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POPULAR MECHANICS

MAY 1963

35 CENTS

Study-Play-Sleep Dens for Children

25 Tips for Lawn Mower Buyers



FORD V8



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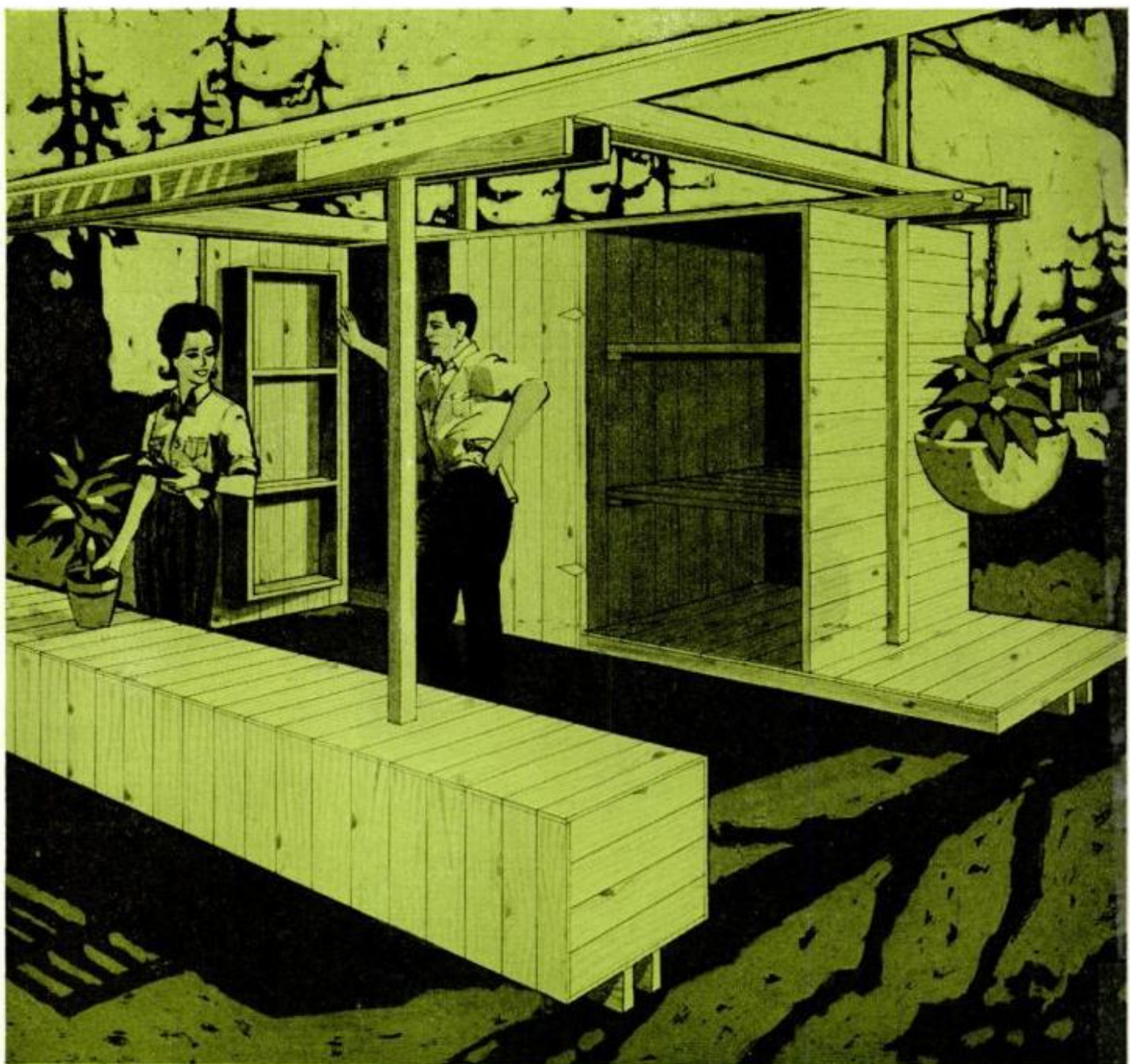
FORD
Versus
CHEVY
at INDY!

CHEVROLET
V8



Owner

Reports on Buick and Chrysler



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Plan to build an outdoor storage center . . . and make your first step a visit to your Western Pine lumber dealer! He has a free booklet to guide you from start to finish! He also has all the building materials you'll need . . . including "good-looking, good-working" woods from the Western Pine Region! These woods are pre-seasoned to stand the test of time . . . readily accept paint and stain . . . and nail and saw with ease! And WPA woods are inexpensive, too! **Important:** if your dealer is out of plans . . . send 10c for handling to:

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FASTEST "DRAGSTERS" OF THEM ALL!

Designed for all-out acceleration over a quarter-mile straightaway, these two "dragsters" are the kings of their kind. And both spark their amazing power with silvery-plated Champion spark plugs . . .



ON LAND: By the yardstick commonly used in automotive road tests, going from a standing start to 60 mph in 10 seconds is potent performance indeed. This "dragster" took just 7.77 seconds to cover a quarter mile from a standing start, crossing the finish line at 190.26 mph! That's the quickest quarter-mile acceleration run on record, made last January by this remarkable racer. Built by Californians Keith Black and Tom Greer (driven by Don Prudhomme), its Chrysler engine is fired by Champion spark plugs.



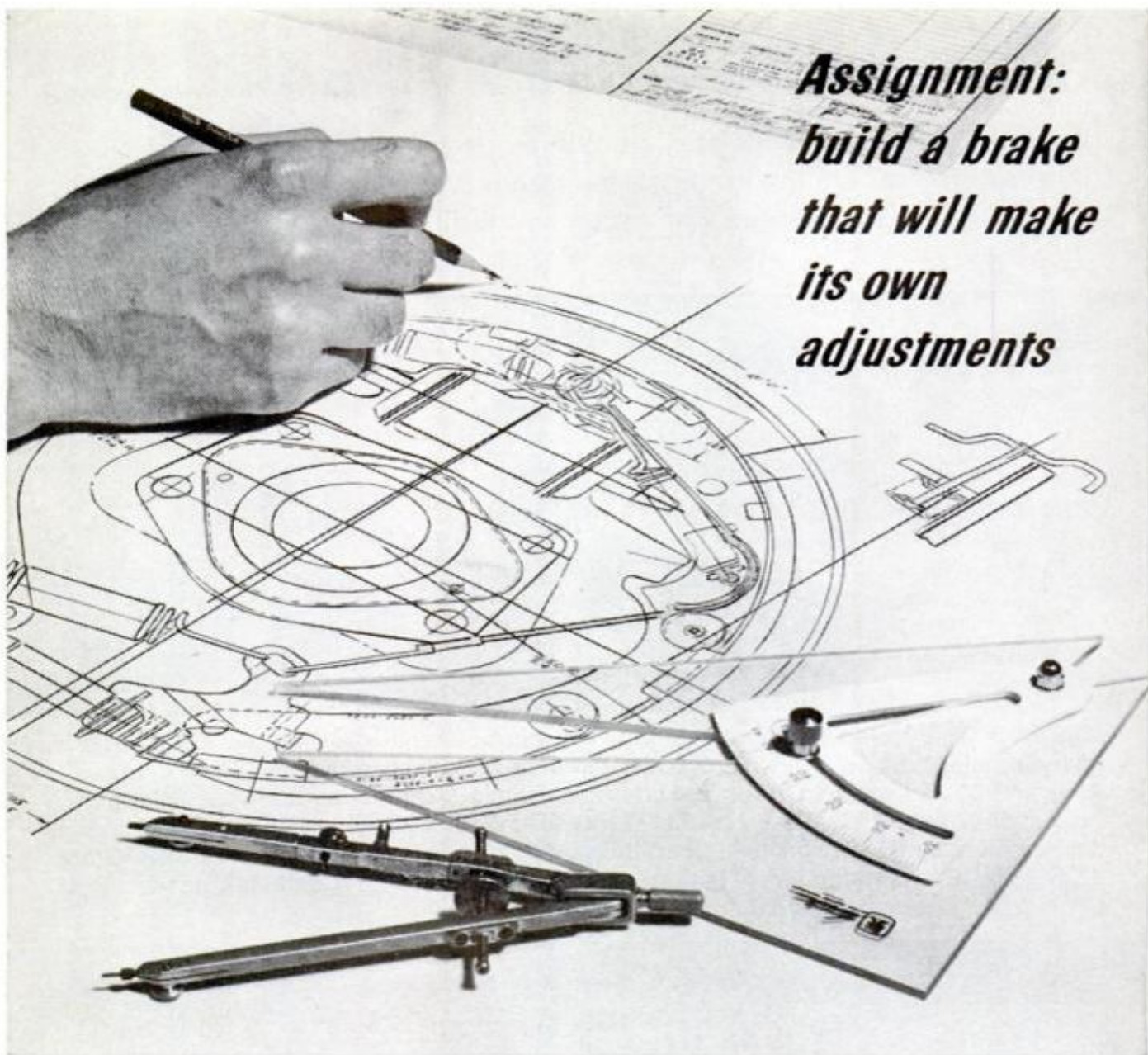
ON SEA: Floating "dragsters" are fairly new on the speed scene—and they really travel. At the end of a quarter mile this boat, the "Golden Thing," was slashing over the water at a record speed of 152.80 mph! It happened at the World Championship Boat Drags last fall, with Chuck Gireth driving. The "Golden Thing's" Champion-equipped Chrysler engine was set up by the same Keith Black who co-owns and tunes the world's quickest land dragster (see above).

Why do engine experts like Keith Black—the man who prepared these two record-holding dragsters—choose Champion spark plugs? Because engine experts everywhere know from experience they can depend on Champions to deliver absolutely all the performance that can be squeezed out of an engine! Why settle for less from your engine? Always specify Champions.



Champion Spark Plug Company
Toledo 1, Ohio

**Assignment:
build a brake
that will make
its own
adjustments**



Result: Every Ford-built car in '63 has self-adjusting brakes

"Give us a brake," Ford Motor Company engineers were told, "that will automatically compensate for lining wear whenever an adjustment is needed—and make it work for the entire life of the lining."

Today, not only does every Ford-built car (Falcon extra-duty bus-type wagons excluded) have self-adjusting brakes, but the design is so excellent that adjustments can be made more precisely than by hand.

This Ford-pioneered concept is not complex. Key to it is a simple mechanism which automatically maintains proper clearance between brake drum and

lining. Self-adjustment—which normally occurs but once in several hundred miles of driving—takes place when brakes are applied while backing up.

The quest for total quality in Ford-built cars has produced other extra-value features like extended major chassis lubrication intervals, use of rust-resistant galvanized steel for vital underbody parts and new, longer-life electrical systems.

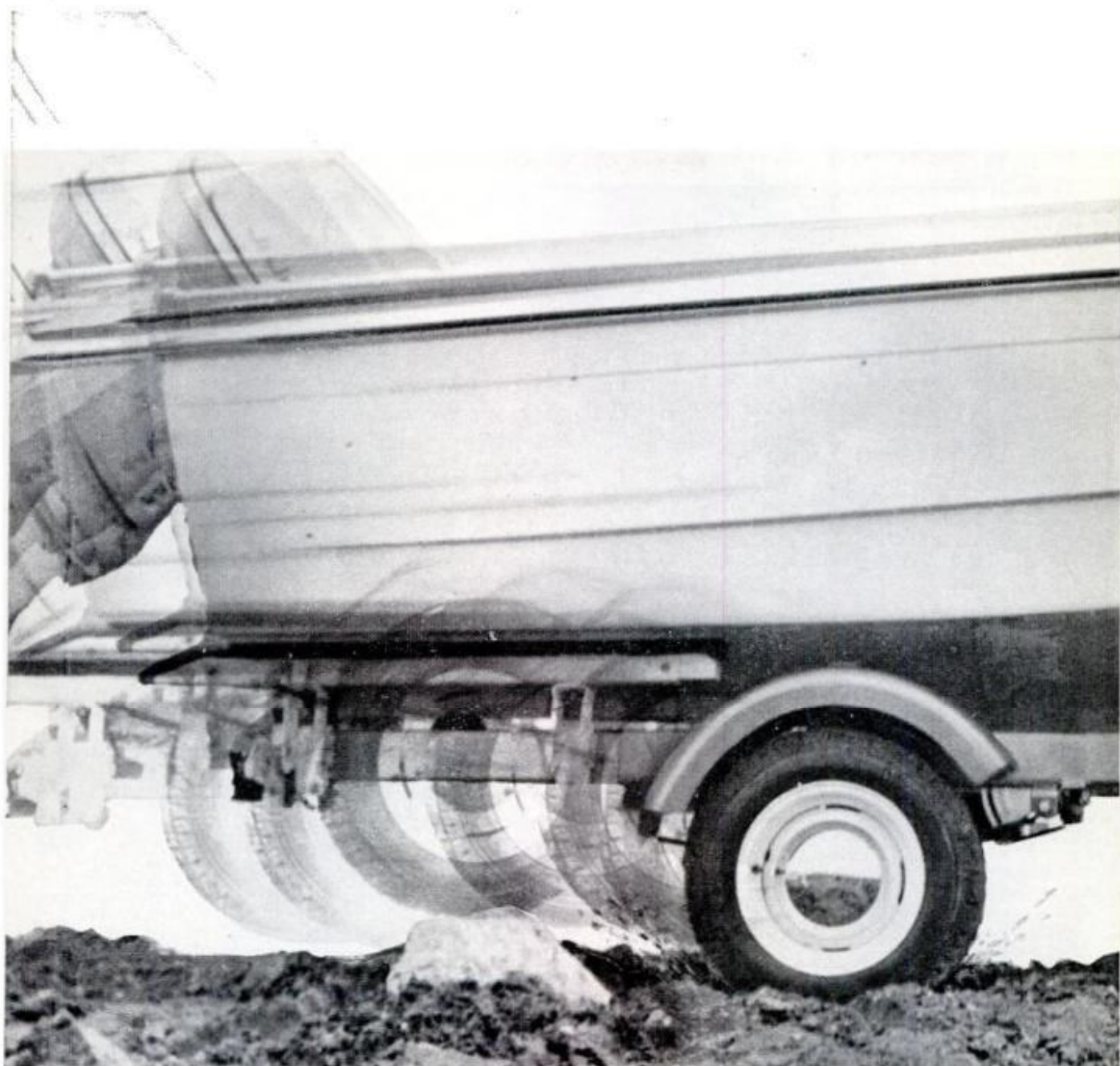
Such achievements through engineering excellence are reasons for Ford Motor Company's success in bringing you quality cars that last longer, need less care and keep their value better.

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**WHERE ENGINEERING LEADERSHIP
BRINGS YOU BETTER-BUILT CARS**

MOTOR COMPANY



These tires protect your fun with Nylon!

Now, Goodyear Super Rib boat trailer tires (4-ply rating and above) are made with 3-T *Nylon* cord—triple-toughened for extra strength and stamina. That's why they take murderous poundings under heavy loads far better than ordinary tires.

Another point: because they're smaller around, boat trailer tires have to spin almost twice as fast as their big brothers. This builds up heat that can

cause fun-killing blowouts. But Super Ribs are built lighter and stronger... run cooler, last longer. And, they're made with five husky ribs on a wide, flat tread for more stability, straighter tracking and smoother going—no matter what route you take.

So protect *your* boating fun with 3-T *Nylon* Super Rib trailer tires. That way you won't be dropping anchor—along the road. Goodyear, Akron 16, Ohio.

ANOTHER REASON WHY: MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

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This One



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MAY 1963

3

POPULAR MECHANICS®

MAY 1963
VOL. 119 NO. 5

INTERNATIONAL EDITIONS • SPANISH • CARIBBEAN • FRENCH • PORTUGUESE

Features of Special Interest



Hints for Mower Buyers
page 74

| | |
|--|-----|
| Ford Vs. Chevy at Indianapolis' 500 Race | 69 |
| 25 Tips on Buying Lawn Mowers | 74 |
| Owners Report on Their 1963 Chryslers | 80 |
| First Pleasure Drive All the Way to Panama | 86 |
| Squirt Gun on Hydrofoils | 92 |
| The 1963 Buicks: What Their Owners Like and Don't Like About Them | 96 |
| Motorized Gold Miner | 101 |
| Two Ways to Ride a River: | |
| 1. Outboard Jet on the Wild White Rogue | 104 |
| 2. Probing the Kobuk's Arctic Wilderness | 107 |
| Model Solar System | 111 |
| All Aboard the Gemini Spaceship | 112 |
| Does Corn Grow Better to Music? | 118 |
| Update Your Old Phono | 177 |

For the Workshop Craftsman

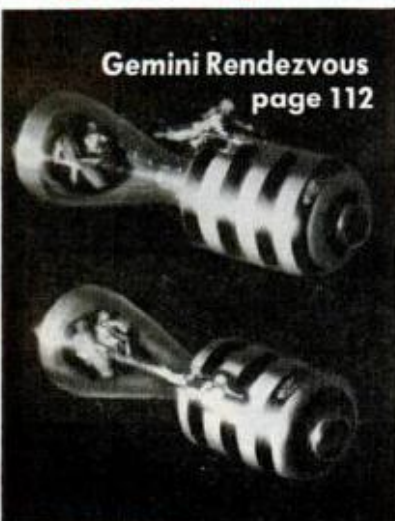


Back-Yard
Dump
Trailer

page 156

| | |
|--|-----|
| Study-Play-Sleep Dens for Youngsters | 124 |
| Suitcase Picnic Table | 132 |
| How to Repair Single-Lever Faucets | 136 |
| Double-Spiral Candlesticks | 140 |
| The ABCs of Anchoring | 142 |
| Shoji Screen Hides Old Windows | 147 |
| Reel for Your Soaker Hose | 148 |
| Controlling Garden Insects Safely | 150 |
| Trailer for Garden Tractor | 156 |
| 10 Retaining Walls to Dress Up Your Yard | 160 |
| Sunken Barbecue Pit | 163 |
| Cast Your Own Patio Blocks | 164 |
| Know Your Car's Cooling System: Part II | 166 |
| Tripod Doubles as Easel | 175 |

Regular Departments



Gemini Rendezvous
page 112

| | |
|--|-----|
| Over the Editor's Desk | 8 |
| Sidelights on Aviation | 16 |
| Science Worldwide | 23 |
| Worth Writing For | 26 |
| Items from All Outdoors | 34 |
| Sidelights from the Services | 38 |
| Spotlight on the Jeep Wagoneer | 44 |
| Tune in on the Inventors | 66 |
| Detroit Listening Post | 94 |
| What's New for Your Home | 102 |
| Solving Home Problems | 134 |
| New on the Market | 139 |
| Shopping for Tools | 159 |
| New for Shutterbugs | 173 |
| Clinic for Homeowners | 184 |

NEXT MONTH—Life Detectors for other worlds are on the space agenda. June *PM* tells how they'll work and what they may learn. You'll find owner reports on Valiant and Cadillac; details on the fantastic plane that may become tomorrow's supersonic transport; plans for building stereo in a suitcase, and much more.

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ADDRESS COMMUNICATIONS TO: 575 Lexington Ave., New York 22, N.Y. For additional sources of information on the articles in this issue, or the name and address of the manufacturer of a particular product, write to Bureau of Information, Popular Mechanics for free "Where-to-Find-It-List."

SUBSCRIPTION SERVICE: Mail all subscription orders, changes of address, correspondence concerning subscriptions, and Postmaster notices of undelivered copies to Popular Mechanics, 250 West 55th St., New York 19, N.Y.

ADVERTISING OFFICES: New York: 575 Lexington Ave., MUrray Hill 8-8500; Chicago: 740 N. Rush St., WHitehall 4-0100; Detroit: General Motors Bldg., TRinity 5-8711; Cleveland: Hanna Bldg., 1422 Euclid Ave., PRospect 1-0456; Los Angeles: 3460 Wilshire Blvd., DUNKirk 2-8458; San Francisco: 111 Sutter St., YUKon 2-0823.

Published monthly by Popular Mechanics Company, 575 Lexington Ave., New York 22, N. Y. Richard E. Berlin, President; Richard E. Deems, Executive Vice-President; Fred Lewis, Vice-President and General Manager; John R. Miller, Vice-President; Joseph R. Buell, Jr., Vice-President; G. O. Markuson, Treasurer; R. F. McCauley, Secretary. Single copy in the United States and Canada, 35 cents. Subscription prices: United States and Possessions, \$4.00 for one year; \$7.00 for two years; \$9.00 for three years. Canada, add \$0.50 for each year. Pan-American Postal Union countries, add \$1.00 for each year. All other countries, add \$2.00 for each year. When changing address, give old address as well as the new, with postal-zone number, if any, and allow six weeks for change to become effective. Second-class postage paid at New York, N. Y., and at additional mailing offices. Authorized as second class mail by the Post Office Department, Ottawa, and for payment of postage in cash. Registered as Second Class matter at the Post Office at Mexico, D.F., Mexico, June 20, 1950. ©1963 by Popular Mechanics Company. All rights reserved. Printed in the United States of America.

BACKSTAGE at PM

The controversy over the dangers of insecticides, stirred up by Rachel Carson's bestseller, "Silent Spring," grows hotter. So, we're pretty sure some readers will grab pen in hand to write irate comments about the article on page 150 dealing with pest killers.

Go to it. We're always glad to have your reactions, good or bad. Before you draft that letter, however, you might want some background information.

When the layout on backyard pests was being prepared, we already were aware of the growing furor over the possible effects of poisonous pesticides on wildlife, pets and human beings. Few will dispute the fact that there are grounds for concern, particularly over the indiscriminate use of such pesticides by careless sprayers. That's why our article on the killing of backyard pests contains (on page 152) an important list of precautions which minimize danger to wildlife, domestic pets and humans.

But a magazine's responsibility to its readers extends beyond the listing of safety precautions. The very existence of a technical controversy implies a responsibility on our part to probe into the factual heart of the matter. Just what damage have these pesticides done? Was the problem one of over-dosage, careless spraying or simply the poisonous content of the insecticides themselves? What or who was killed or injured? Has the wildlife recovered? Were the pests all destroyed?

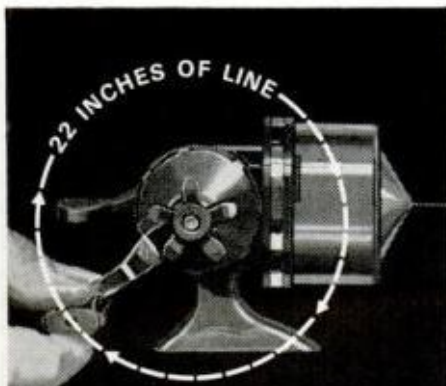
To answer these questions, we decided to select one community, and interview those whose knowledge had a direct bearing on the problem. But which community?

In Miss Carson's book, she says: "Perhaps no community has suffered more for the sake of a beetleless world than Sheldon, Illinois . . . and adjacent areas in Iroquois County."

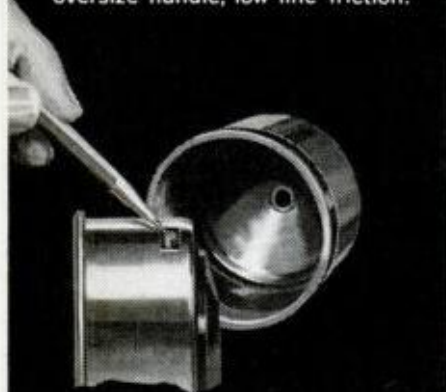
Miss Carson then proceeds to cite an impressive record of damage, dosage and wild and domestic life kill in Sheldon.

Next month, join *PM* in a revisit to Sheldon, to see how it is faring with its insecticide problem today.

The Editors



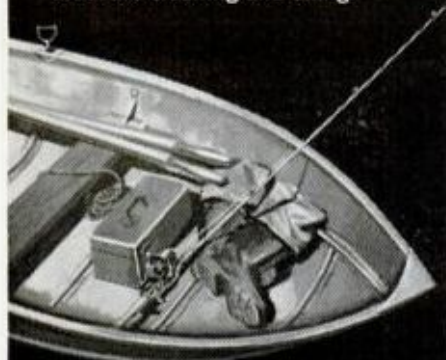
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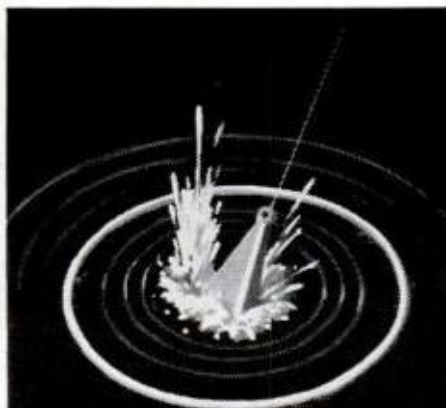


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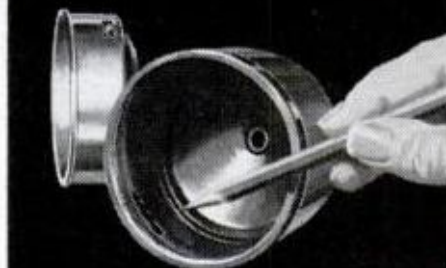
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326HO? That's our three-tiger V-8, a no-nonsense piece of sporting goods with an input via four yawning throats, an outgo via two thrumming pipes, and an outcome that's more than a little startling.

If you intend taking a three-tiger out into the country and letting it out for a gentle, nerve-soothing

gallop, we suggest you gird yourself with some of our super-handling stuff. Like heavy-duty springs and shocks, plus an extra-fast steering ratio of 20 to 1, for instance.*

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Over the Editor's Desk

Shoe Trees Next?

I ran across a new use for old shoes. A lady in Rialto, Calif., retrieved a pair



of her husband's shoes, sprayed them red, filled them with soil and put low-growing plants in them.

Highland, Calif.

KENNETH C. JONES

We're printing this as a warning to our male audience. If this is the beginning of a trend, you'd do well to hide your favorite fishing or gardening shoes. They used to say something about not letting grass grow under your feet; now, watch it, or there'll be plants growing in your shoes. Red shoes, at that!

To Wish You Well

My young son and I built a wishing well (page 132, Aug. *PM*) on our patio that we use as a bar. In the bucket we put the different bottles or melons or anything that needs to be kept cold. It has become very popular.

Belen, N.M.

MRS. THERESA TABET

Little wonder—and watch the wishing wells spring up over the land. You might add music, something like "When You Wish Upon a Bar."

Airplanes for Everybody

On behalf of the Experimental Aircraft Association and all people in aviation, I want to thank *PM* for presenting *Fresh Flock of Fold-Wing Airplanes* (page 90, Feb. *PM*).

We at headquarters are averaging over 75 letters per day just from this article. Individuals who designed and built those folding-wing airplanes, too, are swamped with mail. This is a good indication of

[\(Please turn to page 12\)](#)

POPULAR MECHANICS

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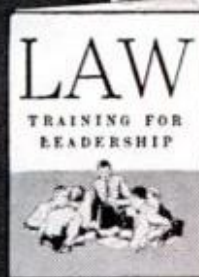
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221

"I SAW MYSELF 10 YEARS FROM NOW!"



IT WAS PAYDAY. THERE WAS FRED, LOOKING A LITTLE RUN-DOWN. ON THE SAME JOB 10 YEARS. NICE GUY. MARRIED. TWO CHILDREN.

FRED AND I WALKED AWAY FROM THE PAY WINDOW TOGETHER. HE SEEMED DEPRESSED, UNHAPPY.

EACH WEEK I FEEL I'M LETTING THE KIDS DOWN. CAN'T SEEM TO AFFORD THINGS THEY NEED. I'M JUST NOT GETTING AHEAD.



FRED'S WORDS HIT ME ALL OF A SUDDEN. I COULD SEE MYSELF SAYING THE SAME THING—
10 YEARS FROM NOW!

WILL I HAVE THE SAME OLD JOB 10 YEARS FROM NOW? SAME THIN PAY CHECK? MONEY WORRIES ...LIKE FRED'S?



THAT NIGHT, STILL THINKING ABOUT FRED, I SAW AN I.C.S. AD ABOUT HOW I.C.S. TRAINING OPENS JOB OPPORTUNITIES. HOW PEOPLE LIKE ME CAN WIN PROMOTIONS, MORE PAY.



THIS LOOKS LIKE JUST THE THING I NEED TO DO SOMETHING ABOUT GETTING AHEAD!

I MAILED THE I.C.S. COUPON THAT NIGHT. MY BOSS SOON LEARNED I WAS AN I.C.S. STUDENT. HE MOVED ME OFF THE LINE. AND TWO RAISES LATER...

GEE, FRED, THESE I.C.S. COURSES ARE GREAT! YOU OUGHT TO SIGN UP, TOO!

WELL...MAYBE SOME DAY...

FRED'S STILL ON THE SAME OLD JOB. STILL HOPING FOR THE "BREAK" HE'LL NEVER GET WITHOUT TRAINING. ONE DAY THE BOSS CALLED ME IN...

YOU'RE BEING PROMOTED TO ASSISTANT SUPERVISOR. AND A GOOD RAISE GOES WITH THE JOB!

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- Sanitary Engineering
- Structural Engineering
- Surveying & Mapping

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- Mechanical
- Sheet Metal

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- Electrical Engineering
- Elec. Eng. Technician
- Elec. Motor Repairman
- Industrial Electronic Technician

- Industrial Telemetering
- Instrument Technician
- Practical Electrician
- Practical Lineman

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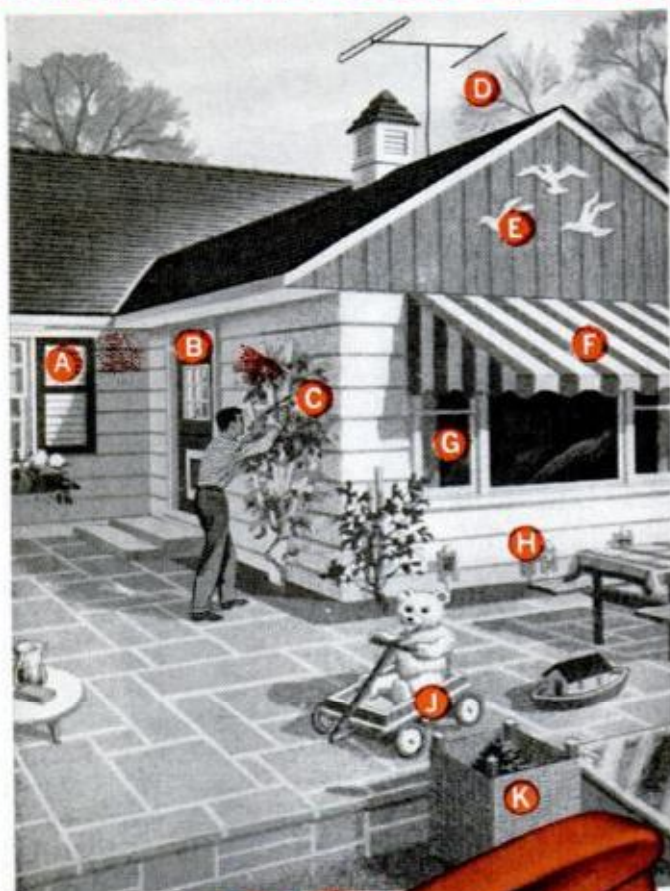
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- Textile
- Other (please specify)

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Over the Editor's Desk

(Continued from page 8)

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PAUL H. POBEREZYNY
Hales Corners, Wis. President

More Light on Lights

I enjoyed the Owners Report on the '63 Chevrolet (page 85, Feb. *PM*). Regarding your comment about idiot lights, I think a combination of both dial and light is ideal. Many airplanes have such a system—for example, a gas gauge plus a red light that goes on when the tank needs switching.

I enjoy your magazine; you have the right idea in pointing out the faults as well as good points of cars. Sheboygan, Wis. JOSEPH A. ZINTHEFER

Concrete Indian

We at the Lorado Taft field campus of Northern Illinois University are doing a history of Eagle's Nest Art Colony and the Oregon area. In dealing with the construction of the Blackhawk statue, we find voids in existing literature. Could you forward to us copies of your March 1911 edition.

DeKalb, Ill. MARVIN J. STARZYK

*This took us back more years than any of us could remember—but, sure enough, *PM* had an article, Colossal Indian Statue Built of Concrete, on page 413 of that issue. And Professor Starzyk now has a copy of our report on the 48-foot statue built by Lorado Taft near Oregon, Ill.*

Newspaper Pudding

Did you ever wonder what to do with all your old newspapers? I've found a use for them. I now get the best of the garden weeds by using "newspaper pudding."

Add a large armload of old paper to a washtub full of water. Let the mixture soak 24 hours and stir occasionally. Now pour the "soup" around flowers, tomatoes, corn, or other crop. The pulp mixture dries into a quarter-inch mat that will choke off weeds, halt erosion, keep the soil cool and reduce leaching of fertilizer.

The pudding is much cheaper than straw and works better around small plants because it doesn't shade young seedlings.

Ontario, Wis. PAUL D. BREY

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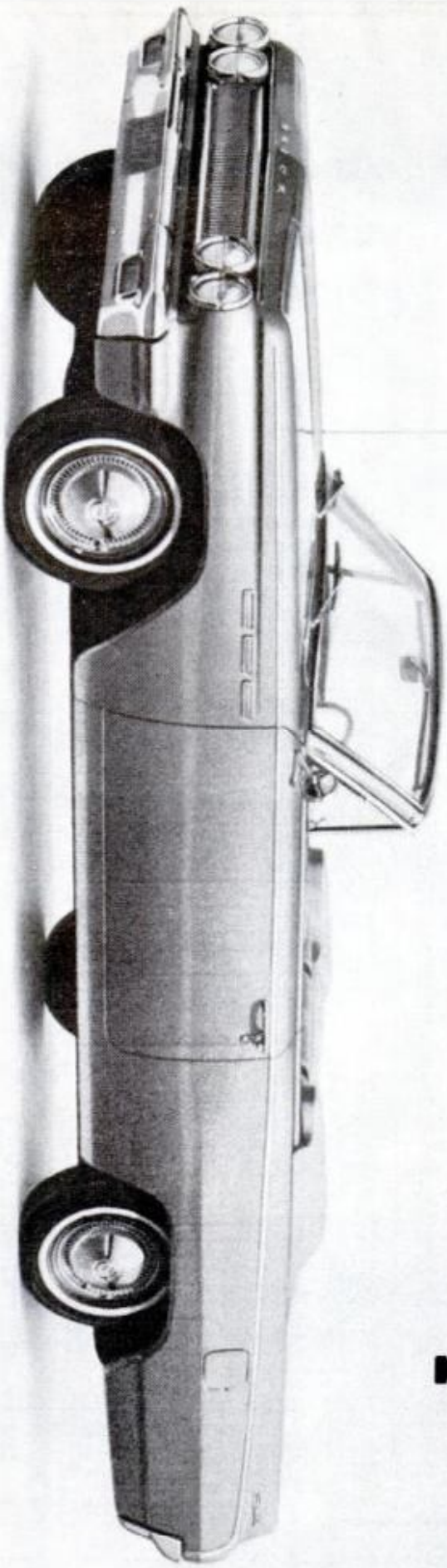
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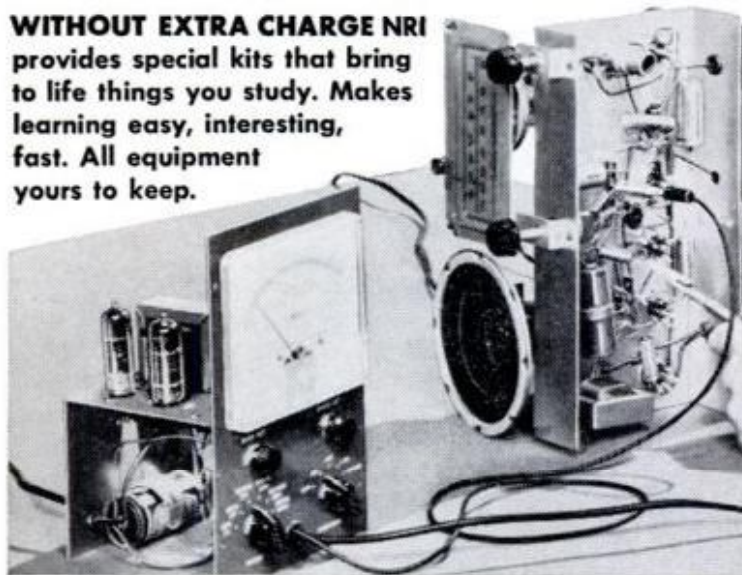
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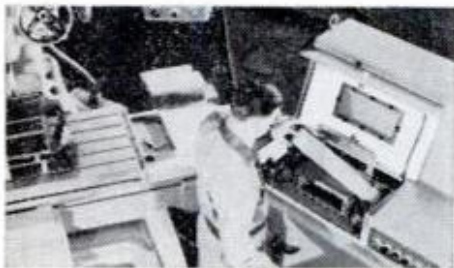
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J. M. SMITH
President

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NRI was a wonderful foundation.
RAYMOND D. ARNOLD, Attleboro, Mass.



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JOE DUCKWORTH, Fort Worth, Texas.

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Weeding out nuts among the draftees, Army psychiatrists have traditionally used such questions as, "What would you do if you saw a submarine on Main Street?"

Now, similar questions may make more sense. The Army—that's right, the Army—may be getting an aircraft carrier.

Plagued by poor landing fields for its many helicopters in South Vietnam, the Army is investigating the possibility of salvaging from mothballs one of the Navy's World War II carriers and keeping it in coastal waters for servicing its whirlybirds.

Lack of courtesy was cited last month as a prime reason why air travelers dislike some airlines more than others. An abundance of courtesy—plus a considerable amount of ambition—has almost created a six-figure business for a young couple who operate a small private airport miles from any big city.

They bought the airport company in Grand Island, Neb. (population 25,000) for

\$7000 a few years ago, went into debt for \$18,000 the first year, then—by offering such niceties as baskets of fruit for the pilots and passengers, and 15-minute refueling service for the planes—most of them executives jets—they built up the business to more than \$100,000 last year.

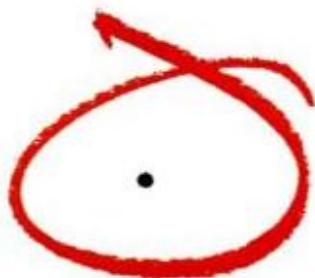
With such simple courtesies they have lured business aircraft from such giants as General Motors and IBM to make refueling stops on long, cross-country hops, when they really have no other business in Grand Island. The young couple—they're still in their 20s—meet the planes on the runways, guide them to the ramp, offer station wagon service to restaurants and motels, and keep an air-to-ground radio in their hangar apartment so they're ready for planes around the clock.

Sadder news greeted another small-town aviation group recently.

The government rejected an application to inaugurate a so-called third-level airline service. It would have served small communities deserted by the small feeder lines which now go only to larger cities.

"No significant public need" was cited.

Kevin V. Brown
Aviation Editor



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The "Pharaoh's Curse" on ancient Egyptian tombs may be more than just legend. At least two scientists have discovered that mummy wrappings often contain tiny fungus organisms that cause something called Coptic disease, well known to archaeologists. Victims usually get a skin rash, sore throat and an inflamed nose. A curse, aimed at grave robbers, was carved on most ancient tombs.

An amateur astronomer in Japan recently discovered a new comet—with a \$22 homemade telescope. Kaoru Iketani, 19, who works in a musical instrument factory, first sighted the comet on January 3rd, about 20 degrees southeast of the star Spica. Tokyo Astronomical Observatory has confirmed the discovery.

Fog can be dispersed with a "fog eater" developed in Cologne, West Germany. It has two fans, each 23 feet in diameter, which draw foggy air into a spinning wire-mesh disk. Moisture is trapped in the mesh, condenses and runs off as water while the fans blow out cleared air. It's said to clear a radius of about 500 feet in a few minutes.

Underwater joyrides will be offered visitors to the 1964 Swiss National Fair in Lausanne. A submarine for tourists, called a mesoscaph, will give passengers a fishes'-eye-view of Lake Geneva's underwater life. The sub is being built of special steel and will hold 40 persons.

Deaf since birth, a Los Angeles woman can now hear through an electronic "ear" which was surgically incised into her skull by a neurosurgeon at the University of Southern California Medical School. The two-ounce device carries signals on only one channel from a lapel microphone to the auditory nerve, but this permits her to distinguish words. The next model can be placed just under a patient's skin, the inventor says; eventually, a multi-channel "ear" will be able to approximate normal sound reproduction.

Seat belts, if worn incorrectly, can be almost as dangerous as no protection at all. The Journal of the American Medical Association recently reported that a woman involved in an auto collision had to have her spleen removed because she had placed the seat belt too high, across the abdomen and lower rib cage. Proper way is to fasten the belt low down—over the bony structure of the hip and pelvis.

Sawing through concrete a foot thick is easy with a diamond-bladed saw developed by a Canadian inventor. Hydraulically powered, it runs on a track and uses blades up to 30 inches in diameter.

Fresh-water fish have a chemical warning system that tells the rest of the family to stay away when the fish is attacked. The surface body cells of most North American fish secrete a chemical substance which is released when the cells are broken open, according to Dr. Wolfgang Pfeiffer of the University of British Columbia. Chemical composition of the substance isn't known, but very tiny amounts from wounded fish will repel schools of the same kind of fish.

Tomb germs which had lain dormant for more than 1200 years came to life recently after being placed in an incubator. The bacteria were taken from the sealed tomb of a Maya Indian chief in Guatemala. They had remained inactive for 12 centuries because of lack of moisture, light and food. None have so far been identified, says Dr. Joseph R. Valenta of Smith Kline & French Co., who made the discovery.

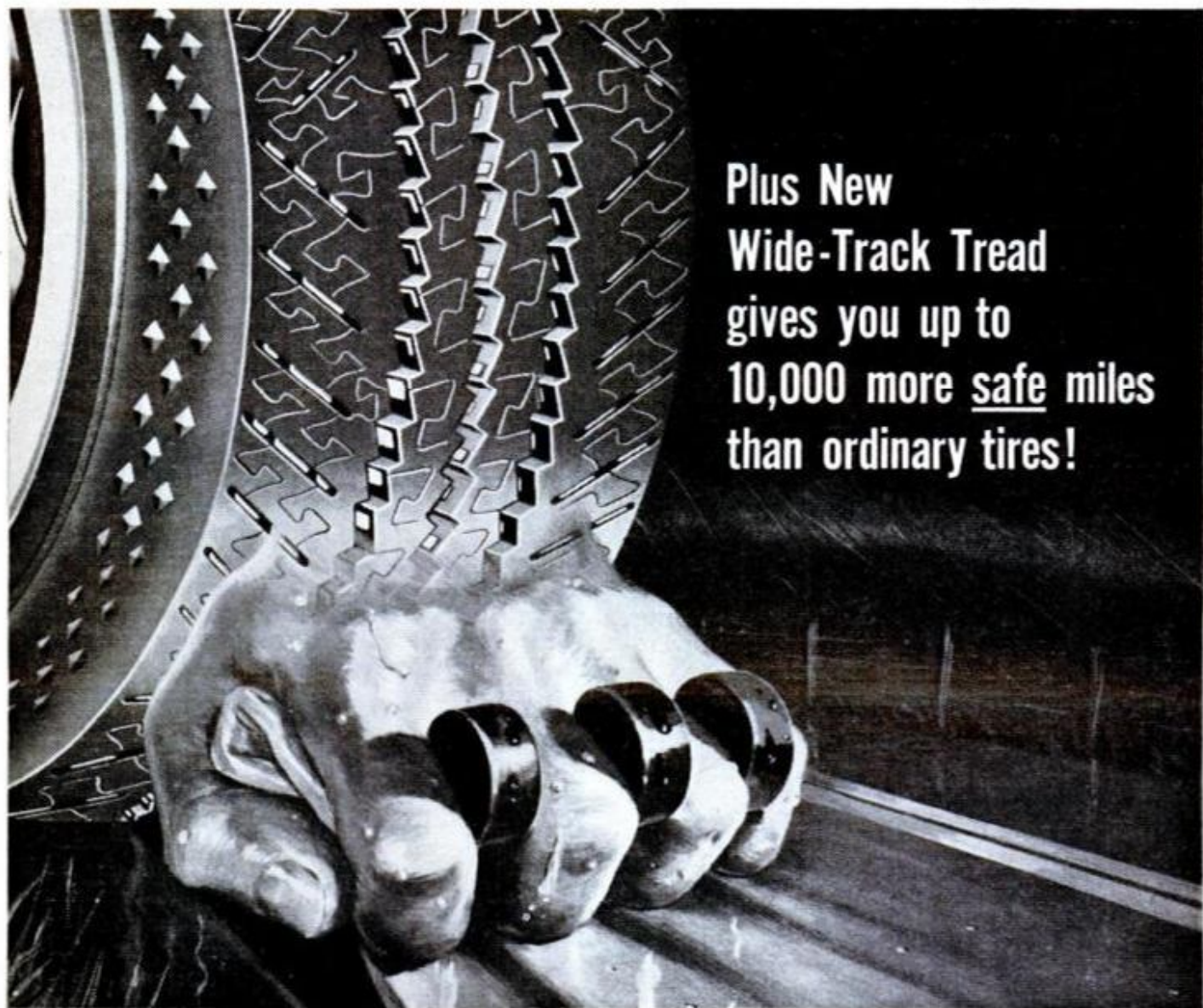
Surveying a landing site on the moon may be done from the earth by shining a "measuring" beam of light a mile wide on the lunar surface. Ruby lasers, a Hughes Research Laboratories scientist says, could measure lunar heights as small as five feet, hence could map safe areas for astronauts to land. The finest astronomical telescopes can "see" objects on the moon one-quarter of a mile across, but provide no clues to heights.

Two electronic brains will battle it out in a high-powered quiz game in Sweden next January. The contest was set up when one government committee recommended one kind of computer for government use and a second committee recommended another brand. The computers will be tested under identical conditions.

John P. McNeel
Science Editor

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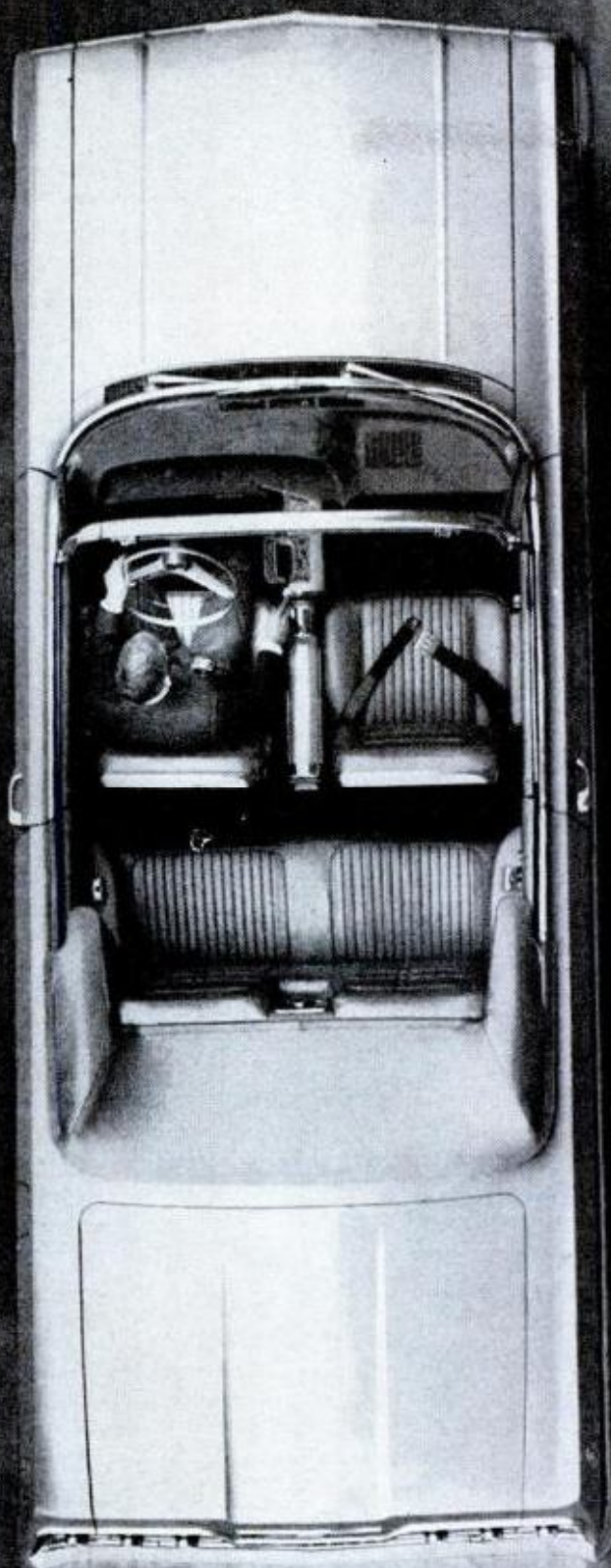
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"Fiberglass Boats You Can Build," edited by Chapman and Koelbel, offers eight boat designs and complete building instructions utilizing this easy-care, easy-repair material. Plans range from a 23-foot inboard cruiser to a 12-foot racing dingy and include accessory projects for masts, rudders and even a galley sink. The 192-page large-sized book costs \$5.00 and is published by Motor Boating, 959 Eighth Ave., N.Y. 19, N.Y.

Stamp collectors can shore up your findings with a group of 19 U.S. ship and boat commemoratives showing almost every ship stamp issued over the years, including the first built in America. Available for ten cents from Garcelon Stamp Co., Dept. PMC, Calais, Me.

Electronics is simple enough for every layman to understand. So says the updated, revised book, "Electronics Made Easy," (Hawthorn Books) authored by Lothar Stern. It teaches the basics of radio quickly without complicated mathematical formulas, including how to read schematic diagrams. Hi-fi and stereo sound reproduction and components are fully explained, with the final chapters presenting 25 projects—from a simple crystal set to a PA system and valuable electronic equipment that you can construct. This 224-page book is available for \$4.95 from the Popular Mechanics Book Dept., 740 N. Rush St., Chicago.

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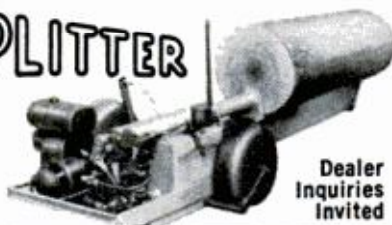
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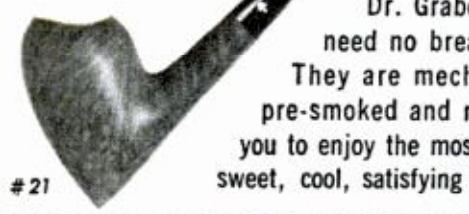
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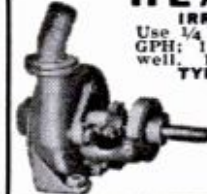
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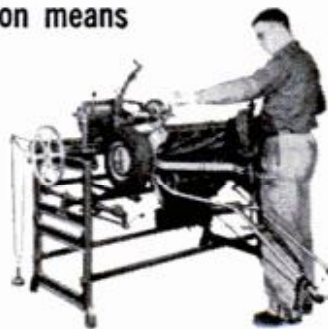
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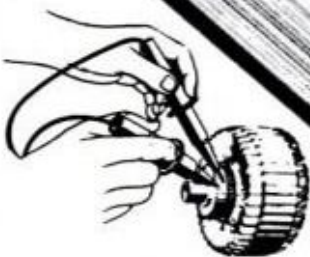
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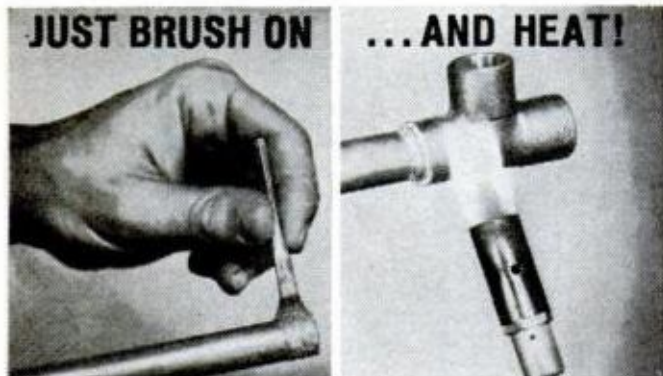


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STUART JAMES
Outdoors Editor

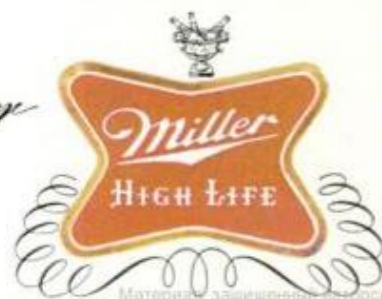
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Sidelights from the SERVICES

By William R. Kreh

Chicken bones are collected with enthusiasm by an Air Force cook stationed in England. He builds model ships with them. Airman 2/c Santo L. Sexton has even invented a special bone-binding glue to use for his models.

A "seeing eye" missile is being studied by the Navy. Called *Condor*, it's an air-to-surface missile that's guided by television. It would be dropped from a plane as high as 40,000 feet. The aircraft could turn and escape from the area while the pilot guided the missile to the target as far as 100 miles away. Television cameras in the *Condor* would feed a picture of the ground below it into a cockpit screen.

Good Scout. A 17-year-old boy in Falls Church, Va., has developed a new method of direction finding that's so good it's been adopted officially by the Army and Air Force for their survival training.

Bob Owendoff's method, called "shadow tip," works with the help of a three-foot stick driven into the ground. The tip of its shadow is marked. After waiting 10 minutes or longer, a mark is made where the tip has moved.

A line drawn through these two tip marks will always run east and west. The second mark is always toward the east. Young Bob says that more than 50,000 trials of the method show it is more accurate than other emergency systems and is usually truer than magnetic compass readings.

How high the ocean! The navy is taking to the air to find out more about the ocean. A Lockheed *Super Constellation* is being modified by the Navy to serve as a flying oceanographic research laboratory. It'll serve as a test platform for experimental airborne oceanographic instruments.

The earth's magnetic poles may be pinpointed by the end of this year, thanks to a survey Navy planes have been running since 1952. The study deals with the earth's magnetic field and the findings during 750,000 miles the specially equipped Navy planes have flown are said to support an eight-pole, rather than two-pole, theory. The program—Project Magnet—has involved flying over all the earth open

to American planes. It's hoped the study will tell why the earth's magnetic field changes from year to year by finding out how it's generated. This will then lead to more accurate settings on magnetic compasses and improved navigation.

The same type of photography that spotted missiles in Cuba recently helped save lives during floods in Morocco. Aerial reconnaissance photos taken by U.S. Air Force planes assisted rescue crews in pinpointing the locations of stranded victims. Some 2800 feet of film showed victims stranded on roof tops, canal banks, railroad causeways and at other points of high grounds. In addition, the aerial photos helped authorities determine depth of water, direction of flood movement and what areas were navigable.

Polaris submarines no longer carry bricks. Until recently, standard construction bricks were carried by the Navy's underwater missile ships. They were used as weight to sink bagged garbage so the refuse wouldn't float to the surface and betray a sub's presence. A new hydraulic device for compacting garbage into a disposable container has been developed. When the container is full, it is ejected from the sub and sinks of its own weight. In tests of the new device, trash filling a 55-gallon drum was squeezed into a package nine inches wide and 24 inches long.

Special space shaving cream will be needed before man ventures far into outer space. So says Dr. Stanley C. White of Brooks Air Force Base, Tex., who, among other things, has the whisker-disposal problem of future astronauts to worry about. He says that if astronauts shave untrammelled the whiskers might fill the cabin with a fuzzy haze and even clog up some of the machinery of their spaceship.

Pellet shooting is being tried by the Air Force. It has set up a pellet-gun training program to help its men sharpen their shooting eye and have fun at the same time. Pellet "ranges" are being set up indoors in many places—alert shacks, missile holes, even offices. The 22-caliber pellets are fired through a rifled barrel at 300 to 700 feet-per-second muzzle velocity. They're fired at targets which are attached to special "bullet traps." Of the many elements involved in shooting, all but two—noise and recoil—are involved in pellet practice. In addition to standard targets, there are several "fun and game" targets on which the shooters play checkers, ticktacktoe, anagrams, etc.



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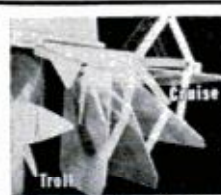


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Spotlight on the Jeep Wagoneer

By Ed Nelson



DISENGAGING LOCKING HUBS for gas-saving free-wheeling in over-the-highway operation is a finger-tip job

HAVE YOU EVER SEEN a trimly-gowned matron driving home from town, detour suddenly across a muddy field and up a snowy slope?

Neither have we, but Willys is betting you could, since the introduction of its new Jeep Wagoneer, a luxury station wagon on a muscular chassis that would do credit to an armored scout car.

Your first clue to the car's dual nature comes as you climb in. It's a high step, not quite the thing for grandma's hobble skirts, but the padded full carpet and tasteful interior, give it appeal that Willys wagons never before dreamt of having.

There's no step-down, although there's a sizable doghouse for transmission, transfer case, and the forward propeller shaft that goes to the right of the engine to drive front wheels through an offset differential.

The well-located instrument cluster has warning lights for oil pressure and alternator charge. A broad, slightly curved windshield with thin A-pillars and your high, bridge-of-a-ship perch give you sweeping vision all around. You know just where you're putting the car and can park it almost anywhere. A foot-operated park-

ing brake is a welcome convenience.

Seat height and headroom both are fine front and rear, but we'd like to see a little more rake to the seat backs—or adjustable backs *a la* Rambler. With Willys' design you sit bolt upright, which is fine for off-the-road operating but does not give lounge-chair comfort for turnpiking.

With the back seat folded down and the steel floor panel in place, cargo space is long (111 inches to the end of an open tailgate) and wide (55 inches). The rear opening is nearly 40 inches high.

Road clearance (7.7 inches) is good for cross-country work. In the driveway you'll find a gallon anti-freeze can slides under the sills. Fifteen-inch wheels help.

Willys' Tornado, America's only production overhead-camshaft engine, is rated at 140 horsepower and feels extra strong yet well-behaved. *PM's* test car did 0-60 in just under 17 seconds. Torque (210 pound-feet) peaks at only 1750 rpms for good low-range power. The 8.5:1 compression ratio is satisfied with regular gas. According to a surprisingly accurate speedometer, we rolled along at 60 without fuss and

[\(Please turn to page 46\)](#)



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Spotlight on the Jeep Wagoneer

(Continued from page 44)



THE WAGONEER IS A NEW combination of motorized muscle and stylish comfort. Interior room is generous

found the Wagoneer stable in crosswinds with a solid, heavy feel—hardly imaginary since it weighs nearly 4000 pounds fully equipped. Stiff springing helps stability even though the car is about 10 inches higher than the average '63.

The overhead cam design by-passes a series of valve train elements to make any necessary adjustments easier and less frequent. The entire cylinder head assembly, including camshaft, rocker arms, valves and springs, can be removed as a unit for bench servicing. With the 3.73:1 rear axle (standard with the automatic), the engine runs at reasonable speeds. The heavy duty three-speed transmission with torque converter is quiet and works easily as a passenger car's.

At under 184 inches overall, the Wagoneer is only 3-plus inches longer than a Corvair and lots higher, yet doesn't look at all stubby. It's 7 1/3 inches longer than the old Willys wagon, 4 inches wider, and 8 inches lower. But instead of looking high and square (which it is), the car looks like a well-designed compact on a high-water chassis.

As with many front-wheel-drive vehicles, your turning-circle diameter is limited, but with a 41-foot circle, the Wagoneer's penalty isn't severe. Heavy duty springs, so valuable when you're walloping across the fields, give a slightly jiggly ride on smooth concrete. Every highway expansion joint is telegraphed through the wheels into the body. But the seats, firm enough to give support, have a soft surface to minimize the jiggle.

As you'd expect, a two-wheel-drive version with independent torsion bar front suspension (\$135 extra on FWD models), rode somewhat less choppily on bad pavement. But even the solid-axle Wagoneer's ride can't be called "truck-like." It's a good compromise between a compact and

(Please turn to page 48)

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Spotlight on the Jeep Wagoneer

(Continued from page 46)



CARGO SPACE IN the Wagoneer is long, wide and high. The tailgate makes a handy-height work platform

a stiff-sprung pickup and one you can live with on long trips. With power steering (\$81), the car is light-footed and threads easily through traffic.

Another slight penalty comes with Willys' front-wheel drive. The solid front axle and power steering seem to interfere with the caster action that returns the steering wheel after cornering. You'll have to get used to steering out of a corner as well as into one.

Four-wheel drive spreads the pulling power among four tire prints instead of between just two. Unless you're doing really rough work with a special traction problem, you can ride all winter without hearing singing snow tires.

It showed its value in a winter test on a long, slick hill before sand trucks arrived. We couldn't make it in two-wheel drive. On a second try, just as we started to slip, we leaned over to pull the knob peeking through the carpet near the throttle foot. (You can do it while rolling.) The transfer case and front wheels engaged, the little green light went on and we rolled straight up the hill. By comparison, a compact wagon with snow tires and a limited-slip differential also made it, but with some fish-tailing at the rear end. And despite its special equipment, the limited slip compact could never shove its "dead" front wheels through mud or deep snow, as the FWD Wagoneer does easily.

For the roughest work, the FWD Wagoneer also has a Powr-Lok rear differential. And for this purpose you'd order manual transmission. Its transfer case has two ranges—a 1:1 High for slippery going or steady normal-speed driving and a 2.03:1 Low for stump-yanking power.

At a basic \$3332, the FWD Wagoneer isn't for every casual motorist. But for six-passenger comfort, good cargo capacity and year around agility on or off the road, it deserves careful consideration. Adding the automatic plus power options make it behave as docilely as a family pet. ★★★

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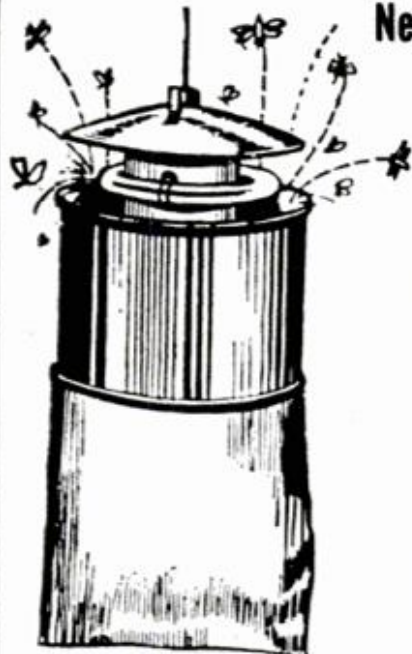
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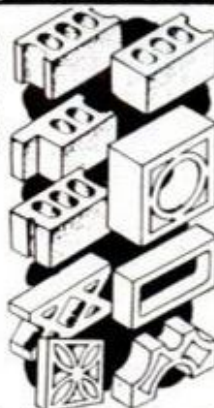
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Tune in on the Inventors

Talking underwater is now possible with a new breathing mask which permits swimmers to communicate via air valves. Kept secret by the Navy for four years, the device won patent 3,076,174 for Walter N. Wainwright, Waterford, Conn., and Russell I. Mason, Barneveld, N.Y.

Duck hunters and soldiers can take shelter in a portable shooting blind designed for swamps and water areas. Patent 3,075,252 went to Adolph King, McKenzie, Tenn.

Underwater missiles can be tested with a small-scale test-launch vehicle which can be shot from submerged vessels and recovered intact. It won patents 3,075,301 and 3,075,302 for Willy A. Fiedler, of Los Altos, Calif., and Joseph E. Madden, of Mountain View, Calif.

Fishermen who like equipment in neat packages will welcome a new folding chair with a fishing-pole holder and a tackle box all in one piece. It won patent 3,077,327 for Glenn L. Batie, Virgil U. Speed and Edmund E. Fuerst Sr., all of Iowa.

Copying colored negatives and originals is simplified by a process developed by Alfred Simmon and Louis L. Weisglass, both of New York. Patent 3,077,140 describes how a light-collecting reflector and color filters reduce the number of correction filters required.

Boats can be stored out of water in a portable boat house which won patent 3,077,742 for Philip Brown of Keegan, Me.

Using a continuous belt instead of a dial face to show the hour hands, a straight-line clock invented by James T. Wynne of North Little Rock, Ark., has been granted patent 3,024,590. The electric timepiece runs on a synchronous motor and uses a system of pulleys to record time accurately.

Continuous meals can be served without having to bother with dirty dishes on a new automatic table which contains a dishwasher in its lower compartment. Eating trays rotate 180 degrees for scouring in the washer. Patent 3,075,215 went to Edward Marue, Northridge, Calif.

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FORD Vs. CHEVY

at the Indianapolis 500

What happens when Grand Prix champions racing American V8s challenge the old Indy pros in their heavier (but traditionally successful) Watson-Kurtis racers? Here's the inside story on Indy's most exciting year

By Jim Whipple

ANYONE who ever called the Indianapolis 500-mile race "a dull contest that proves nothing of value" will have to eat his words this year.

For 1963 is the year that Ford-engined cars may run against Chevrolet-engined cars at the "Brickyard" for the first time in history.

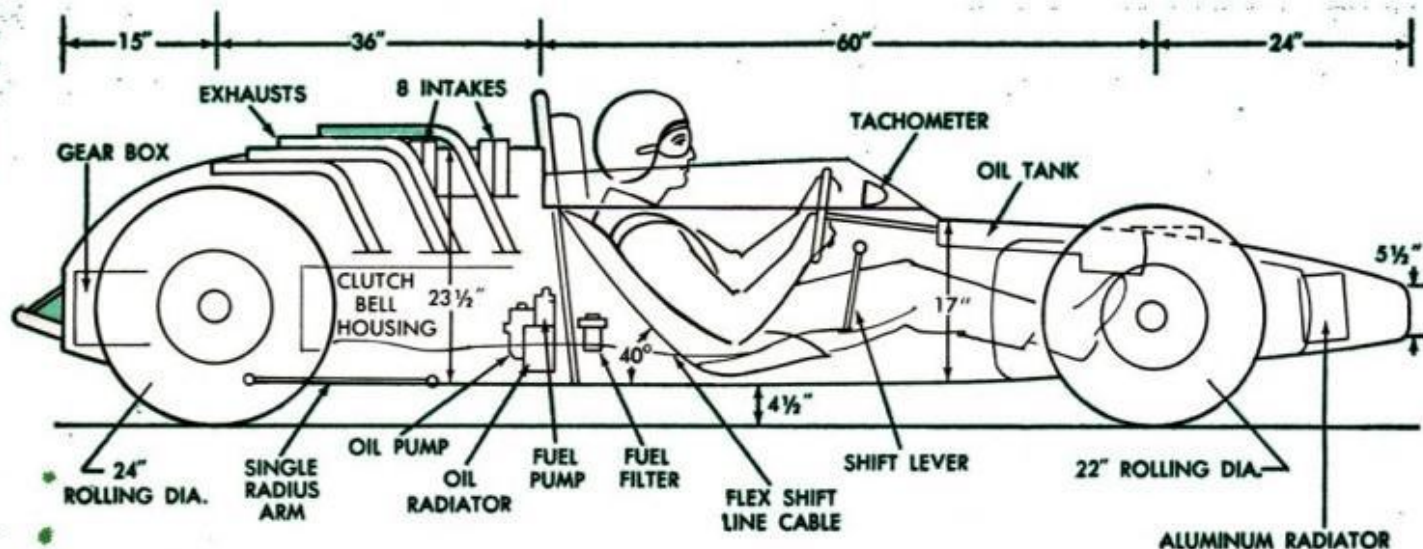
This is also the year that at least 10 rear-engined cars will be in the garages of Gasoline Alley at qualifying time. And this is the year when the World's Champion Grand Prix driver, Graham Hill, will be competing against Dan Gurney, one of America's top drivers and a strong contender for Hill's World Championship last fall.

This is the year that may well see dethronement of the famed Offy (Offenhauser) engine, the four-cylin-

TYPICAL, Offenhauser-engined roadsters like these have been winning at Indy since World War II. Improved each year, they run faster and faster, but this year may lose



Will This Chevy V8 Win at Indy...



HARVEY ALUMINUM special at left, by Mickey Thompson and powered by an aluminum Chevrolet V8 of 350 horsepower will weigh 1050 lbs. dry, 36 percent less than the average Watson or Kurtis-built Offy-engined car. Sketch, top, shows the major parts

der wonder that's been taking the checkered flag at the historic "brickyard" for decades. This is the race that could change the shape of Indy cars for years to come as the typical Offy-powered, solid-axle, front-engined "Indy cars" of A. J. Watson face at least two teams of the "new era" cars, lighter, lower, rear-engined, and independently suspended, with chassis designs proved in European road racing.

This is also the year that a winner may come down victory lane with just gasoline in his tank as opposed to the blended fuels (benzol, methanol and alcohol) that the Offys use, for one team plans to run on 103 octane super premium. Paradoxically, the lightweight English racer driven to a ninth place in 1963, may compete this year, but this time with an Offy engine.

Just a few seasons back, when Indy's 2½-mile, four-cornered oval was a virtual monopoly for the Meyer-Drake Offy engine, with an occasional unsuccessful challenge by the heavy Novi V8's, there was some justification for the claim that the "500" had abdicated its traditional role as an automotive proving ground.

Nothing could be further from the case

this year. Cars will be running with either carburetors or the traditional fuel injectors. Some cars may have transistorized ignition, both contact point and breakerless, as well as magnetos; valves will be operated by pushrods as well as by overhead camshafts; independent suspensions will be matched against solid axles; new types of tires will be running. New brake materials will be in use on the traditional discs, and dozens of other innovations will undergo one of racing's toughest tests.

Driving Showdown

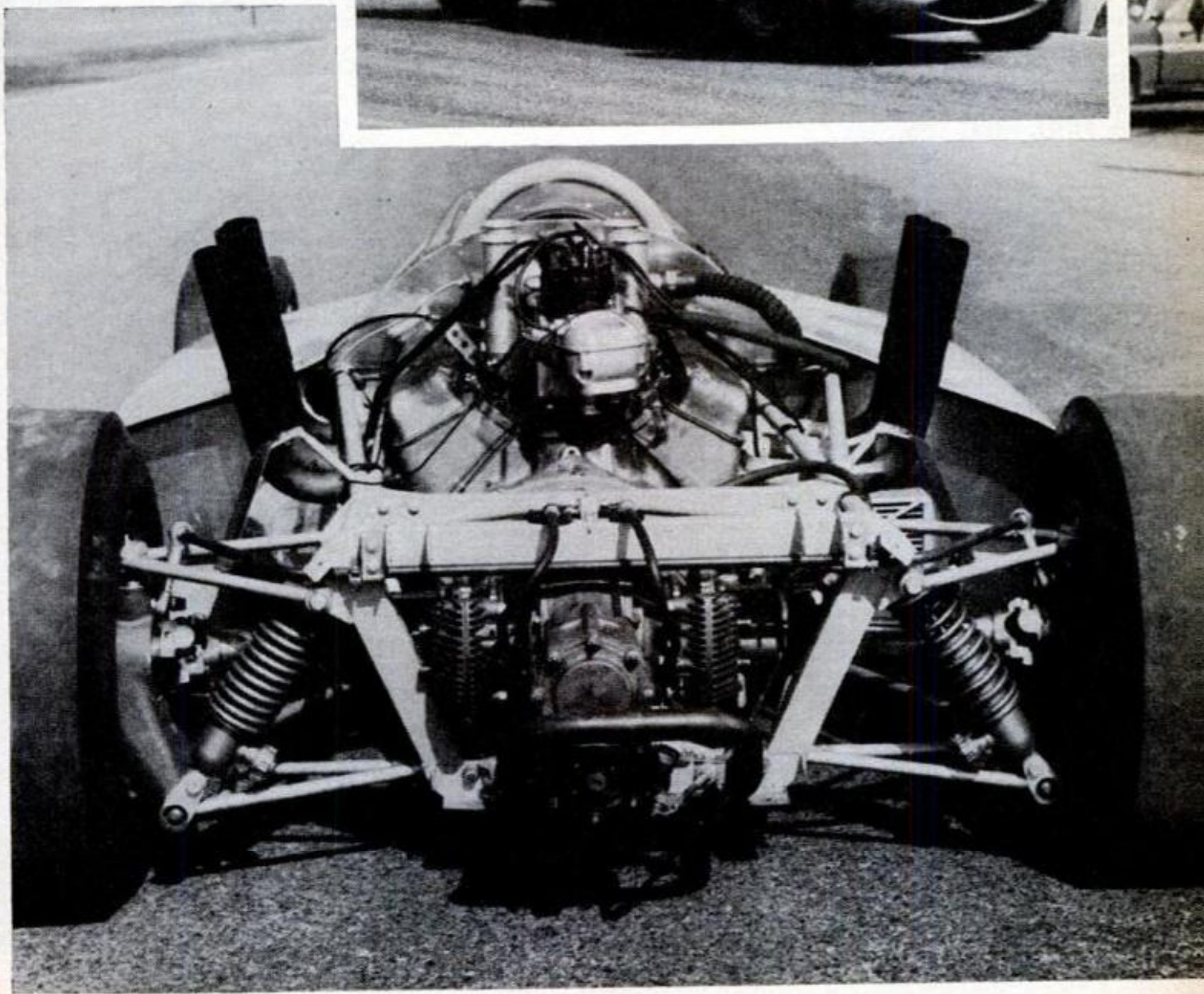
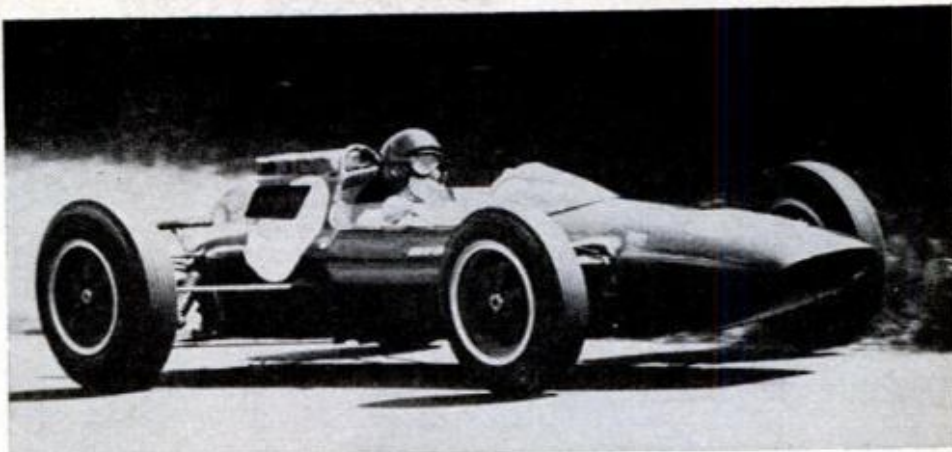
Drivers, too, will learn new tricks as the top European road-racing champions swap skills with expert Indy old pros. For some time now, in fact, the average U.S. driver has been a bit scornful of the European Grand Prix chauffeur, the so-called "sporty car" driver with his spidery machine and courteous "Thank-You's" waved at drivers whom he's passed. On the other hand, the Europeans have felt that 500 miles of nothing but left turns on near level pavement, was not a true test of either cars or the skill of the drivers.

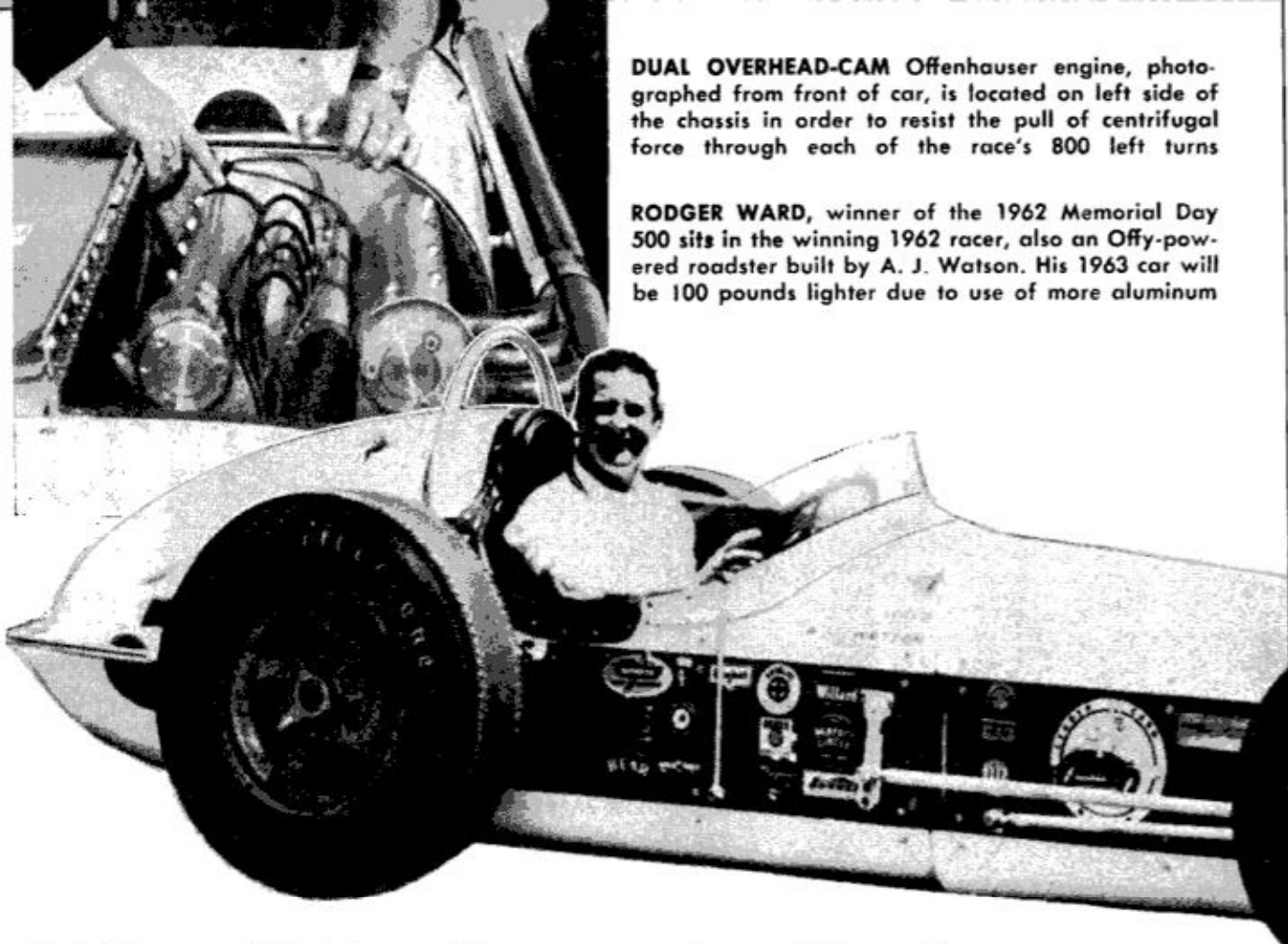
...Or Will a Ford V8 Win?

FORD'S FAIRLANE V8 cast in aluminum will be the push behind Dan Gurney, who will be driving a Lotus similar to the one shown at the right except for a set of wide-tread, slick tires

GRAHAM HILL (center photo) checks new Mickey Thompson car at Riverside, Calif. Shape of rear bodywork and exhaust stacks had not been worked out at time of these trials

CHEVROLET V8 sits about as low as possible in the rear of Thompson's car. Note the inboard disc brakes with finned calipers at either side of the quick-change differential





DUAL OVERHEAD-CAM Offenhauser engine, photographed from front of car, is located on left side of the chassis in order to resist the pull of centrifugal force through each of the race's 800 left turns

RODGER WARD, winner of the 1962 Memorial Day 500 sits in the winning 1962 racer, also an Offy-powered roadster built by A. J. Watson. His 1963 car will be 100 pounds lighter due to use of more aluminum

But this year, U.S. drivers will emerge with new respect for Grand Prix machinery and the Grand Prix drivers will learn that 500 miles at Indy is no easy "piece of cake."

All this renaissance of new ideas at Indy began back in 1961 when a lone English Grand Prix driver, Jack Brabham, then World Champion, entered a small, light car built by Britain's John Cooper and powered by a 167-cubic-inch 300-h.p. Coventry Climax engine. Even without tires tailored to the track, Brabham found that he could do consistent 141-142 mile-per-hour laps in the race. He finished ninth among the field of 255-cubic-inch, 400-horsepower, Offy-engined cars.

The Crucial Right Turn

Driver Brabham learned something about the typical Indy car in that race. As he expressed it, ". . . they haven't got a first class suspension. They're very, very rigid . . . they're loaded on the left-hand side of the car and made for left-hand corners and they're so biased that way that the moment they've got to turn right to miss anything the car just doesn't turn—it spins.

"This is what happened this year (1961). Somebody lost it and the driver behind tried to go to the right to avoid him. His car spun, too, and there was a pile-up. I was right in it, but the Cooper gave me no trouble at all. I just turned right and

went around the car."

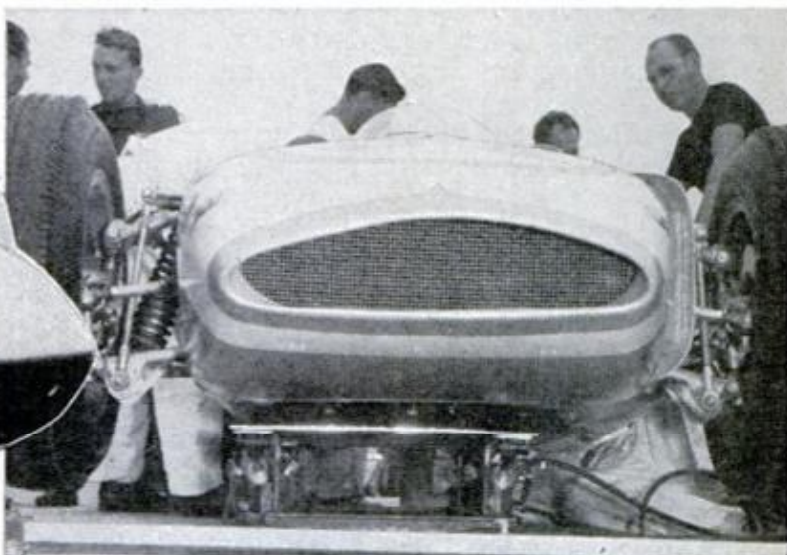
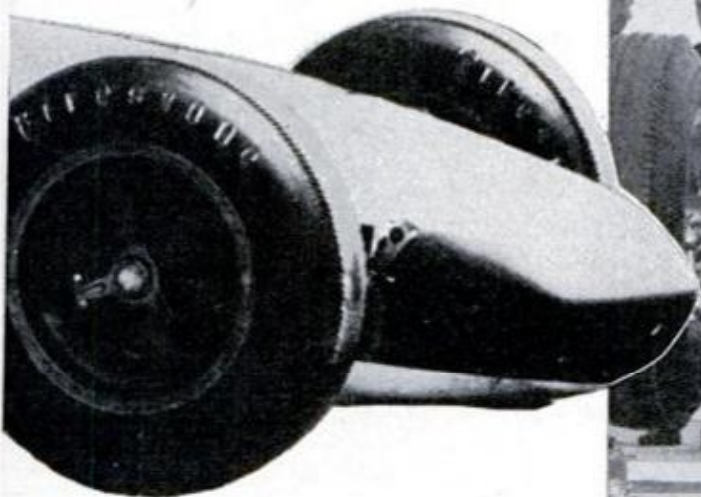
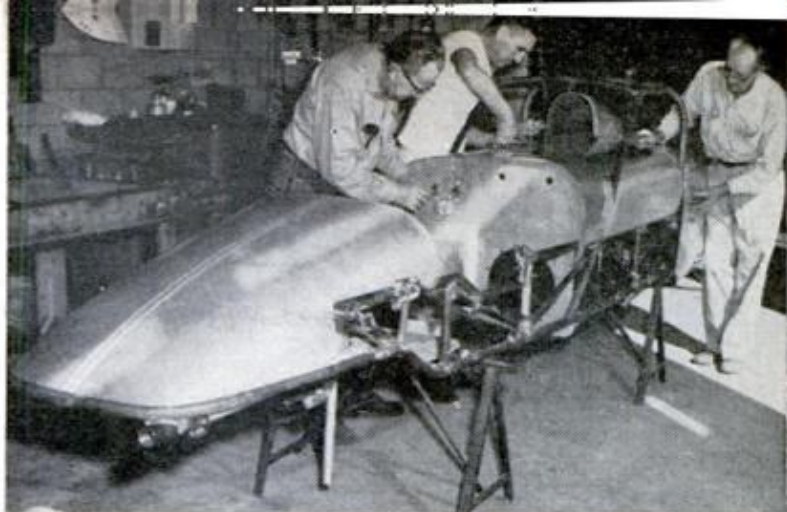
But most important, Brabham learned what a small car could do in the 500. As he put it, "our car was much quicker through the corners. Unfortunately we were not quick enough down the straights . . . they were holding us up in the corners and leaving us behind on the straights. There's no substitute for horsepower there . . . unless you can compete down the straights, you can't compete at Indy."

What Brabham learned about the maneuverability and safety of the smaller, lighter, independently suspended car was not lost on California speed merchant, Mickey Thompson, who brought three lightweight, rear-engined cars to Indy for the 1962 race. He watched one of them, driven by Dan Gurney, move up to 9th place by the 96th lap, when a transmission seal failure forced it out of the race.

This car was powered with a much modified 330-horsepower version of the aluminum Buick Special V8. Although this engine held up turning at 7000 r.p.m. with its pushrod-and-rocker-arm valve train, it was obvious to Thompson that both additional power and a greater reliability factor would be necessary to insure an even chance of victory. After all, the Buick's Skylark V8 started out in stock form as a 215-cubic-inch engine rated at 195 horsepower, and the Offys were pulling 400 horsepower on the same

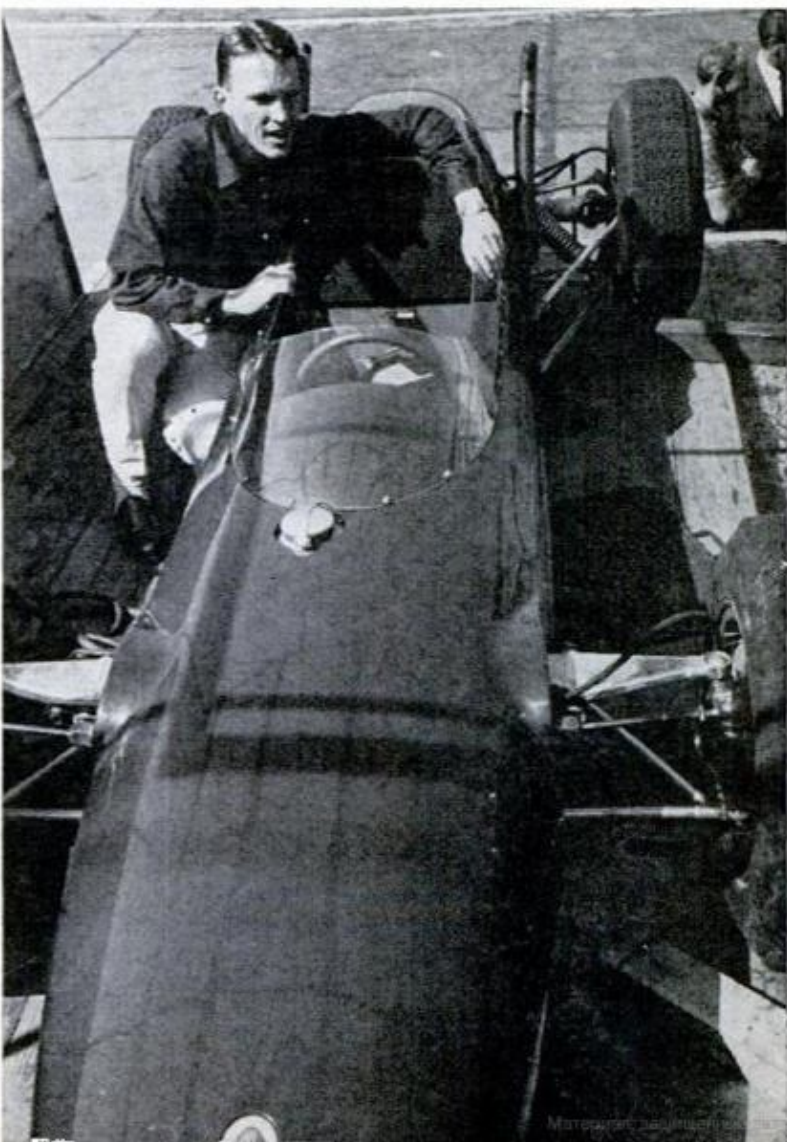
[\(Please turn to page 196\)](#)

SAFETY ENCLOSURE of 1¼-inch light alloy thick-wall tubing will protect driver of Frank Kurtis' Offenhauser-powered car. The "cage" is an integral part of the independently-suspended frame



PIT STOP (center photo) during 1962 qualification at Indy shows Thompson's Buick V8 entry, driven by Dan Gurney. The same entry may run this year with Chevy V8 power against Ford-Lotus V8

LONG, LEAN LOTUS, with Dan Gurney leaning on the engine compartment, will be the smallest car ever to run at Indy, but its aluminum Ford V8 will deliver in excess of 360 horsepower from 255 cubic inches of displacement. Car's weight is expected to be near 1100 pounds dry. It has been clocked in trials at Indy at 149.378 m.p.h., just under the track record





25 Tips on Shopping For **Lawn Mowers**

By Jackson Hand

WHERE MOWERS are concerned, only rarely will the biggest, shiniest and most expensive be the *right* one. The mower you want is the one that does the best job for *you*. It's not hard to find if you know what to look for.

1. Buy the least lawn mower you need. Spend the extra money on quality. If you can mow your lawn in less than 15 minutes you don't even need a power mower. If not, decide on the minimum size and accessories your piece of real estate will require.

2. Reel or rotary? Your lawn decides this. If terrain is hilly, with sharp embankments or rolling hummocks, a rotary will dig soil on the crests and wedge in the valleys. Also, if you have bent grass or other low-lying varieties, use a reel type. A rotary may cut the reclining stems and leave stubble. But if it's rough grass, a rotary's four-wheel suspension levels it out. Even on smooth lawns, the trend seems to be toward rotary. One reason is economics. A rotary, because of parts and

assembly, costs less to manufacture.

One drawback: Rotaries must be handled with more care, although ordinary safety precautions apply to either.

3. Self-propelled or U-push-it? Most reels are self-propelled, but rotaries are so light and easy to use that you don't need drive features unless you have a huge or heavily sloping lawn or a weak heart.

Self-propelled mowers set a pace you might not like and, when you get down to short strokes around trees and shrubs, you have to use manual and they then push hard. They have more moving parts, take a bigger engine and put more strain on it.

If you really need a self-propelled mower, you may want a riding mower.

4. What size? 18, 21 or 24-inch? A good 18-inch rotary will cut close to an 18-inch swath. A 21-inch of the same quality will cut about 19½ inches, and so on. It has to do with torque and the fact that virtually all the resistance offered the rotating blade is at the tip; it slows the engine.

LONG DRIVE BELTS, generally, should have idler pulleys to control tension. Check belt on riding mower; belt replacement on some may require dismantling

BIG WHEELS are big asset. They roll easier, last longer. Best wheels of all sizes are cast or stamped and use ball bearings. Wheels should be easily oiled

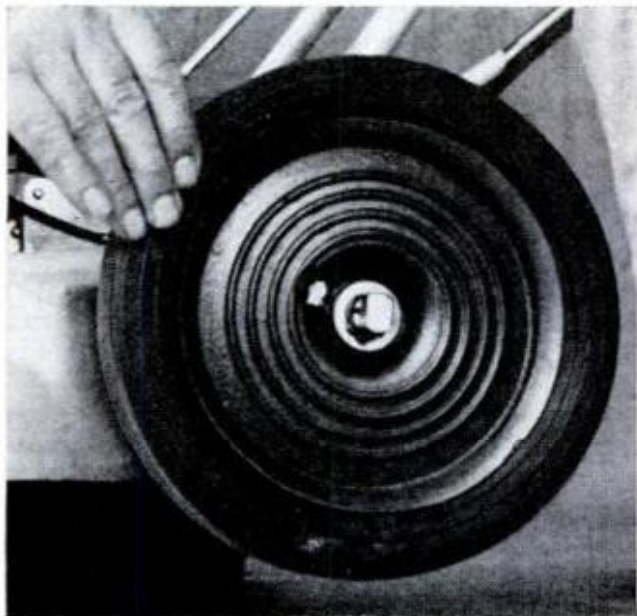


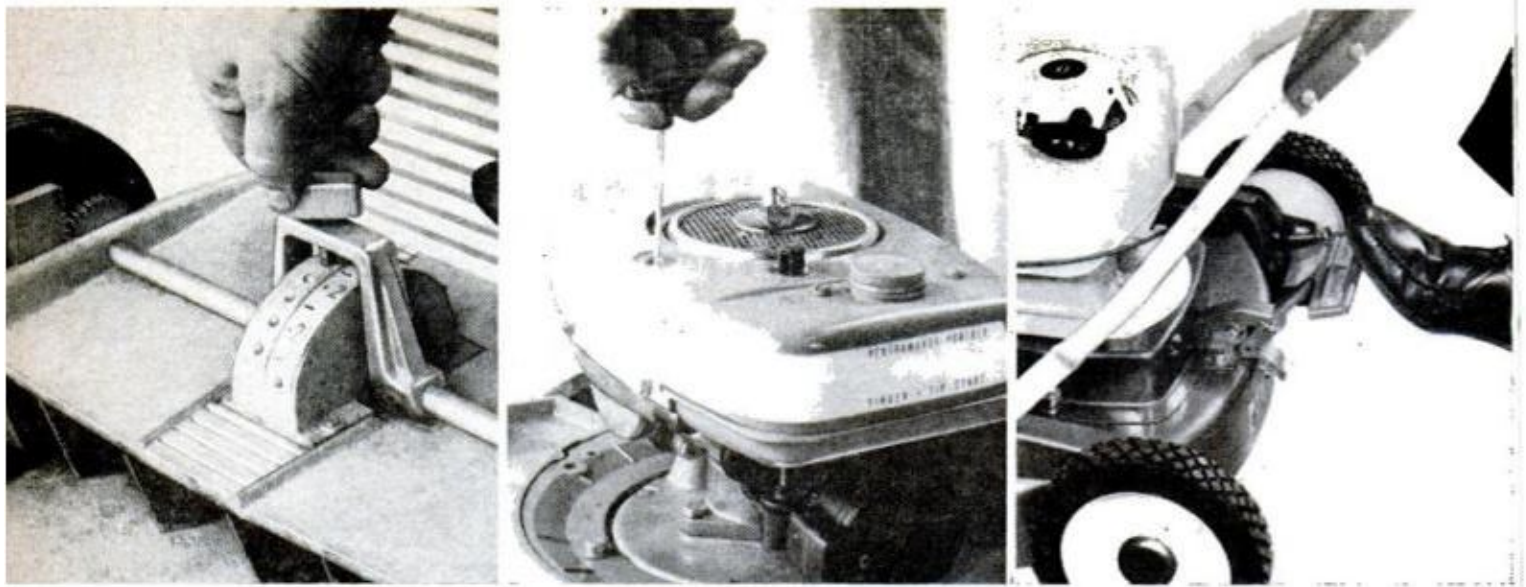


LIFT IT! This is one of your first tests. You'll be doing it a lot later, especially on non-drive mowers. You don't want a flimsy machine, but one compact enough to carry. Compactness is sign of good design, although larger machines for larger lawns may not pass this test

SELF-DRIVE MOWER may have pawl drive or differential. Lift one wheel and try to turn it. Differential won't turn; pawl turns with a ratchet click

CUTTING SWATH can be checked by laying straight-edge across outside of wheels. It should cover tip of blade, indicating blade will cut beyond wheels





OTHER FEATURES: Height adjustment should be simple. Most work one wheel at a time, but some (left) raise two wheels at once. Starting is easier on new models (center). One pull, straight up, is enough. Extra-hot spark does it, and straight-up pull eliminates risk of pulling mower over your feet. Safety clutch (right) stops blade rotation on one model without shutting off engine, and blade spindle mounted to the frame is driven by belt from motor shaft. This protects shaft from damaging shock when blade strikes heavy object and stops. Other models feature fly-away blades that swing freely when large objects are hit

down less when the tip is 9 inches from the shaft than when it is 10½.

There are other factors. Big lawn mowers are for big, smooth lawns. On uneven lawns, big mowers scalp high spots more and leave more uncut in the valleys. Big mowers are harder to work around trees and other obstructions so, for the average lawn, it's wiser to spend the extra cost of a larger mower on extra quality in a smaller mower. Here is a rule of thumb:

For a 50-by-50-foot yard—an "18."

For a 100-by-150-foot yard—a "21."

For a larger yard—24 inches and up.

5. How powerful? Whether it's two-cycle or four-cycle should not make a difference. Mufflers cut down the noise on both equally. Oil-with-gasoline is a pretty foolproof lubricant on the two-cycles, and a four-cycle with its oil-filled crankcase may not get adequate lubrication in some parts in certain operating positions. But, the overall engineering on either is good.

More important is the horsepower. An average residential mower needs 2½ to 3 horsepower. However, for Bermuda, zoysia or St. Augustine grass you may need 3½ hp. Reel types usually require a half horsepower more than rotaries, and rider engines start at 3½ hp. and go up.

6. Where should you buy a lawn mower? The best place is at a garden-equipment outlet that also does maintenance for commercial gardeners. Usually their repair service is tops. It isn't the initial purchase as much as later maintenance service—or lack of it—that causes most problems.

The rule of thumb is: *You should be*

more interested in repair facilities than in price when you buy a lawn mower.

7. Check the handle. In the store, start with the handle. It should be adjustable so you don't have to stoop to use it, and it should be strong enough so you can twist it and raise one side.

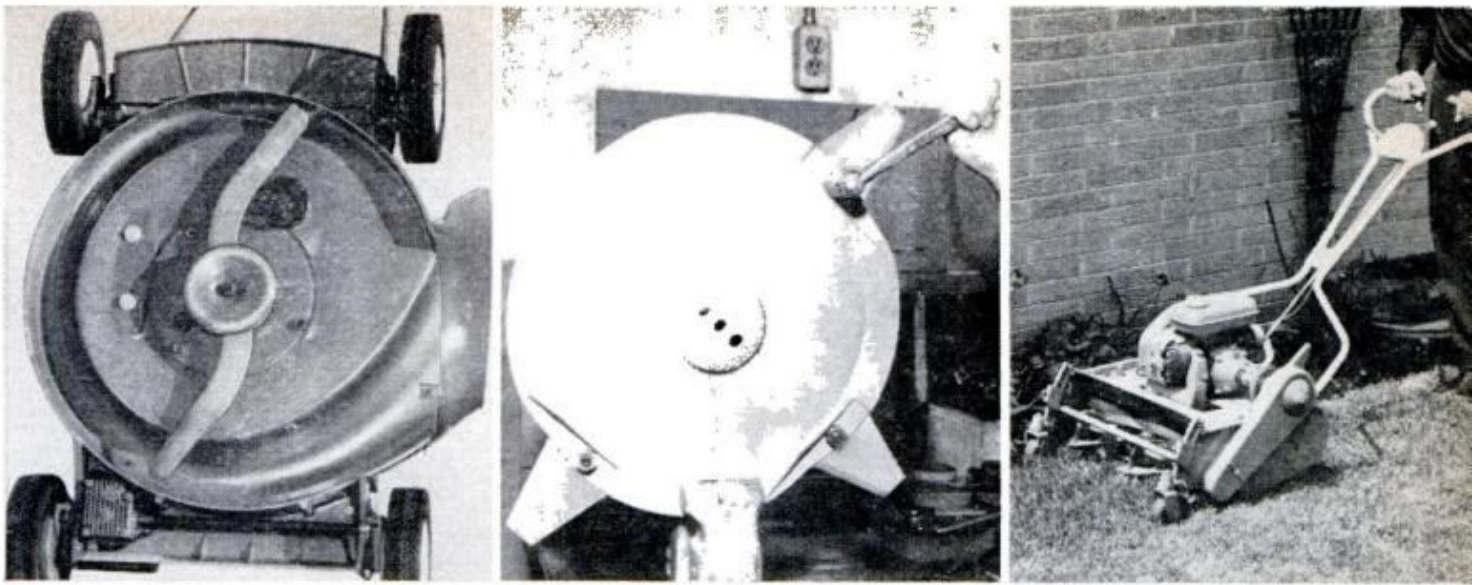
8. Check the controls. They should be on the handle or safely on top of the machine. Start, idle, light-cut and heavy-cut are desirable settings. Watch to see how much backlash or slack there is.

9. Check the starters. Electric is easiest, especially battery types, because mowers seldom stop close to electrical outlets. But recoil starters are not hard to handle. The newest idea is a one-stroke variety which primes at the beginning of the pull, then turns the engine over toward the end.

10. Check the housing. On rotaries the housing is also the chassis. It can be stamped or cast, provided it is buttressed for rigidity. Beware of thin, flimsy castings. A stone thrown by the blade can break through. Strong aluminum or magnesium castings rate high. Steel housings are strong with riveted or welded braces, but may be too heavy.

11. Check the chassis on reel mowers. They are usually strong, but should have metal covers or decks that cover the reel. Belt guards are essential.

12. Check the wheels. A large wheel rolls more easily than a small one, and the best wheels are ruggedly cast or stamped, and use bearings, although hardened pins and wheel cores are good enough. Four identical wheels are best on self-drive



ANGLED BLADES on new model (left) provide shear cut and reduce impact if blades strike hard object. Most blades, however, are straight with some propellor-like twist to give maximum blowing action on cuttings. Another new design (center) has disc with small double-edged blades bolted at four positions. When one edge dulls, blade can be flipped over for double life. These blades also swing away when heavy object is hit, protecting center shaft. Reel mowers' problem—that they can't cut close to edge—is overcome on rear-drive model (right) on which cutter reel is wider than wheel spread, a feature common on rotary-type mowers

mowers, so that they can be interchanged.

13. Check the forward drive. Riding mowers need variable forward speeds to adjust to the heaviness of the cut. Forward drive on walking mowers needs easy on-off-neutral positions. Push a self-propelled model by hand to gauge the difficulty of moving and maneuvering it in corners.

14. Check height adjustments. Cutting height is not changed often, but it must be done by simple mechanical means. Best method is by eccentric wheel mounts that can be rotated.

15. Check over-all design. Look for compactness. Close wheel positioning on rotaries gives a smooth cut. Blade should extend beyond wheels for close trimming.

16. Grass catchers are optional. Still in great demand, grass catchers are frowned on by some. Best rule: If clippings are long and heavy and might smother grass, remove them. If you mow frequently, grass clippings are small enough to drift down through the grass where they will decompose and add mulch to the soil.

17. Close-coupled design is important in riding mowers. Look for short wheelbase, big drive wheels, jointed front axle.

18. How many drive wheels? One may not be enough, unless you can switch tires when one wears out. Better machines drive with two wheels; some have differentials.

19. Want a double-duty machine? Popularity continues for a riding machine with a powered drive unit that cross-hitches to push a regular lawn mower ahead of it. The mower comes off for trimming corners that riding mowers won't reach.

20. Check safety features. You might regret buying any machine that does not have the seal of the American Safety Association. Reel mowers do not throw objects, but those thrown by rotary blades can have projectile impact. Rotary housings should hang below blade level.

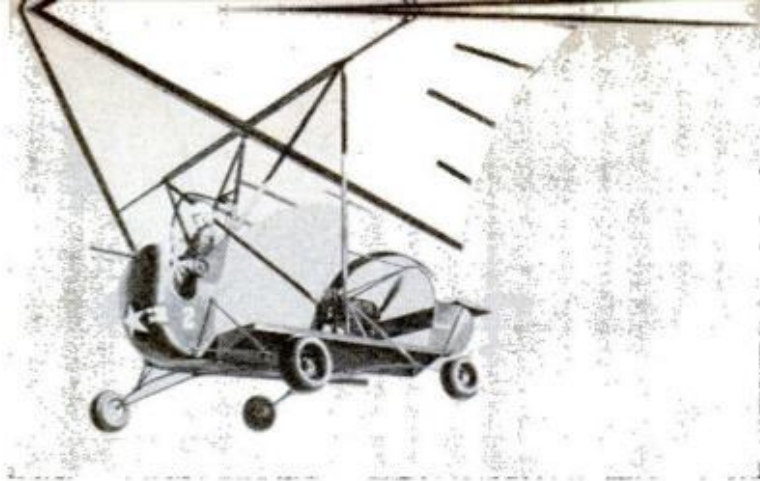
21. Check blade design. The newest rotary designs work on the principle of a slicing cut caused by an angled cutting tip. This feature is found on steel blades forged into an approximate S-shape, and in flat-disk blade receptacles to which three or more small cutting sections are riveted.

22. Check reel design. It is affected mainly by the number of blades. Many blades mean a fine cut but, since tall grass can't spring up between the close-spaced cutters, you must mow more frequently. Wider spacing minimizes this problem.

23. Check crankshaft protection. A rotary mower must have a clutch-slip or shear-pin to prevent shock to the critical motor shaft. In some models, bolted-on blade tips stay in place for cutting grass, but swing freely when they hit a heavy object. One manufacturer puts the blade on a separate, belt-driven shaft.

24. Electric mowers are best for small lawns. Few things can go wrong with electrics, and they mow beautifully. Safety features should include dead-man switches on handles, and an electronic brake to stop the blade or a visible signal that the blade is turning.

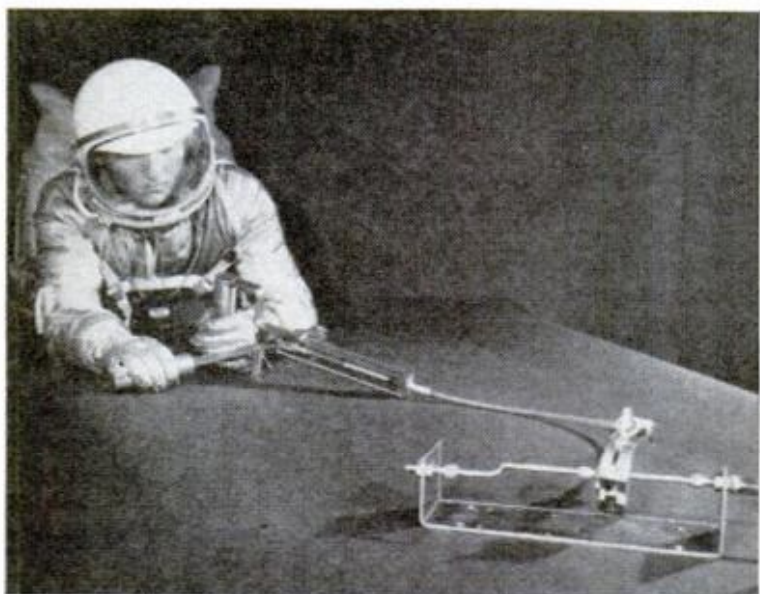
25. Try it out on your lawn before buying it. This is the acid test. If the dealer won't let you, find another dealer. ★★★



Flying Fleap

Two flexible-wing vehicles will be built by Ryan Aeronautical Co. under a recent Army contract.

The two new test craft will carry a pay load of 1000 pounds, have a range of 100 miles and a take-off distance of 300 feet. The *Fleap*, as it is dubbed, is intended as a utility vehicle which will be used by the Army.



Tools for Space

Special tools will be needed for astronauts working at zero gravity so that the men can apply force without floating away.

One firm's torque-free tools operate on the "closed force path" principle so that one part of the tool counterbalances another part. This would prevent an astronaut from floating away at the turn of a bolt. Space tools could also be power-driven.

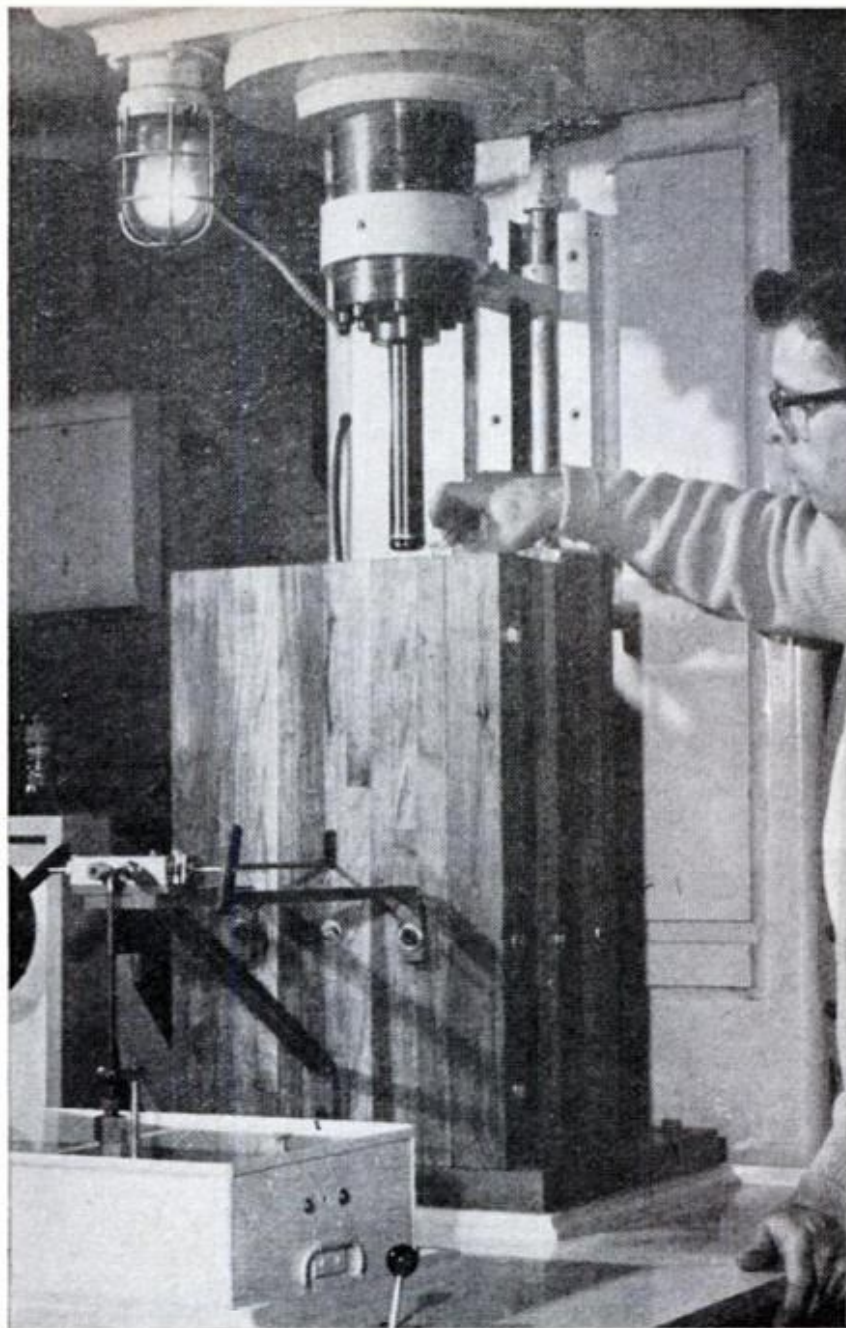
The firm, American Machine & Foundry Co., is developing three types of tool, two kinds of wrenches, and a nut and bolt tool. In use here is a wrench.

British "Winter Car" Has Engines Front and Rear

The Mini Moke, on the frame of a British Mini with an extra engine driving the rear wheels, got a heavy workout during England's record winter. It can climb a 27½-percent grade easily. Rush,

10-day production was directed by Alec Issigonis, British Motor Corp. engineer. BMC says the 72-horsepower vehicle is experimental, though reportedly it may be sold in England for \$1330.



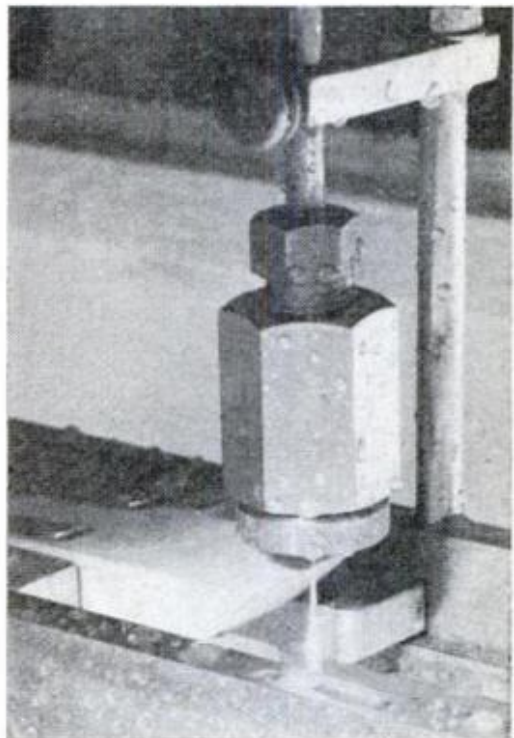


Water Saw

Jets of water, moving at 3000 feet per second, cut wood and save much of the waste lost in sawdust (as much as 40 percent of the log) in normal sawing.

The jets, formed by compressing water at 50,000 pounds per square inch, range from .001 to .010 inch in diameter, making ultra-thin, sawdustless cuts.

The research at the University of Michigan may lead to water saws that can trim limbs from logs as they are prepared for the mill, that save time and money, and require little maintenance.



Versatile Garden Cart

Any number of lawn chores can be accomplished with this adaptable garden vehicle. Besides such regular work as hauling trash, gathering leaves and grass, and carrying garden supplies, the Fold-A-Kart can also be used as a hand truck for loads up to 150 pounds, such as garbage barrels. With the rubber-tired wheels folded sideways, right, it can run along flower beds to dump peat and topsoil where needed.

It folds to a slender five-inch width for storage, and fits into automobile trunks for camping or picnic trips. The cart is available at \$18.95 (in most states) from Fold-A-Kart, Inc., 1010 Denison Ave., Cleveland 9, Ohio.



MAY 1963



A Nationwide Survey
Based on 1,297,466
Owner-Driven Miles

Owners Love Driveable Chrysler, Criticize Headroom, Rear Vision

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

The "Buy Again" → percentage is the highest recorded in PM for a domestic car since 1955. The Excellent percentage is highest since PM switched to a four-point rating system last year

THE BIG STORY gleaned from our PM survey on Chrysler was one of a remarkable degree of owner satisfaction.

Some 91.3 percent of all owners responding to the PM questionnaire stated that they would buy another Chrysler. An exceptionally high 73.7 percent rated their new Chryslers as Excellent, while 23.5 percent called them Good. This left only 2.8 percent to split between the Fair (2.0) and Poor (0.8 percent) ratings.

Contributing to these favorable ratings was the Chrysler's apparent mechanical soundness at the time of delivery. Over 75 percent of all owners responding reported no mechanical trouble of any kind.

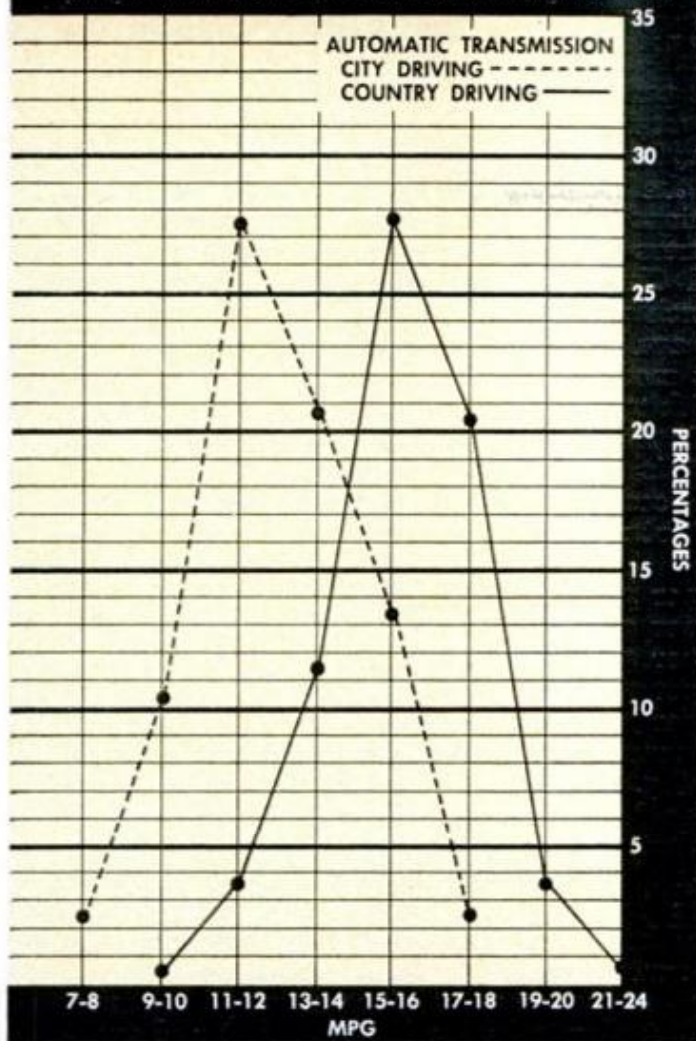
Fuel mileage did not prove to be as much of a concern as fuel cost. Although 59.2 percent of the owners felt that mileage was about what they expected (14.9 percent called it better and 25.9 percent not as good), the third ranking

POWER AND PERFORMANCE, handling ease and interior comfort got widest praise from Chrysler owners

| | |
|----------------------------|---------------------------|
| Comfortable Ride (52.2%) | Lack of Headroom (15.4%) |
| Easy Handling (48.3%) | Poor Visibility Aft (14%) |
| Snappy Performance (31.6%) | Fuel Cost (7.3%) |



WHAT MILEAGE DO CHRYSLER OWNERS GET?



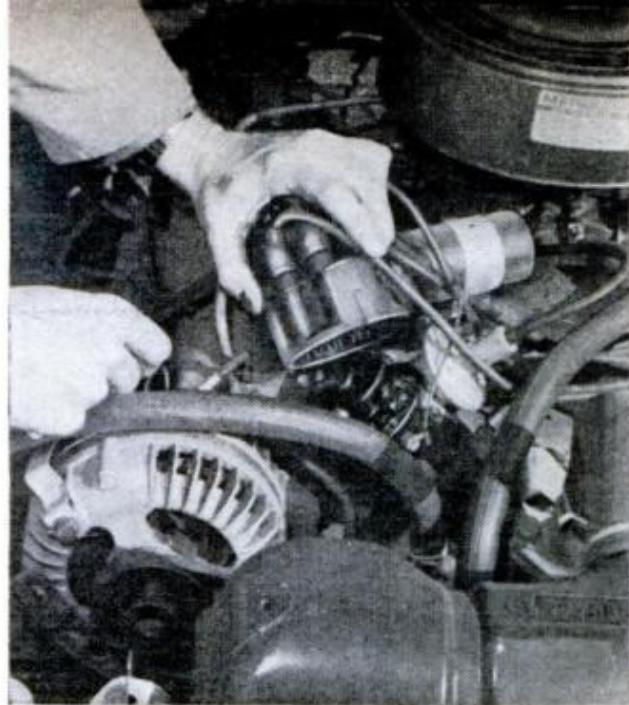
MOST CHRYSLER OWNERS with automatics reported they got 11 to 14 miles per gallon in town and 15 to 17 on trips. Some of those with high-compression engines complained of the need for Premium gasoline.

ALTHOUGH CHRYSLER'S ENGINE room is full (top right), the distributor and alternator are conveniently up front. Several owners found engine component access among the good points about Chrysler's design.

SEAT HEIGHT, FRONT AND rear (center right), contributes to the comfort that topped the owners' hit parade. Less headroom is the price they pay. Rear kneeroom and legroom are also quite generous.

A SMALL ITEM TO DESIGNERS, perhaps, but some PM owners found windshield wiper control too secluded behind the wheel and turn signal. The neighboring headlight switch isn't much easier to find at night.

MAY 1963



Engines with high compression ratios → requiring Premium fuel should theoretically give greater efficiency (i.e. more miles per each costlier gallon) but for most people the Regular fuel engine is most practical

For the extra cost of Premium fuel—it runs about six dollars a → tankful in New York—PM had 100 mile-per-hour speeds on tap

One out of every two (49.2 percent) buyers reporting on 1963 Chryslers chose the Newport →

Chrysler's big engines turn over slowly at average speeds thanks to "overdrive" rear axles of 2.76 to 1 ratio on Newport and New Yorkers. This means less noise, → less vibration

complaint from 7.3 percent of owners was that they could not burn Regular grade gasoline in their cars. An almost equal number (7.0) cited economy and the ability to use Regular as a best-liked feature.

If that sounds paradoxical, remember that a wide range of models and engines are all covered by the Chrysler nameplate—everything from the 265-hp. Newport with manual shift to the 390-hp. "300 T" series with automatic. Obviously, opinions about satisfactory fuel mileage will vary among owners of such a wide range of power plants, even though all Chryslers share the same 215-inch long body and 122-inch wheelbase chassis.

The test car available to PM was, unfortunately, one of the thirstiest models Chrysler produces—a "300" two-door hardtop with optional 413 cubic inch, 360-horsepower engine, automatic transmission and full power assist. Shipping weight of this car was 3752 pounds.

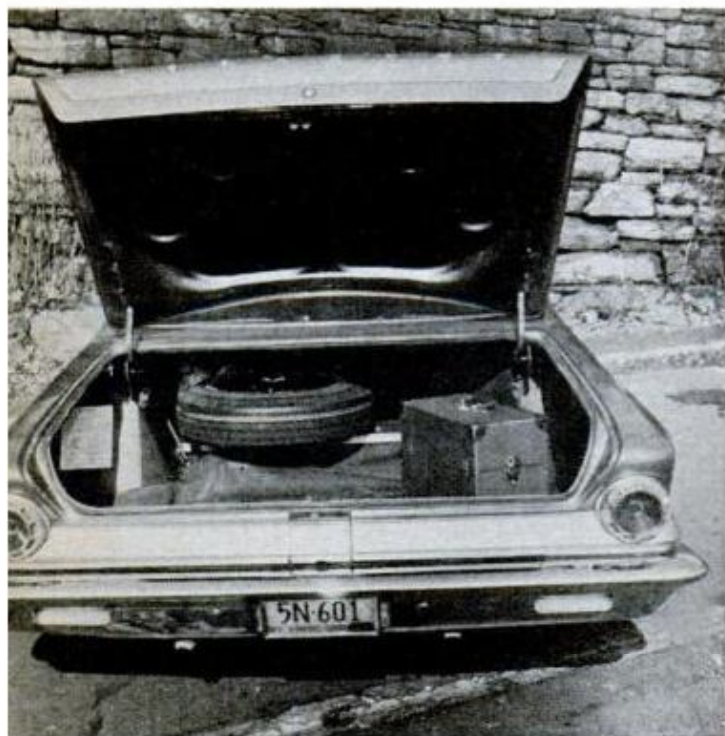
Metered fuel consumption at constant speeds, after correction for a not unusual 3 percent odometer error, was as follows:

- 17.01 miles per gallon at 30 m.p.h.
- 16.47 miles per gallon at 40 m.p.h.
- 16.11 miles per gallon at 50 m.p.h.
- 13.90 miles per gallon at 60 m.p.h.
- 13.42 miles per gallon at 70 m.p.h.

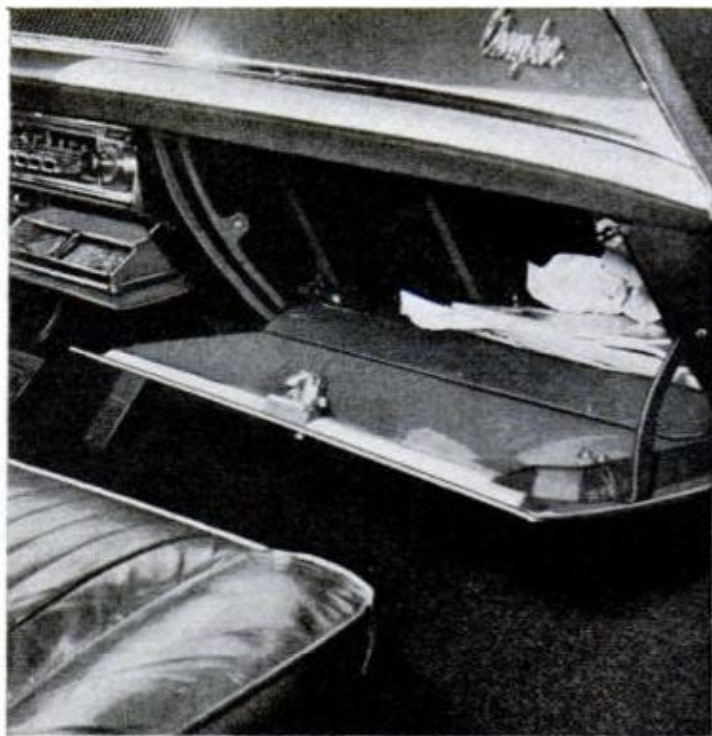
Over-all fuel consumption after about 450 test miles of all types of driving averaged 11.63 miles per gallon. It's a safe bet that the lower-powered Newport model would do substantially better.

In sampling the specific comments from Chrysler owners, let's start on the bright side. Here are the five features Chrysler owners liked most, in order of the frequency with which they were mentioned:

"As a sales representative who drives about 35,000 miles per year, I find Chrysler to be ideal. Its comfort and overall performance creates less road fatigue."—North Carolina salesman.



THE CHRYSLER 300 TRUNK, somewhat snug, drew only a third as many complaints as rear end styling. You lift luggage only 24.3 inches to clear the lip



MIDGET GLOVE BOX with waste space above it got brickbats from 17 percent of Chrysler owners. Wide door could lead you to expect a spacious interior

"A ride too smooth to believe with instant response to any steering direction."—Connecticut businessman.

"It has the typical and anticipated Chrysler comfort and handling ease."—South Dakota utility company executive.

"My New Yorker rides like a parlor car on the Santa Fe!"—Pennsylvania attorney.

"Easy to drive—nimble and responsive."—Wisconsin college professor.

"It is very easy to drive without any power steering and easy to park, too."—California attorney.

"From a woman's angle, it is truly a delight to drive from the seating comfort to the simplicity of the pushbuttons, plus the steady (yet not nervous) feel of the power steering."—Virginia realtor.

"When passing there is adequate power to handle any situation one might encounter."—Wisconsin dentist.

"Plenty of power when needed and responds to all needs in traffic."—Indiana salesman.

"Wonderful performance with plenty of power."—Massachusetts mechanic.

"It handles and runs like a scared rabbit when you need the speed."—Texas contractor.

"I like the whole car—it's an eye catcher."—Pennsylvania electrical worker.

"The style is tremendous!" Minnesota grocer.

"This should be Chrysler's best year as they have a good solid car with the cleanest lines in the automotive world."—Arizona linotype operator.

"Styling represents a significant improvement over previous years."—Minnesota supervisor.

"I like most of all the deft way it corners."—Maryland self-employed man.

"Corners well, and is very good on ice or snow."—Michigan machinist.

"I like the stability on curves."—Illinois investment counselor.

He's right. We looked for these traditional virtues
← and we found 'em!

A compliment, but not one that the Santa Fe
← wants to hear!

The lady makes a good point. Chrysler's steering assist is power which
← does not overpower

Sure does, Tex, but State Police Chrysler
← pursuit cars go like hound dogs!

If the public finds out about the solidity and agrees with him
← on the styling, he may just be right

And fins are back on fish
← where they belong

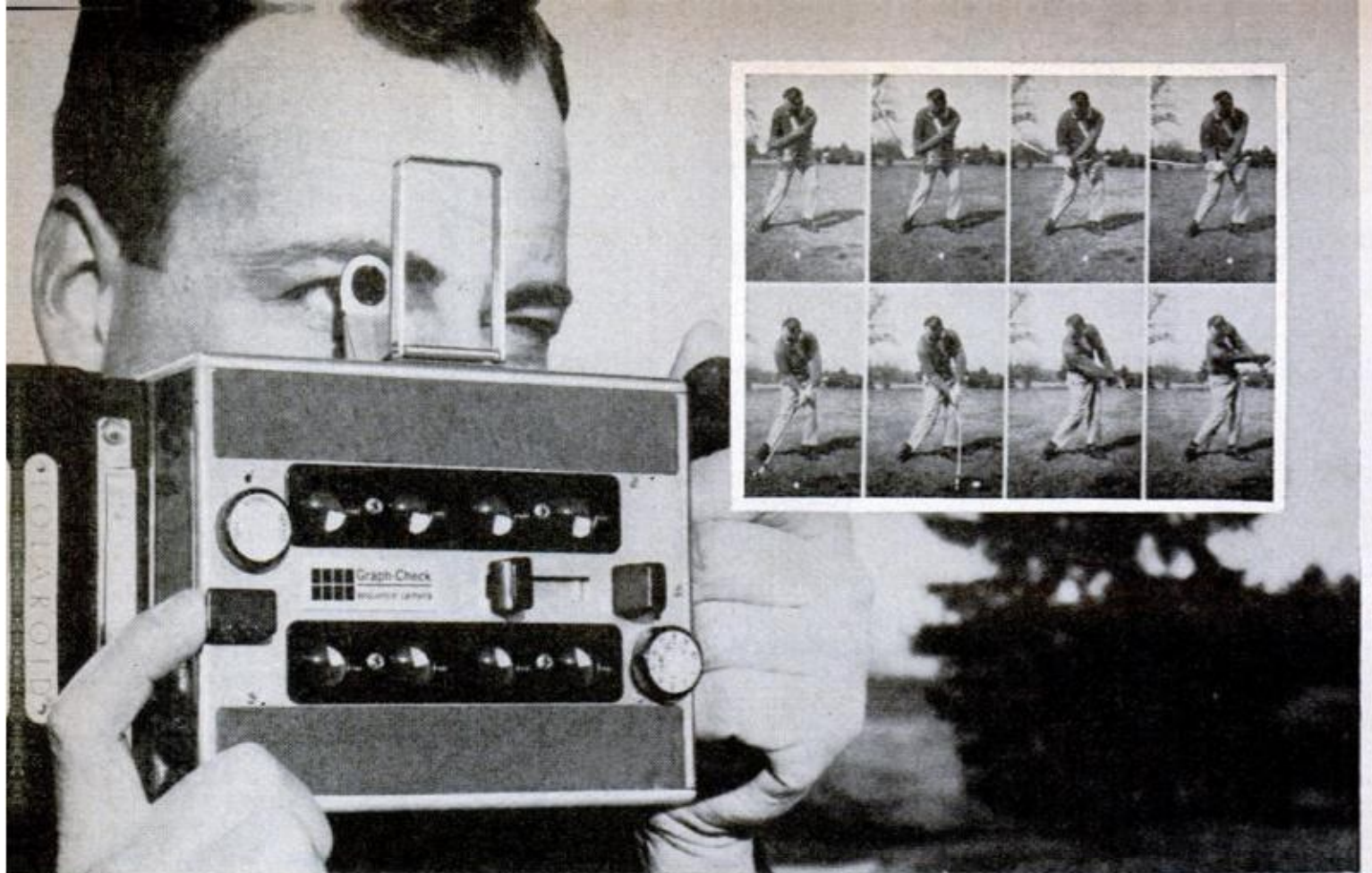
← So do we!

(Please turn to page 212)

SUMMARY OF OWNERS REPORT



| | | |
|---|--|---|
| Fuel mileage experience | Best-liked exterior style features | Consider buying another full-size car? |
| About as expected 59.2% | Front end 12.8% | Yes, did consider 55.9% |
| Better 14.9 | Clean, crisp, straight lines 11.2 | No, did not consider 44.1 |
| Not as good 25.9 | Simple, conservative design 7.3 | What make considered? |
| Best-liked features | Grille 5.6 | Oldsmobile 21.0 |
| Riding comfort 52.2 | Rear end and deck 5.3 | Other General Motors make 42.5 |
| Handling ease 48.3 | Smooth, streamlined appearance 4.7 | Dodge 10.5 |
| Power, performance 31.6 | Lack of excess chrome 4.5 | Other Chrysler Corp. make 10.5 |
| Style 19.8 | Absence of fins 4.2 | Ford 8.0 |
| Roadability 10.3 | Least-liked exterior style features | Other Ford Motor Co. make 8.0 |
| Roominess 8.9 | Rear end 11.7 | Other U.S. makes 2.0 |
| Visibility 8.1 | Rear window style, blind panels 10.6 | Imported makes 0.5 |
| Economy, use of Regular fuel 7.0 | Rear deck and trunk design 4.2 | How is dealer service? |
| Luxurious interior 5.9 | Grille 3.9 | Excellent 72.6 |
| Tight, rattle-free body 5.6 | Bumpers 3.4 | Average 22.0 |
| Specific complaints | Best-liked interior style features | Poor 5.4 |
| None at all 35.8 | Dashboard, instruments 24.0 | Would you buy from him again? |
| Insufficient head room 15.4 | Comfortable seats 22.9 | Yes, would buy there again 74.6 |
| Poor rear visibility 14.0 | Upholstery 12.6 | No, I would not 4.7 |
| Need for Premium fuel 7.3 | Entry handles (grab rail) 4.2 | Make of car traded in |
| Poor workmanship 6.4 | Colors 3.9 | Chrysler 41.1 |
| Pushbutton transmission 5.6 | Pushbutton transmission 3.9 | Plymouth 12.6 |
| Difficult entry and exit | Adjustable seats 3.9 | Other Chrysler Corp. make 21.8 |
| Windshield wipers 3.6 | New steering wheel shape 3.4 | Chevrolet 3.6 |
| Mechanical trouble, if any | Least-liked interior style features | Other General Motors make 8.9 |
| No mechanical trouble 75.7 | Glove box and door 17.0 | Ford 2.2 |
| Brakes (including brake pull) 4.5 | Ash tray 8.7 | Other Ford Motor Co. make 1.4 |
| Horn 3.6 | Transmission hump 5.9 | Would you buy another Chrysler? |
| Automatic choke 2.2 | Location of wiper switch 2.5 | Yes, would buy Chrysler 91.3 |
| Carburetor 2.2 | | No, wouldn't buy Chrysler 2.0 |



Now It's Eight Pictures in 10 Seconds!

Featuring eight separate lenses and eight shutters that click off, in automatic sequence, at 1/1000th of a second each, a new camera turns out a 4 by 5 Polaroid print with eight pictures in 10 seconds.

Designed for teaching outdoor sports (the insert shows Arnold Palmer swing-

ing at a golf ball), the sequence camera can be used by a beginner. It has only two controls, for exposure ("dull," "normal" or "bright") and for sequence duration (all eight pictures may be taken within 1/10th second or over 10 seconds). \$395; Graph-Check, Inc., St. Petersburg, Fla.

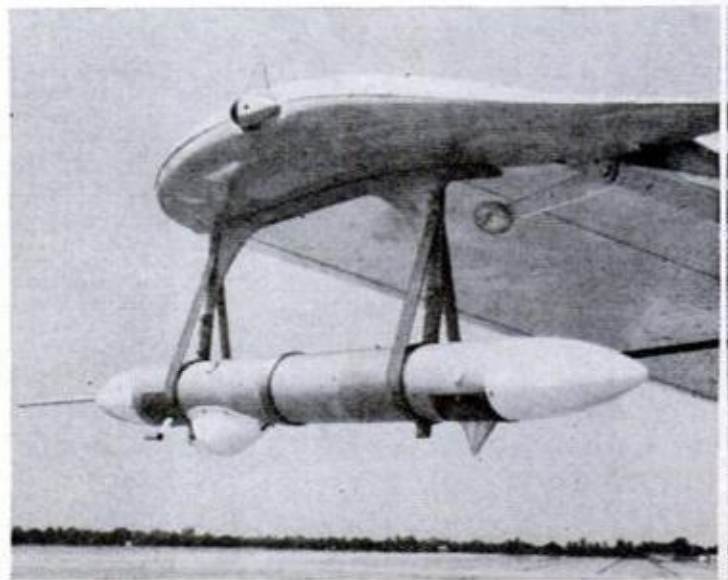
You Won't Hit the Roof

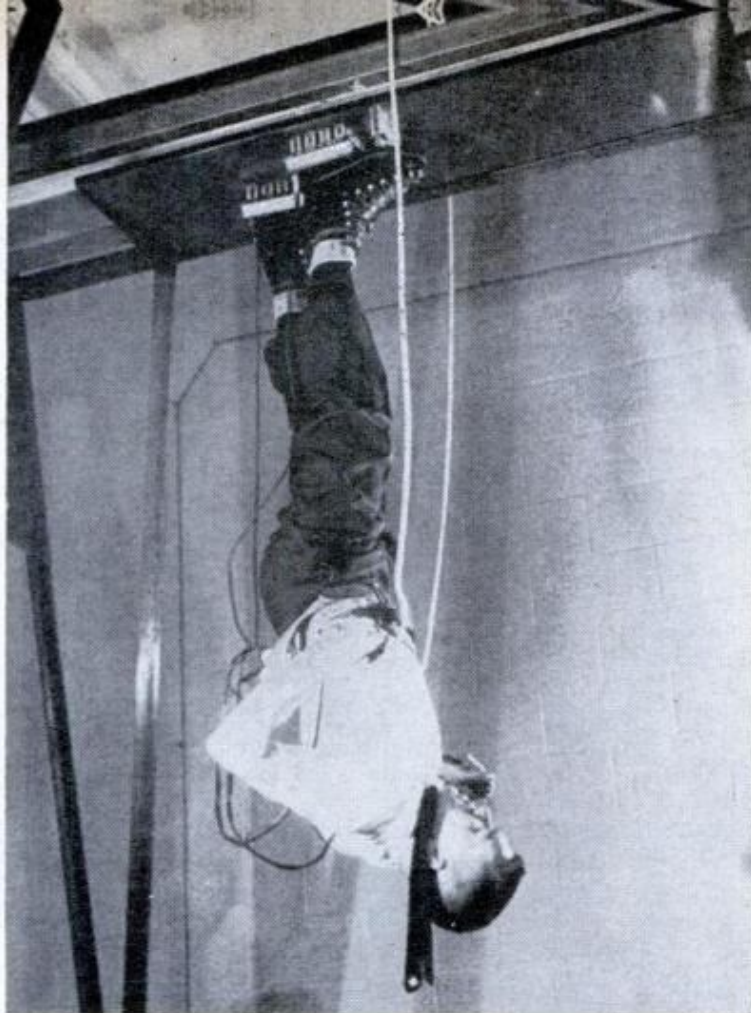
You aren't likely to hit the roof getting in or out of this version of Fiat's 2300 coupe. In the Pininfarina design, the greenhouse is hinged at the front and lifts about 8 inches when a door opens. The prototype was shown in Turi, Italy.



Weather Bomb

Built to be attached to wingtips or sent aloft in unmanned drones, a miniaturized weather pod contains instruments to measure temperature, pressure and precise dewpoint for forecasting. On a drone it can be flown directly into a severe storm.





Footsteps on the Ceiling

Magnets with memories can be strapped to the shoes, allowing the wearer to walk upside down suspended from an overhead steel beam. A new magnetic circuit enables the magnets to remember when to turn on and off. Westinghouse designed them for possible use in space vehicles.

Garden Tool Toter

Tools needed for yard work can be carried in a gardener's cart which holds large tools in a vertical rack, small items in bins. The front wheels swivel for easy steering. Garden Caddy is made by the National Steel Cabinet Co., Edgefield, S.C.



Ventilated Viewer

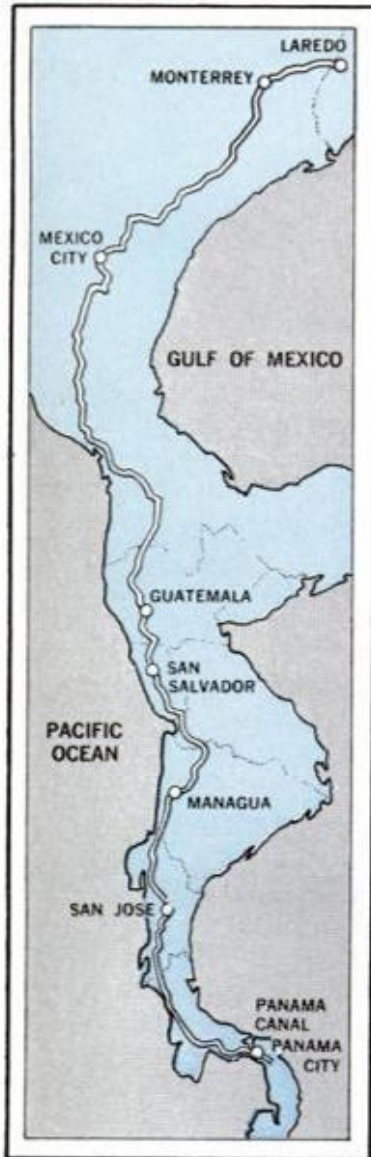
Equipped with a ventilating system built into its rubber-padded viewing turret, a five-foot fiberglass paddle board allows easy breathing for the person viewing underwater life through a window in the bottom. Costs \$89.95 from Betts & Gantner, Boca Raton, Fla.

An Icer Tests a De-Icer

Vapor clouds sprayed from a special rig condense and turn to ice on the rotor blades of a helicopter to test a new electrical de-icing system. The tests were made in Canada in subfreezing weather to develop an all-weather helicopter.



First Pleasure Drive to Panama



The road's open—and you don't need a Jeep. PM's Western editor Tom Stimson finds that an undoctored family sedan will now take you all the way to the Canal in solid comfort

DRIVE A CAR all the way to the Panama Canal? Are you crazy? It can't be done! First, you have to ship the car by rail from Mexico to Guatemala. From Costa Rica you have to go by sea. You can't get through the jungles. The maps show that there aren't any roads!"

Well, the maps are out of date.

I know, because I recently drove to Panama with no trouble at all. You can do it yourself. The road is open all the way. In fact, the "official" opening of the Inter-American Highway is being celebrated in early May, in Washington.

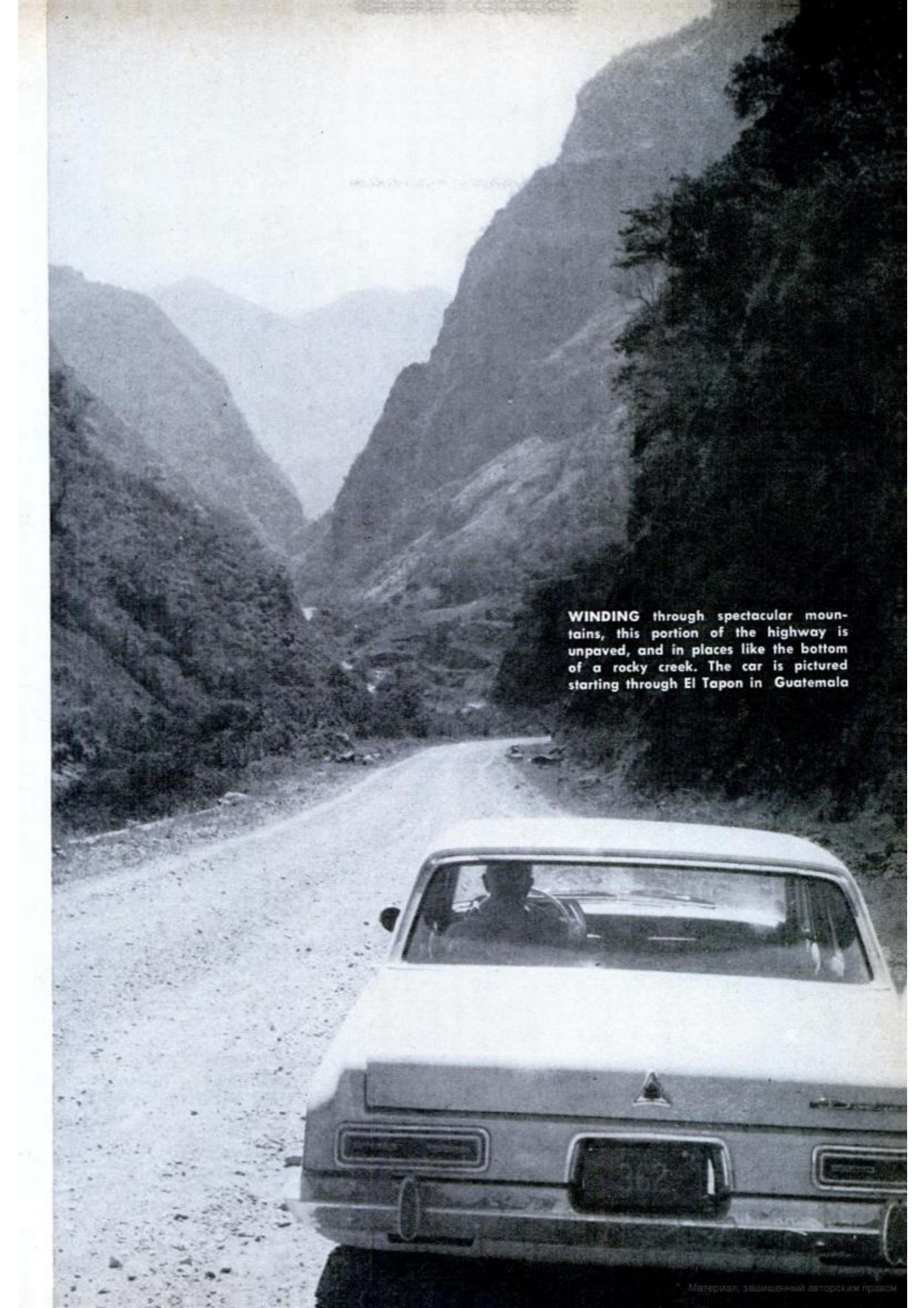
This past winter Joseph Barnett of the U.S. Bureau of Public Roads told me that the road could be driven, that most of it was paved, that the last bridges in Costa Rica were completed. Paul White, a friend of mine, and I decided to try it. We wouldn't be the first car over the route; a number of four-wheel-drive vehicles, for instance, have driven it on an adventure basis. But we weren't after adventure. We didn't want to build any log bridges or hire Indians to slash out a trail. We wanted to find out whether typical vacationists in a typical pleasure car could drive to the Canal Zone with ease and safety.

Paul is an old hand at "pioneer" driving. He has driven from Capetown to Cairo, and most of the way around

FROM LAREDO to Panama the highway above winds through a wonderland of lush vegetation. In Costa Rica, below, orchids grow and strange birds chatter

WE HAD TO DETOUR around a newly completed concrete bridge in Costa Rica. It was waiting for the highway approach to be brought up to grade level





WINDING through spectacular mountains, this portion of the highway is unpaved, and in places like the bottom of a rocky creek. The car is pictured starting through El Tapon in Guatemala



MEN AT WORK are a common sight along the highway where all cooperating countries are doing their best to complete their respective sections

ROCK SLIDES are most frequent in northern Guatemala, and here in El Tapon a narrow road has been bulldozed over a treacherous slide area



MODERN HIGHWAY travel comes to a standstill when it collides with the past. Herd of horses meandering along the road, cares little for hurrying tourist



Australia. Guided by past experience, he assembled an assortment of tools and spare parts, including shovel, towrope, chamois for filtering gasoline and a hydraulic jack. We also carried emergency supplies of medicines, food, water, gasoline and oil. This was all good insurance, but we didn't touch any of the supplies. We carried two brand-new spare tires, and blew one tire from a rock-cut on a freeway just south of Mexico City. That was the only trouble we had.

We traveled through eight different countries (including the U.S.) and saw smoking volcanoes, orchids by the ton, iguanas, strange tropical birds, and spectacular mountain and jungle scenery. Each country has its own monetary system, and we got accustomed to *quetzales* in Guatemala, *lempiras* in Honduras, *cordobas* in Nicaragua, as well as *colones*, *balboas* and *pesos*. We drove the 5000 miles from Los Angeles to Panama City in just under three weeks and could have done it in less time.

We made the trip in a 1963 Dodge 440 sedan that I broke in myself. The Dodge is a typical low-clearance modern car and was entirely stock except for the tires; we turned in the original two-plys for four-ply nylons. After a grease job and a wash in Panama the car looked and performed as it had in California. There were a couple of small gravel scratches in the paint, but there wasn't a squeak that needed attention.

What's the road like? It ranges from



SOUTH OF GUATEMALA CITY the highway passes in the ominous shadow of a pair of active volcanoes, an unusual treat for the U.S. tourist and his camera

excellent to awful. In places the road is slow. Some days the speedometer stood at 70 hour after hour. Other days we crept along at 15 and 20, sometimes getting up to 40 miles per hour. We took five hours to drive the 85 miles from San Jose, Costa Rica, to the little town of San Isidro on the other side of the Continental Divide.

Actually, from the U.S. border to its termination 42 miles south of Panama City, the road is paved all the way except for 60 miles in Mexico, 152 miles in Guatemala, 200 miles in Costa Rica and 77 miles in Panama. These unpaved stretches are described as "all weather gravel." All-weather they may be, but some of the gravel consists of loose four and six-inch river stone. To the driver it was like a rocky stream bed.

There's an explanation for this. Ralph Agnew, Bureau of Public Roads regional engineer in Costa Rica, told me that except for Mexico, whose excellent highway system is financed entirely by Mexico, U.S. money has been matched with local money to build the different sections of the highway. The U.S. funds become available sporadically. The result is that a section of highway may be surveyed, graded and a sub-base of stone put down and then lie untouched until additional money becomes available. Meanwhile truck and bus traffic begins on the unfinished road, and within a few months it's torn apart. In places it is an obstacle course of ruts, rocks, weeds and slides.

MAY 1963



CENTURIES-OLD TRANSPORTATION, yoked oxen pulling an ancient sugar cane cart, pokes along the road in El Salvador, and the tourist must simply wait

Drivers can make better time, and the climate is somewhat nicer in the winter dry season than in the summer rainy season. There is one small section of the road in south Costa Rica that receives an average of 25 feet of rain per summer. Heavy summer rains were the major reason two sections of the highway were incomplete until recently.

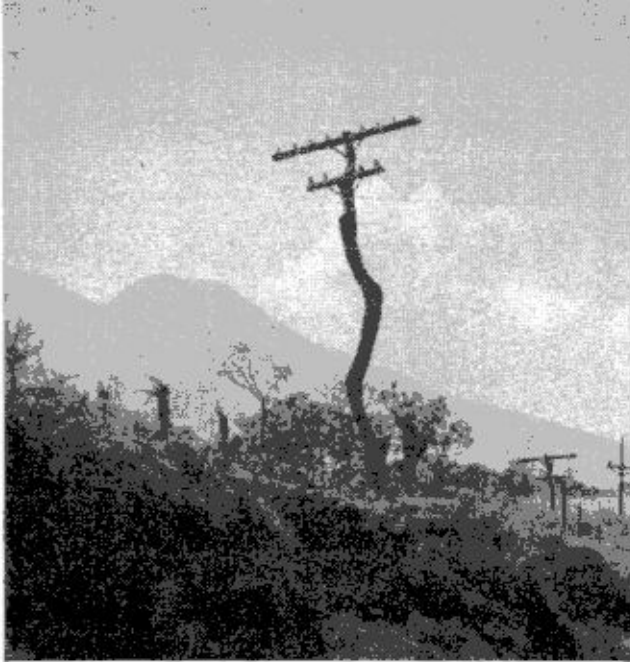
Negotiating the Cork

The first of these sections is the El Tapon stretch in northern Guatemala. El Tapon (the "cork," or "plug") is a seven-mile length of road that is cut into the side of a narrow canyon. Landslides occur frequently in the canyon during summer rains. Actually, El Tapon is only part of a 95-mile section of dirt and gravel road that is subject to slides. This was the area that previously had to be detoured by the rail trip from Mexico.

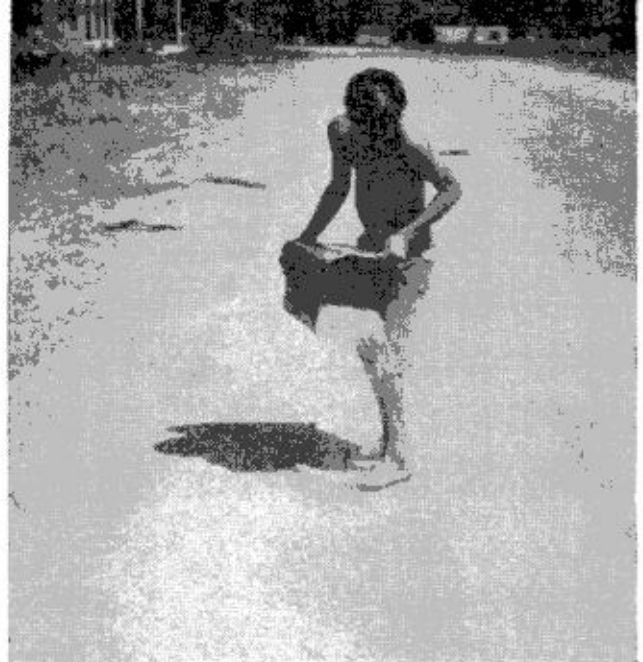
Highway officials now regard this section as all-weather, passable at all times of year. Trucks and buses go through year around, and even pleasure cars make the trip in the summer rainy period. But the road is apt to be closed for a few hours any time during the summer while a path is bulldozed across the top of a new slide.

No attempt is being made to keep this part of the road at full width as yet. Traffic moves up and over the slides, or around them. Parts of the road are one-car wide because of undercutting by the river. A couple of bridges aren't finished. Cars

89



POSED AGAINST THE SKY, a twisted tree serves as a telephone pole, a common sight along the highway in the less developed countries south of the border



IN NORTHERN PANAMA the road serves a dual purpose. A coffee mill operator uses one side for drying his coffee beans and traffic makes a slight detour

splash through a few inches of water at these points during the winter. During summer high water, all traffic takes a long detour to several narrow 10-foot wide stone arch bridges, one of which has been in use since 1640.

Public Roads officials are waiting for the El Tapon section to stabilize itself before they bring it to full width and pave it. This is planned for about four years from now. Personally, I wouldn't want to pull a travel trailer over this part of the highway (which climbs to 9500 feet), but it would be an easy trip for a pickup with camper top. In January, dry and dusty, we drove the Dodge through most of this section at 25 to 40 miles per hour.

The other previous bottleneck on the Inter-American Highway was a 133-mile stretch of jungle in southern Costa Rica that was impassable, mainly because 44 streams and rivers had not been bridged. Today an engineered roadway with wide sweeping curves has been cut through the jungle, final grading has been completed and all of the bridges are now in use. The road is open all year around, and traffic is moving with no delays.

Landslides are common in this area, but traffic simply detours around them.

When White and I reached Panama's western frontier we assumed that all the poor road was behind us; actually, the worst was yet to come. From south of David to Santiago, 114 miles of old pavement has been allowed to break down into loose boulders and gravel because of plans for a new high-speed concrete road that eliminates the poorest 33 miles of the old road. It was being completed at the time we made the trip, and is now in use.

The Inter-American Highway comes to

an abrupt end at the edge of a river just beyond the town of Chepo, 42 miles east of Panama City. Trucks and Jeeps can ford the river at low water and continue on to a couple of small jungle settlements, but the building of an improved road through the Darien Gap to connect with the highway system of South America is still a number of years away.

Yankee, Go Home?

Are there any feelings against Yankees in Central America? Not that we could discover. A smile and a few halting words in Spanish on our part would start a friendly conversation anywhere. People often went out of their way to be helpful. In San Jose, Costa Rica, for example, a taxi driver with a passenger went out of the way to guide us halfway through the city to the hotel we were seeking. This was a great help, for we were in a maze of narrow one-way streets and the signs that showed "circulation" were hard to find. If there are any anti-U.S. feelings we weren't aware of them. We saw painted on walls "Castro No! America Si!"

Parts of the Inter-American Highway have been used for years and country-to-country commerce and bus traffic is on the increase. Now, international tourist travel is beginning.

What about passports, accommodations, gasoline? The Travel Division, Pan American Union, Washington 6, D.C., will mail you "Motoring in Central America and Panama" for 25 cents, "U.S. Tourist Requirements for Entry into Latin American Republics" for 10 cents, and has other literature as well.

Briefly, here are some of the things you need to know:



SACKED AND BURNED by pirates and later reduced by an earthquake, the ruins of Old Panama City are a reminder of the ancient culture of Latin America



BELOW PANAMA CITY, near the town of Chepo, the author poses beside sign that marks the end of the trip down the 5,000-mile Inter-American highway

PASSPORT. You need a current U.S. passport (\$10), current smallpox vaccination certificate, automobile ownership certificate, Inter-American Highway driving permit (\$2 from A.A.A.) and a dozen or so passport-type photos. A visa of permission to enter each country must be stamped in your passport ahead of time by one of the country's consulate offices. Some countries charge a visa fee of \$2 or \$3, some do not. All Central American countries have consulates in Los Angeles and in several other large U.S. cities. In some cases it may save time to enter Mexico on a tourist permit (multiple entry: \$5) and obtain visas for the other countries at consulates in Mexico City.

Domestic automotive and public liability insurance is not good south of the border. A few U.S. companies with agreements in other countries can write policies for Central American coverage, and more work is being done on this. It usually is best to buy Mexican short-term insurance at the border.

BORDER FORMALITIES. The Central American countries have not yet streamlined their border formalities for tourists, as has been done in Europe. It takes about an hour to check out of one country and enter the next. Passports must be stamped, a description of the car entered into a ledger, and possibly one suitcase must be opened for casual inspection. We found all border officials helpful and friendly; some speak a little English, some do not.

Most border stations are open 24 hours a day but are "officially" open from 8 a.m. to 12 noon, and 2 p.m. to 6 p.m. During these hours all paper work is free. Fees amounting to about \$6 are charged for entering or leaving a country at other

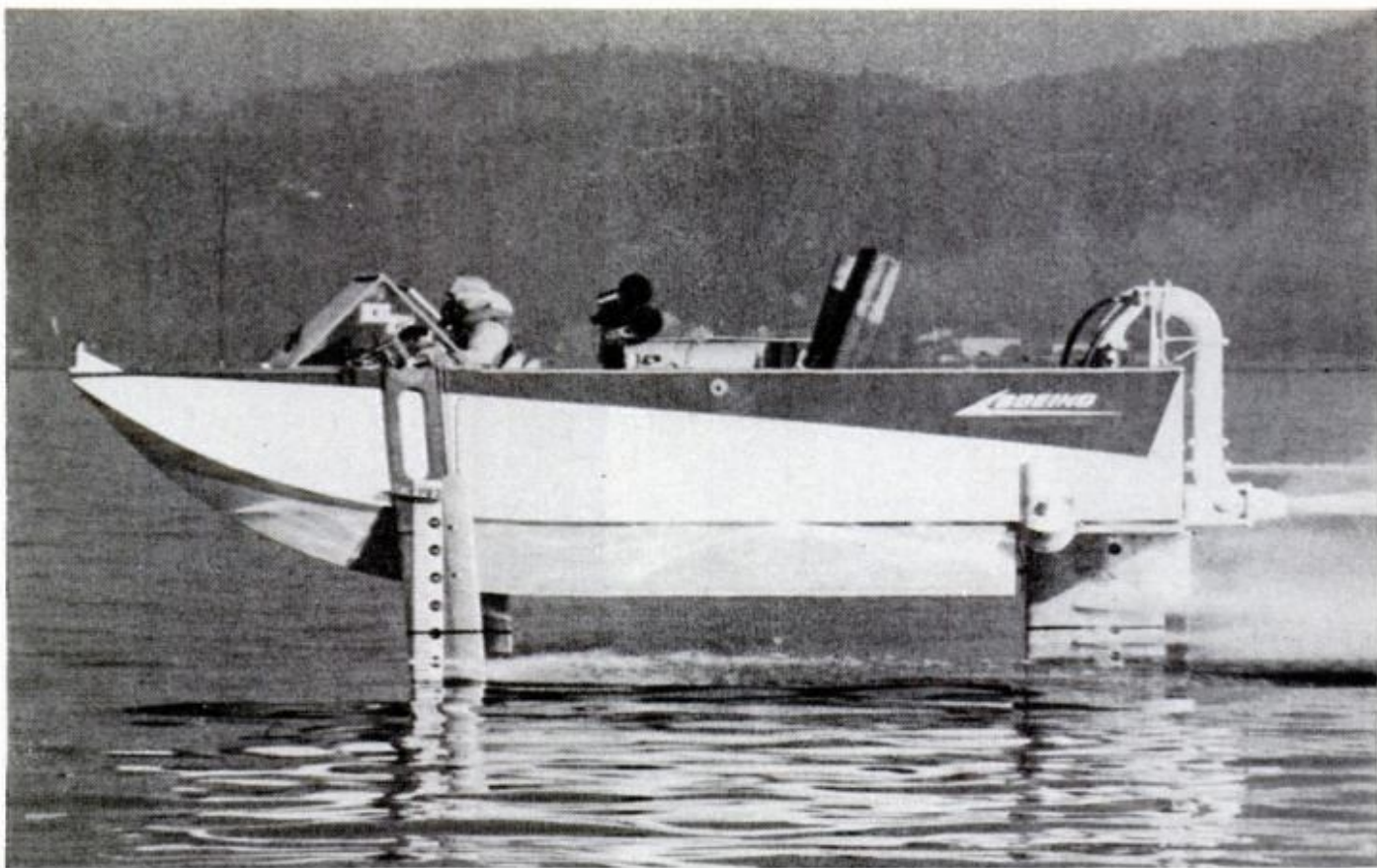
hours or on week ends or holidays.

TOURIST ACCOMMODATIONS. The highway is still so new that motels and trailer parks are not in evidence south of central Mexico. Good hotels, even luxury hotels, can be found in the capital city of each country and in a few other large towns. Usually you can drive from one capital to the next in a short day. English is spoken at the best hotels and their restaurants are excellent. It is best to order lunches the night before, to be eaten en route the next day.

Cost of lodgings ranged from \$4.80 to \$20 a night, and averaged about \$12.

GASOLINE. There are filling stations in every town and sometimes out in the country, 75 miles apart at most. In Mexico gasoline costs about the same as in the U.S. In the rest of Central America it costs about half a dollar per gallon for the best grade, often of low-octane rating. My fuel bill from Los Angeles to Panama (one way) was close to \$140. There are no credit cards. South of Mexico, the service stations are operated by several U.S. oil companies and are modern and spotless—quite a change from the usual Pemex station in Mexico. Good repair facilities exist only in the larger towns. Spare parts for U.S. and foreign cars are available in every capital.

MONEY. It's best to carry traveler's checks and to cash only minimum amounts. This avoids the nuisance of carrying one country's currency into another and then trying to exchange it. At Paul White's suggestion we each carried 50 \$1 bills and these were acceptable everywhere for border fees or gasoline, avoiding the cashing of larger sums when on the way out of a country. ★★★



Squirt Gun on Hydrofoils

Boeing's improvised hydrojet craft may be a forerunner of a water-spouting ocean liner

SPOUTING A 30-foot stream of water from a pipe draped over the transom, Boeing's 2½-ton turbine-powered *Little Squirt* streaked across Seattle's Lake Washington on an overcast day in January and became the first boat to successfully combine hydrojet propulsion with a fully submerged foil system.

While it's hardly a thing of beauty, engineers hope that this one-of-a-kind research boat will provide them with valuable information on whether hydrojet propulsion might be used on large, ocean-going hydrofoils.

Power transmission, one of the toughest problems in any hydrofoil design, becomes even more difficult in the 100-ton-and-over range. The larger the boat, the greater the distance over which power must be transmitted.

Boeing's 20-foot Pump Jet (the *Squirt's* official designation) incorporates an ingenious solution to this problem. Water is scooped up through an intake located in the leading edge of the aft strut, accelerated by a centrifugal pump, then rammed through the U-shaped pipe which carries it over the transom and down again to be

ejected horizontally through a high-pressure nozzle. While still hullborne and gaining speed, the jet exhausts into the water. Once foilborne, however, it squirts water through the air like a fire hose.

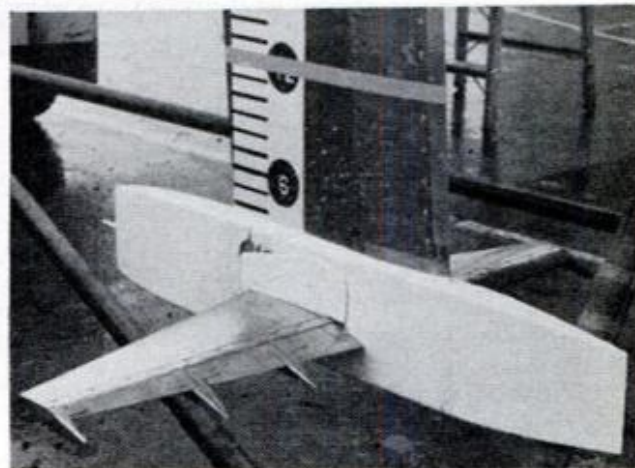
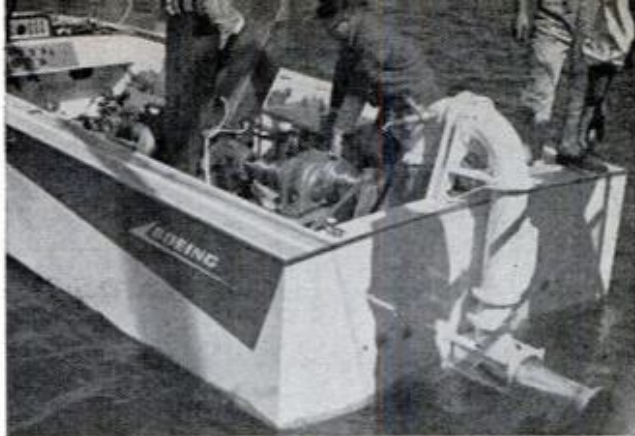
An air jet could be used in place of the hydrojet, but for full efficiency, such engines must operate at far higher speeds than those normally considered practical for a boat. (However, Boeing is developing a jet-powered hydrofoil test craft for the Navy in which performance will be emphasized rather than peak efficiency.)

The Pump Jet's foil system is operated by a combination of electronic and manual controls. The driver sets the basic angle of attack of the foils and controls the rudder (built into the aft strut).

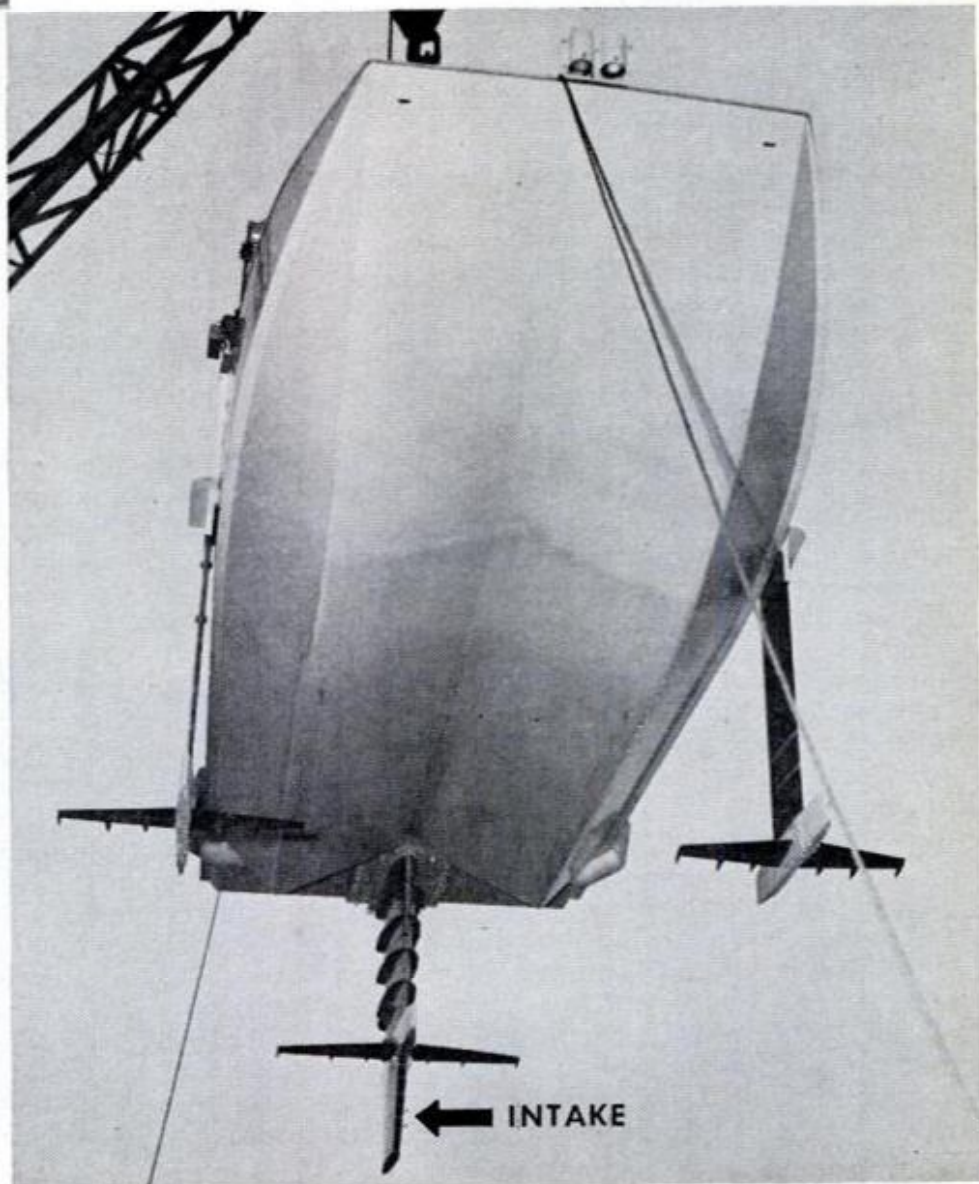
An "autopilot" sets the trim of the movable flaps on each foil. It bounces a high-pitched sound off the water to measure the distance between hull and surface, tabulates this with data from accelerometers and gyros, then adjusts the flaps to maintain a level ride at a constant height. Whole operation is almost instantaneous, and controls can be set to fly boat at any height up to 2½ feet. ★★★



TEST JET UNIT is an industrial pump turned on end. Driven by a 475-hp. turbine, it pushes boat to 45 knots. If system shows any promise, special-built pump with through-transom exhaust will do away with extra plumbing hanging over transom. Below, note aileronlike flaps on rear part of the foil



TUNNEL HULL was designed and fabricated by Boeing just for this project. An air-lift hull was chosen because of extra boost it provides during acceleration before the boat rises on its foils. Jet intake (arrow) is located in aft strut below the rear foil so it is always well below the surface





By Jim Whipple



Auto Inspection Could Save 15,000 Lives in U.S. Quicker Stopping Now on Anti-Skid Pavements

Normally safety isn't a very exciting topic, but a survey we recently received brought us up with a start. The gist of the survey, published by Wayne State University, Detroit, Mich., is simply this: "Almost 15,000 auto accident deaths could be avoided annually in the U.S. if every state maintained a vigorous program of motor vehicle safety inspection."

When you learn that the figure 15,000 represents about 40 percent of the total annual auto deaths you should be impressed.

The survey, directed by Drs. Albert J. Mayer and Thomas F. Hoult, was an extensive one. It covered all those states whose inspection status did not change over the years 1948 to 1960. They were states situated in all regions of the country. Here's how they compared over the 12-year period in deaths per 100,000,000 miles driven.

In states where inspection was carried out in state-owned stations, deaths were 3.99; in states where inspection was done by private garages, 5.28; in states where there was incomplete or cursory inspection the rate went to 6.46; this was little better than in states having absolutely no inspection, where the rating was 6.91 deaths per 100,000,000 miles driven.

The difference between the 3.99 deaths in the "total inspection" states and the 6.91 deaths averaged in the inspectionless states works out to be about 15,000 deaths annually when multiplied by the total mileage driven in the U.S.

Perhaps in a nation of 180,000,000 people where millions die annually from old age, sickness and household accidents, 15,000 lives may seem trifling to some, but we seem to recall having entered World Wars for less. Dodge Division deserves credit for sponsoring the survey.

Good news that may well save additional lives comes from the town of Mamaroneck, N.Y., where a new type of asphalt paving called Levelride has proven 30 percent more effective in reducing skids. Comparison of Levelride topping with conventional smooth asphalt, when both pavements had been wet down with a fire hose, showed that at 39 miles per hour

it took 150 feet for the test car to stop on the conventional pavement, while on Levelride the test car stopped in as little as 104 feet. The average reduction in skidding worked out to 30 percent. Some of the testing was done on Levelride over a year old.

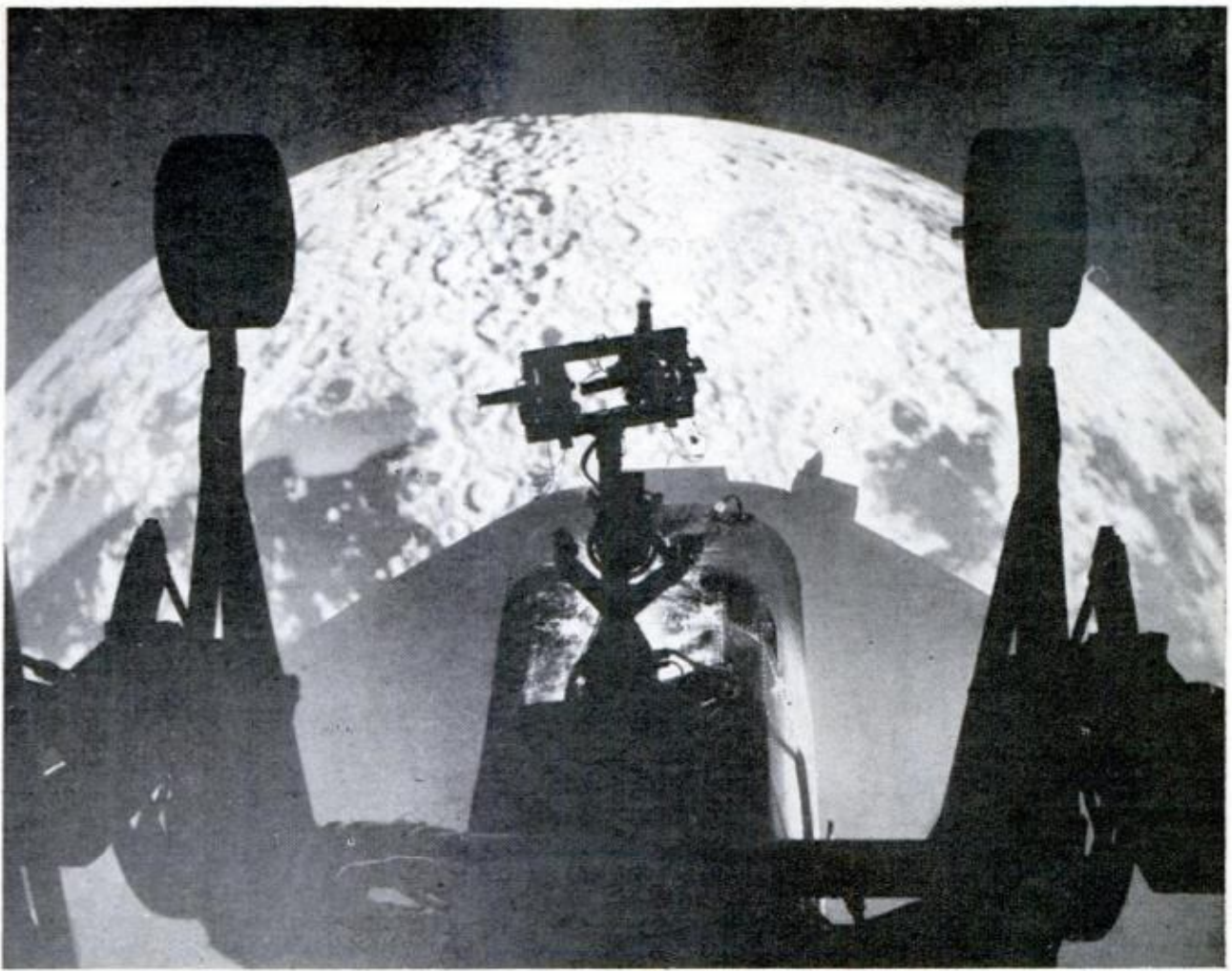
There's nothing exotic about Levelride. Developed by Cold Mix, Inc. of White Plains, N.Y., with an assist from Johns-Manville, it consists of two percent 7M06 asbestos fiber, eight percent asphalt and 90 percent sand spread $\frac{3}{4}$ -in. deep.

No session on safety and accident prevention these days would be complete without mention of seat belts. It seems there's a new trend in the seat belt situation and if it keeps up the only reason U.S. motorists will have for not being belted in is that they are too forgetful, (or lazy), to snap a buckle. Studebaker has just announced that belts will be installed at the factory in the front seat of every Studebaker automobile.

They aren't a gift from Studebaker, however. Their cost will be added to the price of the package. Those who'd rather save than be safe can have the dealer remove the belts and refund the money. It'll be interesting to see how many are taken out.

Studebaker isn't the first to standard equip with belts. Sweden's Volvo announced a similar plan a couple of months ago, using an unusually safe combination shoulder harness-seat belt that quick-snaps out of the way on the door post (instead of dragging across a muddy door sill) when not needed. A PM editor found you could easily hitch yourself into—or out of—it in five seconds.

Speaking of Studebaker, the word is that next year's Lark will be completely restyled. We'll amend that to the extent that areas below the window sills may be restyled. The roof, door frames and windows comprising what is known as the greenhouse area were completely new on the current model. What Studebaker is doing with the Lark obviously is redesigning one half of the car at a time—a clever way to spread the cost of tooling over an extended period of two years.



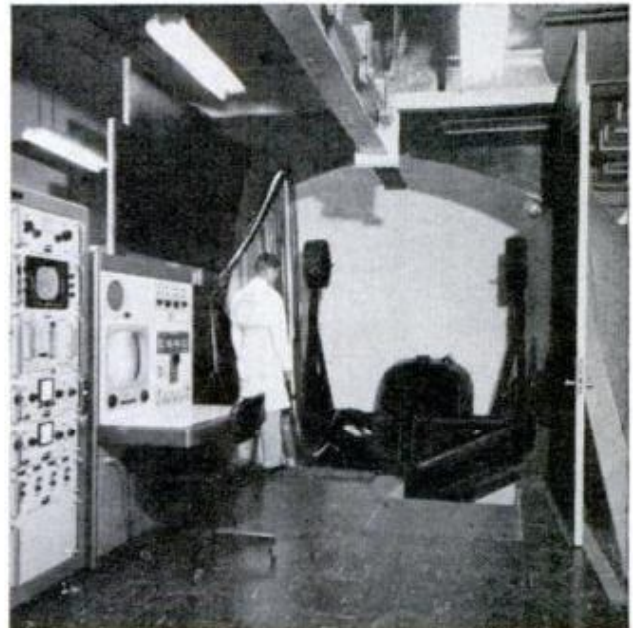
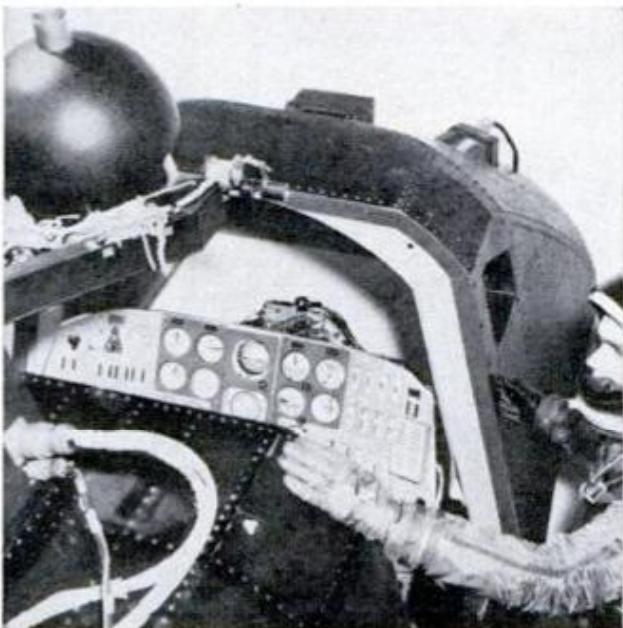
Flies to the Moon via "Cinerama"

SPACE SIMULATORS have reached the extreme in realism in Dallas, Texas.

Imagine sitting in a theater in which the screen was not only in front of you but wrapped all around you. Then, while the projector showed a simulated flight to the moon, your seat began to move to simulate the movement of your space vehicle.

Well, that's just about what happens in a Ling-Temco-Vought simulator built to

study problems of lunar flights and pilot reaction as well. The spaceship responds to the pilot's controls, his instrument panel provides complete flight data and projectors coordinate accurate films of the moon, with all its peaks and craters, coming closer and closer. A closed-circuit television system watches the pilot's reaction, and high-fidelity speakers blast rocket and other atmospheric noises at the pilot.





A Nationwide Survey
Based on 1,007,736
Owner-Driven Miles

Serene, "Shiftless" Ride Pleases, Mileage Disappoints Buick Owners

Marginal and holdface comments by Jim Whipple, PM's auto editor

Buick ownership is like politics. Several owners phrased it this way, → "I'm a Buick man." It sounded like "I'm a Republican" or "I'm a Democrat"

We think that more people will buy Rivieras as more become available →

SCRATCH A 1963 Buick buyer and you'd have a better than two-to-one chance of finding a man or woman who had owned a Buick before.

In fact, of all owners PM surveyed, 55.1 percent had traded in a Buick on their new one.

Buick buyers are also inclined to favor General Motors products; 75.4 percent of the owners traded GM cars on their Buicks.

Of the models they purchased, 45.6 percent bought the lower-priced Buick LeSabre, 17.0 percent the Electra 225, 12.5 the Wildcat and 6.9 percent bought the single-model sports hardtop Riviera.

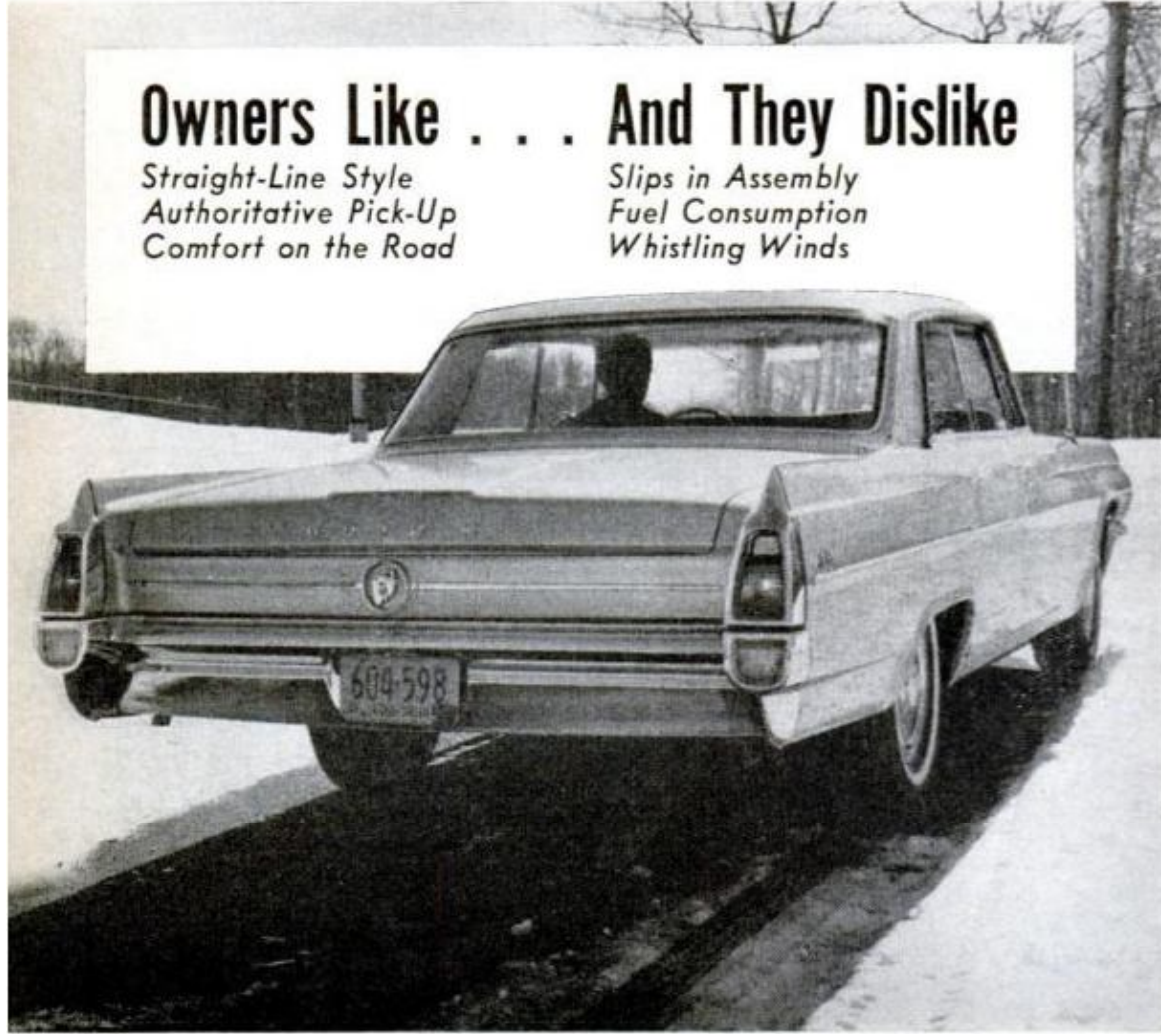
Features "best-liked" by Buick owners were handling ease, (44.9 percent,) and riding comfort, (43.6 percent of

WHILE MOST OWNERS WERE ENTHUSIASTIC about Buick's crisp, European styling, a few expressed doubts about the return of the modest tail fins

Owners Like . . . And They Dislike

*Straight-Line Style
 Authoritative Pick-Up
 Comfort on the Road*

*Slips in Assembly
 Fuel Consumption
 Whistling Winds*



Motorized Miner

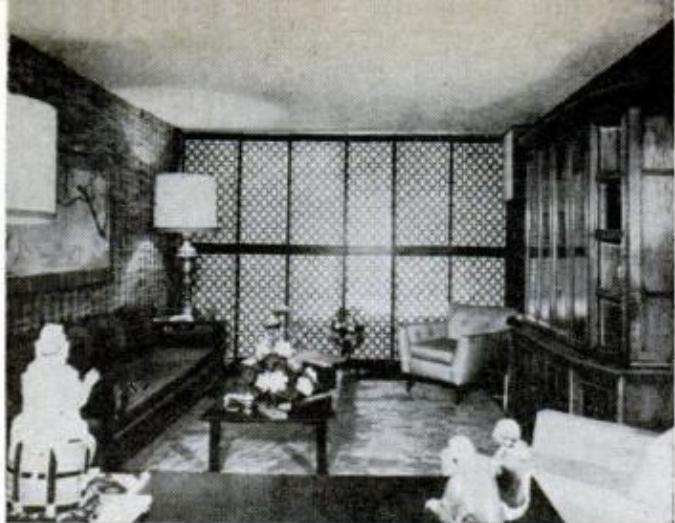
The beard looks like a prospector's should, but the transportation has changed. Where the burro was once the mainstay for travel, a little gas-powered machine is taking over.

Casey McGregor, a 55-year-old prospector, wandered the Snowy-Range mining district in California's Los Padres National Forest for years with mule, horse and burro. But when he discovered a lost Spanish gold mine and settled down to the task of hauling supplies and equipment up seven miles of steep, rugged trail, animals proved too difficult to handle.

For several months Casey hauled his supplies on his back, then he discovered the Tote Goat, a powerful little trail bike. Only thing wrong with it, says Casey, is that you can't talk to it.

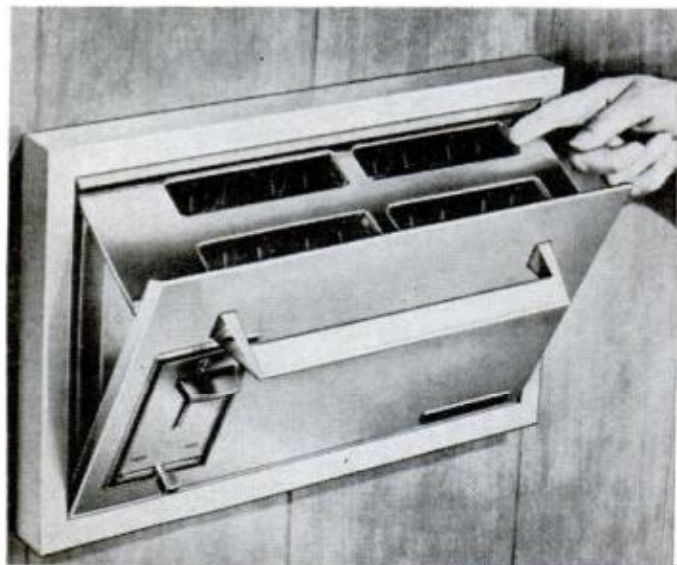
On a trailer he built for his five-horsepower bike, Casey has hauled in equipment that would have taken a herd of mules to carry. At the mine site he now has a cabin and storage sheds, two 110-volt generators, two electric water pumps, a kerosene cook stove, a complete blacksmith's forge, and a gasoline-powered tractor.





NEW FOR YOUR HOME

ROOM DIVIDER "sandwich" of translucent frosted plastic between two Philippine mahogany grilles, top left, separates living room from hall. By Jaffre Products, 189 First St., Brooklyn 15, N.Y.



HIDE-AWAY TOASTER fits into standard four-inch thick wall, operates in or out of mounting frame, folds into wall, switches off automatically. Swanson Mfg. Co., 607 S. Washington St., Owosso, Mich.

LIGHTED HOUSE NUMBER of weatherproof plastic operates off existing doorbell wiring. Always visible, unit costs \$14.95; Madigan Electronic Corp., 200 Stonehinge Lane, Carle Place, L.I., N.Y.



"KNO BOWS" eliminate tying shoe laces which are inserted into this gadget, knotted and held firmly for permanent wear. Basic colors cost 49 cents a pair; JT Sales Co., 5712 Lawrence Ave., Chicago 30, Ill.



POPULAR MECHANICS

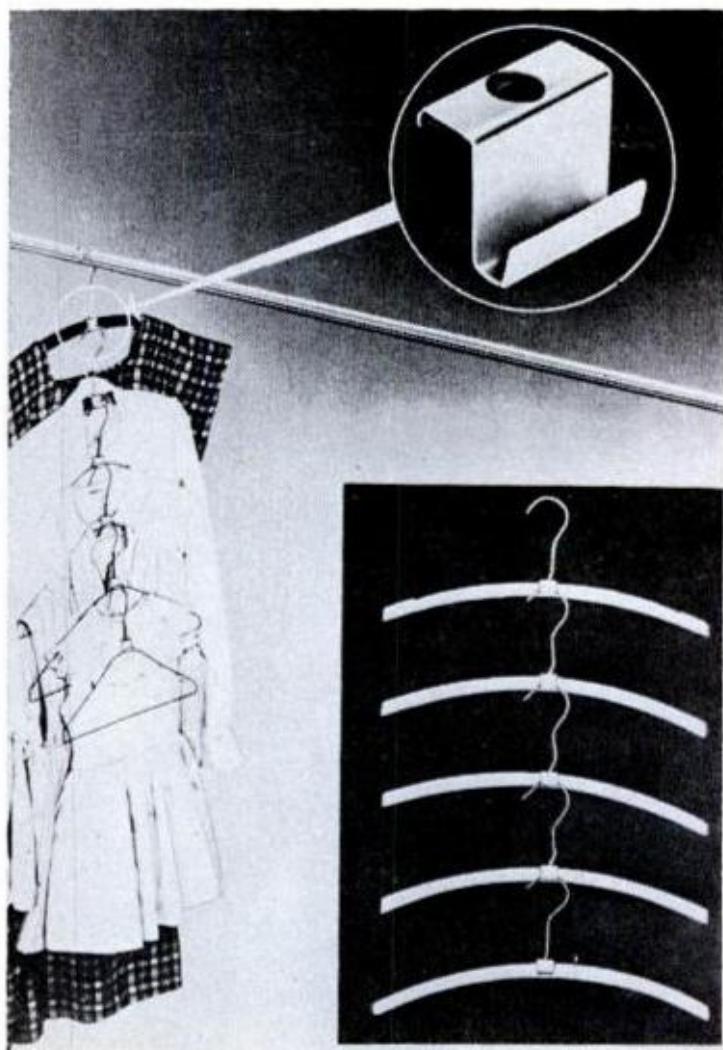
Материал, защищенный авторским правом



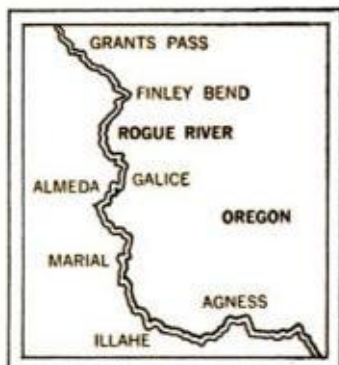
MOBILE IRONING CENTER 15 inches wide and 24 inches deep includes metal slip-out ironing board (33 inches high) and compartment for equipment. By Swanson Mfg. Co., 607 S. Washington St., Owosso, Mich.

HANGER FASTENERS of steel make more closet space by fitting over most hanger hooks; next hanger slips onto its ledge. Pack of 15 costs \$1; Better Buys and Bargains, 631 E. Winneshiek St., Freeport, Ill.

CANDLES THAT WON'T BURN down are actually hollow re-fillable cylinders that burn smokeless LP-gas, adjust to desired light. Made by Prepo Corp., Edgerton, Wis., 12-inch tapers are \$18 a pair; 15-inch, \$20



There's a Way to Ride a River . . . 1



Conquering the Wild, White Rogue

We zigzagged up the Devil's Stairs, slammed between rock walls to climb a hill of water

By Bert Goldrath

FROM GRANTS PASS to the Pacific Ocean, Oregon's Rogue River is a 120-mile tumult of exploding white water. Plunging down from the Cascade Range, it careens through deep, narrow canyons, dropping 1000 feet over and around rocks and boulders as big as houses.

Rivermen and daredevils have challenged the Rogue for many years. On rafts, rubber boats and sturdy river craft, they have taken the death-defying roller coaster ride down the river's white water.

Last September, I joined a party in a unique challenge of the Rogue. The purpose of our trip was to test a jet-drive outboard conversion invented by Richard

Stallman of San Carlos, California.

Stallman elected to torture-test his jet-drive, not only by deliberately choosing a time when the river was at its lowest level, but by plunging up-river all the way—*against the current*.

One boat might make the difficult passage and it could be considered a lucky fluke, so Stallman chose to run two boats up the Rogue to prove his jet-drive.

We were staking our lives on what is essentially a high-powered water pump, an odd-shaped device that replaces the propeller and gear box on a conventional outboard motor. Encased in a cast-aluminum housing, the jet attachment mounts

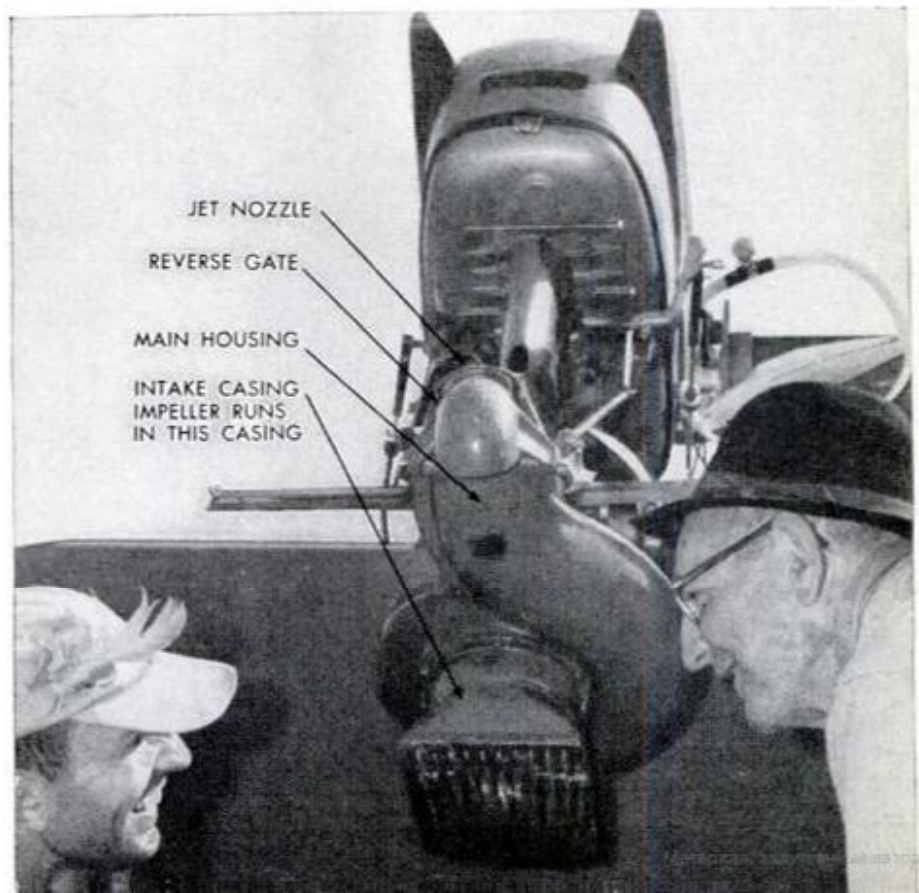
PERILOUSLY CLOSE to the rocky shoreline, Dick Stallman, inventor of the jet-drive unit, follows the lead boat through a stretch of rough water



RIVERMAN Glen Wooldridge was in trouble when the single jet unit on his boat could not make the difficult Black Bar falls. The boat was washed sideways down the face of the falls and was in danger of swamping but the 35-hp. engine gained power enough to straighten it out.



PROUD INVENTOR and happy riverman examine the jet-drive conversion unit after the successful up-river trip. Grating on bottom of water intake keeps any foreign objects from entering the snail-shaped impeller housing





PLUNGING AND BOUNCING through the white water, Wooldridge clings to a vertical post for balance



PORTAGING BOATS and equipment was necessary in a few places where the steep falls were impassable

with the leading edge of its water intake scoop flush with the bottom of the boat transom. The trailing edge is only an inch and a half below the bottom of the boat.

A grate protects the scoop from swallowing foreign objects. Water is forced through the snail-shaped housing by an impeller, and is rammed out the jet nozzle, above the waterline, at a rate of 1000 gallons a minute or 50 miles an hour, driving the boat forward in accordance with Newton's Law: every action has an equal and opposite reaction.

On the 32 miles of smooth water from the coast to Agness, Ore., I kept my fingers crossed and hoped that Newton knew what he was talking about. At Agness the Illinois River empties into the Rogue; above that the going gets rough.

Both of our boats, a 16-footer and an 18-footer, were designed and built especially for Rogue River travel. They have a five-foot beam across the bottom and six and a half feet on deck. The pram bow is sharply raked to ride high, and the sides are flared to keep out spray. They're built of three-eighths-inch fir plywood fastened over one-by-three Port Orford cedar frames, 14 inches on center. A beefed-up one and five-eighths inch plywood transom is further braced by chains secured to the floor timbers aft.

As important as boats and power was, the guide who would lead the way up the Rogue was just as vital. Stallman wisely chose Glen Wooldridge—40 years a Rogue riverman—to handle the tiller of the lead boat. Stallman guided the second boat.

Once into the crashing white water of the Rogue we settled down to the grueling battle. The boats were heavily laden with complete camping gear and extra fuel. The 16-footer, carrying 1200 pounds, was

powered by a 35-horsepower Evinrude. The 18-footer carried 1800 pounds and twin 25-horsepower Johnsons.

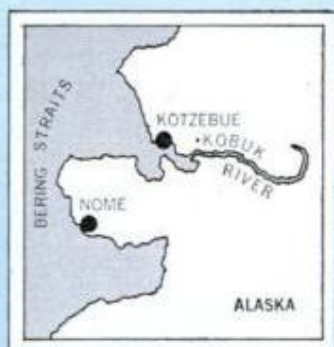
We jounced steeply up Fall Creek bar and zigzagged past the Devil's Stairs. On occasion a jet intake would slam against a rock and the engine would kick up. At these moments power and steering was gone and we held our breath until the intake dropped back into position. Blossom Bar was our first big challenge—100 feet of lashing river with no apparent opening through the boulders. Long lines were attached to the bow of each boat and all of us except the drivers went ashore to hold the lines. Wooldridge let his single-engine boat drift down the river a few hundred feet, then poured on the coal and powered the length of the narrow channel, cranking his boat this way and that like a quarterback taking evasive action. Close behind him, seeking the same openings, roared the second boat. Swishing around a final obstacle as they climbed the steep watery hill, both boats emerged into the smooth water above the bar.

No two hazards on the Rogue are quite alike. Take Mule Creek canyon, where we followed Wooldridge between tight vertical walls close enough to snap a boat in two if it should be caught crosswise.

We fought the Rogue for four days, sleeping exhausted at night, awaking each morning to face a dozen perils. Where there wasn't enough water for the jet intakes, we hauled the boats with block and tackle. At Black Bar falls the single-engine boat had to be portaged. Going over Rainie falls, where salmon need a fish ladder, we rolled the boats on logs.

But wherever there was water and an opening wide enough for the boats, Stallman's jet-drive conversion did its job. ★★

There's a Way to Ride a River . . . 2



Probing the Kobuk's Arctic Wilderness

We rammed an outboard 485 miles into Alaska's Wilds to set a new, adventure-filled record

By Steve McCutcheon

NEAR the upper Kobuk River canyon — a white water gorge far north of the Arctic Circle — there's a driftwood tripod covering an empty bottle with a note in it. Maybe some day someone will read it. It was put there last summer by our party, the first White expedition ever to drive a powerboat that far up Alaska's largest clear water river. The last recorded deep penetration by similar transport was made in 1883 by one Lt. Stoney, U.S.C.G., who put out from the Revenue Cutter Corwin and, in 15 days, went up a calculated 85 miles and back.

As our specially outfitted aluminum riverboat — shaped like a hollowed-out

chisel blade — slammed homeward across the chop of Kotzebue Sound scooping water over the bow like a dipper, we could recall vividly each of the 975 miles we covered in 22 days. Our 485-mile penetration had taken us north and east into the Brooks Range, only one day's journey from where Walker Lake, fountainhead of the Kobuk, nestles. Unhappily, *that* stretch was impassable.

Looking back over those miles, it seems each was fraught with something memorable — wild beauty, staggering space, contrary currents, rock-strewn rapids and breathtaking moments. Our 30-horse outboard had ground up a total of 66:15 hours, churning water, gravel,





PLACID WATER marks the lower Kobuk, and our horse trough river boat moved along at a steady 17 m.p.h. Special motor mount, controlled by handle in operator's right hand, raises motor clear of obstructions, shallows

rocks and a forest of submerged snags.

My decision to run the Kobuk jelled on Thanksgiving, 1961, in Anchorage. I'd been down the Yukon twice, up the Kuskokwim, down the turgid Tanana and the Susitna. The remote Kobuk wilderness, plus tales of gold and jade deposits far upstream, whetted my appetite. No powerboat had ever been known to ram its way to the headwaters, which made it more intriguing. Phyllis, my wife, agreed. Eugene Roguszka, Alaska State Director of Aviation and his wife, Dolores—old friends—volunteered to join us. It would take four to manage a boat capable of such a journey.

The next six months were a maelstrom of planning. The boat had to be light, shallow draft, big enough for four plus a month's supplies. It also had to be small enough to fit the door of the DC-4 that would airlift it to Kotzebue at the river delta. We found it in the Fairbanks shop of a riverboat dealer. It was a shovel-nosed aluminum shell of his own design, 24 feet long, four feet wide and 20 inches deep. It weighed 487 pounds and was soon fitted with a special lifting motor mount, custom balanced for my 30 horse outboard. In shoal water and rocky rapids, the entire motor could be lifted clear.

While the women looked to pots, pans, dried foods and culinary gear, Gene and I built special rigging. Recalling how five-foot waves on the Yukon had swamped this type of horse-trough craft, I rigged a bow cover and a tent-like shelter with wooden frame. Gene built four boxes with hinged lids for supplies—each custom designed for its load.

Tents, stove, fuel, spare outboard and

propellers were added to the rising mountain of supplies—half a ton of them.

On July 2, we flew to Kotzebue. Next day found us roaring across the Sound in our craft, heading for one of the Kobuk's 15 delta channels. We were down in the stern—loaded to negotiate the inlet's heavy chop. Later, on the placid water we'd shift the load for planing.

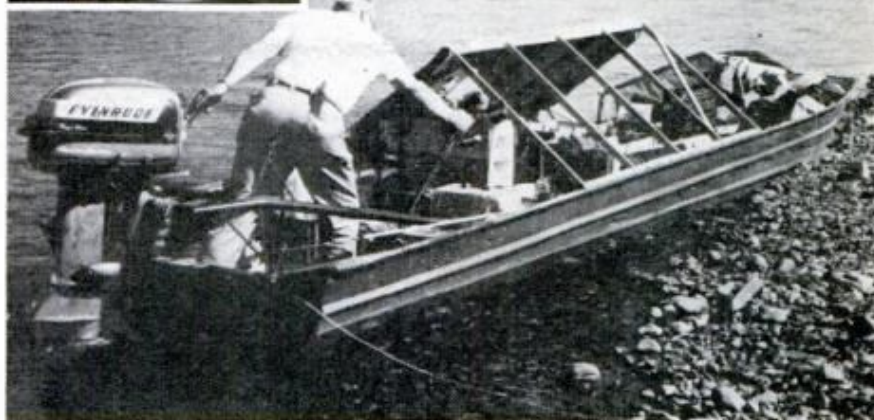
The next 20 days were a kaleidoscope of wilderness adventure for all. Under a warm sun and stiff breeze, the shallow inlet whipped up a froth, pounding and threatening to inundate us. Under full throttle, I fought to stay atop the chop. Four hours later, making for Melvin Channel—our route to the main stream—the motor leaped under my hand. Weeds and Bottom! Our motor mount worked!

Bomber-Size Mosquitos

Our first camp, at the channel mouth, was a sampling of many to come. Mosquitos harpooned us, fell in our coffee, peppered the scrambled eggs. They flew in our mouths and up noses.

As we purred upstream at 17 m.p.h. we passed colorful Eskimo villages, stopping to take on supplies and free advice. Up the glassy water of the 1100-yard-wide lower Kobuk, the outboard sang a throaty song in the stillness. Tundra stretched to the horizons, willows on the banks riffled a sluggish current.

We made camp after camp up narrowing shores, through an interminable area of sand dunes—a real Sahara of the arctic. The terrain piled into rolling hills, then mountains. Fish were plentiful. Phyl caught a 14-pound shee fish. It put up a fight that whitened her knuckles.



PRIZE FISH of the trip was my wife, Phyllis' 14-pound shee, above left, which hit on the first cast. Our 24-foot craft, rigged with tent frame bolted to the gunwale kept us, and our gear, dry during Arctic deluges. Although motor mount could lift prop clear of obstructions, we still managed to ding the blades often (inset)

We were drenched under Arctic deluges, baked under brassy sun, frozen in brief hours of polar darkness. Temperatures ranged from freezing to 107 degrees.

While Gene and I rigged camp sites, the ladies scouted the shores for jade. Some 200 miles upriver they found it—everything from pebbles to huge green boulders. In one Eskimo village, native craftsmen still carved it into primitive art forms, fish lures and spearheads. Ahead, the Jade Mountains reared craggy peaks to scrape the clouds.

At Mile 200 the water was getting noticeably faster. The shores grew steeper and closed in. Giant cliffs of permafrost—the arctic's frozen muck—had been undercut by currents, forming great platters of frozen tundra that stood on edge along the banks.

We stopped at Kobuk Village, a small settlement of Eskimos and a handful of whites, to resupply at this last outpost before heading into the uninhabited reaches of the upper river. Here we had our last real meal in a real house and investigated the site of the Dahl Creek gold strike, where we found prospectors still panning placer deposits for yellow crumbs. Then off again.

The current was up to six m.p.h. now. Bars bumped the skeg more often. We had to read the water carefully. I missed a ruffle and dinged the prop, which had to be hammered out. It was the first of many hammerings.

The river split. One channel ended for us in a maze of gravel bars; another in a tangle of branches, sloughs and crosscuts. A third, beneath sweepers, came spilling at

[\(Please turn to page 186\)](#)



CUSTOM BUILT packing boxes included this one with table that slipped down over base to form the lid

COOK TENT was the 8 x 8 Egyptian cloth dome type in background. Poplin covered teepee was for us





Flower Fighter

In Florida, where water hyacinths grow in such profusion that they make waterways impassable, a floating mower has been devised to keep the plant under control.

Designed and built by the Grimes Development Co. of Delray Beach, the mower is an eight-by-fourteen-foot raft powered by an Allis-Chalmers industrial motor and a Jeep differential. Connected to the differential are two chain-and-sprocket drives that motivate an eight-foot shaft in the bow, to which are attached 21 choppers. The choppers, which resemble a sturdy auto engine fan mounted vertically on the rod, are made of two pieces of four-by-twenty-four-inch steel criss-crossed and welded together, giving 84 cutting edges.

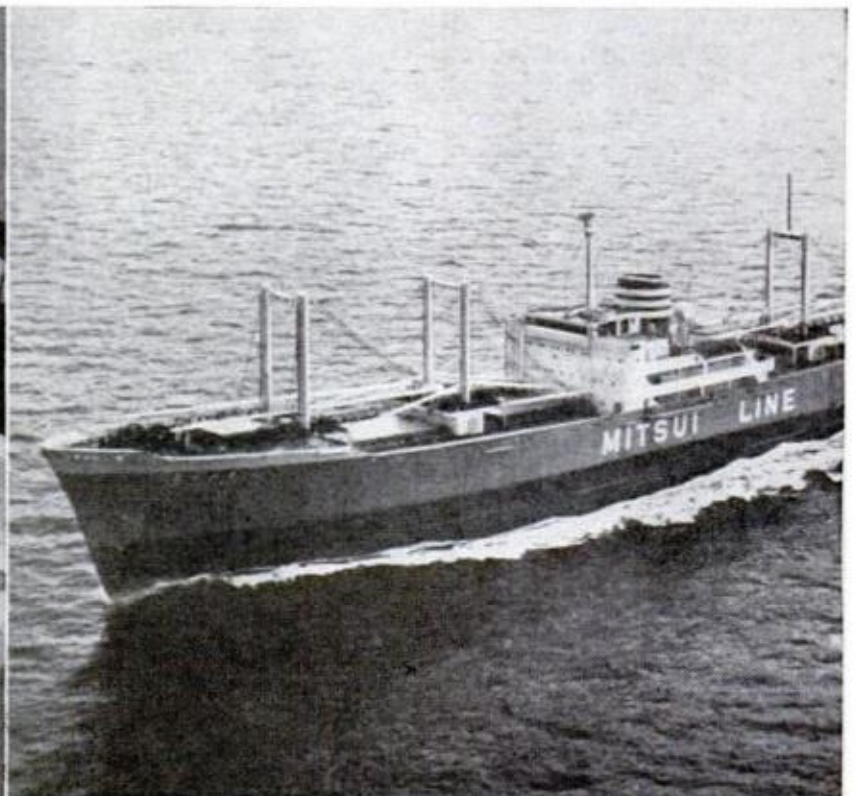
Rotary movement of the blades gives the craft its forward motion; a small outboard motor provides steering.

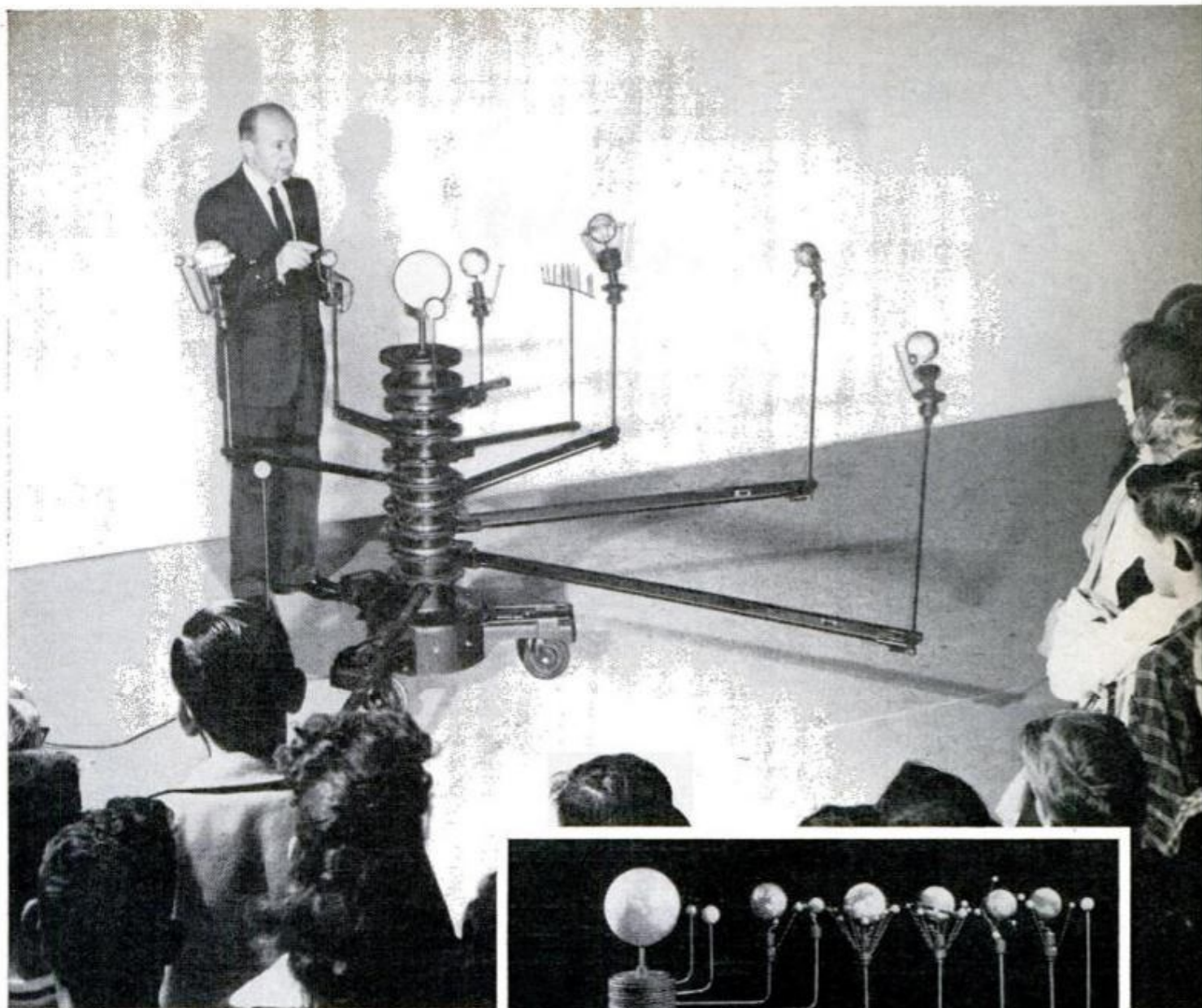
Cruising through a hyacinth-clotted lake, the mower chops the plant into small bits that sink to the bottom.

New Japanese Cargo Ship Practically Runs Itself

Only 35 crewmen, including officers, are needed to operate the new automated Japanese cargo ship *Kasugasan Maru*. The electro-hydraulic deck facilities are fully automated, as are the engine room and

electrical systems. Controls, left, permit the main engines to be run by remote control from the bridge, as well as from the engine room itself. The 8500-ton ship has a top speed of 21 knots.



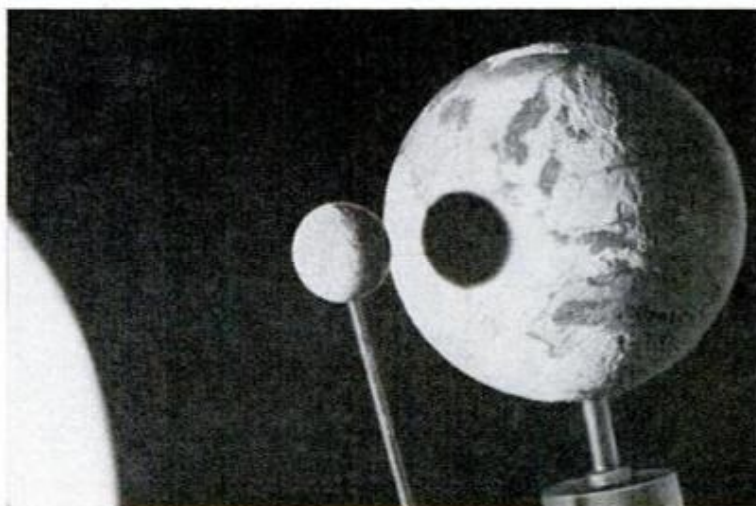
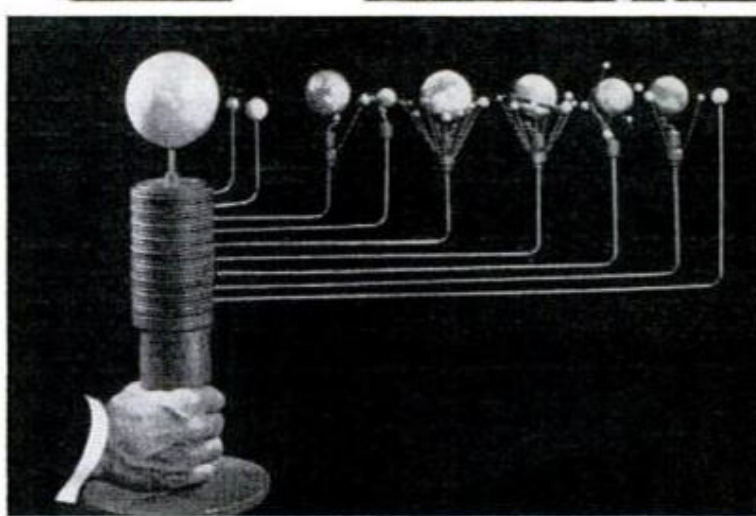


Model Solar System

Students can see how planets revolve around the sun, how eclipses occur and how the earth's motions cause the changes in seasons by viewing a new operating model of the solar system.

The Verson Solar System shows all nine planets with their moon satellites, plus the planetoid belt that also revolves around the sun. Mounted on a wheeled carriage, the system is plugged into any light socket. It uses a series of motors and slip clutches to move the heavenly bodies at the proper speeds. The sun is illuminated for demonstrating eclipses (bottom photo). Also available is a portable model of the system (inset).

The two models, at \$2200 and \$195, are available from Verson Solar Systems, Inc., 1415 W. Alabama, Houston 6, Tex.



All Aboard the GEMINI

A top space author takes you aboard the passenger space liner of the future—now taking shape in Project Gemini

By Robert A. Heinlein

.....TIME: 1984, OR THEREABOUTS.....

THE ROCKET SHIP LIFTS from Mauna Loa Port, Hawaii; her passengers are tranquilized and strapped down to contour couches. In a few minutes the booster stage separates, then plunges back to the "lift" atmosphere under the control of the booster-stage pilot.

This officer brings the booster down in an unpowered glide toward the Pacific, and lands her, seaplane-fashion, on the water. He does this so precisely that his tow ship is less than 10 miles away.

A line is passed, a towing crew comes on board, and the booster pilot sacks in, having been on duty for little more than an hour and having actually worked about 15 minutes. For this, he gets paid in excess of \$100 per minute—and is worth every cent of it. . . .


The important thing is that the enormously expensive giant booster has been saved to lift another day. With proper maintenance, there's no reason why it should ever wear out. That is one reason why space travel will be relatively cheap in 1984.

The keys to tomorrow's cheap space travel are reliability, precise rendezvous techniques in space, and undamaged recovery of ships in orbit. And these are no longer in the daydream category. They are the objectives of Project Gemini—a very much alive program with plenty of money and steam behind it.

Preparations for Project Gemini are underway now at the National Aeronautics and Space Administration's Manned Spacecraft Center at Houston, Tex. It is to be our next step toward conquering space.

SPACE PACK, called SMU (self maneuvering unit), will be used by astronauts for repair or assembly work outside spacecraft. Strapped to the spaceman's back, the pack contains a life-support system, thrust jets, and stabilization and control units. In test flights, right, an engineer, in a state of weightlessness, propels himself through the cabin of a high-flying jet





DOCKING procedure in space is a major item on Gemini's schedule. Astronauts in the two-man space ship must achieve orbit identical to that of previously launched Agena (foreground), and then "lie up" to it

But we left the second stage and the cabin of that 1984 ship still in trajectory and approaching orbit. . . .

The second stage boosts the cabin into circular orbit around the earth before separating; its pilot then uses retro-rockets to slow his empty vehicle as it dips into the atmosphere. As the ship slows, he breaks out a paraglider, or Rogallo delta wing, made of a special heat-resistant plastic with three nitrogen-filled sleeves that serve as spars. Acting as a parachute as well as a wing, the unit allows the pilot to maneuver his craft on target—a dry lake in the Mojave Desert.

The third stage, the passenger section, stays in orbit. Its destination is "Space Island Goddard"—a manned orbiting space station, named for an early U.S. pioneer in rocketry, Robert H. Goddard. Here the passengers will transfer to today's moon ship. But the island is in orbit a long way out, and the passenger section doesn't carry enough fuel to reach it. The first task is to rendezvous with an unmanned tanker-cargo vessel so that its power can be used for the rest of the trip.

The tanker-cargo ship may have been placed in orbit hours or days earlier, timed to pass over Hawaii at the exact angle to rendezvous with the passenger ship.

The spacecraft's captain has the help of complex radar and computer systems on the ground and in his own ship in making speed and course corrections for rendezvous. All course information is programmed into his autopilot. Not until he closes the gap to some 20 miles and sights

the flashing beacon on the tanker-cargo unit will he take over manual control.

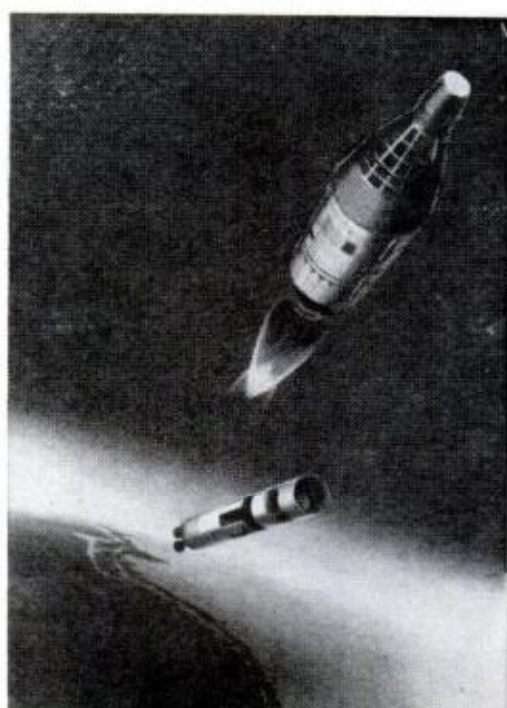
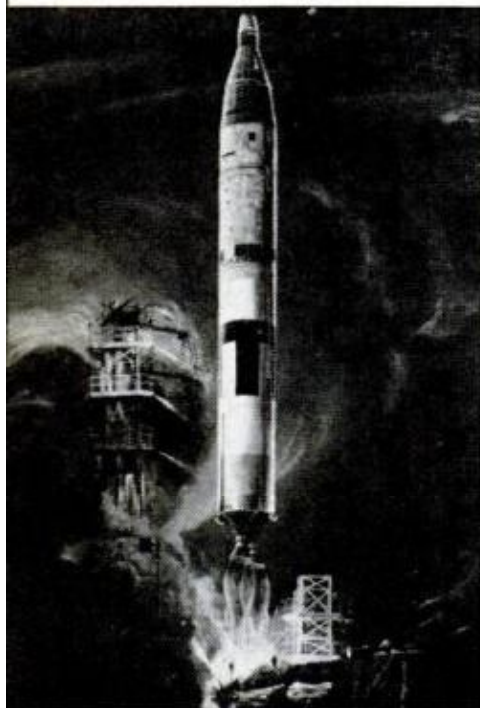
During the catch-up period he sends the copilot outside the ship to inspect for and, if necessary, correct a suspected fault in a radar antenna, and this he solemnly logs. In fact, there is no malfunction, but the copilot gets a nice "special hazard" bonus for pressure-suit work outside the ship in orbit. This is a traditional racket, condoned by the business office, and is a way skippers reward good copilots.

When the ship is about 100 yards from the cargo-tanker, the captain initiates the docking maneuver. He moves in, fitting the nose of his ship into the docking cavity in the bow of the tanker; he knows the two vessels are joined when he feels the grapples lock into place. During the docking maneuver, the passengers are strapped down, but it is accomplished so gently they are hardly aware of it.

With help from ground-based computers and radar, the captain now starts a longer maneuver; his twinned ship will move from a low circular orbit into an elliptical orbit tangent at its apogee to the orbit of Space Island Goddard, and so timed that ship and space station will reach the same point at the same time.

The maneuver is without incident save that both the larger loading docks at Goddard are occupied. Our ship lies off a mile or so, perfectly matched in orbit, and waits. In a few minutes, one of the docked ships departs and our cargo-tanker backs gently into the vacated space. The passenger cabin is warped into a smaller dock-

A TWO-MAN GEMINI, riding atop a Titan II booster, will blast off, perhaps in the fall of 1964, for a rendezvous in space with an unmanned Agena-D target ship. Far out in space, the big booster's first stage, right, falls away



ing socket nearby. The passengers disembark to wait for a scheduled moonship.

All of the above is implied by Project Gemini. Every maneuver described in the "1984" sequence above will be proved out—or washed out—by Gemini, with the exception of the space island procedures.

When Project Gemini is completed, perhaps two years from now, we will have accomplished all the major steps needed to achieve regular and reliable space travel. One factor, the development of truly big boosters, is not part of Gemini but is going ahead in other projects.

The purpose of Gemini is to design, develop, build and launch a series of two-man spacecraft, controlled by the pilots and capable of staying in orbit for up to two weeks. It will be capable of undergoing repair or service in flight by the crew, including repairs made outside the vessel by a man in a space suit. It will perform a precise rendezvous with an unmanned tanker, joining with the tanker and then maneuvering as a single ship. Finally, it will separate from the tanker for a soft landing on earth. During one flight, simulated repairs will be done outside the capsule in space.

At some point in the Gemini program, the plan is to launch an unmanned Agena tanker into a circular orbit 150 miles up and on a course that would bring it over Cape Canaveral twice a day. After its precise orbit has been determined, the two-man Gemini will be launched into an elliptical orbit that will bring it within a few hundred miles of the Agena.

Both vehicles will be maneuvered under ground control until they are in the same plane and about 250 miles apart. Gemini's radar will then lock onto the Agena, and its autopilot will operate the engines to home on the target.

The Agena will be displaying a flashing light (to distinguish the signal from the steady light of stars) and the astronauts should sight this at a range of 20 miles. Shortly after, they will use manual controls to bring the two craft together.

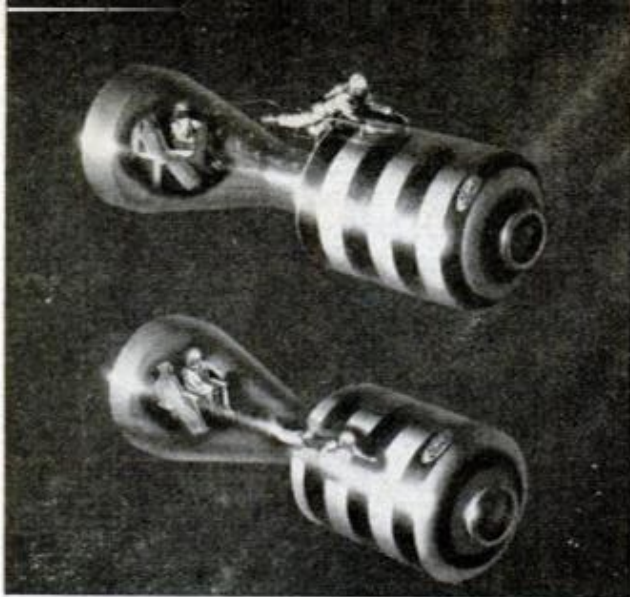
Long before that movement, the Agena tanker would have been turned around so that its engine is forward and its other end, with the mating ring on shock absorbers, is toward the rear. Both vehicles will be traveling in excess of 17,000 miles per hour, but speed of contact is expected to be no more than one or two feet per second, a very mild touch rate.

If the tanker is hit too hard or at the wrong angle it could be damaged. Too, if the closure is not exactly right the tanker would be bumped and would float away. Another try would be necessary. But Gemini has 16 thrusters, small jet engines, for speeding up, slowing down, changing attitude and changing direction. The astronauts should be able to mate the two crafts with no trouble; the vehicles automatically locked together.

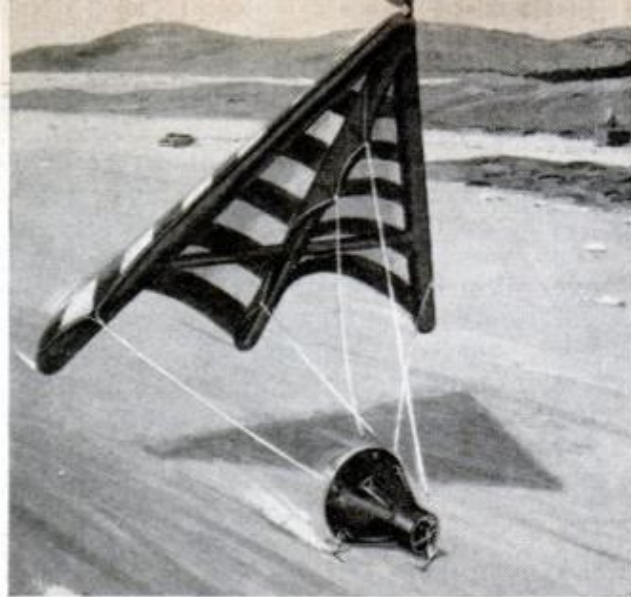
Now the men in Gemini have control of Agena's big engine and its load of fuel. They can turn the twinned craft around to get the engine at the rear, then perform large-scale maneuvers in space. They could move from a circular to an elliptical

THE SECOND STAGE separates once the craft is in orbit, left. The capsule and target ship will be maneuvered into position for docking by ground controlled and spacecraft radar; astronauts themselves will accomplish hookup





DRAWING of proposed space trainer shows astronaut leaving capsule to enter space lab, top; in another version, he goes directly into the lab from capsule



AT 70,000 FEET, a paraglider will open and bring Gemini to a soft landing at pre-selected site, but first two capsule landings will be made by parachute

orbit, just as our 1984 spacecraft will do to complete the trip to Goddard.

But all of this isn't contemplated yet. Instead, after some maneuvers, the Gemini capsule will unmate from Agena for its return to earth, leaving Agena to plunge eventually to a fiery death in the atmosphere. The detaching operation could be sticky, for it has been shown in the laboratory that metals weld themselves together in a vacuum. Whether this would happen at 150 to 200 miles altitude is not known. As a precaution, the astronauts will be able to explode the latches to separate the crafts.

The two men on Gemini will wear soft suits, either metallic gold or silver in color, and soft helmets that balloon out when inflated. They can unzip portions of the suits for greater comfort when their cabin is pressurized. They would zip up only for re-entry, or when the cabin was depressurized deliberately; this would be done so one hatch could be folded back for an astronaut to step out into space.

The only other time the suits would be pressurized would be in the unlikely event that they were hit by meteoroids. Gemini's skin is tough enough to resist pinhead-sized meteoroids, but one the size of a marble could smash through. The cabin air would leak out, but slowly enough for the astronauts to pressurize their suits.

The first and second shots in the Gemini series will land by parachutes, Mercury-fashion. After that, each craft will land under the pilot's control, using a paraglider he can open at about 70,000 feet. By trimming the paraglider's attitude with cables and shifting its center of gravity, the astronauts could land anywhere inside an area 50 miles wide by 450 miles long. Gemini's landing gear consists of struts and skids, similar to that of the X-15.

It's planned now to terminate these flights somewhere in Texas. A grain field, a dry lake bed or any flat piece of desert is suitable; the craft would land at a forward speed of 45 miles per hour and with an impact velocity that depends on the pilot's skill. For safety's sake, the craft would be able to land on water.

The Gemini spacecraft is admittedly a minimal vehicle for two men; necessarily so because we don't yet have really big boosters. The engineers would happily design a much larger ship if we had the power to lift it.

Gemini is half again as big and looks very much like the Mercury capsule. But there the resemblance stops. Mercury was simply a space capsule, controlled from the ground with the astronaut hardly more than a passenger. In one Mercury shot a chimpanzee was the "astronaut."

The Mercury capsule is cram-jammed with automatic gadgets, duplicated circuits, and electronic and mechanical spaghetti of all sorts. The Mercury shots proved that an astronaut can actually control his ship. This made much of the complexity unnecessary.

Gemini is pilot-controlled and maneuverable. It is equipped to monitor its Titan II booster on the way up, and can separate and abort the shot if necessary. As a spacecraft, it can change attitude and direction in the vacuum of space. And yet, its control board is extremely simple. The displays, read-outs and switch buttons are very few. There is just one control stick, similar to a single-engine sports plane control stick. It is located between the pilots. There are no controls for the feet. Despite the many rocket thrusters, there is remarkably little plumbing.

The worst shortcoming of the Gemini

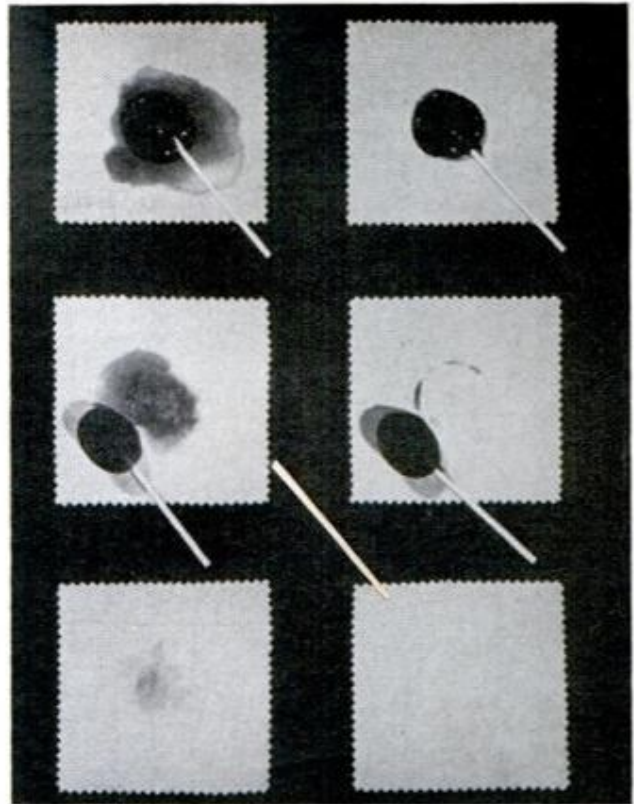
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Stain-Resistant Finish

Fabrics treated with a new fluorine-based textile finish are water and oil repellent and resist staining from such agents as grease, coffee, ink and salad oil. Applied in the finishing process at the mill, the treatment has no effect on a fabric's appearance or feel. It is said to stand up well to washing and dry cleaning.

Called Zepel fabric fluoridizer, the finish makes stain removal easy, as is indicated in photos of treated and untreated fabrics. Swatches of untreated fabric, left, show the effect of a gooey lollipop on upholstery fabric. The middle photos show stains left when the lollipop has dried. After spot cleaning with water, bottom, the untreated fabric remains soiled, the treated swatch is clean.

Developed by Du Pont, Zepel-treated fabrics will be used in upholstery slip covers, rainwear, sportswear, draperies and other fabrics. These fabrics are expected on the market later this year.



Lifeguard for Astronauts

Designed to blast Apollo astronauts away from the launch rocket in case of trouble this launch escape motor gets a final turn of the screw before being released for preliminary testing.

The motor is similar to, but much larger than, the escape rocket used in the Mercury program. Built by Lockheed Propulsion, the solid-fuel motor can develop 100,000 pounds of thrust within seconds.



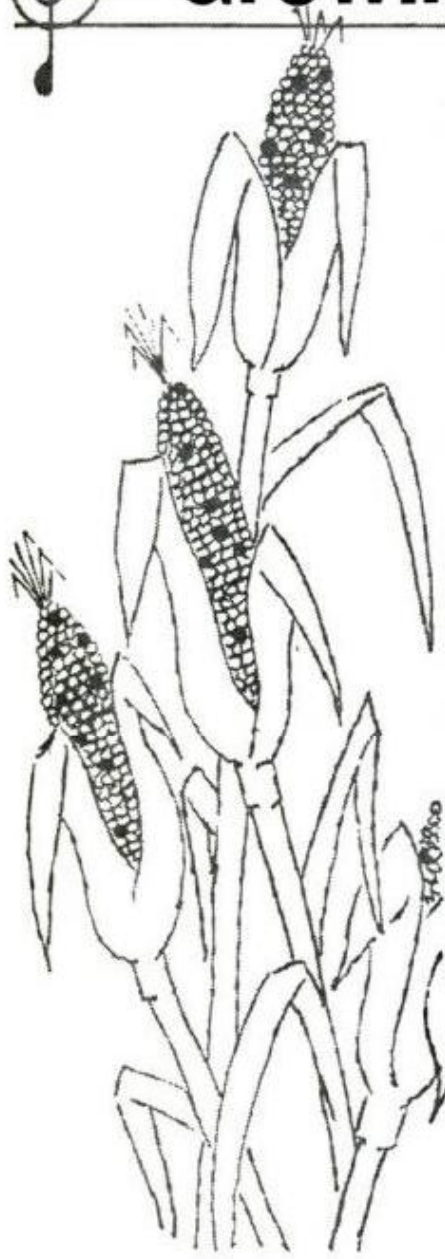
Next Come Wheels?

The trend toward automotive-style cockpits for boats can't go much further than Century's Sabre 18. Noting a close resemblance between the boat's standard cockpit and the interior of a Rambler, American Motors cooperated with Century in turning out an exact duplicate.

Now, for a slight extra charge, you can order a Sabre 18 with Rambler interior—same upholstery, steering wheel, dashboard, floor mat and colors.

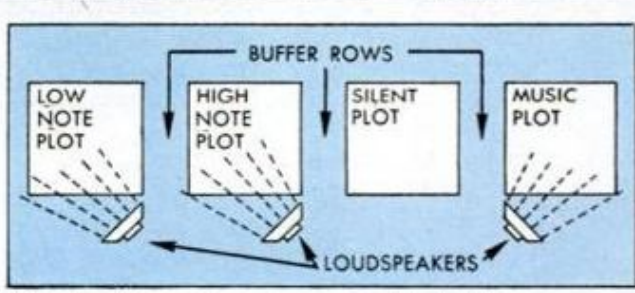
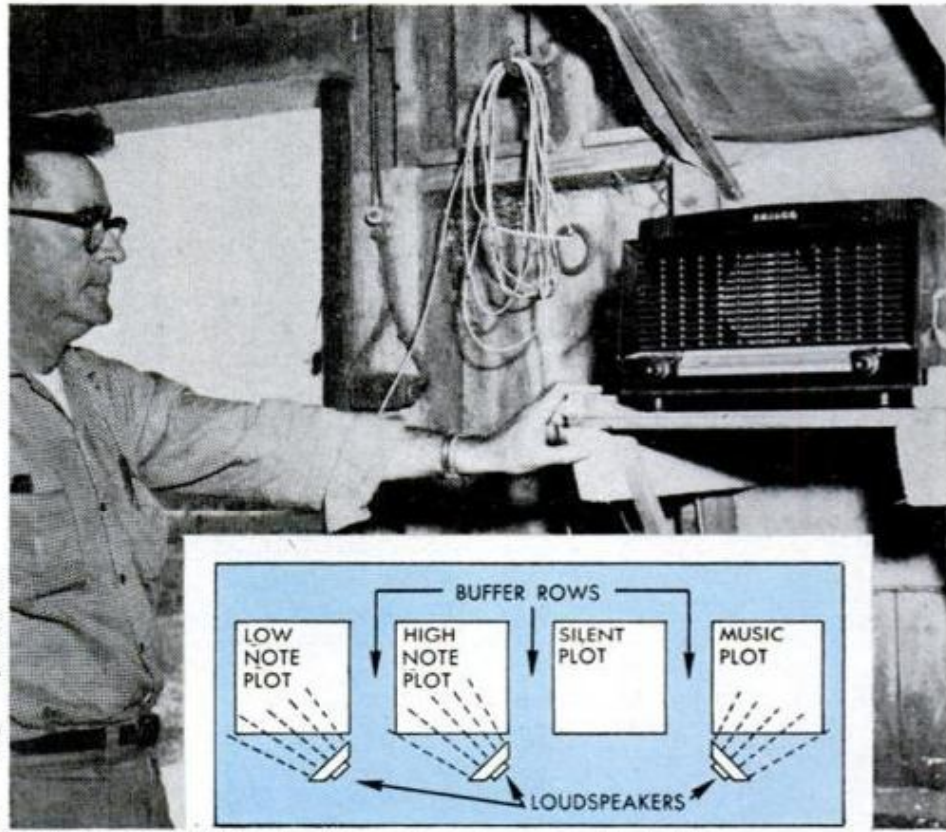


Growing Corn to Music



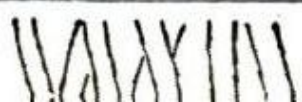
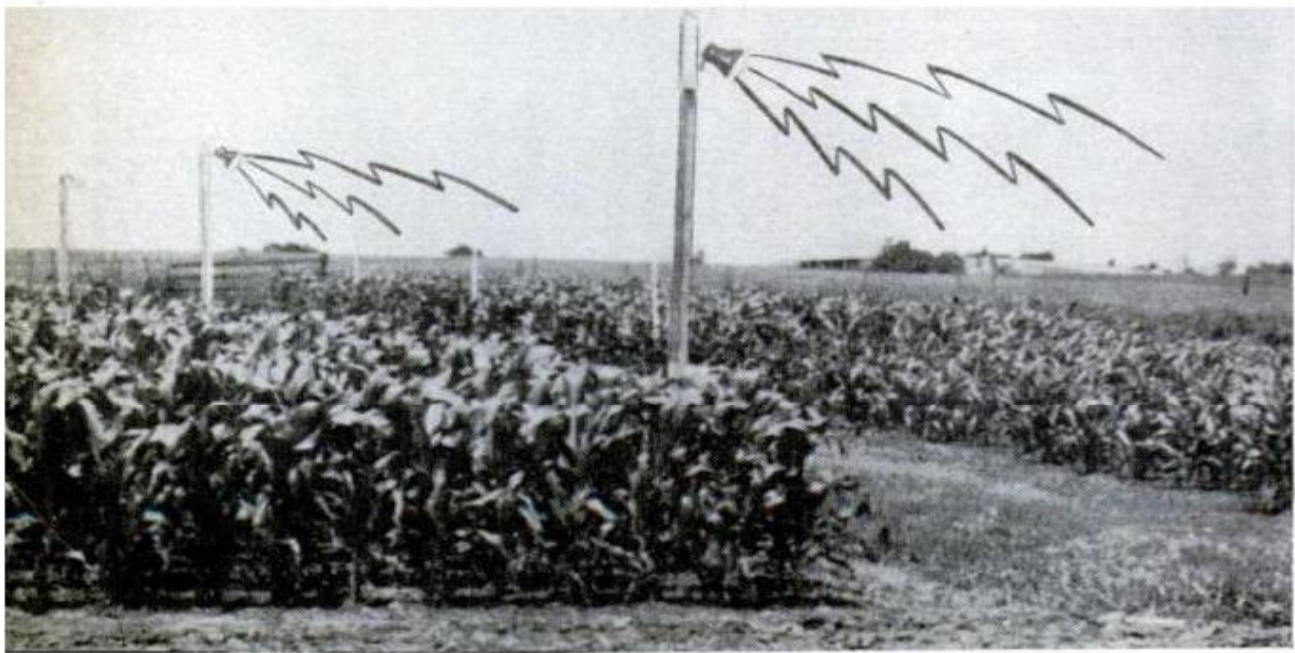
Beaming melodies at corn plots may increase their yield by as much as 17 percent

By Clifford B. Hicks



GEORGE E. SMITH, the farmer's answer to Mitch Miller, pipes the sweetest music this side of Grand Old Opry to his crops. He also beams high and low notes at some plots

MUSIC TO GROW BY is aimed at test corn. Played continuously, it seems to make stalks grow faster and taller, bloom quicker and yield more than neighboring plots without music



CAN THE EARS on a cornstalk hear? Will the plant respond to music? If so, does it dig the twist, or long-hair stuff?

These are some of the questions raised—along with the corn—on a farm in central Illinois. The experiments are designed to find out whether music can make plants grow faster or taller.

There are echoes of these music tests around the world—in California and Switzerland, in India and Canada. And the Canadian tests have turned up another—and startlingly beneficial—effect of beaming sound waves across a cornfield.

The Illinois farm is just off Route 66 near a little farm community named Normal. There, George E. Smith has been conducting his music-in-the-cornfield experiments for the past three years. He's harvested a big crop of facts, figures—and controversy.

A good many people consider the idea of playing the hit parade to corn plants pretty off-beat, but at 49 Smith has the look and manner of a quiet, competent farmer, which he is. He also has the studious eyes, behind horn-rimmed glasses, of a scientist, which he also is. His scientific experiments started early in 1960.

"The farm editor of the local paper," Smith explains, "told me he had just received the results of a curious experiment in India. An Indian botanist claimed that

when he played classical music to rice plants, they grew faster and higher. I decided to try a similar experiment."

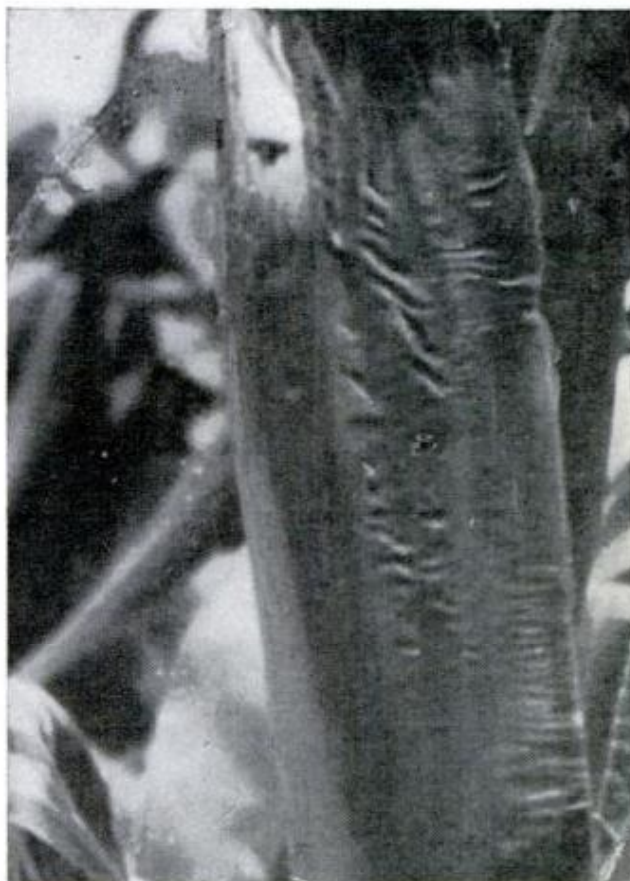
That spring, using two identical greenhouses, he tried his first, tentative experiment. In several flats he planted corn and soybeans, using the same soil in all the flats. Half the flats went into a corner of one greenhouse, the other half into the corresponding corner of the other greenhouse. Both houses were kept at precisely the same level of humidity and temperature. In the "music" greenhouse he placed a small record player with the speaker directed toward the experimental flats. He played the same record—Gershwin's "Rhapsody in Blue"—24 hours a day.

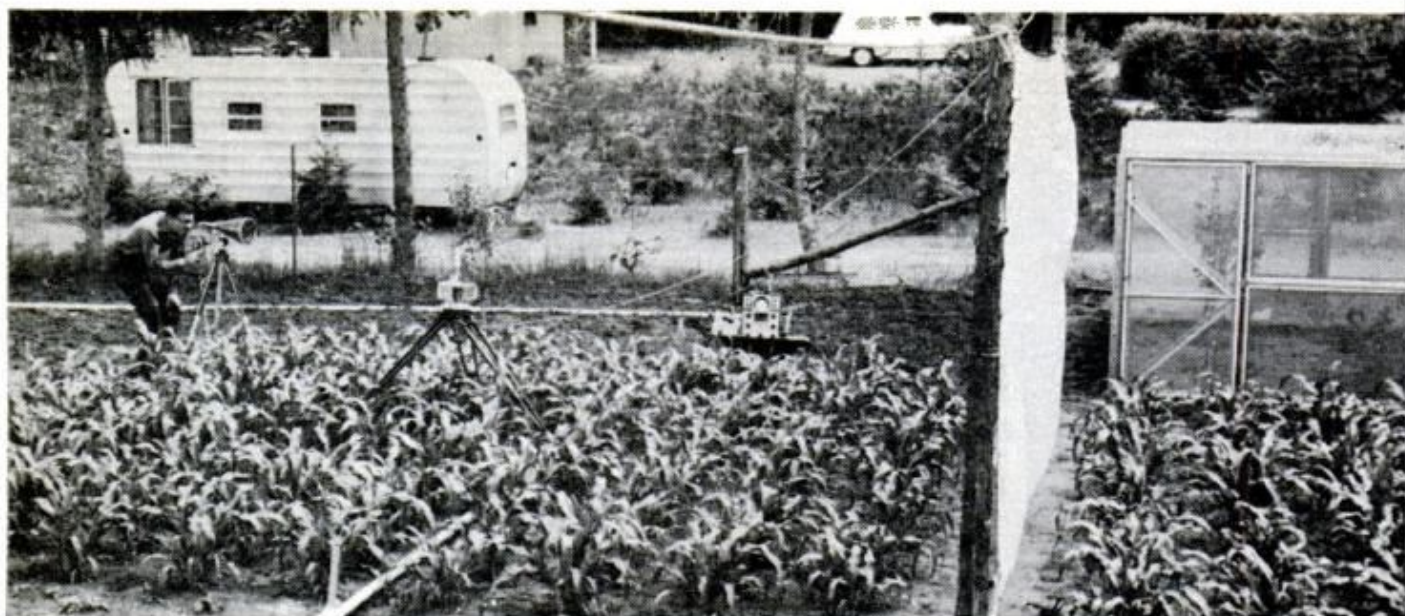
The results of the first experiment were surprising. The "music" plants sprouted first, were greener, and their stems were thicker and tougher than the "silent" plants. Sceptically, Smith removed 10 corn plants and 10 soybean plants from each test plot. He cut them carefully at ground level, and immediately weighed them on an apothecary's scales.

The 10 "music" corn plants weighed 40.2 grams; the "silent" plants 28 grams. The 10 "music" soybean plants weighed 31 grams, the "silent" plants 24.5 grams. Furthermore, when he dug up the soil he found a significantly larger clot of roots on each

BEST EFFECT is that crops in "music" plots yield as much as 17 percent more than "silent" plots. At harvest, crops are weighed carefully and recorded

WORST EFFECT is that the sound of music may also be destroying some plants. This stalk, immediately in front of loudspeaker, shows damaged tissue





PLASTIC WALL separates "music" plots from "silent" plots in Canadian test. Wall bounces sound back, insulating second plot. Two plots are then compared

plant from the plots where music played.

The following May, Smith planted 10 rows of corn in a plot, skipped an area equivalent to 10 rows, then planted 10 more rows of the same seed. At the corner of one of the plots he installed a loudspeaker on a telephone pole and connected it to a record player inside the barn.

Once again he started with "Rhapsody." However, Smith has a quiet sense of humor, so he whimsically selected music to fit the stage of the corn. After the plants had sprouted, he played stirring "marches to grow by"; at the time of pollination and fertilization he played the wedding march; then came "happy" music for the swelling corn ears; for the ripening grain, he chose "Silver Threads Among the Gold."

The results: Sprouts directly under the speaker appeared 12 hours earlier than any other sprouts in either plot; the music plot "looked" healthier (a subjective judgment); there definitely was more rapid growth in the music plot; the plants were more uniform (again subjective); and silking definitely occurred three days earlier.

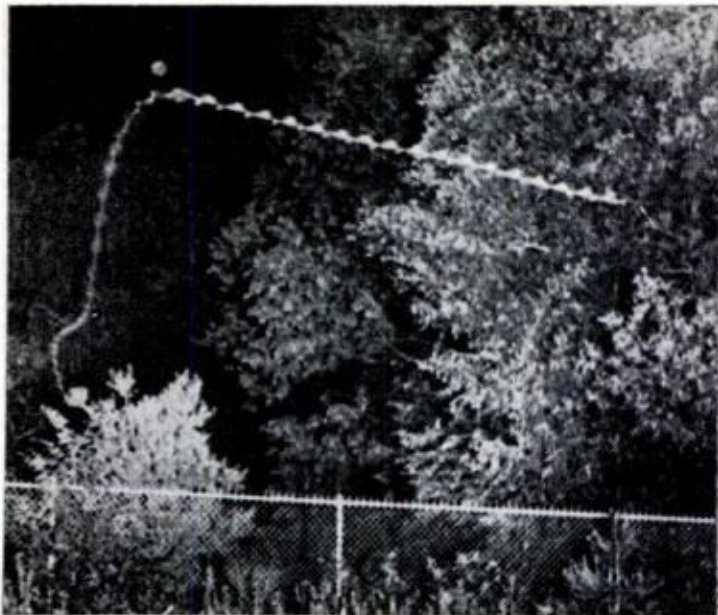
Most significant of all (and no chance for a subjective judgment here), the yield was 137.5 bushels per acre in the music plot,

116.7 bushels per acre in the silent plot. This was a difference of a whopping 20.8 bushels per acre.

At the same time, during the corn tests, Smith tried to check out a question that had popped into his mind: *Could the music be raising the temperature of the soil, thereby accounting for the other effects?* Sound waves are a form of energy, he reasoned, and energy can be converted into heat. At the beginning of the experiment he inserted thermometers into the ground, and during the growing season he systematically recorded the soil temperatures throughout the plots. He found that the soil directly in front of the loudspeaker was two degrees warmer than the soil some distance away. And subsequently he noticed that the leaves of the plants directly in front of the loudspeaker were being "eaten" away—evidence that sound waves can destroy leaf tissue.

Again last year Smith expanded his tests. This time he prepared four plots, side by side. Across the first plot he broadcast the same musical score that he had played the previous year. The second plot was his silent control plot. Across the third plot he broadcast a high continuous note





SIDE EFFECT. Multiple-exposure shows path of cornborer moth, scared off when sound (dot) turned on



INDIA EXPERIMENT featured floor show, but there is no proof that it inspired the plants to grow more

(1800 cycles per second). The fourth plot received a low note (450 cycles).

When all plots were harvested, they produced a surprising table of results:

| | Number of Ears | Bushels per Acre |
|----------------|----------------|------------------|
| Silent plot | 269 | 171.3 |
| Music plot | 287 | 186.1 |
| High-note plot | 300 | 197.8 |
| Low-note plot | 328 | 200.9 |

If you want to draw some fast conclusions on the basis of this one experiment (which George Smith refuses to do), you might say that corn plants "appreciate" sound, but prefer a single note to music!

Actually, the significant finding is not what corn plants "appreciate," but the fact that all the sound plots yielded more than the silent plot, and that the continuous low-note plot yielded 29.6 more bushels, or 17.3 percent more than the silent plot.

What's the explanation?

George refuses to theorize. He's a botanist, and he isn't naive. He doesn't believe that plants have inborn music appreciation. When forced into a corner, he still refuses to theorize, but offers some thoughts.

"Sound waves are a form of energy, and energy does affect cells. It's a matter of

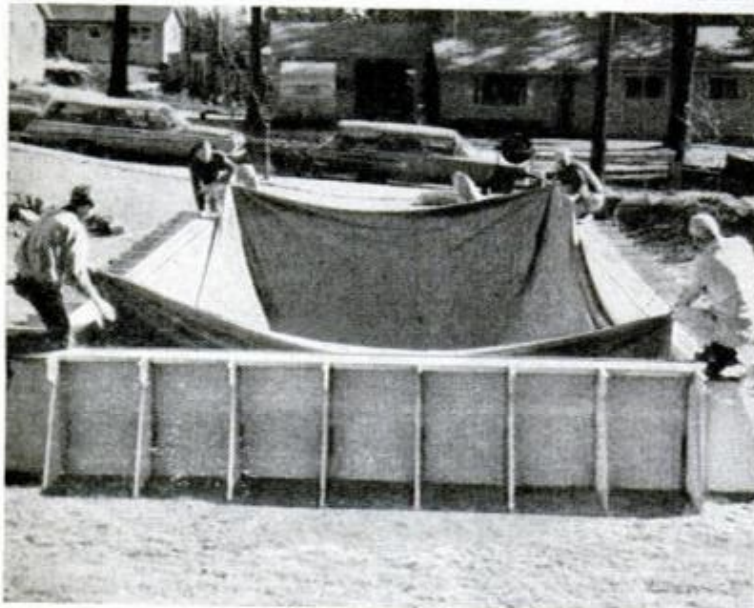
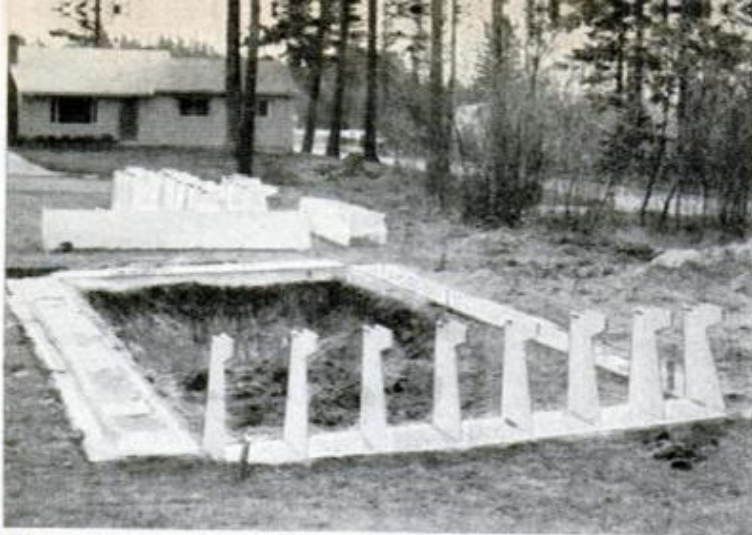
record that sound waves can destroy cells. I've seen it in my own test plots, and it's been proven elsewhere. Energy may have other effects on cells—beneficial effects—that we don't know about. And, of course, there's the possibility that sound energy can increase molecular activity in the soil, thereby raising the temperature or affecting micro-organisms, although my 1962 experiments were inconclusive in this respect. Experiments have shown that a short burst of light energy can 'wake up' a plant and make it grow even in darkness. This, of course, has no bearing on my experiments, but it does indicate that bursts of energy in various forms may touch off unique effects of which we aren't aware."

Not as proof, but as evidence he points to other experiments around the world. In Kansas, high-frequency waves were used to control insects in stored wheat; the same wheat, planted later, germinated faster than untreated wheat, and in the early stages grew faster. California tomato plants have reportedly responded to music.

There have been extensive experiments in India on rice, tobacco, tapioca, sugarcane and cotton. According to Dr. T. C. N.

(Please turn to page 183)





Quick Pool

With about 48 hours of labor, a do-it-yourself family can have a new swimming pool.

The kit pools, which come in four sizes ranging from 12 by 20 feet to 16 by 32 feet, stand three feet above the ground. Excavation makes the deep end six feet deep.

The parts in each kit are pre-cut, predrilled and marked for installation. After the excavation is made, the footings and plywood bases are erected around the pool area. Then a thin layer of sand, cement and vermiculite is applied to the floor and a heavy-gauge vinyl liner attached to the rim of the pool.

Manufactured by the Islander Pool Co., Eugene, Ore., the pool sells for about \$1200.





Mechanized Water Boy

Thirsty athletes can now have a portable water fountain. "Water Boy" contains a five-gallon tank to which four hoses are attached. A squeeze nozzle controls each stream of water in this \$79.50 unit made by the B. & G. Co., Plumsteadville, Pa.

It Cooks with Smoke

Wood is burned at the bottom of an L-shaped structure and the smoke drifts up the vertical section to do the cooking in a new, portable patio oven.

Good for meat, fish or poultry, the stove includes a firebox with dampers to control the fire. The food is hung in the cooking chamber. Oak, hickory and fruitwood are the best woods, imparting a flavor to the meat obtainable in no other way. Made of two layers of sheet steel, with air space and glass-fiber insulation, the outside surface remains relatively cool.

Priced to sell under \$150, it is made by Pilgrim Manufacturing Co., 767 S. 17th St., Richmond, Calif. Its shipping weight is 160 pounds.

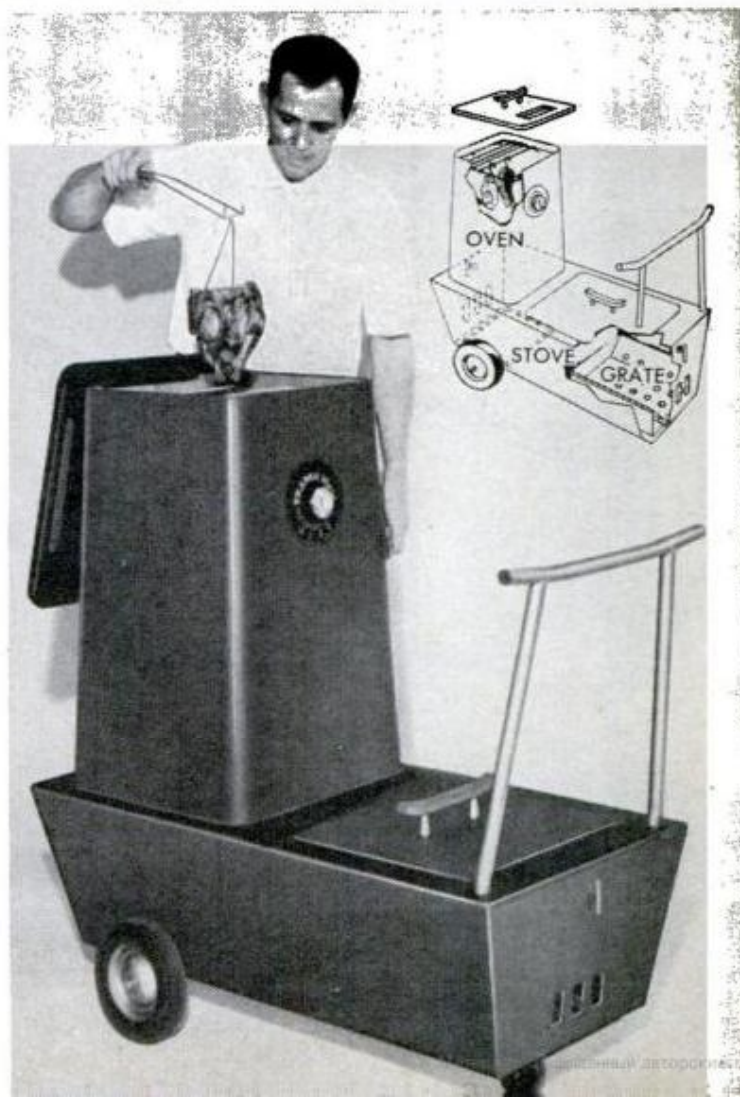
Saturn's Rings are less than eight inches thick—not the 10 miles previously thought—according to two astronomers who studied 1000 pictures taken from a South African observatory. The rings are about 45,000 miles wide.



Nips Frost from Cat-Bird Seat

De-icing and anti-icing mixtures are sprayed from a specially built snorkel-like vehicle onto surfaces of huge airline jets.

The self-propelled units hold 1000 gallons of heated antifreeze (water and glycol) which remove and retard ice.





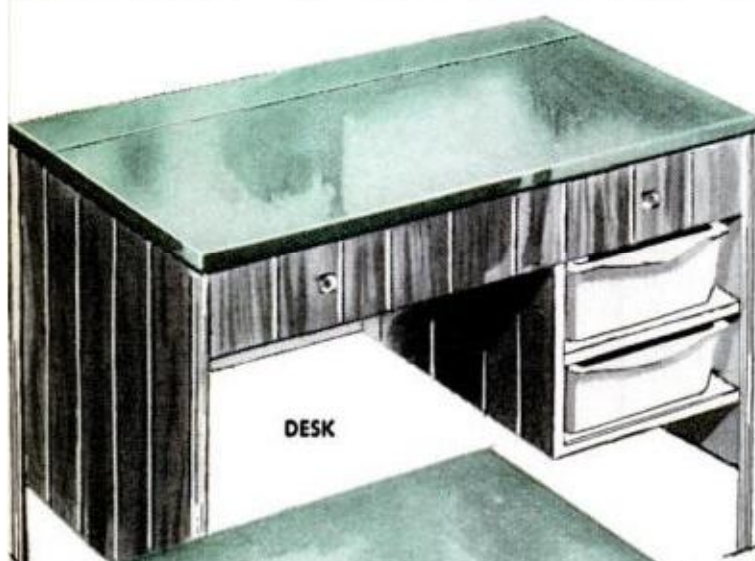
STUDY PLAY SLEEP DENS

For School Ager

Borrowing an idea from college dormitories, PM asked designer David M. Swartwout to create a matching furniture set to fit children's rooms of any size

COLLEGES must furnish dormitory rooms where students can live, study and relax in comfort. Parents of younger children face much the same problem at home. Once the child starts to school, they must convert a room that's been virtually a nursery, into a place where the child can prepare his homework. Yet the room must remain a comfortable bedroom, and is likely to be used—just as college rooms are—as a social lounge—a place to entertain school chums.

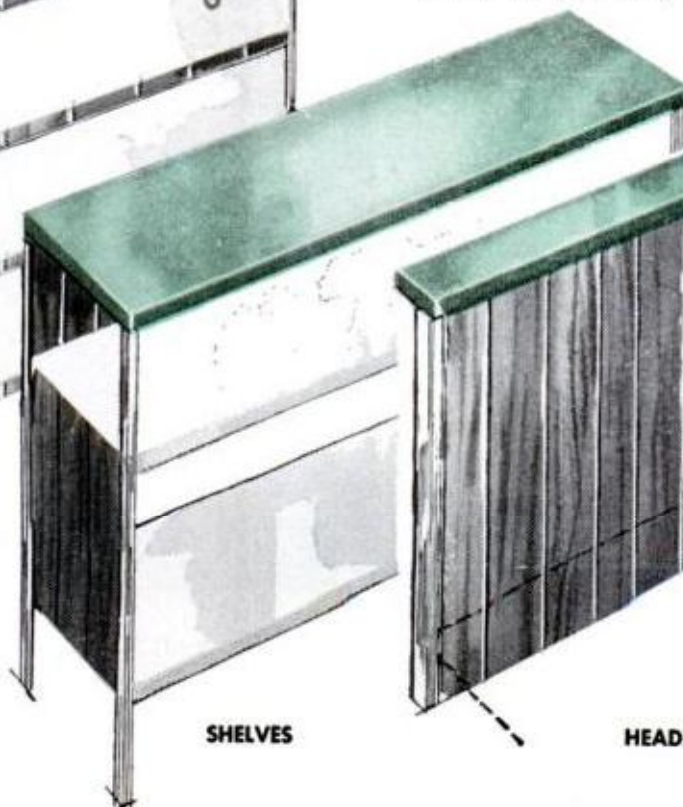
Much can be learned by studying the style of furniture colleges choose for students' rooms. It's simple, sturdy, attractive and easy to keep clean. The four



DESK



CHEST

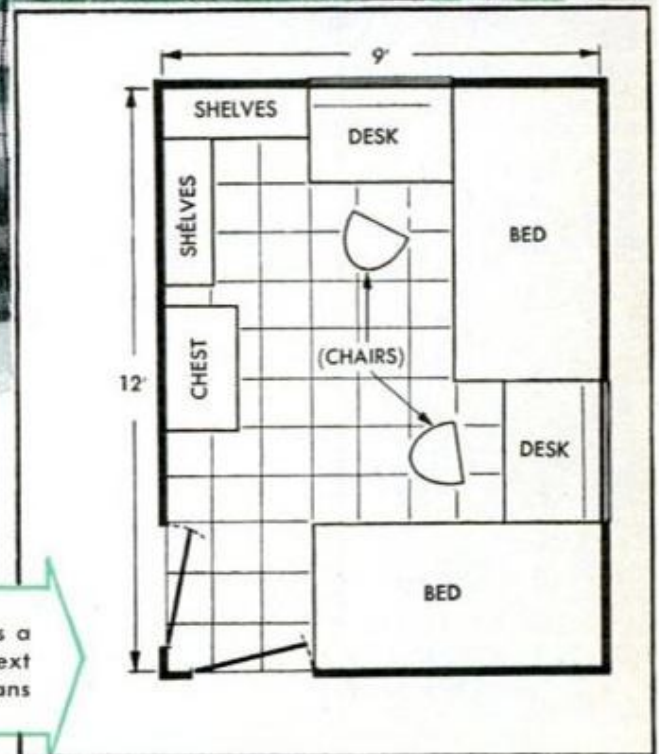
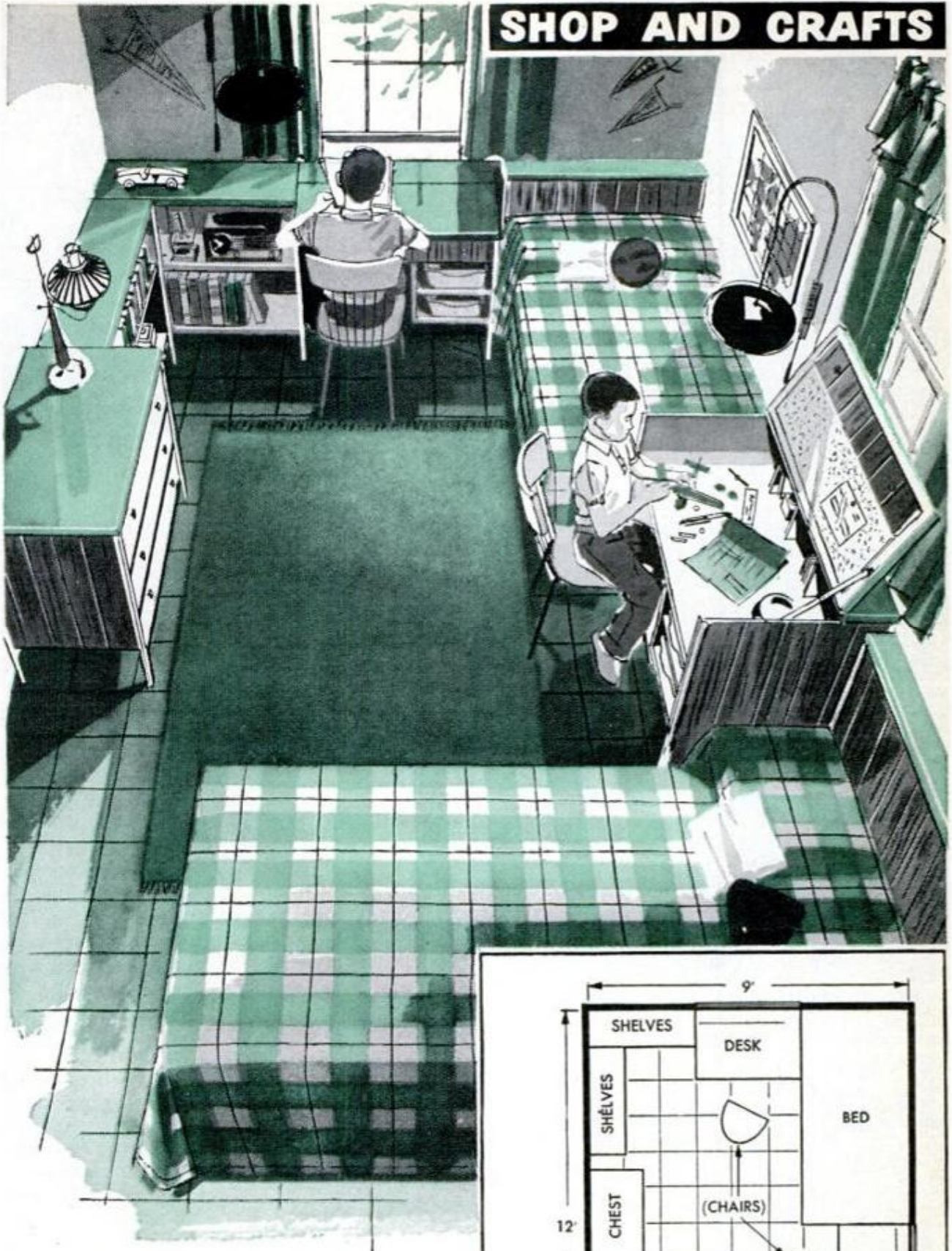


SHELVES



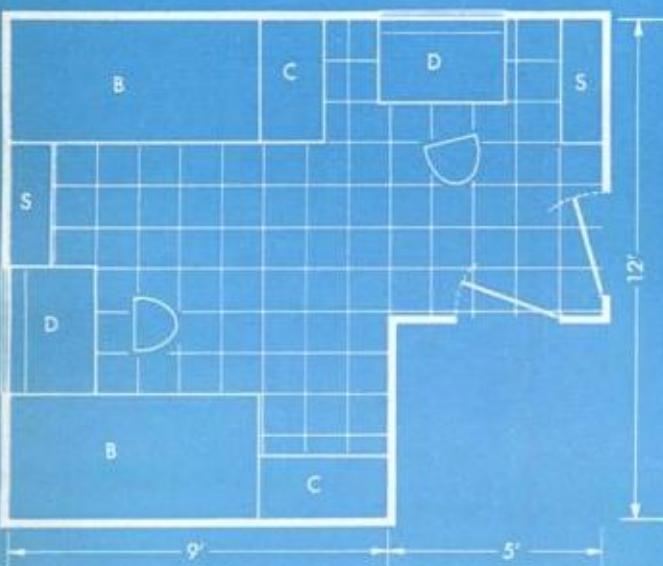
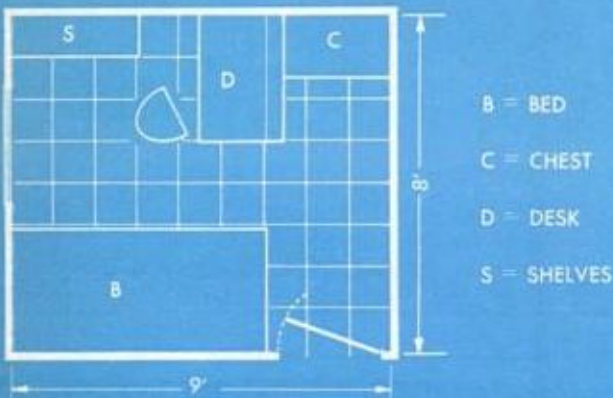
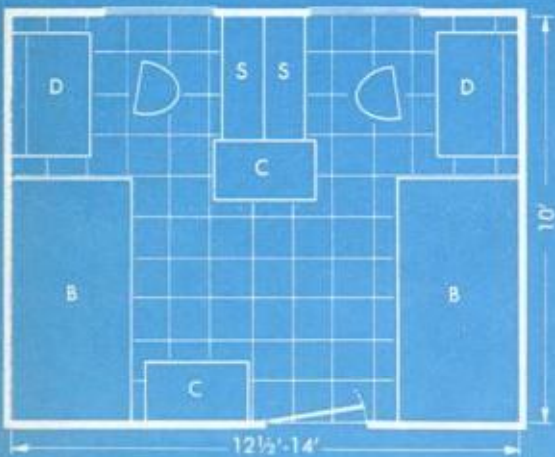
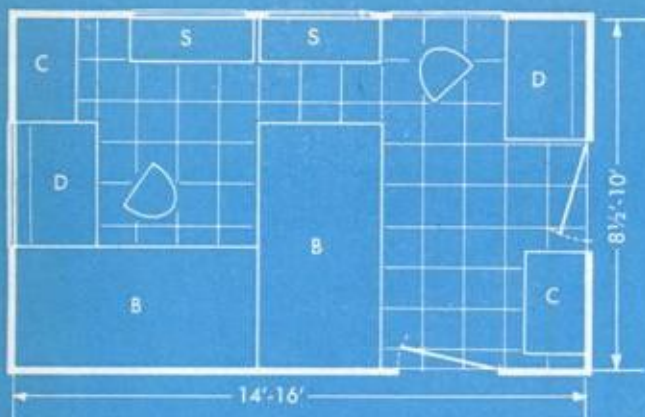
HEADBOARD

SHOP AND CRAFTS



DOUBLE OCCUPANCY of this corner room requires a pair of each unit on the facing page. On the next pages are sample groupings for four other floor plans

4 MORE FLOOR PLANS



LIFT THE LID of this two-level desk...

matched co-ordinates shown here have all these good points, plus this extra: they're adapted for students who live at home.

This college-style furniture is exceptionally easy to build, since it uses as many pre-fabricated parts as possible. The chest is merely a dressed-up commercial drawer case with knock-down drawers. Even simpler are the desk's drawers: you just buy plastic dishpans of a color to complement the top finish.

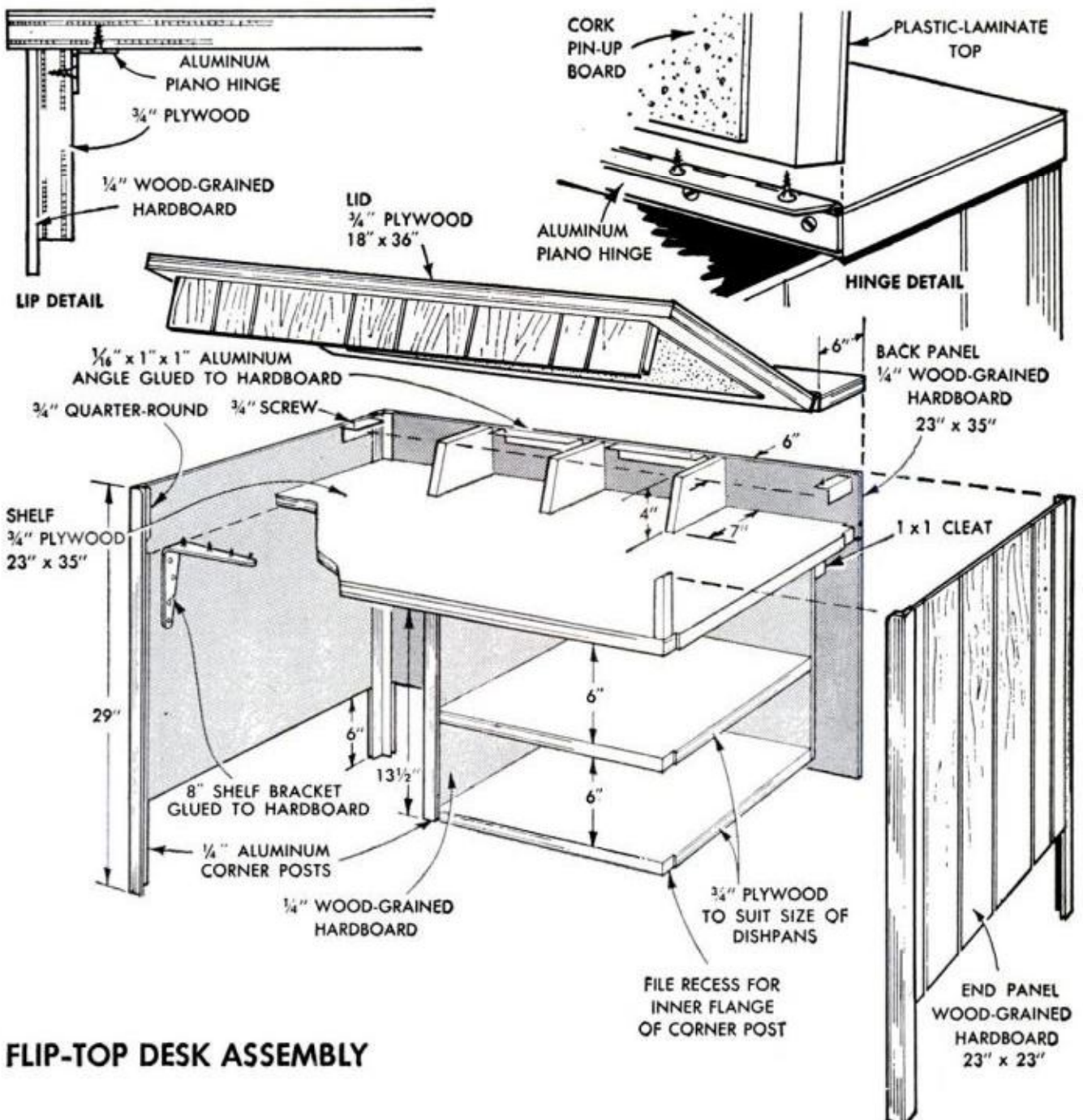
Another feature of the desk is illustrated across the top of these pages. It's a double-deck affair that grows up with the child. The school-age child doesn't abandon the lower level, however, when he outgrows scribbling. If he's a model-maker, he can spread out his project on this surface; then, when study-time comes, there's no need to clear the half-finished work away. He just drops the lid and leaves the model undisturbed till he can get back to it.

Kids will be further intrigued by the cubbyholes tucked away at the back, where private papers can be filed—safely out-of-sight when the lid is dropped. And if you glue a sheet of corkboard on the inside of the lid, it provides a handy bulletin board when the top is raised.

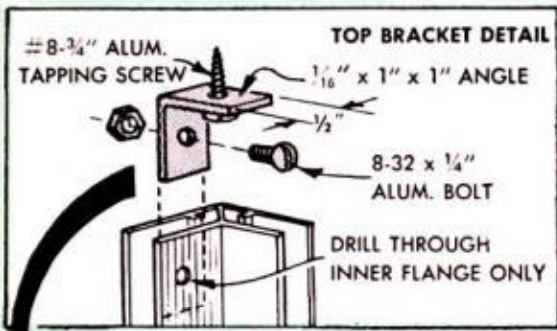
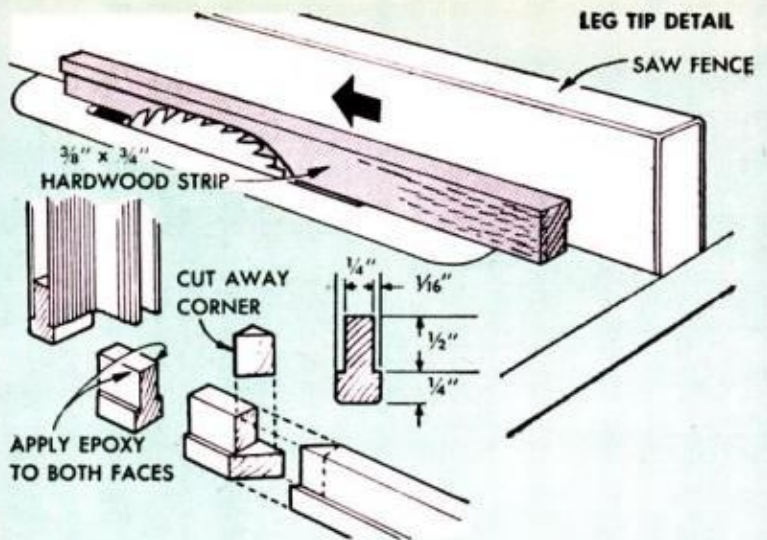
The units are not so much constructed as assembled. The 1/4-in. prefinished hard-board panels (wood-grained or plain) are merely epoxy-glued into slotted corner posts. These do-it-yourself-aluminum posts eliminate all framing and mitering, and neatly cover sawing errors and chipped edges. The beauty of such simple construction is that it lets you provide each of your children with a full set of the furniture. No more squabbling over property rights when each occupant of a shared room has his own desk, wardrobe chest and bookshelves. (See page 128.)



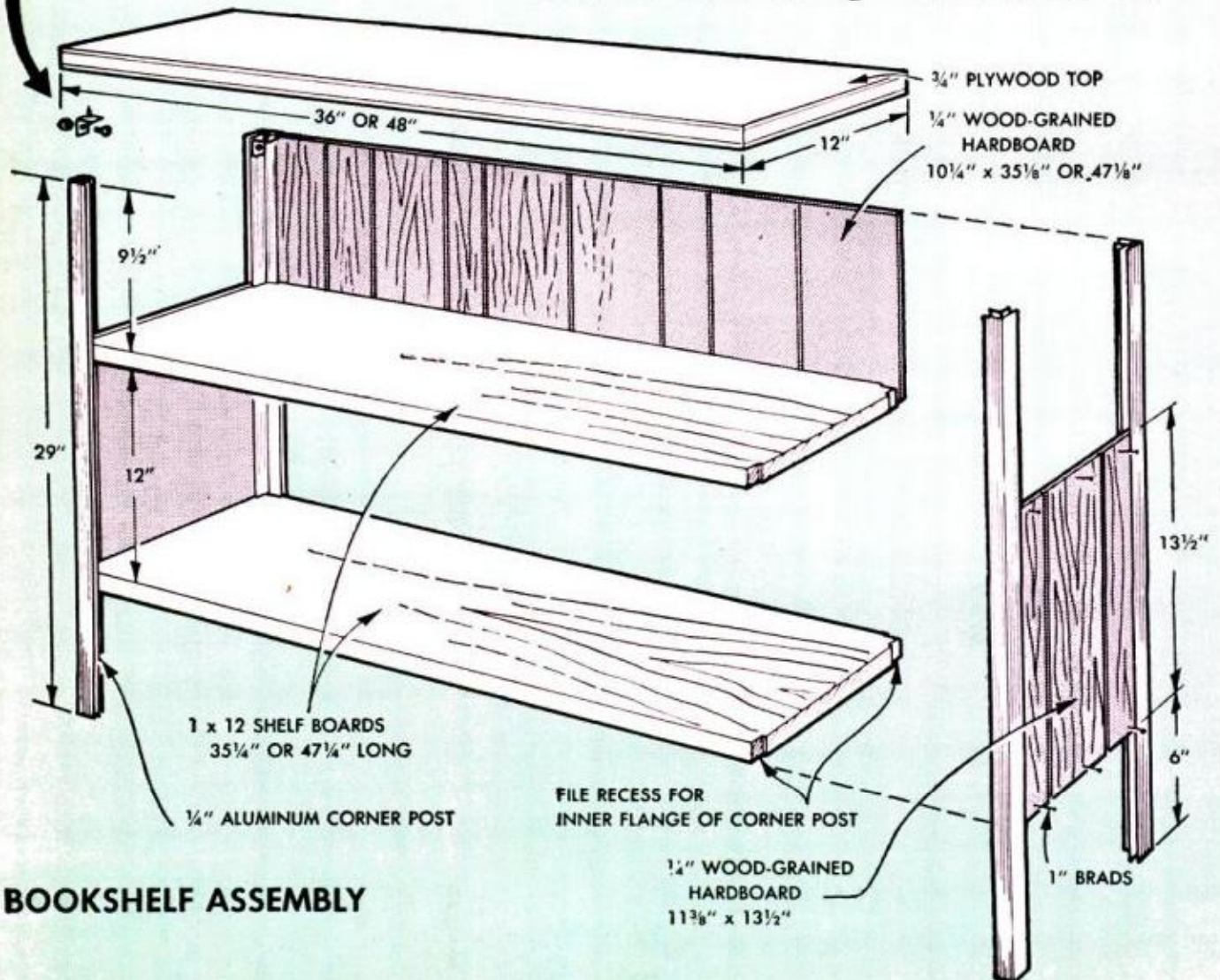
...and the lower surface is the right height for pre-teens—or for typing



FLIP-TOP DESK ASSEMBLY



Construction principles are most simply demonstrated in the bookshelf assembly. The alternating side and back panel design hides end grain and saves on hardboard. Before assembling, paint the shelf boards—and the backs of panels if they'll show. The placement of the finished unit determines which way the hardboard faces. If you plan to use the shelves as room dividers, you'll want the prefinished side turned out. When painting, leave a margin along edges where glue must be applied. In the sketch, brads are driven through the hardboard into



BOOKSHELF ASSEMBLY

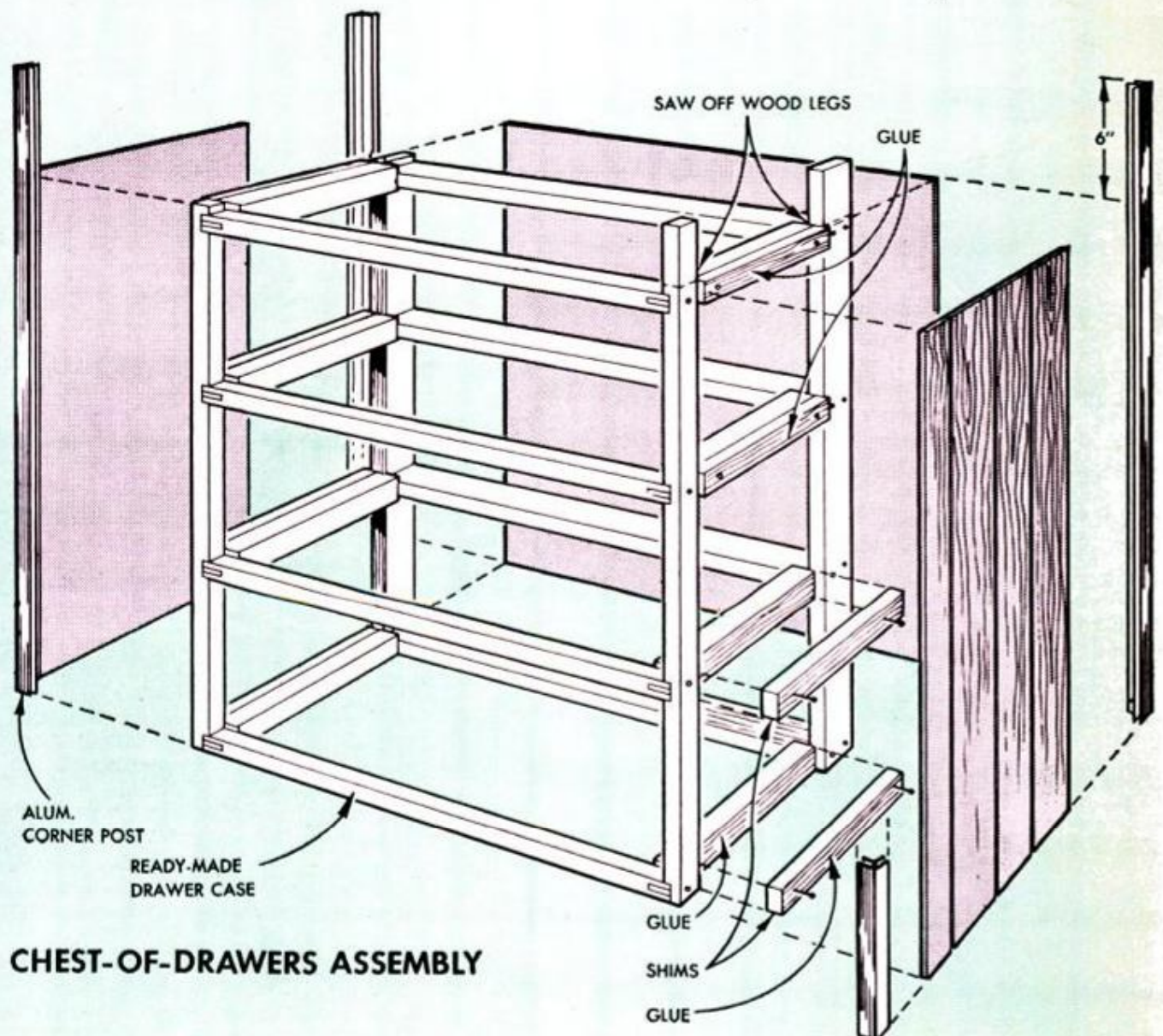
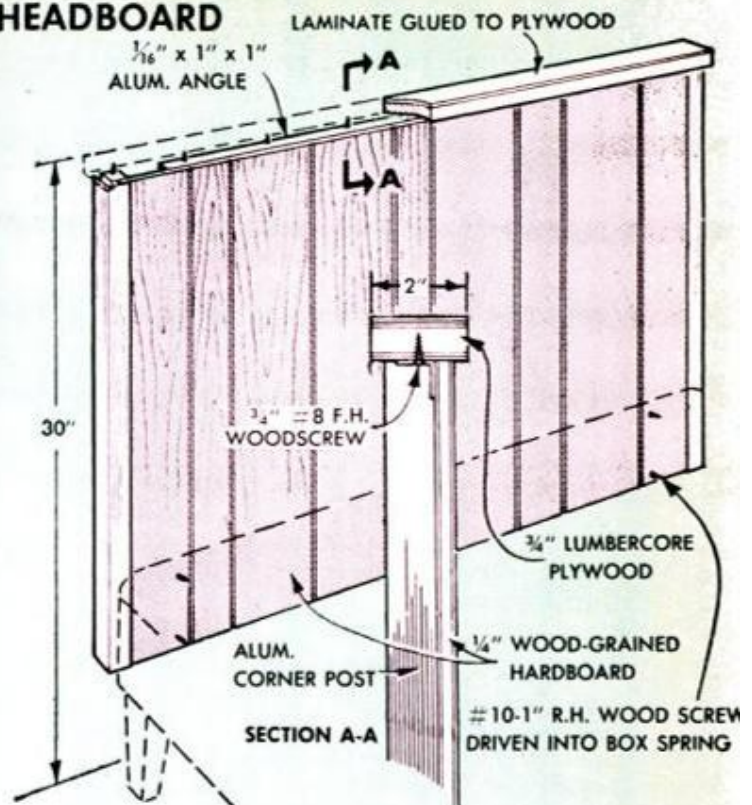
the shelf ends and the rear edge of the top shelf. If you'd prefer to avoid exposed nailheads, try assembling with epoxy glue only. Alignment will be tricky, but the effort is neater. Attach the top with brackets snipped from aluminum angle.

The flanges of the corner posts present scant bearing surface on the floor so glue in mitered hardwood inserts (as shown in the detail at left) to form a solid foot.

A similar procedure is followed in assembling the other furniture in the suite. With the desk, glue the side panels in the corner posts first; then glue and nail the back panel and the pigeon-hole partitions to the lower shelf, and add two cleats underneath to define the drawer compartment.

A bit more fitting is involved when you come to the chest of drawers, since you're enclosing an existing drawer skeleton. After assembling the knock-down case and drawers, trim

HEADBOARD



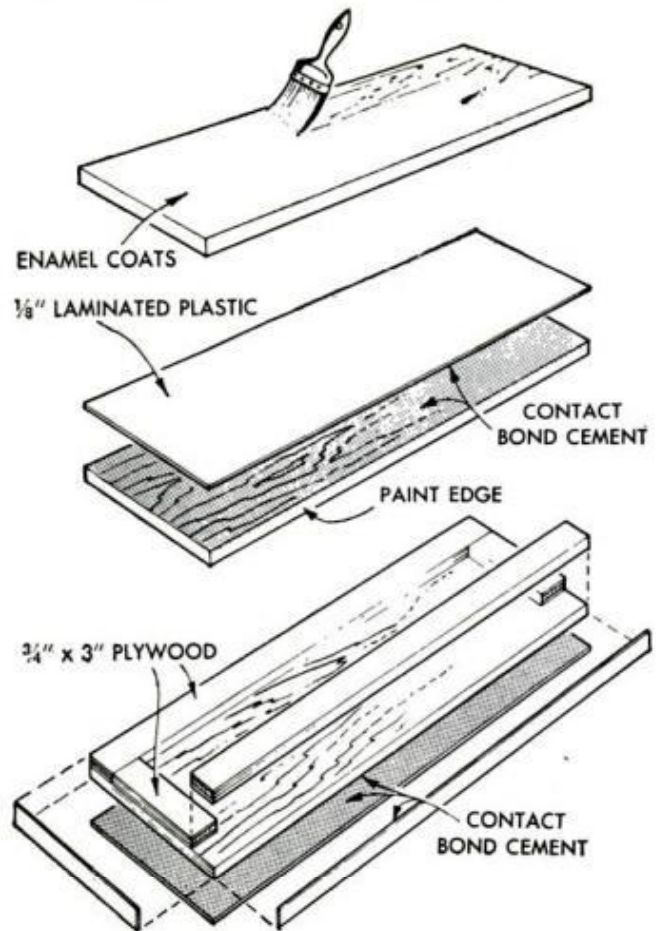
CHEST-OF-DRAWERS ASSEMBLY

the legs off flush with the bottom of the case. Slip the drawers in place and check side movement, marking maximum positions on the frame. The overlap of the corner post shouldn't extend beyond these limits. Cut the posts 6 in. longer than the height of the case, no matter how many drawers tall the case you've chosen may be.

Cut shims or blocks to fill the gaps between the case and the hardboard facing, as shown, allowing also for the thickness of one flange of the corner post.

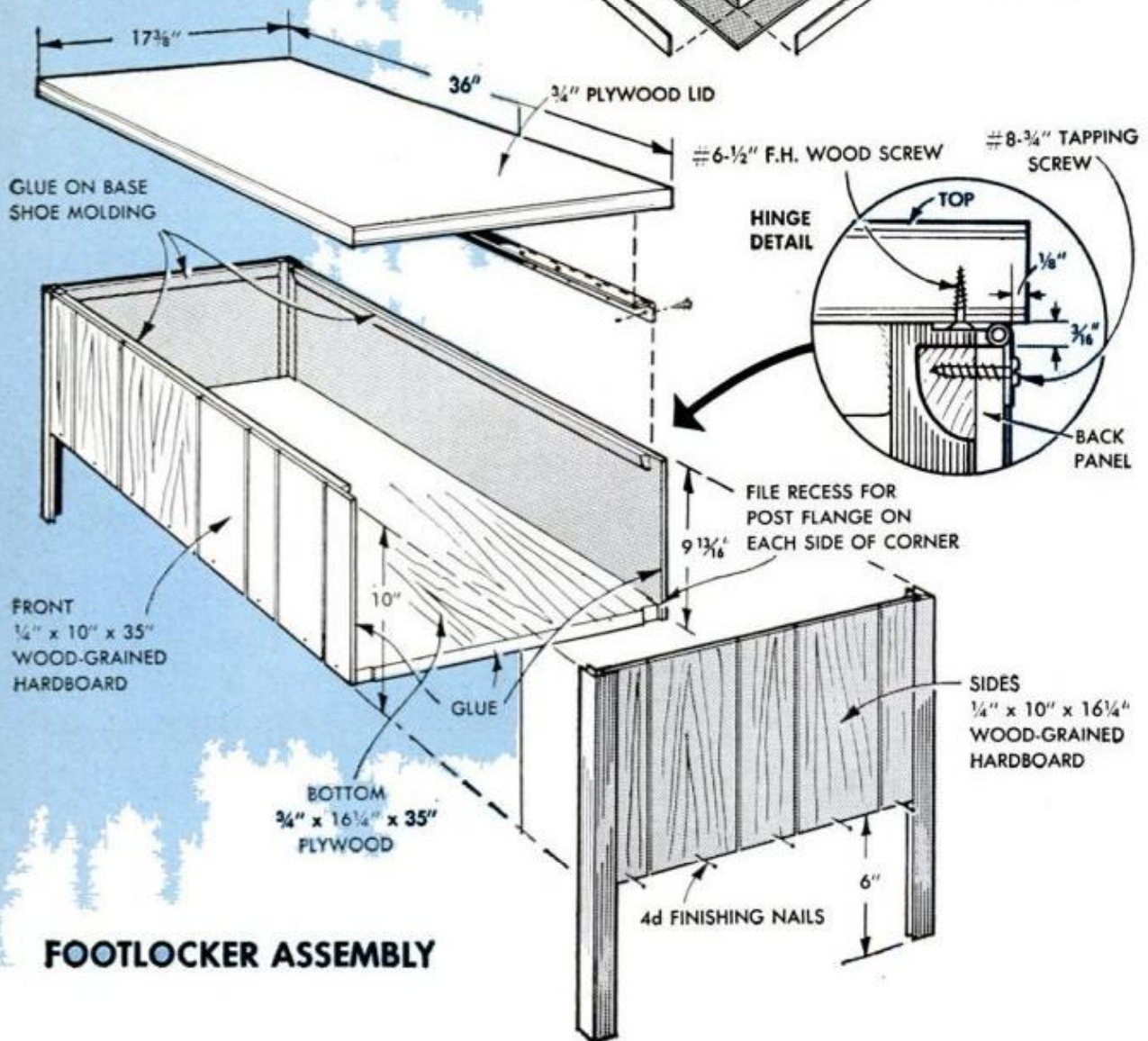
Turn this assembly upside-down and apply epoxy cement liberally to all butting surfaces. Since this unit must support heavy, shifting weight, it's best to spot a few 1-in. finishing nails through the hardboard facing into the stiles and rails of the case. Now slip the finished top panel beneath the inverted case, positioning it to lap about $\frac{1}{2}$ in. at the front and $\frac{1}{8}$ in.

THREE WAYS TO FINISH THE TOPS



AN OPTIONAL FIFTH PIECE FOR THE SUITE.

This footlocker is ideal for bedding storage where a linen closet is lacking—or as a toy box for younger children. Placed at the foot of the bed, it forms a matching counter-bench—if you finish all tops the same way (right)



FOOTLOCKER ASSEMBLY

at sides and back. Drive screws into it through the top rails.

Glue hardboard facing strips between the drawers, allowing $\frac{1}{8}$ -in. clearance, top and bottom. The drawer fronts may be finished to match the top, or enameled a contrasting color.

For the headboard, cut a plywood top-strip enough longer than the panel to overlap at least $\frac{1}{4}$ in. on each side. Attach it as shown, by gluing aluminum angle along the upper edge of the panel, or cut a $\frac{1}{4}$ -in. slot in the underside of the top and glue the panel into it.

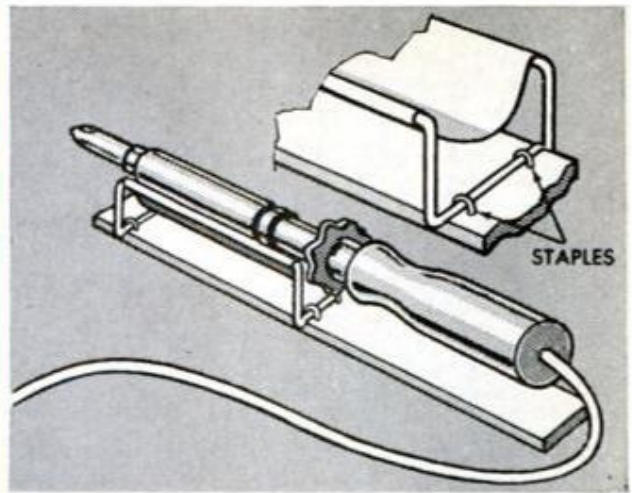
The locker should be as long as a single bed is wide. The corner-post legs are 16 in. tall, and recesses are filed at the corners of the plywood bottom to take the inside flanges. Cut the back panel (which can be regular hardboard since it won't show) $\frac{3}{16}$ in. shorter than the front and sides; this permits the barrel of the piano hinge to ride on its top edge so the lid will close flush. When attaching the hinge, turn in only the two end screws, first, to see if any adjustment is necessary.

The tops of all units should match. Choose one of the three finishing methods at the top of the facing page, and use it for each piece. The methods range in complexity and cost from a simple enamel coat to a built-up thickness with plastic laminate applied to both top and edges.

For enamel, prepare the plywood carefully, filling the edges with spackle or wood putty. Then sand top and edges smooth, finishing up with 3/0 sandpaper, and brush on an enamel undercoat or resin sealer before applying a finish coat (or coats) of a good grade enamel. Let the children choose the color; in a double-occupancy room, you might even use different colors on each child's suite.

The second method is to apply a $\frac{1}{8}$ -in. plastic-coated hardboard or plastic laminate, using contact bond cement. Cut the plastic panel slightly larger than the plywood. Then coat both the plastic and the plywood with the cement and align them with a sheet of wrapping paper laid between. Press the coated surfaces together, withdrawing the paper a little at a time and tapping with a hammer and a scrap block to assure a good bond. Remember: once the panels make contact it is impossible to adjust position, so be certain to start out right.

The third method is similar, with the addition of an edging of the same material. To apply this, it's a good idea to double the thickness of the top by gluing strips of plywood to the lower face as shown. This gives you a $1\frac{1}{2}$ -in. edge. Fill the voids in the edges and sand smooth before applying contact bond cement. ★★★

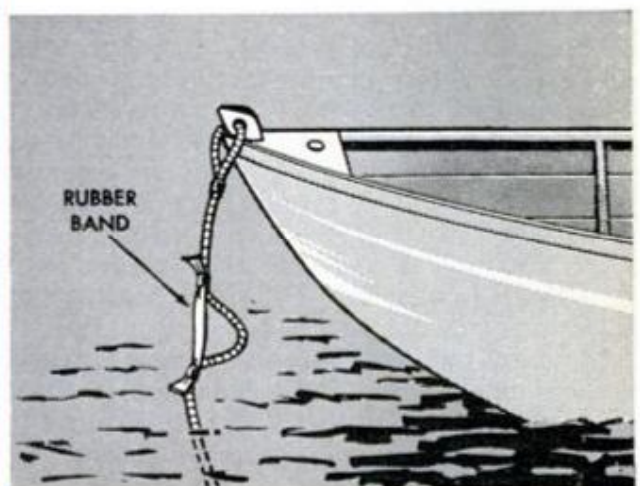


Cool Handle for Iron Rest

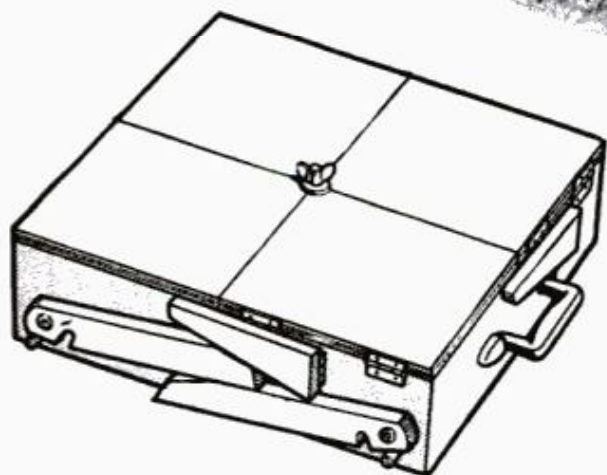
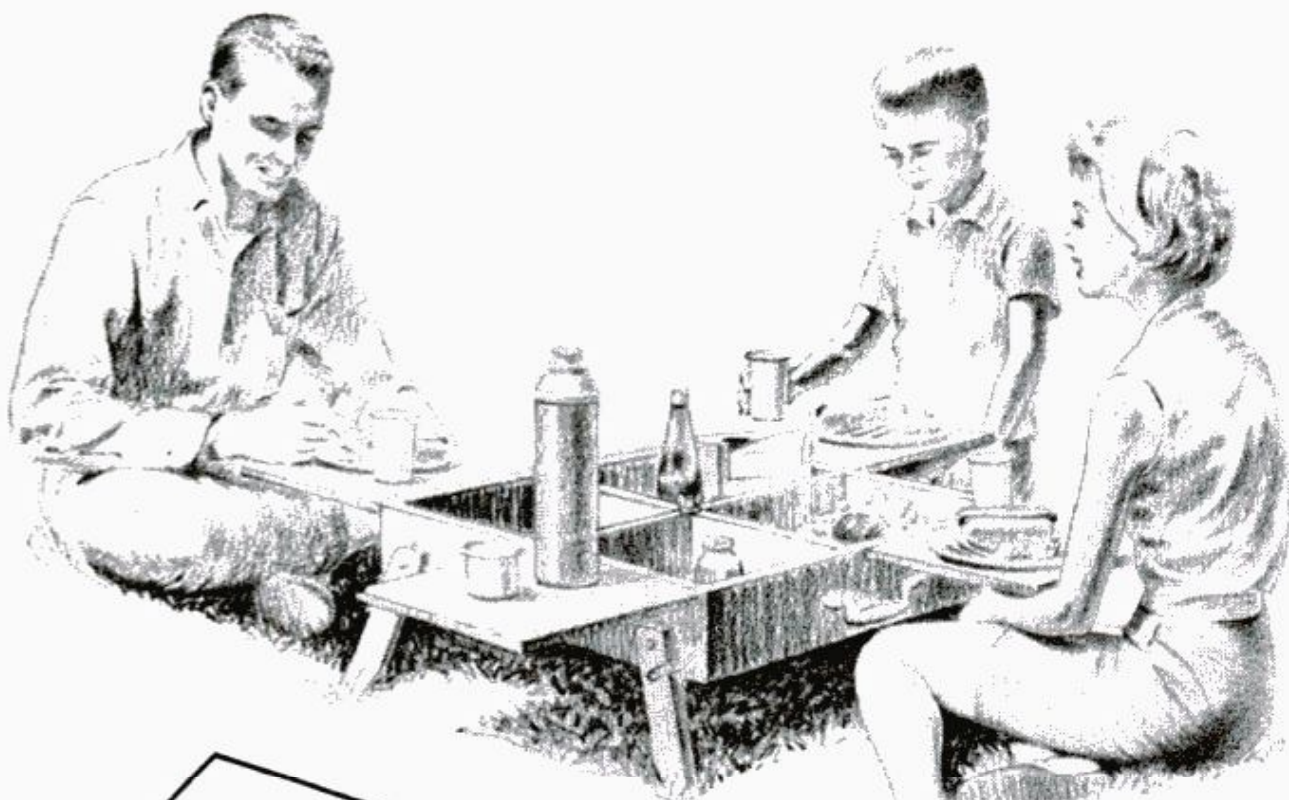
After only a few minutes use, your soldering gun rest has picked up enough heat so that it's impossible to move without burning your fingers. Of course you can lift it with pliers, but a far simpler solution is to add a handle to the rest which won't conduct the heat. Just staple the rest to a wooden slat so that the end extends to the same length as the handle of the soldering iron. (A piece cut from an old wooden venetian blind slat works fine as a handle.) Once the handle is added, you can move both iron and rest easily with one hand.—S. H. Sutton

Shock Band Tames Waves

Still-fishing from a boat anchored on a quiet lake or stream is one of the most relaxing pastimes a fisherman can imagine. But add a little breeze and the boat begins to jerk annoyingly with the waves. To keep such fishing really still under these conditions, tape a length of rubber cut from an inner tube to the anchor line, as shown. The rubber band will act as a shock-absorber and permit the boat to rise or fall smoothly with the action of the waves.—G. E. Hendrickson



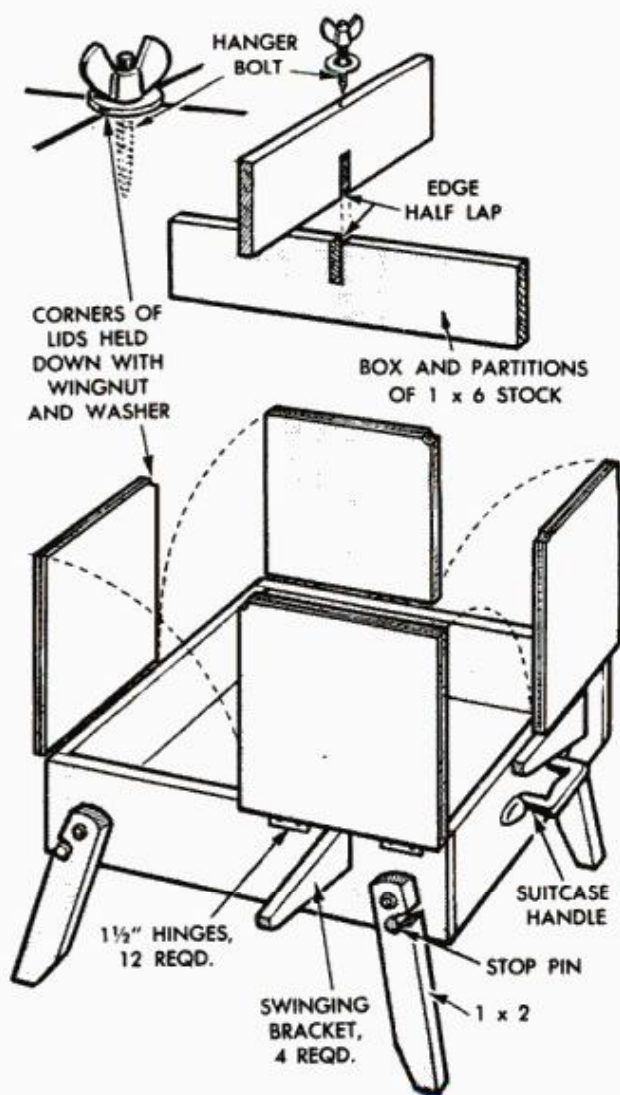
Picnic Hamper-Table Tailor-Made to Fit Car Trunk



YOU WON'T HAVE TO WORRY about ants on your next picnic with this ingenious hamper which opens up to become a table. It's elevated on swing-down legs, and all the food may be served from the four compartments inside the hamper. When the four lids are folded back to rest on hinged brackets, they form individual trays for holding plates, cups and silver.

The hamper is designed to be carried flat in the bottom of your car's trunk, so dimensions will vary according to the make of car. Sides, partitions, legs and brackets are cut from 1 x 6 stock. The four lids are cut from 1/2-in. plywood, and 3/8-in. plywood is used for the bottom.

After measuring your car's trunk to determine the proper size to make the hamper, cut out all pieces and assemble them as shown at right. Note that a corner of each lid must be cut off to fit around the hanger bolt which keeps the four lids closed.—Edward Capper



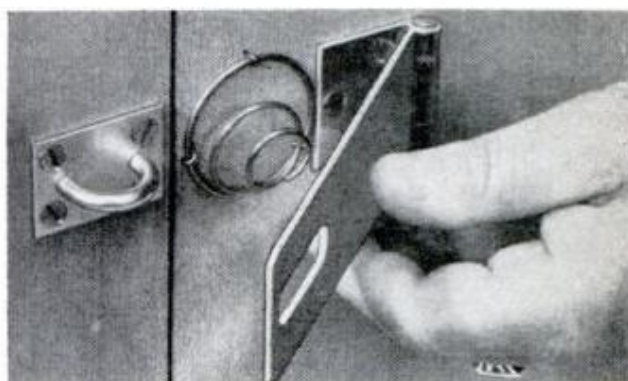
Bedding Down Pickup Truck

Need a guard rail to protect the rear window of your pickup truck? One contractor found that the headboard of an old metal bedstead was just the right width. Placed as shown with the legs resting inside the truck body, the head was secured with four carriage bolts—two through the side of the body and two through the front. Then to make sure the nuts would not work off, the ends of the bolts were peened with a hammer.—*Lee H. Schrimpf*



Don't Get Locked In

Ever get accidentally locked in a tool shed or other out-building by having the hasp-fitted door blow shut on a windy day? Like a screen-door hook, hasps will sometimes catch themselves on the staple—and if the slot in the leaf is not perfectly aligned, you're in trouble. Pushing from the inside only makes the hasp bind harder. This can't happen if you mount a coil spring behind the leaf hasp.



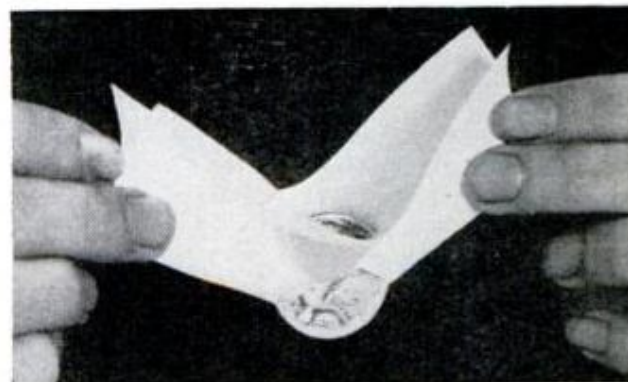
Doggy Fountain Won't Tip

Pets have a way of tipping over their drinking water and playful Rover is no exception. The answer is to stake the pan to the ground and you can do just that by using a one-piece angel-food cake pan and driving a length of broomstick down through the center. Pan can't possibly be tipped and yet can be easily lifted up over the top of the stake for cleaning or dumping stale water.—*Robert E. Lunt*



Fifty-Cent Trick

Slipping a half dollar through a hole the size of a nickel is a good trick if you can do it. The hole has to be in paper—no fair punching one in a strip of inner tube. Sound impossible? Just crease the paper lengthwise through the center of the hole and stand the coin in the fold, so it bridges the hole. Then lift the ends of the creased paper as shown. This elongates the hole, letting the coin drop through.



Magnet Corrals Date Stamp

Stuck to the cover of the ink pad, itself a magnetic paper clip sold in stationary stores will solve the problem of keeping track of that elusive date stamp. Held by the magnet, both the stamp and the pad will always be together when you want to use them without having to look for one or the other. The attached clip can still be used for holding bills at the home-office desk, as well as a few paper clips.





JACOBSON MFG.CO. PHOTO

EDGE FLOWER BEDS with a row of bricks and you can forget about hand trimming. The bricks will provide a smooth riding surface for the inside wheel of your mower and give the beds a finished appearance

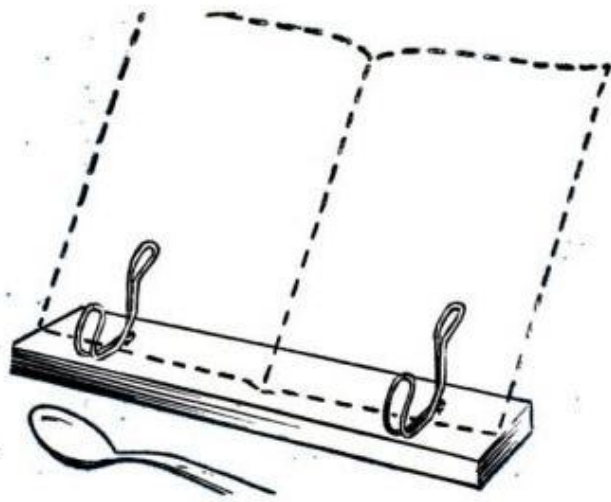
Solving HOME PROBLEMS

WHEN CLEANING paintbrushes, fold a strip of ¼-in. hardware cloth double, then bend it as shown so that the lower part is 1 in. above the bottom of the solvent can. This will provide a rough surface for rubbing the bristles, yet allow sediment to settle



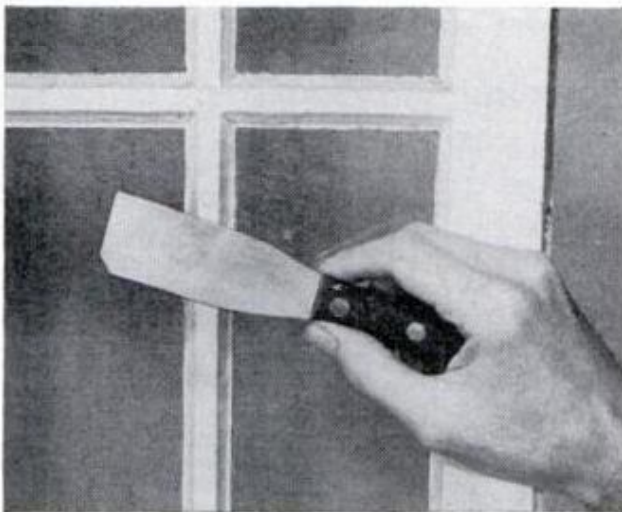
COILED LAMP CORDS not only look neater but simplify floor cleaning. You can turn your present lamp cord into a coil-type cord by just wrapping surplus tightly around a pencil, then pulling the pencil out. If cord is accidentally pulled out straight, do this again



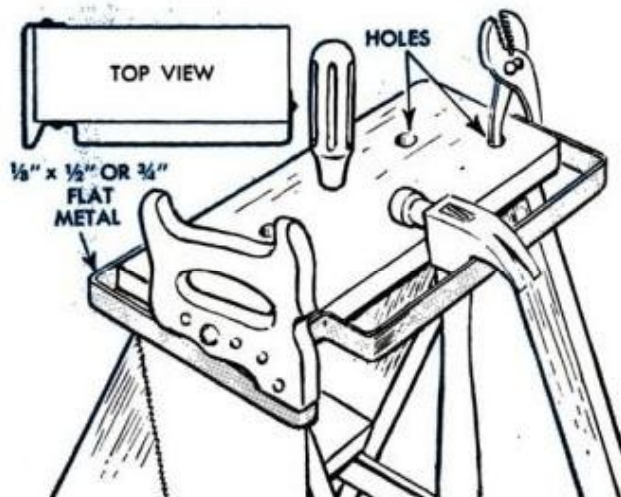


MAKE A STAND for your wife's cookbook by mounting two coat hooks on a scrap of wide board. This also makes a good copy holder for use with a typewriter. Just slip a cardboard backing into the hooks

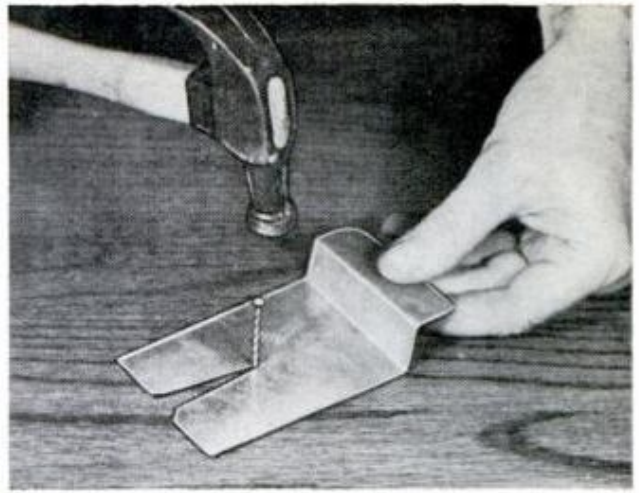
FOR NEATER GLAZING, grind off one corner of your putty knife to make a 45-deg. angle with the end. Run this edge into a corner and you'll produce a perfect uniform joint between the two putty bevels



TOOL HOLDERS added to the top of your stepladder will save climbing down every few minutes to get the right tool. Make them as shown, but don't drill a great number of holes or this will weaken ladder

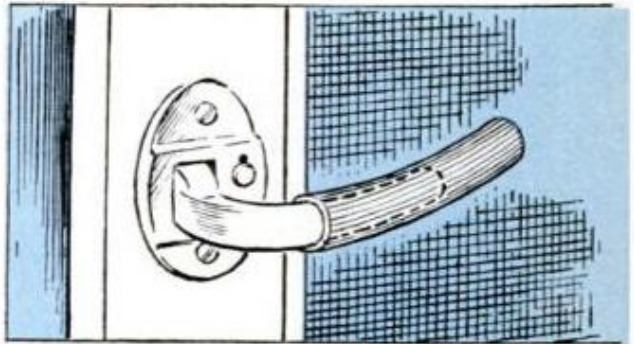


MAY 1963



AVOID MARRING a smooth surface with hammer marks by using a sheet-metal nailing shield. Notch one end of a metal strip, as shown, then bend other end for handle. Finish driving nails with a nailset

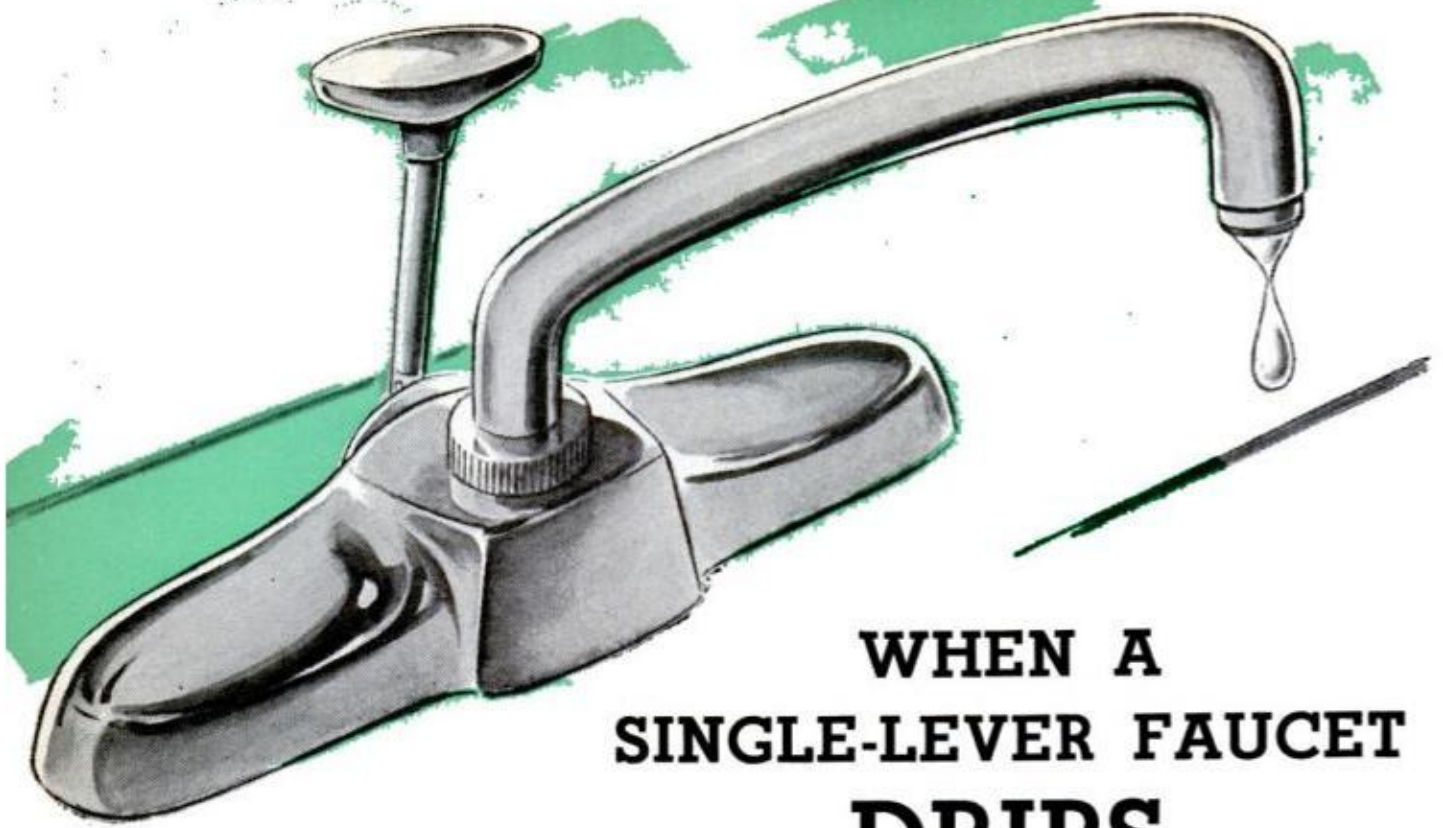
STORM DOOR HANDLES often catch on your coat sleeves, especially when you're trying to slip out the door with both arms full. To avoid torn sleeves, push a length of rubber tubing over the end of the handle



INSTANT COFFEE and other products packed in jars will often be almost used up before you notice it because the label conceals the contents. Avoid this by cutting a narrow strip out of the label on the jar



135



WHEN A SINGLE-LEVER FAUCET DRIPS...

.. It's not just a matter of replacing a washer. But these new mixing faucets are simpler than they seem. Here's how to save a plumbing bill

By Jackson Hand

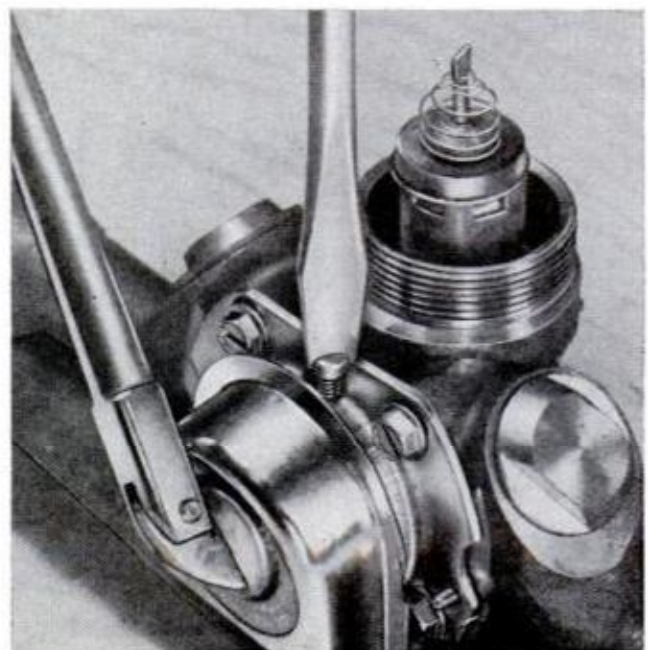
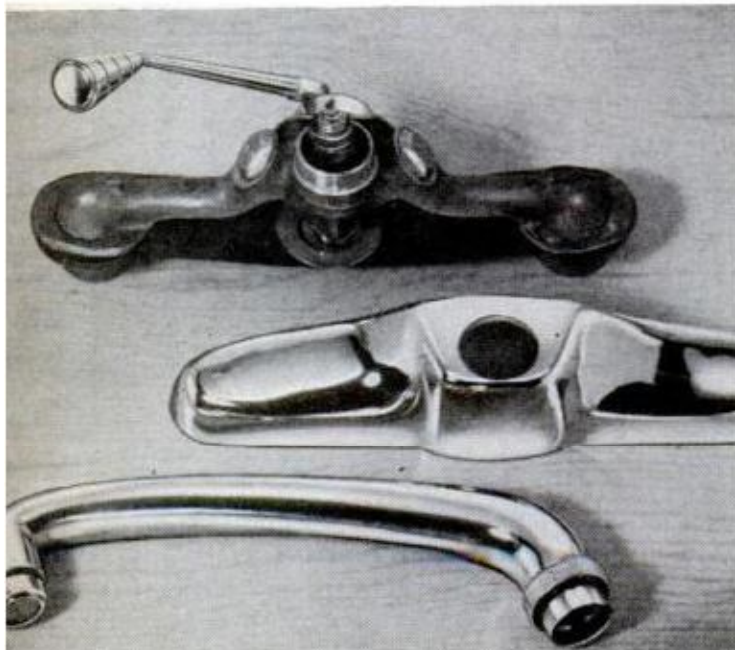
MANY A MAN who could always lick a leaky faucet with one hand tied behind his back finds himself in trouble when he tackles one of the new single-lever types. He's likely to feel he should

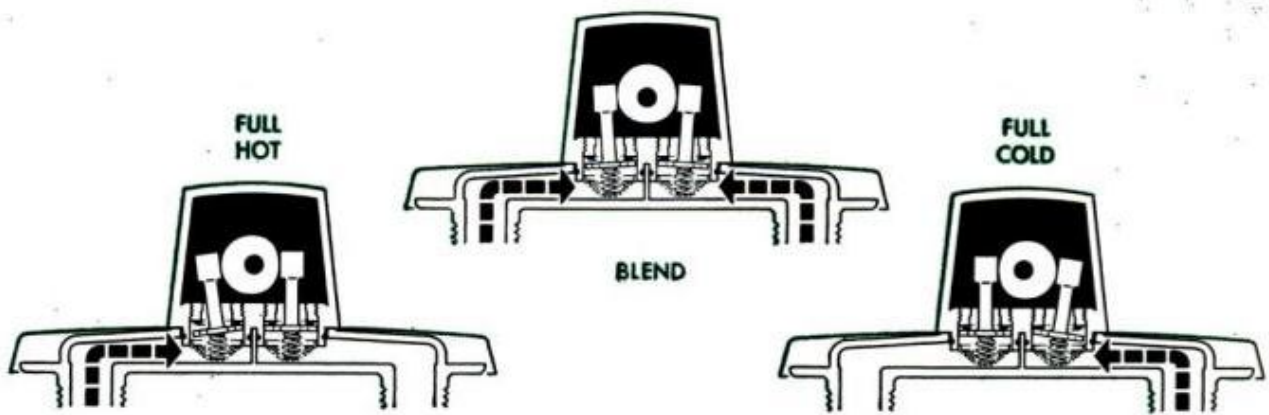
STRIP OFF the chrome jacket to get at the cast-brass works. No part you wrap a wrench around will show when hood's replaced, so marring finish is no problem

get professional help, despite the fact that a plumber may charge him the price of a new faucet just to fix an old one.

Why risk it? Aside from one-hand operation and instant adjustment of tempera-

INSTEAD OF PACKING NUT, most single-handle faucets have screw at rear that can be adjusted to snug up handle to prevent drift in the temperature setting





THREE POSITIONS of rotating cam show how tip-valve fixture admits water flow. Far left, cam leaves cold valve firmly seated while it tips other one to admit only hot water to faucet. Center, valves are equally tipped to blend hot and cold. Right, cam has reversed position to close hot valve, open cold one fully

ture, single-lever (or the brand new single knob) faucets are new-fangled in just one important respect:

Standard faucets require manual pressure in closing. Modern faucets, in general, close by gentle spring activation, plus pressure of the water itself, plus some beautiful machining at the factory. You can't make them stop dripping just by twisting harder on the lever. If you tried to, you might break the lever off.

Inside the gleaming chrome housing of such faucets you'll find one or another of these variations:

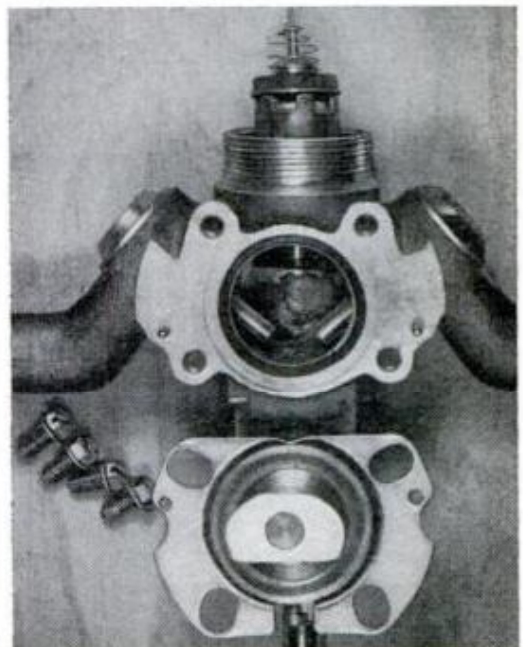
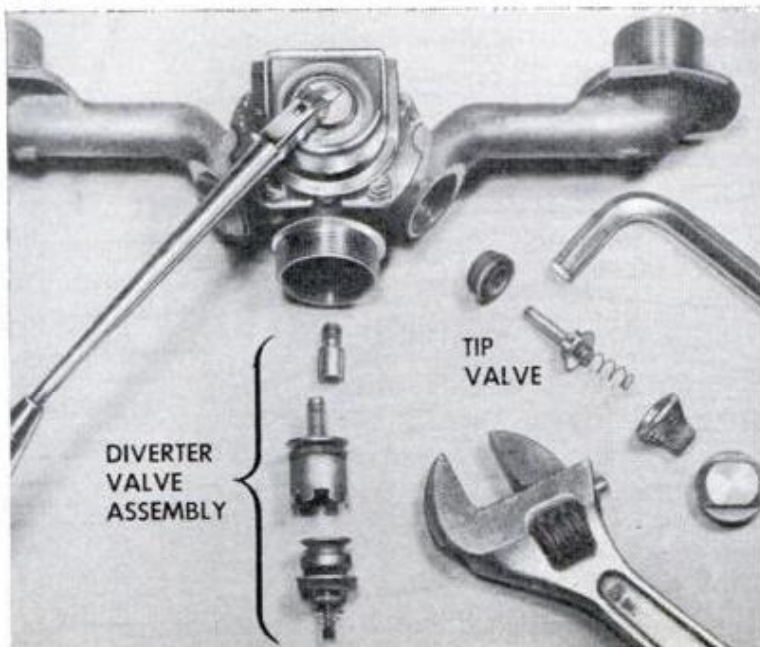
- **Tip valve.** Stainless-steel valves, shaped somewhat like golf tees, seat in neoprene rings, held by gentle springs. A cam tips one or both of two valves to admit hot and cold water. Once you adjust the mix to the temperature you want, you

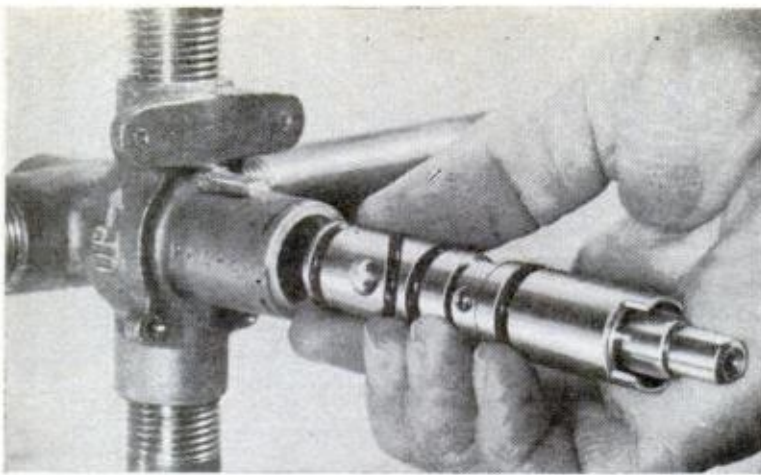
can shut the faucet off, then reopen it for the same blend without any adjustment.

- **Sliding port.** A "core" fits with careful machining inside a "sleeve." Both have cold-water ports and hot-water ports. At one setting, both cold-water ports coincide. As you turn the core in the sleeve, the cold ports start to close, the hot ports start to open. Eventually, the hot ports come into coincidence and the cold ports are closed tight. A push or pull on the knob regulates the degree of flow at any setting, from full to off, as the core slides in and out inside the sleeve. (This action may be reversed: push-pull for temperature change, rotate for on and off.)

- **Ball valve.** A nylon cam pushes stainless-steel balls against openings in a neoprene seat, varying the proportions of hot and cold water allowed to enter the fix-

EXPLODED VIEW BELOW LEFT includes wrenches needed for repairs: adjustable and $\frac{1}{16}$ -in. Allen. Tip valve group (duplicated inside cap under handle) consists of rubber seat, spring valve, strainer and cap. The diverter valve is for spray rinse attachment. In photo at left, cam plate is dropped to show valves inside





SLIDING PORT FAUCET (above) confines all working parts in a single cartridge. Should it wear, you replace the whole thing with simple tools. With newest of the single-control faucets (below) you dial temperature, then pull knob to regulate flow. Easy to work with soapy grip, it's fine for shower or tub



ture. An in-and-out motion of the cam regulates the amount of flow, from full to off, at any setting.

• **Squeeze tube.** Two neoprene (or rubber) tubes pass over an "anvil," one carrying hot, the other cold. These tubes are squeezed against the anvil by a cam-action shoe. Rotation of the cam lets you squeeze either tube shut entirely—or adjusts the relative amount each tube is open. A pre-selected temperature cannot be brought

back repeatedly, because the cam must be returned to neutral to shut off the water.

In none of these faucets do you find anything resembling the old-fashioned faucet washer. Nor do you find anything else which wears out very rapidly, since there is no squeeze-and-grind of a necessarily soft material (washer) against a necessarily hard material (seat). Problems of dripping are most often due to sediment or particles large enough to prevent seating of the gently activated valves. If repeated wide-open-to-shut cycles fail to dislodge such particles, perhaps the faucet will have to come apart. This is a job you can easily do.

It's possible—though rare—for tiny, hard particles to work in between the sleeve and the core of sliding-port types, eventually causing leaks from wear.

Tip-valve repair may mean replacement of the tee-like valves, and perhaps also the neoprene-covered brass seats—certainly not very often, for there is almost nothing except flowing water to cause wear.

You can't just pick up parts at a supermarket—you must go to a plumbing supply house. You replace the entire mechanism in core-and-sleeve faucets, and also

in the ball-valve type. In the squeeze-tube faucet, you replace the tubes alone, should they show signs of wear—and probably *before* they do as a precaution against serious flooding if a tube ruptured. The cost of tubes or a core-and-sleeve or ball valve insert is in the neighborhood of two or three dollars. Manufacturers state that you can expect a minimum of five to ten years of service from a replacement, since the repaired faucet is good as new. ★★★

Use This Table to Choose the Right Fuse for Electric Motors

On starting, electric motors draw about twice the current they require for normal operation. If there's a risk of blowing your fuses or circuit breakers under this surge, you should use the time-delay type. The table at right helps you estimate your fusing needs. It applies to repulsion-induction motors. Capacitor-type motors draw about 1½ times and split-phase types about 3 times the listed amounts for starting. If there are two motors on one circuit, add the second's starting draw to the first's running wattage.—Paul C. Ziemke

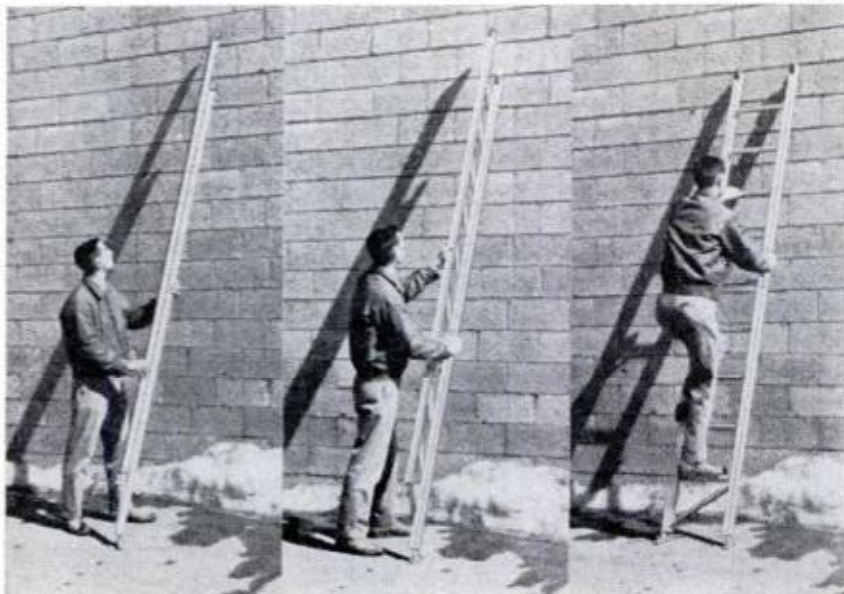
| Motor Size (Horsepower) | Watts Input | Watts Input |
|----------------------------|-------------|-------------|
| | Running | Starting |
| 1/6 | 275 | 500 |
| 1/4 | 350 | 750 |
| 1/3 | 400 | 1000 |
| 1/2 | 550 | 1200 |
| 3/4 | 800 | 2000 |
| 1 | 1100 | 2700 |
| 1 1/2 | 1550 | 3200 |
| 2 | 2000 | 4000 |



FLEXIBLE SHEETS of ceramic tile are faster, less costly to install. Consist of one-inch tiles held together by dots of high-strength bonding material. About 85 percent of tile surface is exposed to mortar bed, which may be conventional or thin-set. Sheets cut readily with knife or trowel. Called Dot Tile. Mosaic Tile Co., P.O. Box 112, Zanesville, Ohio



ALUMINUM LADDER folds into a single 2¼ x 3½-in. rail. Made in lengths of 4 to 24 ft. (unfolded) with usable rung width of 13 in. Safety features include rubber shoes and non-slip serrated rungs. Aluminum Safety Products Co., 3909 N. 35 St., Milwaukee 16, Wisc.

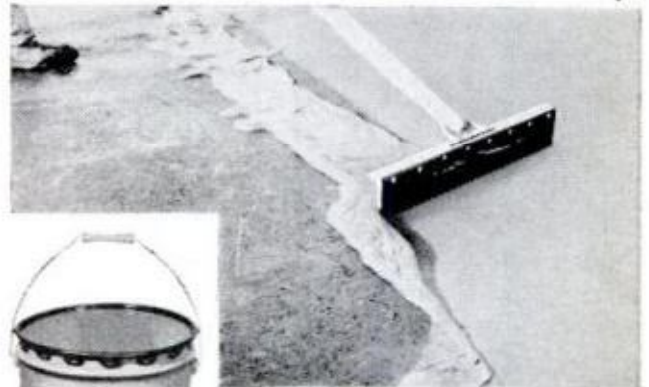


MAY 1963

New on the Market

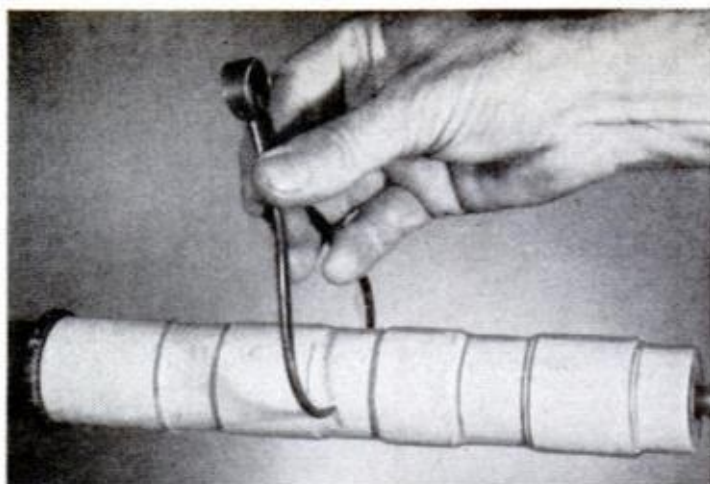
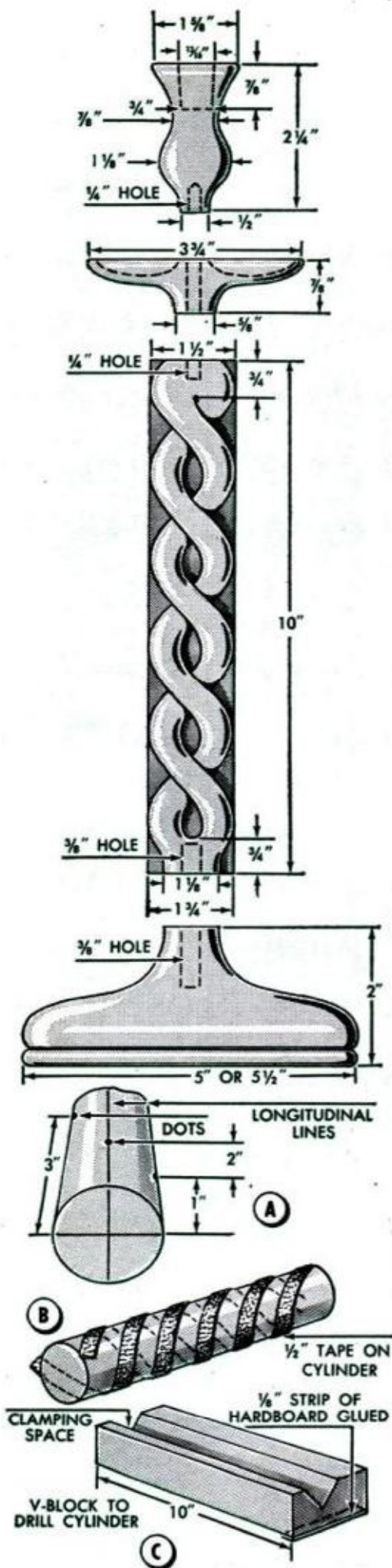
SPRAY KIT is said to let the home craftsman produce a professional low-luster finish in a matter of hours. Includes stain, penetrating sealer, finish coat and a trigger handle for the spray cans. Retail price about \$4.95. Colony House Div. of A-M-R Chemical Co., 1015 E. 35 St., Brooklyn 10, N.Y.

PLASTIC COATING imparts a durable red, green or grey finish to asphalt pavement. Comes in liquid form, with sunfast pigments and reinforcing mineral fibers already worked in. Applied with plastic-bristle brush or rubber squeegee. Helps conceal cracks or patches. Trade name is Vynatex 23. For price data contact Maintenance, Inc., Wooster, Ohio

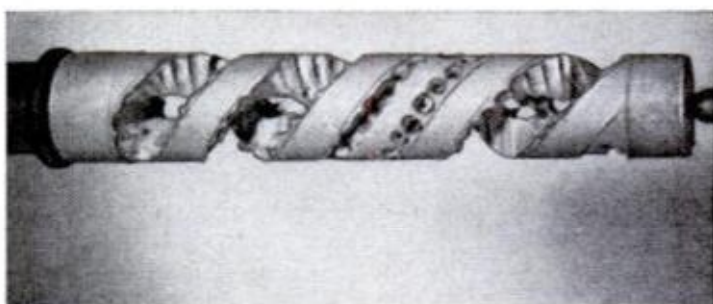


CONCRETE IN A TUBE is mixed with petroleum distillates instead of water to keep it wet and ready to use. "Crack Crete" substitutes for ordinary concrete in repairing sidewalks, mortar joints, etc. Costs \$1.98 plus 25¢ postage from Stadri Products Co., 147-47 6th Ave., Whitestone 57, Long Island, N.Y.

139



TAPERED CYLINDER for the spiral section is formed by first turning to diameters which are successively smaller by 1/16 in. at five equidistant points. Remainder is then dressed down. The cylinder is now ready for layout of the spirals



OVERLAPPING HOLES are drilled diametrically entirely through the waste between the spiral lines or masking tape. Use a drill press and twist drills; flat bits or auger bits won't work. Waste may have to be freed with a fret saw

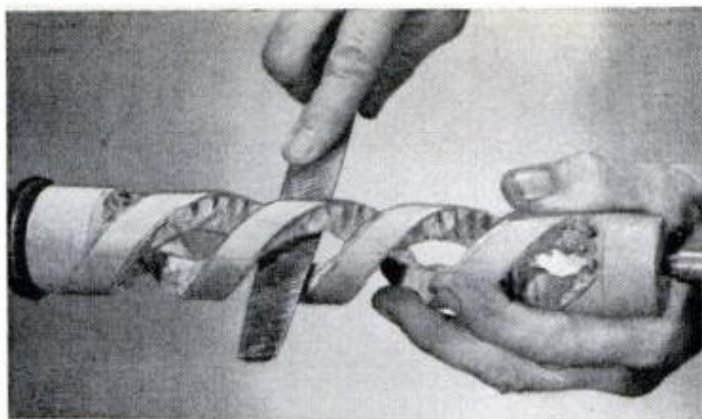
Double-Spiral

By E. R. Haan

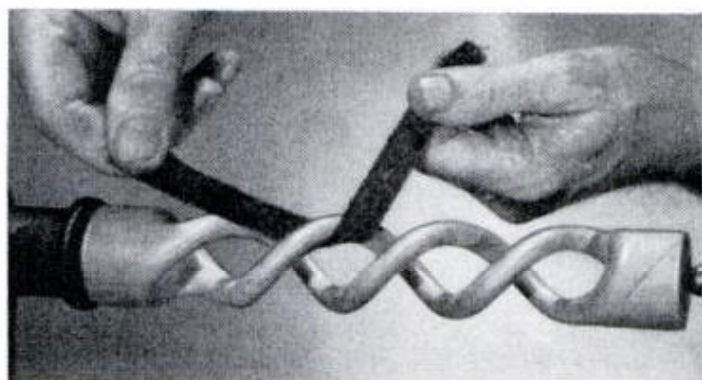
IT LOOKS as if this candlestick was simply twisted. But when you consider it's wood, you know better. The trick is explained in the four photos across the top of the pages which show how the candlestick starts out as a plain tapered turning and winds up as a beautiful double-spiral, hand fashioned while held between lathe centers.

As shown in the drawing at left, each candlestick consists of four turned parts, doweled together. To lay out the spiral portion, pencil four longitudinal lines on the cylinder to divide its circumference into quarters. Make a dot 1 in. from the end on one of these lines, another dot 2 in. from the end on the next line, a third dot 3 in. from the end on the third line, as shown in detail A. Continue in this manner.

Next, you apply a length of 1/2-in. drafting tape spirally around the cylinder so that one edge touches the dots. Then apply a second length of tape, centering it precisely between the spirals formed by the first one. Detail B shows



DOUBLE SPIRALS become almost square in cross section after rough edges are dressed down with a rasp. Further filing makes them octagonal or slightly rounded. For this operation, and sanding, work is best held between lathe centers



ROUNDING THE SPIRALS is done with strips of abrasive cloth about $\frac{1}{2}$ in. wide. Use coarse, medium and fine grades successively. Attractive grain comes out as finish gets smooth. Entire rounding operation should take about 4 hours

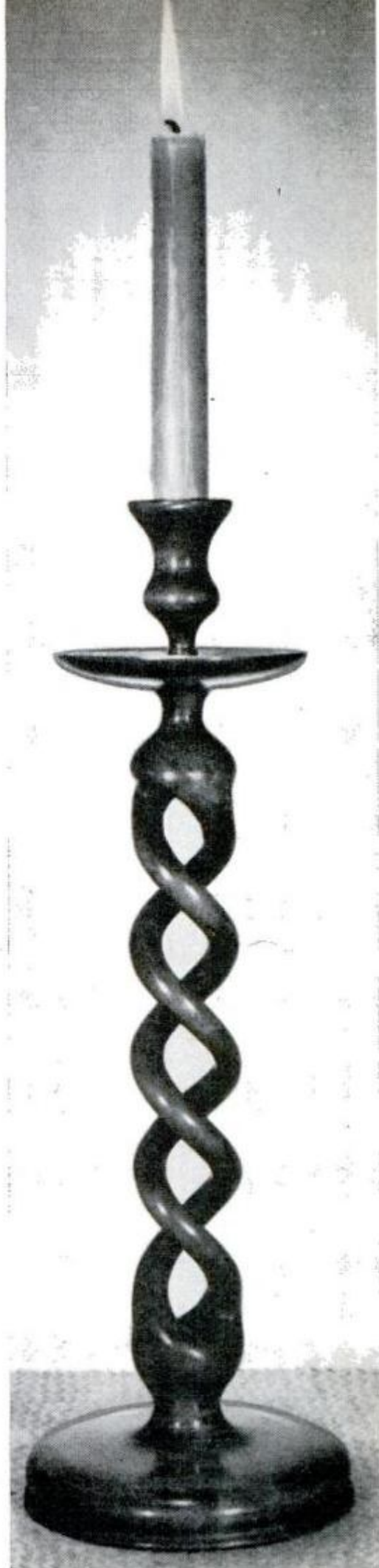
Candlestick

the tape properly applied. You can pencil lines along the edges of the tape and remove it, or you can leave the tape intact. The wood between the tape, except that at the ends of the cylinder, is to be removed.

Removal of the wood is accomplished by first drilling diametrically through the cylinder, using a drill press and a $\frac{3}{8}$ -in. twist drill. The holes are overlapped and positioned along the edges of the tape or marked lines. *Don't* use flat wood-boring bits or regular auger bits. Drill slowly when breaking through, to minimize ragged edges.

To hold the cylinder for drilling, use a 10-in. length of 2x4 with a 45-deg. V groove sawed lengthwise as shown in detail C. To assure drilling at right angles to the axis of the cylinder, glue a $\frac{1}{8}$ -in. shim under the end of the block supporting the smaller diameter of the cylinder. After clamping the block to the drill-press table, center the drill precisely over the V groove. Then all you have to do is move the cylinder in the groove for drilling each of the overlapping holes. Near the ends of the cylinder,

(Please turn to page 183)





MODIFIED
MUSHROOM



SEA CLAW



DANFORTH



ABCs of ANCHORING

By Gordon P. Manning

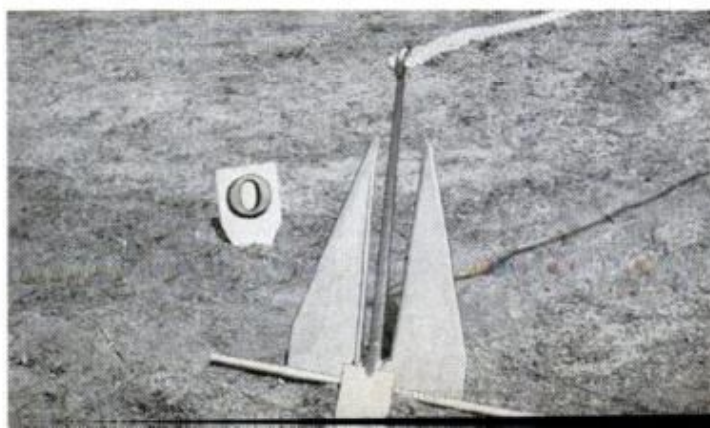
IF YOU'RE going fishing in a 9-ft. dinghy and want to take along a tried-and-true anchor, just tie a big rock to a line and toss it over the side when you want to stop. Such an anchor is difficult to stow and requires plenty of muscle, but it worked for the cavemen, and it still works if you don't get caught in a bad blow. However, for anything larger than a dink, you'll have to leave the Stone Age and use one of today's lightweight anchors.

Modern anchors rely almost entirely on efficient hooking action instead of weight. Some of the heavier types are simply improved versions of designs going back hundreds of years; others, like the ultra-light patent anchors, are entirely new, the result of applying modern science to the ancient problem of holding a boat in one place.

Yachtsman, or kedge, anchor is what most people think of when they hear the word "anchor." The basic design was developed almost 2000 years ago, and it's

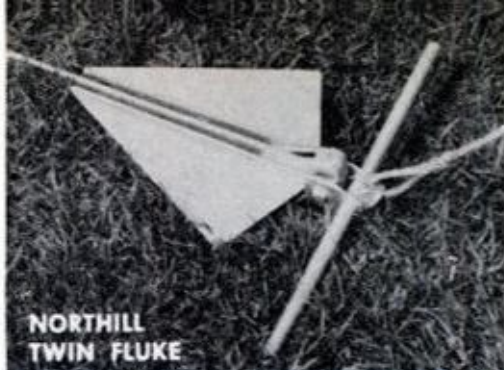
still one of the best for getting a quick grip in any kind of bottom. While a yachtsman is extremely heavy in proportion to its holding power in most bottoms, this extra weight can come in handy when anchoring in a rocky bottom where it's almost impossible to get a good grip. It breaks out readily and with a folding stock (a relatively recent innovation) can be stowed without

BEACH TEST using lightweight Danforth begins with anchor sitting upright as though let down from boat





NORTHILL
UTILITY

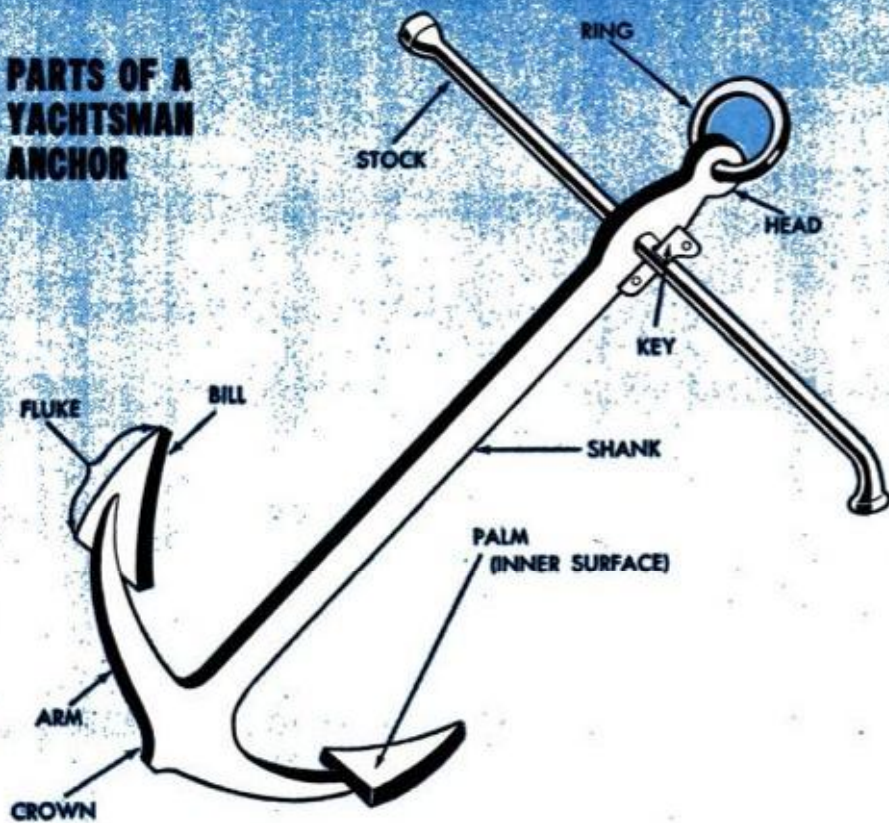


NORTHILL
TWIN FLUKE



BENSON

**PARTS OF A
YACHTSMAN
ANCHOR**



FISHERMAN'S MUSHROOM



NAVY

too much difficulty. However, if the boat swings, the anchor line can become wound around the exposed fluke resulting in a pulled-out anchor. Also, it's heavy and ungainly to handle in a small boat.

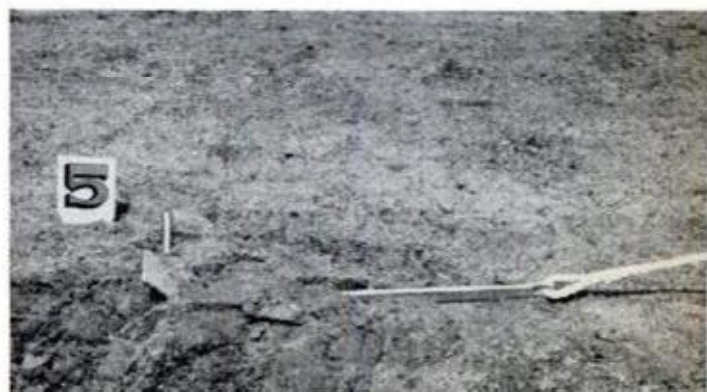
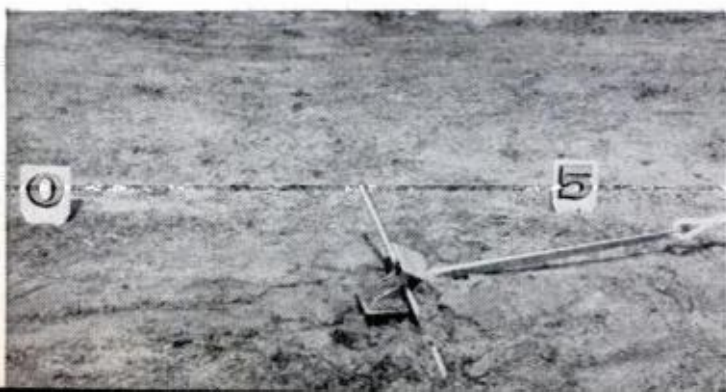
Navy, or stockless, anchor has been around a long time, too. Consisting of a shank with arms and flukes, it's used on larger vessels because it requires almost no handling (the shank can be drawn right up into the hawse pipes). Once set, this type doesn't foul easily, but getting it set on a small boat is sometimes difficult. If the bottom's rough, the anchor may capsize be-

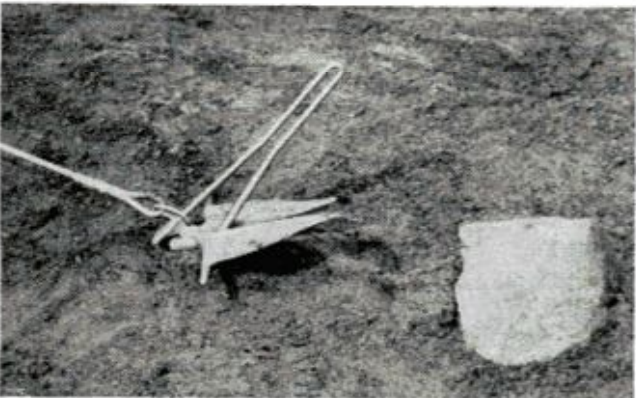
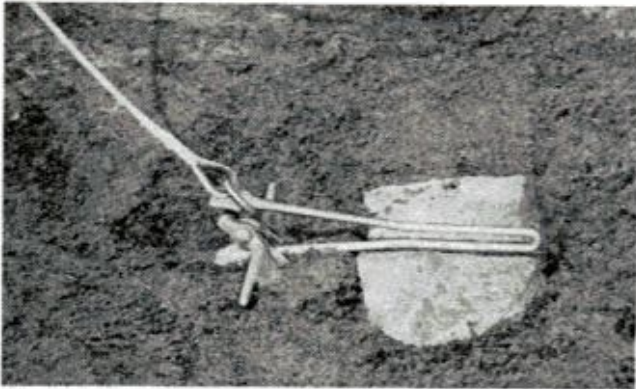
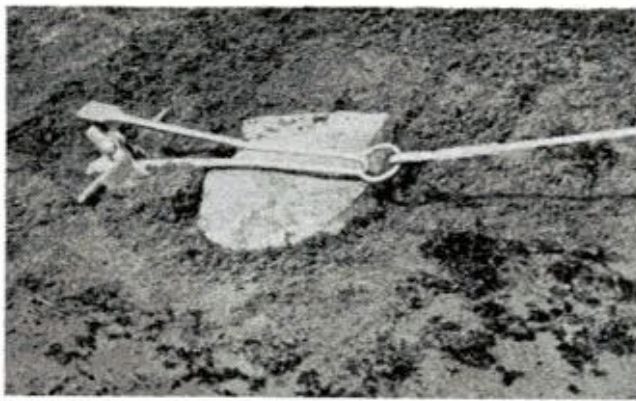
fore digging in, and when the boat swings from side to side, it has a tendency to dig itself out, as first one fluke comes free, then the other. Like the yachtsman, it's quite heavy for a given holding power.

Sea Claw, an improved version of the Navy anchor, has sharper flukes to achieve faster, more certain penetration. Oddly enough, this variation on the "stockless" anchor includes an opposed stock in the crown to prevent tipping. While still somewhat heavy by present-day standards, and hard to clean as well, this type is quite popular on larger boats.

UNDER PULL, foot at crown lifts rear of flukes so that points penetrate into bottom at shallow angle

ALMOST BURIED within 5 ft., anchor is now set firmly in the bottom. Note shallow angle of anchor line





BENSON'S SNAG-PROOF anchor has a split shank holding a sliding ring to which the line is attached. When the anchor is snagged (top photo), it can be freed by simply reversing the direction of pull so that the ring slides back to the crown (middle photo) and pulls the anchor out the same way it went in (bottom photo). When released by a change of wind or current, the Benson will flop over and reset itself within a short distance provided the bottom is soft enough to make quick surface penetration possible

Mushroom anchor, also an old design, is now used almost entirely for permanent moorings. It's virtually foul-proof, but only useful in a bottom soft enough to allow the anchor to dig itself in deeply. A small streamlined version of this design is quite popular with anglers who want a low-cost anchor which is particularly effective in soft mud bottoms. Scott's streamlined fishing boat used a modified fisherman's mushroom in which the circular portion has been notched to form four wide flukes.

Grapnel anchor (not shown) has four or five curved, sharp-pointed arms and holds by entangling itself in bottom growth. It's hard to stow, fouls cable easily and is seldom used except under special conditions.

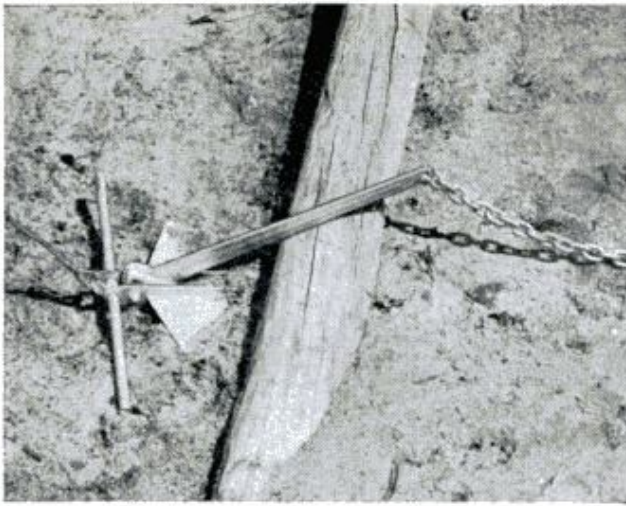
Today's most popular anchors, the lightweight patent models, have all been developed within the last 30 years. They dig in quickly, hold like bulldogs and are easy to stow.

Danforth anchor, one of today's most popular designs, was used on thousands of W.W. II landing craft to kedge off the beaches. Its two long flukes dig in quickly under a heavy pull and it's one of the easiest to handle and stow. This lightweight anchor has only one real disadvantage: when anchoring in a strong current an unweighted Danforth will sometimes "sail" down through the water at a flat angle, making digging-in more difficult. However, this can be corrected by adding a length of chain between anchor and line, a practice recommended for all anchors.

Northill looks a lot like an angular version of the yachtsman's anchor, except that the opposed stock is in the crown instead of the head. This, plus the angle and shape of the plowlike flukes, makes it dig in faster and hold better. However, it has the same disadvantage of holding by one fluke while the other is exposed, making it possible to foul the anchor line on this projecting arm. Northill's twin-fluke model resembles the Danforth, but features

CHOOSING AN ANCHOR SITE

- If you're in a strange area, consult the chart before making any decisions.
- Choose a landlocked anchorage if possible, otherwise look for the best protection.
- Avoid lee shore where unexpected squall could blow your boat in toward beach.
- Give rocks, reefs and shoals a wide berth as boat may swing full circle with a sudden change of wind direction.
- Stay away from cable areas. These are both indicated on the chart and marked by large warning signs on the shore.
- Try to anchor over a bottom which will give best bite possible. Soft mud and clay make for very good holding, so look for spots marked "sft" or "stk" on your chart.
- Steer clear of rocky bottom, hard sand and heavy bottom growth (eel grass, etc.) where anchor might get fouled. If forced to anchor in such places, always use buoyed trip lines.
- Never anchor in channel or waterway or near enough so boat could swing out into traffic.
- Check level of tide, if any, and make allowances when figuring scope.



TRIP LINE attached to crown will often free snagged anchor which won't break loose by reversing pull

angled fins on both sides of each fluke.

Benson anchor has a divided shank holding a sliding ring to which the anchor line is attached. If the anchor snags under a rock, etc., you just reverse the direction of pull and the ring slides back toward the crown, allowing the anchor to come out the same way it went in. Danforth's Shear-pin model accomplishes this by notching the foot and blocking this notch with a pin which will break under pressure.

There are literally dozens of other modern anchors which make use of these same principles, achieving greater holding power through the use of quick-penetrating flukes with large surface area. In addition, each design has a number of sizes.

Choosing the proper anchor for your boat is no simple task, because there are so many factors which must be taken into consideration. Have a talk with your marine dealer before deciding on a particular type. He'll be familiar with local conditions, and can inform you as to how different types have performed in your area.

Once you have decided on a particular type, you can use the manufacturer's table as a rough guide to finding the right size anchor and line for your boat. However, don't rely completely on manufacturer's recommendations since these are based on average anchoring conditions. You also have to consider anchorage exposure, type of bottom, shape of your hull, wind and many other things. Your dealer will be a big help there.

Once you have purchased a good anchor, the next step is rigging it to your boat. And here is where many new boaters go astray.

Since modern lightweight anchors get their holding power by digging into the bottom at a shallow angle, it follows that the direction of pull on the anchor line should be at the shallowest possible angle to the bottom. Double the angle and the

ANCHOR LINE TOO SHORT



CORRECT AMOUNT OF LINE



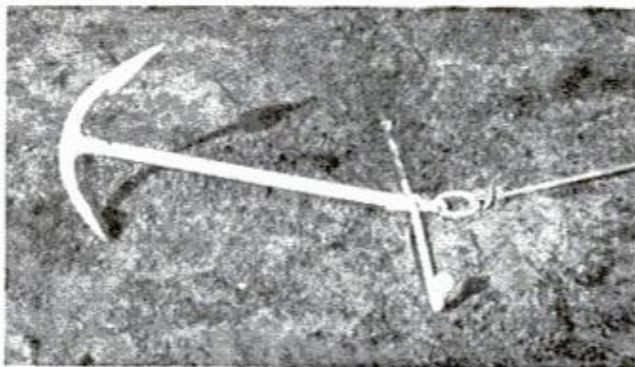
FOR BETTER HOLDING, ADD A LENGTH OF CHAIN



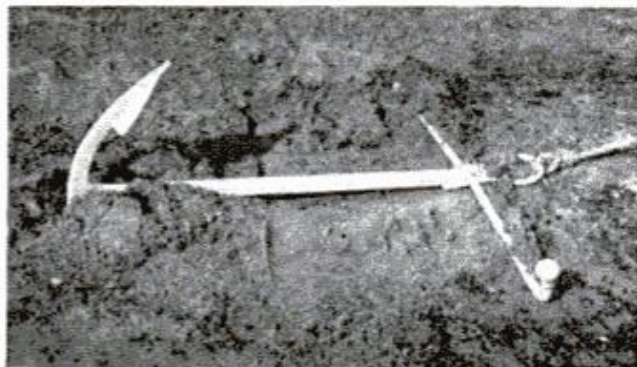
SCOPE of seven to one (anchor line vs. water depth) is recommended for normal anchoring. However, the addition of a length of chain will absorb shocks caused by waves acting on hull and make possible shallower angle of pull, increasing holding power

CHAIN INSTALLATION shown below consists of 8 ft. of $\frac{1}{4}$ -in. galvanized chain shackled to 8-lb. anchor. It's used with a 100-ft. length of $\frac{3}{8}$ -in. nylon line attached by splicing around the galvanized thimble





YACHTSMAN has an opposed stock, lands on bottom ready to dig in quickly with sharply angled fluke



ONE BAD FEATURE of yachtsman is projecting fluke which offers perfect place for fouling anchor line

holding power of the anchor drops by one half. Continue to increase the angle and the anchor will finally break out of the bottom altogether. This means that you'll have to put over plenty of anchor line, or "rode," to get the best grip on the bottom.

For average conditions, the "scope" (amount of line in use) should be about seven times the depth of the water; for a hard blow, increase this to ten or fifteen times the depth. However, you can cut down the length of line required without seriously affecting holding power by breaking the straight-line pull between boat and anchor. On larger boats, this is achieved by running a second anchor or weight part way down the line. On smaller boats the most common solution is to add a 6 to 10 ft. length of 1/2-in. or 3/4-in. galvanized chain between the anchor and the end of the line. This will increase the holding power of your anchor under all conditions, and also cut down on anchor failure due to surge action from the boat. Many marine dealers offer a ground tackle package with

anchor, chain and line in a single unit.

You can use your anchor as a lead to check the depth of the water if you mark the line at specific intervals. These markings will also come in handy in keeping track of the scope which you have paid out. Of the many marking methods in use, one of the most practical is a small dot or ring of colored paint. Mark the first 20 ft. at 2-ft. intervals, then mark the rest of the line at 5 or 10 ft. intervals. By varying the colors or number of rings, you can read the rode at a glance.

Another method is to tie a short length of string or marlin through the line, taking care to weave each strand tightly through the lay of the rope.

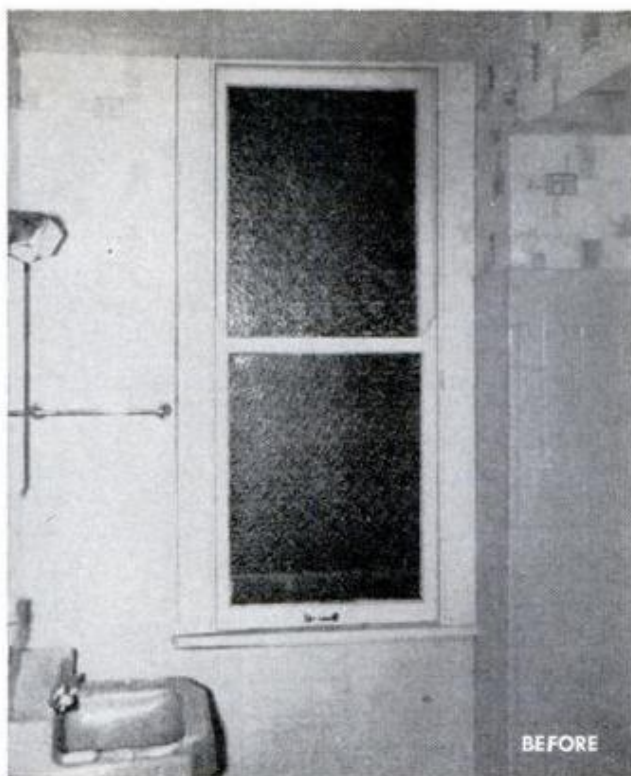
The actual process of anchoring a small boat seems to be one of the least understood operations in boating. However, assuming you have the proper ground tackle, it's actually quite simple. First, pick the exact spot where you want your boat to be when she's finally at anchor. Then head up into the wind or current, whichever is stronger, and go far enough *beyond* this spot to allow for the proper scope. Next, with the boat stopped, lower the anchor slowly over the side directly to the bottom, pay out a scope at least three or four times the water depth and make it fast temporarily. Finally, reverse the engine and idle slowly backward until the anchor digs into the bottom and stops the boat.

If you're just stopping for an hour or two in calm water and plan to stay around the boat, this scope of three or four times the depth will be sufficient. However, if you plan to leave the boat unattended for any length of time, increase the scope.

Getting the anchor up is simply the reverse of anchoring. Just run slowly up over the anchor, give the line a tug and the anchor should break free. If it's dug in deeply, make a quick turn around the bitt when all slack is out and power ahead very slowly. If this doesn't work, run in a tight circle around the anchor, since pulling from another angle may free it. ★ ★ ★

ANCHORING TIPS

- Never heave an anchor over upside down. It will probably snag the line and fail to bite.
- In a real blow, let out every bit of line you have aboard, provided you have enough space to do so without danger.
- After setting anchor, take a cross range on nearby shore objects and check after 15 min. or so to make sure you aren't dragging.
- Never attach line to anchor with a knot; use an eye splice with a thimble.
- Any pleasure craft over 25 ft. should carry two anchors—a service anchor for normal use and a storm anchor which can be put out to provide extra holding power in a big b'ow.
- Don't leave a releasing anchor (Benson, Danforth's Shearpin) unattended for long periods of time as a sudden change of current or wind can release it.



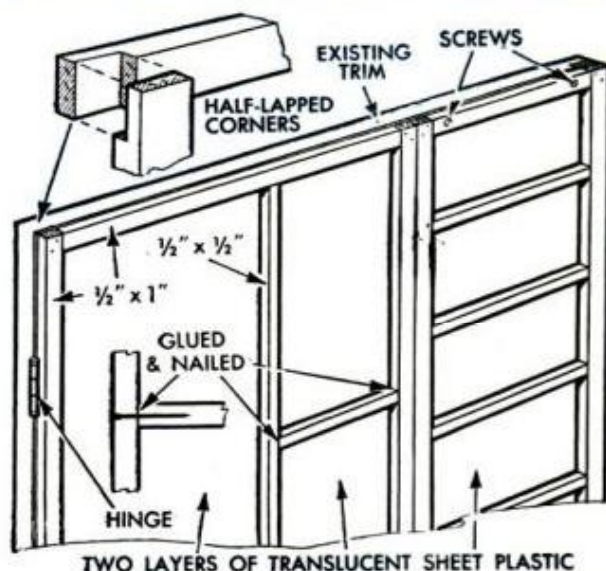
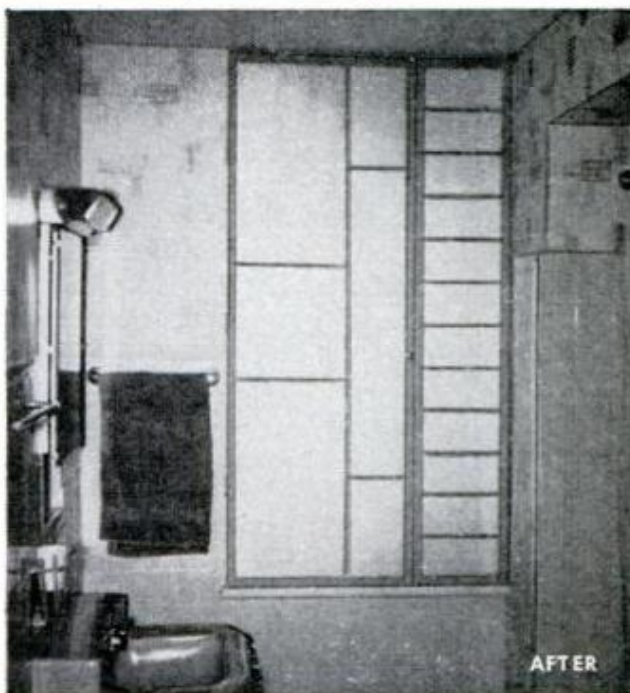
SHOJI SCREEN Hides Unsightly Window

YOU CAN TILE the walls, put in new fixtures and paper, repaint the woodwork, add a new floor and a fluorescent light. But what can you do with an old-fashioned unsightly window when it comes to remodeling a bathroom? You can do as I did and cover it up with a Shoji screen. It made the most attractive window you ever saw without altering it whatever.

The screen completely hides the window without sacrificing access to it or its usefulness for ventilation, since one part of the screen is hinged to open. It also acts as a storm sash, and saves you the cost of a new window.

Make the screen by tacking a double layer of translucent plastic to the back of a frame $\frac{1}{2}$ x 1-in. wood. Half-lap the corners of the frame first and fasten them with waterproof glue and small nails. The divider strips are $\frac{1}{2}$ x $\frac{1}{2}$ -in. wood, held by waterproof glue and a single finishing nail at each joint.

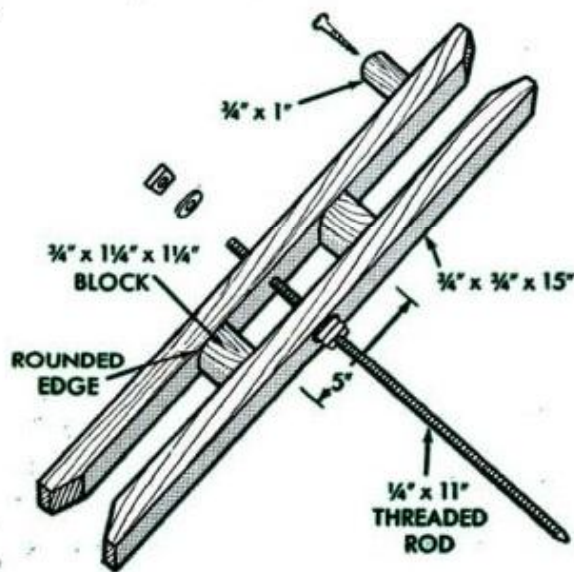
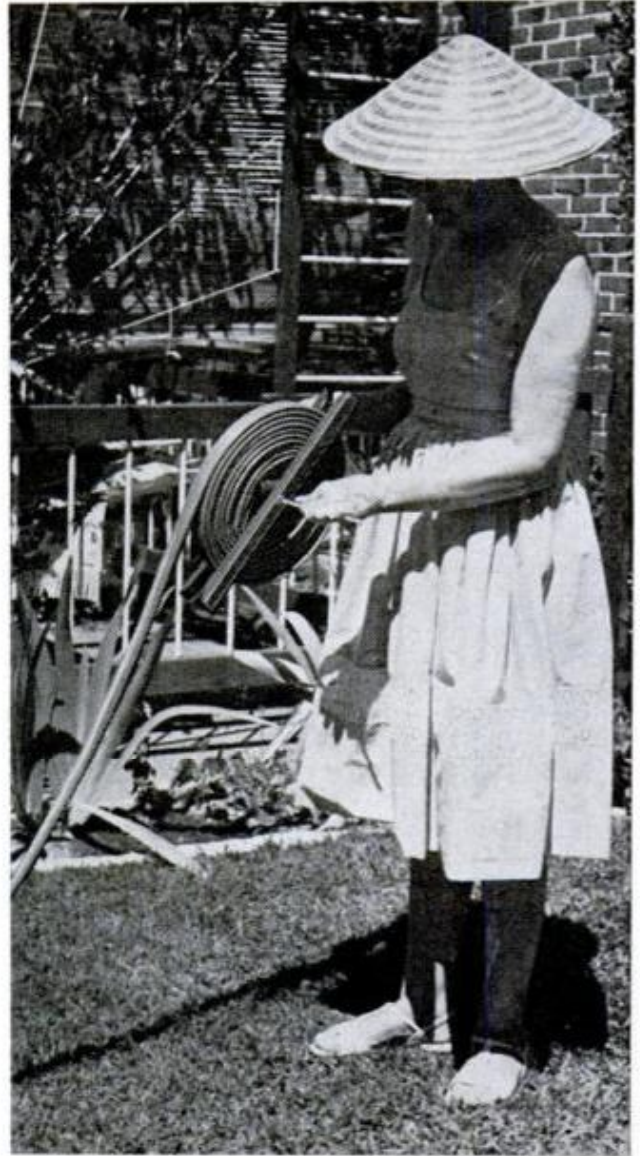
As shown in the photographs, the screen completely covers the old window trim at the sides and top, but rests on the sill. The hinged section is fastened to the side trim with three chrome-plated brass hinges. The fixed section is attached with matching screws. If the half-lapped corners of the frame are too difficult to make, you can simply butt the pieces together and fasten with glue and nails.—Ray Kotrba



Soaker Hose Stores Neatly on Wooden Reel

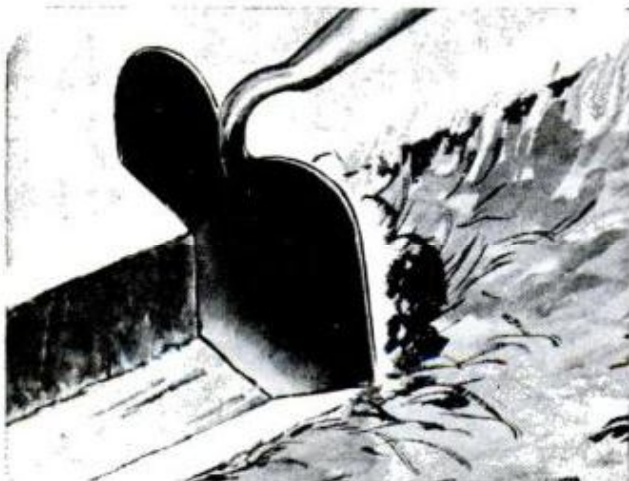


HOME-MADE REEL works equally well when stuck in the ground (above) or hand held, as in photo at right



Rolling up a soaker hose can be a bothersome chore, but not any more. With this crank-type holder, you can reel it in and pay it out as easily as you would a kite string. The detail shows how simple it is to make. You can save yourself the job of threading the ground spike by buying a

length of ready threaded rod at your hardware store. Two jam nuts provide a shoulder on the rod for the hardwood arms. Make the holes in the arms slightly oversize to assure free reeling. The reel knob is a piece of dowel drilled through the center for a wood screw.—*Wm. G. Waggoner*



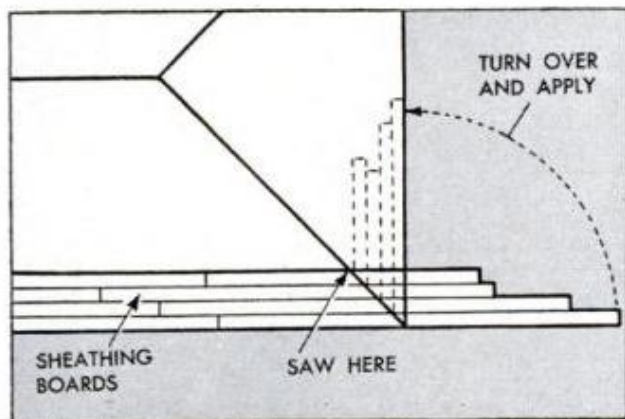
Notched Hoe Speeds Edging

Cutting a neat trench between your lawn and the sidewalk is easy with this modified hoe. Cut a square notch at one side of the blade and trim off the opposite corner at 45 degrees, leaving 2 in. of the original blade edge between the cuts. The notch, when pulled along the sidewalk edge, serves as a guide and also as a depth gauge.—*Bill Dye*

Pencil layout marks left on wood after the job's done come right off when rubbed with wood alcohol on a rag. Method is faster, easier than sanding.—*E. A. Fnecko.*

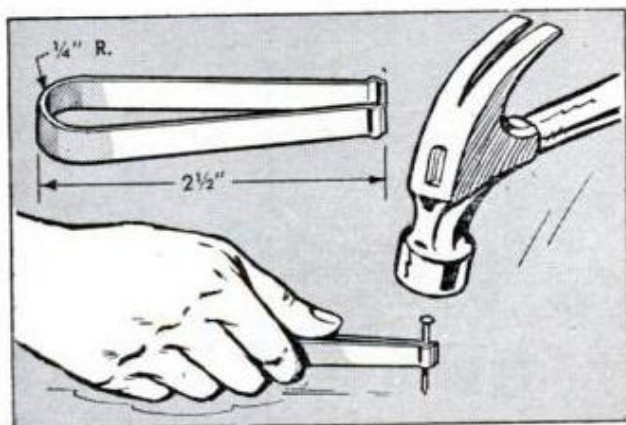
Clamp Provides Third Hand

When you're cutting a fair size piece of glass, holding the straightedge firmly for the full length of the cut takes a bit of doing. More times than not, the straightedge will shift, resulting in an inaccurate score. Next time, use a spring-type glue clamp to hold the far end of the straightedge to the bench top. It will give you the third hand you need. A piece of carpet or blanket will cushion the glass.



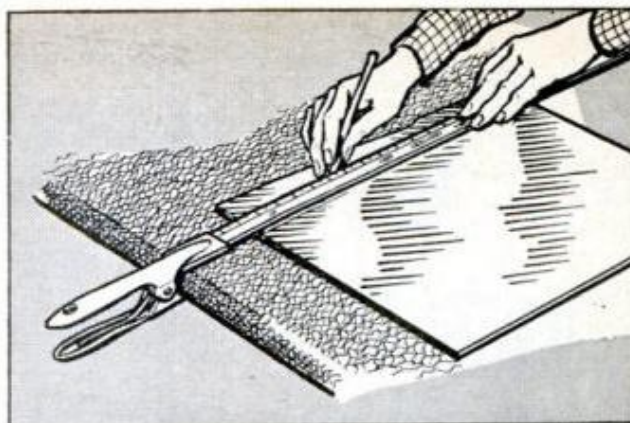
Bolt "Tongs" from Hinge

When you find it necessary to shorten a bolt on a grinding wheel, try using a strap hinge as a clamp to hold it square to the wheel. Just drill a hole slightly larger than the bolt in one leaf near the hinge barrel, insert the bolt in the hole and close the hinge. Gripped like pliers, the hinge will hold the bolt securely, even more so if you bend the leaf as suggested.



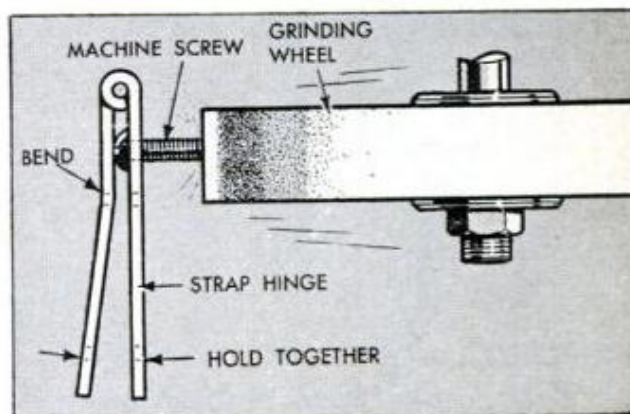
Miter Box Rides Sawhorse

A miter box made to slip on and off the top of a sawhorse will prove extra handy on a job where there's a problem of holding it. Made to fit snugly so it will stay put without clamping, the box is handy for mitering quarter-round and other small molding. It's made like any box except that the sides project below the bottom to form a channel or saddle to fit the horse.—*Wilfred Beaver*



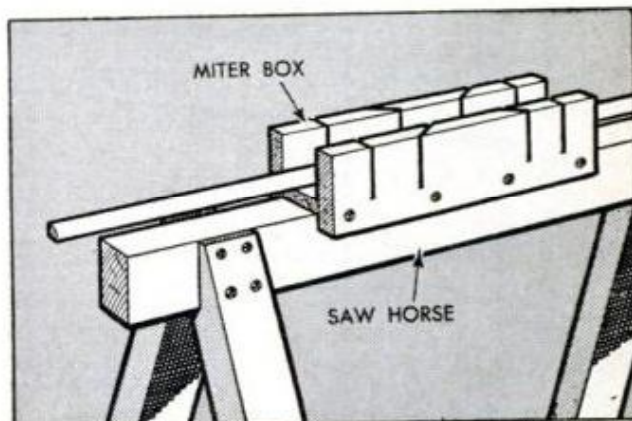
One Cut Kills Two Birds

Cutoffs become readycut starter pieces for the adjoining side of a hip roof when you follow this timesaving shortcut. Instead of sawing off each board at the hip one at a time, apply four or five rows of roof boards, nailing them to all but the hip rafters and letting them run past. One cut up the center of the hip will automatically saw the cutoffs at the right angle.



Brad Tweezers Save Fingers

Holding tiny nails or tacks for starting with a hammer can be hard on the fingers. To make a tweezer-type holder like this, cut a 3/8-in. strip of sheet metal and bend it over a 1/2-in. dowel. Then form the "jaws" around a tiny nail. The spring tension of the metal will hold the tweezers open except when in use. Dimensions of the tweezers can be varied to suit small screws.—*Robert L. Sargisson*



WANTED: DEAD OR ~~ALIVE~~



AMERICA'S TOP 20 BACKYARD ENEMIES

Bugs, slugs and other thugs (pests) may be hiding out in your garden, eager to make a meal of those tender young plants. For mug shots of the 20 worst offenders, see pages 152-153. Be on the lookout for them; they're all plant killers. But the right antidote—correctly applied—can stop them, with minimal harm to wildlife



YOUR GARDEN may be the most beautiful collection of rare plants imaginable, but it's just a housing project and free lunch to a Japanese beetle. And he's ready to move right in, whether the landlord is willing or not.

The earlier you discover such an insect invasion, the sooner you can start fighting it, so keep a close watch for those first signs of plant damage. Often you can guess the culprit's identity from the plants being attacked and the type of damage inflicted. Knowing your enemy is half the battle, for once you have pinned the guilt on the right pest, you can simply follow the recommended procedures for getting rid of him.

In many cases, especially with larger-size pests, your best bet is to go over every plant in the garden the minute you discover those first danger signs, picking off and destroying the pests as well as their eggs. However, you're bound to miss a few, so after this first assault, you'll have to fall back on man's ultimate weapon in the battle with garden pests—pesticides.

There are many different types of pesticides, but almost all of these can be classified as either stomach poisons (which must be eaten to be effective) or contact poisons (which only have to come in contact with some part of the insect's body to be effective).

Pesticides must be applied in a manner which will insure that they will either be eaten, absorbed, come in contact with or

form a barrier against the pest you are fighting. Thus, the tools you use to apply a chemical will be determined by how it kills and the size and nature of the plants you are trying to protect.

Sprayers and dusters both operate in basically the same manner: A current of moving air (or water in the hose-end sprayer) distributes the chemical evenly so that it is deposited upon surfaces requiring treatment. Since many chemicals can be applied with either tool, it's best to consider the advantages and disadvantages of each before deciding which type to buy.

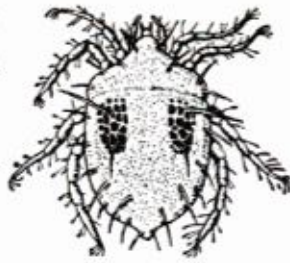
A sprayer can be used for a wider variety of home pest-control jobs than a duster. You can apply sprays in a breeze which would make dusting difficult, if not impossible. And unlike dusts, sprays leave no visible residues.

Dusts are generally easier to use and the equipment is light. They can be purchased ready mixed and formulated, whereas sprays must be measured out and mixed. You can keep a duster filled and ready to use, but a sprayer should be cleaned after each use. Finally, some sprays may be injurious to certain plants, while similar dust formulations are not.

Be sure that the equipment you select is suitable for applying all the pesticides you are likely to use. Also, don't buy a sprayer or duster that isn't large enough to handle your largest job. If you foresee a wide variety of jobs, better to buy two—one for heavy-duty work and the other



EASTERN TENT CATERPILLAR



MITE



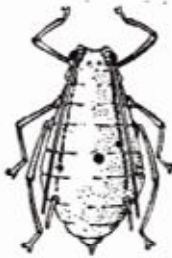
CLAY-BACKED CUTWORM



CHINCH BUG



ANT



APHID



SLUG



CODLING MOTH

PESTICIDE PRECAUTIONS

- Read the entire label before opening the container. Don't inhale vapor of a concentrated chemical, and if any is spilled on skin, wash it off immediately.
- Always store in original container with the label intact.
- To minimize "silent spring" dangers, keep pets and wildlife out of spraying area (use a temporary scarecrow to frighten birds). Don't spray to runoff. Pick off and destroy pests which have been killed by chemicals.
- Keep out of spray drift. Never smoke while spraying. Be sure to wash hands and face before smoking or eating.

EASTERN TENT CATERPILLAR. Leaf-feeder that attacks fruit trees, rose and hawthorn bushes; easily recognized by weblike "tent" it weaves. If caught early, simply pick off and destroy; otherwise, use DDT, toxaphene, methoxychlor, chlordane or lead arsenate

MITES. Several species (white, spotted, red), some only 1/25 in. long. Bulb mite goes after flower bulbs; two-spotted spider mite causes "russeting" of apple, peach foliage; cyclamen mite attacks leaves, stems of dahlias, etc. Spray with EPN wettable powders

CUTWORMS. Many species, varying from green to black striped, up to 1 1/4 in. long. Destroy early garden plantings by cutting at ground level. Dust soil with toxaphene or DDT before planting; protect plant stems with a cardboard collar set 1 in. in soil

CHINCH BUG. Sucking insect which feeds on corn, sorghums and your lawn. Fight it by spraying with insecticides containing nicotine, sabadilla, chlordane, DDT, or toxaphene. To find out which acts best in your area, write to your state agricultural college

ANTS. Many species, but few actually eat plants. Some (cornfield ant) cause damage indirectly by keeping "herds" of aphids which they "milk" for food. To fight them apply a chlordane drench to infested soil with a common garden sprinkler can

APHIDS. Soft-bodied plant lice (white, blue, green) which attack both vegetable and flower plants, especially in early summer. Dust plants with malathion once a week, but make sure they're dry before dusting and don't treat them within 1 day of harvest

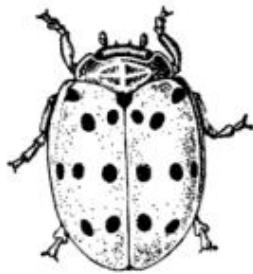
SLUGS. Such "snails without shells" come in many colors up to 4 in. long. Rose slug is yellowish-green with stiff hair on back; gray garden slug has black spots. Found mainly on vegetable plants, control by spraying or dusting with DDT, lead arsenate

CODLING MOTH. Wormlike larva devour apples, pears, and English walnuts, but adults lay the eggs so go after them first. Brown moths show up when trees start to bloom, larva about four weeks after petals fall. Use DDT, lead arsenate or a combination

MEXICAN BEAN BEETLE. Brown with dark spots; about 1/4 in. long. Eggs laid on underside of leaves in the spring, larva feeds principally on this side too. Spray or dust with malathion, rotenone, malathion or methoxychlor, repeating weekly until pests disappear

CORN EARWORM. Caterpillar that also attacks tomatoes. Feeds on central shoot of plant early in season, later burrows through silk and eats kernels near tip of ear. Spray shoots with DDT; use same spray on silks when they appear and repeat four times

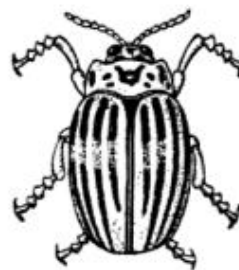
COLORADO POTATO BEETLE. Attacks potato and eggplant. When discovered, check all plants for infestation, picking off beetles and crushing eggs. Do this once a day, then once a week apply DDT powder or spray. Cover foliage completely, top and bottom



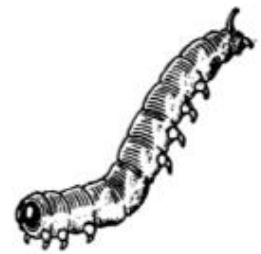
BEAN BEETLE



CORN EARWORM



POTATO BEETLE



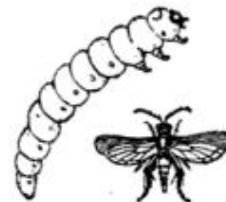
TOMATO HORNWORM



CABBAGE WORM



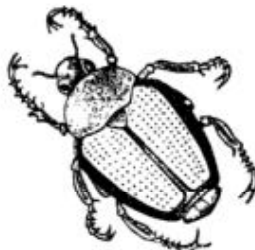
CUCUMBER BEETLE



SQUASH VINE BORER



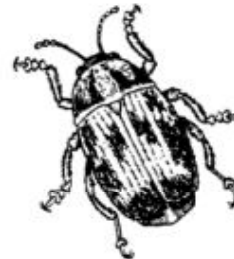
POTATO LEAFHOPPER



JAPANESE BEETLE



GLADIOLUS THRIP



PEA WEEVIL



ORIENTAL FRUIT MOTH

HORNWORMS. Several species, but most common garden variety has a taste for tomato plants. Check for these in the evening and pick off any you discover. Also, dust with TDE or standard toxaphene powder, or spray with either these or DDT solution

IMPORTED CABBAGEWORM. This garden giant (about 2½ in. long) doesn't stop with eating ragged holes in the outer leaves of cabbage plants, it bores right into the head. When discovered, pick them off by hand, then spray or dust with toxaphene or malathion

STRIPED CUCUMBER BEETLE. Most troublesome in Eastern and Central States, it invades cucumber, squash and melon plantings almost overnight. Not only eats leaves and girdles stems, but transmits plant diseases. Treat as you would the bean beetle

SQUASH BORER. About 1 in. long, this caterpillar hatches from eggs laid on stem of squash in spring and bores into stem near ground. Handpick daily, slitting stem with razor blade and removing borer, then cover the slit with soil. Spray with malathion

POTATO LEAFHOPPER. Destroys potatoes and bean by sucking plant juices from tender undersurfaces of leaves. Also transmits "hopperburn" disease which causes margins of leaves to turn brown and curl. Spray or dust with DDT, methoxychlor or malathion.

JAPANESE BEETLE. An all-around pest, the larva feeds on roots and the adult eats foliage, Attacks wide variety of plants, trees, etc. Spray or dust with DDT once a week; or dust with powder containing spores of milky disease in April or May (in North)

GLADIOLUS THRIP. About ½ in. long, it attacks both stored bulbs and growing flowers. Withered and white blotched leaves are signs of thrip feeding. Dust or spray with malathion or DDT once a week until pests disappear. Dust bulbs after harvesting

PEA WEEVIL. A relative of that old Dixie Devil, the boll weevil, it's one of four main types of northern weevils (the others being strawberry, root and vegetable). Adult severs stems; larva feeds within buds. For best control, spray or dust with methoxychlor

ORIENTAL FRUIT MOTH. Goes after peaches, quinces and other fruits. Moth appears when trees bloom; larva attacks tender twigs early in season, causing them to wilt, later goes on to fruit. Spray with DDT at petal-falling stage of fruit development

LIST OF PAMPHLETS giving further information on backyard pests and how to control them may be obtained by sending 35¢ to Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Ask for "List of Available Publications of U.S. Department of Agriculture."

for those small touch-up operations.

Among the most popular types of sprayers: *continuous or intermittent household*, manually operated, good for small jobs; *compressed air*, manually operated air pump, one of the most popular for backyard use; *knapsack*, unpressurized spray material forced out by manually operated pump developing hydraulic pressure; *wheelbarrow*, same principle as knapsack, but holds more spray material; and *electric*, generally used only for extra-large jobs.

Dusters include: *plunger*, comparable to household sprayers above; *knapsack*, contains an agitating device and lever-actuated bellows; *crank*, comes in many sizes, uses high-speed fan driven through gears by hand-operated crank; and *traction*, contains high-speed fan driven off front wheel, used for big jobs.

For more detailed information on pesticides and application equipment popular in your area, stop in at your local garden supply store. ★ ★ ★



CRANK DUSTER comes in wide variety of sizes, from small hand-held model to this large heavy-duty type

SPRAYERS



HOUSEHOLD



ELECTRIC



COMPRESSED AIR



KNAPSACK

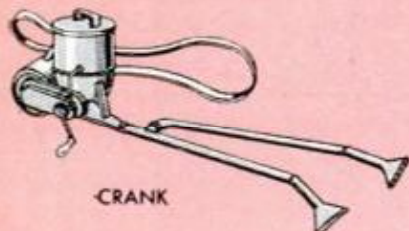


WHEELBARROW

DUSTERS



PLUNGER



CRANK



KNAPSACK



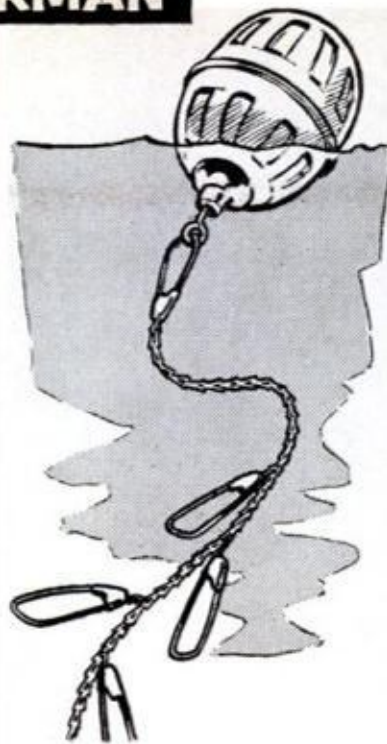
WHEELBARROW
OR TRACTION
TYPE

Handwritten signature

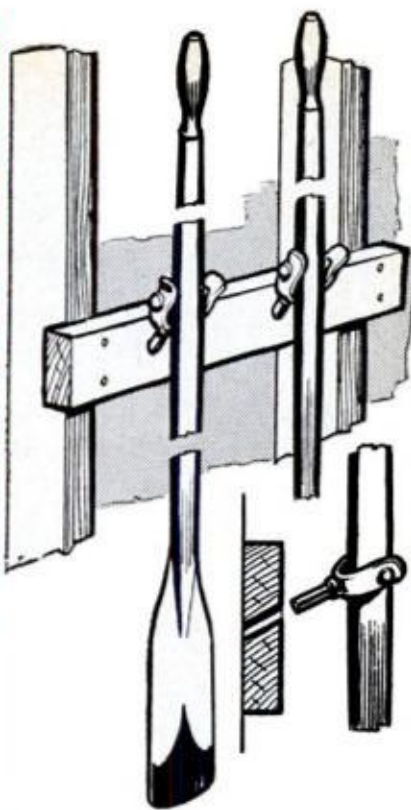
FOR THE FISHERMAN



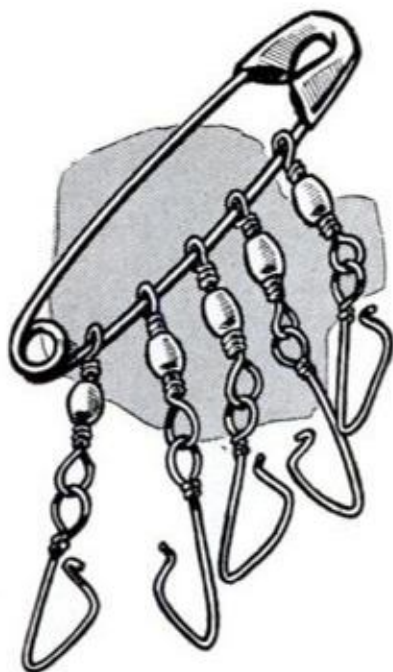
DRY STORAGE in an open boat is always a problem. However, you can protect small items from rain and spray by carrying them in a screw-top jar mounted under one of the seats. It makes a fine place for extra matches, etc.



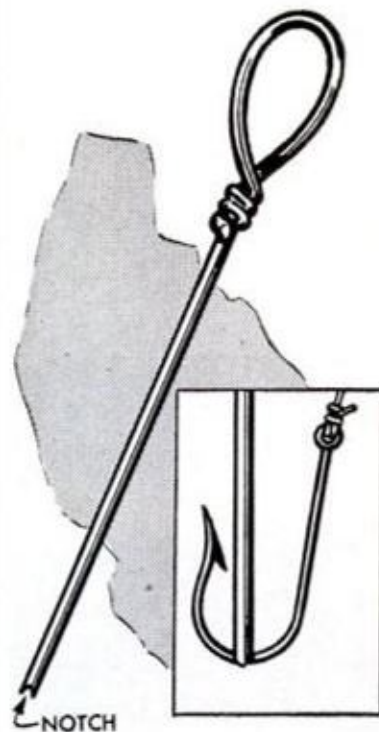
IF YOU WANT extra insurance against losing that string of fish, attach the top clip to a toilet float. Then, if the stringer should come loose from the boat, you'll be able to retrieve it easily.



TO MAKE a space-saving storage rack for your oars, just drill a couple of angled holes a few inches apart in a length of 2x4 and nail it to two studs in your garage. Then hang the oars by slipping pins into angled hole.



NEXT TIME you're cleaning your tackle box, keep three or four large safety pins handy. They make fine holders for snap swivels, hooks and even small lures, keeping them from getting scattered all over the box.



HOOK EXTRACTOR can easily be made from a short length of $\frac{1}{8}$ -in.-dia. galvanized wire. To use it, follow the leader down the fish's throat, engage hook in notch, push it free and withdraw.

FISHING LURES won't become tangled when stored together in the tackle box if you wrap each one in a sheet of plastic or plastic bag and secure it with a rubber band. This will also protect the lures from possible damage in the tackle box.

TO AVOID the discomfort of a wet seat when returning to your boat after a shower, wrap a grain sack or folded piece of canvas around the seat and pin the ends together. This endless pad may then be pulled around to present a dry seat after rain.

WORMS will stay healthier and livelier if you keep them in a reasonably large container. You can make a fine take-along worm can from a 2-gal. oil can by just cutting out the front. Worms won't bunch up as in a narrow can, and come out peppier.



NO-SWEAT HAULING of heavy, bulky items is yours when you hitch this husky wagon to your yard tractor

TRAILER FOR YARD TRACTS

By Hank Adams

THE POPULARITY of garden tractors and riding mowers inspires the design of this handy cart. If you've made an investment in such a powerhouse, you get an extra "return" if you can convert it into a real hauling tractor to spare your back—or an earth-moving dumptruck that'll make your wheelbarrow obsolete.

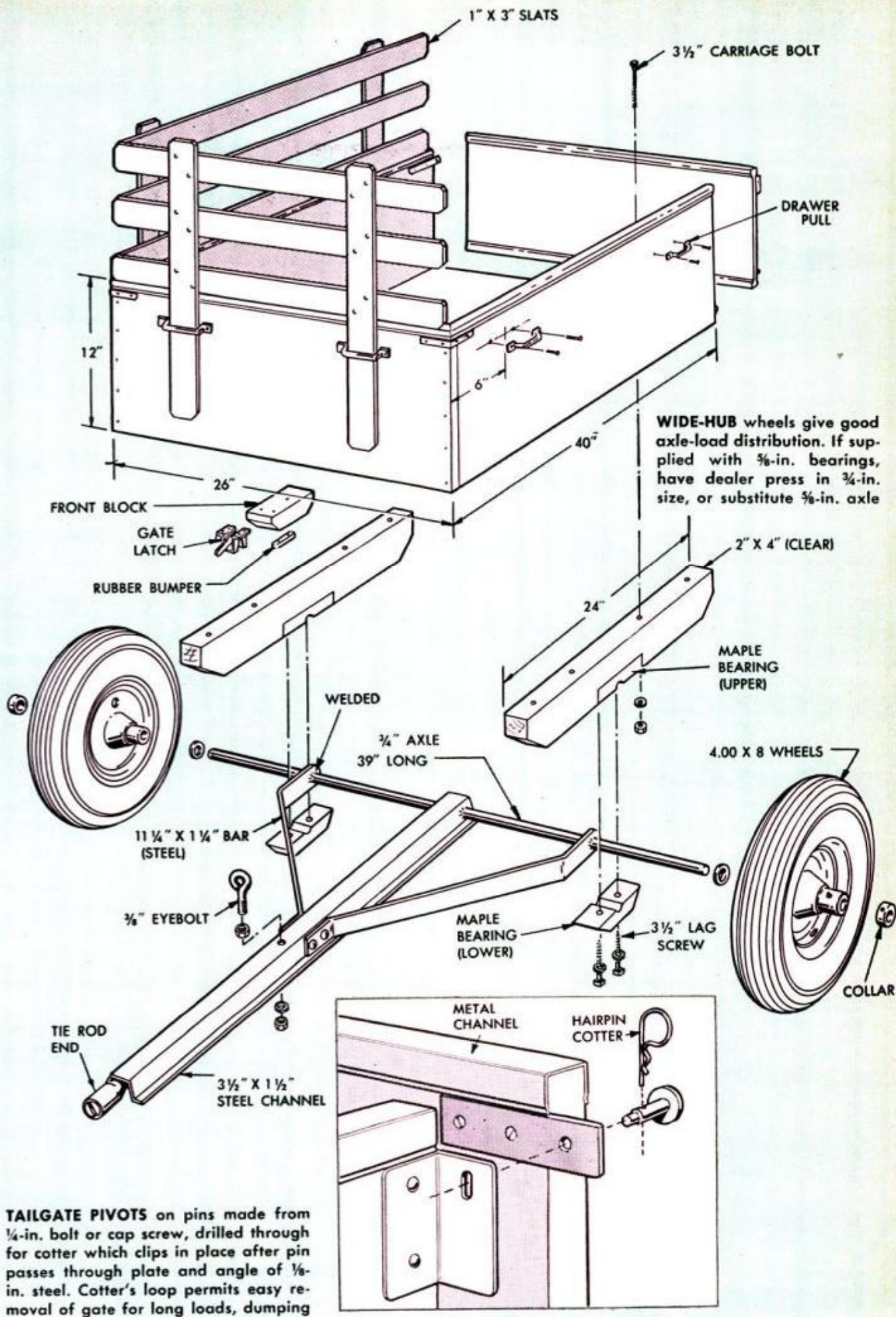
Simple construction techniques are possible because you needn't build the trailer

for high-speed travel. It would cost three times as much to get similar features in a commercial cart. The wheels are the biggest cost item, and if you can swipe one from that obsolete wheelbarrow, you've cut this cost in half.

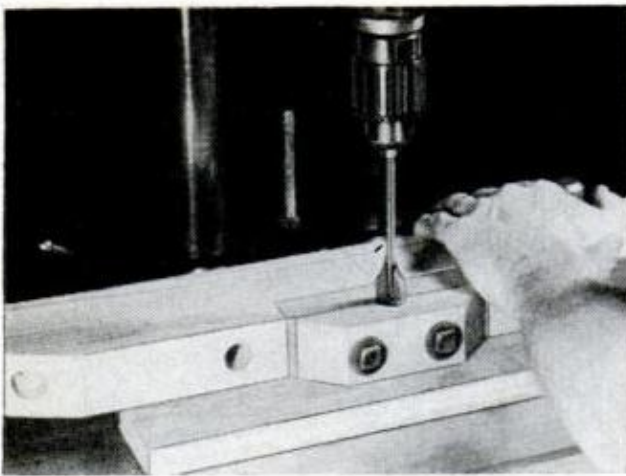
Built to the dimensions shown on the opposite page, the cart has a heaped capacity of about $7\frac{1}{2}$ cubic feet, or roughly 1000 pounds of dirt or stone. With the

IT BEATS A WHEELBARROW! For this job, tailgate comes off (detail, next page), lets you dump while you sit

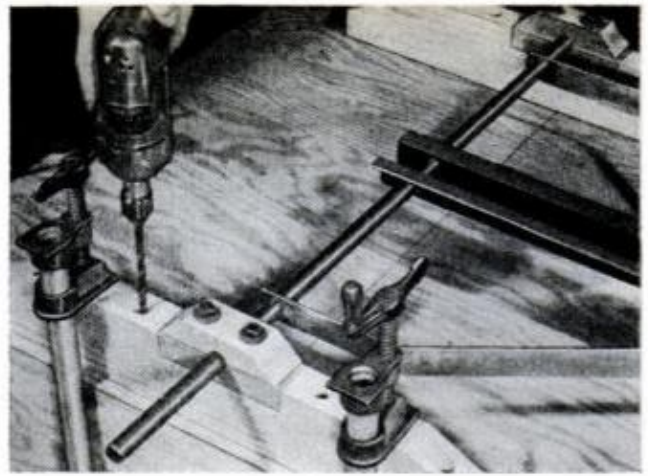




TAILGATE PIVOTS on pins made from 1/8-in. bolt or cap screw, drilled through for cotter which clips in place after pin passes through plate and angle of 1/8-in. steel. Cotter's loop permits easy removal of gate for long loads, dumping

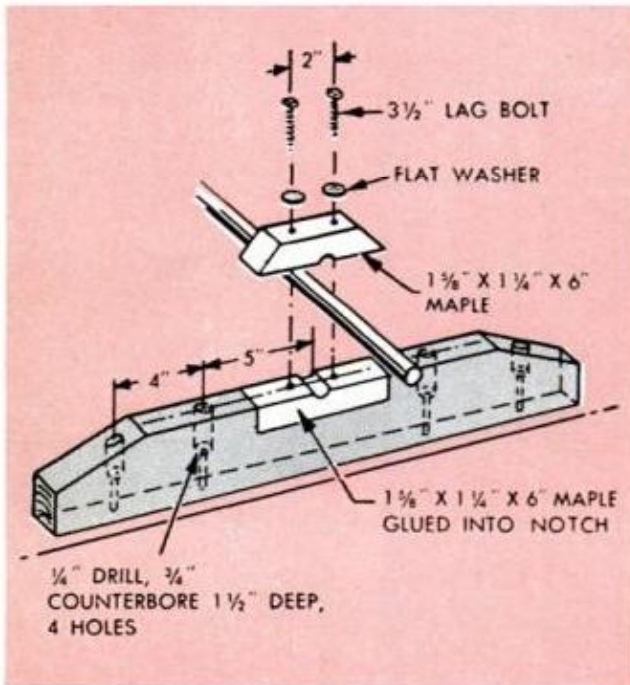


DRILL AXLE HOLE after gluing upper bearing block into beam and fastening lower bearing to it with lag bolts. Use joint line as center for $\frac{3}{4}$ -in. bit



TO ASSURE SQUARE ASSEMBLY, weld axle to draw-rod unit and fasten it to beams before you drill $\frac{1}{4}$ -in. holes on into trailer bed, for carriage bolts

AFTER DRILLING BLOCKS as shown above, back out lag bolts and separate blocks in order to position axle between them (see dimensioned sketch below)



NO ACCIDENTAL DUMPS when you install a gate latch under the trailer bed to engage eyebolt in the drawrod. Bumper block, behind latch, keeps bed level

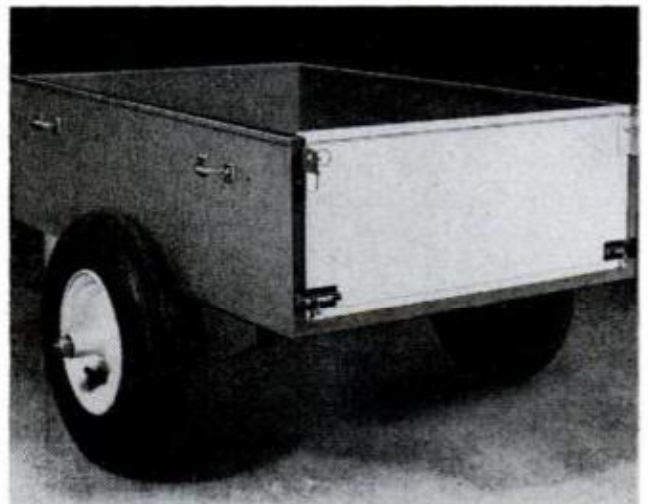
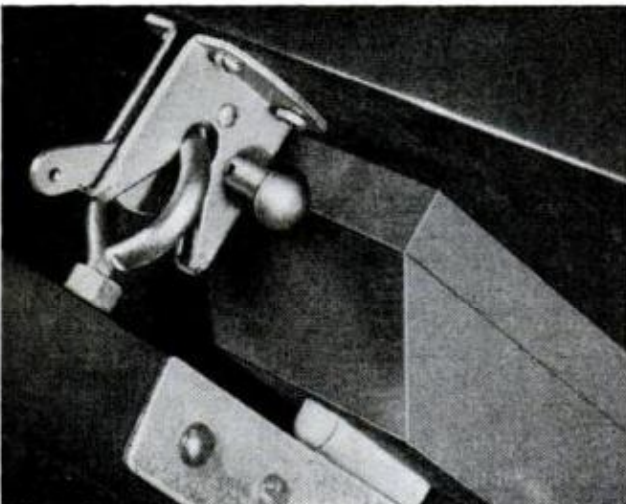
stake sides in place, it'll haul a huge pile of leaves, grass clippings or trash. It takes $5\frac{1}{2}$ -7 hp. to haul half-ton loads, so if your power unit has less, you'll either have to make a smaller trailer or be careful how you load this one.

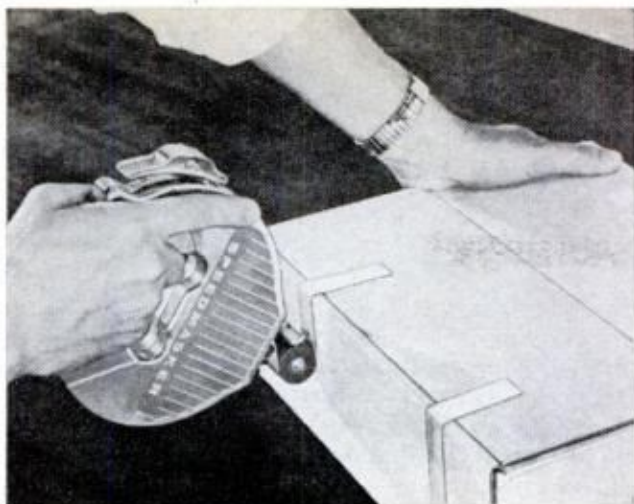
The body is $\frac{3}{4}$ -in. exterior plywood, assembled with screw-type nails and waterproof glue. The top edges are capped for durability—the metal raceway used for certain wiring will fit over $\frac{3}{4}$ -in. panels.

Centering the body over the axle makes dumping easier, but a balanced load tends to lift against the hitch. It's best to locate the axle 2 or 3 inches behind the center; this also increases the dump angle. Before mounting the axle, apply stick graphite to the bearing surfaces.

A steering tie rod and ball joint from an old car provide a universal hitch. In the model shown, the tip of the tie rod is welded inside a drawbar made of hat-section channel. This could also be U-channel, or even $1\frac{1}{2}$ -in. pipe. ★ ★ ★

MOUNT SLIDE BOLTS horizontally at lower corners of tailgate. When gate is pivoted up and back, extended bolts rest on top edge of sides to hold gate up





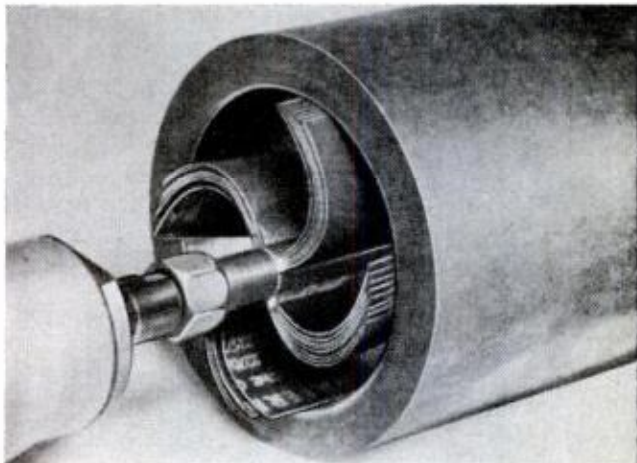
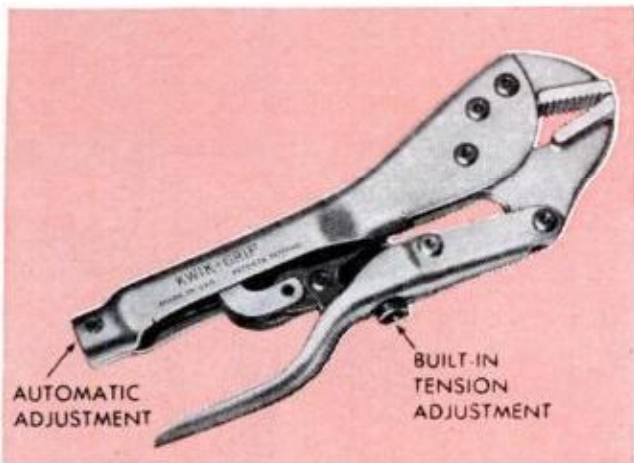
Shopping for Tools

By Arthur Maher

SPEEDMASKER TAPING TOOL applies any pressure-sensitive tape with a 3-in core faster and more neatly than by hand. Works over rough surfaces, in crevices, in and out of corners, etc. Reel brakes for making tight bundles. Price is \$17.95. Rose Manufacturing Company, 2150 Westwood Blvd., Los Angeles 25, Cal.

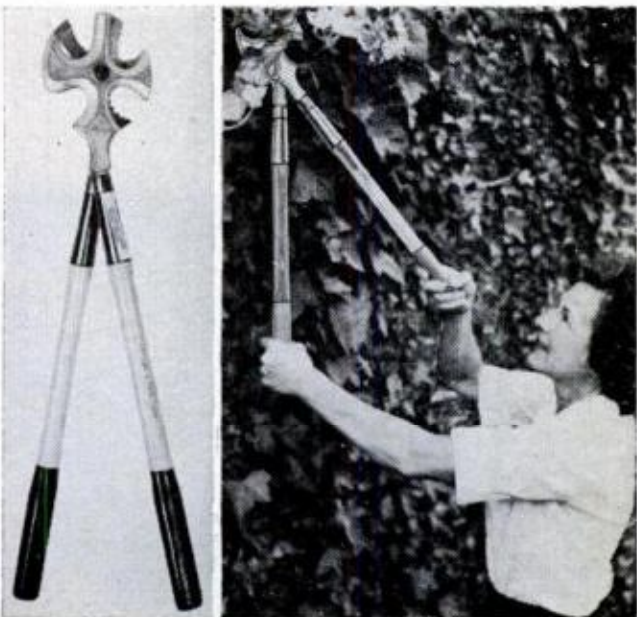
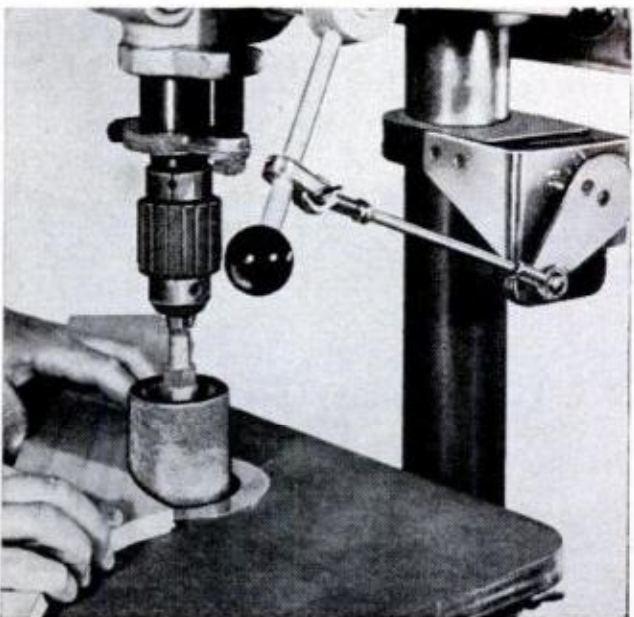
LOCKING PLIERS need no adjusting screw. Set themselves automatically to grip large or small objects. Said to give full locking pressure on any size object within their range. Tradenamed Kwik-Grip. Crestline Products, 218 North 5 Street, Minneapolis, Minnesota.

FLAP-TYPE ABRASIVE WHEEL polishes inside walls of tubes, cylinders, etc. Has a rotating polishing head made up of abrasive sheets. Centrifugal force holds abrasive against work surface. Sold by Merit Products, Inc. 3691 Lenawee Ave., Los Angeles 16, Cal.



PARTS KIT converts a drill press or Shopsmith to an oscillating drum sander for much less (\$11.85) than the price of an industrial unit. Contains geared electric motor, hub, rod-end bearings. Order from J & B Products, P. O. Box 5508, Sherman Oaks, Cal.

SELF-SHARPENING PRUNER is said to cut limbs up to 1½-in. in diameter. Also does many other jobs, including lawn edging, weed digging, vine trimming. Suggested retail price is \$9.95. Made by Gee-Whiz Tool Corporation, 1187 Walker Ave., Memphis, Tenn.



RETAINING WALLS To Dress Up Your Yard

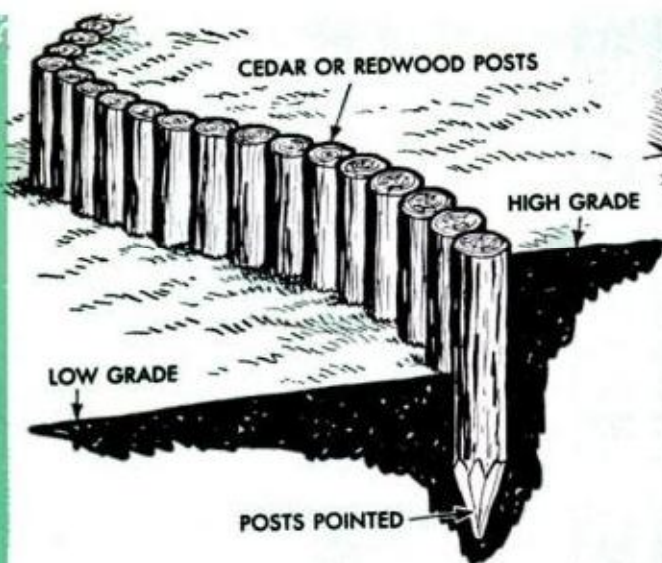
By William B. Eagan

AS CONVENTIONAL construction sites become scarcer, home builders are taking to the hills! At least, more and more houses are springing up on plots once considered too sloping. Many home buyers are finding that split-level lawns have more character than the familiar billiard-table-flat variety.

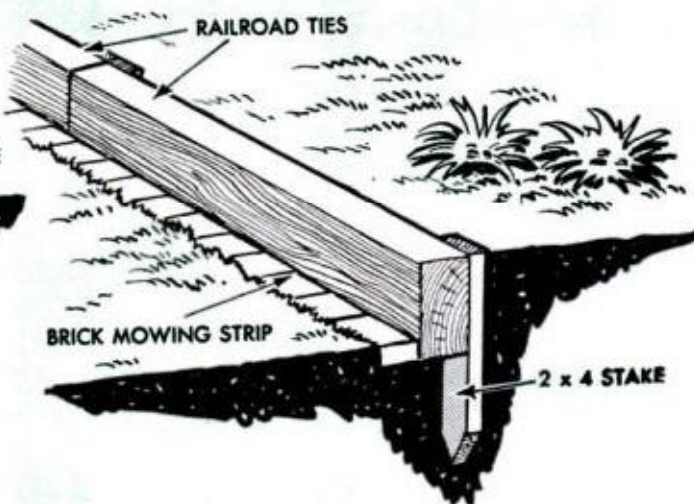
Most sloping lots, however, must be adapted to residential use. The usual treat-

ment consists of leveling one section to serve as a patio or lawn-game area—and this involves chopping into the slope. The shoulder of exposed earth—whether it's less than a foot or over four feet in height—must be buttressed to keep it from washing down to fill the excavated area. That's a job for a retaining wall, and choosing the right one for a given site can add interest to any home grounds.

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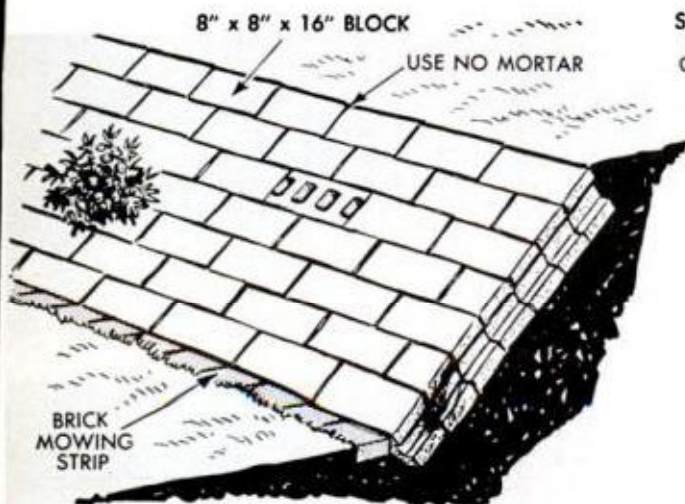
WHEN GRADE LEVELS aren't more than foot apart, staked walls offer masonryless solution. With 3-ft. posts, driven side by side, you can follow ground contour for less cutting and backfill



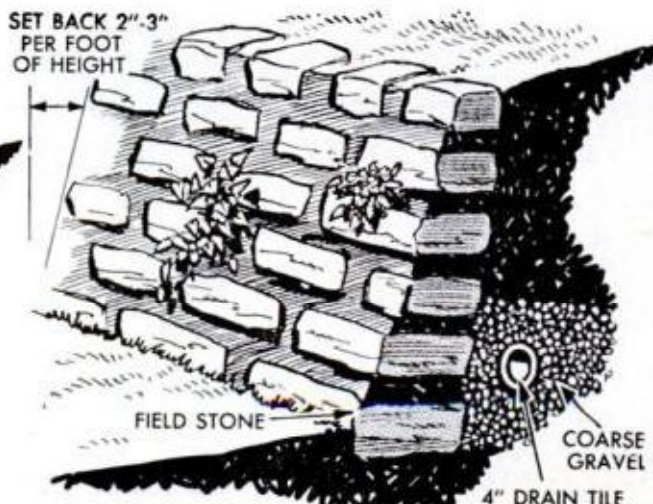
RUSTIC EFFECT is achieved with old railway ties, left in wake of track crews. Form shallow trench for tie, set on edge beside strip of brick. Attach treated stakes with aluminum nails before driving

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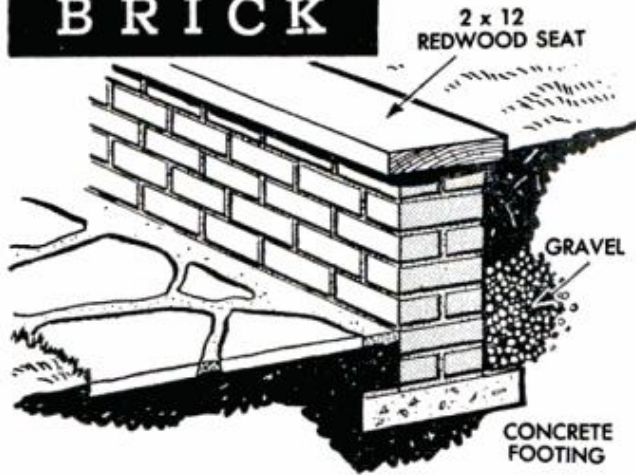
MORTARLESS MASONRY requires carefully-flattened slope. Cement blocks offer chance to set scattered units on edge so you can fill exposed cores with dirt, plant flowers or vines in them



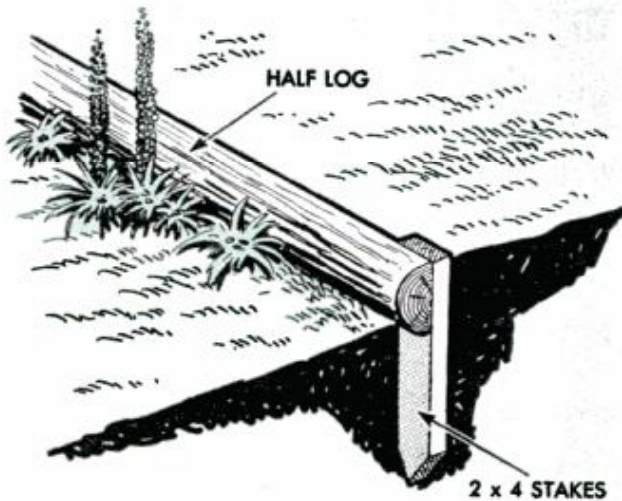
LESS EXPENSIVE THAN BLOCK is slanted wall of fieldstone. Set largest stones in trench for base, use diminishing sizes for succeeding courses, covering each layer with 3 or 4 in. of well-tamped earth



BRICK

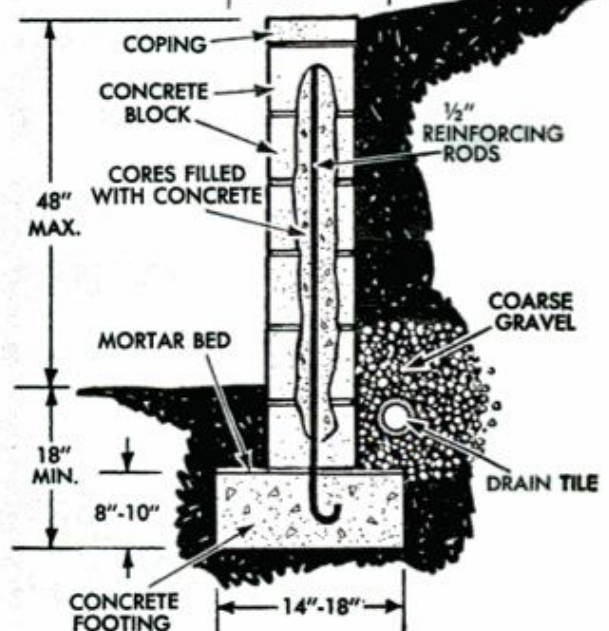
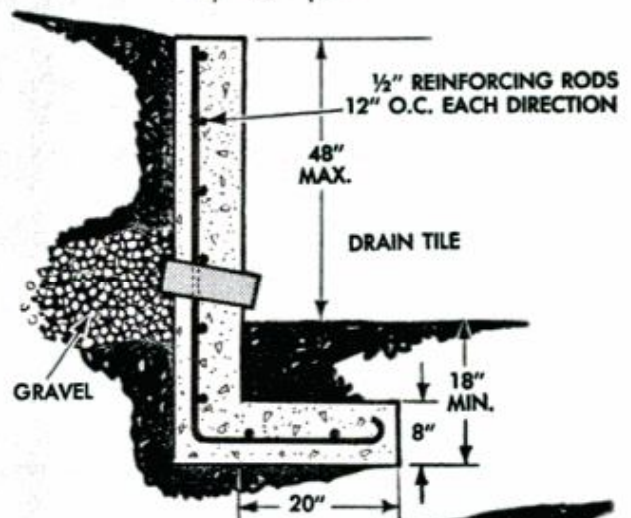
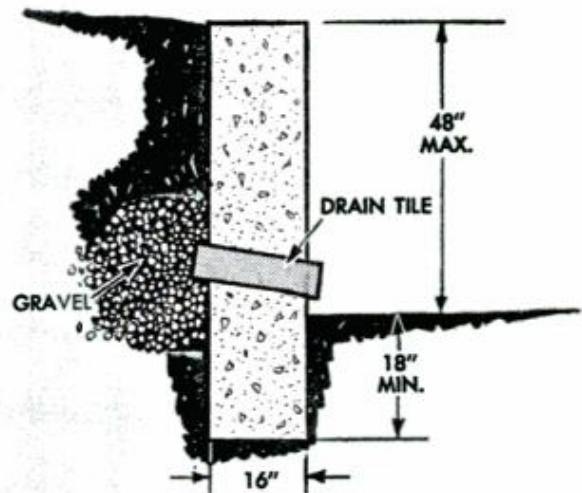
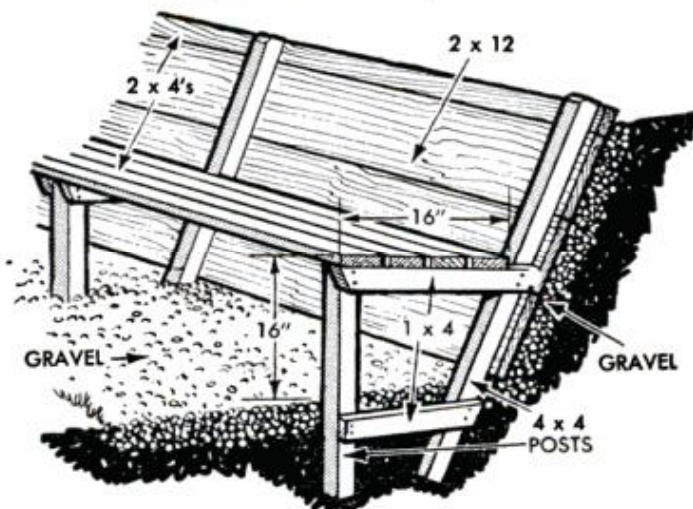


BENCH IS A BONUS when you cap a mortared brick wall with a redwood plank—ideal where wall is 15 to 18 inches high. Anchor plank with dabs of epoxy



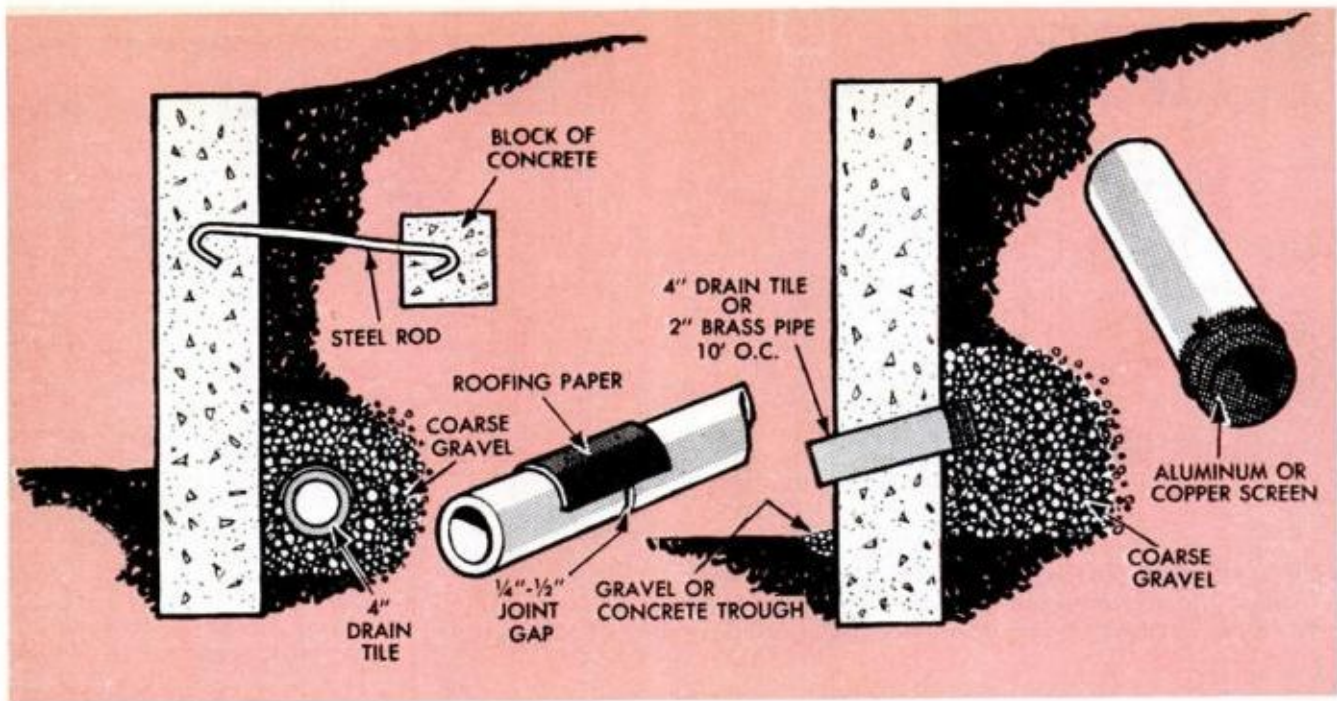
EASIER TO WORK WITH than ties, half-logs are staked in the same way. Cut the soil back to a straight shoulder and butt the flat side against it—or backfill after staking the logs in place

ANOTHER DUAL-PURPOSE treatment is one in which redwood or treated cedar frame supports plank back and spaced-slat seat. Gravel fill prevents seepage of dirt through cracks and keeps underfoot area dry



EXTREME DROPS IN GRADE call for walls of concrete. L-type (center) is usually more economical than mass-type (top); it requires less concrete, but fussier forms and reinforcing. Block wall needs no forms, but rods embedded in poured footing must be spaced to pass through cores

TURN PAGE FOR MORE DETAILS



GREATEST THREAT to retaining walls is under-surface water flowing down slope of lot. There are two ways of carrying off this water with drain tile—by running it parallel to the wall (left) or by piercing wall at intervals (right). If water pressure is excessive, wall can be anchored to buried "deadman" as shown at left

A retaining wall that's thrown up without proper regard for adapting it to its site can be a fairly grotesque structure—and may soon bulge, split or topple. Properly erected, however, the wall should last a lifetime. If your lot calls for a wall over 4 ft. high, below a steep slope, you'd better get a professional engineer or landscape architect to design it for you. The walls shown on the previous pages, however, you may be able to build yourself.

Often, several low walls stepped down a steep bank are superior to one high wall at the base of the slope.

Bear in mind that a retaining wall several feet high acts rather like a dam. Water drainage within the soil exerts pressure against the rear face unless some provi-

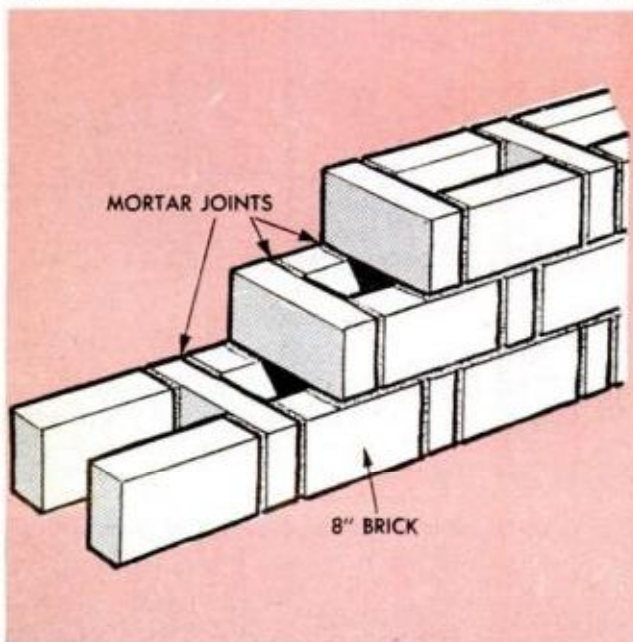
sion is made to let this water flow around—or through—the wall. Drain tile can be laid in a line parallel to the wall, with joint gaps to permit entry of water. Such a channel must have enough incline to create a gravity drain, and the lower end should extend beyond the end of the wall. A roofing-paper cap prevents dirt or gravel from sifting into the joints.

An easier and cheaper method is to pierce the wall with tile at regular intervals, above the outer base. The buried end of the tile is covered with screen to prevent clogging. As with the parallel method, the tile should be surrounded by coarse gravel fill. But since the piercing method actually drains accumulated water through the front face of the wall, an open trough must be provided to carry it off.

Since most retaining-wall materials are porous, it's best to waterproof the rear face before backfilling. Liquid asphalt is only one of many possible applications.

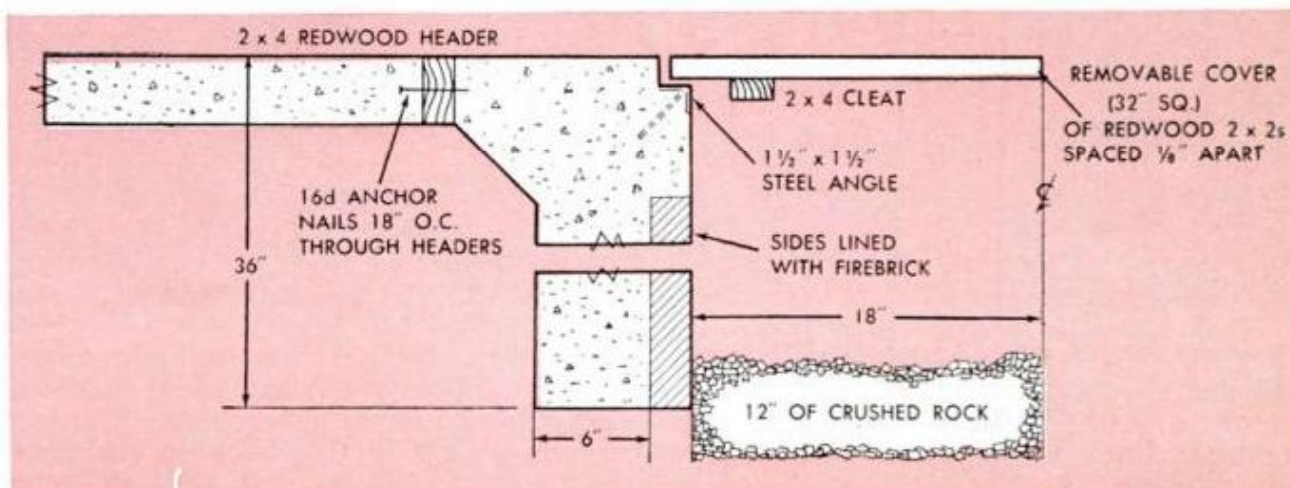
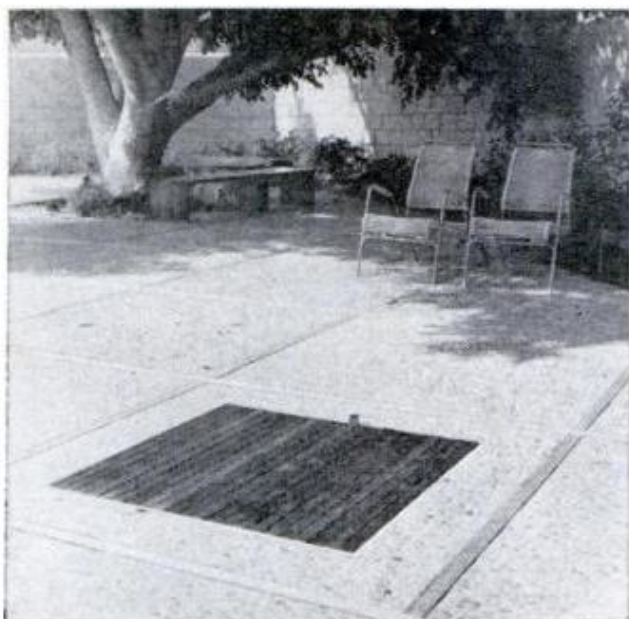
Where pressure against a concrete wall is likely to be excessive, reinforcing rods should be used as indicated in the sketches. Another safeguard is to bury a deadman (a large mass of poured concrete or a concrete-filled block) when backfilling, tying it to the upper part of the wall with a steel rod, as shown above.

In some cases you can add strength by leaning your wall toward the grade at least 1 in. per foot of wall height. ★ ★ ★



BRICK WALLS OVER 18 IN. HIGH should be double. On poured footing, bricks are laid on edge, in parallel rows, with alternate ones acting as tie-bricks

Old-Fashioned Barbecue Pit Hidden in Modern Patio



Here's a barbecue pit that lives up to the name. It's a real pit sunken below the surface of the patio which is concealed by a sturdy redwood cover when not in use. Walls of the pit are of poured concrete reinforced around the top with steel angle.

Designed by Leonard Brooken, AIA, the barbecue pit is lined with firebrick and floored with a thick layer of crushed rock to conserve heat. Naturally, all dimensions may be varied to suit your requirements.—Woodward Radcliffe

Notched Typewriter Eraser Does Neater Job on Single Letters

The modern circular typewriter eraser, with its quick-cutting core sandwiched between two layers of softer rubber, is a well-designed tool for most erasing jobs. However, when you find it necessary to remove a single letter from the middle of a word, this type of eraser isn't as efficient as a pointed one which is designed to be sharpened in a pencil sharpener. To make your circular eraser better suited to such delicate jobs, simply cut three or four notches in it with a sharp knife or razor blade. This will provide the necessary blunt points for such jobs while retaining most of the original eraser to be used in the normal manner.





Cast Your Own Patio Slabs

By Woodward Radcliffe

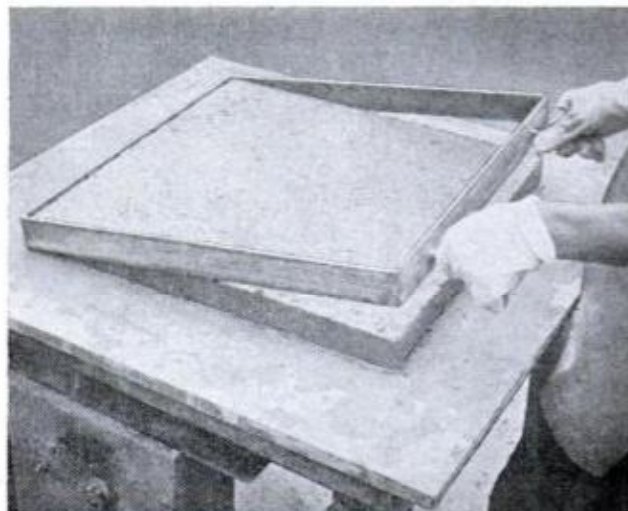
PLANNING TO BUILD a patio this summer? If you're searching for something a little different from the old familiar brick or plain concrete, take a close look at the interesting patio shown above. It's assembled from cast modular blocks, and that novel texture is achieved by pressing a layer of coarse aggregate into the concrete while it's still wet.

Before you begin the actual work, block out the patio plan on a sheet of graph

paper. Once you have determined the sizes of the different blocks, you'll have to make up two forms for each size. The first should have sides $1\frac{3}{4}$ in. high and must be $\frac{1}{4}$ in. shorter on all sides than the finished dimension of the block. Sides of the second will be 2 in. high and match the desired outside dimension of the block. The two-form system makes it possible to level the concrete before adding aggregate, while allowing for overflow.

1. MIXTURE of 1 part cement, 2 parts sand and 2 parts pea gravel should be moistened to mortar consistency, then firmly tamped and leveled in the mold

2. AFTER TAMPING, vibrating and screeding (settling and smoothing), allow mixture to harden enough to hold shape, then remove first mold and put on second

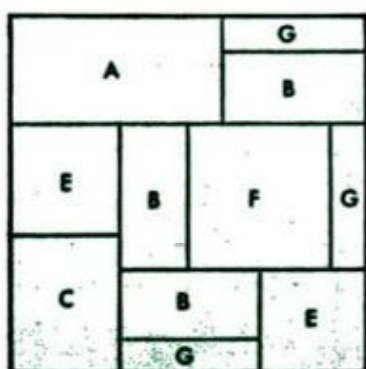




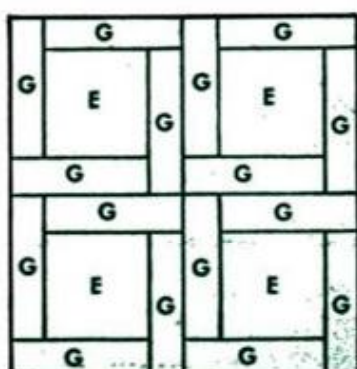
3. **SPREAD** aggregate evenly over the surface of the moist concrete. Colorful beach pebbles were used here, but any reasonably coarse gravel will work



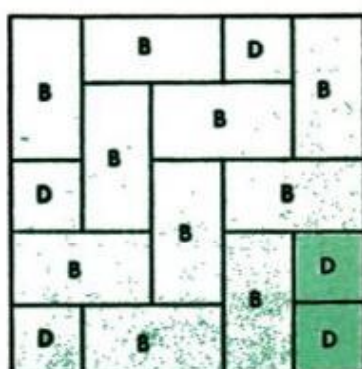
4. **LEVEL** aggregate and press it into the moist concrete with a hand tamper. Pebbles making up coarse aggregate should all be approximately the same size



BROKEN ASHLAR



FRAMED SQUARE

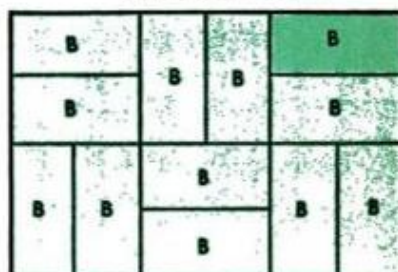


BASKET WEAVE

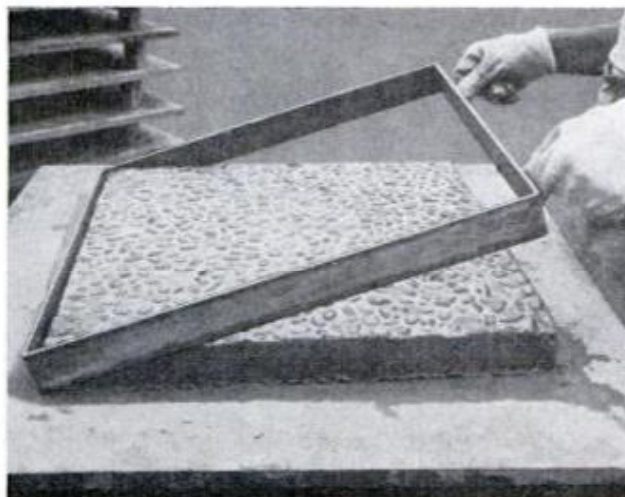
KEY

| | |
|---------------|------------------|
| A—18 x 36 in. | F—24 x 24 in. |
| B—12 x 24 in. | G— 6 x 24 in. |
| C—18 x 24 in. | Subtract 1/2 in. |
| D—12 x 12 in. | for joint. Make |
| E—18 x 18 in. | each 2 in. thick |

ONE SIZE ONLY

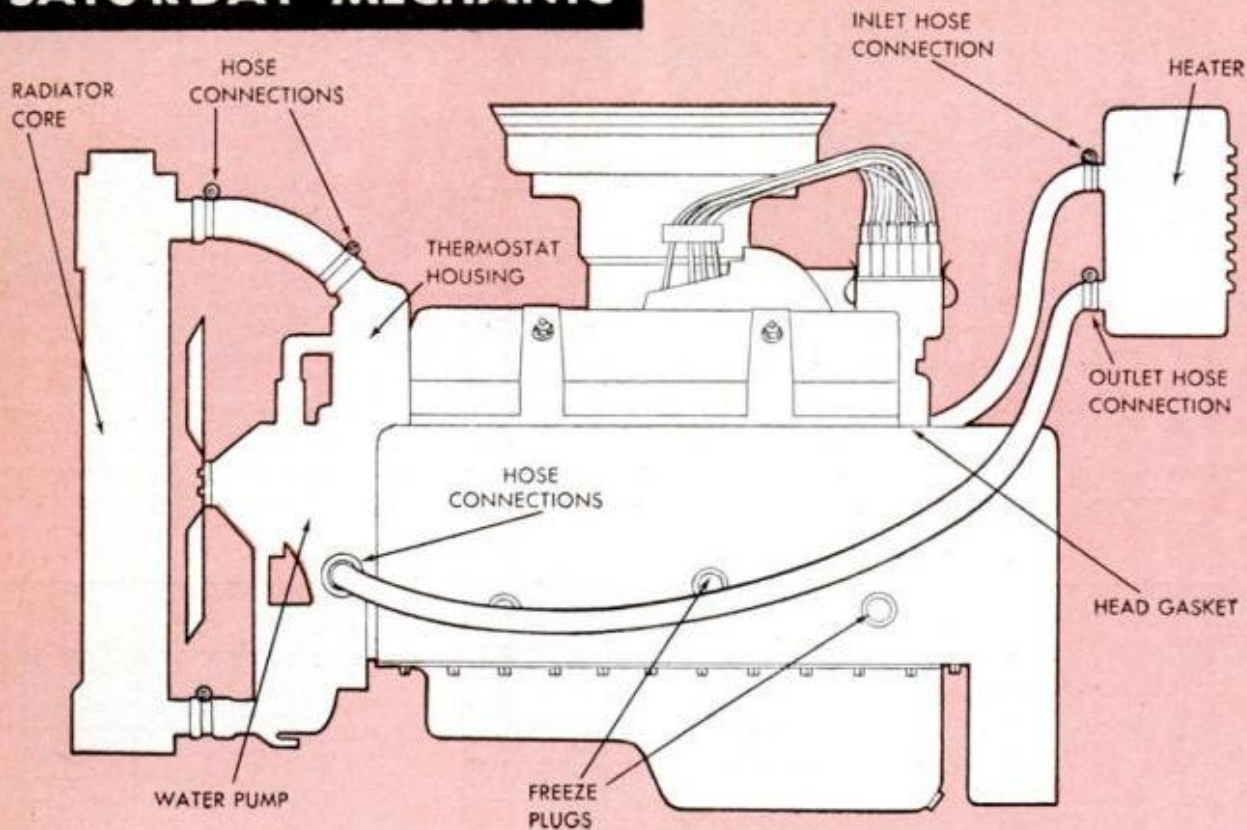


5. **WHEN SET** sufficiently to retain shape, remove the second form and allow the concrete to dry before installation. Don't let it dry in the frame



6. **ASSEMBLE** the modules according to the plan you decided upon. The four suggested patterns shown on this page are only a few of the hundreds possible





WHERE COOLING SYSTEMS GO WRONG

Last month's article told how your car's cooling system works. Here's the other side of the coin—troubleshooting and proper maintenance of the system

By Morton J. Schultz

MORE THAN 700,000 automobile radiators end up on the scrap heap every year. Probably an equal number require expensive repairs to keep them in service. What's the main reason for this? *Neglect!*

Today's automobile cooling system is sturdy enough to take as much of a beating as any other part of your car, but it still requires more extensive maintenance than just pouring in antifreeze in the fall and draining it out in the spring. (With the advent of so-called permanent antifreeze, many car owners have eliminated even this step.)

Proper maintenance means going over each part of your car's cooling system at least twice a year—right now, in the spring and late in the fall when you put

in antifreeze. It begins with a step-by-step check before you drain the system.

Radiator. Clean out all dust, debris and bugs from the radiator core, since an accumulation of such material will cut down on cooling efficiency. Loosen any large bugs with a soft brush, then blow out the dirt by directing a stream of air through the radiator from the rear face. (Use the air-pressure hose at your local service station or the blower end of a vacuum cleaner.) Be careful not to hit the radiator with the hose extension since those thin metal fins are easily damaged. After all dirt has been blown out, use the vacuum cleaner to clean the splash pan in front of the radiator.

Hoses and clamps. Run the engine a while to build up pressure in the system,

then check every hose and connection carefully for leaks. However, leaks are only one of the troubles which can result from a rotted hose. Another, and more serious one, is the restriction of coolant circulation which occurs when a weakened hose collapses under quick acceleration. You can detect such weakening by squeezing each hose gently along its entire length. If any hose feels soft and spongy, replace it—it's probably rotting. When installing a new hose, clean the connections thoroughly with a wire brush and rag to remove any rust, then apply a thin layer of non-hardening compound and seat the hose firmly on the connection.

Clamps should fit tightly around the hose without cutting into the rubber. Inspect all clamps and replace any that are badly bent or otherwise damaged.

When checking hoses and clamps, keep this rule in mind: If you have any doubts as to whether a hose is good or not, replace it. A weak hose may burst at high speeds, causing a sudden loss of coolant. And if that coolant happens to be an inflammable-base antifreeze, it could result in a fire.

Thermostat. By restricting the flow of coolant at certain temperatures, the thermostat holds the engine operating temperature within specified limits. It operates like a valve which remains closed until the coolant reaches a certain temperature, then allows it to circulate. This provides for quicker warm-up.

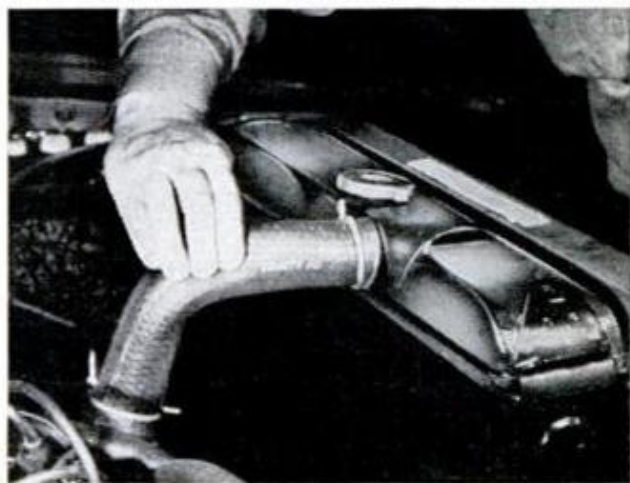
Most cars have only one thermostat, generally located in the water outlet in the cylinder head or in the upper radiator hose. If you have a 1958 model, however, you might find that it has as many as three thermostats. That year, many manufacturers tried using two extra thermostats to speed engine warm-up, locating these two in the block, just to the rear and on both sides of the water-pump flange connection. If you own a '58 car, check the owner's manual to determine how many thermostats it has.

Begin by removing the thermostat from its housing and flushing it with water. Make sure the spring, valve and bleed hole are clear of dirt and operate freely. Now, look on the valve face or body for a figure giving the temperature at which the manufacturer says the thermostat valve will open (most are rated at either 160 or 180 deg. F). You can check its actual performance by hanging it in a container filled with water and heating the water, keeping track of the temperature with a thermometer. If the valve doesn't begin to open at the specified temperature and isn't completely open at five degrees above its rated setting, discard the thermostat

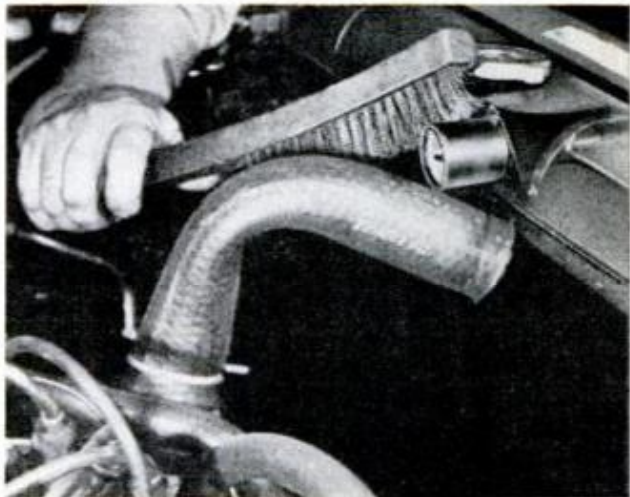


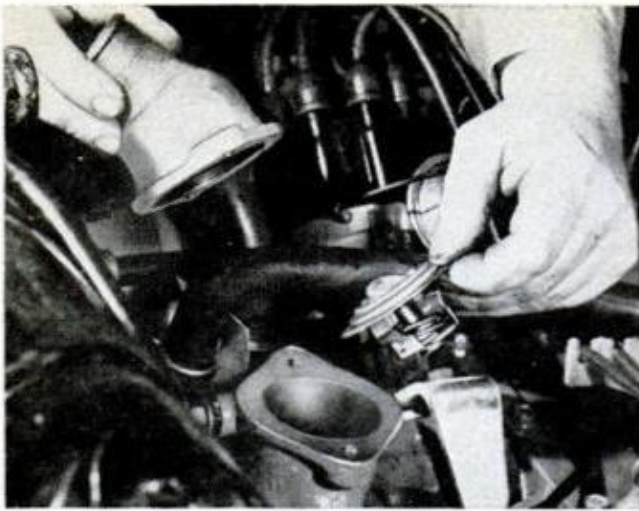
STREAM OF AIR directed through the radiator from the rear face will blow bugs, debris and dust out of the core. Loosen large bugs with a soft brush

SQUEEZE HOSES to detect rot. Soft spots indicate that hose should be replaced. When in doubt, rub inside surface with finger. If it flakes, it's rotten



CLEAN CONNECTIONS thoroughly before installing a new hose. Use a wire brush to remove rust spots, then wipe the hose connection with a clean cloth

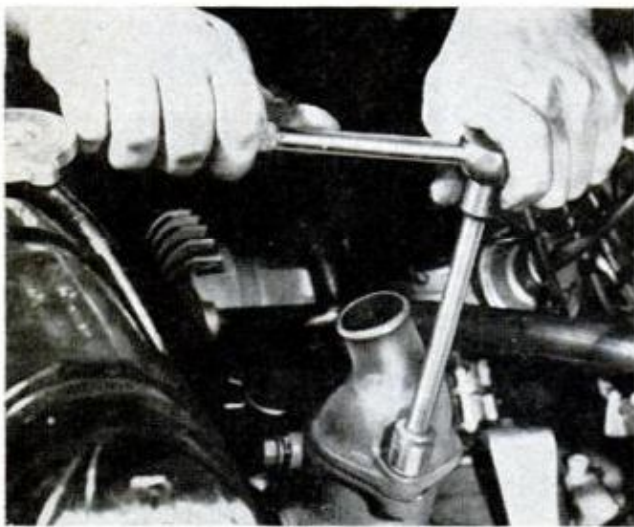




REMOVE THERMOSTAT by unbolting the housing. Note the position of this unit before removing it so that you will be able to put it back correctly



ALL YOU NEED to test thermostat is a container of water and a thermometer. Simply hang thermostat in water and heat container on a stove or hot plate



AFTER CHECKING thermostat, replace it and tighten the housing bolts securely. Make sure that this connection is tight since leaks often occur here

and install a new one. When replacing the unit, be sure to tighten the bolts around the housing firmly, since leaks often occur at this point.

Fan belt. This belt drives the water pump, and if it is too loose or too tight, the pump won't operate properly. A loose fan belt will slip and prevent the pump from circulating coolant as it should. A tight belt puts excessive strain on the pulley bearings and water pump, causing early failure.

Inspect the belt before you start to adjust it. A worn belt may assume the wrong shape as it is driven, and this cuts down on its ability to drive the pump. If you find that the belt is worn, cracked or glazed, replace it. Should the belt require frequent replacement, you'll probably find that the trouble is caused by: use of wrong belt; pump pulley and generator pulley not in same plane as crankshaft pulley; wrong belt tension or binding water pump.

To adjust the fan belt, place a straight edge along the belt from the generator pulley to the water-pump pulley. With the end of a ruler, push down on the belt midway between the two pulleys at a right angle to the straight edge and read the amount of slack from the scale on the ruler. Check this against the recommended amount of slack listed in your owner's manual and adjust if necessary.

Water pump. While this part of the cooling system gives the least amount of trouble, things do go wrong with it occasionally. The two most common indications of a bad water pump are leaks around the shaft or body and noise. Should you find such leaks, first check to make sure the fan belt isn't loose. If the belt is properly adjusted and the pump pulley isn't slipping, the pump will have to be removed from the engine. This is a job best left to a mechanic who has the specialized tools.

With the pump off the engine, check the impeller and pulley to make sure that both are tight on the shaft. If either can be made to slip by twisting the impeller in one direction while twisting the pulley in the opposite direction at the same time, the pump needs overhauling or replacing. (Since water pumps cost only about \$12, simple replacement is often the best choice.) If the impeller and pulley are both tight, the cause of the leak is probably a damaged impeller seal which can be replaced.

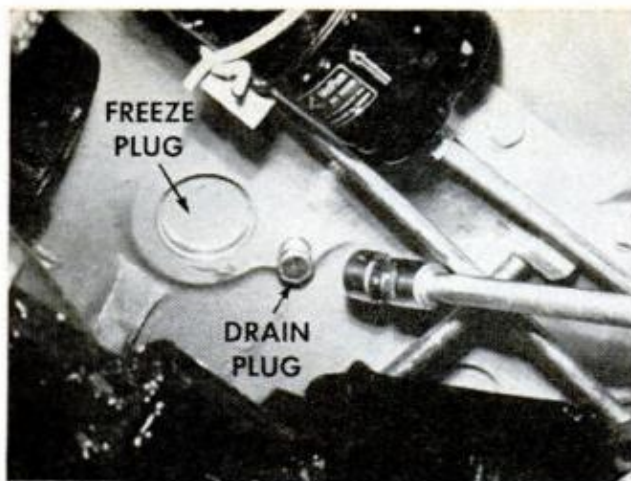
Noise usually indicates that the bearing and shaft assembly must be replaced, and this is a job for a mechanic with the proper tools.

Drain cocks. If you can't stop a leak at the cock by tightening, the cock is damaged and should be replaced.

Naturally, the radiator pressure cap and filler neck should be checked.

| IF THIS IS THE PROBLEM | AND THIS IS THE CAUSE | HERE'S THE BEST REMEDY |
|---|--|---|
| Engine runs too cool | *Defective thermostat | Test and replace, if necessary |
| | *Missing thermostat | Insert one into the system |
| | *Instrument gage reading incorrect | Insert thermometer into coolant after engine has been running (see photo lower left). Is reading same as that shown on temperature gage? |
| | Over-exposed radiator (in cool weather only) | Cut down radiator surface with a cover |
| Engine runs too hot—but without loss of coolant | *Defective thermostat | Test and replace, if necessary |
| | *Defective fan belt | Inspect and adjust or replace, as necessary |
| | *Rotted water hoses | Replace |
| | *Rust and corrosion clogged radiator | Clean |
| | *Bugs and dirt lodged on outside of radiator core | Clean out with air pressure |
| | Water pump | Inspect and repair, as necessary |
| | Defective coolant distribution tube | Remove water pump and radiator. Remove distribution tube and put in a new one |
| | *Overloaded engine | Try to reduce load to normal. Drive in lower gear. Avoid spinning wheels to get out of mud or snow—a tow charge is much less than engine repair bill |
| | *Poor engine adjustment (overheating can result from causes other than in the cooling system) | Check ignition timing, valve timing, compression, carburetor adjustment, brake adjustment, and oil level |
| | Instrument gage reading incorrect | Test and repair |
| Engine runs too hot—coolant being lost | *Leaks at: Hoses and clamps | Tighten. Replace bad hoses and clamps |
| | Radiator and heater | For small leaks, add sealer to radiator. Have large leaks soldered by a radiator specialist. If heater leaks, have it removed from car and repaired |
| | Water pump | Tighten bolts around housing. If this doesn't work, leak is probably at packing gland or backing plate. Tighten or repack gland-type pumps. Replace leaking packless-type pumps. Tighten or replace leaking backing plate gaskets |
| | Drain cocks | Tighten, or replace if damaged |
| | Head gasket | Tighten head bolts, using tension wrench |
| | Engine freeze plugs | Tap center of plug with ball peen hammer to spread and tighten plug. If leakage continues, remove plug, clean seating groove in engine block and put in new plug |
| | Thermostat housing | Tighten. If housing is cracked, replace |
| | Cracked cylinder head or block | Small cracks can usually be brazed if they are not in a cylinder wall or valve seat. Large cracks anywhere in the block or head, or cracks in a cylinder wall or valve seat, usually require replacement |
| | *Defective radiator pressure cap | Test and replace, if necessary |
| | *Surging or after boil (overflow loss of coolant can be caused by boiling at hot spots if engine is allowed to idle for some time or is turned off right after hard run) | Install a surge tank or a lower opening thermostat |
| | Exhaust gas leaks that cause loss of coolant through overflow tube | Check for exhaust gas leaks at cylinder head gasket. Replace bad gasket |

*Most likely causes



DRAIN COCKS are located on both sides of the block. Some can be reached from above, but others must be loosened from below. Check for leaks at freeze plugs



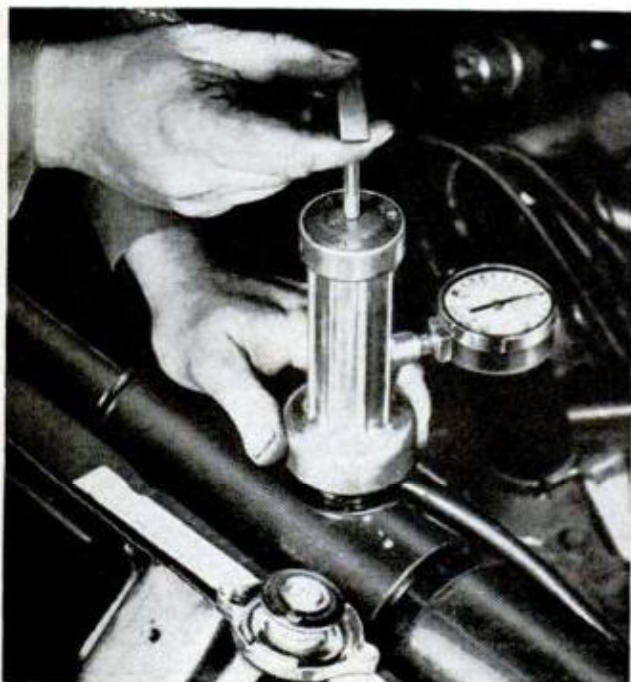
IF COOLING SYSTEM has been functioning properly, you can clean it with one of the modern light-duty chemical cleaning agents, such as this fast flush

Cleaning the system. Cleanliness plays an important part in the satisfactory performance of your car's cooling system. The channels in that radiator are only about $\frac{3}{16}$ in. wide and $\frac{3}{4}$ in. deep, so it doesn't take much dirt or rust to cause serious trouble. Overheating is the most obvious and immediate problem which could result, but this, in turn, can lead to scored cylinders, warped cylinder heads and burned, sticking valves.

If your car's cooling system has been performing properly, follow this simple cleaning procedure each spring and fall:

- **Drain system.** You'll find drain cocks located at the bottom of the radiator and on the sides of the engine block. Be sure to open all of these cocks; otherwise, cool-

PRESSURE TESTER is the best tool to use for locating leaks in a cooling system. It enables you to pump up pressure in the system without starting engine



ant won't drain from the lower part of the block. After draining, close cocks and refill system with water.

- **Flush with chemical.** Pour a commercial fast-flush preparation into the radiator and let the engine idle for about 30 min. Turn the heater control to its highest setting so the heater cores will be flushed thoroughly at the same time.

- **Flush with water.** Open all drain cocks again and flush the entire system with water while the engine is running. Keep flushing water through the system until it comes out clean at the drain.

- **Refill.** In the spring, simply close the drain cocks after flushing the system with water and make sure that the whole system is full of water before replacing the pressure cap. In the fall, let enough water drain from the system to make room for the antifreeze, then close drain cocks, add antifreeze and fill with water.

- **Add rust inhibitor.** This is only necessary in the spring, since antifreeze already contains a chemical to protect the system from rust. In the spring, however, add a can of rust inhibitor to the water in the radiator to prevent rust formation and grease deposits.

If your car's cooling system has been overheating, try this heavy-duty cleaning procedure before consulting a mechanic:

- **Drain system.** As in light-duty cleaning, drain system completely and then close all drain cocks.

- **Flush with heavy-duty cleanser.** This chemical comes in a two-part container. After filling the system with water, pour the powder from the top part of the container into the radiator. (This forms an acid.) Then replace the radiator cap and let the engine idle for at least an hour, longer if the system is heavily clogged. Coolant should reach 180-190 deg. F. (If necessary, block the air flow by placing a

piece of cardboard or newspaper in front of the radiator.) Also, be sure to turn the heater to highest position. Finally, shut off the engine, drain the system and let it sit for an hour or so to allow the block to cool down.

● **Flush with water.** Start the engine again, and with the drain cocks open, run water through the system until it flows out clear.

● **Flush with neutralizer.** Close the drain cocks, refill the system with water and add the powder in the bottom part of the container. This is designed to neutralize any acid remaining in the system. Replace the pressure cap, start the engine and allow it to idle for about 10 min. after reaching operating temperature.

● **Flush with water.** Start the engine and drain out the neutralizer, then flush thoroughly with water while engine is running and drain cocks are open.

● **Refill.** Close the drain cocks, and depending on the season, refill with either water or water and antifreeze.

● **Add rust inhibitor.** Follow the same procedure here as you would in light-duty cleaning, mentioned earlier.

If heavy-duty cleaning doesn't do the job and the system is still overheating, the next step is reverse flushing. This requires the use of a high-pressure flushing gun and other special equipment. Thus, you'll probably be better off taking the car to a shop which is equipped to do this type of work.

Recheck for leaks. After cleaning, check over the entire system for leaks once again, this time paying special attention to the radiator. Small leaks in the radiator have a way of showing up after cleaning. They may have been present before cleaning but remained undiscovered because they were plugged by rust. Cleaning removes this rust, allowing the coolant to seep out. If you spot a radiator leak, no matter how small, add a can of sealer to stop it. Such leaks grow worse in a hurry, and a seep or drip can become a stream when several pounds of pressure are built up in the system during ordinary operation of the engine.

Sometimes, pin-hole leaks are almost impossible to detect since the only evidence is a steady lowering of the coolant level. Being so small, they allow coolant to seep out only after pressure is built up within the system, and this evaporates almost instantly in the air stream from the fan. About the only way to discover such leaks is to pressurize the radiator with air and immerse it in a tank. If you are losing quite a bit of coolant but can't discover the leak, take your car to a radiator shop for this check. ★★★

Keeping Your Car Up To Par

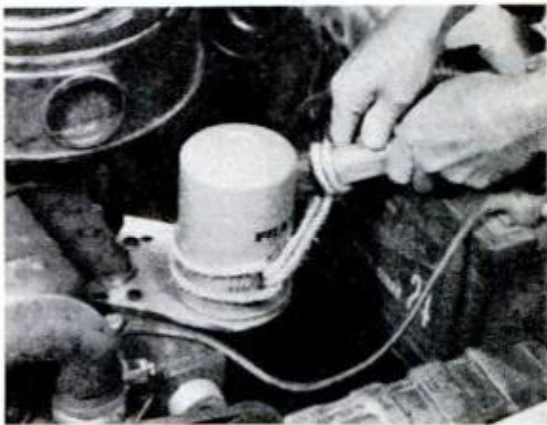
WHEN INSTALLING car accessories that require drilling of mounting holes, spot the hole, then apply a square of masking tape over punch mark. This will prevent paint damage should the drill slip. Press a rubber grommet over the drill bit and slide down to the chuck to serve as a protective buffer should the drill break through the metal unexpectedly

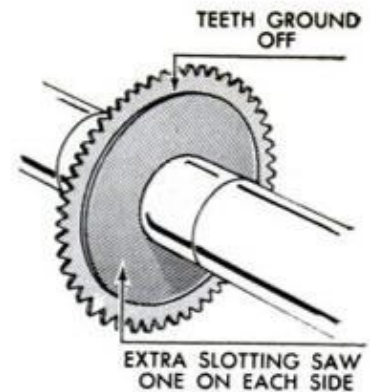
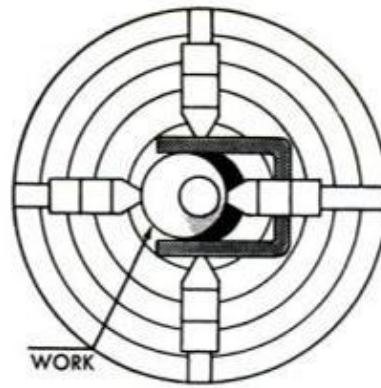
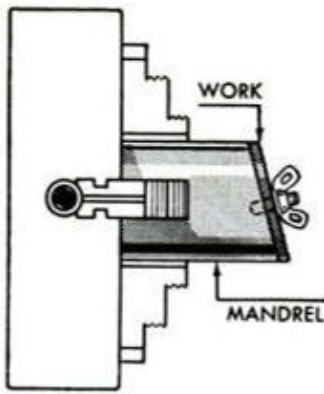
ON SOME OLDER CARS, also some of the later models, spark plugs are not readily accessible and there's always the chance that when removing or replacing them the wrench will cant slightly and break the porcelain. Prevent this by trimming a rubber plug umbrella to fit inside the socket. Place this over the plug to cushion the porcelain

OIL FILTERS on Chevrolet Corvairs will often leak badly if the filter screw is tightened much over the recommended tension. Overtightening can damage or even break the nylon gasket. Whenever there is undue loss of oil, check the filter gasket first before doing any other trouble shooting. If the gasket shows damage it should be replaced

WIPER BLADES which no longer sweep the windshield clean may be renewed by this simple treatment. Just lay a sheet of fine sandpaper on a flat surface, and holding the blades perpendicular to the surface, run them lightly back and forth across the sandpaper. This will not only clean the blade of glaze, but square off the edges so they wipe better

TO LOOSEN a screw-off, throwaway oil filter, improvise a tool from a length of rope and a hammer. Double the rope and loop it around the filter, as shown. Then wrap the loose ends around the hammer handle and place the handle against the filter. When you apply pressure on the handle, this will tighten the loop on the filter and loosen it easily





Turning an Oval

Perfect ellipses can be turned from thin stock with the aid of a mandrel having the end cut at an angle. The slanting end, which will have an elliptical face, is drilled and tapped for a $\frac{1}{4}$ -in. thumbscrew. Cut the stock to approximate size and shape, drill a center hole in it, secure it to the mandrel with a thumbscrew, then turn it to final shape.

Chucking Off-Sets

Eccentrics and other work having considerable off-set are easier to mount in a four-jaw chuck if used with a pair of clamp bars. Rest the bent ends of the clamp bars on each side of one chuck jaw, and the straight ends on the work, as shown above. This eliminates all side thrust of the jaws, as well as the danger of marring the work surface.

Stiffening Blade

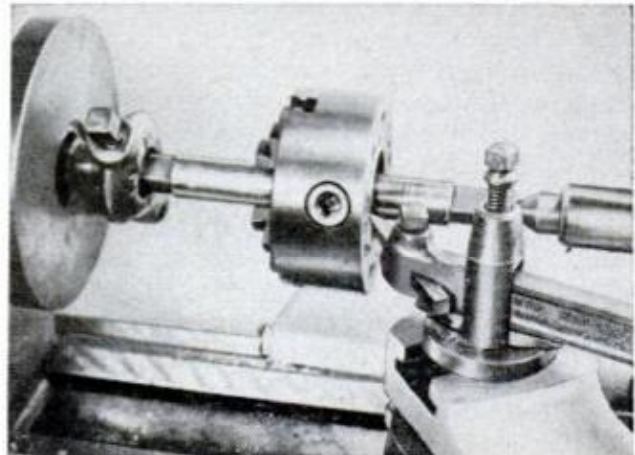
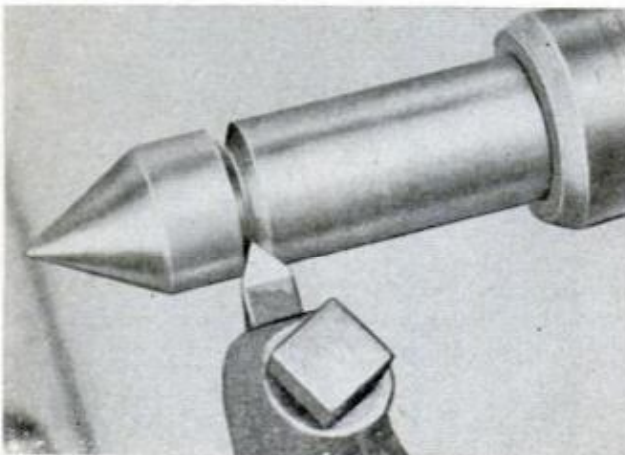
Thin slitting saws often tend to walk or make slanted cuts, unless you find some way to stiffen them while cutting. To do this, grind the teeth off two worn out slotting saws and clamp them on the arbor, one on each side of the slitting blade. The ground blades will seldom interfere with the work as most slitting cuts are only $\frac{1}{4}$ in. deep.

Grooved Center Positions Tool

A V-groove machined or ground into the shank of a tail center will save you a lot of time in centering a thread chasing tool. The groove angle must be exactly 60 deg. and it must be accurately squared with the lathe's center line axis. The tool is centered in the groove in the same manner as if you were using a center gauge held against the work. Vertical positioning is assured when no light gap is visible between the tool and the sides of the groove. A white paper held under the tool makes such a gap easy to detect.

Refaced Chuck Trues Itself

Here's an easy way to re-true a universal three-jaw chuck without having to re-grind the jaws. First, remove the chuck from its backplate and clamp the jaws tightly on a hardened and ground lathe mandrel—one that you are sure runs true. Set the mandrel between centers and re-face and reshoulder the back of the chuck to again fit snugly against the backplate. Any error in the jaws will now be compensated for in the body of the chuck. The body may not run true, but work held in the jaws will.—H. J. Gerber



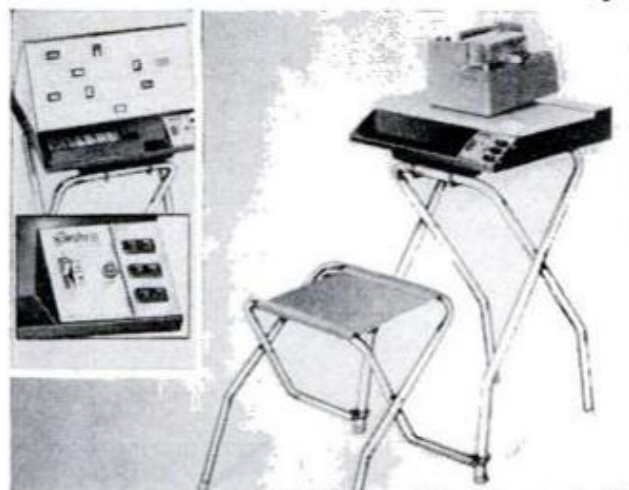


FOR SHUTTERBUGS

VIEWLEX SLIDE SCRIBER adds titles to 35-mm slides. First it punches a slot out of the cardboard slide mount, and a title panel is inserted in the slot. Then, with the slide in the machine's engraving frame, the user writes the title on a scribe sheet and his exact strokes are reproduced on the title panel. Title appears on the screen when slide is shown. Price \$39.95. Viewlex, Inc., Holbrook, Long Island, N.Y.

FOLDING PROJECTOR STAND has a built-in control panel that operates room lights and projector. Top measures 16 $\frac{1}{16}$ x 17 $\frac{3}{8}$ in., lifts up to become illuminated slide sorter that takes 30 slides at a time. Stand is \$26.95; chair, \$4.95. Harwood Electronics Company, 466 West Superior St., Chicago 10, Ill.

"TV-ZOOM" CAMERA takes 8-mm film, is said to be fully automatic. F:1.8 lens gives 9.5-30-mm focal lengths. Electric eye works with ASA 10-40. Reflex viewfinder has red signal to prevent under-exposure. Battery operated. Retails for \$139.50. Case: \$5.95. Kalimar Inc., 1909 Kings Highway, St. Louis 10, Mo.



MASTER PHOTOGUIDE is full of dials, tables and computers that help figure exposures, pick the right filter, use close-up lenses and calculate depth of field. For black-and-white and color films, in all types of light. Covers new Kodachrome-X. Lists at \$1.95. Eastman Kodak Co., 343 State St., Rochester 4, N.Y.

DARKROOM TRAY ADJUSTS to 16 sizes, from 12 x 12 in. to 42 x 42 in. Made of slotted wood strips that pack into an easily stored 2 x 4 x 46 in. unit. Chemicals are held by a plastic liner that cleans with cold water rinse. Sells for \$6.95 complete. Grico, Inc., 234 West Portage Trail, Cuyahoga Falls, Ohio



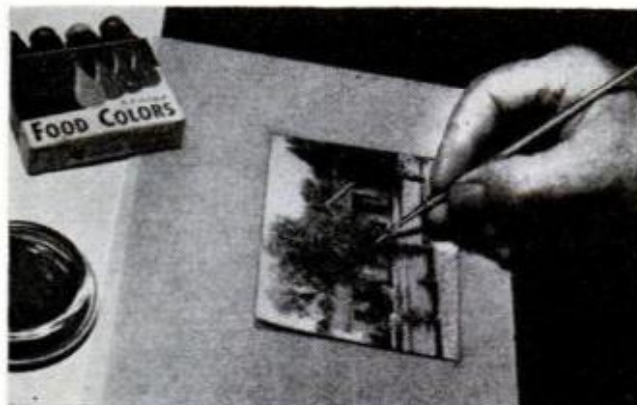
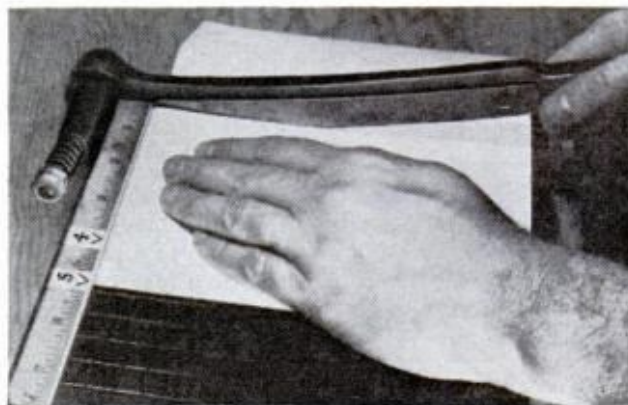
DARKROOM HINTS

Darkening Prints

You can make a handy tool for darkening selected areas of a print by cutting the end off a cotton-tipped swab designed for use in the nursery and gluing this to the spout of a small plastic squeeze bottle. Fill it with warm full-strength developer, squeeze to soak cotton and rub on print.

Tabs Aid Trimming

Trimming a batch of prints accurately is a precise enough job to strain your eyes under the best lighting conditions, but when you're trying to read the ruler on your print trimmer in the dim light of the darkroom, it's even worse. To make the job easier, mount tabs of adhesive tape over frequently used markings and ink in bold figures on these tabs so they stand out.

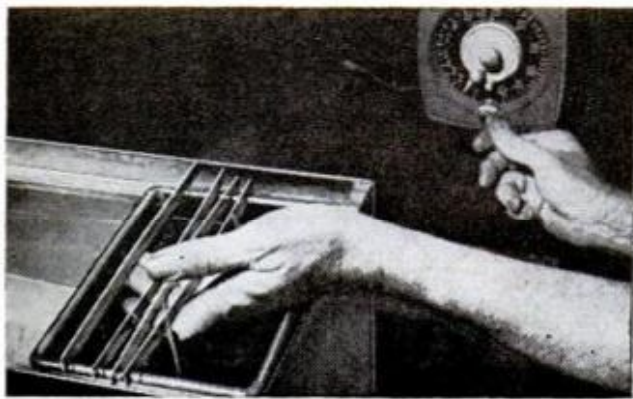
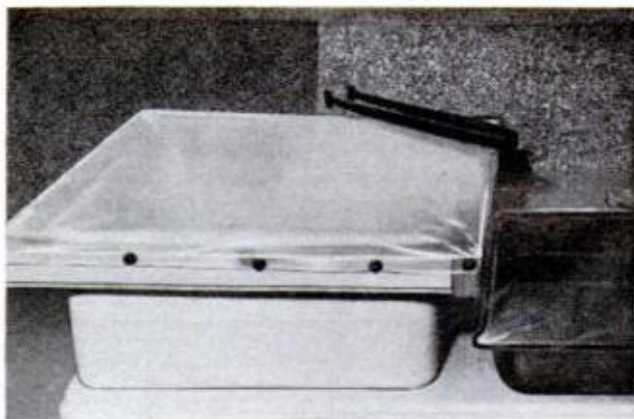


Low-Cost Tinting Kit

A good way to get some experience in tinting black-and-white prints without investing much money in materials is to use food colors in place of watercolors or oil-base paints. While results aren't quite as brilliant or permanent, these are perfect for practice work since you can remove all coloring from the print in a few minutes by simply placing it under running water.

Covers for Open Trays

Photographers who do a lot of darkroom work often find it convenient to leave the hypo and stop bath in their trays for several days at a time. If you are in the habit of doing this, it would be worthwhile to make covers for these trays to reduce evaporation and keep out dust. Just tack plastic sheeting over a wood frame large enough to fit around outside of the tray.



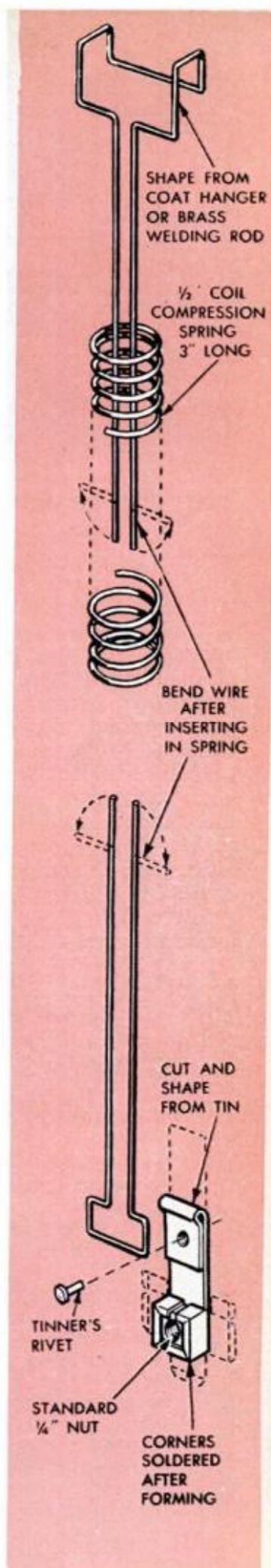
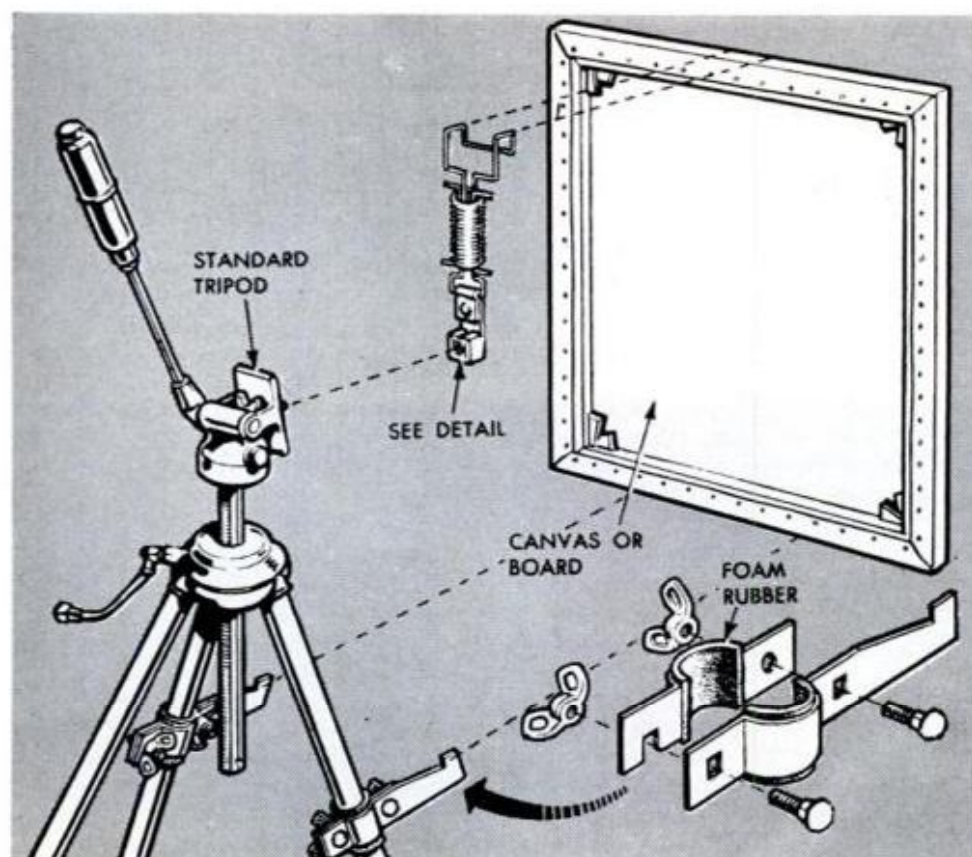
Timer Signals Agitation

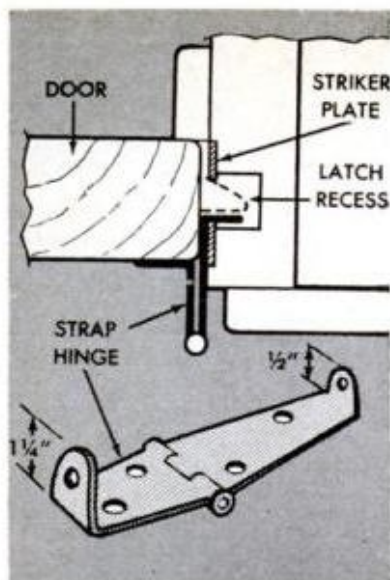
Most manufacturers recommend agitation at 1-min. intervals to obtain the best results in developing. You can do away with clock-watching, yet hit the interval right on the dot if you set your enlarger timer for 1 min. and use this to signal agitation. It will make an audible click when the spring returns the hand to zero and is easily set for the next agitation period.



Tripod Doubles as Easel

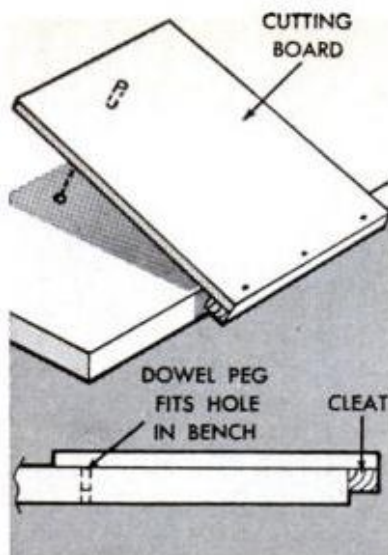
CAMERA FANS with a yen to dabble in oils don't have to invest in an artist's easel to hold their canvas. They already have the makings of a dandy one—their camera tripod. The change-over requires nothing more than attaching a couple of adjustable brackets to the tripod legs and a spring hold-down to the pan head. The details show how the three parts are made. The brackets are formed to grip the tubular tripod legs by bending $\frac{1}{8}$ -in. aluminum around a pipe at least $\frac{1}{2}$ in. larger in diameter to accommodate the foam-rubber lining. Holes for the carriage-bolt heads are filed square. Wire yokes of both hold-down parts pass through a 3-in. coil spring and hook over opposite ends. The upper end of the hold-down is shaped to hook over the edge of the canvas. The lower end has a $\frac{1}{4}$ -20 nut to fit the tripod mounting screw.—Phillip C. Radcliffe





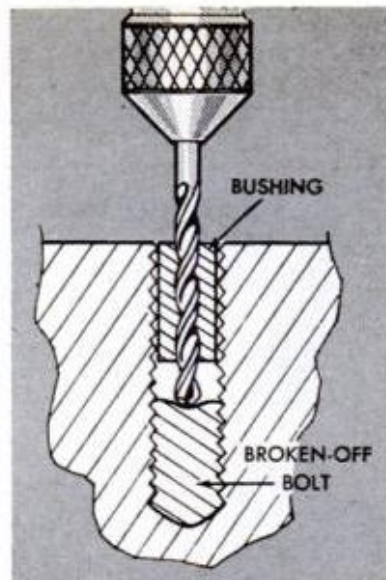
Traveler's Lock

Here's a foolproof latch small enough to be carried in your pocket that will lock any motel door so that it can only be opened from the inside. Made from a 3-in. strap hinge, it requires no mounting holes and won't damage the surface of the door. To use it, just hook the longer leaf into the latch recess in the casing, close the door and swing the other leaf against the door. Cement a felt pad to the $1\frac{1}{4}$ -in. leg to prevent scratching.



Cutting Board

When you try to prevent marring the surface of your workbench unnecessarily by using a cutting board, you usually run into the problem of holding the board in place. Here's a simple stay-put cutting board that uses a dowel and cleat to anchor it to the bench top. Just nail a cleat underneath one edge of a scrap piece of plywood or lumber, glue a short dowel to the underside of the board and drill hole in bench top.



Pilot Bushings

Screw extractors which are used to remove bolts that have broken off inside their holes require drilling a pilot hole in the bolt. You can simplify the job of starting the drill properly by making a set of bushings having outside diameters to match different bolt sizes and an inside diameter slightly larger than the pilot drill. Each one should be about $\frac{3}{4}$ -in. long. After drilling the pilot hole, the bushing is lifted or hooked out.

COMING UP NEXT . . .

HOME MAINTENANCE CENTER. No room for a full workshop? Next month *PM* shows you how to build an in-the-wall cabinet, with fold-down work table, that takes up only inches of floor space, yet easily holds all tools and supplies required for those around-the-home maintenance jobs. Included with this are checklists of basic tools needed for plumbing, painting, and other jobs.

WATER BUG. If you're a model-boat enthusiast, be sure to pick up a copy of the June *PM*. You'll find plans for a novel new model that looks like a hydrofoil, runs like a three-legged skier and can be operated on a tether or run free. Combining speed with stability, the 18-in. boat will slice through a 5-in. ripple easily. Watch for this unusual but easy-to-build model next month.

PORTABLE YARD LIGHTS. Here's a double-barrelled answer to the problem of changing your outdoor lighting arrangement to accent new blooms or to suit different activities. Next month's *PM* will include complete build-it-yourself plans for two clean-lined yard lamps that can be moved from one location to another in seconds. Both are made from easy-to-use DIY aluminum.

FOLDING KAYAK. Build a foldaway funboat for less than \$20. It's as easy as Eskimo pie with the easy-to-follow plans in *PM*'s June issue. Made entirely of wood, canvas and contact cement, the boat has no metal parts and weighs under 40 lbs. when completed. It's a fun-filled weekend project for anyone over the age of 12, perfect for a father-and-son workshop team.



Updating Your Old Phono

WITHIN A FEW BLOCKS of your home there may be dozens of outdated, 78-r.p.m. only, record players just waiting for some enterprising experimenter to grab them out of discard for fun and profit. Fun, because they can be made into LP units by almost anyone in a very short time. Profit, because the refinished instrument will find a ready buyer easily and the conversion will cost only a few dollars.

Often the discarded player will have a good quality speaker that can be retained. But even if its cone is torn or split, it can be easily patched with rubber cement or thin plastic tape.

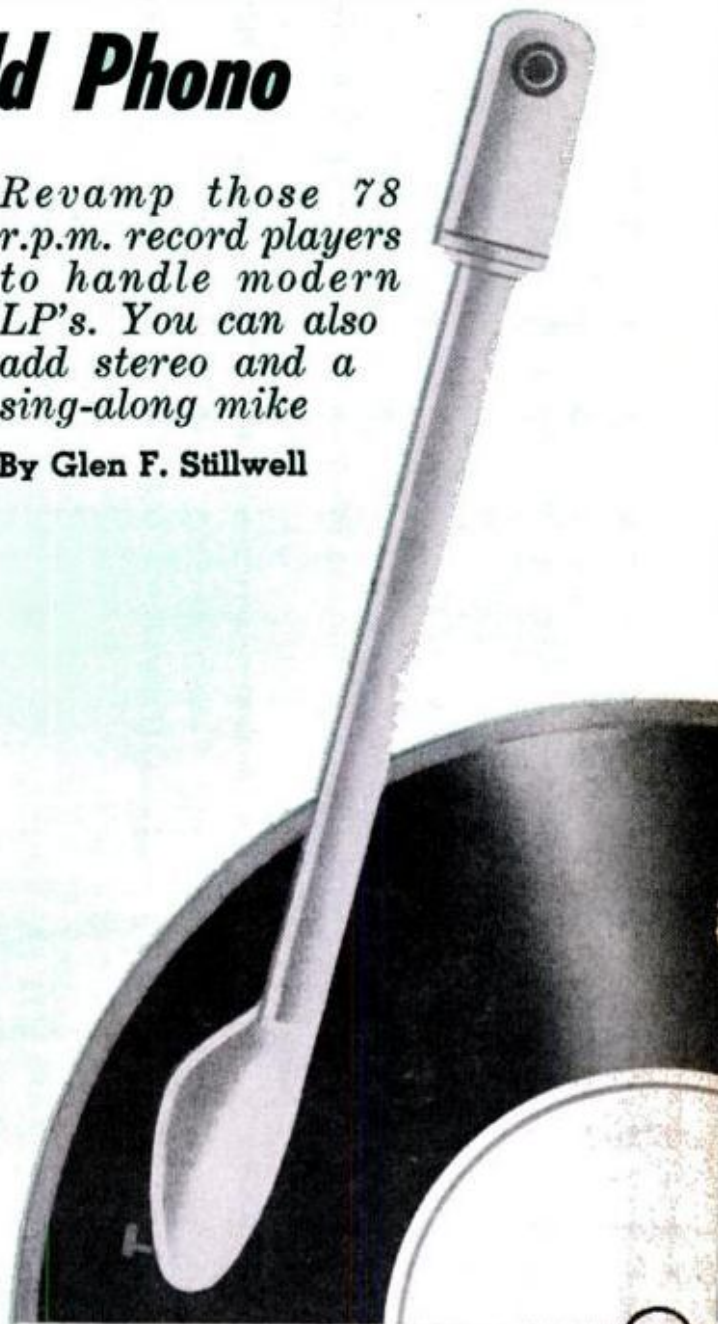
If the original amplifier is still working well, you can use it. But if there is anything at all wrong with it, toss it out. You can get 3-tube phono amplifiers from most radio supply houses for about \$5 to \$8. Compact stereo amplifiers are also available at about double the cost.

To make that 78-r.p.m. player turn at 33-r.p.m. may only call for a new motor spindle or drive wheel of slightly different diameter. Or you can purchase a multiple-speed motor and get 16, 33, 45 and 78 r.p.m. Then you can

Revamp those 78 r.p.m. record players to handle modern LP's. You can also add stereo and a sing-along mike

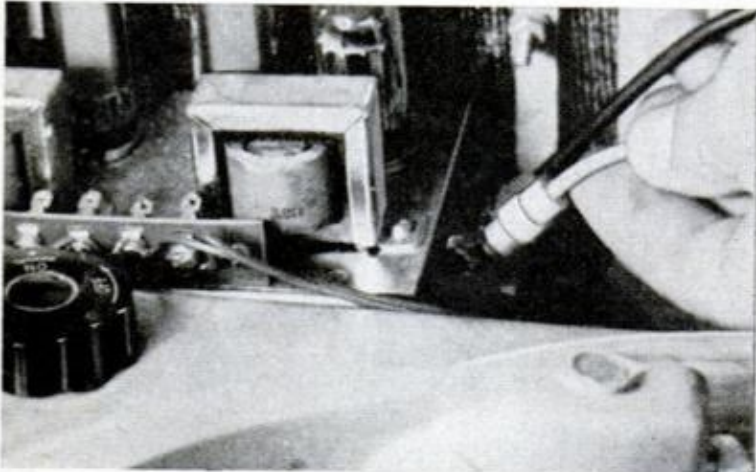
By Glen F. Stillwell

WITH TURNTABLE REMOVED you can get at the motor, either to replace it or modify it for 33 r.p.m. At the bottom right, a thin layer of rubber cement is applied to the turntable's inner rim. It will stop turntable slippage that causes wow

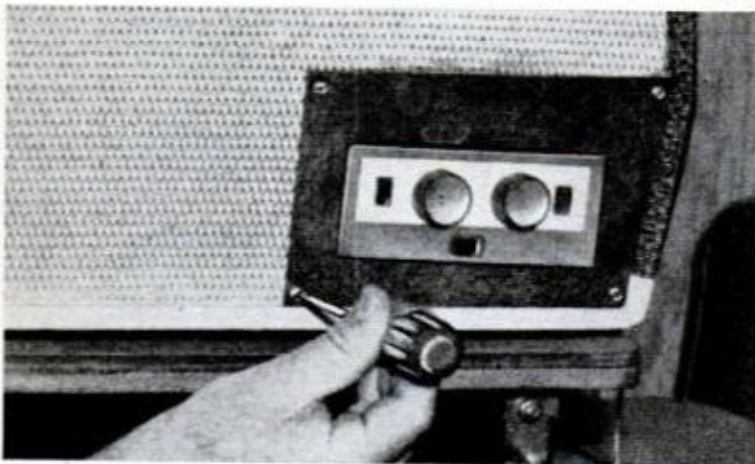




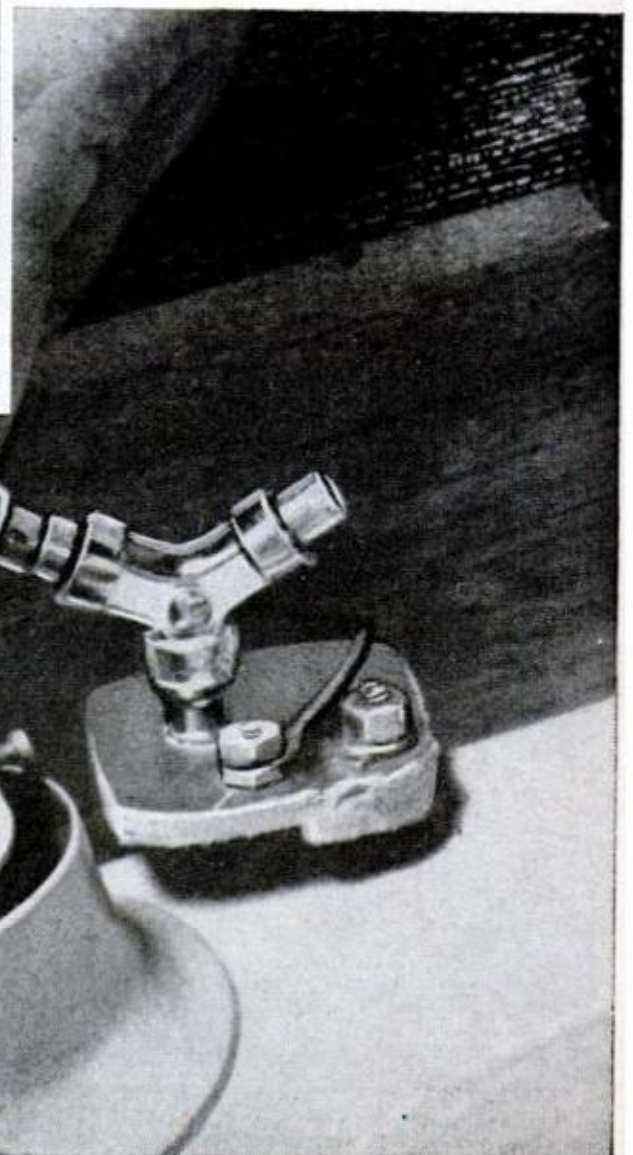
OLD SPEAKERS that have cracked or torn cones can be easily patched with plastic tape and rubber cement. Brush the cement right over any cracks to form a thin film and use the tape to patch rips and tears



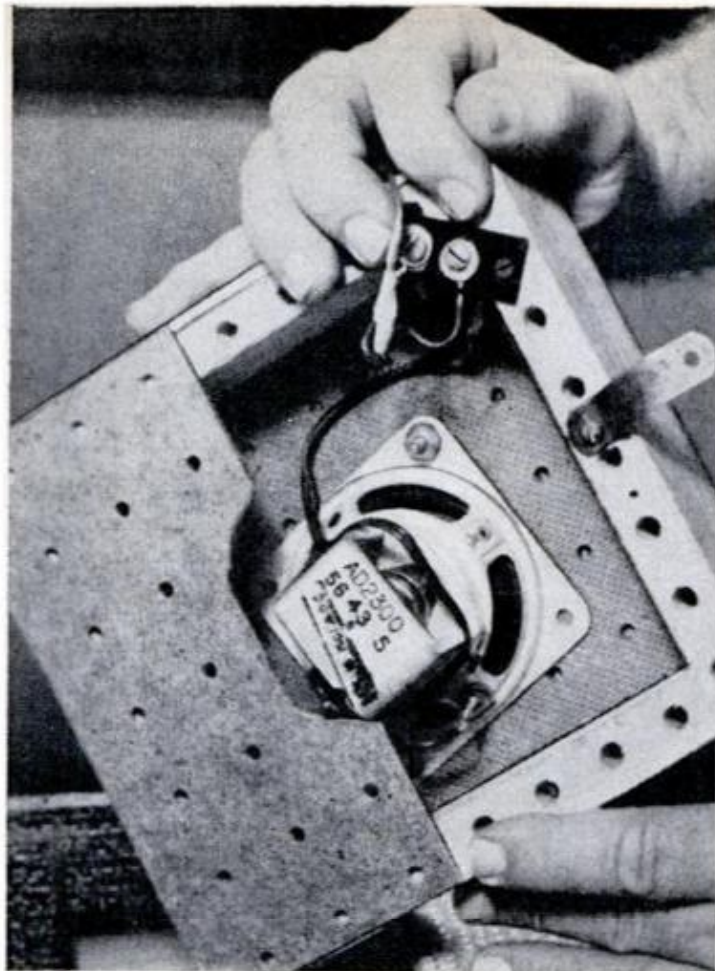
AFTER INSTALLING the stereo amplifier, don't forget to plug in the leads from the stereo pickup arm. With some amplifiers, access to these jacks can be eased by bending the mounting panel up at a 45° angle



A RECTANGULAR PLATE of colored plastic around and behind the knobs of a replacement amplifier will cover the holes of the original unit. It will help improve the appearance of the renovated player, too



SIMPLE Y-ADAPTER plugs right into existing amplifier input jacks. Lets you connect two signal sources at the same time for twice the fun



A PEGBOARD HOUSING is just right for stereo extension speakers. Dress up the rough wood sides by covering them with a sheet of plastic wood veneer

play all records. If you wish, remove the existing player mechanism entirely and fit a more modern setup into its place.

In one job of mine I found that by shortening a fairly modern RCA player (no amplifier) it would fit neatly into an older record-player box. In another conversion, that ultimately became a conversation piece for someone's den, an old changer with long play speed was fitted into a spring-wound phonograph console. The speaker was slipped into the horn and a grille cloth placed in front of it.

In any installation of this type, pegboard is about your most useful construction material. It's excellent for making new front panels. Just cover the pegboard with an attractive cloth. Use two strategically located holes for the amplifier controls. For amplifier mounting you'll find it hard to beat. Simply fasten your new amplifier down to a small sheet of pegboard and then place the pegboard where you wish inside the phono case. Blocks of wood will make convenient mounting brackets.

For a really polished job get a set of new hinges and lid clasps. If the outside of the case is worn, cover it with a sheet or two of self-adhesive plastic. Or if you wish, clip some color photos from old



RECORD ALBUM COVER cemented inside the lid of an old record player goes a long way toward improving its appearance. Magazine photos can also be used

magazines and cement them into place. Record album covers are also good.

If you turn the set into a stereo player you'll need an additional speaker housing for the second-channel speaker. You can build it yourself out of plywood and cover the cabinet with plastic veneer. Or look through some electronics catalogs and pick out an inexpensive prefinished unit.

If you'd like to use your phono as a public address amplifier for parties and other special occasions there's a simple modification you can make. Pick up a dual phono Y adapter and plug it into the amplifier input. Now you'll have two inputs, one on each arm of the Y. Use one for the phono and the other for a mike.

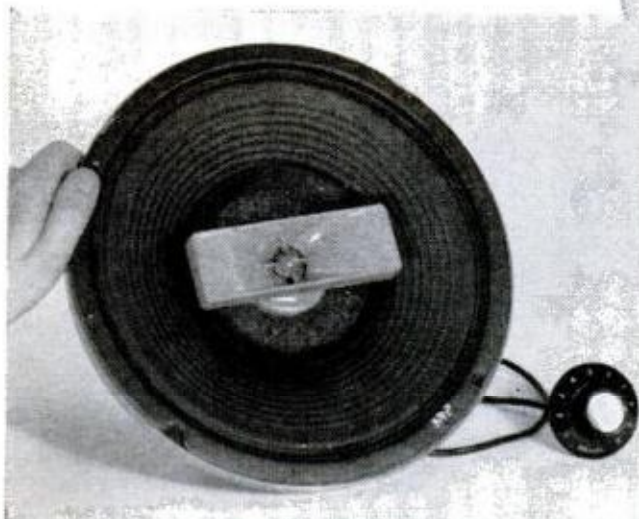
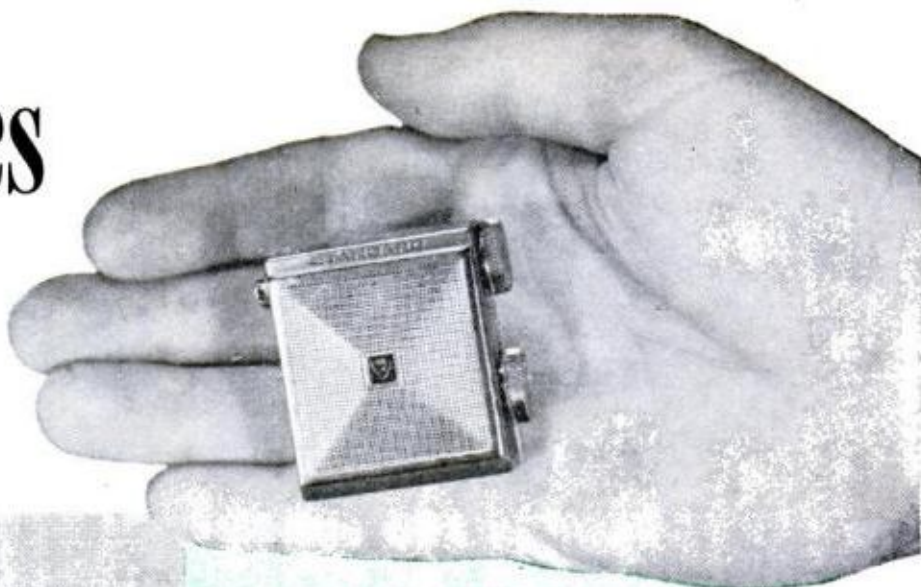
With this arrangement, you can sing along with your records, or by turning off the turntable and using the microphone alone, turn the unit into a small amplifier.

Ingenuity is a prime factor in doing this type of job. I have seen old phonos taken apart and put back together again inside desk drawers, kitchen cabinets, nighttables and coffee tables. So scout around and pick up one or two old phonos, then look through your electronics catalogs to pick out materials and go to work. It's well worth the effort.

NEW IN

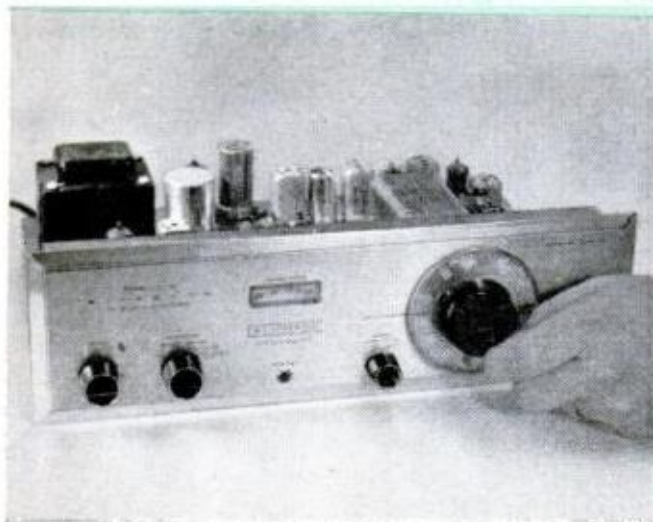
Electronics

SUBMINIATURE TRANSISTOR RADIO has 7 transistors and is tiny enough to lose in the palm of your hand. The Micronic Ruby is made by Standard Radio Corp., New York, N.Y. \$29.95



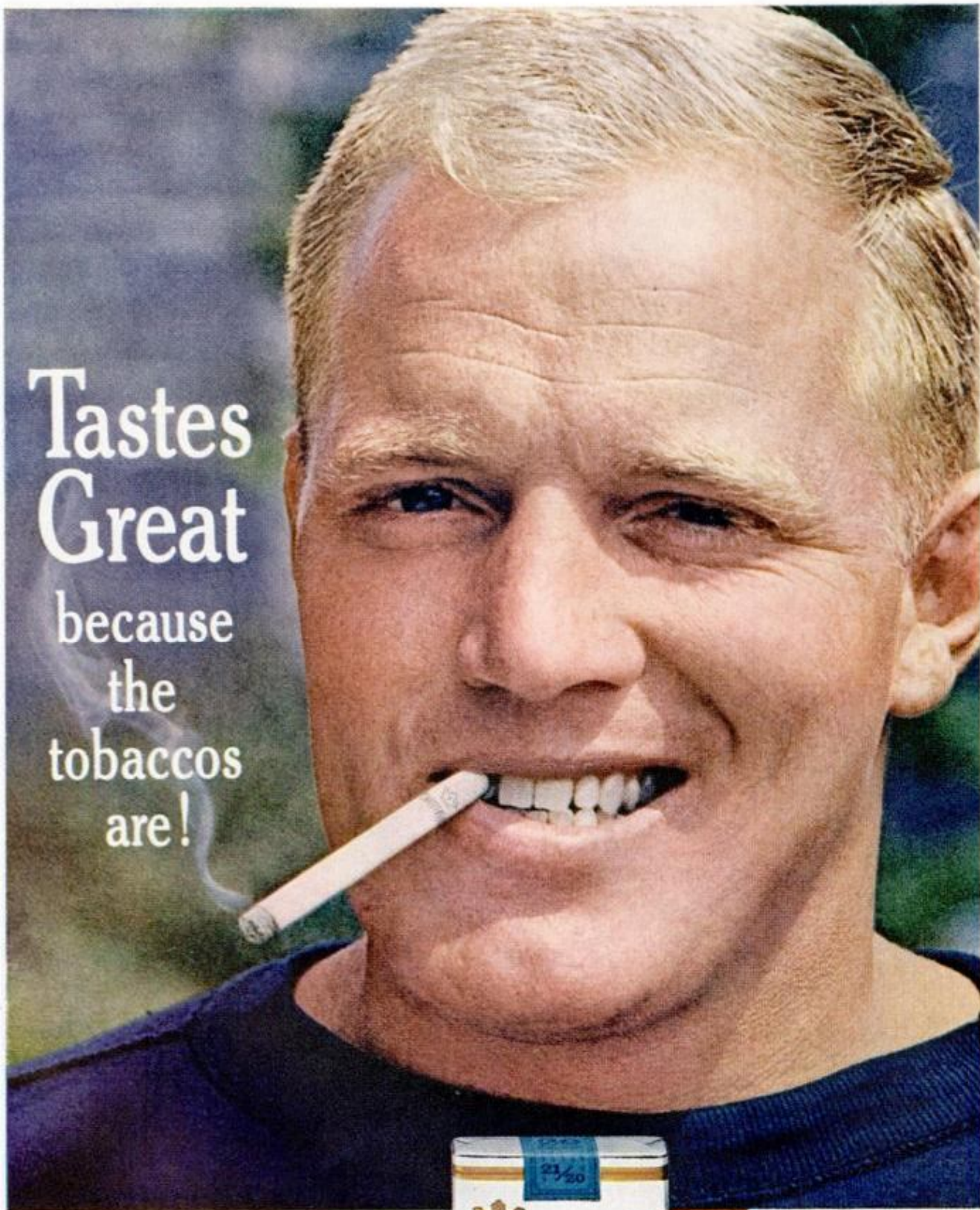
STEREO ON A BUDGET IS EASY if you use this 3-way 12-inch speaker in both channels. The KN-830 has a frequency response of 40—18,000 cycles, two built-in crossovers and a 13-ounce ceramic magnet. Price is \$26.96. It will handle 20 watts of music. Binding post terminals make connections easy. The compact, hi-fi unit is available from Allied Radio Corp., Chicago

YOU DON'T BUY BATTERIES for this portable CB transceiver. At the end of a day's use, plug it into any a.c. outlet and the next morning it's ready to go once again. The secret is a built-in rechargeable nickel-cadmium battery which gives up to 2500 hours of service. The EICO model 740 requires no license, is sold as a kit for \$54.95 and ready to use for \$79.95



IT'S EASY TO TUNE IN STEREO with this H. H. Scott LT-110 stereo tuner. Turn the Sonic Monitor on and tune across the FM band. When you hit a stereo broadcast you'll hear an audio tone from your speakers. Tune for the loudest clearest tone, switch the Sonic Monitor out and you're listening to FM stereo. The stereophonic build-it-yourself kit carries a \$159.95 price tag

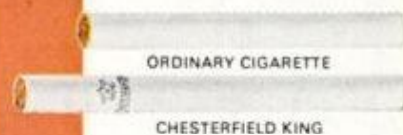
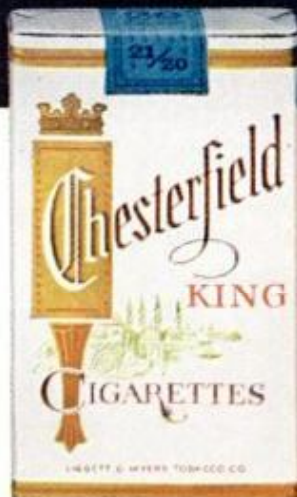
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SCOTT CROSSFIELD, who has written the introduction to the American Space Digest, made the original test flights of the X-15. He is presently a prominent aerospace executive. Mr. Crossfield strongly recommends this book to every American.

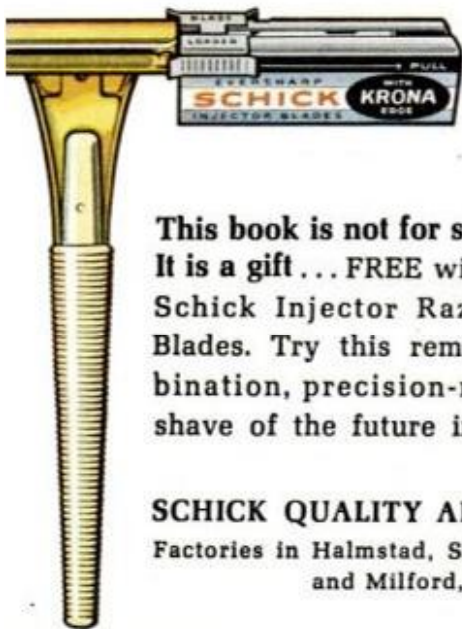
The American Space Digest—a 64-page space pictorial in full color—is a look at the accelerating space age... from Explorer I to a projection of what life will be like just beyond the horizons of existing research.

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Growing Corn to Music

(Continued from page 121)

Singh, head of the Department of Botany at Annamalai University, "It has been found that crop plants experimented upon expressed statistically higher yields . . . to the extent of 25 to 65 percent." Now the Indians are trying music on tea.

Recently Smith received a letter from Peter Belton of the research branch of the Canada Department of Agriculture. Belton indicated no surprise at Smith's results, for he had observed similar effects as an offshoot of another "sound in the cornfields" experiment that may also have widespread implications in the future of agriculture.

Belton has been experimenting with controls for the European cornborer moth. This moth, in its larval stage, does extensive damage to cornfields.

"We first tested the hearing ability of the moth," says Belton. "It was obvious that moths could hear sounds at about 50 kilocycles—high-pitched sounds similar to those made by a bat, a natural enemy.

"We were encouraged," says Belton, "so we ran a field experiment to see whether borers could be repelled from plots of corn during their egg-laying season. We planted two plots of corn, 10 feet by 20 feet. Each plot was divided in half by a sheet of plastic about eight feet high. Such a sheet will stop virtually all sound at this frequency. We broadcast the batlike sound across two of the half-plots from dusk to dawn."

When the ears were ripe, Belton and his coworkers examined the corn for damage. In the silent plots, 19 percent of the ears were damaged; in the sound plots, only 5 percent. There were 60 percent fewer larvae in the sound plots than the silent ones.

"We don't expect any sudden drop in the cornborer population," says Belton, "but if enough corn is protected with these high-pitched sounds we would expect the egg-laying behavior to be so modified over a period of years that the population would be reduced."

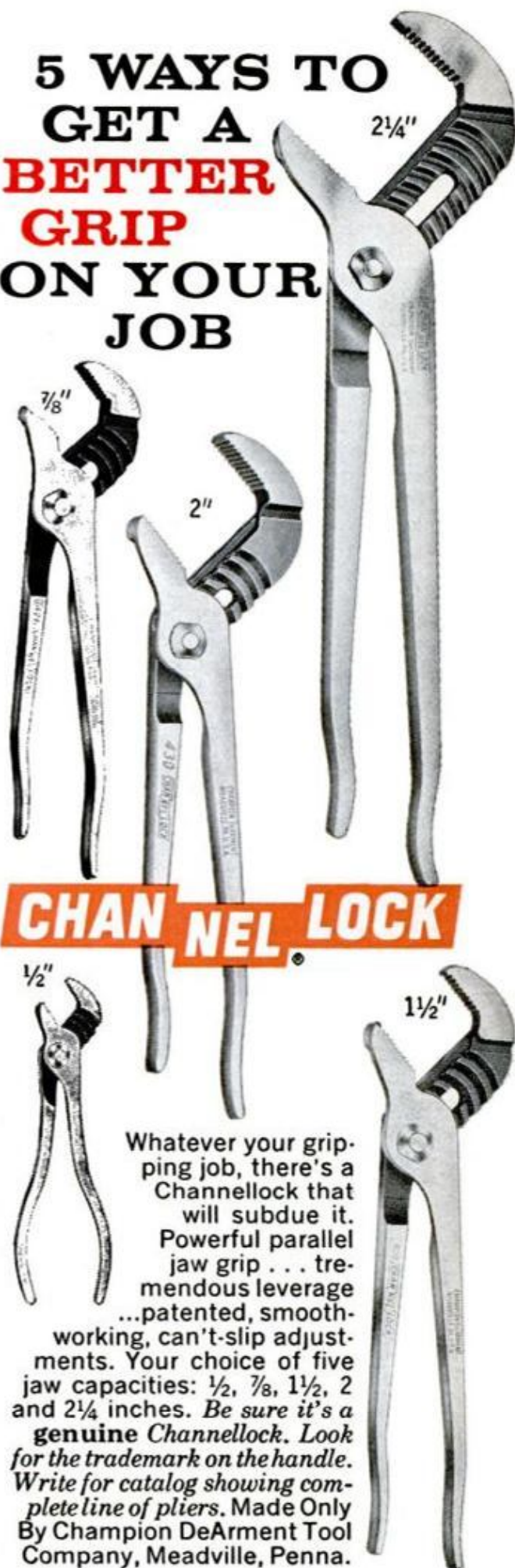
Belton contacted Smith because of a side effect he had noticed. The corn in the sound plots was three inches taller.

Smith, of course, isn't surprised at the side effects Belton has noticed. He's convinced that sound has an effect on plant growth, although he doesn't know how. He hopes to keep experimenting until he has more definitive answers. This summer he'll experiment with five different varieties of hybrid seed corn, and also try broadcasting music for only 30 minutes a day to one plot, to find out whether the sound must be continuous.

"This year will be an exciting one," he says quietly. ★ ★ ★

MAY 1963

5 WAYS TO GET A BETTER GRIP ON YOUR JOB



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CLINIC FOR HOMEOWNERS

Cleaning Old Reed Sofa

Q—I have a very old reed sofa, or love seat, which I value quite highly. I'm quite sure it is made from genuine reed woven over a hardwood frame. It has a very high, ornate back and the frame and reed are still in good condition. But it's been painted. How do I go about removing the paint and cleaning it?—G.M., N.Y.

A—If, as you say, it has been painted, it very likely was originally finished with shellac. You can take off the paint easily with a wash-off type remover but you may have to resort to alcohol to remove all the shellac. After the paint is off (residues from a wash-off-type remover are easily removed by washing with cold water), apply alcohol with a paint brush, keeping the surface wet and brushing off the softened shellac with a bristle brush. A brass-bristle brush of the type used for cleaning suede shoes is ideal for this purpose as it won't damage the reed. Once the old finishes have been removed, go over the reed with fine steel wool (000 or finer) to prepare the surfaces for a clear finish or a colored enamel as desired.

"Bent" Casting

Q—One corner of my porch is supported by an ornamental iron post in what I think is called the oak-leaf pattern. Only it is not iron; it is aluminum and apparently the leaves are castings. One is bent noticeably out of alignment. Don't know how it happened. Can it be straightened?—C.Y., Fla.

A—We don't know—for sure. You must mean that the leaf is twisted rather than bent, as usually these leaf castings are anchored at two points at least. It's just possible that you could tighten an adjustable wrench on the leaf and, by heating the metal with a propane torch, ease it back into alignment with the rest, or nearly so. This would be a ticklish job at best, and there's always the chance that the leaf might pop out, but we think perhaps it's worth trying.

Tall Hedge

Q—The privet hedge in my back yard is about 10 ft. high and has spread to a width of 4 to 6 ft., because, I suppose, it has been allowed to grow for several

seasons without trimming. I'd like to get it under control again; what do I do, trim it back to average hedge height or close to the ground?—V.C., Mo.

A—You can trim it to hedge height this spring before growth starts, but usually the new wood will break at a point near the top ends of the trunks, or stems, and very little new growth will appear at a point below half the height of the cut ends. This growth may make the hedge rather difficult to manage by trimming and result in an unsightly appearance. Usually it is better to wait until late fall and then trim the trunks close to the ground, being careful to damage the bark as little as possible. Paint the cut ends with a protective coating. In the spring when new growth starts it may be necessary to keep it thinned somewhat and keep any spreading branching cut back until the new growth reaches average hedge height, when it can be kept trimmed regularly.

Oil Spot on Garage Floor

Q—How does one remove the oil spots from a concrete garage floor? I'm referring to the oil and grease drippings from the car. I have been told to use white gasoline but it seems to me that would be unsafe.—E.N., Ga.

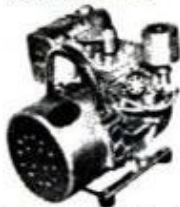
A—You're correct in assuming gasoline is unsafe to use as a cleanser. It is not a cleanser; it is a motor fuel. Oil spots on a concrete floor are a problem not having an easy solution, especially if the concrete is old and more absorptive. You can usually remove most of the stain by wetting the affected surface with carbon tetrachloride and scrubbing with an old broom. Mop up the loosened residues while still wet. Although carbon tet is nonflammable the fumes are highly toxic and because of this it shouldn't be used in any enclosed space except with utmost caution. Have the garage door and all windows open and direct the blast from an electric fan over the affected area to disperse the fumes rapidly. Don't work inside the building more than a minute or two at the most.

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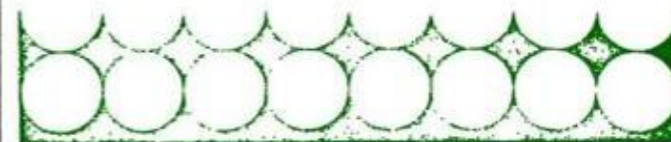


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Probing the Kobuk's Wilderness

(Continued from page 109)

us over a bar. We decided to try it.

The current here was 10 m.p.h. We sheared into it, fighting upstream. Sweepers clawed at us. Ahead, the river was a series of frothing steps. The flat pitch prop bored at 5000 r.p.m.'s. Then, I saw the chute—a narrow squeeze between two bars. A razorbacked rock at the end hurled spume high in the air. Beyond it was deep, unruffled water—four feet higher than us. If I could run the chute, shear the bow laterally onto the spillway and blast the stern around fast enough to jump the bar and miss the rock—Well, if I didn't, we'd roll in fast water and it would be every man for himself.

I opened the throttle and we slashed the mauling current, heaving from side to side. Slowly we came abreast of the rock, bobbing and weaving. The trick was not to hit the rock and bust the prop as we came around. The tiller went hard over; the bow came around, rising on the shallow fan of the spillway. As the last thwart inched over the bar, I swung the bow hard left, rammed the lift lever forward and the prop left the water screaming. I throttled back for a count of five. She was shearing hard—trying to go back down the chute broadside. I dropped the prop just enough to cover it and eased on power. We stopped swinging. Two seconds later, the screw dropped to half depth at full steam, and we swung out onto a millpond. That night I rebuilt the prop while the rest caught greyling.

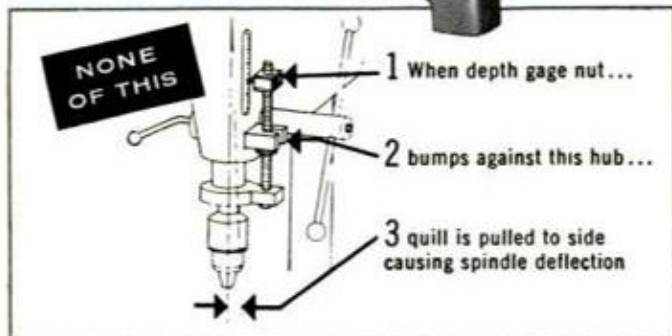
From here, the Kobuk narrowed through shouldering mountains and became diamond clear. We breasted more and more white water, dodging boulders in six-foot channels. You could see the gradient ahead. The river dwindled and the country grew wilder. In one day we counted two moose, a caribou, three bears and countless beavers, loons, ducks and gulls. That was our 16th day on the river. The sky glowed pink at 10:30 P.M.

Next morning, I wanged the prop on a turn in a rocky millrace and had to break out a spare. Fifteen minutes after a fresh start we were hung up on a bar. Loose again, we blasted over a series of cascades and broke out into the Upper Kobuk Canyon. There was white water and jutting rock as far as the eye could see. Our skeg banged boulders. We sheared a pin on a ledge, slewing sideways into a handily adjacent pool. It was time to go home.

And so, we swung around—full tilt. One instant we'd be aimed at a giant boulder; the next I'd swing hard over

(Please turn to page 188)

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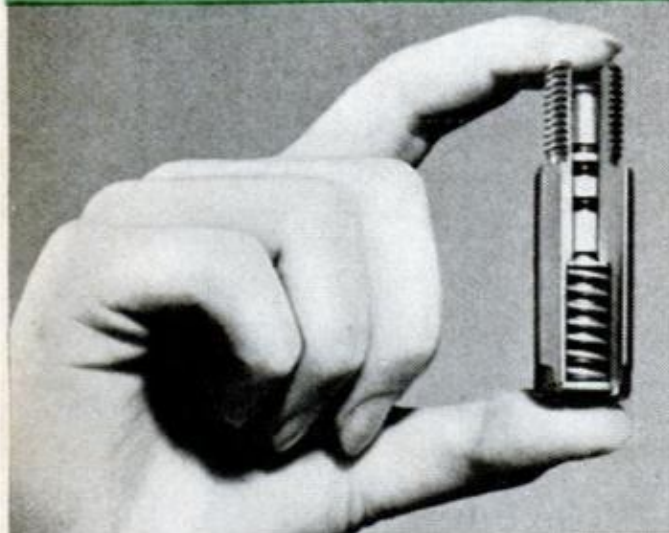
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Probing the Kobuk's Wilderness

(Continued from page 186)

and head for a bar. At one spot, Phyl grabbed the bow line, thinking we were about to beach. As we slid sideways into a pool, I reversed direction and she nearly left the boat. Sweepers approached at an astounding rate. We slammed between rocks and through bends at 30 m.p.h., maneuvering the memorable chute in a split second. We were 30 miles downstream in less than an hour.

The rest was a daydream of fishing, camping and coasting homeward. It was July 25th when we passed the mouth of Melvin Channel, skirted the Inlet and entered Kotzebue Sound in the teeth of a gale. At 9:45 that night we hit the beach and tied up. We'd been under way 15 out of 22 days. We'd missed our Walker Lake goal by a hair. But we'd had the satisfaction of reaching a point never before attained in a rig such as ours. ★★

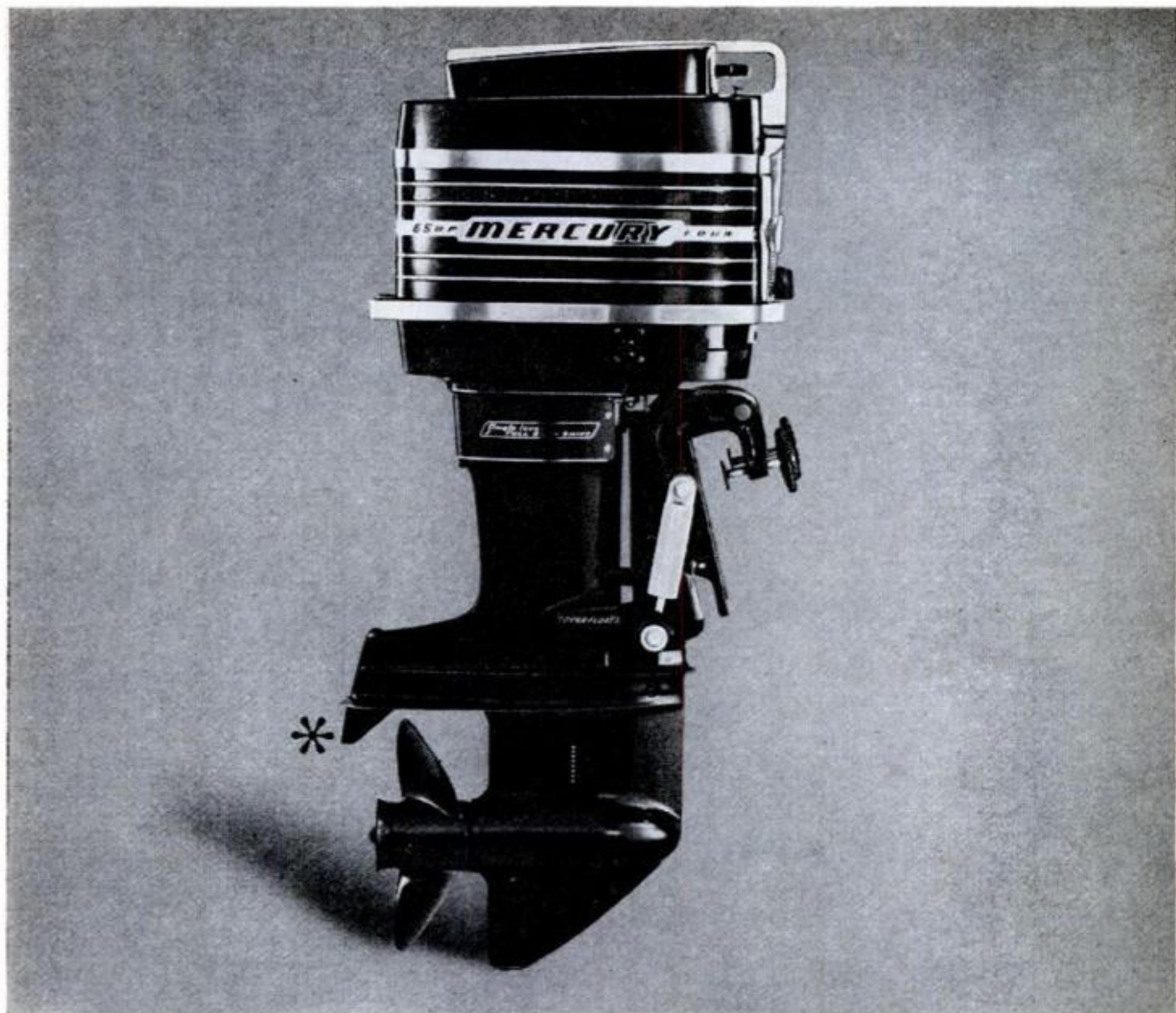
Double-Spiral Candlestick

(Continued from page 141)

both rows of holes converge in a semicircle (see photo on page 140). If any wood remains between adjacent holes where you missed overlapping them, use a fretsaw or tiny keyhole saw to free the waste.

After the waste has been removed, replace the cylinder between centers in the lathe. Next, work down the ragged edges with a rasp. Then, using strips of emery cloth or coarse-grit paper torn from a sanding belt, round the spirals, as shown on page 141. This work will be easier if you improvise some way to wedge the lathe headstock to hold the work stationary at any desired point. It takes about four hours to produce a finished spiral from the time it was filed square. The spirals shown in the photographs were reduced to almost $\frac{3}{8}$ in. in diameter.

Holes for the dowels in the spiral portion can be bored in the lathe by using a chuck and drill mounted at the tailstock and fed to the work while rotating the work by hand. After assembling the parts with dowels and glue, and allowing to dry thoroughly, the ends of the spiral section are turned down to join the base and drip cup neatly. Turning at the drip-cup end requires very light cuts, since the spiral is no longer solid, but is springy and may break if the tool should catch. To avoid such trouble, you can use a round file instead of a turning chisel. Sanding finishes the work, except for staining, if desired, and a coat of clear linoleum lacquer or and spraying with clear lacquer. ★★



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a new one costs only a buck. In fresh water, it lasts like aluminum.

A small thing, perhaps... but another example of the tender, loving care in design, proving, and production to give you more RUN for your money with Mercury.

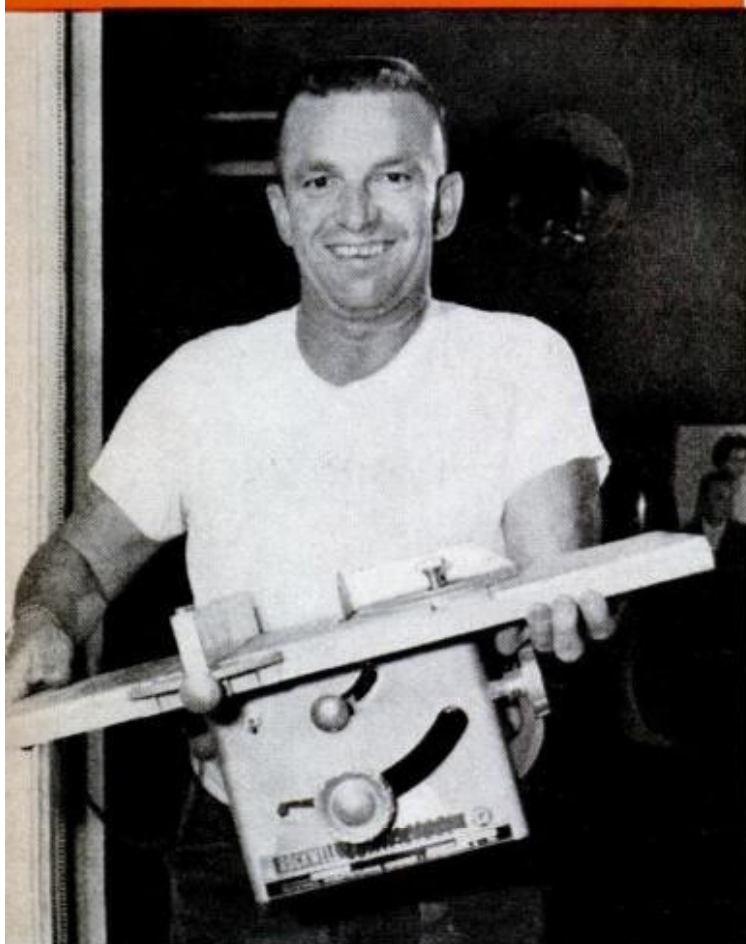
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All Aboard the Gemini

(Continued from page 116)

spacecraft is that it's so pesky small. Your reporter is not a claustrophobe; I have done some deep-sea diving, explored some tight passages in caves, I don't shudder at being trapped in an elevator. But I found that 20 minutes in the pilot's seat of Gemini more than enough even though I knew I could get out at any time.

One Gemini flight is planned to last two weeks, which means that enough groceries to feed two grown men for that length of time must be stowed inside that tiny compartment. Don't think of it in terms of "pills"; that is a Buck Rodgers' concept. That food will occupy about as much space as it would in your home freezer.

Too Much Togetherness?

The two astronauts will lie side by side about one foot apart. Fortunately, our astronauts have been selected for temperament (among other things) and they are all strongly motivated—necessarily so, for it seems to me that the greatest hazard of that two-weeks trip will be too much "togetherness." It would be easy to hate Helen of Troy under those circumstances, to say nothing of another unbathed male.

The space is too tight to permit them to take off their space suits (that itch between the shoulder blades!) although they will be able to unzip parts of it and fold back the helmets. Even bodily functions must be cared for with the suit on.

These are some of the shortcomings that our astronauts must endure because of the lack of a big booster, and they are not minor. Obviously, it takes real heroism to ride a column of fire up into the sky in the present imperfect state of the art, but I think it will take heroism of a different kind to refrain from choking your cellmate after two weeks of listening to him snore only inches from your ear.

Twelve spacecraft are planned for the Gemini program, and it is hoped that the first unmanned ballistic (non-orbital) test shot can be made late this year; two men would then be put in orbit in the spring of 1964. By the fall of '64, if all goes well, the first attempt will be made to dock into an unmanned Agena-D. If that is successful, we will have proved out all the basic essentials of space flight.

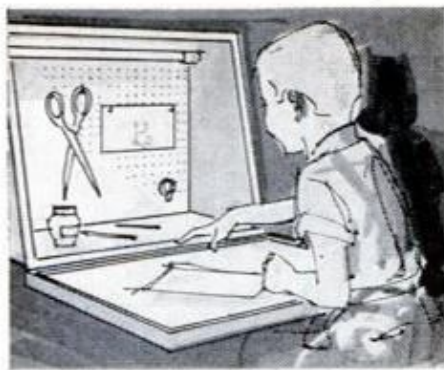
Some people are predicting that the Russians will be making a landing on the moon by 1965. Perhaps they will be, but let us hope not.

They certainly seem ahead now in the race for space. But if all goes well, Project Gemini might be the point at which we catch up and pass them. ★★★

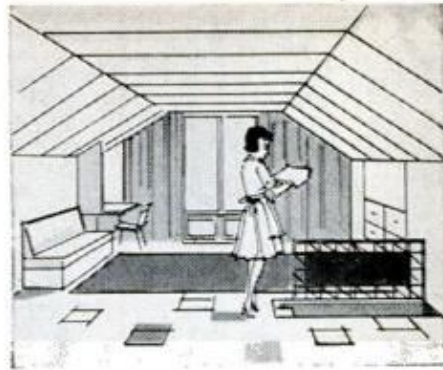
POPULAR MECHANICS



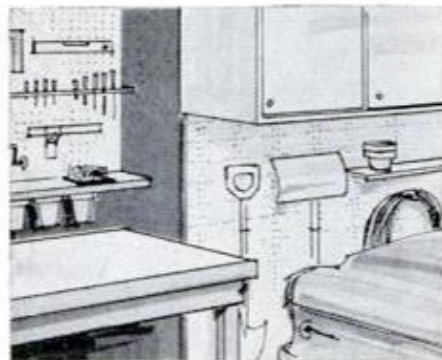
1. Fences of distinctive design



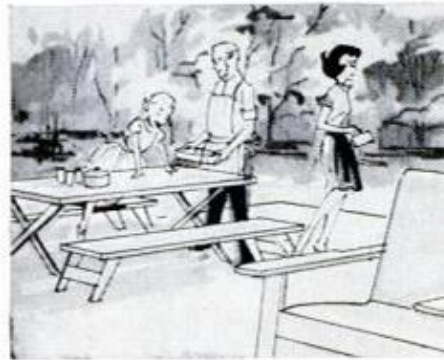
2. Wall desk with optional chalkboard front



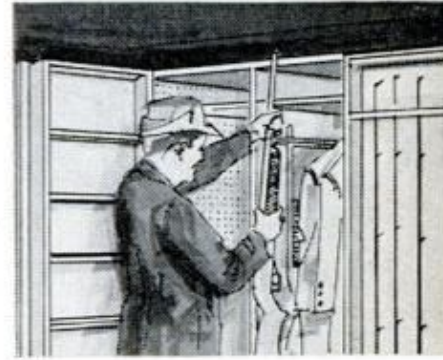
3. Remodeled attic



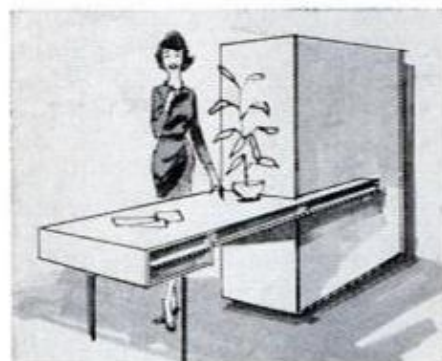
4. Garage interior remodeling



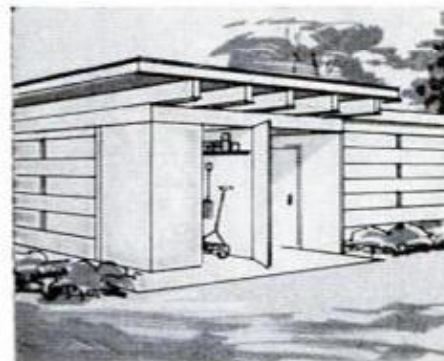
5. Picnic table and benches, lawn chair



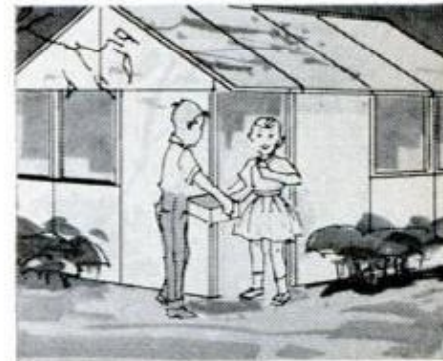
6. The sportsrobe



7. Room divider with desk and wardrobe



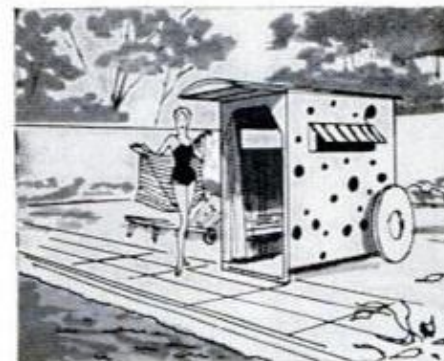
8. Woven carport wall with tool room



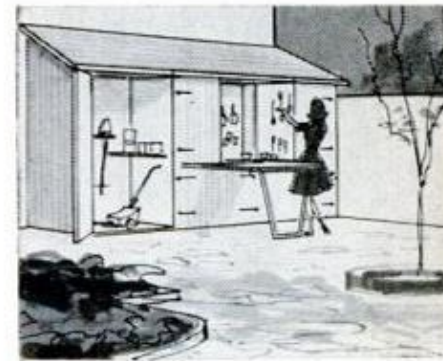
9. Playhouse plan for children



10. Home entertainment center
Family leisure hi-fi center



11. Roll-away cabana



12. Outdoor living room

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And save money doing it. Easy way is with a Sealed Power KromeX ring set. Sealed Power Corp., Muskegon, Mich.



Sealed Power Stainless Steel
oil rings stop oil pumping

Owners Report—Buick

(Continued from page 100)

"It holds the road better than other car of the same size I have driven."—Pennsylvania pharmacist.

We'll agree with him insofar as resistance to crosswinds is concerned. Buick has good directional stability.

Turning back from the bouquets to the brickbats, here are numbers six through ten—in order of frequency—of Buick owners' complaints:

"Quite satisfied except for the noise the heater blower makes when operating."—New York factory supervisor.

"Heater ducts not placed in good positions for warming the front seat; also, ducts for defrosting not large enough to cover front windshield."—Arizona sheriff.

PM's objection to Buick heater is the combined fan and air control that forces you to run fan when you open fresh air intake. At high speed for defrosting, the heater fan is a bit loud.

"Dislike the heater in combination with air-conditioner; moreover, the fan on the heater is very noisy."—Texas physician.

"Inadequate heater for our climate; side and rear windows fog; also, snow accumulates on rear windows."—Maine salesman.

"Poor workmanship on the chrome trim throughout."—California machinist.

"There's a blind spot when looking for on-coming traffic over right rear; this is very bad."—Illinois optometrist.

"Vision out of the rear window is poor in the Riviera model."—Indiana housewife.

"Side visibility is poor in my two-door hardtop at intersections."—Minnesota credit supervisor.

Here we go again sacrificing safety and convenience to the great god, style. If Buick had a window instead of sheet metal at rear quarter, we wonder whether as many people would buy it. U.S. buyers must make up their minds which is more important; looking at their cars or looking out of them!

"I couldn't get it into reverse as slush froze up transmission control linkage."—New York salesman.

"I've had a leak in the transmission."—New Jersey sales manager.

"Lack of head room for a 6-foot 3-inch man not even wearing a hat."—Ohio government worker.

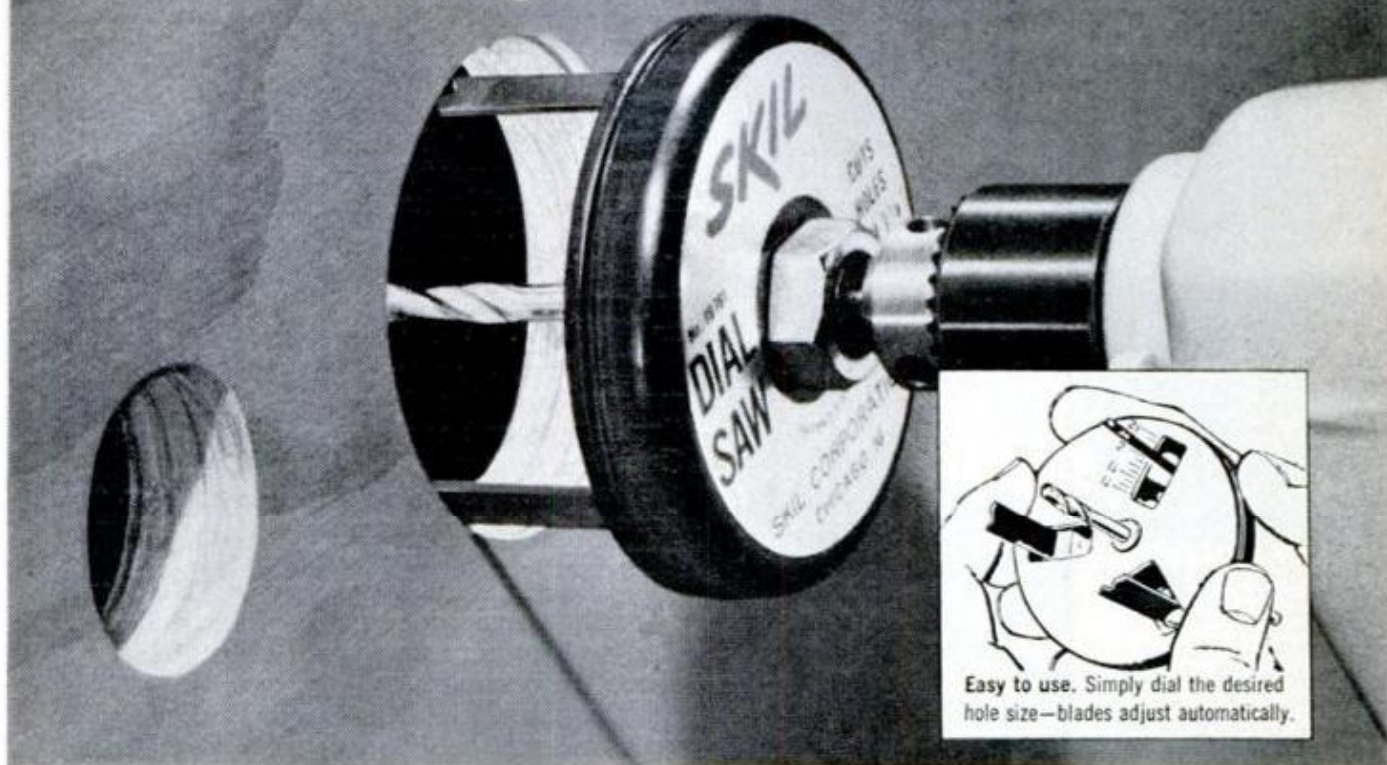
Headroom isn't too generous, it's true but, seats are comfortably high which is a plus for most people.

Owners found still more to praise in their Buicks. Here is the final list, numbers 11 through 16:

(Please turn to page 194)

FREE! \$495 DIAL SAW

for drilling holes 1 1/8" to 2 1/2"...



Easy to use. Simply dial the desired hole size—blades adjust automatically.

with any of these powerful Skil drills!

Model 503D 1/4" Drill has a full 2.5 amp. motor that provides power to spare for drilling in concrete, metal, brickwork, plaster, wood or wallboard. Lightweight—only 3 lbs. Priced under \$20.

Model 560D 3/8" Drill has double reduction gears, powerful motor for greater drilling torque. Side handle gives extra control, removable when drilling in tight spots. Priced under \$35.

Model 541D 1/2" Drill—Most compact, low-cost 1/2 inch available. Gives big drill performance with small drill handling ease. Powerful 3 amp. motor, multi-ball thrust bearing for heavy-duty work. Removable side handle. Priced under \$37.

Prices slightly higher in Canada.



You'd need a dozen or more attachments to cut the range of hole sizes made by this remarkable Skil Dial Saw.

Dial any size from 1 1/8" to 2 1/2". Cut through wood, wallboard, plastics and compositions.

The Dial Saw is yours *Free* with any of the three Skil drills illustrated. But don't wait. This is a limited time offer available at most hardware and lumber dealers.



WRITE FOR FREE SKIL POWER TOOL CATALOG

Send to Skil Corp., 5033 Elston Ave., Chicago 30, Illinois.

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City _____ Zone _____ State _____

Dept. 513-E

WISS CUTS BEST



NEW! WISS WIZZ® NO. 711-G GRASS SHEARS. The best designed grass shears today. Patented Magic-Bar action multiplies power, cuts more with less effort. Floating blade design features super-keen alloy steel with lightweight aluminum handles, convenient closing latch. With grips, \$3.25, without grips, \$2.99.

Wiss is the quality name for all garden cutting tools

NEW 708 ANVIL PRUNER



For extra easy cutting—specially tempered and sharpened blade combines with efficient molded grip design and low gear—high gear latch for light or heavy branches. Only \$3.25 or in a smaller version, \$2.75.

8½" E ENGLISH PATTERN HEDGE SHEARS



Engineered for balance and light weight with hot drop-forged blades of fine cutlery steel. Neoprene shock absorber. These custom styled hedge shears are preferred by professionals and homeowners alike. \$6.50.

J. WISS & SONS CO., 33 LITTLETON AVE., NEWARK 7, N. J.

World's Largest Manufacturer of quality Shears, Scissors, Pinking Shears, Skalloping Shears, Metal Cutting Snips and Garden Shears

Owners Report—Buick

(Continued from page 192)

"It's a smooth car."—California manufacturer's representative.

"My Riviera is extremely quiet at high speed."—Georgia manufacturer's representative.

"Trunk space is far above average."—South Dakota baker.

"It's back to standard size."—South Carolina government worker.

Just whose standard is "standard" these days?

"I have a brand new car whose body is nice and tight; I would like to see the same condition and performance at 50,000 miles."—Florida broadcaster.

Wouldn't we all! For the record it seems that five-year-old Buicks we've encountered are as solid as most cars in their price class and definitely better than some.

"The smaller size of the steering wheel makes for easier steering and ease of getting in and out of parking places."—South Carolina housewife.

Here are numbers 11 through 16 on the dark side, to complete the list of reactions from Buick owners:

"Air switch on heater works hard and operating arm on same broke twice: I'm still waiting for the part."—Pennsylvania electrical worker.

"The windshield is too wide and that puts the sun visor too close to one's head; hence, the sun visor is very awkward to use, but it must be used even in the middle of the day."—Illinois university dean.

There's room for a new type of sun visor, one that's both easier to use and more effective because there are times when that big windshield is worth having.

"The front windshield should have something to eliminate glare."—Maryland traveling salesman.

"I've had trouble with the carburetor."—California government worker.

"Automatic choke hose was installed with kink so no air could pass."—Massachusetts chemical engineer.

"Hard to get in and out of back seat; all seats too low."—Colorado steel worker.

For a car of Buick's size we think that the rear door on LeSabres and Wildcats might be bigger.

"Oil drips on concrete garage floor. Mechanic does not seem to be able to correct problem."—Illinois retiree.

"Side windows inclined to rattle."—Tennessee maintenance man.

That concludes PM's rundown on the pros and cons of the 1963 Buick as reported by a group of owners after 1,007,-736 miles. ★★



AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

AC sparks five out of six

One of the real tests of any spark plug is acceleration—response when you want it most! In the 1963 Pure Oil Performance Trials at Daytona, stock cars equipped with standard AC Fire-Ring Spark Plugs captured first place in five out of six acceleration tests. One reason was AC's Self-Cleaning Hot Tip. It heats faster to burn away harmful carbon deposits. The result: sustained peak power mile after mile.

Get the same winning power response from your car. Be sure your tune-ups include performance-proved AC Fire-Ring Spark Plugs with the Self-Cleaning Hot Tip.



Acceleration competition was in the important driving range starting at 25 miles per hour. All entries were finely tuned, used premium gasoline, and were driven by professional drivers. These tests are not a measure of vehicle top speeds.



**FIRE-RING
SPARK PLUGS**

Ford Vs. Chevy at Indy

(Continued from page 72)

alcohol-base fuels.

Much encouraged and enlightened by the ease with which Gurney kept up with the pack, Mickey and his sponsor, the Harvey Aluminum Co., are loaded for bear in '63.

This year the Thompson-Harvey team has brought no less than four cars to Indy, all of them powered with aluminum Chevrolet V8s mounted between the driver's seat and the rear axle. The engine was cast from Chevrolet 283-cubic-inch engine patterns with bore and stroke reduced to 3.75 x 2.90 for a displacement of 255 cubic inches, which is just within the Indy limit.

It is a push-rod, valve-in-head design, with forged aluminum rocker arms running on needle bearings. The fuel will be inducted via Hilborn injectors through a manifold designed by Thompson. Ignition will be magneto and lubrication will be dry sump with an oil-cooling radiator. Pistons and rods are also made by Thompson of aluminum and the rods will have needle bearings at the wrist pins.

This engine puts out in excess of 350-horsepower between 6000 and 8000 r.p.m. These engines will be mounted amidships in four cars; two of these will be the "old" Harvey specials of 1962, slightly modified versions of Gurney's Buick-powered mount of last year.

The two new cars are characterized by Mickey Thompson as "way out" jobs. Built around tubular aluminum frames, their bodies are fiberglass with inner panels and undertray of .035 sheet magnesium. These cars ride only 4½ inches from the track, and at the base of their plexiglass windshields are only 21½ inches high. Highest point on the cars is the roll bar—33 inches off the ground.

Their bodies carry 47-gallon gas tanks outboard between the wheels on the left sides. Wheels, made of magnesium, are just twelve inches in diameter, but have rim widths of seven inches front and nine inches wide front and rear.

To cut unsprung weight and make room for these wide, wide wheels, brakes are mounted inboard both front and rear.

The brakes themselves are Airheart calipers working on forged aluminum discs faced with copper-iron. Suspension is independent by A-frames supported by combination coil spring and shock absorber units.

Power from the Chevrolet will be transmitted via a triple disc clutch, Halibrand two-speed transmission and then through a Z-F limited-slip differential.

Dry weight of these cars is just 1050 pounds. Making the Chevrolet V8 of aluminum represents a weight-saving of 125 pounds over the cast iron version.

As we go to press, it is expected that Graham Hill and Bill Krause will be the drivers of the two new machines.

Facing off against the Harvey Aluminum-Mickey Thompson stable, will be Dan Gurney, who drove for Thompson last year. But this year, if all goes as planned at this writing, Gurney will be sitting in front of a Ford V8 instead of a Buick.

Dan will have wholehearted cooperation from Britain's Colin Chapman, designer of the rear-engined Lotus Grand Prix car which Dan will drive, and Ford Motor Company, who developed the all-aluminum Fairlane V8 engines for two cars. Gurney's team mate in Ford-Lotus will be Jim Clark, who finished second to World Champion Graham Hill in the last contest of the Grand Prix circuit.

The Ford Fairlane engine is ideal in size—an inch or two smaller than the Chevrolet—so that it fits neatly into the Lotus' narrow frame. Its displacement of 260 inches was easy to reduce to the required 255, and casting it in aluminum brought the weight down to a respectable 325 pounds. (It is estimated that the Thompson-Harvey version of the Chevrolet V8 will weigh about 375 pounds.)

Ford V8 Runs on Gasoline

Ford development engineers set up some tough requirements for themselves when they agreed to design an engine or two for Gurney. One Ford executive described the project as "an engineering exercise" in which Ford wanted to design an engine that would be something of a research device from which there would be some "fall-out" of technical break-throughs that would help them in designing better passenger car engines.

For these reasons, Ford determined to run their engine on 103-octane gasoline rather than taking the methanol-benzol route to power. Thus, Ford engineers forced themselves to design the extra horsepower into the engines rather than pour it into the tanks in the form of ultra-hot fuels.

For the same reasons—the desire to design a super automobile engine rather than put together a pure racing plant like the Offy, Ford decided to use four dual Weber carburetors in preference to the fuel injectors chosen by Mickey Thompson. Just in case the engine might someday be used with injectors, a provision was made for a pump drive.

(Please turn to page 198)

TRIMS TRIMMING TIME! In corded products, two B&D Hedge Trimmers, each cuts a 13" swath in a sweep of your arm. Light, easy one-hand control to reach the tough spots. Right or left hand auxiliary handles. Powerful, air-cooled motors.



CORDLESS, OF COURSE! World's first, B&D's Cordless Hedge Trimmer has nickel cadmium Power Pack in handle that delivers enough power to trim an average hedge 3 feet high and 200 feet long! No cords, generators! Recharge overnight.



We challenge you to find an easier, quicker way to get your lawn and garden chores over and done with this weekend.



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 AIR TOOLS POWER TOOLS

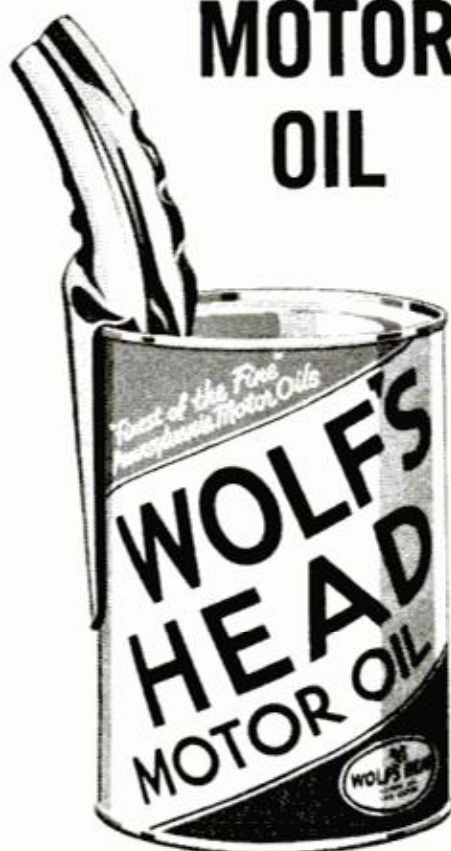
CHECK YELLOW PAGES "Tools-Electric" for the nearest B&D dealer. Send 25c for 180-page book, "How to Choose and Use Power Tools" to: The Black & Decker Mfg. Co., Dept. D053, Towson 4, Md.



GOODBYE BACKACHE! Say so-long to tedious hand clipping with a B&D Lawn Trimmer. Perfect for cutting around flower beds, fences, trees, walks, hard-to-reach spots. Scythes down troublesome weeds. Light (only 5½ lbs.), yet powerful.

TWO FOR YOUR MONEY! B&D's combination Lawn Trimmer & Edger takes the groans out of gardening. You walk erect as you TRIM grass or weeds. Turn two wing nuts and the head, and you're EDGING around walks, patios, driveways.

THE UNCOMMON MOTOR OIL



100% PURE PENNSYLVANIA

Tri-ex Refined three
extra steps for

**Maximum performance,
Maximum protection,
Maximum economy**

Scientifically fortified
to clean as you drive

It pays to be particular about
your oil—use WOLF'S HEAD.

**WOLF'S HEAD OIL REFINING CO.
OIL CITY, PA.**

Ford Vs. Chevy at Indy

(Continued from page 196)

Ignition of the Ford V8 will be by transistor-switched coil rather than by the magneto traditionally used at Indy. Ford plans to run both breaker point and contactless ignition. Valves are carefully opened by balanced pushrods which use an extra spring in the gallery between tappets and block top to speed closing.

The valves themselves will be slightly larger than stock and operate in well-modified ports leading up in a short curve to an even shorter intake manifold leading to the eight carburetor barrels.

To improve engine breathing in that ram intake manifolds are not used, Ford engineers have relied on tuned exhausts to create an extracting effect to help speed gas flow and empty the combustion chambers more completely.

A Ford spokesman told PM that this engine has been run for 80 hours on a dynamometer at 6000 r.p.m. without problems. To help insure such reliability, iron main-bearing caps are cross-bolted to the aluminum bulkheads in the block.

At 6000 r.p.m. Ford's aluminum V8 develops 360 horsepower when operated on no more than 103-octane gasoline.

Computer Racing

Ford has already "raced" this engine by feeding all factors of wind drag, transmission losses, wheelspin, rolling friction and slower cornering speed into a computer which told them that Gurney's Lotus-Fords can be lapped at a consistent 149 miles per hour with no strain. Allowing for routine pit stops to refuel and change tires, this should put victory technically within reach, as Rodger Ward's winning average last year was 140.292 miles per hour. (Note: Ward's car was capable of higher averages as well, but the race was slowed down several times after accidents.)

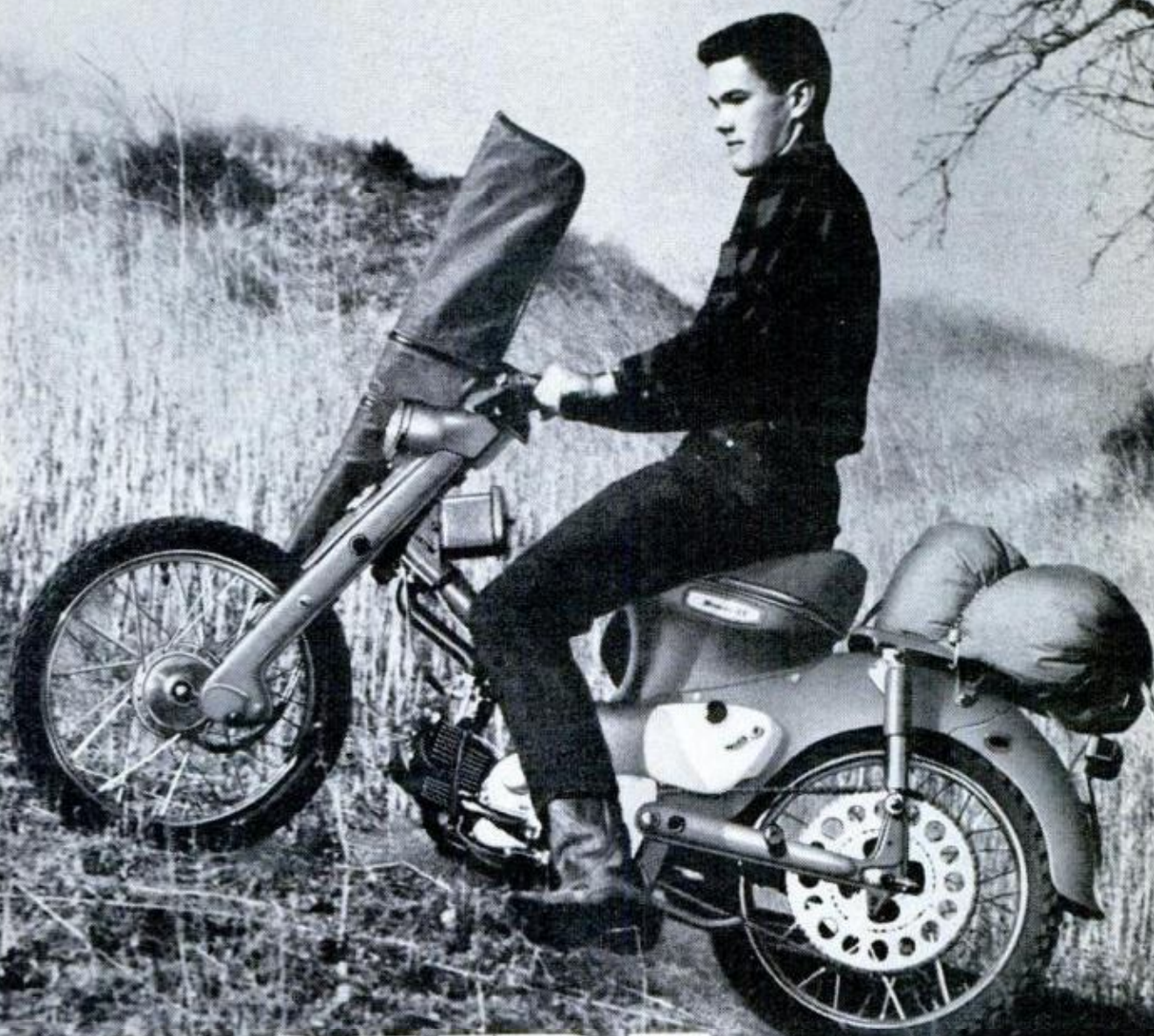
In design, Gurney's Ford-engined Lotus 25's are similar in concept to the Harvey Aluminum-Mickey Thompson cars, the chief exception being that Colin Chapman's Lotus is of unitary or monocoque construction employing sheet steel rather than tubing and stressing the aluminum skin on the sides to make it part of the load-bearing structure. Rubber fuel tanks are housed between the inner and outer skins.

Another difference: the front suspension-coil spring and shock unit is carried inside the body instead of being slanted outside to the lower A-frame. Lotus'

(Please turn to page 200)

FOR THE MAN ON THE WAY UP

You're sure to arrive with a TRAIL "55". For the HONDA TRAIL "55" is made for going places...places most men have only dreamed of going. ■ Imagine a vehicle with a lively 4-cycle OHV engine and a low gear ratio of 70 to 1 which will whisk you—plus 250 lbs. of load—up mountains, over logs, down gullies, through terrain that would stop a jeep and make a burro balk. A vehicle so rugged it is virtually maintenance-free; yet so light (126 lbs.) and compact it will fit on a car bumper or in the smallest station wagon. A vehicle that will take you to that trophy buck or record trout—and back again—with matchless ease and economy. ■ That is the HONDA TRAIL "55"—America's largest selling trail machine. See it soon at your nearest HONDA Dealer (for his name, phone Western Union and ask for Operator 25). Full price (plus destination and set-up charge): *only* **\$275**



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FIX-UP / Product Tips from / **DAP**

HOW TO FILL STUBBORN CRACKS AND JOINTS



USE KWIK-SEAL for watertight seals around tubs, sinks, lavatories and showers. Stays flexible for long-lasting results.

Keeps its neat, attractive satin-white finish to dress-up tile areas in kitchens and bathrooms.



USE DURATITE WOOD DOUGH when hinges or drawer knobs come loose. Fill screw holes with Wood Dough, let dry and reseal screws

for tight, sturdy fit. Ideal for covering holes and other blemishes in woodwork, paneling, furniture.



USE DAP SPACKLING to patch hairline cracks and large breaks in plaster . . . fill seams in drywall. Ready-mixed, creamy-

smooth. Easy to use. Sticks tight. Sands to an invisible edge. Paint covers without priming.



USE KWIK-SEAL for easy and perfect repairs of cracks around interior window and door frames. Apply direct from plastic

squeeze tube. Takes minutes to apply, makes a long-lasting seal. One coat of paint covers.



USE "33" GLAZING COMPOUND to replace old, cracked putty that leaks air, moisture and causes heat loss. Stops rattles caused by loose

panes of glass. Easily applied, sets to a smooth surface. Holds fast to wood or metal sash.

If your dealer doesn't carry these products, please send us his name and address.

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DAP / DURATITE / Indo

Ford Vs. Chevy at Indy

(Continued from page 198)

four-disc brakes are placed outboard rather than within the body. They are actually inside the wheel rims where they can get cooling air, yet are not in the direct airstream to create drag.

Although it's never been raced at Indianapolis, there's little doubt as to the Lotus' capability. Last fall, Jim Clark ran practice laps at Indy using a 170 horsepower engine, doing over 142 m.p.h. per lap. With double that power available from the Fairlane V8, qualification by Clark and Gurney at over 150 m.p.h. should be no problem in the Lotus.

What will be a problem for both the Gurney-Lotus-Ford entries and the Harvey-Thompson Chevrolet cars will be winning the race. Qualification laps at 150 m.p.h. are one thing, but 200 laps back-to-back is the big job. You have to have all 500 miles behind you to win.

The Watson Worry

Another thing that Gurney, Clark, Hill and Krause will have to put behind them is a thundering herd of old pros sitting behind powerful Offy engines that have been winning for more years than some of the rookie drivers have lived. Even if all the rear-engined, "new era" cars make the starting lineup, a feat that is statistically improbable, there will still be 25 or so of the 1600-pound, 400-horsepower Indy roadsters.

And of these, one of the toughest to beat will be the car driven by last year's winner, Rodger Ward. Sponsored by Kaiser Aluminum Co., and slightly revised in design, this car is one of A. J. Watson's best. Watson has been building Indy winners since 1959, and his record is impressive: two firsts in '59 and '62, two seconds ('60 and '62) and a third place in '61. Watson built his first Indy car for the 1956 race after serving as mechanic and chief mechanic since the 1940's.

His cars—he has built eight new ones for this year's race—represent the last word in design of the Offenhauser-powered Indy roadster.

Simplicity is the keynote to Watson's approach. The chassis are of welded light tubular steel with fiberglass nose and tail cones and light aluminum or magnesium body panels. Mike Scott, who designed and built the body for Watson's first car in '56, is still using the same molds for fiberglass nose and tail pieces, so there's an easy way to identify a Watson car.

Tread on the cars is a relatively narrow 49 inches (Thompson's cars have 55-inch

(Please turn to page 202)



Winners' circle

Why racing "pros" prefer Perfect Circle rings—the piston rings to install for championship performance in any engine

Starting point to finish line—that's the toughest trip an engine can take. To maintain full-power performance, racing "pros" take extra care in picking engine parts. Their choice in piston rings: Perfect Circle.

PC-equipped cars have won 28 of the past 35 races at Indianapolis. Year after year, more major USAC events and NASCAR competitions are won by drivers using PC rings than any other piston ring brand.

The Perfect Circle piston rings that racing "pros" use are the *same* off-the-shelf rings you can install for championship engine performance in your car. They are *not* specially-made for racing. What does make them special is their lasting precision fit and long-life dependability in any engine.

The next time you install rings—or have them installed, be sure to stop oil loss through valve guides by installing Perfect Circle Valve Seals, too.



PERFECT CIRCLE

**PISTON RINGS • CYLINDER LINERS • PRECISION CASTINGS
TURBINE BLADES AND WHEELS • ELECTRONIC PROGRAMING EQUIPMENT
SPEED CONTROLS • HAGERSTOWN, INDIANA**

Plants and Subsidiaries: HAGERSTOWN, RICHMOND, NEW CASTLE, TIPTON AND RUSHVILLE, INDIANA
THE PERFECT CIRCLE COMPANY, LTD., DON MILLS, ONTARIO, CANADA • SCHELLENS TRUE CORPORATION,
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ARGENTINA, AUSTRALIA, BRAZIL AND FRANCE

(Continued from page 200)

treads) and the engine sits straight up in the car. Since 1957, the chassis have been offset to the left one inch. Some builders use a greater amount of offset, but Watson says an inch is enough.

In 1957, when cubic-inch displacement limits were reduced from 274 inches to 255 (4.2 litres), Watson again pioneered Indy practice by reducing the stroke of his engines one-quarter inch from $4\frac{5}{8}$ to $4\frac{3}{8}$ inches, while other mechanics were merely reducing the bore. To get further benefit from the reduction of crucial piston speed, he shortened connecting rods from 8 to $7\frac{1}{2}$ inches. The result was the raising of peak r.p.m.s from 6200 to 6600.

The typical Watson-built car weighs in at around 1600 pounds, (the car set up for Rodger Ward will be 100 lbs. less with aluminum hubs front and rear, and an aluminum gas tank). This may seem overweight when compared with 1000 to 1100 pounds of Thompson and Gurney's cars, but it's there for what has always been a good reason, and not because of sloppy engineering.

Up until 1962, the Indianapolis Motor Speedway was surfaced largely with red bricks—hence its nickname—"The Brickyard." As the Offy engine developed greater power and winning averages crept up to the 130's and 140's, mechanics and designers learned that to survive 500 miles of pounding on the bricks, their chassis had to be beefy. Whenever a designer attempted to pare off the pounds by eliminating bulky strength, his car was an almost sure bet not to finish.

No Bricks to Batter

But, by 1962 the Speedway had been almost completely resurfaced with butter-smooth asphalt and cars no longer took the battering of the bricks. However, the lighter designs have not yet won, so there has been little incentive to cut weight and size that may no longer be needed. That the designers of conventional roadsters will be watching the "new era" cars closely on May 30th is an understatement.

However, Gurney and Graham Hill will not only be pitting their skills and their new designs against Watson-style roadsters, they will be bucking over a half-century of Indy statistics and a cumulative thousand or so years of Brickyard know-how locked in the minds and reflexes of the hundred or so regulars among participating drivers and mechanics.

Statistically, it takes four cars brought to the track to insure one crossing the

(Please turn to page 204)



New STANLEY Sabre Saw with TILTING BASE . . .

cuts into, up to, around, across and through just about anything. Angle cuts from 0° to 45° left, 0° to 30° right. FLUSH Cuts right up to a wall and parallel to the wall. Cuts curves, pockets, scrolls, intricate patterns. POWERS THROUGH 2" x 4" lumber, electrical conduit, $\frac{1}{2}$ " steel bars, aluminum, other metals. AT BETTER STORES EVERYWHERE, at a new low price of \$44.50. Non-tilting base, \$34.50.

STANLEY POWER TOOLS

THE **STANLEY** WORKS

NEW BRITAIN, CONNECTICUT



Left: Lever action rifle Model 250, \$56.95. Center: Semi-automatic rifle Model 290, \$52.95. Right: Pump action rifle Model 270, \$52.95. Specifications: Magazine Capacity—21 Short, 17 Long, and 15 Long Rifle cartridges interchangeably. Sights—Rear: Square notch, adjustable for elevation and windage. Front: Square post on streamline ramp. Receiver—Grooved for tip-off scope mounts. Bolt—Engine turned. Barrel—20 $\frac{1}{2}$ " ; 1 turn in 16"—right-hand twist. Overall Length—39". Stock Dimensions—Pull—13 $\frac{1}{4}$ " , drop at comb 1 $\frac{1}{4}$ " , drop at heel 2 $\frac{1}{4}$ " . Weight—5 lbs., approximate.

Winchester still believes 22's are real rifles.

Here are three new Winchester 22's: a lever, an auto, a pump. Which would be your favorite small game rifle?

These are man-sized rifles. Plain hard-working guns with plenty of guts instead of fancy frills.

Here's the heft, the feel and the honest wood-and-metal workmanship that have always placed a Winchester above the pack. These new 22's are hunting rifles, designed to deliver plenty of firepower just where you want it—for years and years and years.

If there's one word men have used most to describe why they won't be without a Winchester it's the word "honest."

An honest rifle being one that a man on a hunt can depend on—no matter how tough the going gets. When you're packing a Winchester you can be pretty sure it'll work and shoot where you point it.

That's as honest as a rifle can be. That's a real rifle. That's the only kind of rifle Winchester makes.

WINCHESTER *Western* **Olin**
WINCHESTER, WESTERN DIVISION

Ford Vs. Chevy at Indy

(Continued from page 202)

finish line. Each year 60 or 70 cars are rolled into the pits during qualification, but only the fastest 33 make the race.

Of these, historically, 15 to 17 cars are fated to complete fewer than the 200 laps that make the race. See how they fell by the wayside in 1962:

Cars #96, #19, #67, #83, #45, #29, #17—pulled off the course by the driver—wrecked or spun out.

Cars #9, #32, #53—out of race due to magneto trouble.

Cars #26, #21, #62—out of race due to engine failure.

Car #88—out with broken steering gear.

Car #1—out of race due to lost wheel following pit stop.

Car #18—out of race due to oil leak.

Car #34—out with ruptured oil seal.

Those are some reasons why they didn't finish. Now for some clues as to why 13 of the 16 who did finish didn't make the big money. You'll find them in the pit stop records under remarks like "transmission adjustment," "replace spark plugs," "replace magneto," "add water," "adjust throttle linkage." (These are other than the usual replacement of worn tires and

adding of fuel.) All tell the story of precious seconds lost in a race where the winning car may cross the finish line only 40 or 50 seconds ahead of the man who finished fourth.

As the records show over the last several years, A. J. Watson has been able to keep his own cars (the ones on which he personally supervises preparation) near the winner's circle much of the time.

PM's reporter Pack Bryan, a writer steeped in Speedway lore, called Watson to find out his "secret."

Says Bryan: "We went over the list of drop-outs with him and, interestingly enough, learned no special tricks or secrets. He felt that much of his success has been due to luck." Then he contradicted himself by saying, "We believe in being thorough. We try to get to the Speedway early in May, ready to race. Of course, we're working on the car all the time, right up until the race itself, but by going over and checking everything ahead of time we feel we can get a head start on those dozens of little problems that are bound to crop up. It also gives us more time to practice pit stop procedures."

Illustrating this thoroughness, Watson was planning dynamometer tests on the

(Please turn to page 206)



**Rugged,
sure!
But just
an old
softy
inside.**

Here's the outside story of this rugged Ranger boot. Eight inches high. Golden tan leather. A crepe-tone cushion outsole. It'll take on anything: vegetable, mineral, or animal. The inside story? Sheer, solid comfort. Sure, solid support. There's a wedge heel, a steel shank and a Chrotan sweat-resistant insole. The smaller boot,



below, in spice tan glove leather, has cushion crepe sole, no-seam back, cushion insole. Insist on Ranger, the biggest name in utility shoes. Rangers start at 8.95. For nearest dealer, write Ranger, Endicott Johnson, Endicott, N. Y.

RANGER

A quality product of Endicott Johnson

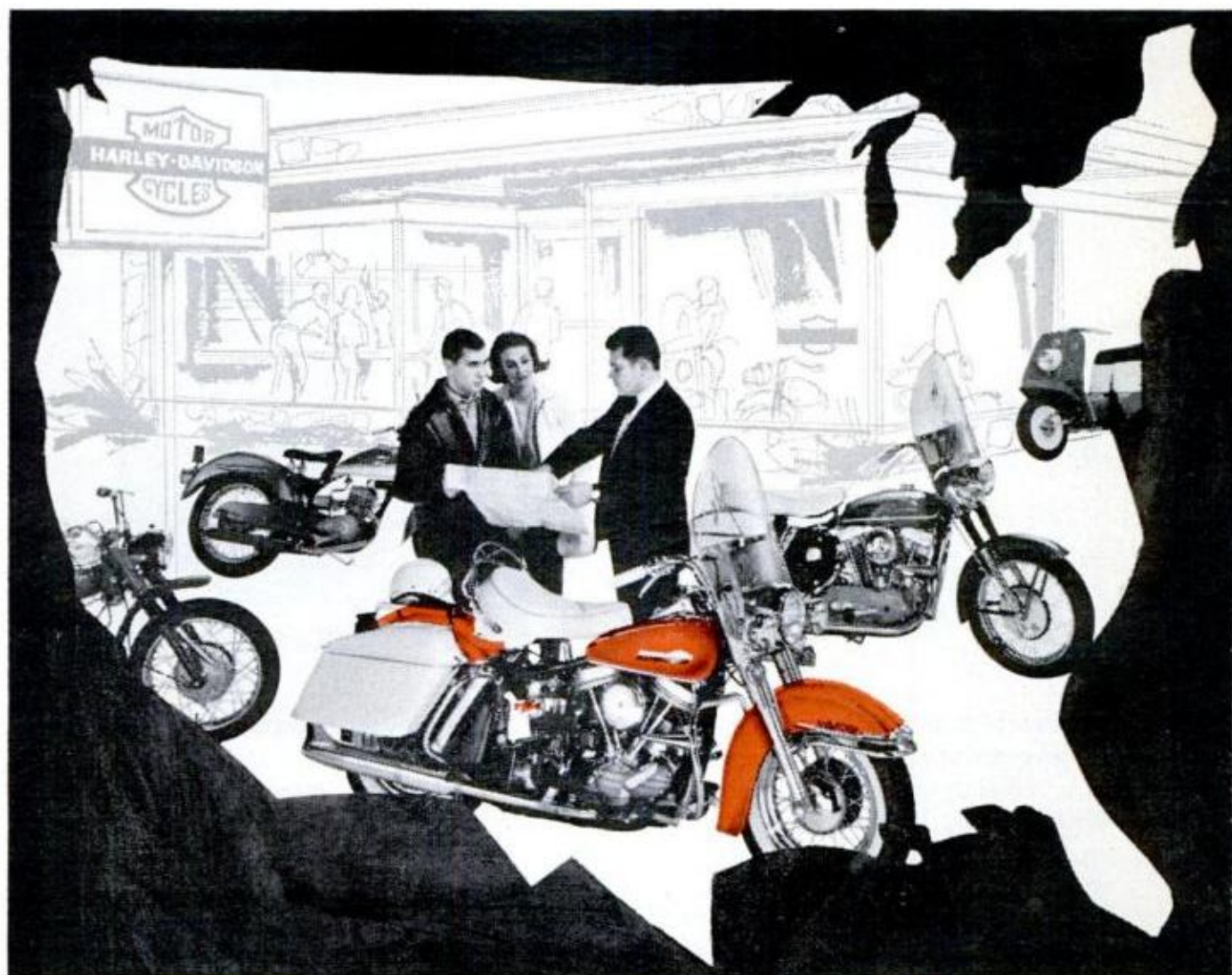
Your home away from home...

Wherever You Go!

It's nice to know that, wherever you go, you have "a friend in town" . . . the Harley-Davidson dealer. Stop in for a chat; for directions; for service; for answers to your questions about motorcycle performance; or for information about local motorcycling activities. You'll find the Harley-Davidson dealer is genuinely interested in you . . . that his unmatched motorcycling know-how and the very best in service

are yours for the asking. Stop in soon. Let your Harley-Davidson dealer round out your riding pleasure with this exclusive combination:

- 8 basic motorcycle models
- Choice of power, styles, colors
- Hundreds of special accessories
- The snappiest scooter on wheels
- Smartly styled clothing
- Countless mechanical options
- Service and parts
- Unmatched experience.



HARLEY-DAVIDSON
MOTOR CO., MILWAUKEE 1, WISCONSIN

Ford Vs. Chevy at Indy

(Continued from page 204)

engine for Rodger Ward's 1963 car in early February. In a typical year, team leader Ward's car (usually a brand-new one) arrives at Indianapolis with virtually a new engine. After carefully checking the block and crankcase, Watson replaces all moving parts which might possibly fail from fatigue.

Some mechanics feel that you shouldn't use new parts until they've been tested in a running engine, he says. "We feel, though, that the material used to make these parts is good and that we can rely on them."

Why Magnetos Fail

Hardly a year goes by that one or more cars doesn't drop out of the race because of magneto failure. Pack Bryan asked Watson about this: why they're used, what causes their occasional unexpected breakdowns, what he does to minimize the problem?

'To begin with,' he replied, 'A magneto is a light, self-contained unit that's simpler to install and keep running than a battery-distributor arrangement. It will work just as well on a hot engine as a cold one

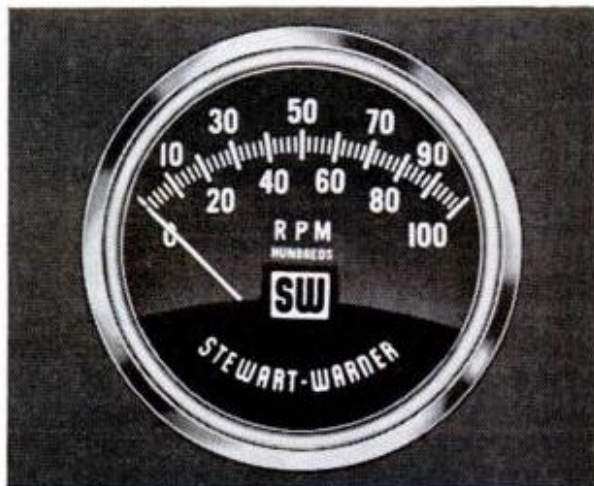
and gives a fatter spark the faster you turn it. The ones we use are an aircraft type, set up for us by Joe Hunt. They're actually designed to turn at about half the speed that we turn them, so there's one of your answers.'

'And, of course, old bugaboos of heat and vibration acting on the mag itself are still with us. The armature cools itself through its spinning action, but the field coils just sit and get hot. The heat comes not only from the action of the mag itself, but also from direct, solid contact with the engine. We run a big hose from the opening in the front of the car and direct a blast of cooling air on it. For obvious reasons (durability and prevention of driver fatigue) we try to have our engine running and the car itself rolling as smoothly as possible, so that takes care of the vibration problem.

'You can never be sure, though,' he continued. 'Many mechanics stick on a new mag for the race, to take no chances. Last year, the night before the race, I was looking over three good magnetos, one of them new. I couldn't make up my mind since they were all good as far as I could tell. I flipped a coin and the new mag won.' (And so did the car—Ed.)

(Please turn to page 208)

for perfectionists!



A Stewart-Warner Tachometer can help you achieve an operating efficiency that just isn't possible with less sensitive tachs. With Stewart-Warner, rpm changes show up instantly. Accurately! Even at high speeds, there's no lag or overrun. You just "follow the needle" and set your shift pattern accordingly. You avoid over-revving and keep your engine operating in its most efficient rpm range. No guesswork about it!

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10,000 rpm with segment and full sweep dials...2 $\frac{5}{8}$ " or 3 $\frac{3}{8}$ " diameter. All easy to read, designed to complement any dash. Make your choice today from the most complete line of automotive instruments in America. *Stewart-Warner!*



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New Johnson Compacts

So dependable, they all have a 2-year warranty!

Above is the Sea-Horse 3. Home in the teepee are three other power-packed papooses: the 18 (at right), 10 and 5½ hp models.

The spunky 3 has a built-in fuel tank plus, as a new accessory, a fuel pump and separate 6-gallon tank to boost cruising time to 17 hours. The 18, 10 and 5½ offer thermostatic cooling, super silencing, cushion-hub prop and built-in gear shift.

The same 2-year warranty policy — *good for parts and labor* — also applies on the new 75, 40 and 28 hp models. For free catalog, write: Johnson Motors, 1360 Pershing Rd., Waukegan, Illinois. Division of Outboard Marine Corp.



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SPORTLITE FILMS, Inc.
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Dept. PM, Chicago 6, Ill.

Ford Vs. Chevy at Indy

(Continued from page 206)

We'll add another factor here, not mentioned by Watson, that can't help but contribute to his success.

Cleanliness.

Watson's garage and crew are always among the cleanest at the Speedway. There's a place for every part and tool, and it's always there. This indicates a thorough, careful old pro outlook that avoids the last-minute, "where-is-it-Oh-Gosh-here-it-is-on-the-floor-we-should-clean-it-but-we-haven't-got-time" frenzy.

Like most of the mechanics in the Speedway's Gasoline Alley, Watson covers the floor of his garage with a light-colored linoleum. It is easier to clean and cushions dropped parts and tools.

Watson cars are "clean," too. Lift the hood and the engine looks almost lonely sitting there. There's not a lot of trick hardware or tin-work, no miles of plumbing and wiring going all over the place. There seem to be fewer pieces to break or fall off and everything is held in place securely and neatly.

The days of baling wire, screen door springs, and friction tape are long gone from the Speedway because of the high speeds and tremendous stresses put on the cars. But there are still some mechanics who, because of a shortage of time or money, are forced to resort to jury rigs to get their cars running.

Outfoxing the Oval

In addition to beating the sturdy Offenhouser "old-pro" drivers like Rodger Ward, A. J. Foyt, Len Sutton and Eddie Sachs, and the "plan ahead" perfectionism of the A. J. Watsons, the Grand Prix drivers and their Ford- and Chevy-powered cars have to beat Indy's oval itself.

As Dan Gurney pointed out to *PM* editor Tom Stimson, the Speedway is simpler but not necessarily easier than the European tracks. Its four, banked left turns look identical, but actually each is different at high speed. This is because of variations in the settlement of the earth, differences in compaction, differences in drainage. As a matter of fact the turns change from year to year. The difference is so great that if you set up a car's suspension for one of the corners, performance goes down on the others. The final setting must be a compromise.

Another consideration is mileage; the 500 is about twice the distance of the average Grand Prix and speeds are higher, so mechanical and driver endurance is a greater factor. Then, too, at high speeds

(Please turn to page 210)

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GREASELESS-STAINLESS**

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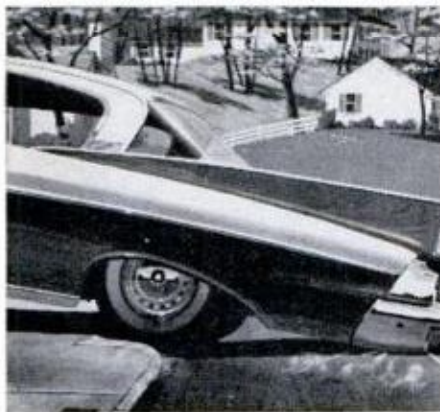
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PM-5-63



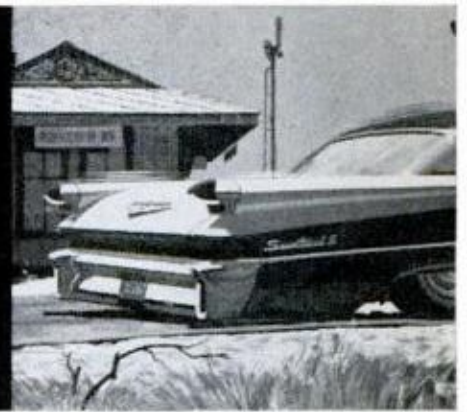
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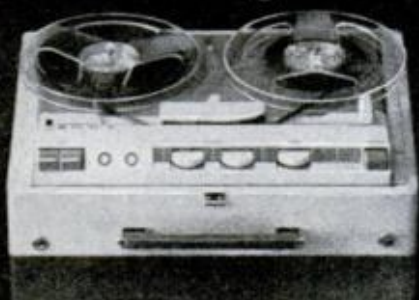


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210

Ford Vs. Chevy at Indy

(Continued from page 208)

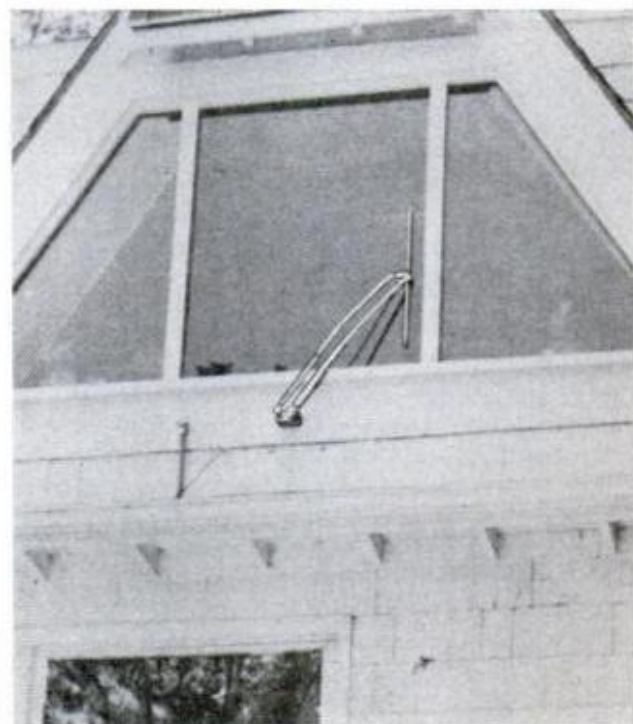
the slight breeze that usually prevails at Indy takes any monotony out of the two long and two short straight aways per lap. When the wind shifts, the unwary can find new and exciting problems at 160 m.p.h.

So there you have it, the background of the 1963 Memorial Day 500. Radical new cars, powered by light V8 engines developed from the bread and butter powerplants of the world's largest auto-makers, Ford and General Motors, and driven by drivers with world-wide racing experience.

These combinations face the sturdy Offenhauser roadsters of Watson and Kurtis with their almost monotonous records of success year after year at ever higher speeds—cars which will be driven by the hottest of the U.S. rookies and the shrewdest of the old pros, and serviced by one of the most professional group of racing mechanics in the world.

Who will win? At this point few would care to predict. But one thing everyone knows: the first man to complete lap 200 this May 30th will know he's been in a race! ★★★

Room with a View



Just as on a car, a huge windshield wiper arm and blade clean the den picture window of Frank Sprague, a windshield wiper manufacturer in Michigan City, Ind.

The assembly is powered by a windshield wiper motor, operated by compressed air. It allows a clear view during rainstorms when moisture hits the window.

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I'm interested in CAR OWNER FACTS BOOKLET
 BEAR SCHOOL BEAR SERVICE AS A BUSINESS OPPORTUNITY

Owners Report—Chrysler

(Continued from page 83)

"I like most its maneuverability and cornering. I drive 45,000 miles per year and these features are important. I find that the car holds the road beautifully."
—New York traveling salesman.

"The car's torsion bar suspension is terrific. For high-speed highway travel there is no car that holds the road better or is easier to control."
—Ohio salesman.

Even happy owners, of course, find some points they dislike. Here are the five mentioned most often, in order of frequency:

"I am a short man (5'6") yet haven't sufficient headroom with my hat on. Headroom should be increased by at least one inch."
—Indiana engineer.

"Not enough headroom when getting in auto while wearing a hat."
—Illinois school administrator.

"With the low roof line, when I get in and out, my hat is always knocked off. And, when driving, my hat hits the sun visor when it's not in use."
—Maine retiree.

PM testers agree in part. Tall drivers do find hatroom scant although it seems OK for heads. Owners should note that Chrysler front seat bases are designed for semi-permanent vertical and horizontal adjustment by loosening or tightening four bolts on the seat support side plates—a nifty idea.

"I don't like the low top because my hat brushes the roof while driving."
—Ohio steel worker.

"Visibility in driving is very good, but not when backing up as I can't see the rear fender."
—New Jersey crane operator.

"The post between rear side windows and large rear window is too large, sometimes obstructing driver's view when parking and passengers' view when sitting in back."
—New York garment buyer.

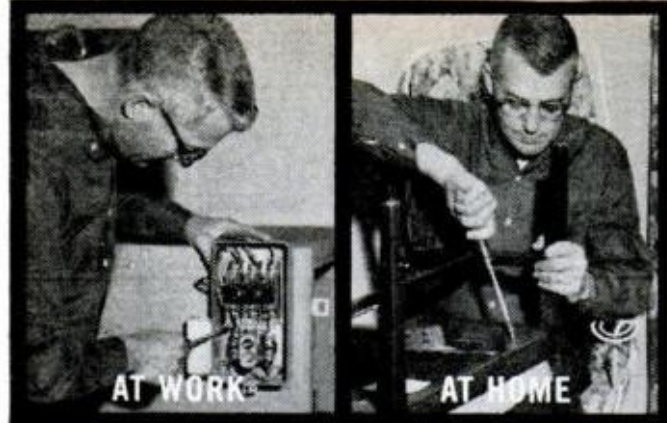
This T-bird syndrome is a legitimate complaint that's heard in similar form about any car where stylists have replaced glass with steel in the rear quarter panel. But almost every time that it's been done sales have increased.

"The rear corner posts are too wide and create a blind spot in the rear-view mirror, especially after passing another vehicle."
—Michigan electronics technician.

"Performance is very poor on regular gasoline."
—Washington D.C. library assistant.

"Am forced to use the highest octane (102-103) gasoline on the Pacific Coast to eliminate knock."
—California marketing supervisor.

The 10.1 to 1 compression ratio engine in PM's test "300" was also sensitive using
(Please turn to page 214)



WHEREVER YOU USE A SCREWDRIVER— A QUICK-WEDGE® DOES IT FASTER, EASIER

because a Quick-Wedge® Screw-Holding Screwdriver holds, starts and drives the screw . . . straight! With a Quick-Wedge® there's no more fumbling with the screw . . . it's held tight, until YOU choose to release it. Every screwdriving job is easier, even in "hard-to-get-at" places. Prove it to yourself, use a Quick-Wedge®. You'll never be without one. **THEY'RE FULLY GUARANTEED!**



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CUBA?

History reports itself while it is happening, in English, from the Caribbean . . . Moscow . . . New Delhi . . . London . . . Laos . . . Little America . . . and very soon, the Moon. Be there tonight on a hallicrafters.



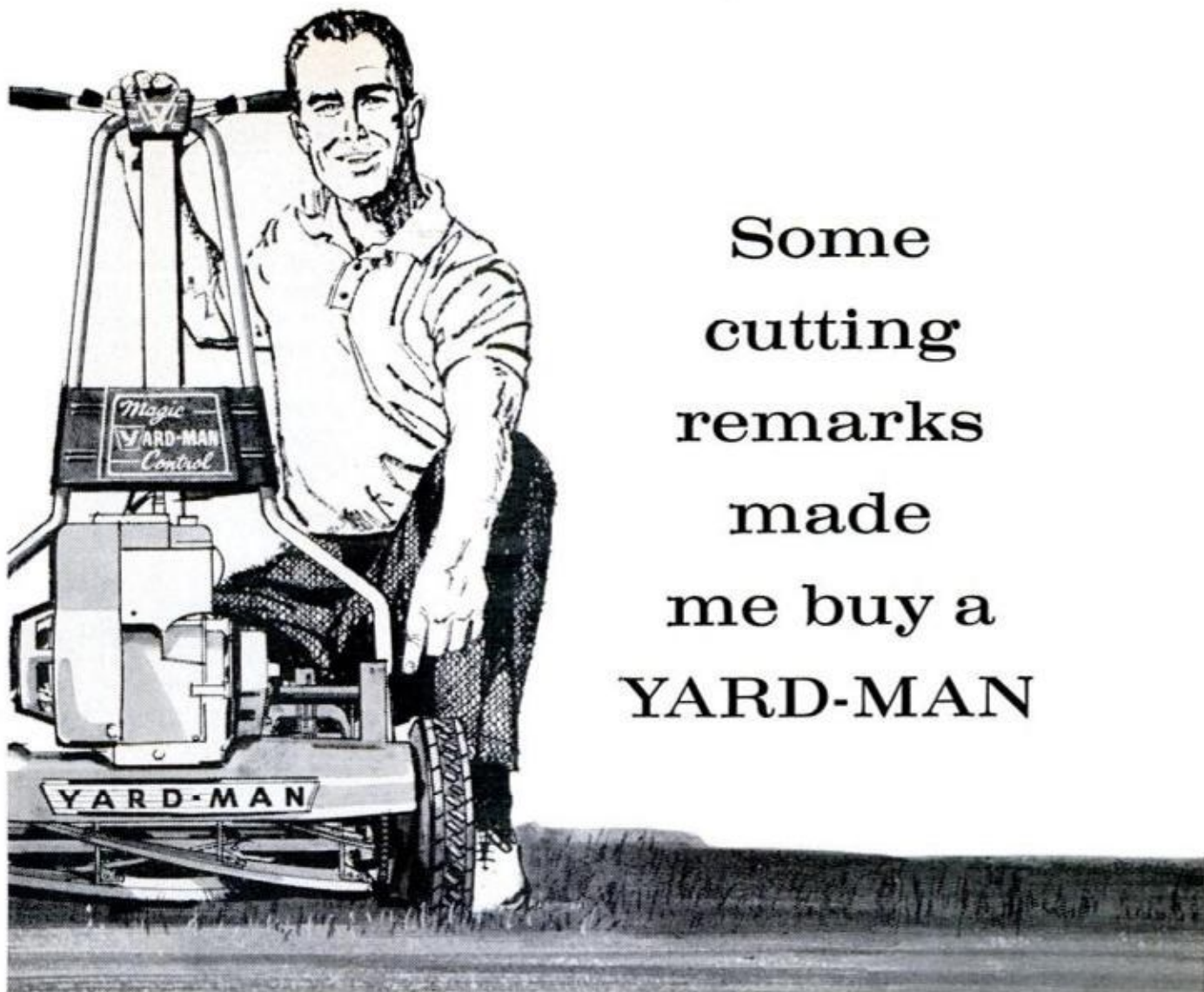
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hallicrafters

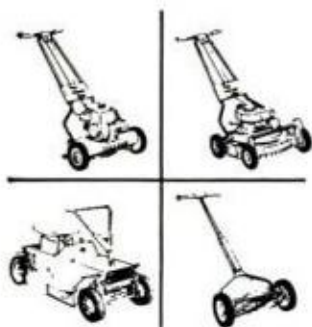
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Some
cutting
remarks
made
me buy a
YARD-MAN

I began lawn care with a "bargain" mower and found it didn't pay. I'd also been left in the state of confusion by too many claims and gimmicks concerning lawn mowers. Recently, however, a Yard-Man dealer brought me back to earth with a few "cutting remarks" that make a lot of sense. He pointed out that the basic function of any mower is to cut grass correctly, safely, and easily. For this purpose the heart of the mower is the cutting blade, and this is just one place where Yard-Man has the "edge" on other mowers. Yard-Man cutting blades are made only from austempered steel. They are tougher than tough carbon steel and take a factory sharp cutting edge and keep it for an entire lawn mowing season. Smooth grass cutting, the full length of the blade, is assured by Yard-Man's exclusive, easy adjustment at all three vital points . . . the wheels, the roller and the bedknife. Each blade of grass is cropped with a crisp sealing action leaving the lawn green and healthy. Yard-Man offers you grass cutting at its finest, and with all the convenience and ease of a top quality lawn mower. This is YARDMANship! Ask your local dealer to demonstrate for you.



YARD-MAN INCORPORATED

Dept. M, Jackson, Mich.

Manufacturers of the famous Silent Yard-Man
Hand Reel, Power Reel, Rotary and Riding Mowers.

Owners Report—Chrysler

(Continued from page 212)

Premium fuel. Either Super Premium or a slight retarding of the spark eliminated it.

"It would be a tremendous car if it were assembled with *any* care at all."—New Mexico electrical engineer.

The 6.4 percentage of Poor Workmanship complaints is higher than average, but even so more than 85 percent of all owners had no complaints regarding lapses in quality control during manufacture.

"Does not have a finished look around windshield wipers. Also, poor fit around hood cover and grille-work."—Florida retiree.

"Window washers were not connected; the horn didn't work; car needs a general 'tightening up.'"—Texas office worker.

"Automatic transmission gear buttons are not lit up; therefore, are not familiar when driving at night. I cannot read the different gear shifts as it's badly located and dimly lit."—Pennsylvania sales manager.

"Transmission pushbuttons should be back farther where easily reached and printing on them is hard to read. Moreover, the buttons are bunched too close together, so it's hard to get a finger on just one of them."—Washington, D.C. movie projectionist.

One way to silence these complaints . . . go back to steering post lever control.

"Pushbuttons on transmission are too small and inconvenient to operate."—Wisconsin electrical engineer.

"I would put the drive button on top and the reverse button on bottom."—California salesman.

Here are numbers 6 through 10 of the most-frequently-mentioned features PM's owner panel liked:

"There is more than enough legroom in the rear seat of the car."—Arizona retail store manager.

"I like the front-end design that gives you a better view of the road when driving."—Pennsylvania serviceman.

"I can use standard gasoline in it which I could not do with my Buick."—Louisiana dentist.

"I like the good styling, comfort and economical operation."—Georgia auto mechanic.

"Excellent riding, smooth performance and it's economical to drive—17.9 on trips, 15.9 overall."—Pennsylvania phone company manager.

"It gives luxury car performance on regular gas."—Illinois nurseryman.

(Please turn to page 216)



the difference is PLA

Look at the models that win competitions and you'll see the difference PLA enamels make. One coat covers. But new, instant-drying SPRAY PLA enamel lets you apply 10 coats in ten minutes. And with each coat, you add dramatic depth and beauty. Brush on PLA for the little finishing touches. Hundreds of color combinations possible with transparent SPRAY PLA colors over metallic base coats. PLA for trim, in 54 colors—15¢ each. SPRAY PLA in 25 matching colors—69¢ each.

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THE TESTOR CORPORATION Rockford, Illinois

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GROOVE-JOINT PLIERS

With the new 8-inch size added, you can get any size of this useful every purpose tool . . . from the handy little 4-inch ignition plier, to the giant 16-inch—the largest plier made—with jaws that open parallel up to 4 1/4 inches . . . All fully nickel-chrome plated.

"There is nothing finer than a DIAMOND"

Be sure and ask your dealer for
Diamalloy Groove Joint Pliers.

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**STAINS
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MAY 1963

NEW DELTA Fast-Flo

**HIGH-VOLUME
BILGE PUMP
SUBMERSIBLE**

MODEL A1100 **\$1995**



- Pumps 10 gallons a minute against 3' head.
- Easily handles salty, sandy and other contaminated water. No screens to clean.
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- Fully guaranteed.

NOW AVAILABLE . . . 6-V Model A1106 . . . \$21.95



POWERhorn Far-reaching resonant tone. Solid brass with heavy chrome finish. Motor is permanently sealed. Tone unaffected by vibration. 12-V. Model A-2998, \$12.95

FREE—Marine catalog. Write today.

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Delta Electric Co., 323 W. 33rd Street, Marion, Indiana

*"Messenger" CB Transceivers...rated
BEST in Nation by Electronic
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*New impartial survey by leading electronic magazine shows Johnson "Messenger" Transceivers rated "BEST"—BEST BY NEARLY 50% OVER SECOND CHOICE BRAND.

4 feature-packed "Messengers" . . . and Selective Call System outperform everything!

Compact, Hand-Held—100 milliwatt or 1 watt "Personal Messengers". Rugged and reliable—11 transistors, 4 diodes! Twice the sensitivity and 40% more range than similar units with conventional circuitry—more output than similar units with same rated inputs!

Mobile or Base Stations—performance proved Viking "Messenger" and new "Messenger Two". Punches your signal across the miles—high efficiency design makes full use of maximum legal power. Excellent receiver sensitivity and selectivity. Automatic "squelch" control—5 or 10 channel coverage—easy to install anywhere!

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NEW! TEN POWER TELESCOPE



THE BALSCOPE TEN

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■ For the first time, due to a manufacturing breakthrough... a *quality* telescope for only \$9.95! Ideal instrument for all kinds of nature study, for vacations, for all outdoors. No clumsy draw tube—focus with a single turn of the eyepiece. Only 10¼" long, and weighs just 9 ounces. Belt holster accessory at 98¢. See it at optical, photographic and sporting goods dealers. Made to American standards of quality by America's most respected optical craftsmen, Bausch & Lomb Incorporated, Rochester 2, N. Y.

BAUSCH & LOMB



Owners Report—Chrysler

(Continued from page 214)

True enough with Newport in proper tune.

"Uses 94 octane gas without pinging."
—Maryland policeman.

"I like the two-barrel carburetor for regular gas."—Indiana factory worker.

"I like most the quiet elegance of the interior."—New Jersey silk screener.

"I found no rattles in the car which is something unusual for any Chrysler Corporation auto."—Wisconsin welder.

About two years ago a rattle-free Chrysler product was the exception. For 1963 such cars are the rule.

"The body of the car is much sounder."
—Indiana mailman.

"Workmanship and quality seem much better."—Ohio advertising manager.

You get a thorn with every blossom. Here are others that Chrysler owners found in their cars, shortcomings number 6 through 10:

"The lowness of the door is a problem for taller people."—New Jersey college professor.

"The brakes react quickly but sometimes they do swing either right or left."
—Indiana insurance man.

True enough. Chrysler switched to self-adjusting, servo-action brakes this year and on some early production cars there have been problems. A total of 4.5 of owners responding mention brake problems.

"I've had trouble with extreme brake pull."—Michigan retail route salesman.

"Windshield wiper blades should be longer or overlap for better vision in rain or snow."—Pennsylvania die sinker.

Windshield and its frame are only visible parts left over from '62 Chrysler. The engineers just ran out of time and couldn't redesign everything. For a clue to what's coming, look at '63 Dodge and Plymouth windshield wipers.

"I've had trouble with the horn short-circuiting."—Kansas insurance man.

"I have a lot of air noises; I think it should be more soundproof."—Washington, D.C. machinist.

"Too much air noise around the doors."
—New York grocer.

To wrap up the compliments, numbers 11 through 16 are listed according to how many owners made them:

"Power steering is the greatest—does what I want it to do! And, there's no fatigue with it."—Michigan retiree.

"I like the safety features engineered into my Chrysler, especially the transmission locking system."—Ohio farmer.

(Please turn to page 218)

1963 BSA SUPER ROCKET



**delivers high performance!
reflects brilliant beauty!**

A famous and superbly designed twin cylinder sports motorcycle now improved for even better performance. Beautifully finished in blazing red enamel, with fully chromed fenders, and many other parts in chrome and highly polished alloy.

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YET IT CUTS THROUGH STAINLESS STEEL

Here is a saw that must be used to be believed. Razor-thin, yet it cuts through wood, plastic and metal. It never chips... never splits... always leaves a smooth edge. Perfect for precision cross-cutting and notching...for trimming that extra 1/8th of an inch...for sawing smoothly along the grain. Another quality tool from X-Acto. The Razor Saw with two different blades...only \$1.75. Refill blades always available. See the Razor Saw at all better hardware or homecraft stores or order directly from:

ANGLED HANDLE PREVENTS BARKING OF KNUCKLES.

OVERALL LENGTH: 9 1/2"



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Complete set
only \$1.75

How would you like a

SIDE LINE BUSINESS IN YOUR GARAGE?



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Ever thought about owning a small business in your home that would net you an extra \$100 to \$200 a month? A business that did not need a large investment and one that you could operate whenever you wanted to work? If you have a small space in your basement or garage, here's an exceptional money-making opportunity. Hundreds of others, just like you, have started such a business in their spare time, found it so profitable (90c out of every \$1.00 is clear profit) that they have quit their regular job to devote full time to this unique business. Since 1932 we have shown hundreds of men how to build a profitable service business with Foley Saw Filing equipment.

FREE BOOKLET TELLS HOW—This fact-filled booklet explains how you can start, how to get business from hardware stores, home owners, carpenters, schools, factories. It tells actual results of others whom I have helped start in business. Send coupon today. No salesman will call.

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BAR'S LEAKS

Specified by cooling system engineers at auto factories... then every 5,000 miles... stops engine block and gasket leaks... inhibits rust, scale... lubricates water pump seal... protects all metals, rubber, plastic... does not clog... use with anti-freeze, new or old... neutralizes acid.

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USED IN 4 OUT OF 5 CARS
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Gear up with **GRAVELY**
for All Your Mowing!

Choose from 5 with All-Gear Drive! Name the job—there's a Gravely mower for you. Choose from 50" Rotary Mower (above), 30" Rotary, 42" Sickle, 30" Reel, 75" Gang Reels. All powered by all-gear drive Gravely Tractor—powers 31 tools in all. Unique swivel action insures uniform cut every time.

Check your Yellow Pages for Gravely Sales and Service Representative. Or send for free, four-color "Power vs. Drudgery" booklet. Write Now!



TRACTOR DIVISION
Studebaker
CORPORATION

5705 GRAVELY LANE DUNBAR, WEST VA.

Owners Report—Chrysler

(Continued from page 216)

"Low wind resistance at touring speed."
—Texas editor.

PM found wind noise level satisfactorily low too.

"I like most the riding comfort, steering, braking and 'get-up-and-go' of the car."
—Ohio machinist.

"It has better than average braking ability."
—Ohio truck driver.

"I like the cornering and balance characteristics of torsion bar suspension."
—Illinois salesman.

Chrysler products have just about the best balanced suspension in the industry.

"Another reason why I bought our 1963 Chrysler was the five-year or 50,000-mile guarantee; in fact, this was the deciding factor between buying the Chrysler and another make of car."
—Massachusetts retiree.

The new warranty was an important consideration for 5.6 percent of all owners responding. In future years this percentage should climb as the Chrysler warranty proves its worth.

The final list of faults—numbers 11 through 16—are listed here according to frequency of mention:

"Door does not close properly; I had this defect with my other Chryslers."
—New Jersey salesman.

"Doors could fit better."
—California teacher.

"My specific complaint is rattles which indicates poor workmanship in assembly."
—Virginia research analyst.

"I've had problems with the automatic choke's sticking on three occasions."
—Michigan metallurgist.

"I've had trouble with a clogged jet in the carburetor."
—California aircraft worker.

"Paint seems to chip easily."
—Illinois judge.

"Exterior paint poorly worked down by abrasive agent."
—Florida auditor.

"I certainly don't like the whistling little windows and their horrible handles."
—New York teacher.

"When locking the wing vents on the front doors, one can get a finger squeezed slightly until he learns the workings."
—California accountant.

Pass us the Band Aids, please!

That wraps it up, a summary of the compliments and complaints of a representative group of 1963 Chrysler owners who've rolled up a combined mileage of 1,297,466 miles on their new cars in a few months of driving. ★ ★ ★

PLANER • MOLDER • SAW!



Now you can use this ONE power-feed shop to turn rough lumber into moldings, trim, flooring, furniture... ALL popular patterns. RIP... PLANE... MOLD... separately or all at once with a one HP motor. Use 3 to 5 HP for high speed output. Low Cost... You can own this power tool for only \$30.00 down payment.

Send postcard today for complete facts.

BELSAW POWER TOOLS, 903 Field Bldg., Kansas City 11, Missouri

Works in Seconds!



Loosens Rusted Bolts
nuts, screws, "frozen" parts!

LIQUID WRENCH

SUPER-PENETRANT

BONUS USE: Add to crankcase to quiet noisy valve lifters... remove gum, sludge deposits!

THEN ADD...

MOTOR-MEDIC

EXTRA LUBRICATION... SMOOTHER PERFORMANCE



Both at leading dealers everywhere!

KILL TERMITES yourself

with **Arab**
U-DO-IT



PROFESSIONAL TERMITE PRODUCT FOR HOMEOWNERS

\$95 Treats Avg. 5-Room Home Save as much as \$100 or more. Do the job yourself with this professional Chlor-dane formulation (government tests still effective after 12 years). Easy to apply. Thousands of satisfied customers. 5 yr. chemical replacement GUARANTEE available. If your lumber dealer can't supply you, send for further information to ARAB U-DO-IT, 2707 Winthrop, Indianapolis 5, Ind.

BVI **Painting is Easy!**
ELECTRIC PAINT SPRAYER

Powerful built-in 110 V. AC Motor

Just plug in and Spray

Fully Guaranteed



Pull trigger to spray paint, varnish, enamel, mothproofers, garden sprays, weed killers, insecticides, 3-7 times faster than a brush, easier to clean, too. Completely self contained, Sapphire nozzle, instant heavy or light spray adjustment, 24 oz. graduated jar. Foolproof and trouble-free. Less than \$14.00 at dealers everywhere. Burgess Vibrocrafters Inc., Grayslake, Illinois



NEW HYDRAULIC CYLINDERS
Hvy Duty 2000 P.S.I. Air-oil
FOB KC under 20 lbs. add 15% PP

| Bore | Stroke | D. Shaft | Long | Double Action |
|--------|---------|----------|---------|--------------------|
| 1 7/8" | 3 1/4" | 3/8" | 13" | 5 1/2 lbs. \$ 4.50 |
| 1 5/8" | 2 3/4" | 1" | 13" | 11 lbs. \$10.95 |
| 2 1/4" | 4" | 1 1/4" | 13 1/2" | 5 lbs. \$ 8.95 |
| 2 1/4" | 4" | 1 1/4" | 24" | 12 lbs. \$12.95 |
| 2 3/8" | 13" 15" | 1 1/2" | 30" | 11 lbs. \$14.50 |
| 3" | 10 1/4" | 1 1/2" | 19" | 15 lbs. \$12.95 |
| 3 1/4" | 10" | 2 1/8" | 23" | 29 lbs. \$15.75 |
| 3 1/2" | 14 5/8" | 1 5/8" | 21 1/2" | 17 lbs. \$34.75 |
| 1 7/8" | 7 1/2" | 2" | 21" | 35 lbs. \$24.75 |

Hyd. cylinder D.A. 2 5/8" bore x 3" stroke 1" D. shaft with 4 way control, valve rated 7000 lbs. \$12.95.

Bendix Vacuum Air pump 17C.F.M. 24" HG Press 20" HG suction. Good \$9.95. New \$12.50.



Centrifugal Elect. water pump for boats, trailer, camp, cabins has motor 12-24VDC delivers 2-300 G.P.H. & variable rheostat heavy duty 1/2" intake port 1" hose outlet \$8.95.

New open center 4 way control valve #10080 with adj relief for 1 to 4 D.A. cyl. 3/8" ports \$12.95. New Hyd. Solenoid control valves 3 way 12-24 VDC 1500 PSI \$6.95 per pair.

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1200GPH pump with 1HP motor 12-24VDC 26amp water-fuel \$12.95.

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IT'S EASY to measure with a Rolatape. Totalizer visually records measurements in feet and inches... gives precision accuracy every time. Does an hour's work in 5 minutes. No tapes to wind, no helper required.

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Rolatape MEASURING WHEELS

SHOOT A STAPLE WHEREVER YOU'D DRIVE A NAIL!

Same Machine uses 6 Staple Sizes



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No. T-50 All-Purpose STAPLE GUN

Available at Hardware, Building, Lumber and Stationery Dealers Everywhere. **ARROW FASTENER CO., INC.** 1 Junius St., Brooklyn, N. Y.

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Handiest tool you'll ever own. Moto-Tool's high speed (27,000 rpm) is ideal for precision grinding, drilling, polishing, carving, engraving, deburring, sharpening. Does fine detail work with pin-point accuracy. Eliminates time consuming hand work, gives the finished job a professional look. Weighs only 13 oz. — handles easily as a pencil. Fastest, most powerful tool of its kind. Widely used by tool and die makers, model builders, gunsmiths, repair men, schools



No. 2 Moto-Tool only.....\$19.95
No. 2 Moto-Tool Kit..... 29.95
(Incl. No. 2 Moto-Tool & 23 assorted accessories in steel case)

NEW HEAVY DUTY NO. 3 MOTO-TOOL

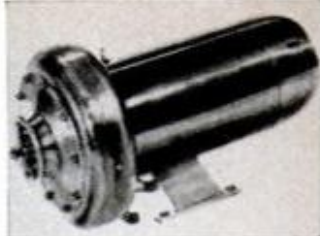
New high torque motor designed for industrial use. Same features as No. 2 plus 50% increase in power. Weighs only 18 oz. Complete with 1/4" and 3/2" collets and finger grip in steel case...\$29.95

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Screamin Demon
20 H.P.—Wt. 15 lbs.
Built From Easy to
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Length 15", Dia. 8 1/2". Fuel-Gas or Kero. Ideal project for serious-minded hobbyists, students, scientific and industrial classes. Make on 9" metal cutting lathe with milling attachment. Use on boats, small cars, industrial, etc. Full size assembly drawings with critical dimensions, bill of materials and photos. Price \$5.00. No C.O.D.
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MINEOLA, N. Y. — SEE YOUR LOCAL STORE

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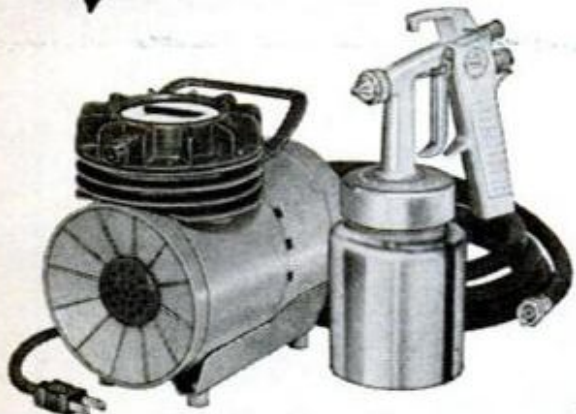
Increases gas mileage

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Motorized! Ready to plug in and spray! Use it to paint anything, from a toy to a house. Does an hour's painting in just minutes. Pays for itself on the first big job. Also use it to spray insecticides, weed killers, liquid fertilizer; vacuum, tire inflator, etc. A real professional tool needed in every work-shop. Ask for Speedy Sprayer "Compact" No. 404, **\$39.95**

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USED ONLY WHEN WANTED... DOES NOT INTERFERE WITH OPERATION OF REGULAR SWITCH

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Professional Electric Arc Welder. Ideal for Home, Shop, Farm or Industrial use. The handiest tool in your workshop. Weld, Braze, Solder, Cut, Bend all metals. Do expert work on your first job. Build or repair Boats, Trailers, Auto Bodies, parts, fenders, metal and ornamental iron furniture, fixtures, farm equipment, garden tools, bicycles, toys, etc. Operates on any properly wired 110 V. A.C. line. Complete with helmet, arc torch, electrode holders, flux, rods, cables, instruction book. **FULL YEAR GUARANTEE.** 10 day money back trial. **ONLY \$38.50 f.o.b.**

Only \$38.50 f.o.b. Send only \$6.00 check or m.o. Pay postman balance plus charges. **EASY PAY PLAN.** Low down payment. Pay as you weld.

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TUB CAULK • TILE ADHESIVE

Pure White • Elastic
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Sticks like glue! 101 Household Uses!



\$SAVE!  **\$SAVE!**

ASSORTMENT-60 COMPRESSION SPRINGS. Same high quality as supplied to industry. 2 each of 30 sizes. All 10" long. Dia. 1/32" thru 1/2". Just cut to length required for spring you need. Price \$8.90. Send check or money order. No C.O.D.'s.

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IF YOU PRIZE IT...KRYLON-IZE IT!

Stereo in a Suitcase is handy for toting or packing along in any car trunk. The June PM tells how to build it, complete with plans.

GUNK® removes grease
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- power mowers • engines
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MAY 1963



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Emperor
makes
yard
care

*fun!
easy!*

This powerful 6 h.p. riding mower saves time and work on many tough, year 'round Gard-N-Yard jobs! Ariens EMEROR mows, aerates, rakes, rolls, fertilizes lawns; hauls carts . . . plows snow. Choice 32" or 26" rotary mower. Has rear-mounted 6 h.p. engine for extra traction, stability . . . 4 speeds forward; reverse—fingertip controls. Built for long service—priced to save money!

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PROTO VACUUM
GAUGE AND
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221

Odors on Order

Shampoos that smell like beer, plastics with the odor of leather, pet soaps that impart a chocolate fragrance to a dog, and nylons that are reminiscent of a lilac patch—all these are examples of built-in smells that attract your nose and dollars. Recently, America's smell-merchants have become increasingly cognizant of the influence that odor, like color, has on the buyer's motivation and his pocketbook.

Repeated merchandising tests have shown that a specific odor can make the difference between the sale of a product and its complete failure—even if the aroma has no relation to the product.

For example, a panel of female testers was provided with two selections of stockings and asked to pick the box they liked the best. Without exception, they chose the same box—giving appearance and sheerness as their principal reasons. Aroma was not mentioned, but the stockings selected had been impregnated with a floral odor. The two groups of hose were identical with the exception of the scent.

Odors May Be Masked

Odor masking, on the other hand, is the process of obliterating one odor by superimposing another to create a more pleasant aroma. Giving fertilizer a pleasant odor is an example of this type of "smellology." The product usually smells like a stock yard on a hot day. Sales of one brand were increased after the bags were sprayed with a "new-mown-hay" scent.

When vinyl raincoats were first on the market, the stench was overpowering. Treated with first a deodorant, and then a reodorant, they have become pleasant to have around.

Paints, in addition to plastic products, are another example of the use of a reodorant to give a product a new scent. Not long ago, it was necessary to stay away from a painted room for days. Reodorants added to the solvent by manufacturers have eliminated the overwhelming painty odor so that a newly painted room can be used immediately. The hissing aerosol cans used in the home are almost exclusively manufactured with either a masking perfume or reodorizing fragrance—or both. These include room fresheners, furniture polishes and waxes.

Mixing scents is a ticklish business and perhaps reaches its high point in the manufacture of perfumes. There are expert perfumers whose sense of smell is so acute that they can mix precise amounts of 100 or more ingredients and detect by smell whether the odors of resulting blends are correct for use in perfumes.

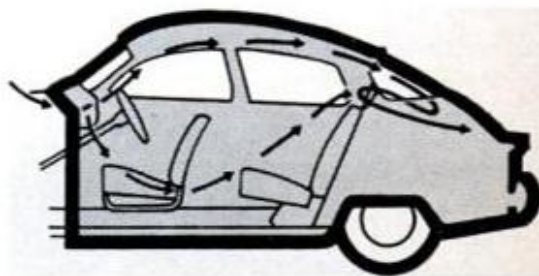
1963 SAAB . . . built so well



SAAB STANDARD EXTRAS place complete comfort and convenience within easy reach of its driver. At no extra cost, SAAB provides: electric clock, temperature and fuel gauges, ammeter, on easy-to-read instrument panel; heater and defroster to warm or cool car interior as required and keep all windows fog-free; dual padded sun visors; cold start control, ventilator shades, and carburetor preheater for instant starts in any weather; windshield washers, lockable glove compartment; safety belt fittings; factory undercoating—all *standard equipment!*

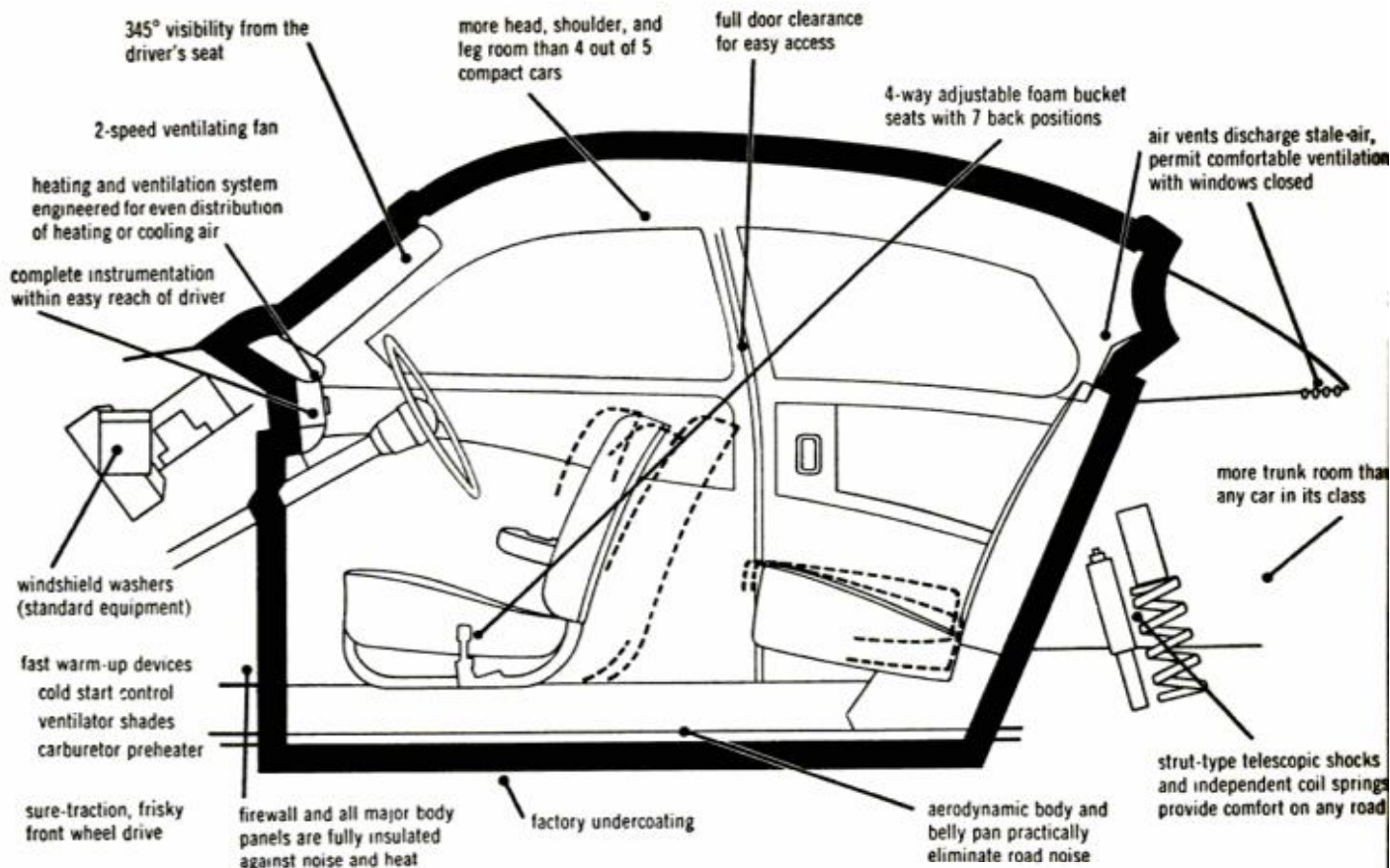


SAAB RIDING COMFORT is based on front wheel drive, which eliminates driveshaft, makes all floor space flat and usable, permits quick conversion of SAAB interior to a bedroom big enough for two. Front wheel drive, combined with carefully calculated understeering, low center of gravity, and advanced suspension design, provides swayless directional stability for relaxed driving. Sure-footed front wheel traction pulls the rest of the car firmly and easily around sharp curves and corners, through mud, ice, and snow.



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that it has a 24,000-mile/24-month written warranty*



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. . . for those who enjoy mechanical excellence, technical uniqueness, and extraordinary craftsmanship.

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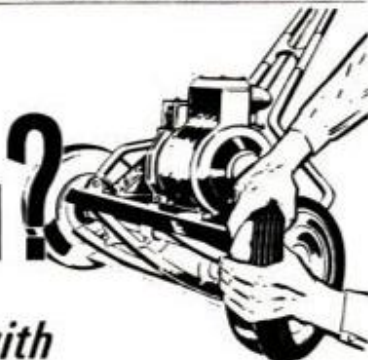
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Made of same tough tread rubber used in passenger tires. Outlasts original mower tires by far. Won't leave black marks on walks or drives. Only \$3.95 a pair at your favorite hardware store, garden center, mower repair shop or service station.

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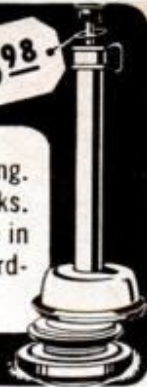
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PLASTIC WOOD®

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Adjusts to any angle!

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- Handymen need TEENUTS!
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Low-viscosity Klean-Strip is a free-flowing remover that peels off all furniture finishes without making a gummy mess. Old finish stays wet and workable, can be wiped off easily. Leaves surface dry, clean, ready for new finish. Non-flammable, safe.

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Drive it for 75c a week. Rider Agents Wanted. Send 25c for 32 page book, full details, dealer price. Or send \$1 (refunded first order) for this plus Service and Repair Manual and 16 5x7 photos of car and factory.

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Shrinks Hemorrhoids New Way Without Surgery Stops Itch — Relieves Pain

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

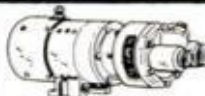
In case after case, while gently relieving pain, actual reduction (shrinkage) took place.

Most amazing of all — results were so thorough that sufferers made astonishing statements like "Piles have ceased to be a problem!"

The secret is a new healing substance (Bio-Dyne®)—discovery of a world-famous research institute.

This substance is now available in suppository or ointment form under the name Preparation H®. Ask for it at all drug counters.

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Just received from Air Force stock. Ideal for pumping oil, hydraulic, diesel, insecticides and other fluids. Adjustable relief valve for varying pressure from 1400 PSI down. Also operates well on reduced pressure at 12 V.D.C. Inlet port 3/4" pipe, outlet 1/2" pipe, 15" L. x 4 1/2" W. x 5 1/2" H. Shpg. wt. 23 lbs. Approx. GOVT. COST \$280. NEW. \$17.95



HEAVY DUTY GEAR MOTOR

Unit contains powerful motor driving thru a 40 to 1 gear box with an output of approx. 200 RPM's at 12 V.D.C. Can also be used on 24 V.D.C. at increased speed. Makes excellent electric car or golf cart motor. Reversible, all ball bearing construction throughout. Shaft size 5/8". Shpg. Wt. 35 lbs. 15 1/2" L. x 5 1/2" W. Tested prior to shpg. Excellent condition. Approx. GOVT. COST \$250. \$17.50



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With Deluxe accessories consisting of one R1 300 amp generator, 30 feet welding cable, welder's adjustable helmet, electrode holder, 300 amp ammeter, 300 amp shunt, rheostat, toggle switch, 300 amp reactor coil arc stabilizer, voltage regulator, battery charging relay, one pair heavy duty welder's gloves. All units guaranteed pre-tested. Approx. Govt. cost \$750. Most items new — all perfect. Wt. 82 lbs. \$49.50



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*Lighter duty & remote control models also available from \$55.00. Write for spec sheet.

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Nylon body eliminates heat . . . lightweight minimizes load on drill. Special non-slip clutch drives large screws without overload on drill . . . clutch automatically disengages when screw is set. Fits any power drill. Comes w. Phillips #1 blade and 1/4" blade for slotted screw from #6 to #14. Nylon screw finder prevents blade from slipping off screw and marring work.

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Low Cost, Many Shapes For New Plastic Lasers

Plastic lasers—which can be produced at low cost in shapes ranging from thin, flat sheets to hair-thin fibers, have been developed by Radio Corporation of America researchers.

The new lasers are made of polymethyl methacrylate, a plastic that is known by such trade names as Plexiglas and Lucite. Other more costly lasers have been made from gases, synthetic rubies, liquid chemicals and crystals.

The wide range of sizes and the economy of mass production open up a wide range of uses for lasers. Models the size of a file cabinet, for instance, could carry broad beams of light to Mars.

RCA scientist Dr. Nikolaus E. Wolff, one of the developers of the plastic laser, told *PM* that potential applications are limited only by the imagination. Lasers for quick and accurate measurement of distances, simple devices for light communications and laser replacements for the infinitely complex system of wires in computers, are only a few uses foreseen by the scientist.

The RCA experimental laser is a clear plastic fiber 15 inches long, which contains traces of europium, a rare earth. To make it work, the laser is placed in a vessel of liquid nitrogen and exposed to intense flashes of ultraviolet light. Each time a flash occurs, light sweeps along the fiber and stimulates other flashes. These "combine to create a single pulse of coherent light which bursts from the ends of the fibers with enormous power," RCA reported in describing the plastic laser.

Ice for the Bends

An ice pack treatment for the bends, the decompression affliction that causes severe pain—and sometimes death—among deep-sea divers, underground construction workers and even airplane pilots, was recently described by a Canadian surgeon.

Dr. Edward H. Simmons of Toronto said he had packed one workman in ice up to the hips to relieve severe pains in the kneecaps and leg muscles. The worst of the pain was gone, he said, in 45 minutes, and the man was able to go home after 12 hours in the ice. If proven successful, the method could simplify treatment for victims of the bends where no decompression chamber is readily available.

The bends, called caisson disease by underwater construction men, occur when there is a sudden reduction of air pressure, causing nitrogen bubbles to form in the tissues and blood stream.

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| 10 1/4 x 15 | 2 blade | Bronze | CUP-158 | 29.00 |
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| 11 1/4 x 16 | 2 blade | Bronze | CUP-208 | 34.00 |
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| WEST BEND 80 h.p. | | | | |
| 11 1/4 x 16 | 2 blade | Bronze | CUP-308 | 35.00 |
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| 10 1/4 x 13 | 2 blade | Bronze | CUP-354 | 30.00 |
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| 10 1/4 x 13 | 2 blade | Bronze | CUP-360 | 27.00 |
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MICHIGAN

MAY 1963

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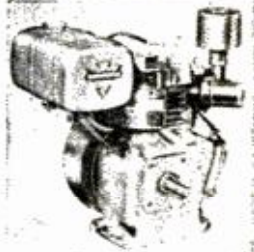
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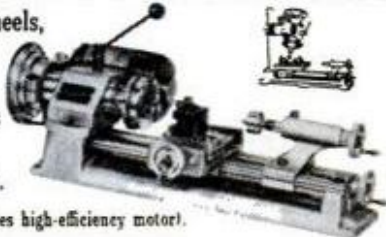
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- Aero Engineering
- Aircraft Drafting
- Aircraft Mechanic

BUSINESS

- Accounting
- Cost Accounting
- Public Accounting
- Bus. Administration
- Executive Training
- Marketing
- Personnel-Labor Relations
- Programming for Digital Computers
- Purchasing Agent
- Real Estate
- Salesmanship
- Sales Mgmt.
- Small Business Mgmt.
- Traffic Mgmt.

CHEMICAL

- Analytical Chemistry
- Chem. Engineering
- General Chemistry

- Lab. Technician
- Nuclear Energy
- Plastics
- Pulp, Paper

CIVIL ENGINEERING

- Civil Engineering
- Construction Engrg.
- Highway Engineering
- Reading Structural Blueprints
- Sanitary Engineering
- Structural Engineering
- Surveying & Mapping

DRAFTING

- Architectural
- Electrical and Electronic
- Mechanical
- Sheet Metal

ELECTRICAL

- Elec. Appliance Servicing
- Electrical Engineering
- Elec. Eng. Technician
- Elec. Motor Repairman
- Industrial Electronic Technician

- Industrial Telemetering
- Instrument Technician
- Practical Electrician
- Practical Lineman

ELECTRONICS

- Automation
- Basic Electronics
- Electronic Computers
- Electronics Technician
- Hi-Fi Stereo and Sound Systems
- Industrial Electronics
- Ultrasonics

ENGINEERING (Professional)

- Chemical
- Civil
- Electrical
- Mechanical

ENGLISH and WRITING

- Better Business Writing
- Introductory Technical Writing
- Short Story Writing

- Practical English

HIGH SCHOOL (Diploma)

- High School General
- High School Math
- High School Secretarial
- High School Vocational
- College Preparatory

MECHANICAL and SHOP

- Gas and Electric Welding
- Industrial Engineering
- Industrial Instrumentation
- Machine Design
- Machine Shop Practice
- Mechanical Engineering
- Reading Shop Blueprints
- Tool Design
- Toolmaking
- Safety Engineering

SECRETARIAL

- Clerk-Typist
- Professional Secretary

- Shorthand
- Stenographic
- Typist

STEAM and DIESEL POWER

- Boiler Inspector
- Power Plant Engineering
- Stationary Diesel Engineering
- Steam Engineering

SUPERVISION

- Foremanship—Suprv'n
- Personnel—Lab. Rel'n's

TV-RADIO

- Radio and TV Servicing
- Radio-Telephone License
- TV Technician
- Practical Radio-TV Engineering

MISCELLANEOUS

- Railroad
- Textile
- Other (please specify)

Name _____ Age _____ Sex _____
 Home Address _____
 City _____ Zone _____ State _____
 Occupation _____
 Employed by _____ Working Hours _____

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ing. And big 4-ft. doors at rear and sides (left side optional) put all the load within easy reach for fast unloading!



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