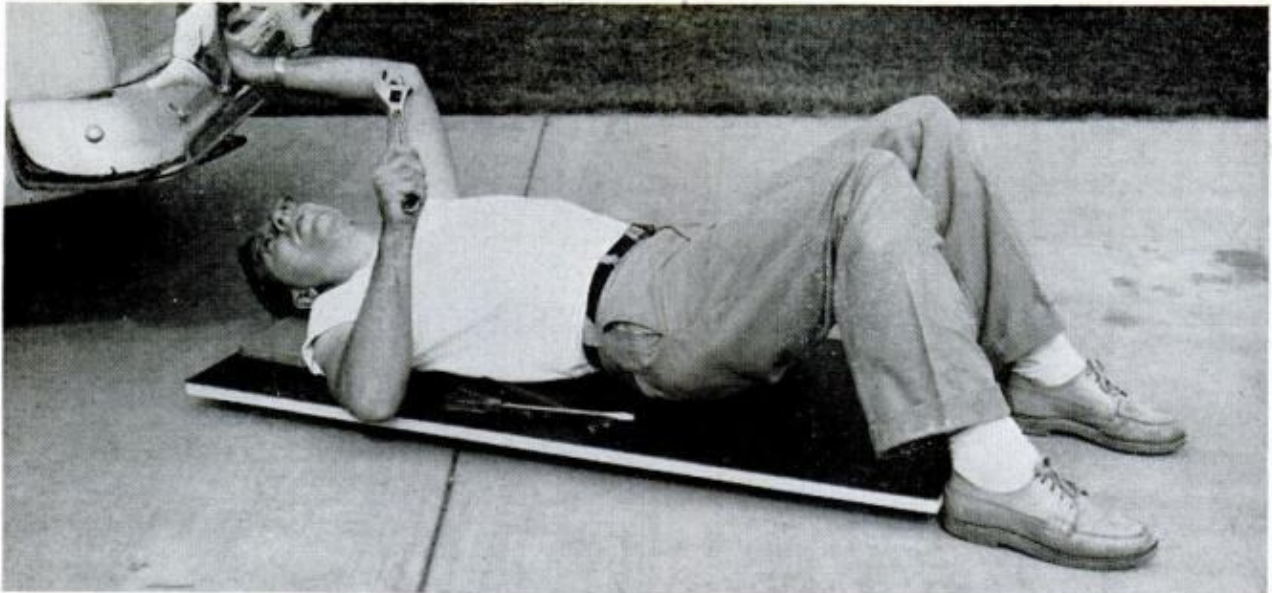
until the pointer shows the correct value on the scale and you can't miss. There's no chance of stripping threads or cracking a cylinder head due to stresses set up by uneven tensioning of bolts. Experienced auto mechanics often can judge tension quite accurately free hand, but week-end mechanics should use a tension wrench.

Under-the-hood jobs generally can be done in a more or less comfortable stand-up working position, but when you have to disassemble brakes or get under the car, then creepers, rugged car stands and reliable jacks are musts. Two types of creepers are detailed, a floor creeper for use when getting entirely under the car and another, with a handy tool shelf, which makes a sit-

**ADAPTER ARM** gives torque wrench extra reach, permits working in places otherwise impossible to get into





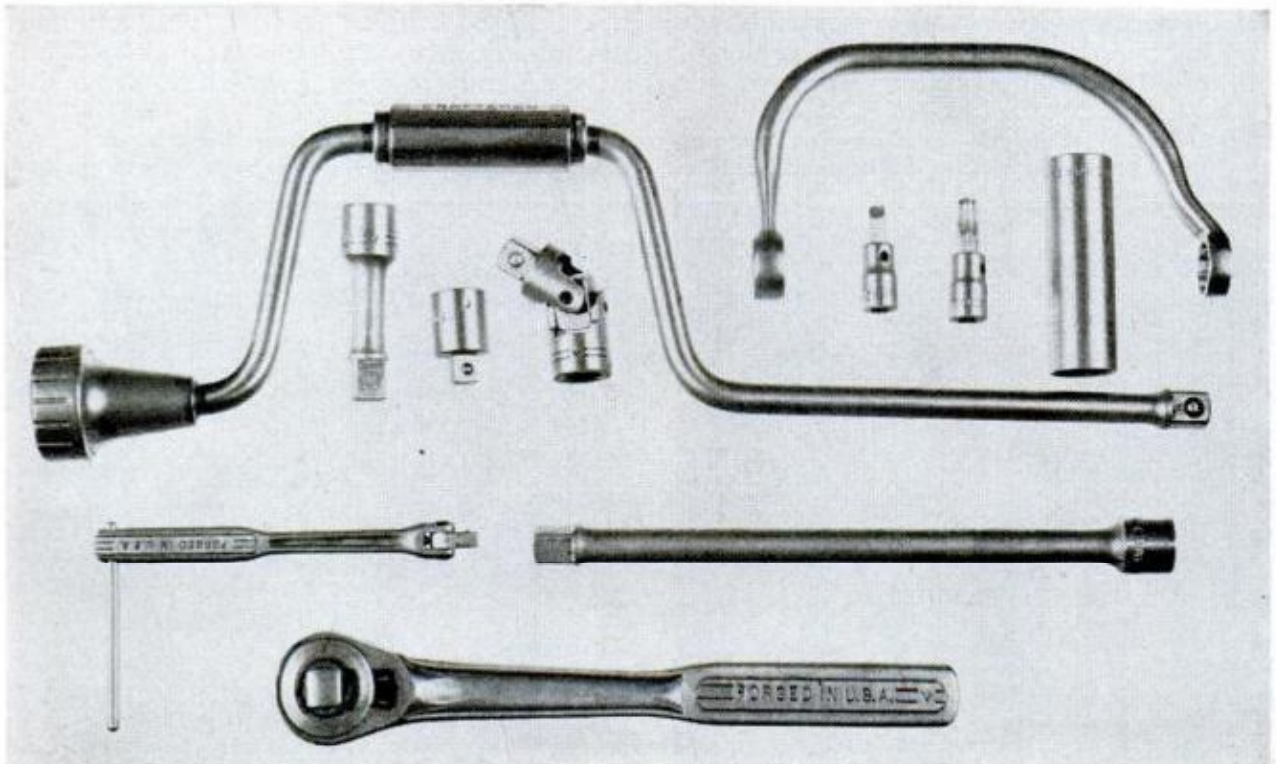


**FLOOR CREEPER** enables car mechanic to work comfortably in reclining position. Be sure car can't roll

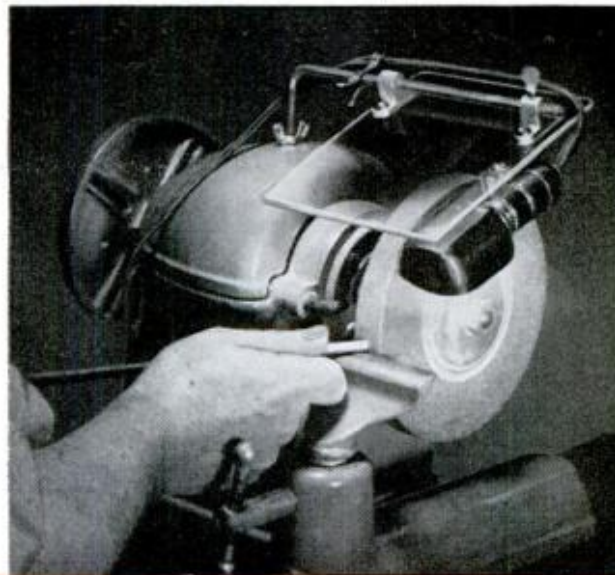
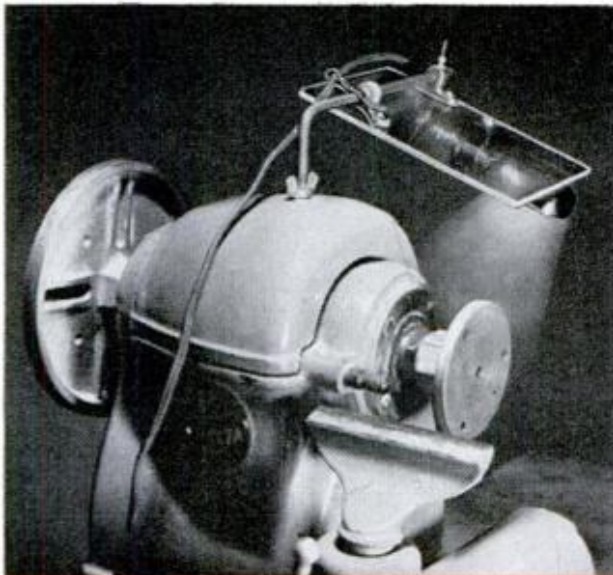
down job of brake work. These you can easily make yourself, using a 1x2 frame joined with corrugated fasteners, covered with 1/4-in. perforated hardboard and fitted with casters for the floor type, and an open-sided box of plywood on casters for the brake creeper.

Never get under a car without first jacking it to a convenient height on a level driveway and supporting it on car tripods, or stands. Never trust bumper jacks alone or unstable bricks or blocks. Always jack up the car and drop it onto stands before working underneath it. ★ ★ ★

**SOCKET-WRENCH SETS** are indispensables in auto repair work. Below are various socket drivers available



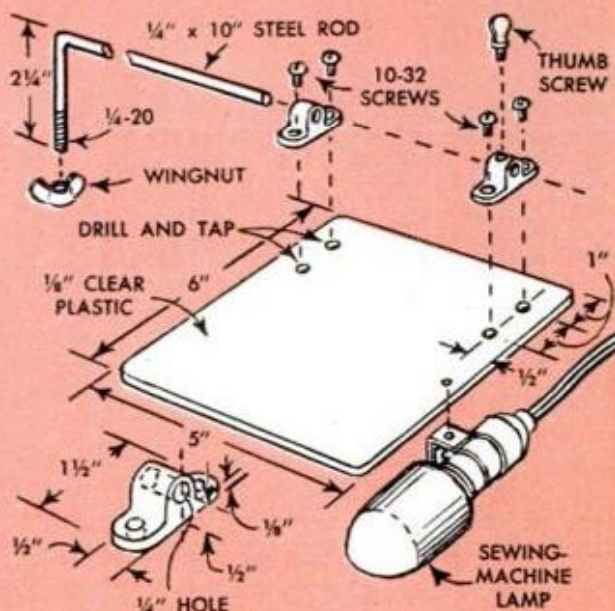




## Face It With an Eye Shield

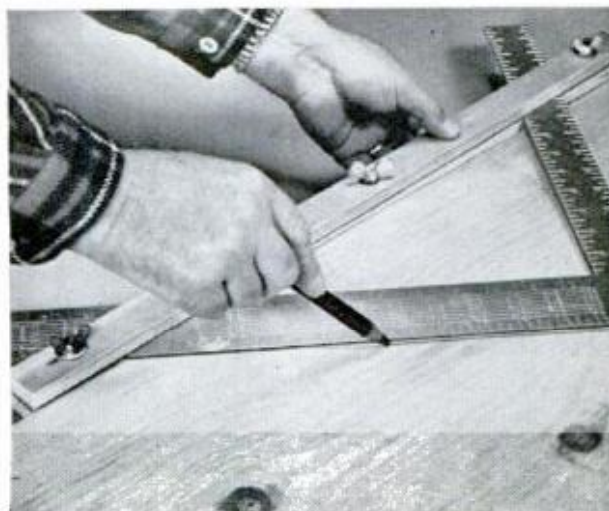
Don't face any grinding wheel without a safety shield. Just one flying abrasive particle in your eye and you're in trouble. This adjustable shield is made for a lathe which pinch-hits for a grinder. It's simply a piece of clear plastic mounted on a swinging bracket consisting of an arm and two mounting lugs, one drilled and tapped for a thumb-screw. The lugs, also lamp, are attached to the shield with screws turned into holes tapped in the plastic. Drill and tap a hole in the lathe pulley guard (the guard shown comes with a tapped hole) thread the end of the arm, run on a wingnut and then turn the threaded end of the arm into the hole. This mounting permits any adjustment desired.

—Howard R. Clark



## Angle Jig on Square Halves Layout Time

Clamp two hardwood strips diagonally across the beam and leg of a steel square and you have an angle jig that can cut layout time on stair stringers and roof rafters in half. The strips should be cut long enough to span the square diagonally with about 2 in. to spare at the ends. Clamp the strips together and drill three 1/4-in. holes through both strips, one hole about 2 in. from each end and the third at the center. Insert 1/4-in. stove bolts in the holes and turn on wing nuts over washers. Locate the desired height of the riser and width of the tread on the leg and beam of the square and clamp the strips in place. Then place the jig against the edge of the stringer and slide it along as you mark off.

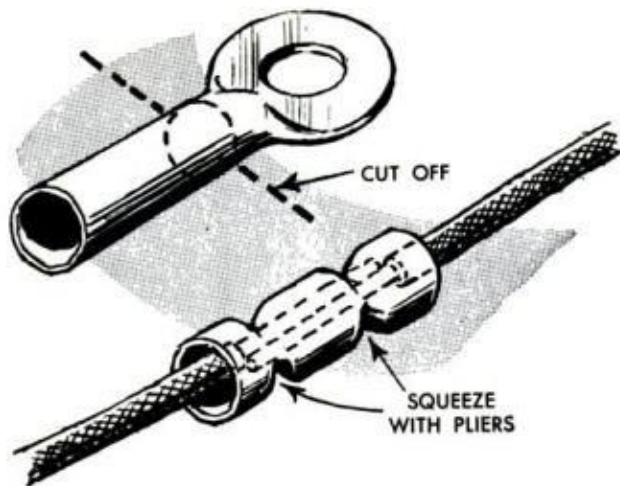




## FOR THE MOTORIST

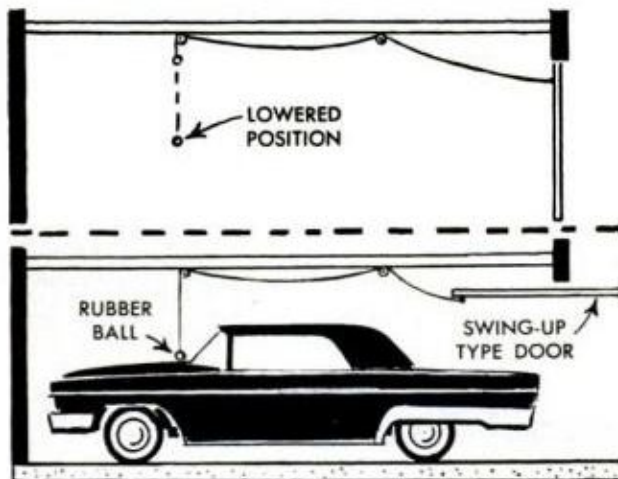
### Solderless Connectors

Looking for a simple way to splice electrical connections without soldering? Simply use a short length of copper tubing as shown in the drawing at the right. The end cut from a terminal lug will do, as will any copper tubing of small diameter. Insert the bared end of each wire into opposite ends of the tube, pushing the stripped ends past each other so that they lap inside the tube. Then with a pair of long-nosed pliers crimp the tube tightly near each end so it grips the wire.—*John Krill*



### Squeeze-Out Filter Elements

The newest idea in filter elements for carburetor air cleaners, which is a washable "cuff" of urethane foam, can be applied to other late model cars that are not so equipped. As pointed out by the Scott Paper Co., the foam filter can be washed, squeezed out like toweling and dried in a jiffy, clean as a whistle. The foam cuff slips in place around the perforated metal frame inside the cleaner housing. Before installation, the washed filter is impregnated with oil as is normally done to provide high filter efficiency.



### Retractable Car Parker

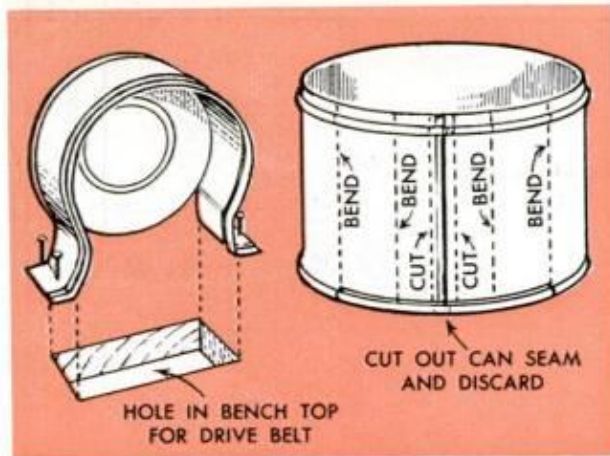
In using the idea of a dangling rubber ball to serve as a telltale stop when parking a car in a small garage, one motorist went one better and rigged the ball so it would retract to the ceiling when the garage door was closed. This kept the ball up out of the way when the garage was used for play or work activities. When the door is up, the ball is suspended at a height where it still touches the windshield as originally placed. Such an arrangement will only work with a single-type door which extends part way when open.



### Stowaways in Hub Caps

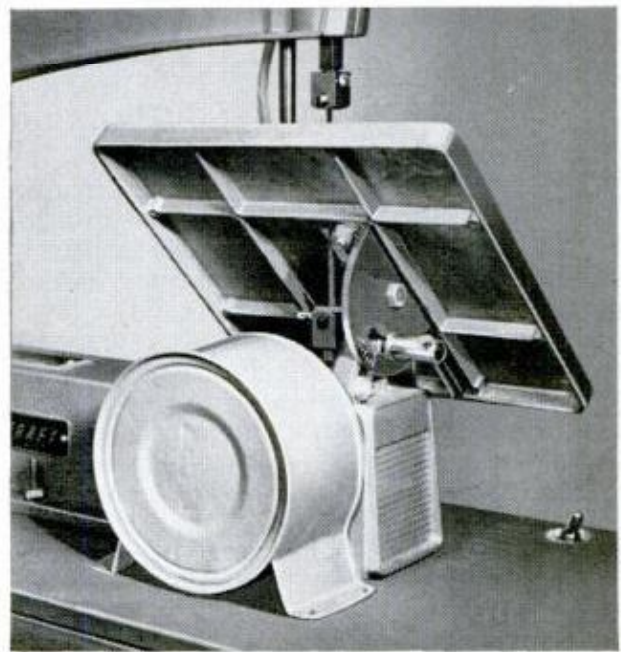
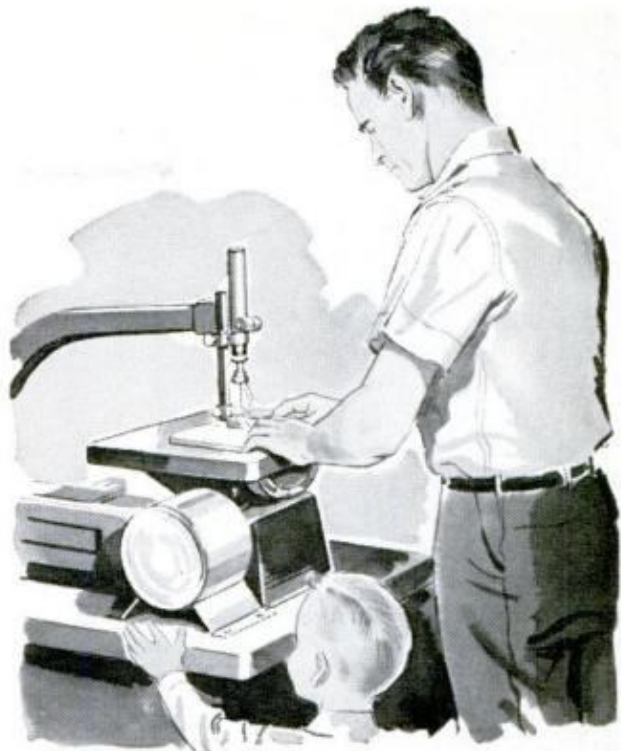
How often have you searched the car for a cloth to wipe the hands after changing a tire on the road only to remember that you forgot to put it back the last time? You won't find yourself without one if you do as Bil Toman does. He stows a cloth away in the hub cap of each wheel and forgets it. Cached here, there is little chance of using these wiping cloths at times other than emergencies. Even when engine repairs on the road soil the hands, a cloth is as close as your hub cap—for sure.





## COFFEE-CAN BELT GUARD

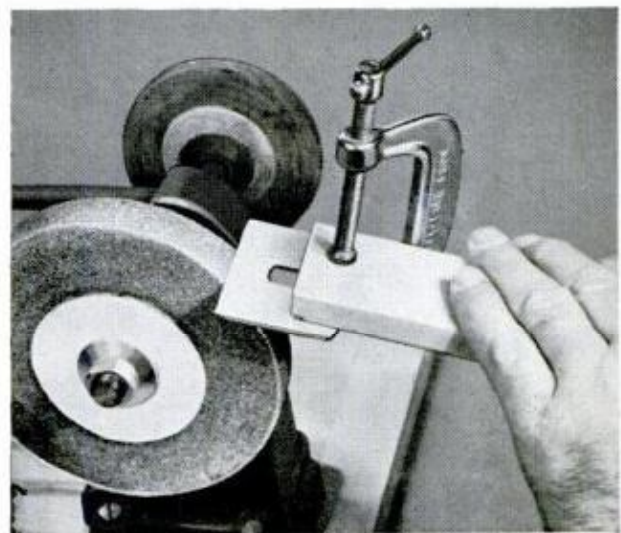
An unguarded V-pulley on a power tool is an invitation to a painful injury, especially when children stray into the workshop. To safeguard little fingers as well as your own it will pay you to take the time to cover open pulleys. For a small pulley such as that on a jigsaw, a 1-lb. coffee can works perfectly. First remove the loose ring from the top of the can and cut out the soldered seam. Make a cut along the bottom flange as shown in the drawing and bend the two ends outward to form brackets. Then paint the completed guard to closely match the finish of the machine. Position the guard so that it clears the pulley when mounted over the belt opening in the bench top. Use screws to fasten it in place so it can be removed easily when necessary. Such a guard also can be used on a horizontal drive by attaching to a vertical mounting bracket and cutting a suitable opening in the can for the belt.—*Manly Banister*



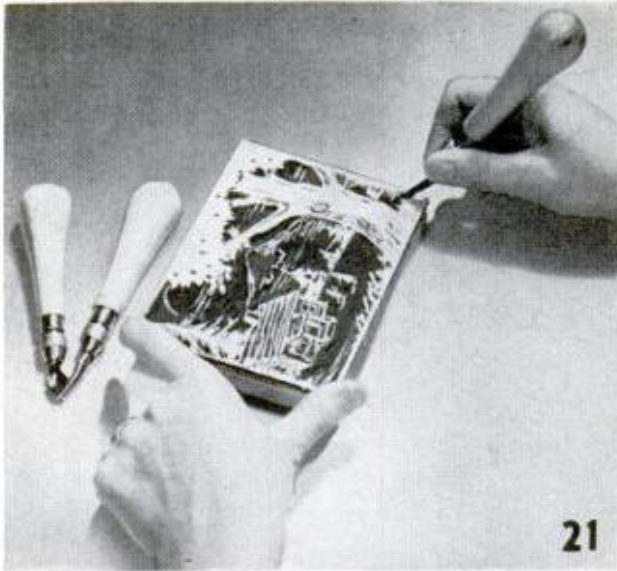
## Too Hot to Handle

Solve the problem of holding freehand the short blades from spoke shaves and scrub planes without burning the fingers when grinding them, by clamping a blade to a block of wood with a small C-clamp. This provides a cool, comfortable handle and at the same time affords a better grip for holding the blade at the proper angle for grinding.

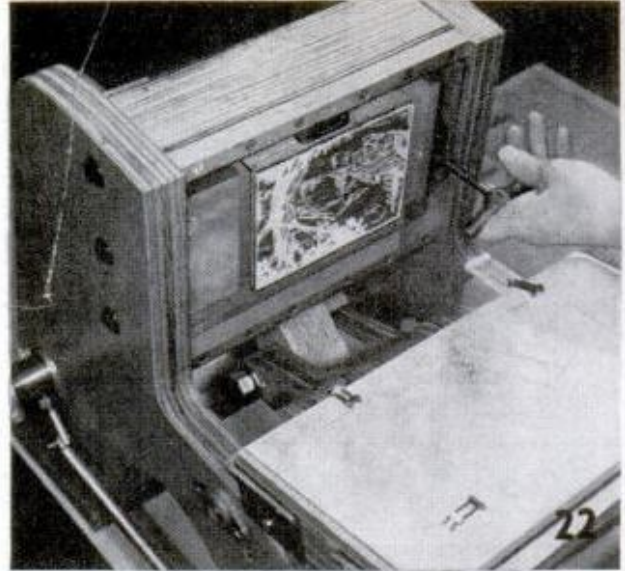
**Vent your barbeque fire** with a few left-over handfuls of mineral insulation. Spread the material in the fire pan before adding the charcoal. It helps to speed up ignition, keeps the coals bright and hot.







**FINISHING TOUCHES** on cut should be worked with care. It's easy to damage a good cut at this stage



**FINISHED CUT** is locked in the bed with printer's furniture (hardwood blocks) and two key-operated quoins

# Linoleum-Block Press

By Manly Banister

Part II

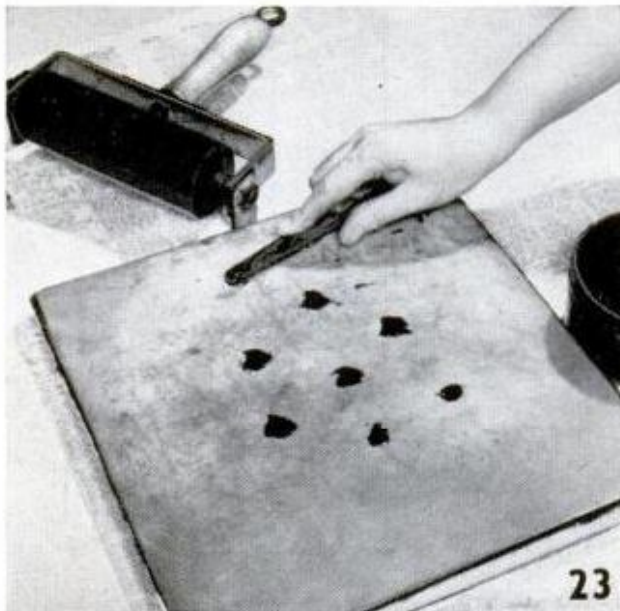
**W**ITH THE side frames, bed, and crank made and trial-assembled, refer to Figs. 14 and 19, Part I, for the hole locations and how the sandwich type assembly of the platen rocker and carrier is made. These parts assemble into one piece as you will see from Figs. 25 and 26. Remember when checking the thicknesses of plywood to be used in sandwiching the platen carrier that the 1¼-in. oak members shown in section in Fig. 25 are not a part of the assembly,

**DABS OF PRINTER'S INK** placed on a slab of marble or square of glass is first step in inking press

but are carriers, or supports, for the rocker bushings, Part I, Fig. 16. In this connection, note the top view, Fig. 26 and the identification and relationship of these parts will be clear.

When assembled the carrier must fit as indicated in Fig. 25 without any end play and without binding. This may mean that some sanding will have to be done in order to assure a perfect fit. If 1⅛-in. plywood is not readily available, the carrier can be

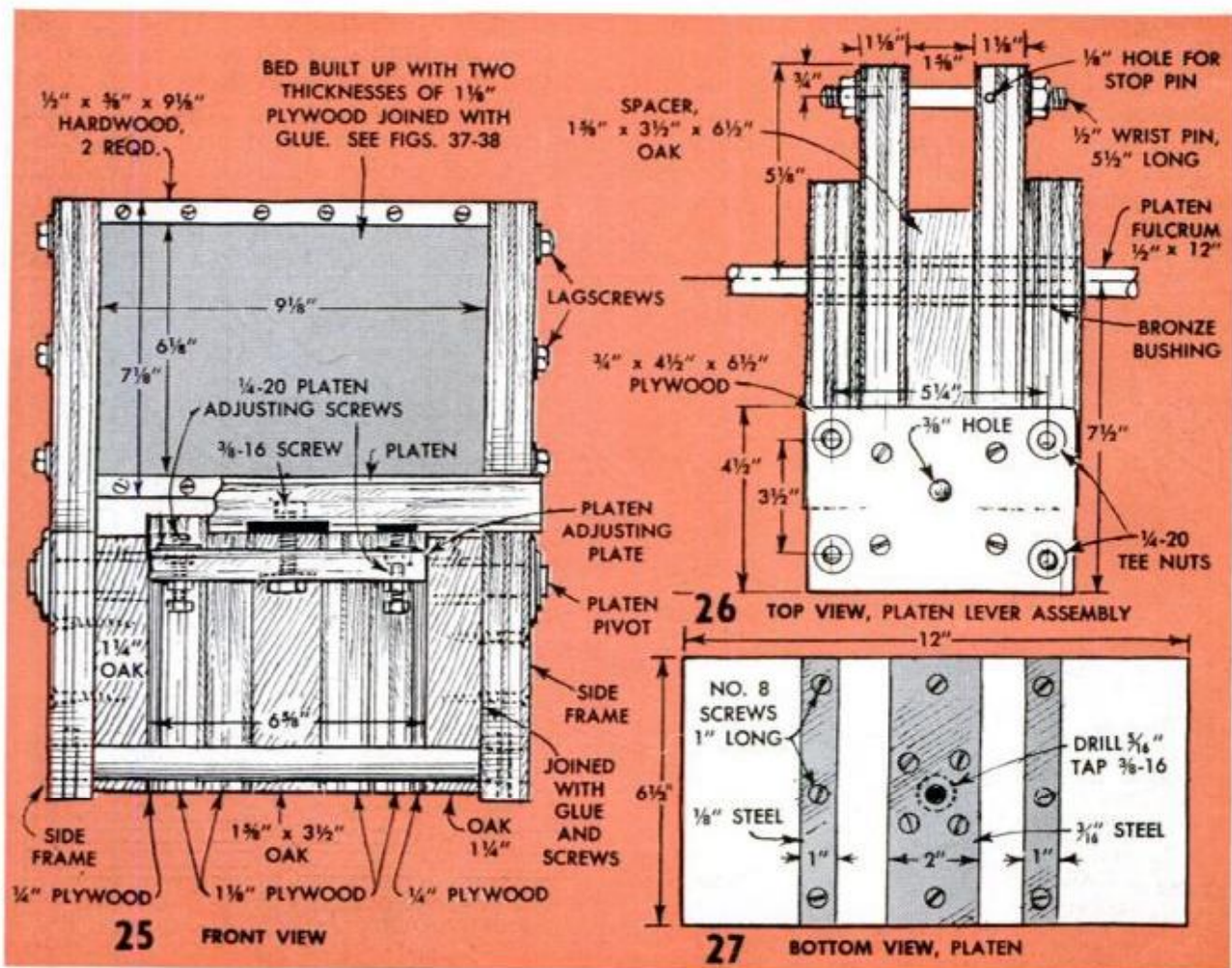
**ROLL OUT INK** with a brayer—a roller made especially for the purpose—until surface is uniformly coated



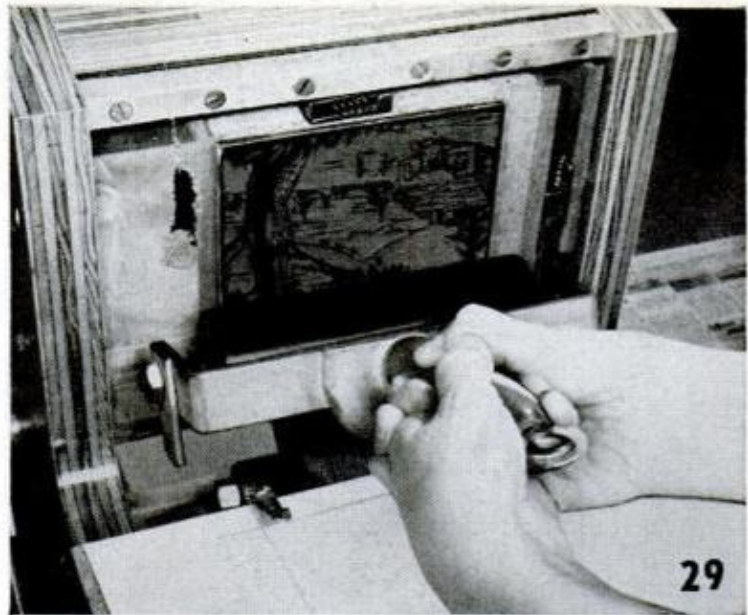
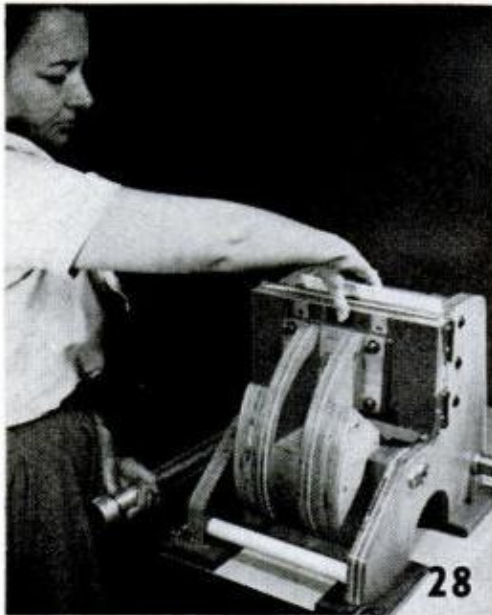


built up from lesser thicknesses of plywood. Cut the two rocker members and finish the edges before gluing the whole together sandwich-fashion. Use a moisture-resistant glue, spread it uniformly and when clamping be sure that the pressure of the clamps is uniformly distributed so that you get sound joints throughout. When the assembly is drilled for the wrist pin taking the forward end of the connecting link, Fig. 36, and the bushings for the fulcrum, or pivot shaft, it is necessary to drill a clearance hole all the way through for the pivot as indicated by the dotted lines in Fig. 26. The size of the hole must be such as to admit the bushings in a drive fit.

The platen - adjusting plate, Figs. 25 and 26, also Fig. 14, Part I, carries five cap-screws, four provided for leveling the platen and the fifth screw at the center serving to hold the assembly rigidly in place. Note in Fig. 27, which shows a bottom view of the platen, that this cap screw turns into a hole tapped in the center





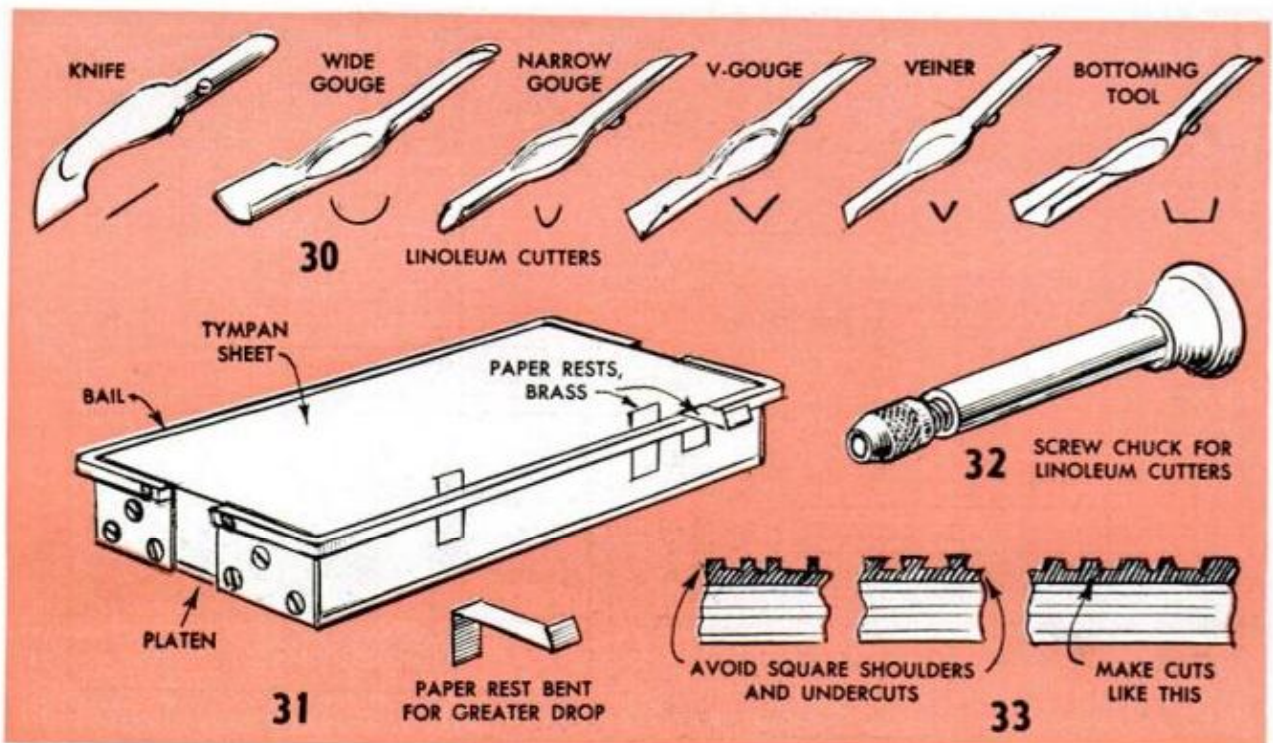


**IMPRESSION IS MADE** when press is closed as in left-hand photo. Uniform pressure on handle assures a good print. Right, inking the cut with the brayer must be done each time an impression is made as at the left

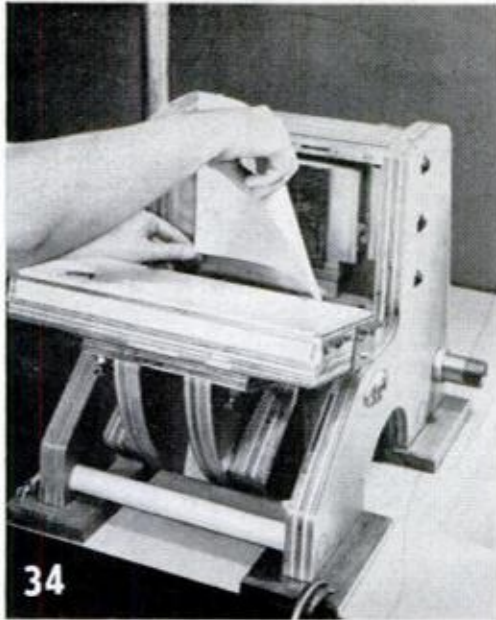
of a steel plate inset flush across the bottom of the platen at its center. Wear plates against which the ends of the adjusting screws bear also are inset, one on each side of the center plate, Fig. 27. The platen is faced on both sides with  $\frac{1}{8}$ -in. hardboard, is fitted with metal wear plates at the ends and carries bails of  $\frac{3}{16}$ -in. square steel pivoting on small screws as in Fig. 14, Part I. When made ready the platen is faced with a sheet of  $\frac{1}{8}$ -in. cork and covered with a sheet of manila paper, the whole being held in place by the tympan bails, Fig. 31. The latter detail also shows the sheet-brass paper rests which hold the paper in place as the impression is made, Fig. 22.

Next step is to attach the lower end of the connecting link to the carrier. The wrist pin, threaded at both ends, must be inserted while the carrier is tilted. It will be necessary to remove the bed, notch it as in Fig. 38 and then make a trial assembly with the bed in position to determine if the notch as dimensioned allows sufficient clearance for the link. If everything checks out, then reassemble with parts in position and you're ready to level the platen.

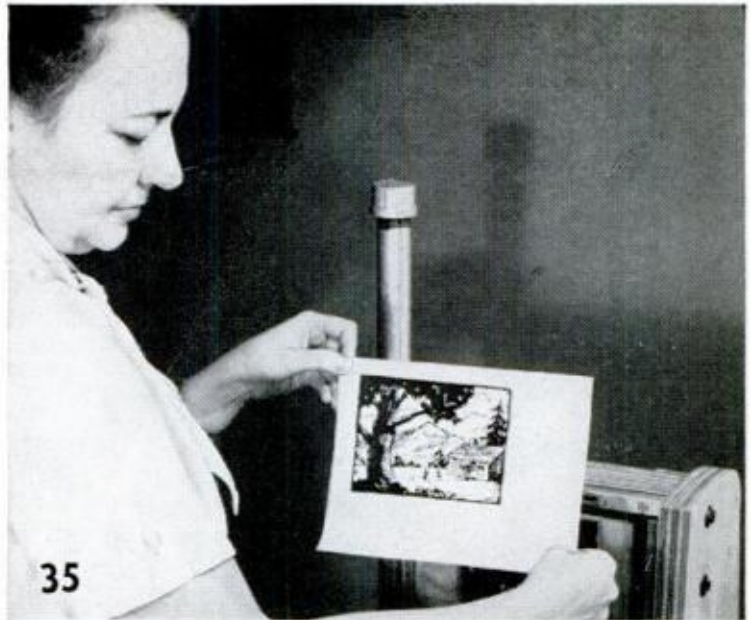
This is done by bringing it up to the bed and then adjusting the leveling screws until it makes uniform contact. When full contact has been assured, remove the short setscrews from the threaded pipe joints in







34



35

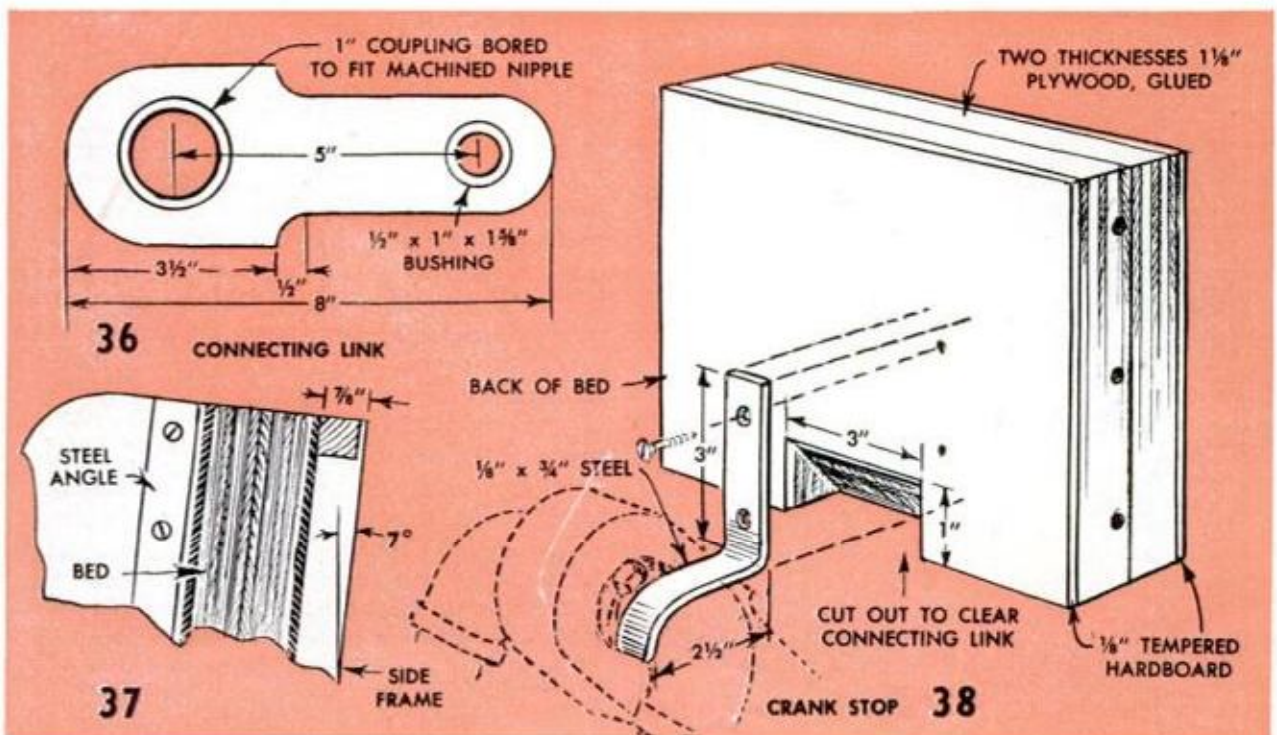
**LIFTING PRINT** must be done carefully to avoid smearing. Hold one corner and "peel" the print from an opposite corner as in photo at left. Right, note the sharpness and clarity of print made from a good lino cut

the crankarm and tap the holes all the way through. Insert longer setscrews to make sure the threaded joints will hold when you exert pressure on the crank handle.

Now note the position of the bed in Fig. 37. The front face of the bed should incline 7 degrees from the vertical and should be about  $\frac{7}{8}$  in. from the edge of the side frame. If necessary, sand the edges of the side frames to obtain this dimension. The square member shown in section in Fig. 37 is a part of the "furniture" of the bed. One piece is screwed to the top of the bed and a duplicate piece at the bottom as in Fig. 25. These pieces permit you to assemble the linoleum cut with blocking and quoins as

in Fig. 22 ready for taking the impressions.

Making the linoleum cuts as in Fig. 21 requires the tools detailed in Figs. 30 and 32 and the simple processes of inking and printing are pictured in Figs. 23 and 24, also Figs. 28, 29, 34 and 35. When making cuts in linoleum with the tools avoid making undercuts and leaving any square shoulders at the edges of recesses, Fig. 33. Shoulders should always be sloping 3 to 5 degrees as in the right-hand detail, Fig. 33. Keep tools sharp. Grind out any nicks, however small, as a nick will tend to tear the material when cutting and may cause irreparable damage to an otherwise perfect lino cut. ★ ★ ★



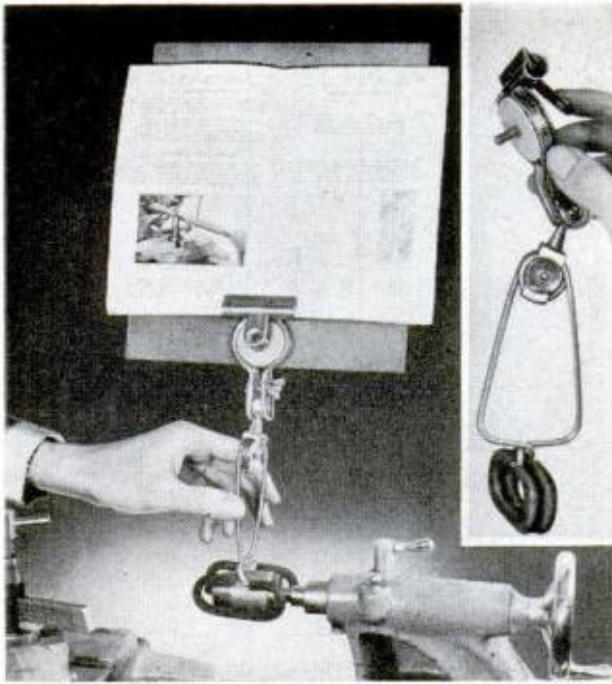


## SHOP SHORT CUTS

### Plans at Hand

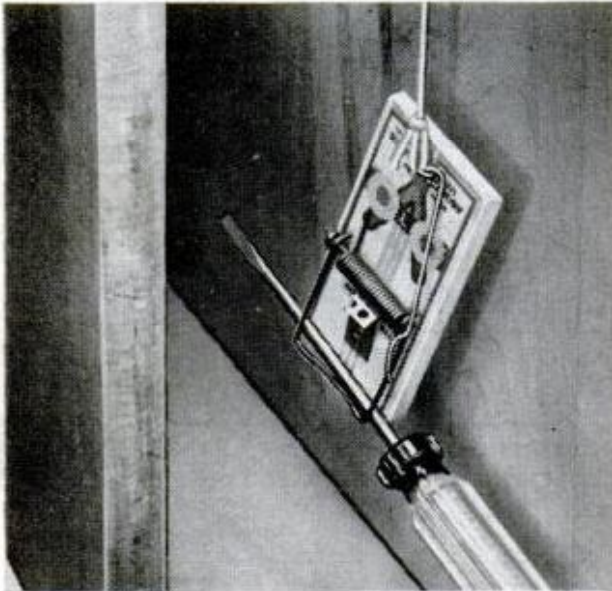
When working from plans, charts or magazines you will find that the spring clamp of a photoflood reflector makes a dandy holder. For example, when working at the lathe, a drill chuck inserted in the tailstock sleeve provides a convenient clamping surface. The rubber-covered loops of the spring clamp will hold it securely wherever placed. A plywood disk about  $\frac{1}{2}$ -in. thick is cut to fit in the pinch clamp which normally grips a lamp socket. A  $\frac{3}{16}$ -in. stove bolt passing through the wood disk holds a spring paper clamp and a square piece of hardboard which supports the copy for quick, easy reference. Spring reflector clamps are available from hardware stores or photo supply dealers.

—R. Hanscom



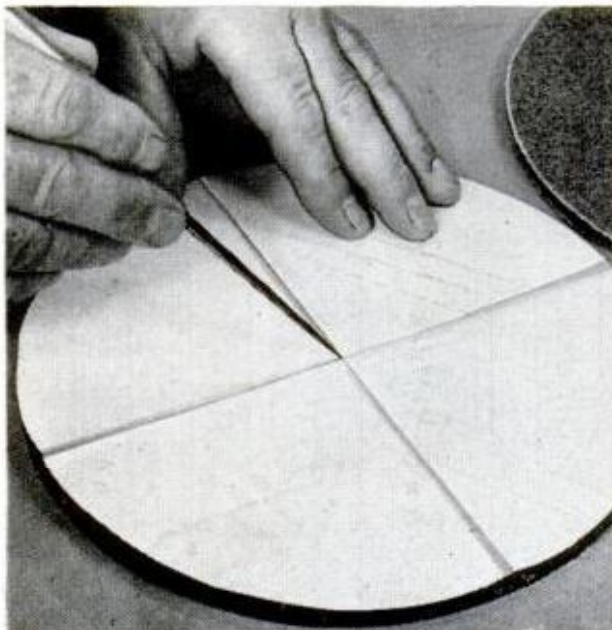
### Mousetrapping Tools

While it does not happen very often, occasionally small tools or parts are dropped in hard-to-reach spaces. Retrieving them can be very frustrating. Though this does happen in the home and workshop it seems to be more common and irritating when working under the car hood, over a sump or around large machines. A magnet is not always available and will not attract all materials but a mousetrap will grab with finality. Simply tie a string of suitable length to the staple holding the trigger and set the trap. Lower the trap into the confined area close to the fugitive part or tool and dangle it until the bait pan contacts the object. This will spring the trap, the jaw will grab the runaway and up it comes.



### Getting on Center

Finding the center of a disk or other round stock is easy and can be done quickly with a thin paper. Place the disk on it, trace the outline with a soft pencil and cut it out. Fold this in half twice, the second time lining up the two halves of the first crease, to give you two creases crossing each other at right angles as indicated in the photograph. Now carefully lay it flat on the work and using any pointed tool, pierce the disk at the intersection of the crease marks. This will give you the center of the round stock and you continue from there.—Bil Toman



**Barbecue charcoal fires** are easily started using empty milk cartons as tinder. Slit, flatten and cover with charcoal. Touch off with a match and you're in business.



Shop  
Projects  
1961  
#757



## High-Polish Finishing

**Fast, easy way to finish small parts is to polish them with an abrasive in a tumbling machine. Here is a unit just the right size for the small shop**

**By Walter E. Burton**

**A**NYTHING FROM tablespoons to jet-engine blades can be polished in a tumbling machine, or barrel finisher. The principle on which the tumbling machine operates is quite simple and effective. Parts to be polished are placed in a container, or drum, with a given quantity of abrasive and sometimes other filler materials such as sand, wood shavings and the like, and the container rotated at a uniform speed ranging from 10 to 30 r.p.m.

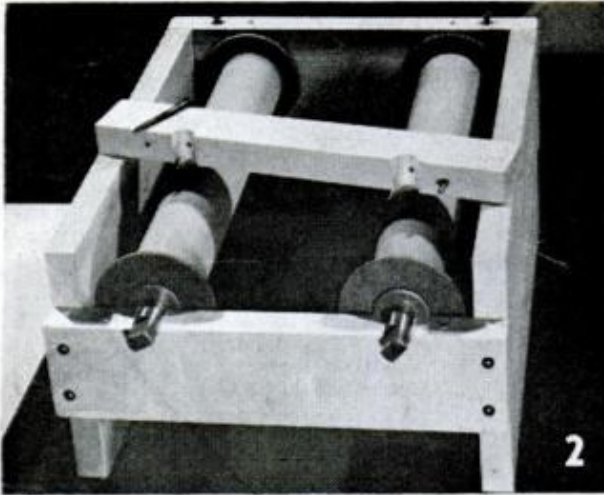
Not only metal but wood, plastics of various types, also jewelry, can be given high polishes with the right abrasive and suitable filler materials.

The small-shop unit illustrated in Fig. 1 and detailed in Figs. 5, 6 and 7 can be made from a couple of wringer rolls (those from a hand wringer or wringer-type washing machine will do very well), a spare 1/4-hp.

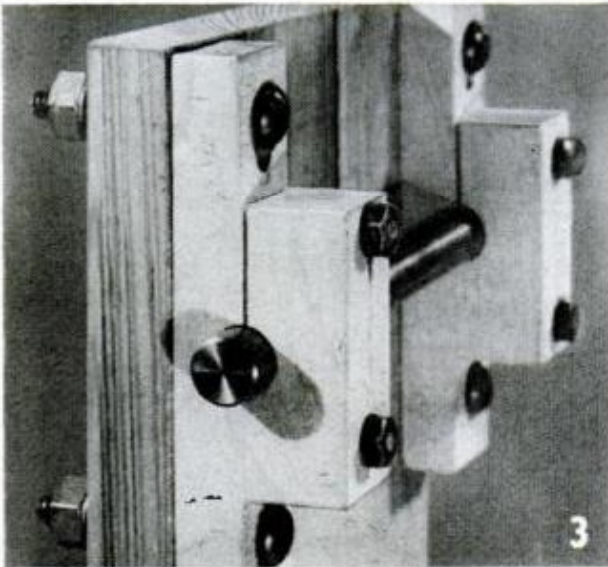
motor, a few pieces of plywood, hardwood for bearings, three V-pulleys and a short length of 1/2-in. steel shafting. A one-gallon paint can serves as the container, or barrel. These parts make up into about the smallest practical tumbler you can use for small parts. The unit can be made much larger by substituting larger and heavier rollers and a different drive assembly.

Figs. 2, 3 and 4 picture steps in the assembly of the unit as detailed in Figs. 5, 6, 7 and 8. As you can see, the whole thing is quite simple to make and easy to assemble ready for use. Note that only one roller is power driven; the other is simply an idler. In use, the container is placed on the rollers as in Fig. 1 and due to the reduction from the motor to the jackshaft, and again from the jackshaft to the driven roller, the speed of rotation of the tumbling drum is reduced



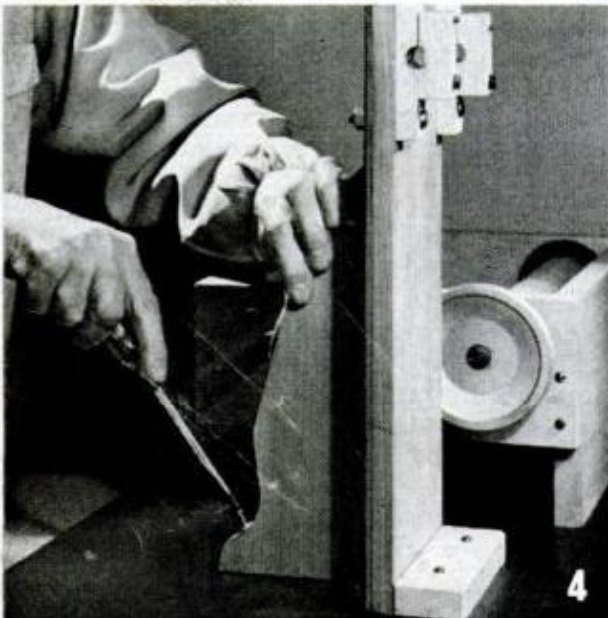


**BOXLIKE FRAME** carries rolls which turn tumbling drum at slow speeds. Rolls are from washing-machine wringer. Each roll is fitted with flanges at ends



**JACKSHAFT** is mounted in hardwood bearings bolted to vertical support stiffened with brace and cleat

**JACKSHAFT SUPPORT** with its single brace and cleat is attached to machine base with screws and glue



to only a very few revolutions per minute.

The wringer rolls should be in good condition, preferably new, as new ones are readily available as repair parts for washers. Old, worn rolls having hardened surfaces are not suitable, as the container will tend to slip and fail to rotate uniformly. This is especially true if it is loaded with metal parts. Hardboard flanges must be made and fitted to each end of each roll as detailed. After fitting they should be cemented in place. Bearings for the rolls are made by clamping the two supporting pieces together and then centering holes for the spindles on the line of the joint. The holes must be of a size to permit the rolls to turn freely, especially the idler roll, detail B, Fig. 7. A small smear of paste wax or beeswax in each hole will provide sufficient lubrication. When assembling the boxlike frame which forms a support for the rolls, be sure that the holes which provide bearings for the roll spindles are in line as otherwise the rolls may bind which can cause irregular rotation of the container. The side members of the frame which form the bearings for the roll spindles should be of maple as this is best for slow-speed bearings.

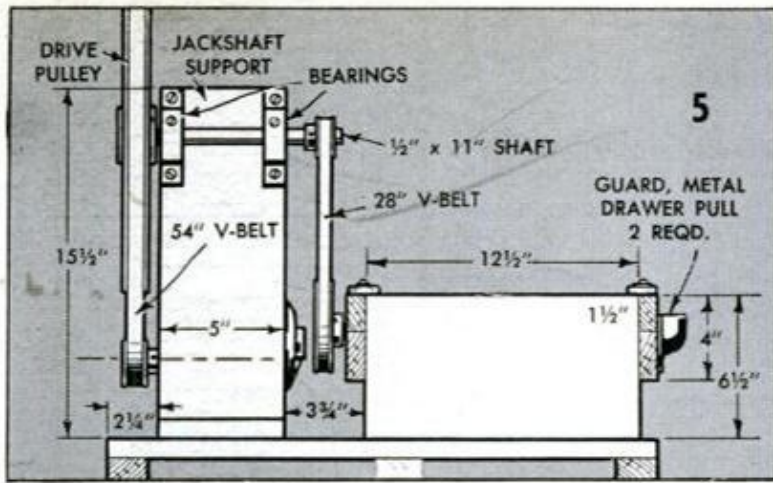
### Guide Rollers

Note also in Fig. 7 the small rubber rollers, detail A, which are attached to the upper edges of the end bearings. These are referred to as rubber rollers, but they can be anything suitable for the purpose. A skate wheel will do very well. The purpose of the rollers is to provide rolling contact at the ends of the container when it drifts one way or the other on the rolls as it will do unless the unit is precisely level. If the ends of the roll spindles are milled to form flats, then the outer end of the driven roll should be fitted with a guard so that it cannot catch and wind a shirt sleeve or a glove when rotating. A metal drawer pull makes an effective guard, Figs. 5 and 7.

The box supporting the roll bearing assembly is mounted on a base of plywood which is cleated as in Fig. 5. The dimensions of the base given were found sufficient to provide space for the box and a motor mounting and jackshaft. The motor mounting, Fig. 8, is a simple arrangement making use of a wedge to tighten the V-belt. Any hinged motor mount can be used.

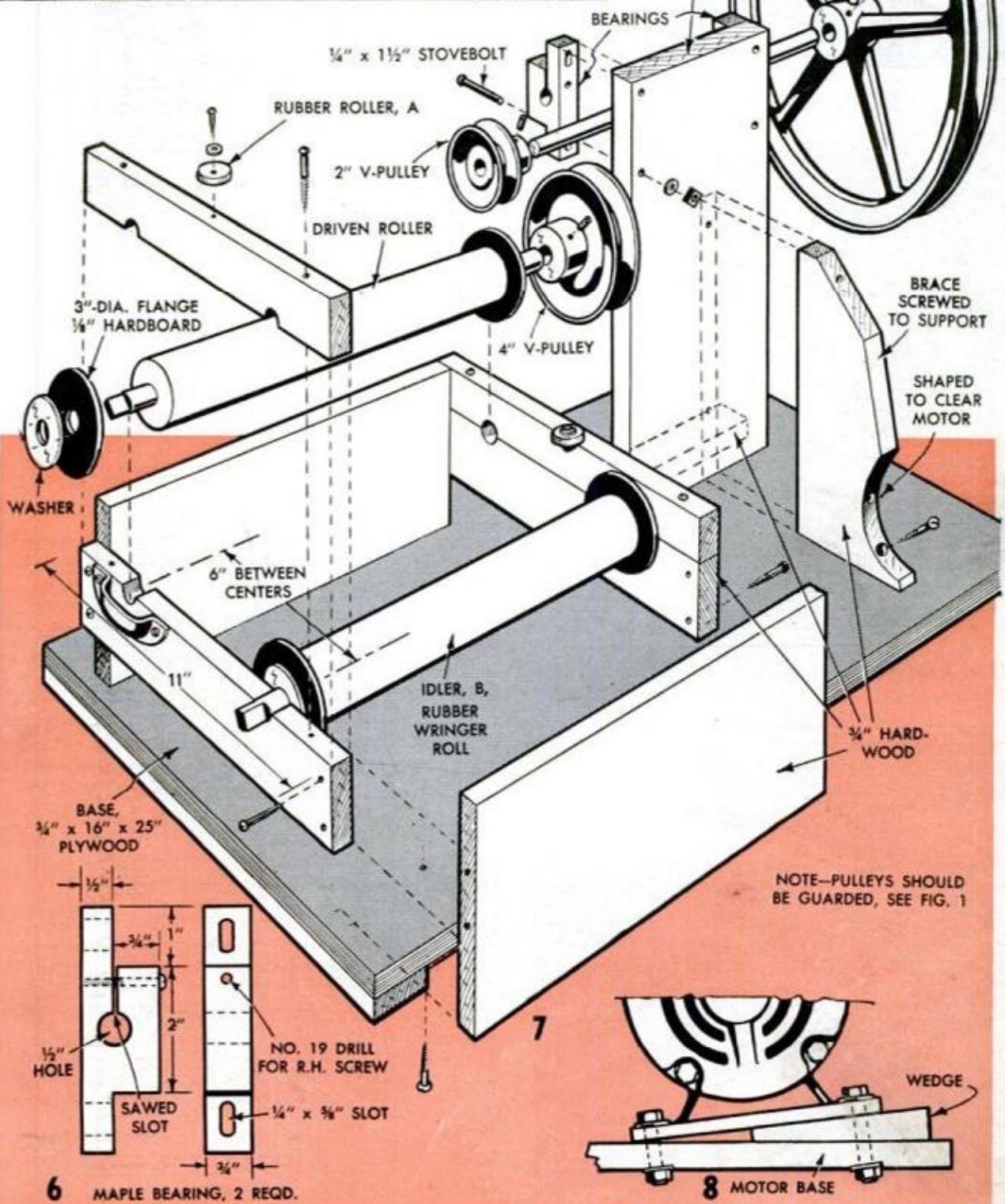
The jackshaft is mounted on a support consisting of a 5 x 15-in. piece of hardwood fitted with a brace of the same material. Both brace and support are screwed to the base, the approximate position of the brace and support in relation to the roll-bearing assembly being shown more clearly in Fig. 10. The support is screwed to a short cleat attached to the base as in Figs. 5 and 10.



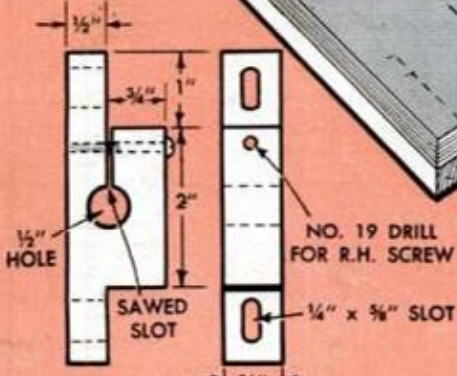


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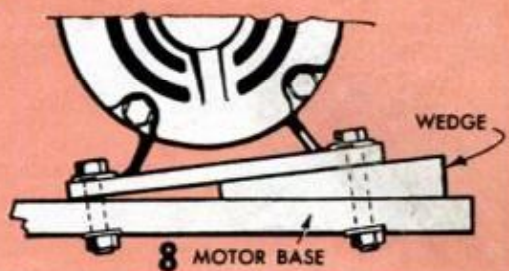
14" V-PULLEY



BASE,  
3/4" x 16" x 25"  
PLYWOOD

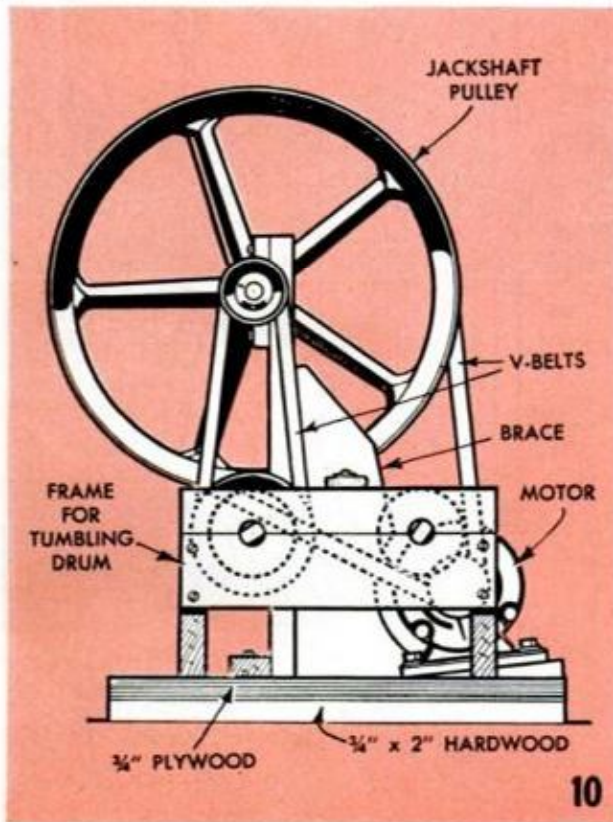


6 MAPLE BEARING, 2 REQD.



8 MOTOR BASE





Bearings for the jackshaft are made from maple as in Fig. 6, using  $\frac{3}{4}$ -in. stock. Slots at the ends of each bearing provide for tightening the belts. The slot cut into each  $\frac{1}{2}$ -in. hole provides an adjustment for taking up wear. A smear of paste wax or beeswax in each hole provides ample lubrication. Do not use lubricating oil in wooden bearings. No collar is necessary as the pulley hubs can be set against the bearings. When assembled there should be a slight amount of endplay. To prevent the shaft from binding in the bearings it may be necessary to shim one or the other or both bearings to assure proper alignment.

If you use a spoked pulley on the jackshaft of the type shown in Fig. 7, it should be guarded as in Fig. 1. An exposed spoked pulley can cause a painful injury, even though it is turning at slow speed and is driven by a fractional-hp. motor. A simple plywood guard cut to a contour slightly larger than the diameter of the pulley and attached to the machine base will give suitable protection.

### Tumbling Drum

If you use a 1-gallon paint can as a drum, or barrel, the inside of the container should be coated with a rubber-base paint as in Fig. 9. Or you can line the inside of the can with sheet rubber (that from an inner tube will do). Cement the rubber to the metal with a suitable cement that will bond the rubber sheet firmly. Be sure the cement is dry before the drum is used. The coating of rubber-base paint or rubber sheet is necessary to protect the thin sheet metal from the abrading action of the abrasives used in polishing. The can must not be dented or otherwise misshapen. A can even slightly out of round will not roll uniformly.

In general polishing and deburring, rounding edges of small metal parts is done by tumbling them in the drum together with an abrasive and other filler materials which may consist of lubricants and cleaners and in some instances, water. The volume of the fillers usually must be greater than that of the parts to be polished and the drum is filled only half full, the water level (if water is used) even with that of the solids or slightly less.

Only the small-grade sizes of granular abrasives are practical for use in the small drum. These usually are available through your local hardware dealer. The exact amount of abrasive and the grade must be determined largely by experiment. The small particle sizes cut more slowly, of course, and are generally more suitable for high polishing. Coarser particle abrasives are more suitable for deburring and rounding corners. ★ ★ ★





## Wheel-Track Planting Saves Valuable Seed

When spring-planting schedules tighten to the point where there just isn't time left to prepare a good seedbed, farmers resort to wheel-track planting to prevent waste of seed. A sudden, prolonged dry spell after late spring rains can result in cloddy seedbeds. If corn is drilled or checkrowed in such seedbeds at accepted depths, a percentage of the seed will be dropped in loose, dry topsoil and fail to germinate on time, may be lost entirely. But seed planted in

tractor wheel tracks drops in a compacted seedbed, in damp soil, where uniform germination takes place even though dry weather may continue. In the setup pictured the regular extensible front axle of the tractor has been extended beyond its normal limits by bolting the axle sections to lengths of heavy steel channel. Dual tires on the front wheels permit the shoes of the four-row planter to trail in the center of the tractor wheel tracks.—Paul D. Andre

## Portable Short Elevator

A handy, portable short elevator for running small grains into a feed grinder from a trailer or overhead bin can be made by altering a single elevator section. Fit the lower end with curved skid shoes made from sections of an implement wheel rim, add a motor and jackshaft and provide a sprocket at the upper end to carry the shortened chain. Close the lower open end with a piece of sheet metal as pictured.



## Trailer-Bed Catwalks

When building a trailer bed for a box with high sides and ends it's a good idea to allow for a 6- to 8-in. catwalk on both sides. The walks not only aid in getting into and out of the box, they also permit use of heavy braces along both sides to prevent spreading of the box under pressure of heavy loads. Use hardwood braces and join to the side panels with at least four spaced bolts per brace to assure adequate rigidity.





# RADIO TV HI-FI

ELECTRONICS



**Simple  
Tube  
Checks...**

**...Save  
You  
Money**

G  
O  
O  
D



B  
A  
D



*By Phil Simmons*

**It doesn't take a "pro" to find and replace tired tubes. Here's how you can do it**

**I**F YOU call in outside service every time a tube goes bad in your radio or TV set, it will cost you anywhere from \$2.50 to \$10 per call. That's over and above the cost of the new tube.

Actually, some 90 percent of all service calls made result in tube replacements only. This should come as no surprise, when you

consider that your TV set has 20 to 25 tubes and your table radios have anywhere from five to ten apiece. Other electronic equipment, such as amplifiers, record players and tape recorders, can quickly run the total number of tubes in a typical American home to near the 100 mark.

So you can see why being able to locate

## PUZZLED BY TUBE LABELS?

Manufacturers of television receivers use different nomenclature for tube diagrams inside the back of their sets. The following list will prove helpful in locating tubes mentioned in the "Trouble Shooter's Guide" on opposite page.

**LOW-VOLTAGE RECTIFIER** may be called just **RECTIFIER** or **LV RECT.**

**TUNER TUBES** may be called **RF AMP**, **MIX(er)**, **CON(verter)**, **OSC(illator)**.

**I.F. AMPLIFIER** tubes may be called **1st** (**2nd**, **3rd**) **IF.**

**DETECTOR** tubes can be located as **VID(eo)**, **DET** or **AUD(io)** or **SOUND DET.**

**AUDIO PREAMPLIFIERS** can be called **1st AUD.**, **AUD I/P** (input).

**AUDIO OUTPUT TUBE(s)** can also be referred to as **AUDIO AMPLIFIERS**, or **2nd AUDIO.**

Some sets do not have second video detectors, and **VIDEO AMPLIFIERS** may be designated as **VIDEO OUTPUT** (or o/p).

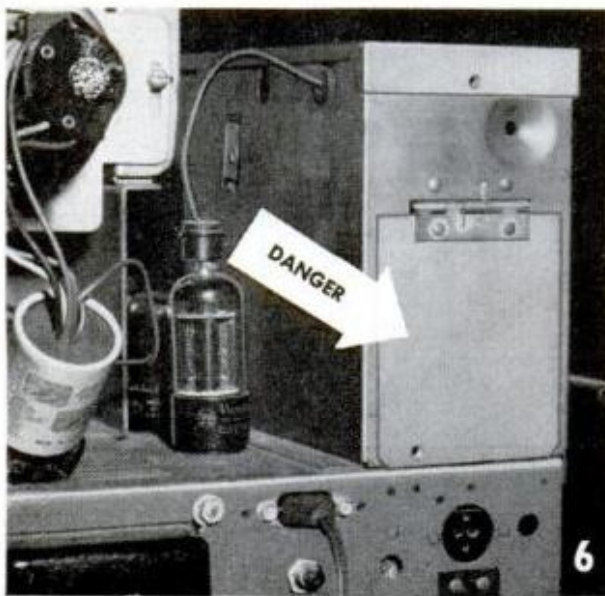
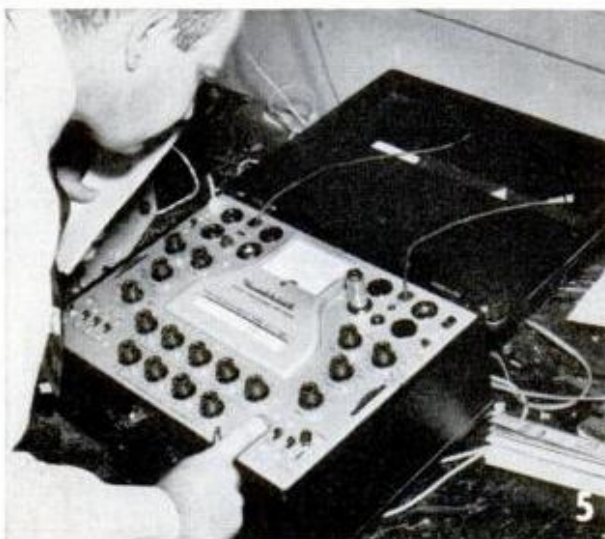
**SYNC** tubes may be designated as **H(orizontal)** or **V(ertical) SYNC.**



# TUBE TROUBLE SHOOTER'S GUIDE

SYMPTOM	POSSIBLE CAUSE	WHAT TO DO
<b>AC-DC RADIOS</b>		
Tubes do not light	Open filament	Check all tubes. Lack of filament continuity gives no reading
Tubes light, loud constant hum from loud-speaker	Cathode-to-filament short	Check all tubes for shorts on a tube tester
Hum varies with volume. No signal or station is heard	RF or IF amplifier tube with no emission	Check all IF or RF amplifier tubes for "good" or rated reading on tube tester meter
Signal not loud enough even at high volume settings	Tube(s) with low emission	Check all tubes. Replace tubes that register "weak" or below rating
<b>TRANSISTOR RADIOS</b>		
Doesn't operate	Most common defect is weak battery	Check and replace battery. Use battery tester to simulate load conditions
Battery okay but radio is still weak, buzzes or won't work properly	Transistors or other components ailing or connections faulty	If transistors are plug-in type check with transistor/diode checker. Check for mechanical failures, such as shorts, poor connections
<b>AUTOMOBILE RADIOS</b>		
Radio completely dead, pilot lamps unlit	No power to unit	Check radio fuse in line from car radio to power source
Pilot lamp and tubes light but there's no signal	One or more bad tubes, bad vibrator	Check tubes. If okay, check or replace vibrator
Car radio has low hum, weak signal at maximum volume levels or no signal at all	Check antenna connections and lead. Could also be weak tube(s)	Corrosion can interfere with signal. Replace antenna if necessary. Check tubes
<b>STEREO/HI-FI</b>		
Tubes don't light	No primary voltage	Check to see that unit is properly plugged into live outlet. Check fuse for continuity
Tuner works but magnetic phono doesn't	Preamplifier tube(s), magnetic cartridge or wiring defective	Check tubes in preamplifier first. If okay, have cartridge checked
<b>AC-DC PHONOGRAPHS</b>		
No signal	Faulty cartridge or bad tube	Place finger on center lug on back of volume control. If loud hum is heard, cartridge or wiring is at fault. If no hum is heard, check tubes for shorts and strength
<b>INTERCOM SYSTEMS</b>		
One unit of system doesn't work	Faulty tubes in inoperative unit	Follow steps outlined for testing tubes in AC-DC RADIO, above
<b>TELEVISION</b>		
No picture, no sound. Picture tube doesn't light	Check to see that receiver is plugged into live outlet. Check primary fuse. Sometimes caused by absence of low voltage rectification	Check low voltage rectifier tubes. See manufacturer's layout for type and location
No picture, no sound. But picture tube lights	Short at antenna, channel not tuned properly, weak or bad tubes	Inspect antenna terminals for shorts. See that channel selector is on active channel. Check all tubes in tuner, IF amplifier circuits, detector circuits
Picture but no sound	Loudspeaker connections, weak tube	Check speaker plug, check audio detector tube(s), audio preamplifier tube, audio output tube(s)
Sound but no picture. Picture tube lights.	Loss of video detection or amplification	Check first and second video detector tubes, video amplifier
Picture "tears" or "rolls"	Sync or vertical and/or horizontal circuits inoperative	Check all sync tubes. Check all vertical and horizontal oscillators and amplifier tubes





**1. TRANSISTOR TESTER** also tests diodes. Operates from self-contained batteries. Lafayette Radio, N. Y.

**2. TUBE TESTER** provides indication of tube quality on easy-to-read meter. From Knight-Kit, Chicago, Ill.

**3. CONTINUITY CHECKER** tells if filaments are good. Tests heaters of most tubes. Lafayette Radio, N. Y.

**4. INEXPENSIVE TESTER** uses hidden drawer instead of roll chart. Tests all tubes. Knight-Kit, Chicago, Ill.

**5. LABORATORY** tester provides all info required on standard tubes. Heath Co., Benton Harbor, Mich.

**6. DOG HOUSE** is technician's name for high voltage cage. Keep hands away from here for safety

and replace ailing tubes can keep good hard cash in your bank account.

The chart on the facing page gives you some basic guidance on where to look for trouble, depending on the symptoms you have observed. It assumes, of course, that you have already checked to make sure the line cord is plugged in firmly, and that fuses in the radio or TV set are functioning (with set unplugged, check to see that the wire in the glass envelope is not burned out).

The tubes you will remove for checking can be tested at your local radio or TV repair shop. Or perhaps you can do it yourself on one of the tube testers now available in many corner drug stores. In either case, there should be little or no charge. If you want to save yourself trips to the store, however, it might be wise to buy your own tube tester (\$3.95 and up) which will then

(Continued to page 202)



# One Chassis Space-Saver Stereo

By Otto Fried

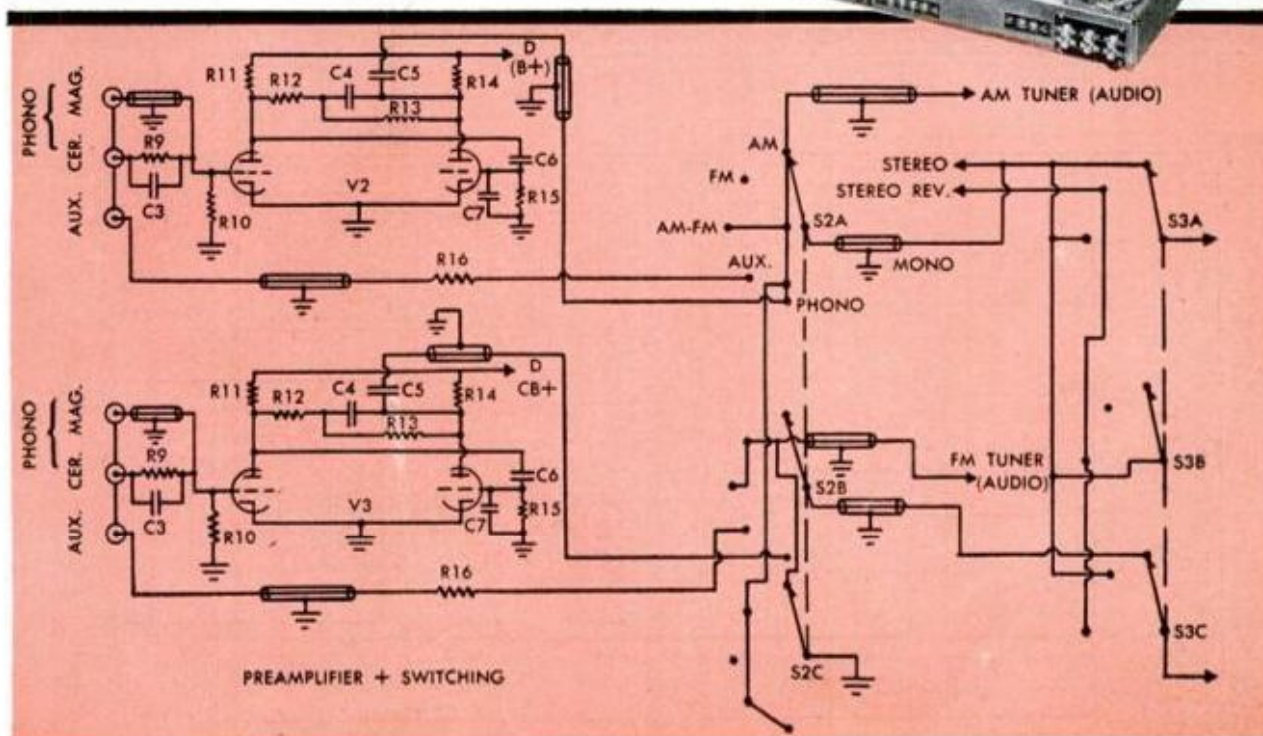
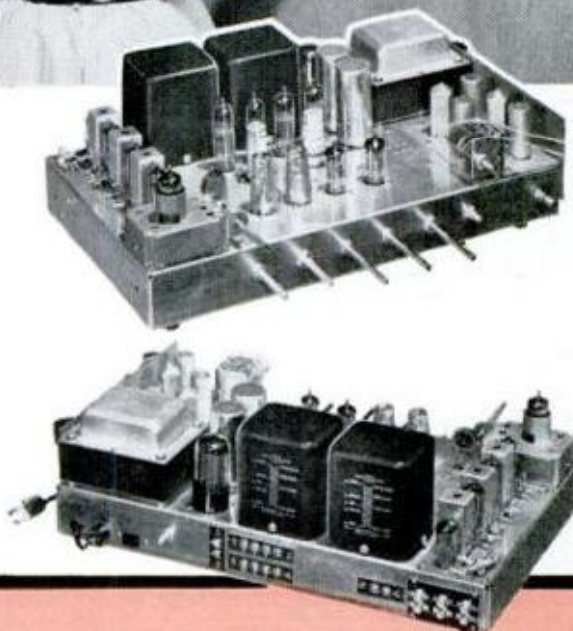
LIKE MANY, you may have succumbed to the magic of three-dimensional sound but find yourself cramped for space. This flexible unit, combining amplifiers, preamplifiers, FM tuner and AM tuner—all with a common power supply—solves all of the problems. Yet, it does not sacrifice the quality that makes for honest high fidelity.

It is designed around modular principles, so that any part of the system, such as the AM tuner or FM tuner or both, can easily be eliminated without serious design changes.

When you have all the components you will need for building, punch the chassis according to the diagram on page 192. Power resistor R2 gets quite hot, so both the chassis and bottom plates are perforated to provide cooling. In addition, use half-inch rubber mounting feet to raise the chassis and allow air to circulate. Use shielded cables where indicated to avoid unnecessary hum.

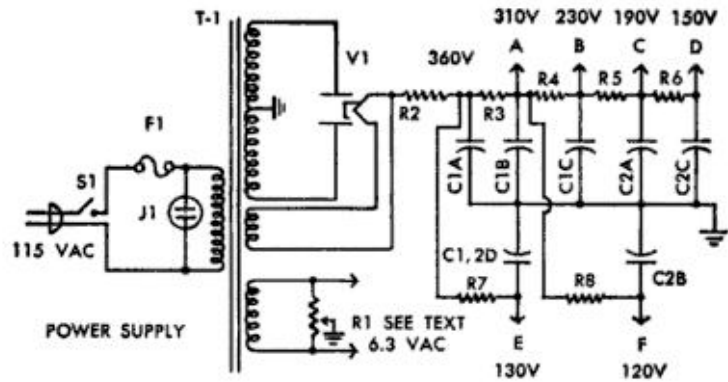


PART 1





**POWER SUPPLY DIAGRAM** is shown at right. At the bottom of the page is the dimensioned diagram for chassis punching. Follow layout, marking chassis before punching



While dual potentiometers are not available in assembled form, the sections are available separately and the units can be assembled. The hum-balancing potentiometer (R1) used in the unit illustrated has the center arm internally connected to the shaft. If the potentiometer you use has the center lug insulated from the shaft, be sure to ground the center lug to the chassis in order to obtain a hum balancing effect.

The FM tuner is sold either with a string drive or a gear mechanism. We selected the gear drive to save space.

Loading resistor R10 can be altered in value to accommodate the requirements of the particular cartridge in your record player. But the 100,000-ohm resistor we used was tried with all popular types of cartridges and no loss in frequency response was noted.

The output of the preamplifiers is applied to selector switch S2, which picks up all the inputs, including the FM tuner and the AM tuner. Mode switch S3 permits you to switch channels for the best stereo effect and enables you to parallel the inputs for monophonic programming. Two speakers

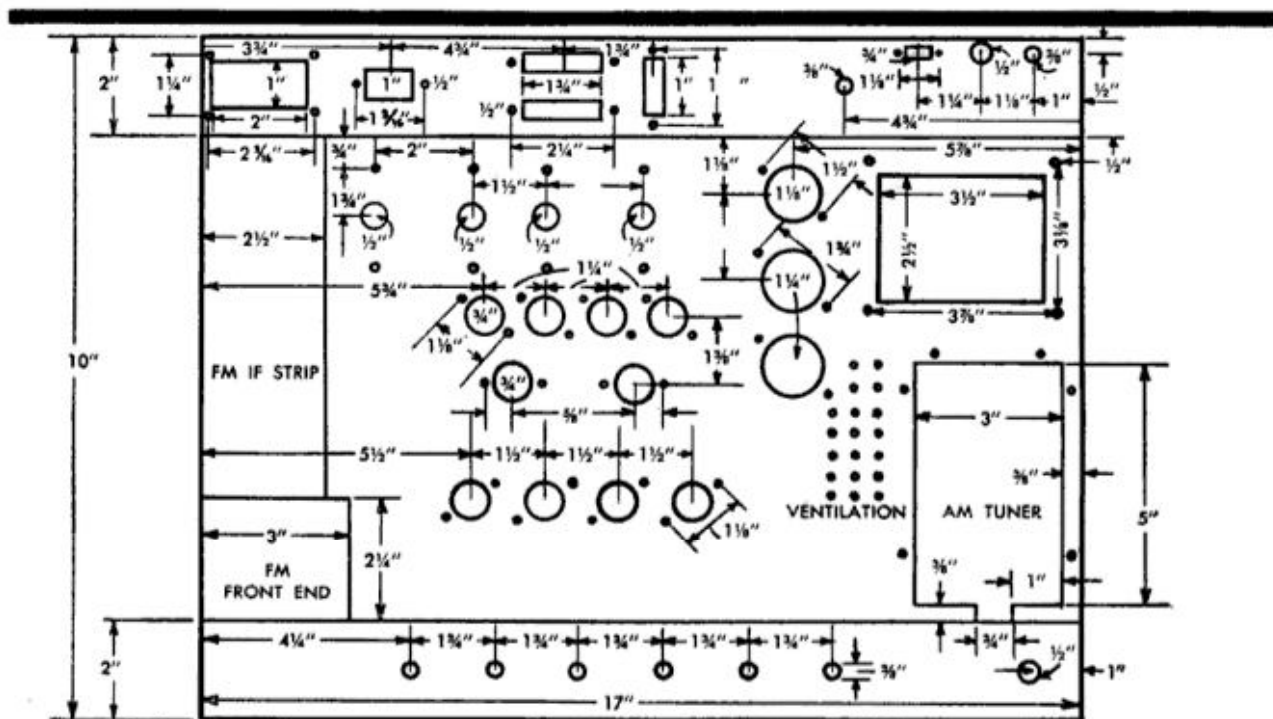
will add depth, even to monophonic music, so always leave both speakers connected even when not using the unit in stereo. You will find that this system operates very well with any loudspeaker system you have.

Exceedingly low distortion amplifiers such as the one used here can use capacitor input filters. We also use indirectly heated tubes as this prevents the voltage ratings of the capacitors from being exceeded. Initial surge voltages are thus avoided when the set is turned on.

Input resistor R2 drops the voltage from the power transformer. Potentiometer R1 minimizes hum level.

By using low-gain tubes in the preamplifier, we have just about eliminated any danger of hum and microphonics which affect the high-gain types.

The function switch has a position marked AM-FM which connects the FM tuner and the AM tuner, each to a different channel of the stereo amplifiers. If the Mode switch is placed in STEREO you will hear the FM from one channel and the AM from the other. This is of course, for stereo simulcasts, where one channel of the stereo pro-





gram is fed to each of the FM and AM channels respectively.

Follow the chassis layout pattern, and with a soft pencil, draw the pattern on the chassis placing the markings for holes in the proper place. Now using a center punch and a hammer, punch-mark each hole that is to be cut. Use the smallest size drill required, and drill out each punch mark. Follow this by carefully drilling the next larger size holes, but only where they are required.

When all screw holes have been drilled, use chassis punches to cut the tube socket holes. A square punch will be of great assistance for making professional corners on tuner and transformer cutouts, and if you possess a hand nibbler to use in conjunction with the square punch, the finished job will be professional in appearance and easier to work with.

As the chassis must be constantly lifted and turned in order to gain access to either side, it is wise to mount the lightest components first. Of course, the last parts to be put in place are the heavy transformers. After mounting the transformers, take the cartons that they come in and carefully cut part of the top of each carton away. This will allow you to slip the carton over the transformer and using masking tape, hold it in place. The entire weight of the chassis rests on the tops of the transformers while wiring, and the cartons will prevent marring of the painted surfaces.

In this issue, we have provided the schematic diagrams for the preamplifier and switching circuits and also the power supply. All of the parts lists are also given. Next month we shall conclude with instructions for completing the amplifier and tuner circuits.

## SPECIFICATIONS

### AMPLIFIER: EACH CHANNEL

Power output: 8 watts  
 Harmonic distortion: less than 1%  
 Sensitivity: 1.5mv in phono input  
 Frequency response:  $\pm 2$  db (20cps to 20 kc)  
 Tone control:  
 Max. treble cut: approx. 10db at 10 kc  
 Max. treble boost: approx. 8 db at 10 kc  
 Max. bass cut: Approx. 14db at 40cps  
 Max. bass boost: approx. 12 db at 40cps  
 Hum and noise level: 65 db or better below rated output  
 Crosstalk:  
 at 1 kc: less than 40db  
 at 10 kc: less than 30db  
 Power consumption of the entire system: 220 watts

### FM TUNER

Tuning range: 87.5-108.5 mc  
 IF bandwidth: 6db down: 250 kc  
 AFC at  $\pm 1$  volt: 220 kc  
 Sensitivity: better than 4 microvolts for 20db quieting  
 Image rejection: better than 40db  
 IF rejection: Better than 60db  
 Drift—1st hour: less than 50 kc  
 Drift. caused by 10% line voltage variation: less than 30 kc

### PARTS LIST — POWER SUPPLY

T-1 Power transformer, 400-0-400 vac. 200 mADC, 5 v—3 amps, 6.3 vac—5 amps Allied Radio 62GO33  
 S-1 Spst toggle switch  
 F-1 Fuse, 3 amps, Slo-Blo  
 J-1 Auxiliary ac socket  
 V-1 GZ-34, rectifier  
 R-1 100 ohm, potentiometer,  $\frac{1}{2}$  w, linear taper  
 R-2 300 ohm, ww, 25w  
 R-3 200 ohm, ww, 7w  
 R-4 10k,  $\frac{1}{2}$  w  
 R-5 10k,  $\frac{1}{2}$  w  
 R-6 22k,  $\frac{1}{2}$  w  
 R-7 12.5k, ww, 10w  
 R-8 7.5k, ww, 10w  
 C1, C2 40-40-40-20 mfd/450v-350v-350v-150v electrolytic  
 Chassis—10"x17"x2"—aluminum  
 Bottom plate for the above  
 Hardware, ac cord, tube socket, etc.  
 All resistors  $\pm 10\%$

### PARTS LIST — PREAMPLIFIERS

All resistors  $\frac{1}{2}$  w,  $\pm 10\%$  unless specified (all parts with \*, 2 required)  
 \*R9 22 meg.  
 \*R10 100k  
 \*R11, R14 220k  
 \*R12 47k  
 \*R13, R15 3.3 meg  
 \*R16 470k  
 \*C3 .005 mfd, 600v, disc  
 \*C4, C7 .01 mfd, 600v, disc  
 \*C5, C6 .02 mfd, 600v, disc  
 S2 3 pole, 12 position rotary  
 S3 3 pole, 5 position rotary  
 V2, V3 12AU7  
 Input jacks, tube sockets, tube shields, hardware, wire.

### PARTS LIST — AM TUNER

R42 22k,  $\frac{1}{2}$  w,  $\pm 10\%$   
 R43 220 ohm,  $\frac{1}{2}$  w,  $\pm 10\%$   
 R44 2.2 meg,  $\frac{1}{2}$  w,  $\pm 10\%$   
 R45 270k,  $\frac{1}{2}$  w,  $\pm 10\%$   
 R46 220k,  $\frac{1}{2}$  w,  $\pm 10\%$   
 R47 10 meg,  $\frac{1}{2}$  w,  $\pm 10\%$   
 R48 470k,  $\frac{1}{2}$  w,  $\pm 10\%$   
 C22 Tuning capacitor, Allied Radio 61HO65  
 C23 Trimmers, supplied with C22  
 C24 .1 mfd, 400v, tubular  
 C25 .05 mfd, 400v  
 C26, C29 330 mmfd, disc  
 C27 .01 mfd, disc  
 C28 .005 mfd, disc  
 L1 Loopstick, Allied Radio 60H893  
 L2 Oscillator coil, Allied Radio 55H507  
 T3, T4 455kc IF transformer  
 V10 6BE6  
 V11 6BA6  
 V12 6AV6  
 All sockets with center shields  
 Tube shields  
 C30 .05 mfd, 400v

### FM TUNER

Waller front end UT-347 AFC or UT-345 AFC  
 Waller IF strip GS-406  
 (both furnished with tubes)  
 .001 mfd, disc  
 1.8k,  $\frac{1}{2}$  w,  $\pm 10\%$  resistor

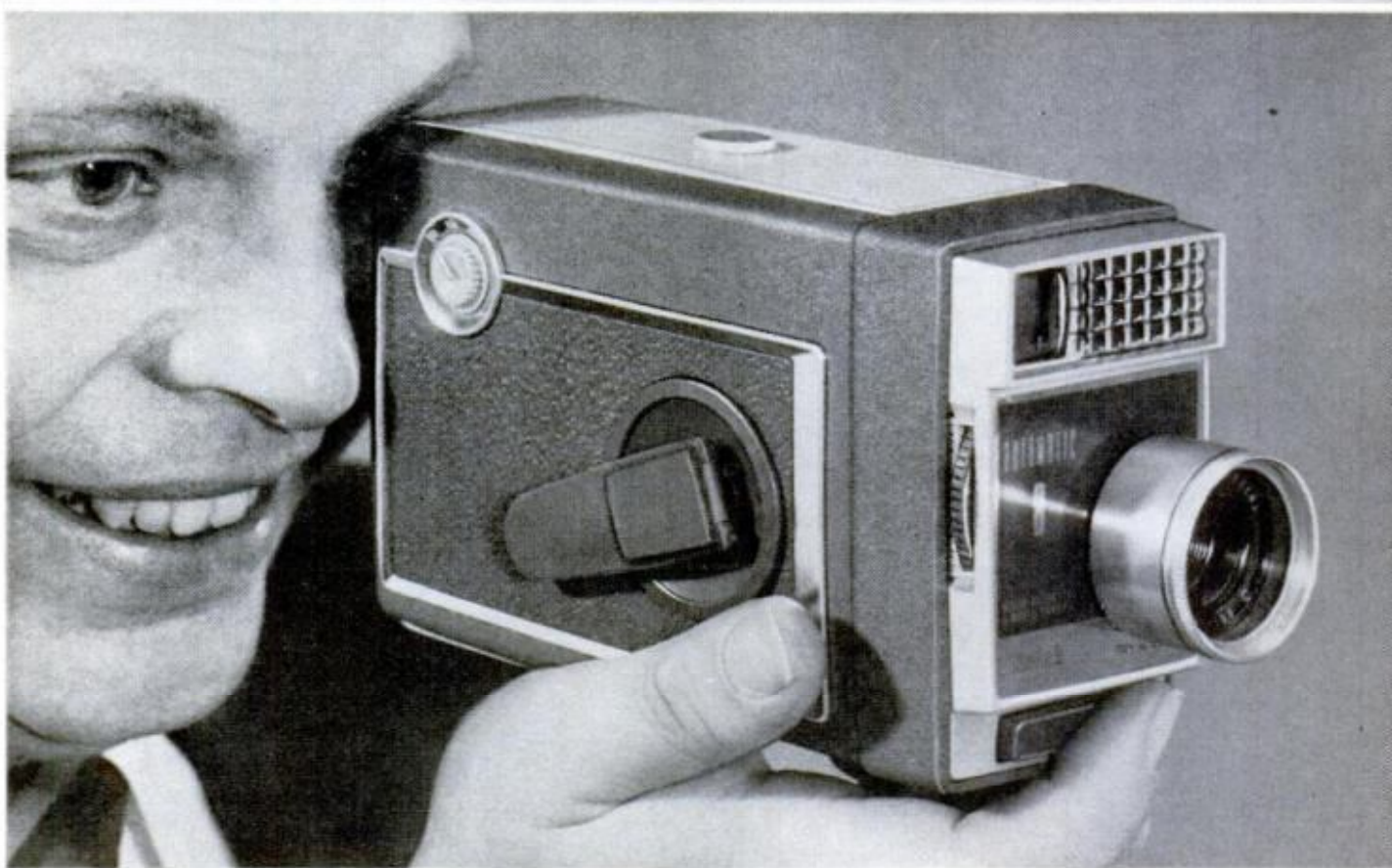
### PARTS LIST — AMPLIFIERS AND TONE CONTROLS

All resistors  $\frac{1}{2}$  w,  $\pm 10\%$ , unless specified

\*R17 330k  
 \*R18 .5 meg pot., audio taper, ganged  
 \*R19 47k  
 \*R20, R27, R32 1.5k  
 \*R21, R28, R29, R34, R35 100k  
 \*R22 10 meg  
 \*R23, R25 1 meg pot., audio taper, ganged  
 \*R24 270k  
 \*R26 27k  
 R30 1 meg pot., linear taper  
 \*R31 180 ohm  
 \*R33 390k  
 \*R36, R37 680k  
 \*R38, R39 1k, 1w,  $\pm 10\%$   
 \*R40 330 ohm  
 \*R41 350 ohm, ww, 7w  
 T1, T2 Output xformer, primary 8k, tapped Allied Radio 62GO82  
 \*C8 47 mmfd, disc, 600v  
 \*C9, C16, C18 100 mfd, 3v, Allied Radio 13L834  
 \*C10, C19, C20 .02 mfd, disc, 600v  
 \*C11, C15 100 mmfd, disc, 600v  
 \*C12 2500 mmfd, disc, 600v  
 \*C13 .001 mfd, disc, 600v  
 \*C14 .01 mfd, disc, 600v  
 \*C17 .05 mfd, 400v, tubular  
 \*C21 100 mfd, 50v electrolytic  
 V4, V5 ECC83/12AX7/7025  
 V6, V7, V8, V9 ECL82/6BM8  
 Tube sockets, hardware, tie strips, wire, etc.



# New Ideas in Photography



**BIG EASY-TOUCH EXPOSURE LEVER** on front of Kodak Automatic 8 Movie Camera is handy when you grab the camera for a sudden picture opportunity. Camera is smart two-tone aqua color, weighs only 20 ounces.

## Meet Kodak's Lowest-Priced Automatic Movie Camera!

Have you noticed how many people are taking *movies* this summer? One reason is the smart camera above—the new Kodak Automatic 8 Movie Camera. There's nothing to set, nothing to remember. Electric eye sets the lens opening for you—continuously, *automatically*. And the camera is always in focus.

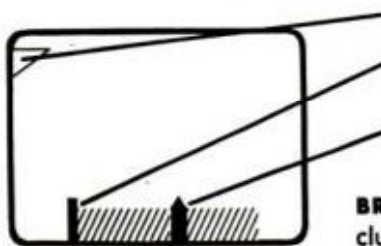
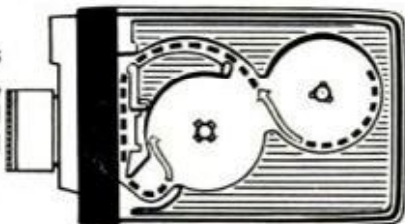
Result: Anyone can get sharp color movies from the very first. Priced at less than \$50, the Kodak Automatic 8 brings a top-notch

automatic movie camera within reach of almost every family. How about yours?

Check these facts about the Kodak Automatic 8 Movie Camera. They spell *quality*:

- Fast  $f/1.6$  lens.
- Built-in "Type A" filter lets you use same roll of color film indoors and outdoors.
- Electric eye can be set for film-exposure indexes 10, 16, 25, and 40.

**FILM-LOADING** is fast and simple, thanks to recessed film channels and directional arrows.



Parallax correction  
Indicator warns if light  
is too dim  
Arrow tells when filter  
is in position

**BRIGHT VIEWFINDER** includes three important aids.



# from Kodak

- Pre-stressed spring for even camera speed; positive cutoff at end of film run.
- Accepts Series 5 lens attachments directly.
- Bright finder for quick, easy aiming.
- Footage indicator shows amount of film remaining; resets automatically.
- Up to 40 average-length scenes on a single roll of 8mm film.
- Has sockets for light bar, tripod.

Right now is the best time for outdoor movie-making. See the Kodak Automatic 8 Movie Camera—and start taking movies *this weekend!*

\* \* \*

## Now—power film-wind keeps you "Always ready for the next shot"

Now fast-action picture sequences are as easy as single shots! A new Kodak 35mm camera—the Motormatic 35—has a spring-power film drive and automatic electric eye. They keep you always ready for the next shot—no pictures lost while winding film or setting exposures.

You can snap as many as 10 pictures in 10 seconds without even taking the camera from your eye. As soon as you shoot, the film zips forward to the next frame. If the light changes, the electric eye adjusts the lens opening automatically!

**How power-wind works.** The entire "power plant" is built into the baseplate of the camera, only about 5/16-inch deep. It consists of a powerful spring, gear train, and two speed-control governors—one a centrifugal brake, one aerodynamic.

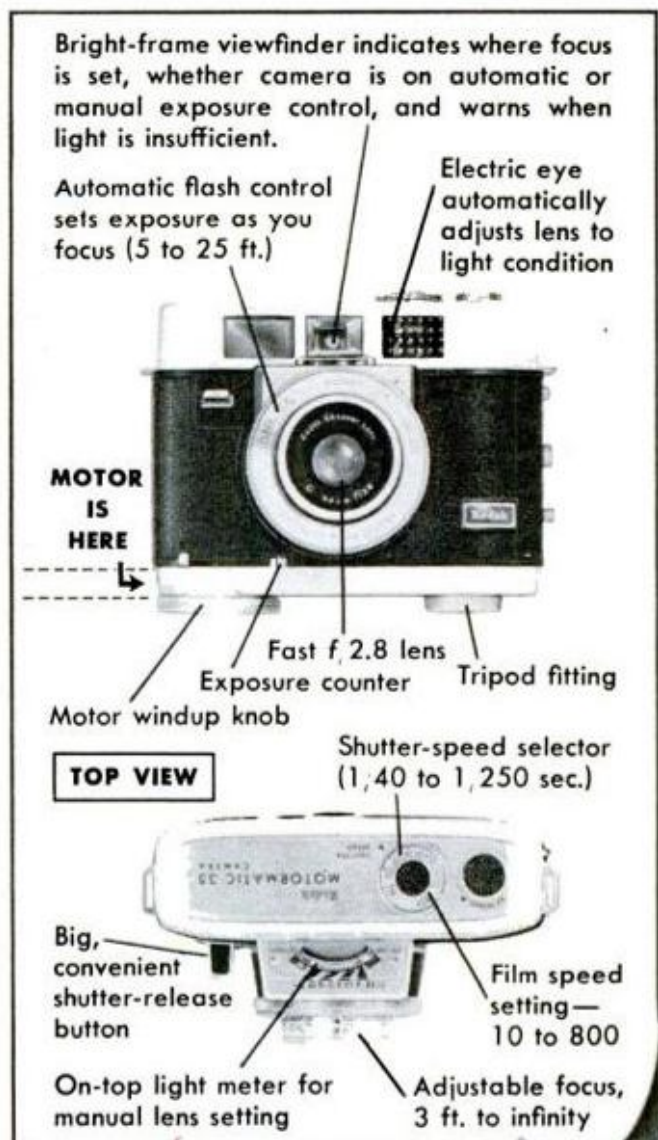
Turn the windup knob, and you store enough energy for ten pictures. Now press the shutter button. The shutter clicks; then the spring's power goes automatically through the gear train to advance the film exactly one frame—and cock the shutter for the next shot. The action takes only 3/5 of a second—with a smooth, steady pull that puts no strain on the film.

**Automatic flash control** assures good

exposure in flash shooting. Eliminates computing, thus makes it easier and quicker to change your distance. Just set the focus . . . 5 to 25 feet . . . and lens automatically sets to right opening.

**Ideal family camera.** Unlike most advanced-type cameras, the Kodak Motormatic 35 is especially easy for a beginner to use. Yet it lets him take pictures beyond the capability of most simple-to-use cameras. At the same time, the Kodak Motormatic 35 Camera offers the skilled picture-taker exciting new opportunities for fast-action shots. See *all* its features at your Kodak dealer's. Less than \$110.

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# CLINIC FOR HOMEMAKERS

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## Paint Defects

**Q**—What causes checking, blistering and peeling of paint when applied to wooden siding? I have an older home and the paint on the siding is in bad shape and getting worse. The paint was applied only three years ago and already there are fine checks, cracks and areas where the paint has blistered and peeled to the bare wood. What should I do, repaint, or apply another type of siding over the old?—J.L., Kan.

**A**—Paint defects usually are not defects of the paint itself but are brought about by conditions which affect the paint film. As a rule, checking and cracking of the paint film are due to stresses set up by wide temperature variations, changes in the structure or structural members due to the presence or absence of normal moisture and failure to mix the paint properly and apply it according to accepted practices for brush or spray application. Moisture penetrating the walls from the room side to a point directly under the paint film is the common cause of blisters and peeling to the bare wood. The checking and cracking of the film first referred to is commonly caused



by a heavy application of a single coat to attain maximum coverage, rather than a build-up using several coats, each mixed to a much thinner consistency and applied with long drying intervals between coats.

## Pruning Brambles

**Q**—I have red raspberries on property which I have just purchased. The patch has been neglected and I would like to clean it out and do whatever is necessary to reestablish it and bring the plants back to full productivity. I know this can be done, but how? How does one prune raspberries?

—G.W., Mich.



**A**—Assuming that none of the plants is of the everbearing variety, permit all the live canes to fruit this season, then clear out the weeds and whatever other rubbish may have accumulated and burn the collection. Then remove all the dead canes and dispose of these by burning. Short, live canes can be cut out at this time as the chances are that these will not live through the coming winter. Finally, mulch the entire patch heavily with clean, weed-free straw. Wheat straw is best, although straw from any small grain is suitable. Dry straw should be applied to a depth of at least 6 in. as it will soon settle to half this depth or even less. A thin covering is ineffective both as a mulch and as a deterrent to weed growth. Leave the straw covering on during the winter and then in the following spring, before growth starts it usually is permissible to reduce the height of the existing canes, or stems, to about 36 to 40 in. This tends to stimulate growth, encourages the canes to branch and can increase the yield of fruit if the canes are healthy. A season or so later it may be advisable to cut back the stems again to the same height and trim any branches lightly to improve the quality of the fruit. This should be done just at the time the flower buds can be seen, usually in midspring. ★ ★ ★



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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

## "Soup Up" Your Stick Planes

(Continued from page 149)

the turns have run off and the model is gliding. To prevent this from happening you can make a "tensioned" motor. Make this up as a two-strand motor forming a single, double-length loop. Wind on about 100 turns, Fig. 13, then double the motor, end to end, Figs. 14 and 15, and bind both ends with thread. When you release the rubber it will coil itself into a comparatively short skein. Tensioning the rubber in this manner does not decrease the number of permissible turns very much, but when the model is on its downward glide at the end of the flight, the rubber will remain taut and maintain the trim of the model.

A model modified in this way can give quite astonishing flights, and if you fly it across a concrete road or other surface which reflects heat and forms thermal currents, you may easily make out-of-sight flights, so be sure to have your name and address on the plane.

### Improving Stability

A model can be made more stable longitudinally by the simple device of using sweepback on the wings, Figs. 6 and 7. Most of the smaller types of models use a plastic fitting for attaching the wings to the fuselage stick. The fitting has a slot by which it fits onto the stick and two other slots into which the sheet balsa wings are held by friction. Take the wings out, cut the root ends at an angle and reinsert them. You will have to position the wings a little further forward to compensate for the changed shape, but there will be an immediate improvement in longitudinal stability.

To improve the lateral stability you can increase the dihedral angle by steaming the wing, but a better method is to convert the model to a parasol monoplane, Fig. 2. To do this, cement a piece of balsa the same thickness as the stick and longer than the chord of the wing, to the top of the stick in the approximate position where the wing is normally set. See Fig. 3. Position the wing at the top of this piece, then make a few flights adjusting the wing as required. Once the correct wing position has been established, you can cut away the surplus wood, leaving only about  $\frac{1}{8}$  in. at each end for fine adjustment.

You also can add "camber" to the wing to increase the lift by shaping the wing while holding it in the steam from a kettle. Another way is to spread a very thin smear of glue along the underside of the wing, Fig. 9, about one third of the distance from the leading edge. In drying, the glue will

(Continued to page 200)

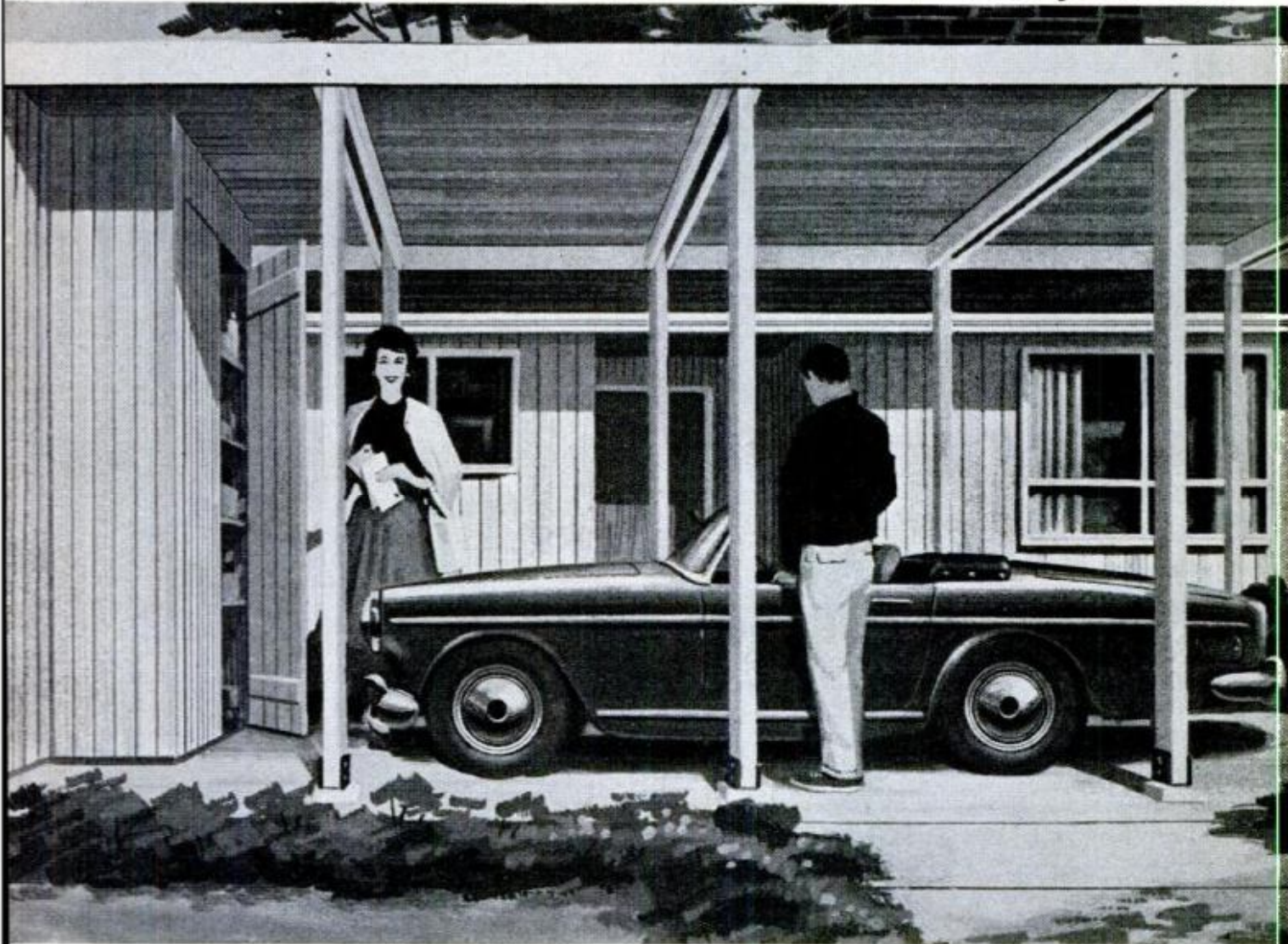


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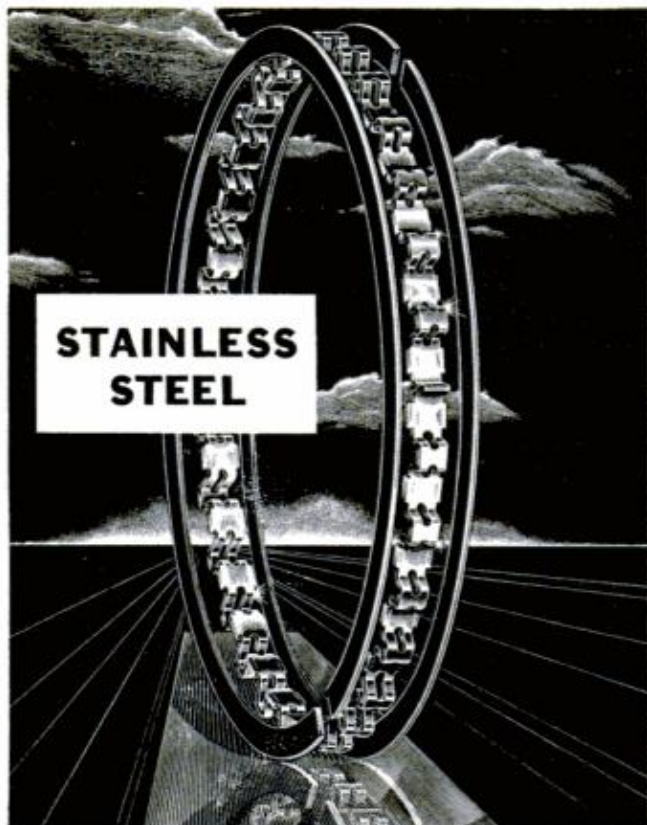
Your local lumber dealer will help you select the right materials and methods. See him for your free carport idea booklet. If he is unable to supply you, write to: Western Pine Association, Dept. M-3, Yeon Bldg., Portland 4, Oregon, giving us the name of your dealer. Enclose 10c for handling and mailing.



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**Sealed Power** Stainless Steel  
oil rings stop oil pumping

contract and pull the wood into the required shape. This system, however, also adds weight and thus the steaming method is preferable. Remember to recheck for "wash-out" when you are finished. Remember also that the wing must always have a positive "angle of attack"—that is, the leading edge must always be higher than the trailing edge. Fig. 10. You can adjust this by cutting the top of the pylon to the appropriate angle, experimenting until you establish the best angle. This adjustment is, however, not possible with some of the large models which have a wing inserted through a slot in the stick. Here it is best not to experiment with cambered wings.

You also can add weight near the wheels to give increased "pendulum stability." Small nails, secured to the bottom of the undercarriage leg with adhesive tape, are quite effective, and by varying the size of nail you can vary the weight as desired.

### Indoor Flights

On winter evenings, you can have a lot of fun flying stick models indoors tethered to a pylon, made from a length of dowel with a nail at the top, set into a wooden base as shown in Fig. 8. A simple wire attachment, fashioned so that it can rotate on the nail, with a washer above and below is all that is necessary. A hook tied to a length of thread can be attached to the wingtip to tether the model.

Stick models can be flown in this fashion in quite small rooms and a large basement is ideal, but since the model lands immediately when the rubber motor runs down, it is the length of the motor run which alone determines the duration of flight. For this type of flying, the model should be lightened in every way possible, by sanding down the wing and tail surfaces, lightening the fuselage stick and filing any surplus material off the plastic propeller and thrust bearing. Put the rudder beneath the stick as in Fig. 11 to give the model a better takeoff and landing attitude and to make it easier to trim for a long, level flight rather than a steep climb. On some models the horizontal stabilizer is in a slot and is not affected by this change, but on other models it is normally held onto the bottom of the stick by a rubber band. In transferring it to the top of the stick to allow for the change, be sure you do not alter its angle to the line of flight. You may have to make a little platform for it, from scraps of balsa. Use a two-strand motor, without tensioning, and experiment with different lengths of motor. Aim at getting the maximum number of turns on the motor. To do this, stretch it, when winding, to two or three times its normal length. ★ ★ ★



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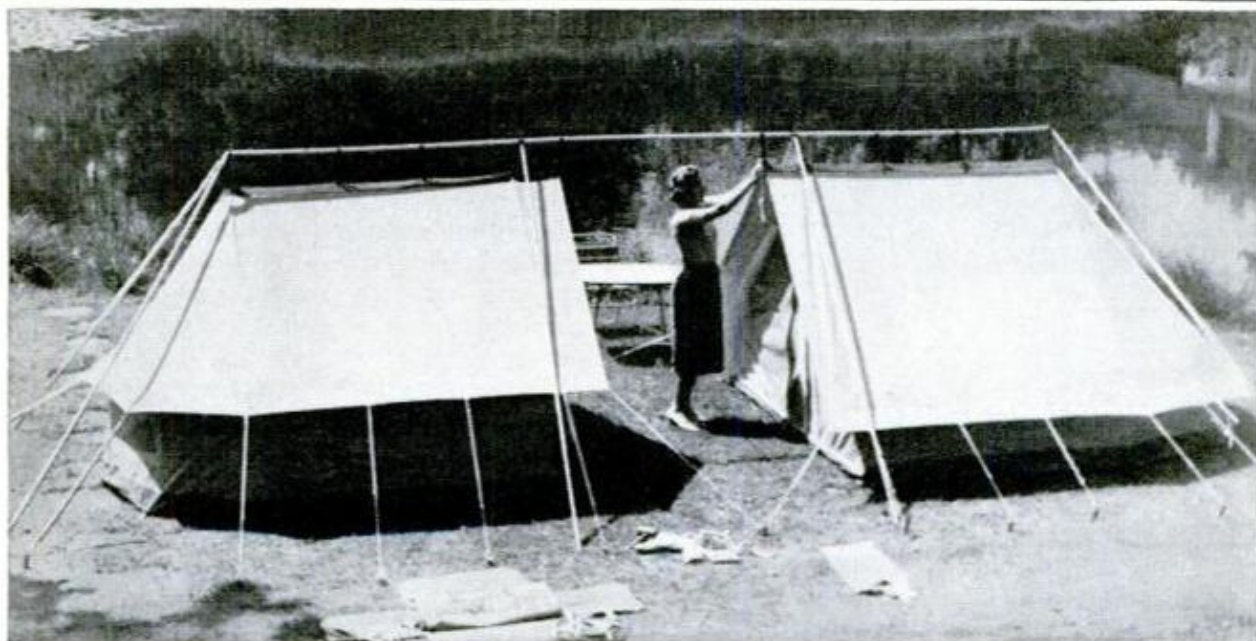
"I've used guns for years as a U. S. Border Patrolman. Believe me, this CO<sub>2</sub> gas-powered pistol is one of the finest handguns I've ever shot.

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Newest model in an old line of German tents is the trapeze house tent, which features a new idea in camping comfort, an "overtent." Basically a two-section, externally supported tent, the trapeze model uses a second roof over the basic unit to serve as a sunshade and extra weather protection, and the air space between the tents

serves as insulation. In addition, you can add a foretent and storage tent to cover the space between the two units. You can buy a piece at a time or the whole rig at once. Quick-tension guy lines have rubber tension rings; a rubber "tub" bottom stays dry even in a puddle. Imported by Sportberger, Box 571, Minneapolis 40, Minn.





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## Tube Checks Save you Money

(Continued from page 190)

always be convenient for prompt checking.

Do not attempt to test tubes located in the high voltage box of a TV set, which you can identify by the fact that it is a box which is completely enclosed. Failures caused by troubles in this box may show up in the form of a picture tube which does not light. We have listed no tests for the high voltage section in the trouble-shooting chart, because this section should only be serviced by an experienced TV serviceman. The same holds true for the TV picture tube, which should only be handled by a trained serviceman to avoid the ever-present danger of implosion. Even if the tube didn't implode, an expert would still be needed to reset the various magnets, yokes and traps on the picture tube.

### Safety First!

Before actually removing any tube for checking, make sure that the set is unplugged. The tube locations may be marked either on the cabinet, or on a tube location chart pasted onto the set. If the chart or markings are missing or unreadable, then make up your own location chart as you remove the tubes, listing the numbers of the tubes you pull out at the correct locations so that you will know which sockets to return them to.

### "Getter Flash"

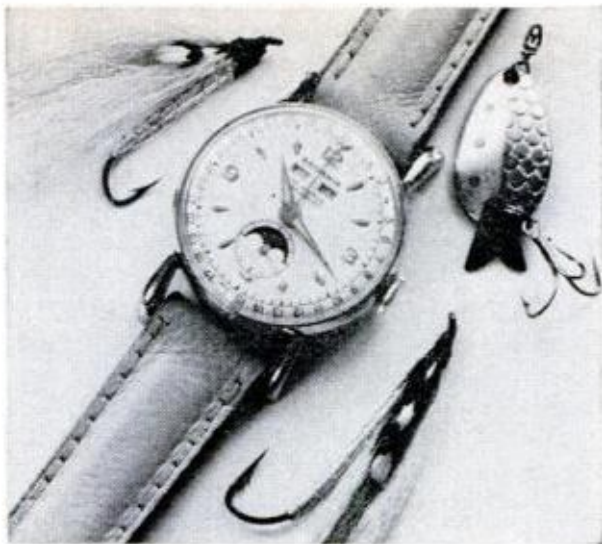
If you see a black, apparently "burned" area inside the glass of the tube, don't jump to the conclusion that the tube is faulty. This black mirrorlike coating is caused by the "getter flash" used by the manufacturer to burn away vestigial oxygen after the tube has been evacuated. It doesn't affect performance.

Tubes that have been broken or cracked may take on a cloudy, whitish cast inside. But, aside from this symptom, you can't tell from looking at a tube whether it is good or bad. It will have to be checked on a tube tester.

### "Burned" Tube?

Brown spots that appear on the screens of some TV sets do not necessarily mean that the tube is burning out. They can be an accumulation of grease or dust collected by the electrostatic charge on the face of the tube. In this case, carefully remove the mask on the front of the set (but not the picture tube itself) and wipe down the front of the picture tube and the inside of the glass mask that goes in front of it with a mild soap and water solution, and then remove the soap. ★★★





### Fisherman's Calendar Watch Tells Moon Phases and Tides

Fishermen who want to keep abreast of time and tides can depend on a Swiss watch to keep them informed.

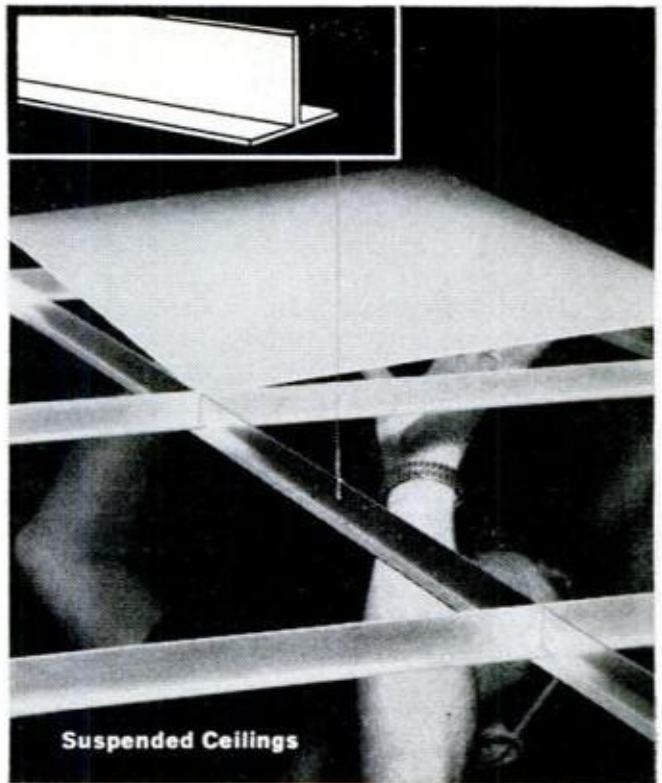
The timepiece keeps track of the day, the date, the month, phases of the moon and the measure of the tides. The moon-phase mechanism works automatically with the calendar. The moon rises in the aperture of the dial to indicate rising tides and descends with the lowering of the tides.



### Plastic Gun-Storage Envelope

Chemical-vapor disks inside a new plastic firearm-storage envelope keep a gun rust- and corrosion-free for up to two years, even in humid or salt-air climates. A draw-string closure seals the gun in a rustproof environment. The case is made for long guns or hand guns by P. W. Clough Co., 100 Main St., Newmarket, N. H.

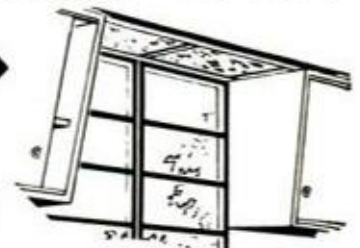
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Suspended Ceilings

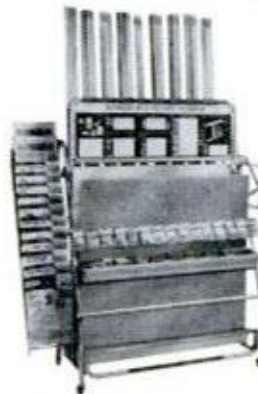
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## Learn to Ski This Summer

(Continued from page 157)

towing craft. The driver should know this and steer accordingly.

When you are tired, it's time to come in for a landing. Pick out a suitable spot that will enable you to end up in the water close to a shore, or in deep water since you should be wearing a life vest or belt and will have no trouble removing the skis and boarding the tow boat. In the latter case the boat should pick up the skier at amidships as in Fig. 10. Don't try landing next to a dock, float or boat until you can judge your free-glide distance quite accurately. At a speed of 20 to 25 m.p.h. you will glide 15 to 20 yd. after letting go of the rope. As the skis lose planing speed, you will sink slowly to a stop in the water. Avoid coming in where there are rocks or other obstructions, or where the water is less than 1 ft. deep at the end of your anticipated glide path into shore.

### Dock Start

For beginning skiers who find it difficult to control the floundering skis when starting from deep water, there is an easier way of getting up, that of starting from the end of a dock as in Fig. 6. Skis are put on while standing at the edge of the dock, after which the skier sits down and rolls on one hip to permit the skis to be swung out over the dock edge onto the water. The skier then coils about 8 ft. of tow rope in one hand while the boat moves slowly away to take up the slack. When all slack is gone, the skier shouts, "Hit it!" to the driver, who then accelerates the boat to about 10 m.p.h., faster as soon as the skier is off the dock and planing. Knees are bent slightly and arms straight out. (As if you didn't know by this time!)

For safe operation, there should be two people in the boat, a driver and an observer seated as in Fig. 12. The driver concentrates on operation of the boat, while the observer keeps an eye on the skier and relays instructions from him to the driver. Because of engine noise, it usually is necessary to learn a few hand signals as a means of communication. The following are basic ones that all skiers and drivers should learn: (1) Hand up, palm facing forward: "Stop!" (2) Hand moved in lifting motion with palm up: "Faster!" (3) Palm facing down: "Slower!" (4) Forefinger and thumb formed into circle: "Speed okay!" (5) After fall, one hand raised and waved from side to side: "I'm okay!" (6) Hand moved in slashing motion across throat: "Cut ignition!" When followed by skier pointing shoreward: "Go in for landing!" (7) Sight-

ing along edge of hand pointed in new direction: "Go in this direction!"

The electronically minded skier may want to use a two-way intercommunication system, such as that shown in Fig. 7. The skier's unit is mounted on the tow-rope handle, while the boat unit may be hand held or kept on a dash-mounted bracket.

Once the basics of skiing are learned, many skiers go on to learn slalom skiing, jumping and tricks, starting first with easy ones. A good beginners' trick is the "no-hands" ride. You do this while skiing, by grabbing the towline and pulling a crook upward in it with the right hand while in a semicrouched position. Next, tuck the handle in back of the knees with the left hand. You then must lean forward and downward slowly until the crook in the rope is pulled straight. An upright position is resumed, with hands on hips for balance, when you are riding well.

### Side Slide

Another easy trick is the side slide. It is done by turning quickly and banking the skis sharply upward at the leading edge as in Fig. 7. The skis must be kept banked or tilted until forward skiing is resumed. After these simple tricks are mastered, you may want to try some of the more difficult ones, such as the "no-hands-one-ski" trick shown in Fig. 15, or novelty type of skiing as in Fig. 18 (mixed doubles event in tournament skiing). The two skiers shown in Fig. 17, are playing a game of "joust," another type of novelty skiing. There are over 80 AWSA recognized tricks.

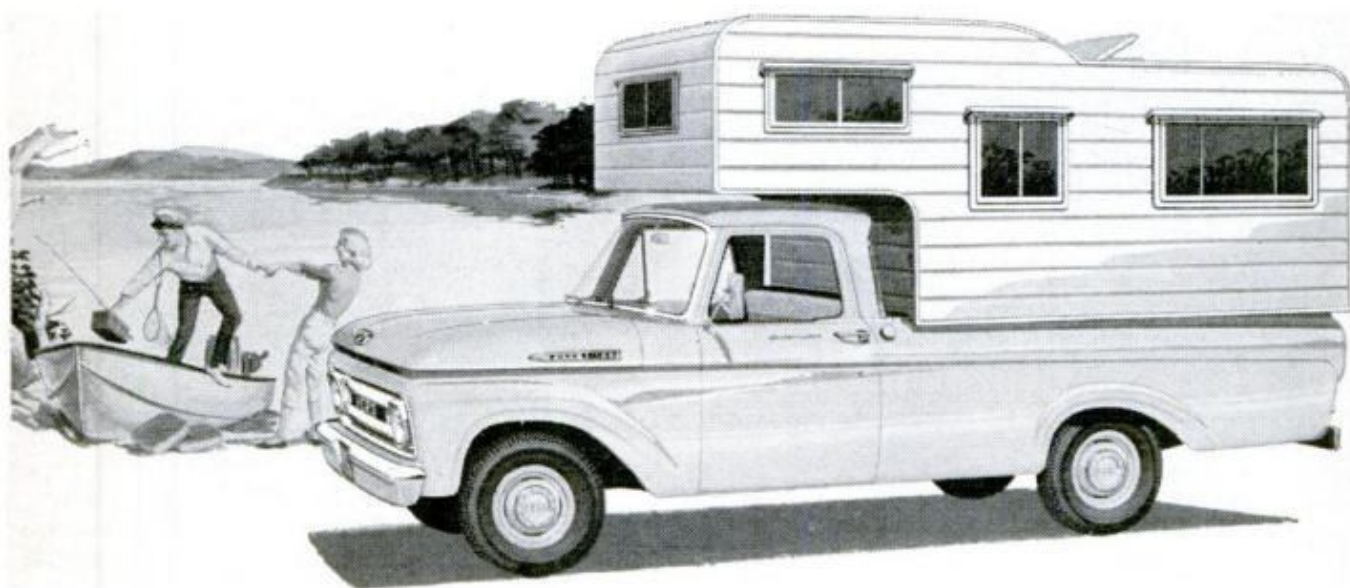
When learning to jump, it is important to approach the ramp in a crouch, keeping the weight evenly distributed on both feet for good balance. The crouched position should be maintained until after the landing is made, to make it easier to maintain balance and lessen the chance of injury in the event of a bad fall. The tow boat should pass the ramp at a distance of 20 ft. from the side and continue on a straight course until the jumper lands and recovers as in Fig. 16. Boat speed may be upped as experience is gained.

Slalom skiing, Fig. 20, is a favorite event with tournament skiers and spectators because it has all the elements of a good competitive game. There are plenty of thrills, spills and flying spray in making the sharp turns around the plastic course buoys at high speed. The course is 315 yd. long and is laid out in a zigzag pattern as shown in Fig. 19. One or two skis may be used, although most competition skiers prefer one slalom ski. This ski is fitted with an extra toe binding to hold the other foot, and a

(Continued to page 206)



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842 ELM PLACE, RICHMOND, IND.

fairly deep keel at the after end on the underside. The keel enables the skier to maintain better directional control when steering around buoys at high speed.

The fundamentals of slalom skiing are simple: place most of your weight on the forward foot and use the rear one to start the ski in its turn. Before going on a slalom course, the beginner should practice turns on open water. Start out making slow, broad turns at low speed and work up to sharper turns at faster speeds.

In addition to providing judges and certifying records of performances, AWSA is a prime promoter of water skiing safety. Before a skier can compete in a tournament event, his skis are inspected for splinters, nicks, loose fittings and sharp edges that could cause injury, Fig. 8. In distance jumping events, skiers are required to wear plastic coated, foam-rubber life jackets of the type shown in Fig. 9, which protect the back and kidneys from injury in the event of a bad fall. Life belts must be worn in all other events. Towing equipment too, must be the best. The boat is selected for its stability in tight turns and for its general good handling characteristics when towing. The pylon, to which the tow rope is secured, must be strongly made and anchored securely to the boat as in Fig. 12. Note that the rope is kept clear of the motors by means of a U-shaped bar bolted to the transom. Each towboat has a highly experienced driver and an observer. A two-way radio, Fig. 13, is used for keeping in touch with the judges' stand and to call for rescue assistance, in the event of an accident.

### Towboat Speed Control

Towboats are equipped with two speedometers, one for the driver and one for the observer. A special speed governor, diagrammed in Fig. 11, makes it easy for drivers to maintain the critical boat speeds required for various events. The governor is joined to the speedometer pickup line by means of a T-connector and is connected electrically to the motor's ignition system. This is how it works. Pressure is introduced in the speedometer's pickup system by lake water entering (forced in by speed through the water) a forward-facing orifice in a pickup tube. The resultant compressed air, in turn, exerts a force on the closed end of a Bourdon tube fitted with a contact that is capable of transmitting an electrical current as shown. When boat speed exceeds the desired rate, pressure in the Bourdon tube closes the gap between it and the contact screw, which shorts out the ignition momentarily, until speed is reduced to the set rate. ★ ★ ★



## Subway Train Needs No Crew

Built to shuttle passengers the half mile between Times Square and Grand Central subway stations in New York, a three-car passenger train runs along quite nicely at 30 miles per hour without any crew. It will even make stops, and open and close its own doors. The doors, incidentally, stay open for a minute; if a glut of passengers keeps them open longer at one stop, they close faster at the next station.

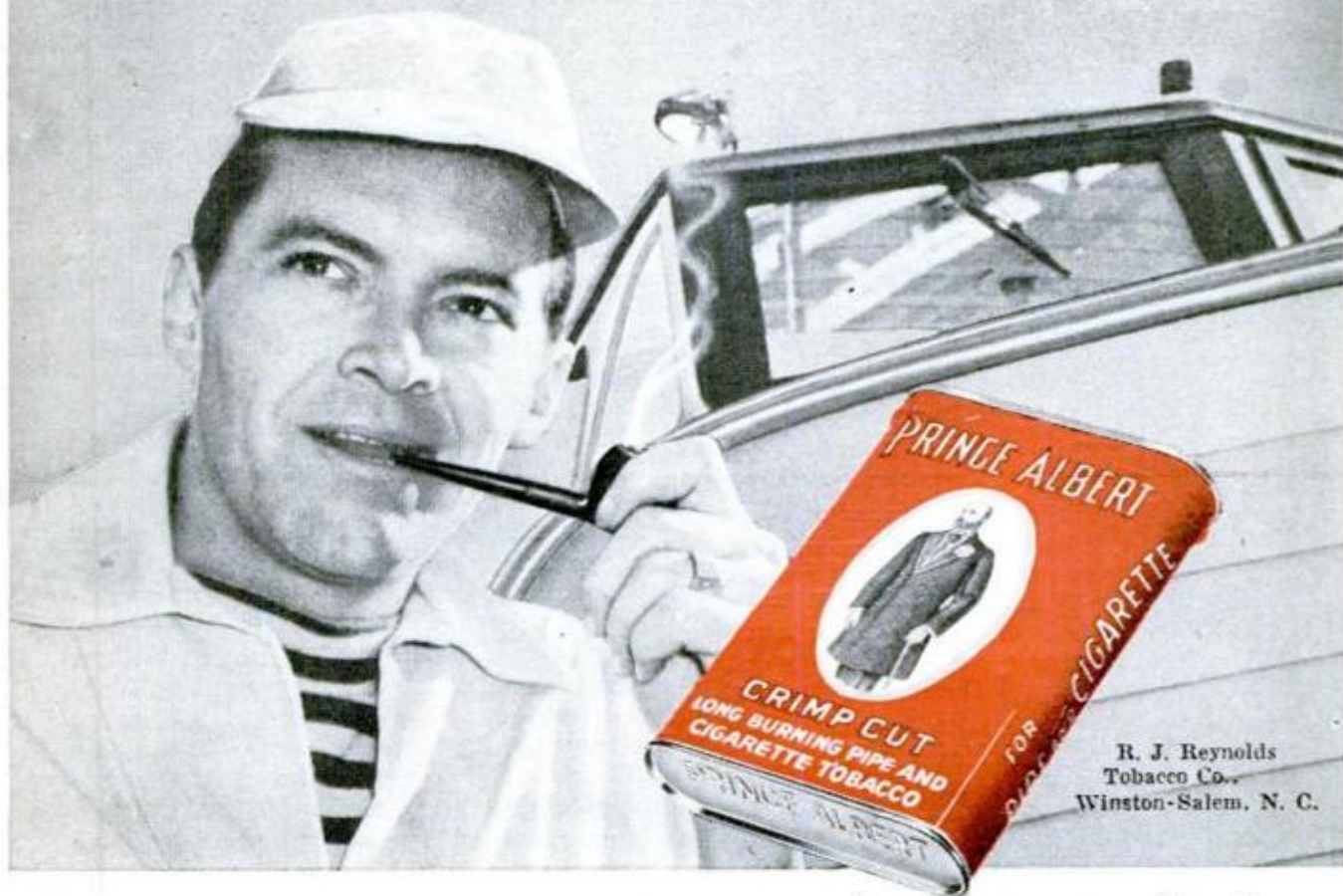
The train takes directions from electronic dispatchers at the stations. Train orders are on magnetic tape and are transmitted electronically to the running track. Listening

coils on the train pick up the orders—they come in series of electric impulses—which in turn are picked up by an amplifier in the motorman's cab (only there isn't any motorman anymore) and sent into a decoder. As impulses vary, brakes are released or applied, doors open and close, power is applied or removed. Even destination markers change automatically.

Although the train has made some 1500 test runs there will be a slight addition before it goes into use: It will be equipped with a telephone system to keep it in voice communication with human dispatchers.

*The proof is in the puffing!*

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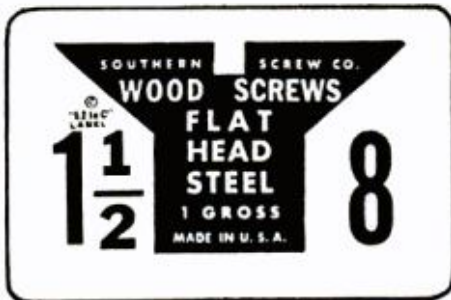
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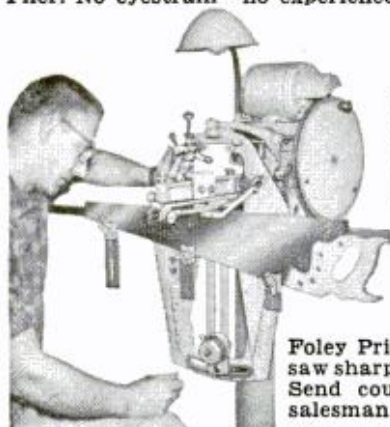
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## Hole Through the Bottom of the Sea

(Continued from page 89)

With all these handicaps, how can you rotate a drill column through a couple of miles of sea water and actually drill a hole in the sea bottom? The fact is that the drill-pipe is so flexible that the ship can move 600 feet away from over the hole without snapping or permanently bending the rotating pipe. This same flexibility protects the pipe from the bending action of currents and from the effects of Magnus lift. In normal drilling the pipe may bow toward different directions at different depths, or even take on an elongated corkscrew shape.

A 40-foot tapered guide tube under the ship and a 40-foot flexible guide tube at the sea bottom protect the pipe from extreme bending forces at these two points.

The up-and-down motion of the ship is compensated for by three "bumper subs" at the bottom of the drill column. These are overlapping sections of pipe that slide up and down on splines. The ship can ride up and over a 15-foot wave and yet the pressure on the drilling bit remains constant.

### Hollow Bit Cuts Rock Core

Several kinds of conventional rotary drilling tools have been tried, as well as a new sea-water operated turbodrill that contains 200 power stages inside a 30-foot length of pipe. The drill rotates a hollow bit that has 750 diamonds, worth \$4000, as cutting teeth. With a hole in its center, the drill leaves a central core of rock two inches in diameter. This core is hauled to the surface by a wire line inside the drillpipe.

In action, sea water is pumped under pressure down through the drillpipe to spin the turbodrill stages. The sea water then discharges through holes in the bit and returns up to the sea bottom, carrying with it the material the bit grinds away.

Before they are through the AMSOC committee expects to automate the drilling procedure, or at least to perform by remotely-controlled tools a number of operations that are now done by hand.

The program this spring began with a preliminary testing of equipment in 3000 feet of water about 25 miles off La Jolla, California, after which deep tests were made in 12,000 feet of water near Guadalupe Island off the west coast of Mexico.

Next year additional samplings of the ocean bottom at other locations are planned. Three years from now, the actual drilling of a hole to the Moho discontinuity, or through it, will be attempted, using a larger drilling rig of different type and a larger vessel for the probing of Earth's mysterious history. ★ ★ ★





## Telescoping Sprayer "Plays" Like Trombone

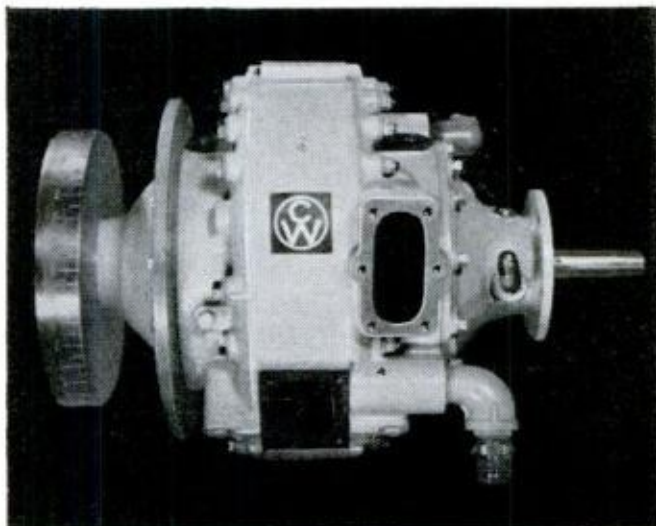
Pressure for producing a stream from this garden sprayer is obtained when the operator pulls two handles together somewhat in the manner of a trombone player. The metal tube telescopes, providing pressure for a 20 to 30-foot stream.

Liquid fertilizer or pesticide is drawn from an ordinary bucket.

Manufacturer of the sprayer is H. D. Hudson Co., 589 E. Illinois St., Chicago 11.

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## The Limit in Land Speeds?

(Continued from page 100)

another 60 m.p.h. left in his *Special*. Experts claim that this car, built more than 20 years ago, could be exhumed from its museum, put in shape and pushed past its own land-speed record today, although not by a large amount. And herein lies the significance: In the 40 years from the establishment of the first record of 39 m.p.h. to Cobb's pre-war runs with the *Railton Special* the land-speed record was increased almost 10 times. In the 20 years which have passed since then, it has scarcely been raised at all, and that by the same car! Certainly an impasse of some kind has been reached, and the mechanical problems which contribute to this impasse deserve a look.

### The No-Flywheel Stall

Hampering the piston engines has always been the speed of their parts and their ability to withstand the stresses imposed by this speed. As for the excessive engine r.p.m., this necessitated a shift to aircraft power plants as early as the first attempts of Campbell, Eyston and Cobb. In fact, having no flywheel, the *Railton Special* bedeviled Cobb by stalling when he lifted his foot from the accelerator to shift gears—at 250 m.p.h. There hadn't been an auto engine in any of the giant cars for nearly 30 years when Thompson showed up in 1959 with his four modified Pontiac units.

But Mickey faced the same difficulty at first which had dismayed AB Jenkins—a pinion gear traveling at close to 20,000 r.p.m. No bearings available could withstand the torque this produced. With typical "rodger" ingenuity, he devised and installed a separate overdrive for each wheel, which brought the final ratio down to 1.20 to 1, thus enabling a 400-m.p.h. speed from his 30-inch wheels. Cobb's car had an engine-wheel ratio of 1.3 to 1, but his wheels' diameter was 42 inches, permitting an engine r.p.m. of only 3500.

### Elliptical Tires?

Another crucial barrier has been the tires. When Sir Malcolm Campbell was driving his *Bluebird* at 300 m.p.h., the Dunlop Tire & Rubber Corp. calculated that the centrifugal stress attempting to tear the tire away from the rim at a half ton for each inch of circumference. No tread can be used at this speed, since the weight of this bit of rubber would send it whipping off the tire. In laboratory tests, without the wind of forward velocity rushing over them, the tires heated by more than 60 degrees a minute. Even on the Bonneville flats, where

the damp salt has a cooling effect, the tires on some of these cars have expanded by nearly three inches in diameter during the runs, and Sir Malcolm described them as spinning into an elliptical shape.

This expansion had to be overcome, since the clearance between rubber and shielding had to be reduced in order to provide more aerodynamic efficiency. Barely an inch and three quarters separates Thompson's tires from the body of his car. In order to insure proper use of their product, the tire companies have usually made the wheels as well, in themselves masterpieces of light metal construction. Such pride and reputation rides on these special designs that when it was erroneously reported last year in a major sports publication that one of Athol Graham's wheels had failed, causing his crash and death, a legal suit was considered against the magazine.

### Tires Are Playing-Card Thick

For Cobb's car, the Dunlop company made a tire with the thickness of a playing card. These tires did not touch the earth until they were placed on the *Railton Special* at Bonneville, and a team of company personnel walked the 14-mile course before the runs, picking up the tiniest obstruction, crushing salt bits the size of marbles to insure a perfect surface.

Donald Campbell's *Bluebird* wore somewhat similar tires last year—four-ply rayon sprayed with a coating of natural rubber. The total thickness: one-fiftieth of an inch! These tires are inflated with inert nitrogen to pressures well over 100 pounds per square inch to avoid the increase of heat which might come with any flexibility, and on each tire rests as much weight as an ordinary low-priced American car.

### Icing the Engines

The problem of engine cooling also is far removed from that of common cars. Railton's machine sported tanks which were filled with ice before each run and, even though the two Napier Lion engines burned more than 20 gallons of exotic fuel on each dash, they ran too cool for Cobb's liking. Eyston's huge *Thunderbolt* simply ignored any special cooling, and Athol Graham's *City of Salt Lake* used dry ice. With the advent of turbine engines in the second *Bluebird*, this problem has been eliminated.

Proper design of the body used in a car traveling at 400 m.p.h., is of course, critical. An improper curve of the upper surface might create a lift sufficient to raise the car off the ground, or at least destroy its traction. A similar error in the underside would suck the car downward and overload

(Continued to page 212)





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- Boat, 12-ft. runabout . . . B114
- Boats, model . . . L143
- Boats, small . . . D6
- Bobsled . . . B5
- Brake, bending, sheet-metal . . . B85
- Breakfast nook, built-in, uphols . . . D25
- Brick, tuck-pointing . . . D17
- Build-it-yourself house, blueprints . . . B47
- Build-it-yourself house description . . . D12
- Built-in furniture . . . D5
- Bunk beds . . . L51
- Burglar alarms . . . L128
- Cabin cruiser, 17-ft. . . B80
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- Campgrounds, U.S., list . . . B95
- Camping guide . . . B95
- Canoe construction, Canadian . . . L30
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- Carport . . . B19
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- Ceilings, modernizing . . . D28
- Chair, captain's, modern . . . B86
- Chair, TV . . . B92
- Chairs, lounge . . . B29
- Chevrolet manual (1950-58) . . . B26
- Chinese oven . . . D10
- Christmas cards, how to make . . . B88
- Christmas displays, outdoor . . . B89
- Christmas toys . . . L66
- Chrome plating . . . L86
- Closets . . . B23
- Cocktail table, 3-tray . . . B91
- Cocktail tables . . . B29
- Compound angles, cutting . . . D22
- Concrete block machine . . . B10
- Concrete, casting . . . B31
- Concrete, coloring . . . D8
- Concrete garden furniture . . . L6
- Concrete, guide to using . . . B10
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- Condensation, overcoming . . . D23
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- House wiring . . . D5
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- Midget jeep, motorized . . . B4
- Mirror silvering . . . L70
- Mixer, concrete . . . B14
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- Model boat, radio-controlled . . . B90
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- Model prairie schooner . . . B100
- Model ship, Half Moon . . . B99
- Model ship, Santa Maria . . . B102
- Model ship, Sovereign of the Seas . . . B106
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- Photo, timer . . . L25
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the tires. In either direction lies disaster.

What the body must do is insure that the car weighs approximately the same (exerts the same pressure on the tires) at top speed as at rest. Again, it is worth mention that when the new *Bluebird's* designers had completed their wind-tunnel tests, the camber they gave to the car was almost identical to that Reid Railton had given his *Special*.

### Jets and Turbines

With last year's runs may have come the twilight of the piston-driven cars, which eliminates even this resemblance to the standard product. Dr. Nathan Ostich's pure-jet *Flying Caduceus* (although not recognized as a car yet) and Campbell's turbine-driven jewel may encourage the trend to these new power sources. Although Campbell's *Bluebird* came to grief, its final moments showed what might have happened. In the mile and a half it traveled before crashing, the car accelerated to an estimated 365 m.p.h. This acceleration and resultant slippage probably caused England's pride to yaw and finally swerve out of control.

This emphasizes another crucial barrier: The absolute necessity for such hazardous acceleration. The Bonneville Salt Flats are the only place known on earth where these runs can even be attempted without encouraging suicide. Every person who has driven more than 300 m.p.h. has done so on these Flats and, at one time or another, owed his life to their absolutely level, hard and broad surface. Only Cobb made his runs without serious mishap, although Athol Graham was the first person to be killed in these attempts.

### Bonneville's Limitations

But even Bonneville has limits. The long straightaway cannot be lengthened to more than 17 miles under the best of circumstances, which means that the cars have a little more than 90 seconds to arrive at their top speed and the same period to come to a stop. Traveling more than 400 m.p.h., Cobb and Thompson passed through the measured mile in less than nine seconds! To bring the present *Bluebird* to a stop from top speed requires the dissipation in seconds of an estimated 75 million foot-pounds of energy. The braking and acceleration this demands has caused most of the mishaps here, but it cannot be avoided. Chutes might be used instead of brakes to arrest these huge cars, giving them more miles to reach maximum velocity, but they have not been successfully applied to record runs to date. Unless other spots are found in the deserts of North Africa, Australia or Asia,

the land-speed record must be sought on this single spot of the earth's surface and the vehicles designed specifically for its peculiarities.

Now, as these vehicles become more and more complex, the barrier of expense arises as well. The cost of the *Bluebird* was put at \$4,500,000. Most of the other big cars which ran at Bonneville could not have done so without the backing of large companies. It costs roughly a thousand dollars a day merely to keep the USAC timing crew on hand, and this must be paid by the car owner or sponsor.

Then, too, these runs must be regarded primarily as pure sport, since only a small part of their equipment has an application elsewhere. As this sport has gradually exceeded the resources of sportsmen or single companies, it will have to be supported by groups of companies, such as the 70-odd organizations which built Campbell's car, or by a nation itself for national prestige.

### The Last Barrier

There is, also, one other barrier to be overcome, perhaps the most obstinate of them all. Driving a car—or any vehicle—at this speed can hardly be called fun under the circumstances. The challenge is there, certainly, and sportsmen like Art Arfons, Dr. Ostich and the late Athol Graham rise to meet such challenges in the same way climbers tackle a new peak. But the risk is growing, the reason for the feat declining. A person does not appreciate the phenomenon of such land speed until he has seen a car rise over one white horizon, crackle mysteriously past, and disappear over the other horizon—all in a matter of seconds.

Sir Malcolm Campbell described the sensation within the cockpit thus: "It was as if the world had been reduced to a small elliptical surface, which traveled along with me. At no time could I see more than a few hundred yards down the salt."

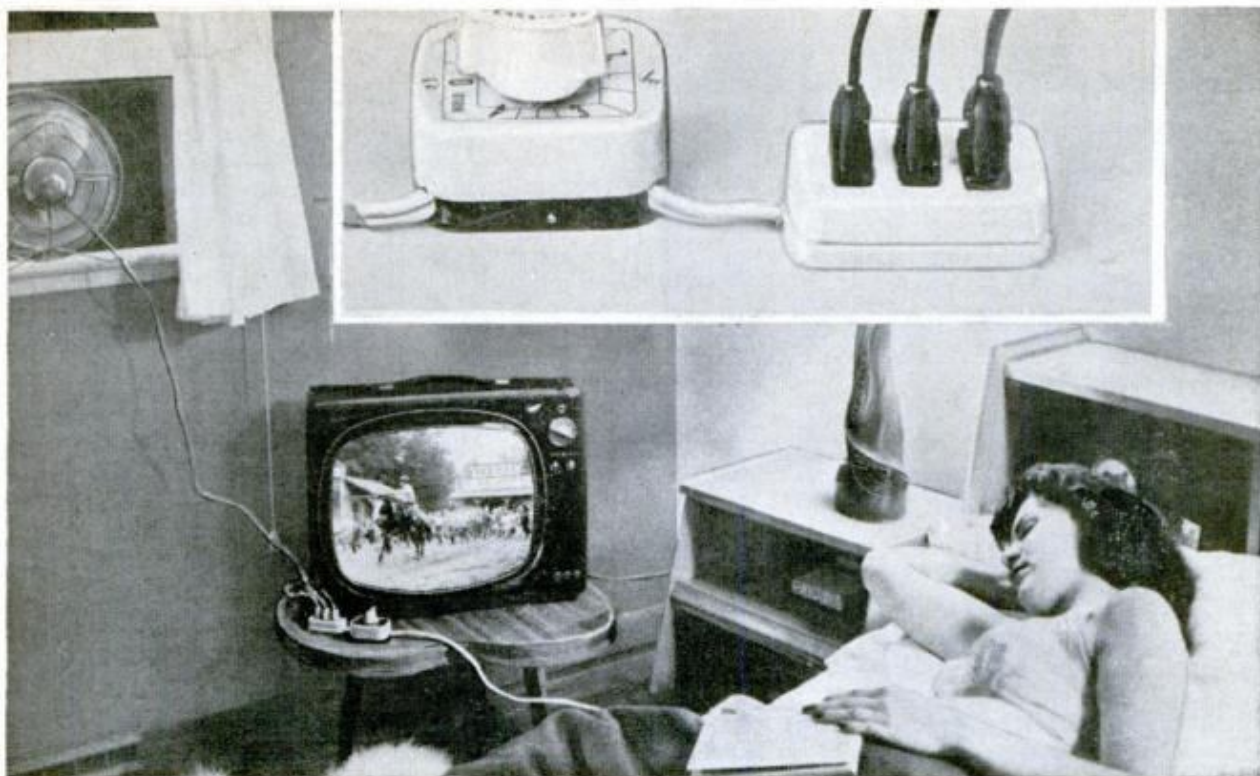
John Cobb said, "I had the odd sensation of driving up a steep hill."

Athol Graham, before his fatal run, admitted that the project had lost any enjoyment it once had.

Mickey Thompson, the most persistent and perhaps the most practical 400 m.p.h. dreamer yet, left the Flats last year saying, "Why tempt fate?"

The implication of all this is that the Salt Flats have been outgrown, in the same way that most highways have been outgrown by modern cars. Unless the course over which the ultimate auto is run exceeds that at Bonneville and the reason for making such a run is considerably sharpened, our final automotive speed record may be nearer than we think. ★ ★ ★





### Timed Extension Cord Switches Off Appliances

Plug your electrical appliances into this new extension cord, set the dial for any time up to four hours, and relax. Should you fall asleep, the timer automatically

shuts appliances off at preset time. To use as a conventional extension cord, set the knob to "hold." Price: \$6.95 from M. H. Rhodes, Inc., Hartford 6, Conn.



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### Panoramic Plastic Face Mask

Not a space man, but a hockey player, goalie Curre Anderson of the Hammarby team in Stockholm, Sweden, models a new plexiglas face mask. It is designed to protect a goalie's face from flying sticks and pucks without impairing his view of the play around him.

### Adventure Road

(Continued from page 129)

Standard specifications apply to the highway throughout Canada. The right of way is at least 100 feet wide in the country, 66 feet wide in urban areas. The road has a minimum finished width of 32 feet including 5-foot shoulders and 22-foot width of pavement, and a maximum width of 44 feet, including 24 feet of pavement and 10-foot shoulders on each side. Curves do not exceed six degrees and maximum grades are six percent except in a few mountainous areas. Sight distance gives a clear view at least 600 feet ahead. There are no tolls.

In the east the Trans-Canada Highway starts at St. John's, capital of the island province of Newfoundland. St. John's abounds in historic sites including Signal Hill, where Marconi received the first radio messages flashed across the Atlantic in 1901. From here the first trans-Atlantic flight was made in a World War I surplus aircraft in 16 hours to Ireland on June 9, 1919. Nearby are iron-ore mines and the big international Gander Airport.

### Caribou and Fish

North of St. John's the highway passes through Terra Nova National Park, a scenic and game preserve established in 1956. The highway winds past small fishing communities on the rough indented coast, turns inland through wooded areas and prime salmon-fishing country to the paper mill towns of Grand Falls and Corner Brook. This is caribou-hunting country, and fishing is good all the way down the west coast to Port Aux Basques, where the motor trip is broken by a 6½-hour ferryboat ride across Cabot Strait to Nova Scotia.

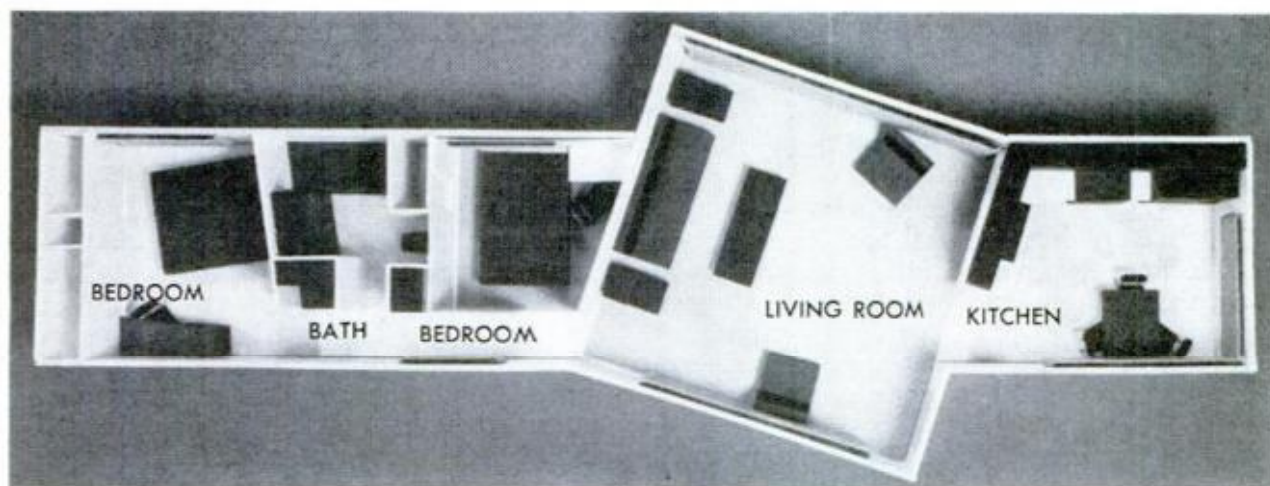
You move your watch back half an hour to Atlantic standard time when you arrive in Nova Scotia. At Sydney you will see the shafts of coal mines extending far out under the Atlantic Ocean. After crossing the curving \$23,000,000 Canso Causeway over the Canso Strait to the Canadian mainland, the Trans-Canada Highway follows the Nova Scotia coast and numerous small fishing villages to New Glasgow and Pictou, bypassing the seaport of Halifax and historic sites such as Grand Pre, made famous in Longfellow's poem, "Evangeline."

Near Pictou, ferryboats will take your car across Northumberland Strait to Prince Edward Island, a nonindustrial region with good sand beaches, fine golf courses, good fishing and the historic capital city of Charlottetown. A ferry connects at Borden to Cape Tormentine, New Brunswick.

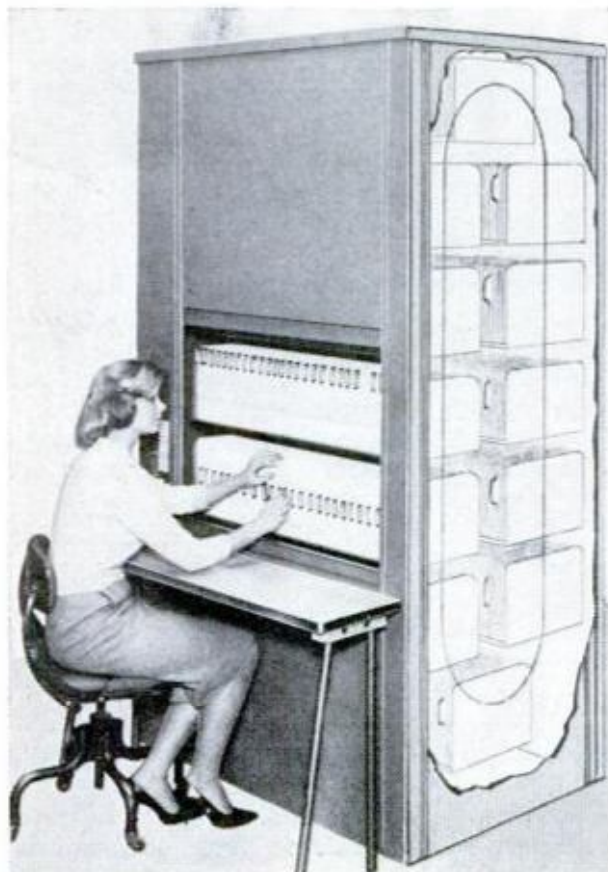
Those who do not take the side trip to

(Continued to page 216)





## Mobile Home With a Fold-Out Living Room



Ten feet wide so it can travel on highways, a new mobile home has hinged walls that swing out to form a 14 by 14-foot living room. In addition, it has two bedrooms, a bath, and a kitchen.

The unique design gives the living room a door facing forward in the middle of the trailer and allows more wall space in the room for furniture and more floor space.

The Frontier 200 is legal wherever 10-foot-wides are legal, according to Frontier Homes Corp., 102 S. 32nd Ave., Omaha, Neb.

### Shelves That "Come to You"

Rotating inside a large cabinet, motor-operated shelves save up to 50 percent of floor space and manual labor.

Since there are no drawer pull-outs, narrower aisles are permitted and, since the shelves operate with an automatic self-leveling, push-button operation, time is saved searching for the right shelf.

With up to 16 shelves, it can be operated from either sitting or standing position.

The Motorshelf is manufactured by Wheeldex & Simpla Products, Inc., 1000 N. Division St., Peekskill, N. Y.



Prince Edward Island continue on from New Glasgow to Truro, then partly along the coast and inland via the coal-mining town of Springhill to Amherst.

The highway crosses into the province of New Brunswick near Sackville, home of Canada's main short-wave worldwide broadcasting station. Then along the Pettitcodiac River to the railway and industrial city of Moncton, and westerly through rural and river country to Fredericton, capital of the province. Bypassed is the big seaport city of Saint John with its Reversing Falls caused by the tides at the mouth of the St. John River.

From Fredericton, which has a number of historic buildings and a new art gallery, the highway follows the picturesque St. John River close to the border of the state of Maine. Near Edmundston the road enters French-speaking Quebec province, and you put your watch back an hour to Eastern Standard Time.

Through Quebec the highway—although it is not officially part of the Trans-Canada—follows river and lake country to the south shore of the St. Lawrence River at Riviere du Loup, then turns southwest to numerous small farming communities long established along the river.

#### Canada's Oldest Community

At Levis you can cross the mile-wide St. Lawrence River by car ferry or highway bridge to Quebec City, Canada's oldest community which this year celebrates 353 years since its founding by Samuel de Champlain. Here on the bluffs overlooking the river the French lost Canada to England in 1759.

Back again on the south side of the river the Trans-Canada Highway strikes inland by way of Drummondville to Montreal, where you should try taking the new expressway up Mount Royal. From the top there is a magnificent view of Montreal harbor, largest seaport in Canada. There are many beautiful old churches in Montreal, monuments at historic spots where the city was first settled over 300 years ago, a great number of fine French restaurants.

Near Dorion the highway enters the province of Ontario for the next 1500 miles. First major stop is Ottawa.

Visit the Parliament Buildings, listen to the daily carillon concert from the Peace Tower, and ride up the elevator past the carillon bells to the tower's balcony, highest point in Ottawa. The parkways with their colorful floral displays follow the Rideau Canal to Rockcliffe, where Canada's Governor-General resides.

From Ottawa the Trans-Canada Highway strikes westward through lake and

forest vacation land via Peterborough to Orillia, where Champlain explored some 350 years ago. This is all excellent fishing, summer resort and camping country. At Orillia expressways lead 80 miles south to Toronto, capital of Ontario, and Canada's second largest city.

Northward the road is through the Muskoka Lakes summer resort region, then westward through hilly uranium-mining country to Sault Ste. Marie, with the north end of Lake Huron and the fishing paradise of Manitoulin Island never far away. At Sault Ste. Marie you will watch with fascination the world's heaviest water commerce through the locks.

#### Into Virgin Country

Heading north you begin the newest part of the Trans-Canada Highway, sections of which were completed late in 1960, high above the rocky shore of Lake Superior. This is virgin country where only lumbermen and trappers have gone before. There are few motels or hotels for the next 600 miles or so. You will pass through the iron-mining town of Wawa and the paper-mill model communities of Marathon and Terrace Bay on the way to the twin grain terminal ports of Port Arthur and Fort William at the western end of Lake Superior. Camping spots are being built along this route where it is well to fill up with gas at each settlement for gas pumps are long distances apart.

At Port Arthur move your watch back another hour to Central Standard Time. Nearby is Kakabeka Falls, highest west of Niagara till you reach the Rocky Mountains. The route between Sault Ste. Marie and Port Arthur-Fort William is part of a new vacation area forming half a circle tour of Lake Superior, the southern part through the United States.

Westward from the twin cities the Trans-Canada Highway threads its way through thousands of lakes to the province of Winnipeg, Manitoba. From here to the Rocky Mountains, through Saskatchewan and Alberta, are the grain-growing prairies of western Canada, a rolling treeless country where you can see for miles.

Your route is through Brandon, Moose Jaw, Swift Current, Medicine Hat to Calgary where the Rocky Mountains loom in the distance. In Saskatchewan move your watch back another hour to Mountain Standard Time. There are provincial and national game preserves off the highway where you can see hundreds of buffalo and big game animals on the range.

At Calgary, the Dinosaur Park has many stone replicas of these prehistoric animals



unearthed nearby. And here Indians and cowboys gather in July for the famous Calgary stampede.

Now the highway enters some of its scenic highspots as it leads by way of Banff through the Rocky Mountains to the Pacific coast. Mount Eisenhower, 9400 feet high, is easily seen from the road as you near Banff. Take the ski lift up Mount Norquay for scenic views of the Bow River Valley. Trails lead to many of the mountain lakes in the distance.

After leaving Banff westward you drive through roads in Yoho, Glacier and Revelstoke national parks with snow-capped mountains always in view. You can fish and camp alongside rushing mountain streams and see mountain sheep and goats on the road and up the steep mountain slopes. Black bear are common and you may even come across a grizzly, but keep your distance! Motels, lodges and luxury hotels abound here, and horseback riding is popular into areas which cannot be reached by car. Guides are available for mountain climbers. As you cross into British Columbia you drive over the Great Divide, where the flow of rivers is eastward into the prairie regions, westward to the Pacific Ocean. Here you change to Pacific Standard Time, moving your watch back for the sixth time since leaving St. John's.

### Mountains Always in View

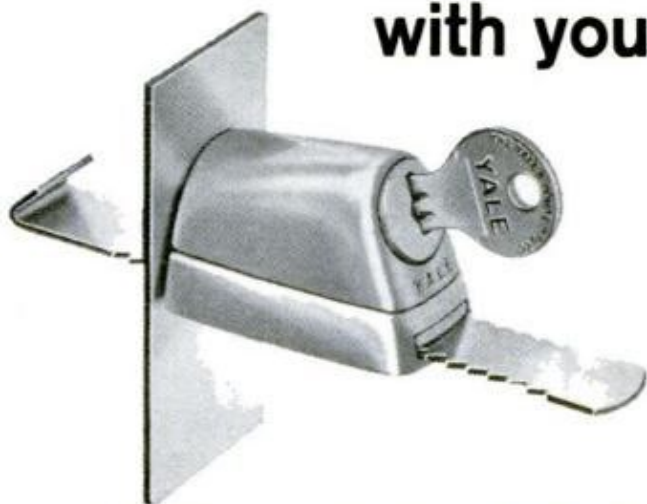
You leave the highest mountains behind at Revelstoke, but mountains are always in view to the Pacific coast. Millions of tons of rock were excavated to make the winding road down from Revelstoke to Kamloops. From here it continues westerly for some miles, then turns south to follow the Thompson River to Lytton and south along the turbulent Fraser River canyon to Hope.

Vancouver, Canada's third largest city and a major seaport, has good beaches, Oriental sections, and fine homes on the forested hills across Burrard Inlet from the downtown area. Visit Stanley Park with its magnificent Douglas fir trees, Capilano Canyon with its wooden swing bridge 200 feet above the canyon, ski lifts on Grouse Mountain for the view, and the docks where shipping from Asia predominates.

Leaving Vancouver you board a ferry for the four-hour trip through island-studded Georgia Strait to Victoria on Vancouver Island, capital of British Columbia. This is the official terminus of the Trans-Canada Highway, but you can drive for some miles outside the city through fishing and lumbering towns along the irregular coastline.

There is plenty to see along the new Trans-Canada Highway, and you can see most of it from your car. ★ ★ ★

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## Tropics on the Half Shell

(Continued from page 115)

plans on a total of 15,000 varieties of tropical plants.

To show these plants in their native habitat, the Climatron has been carefully landscaped. On the inside the Climatron has two levels, bisected along the north-south axis. The upper level topography includes a miniature mountain, with coffee and chocolate trees growing on its sides. Down one side tumbles a stream (powered by a 150-gallon-per-minute pump). A few feet away a swamp has a small jungle growing around it. A miniature rubber plantation is nearby.

On the Climatron's lower level a Hawaiian section with waving palms and pineapples is only a few feet away from a Himalayan mist forest. On the opposite side are rice paddies, lily pond and aquarium.

To put a valuation on the Climatron is nearly impossible. The structure itself cost \$600,000. Some plants are invaluable. A giant palm, for example, cost upwards of \$2000. Costly orchids are everywhere in the Climatron; other plants grow nowhere in America except in the Climatron. When complete, value of the plants alone will be up in the millions.

### A Dozen Pocket Climates

Because tropical plants are extremely sensitive to even slight temperature and humidity variations, the Climatron duplicates a dozen different tropical climates ranging from steaming jungles to cool mountains. Some areas in the Climatron have warm days and cool nights, other parts have hot days and hot nights. One section is damp and muggy all the time; a few feet away it is comparatively dry.

Keeping these many climates under close control is complicated by the sun blazing through the transparent dome, blistering Saint Louis summer temperatures, subzero winters and the complete lack of any partitions inside the Climatron.

The solution to this temperature and humidity problem is two separate air-conditioning systems—one for heating (to simulate solar heat gain in winter) and one for cooling the 1.3-million-cubic-foot structure in the summer.

The heating system moves air from the south side of the Climatron to the north; cooling air moves from the west to the east. By careful control the two systems maintain the required temperature and humidity for every part of the Climatron.

The air intakes have atomizer sprays for additional cooling by evaporation and for adding humidity to certain areas of the

Climatron. Depending on temperature and humidity requirements, water temperature can be varied from 50 to 180 degrees.

Brain behind these complex air-conditioning systems is a Honeywell DataCenter at the front entrance. Using 10 Honeywell thermostats and humidistats at various points in the Climatron as "nerves," the DataCenter "brain" automatically controls fans, dampers, valves and sprayers to maintain the proper climate in each area of the Climatron. Because certain areas require different temperature and humidity settings at night, the DataCenter automatically changes them during the evening. An override switch can provide up to 11 hours of "daytime" climates during the "night" setting if necessary.

The entire complex of air-conditioning equipment is controlled automatically by the DataCenter. Entirely unattended, the DataCenter regulates the two air-handling systems to maintain the dozen interior "climates." And it does this so effectively that visitors can tell when they leave one climate zone and move into another, even though there is almost no perceptible movement in the air around them.

### Bad Weather by Push Button

Besides controlling the two air-conditioning systems, the DataCenter does much more. One push button turns on manmade rainstorms from an overhead sprinkler ring 40 feet up to water the plants and add humidity to the interior. Another push button turns on 100,000-watt floodlamps inside the Climatron.

The striking Climatron is the first phase of a master redevelopment plan for the century-old Shaw's Gardens in Saint Louis, left to the city by millionaire Henry Shaw.

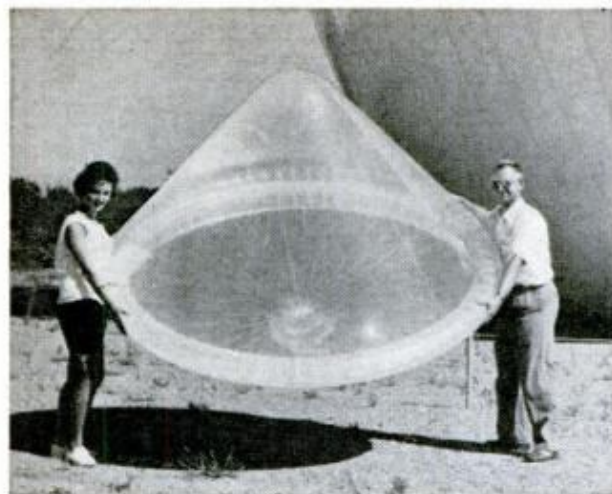
During the coming century, the gardens will display plants from the entire world simultaneously, ranging from tropical to arctic vegetation in bloom on the same day. To do this, the directors plan additional greenhouses based on the Climatron design—the world's first air-conditioned greenhouse system. ★ ★ ★

### QUOTE:

*"An appalling number of citizens believe that it is up to the scientist to make the [moral] judgment, as though he had an especially valid set of values. This leads to an abdication of the right and responsibility of every man to participate in forming the fabric of society. A more cautious use of the phrase 'Science says . . .,' a more temperate view of the authority of science is necessary."*

DR. POLYKARP KUSCH, Physicist  
1955 Nobel recipient





## Inflatable Solar Collector

Rocketing into space in a canister the size of a teacup, a solar collector will billow out to a conical shape with a metalized Mylar reflector that is seven feet in diameter.

The sun's rays striking the reflector are focused onto a collector. These rays will be transformed into heat energy which then may be used to power various electrical and mechanical instruments in space.

Under tests by the G. T. Schjeldahl Co., Northfield, Minn., the collector is held to precise dimension by a rim inflated to five pounds per square inch of pressure.



JULY 1961

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R50 Pulls 50 lbs. (3 x 3 x 2 1/2 in. wt. 38 oz.)	\$3.95
R75 Pulls 75 lbs. (3 x 3 x 1 1/2 in. wt. 42 oz.)	\$4.95
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H20 Hobbyist Assortment 12 valuable "odds & ends" small magnets	\$2.00
W35 Welder's Magnetic Positioner Block (2 x 2 1/2 x 2 1/2 in. wt. 2 1/2 lbs.)	\$3.75
S10 Ring Magnet (2" OD, 1" ID, 1 1/4" L. wt. 1 1/2 lbs.)	\$1.95
M30 Hot Pad, Bulletin Board, Multi-Purpose (1/4 x 1/2 x 3/4 in.)	10 for \$1.00
C40 Self-Adjusting Magnetic Cabinet Door Latch	3 for \$1.00
P50 Pen-type, Handy Magnetic Pickup Tool	3 for \$1.00

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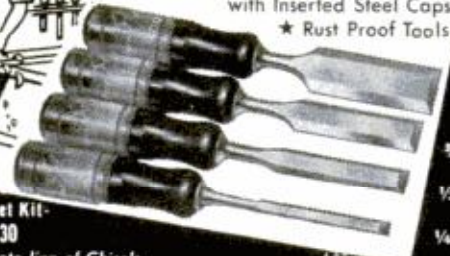


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3/4" - \$2.70  
1/2" - \$2.40  
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RIVERLIN WORKS MILLBURY, MASS.

# Survive in the Wilderness?

*We did for weeks — with no advance warning and only 10 minutes to get everything we would need for ourselves and our four-year-old son. In the August issue of PM, we'll tell you all about our adventures.*

*The Tinsley Family*

## Working the Superhot Lines

(Continued from page 111)

and guided it into place with his body. As the pole was being maneuvered it glanced against a live wire above. The lineman was killed instantly. The "juice" had flowed from the wire, through the wooden pole, through his body and into the ground.

"In almost every case where a lineman is killed," says Zehren, "the fellow just didn't use enough safety devices. There's always plenty of everything on the truck. But it's human to take short cuts."

Among life-saving items used by linemen these days, besides gloves, are: rubber line protectors that look like rubber hoses with a lengthwise slit, rubber boots and sleeves, rubber blankets that are thrown over such large dangerous areas as transformers and insulator banks, and insulating hard hats that can withstand the impact of eight pounds falling five feet.

Most crews today use walkie-talkies to coordinate efforts among the men strung out along a line.

But a lineman still uses the old safety strap. He wraps it around the pole when climbing and around crossarms—just in case—when he's at the top. These straps used to be made of leather, however. Today they are made of nylon impregnated with rubber. The center layer is brightly colored so that it's easy to tell when the belt has worn and needs replacing.

### Space-Suit Smocks for Manholes

For complete insulation in manholes, where live wires surround you, Pacific Gas and Electric Co. linemen last year began to use asbestos smocks and hoods. Looking much like a space suit, each has a plastic window in its hood. Recently wearing one saved a lineman caught in the fiery arc between 4000-volt hot lines that he was disconnecting. In similar situation, a man who didn't use his smock was killed.

In wide use now is the hot stick, which is "must" equipment for working with high-tension lines. Hot sticks are made of laminated wood, plastic coated for insulation, and are six to sixteen feet long. Attached to the end of these sticks are any of a host of metal tools—clamps, prongs, etc.

Working a hot stick takes a good eye and strong, steady hands. Imagine, for instance, winding a jacket of aluminum armor rods around a wire. You'd be moving the business end of the tool only fractions of an inch from at least six feet away. In fact, the minimum length for hot sticks on the Appalachian Power Company's 345,000-volt lines is 12 feet!

(Continued to page 222)





## Housing Muffles Engine Roar

With its engine quieted by a large muffler and enclosed in a low-silhouette housing, a gasoline-powered lawn mower gives off only a muted tone as it operates. The hood tilts back for easy access to the three-horsepower four-cycle engine. Among the mower's other features are a recoil starter and height-adjusting levers on its wheels. Side panels of the deck are aluminum alloy; the center sections are steel. The Quiet Turf-master is manufactured by Dille & McGuire Manufacturing Co., Richmond, Ind.

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AMERICAN  
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**NEW AC SHOP TYPE WELDER**, the 180 amp. "Hustler" welds, cuts, burns holes, hardsurfaces and heats metal for bending and forming. Comes complete with accessories. Meets REA requirements.

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### FISH & WORM SHOCKER

**ITEM #670.** Harvest worms, clear private ponds of coarse fish. Powerful 110-v AC hand geared generator creates powerful electric field in ground or water. Amazing results. Also fascinating for experimental — use for fun at parties. Has Super-Alnico magnets. Govt. cost over \$12. **SALE...\$3.89** Ppd.

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**FREE  
BIG 1961  
CATALOG**

Save to 70% on  
1000's of Surplus  
and New Equip.  
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GUARANTEE  
ON ALL ITEMS**

### SPECIAL OF THE MONTH

#### HYDRAULIC SPEED REDUCER

**ITEM #1304.** 1½ hp variable speed hydraulic transmission. Variable speed 0 to 350 rpm. Instantly reversible. Ideal for lathes, midget cars, etc. Roller bearings, and complete with 3-phase 220-v AC ball bearing motor. Size 21" x 9" x 20". Wt. 200 lbs. Output shaft 1" diam., 2" long. Govt. cost over \$1,000. **\$89.50 FOB** SALE.....



#### ELECTRIC CAR MOTOR

**ITEM #576.** Powerful gear motor. Hi torque. Build boy's car, golf cart, winch, elevators, etc. Runs on 6 or 12-v battery. Reversible. Gear ratio 33 to 1. 100-150 rpm. Ball bearings. Shaft 5½" diam. Size 15½" x 5¼". Wt. 30 lbs. Govt. cost \$295. **SALE.....\$18.99 FOB** Reversing switch for above motor—\$3.50 FOB



#### STANDARD DIAL PHONE

**Item #716.** Genuine W.E. modern, hi-efficiency dial phone. Use for extension to main line on private system. Use several for complete private system. Work on any system. Shipping wt. 8 lbs. Cost gov't. \$29.50. **\$8.49 FOB** SALE.....



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LINCOLN, NEBR. DEPT. 809

## JOINT AND SHARPEN ALL SAWS

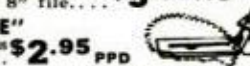


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**PAINT BRUSH HOLDER**  
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**CRAIG-CRAFT, Tonawanda 1L, N. Y.**



But this is why hot sticks are used: they keep man and wire at a healthy distance.

Linemen actually never wear insulating gloves to handle hot sticks. The reason is that in time (especially in wet weather) the insulating qualities of hot sticks break down. If you handle them with bare hands you can feel tiny warning tingles when the break-down begins, and replace the sticks. If you use gloves, you feel nothing until the sock of full current hits you when the break-down is complete.

The latest hot stick is a telescoping glass fiber one that stretches from 4 to over 28 feet. The whole stick weighs only seven pounds and is being used by linemen in Louisiana, Ohio, and Washington, D.C.

Glass fiber is both strong and an excellent insulator. One of the lineman's newest pieces of equipment, in fact, is the glass fiber aerial bucket on the end of a knife boom. These booms can reach as high as 65 feet, and will soon go to 100 feet. They eliminate the need for linemen to climb shorter poles and are invaluable for working on lines between poles.

These aerial buckets, in fact, are what make the bare-hands technique possible, by borrowing an idea from the birds.

Birds can rest safely on bare power lines because as long as they touch only that wire they're at the same electrical charge. Until aerial buckets, there was no way to completely insulate lineman from ground. Remember, even a wooden pole is a conductor. And newer lines use metal towers.

### Charging Up the Linemen

To keep the lineman at the same charge as the line on which he's working, the bucket is lined with ordinary metal fly screening which is clamped to the hot line. Touching the line with his hands is then only a formality.

"It seems a reckless folly," says Harold L. Rorden, American Electric engineer who developed the bare hands technique. "But it is not essentially different from being at ground potential and insulated from all other energized conductors."

Rorden worked with Whitey White on the new technique in the laboratories of Ohio Brass Co. in Barberton, Ohio. They started at 4000 volts and went up to 380,000. In the field they replaced an insulator and armor rods on the 34,000-volt line that feeds Whitey's home. Then they spliced a line. Next they repaired two 138,000-volt lines between Fostoria and East Lima that had been damaged by rifle bullets, probably from a hunter. (Besides hunters, kite and model-airplane flyers, drunk or sleeping pole-hitting motorists and weather are the lineman's chief enemies.)

The new technique allows the lineman to work in the best position (close to what he's working on) with more freedom of movement than ever. What's more, the new method saves time. Where it normally takes 10 hours to change a 34,000-volt insulator, Whitey and a companion did it in one hour.

Rorden estimates that the bare-hands idea can be used in up to 80 percent of today's hot-line jobs.

### A Creepy Feeling

How does it feel to bare-hand a hot line? Explains Whitey, "You get a creepy feeling, sort of like when you take a wool or orlon sweater off in the winter." This is because high-voltage lines are surrounded by static electric fields. Men using hot sticks, who get a similar feeling, are beginning to wear conducting shoes to avoid it. To eliminate the feeling the metal screening is now extended to form a cage surrounding the lineman's head and shoulders on three sides. It will be used on lines over 108,000 volts.

Another phenomenon of high-voltage lines is corona, an eerie glow that can light wires up for miles. In the lab, Rorden proved that the corona around his hand on a hot line was only show: there was no feeling or danger. The new head-and-shoulders cage will prevent it, though.

Another trick is helicopters. For several years now power companies have used "whirly birds" to inspect lines, spread weed killers and fly linemen into isolated trouble spots. Now they've been used to hoist, haul and place towers for new lines. Installation time is cut by a third.

But no matter how mechanized or automated the power business becomes (some companies now use electronic computers to detect trouble), the man who gets up there and fixes the lines will never be replaced.

And for him, no matter how hot the line or he-man the job, there is only one philosophy to live by: keep a cool head, don't be a hero. The fussier you are, the greater the odds you'll live to an old age.

After all, there's nothing like fresh air, outdoor work. ★ ★ ★

---

### QUOTE:

*"The dial telephone was invented by an undertaker, the safety razor by a traveling salesman, the pneumatic tire by a veterinarian and color film by two musicians. . . . It is the nonconformists who make innovations. A society of ants is efficient and orderly. It is not creative."*

LYNN A. WILLIAMS, President  
Anocut Engineering Co., Chicago



# STUCK



## REEL?



**QUICK!** Set it spinning like new with a few drops of 3-IN-ONE, the perfect oil for lubricating, cleaning, preventing rust.

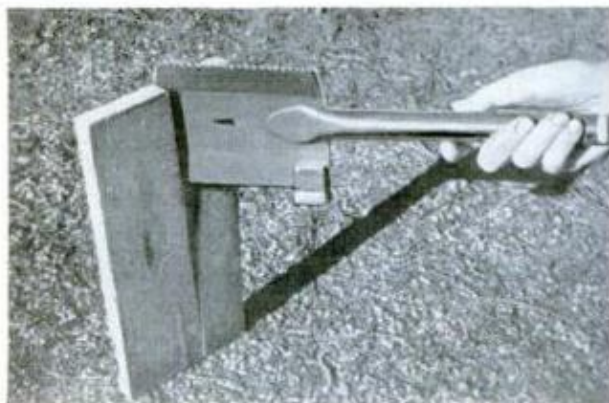
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If it's worth painting  
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### Six-In-One Camping Tool

Combining six often-needed implements into a single 16-inch unit, a new camper's combination tool is a spade, hatchet, saw, hammer, nail puller and cap opener. It's compact enough to fit in a pack, or can be carried in its own leather holster. The tool sells for \$5.95 and is imported by Designs Modern, Box 4111, Carmel, Calif.

JULY 1961

# DIAMALLOY

## BIGGEST PLIER MADE!



This Diamalloy Groove Joint has jaws that open to 4 1/4 in. with parallel jaws... wide enough to take in a 2 in. pipe union. Yet it's light, strong, quickly adjusted—an amazingly handy tool. Ask for this new HL116P plier at your favorite hardware dealer or supply house. "There is nothing finer than a DIAMOND". Made in the U.S.A., and only by

## DIAMOND TOOL

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For free tool booklet, write your name and address on margin below, clip ad and mail to manufacturer.

223



## Owners Report on the F-85

(Continued from page 78)

"Not enough room for a six-foot man."—California retiree.

"Front seat is too short fore and aft and too low."—Kansas engineer.

**He's right, it is too short front to back for long-legged drivers who also need either higher seat or one moved further back.**

"Front seat needs to be back more."—Texas salesman.

"Shift lever travels too long and it is very hard shifting from low to second."—Pennsylvania lab. technician.

"The gear shift is very stiff in cold weather—almost impossible to shift from low. Over-all the F-85 is a wonderful car. Possibly many of my complaints could be rectified by a good service department. I have had the car in the shop, but since this is the first year for F-85, no service department has the patience to cope with the difficulties."—Maryland office manager.

**This is a good point. It always takes longer to diagnose a new ailment on a new "patient." If factory could only check out and "prep" cars more thoroughly before they're shipped, dealer's service departments would not be swamped.**

"Manual shift too awkward—too far between gears with too much stiffness—cars 15 years ago were much better."—New Jersey serviceman.

*Now, for a bit more applause, here are the best-liked features ranking seven through twelve.*

"I can park in such a small area."—Mississippi professor.

"Parking is extremely easy. I think this is the one feature I like the best."—Virginia housewife.

"Gas mileage is 21.5 over-all. Car runs well on regular gas."—Pennsylvania steel worker.

**His kind of mileage is possible on well-tuned stick-shift F-85 with its 3.08 to 1 axle ratio—if you drive conservatively.**

"The economy has cut my running costs almost in half over my other car."—Minnesota engraver.

"Most of all it is very economical—17 to 21 miles per gallon."—New Jersey salesman.

"When doing 60 to 65 miles per hour, she holds the road nice, even on sharp turns."—New York bus driver.

**Well . . . not quite like a sports car, but if the seat suits your shape you can really roll up the miles in comfort.**

"Hugs curves like a sports car. No strain on driving long trips."—Washington chemist.

"Wider view of road due to lowness of body and shorter hood."—Michigan bookkeeper.

"Good vision all around."—Illinois office manager.

"Steering very good due to less weight up front with aluminum engine."—New York engineer.

"Steering is very good without power steering."—Illinois realtor.

**More rips in the silver lining—here are complaints numbering seven through twelve in mentioned frequency.**

"Hard to keep rattles out—required several trips to service station."—Kentucky retiree.

"Rattle in rear suspension. There is now supposed to be a factory fix for this, though they haven't taken care of it yet."—California executive.

**One of PM's test cars had a similar problem.**

"The only change I would like to make would be to exchange those silly red lights on the dash for gauges."—New York engineer.

"Wind noise of wing windows at high speed."—California electrical engineer.

"Much greater appeal if roof were raised, say four inches."—Texas insurance man.

"Wheels too small. Can't enter without knocking my hat off. Not so with the Tempest which has 15-inch wheels, raising it two inches higher off the road."—Connecticut air-traffic controller.

**A cheap "fix" for this problem is to duck your head two inches.**

"Poor paint job."—California teacher.

"Assembly defects. It seems poor business to spend a lot on advertising, engineering, styling, and then to throw a car together on the assembly line."—Virginia surveyor.

**Here is one of the great ideas of western man; the auto executive who licks the problem of quality control can pretty well write his own ticket.**

"An annoying hum from the transmission, driveshaft, or rear end."—Florida technician.

"There was excessive drive noise which has since been corrected."—Michigan engineer.

*Now back to the compliments—more items on the positive side with best-liked features ranking thirteen through eighteen.*

"I appreciate the F-85's smooth, quiet engine."—Alabama engineer.

"The car rides smoothly and is very quiet, solid and doesn't have any squeaks."—Kansas farmer.

"I like the lightness of body and solid feel."—Ohio office worker.



*It's a unique and pleasant sensation, this combination of light-car responsiveness combined with heavy-car solidity.*

"The aluminum V-8 is a tribute to Olds engineers."—New Jersey serviceman.

"The engine is powerful and gives a quick response."—Texas bank examiner.

"Superior body style and interior fabric, dash and rear seat design."—California salesman.

"We like the rear section of our station wagon, and the way it opens. With no tailgate, you load up much easier."—California insurance man.

**We agree. However, you'll find it's troublesome to ride with tailgate open.**

"I like its comfort and the quality of furnishings."—California purchaser.

*To top off the owners' commentary, the last of the gripes, numbering thirteen through twenty.*

"No dome light when opening the door."—Florida secretary.

"Has bad steering characteristics in heavy winds."—Iowa telephone man.

"Door locks are not visible from a normal standing position."—Illinois engineer.

"Motor supports are not rigid enough, allow the motor to vibrate too much."—Texas farmer.

"There's a vibration around the transmission I can't get rid of."—Arkansas mechanic.

**It may well be the drive shaft which turns out to be the biggest cause of vibration complaints by far.**

"Power steering too sensitive."—Massachusetts executive.

"Turning corners requires much windmilling of steering wheel."—Missouri cartographer.

"A two-speed windshield wiper would be an improvement."—Florida engineer.

"Top of windshield should be a few inches forward so head would not hit sun visor. I am six feet, three inches tall."—Florida foreman.

"The gas tank hangs mighty low. Suggest it be placed in the fore part of the trunk over the rear axle. I wonder how much protection these bumpers are, up against the body?"—Iowa inspector.

**He's got a good idea. With gas tank forward, over rear axle hump, spare could sit below trunk floor, give larger, more accessible trunk. As for the bumpers, see below.**

"Bumpers do not protect corners of car. I have received damage to rear body and taillight when parking."—New Jersey engineer.

*That wraps up the pros and cons as culled from reports of brand-new owners on a brand-new car.* ★ ★ ★

JULY 1961

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## Science Takes the Measure of Man

(Continued from page 119)

this, the Air Force scientists literally started at the bottom. Through a pediscope, which is a glass-bottomed seat with an angled mirror under it, they took photographs showing buttocks pressure points.

Using a stereoscopic three-dimensional photographic technique, the scientists took a series of photographs after stippling their subjects with paint to provide contrast. This stippled effect brings out the body's contours and, with the aid of a special viewer, allows maps to be made of the body, its diameters, surface arcs and areas, circumference shapes, proportions and volume.

With anthro-photogrammetry, six mirrors are used to record simultaneously on a photograph the top, sides, front and back views of one man, revealing his special physical characteristics and shape.

### Man's Center of Gravity

Another important device is the chair-on-a-swing used to measure a person's center of gravity. Using a plumb-line principle, the chair containing the subject is suspended and the plumb line is drawn on a cardboard attached to the side of the suspension frame. Changing the point of suspension several times and drawing the resulting changes in the plumb line, the scientists obtain a point where the lines cross for the individual's center of gravity.

Among the older anthropology measuring instruments is the common X ray. Internal photographs are used for studies of the mobility and flexibility of the body.

Air Force scientists also devised special measuring boards for measuring height, breadth and reach. Tapered rods were adopted as gauges for hand grip inside-diameter measurements. Boards with holes of various sizes were developed to obtain finger-diameter standards. Wooden rings were constructed to determine a standard helmet size that would fit any man's head. Although 8½ inches is the standard today, the testing continues to record any further changes. The anthropologists' "tool chest" also includes standard torque wrenches and strain gauges for measuring grip strength.

All these factors are added together and form the gigantic slide rule used in designing future aircraft and spacecraft crew stations, space clothing that is both protective and flexible and easier-to-grasp handles for tools, luggage and appliances. They already are being considered in the design of civilian clothing, tools, luggage and perhaps even your chair of tomorrow. ★ ★ ★



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## Safety Glass

(Continued from page 70)

the switch-over to tempered glass in vents and side windows. And even Cadillac is using some tempered glass in rear-window vent panes.

This changeover, it must be emphasized, is in accordance with the letter of the American Standards Association's safety code, which permits the use of either type of safety glass, although requiring different types of impact tests for each.

Many state statutes, however, specify that "safety glass" shall mean any product composed of glass so manufactured, fabricated or treated as to substantially prevent shattering and flying of glass when struck or broken.

It is here that the car owner might ask: "What's going on? I thought I was paying for shatterproof glass when I bought my car."

Because this question has been asked by many consumers, the Federal Trade Commission recently persuaded manufacturers to use the clearly understood labels, *Laminated Safety Glass* or *Solid Tempered Safety Glass*, on windows of cars produced after current inventories are exhausted. And the American Standards Association itself, on April 25, 1961, appointed six task force groups to conduct studies of glazing materials used in automobiles, in terms of injuries caused by or involving glass, fracture characteristics on impact, energy absorption, visibility performance, durability, and exit problems relating to auto glass.

"Since both laminated and tempered safety glass are used in motor vehicles, both will come under this scrutiny," says Arthur S. Johnson, chairman of the American Standards Association's Sectional Committee on Safety Glazing Materials. Specifically, this Committee, after studying the research reports from their task-force groups, will reconsider the existing standard for safety glass approved in 1950, and up-date it if necessary.

This new research effort is welcome news for the American consumers, for there are many questions about each type of glass that have not been satisfactorily answered.

PM hopes that wide publicity will be given the results of the research, for it is patently unreasonable to deny the customer's right to know exactly what he is paying for, or to refuse him the option of intelligently choosing between the two products at their respective prices. At this writing, in fact, one major auto manufacturer is reported to be considering providing just such an option.

In the interest of public information, a summary of pros and cons should begin by

stipulating that the perfect automobile glazing material is yet to be developed. As the ASA code puts it, "since accident conditions are not standardized, no one type of safety glazing material can be shown to possess the maximum degree of safety under all conditions, against all conceivable hazards." Conceding that, the following points are pertinent:

1. Both laminated and tempered auto glass withstand the impact of most objects hitting them. Laminated resists small, sharp objects better; tempered has much more resistance to large blunt objects. Thus a ½-pound steel ball will crack laminated glass after a free fall of two feet, but it takes a 15 to 16-foot drop to fracture tempered glass of equal thickness. But one laminated sheet stops a falling dart missile which will go through three separate tempered panes of standard windshield thickness.

### Window-Smashing Report

EDITOR'S NOTE: PM's own window-smashing experiments would seem to bear this out: Twice in succession, laminated windows were broken by one blow of a small steel ball. But the first steel-ball blow of equal force against the center of a tempered pane failed to break it; a second blow near the edge of the same tempered pane shattered it. In a second test of tempered glass, it took six successive blows, directed against various points of the window, to break the glass. But when a steel punch was substituted for the steel ball, a third pane of tempered broke on the first blow.

2. Laminated glass rarely if ever breaks of its own accord. Tempered glass sometimes appears to shatter spontaneously—even on the dealer's shelf. Even some of tempered glass' backers concede that sudden temperature changes can trigger shattering, but they maintain that this can only happen when the tempered surface has been previously damaged by scratches or abrasions.

DuPont studies indicate that the strength of tempered glass "varies tremendously from piece to piece." Yet a Ford Motor Company report states that "variation in quality and uniformity applies more to laminated than to tempered glass" and "the behavior of tempered safety glass is much more evenly predictable and its quality is virtually uniform throughout any normal temperature range."

In a slap at laminated glass, Ford's report notes that "the laminate becomes brittle as the temperature drops below freezing and soft and weak as the temperature rises." Chrysler tests show that very low (-15° F.)

(Continued to page 230)



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or high (120° F.) temperatures can decrease by one to five feet the height needed to break laminated glass with a falling ball or shot bag. Yet DuPont studies show that laminated glass does a more effective job of stopping small, sharp missiles than tempered glass, even at 0° of 120° F.

3. Both tempered and laminated glass have been said to weaken with age and weathering, but conclusive studies on this point are not readily available.

4. Tempered glass' 10-to-1 greater resistance to breakage by rounded objects has led its opponents to claim that its use creates the danger of skull fracture. An analysis of 300 accidents in Great Britain, where tempered glass is widely used in windshields, does not support this claim. Not one example of head injury (other than bruising) caused by impact with tempered glass windshields was observed.

### The Problem of Escaping

Without a sharp instrument, you might have a hard time breaking or pushing out an unbroken tempered glass window with your hands or feet, in the event your car doors were jammed shut in an accident. Defenders of tempered glass answer this by pointing out that the windshield of your American car is still laminated glass, and presumably this could be broken and pushed out to allow you to escape (one automotive engineer claims he has the scars to prove that this can be done). This assumes, of course, that the windshield has not been blocked in a head-on collision.

5. Claims have been made that a loud explosive sound accompanying the breakage of tempered glass, coupled with the flying glass fragments, might startle the driver into losing control of his car. DuPont studies show that when tempered and laminated glass are broken with a two-pound ball, the sound accompanying the tempered glass break "is not only of greater amplitude but also of greater duration." Ford studies, on the other hand, note only a small difference of 1 in 100 decibels.

*The ears of PM's glass breakers could detect only a slight difference. With either type of glass, the sound of the window being hit and breaking could startle the driver.*

6. Laminated glass is slightly more expensive as original equipment; tempered's relative replacement cost is hotly disputed. But reports from Canada, where tempered glass has been long and widely used in sidelights, show that the replacement rate for tempered sidelights is only 10 percent of the rate for laminated sidelights.

While laminated can be cut and installed in the field, tempered must be made to size at the factory, then supplied to the field for

installation. If car manufacturers follow an expected trend toward attaching such things as vent window hinges through the glass before tempering, it may be difficult to replace tempered with laminated even if the owner wishes to.

There's also the problem of replacing laminated glass in the same channel used for a tempered light which has been broken. Neal Rubin and other experts from American Glass Company of Chicago, who helpfully assisted *PM* in replacing several broken sidelights, point out that a firm fit between the tempered window's channel and the laminated window replacing it is very difficult to obtain.

### Are Code Changes Needed?

Obviously, there are important disagreements which need to be resolved by the task-force researchers of the American Standards Association. And safety codes written to cover the cars of yesteryear, with their small flat windows and windshields, should be searchingly reexamined to make sure they adequately protect the modern car owner, surrounded by a "greenhouse" consisting largely of broad and wrapped around expanses of glass.

Not only are today's glass areas far larger, but they may also be less firmly framed, due to the vogue for wider doors and thinner doorposts, and the sweeping popularity of the "hardtop" design. Yet, in the face of this change, there has been a trend to decrease the thickness of tempered sidelights from  $\frac{1}{4}$  to  $\frac{7}{32}$  and  $\frac{9}{32}$  ( $\frac{3}{16}$ ) of an inch. Some experts maintain  $\frac{1}{4}$  inch is the minimum thickness for proper tempering. Others note that the thinner glass is *sheet* rather than *plate*, and therefore stronger.

Today's windshields, which have jumped nearly 400 percent in area, perhaps could use a thicker plastic interlayer than the .015 of an inch or 15 gauge specified in a 1938 code. Doubling the laminate thickness to 30 gauge would increase its cushioning effect or penetration resistance  $2\frac{1}{2}$  times—and cut the number of serious injuries caused by penetration of the face and neck through the windshield.

These are some of the important factors which the American Standards Association researchers undoubtedly are considering.

Perhaps another should be added to the list—a search for an entirely new type of glazing material, or a recombination of the old types, which would overcome the limitations of both the tempered and laminated safety glass used today.

*PM* will keep its readers posted on developments in this field. Meanwhile, for your own satisfaction, why not take a close look at the glass in *your* car? ★ ★ ★





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Part No.	Bore	Stroke	Eye-to-Eye Lgth.	Shaft Dia.	PRICE
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No. H-70L	3-1/2"	43-1/2"	55-1/8"	1-3/4"	44.88
No. H-70M	3-1/2"	47"	64-1/2"	2"	49.88

### SURPLUS DBL. ACTION

#### HYDRAULIC CYLINDERS

1500 PSI Double Action CYLINDER - Bore 2", Shaft 7/8", Stroke 9", overall length 14-1/2". **595**  
Catalog No. H-48 . . .

New 1500 PSI Dbl. Action Cylinder. Ideal for clutch or throttle control when used as a master & slave. Has 5/8" bore, 4-1/8" stroke, 7/16" shaft, 9-5/8" closed length. Parts are 1/4" tube (7/16-20 thread). No. H-60 **375**

1500 PSI Double Action CYLINDER - Bore 1-1/2", Shaft 9/16", Stroke is adjustable 1-3/16" to 4-3/8", length 14-1/2". No. H-84. . . **395**

1500 PSI, long stroke cylinder - Has Stroke of 15-5/8", Bore 1-1/2", Shaft 1", Length 22". No. H-14  
Cost Gov't approx. \$120.00  
Palley Catalog Price \$11.75 **795**

4.5 GPM HYDRAULIC PUMP/MOTOR **7.95**  
Cat. No. HPU-15

Delivers 4.5 GPM at 2300 RPM at 1000 PSI. Motor is 24V, DC - rated 3.75 HP intermittent, 2HP continuous. Integral by-pass valve is set at 1200 PSI. Use in Hyd. systems on trucks, tractors, etc.

FOUR WAY HYDRAULIC VALVE No. V-13USU **788**

Sliding piston type with built-in relief valve to limit stroke. Pressure balanced in neutral position. Has 5/8" AC tube ports. Reg. Catalog price \$12.75

NYLON PARACHUTE CAR COVER **488**

Large enough to cover any car. Made from one half of a 28 ft. cargo parachute. Constructed of 100% NYLON throughout.

U.S. ARMY POLAROID SUN GLASSES **119 PR.**  
Extra lightweight. Rose tinted plastic polarized lens. Comes with case. Worth up to \$3.95

## SAVE 3 POWER SPECIAL SURPLUS TELESCOPES

Made of sturdy brass and steel. Has Kellner eyepiece, military reticle, achromatic erecting lenses, 1 achromatic objective lens (25mm dia.). All optics are coated. Length 22-1/2". Field of view is 12°, 19 feet. Comes with 3 clip-on light filters and a rubber eyepiece. Reticle can be illuminated for use at night. Cost Government approx. \$150.00. NOW ONLY . . . **388**

WATERPROOF ARMY BEDROLLS **788**  
Special NEW Surplus 1 A 42" x 78" heavy duck canvas duck Bedroll. Has a roomy pocket either end. Makes ideal enclosed ground cloth for sleeping bag or air mattress. Comes with three 8ft. web straps and metal buckles. Cost Gov't approx. \$21

PORTABLE ICE PAC **199** **249**  
Extra heavy Neoprene rubber with insulated inner liner. Keeps food or liquid cold all day. Ideal for packing and icing down small game & fish. Waterproof and salt resistant. Size 16" x 13" x 8" Shpg. Wt. 10 lbs. Size 21" x 16" x 12" Shpg. Wt. 20 lbs.

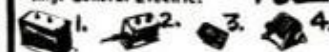
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Aircraft type. Easily converted for use as Arc Welder. Rated 300 Amps, 24-32V, DC.

3750 to 4000 RPM, counterclockwise. 3/4" splined shaft. Instructions for Arc Welder conversion FREE! **1695**  
Mfg. General Electric.



MAKE YOUR OWN ARC WELDER with above Generator and these elect. units.

1. WELDING REACTOR - Use with the above generator. Takes up to 400 Amps current load. . . . . **10.95**

2. Throttle Control SOLENOID - Use as welder or motor control. Has 5" shaft, 1" travel. . . . . **7.95**

3. 24 Volt RHEOSTAT - To control welder output. Has 5 variable outputs and an "off" position. . . . . **1.95**

4. "Y" BELT PULLEY ADAPTER - For use with R-1 Generator. **12.95**

1000 PSI VICKERS PUMP **2250**  
A piston type, positive displacement Hydraulic Pump.

Displaces .507 cu. in. per revolution. Capacity: 6 GPM at 3000 RPM with 1000 PSI or 3 GPM at 1500 RPM. Cat. No. H-P4USU . . . **11.95**  
PUMP MOUNT for above.

## 3-DAY INSTRUMENT PANEL CLOCK

Regularly \$44.50 **1950**

Ideal for car, boat, airplane, etc. Has black face, luminous dial and hands. Has sweep second hand. Made by one of World's most famous clock makers. 2" dia. face. Originally used on plane. Now completely overhauled.

## 8x ELBOW SCOPE

Has a 2" objective lens, a Kellner eyepiece and an Amici erecting prism. The cross hair reticle is illuminated. Has 3 built-in light filters. Field - 325 ft. at 1000 yds. **988**



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# WORK AND PLAY CHEVROLETS



The **Corvair 95** design is a natural for camper body installation. Extra-low central floor section, just 16 inches off the ground, allows stand-up head room inside (plenty of room inside for cooking and other activities) with minimum over-all exterior height. Also, Rampside camper units offer walk-in side door convenience.



They're built to do a bigger, better day's work every work-day in the week—and then head for the tall timber on those get-away-from-it-all fishing, hunting and camping trips you dream about! With roomy cabs and interiors, rugged build, and Independent Front Suspension ride, these dual-purpose Chevy models offer a really smooth way to rough it! *Camper bodies for Chevrolets are available from leading manufacturers everywhere.* They're tailor-made for Fleetside, Stepside or Corvair 95 pickups, and even for chassis-cab models if you want real house-trailer living. Many of the styles offered are readily removable, or otherwise adaptable to workaday truck operations, giving you versatility enough in one vehicle to last the whole year round!



If your daily routine calls for a panel or crew carrier, take a good look at the Chevrolet Suburban Carryall. All-purpose transportation doesn't come any handier! With two roomy rear seats you can remove or rearrange in a jiffy, you can carry 3, 5, 6 or 8 people, plus tools, supplies or camping gear. With a Carryall, you're ready at the drop of a hat to get away from it all, wherever the gettin' looks best. Plan *your* next outing around one of these smooth-traveling work-and-play Chevies, and find out just how *versatile* a vehicle can be! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.





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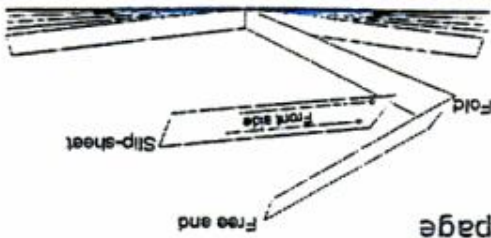
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Back

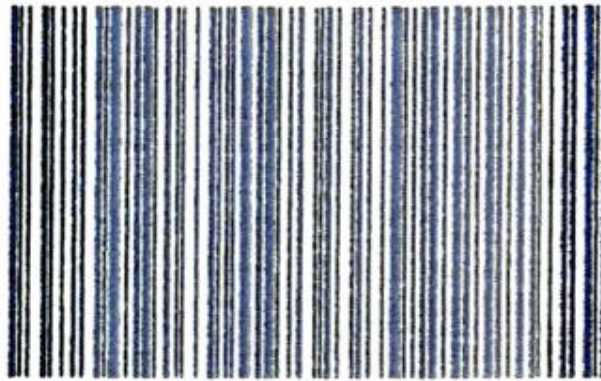
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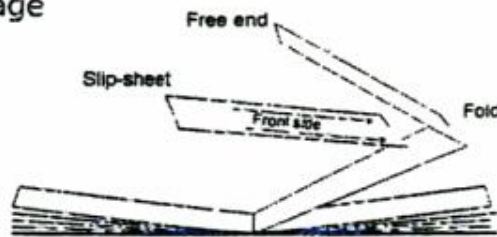
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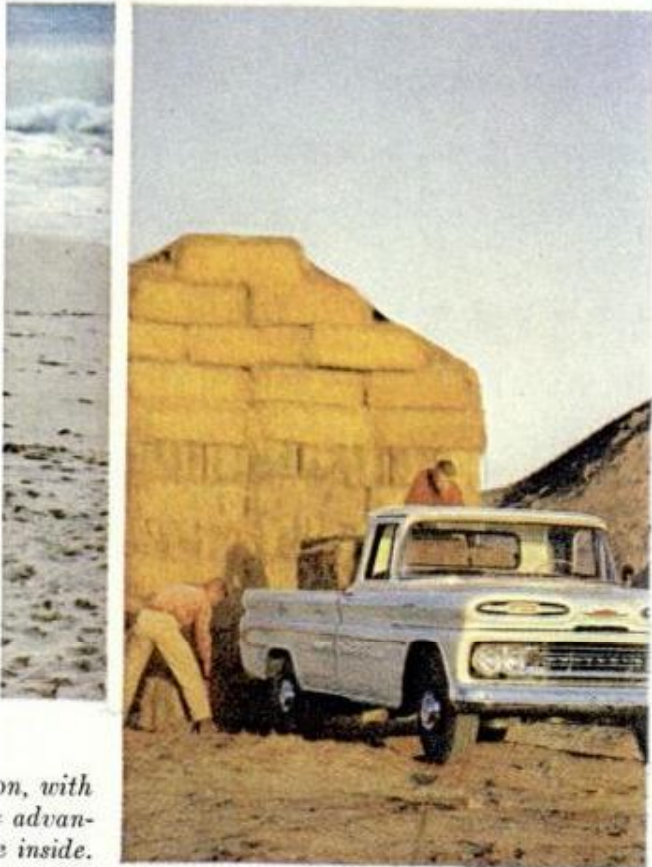
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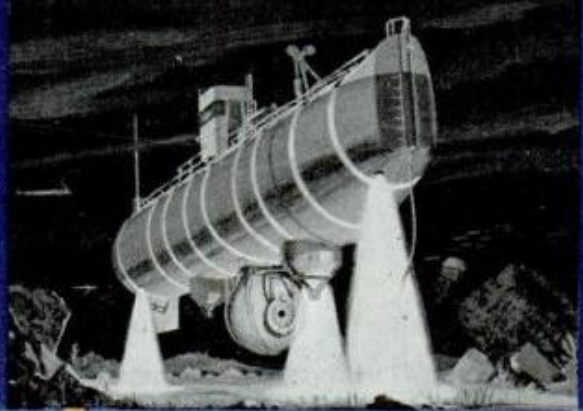
For big payloads or playloads you'll find the **Suburban Carryall** can't be topped. Rear seats are quickly removable, and interchangeable for any combination of passenger and cargo capacity. And there's plenty of room for installation of eat-and-sleep custom camper accommodations. Carryall is available with either station wagon tailgates or panel-type rear doors.



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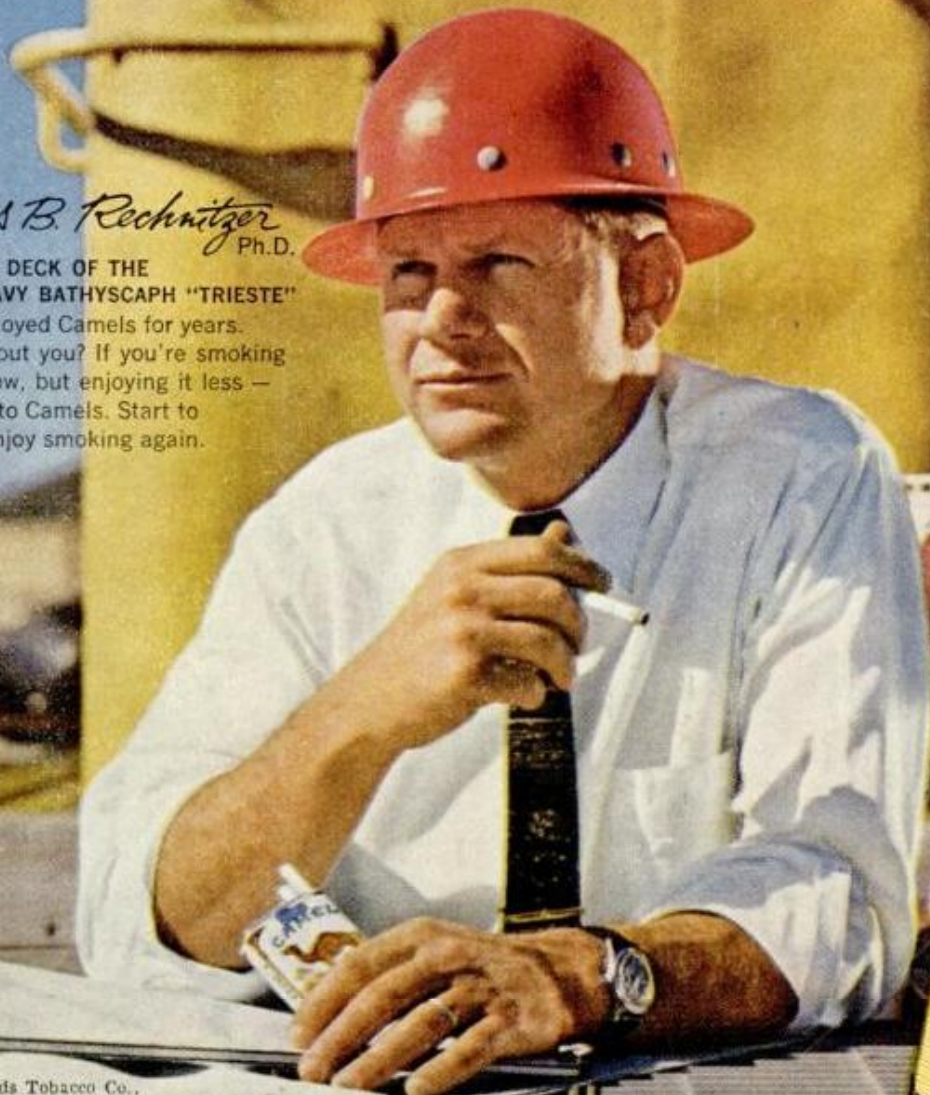


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