

Popular Mechanics

**THIEFPROOF
YOUR CAR** Page 112
17 of the best ways

JULY 1972
50 CENTS

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★ **WOW 'EM ON SKIS**
World's champion slalom and trick skier
Christie Freeman shows you how

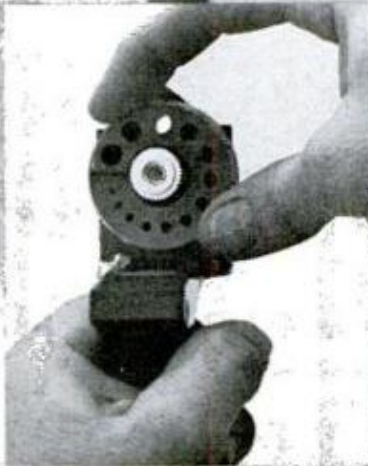
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Whatever you drive, wherever you go,
Pennzoil is worth asking for.



Now, drill straight as an arrow every time.



This One



5F9D-GYH-W6HZ

New Drill Guide helps your electric drill go straight and on the mark into metal, wood, plastic. No skidding in the wrong direction.

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PRECISION PLIERS
(wonderful for fine work)

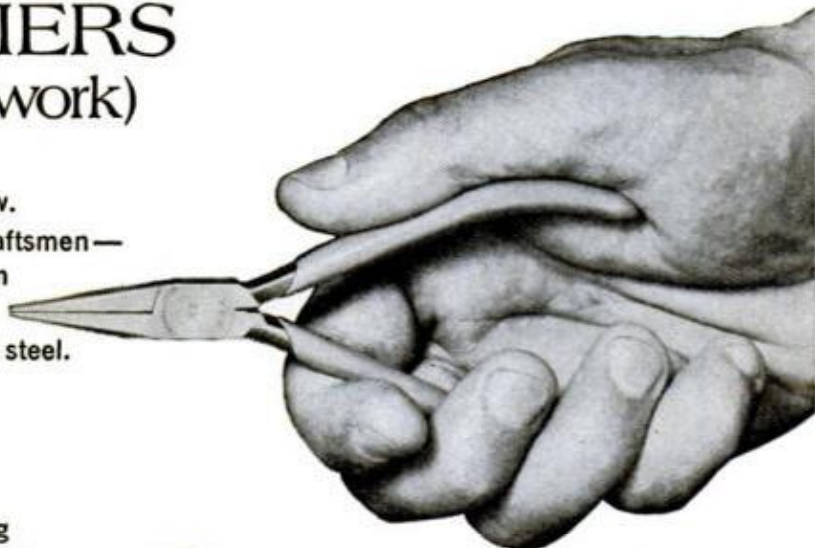
Beautiful? They'd grace a jeweler's window.

Practical? Thousands of precision work craftsmen—
professionals and hobbyists alike—buy them
every year and swear by them.

Precision made of high grade drop forged steel.
Beautiful polished finish. Blue dipped
plastic comfort grips.

Ask for CHANNELLOCK Little Champ
precision pliers. You'll like 'em.

LET US SEND YOU OUR CATALOG showing
Little Champs and their equally fine big cousins.



TOOLS BY
CHAN NEL LOCK
MEADVILLE, PA. 16335



2,000 miles in a weekend.

Gary Thronson got up at 5 am (as usual), piled his pretty wife, Glenda, and his son, Eric-the-tiger (who is the 5th generation of Thronsons to be born on the Thronson farm in Hayfield, Minnesota) into their Toyota, and headed south.

Gary did most of the driving, Glenda did some. The

Toyota and little Eric just kept on going.

And, at 5 am the next morning, they were in the middle of Arkansas.

They met some friends, saw the drag races, got back in the Toyota, and drove back. Another 1,000 miles, virtually nonstop.

"What's so special about that?" said Gary. "That little Toyota, she goes."

And goes, and goes. On Champion Spark Plugs.



Toledo, Ohio 43601

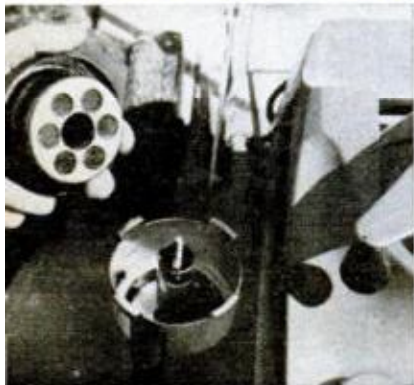
20 million people have switched to Champion Spark Plugs.

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Cover photo taken at Cypress Gardens, Fla., by Jerry Imber
Christie Freeman, world's champion slalom and trick skier, shows you how to wow 'em with spectacular tricks on skis

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JULY 1972

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LETTERS TO THE EDITOR

Speedometer won't spot bad vibes

Maybe you can find prop-shaft vibration with a tachometer, but *how* with the speedometer (*Troubleshooting by the seat of your pants*, page 120, May PM)? Almost no cars have transmission integral with the differential back at the rear end. Consequently, no matter what the gear range used, the prop shaft is going to make the same number of rpm per mile traveled.

THREE RIVERS, MICH.

A. MAHNKE

You're right. Author Mort Schultz really wasn't asleep at the wheel; he was just trying too hard to make it easy for car owners without tachs. The procedure he gave for isolating engine-caused vibrations from driveshaft vibrations can be followed if you have a tach, but you can't do it using your speedometer. Use of two different gear ranges lets the engine, and not the prop shaft, operate at different speeds.

Home improvement—keep the porch!

The many articles on house improvement were impressive and informative (*Better ways to get a better home*, page 110, April PM). Thank you for the publication of such helpful material.

BETHESDA, MD.

DENNIS G. BURDETTE

I was glad to see the April issue. I had been trying to convince my husband I need a bigger kitchen.

"Whoever heard of it downstairs?" says he. "PM." I said—so he at least will consider it now.

SNOHOMISH, WASH.

MRS. G. J. HINDS

How does anyone get the idea that a house is more functional and a better home if it does not have a front porch?

Some of your new "charm" sketches don't even show plans for a small roof to protect a person from the elements as he reaches for a key to the front door. Friends have to stand in the rain while waiting for someone to welcome them.

Finally, where can a person relax and

(Please turn to page 8)

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Norbert Kaiton,
Ridgewood, N.Y.

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It's all yours when you add a pint of Gumout to your gas tank.

Try it. It works.

GUMOUT

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Also available in Canada

LETTERS

(Continued from page 6)

"watch the world go by" if there is no porch?

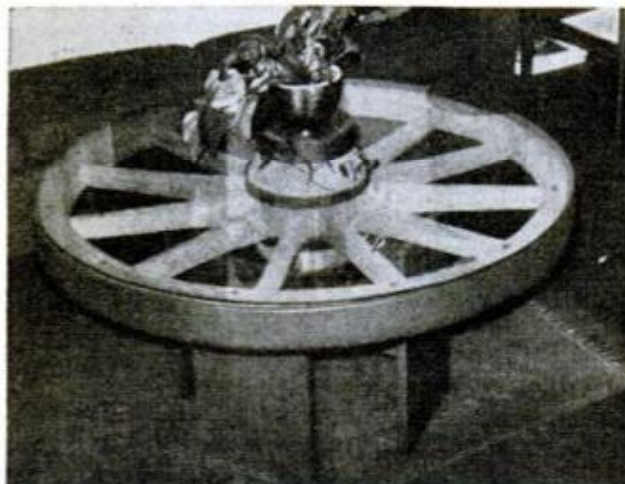
When I was a child, we lived in the country in Maryland. We had a large porch similar to the one shown on page 134. It was a "fun" porch for all seasons.

Our home now has a porch. Bettering your home should *not* include doing without a porch.

LONG BEACH, CALIF. ROLLAND TRUMAN

A bit different from PM's

I made my table slightly different from that in 'Glass-top' wagon-wheel table (page 182D, Feb. '71 PM). I made the stand straight instead of slanted, didn't cut notches for the spokes to rest in and



used quarter-inch plate glass for the top rather than plexiglass. (The glass was salvaged and very cheap.)

Everyone who sees the table likes it, and I am real pleased with the way it turned out.

WATSEKA, ILL.

FRED BOHLMANN

Source of electronic stopper

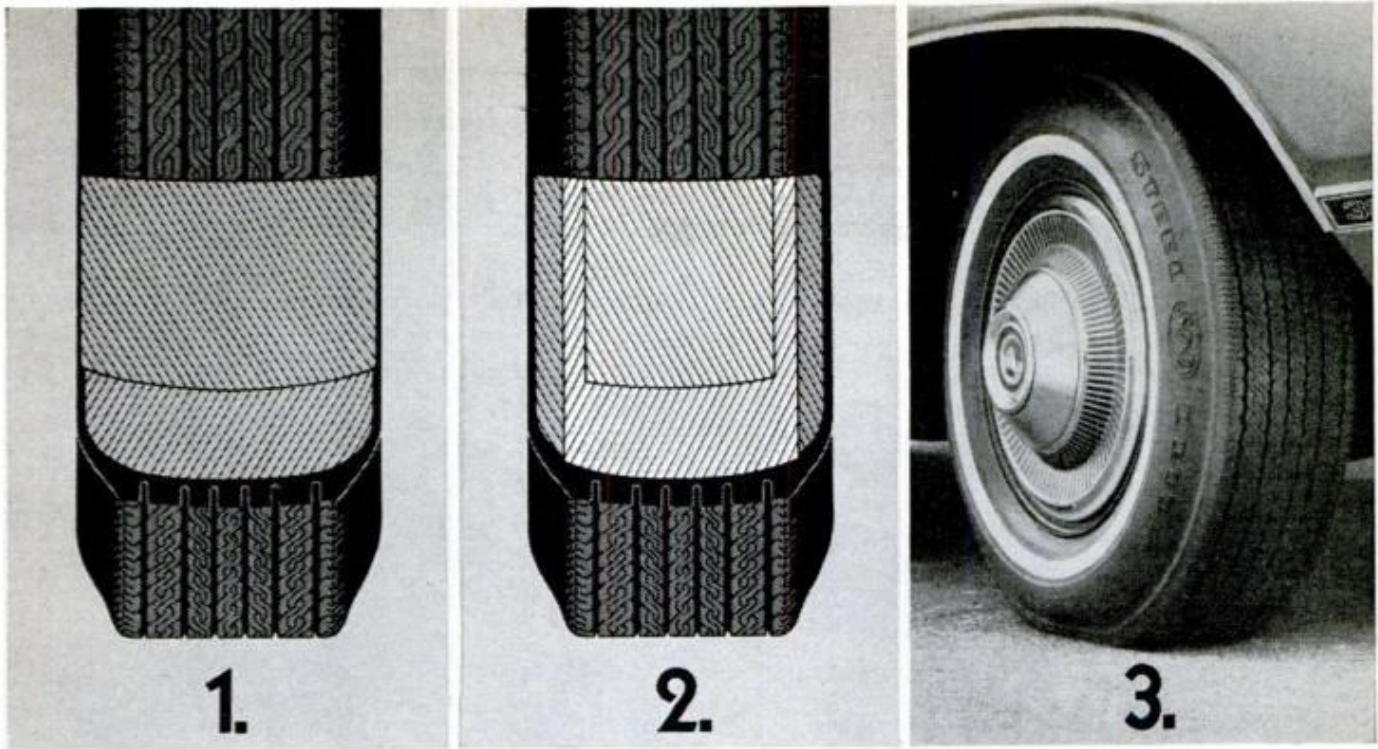
In the "Interior treatment of slab floor" portion of *What you should know before termites put the bite on you* (page 124, March PM), the third step involves use of an electronic stop device that will turn off a drill when it nears a conduit. What company supplies the unit?

MULBERRY, IND.

DONALD W. KELLER

Lots of readers are asking that question. The device, the Stop N'Time, is available from York Chemical Co., 195 Atlantic Ave., Garden City Park, N.Y. 11040. Model

(Please turn to page 10)



How to build the people tire.

The problem? Design a tough tire for a new world that has more driving for people to do, more curbs for people to run over, more people who are too busy to check their tires.

- 1.** Give it strong polyester body plies, full tread depth, and a concave molded tread.
- 2.** Put two armor belts of steel under the tread. Steel cords so strong a single cord will pull a car. Cords set so close together you'll need 805 feet for each tire.
- 3.** Or simply see your Firestone Dealer, Store, or service station. You'll find we've already built The People Tire and it's ready for you.

We're not saying it's a tire you *shouldn't* take care of. We're saying that, with a little care, it will really take care of you.

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500 Steel Belt

the people tire

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CARLO STOCK.

LETTERS

(Continued from page 8)

10, which will handle up to 10 amps., sells for \$89.50; Model 30, which handles up to 30 amps., sells for \$104.50. Both prices are f.o.b. Garden City Park.

Both units cut off the power to the tool being used when the bit strikes a grounded piece of metal, such as a water pipe, oil pipe, or conduit.

Etching in soot

Here's a photo from *The Daily Telegraph* of Napier, New Zealand, about my art form in soot. A few years ago I was reading an old PM that described this



technique (*Etching in soot*, page 151, Aug. '56 PM). So I thought I would try it. It has made a tremendous difference in my life and brought me great joy.

MRS. F.M. SANDERSON
MEEANEE, NEW ZEALAND

Round 2: VW vs Fiat

Just ran across Chris Kotowski's letter (*Letters*, page 6, March PM) saying he thinks the VW Beetle a better car than the Fiat. I disagree vehemently. I own a Fiat and have owned a Beetle.

About commercials—I think Chris has it the wrong way around. I was one of the victims of the carefully propagated myth that German engineering is better than Italian. My considered judgment is that anything the Germans can do, the Italians can do better—except advertise, maybe.

ANSONIA, CONN. ALAN MACFAWN

Has had one for eight years

The Wide Sweep Lawn Rake (*Exciting New Products*, page 126, May PM) is not a new product. I've had one for about eight years. It's named Sweep Rake and is made by Gardex, Inc., Michigan City, (Please turn to page 12)



**This
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won't
loosen.**

**This
handle
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These great minds were Rosicrucians . . .



Francis Bacon Benjamin Franklin Isaac Newton

WHAT SECRET POWER DID THEY POSSESS?

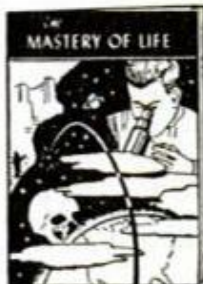
Why were these men great?

How does anyone—man or woman—achieve greatness? Is it not by mastery of the powers within ourselves?

Know the mysterious world within you! Attune yourself to the wisdom of the ages! Grasp the inner power of your mind! Learn the secrets of a full and peaceful life!

Benjamin Franklin, statesman and inventor . . . Isaac Newton, discoverer of the Law of Gravitation . . . Francis Bacon, philosopher and scientist . . . like many other learned and great men and women . . . were Rosicrucians. The Rosicrucians (NOT a religious organization) have been in existence for centuries. Today, headquarters of the Rosicrucians send over seven million pieces of mail annually to all parts of the world. Address: Scribe C.L.Z.

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Your Zip Code

LETTERS

(Continued from page 10)

Ind. Mine varies slightly from the one shown. It has 47 steel spring teeth on a 30-inch head with a 60-inch handle.

Turned upside down, it's excellent for leveling new topsoil.

WEST HAVEN, CONN. THOMAS W. GIBBONS

Not the only ones

How to be your own minibike mechanic (page 104, Jan. PM) is well written, but contains a misleading statement on page 106.

The writer has properly instructed readers to use grade 5 bolts or better, but he improperly advises that "the only nationwide suppliers of grade 8 bolts are Caterpillar Tractor dealers."

Grade 8 bolts are available from auto-parts dealers, automobile dealers, industrial parts-supply houses and, in fact, any one of more than 10,000 outlets sold by manufacturer/expeditors such as Kar Products, Inc., of Des Plaines, Ill. (I mention Kar products because the No. 8 bolt shown in the photo on page 106 bears the Kar mark on the head.

ELK GROVE VILLAGE, ILL. JAMES H. HURLEY

Sander builder

I just finished making my disc sander (*Salvaged motor makes a handy shop sander*, page 172, Dec. '71 PM). I chose the "alternate design," and instead of wheels, made a removable dolly so my machine won't move while I work. I added a door on the back for storage needs.

My sander was made in my eighth grade industrial arts class at Plaza Park School with the help of William E. Miller, my instructor. Let's have more articles like that one!

EVANSVILLE, IND.

EDDIE DELAU

Puzzled for two years

Two years ago my neighbor cleaned his attic and found an old board filled with holes and a bag of pegs. I was fascinated and made my own board. On and off, I've tried to find the solution to the puzzle.

You can imagine my surprise when reading the March PM I saw the peg puzzle (*Jump-a-peg puzzle*, page 137) and, to my great pleasure and satisfaction, the solution on page 145. Thank you!

PAWCATUCK, CONN.

A. A. BARBER

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in a Scorpion Too



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Find out about the complete Rotorway story . . . a truly exciting adventure in vertical flight.

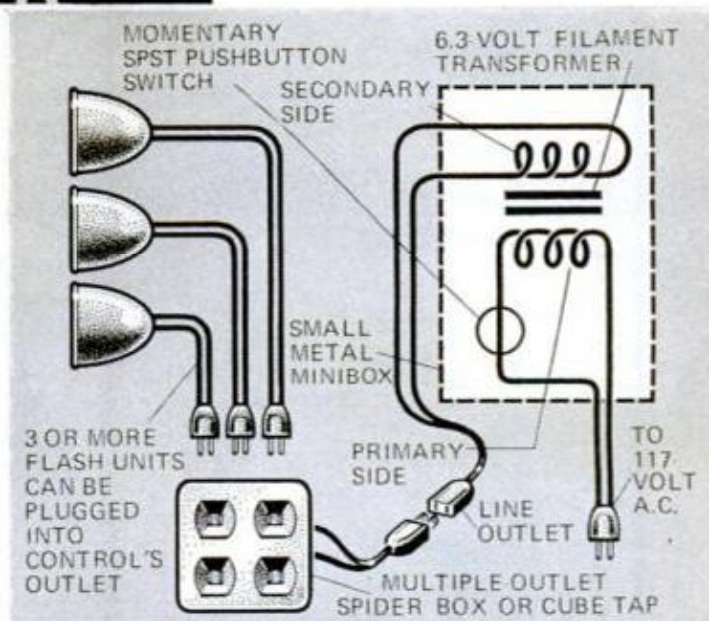
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PHOTO HINTS



Low-voltage flash control lets you shoot without batteries

With this low-voltage control, you don't have to worry about having a fresh supply of batteries on hand every time you want to make a flash shot. The control provides a limitless source of power right from your nearest wall outlet and can be used whenever you're shooting indoors with flashbulbs. A small radio-type filament transformer steps down line current to a tame six volts for firing the bulbs. (Firing flashbulbs directly on house current is not recommended as the high voltage occasionally causes the glass to shatter with explosive force.)

The control is designed primarily for open-flash shooting in a darkened room where you open the camera's shutter, fire the flash separately, then close the shutter. You just plug your flashgun into the

control, press a pushbutton switch, and the bulb fires. Simple flash holders can be improvised cheaply by fitting standard photoflood reflectors with screw-in flashbulb adapters, as shown at lower left, above. The adapters are available at photo shops. The transformer and pushbutton switch can be obtained from radio-parts stores or mail-order houses like Lafayette Radio and Allied Radio Shack.

If you want to control your flash with the camera's shutter release, wire a sync cord in series with one lead from the transformer. Pressing the release will thus fire the flash at the same time it trips the shutter. In this case, the pushbutton will have to be held down during the operation or replaced with a toggle switch.

—Norman Fallon, New York, N.Y.



See-through storage for film

A clear-plastic shoebox is ideal for storing film, especially if you keep it in the refrigerator to prolong its life. The box protects the film from spills and makes the contents readily visible for keeping tabs on your supply.—*John F. Pilznienski, Dearborn Heights, Mich.*



Mix chemicals with an eggbeater

An ordinary kitchen eggbeater makes a perfect tool for mixing powdered dark-room chemicals that must have water added. Use a stainless steel beater and mixing bowl, and neither the metal nor the chemicals will be affected by the other.—*Robert Hertzberg, Flushing, N. Y.*

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Drivin' with Dan

Why is webbing on the driver's side of stock cars? Why do radiators have to be changed so often in racing cars? Do race drivers need extra strength? Dan Gurney answers these and other automotive questions

Q. In the scenes in which cameras were mounted inside the cockpits of the race cars in Grand Prix and Le Mans the tachometer needles moved in discrete steps, much like the sweep hand of a stopwatch rather than the more familiar smooth arc. Are these special tachometers, or are the engines in these cars actually capable of exceptionally fast and accurate changes in rpm?—C.M. Hansen, Red Bank, N.J.

A. Racing tachs are usually mechanical, and they do move in snatches or leaps, particularly in the lower gears where the revs go up and down rapidly. Another type of tach is the chronometric where a second needle moves up with rpm but never drops back. It "sticks" to indicate the highest revs you've turned. You have to reset to zero.

Q. Why the webbing on the driver's side of stock cars at Daytona?—Don Moore, Tuscaloosa, Ala.

A. In the event that a driver runs the car with the window down for any reason, the webbing is intended to keep him from being thrown out the window in a violent crash or roll. The famous NASCAR and motorcycle ace



YANKEE 500Z is a new enduro machine from the Yankee Motor Co. in Schenectady, N. Y. The 500-cc two-stroke twin has simultaneous firing for off-the-road use and a conventional 180° setup for the road

Joe Weatherley was killed at Riverside when he was thrown partly out the window after he hit the wall because his brakes didn't function properly.

Q. In the last race at Phoenix last season, I noticed Mark Donohue left due to overheating. He said that the radiator had not been changed from Indianapolis. I believe the same thing happened to A.J. Foyt at the first race in Phoenix last season. Why is it necessary to change radiators on these cars for different tracks? Where is the Offy engine made for Indy cars and do they make engines for any other purpose, such as cars, trucks or industrial use?—Pat Parish, Fort Worth, Tex.

A. Most radiators lose cooling efficiency from being drained and filled often. When empty they seem to corrode faster. Aluminum radiators seem to require the most care. In Mark's case, I believe that small stones and gravel from the deteriorating race track were kicked up by the front tires and they bent the cooling fins closed, blocking off the airflow. Cooling 800 hp in a small car is a big problem. Offies (Drake) are made in Costa Mesa, Calif. They also make midget race car engines but none for passenger cars or trucks.

Q. Is Harley-Davidson the only American motorcycle manufacturer?—Linda Robbins, North Merick, N.Y.

A. No, it's not, but it's certainly the best known. A new American bike is the Yankee (appropriately named, isn't it?) As with Harley, not all of the machine is made in the United States; many components are imported. See the accompanying photo for the bike in action.

Q. I've noticed that some Championship and Formula One drivers wear shoes that look a lot like boxing shoes. Could you tell me what kind of shoes they are and what the advantages are

(Please turn to page 22)

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DRIVIN' WITH DAN

(Continued from page 20)

to wearing them? Do all drivers (including those who race on other circuits) wear that kind of shoe?—N.J. O'Reilly, Batesville, Ind.

A. There is a lot of variety in shoes in racing. Some drivers do wear boxing shoes although most wear shoes designed and made for racing, and they often are made of fire-resistant materials.

Q. Do race drivers develop unusual strength in their arms, or isn't race driving that tough?—Cal Draper, Corbin, Ky.

A. Race drivers do not need unusual strength. It's using the right muscular tension and concentration that is so exhausting. You are always straining for the "feel" of what the car is doing through the wheel. That requires extraordinary effort, but it's not totally muscular.

Q. I am presently a mechanic. While I realize that it may take considerable time and effort, my ambition is to become a mechanic on the racing circuit. What steps should I take to accomplish my goal (training, books to read, people to contact, gaining recognition in the field)?—Nelson Haggerty, Flagstaff, Ariz.

A. I suggest that you seek out Clint Brawler, who lives in Phoenix and ask him. He has one of the best records in Championship USAC racing as a chief mechanic. Reading is important and so is actual racing experience. Relating theory to practice is very important. You must be in the field before you gain recognition. Also, have you considered handling a friend's car in SCCA club racing?

Q. Approximately, what is the purse of the U.S. Grand Prix held at Watkins Glen?—Steven Prensky, Arverne, N.Y.

A. Approximately \$200,000 with \$50,000 to the winner.

Q. Last year FIA rules for the manufacturer's Championship stated that this year all 12-cylinder cars, including the Porsche 917 and the Ferrari 512, would be banned from the track. Recently I learned that a Ferrari 512 had won this year's Daytona. Porsche has quit competition because of rules; Ferrari hasn't. How can this be?—Eric Baker, Colorado Springs, Colo.

A. They haven't been banned because of the cylinders; the maximum displacement has been limited to 183 cu. in. Ferrari has a good engine in this limit (3 liters), but Porsche's

(Please turn to page 24)

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DRIVIN' WITH DAN

(Continued from page 22)

powerplant displaces 5 liters so it has decided to run its engines in the Can-Am Series instead.

Q. I own a 66 Tempest Custom and am interested in setting up the chassis and other suspension components for improved handling characteristics similar to those demanded by Trans-Am type racing. I would appreciate any information you could provide.—Paul Covey, Cincinnati.

A. Start with antiroll bars front and rear, and wider wheels and tires. Competition-style shocks also help.

Q. I overheard a British mechanic at Lime Rock and could hardly understand a word he said! I remember him referring to "tick over." What's that?—Bob Wright, Bridgeport, Conn.

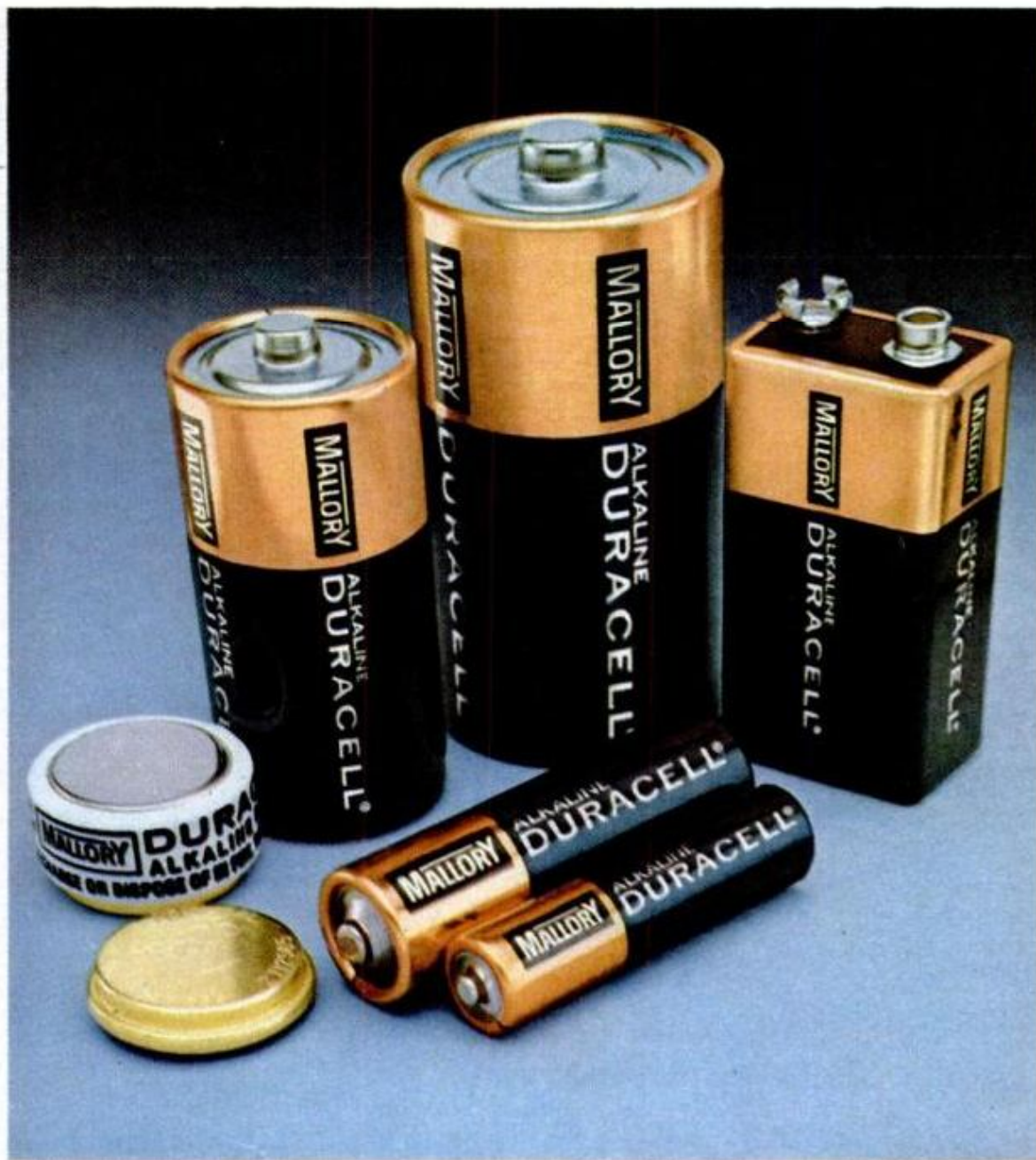
A. Indeed it's a different language—especially the auto and racing terms. I had to learn to communicate in American English and British English when I was first racing there. "Tick over" is simply idling rpm. Here are other terms that come to mind: dampers (shocks), wings (fenders), gudgeon pin (wrist pin), dynamo (generator), bonnet (hood), boot (trunk), track rod (tie rod). If you ever drive in England, old chap, make sure your "windscreen" is clean and your "tyres" are inflated properly. Really, you wouldn't want to run into any "flyover" abutments while you're driving on the left side of the "motorway!"

Q. Recently you said Phil Hill was the only "American" world champion. Where do you suppose the magnificent Juan Manuel Fangio comes from if not "America"?—Ed Krans, Salem, N.H.

A. I stand corrected and I hope you'll excuse my Yankee oversight. The Argentine, Juan Manuel Fangio, is certainly the acknowledged king of Grand Prix racing drivers of the Americas. He was five times World Grand Prix Champion and I believe he counts me as one of his many friends and admirers. I am also nevertheless very proud of the Norte Americano Phil Hill's achievement of winning the Grand Prix World Championship in an Italian Ferrari in 1961. I'm a Norte Americano myself! ★ ★ ★

If you have questions on racing, high-performance and everyday driving techniques, send them to "Drivin' with Dan," c/o Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Questions cannot be answered by individual letters. Questions on maintenance and repair should be addressed to the Auto Clinic (see page 46).

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I was young once, as you may be—today I am older. Not too old to enjoy the fruits of my work, but older in the sense of being wiser. And once I was poor, desperately poor. Today almost any man can stretch his income to make ends meet. Today, there are few who hunger for bread and shelter. But in my youth I knew the pinch of poverty; the emptiness of hunger; the cold stare of the creditor who would not take excuses for money. Today, all that is past. And behind my city house, my

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

By Victor B. Mason

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

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

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

I Have All The Money I Need

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

Please don't misunderstand this statement. I am not a philanthropist. I believe that charity is something that no proud man will accept. I have never seen a man who was worth his salt who would accept something for nothing. I have never met a highly successful man whom the world respected who did not sacrifice something to

gain his position. And, unless you are willing to make at least half the effort, I'm not interested in giving you a "leg up" to the achievement of your goal. Frankly, I'm going to charge you something for the secret I give you. Not a lot—but enough to make me believe that you are a little above the fellows who merely "wish" for success and are not willing to sacrifice something to get it.

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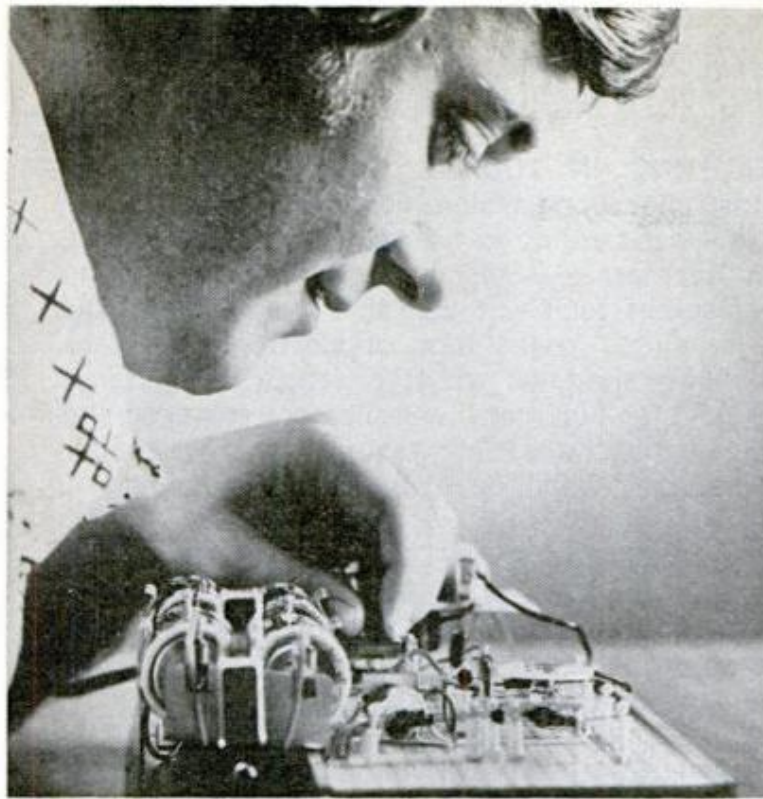
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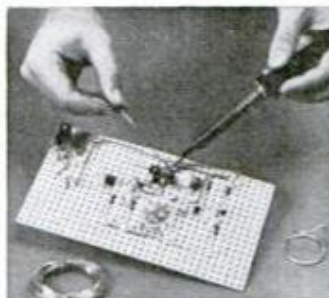
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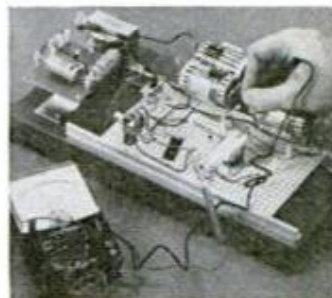
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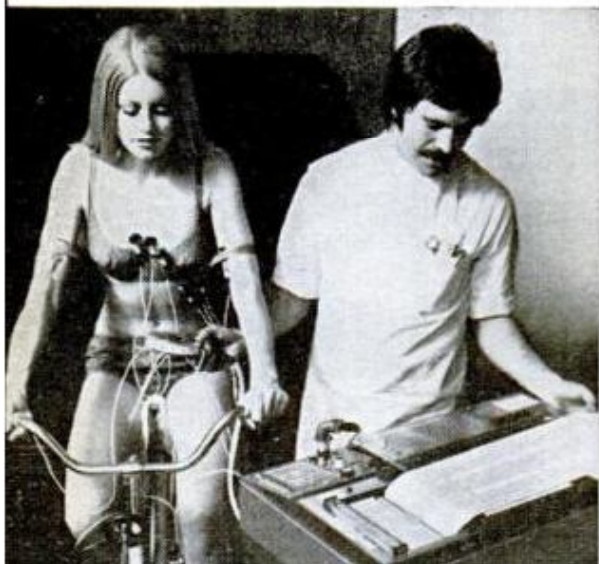
By JOHN PEARSON



Sight moves with pilot's head

DOGFIGHTING IN TODAY'S SUPERSONIC PLANES calls for split-second aiming. For greater accuracy, the Navy is experimenting with a helmet-mounted sighting system that provides instant elevation and azimuth-angle readings for any target that the pilot eyeballs. These readings, in the form of electronic impulses, automatically aim radar and other sensors at the target before guns or Sidewinder missiles are triggered. Immediate goal of the test program is to improve the air-to-air combat capabilities of the F-4J Phantom.

SOME 500 PERSONS ARE KILLED EACH YEAR by stings from bees, wasps, hornets and yellow jackets, according to Dr. Marion C. Collins, president of the Medic Alert Foundation. He reports this is more than double the number of fatalities attributable to snake bites. "Swelling in an area other than the site of the bite indicates the person has an allergy to the sting—an allergy that could prove fatal if not promptly treated," says Dr. Collins. He advises persons with such an allergy to wear a Medic Alert bracelet or necklace, which carries the phone number of the Foundation's computerized answering file. The file contains emergency information on each member.



Pedaling helps heart research

HOW AGE AFFECTS THE HEART'S RESPONSE to physical stress may be determined by "bicycle" tests being conducted at a laboratory in New York City. The ultimate object is to try to develop information that would provide a basis for devising an "early warning system" for heart attacks. Volunteers ranging in age from 18 to 80 ride a stationary bike while hooked up to an electrocardiograph machine and a computer. Several hundred measurements a minute are made, with a total of several thousand being recorded for each participant in the test.



Bending light with fiber optic

"GOOD QUALITY" GASOLINE WITHOUT LEAD and with an octane rating of 89 has been refined from crude shale oil, according to U.S. Bureau of Mines researchers. The octane number and low nitrogen-sulfur content of the shale oil fuel compare favorably with regular gasolines, say the scientists. A major drawback: Production costs are relatively high.

A NEW TYPE OF OPTICAL FIBER that may prove useful for communications systems of the future has been developed at the New Jersey labs of Bell Telephone. The fiber is a liquid-filled fused quartz tube that provides an efficient medium for transmitting light signals. These signals, in turn, can carry telephone, television and digital data transmissions. Light-guiding fibers are

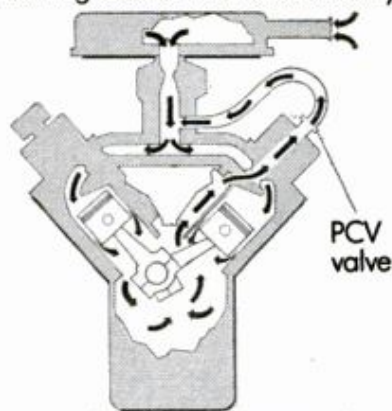
(Please turn to page 32)

Clean air: good reason to use a great oil.

Today's anti-pollution systems are making the temperature of your motor oil higher than ever before. And if your system isn't working properly, that makes it even tougher on your oil and your engine. Today you should name your oil. By type. By SAE Grade. By brand.

Briefly, here's what's happening.

When the PCV valve is working properly, your car's engine is running cleaner than ever. Blowby



gasses that once seeped into the crankcase are recycled back to the combustion chamber. This not only keeps the air cleaner; it also keeps your oil cleaner.

Keep your PCV Valve clean. On the other hand, if the PCV valve gets clogged, combustion or blowby gasses are trapped in your crankcase and form damaging corrosive acids. What's more, today's engines must operate on a leaner fuel/air mixture than did engines in cars without anti-pollution devices. So today, your engine, and its motor oil, are operating under much higher temperatures.

Other systems, more heat. Today's improved combustion systems, supplemental air injection systems, lower compression ratios, air conditioning and power equipment are all "hot items." They put extra stresses on your engine that can send your motor oil's temperature over the 300° level.

What heat can do to motor oil. Heat is motor oil's number one enemy. Because, when heated, oil has a tendency to oxidize. Excessive oxidation causes oil to thicken—and not lubricate properly.



The newest service designation — see the chart — is "SE." It meets 1972 requirements and it's vitally important that you use it when recommended.

Then, especially these days, ask for the highest quality brand you can find. By name.

Old designation	New designation	Oil description
ML (Motor Light)	SA	Oil without additive, except that it may contain pour and/or foam depressant
MM (Motor Medium)	SB	Provides some antioxidant and anticuff capabilities
1964 MS (Motor Severe)	SC	Oil meeting the 1964-67 requirements of the automobile manufacturers. Provides low-temperature antisludge and antirust performance
1968 MS (Motor Severe)	SD	Oil meeting the 1968-71 requirements of the automobile manufacturers. Provides greater low-temperature antisludge and antirust performance
1971-72 (none)	SE	Oil meeting the 1972 requirements of the automobile manufacturers. Provides high-temperature antioxidation, plus greater low-temperature antisludge and antirust performance

Remedy #1. Change oil frequently. Consider your car manufacturer's oil change recommendations as absolute minimums — under ideal conditions. Take careful note of the warnings against severe operations — such as heavy loads, sustained high-speed driving, constant heavy traffic, dusty roads, and extra cold weather. You might not be changing your oil often enough.

Remedy #2. Know your motor oils. First ask for the service designations and viscosity recommended in your owner's manual.

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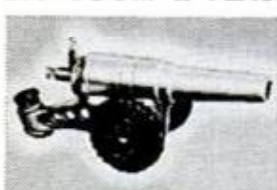
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SCIENCE WORLDWIDE

(Continued from page 30)

potentially cheap, adding to their promise as a high-capacity optical transmission medium. Up to now, fiber research has focused on solid-core fibers.

The environment

WORN-OUT TIRES, now being discarded in the United States at a rate of 200 million a year, will be used as fuel to generate steam for new tire production at a Goodyear Tire & Rubber Co. plant in Jackson, Mich. Scheduled for completion late this summer, the facility will burn 3000 tires a day. Smoke and odor molecules are consumed in the burning process, according to a Goodyear executive. All that finally remains of the tires is a sterile, inert ash. The process reportedly has been used successfully in England.

THE MAJOR PORTION OF PESTICIDES added to the environment can't be accounted for, according to University of California researchers. Scientists think that the chemicals pass into the atmosphere where they are broken down and altered under the influence of sunlight, oxygen and humidity. But the possibility exists, according to the scientists, that a presumably safe pesticide may be transformed into a harmful substance that will increase air pollution.

BILLED AS THE WORLD'S BIGGEST, a 175-ton stainless steel scrubber will be installed at a power-generating plant in Cohasset, Minn. Measuring 18 by 26 by 126 feet, the unit is a three-phase scrubber. Exhaust containing fly ash, sulfur dioxide and other pollutants is sprayed with water in one chamber, then pressurized in a second. In a third chamber the water is atomized and separated from particles of foreign matter. The moisture that remains is then evaporated as steam.

SIGNIFICANT AMOUNTS of gold and mercury have been found in certain Chesapeake Bay oysters, report University of Maryland researchers. The oysters come from an area that is affected by industrial pollution and is not fished commercially. The scientists indicate it's safe to eat commercially harvested oysters from the bay. ★★



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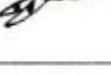
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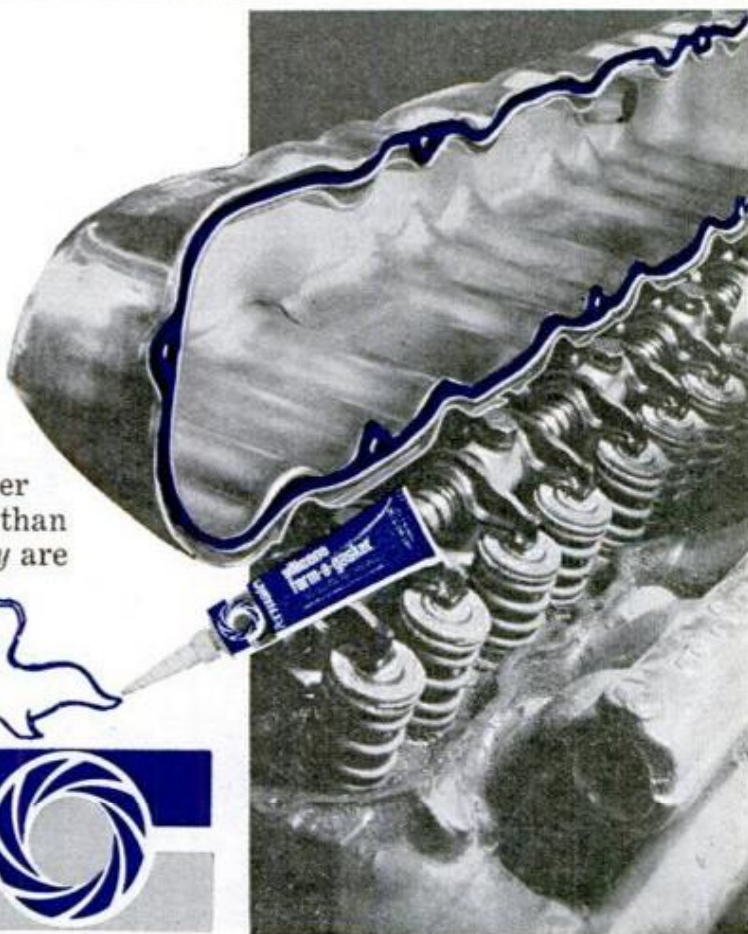
undercover job

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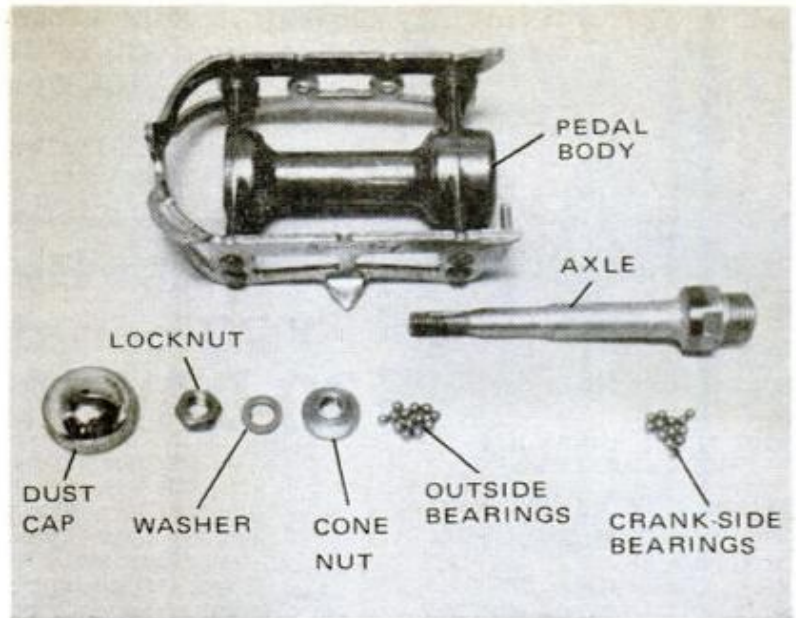
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THE BICYCLE SHOP

By EUGENE A. SLOANE

Tiny pedal bearings that take a lot of stress need periodic maintenance just as do all other moving parts of your bike



RATTRAP-TYPE PEDAL is disassembled to show two sets of bearings that are used at either end of axle. Lubricate them periodically

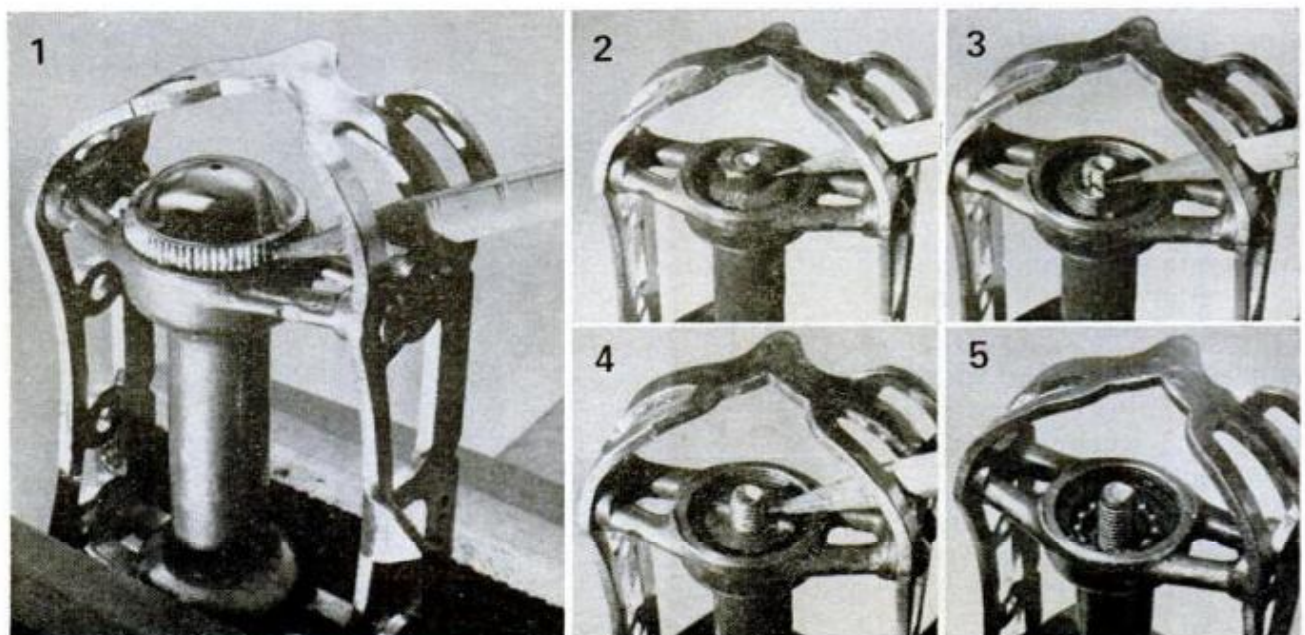
BICYCLE PEDALS need maintenance to prevent pedal bearings from wearing out prematurely. Pedal failure on inexpensive bicycles isn't too critical since new pedals cost only around \$7.50 a pair. Still, preventive maintenance could forestall failure indefinitely. Good pedals, such as Lyotard, cost upward of \$15 a pair; top-grade ones made by Campagnolo of Italy, list at a rather staggering \$30. It pays to care for your pedals, both in terms of cycling efficiency and replacement cost.

Pedal maintenance is simple. Remove them from the bicycle, disassemble, clean parts in kerosene, reassemble and adjust cone play. Some pedals can't be taken

apart, such as some German, Japanese and Italian rubber-tread types on less expensive bicycles. Your only maintenance is an occasional dash of medium heavy oil—No. 30 S.A.E. automotive oil, for example.

Pedals that can be disassembled should be lubricated every three or four months, depending on how often you ride. After a 1000-mile jaunt, pedals (and everything else) should come apart for a re-lube job.

Bicycle pedals are of two types: conventional rubber-tread pedals and racing type "rattrap" pedals. Maintenance procedures are similar, with one difference: To get at rubber pedal bearings, [\(Please turn to page 36\)](#)



TO DISASSEMBLE RATTRAP PEDAL, pry off dust cap shown in 1. Locknut, 2, is removed with wrench. Lift out locknut washer, 3. The cone nut, 4, is slotted; remove with a screwdriver. Ball bearings, 5, are in cup

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THE BICYCLE SHOP

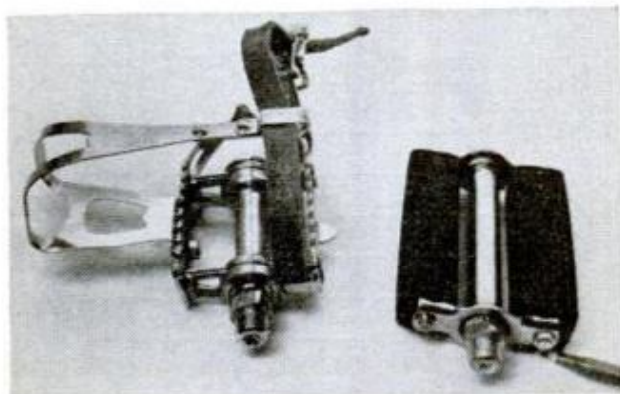
(Continued from page 34)

take the pedal rubbers out by unscrewing the rubber axle nut. Once the nut is off, the axles can be pulled out, revealing the pedal cone assembly. To get at rattrap pedal bearings, just remove the dust cap.

Pedal maintenance is a lot easier to do at your workbench. When you take off pedals, bear in mind that both unscrew toward the rear of the bicycle. So that you will never get threads caught and possibly stripped by trying to screw pedals on the wrong way, remember that pedals *always* thread on the bicycle toward the front. As you cycle, pedals should rotate in the direction they tighten; otherwise, they'll soon work loose and fall out.

Follow these simple steps to complete the dismantling of your pedals:

1. Unscrew pedal locknut.
2. With a small screwdriver, pry off the washer underneath the locknut. Note washer is splined.
3. With a screwdriver, unscrew the cone nut all the way off the axle. At this point, the pedal axle hub, where it screws into the crank, should be in a vise.
4. With pedal axle in vise, grasp pedal-axle top with your fingers so it can't slip back out the pedal body. Loosen the vise, and, with your fingers holding the pedal axle in the pedal body, lay pedal sideways on a rag, where the loose pedal bearings can't get away. This done, you can pull the axle out of the crank end of the pedal body and remove all the loose ball bearings from their cups. In the pedal illustrated there are 13 bearings in each cup. It's a good idea to count bearings in the cup before removing them to see if you've lost any. (If so, take a sample to your bike shop for an exact replacement.)



RUBBER-TREAD PEDAL compared to the rattrap type. The pencil is pointing to the rubber-tread axle nut

5. Clean everything in kerosene. Then put a light layer of grease (such as Lubriplate Type A) on both cups inside the pedal body, and roll bearings around in a dab of grease until they're lightly covered and clump together.

6. Put one set of bearings back in the crank side of the pedal body (the side opposite the dust cap, or opposite from where you unscrewed the cone locknut). Then tamp more grease around these bearings (the grease will hold bearings in place temporarily) and slide the axle, small side first, into the pedal body on the crank side. Pick up the axle sticking out of the pedal body side *without* bearings in the cup and, holding in this manner, put crank side of the pedal axle in the vise.

7. Stick the remaining bearings back into the cup on the locknut side, smear some grease over them, screw the cone nut back on the axle and hand-tighten until snug against bearings. Make sure the convex or rounded side of the cone nut goes first, with the flat side facing up. If axle threads are rough, you may need a screwdriver to screw the cone nut back on; either way, the cone nut should be brought *gently* snug against bearings, then backed away about one-quarter turn.

8. Insert the splined washer back on the axle, and then thread the locknut back on. Tighten the locknut snugly with a wrench, but be careful not to overdo it. A pedal axle shaft is not like an automotive headbolt; too much torque and you can strip the pedal axle nut.

9. Remove the reassembled pedal (dust cap or rubbers are not reinstalled at this point) from the vise. Grip the pedal body firmly in one hand, and twist the pedal axle shaft with the other. The axle should rotate freely, without binding or sensation of roughness or resistance. Twist it rapidly to and fro until grease is worked in well. Then twist the axle from side to side, up and down and in and out, to test for looseness and sideplay. If it binds, loosen the locknut, back off the cone nut about a quarter turn, retighten the locknut and check again for binding. The opposite procedure should be done if cones are too loose. With a little experience (say about 100 pedals) you will be able to get the cones just right the first time. Now thread the pedal back into the crank. ★★

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APPLIANCE CLINIC

By PAUL MANN

Sluggish toaster

The slide of our Hamilton Beach toaster drags and sticks, causing the toaster to remain on and toast to burn when it should have popped up. How do I repair something like this?—Michael Shay, Freehold, N.J.

This condition is usually caused by a buildup of foreign deposits on the slide mechanism or by a lack of lubrication. After a while, the accumulation of this foreign material, such as crumbs and grease, may interfere with the operation of the slide.

After disconnecting the cord from the power source, remove the toaster's cover for cleaning (a job you should do periodically). To do this, you first remove the light-dark adjustment knob, the screws from the bottom plate, and the handle; then you can lift off the cover.

Now, scrape off deposits on the slide mechanism and wash the mechanism with a nonflammable grease solvent and small paintbrush. Allow the solvent to air-dry, plug in the toaster and operate it for about four cycles to let the remaining solvent evaporate. Allow the toaster to cool and then lubricate the sliding parts with a heat-resistant grease having a silicone base. Such lubricant is available at hardware stores. Don't overlubricate; a thin film is sufficient.

Thunderclap

We have a 50-gallon natural-gas water heater almost 11 years old. Recently, when a hot-water faucet in the house is turned on, we hear a rumble from the heater that sounds like thunder. A plumber told me that particles have formed in the tank and when water moves there, it jiggles them. Can this be true?—Howard Moster, University Heights, Ohio.

According to technicians of the New Jersey Public Service Electric & Gas Co., deposits of particles can form on the bottom of a hot-water tank. When water en-

ters the tank, it does so with enough force to agitate particles, causing them to bounce off the sides of the tank. Intake tubes of many tanks extend almost to the tank floor—near enough to the particles to really stir them up. Particles can be a result of rust forming in the tank, a first sign that the unit is in the process of failing. In hard-water areas, particles may also result from calcium in the water. Calcium particles won't harm a tank, and the unit may remain serviceable for many years, although the noise may be annoying.

Getting replacement parts

We have a Hotpoint upright freezer 14 years old. It's in good shape, but the handle and latch broke and we haven't been able to get another. They say that after 10 years the company stops making parts. Is this true?—Warren Lowry, Colfax, Wis.

Who is "they"? Certainly not the major manufacturers of appliances, which maintain parts supply depots in every state to keep stocks of replacement parts. For example, General Electric's policy is to make operating parts available for 15 years from the last production date of a model. The company will even supply parts beyond this period if there is a continuing demand. Their warehouses are often in the largest city of a state.

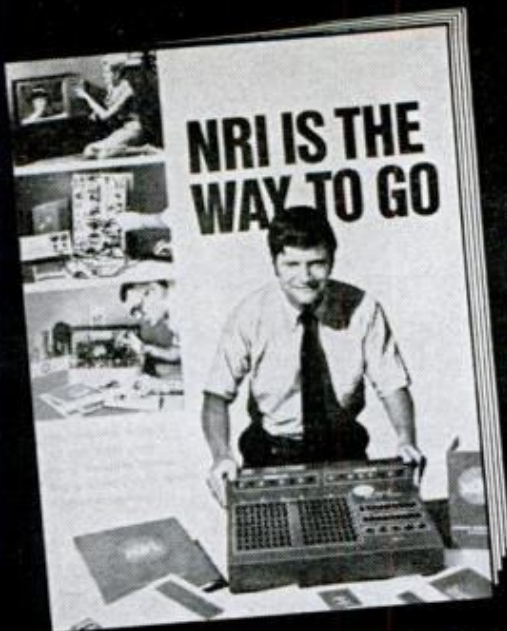
In addition, there are independent appliance-parts supply houses that stock the most popular replacement parts for major brands of appliances. Do a little detective work and find out where these parts depots are located. Then write or phone them. I'm quite sure you'll get what you need.

Wash and tear

I'm almost certain that our washing machine is tearing our clothes. On a few occasions, clothes that I am sure were in good condition had tears in them when removed from the machine. Is there anything that can do this?—Mrs. Jack Engel, Columbus, Ohio.

This is not common, but it can happen if the agitator has developed burrs, sharp spots or rough areas. I suggest that you remove the agitator from the washer and examine it carefully for damage. Also look for rough spots in the drum. If you find any carefully sand them down with a

(Please turn to page 40)



1

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APPLIANCE CLINIC

(Continued from page 38)

piece of fine emery cloth. And check what goes into that machine. Something had to damage the agitator—maybe something that was inadvertently left in a pants pocket or such.

Power shortage

After changing the motor brushes in a Lewyt Model 88 vacuum cleaner, I find that there has been no increase in the power. Why not?—Warren E. Fassy Jr., Nola, La.

Changing of the motor brushes will not change the performance unless, of course, the old brushes were so completely worn out that the motor wasn't operating. There is no way to improve the performance of a vacuum cleaner over and above its original performance.

However, your unit may be clogged with dirt. To find out, just place your hand over the end of the hose while the appliance is running. If the vacuum cleaner is operating satisfactorily, you will hear a change in speed and noise. If there is no change, the unit is probably clogged and should be cleaned out.

Help is available

I think I've been cheated. A repairman charged me \$60 to install a new thermostat in a refrigerator which was running three hours at a time. There has been no relief. Is there any consumer group around that can help people who must rely on professionals for appliance repair?—Mrs. Robert Franco, Newark, N.J.

Try the Major Appliance Consumer Action Panel (MACAP) at 20 North Wacker Dr., Chicago 60606. This group comprises a panel of experts that has recently been established by the Assn. of Home Appliance Manufacturers, the Gas Appliance Manufacturers' Assn. and the American Retail Federation. Anyone who thinks he has been victimized by a serviceman or who buys an appliance that is faulty may find it worthwhile to get in touch with MACAP. ★★★

If you have a question about any appliance, send it to Appliance Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Sorry, but letters cannot be answered individually. However, problems of widest interest will be answered in this column.

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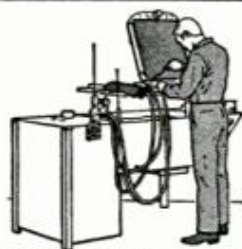
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Supertire lets you ride a blowout!

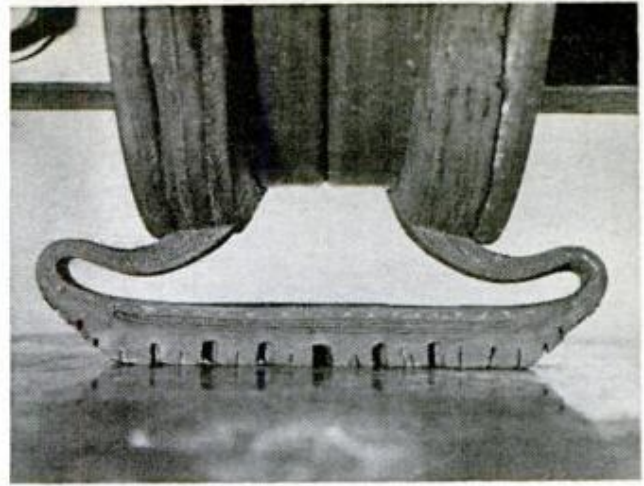
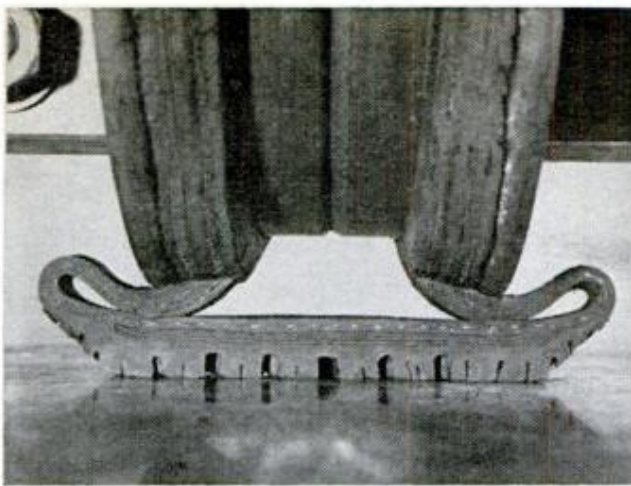
Dunlop's 'total mobility tire' lets you maintain complete control of your car and ride without ruining the flat tire!

By DAVID LAMPE

YOU'RE DRIVING FAST, speedometer is nudging 80 mph and your full concentration is on the car—on the hum of the engine, the road noise of the tires and on your own reflexes as you click off the miles. Suddenly, up front—a loud bang. If you're quick, cool—and lucky—you can wrestle the car to a safe stop using up the whole road to do it.

Blowouts are hazardous with today's tires, but in just two years—in 1974—things will be different. High-speed blowouts—even at 100—will signal themselves to you gently by a minor steering shudder, a slight heaviness on the steering wheel and a slight pull toward the blown tire. But you'll still be in control of your car, and if you ease back to 50, you'll be able to drive on for at least 100 miles without damaging either your tire, your vehicle or your nerves. Indeed, if your blowout is less than a quarter inch in diameter, it'll seal itself while you drive. And your tire will partially reinflate as you go along.

TOTAL MOBILITY TIRE, as Dunlop calls it, is designed to stay in position on the wheel rim after a blowout with the wheel rim resting on the cushioned tread areas. Conventional tire will dislodge from the rim and is badly damaged very quickly. Extensive testing has shown that the tire can run up to 100 miles at speeds up to 50 mph after a blowout and still allow driver control of the car



CUTAWAY OF TIRE at left shows tire after a blowout. Note the wide bead that remains in place. A special fluid inside the tire vaporizes immediately after the blowout to lubricate against friction, to seal small punctures and to partially reinflate the tire as you continue to drive on it as shown in the photo at right

This isn't just a "maybe" proposition. Five years ago somebody at Rolls-Royce suggested to a design engineer employed by Dunlop, Europe's biggest tire manufacturer, that fail-safe tires would add a final touch of perfection to "the world's best" autos. The Dunlop man agreed—and said that "lesser" cars should also be shod more safely. And so the firm that produced the world's first pneumatic tires almost 100 years ago—for bicycles—decided to apply its more recent experience in designing Grand Prix racing tires to the ultimate tires for everyday autos.

Dunlop engineers already knew that a blowout causes havoc—even at comparatively low speeds—because a burst tire's beading jumps from the flat outer edge of the rim into the well at the center. The distorted tire then quickly shreds away to nothing. To keep this from happening on Grand Prix racers, Dunlop had worked out a way to peg tire casings to wheel rims. In 1970, champion driver Jackie Stewart had barreled a Matra-Ford around South Africa's Kyalami racing circuit at a blistering 130 miles an hour—with one of his pegged-on Dunlops absolutely flat.

Like most modern racing tires, the treads on Stewart's were wider than their sidewalls were high. Their low profiles, extra-stiff sidewalls and pegging kept them within 60 percent of their inflated shape even with no air inside.

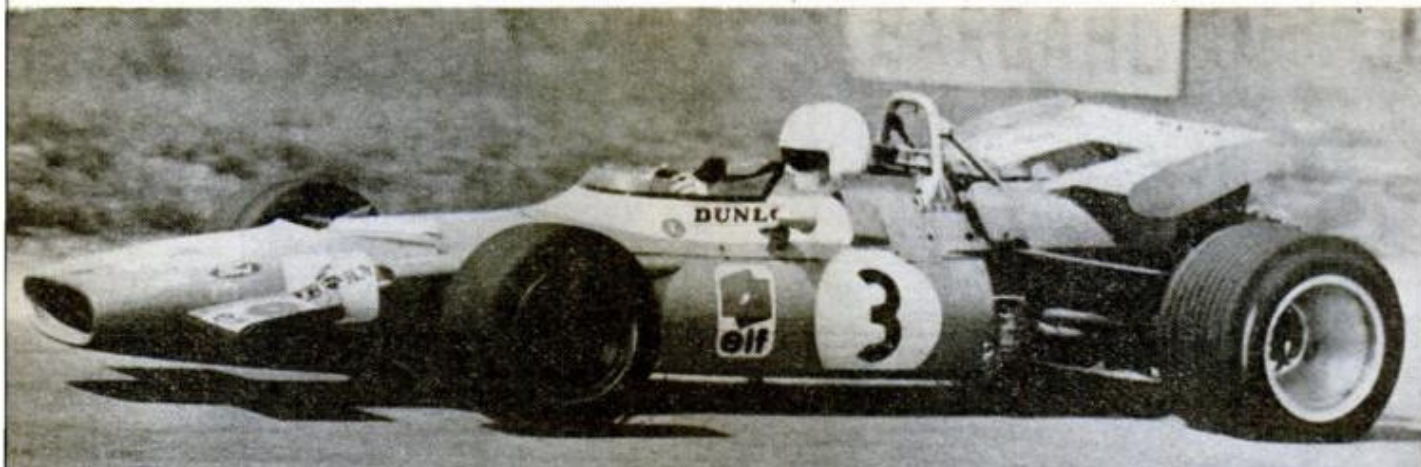
For a passenger-car version of this "Total Mobility Tire," Dunlop produced a low-profile tubeless casing of conventional radial construction but with extra stiff sidewalls. To keep this new tire from abrading inside when it blows—and from generating rubber-destroying heat—Dun-

lop chemists concocted a liquid lubricant (they still won't say what's in it, but it's thin, oily, brown) which is released automatically inside their new tire when it bursts. This liquid, beside lubricating the rubber to ease abrasion, dissipates heat. It also happens to be a rubber solvent—and seals holes up to a quarter inch in diameter. Finally, as it warms up, this liquid vaporizes, expands and begins to reinflate the blown tire. It builds up only five to ten pounds per square inch of pressure—but that's sufficient to lift the car a little, and so stop further scrubbing inside the tire.

Dunlop technicians plan to encapsulate the multipurpose liquid in the rim of their new tire or, possibly, in the walls of the tire itself. "You need about a wine-glassful for a small tire," a Dunlop man told me. He also explained that 16 different systems of encapsulation are being considered.

Pegging a tire casing to a rim—as Dunlop did on Jackie Stewart's Matra-Ford—is expensive and complicated. So for its new tire, Dunlop—which also is Europe's biggest manufacturer of auto wheels—has invented a new flat-bottomed rim section that has no well a tire's beading can sink into. Its new tire beading is so fat that no amount of lateral pushing and pulling will draw it out of position.

To get the feel of the Total Mobility Tire, I drove a small, British Leyland Mini fitted with them. I let all the air out of one front tire, then steered into a cobblestone roadway and gunned up to 50. I zigzagged. I bounced the little car in and out of gutters. I took corners foolishly fast. I braked like a lunatic. Yet except



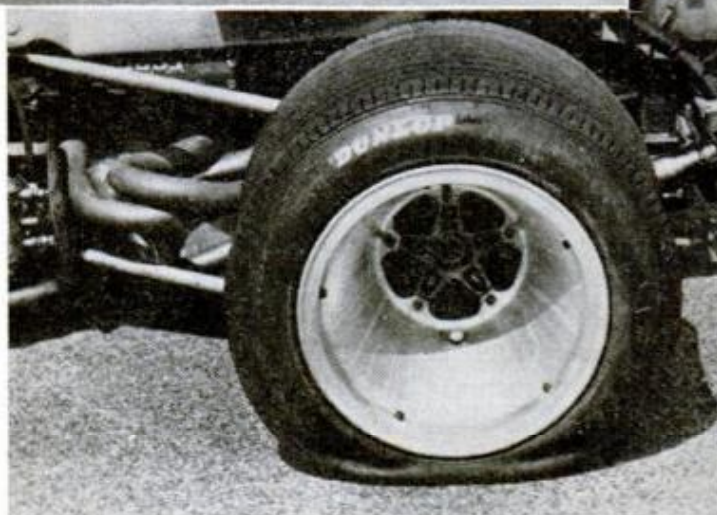
BEAD-RETAINING DEVICES were used on rear tire of Jackie Stewart's Matra-Ford during these early tests by Dunlop engineers who developed the super-tire. Car handled even at 130 mph with tire flat

for a very slight pull of the steering toward the flat tire, I wasn't even aware I was driving on anything unusual. At the end of my test the flat tire, by then partially inflated by the miracle liquid inside it, was in as safe a condition as it'd been at the start.

More than 30 international patents already protect this new invention, but Dunlop technicians admit it's not yet past the prototype stage. "Next step," Ian Mills, a member of the design team, told me, "is to design a specific tire and wheel for a specific production car." And so early this year, the Total Mobility Tire was shown to automakers in Britain, France and Italy. Interest was considerable, and the first production autos shod for total mobility should be in European showrooms in 1974. Several European tiremakers, anxious to get into the act, are negotiating with Dunlop to make the tires under license, an arrangement I suspect we'll also see here.

Not all the big problems have been solved. Although the new tire can be vulcanized as easily as conventional radials, getting it on and off rims remains a factory operation. To replace a Total Mobility Tire at present, you also have to replace the rim it's wedded to. But Ian Mills assured me that a number of different tire-mounting methods are being studied. At the same time, he explained, Dunlop market researchers are trying to determine whether motorists will be willing to take full advantage of the innovation, buying cars without spare wheels and buying new rims with their new tires.

Initially, Total Mobility wheel and tire



AUTHOR DEFLATED SUPERTIRE on this Mini and tortured it without losing control or damaging tire



units will cost marginally more than conventional radial tires—if drivers will forego carrying spare tires. And since the new tires will last a lot longer, give much greater road adhesion and immeasurably greater safety and convenience, their per-mile cost at slightly more than radials' shouldn't upset most motorists.

The biggest bug of all that Dunlop planners face is a law not one British driver in a thousand is aware of. Over there it happens to be an offense to drive on a public road with a flat tire! ★★★

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SOLUTIONS FOR MECHANICAL HEADACHES

AUTOMOBILE CLINIC

BY MORT SCHULTZ

Freeze up

When I drive my 1971 Dodge Monaco with the airconditioner on for four or five hours steady, the unit freezes up and no air will come through. I shut it off for 15 or 20 minutes, which apparently allows the freezing condition to subside, because the unit will work again. What's wrong?—Robert Deer, Adrian, Mich.

Possibly a frozen evaporator coil, which can be caused by excessive dirt on the fins or a malfunctioning part related to the evaporator, such as the expansion valve. Before having the evaporator dismantled, however, run the unit and look into the sight glass of the receiver-dryer, which is that large cylinder you'll find near the condenser. If you see bubbles, it means that there is moisture in the system that is probably causing your problem. Evacuate and vacuum the system, replace the receiver-dryer with a new unit, and recharge the system with refrigerant.

Hole in the head

I have a 1961 Buick Special with an aluminum head that has had a couple of its sparkplug holes stripped. Can this be corrected without replacing the head?—Earl Stiles, Casper, Wyo.

Kits are available for both aluminum and cast-iron heads. One major maker is the K-D Manufacturing Co. of Lancaster, Pa. The kit contains solid steel inserts of various sizes and a tap-and-reamer. Repairs can be made with the head remaining on the engine. If you can't find the kit locally, I suggest that you write the manufacturer.

Dwell awhile

We are running 1965 and 1967 Volkswagen Beetles. Both have the Bosch distributor. What is the dwell angle? No one seems to know, including the local dealer.—C. R. Hullihen, Bloomfield Hills, Mich.

The nominal dwell for the Bosch distributor—that is, the dwell at which new points should be set—is 44° to 50°. The wear limit dwell specification is 42° to 58°. Used points need not be reset as long as

the dwell is within this range. Tell your dealer. He can use the information.

Turn off dieseling

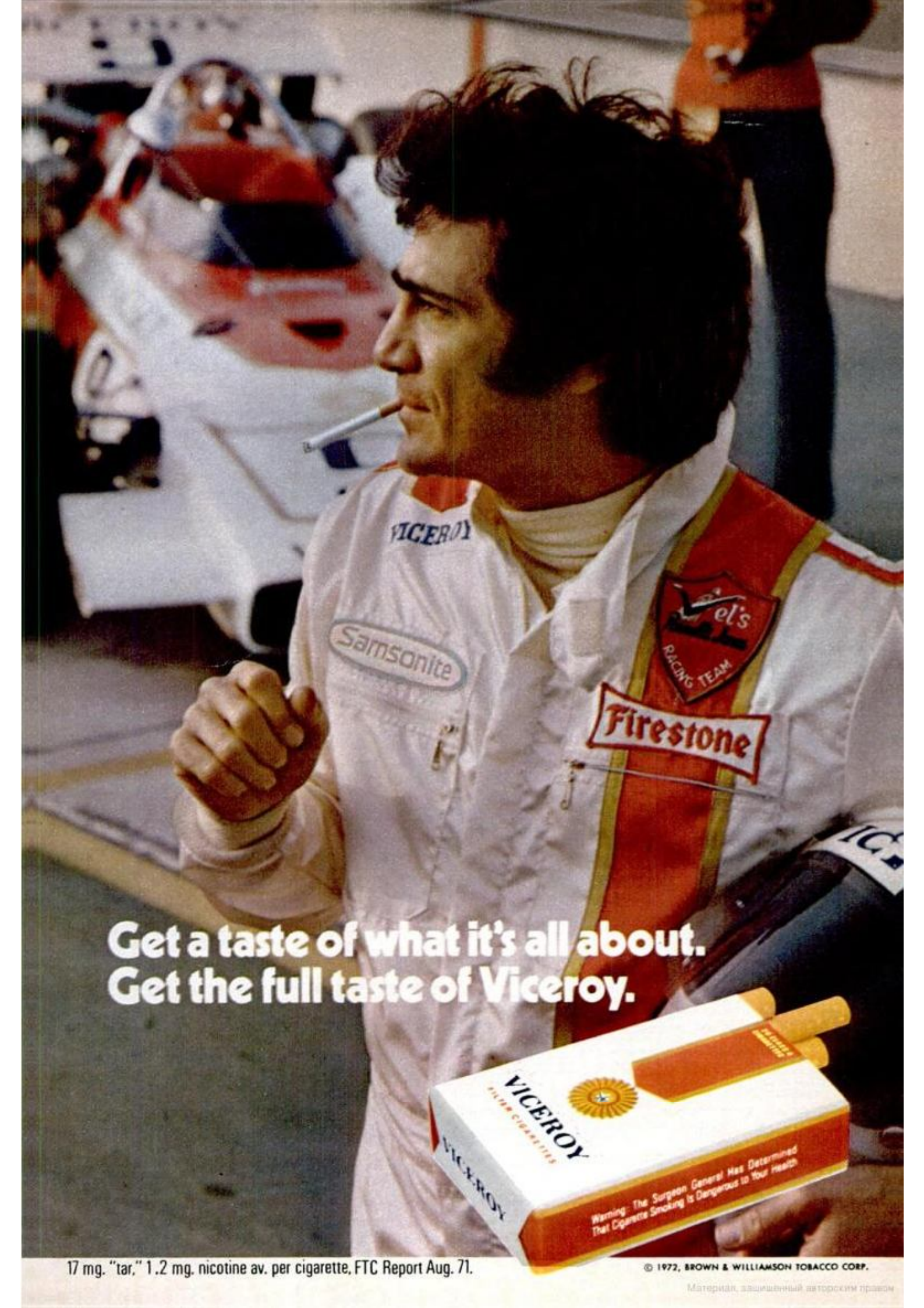
The 429-cu.-in. engine of my 1970 Mercury Colony Park often continues to run after I turn off the ignition. I have to sit and wait for it to sputter, cough and finally die out. It happens in any kind of weather. My mechanic says the car's idling is too fast and he keeps slowing it down. Pretty soon, there will be no idle left. Please help us.—Harvey M. Tuckman, Norwalk, Conn.

It's time to settle this once and for all, because *Automobile Clinic* is receiving so many letters concerning this problem. The condition is called dieseling or after-running. It prevails primarily in late-model engines, which, because of emission control equipment, operate on lean fuel mixtures and retarded ignition-timing settings. We've discussed the theoretical aspects before (see *Saturday Mechanic: How to stop a dieseling engine*, page 154, Oct. '69, PM).

For now, let me emphasize that to control dieseling the carburetor and ignition timing settings must be exactly to manufacturer's specifications. Many models are equipped with a throttle solenoid and other controls, such as time delay and recovery relays, that help reduce exhaust emissions by eliminating distributor advance in the low forward gears. If these components are not adjusted properly or are inoperative, dieseling will occur. Also, remember to keep your foot off the throttle before turning off the ignition. As a last resort to get an engine to cut out without dieseling, shut the ignition off with the transmission in gear.

The search goes on

I have a 1966 Chevrolet with a 283-cu.-in. V8 engine that cuts out and backfires terribly when I take off from a dead stop or try to accelerate. I've taken the car to two Chevy dealers and two independent mechanics. They have replaced the fuel
(Please turn to page 48)



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AUTOMOBILE CLINIC

(Continued from page 46)

pump, fuel filter, coil, sparkplugs, breaker points and condenser. The carburetor is new and plug wires have been checked. What have we missed?—Dave Hill Jr., St. Elmo, Ill.

There are two other possibilities. Just on a hunch: Have the engine checked carefully for a vacuum leak. But the more likely cause of the trouble is a leaking or sticking valve, or a weak or broken intake valve spring. I'd get some diagnostic work done on the innards of the engine—you've done everything on the outside.

Clutching for a solution

My 1966 Oldsmobile Dynamic 88 wears out one clutch after another. I'm now about to have the fourth one installed in 14 months. All have shown definite wear. Do you have any ideas why this is happening?—William Gleim, Fresno, Calif.

The two most common reasons for rapid clutch wear are improper adjustment and riding the clutch pedal. Many car owners think a new clutch doesn't require adjustment. They're wrong. A new clutch requires readjustment soon after it is installed, because parts are new and "tight." A clutch will wear out if there isn't ample tolerance. There should be about one inch of free play in the clutch pedal. To be on the safe side, have the clutch readjusted 30 days after installation and again 30 to 60 days after that. Riding a clutch—that is, depressing the pedal part way or simply resting your foot on the pedal—will wear out a clutch faster than anything else. Many drivers ride a clutch pedal unconsciously. Stay aware of what you're doing, and keep your foot off that pedal except when actually shifting.

Forced retirement

My 1967 Plymouth with a slant Six has 50,000 miles on it and is using quite a bit of oil. The oil is coming out of the filler neck. My mechanic checked the PCV valve, and it's okay. He took the oil filler cap off and raced the engine. Oil smoke came out the filler neck, which prompted

him to say that I have a tired engine and should get rid of the car. Should I follow his advice?—Earl G. Aker Sr., West Greenwich, R. I.

That depends on how much you trust your mechanic's judgment and how much money you are prepared to spend. Assuming the worst—that the engine needs a complete overhaul because of worn rings, piston and bearings—can you purchase a car for the few hundred dollars it will cost to replace or overhaul the engine? But maybe things aren't as bad as you think. This is why I say that it may be worthwhile to get the opinions of a couple of other mechanics. "Oil smoke" and oil loss can be caused by other things, such as bad valve-guide seals, which are relatively inexpensive to replace.

Window woes

I own a 1969 Jeep. It has a white vinyl top and plexiglass windows. I keep the windows clean with wax, but the back window has become badly stained with road oil and salt. I can hardly see through it. I have tried every household product to get it clean, but nothing helps. Have you any suggestions?—Richard Froehlich, Johnstown, Pa.

Frankly, no, other than to have the window replaced. Dirt and grime eat into these windows, and it is most difficult to get them clean. If any other Jeep owners have had the same problem and have found a solution, let us know!

Service Tips

● **Chrysler spells it out** in no uncertain terms . . . the only recommended lubricant for power-steering units of 1972 and prior-model cars is Chrysler Approved Power Steering Fluid (part No. 2084329) or equivalent. Other types, such as transmission fluid, will cause deterioration of pressure hoses, especially under high temperature conditions.

● **Wheel covers can be bent** if they aren't removed properly. According to Oldsmobile, the way to do the job is to insert the blade end of a jack handle or a large screwdriver as far as possible under the lip of the disc and pry or sharply strike against the wheel or tire. Don't pull up on the tool. ★★★

GOT A PROBLEM WITH YOUR CAR? Ask Mort about it. Send your question to Auto Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Letters cannot be answered individually, but problems of general interest will be published in the column.

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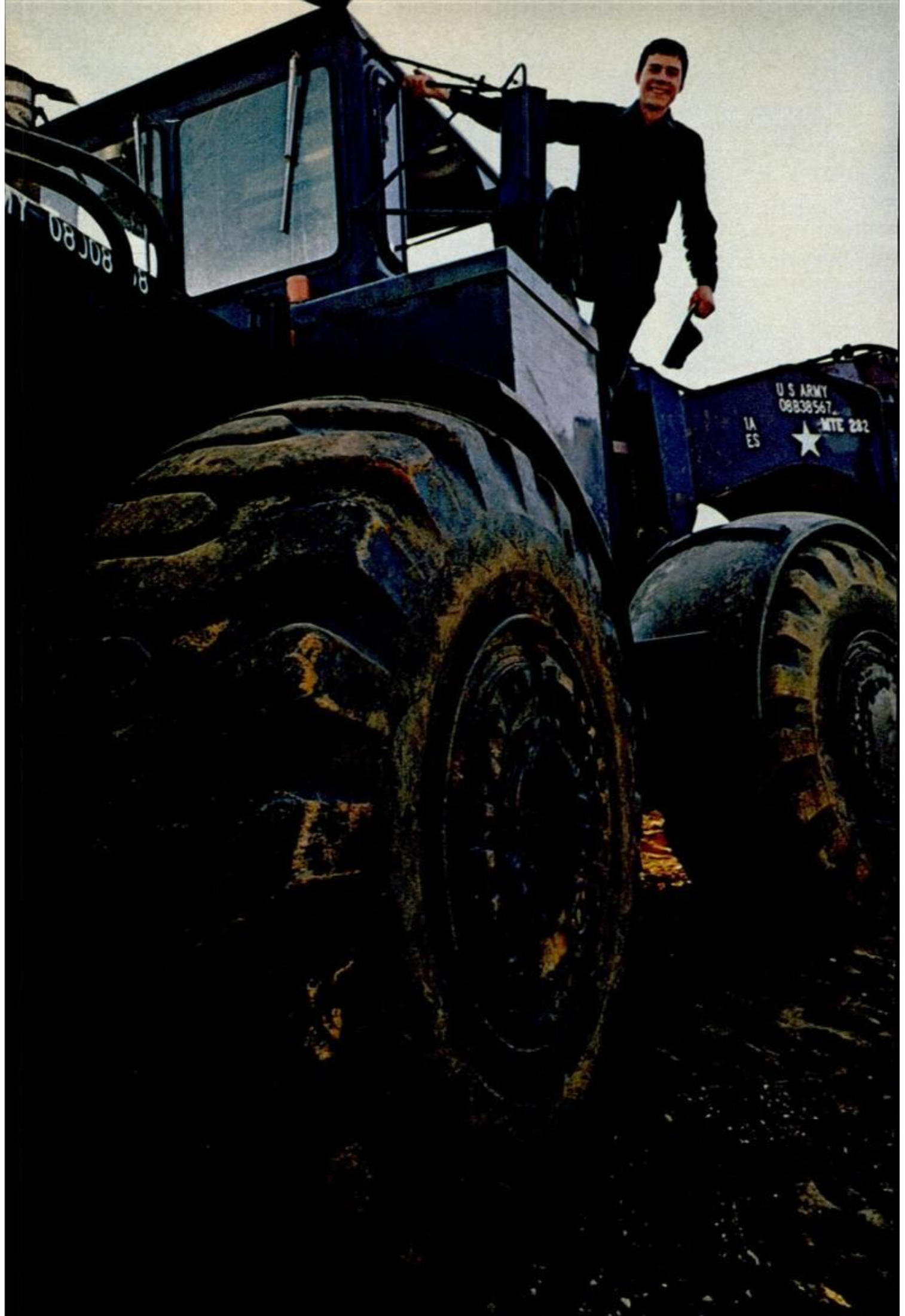
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DETROIT LISTENING POST

BY ROBERT LUND

THE 'INTERIM CAR' is something you'll be hearing a lot about over the next couple of years, so you might as well learn the lingo now. What's an "interim"? Sounds like another name for the intermediates or mid-size cars. But Detroit's using the word in the dictionary sense—meaning provisional or temporary. The auto companies say they just can't cut it on the government regulations coming in 1975-76. The antipollution standard in particular.

The best they claim they can do is a patch job—one that's in partial compliance with the regulations.

Car producers are going on the prayer that the government will ease the rules or grant an extension when the time comes to put the '75-'76 cars in production. If the reprieve comes, cars built during the grace period will be known as interims—meaning they satisfy some of the regulations. Meanwhile, the car firms are in a state of limbo. They don't know what to do for '75 and beyond. What kind of cars to build, what to put on 'em. What the government will accept, what will be turned down. This explains the layoffs of car designers and why the tool and die companies aren't getting orders for production equipment for '75-and-future model cars.

It's a strange pickle for an industry that normally knows exactly where it's going five and six years ahead.

AIRPLANE BRAKES FOR CARS? Ford's put an order out to a supplier to rework an aircraft-type



1973 PLYMOUTH DUSTER comes on strong with a new, bold front end in this sneak sketch out of Detroit

brake—scale it down in size—so it can be used on an automobile. Ford has some military contracts and may be thinking of the brake for Army vehicles. It could be used on civilian cars, too, but the price would be pretty steep.

HOTTEST THING ON WHEELS right now, in terms of how much sales have shot up over last year, isn't a car. It's the minitruck introduced into the United States by the Japanese. If you think you've seen a lot of 'em around, wait a couple of months. The invasion has hardly begun. There are five that are available now: The Datsun PL-620, Toyota Hilux, Ford Courier, Chevy LUV (Light Utility Vehicle) and the Mazda B-1600. The Mazda is made by Toyo Kogyo who also makes the almost-identical Courier for Ford. The LUV is made for Chevy by Isuzu Motors.

Chrysler's trying to swing a deal with Mitsubishi to market a mini-pickup through Dodge dealers. International Harvester is thinking about building its own. American Motors may go that route too, via its Jeep Div., if it can't line up an import. Olds and Lincoln-Mercury would like to get on the bandwagon, but have to get approval from GM and Ford headquarters. VW would like to have an entry but figures the boom's likely to level off before it could put a pony pickup in production. (See page 96 for a report on the minitrucks that you can buy right now.)

STRAIGHT FROM THE HORSE'S MOUTH—but the horse doesn't want his name used—here are the numbers on the modified Nova (re-named Omega) coming from Olds this fall. Three models: a two-door, four-door and a hatchback. Olds' lowest rated V8 will be standard. There won't be a Six. First-year production: 45,000 to 50,000 copies.

CHRYSLER LIKES FORD'S BETTER IDEAS. Two of 'em, anyway. Chrysler has confirmed that Ford will make dies for some '74 Chrysler cars. In another area, Chrysler's picking up on a project where Ford's pulling out. Ford has been working with Bendix on electronic fuel injection. Bendix will supply 10,000 EFI systems for the '73 or '74 Thunderbird. But Ford figures EFI for a hot item and is on a crash program to develop its own system. So Bendix has turned to Chrysler, or the other way around—Chrysler came to Bendix, and

(Please turn to page 58)

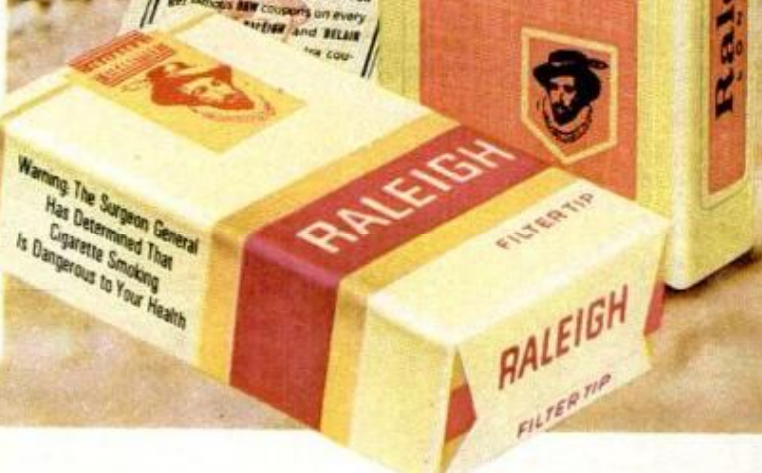
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Filter Kings, 17 mg. "tar," 1.2 mg. nicotine; Longs, 18 mg. "tar," 1.3 mg. nicotine, av. per cigarette, FTC Report Aug. '71

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DETROIT LISTENING POST

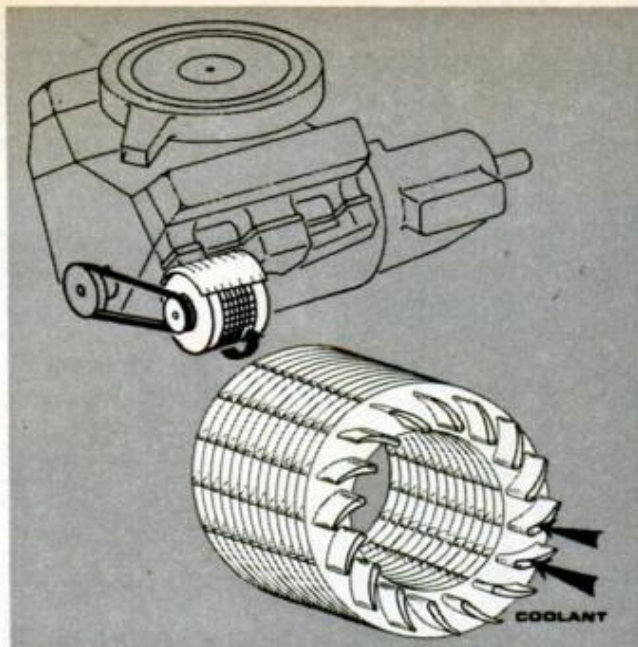
(Continued from page 56)

Big C is in line to get the Bendix unit. Musical chairs, Motown version.

GM'S REPORTEDLY REVVING UP to turn out more than 1.5 million Wankels a year within four years. Why so many? GM doesn't expect the rotary to catch on that fast. Why the big push on production? Suppliers who hope to be cut in on the GM program offer the explanation that GM may supply the engine to other automakers—specifically Chrysler and American Motors. Chrysler is negotiating to produce the engine on its own. But Big C is a late starter and if it wants to go Wankel the same year that GM and Ford do, it may have to buy a batch of engines from an outsider.

Supplier sources also report that another GM division is cutting itself in on the action on the Wankel. Information is that Detroit Diesel Allison is developing a two-stage diesel rotary.

ROTARY RADIATORS, just like rotary engines, are on the way. These spinning heat exchangers are more efficient than the cumbersome radiators that now take up so much



ROTARY HEAT EXCHANGER would replace conventional radiator. Driven by the fan belt, the unit spins while the engine coolant passes through the blades

space and dictate frontal area of today's cars. The accompanying drawings show how the rotary would be installed and how it works. Donbar Development Co. is championing the device for automotive use as well as other applications. ★★★

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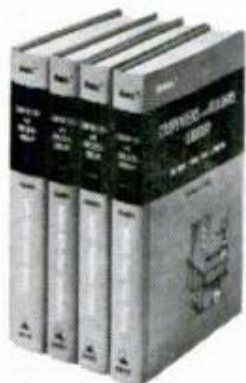
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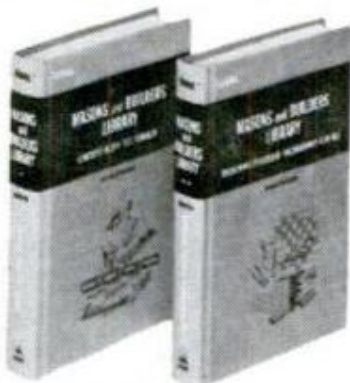
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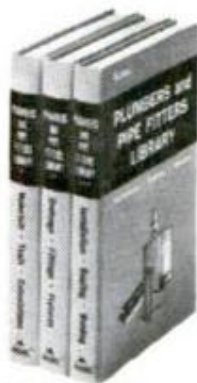
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ALL By BILL McKEOWN OUTDOORS

THIS MONTH is as good as any not to drown. More people take to the water this time of year, however, and living it up afloat while cooling down too often means falling overboard. National Safe Boating Week, July 2-8, is a timely reminder that careful boating can make the sport more pleasant for 51 additional weeks each year as well.

"What recommendations would you make for PM's six million readers?" Rear Adm. Austin Wagner, chief of the Coast Guard's Office of Boating Safety, was asked. Pleasure boating is fun and seems simple, the admiral pointed out, but too many small-craft owners take to the water without learning the hazards involved and how to handle them. Statistics the Coast Guard has been collecting indicate important facts: 68 percent of all boats in use are 10 to 16 feet long with a 12½-footer the most popular average size. "Over 70 percent of the annual fatalities occur in craft in this size range," Admiral Wagner notes. "It is apparent why standards should be established for proper construction and capacity of passengers, load, motor power and flotation for these small craft, and why owners must learn to handle them properly. In an automobile accident, if you survive the first minute you are probably going to be all right. But in a boating accident, when you find yourself in the water, your troubles have just begun."

Thousands of new boatmen are going afloat every year who do not even know that U.S. Power Squadron and Coast Guard Auxiliary courses are available, the admiral observes, yet a large percentage of accidents are found to be caused by lack of knowledge of basic boat operation. Pleasure skippers must learn proper handling—or mandatory education is likely to be required.

ONE BENEFIT for all boatmen in the recent Federal Boat Safety Act of 1971 is the requirement that all passengers in any size boat have an approved life preserver available. Even a water-ski towboat must carry "personal flotation devices" (as the Coast Guard calls them) for the skiers out behind the boat as well. And no longer are tippy little sailboats and dinghies exempt from this worthwhile safety requirement. Punt, skiff, raft, dory,

johnboat, kayak, pram, canoe—name it and you now need a preserver. Needless sinking is practically illegal.

THE NEXT BIG SNOWFALL is months away, but already announcements are being made about next winter's new snowmobiles. Look for quieter engines and more sizes and varieties of power. Outboard Marine has announced it will have a low of 72 decibels as well as U.S.-made rotary combustion engines for some of its Evinrude and Johnson models.

FOR A COOL MIDSUMMER VACATION that can really beat the heat, Braniff now has direct flights to South America's winter sports areas and the snowfield ski resorts of the Andes. Or for the sportsman or club that wants to be sure of hunting and fishing results, it's possible to practically reserve a Panama black marlin or Argentine red stag, Colombian trout or a dorado in Paraguay on a planned tour. Braniff International, 135 East 42nd St., New York, N.Y. 10017, has booklets covering outdoor adventure and hunting and fishing tours free for the asking.

RECREATIONAL-VEHICLE OWNERS have long had complaints about the difficulty in getting service for the clutter of conveniences a modern travel trailer, pickup camper or motor home is likely to have aboard. When a stove, refrigerator or toilet malfunctions, an owner doesn't want to have to figure out who originally made it to get it fixed. The word seems to be getting through to several RV manufacturers. Coachmen Industries, for instance, of Middlebury, Ind. (and branches in Texas and Georgia), now provides a one-year warranty for all the appliances and gadgetry it supplies aboard. A buyer gets an owner registration card that he can take, along with his troubles, to the nearest dealer. If it works, a system like this could help the whole industry grow up.

ADVENTURE on foot with backpack, on a bicycle, in a canoe or even underwater is available through an increasing number of planned trip tours. While many scheduled for midsummer are already full-up, others have openings for later in the season, and it's not too soon to start planning for next year. Among excellent sources of information are the Sierra Club, 220 Bush St., San Francisco, Calif. 94104; American Youth Hostels, 20 West 17th St., New York, N.Y. 10011; and the Adventure Trip Guide, a book listing family pack trips, float trips, and canoe, hiking and jeep trips into wilderness areas. It is \$3.45 by first class mail from Farm &

(Please turn to page 62)

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ALL OUTDOORS

(Continued from page 60)

Ranch Vacations, 36 East 57th St., New York, N.Y. 10022.

SEE THE U.S.A. in your you-know-what is easier, thanks to a new book prepared by Chevrolet called *National Parks & Monuments* and available for \$1.95 from Chevy dealers. The large-format paperback has photographs of nearly every national park in the 50 states, plus recreational areas and historical sites in each park. Visiting hours, fees, attractions and distances to nearby towns are also given. The booklet was issued to celebrate the 100th anniversary of the U.S. National Park System this year.

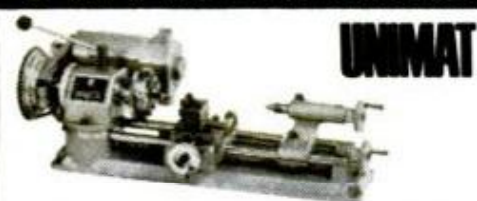
One of the most useful features, however, may be the commercial: On each state map are marked the locations of Chevrolet dealers. A traveler who needs some service can spot the nearest place at a glance, rather than wondering how far it is to the next place he can find a part or repairs. Chevy has also produced a noncommercial half-hour movie, *Our National Parks—Yours to Enjoy*, that should be appearing on local TV this centennial year.

A FINE PAMPHLET discussing the responsibilities of off-road vehicle owners in protecting the ecology, *Your Land, Your Jeep and You* has been written by humorist-conservationist Ed Zern and is being distributed by American Motors. Every new Jeep owner will receive one, and copies are available from dealers. Boatmen can get a helpful booklet from Evinrude outboard motor dealers that is called *The R.P.M. System*. It gives instructions for the important job of matching the right propeller diameter and pitch to obtain best boat performance.

NATIONAL HUNTING AND FISHING DAY will be Saturday, Sept. 23rd.

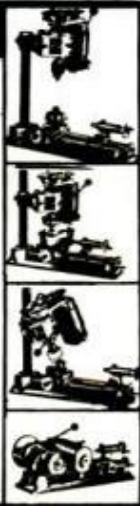
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HOMEOWNERS' CLINIC

BY W. CLYDE LAMMEY

Basement wall 'leak'

I have an outside entrance to my basement. There are drops of water on the concrete-block wall near the floor—even when weather is dry. What could cause such a leak?—G. R. Waud, Elmira, N.Y.

I don't think it's a leak; I'm quite sure it's condensate. If you place your hand on the wet surface, you no doubt will find that it's noticeably cold. Moisture condenses here because of the variation in temperature. Though it is hard to diagnose from this distance, it is also possible that these drops of water are caused by sweating cold-water pipes overhead. If so, you can correct the problem by wrapping the pipes with a pipe insulation that comes in rolls, and is carried by well-stocked hardware stores.

Faded spot on headboard

A small area on the headboard of my maple bed has faded or turned a lighter color. Is there a way to match it back to the original color?—Leonard Houser, Redwood City, Calif.

If the area is slightly rough to touch, go over it very lightly with medium-fine steel wool and then coat it with artist's color (the kind that comes in tubes). Spread this with your fingertip, mixing and blending several colors until you get a matching tone. Let this dry thoroughly—at least 72 hours—and then spray on a clear finish, such as that sold in pressurized containers. Make certain the spray you select is compatible with the existing finish on the headboard. If you are not sure of this finish, ask your paint dealer to recommend what to apply over the repaired area.

Finishing chest in white lacquer

I have a Victorian chest with a black marble top and want to finish it in a white lacquer with gold. Can you start me on the procedure?—B. M. Daly, Dallas.

I'll assume the chest has been stripped of all old finish and sanded smooth and that all necessary repairs have been made.

Borrow or rent power-spray equipment (from a local paint dealer) and spray on a white lacquer undercoat. Consult *Popular Mechanics Do-It-Yourself Encyclopedia* for spray-painting procedures. If you don't own a set, check your local library. Follow the undercoat with at least two coats of lacquer. Then lay the gold paint on vertical and horizontal beadings and moldings with a camel's-hair brush. Use masking tape to assure gold lines of uniform width. Finally, apply a mist coat of semigloss clear finish (lacquer).

Oil spilled on asphalt tile

I spilled a small amount of lubricating oil on asphalt tile in my basement. Although I wiped it up immediately, the oil seems to have softened the three tiles affected. Is there any coating I can apply to prevent further deterioration?—R. Thorsen, Moline, Ill.

Oil and asphalt tile just don't mix. There is no practical alternative to replacing the affected tiles with new ones. Heat damaged tiles with a propane torch and remove them with a wide-blade scraper. Remove all hardened cement and make certain the subfloor is thoroughly clean. Lay the new tiles over fresh adhesive; press them down firmly and hold them with weights until the cement sets.

Loose register vanes

Two wall registers in my warm-air heating system won't remain open. The vanes drop to their closed position as soon as the control level is released. Can these be repaired?—R. Hanscom, Joplin, Mo.

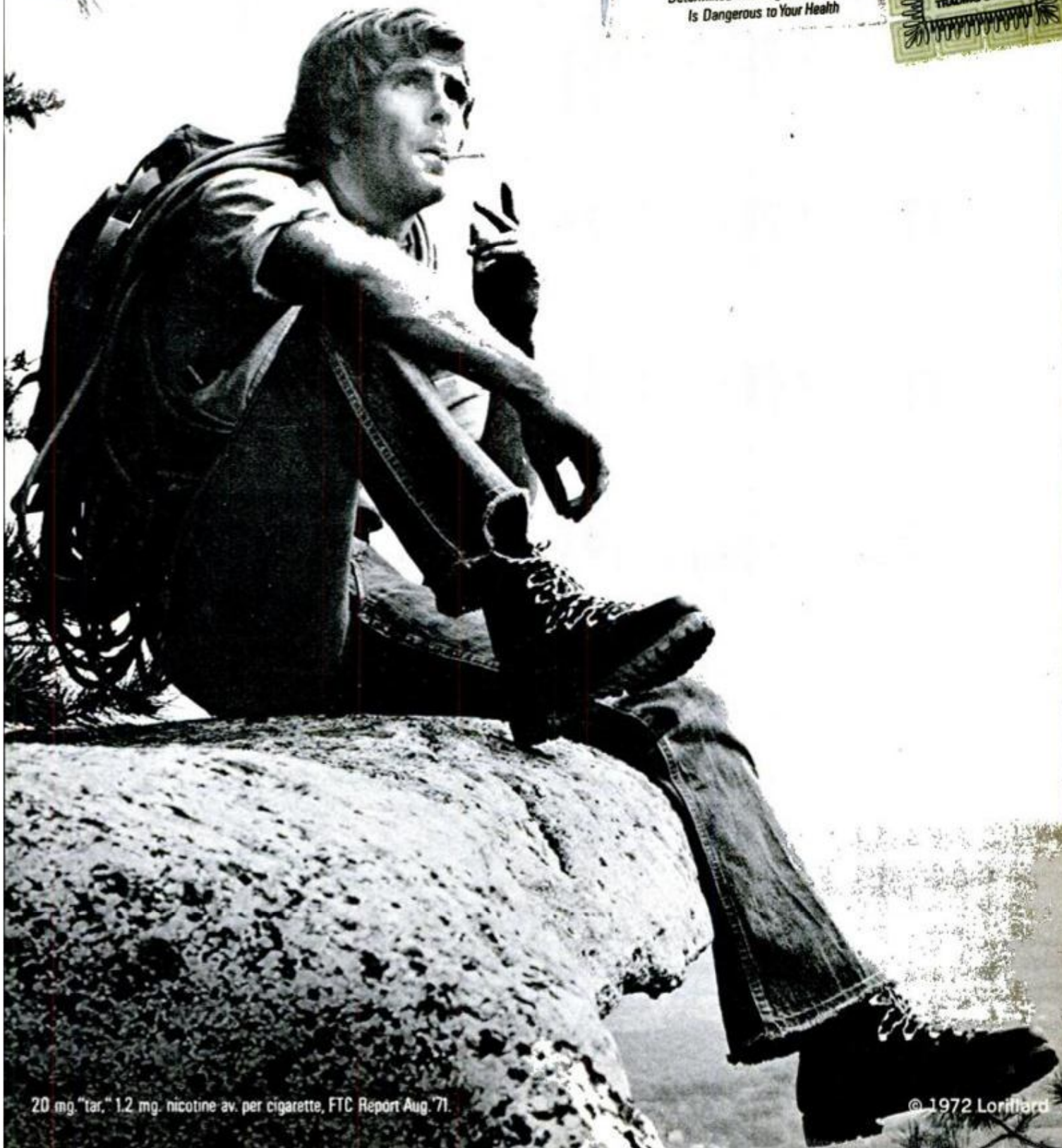
Chances are the pivots at the ends of the vanes have become worn through usage. Turn out the two screws holding the unit in place, lift it out and you'll see the vanes are pivoted on rivets that normally are set with just enough friction to hold them in place at the desired setting. Stand unit on end with heads of several rivets resting on a sturdy metal surface and tap each lightly. Test for free movement as you go to make sure you don't overtighten them, which would make the vanes difficult or impossible to adjust. ★★★

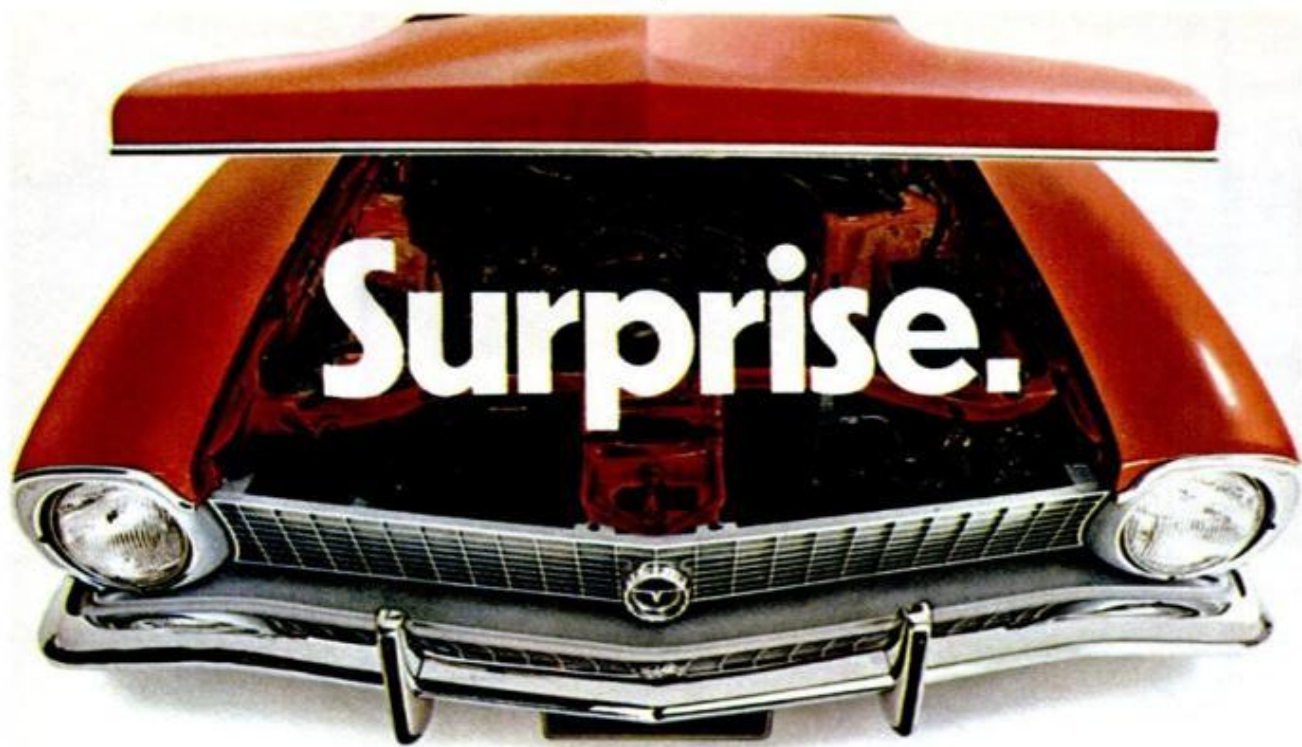
Do you have a home maintenance or repair problem? Send it to Homeowners' Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. While letters cannot be answered individually, problems of wide interest will be discussed in this column.

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Spectacular ski tricks you can do

World's champion gold medalist
Christie Freeman shows you how

By HARRIS E. DARK

*Photographed at Cypress Gardens, Fla.,
by Jerry Imber*

SPEEDING ALONG on slats over the water is probably one of the safest of all outdoor sports—even if you try such spectacular tricks as skiing backwards, jumping wakes or holding onto the ski rope with your toes.

That's the word from vivacious, 20-year-old Christie Freeman of Thayer, Mo., champion trick and slalom skier who's been skiing since she was 5.

If you're doubtful that you can learn anything about trick skiing from words and pictures, just look at Christie. She picked up most of the basic tricks from publications of the American Water Ski Assn.—until she took second place in



SKIER'S SALUTE is an early exercise for practice on one ski

TWO-SKI SIDE SLIDE uses the trick skis without bottom fins

LEG TOW is an easy trick and exercise for balance practice

her first contest at age 12. Tournaments and titles have followed, and at 18 last year Christie took first place in tricks and set a new world female record in slalom at the California International Cup tournament, only to break her own record twice and win the Women's World Slalom Gold Medal at the World Water Ski Championships in Spain.

A beginning skier, Christie advises, should fit on his skis ashore first to learn using the legs to stand while keeping back and arms straight. Practicing the deep-water start, seated back on the skis with knees to chest and ski tips up, comes next. Once you have skied, zigzagged across the wake of the towboat (and fallen) enough to feel at ease and secure on

DOCK START must be prepared for by carefully coiling line so it feeds freely on "hit it" command



your skis, why not try some advanced maneuvers?

● **The skier's salute**, with one ski raised from the water and almost vertical to it, is your introduction to one-ski tricks and slalom. With knees slightly bent to act as shock absorbers and weight well back, your lift foot is arched to keep the forward tip of your ski well up and your knee raised toward your chest. Any dip of the ski tip can trip you or pull off the ski.

Once you can lift one ski easily, ride on it and practice lifting the other until you are equally at ease on either foot. Again, practice ashore before trying it on the water. Eventually, Christie points out, you will find one foot which feels more comfortable for advanced one-ski tricks. Slalom and tricks require development of real strength in both legs, however, so she recommends alternate left and right practice.

● **Two-ski side slide** is the basis for a number of more complicated turns. Trick skis are necessary, with no fin on the bottom. They are usually shorter and more rounded than beginners' skis. At between 15 to 20 mph, take a slightly crouching position with arms partially bent. As the tow handle is pulled in, turn body in direction of the turn. Outside ski comes around and in front of inside ski while inside hand releases grip on tow handle; the inside shoulder is lowered slightly while skis have small slope away from the towboat and are wide enough apart for firm stance. To return to forward skiing, waist-high handle is moved out from inline with feet toward ski tips as body turns skis to point ahead again.



BACKWARD ON TWO is first tried on flat, then across wakes

SINGLE SKI BACKWARD takes more lean and weight forward

TOE-TOW ON ONE requires an exact balance, much practice

● **Front-to-back turn** is a continuation of the side slide but through 180°. With the handle pulled in waist-high toward the body in a partial crouch, the skier turns and reaches behind his back to grab tow handle with hand on inside of turn as the outside ski comes around. Skis are kept farther apart for better balance until reverse tracking position is reached. While traveling backward, the skier leans away from the pull of the tow rope, keeps knees slightly bent, and holds tow handle in middle of back with arms bent to absorb tow shock. Procedure is reversed to return to forward skiing position.

Skiing backward can commence from a deep-water start. With towboat in gear and moving forward fast enough to keep

towline taut, the skier turns in the water so that he faces away from boat with rear ski tips above the surface and towline held with both hands behind hips. To signal for the boat to accelerate, the skier drops his head under water while lowering hand-grip level with his heels. Skier must straighten up from crouch slowly after boat speed lifts him into skiing position.

● **One-ski tricks** require some of the same turning techniques as with two, but with a different balance. About 60 percent of body weight will be on the rear foot while the skier travels forward. Running backward, however, it is necessary to place 75 percent of body weight on the forward foot away from the towboat and to

REAR-VIEW MIRROR is now required by law in some states and must give driver view of skier's signals



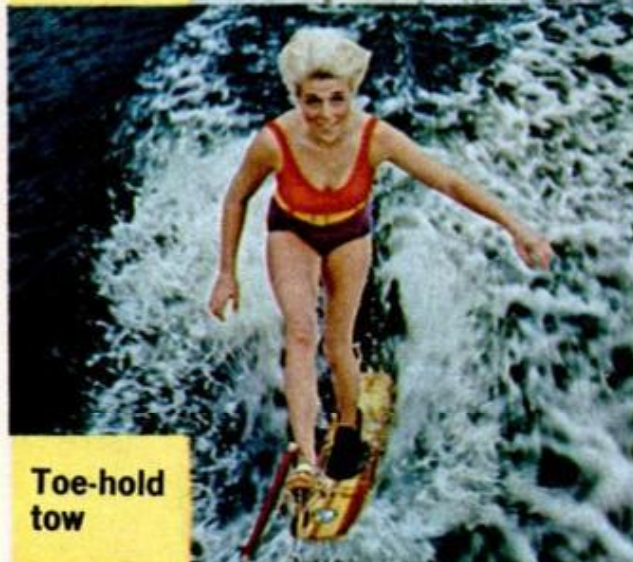
lean well forward toward the front tip of the backward-running ski. Slower tow speeds, down to about 15 mph with light skiers, make balance easier, but the full weight on one ski causes it to track in a deeper groove. For the quick turns which tricks require, the skier will drop smoothly into a deeper crouch, pull in on the tow handle, and then spring up and turn, all in one continuous motion while shifting weight as necessary. A lot of practice is necessary, of course, but the rewards come when you can perform one-ski side slide, front-to-back turn and one-ski 360° turns as easily as you did on two skis.

● **Wake turns** can be your next challenge if you haven't tried them already. Shortening your 75-foot line to about 50 feet will bring you closer to the wake of your towboat. Now you will be doing your turns more quickly and in the air as you leap from the lip of the wake. The back-to-front wake turn provides an added problem since you cannot see the wake coming and must time your leap as you feel the slope of the wake from your skis. For one-ski wake turns a left-footed skier will usually cut for the left wake and make a left turn, while the skier with right foot forward will turn right.

ADVANCED TRICKS like one-ski slide, toe hold, and forward and reverse step-overs can be performed with flotation jacket or belt in tow boat but should always be practiced with preserver worn. Below, cover-girl Christie gives her driver-brother Pat final instructions on speeds and tricks scheduled before run off photo stadium, Cypress Gardens, Fla.



One-ski side slide



Toe-hold tow



Front-to-back stepover



Back-to-front stepover





SKI SAFETY includes life jacket, line clear of motors, alert observer, before heading for jumps

The full 360° wake turn is usually started from outside the wake. The skier cuts in with the towline partially wrapped around him as one hand grips the handle behind the back and the other holds the rope in front until time for the leap, release and turn.

● **Two-ski stepover turns** look simple when Christie performs them but offer an easy opportunity for the beginner to trip himself. Again, practicing ashore with the towline secured is the first step in

learning. Expect a few spills when you take to the water and try the hop-up from a crouch, turn and step over to reverse position with the line between the legs all in the same moment. Back-to-front stepover is the reverse procedure.

● **Swan maneuvers** can be attempted with regular tow handles and the heel hooked over the grip for traveling forward or the toes for reverse, but added toe and heel loops or slings are preferable. Swan turns, also known as toehold turns, are a suitable challenge for the advanced skier to perform gracefully, since the arms are not used to ease the strains of the towline and recovery from backward maneuvers requires leg muscles not ordinarily used. For tricks like the 360° swan turn, the skier benefits from the help of an experienced instructor, although even here the beginner can learn much from booklets such as the "ABC's of Trick Skiing," 35 cents from the American Water Ski Assn., Seventh St. and Avenue G, S.W., Winter Haven, Fla. 33880. Memberships and additional instruction pamphlets are available from the organization.

The driver and observer in the towboat are also members of any trick ski performance, Christie Freeman notes, and should know all safety procedures and hand-signal instructions from the skier. To pick up a fallen skier, the driver will circle right if the steering wheel is on the right side of the boat, and will always keep the skier in sight. ★ ★ ★

HOW TO SIGNAL YOUR DRIVER



Sears' new video recorder: How it works



SIMPLE CONTROLS (above) and drop-in loading (below) make operation easy



The inside story of the first video cartridge recorder you can actually buy.

By IVAN BERGER, Electronics Editor

WHAT GOES ON INSIDE the cabinet of Sears' new cartridge television recorder? For the answer, I went to the Chicago plant of Warwick Electronics, maker of Sears sets.

In the lab, I found the video cartridge mechanism mounted on a test rack, leaving a gaping hole in the TV console cabinet behind it. This set had been through the wringer, constantly torn down and re-

assembled by the men who were preparing the manuals and training programs for Sears servicemen. But that hardly showed in the results on the screen.

After I turned the knob to "Play," the screen was blank for five seconds. This is deliberate—a muting circuit keeps streaks and squiggles off the screen until the tape nears clear-picture speed.

Inside, a lot was happening. As I closed the door to its compartment, the cartridge's lid opened, revealing the half-inch tape. Because the two reels are stacked hub to hub, the tape crosses the cartridge at a diagonal (photo below, center).

Closing the door positions the tape over two tape-lifter arms that wrap the tape around the rotating head wheel (below, right) during play.

The heads revolve because color video recording demands that tape move at high speed past the heads, while tape economy demands the tape move slowly. With the tape moving at an economical 3.8 inches per second, you can tape 100 minutes of color on less than 2200 feet of tape for about \$40—much less than 100 minutes' worth of color movie film and processing.

By turning the head assembly 1200 rpm in the opposite direction from the tape's movement, the effective head-to-tape speed becomes 545 i.p.s. Even this wouldn't be enough if Sears didn't use another economy technique called "skip-field." TV cameras scan each scene 60 times per second, interlacing the lines from two

(Please turn to page 182)

Coming next year: Some competition from RCA?

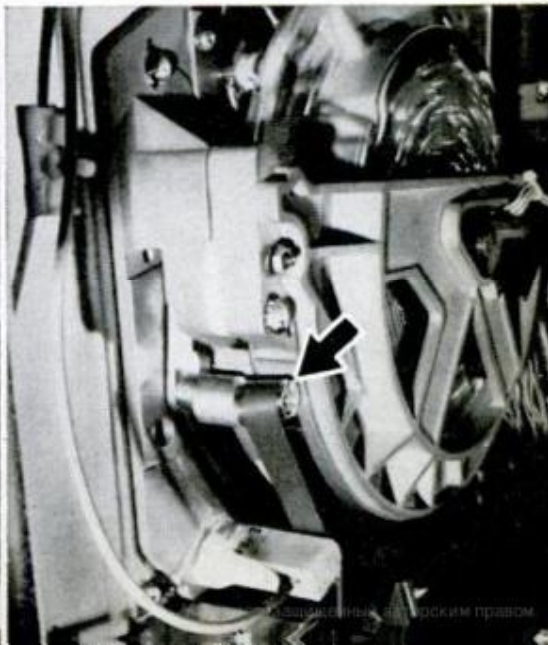
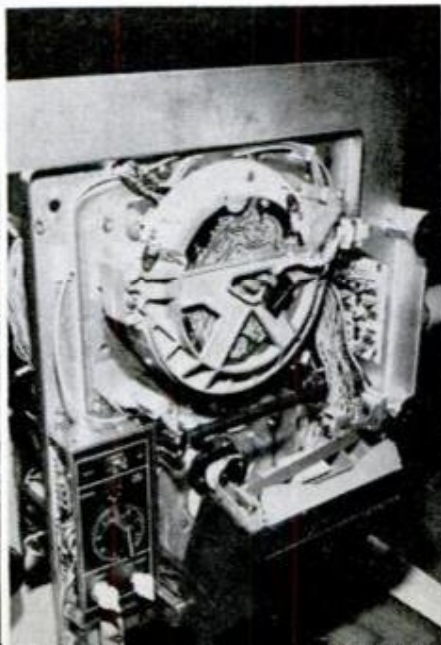


Two days after I saw the Sears set, RCA announced its SelectaVision MagTape video cassette system, due late next year. To fit all color sets, the RCA unit includes a tuner for off-the-air recording, and a digital clock timer. It is expected to sell for \$700, due to a simple, inexpensive design developed by an RCA engineer in his basement workshop. Start-up time is said to be shorter than Cartrivision's, and both head and tape life are claimed to be longer. A one-hour cartridge will hold 900 feet of 3/4-inch tape running at 3 inches per second, will be about the size of a hardcover book and should sell for about \$30. Magnavox and Bell & Howell will also have MagTape machines.

SEARS CARTRIVISION mechanism, mounted in laboratory test rack, is surrounded by sample movies, blank cartridges. Note tape counters (arrow) on cartridges

COVER REMOVED, tape head wheel (with three heads) is visible. Lid of cartridge opens for threading, exposing tape's diagonal path across cartridge

AS HEAD WHEEL ROTATES at 1200 rpm, arms (arrow) lift tape, wrap it 120° around wheel. Sensing head shown against tape stops machine if tape breaks





LOWERING BASKET, a Coast Guard rescue copter prepares to pick man off wave-lashed rocks after his boat was dashed against reef by heavy seas. Bystander on beach tries to aid stranded victim, but is unable to reach him.

'You have to go out, but you don't have to come back'

That's the slogan of Coast Guard helicopter rescue teams that go out daily to save the lives of others—and don't always come back

By JOHN ENNIS

LIEUTENANT COMMANDER DONALD ADDISON stared out the plastic canopy of his Coast Guard HH-52A helicopter at the angry gray thunderheads blanketing the sky. Below him gale-force winds lashed savagely at the seas off Cape Hatteras, an area known as the "graveyard of the Atlantic" because of the many ships and lives its treacherous waters have claimed. Addison had flown six missions during the past eight hours and was glad to be heading home. He was tired. Very, very tired.

Then it came. "CG 1388," crackled a voice in his earphones. "This is Coast Guard Elizabeth City. Request you divert five miles south of Diamond Shoals Light Tower and assist crew of burning tug." Addison rogered the message and glanced wearily



at the empty copilot seat next to him. Except for one inexperienced crewman, he was alone. It was Dec. 23, 1971—a Christmas week he will never forget.

The wind was on the port quarter of the *Palmer Gaylord* when Addison reached the blazing vessel. The crew huddled on the fantail, trying to escape flames being whipped toward the stern by 45-knot gusts. The tug was bobbing like a cork in 18-foot seas. Addison dropped a smoke flare, then, reciting a silent prayer, placed his helicopter in a hover 40 feet above the after deck and ordered Petty Officer Richard Hanson to lower the rescue basket.

Leaning out the craft's side door, Hanson repeatedly tried to place the basket on the tug's fantail. Suddenly, two frightened seamen lunged for it together, and Addison felt the helicopter sink sickeningly under the weight of the overloaded basket. He grabbed for the throttle to increase engine power and sighed with relief as the altimeter needle moved slowly

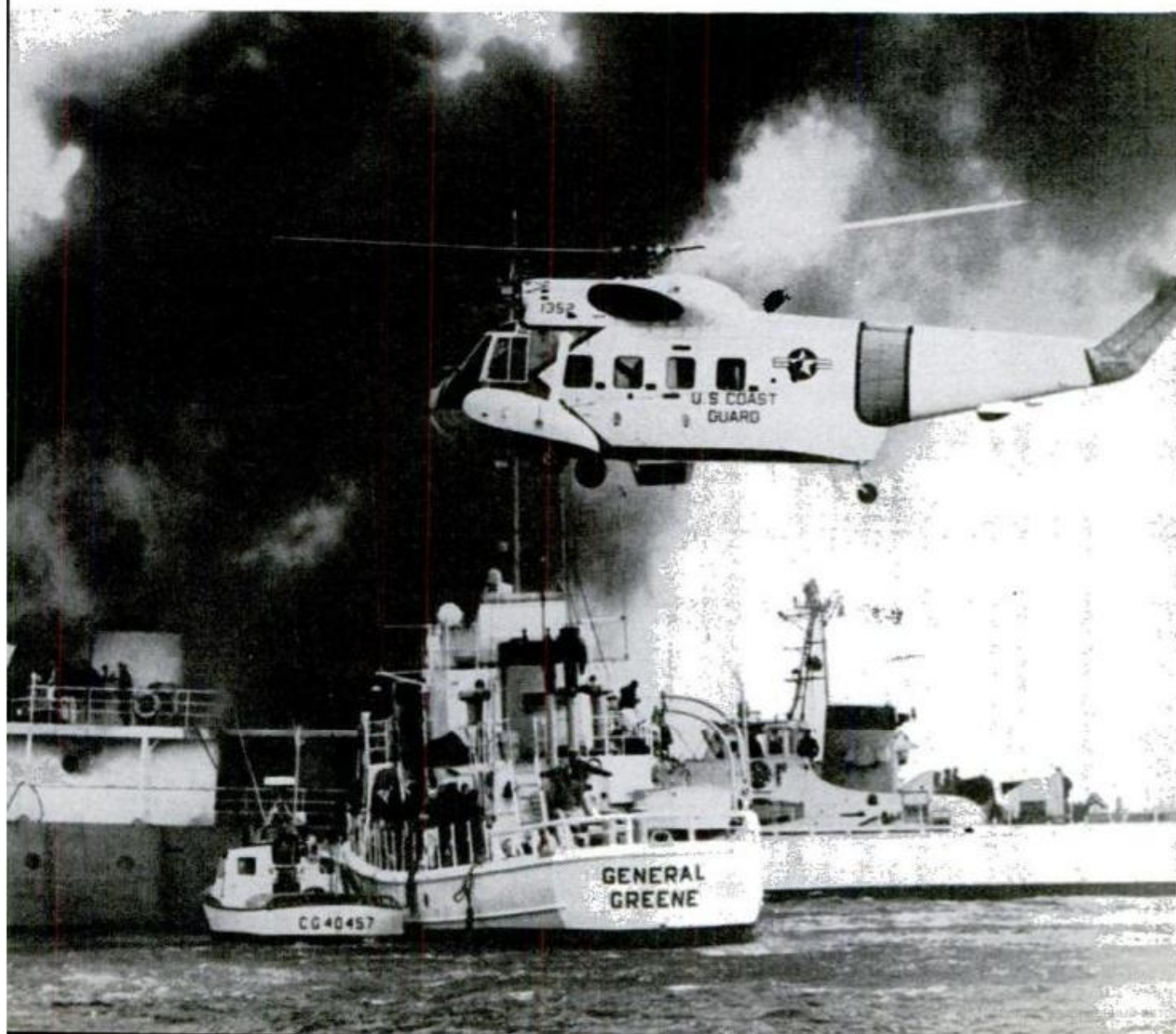


ADMITTEDLY PRIMITIVE, the use of chalkboard is often the only way to communicate with those below

from 30 feet up to 40. Hanson finally got the men on board, but it was totally dark by now. Addison could see nothing from his pilot's seat because he was directly over the burning ship. Hanson had to serve as his eyes.

"Come right 10 degrees, skipper—no,

RUSHING TO AID of burning freighter, a copter flies in firefighting equipment to surface CG vessels



no, you're drifting left. Bring her right 15 and I think I can hit the target."

Twenty minutes later, they had plucked three more survivors off the flaming deck, but fatigue was taking its toll. Both were exhausted, and Hanson was near collapse from exposure to the icy winds. The chill factor was 20 below zero. The basket went down for another load, then another. Suddenly, Hanson felt a cold wave of terror sweep through him as he lowered the basket for the final time. There was one more man left on the stern, and the fire-gutted ship was now almost fully in flame. It could blow at any moment. If it went up while the helicopter was still overhead, the blast would rip the aircraft to shreds.

When the last survivor was hauled on board, Hanson asked him nervously how much fuel still remained in the tug. "Forty thousand gallons, son, forty thousand gallons!" As they touched down at the Elizabeth City Coast Guard Air Station, Addison and Hanson saw the flashing red lights of waiting ambulances. They also noticed another red light. It was on the instrument panel and it told them that their copter was out of fuel.

Such hazardous missions are all in a day's work for the small band of unsung heroes who form the Coast Guard's helicopter rescue service. The men in this little-known group have a saying: "You have to go out, but you don't have to come back." And some don't. Since 1952, 10 helicopters have been involved in fatal

crashes, and 23 pilots and crewmen have lost their lives. Just recently, three rescue personnel were killed when their craft crashed into a mountain while searching for a missing boatman.

The two biggest problems helicopter teams face are their inability to communicate with survivors below and the pilot's inability to see what he's doing because his craft is almost always directly above the point of trouble. In most cases, a crewman leaning precariously out a side door must act as the pilot's eyes, as Hanson did for Addison, but this is risky at best. The sensitive nature of helicopter control and the time required for a crewman to relay instructions to the pilot can be disastrous when a copter operates in close quarters and a difference of inches can spell death.

In one instance, a rescue copter had to hover a few feet above the water with its whirling rotor blades almost touching a vertical cliff face while crewmen pulled survivors from a downed airliner being dashed against jagged rocks by 20-foot seas. This is no situation for a "blind" pilot to be in. In another instance, a crewman had to jump into the water to calm panicking survivors from a sinking ship because there was no way to reassure them from the air that help was coming and they were in no real danger.

Crewmen often use messages written on a chalkboard to communicate with survivors below, but this is admittedly a crude and primitive method. Sometimes a

DRAMATIC RESCUE SCENES below show seamen being airlifted to safety from sinking fishing trawler just seconds before boat went down. At left, Guardsman prepares to lower stretcher-like basket as cop-

ter pilot skillfully holds machine steady over the pitching deck in heavy gale winds. Photos at center and right show an injured crewman being hauled up in basket to copter above. Inside copter, medic ad-



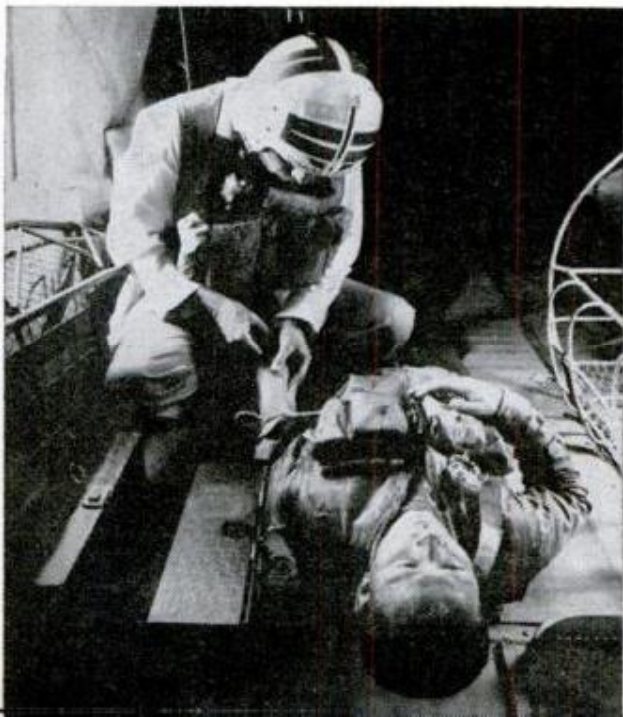


FLOOD SURVIVOR is plucked from roof of his home after being stranded by rising storm-driven tides

telephone on a 100-foot extension cord is dropped from the copter so crewmen and survivors can talk back and forth, but this raises problems, too. The long cord acts as an antenna and frequently picks up radio broadcasts from nearby stations. "The last time we used it," chuckles Addison, "the cord picked up a hard rock program and the fishermen we were trying to rescue thought we had lost our minds."

One proposal is for a closed-circuit TV camera to be mounted below the copter, aimed downward, with a monitor screen in front of the pilot to give him a view of the scene below. Sikorsky, which builds the Coast Guard's helicopters, is working on such a system. One problem is that the

ministers temporary first aid (left, below) as copter continues rescue of other seamen. Doctors are carried on some missions, but not all, so the copter crew must have medical training, too. After rescue



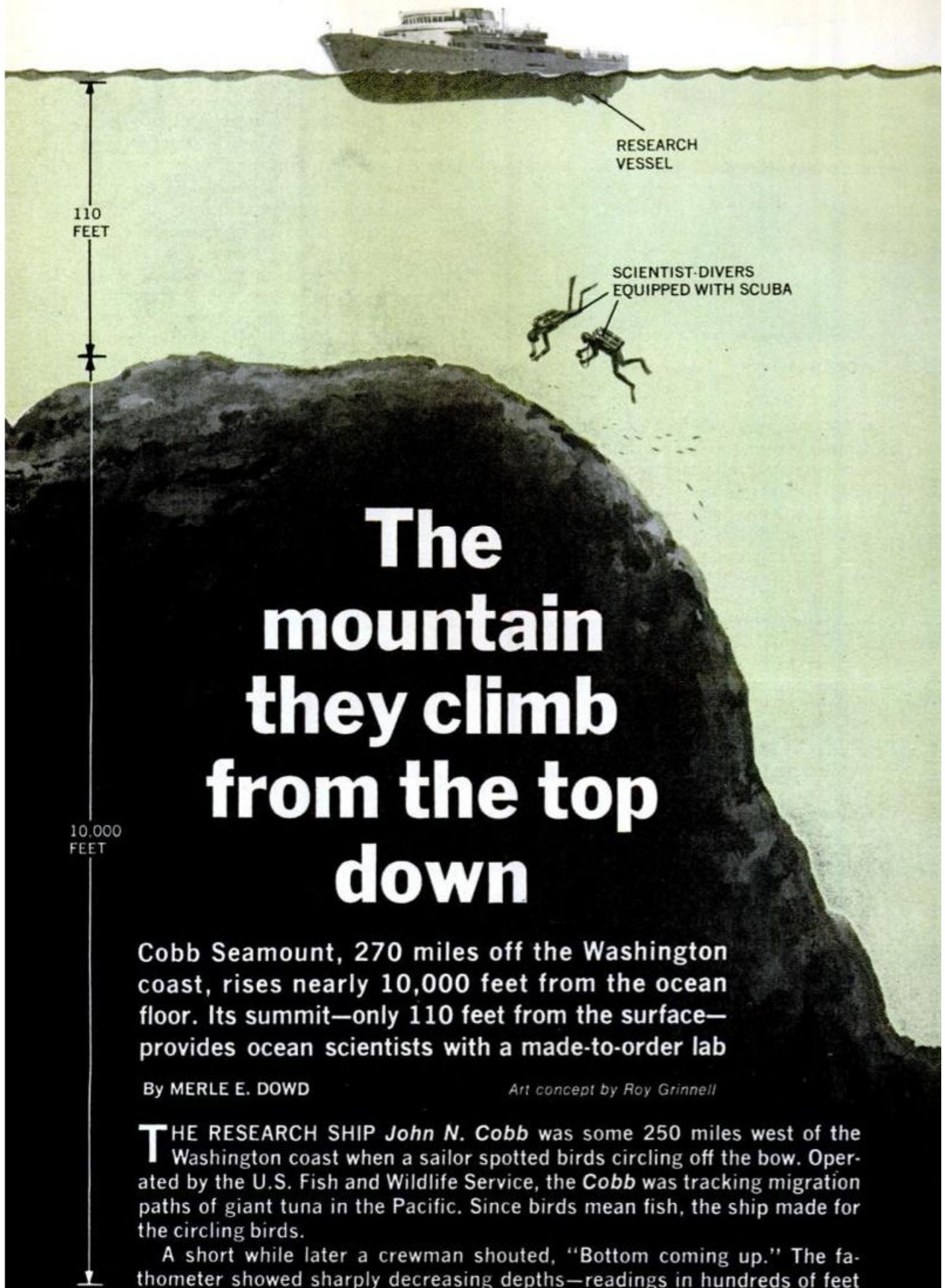
TV camera must be able to operate at very low light levels, such as in bad weather and at night. As an additional aid, the Coast Guard is also exploring the use of high-intensity lights for night rescues. So far, the most promising device is an intensely brilliant xenon searchlight produced by Spectrolab.

Another aid being studied is an automatic distress detector known as DALS for "Distress, Alerting and Locating System." Heart of the system is a small inexpensive transmitter every boatman would be required to carry. The transmitter could be operated manually by a boatman in trouble or would sound off automatically under impact or submersion in the event a boatman is injured and unable to operate it himself. Signals from the transmitter would be picked up by shore stations and the boat's position radioed immediately to the nearest Coast Guard helicopter in the area. Such a system would speed rescues and save countless more lives, say Coast Guard spokesmen.

Despite present difficulties, however, the Coast Guard rescue service has a remarkable record. During 1971 alone, its 87 operational helicopters responded to 4877 emergencies and saved 841 lives. In the aftermath of Hurricane Betsy's savage destruction along the Louisiana coast, helicopter crews rescued 1192 flood victims during 72 hours of nonstop flying—just one of the fantastic feats routine for the men of this unique service. ★★

is complete, copter flies to nearest landing point (right, below) and injured are rushed to waiting ambulances. Machines have wheels as well as sea-plane-like hulls, can land on either ground or water





The mountain they climb from the top down

Cobb Seamount, 270 miles off the Washington coast, rises nearly 10,000 feet from the ocean floor. Its summit—only 110 feet from the surface—provides ocean scientists with a made-to-order lab

By MERLE E. DOWD

Art concept by Roy Grinnell

THE RESEARCH SHIP *John N. Cobb* was some 250 miles west of the Washington coast when a sailor spotted birds circling off the bow. Operated by the U.S. Fish and Wildlife Service, the *Cobb* was tracking migration paths of giant tuna in the Pacific. Since birds mean fish, the ship made for the circling birds.

A short while later a crewman shouted, "Bottom coming up." The fathometer showed sharply decreasing depths—readings in hundreds of feet

instead of thousands, as is normal for the area, the Cascadia Basin.

A series of depth measurements showed that the *Cobb* had come upon an uncharted seamount, a mountain peak rising to within almost 100 feet of the ocean's surface. The discovery—on Aug. 1, 1950—eventually went on the charts as the Cobb Seamount, in honor of the founder of the University of Washington College of Fisheries.

Seamounts are not unusual. More than 2000 are charted along North America's western coast, mostly in Alaskan waters. But Cobb is unusual. It rises higher than most, nearly 10,000 feet above the ocean floor. Its summit, only 110 feet below the ocean's surface, is well within diving range. This is what makes it a made-to-order sea lab.

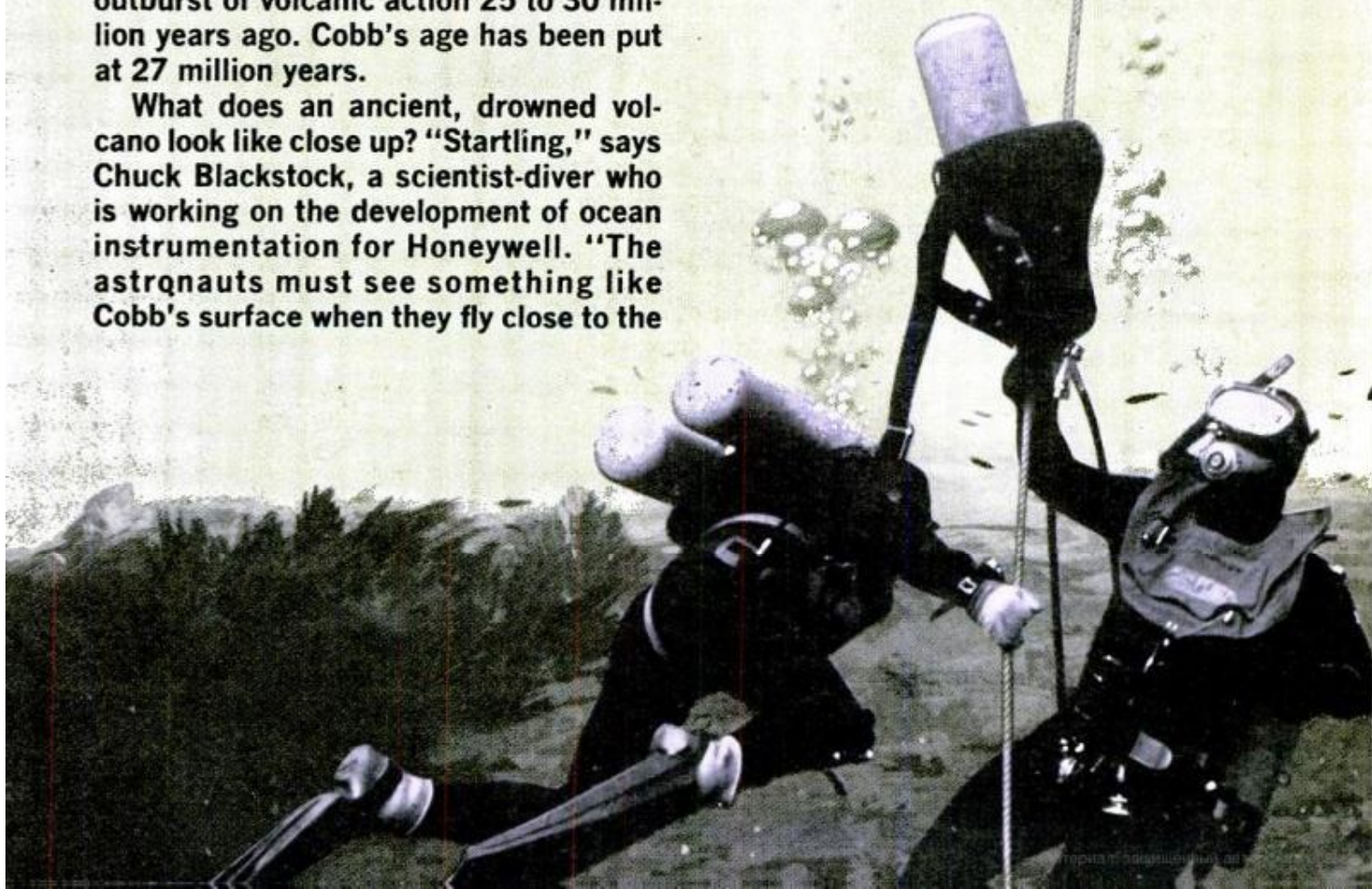
Seamounts, scientists say, are created by volcanos. Lava bubbles up through cracks in the ocean floor to build what may become a mountain. The many seamounts off the West Coast point to an outburst of volcanic action 25 to 30 million years ago. Cobb's age has been put at 27 million years.

What does an ancient, drowned volcano look like close up? "Startling," says Chuck Blackstock, a scientist-diver who is working on the development of ocean instrumentation for Honeywell. "The astronauts must see something like Cobb's surface when they fly close to the

moon. You see a lot of craters—some only three to five feet deep and maybe six across. Others are bigger—about 30 feet deep and up to 150 across. Then there are deep fissures, probably extinct fumaroles or steam vents. Nothing is smooth on that surface—it's a forbidding place."

Scientific interest in Cobb centers on opportunities for learning more about how the sun, ocean and air interact, wave actions and their effects on ship structures, and marine biology. Research programs are coordinated by the SEA-USE Council. Project SEA-USE (for Seamount Exploration and Undersea Scientific Expedition) is supported by the states of Washington, Oregon, Alaska and Hawaii, plus Canada's province of British Columbia, and various federal agencies and private companies.

"What we want to know, for example, is how the energy exchange between the ocean surface and air affects weather," explains Dr. Franklin I. Badgley, profes-



sor of atmospheric sciences at the University of Washington. "We'd like to find out what controls the exchange of carbon dioxide and oxygen by plankton and seaweed. One of the difficulties in getting measurements at the air-sea interface is finding something stationary to hang instruments on. Ships are very bad because they interfere with the things we want to measure—wave patterns, air currents and air temperatures. Buoys are tossed around by the waves."

Cobb offers a base for a fixed research tower in an open-ocean environment. But building a tower strong enough to withstand 60-foot waves and 80-mph winds poses a formidable challenge.

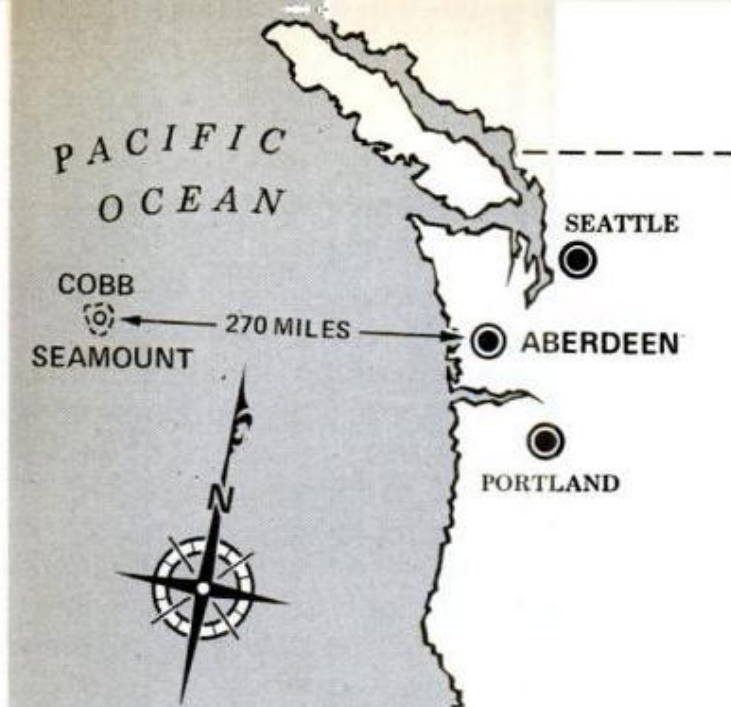
One mast, called the Totem Tower, was placed on Cobb in 1968 by a team from Oregon State University. "It was a long cylinder, possibly 15 feet in diameter," reports Chuck Blackstock. "It was erected in the bottom of a 30-foot crater after being towed to the site. Apparently, the guy-lines that were to support it failed, and a lower section of the cylinder buckled. Then the tower collapsed."

How to anchor a ship at the seamount has proved another tough problem. There is nothing on Cobb's summit—no sand or even rubble—for an anchor to bite into. In 1969, attempts to implant an explosive anchor failed. The hard basaltic rock cracked the anchor. "It's like firing a banana into a brick wall," reported one diver.

Another approach was tried the following summer. A coring rig was used to bore three holes in the rock. Ring bolts two and a half inches in diameter and five feet long were grouted into the holes. Three days later, after the concrete had set, one bolt was tested to destruction. It finally failed at 110 tons of vertical pull, indicating plenty of strength for mooring surface ships or anchoring cables to steady a tower.

In the summer of '71 a team of divers aboard the Coast Guard buoy tender *Cactus* were given the task of securing a mooring line from the ship to a ring bolt. They ran into turbulent conditions on Cobb's summit.

"If you weren't hanging on to something down there, the sea surge would carry you 25 feet one way, then 25 feet back again," the lead diver reported. "There was a school of red snappers moving back



AN ABUNDANCE of sea life and an isolated location make Cobb an ideal "lab" for biological studies

and forth with us. They didn't even try to fight it."

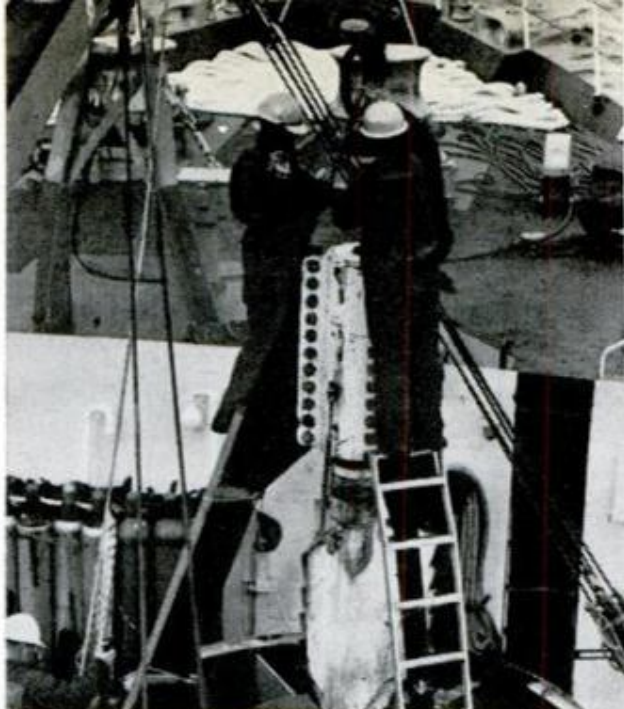
The divers finally succeeded in threading a light line through one of the rings. This was used to pull an anchor chain into position so that it could be linked to the bolt. Later, heavy seas hit. The anchor chain broke—but the ring bolt, slightly bent, remained fixed in the rock.

For the most part, ships have tried to maintain position through the adroit use of power and steering.

"When we arrive," says Chuck Blackstock, "we locate the summit with sonar and drop weighted lines with cork floats to mark the edges of the area. We use scuba and a safe-line system when diving. As we dive, we pay out a thin nylon line from a reel. The upper end is attached to a float. As we move around the summit, the float follows us, and a surface crew keeps an eye on the float from a dinghy. About 30 feet below the surface, a safety tank of air is attached to the safe-line in case we run out of air during decompression.

"Diving at Cobb is different from diving in inland or coastal waters. In open ocean the ship becomes your only reference. The water is clear, an azure blue rather than the green we see nearer shore where dirt and marine organisms cloud the water. On my first dive, I remember looking up and seeing the whole bottom of the ship, from bow to propeller. I felt as big as an ant."

Currents create an upwelling, especially



EXPLOSIVE ANCHOR is readied aboard Coast Guard cutter. It broke when fired into seamount surface

around Cobb's northern face. The upward surge of water carries mineral nutrients up toward the surface. Plankton feed on the nutrients, starting a marine food chain that extends to big fish.

There are plenty of rockfish, cod and red snapper and occasional blue sharks that swim lazily over the summit. Scallops grow on all vertical walls, and there is also an abundance of sea urchins, starfish and tubeworms.

"Cobb furnishes an ideal laboratory for studying marine life because of its isolation," explains a University of Washington biologist.

The first big payoff from research at Cobb may involve new knowledge about wave spectra—wave height, period, direction. Tanker breakups that spew thousands of tons of oil into the sea have sent ship architects back to their drawing boards. Designers want data instead of guesses at wave heights and distances between troughs and peaks so they can relate hull stresses to ship motion.

"In the past, ships ran about 450 feet long," explains Rear Adm. Emory D. Stanley, USN (Ret.), secretary of the SEA-USE Council. "When they encountered 1000-foot-long waves, they took a bit of a beating, but structurally there was no problem. A ship 1000-foot long is something else. When it suddenly finds itself supported by waves at both ends but with no support in the middle, that's rough. And they *have* been breaking up."

This summer or fall, according to Adm.

JULY 1972



SURGE METER was fixed to summit with explosive bolts. Instrument was damaged by fishing trawlers



"PINGER" WAS PLACED on Cobb to provide directional data for ships equipped with sonic sounders

Stanley, there will be a two-ship expedition to Cobb for the purpose of placing a pressure-sensor wave gauge on Cobb's pinnacle. Information obtained from this gauge and from other instruments installed in ships could eventually open the door to new wave-gauging techniques that could be used anywhere in the world.

Another project that may be carried out this summer would involve a two-man sub. As part of a geological study, scientists would use it to explore Cobb's 300-foot terrace.

Weather and rough seas are a problem at this exposed ocean research outpost. But scientists seem very willing to put up with lurching ships and queasy stomachs in exchange for the privilege of working at the unusual "lab." ★★★

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NEWS BRIEFS



'DB' doesn't mean 'Der Beetle'

Looking a little like the rear end of a Volkswagen, this new electric high-speed rail coach of the German Federal Railway will begin op-

erating between Munich and Bremen in 1973. The front car pulls four others at a top speed of 120 mph. Each car seats 183 passengers.



Competition for Rolls?

Two British garage owners, Derek Skilton and Jack Perkins, are custom rebuilding vintage cars of the 1930s for those who can afford them. Each model has modern performing parts—engine, brakes, suspension, and such. This SP Highwayman sells for about \$15,000.



A dog's life—saver

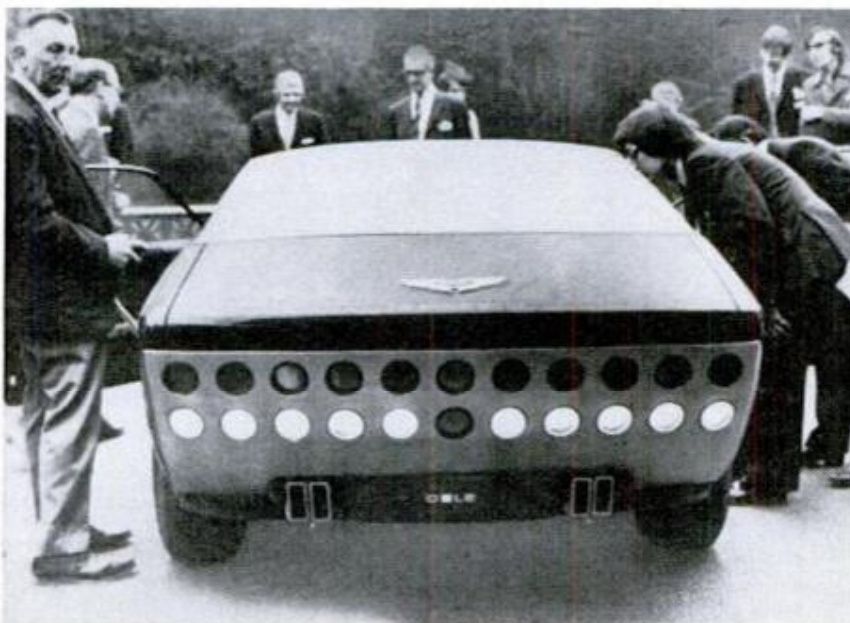
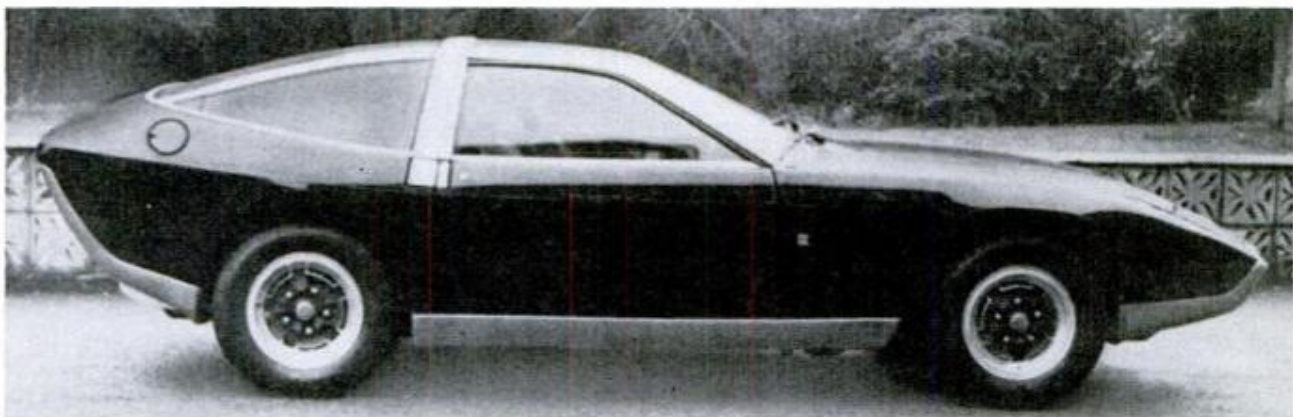
Shouldn't man's best friend be safe, too? Pet Care Products of England thinks so and has developed a car seat belt which is also a leash collar. The harness protects Fido in an accident and also keeps him from jumping about, creating a distraction to driving.



All-terrain vehicles all over the place

That's the way it was recently during a one-day ATV rally held by the National ATV Assn. at Treasure Lake, Pa. There were 48 vehicles

and 110 participants—mostly family groups. The sloshy drive (it was rainy) over the Treasure Lake trail took about 3 hours.



Not for sale

It cost \$53,000 to build, but you can't buy this sleek-looking job for any price. It's a one-and-only model which was created by Ogle of Great Britain. Based on the design of the Aston Martin D86, the car will be employed to promote a famous brand of cigarettes in England. What a pity! The three-seat gem will not only hit 170 mph, but sparkles at that. As you can see, it sports a battery of 22 rear lights, including four directional lights on each side. Ogle designed the Bond Bug and the Reliant Scimitar GTE.

PM BUICK SKYLARK OWNERS REPORT...

A nationwide survey based on
960,000 owner-driven miles



Handles like a dream, but gas mileage is a rude awakening!

BY MICHAEL LAMM, West Coast Editor
Photos by the author

"OUR LAST BUICK was a 1966 Special," says a Findlay, Ohio, sales manager, and he adds: "It went 120,000 miles without any problems. Buicks have quality."

But it doesn't have the economy that owners want. Gas mileage is the one thing Skylark owners are most unhappy about. They're talking about an average 11.9 mpg around town and 14.5 mpg out on the road. That's with the 350-cu.-in. V8 engine which 98 percent of all owners surveyed have in their Skylarks. Fuel mileage averages were not available on the 455 V8 because of the small sampling obtained in the *PM* survey. The comment, "Not enough miles per gallon" appeared again and again. Alongside that complaint came, "Gas tank hard to fill; should also be larger."

Several drivers griped about high

rough idle and stalling. A Milwaukee professor of electrical engineering expressed it this way: "It's a California car. By that I mean engine idle speed is too high and fuel mixture too lean for cold Wisconsin winters. Almost always stalls in cold and is difficult to control on ice because of high engine idle."

Since Buick gets quite a few repeat customers (almost 40 percent in our survey) they tend to compare the '72 Skylark with previous models. "Our 1969 Special had better rear visibility and more items that are now options were standard then," notes a Maryland attorney. "Handling and suspension are greatly improved over 1971 models," says a California planning estimator. A San Francisco shipping clerk avers, "There was more room in our 1967 Skylark than in our 1972."

An area that comes in for all sorts of



SKYLARK TRUNK includes tie-down, a clever touch, but owners feel trunk light should be standard. A map light on rear-view mirror is optional. Rubber

bumper strips cost \$24 extra, are good only in very light taps. Semisealed cooling system uses large Teflon box to catch, recirculate radiator overflow

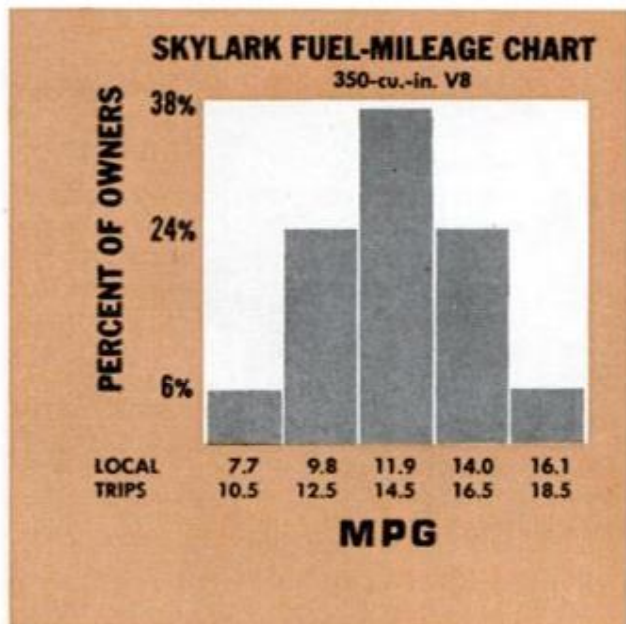
praise is the Skylark's handling. "It's so easy to handle," says a West Virginia maintenance man. "Good handling, holds the road well," comments a Denver clergyman. "Has plenty of power when I need it," says a Texas mathematician. "I feel more confident driving in bad weather because of the Skylark's handling and the heaviness of the car."—Wisconsin stenographer. "Good handling in tight curves plus good acceleration at 60 mph and over."—Tennessee mechanical engineer.

What improvements do Skylark owners suggest? "Trunk is too small—spare tire takes up most of the room," says a New York sales representative and this

complaint is echoed by 12.4 percent of all the respondents. Judging from the comments, trunk space is tighter in sedans than in convertibles and coupes, but it's tight in those, too.

"The two skimpy little horn buttons on the steering wheel spokes have already caused me to come close to two collisions. Bring back the horn ring," says a Pittsburgh real-estate appraiser. Many other owners feel the same way. The trouble is that when they are forced to turn the wheel in quick emergency situations, the recessed horn buttons are rather hard to find.

Other recommendations for improve-



HEADRESTS have only two positions—up and down. Rear-seat riders say it's hard to see out windshield



SKYLARK HANDLING is well liked. Variable-ratio adds only \$15 to price of optional power steering

ments: "Rear-view mirror obstructs forward vision, should be raised." "Front-seat latches are terrible, ought to be relocated." "At 55 mph and above, there's too much wind roar around the windshield. Design should be changed." "Trunk should be larger and lower for better access." "I'd like to see a car about this size with front-wheel drive for better traction on ice and snow." "There is a lot of unused space between the radiator and the front of the car. Part of this space could well be used to give a bit more room for long-legged passengers in the rear seat." "Would like better visibility for backing up." "Glovebox and ashtrays need to be bigger."

How do the Skylark owners rate the cars on comfort? "Needs more headroom and more legroom in the rear seat," says the West Virginia owner of a two-door

TRUNK TOO SMALL, say owners. Spare tire, tools cut into space. Sedan owners are the hardest hit



HORN BUTTONS in steering-wheel spokes are hard to locate in emergencies. Owners would like ring back

hardtop. But an Illinois supervisor with a two-door hardtop doesn't find comfort to be a problem: "On a trip to Florida, passengers reported both front and rear very comfortable." A Chicago city employee reports, "Ride is nice, and the nonpower steering feels comfortable to handle on the road." "Seats could be a bit more firm," writes a New York manager. And a Wisconsin engineer: "Very comfortable front and rear, although my rear-seat passengers are normally children."

What do Skylark owners think of their dealers? "It is refreshing to deal with someone who treats you like a customer *after* you buy the car." "Superior." "Very satisfactory." "Dealer is very courteous. I complained about poor gas mileage, and he explained it was due to the antipollution mechanism." "My dealer's reputa-

WORKMANSHIP GOT GOOD RATINGS, but owners are annoyed by minor things. Loose panel is on PM car





LOW GAS MILEAGE rankled many owners, but ride and comfort scored high, also looks and workmanship

tion was the main reason I chose my Skylark over the Cutlass." "The service advisers are rude and stupid; service is very sloppy and impersonal. I'm only glad I haven't had any serious mechanical difficulties."

Most owners reported no mechanical difficulties at all—61.9 percent said they hadn't yet needed to have any repairs. Actually that's about average (59.1 per-

cent is average for our last 10 Owners Reports, and ironically the Pontiac Grand Ville showed one of our best no-repairs-needed records at 76.3 percent). Capping the repair question, an Ohio plant engineer commented, "You can't beat Buick for mechanical dependability. This is my fifth new Buick, and I've never had a serious mechanical problem."

Those owners who did have mechanical problems cited carburetor maladjustments as their headache No. 1. We've already covered high idle speed and stalling. The other carb complaints centered on leaks, hard starting and a tough-to-set automatic choke.

Overall, Skylark owners endorse their cars more enthusiastically than most. Problems tend to be minor; dealer relations are good; the car excels in handling and workmanship; and nobody complained too much about price. The one big gripe is gas mileage, and here owners really let Buick have it. It should be better. ★★★

Summary of 1972 Buick Skylark Owners Reports*

Total miles driven	963,353
Average miles per gallon	
350-cu.-in. V8	
Local driving	11.9
Long trips	14.5
Engines:	
350-cu.-in. V8	98.0%
455-cu.-in. V8	2.0
Transmissions:	
Automatic	98.1%
3-speed manual	1.9
4-speed manual	0.0
Body styles:	
2-door hardtop	38.3%
4-door sedan	28.0
2-door coupe	20.1
4-door hardtop	10.7
Convertible	2.8
Why the Skylark?	
Past experience	38.1%
Styling	20.9
Size	19.1
Price	9.8
Reputation	9.3
Handling	7.9
Specific likes:	
Handling	51.5%
Ride	35.4

Styling	33.0
Comfort	25.2
Performance	16.5
Size	12.6
Power	12.6
Specific dislikes:	
Low gas mileage	31.7%
Rattles	12.0
Poor rear visibility	5.8
Small trunk	5.8
Dealer service	5.3
Poor workmanship	4.8
What changes would you like?	
More trunk space	12.4%
Better gas mileage	7.3
Different styling	6.7
Different seat shape	5.6
Better quality materials	5.6
More rear legroom	5.6
Had any mechanical trouble?	
No	61.9%
Yes	38.1
What kind of trouble?	
Carburetor	17.9%
Transmission	13.2
Electrical	7.2
Brakes	7.2
Gas gauge	7.2
Did you repair it yourself?	
No	98.7%
Yes	1.3

Dealer repairs satisfactory?	
Yes	52.8%
No	47.2
Is the Skylark your only car?	
No	51.4%
Yes	48.6
Other cars owned:	
Buick	34.8%
Chevrolet	17.9
Ford	15.2
Volkswagen	12.5
Dodge	6.3
Pontiac	6.3
Accessories/power options:	
Automatic transmission	98.1%
Power steering	68.2
Airconditioning	67.2
Radio	60.1
Power brakes	55.6
Tinted glass	30.8
Vinyl top	21.7
Age distribution of owners:	
15-29 years	24.1%
30-49 years	45.3
50-plus	30.1
Would you buy another Skylark?	
Yes	88.4%
No	11.6

*Percentages might not equal 100% due to rounding and/or insufficient data.

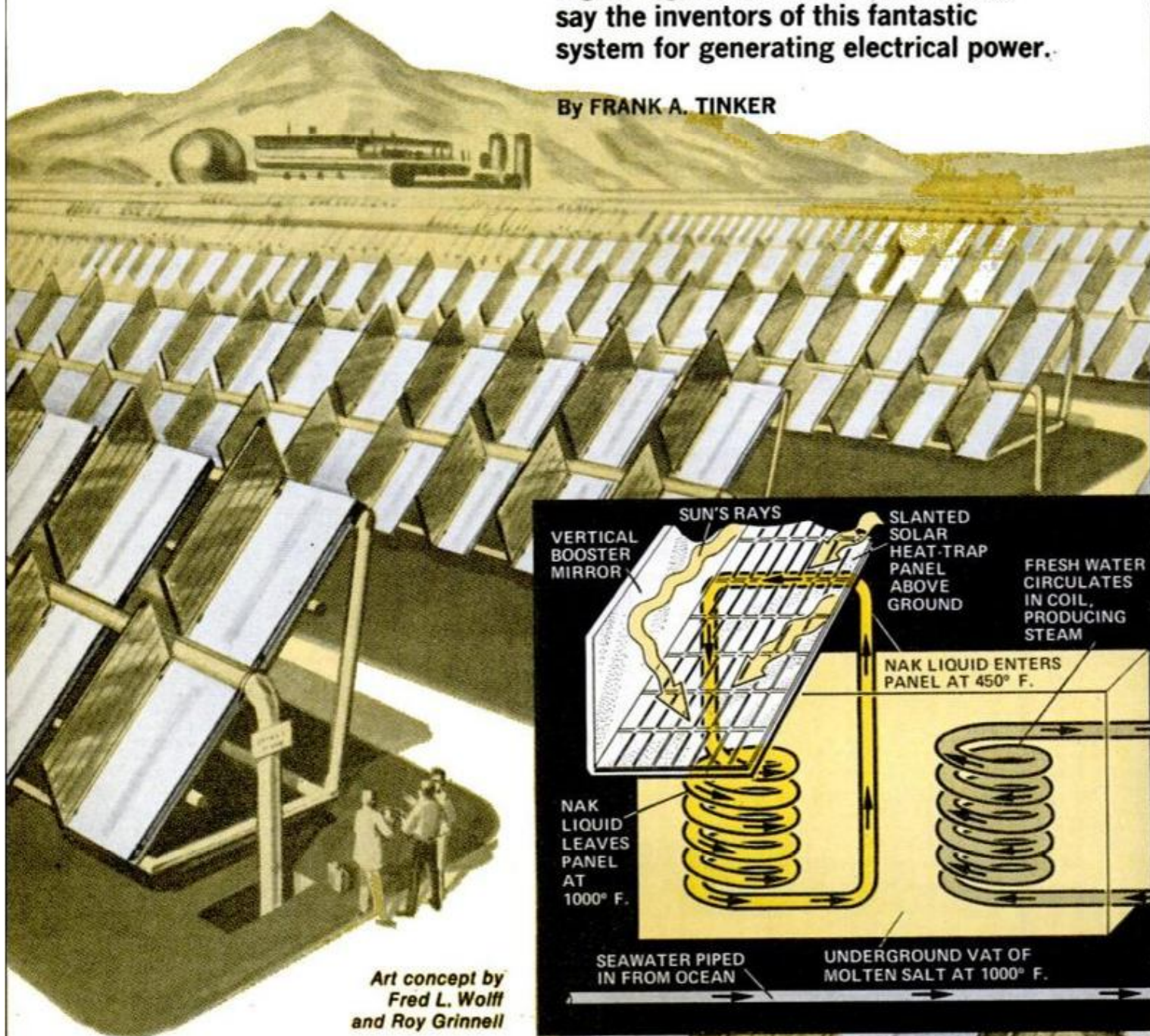
SKYLARK'S SIZE is well liked by owners. Wheelbase is 116 in.



Will solar farming solve our power crisis?

Plant a few thousand square miles of useless desert with heat-producing sun traps and you have a solar furnace big enough to run the whole country, say the inventors of this fantastic system for generating electrical power.

By FRANK A. TINKER



Art concept by
Fred L. Wolff
and Roy Grinnell

THEY MIGHT BE FIELDS of corn or wheat stretching for miles as far as the eye can see—but they aren't. In a bold new scheme to harness the sun's energy, these seemingly endless fields would be "solar farms" planted with heat-trapping devices to "grow" electrical power from sunlight. Sound fantastic? Not according to a husband-and-wife team of research scientists, Dr. and Mrs. Aden B. Meinel, who have already demonstrated a pilot model of their proposed system.

What's so remarkable about the Meinels' plan is not only that it works, but that it could be put into large-scale operation relatively quickly—a vital point in view of the desperate power crisis we now face. Those blackouts and brownouts are no accident. The fact is, we—along with the rest of the world—are simply running out of power sources. Oilmen estimate there are enough petroleum reserves to last only 11 years. Coal, though abundant, is costly to

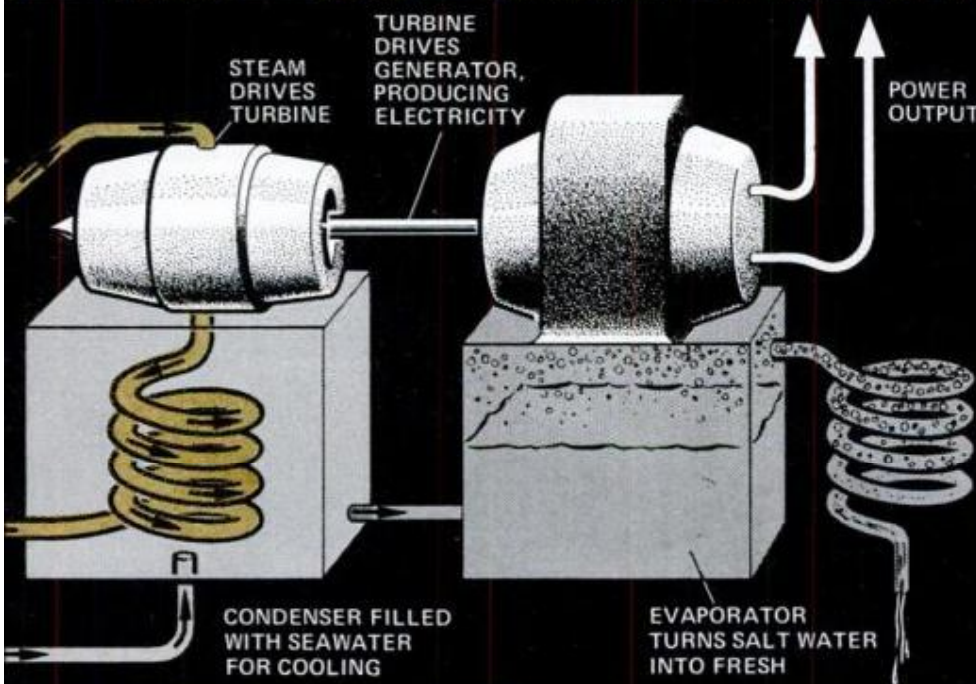
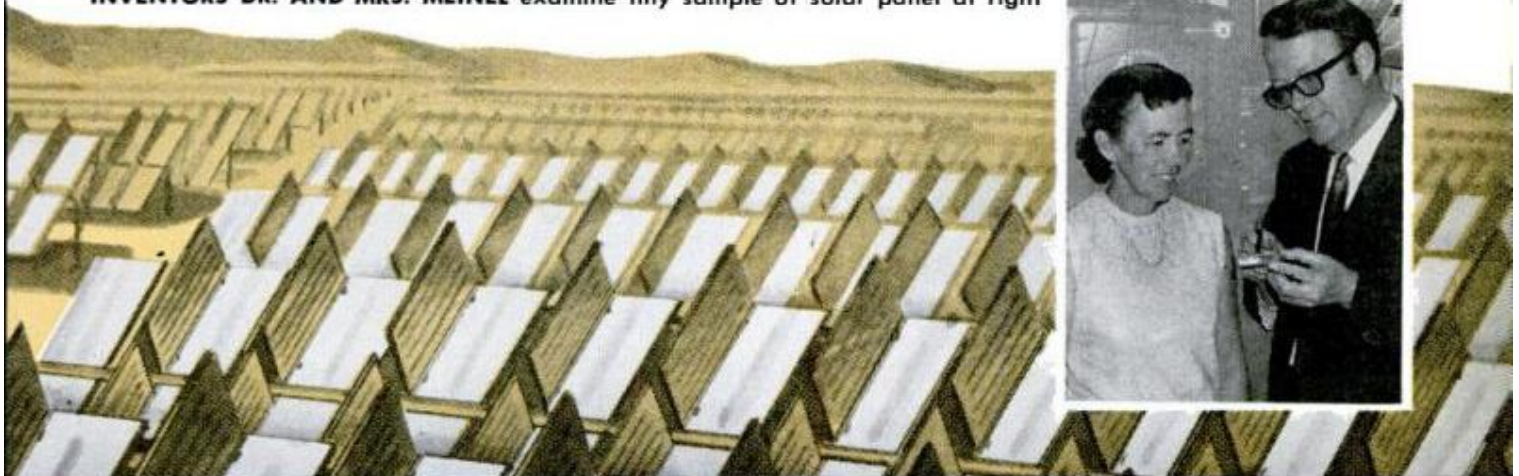
mine and a major polluter. Nuclear reactors of the size and type needed to produce meaningful power are a long way off.

That leaves the sun—cheap, plentiful and pollution-free. Doctor Meinel, director of the Optical Sciences Center at Arizona University, and his wife, Marjorie, based their system on the heat-trapping ability of microthin layers of gold, hafnium, quartz and other minerals and elements bonded together in sandwich-like panels. The panels work something like a greenhouse, letting solar heat in, then keeping it from escaping. Sunlight is absorbed by the panels, then the infrared portion is trapped inside by the reflective gold or other metallic layers. These imprisoned infrared rays build up intense heat, reaching temperatures of 1000° F.

Each panel is about 3 feet wide by 10 feet long and is angled to catch the sun's rays. A "booster" mirror is attached at a

(Please turn to page 184)

INVENTORS DR. AND MRS. MEINEL examine tiny sample of solar panel at right



HOW SOLAR HEAT is transformed into electrical power is shown in drawing at left. Literally hundreds of sloping panels catch sun's rays, heating special NAK liquid of sodium and potassium. This, in turn, heats water to create steam to drive turbine that runs generator to produce electricity. In process, seawater for cooling is turned into valuable fresh water



The homebuilt plane

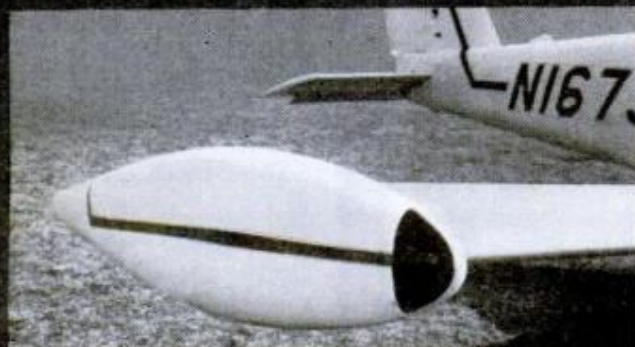


TAKEOFF REQUIRES about 550 feet. Equipped with 150-hp engine, the PL-2 climbs 1700 feet per minute



BIG SPINNER and prominent air inlets add to the PL-2's fast look. Top speed is said to be 150 mph

TWO WINGTIP TANKS hold total of 25 gallons of gas. Navigation light nestles in nose of each tank

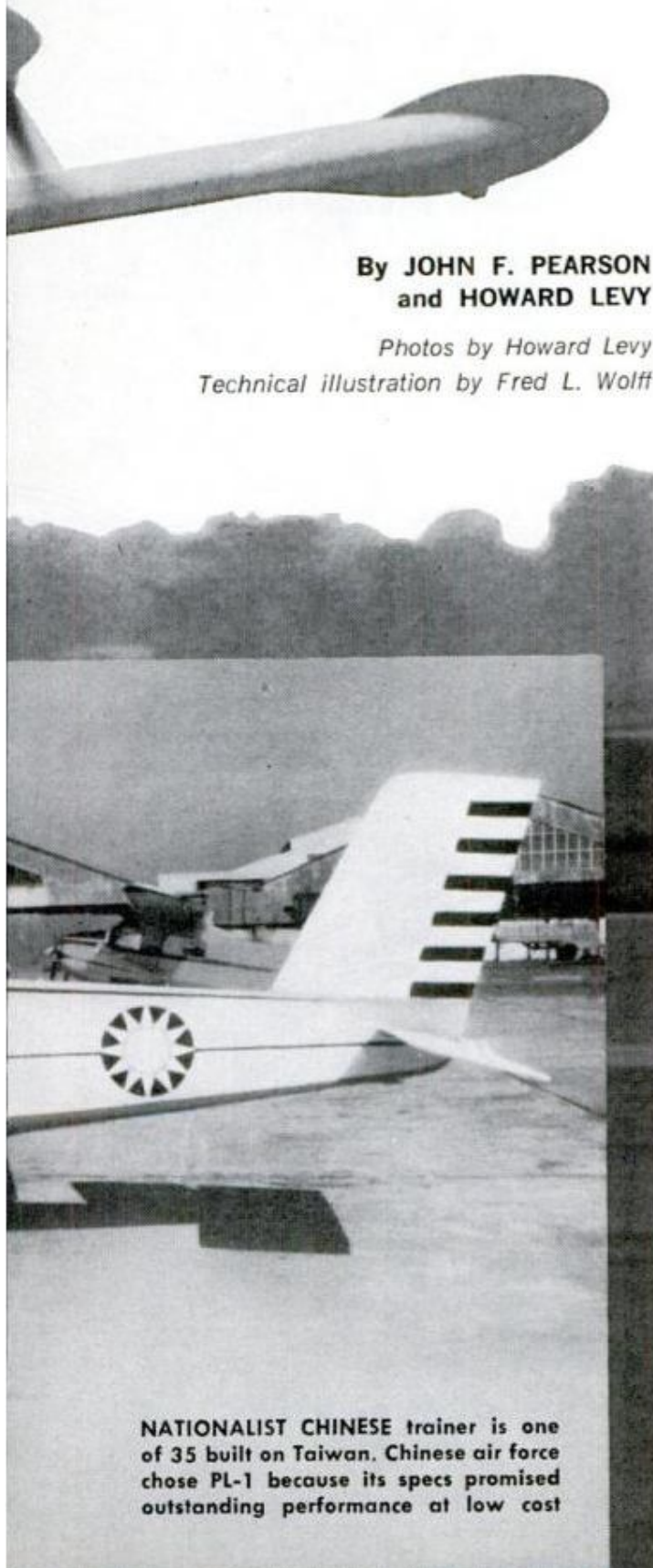


that's going commercial

The Pazmany two-seater is an all-metal plane that's rugged enough for aerobatics. The Nationalist Chinese built 35 of them for use as trainers.

By JOHN F. PEARSON
and HOWARD LEVY

Photos by Howard Levy
Technical illustration by Fred L. Wolff



NATIONALIST CHINESE trainer is one of 35 built on Taiwan. Chinese air force chose PL-1 because its specs promised outstanding performance at low cost

THE PAZMANY MUST be one of the most successful aircraft of homebuilt design ever to come off the drawing board.

A prototype of the Pazmany PL-1, the work of two California amateur builders, was first flown in 1962. It performed so well in tests and in actual use—one of the builders commuted to work in it—that its reputation spread. When the air force of the Republic of China chose a primary trainer in 1968, factory-builts were passed over in favor of the PL-1.

Now the South Korean air force is building a PL-2, an improved version of the basic plane, for evaluation, and commercial production by a manufacturer in Japan is in the offing.

The plane has qualities that make it ideal as a trainer: It has side-by-side seating, is what pilots call a "forgiving" plane, and is a rugged hunk of flying machinery that will stand up under student abuse. What appeals to flying enthusiasts is that it is also fully aerobatic and a smooth-looking plane.

It's not surprising that a craft of this caliber was designed by a professional—Ladislao Pazmany, a San Diego aeronautical engineer and an expert in the light-plane field. He estimates that he spent some 12,000 hours over a period of 12 years to work out the engineering and detailed plans for the PL-1 and PL-2.

Plans for the PL-2 are available in sets of 48 drawings. A set costs \$150.

The second PL-1 to be built was the work of Robert L. Miller of Alberta, Canada, who had no knowledge of aircraft construction or even a pilot's license. To educate himself he spent evenings studying the Pazmany blueprints and weekends hanging around a local airport and watching mechanics make repairs.

The airport also was a source of scrap metal, including rivets. Advice and assistance from other homebuilders—a most cooperative breed—helped keep the final cost down to \$2600. It took Miller and his



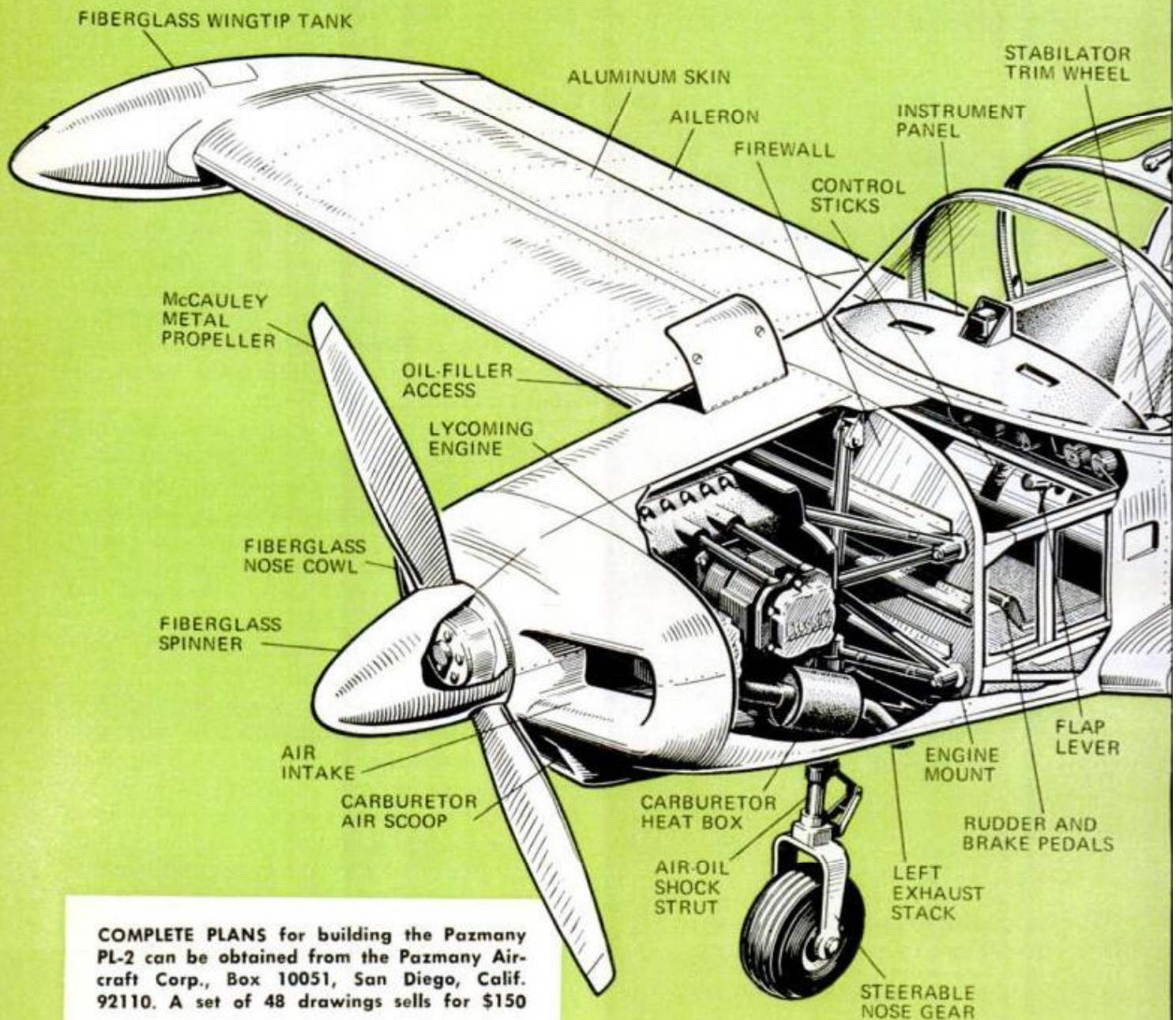
LANDING GEAR is attached directly to wing spar. Hefty shocks take the bumps out of rough landings

wife, who became a skilled riveter, 26 months to build the PL-1. This plane, too, proved rugged and reliable, and a really good aerobatic performer.

Constructing the Pazmany was a completely satisfying experience for Miller, who later wrote about it in a magazine article.

"The way I see it, the building of an airplane is a challenge, and must be met as such," Miller observed. "One must realize the intricacies involved and be willing to labor for a long, tedious period of time, as delicate work cannot be hurried. If this is clearly understood, there is little chance of becoming discouraged and therefore blaming the design . . ."

According to Miller, there is nothing quite like being able to rub your hand over your plane's wing and "recall the



COMPLETE PLANS for building the Pazmany PL-2 can be obtained from the Pazmany Aircraft Corp., Box 10051, San Diego, Calif. 92110. A set of 48 drawings sells for \$150

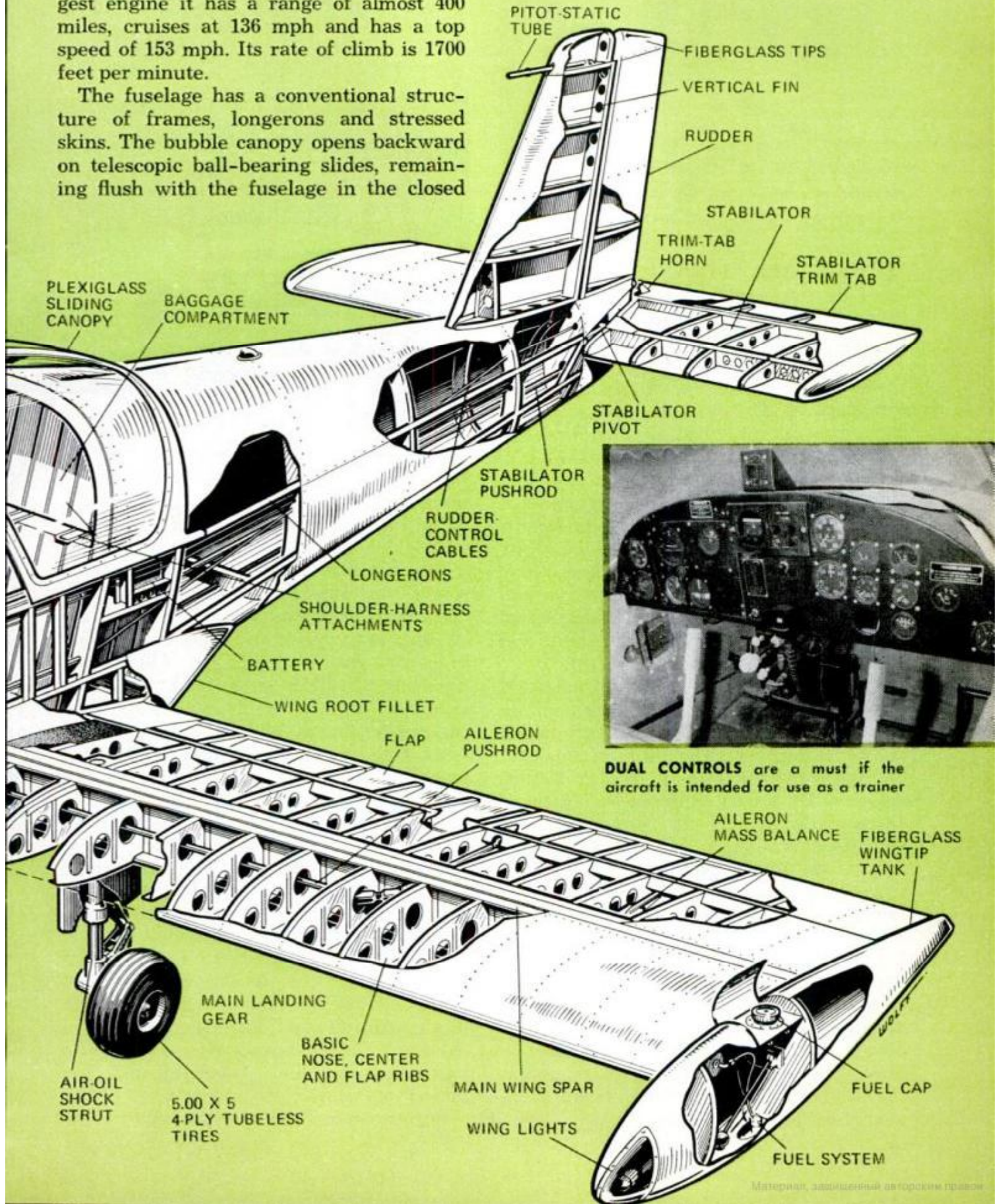
exact placing of each and every nut, bolt and rivet." The man who buys a factory-built is denied this satisfaction.

The PL-2, like the earlier version, is an all-metal two-seater. It has a wingspan of 28 feet, is 19 feet long and 8 feet 8 inches high. Empty weight is about 900 pounds. It can be powered by engines ranging from 108 to 150 hp. With the biggest engine it has a range of almost 400 miles, cruises at 136 mph and has a top speed of 153 mph. Its rate of climb is 1700 feet per minute.

The fuselage has a conventional structure of frames, longerons and stressed skins. The bubble canopy opens backward on telescopic ball-bearing slides, remaining flush with the fuselage in the closed

position. Behind the two seats is a compartment that can hold about 40 pounds of baggage.

It's estimated that the average builder can expect to lay out about \$4000 for the plane. To date, Pazmany has sold 375 sets of plans to purchasers in all parts of the world. ★ ★ ★



DUAL CONTROLS are a must if the aircraft is intended for use as a trainer



DATSUN PL-620 is successor to the Li'l Hustler—the lightweight pickup that opened up the market

THEY ALL LOOK ALIKE, those lightweight pickups. There are some differences the eye can see, but the similarities are greater than the differences. They were designed, and all start down the assembly line, in Japan: Nissan makes the Datsun; Toyota, the Toyota Hilux; Toyo Kogyo, the Ford Courier and the Mazda B-1600; Isuzu, the Chevy LUV.

Datsun has been the leader in the field since the company made a big success of a sedan that wasn't selling well in Japan: It cut off the rear of the car, added a box and found a growing market. Since then, it has dominated the Japanese market, with over 60 percent of early 1972 pickup sales. Toyota has almost 30 percent, and Toyo Kogyo and Isuzu split the rest.

It was in 1959 that Datsun first imported the Li'l Hustler to the West Coast, selling 159 units in all. It should have been called the Little Sleeper: The estimated market for lightweight pickups in 1972 is 200,000 vehicles! Datsun is shooting for 78,000 of those sales, and its just-introduced second-generation pickup, shown here, will be the lightweight target of second-place Toyota and the growing number of latecomers.

The sales figures have whet appetites at Ford and Chevrolet. Both started importing the Japanese half-tonners under their own names for West Coast and some eastern coastal markets early this spring, and Mazda started bringing in its B-1600 in May. The on-again, off-again rumor is that Dodge will soon import a pickup version of its Mitsubishi-made Colt.

The Are they

By **BILL HARTFORD**, Auto Editor,
and **MICHAEL LAMM**, West Coast Editor



TOYOTA HILUX is the half-tonner that arrived here several years ago to give Datsun some competition

The big market is on the West Coast where you see the minitrucks used for absolutely everything—as campers, for hauling motorcycles and other recreational equipment, reworked by filling stations and small businesses for utility roles, as second cars for outdoorsmen and first cars for teenagers. With mag wheels, wide tires and fancy paint, they're "tough" trucks, the latest "in" wheels for the enthusiasts.

All of the minitrucks, unloaded, ride like fat-farm machines—pretty jouncy. Many owners lay in four 60-pound bags of sand just behind the cab, which they say, helps quite a bit. That extra weight also improves traction and braking, both of which tend to be skittish otherwise.

All the engines use single overhead cams, aluminum heads and cast-iron blocks. All but the Courier and Mazda are oversquare. All come with all-synchro four-speed manual transmissions, but none (yet) come with automatic.

Performance of all is very similar. Don't

lightweight pickups: really all the same?

Datsun, Toyota, Ford, Chevy and Mazda. You can tell them apart by the name that appears on the tailgate! But what are the differences and where should you put your money?

let the Courier's and LUV's lower horsepower figures fool you. Detroit purposefully underrates output these days. We didn't do any side-by-side hillclimbing or hauling comparisons, but it was easy to feel that the four are very closely matched.

Same goes for load capacity—all about a half-ton (plus 300 pounds for driver and passenger). And although these pickups don't take up much garage space, their beds are within four square feet of equaling the El Camino and Ranchero.

As for gas economy, expect 19 to 25 mpg overall. What you get will depend more

Dealers can help you pick and choose. Here's a closer look at each lightweight.

Datsun PL-620. The 521 Datsun's popularity and entrenched position as field leader give it a solid resale value. That should be even more true for the new 620 pickup with its many improvements and refinements. Drive train remains the reliable L16 engine and four-speed synchro gearbox, but under the all-new sheet metal are components that help driveability. Vacuum-assist added to the braking system gives 30 percent more stopping power with the same pedal pressure. Two-stage leaf springs in the rear give a softer ride with light loads, and a new mounting system for cab and bed cuts passenger compartment noise and vibration. The airconditioner can be fitted to the same radiator and the fuel tank is 10 percent larger. Seatback has been reclined for better driving position and a slightly longer cab gives more legroom. Flow-through ventilation is another addition. There are lots of bright colors available, but the best



FORD COURIER is a newcomer made in Japan by Toyo Kogyo, maker of the almost-identical Mazda

on how you drive than on the truck itself. The LUV has the deepest rear-axle ratio and the smallest tank, so you might find yourself pulling into gas stations a bit more often with that than with the rest.

Usable cargo space in all four is chopped up by the rear-wheel houses, but there's little you can do about it. A wide variety of camper bodies and shells is available.

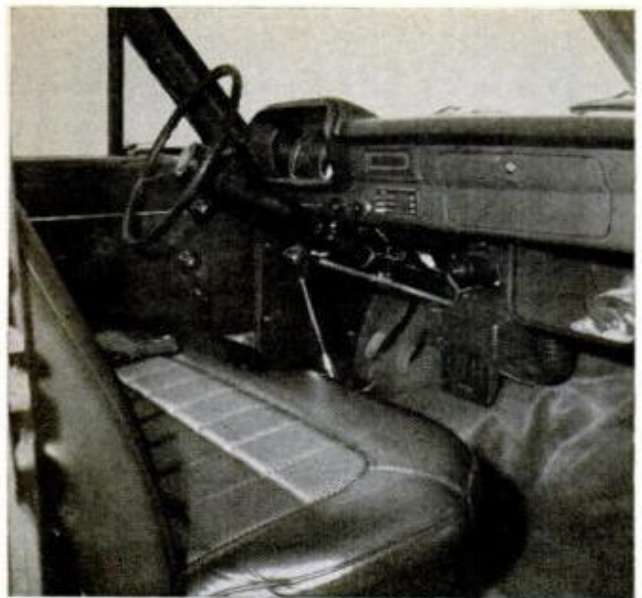
JULY 1972

CHEVROLET LUV, also from Japan, is a Light Utility Vehicle made to United States specs by Isuzu Motors





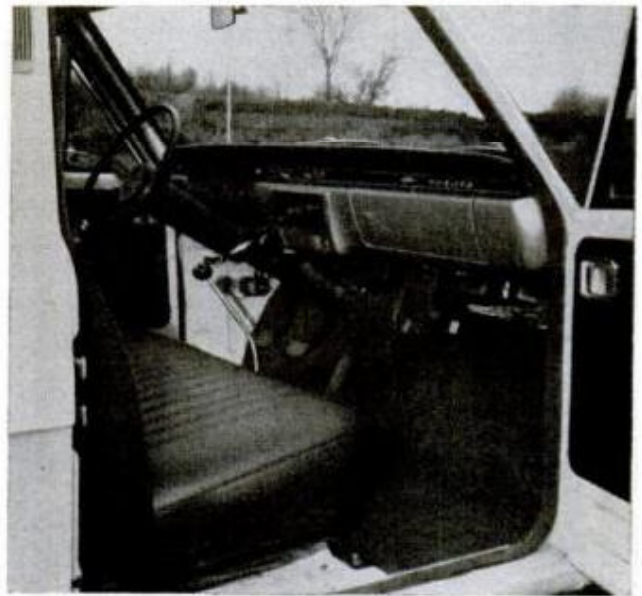
DATSUN PL-620 interior is neat and functional. Re-design of the side glass eliminates wind wings. There's more legroom, thanks to slightly longer cab



FORD COURIER has bench seat notched for gearshift; lights, other controls on steering column. Automatic transmission is not an option with pickups



CHEVY LUV interior has the most unusual dash design. And like all the other lightweight pickups, it has a convenient parcel shelf below the glovebox



TOYOTA HILUX has a large glovebox, passenger-car-type dash. Seatback rake is good, bench too firm. Steering in all pickups is recirculating-ball type

part of all is that the \$2236 sticker from the 521 carries over to the 620!

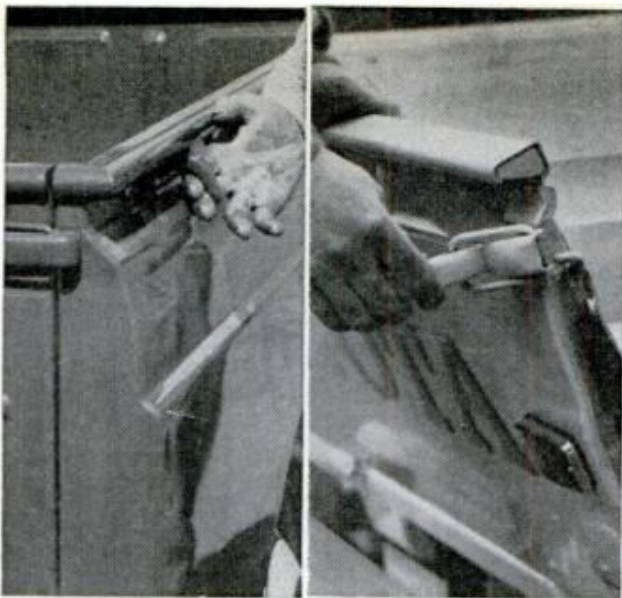
Toyota's Hilux, only pickup in its class with a double-wall tailgate standard, is similar to Datsun, yet Hilux lines lack personality. Seatbacks have a good rake, but the bench is thin and too firm. Turn-signal lamps atop the fenders are unnecessarily distracting. The coil-spring front suspension incorporates a torsional stabilizer bar for good handling. Clutch is hydraulic and brakes get vacuum assist (it's been found a lot of women are jockeying these pickups and the power brakes are welcomed). Shifting is not as crisp as we'd like, but the gearbox is strong.

Ford Courier. The grille shows a definite Ford influence and keeps identity in line with other Ford pickups.

The Courier boasts the biggest cargo bed and longest wheelbase in this class. It also has the best ride when unloaded and it does seem to be quieter than the other pickups.

Lights, wipers, washer, dimmer and turn-signal controls on the steering column take some getting used to. The transmission is excellent, but the gearshift lever comes back too far in second and high. To accommodate it, there's a notch in the middle of the seat!

Mazda B-1600. Toyo Kogyo sells it in



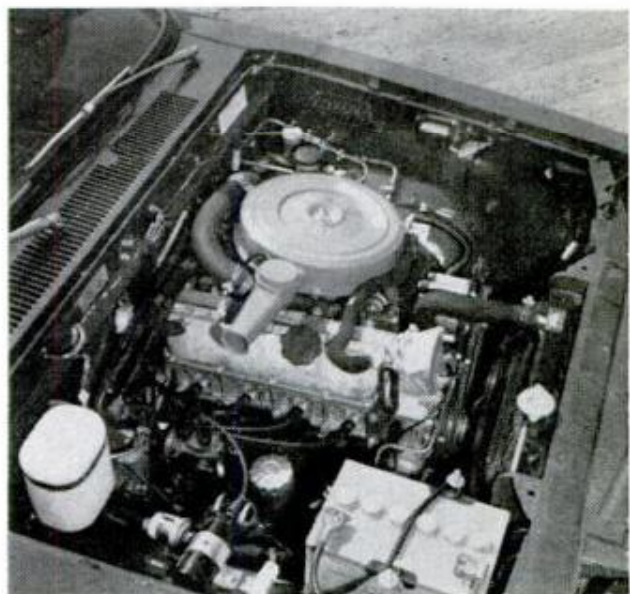
TIE-DOWN HOOKS are standard on all the pickups, as are full-width, bottom-hinged tailgates with latches at the sides and support chains that unhook



CARGO BOXES of the lightweights all have ribbed construction of floor, but not all have a double-walled tailgate. All have a full-width rear window



SPARE TIRE under the cargo bed behind rear axle cranks down from either the side or the rear of all trucks. When up, tire is held by safety chain



ENGINE CONFIGURATION is single-overhead-cam, in-line four for all trucks. All use two-barrel, downdraft carburetors and operate on regular fuel



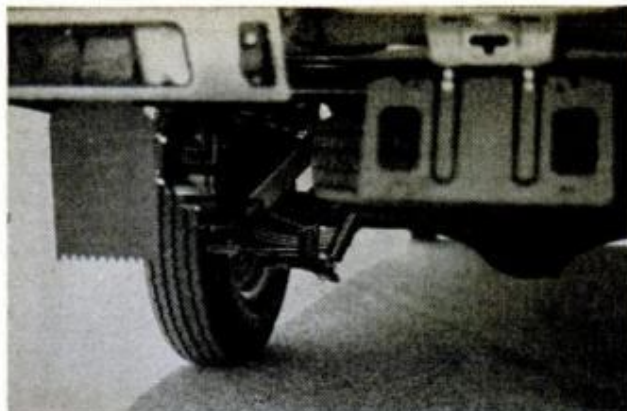
CONVENIENT STORAGE for tools and jack is behind backrest of bench-type seat used in all the minitrucks. The bench is on runners but the backrest is not adjustable for rake. Head restraints are not required by government on vehicles in the truck category. Rear window is close behind seat. Helmet is must for off-road racing!

EXTRACTOR VENTS mark lightweight pickup trucks that have flow-through ventilation. Location of the functional louvers is on rear quarter panel of the cab. Datsun, Toyota and Chevy feature the flow-through system. Ventilation system of Ford and Mazda is not the flow-through type. Heaters, of course, are standard in all the trucks

JULY 1972



NEW DATSUN details show the absence of ridge at the tailgate of cargo bed for easy washing out. View of the rear suspension shows the two-stage leaf spring that will give softer ride when pickup is unloaded, and heavier springing that is needed when truck is fully loaded (1440 pounds)



Japan. As of May, Mazda of America began selling it here. It's the same pickup Ford imports as the Courier—the biggest difference being the engine. The Mazda's smaller ohc Four displaces 96.8 cu. in., axle ratio is slightly steeper, curb weight a little less. Like others, Mazda is looking to whittle away some of the Datsun domination of the market, and is doing it with a solid, but conventional pickup: Wait'll they blitz us with a rotary pickup! It's just a matter of time.

Chevy's LUV, basically a Japanese KB-30 Isuzu pickup, is restyled and trimmed to look more like bigger Chevy pickups. Its front torsion bars are adjustable, and there's a 0.71-inch-diameter front stabilizer bar to aid cornering, plus an extra

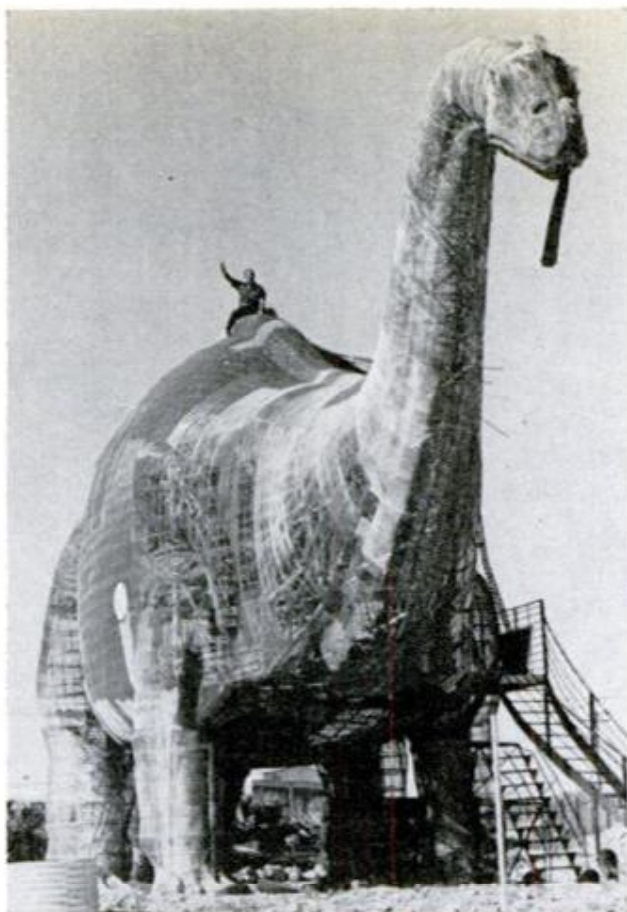
helper leaf around back. Brakes have vacuum assist. Steering is light and precise, and the stick snaps into each gear with a positive click. The flow-through ventilation system lacks volume. The sloping hood gives great forward vision, and the spare lowers via an insertable crank from the side.

Pricing out all of these pickups with the options you need or want is a tough, nit-picking job. For example: Do you like door armrests? Not all of the trucks have them. You'll have to put them on yourself or consider a different truck—if you live where you have a choice. Not all have national distribution. Selecting one may—alas—come down to dependency on a local dealer. ★★★

LIGHT PICKUP TRUCK SPECIFICATIONS

	Datsun PL-620	Toyota Hilux	Ford Courier†	Chevrolet LUV
Price	West Coast P.O.E. \$2236	\$2222	\$2222	\$2184
Engine and drive train	Engine type	Sohc I4 4	Sohc I4 4	Sohc I4 4
	Bore and stroke	3.27 x 2.90 in.	3.48 x 3.15 in.	3.07 x 3.70 in.
	Displacement	97.3 cu. in.	120.0 cu. in.	109.5 cu. in.
	Net bhp @ rpm	92 @ 5600	97 @ 5500	74 @ 5000
	Net torque @ rpm	99.8 @ 3600	106 @ 3600	92 @ 3500
	Compression ratio	8.5:1	8.5:1	8.6:1
	Transmission type	4-speed synchro	4-speed synchro	4-speed synchro
Hauling	Rear-axle ratio	4.38:1	4.11:1	4.11:1
	Curb weight	2127 lbs.	2447 lbs.	2510 lbs.
	Payload*	1440 lbs.	1400 lbs.	1400 lbs.
Dimens.	Bed length/width/height (inches)	73/56/16	73/56/16	75/62/16
	Wheelbase	100.1 in.	99.8 in.	104.3 in.
	Overall length	169.2 in.	165.9 in.	172.0 in.
	Overall width	62.5 in.	63.2 in.	63.0 in.
General	Overall height	60.8 in.	61.8 in.	61.6 in.
	Front suspension	Torsion bar	Coils, stabilizer	Coils, stabilizer
	Rear suspension	Leaf springs	Leaf springs	Leaf springs
	Tire size	6.00 x 14	6.00 x 14	6.00 x 14
	Brakes	Drum/drum with vacuum assist	Drum/drum with vacuum assist	Drum/drum
Fuel capacity	11.8 gal.	12.2 gal.	11.9 gal.	10.0 gal.

*With 300 lbs. for driver and passenger. †Mazda B-1600 specs same except: Price, \$2195; bore and stroke, 3.07x3.27; displacement, 96.8 cu. in.; hp, 70@5000; torque, 82@3500; rear-axle ratio, 4.375:1; weight, 2470; payload, 1200 pounds; bed width, 57 inches.



Prehistoric beast appears near Palm Springs

A steel-framed dinosaur, which will be given a "skin" of cement, has been built over the past five years by Claude Bell and Norman

Carner near Palm Springs, Calif. The giant is 150 feet long, 60 feet high and weighs some 150 tons. It'll be a tourist attraction.

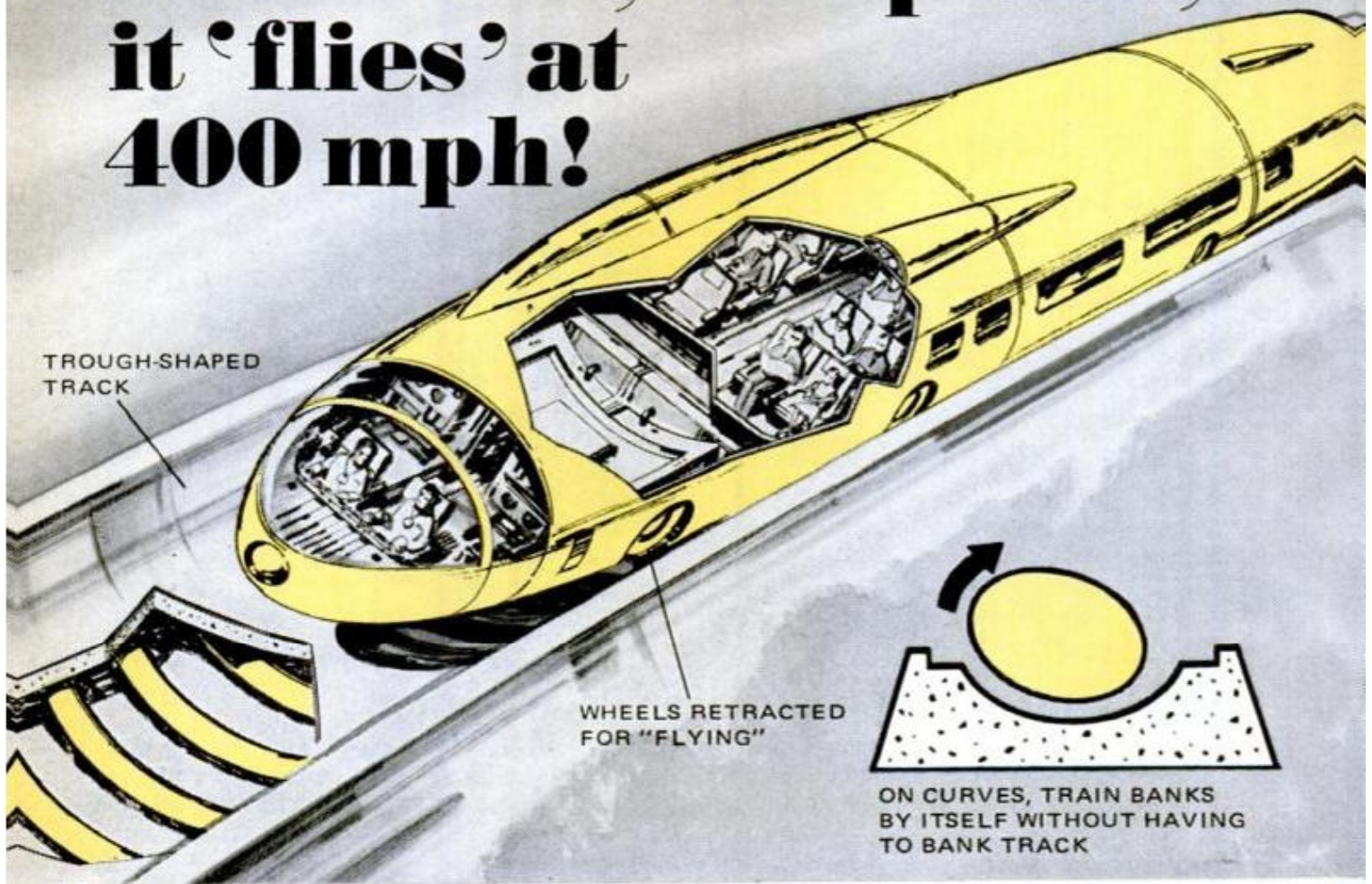


'Hover dinghy' designed to explore Himalayan rivers

Testing his air-cushion dinghy in Paris is Michel Peissel, who took the specially made vehicle on an exploration of the river country

of the Himalayas this spring. The British-made dinghy floats on an air cushion created by the horizontal fan behind the operator.

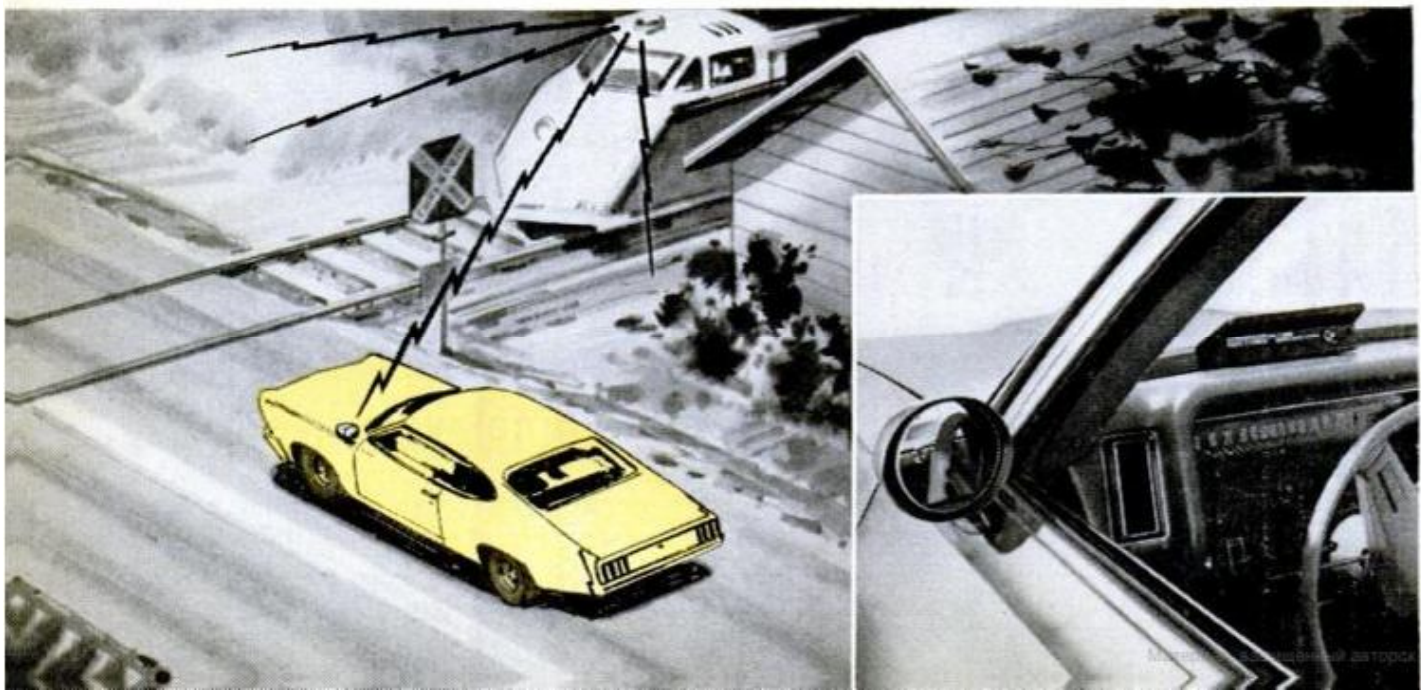
Half train, half plane, it 'flies' at 400 mph!

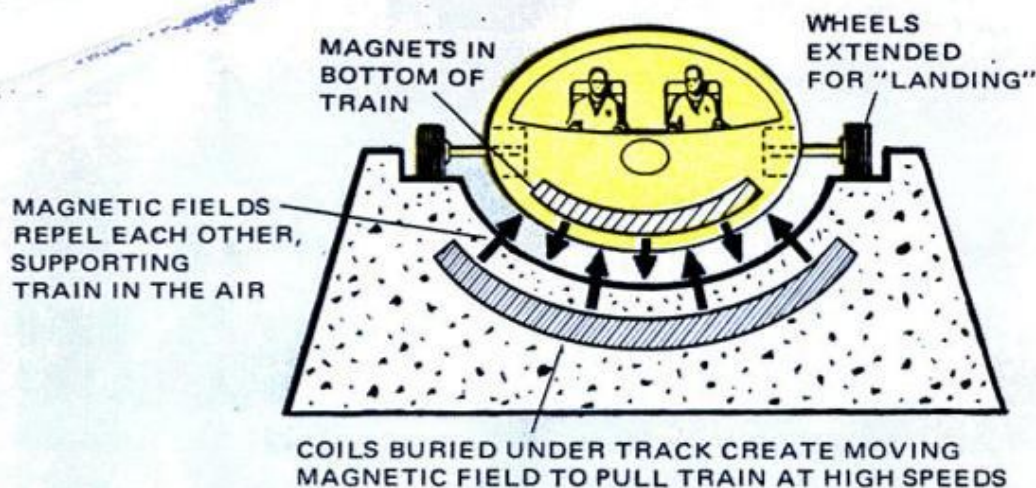


Electronic 'ear' helps make driving safer

Driving along with the windows closed and radio blaring often makes it difficult to hear warning signals such as train whistles, sirens and the horns of other motorists. With this outside "ear," there'd be no problem. An amplifying device hidden in the

rear-view-mirror housing picks up sounds and triggers a dash-mounted indicator inside the car. A light flashes on and an audible warning sounds to tell you danger is approaching. Inventor is James R. Thomas, Fort Worth, Tex.





IT DOESN'T FLY ON AIR, yet it zooms along at up to 400 mph without touching the ground. Called the Magneplane, it's designed to combine the speed and comfort of air travel with the greater safety and lower cost of land travel. The 200-passenger wingless craft is actually supported on a magnetic field as it rides in a troughlike track. Magnets in the floor interact with coils embedded in the trough to produce a field of opposing forces that keep the vehicle suspended virtually friction-free a few inches above the track. At the same time, the magnetic field moves rapidly from coil to coil, pulling the craft along

with it. The speed can be controlled merely by varying the rate of the moving magnetic field along the track.

The track doesn't even have to be banked at curves because the craft banks itself like a plane, automatically assuming the correct angle proportional to speed and curvature. By contrast, rail roadbeds must be banked to a fixed angle and are limited in speeds they can safely handle. Small retractable wheels on the Magneplane are used only for "landings" and "takeoffs" at station stops. The project is currently under study by scientists at Massachusetts Institute of Technology.

Flip-top can turns into a disposable mug

They've added a new wrinkle to flip-top beer and soft-drink cans. As you pull a tab, a metal strip peels open the top and at the same time curves outward to form a convenient handle for easy drinking directly

from the container. Handy for camping trips and picnics where glasses often aren't available, the self-handled can was invented by David E. Russell, 110 Riverside Ave., Jacksonville, Fla.



A nationwide survey based on
1,200,000 owner-driven miles



PM
PLYMOUTH FURY
OWNERS
REPORT

Owners stick with a good thing, but bite bullet on gas mileage

By MICHAEL LAMM, West Coast Editor / Photos by the author

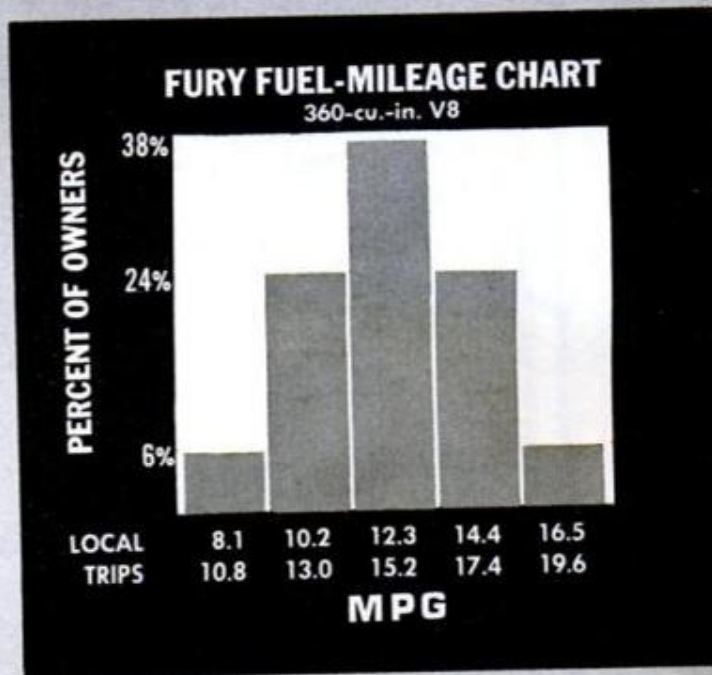
THE REASON owners keep coming back for more is that they've had such good service from Plymouths in the past. Nearly 55 percent list "past experience" as their No. 1 reason for buying the 1972 Fury.

Meanwhile, the thing owners gripe about most is poor fuel economy. Says a Michigan retiree, "Gas mileage is too low. I got at least 16 mpg around town with the old Belvedere; am now lucky to get 10 mpg." A Virginia housewife adds, "It's an easy rider and handles great, but it gives the worst gas mileage we've ever had." By "worst," she means 13-14 mpg average from the 360-cu.-in. V8.

Here are some other reasons people gave for choosing Plymouth over its competition. "Because Chrysler Corp. has the best-engineered cars today."—Maryland retired plumber. "I think Chrysler builds a good product; all my previous Chrysler Corp. cars gave me good service with normal maintenance."—New York accountant. "I liked the style, and I've gotten better service from Plymouth than from Ford or Chevrolet."—South Carolina textile tradesman. "90 percent for its appear-

ance and 10 percent for its quality."—Ohio engineer. "I thought it was good on engineering and would give me long, care-free service."—Bronx packer. "A sporty-looking car in the lower price ranges."—Detroit autoworker.

Once they've lived with their Furies for awhile, what do their owners think of



them? Here are representative comments:

"I don't think there is any car on the road that drives as nice as the Fury III. Dealer is good—I go in, they take care of me quick. I never need an appointment."
—Ohio truck driver.

"Very roomy, very good dealer. I bought a new 1966 Sport Fury, liked it so well I got hooked on Plymouths. I like everything about mine but the gas mileage and the rough idling, both caused by the smog control."—North Carolina mechanic.

"Very courteous and fair salesmen but poor service. The car is good mechanically but poor bodywise. I purchased this car last November. First time it rained I ended up with a 3-inch puddle in the left-rear foot well. I've brought the car back to the dealer four times, but it's still the same. Otherwise it's very comfortable, easy-riding, easy-handling."—New York postman.

"I got sick of the trouble I was having with GM cars. This Fury is the best-riding, best-handling car I've ever had. I have no complaints except gas mileage."—Pennsylvania railroader.

"It's a shame I couldn't wait—I just had to be the owner of one of the first 1972 Plymouths built. Workmanship is lousy. The body isn't tight, the instrument panel isn't arranged correctly, the trunk lid keeps falling shut. I've installed 2½ sets of new shocks to try to correct a knocking noise in the rear end. I also get a lot of wind roar from the side windows at turn-pike speed. Among inherent flaws, the



ELECTRONIC IGNITION (on firewall) uses no points, can't wear, keeps emissions low and engine in tune

front seatback isn't straight enough. I hit my knees on the dash. The brake and hood releases are too close together. Rain drips off the roof when you open the door. And the dealer keeps stalling on service."
—Missouri salesman.

"I am a high-speed driver," says a Des Moines commercial artist and sometime flyer. "To me, a car has one function and that is to run and furnish transportation when I want it. I'm driving my seventh Chrysler product, and none has ever failed me. What I expect from my Fury is dependability, power, lasting qualities, styling, lack of high maintenance costs, plus acceleration and speed when I need it. My one complaint is the lap-belt locks. They're hard to fasten and would be rough to release in a wreck. Belts should release with a flick of the finger—like releases on a parachute."

"Workmanship is good when you com-



RELEASE PULLS for hood and emergency brake stand too near each other. Drivers often confuse the two



REAR-BUMPER RUBBER, supposedly permanent, pulls away. Platers say it makes bumper hard to straighten



BIG TRUNK has high loading sill. Owners appreciate roominess, say they like the lock offset to right



POWER DISC BRAKES cost only \$63 extra, give excellent stopping. Fury's clean styling turns heads



SOME OWNERS feel interior design lacks verve, is uninspired compared with car's flashier exterior styling

pare it with other American cars. I'm very satisfied with my Fury III in all areas, but I'd like to see them bring back vent windows, and the 400-cu.-in. V8 really doesn't get good gas mileage. It's good-looking, the airconditioning is excellent, and it's comfortable."—Georgia construction firm owner.

"After driving a short distance and then stopping, the engine is hard to restart. My dealer is okay, but he hasn't been able to correct the hard starting. We traded a 1969 Fury and got a fair deal. I'd like better mileage and a vent on the right side. It rides and handles well, and although it's no fault of the car, I find it a little large. The middle seat belt is too short. I complained to Chrysler about this, and they told me it was a government law. If so, it's stupid, because I'll never use the belt and I'm sure lots of other people won't either."—Ohio retiree. [Chrysler Corp. dealers tell us they recognize the short seat-belt problem, and most will correct it free of charge.]

"I bought my Fury on the strength of quality and performance observed in Chrysler products owned by friends, family, police and taxis. I'm very pleased with my car's durability, performance, and styling, but what bothers me is the steady decline from year to year of gas mileage. I also think the interior looks crude in comparison with GM and Ford cars. When I got my Fury, the rear wheels sounded loose, and there was a popping noise in the left-front suspension when driven over uneven surfaces. Also water leaks around both front doors. The dealer fixed the leaks, but the noises persist."—Texas parole supervisor.

"Hard starting when warm. Cold, she starts the instant you hit the key. The dealer has tinkered with the carburetor, choke settings and timing, but it seems to get worse. I've always owned Plymouths, and I like my Gran Coupe overall—the ride, performance, convenience, comfort, and options, particularly the disc brakes and rear-window defroster."—Illinois salesman.

"I owned two Fords and two Dodges, but this Fury is the best. I like the unitized body, good visibility, styling, gauges instead of lights (but I would like an oil-pressure gauge). Workmanship is excellent—good paint job and all chrome and trim fit well. Right after I got the car, the



MORE THAN HALF of Fury buyers have owned Plymouths before. Age distribution is very even, meaning that car appeals to all age groups. Unit body and torsion-bar suspension are among car's technical advances

left-front disc brake locked, causing the car to spin completely around. This was fixed promptly at no charge—a very courteous, friendly, understanding dealer. No runarounds.”—Louisiana teacher.

“Windows leak air, don't seal right,” says a self-employed Illinois man, “but that's my only major complaint. I do think my 1969 Fury was built a lot better, yet the 1972 is comfortable, handles well, and I like the fan that keeps fresh air circu-

lating.” [Most owners said they didn't like the fan.]

Finally, from a pleased Brooklyn sales representative: “It's one big, beautiful auto. It handles well and stops on a dime. The dealer replaced a cracked head gasket and adjusted the trunk lid. Otherwise everything has been fine. Mechanically, I think Plymouth is far superior to GM and Ford. It's a very comfortable car front and rear.” ★ ★ ★

Summary of 1972 Plymouth Fury Owners Reports*

Total miles driven 1,200,262

Average miles per gallon
 318-cu.-in. V8, local driving . 12.5
 long trips . 15.2
 360-cu.-in. V8, local driving . 12.3
 long trips . 15.2
 400-cu.-in. V8, local driving . 11.3
 long trips . 14.2

Engines:
 318-cu.-in. V8 35.6%
 360-cu.-in. V8 52.7
 400-cu.-in. V8 11.7

Transmissions:
 Automatic 99.1%
 3-speed manual 0.4
 4-speed manual 0.4

Body styles:
 2-door hardtop 38.3%
 4-door hardtop 32.4
 4-door sedan 29.3

Why the Fury?
 Past experience 54.6%
 Styling 17.5
 Price 13.3
 Dealer service 7.1

Specific likes:
 Handling 47.0%
 Ride 42.9
 Styling 34.6
 Comfort 34.1
 Performance 16.6
 Economy 11.5
 Power 8.3

Specific dislikes:
 Poor gas mileage 23.1%
 Rattles 15.0
 Short seat belts 7.3
 Poor workmanship 5.1

What changes would you like?
 Exterior design 10.1%
 Add vent windows 9.7
 Improve rear vision 9.2
 Use better materials 6.8
 Better workmanship 5.8
 Change seat shape 5.3

Had any mechanical trouble?
 No 51.2%
 Yes 48.7

What kind of trouble?
 Carburetor 19.7%
 Electrical 11.1
 Cold starts 9.4
 Brakes 6.0
 Power steering 5.1
 Transmission 5.1
 Shock absorbers 5.1

Did you repair it yourself?
 No 95.7%
 Yes 4.3

Dealer repairs satisfactory?
 Yes 72.1%
 No 27.9

Is the Fury your only car?
 Yes 52.5%
 No 47.5

Other cars owned:
 Plymouth 36.0%
 Chevrolet 14.9
 Dodge 11.4
 Ford 8.8
 Chrysler 7.0
 Volkswagen 6.1

Accessories/power options:
 Automatic transmission 99.1%
 Power steering and brakes 86.3
 Airconditioning 57.9
 Radio 57.9
 Vinyl top 21.5
 Tinted glass 20.2
 Remote sideview mirror 13.9
 Power steering (alone) 12.0
 Light groups 9.9
 Cruise control 9.9
 Power seats 3.9
 Power windows 3.5
 Sunroof 0.4

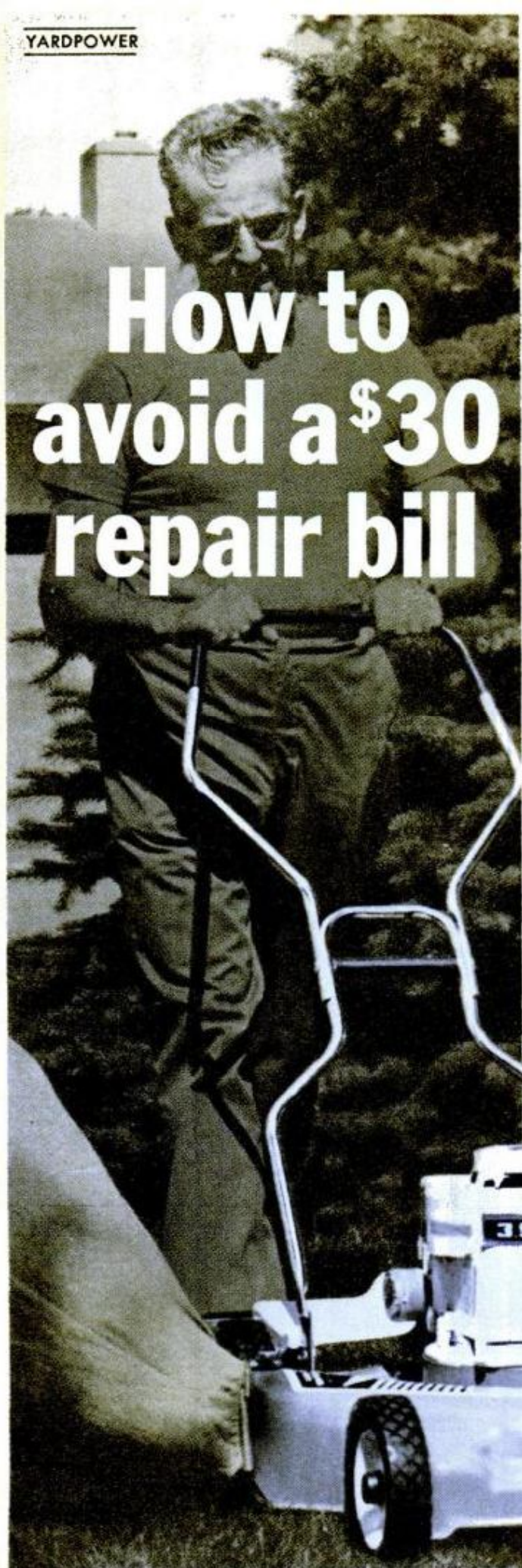
What options/accessories would you order next time?
 The same 68.4%
 Airconditioning 7.9
 Power windows 6.1
 Rear defroster 4.8

Age distribution of owners:
 15-29 years 15.4%
 30-49 years 44.7
 50-plus 40.0

Would you buy another Fury?
 Yes 86.0%
 No 14.0

*Percentages might not equal 100% due to rounding and/or insufficient data.

How to avoid a \$30 repair bill



WILL IT COST YOU \$30 and an hour's time to mow your lawn some day this summer? It could, if you neglect preseason preparation for your mower and then skimp on preventive maintenance during the season.

In less than an hour, an engine running on a contaminated or low oil supply, or with an improperly serviced air cleaner, can score a crankshaft, connecting rod, cylinder wall and piston.

For an average 3½-hp engine this would add up to a new crankshaft at \$13.95; connecting rod, \$3.95; piston rings, \$4.50; gasket set, \$3. Add the cost of an hour's labor—at \$8 an hour—and you would have a total bill of \$33.40.

The engine is the heart of power lawn equipment and, like the motor in your car, requires periodic checks. Most small air-cooled engines run between 3200 and 3600 rpm, which adds up to a lot of spinning and possible wear through friction.

For the most part, concentrate your maintenance work on three major systems—intake, lubrication and fuel. Check each system in a step-by-step procedure. *Caution:* Before working on a mower, disconnect the sparkplug wire to prevent accidental starting.

Intake system. This is the component through which the engine breathes—it draws in air to mix with the gas. Dirty air entering the engine through an improperly serviced air cleaner is frequently the cause of hard starting, loss of power and complete engine failure.

Neglected maintenance can easily cost you that much in parts and labor

By JOHN L. O'ROURKE
POPULAR MECHANICS

There are three common types of air filter; each should be cleaned after every other mowing.

● **Polyurethane sponge.** This type should be washed in a detergent solution or solvent. Squeeze the sponge dry, then pour new engine oil into it. Work in the oil and squeeze out any excess. Clean the container that holds the element before putting it back. Check to make sure that the cover fits securely.

● **Paper element.** This very effective type of filter can be cleaned by tapping it gently and blowing low-pressure air through it. The element should be inspected for holes that would allow dirt to enter the engine. If severely clogged or distorted, replace with a new element.

● **Oil bath.** Basically, this is a container that uses a layer of oil to trap dirt particles. Wash the element in a solvent such as kerosene and add fresh oil to the proper level indicated.

If an air cleaner is doing its job, it will collect enough dirt to restrict the flow of air to the carburetor, and the engine will begin to run rough. Check the condition of the air cleaner before attempting a carburetor adjustment. Never run the engine without an air cleaner.

Lubrication system. Two types of air-cooled engines are used on lawn equipment: two-cycle and four-cycle. Each requires a different method of lubrication.

The four-cycle engine carries its oil supply in its base. The oil is pumped or splashed to the moving parts. Most manu-

facturers of four-cycle engines recommend an SAE 30 MS grade oil. The MS stands for "motor severe," indicating that this oil will withstand high engine heat. Oils designated ML (motor light) or MM (motor medium) will not hold up.

Oil should be changed on a regular basis, at least every 25 hours of running time; more often if there's dust in the air. An oil change is your cheapest insurance against engine failure.

To change oil, run the engine until it is at operating temperature. Turn it off, remove the filler and the drain plugs, and let the oil run out. Replace the drain plug and, after making sure that the engine is level, add fresh oil. Consult your owner's manual for the correct amount of oil. Because of the small capacity of these engines, you must maintain the proper oil level for cooling as well as lubrication.

If you have a large garden tractor that's used the year round, be sure you're using the proper weight oil for the season. When it's above 40°F. use MS 30; when it's below, use MS 5W-20.

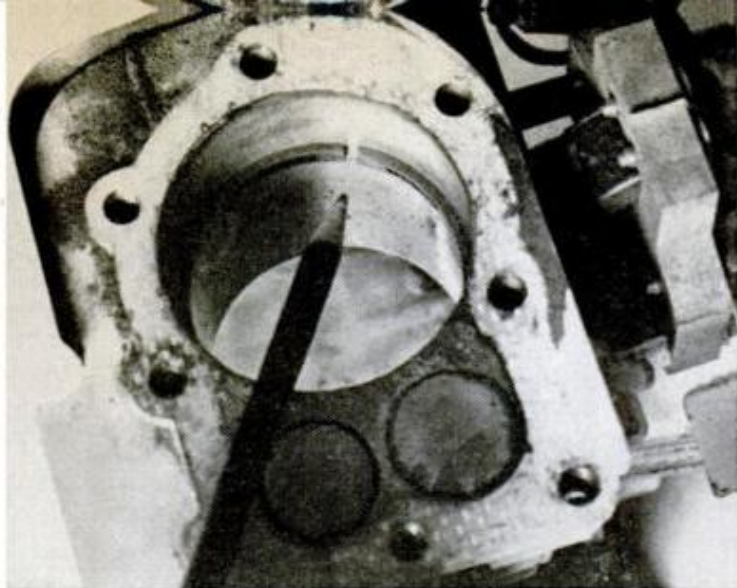
Two-cycle engines get their lubrication from oil mixed with gasoline, and the ratio varies for almost every make. Once again—check your owner's manual. Mix the oil and gas thoroughly and use all the mixture from the storage can before preparing a new batch. This will prevent a buildup of the oil ratio and assure you of having fresh gas.

Fuel system. It requires little service, but be sure that what you pour into the

AFTER CLEANING an oil-bath filter element, add fresh oil to the container, following instructions in owner's manual. Sponge element (center) should

be squeezed to remove any excess oil. Too much oil will restrict air. Improperly serviced air cleaner resulted in the worn piston pictured at right





ACCUMULATION OF DIRT IN OIL SUMP (upper left) is the prime cause of premature wear in engine

DIRT CAUSED this excessive piston-ring gap (above) which results in low power and high oil consumption

WEAR ON UPPER MAIN BEARING (far left) resulted from dirty oil. Be sure to clean around oil filler plug before removing it to keep dirt from entering



Here are additional tips for keeping your mower healthy:

- *Keep cutter blades sharp and balanced.* If the blade on your rotary is badly nicked, replace it.
- *Clean grass cuttings* from engine cylinder fins and head after each mowing.
- *Keep all belts at proper tension.* Be sure that gear boxes and pulleys are well lubricated.
- *Operate the engine at proper speed,* usually between 3200 and 3600 rpm. This will assure proper lubrication and cooling. If engine runs hot, check to see that you are using the oil specified by the manufacturer. If it's a two-cycle engine, make sure you are using the correct mixture of gas and oil.
- *Scan the area to be mowed for obstacles* that could cause a bent crank, sheared flywheel key or possible injury to yourself or others. ★★★

tank is gasoline. Many a tank and carb have gotten fouled up by kerosene, paint thinner and other liquids. Use a clearly marked can for your gasoline. If you have two-cycle and four-cycle engines, it's doubly important to use gas cans that are readily identified.

Buy gas—regular, not premium—in limited quantities so that it will be fresh. This prevents gum and varnish deposits that could plug the carb.

When storing the engine, drain all the fuel from the tank. Then run the engine until it stops. Or you can buy a commercial additive that will prevent the gas from going stale.

REGULARLY LUBRICATE all controls and check for travel on linkages and levers. Good maintenance can prevent breakdowns

CHECK THE BLADE and hub assembly for wear, tightness (far right). Replace a badly worn, nicked blade. Be sure you remove spark-plug lead before you start work on the blade assembly

110

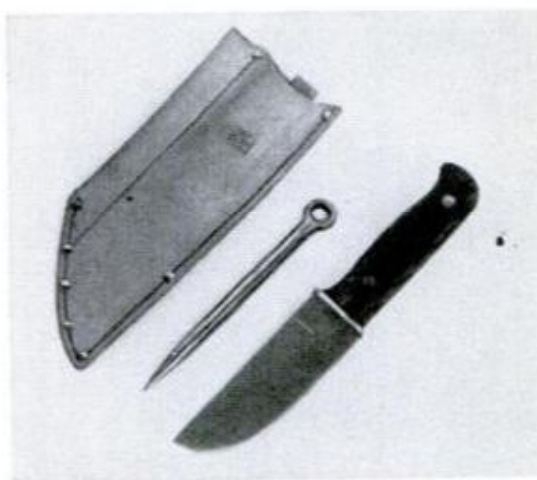


New for boatmen



PAPOOSE is an 8-foot 20-pound aluminum canoe with Dow Ethafoam lining and sponsons for stability and flotation. Small enough to fit in the back of a station wagon and light enough to portage through the woods, the little craft from Sportspal Inc., Emlenton, Pa. 16373, could prove popular for packing in to remote fishing hot spots. It is \$185 f.o.b.

SAILOR SET of rigging knife, marlin spike and fitted leather sheath provides an old salt's standby at a new low price: \$7.95 plus postage. Both marlin spike and 3 $\frac{3}{4}$ -inch blade are stainless steel; sheath is rivet-reinforced. Goldbergs' Marine, 202 Market St., Philadelphia, Pa. 19106, offers 6000 more boating items in \$1 mail-order catalog.



PACK/RAFT, a \$120 inflatable boat from American Safety Recreation Products Group, 16055 Ventura Blvd., Encino, Calif. 91316, is said to weigh in at under five pounds, fit in a 20x8-inch stuff sack, and blow up to 72x43 inches for floating two full-sized fishermen. Wilderness bed, bathtub and shelter as well as boat are other recommended uses. Neoprene-coated nylon meets military specs.

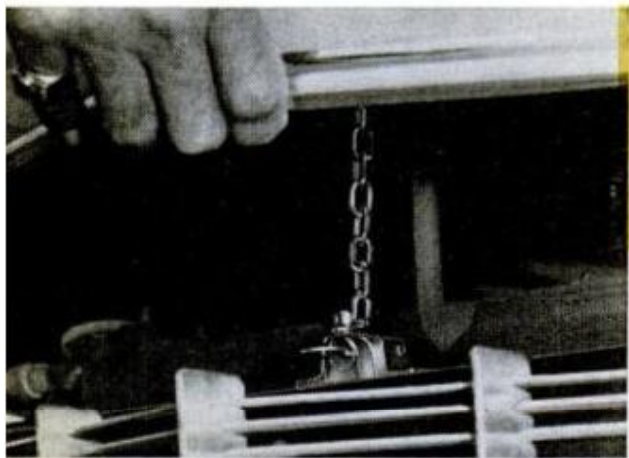
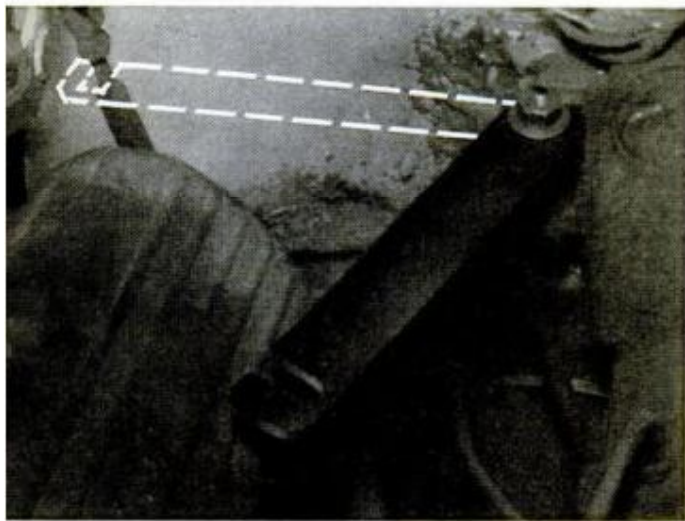


FLEX-A-TRIM trim tabs are claimed to adjust continually and automatically to boat speeds when installed on the transom of any power craft up to 24 feet. By flexing to water conditions and speed, tabs are reported to help prevent squatting, pounding and porpoising, raise the hull more quickly onto plane, improve and level running angle, and reduce power and rpm necessary for most speeds. From Scott Molding Co., Box 2958, Sarasota, Fla. 33578, the Flex-A-Trim tabs list at \$17.50 per pair.



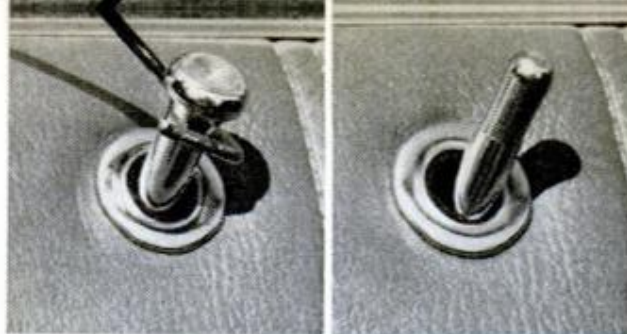
ODDS ARE 10,000 TO 1 that thieves who dial this ignition system get a wrong number. See page 118

MAKE THIEVES CRAWL with this do-it-yourself accelerator lock. See types on page 117



YOUR RADIATOR CAP is all you'd lose with this hood lock on. See page 115

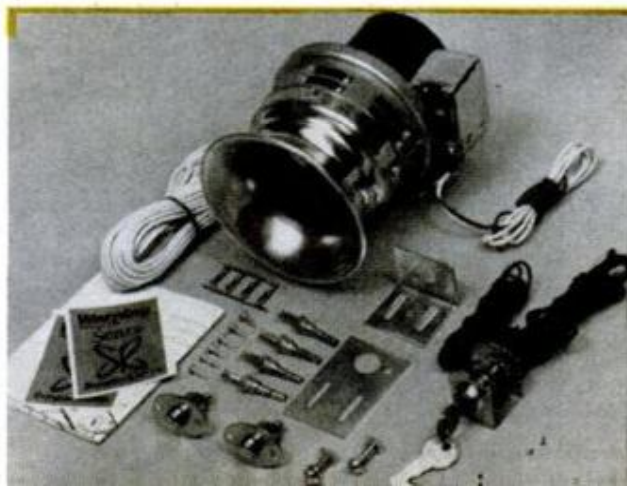
PUT THEM ALL TOGETHER and they scream, "Stop, thief!" For more alarms, see page 116



ONE WAY TO NIP mushrooming auto thefts: Replace your car's mushroom door-lock buttons. See page 115

17 ways to

By **FRED W. SCHLUETER**



IF YOUR CAR has never been stolen, stripped or broken into, it might seem a bit extreme to equip it with all the safeguards illustrated here. But with thieves taking one out of every 99 U.S. cars last year—and with countless thefts from car interiors—it's all too likely that you either have been a victim or will be sometime in the future. And once you have, no amount of theftproofing may seem enough.

So here are 17 basic types of theftproofing gadgets for your car, with a few variations on the basic themes, and some hints and tips thrown in for good measure. You probably won't try them all at once, but if you do, the odds against your car's being stolen or broken into will go up dramatically.

There's a lot you can do to discourage thefts without spending a penny on gad-

thiefproof your car

*Technical illustrations
by Peter Trojan*

getry. When you park, always lock the doors, ignition, trunk and windows, and remove the ignition key—even if you're "just leaving the car for a minute"; the average thief takes just minutes to get a car opened, started and away. Do this even if your car breaks down and you leave it to look for help. Just because you can't start it doesn't mean a more knowledgeable thief might not be able to.

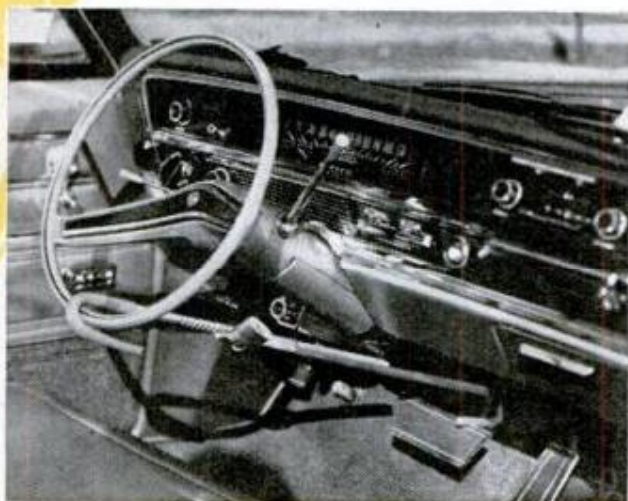
Don't leave your license, registration, or other identification in your car (unless your state requires it), or you'll help a thief "prove" ownership if he's stopped. And even if a thief doesn't take your car, he may take your registration papers, license plates, or Vehicle Identification Number (VIN) plate, to cover the theft of some other car.

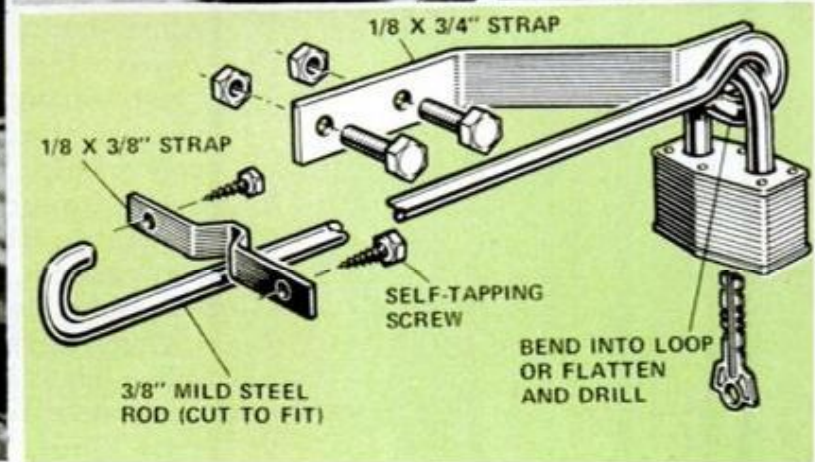
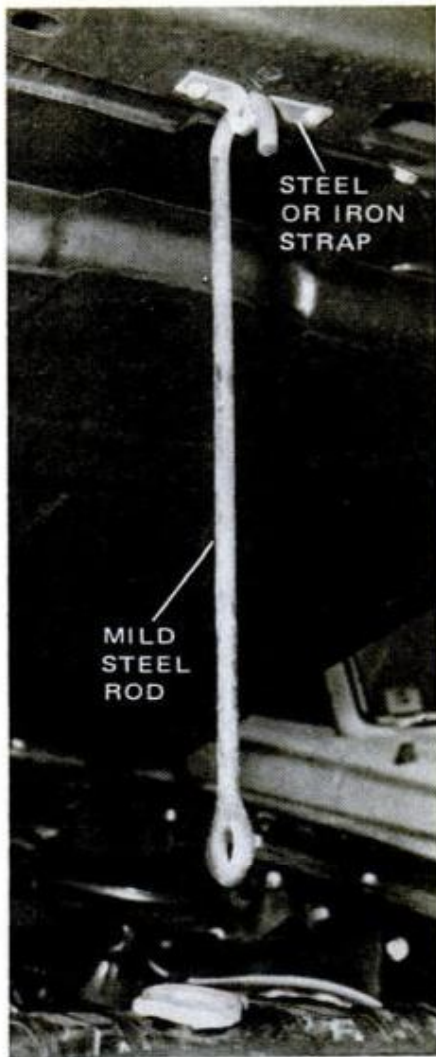
When you return to your parked car, check to make sure your plates, VIN and papers are intact. You and every driver in your family should also carry complete information on your car's make, model, year, color, license plate and VIN, at all times. Then, if your car is stolen, you'll be able to tell the police, on the spot, just what to look for.

When you park in public lots or garages, don't tell the attendants when you expect to be back. Unscrupulous attendants can drive your car away to replace your new, saleable parts with old and worn ones, if they know they have time. When you pick your car up at a garage, check its mileage—a few miles added since you parked it may indicate just such a parts swap. At the least, it means your car has gone on an unauthorized joy ride.

Marking your car unobtrusively won't prevent theft, but it may help you get your car back (and help authorities con-

HOOK THIS LOCK onto your wheel and pedals, and the thieves may not hook your car. See page 117





LOCKING YOUR HOOD will keep thieves away from your valuable engine parts and accessories—also from any alarms, locks or other safeguard devices you install in your engine compartment. The home-made lock shown above is just a suggestion; you'll have to adapt it, or design your own, to fit whatever car you have. This lock is made of a 3/8-in. mild-steel rod (left), suspended from a bracket of 1/8 x 3/4-in. flat stock. Another flat-steel bracket is attached to the grille frame (center), and bent so its tip will be near the lower end of the

lock rod, and parallel to it. The bottom of the lock rod can either be bent into a loop, as shown, or flattened and drilled for the lock. Place your parts so the lock will hold the assembly under tension to prevent rattles. Any noise that remains can be damped with rubber hose or tubing. Before you build it, make sure that your design will let you get at the padlock once the hood is closed. If you don't want to roll your own, there are commercial hood locks by the dozens, available at every auto supply store. For three examples, see the facing page

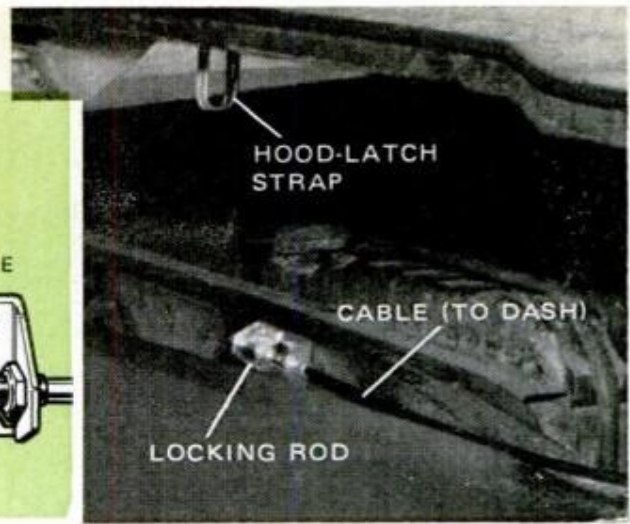
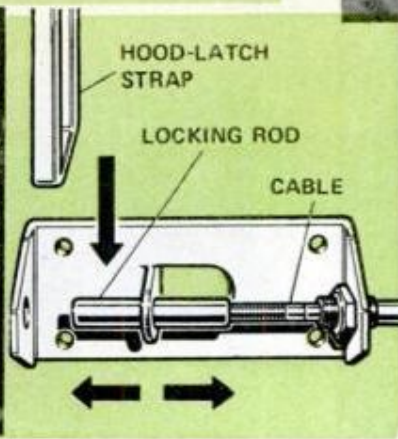


LOCKING WHEELS AND TIRES to your car can save you the embarrassment and expense of attempting to drive off without them. Just replace a lug on each wheel with a key lock. Models for most U.S. and many foreign cars are four for \$9.95 from On-Guard, Gotham Pkwy., Carlstadt, N.J. 07072, and others

vict the thieves), should the police ever find it again. A business card dropped in the window slot may be enough. Some owners make tin-can templates with irregular hole patterns, then "fingerprint" their cars with patterned marks made with a punch or nail. This is especially useful in identifying parts of cut-up or dismantled cars. (But be sure to keep the template to identify the hole patterns.)

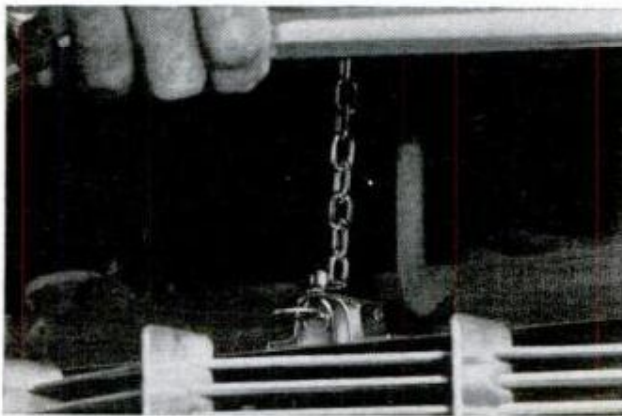
Locking your car discourages casual pilfering. But some thieves will still break in when they know they'll find something of value. So leave nothing stealable where a thief can see it. Even articles of little value may encourage a thief to break in, causing greater loss from damage to your car than from the theft itself.

LINE OF DEFENSE



IGNITION AND HOOD are both protected with Chapman Kar-Lok. Single button beneath your dashboard shorts out the ignition and locks the hood; a key lock in the button releases it. Armored cable protects both the ignition wire and hood-latch release. Even if the wires are cut, the ignition is inoperative, so a thief can't "hot wire" the system without going under the hood. But cutting the cable won't unlock the hood, either. The lock is rela-

tively pickproof, and thousands of key patterns are available. The installation is time-consuming, but fairly simple, requiring only a screwdriver and drill. The installation kit includes a lump of clay to take impressions of the space beneath the hood, so you can find where there is sufficient clearance for the new lock bolt. \$29.95. Made by Chapman Performance Products, Inc., 5567 North Elston Ave., Chicago, Ill. 60630. Auto stores stock it

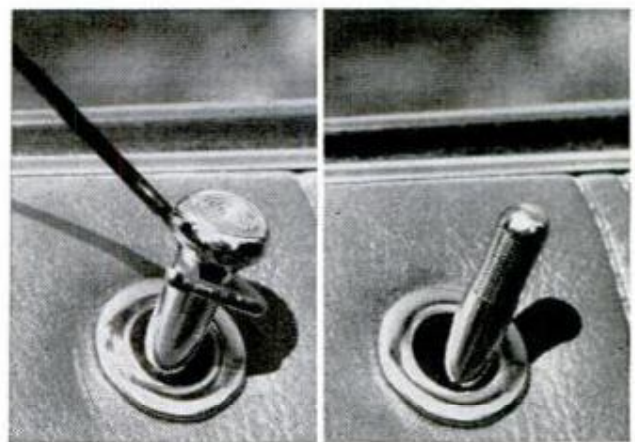


THIS CHAIN LOCK will not change your car's appearance, since it can't be seen when the hood is closed. Available for \$4.95 from Lustre Line Products, Richmond and Norris Sts., Philadelphia, Pa. 19125

FOR A SPORTY LOOK, these locks appear to be race-car hood pins; they're also a more visible deterrent. Sold for \$8.50 by Eelco, Box 4095, Inglewood, Calif. 90309; similar types by other manufacturers

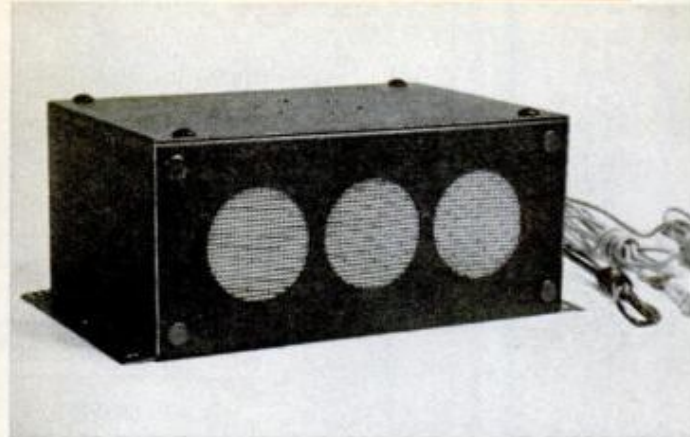
Transfer valuables to your trunk before you reach your parking place, rather than where local thieves can see you. If you must leave your belongings under glass—in a station wagon, for example, or a hatchback coupe—try to hide the most valuable under the seat, in the glove compartment, or under less valuable objects.

Eighty percent of all car thefts are made by nonprofessionals between 15 and 21 years of age. Many of these cars are eventually recovered, though often after severe damage (a stolen car is many times more likely to be involved in an accident than an average car). Many more are stolen and stripped of all marketable parts, including not only accessories, but engines, fenders and entire front or rear

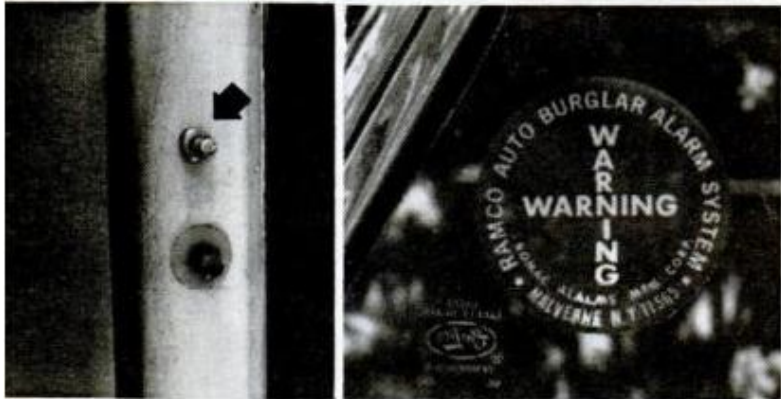
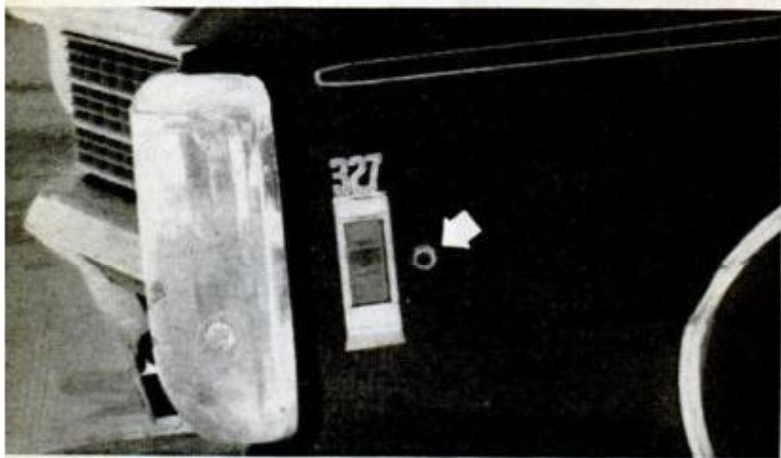


CYLINDRICAL LOCK BUTTONS will eliminate the classic trick of fishing door locks open with wire or string (a problem in hot weather when you'd like to leave your windows open a crack). Just unscrew the factory-supplied mushroom buttons and screw on the new ones. About \$1.50 per pair at auto stores

ALARMS SCREAM 'STOP, THIEF!' BEFORE HE REALLY STARTS



FOR EASIER INSTALLATION, there are alarms that sense the voltage drops that occur when courtesy lights turn on as doors, hoods or trunks are opened; also when the thief starts the car, steps on the brake or even switches on the radio. This \$39.95 alarm has an electronic siren. An optional time-delay switch saves fender-drilling for external key switches. RFM Industries, Farmingdale, N.J. 07727



ALARM SYSTEMS won't always stop a thief from breaking into your car, but may keep him from hanging around to jump the ignition, strip the car or take any but your most accessible possessions from the interior. Some alarms blow your car's horn to attract attention; other, more expensive systems such as this one are wired to sirens. When the siren is mounted under the hood (top), a nearby fender (center) becomes a convenient place to mount the lock switch. Most people mount it on driver's side to save steps when they enter the car; others prefer side away from traffic. Switches installed on each door post (lower left) and on brackets under hood and trunk lid trigger alarm if an intruder breaks in. Warning stickers in your window (lower right) may deter a thief from trying, but don't rely on them alone. The alarm shown here is \$29.95, made by Ramco Industries, 10 Broadway, Malverne, N.Y. 11565. Similar units are generally available

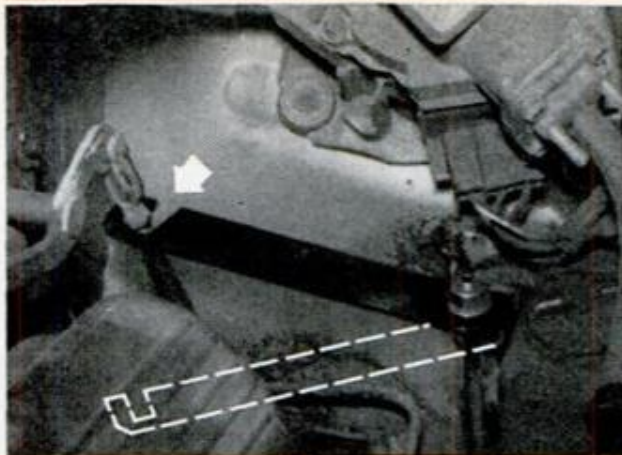
sheet-metal assemblies. Even if recovered, stripped cars are just about worthless. And all these are in addition to the cars stolen for outright resale.

You can help cut the toll by resisting suspicious "bargains" in used cars or parts. But it's even more important to protect your own car from theft as much as possible. You can't be absolutely sure your car won't be a victim. But every obstacle you throw in a thief's path will at least tempt him to try some other car.

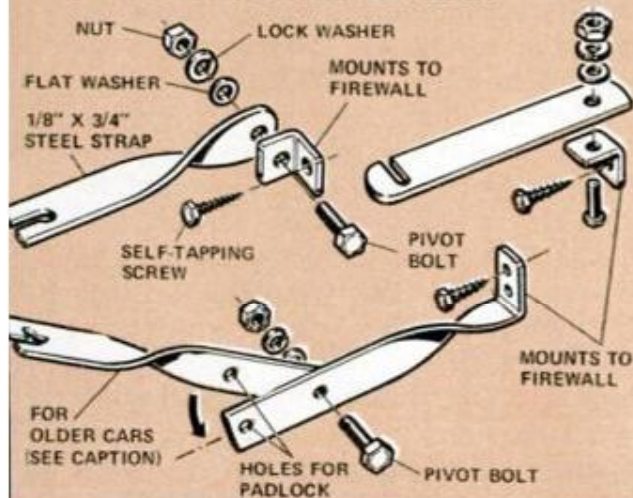
Hood locks are basic to any car protection program. Once under your hood, a thief can easily start your engine, disable most alarms and other safeguards, and steal whatever engine accessories he pleases. Keep him out, and you make all your other precautions more effective. Car manufacturers can't provide hood locks, due to fire laws in some areas (some do, at least, put their hood-latch releases in the passenger compartment). But if your fire laws permit, you can choose from a wide variety of hood locks to install—even make your own. In general, the harder the lock is to break into, the more it will cost; so don't economize unduly.

Locks are also available to protect your battery, wheels and tires (including models for outside-mounted spares), gas tanks, glove compartments, and even to lock dune-buggy engines to their chassis. Accessories as simple as straight-sided door-lock buttons (page 115) can also help keep intruders at bay.

CONTROL LOCK YOU CAN MAKE



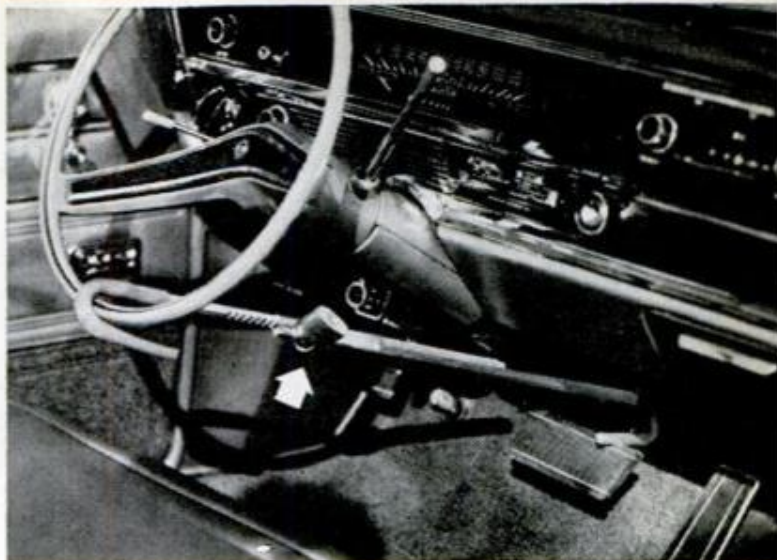
3 TYPES OF ACCELERATOR LOCK



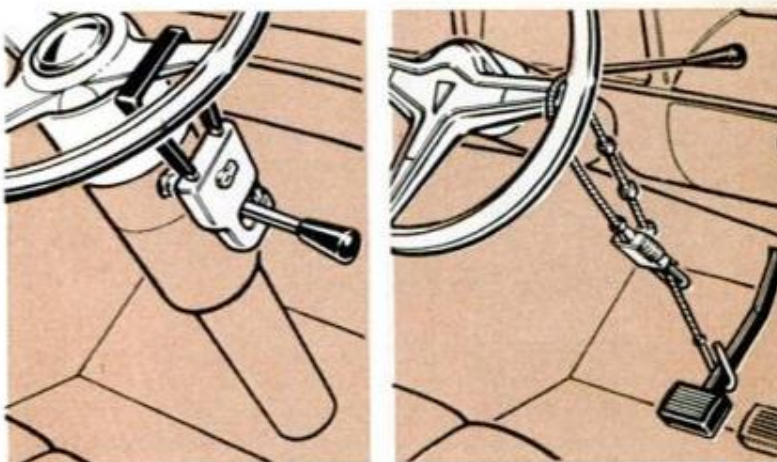
LOCKING YOUR CAR CONTROLS won't keep a thief from looting or stripping your car, but it may stop him from driving it away. Homemade accelerator locks shown here can supplement the steering locks found on today's cars, and thieves will be even less well prepared for them. Hook one over your accelerator linkage and your car won't move faster than its idle speed. A flat, notched bar (top), swinging sideways from a bracket on the firewall, will lock many linkages, depending on their direction of movement. Others require an end-notched bar with a half twist (bottom), mounted to swing down over the linkage. For older cars, where the linkage is so far from the firewall that the locking bar might flex under pressure on the pedal, make the bracket longer and drill overlapping holes for a padlock (center). Dimensions will vary from one car to another. But whichever lock you install, make sure it leaves no play in the pedal or linkage

JULY 1972

... AND THREE YOU CAN BUY



FOR PRE-1970 CAR WITHOUT A STEERING LOCK, a rigid bar can be locked over the brake pedal and the steering wheel to immobilize both of them. The Auto-Lok, shown, costs \$7.95, including a padlock (RMS Electronics, 50 Antin Pl., Bronx, N.Y. 10453). Auto-Hook Lok with built-in key lock (not shown) works similarly (\$13.95 by mail from Comm Industries, Box 505, Newton, Mass. 02158). Numerous manufacturers have made similar designs widely available through most auto-parts or supply stores

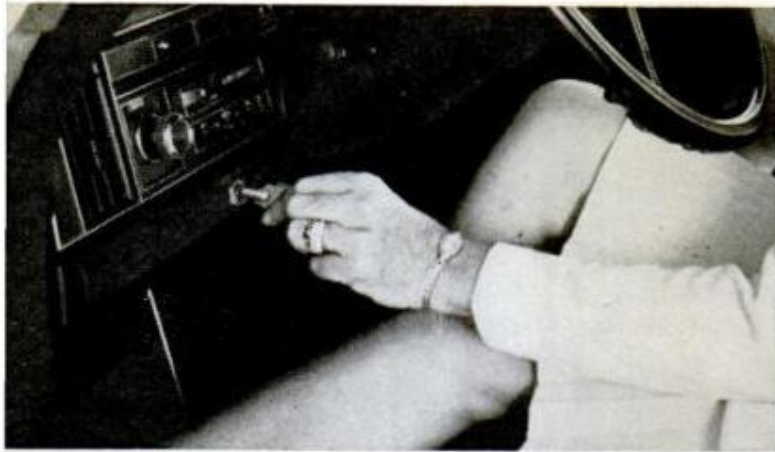


YOUR GLOVE COMPARTMENT can hold either of these steering locks, making them handier than the rigid versions shown at top (though possibly not as secure). Crowley's Car Lok (\$5) fits over the wheel and automatic transmission lever of most U.S. cars, but it won't work in a car with a tilting steering wheel or telescoping steering column. Brenner Kabelock (\$7.50) fits all cars, coils compactly when you're not using it. You can obtain them from Hamilton Import, 303 Fifth Ave., New York, N.Y. 10016

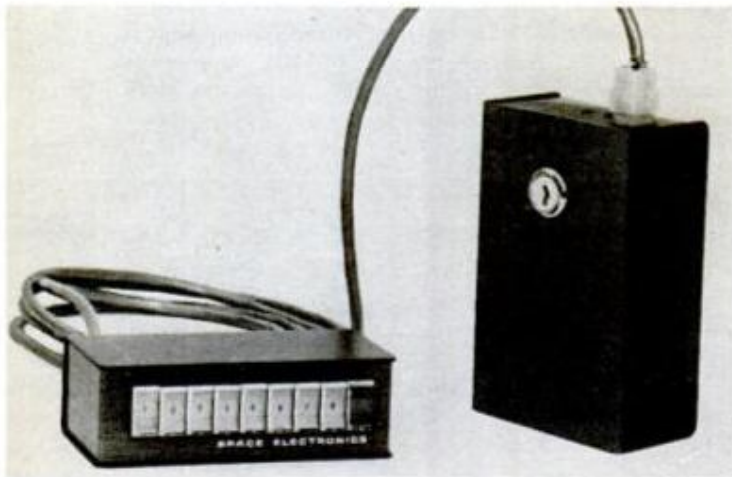
Much as these locks protect your car's accessories and contents, they do not prevent thieves from driving your car away. But locks on your cars' controls—or, better yet, on its operating systems—do help. Congress had this in mind when it mandated steering or transmission locks and

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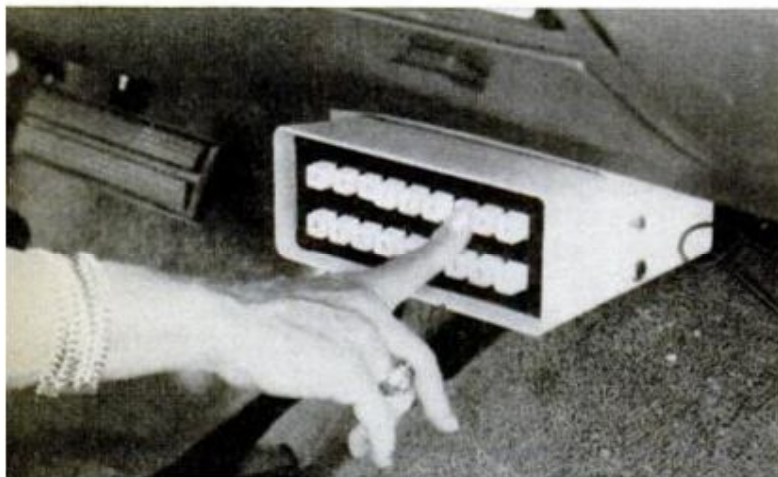
BRAKE, IGNITION, GAS LOCKS



THIS KEY LOCKS YOUR BRAKE SYSTEM, which immobilizes your car so that it not only can't be driven away, but can't be towed, either. Since it hooks into your hydraulic brake line, it should also work on trailers—or even motorcycle sidecars—having hydraulic brakes. The dashboard lock uses a special, tubular key (a type often used for alarms, too) that's hard to duplicate. It's \$49.95. Sta-Lok Co., Ltd., 1647 Monrovia Ave., Costa Mesa, Calif. 92627



ANTITHEFT IGNITION SYSTEM is a solid-state electronic combination lock. You can select any of 10,000 different three-digit combinations, yet even if a thief should stumble on the right combination, the car won't start if he's hit one wrong digit. The maker claims this \$89.50 system is virtually impossible to jump or hot-wire. Offered by Space Electronics, Inc., Box 634, Littleton, Colo. 80020



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buzzers reminding us to remove our ignition keys.

Accessory steering locks are now widely available for cars without these built-in safeguards (or as additional protection for cars that do have them—thieves don't find the built-in kind too hard to beat). Highly visible, such control locks warn thieves they'll have to work a little harder to get your car than the next one.

But operating systems locks are claimed to baffle them completely. Simplest of these are hidden ignition switches, like those on page 119. Dashboard combination locks like those shown below also serve as deterrents. Other variations on these include: the Deweko Electronic Lock (about \$35 installed, C&W Manufacturing, 235-N Robbins Lane, Syosset, N.Y. 11791), with combination-coded electronic plugs that supplement your ignition key; and the Keyless Key (\$4.95 from MG Mitten, Box 4156 Catalina Station, Pasadena, Calif. 91106), an ultracompact combination lock for the ignition, which sets off your horn if tampered with.

Blowing horns, flashing lights and noisy bells or sirens make cars—and car thieves—uncomfortably conspicuous. A nervy thief can still work on your car until he shuts off the alarm. But most thieves aren't that nervy.

There are dozens of alarms in addition to those on page 116. And now Detroit is offering them, too. Alarms are standard on Corvettes, and '73 Chryslers will offer a system built into the car's basic wiring (which makes it harder to detect and disable). The Chrysler unit doubles as an occupant distress alarm—push a button on the dash, and it locks the doors and hood, blows the horn, and starts the emergency flashers. It shuts off after three minutes, so neighbors aren't "serenaded" all night. But it resets itself, so you're protected.

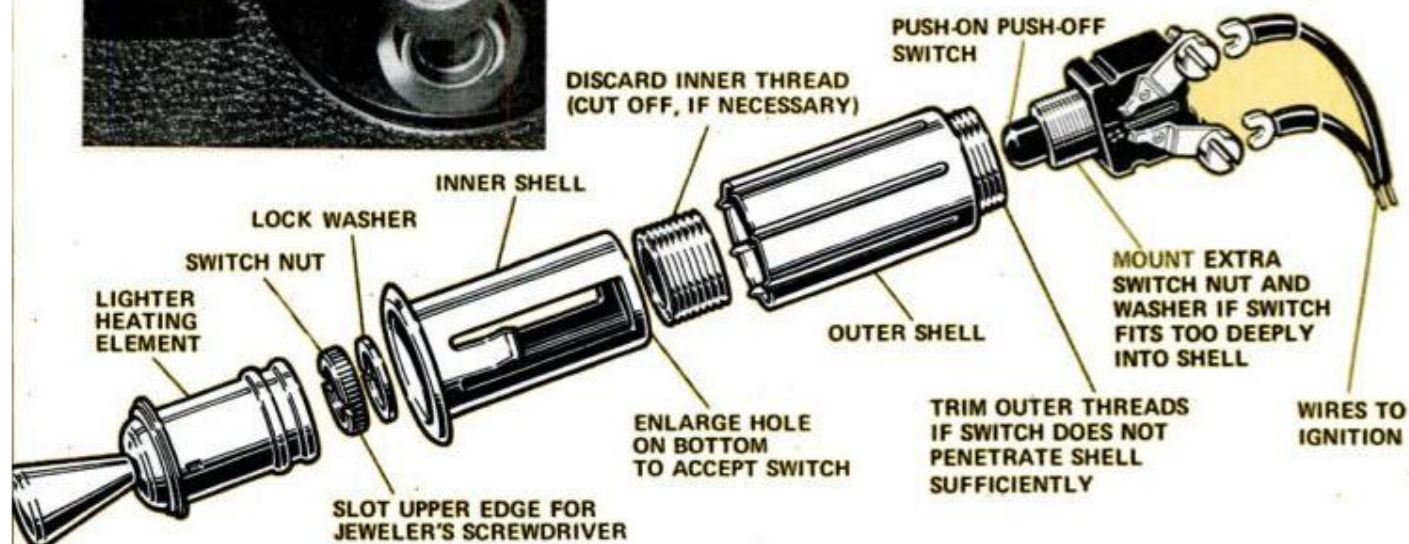
If Chrysler's alarm sells—and it should—other makers are certain to follow. The safeguards that looked so extreme at the start of this article may be standard on one of the next cars you buy. ★★★

THIS COMBINATION LOCK SHUTS OFF THE GAS instead of the ignition—which makes it harder to install, also harder to jump. The pushbutton console is armored and the control cable holds hundreds of wires, so the thieves won't know which pair to jump. And the solenoid shutoff valve cannot be removed without the right combination. About \$160. Safetech, 10 Industrial Rd., Fairfield, N.J. 07006

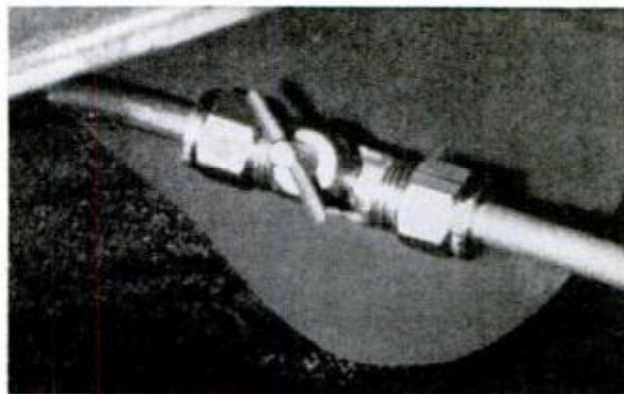
POPULAR MECHANICS



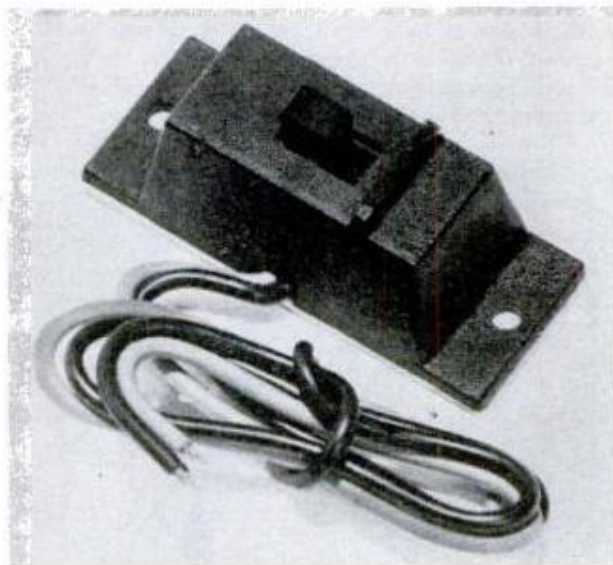
BAFFLE THIEVES WITH HIDDEN SHUTOFFS



SNUFF OUT THE IGNITION with your cigaret lighter and your car can't be started until you push the lighter knob. The secret is a switch hidden deep in the lighter's body. Connect it between the "hot" terminal of your fuse box and the negative side of your coil (or vice versa for cars with positive-ground ignition); a push-push switch is preferable to a momentary-contact type. When driving, you carry the lighter element in your pocket, so an unknowing passenger won't accidentally stop the car; replace the element when you park. The switch nuts and washers (including the optional ones not shown here) position the switch just far enough into the lighter to be actuated when the element is pushed in. Hacksaw a slot in the face of one switch nut, so that you can tighten it with a small screwdriver after it is inside the lighter's shell. The lighter's original inner contact (not shown) is discarded



HIDE A FUEL SHUTOFF under your hood, and the thief will be able to move your car only as far as the gas in the carburetor will carry him. Simply install a needle valve (about \$2.50 at auto stores) in the fuel line and lock the hood. If your lines are of hose instead of copper, you'll also need nipples and hose clamps. Marine-type solenoid valves (\$5) are even more convenient and easier to hide



AUTO-GUARD SWITCH disables your ignition, preventing unauthorized shorts even if the wires are jumped. Small, black and unmarked, the switch is easy to conceal, hard for thieves to comprehend if they stumble across it. It fits all cars and causes no battery drain, sells for \$6.95. Raney Sales Co., Box 2112, Decatur, Ala. 35601; Transcontinental Enterprises, Box 191, Kent, Ohio 44240 and many others

JULY 1972



TIME-DELAY FUSE IN Buss Auto Protector (and the similar Taroda Steal n'Stall) cuts out the ignition shortly after an unauthorized start. With the car stalled in traffic near the spot where it was stolen, a thief isn't likely to stay and investigate. But you can restart the car easily. \$4.98. Bussman, University at Jefferson, St. Louis, Mo. 63107; Taroda, 3525 West Peterson Ave., Chicago, Ill. 60645

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Sharpen your shooting

By BOB CORLEY

WHEN SHOOTING ACTION SHOTS with a long lens, a tripod is out of the question and it's often difficult to hand-hold the camera steady enough to avoid blur. The answer is a gunstock mount that gives you a solid shoulder rest and a stable two-hand grip for firm camera control. Readily portable, such a rig is ideal for grabbing fast sports and nature shots on the run.

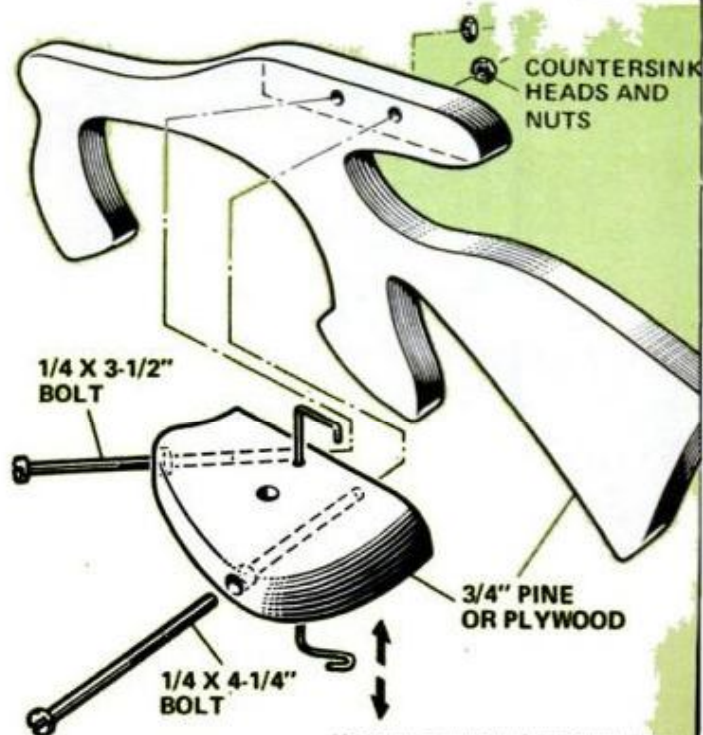
The stock shown here has several features not found on most homemade or commercial models. The camera platform is deliberately offset to the side so your eye lines up easily with the viewfinder window without your having to twist your head. Any 35-mm still camera or lightweight movie camera having a tripod socket can be used. By removing the platform, a 35-mm camera can be turned sideways and fastened directly to the stock for making vertical shots. The stock is light and maneuverable, being less than 20 inches long.

In cutting the parts, follow the squared pattern on the facing page. Virtually any wood will do, though the tougher, the better. You can use plywood and paint it or, for a really slick job, a natural-finished hardwood. The side-mounted camera platform is attached to the stock with only two bolts, making it easy to remove. One bolt passes straight through, while the other is angled at 45°. The camera is fastened to the platform with a short 1/4-20 bolt threaded into the tripod socket. A screw with a knurled thumb wheel is handiest for this, or you can use an ordinary bolt with the head cut off and a wingnut threaded on for tightening the camera in place.

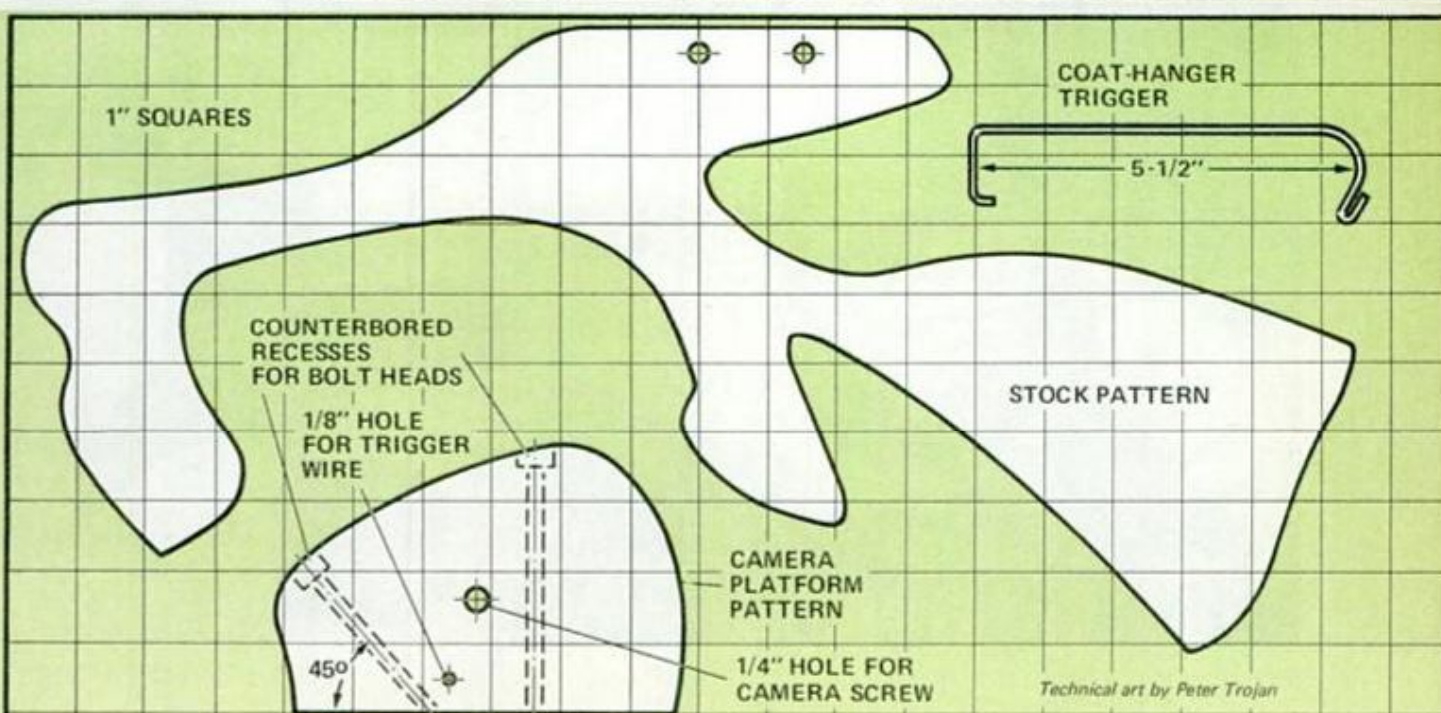
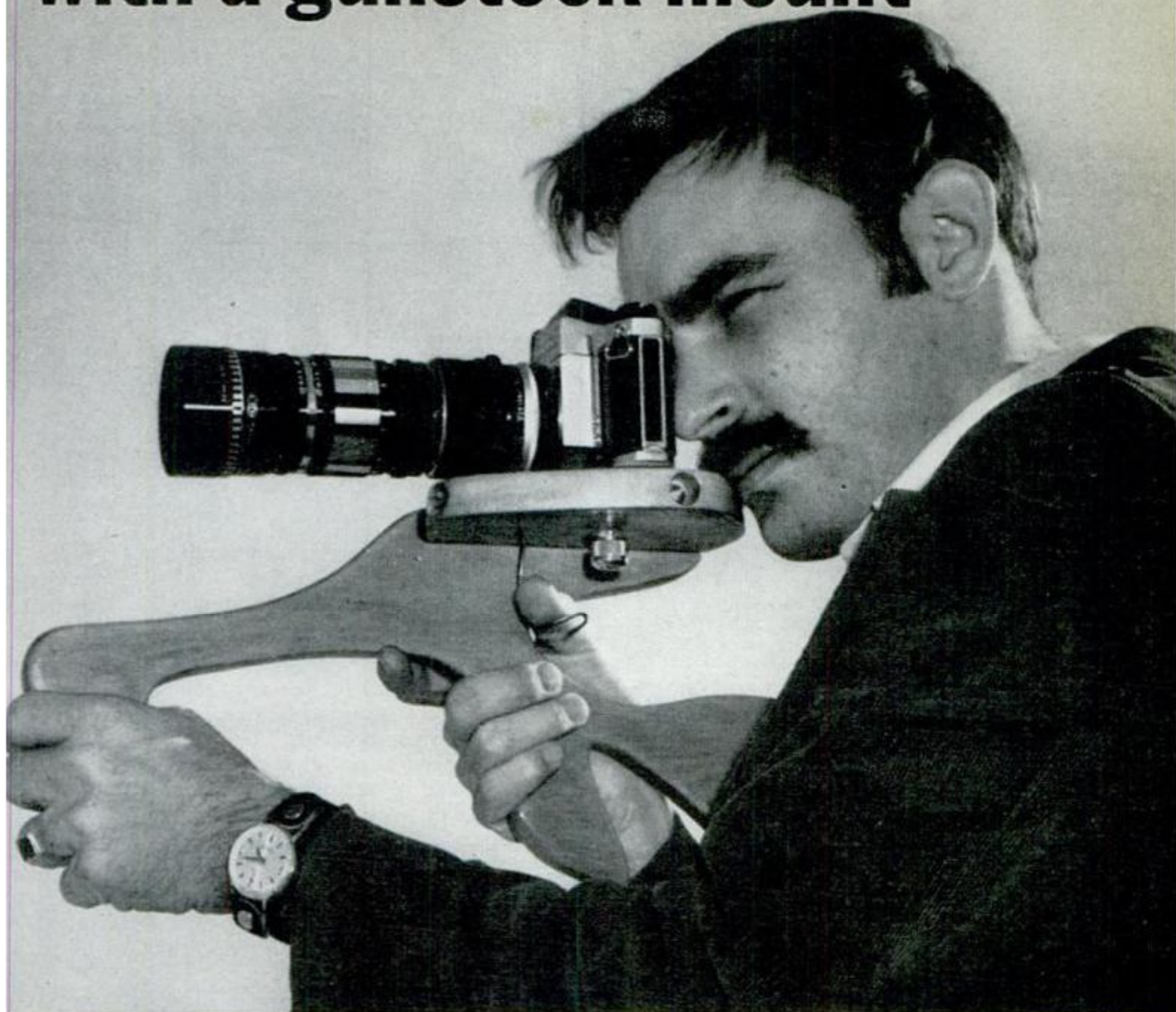
The platform is shown on the left side of the stock for right-handed shooters. For lefties, mount it on the right side. Note that the rear edge is rounded off to match the curve on the end of the stock's upper rail. The gun's "trigger" is merely a length of bent coathanger wire arranged so it depresses the camera's shutter release when you pull down on the lower end with your thumb. ★★★



TRIGGER MECHANISM consists of bent coat-hanger wire that hooks into top-mounted shutter release (upper photo above). Wire passes down through camera platform and trips shutter when pressed by thumb from underneath (lower photo). For cameras with front-mounted shutter controls, a release cable can be run through hole in forward hand grip and operated by squeezing plunger with finger

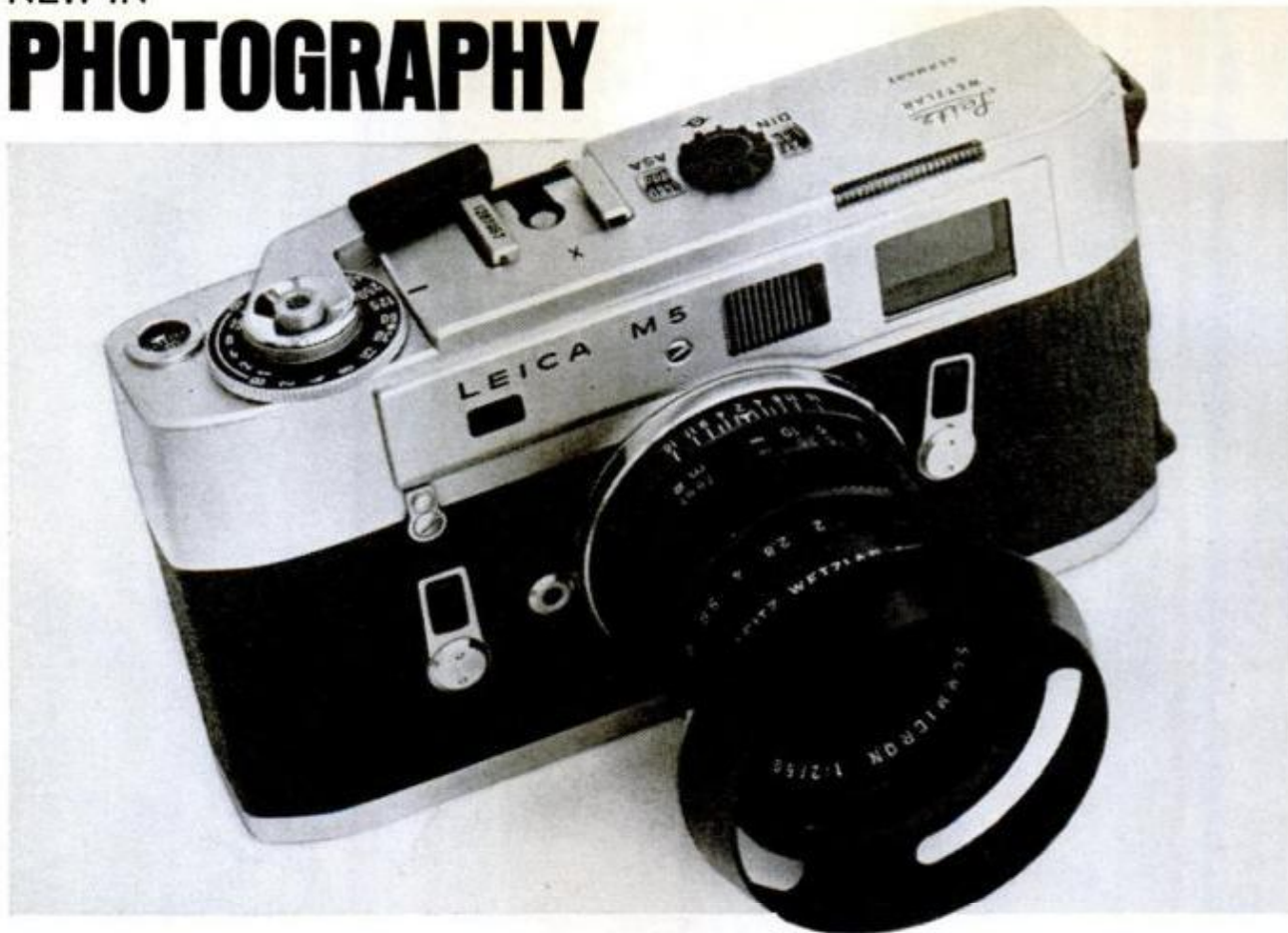


with a gunstock mount



NEW IN

PHOTOGRAPHY



FIRST THROUGH-THE-LENS METER in a production rangefinder camera is featured in the new Leica M5. The meter cell, on a hinged arm, swings up in front of the focal plane shutter when you wind the film. As you click the shutter, it swings down again. The meter scale is visible in the viewfinder, together

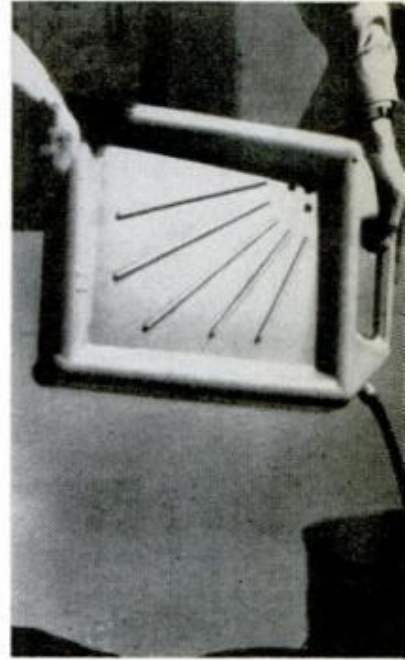
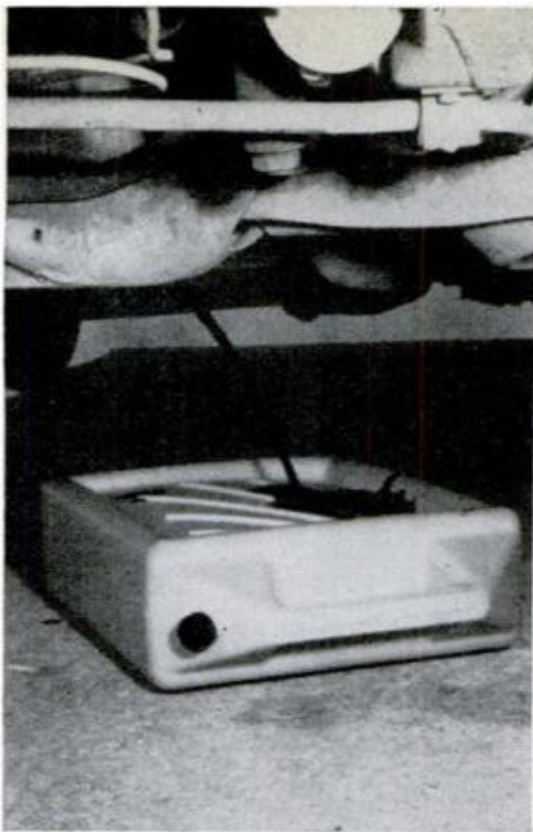
with a shutter speed scale, viewfinder frames for 35-mm, 50-mm, 90-mm and 135-mm lenses (as in previous Leica "M" models, changing lenses brings the correct frame into place), and a meter battery check. With f/2 lens, \$849; with f/1.4, \$948. E. Leitz, Inc., Rockleigh, N.J. 07647.

FOR SPARE FILM, Klip-Pack plastic cans clip to your belt, camera strap, or pocket. Weather-proof, they float. They can even be sterilized for medical photography; won't stick

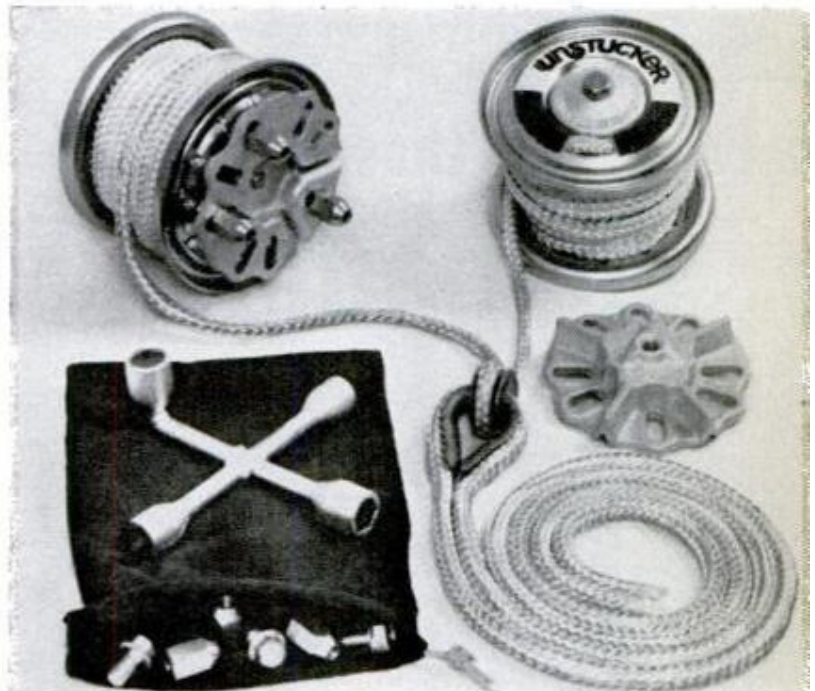
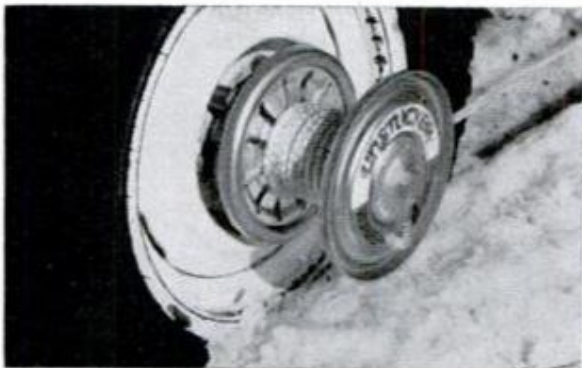
to your fingers in freezing weather, either. Three for \$2 postpaid from the Kessinger Co., R.R.2, South Bunn St., Bloomington, Ill. 61701.



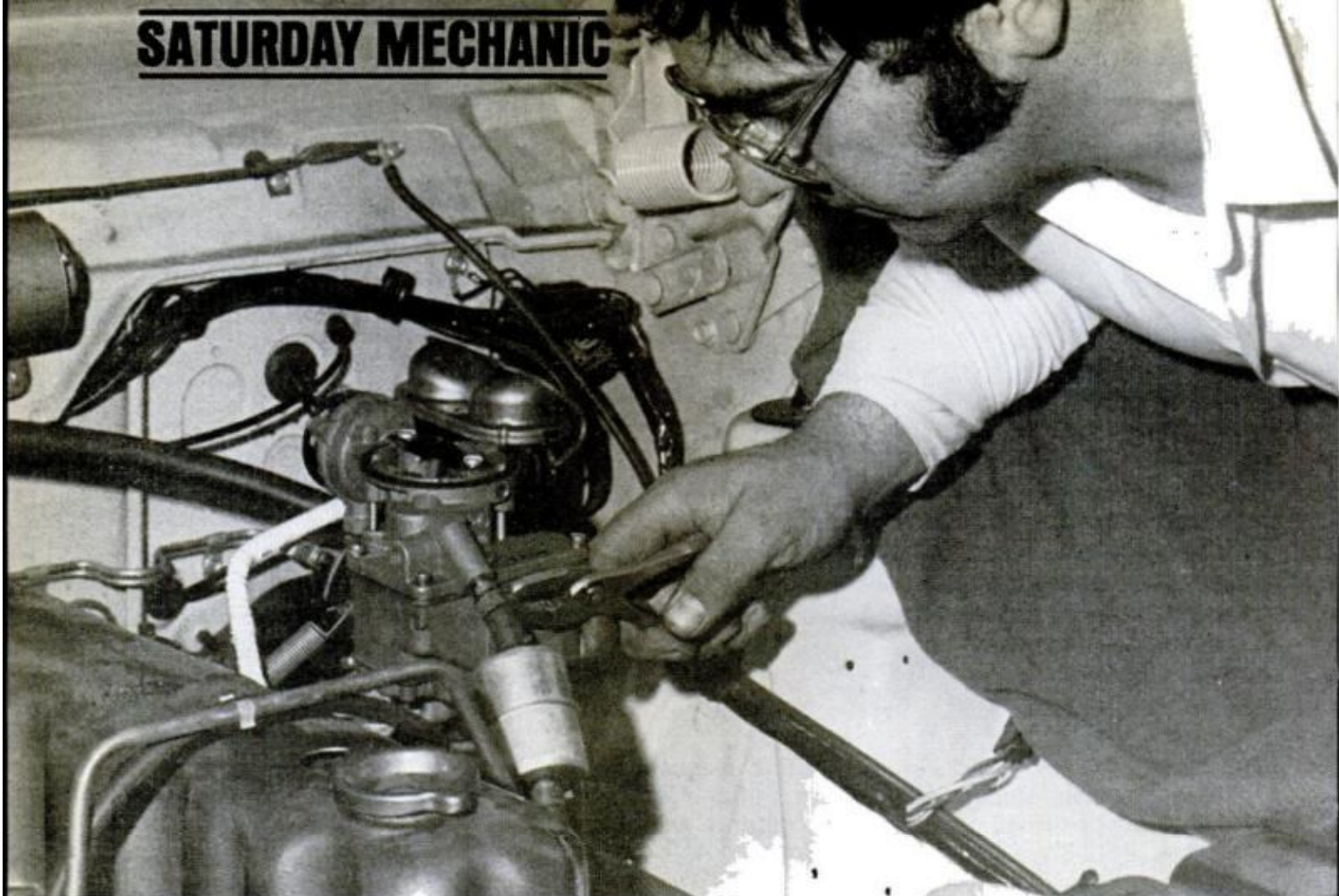
NEW FOR YOUR CAR



DRAINING ENGINE OIL is a snap with this plastic container that forms its own catch basin. Oil runs down its sloping side and in through small holes in one corner. Once filled, the container can be turned upright and its contents poured out a spout without messy spills. Called Drain-eze, it holds 18 quarts, sells for about \$5. Gott Manufacturing Co., Winfield, Kans.



YOUR OWN WHEELS do the work in this clever system for pulling a mired vehicle out of mud, sand or snow. Twin drums bolt on the rear wheels with lines anchored to a nearby tree, pole or rock. As you spin the wheels, the ropes wind around the drums, pulling you free. Adapter plates permit the drums to fit most cars, trucks and campers and can be left permanently attached for quick use. About \$90. Sports Innovations, 5301 Edina Ind. Blvd., Minneapolis, Minn.



FUEL FILTER MAY BE EXTERNAL TYPE found in fuel line to the carburetor and secured with removable clamps

Forget those big repair bills: Remember your filters!

By MORT SCHULTZ

DIRTY OR CLOGGED FILTERS can cause your car to run rough or stall completely, can cause premature wear of engine and transmission, and generally result in unnecessary aggravation and expense. All cars have at least three important filters: oil, fuel and air cleaner. Those with automatic transmissions have an automatic-transmission-fluid filter.

Mandatory on later-model cars are evaporation-control-system canisters, which are charcoal-filled containers that trap gasoline vapors that would be discharged into the atmosphere. They, too, incorporate a filter.

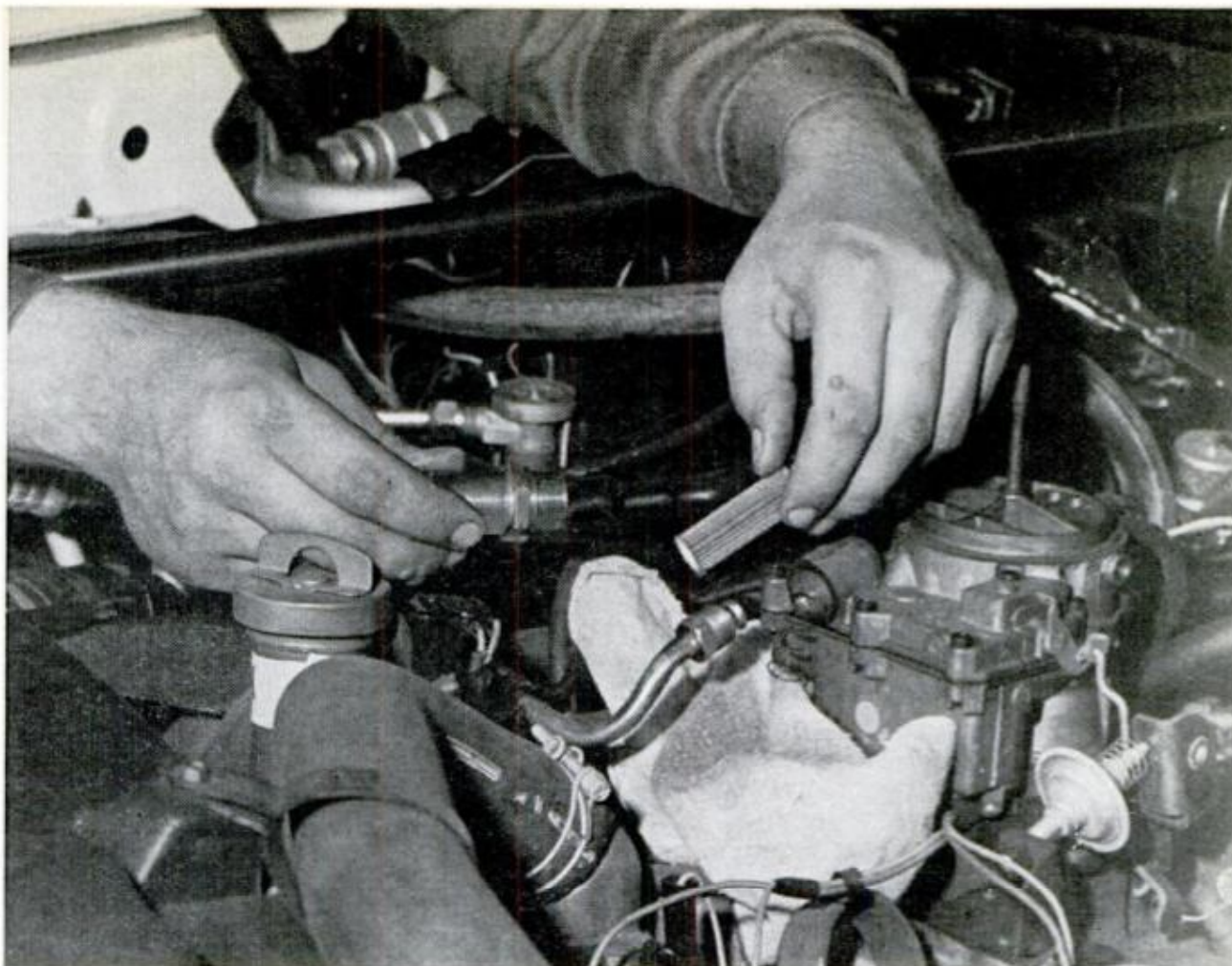
Later-model cars also have a positive-crankcase-ventilation filter in the air

cleaner. It removes particles from crankcase vapors while the vapors are making a circuit back into the engine for reburning.

When a PCV filter is not used, the oil filler cap may act as a filter. It requires periodic cleaning.

There are still other filters, but the ones mentioned need servicing most often. Others, such as the one in the power-brake-assist unit and the receiver-dryer of an air conditioner, are serviced less frequently, usually when the system is disassembled. Don't forget them. Check your owner's manual to determine which filters you have in your car and how often they should be serviced.

Service intervals assume that the car is



FUEL FILTER OF INTERNAL TYPE is found in carburetor. Disconnect the fuel line and filter retaining nut

being used under normal conditions. More frequent servicing will be needed if you operate in dusty areas, if the car is idled for long periods, if you tow a trailer or if you make short runs that prevent the engine from reaching its ideal operating temperature.

Under these rough conditions, cut the service interval in half. For instance, if a 12/12 interval is recommended, cut it to 6/6.

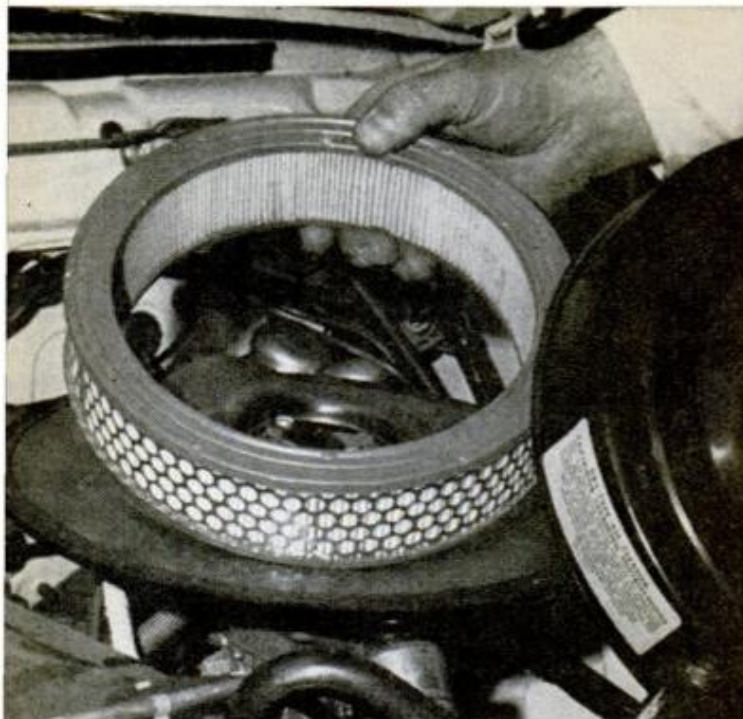
Before shopping for a filter, copy the part number off the old filter. If there is no number, tell the auto-parts dealer the exact make and model of your car, and its engine designation. His parts catalog will list the right filter. To be on the safe side, however, take your old filter with you to make certain that you get the right one.

● *Oil filter.* Most engines are protected by a full-flow, throw-away oil filter. All oil from the pump must pass through the filter before it can enter the engine oil galleries.

In the filter, oil passes through an element where dirt and particles are re-



OIL FILTER GASKET should be coated with oil before installation. Do not overtighten the filter



AIR-CLEANER PAPER ELEMENT is easily replaced. Often service intervals are on sticker on the cover

moved. Filters are always designed with a bypass valve so that the engine will receive ample lubrication if the filter element becomes restricted.

One indication of a restricted filter is a momentary flashing of the oil-pressure warning light (or an indication of low oil pressure on a gauge) as the car is accelerated in low gear. This can also be a warning of a clogged oil screen.

The procedure for replacing an oil filter is pretty much the same from car to car. After the crankcase has been drained, you simply turn the filter counterclockwise to remove it.

Since you probably don't have the use of a lift, it may be easier to remove the filter from topside. If it's too difficult, you'll have to do it from below.

Wipe the engine flange and the base of the new filter with a clean cloth. Coat the gasket of the filter with a light film of engine oil.

Now screw the filter onto its seat by hand until the gasket contacts the seat—then turn it half to two-thirds of a turn more.

Don't use a wrench, and don't overtighten the filter. Tighten the filter slowly so that the gasket isn't pinched, resulting in a leak.

With the filter in place and fresh oil in the crankcase, start the engine, run it at fast idle and check around the filter to make sure that oil isn't leaking.

Remove the oil filler cap. If it's the type with a mesh filtering material, wash it thoroughly in kerosene, shake off excess solvent and allow to air dry.

● *Fuel filter.* There are three types of fuel filter installations.

One is a bronze or paper element that is inside the carburetor inlet. It's generally used on GM models. To remove it, you must disconnect the fuel line at the carburetor and wrench loose the large retaining nut. These filters usually have a small spring which can be reused if it hasn't lost tension.

Another type of fuel filter is inserted into the fuel line between the fuel pump and carburetor. Most Chrysler Corp. and AMC models are equipped with this kind. To replace this filter, detach the retaining clips and pull the filter connectors off the fuel line.

The third type of fuel filter, which Ford uses on some models, is external but is screwed directly into the carburetor. To replace it, loosen the fuel inlet hose and unscrew the fuel filter from the carburetor.

After installing a new filter, start the engine and check for fuel leaks.

● *Air-cleaner element.* In most cars, a paper element is standard. It should be replaced according to the service interval recommendations.

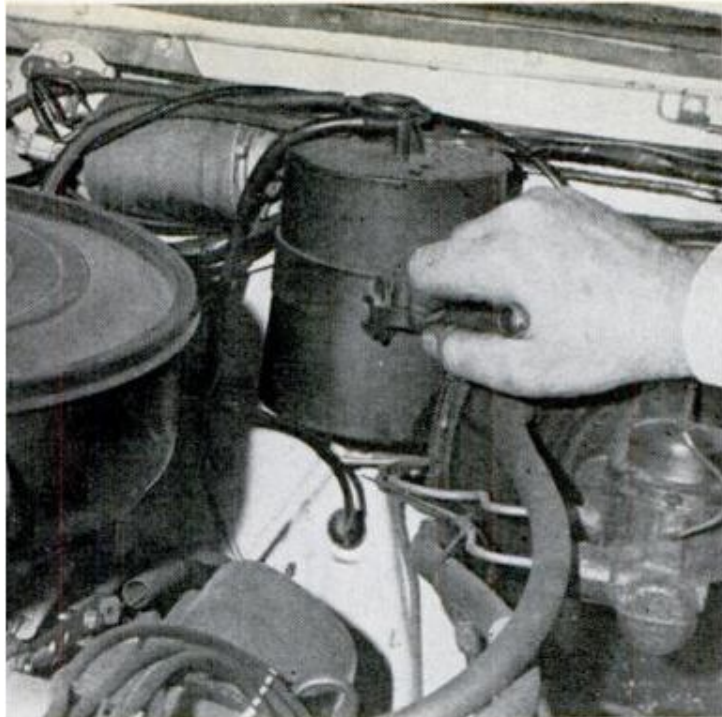
Note that Chrysler and AMC suggest that the air-cleaner element be cleaned to extend its life. Cleaning is done with compressed air. Hold the nozzle at least 2 inches away from the *inside* of the element and blow out dirt around the element's entire circumference. Be sure that compressed air is not used on the element's outside surface. This will only serve to force dirt deeper into the filtering material.

If you don't have compressed air available to clean the filter, shorten the replacement time for Chrysler and AMC air cleaner elements to 12/12.

Some cars have a polyurethane air-cleaner element that can be washed in kerosene and reused.

In securing the air-cleaner cover, don't exert full force on the wingnut. Make it secure, but don't bear down. Overtightening could cause distortion.

● *Automatic-transmission-fluid filters.* Does an automatic transmission require service? It depends upon the manufac-



EVAPORATIVE CONTROL CANISTER is secured with a clamp. Remove from the clamp and detach the hoses

turer and model year. Even so, manufacturers have changed their minds on the subject many times. As long as you're doing your own work, replace the fluid and filter every 24,000 miles.

Start by placing a wide-mouth container beneath the transmission oil pan, loosen the pan bolts at one corner, and tap the pan to break it loose. Allow fluid to drain, remove the pan and discard the gasket.

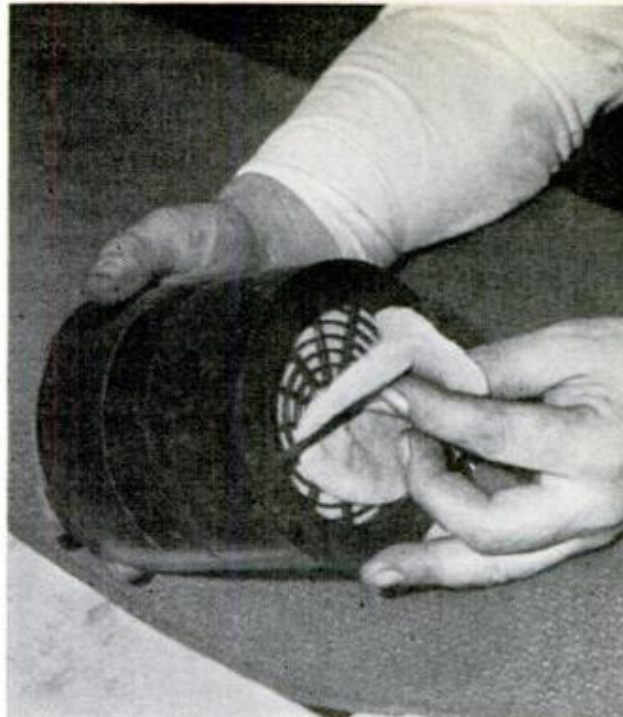
Unscrew the old filter, which is attached to the valve body, and install a new one. Clean the oil pan and reinstall it, using a new gasket. Be sure that oil-pan bolts are tight and install fresh automatic-transmission fluid.

● *ECS canister filter.* Many cars built from 1970 on have an evaporation control system that traps fuel vapors which normally escape from the fuel tank. This is done by using a charcoal-filled canister that adsorbs vapors and stores them until they can be dispersed to the engine for burning.

Most canisters have a filter in their base. To remove it for replacement, first detach hoses from the canister and loosen the bracket that holds the canister in place. Then you can remove the canister, turn it upside down and pull the filter from the base.

● *PCV valve and filter.* The PCV system used by all cars since 1963 helps control air pollution caused by crankcase blowby

JULY 1972

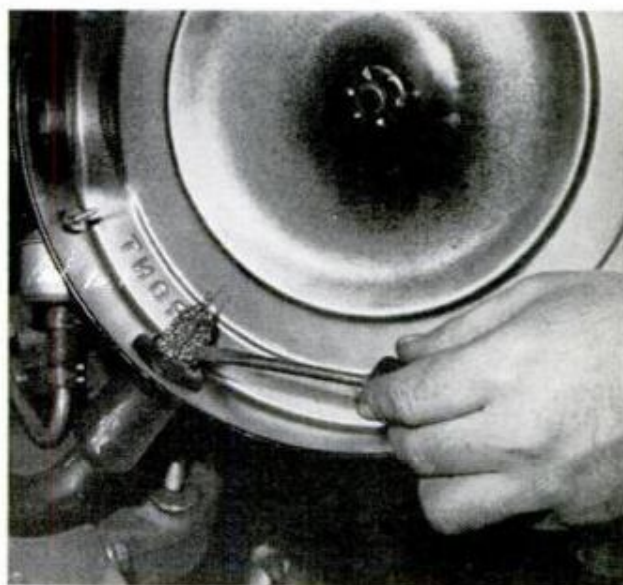


CANISTER FILTER is usually found in the base. With some canisters you must detach the base to remove

gases. Gases are redirected back into the engine for reburning.

For maximum engine efficiency and to keep the engine from using oil, thoroughly clean the system as often as called for by the manufacturer: Do this by disconnecting all hoses and carefully pushing a clean cloth patch through them.

Remove the PCV valve and discard it for a new one. Replace the PCV filter. If your car has one, you'll find it in the air cleaner. One type is a snap-out kind made of material resembling cotton. The kind shown in the accompanying photo is a mesh screen. ★★★



MESH FILTER used in some PCV systems is found where the hose attaches to the air-cleaner housing

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EXCITING NEW PRODUCTS

BY CATHERINE BILSKI



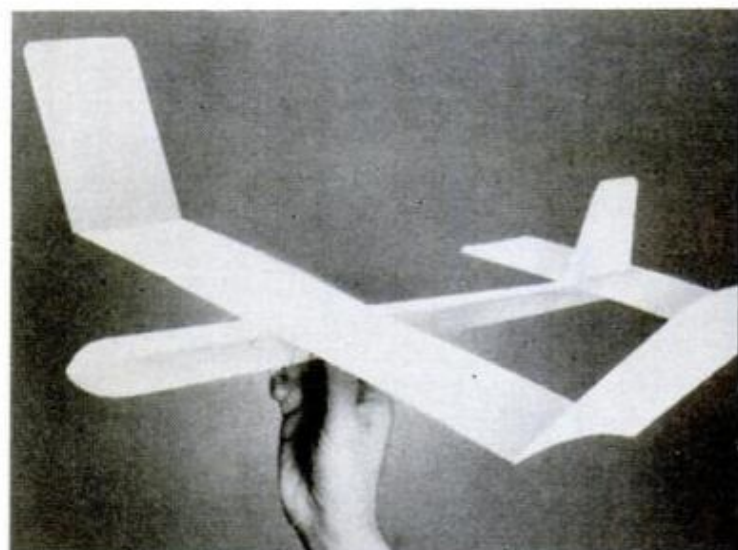
CHANGE DESIGN of the new Airguide Indoor-Outdoor Thermometer to suit your taste and decor. Four pressure-sensitive panels come with the basic white instrument, let you use photos, fabrics, original art—almost anything—on its face when desired. Twin tubes show indoor, outdoor temperatures; bold numbers enhance modern design, are easy to read. \$5.95. Airguide Instrument Co., 2210 Wabansia Ave., Chicago, Ill. 60647.



RICH WOODGRAIN FINISH on this Paragon 24-hour timer will complement any decor. This home-security device turns lamps, radios and the like on and off at preset intervals to give your home that "lived in" appearance while you're away. With it you can also control a regular on-off pattern automatically. Also available in harvest gold, poppy red or avocado, \$14. AMF Paragon Electric Co., 1600 12th St., Two Rivers, Wis. 54241.



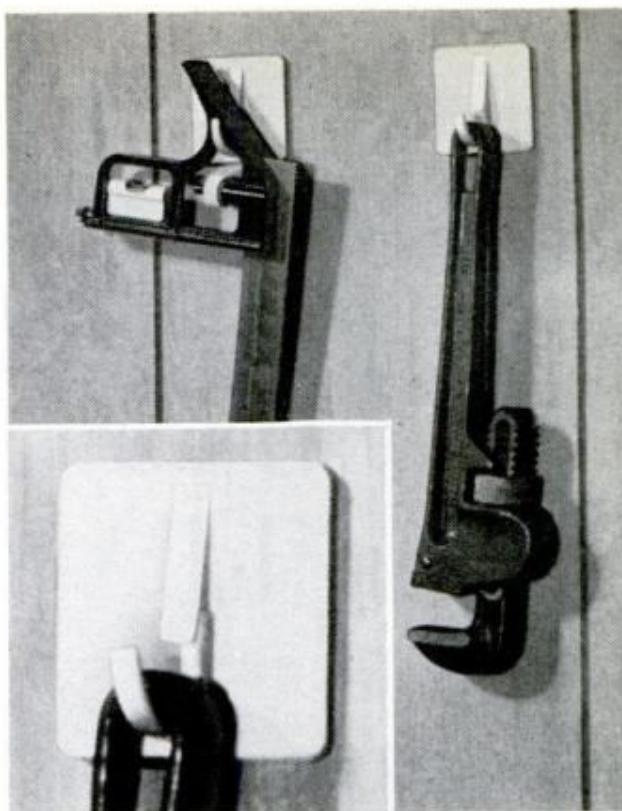
ALL-PURPOSE Revere Inflator inflates or deflates just about everything from beach toys to inflatable boats. It features a high-volume, low-pressure, fast-inflation pump and quick-deflation capability. Model RA-2 (shown), designed to operate on 12-volt d.c. power, plugs into the cigaret lighter in your car. Retailing for \$29.95, it's made by Revere Survival Products, 605 West 29th St., New York, N.Y. 10001.



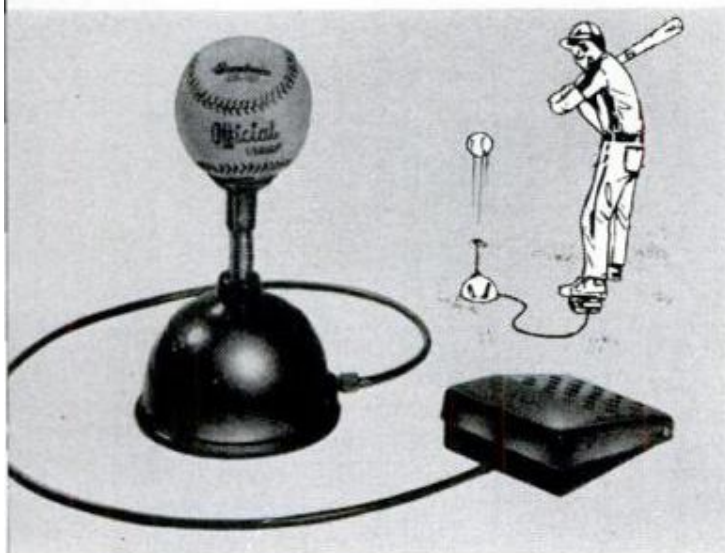
FUN TO FLY for children and adult aircraft modelers, the Mesmera is a towline glider made completely of sheet foam. It features a 30-inch wingspan, is lightweight, waterproof, weather-resistant and requires no finishing. It assembles easily with adhesive tabs included with the kit and retails for \$2.50 from Mason Renshaw Industries, 6315 East Coast Highway, Box 445, Carpinteria, Calif. 93013.



FINGERTIP CONVENIENCE and modern styling are combined in the Moen liquid dispenser. Designed for the fourth hole of most kitchen sinks, it's easy to install and holds a full 8-ounce supply of liquid soap, detergent or hand lotion. The base fits all standard sink drillings and a washer and nut locks it tightly in place. \$6.95. Moen, Div. of Standard Screw Co., 377 Woodland Ave., Elyria, Ohio 44035.



HOLD HEAVY OBJECTS such as tools and winter coats with Magic Mount Utility Hooks, which are handy to have around the home, camper, shop, office, or wherever you need neat "hang ups." There's no nailing, drilling, moistening or gluing—just peel off the protective back and press the hook instantly into place. Two hooks retail for 39 cents from Miller Studio, Box 310, New Philadelphia, Ohio 44663.

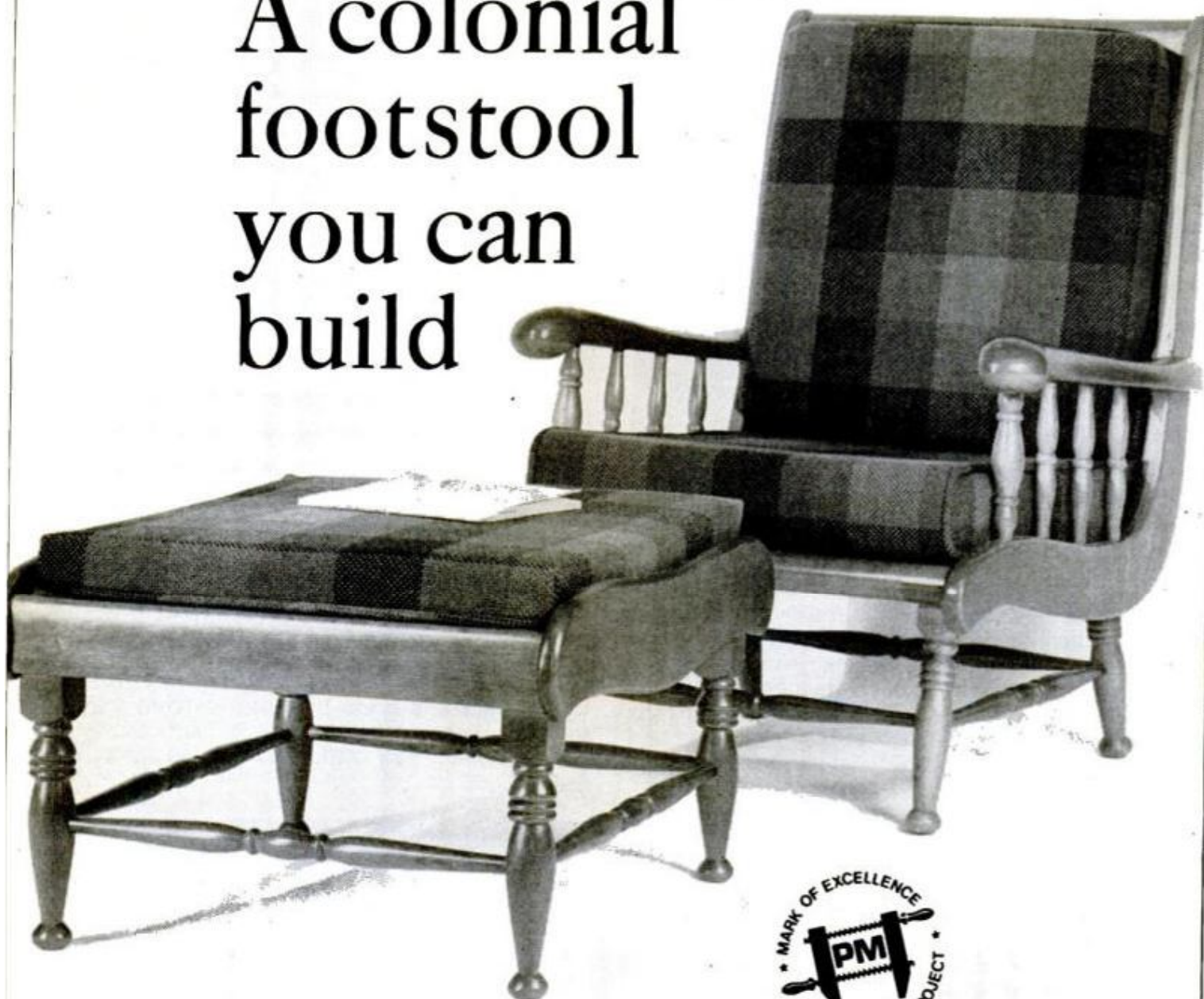


IMPROVE YOUR BATTING, timing and coordination with the Pop-Up Batting Trainer. Ball pops up to strike-zone height for any size batter by a simple spring-tension adjustment. Consists of a spring-loaded tee, foot-trigger pedal and extension cable. The base is made of rugged cast metal. Instructions are included. Unit sells for \$5.98 (ball not included) from Mail Order Games Co., Box 10547, Knoxville, Tenn. 37919.



UNIQUELY DESIGNED, the Space Saucer Clock Radio adds contemporary beauty to your room, office or just anywhere. Consists of AM solid-state radio, ballpoint pen in holder, automatic and manual clock controls and exclusive twist-a-dial alarm setter that gently wakes you. Height is 5 inches; diameter, 7. Sells for \$26.95 postpaid from A. J. Tomaszewski, 115-14 224th St., Cambria Heights, N.Y. 11411.

A colonial footstool you can build



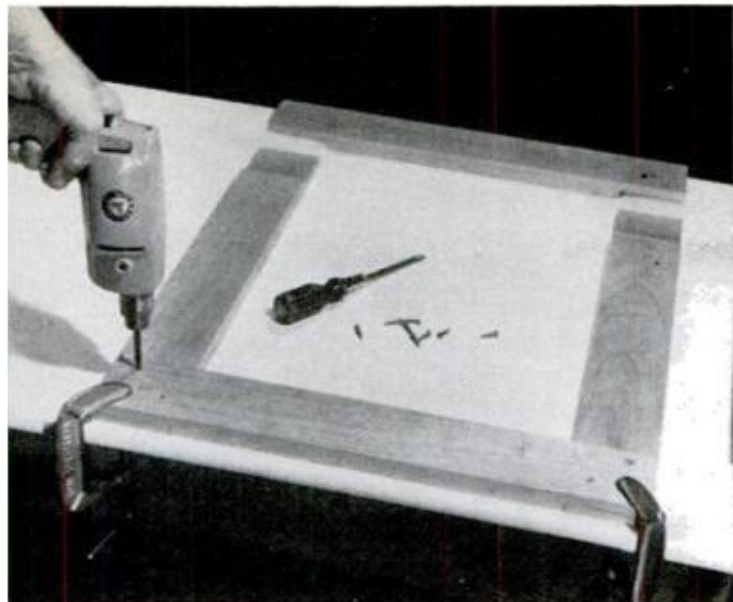
Now you can have a companion piece to match that handsome chair recently featured in *PM*.

By **ROSARIO CAPOTOSTO**
Photos by the author

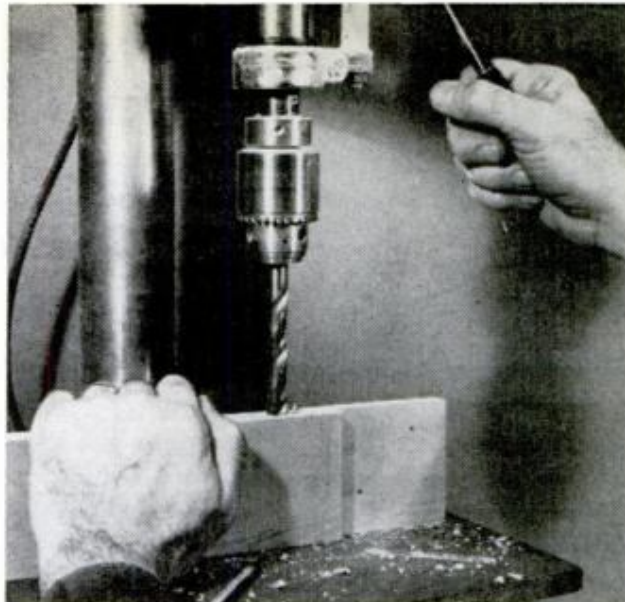
ANYONE WHO BUILT the handsome colonial chair featured in our December and January issues (*A colonial chair you can build for \$53, page 144, Dec. '71 PM*) has had many months of comfortable sitting. Now it's about time to get out of the chair and back into the workshop—this time to make a companion footstool for the chair.

Even if you haven't built the chair and never intend to, the stool will be a welcome addition to most living rooms and family rooms. Simply by selecting different material to cover the cushion, you can match it to any decor.

Its basic design, with some minor differences, is very similar to the chair. It



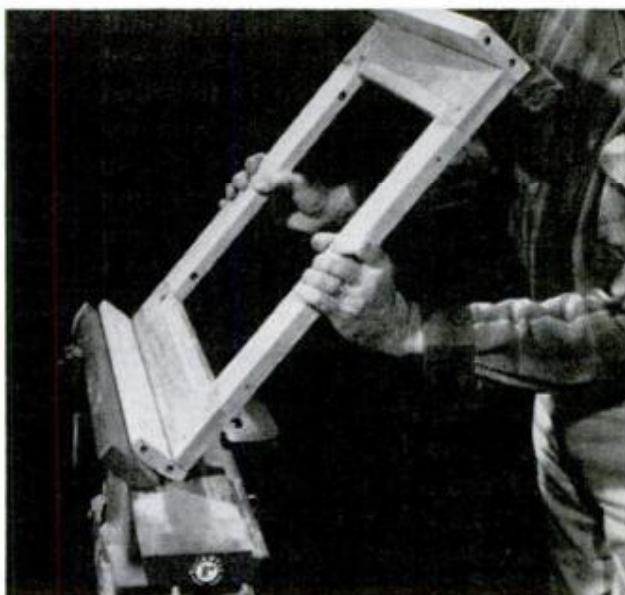
SEAT-FRAME MEMBERS are readied for assembly by boring two holes for $\frac{3}{4}$ -in. screws at each corner



COUNTERBORE screw holes in seat-frame members, then use glue and the screws to assemble the frame



ROUT RABBET FOR HARDBOARD INSERT before sides are attached. Clamped 2x4 limits width of the cut



AFTER FASTENING ENDPieces to the frame, you can shape the curved profile freehand on the jointer

varies in that the legs are perpendicular, the seat frame is not as heavy and a hardwood panel—not webbing—is used for the seat. But if your stool will be used mostly for sitting, you might prefer webbing because it has “give.” (See the December article for webbing how-to.)

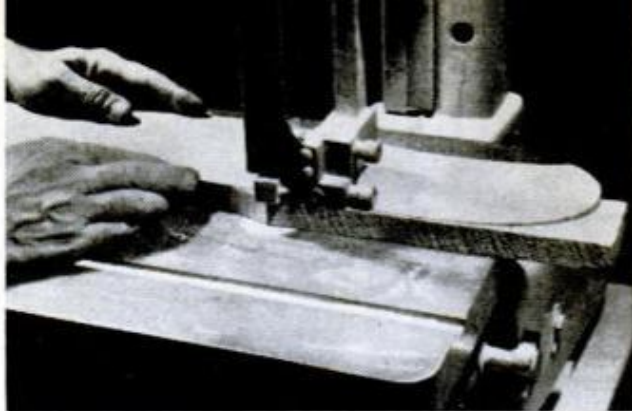
The boxed-in seat utilizes the back section of Sears’ two-piece Replacement Cushion Set (No. 24K 19211 LH). It’s sold only as a two-piece set, so plan to use the extra cushion as a throw pillow. Depending on the price of cherry lumber in your area, cost of materials (including cushion set) should be about \$28.

Use seasoned cherry lumber and begin with the seat frame by dadoing the end lap joints. Assemble the pieces with

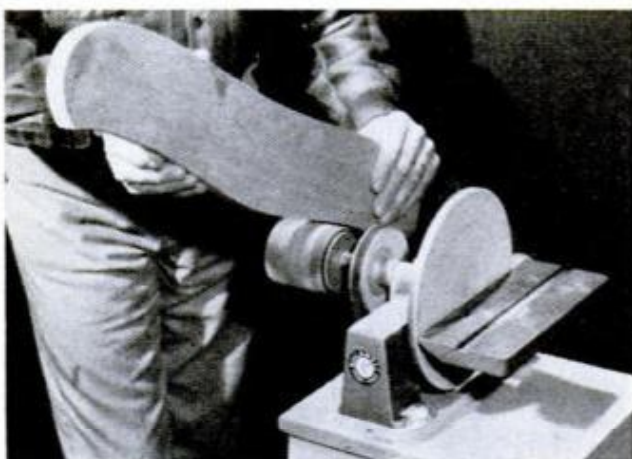
clamps to hold corners square while you bore a pair of pilot screw holes in each corner. The screws are needed only to prevent sliding during gluing. Make certain you locate these screws clear of the area reserved for the leg tenon holes. The side and endpieces are attached with screws and glue, so bore and counterbore the screw holes through the four boards first. After the seat frame is glued, bore the four blind holes for the leg tenons and rout the rabbet for the panel.

Glue up only the two endpieces, leaving the patterned sides until the curved cross sections of the ends have been shaped. Finish-sand the ends prior to assembly of the sides.

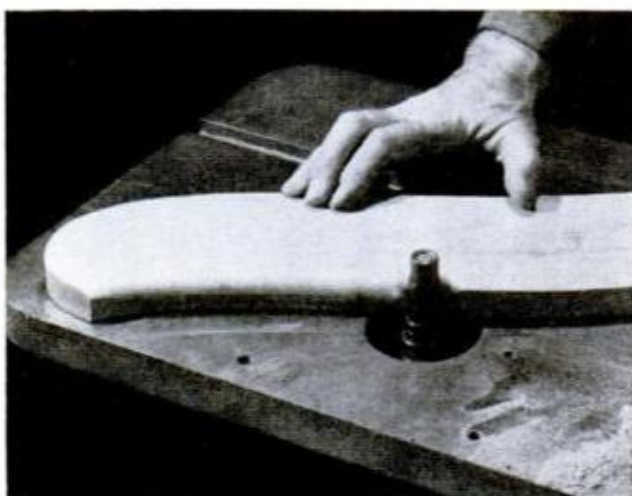
Cut the sides, sand them smooth and



SHAPED SIDEPieces are easiest to cut on a band-saw, but you could also use a jigsaw or a sabre saw

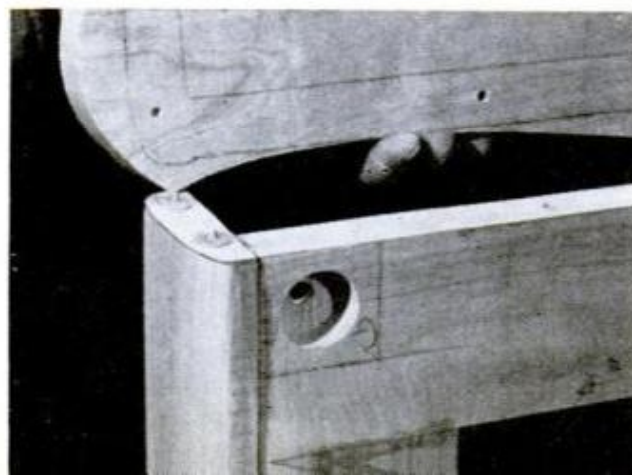


SAW MARKS AND BUMPS ON EDGES must be sanded smooth before the sidepieces get corners rounded



HALF-ROUND CUTTER AND SHAPER are used to shape radius on sides. Bottom inside part is not rounded

SIDEPieces are attached to the frame with glue and dowels. Use dowel-centers to locate hole positions

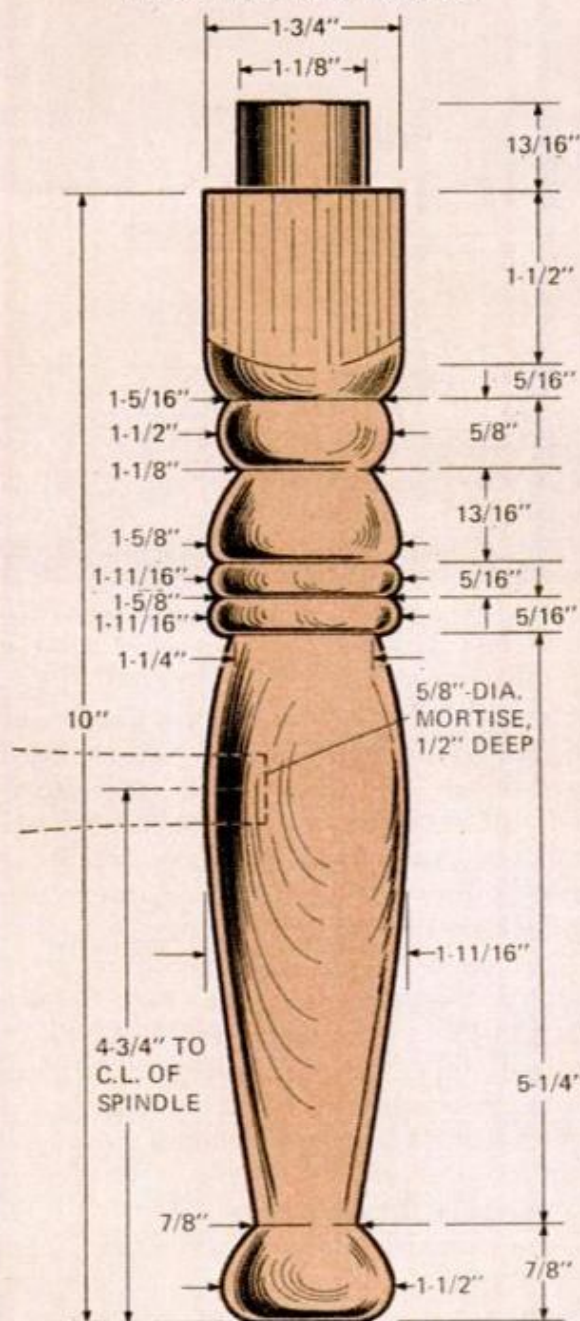


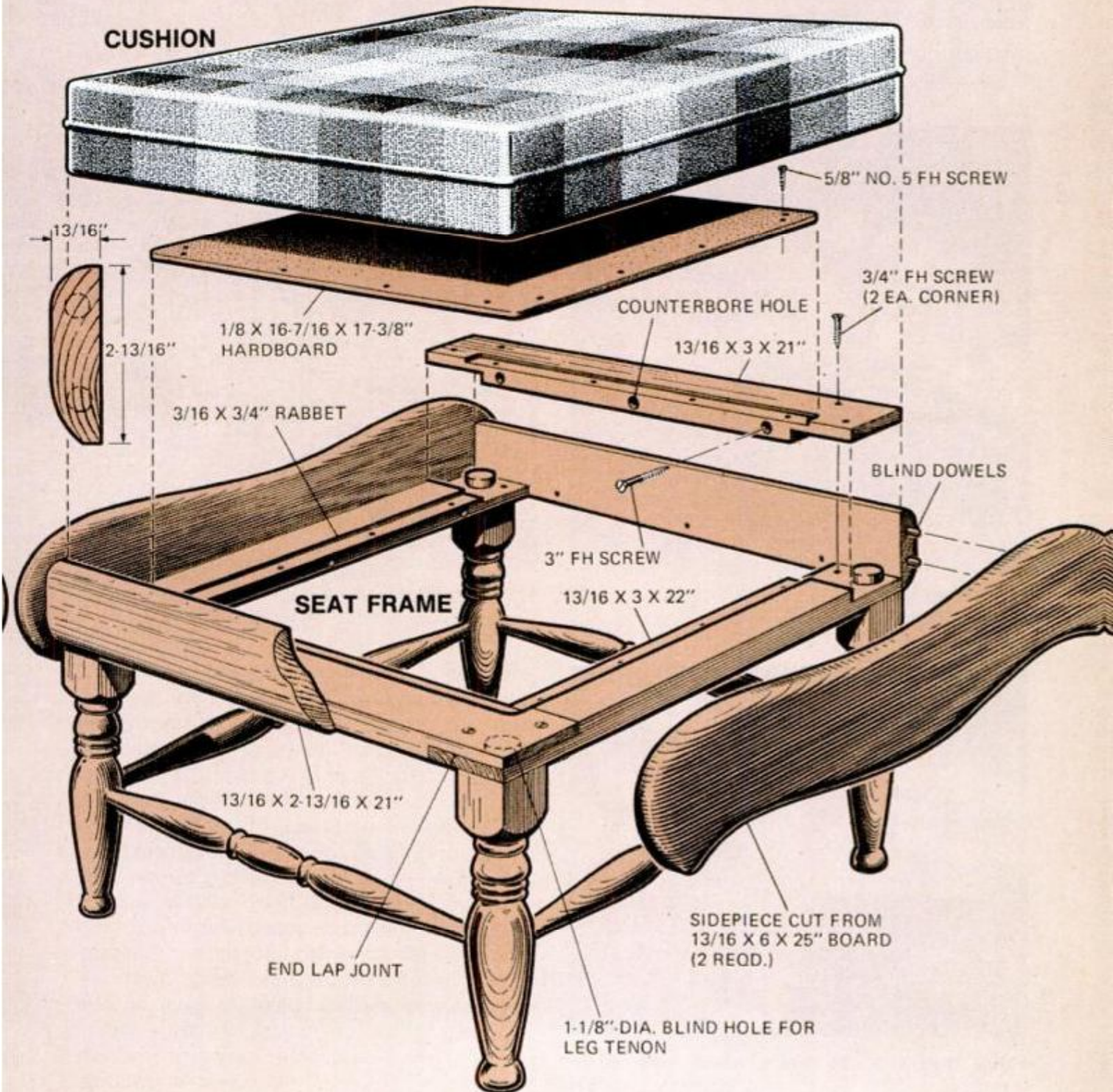
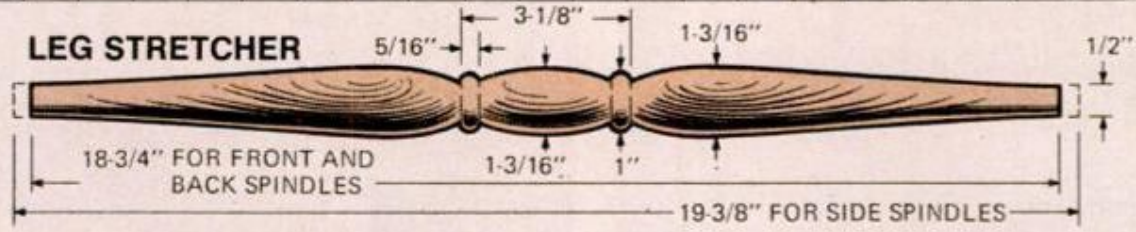
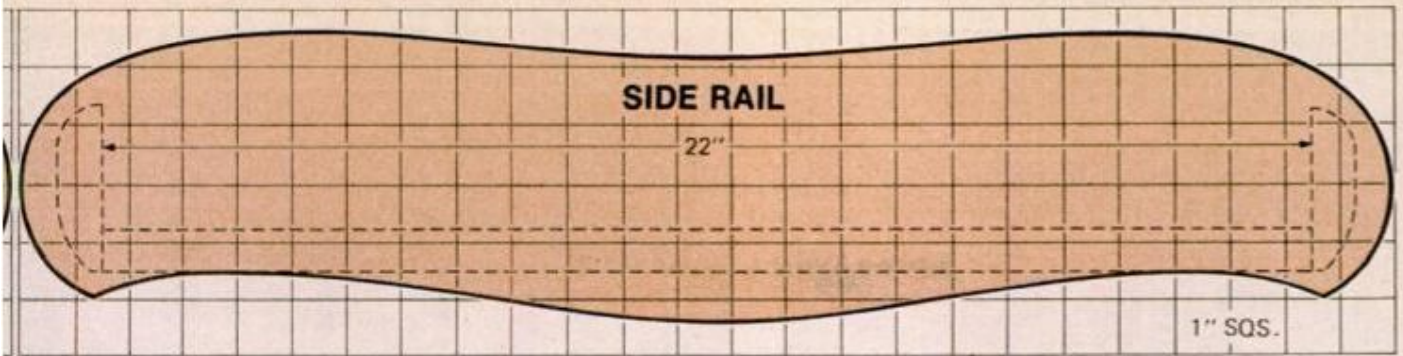
shape a half round on both sides. Do not round the inside bottoms, which are left square. Locate the position for the dowel holes and glue on the sides using bar clamps to pull in the ends.

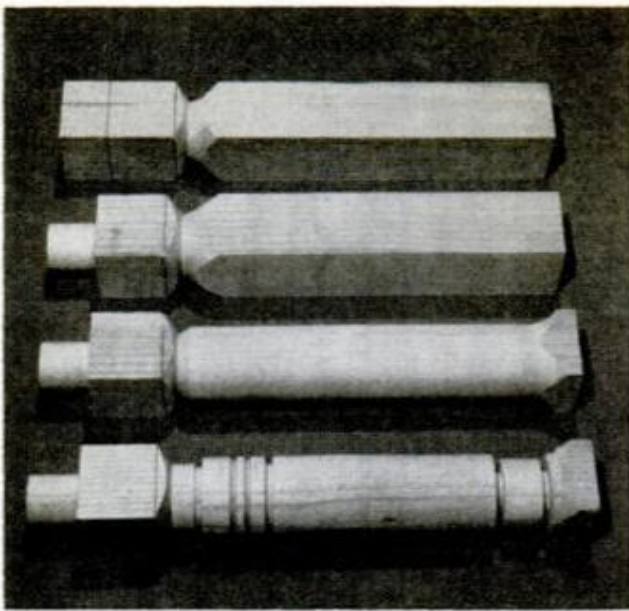
Next, turn the legs. Since the tops of the legs are square-shouldered, joint the turning blocks true and smooth. Carefully mark the lathe centers on the blocks so the shoulders will form symmetrically. Turn a 1 1/8-in.-dia. tenon at the top and leave a square section in the scrap area beyond the foot of the leg to facilitate accurate boring of spindle holes. And set up a simple jig to be sure to get holes that are uniformly located on each leg.

The spindles are turned from 1 1/8-in.-

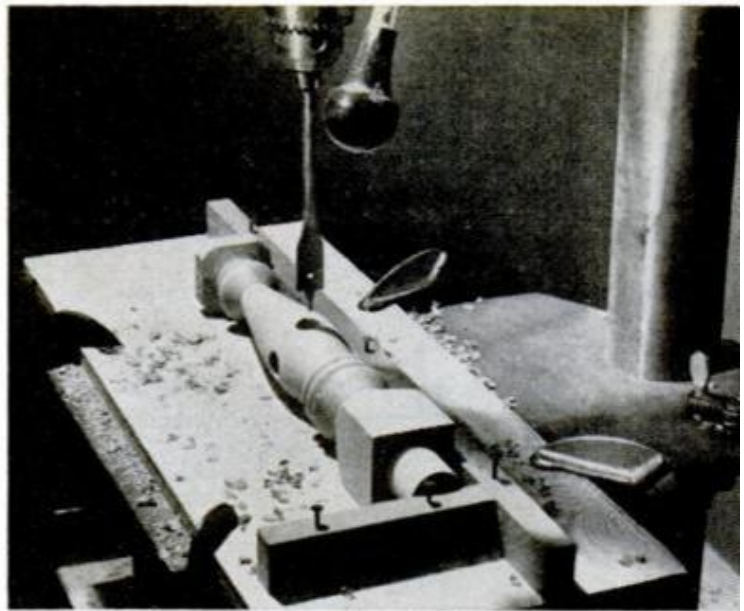
LEG-TURNING DETAIL



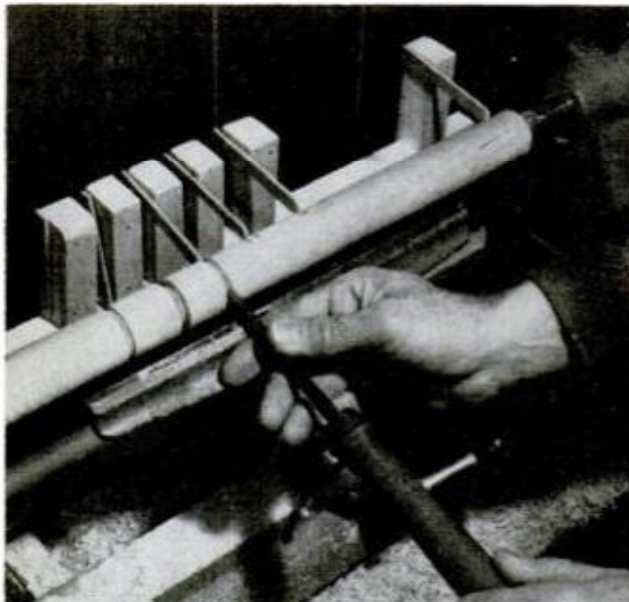




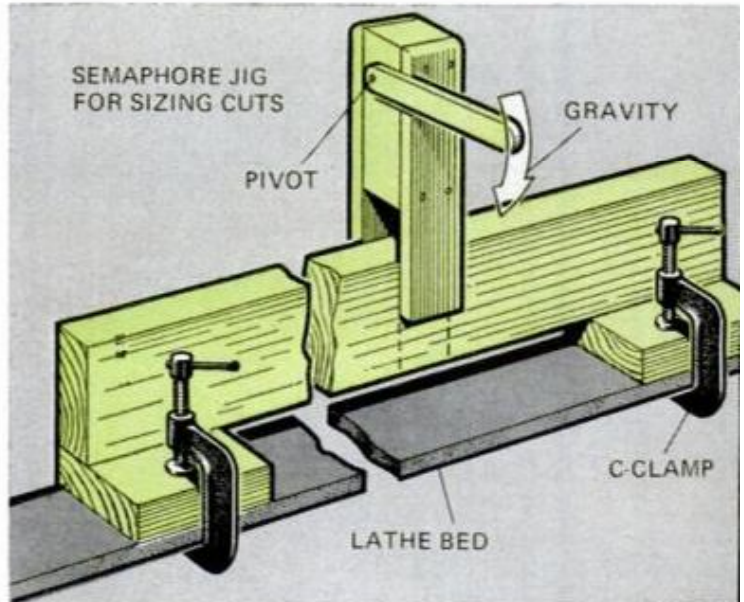
LEG-TURNING PROGRESSION, top to bottom: Chamfer cut, tenon, rough cylinder, then parting cuts



TWO FLATS keep leg positioned for boring spindle holes. Next step is to cut off waste at the bottom



SEMAPHORE JIG is easy to make; it simplifies the task of obtaining accurate diameter of sizing cuts



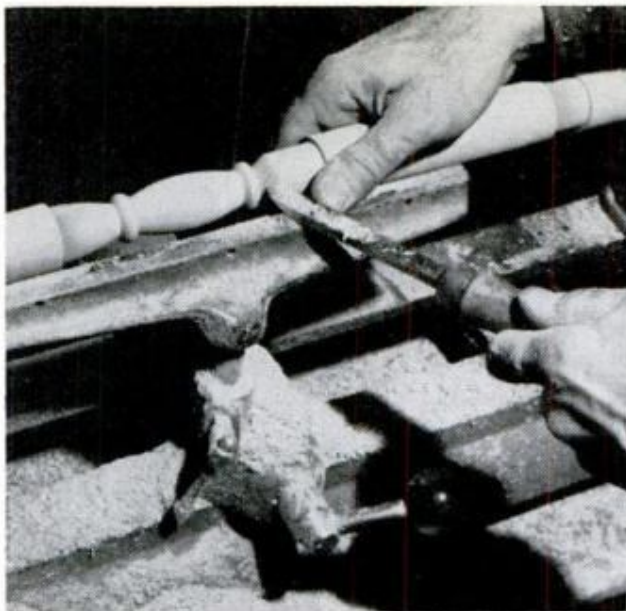
SCRAP MATERIAL is adequate for making a semaphore jig. See text for information on how to use it



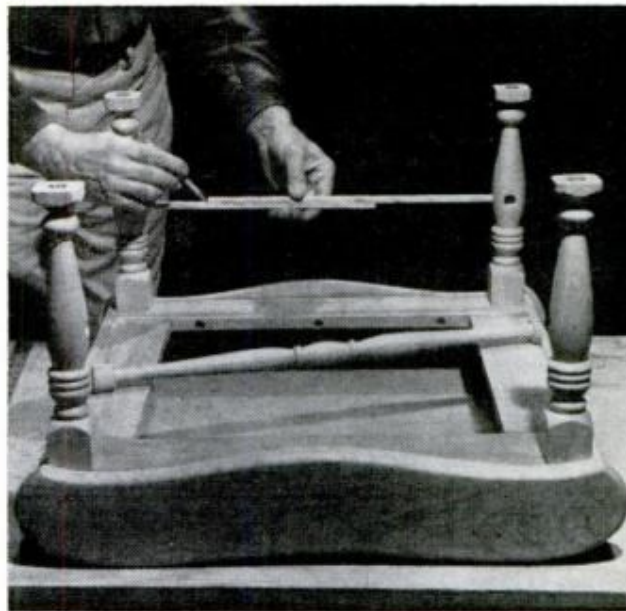
LONG, THIN SPINDLES tend to vibrate, so work the center area first. Thick ends minimize bouncing

sq. stock. Due to length and small diameter, you may encounter whip (vibration). Overcome this by use of a backstick—a simple notched piece of wood mounted to support the workpiece from behind. Or, keep it simple as shown in the photos.

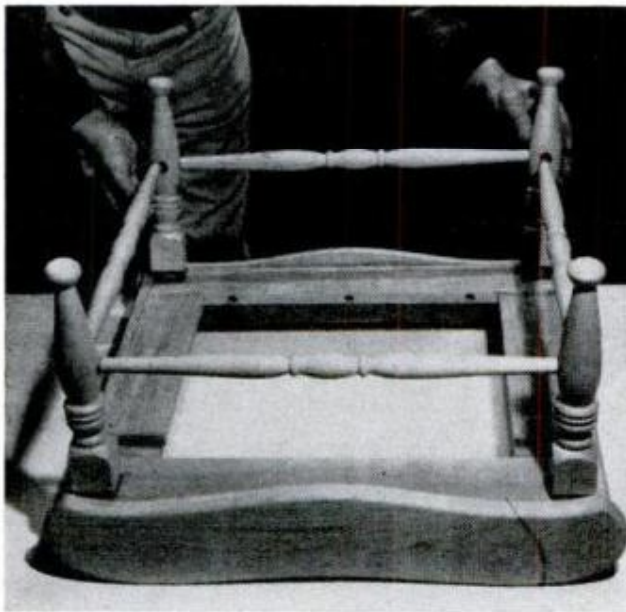
The important phase of repeat turning is the making of the sizing cuts (parting-tool cuts which “plot” the diameter at various locations). The caliper serves quite well, but it requires continual stop and go. You may want to set up a semaphore jig for making these cuts. There are only four of each pattern to turn on the legs and spindles—no production run—but you may enjoy the ease with which you can get absolutely accurate diameters.



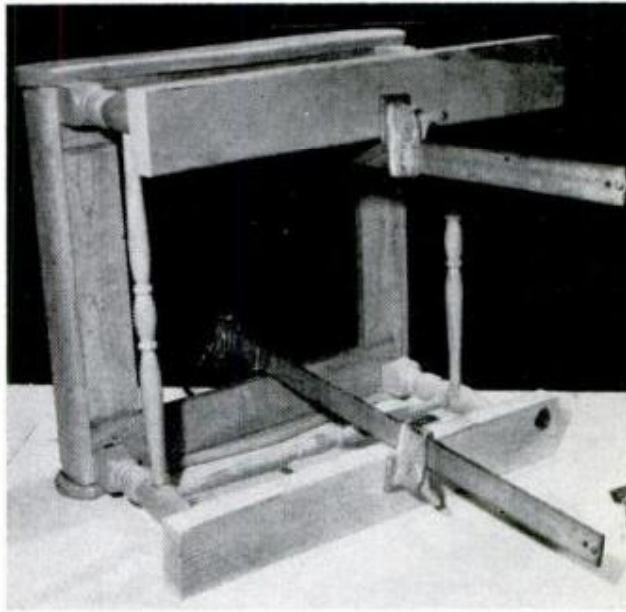
EASY WAY TO BEAT WHIPPING: Grasp work lightly with one hand while your thumb guides turning tool



DETERMINE SPINDLE LENGTH by inserting legs and using two sticks (in spindle holes) as depth gauge



TO GLUE LEG ASSEMBLY, insert first pair of legs part way so they'll "give," ease in the second pair



MINIMAL CLAMPING is required. Legs are bridged with two lengths of lumber to seat the leg tenons

This jig is a length of board mounted on edge in back of the lathe. Make a series of notched-out blocks which ride snugly along the top edge of this board. Pin a thin strip of metal or wood to the side of the block. The strip is pivoted near one end so the outer end can swing down against the workpiece. Determine the length of each strip after making the initial sizing cuts on the first piece using a caliper. Using the model as the guide, position the blocks and pin the strips so they will just drop down past the work when the proper diameter of parting cut has been reached. On the subsequent turning, simply lay the arms over the top of the turning. Then just feed in the parting tool

in line with the arm until it drops down.

Turn the ends of the spindles down to a diameter of $\frac{5}{8}$ -in., then finish-sand them on the lathe before you cut off the waste ends.

If you use a spade bit to bore the blind holes in the seat bottom, the point of the drill bit will penetrate the frame and form small holes on the top side. Plug these holes with wood putty so glue in the tenon joint cannot escape. Cut spindles to length and test all parts for fit. Work turnings into the base, then clamp legs to the seat with a pair of bar clamps and two boards as shown. Screw the hardboard panel into the recess after applying several finish coats of lacquer or varnish. ★★ ★

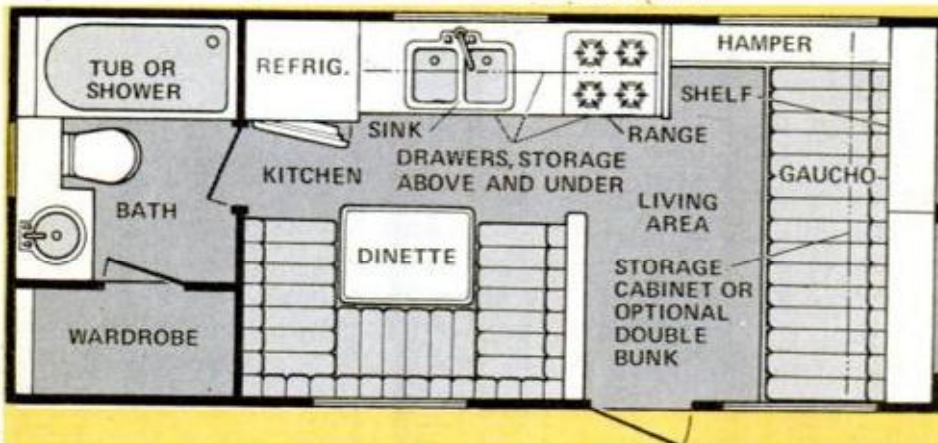


LUXURY TRAILER provides comfortable living, no matter where you vacation. To order plans, see page 138

Now: a 20-ft. travel trailer you can build yourself

This beauty has all the comforts of home, from convenience cooking to complete bath with shower. Starting with plans we offer, you can assemble Laguna-20 for less than \$2000

LAGUNA-20 FLOOR PLAN



LAGUNA-20 looks just like a commercial trailer, inside as well as outside. Floor plan at left reveals an important planning point—total self-containment. Prototype trailer above and on the facing page was built in the same way a do-it-yourselfer would build his own at home. The design conformed to California's stringent travel-trailer code. After the unit was completed, it was inspected, approved and registered by state of California



GAUCHO at front of trailer provides spacious comfort by day, sleeping for two at night. An optional bunk can be built above gauchos to sleep two more

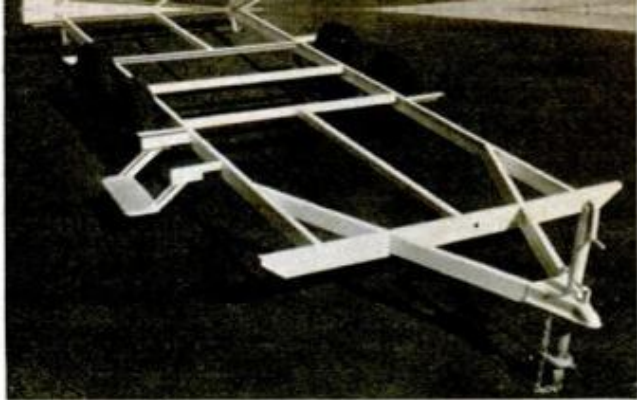
THERE'S NO ARGUING that, dollar for dollar, camping in your own trailer is just about the best family-vacation bargain around. But, until now, a trailer vacation—with all the comforts of home or vacation spa—meant you had to lay out anywhere from \$3500 to \$8000, or settle for traveling with the barest essentials and conveniences.

An aggressive and creative firm in California—Glen L Recreational Vehicles—has changed that picture. It has designed a comfortable, luxurious trailer that can be assembled for about \$2000, using tools of the type builders probably already own. And it has agreed to sell plans, full-size



LOTS OF DRAWER SPACE and cabinets, plus pullout cutting boards are in dream camping kitchen. Plumbing fixtures are connected to a 6-gal. water tank and a 30-gal. waste-holding tank (to make the unit independent during extended on-the-road time). Comfortable dinette at the left converts into a roomy bunk to sleep two adult-size vacationers

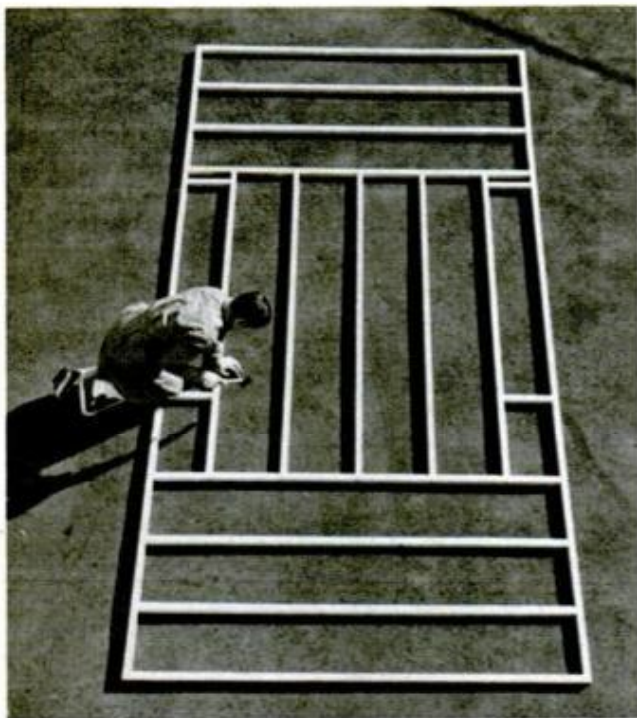




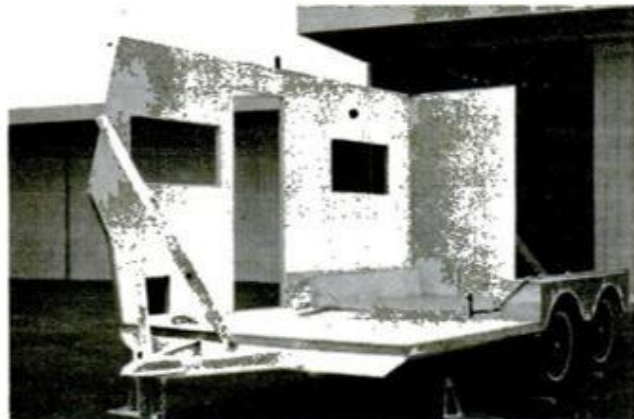
COMPLETED TRAILER FRAME for 20-ft. Laguna-20 with tandem axles. Note the coupler with jack stand



WALLS ARE ASSEMBLED on the trailer floor. It is a must that all studs be exactly the same length



FLOOR FRAMEWORK consists of 2x2 stock. Continuous sidepieces are cut to length after the assembly



FIRST WALL is erected and braced in position. Next, crosswise partitions will hold the wall in place

patterns and a construction manual that will let *PM* readers build one for themselves in the least possible time. (See *How to order plans*, at left).

The rugged 20-footer has a lot more going for it than is immediately obvious in the photos. Perhaps its strongest design feature is the fact that it is totally self-contained. There's even a complete bathroom with space for an optional tub or shower.

The lighting system runs through a converter which takes in 110-volt power whenever it's available and converts it to 12 volts. At other times, the system simply runs off the trailer battery. The converter also charges the trailer battery

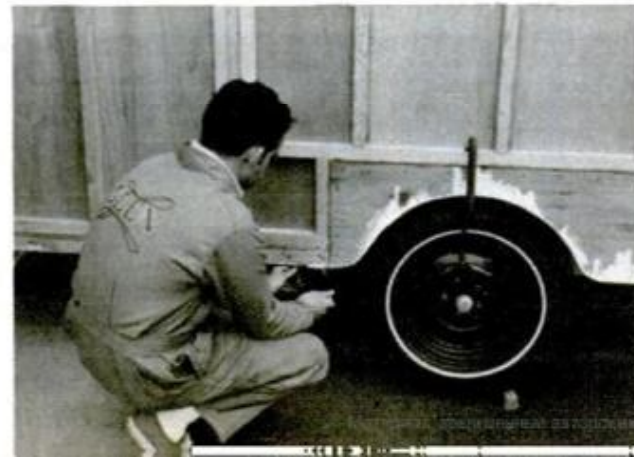
HOW TO ORDER PLANS

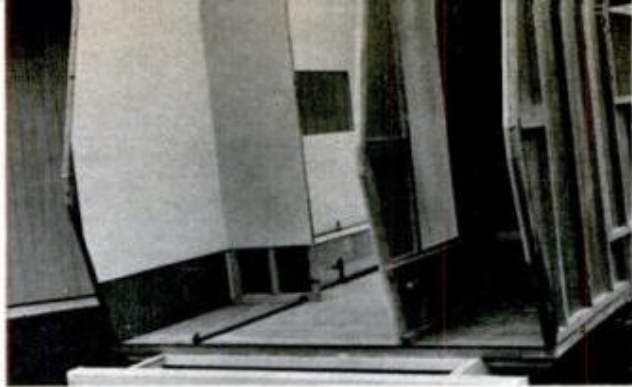
Five large plan sheets, 32-page construction manual, full-height patterns giving contour and position of sidewall members at front and rear ends, full-size patterns for wheel-well cutout and cambered roof beams. Complete for \$15 postpaid via parcel post. Order from Glen L. Recreational Vehicles, Dept. PM, 9152 East Rosecrans, Bellflower, Calif. 90706.

NAIL 3/8-IN. PLYWOOD FLOORING to framework after coating latter liberally with waterproof glue

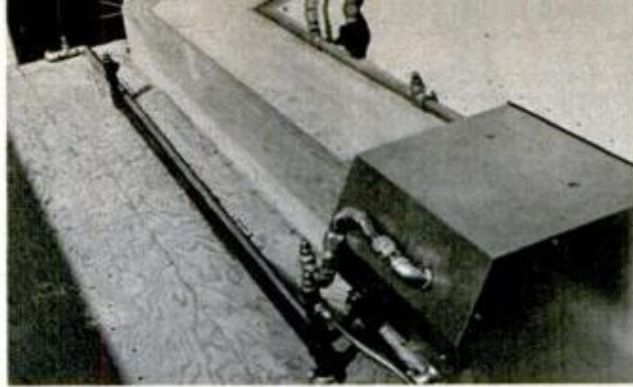


BOLT WALL in position to the floor through the lower wall plate. Notice clamps are holding wall





BATHROOM AREA with partitions installed. Interior of closet at right can be covered with paneling



WATER HEATER connected to LP-gas, hot and cold-water lines. At center, the connection for city water



WHERE TOP AND BOTTOM parts of front wall butt, V-cavity is filled with wedge-shape piece of wood



PLASTIC-PIPE DRAIN FITTINGS are taped and a line is drawn to locate relative position of the fittings

automatically when connected to a 110-volt power source.

The prototype shown sleeps four: The dinette and gauchó both convert into double beds. If you wish, the cabinet area above the gauchó can be fitted with a convertible double bunk. Details for this option are included in the plans. Other good features are the full-height, hanging wardrobe closet and many storage compartments.

Experienced over-the-roaders will appreciate the tandem axles which provide steady tracking.

Features to keep all trail-cooks happy abound in the kitchen setup. There is a 6-gal. water heater, a four-burner range

with power vent hood and a double-sink that will let the fussiest chef prepare near-banquet-size meals for the family. And, as all campers know, that 30-gal. waste-holding tank will minimize stops at sanitary disposal stations.

The plans, patterns and manual are clear, concise and easy to follow. The manual is profusely illustrated with step-by-step photographs which will simplify your work. (*Editor's note:* The manual is not available separately. It is offered only as a part of the complete package.) Finally, to make building the Laguna-20 as easy as possible, Glen L incorporates standard recreational vehicle equipment throughout. ★★★

KITCHEN SINK CABINET is shop-assembled, positioned in trailer after rough-in plumbing is installed

CONTINUOUS ROLL ROOFING is started at front above windows. Latter inserts into "Pittsburgh" lip



High-style table from construction-grade lumber

This sturdy, contemporary 'butcher-block' furniture is constructed to take punishment from youngsters

By HARRY WICKS, Workshop Editor

Data: Annette Sukov
Color photo by Les Turnau

BUTCHER-BLOCK FURNITURE is riding a wave of popularity these days and it's not difficult to figure why. It is sturdy and can be used practically anywhere in the home. These features motivated the builder of the handsome furniture shown to create a small dining set for his own kitchen.

He selected inexpensive construction-grade stock to build the set; his thinking was that if it was sanded and finished correctly the set would have the looks—without the price tag—of sets selling for \$150 or more.

Ted McLaren of Minneapolis (who also designed the *Do-it-yourself paper furniture* (page 132, June *PM*), accomplished exactly what he set out to do. His cash outlay was a mere \$35, and by using building construction techniques—rather than sophisticated cabinetmaker's joinery—he completed the set in a couple of weekends. You can build the table and benches factory-fashion. For example, all parts can be gang-cut, sanded and as-

sembled, and all the assembled pieces can be finished simultaneously. To avoid confusion, keep bench and table parts in separate stacks and label each part.

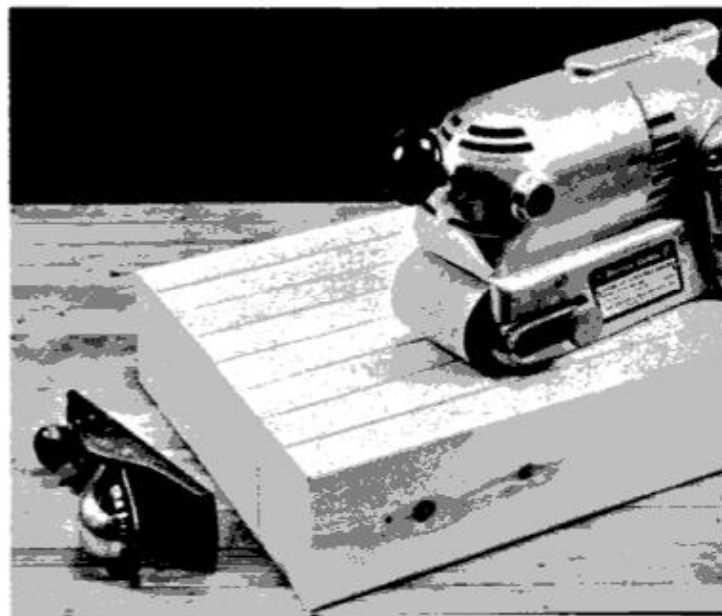
Since it is not uncommon for construction-grade lumber to come with rough edges and/or with knots missing, select the lumber personally if you can. For the bench and tabletops, try to use only 2x4s with marfree edges. Because these are left natural, any filler used would show through and lessen the butcher-block effect. In all likelihood, you will have to accept some nicked lumber; save these pieces for members that will be painted. These can be filled and sanded; the paint will hide the filler.

The only dimensions that can (and should, if necessary) be altered, are the lengths of the benches and table. Heights and widths are standard architectural dimensions. With size of set determined, cut all parts at one time and label them as mentioned.

Most two-by stock has slightly rounded

BENCH, TABLETOPS are assembled with glue and 8d common nails (8d finishing nails in outside boards)

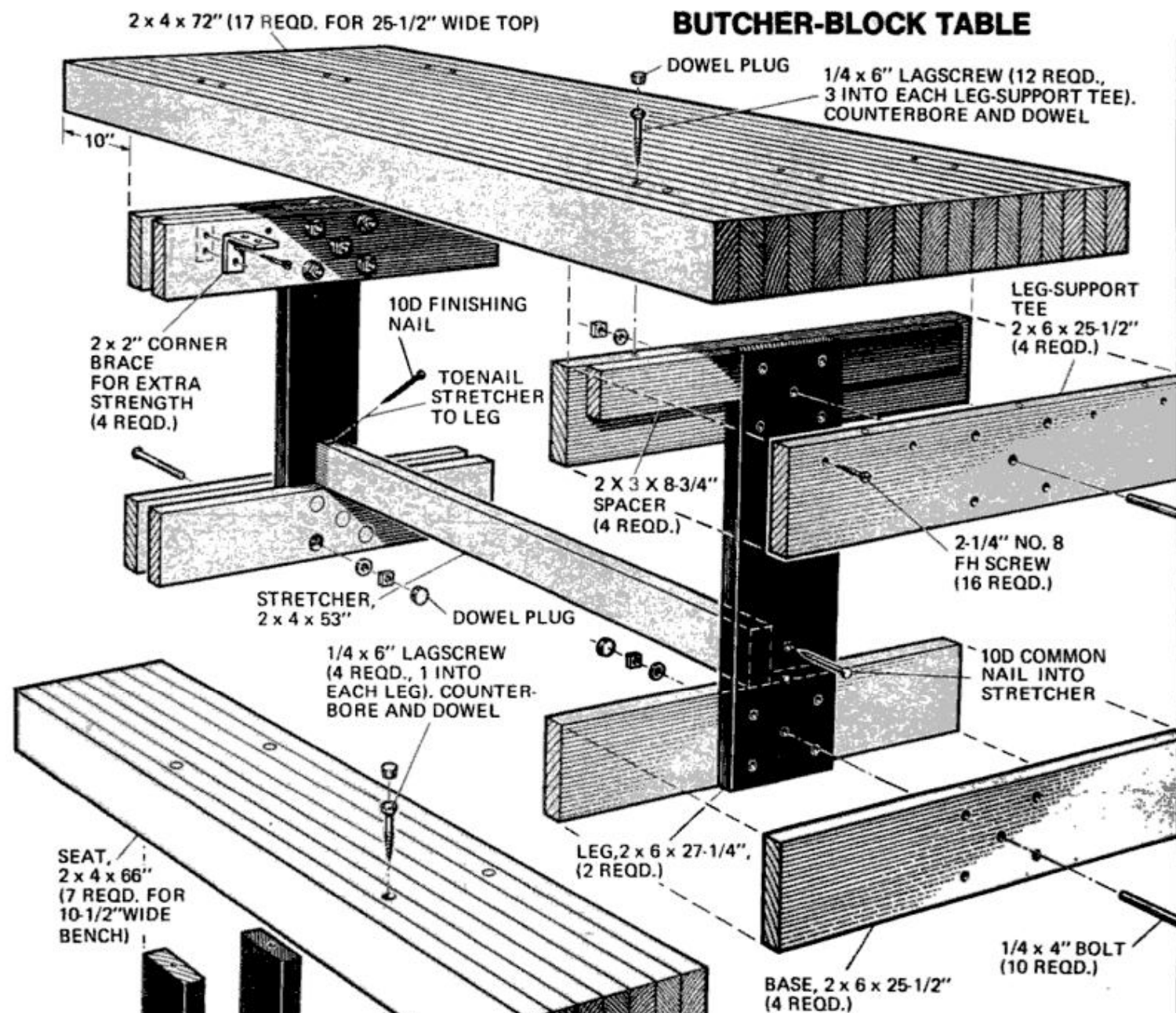
BLOCK IS PLANED and sanded after glue has dried, then is stained and finished with semigloss varnish



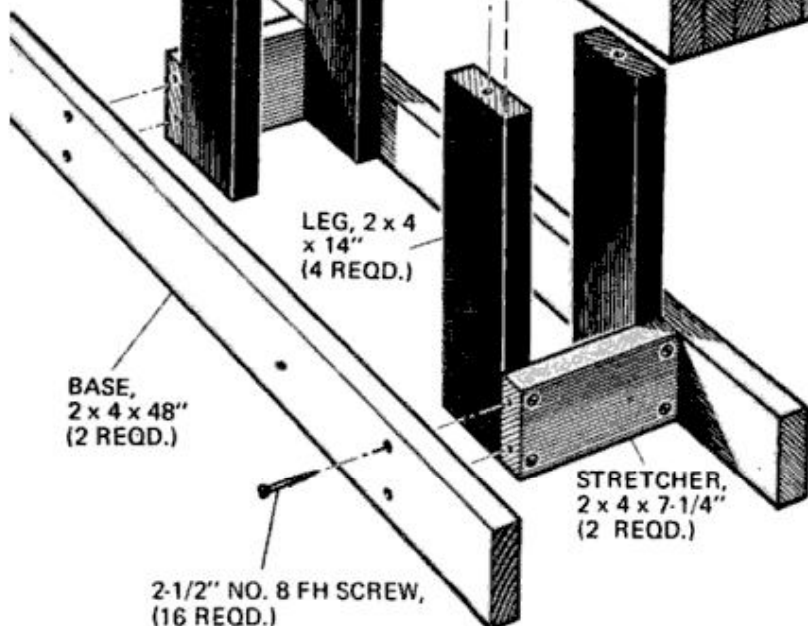
BUILT TO TAKE IT, this rugged
"butcher-block" table and bench
set is ideal for young families



BUTCHER-BLOCK TABLE



Technical art by Peter Trojan



BUTCHER-BLOCK BENCH

edges. If you plane and sand these before assembly, the job goes faster. To assemble the tops, use glue and 8d nails. Apply white glue to the first 2x4 and drive 8d common nails through the second 2x4 into the first. Continue doing this until the last (outside) board. Here, use 8d finishing nails because you can set the cupped heads and fill the small indents so they are practically invisible. You can, of course, drill the 2x4s and fasten them together with threaded rods, washers and nuts and then hide the hardware with dowel plugs.

Finally, assemble the benches and table as shown in the drawing above. McLaren finished the original with two coats of polyester resin on the tops and enamel on the bases. ★★★

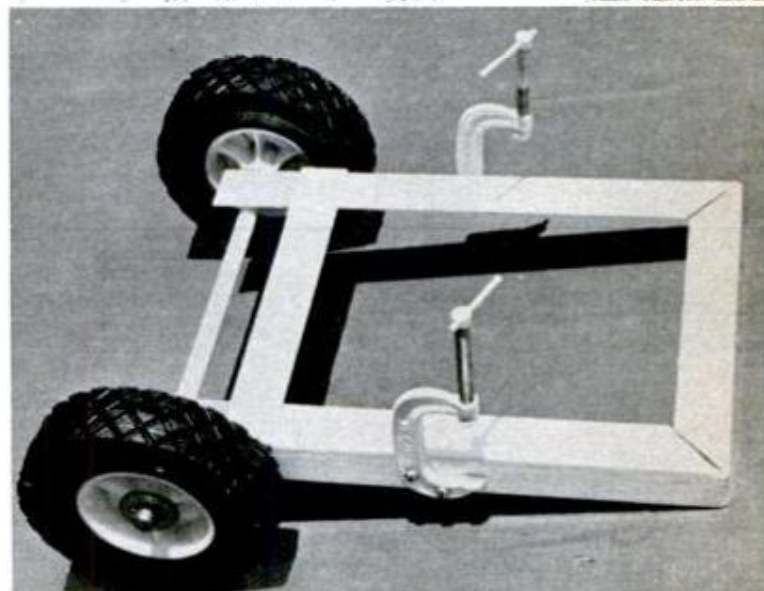
A one-man dinghy dolly you can build for \$8

ORDINARILY, getting a dinghy from storage down to the big boat (or any maneuvering on land for that matter) can be a backbreaking chore for even two men. Happily, with about eight bucks worth of standard hardware-store items and a weekend in the shop, you can build this lightweight dolly and be rid of the problem.

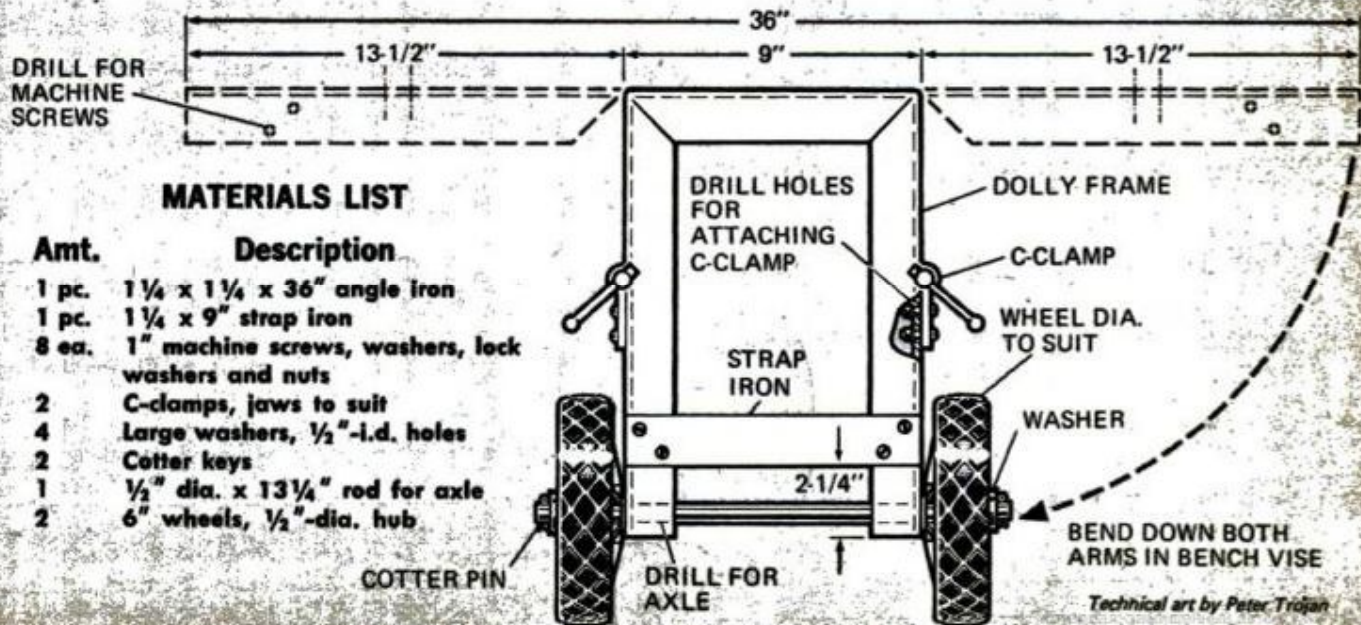
I built the dolly shown here for exactly \$7.97 in a single work session and, since, have been able to handle my small boat—alone—without any grunting and groaning. It's helped to move other bulky items as well.

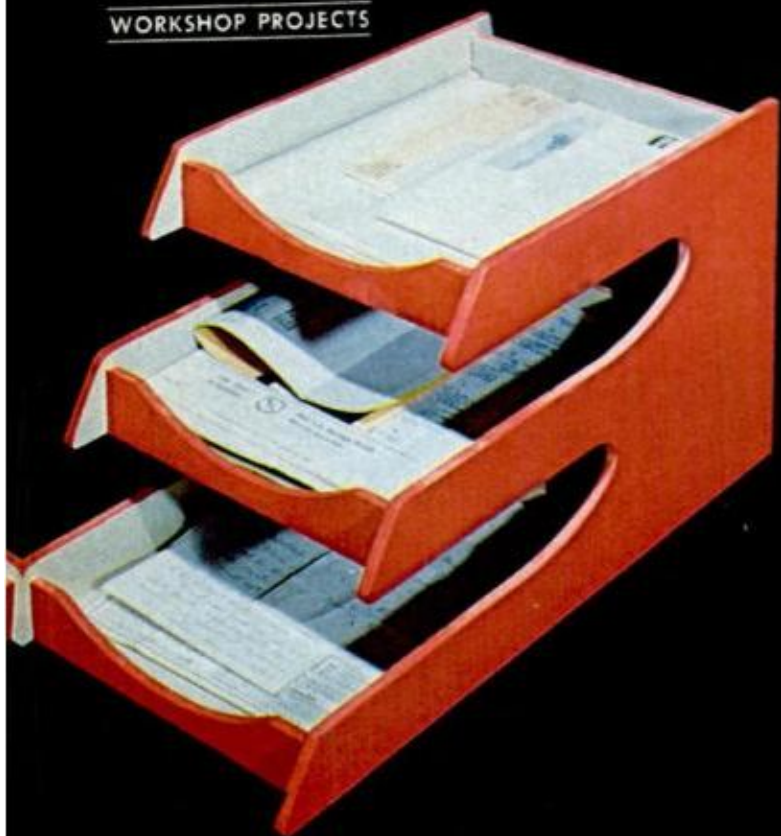
Constructed mostly of angle and strap iron, the pieces are sized, bent and assembled as shown below. Dimensions can be altered to fit your particular boat. You should check your transom measurements before drilling and bolting the C-clamps in place. The wheels, too, could be varied if you already have a pair. The dolly was designed for average home construction using a hacksaw, bench vise, electric drill and machine screws. If you own, or have access to, welding equipment, the strap and C-clamps could be welded on for a more permanent job.

—Bill Baugham, Garden Grove, Calif.



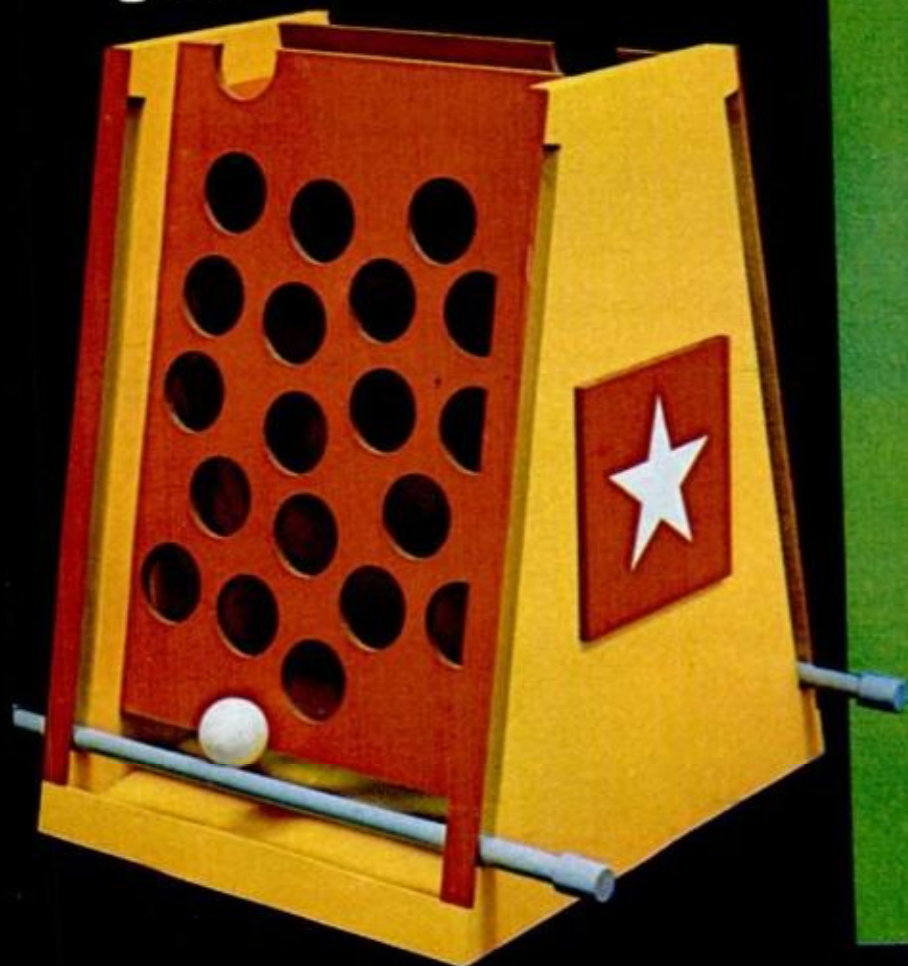
WITH LIGHTWEIGHT TOTOER you can single-handedly haul your small boat from storage to the big boat



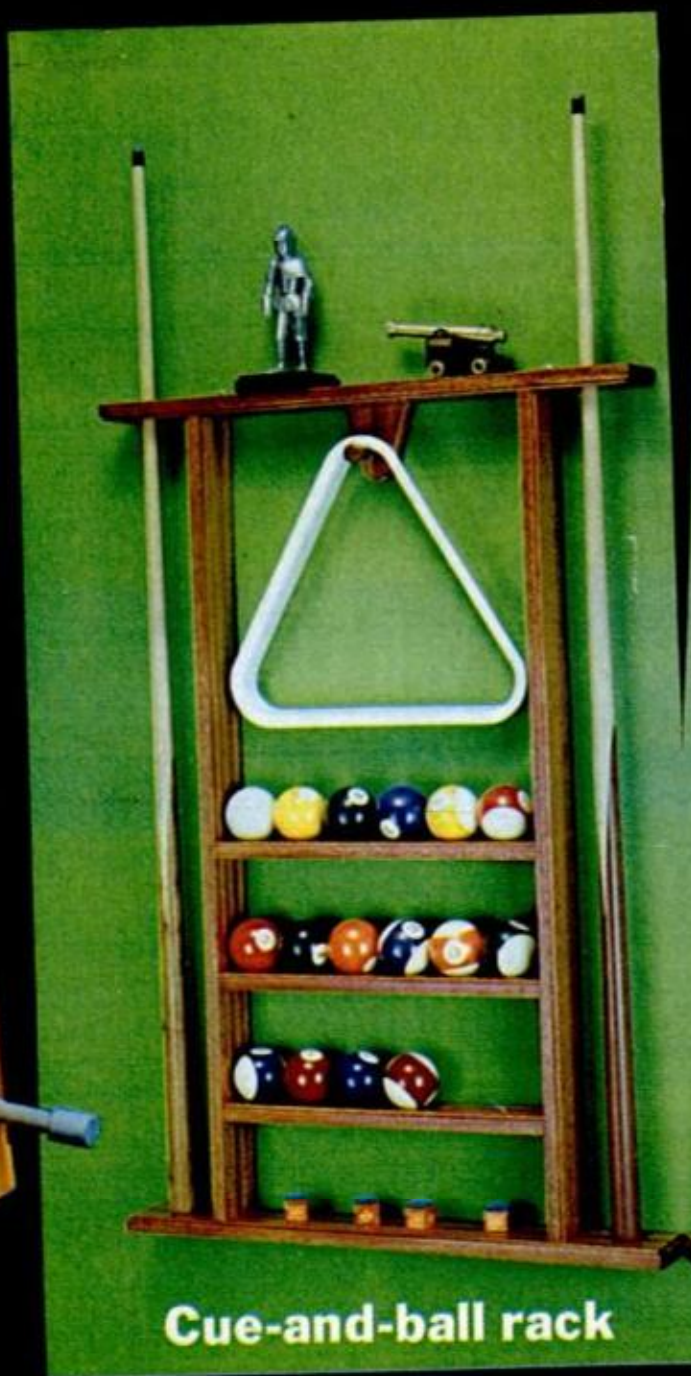


Modern mail organizer

'Swiss-cheese' mountain game



Little projects—lots of kicks



Cue-and-ball rack

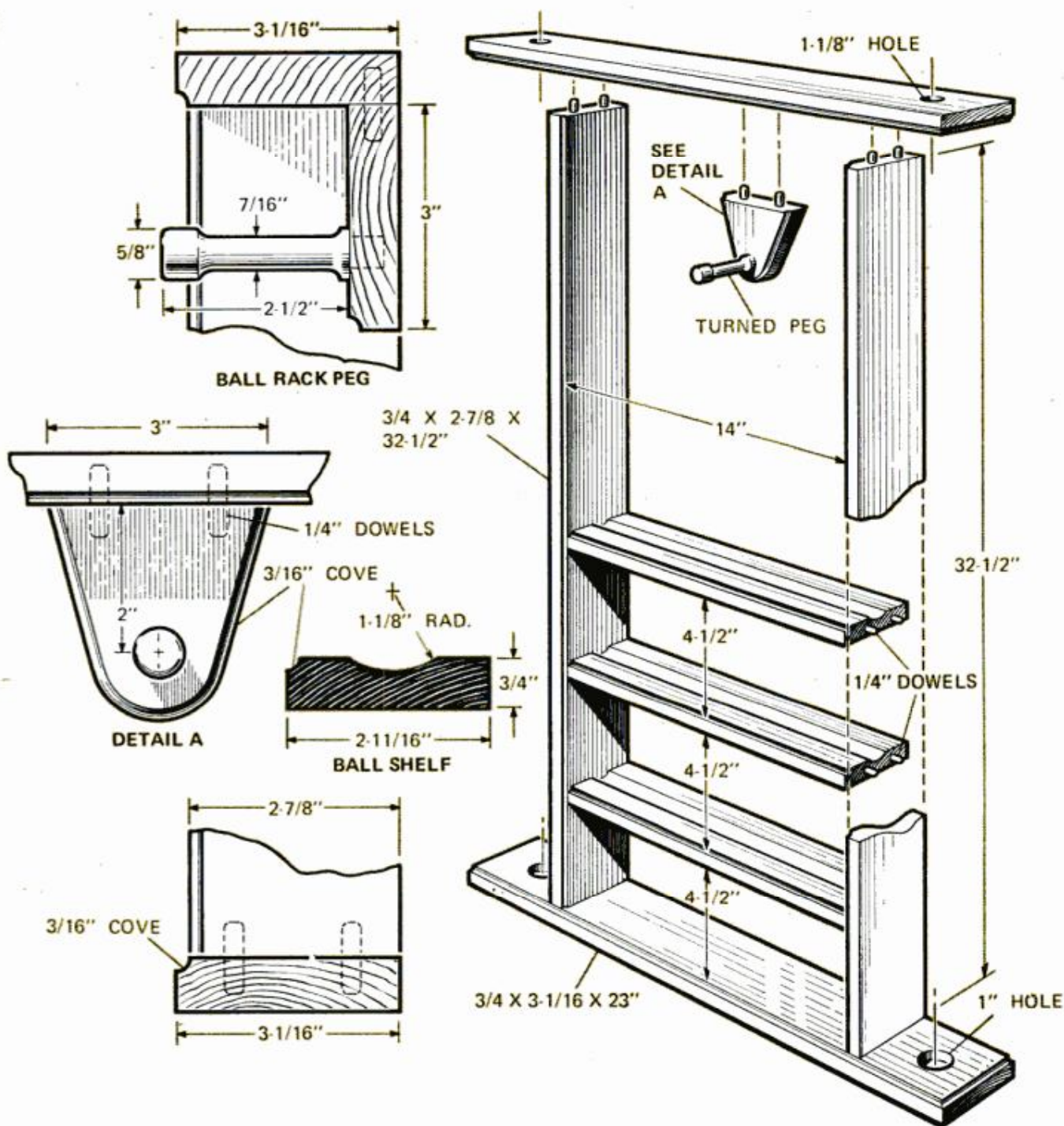
Cue-and-ball rack

ROUNDING UP THE BALLS and cues when you're ready to "rack 'em up" is no problem when you store them in a handy wall rack. While this handsome one of walnut holds two cues, it can be built to hold four by making the outboard ends longer and boring extra holes top and bottom. Except for the size of the holes, the top and bottom pieces are alike, as are the sides and the three shelves. Make ball grooves in the shelves by passing the work diagonally across the blade of your table saw. Clamp a wood fence to the table and start with the blade only $\frac{1}{16}$ in. high. Raise the blade $\frac{1}{16}$ in. with each successive pass until you have a concave

groove 1 in. wide. Hand-finish the rough cut by wrapping sandpaper around a large dowel.

If you don't have a lathe, a length of dowel can be substituted for the turned rack peg. All parts are blind-doweled and glued together. Finishing is a lot easier if you do it before the rack is glued together. Apply strips of masking tape to the pieces at the glue joints to keep the wood free of stain. When the finishing is completed, peel off the tape and apply glue to the dowels. Glue and clamp the shelves to the sidepieces first, then add the top and bottom pieces and finally the peg bracket. Add two flat, metal hanging hooks to the rear edge at the top.

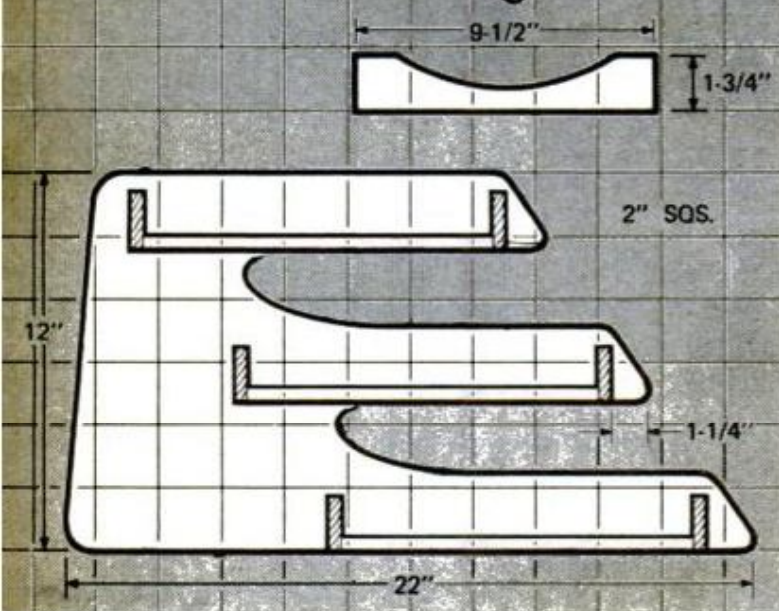
—Wayne C. Leckey.



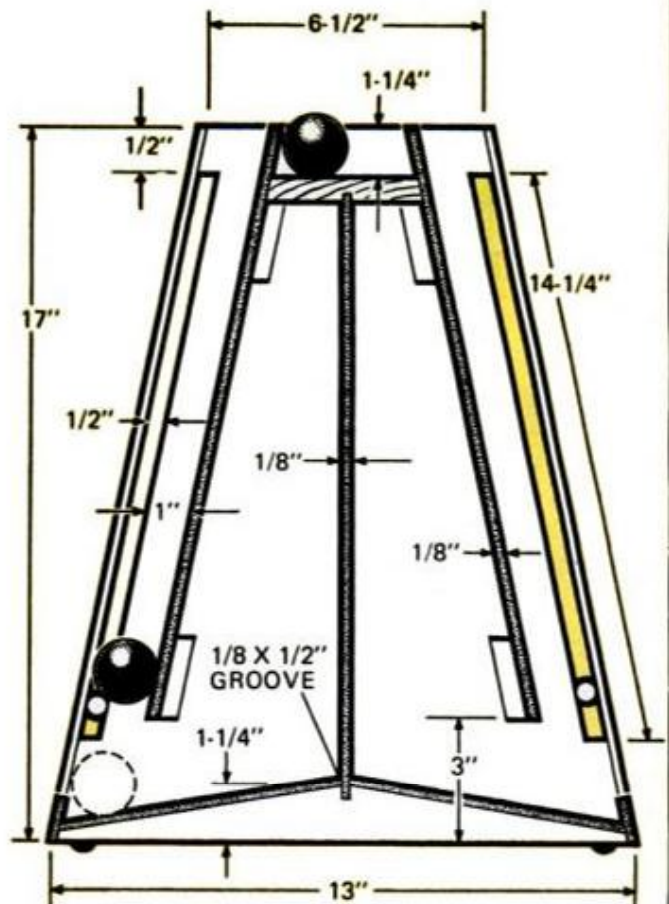
Mod mail organizer

IN TODAY'S "PAPER WORLD," almost everyone can use a mail organizer—the chief executive of the house, the housewife, students and, of course, the office worker. For you fellows in the latter category, imagine the impression you'll make with this sleek IN and OUT box on your desk, especially if you paint it fireball fluorescent red.

Use $\frac{3}{8}$ -in. plywood to make it. Tack-nail together the two side pieces and jig-saw or bandsaw both at once. Cut the three shelves, glue and nail the ends to them, then glue on the side panels. Sand a slight soft radius on all edges and corners. Set and putty the nailheads before painting.—*Ro Capotosto, Greenlawn, N.Y.*



BALL HOLES are bored in hardboard sides with a $1\frac{1}{4}$ -in. hole cutter in a drill press



END VIEW SECTION

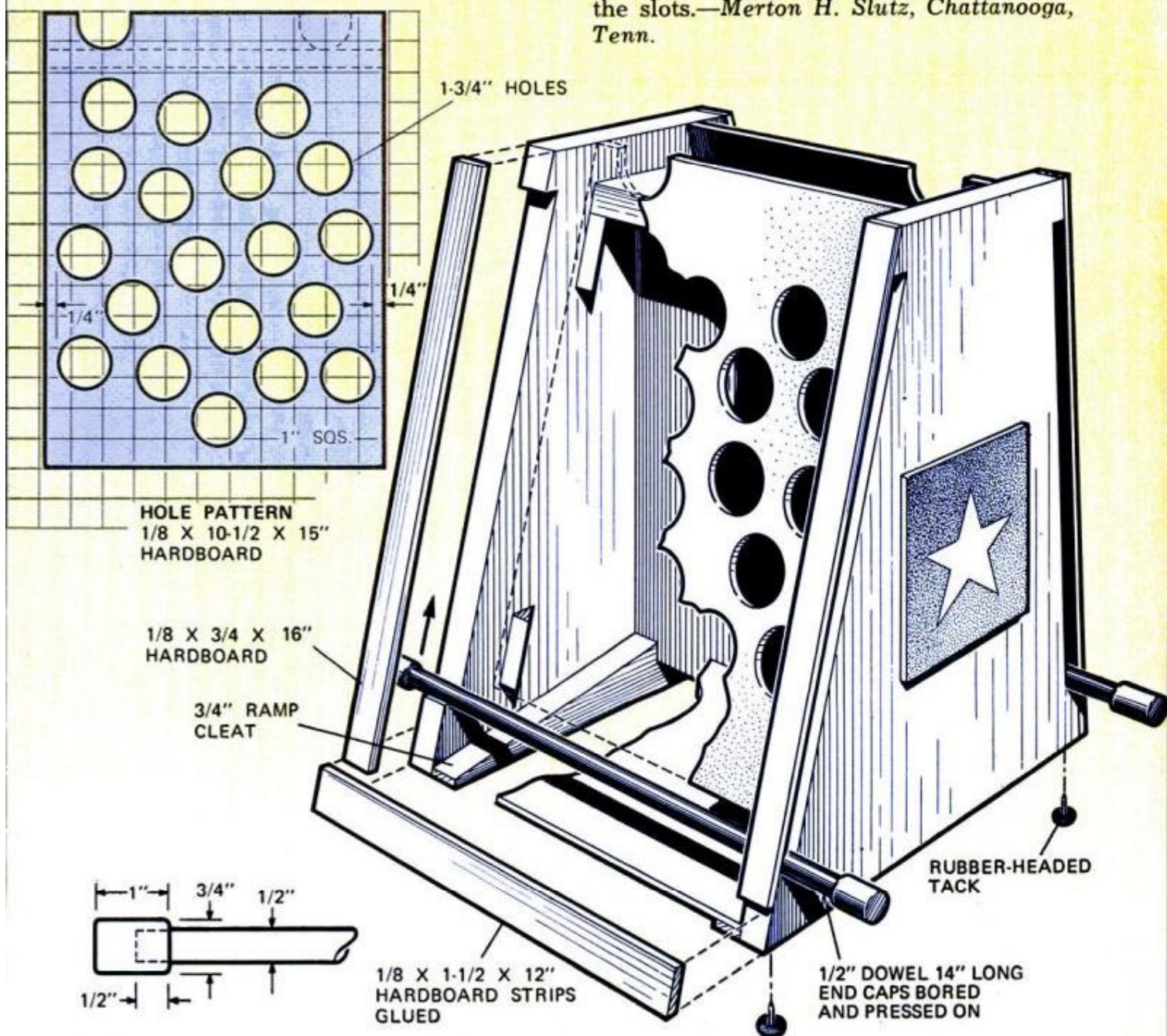
'Swiss-cheese' mountain game

IN A RACE TO SCALE this "Swiss-cheese" mountain, climbers on opposite sides must watch their step in maneuvering a table-tennis ball up the treacherous slopes. A slight miscue will send the ball through a hole in the "cheese" and back to the starting point. It's a game for two or four players (two to a team), and the climber (or team) who reaches the summit tray first wins.

Made in the shape of a wedge of cheese, the game consists of two 1/8-in. (or 1/4-in.) hardboard sides that have 19 holes in them. Notice that the side holes are bored 1/4-in. in from the edges and that no hole

is more than 1/2 in. from each adjacent one. The section view shows how ramp cleats, glued to the 3/4-in. plywood ends, support a center partition and a sloping floor of 1/8-in. hardboard. A saw groove in the bottom of the summit tray fits over the partition so it is 1/4 in. down from the top.

To cut the slots for the dowels in the edges of the slanting plywood ends, set the saw fence a scant more than 1/2 in. from the blade. Then turn on the saw and carefully lower the work over the blade. Run the cut as far as you can, then stop and square it off with a hand or sabre saw. Hardboard strips cover the notches to hold the 1/2-in. dowel handles in place. Short sections of 3/4-in. dowel cap the ends. The dowels should slide freely in the slots.—Merton H. Slutz, Chattanooga, Tenn.



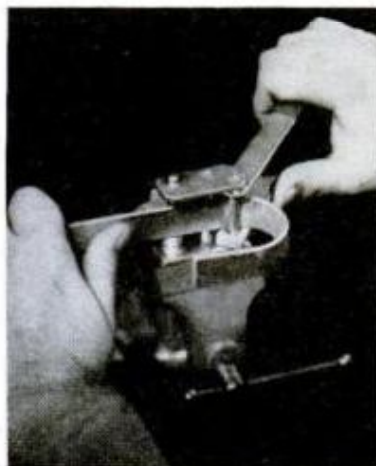
New tools you should know about



YOU CAN ETCH GLASS quickly and easily with the Diamond Stylus Pencil. Simply tape the art to be copied below glass and scratch on the surface. \$4.95. Robert-Allan Co., 17 Acorn Lane, Plainview, N.Y. 11803, makes it.



SOLDERING-GUN KIT by Wen Products, 5810 Northwest Hwy., Chicago, Ill. 60631, has 20 soldering lugs, comes in light plastic carrying case. Gun delivers 200 watts of heat on current draw of only 55 watts. About \$7.95.



WITH FLATFORMER TOOL and an ordinary vise, flat metal strips can be bent to almost any shape. For material to 1 in. wide and $\frac{1}{8}$ -in. thick, \$7.98. Vinkemulder Tool Co., 2223 Estelle Dr. S.E., Grand Rapids, Mich. 49506.

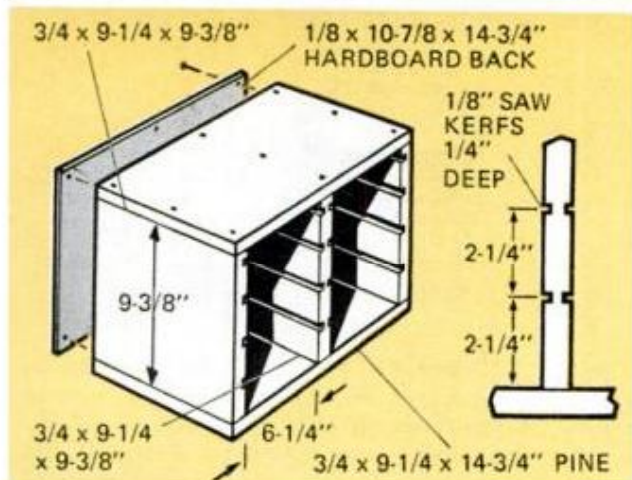


CARBIDE-TIPPED router trimming set is designed for use with plastic laminates. Three-piece set, No. 76-350, gives straight, bevel and flush cuts, sells for \$19.99. At retail outlets handling Black & Decker tools.



LIGHT RUST can be rubbed off with Rust Eraser from Brookstone Co., Dept. C-PM, 10 Brookstone Building, Peterborough, N.H. 03458. Eraser is advanced as tip wears. \$1.60 postpaid; refills, 50 cents each.

Now: small-parts drawers by the dozen



IF YOU WISH you could keep track of countless screws, bolts, nails and other small parts in one handy place, Baumbach Engineering Co., 126 Caldren Ave., Mountain View, Calif., has made it easy to have a small-parts cabinet with as many drawers as you want. Its Dandy Drawers of

high-impact plastic slide in $\frac{1}{8}$ -in. saw kerfs that you cut on your table saw. The 5x9-in. drawers come in red, green, yellow and gray, can be labeled with a felt-tip pen and divided into two, three or six compartments. Twelve drawers cost \$8.60 postpaid.

Contour gauge as jig

I solved the problem of supporting a quartet of evenly spaced dowels while cross strips were glued to them by using a contour gauge as a jig. First I laid the dowels on a bench, with spacer blocks between them, and pressed the gauge over them. Then I clamped the gauge in a vise and placed the dowels in the notches.

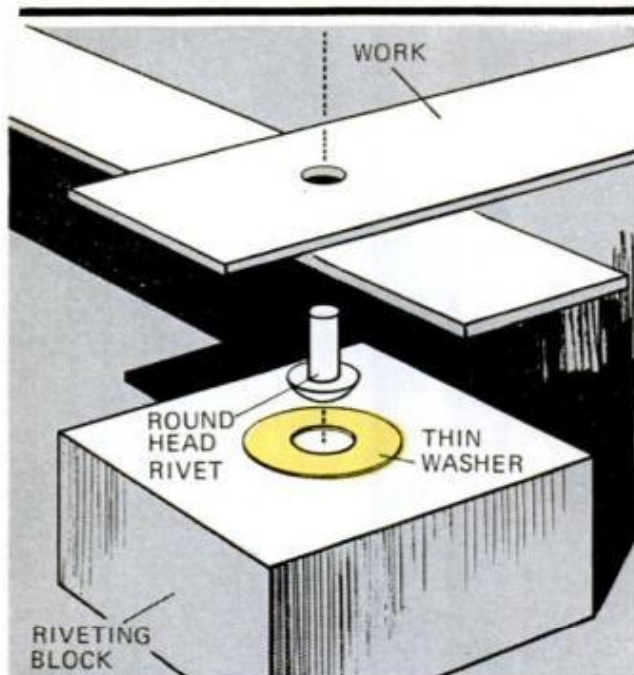
—Walter E. Burton, Akron, Ohio

By adding Styrofoam (drinking cups, egg cartons and packing material) to regular lacquer thinner until the thinner will no longer dissolve it, you'll get a plastic paint you can use as a wood sealer.

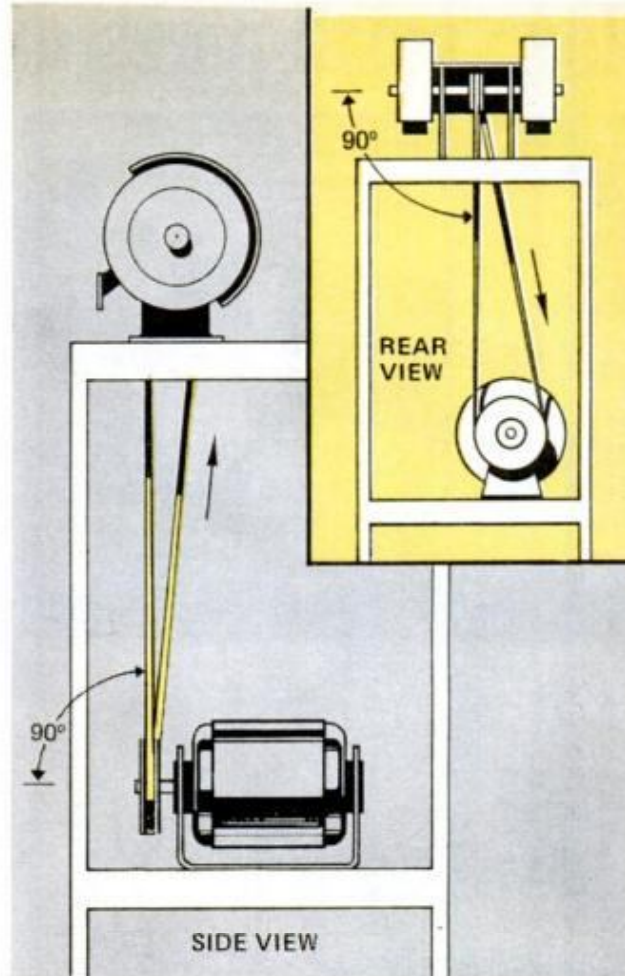
—Robert W. Miller, Lompoc, Calif.



BETTER WAYS TO DO IT!



WHEN RIVETING several parts together that must pivot, place the rivet head in a thin metal washer. The trick spaces the head for minimum friction between the parts.—*Harry Josephs, Gardenville, Pa.*

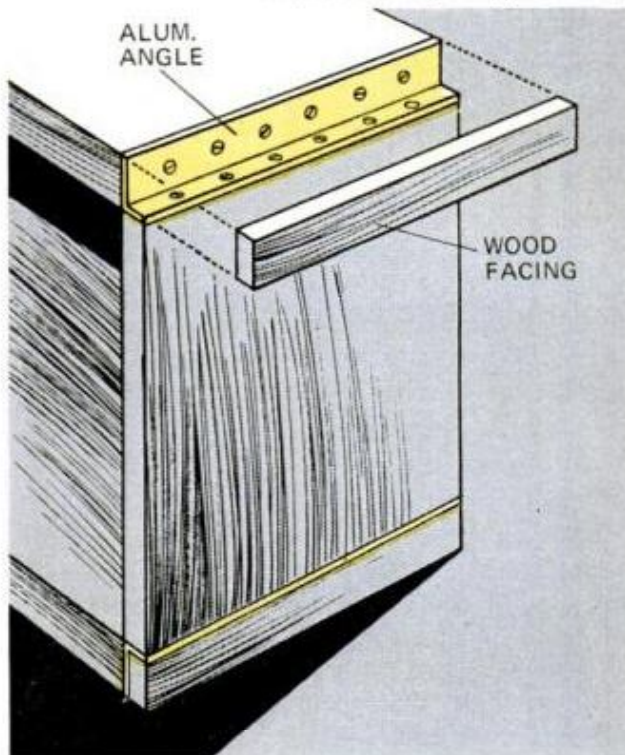


CORRECT GRINDER ROTATION can be obtained by remounting the motor. The important point is to make certain that belt coming onto the pulley is at 90° to the pulley's axis.—*Ivan Washburn, Arlington, Va.*

Illustrations by Adolph Brotman

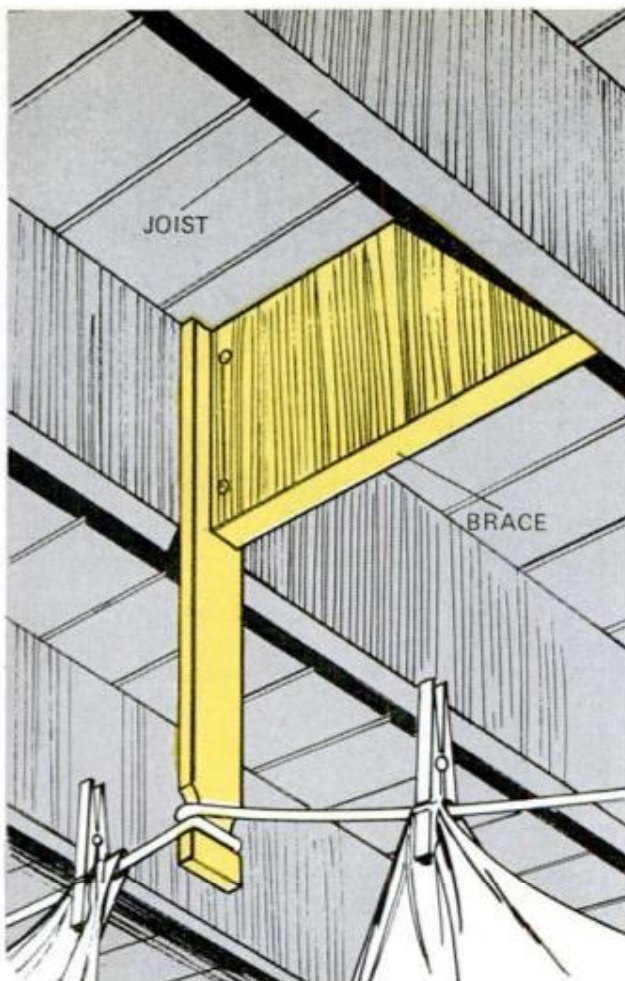


WAX BUILDUP around chrome parts is almost inevitable when you wax your car. To remove it, try a small shoebrush. This will save a lot of armwork, making your job a snap.—*Daniel Dandio, Berlin, N.J.*

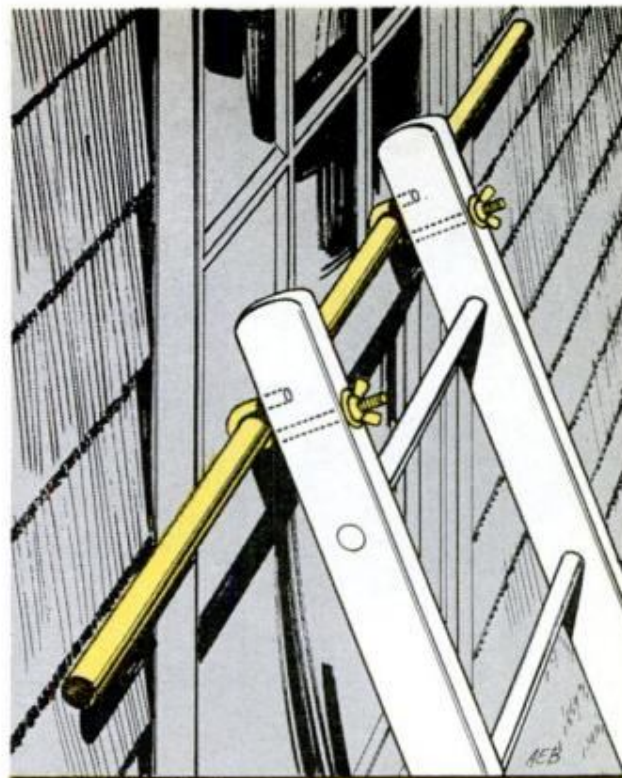


TO ASSURE strong joints and avoid end grain when building a cabinet, use aluminum angle to attach the top and bottom to the sides. Wood facing is cemented to the angle.—*Harry A. Jorgensen, Washington, D.C.*

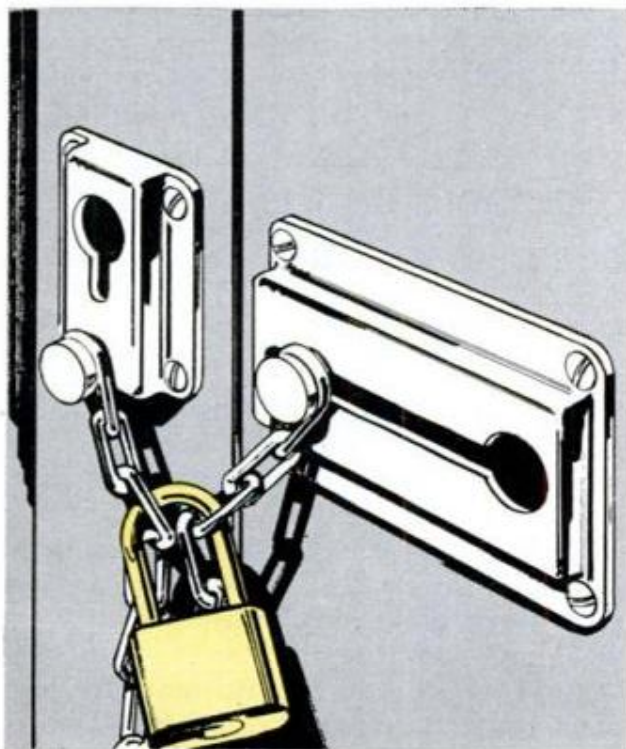
POPULAR MECHANICS



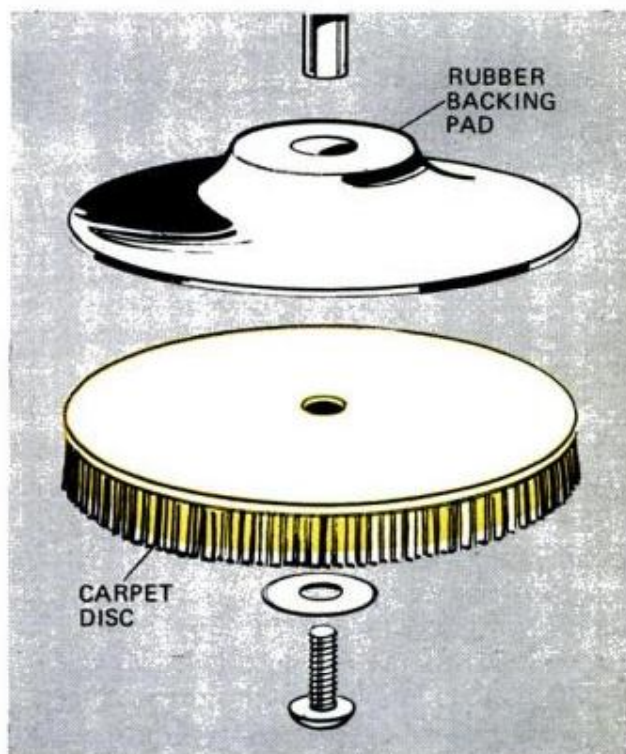
INDOOR CLOTHESLINE SUPPORTS will stay where you want them if they are braced as shown above. The bridging can be toenailed or held by nails driven through the joists.—R. E. Murray, Circleville, Ohio



MAKE A WINDOW "SPANNER" for your ladder by bending two J-hooks from 5/16-in. rods threaded at one end. Short leg goes in blind hole; the long one receives washer, wingnut.—Andrew Vena, Philadelphia



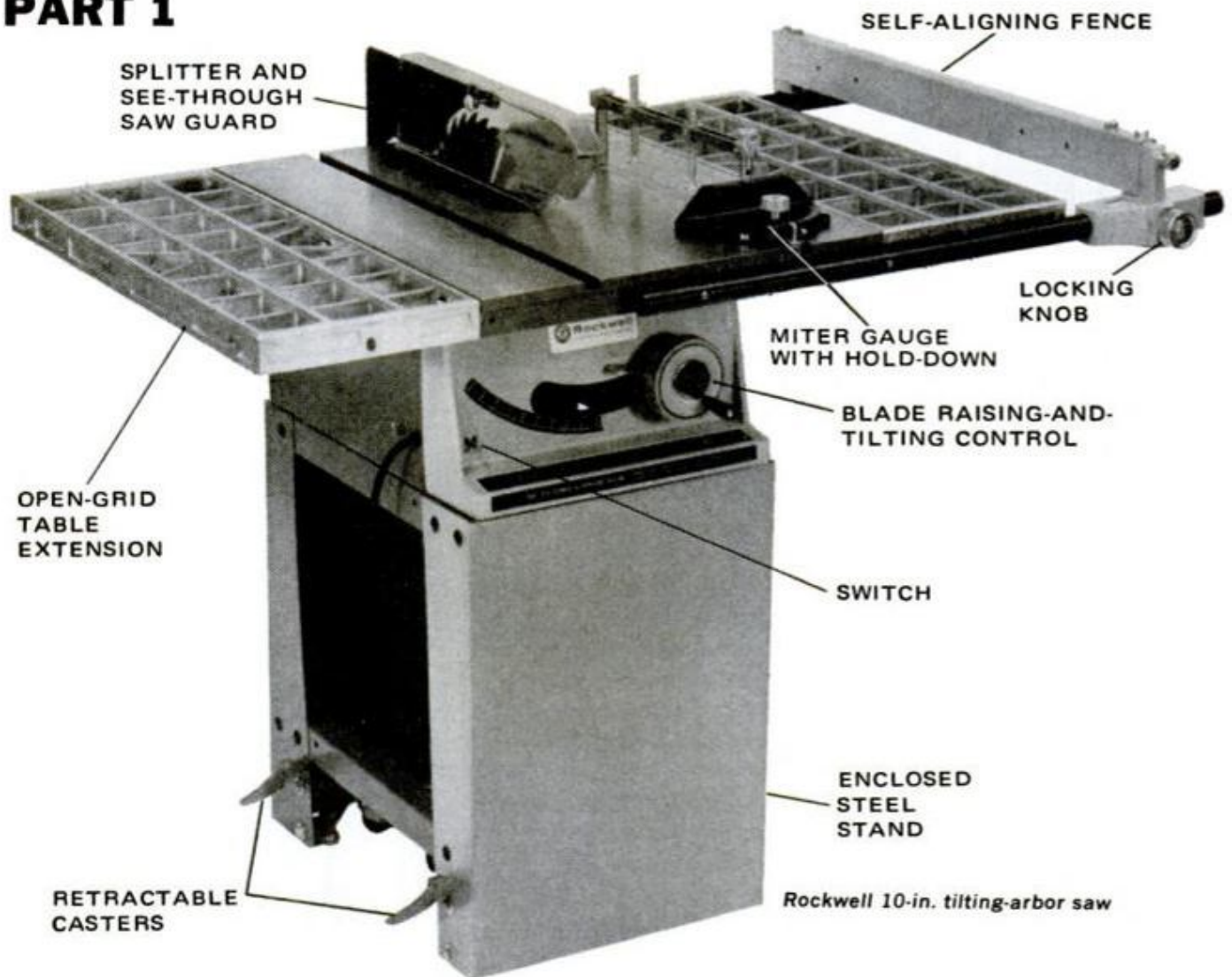
DOOR-CHAIN EFFECTIVENESS can be increased by use of a small, strong padlock fastened to top links. The lock reduces the gap so that a tool can't be inserted for prying.—Opie Read Jr., Pasadena, Calif.
JULY 1972



DISPOSABLE BUFFING PADS for power polishers can be fashioned from scraps of wool carpet. Just use the backing pad as a template; cut and assemble it like a sanding disc.—Lawton P. Evans, Seattle, Wash.

Bench-saw know-how

PART 1



Rockwell 10-in. tilting-arbor saw

A short course for beginners on the operation of this basic shop tool

By **WAYNE C. LECKEY**, Home and Shop Editor

Photos by Robert D. Borst

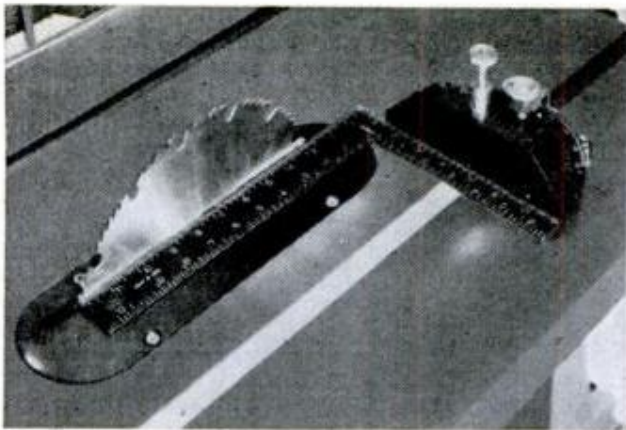
A BENCH SAW is not a difficult tool to run—plain ripping and crosscutting come naturally to most beginners, and other techniques are easily learned. But, as in operating any power tool, there is a right way and a wrong way. Using it before you are fully familiar with its mechanical features is as unwise as dashing off in a strange car without first learning what and where the controls are.

The bench saw (which is also called a "table saw") is not to be feared, but since you can't always operate it with the guard over the blade, you have to regard it as

potentially dangerous. You have to respect its whirling blade, keep your mind on what you're doing and not become overconfident. If you always remain a bit "afraid" of the saw each time you flip the switch, chances are you'll never get cut. My best advice is to learn the safety rules (see facing page) and obey them.

All bench saws have a rip fence for use when you want to cut a board lengthwise, and a miter gauge when you want to cut it crosswise. How perfect these cuts will be depends on how accurately the fence and miter gauge are set in relation to the blade.

Make these initial checks before you saw a board



CHECK MITER GAUGE with square to see if it is at a 90° angle to blade, thus assuring a square cut

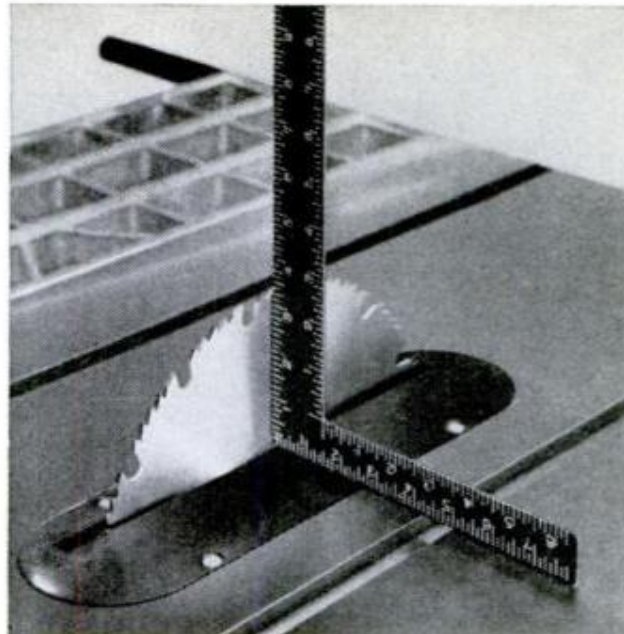
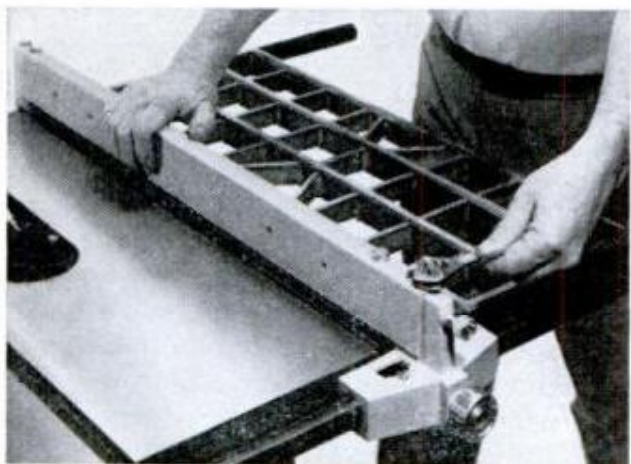
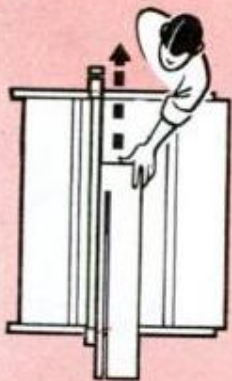


TABLE MUST BE SQUARE with the blade. If it isn't, follow manufacturer's instructions for adjusting table



MAKE SURE that rip fence is parallel with saw-table slots so work will not bind against the blade

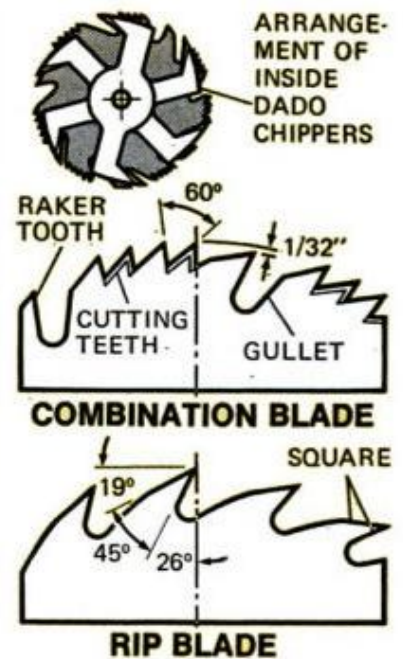
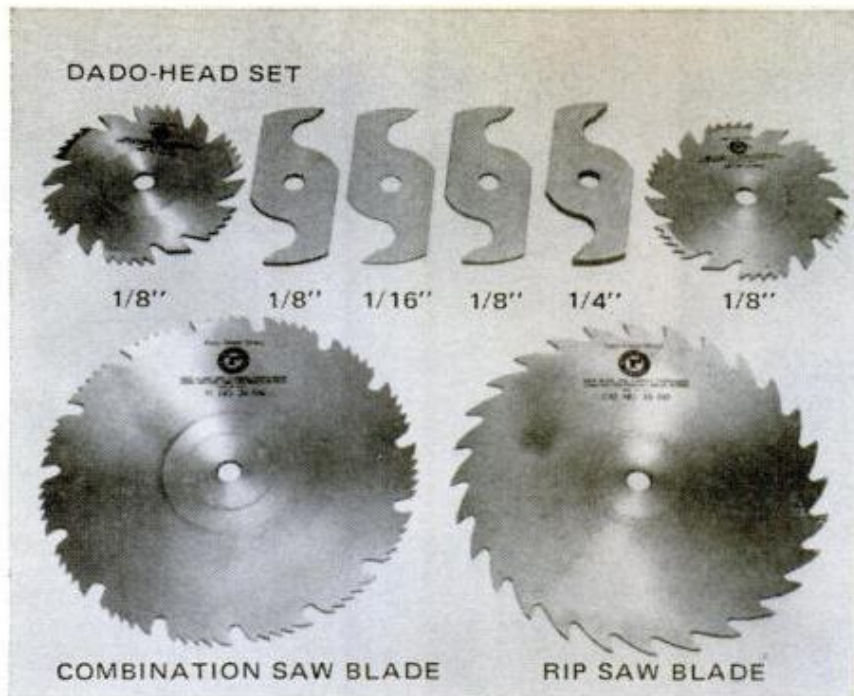
So before you cut a board, there are three initial alignment checks to be made: 1. table slots, rip fence and blade must be parallel; 2. rip fence, miter gauge and blade must be perpendicular to the table; 3. miter gauge must be at a right angle to blade and fence. Each is easily checked with a square as shown above. The instruction manual for your particular saw



KICKBACK will happen when fence is out of alignment. Adopt safe practice of standing to one side so you won't be hit by flying work.

SAFE WORK HABITS AND PRACTICES

1. Keep floor clean in front of the saw—sawdust can be slippery.
2. Roll up your shirt sleeves to the elbow, and remove tie, rings and wristwatch.
3. Pull out plug at electrical outlet when leaving machine at end of a work session.
4. Never reach across the blade while the saw is running.
5. Always use a push stick when ripping narrow work.
6. Keep the blade just high enough to clear stock when ripping.
7. Stand to one side of the blade—never directly behind it.
8. Never rush or force work into the blade.
9. Don't hold both ends of the work when crosscutting.
10. Always return the miter gauge to the starting point when crosscutting.
11. Keep the blade sharp and properly set at all times.
12. Never rip against the fence when edge of the work is irregular.
13. Wear goggles or a face shield when you're doing close work.
14. Always use a guard and a splitter whenever practical.
15. Never saw freehand; always use a fence, miter gauge or jig.
16. Never use the fence itself as a stop when you're cutting duplicate work.
17. Keep your mind on what you're doing.



BASIC BLADES. Combination blade, which both rips and crosscuts, is most popular in home shop. Rip blade is used for ripping only. Dado head consists of two outside cutters and four interchangeable inside chippers

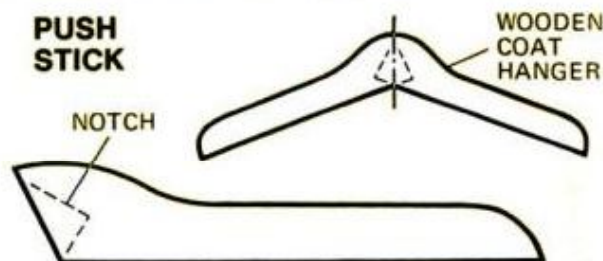
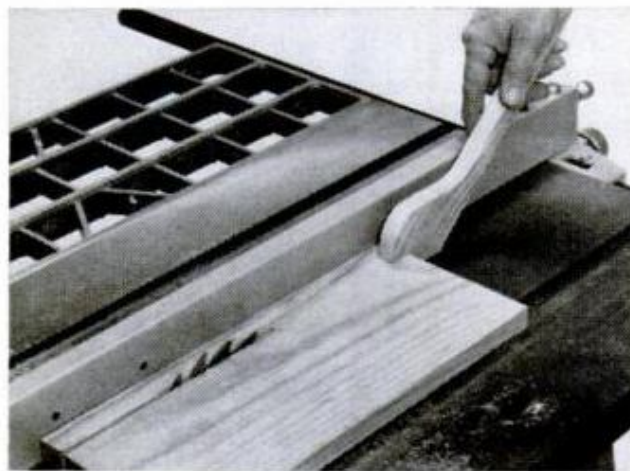
will show what to loosen and adjust to correct any misalignment.

Your saw will probably come equipped with a combination blade, a general all-purpose blade that rips, crosscuts and miters, and handles most common cutting jobs. You can add other special-purpose blades, such as a rip blade, a coarse-

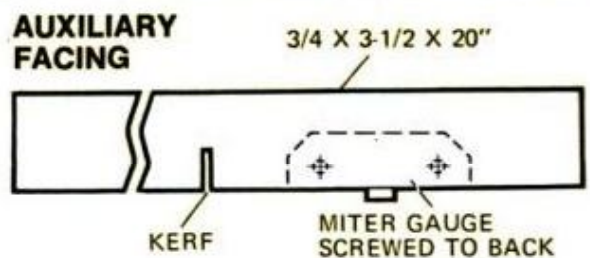
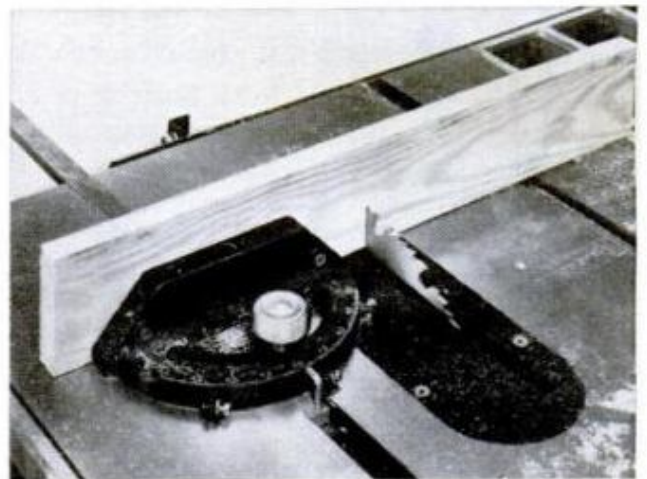
tooth saw for faster ripping; a hollow-ground planer blade that makes smoother crosscuts, and a fine-tooth plywood blade that's best for cutting laminated woods with minimum splintering.

Another special-purpose cutter, called a dado head, has various combinations of saws and chippers for cutting grooves $\frac{1}{8}$

First projects—a push stick and a wood facing



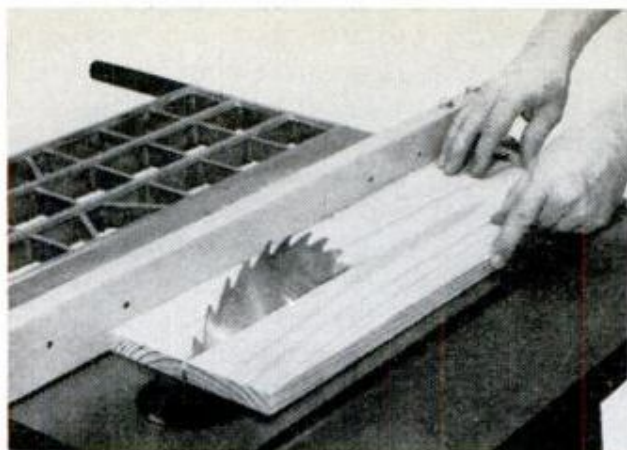
WOODEN COATHANGER provides two ready-made push sticks to rip work less than 3 in. wide safely



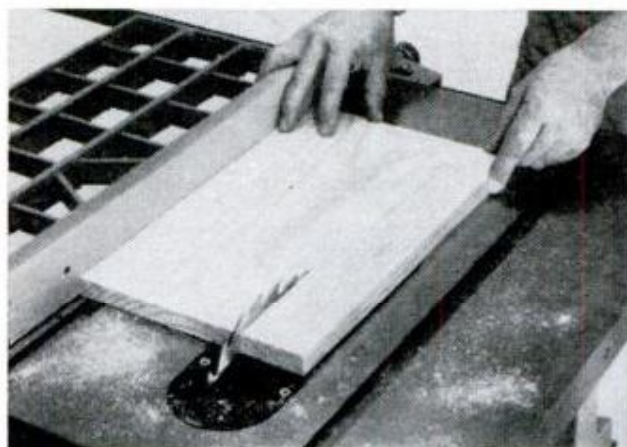
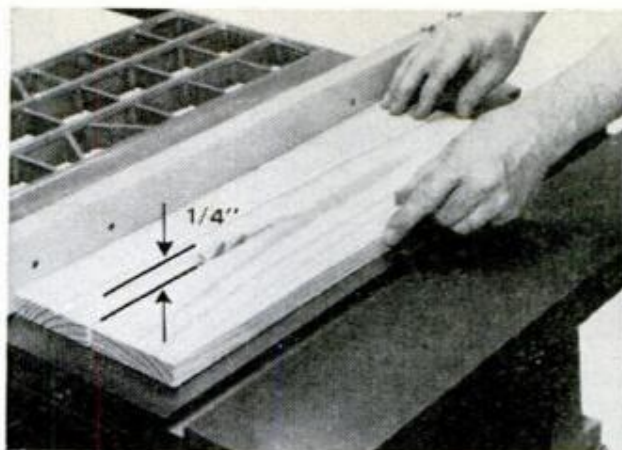
WOOD FACING added to miter gauge provides extra work support, lets you align saw mark with the kerf

POPULAR MECHANICS

Safe and unsafe bench-saw practices



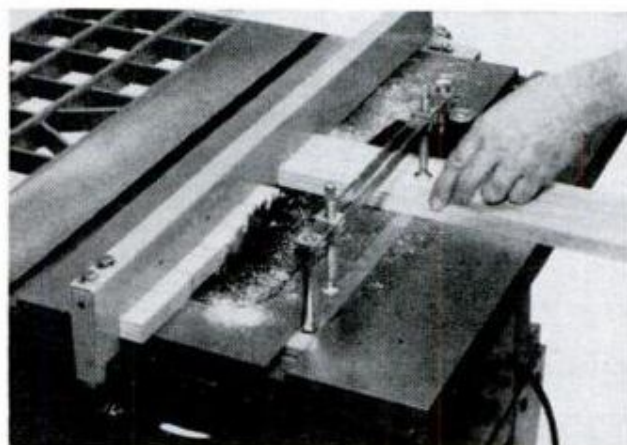
DON'T SAW WITH BLADE THIS HIGH when it's not practical to use guard; there's too much chance of injury. The less the blade is exposed the better. Blade should project no more than $\frac{1}{4}$ in. when ripping



GOOD RIPPING HABIT is to hook little finger over fence to keep hand safe distance from the blade



WHEN CROSSCUTTING a wide board on a small saw, place the miter gauge backwards in saw-table slot



NEVER USE FENCE as stop when mass-cutting duplicate work lengths. Work will wedge between fence and blade and be thrown with force. Play it safe and first clamp block to fence so there will be ample clearance

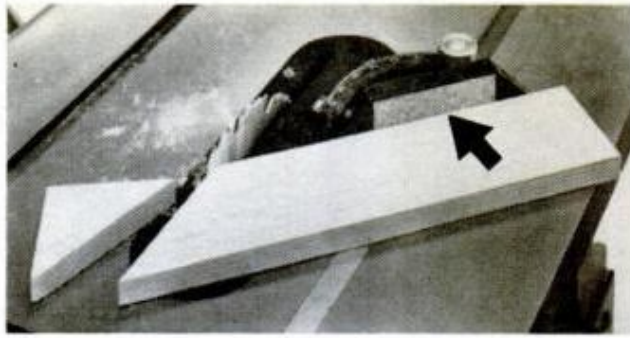
to $\frac{1}{16}$ in. wide. It is usually made up of two outside blades and four swaged chip-pers so arranged on the arbor that the swaged ends fall in the gullets of the two outside blades.

Two of the first things you should make for your saw are a push stick and a wood facing extension for the miter gauge. A push stick is a must for pushing narrow

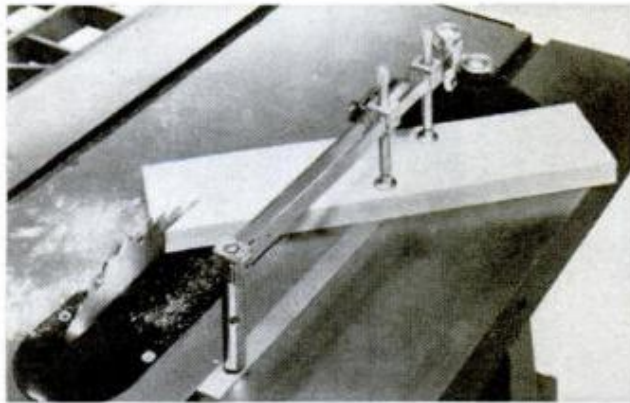
work safely past the blade. All crosscutting is done more conveniently and with greater safety if the miter gauge has a wood facing. With the kerf in the facing, you can line up the saw mark precisely with the blade. Drawings on the facing page show how to make both push stick and wood facing.

The photos above give graphic examples

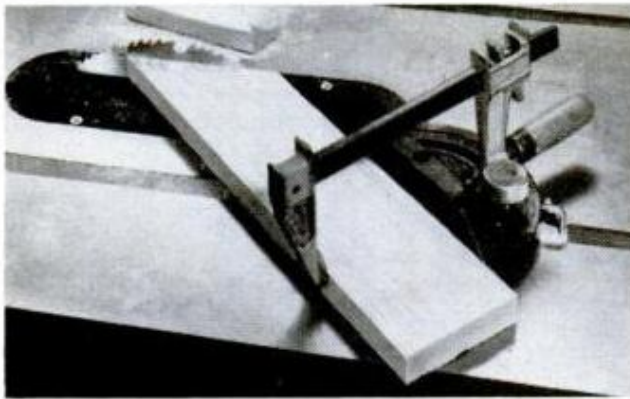
Ways to prevent creeping



SANDPAPER GLUED to face of miter gauge will provide noncreep work surface when making miter cuts



HOLD-DOWN ATTACHMENT fitted to miter gauge will keep workpiece from creeping during miter cuts



ANOTHER WAY to prevent creeping when cutting miters: Hold work to miter gauge with a bar clamp

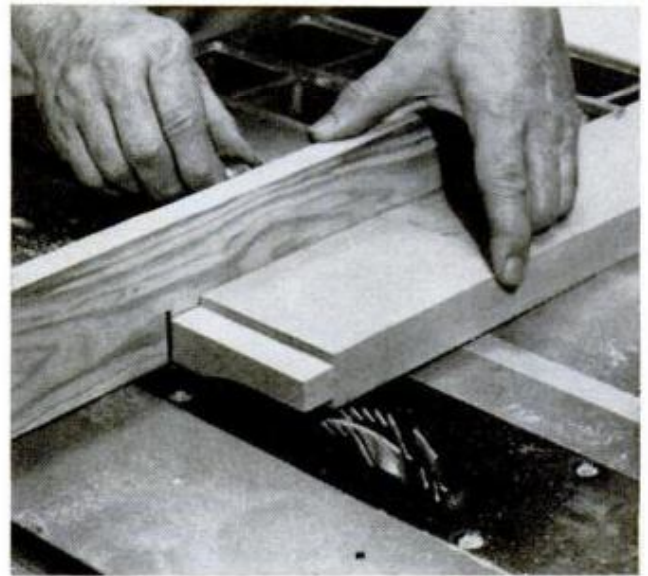
of the right and wrong ways to perform common rip and crosscut operations. It's always good practice to expose the saw blade as little as possible above the work when it's not practical to operate the saw with the guard in place. A high blade cuts faster, but it's not as safe.

A good habit to follow when ripping is to hook the little finger over the rip fence as you feed work. This keeps the hand from wandering toward the blade.

When you wish to crosscut a wide board whose size forces the miter gauge off the table, reverse the gauge. Cut about halfway through the board, back up an inch and turn off the saw. Then reverse the gauge—leaving workpiece untouched—start the saw and complete the cut.

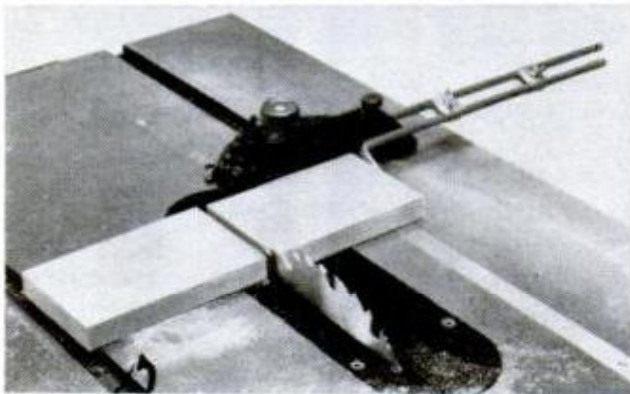
When you want to use the rip fence as a stop in mass-cutting pieces of identical length, don't make the mistake of butting the work against the fence. Clamp a block

(Please turn to page 186)

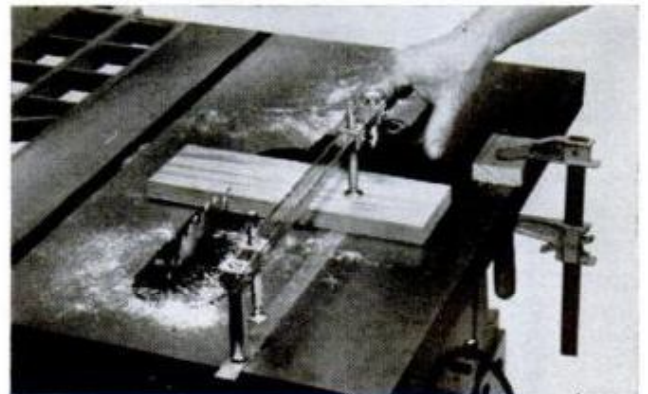


SHORT TENONS are made with one pass, each side, by switching from regular saw blade to a dado head

Two setups for mass-cutting duplicate lengths



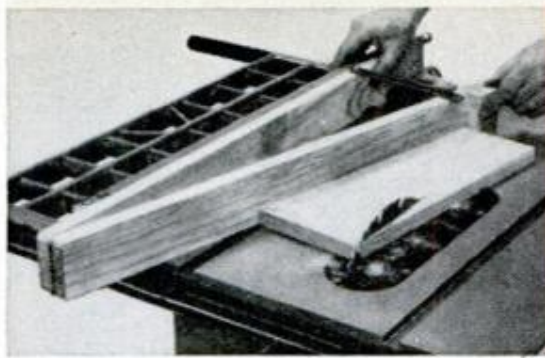
SPECIAL STOP ROD, designed to fit miter gauge, will assure identical cutoffs up to 27½ in. long



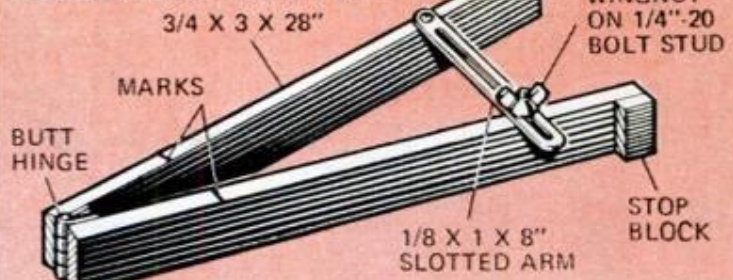
BLOCK OF WOOD clamped to saw table will serve as a stop for mass-cutting short lengths of stock

POPULAR MECHANICS

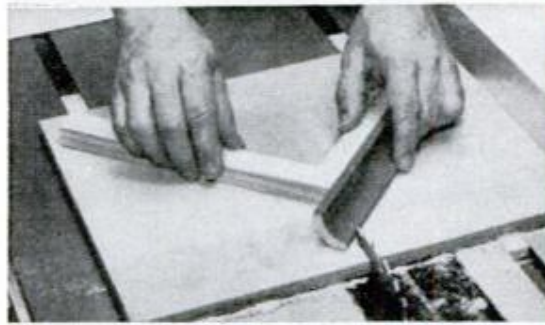
Simple jigs and fixtures to use with your saw



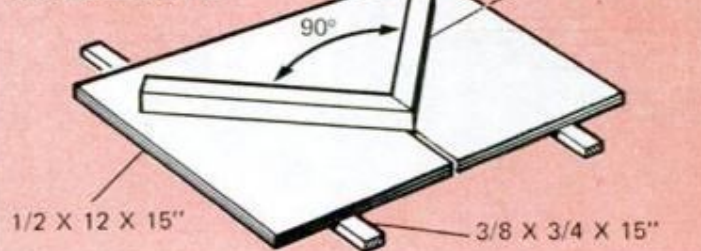
ADJUSTABLE TAPER JIG



TAPER JIG lets you rip at angle. Work is hooked on stop block and jig is guided along fence to make cut



MITER BOARD



MITER BOARD is better, more accurate, than saw's miter gauge when making right and left-hand miter cuts



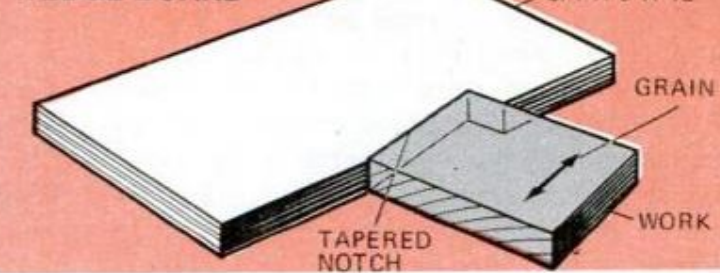
SQUARING BOARD



SQUARING BOARD permits straight rip cuts to be made on bandsawed leftovers that have irregular edges



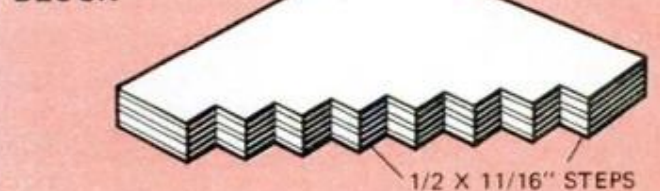
WEDGE BOARD



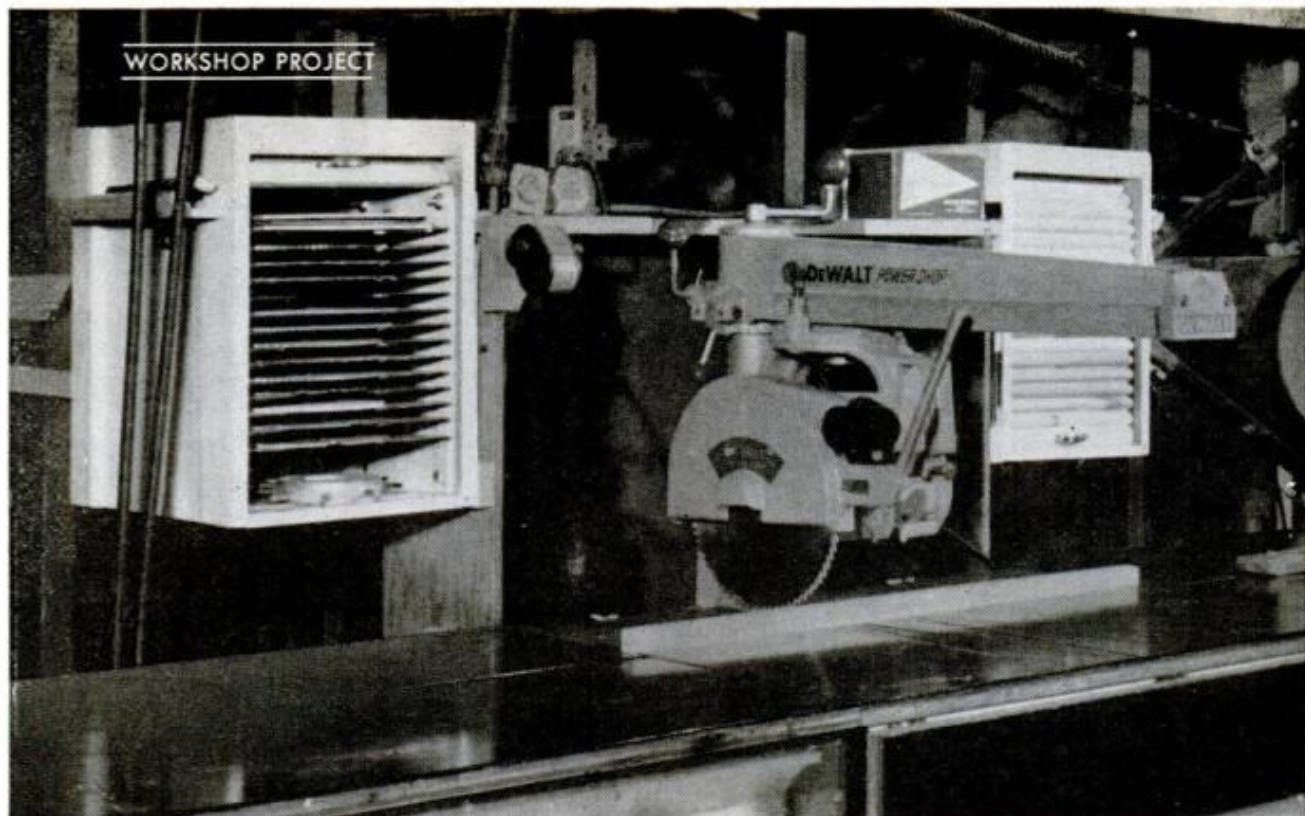
WEDGE BOARD makes fast work of mass-cutting wedges. Flop work in notch each time to cut next wedge



STEPPED STOP BLOCK



STEP BLOCK clamped to saw table sets width of each pass automatically when cutting duplicate dados



In June we presented a fabulous workshop with some great shop ideas. The owner's plans are duplicated here so you can make your own. . . .

Deluxe wallcase for circular-saw blades

LAST MONTH we presented the fourth in *PM's* new series of Great Workshops (*This shop paid for itself . . . and grew and grew*, page 63). It was loaded with good shop furniture—executed in craftsmanlike style—by owner C. E. “Doc” Banister of Pomona, Calif. But one feature in particular caught our eye: a pair of handsome circular-saw-blade boxes that Doc built and installed flanking his radial saw (see photo above). Doc agreed to draw plans so others could build one.

Since the cabinet holds 14 10-in.-dia. blades and a dado-head set, one cabinet is sufficient for an average home workshop. Besides the box's storage capacity, it's good looking, a fine exercise in wood-working and, because of the tambour door, blades are kept clean.

The box requires a minimum of material. Sides are of $\frac{3}{4}$ -in. stock, base and top

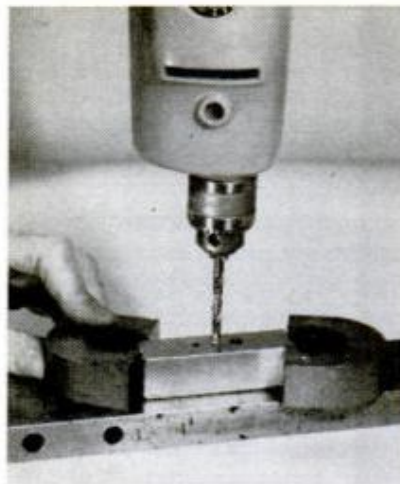
of $\frac{1}{2}$ -in. material and inner and outer backs of $\frac{1}{8}$ -in. hardboard and $\frac{1}{4}$ -in. plywood respectively. The tambour door is made up of stock screen moldings with canvas glued on the back side.

Start by cutting the box parts to size. Next, set up your router with a $\frac{1}{8}$ -in. grooving bit to make the grooves for the blade shelves. Then, with a rabbet cutter, make the edge rabbets as required. Glue up sides, top and bottom (minus the front rail so you can get the door in later). Check box for square and tack on diagonal braces to hold it while the glue dries.

Cut the 14 shelves, slip them in place and install the shelf back and box back using glue. Cut the 24 molding pieces and door bottom rail to length and lay out the door using clamps and strips of wood to hold it square and flat. Next, cut a piece of canvas $10\frac{1}{2}$ x 12 in. Spread contact ce-

HINTS

FROM READERS



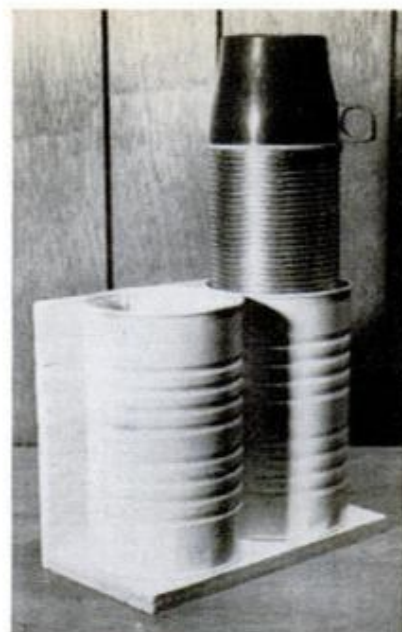
Magnetized drilling aid

A guide block steadied by two strong, permanent magnets makes it easier to start a straight hole with an electric drill. Place magnets to hold the guide where wanted to resist any tendency to twist.—*B. W. Ervin, Kent, Ohio*



Workbench-desk caddy

A discarded distributor cap makes a handy holder for small shop tools and desk items. After cleaning the cap, drill holes slightly deeper (where necessary) and spray-paint for looks.—*C. Wayne Close, Grants Pass, Ore.*



Thermos toter

To keep my Thermos bottle from tipping while traveling in my car, I made this carrier by screw-fastening a pair of suitable tin cans to two plywood pieces joined at right angles.—*Marshall Lincoln, Wickenburg, Ariz.*

How to hang pictures without driving nails in paneling

A simple method of hanging pictures in a paneled room that has a suspended ceiling is to use monofilament fishing line. The fishline is pushed up behind the suspended-ceiling wall angle and into the

panel grooves. Nails are driven into the wall above the suspended ceiling to hold the lines, which are almost invisible. There's no damage to the paneling.

—*Donald Rosenquist, Bay City, Mich.*

NEXT MONTH IN SHOP AND CRAFTS

OUTDOOR FAMILY LIVING '72: A 19-page special section packed with better ways to use your back yard. You'll find a Dutch minibarn lawn building for yard-tool storage that will be the envy of your neighbors, playground equipment you assemble quickly and easily, creative ideas for your garden, homebuilt lighting for accent and function, the newest of fine outdoor-living products and even a putting green you can install to put the 18th hole right at your door.

A BEAUTY—AND SO SIMPLE TO MAKE—it's a Spanish-styled octagonal "drum" table. The inexpensive "hand-carved" panels, plywood construction, plastic laminates and PM's detailed how-to drawings make it so much easier to build than its good looks suggest.

SHORT COURSE IN CRAFTSMANSHIP: THE BENCH SAW—Part 2. After we've taken you through all the basics of working with your table saw (pages 152-157), you'll be all set for the vast collection of sophisticated techniques in Part 2, August PM. Too, you'll learn how to work with a dado-head set and how to build supports to solve cutting problems. You'll also see how to make a trivet and "carved tower" from solid blocks of wood.

PLUS: Weekend projects, a really new paint can, a low-cost circular-saw shop test, a stand you can make for converting your router to a "shaper," and more.

The latest craze on Muscle Beach is to show off your puffing strength with the new tasteless cigarettes.

Now everybody will be showing off their strength by puffing new tasteless cigarettes



...almost everybody.



©1972 R. J. Reynolds Tobacco Company, Winston-Salem, N. C.

Camel Filters.
They're not for everybody.
(But then, they don't try to be.)



20 mg. "tar", 1.3 mg. nicotine av. per cigarette, FTC Report AUG. '71.

JULY 1972

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HOMEMADE CARTOP CARRIER holds our four Raleigh Sprites safely for motoring across stretches of country between scenic bicycle-touring areas. Mountains in background are New York's Adirondacks

Bicycle touring: better than ever

Mapped tours, light tents and packs, hostels and—best of all—easy-pedaling bikes make it a great way to go!

By **JOHN A. LINKLETTER** / *Photos by the author*

TODAY'S BICYCLE BOOM is a nice, quiet kind of boom that doesn't drown out the sounds and fragrances of the countryside.

If you haven't joined the millions of cyclists yet and your last pedaling was in the days of balloon tires and coaster brakes, you'll find things have changed.

Lightweight bicycles, 5, 10, and even 15-speed gearing, featherweight camping equipment, bicycle paths and comfortable hostels make touring by two-wheeler a great way to vacation with a family.

We—John, Scott, my wife and I—loaded four new bicycles on a homemade cartop carrier last August and drove from

AYH SADDLEBAGS hold lots of gear, keep weight low, fit almost any rear carrier and slip off easily at destination. Here, Scott, John and my wife load up at Star of the Sea Hostel on Nantucket





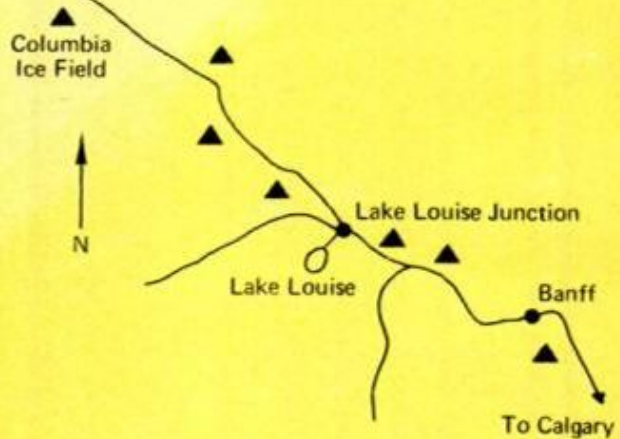
HISTORIC TOWN of Nantucket has lots to see, plus picturesque cobblestone streets that aren't really for cycling. But the island's smooth bike paths (above) make up for the bumpy ride in town. After leaving Nantucket, we drove to New York State and set up camp (below) with two L.L. Bean backpacker tents. Four-man tent in the foreground weighs 7 pounds, 4 ounces; two-man in background weighs 4 pounds, 13 ounces



ONE OF MOST ENTICING of 90 tours mapped out in *North American Bicycle Atlas* by American Youth Hostels is 178-mile "Banff-Jasper Traverse." There is a hostel (triangle) every 20 to 25 miles. Besides mapped tours in 47 states, Canada, Mexico and the Caribbean, the book describes 62 shorter bicycle trips

To Edmonton
Maligne Canyon
Jasper

ALBERTA

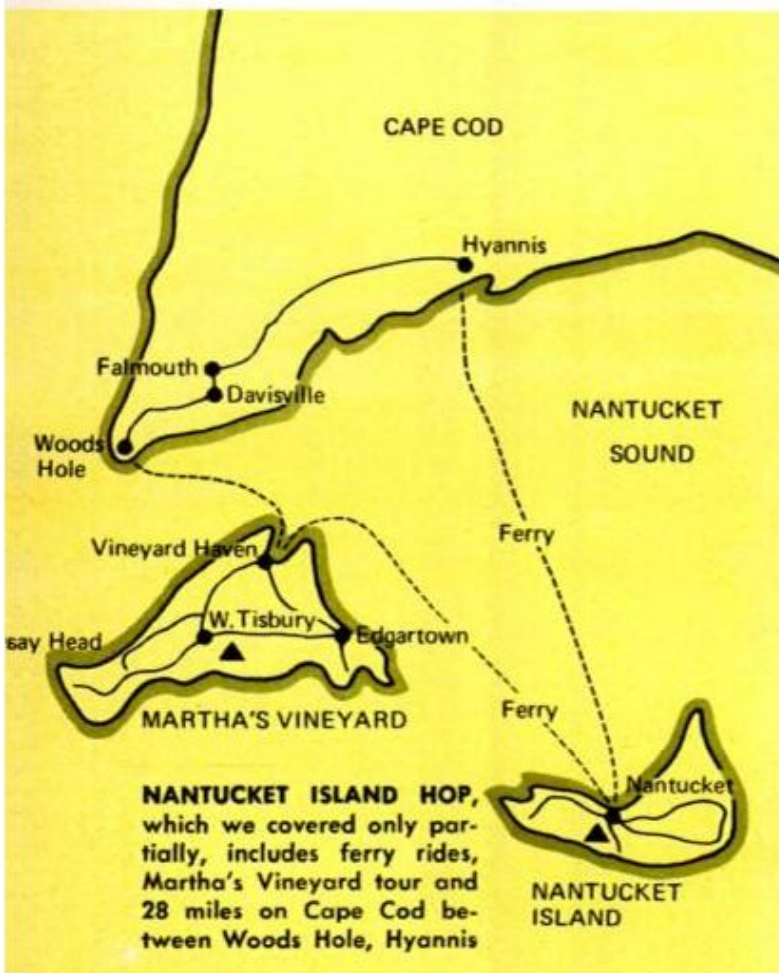


HOSTEL supplies the pots, pans, stove and kitchen while cyclists bring the food. Here my wife and other tourers fix evening meal at Star of the Sea

Connecticut to the Nantucket ferry and then sampled an American Youth Hostels (AYH) tour of the island by bicycle. Armed with advance reservations and packing our own food (as all hostelers do), we pedaled to Surfside to spend a night in the family room of the Star of the Sea hostel. After the Nantucket tour, we carried the bicycles to New York State where we tried our lightweight camping gear.

Hosteling, because it was new to us, turned out to be the most interesting part of the trip. Preparing a meal and eating in a community kitchen and dining room with 50 or 60 of the peppiest kids I've met was an exhilarating experience. Surprisingly—to our sons, anyway—the youngsters spent a lot of time talking with us. No generation gap that I could detect. As a matter of fact, the only such gap I could find was that our "house parents," Mr. and Mrs. Charles Martucci, were considerably younger than two members of their brood that night. But, no matter; they were knowledgeable and experienced cyclists who supervised the hostel with admirable calm.

For our week-long car-and-bicycle tour, we found the four-bike cartop rack the ideal way to get the vehicles across those long stretches of country to the areas we wanted to see close-up by bike. Ours was homemade, but commercial



NANTUCKET ISLAND HOP, which we covered only partially, includes ferry rides, Martha's Vineyard tour and 28 miles on Cape Cod between Woods Hole, Hyannis

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- Front bumper guards.



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Dodge brings you the best in baseball Saturdays on NBC. See your local TV listing.

DODGE SWEPTLINE TOPPER

...IT'S A GREAT DEAL BECAUSE DODGE STARTED WITH A GREAT PICKUP.



THE STAR OF THE SEA Youth Hostel on Nantucket was built in 1833 as a U.S. Coast Guard station

models are available at bicycle shops.

If you haven't selected a bicycle yet, seek an expert's opinion—for example, Eugene Sloane in *The Complete Book of Bicycling* (\$9.95, Trident Press, 630 Fifth Ave., New York, N.Y. 10020). Sloane, in giving a great deal of helpful information about bicycle selection, makes two observations that particularly helped us: Frame size should be such that you can straddle the top bar with comfort, and the saddle should be adjustable to the ideal height—so that you are “able to just reach the pedals comfortably with the heels. . .”

My wife and I selected five-speed Raleigh Sprite 27 models; the two boys took 10-speeds of the same make. They performed beautifully for us. We adults found the five-speeds are certainly adequate for the touring we did and are fine for hometown use. We all selected “flat” handlebars (as opposed to racing-style “dropped” handlebars), and I find that I continue to feel more comfortable with the flat style. I should point out that one son—a real enthusiast—has now switched to dropped handlebars in the fashion of most earnest and experienced cyclists. (On this point, Eugene Sloane offers an excellent discussion concerning the superiority of dropped handlebars.)

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We did some experimenting, too, with packs. There's no question that saddlebag-type carriers and handlebar bags make up the best carrying combination. We also found that a lightly filled day pack (a “soft” backpack) works well. But a couple of upright packs that we carried on the bikes' rear carriers tended to fall over and unbalance the bicycles.

If you're interested in touring, you'll find 152 tours listed, plus much other information, in the *North American Bicycle Atlas* from American Youth Hostels, 20 West 17th St., New York, N.Y. 10011. It's \$1.95

(Please turn to page 184)

ABOUT HALF of bikes at hostel had conventional “flat” handlebars; the rest were “dropped” style



POPULAR MECHANICS

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ready for: rotary valve engine... five-speed, wide-ratio transmission... five-way adjustable rear shocks.

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—along with the Kawasaki 90,

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Kawasaki 100 G4, world's first 10-

speed trail bike. The Kawasaki

750, world's fastest production

machine. In fact, compare our whole

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We know who'll come out ahead.



Kawasaki
MOTORS CORPORATION

New gear for bicycle touring



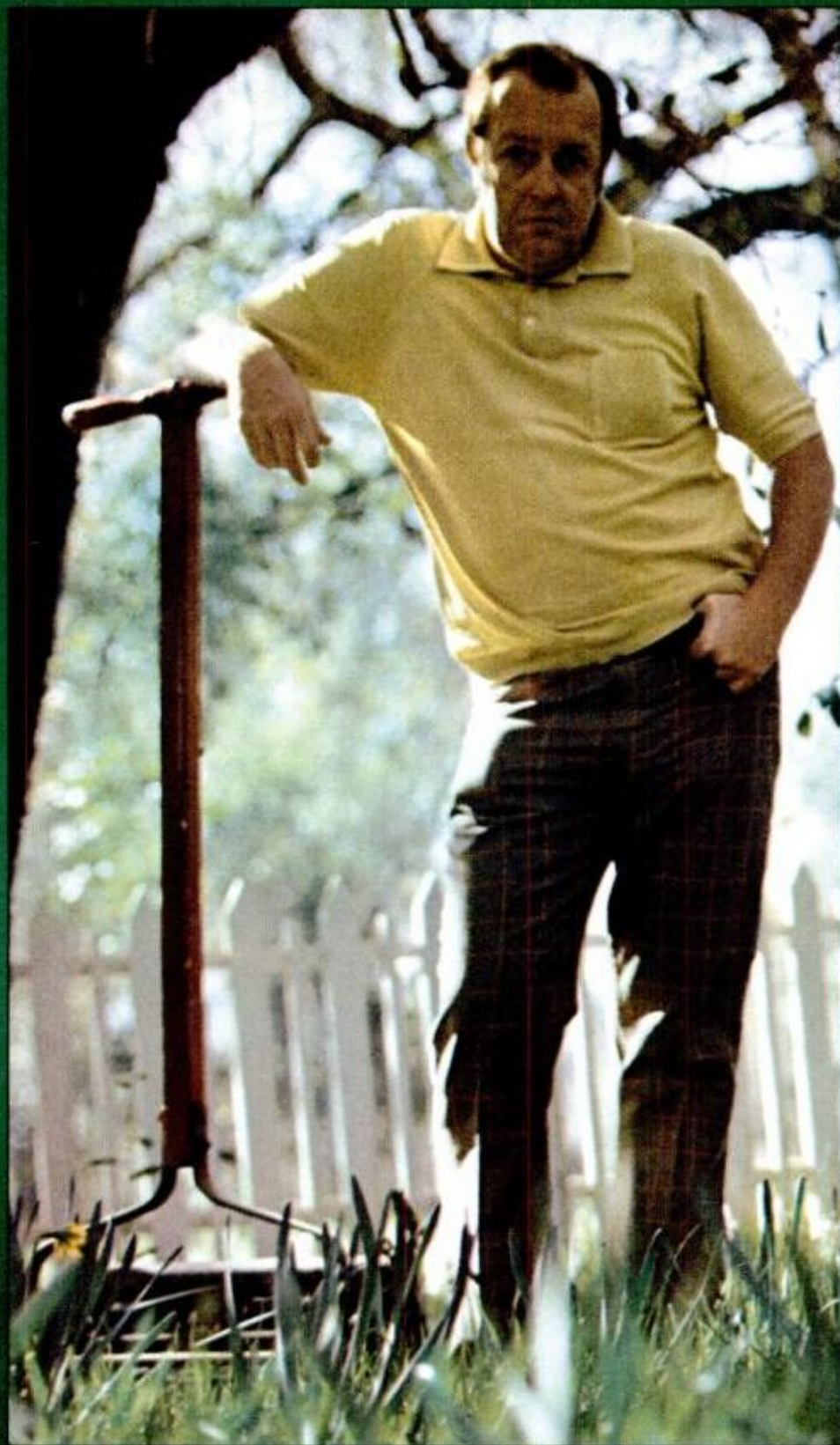
WATERPROOF CAPE (\$11.95) and chaps (\$6.50) fold into ditty (95 cents); total weight, about 13 oz. Cape, held in place by thumb loops, allows air to circulate. Tough, 6-layer nylon taffeta-urethane-zepel fabric can be repaired with hot iron. Trail Tech, 108-02 Otis Ave., Corona, N.Y. 11368.



CASE-HARDENED SECURITY CHAIN, extremely resistant to hacksaw or file, is rubber coated. Four-foot length lets you secure bicycle properly—through wheels and frame to solid post. About \$7.30 at hardware, sports stores. Campbell Chain, Box 1667, York, Pa.

BICYCLE BAG (\$19.95), made of urethane-coated oxford nylon, weighs 1 lb., 5 oz. Brilliant orange nylon vest (\$4.50) and safety ditty (\$1), both with reflective stripes, offer high visibility; weights: 2½ oz. and ¾ oz. Trail Tech, 108-02 Otis Ave., Corona, N.Y.

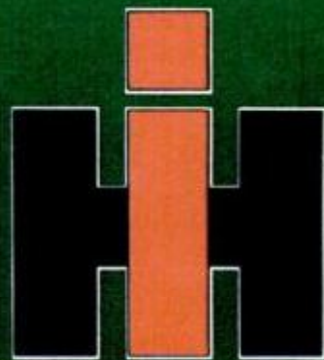
Season's greetings.



International Harvester

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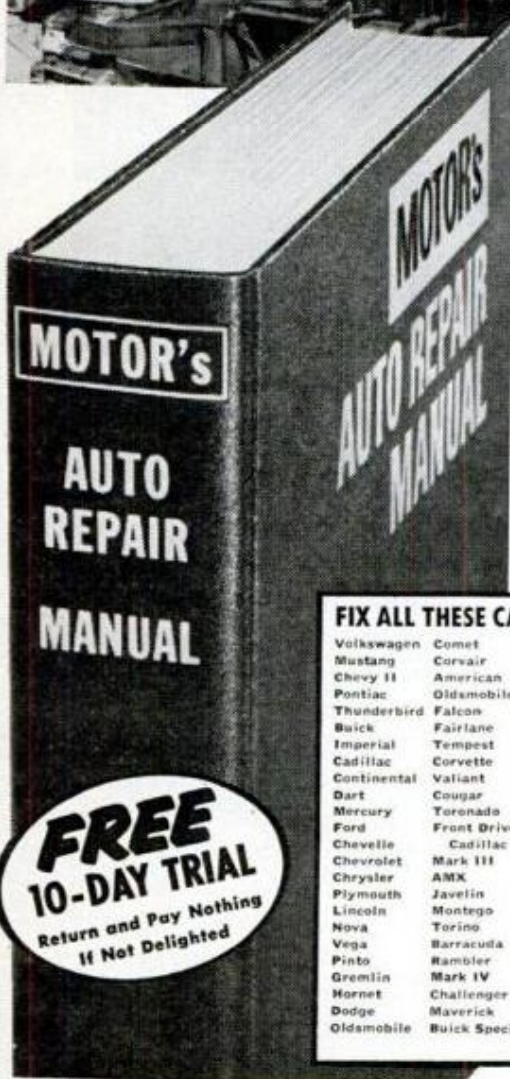
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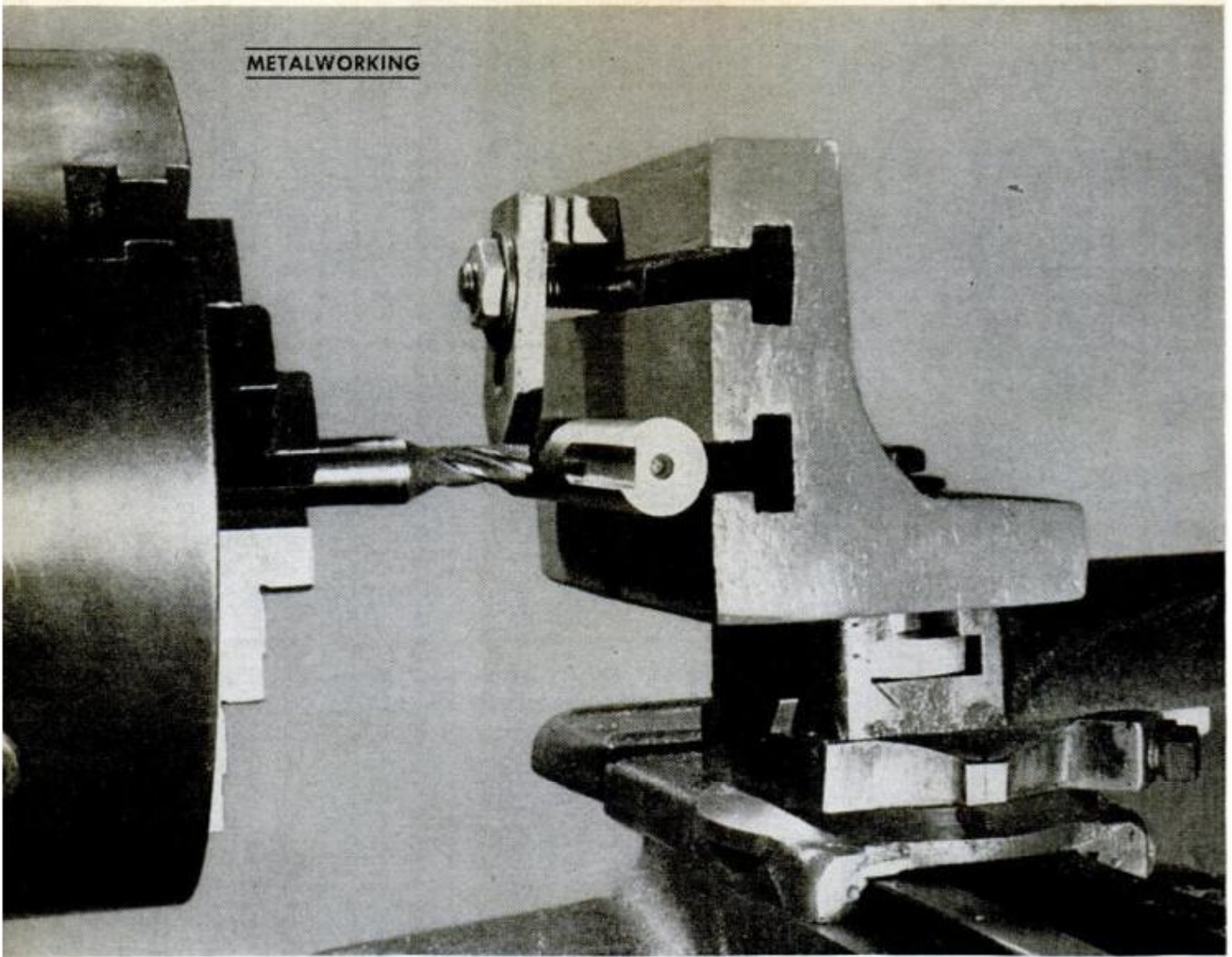
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A lathe milling-machine table

YOU CAN BUY a lathe milling-table attachment for about \$50, but I made a versatile one from a common angle plate for less than \$10.

Angle plates are available from lathe manufacturers and tool-supply houses. Pick a plate that has a 5x6-in. face. Drill two holes in the plate for attaching it to the lathe compound rest with two cap-screws and two shouldered T-shaped nuts. To turn the T-nuts, use stock $\frac{1}{2}$ in. larger in diameter than the largest width of the T-slot in the rest. The finished length of the T-nuts should be about $\frac{1}{64}$ in. less than the distance from the top of the compound rest to the bottom of the T-slot. The neck of the nuts should be of a diameter that will slide freely in the T-slot. Each nut is drilled and tapped, and parallel flats are filed on opposite sides to prevent the T-nuts from turning. If the

machine-finished surface of the compound rest is not slightly above the finished surface of the casting that houses the feed screw of the rest, shim with about $\frac{1}{16}$ -in.-thick metal strips.

The angle plate and the lathe compound rest must make solid contact without interference.

To mill the T-slots in the angle plate, you bolt the plate to the top of the compound rest. It's advisable to screw a faceplate on the lathe spindle to serve as a lining-up method so that the angle plate is properly set. The compound rest is first set at the degree mark that makes it movable in a direction parallel to the ways of the lathe bed. Now if you move the lathe carriage so the angle plate is flush against the lathe faceplate, you can judge by slipping paper feelers at different places between faceplate and angle plate

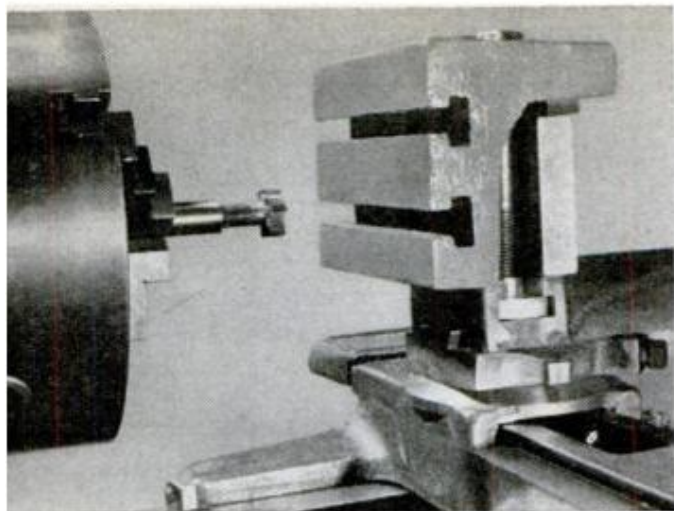
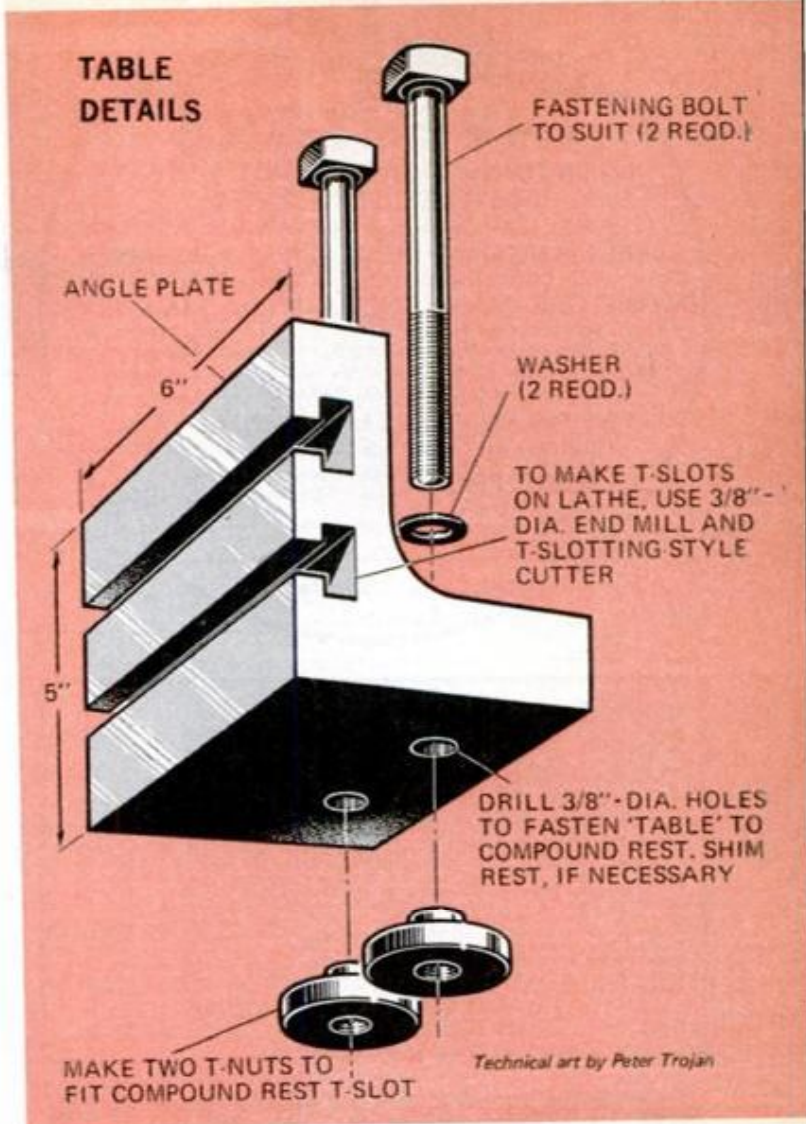
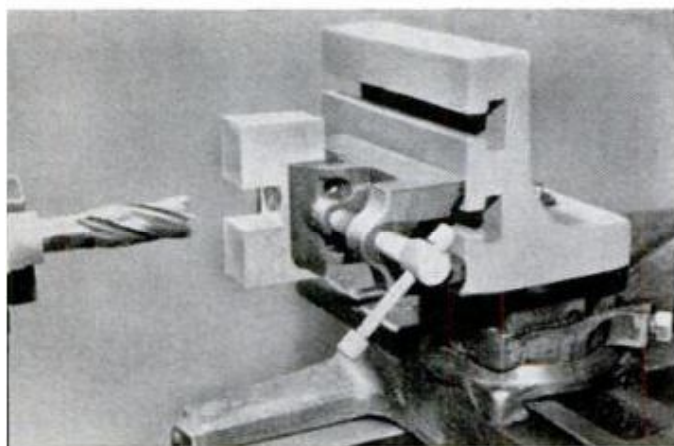


TABLE (left) is being used to make a keyway slot in a $\frac{3}{8}$ -in.-dia. shaft. Above: T-slot cutter used to make a cut on the table face. Below: Small drill-press vise fastened directly to the angle-plate face



for about \$10

By FREDERICK C. LURZ

how well the angle plate is aligned for square cutting.

Cutting one or more T-slots in the angle plate may be done by first using a $\frac{3}{8}$ -in.-dia. end mill or a drill that is flat-face sharpened to make a two-lipped end mill. The larger end of the T-slot is cut with a T-slotting-style cutter.

With the angle plate slotted, you have almost the same advantages of a regular milling machine. Work may be strapped to it in various positions by the use of square-headed bolts with the heads set in the T-slot. For variations of the position of the workpiece, tapped holes may be made in the edges of the angle plate that run parallel to the T-slots. After a cut is taken, various-width spacers can be measured by relating to an approximately $\frac{3}{16}$ -in. metal strip fastened to the edge of the angle plate by means of the tapped

holes. Measuring to the edge of the angle plate takes the place of the up-and-down positioning of a milling-machine table.

In other words, after the part to be milled has a cut taken upon it, if it is necessary to take another cut alongside the first cut, the part is moved over on the angle plate and the dimensions to be obtained are determined by measuring to the edge of the metal strip temporarily fastened to the angle plate edge.

Depth of cut can be measured in thousandths of an inch by moving the micrometer dial upon the compound rest of the lathe.

Depending upon your inventiveness, you'll find that many setting operations may be made on this angle-plate milling table. For openers, consider fastening a small milling or drill-press vise to the angle as shown in the above photo. ★★★

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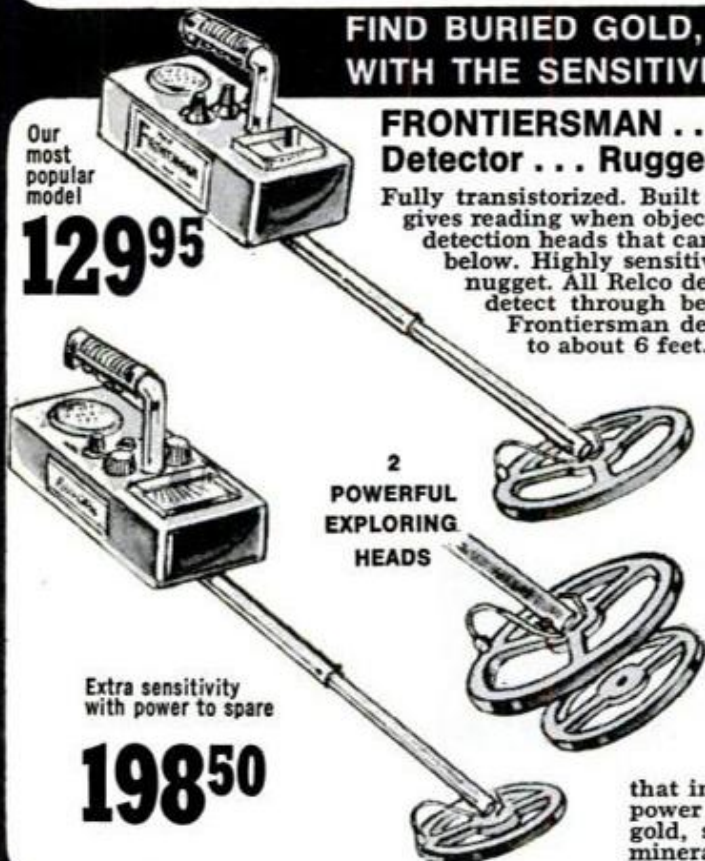
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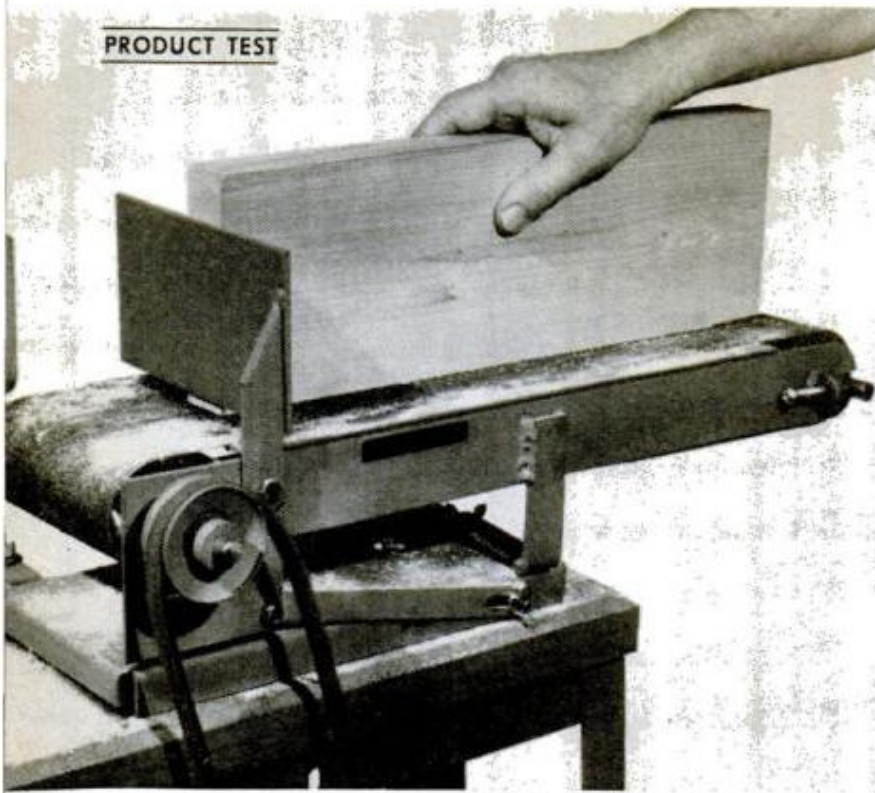
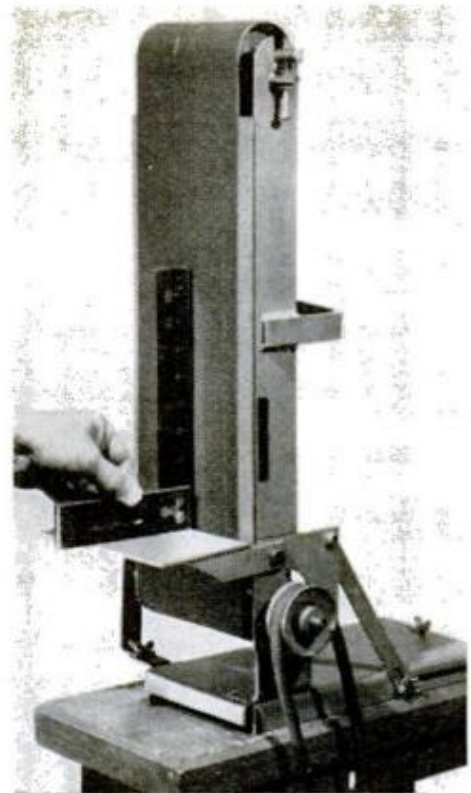


TABLE PROVIDES WORK STOP when the belt is used horizontally. The 4-in. motor pulley drives the 6-in.-wide belt at a 3450-rpm clip



PHOTOS BY ROBERT D. BORST

USE TRY SQUARE to check for right-angle sanding; a bevel square for angles

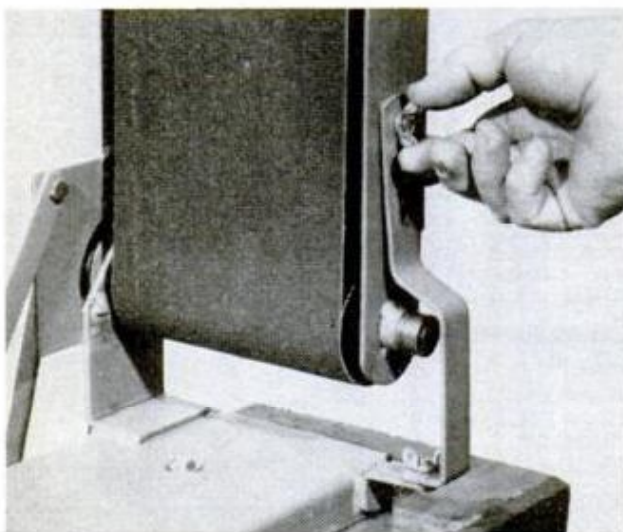
'Ugly duckling' sands like crazy

THERE'S NOTHING FANCY about this combination vertical-and-horizontal sander. The tilting table has no degree scale, there are no handy knobs to turn for proper belt tracking and tension, and there are no shiny chrome parts. In fact, its welded construction makes it look homemade. But simple as it is, this "poor man's" sander sands like crazy.

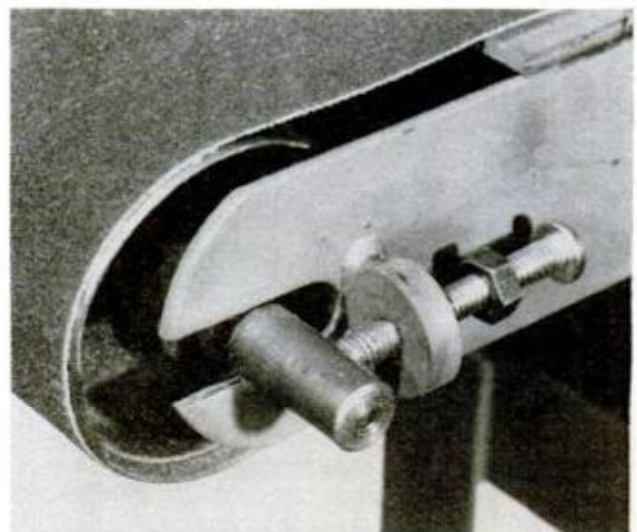
Nor does it have a fancy price. If you already have a 1/3 or 1/2-hp motor you can

own this 6-in. workhorse for \$34.95 f.o.b. It's made by Arco Manufacturing Co., 1701 13th Ave. North, Grand Forks, N.D. 58201, and comes with one medium 120-grit belt. It takes a 1/2-hp, 1725-rpm motor with a 4-in. pulley. To swing it from a horizontal to a vertical position you remove one wingnut and loosen two others. With the right belt you can also use it to polish and deburr metal.

—Wayne C. Leckey, *Home and Shop Editor*



SLOTTED STANDBY BRACE helps support machine when swung to vertical position. Wingnut holds it



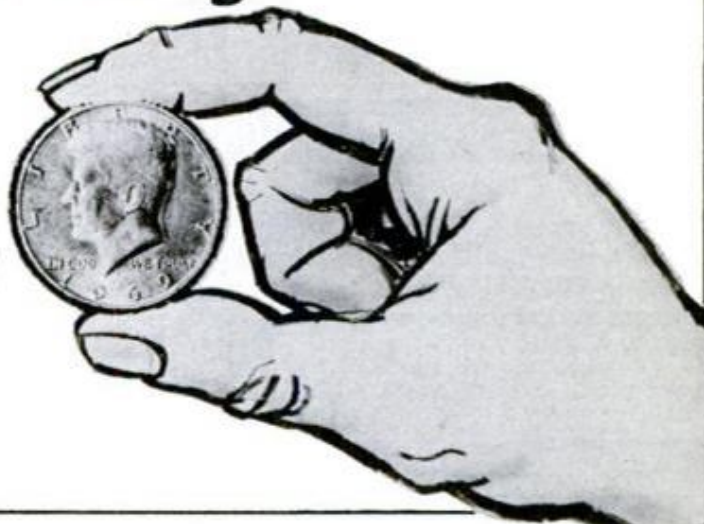
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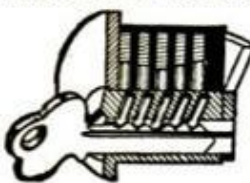
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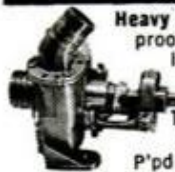
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SEARS' NEW VIDEO RECORDER

(Continued from page 75)

scans to make one complete "frame." To save tape, the Sears unit records only one field in three, repeating each field three times. This cuts the picture's effective "shutter speed" from 1/60 second per field to only 1/20, which can blur some motions—but fast football action looked okay. This technique is a hallmark of all Cartrivision recorders, including Sears' unit and those available soon from Admiral, Emerson, DuMont, Montgomery Ward and Teledyne Packard-Bell. All will use the same tapes interchangeably.

"Play," "Record," "Fast-Forward" and "Rewind" controls are like those on many audio recorders; correct recording level, color balance and the like are maintained automatically. (Even if you set your screen controls for green faces, you'll get a normal tape.) You can set a timer to record shows up to eight hours after you leave the house, and you can make "home movies" with the optional (\$250) camera—or use it to keep an eye on things in another room, without rolling the tape. Only the "Lock" and "Hold" controls ("Tune" and "Fine Tune" on other Cartrivision sets) are unfamiliar; adjust them for best picture when you start each tape.

Tapes are available blank in lengths from 15 minutes (about \$13) to 100 minutes (\$40). Cartridges with recorded entertainment will cost about \$13 to \$40 each, and full-length movies rent for about \$3 to \$5. Sears stores can get any tape in the 600-title catalog within 48 hours.

Blank cassettes have a tab you knock out after you record them, to prevent accidental erasure; recorded tapes you rent or buy have it already knocked out. Rental cartridges won't rewind on home machines; you can play them only once per rental.

The tapes have two sound tracks, for stereo or bilingual use, which play together through the set's speaker; but rear-panel jacks let you plug in external amplifiers for stereo, or mute one track of a bilingual tape. Tape time counters are built into cartridges, not the set.

Sears sells the complete 25-inch color console unit for \$1350. This fall, it will add a video cartridge attachment (about \$750) for recent Sears color sets followed by a tuner (about \$150) that lets the attachment record off the air. ★★ ★

The bargain hunter

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BICYCLE TOURING

(Continued from page 166)

plus 65 cents handling. In it is an application for membership (which you'll need in order to stay in hostels). Family membership is \$12; individual junior (under 18), \$5; senior, \$10. With membership you get a handbook listing all hostels. The hostels charge an overnight fee; at Star of the Sea it was \$1.50 per person.

The Metropolitan New York Council of American Youth Hostels, 535 West End Ave., New York, N.Y. 10024, offers an *Equipment Catalog* free. We bought our saddlebags (\$15.50) and toolkit (\$3) there.

Our backpacker tents and hiker stove and cooking unit came from L.L. Bean, Inc., Freeport, Me. 04032. The two-man tent was \$40; the four-man, \$66; gasoline-fueled campstove (18 ounces), \$10.95; and nesting cooking unit (18 ounces), \$9.95. Write the company for a free catalog.

Another excellent source of equipment is Trail Tech, 108-02 Otis Ave. Corona, N.Y. 11368. We didn't carry any Trail Tech gear, but I had a chance to use some of it later. It's well-designed and ultra lightweight (see page 168). The firm will send a free catalog on request.

If you're ready for a jaunt in Europe, American Youth Hostels can help you there, too. In addition, there are a number of appealing "package tours" offered by Swissair and Sabena. Both airlines include a bicycle in the cost of the tour—and you keep the bike afterwards. Swissair tours start at \$599 for two weeks. Write to Swissair, Wings & Wheels, 608 Fifth Ave., New York, N.Y. 10020, attention David Haron. Sabena tours range from 16 to 27 days and start at \$689. Write Sabena Belgian World Airlines, Adventure on Wheels, 150 S.E. Second Ave., Suite 1104, Miami, Fla. 33131, attention Richard McGill.

On any tour, you'll want to be prepared to make repairs. In addition to *PM's* regular *Bicycle Shop* and the already-mentioned *The Complete Book of Bicycling*, you'll find help in these books: *Derailleur (5, 10 and 15-Speed) Bicycle Repair* (\$4.95) and *Coaster and 3-Speed Repair* (\$4.95), both from Xyzyx Information Corp., 21116 Vanowen, Canoga Park, Calif. 91303; and *Anybody's Bike Book* (\$3, plus 25 cents postage and 5 percent local tax), Ten Speed Press, 2510 Bancroft Way, Berkeley, Calif. 94704. ★★

SOLAR FARMING

(Continued from page 91)

right angle to the panel along one edge. Light is reflected onto the face of the panel by the mirror as well as striking the panel directly. Thus the booster mirror, in effect, doubles the light-gathering surface of each panel, intensifying the heat generated. The heat is transferred to a liquid mixture of sodium and potassium flowing through the panels. This liquid, called NAK after the elements' symbols (NA for sodium plus K for potassium), circulates through coils in a huge vat of molten salt. The salt acts as an energy-storing reservoir, remaining hot through nights and sunless days to provide a constant source of heat.

Water flowing through the molten salt is turned instantly into superheated, high-pressure steam to drive turbines that, in turn, power generators to produce electricity. A cluster of several thousand panels feeding their heat into a single salt vat could provide a 1000-megawatt powerplant. A thousand such plants could thus produce a colossal one million megawatts of power. Present national consumption, about 300,000 megawatts, is expected to double in 20 years. Even so, the million megawatts eventually provided by the Meinels' plan could easily handle the country's power needs by the end of the century—with plenty to spare.

The ideal location for the Meinels' solar farm is a 75-mile square of arid desert along the Colorado River between Arizona and California. Its big advantage: It practically never rains there. Skies are cloudless an average of 330 days a year. From this mammoth power complex, electricity would be piped to towns and cities all over the country through underground transmission lines. One valuable bonus is the staggering amount of fresh water the system would supply as a by-product. Seawater pumped in from the nearby Gulf of California to cool condenser coils for the steam turbines would be desalted at the same time during evaporation. The resulting fresh water—an estimated 50 billion gallons a day—could turn normally barren desert into rich, fertile farmland. How soon the project will get underway is not yet known, but several large power companies studying the plan are prepared to put up funds for an operating prototype to be built within a few years—and none too soon. ★★



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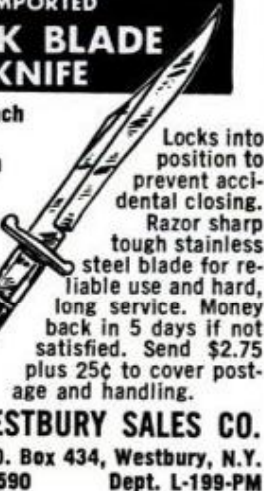
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BENCH-SAW KNOW-HOW

(Continued from page 156)

of wood to the fence; then butt work against it. Then the cutoffs won't jam between fence and blade and be thrown back at you with great force. Too, it's good practice to stand to one side of the blade (normally, left) and not directly behind it when ripping. You'll not be struck by severed work should it be kicked back at you. Usually, this happens when the fence is not parallel to the blade, causing the workpiece to bind.

There are several tricks to follow when sawing a plain or compound miter to prevent the work from creeping as it is cut. Three ways are shown on page 156. Where your miter gauge isn't designed to accept a work hold-down, a piece of medium-coarse sandpaper can be glued to the face of the miter gauge to provide a noncreep surface. Or you can simply clamp the workpiece to the miter gauge.

As you become more proficient in the use of your saw, you'll find that it's far from limited to just plain ripping and crosscutting. When teamed up with simple

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wooden jigs you can make yourself, your saw can take on new jobs in a production-like manner.

Five such jigs are pictured and detailed on page 157. In the case of the adjustable taper jig, two marks made 12 in. from the hinged end permit you to set the jig to any given angle by measuring across the marks. For example, if you open the legs 1 in. at the 12-in. marks, the jig will produce a tapered cut of 1 in. per foot.

Nothing is more accurate and faster than a miter board when it comes to mitering picture-frame molding on a bench saw, and the sliding squaring board makes quick work of squaring up the edges of odd-size scraps with uneven edges. You can produce tapered wedges of any size and amount in jig time with a wedge board. A stepped stopblock takes all the guesswork out of producing perfect fitting half-lap joints with a dado head.

Next month, we'll take you beyond the basics and fundamentals of operating a bench saw and show you how to build a "third-hand" support for holding long rip and crosscut work, and create fancy "waffle" cuts with a dado head. ★★

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(Continued on next page)

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(Continued from preceding page)

VENDING Machine big catalog. Rake, 523 A Spring Garden, Philadelphia, Pa. 19123.

MAIL Baby Catalogs imprinted with your address to New Mothers for Big Profits! Details 25¢. Volz PM, Ypsilanti, Michigan 48197.

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\$200.00 SPARE Time earnings with your Tablesaw. Write: Workshop Five, 3800 Harney, Vancouver, Washington 98660.

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(Continued on next page)

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(Continued from preceding page)

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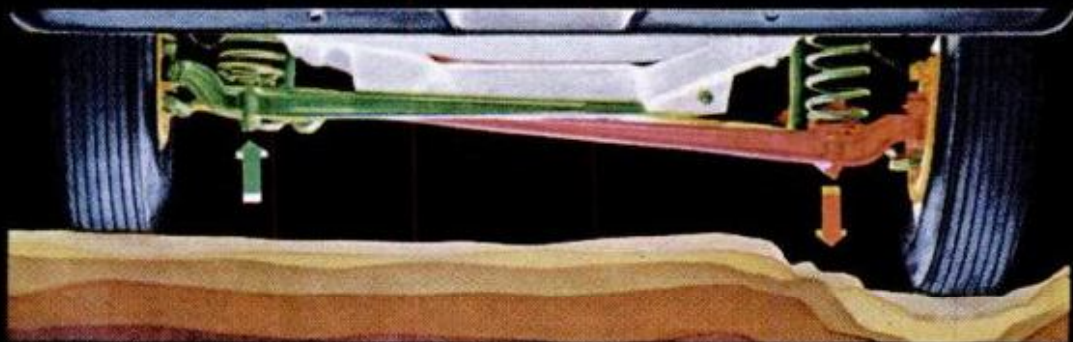
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