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POPULAR MECHANICS

JULY 1962

35 CENTS



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- **The Desperate Flight of Airtransit 13**
- Flying Model Gyroplane: Complete Plans



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JULY 1962

This One



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JULY 1962

VOL. 118 NO. 1

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Features of Special Interest

Scuba Search! - - - - -	67
The Great Donkey Derby - - - - -	76
Owners Report on the Oldsmobile - - - - -	78
Boats Full of Good Ideas - - - - -	84
Stay Safe in Salt Water - - - - -	86
Bubble Trouble on Tap - - - - -	90
Street Scene, Tokyo Style - - - - -	96
The Harrowing Flight of Airtransit 13 - - - - -	103
Master Mechanic of the Mountains - - - - -	110
Improve Your Hobby With Photos - - - - -	118

For the Craftsman

Poolside Cabanas - - - - -	124
Spinning-Wing Model Autogiro - - - - -	132
The ABCs of Good Concrete - - - - -	135
Back-Yard Sun Lounge - - - - -	142
Appliance Fix-It File: Electric Shaver - - - - -	144
Building the PM "Scoot-About" - - - - -	146
Single-Point Thread Cutting - - - - -	152
Masking Tape Holds Everything - - - - -	158
Build an Electric Lawn Edger - - - - -	164
Photo Cell Garage Door Opener - - - - -	167

Address communications to: 200 E. Ontario St., Chicago 11, Illinois. **SUBSCRIPTION SERVICE:** Mail all subscription orders, changes of address, correspondence concerning subscriptions, and Postmaster notices of undeliverable copies to Popular Mechanics, 250 West 55th St., New York 19, N. Y.

Published by Popular Mechanics Company, RICHARD E. BERLIN, *President*

CLIFFORD B. HICKS
Editor

RICHARD E. DEEMS
Executive Vice-President

JOSEPH R. BUELL, JR.
Publisher

Managing Editor: DON DINWIDDIE
Assistant Managing Editor: JOHN A. LINKLETTER
Shop and Crafts Editor: WAYNE C. LECKEY
Eastern Editor: RICHARD F. DEMPEWOLFF
959 Eighth Ave., New York 19, N. Y.
Western Editor: THOMAS E. STIMSON, JR.
Suite 1003, 3460 Wilshire Blvd., Los Angeles 5, Calif.
Art Director: HENRY M. NEHRBASS
Automotive Editor: JAMES R. WHIPPLE
Associate Editors: W. CLYDE LAMMEY, WALLACE MYERS
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Assistant Editors: JAMES BIERY, KEVIN V. BROWN
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Assistant Art Director: LEO R. WEEKS
Art Editor: RICHARD A. POTTS
Chief Photographer: FRANK P. FRITZ
International Editor: HEINZ P. SCHLICHTING
Ritterstrasse 26, Karlsruhe/Bd., Germany
Advertising Manager: FRANK R. DUPUY
959 Eighth Ave., New York 19, N. Y.
Advertising Production: DOROTHY M. WINER
Director, Bureau of Information: ALLAN CARPENTER

If you wish additional sources of information for the articles in this issue, or if you wish the name and address of the manufacturer of a particular product shown here, write to Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11, Ill. Ask for the free "Where-to-Find-It-List" for this issue.



Bubble Trouble
page 90

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Departments

Sidelights on Aviation - - - -	8
Over the Editor's Desk - - - -	10
Items From All Outdoors - - - -	16
Science Overseas - - - - -	18
Tune In on the Inventors - - - -	20
Science Bulletins - - - - -	24
Worth Writing For - - - - -	30
Spotlight on the Consul Capri - -	58
Pentagon Sidelights - - - - -	64
Detroit Listening Post - - - - -	74
What's New for Your Home - - - -	116
Solving Home Problems - - - - -	129
Clinic for Homemakers - - - - -	174
On the Market - - - - -	186
Shopping for Tools - - - - -	200



Poolside Cabanas
page 124

Next Month . . .

Can the wizards of Wallops Island—America's shoestring Canaveral—do it again? Can a supersonic whirlybird be designed? Can you build a 38-m.p.h. runabout boat for \$38? Can you store-test the quality of a transistor radio? Is there a secret to catching fish when the summer heat is at its worst? You'll find highly satisfactory answers to all these questions in the August issue.



All About Concrete
page 135

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Water Flivver
page 146

Published monthly by Popular Mechanics Company, 200 E. Ontario St., Chicago 11, Ill. Richard E. Berlin, President; Richard E. Deems, Executive Vice-President; Fred Lewis, Vice-President and General Manager; John R. Miller, Vice-President; Joseph R. Buell, Jr., Vice-President; G. O. Markuson, Treasurer; R. F. McCauley, Secretary. Single copy in the United States and Canada, 35 cents. Subscription prices: United States and Possessions, \$4.00 for one year; \$7.00 for two years; \$9.00 for three years. Canada, add \$0.50 for each year. Pan-American Postal Union countries, add \$1.00 for each year. All other countries, add \$2.00 for each year. If you plan to move, notify us at least 30 days in advance so you will not miss an issue. Give both your old and new addresses. Second-class postage paid at Chicago, Illinois, and at additional mailing offices. Authorized as second class mail by the Post Office Department, Ottawa, and for payment of postage in cash. Registered as Second Class Matter at the Post Office at Mexico, D.F., Mexico, June 20, 1950. © 1962 by Popular Mechanics Company. All rights reserved. Printed in the United States of America.



Thread Cutting
page 152

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What Price Noise?

THE U. S. is the world's noisiest nation, and it's getting worse. And it's costing you in terms of money, comfort and health.

As a taxpayer, you not only support local antinoise efforts but share federal noise-abatement costs. It costs up to \$20,000,000 a year just to measure rocket-engine noise to minimize injury to equipment and personnel. Property damage caused by sonic booms from military jets added \$80,000 to the government tab within a recent four-year period, and many homeowners claim that this covered only a fraction of boom-caused damage.

Even subsonic jets, because of their deafening whine on takeoffs, have caused property values to plunge drastically near airports. Some homeowners flanking New York's Idlewild, for example, report that they can't sleep or relax because of the big commercial jets and they can't sell their homes, either. The Supreme Court recently awarded damages to a Pittsburgh homeowner who abandoned his home because of the noise that came from the nearby municipal jetport.

Even away from home and tax forms, you are paying for noise. Your cost of living goes up when industry has to hike prices to cover the estimated \$2,000,000 lost *each day* because of decreased efficiency and lost man-hours caused by noise.

Noise can rob workmen of their peak working ability, causing fatigue, impaired reflexes and nervous tension. On one assembly line, located next to a noisy boiler room, 60 imperfections were found in a batch of 80 pieces. When the work was removed to a quieter part of the shop, 110 units were turned out in the same time—with only 7 flaws.

The greatest cost, however, is in health. The Air Force reports that continued exposure to sounds of 100 decibels for more than eight hours can produce permanent hearing loss. Also, exposure to any disturbing level of noise can cause severe indigestion, undue pressure on the brain, damage to the nervous system, impaired vision, even insanity.

What can be done about it? Three things, says authorities:

1. Protect yourself with earshields and other antinoise equipment.
2. Lessen noise at the source through engineering refinements or sound suppressors.
3. Put distance between yourself and the source of the noise.

Despite the cost or possible inconvenience, such precautions will pay off in the long run—with a quieter world.

—Charles Remsberg



Extra! New nylon truck tire costs less per day than your newspaper!

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This is the lowest-priced Goodyear 3-T Nylon cord truck tire ever offered—a real value! And it's one of the strongest reasons we know for your *not*

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1. Can you identify this device?



2. What does this symbol stand for?

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QUAKER STATE OIL REFINING CORP., OIL CITY, PA.

Sidelights on aviation

The team that created the unusual article on "*The Harrowing Flight of Airtransit 13*," beginning on page 102, is itself unusual and unusually qualified.

Frank Tinker, the author, and Bill Fleming, the artist, have never met, yet their careers have striking similarities.

Frank, who now lives in Ogden, Utah, is a former Air Force pilot who spent part of World War II in a Japanese prisoner-of-war camp as a cellmate of Gregory "Pappy" Boyington. He survived to become an airline pilot, flying many of the charter runs he describes so well in this month's issue.

Bill, a Chicago suburbanite, was born in Ogden, just a few blocks from where Tinker now lives. He, too, is an Air Force veteran, flying as a navigator on B-24s and other large bombers. Now a free-lance artist, he welcomed the chance to "get back in the saddle" by illustrating an article on aviation.

Both men made several field trips—to traffic-control centers, to flight lines, to pilots' ready rooms—to gather material and check the accuracy of their work.

Frank's original assignment began informally in the offices of *Popular Mechanics* when we asked him, "What would happen if everything that could go wrong with the air-traffic control system did go wrong, all at once?" Frank's answer: "Pilots and controllers would go to emergency methods to work their way out of it."

So he created a fictional flight—in which a disabled plane, losing altitude with mountains behind it and bad weather ahead of it, drops toward an area already saturated with circling aircraft, just as the traffic-control center that's trying to keep them separated loses contact with all of them—and describes how they work their way out of it. Bill Fleming took it from there.

We think they did a dandy job.



Project Little Guy, a recently established federal program, will develop a simpler, more efficient cockpit for small aircraft, at a cost light-aircraft owners can afford, that will enable them to fly more safely in poor weather and more efficiently in good weather.

The program is expected to produce a flyable prototype within three years.

Kevin V. Brown

POPULAR MECHANICS

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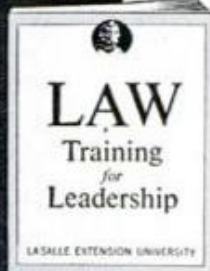
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Over the editor's desk

Shopping for a P-51

Bravo on the March article, *The Old Warbirds Are Still Flying*. The men who restore and fly these planes pay a great tribute to a hard-won war.

Can you give me any information on obtaining and restoring a P-51 Mustang? Calgary, Alberta, Canada BOB STEWART

The P-51 as shown in March is remodeled into a tandem-seat plane and sold by Trans-Florida Aviation, Sarasota, Fla. There also might be some still available from government surplus.

Brass-Geared Chimer?



This clock with wooden gears (built from your Dec. '59 and Jan. '60 issue plans) is an excellent timekeeper besides being a beauty.

Why not show us how to make an eight day movement with brass gears—a clock that would chime the quarter hours as well as strike the hour?

Belle, Mo. DELMAR HARRISON

A brass-g geared movement which would chime as you suggest would require some complex craftsmanship, Del. We wonder how many readers would have the time and patience to tackle such a project.

Hammer Off the Switch?

I have been driving and repairing autos since 1912 so I can remember the folding steering wheel (*Old Time Touches*, March '62 PM). I think it was also used on some

of the 1911-1913 Carter cars, which had no clutch or gear transmission but used a friction drive . . .

The 1927 Essex had a manual-operated shutter on the radiator. And some old Pontiacs had a shutter to which was connected a thermostat in the upper tank.

Some real old Chevrolets and Overlands used an ignition switch that would switch itself off if left on when the car was stopped. A bimetal strip heated up and caused a small coil to vibrate a hammer that kept on pounding until the switch disconnected.

Fairdale, N. Dak.

A. J. AUNE

Shades of ye old Pines Winterfront—we remember those radiator shutters well. It would still be a worthwhile feature for faster warmups.

Vote for the Side Pocket

Re your March article, *Detroit: Where Are These Old Time Touches?*, the best one was omitted—the side door pocket which would be most welcome today.

Clifton, N. J.

D. HERVISH

We'll second the suggestion. Where else can the devoted clutterbug turn in these days of shrinking glove compartments?

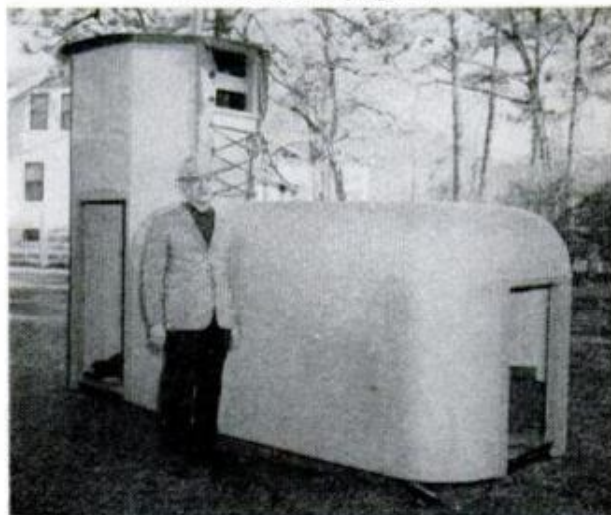
Old-Paint Playhouse

This playhouse does not look like the one in your plans (p. 164, June '61 PM) but its lines were dictated by the material I had on hand. The framework was cut from scrap and the outer Masonite shell was glued to the frame. It has a partial floor forming a loft lookout and a permanent ladder from floor to loft.

Trim was set in mastic and then the whole shell was treated with buckets of old house paint too thick to use. Applied with a sponge, it gave a textured finish and helped cover mastic-filled cracks and nail heads.

It took about three weeks of spare time

(Continued to page 12)



POPULAR MECHANICS

AMAZING NEW HOME TRAINING PLAN IN AIR CONDITIONING AND REFRIGERATION

Important news for the inexperienced man who needs a short cut to a better job, more money and greater security.

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REAR VIEW

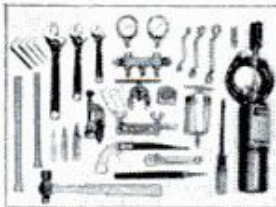
25 Kits
20 Shop Projects

Learn by Practicing—Get Experience

The new CTI semi-sealed condensing unit. You build this heavy-duty commercial-type unit from 25 kits that CTI sends without extra cost. You complete 20 Shop Projects. After assembling unit, you may then build an air conditioner, freezer, refrigerator or milk cooler.

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You get wrenches, tube flaring tools, hammer, tubing, fittings, gauges and other items used by the experienced mechanic. Everything is of professional quality. Best of all, CTI trains you to use tools with speed and skill.



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Graduates Praise Training

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to build and cost about \$50. My grandchildren and the neighborhood children more than kept it hot last summer. Spearfish, S. Dak. ROBERT PARKER

Pontoon River Queen

We changed your March '59 plans for this pontoon houseboat to take a paddle wheel which is powered by a seven horsepower air-cooled motor.

The boat sleeps three and has carried



21 passengers.
Crooksville, Ohio

NED GRANT
DAVID ROBBINSON

That paddle wheel is a neat nostalgic touch, and might well be worth the loss in efficiency that is inherent in such a propulsion system. After all, just listening to that paddle churning should make a fellow happy to relax and laze along the river.

Slighted Cliff Dweller?

... You are always giving hints about the home and hobbies that are for homeowners. I am quite sure you have more cliff dwellers than homeowners for readers. Don't you think it is high time to devote a page or two to the people that live in apartment houses?

Bronx, N.Y.

L. SCHWEITZER

We thought we did—articles such as those in this issue on the TV hi-fi audio coupler, on using photography in your hobbies, on repairing an electric razor, on using masking tape plus many other newsworthy products and hints that should interest everyone—no matter where they live. But your opinions are a welcome reminder that we should keep checking on the balance of material we publish for cliff dwellers and homeowners.

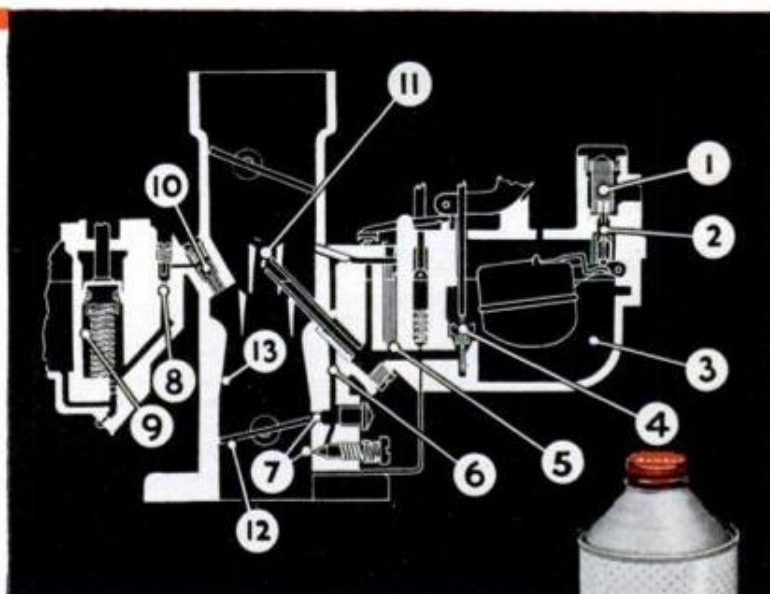
(Continued to page 14)

GUMOUT CLEANS CARBURETORS

13 WAYS!

There are at least 13 potential trouble areas in your carburetor—areas where even the tiniest speck of dirt or gum will impair engine economy and performance. You can clean a dirty carburetor quickly, thoroughly and economically with GUMOUT. Just add GUMOUT to your gas tank. It cleans your carburetor while you drive. Get GUMOUT at your favorite service station or auto supply store. You'll get improved engine performance and better gas mileage.

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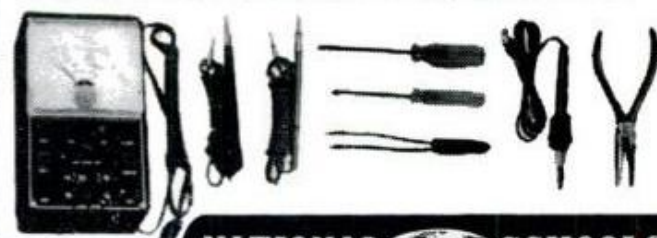
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Fishermen vs. Boaters—the Final Round

I read your *Bitter Battle of the Waterways* (March PM) and agree equally with authors Joe Bell and Howard Hartman. . . . The worst thing a fisherman can do is anchor his boat smack in the middle of the channel. Anyone trying to get through finds himself playing hopscotch with anchored boats.

I know how Howard feels, too. Anyone anchored fishing is not expecting to be riding a roller coaster when some slap-happy water jockey comes tearing by like the devil was chasing him.

Again, it's the inexperienced clod that's to blame . . .
Elizabeth, N. J. JOHN M. ALLEN, JR.

. . . I have found that catching fish was not hampered by passing boats. My advice is, have good anchors and, if things get too rough, install safety belts.
Springdale, Ark. KENNETH MORRIS

. . . set a speed limit, say 5 to 10 m.p.h., during prime fishing hours. If a boater wants to go out at 6 a.m. and try to tow a skier at 5 m.p.h., he won't be bothering the fishermen.
Gustine, Calif. ELMER B. HATCHER

. . . most people who have big motors and boats for strictly pleasure riding are more courteous than water skiers. They pull out of a dock at a slow idle, slow down when passing fishermen, and observe safety rules. Water skiers take out away from the dock like a rocket, kick up boat-swamping waves with a to-hell-with-the-other-guy attitude, even drive fast among children swimming around shore (not their children, of course) . . .
Kansas City, Mo. ALVA L. THOMPSON

. . . with all these bigger motors we are having fewer fish each year—just watch the gas and oil slick on some lake at evening time—fish don't live long after getting gas and oil in their gills, or having prop backwash ruin the fish-spawning beds . . .
Lowry, Minn. CHARLES A. KALINA

. . . I'm sitting on top of the fence right smack in the middle. I have a boat and a large motor I use through the summer to water ski, and a small motor for fishing through the winter. We have laws keeping motorboats off some lakes because they are too small. On large lakes 98 percent of the fishermen are on shore or trolling very near it. Any boat jockey that pulls skis

close to shore at full speeds has rocks in his head and I have some patches in my boat as vivid reminders. Our boat laws have speed limits only close to shore or in swimming areas and I am satisfied with them, both as a boater and an angler . . .
Reedley, Calif. VERLE M. GANT

. . . don't make statements like "we'll be happy to give fishermen the early morning and late afternoon hours." Only a person who is rich or works nights would make that statement. It would limit the average skier to a few hours on week ends.
Stillwell, Ind. RON THOMAS

. . . wonder how the speed boys and water skiers would like for me to run a converted PT boat close by them at full throttle? . . .
Aberdeen, Wash. FRANCIS SMITH

. . . on a lake three miles square, you could put at least a dozen parties of fishermen. But put three or four speedboats on it and it's crowded. The fisherman is the only one left who knows what size motor to put on a boat . . .
Terrace, B.C. L. WATMOUGH
Canada

. . . Fishermen today may be compared to the horse transportation of yesterday. The horse was driven off the main route; the fisherman will be forced to pick a small pond or creek . . .
Ottawa, Ill. ED BRODY

Someone once said that our next Civil War, if there is one, will be fought between fishermen and speedboat-water skiers. After being swamped with letters from both groups of belligerents, we're inclined to agree. Of those writing, irate fishermen outnumbered irate speedboaters and water skiers by about four to one. Another 20 percent took a broadminded viewpoint—they could sympathize with both sides; many of them, in fact, liked both speedboating and fishing.

Other writers who didn't have a very high opinion of either boaters or anglers were the scuba divers, sailboaters, swimmers and some owners of lake property. Each of these groups counted around two percent of the final response.

All told, it has been a good fight, and our thanks to all of you who wrote PM giving your forthright opinions and suggestions.

The Editors

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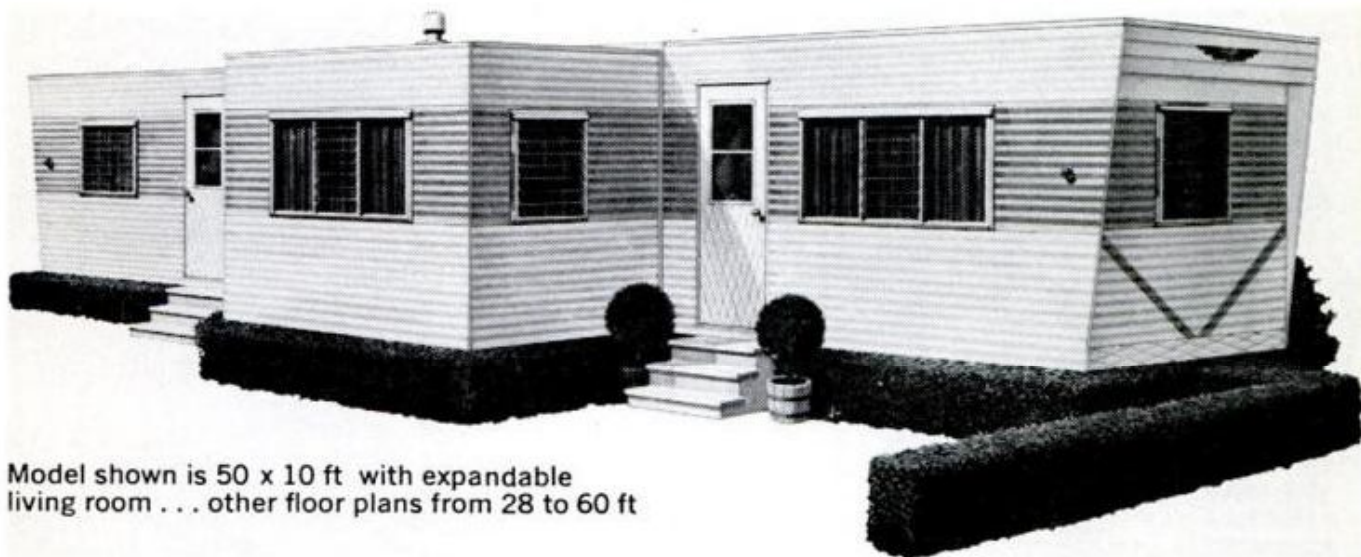
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Items from all outdoors

Living with sharks seems like making a living the hard way. But a number of dedicated scientists are doing it, trying to learn the whys of the behavior of the dangerous marine animals. Several of them, through papers and works published in scientific journals, contributed greatly to the research for the article *Stay Safe in Salt Water* which appears on page 86 of this issue. In addition to the excellent book by Dr. Bruce W. Halstead mentioned in the article, I am especially indebted to the following scientists for individual items of background information:

Perry W. Gilbert, Leonard P. Schultz, and Stewart Springer, who make up the U.S. Navy Shark Research Panel. Albert L. Tester, University of Hawaii. Isaac I. Ikehara, Hawaii Division of Fish and Game.

Looking for a fishing vacation, drive-in spot? A great new Canadian highway has opened an 80-mile trail into prime Manitoba Northern pike, walleye and lake trout country formerly accessible only by float plane. Early reports are that the fishing is tremendous. The highway turns into the bush from Highway 10 at Simonhouse, Manitoba, 525 well-paved miles north of Winnipeg.

Called the Simonhouse-Snow Lake Road, it opens the famed Grass River Chain of lakes, which includes Tramping, Iskwassum and Reed Lakes and the Grass River itself, to the wheeled angler and camper. For details, write Mr. W. E. ("Wilf") Organ, Travel and Publicity Branch, Government of Manitoba, Winnipeg, Manitoba, Canada, and tell him I sent you.

There's a sudden flood of golf gadgets on the market; more than ever before. One of the best we've seen is a new practice ball that, when hit, gives an estimate of the distance a real golf ball would have traveled on that swing. It's much like the familiar holed plastic backyard practice balls, except for a calibrated pin that gives the distance reading, then is reset for the next shot. Called *Measure-Flite*, the ball sells four for a dollar from K.G.S., Inc., 9016 West Pico Blvd., Los Angeles 35, Calif.

Dick Kiepatnik

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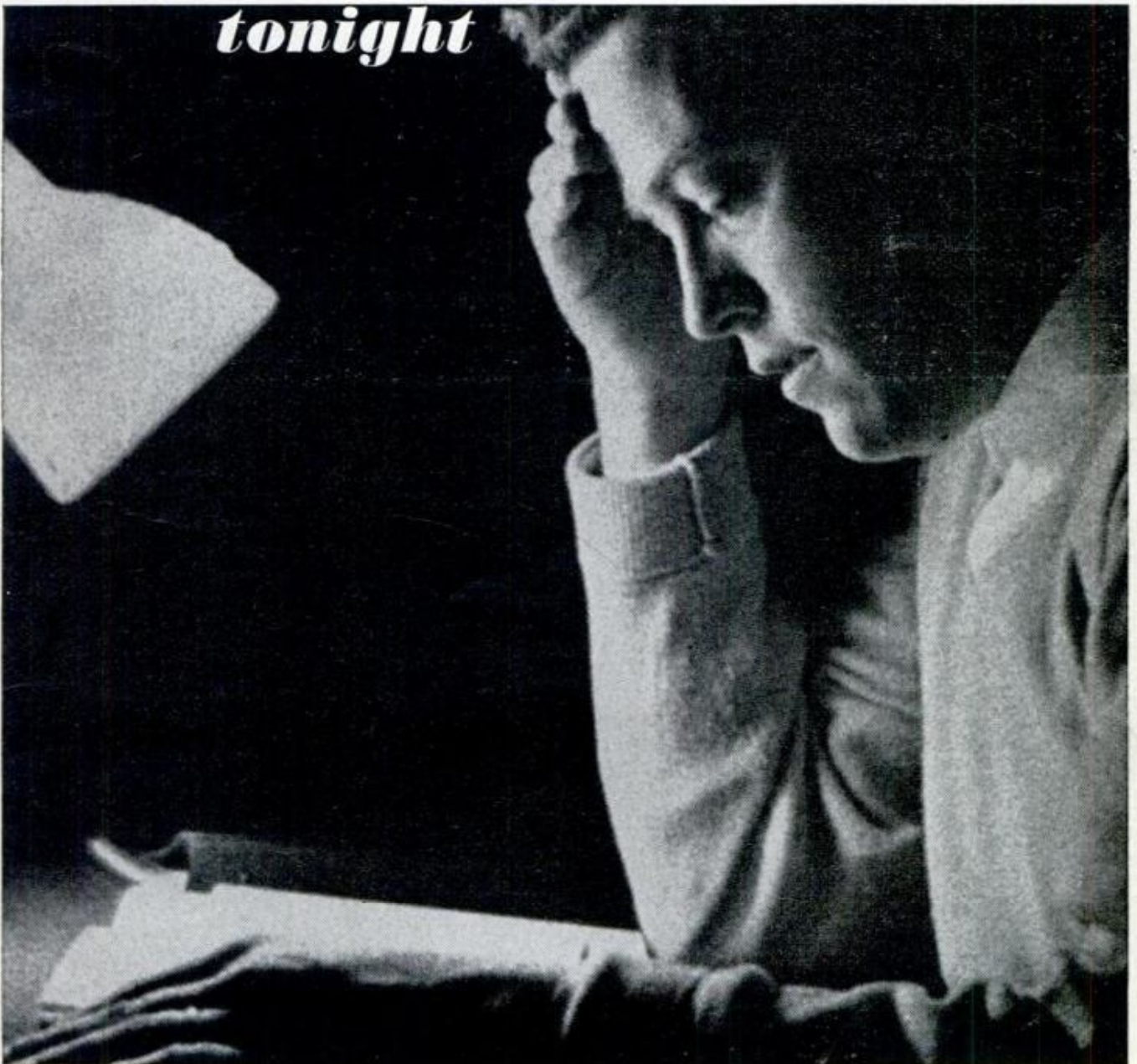
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Science overseas

By William Kreh

Mosquitoes do their biting near the ground during the day, but gradually move up in the forests as the sun goes down. So say biologists at the East African Virus Research Institute who have been studying the pests from a perch on a 150-foot tower in the Zika Forest of Uganda.

This suggests—if the pattern holds true elsewhere—that we build tree houses for enjoyable day-time relaxation, and use our patios only at night. Then again trees do have ants . . .

Electronic help for bargain hunters is available at a new discount supermarket in Nice, France. Whenever a housewife sees something she wants, she just picks up an IBM-punched card near the merchandise. At the check-out counter, she gives the cards to the clerk who feeds them into a machine which automatically prints invoices. One copy of the invoice goes to the shipping department where the merchandise is packaged for later delivery. And the shopper doesn't have to carry anything heavier than cards.

The tall, thorny ginseng bush may prove to be the boon to man that Koreans, for example, have long thought it to be—although in a slightly different way. Soviet scientists say a drug obtained from roots of the bush has successfully protected mice against atomic radiation and this holds out hope for protection of man. Koreans have long soaked the root in their rice wine in the belief it made them healthy and virile.

Sun spots may affect the sex life of animals in high latitudes. Scientists in Iceland say their research shows the best spawning years for the rock ptarmigan and Icelandic herring, river salmon and cod have turned out to be every 11 years—the same cycle as sunspots.

Floating giant glass fiber balls filled with paper pulp from logging country to manufacturing plants on the sea coast is being tried by a Canadian lumber-newsprint firm.

In one run, a loaded eight-foot ball floated 50 miles down the Fraser River, through the boiling Hell's Gate, and was picked up

100 miles east of Vancouver. The balls weigh 200 pounds when empty. Each can carry about 250 cubic feet of wood pulp or chips. The technique, company officials say, could be used for other types of cargo, and might revolutionize inland water transport.

Tokyo University scientists have succeeded in using radio facsimile to transmit maps, showing ocean currents, water temperatures, locations of schools of fish and other data to Japanese fishing boats as far off as the Indian Ocean.

They may "talk" ships into Australian ports when the weather gets too rough for harbor pilots to go aboard.

A radio communications system has been set up in the port at Sydney which enables harbor pilots to talk ships into port in the same way as aircraft are talked down by a controller on the ground in bad weather.

The control center has been linked with a remote control radio station at Newcastle, 100 miles north of Sydney, to improve communications with ships in that area. A similar station will be set up at Port Kembla, 60 miles south of Sydney.

Microphones should get their enjoyment from fiddling with a new Japanese television set. It measures six by six inches, weighs six pounds, has twenty transistors and operates on either house current, or a 12-volt car battery. Naturally, it's billed as "world's smallest."

Seaweed may prevent tooth decay. So believes a British dentist who's started a 10-year experiment to try and prove it. He's enlisted a group of children to take part in the test. They're starting to eat seaweed—baked into biscuits—when they're one year old.

Nonfogging safety goggles have been developed in England. The double plastic lenses enclose an insulating air space and a small triangular metal condenser is fitted into each side of the frame. The condensers, being the coldest points, draw away the moisture created between the goggles and the face of the wearer. The goggles fit close to the face and can be worn over all normal eyeglasses.

Salmon don't cotton to the odor of people. Tests by Canadian scientists show that if a human being comes within smelling distance of salmon, the fish will not swim upstream to spawn. ★ ★ ★

GET READY FOR THE SPACE and SCIENCE ERA! SEE SATELLITES, MOON ROCKETS CLOSE-UP

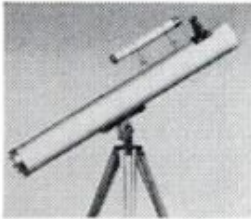
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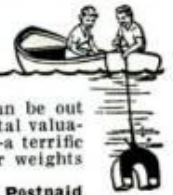
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Tune in on the inventors

Inventors are busier right now than at any time in the last 30 years, according to the Patent Office. As this issue of PM goes to press, the office has just finished issuing 1361 patents in a single week, the largest volume since 1932.

✓ ✓ ✓
A massage-exercise suit, which gently massages the wearer while he is in motion, won patent 3,028,857 for Mildred Parker of San Bernardino, Calif. The suit, which includes a face mask, gloves and socks, has a lining studded with closely-spaced rubber massaging tips. Crazy, man.

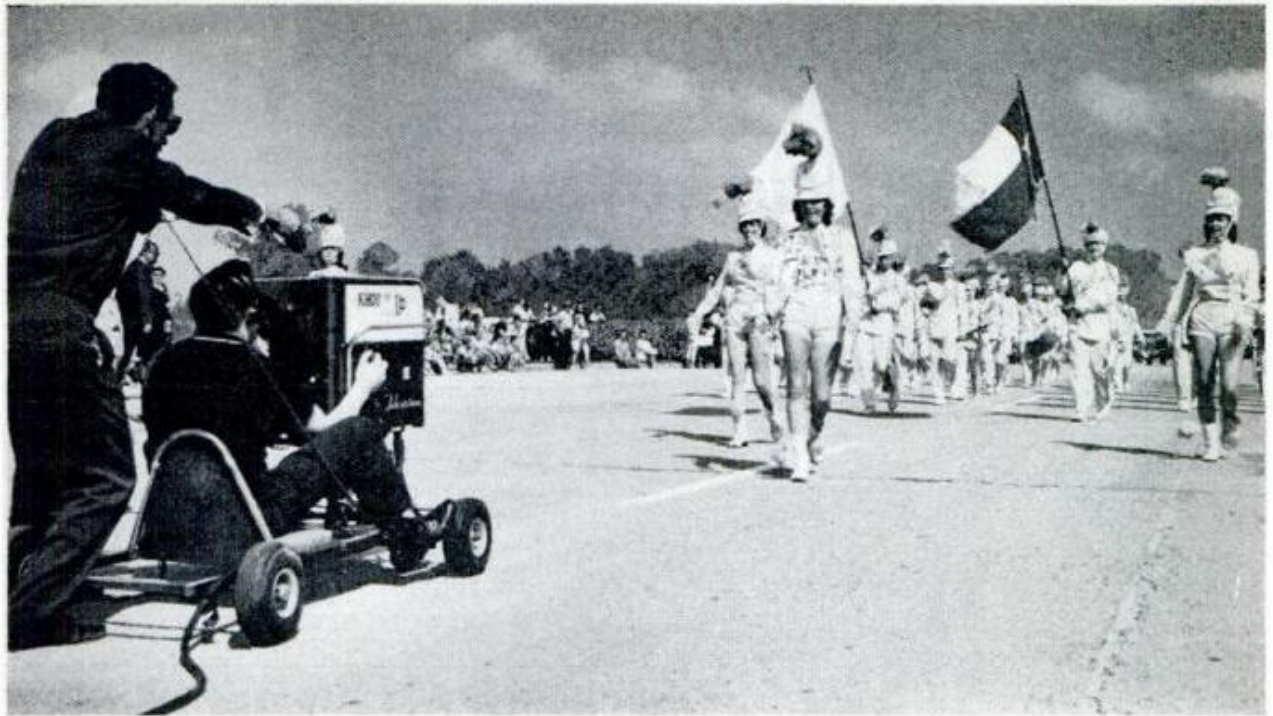
✓ ✓ ✓
A "permanent" light bulb, which will burn constantly for years, won American patent 3,026,436 for John D. H. Hughes of Wantage, England. The bulb is coated on the inside with a phosphorescent material, which is activated by a radioactive gas to emit light from its outer surface.

✓ ✓ ✓
Man-made diamonds can be "grown" from methane or any other carbon-containing gas by a process which won patent 3,030,188 for W. G. Eversole of Kenmore, N. Y. His method produces continuous industrial diamond powder by passing the gas over diamond seed crystals at a temperature around 1800 degrees.

✓ ✓ ✓
Best-looking invention from a PM reader this month won design patent 115,999 for Allen L. Wiseman of Thomasville, Ga., on a new playing-card design which he describes as "dwarf capsular." The cards are 1 5/16 inch wide by 3 1/2 inches long, and rounded at the ends, and are surprisingly easy to handle and shuffle. The shape should also contribute greatly to their useful life, since there are no corners to be torn or dog-eared; the size makes the cards easy to carry anywhere. Any manufacturers interested? Mr. Wiseman is shopping for one.

✓ ✓ ✓
Most unusual idea in a long time won patent 3,029,784 for Charles Elbreder and Edward Ross of St. Louis, Mo. They patented a hatching tablet containing shrimp eggs. Dropped in water, it hatches shrimp. Instant seafood?

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



Low-Angle TV Dolly From Kart

High-angle TV shots have been solved with booms, cranes and utility trucks, but low-angle TV shots have always been a problem. Station KHOU-TV in Houston, Texas, solved the problem by mounting

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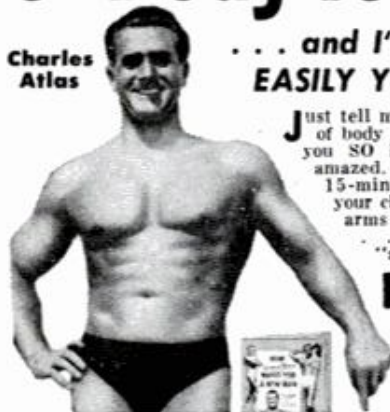
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Science bulletins

Triplethink, anyone? We are capable of executing several different mental processes simultaneously, concludes Dr. Ulric Neisser of Brandeis University. He put people to scanning lists of nonsense words, looking for one or more particular letters. They took no longer to search for either of two letters, or any of four, than for one letter alone.

This is something to bear in mind (along with any two or three other things you choose) the next time you're turned loose, with a grocery list, in a strange supermarket.

Snails may show astronauts how to withstand extreme heat of outer space.

Dr. Austin Phelps, University of Texas zoologist, is studying a New Mexico snail colony living in a hot spring where the temperature is a continuous 112 degrees. The snails are tiny—they measure less than one-eighth of an inch in diameter—but they are hardy. Most animals cannot exist under such conditions because the heat coagulates proteins and destroys enzymes in their bodies.

Dr. Phelps hopes the secret to the snail's resistance can be applied to man for longer and more comfortable space flights.

An electronic device that corrects a number of disturbed heart rhythms in man has been used successfully on nine out of ten patients at Peter Bent Brigham Hospital, which is associated with Harvard University.

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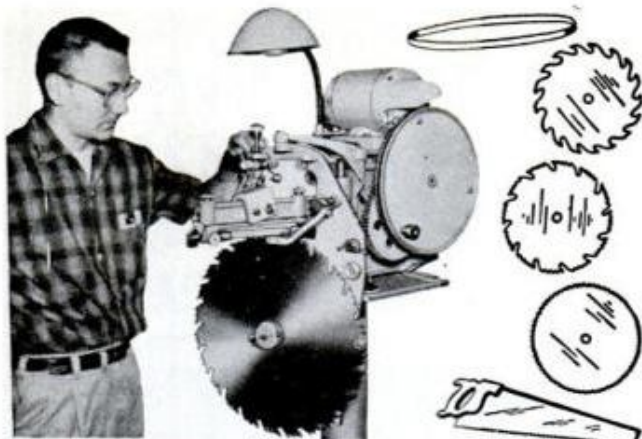


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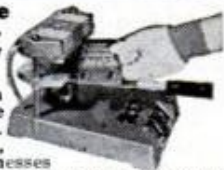
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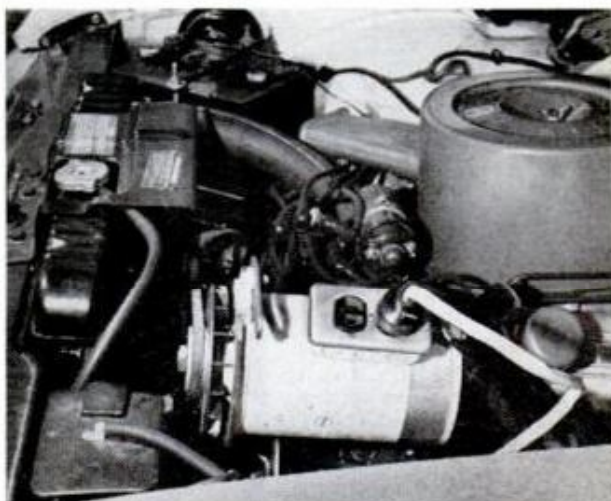
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POPULAR MECHANICS

Electronic Cameras Detect Fires

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The system, which combines an airborne scanning microwave radiometer with ground-control television displays, was developed by Space-General Corp. of Glendale, Calif.

In use, it would enable command posts to scan 100 square miles of fire area about every three minutes. A fire commander, monitoring the TV screen, would be able to follow the path of the flames and dispatch equipment to strategic locations.

Life Not Spread by Space Travel

Seeds of life did not reach Earth after traveling through space from another world, says Dr. Carl Sagan, University of California scientist.

He debunked the 50-year-old theory that germs of life might have escaped from one world and been pushed by stellar radiation across space to seed life on other worlds.

Dr. Sagan told a meeting of the American Association for the Advancement of Science that the theory had been "robbed of any reasonable plausibility" by modern knowledge about the size of microorganisms, their ability to withstand effects of radiation, birth and death of stars, and the vast immensity of space.

He said scientists no longer need the theory because they have good evidence that life could have evolved on Earth and elsewhere through known chemical processes.

If an organism could overcome effects of radiation, protons and X rays in space, he said it was unlikely it could hit another planet in the vastness of space.

Metered Home Fuel Oil

Central distribution of residential fuel oil, which eliminates individual storage tanks and meters the oil the same way natural gas and electricity are metered, will be inaugurated in three eastern cities.

Housing developments involving nearly 5000 homes in Poughkeepsie, N. Y., Washingtonville, N. Y., and Old Saybrook, Conn., will include new house meters that can register the rate of oil flow at the slow speed involved in home heating. One large supply tank, holding 10,000 gallons, can serve 50 homes.

The project was developed by the Tri-State Pipe Lines Corp. of New York City.

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Munce's sculptures are exhibited in art galleries.



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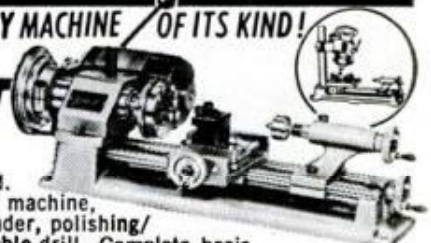
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booklet discusses the variables automobile drivers must be aware of, and suggests check to keep drivers and cars in tip-top performance. The variables include driving skill, physical fitness, attitudes, condition of car and condition of road. The 15-cent booklet is published by William-Frederick Press, 55 East 86th St., New York 28, N. Y.

HO model railroading is treated in a new catalog available for 25 cents from Akane, P.O. Box 713, Baltimore 3, Md. In addition to a price list for the company's new hand-crafted models, it contains replica and prototype descriptions and 29 photos. Steam locomotives pictured include not only some famous in the U. S. (such as the B&O class EM-1 2-8-8-4 Baldwin Articulated,

used in the Allegheny Mountains), but one of the Mikados built in 1897 for Japanese roads.

Florida is examined in facts and figures for those planning to move to or vacation in the state in a free booklet—"The Florida Buyers Digest"—sent out by Scott Mitchell House, Inc., Dept. F-PM 1, 415 South Broadway, Yonkers, N. Y. It also contains maps and photographs of the Sunshine State.

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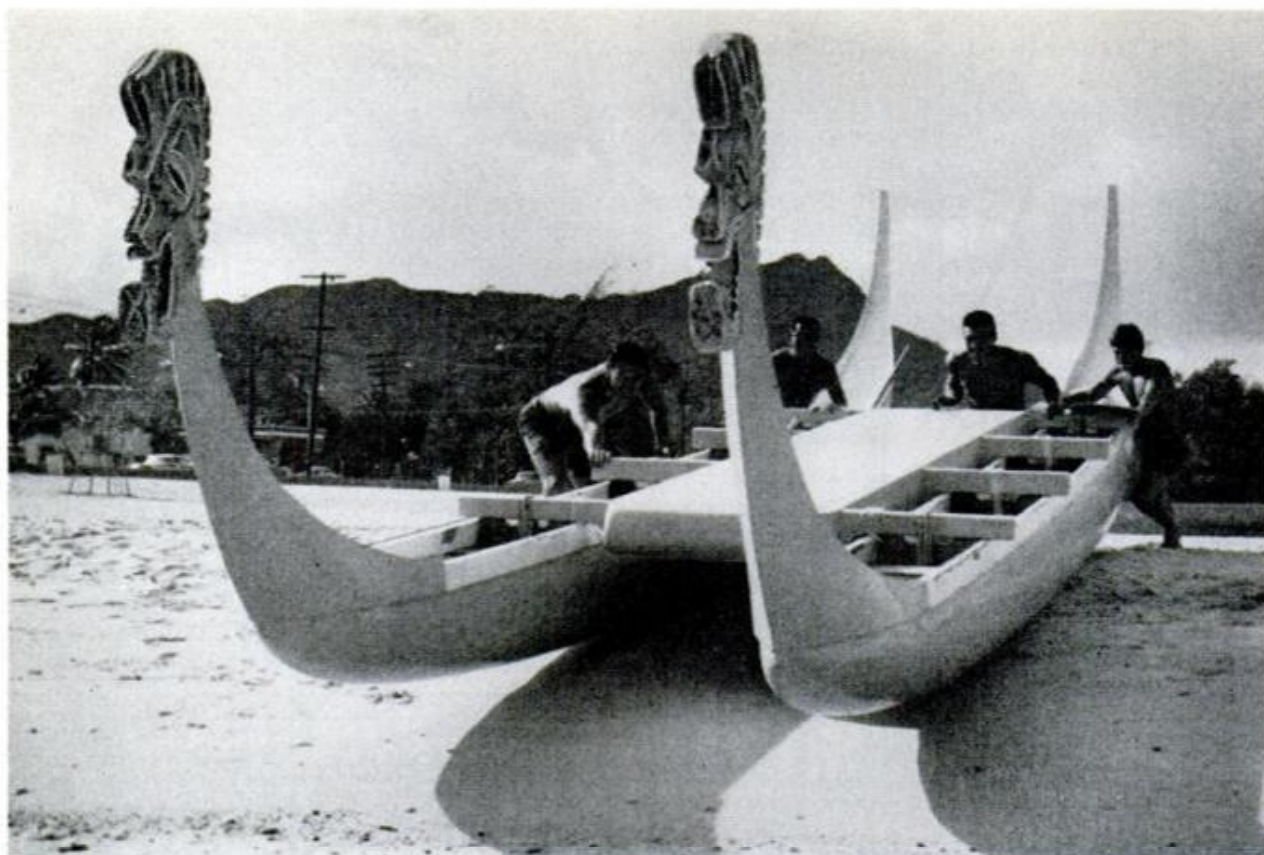
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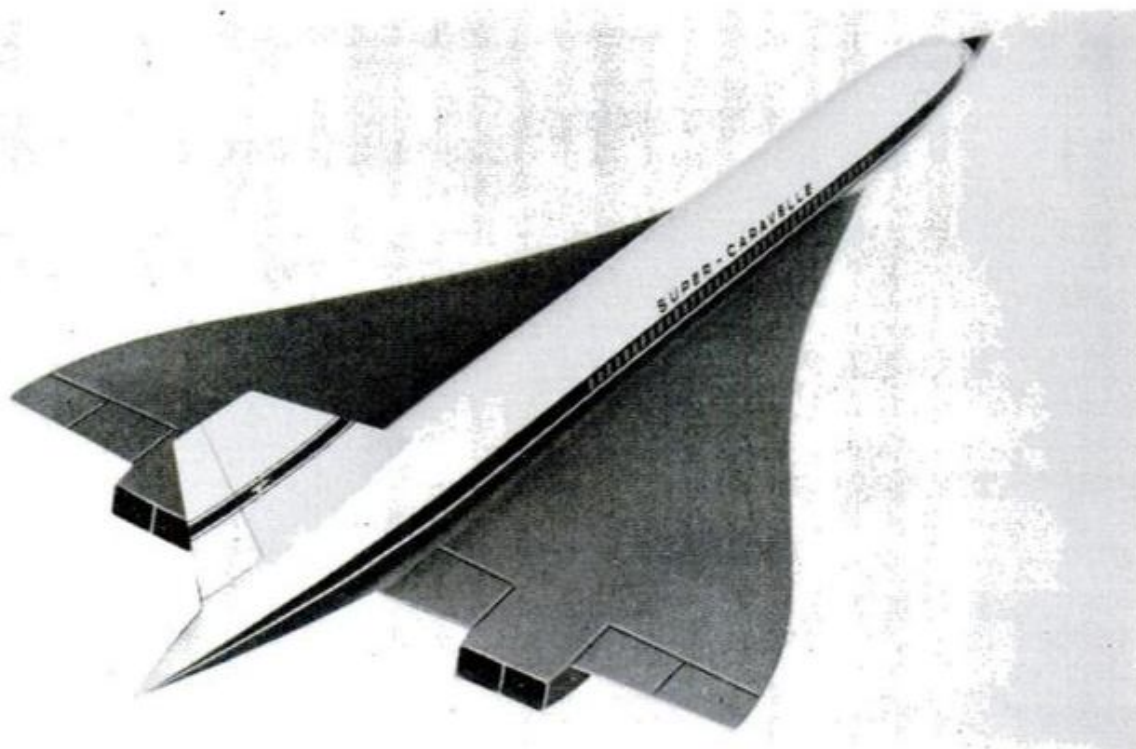
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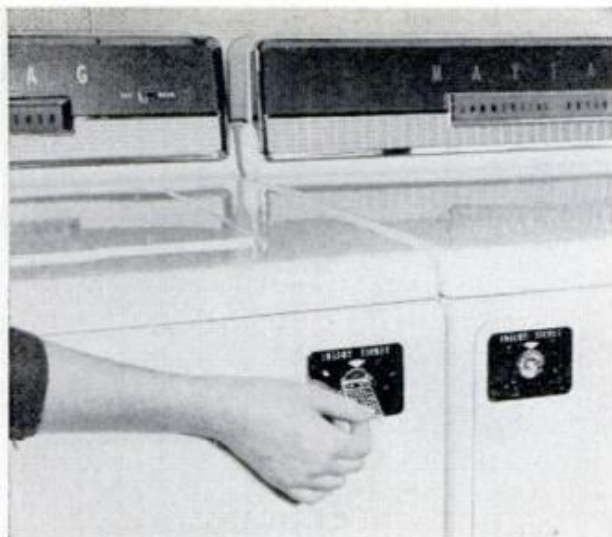
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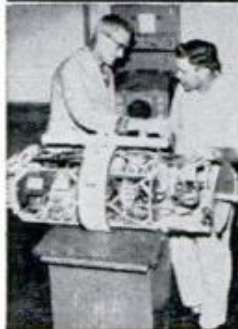
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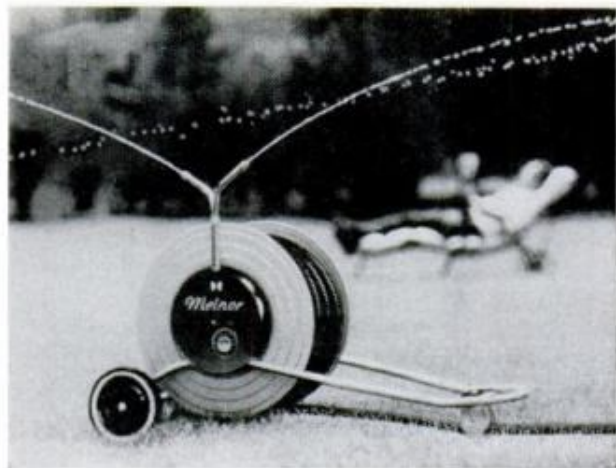


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STARTER Collections, 15 Indian cents, \$3.50. 12 Liberty nickels \$3.50. 18 Barber dimes, \$7.50. 15 Barber quarters, \$10.00. 15 Barber halves, \$20.00. Postpaid. All different. Folders, Good, Herman Prager, 470 27th Avenue, San Francisco, Calif.

LINCOLN Cents: 1923S, 24S, 21SP, 16SD, 17SD, 18SD, 19SD, 20SD, 25SD, 29SD, 30SD, 28SD, 27SD, 1955S, 54SP, 32D, 33P, 39SD. Good to fine. Complete lot \$7.50. Rolls 1955S \$10.00 fine to X fine, 1949S \$3.00. Berry, Box 306, Westminster, Calif.

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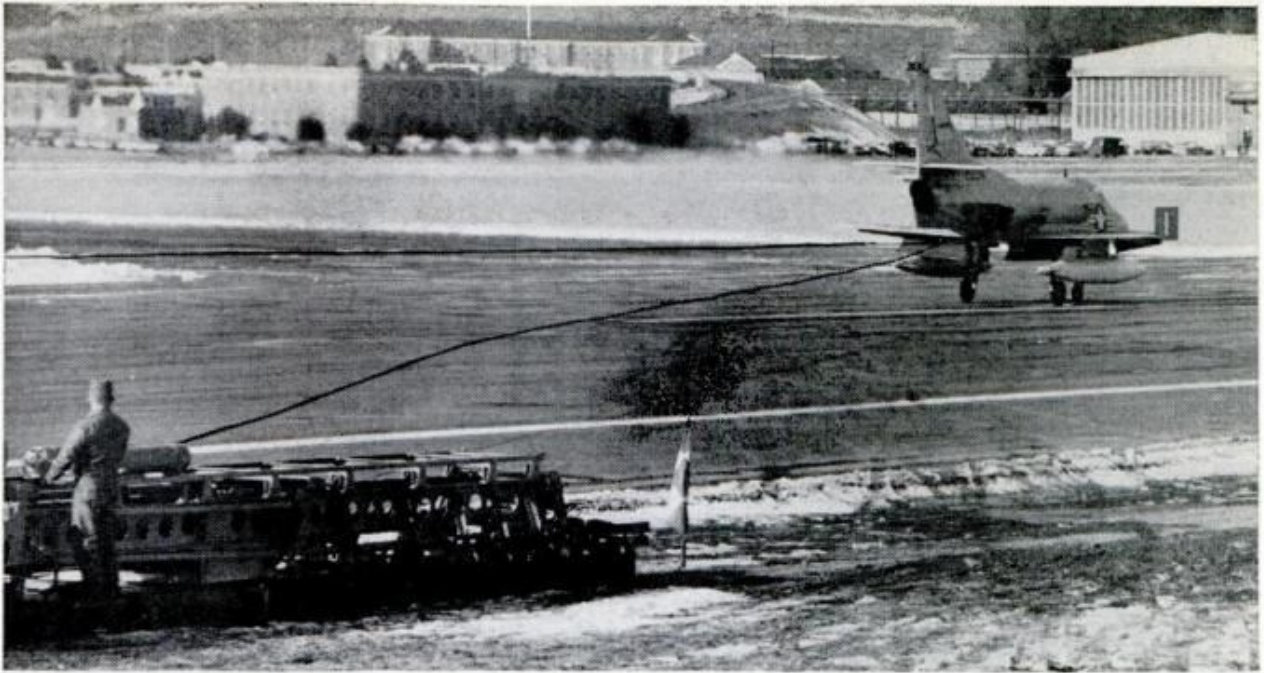
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Marine Jets Use Arresting Gear for Short-Field Landings

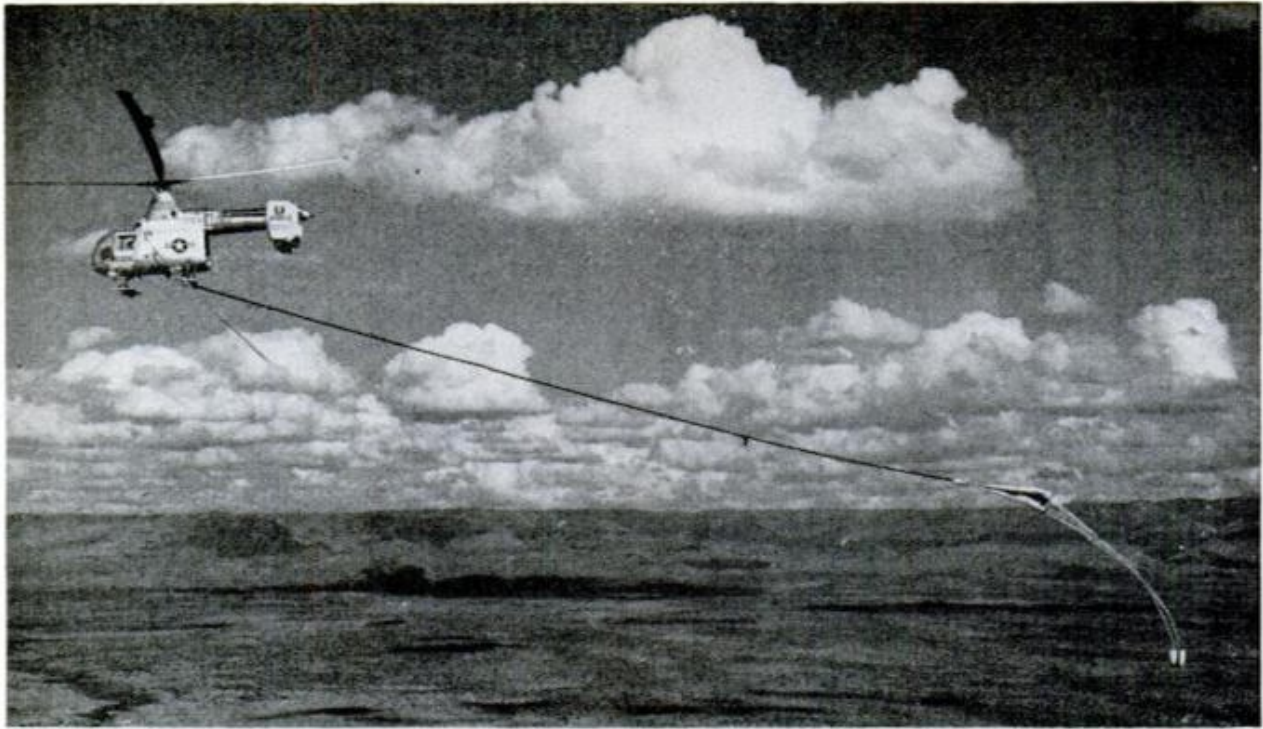
Borrowing a principle from Navy aircraft carriers, the Marines are practicing with arresting gear for landing their supersonic jet fighters on hastily constructed landing strips too short for normal use.

The arresting gear and JATO (jet-assisted takeoff) equipment will allow the

fighters to operate from advanced bases only 2000 feet long. Normally, the jets use fields with runways 8000 to 10,000 feet long. The new technique will keep them close to the front lines, for close tactical support of ground forces, and also eliminate long trips back to remote bases for refueling.



"I see Linkletter is using his new helimower!"

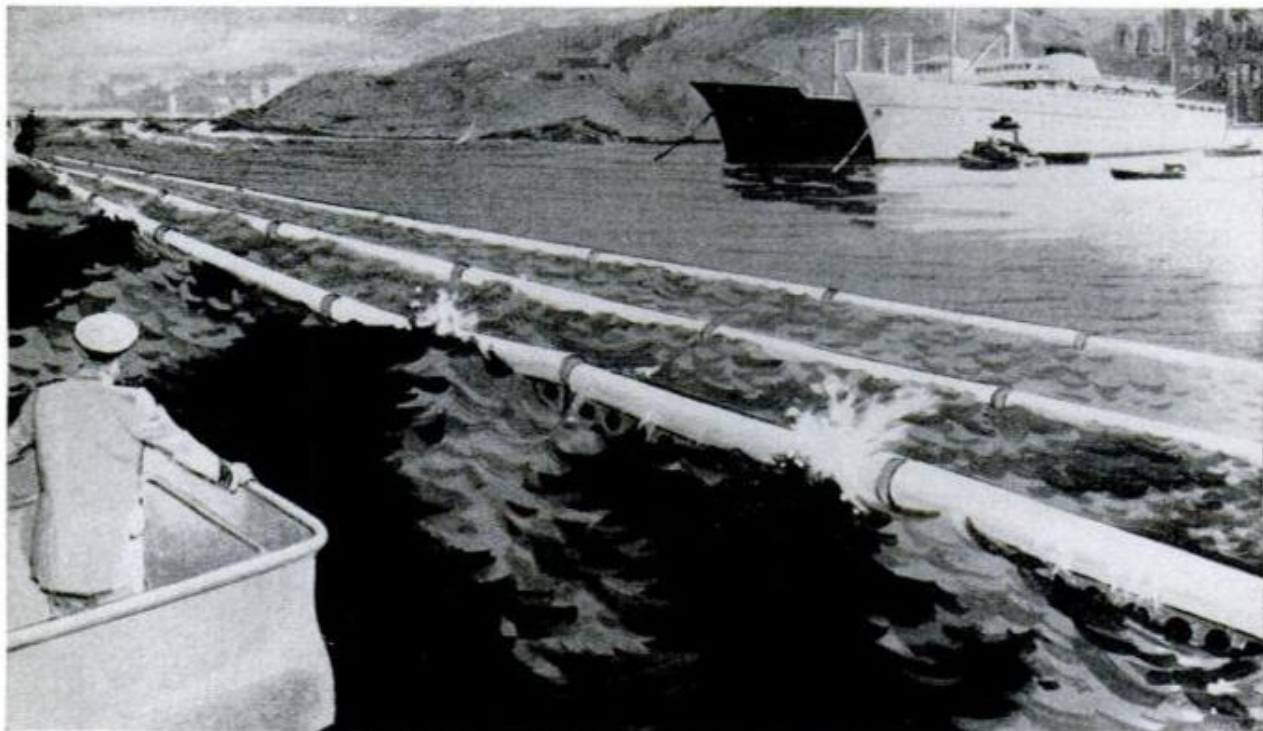


'Copter Makes Aerial Catch of Nose Cone

Aerial fly-casting caught a dummy nose cone for a Kaman H-43B *Huskie* in a recent test at the Air Force Missile Development Center at Holoman Air Force Base, N. M.

Until recently, the Air Force has snatched

most nose cones and satellites from the sky with huge transports, usually Fairchild C-119 *Flying Boxcars*. Besides being maneuverable, the helicopter can return the nose cone to the ground without having to make a landing.



Portable Breakwater Traps Waves, Creates Harbor

Vertical panels of coated fabric hung from plastic floats are being tested as possible artificial breakwaters to create temporary harbors or small-boat marinas, aid refueling or rescue operations, or protect offshore oil rigs or Texas towers.

Three parallel rows of panels have reduced three-foot waves to inches. Larger sizes may be able to quell 10-foot waves, even in open water.

The wave traps were developed in the research center of the U. S. Rubber Co.

HOW TO MAKE YOUR SPEEDOMETER TELL THE TRUTH

ALMOST ALL speedometers are off. An initially accurate reading on a car will be wrong after $\frac{1}{16}$ -inch of tire tread wear. Accuracy at one speed doesn't mean true readings at all speeds, but fairly accurate readings—probably less than five miles off—over the normal driving range.

To find true car speed (as well as odometer error), with the average load carried, head for the nearest tollway or other road with mile posts.

Hold the needle on 60 m.p.h. and time the trip between mile posts. If the speedometer checks out right on the nose, a mile in 60 seconds, that's fine—for that speed.

This doesn't necessarily mean accuracy at other speeds, however. At 80 m.p.h., for example, a speedometer could be off as much as 15 m.p.h.

Here's how to figure your actual speed at *any* indicated speed: There are 3600 seconds in an hour. Divide the number of seconds it takes you to go a measured-mile into 3600, and you'll have your answer in m.p.h.—

$$3600 \div 75 \text{ secs.} = 48 \text{ m.p.h.}$$

(With a slide rule, you can set the 6 on CI-scale over the 6 on D-scale, read off your speed in seconds-per-mile on CI-scale, and directly below on D-scale will be your speed in m.p.h.).

If you don't want to figure while driving, use the handy table (at right). Above 60 secs., the table reverses itself. If you go a mile in less than 60 secs., read time in the right-hand column; your speed will appear on the left.

To correct the speedometer, it is easier to recalibrate the dial than the needle, which entails a minute adjustment of a

SPEEDOMETER

Seconds per mile	Miles per hour	Seconds per mile	Miles per hour
180	20	76	47.4
170	21.2	74	48.6
160	22.5	72	50
150	24	70	51.4
140	25.7	68	52.9
130	27.7	66	54.5
120	30	65	55.4
115	31.3	64	56.3
110	32.7	63	57.1
105	34.3	62	58.1
100	36	61	59
98	36.7	60	60
96	37.5	59	61
94	38.3	58	62.1
92	39.1	57	63.2
90	40	56	64.3
88	40.9	55	65.4
86	41.9	54	66.7
84	42.8	53	68
82	43.9	52	69.2
80	45	51	70.6
78	46.1	50	72

very delicate spring; even this is usually unsatisfactory for all speeds. You can calibrate the speedometer and make up a new dial to paste over the old one, or determine actual speed in increments of five m.p.h. through the useful daily range and attach a chart with these figures to the instrument panel. Tire wear or load change necessitates periodic recalibration.

To check odometer, drive over a measured 10 miles, noting the reading before and at the end of the stretch. The difference should be 10 miles; if it isn't, the ratio of error can be determined and applied to an odometer reading for any length trip.—G. C. Edmondson

Meteorites Durable on Earth

Lying in the cold, cold ground doesn't seem to affect meteorites very much. Both the stony and iron types resist corrosion to a puzzling degree—an Earth age of 600,000 years for some of the iron visitors from outer space is not unusual!

Scientists once believed that meteorites disappeared by weathering in a relatively short time, but recent studies by two men have indicated that they are long-lived.

Dr. James Arnold, University of California, dates iron meteorites by measuring amounts of radioactive chlorine-36 they contain. Cosmic rays hitting meteors while they are flashing to Earth produce radio-

active compounds that provide a way of telling time elapsed after a meteorite's fall, because radioactive compounds disintegrate at a known, steady rate. Dr. Arnold found that the Williamstown meteorite discovered in Kentucky was 600,000 years old, and further investigation established this as a not too unusual age.

Dr. Hans E. Suess, also of the University of California, reports that by measuring the radiocarbon content of stony meteorites he has established that those whose age had, up-to-now, been unknown, have been on Earth from a few thousand to 20,000 years.



FORD OF ENGLAND sires a baby Thunderbird in this Capri, a new Italian-styled sports coupe

Spotlight on the CONSUL CAPRI

By Dick Williford

OUT ON THE ROAD, we found Ford of England's Consul Capri almost as much fun to drive as its racy lines had led us to anticipate.

At three turns lock-to-lock, the steering is satisfactorily quick for anything short of sports car competition, and yet it does not require nervous attention during normal driving. Recirculating-ball gearing makes the steering action smooth and precise.

Tire adhesion is good on all surfaces; ride is comfortable with a minimum of body roll (achieved with the use of soft springs and stiff shock absorbers) resulting in safe, stable and predictable handling.

Top speed is about 80, but the Capri seems to run best between 60-70 m.p.h., and gives the impression that it could run for long periods of time at full-throttle without damage.

The disk brakes on the front wheels are a distinct plus. The Capri would be quite satisfactory for most driving with drum brakes up front as well as in the rear, but when you really want to haul this car down from 70 or 80 in a hurry, those fade-resistant disks do a job and keep on doing it, stop after stop.

The Capri shares the Consul Classic's 81-cubic-inch engine, rated at 54 hp. (developed at 4900 r.p.m.). The plucky overhead-valve four has a torque rating of 74 foot pounds at 2500 r.p.m. Known as the 109-E, this power plant was adapted from

CAPRI'S WIDE DOORS and separate, forward-tilting front seats give easy access to the car's rear area



the Anglia's 105-E engine by increasing the stroke from 1.9 to 2.56 in. This relatively simple expedient raised the displacement from 60 to 81 cu. in. Bore remains 3.18 in.

In one area we found the Capri disappointing—there's quite a gap between the potential of the well-balanced, roadworthy chassis and the ability of the engine to take advantage of this potential.

When the Capri's designers converted it from the Classic sedan to a sports coupe, by lopping off the top structure, they lowered the center of gravity and accordingly, reduced lean, sway and weight transfer, all of which improve handling and stability.

However, the car's weight remains virtually the same (2055 lb. for the Capri as compared with 2093 for the four-door Classic). No change was made in the gear ratios which seem most suitable for a family econ-

(Continued to page 60)



SEAT BELTS, if used in every car, could save at least 5,000 lives a year . . . reduce injuries by one-third, according to the National Safety Council. Many of those saved from injury or death would be youngsters—for *drivers kill and cripple more children than any disease*. Protect *your children* . . . drive with loving care. Give them the security of seat belts.

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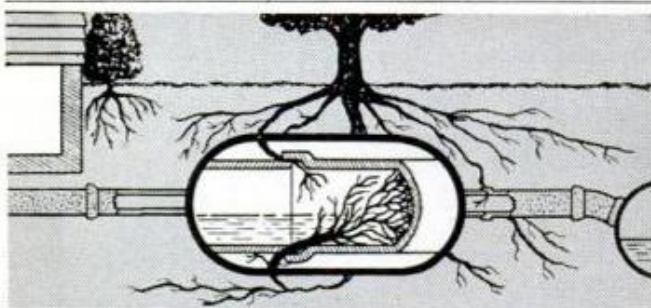
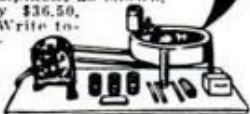
City..... Zone..... State.....



Make your own Gems 36⁵⁰

The Gem Maker comes complete with all necessary equipment, including a super-charged diamond blade for sawing, and all the wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt for only \$36.50, f.o.b., Burlington, Wisconsin. Write today for information and literature.

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

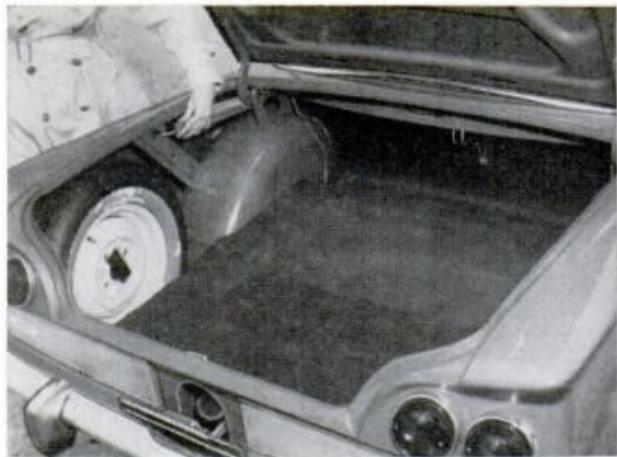
Roots are just naturally thirsty. They force their way through joints in your sewer line, eventually clog it. Toilets and sinks "back up", soon overflow. Now you can avoid costly digging or mechanical cleaning this easy, permanent way.



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.



LARGE TRUNK SPACE owes a lot to spare mounted vertically in fender well. It's 52 in. wide, 49 in. deep

omy car of the Classic's weight, equipped with a 54-hp. engine.

First gear of 4.11 to 1 (coupled with the 4.12 rear axle) gives enough torque to start fully-loaded on a hill and pull a trailer, too. Using the 2.39 to 1 second gear, you can start on level ground and crawl through traffic at a walking pace. Third gear, at 1.41 to 1, is the correct transmission ratio for high-speed passing and hill climbing. But, it's a far gap from second, leaving a "soft" spot in the acceleration curve.

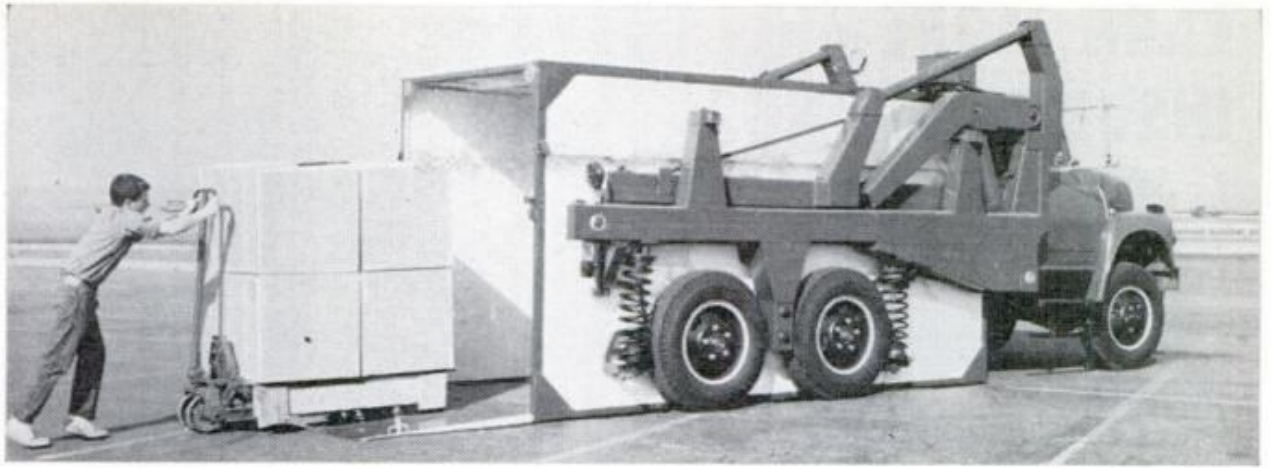
Also, coupled with that low (i.e. high numerical) axle ratio, Capri's third gear allows the acceleration curve to flatten out at about 55 m.p.h. With a happier rear axle cog, say 3.70 to 1, you could zoom on up to 65 with plenty of snap.

Top gear, at 1.00 to 1, gives good hill climbing power at 55-60, but with that 4.12 axle ratio, the engine seems a bit noisy at cruising speeds of 65-70. A better setup would be a higher (i.e., numerically lower) rear-axle ratio for quieter, more economical cruising speeds, plus higher top speeds. This would also "open-up" third gear, making it suitable for hill climbing and passing throughout the 45-70-m.p.h. range.

Granted that a 1340-cc.-displacement engine, coupled with a 2000-lb. car that is intended for all-around motoring, cannot be all things to all drivers. Therefore its rear axle ratio must be a compromise, balancing the need for pulling power at low speeds with desirable passing and cruising potential at the high end.

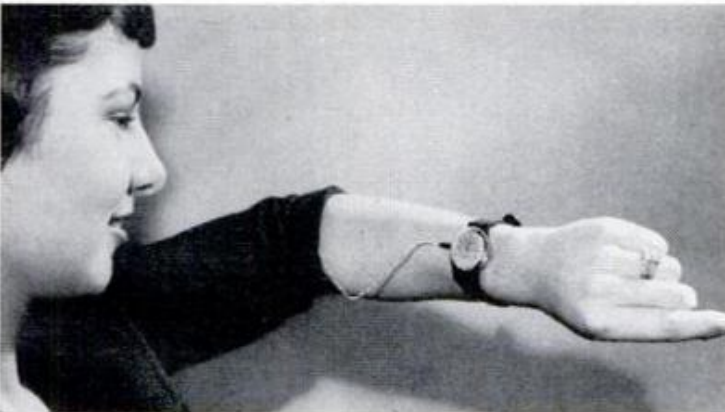
Another reason for sticking with the existing ratios—eminently suitable for the Classic sedan, which must be able to carry four adults and trunk jam-packed with luggage—is just plain money. A separate set of axle and transmission ratios, more suitable for a two-place touring coupe like the Capri, would add to the present \$2378 cost (at East Coast ports).

(Continued to page 62)



Ground-Level Loading

Driver and vehicle down-time is cut with a new truck which uses interchangeable containers of assorted sizes and types with gates that double as loading ramps. These allow production-line or ground-level loading. Cab-operated control lifts or drops containers in less than a minute, or suspends them up to 60 inches high. Manufacturer is Techno Prods., Cleveland 3, Ohio.



Watching Heart Beats

Effects of stress on heart action are gauged by an electronic monitor inside a wrist-watch case.

Two lead-foil electrodes, taped to a patient's chest, pick up heart-beat voltage which, amplified, causes an electromagnet to move the hands: 9000 beats move the minute hand full circle. By comparing beat totals with activity it's possible to tell stress. Lockheed scientists developed the monitor.



Stock-Car Trailer

Rebuilt from a Rambler station wagon, minus engine and front end, this camping trailer sleeps two adults and two children.

The seats were removed to accommodate the beds and, under the hood, there's room for gas tanks and camping stove. A trailer hitch was welded on the front end, and a rack holds a boat.

The car-trailer was built by Earl Rockwell of Francesville, Ind., from the 1951 Nash. He put screens on the front windows, for fresh air while sleeping, and curtains on all the other windows. It uses the original rear wheels and a small front wheel.

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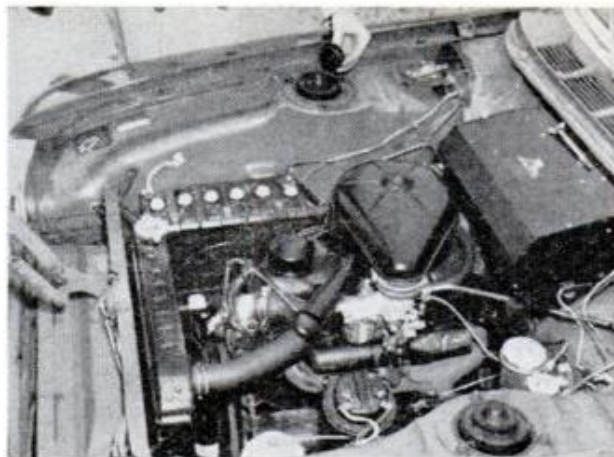
\$..... TO OPEN MY ACCOUNT

NAME.....

ADDRESS.....

CITY..... STATE.....

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STURDY, FOUR-CYLINDER engine sits deep under Capri's wide hood, yet is easier to service than it looks

Still another factor favoring the Capri's present ratios, are the narrow, winding roads of Great Britain, where you need most of your acceleration below 60 m.p.h. This the Capri has in good measure. It will jump up to 40 m.p.h. in 9 seconds, and hit 50 in 14 secs., with two men aboard. Nevertheless, we'd still like to try one with a 3.70 to 1 rear axle.

Obviously, you won't be rushing out to the local drag strip with a Capri, but it has a lot to offer if you want real "fun-driving" with style and generous economy. PM's over-all test mileage was 26.3 miles per gallon. This included cold weather warmups, a lot of sliding around on icy streets, plus our usual acceleration testing, so owners can look forward to better mileage if they drive with moderation.

A true pillarless hardtop, the Capri has a roof line that's two inches lower than the 56-inch height of its sister car, the Consul Classic.

Because the Capri is a two-seater made from a four, there's room for large, well-padded lounge chair seats (in your choice of leather or vinyl). These seats are not the small, wrap-around buckets typical of most sports cars of similar size or power, but are shaped to give good support when cornering, and they have a 5-in. fore-and-aft adjustment range.

An optional rear seat cushion rests on the kick-up panel above the rear axle. While this seat is comparatively large (49 in. wide by 17 deep), the 40-degree slope of the Capri's rakish rear window restricts headroom, limiting the rear to children or additional luggage.

Sold and serviced in this country by strategically-located Lincoln-Mercury dealers, the Capri handles daily motoring chores reliably, economically—and with style.

And if you're the sporting kind, its good handling and excellent brakes make it a fine rally or sports touring car. ★ ★ ★



FINISH

Mobil Economy Run



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For top economy and performance, twice as many car manufacturers the world over (including Rambler) specify new silvery-plated Champion spark plugs. Why settle for less in your car?



CHAMPION

Pentagon sidelights

By William R. Kreh

Pure oxygen and everyday air are hard to tell apart. Researchers at the Naval Aviation Medical Center in Pensacola, Fla., recently conducted tests on 156 aviation cadets. The cadets took sniffs from six tanks, three of which contained oxygen. Results showed none could conclusively and positively tell which was which. The Navy's interested in knowing this because only recently it's been found that too much oxygen can be just as hazardous as too little to high-flying jet pilots. The medical men also confirmed that oxygen builds up a supply of vitality, but that football and other athletic coaches would have better results if they gave their athletes shots of oxygen only before, rather than during or after an athletic event.

Army scientists are shooting at each other. But it's all just research into finding the right size and shape of future antimissile missiles. They want to know exactly what happens when two high-velocity projectiles collide in flight, because a defensive missile intercepting an intercontinental ballistic missile could strike at velocities upward of 40,000 feet a second. Little is known about the effects of impact at these velocities. Army ballistic experts are getting about 20,000-feet-a-second velocity in their experiments. One of the special guns shoots a two to seven pound "target projectile" while the other shoots a 30-caliber "interceptor projectile." High-speed movie cameras record what happens when the two hit.

Time "stopped" in the United States the other day when the Navy moved a clock. The clock was the 75-pound, \$13,000 time-piece which controls the time in this country. It stopped "ticking" while being moved to a new \$230,000 laboratory at the Naval Observatory in Washington, D. C. A standby clock, however, kept time during the 10-minute, 300-foot move. Heart of the clock, which took two years to build, is a gold-plated quartz crystal oscillator. To keep its accuracy, its temperature must never vary by more than $\frac{1}{200}$ of a degree, so a 24-volt battery was hooked up to provide the necessary heat to keep it from getting chilled during the move.

Magic crystals called lasers may form the basis for a real science-fiction weapon—a "death ray."

The Army won't admit it's working on such a weapon, but spokesmen admit a laser weapon is entirely possible. A laser amplifies light and produces it in a narrow beam. Over one mile, the beam spreads only two feet. In one experiment, a scientist focused a "medium power" laser beam to a spot two millimeters in diameter and burned a hole through 10 tempered steel razor blades with one extremely short pulse of light.

In planning your trip to the moon, you can now study charts to help you find your way. The Air Force has published the first 13 of a series of 84 three-color charts of the surface of the moon. Each chart is 22 by 29 inches and is drawn to a scale of one inch to 16 miles. Cost of the charts is \$7.50.

How slow can the world's fastest plane fly? A demonstration of the versatility of the Navy's F-4H Phantom, which holds the world jet speed record, recently had the supersonic jet flying formation with a Ryan PT-22 propeller plane built in the early 1930s. The jet, which can fly $2\frac{1}{2}$ times faster than the speed of sound, successfully paced itself with the vintage aircraft, which had a top speed of about 135 m.p.h.

A portable fallout shelter designed to protect bulldozer operators from radiation while cleaning up the rubble of an atomic blast is being tested by the Army. Fitted to large tractors, the one-man cab shields the operator from residual fallout by thick lead sheets sandwiched between structural steel walls and radiationproof leaded glass windows.

Women's clothing will be made the same way they make the Polaris missiles. Well, not really. But PERT—one of the biggest reasons for the success of the Navy's Polaris program—has been adopted by a brassiere manufacturer, as well as a New York show producer, the Post Office Department and the Department of Agriculture.

PERT is an acronym of Program Evaluation and Review Technique—a fancy name for a new system which is used to plan, schedule and control the influences of time, resources and performance to get a job done. It worked so well in the Polaris program that the Secretary of Defense has urged the military services to use the PERT system wherever possible. A booklet has been prepared describing the system for private firms interested in improving efficiency.



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You should care what parts go into your Chevrolet—because your Chevy does! When it comes to something as vital as brakes, it's particularly important to install only *genuine* GM Chevrolet parts. Dependability is the big reason. Chevrolet's premium-quality replacement brake linings are made of a specially formulated material to give you the sure stopping action and long brake life that were originally built into your car. The linings are **bonded by a special process**—there are absolutely no rivets used that can score the drum. And because they're engineered especially for your Chevrolet, you know they meet the exacting specifications of your car's advance-design braking system. Like all genuine Chevrolet parts, they're readily available through your local Chevrolet dealer and all leading independent garages and service stations. Ask for them by name. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



*Chevy-est: all Chevy with new-car reliability maintained part by part.

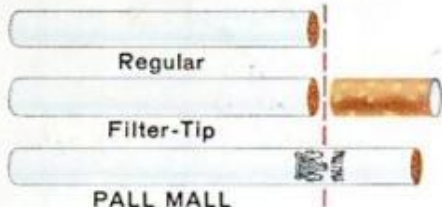


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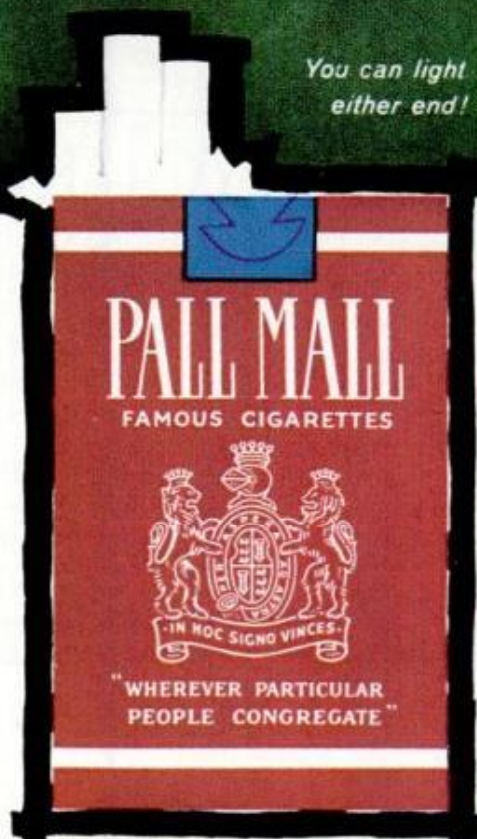
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can't beat Pall Mall's natural mildness. It's so good
to your taste. Never too strong. Never too weak. Al-
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fine tobacco tastes best.
Pall Mall's famous length
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around and through the finest
tobaccos money can buy.
Makes it mild but does not fil-
ter out that satisfying flavor!



Scuba Search!

**POPULAR
MECHANICS**

JULY

1962



THE ULTIMATE underwater communications device—a TV camera sealed in a watertight, balanced case

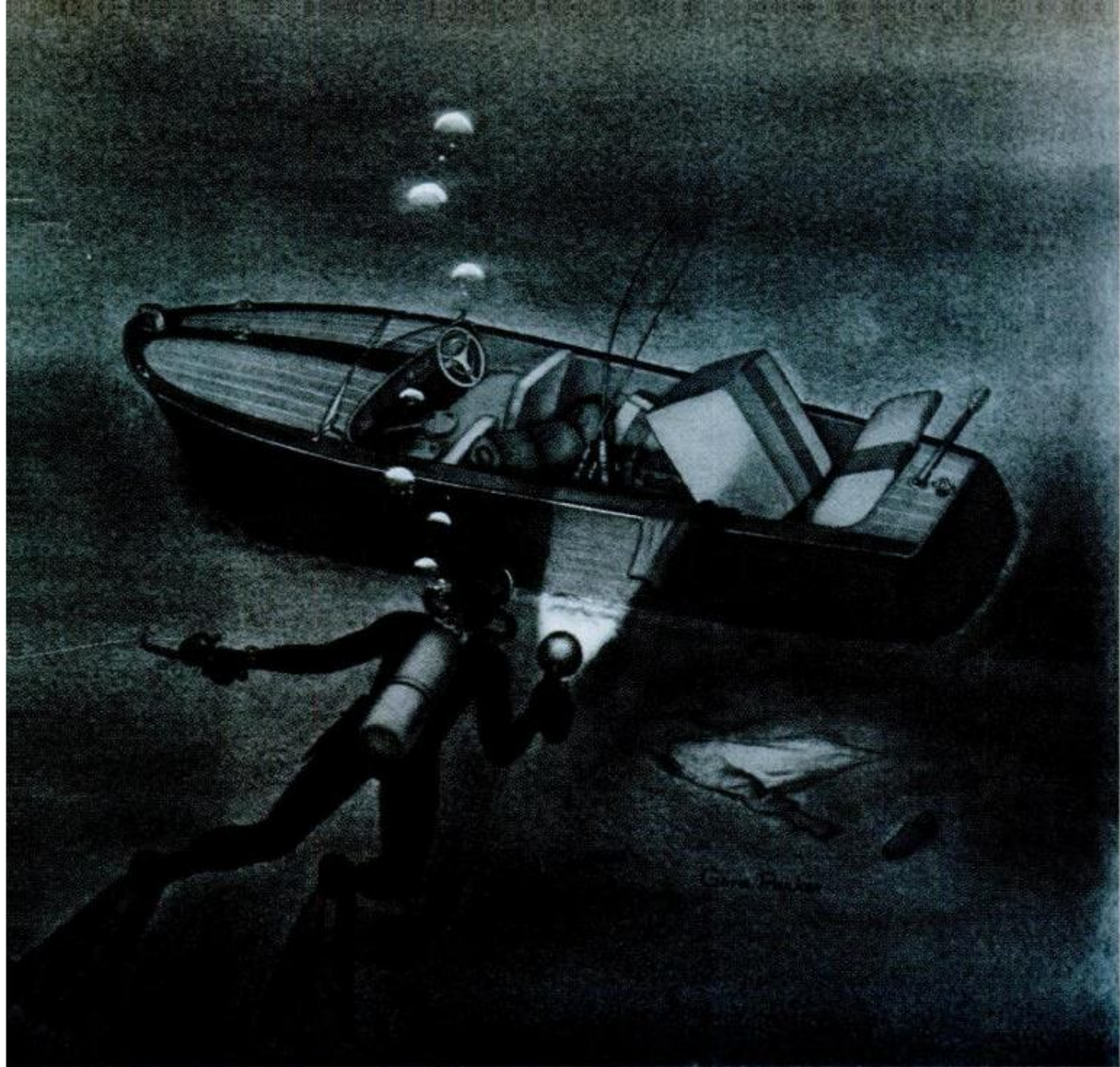
By Gene Parker

HIS VOICE on the telephone was hesitant. "Can you bring my boat back up from the bottom of Lake George?"

My reply was just as cautious. "How deep?"

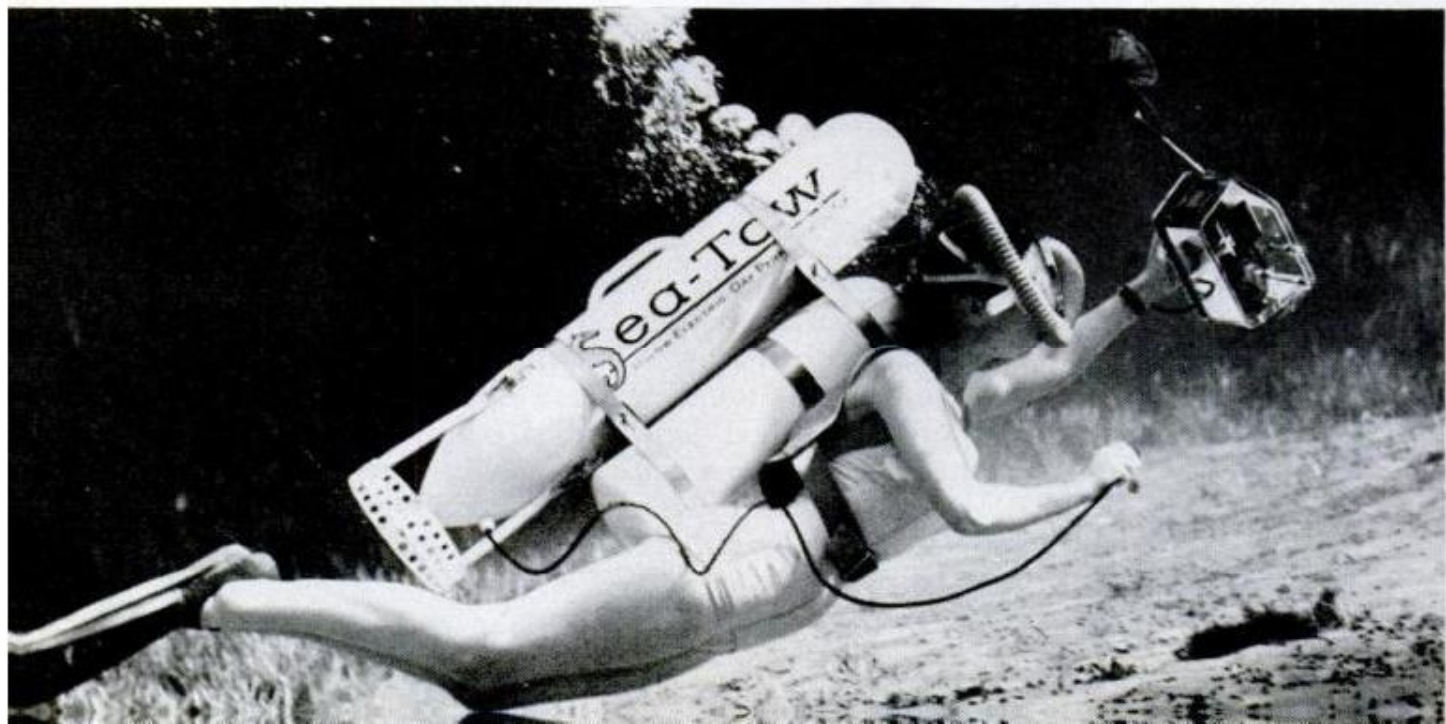
"Well, it sank off Dome Island, above Pilot Knob."

I told the caller that he had done a good job of picking the deepest spot on the lake, but that we could probably raise his boat if we could find it. He said he had placed a marker buoy on the spot, and I relaxed a bit—that was a break. He went on to explain that his inboard



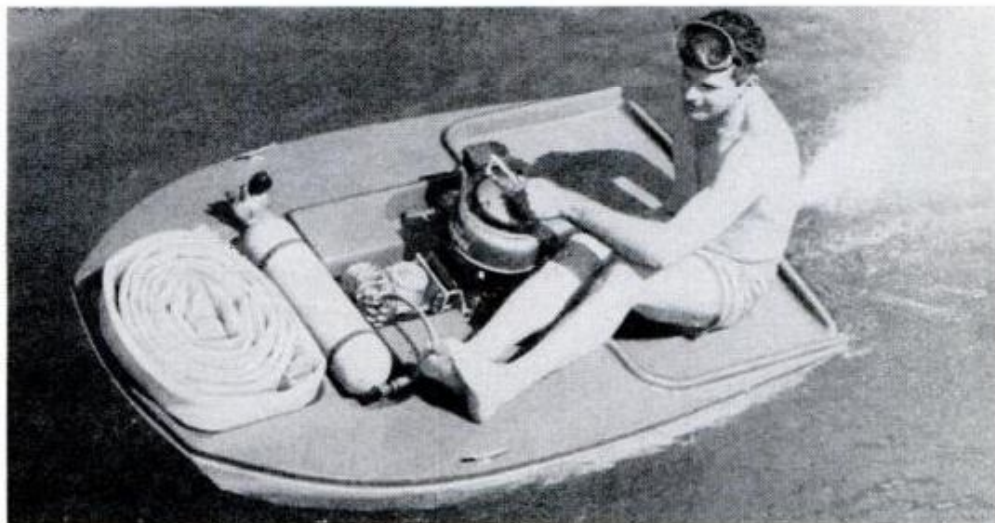
PM'S AUTHOR, doubling as a painter, did this impression of himself finding the boat in the salvage operation described in the text. Note fishing reel and stub rod used to hold light line to guide the search

PORTABLE PROPULSION UNIT, mounted on tank harness, uses electric motor to propel diver at three knots





HIGHLY MANEUVERABLE diving plane (left, above) lets a towed diver "fly" through water behind a boat. Flexible planes are controlled by an aircraft-type joystick. Simple lifting "balloon" (right, above) is a strong plastic bag which is tied onto a find, then inflated from diver's air supply or from a separate tank. Easier to use than makeshift oil-drum floats, the bags come in sizes to lift weights from 100 to 1000 pounds



SPECIALTY TOOLS for underwater prospectors, jet-powered dredge boat (left) and dredge suck up gold-bearing gravel for sluicing. Engine powers suction dredge; tank on boat supplies air through "hookah" rig

runabout had suddenly filled with water and sunk while he and two companions were crossing a wide, choppy area. Fortunately, a nearby fisherman had come to their rescue, fished them out, and stayed to help them mark the spot with a buoy. Encouraged, we agreed to try to find and raise the boat.

Running an underwater search and salvage service, even as a spare-time activity, is a lot of work. It's also a lot of fun. It isn't dangerous if you have the right equipment and use it properly, but a measure of excitement is usually inherent in the work, whether it's for pay or a volunteer dive for police or Civil Defense authorities. For frosting on the cake, there's always the lure of "sunken treasure," whether it's pieces of eight, a lost

outboard motor, or a valuable archaeological find.

Toughest job—and the biggest challenge—in any kind of underwater search or salvage mission is finding the object itself. Unless it's marked or spotted accurately, even a big boat can shrink to a needle size in the haystack of a lake bottom.

That's how it was with this job. When we arrived at the scene of the sinking on the next weekend, the buoy was gone, stolen by curious or thoughtless boaters, but that was nothing new to my partner, Len Jones, and me. We'd had a plague of buoy thefts all summer.

After questioning the owner and an eyewitness carefully, we staked out a search area with four marker buoys with Divers Flags and started our search. At this



DIVER-HELD SONAR senses objects up to 120 yards away. Self-contained unit has two sets of earphones for two divers; three-position switch for range settings; is pressure resistant to 200-foot depths

depth, 185 feet, we chose to work a circular pattern around a buoy anchor. With this method, which works best when searching for large objects under poor visibility, the diver descends to the anchor, then attaches a 100-foot line to it and swims to the end of the line. He then turns and swims a complete circle. The line, dragging between the diver and the anchor, will hang up on any large object. The diver gouges a mark on the bottom before starting his circle; when he finds his mark he knows he's made a complete swing.

He ascends to the surface for his rest while the next diver moves to another buoy. These dives took about 12 minutes each. Depending on visibility on the bottom, the buoys are spaced so the search circles adjoin or overlap. Repeated circles form a checkerboard pattern over the search area.

Taking turns, and carefully calculating the time we'd spent underwater, Jonesy and I started our search. At 185 feet, our optimum exposure time was only 35 minutes a day, and with the nearest recompression chamber 200 miles away, we couldn't risk staying overtime and get-

ting "the bends." Fortunately, on our fifth dive—my third and the last of the day, I saw the big red-and-mahogany boat sitting upright on the mud bottom. Fighting nitrogen narcosis, the effect of breathing compressed air at great depth, I swam to the boat, tied a light marker line to the steering wheel, picked up a fishing rod from the cockpit and kicked off toward the surface, paying the marker line out as I ascended.

When I surfaced, waving the rod, the owner excitedly proclaimed it his; we'd found the boat. Len made one more brief dive to attach a regular marker buoy line and we called it a day. After the time we'd spent on the bottom, any more dives that day would have been foolhardy.

Early the next morning we prepared to raise the boat. Its dry weight—2600 pounds—told us it would weigh about 900 pounds on the bottom. Our plan was to sink two 55-gallon oil drums, attach them to the lifting rings at either end of the boat, then fill the drums with compressed air until they were buoyant enough to lift the boat. At that depth, each drum would have about 450 pounds of lift; we planned to add other lift as needed with surface lines.



AUTHOR and diving companion John McMullin, with three 200-year-old British "Brown Bess" muskets recovered from the depths of Lake George. Eastern lakes, once the highways of early Americans, are rich in relics

After a grueling day of wrestling drums and lift lines, and one big disappointment when we'd lifted the boat only to lose it again, because of a mistake in towing signals, we finally buoyed the boat almost to the surface, then rode the submerged craft while our boat towed it to a landing dolly across the lake.

After winching the boat out of the lake, we found an entire plank torn loose on one side, which explained the sudden sinking. The boat was damaged, and showed some effects of high-pressure soaking on the wood surfaces, but it could be repaired.

Our job was done, but before we packed up to leave, we drank a toast in soda pop recovered with the boat, still icy cold after its stay at 31 fathoms.

Simple as it sounds, that was a deep, cold, tough operation. It was safe, but only as long as Jonesy and I used our equipment properly and followed these safety commandments:

—Alternating divers, one going down while the other came slowly toward the surface on his decompression schedule, kept the resting man as a safety diver on the anchor rope at all times.

—Extra tanks, filled and ready, were on hand at all times.

—Each diver carried a long, light line on a reel so he could mark a "find."

—Depth and time of each dive were planned and recorded (and strictly adhered to) to keep within safety limits.

—After each dive we rested while comparing notes.

When we were both in the water at depth at the same time, Jonesy and I preferred not to wait out the long decompressing ascent on a line beneath our boat, but moved to a nearby underwater cliff and worked our way up, exploring the rocks as we rose. We managed a lot of exploring that way, using time that would otherwise have been wasted.

The equipment for underwater search and salvage can be as simple as a mask, snorkel and basket float, or as complicated as an electric two-man submarine equipped with electronic navigation and locating gear. Here's the equipment used by my group, the Schenectady Search and Recovery Divers:

—Good-sized boat and a raft for a float.

—Electronic depth indicator for sensing bottom.

THERE'S A SYSTEM TO SEARCHING

- Marker buoys and Divers Flag buoys, and light line on reels for markers.
- Search equipment—underwater propulsion devices or towed diving planes.
- Portable lights for deep or dark water.
- Underwater communications equipment—radio, telephone or loudspeaker.
- Diver-held locating equipment—metal locators, hand-held sonar, etc.
- Underwater camera equipment, for photographing finds on the spot.
- Recovery equipment—“balloon”-type floats, spare tanks, cables and hardware, and “prospecting” equipment, such as portable hydraulic dredges.

For most searches, conducted in water under 50 feet deep and clear enough for fair visibility, the diving plane-and-towboat system is unbeatable. Towed behind his boat, the diver—even without scuba equipment—“flies” through the water, controlling his course by moving the plane.

He can swing back and forth across the boat's course, and with practice can dive to 50 feet or more, though 30 feet is a sensible “floor.” Two divers, working behind the same boat, can cover twice as much ground. We prefer this system.

A diver planes behind a boat on a fairly long towline (three times the intended maximum depth, that is, a 60-foot line for searching 20-foot-deep water). He should travel at two to four miles per hour (under two, the plane doesn't respond well; over four, water resistance is tough on the diver). Using this system, he can cover a swath twice as wide as the visibility distance, and stay under as much as 2½ times his normal air time, since he conserves air by not exerting himself.

Snorkelers Can Use Plane

A snorkel diver can use the plane, too, but must, of course, fly to the surface occasionally for air. In either case, the diver tilts the plane in the direction he wants to go; the towline pull and angle of the plane do the work for him.

The diving plane is attached to the towline by a slipknot through the lead ring (see drawing on page 73). When he spots something that merits closer inspection, he simply pulls the tail of the slipknot (try it on dry land first) to release the towline. Just ahead of the ring, the towline runs through a small, bright-colored plastic foam float.

The released towline bobs to the surface, alerting the towboat crew. The diver holds onto the plane while he swims to the object, and if it's worth further inspec-

tion, he ties his reel-mounted light line onto the float and pays out the line as it floats to the surface. This marks his location and his find. He can tie the other end of the line to the object to make a good temporary marker buoy.

To warn other boats away from the towed diver, the towboat should also pull a float, mounted with a regular Divers Flag, on a line approximately equal to the diver's towline.

Shark Bait!

Unfortunately, not many divers like the diving planes for salt-water use. They feel like a trolled bait in shark waters.

For spot-searching for large objects, we prefer the method described earlier, where we circle a buoy anchor dragging a light line. When the same method is used for a detailed search, the diver makes one round, then shortens his line to the anchor and makes another round, and so on until he has covered the entire circular area.

With a large anchor or framework, he can make an automatic spiral search pattern by winding or unwinding his line as he swims around home base. The distance between two sweeps with any pattern should not be more than twice the visibility distance at that depth, that is, with 10-foot visibility, the search paths should be not more than 20 feet apart.

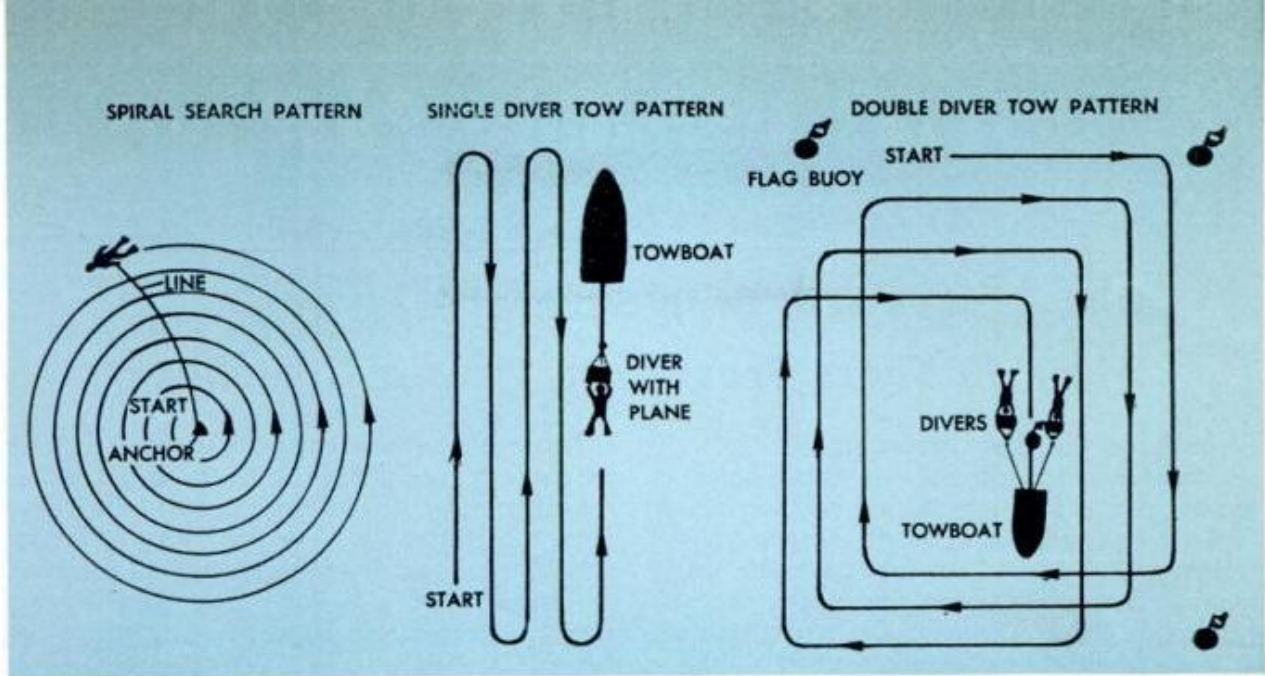
Easiest pattern for covering a large area quickly, as in underwater exploration, is to swim or be towed back and forth across the search area, again spacing the paths to avoid missing anything.

One problem with the back-and-forth pattern, however, is that a towboat has trouble turning around at the end of each sweep without slacking the diver's towline. An overlapping box pattern solves that problem, as shown on page 73 in the double-diver tow pattern. The tow boat, working within a square area marked off with buoys, executes overlapping rectangles until the divers have been towed over the entire marked-off area.

In any pattern, it is essential to mark off the course with buoys to help the boat driver, and to mount Divers Flags on the buoys to keep other boats clear.

An underwater search doesn't need to be formally organized. Any pair of divers—buddy system, remember—can casually scrounge the bottom of any body of water, and find anchors, fishing lures and all manner of overboard items. Occasionally they make a big strike. Real sunken treasure

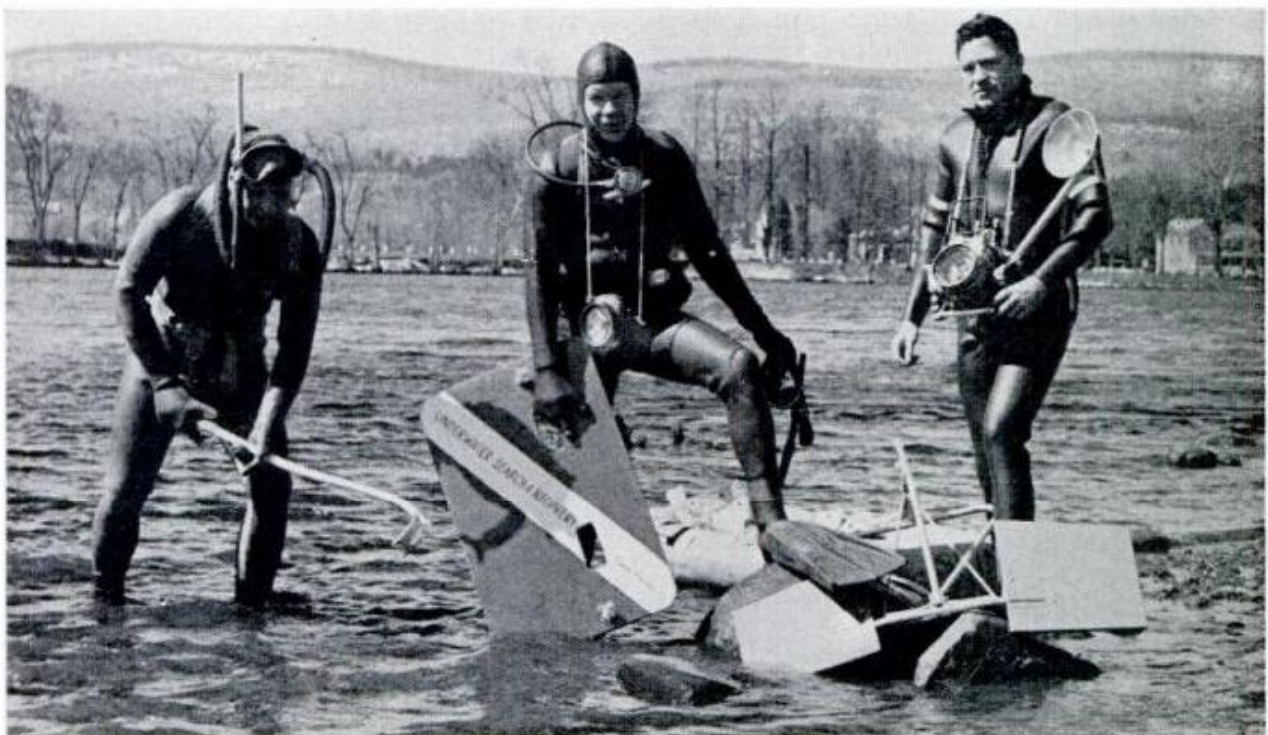
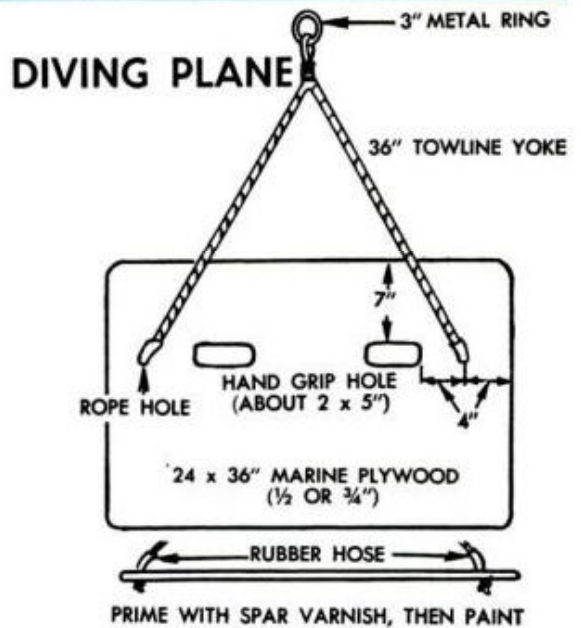
(Continued to page 198)



THREE TYPICAL search patterns. Left to right, a spiral search around an anchor for deep detail work, a towed back-and-forth pattern, and a professional overlapping box pattern for towing two divers

SIMPLE DIVING PLANE, right, is easy to make and use. Be sure to use marine plywood. Round and seal edges. Drill rope holes just large enough to hold rope inside close-fitting rubber tubing (to prevent chafing). For safety, paint bright red with four-inch-wide diagonal white stripe (see photo below) to resemble Divers Flag. Attach towline to yoke ring with a slip knot and allow bitter end to trail within easy reach so a quick tug will release towline. Attach plastic-foam float near end of towline so it will float to surface as marker when plane is released

AUTHOR, center, and two companions, rigged for a towed exploration. Equipment, left to right, includes digging scoop, two diving planes, underwater light (around author's neck), underwater camera





By Jim Whipple



Disk Brakes Will Stop Several '63s After 40 Years Brass Trim Tries a Comeback

Look for the disk brake in '63. It will be standard equipment on Studebaker's **Avanti** and probably optional on **Hawk** and **V8 Larks** as well as on another make. Disk brakes will be used on front wheels only because front brakes do the major part of the stopping job. Disk brakes will go on as part of a power package along with highest-powered engines, or as a production option.

Disk brakes will not be standard equipment because they are more expensive than conventional drum brakes and not vital to the safety of the average driver unless he does a lot of fast driving and hard braking.

Then too, the extra pedal pressure requires a power booster on cars weighing much over 2500 lb. **Studebaker's** disk brakes will be available only with power booster. This brake is manufactured by Bendix in the U.S. on license from Dunlop, the English firm that developed the brake.

Brass, that base metal with the gleam of gold, once limited to tacks, clocks and bedsteads, may soon turn up as automobile trim. Anaconda American Brass Co., a leading U.S. producer, announces some trial installations on a handful of 1962 cars.

Biggest problem in previous use of brass such as seen on antique autos of 1900 to 1920 was tarnishing . . . you had to polish it almost daily. Today's motorists would rather get their exercise on the golf course, so Anaconda intends to preserve the golden glitter of their trim with a coating of clear, acrylic lacquer.

We hope it proves out on the salty streets of northern U.S. cities, because the image of a luxury car in black or deep maroon with shiny brass grille, windshield and window trim, intrigues us no end.

Extended interval chassis lubrication, the biggest thing since the death of the grease cup, will be even bigger next year as more makes climb on an ever more popular band wagon. It seems that the monthly appointment at the local grease rack required by conventionally-lubed cars has not been one of America's favorite pastimes. **Chevrolet**, biggest single holdout for 1000-mile greasing will join the long-termers in 1963.

Intervals between chassis bearing repack of as long as 30,000 miles in some cases leapfrog 6000, 10,000 and 12,000-mile servicing of items such as fuel filters, front-wheel bearings, breather caps and the like. What's needed is a ready reference service chart visible under the hood to remind the forgetful.

Renault of France, second largest importer of automobiles into the U.S. has some goodies in store for the buyer who's looking for something smaller, more economical and more fun than the average Detroit compact.

Within the year we will see a new version of Renault's sports touring coupe, the **Caravelle**. Basically the present **Caravelle** unit body, it will have considerably more power and disk brakes. (PM will shortly publish a road test of this car.)

Later an entirely new four-door sedan, using the **Caravelle's** new engine, suspension and brakes, will be introduced in Europe for eventual import to the States.

The new **Renault** may well be priced to compete with a German import that's enjoying great success and little or no competition in the U.S. at present. This fact could turn a one-sided turkey shoot into a real live *guerre* once again.

Now that there's a second fiberglass production car, the **Avanti**, joining **Corvette**, which has been "glass" since 1954 (and we've yet to see a rusty one!), you can expect to see more and more of it. Right now there's a growing business in replacement front fenders of **FRP** (fiberglass-reinforced plastic) and one car will have a radiator overflow tank of fiberglass.

Although a fiberglass automobile body requires more time than one of stamped and welded sheet steel—due to the need for curing the resin—less than half the number of individual parts are needed and the tooling expense is less than the cost of steel.

The current trend toward unitized steel (body-and-frame) construction plus the time factor may limit the use of fiberglass to low-volume cars like **Corvette** or **Avanti**.

★ ★ ★



One-Man Antitank Missile

Compact enough for the ordinary infantryman to carry into battle on his back, an antitank-missile system is simple enough for a nonspecialist to operate and powerful enough to destroy any tank.

The 44-pound missile assembly (bottom) is easy to set up and ready to fire at all times. The operator (top), using a six-pound sight controller, can change the missile's direction with a thumb-tip control.



JULY 1962



Automatic Water Watcher

Measuring water flowing through its neatly housed mechanism, a timer that fits to a garden hose automatically shuts off the flow at a pre-set number of gallons.

The timer, which sells for \$4.95, is made by Melnor Industries, Inc., Moonachie, N. J.

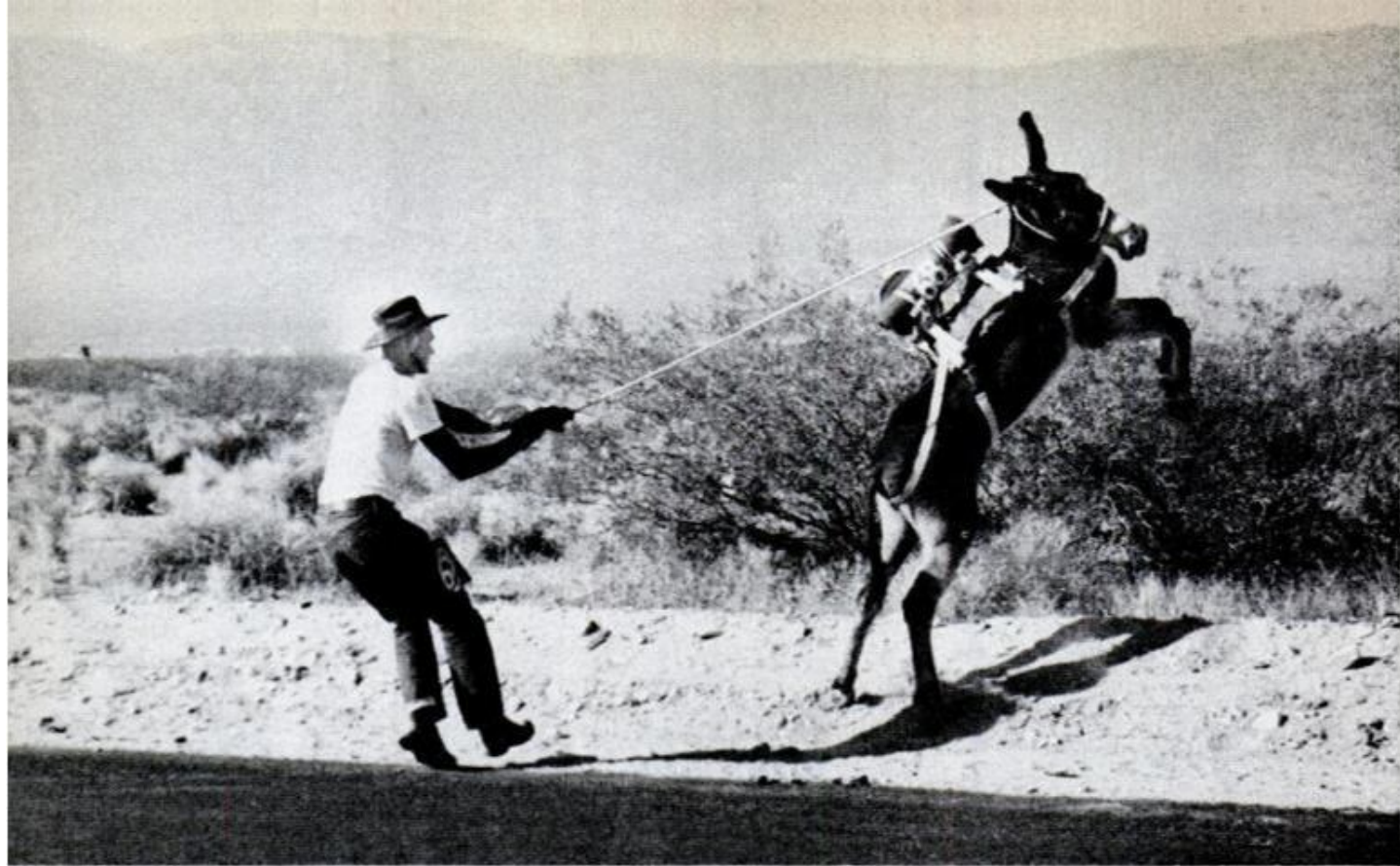
No Dust on Disk

Dust will not be attracted to phonograph records that are treated with a new permanent antistatic chemical.

In a demonstration, cigarette ash leaped to the underside of an untreated record (at right in the photograph), while none went to the treated record.

The chemical additive is made by Armour Industrial Chemical Co., Chicago, Ill.

75



UNHAPPY BURRO and unhappy contestant pull in opposite directions. The "jacks" have never worn saddles; some buck all the way. Worse yet, others try passive resistance and won't move at all



WILD CHASE follows a burro's escape, as a mounted judge tries to rope and return him. It's no violation of the rules to lose your donkey, but contestants are disqualified for deserting one who won't budge

THE GREAT DONKEY DERBY

EVERY SUMMER the desert tranquility of the town of Apple Valley, California, is shattered by a massed chorus of heehaws, when a hundred "mountain canaries" come in for the big donkey race.

Wild burros from the California and Arizona range are the real stars of the grueling man-and-beast race from Apple Valley to Big Bear, 42 miles away and several thousand feet higher in the mountains.

Along with the burros come a hundred jackass jockeys, amateur and professional wranglers attracted by ten dollars a day plus expenses and a chance at five hundred silver dollars first prize. Even more important is the challenge of pitting themselves against the wild stock, the blazing desert, the twisting climb, and each other.



HOME STRETCH runs up the main street in Big Bear, where thousands line the route to cheer the finishers. By the third day, some of the burros have been tamed into cooperation, but most are stubborn to the end



PLODDING WEARILY across a dry lake bed, five tired wranglers and their partners eat dust under the watchful eye of a judge. Race course starts uphill on the second day, but at least gets a little cooler

Each wrangler—or his sponsor—puts up a hundred dollars for expenses and the prize pool. On the morning of the first day of the race, each one meets his burro for the first time. He must rope the donkey, get him into a halter and pack saddle, and lead him to the starting line. From there on, the race to Big Bear is a three-day, no-holds-barred scramble. Anything goes except cruelty to the animals and the use of special equipment to make them move. There are no other restrictions on methods—or language—used.

Each night the “teams” are timed into a scheduled stop. Next morning the wrangler must draw lots again for another burro, then catch, halter and saddle his new companion before he starts the new lap. Every

man works with three donkeys to lessen the odds of one man getting a partner that’s too cooperative—or too stubborn.

The wrangler with the shortest total time on the road is the winner. Surprisingly, about seventy percent of the men finish the race and dash, creep, crawl or hobble over the line. Most of the burros make it, too, though a few break away, elude patrolling judges on horseback, and disappear into the surrounding desert.

Occasionally a lady wrangler enters the race, and some do very well. One managed to finish two hours ahead of her husband.

If you want to prove just how tough *you* are, there are always plenty of donkeys waiting for a partner.

—John Boykin and Bob Grant



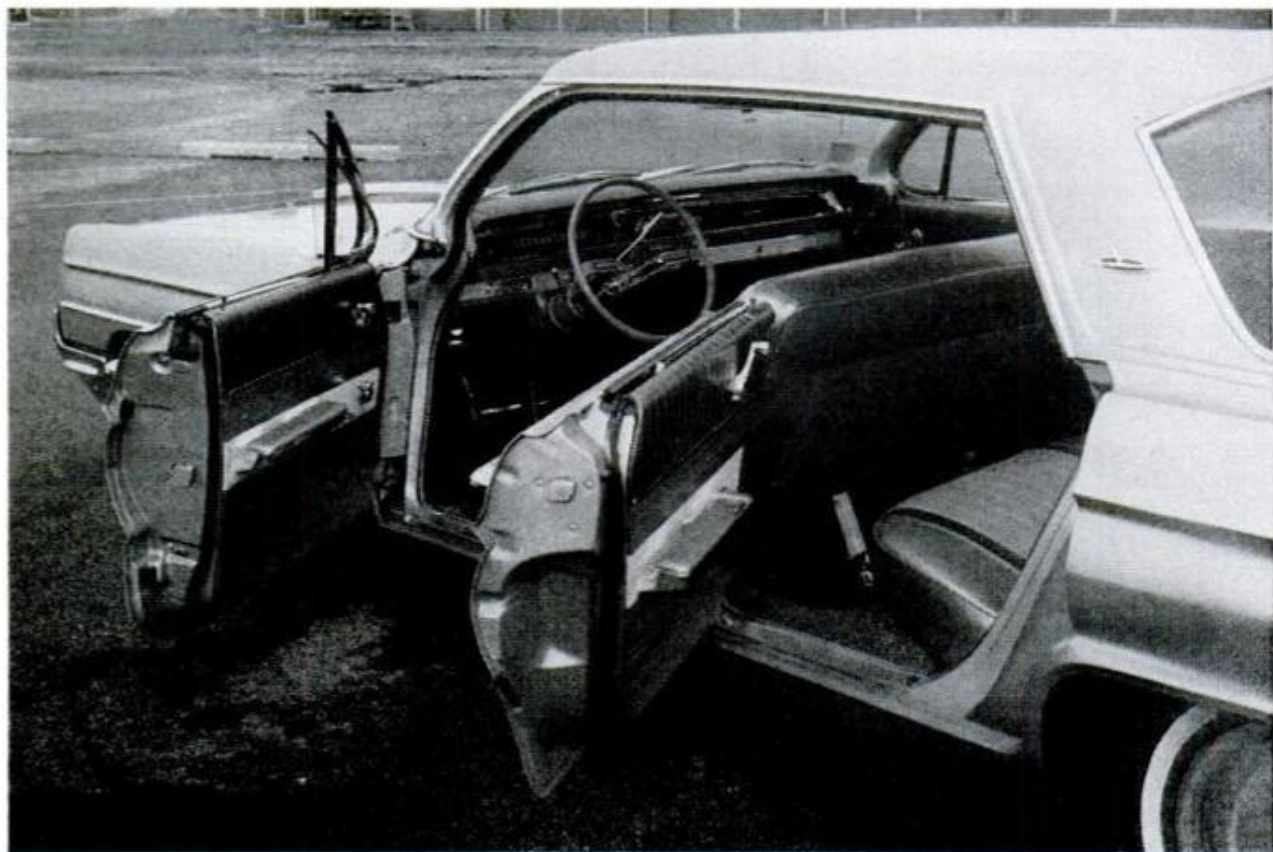
OWNERS LIKE . . .

Easy driving, lush ride
Hot performance
Smooth, subdued styling

DISLIKE . . .

Thirsty engines
Thin, chipping paint
Air leaks at windows, doors

DOORS ARE CONTROVERSIAL: Some owners said they are hard to enter, others mentioned poor fit, wind noise





POPULAR MECHANICS

OWNERS
REPORT

A NATIONWIDE SURVEY

BASED ON
1,498,165
OWNER-DRIVEN
MILES

SOLID, SUCCESSFUL OLDS

Owners love its thrust but not its thirst

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

OLDSMOBILE HAS BECOME the solid center of the medium-priced class. It has followed only Pontiac and the giants Ford and Chevrolet in sales for the first three months of 1962.

These figures include the compact "little brother" cars, F-85, Chevy II, Tempest, Falcon and the like. But large-size Oldsmobiles—the Dynamic 88, Super 88 and 98—remain in fourth place in sales among the large-size cars.

Many 1962 Oldsmobile buyers are repeat owners, coming back for their third or fourth edition of the make. Some 53.9 percent of all buyers traded Oldsmobiles on their '62 models, while 8.4 percent of all those reporting owned at least two Oldsmobiles (including the one just purchased).

For 46.4 percent of all owners the new Olds shared the driveway with at least one more car. The average passenger load was 3.1 persons for each trip.

Some 60.4 percent of Oldsmobile owners ordered the Dynamic 88, and about 14 percent each bought the Super 88 and 98. The specially-trimmed Starfire accounted for 11 percent of all sales.

Under the hood, owners cast their vote for economy with just over 60 percent winding up with the 280-horsepower engine. The remaining 39.6 percent selected the powerhouse 330-horsepower job.

A few Dynamic 88 buyers optioned their V8s with the economy versions of the basic 280-horsepower engine. This

← *Olds has the highest repeat percentage of any car that PM has reported on in recent years*

← *This thrifty 60 percent know a good thing—they're getting all Olds advantages on the 88 without paying for the plush of the Super or 98*

This engine turns up 260 horsepower—ample for any family car in Olds' 4200-pound weight class →

is a power plant with reduced compression ratio (8.75 to 1, instead of 10.25 to 1), which permits use of a good grade of "regular" gasoline.

Proof that buyers of smaller-engined models were looking for economy, is the fact that 52.9 percent of them felt that fuel mileage was not what they expected, while 54.6 percent of the owners reporting on cars equipped with the more powerful engine (330 hp.) felt that their fuel mileage was about what they had expected.

PM checked out the constant-speed mileage of its test car, a Dynamic 88 four-door hardtop with 260-hp. economy engine, Hydra-Matic, power steering and power brakes. Here are the results:

- 22.0 miles per gallon at 30 m.p.h.
- 20.2 miles per gallon at 40 m.p.h.
- 18.8 miles per gallon at 50 m.p.h.
- 17.0 miles per gallon at 60 m.p.h.
- 15.1 miles per gallon at 70 m.p.h.

A well-tuned and thoroughly broken-in engine should be able to better this average →

Over-all mileage, including a large amount of uneconomical city traffic driving, was 11.2 miles per gallon. The driving was done on dry pavements with temperatures ranging from the high 20s to the low 40s.

After driving an average of 4393 miles Olds owners were generally pleased with their new cars. A comfortable 62.8 percent rated their choice Excellent, while 31.2 percent characterized their cars as Good. A commendably low percentage, 4.5 were inclined to rate their Oldsmobiles Fair, and only 1.5 percent said their cars were Poor.

Of the Oldsmobile owners reporting, 80.7 percent voiced their desire to buy again. Only a small 7.6 percent declared that they would not buy another Olds.

Here are the five features Oldsmobile owners liked best, in the order they were most often mentioned.

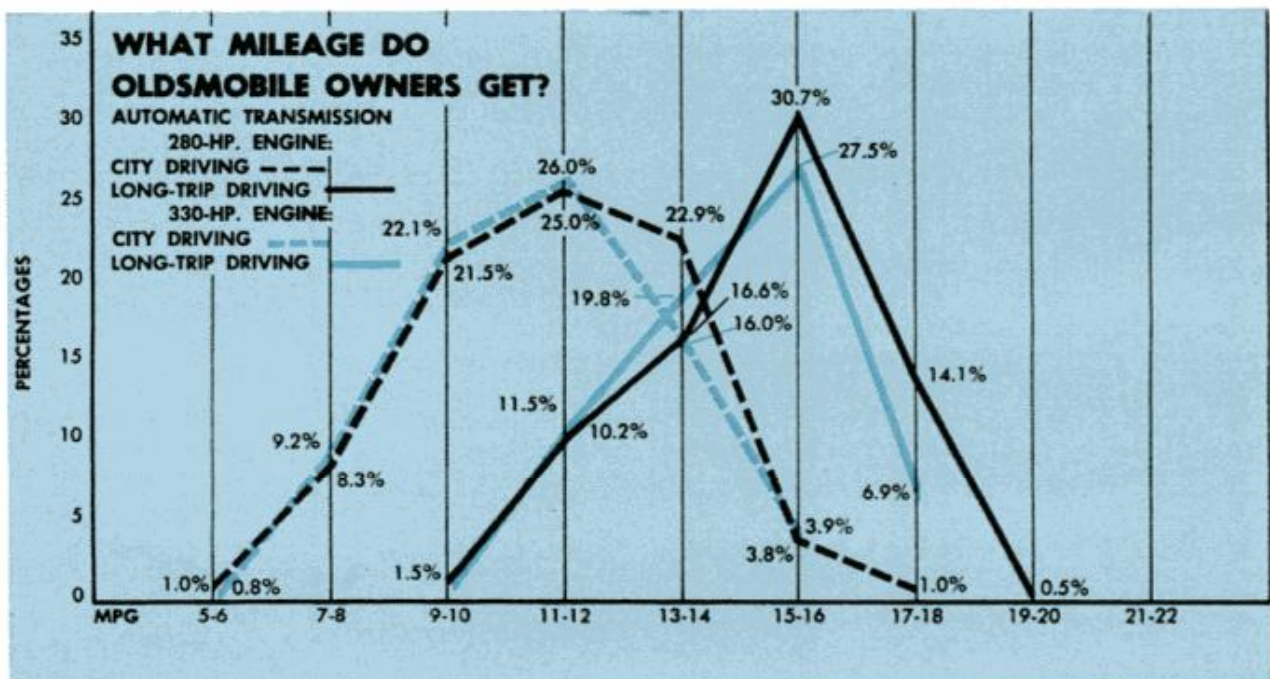
"I like its easy handling — with no power steering or brakes."— New Jersey chemist.

"Like the handling ease—of course we have power steering."— Minnesota plant owner.

"It's very responsive to all controls."— Florida merchant.

"I like the ease of driving and feel of the road."— Arizona self-employed.

GRAPH IS BASED on automatic transmission owners' mileage; only three percent of buyers ordered stick shift





MANY OWNERS praised Olds' huge trunk which swallowed an outboard motor like the whale did Jonah

"It's so easy to ride in—just like sitting in your choice chair at home."—Pennsylvania minister.

"I like the over-all riding comfort plus ease of handling on the road; on long trips I am not tired at the end."—Indiana engineer.

"Although the ride was softened in the '62, it is still firm enough on the road."—California sales manager.

"The seats have been raised so they are much more comfortable, and I get better vision."—Michigan factory foreman.

"I like the power, especially on a trip on the highway; it

← **He means end of the trip, of course**

OLDSMOBILE OWNERS' RATINGS:

EXCELLENT 62.8% **GOOD** 31.2% **FAIR** 4.5% **POOR** 1.5%

Automatic economy:	280-hp. engine	330-hp. engine	Best-liked exterior features		Is Oldsmobile only car in family?
About as expected	34.4%	54.6%	Clean, straight-line styling	14.0%	Yes, it is
Better	12.7	6.7	Roof styling	6.1	No, it isn't
Not as good	52.9	38.7	Grille	5.2	
Best-liked features			Absence of frills, fins	4.1	Make of other car:
Handling ease	49.3		Chrome trim	4.1	Chevrolet
Riding comfort	44.6		Front-end treatment	3.5	Another Oldsmobile
Power, performance	35.6		Least-liked exterior features		Other GM make
Styling	25.1		Recessed headlight area	3.5	Ford
Visibility	8.7		Taillights	3.5	Other Ford Motor Co. make
Large trunk space	6.4		Chrome trim	2.3	Chrysler Corp. makes
Power steering	5.5		Bumpers	2.0	Other U.S. makes
Roadability	4.7		Grille	2.0	Foreign makes
Size and weight	4.4		Best-liked interior features		Decision to buy Oldsmobile based on:
Roominess	4.4		Comfortable seats	18.9	Performance
Most-frequent complaints			Dashboard	15.5	Comfort
Poor gas economy	12.5		Upholstery, colors	14.6	Styling
Inferior paint finish	7.0		Headroom	4.1	Size
Wind noise at doors, windows	6.7		Bucket seats	3.8	
Hydra-Matic action	5.5		Least-liked interior features		How is dealer service?
Windshield too high	4.1		Transmission hump	8.4	Excellent
Lack of headroom	4.1		Recessed floors	5.2	Average
Difficult entry/exit	3.8		Glove compartment	4.1	Poor
Turning radius too large	3.5		Uncomfortable seats	4.1	
Had mechanical trouble?			Horn operation	3.5	Make of car traded in:
No trouble	79.6		Considered another car in		Oldsmobile
Some trouble	17.2		Oldsmobile's price range?	41.1	Chevrolet
Considerable trouble	3.2		Buick	56.5	Other GM make
What was trouble?			Pontiac	46.7	Ford Motor Co. make
Carburetor ills	7.9		Chrysler	19.6	Chrysler Corp. make
Hydra-Matic transmission	2.6		Mercury	10.9	Other U.S. make
			Chevrolet	10.9	
					Would buy another Oldsmobile?
					Yes, would buy
					No, would not buy
					Undecided



SCULPTURED FRONT-END of Olds is hard to clean, but styling results in added protection by dual bumpers

**Bet he feeds his horse
high-test oats, too** →

**This man comes
awfully close to hitting
a very big reason for
Oldsmobile's success** →

**Back in 1958 (p. 122,
PM June), Olds owners
made low gasoline mileage
their first complaint, →
too. The '58 Olds was
about the same weight,
but had a 371-cubic-inch
engine compared to 364
of current car. Mileages
were about the same**

holds the road, and you have to keep checking the speedometer, as it's fast, very fast."—Illinois fireman.

"It has plenty of pickup when extra power is needed."—Arizona retiree.

"Performance is the feature I like best."—Idaho cowboy.

"Like its engine performance—it gets up and goes."—California executive.

"I like the way it responds when I need a little extra get-up-and-go. She has it when you need it."—California machine operator.

"I like most the clean lines without exaggerated styling."—Michigan salesman.

"Clean, smart styling."—Louisiana petroleum engineer.

"I like the Olds' prestige without flare."—New Jersey insurance consultant.

"Smooth cleanliness—no tinsel."—New York housewife.

"The lowness of hood and front fenders makes it easy to see the road in front of you."—Illinois aircraft worker.

"I like the cross-over feature of wipers which eliminates the blind spot in the center of the windshield."—Illinois merchandise manager.

A lot of "repeaters" among Olds owners doesn't mean they're easily satisfied: Here are their first five complaints listed in order of frequency.

"I should have better gas mileage in the Dynamic 88 (12 m.p.g.)"—New York photo technician.

"I've had unexpected bad gas mileage."—Michigan merchant.

"About my only complaint is the low gas mileage."—Kentucky research analyst.

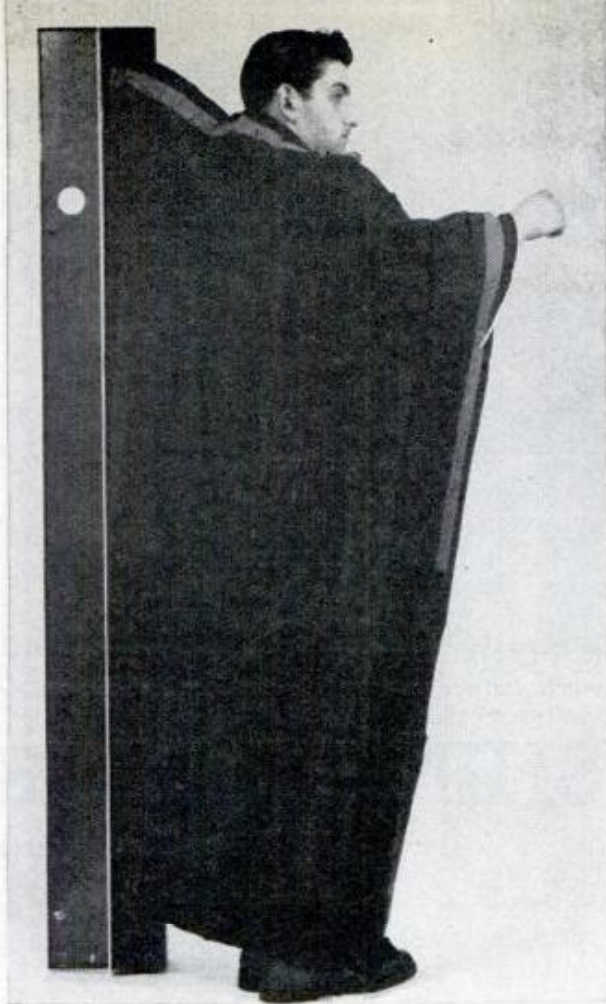
"They talk economy with this car, but it sure isn't there. Would like to get better gas mileage—(12.7 m.p.g.)"—California sales engineer.

"I think that 10.3 miles per gallon is rather poor for highest gasoline."—Arkansas chiropractor.

"My car has an 'expressway axle'; I should get considerably better gas mileage (14-15 m.p.g.)"—Indiana farmer.

"The paint job is poor—car's not covered at bottom and paint's already coming off the wheels."—New York educator.

(Continued to page 190)



Cover-Up for Fire

Enclosed in a convenient stand-up case attached to the wall, a fireproof blanket can be yanked out and wrapped around an industrial worker whose clothes are in flames.

A loop of rope extends outside the case. The person on fire can pull this, whirl to the left and wrap himself tightly in the blanket. Blanket and case (\$33) made by Mine Safety Appliances Co., Pittsburgh, Pa.

Serious Monkey Business

To study the effects of radiation at various levels of fatigue, monkeys are exercised inside a rotating, plastic sphere and studied by researchers at the University of Tennessee medical school.

Four feet in diameter, the sphere is turned constantly at three miles per hour or faster. The monkeys are put on this treadmill after slight exposure to radiation and studied by the scientists.

The purpose is to discover what effect prolonged exposure to low levels of radiation has on the body, levels man might encounter in nuclear warfare or in outer space. One theory is that such exposure does subclinical damage to the body which has escaped detection. It might be brought out by stress conditions, such as exercise.

A second part of the experiments will be to test antifatigue compounds, and during the tests the monkeys will exercise both with and without the compounds.



Portable Electric Smoker

Up to 20 pounds of meat can be smoked at one time with a new, portable electric smoker. An electric coil smolders pulverized hickory for smoke-house flavoring. The unit is equipped with a hinged ventilator door and three removeable chrome-plated grills. It costs \$29.95; the manufacturer is Ewing Products, 1014 W. Burbank Blvd., Burbank, Calif.





TWIN 45-HORSEPOWER motors drive Smallwood boat 45 m.p.h., but oar manpower is used for shore-line casting

TWO FISHING BOATS

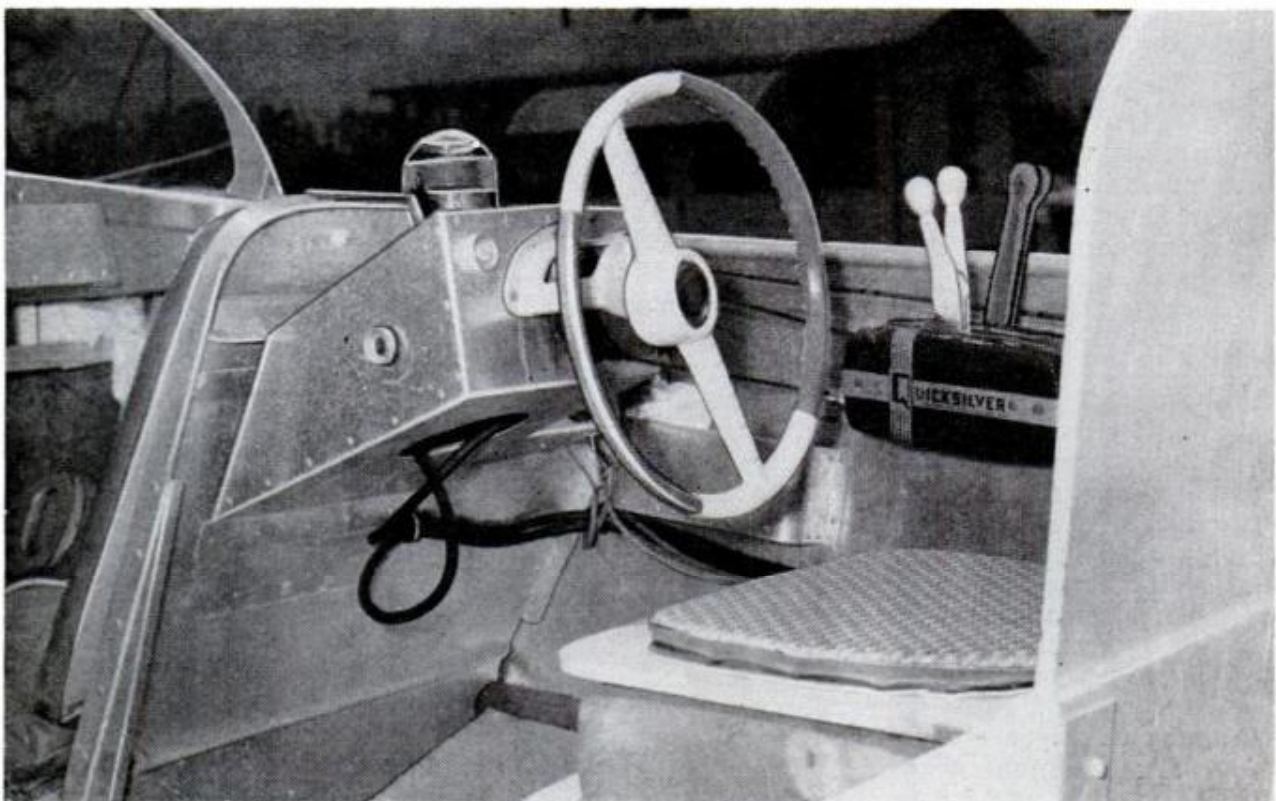
By Max Hunn and

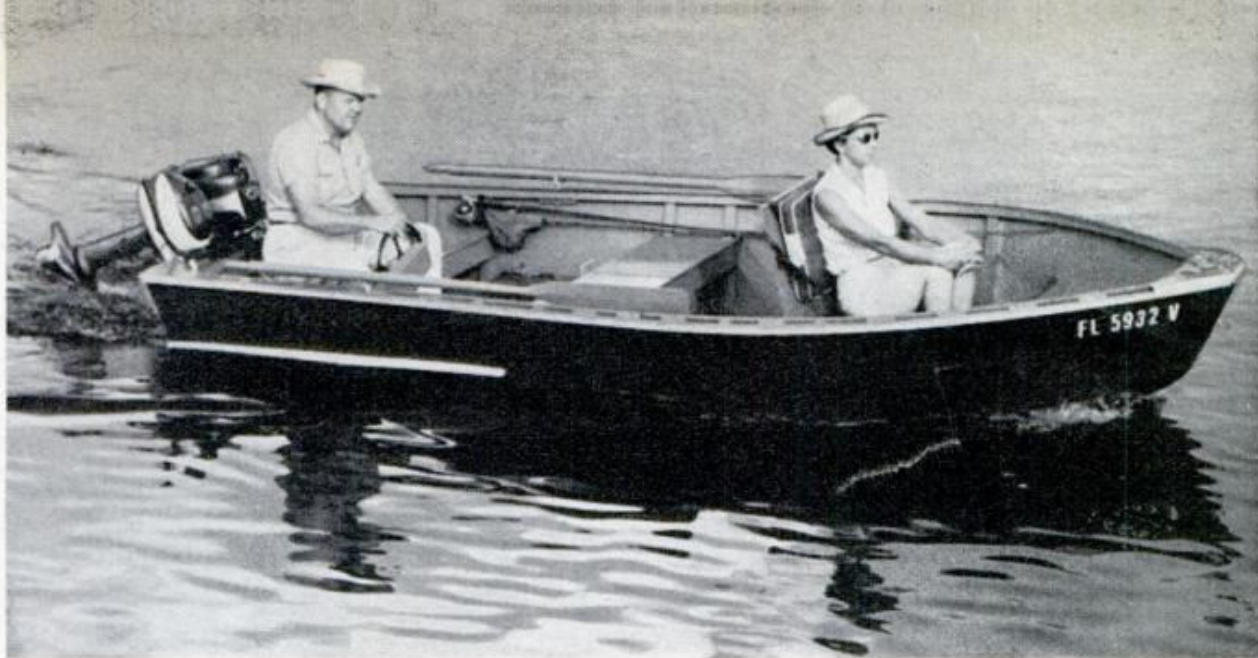
CUSTOM-TAILORED for the tricky job of covering 75 miles a day in the mangrove swamps around Florida's Shark River, boat number one on this page is the product of Ted Smallwood, veteran fishing guide from Everglades, Fla. Starting with a stock 16-foot aluminum utility runabout, Smallwood chose twin outboards for speed and safety on offshore runs. With one tilted up, the other motor serves nicely for trolling and low-speed operations. A 30-gallon fuel tank

built in amidships provides plenty of fuel for a day's fishing; a 12-gallon reserve tank under the foredeck is for emergencies.

For casting mangrove shore lines, he rows the boat from a stern icebox-seat, using long oars and specially-added oarlocks. For plenty of room for standup casting, he cut a casting "pulpit" in the foredeck. The second angler has the cockpit to himself. Built-in racks hold tackle, parts and props, water and food out of the way.

FOR FAST RUNNING, Smallwood pilots from a bucket seat amidships; anglers ride seat behind windshield





SINGLE 25-HORSEPOWER motor planes Steerman's light plywood hull; 3½-horsepower auxiliary is for trolling

FULL OF GOOD IDEAS

Charles Waterman

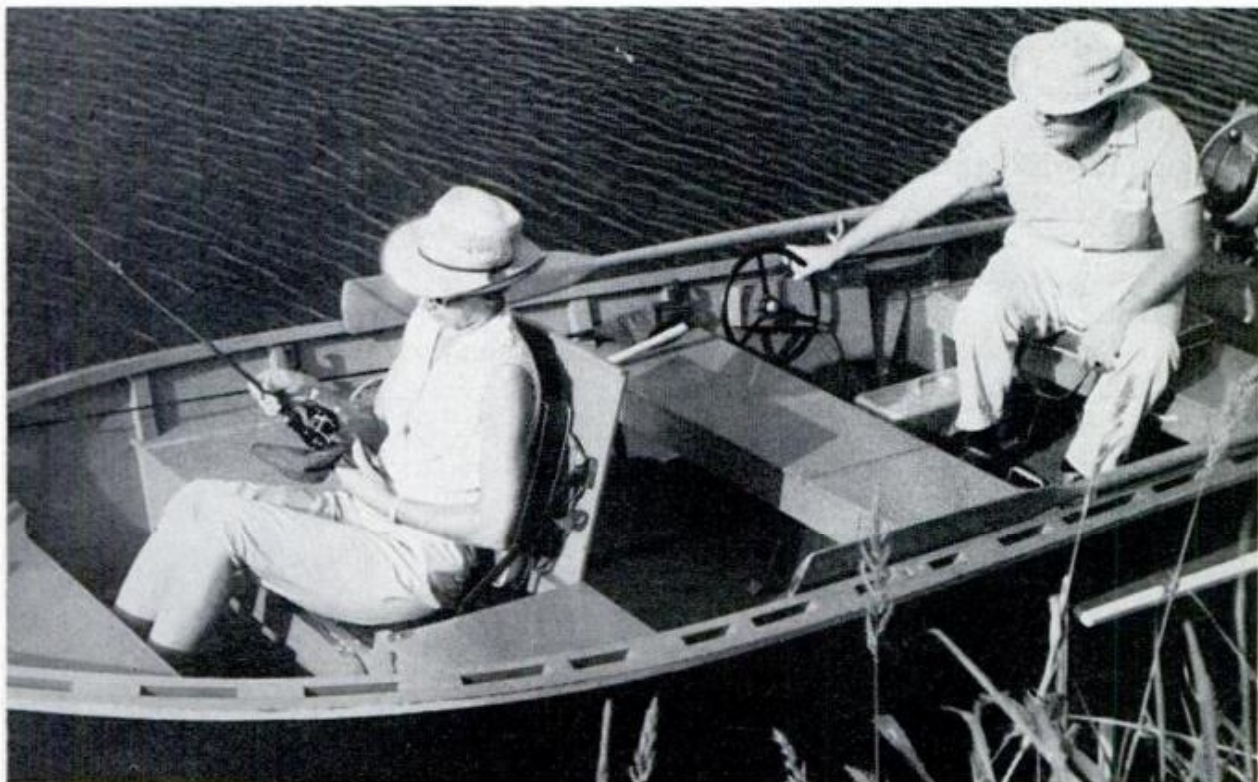
MORE CONVENTIONAL, but no less ingenious, boat number two on this page was fitted out by W. S. Steerman of DeLand, Fla., for his own use. The beamy 14-foot plywood hull is of his own design.

When running with the 25-horse motor, Steerman pilots the boat from a stub dashboard mounted in front of his stern seat. When fishing, the panel swings over against the side of the boat on a hinge, but the first pulley is on the same axis as the hinge, so

the wheel will work well in either position.

Boxed wooden seats hold drawers and compartments for storage; the center section of the forward seat swings back to form a seat back, which is padded with two standard floating cushions. The cushions store under the back when it is closed. The unusual bow width keeps the boat stable despite standing fishermen. For slow shoreline casting, Steerman rows, again from his stern seat with aft-mounted oarlocks.

FOR FISHING, wheel folds against Steerman gunwale; passenger can sit or stand on small casting platform



STAY SAFE IN SALT WATER

Don't let anyone tell you sharks are sissies, barracuda won't bite, or moray eels are cowards. All three are dangerous swimming companions—if you don't know how to avoid or discourage them . . .

THE SWIMMER AT RIGHT doesn't know it, but he has company. The water off his vacation beach is home to at least three famous killers, any one of which could eat him—or make a good try at it. The odds in his favor, of course, are good. These killers are not so voracious that they always tackle a man on sight. But it can happen.

Every year on the American coasts, a scattering of salt-water swimmers get into trouble—and the number is increasing as water sports become more and more popular. The odds are numerically better than the odds on being struck by lightning—but nobody wants to be struck by lightning, either. The parallel continues: If you follow half a dozen simple rules, you'll cut down the odds even further.

SHARKS are by far the most dangerous of marine (ocean-dwelling) animals, and the one fish that will actually kill and eat its human victim. Biologists and public safety authorities around the world manage to track down thirty-odd instances a year of unprovoked attacks by sharks on humans. (They don't usually count provoked attacks; anyone foolish enough to annoy a shark ranks with the man who plays Russian Roulette.)

Sharks are numerous in the world's temperate oceans, though they are found in the greatest numbers in tropical and subtropical zones. But if it's warm enough for swimming, it's warm enough for sharks. They range north to Massachusetts and Northern California in summer, though most attacks occur in waters warmer than 70 degrees.

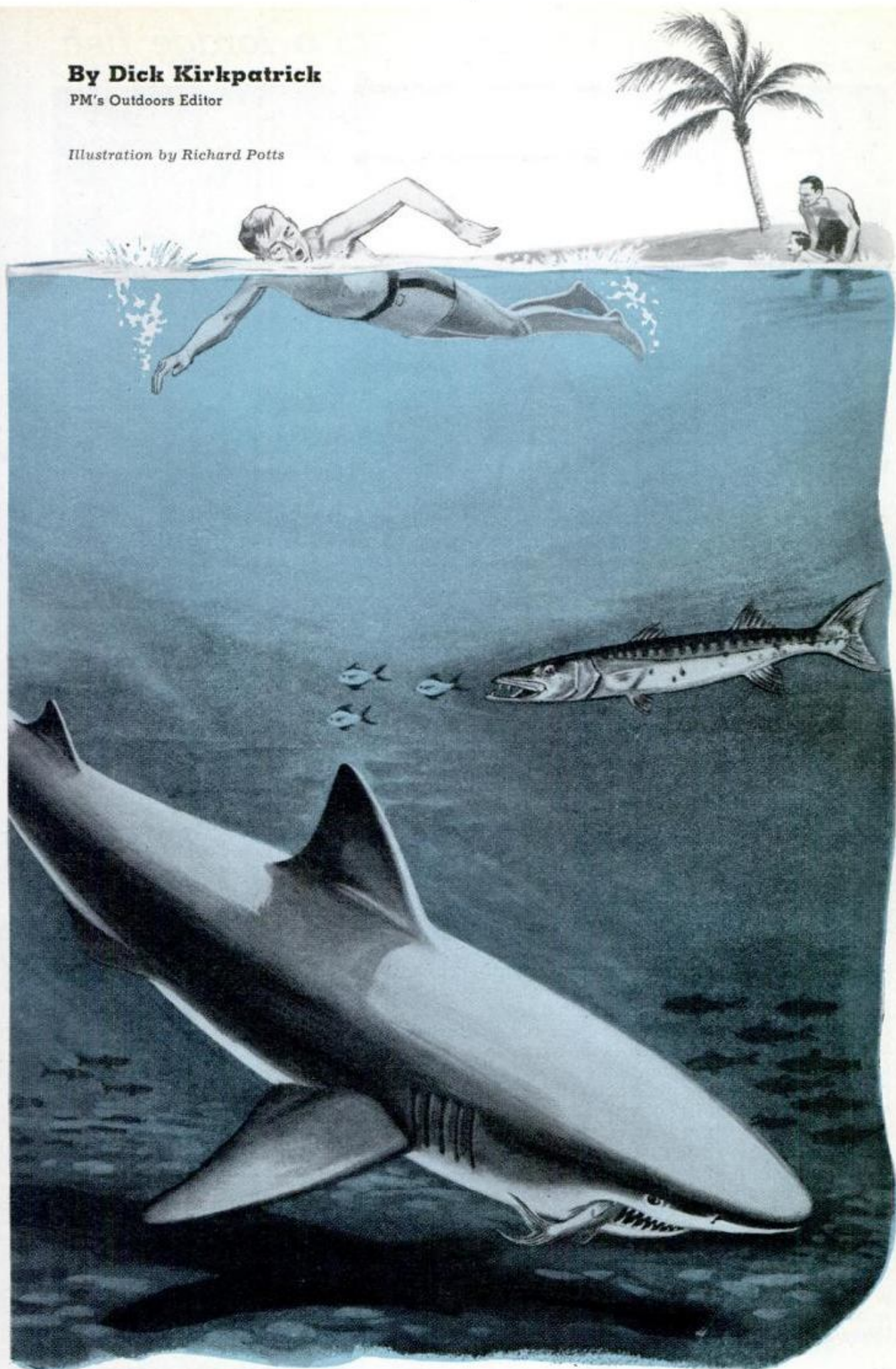
Four "families" of sharks are known to be dangerous to man. Most dangerous are the Mackerel sharks—the great white shark, mako, and mack-



By Dick Kirkpatrick

PM's Outdoors Editor

Illustration by Richard Potts



How to imitate a forage fish



BRIGHT METAL, light colors stand out in dark water



WADING FEET stir bottom like fish; body doesn't show

erel or porbeagle. These big, savage killers grow to at least 34 feet—maybe 100—and fear nothing, especially a man-sized morsel.

Requiem and Sand sharks, though smaller, are no less vicious, and may be more dangerous to man because they are much more numerous and spend more time in shallow water. The two families include the tiger shark, lemon shark, and blue shark, all common in American coastal waters, and a number of less-well-known species; these include three species known to live in fresh water, though not in North America. The fourth family blamed for attacks on humans are the hammerheads.

The most tragic detail in shark attack reports is that many—perhaps most—of the attacks may have been cases of mistaken identity. The shark mistook his victim for his more natural prey—small marine animals or fishes.

Despite their wonderful talent for killing and surviving, sharks are not very bright. Their eyesight is poor—they depend heavily on taste, smell and hearing to find their food. A swimmer splashing on the surface is just another chow call to the shark, as is a pair of feet scuffling along a muddy bottom or a stringer of bleeding fish at a spear-fisherman's belt. It's small comfort to the victim to know he was attacked by mistake, but knowledge of that failing can save *you*.

All the authorities agree that the best defense against sharks is distance. Stay out of their water and away from them. The best way to keep sharks out of *your* water is to avoid attracting them. Here are some good *don'ts*: Don't swim alone, or at night, or in cloudy water where visibility is poor. Don't put part of your body

in the water—waders, dabblers, and hand-trailers are most often attacked. Don't splash around the surface. Don't toss blood or garbage in the water—especially fish blood or entrails. Don't wear sharply-contrasting colors or shiny objects—the flash of a belt buckle or the bright spot of color on a swimming suit can look like a fish to a near-sighted predator. And don't bother sharks of any size.

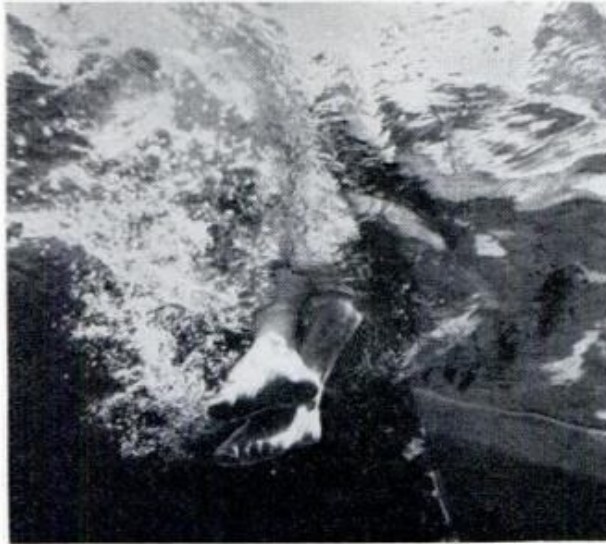
You're safer in the water than halfway out, but if you spot a shark, get out. Don't hurry or splash; swim smoothly to shore or your boat and climb quietly out.

If you're approached by a shark and can't get away, you're in trouble. But if he's just cruising and looking, you can sometimes discourage him by "roaring" underwater or creating other unpleasant sounds. Don't run away, however. Face the shark while you retreat as clamly as possible. A normally-feeding shark will circle, roll and fidget before closing. He can sometimes be discouraged by jabbing with a hand-held spear, or by a blow around the nose, but attacking the shark won't usually do much good, and may excite him to a more serious attack.

Two big problems—and two situations where there is almost no defense: A big, hungry shark, determined to press home his attack, is almost impossible to stop; a fatal wound won't keep him from attacking. And a group of sharks of any size, worked to a feeding of frenzy by blood or food in the water, won't respond to anything; they'll attack everything and anything—even bite their own tails in their excitement.

There are a lot of ideas about methods for keeping sharks away. Some work, most

and attract salt-water predators



A SHARK'S-EYE VIEW of feet dangling overboard

don't in every case. The vaunted "bubble barrier" for beach protection didn't work; hungry sharks swam right through it. Chemical and dye repellants work on casually-feeding sharks, but have little effect on a determined attacker or a school.

One of the few effective methods so far has been an electronic shocking device (see p. 100) developed by Miamian John Hicks, which drives sharks away every time, though it isn't certain how well it would work on sharks in a feeding frenzy, and nobody wants to try it. Again, the surest defense against shark attack is to stay out of the shark's water.

BARRACUDA are less of a problem than sharks, but they can be a tough opponent, and can deliver a terrible, slashing bite. Unlike the shark, however, the barracuda has excellent sight. He is very fast—some biologists estimate his speed up in the 30s

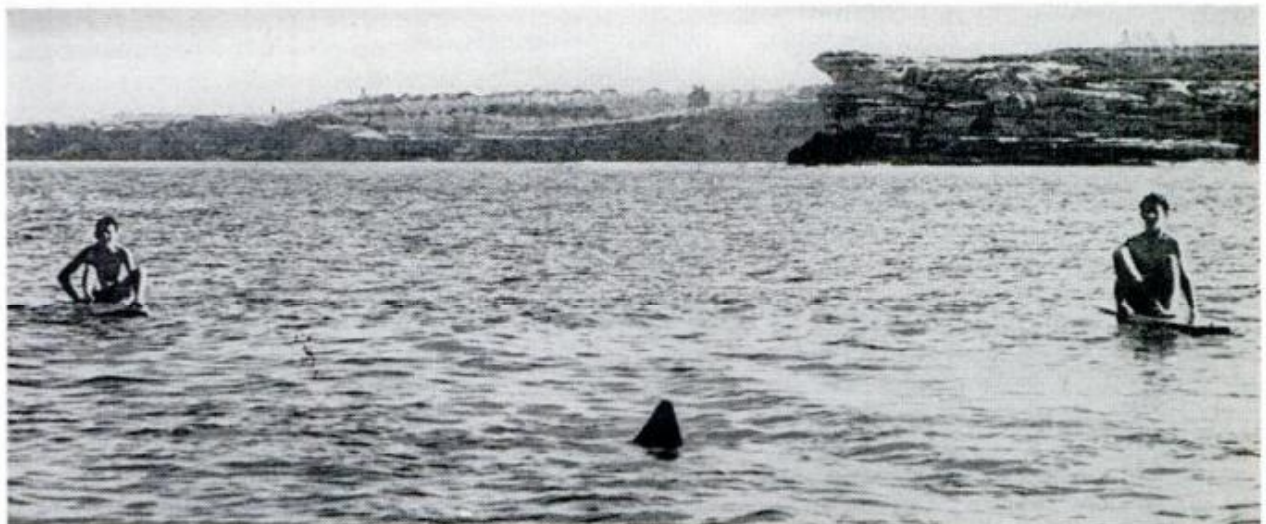


Photographed for PM at Florida's Silver Springs
WHITE HAND against dark background imitates fish

—and is capable of slamming his jaws together so hard that they're shock-absorbed to keep him from stunning himself. The Great Atlantic Barracuda is the most dangerous member of the family. He grows to a length of six to eight feet, and is very aggressive in his feeding habits. In some areas of the West Indies he is more feared than the sharks. Most biologists believe that barracuda attacks are made by mistake, too, and in much the same way as the sharks. A fisherman washes his hands overboard; a swimmer shows a bright metallic buckle; a diver shows a white hand against a dark wetsuit in murky water, and **WHAM!** The 'cuda is always in a hurry to beat his companions to the chow line, and he's so fast that he's got you before he knows you're not a forage fish. It's not much comfort to know you

(Continued to page 180)

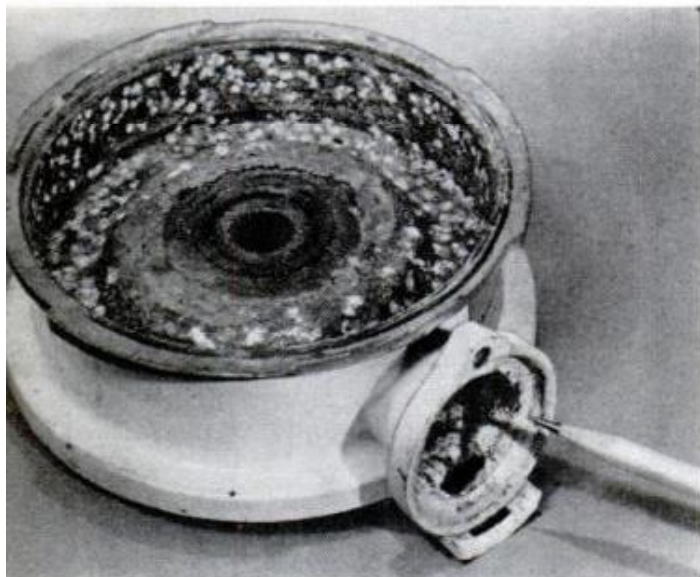
BIG SHARK "trees" two Australian surfers on their boards. Their paddling attracted the shark; (they were saved)



BUBBLE TROUBLE ON TAP

By **Volta Torrey**

We use 320 billion gallons of water a day but by 1970 pollutants may cut our ration



WASTE DISPOSAL unit, fitted as a sink strainer, shows the effects of corrosion caused by detergent

NOT LONG AGO, a woman in Long Island, N. Y., was filling a cooking pot with water from her kitchen tap. Suddenly the pot foamed over with crisp, white suds.

These suds, she knew, were caused by synthetic detergents that had drifted over from neighborhood septic tanks and were adulterating her well. Since the sudsy water is distasteful, she uses tap water only for cooking and washing. She buys drinking water in bottles in another town for herself and her family.

Some months earlier, another housewife found that detergents were corroding metal parts in her automatic washing machine.

This corrosion of parts, and sudsing of tap water, are among the first signs a community has that something is happening



to its water supply. This *something* is so widespread that some washer manufacturers are finding it necessary to forestall corrosion by using plastic or stainless steel parts. Automatic garbage disposers have been affected, too. While a heavy stream of cold water usually will flush the stuff out, one maker now puts a polypropylene lining into his disposers to cut servicing costs.

These annoying occurrences in homes and to appliances, however, are only signs of a grave crisis in store for our water supply by 1970, if something is not done. This crisis is developing, say experts, because we have to reuse our water more rapidly as our population grows. Many of our facilities for restoring water to reusable purity are not up to the job, and, for another reason, we have not yet



MOUNTAIN OF FOAM appeared unexpectedly on a brook behind a suburban Virginia home, giving billowing proof of syndets' resistance to nature's and man's ways of disposing of waste from synthetic detergents

learned to deal with many beneficial chemical inventions such as detergents which, unfortunately, can cause harm when disposed as waste into our water supply.

In many areas, the fight, at least for the present, seems lost as suds come billowing out of streams that once were pure, or flow out of control into a neighborhood's wells.

The basic problem is that synthetic detergents (syndets) defy both nature's and man's standard methods of purifying water.

Soap, the kind your mother used, was made from animal fats on which bacteria and other micro-organisms fed and thrived. Soap's molecules consist largely of long chains of carbon atoms with hydrogen atoms attached to them. After soap goes down the drain with waste water and into

cesspools, sewage-treatment plants or surface streams, the bacteria destroys the chains of molecules and effectively disposes of the waste.

Synthetic detergents were invented during World War I, because Germany's supply of soap was cut off. Dr. Fritz Gunther devised a detergent that could be made from coal tar. But it and other detergents that have since come on the market are not considered good eating by the bacteria and micro-organisms which thrive on animal-fat soaps. And because the syndets are not eaten by bacteria, they tend to remain in the water system and escape destruction by standard water purification techniques.

Syndets have long chains of carbon atoms with hydrogen atoms attached and, in addition, they often have a benzene ring hooked



The fight against foam is going on in streams and labs across the U.S.

to an atom of carbon. It is this ring which makes it more difficult for the micro-organisms to break up the stuff after it has been consigned to the sewage-treatment plant.

This was not a serious problem 25 years ago when there were few detergent manufacturers. Today there are more than 250 in the U.S. alone, and detergents outsell soaps two to one. Housewives like syndets because they lift and disperse many kinds of dirt liable to be found on dishes, in clothing or other things washed with water. Detergents lower surface tension and make things soluble that ordinarily are not. When water is hard, as in many parts of the Middle West, natural soaps tend to leave a "bathtub ring." Synthetic detergents create suds and work better than natural soaps in such water.

According to the U.S. Public Health Service, four billion pounds of syndets are produced each year and each pound ends up as waste in water.

Manufacturers use an inexpensive product of crude oil and many of their detergents also contain the foam-maker, alkylbenzene sulfonate, or ABS. This is the stuff that is creating mounds of slippery foam in some city sewage treatment plants, and by its foaming presence, is revealing the extent of the pollution problem.

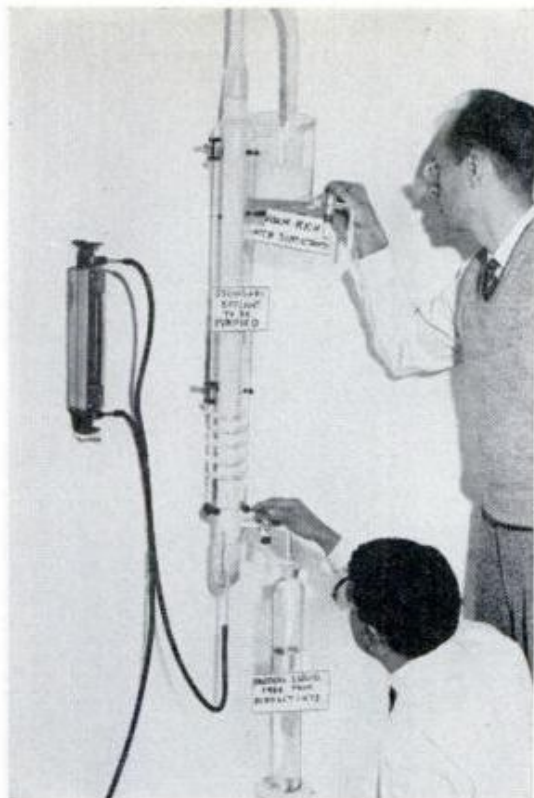
ABS is not the only fly in the otherwise beneficial detergent ointment, however. Some types of detergent also carry phosphate compounds that promote the growth of scum and other unattractive by-products. ABS, however, attracts attention because very small concentrations of it—a few pounds per million gallons—will make water foam. Consequently ABS is easily detected and serves as the tattletale which has put the experts on guard.

If a town puts syndets into a river near the headwaters, it can carry some of them to the next town downstream. This town's water may not be affected seriously, but when it adds syndets to the river in its waste, the third town may get too many in its water.

This cycle may be repeated from five to ten times along the river and towns near the river's mouth may receive waste overburdened with syndets.

We apparently can consume such small concentrations of ABS as have been put in

SAMPLES OF WATER from a network of streams keep health officials informed on spread of pollutants



FOAM FRACTIONATION, a means of ridding water of detergent waste, is explored in Esso laboratory. Air is introduced in tubes, left, and rising bubbles carry chemical waste to top, as at right. Foam is then drawn off

our water so far, without becoming ill. But the consequences of continued consumption of such water for long periods of time are not yet known. It is probable, however, that water containing enough ABS to be harmful is likely to be so unattractive that we would object to drinking it.

ABS, though, isn't the only chemical that may be harmful. A standard reference book, used by filtration engineers, states that a wide range of chemicals goes into the complex compositions we know as synthetic detergents. Any one of these individual chemicals may be an irritant. The book further points out that the early synthetics touched off a large number of cases of contact dermatitis. Although considerable progress has been made in removing the irritants, the incidence of dermatitis of the hands is considerably higher than it was before the synthetics took over the market.

A postscript to this information is added by Edward J. Zimmer, director of Chicago's Plumbing Testing Laboratory:

"If it's rough on the tough hides of hands, what do you think it does to the delicate interior plumbing of the human being?"

Syndets also can get into ground as well as surface water and they may remain there undetected until they are so concentrated that costly removal methods or new sources of water are needed. In one Long Island, N. Y., development that has four to five homes per acre, syndets recently were

found to have penetrated a third of the wells. In other suburban communities even deepening the wells has failed to yield water free of syndets.

What can be done to remove ABS from water? One way to do the job is to run water through activated carbon. This is an added expense, but authorities at the Department of Health, Nassau County, N. Y., where the technique has been tried, urge further study of its use both with water from private wells and in large water-treatment plants.

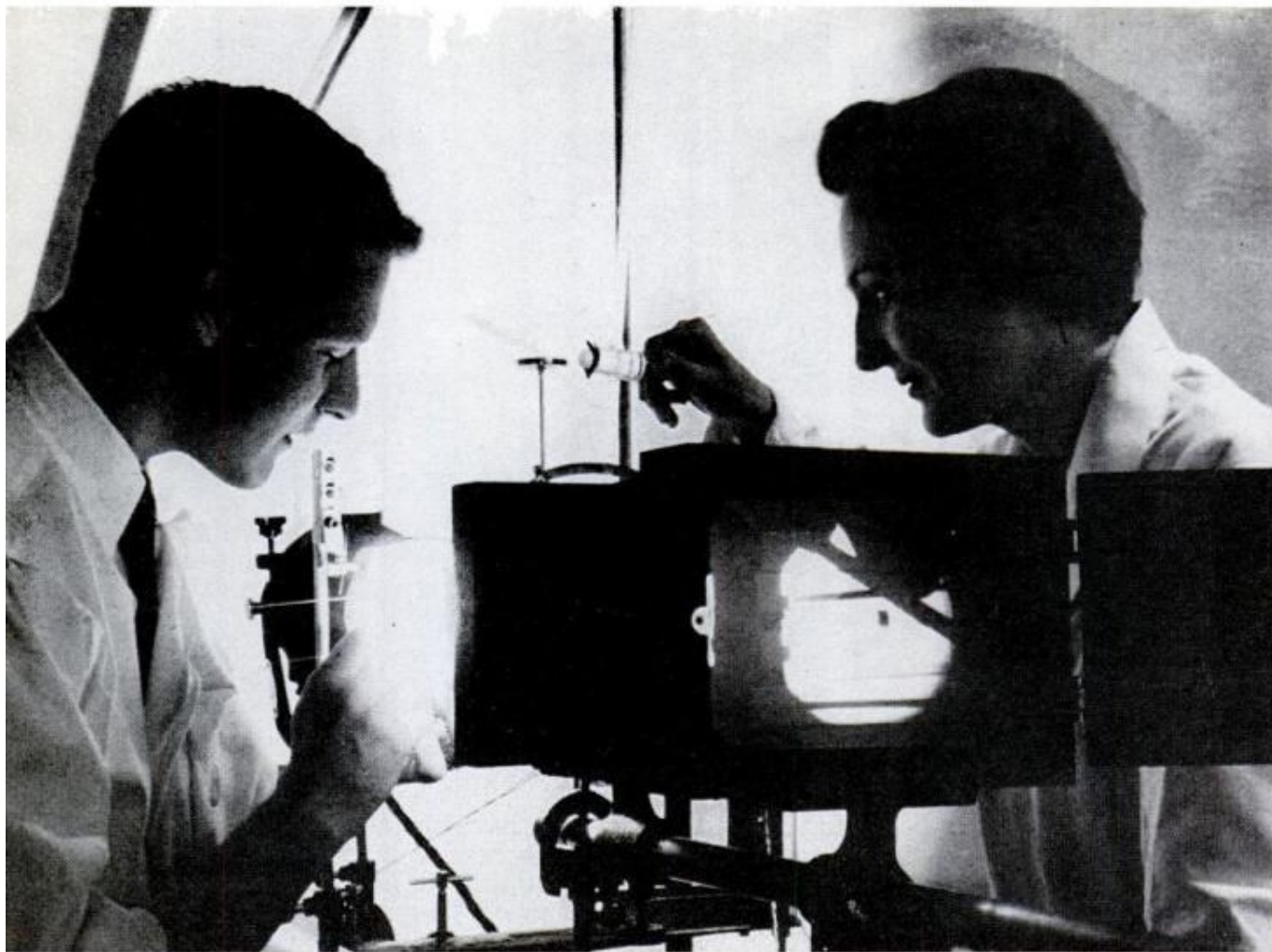
Foam fractionation is another possible way of combating syndet contamination. This process has been known for years, but was not considered seriously in connection with water pollution until recently.

In foam fractionation, a gas (usually air) is put into the polluted water to create a stream of rising bubbles. Since the chemicals usually flock to points where air and water meet, they cluster around these bubbles and ride them to the surface. The resulting foam then can be skimmed off like the head on a glass of beer.

In small-scale tests, researchers of the Esso Company have demonstrated that 90 percent of the detergents can be removed from sewage-plant affluent this way. The U.S. Department of Health, Education and Welfare has contracted for further study of this technique.

The federal government also is supporting studies of possible dumping places for

Will research solve the problem?



HOW DO CHANGES in surface tensions of detergent solutions aid its cleaning ability? Do these changes help make detergent a difficult waste to remove from water? Midwestern Research scientists seek answers

troublesome chemicals and investigations of ways of making discarded materials useful again. Businessmen have become concerned, too, and both university and industrial laboratories are tackling the pollution problem's many aspects. The Midwestern Research Institute in Kansas City, for example, is seeking more fundamental knowledge of the washing process by using a vibrating jet method to study the surface tension at the surface of freshly formed detergent solution.

Prof. Rolf Eliassen, Stanford University, has challenged the chemical inventors to come up with a solution to the problem their products have created. "It should not be difficult," he says, "for the chemical industry to develop a different series of compounds, and produce some which could be broken down by bacteria and still be relatively inexpensive."

Sugary Detergents?

Detergents that bacteria can destroy after they've been used can now be made from sugar-based materials. These are said

to be biologically *soft* detergents, and efforts are under way in many laboratories to develop soft detergents that can be competitive in cost and popularity with the hard ones.

Hard detergents still could be used in coastal communities where waste water is discharged into the sea, and soft detergents where that water must soon be used again in some other community. People with soft water might also be encouraged to go back to using soap.

Finding ways to change or oust the pollutants is a problem that is not restricted to American's back yards. The problem is a worldwide one that has already arisen in England, West Germany and Russia.

Manufacturers have cooperated with government authorities in England to place only certain kinds of detergent on sale in some areas, and in West Germany legislative action has been taken. Even the Russians have not yet claimed to have invented a solution. Their public health journal,

(Continued to page 188)



Instant Papier-Mache Mix Comes in Five-Pound Sack

Papier-maché for your own art projects comes out of a bag with a new "no-mess" mix that eliminates making your own. One

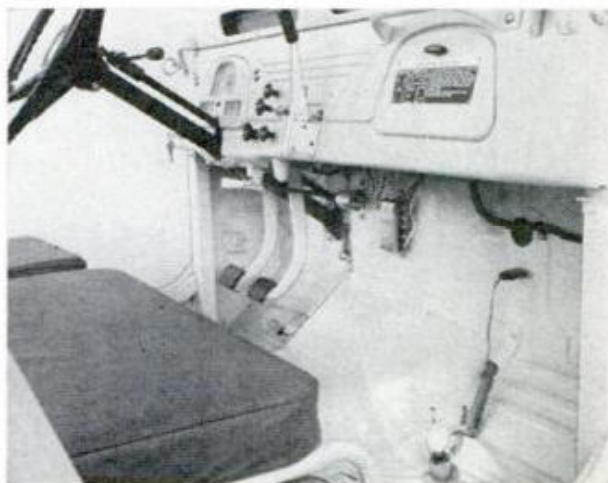
pound is mixed to a quart of water. The dry-mix costs \$2.79 for five pounds from Edmund Scientific Co., Barrington, N. J.

Cross-Country Heavyweight

A high-powered utility vehicle from Japan is the "Land Cruiser," made by Toyota Motors.

The manufacturer claims a top speed of 90 m.p.h., and gas economy as high as 28 m.p.g. The engine is rated at 135 hp., 236 cu. in., and develops 217 ft. lbs. torque at 2000 r.p.m.

On a 90-in. wheelbase, the four-wheel-drive car has three power takeoffs and a two-speed transfer case. It can carry seven passengers. Price: Softtop model—\$2665, port of entry.



STREET SCENE, TOKYO STYLE

By Elliot H. McCleary



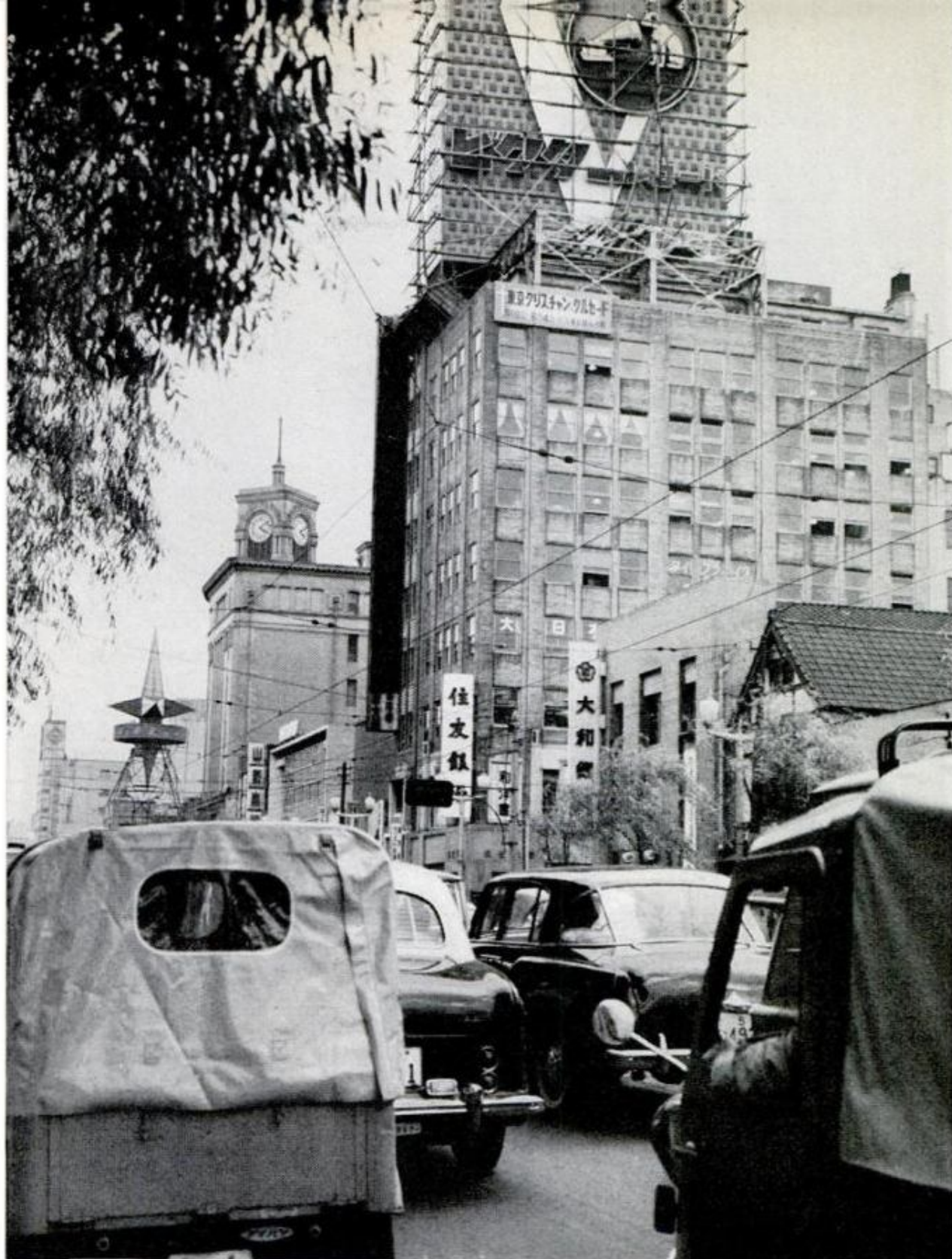
PEDICARS are strictly for tourists and camera fans, but many people hesitate to try traffic in one like this



BICYCLES are the delivery trucks of Tokyo. This one transports noodles from a restaurant to homes



JINRICKSHAS, man-pulled, are rare. They are used primarily by Geisha girls who prefer their privacy



TRAFFIC JAMS are part of the road conditions. The assortment of vehicles, like these stuck at a light in the busy Ginza district, also compete for road space with pedestrians. Sidewalks are in short supply

TRAFFIC IN TOKYO, the world's largest city (population: 10 million), is, to put it mildly, dense, wild, fast, and furious.

The very diversity of vehicles, as well as their number, is startling. There are automobiles of varying shapes and sizes—Japanese, French, German, an occasional, looming Chevy or Plymouth.

Coveys of goggled motorcyclists thunder their motors at intersections, roar away in

blue smoke when the light changes. There are three-wheeled trucks guided inside by handle bars. There are sleek cabs dashing in and out of openings in the traffic, scattering the pedestrians who stream in thousands across intersections, or walk right in the street in the majority of byways which have no sidewalks.

To add to the confusion and excitement of Tokyo driving (which, by the way, pro-



CARPENTER'S carry-all demonstrates one use of bicycle. Each workman rigs his own contraption to suit needs

ceeds down the left side of the street) there are messengers on bicycles wheeling in and around the cars, laundrymen with huge bundles behind them, repairmen with ladders and tools mounted on bicycle side-cars and trailers, and white-capped restaurant delivery boys—some balancing trays on which are bowls of fish, rice or fuming tea.

All this activity is more amazing when you consider that cars are a luxury in a land where the average workman makes less than \$100 a month. Also the Japanese auto industry turns out less than 500,000 four-wheeled motor vehicles a year and less than 200,000 of these are passenger cars. But Tokyo alone has 400,000 cars and trucks on its streets, with 3000 being added every month.

GOLD-PLATED funeral wagon, adorned with carvings, is a copy of a gate at the famous Nikko temple



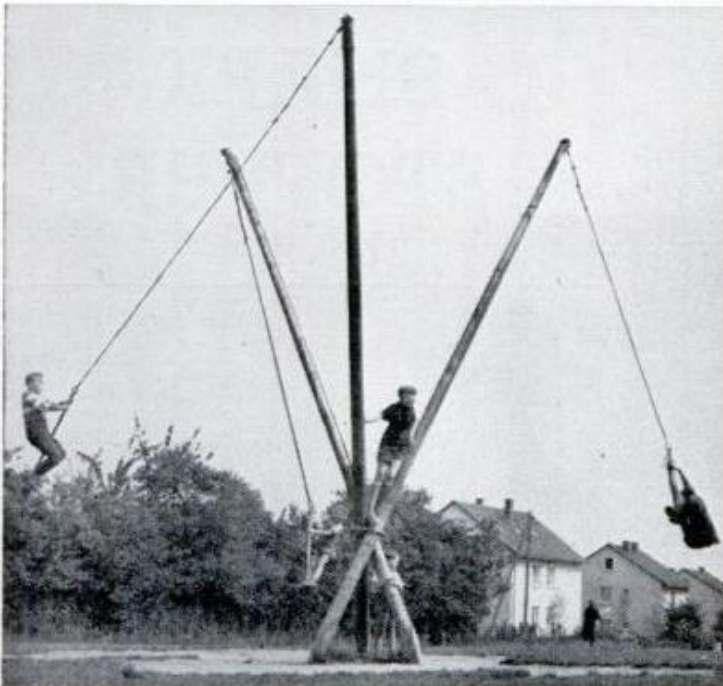
Traffic is further congested by the national output of a million and a half motor bikes and motorcycles and 300,000 three-wheelers a year. The city government cannot keep up with the demand for better streets and more sidewalks which are desperately needed to curb the rate of 14,000 accidents per year.

Something will have to be done, muse the city fathers while they appropriate more money for traffic policemen, street lights, and an expressway.

But like their counterparts in the United States, they may be unable to solve a modern mystery: Why does a mild-mannered average man suddenly become an avenging warrior when he gets behind the wheel of his Datsun?

THREE-WHEELERS cut path in and out of traffic; some 300,000 are added to the frantic traffic each year





BALANCING APPARATUS, upper left, is a playground version of the rocking chair

WOODEN BALL, upper right, only moves backward and forward on the guide rails. Architect Joachim Kimpel lends a hand

TURNING DISK, center, is activated by body movements of one or several children

MODERN SWING, bottom, is made of wood; the design eliminates possible collisions

Strange Shapes for Play

Unconventional and modern playground equipment has been developed in Ulm, Germany, by architect Joachim Kimpel. A 10-year study of children's methods and behavior at play by the architect, a gardener and a psychologist led to the redesigning of recreational equipment for climbing, spinning, balancing and swinging.

Each apparatus took days of study. Scale models were made before the experts decided which of the projects was best suited for the children. The specially designed playground equipment is intended to develop all the child's physical abilities, particularly his coordination and balance.

Although the modern design stresses function and mechanics, it retains qualities of good form that will readily capture a child's imagination.



Ride 'em, Prospector!

People traveling into the wilds can bounce along on a *Desert Rat*, a new vehicle that carries two passengers and equipment.

The *Rat*, powered by a one-cylinder engine, can go 20 miles an hour. Its 15-inch-wide low-pressure tires keep it from bogging down in sand or mud. It's made by Remote Area Transportation Corp., Box 1760, Santa Ana, Calif.



Headed for the Desert

Not a gas or heart-attack victim but a scientist preparing for an expedition, Norwegian physiologist Harald Andersen tests a hood built to study human breathing. Designed to be taken along on a trip to the Kalahari Desert in Africa, the hood will help Andersen study the metabolism of the desert natives, who withstand very low temperatures with no apparent discomfort.

Bathtub Artists

New crayons will mark on paper like any others, but it's more likely the marks will appear on the youngsters who use them—and with their parents' full approval. The colors are made of castile soap. While coloring, the kiddies are being cleaned, and all markings wash off the young artists and the bathtub completely.

Made by Steven-Rogers Co., South Lyon, Mich., the crayons sell for 49 cents for a package of six.

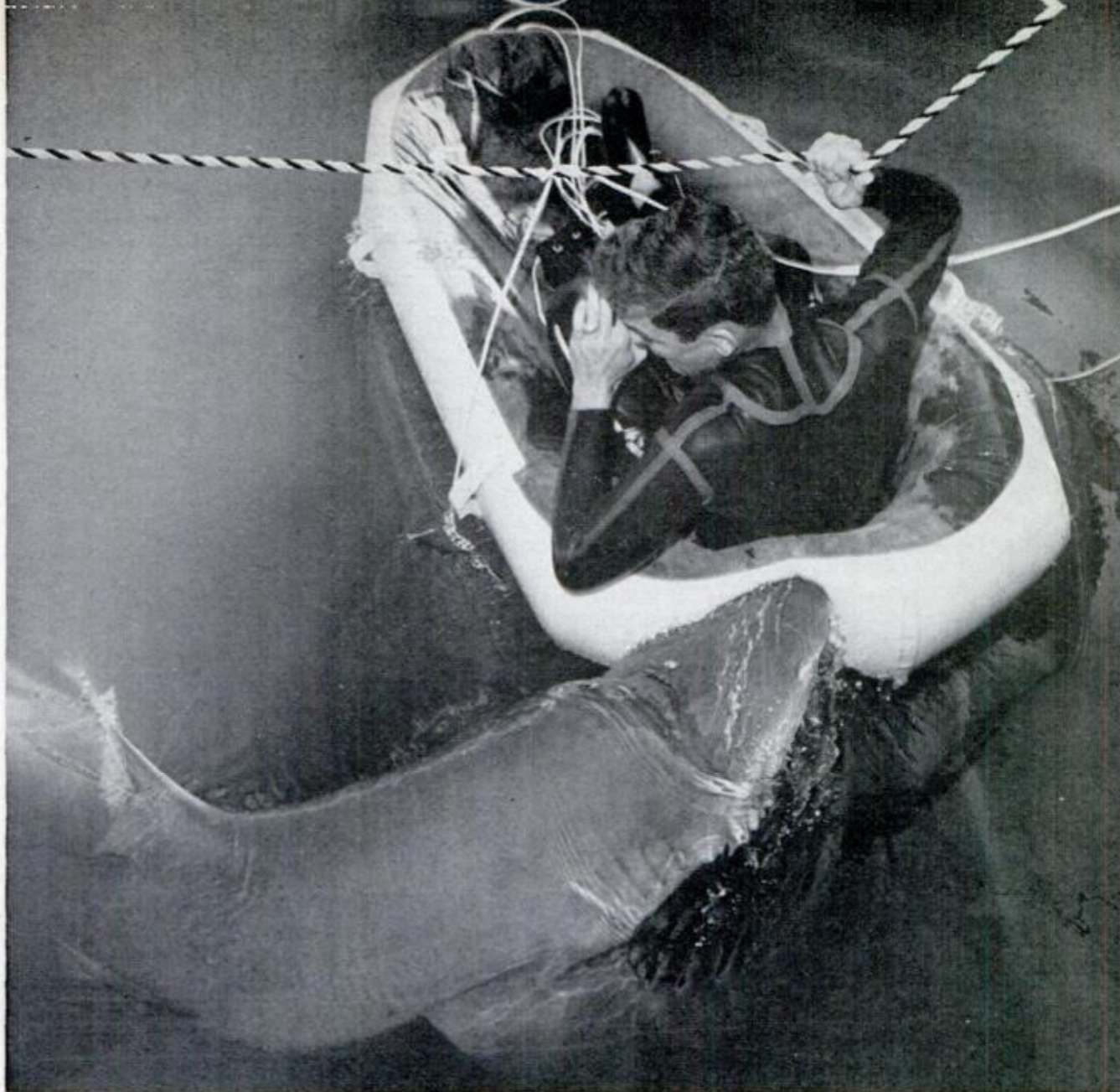


INVENTOR HICKS, above, demonstrates his shark repeller; this portable model has a range of 15 feet

SHARK STOPPER



POPULAR MECHANICS



600-POUND LEMON SHARK nudges Hicks' life raft during a demonstration off Miami. Moments later Hicks turned on device and placed it in the water, and the big shark swam away immediately and did not return

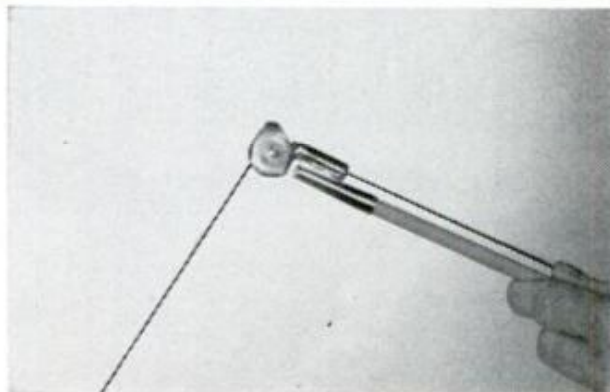
Best defense so far against shark attack is an electronic offense, according to John Hicks of Miami, Fla., who has developed a shark repeller that will drive away or hold off any fish within 12 or 15 feet. The eight-ounce portable package can be carried or worn by divers, and can be left on for continuous protection or snapped on as needed. Its life expectancy for continuous

operation is about 36 hours. Another larger model can be built into emergency life rafts. Though the emissions are effective against fish, the human nervous system doesn't feel them. The inventor says his device is much more successful than chemical repellants, which can be diluted or carried away by the water, and which do not always stop sharks that are actively intent on attacking a man.

Swivel Roller Top for Rod

Solving a familiar problem for wire-line fishermen, a new swiveling rod tip revolves 360 degrees to keep the line on the roller no matter how the rod is held. Thus, even with the rod upside down, the line stays in place and feeds out or in smoothly and with no danger of kinking or wearing against nonrolling surfaces.

The tops are available in 11 sizes to fit rod tops from $\frac{1}{8}$ to $1\frac{3}{32}$ inch from W. W. Mildrum Jewel Co., East Berlin, Conn.



THE HARROWING FLIGHT

IN PHOENIX, ARIZ., a steel ladder was left uncleaned and in Los Angeles, Calif., the proprietor of a corner gas station, learning that the sea bass were running, closed his place early in the afternoon. Two small birds of fate were thus set free.

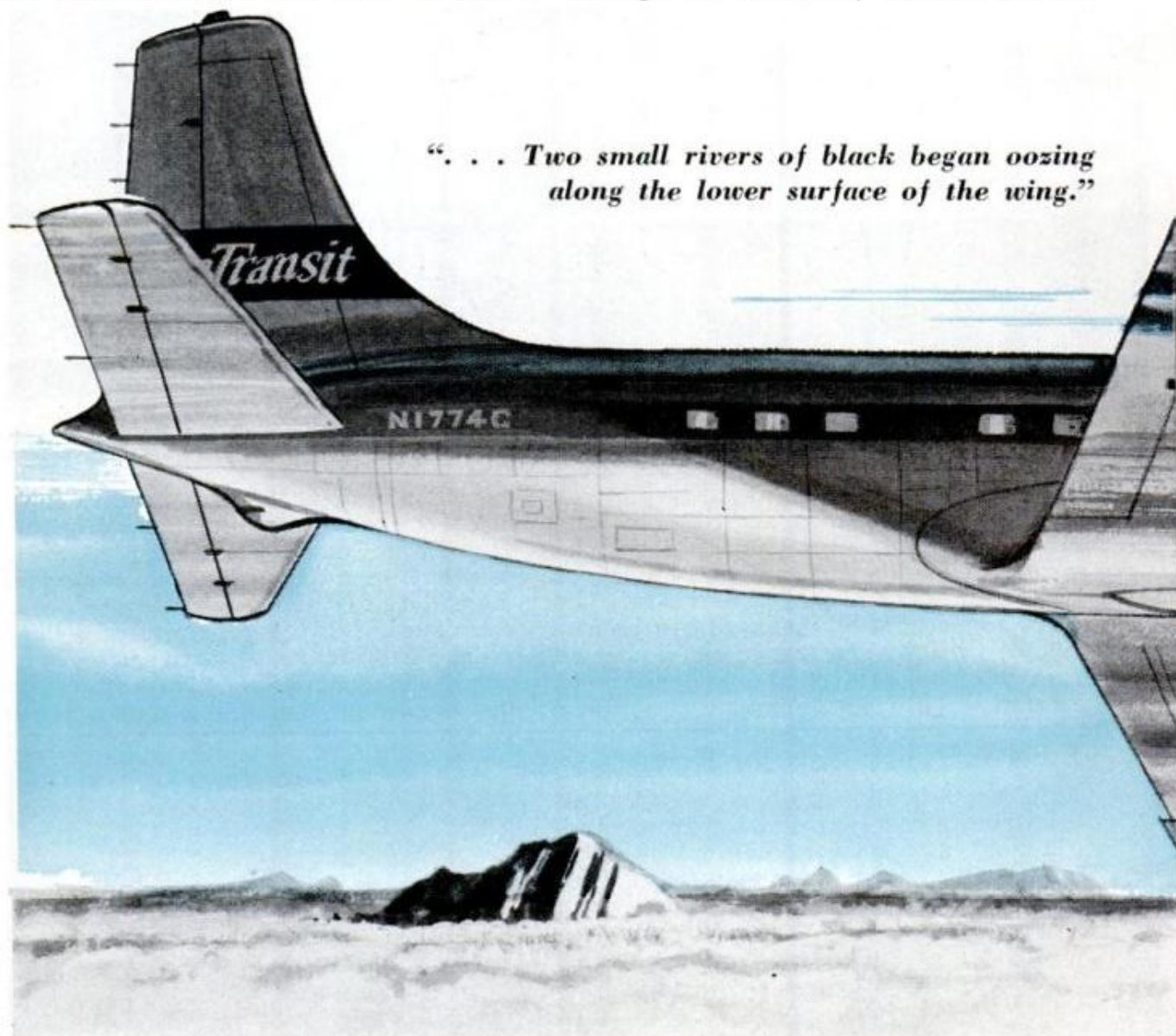
Insignificant? Not at all. When the birds came home to roost, a first-class crisis would hit the overloaded, delicately tuned air-traffic control system of a large part of the country.

The ladder was being used by a Phoenix contract mechanic working on a four-engine DC-6 of Airtransit Airlines, scheduled that afternoon as Flight 13. The two starboard air coolers had been cleaned. As he tightened the last bolts, the mechanic slipped on the greasy step and bounced off the concrete ramp below. The bolts under-

standably, were overlooked. Airtransit's DC-6 was taxiing hurriedly out with its charter load of passengers as the first drops of oil began seeping through.

When the fishing bug bit the man in Los Angeles, a last-minute caller who was not quite in time shrugged and drove on home, an empty diesel fuel can bumping along in his pickup. The fuel was to have gone into an emergency power unit which ran dry during a test run that afternoon. But the shifts were changing at the Air Route Traffic Control Center when the man was sent out for the refill—one shift assumed he would return, the other didn't know he had gone. After all, mechanics and maintenance men are human, too.

So are pilots. As the DC-6 climbed out on course, Captain Buck Archer went through the check-list, reread his clear-



“... Two small rivers of black began oozing along the lower surface of the wing.”

OF AIRTRANSIT 13

BY
FRANK
TINKER

*Here's one of the most exciting—
and revealing—articles on
aviation you'll ever read. The
characters and situation are
fictitious, but the individual
incidents have occurred before
and could occur again—exactly
as described—at any moment*



JULY 1962

103

ance to Los Angeles International, joshed the stewardess as she went back into the cabin for coffee and turned to his copilot.

"There you are, slave," he roared, waving the ATC clearance. "Follow orders. Forty years of flying experience in this cockpit and we're bossed around by a two-year recruit to the Federal Aviation Agency."

And two small rivers of black began oozing along the lower surface of the wing.

Captain Archer's argument was a boisterous mixture of prejudice and truth, as even he would have admitted. The prejudice was obvious, but the truth of it was that there has been a continuing trend in aviation to transfer flight responsibility from the cockpit to the ground.

An airline pilot today has little actual control over his route of flight. Although Air Traffic Control is still technically an advisory service, in reality the controller in the center, who may never have flown an aircraft, now makes vital decisions for hundreds of airliners each day.

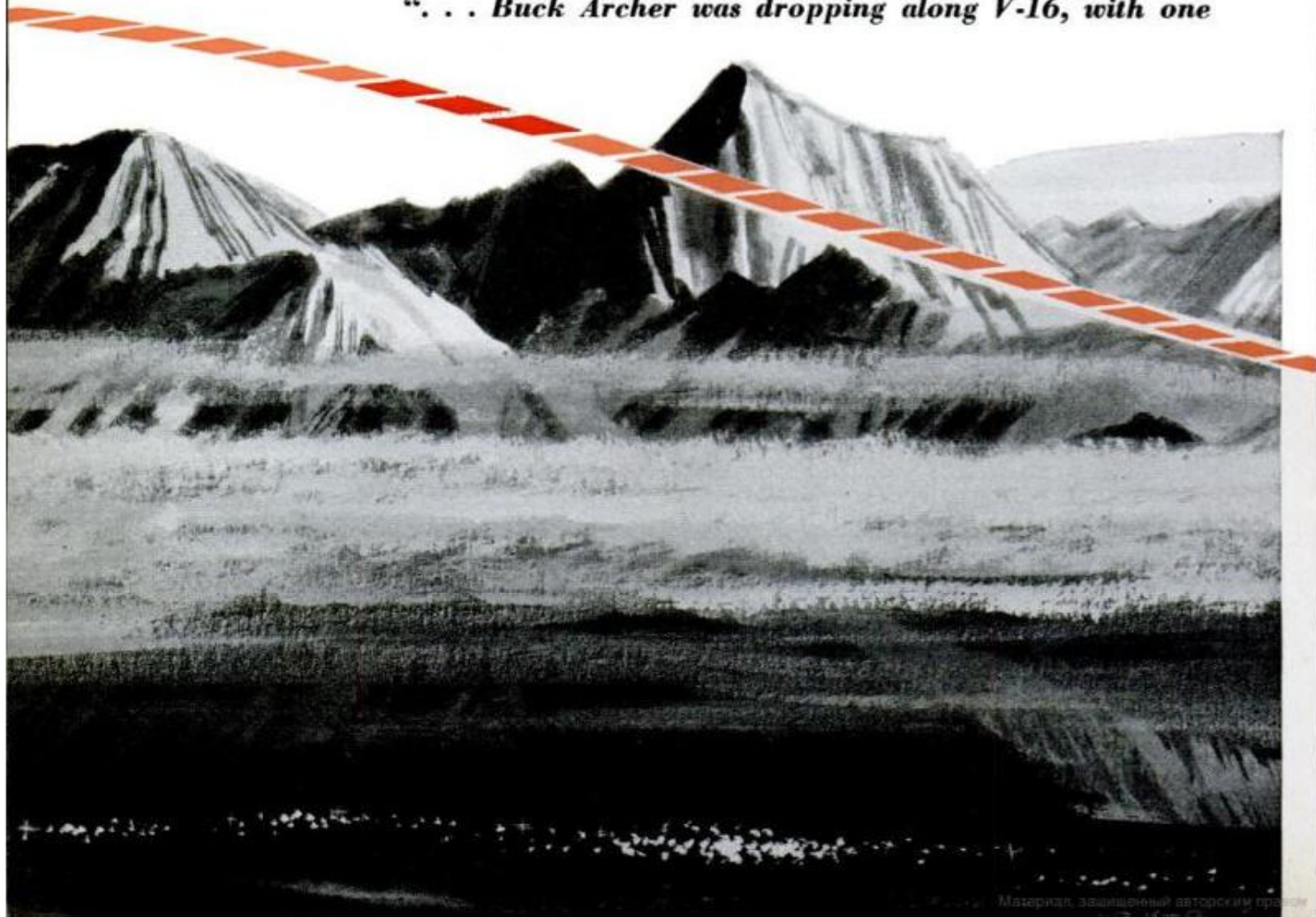
Down below gruff, blunt-talking Ted Clark, taking over his swing shift as watch supervisor of the control center at Los Angeles, realized all this even better than Buck. Ted, too, had flown until his eyes grounded him—and some of the junior controllers suspected this was the reason the old curmudgeon was forever chewing on them, favoring the crews aloft.

Today he was grumpier than ever. A stratus layer of clouds scudded over the area, there was a promise of early fog and the evening holiday air traffic was already building up. In another hour that traffic would peak, and every controller in the place would be sweating over the Chinese puzzle which the conflicting, shifting, crowding streams of planes created.

Things went fairly well at first. It took some time after a person came on duty to get into the pace, to unravel the blips, codes and voice transmissions and to translate them into aircraft flows. All these had to be spaced unerringly—the only passing grade here is 100 percent—and other directives from higher headquarters had to be followed; these often made less than sense. Traffic was heavy from the east and north, inbound along Victor Airways 107, 210 and 16. Young Jim Wheeler had control of D-4 sector, that area along V-16 east through Ontario, Banning and Blythe. It would pay to keep an eye out here, he thought.

For this job is not merely a matter of accepting calls from aircraft and sending them someplace else. Somehow, the Hollywoodish fiction has managed to be circulated by persons who should know better that a control center is an obscure part of an airport tower, over which planes drone every time a clearance is given. Actually, the controllers never see the planes. The Los Angeles Center, now lo-

“. . . Buck Archer was dropping along V-16, with one



cated on busy Manchester Boulevard, will be moved next year to Palmdale, 60 miles from Los Angeles. Its controllers converse with pilots through a half-dozen remote installations scattered throughout southern California.

Orders and critical advice go out to aircraft in an area reaching to Bakersfield on the north, Blythe on the east and the Mexican border on the south. Over 40 airports of consequence are included in this parcel. In order to handle its mushrooming air traffic, the chunk of space overlying this mountainous real estate is divided into sectors and a controller assigned to each.

The communications setup by which aircraft are separated, dispatched, admitted and guided through this maze of intersections is itself a marvel of electrical engineering. Each controller has a selection of radio frequencies with which he can talk to pilots in his sector. In addition, he has direct lines to every tower, approach control and flight-service station there. Or, if he needs, he can, through the coordinator, talk with any facility in any sector.

Behind each group of controllers sits a coordinator, whose job it is to maintain a watch over their sectors and smooth the flow of craft between them.

Back of the whole works sits scowling Ted Clark, the "watch soup," who can kibitz on, or join in, any transmission of any coordinator or controller. Direct lines

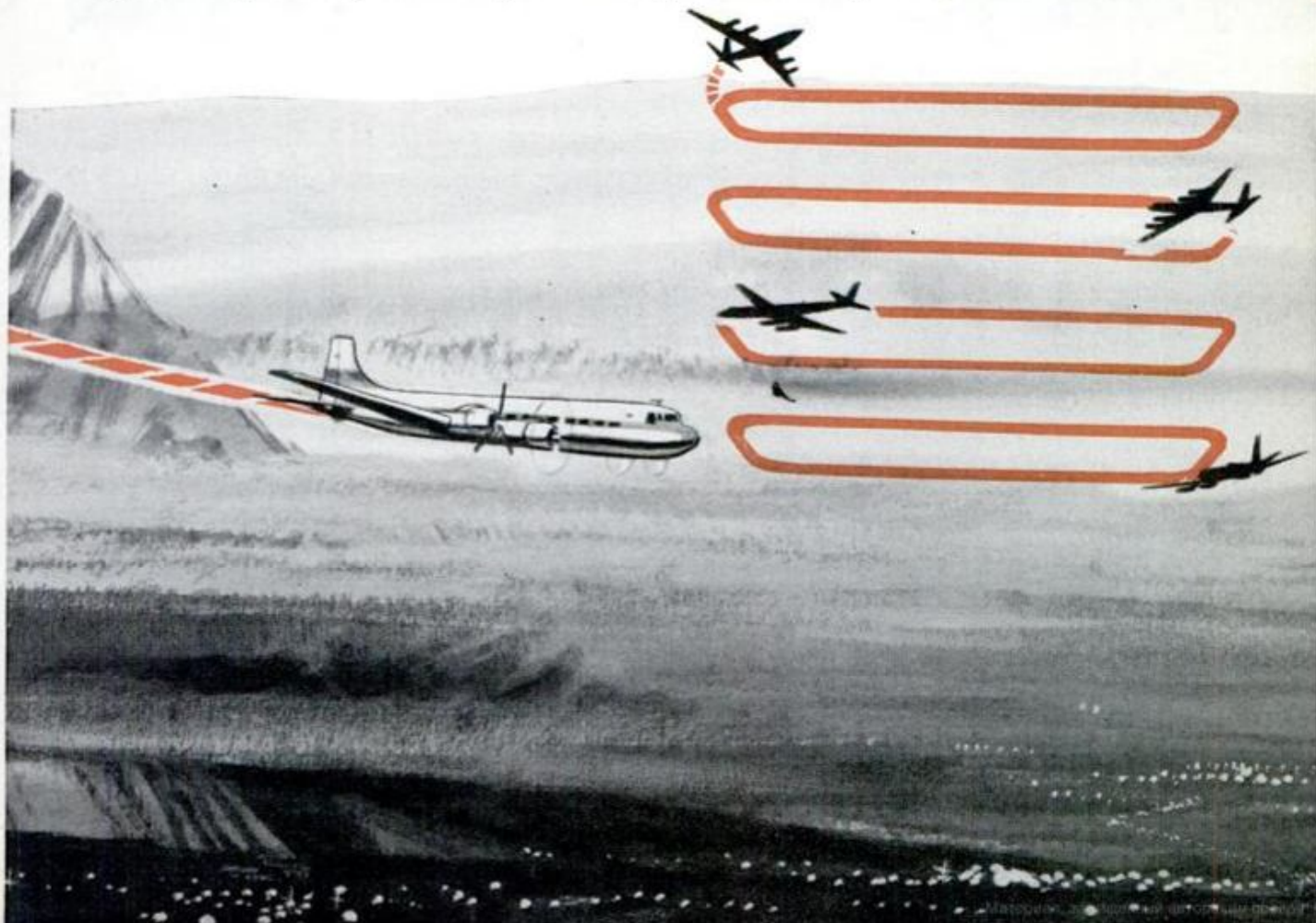
also connect him with adjacent centers in Phoenix, Oakland and Salt Lake City. Ted, at the moment, was exchanging aircraft estimates with these centers and mentally computing just how many his controllers could accept from each when the almost inevitable fog created the equally inevitable pileup over the area.

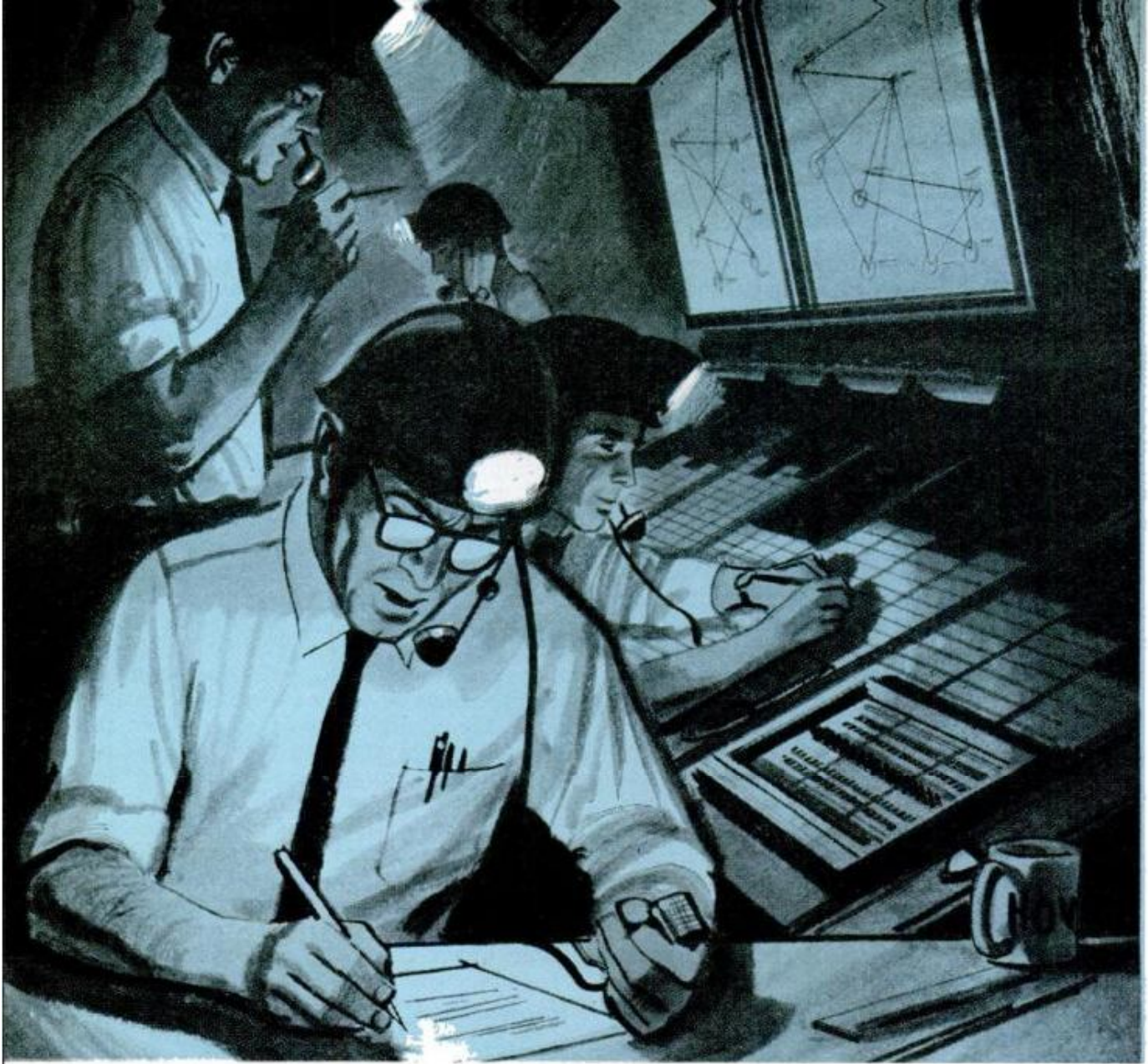
This is the team, the headquarters, to which everything that moves in the air for thousands of square miles is, or should be, known. Important? Enough so for its exact layout to be considered classified information.

"Simple business," Buck Archer muttered to his copilot as his plane cleared Blythe. "If those guys downstairs had to worry about 200 gadgets instead of one, fly an aircraft and keep their passengers sober, they might earn their keep."

His peevishness might have been caused by the report of lowering visibility in the valley and "moderate"—no one ever reports it as heavy—icing over the mountains ahead. He could not worry yet about the oil level in his starboard tanks because, unfortunately, gauges on some aircraft are as cranky as those on cars. The No. 3 gauge was already written up as inoperative, but this was not a "no go" item. When he first called the center, just out of Blythe, there was less than half a tank remaining in No. 4, yet the needle was just beginning to flicker down from the full mark. Soon,

engine out, directly toward four aircraft unaware of his predicament."





“The controllers strapped on miners’ lights in the darkness, and were on the lines to other facilities in the sector . . .”

perhaps, Captain Archer might be able to test his own argument.

For, back on Manchester Boulevard, the situation was now going rapidly from busy to absurd. In the space of the 10 hours from early afternoon to late evening, more than 500 planes would be directed on instruments in and out of Los Angeles International Airport alone. In the last year, Los Angeles International replaced Chicago's Midway as the world's busiest airport. In addition, the Los Angeles area has its own disturbing peculiarities which bleach the hair of controllers and pilots.

One, of course, is smog. This and other vagaries of weather often give this part of California the highest percentage of instrument landings in the nation. Further, while New York has many alternate airports, this western coastal bowl has few. While Chicago sits in the middle of a low, flat landscape, the minimum altitudes for approaches to Los Angeles from the moun-

tains to the east vary from 10,000 to 14,000 feet, all within a few minutes' flying time of the airport itself.

To prevent an impressive pileup of junk from forming along the slopes, aircraft departing for the east actually fly westward to “fish” intersections over the Pacific, aptly named Dolphin, Eel, Carp and Bonita. After they gain enough altitude they double back and overfly the layer of incoming traffic. Ingenious, yes, and necessary.

If this were all, and every aircraft was following these well-designed procedures, the work of controllers like Ted Clark and pilots like Buck Archer might not be so difficult. But among the jets roaring through their climbs to the fish intersections, the high-speed letdowns of incoming craft from the east, and the trans-Pacific flights hurtling along their corridors, there are still others. Military aircraft, many not under center control, bore through adjacent areas at near sonic speed. Many

"Buck was shooting earnest glances at the oil gauge . . ."

private planes, in all but "full storm" conditions when all air traffic is on instruments from the ground up, appear out of nowhere requesting immediate clearances through this meticulously regulated whirlpool.

Ted Clark's voice took on the edge of a well-filed saw as he watched the stacks of traffic building now over several fixes and listened to the pleas of these "pop-ups."

As the weather thickened, the first airports to close were Norton and March Air Force Bases in the eastern part of the valley where smog piles up against the mountains. Ontario became marginal, flights were diverted and the stacks which had been confined to Baldwin and Hermosa intersections began to grow elsewhere. Forty planes circled over Long Beach, Downey, Eel Intersection, Oceanside and other fixes. Some of these had already been given to the airport approach control for their chance at an instrument landing; most of them were still under center direction. Among these were four airliners holding over Ontario, in Jim Wheeler's sector.

And now, having become a strip of paper on Wheeler's board, Buck Archer reported he was at Eagle Intersection. Though the controller could not know it, Buck was shooting earnest glances at the oil gauge of his No. 4 engine as often as the heaving plane permitted. The needle had dropped now to a point barely above the half-way mark and, if Buck hadn't seen this happen a number of times before, he might have immediately diverted to Palm Springs. As it was, he elected to continue.

As the spread between dewpoint and temperature had narrowed at Los Angeles, word went out over Ted Clark's lines to other centers that a landing delay could be expected. Care would have to be taken not to saturate the system and thus invite that nightmare known in the profession as Black Friday, when the traffic threatens to burst the system wide open. As the situation tightened and those two little birds of fate (remember?) circled for their landing, airline dispatchers began their inevitable round of calling the center, demanding to know why *their* craft could not be cleared on schedule. The fact that four or five other flights were also scheduled out at that same time, along the same route, seemed to matter not at all.

"I'm open to suggestions," Ted growled at them.

The truth was that there was just so much space, and it was unavoidably clogged. Every flight chose the best route,

of course, which was often the identical one.

"Can't they understand," Ted asked no one in particular as he banged the phone down after the umpteenth call, "that delays are not deliberately plotted here?"

As the ports along the way closed down, as fog rolled up on Ontario International, as Airtransit 13 labored at climb power against its sudden load of ice, Buck Archer's copilot jabbed him and pointed to the panel. Their moment of truth had arrived.

The No. 4 oil-quantity gauge suddenly became accurate—its needle was resting on empty! There was only one answer to that, and it wasn't a pleasant one under the circumstances.

They were in Banning Pass now, where their altitude—and the legal minimum to clear the rocks on either side—was 14,000 feet. Turning back was out of the question, particularly since they now would be descending, whether they liked it or not.

Buck grabbed for the throttle. If the prop was still on after the engine seized, which it almost certainly would do if he let it run dry, the chances were that it wouldn't feather. The engine itself would be ruined, the reputation of Captain Brownleigh Archer likewise, and the plane might not stay aloft with the increased drag.

"Call the center—tell 'em we're feathering!" he barked at the copilot. By this time he was already half-way through the procedure—throttle back, R.P.M. back, feathering button pushed, mixture off, switch off. . . .

And let Miss Taylor, she of the steady voice and cheery grin, announce to the passengers that there was really nothing to worry about: The Captain was shutting down the right outboard engine due to a malfunction. They would be descending shortly for Los Angeles anyway. . . .

You're damn right they would.

With METO (maximum except takeoff) power on the three good fans, they were being battered down by canyon turbulence and their overwhelming load of ice, but Buck had begun to pick up Banning Fan Marker, at the west end of the pass. Walk the thin centerline of this airway, he thought, and we'll be O.K. And at Banning, he was just 11 minutes from Ontario.

At the center, "Watch Soup" Clark was monitoring D-4 sector when the call came in "Feathered No. 4 due to oil loss. Unable to maintain. Declaring emergency."

"Roger," Jim Wheeler snapped almost as a reflex. He was going to say more but

that moment was chosen to test the beleaguered system and the people who run it. As the second black bird of fate fluttered home, the lights yellowed. Then, instead of returning to their former brilliance, they remained dim, perceptibly fading. The voices in the controllers' earphones dropped to unreadable levels. As it happens once or twice a year in almost all communities, the central power supply had failed.

Jim Wheeler keyed his mike. Nothing. He spun to his coordinator. "No power!"

Ted Clark had already seen his action. Without waiting for confirmation, he turned to a panel at his side and flipped on switches to a spare transmitter and receiver, in case they were at fault. They weren't. He saw the maintenance officer disappearing on a dead run for the spare power unit. A precious minute had passed.

What he could not see, but had not forgotten, was Buck Archer dropping along V-16 with one engine out, directly toward four aircraft holding over Ontario and another half dozen over Downey, all unaware of his predicament. But, if the small faults which closed down this part of the system

were human, so were the minds which rose to the challenge of repairing it. Emergencies like this were so rare that they had to be invented as part of the training. Ted Clark, who was following the situation like a cat ready to pounce, now watched with a grim satisfaction as brains and improvisation took the place of gadgets and procedures. Even before they strapped on the miners' lights which were being passed out in the darkness, the controllers were on the long telephone lines which connected them to the other facilities in their sectors.

"Give Wheeler a hand!" Ted growled to the coordinator backing up sector D-4. But the controller was already there. Another was dispatched to help.

"Ontario Radio," Jim Wheeler was saying. "Emergency. Emergency. Airtransit DC-6 unable to maintain altitude. Westbound from Banning on V-16, last reported at one-four thousand. Broadcast warning to all craft. Power failure here."

"March Rapcon!" the coordinator rasped. "Emergency! What's your situation south of V-16? One-four thousand and below?"

"Wide open," Rapcon's voice crackled. "Help yourself."

"When they broke out of the ragged, rolling fog at 300 feet with the



"Roger—keep this space clear until further advised."

It took only a nod from the coordinator to Wheeler. Both knew that the planes holding over Ontario, where the airport had just been closed by fog, would be riding the VOR (very high-frequency omnirange). Probably—but not certainly—the crews would have the audio signal on as well as the visual indicator needle.

"Ontario," Wheeler said, almost without pause and almost grinding his teeth because, according to regulations, there was no faster way to say the obvious, "ATC clears United five-six, Western . . . immediately to Corona Intersection, heading one-six-seven degrees. . . ." Four minutes gone—another five might put Airtransit Airlines in the holding pattern of the planes over Ontario.

The other controller coming in to help had taken a running look at the board, listened to a few words, and was on the line to L. A. Approach Control, which controlled traffic approaching Los Angeles.

"Emergency. Airtransit DC-6 unable to maintain altitude, westbound at Banning," he said. "Can you take him?"

"Affirmative. Have him call me when he can or clear him on in. Runway two-five left or two-five right. Wind southwest at twelve."

The pilots holding over Downey, next in line for an instrument-approach landing, slapped the wheels of their craft when Approach Control's message came, seconds later.

"Pacific Three cleared for an immediate ILS (instrument landing), report leaving Downey and outer marker inbound. United 43 and Pacific 201, stand by for possible clearance to Eel intersection, V-16, direct Eel."

The controllers' supposition had been right—two of the pilots holding over Ontario had been monitoring the VOR audio; they were turning off the airway before their co-pilots had completed the acknowledgment. Two others, however, had the volume squelched. But when the center's silence had continued for several minutes, one called for a new estimated approach time, just in case. No response.

Being neither stupid nor new at this exacting game, they both hurriedly switched

(Continued to page 182)

runway lights dead ahead, a warm feeling flowed through the cockpit . . ."



MASTER MECHANIC of the MOUNTAINS

By Thomas E. Stimson, Jr.

SHAWVER'S portable electric arc welder, built from a war surplus auxiliary power plant, is mounted on a two-wheel frame for mobility



BILL SHAWVER wants to retire this year, but his neighbors won't let him. For 14 years he has been friend, master mechanic, builder and general consultant for the 30 families that spend their summers on the shores of Silver Lake in California's Sierra Nevada mountains. He has remodeled some of their cabins, built half a dozen new ones and erected fireplaces by the score. In between times he invents new tools to help in his work.

A few years ago he needed an arc welder complete with its own power plant but he couldn't afford a new one. He found an ideal substitute in a war surplus auxiliary power plant from a B-29 bomber that required little conversion. Originally the power plant consisted of a 2-cylinder 10-hp. gasoline engine connected to a generator that produced 200 amperes at 28 volts. Shawver replaced the original starting mechanism with a 6-volt battery and a 6-volt automobile starter. At the generator end he added a rheostat, condenser and coil for pulling a steady arc. With this machine he can burn up to quarter-inch welding rod and produce a heavy quarter-inch bead at one pass.

Shawver uses it for manufacturing such projects as boat hoists, docks and railings. It's good for even the little jobs like repairing barbecues and making fireplace andirons.

With it he built a motor-driven ski-lift-type of tramway for one neighbor whose cabin is 50 feet above the lake. The lift—complete with automatic brake and car-type shock absorbers to prevent swaying—carries several people or a fishing skiff laid over on its side.

Shawver's first job at Silver Lake was to build a fireplace and chimney but before he could start he had to find a source of good rock. He hunted through the mountains until he found the kind of stone he wanted, filed a mining claim on the ledge, and started to quarry it.

One of the first things he did with his arc welder was to build a crane, mounted on his truck, for loading and unloading big chunks of rock. Another was a low-down wheelbarrow that lies flat on the ground so he can roll a heavy rock onto it instead of lifting the weight. Those two tools took a lot of the manual labor out of handling stone.

With the welder, too, he built a tractor to his own specifications. The finished machine looks like a hay-wire collection of junk but it's just what he wants, sturdy and reliable and small enough to load onto a pickup truck. On a frame of pipe and angle iron he mounted a 9 hp. stationery engine that he connected to an old Plymouth transmission by a 3-to-1 reduction chain drive. The transmission drives a Plymouth rear end, with the axles cut down to fit the narrow tread. Wheels, brakes, steering mechanism are all Plymouth, all from the same wrecking yard. Rear tires are 7.00-16s with snow chains installed for better traction.

The tractor has no springs, so for comfort he



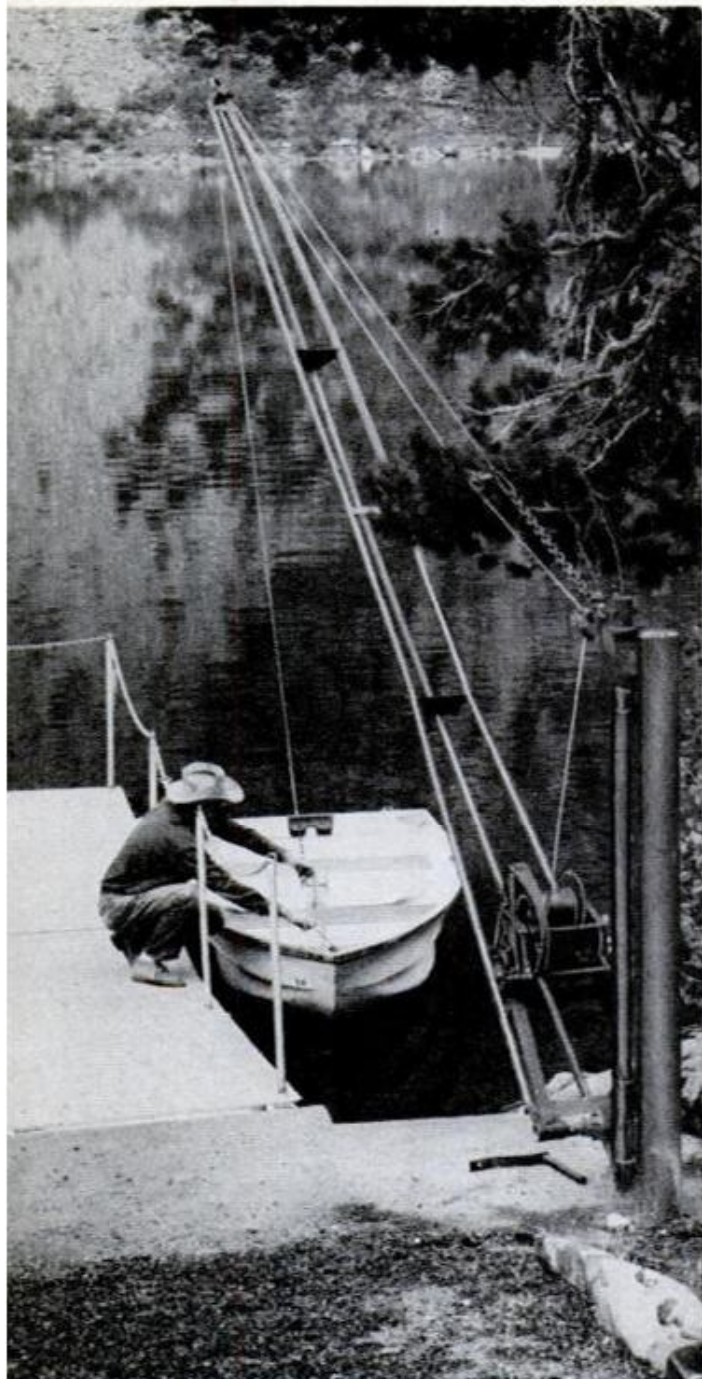
HILL-CLIMBING tramway saves a 50-foot climb by hauling people and boats from this cottage to the lake

added a metal tractor seat that rides on a motorcycle seat assembly mounted on one leaf of an automobile spring. Attachments, all controlled from the driver's seat, include a 9-inch plow, cultivation disks and a grader blade. For some work, such as digging out a hillside basement, he attaches a scraper to the front of the tractor.

If you are planning to use a lot of dowels on a job, Shawver has a tip for you. One cabin called for many dowels and it's sometimes tough to drill the holes straight so

that the dowel rods will fit perfectly. Shawver built a jig that consists of two pieces of angle iron slotted and bolted together to fit in place against the material, with a guide tube for the drill brazed to the angle iron. A guide bushing brazed to the drilling bit, fits inside the guide tube and the bushing is slotted for discharge of shavings.

One problem in owning a mountain cabin is that field mice like to move inside, especially in winter when no one is there. A favorite point of entry is an overhead



BOAT CRANE solves launching problem by lifting the boat bodily, then turns and folds out of the way

garage door, which ordinarily is built with a gap measuring $\frac{3}{4}$ -inch or more between each end of the door and the jamb to prevent binding when being raised or lowered.

Bill Shawver's garage doors are all mouseproof, in fact they are virtually airtight. He tapers his door jambs so that the opening is at least $1\frac{1}{2}$ inches wider at the top than at the bottom, then builds the door to fit the slanted jambs. Such a door has plenty of sideplay while it is being raised or lowered, yet it fits air tight against the jambs when in the closed position. No space is left for a mouse to enter.

A closed overhead door is likely to freeze in place if winter snow turns into ice, so



ORDINARY FAUCET, welded onto jerry can, saves pouring and keeps fresh drinking water "on tap" in camp



LOW-DOWN wheelbarrow simplifies handling heavy rocks; ground-level bed eliminates lifting and carrying

Shawver nails a length of firehose along the bottom of the door so that the hose rests against the driveway. Any ice on the hose is easily broken loose. The fire hose also serves as insulation and, with the virtually air tight jambs, keeps a garage relatively warm all winter long.

In his career Shawver has been an automobile mechanic, a construction worker, a miner, a Forest Service mechanic in Alaska and a guide in the Jackson Hole and Big Horn areas. In each of these jobs he picked up new knowledge that his ingenious mind has been putting to work ever since.

But now he wants to retire. "Just as soon as my friends will let me," he says. ★ ★ ★

It's a Real Gasser!

Buses in the People's Paradise of Red China go a long while between fuel stops. They carry a supply with them almost as large as the bus itself.

A huge inflatable bag on top of a bus used in Peiping is filled with natural gas on which the bus operates. The gas flows through hoses to the engine, supplying enough power to drive the bus and pull another one behind it.

The second bus has a deflated bag on top of its roof, so apparently it, too, can operate independently. The news release from Red China gave no description of the gas-burning engine.



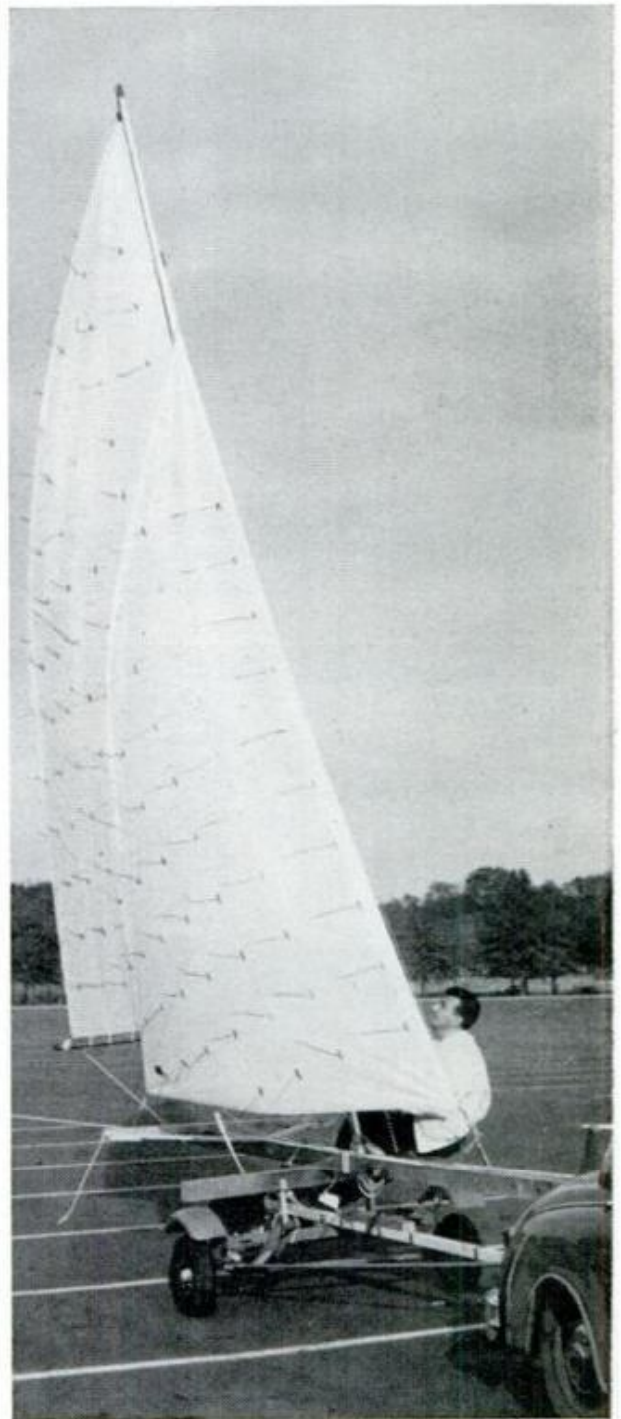
Trailer Sailor

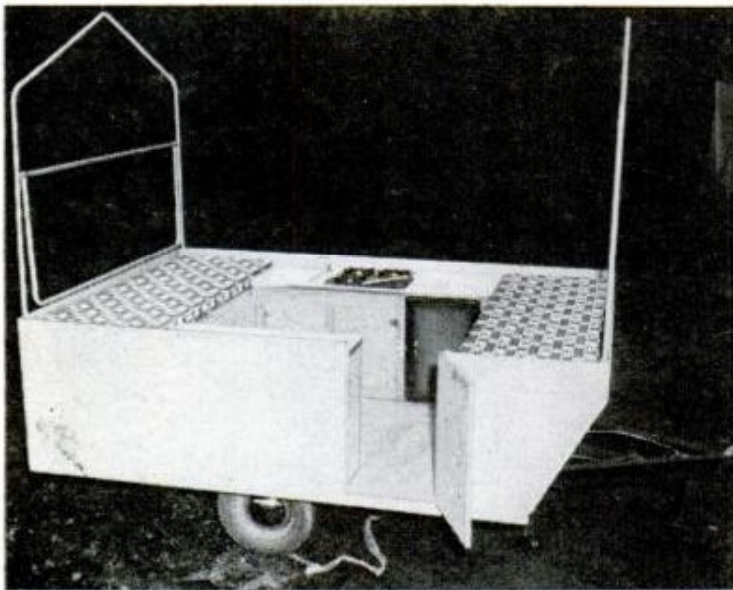
Studying wind flow over a suit of sails in a black-top parking lot, a sail engineer rides a new "sailing trailer" designed to permit such tests without using a boat. Towed behind a car, the trailer allows careful testing of sails and sail systems at all speeds and headings and from any position. Yarn tails show the air-flow patterns. The trailer was developed by Ratsey & Lapthorn, sailmakers, of City Island, N. Y.

Heavy-Duty Diesel Outboard

Built for heavy-load operation on jobs requiring long life, continuous use and low consumption of inexpensive fuels, a new three-cylinder diesel outboard develops 15 horsepower at 4000 revolutions per minute. Fuel consumption is half that of a 15-horsepower conventional outboard, but thrust at low speed is doubled.

The motor weighs 190 pounds. It's made by Scott Division of McCulloch Corp., 2700 Winter St., N.E., Minneapolis, Minn.





Kit Camper

For the do-it-yourself type who'd like to build his own camping trailer, a nationally distributed camper is now available in knockdown, pre-cut kit form. The finished sleep-four-plus-one kit trailer includes a water tank and sink, three-burner LP gas stove, icebox and sunshade-dust cover. The kit costs \$599 and goes together in 40 to 50 hours; the comparable ready-made model is priced at \$799. The kit is also available in four progressive sections to spread out work and cost. The Porta-Camper is made by Holiday Industries, P.O. Box 1, Ralston, Neb.



Jet-Powered Catamaran Skims Over Water on Hydrofoils

Featuring V-shaped hydrofoils on a catamaran hull, a Lockheed-California research craft skims above the water in tests at Morris Dam, Calif.

Powered by a Fairchild J-44 aircraft jet engine developing 1000 pounds of thrust, the craft is expected to be capable of reaching speeds in excess of 75 knots, or 86 miles per hour.

The goal of the high-speed experiments, which are being conducted under contracts from the Office of Naval Research and the Navy's Bureau of Ships, is to get data on hydrofoil stability, and to determine sound radiation of foils.

Findings will be correlated to Lockheed's continuing antisubmarine warfare detection program.



Designed, Flown in Five Weeks

Louis Anderson of Mansfield, Mo., who flies fire-patrol and crop-dusting missions for a living, designs planes in his spare time. His latest creation took exactly five weeks and three days from the time he drew up the plans on the hangar floor, until the plane was built and flown.

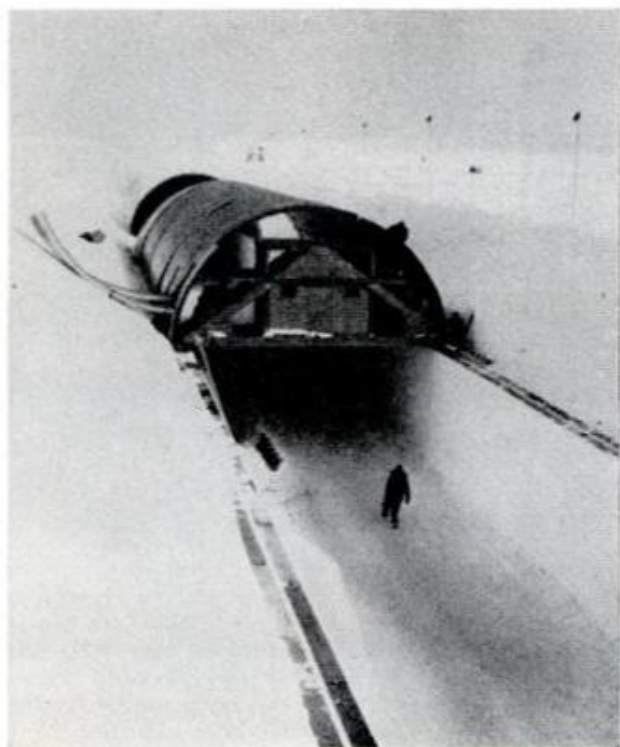
His "Scampy" is a one-place biplane with swept-back wings spanning 17 feet 10 inches. Its 85-horsepower Continental engine powers it to a maximum 150 miles per hour, with a range of 260 miles.



City Builders in Antarctica Make the Snow Fly

U.S. Navy Seabees, erecting the New Byrd Station in Antarctica to house scientists and their equipment, cut tunnels 20 feet deep using lumbering, 19-ton snow millers that gouge out snow and throw it

onto banks. The tunnels are roofed with steel arches to form buildings. This new construction was necessary because a five-year accumulation of snow threatened to collapse the older Byrd Station.





WHAT'S NEW FOR
Your Home

STAINLESS-STEEL KITCHEN CONSOLE has a fluorescent light built directly above the sink which illuminates the entire sink area and eliminates shadows. An electrical outlet is located at each end of the control pedestal containing the light. The console has a built-in spray under the water faucet. When control is set for "flood" or "spray," the spray goes automatically into action, leaving the housewife's hands free. Also included are remote control pop-up drains, garbage disposer, vegetable basket and cutting board. Deluxe model has power unit, food mixer, blender and electric knife sharpener. Available in five models; prices range from \$271 to \$443. This steel sink unit is made by Elkay Mfg. Co., 2700 S. 17th Ave., Broadview, Ill.



MIRRORED WALL PANELS can be cemented to wood, plaster, hardboard or tile. The panels are available in 12-inch squares with electro copper plated silvering. No tools are required for installation. Price range is \$14 to \$32 per one-dozen package (cement included). The mirrored wall panels are supplied in 12 different engraved decorator styles. The manufacturer is Revere Glass and Mirror Co., Inc., 17 White St., New York 13, New York



BABY-FOOD FEEDER brings easy transition from milk-nipple stage to food-spoon stage. After baby familiarizes himself with cereal and strained food from feeder, he accepts it more readily from a spoon. Costs about \$2; made by Hy-Tyme Inc., 7651 N. Paulina St., Chicago 26, Ill.



OVERHEAD FAN creates a downward breeze which forms an invisible, effective fly barrier without the use of insecticides. The fan's slow-turning 36-inch plastic blades create a gentle air turbulence and repel flies without cooling food or ruffling napkins. Lightweight and portable, the fan is easy to install indoors or outdoors—wherever there is an insect or fly problem. The overhead fan costs \$29.95 in black or turquoise; it's made by Breezette, Dept. P55, 2918 Gilroy, Los Angeles 29, Calif.



STEAM STIRS, COOKS, and heats foods without adding fats or water. Steam entering one-way valve in water-filled boiler cooks and stirs food in bowl. Price is \$14.95; made by Steamstir Corp., Box 1929, San Mateo, Calif.



DRAPES OPEN AND CLOSE automatically with a silent, electric traverse-rod actuator. It requires only screwdriver installation. In four models, from \$25 to \$40. Stanley Drapery Hardware, Wallingford, Conn. makes the unit



FLEXIBLE SNAKELIKE LAMP winds, grips, stands and attaches anywhere without any marring effect. The lamp's flexible tubing helps it shed light in hard-to-light places. Manufacturer is Illumatronics, Inc., 2423 Pacific St., Brooklyn 33, N. Y.



FOLDING PLASTIC BOTTLE holds five gallons of liquids or solids; folds into a two-inch-thick package weighing a half pound. Price is \$2. The bottle is made by Associated Plastics, Inc., 1510 University Rd., SW, Cleveland 13, Ohio

RECENTLY A GROUP of novice yachtsmen attending power-squadron lectures in a Long Island town, spent hours each week copying their instructor's charts and navigational diagrams from a blackboard. All, that is, but one young boatman.

He watched, listened and asked questions but took no notes. After the lecture was over, he waited for the class to clear out. Then he stood in the back of the room and shot a picture of the blackboard—accurately recording everything discussed during the meeting.

The young man had discovered something industry has known for years: Your camera can be as practical as a hammer. There's even a name for this kind of picture taking: "Functional photography."

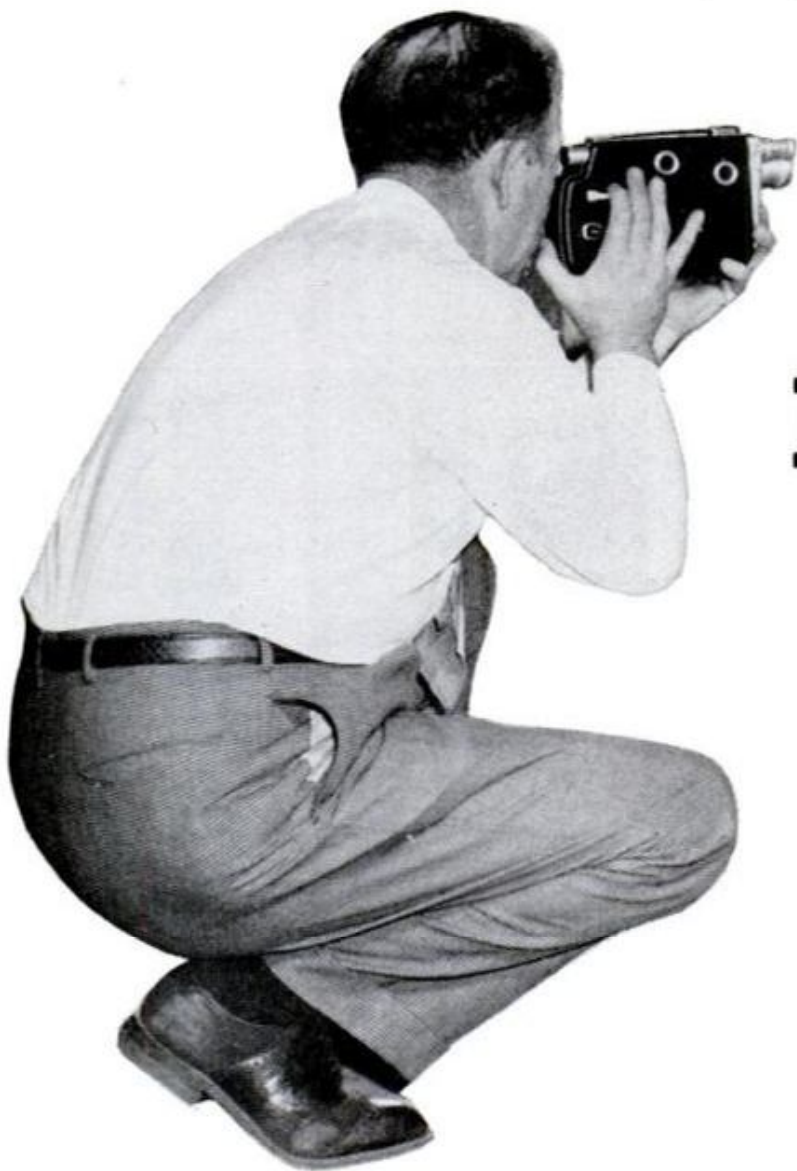
Have you a hook or slice you can't cure? Does your model railroad layout lack realism? Does your garden look seedy despite all planning efforts? Are you having route trouble on your sports-car rallies? Whatever you do, from bird-watching to piloting a glider, a camera probably can help you do it better.

In some cases such picture-taking is used to solve problems; in others it provides an accurate method of recording information for analysis or file.

Ed VanLeer, expert model railroader and past president of the National Model Railroad Association, recalls that, of some 700 railroad buffs attending trips to switching yards during a recent Chicago convention, virtually all carried a camera. They were not snapping vacation shots. They were recording engine types, prototype cars and yard equipment for possible reproduction in miniature scale.

According to VanLeer, one picture and some key measurements can provide all the information you need for scaling in detail. One VanLeer model that took first prize in a National Model Railroaders' contest is a scale replica of a steam locomotive he built entirely from pictures he took in 1934!

The basic requirement for scale-model photography, according to VanLeer, is to place the camera so that it will record what you would see if you were about an inch tall and in the scene. If the picture looks



Improve Your Hobby With Photos

realistic, the layout will, too. Low camera position quickly reveals flaws by providing scale perspective.

Actually, builders of all kinds of models are using photography as a handy assist to their particular interests. And full-scale antique-car enthusiasts regularly preview their restoration jobs with a camera.

"Suppose," says one of them, "you acquire a 1911 Packard in the rough. Why not look for an authentically restored model at the next antique-automobile concourse or Glidden Tour, and cover it photographically from every angle? This helps you get authenticity in your own restoration."

He did just this recently. One shot views the front, another shows the side and rear of the Packard, another the instruments. Still others show engine, carburetor, fuel pump, side lamp, bulb horn, hub caps, grease cups, shock absorbers and many other details characteristic of the 1911 era.

In the field of sports, photography is a made-to-order teaching aid. With more and more boys—and girls—forming Little Leagues, Pony Leagues and Babe Ruth Leagues in villages from coast to coast, the teaching of baseball fundamentals gets tougher. But many a dad with a variable-speed movie camera has found that slow-motion movies of Junior in action can be a real eye-opener.



Joe Minella of Irondequoit, N. Y., who runs a championship athletic program for an industrial complex, leans heavily on picture analysis for teaching the budding sluggers in his 136-team baseball league of boys 11 to 15.

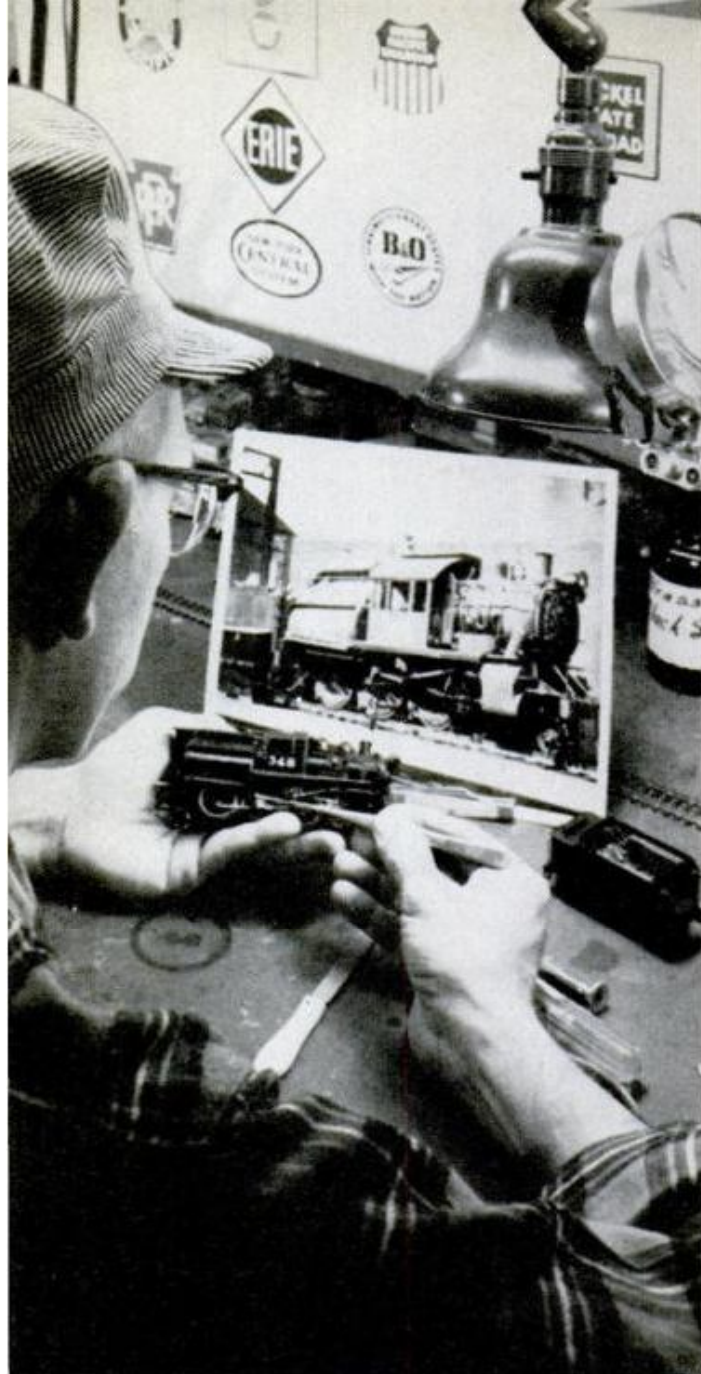
"Take your boy out on the lawn and get him to swing at a few pitches while you take movies," Minella says. "Set the camera at 32 or 64 frames-per-second and adjust your lens opening for the faster speed. For instance, if you are shooting film that exposes properly at f:16 on a sunny day, you'll need f:11 for 32 frames-per-second, or f:8 for 64 under the same lighting. You'll get a slow-motion movie revealing every dimple and hitch in the boy's swing. Take the movies from different angles until you find one that shows what you are trying to

diagnose. Almost any kid, when he views his actions, will see his faults and work at correcting them."

Even a still camera can do a commendable job of coaching. With a quick finger and a good eye, the photographer can fire off two or three shots as a player slides into base, or fields a bouncing grass-cutter.

Minella uses photography similarly in football, basketball and other competitive sports. "Such faults as leaping from the wrong foot on lay-ups and turning the head on tackles, are spotted quickly by a camera," he observes.

A skin-diving expert in New York's Finger Lake region would agree. He recently devised an underwater camera case for instruction. He uses the rig to take subsurface pictures of his students, to demonstrate

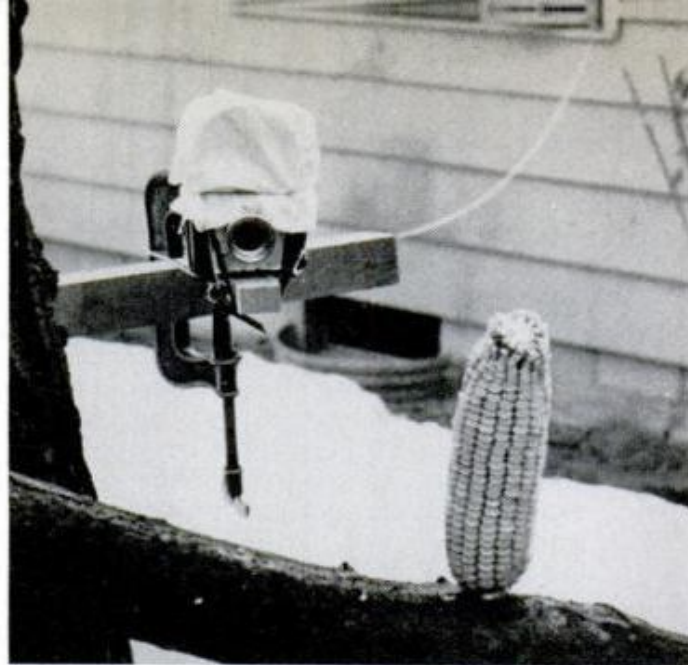


RAILROAD BUFF uses pictures of locomotive taken in field as guide to accurate assembly of model

the right and wrong way to flutter-kick and proper techniques for "buddy-breathing" under water.

Karl Warner, a former Olympic track star, uses photography in coaching a high-school ski team, found it improved team speed and raised scores. By shooting movies at 64 frames-per-second, he can analyze each member's form in slow motion and point out errors. "During a race," he says, "a skier might realize that he knocked over a flag, but he wouldn't know why. Movies show him whether he was too far back on his heels, too far forward, or what." Warner also carries a 35-mm. camera under his parka on ski trips, shooting any unusual display of form or skill, which he passes along to other ski groups for information.

Camera coaching can even help perfect your own golf game. One devotee who re-



AMATEUR NATURALISTS can set up simple camera trap, take pictures of woodland friends for study

cently had his "swing" analyzed by photography warns, however, that you may feel like giving up the game once you see yourself in slow motion. "The technique magnifies faults," he points out, "but it *does* help."

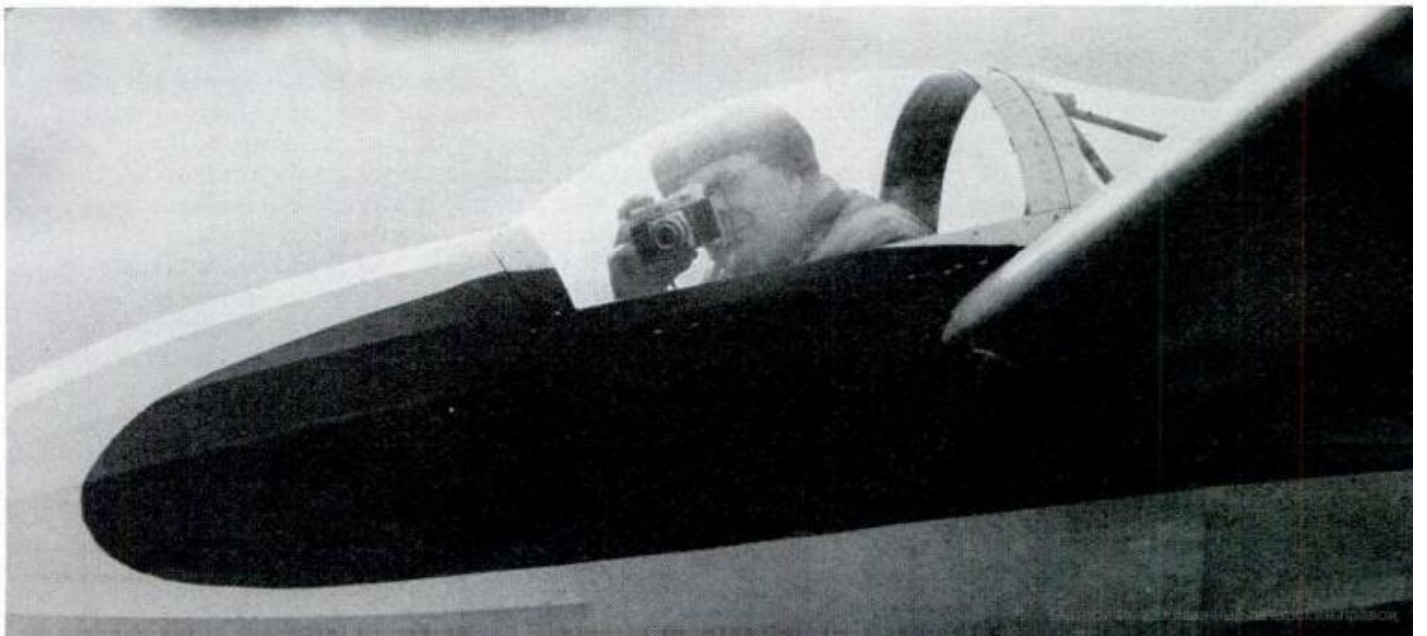
Improving poor drives or chips isn't the only way a camera can serve a golfer. Still shots of the hazards and terrain, taken before playing a strange course, often can help greatly in planning approach shots and in avoiding trouble.

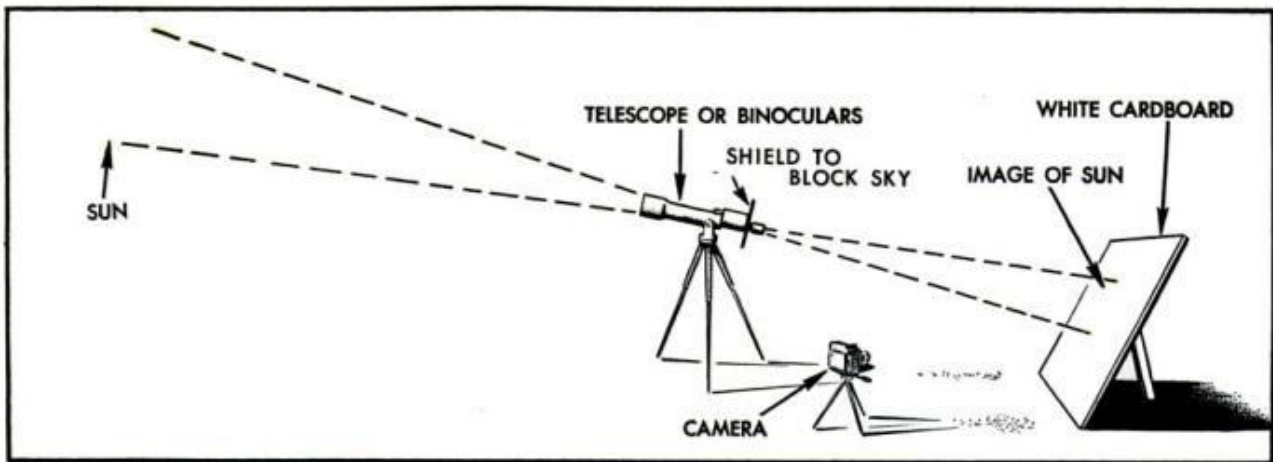
Suppose you fish. Even here, your camera can be a highly functional aid instead of just producing the hackneyed shot of you and your buddy standing cheek-to-fin with a prize catch. One well-known angler photographs his best camp sites so that on later trips he can repeat the precise location and handling of equipment. "It's easy to forget



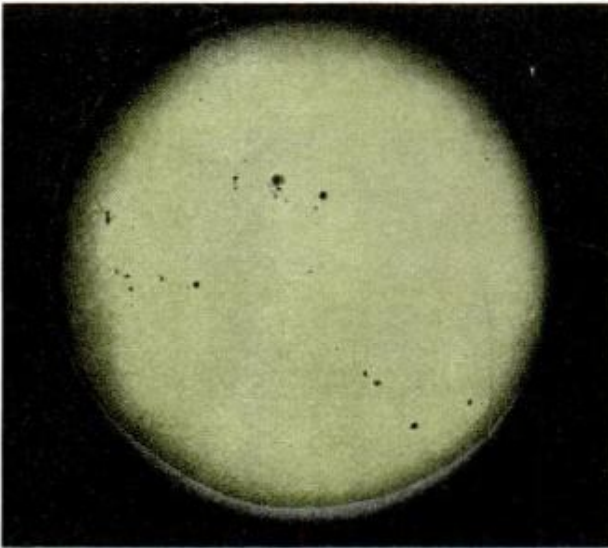
LITTLE-LEAGUE coaches find both movies and still pictures of players useful for teaching the youngsters. Flaws in their playing techniques are more easily shown, making one picture worth a thousand lectures

SOARING ADDICTS have adopted camera as official tool for taking "proof of passage" photos. Sealed camera is carried aloft and designated check points photographed from air, proving pilot passed over them





AMATEUR ASTRONOMERS take pictures of heavens even with simple box camera. Sun photo (left) was taken with setup shown above. Image was projected through telescope onto cardboard and photographed



SKIING TECHNIQUES can also be improved by studying photos taken on slopes. Movies are especially valuable, since they can be reshown in slow motion

details of a well-pitched camp without a picture," he says. "The photos provide the know-how to do it again."

He also recommends having a companion take a picture of your casting technique with bait, fly or spinning gear. "You may not realize your elbow is out," he says, "but a picture can tell you exactly how good your form is—or why it may be less than good."

This same outdoorsman discovered inadvertently that a camera could make an ideal tool for perfecting the performance and trim of a boat used on fishing trips. "Someone happened to snap my boat," he says, "and after seeing the picture I realized that the load was badly distributed. We were able to correct our packing to get maximum performance on future trips. This photograph is our permanent reference for final selection and stowage of gear."

For such sports as mountain climbing, a camera has always been standard equipment. According to Dr. Henry Staehle of Irondequoit, N. Y.—a crampon hiker and piton-pounder for many years—climbers photograph the mountainside from different angles before a difficult ascent. Then, on the print, they pencil in possible routes of ascent and descent. "This is the kind of

thing you would have real difficulty reconstructing accurately in a sketch or in words," he points out. Great conquests of sheer faces in the Himalayas usually are preceded by telephoto studies of alternate routes.

Dr. Staehle also advises photographs as a means of teaching novice climbers the finer points of working with rope, ice axe, piton and karabiner.

Naturalist H. Lou Gibson uses photos to catalogue and classify his woodland findings. He also photographs plants in their natural habitat, using the pictures to lay out authentic wild flower gardens in his own yard.

Often, too, a nature picture may turn up something no one has ever seen before. Gibson photographed a water-strider so that he could study closely and at leisure the "dog paw" impression shadows made by the insect's weight on the surface tension of the water. The picture revealed lines of force in the water surface around the bug's feet. To the best of Gibson's knowledge these lines had never been observed before. More interesting was the fact that the strider gets part of its support and traction from small air bubbles held in the feet. This was not revealed until the scientist put deter-



gent into the water and his pictures caught "stars" created by sunlight on the bubble surfaces.

So if nature study is your dish, there's a chance that the pictures you take will turn up unknown scientific data. Wildlife shots of larger animals are easily obtained by setting up a simple camera trap (page 120).

For gardening and landscaping, one horticulturist photographs successful massing of blooms to help in planning and changing his garden from season to season. If an experimental planting proves poor, he takes a picture to remind him *not* to repeat it. His picture file is a catalogue of "problem" plants, and recognition shots of unhealthy plants with appropriate insect or soil conditions noted on them.

Some spare-time scientists, like amateur astronomers, use a camera for biological reasons, according to star gazer Howard Colton of Fairport, New York. "You could stare at the sky all night," he says, "and never see more stars than you saw at first glance. The eye doesn't 'store' light. But photographic emulsion does. So astronomers use cameras to stare for long periods at the night sky, and record stars invisible to the naked eye."

You'd suffer certain eye damage trying to

view sunspots through an unfiltered telescope or binoculars. But the phenomenon can be seen and recorded by rigging the telescope or glasses on a steady support, with a piece of white cardboard for a "screen" on which the sun's image can be projected through the eyepiece (see diagram). Shoot the image, and you'll have a picture of the sun with its spots if any are present. But *never focus visually on the sun.*

For sun shots use the slowest film you can get, and shut down the diaphragm for high resolution pictures. Fast film and wide openings are best for distant bodies and fast-moving objects. Shoot manmade satellites an hour before sunrise or an hour after sunset when you're in the Earth's shadow and the satellite is sunlit.

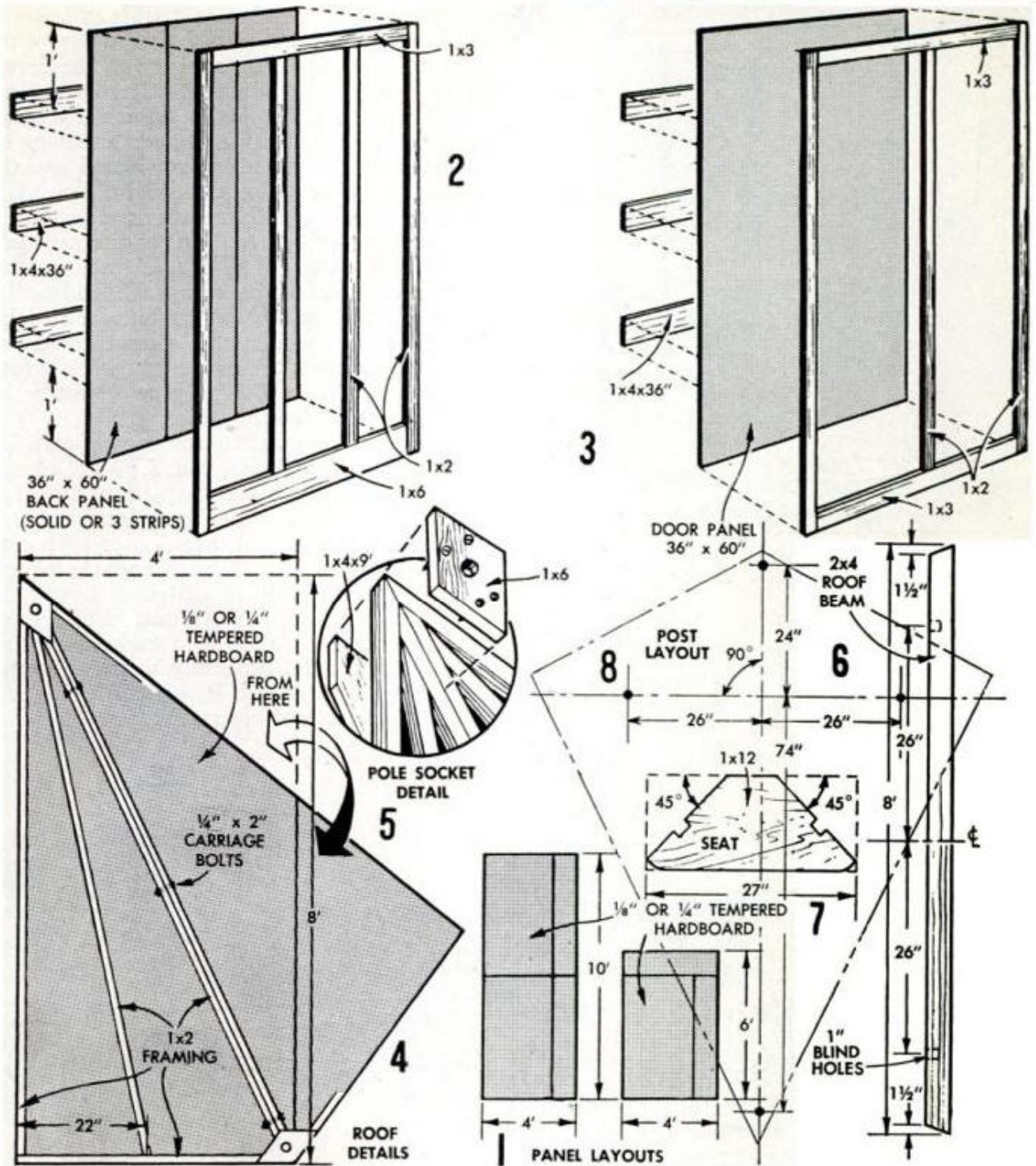
In sports-car rallying, where the accent is on precision driving—not speed—the driver and navigator follow often cryptic route instructions and strive to maintain a specified average speed. Hidden check points along the way rate cars on this basis. Newest wrinkle is to use photographic route clues instead of the usual "treasure hunt" type of route instruction sheet. For example, "turn right at Winged Red Horse" is not nearly

(Continued to page 176)

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POOLSIDE CABANAS



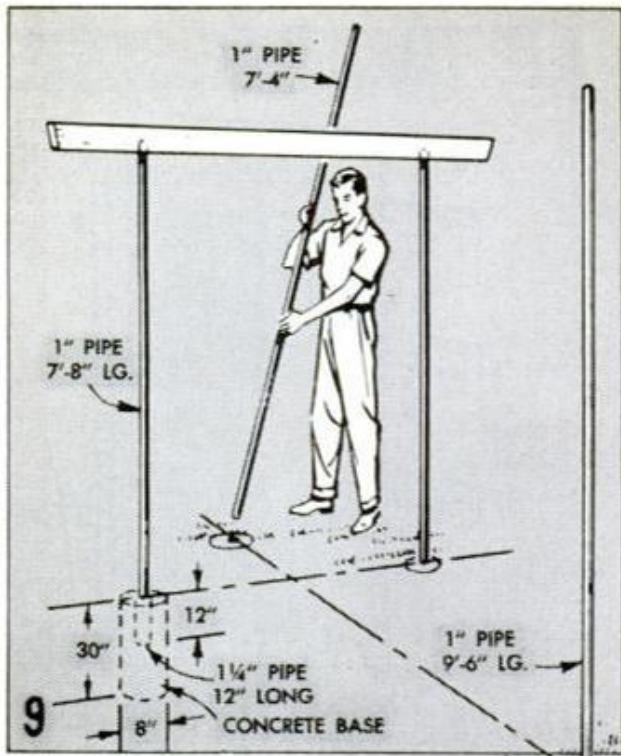


BESIDES MAKING IT extra convenient for guests to change for a quick dip, poolside cabanas save traipsing inside the house with wet suits, which can be a real nuisance with youngsters. Here you have a choice of two colorful cabanas built from materials available anywhere.

Kite Cabana. When not being used as a dressing room, this colorful unit functions as a shade and windscreen. The actual panels are cut from tempered hardboard, smooth on both sides, and steel pipe is utilized for supporting poles. Use $\frac{1}{4}$ -in. hardboard for a year-'round cabana, and $\frac{1}{8}$ -in.

if you plan to dismantle the unit at the end of the season, suggests the American Hardboard Association. Begin by cutting a 4 x 10-ft. panel and two 4 x 6-ft. panels according to the panel layouts, Fig. 1. Next, saw a 4 x 8-ft. sheet diagonally to form the two roof pieces. Paint each of these panels with a good exterior undercoat, being careful to cover the edges so that the hardboard is completely sealed. Now while the paint is drying, cut the various frame members to length and paint them.

For neatness, use $\frac{3}{4}$ -in. binder head sheet-metal screws to attach the door and

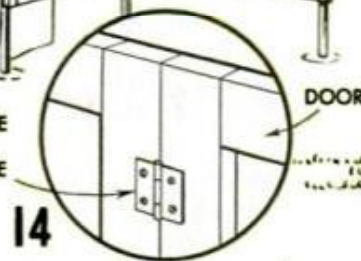
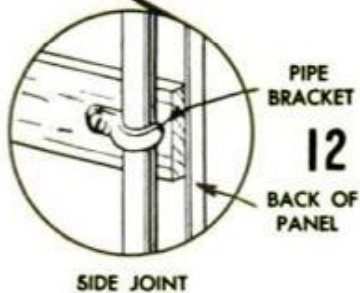
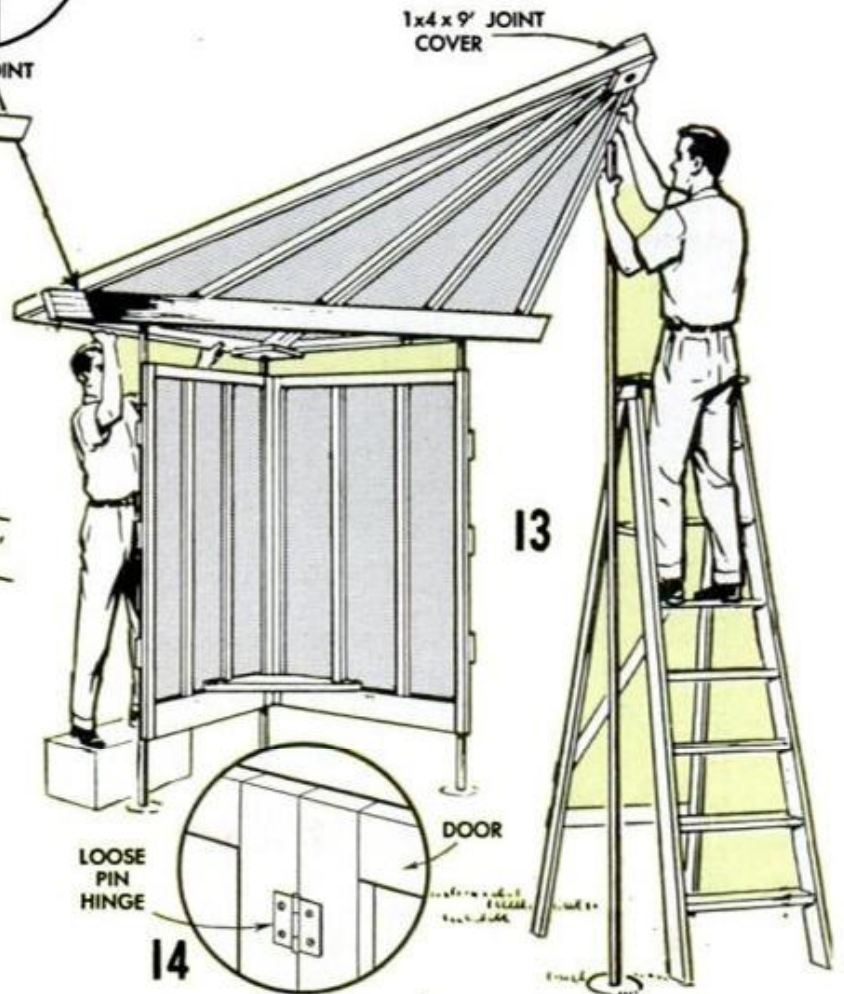
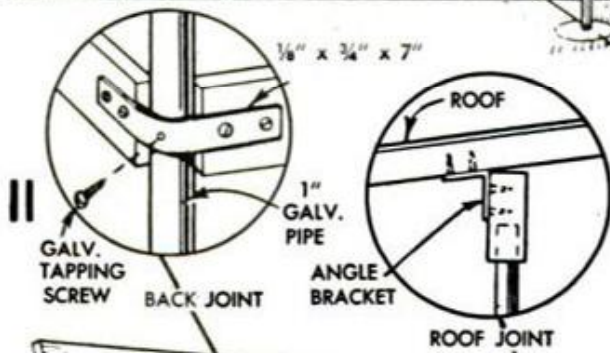


side panels to the inside framing, Figs. 2 and 3. The 1 x 4 outer frame strips should be secured with 1½-in. No. 10 galvanized wood screws. Be sure to drill lead holes in the hardboard and pilot holes in the wood.

Fit the roof panels together on the driveway or other flat surface and saw the 1 x 2 roof framing to fit, Fig. 4. Attach the framing with ¾-in. binder head, sheet-metal screws. Saw the 1 x 4 cover board and the triangular pole sockets, Fig. 5, but don't bolt the top panels together until final assembly.

Cut 1-in. galvanized pipe to the required lengths for the poles, Fig. 9, and saw the 2 x 4 roof beam, beveling the end as indicated, Fig. 6. Drill two blind holes for the poles in the beam to a depth of about 1 in. While you are cutting pipe, saw four 12-in. lengths of 1¼-in. pipe to form the lower sockets for the poles.

After choosing a site for the cabana, lay out the pole positions, Fig. 8. With a post-hole digger, dig 30-in.-deep holes approximately 8 in. in diameter for a concrete base at each location. Fill these holes with concrete around the 12-in. lengths of pipe. While the concrete is still wet, insert the poles into these sockets and check them with a carpenter's level to make sure that the sockets are absolutely vertical. After the concrete has set, insert the poles and add the 2 x 4 roof beam, Fig. 9.



Rest the side panels on blocks or boxes while erecting the cabana, Fig. 10. Use pipe brackets to fasten the side panels to the front poles, Fig. 12, and flat steel to attach both panels to the rear pole. When the two panels are in place, cut out the seat and nail it to the 1 x 6 bottom frame member of each panel, Fig. 7.

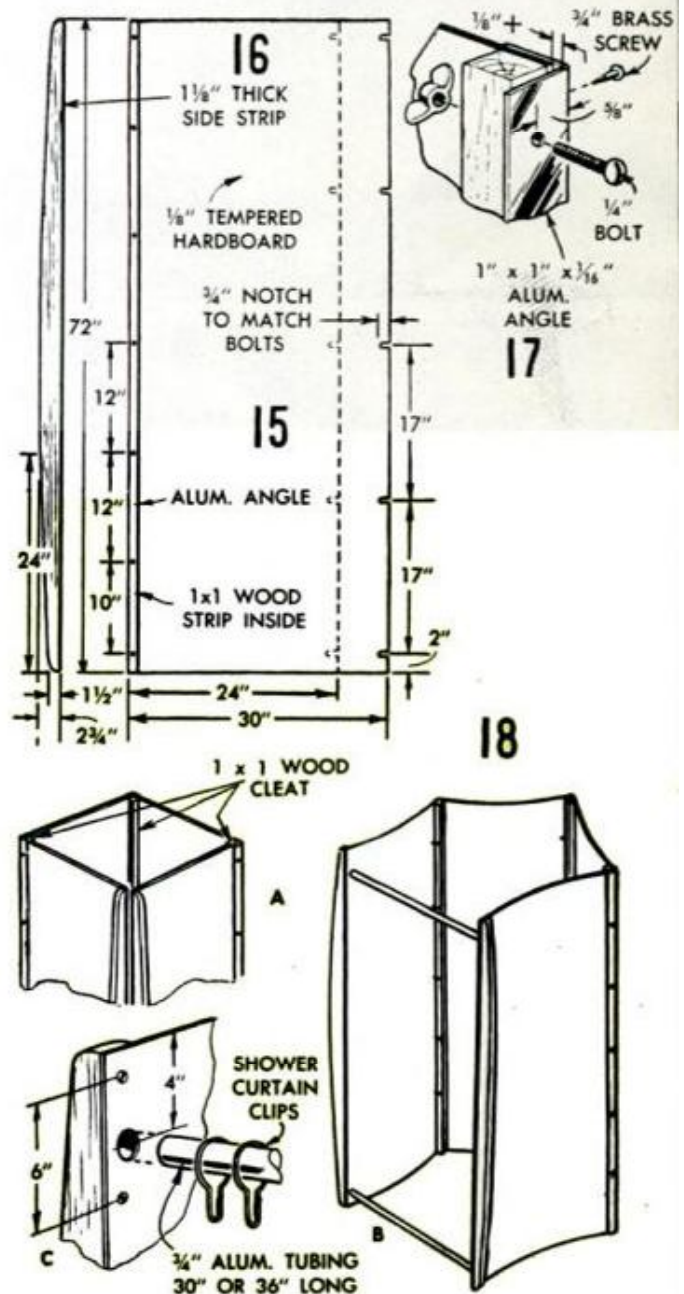
The roof is next. Attach the two panels along the centerline with 3/16 x 2-in. carriage bolts, Fig. 4. Then fasten the post pads in place with 1 1/2-in. No. 10 wood screws, turn the assembly over and attach the cover board over the center seam. With the aid of a helper on a stepladder, raise the roof to the top of the cabana and check to make sure that it rests evenly on all four poles, Fig. 13. When the roof is in position, attach it to the beam with angle brackets, Fig. 11.

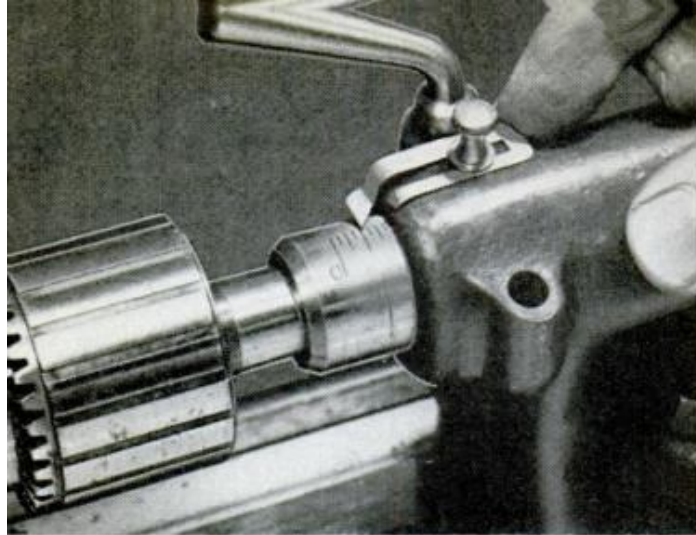
Support the doors on blocks or boxes while you mount the hinges, Fig. 14. To keep doors closed, use a simple hook-and-eye catch. A drop-down aluminum bar can be screw-fastened to the inside edge of one of the door frames to hold the doors open. Rope guides running from the top of the side poles to the ground will act as backstops so the doors won't swing too wide.

Portable Cabana. Easy to put up or take down, the walls of this lightweight unit are made by cutting two 4 x 6-ft. hardboard panels of 1/8-in. tempered hardboard in half lengthwise. Cut these panels and all framing members before beginning construction. Drill and countersink holes for 3/4-in. aluminum wood screws in the three lengths of aluminum angle. Then screw-fasten these angles to the panels and 1 x 1 cleats, leaving a 1/8-in. slot between each undrilled flange and 1 x 1 cleat. Add tapered door posts to the end panels, Fig. 16, and drill blind holes through the hardboard and into these posts, Fig. 18, for the 3/4-in. aluminum tubing.

Next, slip two panels together and drill holes for the 1/4-in. bolts, Fig. 17. Since holes will not be drilled at exactly the same locations in all panels, it's a good idea to key matching panels. Pull the panel out of the slot and, using the drilled holes as guides, saw notches in the edge of the hardboard, Fig. 15, so you will be able to assemble and dismantle the cabana by merely loosening the wing nuts.

To set up the cabana, slip the panels into the slots and tighten the bolts, then spring the two side panels apart and brace them with lengths of aluminum tubing inserted in the blind holes at top and bottom. The shower-curtain door must be attached at both top and bottom with regular rings and somewhat taut so that it won't blow open at the slightest breeze. ★ ★ ★

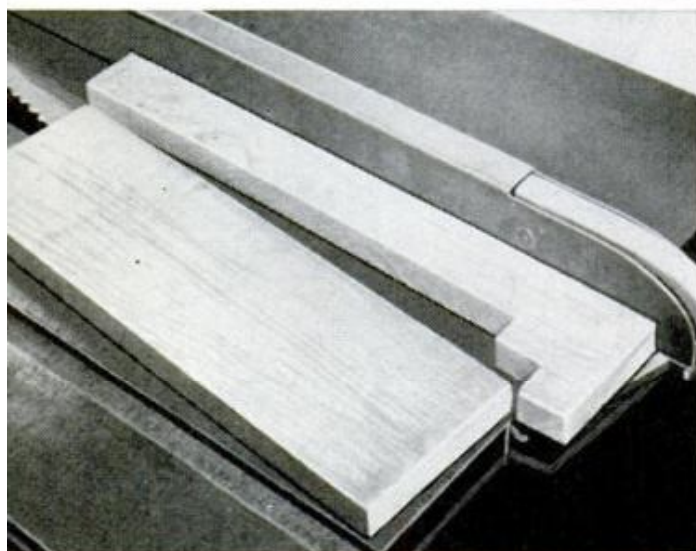




SHOP SHORT CUTS

Make a Point to Point

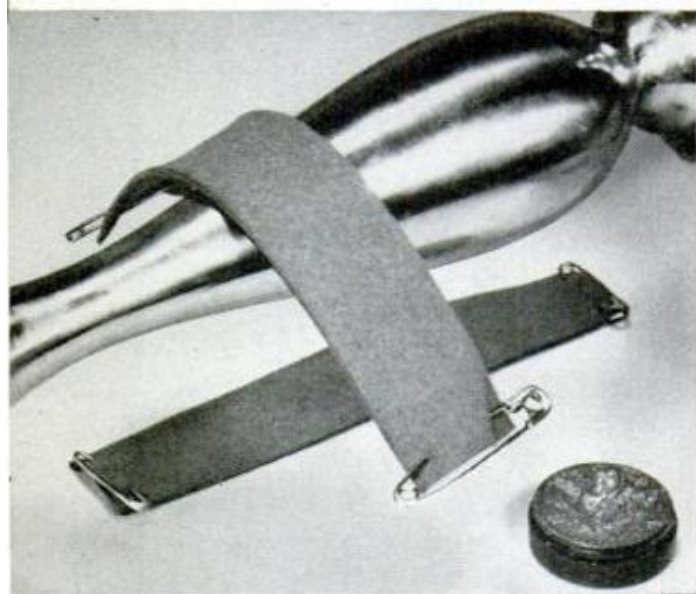
When you have need to drill, ream or thread to precise depths in a lathe, an indexing pointer on the tailstock sleeve is an aid to more accurate work. Drill and tap the spindle housing for a 6-32 stud (made from a 6-32 screw) and make a slotted pointer from sheet brass. Lock the pointer with a 6-32 knurled nut.—*Walter E. Burton*



Taper Off With a Jig

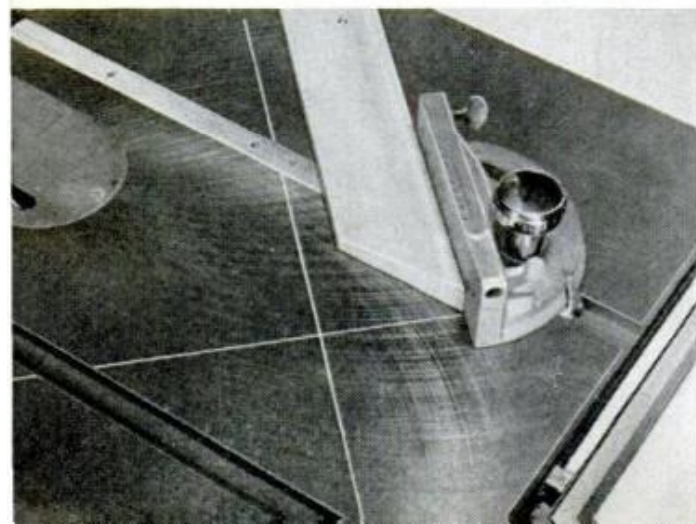
Cutting a long, tapering wedge can take quite a bit of doing if you go at it in a rule-of-thumb fashion. It takes only a few minutes to make a jig that will turn out duplicate wedges as fast as you can push the stock past the saw blade. The jig consists of a short length of stock notched as you see in the photo. By varying the width of the notches you can vary the degree of taper. This same jig can be used to taper the four sides of a square piece of stock by running the stock past the saw four times, rotating it one-quarter turn after each pass.

—*Bil Toman*



Take a Shine to Metal

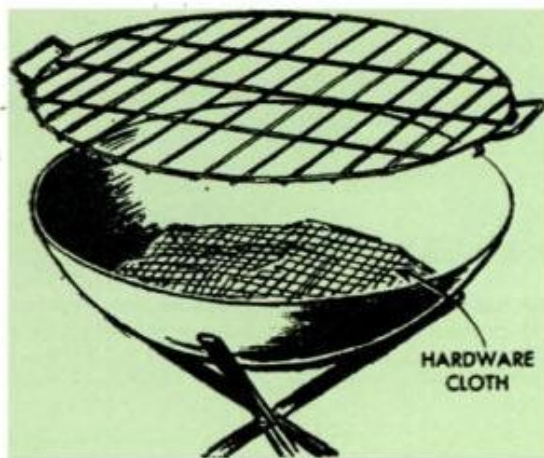
Polishing small turned parts of metal—steel, brass, bronze and aluminum—can be done while the work is still in the lathe, using 1-in.-wide strips cut from felt. For some metals such as brass and aluminum, very high lusters can be accomplished with the felt strips alone. But for the harder metals the strips should be coated with a fine abrasive mixed with oil to a paste. Attach a safety pin to each end of the felt strip for a sure grip. When polishing the rotating work keep the polisher moving and apply only light, intermittent pressure to prevent heating unduly. When finished, wipe the work with a clean cloth.



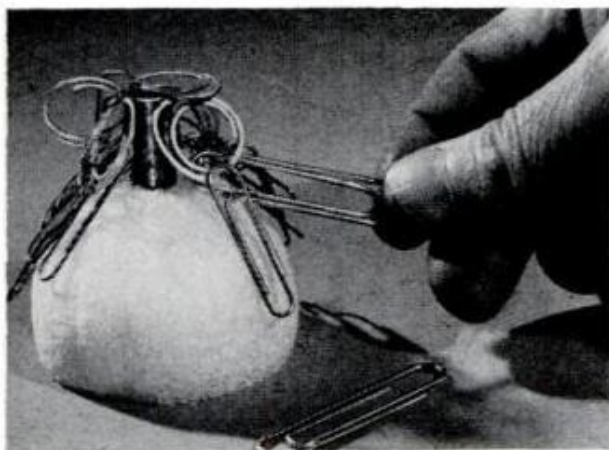
Score One for the Saw

Lines ruled or scored on your saw table make quick settings for 45-degree cuts easier and faster. Set a T-bevel with a protractor to precisely 45 degrees. Then set the miter gauge with the T-bevel to 45 degrees with the saw blade. Lay a straight-edge along the miter gauge and either score the lines in the saw table in two directions as pictured, or rule the lines with a ruling pen filled with white enamel.—*H. Hanscom*

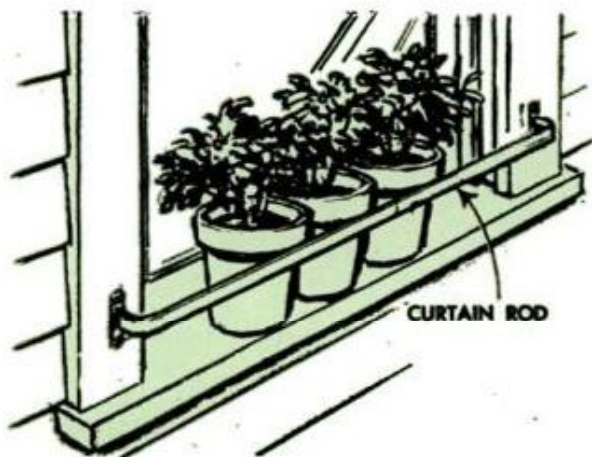
Solving HOME PROBLEMS



BARBECUE FIRES will burn more efficiently if you place a piece of hardware cloth over the bottom of the grill to provide a constant draft for the fire



PAPER-CLIP TREE for your desk can be made by mounting a small permanent magnet in any suitable base. Just toss clips on the tree and it will hold them

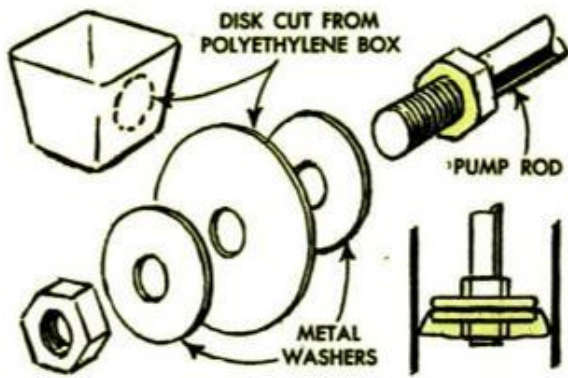


REMOVABLE GUARD RAIL to prevent potted plants from falling from window ledge is made from a flat curtain rod. Mount rod holders on the window frame

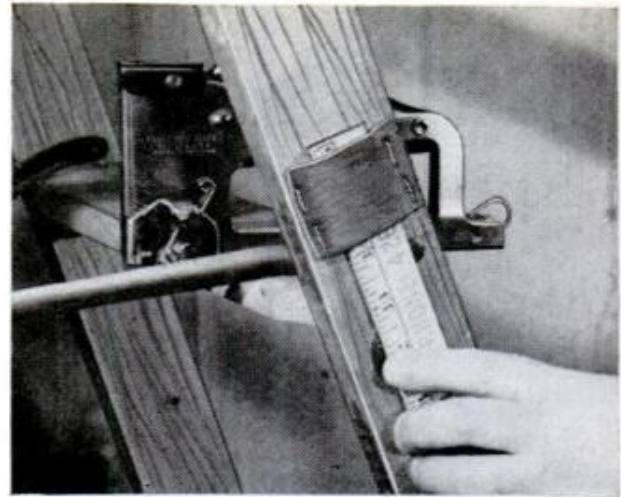


TO SPRAY WASPS' NESTS under eaves, tape an insect bomb to a pole and mount an L-shaped metal strip over the cap so that you can trigger it with a string

Solving HOME PROBLEMS



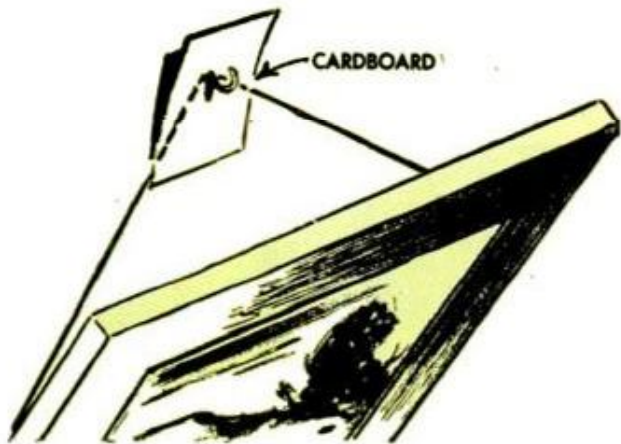
EMERGENCY PUMP LEATHERS for a piston pump can be cut from polyethylene refrigerator container. Just dip the polyethylene in boiling water to soften it



TO KEEP A YARDSTICK always at hand when working around a stepladder, make a holder for it by stapling two strips cut from an inner tube to the ladder

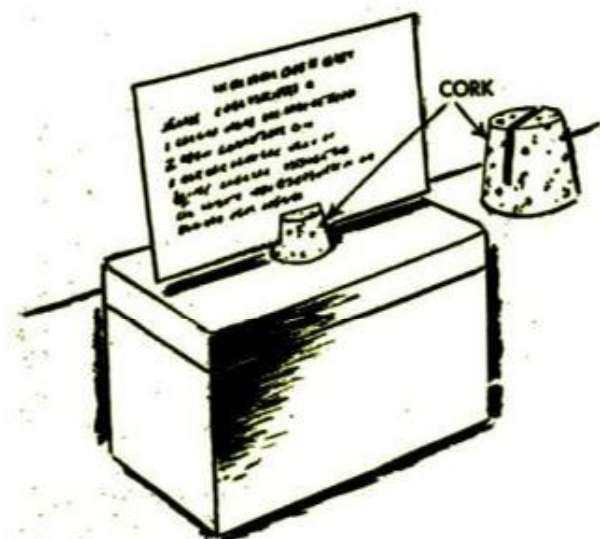


YOU WON'T MISPLACE the cap to a car polish or wax can if you place a small magnet on the side of the can and lay the cap on it when you open the can



WHEN HANGING PICTURES, an easy way to engage the cord on the hook is to slip a piece of cardboard over the hook and bend it outward from the wall

YOUR WIFE WILL appreciate an upright holder for recipe cards. To make one, glue a small cork to the top of her recipe file and cut a slit in the center



IF PLASTIC PUMP supplied with window cleaner, hand cream, etc. doesn't reach to bottom of bottle, you can extend the tube with waterproof adhesive tape

QUICK AND EASY

All Wet But Fun

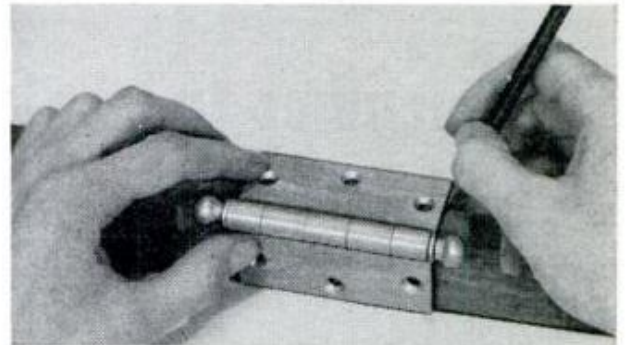
If you have to replace your garden hose this year, don't throw it away—it may still be good enough to make this spray hoop for the kids. Select a length of hose with a female coupling on one end and drill $\frac{1}{8}$ -in. holes at 3 or 4-in. intervals along one side of this hose. Plug the cut end with a cork and coil the hose on the ground to form one large circle with the holes on the inside surface. Drive two stakes into the ground, the distance apart depending on the size of your hoop, and mount the hoop on these stakes using twine or tape. Then connect the hoop to your garden hose, turn on the water and stand clear! Don't forget to move the spray hoop occasionally to prevent heavy traffic from wearing bare spots in your lawn.—*G. E. Hendrickson*



Try Hinge for Try Square

What can you use in a pinch for a try square? Probably a number of things, but one man found that a butt hinge works perfectly for marking small stock. Folded as shown, one leaf of the hinge serves to hold the other leaf square with the edge of the work as it is moved along like a regular square. Handy also for spotting mating dowel holes accurately.

—*Richard Hanscom*



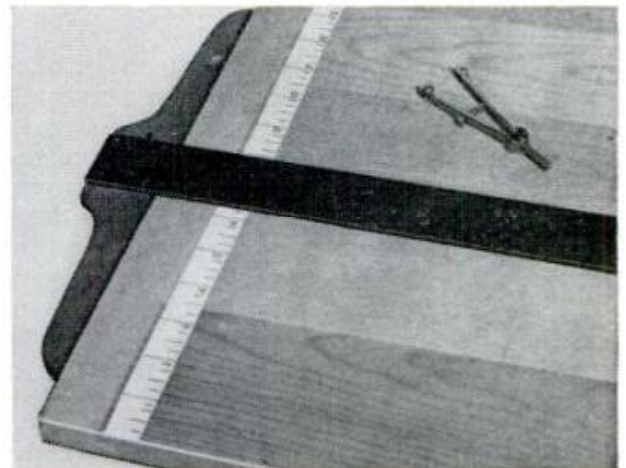
Ferrules From Flash Bulbs

Don't toss away all your used flash bulbs. Save a few. The bases make neat ready-made ferrules for file and other small-tool handles. Simply file off the two socket pins after removing the glass and drill a hole in the end to suit the tool. Press the base over the end of the handle and polish with fine steel wool. Dimpling the ferrule with a prick punch will hold it secure if necessary.

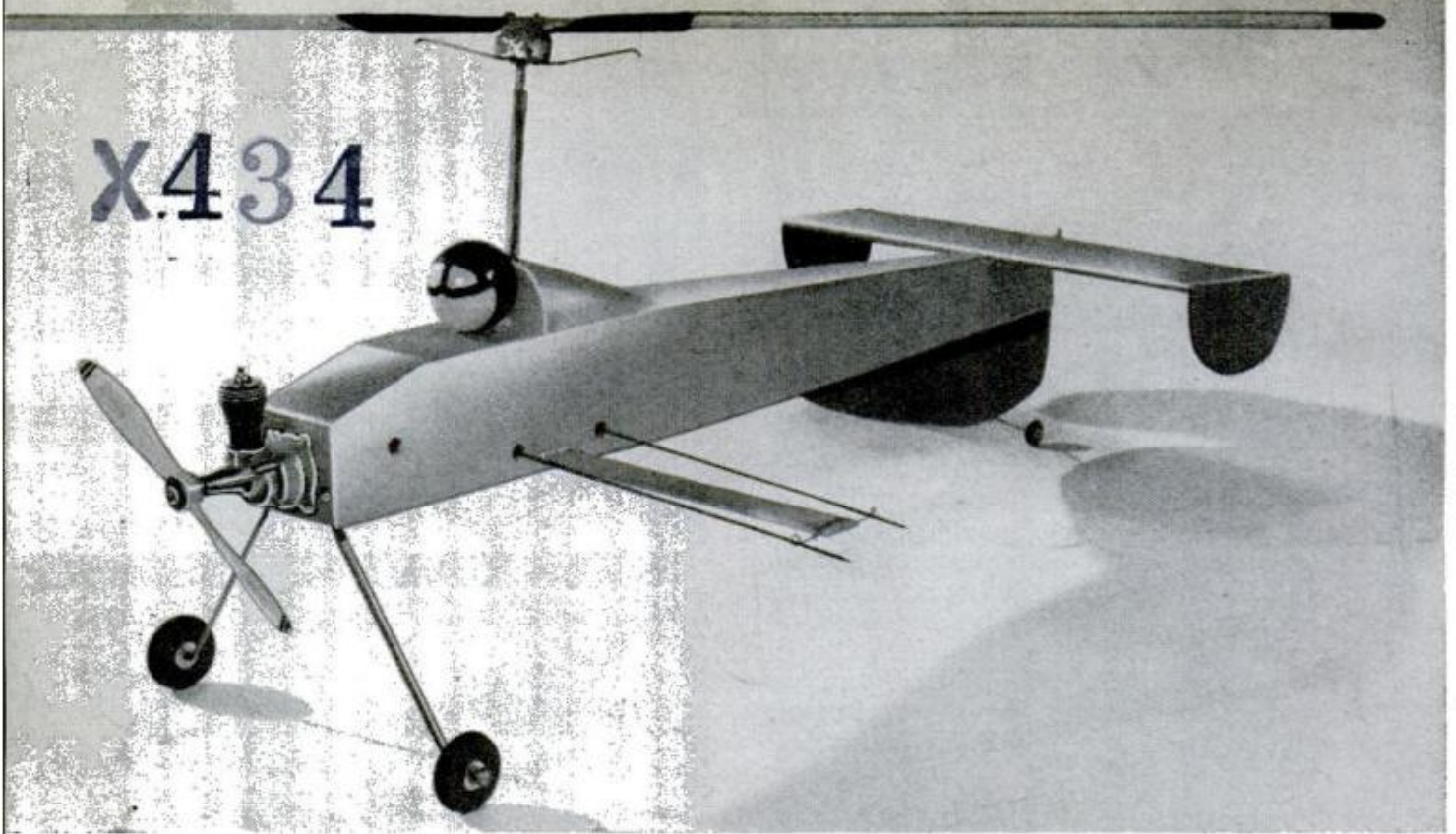


Scales Speed Layout Work

When it comes to ruling equally spaced lines, both horizontally and vertically, cloth tape measures glued to one side and across the top of a drawing board will make the work go twice as fast. The T-square is merely aligned with the tape calibrations to make it far more convenient than first marking off the lines with dividers or a regular ruler.—*Henry Hanscom*



To prevent mildew on matchstick blinds used on a screened-in porch, hang them from a clothesline and spray both sides with good spar varnish.—*Henry Salembier*



Remember the Spinning-Wing Autogiro?

Here's a control-line model gyroplane that works on the same principle as older prototypes but features several space-age improvements

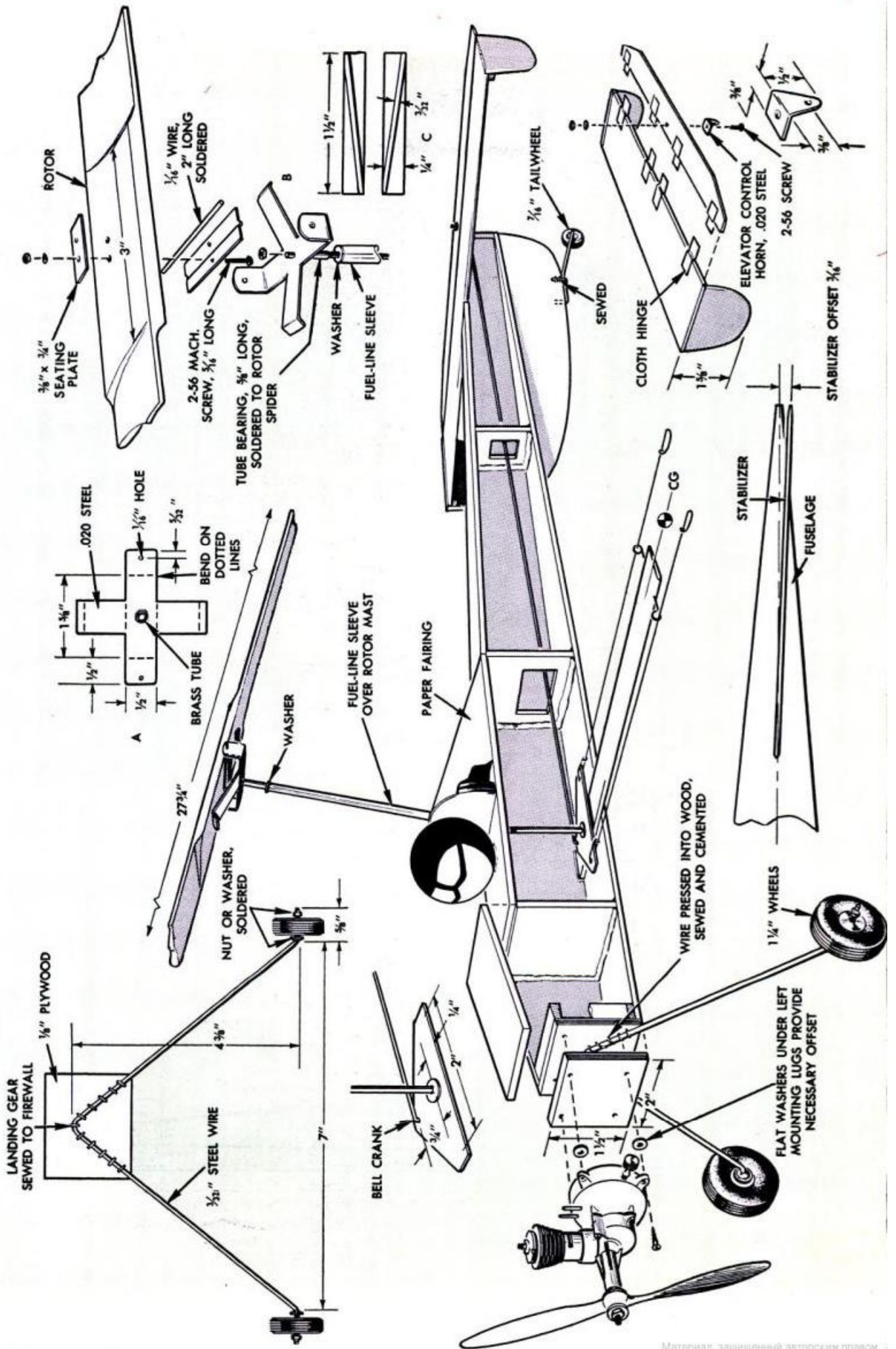
By Roy L. Clough, Jr.

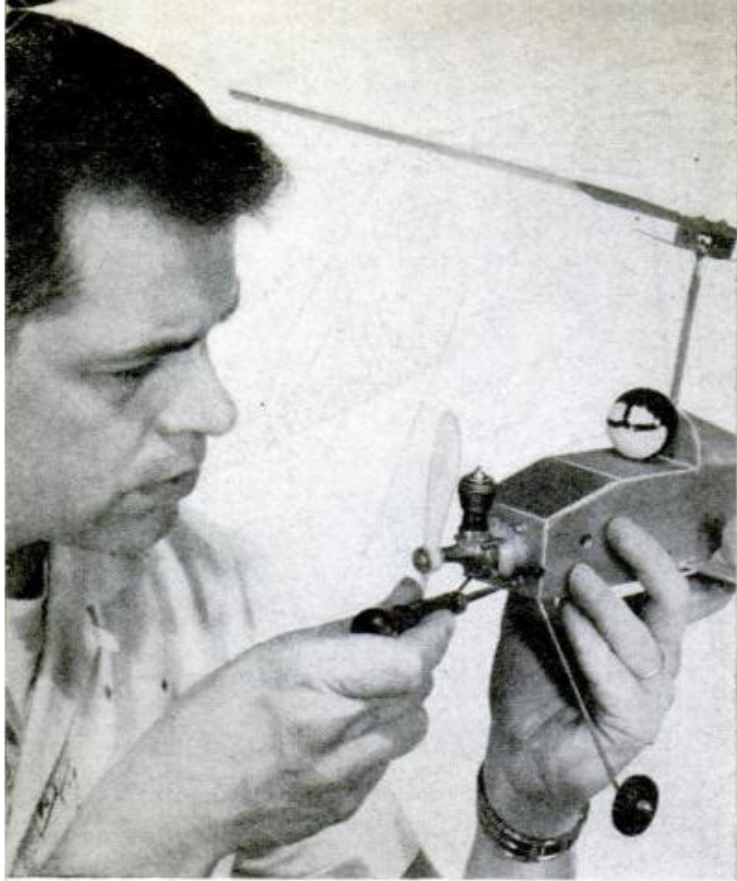
BEFORE YOU conclude that this is a model of a helicopter, take another look. It's a model plane with a spinning wing, or rotor, that windmills in the slip stream of a conventional propeller to provide the lift necessary for flight. The rotor is self-spinning and that's where the autogiro or gyroplane, as it is now called, differs from the airplane and the helicopter, in appearance, in flying characteristics and also in construction. And on the end of a control line it will be a new experience for you model-plane fans.

Control-line gyros have been built, of course, and flown with fair success. But none could be considered spectacular performers. Some showed a persistent tendency to roll up in the control lines and some that performed satisfactorily otherwise developed an arm-shaking vibration. This appears to have been largely due to use of a rigid rotor which tended to develop a condition of unbalance while in flight. The rocker-type, or seesaw, rotor used in this model starts spinning quickly and easily and the gyro lifts off and flies smoothly without dipping, diving or rolling. It pulls

hard, but not too hard, on the control lines and settles as lightly as an autumn leaf when the motor fades.

The fuselage is simply an elongated balsa box made mostly from $\frac{3}{32}$ -in. material except the bulkheads, A, B and C, and the stabilizer which are $\frac{1}{8}$ -in. stock. Although the over-all size of the bulkhead, C, is given, you may have to do some fitting of this member to assure a true fairing of the fuselage sides and top piece. The fuselage is fitted with a conventional engine, propeller, landing gear and a standard control-line elevator for controlling the gyro in flight. The rotor mast centers $4\frac{1}{4}$ in. from the forward end of the fuselage. In assembly it passes through the bottom of the fuselage, the bend at the end being seated and cemented in a notch cut in the bottom of the fuselage. Note that it also passes through the control strut and the bell crank. Washers are soldered above and below the crank, permitting the latter to swing freely on the mast. After installing the controls and the reinforcing strips at the forward end of the fuselage, cement the fuselage top pieces in place, then the pilot's head and the fairing.



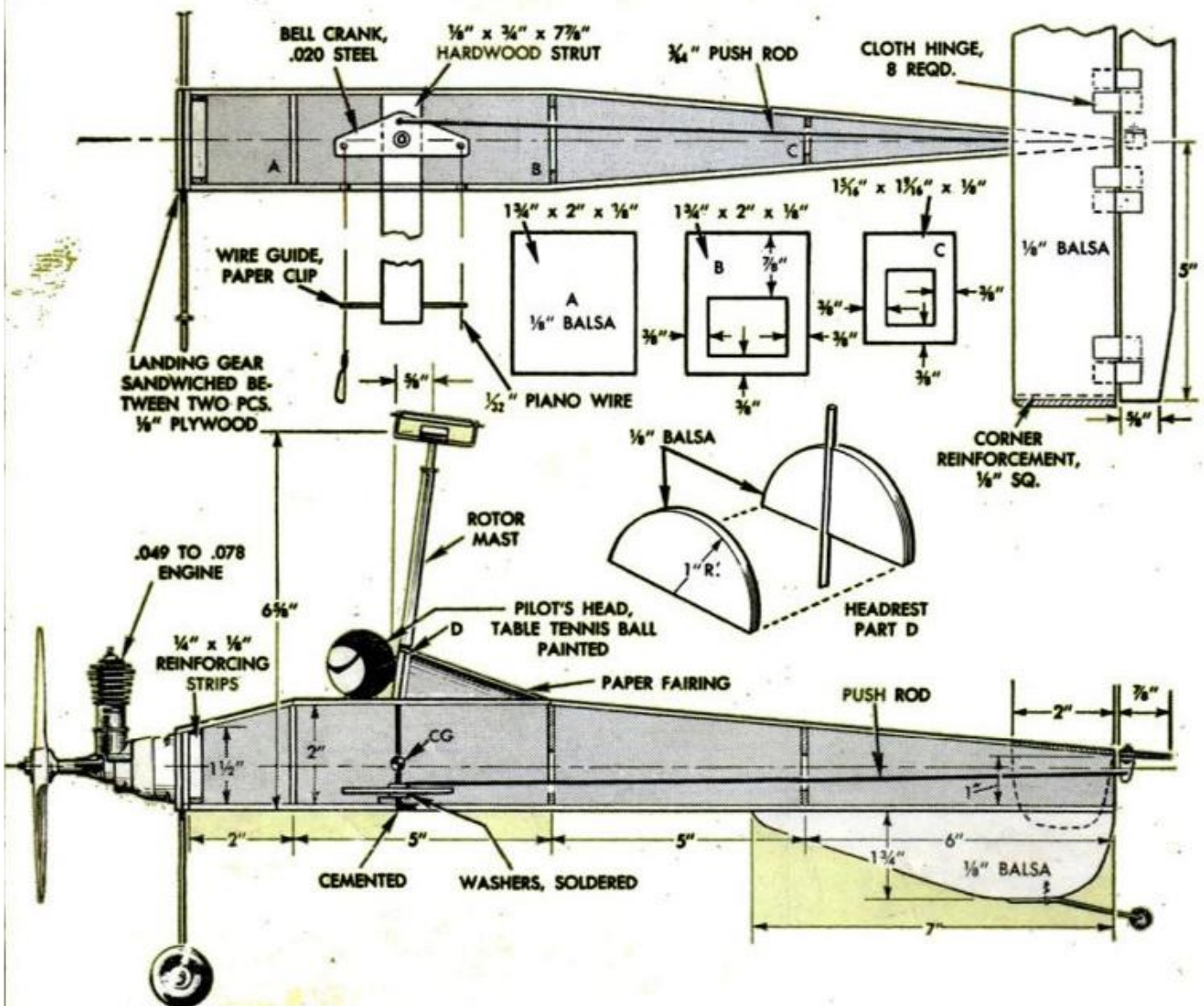


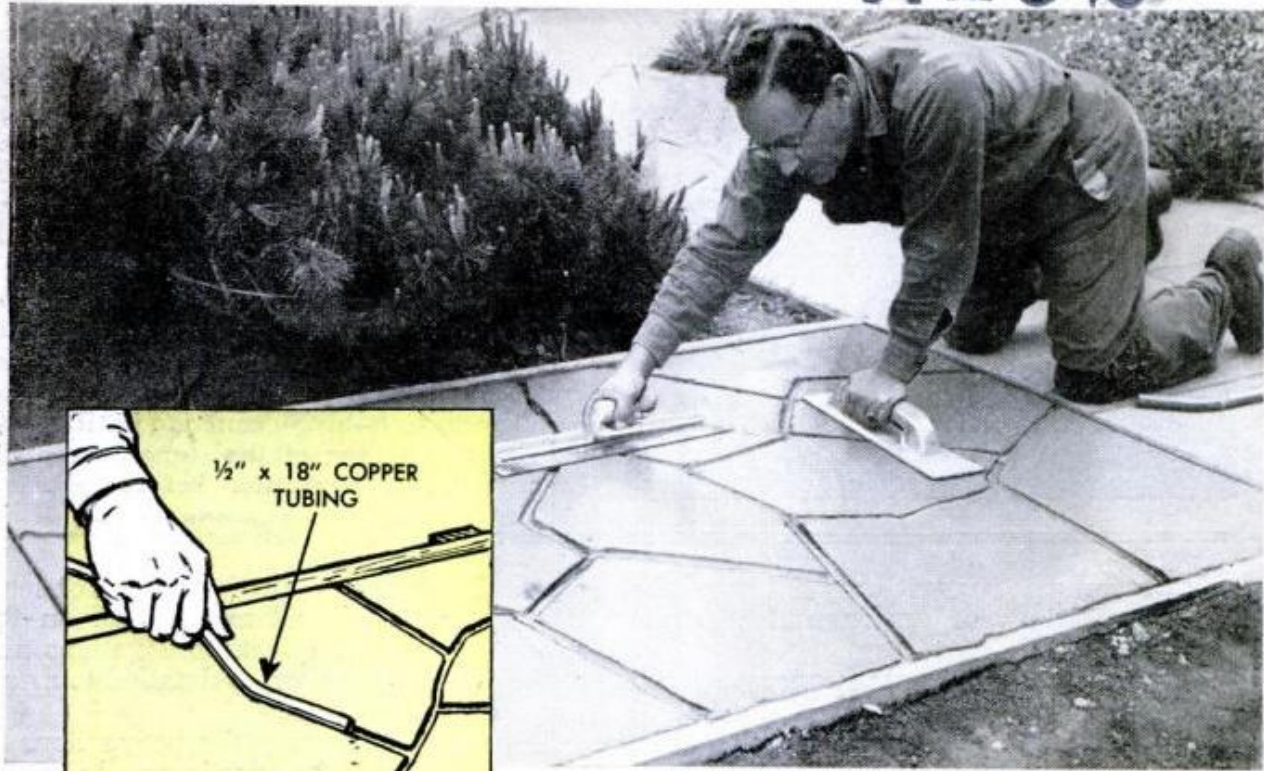
MOUNT ENGINE on the fire wall with four small bolts, using washers under left mounting to provide offset

Study the rotor drawing closely. Note that the blades operate at a negative pitch and that the rotor, although stiff from tip to tip, is pivoted at the center to permit a seesaw motion. Stops on the hub pivot limit vertical motion so that blades won't strike the tail. This type of rotor mount allows the blades to rock without transferring motion to the fuselage, yet keeps the rotor tracking evenly.

Give the model a coat or two of sealer before applying pigmented dope. Make certain that everything runs freely, and that the center of gravity is either right on, or just ahead of the control crank or bell-crank, axis. If the center of gravity (CG) is behind the control crank axis, the model may not pull hard enough on the lines to give good control.

After you get the feel of it, you can make jump takeoffs by letting the model roll about 6 ft., giving it full up and dumping the elevator quickly to bring it into a normal flight attitude. Incidentally, that machine-gun-like popping you hear in flight is common to all rotor craft. It's caused by the rotor blades running into their own tip vortices. ★★★





AFTER TROWELING and just before the initial set of the poured concrete, you can make a very realistic simulation of a flagstone walk or patio by scoring the surface with the special S-shaped tool detailed

The ABCs of Good Concrete

If you take the time to mix, pour and work concrete by a few simple rules of procedure you can't miss

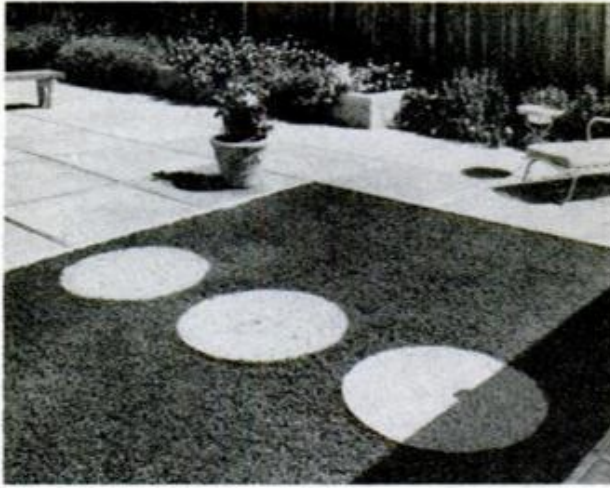
By Richard S. Huhta

THREE SIMPLE but important basic rules are the key to success in mixing and working concrete. First, the water you use should be clean and pure enough to drink. If not, it should never be used in mixing concrete. Second, the proportions of water, cement and aggregate are not a matter of guesswork. Each ingredient of the mix must be measured — accurately. Third and last of the basics requires that the ingredients be dry-mixed and wet-mixed — thoroughly. And that's it.

You have three choices of the form in which you purchase the ingredients for mixing and pouring a batch of concrete. If, for example, you are replacing a small section of walk between the house and garage you can buy all the materials ready-mixed and packaged for easy handling. Just add water in the proportions directed by the instructions on the package and wet-mix. If you're thinking bigger and have planned to concrete a driveway, pour a slab floor for a garage, pour a foundation for a room addition to your home or lay a patio, then

you have the choice of buying the cement, sand and gravel or other suitable aggregate and dry and wet-mixing them yourself on the job, or ordering the necessary yardage from a supplier of ready-mixed concrete. If you order from a supplier, tell him how much concrete you need (figuring about 10 percent overage to cover any estimating error) and what you are to do with it. He will deliver the proper mix ready to pour. And if you're pouring a driveway or a slab that will be exposed to weathering, order an air-entrained mix, which is a special mix containing myriad air bubbles that aid concrete in resisting deterioration from weathering. If you mix your own concrete, order a cement containing an air-entraining agent.

When used for a patio or an all-weather walk or stepping stones, concrete has decorative possibilities. It can be colored, cast, formed, muted, and surface-finished in almost any manner that suits your fancy. It can be strictly utilitarian, purely ornamental, or both. The accompanying illustrations



Project: STEPPING STONES

In most heavier soils round concrete "stones" can be cast right where you want them, using the soil itself as the form. Simply excavate to a depth of $2\frac{1}{2}$ to 3 in. being careful to make the excavation round and the edges vertical. Then pour a very stiff concrete mix and trowel flush with the grade level. Before the concrete sets, bevel the corner uniformly all the way around so that it does not chip. If the soil is sandy or loose and crumbly, you will have to use a sheet-metal form to hold the concrete until it sets. To prevent settling of the stones, tamp the earth in the excavation before pouring.

and procedures suggest only a few of the many variations of ornamental concrete work.

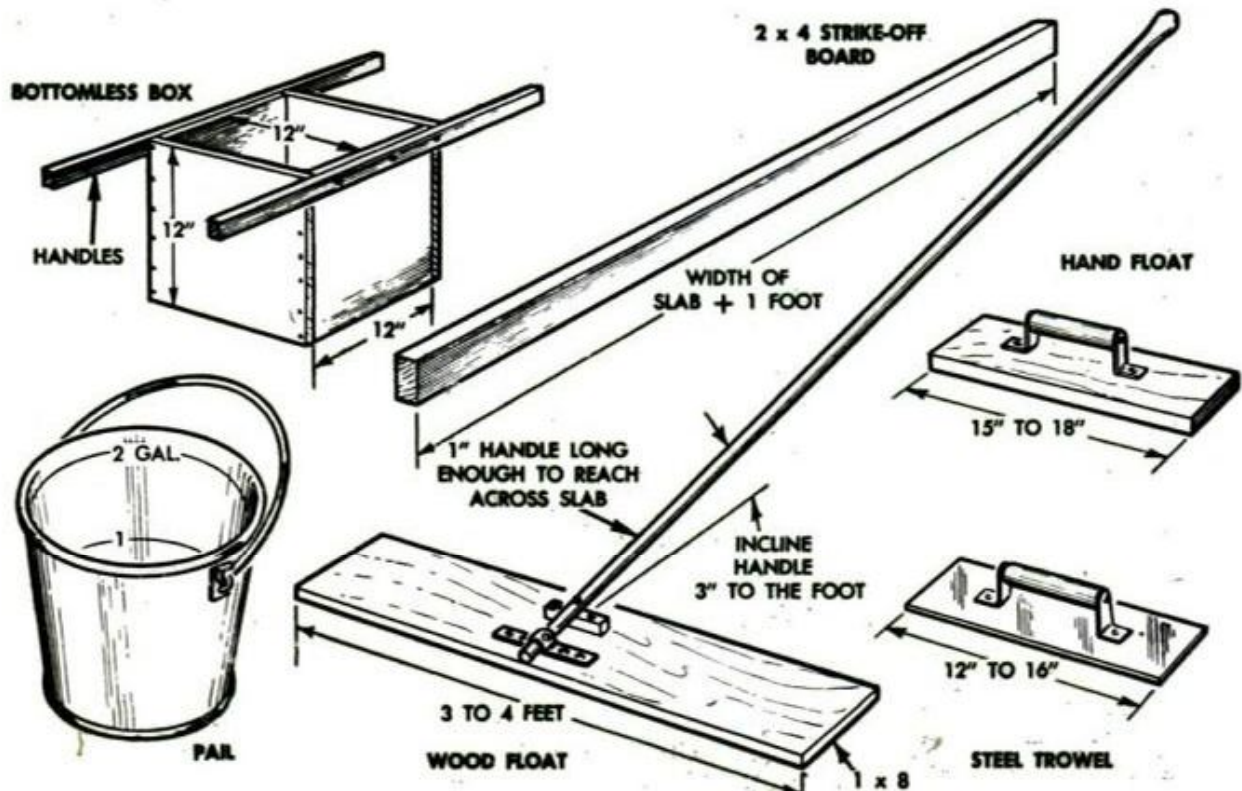
Estimating the amount of concrete you'll need for any large project can be done quite accurately by using the values in the table, page 137. For example, for a patio 4 in. thick, 10 ft. wide and 20 ft. long, multiply the length (20 ft.) by the width (10 ft.), and the area will be 200 sq. ft. The table will show that for a 200 sq. ft. slab 4 in. thick you will require 2.5 cu. yd. of concrete. If the project measures larger than 500 sq. ft., you double the figures given.

For most projects around the home, use a 1:2- $\frac{1}{4}$:3 mix consisting of one part portland cement, $2\frac{1}{4}$ parts sand and 3 parts crushed stone, washed gravel or other suitable aggregate. Common practice calls for

5 gal. of water per sack of cement. To measure water use a pail marked off on the inside to indicate quarts and gallons and make a bottomless box as detailed to measure sand and gravel.

You can easily vary the proportions of the mix to change its consistency, but don't appreciably alter the proportion of cement to water. Any excess of water over recommended amounts reduces the strength of concrete. There are times when a "soupy" mix may be permissible, but as a rule the stiffer the mix, within the limits of workability, the stronger the concrete.

Before starting any project, mix up a small trial batch first. If it is too stiff, use a little less sand; if it is too soupy, add sand until the mix stiffens. Always use dry ingredients; wet aggregate will make a mix



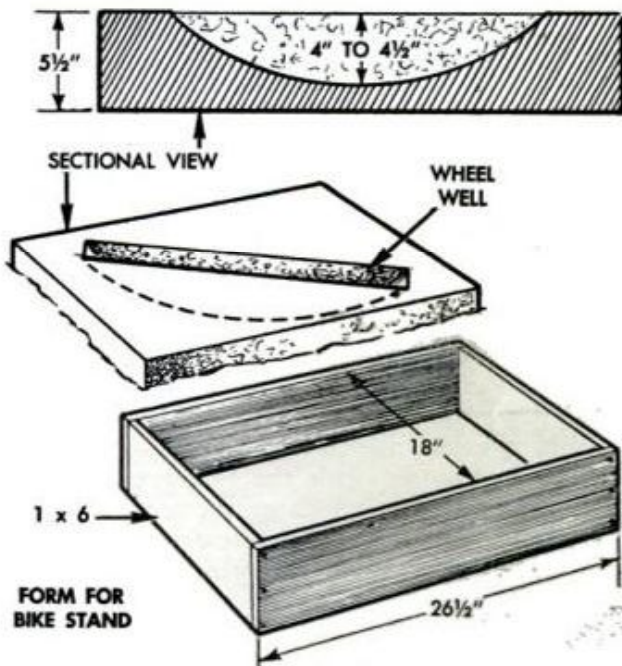
soupy. You can compensate for damp aggregates by reducing the water content of the batch slightly, but usually it's best to test first by mixing at least one trial batch.

Before placing any large quantity of concrete be sure that the forms are properly aligned, that they are adequately braced and tightly joined. Even a half yard of wet concrete exerts considerable pressure on a form so be sure that it is properly constructed.

If you're placing concrete over a footing or over a grouting, sprinkle the area with a hose first. This will prevent the dry base from drawing water out of the fresh mix. If you are placing concrete over scooped-out earth as in a shallow excavation, dampen the soil surface but don't soak it so thoroughly that it turns to mud. Place the concrete exactly where you need it. After placing don't move it any more than is necessary. Use a shovel and heavy rake to level the concrete and to compact it in the form. If your project is a large one, completely fill one part of the form before moving on to the next. However, on narrow vertical forms, such as a retaining wall, fill the bottom first and build up gradually.

On horizontal work, such as a slab, a patio, or sidewalk, use the shovel in a spading motion along the sides of the form to be sure it is filled completely. Tap the sides of the form with a hammer to settle the concrete and to prevent air pockets from forming.

After the form is filled, use a strike-off board like the one detailed to level the surface. The strike board should be at least 12 in. longer than the width of the slab. Move

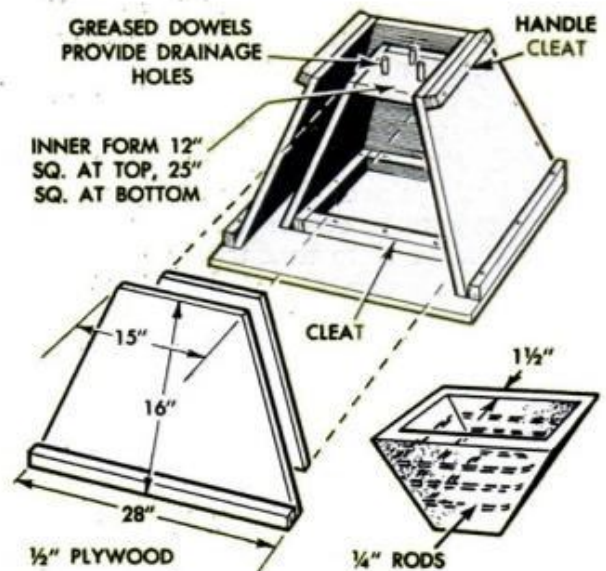


Project: BICYCLE BLOCK

Not the least of the home problems is where to park the bikes, especially if there's more than one. Here's a solution—a bicycle block or wheel park, made from concrete as you see pictured above and detailed in the center view. For one bike you build the simple box form detailed, excavate it flush with the grade and pour a stiff mix. While the mix is still plastic, imprint the tire and level the surface. Wait a few minutes, then imprint again, deeper this time. Wait again until the water sheen leaves the surface of the concrete and imprint to a depth of 4 in., deep enough so that the well will hold the bike upright. Smooth off, clean up edges and bevel the corners of the slab. For two or more bikes you simply enlarge the slab, making sure that you allow enough clearance between the bikes when they are parked. The parking block can also be made part of a walk or a section of a patio.

CUBIC YARDS OF CONCRETE IN SLABS

AREA IN SQ. FT. (LENGTH X WIDTH)	THICKNESS OF SLAB IN INCHES				
	4"	5"	6"	8"	12"
25	.31	.39	.47	.60	.95 CU. YD.
50	.62	.77	.93	1.2	1.9 CU. YD.
100	1.2	1.5	1.9	2.5	3.7 CU. YD.
200	2.5	3.1	3.7	4.9	7.4 CU. YD.
300	3.7	4.7	5.6	7.4	11.1 CU. YD.
400	4.9	6.2	7.4	9.8	14.8 CU. YD.
500	6.2	7.2	9.3	12.4	18.6 CU. YD.



Project: PLANTER BOX

What's a patio without a planter? And what better material for a planter than concrete? This one is cast upside down and requires a two-part cored form tapering equally on all four sides. Each of the reinforcing rods consists of two members cut and bent to a U-shape from $\frac{1}{4}$ -in. rod stock. When placed in the form the ends of the rods must overlap about 3 in. All faces of the form in contact with the concrete must be thoroughly coated with crankcase oil to prevent the concrete from sticking. Note that three $\frac{1}{2}$ -in. dowels are placed in the top

(which will be the bottom of the casting) of the inner form, or core, to provide drain holes in the bottom of the casting. These dowels should be coated with oil or a light grease. Pour a stiff mix, using only one third the normal amount of sand. As the concrete is poured, tamp it well to work out any air bubbles. Lay the reinforcing rods as you go, being careful to get them uniformly spaced. When the form is full, cover immediately with burlap and keep this dampened for at least five days. Wait another five days before filling with soil.

the strike board back and forth in a sawlike motion as you move it along the length of the form. After you have made one pass, fill in the low spots and strike the surface a second time.

In finishing a large area, work a long-handled wood float, as detailed, back and forth across the surface. This will smooth out any irregularities. Use a hand float, like the one detailed, for finishing a small surface, such as a section of walk.

For a smooth troweled surface, use a steel trowel, but wait until all water has left the surface and the concrete is beginning to stiffen in the initial set. Press your thumb into the surface and if it barely dents the concrete, it's ready for troweling. When troweling, sweep the trowel in wide arcs across the work and finish one section at a time. If you are working air-entrained concrete, use a steel float rather than a wooden one. After you have finished troweling, cover the concrete immediately with burlap or straw and keep the covering continuously wet for at least three, and better,

five days in warm weather, seven to ten days in cool weather. This is called curing and the process enables concrete to develop its maximum strength.

Concreting in hot weather (85 deg. F. and above) can present some problems, but you shouldn't have any trouble if you follow through with these steps: 1—Sprinkle the aggregate to keep it cool. 2—Use cold water, adding ice cubes if necessary. 3—Erect wind breakers so hot, dry winds won't dry out the surface. 4—Finish the concrete as quickly as possible and cover it with damp burlap immediately. If the temperature is 90 degrees or higher, cover the fresh concrete as soon as you strike it off. Then lift the covering, finish a small section at a time and replace the cover. 5—Cure the concrete for ten days.

Cracking of large slabs and driveways can be prevented if you use welded-wire reinforcing which is relatively easy to place in horizontal forms. It is available from most building-supply dealers. On large projects lay wire reinforcement on small

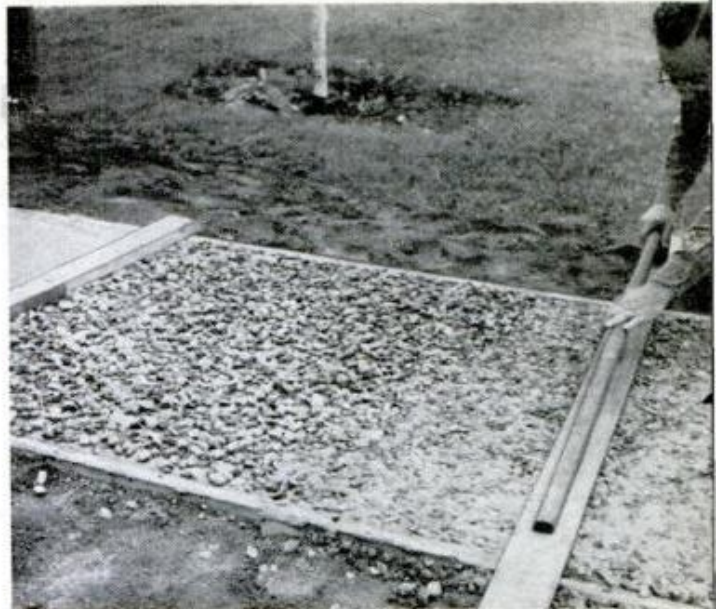
pieces of scrap lumber so that it rests just a little higher than the center of the slab. If you have to use several sections of reinforcing, overlap them by one full space and join with wire. For smaller projects use a welded-wire fabric, or mesh, the kind that has 1 x 2-in. openings. Press the mesh lightly into the concrete when the form is about half filled. Regardless of what kind of reinforcing you use, be sure that the concrete mix does not contain an aggregate larger than the openings in the reinforcing. Since concrete expands and contracts due to temperature changes you should provide contraction joints whenever you butt a walk or a patio against a building. Suitable contraction-joint material can be obtained from building-supply dealers.

Color will add a touch of beauty to any project and concrete is no exception. Concrete can be colored in several ways. You can blend a dry pigment in with the mix or dust it over a freshly poured slab or apply it in the form of a stain or paint. Blending a pigment in with the mix is an easy way to color concrete and ordinarily gives good results. However, if the concrete is exposed to direct sunlight for most of the day, the color will, in time, fade somewhat.

If you blend a pigment in with the mix, follow these pointers for best results: 1—Use a white cement. It will give a more distinct color effect, particularly with the lighter shades. Try also to use a light-colored aggregate. 2—Add pigment to the mix by weight, not by volume, and follow manufacturer's recommendations because the actual quantity may vary. 3—Mix the cement, aggregate and color dry before adding water.

Dust-on-type pigments are also available but unless you are experienced you may find it difficult to obtain uniform results. Dust-on colors usually are sprinkled on the concrete after it has been struck off and before it becomes stiff enough for troweling. The amount of pigment to be used will vary, but all pigments are applied in much the same manner. First, sprinkle about two thirds of the color on the concrete after all surface water has disappeared. Then spread the pigment with a float after it has absorbed some of the moisture from the damp concrete. Now spread the remaining one third of the pigment over the surface and float it again. Trowel the surface, let the concrete set up slightly and trowel again. Finally, cure the concrete and let it dry thoroughly. Then apply two coats of a special concrete wax to the surface, following instructions on the container.

Staining is another way to obtain color but stains cannot be applied until the concrete is fully dried out, which takes four to



NOVEL WALK SURFACE is obtained by covering fresh concrete with stones. Then press stones into concrete



PRESS STONES into concrete until they are covered by thin layer of cement paste. Then apply retarder

BROOM THE SURFACE lightly and wash away cement paste with light stream from hose exposing the stones





CASTINGS made in this fashion can be used as flagstones or, with a little ingenuity and imagination, they can be used as pattern insets in a retaining wall of blocks or other masonry

Project: MUTED STEPPING STONES

Muted or textured surfaces — whichever way you like to say it—make these stepping stones something special. Photo at the left pictures what you get; photo at the right shows how the surface is produced. The box form is made about 4 or 5 in. deep and about 14 x 14 in. square. Then you fill it about half full of selected stones as nearly uniform in size as possible, remembering that the larger the stones the coarser the texture. Small stones produce a finer pattern. Over

the stones you place a sheet of plastic—the kind cleaners use to protect garments. Then you mix cement, sand and very fine gravel or crushed stone to an easy pouring consistency. Pour this over the film and strike off level. Allow the concrete to set and harden before removing the form and stripping off the film. Cure the stones in the usual way for at least five days before they are put into use. Sizes larger than that given should be wire-reinforced.

six weeks after placement. Staining concrete is much like staining wood. Be especially careful to get a uniform application of stain over the surface. After staining, the surface usually is sealed with a special colored wax.

Color, however, isn't the only way to dress up a concrete project. With a few simple tools you can create some attractive and unusual designs in the surface. A broom pulled across a slab in a wavy motion will give an interesting effect. Use a stiff-bristled broom to obtain a rough texture, a soft-bristled broom for a finer texture. A coffee can and two or three other cans of varying dimensions can turn a plain surface into one presenting a random pattern of circular imprints. Overlapping the circles will give an even different effect.

For an interesting flagstone effect, bend an 18-in. length of ½-in. copper tubing into an elongated S-shape. Use this to score the surface of the concrete in a random flagstone pattern. The result is remarkably realistic as you can see from the photo on page 135. Do the initial scoring while the concrete is still in the plastic state. Then wait until all the surface moisture has disappeared and float the surface carefully.

Reshape the somewhat ragged imprinted scoring with the tubing and then finish the job by troweling. Clean the joints later with a fine-bristled paintbrush.

A distinctive decorative edging on a walk can be achieved by pressing tree leaves into the concrete. Use a trowel to do this job, and press the leaves, stem side down, even with the surface so a trowel can pass smoothly over without filling the imprint. Remove the leaves only when the concrete has set up firmly enough to hold the impression and permit troweling over it.

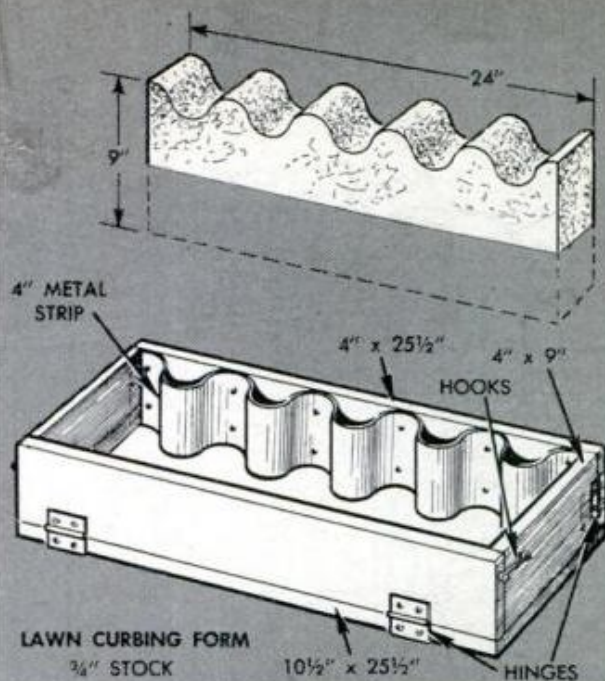
A Travertine finish is particularly attractive where there is a broad expanse of concrete. It consists of a thin coating of white cement and color spattered over a regular concrete surface. After you have finished floating the regular surface, roughen it with a horsehair push broom. Then blend together a sack of white cement, 2 cu. ft. of sand and ¼ lb. of yellow pigment. Add enough water to make a thick, creamy mix.

Spatter this mixture onto the surface of the walk or patio with a whitewash brush, using just enough force to create a pattern having both ridges and depressions on the surface. These ridges should be between ¼ and ½ in. high. When you have finished, let

the spatter mix set up a bit, then trowel it lightly to flatten the ridges slightly. Some areas will then be quite smooth while others will be heavily pitted. This is the desired effect. If you wish, the slab can be scored at this time to provide an added decorative touch.

Exposed aggregate surfaces will also add the unusual in surface decoration to a walk, driveway or patio. An exposed aggregate surface is, simply, one in which the top film of cement has been washed away, leaving the aggregate partially exposed. If colorful aggregates are used, the results can be extremely pleasing. For a most attractive effect, use rounded pieces of aggregate and sprinkle these over the surface after it has been floated. Then press the aggregate into the concrete until it is completely embedded. Next, float the surface with a magnesium float. After floating, the cement paste should just barely cover the embedded aggregate. Now, brush on a retarder, which is a chemical compound that prevents the top surface of the concrete from hardening. Most building-material dealers can either furnish you a retarder or direct you to a source of supply. On some smaller projects you may not even need a retarder: Just hose and brush off the surface. The retarder can usually be brushed and hosed off a couple of hours after it has been applied. Whether you use a retarder or not, it is extremely important that the hosing and brushing operation be performed at the moment when the paste on top can be most easily removed without disturbing the aggregate particles. If you do find that you are dislodging particles, hold off until the concrete sets up a bit more. ★★

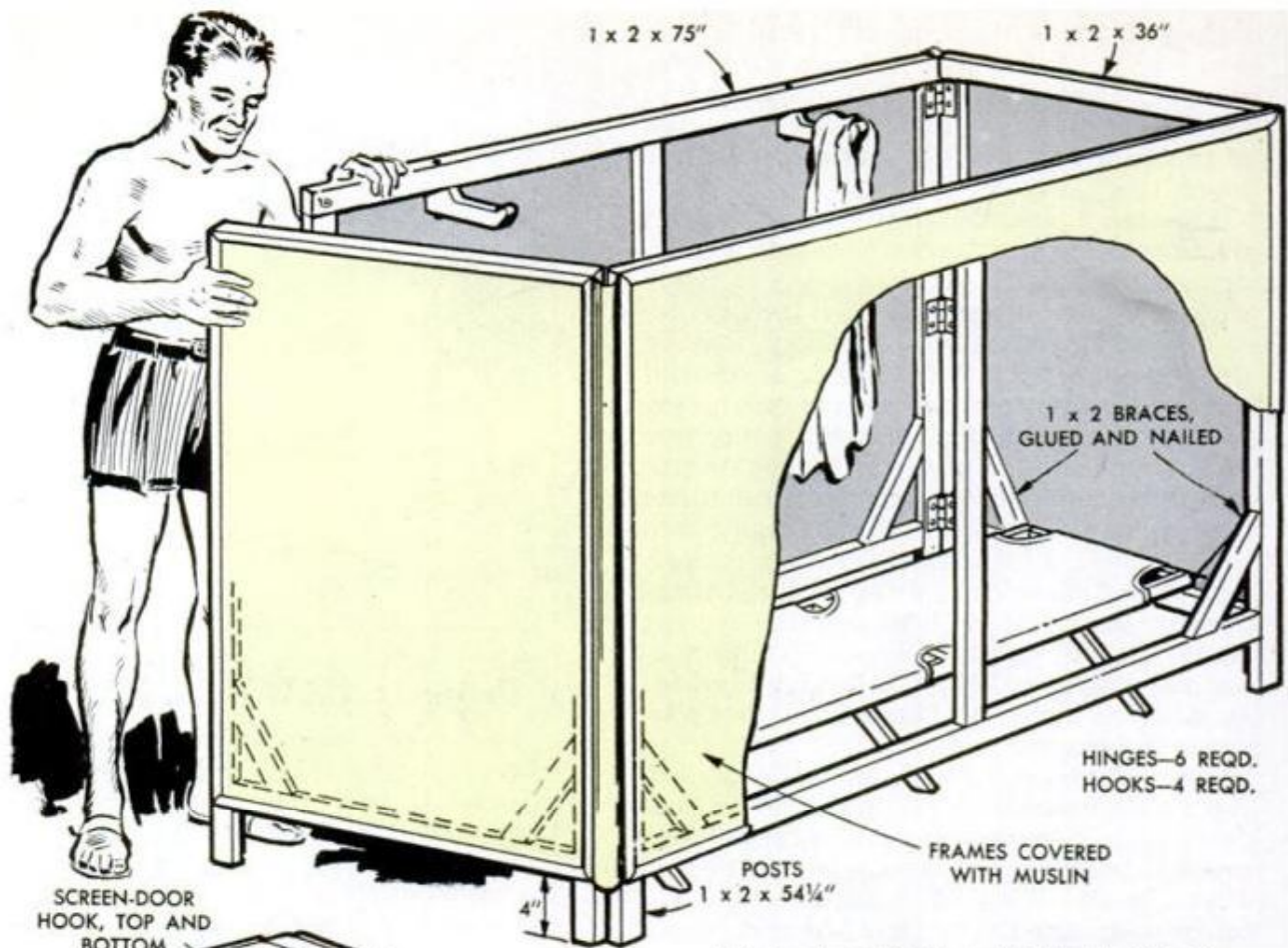
WALKS or driveways are often broom-finished as in photo at right. Below, tin cans of various sizes make interesting imprinted pattern on walk



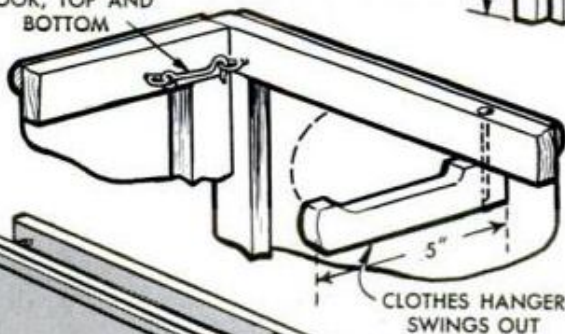
Project: LAWN CURBING

You've probably already decided just where you need this curbing. It would be difficult to find a place on the average lawn or in the flower garden where you couldn't make use of it, either as a curbing or an edging. Note that the front of the form is hinged for easy removal of the casting. The metal strip in the detail can be bent into uniform corrugations as shown, or you can use a strip cut from corrugated aluminum roofing. Note also that the form is only 24 in. long. This is a convenient size. If you make the form longer, the castings are quite heavy and difficult to handle. Use a standard concrete mix with fine aggregate, tamp lightly and strike off flush. Wash the form after removing each casting. Reoil occasionally to prevent sticking.

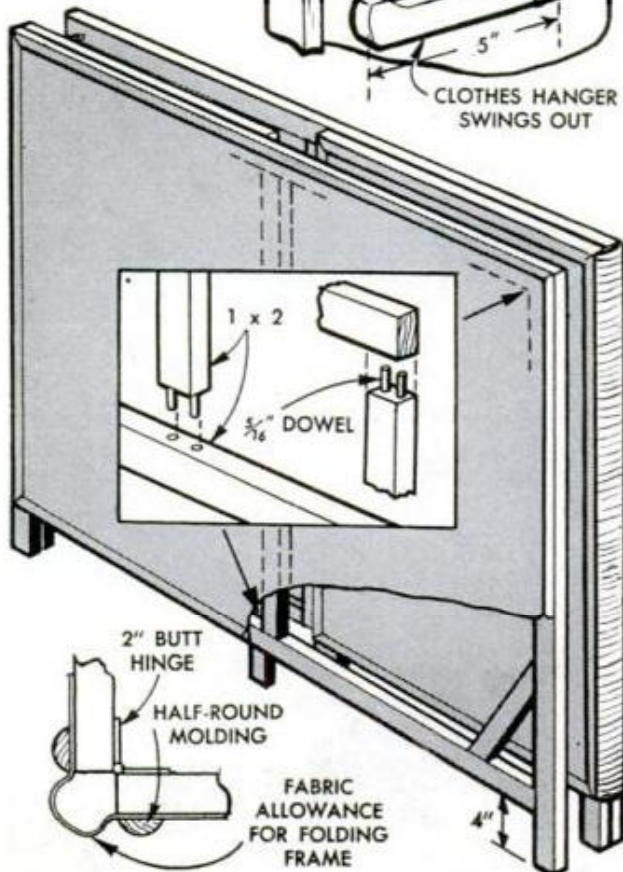




SCREEN-DOOR
HOOK, TOP AND
BOTTOM



CLOTHES HANGER
SWINGS OUT



2" BUTT
HINGE

HALF-ROUND
MOLDING

FABRIC
ALLOWANCE
FOR FOLDING
FRAME

BACK-YARD SUN LOUNGE

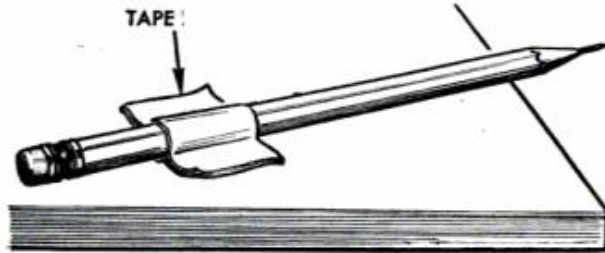
By Hi Sibley

WANT TO RELAX in the back yard without being bothered by gawking neighbors? This lightweight, portable enclosure will provide the privacy you desire, yet permit high-noon sun bathing or just plain loafing in the subdued sunlight which filters through the muslin walls. At the end of the day, simply fold the enclosure flat and store it in the garage or basement.

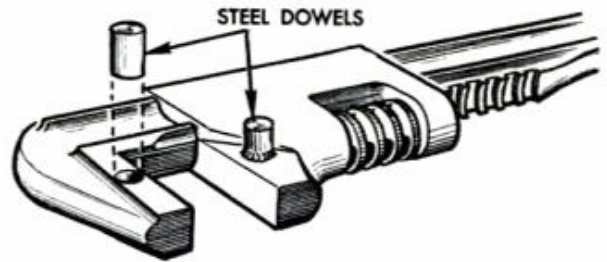
Build each section of the frame from 1 x 2s, doweling all 90-deg. corner joints and gluing and nailing corner braces. If you wish, add a narrow fold-down shelf between the uprights at the closed end to hold magazines, sun-tan lotion, etc. Since the lounge will undoubtedly be left out during at least one summer shower, give the frame a coat of exterior enamel to protect the wood. After you have assembled the frame with 2-in. butt hinges, staple the muslin in place, cover the exposed edges with half-round molding and paint the molding. You can convert the lounge to a summer playhouse for the kids by laying poles across the top and covering it with an old sheet. ★★★

POPULAR MECHANICS

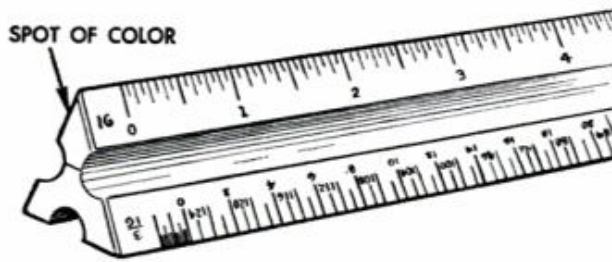
TAKE A HINT



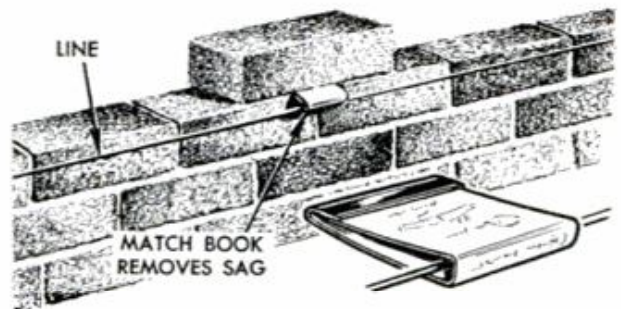
TO PREVENT A PENCIL from rolling off an inclined drawing board cut a length of masking tape about 2 in. long, lay the pencil on it at the center and then fold back the tape ends to form tabs or ears



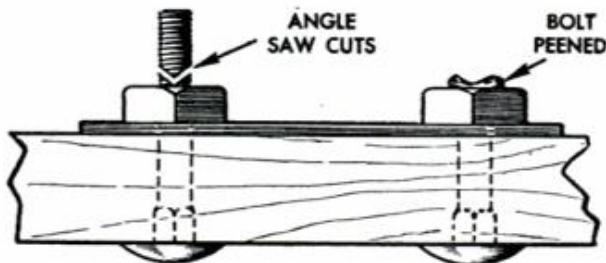
SPANNER wrench can be made simply by welding two short steel pins to the jaws of an adjustable wrench. This gives wide adjustment for loosening caps on drums containing oils, greases and paints



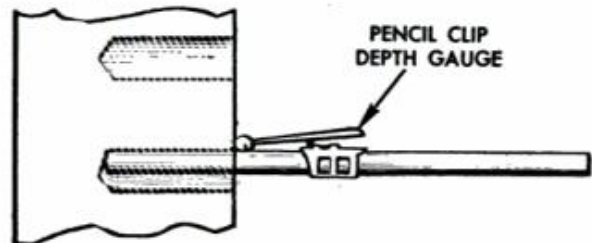
SPOT OF COLOR on one leg of a triangular scale makes quick work of selecting the most-used scale. A spot of red enamel or fingernail polish does it nicely. Or, if you prefer, use colored tape



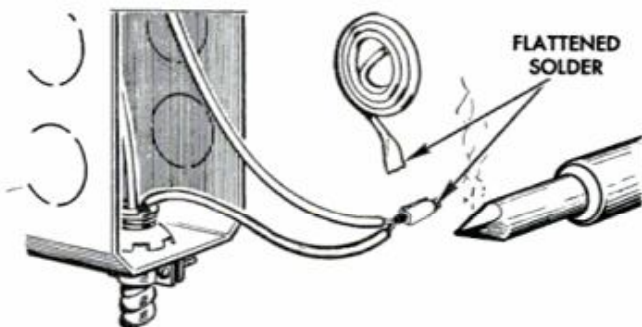
MATCHBOOK, or pad, held by a brick takes the sag out of a mason's line, keeps it just the right distance away from the top course so it does not interfere with striking the mortared joint



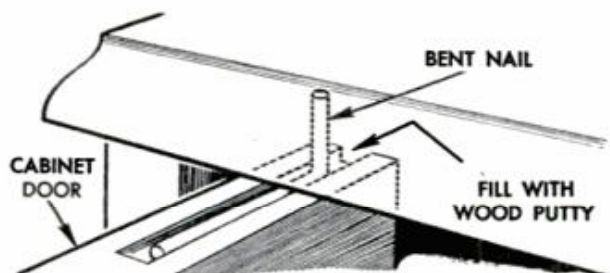
PEENING END of a bolt to make sure it holds is done by making angle saw cuts as in left detail. Thenpeen projecting ears flat as in right-hand detail. Bolt will stand shock without loosening



SLIDE A PENCIL CLIP on a dowel and you've got a quickie depth gauge that will measure depth with sufficient accuracy for all but the most precise work. Clip should be fairly tight fit on dowel



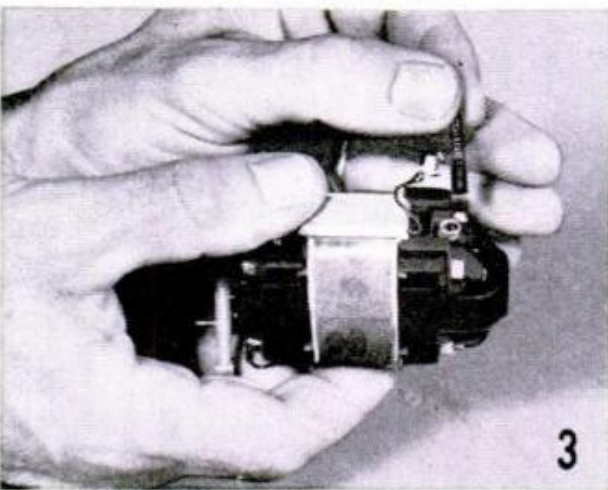
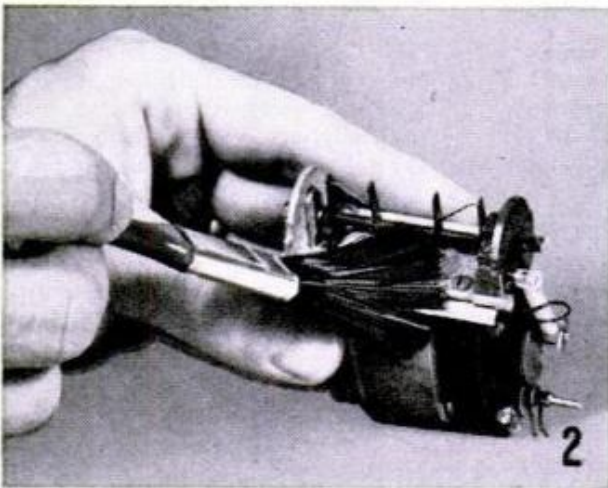
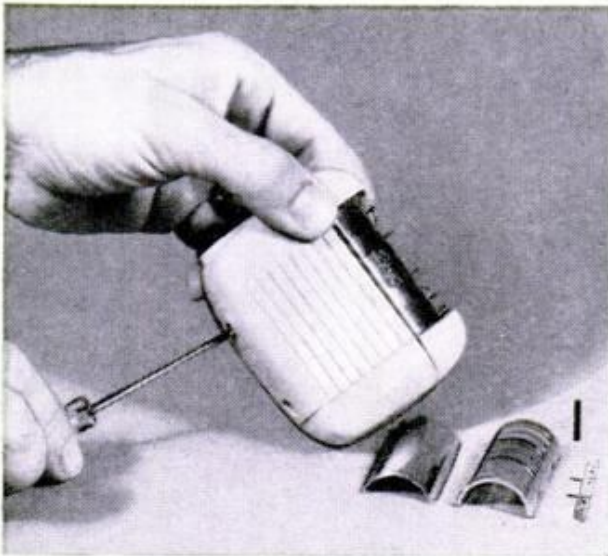
SOLDERING WIRE SPLICES is easier if you first flatten the wire solder and wrap a length of it around the splice over the paste flux. Heated from underside the solder wrapping flows readily



POSITIVE DOOR HINGE can be made from a bent nail or a curtain-rod book. Cut a stopped groove in top and bottom edges of door, set in the hinges and fill grooves flush with wood putty or epoxy

ELECTRIC SHAVER

Household



SHAVING with an electric razor has become something you do regularly without thinking much about it—like driving your car, it's become second nature. You just plug the shaver into an outlet and mow 'em off. It's that simple. But some morning—with only minutes left for coffee and toast—you plug in your shaver and it doesn't work. Then what?

Could be that it needs only a thorough cleaning. You'll know when you cleaned it last, maybe six months ago? Or was it that long? A shaver gets rather steady, rough usage and it wouldn't be surprising if yours needs more than cleaning, especially if it's an older type and you've used it for several years. If it's a brush-motor type driving a blade through a camming or swinging arm, it could be that this mechanism is excessively worn or perhaps even disconnected. The shaver pictured in Figs. 1 through 6 is typical of this type. Or, your shaver may be of the vibrator type, the one shown partially disassembled in Fig. 7 being typical.

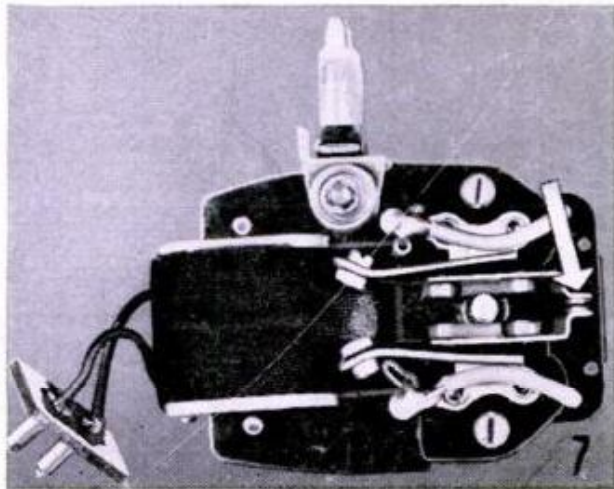
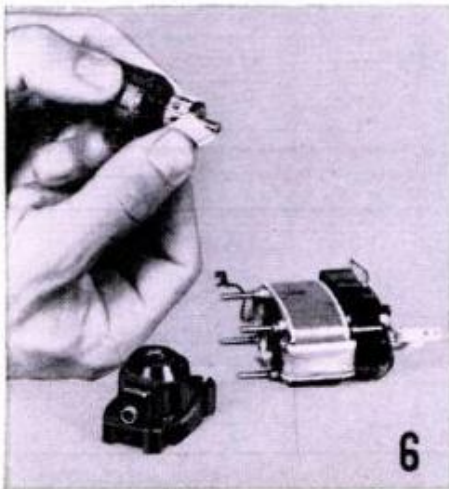
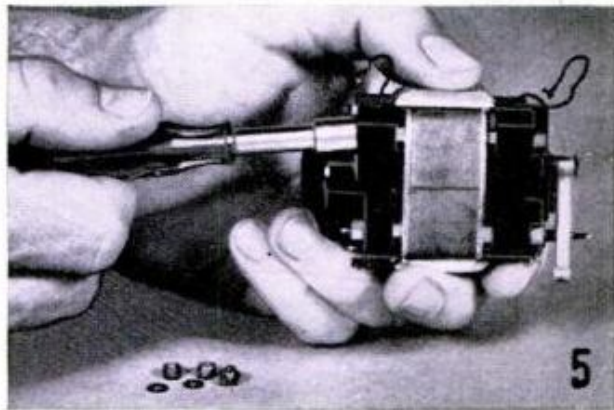
Both types should be cleaned and serviced periodically. If you decide to do this chore yourself, go light on the screwdriver, Figs. 1 and 6, and have something handy in which to place small parts. The shaver pictured in Fig. 1 will look like that shown in Figs. 2 through 6 when you have removed the head, blade and motor housing, or case. Be especially careful when cleaning the blade compartment, Fig. 2, and removing and examining the tiny brushes, Fig.

Appliance Fix-It File

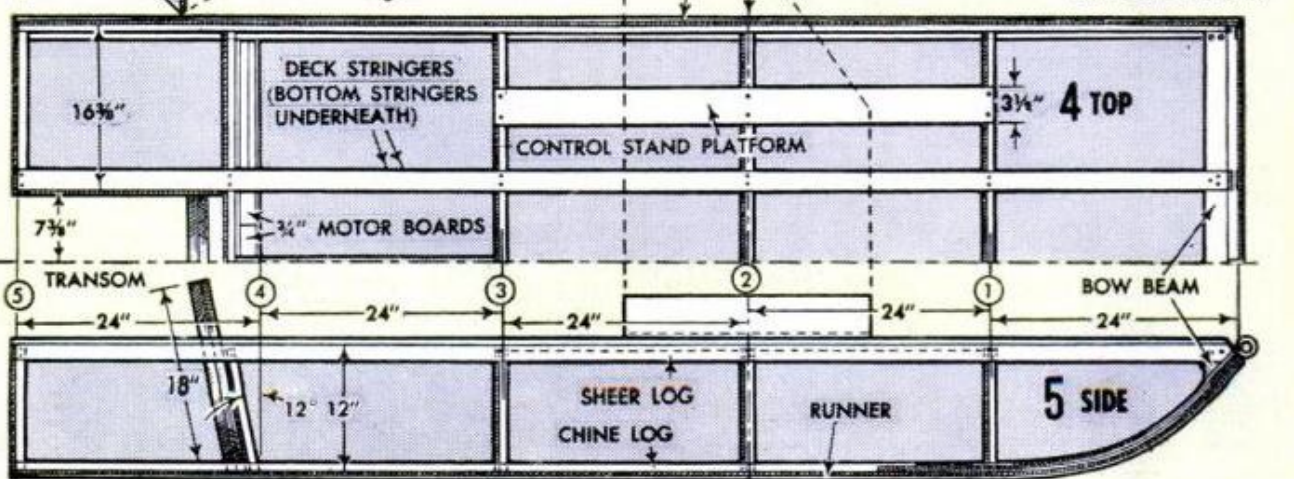
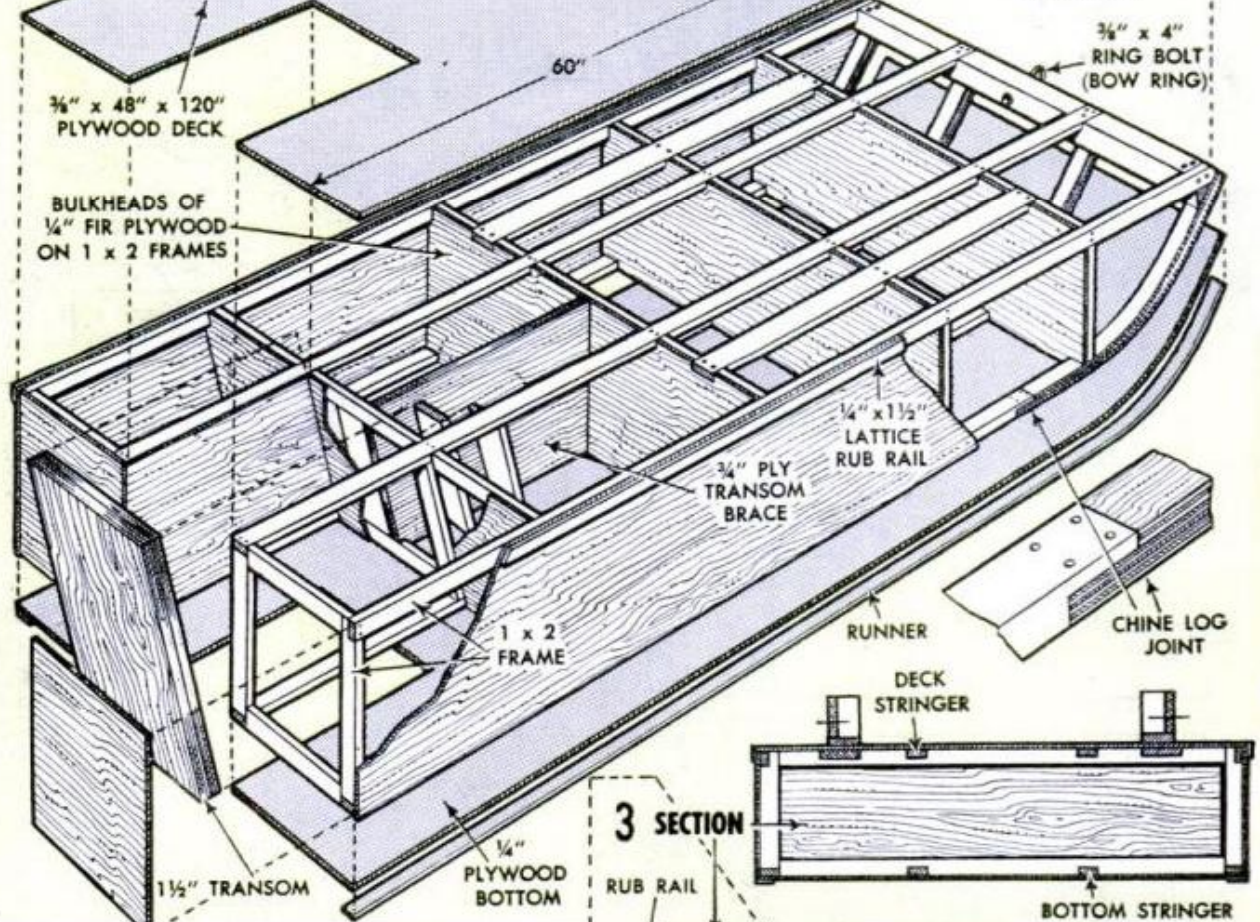
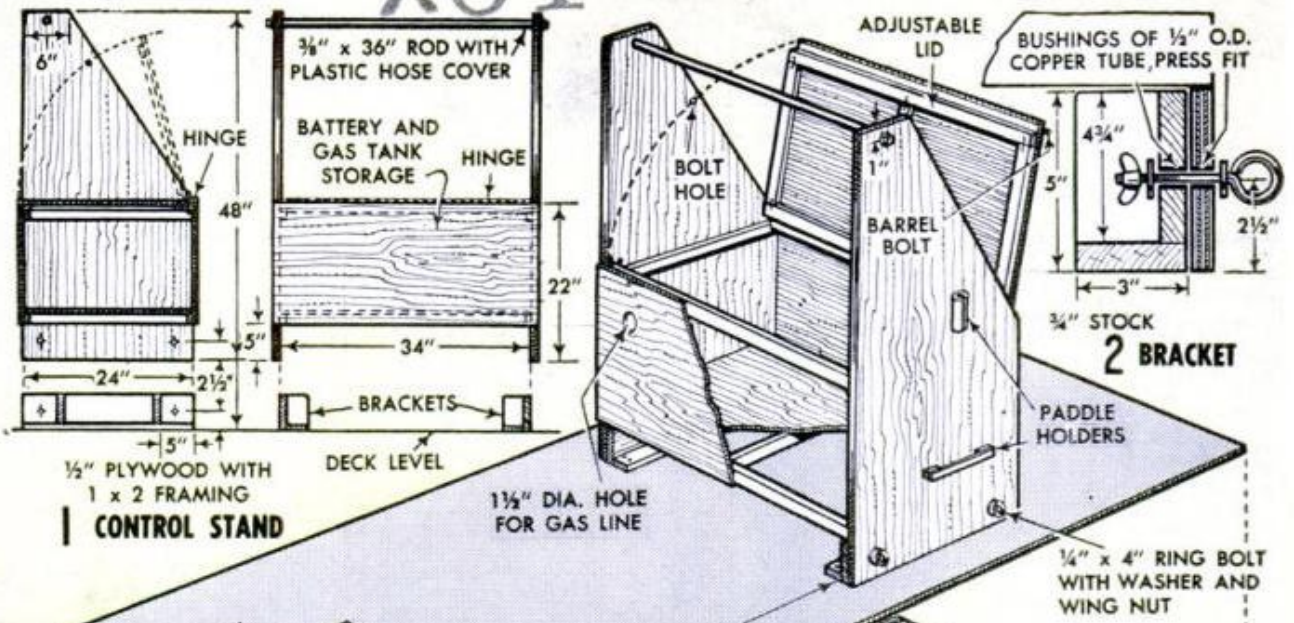
3. Note closely the condition of the brushes, whether they are chipped at the edges or one worn shorter than the other. If both brushes are appreciably shorter than the one pictured in Fig. 3, they should be replaced.

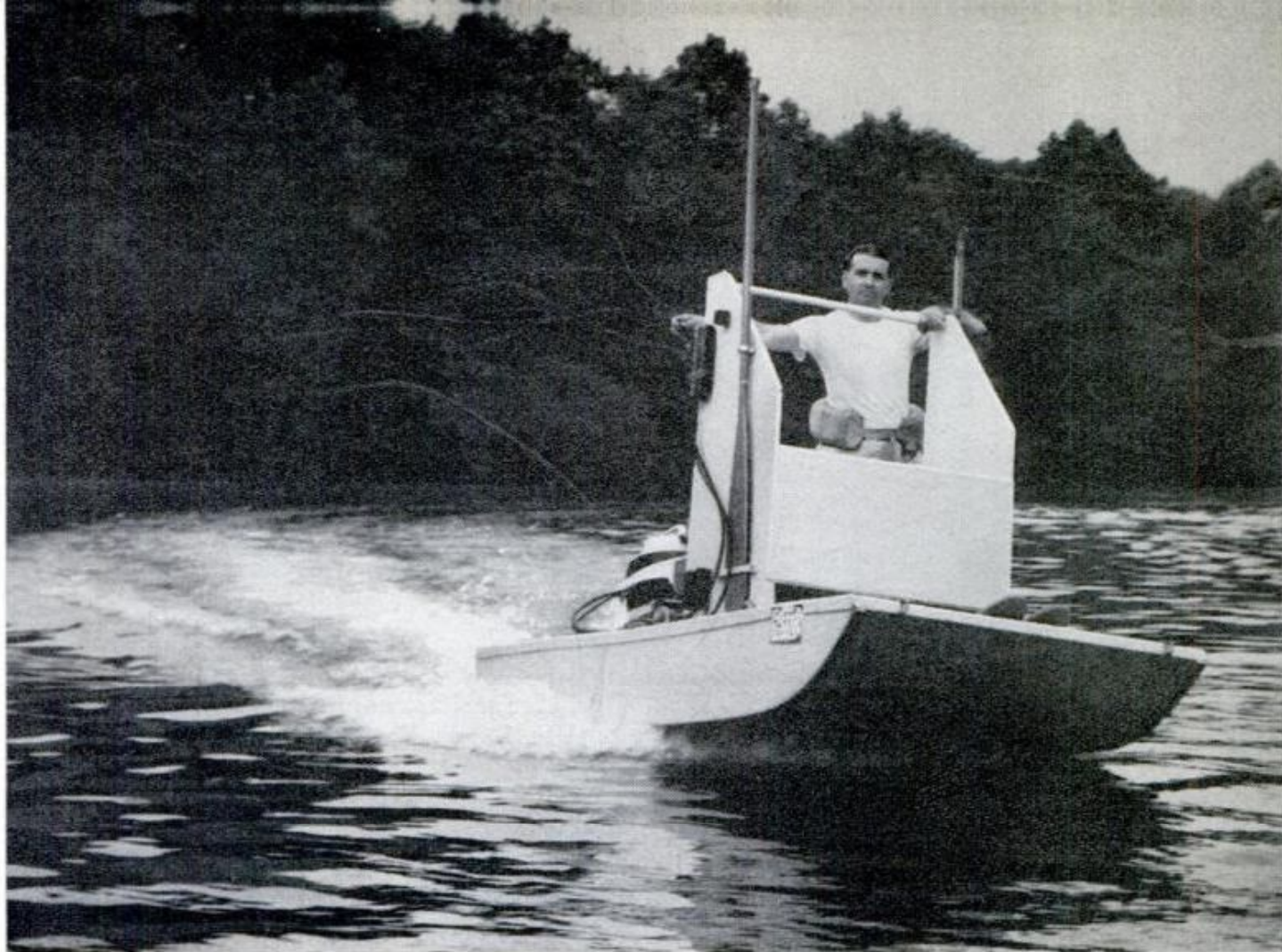
If you feel more venture-some, you can go a step further and dismantle the tiny motor as in Figs. 5 and 6. This must be done in order to clean the commutator as in Fig. 6. Remember in this step the brushes must be removed first and they must be placed so that you are sure to return them to their respective holders and in the same relative position as they were originally. Before reassembling, brush away all dust from the assembly.

Clean a vibrator-type shaver periodically and closely examine the breaker points, arrow in Fig. 7. They should be clean and bright. Otherwise replace them. And finally, release the shaving head and clean it regularly for better shaves.—*John Pennington*



X81





LIKE TO BUILD A BOAT FOR FUN? TRY

PM's SCOOT-ABOUT

HERE'S A BOAT we think will appeal to almost everyone—fisherman, ski enthusiast and the man who just likes something different in boats. Designed by Albert Harrison, Ambler, Pa., this 200-lb. powered aquaplane features a removable control stand which can be lashed flat on the deck for car-topping or trailering.

Ballast-type steering makes riding *Scoot-About* a sport in itself. To turn, you simply shift your weight in the direction you want the craft to go—the more you lean, the sharper the turn. Clamp a 15-hp. outboard on the motor board and you can skim over the water at 30 m.p.h.

The motor is lashed in a straight-ahead position with shock-cord ties looped through the steering bracket and fastened to the deck at each side. This permits you to steer manually when moving at speeds too slow for ballast steering.

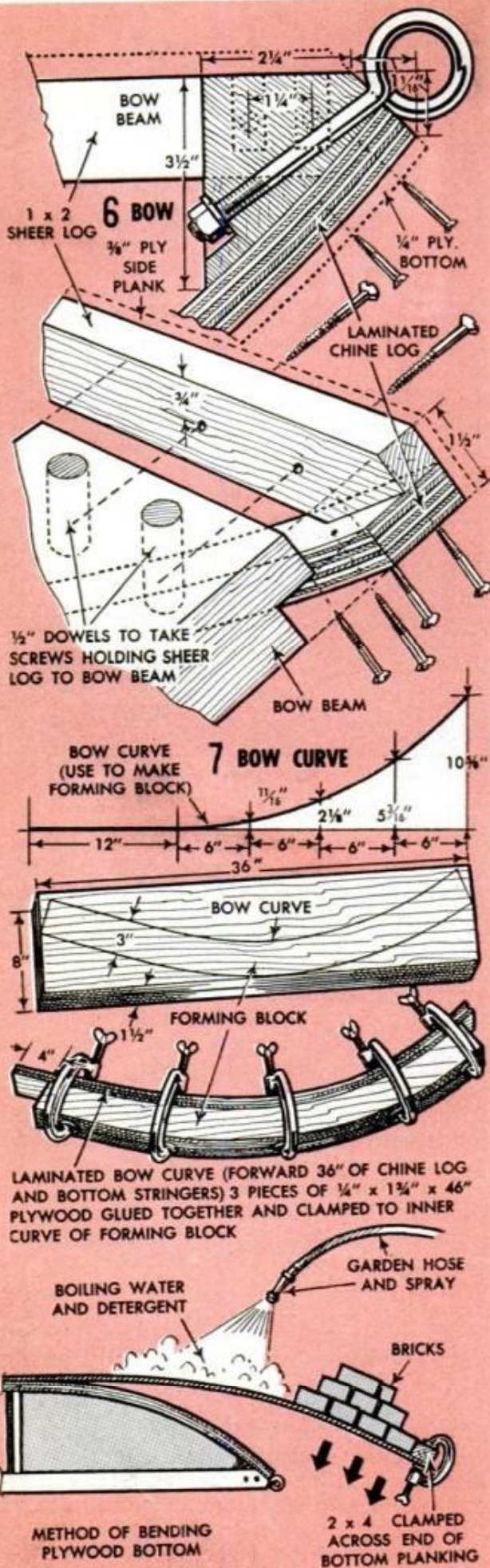
Joints are fastened with plastic resin glue and either silicon bronze annular-thread nails or brass wood screws. Be sure to coat both mating surfaces with glue and coun-

tersink all exterior fastenings slightly so that they can be concealed with wood putty. While fiberglassing the whole boat will make maintenance easier, you may want to skip this step. In such cases, we strongly recommend that you cover all joints with fiberglas tape to protect the end grain of the plywood.

Begin by assembling the bulkhead-type frames. All of these have the same dimensions except No. 4 which must be made $\frac{3}{4}$ in. higher to allow for the necessary 12-deg. tilt and the beveling of the upper and lower edges, Figs. 4 and 5. Don't add the $\frac{3}{4}$ -in. reinforcing boards to this bulkhead until you have assembled the hull framing and installed the transom brace.

After cutting all bulkheads from $\frac{1}{4}$ -in. plywood, attach 1 x 2 gluing strips flush with the edges. Notch the corners of each to take chine logs, sheer logs, deck stringers and bottom stringers, keeping in mind that the notches in No. 4 must be cut to the same angle as the beveled edges.

You will note that the forward 3 ft. of



the chine logs and bottom stringers are laminated from $\frac{1}{4}$ -in. plywood strips, Fig. 7. This method of forming is much easier and more practical than bending solid 1 x 2s and will produce a stronger frame. Make the forming block from scrap lumber and clamp the plywood laminae to the inner curve of the block. The bottom two laminae should extend 4 in. from the after end of the block, while the top lamina is flush with the end of the block. After the glue has cured, remove the laminated member from the block and splice it to the solid member as shown.

Before assembling the frame, prepare the bow beam, Fig. 6. This is a 4-ft. length of 4 x 4 which must be beveled approximately 45 deg. and notched to accept deck stringers, bottom stringers, sheer logs and chine logs. Dowels inserted near the ends of the bow beam, Fig. 6, provide a good grip for screws running into the end grain.

Use $1\frac{1}{4}$ -in. boat nails and glue to assemble the frame. Install the $\frac{3}{4}$ -in. plywood transom brace between bulkheads No. 3 and 4, then glue and nail $\frac{3}{4}$ -in. reinforcing boards to the center section of bulkhead No. 4. To provide support for the control stand, two short 1 x 4 deck stringers must be installed between bulkheads No. 1 and 3, directly under the mounting locations of the stand brackets. Notch these three bulkheads and install the stringers.

Glue and 1-in. boat nails are used to attach the planking. To assure a perfect fit, you might make a pattern for each piece from heavy paper, allowing about $\frac{1}{8}$ in. excess on all sides. This excess can be trimmed off after the planking is mounted on the frame. Plank the transom first, then the motor well and sides. Before you plank the deck, trim the upper edges of the side planking flush with the deck framing and fair this framing to provide for perfect mating of planking and frame surfaces. Then install the deck planking, and turn the hull over.

Fasten the bow ring to the bow beam before planking the bottom. Begin nailing the bottom planking at the transom and complete all nailing and gluing up to bulkhead No. 1. Since the bow curve is close to the critical bending radius for $\frac{1}{4}$ -in. 3-ply fir plywood, soak the outer ply with hot water for about 20 min. prior to bending and wet the plywood often during the bending process. A boiling water and detergent solution will have greater penetration than plain water and can be applied with a garden spray, if one is available. If not, you might run a hose from the hot water faucet of your laundry tub and simply spray the plywood with hot water. Clamp a 2 x 4 across the extended

end of the planking and pile bricks behind this, one at a time, until the weight pulls the plywood down to fit the bow curve. Then nail the planking in place, fiberglass all joints and mount the rub rails and aluminum runners. (These protect the plywood bottom during launching.)

Assemble the control stand, Fig. 1, and mount the stand brackets on the deck. Attach barrel bolts to the upper surface of the lid on each side and drill sockets in the side panels so that the lid can be locked in a raised position as a wind or spray shield. The grip bar at the top is simply a length of steel pipe covered with a piece of plastic hose and held in place by a tie bolt running through the pipe. Make the upper part of the two-piece paddle holder from a short length of radiator hose split down one side.

Four eye bolts running through copper bushings hold the removable control stand to the deck brackets. The brackets illustrated here are high enough to provide clearance for water skis. If you don't plan to use *Scout-About* as a ski boat, these brackets can be made of 1 x 4s and the bottom of the box lowered accordingly.

MATERIALS LIST

PLYWOOD (fir, exterior or marine, grade AB or AA)

- 2 pcs.— $\frac{1}{4}$ " x 12" x 10"—Side planking
- 2 pcs.— $\frac{1}{4}$ " x 12" x 16 $\frac{3}{8}$ "—Port and starboard transoms
- 2 pcs.— $\frac{1}{4}$ " x 12" x 24"—Motor-well sides
- 1 pc.— $\frac{1}{4}$ " x 4' x 12"—Bottom planking (trim after bending)
- 3 pcs.— $\frac{1}{4}$ " x 12" x 47 $\frac{1}{2}$ "—Bulkheads 1, 2 and 3
- 1 pc.— $\frac{1}{4}$ " x 12 $\frac{3}{4}$ " x 47 $\frac{1}{2}$ "—Bulkhead 4
- 1 pc.— $\frac{3}{8}$ " x 4' x 10"—Deck planking
- 2 pcs.— $\frac{1}{2}$ " x 24" x 48"—Control-stand sides
- 2 pcs.— $\frac{1}{2}$ " x 24" x 34"—Control-stand lid and bottom
- 2 pcs.— $\frac{1}{2}$ " x 17" x 35"—Control-stand front and back
- 2 pcs.— $\frac{3}{4}$ " x 14 $\frac{1}{4}$ " x 18"—Motor board

(NOTE: Wherever possible, cut $\frac{1}{8}$ " oversize on all sides and trim after plywood is mounted on framing. This will assure a perfect fit.)

LUMBER (white pine, spruce or fir)

- 12 pcs.—1 x 2, 10' long—Framing
- 1 pc.—1 x 4, 12' long—Stand stringers and backing boards for bulkhead 4
- 1 pc.—4 x 4, 4' long—Bow beam
- 1 pc.—1 x 6, 5' long—Control-stand brackets
- 1 pc.—1 x 4, 4' long—Control-stand brackets
- 1 pc.— $\frac{1}{2}$ " dowel, 12" long—Cross-grain anchor for fastenings in bow beam
- 2 pcs.— $\frac{1}{4}$ " x 1 $\frac{1}{2}$ "—Rub rail

FASTENINGS

- 5 lb.—Plastic resin glue
- 5 lb.—1" x .083"-dia. silicon bronze annular-ring nails (Stronghold, Anchorfast or similar)
- 3 lb.—1 $\frac{1}{4}$ " x .109"-dia. silicon bronze annular-ring nails (Stronghold, Anchorfast or similar)
- 2 doz.—2 $\frac{1}{2}$ " No. 8 F.H. brass wood screws (mounting motor board)
- 3 doz.—2" No. 8 F.H. brass wood screws (bow assembly)

FITTINGS, HARDWARE AND MISC.

- 1 pc.— $\frac{1}{2}$ " x $\frac{3}{4}$ " galv. steel pipe
- 1 pc.— $\frac{3}{8}$ " x 36" tie bolt or threaded steel rod
- 1 pc.— $\frac{3}{8}$ " x 34" plastic hose
- 1 pc.—1" x 34" continuous brass (piano) hinge
- 4 pcs.— $\frac{5}{16}$ " x 2" eyebolts
- 1 pc.— $\frac{1}{2}$ " x 5" eyebolt
- 2 pcs.—1 $\frac{1}{2}$ " x 11" aluminum stripping with screws (runners—mount on hull and trim off excess)
- 2 pcs.—barrel bolts

OPTIONAL FIBERGLASSING

- 8 yd.—7 or 8-oz. Fibreglas cloth, 50" wide
- 4 yd.—7 or 8-oz. Fibreglas cloth, 38" wide
- 3 gal.—Polyester resin, marine grade
- 1 gal.—Marine paint (add nonskid compound for deck)



SHALLOW DRAFT makes "Scout-About" a perfect fishing boat for exploring all those out-of-the-way inlets



SCOW HULL is very fast when planing. With a 15-hp. motor, you can even use it for water skiing

BALLAST STEERING adds new excitement to just plain boat riding. Manual steering is used at slow speeds

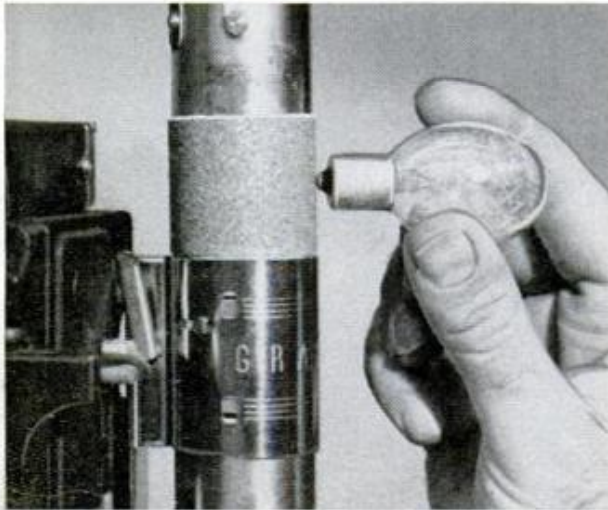




Focusing Cloth Gets Clipped

While wet plates and flash powder went out of general use generations ago, the black focusing cloth has remained and with it the age-old problem of making it stay put on the camera. Windy or calm this "essential nuisance" has a way of getting in your hair. Of the many things which have been used to anchor the elusive cloth self-gripping clips cut from a scrap of plastic garden hose do a fine job of clipping it to the camera as shown in the photo. Cut the hose in 1-in. lengths and then slit the pieces lengthwise. Four such clips will end the stay-put problem for good.—*Bil Toman*

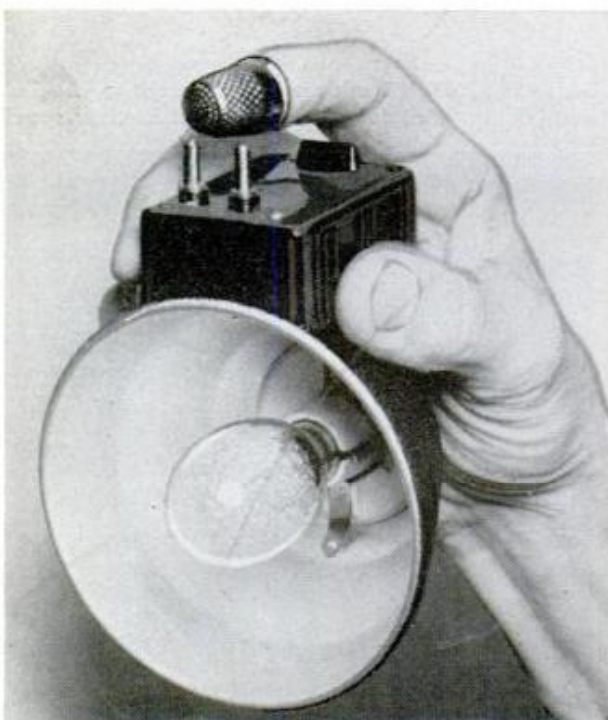
Milk filters make the ideal filters for photographic solutions. Each 6½-in.-diameter disk provides four filters for the standard two-piece photo-solution funnel. Get the filter type known as fiber-bonded, obtainable at hardware and farm-supply stores.



Photos From Scratch

Everything's set for that cutest-of-all shot. You hear the satisfying click of the shutter but the flash bulb didn't fire. There goes a sheet of film and the picture must be posed all over again. Nine times out of ten, poor contact is the cause of such failures. Before you set about posing and composing the picture over again, take time to wrap a strip of fine sandpaper around the battery case of the flash gun. Fasten in place with a spot of glue. Before you insert each bulb, scratch the contact across the abrasive lightly. Then it'll fire, every time.

—*Pat Sinapi*



Light Up With a Thimble

Plug-in flash guns of the type that automatically synchronize with the shutter also can be fired when hand-held for open-flash shots anywhere you can use such an exposure. This trick also is useful for top-lighting close-up subjects where a single off-camera flash gives just the right emphasis. Some open-flash-shut shots can be bounce-lighted, using the same stunt. One good look at the photo and you'll see how it's done. You wear—of all things!—a thimble on your index finger, grasp the body of the unit as pictured and when you're ready for the flash, just touch the thimble to both terminal posts.—*Arthur Trauffer*

An electric immersion heater of the type used for making instant coffee in a cup is just the thing for heating photographic chemicals in developing tanks. Just plug it in and hang it over the edge of the tank. It's portable, safe.

NEW FOR SHUTTERBUGS NEW

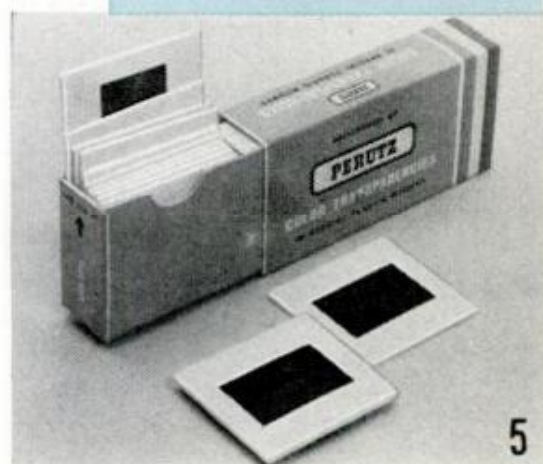
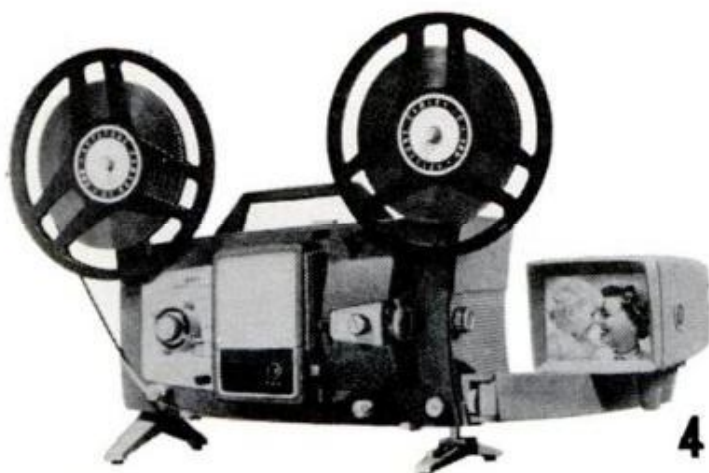
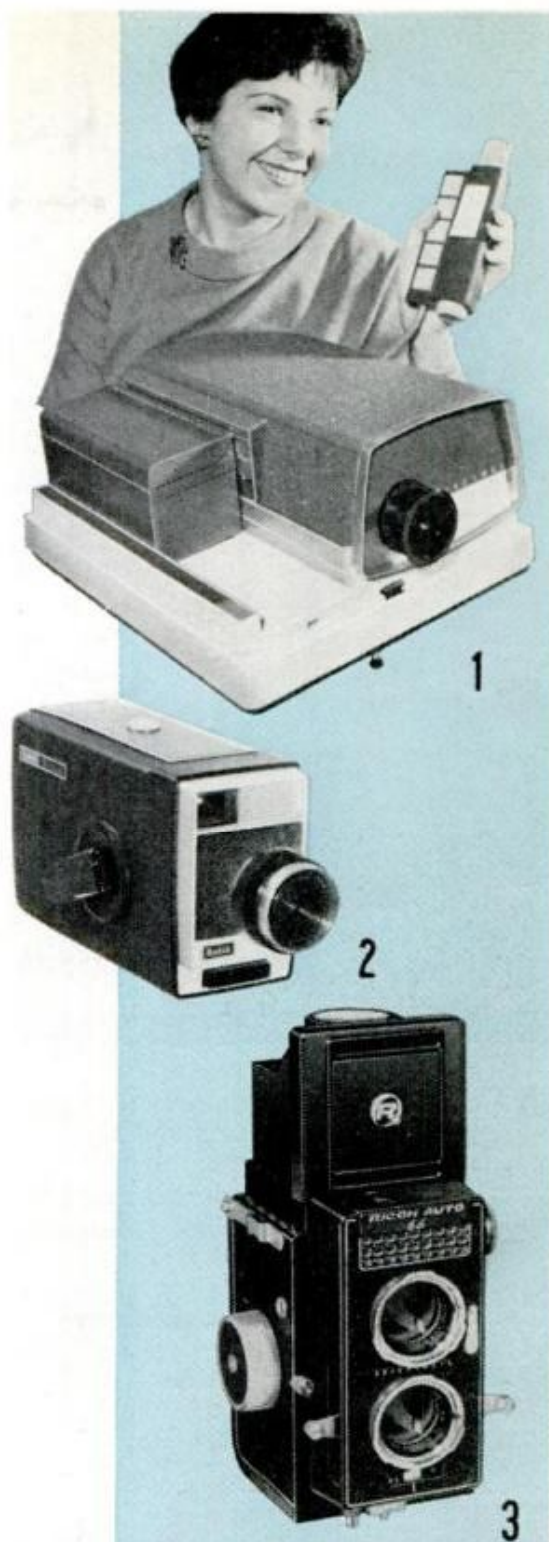
1. SLIDE PROJECTOR automatically projects either 35-mm or $2\frac{1}{4} \times 2\frac{1}{4}$ slides by means of an internal magnetic action. The remote push-button unit includes all the necessary controls for changing slides, focusing, using light pointer and switching lights. Price is \$210. Made by Heiland Div. of Minneapolis-Honeywell Company, 5200 East Evans Ave., Denver 22, Colo.

2. KODAK 8-MM. MOVIE CAMERA features simplicity of operation at an economical price. User needs only check lighting conditions and rotate lens to make one simple setting. No focusing is necessary. An exposure guide is located on the side of the camera. With a fast f:1.9 lens, the camera sells for less than \$35. Made by Eastman Kodak Company, Rochester 4, N. Y.

3. AUTO 66 TWIN-LENS REFLEX has an electric-eye control with cross-coupled shutter for automatic exposures. Other features include duo-lever focusing controlled from either hand; a built-in magnifier for critical focusing; plus automatic loading and film stops. Priced at less than \$80. Interstate Photo Supply Corp., 300 Park Ave. S., New York 10, N. Y.

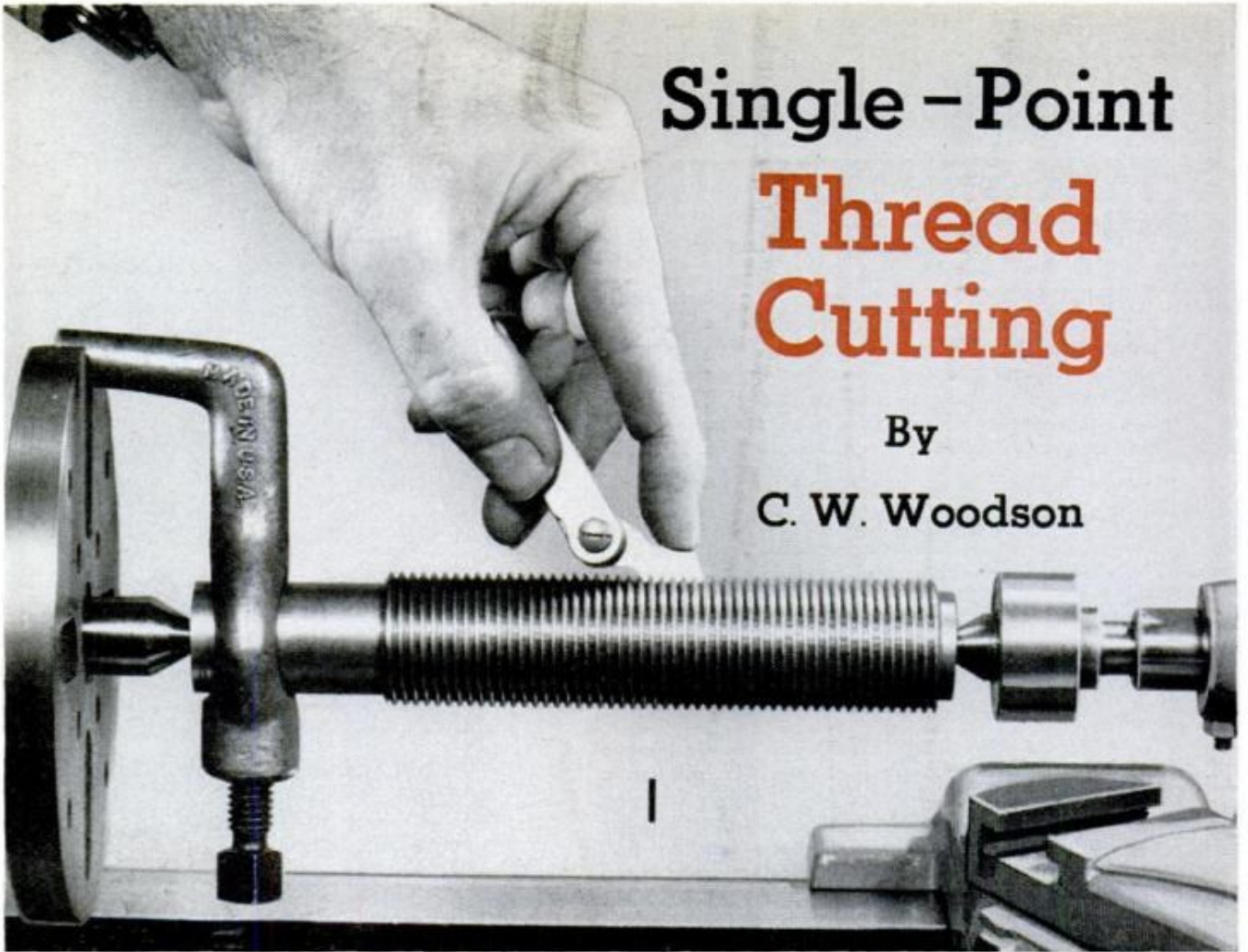
4. LOW SILHOUETTE 8-MM. home movie projector automatically threads film onto camera in only six seconds. Remote control unit permits operator to start or stop show from his easy chair. Included with unit is a previewer and editor for viewing films—the attachment mounts on the chassis of projector. Keystone Camera Co., Hallet Square, Boston 24, Mass.

5. DURABLE PLASTIC MOUNTS are being used for mounting new Perutz color film. They are said to never warp or bend. Plastic halves snap tightly together, but allow removal of film. Processing is included in original purchase price. New transparency film has an ASA rating of 50 and is distributed by Burleigh Brooks Inc., 420 Grand Ave., Englewood, N. J.



Single - Point Thread Cutting

By
C. W. Woodson

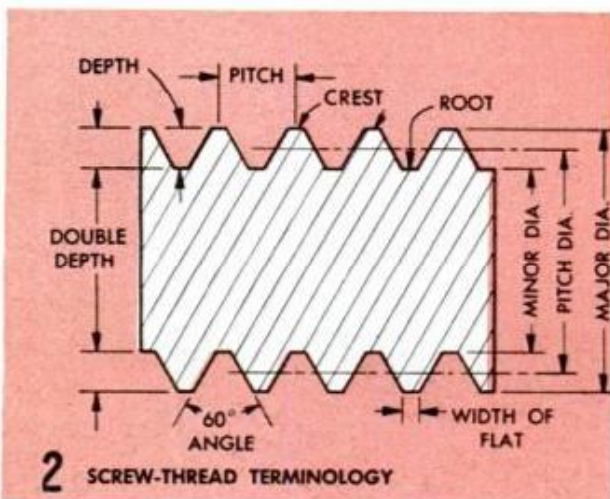


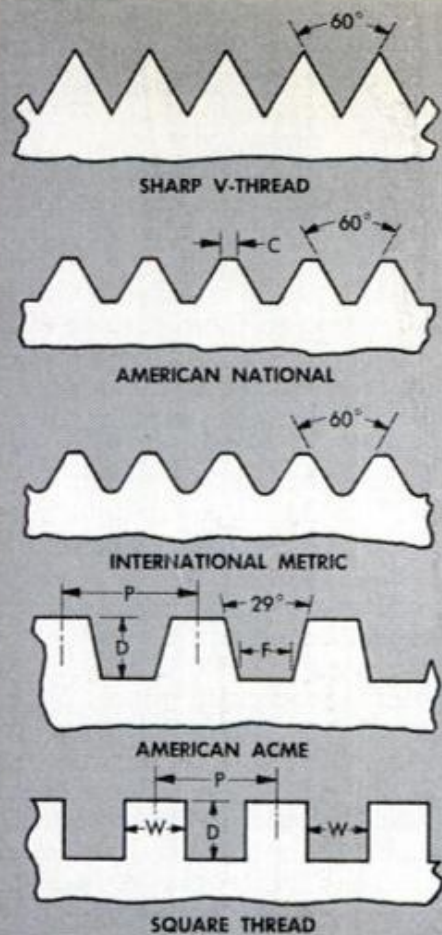
THREADS OF precision accuracy, in a wide range of forms and sizes, can be cut on a screw-cutting lathe with a single-point tool bit ground to the exact form of the thread required. By connecting the headstock spindle of the lathe with the lead screw through the gear train, a positive carriage feed and lead-screw drive is obtained and any desired pitch of thread, either right-hand or left-hand, may be cut.

Common screw-thread terminology and various thread forms, are shown in Figs. 2

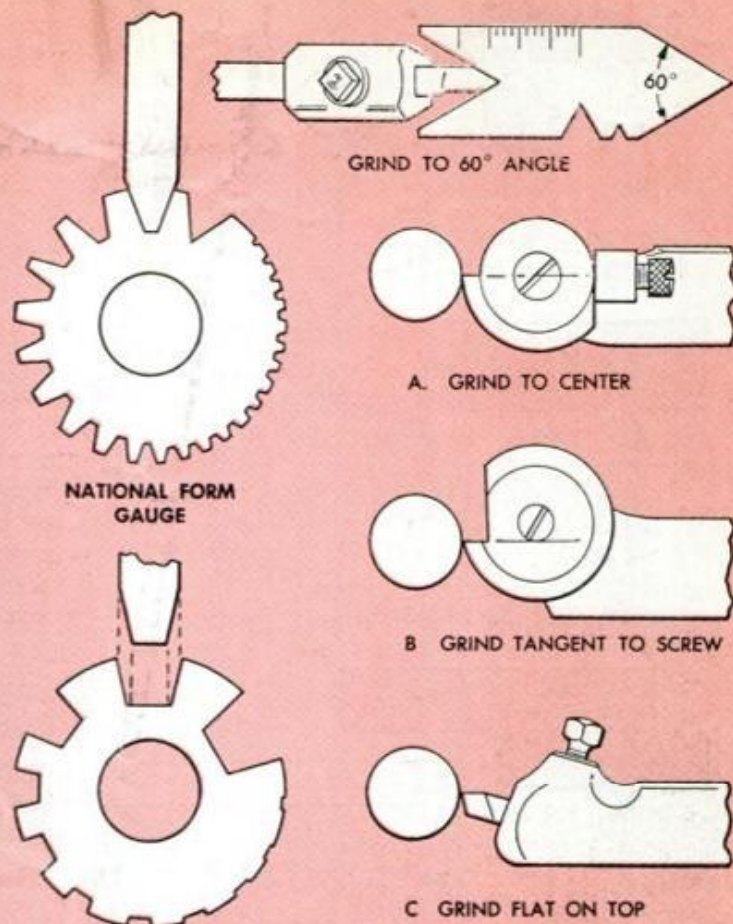
and 3. The American National thread form is one of the most commonly used. This thread form ("form" meaning the profile or cross section of a thread) is shown in Fig. 3 and the common terminology designating form, measurements and characteristics is given in Fig. 2.

The American thread form is more easily held to accurate dimensions than some other thread forms. This is made possible by the wide 60-deg. included angle of the thread and also because of the flat crest and root which are one-eighth the pitch. The American National thread form is used in the American National Coarse Standard Thread (N.C.), American National Fine Standard Thread (N.F.), and American Special Screw Thread Pitches (N.S.). Sharp V-threads, Fig. 3, are known as locking threads. They fit closer and form a tighter seal because of the wedging action of the sharp top and bottom. However, the Sharp V-thread is rarely used except on fittings requiring a seal. The International Standard Metric screw-thread form is similar to the American National thread form having a 60-deg. included angle. It is cut with a flat at the top of the thread and a radius at the root which provides greater clearance.





3 THREAD FORMS

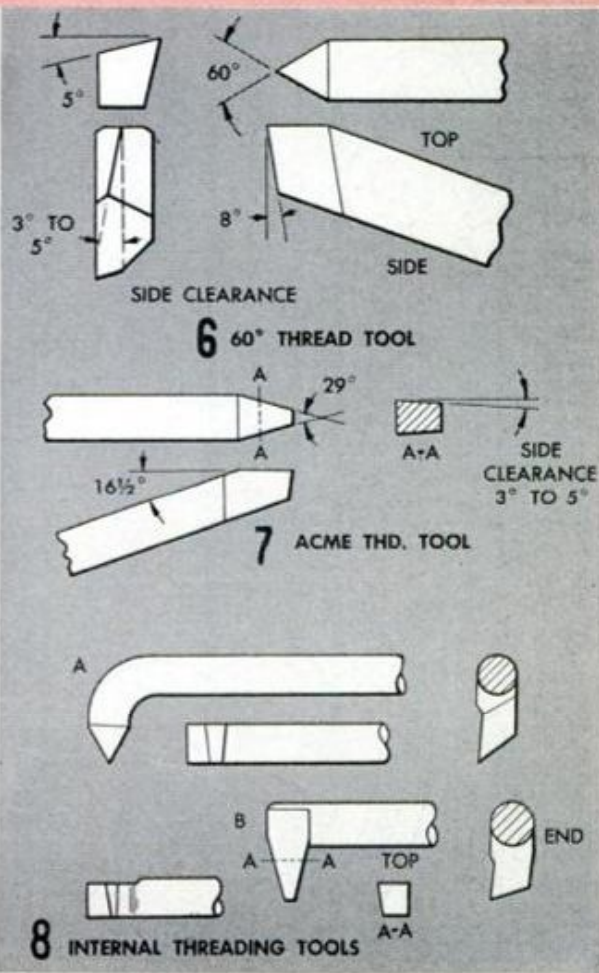


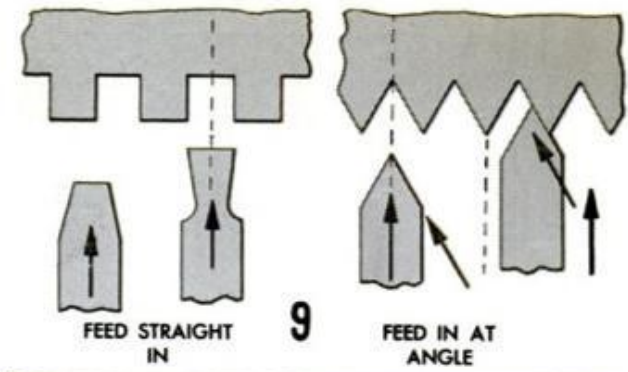
4 ACME FORM GAUGE

5

Acme screw threads are widely used for feed screws and adjusting screws on machine tools. They have a distinct advantage on lead screws of lathes where a split-nut can be easily engaged and disengaged due to the slope of the sides of the engaging threads. The slope of the sides also compensates for wear, allowing the half-nut to seat closely, reducing backlash to a minimum. The wide root and crest of the Acme thread form is strong and capable of carrying a heavy load.

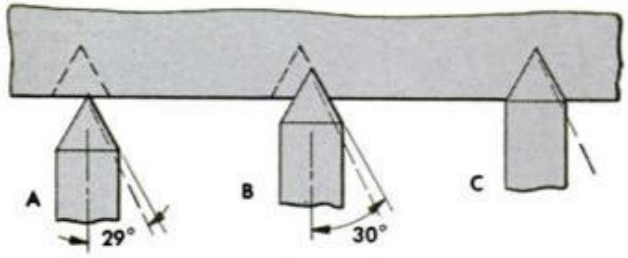
When cutting the threads both the tool and the compound rest are set at 90 deg. to the center line of the threaded part, Fig. 32, and the tool is fed directly into the work. Compare with the 29-deg. worm thread form, Fig. 31, with which it differs only slightly. Square threads are used for vise screws, jack screws and in general for the maximum transmission of power. The sides of the tool for cutting square threads are ground at an angle conforming with the helix angle of the thread, Fig. 34. The helix angle is determined by drawing a line A-B in Fig. 34, equal to the circumference of the thread to be cut. The line B-C is drawn equal to the lead of the thread and at right angles to the line A-B. The triangle is completed by drawing line A-C.



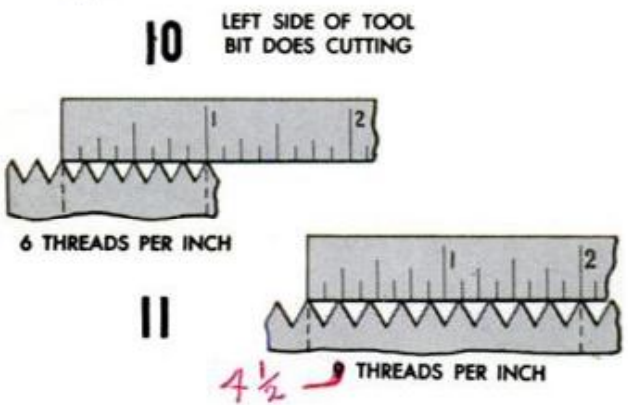


The angle in the triangle is the helix angle of the thread, Fig. 35. The sides of the cutting tool are ground with a slight clearance which is necessary because the thread is square and progresses in the form of a helix, giving it a slight twist.

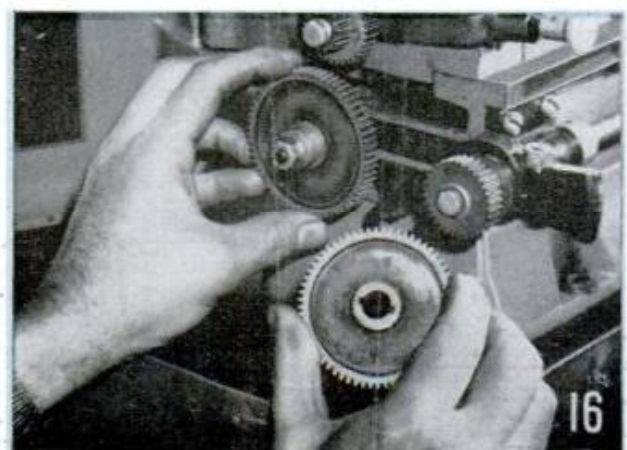
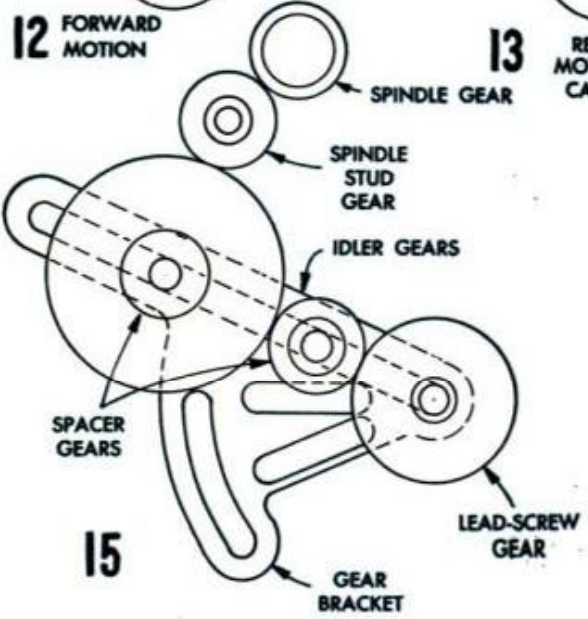
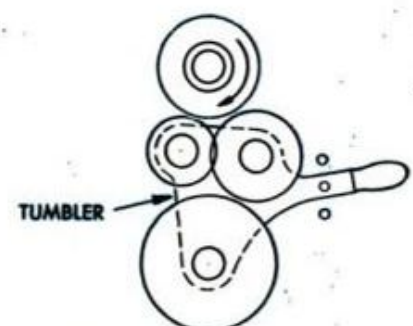
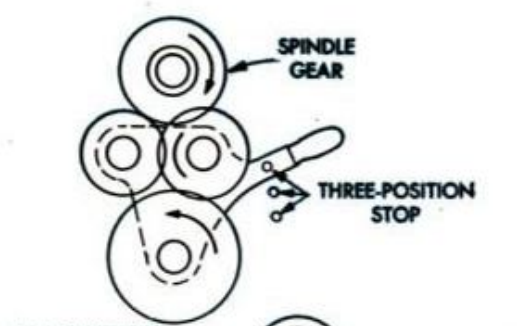
The helix angle of a thread, Fig. 22, is the angle formed between the advancing thread and a line perpendicular to the axis. The helix angle is governed by the size of the thread form and the number of threads per inch in relation to the diameter of the thread.



Thread form, Fig. 21, is the profile or cross section of a given type of thread. Thread dimensions applied to the thread form include angle, radius, depth, crest, root, flat, etc. Thread series are determined by a specified thread form, Fig. 21, the upper detail, A designating a specified form, B, a specified number of threads per inch, C, a specified thread diameter. See also the lower detail A,B,C, in Fig. 21.



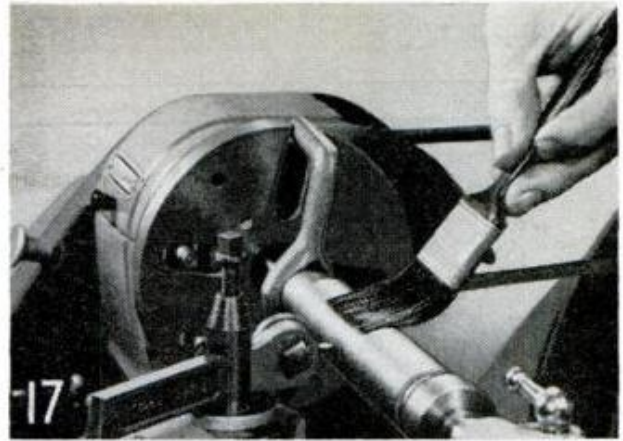
Single-point thread cutting tools, Figs. 5, 6, 7 and 8, are the pointed 60-deg. tool, the Acme thread tool, Fig. 7, which are used for external thread cutting. Fig. 8, A and B, are the same single points used for internal threading. The National and Acme forms are ground to gauges as in Fig. 4, while the sharp-pointed tool is ground and set with the gauge shown in the upper detail, Fig. 5. All these tools are ordinarily



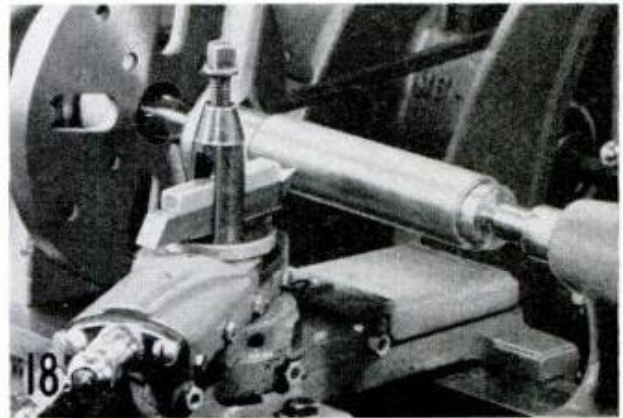
ground flat on top as in Fig. 5, detail C, also Figs. 6 and 7. Details A and B, Fig. 5, show two types of the preformed threading tool, which is ground tangent to the center, or to the screw as indicated. There are, of course, variations from these common thread forms. The square thread, Figs. 3 and 9, the metric thread Fig. 3, and the worm thread, Fig. 31. The worm-thread form is similar to the Acme form but differs in depth and in width at the top and bottom of the tooth.

Internal threads are cut in the same manner as external threads except that the tools are of the boring-bar type, A and B in Fig. 3. When cutting internal threads the bore of the hole becomes the minor diameter of the thread, the hole being bored to run dead true before the threads are cut. The point of the tool is also placed on center and square with the work, as in Fig. 26, detail B, which also shows how the compound rest must be swung 29 deg. to the left, detail A, for cutting internal right-hand threads which are cut from right to left. When left-hand threads are cut the procedure is reversed.

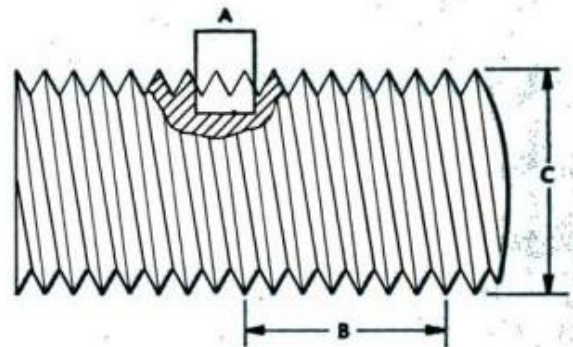
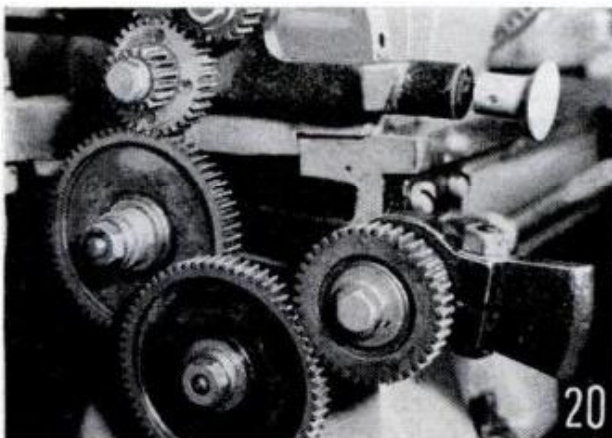
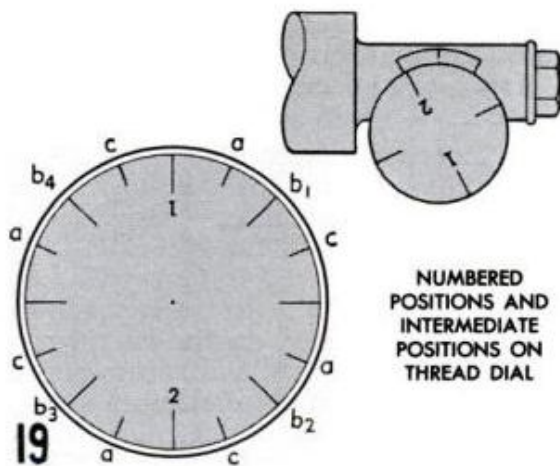
Cleaner work is produced by setting the compound rest to the right at an angle of 29 deg. for cutting 60-deg. screw threads, as in Fig. 23, detail A. The tool bit is set at lathe-center height and at right angles to the work, detail B. See also Fig. 27 show-



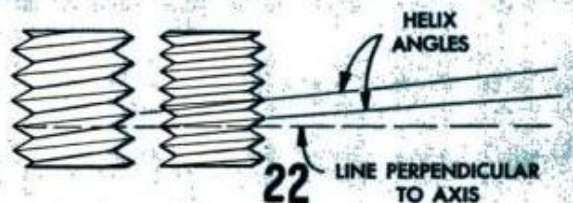
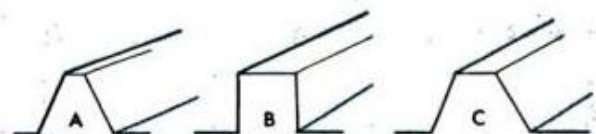
ALWAYS USE a cutting oil, such as lard oil, when cutting threads. Apply with a brush as pictured



MAKE SURE before starting thread that work is correctly mounted and that tool is properly adjusted



21 THREAD SPECS DETERMINED BY THREAD FORM, A, BY NUMBER OF THREADS PER INCH, B, AND THREAD DIAMETER. SEE ALSO A, B, C, BELOW





ing how the tool is set for threading a taper. The depth of cut is adjusted by the compound feed screw, allowing the left side of the tool bit to do the cutting. In this way a curled chip will be formed and a cleaner cut made in most common metals. Note the right-hand detail in Fig. 9 and details A, B, and C in Fig. 10. To cut the Acme and square-thread forms the tool must be fed straight in as in the left-hand detail, Fig. 9, but when cutting the 60-deg. V-thread you feed with the compound which is set at 29 deg. as in details A and B, Fig. 10. After adjusting for the final cut, the tool is fed straight in with the carriage cross-feed screw, detail C, Fig. 10. This finishes the cut and cleans up the thread from root to crest.

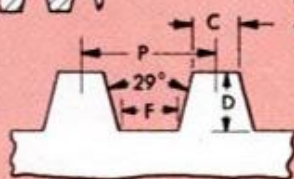
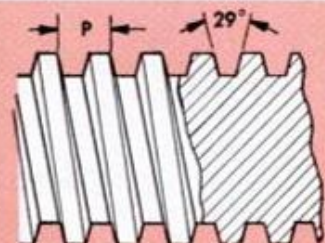
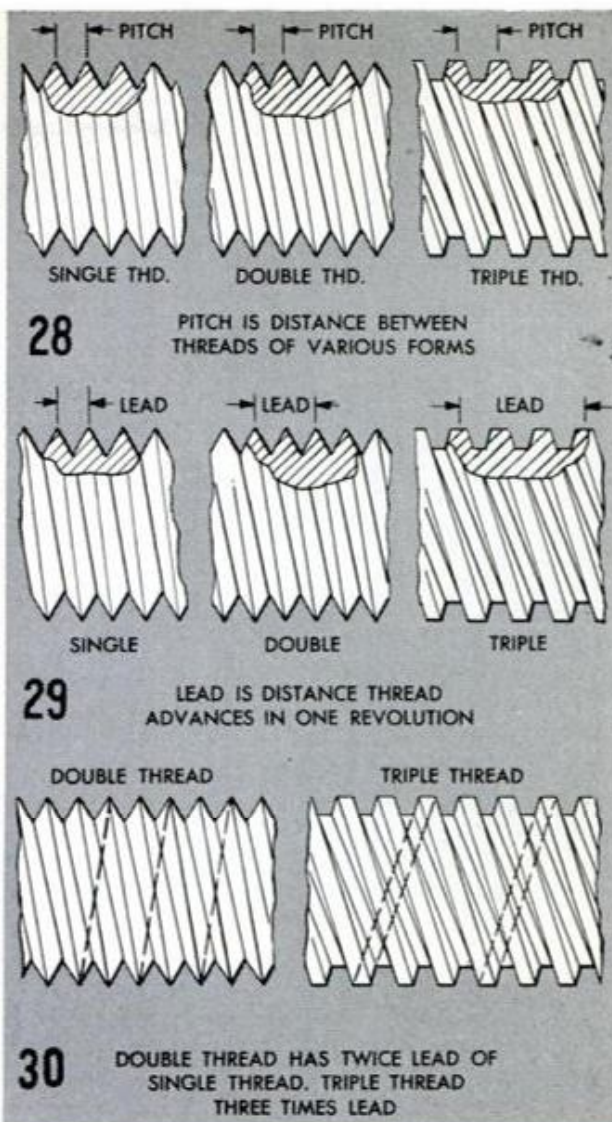
To cut threads on a standard change-gear lathe you set up a gear train as indicated on the thread-cutting chart (which comes with the lathe) for producing the desired number of threads per inch. After selecting the indicated change gears, they are placed on the reverse stud and lead screw respectively and connected with the idler gear and compound gears, as in Figs. 15, 16 and 20. In the operation of the reverse gears, Figs. 12, 13 and 14 show how the reverse lever is set for forward motion Fig. 12, for reverse, Fig. 13, and in the neutral position, Fig. 14. These positions are common to most lathes. When cutting left-hand threads the spindle and the work turn forward (towards you), but the direction of the lead screw is reversed, moving the carriage and cutting tool toward the tailstock.

The thread dial indicator, Figs. 19 and 25, simplifies and speeds the work of cutting threads in the lathe by indicating the proper time to engage the half-nuts on the lead screw so that the tool will enter the same groove of the thread for each successive cut. Mounted on the carriage, its gear meshes with the lead screw and rotates the dial when the half-nuts are disengaged. On most lathes one complete revolution of the dial face represents 4 in. of carriage travel. The dial usually is divided by four main, or numbered, divisional marks and four secondary marks. In the small detail, Fig. 19, only the main markings are shown. Rotational movement from one numbered mark to the next will represent 1 in. of carriage travel, and from any mark to the next one will represent 1/2 in. To cut an even number of threads per inch, Fig. 11, the half-nut is engaged for each cut at any of the graduation marks since a whole number of threads will be completed at 1/2-in. intervals of carriage travel. For an odd number of threads per inch, the half-nut is engaged at any main

graduation mark, such as 1 and 2, Fig. 19, since a whole number of threads requires 1 in. of carriage travel. For fractional threads, such as $11\frac{1}{2}$, the half-nut is engaged at either odd numbered or even numbered marks since, because of the fraction, 2 in. of carriage travel are required to complete a whole number of threads. The large dial in Fig. 19 is laid out with 16 marks to aid in cutting multiple threads. Only 1 and 2 are marked; the lettered positions are marked by the operator as required by the work.

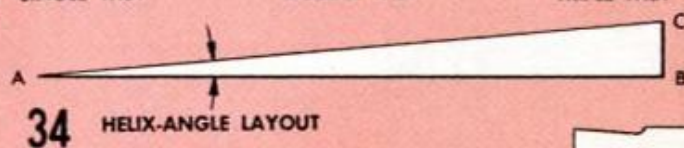
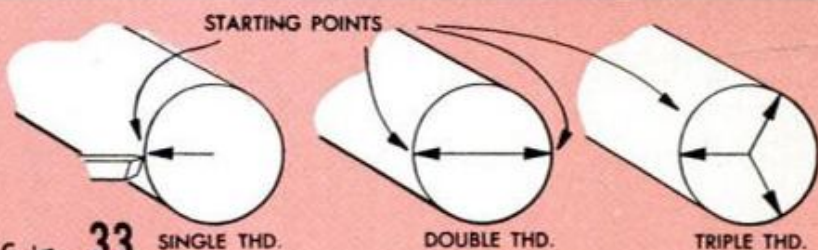
Fig. 1 pictures the use of the screw-pitch gauge to determine the number of threads per inch. Fig. 17 shows one way of applying cutting oil when cutting threads in steel. Fig. 18 pictures the second groove of a multiple thread being cut. When cutting a thread, after the tool has been properly set as in Fig. 23, A and B, the point of the tool is brought in contact with the work piece, Fig. 24, by adjusting the cross-slide. Check the setting of the micrometer collar. The tool is then backed off and the carriage moved until the tool point is just beyond the right-hand end of the work. The cross-slide is advanced to the same micrometer reading as when the tool point touched the work, and then with the compound feed the tool is advanced .002 to .003. A trial cut is taken and the pitch measured with the screw-thread gauge. At the end of the first cut the tool is backed

(Continued to page 178)

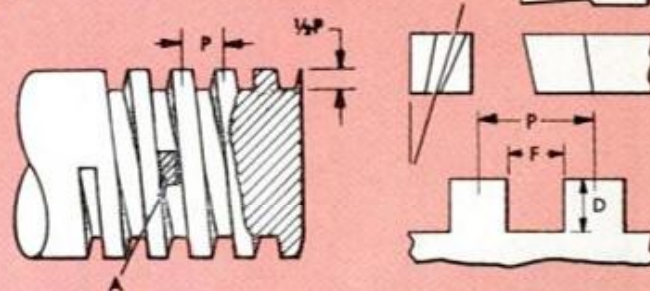


32 TOOL SET AT 90° AND FED STRAIGHT IN

ACME THREAD GAUGE



35 SIDES OF TOOL, A, ARE GROUND AT ANGLE CONFORMING TO HELIX ANGLE OF THREAD, OTHERWISE CLEARANCE WILL BE INSUFFICIENT





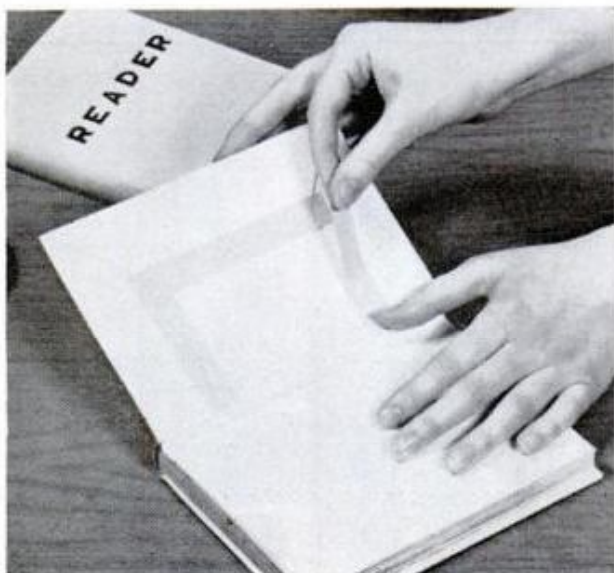
H-O-L-D EVERYTHING

As a holder, fastener or clamp you can't beat masking tape for speed, versatility, convenience



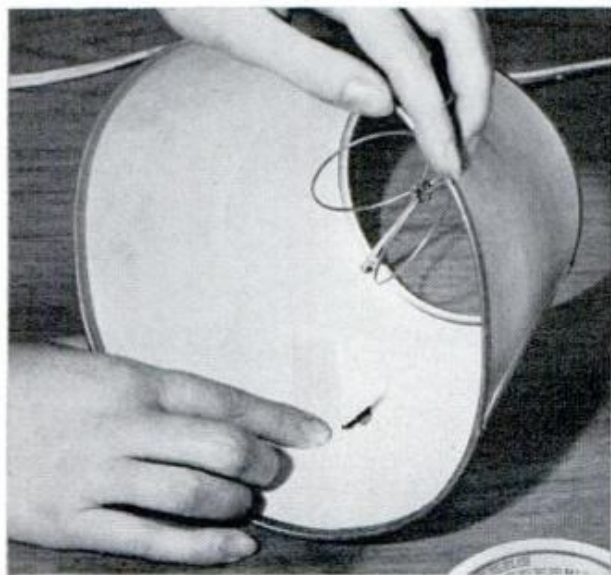
PRIMARY USES of masking tape are protecting adjacent areas when spray-painting, cutting a sharp, clean line at a point where one color is to meet another and for striping and other decorative effects achieved by masking out areas to form a pattern of colors that harmonize. Typical examples are use of skirted masking in auto-body refinishing, straight-line masking in two-color wall painting and when spray-painting doors and paneling in two or more colors

WHEN YOU MOVE there's no need to take things out of the drawers of chests and cabinets having no drawer locks. Just tape the drawers closed as pictured, using at least two strips of tape at each end. Of course, if the drawers are heavily loaded, as the drawers in a cabinet workbench, for example, don't rely on tape alone to hold them in the closed position. Masking tape comes in widths up to 1 in. or more and the wider the strip the greater its holding power

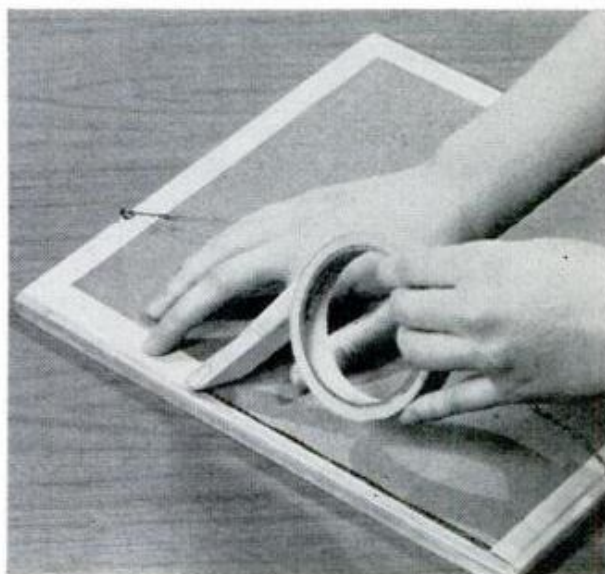


ANY PROTECTIVE BOOK JACKET, large or small, looks neater, lasts longer and offers greater protection to the hard cover of the book if it's taped in place. Just fold the jacket over the top, bottom and side of the book cover and tape in place as pictured. Short pieces of tape make excellent index tabs for a reference book. Just stick one end of a 1-in. length of tape to one side of a page, fold tape back neatly on itself and then stick the other end to opposite side of page

TAPE WOUND in a slow, advancing spiral around a hammer handle makes a good nonslip grip. Wrap several layers of tape in the same way, around the body of a cold chisel or a star chisel. The wrapping of tape softens the "sting" of the hammer blow. Wrappings of tape over the cutting edges of chisels will prevent nicks when storing in a drawer. Likewise a tape wrapping will protect drill bits, auger bits, reamers, router bits, molding cutters and saw teeth



THAT OLD PAPER LAMP SHADE—throw it out, or keep it just for old-times' sake? Don't bother debating the question. There are few lamp shades that are still lamp shades that can't be fixed and made to shine again with judicious use of tape. Patch up holes, tears, replace original tape, spray-paint



TAPE is as much a part of picture framing as the frame. First you put glass in place, then the picture, a filler of cardboard and then—surely you're not reviving that ancient method of driving in tacks or shingle nails to hold the whole thing in place? The picture shows the neat job masking tape makes of it

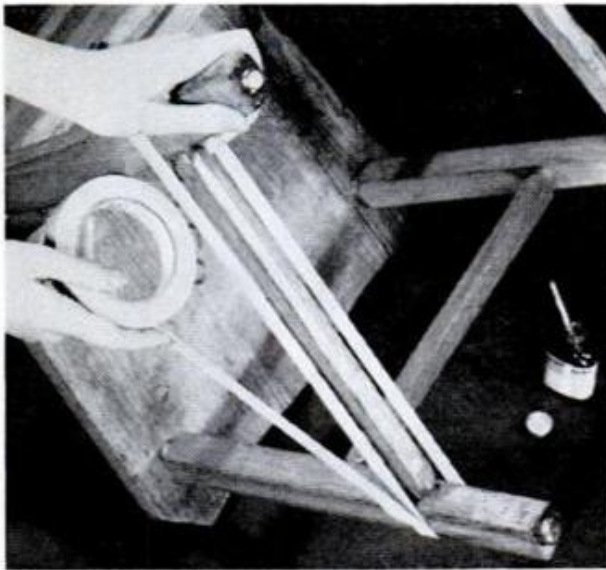
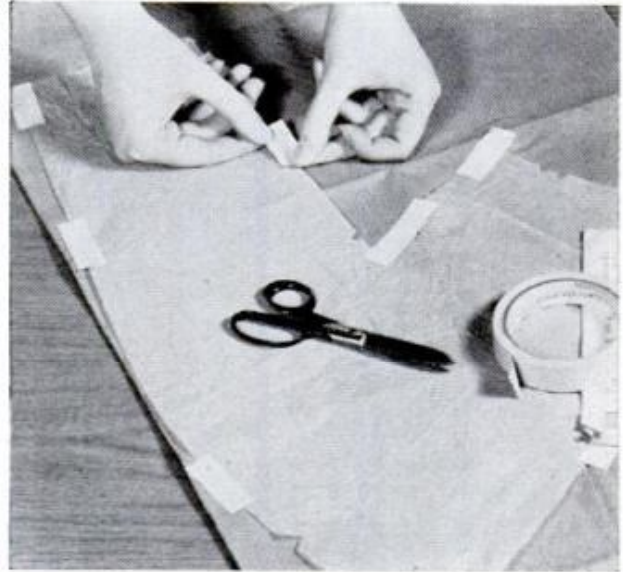


TWO-TONE leather shoes pose a problem—how to brighten the white leather without getting the whitener on the black or tan leather. It's simple; mask off one or the other and proceed just as you would with a two-color paint job. Apply the tape to one leather color, apply the whitener or the polish to whichever is the unmasked area. Let it dry and strip the tape off; then, using the same pieces of tape, apply to the finished area to protect it from finish to be applied



◀ **OOPS! THIS DOLL** is a plaster-cast case—unless you can find the tape—but quick! before the pieces get lost. One minute, or maybe two, to fit the fracture back together, another minute to wrap with tape and little Miss Moppet has her doll back again as good as ever—well, almost as good. And that goes for other toys, too, for you'll be surprised what tape can do in repairing toy wear and tear. When making a repair, always wrap tape as tightly as possible

▶ **YOU DON'T** think of tape in the sewing room but it has its place there, too. Those tissue patterns that almost literally float about the room—stick 'em down on the fabric with masking tape and you can keep things under control with only two hands, maybe less

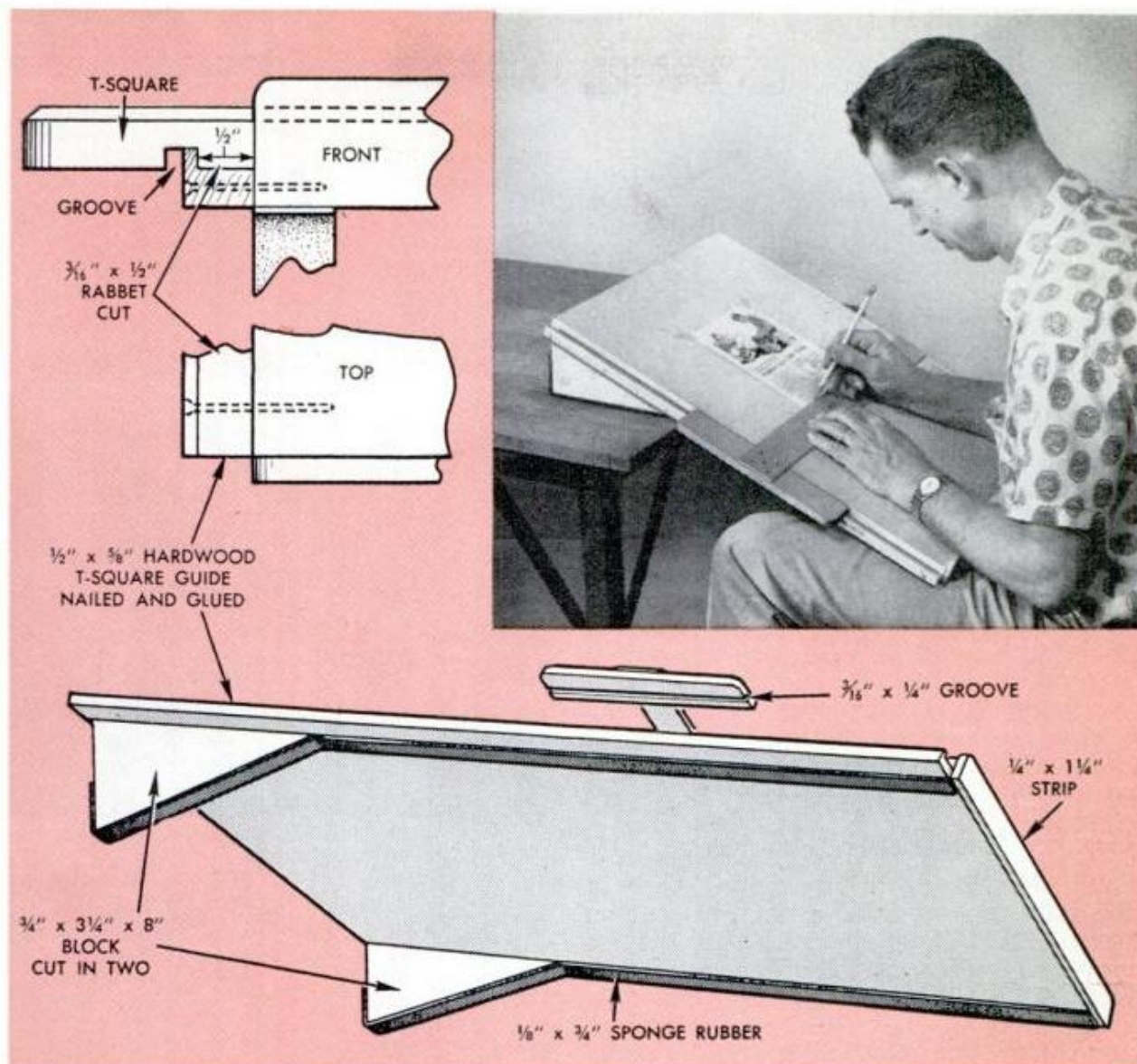


◀ **TAPE AS A CLAMP?** Yes, with limitations. You have a valued old chair with a spindle, or "spooling" (that's what they used to call turnings) loose. Force joints partly open, squirt in glue and then clamp with wrappings of masking tape. Try it, you'll find it works

▶ **FINALLY, THOSE LABELS.** Ever try to remember what you put in a jar a year or so ago? Maybe you can be sure by looking at contents seen through the glass, and then again, maybe you can't. And what a disaster if you should hurriedly open a jar of what you thought were raspberry preserves and it turned out to be left-over red paint somebody had squirreled away. Make certain with a label. Letter contents on tape, stick on jar and you'll know for sure



Lap Board for Shop Draftsman Has T-Square Guide



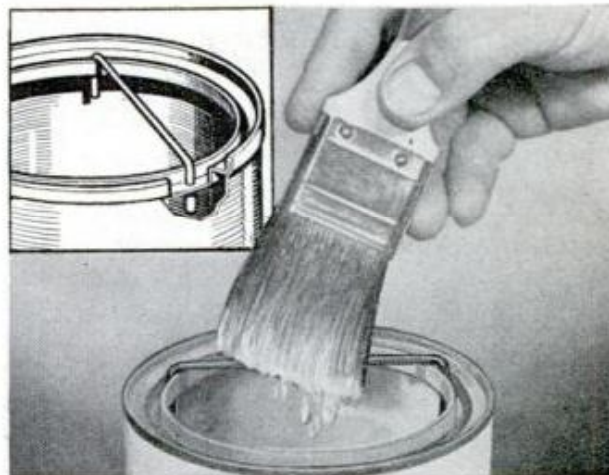
Any standard drawing board in the smaller sizes can be fitted with two non-slip triangular feet and a T-square guide and used as a lap board as pictured. Note that the wood T-square head is grooved lengthwise $1/4 \times 3/16$ in. to drop into a

rabbeted strip attached to the long edge of the drawing board with nails and glue. A wood block of the dimensions given is cut diagonally and the pieces glued and nailed to the underside of the board at the forward end.—Arthur W. Arnemann

Strike Wire Saves Paint

Excess paint on a brush rarely goes where you want it. It spatters, runs down your wrist or drops on the floor. You count it wasted and wipe it up. Install a strike wire on the can and you may save enough paint to cover a square foot or more. Punch two holes through the metal at the bottom of the groove in the rim of the can. Cut a length of coat-hanger wire, bend the ends at right angles and press into the holes as detailed. Then each time you dip the brush, stroke it lightly over the wire to remove excess paint.

—Bil Toman



FOR THE MACHINIST

Plug Mandrel

Distortion is the main problem in chucking and machining thin-walled tubing. Pipe centers won't always do it, but a rubber plug with an expander bolt turns the trick nicely as it exerts equal pressure in all directions from a center. Turn the plug from machining rubber, center-drill it and provide a machine bolt, two washers and a knurled nut. Slip the tubing over the rubber mandrel, draw the nut finger-tight and chuck the job in the regular way.

—H. J. Gerber

Marked Chuck

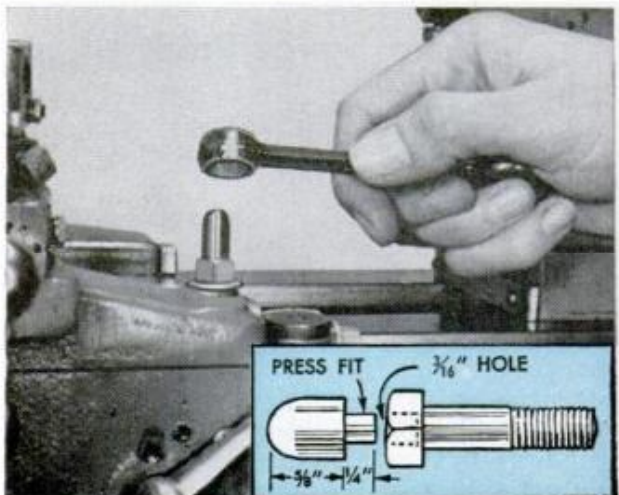
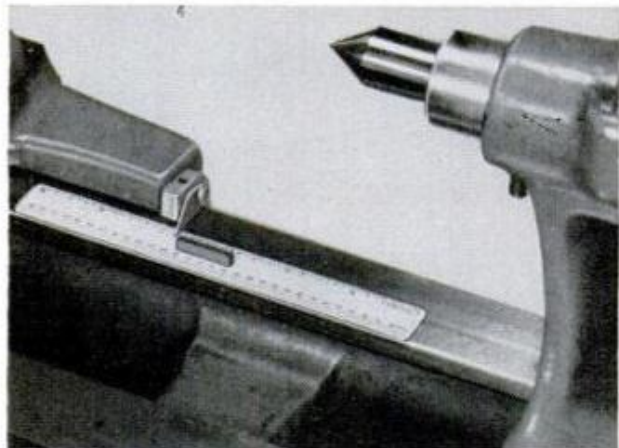
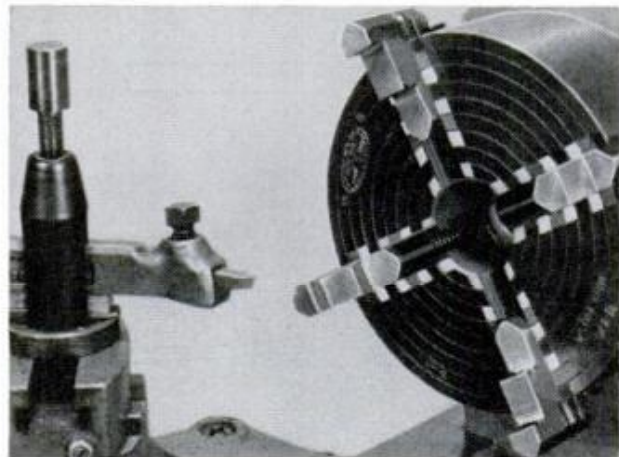
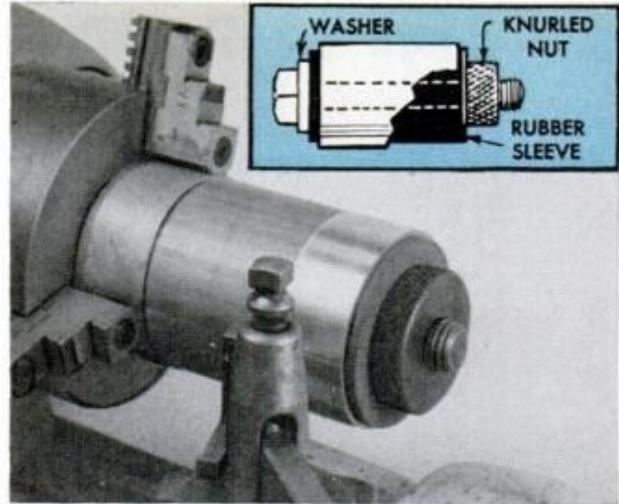
Dead centering work in a four-jaw chuck is a matter of cut-and-try, counting the grooves in the chuck face, and, a certain sixth sense. If you've wished for a faster way, try this: Paint blocks of alternate colors, say, red and white, on each side of the jaw grooves, each color block square and covering a space between two grooves as pictured. You can also use three colors if you wish. The color blocks aid in making a close preliminary setting and make it easier to center the work after placing in the chuck.

Go by the Rule

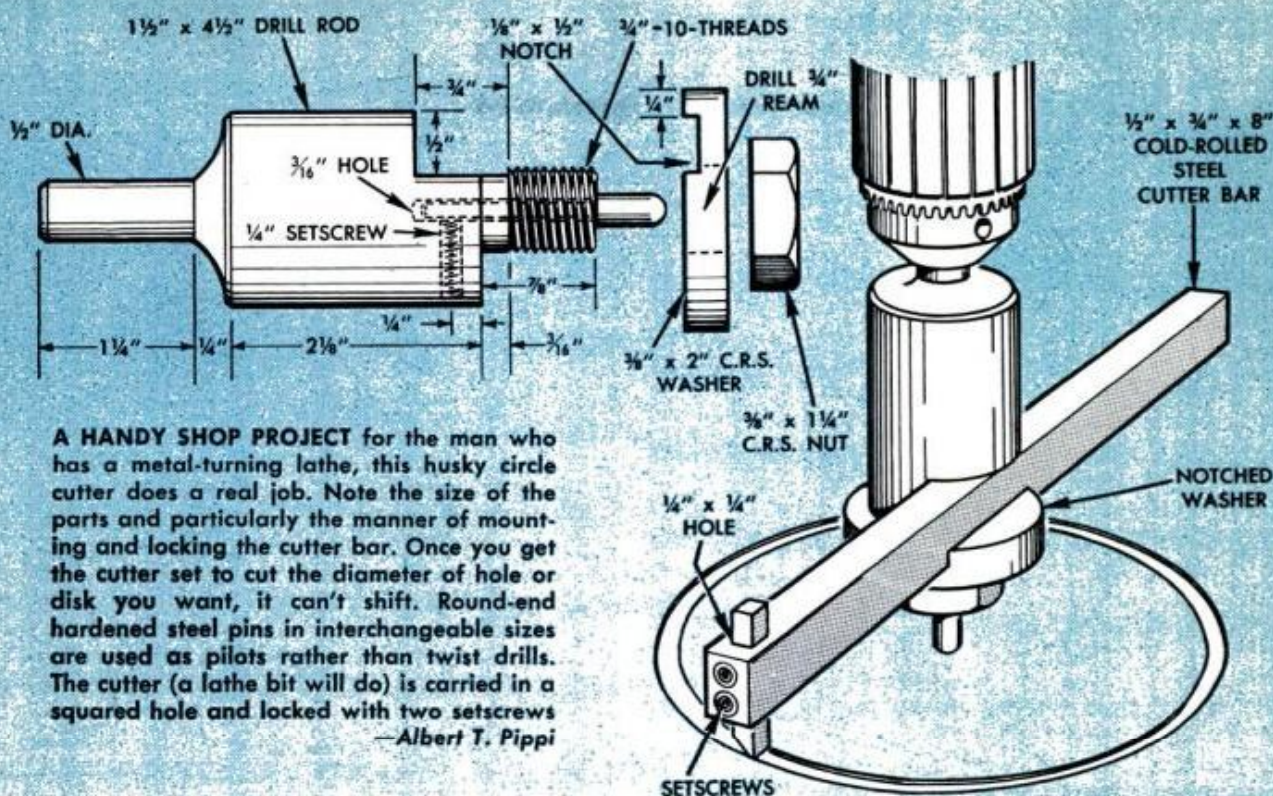
When boring or making shoulder cuts in the lathe an accurate means of keeping track of the exact distance the carriage moves can save time and avoid possible rejects. A machinist's rule, or any 6-in. scale, attached to the lathe bed and zeroed at any convenient point will ordinarily serve the purpose with sufficient accuracy. A pointer attached to the end of the carriage slide as pictured completes the setup. To avoid the necessity of drilling and tapping the lathe bed, you can hold the rule in place with a permanent magnet.

Where's That Wrench?

Every machinist has spent time searching for that lathe tool-post wrench that gets itself lost so easily and so frequently. One handy place to park it is the head of the carriage clamp screw, but even that takes an extra close look or two to make sure the box end of the wrench is slipped safely over the head of the screw. Otherwise it drops down into the oil pan or onto the floor and you're hunting for it again. One old-timer in the shop went to the trouble of drilling the head of the clamp screw and inserting a round-end pin that would just take the box end of the wrench. Not a bad idea!



This Circle Cutter Is Built to Take It



Soldering Jig

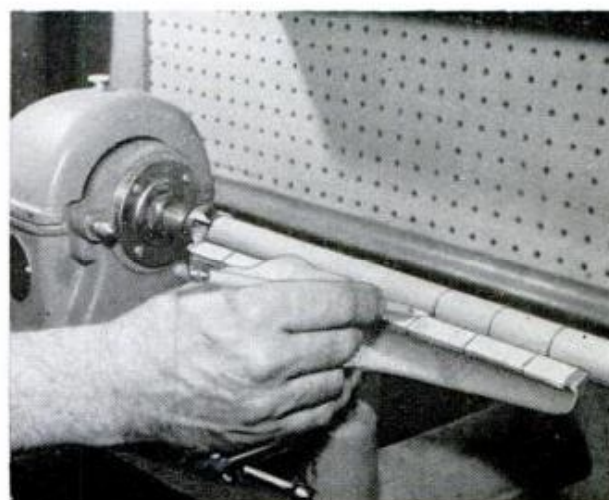
You may know of a dozen ways to solder a wire splice, but have you thought of this one? Soldering a splice anywhere outside an outlet box calls for that phantom third hand, which in this case is supplied by the coffee can with the notched rim. Just twist the splice tight, press the connected wires into the notches with the splice near the center of the can and you can go to work on it with either a soldering gun as pictured, or an electric soldering iron, flux and wire solder. Notches in the rim of the can hold the wire rigid so that you can bear down with the gun or an iron.

—William B. Egan

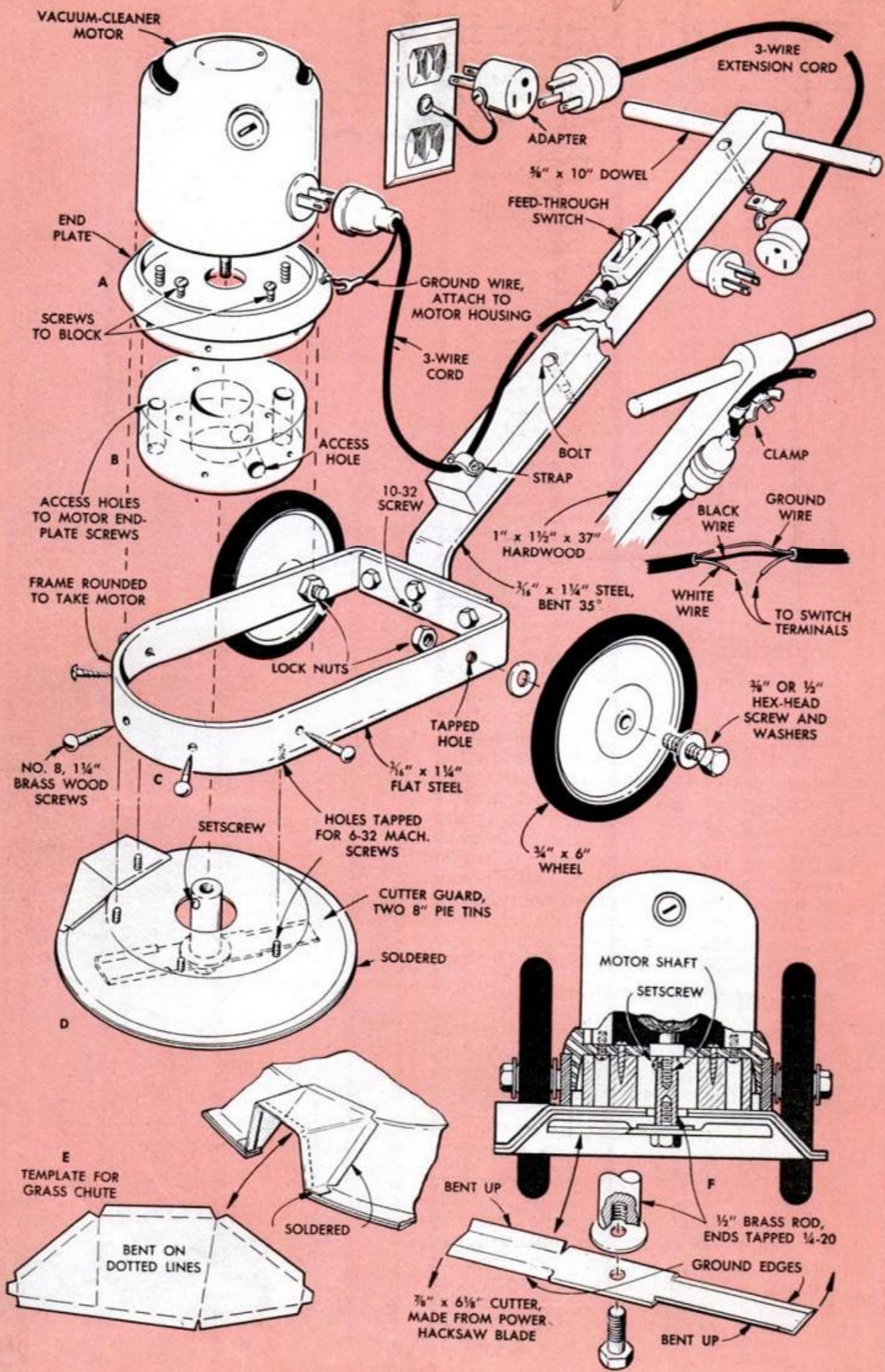


Lay Off

When you have need to lay off duplicate turnings for equidistant cuts such as beads, Vees or concaves, stick a piece of tape to the top of the tool rest, mark on it the spacings required and then proceed to transfer these to the turning as pictured. Run the lathe at slow speed or turn the spindle by hand.—G. E. Hendrickson



A tiny drill bit is easily made simply by snipping a short length from piano wire or drill rod and chucking in a pin vise. The cutting end should either be nipped at an angle or cut to a V-shape to provide cutting action and chip clearance.



VACUUM-CLEANER MOTOR

END PLATE

A

SCREWS TO BLOCK

B

ACCESS HOLES TO MOTOR END-PLATE SCREWS

FRAME ROUNDED TO TAKE MOTOR

D

E
TEMPLATE FOR GRASS CHUTE

BENT ON DOTTED LINES

SOLDERED

$\frac{7}{8}$ " x $6\frac{1}{2}$ " CUTTER, MADE FROM POWER HACKSAW BLADE

BENT UP



ADAPTER

$\frac{3}{8}$ " x 10" DOWEL

FEED-THROUGH SWITCH

GROUND WIRE, ATTACH TO MOTOR HOUSING

3-WIRE CORD

BOLT

STRAP

1" x $1\frac{1}{2}$ " x 37" HARDWOOD

$\frac{3}{16}$ " x $1\frac{1}{4}$ " STEEL, BENT 35°

BLACK WIRE

GROUND WIRE

WHITE WIRE

TO SWITCH TERMINALS

$\frac{3}{8}$ " OR $\frac{1}{2}$ " HEX-HEAD SCREW AND WASHERS

$\frac{3}{4}$ " x 6" WHEEL

MOTOR SHAFT

SETSCREW

$\frac{1}{2}$ " BRASS ROD, ENDS TAPPED $\frac{1}{4}$ -20

GROUND EDGES

BENT UP

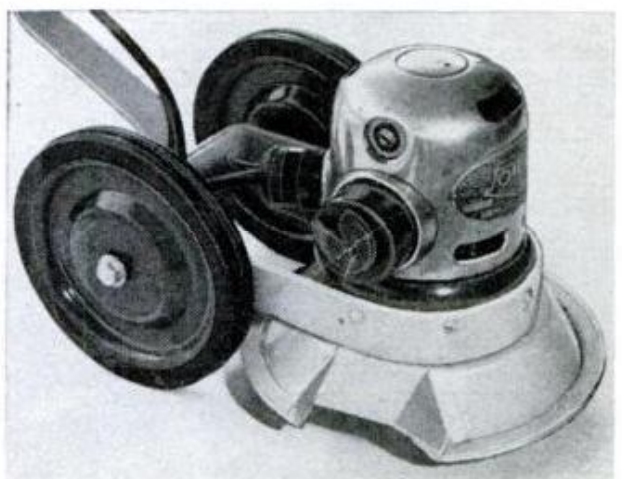
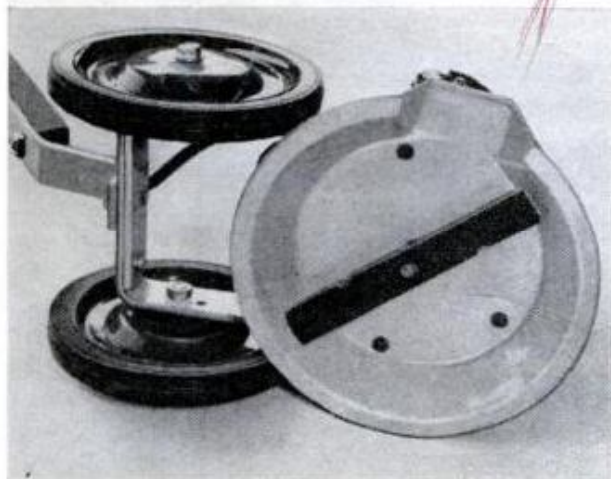
ELECTRIC LAWN EDGER

Works under shrub overhangs without clipping a leaf, edges along flower beds and walks where lawn mower won't reach

By E. R. Haan

AN OLD vacuum-cleaner motor of the type designed to be flange-mounted in an upright position, a pair of garden-cart wheels, a couple of pie tins, a power hack saw blade and a few other odds and ends assemble into this handy lawn edger. As you see from the pictures and details, it's simply a pint-sized rotary mower. Details A to F inclusive show how this one was built and even though your motor may differ slightly, you can still follow through with the general assembly of parts.

In the original the flanged, motor end plate, A, is screwed to the wood disk, B, which in turn is screw-fastened to the semicircular end of the frame C. This provides a base for the pie-tin guard, D. The size of the template for the grass chute, E, is determined by shaping foil over the opening cut in the pie-tin guard. Using the shaped foil as a pattern cut a template from thin sheet metal and use this to lay off the shape on the sheet metal from which the chute is to be cut. Solder the formed chute over the opening in the cutter guard. The cutter is made from a section of hacksaw blade with trailing edges bent up as in detail F. The cutter is screwed to the end of a shaft extension which turns onto the threaded end of the motor shaft, to which the extension is setscrewed. To drive the unit, use a three-wire cord and be sure it is grounded all the way from the motor back to the outlet as indicated.





Coming Up Next . . .

PAD SANDER. Nothing beats a pad sander for that final fine sanding before finishing. You build this one yourself, using an old vacuum-cleaner motor and a few other odds and ends. Sander is speed-controlled by resistors in series with the motor. It's PM's shop feature for August.

THE PM 35. It'll do 35 m.p.h. and it was built in 35 hours for \$35. Nothing fancy about it; it's all boat—a neat, streamlined outboard run about 13 ft.-9in. in over-all length, with a 6-ft. beam and weight of 200 lb., less windshield and steering gear. Seats two persons. Details in August PM.

TURN-AROUND WATER SKIS. After riding slalom on a single ski, water skiers usually are ready for greater things—such as skiing sideward, backward and round-and-round on those banana-style skis which turn up at both ends and have no keels or fins. August PM tells how to make 'em.

OUT WITH THAT STUMP. You had the tree removed but what about the stump? You have three choices of method for getting rid of it for good—dig it out, pull it out, burn it out. The latter method is simplest. But, you say it won't burn. Oh yes it will! August PM tells you how to burn out stumps safely.

TIRE CARE. When you're buzzing along at expressway speeds it's hard to visualize the beating your tires take. And when you brake hard in an emergency or out of habit—the brakes lock the wheels but it's the tires that stop the car. An article in August PM outlines simple steps in tire care that can add safety and mileage.



Straight Cut

When it's necessary to make a straight, square cut with a handsaw, such as when fitting a door, clamp a 2 x 4 along the cutting line. Start the cut at the edge and then place a short length of 2 x 4 against the blade as illustrated, holding it lightly in this position as you saw across the width of the door.—Robert L. Sargisson

New Twist

To set this marking gauge for desired marking distance you give the bar, or beam, a slight twist. It locks solidly by a camming, or wedging, action in the opening in the hexagonal guide block. The shape of the beam is shown in the shaded sectional view. The opening in the block is the same shape, only it is slightly larger to permit the beam to slide freely.—Ernest Evans

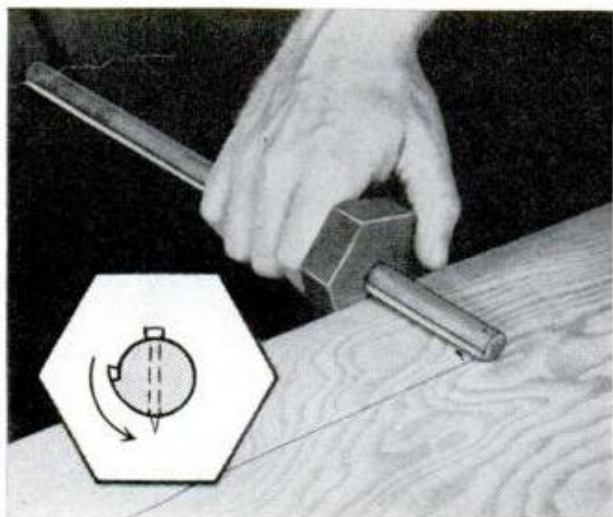
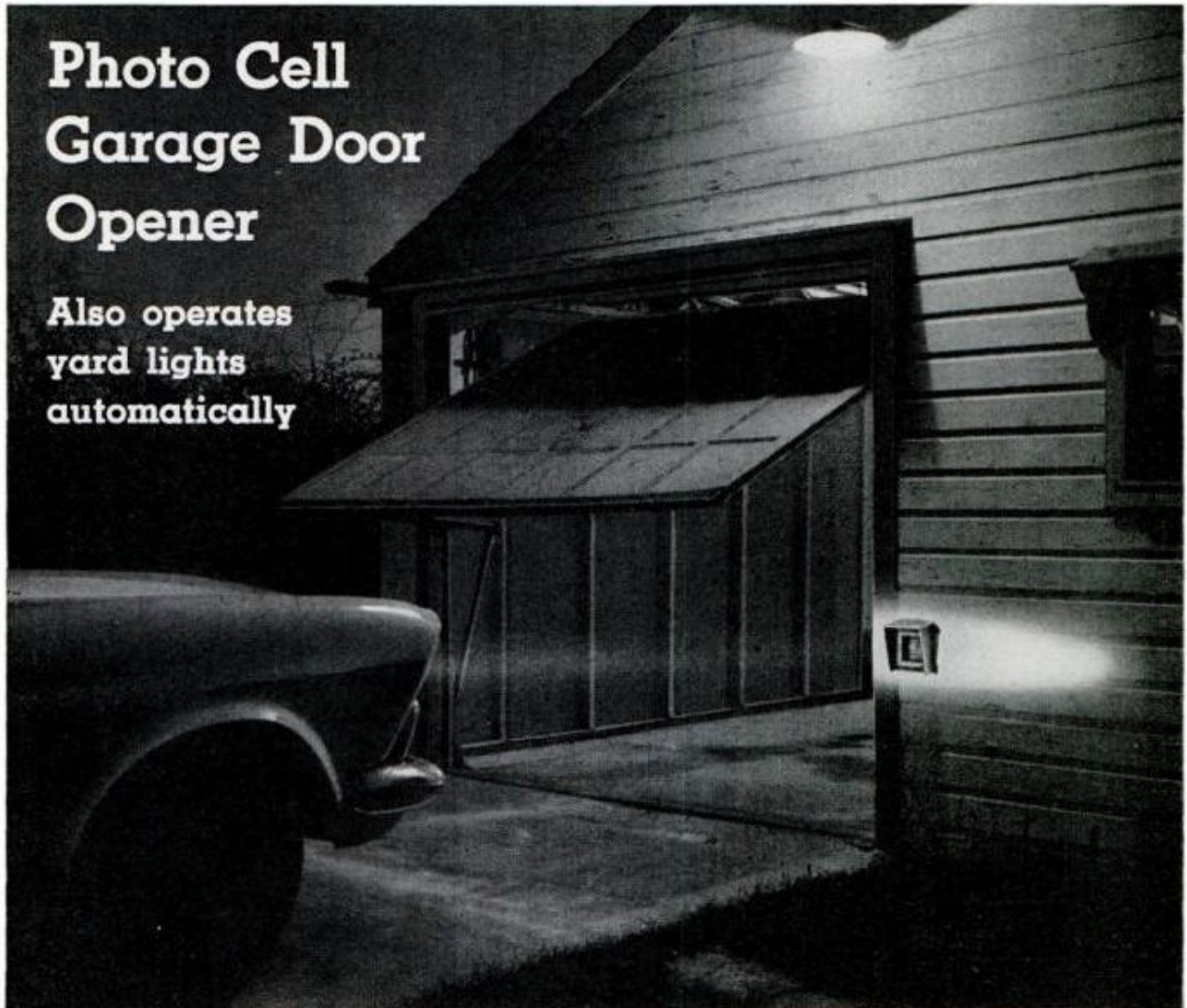


Photo Cell Garage Door Opener

Also operates
yard lights
automatically



FLICK your headlights to high beam and they activate the photo cell that opens the garage door for you

THERE'S A pounding rain outside. You pull the car into the driveway, make a run for the garage door and get soaked while you wrestle the door open. Then, with the car safely inside the garage, you dash for the house. Oops! Didn't see the kids' plastic pool in the dark, did you? Oh well, you were wet anyway.

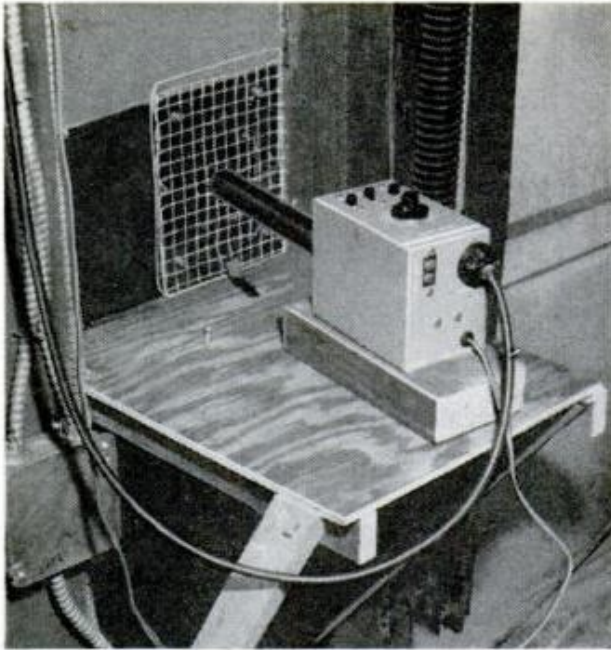
You can avoid such soakings if you install this photo cell garage door opener. The photo cell control kit costs \$12.95 (Lafayette Radio, KT-133A) and the garage door opener motor, rails and switches are available for \$69.95 (Heathkit #GDA-20-3). But some ingenious chaps have even adapted old washing machine motors to open garage doors.

Your car's high-beam headlights trigger the circuit which opens the garage door, then the opening of the door turns on both

garage and yard lights. The motor-rail-control circuit kit also includes a delay circuit which shuts off garage light when door closes but keeps yard light on long enough for you to make it to the house without tripping over something in the dark.

Photo cell door openers have an advantage over radio controlled types, which can be activated inadvertently by nearby ham operators or other radio controlled garage door installations. The result? A garage left wide open to the weather or, should you happen to leave your convertible halfway in or out of the garage, a good start on a two-part car.

When mounting the photo cell, place it at a level slightly higher than your car's low beams. Mark the area to be cut out in the garage with a pencil, and check it against your headlights at night. When the place-



BLACK TUBE (above) curtains ambient light. (Below) limit switches are installed on guide rails of door



ment is correct, cut the aperture and form a light shield to prevent ambient sunlight from operating the unit.

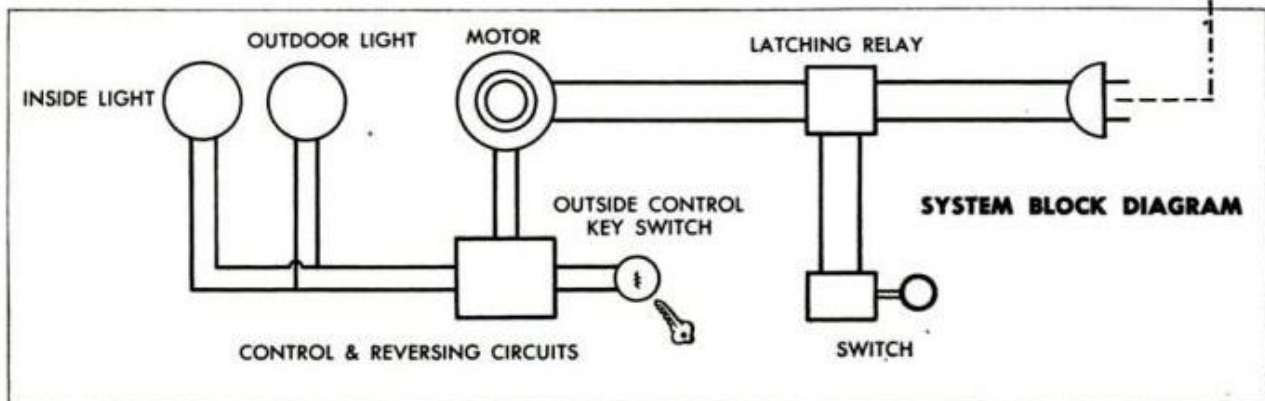
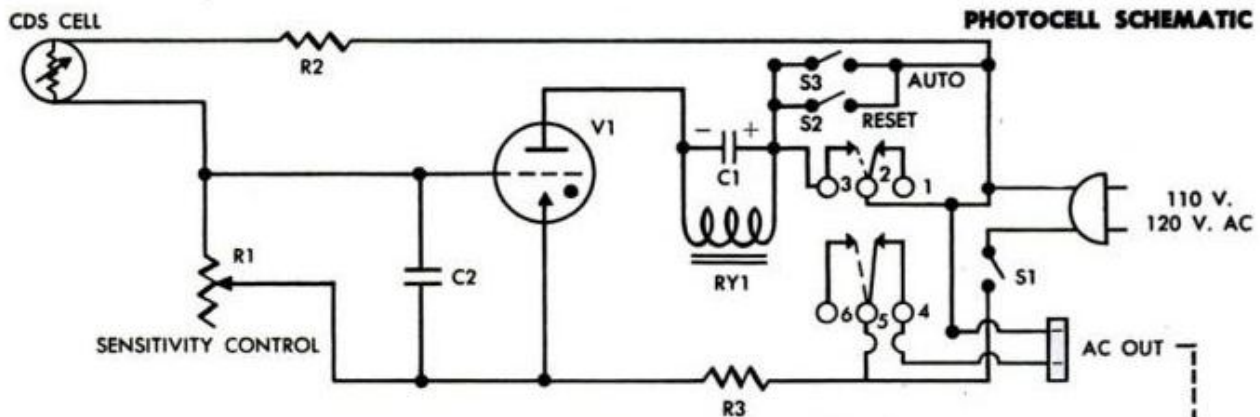
Place a cardboard tube between the photo cell and the aperture to better direct the light, and use some screening to keep children from poking into the unit. Follow the diagram for the photo cell circuit, or you can obtain this in kit form from the distributor. Instructions for installing the motor, rails and switches come with the kit of these parts.

A top limit switch turns off the motor when the door is fully raised. By the use of a compound thermal delay switch here, the garage light is turned off when the door closes, but the yard light stays on long enough for you to make it to the house.

PARTS LIST

- V1—5823 tube
- CDS—Clairex CL-3 photo cell
- R1—5 megohm potentiometer
- R2—150K, 1/2 watt
- R3—125 ohm, 5 watt
- C1—8 mfd, 250-volt electrolytic
- C2—270 mmfd
- RY1—DPDT 115-v. a.c. coil
- S1—SPST slide switch
- S2—SPST slide switch
- S3—SPST slide switch, spring return

All above available as a unit (Lafayette Radio Kit #KT-133A) from Lafayette Radio Co., 165-08 Liberty Ave., Jamaica, N. Y.



TV HI-FI Audio Coupler

IT'S A SHAME to forego the enjoyment of listening to your hi-fi speaker reception when you watch TV. You can bypass the small speaker in the TV set and couple directly into your hi-fi speaker by making the simple modification shown in the lower right diagram (Fig. 3). To use the amplifier in your hi-fi system as well, the transistorized coupler shown below in Fig. 2 will provide a good match for the system. As you can see in Fig. 1 it bypasses both the audio amplifier and speaker in your TV set and uses the extra high-level input on your amplifier. This works out very well on live or taped shows. But don't expect radical improvements when watching old grade B movies!

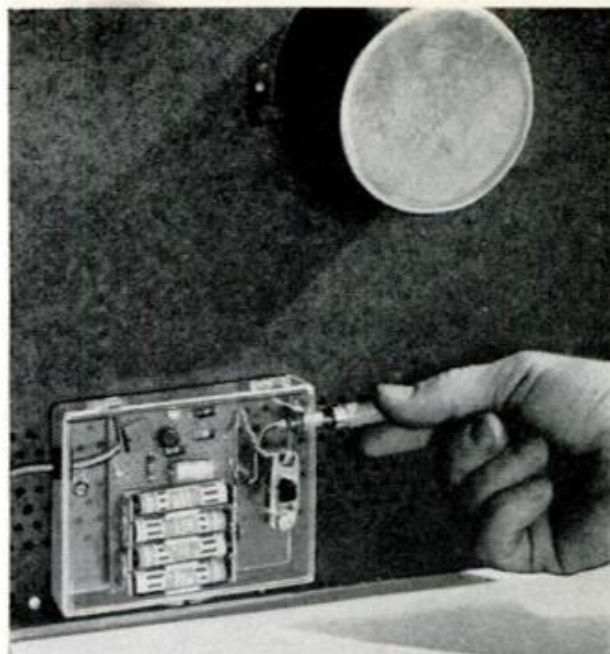
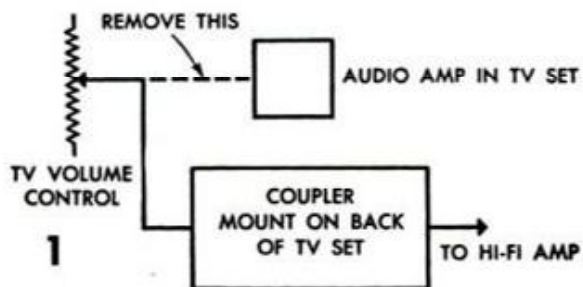


PHOTO ABOVE SHOWS PARTS PLACEMENT. Cable goes to hi-fi amplifier low-level input. Bolt to TV set



PARTS LIST

- R4—1K, 1/2-watt carbon resistor, 10% tolerance
- R3—3.3K, 1/2-watt carbon resistor, 10% tolerance
- R2—330K, 1/2-watt carbon resistor, 10% tolerance
- R1—470K, 1/2-watt carbon resistor, 10% tolerance
- C1—.1 mfd., 600-v. miniature capacitor (Lafayette C-615)
- C2—20 mfd., 25-v. miniature electrolytic capacitor (Sprague TE-1206 Littl-Lytic)
- Q1—2N508 transistor (GE)
- B—4 1.5-volt pen-lite cells series connected (Allied Radio Co. #78J243)
- S—Switch (Allied Radio Co. #34B968). Battery holder (Lafayette MS-170)
- 1—7/16" x 3 3/8" perforated Bakelite board (Lafayette MS-304)

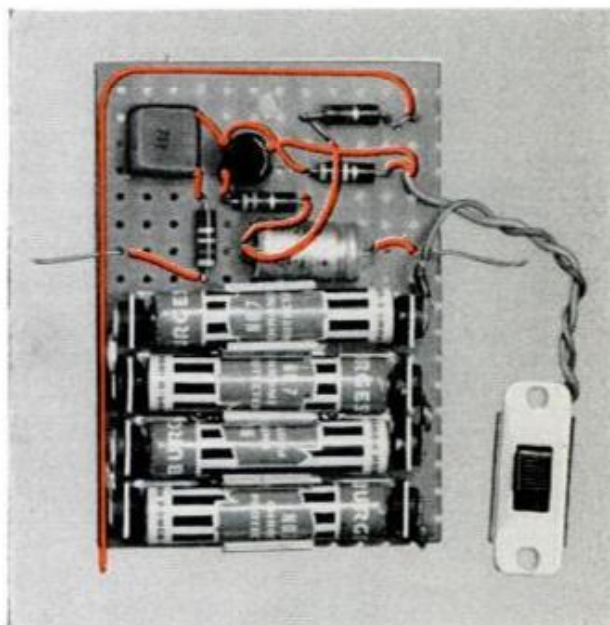
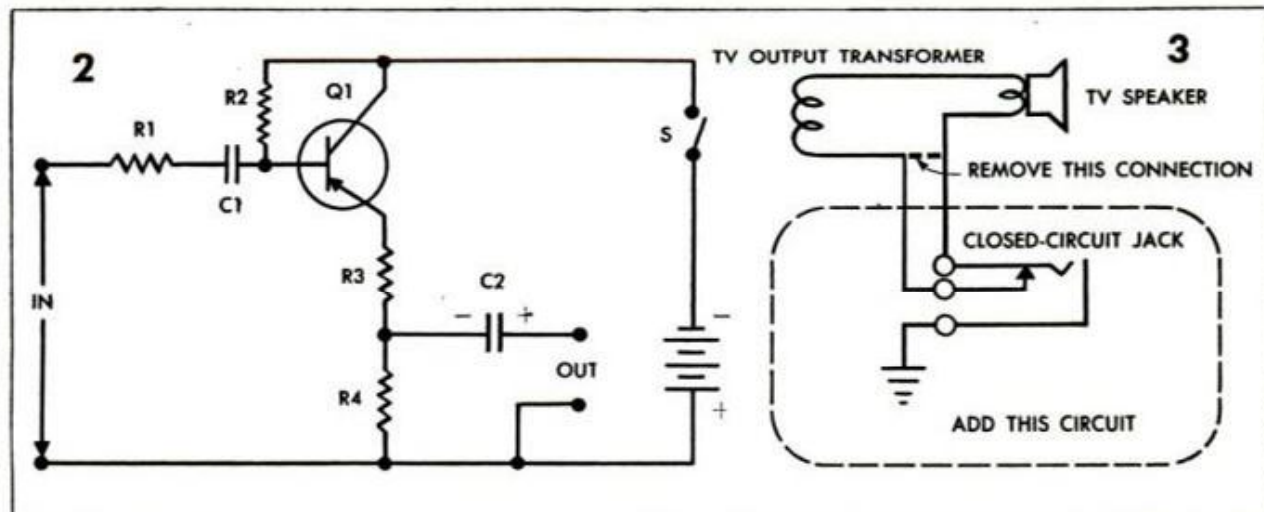
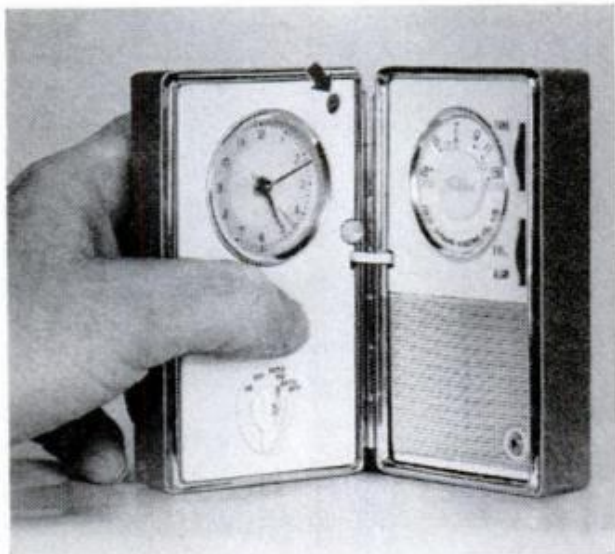


DIAGRAM ABOVE DETAILS WIRING. Wiring in color is on reverse side of board. Mount unit in plastic box



Electronically New ...



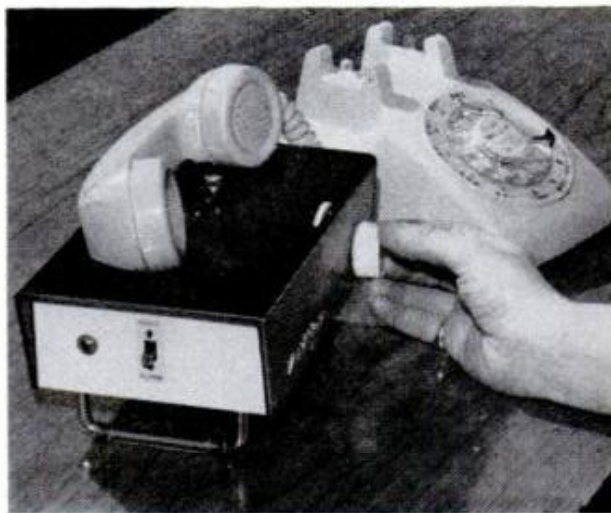
PORTABLE CLOCK RADIO also serves as alarm. Button under thumb causes light (arrow) to illuminate clock or radio dial. Earphone jack provides quiet listening. Six-transistor circuit has push-pull output. Comes in tan or blue case. Toshiba Model 6TC-485. Clock radio is priced at \$59.95 from Transistor World Corporation, 52 Broadway, New York City 4, N. Y.

WIRED TRANSISTOR 1200 INTERCOM is a two-station set for the home or farm which provides distortion-free two-way communication. Two-wire cable included extends one mile. Operates from single low-cost battery, has built-in buzzer for signaling. Comes with 9-volt battery, cable. \$19.50 from P. A. Brown, Dept. MC-1, 54 Ruxton Rd., Great Neck, L. I., N. Y.



QUIET STEREO is provided by these hi-fi stereo earphones, similar to those used by astronauts. Impedance of 16 ohms and flat response is provided over full audio range. Plug can be wired for stereo or mono operation. Phones adjust vertically, axially. \$37.50, Roanwell Corp., 180 Varick St., New York 14

170



COMBO TELEPHONE AMP and radio provides hands-free telephoning simply by resting phone on cradle-top. When not in use as telephone amplifier, the unit serves as four-transistor AM radio. Automatically switches to amplifier when phone is in place. \$32.95 from H and N, 6452 Lankershim, N. Hollywood, Calif.

POPULAR MECHANICS



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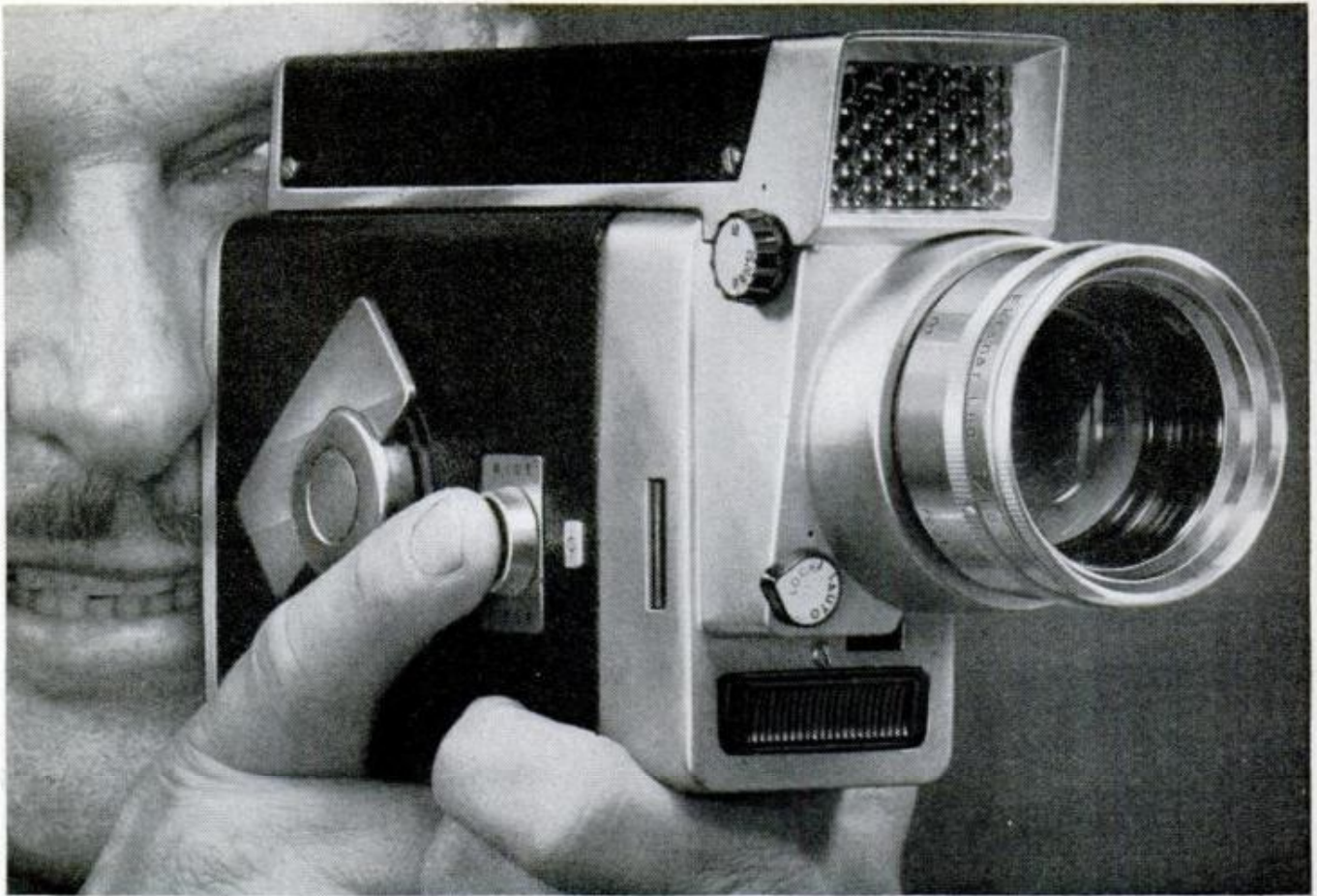
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New KODAK Zoom 8 Reflex Camera, Model 2

Zooms you right into the

New Kodak focusing zoom lens keeps every zoom shot in razor-sharp focus from wide-angle to telephoto close-up.

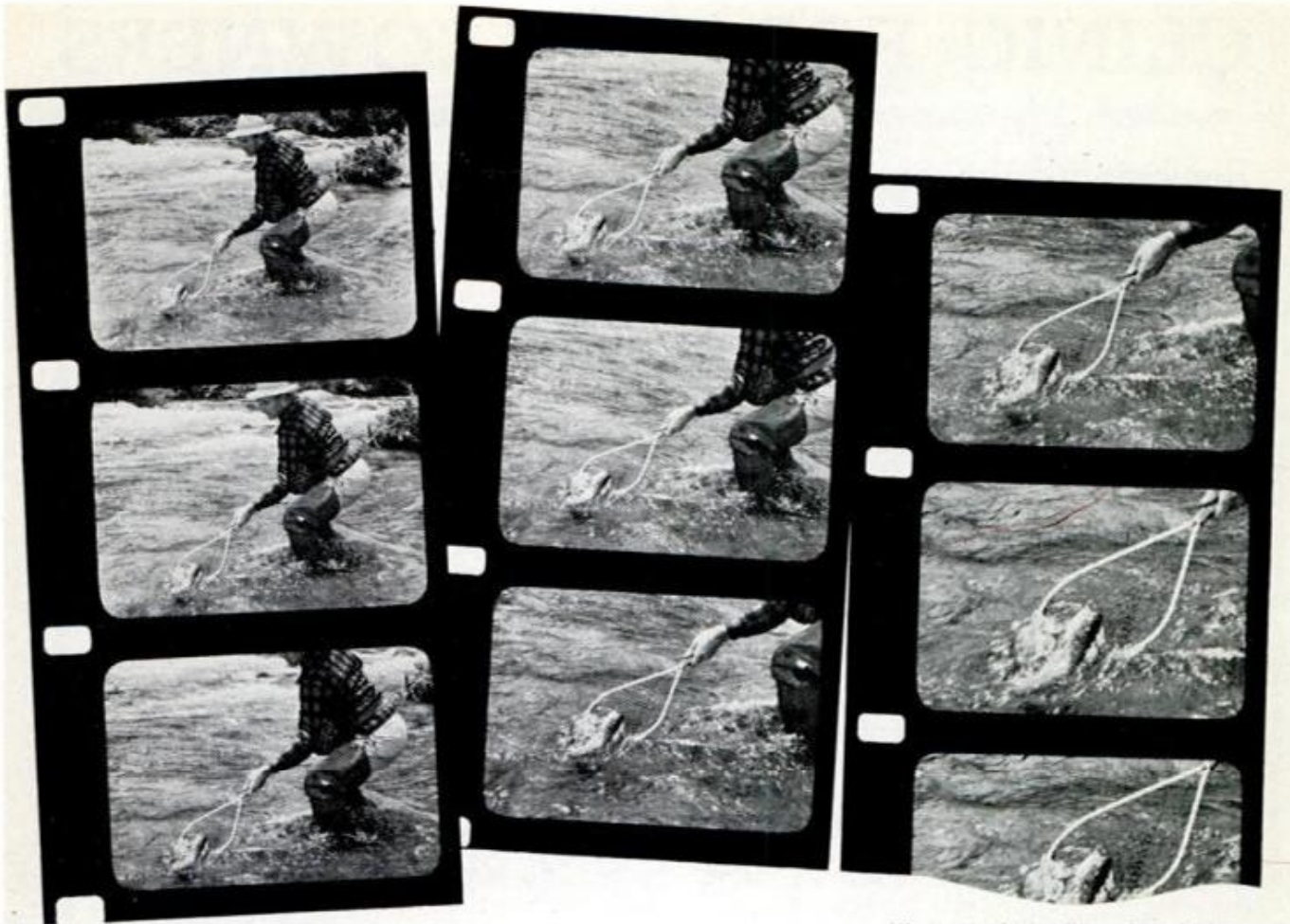
You can be in two places at once with this camera. Want to close in on that battle? Press the zoom button—and in you go, automatically. You see the action looming up right in the reflex viewfinder . . . big and sharp . . . just as you'll see it on your screen.

You'll take exciting, action-filled 8mm movies with the KODAK Zoom 8 Reflex Camera, Model 2. Sports movies, family movies, indoor movies. KODAK EKTANAR $f/1.6$ Zoom Lens focuses from 4 feet to the horizon to keep the action crisp, sharp. And you're fully in control. Just push the button down—you zoom from wide-angle to tele-

photo close-up. Push up—you zoom back. And you can stop anywhere in between. A manual control also lets you zoom fast or slow, lets you pre-set the lens anywhere from wide-angle to telephoto.

Electric eye sets lens, adjusts exposure continuously to the light, indoors and out, even warns when light's too dim . . . a rare circumstance with this camera's big $f/1.6$ lens and new, faster KODACHROME II Film. A special control also lets you lock the lens at any setting to shoot special effects.

Start getting the action around you on *film!* Ask your Kodak dealer to demonstrate the KODAK Zoom 8 Reflex Camera, Model 2, and see how exciting movie-making can be! Less than \$215. Or as little as \$22 down at most dealers'!

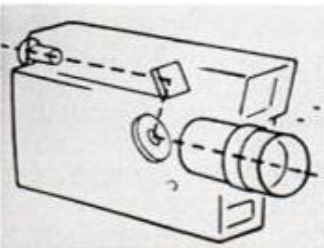


All on a single film wind! Wide-angle to telephoto close-up! And all done automatically . . . with the KODAK Zoom 8 Reflex Camera's powered zoom button!

splash of a trout battle!



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CLINIC FOR HOMEOWNERS

Replacing a Broken Sidewalk

Q—The sidewalk leading to our back door is laid next to the wall of the house. It's broken in several places and tips inward toward the wall for the entire length. Instead of repairing this walk, could I use it as a foundation or fill and pour a new walk right over it?—L.L., Neb.

A—Obviously, the original walk has settled and broken up due to a lack of adequate support, so we wouldn't advise using this as a foundation for a new walk. Quite likely, the old walk was laid over freshly graded earth without allowing sufficient time for settling. We would suggest that you break up the old walk and remove it entirely. Then excavate for a gravel fill about 5 in. deep and tamp it down firmly. Pour a new walk in wooden forms, striking off the concrete to a depth of at least 3 in. As soon as the mixture sets, cover with burlap or earth and wet down with a hose at frequent intervals for a week or more. This frequent moistening will allow the concrete to cure slowly, resulting in a strong, lasting walk.

Reseeding a Mossy Terrace

Q—Our lot slopes and is terraced at the lower edge. This terrace is covered with moss which has choked out most of the grass. My father used to say that moss grows best where the soil is poor. Is this true, and if so, how do I get rid of the moss?—R.W., Ind.

A—It's true that moss often takes over when the available plant food is depleted to the point where the soil no longer will support a vigorous sod. Moss usually grows only in poorly drained soils, particularly on north slopes, and it thrives in the shade. In order to get rid of this intruder, you'll have to rework the soil to a depth of 4 to 6 in. Once it's thoroughly aerated, work in humus (compost or peat moss), add a complete fertilizer and rake this into the top 2 in. of loose soil. Soak the slope with a hose and allow the top to dry, then reseed with a suitable mixture of lawn grasses. Rake this seed into the top inch of soil, sprinkle lightly and cover with a mat to prevent the soil from washing down the slope during a heavy rain. Prepared mats for this purpose are available, or you can use straw. To discourage a recurrence of this trouble, trim or thin any trees shading the slope.

Sweating Water Pipes

Q—Our house has a cold-water pipe running across the basement which sweats during the summer. I want to make this part of the basement into a rec room, but can't go ahead with the job until I find some way to stop the constant dripping from this pipe. Can you help me?—B.K., Ill.

A—There are several ways of preventing condensation on pipes carrying cold water. Wrapping the pipe with several thicknesses of newspaper is generally quite effective, but we wouldn't recommend this if the pipe is left exposed. There are several commercial products made especially for this purpose, both heavy wrappings and thick liquids which are painted directly on the pipe. Check with your hardware dealer about these.

Filling Open-Grained Woods

Q—I always have trouble filling the pores of grainy woods such as walnut and oak. When I follow the directions and wipe across the grain, this leaves very little filler in the pores. What am I doing wrong?—J.C., Conn.

A—We think that you're probably either wiping the filler too soon after application or using too much pressure when wiping. The real trick here is mixing the filler to the proper consistency—slightly heavier than thick cream. Apply with a brush, spreading it quickly and uniformly. If the wood is perfectly flat, some finishers "strike off" the surface with a straightedge to remove excess filler. Don't begin wiping until the filler has set, which will require from 5 to 15 min. When all sheen is gone from the surface and it has a flat appearance, rub lightly across the grain with a piece of clean burlap. If it shows a tendency to stick, moisten the cloth with a few drops of turpentine. Continue rubbing with a straight back-and-forth stroke across the grain until all excess filler has been removed. Don't use too much pressure since this will tend to pull the filler out of the pores. Allow 24 to 48 hrs. drying time, then sand lightly with the grain.

As a service to Popular Mechanics readers in solving the hundreds of problems pertaining to a home—inside or out—you are invited to present your problems to The Clinic Editor for his helpful advice. Address your questions to The Clinic Editor, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

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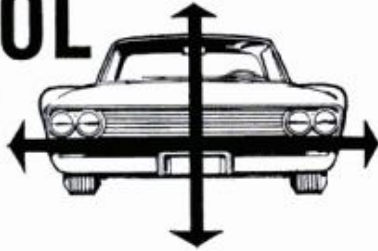
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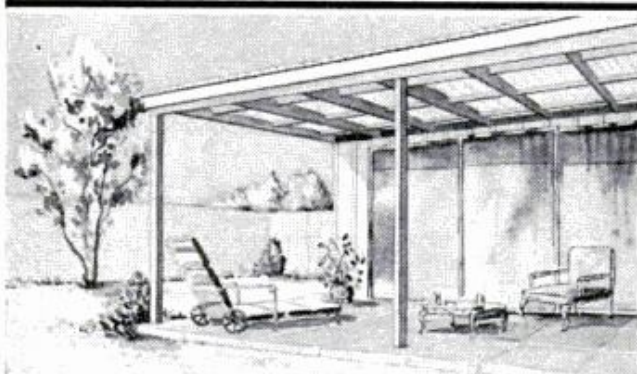
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Improve Your Hobby with Photos

(Continued from page 123)

as provocative as a photo of the horse sign, viewed from the driver's seat.

One Eastern group uses booklets of photos and puzzle-type photo cutouts to guide their rally hounds. Another rally-planner sent out a camera car in advance and shot sequences of all landmarks and turnoffs in the first 12 minutes of the route. Rallyists saw the movie, had to follow the road from memory, and were given a series of snapshot clues for the rest of the all-day drive.

One of the perennial problems of these automotive buffs is getting replacement parts and accessories for their foreign-made cars. "Often the manual does not list a part," one of them explains. "So when this happens, I photograph the part from all angles and mail the pictures with a note to the manufacturer. It works."

One avocation in which photography is an absolute requirement deserves a mention—gliding and soaring. Any distance flight of more than one leg must, to go on record, have picture proof that the pilot achieved the feats he claims. This requirement is called "proof of passage," and is submitted to the French Federation Aeronautique Internationale (FAI), world authority for soaring records and procedures. Here's how it works: An official observer of the flight takes a picture of the pilot, his ship, and a sign stating his objectives. The camera is then sealed with wire strap and lead.

The ship is launched and the pilot, camera in hand, begins his motorless flight over a planned course which must end at the launching site. At each turning point, usually a prominent landmark such as a town, airport or big interchange, he points the camera out the cabin window and shoots. The angle from which he takes the picture shows whether he went around his pylon point, cut the corner, or missed it entirely. At landing, the seal is broken, the film is processed in a continuous strip and is sent to the FAI for final recognition.

Whether the pilot uses a Brownie or a \$3000 military Graflex makes no difference. What is important is the photographic record that the flight was achieved—or failed.

★★★

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Single-Point Thread Cutting

(Continued from page 157)

off with the cross-slide and returned to the starting point. Again the cross-slide is advanced to the proper micrometer collar reading and the tool fed in with the compound to the depth of the next cut, about .002 to .005. The half-nut is again engaged at the proper dial indicator mark and the point of the tool will enter and follow the first thread groove made. The process is repeated until the full-depth thread is cut.

Multiple Threads

Multiple threads have the advantage of fast travel with a fine thread and are used where coarse threads would be impractical. Focusing devices on binoculars and certain instrument parts are examples of where the fast-acting multiple thread is used. The difference between pitch and lead of single, double and triple threads can be seen in the details, Figs. 28, 29 and 30. Pitch is the distance between threads. Lead is the distance a thread advances in one revolution. In a single thread, lead and pitch are the same. Fig. 28 shows the pitch of the single, double and triple threads to be the same while Figs. 29 and 30 illustrate how the lead varies, the double thread having twice the lead of the single thread and the triple thread three times the lead of the single.

Uniform Spacing

In cutting multiple threads, uniform spacing of the thread grooves is a necessity and the spacing, or start of each thread groove, Fig. 33, can be accomplished by using a thread-dial indicator of the type shown in Fig. 19 with 16 divisions for engaging the half-nut with the lead screw. The thread groove of all multiple threads must be uniformly spaced or the pitch will be unequal and the thread form will not be correct. The first thread groove can be started at any point on the work but the additional grooves must be correctly spaced in relation to the first. ★★★

QUOTE:

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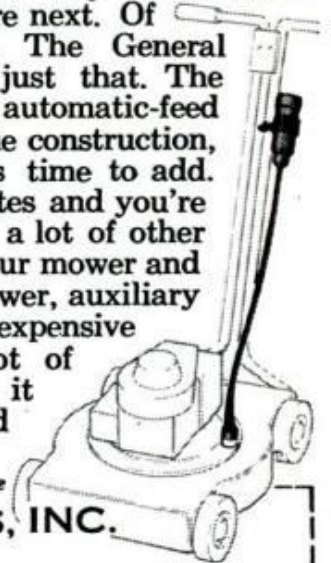
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POPULAR MECHANICS

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Stay Safe in Salt Water

(Continued from page 89)

were attacked by accident, though you do have the happy thought that the 'cuda won't press home his attack—he'll usually spit out whatever he bit off, and leave. The hazard from barracuda attack is loss of blood and the ever-present possibility of luring sharks with blood in the water. Though barracuda are much more numerous than sharks, records show that 'cuda attacks are rare.

MORAY EELS, while they seldom initiate an unprovoked attack on man, must still be rated as dangerous because of the hazard of accidentally provoking one. The moray, which grows to ten feet in length in California waters, lurks in holes and pockets in rocks and coral reefs, from which he darts to grab passing forage fish. Like the barracuda, he can mistake a passing diver's hand for a fish, and the bite is no less painful because it's accidental. He has a mouthful of mean-looking, back-slanted teeth, and the damage is unusually painful, and prone to infection.

Keeping out of trouble with the moray eel is fairly easy; if you don't bother him, chances are he'll leave you alone. Don't poke around in holes in rocks or coral, and don't imitate a baitfish near the reef. You can often spot a moray hole—the edges will be worn smooth, and it's free of underwater vegetation. Don't provoke the moray unless you're equipped and prepared to spear and land him—he's big, strong and dangerous when annoyed, and can climb up a spear shaft to bite the hand that jabbed him.

There are other dangerous marine animals—big fish that are dangerous simply because they're so big, like the grouper and the manta ray, and non-tropical predators like the killer whale, which the average swimmer or diver seldom encounters.

To list all the passively dangerous animals would take a book, and that's already been written. For details on all kinds and types, find a copy of Dr. Bruce W. Halstead's excellent work *Dangerous Marine Animals*, published in 1959 by Cornell Maritime Press of Cambridge, Maryland. Dr. Halstead, a well-known authority on marine biology and Director of the World Life Research Institute, covers marine animals that bite, sting and shock, plus those that are poisonous to eat. If you're planning to spend much time in salt water, it's a good investment.

In the meantime, remember—you're fairly safe in salt water. But don't ask for trouble. ★ ★ ★

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Flight of Airtransit 13

(Continued from page 109)

frequencies. One called his company, the other went to March Rapcon (radar approach control). March received the call when Buck Archer was still 15 miles out, by now down to a melting level and returning to control as the ice peeled away.

"You're cleared immediately south," Rapcon's voice jumped at the pilot of the one airline. "Aircraft unable to maintain altitude five minutes east your position. . ."

Company lines to the center had begun to hum at once. One of the first of these was that of the plane over Ontario. "Tell him to clear the airway to the south and contact Ontario," the Watch Soup growled. "Call me in 10 minutes. Hello, American. . ."

By this time the scopes at Rapcon had picked up Airtransit's pride and grief coming out of the pass, crossing Banning, following its last clearance to Ontario. And, at 6000 feet, a mile below the top of San Gorgonio peak, Buck Archer halted the slide of the craft. When the last of the ice had gone, he maintained his altitude easily. However, getting the bird on the ground was now imperative. Rightly, Buck figured that what had happened to No. 4 could as easily have happened to the No. 3 inboard engine, since both coolers had been worked on. With No. 3 oil quantity gauge inoperative, the only indication of trouble there would be a sudden further rise in oil temperature on the already hot, overworked engine.

With the center dead, unless he could raise somebody else, he would be expected to make good his last ETA (estimated time of arrival) at Los Angeles, start his approach, and hope that he had been wrong about traffic control. However. . .

Ontario VOR was obviously in business. Buck turned up the audio volume and switched to 118.6. "What's your traffic?" was his first question. "I'm holding 6000 and can circle." Maybe once, he added to himself.

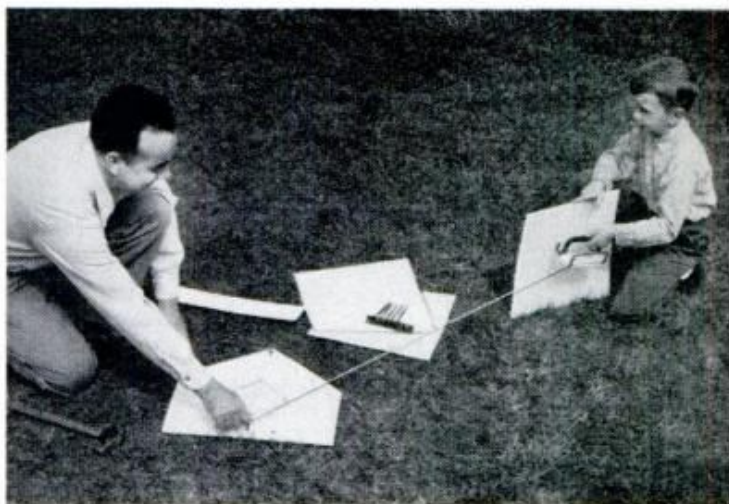
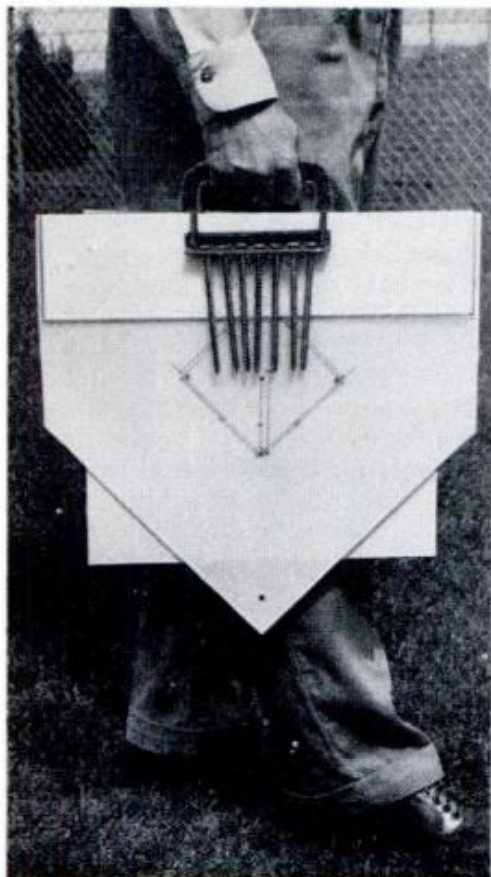
Buck had been in the business long enough to know that he was about to enter the holding pattern for this VOR and that with things as they were planes were almost sure to be stacked there.

"Roger, Airtransit. Stay a little north of V-16 until past Ontario. Advise intentions."

Captain Buck grinned. Now was the time to make the classic comeback that would be repeated in airport coffee shops from coast to coast. But his relief was too great for comedy. Besides, by this time everything was being taped and would go into

(Continued to page 184)

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Easy to install it yourself — in Brick, Stone, Concrete blocks!

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OUTDOORS

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Send \$1 for **BIG FIREPLACE IDEA BOOK**
Over 200 pictures — fireplaces, barbecues galore!
Plans, designs, diagrams, "how-to" instructions.

The **Majestic** Co., Inc. 619 Erie Street, Huntington, Ind.

the FAA report he'd have to file within 48 hours. He settled for a meek request to land as soon as possible. The answer was sheer salvation.

"You're cleared V-16 direct to Los Angeles. Contact Approach Control 118.9 now."

"That's what I call service," he muttered. "Have to do this more often."

As the DC-6 limped past Ontario VOR, 11 minutes after it all began, the maintenance officer at the center was pouring a mixture of kerosene and oil he had scrounged into the emergency unit. Two minutes later Los Angeles Center was back on the air, but now working doggedly to catch up with their own schedules and get the displaced craft back into their holding patterns. Those few minutes' operation at reduced capacity had saturated the system completely.

Ted Clark was telling Phoenix and Oakland that they could each clear no more than four aircraft toward Los Angeles in the next 15 minutes. L. A. Approach Control had asked for and received permission to extend their space upward another 2000 feet to handle the increased landing load. They had not even bothered to divert the craft to the fish intersections. The many other facilities along the way had chipped in to direct traffic in their sectors. And slowly, steadily, order returned.

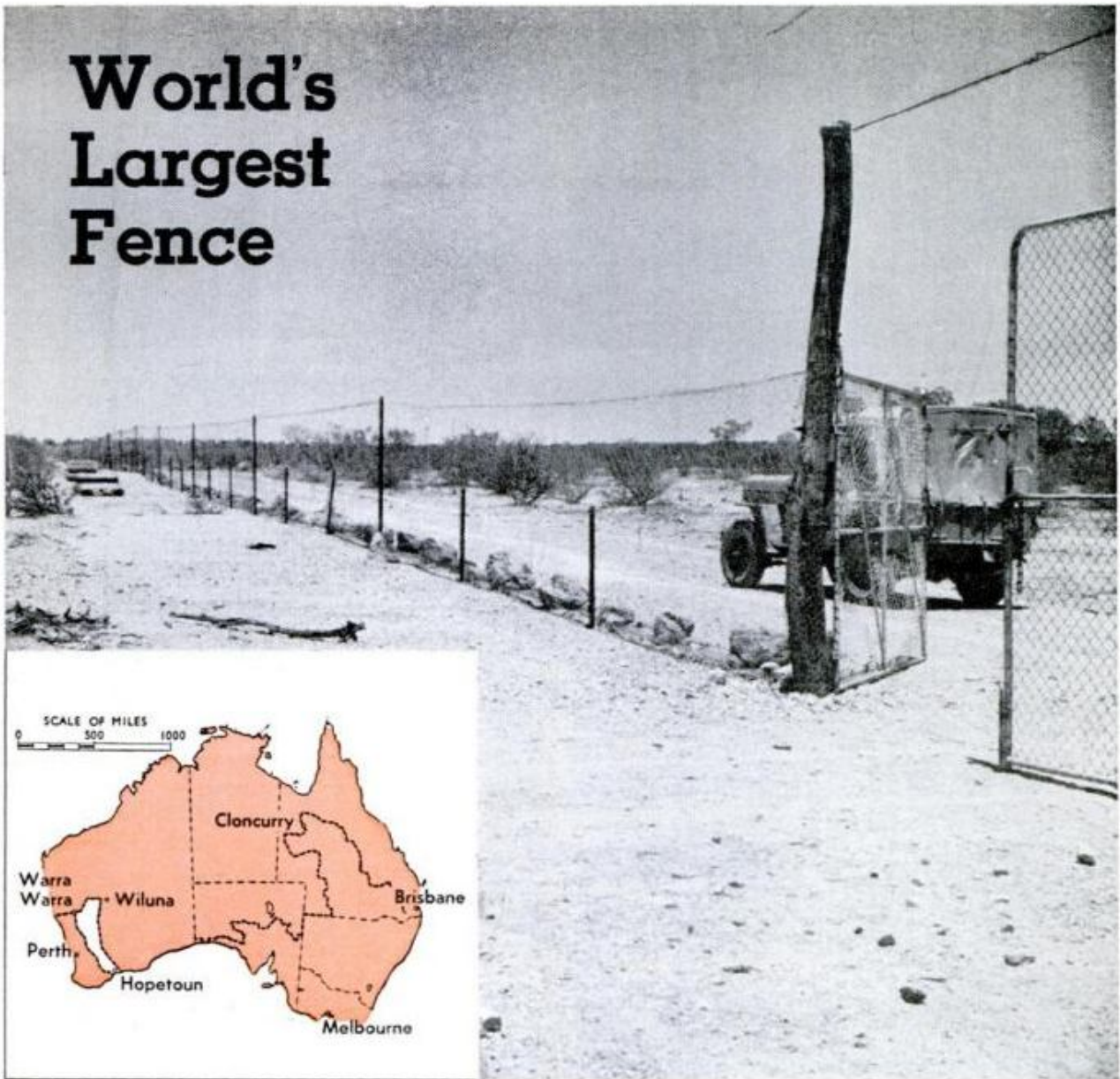
As for Buck Archer and his 50-odd passengers, they were over Downey when the temperature on No. 3 began the rise that signaled the end of that engine. It came as no surprise now. While Buck jockeyed for the approach, his copilot shut down No. 3 before it seized and unfeathered No. 4 to use its last bit of oil and have it handy in case of a go-around. But never had an approach been performed more conscientiously. When they broke out of the ragged, rolling fog at 300 feet with the runway lights dead ahead, the usual warm feeling flowed through the cockpit that it wasn't such a bad life after all. At least, not while you had such help. Had the way through not been cleared, though. . . .

Yes, many travelers might be delayed by those small birds of fate. But, thanks to the elaborate safeguards built into the system and the fact that some men are still masters of machines, thousands of passengers would be landed safely.

"This is Archer, with Airtransit," the voice in Ted Clark's earphone said. "I brought that Six in a few minutes ago. Thought a few words of appreciation might be in order."

"I'll tell the guy responsible." Ted Clark accepted, letting a rare grin replace his scowl. "He's busy right now." ★ ★ ★

World's Largest Fence



SLAKING WEST from Brisbane to separate Australia's sheep and cattle land from the wild dogs and foxes that prowl the Outback, the world's largest fence stands sentry down a length of 5200 miles.

Primarily it guards against forays by the dingo, an intelligent killer canine whose toll, in dollars, amounts to \$5,000,000 a year. Six feet high, the fence has rabbitproof wire mesh buried six inches in the ground and three feet out. The upper section is dingoproof mesh. Barbed wire stretched between fence posts at ground level prevents dingoes from digging under the fence. Patrols travel its length to keep it in dogproof order.

Working in pairs, dingoes cut calves or sheep from herds or flocks and rip them to pieces. They have become a serious threat to Australia's wool industry.

SAFE behind a 5200-mile fence (heavy, dotted line starting at Brisbane) are 20 million sheep and 600,000 head of cattle

WILD DOGS are only carnivorous mammals native to Australia. Their raids are a serious threat to the wool and mutton industries



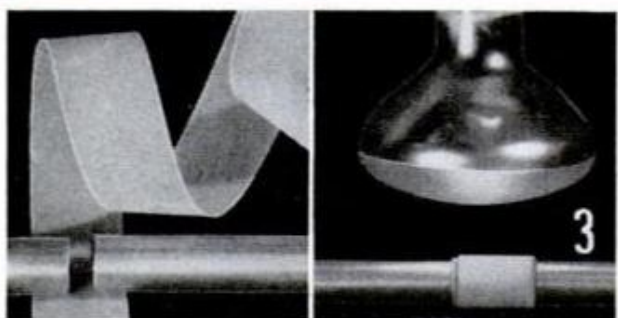
On the market



1. V-BELTS, USING GLASS CORD, lasted four times as long as conventional V-belts, according to tests pictured in the photo. The glass cords form the load-carrying sections of belts, and belts are said to maintain constant size during storage, all but eliminating adjustments while they are being installed and used. Manufactured by B. F. Goodrich Co., Akron 18, Ohio

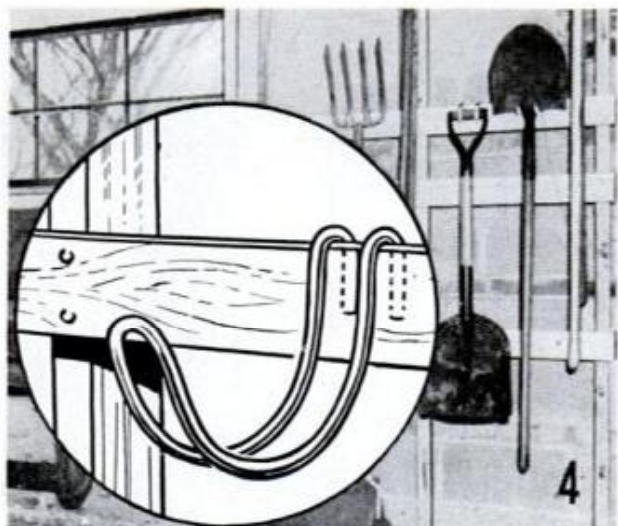


2. LAWN SPRINKLER CAPABLE of watering rectangular areas up to 20'x40' is now available. New sprinkler is of metal construction, having a nylon whirling vane to break up stream of water. According to the manufacturer, it gives complete distribution, evenly saturating area being sprinkled. Price, \$1.95. Proen Products Co., 9th & Grayson, Berkeley 10, Calif.



3. HEAT-CURED EPOXY TAPES and sheets simplify bonding small parts. Resulting bond is stronger than a soldered or welded joint and impervious to moisture and most chemicals. Resin, carried on fine Dacron webbing, is completely stable under normal storage conditions. Infrared lamp cures epoxy tape in 7 min. Plastic Associates, Box 36, Laguna Beach, Calif.

4. STORING HEAVY ITEMS in home and shop is easy with these special hooks. Objects weighing upwards of 100 lb. may be hung from them. They slip over the edge of common 1x4s, eliminating installation. Once 1x4s are installed they are relatively permanent, but hooks may be rearranged at any time. Kerr Wire Products, 933 Cicero Ave., Chicago 51, Ill.



5. TILES SLIP INTO PLACE without nailing or stapling when using Clip-Strips for installing ceiling tile. The new method of application is the easiest yet devised, according to the manufacturer. Metal furring strips go up in same operation as tiles, automatically aligning and eliminating need for individual fastening of tiles. National Gypsum Co., Buffalo 2, N. Y.

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seconds!



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nuts, screws, "frozen" parts!**

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JULY 1962

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wrench
that

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CLICKS"**



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P & C TOOL COMPANY

Portland 22, Oregon



187

Bubble Trouble on Tap

(Continued from page 94)

Hygiene and Sanitation, reports that new combinations of sewage and waste are causing so much pollution in the U.S.S.R. that it constitutes a threat to the "entire national economy."

The U.S. Public Health Service has set a limit on the detergent level permissible in the water of interstate carriers. Few water supplies have syndet levels anywhere near that maximum now, but more public awareness of the problem, research, and engineering know-how is needed to stop the suds from rising.

"The problem has not yet been solved," says Dr. James M. Symons of the Massachusetts Institute of Technology's Civil and Sanitary Engineering Department, "but I have every confidence that an intensive research effort will bring an adequate solution within the next few years."

There are signs already that research on the problem is paying off. For example, Continental Oil Company recently announced that it is building a \$10,000,000 plant to turn our "straight-chain" industrial alcohols from petroleum. These new alcohols are expected to be used in detergents. Because they are much simpler in chemical composition than existing compounds, they probably will be much easier to "break down" at the time they have done their job and must be destroyed.

The detergent manufacturers themselves, for 10 years, have been working toward a solution of the problem (though they deny that the problem, basically, is one of detergents). The Soap and Detergent Association, in a statement to *Popular Mechanics* says:

"First of all, the residues of detergents, as present in waste water, have been shown to be nontoxic. While they may be a cause of froth in some situations, they are not a cause of taste and odor; but rather are indicators of concurrent, invisible sewage pollution which causes such taste and odor.

"In areas of high population density, there is agreement that no lasting solution to this problem exists short of public water and sewer services. In modern sewage-treatment plants, the present surface-active material in detergents is broken down as much as 50 to 70 percent; it's not indestructible, but is one of a number of persistent or 'refractory' organic wastes, all of which must be dealt with in such treatment in the future.

"Today, research is proceeding along two lines: Companies in our industry are seeking individual product improvements

which will increase their amenability to treatment while maintaining cleaning efficiency and low cost. At the same time, the U. S. Public Health Service and others are seeking improvement of treatment processes which will deal successfully with all the new and persistent waste material."

That's the problem, to date. And a bubbling, seething problem it is, for it will affect the palatability—and safety—of your drinking water.

Your shirts may be whiter these days, because the syndets are highly efficient at wiping away dirt. But the syndets themselves are stubbornly refusing to vanish.

★ ★ ★

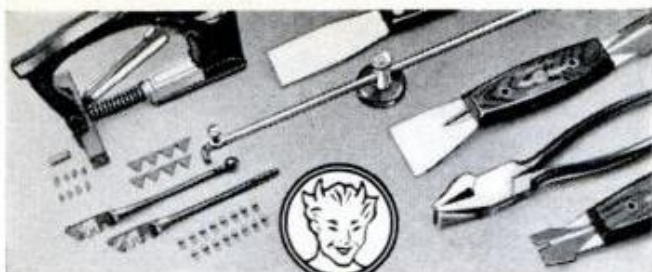
Life Likely on Mars

All scientific data indicates that life exists on Mars. The question should be definitely decided within the next decade, according to a panel of planetary experts of the National Academy of Sciences' Space Science Board. Venus' ability for supporting life, however, still remains a complete mystery.

According to scientists, the early beginnings of life on Mars and Earth were probably similar, but as a result of changing physical environments over long periods of time, biological evolution "must have been very different on the two planets." About Mars, the experts say: "If there are organisms on Mars today, we must not expect them to be similar to familiar life forms. . . . The limited evidence we have is directly relevant only to the presence of microorganisms; there are no valid data for or against the existence of larger organisms and motile animals."

"The planet Venus," the Academy scientists report, "is, in one respect, the sister planet of Earth, since it has about the same mass and radius. In nearly all other respects it appears to be different. . . . Next to the Moon, Venus is our closest neighbor in the solar system, and yet we are utterly baffled by many of its attributes." Among the differing scientific opinions, two likely theories on the nature of the visible clouds surrounding Venus have been offered: That the clouds are water droplets or ice crystals; or that they are dust stirred up from the surface.

The report concludes with the following: "There have been organisms on our planet for about 4000 million years. By a remarkable stroke of fortune, it is in the next few decades that man will first discover . . . what is happening on the neighboring worlds. . . . We are immensely lucky to be living at the dawn of this era of planetary exploration and high scientific adventure."



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The wild scramble that ensues when a bogie hits the NORAD radar screen. What is it like? PM's aviation editor brings you a firsthand (and heartfelt!) report in the August issue.

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fix it quick with
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Handles like putty-hardens like wood!



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Now a favorite table game—bumper pool—can be played on the lawn by the whole family, including the kiddies.

Plastic balls replace the ivories and mallets replace the pool cues, but otherwise

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ELECTRIC STORAGE BATTERY WINCH

New, improved model contains heavy-duty, 2-way drum switch. Fully reversible heavy-duty, two-speed motor, 160 to 1 gear reduction. Ball bearing construction throughout. Drum will handle 70' of 1/4" cable. Can be used on 6 and 12 V. battery. Lift cap. 2000 lbs. plus. Ready to install & operate. 19" long x 9" wide x 8" high. For jeeps, trailers, boats, trucks, etc. Complete with mounting flange, safety load locking brake and leads. Shpg. Wt. 60 lbs. Approx. GOVT. COST \$400. NEW, Model E. \$49.50.

DELUXE MODEL ED Same as above but with extra heavy base & outrigger support bearing. 250' 1/4" cable spool capacity. NEW. \$69.50.



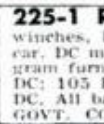
BUILD YOUR OWN ARC WELDER, LIGHT PLANT OR BATTERY CHARGER \$39.50

Kit incl. 1 Navy NEA-5 Gen. combination AC-DC type. AC 115 V. DC 24 V., 200-300 Amps. 2 complete generators in 1, yet no larger than reg. gen. Ideal for home, shop and farm lighting plants. Delivers 1200 Watts AC, DC side for charging batteries, welding and operating war surplus motors. Also in kit: 1 DC Voltage Reg., Reverse Current Relay, 1 Voltmeter, Rheostat, Electrode Holder, Toggle Switch, Welder's Shield, Wiring Diagram for kit. Wt. under 100 lbs. Approx. GOVT. COST \$650. Kit—\$39.50. Navy NEA-5 Gen. as above, purchased separately, \$23.50



U.S. NAVY SEXTANT (AN 5851)

Adjustable bubble and nite lite, built-in averaging device. Both artificial and natural horizon. Used with or without bubble. Used by many power squadrons. All units tested for tolerances. Complete with filters, astigmatizer, & instruction book. Approx. GOVT COST \$586. Like NEW. \$16.50.



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Owners Report on the Olds

(Continued from page 82)

"The acrylic paint appears to be chipping in several spots (not the result of pebbles etc.)."—New Jersey Army officer.

"The car as delivered by dealer had approximately 50 paint defects and dirty spots. Dealer gave satisfaction—mostly at 1000-mile service."—California engineer.

This paint problem is odd. There seems to be no "half-way." Paint is either OK or bad throughout the car.

"The painting could have been of a better grade on interior and exterior also."—Pennsylvania engineer.

"The doors are poorly adjusted, allowing lots of wind noise — evidently there was poor hinge alignment at factory."—Wisconsin postal worker.

"The air noise could be much less with differently designed doors."—Wisconsin machine operator.

"Wind noises still are prevalent after taking car back twice."—Ohio accountant.

"There's entirely too much wind or road noise which my dealer can't fix."—Texas salesman.

PM's test car roared and whistled when any vent or window was open but rode quietly when closed up tight.

"There are wind noises around windshield and windows."—Illinois paint grinder.

"The Hydra-Matic is not smooth shifting."—Ohio sales manager.

"I don't like the way the transmission shifts up; there's more interference than in '60 model—a noticeable change of gears."—Wisconsin salesman.

"There's too much slippage in automatic transmission, and poor gas mileage."—Illinois plant superintendent.

"I would like a 4-speed transmission with more positive heavy-duty action similar to the older transmission."—California surgeon.

Olds' new "soft action" Hydra-Matic lacks the smoothness of many full torque-converter automatics, and sacrifices the positive acceleration of earlier Hydra-Matics.

"The transmission could be improved; in "S" position at a very slow speed (10 m.p.h.) the accelerator must be depressed somewhat before gear train grabs."—Pennsylvania TV production worker.

We experienced the identical delay before the downshift on test car.

(Continued to page 192)

Weld. Cable No. 1, 100' \$21.50, 50' \$10.95
 Arc Stabilizer for R-1, P-1 or G-1... \$ 9.95
 G-1, 160-250A gen. \$12.95 R-1 300 Amp
 \$16.50, Throttle Solenoid... \$7.95

Accessories Kit For Arc Welder for above generators has helmet, gloves, elect. holder, volt reg. rheostat, voltmeter, Gr. Clamp, switch, 30' cable & G-1 gen. 160-250 Amp... \$27.50
 R-1 300 Amp Gen. with accessories kit plus reactor coil \$44.50

Dual Power Battery Motors Kit. Excellent for golf cart, winch, etc., fully reversible, runs on 24-12VDC kit, includes 2 motors each 3/4HP 250 Amp 2300 RPM, 2 relays, switch, 2 couplings with speed reducers 10:1 & cable. Value \$72.50 price... \$32.50

BUILD YOUR HYDRAULIC PRESS
 Complete kit consists of New D.A. cylinder 3" bore x 10 1/4" stroke, 3000 PSI Weaver hydraulic hand pump, control valve, reservoir, hose & fittings, rated 9 tons, instructions incl. \$125.00 value, only... \$57.50

HYDRAULIC PUMP BARGAINS 1500 P.S.I.
 Type RPM GPH *Reversible
 Pesco .447 4500 350 \$12.95
 Vickers .410 3750 375 \$17.50
 *Stratopower PD 4500 375 \$14.50
 Hyd. hand pump 1.5 cu. in. p. stroke \$6.75



NEW HYDRAULIC CYLINDERS
 Hvy Duty 2000 P.S.I. Air-oil
 Special discount Limited Time

Bore	Stroke	D. Shaft	Long	Double Action
1 1/2"	1 1/2"	1 1/2"	6 1/2"	1 1/2 lbs. \$ 2.75
1 1/4"	2 3/4"	1 1/2"	6"	3 lbs. \$ 2.95
1 3/8"	3 3/4"	1 3/8"	13"	5 lbs. \$ 3.50
1 1/2"	2 1/4"	1 3/8"	3 1/2"	6 lbs. \$ 8.95
1 1/2"	4 1/2"	1 3/8"	10"	3 1/2 lbs. \$ 2.95
1 1/2"	2 1/2"	1 3/8"	38"	11 lbs. \$10.95
1 1/2"	8 1/2"	1 3/8"	13"	8 lbs. \$ 6.95
2"	6 1/2"	1 3/8"	17 1/2"	6 1/2 lbs. \$ 6.75
2 3/8"	13-18"	1 3/8"	30"	11 lbs. \$14.50
2 7/8"	16"	1 3/8"	33"	16 1/2 lbs. \$16.75
3"	10 1/4"	1 3/8"	19"	15 lbs. \$12.95
3 1/4"	10 1/2"	2 1/8"	23"	29 lbs. \$16.50
3 1/2"	9"	1"	21"	12 1/2 lbs. \$12.95
3 3/8"	10"	1 1/4"	27"	22 lbs. \$15.50
4"	18 1/4"	1 3/8"	30"	30 lbs. \$24.75
4 1/8"	8"	2"	22"	35 lbs. \$24.50

Prices FOB KC Mo under 20 lbs. add 15% p.p.

Single action 2000PSI. Air or oil.

7/8"	3 3/4"	1 1/2"	6 1/2"	1 lb. \$2.50
1 1/4"	3-9/16"	5/8"	6-3/16"	1 lb. \$4.25
1 1/2"	4 1/2"	9/16"	15"	7 lbs \$4.50
2 1/4"	5 1/8"	2 1/8"	29"	16 lbs \$6.50
2 5/8"	3 3/4"	2 1/8"	13"	9 lbs \$3.50
3 1/8"	2 3/4"	1 3/8"	14"	20 lbs. \$2.95

400 GPH pump with Motor 1/4 HP 24-12VDC. For hydraulic, fuel or water (specify)... \$7.95

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 AM400 Complete automatic has new pump 400 GPH, relief, & adj. press. connected to motor 1/2 H.P. 7 amp 24VDC runs on 12VDC adj. press switch set for 8 1/2 on and 20 1/2 off, gauge check valve, filter, overload switch, tank & 8' cord value \$89.95 save \$47.45 price \$42.50
 AM401 same model less motor including pump mount with Vbelt pulley... \$47.50

New open center 4 way control valve 10060 with adj relief for 1 to 4 D.A. cyl. 3/4" ports \$12.95. New Hyd. Solenoid control valves 3 way 12-24VDC 1500 PSI \$8.95 per Pair.
 New Pesco Hyd Flow Equalizer & Pressure balancer 1500 PSI \$8.95

NEW HYDRAULIC SYSTEM KIT
 400 K heavy duty Power driven, rated 16,000 lbs. lift. Consists of 2 D.A. hyd Cylinders 3 1/2" bore x 2 1/2" stroke ea. rated 8000 lbs. ea. with 1000 PSI, 1 four way hyd control valve with built in relief. \$21. Vickers hyd pump 375 GPH 1000-1500 PSI 3750 RPM, filter, hose & fittings. Value \$169.95. Kit Price \$79.95

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 Sends your voice to any car or house radio. Works up to 1-2 miles from car to car or 1-5 or more blocks house to house depending on local conditions. Just Push Button to Talk—No Complicated Hookups or Wires—Anyone can use it. Transistor powered by flashlight batteries. No License or Permits Needed. Guaranteed to Work. 1 yr. Service Guarantee. Should Last for Years!
SEND ONLY \$3.00 (cash, ck, mo) and pay postman \$9.95 C.O.D. postage or send \$12.99 for postpaid delivery. Ready to operate with clear instructions. Order your Radio-Talkie today—Now!
WESTERN RADIO, Dept. TPM-7, Kearney, Nebr.



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A PERFECT 38

You can build it in 38 hours for \$38, and it will take you across the water at a thrill-filled 38 miles-per-hour. The complete plans for this sleek-looking runabout will appear in the

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Rubber Rope for Sailors

Just put the toggle through the eye and the rubber rope will lash furlled sails, stop halyards from slatting or, screwed to the boom, keep them off the deck.

The Sail Tys, which come in three sizes, 9 1/2, 12 1/2 and 16 inches, are packed five for \$2.95. They are made by Lister Industries, 141 E. 44th St., New York 17.

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SAW SET

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



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839 Lenoir Road, N. W. • Hickory 2, N. C.

"Both of my new Olds' have a lot of rattles and loose bolts."—Oklahoma M.D.

"It's not put together as well as expected for Oldsmobile."—California physician.

"The workmanship is poor. In fact this is the case with all late-model cars. Workmanship was better back in 1940 when cars cost less than \$1000."—Kansas grocery sales serviceman.

Returning to the sunny side of things—let's learn what else owners like about their Oldsmobiles. Here are items six to ten in order of their mention.

"The trunk carries a great deal of luggage."—Georgia manufacturer.

"I like the very deep trunk and location of spare tire."—Minnesota merchant.

"The power steering is superb."—Florida chef.

"The power steering is much improved."—Pennsylvania petroleum distributor.

"My Olds has near perfect control on snow and ice."—Pennsylvania plant supervisor.

"I enjoy its highway handling characteristics (I have no power equipment). City handling is satisfactory."—Michigan civil engineer.

We agree with the man from Michigan. Olds would be fun to drive without power steering until you got into traffic-choked city streets or tried to park it.

"It's stable on the road at high speeds."—Oklahoma excavator.

"The size is good."—New Jersey housewife/receptionist.

"It is a big car and I still have economy in operation."—Ohio self-employed.

"It has plenty of headroom."—California sales representative.

"It's much improved over our 1960 model for comfort of sitting instead of 'bent spine' contortion. There's more headroom for any rear-seat passenger. Also, there's not so much heat from the sun in the new angle of rear glass."—California retiree.

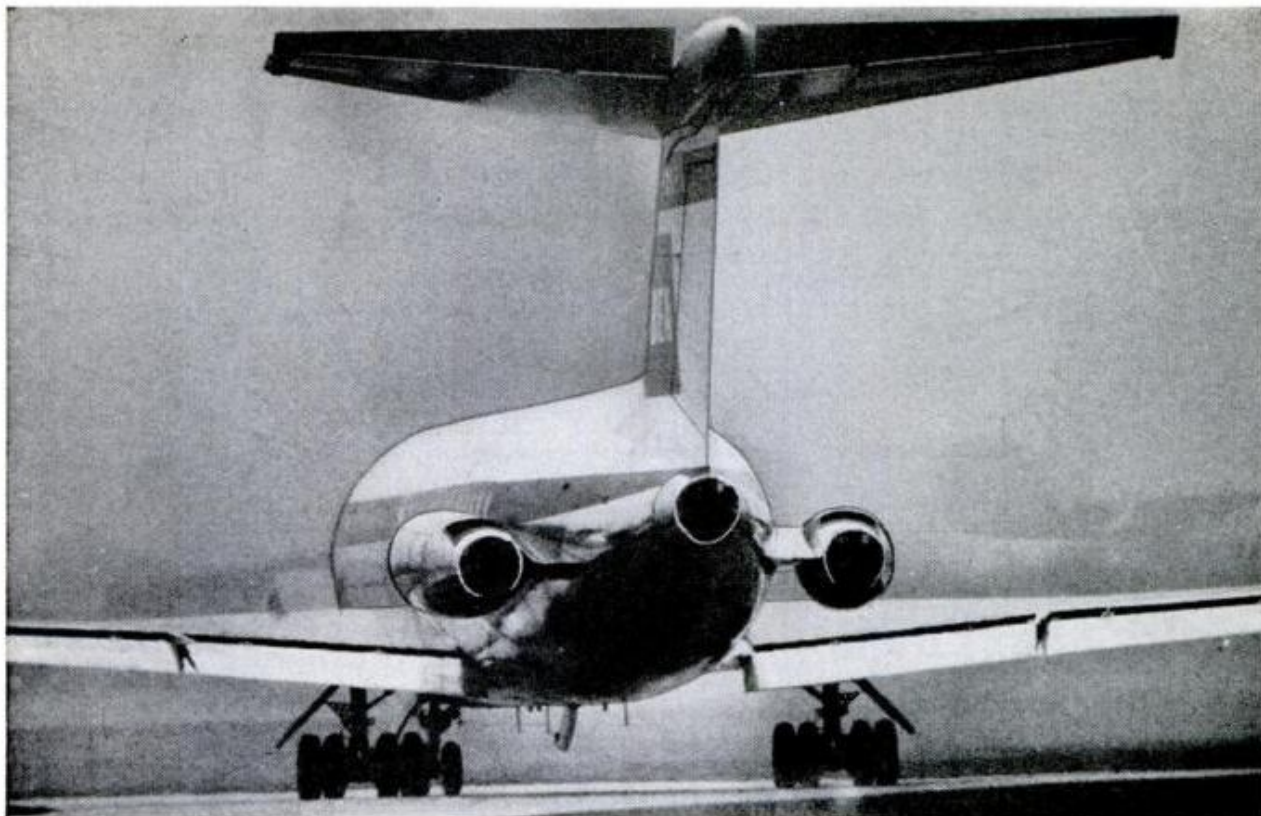
The 1960-61 Olds body is much improved and one of the most livable bodies in its class. If only the drive-shaft tunnel could be eliminated. . . .

And now, more complaints, numbers six through ten are here listed in the order most often mentioned by owners.

"Would like windshield and rear window built not quite so high into the roof as it's too hot in the sun."—Iowa farmer.

"The top of the front windshield is too far

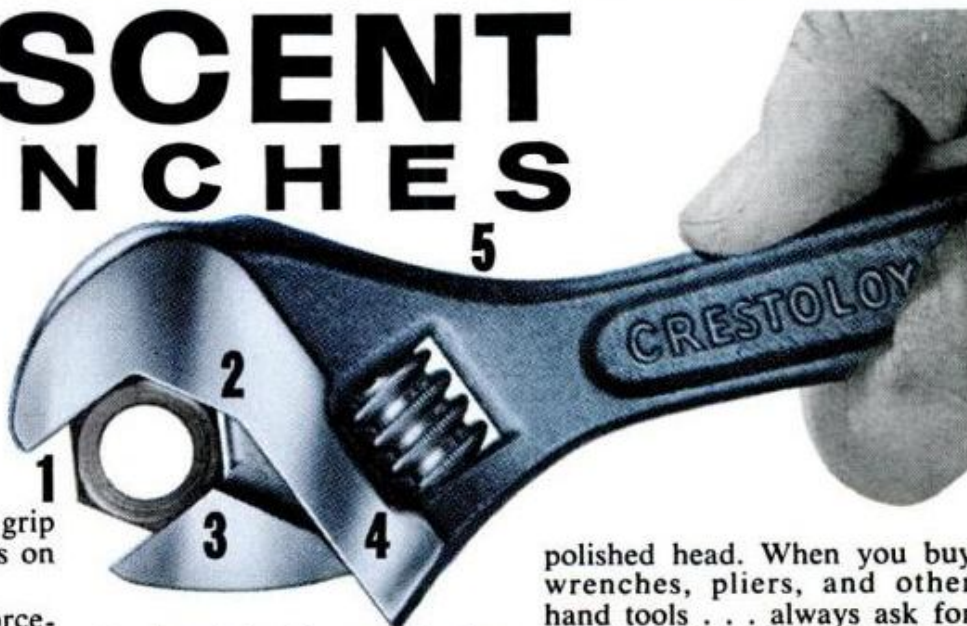
(Continued to page 194)



THREE-ENGINE AIRLINER, the British De Havilland Trident, made its debut recently in successful tests in England. All three of the turbine engines are mounted at the rear of the plane. Two of them are mounted on opposite sides of the fuselage, and third is on top of the fuselage, just in front of the tail structure. Its exhaust is deflected downward and comes out the rear tip of the fuselage of the new airliner

CRESCENT WRENCHES

5 ways
better



1 CRESCENT wrenches grip hex nut and bolt heads on at least three sides.

2 More solid metal reinforcement at points of maximum strain.

3 Jaws are *matched* early in manufacturing process to insure uniform hardness and to stay parallel at all times.

4 Precision machining of *all* parts assure firm hold on nuts and bolts, eliminates slack, lets the wrench open and close freely without a hitch.

5 Special alloy steel, electronically hardened, for a stronger, thinner wrench.

Two styles available: CRESTOLOY, full chrome plated; and CRESCENT, black with

polished head. When you buy wrenches, pliers, and other hand tools . . . always ask for CRESCENT by name! Sold through leading hardware dealers everywhere.

Send for 40-page illustrated booklet, "How To Use Hand Tools."

CRESCENT



CRESCENT TOOL CO., JAMESTOWN, N. Y.

GIGANTIC SURPLUS SALE!

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. Govt. cost over \$12. SALE... **\$3.49** FOB

SELF PRIMING A-C PUMP

• ITEM #209. New expensive Govt. self-priming centrifugal pump. 1/2 hp 115-v AC motor, driving self-priming pump. • 3/4" garden hose connections. 900 gph capacity. Good pressure characteristics. • Use for swimming pools, basement draining, small irrigation, boats, industry. 4-Star Buy! Size 12"x10"x5". Wt. 21 lbs. Gov't cost \$98.75. SALE... **\$33.60** FOB

ELECTRIC CAR MOTOR

• ITEM #564. Powerful gear motor. Hi torque. Build boy's car, golf cart, winch elevators. Runs on 6 or 12-v battery. Reversible. Gear ratio 24-1. 100-150 rpm. Ball bgs. 5/8" shaft. Size 15 1/2"x5 1/2". 30 lbs. Govt. cost \$29. SALE... **\$18.99** FOB. Reversing switch... **\$3.50** FOB.

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It's easy, fast, fun to do your own work with the MIXAL Mixer. Build barbecues, patios, sidewalks for yourself, for others! Mixes 3' x 8' sidewalk every hour! Uses any 1/4 HP motor. Thousands used by contractors! Try it on MONEYBACK GUARANTEE! Send for FREE HOW-TO-DO-IT CEMENT MIXING BOOKLET. Dept. PM-7.



KOL, INC., 2323 Ellis Ave., St. Paul, Minn. (add \$3 W. of Rockies)

Shrinks Hemorrhoids New Way Without Surgery Stops Itch — Relieves Pain

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

In case after case, while gently relieving pain, actual reduction (shrinkage) took place.

Most amazing of all — results were so thorough that sufferers made astonishing statements like "Piles have ceased to be a problem!"

The secret is a new healing substance (Bio-Dyne®)—discovery of a world-famous research institute.

This substance is now available in suppository or ointment form under the name Preparation H®. Ask for it at all drug counters.

back over the driver: good only for bird watching."— New York retiree.

For about \$20 you can buy a windshield with a tinted band through which it's difficult to see anything.

"The heat from sun through windshield, even though it is tinted, is very uncomfortable. Cut down on the windshield size."— Tennessee telephone foreman.

"I'd like to have the body about four inches higher. A tall man's hat hits the top."— Minnesota farmer.

"Not enough headroom."— Michigan engineer.

"The ceiling is too low; getting in and out is not as easy as it was in our '55 model."— New Jersey teacher.

And the reason for this ease of entry is simple—the '55 Olds was five inches higher.

"It's awkward to get into the back seat."— California salesman.

"It's harder to get into the car. Also, you have to drag your feet from the floor recess at the door. The center hump is very bad."— New Jersey plant manager.

"It doesn't turn sharp enough to get around some corners."— Iowa banker.

"The turning radius is too long."— Florida motel owner.

"Turning radius is too large."— Montana Air Force technician.

"Insufficient weather stripping on doors allows squeaks."— Texas executive.

"I wish somebody would make a convertible that wouldn't rattle like a tin can."— California plant superintendent.

Somebody does—Buick Special. (See p. 208, May 1962 PM).

Numbers 11-17 make up the final list of features praised by Olds owners. They follow in their order of frequency of mention.

"Like the neat design of both interior and exterior; the uncluttered look."— Texas bookkeeper.

"I like the fine upholstery throughout."— California secretary.

"Seats are contoured to fit the back, much as a comfortable lounge chair."— Florida housewife.

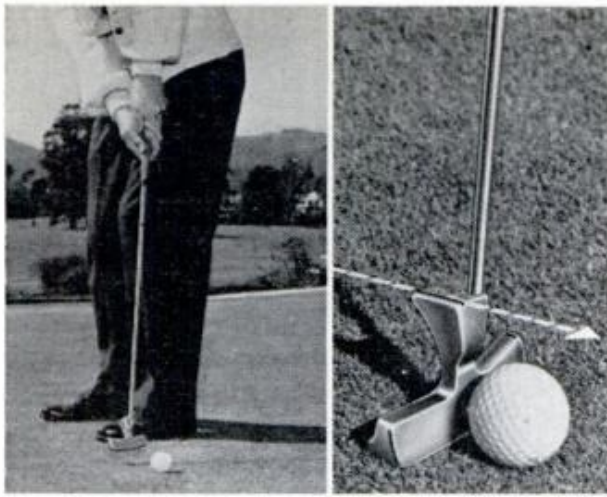
PM found Olds interior very comfortable.

"Interior is smartly designed."— Connecticut restaurant owner.

"The new Olds has wonderful features such as new brake adjustment by backing up car."— New York supervisor.

"I like the smooth-acting transmission."— Michigan foreman.

(Continued to page 196)



Better Aim on the Green

Accuracy on the greens is the purpose of a new putter that's designed to help a golfer send the ball on a straight line every time.

Balanced to strike the ball in the center line of the shaft, the putter has a directional line marker on the head so that the golfer can guide his back swing and follow through.

Priced at \$14.95, the putter is made by Standard Tool & Die Co., 1931 N. Broadway, Los Angeles 31, Calif.



Cordless Grass Trimmer

There's no cord to limit the range of a new battery-powered grass trimmer.

The lightweight yard tool has built-in raking teeth for lifting matted turf. Its reversible steel cutting blades can be replaced.

Made by Aluminum Hardware, Inc., Forest Park, Ill., it sells for \$12.98.

JULY 1962



EASY!

QUIET!

5 TIMES FASTER THAN A BRUSH

The Sprayit 600 gives you real "master painter" results with smooth, fast delivery. Saves you time and work on all home maintenance painting. Precision quality, modestly priced at \$39.95. Oil-less type compressor with built-in motor. Adjustable all-aluminum spray gun. A versatile outfit—also cleans machinery, sprays insecticides, liquid fertilizers; many other home and farm uses. Full year warranty. Send 10¢ for paint spraying booklet and free literature. Thomas Industries Inc., Sprayit Div., Dept. PMS3, 207 E. Broadway, Louisville, Ky.

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REPAIR MOST EVERYTHING MADE OF METAL

Home Appliances. Auto parts. Make and repair lawn chairs, tables, ornamental iron work, gates, wagons, etc. Solder, heat, bend, and straighten, with terrific heat from arc torch. Cut and weld up to 1/4" steel plate. A million uses for Home, auto, farm, inventors, factories, etc. Works from any home 110 volt plug-in. Complete with dark welder's mask, arc torch, supply of carbon steel welding and brazing rods and complete Welding Instruction Book, 1 year guarantee.

SEND ONLY \$3 COD postage on arrival or send \$14.95 and we will send postpaid. Ideal gift for mechanically minded, relatives, friends. Order now. Available only from: **MIDWAY WELDER, Dept. DPM-7, Kearney, Neb.**

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Includes complete instructions (less cabinet). Send 21.95 for KT-135 plus 2.00 postage (we refund excess).

ML-150 (Optional) Leatherette covered wooden cabinet for KT-135 Net 2.75
Lafayette Radio Dept. LG-2, P.O. Box 88, Syosset, N. Y.

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Professional Electric Arc Welder. Ideal for Home, Shop, Farm or Industrial use. The handiest tool in your workshop. Weld, Braze, Solder, Cut. Bend all metals. Do expert work on your first job. Build or repair Boats, Trailers, Auto Bodies, parts, fenders, metal and ornamental iron furniture, fixtures, farm equipment, garden tools, bicycles, toys, etc. Operates on any properly wired 110 V. A.C. line. Complete with helmet, arc torch, electrode holders, flux, rods, cables, instruction book. **FULL YEAR GUARANTEE.** 10 day money back trial. **ONLY \$38.50 f.o.b.**

Only \$38.50 f.o.b. Send only \$6.00 check or m.o. Pay postman balance plus charges. **EASY PAY PLAN.** Low down payment. Pay as you weld.

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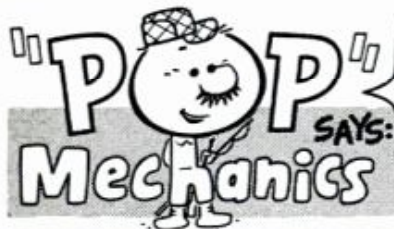
DRAINS cellars, cisterns, wash tubs; **\$7.95**
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1,001 uses. Stainless shaft. Won't rust or clog! Use 1/8 HP motor or larger. 3/4 HP for up to 2,400 GPH; 450 GPH 80' high; or 1800 GPH from 25' well. 1" inlet; 3/4" outlet. Coupling included free. **\$7.95.** **HEAVY DUTY BALL-BEARING PUMP.** Up to 5,200 GPH; or 3,000 GPH from 25' well. 1 1/4" inlet; 1" outlet. **\$12.95** Postpaid if cash with order. **MONEY BACK GUARANTEE**

Centrifugal and Gear Pumps in All Sizes

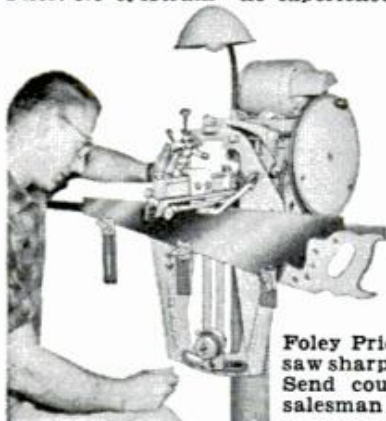
LABAWCO PUMPS. Belle Mead 7, New Jersey



"Friendliest way to get a loaned tool back is to lend yourself with it."

FREE PLAN tells how to start your own business FILING SAWS

Here is a steady repeat CASH business you can start in your own basement or garage in your spare time and make up to \$3 or \$6 an hour. You can file hand, band and both combination and cross-cut circular saws on the Foley Saw Filer. No eyestrain—no experience needed. "The first saw I sharpened with my Foley Filer came out 100%"—writes Clarence E. Parsons.



Every saw you sharpen with the Foley Saw Filer brings you more customers. "I rented a two-car garage and have all the work I can do"—Charles H. Smith.

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Address.....



"The Hydra-Matic transmission shifts without jerks or noise."— Pennsylvania foreman.

"I most like the silence of operation."— Indiana draftsman.

PM drove an Olds 98 that was as quiet as a library on the Fourth of July.

"I like the smoothness at all speeds."— Ohio retiree.

"I've had no expense for lubrication until 30,000 miles. I also like the self-adjusting brakes."— Pennsylvania banker.

"It needs extremely little mechanical service."— New York pharmacist.

All things must come to an end. Here's the final batch of complaints, numbers 11-16, in the order most often mentioned.

"Tires that come with the car (8.00 x 14) are too small."— New York trucker.

"Tires are not wearing evenly."— Alabama businessman.

"The right-hand door does not close properly."— New Jersey lighting technician.

"Too much air comes in around windows and doors."— Minnesota farmer.

"There's air space between doors and the body of car."— Maryland insurance man.

"The pre-servicing of my automobile before taking it out of the showroom was terrible."— New York sales manager.

"I've experienced generally poor service at dealership where I purchased the car; the management tries to please, but some mechanics are indifferent and careless."— Colorado air traffic specialist.

"The wheel covers are already rusted."— Ohio salesman.

"I've only had my car three months and have corrosion where snow collected."— Indiana housewife.

We've noticed post-winter corrosion on a number of '62 cars. Could be they're not plating deep enough.

"It rides hard in comparison to some other cars."— Illinois farmer.

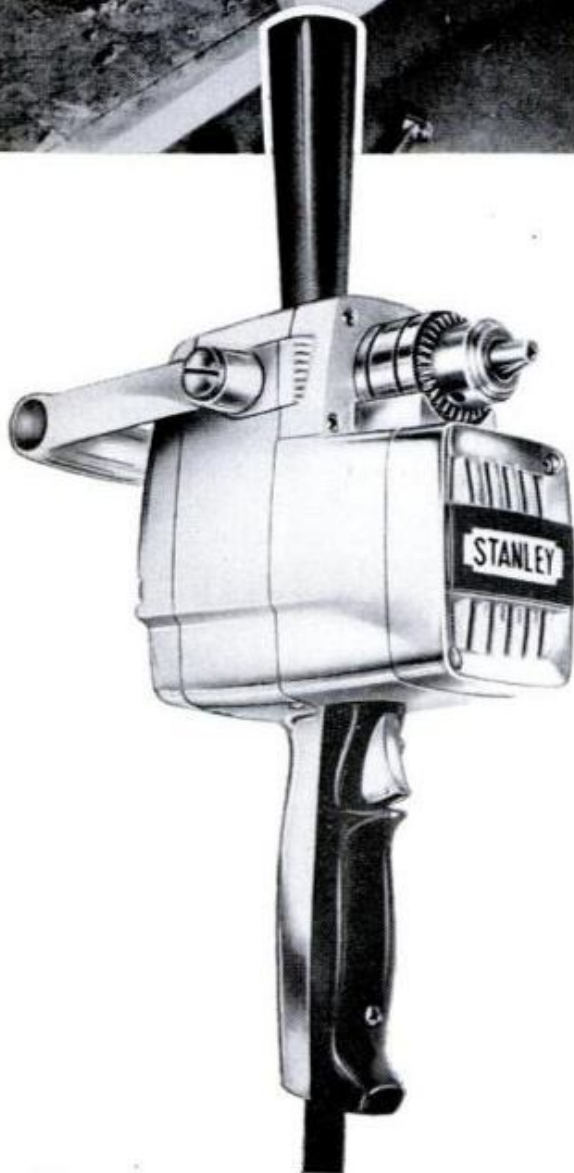
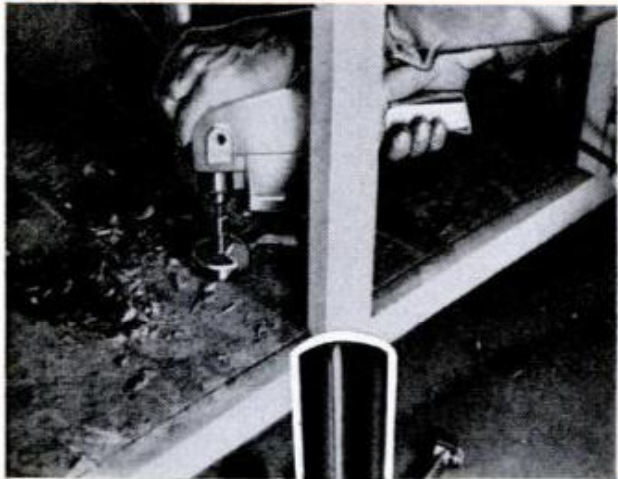
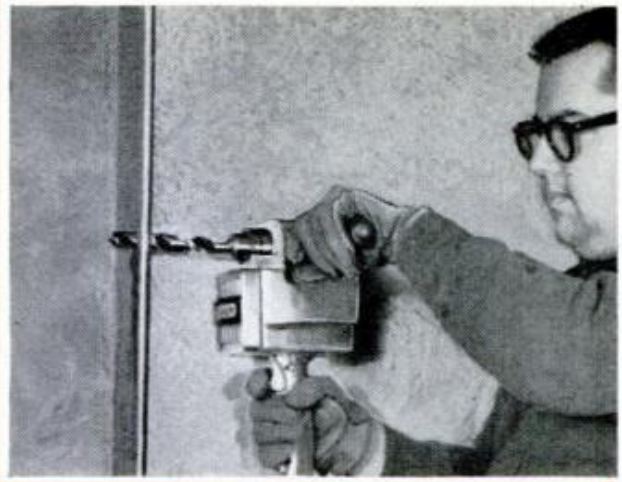
"Ride is choppy at high speeds."— Colorado trucker.

"The Starfire is uncomfortable for back-seat riders."— California doctor.

"When hitting water, it splashes all over hood and windshield."— Montana salesman.

This does happen. Perhaps Olds' close-to-the body front bumper permits splash-up into the wind stream.

"Water from street puddles comes over the front of the hood and splashes on windshield. Very dangerous."— Illinois engineering supervisor. ★★ ★



Nothing Like It

OF ALL THE portable electric drills you may have been acquainted with, you've never seen one quite like this, with the chuck and removable handles stacked up on top of the motor, where they really belong. Clearance, balance and $\frac{1}{2}$ -in. hole-drilling power (over 2 in. in wood) have been built into a unit which, less the removable handles, is only a trifle larger than your fist.

With the chuck on top of the motor housing instead of in front of it as in conventional drills the new drill "points" naturally, controls easily when the torque is heavy as in drilling large-diameter holes, and balances nicely for accurate, one-handed work. With the removable handles off (the spade handle won't lose its screws) the unit is only $3\frac{3}{8}$ in. wide, a size that permits drilling a hole almost any place you can reach with your finger.

The new drill comes in several models ranging in price from \$54.50 to \$64.50. Also available is a Contractor's Kit with reversing drill, three bits and metal carrying case. Made by Stanley Power Tools, Div. of the Stanley Works, 195 Lake St., New Britain, Conn.



Cooler for Car or Boat

Standing upright in a boat or station wagon, a new ice chest has a front opening for easy access. The handles double as tie-down rings for rough roads or seas. The price is \$32.95; manufacturer is the Coleman Co., Wichita 1, Kan.

Scuba Search

(Continued from page 72)

is found by divers every year in the right waters, everything from loose Spanish pirate gold to sunken German subs from World War II. Lake, river and ocean bottoms have become a happy hunting ground for historians and archaeologists, too, searching for lost or flooded artifacts. One of our own favorite spots, Lake George, has turned up so many relics that New York State enforces state park restrictions to preserve valuable archaeological finds from souvenir hunters.

Laws of Salvage

One good thing to learn before you attempt any recovery diving is the salvage law in your waters. Laws vary from state to state, country to country, and from fresh water to salt water. A valuable object that has sunk or drifted away from its owner is not always free for the taking. You're entitled to a salvage fee or a share of the salvaged item's value in most cases, or a reward to defray expenses.

Smart divers work in occasional public relations jobs, recovering fishing tackle or lost items while they're diving just to make friends, and to convince fishermen and boaters that the scuba diver isn't really a menace.

Besides following the standard diving safety rules, it's a good idea to learn to use a little caution and restraint in handling some finds. If it looks like possible police evidence, for instance, you'll make the law very happy by marking the spot and contacting them without disturbing anything. If you think your find may have archaeological value, remember that wood, bone, pottery—even metal, left underwater for many years, deteriorates badly and can disintegrate at a touch. Again, better leave it alone until you learn what your find is. In any such case, an underwater camera can be a great help in identifying your find.

Divers available for search and salvage work can often perform valuable public service, and pick up occasional paying assignments, recovering drowning victims, police evidence, stolen property and lost insured property. Many clubs have placed themselves on standby service for their local police and fire departments and Civil Defense authorities, and many have won citations for their help in all kinds of emergencies.

There's no end to the possibilities of underwater exploration—the last frontier of historical and material wealth is down there, waiting for you to find it and bring it up. ★ ★ ★



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Attention YACHTSMEN • BOATMEN • FISHERMEN • SKIN DIVERS

Never before it at such a low price! NOW... exclusive with Palley's. A light weight, power-brute winch to lift that anchor. Has up to 2000 lb. pull with a rope speed of 130 to 150 ft. per min. Operates on 6, 8 or 12 Volt D.C. current. Weighs only 37 lbs. Also available in a vertical through-the-deck model at \$99.50.



U.S. NAVY WINCH SPECIAL 32.95

Will pay out, hold or reel in 4500 ft. of 3/32" steel cable. Drum is gear driven and operated by a hand crank. Can be turned at 1 to 1 or 8 to 3 ratio. Has ratchet and pawl type brake. Overall size: 29" x 13-1/2" x 13". Originally used to control aircraft towed gunnery targets.



SAVE! 1/30 HP ELECT. MOTOR Only 2.95 EA.

Surplus! Series wound, 28 V., DC. Turns up to 12,000 RPM. Case is 1-5/8" in dia. x 2-19/32" long.

DBL. ACTION HYDRAULIC 1500 PSI CYLINDER Bore 2-3/8", Stroke 19", Shaft 1-1/4", Length 30-3/4", 3/8" ports. 17.88 No. H-53AUSU. Used 24.88 No. H-53ANSU New

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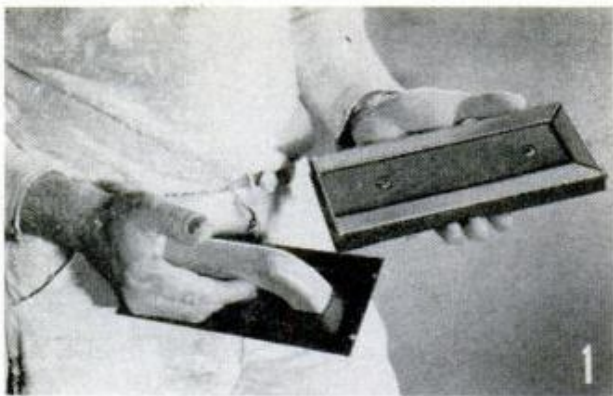
palley's

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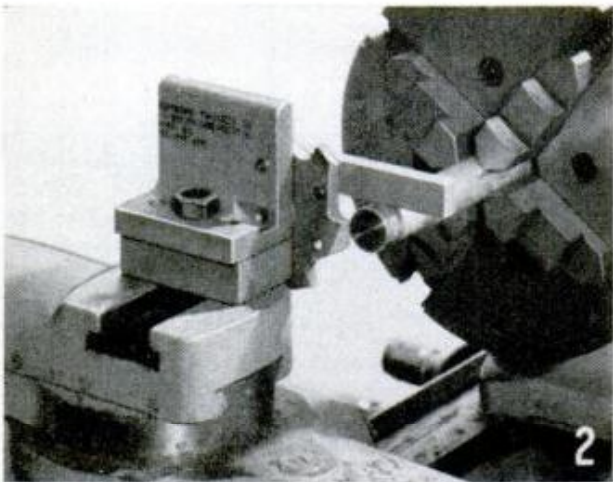
GALLAGHER

"He's putting up a good scrap!"



Shopping for tools

1. TROWEL USING INTERCHANGEABLE FLOATS is designed to save time and money for cement workers. Tool has single handle for holding variety of floats—locks automatically. Float also may be extended ahead of handle for working in hard-to-reach places. Ernco Enterprises, Box 422, South St. Paul, Minn.



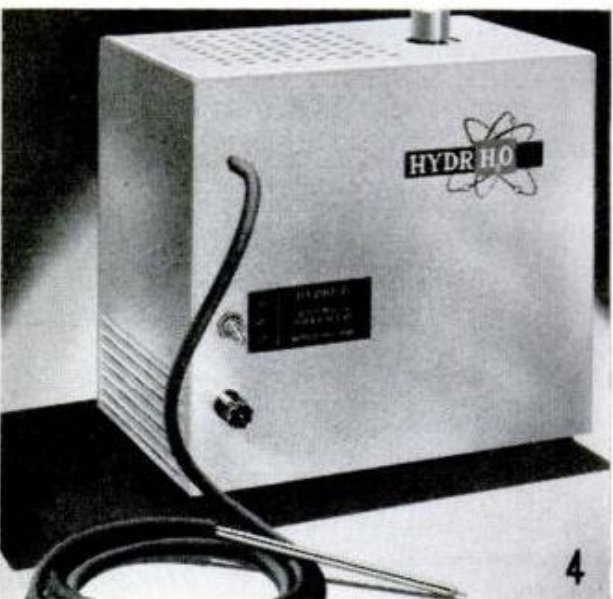
2. LATHE TOOL-POST TURRET consists of indexing "wheel" which presents six different (or alike) cutting edges, each centering automatically under over-arm. Wheel stands vertically in holder, is available as a blank, finish ground, or with carbide tips. \$14.00. Hoffmann Products Co., P. O. Box 853, Lake Forest, Ill.



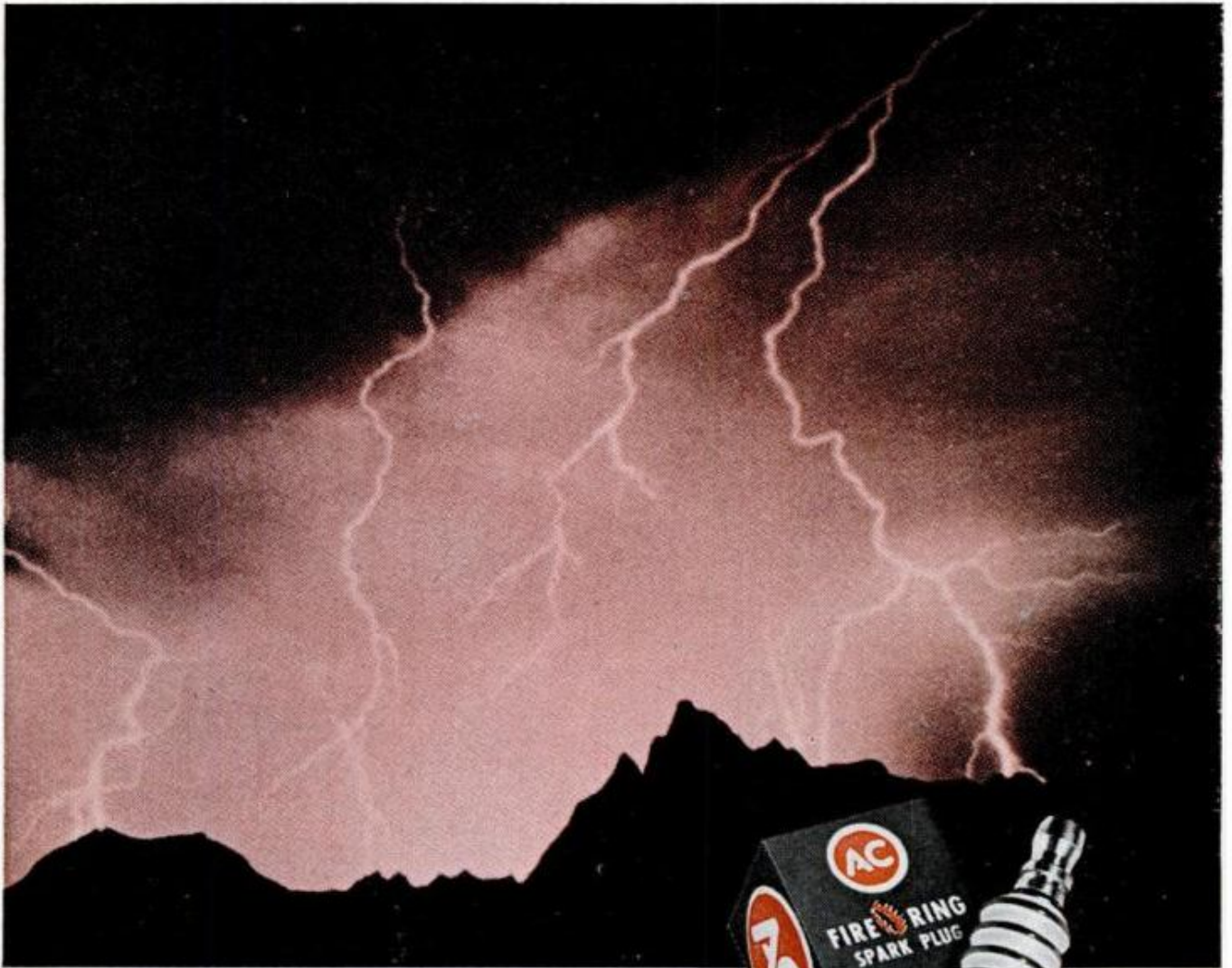
3. CARTRIDGE-LOADING GREASE GUN is versatile and easy to handle. Weighing just 9 oz., gun may be operated by one thumb; fits conveniently in pocket. With special nozzle and adapter, it attaches to any type grease fitting. Sells for under \$4. American Nubrex Inc., 1407 3rd Ave. S., Minneapolis 4, Minn.

4. SELF-CONTAINED WELDER requires only distilled water and electricity to operate. Device produces, mixes and immediately conducts hydrogen and oxygen to pencil torch. Booster cylinder with methyl alcohol doubles BTU output. Priced at less than \$199. Henes Mfg. Co., 1330 N. 21st Ave., Phoenix 9, Ariz.

5. DIAMOND-TIPPED MARKING TOOL, developed for engraving designs on glass, may also be used on plastic and metal items. The shaped point cuts lines of various depths and widths, depending on pressure applied and angle of point. Tool retails for \$2.95 from Diamond Art, 565 Fifth Ave., New York, N. Y.



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AC Fire-Ring Spark Plugs are unique among major spark plug brands. There is only one AC quality — sold only under the AC label. AC manufactures no "second line," nor does it sell under a "second name." AC's dedication to "one line" quality is one reason you always get action — an exclusive brand of action — with AC Fire-Ring Spark Plugs. When you need spark plugs for your car, boat or power mower, see the man best qualified to recommend the proper type. He's your AC Dealer. Ask for ACtion . . . ask for AC.



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AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

PUZZLE: FIND AL

Al's got himself lost in his job.

He does his work. He draws his pay. He gripes, and hopes, and waits. But the big breaks never seem to come.

You have to hunt hard for Al. He's in a rut!

Then, who's the figure standing out in the picture? That's Tom. Tom grew tired of waiting. He decided to act. He took three important steps:

1. Wrote to I.C.S. for their three famous career books.
2. Enrolled for an I.C.S. job-related course.
3. Started to apply—on the spot—what he was learning.

The others began to say, "Ask Tom, he knows." The supervisor began to take notice. The boss began to receive reports on Tom's progress. *And Tom began to move!*

It's a fact worth remembering: An I.C.S. student always stands out!

P.S.—You'll find men like Al everywhere—griping, hoping, waiting—reading this and skipping on. But forward-looking fellows like Tom will take time to investigate, will mark and mail the coupon and get the three valuable career books free. They're men of action. And a few short months from now, you'll see them start to move!



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- Heating
- Painting Contractor
- Plumbing
- Reading Arch. Blueprints

ART

- Commercial Art
- Magazine Illus.
- Sign Painting and Design's
- Sketching and Painting

AUTOMOTIVE

- Automobile
- Auto Body Rebuilding and Refinishing
- Auto Engine Tuneup
- Auto Electrical Technician
- Diesel Engines

AVIATION

- Aero-Engineering Technology
- Aviation Engine Mech.
- Reading Aircraft Blueprints

BUSINESS

- Accounting
- Advertising
- Bookkeeping and Cost Accounting
- Business Administration
- Business Management
- Clerk Typist
- Creative Salesmanship
- Managing a Small Business
- Professional Secretary
- Public Accounting
- Purchasing Agent
- Real Estate Salesmanship
- Salesmanship
- Salesmanship and Management
- Traffic Management

CHEMICAL

- Analytical Chemistry
- Chemical Engineering
- Chem. Lab. Technician
- General Chemistry

- Oil Field Technology
- Pulp and Paper Making

CIVIL ENGINEERING

- Civil Engineering
- Construction Engineering
- Highway Engineering
- Professional Engineer (Civil)
- Reading Struc. Blueprints
- Sanitary Engineer
- Sewage Plant Operator
- Structural Engineering
- Surveying and Mapping
- Water Works Operator

DRAFTING

- Aircraft Drafting
- Architectural Drafting
- Drafting & Machine Design
- Electrical Drafting
- Electrical Engineer Drafting
- Industrial Piping Drafting
- Mechanical Drafting
- Sheet Metal Drafting

ELECTRICAL

- Electrical Appliance Servicing
- Electrical Engineering

BEFORE which I have marked X (plus sample lesson):

- Electric Motor Repairman
- Elec. Engr. Technician
- Elec. Light and Power
- Practical Electrician
- Practical Lineman
- Professional Engineer

HIGH SCHOOL

- Good English
- High School Diploma
- High School General
- H. S. College Prep. (Eng'g & Science)
- High School Math
- High School Science
- Short Story Writing

LEADERSHIP

- Industrial Foremanship
- Industrial Supervision
- Personnel-Labor Relations
- Supervision

MECHANICAL and SHOP

- Diesel Engines
- Gas-Elec. Welding
- Heating and Air Conditioning
- Electrical Engineering
- Industrial Instrumentation

- Industrial Safety
- Machine Shop Practice
- Mechanical Engineering
- Plumbing and Heating
- Professional Engineer
- Quality Control
- Reading Shop Blueprints
- Refrigeration and Air Conditioning
- Tool Design
- Tool Making

RADIO, TELEVISION

- General Electronics Tech.
- Industrial Electronics
- Practical Radio-TV Eng'r
- Radio-TV Servicing
- TV Technician

RAILROAD

- General Railroad

STEAM and DIESEL POWER

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

TEXTILE

- General

Name _____ Age _____ Home Address _____

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