

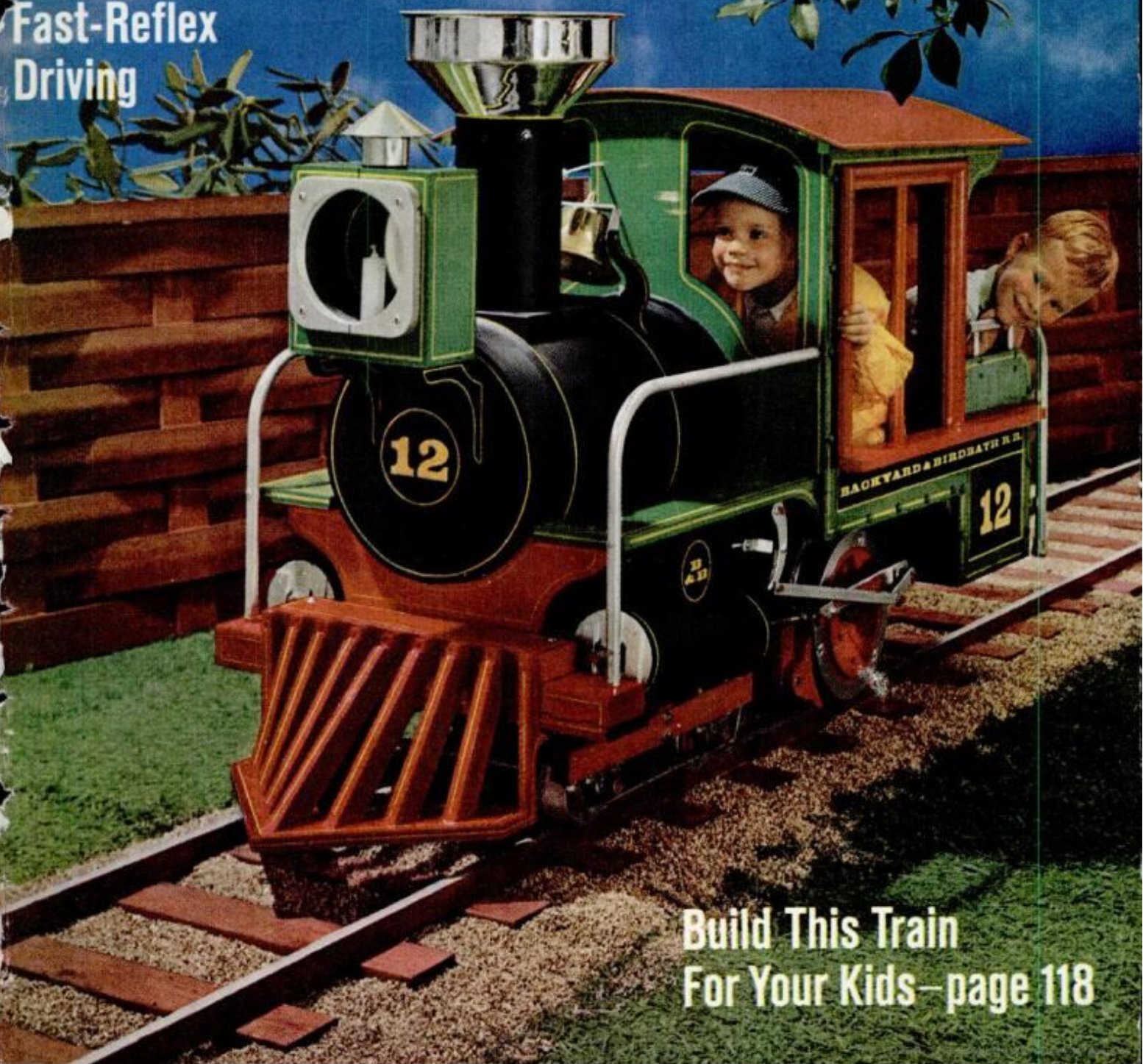
POPULAR MECHANICS

AUG. 1965
35 CENTS

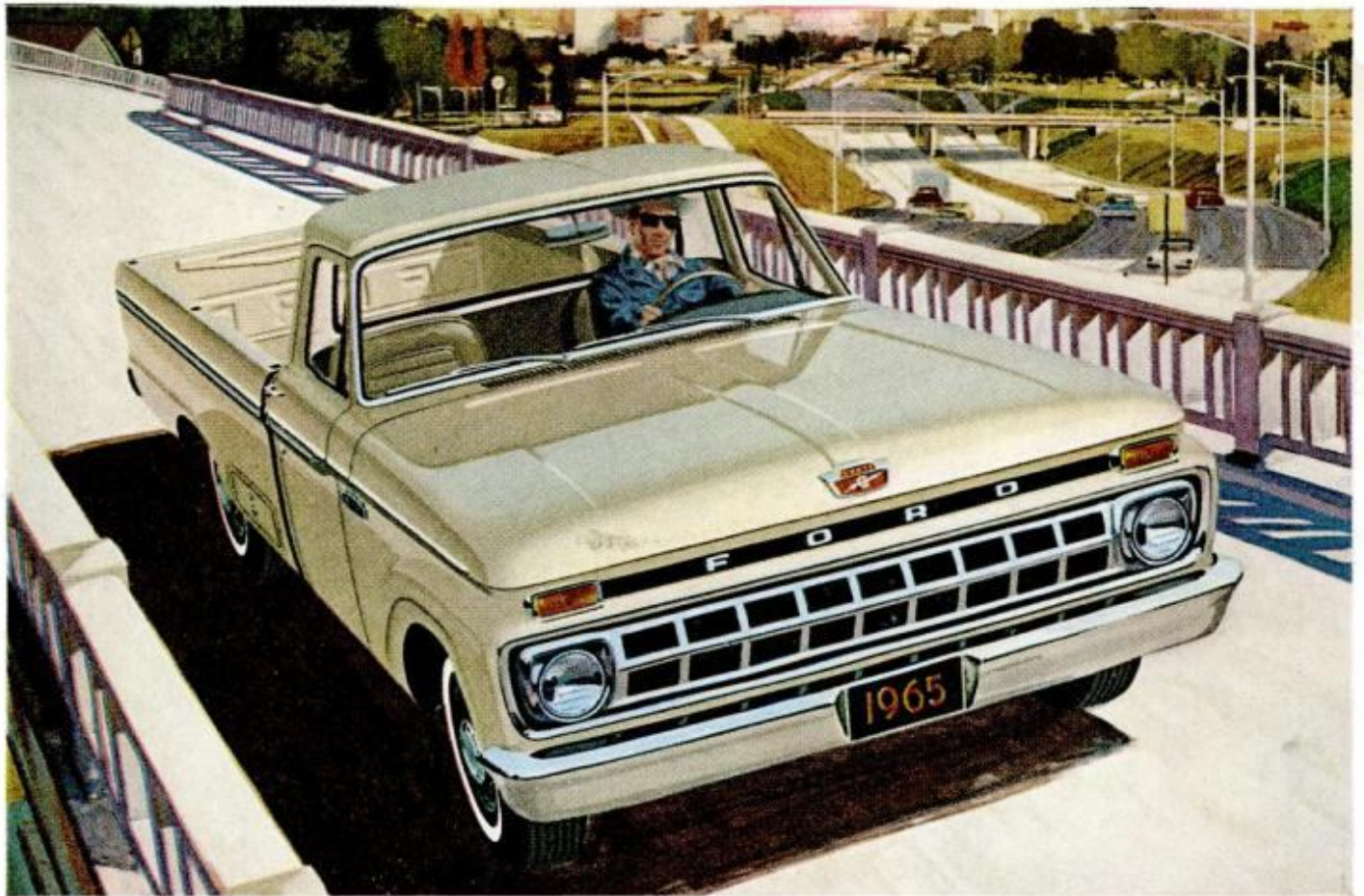
Boat Laws:
Bad? Unfair? Dangerous?

I Was an 18-Foot Robot

Fast-Reflex
Driving



Build This Train
For Your Kids—page 118



POWERFULLY SMOOTH

with the ride that feels like a car...the Six that feels like an Eight

You've never ridden in any pickup with so much car-like comfort.

Its secret: two front axles—a Ford exclusive—that work independently to make the roughest roads ride far more smoothly.

Even on the best of highways, you'll enjoy the unique ride of

Ford's Twin-I-Beam suspension. Gone completely is all riding harshness and pitch.

What's more, this truck corners without mushing out. It brakes to sudden stops without the usual dipping or diving.

Ford's new seven-main-bearing

ing Sixes have the feel of a smooth-stroking Eight—the traditional economy of a thrifty Six. Or you can have a new 352-cubic-inch V-8, most powerful pickup engine Ford has ever built ...surprisingly economical too.

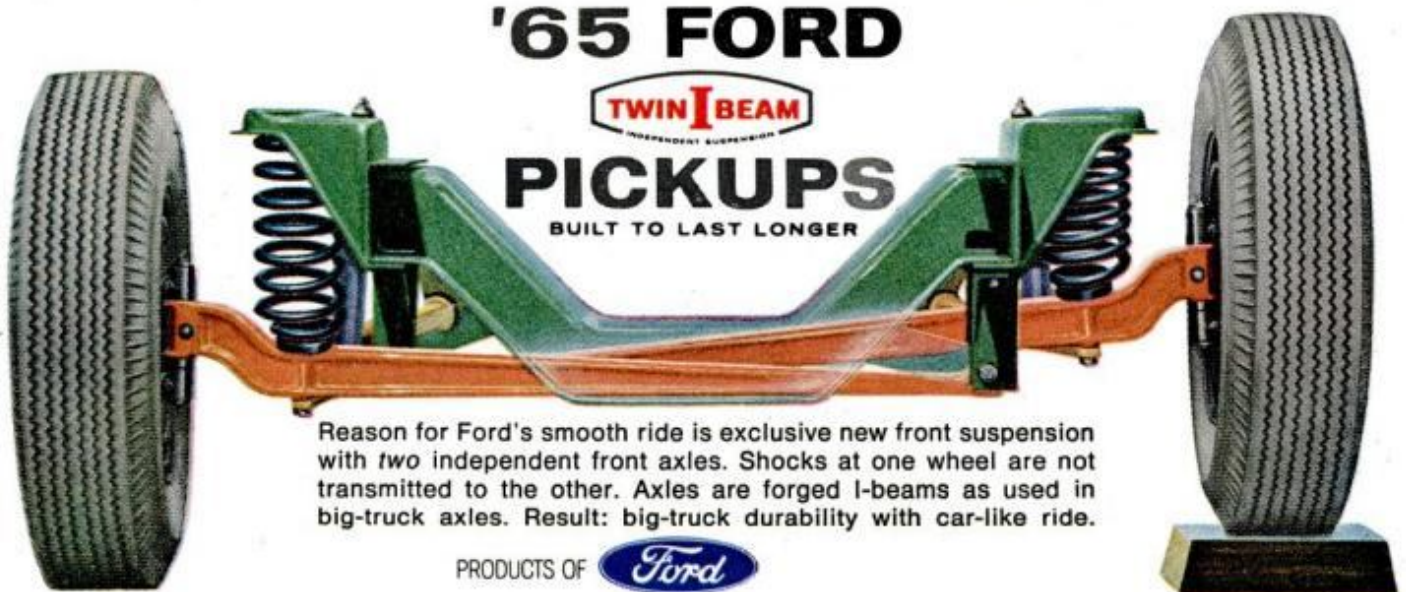
See it at your Ford dealer's!

'65 FORD

TWIN I BEAM
INDEPENDENT SUSPENSION

PICKUPS

BUILT TO LAST LONGER



Reason for Ford's smooth ride is exclusive new front suspension with two independent front axles. Shocks at one wheel are not transmitted to the other. Axles are forged I-beams as used in big-truck axles. Result: big-truck durability with car-like ride.

PRODUCTS OF



RIDE WALT DISNEY'S MAGIC SKYWAY AT THE FORD MOTOR COMPANY PAVILION, NEW YORK WORLD'S FAIR



Wow. Want better luck the next time you paint?

This is the last stage in paint deterioration.

It's time to repaint. But why use a paint that may let *this* happen soon again?

Your house always generates ordinary moisture (appliances, showers, cooking all cause moisture). That moisture tries to get out through your paint job. Ordinary oil-base paints won't *let* it out. You get blistering, then the kind of peeling you see in the picture (and on your house?).

Du Pont LUCITE® House Paint has been proven to resist blistering and peeling better than oil-base paints. It also dries far faster and

holds its color much longer than oil-base paints, goes on without a priming coat (except for spot priming bare places), goes on over damp surfaces (just after a rain-storm, for instance), goes on over wood, masonry, stucco—any surface—and cleans up with just soap and water.

Less work, more wear.

The name is Du Pont LUCITE House Paint.



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

Less work . . . more wear



This One



N1UU-CRF-4E3Y



Some people spell performance "hp." We spell it "Wildcat."



Even though there's a deep-breathing, big-muscled 325-hp Wildcat V-8 under the hood, there's more to Wildcat performance than just horsepower. You see, we remember you've got corners to turn. And bumpy roads to drive on. And traffic to fight. So we harnessed our husky Wildcat V-8 to a crisp-handling, smooth-riding, utterly responsive chassis. And then made available our Super Turbine automatic transmission—so silkily efficient you'd hardly suspect it's putting traffic lights behind you so quickly. But enough talk. Time for action. Go see your Buick dealer and whisper the magic word. Wildcat.

Wouldn't you really rather have a Buick? A wild '65 Buick?

Buick Motor Division

POPULAR MECHANICS

Материал, защищенный авторским правом



POST OFFICE?



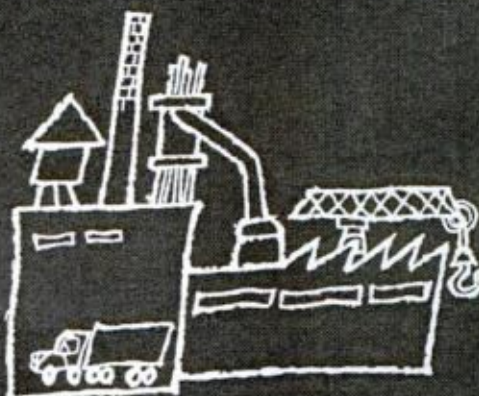
SUPER MARKET?



MAIL ORDER CATALOG?



BANK?



WHERE YOU WORK?

Where do you go to buy U. S. Savings Bonds?

(read on, you may be surprised)

This little quiz may save you a few mis-steps if you're about to buy your number 1 Savings Bond.

It happens they are *not* for sale at the U. S. Post Office. Used to be, but not since 1954.

Unfortunately, you can't buy Savings Bonds at the supermarket, either. But you *can* buy them out of a catalog—from one of the nation's largest mail order companies.

You can also buy Savings Bonds at all banks and many savings & loan associations. Both these institutions offer this service free to the taxpayers.

The last one's easy if you work at a place with the Payroll Savings Plan. Thousands of big and small companies help their employees help themselves by offering Savings Bonds on payday installments.

You can buy your Savings Bond whichever place you like. But do buy them. They're good for your future and your country's.

Quick facts about Series E Savings Bonds

- ✓ You get back \$4 for every \$3 at maturity.
- ✓ You can get your money when you need it.
- ✓ You pay no state or local income taxes and can defer the federal income tax until you cash the Bonds.
- ✓ Your Bonds are replaced free if lost, destroyed or stolen.

*Buy E Bonds for growth
—H Bonds for current income*

Buy U.S. Savings Bonds

STAR-SPANGLED SAVINGS PLAN
FOR ALL AMERICANS



The U. S. Government does not pay for this advertisement. It is presented as a public service in cooperation with the Treasury Department and The Advertising Council.



575 LEXINGTON AVE.
NEW YORK, N.Y. 10022

INTERNATIONAL EDITIONS • AUSTRALIAN • SPANISH • CARIBBEAN • FRENCH • DUTCH



I Was an 18-Foot Robot	63
How to Keep Your Lawn Loyal	68
Color TV Is In	76
Iron Colts in the Back Yard	80
Gary Player Tests Fiberglass Clubs	86
Plymouth Fury Owners Report	88
Sky Diving—PM Editor Makes It Look Easy	92
Fast-Reflex School for Patrolmen	96
Water Highway to the Top of the World	102
The Dismal Swamp of Boating Laws	106
Please Don't Eat the Oleander	112
Television Troubleshooting	170



Build a Train for Your Kids (COVER)	118
Singing Steel Guitar	129
Interior Garden on Wheels	132
How to Tell a Bearing Wall	134
Turn Your Old Door into a New Door	136
King-Size Patio Lounger	140
Barbecue Outdoors with Gas	145
Outrigger Stabilizer for Small Craft	146
Puff-Puff or Putt-Putt Water Bike	148
Give Your Brakes a Break, Part II	154
Don't Let Your Plumbing Double-Cross You	160
Slotting Metal with a Twist Drill	165
Make Your Own Deep-Hole Drills	166

ments

Over the Editor's Desk	6
News from the Services	10
Science Worldwide	12
Take Charge of Your Career	20
Sidelights on Aviation	25
New on the Market	26
Detroit Listening Post	28
Clinic for Homeowners	30
Spotlight on the Dodge Patrol Car	32

Noteworthy New Inventions	36B
New for Camera Buffs	36D
Items from All Outdoors	36F
Worth Writing For	40
Hints from the Readers	133
Solving Home Problems	138
Shopping for Tools	143
Auto Clinic	158
Electronic Kinks	174

NEXT MONTH: They're going supersonic on the Salt Flats and PM has the top contender's story. You'll find a report of the Ozarks' mysterious "spook light"; plus a giant home section with directions for soundproofing your house, tips for putting a crawl space to work, plans for turning waste space into rooms for hobbyists

PORTUGUESE • DANISH • SWEDISH

DON DINWIDDIE
Editor

RICHARD E. DEEMS
President, Mag. Div.

JOSEPH F. KERN
Publisher

WALTER IAN FISCHMAN
Editorial Director

RICHARD F. DEMPEWOLFF
Executive Editor

JOHN A. LINKLETTER
Managing Editor

Published by The Hearst Corporation
RICHARD E. BERLIN, President

WAYNE C. LECKEY . . . Shop Crafts Managing Editor
CLIFFORD B. HICKS . . . Midwest Editor
THOMAS E. STIMSON . . . Western Editor
RAYMOND A. SCHULZE . . . Art Director
KEVIN V. BROWN . . . Aviation
ED NELSON . . . Automotive
ALFRED W. LEES . . . Home Workshop
ARTHUR MIKESELL . . . Boating
JOHN F. PEARSON . . . Science
STUART JAMES . . . Outdoors
LARRY STECKLER . . . Electronics
ARTHUR J. MAHER . . . Building and Landscape
ALEX MARKOVICH . . . Associate Automotive
ROBERT B. BERGER . . . Photography
FRANK X. SMITH . . . Production
MURRAY COOPER . . . Assistant Art Director
LEO R. WEEKS . . . Assistant Art Director
FRANK P. FRITZ . . . Chief Photographer
GARRY WINTER . . . PM Books
FRANKLIN JACOBY, ASID/IDI . . . Design Consultant

ADDRESS COMMUNICATIONS TO: 575 Lexington Ave., New York, N.Y. 10022. For additional sources of information on the articles and products in this issue, write to Bureau of Information, *Popular Mechanics*, for free "Where-to-Find-It" list.

L. PARK BENJAMIN, Advertising Director

ADVERTISING OFFICES: New York: 575 Lexington Ave., MUrray Hill 8-8500; Chicago: 520 N. Michigan Ave., 527-2400; Detroit: General Motors Bldg., TRinity 5-8711; Cleveland: Hanna Bldg., 1422 Euclid Ave., PProspect 1-0456; Los Angeles: 3460 Wilshire Blvd., DUmkirk 2-8458; San Francisco: 1101 Hearst Bldg., YUkon 2-0823.

SUBSCRIPTION SERVICE: Mail all subscription orders, changes of address, correspondence concerning subscriptions, and Postmaster notices of undeliverable copies to *Popular Mechanics*, 250 West 55th St., New York, N.Y. 10019.

Popular Mechanics is published monthly by The Hearst Corporation, 57th St. at 8th Ave., New York, N.Y. 10019, U.S.A. Richard E. Berlin, President; George Hearst, V-Pres.; Richard E. Deems, President of Magazine; John R. Miller, V-Pres. and Gen. Mgr. of Magazines; G. Harry Chamberlaine, V-Pres. for Research and Marketing; William S. Campbell, V-Pres. and Director of Circulation; Joseph F. Kern, V-Pres. for *Popular Mechanics*; Frank Massi, Treasurer; R. F. McCauley, Secy. 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; \$10.00 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. ©1965 by The Hearst Corporation. All rights reserved. Printed in U.S.A.

"Find-It-Yourself" Kit



Looking for bathroom fixtures, blow torches, a block & tackle, building materials... anything? Just let your fingers do the walking. **Action-People do.**

Over the Editor's Desk

Gold Finder

You describe a method of removing black sand from gold in a pan (*Glittering Gold Rush Vacation*, page 102, June PM) that sounds like a gold loser to me.

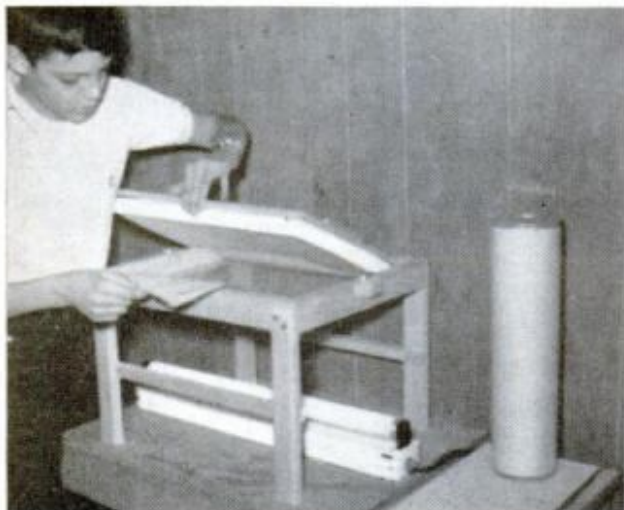
The way it's done in North Georgia is to pour the small amount of iron sand and "color" through a funnel into a small bottle. After panning for several days, pour the contents of the bottle onto a piece of paper, letting the water run off. After the sand dries, it can easily be removed from the gold with a magnet without losing the finer pieces of flour gold (which stick to the iron if you try to separate when the sand and gold are wet). Most of the gold I've found would be extremely difficult—if not impossible—to separate from iron sand with tweezers.

Winter Haven, Fla.

WILLIAM K. HOWELL JR.

Handled Printer

I built the \$3 *Dry Blueprinter* (page 146, January PM) with a few variations. My machine is a little smaller than the plan, and I fastened two pieces of cove



molding to the covers to serve as handles.

Thanks for the fine plans; I got the same results on my blueprinter as I did on one in our school drafting department.

Ishpeming, Mich. JOHN P. SWANBERG

Far-Ranging Sleeper

The *Wagon-Top Sleeper* (page 128, May 1964 PM) will enable my wife and me, along with our three children, to take a 4900-mile vacation trip through Canada this summer.

Among the modifications I made are



these: piano hinge instead of the three T-hinges; a rain drip cap over the door; awnings for the windows; electric wiring (for a light and electric blanket); and chest-type latches instead of screen door hooks for use when unit is folded down for travel.

Thank you for the fine article.

Rolla, Mo.

KENWOOD M. MARKUSSEN

Letter Perfect

The *Hydro Dynamic* (page 144, March 1963 PM) is a wonderful boat. We pull three skiers without any trouble; carry-



ing two people, the boat will reach 48 mph with a 60-hp motor.

We followed your plans to the letter, and would recommend the project to any of your readers.

Avinger, Tex.

W. A. McCAIN

Best-Lighted on the Block

Thanks to the excellent articles in recent issues of PM, particularly *Patio-Yard Lights* (page 165, May PM) we now have an extremely well lighted patio and backyard area.

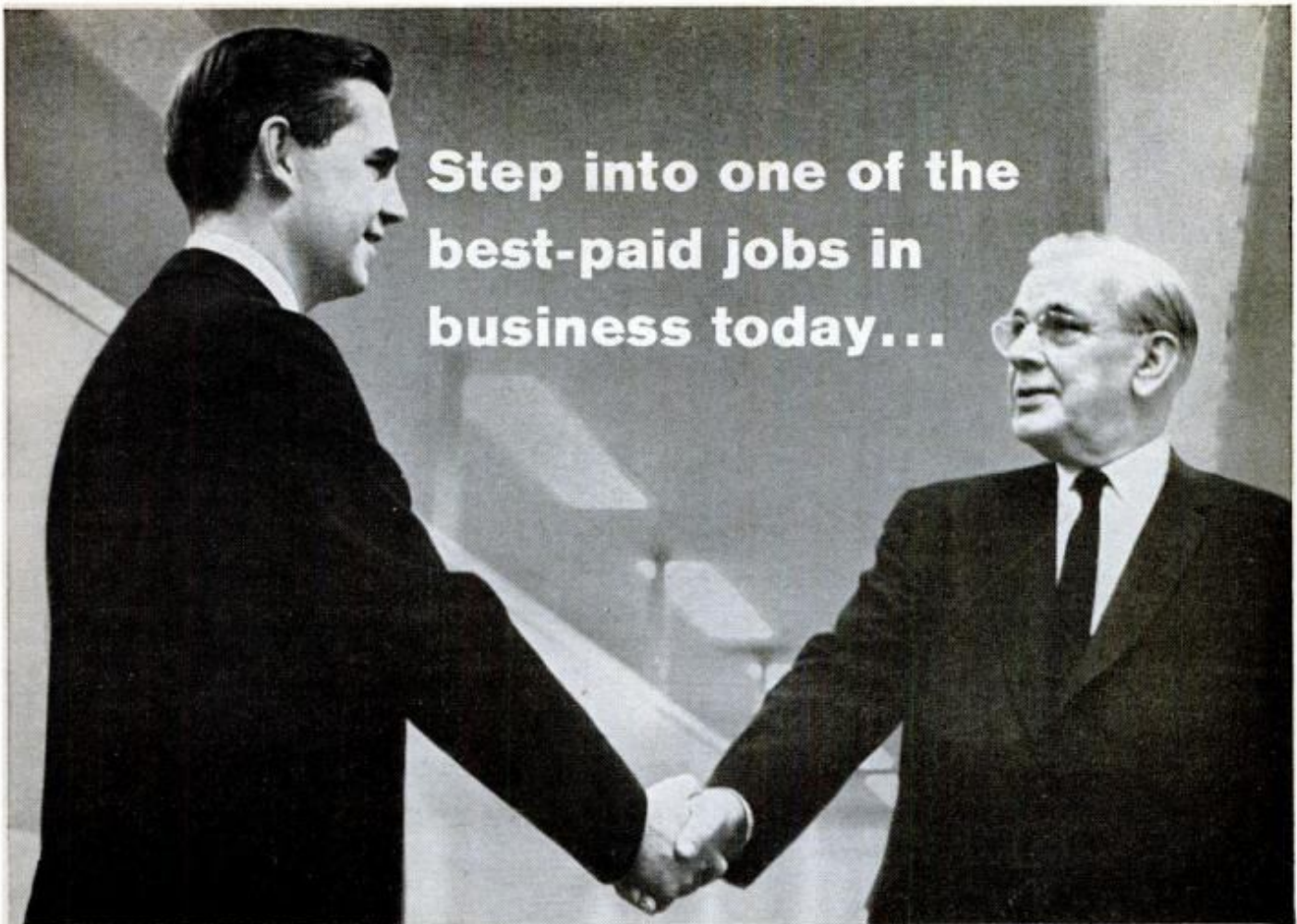
Port Chester, N.Y.

JACK A. LEHRER

Hydro Dynamic's Spray

Our friends find it hard to believe that two amateurs could build such a sleek-looking craft from magazine plans as the *Hydro Dynamic* my dad and I built from

[\(Please turn to page 8\)](#)



**Step into one of the
best-paid jobs in
business today...**

Be an ACCOUNTANT

Train in your spare time with LaSalle

LaSalle graduates report up to 56% increased pay the first year

THE demand for trained Accountants far exceeds the supply. Salaries keep going higher, promotions come faster. Many Accounting-trained men are being moved up to important management positions. Why remain in a dull job with insufficient pay when you can reap such big rewards in money and prestige?

You can take LaSalle Accounting training at home, in your spare hours, without any previous bookkeeping experience. LaSalle's distinguished faculty starts you at the beginning; explains every basic Accounting principle and method; gives you actual Accounting problems with your lessons, then corrects and grades your work; shows you exactly how accountants on the job handle these problems. Your training is complete, practical, and enjoyable. You are thoroughly prepared for every Accounting task you will be expected to handle in the business world.

Your career could not be in more experienced hands. For over half a century, LaSalle has been a world leader in business training, with over 1,000,000 students. More than 5,500 Certified Public Accountants have trained with LaSalle. A LaSalle diploma in Accounting is a credential respected by America's biggest companies.

LA SALLE EXTENSION UNIVERSITY

A Correspondence Institution

Chicago 5, Ill.

Send for Free Booklet and Sample Lesson

If you are truly seeking a more rewarding job, with higher pay, a solid position in the business world, and all the good things that come with success, you owe it to yourself to read LaSalle's famous booklet "Opportunities in Accounting". With it you will receive a free sample lesson in Accounting which will demonstrate how LaSalle makes home study easy, interesting and thoroughly practical. Mail the coupon today.



LA SALLE EXTENSION UNIVERSITY

A Correspondence Institution

417 South Dearborn St., Dept. 44-078, Chicago 5, Ill.

Please send me, free of cost or obligation, your illustrated booklet "Opportunities in Accounting" and also your sample lesson.

Name.....Age.....

Address.....County.....

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

101

SWITCH IT! THEN USE IT!



SUPER TOUGHNESS AND B&L QUALITY AT \$49.95

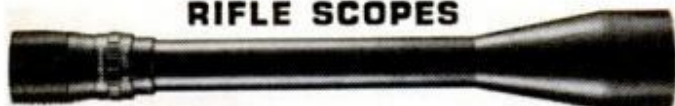
You can switch your B&L scope from rifle to rifle without loss of zero. Adjustments are in the mount, not the scope. Unique V-block mount design assures constant zero.

And the scopes can be jarred, scraped, slammed, frozen and soaked. They still perform beautifully and stay in zero after this torture. Here's a combination of finest American-made instrument quality and tough design at a low price. Here's a lifetime of top optical and mechanical performance. Your dealer can show you a 2½X or 4X at \$49.95, 2½X to 5X at \$79.95, and a 2½X to 8X at \$99.95. For 85-page manual, "Facts About Telescopic Sights", send 25¢ to Bausch & Lomb, Rochester, New York. 14602.

BAUSCH & LOMB



RIFLE SCOPES



Over the Editor's Desk

(Continued from page 6)

the March 1963 PM (page 144).

We powered the *Kasha Kat* (as we named it) with a 50-hp motor.

For the most part we are truly delighted with the excellent looks and handling ease of the boat. However, we do have a performance problem.

We are bothered by quite heavy spray at medium to high speeds. This spray comes from the bow and soaks all passengers.

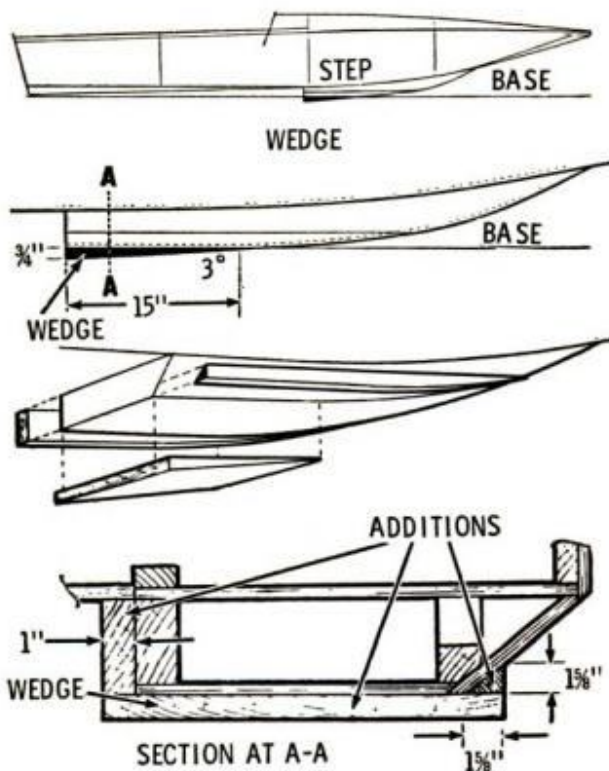
Might some modification of the sponsons be needed?

Scarborough, Ont.

ROBERT F. BRAIN

While most people who built the three-point runabout were well-satisfied with its performance, we've also received some letters like yours telling of spray building up ahead of the sponsons and blowing back into the cockpit.

We consulted with the boat's designer, and he came up with the modification shown in the drawings. Basically, it in-



volves removal of the rails from each sponson, widening the planing surface and adding a shallow wedge. All of these changes increase sponson lift.

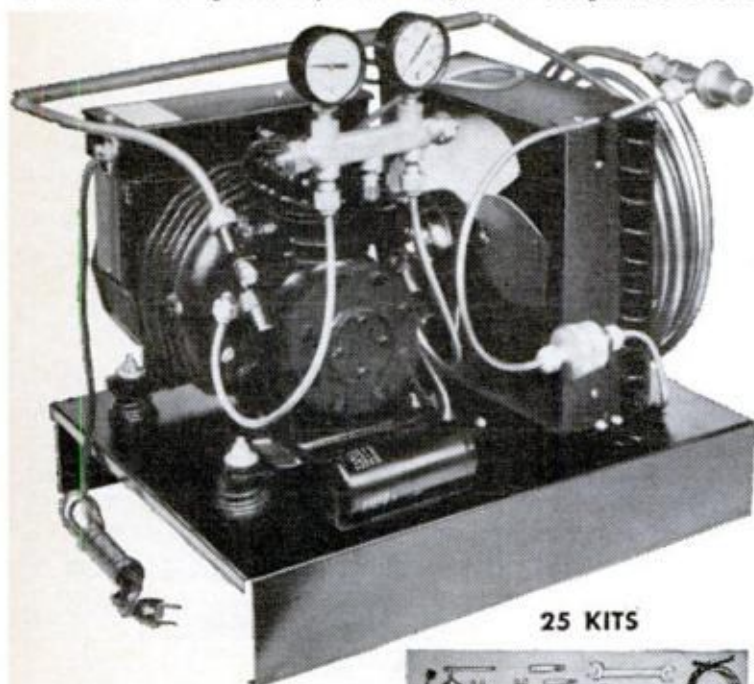
Tests showed that the modification not only solves the spray problem but improves overall performance. We've incorporated it into the plans for the boat, and suggest that it be used on all new construction.

The Editors

POPULAR MECHANICS

Need a better job? Want to own a business? LOOK INTO AIR CONDITIONING AND REFRIGERATION FIRST!

Skilled men are in big demand in the air conditioning and refrigeration field. Industry leaders say that 20,000 mechanics must be trained each year. Here's why: During a 12-year period, production quadrupled. Only one other industry grew so fast. Last year, over 3 million air conditioning units and 5 million refrigerators and freezers were produced. Over 150 million units are in use. It takes skilled men to install, service and repair such equipment. They are well paid. They work steady. Why don't you qualify for one of the better-pay jobs? CTI trains you at home in spare time. For complete information, send coupon. No obligation.



25 KITS

Above—This is how your heavy-duty refrigeration system will appear after it is built. All parts are new and late model. A work project accompanies each kit. Right—You also get mechanic's tools, including wrenches and flaring tubes; also gauges, propane torch.



You train at home—Build a complete refrigeration system

In addition to easy, illustrated lessons, CTI sends 25 kits of parts and tools to build a complete, operating refrigeration system. As you assemble your unit, you get practical experience and gain confidence. You become familiar with parts and their functions. You develop skill in using tools. On completing training, you can convert your system into an air conditioner, freezer or refrigerator (from plans we provide). CTI makes home your training center.

Many earn money while learning

Since the CTI course includes training with real equipment, many students start service work soon after enrolling. They go out on their own, or get a part-time job with a local dealer. Some arrange with food stores, taverns, restaurants, etc., to handle maintenance. Numerous students pay part or all of their tuition through spare-time earnings.



Recommended highly by students

"I operate my own sales and service shop. As a student I made more than the course costs."—Ray Ball, Kan. . . . "I have started a refrigeration business of my own. The prospects are good."—John Brooks, Ariz. . . . "The refrigeration course is excellent. I have had two pay raises."—Paul Zeleski, Ill. . . . "I am now working in the refrigeration field—for the man who advised me to take your course."—G. R. Fontenot, La. . . . "I have my own shop—earn about 60% more than when I enrolled."—David Fonseca, Pa. . . . "My income has doubled. I service in people's homes."
—Donald Minner, California

An easy course—Written especially for beginners

You don't need a formal education, not even a grade school diploma. You don't need previous experience. All we ask is that you can read and write, and be willing to devote a few hours a week to training. If you have ambition, and can finish what you start, you can earn a CTI diploma.

Mail coupon for 3 free booklets



Investigate the opportunities available in air conditioning and refrigeration. Find out how easily you can train yourself for a better job, more pay or a business of your own. Discover how you can earn money as you train. Fill out and mail coupon today.

Commercial Trades Institute
1400 Greenleaf Ave., Dept. R-414
Chicago, Ill. 60626

Accredited Member National Home Study Council

COMMERCIAL TRADES INSTITUTE

1400 GREENLEAF AVENUE
CHICAGO, ILLINOIS 60626

DEPT. R-414

Without cost or obligation, mail me your booklet, Be a Success in Air Conditioning, Refrigeration & Heating; and a Sample Lesson.

Name _____ Age _____

Address _____

City _____ State _____ Zip _____



Sidelights from the SERVICES

By William R. Kreh

Scientific detective work is helping the Air Force keep its jets flying longer and save money doing it. After each 10 hours of flying, a sample of engine oil from each jet engine is airmailed to a laboratory at MacDill Air Force Base, Fla., for microscopic analysis. The oil of engines that need attention shows particles of metal from worn parts.

The elusive Right Whale, object of the Navy's "Operation Moby Dick," apparently didn't like all the attention he was getting. He left Cape Cod Bay without a radio transmitter on his back. The special operation was a Navy scheme to tag a Right Whale which spends the spring months in Cape Cod Bay, then disappears for the rest of the year. The plan was to drop a transmitter harpoon onto the whale's back from a helicopter, electronically tracking him to his unknown destination. A scientist from the Office of Naval Research tried several times to tag a whale, but finally had to hang up his ole harpoon until next spring.

The Navy is interested in the Right Whale as part of a research project. It could provide clues of the underwater creature's habits and habitations and how they might affect submarines. A special harpoon was designed for the project. Attached to it was a radio which, when out of the water, would transmit a continuous note to a receiver located in a small observation plane flying nearby. The harpoon is a harmless dart-tipped shank at the end of a detachable 10-foot pole, designed to penetrate only the whale's foot-thick skin. So far, no luck.

Old fashioned. When the Navy's newest aircraft carrier put to sea for the first time, her skipper, Capt. Lawrence Heywroth Jr., radioed: "Underway on fossil power." This was a reference to the ship's fuel—oil, rather than nuclear. The Navy had fought for nuclear power for the ship, but was turned down by the Department of Defense.

Altitude and thickness of overhead clouds can now be determined accurately with a new Air Force cloud-detection radar. With the new equipment, Air Force weathermen can measure bases and tops of cloud layers up to 60,000 feet over their

stations. Before this, meteorologists used estimates from weather balloons or aircraft flying in the area. An electronic printer, using data from the radar, produces a wide paper tape etched with a continuous horizontal view of cloud conditions automatically.

A sun-powered boat, which could possibly be used in areas such as Vietnam where "noiseless" military movements are a requirement, is being tested by the Army. Solar panels are used to convert sunshine to electrical power which in turn is used to operate the propelling motors or to recharge the batteries. The boat can be operated directly from the solar panels or from the reserve batteries.

Mechanical eavesdropper. An electronic device that will recognize human speech is being developed by the Air Force. Idea is to come up with a machine that can "hear" talk from the earth when spacemen get so far away they can't detect voice communication with the human ear. A possible commercial application: typewriters that can take dictation and produce letters with no pretty secretary involved. There may be some buyer resistance to this one.

Waterjet propulsion. A new waterjet system may someday drive Navy ships at nearly 90 mph. The new system—the aquatic equivalent of an aircraft jet engine—would eliminate the complex mechanical drives and marine propulsion systems now used. It would zoom a ship forward by "swallowing" large amounts of water, passing it through pumps, and ejecting it at tremendous velocities through rear nozzles. Ships powered by the new system would be twice as fast as the swiftest surface vessel or submarine in the ocean today.

Morse Code messages can be received and understood by anybody with a new translating device being tested by the Army. The gadget translates the dots and dashes of the Morse Code into letters of the alphabet as fast as 16 words a minute. The letters flash one after another on a screen the size of a postage stamp. An ear plug permits the operator to listen as well as watch. No bigger than a transistor radio, the device will be used by the Army where trained Morse Code operators aren't available. While telephone and radio transmission is common today, Morse Code still has its advantages. It can get through when interference drowns out voice, and it has a certain amount of privacy.

**LEARN MORE
EARN MORE!**

NEW

**AUDEL HELPS PUT
MORE SKILL IN YOUR
HANDS—MORE MONEY
IN YOUR POCKET!**

AUDEL SKILL-BUILDING PRACTICAL GUIDES

HOME APPLIANCE SERVICE GUIDE

How to fix all large and small appliances, both gas and electric. Covers basic principles, operation & servicing. Tells how to locate troubles, take appliances apart & reassemble. Covers new models. Illus. 608 pages. \$6.95

Circle No. 2 in Coupon

AUTO RADIO REPAIR GUIDE

Complete servicing guide for all types of auto radios, including all-transistor & FM. Fully illustrated with many typical schematic diagrams. Step-by-step removal instructions for all late-model radios. 224 pages. \$4.50

Circle No. 94 in Coupon

REFRIGERATION & AIR CONDITIONING

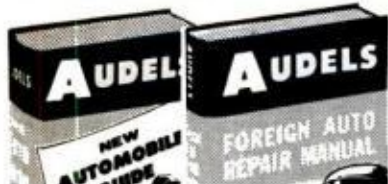
Full information on servicing, operation & repair of all systems and machines, freezers, lockers, water coolers, etc. Describes basic principles of all units. Includes dozens of tables of vital data. Indexed. Illus. 1090 pages. \$6.00

Circle No. 14 in Coupon

COMMERCIAL SOUND INSTALLATIONS

How to install, operate, service & maintain all types of sound & intercom equipment used in factories, schools, stadiums, vehicles, and other commercial fields. Covers selection of equipment and systems. 384 pages. \$5.95

Circle No. 92 in Coupon



AUTO MECHANICS GUIDE

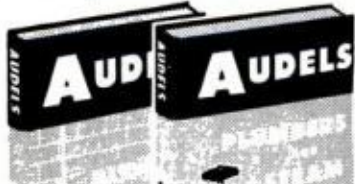
Ready guide for mechanics, students, car owners. Theory, construction and servicing of modern cars. 1000 Illus. 1132 pages. \$6.00

Circle No. 1 in Coupon

FOREIGN AUTO REPAIR MANUAL

Complete, up-to-date service data for all the popular imports: English, French, German, Italian, Swedish. Illus. 592 pages. \$5.00

Circle No. 53 in Coupon



MASONS AND BUILDERS GUIDES

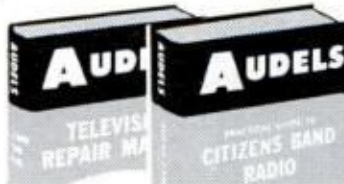
Four practical vols. for bricklayers, stone masons, cement workers, plasterers, tile setters. 2000 Illus. 1440 pages. Set \$10.50

Circle No. 26 in Coupon

PLUMBERS & STEAMFITTERS GUIDES

Four vols. of ready reference for plumbers, steamfitters, gas fitters, sheet metal workers. 3600 Illus. 1833 pages. Set \$10.50

Circle No. 6 in Coupon



TELEVISION REPAIR MANUAL

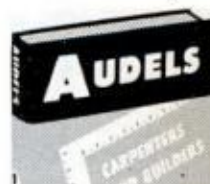
Latest information on TV circuits & how to install, troubleshoot and repair all TV sets, including color. Illus. 512 pages. \$5.00

Circle No. 3B in Coupon

2-WAY CB RADIO GUIDE

Explains how to select, install, operate, maintain all types of CB radios. Latest equipment; FCC regulations. 288 pgs. \$4.95

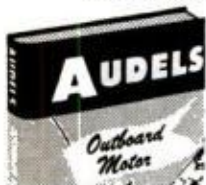
Circle No. 95 in Coupon



CARPENTERS and BUILDERS GUIDES

Four all-inclusive vols. Modern construction and inside trade information for carpenters, builders and all woodworkers. 3700 Illus. 1900 pages. 4-Volume Set. \$10.50

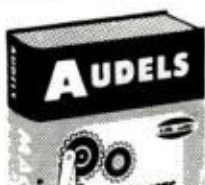
Circle No. 8 in Coupon



OUTBOARD MOTOR & BOATING GUIDE

Practical details on all phases of outboard motor repairs and maintenance. An essential boating tool! Illus. 414 pages. \$4.00

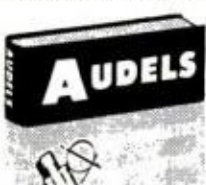
Circle No. 49 in Coupon



MACHINISTS and TOOLMAKERS GUIDE

Modern shop practice for machinists, toolmakers, draftsmen. How to set up & run all machine tools. 1256 pages. \$6.95

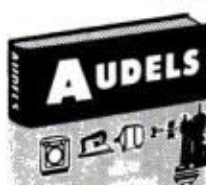
Circle No. 12 in Coupon



MATHEMATICS FOR MECHANICS

A complete guide to the mastery of practical math. Simplified method makes learning fast and easy. Ill. 672 pgs. \$4.95

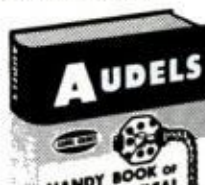
Circle No. 11 in Coupon



new ELECTRIC LIBRARY

10 volume electrical encyc. Answers questions on thousands of electrical problems. 9000 Ill. 5558 pgs. Set \$25.00

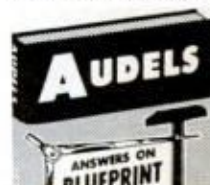
Circle No. 15A in Coupon



PRACTICAL ELECTRICITY

Complete handbook; practical, simplified, ready reference on all electrical subjects. 2600 Illus. 1052 pages. \$5.95

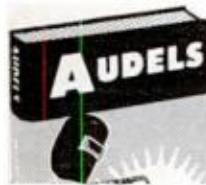
Circle No. 4 in Coupon



BLUEPRINT READING

For mechanics and construction men. Step-by-step explanation of how to read all types of blueprints; easy to understand. Ill. 430 pgs. \$3.95

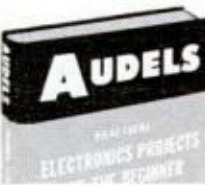
Circle No. 25 in Coupon



WELDERS GUIDE

Concise, practical guide to theory, operation and maintenance of all types of electric & oxy-acetylene welding. Illus. 588 pages. \$4.95

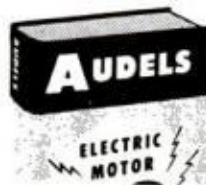
Circle No. 10 in Coupon



PRACTICAL ELECTRONICS PROJECTS

Learn basic electronics through building useful, working transistorized devices. Hundreds of illus. 256 pages. \$4.95

Circle No. 96 in Coupon



ELECTRIC MOTOR GUIDE

Covers hookups, control, maintenance and troubleshooting of all types of motors. Fully indexed. 600 Ill. 1036 pgs. \$5.95

Circle No. 27 in Coupon

ADDITIONAL IMPORTANT TITLES

Circle the numbers wanted in the MAIL ORDER coupon below. All books are sent for FREE EXAMINATION.

No. 5	TRUCK & TRACTOR GUIDE. 908 pages	\$5.95
No. 59	HOME GAS HEATING & APPLIANCE MANUAL. 320 pages	3.50
No. 93	PRACTICAL GUIDE TO TAPE RECORDERS. 288 pages	4.95
No. 97	SERVICING ELECTRONIC ORGANS. 256 pages	4.95
No. 54	PROGRAMMED BASIC ELECTRICITY. 272 pages	4.00
No. 7	PAINTING & DECORATING MANUAL. 592 pages	4.95
No. 48	GAS ENGINE MANUAL. 468 pages	4.00
No. 28	OIL BURNER GUIDE. 420 pages	3.95
No. 9	DIESEL ENGINE MANUAL. 544 pages	6.00
No. 29	SHEET METAL PATTERN LAYOUTS. 1152 pages	7.50
No. 40	PUMPS, HYDRAULICS, AIR COMPRESSORS. 1219 pages	6.95
No. 42	MILLWRIGHTS & MECHANICS GUIDE. 1166 pages	6.95
No. 34	Q & A FOR ELECTRICIANS EXAMINATIONS. 288 pages	3.50
No. 37	POWER PLANT ENGINEERS GUIDE. 966 pages	6.95
No. 41	HOUSE HEATING GUIDE. 1074 pages	5.95
No. 13	WIRING DIAGRAMS FOR LIGHT & POWER. 320 pages	4.00
No. 38	Q & A FOR ENGINEERS & FIREMANS EXAMS. 536 pages	4.00
No. 30	SHEET METAL WORKERS HANDBOOK. 398 pages	3.95
No. 52	DOMESTIC COMPACT AUTO REPAIR. 816 pages	5.95
No. 36	ELECTRIC DICTIONARY. 550 pages	3.50
No. 3A	RADIOMANS GUIDE. 448 pages	5.00
No. 56	HOME MODERNIZING & REPAIR GUIDE. 288 pages	2.95
No. 55	HOME WORKSHOP & TOOL HANDBOOK. 448 pages	5.00



10-DAY FREE EXAMINATION

SEND NO MONEY—Pay the postman nothing! We are glad to send you any of the Audel Guides for absolutely FREE examination in your own home. We take all the risks and leave all the decisions up to YOU. There is no obligation on! If you decide to keep the books of your choice you may pay for them under our astounding easy-pay plan of only \$3 a month.

HERE IS ALL YOU DO—IT'S EASY TO ORDER: In the No-Risk Mail Order Coupon at the right just draw a circle around the number of Audel Guides you want us to send you for FREE EXAMINATION. We will send them to you at once to help you build a brighter future by increasing your SKILL. If you are not COMPLETELY satisfied, return the books, and that will end the matter! NO STRINGS OR CATCHES TO THIS OFFER.

THEODORE AUDEL & CO.
division of HOWARD W. SAMS & CO., INC.
Indianapolis • New York

MAIL THIS NO-RISK COUPON TODAY!

THEODORE AUDEL & CO.—Self Improvement Publishers Since 1879—
4300 W. 62nd Street, Indianapolis, Indiana 46206

Please mail me for 10 days' FREE EXAMINATION the books I have circled at right. I agree to mail \$3 in 10 days on each book or set ordered, and to further mail \$3 a month on each book or set ordered until I have paid the purchase price, plus shipping costs. If I am not completely satisfied with my Audel Guides I may return them.

Name _____

Address _____

Occupation _____

Employed By _____

SAVE SHIPPING COSTS! Check here if you enclose complete payment with order (plus sales tax, if any). We pay postage charges. You have same return privilege.

1	2	3A	3B	4
5	6	7	8	9
10	11	12	13	14
15A	25	26	27	28
29	30	34	36	37
38	40	41	42	48
49	52	53	54	55
56	59	92	93	94
				95
				96
				97

I have bought Audel books before

**Cussing
won't prevent
stalling.**

**But a
Stewart-Warner
electric fuel pump
will.**



A S-W "240" Fuel Pump is a high-performance engine's best insurance against stalling due to vapor lock. Assures quick starts whatever the weather. Exclusive adjustable, automatic pressure-regulator keeps fuel flowing smoothly. Prevents starving and flooding. Line pressure adjustable up to 8 P.S.I.—delivers up to 60 G.P.H. For 6 or 12 volt systems. Your Stewart-Warner dealer will show you a S-W Electric Fuel Pump. You can count on it...from the makers of the most complete line of automotive instruments in America.

STEWART-WARNER 
INSTRUMENT DIVISION

Dept. C-85, 1840 Diversey Parkway, Chicago, Illinois 60614



An unusual fuel cell has been developed by researchers at a California chemical company. It contains coconut juice.

The juice is a medium for microorganisms that, like other forms of animal life, produce small amounts of electricity. The cell, which has operated for more than 50 hours on the juice of one coconut, puts out enough power to run a transistor radio.



If you have a pet turtle in the house, take care—it might be the source of salmonella infection. That warning comes from two Minnesota health researchers writing in the *Journal of the American Medical Association*. They report diagnosing salmonella (a term covering a large group of bacteria-caused infections) in 22 patients, most of them under 6 years of age. Symptoms include diarrhea and fever.

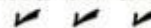
Spread of the infection occurred when children failed to wash their hands after handling turtles or when turtles were put into dishes later used to serve food.



Air bubbles are purifying a lake in Holland. Compressed air pumped into more than two miles of perforated hose lying on the bottom is preserving plant and animal life and removing objectionable odors from a lake that's used for sewage disposal. The bubbles, which are kept going 22 hours a day, cause lower layers of water to rise and thus create continuous circulation.



Oxygen from rocks has been produced by NASA scientists who say the process could be used on the moon to make oxygen for astronauts' breathing equipment and fuel for their rocket ships. The scientists successfully produced oxygen from three types of rocks that they believe are widely distributed on the moon's surface.



A radar scientist caught in a speed trap in Britain beat the bobbies at their own game. He proved that their radar machine was off the beam. He showed that it had

[\(Please turn to page 14\)](#)

POPULAR MECHANICS

Announcing

World-Famous NATIONAL RADIO INSTITUTE'S

Completely New Training-at-Home

for the man who wants to **SAVE MONEY** and **MAKE MONEY**
— spare time or full time — cashing in on the demand for men who know how to

SERVICE ELECTRIC APPLIANCES

NRI's 50th Anniversary Brings You This Opportunity of a Lifetime To Become a Master Appliance Technician . . . Save on YOUR OWN Home, Shop or Farm Repairs . . . Make \$3 to \$5 an Hour Fixing and Servicing Appliances for Your Neighbors!

FOR 50 years, NRI has been successfully training men like you to become top-notch Technicians. Now NRI training is bigger and better than ever — YOU gain bigger and better profits from it!

NRI's new, completely revised and expanded home-training course offers you **EVERYTHING YOU NEED TO KNOW**—whether you want to fix your own appliances to save money, or make money.

Easier Than You Think!

You **DON'T** need technical experience. You **DON'T** need higher education. Everything is explained in plain English — shown in big, detailed, clear pictures. You start from scratch — learn how electricity works — then rapidly advance to installing new outlets, rewiring, fixing and servicing every kind of home, farm and business appliance.

NRI's special new section on modern air conditioning and refrigeration gives you complete know-how in this fast-growing field. Other sections are invaluable for men who work on farms, or in stores or plants. No matter what you're called on to fix, in no time you'll be making repairs like a pro. And — you now get special bonus lessons on 2- and 4-cycle gasoline engines!

Make Extra Money

More than a **MILLION** appliances and engine-powered tools are sold *each week!* Once you can fix them, you'll "cash in" on this boom. It's a fact: NRI-trained men earn \$3.00 to \$5.00 an hour *in spare time alone!*

Don't worry how little you may *now* know about repair work. Former student John D. Pettis, who works out of his basement, says: "I had practically no knowledge of any kind of repair work. Now I am busy almost all my spare time and my day off — and have more and more repair work coming in all along."

No matter where you live, everyone owns and depends on appliances. And once you know how to service them, the owners depend on YOU!

MAIL COUPON TODAY

Wouldn't you like *right now* to be able to repair your own broken appliances? Wouldn't you like *right now* to have money coming in each week? Let NRI show you how. Free Book and Free Sample Lesson describe the new, expanded, low-cost NRI Course in full . . . show how you can quickly master repairing appliances in your spare time. Mail coupon TODAY (or write direct to) National Radio Institute, Dept. 600-085 Washington, D.C. 20016. (No obligation, of course — and no salesman will call on you.)



This FREE BOOK

will open your eyes to a whole world of new opportunities for making money, saving money, through time-tested, low-cost NRI training.



This FREE LESSON

will show how simple and clearly illustrated NRI training is — how it can quickly prepare you to be an expert Service Technician in your community!



Earn While You Learn with this Professional APPLIANCE TESTER KIT — Yours at No Extra Charge!

FIX ALL THESE — AND MORE!

- | | |
|-----------------------------|-----------------------------|
| Travel Irons | Electric Shavers |
| Steam Irons | Clocks |
| Lighting Fixtures | Food Mixers and Blenders |
| Fluorescent Lights | Tank Vacuum Cleaners |
| Switches | Canister Vacuum Cleaners |
| Heaters | Upright Vacuum Cleaners |
| Fuses | AC Motors |
| Plugs | Non-automatic Washers |
| Lamps | Automatic Washers |
| Electric Blankets | Refrigerators |
| Toasters | Freezers |
| Coffeemakers | Vegetable Coolers |
| Chafing Dishes | Soda Fountain Coolers |
| Automotive Air Conditioners | Bench Grinders |
| Water Heaters | Two-cycle Gasoline Engines |
| Centrifugal Pumps | Four-cycle Gasoline Engines |
| Egg Cookers | |
| Bottle Warmers | |
| Vaporizers | |
| Paint Sprayers | |
| Waffle Irons | |
| Roasters | |
| Deep Fryers | |

MAIL NOW FOR FREE BOOK AND SAMPLE LESSON

Mr. J. M. Smith, President
NATIONAL RADIO INSTITUTE
Appliance Servicing Division
Dept. 600-085, Washington, D.C. 20016

Please send Free Book and Free Sample Lesson. I am particularly interested in:

- Business of my Own Spare-Time Earnings
 Repairing My Own Appliances

No salesman will call

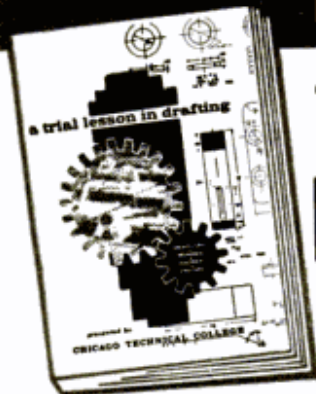
Name.....
(Please Print)

Address.....

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

Accredited Member National Home Study Council

FREE!



Trial lesson in **DRAFTING & DESIGN**

LEARN AT HOME IN SPARE TIME

Check the want ads in any newspaper—SEE the big-pay opportunities open to you as a draftsman. What's more, you can learn this well-paid, prestige profession at home—quickly, easily! No special talent needed! Get complete, step-by-step Chicago Tech lessons in the mail, spend a few pleasant hours studying each week. In a short time you'll be a well-trained draftsman, ready to take your pick of many good jobs. Act now!

FREE INFORMATION—MAIL COUPON TODAY!

Get FREE TRIAL LESSON plus information about C.T.C. practical training. Learn what successful Chicago Tech graduates say about high pay and opportunities in drafting. No charge, or obligation.

Est. 1904 Accredited National Home Study Council

CHICAGO TECHNICAL COLLEGE

K-203 Tech Bldg., 2000 So. Michigan Ave.
Chicago 16, Illinois

Mail me FREE Lesson with information about big opportunities in DRAFTING.

Name..... Age.....

Address.....

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

Science Worldwide

(Continued from page 12)

been focused on an iron fence, which affected its efficiency. Result: the speeding charge was dropped.

✓ ✓ ✓
A bottomless tank for safer storage of oil has been developed in Sweden. Made of plastic, it is floated on the sea. Since oil is lighter than water, when fuel is pumped into the top of the tank, sea water is forced out through the bottom.

In reverse, sea water rises in the tank as oil is pumped out. Since the tank is always full of liquid, air can't enter, minimizing chances of fire or explosion.

✓ ✓ ✓
Miniature earthquakes are being produced by Soviet scientists to test the proposed design of a dam and hydroelectric power station that's planned for a region of Asia. The explosion-simulated earthquakes are set off near a scale model of the dam, which is equipped with instruments to measure its reaction to the tiny tremors.

✓ ✓ ✓
Radioactive chromium is being used by scientists to investigate the movement of sand on the bottom of Australia's Botany Bay. The chromium is mixed with sand and its movement is then traced with highly sensitive instruments.

✓ ✓ ✓
Cats can detect X-rays—and scientists are wondering how they do it. Tests were run at the Veterans Administration hospital in Long Beach, Calif., in which cats had to react to five-second exposures of X-rays in order to avoid mild electric shocks. Researchers found that the felines' reactions were greatest when the rays were directed at the animals' heads. But the scientists haven't been able to determine how the cats sense the rays.

✓ ✓ ✓
To learn about fish, you have to go where the fish are. And the U.S. Bureau of Commercial Fisheries wants to do just that with a fast nuclear submarine. The Bureau's chief, Dr. O. E. Sette, says the kind of boat he needs would be cheap compared to a Navy submarine because it would not carry costly armaments.

It would be equipped with an array of electronic devices to detect schools of fish, listen in on their "conversation" and identify different species. It would also be used for oceanographic studies.

✓ ✓ ✓
Want to slice rock as thin as the ham in some drugstore sandwiches? You can do

(Please turn to page 16)

**HOT SHOT
HOT SHOT**

Amazing New **BENJAMIN**
30 30 CO₂ GAS
BB CARBINE REPEATER

—Packs a PUNCH that's so POWERFUL it will Drive STEEL BBs thru Both Sides of a 5 Gal. Steel Pail at close range!
(26 ga. .018")

You're in for a thrill you'll never forget the first time you shoot HOT SHOT!

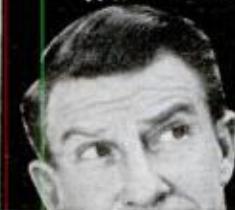
The Hardest Shooting CO₂ Gun on the market—New Model 30 30 embodies features that also assure Flawless Performance: Permanent Alnico V Cast Magnet Shot Holder . . . a Positive, Jam-proof method of loading Ammo in firing position; Convenient, Positive Hammer Safety; 30-BB Mag.; 30 Shots per cartridge; Quality Built. Lightweight—Accurate—Field Tested—Lowest Shooting Costs—use Indoors/Outdoors.

\$18.00 Ask Dealer for Demonstration.
BENJAMIN AIR RIFLE COMPANY
896 Marion St., St. Louis, Mo. 63104

FREE Catalog Benjamin Single Shot and Repeaters—Cal. BB or 177 or 22. Also Special Hunting Knife Offer. Write today!

You Can DEPEND on BENJAMIN

What if I'm laid off?
 Will automation take my job?
 How can I ever afford to retire?
 Am I too old to change jobs?
 Can I learn a new skill?
 Could I succeed as my own boss?
 How can I earn extra money fast?
 Will my job ever pay more?



**FINDS 3-WAY
 INCOME INSURANCE**

"I earned \$2,901.72 while learning locksmithing and now make \$5000 a year—doubling my income. Worries about layoffs, retirement, more money are over for me—thanks to the Locksmithing Institute Course!" — Stanley Nowak, Saginaw, Mich.



**MAIL
 COUPON
 NOW**

Be a SKILLED LOCKSMITH

... and Solve ALL Your "FUTURE" Problems

No question about it... with Locksmithing YOU HAVE IT MADE! You'll do light, clean, fascinating work—take your choice of steady, high-pay job opportunities, or your own big-profit spare-time or full-time business! As a locksmith you have your own "built-in" pension plan. Say "goodbye" to layoffs, automation, slack times, forced retirement! **EARN MORE, LIVE BETTER** in good times and bad. **LOCKSMITHING IS SO EASY TO LEARN—EARN Extra Money RIGHT FROM THE START!** Regardless of age, education, experience, minor physical handicaps, fun and earnings begin **AT ONCE** as you learn quickly, easily at home to **CASH IN** on all kinds of locksmithing jobs. Experts guide you—locks, keys, parts, picks, special tools and equipment as well as complete fully illustrated lessons all supplied with course.

FREE Illustrated Book, **FREE** Sample Lesson Pages Give Exciting Facts. Find out how being a skilled Locksmith can put a quick end to your worries. Locksmithing Institute graduates now earning more, enjoying life. Send coupon **TODAY** for **FREE** illustrated book and sample lesson pages. No salesman will call. Only school of its kind, Licensed by N.J. State Dept. of Education, Accredited Member National Home Study Council.

Est. 1948

LOCKSMITHING INSTITUTE Division of Technical Home Study Schools
 Copyright 1965, Locksmithing Institute Dept. 110-085, Little Falls, New Jersey 07424



**LOCKSMITHING INSTITUTE, Dept. 110-085
 Little Falls, New Jersey 07424**

Please send **FREE** Illustrated Book—"Your Big Opportunities in Locksmithing," complete Equipment folder and sample lesson pages—**FREE** of all obligation—(no salesman will call).

Name
 (Please Print)

Address

City State Zip



START A MONEY-MAKING BUSINESS FOR LESS THAN \$50!



You can have your own lifetime business right at home... work in spare time... and make up to \$200 a month **CASH!** My **FREE PLAN** gives you all the facts: How to start, how to grow. You don't need previous experience. You don't have to sell. I'll even finance you. People bring you the work and pay cash. Over 90c of every dollar you collect is clear cash profit. And you work when you want to. Let me prove you can't find a more certain, lower cost, higher paying business of your own.

Just Mail Coupon—No Salesman Will Call

BELSAW SHARP-ALL CO., Stan Field, President
 716B Field Bldg., Kansas City, Mo., 64111



Name

Address

City State

AUGUST 1965

NEW DREMEL ELECTRIC ENGRAVER

with
 solid carbide
 engraving point



Permanently marks any material

This new compact Dremel permanently engraves names or identification numbers on steel, copper, brass, silver, aluminum, glass, wood, plastic. Handy for marking tools, personal and business valuables, jewelry, industrial tools and dies — anything requiring permanent identification. Weighs only 7 ozs. Exclusive **calibrated** stroke adjustment regulates depth of engraving. Solid carbide engraving point. Diamond points also available.

See your dealer or write for literature.

Model 290 with molded storage case... **\$14.95**

DREMEL MFG. CO.

Dept. 85-BH

Racine, Wisconsin

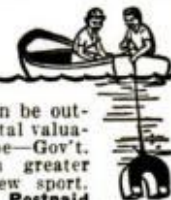
15

UNUSUAL BARGAINS

'FISH' WITH A WAR SURPLUS MAGNET Go Treasure Hunting On The Bottom

Great idea! Fascinating fun and sometimes tremendously profitable! Tie a line to our 5-lb. Magnet—drop it overboard in bay, river, lake or ocean. Trawl it along the bottom—your "treasure" haul can be out-board motors, anchors, fishing tackle, all kinds of metal valuables, 5-lb. Magnet is war surplus—Alnico V Type—Gov't. Cost—\$50. Lifts over 125 lbs. on land—much greater weights under water. Order now and try this new sport.

Stock No. 70.571-H. 5 lb. Magnet\$12.50 Postpaid
 Stock No. 70.570-H. 3½ lb. Lifts 40 lbs.\$ 8.75 Postpaid
 Stock No. 70.572-H. 7½ lb. Lifts 175 lbs.\$18.75 Ppd.
 STOCK NO. 85.152-H ... (lifts over 350 lbs).....\$33.60 F.O.B.



Bargain! 3" Astronomical Telescope



See the stars, moon, phases of Venus, planets close up! 60 to 180 power—famous Mt. Palomar Reflecting type. Unusual Buy! Equipped with Equatorial mount; finder telescope; hardwood tripod. Included FREE: "STAR CHART"; 272-page "HANDBOOK OF HEAVENS"; "HOW TO USE YOUR TELESCOPE" book.

Stock No. 85.050-H\$29.95 pstpd.
 4½" Reflecting Telescope—up to 255 Power.

All-metal pedestal mount.
 Stock No. 85.105-H\$79.50 F.O.B.

MINIATURE WATER PUMP



Wonderful for experiments, miniature waterfalls, fountains, HO gauge railroad backdrops, etc. Tiny (2½" x 1¾") electric motor and pump ideal for hobbyists, labs, schools. Pumps continuous flow of water at rate of one pint per minute at a 12" head. With 2 D Batteries in series will pump to 24" high. Runs 48 hrs. on battery. Works in either direction. Self-priming.

Stock No. 50.345-H\$2.25 Postpaid

WAR SURPLUS AMERICAN-MADE 7x50 BINOCULARS

Big savings! Brand new! Crystal clear viewing—7 power. Every optical element is coated. An excellent night glass—the size recommended for satellite viewing. Individual eye focus. Exit pupil 7mm. Approx. field at 1,000 yds. is 376 ft. Carrying case included. American 7 x 50's normally cost \$274.50. Our war surplus price saves you real money.

Stock No. 1544-H... Only \$74.80 Ppd. (tax incl.)
 8 x 30 Binoculars—similar to above.
 Stock No. 963-H...\$33.00 Postpaid (tax incl.)
 7 x 35 American Made Binoculars.
 Stock No. 964-H.....\$60.50 Ppd. (tax incl.)



SOLVE PROBLEMS! TELL FORTUNES! PLAY GAMES! NEW WORKING MODEL DIGITAL COMPUTER ACTUAL MINIATURE VERSION OF GIANT ELECTRONIC BRAINS



Fascinating new see-through model computer actually solves problems, teaches computer fundamentals. Adds, subtracts, multiplies, shifts, complements, carries, memorizes, counts, shifts, compares, sequences. Attractively colored, rigid plastic parts easily assembled. 12" x 31" x 43½". Incl. step-by-step assembly diagrams, 32-page instruction book covering operation, computer language (binary system), programming, problems and 15 experiments.

Stock No. 70.683-H\$5.00 Ppd.

OPAQUE PROJECTOR

Projects illustrations up to 3" x 3½" and enlarges them to 35" x 30" if screen is 6½ ft. from projector; larger pictures if screen is further away. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volt. A.C. current. 6-ft. extension cord and plug included. Operates on 60 watt bulb, not included. Size 12" x 8" x 4½" wide. W. 1 lb., 2 oz. Plastic case. Stock No. 70.199-H.....\$7.95 Postpaid



OPAQUE PROJECTOR WITH KALEIDOSCOPE ATTACHMENT—Same set as above, but provides endless additional projects with everchanging kaleidoscope patterns.
 Stock No. 70.714-H\$10.00 Ppd.

WAR SURPLUS ELECTRIC GENERATOR



Brand new Signal Corps Electric Generator for scientific experiments, electrical uses, demonstrations. Generates up to 90 volts by turning crank. Use in high impedance relays. Charge ground and bring up night crawlers for bait or study. 2 Alnico Magnets alone worth original price. Wt. 2 lbs. Cost to Gov't. \$15.

Stock No. 50.225-H\$6.95 Pstd.

Same type generator, mounted, with light, as electricity demonstrator.
 Stock No. 50.365-H\$11.95 Postpaid

Order by Stock No.—Send Check or M.O.—Money-Back Guarantee
EDMUND SCIENTIFIC CO., Barrington, New Jersey

MAIL COUPON FOR FREE CATALOG "H"

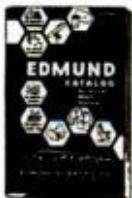
Completely new 1965 Edition, 148 pages.
 Nearly 4000 Bargains.

EDMUND SCIENTIFIC CO., Barrington, N. J.
 Please rush Free Giant Catalog "H".

Name.....

Address.....

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



Science Worldwide

(Continued from page 14)

it with a new machine developed by a British firm. The device uses a diamond wheel to cut rock, concrete or ceramic materials into 1/16-in. slices.

Caviar for the masses. Russian scientists say they have produced a synthetic caviar that tastes exactly like the real article. They also claim that a small laboratory can turn out large quantities of the food, which will take it out of the luxury class.

The report appeared in a Russian newspaper, but there were no details on the process itself. Natural caviar is made from fish eggs, the best coming from the roe of the sturgeon.

A train simulator—the world's first—is being used in England to train engineers for British Railways. The computer-operated simulator enables the trainee to "drive" over 16 miles of track, complete with sound effects and programmed "emergencies." As he drives, a moving picture of the track is projected on a screen in front of him. The trainer is mounted on a pivot and is moved by hydraulic jacks to give the sensation of movement.

The moon may be full of crude oil. So says Dr. Willard F. Libby, professor of chemistry at the University of California and former member of the AEC. He explains that the intense radiation in outer space may cause simple chemicals to form complex organic compounds such as crude oil. Libby reports that he and a graduate student have frozen methane (a simple compound) to its solid crystalline form and subjected it to atomic radiation. The result: "a fair amount of crude oil."

Suggested methods for kicking the cigaret habit are a dime a dozen these days. One of the latest comes from a British physician who advises putting pinholes in cigarets: one pinhole the first week, two the second, three the third.

The air vents cause the smoke to become more and more diluted. The doctor claims that three pinholes will cut tar deposits by 50 percent. He prescribes the system for people who are trying to taper off gradually.

John F. Pearson
 Science Editor

INTERNATIONAL CORRESPONDENCE SCHOOLS

ICS

Dept. 1049, Scranton, Penna. 18515. Please send me FREE Success Kit for the field indicated below.

ARCHITECTURE and BUILDING TRADES

- Air Conditioning
- Architecture
- Arch. Drawing
- Building Contractor
- Carpentry & Millwork
- Plumbing & Heating

ART and DESIGN

- Commercial Art
- Interior Decorating
- Sketching and Painting

AUTOMOTIVE

- Auto Electric Technician
- Automotive Mechanic
- Engine Tune-up
- Transmission Specialist

BUSINESS

- Accounting
- Cost Accounting
- Bus. Administration
- Executive Training
- Marketing
- Personnel-Labor Rel'n's
- Programming for Digital Computers
- Purchasing Agent
- Real Estate
- Salesmanship
- Sales Mgmt.
- Small Business Mgmt.
- Traffic Mgmt.

CHEMICAL

- Chem. Engineering

- General Chemistry
- Lab. Technician
- Nuclear Energy
- Plastics Pulp, Paper

CIVIL ENGINEERING

- Civil Engineering
- Highway Engineering
- Structural Blueprints
- Sanitary Engineering
- Structural Engineering
- Surveying & Mapping

DRAFTING

- Architectural
- Drafting Technology
- Electrical—Electronic
- Mechanical

ELECTRICAL

- Appliance Servicing
- Electrical Engineering
- Elec. Motor Repairman
- Instrument Technician
- Practical Electrician
- Practical Lineman
- Telemetering

ELECTRONICS

- Automation
- Electronic Computers
- Electronics Technician
- General Electronics
- Industrial Electronics

ENGINEERING (Professional)

- Chemical Civil
- Electrical Mechanical

ENGLISH and WRITING

- Business Writing
- Technical Writing
- Practical English

HIGH SCHOOL (Diploma)

- High School Business
- High School: General
- High School Math
- High School Secretarial
- High School Vocational
- College Preparatory

LANGUAGES

- (Edited by Berlitz)
- French German
 - Italian Spanish

MECHANICAL and SHOP

- Gas-Elec. Welding
- Industrial Engineering
- Ind. Instrumentation
- Machine Design
- Machine Shop Practice
- Mech. Engineering

- Safety Engineering
- Shop Blueprints
- Toolmaking

SECRETARIAL

- Clerk-Typist
- Legal Secretary
- Medical Secretary
- Professional Secretary
- Shorthand Typist
- Stenographic

STEAM and DIESEL POWER

- Boiler Inspector
- Power Plant Eng.
- Stationary Engineering

SUPERVISION

- Foremanship—Suprv'n
- Personnel—Lab. Rel'n's

TV-RADIO

- Radio and TV Servicing
- Radio-Tele. License

MISCELLANEOUS

- Textile
- Other (please specify)

Name _____ (Indicate Mr., Miss or Mrs.)

Address _____

City _____ State _____ Zip Code _____

Occupation _____ Employed by _____

Working Hours _____ A.M. to _____ P.M.

Clip coupon here — and take your first big step to real success! Accredited Member, National Home Study Council

UNLOCK YOUR GENIUS

FOR MAKING MONEY

No matter what you are doing . . . or want to do. No matter your education or experience. You have a hidden Genius for making more money. Maybe really big money.

Give your Genius a chance. Give it *knowledge*. Do it *now*.

Mail the card (or the coupon) above. It will put you in touch with the most respected home-study institution in the world — International Correspondence Schools.

Spare-time study with I. C. S. can bring any one of hundreds of careers within your grasp. Every course is a hardheaded, practical study of its subject which prepares you to move ahead in the field. You get training that's worth *money* . . . training that will let you move ahead *faster*.

Pick your field of interest *right now*. Then fill out the card and mail it. I. C. S. will send you three valuable booklets, absolutely FREE. They tell all you need to know to set loose *your Genius* for making more money!

The Genius is there, within you. But it can't go to work without help. Unlock *your Genius*. Mail the card or coupon *now*. Special low rates to members of U. S. Armed Forces. Special training programs for industry. New WICS package for women.

ICS

75th YEAR

Take Charge of Your **CAREER**

By Richard Dunlop

ELECTRONIC CONTROLS on the new No. 2 "instant steel" oxygen furnace in a steel mill in Ohio burned out. Jim Baker, production supervisor, had fixed them before, but this day he was home with stomach flu. Bill Eberle, veteran maintenance man, was called over from the shop.

"Can you get her running?" asked the department head anxiously.

Bill was the sort of man who could fix almost anything with chewing gum and baling wire, but after one look he said:

"I can't even read the circuit prints."

They got Jim Baker out of his sickbed and brought him to the plant, and he couldn't fix the controls either! The furnace was shut down until a company crew analyzed the trouble and got production started again.

Across the nation in industry after industry the Bill Eberles and Jim Bakers are struggling to keep the equipment of the sweeping new technology running, and they are finding it tough.

"What do you do when you update machines and out-date operators?" asks Dr. Joseph S. Kopas, founder of Cleveland's Human Engineering Institute. His group provides several special training programs to help workers catch up with technological change. Dr. Kopas and other educators, economists and industrial and labor leaders know that automation, new products, plant mergers and plant relocations are changing jobs faster than at any other time in the world's history.

Most economists today maintain that automation creates new jobs even faster than it destroys old ones, but there is no denying that a man whose job is automated out from under him feels little comfort in this. There are economists and labor and business leaders who are pessimistic about the impact of automation, or who take a "wait and see" attitude. Thomas J. Watson Jr., is chairman of the board and chief executive officer of International Business Machines Corp., the giant "Think" company which manufactures a high percentage of the data-processing machines that have revolutionized industry. Recently, he pointed out that for four straight years the nation's

economy has continued to grow without a break. "Yet for seven straight years," he said, "the unemployment rate, almost without interruption, has failed to decline."

"As many as 800,000 young Americans may be out of school and out of work today," he added. "If present trends continue, by 1970 they may number one and a half million."

He maintained that unemployment is "a hard, incontrovertible fact, which we cannot ignore away," and he raised the gloomy possibility that "the new labor-saving machines, in coal mines and auto factories and oil refineries have aggravated the unemployment problem."

Modernize or Fail

Few Americans, even those put out of work by the new laborsaving machines, think that the United States should refuse to modernize its factories and shops. They know what has happened to other once-great nations that lagged behind the rest of the world. In the fiercely competitive American market, the firm which does not stay modern also loses out. Dr. Louis T. Rader, general manager of General Electric Company's industrial electronics division at Phoenix, Ariz., noted that from 1948 to 1963 "the industries that invested the most money in plant and equipment in order to increase productivity, enjoyed both increased profits and employment." The industries that invested the least in plant and equipment "suffered a loss in profits and in employment." He ranked the four most labor-efficient industries as chemicals, petroleum, tobacco and instruments, and the least labor-efficient as textiles, leather, lumber and apparel. If a man looking for a job has a skill, he is more likely to find an opening in a labor-efficient industry working with the new machines than he is in one without them.

There are few "fur-lined ruts" in labor-efficient industries. Change marches through these plants and a man's job can be outmoded almost overnight. America's industrial chemical plants make more than 10,000 products used by other firms in the manufacture of consumer products. William Marshall was just out of high school when he went to work at a Wilmington, Del., plant which produced sulphuric acid for the steel industry. He filled barrels and toted crates and advanced rung by rung until he was a helper to a chemical operator. When his company offered on-the-job training and classroom instruction tied into his work, Bill took the courses. Another helper

(Please turn to page 22)

Familiar faces in the Winner's Circle:



CLARK WINS "INDY 500" WITH A TIGER IN HIS TANK!

International Grand Prix star Jimmy Clark put a Tiger in his tank to win the Indianapolis "500". Special Esso Racing Fuel powered Jimmy's Lotus-Ford to a new race record of 150.686 mph.

Since A. J. Foyt rode the Tiger to victory in last year's "500", nearly all major U.S. Auto Club races have been won with fuels and motor oils supplied by Humble.

Put a Tiger in your tank with Esso Extra. It's the High-energy gasoline that gives you the: (1) cleaning power; (2) firing power; (3) octane power for winning performance.

Take a tip from the top racing drivers and fill up at the sign of **Happy Motoring!**



This event was conducted under the auspices of the United States Auto Club.



HUMBLE
OIL & REFINING COMPANY

... AMERICA'S LEADING ENERGY COMPANY ... MAKERS OF ESSO PRODUCTS

HOW TO SELL YOUR INVENTION

If you have an invention (whether patented or unpatented) that you believe has commercial value, our Free Booklet entitled "How to Go About Selling Your Invention" may help you save time and money.

We are specialists in representing inventors and submitting their inventions to manufacturers. We work with scores of manufacturers who are seeking new products or new product ideas, and we therefore know which firms may be interested in your particular invention. Our service is designed to do all those things the average inventor lacks the knowledge or facilities for doing, or does not have time to do. We prepare your sales letters, folios, duplicate drawings, handle correspondence, select the firms.

We charge the standard commission (on sales) and a modest fee for the submitting service. This fee is refunded if a manufacturer buys your invention through our efforts. We are a nationally known concern with an impeccable reputation for ethics and integrity.

The Free Booklet we have prepared especially for inventors contains such information as current royalty rates being paid by manufacturers, discusses many types of inventions, the possible market for them, tells the effective methods of presenting your invention for sale, whether you employ us or do it yourself, and outlines how we may be able to help you.

You can obtain this booklet "How to Go About Selling Your Invention" by mailing the coupon below. And if you wish to write us for comments on your invention, please do so. We make no charge for consultation. But please do NOT send drawings or models. Just describe the purpose and nature of your invention. Mail the coupon to K. O. Kessler, Pres., Kessler Sales Corporation, Dept. D-58, Fremont, Ohio.

You are welcome to ask your lawyer, local Bank, Chamber of Commerce to carefully check on our reputation for honesty and fair-dealing.

MAIL THIS COUPON

Mr. K. O. Kessler, President, Dept. D-58
Kessler Sales Corp., Fremont, Ohio 43420

Please mail me a copy of your Free Booklet "How to go About Selling Your Invention." It is understood that this does not obligate me in any way to use your Service.

My Name.....

Street Address.....

City.....State.....
Zip Code.....

Take Charge of Your Career

(Continued from page 20)

lunched with him almost every day.

"Hey, take time to live," he often rebuked Bill over the after-lunch poker hand. "Don't be a grind. Seniority will look after little old me."

A few years ago the company shut down the by-then obsolete sulphuric acid plant. Today Bill Marshall, who studied instrument repair in his off hours, is a well-paid instrument maintenance man in a new automated plant built by the chemical company. His poker-playing buddy is still out of work.

Comparisons between men like Bill and his friend can be made in almost every factory, shop and office across the country. Dr. John Walsh, director of educational research for International Correspondence Schools, Scranton, Pa., believes that our "unemployment rate would be considerably lower today if we could only overcome so many workers' fear of facing up to the future and preparing themselves for it. So many are afraid to tackle spare time study because they think it's too tough, and they'll probably fail. The tragedy is that with a little encouragement from their family or their employer, most could make the grade."

Fewer Work Hours, More Training

We learned that in the new America which is emerging, machines will direct and perform the most tedious jobs, freeing men for more creative work not only in shops, factories and offices, but in the service industries and in the arts and sciences. Working hours will be shorter for most men, but training hours will be longer. To keep up with an "on-the-go" America men will have to sharpen both vocational and hobby skills with home-study courses, night school, adult education classes in high schools and junior colleges, and on-the-job training offered by unions, industries or government agencies. Men will be expected to go back to the university for re-education.

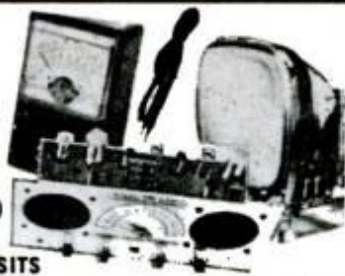
"After all," argues one educator, "even a surgeon has to go back to school from time to time if he is to keep up to date. I know a mastoid specialist who thought he had it made. Then the wonder drugs all but eliminated mastoiditis. He returned to medical school and specialized in obstetrics. I suppose he figured that neither new drugs nor automation was likely to eliminate babies. The truth of the situation is that the real threat to a man's job does not come from the changing times but from his unwillingness to keep up his education and training."

PAY WITH N.T.S. HOME TRAINING the "Project Method" way.

ELECTRONICS DIVISION

1. Electronics-TV-Radio Servicing and Communications
2. Master Course in Electronics-TV-Radio Advanced TV and Industrial Electronics
3. FCC License Course
4. Radio Servicing (AM-FM-Transistors)
5. Television Servicing (Including Color)
6. Stereo, Hi-Fi and Sound Systems
7. Basic Electronics
8. Electronics Math

NO KIT DEPOSITS



AUTO-MECHANICS DIVISION

1. Automotive-Diesel Master Course
 2. Automotive Mechanics
 3. Diesel Mechanics
 4. Engine Tune-Up and Electricity
- Eighty million cars and trucks need maintenance. Here's real opportunity! Get and keep valuable tools. No kit deposits, no extra cost.



AIR CONDITIONING-REFRIGERATION DIVISION

1. Air Conditioning-Refrigeration Servicing Course
 2. Air Conditioning Refrigeration & Electrical Appliances Master Course
- Good income in servicing and installation. Big equipment kits with both courses at no extra cost. No kit deposits.



HOME APPLIANCE DIVISION

1. Home Appliance Technician's Course
- Prepares you quickly for a business of your own or important jobs with manufacturers and distributors. Earn while you learn, using tools and tester you get with your course. No kit deposits.



HIGH SCHOOL AT HOME

National offers accredited high school programs. Take only subjects you need. Study at your own pace. Everything included at one low tuition. Check special High School box in coupon for complete FREE Diploma information.



RESIDENT TECHNICAL TRAINING AT L.A.

You can take classroom training in our famous Resident School in Los Angeles. Check Resident School box in coupon for full details.

SEND FOR FREE BOOK & SAMPLE LESSON



NATIONAL TECHNICAL SCHOOLS

WORLD-WIDE TRAINING SINCE 1905

4000 S. Figueroa St., Los Angeles, Calif. 90037
YOU ENROLL BY MAIL. NO SALESMAN WILL CALL.



NATIONAL TECHNICAL SCHOOLS

4000 S. Figueroa St., Los Angeles, California 90037

NATIONAL TECHNICAL SCHOOLS, DEPT. 201-85
4000 S. Figueroa St., Los Angeles, Calif. 90037
Please rush FREE BOOK AND SAMPLE LESSON on Courses in the Division checked below. No obligation. No salesman will call. Please check one only.

- ELECTRONICS Division
- AUTO MECHANICS Division
- HIGH SCHOOL Department
- AIR CONDITIONING REFRIGERATION Division
- HOME APPLIANCES Division

Name _____ Age _____

Address _____

City _____ State _____ Zip _____

Check here if interested ONLY in Resident Training at Los Angeles.

COLOR-HIT.

RECOLORS LEATHER, VINYL, PLASTIC CAR SEATS,
BOAT CUSHIONS, DINETTE CHAIRS, BAR STOOLS
24 PAINT-ON COLORS .. DRIES FAST .. STAYS FLEXIBLE

COLOR-HIT kit complete with 4 oz. Conditioner, 4 oz. Color, soft brush. Colors 4 dinette chairs, 1 standard auto seat. Two kits color entire car interior. **\$3.98**

Clear Plastic protective coating in aerosol can. Matte Finish **\$1.99**
High Gloss



See Color-Hit at your favorite dept., variety, drug, hardware, or paint store. If not available, order from us, Color-Hit kit in black, white, red, tan, avocado, royal blue, brown, emerald, gold, maroon or turquoise.



Color-Hit Division of Shu-Mak-Up • Dept. P
3317 E. 50th St., Los Angeles, Calif. 90058

Send _____ Color-Hit Kits @ \$3.98 ea.
in following colors _____
plus () Matte Finish () High Gloss @ \$1.99.

Name _____

Address _____

City _____ State _____ Zip _____

Be a Home Builder

EARN BIG MONEY!

Get into Building Construction. Over 1 million new homes are built each year. Billions are spent on remodeling. Earn top pay as a craftsman; or in estimating, purchasing, blueprint reading, supervising. Learn every phase of contracting. Train at home in spare time. Earn cash as you learn. Mail coupon for new opportunity booklet. It's free.



COMMERCIAL TRADES INSTITUTE, Dept. C-206
1400 GREENLEAF AVE. • CHICAGO 26, ILL.

NAME _____ AGE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Accredited Member National Home Study Council



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, 906 Field Bldg., Kansas City 11, Missouri

ARROW ALL PURPOSE STAPLE GUN T-50

HEAVY DUTY



Model T-50

\$12.50

Uses 6 Staple Sizes — 1/4" to 9/16" and Ceiltile

OTHER MODELS FROM \$4.95

SHOOTS A STAPLE WHEREVER YOU'D DRIVE A NAIL!

FASTER! CHEAPER! BETTER!

for 1001 Home Improvement Fastening Jobs: Ceiling Tile, Insulating, Upholstering, Screening, etc.

Available at hardware, lumber, building supply, stationery and other retail outlets.

ARROW FASTENER CO., INC.

One Junius Street • Brooklyn 12, N. Y.

Sidelights on

AVIATION

The Army's navy may soon be sliding down the slip. The Army never really gave up its air force after the old Army Air Corps became the independent Air Force, because it went right on flying smaller and slower aircraft for front-line support and spotting, as the Air Force went in for bigger and faster jets following World War II.

Now it's going in for floating airfields just like the Navy. It is converting a Navy seaplane tender into a floating maintenance facility complete with flight deck.

The Army's "aircraft carrier" will service helicopters primarily, floating close to a coast where the helicopters are engaged in combat operations.

The maneuverability of the carrier gives this maintenance and repair shop extra added protection against retaliation from guerrilla forces.

The carrier will also be a floating storage depot of replacement parts and a library of technical information.

The library is something new. All of the drawings and technical data are on microfilm. If a technician below deck needs a particular drawing, he requests it be shown on closed-circuit television. If he needs a full-size copy, the microfilm is placed on a scanner and the hard copy is reproduced in the shop.

The new carrier is expected to be ready for action early next year.

Supersonic transport passengers of the future may be relieved of radiation hazards believed to be present at the altitudes (70,000 feet) that the 2000-mph aircraft will fly at regularly.

Studies on military pilots who have flown at those heights with U-2s and other high-altitude machines are being conducted, and later this year the Federal Aviation Agency plans to send a battery of instruments aloft to check it out further.

The most significant preliminary finding so far is that the pilots who have been exposed to these altitudes for up to 2000 hours have suffered no discernible physical defect due to radiation.

The engineers are optimistic that the supersonic aircraft can be constructed to protect passengers as adequately as the military pilots have been protected.

Kevin V. Brown
Aviation Editor

POPULAR MECHANICS

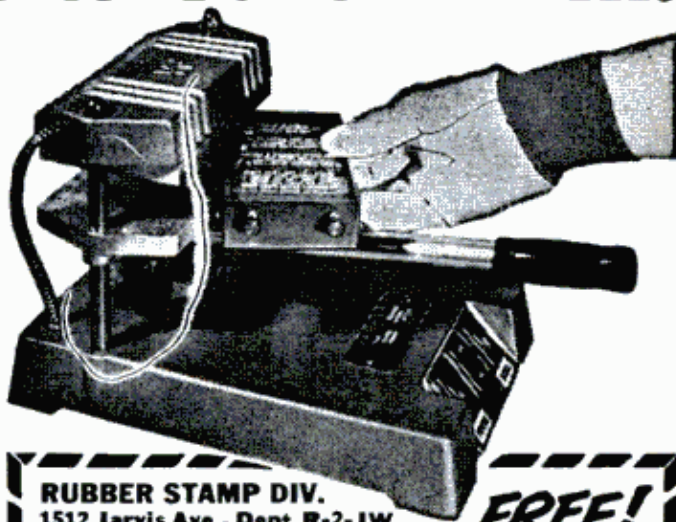
NEW RUBBER STAMP BUSINESS PAYS BEGINNERS UP TO \$9.20 AN HR.

**START AT HOME
IN SPARE TIME**
with Table Top Machine!

We Help Finance You

The multi-million dollar Rubber Stamp business—once controlled by a few big companies—is now being taken over by small operators—one in each community throughout the United States. Men and Women who have this inexpensive machine can turn out huge quantities of Rubber Stamps with special wording that buyers once were forced to buy from big cities. Material costing only 27c makes a stamp that sells for \$1.80. The machine that does the work is simple and easy to operate and it turns out as many as six Rubber Stamps at a time, each with different wording such as names, addresses, notices, stock numbers, prices and other "copy" needed by offices, factories and individuals. Working full capacity, it can earn as much as **\$9.20 an hour for the operator!** Now you can get into the big-pay business yourself, with your own home as headquarters. You don't need experience. We supply everything, including complete instructions and eight ways to get business coming in fast. **We even help finance your start.** Start making up to \$9.20 an hour from the very beginning. Cash in on the profitable Rubber Stamp business in your community, right away. We'll mail full particulars **FREE** and no salesman will call. Be first in your locality. Rush coupon today or send your name on postcard to:

RUBBER STAMP DIV., Dept. R-2-JW
1512 JARVIS AVENUE • CHICAGO 26, ILLINOIS



RUBBER STAMP DIV.
1512 Jarvis Ave., Dept. R-2-JW
Chicago 26, Illinois

FREE!

Please rush full particulars about your financing plan and the little machine that can get me started in the profitable Rubber Stamp business at home in spare time. Everything you send me is **FREE** and no salesman will call.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

GIANT **8 Ft.**

\$1.00

Largest Distributors of new Gov't. Surplus Balloons in the USA. Inflate with air or gas. Fun at the Beach, Water Sports, etc.. Flying Advt. visible for miles. Terrific for attracting crowds at Openings, Fairs, Roadside Stands, Gas Stations, Sports Events. Durable Neoprene Rubber. Guaranteed new. Plus 25c hdlg. No C.O.D.

2 ft. (Beach Ball) size	5 for \$1.00
4 ft. size	2 for \$1.00
8 ft. size	\$1.00 each plus 25c hdlg.
16 ft. size	\$3.00 each
24 ft. size	\$5.00 each

NOVEL PROD. CORP. 31 SECOND AVE., Dept. 1013
NEW YORK 3, NEW YORK

LAFAYETTE RADIO ELECTRONICS

FREE! **1965 CATALOG NO. 650**

516 Pages from the
"World's Hi-Fi & Electronics Center"

Hi-Fi Stereo • Citizens Band • Ham Gear • Test Equipment • Cameras • Tools . . . just about Everything in Electronics for Home, Industry and Laboratory.

Mail the Coupon for Your Free Catalog!

Lafayette Radio Electronics
Dept. LH-5, P.O. Box 10 Syosset, L.I., N.Y. 11791

Send me the Free 1965 Lafayette Catalog 650.

Name _____
Address _____
City _____ State _____ Zip _____

**Earn HIGH WAGES as a
HEAVY EQUIPMENT OPERATOR**

. . . and years of future security in the multi-billion dollar construction industry, in this country and *overseas!* Learn how at National, the original school of heavy equipment operation. For men ages 17 to 56. Amount of previous *education no barrier.* National is NOT a correspondence school. You train on school-owned diesel-engined machines at National's huge proving ground in North Carolina. Full 220 and 440 hour courses. Full-time Job Advisory and Counselling Director for the exclusive benefit of graduates. VA approved. Payment plans available. Write **TODAY** for **FREE** catalog.

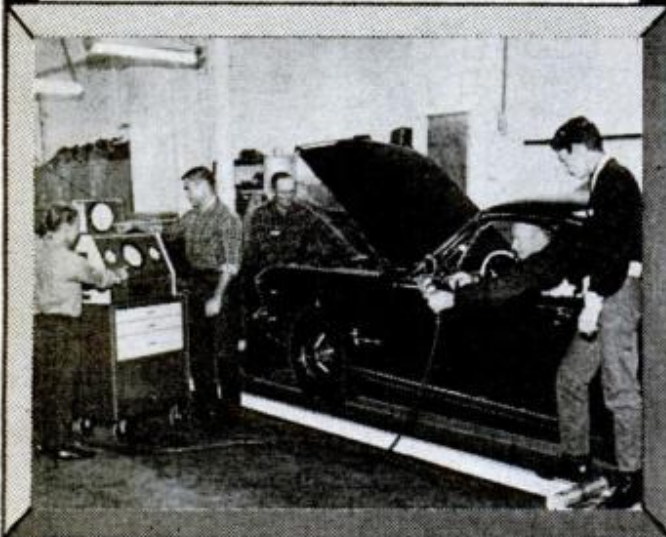
Since National School was founded ten years ago, students from all 50 states and 28 foreign countries have been enrolled. Hundreds of graduates are now working in construction for higher wages than they ever made before.

**NATIONAL SCHOOL
OF HEAVY EQUIPMENT OPERATION** Dept. D-66
P. O. Drawer 1686, Charlotte, N. C.

Please send me **FREE** illustrated school catalog and complete information. I understand there's no obligation.

Name _____ Age _____
Address _____
City _____ Zone _____ State _____

94.6% OF BAILEY GRADUATES ARE EMPLOYED AT TOP PAY IN THE FIELDS FOR WHICH THEY WERE TRAINED!



DIESEL-AUTO MECHANICS DESPERATELY NEEDED!

We have a far greater demand for our students than we can fill!

We can show you an actual waiting list of leading companies throughout the world who have tried Bailey graduates — found them outstanding, and are coming back for more!

Bailey Graduates are Successful . . . RECEIVE BIG PAY — HAVE SECURE FUTURE!

The Famous Bailey Course prepares you for BOTH Diesel and Gasoline Mechanics.

This is a **must**-due to the advent of using Diesel principles, such as 'Fuel Injection' on passenger cars . . . use of gasoline engines for starting Diesel engines, etc. You learn all this at Bailey in the amount of time ordinarily required to learn just one of these subjects, **ALL FOR THE PRICE OF ONE.**

Don't be satisfied with a 'futureless', one-type job — learn how you can make **big money** now!

Write today for Free Booklet that takes you on a step-by-step camera tour through our spacious, modern shops — See Bailey students in action as they Learn-by-doing with the Famous Bailey Method of training!

We provide you with housing and part time jobs while in school, plus nation-wide placement service for graduates.

BAILEY Technical SCHOOLS

1645 S. GRAND Dept. PM ST. LOUIS 4, MO.

MAIL TODAY!

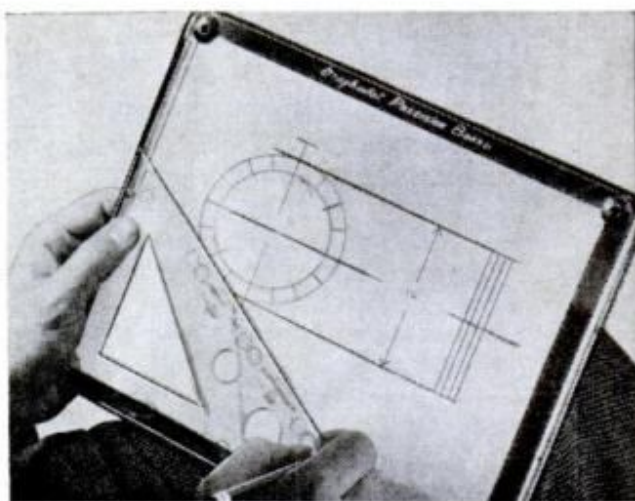
Please mail immediately this free booklet without obligation.

FREE BOOKLET

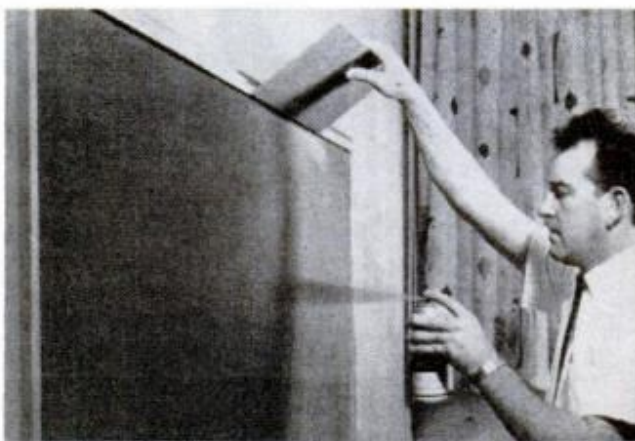


Name _____
 Address _____
 City _____ State _____
 Telephone _____ Age _____

New on the



Drafting table goes with you: This 9 $\frac{3}{4}$ x12 $\frac{1}{4}$ -in. drawing board fits in a briefcase and weighs only 8 oz. Equipped with spring clips for holding two calibrated triangles, plus retractable straight edges that do away with a T-square. Recessed spring clips hold standard size paper in place. Use it on a desk or table, or in your lap. Retail for \$5.45 postpaid, complete with a pair of triangles and weatherproof polyethylene cover. Available from Trident House, Box 27, Neptune, N.J.



Kids bugging you for a blackboard "just like the ones at school?" With Son-Nel Spray Slating, almost any surface such as plywood, steel, paper or hardboard becomes a blackboard. Each 15-oz. can of this product is said to cover about 20 sq. ft. with a dark abrasive coat that dries to a flat, smooth green finish 4 mils thick. For resurfacing worn boards, a can does about 32 sq. ft. Retail price is \$3.98 per can. Available from Son-Nel Products Co., 1990 Embarcadero, Oakland 6, Calif.

Market



Fast-drying water stain for wood comes premixed and ready to use. It can be applied with brush, roller or sponge, and usually dries within an hour, permitting same-day finishing. Tools, brushes and your hands clean with ordinary tap water. Available in wide range of tones, plus a neutral tone which you can color yourself with the use of an all-purpose colorant. The stain is priced at \$9.80 for a gallon can or \$1.95 per pint. From Deft, Inc., Box 2216, Torrance, Calif.



Everything you need for proper care of that special hunting knife comes packed in this kit—a 3-oz. can of honing oil, a coarse Washita stone measuring 1 $\frac{3}{4}$ x4x $\frac{1}{2}$ in. and a fine 1 $\frac{3}{4}$ x2 $\frac{3}{4}$ x $\frac{1}{4}$ -in. Arkansas stone for bringing the edge to razor sharpness. Purpose of the special honing oil is to keep the pores of the stones open, thus insuring maximum abrasive action. Kit sells for \$4.75, and is distributed by Buck Knives, Inc., 6588 Federal Boulevard, San Diego, Calif. 92114.

AUGUST 1965

Not everyone does as well, but T. N. CODY, who started a business of his own, reports...

For 12 months I've averaged

\$800

per month income

— most of it clear profit for me!



• Many men have discovered how to be independent, to be free of layoffs and bosses. C. G. Naples grossed more than \$200 his first week. A father-son combination grossed \$44,000 their second year. H. Lemon says, "I netted \$133 in one 8-hour day."

How much you earn depends largely on you, but we help you to start and work with you for your success. You need no special skill, no large investment. Start part time if you wish. Hire helpers as needed.

NO SHOP NECESSARY • Our **PORTABLE ELECTRIC DETERGER** shampoos rugs, carpets right on customer's floor. Wonderful results bring you repeat business, large fees. So efficient and safe, it is used by largest hotels and railroads.

OURS IS NOT A LEASE ARRANGEMENT • You are free to operate in an independent manner. You sign no contract. You own the detergent outright and are always your own boss...and every dollar you take in is yours to keep. You pay no fees, or dues, or royalties to anyone, and enough supplies come with it to return far more than your investment. Many earn the cost of the detergent in a week or two. It costs nothing to get the details...write TODAY.

Mail Coupon Today for FREE Book

VON SCHRADER MFG. CO.
810 "R" Pl., Racine, Wisconsin

Without obligation send me FREE booklet about your RUG DETERGER and tell me how I can start my own permanent, profitable business.

Name _____

Address _____

City _____ Zone _____ State _____



"\$705⁸³ LAST MONTH
SERVICING RADIATORS"

—ROSS FLUMMERFELT
MUGOTON, KANSAS (Pop. 2,912)
Operate your own profitable business. Easy to test, clean, repair auto-truck-tractor radiators with Inland equipment. Inland, world's largest mfr. of radiator equip., **TRAINS YOU FREE.** Proved merchandising assures volume. Small down payment starts you... Pay-As-You-Profit plan.

NEW INLAND BENCH With ELECTRAMATIC Drive & Brake

FREE!
32-page booklet "Blueprint for Profits" shows equip., prices, owner letters.

• TESTS
• REPAIRS

INLAND MFG. CO., Dept. PM-8

1108 Jackson, Omaha, Nebr. 68102

Send free 32-page booklet and money-making plan.

Print Name _____

Address _____

City _____ State _____

detroit listening post

- **Pontiac Missing the Boat on Chevy 'Mustang' Shell**
- **Danger Sign Spurs Finn Onward**
- **Case of Aerodynamic Doublethink?**

Chevrolet's plans to introduce a **Mustang-style** car for '66 seem to **Pontiac** like a great idea. So great, in fact, that **Pontiac** executives were scrapping within the **GM** family for a chance to add that body to **Pontiac's** '66 line, too. As we go to press, it doesn't look as though they'll make it this year.

Try this for a nightmare situation: It's late at night. You're tooling along a side road and doze at the wheel. You miss a curve, go over a bank and plunge into a water-filled gravel pit.

Test authorities from Indiana University, the Michigan police, an insurance company, and the Red Cross found it needn't be such a nightmare—if you don't panic. You usually have a few minutes in which the car will float. Open a window (don't try to buck water pressure with the door) and scramble out. Or, as the car starts to nose down, hustle out a back window. By keeping calm you use less oxygen. Even when you're on the bottom, it's often possible to get out of a water-filled car.

Citroen's showing in its "new Canadian double transcontinental crossing"—7604 miles from Halifax to Vancouver and back in 134½ hours for an average 57+ mph—sounds pretty good for the course. Unfortunately there's no way to tell *how* good it really is. The **Federation Internationale de l'Automobile** hasn't recognized a speed record on public roads for years, so there's no comparison of **Citroen's** "record" with any other car's. A couple of weeks earlier the **Shell** 4000-mile trans-Canada rally ran from Vancouver to Montreal, but **Citroen** didn't enter it.

A story about Timo Makinen, the big-time professional Finnish rally driver, illustrates the temperament of these men. Another team was given a copy of Timo's route notes—reminders of the kind of corners and hills to expect so a driver can attack stretches he's only partly familiar with. One note advised that at "DANGER sign" the way to drive was "flat out."

Those of us who like to drive for fun tend to focus on the shortcomings of Detroit's trend to "automatic autos"—like the

dead feel of most power steering. We forget the advantages. Then something brings them back to mind—like the experience of a Minneapolis friend who lost all the pressure from a front tire at 80 mph. It may not have been what we used to think of as a full-fledged blow-out, but I still credit the **Saginaw** power steering on his Buick for the complete control he had. He didn't even know there'd been trouble until he noted the way the front corner bobbed.

Safety experts, by the way, are saying advertising has us too scared of blowouts, that they're now rarer and often controllable, and that we should meet the emergency instead of being thrown by it. I'll buy that. I've had only one blowout (a front), but control wasn't difficult.

Ford performance experts inform us that a top was added to the open-cockpit **Cobra** because the aerodynamic characteristics were such that the **Daytona** version had a top speed several miles an hour faster than the original **Cobra**. This is interesting because **Ford's** GT car, built as a closed coupe, has had its top removed. "The windshield is designed to give the open car the same aerodynamic effect as the closed version," Ford people say this should keep **everyone** aerodynamically happy.

I've laid a heavy hand on the most complete car reference book I've seen yet, **The World Car Catalogue 1965**, put together by the **Automobile Club of Italy**. Specs are unusually complete, pictures (from factory stock) are sharp, printing and binding are good. And it's indexed and cross-indexed about every way you can imagine. Nearly 600 models, from Detroit's **Chevys** to Japan's **Suzukis**, are included. The ticket: \$13.75, not too much if you need the book.

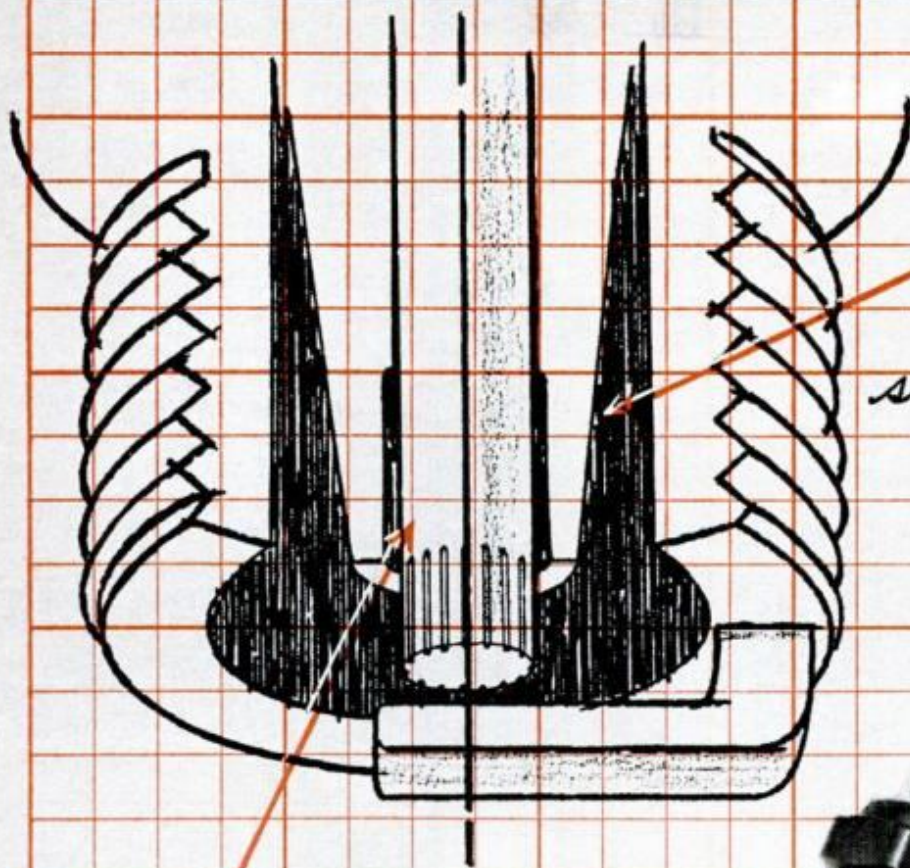
How 'average' are you? The Bureau of Public Roads says the average passenger car in a recent year traveled 9738 miles on 652 gallons of fuel for an average 14.37 miles per gallon.



Automotive Editor

POPULAR MECHANICS

From an AC Engineer's notebook:



*tapered-tip
design opens up
more
scavenging area.*

*thin, recessed tip
heats faster to burn away
fouling deposits.*



Here's how AC Spark Plugs help boost your engine power

Only AC Spark Plugs have the Self-Cleaning Hot Tip Insulator that heats faster to burn away fouling deposits that are a major cause of sluggish performance and hard starting. With ACs you get a continuing, potent, full-bodied spark that promotes powerful performance and gasoline economy. AC's thin insulator tip cools faster, too—guards against overheating and pre-ignition. Gain the benefits of AC's exclusive self-cleaning action. Ask for AC Fire-Ring Spark Plugs with your next engine tune-up.

AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS



**FIRE-RING
SPARK PLUGS**

CLINIC FOR HOMEOWNERS

Q High winds lift the tabs of the uncemented shingles on my roof, creating a ragged, unsightly appearance. The roof is about 14 years old. Would it be advisable to re-roof? Or, is there some way to cement the tabs?—T.H., N.J.


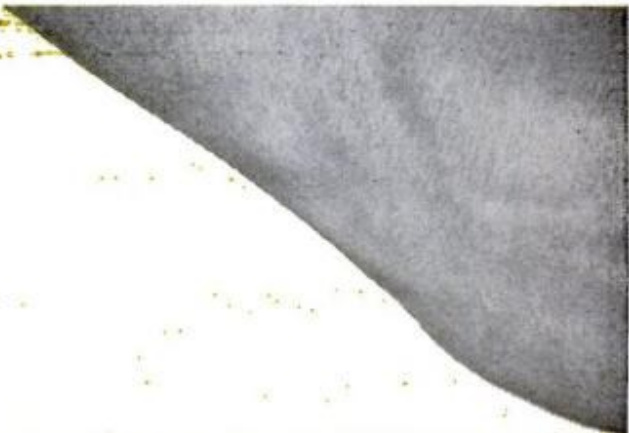
A The permanent remedy is to re-roof, or over-roof, with shingles having pre-cemented tabs. But if the tabs of the present roof have not been badly damaged, or permanently creased by being lifted, they can be fastened with fibrated roofing cement. This is done by lifting the tab and placing a dab of cement at each corner. Uniform amounts of cement should be used—about as much as can be easily scooped up with the blade of a putty knife is sufficient for each corner. After application, the cement is flattened with the putty knife and the tab pressed down lightly. It's best to begin at the ridge of

the roof and work down. If at all possible, try to pick a warm, sunny day to do the job. The heat will help to level the dabs of cement before they harden.

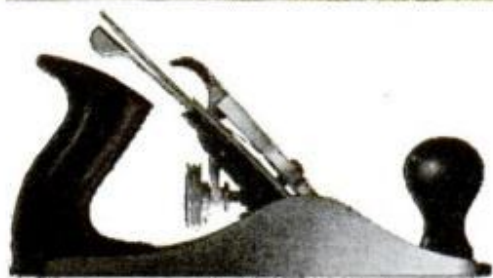
Q I recently purchased an old home with a winding staircase. The wood has been darkened by age as has the trim in the hallway. I've removed the finish from some of the trim, and a neighbor, after examining it, says its quartered oak. What kind of oak is this, and how can I refinish it?—Y.R., Pa.

A The term "quartered" refers to the method of sawing the log, not to the kind of oak. In fact, not only oak but many other hardwoods are quartersawed—that is, cut into planks in such a way that the annual rings are at almost right angles to the face of the board. Stock of this kind is resistant to warping and has attractive grain.

Refinishing is comparatively easy. First, take off the old finish with any commercial paint remover, following the instructions on the container. Then sand the bared surfaces thoroughly using progressively finer grades of sandpaper. Moldings and other curved surfaces can be cleaned ef-



What do these shavings mean to you?



STANLEY Bench Plane #4

STANLEY BENCH PLANES

When shavings like these curl out from your plane, you have the satisfaction of knowing it's performing flawlessly. You'll get this feeling of satisfaction every time you use a quality Stanley bench plane, because perfect performance is built in with special Stanley features like these:

fectively with steel wool, beginning with a fairly coarse wool and finishing with fine. As a rule, it won't be necessary to re-fill the grain of the wood, because most of the original filler will remain and will be leveled by sanding. After sanding and steel-wooling, clean carefully to remove all traces of dust. For a natural finish apply a prepared sealer first and give it plenty of time to dry. Follow with two or more coats of clear varnish.

Q Last season I did not use my snow thrower as I spent the winter in the South. Recently I tried to start the engine but could not turn it over. What has caused the parts to stick together so tightly?—E.T., Me.

A If the engine was not properly serviced for a long period of storage it is likely that some of its parts, particularly the piston, are rusted in place. You might try squirting an ounce or so of penetrating oil into the cylinder through the sparkplug hole. Allow to stand for an hour before seeing whether the engine will turn over. If the oil doesn't work, take the unit to a repair shop.

Next time you store the machine, run

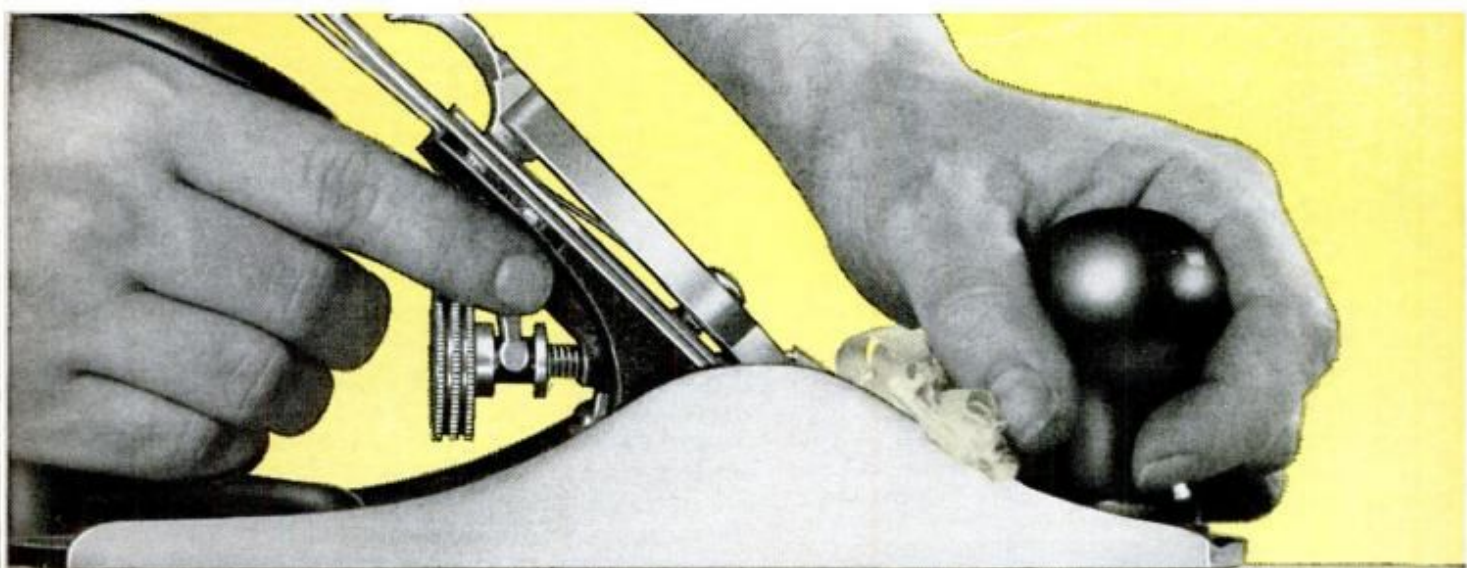
the engine until thoroughly warm, then shut it off and drain the fuel. Start the engine again and allow to run until it stops from lack of fuel. Next, remove the plug and pour an ounce of light oil into the cylinder. Finally, turn the engine over a few times to distribute the oil, then replace the plug.

Q When pruning shrubs, how far above a bud should the cut be made?—F.W., Mich.

A In general, about $\frac{1}{2}$ in., but the distance must be judged by the size of the stem or twig, rather than a hard and fast rule. Usually it's best to cut too far away than too close. The cut should be at an angle, not straight across.

Q We are considering planting a white flowering redbud in our back yard. Is there anything special we should know about setting out this plant?

A A specimen of this type should stand alone, a good distance from the root spread and even the partial shade of other trees, as ordinarily redbud grows best when planted in the open.



Perfect plane performance.

(1) Lever cap prevents chatter by holding cutter securely in position. (2) Lateral adjusting lever prevents uneven cuts by permitting sidewise adjustment of cutter. (3) Blade adjusting nut (brass knob on steel screw) regulates thickness of shavings by providing precise depth control. Stanley Tools, Division of The Stanley Works, New Britain, Connecticut. In Canada: Hamilton, Ontario.

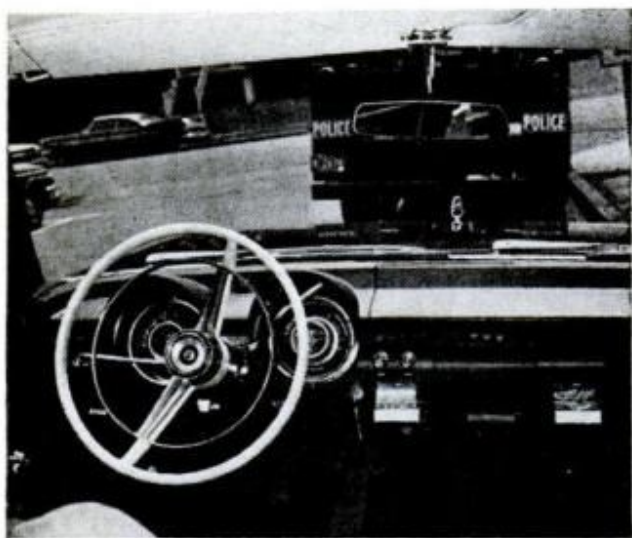
STANLEY®

THE TOOL BOX OF THE WORLD

Spotlight on the Dodge Pursuit Car

Now you can put yourself in this highway king by selecting options from an ordinary Detroit list

By Ed Nelson



DESIGNERS AVOIDED CHROME trim, and spread non-glare paint across the dashboard for functional but stark look. Gleaming hood caused us some eyestrain

SUPERSOFT HEADRESTS CUSHION a relaxing passenger, but are of little use to a driver except as protection from whiplash injuries during a rear-end crash



IF YOU NEED PROOF that Detroit can build a "real" car rather than an overweight, power-assisted, sportified monster, you'll be interested in the fast, roomy, unfrilled, solid-riding, snappy-handling four-door hunk of hardware now roaming California's highways. And the word is that it now is available to consumer-type people.

The paint job is a little gaudy—shiny black with white front doors and roof. But these four-wheeled bombs, '65 Dodge Polaras, are the special cars of the California Highway Patrol.

Their stark interior reminds you that CHP specials have one primary function. And it isn't impressing George Babbitt on the showroom floor. George will be impressed, however, if he ever tries to get away over California's twisting up-hill-and-down-dale road system. It would take an unusual driver indeed to elude an experienced patrolman ramming one of these rigs over the road. We tested one.

Steering Requires Muscles

It had been a long time since I'd driven a full-size U.S. car with neither power steering nor brakes. The experience reminds you there was a time when you had to be a real man to control a car. I wondered whether the loss of road feel that power causes wouldn't be worth accepting for the faster ratio power gives. Little of the patrol's work, however, is on tight back roads. Their car takes 5.3 turns to go from lock to lock with an overall ratio of 28.7 to 1.

The utilitarian interior shouldn't make



you think there's anything uncomfortable about CHP cars. All the normal controls are there—only the spangles of garish chrome are gone. Bucket seats are the heavy-duty type with fabric covering instead of imitation leather. You aren't rocked to sleep as you cruise; this is a solid working vehicle that breathes nonsense masculinity from every pore. After long hours behind the wheel, I still felt relaxed—ready for nearly anything.

Part of that is a credit to the seats (as comfortable as any I've tried for years), with good thigh and shoulder support. But I figure most of the relaxed driving is from the suspension, muscular enough to prevent any bobbing or weaving up front no matter what the road surface. You're never hanging onto the wheel with tense uncertainty in a hard, uneven corner.

Control Instead of Cradle Action

Just how solid is the suspension? The regular Polara springs are stiff enough so that it takes 105 pounds at the front wheels to depress the suspension an inch; the standard rate at the rear wheels is 100 pounds per inch. In Dodge Police Pursuits the rates are 115 pounds per inch in front, 120 in the rear. And in the CHP Polaras, that figure climbs to 130 in the front; 136 in the rear. Of course you feel some of the bumps, but control is never in doubt (for an example, see page 96).

For power, California buys the 413-cubic-inch, four-barrel V8 rated at 360 hp. Final drive is through a 3.23-to-1 rear axle to special 15-inch, six-ply nylon tires on six-inch-wide rims. The Patrol's

HARDEST CORNERING IN PURSUIT car kicks up lots of dust but doesn't ruffle the driver in the solidly suspended Dodge. Steering is slow for tight work

specs require a top speed of 125 and Dodge calculates they can do 129. The Patrol wants to reach 82 in a standing-start quarter mile and Dodge figures they can beat 86. We know the cars will do 0 to 60 in a scorching 7.9 seconds and 0 to 100 in about 19 flat.

Wheelbase Juggling

Patrol specs require a 122-inch wheelbase, so Dodge moves the axle about half an inch back on the rear springs. The heavy duty torsion bars and stabilizer should get most of the credit for the flat, solid cornering.

What Dodge likes to call "suede-finish" paint over the top and face of the dash completely eliminates any glare, but I'd also tape wiper arms. The dash is not padded; the Patrol would rather rely on a strict wear-your-seat-belt program. Disc brakes weren't on the test car either, but cars now on order get them.

Dodge vows you can get essentially the same car, minus a few incidental items the Californians focus on—like a white steering wheel or the extra fraction of wheelbase. The sticker on PM's test car showed \$3793.45. For that price you'd get more than a car. You'd get the chance to imagine yourself perched in this rolling powerhouse along a road high in some California mountain pass—master of all you survey. How could Walter Mitty resist?

Be a two season hunter!

Hunt while your friends are indoors, chafing at the bit. ■ Go with your gun during regular hunting season. **Go out with a Bear Bow during bowhunting season.** ■ If you can handle a gun, you can handle a Bear Bow. It's brought down game in every corner of the world. From 'chucks to an African elephant. ■ Your Bear Dealer has a bow just the right length and draw weight for you. See him today. Write for your free 1965 Bear catalog.

Bear® Archery Company
Dept. PM-8 • Rural Route One • Grayling, Michigan

In Canada: Canadian Bear Archery Distributors
1480 De L'Église, St. Laurent, Montreal, Quebec



Put Pictures on Tape—Now!

Ready for home use at long last is a new television tape recorder from Sony Corp. of America. Priced at \$995, it can tape up to one hour of TV programs on a 7-inch reel of 1/2-inch tape (double the width of standard audio tape). Add a TV camera, another \$350, and you can take your own TV movies and play them back immediately, viewing them on the built-in 9-inch monitor.

Picture quality is excellent and all-transistor circuits should insure long trouble-free life. According to Akio Morita, Sony president, "There is a very big future for home video tape in the U.S. homes during the next five years."

A \$1250 set is also available. It has a walnut cabinet and built-in timing device to turn it on and off for recording of programs while the owner is away.

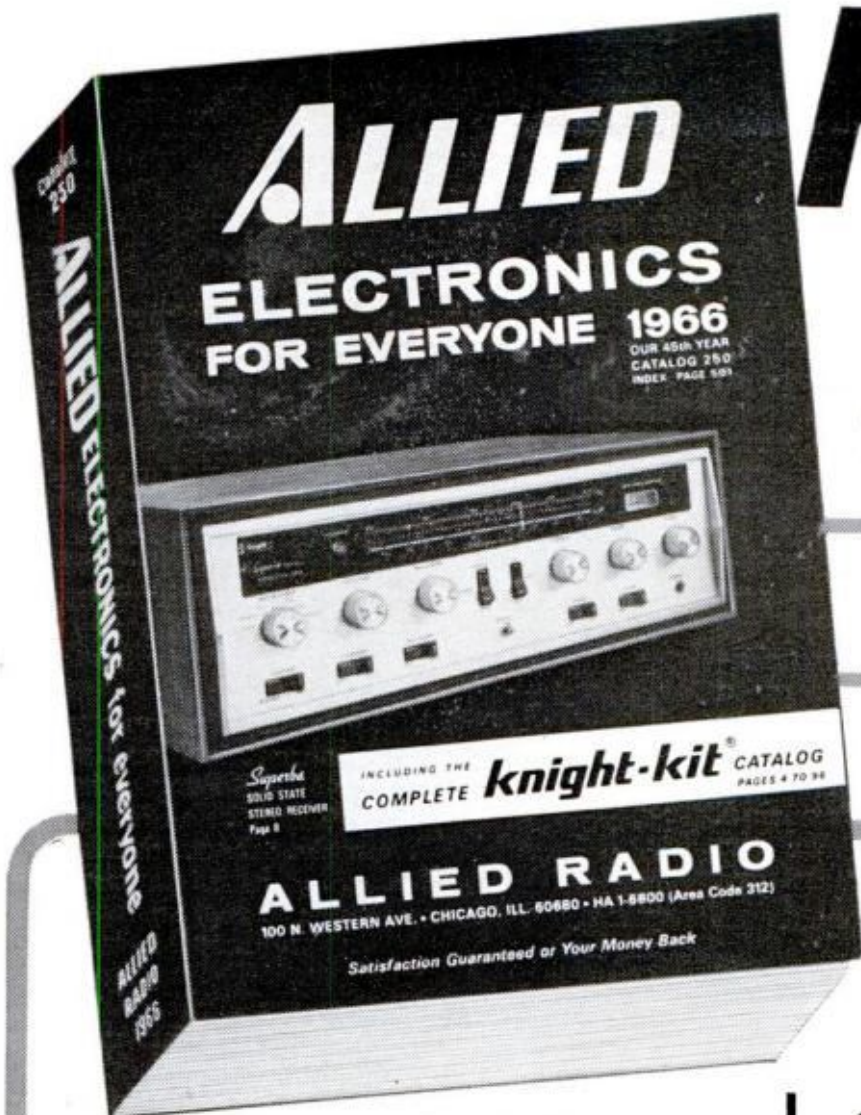
FOR LIVE HOME MOVIES, plug in the camera and roll the tape. You get sound movies, in black and white, at \$39.95 per hour (the cost of tape) and no waste



CLOSE-UP OF TAPE DECK. Controls are no more elaborate than those of a standard audio deck. If anything, the tape is easier to handle as it is wider



POPULAR MECHANICS



FREE!

send today for your

ALLIED

1966 CATALOG

the electronics catalog everyone uses

**508 VALUE-PACKED PAGES
BIGGEST SELECTION**

SAVE MOST ON:

STEREO HI-FI

TAPE RECORDING

CB 2-WAY RADIO

SHORT-WAVE & HAM GEAR

AUTOMOTIVE ELECTRONICS

FM-AM & AM RADIOS

PORTABLE TV • PHONOGRAPHS

TEST INSTRUMENTS

TV TUBES & ANTENNAS

POWER TOOLS, HARDWARE

PARTS, TUBES, TRANSISTORS

see the great new **knight-kits**®



KG-964 Superba
Series 64-Watt
Solid-State FM-AM
Stereo Receiver Kit

KG-201
Solid-State
Motor Speed/
Light Control
Kit



KG-375 Solid-
State Universal
Auto Analyzer Kit



KG-371
Solid-State
Auto DC Power
Timing Light Kit

BIG SAVINGS ON
other great Knight-Kits: Stereo
Hi-Fi, CB, Hobby, Ham, Test In-
strument, Intercom—all won-
derfully easy to build.

EASY TERMS
use the Allied
Credit Fund Plan

*satisfaction guaranteed
or your money back*

ALLIED RADIO

the world's largest electronic supply house

AUGUST 1965

send today for your copy **FREE**

ALLIED RADIO, Dept. 6-H
100 N. Western Ave., Chicago, Ill. 60680

Send **FREE** 1966 Allied Catalog.

Name _____
PLEASE PRINT

Address _____

City _____ State _____ Zip _____



Noteworthy New INVENTIONS

By M. J. Pedersen

Air traffic monitor system allows the man in the control tower to keep track of the various flights simultaneously in three dimensions. Rather than rely on the memory of operators who must mentally construct abstract pictures of the flights, the new system provides a visual record of flight paths. Information for every flight is fed into a computer which gives its answers on a transparent tape, noting the name of the plane, its flight path and altitude. Each of the tapes is placed on a transparent plate and put into a display cabinet for viewing against a terrain map. Patent 3,178,704 went to Leonard C. Moore, Somers Point, N.J., and Patrick J. Kenneally, Valley Lane, N.Y., for the system developed to take the guesswork out of air traffic operations.

Smog protection for trees and crops is afforded by a coat of colorless "paint" which earned patent 3,178,855. The paint consists of an elastic porous film combined with an antioxidant. The antioxidant protects the plant from oxidizing substances such as ozone, peroxides or nitrogen oxides in the air, which virtually smother the plant. The inventor, Dr. Sanford M. Siegel, White Plains, N. Y., reported that two seasonal sprayings on orchards, citrus groves or ornamental shrubs would provide adequate protection.

Beach chair that folds up to become a suitcase is especially handy for bathers toting home beach wear. Lightweight and durable, the suitcase-chair uses metal tubing throughout. Patent 3,179,465 went to Arthur H. Roberts, Brooklyn, N. Y.

Navigation by the stars takes a scientific turn with the "star" being a man-made satellite. U. S. Navy ships and Polaris submarines are currently using an all-weather system of navigation-by-satellite which recently won patent 3,172,108 for Dr. Frank T. McClure, Johns Hopkins University's Applied Physics Laboratory, Silver Spring, Md. Of key importance is the Doppler effect in which sound waves coming from a moving object appear to have a higher pitch as the source of the sound approaches and lower as the source moves

away (e.g. a train whistle or automobile horn).

A navigator, listening with a radio, can trace the shift in a satellite's frequency as it moves in the sky. To learn his position, he need only feed this information—plus the exact position of the satellite (as broadcast by the satellite)—into a computer.

Automation in the henhouse attempts to boost profits for poultrymen by keeping tabs on the productiveness of each hen. The floor of the henhouse is sloped so that each egg rolls toward the outer edge of the nest, where it is pushed by an egg roller toward a receptacle. Meanwhile, the rolling egg is detected by a photocell and ticked off by an automatic counter which keeps a written chart of eggs laid. Patent 3,183,514 went to Akira Ishibashi, Fukuoka-shi, Japan.

A giant "patch" that keeps a damaged ship afloat long enough for it to limp back to shore earned patent 3,183,876 for Semen M. Kronhaus, Los Angeles. Made of heavy canvas or flexible plastic, the patch rides on a rail along the side of a ship and can quickly be draped over the side like a windowshade to cover up a hole.

Computer that "talks back" rather than merely disgorging masses of printed information has a "library" of words stored in its memory in the form of coded signals. Thus, when a question, printed on a punchcard, is fed into the computer, the computer can actually reply in a voice. The inventor, Genung L. Clapper, who has also been working toward the development of an automatic typewriter that writes while you talk to it, earned patent 3,183,303 for his vocal computer.

A ready-to-be-launched missile suspended underwater, tethered to a balloon floating on top of the water, received patent 3,180,225. Launching the missile from under the sea obviates the expensive and complex rocket launching pad, according to the inventor, Navy Cmdr. John Emery Draim, Sanford, Fla. The mass of the water surrounding the missile will act as semi-rigid launch rails, replacing the complex launching facilities which can cost up to five times as much as the missile itself. An early test saw the successful launching of a telephone pole from a lagoon in Point Mugu, Calif.

The 175th anniversary of the granting of the first U.S. patent on July 31, 1790, (for an apparatus for making potash and pearl ash) is currently being observed.

Here's the "STRAIGHT DOPE" on HOW YOU CAN FIX 2,341 CAR MODELS

from the Men Who Build 'Em!

Engineers from every American car factory put their know-how at your fingertips in this giant 1,325-page picture book!
COVERS ALL THESE MAKES - 1958 thru 1965!



plus Buick Special, Comet, Corvette, Lancer, Rambler American, Tempest, Chevelle, Volkswagen, more!

BRAND-NEW EDITION!

MOTOR'S
AUTO
REPAIR
MANUAL

TRY BOOK
FREE
FOR 10 DAYS!

Now - the "meat" of 300 shop manuals makes practically any car repair or service job child's play for beginner or expert mechanic!

Now you can "breeze thru" the toughest car repair jobs - in DOUBLE-QUICK time. If you're a beginner mechanic you can tackle jobs you never dreamed you could handle. And if you're already an expert, you'll save yourself hours of back-breaking work... and save money, to boot!

It's easy with the big brand-new Edition of famous MOTOR'S Manual. You get the expert help of 300 Official Factory Shop Manuals - the time and work-saving methods developed by factory engineers in every auto plant in America for their own motor car lines - boiled down in one handy, indexed book.

Factory Experts Practically Guide Your Hands

NO guesswork! NO false starts! MOTOR'S Manual starts you from

"scratch" - expert "know-how" guides your hands through every step of practically every job. With clear illustrations and 1-2-3 instructions, these experts show you how to "polish off" just about any repair on any car listed - 1958 thru 1965 - including all the new "in-between" models.

NEW, REVISED Edition gives you exactly what you need to know to repair 2,341 models. Over 1,300 Giant-size pages. 3,800 "This-Is-How" pictures and diagrams. 457 "Quick-Check" Charts. 55,000 Essential repair specifications, 225,000 Service and Repair FACTS. Instructions and pictures so clear you CAN'T go wrong!

Here's how to make fast, expert repairs on Automatic Transmissions, Engines, Ignitions, Carburetors, Steering Gears, Generators, Alternators, Distributors, Power Steering and Brakes, Starter Motors, much, much more. No wonder well over 5 MILLION copies have been sold. No wonder it's used by the U.S. Armed Forces, thousands of schools!

Try It FREE 10 Days

SEND NO MONEY! Just mail coupon. (Paste it to a postcard for faster action.) Use the Manual for 10 days, free. If you don't agree that it is the greatest time-saver and work-saver you've ever seen - return book in 10 days, pay nothing. Mail coupon today! MOTOR Book Dept., 250 West 55th St., New York, N. Y. 10019. (Schools, Bookstores: Write for discounts.)



GREAT HELP FOR STUDENT. "Motor pulled me out of some rough spots in high school and even now. At present, I'm in the Armed Forces attached to the motor pool."
-W. Bekemerer, Missouri (Apprentice)

CLEAR UP 'MYSTERIES'. "I always rely on Motor when I do a repair I am not familiar with. Well illustrated, complete, simple."
-E. Jones, Minnesota (Shop Owner)



Same Offer on MOTOR'S Revised AUTO ENGINES & ELECTRICAL SYSTEMS

1,300 Big pictures. Clear text explains how parts work; principles involved; design; construction; maintenance. Covers all parts of engines & entire electrical system. For FREE trial, check coupon.

MAIL COUPON NOW FOR 10-DAY FREE TRIAL

MOTOR BOOK DEPT., Desk 518
250 W. 55th St., New York, New York 10019 ★

Rush to me at once MOTOR'S NEW AUTO REPAIR MANUAL. If O.K., I will remit \$2 in 10 days, \$3 monthly for 2 months and a final payment of \$1.95 (plus delivery charges and sales tax, if any) one month after that. Otherwise I will return the book postpaid in 10 days.

Print Name..... Age.....

Address.....

City..... State..... Zip Code.....

Also send me for 10 days' Free Trial MOTOR'S Revised AUTO ENGINES and ELECTRICAL SYSTEMS. If O.K., I will remit \$3 in 10 days, \$2 monthly for 2 months, and a final payment of \$1.50 (plus delivery charges and sales tax, if any) one month after that. Otherwise I will return book postpaid in 10 days.

Check box and save shipping charge by enclosing WITH coupon in envelope entire payment of \$9.95 for Auto Repair Manual (or \$8.50 for Auto Engines & Electrical Systems) plus sales tax, if any. Same 10-day return-for-refund privilege applies.

New for Camera Buffs

By Arthur J. Maher

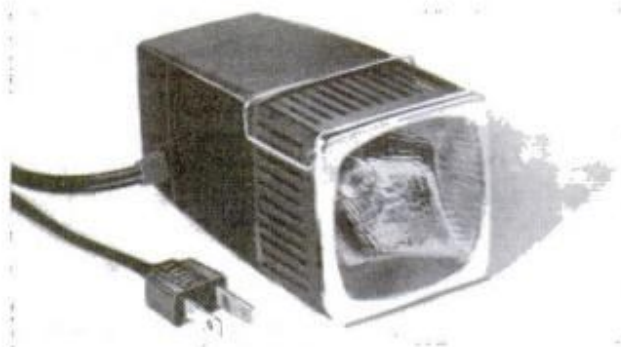
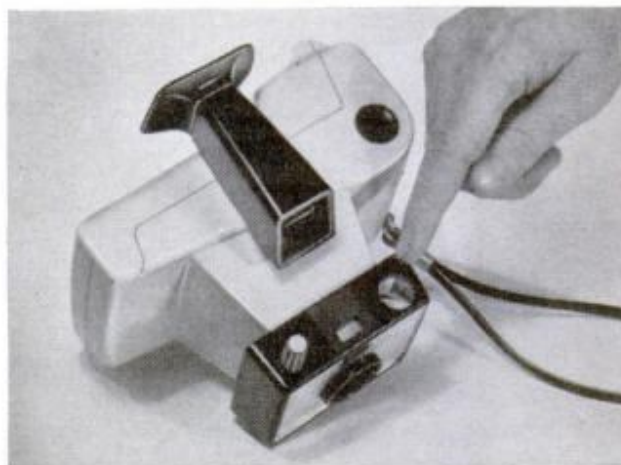
Ten-Second Camera for \$20: Polaroid's latest, the Model 20, sells for about \$19.95. Called The Swinger, it gives you eight shots per roll at about 25 cents each. Development time for the 3000 ASA film (black-and-white only) runs 10 to 15 seconds. Print size is $2\frac{1}{2} \times 3\frac{1}{4}$ —just right for your wallet.

The intriguing shape of this camera is a tipoff to some equally intriguing features—for example, the outdoor exposure control. Squeezing a red knob on the front of the camera lights a tiny bulb inside. This bulb illuminates the word "no" which you see through a window just under the viewfinder. By turning the knob, you should be able to fade out the "no" and replace it with a "yes", and in so doing, set the lens aperture for the prevailing light conditions. If you can't bring out a "yes", you don't have enough light for a shot.

For indoor shooting, you switch to the other intriguing feature, the flashgun. This effective unit is little more than a hole in the lensboard, into which you press an AG-1 peanut bulb (right). A handy lever ejects fired bulbs.

Compact Movie Light is smaller, lighter and produces less heat than other types. It uses only 375 watts, measures only $2\frac{1}{2}$ in. square by 5 in. long and uses a small iodine-quartz lamp with a rated life of 12 hours. Cost about \$20 to \$25. For Argus, Bell & Howell, Keystone, Kodak Super 8 cameras. Made by Sylvania Electric Products, 730 3rd Ave., New York 10017.

Rapid Loading and automatic exposure control give you fast, easy shooting with the model 24 Rapid 35-mm camera. The Rapid Loading system was developed by Agfa. It uses two cartridges, one empty and one full (inset). Drop them in the camera and as you shoot, the film goes from the full to the empty cartridge. No threading, no rewind. Manufactured by Minolta, 200 Park Ave. South, New York, N.Y., the camera takes sixteen 24x24-mm shots per cartridge of film.



**WE'LL SEND YOU
A MONEY-MAKING
"SHOE STORE BUSINESS"
FREE**



Rush postcard today for free sales outfit

Run your own profitable shoe store at home. Sell to friends, neighbors, folks where you work. Earn \$217.00 EXTRA monthly on just 2 easy orders a day. You feature 230 styles of quality shoes for men and women. Famous Air Cushion Mason Shoes that sell themselves. Sizes 2½-15. Widths AAAA to EEEE. Many comfort features—stock of over 250,000 pair to draw from. Also horse-hide jackets. Represent fast-growing million dollar shoe firm in spare or full time and big profits are yours. Everybody is a customer. You don't need to invest a cent in this wonderful sales opportunity. We'll rush you FREE a complete starting outfit that contains everything you need to begin making money. Just send us a postcard today!

MASON SHOE, Dept. F-985, Chippewa Falls, Wisc.

Imported Lock-Blade Knife

OUTDOOR
KNIFE FOR
SPORTSMEN



Opens with flick of finger and locks into position. Prevents blade from snapping shut when in use. Push button release. Convenient pocket size, yet rugged. Fine quality polished nickel steel razor-sharp blade. PIERCE METAL. Narrow tapered blade with thick rigid backbone for heavy duty use. Safety guards. \$2.50 Postpaid. 2 for \$4.75.

Johnson Smith & Co., Dept. 737, Detroit 7, Mich.

**Took in \$9000 in Year
During Sparetime**



Here's ideal way to start in business for yourself without a big investment. You don't even need a shop or office. Work out of your own home, use your present car. You clean rugs new professional way in homes and offices. Start in sparetime—and graduate to full time.

FREE Booklet Tells How

Send for free "Business of Your Own" booklet! It tells the complete story about this profitable service business—lets you decide for yourself. Write today! No salesman will call.

Foley-Care, Dept. 802-5,
3333 Fifth St. N. E.,
Minneapolis, Minnesota 55418

\$6.44 AN HOUR IN YOUR OWN BUSINESS

**STEP INTO THIS BOOMING
\$19 BILLION A YEAR INDUSTRY**



Hundreds of accidents and losses will happen this year in your community.

We'll show you how to investigate and adjust these losses for insurance companies, railroads, government offices. You buy NO tools or equipment. You do NO selling. You need NO prior experience or higher education. And you can operate out of your own home. Right

now independent Accident Investigators average \$6.44 an hour. We'll train you quickly to do the same. Start part-time if now employed. Fill the need for an Accident Investigation specialist in your area. Colorful booklet explains everything. Absolutely no obligation on your part. No salesman will call. Write TODAY for FREE Booklet.

UNIVERSAL SCHOOLS, PM-8, 6801 Hillcrest, Dallas 5, Texas

when it's time to think of college
you should read this

FREE CAREER BOOKLET

about engineering at

MSOE



MILWAUKEE MS-236
SCHOOL OF ENGINEERING

Dept. PM-865, 1025 N. Milwaukee Street
Milwaukee, Wisconsin 53201

Tell me about an engineering career through residence study in:

Mechanical fields Electrical fields

Name.....Age.....

Address.....

City, State.....

LEARN TO EARN!



NO CORRESPONDENCE • NO HOME STUDY • CONTRACTOR OWNED • VA APPROVED

- Students train on the machines they will operate
- All training by fully qualified instructors
- Students live at the school
- Western's graduate students are readily accepted for employment
- Many courses of study are offered

WRITE TODAY FOR FREE SCHOOL CATALOG

WESTERN SCHOOL

OF HEAVY EQUIPMENT OPERATION

Associate member of Associated General Contractors and A.R.B.A.

BOX 510 • WEISER, IDAHO

Dept. M-16
NAME.....
ADDRESS.....
CITY.....STATE.....

ARE YOU MAKING ALL THE MONEY YOU CAN?

U.S. DEPT OF LABOR CITES IMMEDIATE NEED FOR SKILLED TECHNICIANS

Prepare for the better paying jobs at the World's largest, most modern and best equipped Trade School. Greer's expert instruction and actual shop training teaches you how. Job placement aid and help in obtaining convenient living accommodations nearby. Resident training and Home Study courses. Over 100,000 successful graduates.

LEARN AT HOME

CHECK JOB YOU WANT AND RUSH THIS COUPON

- | | |
|--|---|
| <input type="checkbox"/> AUTOMOTIVE MECHANICS | <input type="checkbox"/> GAS & ARC WELDING |
| <input type="checkbox"/> AUTOMATIC TRANSMISSIONS* | <input type="checkbox"/> HELIARC WELDING |
| <input type="checkbox"/> MOTOR TUNE UP* | <input type="checkbox"/> ENGINEERING DRAWING* |
| <input type="checkbox"/> BODY & FENDER REPAIR* | <input type="checkbox"/> BLUEPRINT READING* |
| <input type="checkbox"/> DIESEL MECHANICS | <input type="checkbox"/> TWO YEAR AUTOMOTIVE AND DIESEL TECHNOLOGY* |
| <input type="checkbox"/> MACHINIST, TOOL & DYE* | <input type="checkbox"/> TRUCK DRIVER TRAINING |
| <input type="checkbox"/> REFRIGERATION & AIR COND. | <input type="checkbox"/> CONSTRUCTION EQUIPMENT MECHANICS* |
| <input type="checkbox"/> HEAVY EQUIPMENT OPERATORS | |

NAME.....Age.....

ADDRESS.....

TOWN.....STATE.....

*Resident Courses Only. Resident Home Study

GREER TECH INSTITUTE Est. 1902
Box E 2236 S. Michigan Ave., Chicago, Ill. 60616

A New FREE BOOK for

MEN PAST 40

Troubled With Getting Up Nights, Pains in Back, Hips, Legs, Nervousness, Tiredness.

This new Free Book tells that if you are a victim of the above symptoms, the trouble may be traceable to Glandular Inflammation . . . a condition that very commonly occurs in men of middle age or past.

The book explains that, although many people mistakenly think surgery is the only answer to Glandular Inflammation, there is now a non-surgical treatment available.

NON-SURGICAL TREATMENTS

This New Free Illustrated Book tells about the modern, mild, Non-Surgical treatment for Glandular Inflammation and that the treatment is backed by a Lifetime Certificate of Assurance. Many men from all over the country have taken the NON-SURGICAL treatment and have reported it has proven effective.

Treatment takes but a short time and the cost is reasonable.

Write today for this New Free Book that tells HOW and explains WHY more and more sufferers are using MODERN NON-SURGICAL Methods of treatment. Act Now. No obligation.

EXCELSIOR MEDICAL CLINIC
Dept. M 6153 Excelsior Springs, Mo.

Items from All Outdoors

Last month we ran an article by Euell Gibbons on eating wild foods, and the initial reaction I received on the story was that campers wanted to know more about the subject. Euell has published two books, *Stalking the Wild Asparagus* (\$6.50) and *Stalking the Blue-eyed Scallop* (\$5.95), both by David McKay Publishing Co. His books are entertaining, filled with lore and wit, complete identifications of the plants and sea foods, and recipes for preparing delicious meals. You can get the books directly from Euell at: Route No. 1, Beavertown, Pa.

Camouflage for hunters has taken a bright turn. Accepting the idea that animals are color-blind, Game Winner, Inc., of Atlanta, Ga., has come out with a camouflage suit in brilliant red on red. It's called Vist-O-Flage, and it's a wild looking outfit. It's a safety measure so other hunters can see you, while you're still invisible to the game. Now, we've never been fully convinced that animals are color-blind, but even if they're not, this costume will convulse them with laughter and you'll have some easy shots.

We're probably the only office in New York City that has target shooting as a lunchtime activity. Crosman Arms sent us their new model 99 lever-action repeating Pellgun, so we set up a range in the classified advertising dept., and we've been having a ball. This is quite a target gun. It has the weight of a rifle (5 lbs. 10 oz.) and is 40 inches long. A spring-load magazine holds 10 shots. It operates off a CO₂ powerlet and has two-stage power. On the full cock we've been getting 50 shots on each powerlet with no loss of power or accuracy. It is priced at \$29.95. This may not be a highly technical appraisal, but we can report that the PM stenos are swaggering around the halls like a bunch of Annie Oakleys.

Tracking down globetrotting big-game bowhunter Fred Bear is no easy task, but we cornered him just before he left on his latest African safari. The result is in next month's PM where Fred writes: *You Can Hunt Anything With a Bow.*

STUART JAMES

Outdoors Editor

POPULAR MECHANICS

MAGIC MAIL PLAN

that comes with this Little Machine
CAN MAKE YOU \$5.00 AN HOUR

The machine is turning out a job that will bring operator \$2.58, by mail. Material cost, only 11c!



Write today for free facts about the newest and most fascinating of all new home operated businesses. For the first time, a simplified machine brings the fabulous profits of Plastic Sealing and Plastic Laminating within reach of the small operator. Anyone can learn to operate it with a few minutes practice. Then—with our MAGIC MAIL PLAN—can get mail orders pouring in daily with cash in every envelope.

No Canvassing or Selling

Fill orders at home in spare time to start. Then expand to full time business. We even supply circulars to bring back cash and orders. Rush name for all the facts you need to start. A postcard will do. No charge.

WARNER ELECTRIC CO., Dept. L-2-JW
1512 Jarvis, Chicago 26, Illinois

IDEAL LAWNMOWER SHARPENER 900

"Two-Way" Grinding Option means bigger profits for you!

The Ideal sharpens any reel-type mower by either "Hook" or "Straight-Line" methods. No limitations, every job perfect with no hand filing. Ruggedly built, screw adjustments can't slip, 1/2 hp. motor.



Write for Full Details

THE FATE-ROOT-HEATH CO., Dept. PM-8, Plymouth, Ohio

YOU LEFT YOUR LIGHTS ON!

Why suffer the needless expense—and inconvenience—of a dead battery because you forgot to turn off your headlights or parking lights . . . after driving in rain, snow or fog? Our transistorized, red-light visual alarm is easy to install on any automobile. SATISFACTION GUARANTEED. Mail check or money order for \$3.98 to: **PARCHER ENTERPRISES**

Box 981, Dept. 5M Great Falls, Montana 59401
And your headlight alarm will be mailed POSTPAID!

Bean's Free Fall Catalog

Ready Aug. 15



Hunters, Campers and Fishermen will find many practical items in our fully illustrated Fall Catalog. Shows hunting footwear, clothing and other specialties of interest to both men and women. Many items are of our own manufacture.

L. L. Bean, Inc.
316 Main St., Freeport, Maine 04032
Camping, Fishing and Hunting Specialties



this is not a butter knife!

A butter knife never had it so good! Our putty knife goes through 14 steps to insure perfection. Any Red Devil tool you buy is your best buy. At paint, hardware, variety stores. Try Schalk's Super Savabrush Cleaner — another fine Schalk Home Repair Product.

WRITE FOR FREE PAINTING HINTS BOOKLET



Red Devil Tools.

Dept. PM-8 2400 Vauxhall Road
Union, New Jersey

Since 1872

14778-1

AUTOMATIC TRANSMISSION SPECIALISTS MAKE BIG PAY!

NEW 1965 MANUAL QUALIFIES YOU

Now you can learn diagnosis, adjustment, repair and complete overhaul of all Automatic Transmissions—right in your own home or shop. Covers all current models. Qualifies you for expert service AND the HIGH PAY this exacting work requires. Write for full particulars or order now. Fill in coupon and mail today.



Expert Diagnosis Adjustment and Repair Instruction.

Covers ALL current Makes of Transmissions

Clear and Thorough. Contains over 1100 pages and thousands of Illustrations.

SEND NO MONEY

10 DAYS FREE TRIAL

Lincoln Technical Institute, Suite E-8
472 Market St., Newark, N.J. 07105

Please send full information on Lincoln Tech's New Automatic Transmission Manual.

Name _____

Address _____

City _____ State _____

AUGUST 1965

36G

FREE Key Machine

Kind master locksmiths use. Sells for \$125, but yours FREE with Locksmithing Course



You Can Learn To Be A LOCKSMITH in your spare time

There's a big demand for skilled locksmiths. You can earn big money either full or part-time in your own home. Be your own boss; earn steady, year 'round income with no layoffs. The BELSAW INSTITUTE training, recommended by professional locksmiths, teaches you to make keys, open and repair locks on homes, cars and buildings. Easy, step-by-step illustrated lessons complete with all tools and supplies. We tell you how to get servicing jobs, how much to charge, how to earn while you learn and how to build a secure cash profit business.

Mail Coupon for FREE Book Today!

BELSAW INSTITUTE, 106B Field Bldg., Kansas City 11, Mo.
Send FREE book, "Keys To Your Future!"
No obligation. No salesman.

Name.....

Address.....

City..... State.....

VAUGHAN

SUPERBAR



**Lifts
and
Scrapes**

Pries
Pulls
Pounds

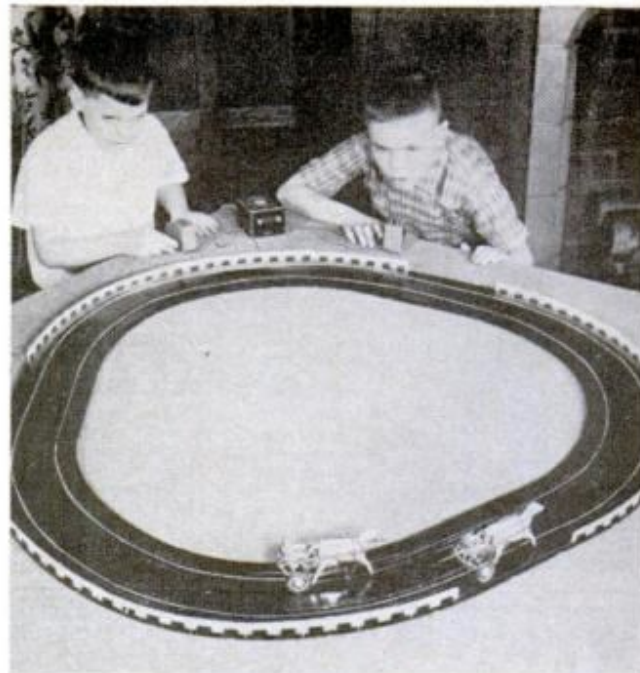
To make your
tool box complete!

The world's most useful tool . . .
available from leading hardware retailers.

ONLY \$249

VAUGHAN & BUSHNELL MANUFACTURING CO.
135 SOUTH LA SALLE STREET • CHICAGO 3, ILL.

Horses for the Tabletop



Tabletop racing fans can try their hand at horse racing with a new harness-racing set.

The racing sulkies are equipped with d.c. motors with worm gear drive. Speed of the horses is controlled remotely by the operators. The track layout takes up a four-foot-square area.

The manufacturer is A.C. Gilbert Co., Erector Square, New Haven, Conn.

Laser's Sound Waves

Sound waves, not intense heat as previously believed, seem to cause damage in certain materials subjected to laser beams (concentrated light), according to surprising research by Hughes Aircraft Company.

When beams focused on transparent materials such as glass or quartz, damage occurred only at the back of the material, indicating that high-frequency sound waves—about 10,000 megacycles—generated by the laser beam travel forward through the material and cause damage at the point of exit.

How High the Moon

Scientists bounced radar waves from the lunar surface and found that to reach the moon, rockets must travel 238,866.16 miles. This mean distance was measured at Washington's Naval Research Laboratory during a period of several months; the distance varies from 221,463 miles to 252,710, depending upon the moon's position in orbit.

And, incidentally, based on this measurement, which is accurate within seven-tenths of a mile, the radius of the earth at the equator is 3963.393 miles.



WOOD ROTTING?

FIX IT QUICK!

The job is easy with the one and only Plastic Wood. Can be sanded and painted.



For surest results always use GENUINE

PLASTIC WOOD

Handles like putty—hardens into wood!

GET INTO ELECTRONICS

V.T.I. training leads to success as technicians, field engineers, specialists in communications, guided missiles, computers, radar, automation. Basic & advanced courses. Electronic Engineering Technology and Electronic Technology curricula both available. Assoc. degree in 29 mos. B.S. obtainable. G.I. approved. Start Sept., Feb. Dorms, campus. H.S. graduate or equivalent. Catalog.

VALPARAISO TECHNICAL INSTITUTE
DEPARTMENT D. VALPARAISO, INDIANA



MAKE SOME REAL MONEY!



BE A SMALL ENGINE REPAIR EXPERT
Garden Tractors • Power Mowers • Outboard Motors • Chain Saws—There's real opportunity in small engine repair, full or part time. Be an expert, make real money, save on your own repairs. Our Home Study Course can open a new future for you. Write today.

GALE INSTITUTE Dept. A
3255 Hennepin Avenue • Minneapolis, Minn.

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.

Enjoy Profits from Your Own Business While Still Employed

Without quitting your job or losing one pay check, you can enjoy **growing profits** from your **OWN** nationally advertised business. Free 24 page book tells how men do it...how they grow to a full time, high profit business...how we guide men to success.

Hourly gross profit is \$9 plus \$6 on each serviceman.

Exclusive **absorption** process cleans and **revives** upholstery, rugs, carpets. Also 5 other on-location services. Your world-wide service is endorsed by McCall's, Parents' Magazine, carpet mills and furniture manufacturers.

You need no experience. We show you how. We finance you for all but a few hundred dollars. Easy to learn...easy to do...easy to build a steady income. We show you 15 tested ways to get customers.

L. Babbit writes, "I average \$2,600 monthly, part time." W. C. Smith earned \$650 in one week. Ed Kramsky said, "in two years I have two assistants, a home and security." G. F. Monroe, after 12 months, sold his business for 10 times his cost. Leo Lubel sold his for \$7,116 more than he paid.

This may be the opportunity of your life. **Find out today** before some one else gets your location. Mail coupon now for details and 24-page illustrated free book. No obligation. No salesman will call. Mail coupon now while territories are open.

DURACLEAN COMPANY

5-168 Duraclean Building, Deerfield, Illinois 60015

Send 24-page booklet telling how I can quickly enlarge my income in spare time while I build my own full time prosperous business. No obligation.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____

LEARN Watch and Clock Repair

engraving and jewelry repair. Individual instruction—start any week. Pass any state exam, certified Master Watchmaker. More jobs than graduates. Write for brochure or phone (717) 397-5927.

BOWMAN TECHNICAL SCHOOL, Lancaster, Pa.
Nation's largest, oldest, best equipped repair school

MARTYRED U. S. PRESIDENTS



To Introduce You to America's Favorite Hobby and World's Largest Stamp Firm:

Presidents Lincoln, Garfield, McKinley — and John F. Kennedy — pictured and honored on 25 all-different genuine postage stamps. Most remarkable are the Kennedy stamps from Argentina, Chile, Colombia, Hashemite Kingdom of Jordan, Paraguay, Togo, Yemen, etc. — positively unique in world postal history! Plus: Complete U. S. Catalog, stamps on approval, Collector's Guide, Bargain List of other Kennedy stamps. One to a customer. Send only 25¢ to:

H. E. Harris, & Co. Dept. P-144, Boston, Mass. 02117



EARN \$1,000 A MONTH

LEARN A TRADE YOU LIKE

Start as a mechanic in a good paying job; then advance to shop service manager. Many make \$1,000 a month and up. You learn fast in our shop because you learn with tools on real equipment. Some students earn part of their expenses while going to school.

CHECK AND MAIL COUPON

- | | |
|---|--|
| <input type="checkbox"/> AUTO MECHANICS | <input type="checkbox"/> AUTO BODY REPAIR |
| <input type="checkbox"/> DIESEL MECHANICS | <input type="checkbox"/> AUTOMATIC TRANSMISSIONS |
| <input type="checkbox"/> GAS, ARC WELDING | <input type="checkbox"/> MOTOR TUNE-UP |
| <input type="checkbox"/> HELIARC WELDING | |

Mail to: **AUTO-DIESEL COLLEGE**
226 7th Ave., No., Dept. 86, Nashville, Tenn.

Please send without obligation free catalog

NAME _____

(please print or write plainly)

ADDRESS _____

CITY _____ STATE _____

Gun Fires Glass Bullets

A gun that shoots tiny glass bullets more than 43,000 mph is being used to measure damage done to spacecraft when speeding meteoroids slam into them.

Synthetic micrometeoroids (one five-hundredth of an inch across) are fired at various metal alloys, plastics and glasses to help engineers design more rugged spacecraft.

It takes a charge of 30,000 volts to fire the gun. Developed at North American Aviation's Information Systems Division, it may have the highest velocity of any gun known.

Pianos Tuned by Sight

Electronic oscilloscopes, which show musical note sounds visually on a TV-like screen, are now being used to tune many pianos.

A piezoelectric quartz crystal supplies the proper frequency through a standard oscillator. If a note is flat when struck, the wave on the screen moves to the left; if sharp, the wave travels to the right. A stationary curve means that the note is exactly on pitch.

The piano-tuning oscilloscopes were designed by engineers of the Wurlitzer Company, Dekalb, Illinois.



Print Your Own

Cards, Stationery, Advertising, Circulars, labels, photo and movie titles, church work, tags, etc. Save money. Sold direct from factory only. Raised printing like engraving, too.

Own a Printing Business

Print for Others, Good Profit. Have home shop. Junior press \$15; Senior \$35 up. We supply everything. Easy rules. Pays for itself in short time. Write now for free details.

KELSEY PRESSES, Z-37 Meriden, Conn.

Made \$900 in Spare Time



"I made about \$900 last year with my Foley equipment by sharpening saws in my spare time." Leo H. Mix.

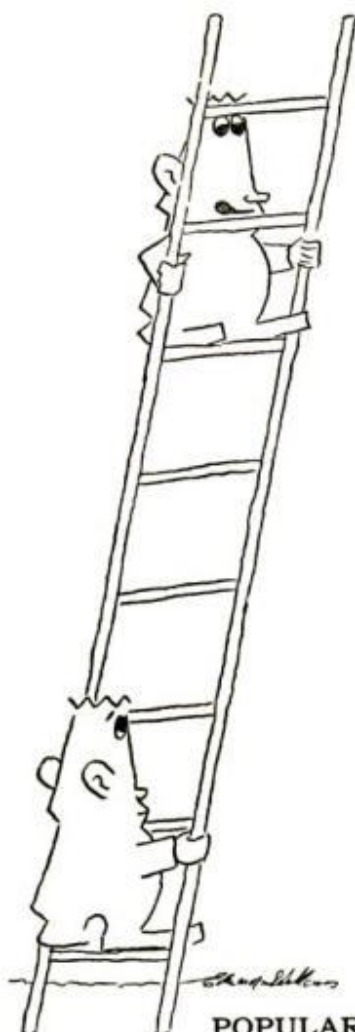
No Experience Needed

With a Foley Automatic Saw Filer anyone can sharpen hand, band and circular saws with professional accuracy. No canvassing—business comes to you.

We Help You Start. We give you inside tips on how to build a sound repeat business; how others have succeeded in this profitable saw filing business.

FOLEY MFG. COMPANY
816-5 Foley Bldg.
Mpls. 18, Minn.

FREE BOOKLET
"Money Making Facts" shows how to start. Write today. No salesman will call.



Something's wrong!

POPULAR MECHANICS

NOW! WARN OVERDRIVE gives 'Jeeps' more Go!



New approved accessory cuts engine RPM 33% at any speed, reduces noise, vibration so you can drive your Jeep 4-w.d. comfortably at freeway speeds. Amazing synchromesh OD lets you shift up or down, on the go, anytime, in any gear, at any speed. Adds six forward speeds, two reverse. At Jeep dealers, or write us.

WARN SALES CO., Inc.
9050-A Empire Way South
Seattle, Washington 98118



MOTOR-MEDIC

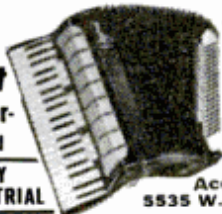
- REDUCES ENGINE WEAR
- MAKES OIL LAST LONGER
- STOPS OIL BURNING

At Service Stations and Auto Supply Stores

ACCORDIONS • Big Discounts

Buy Direct Importer-to-You

5-DAY HOME TRIAL



NEW ELECTRONIC MODELS
SAVE 1/2 42 "New Sound" Electronic and Standard models. Amplifiers too! All Famous Makes. Try before you buy—5-Day Trial. Easy Terms, Trade-Ins. Free Accessories. Money Back Guarantee. Free Color Catalogs, Handy Selection Guide, Discount Prices. Write
Accordion Corporation of America
5535 W. Belmont, Dept. R-85, Chicago 41, Ill.

Though the fisher weighs less than 12 pounds, this fierce North American mammal can kill a fox or deer and best a coyote or bobcat in a fair fight. The fisher appears to be the only animal that habitually dines on porcupine.

LAW FREE BOOK



Write today for a FREE copy of illustrated law book, "THE LAW TRAINED MAN," which shows how to earn the professional Bachelor of Laws (LL.B.) degree through home study of the famous Blackstone Law Course. All necessary books and lessons provided. Moderate cost; convenient monthly terms. Write for FREE law training book today.

Blackstone School of Law, 307 N. Michigan Ave.
Founded 1890 Dept. 50-C, Chicago 1, Illinois

Big Profits in UPHOLSTERY Get Your Share... FAST!



EARN BIG MONEY 3 NEW EASY WAYS

FREE Deluxe Illustrated Book and Sample Lesson Pages

1. Be your own boss, make up to 85% profit.
2. Start earning right away at home in spare-time—keep furniture you make, or sell for hundreds of dollars.
3. Today's home and office upholstery, re-upholstery, slipcover boom make it easy to take your pick of big-pay jobs.

LEARN FAST—EARN FAST

You get UTS expert instructions, plus all tools, new wooden frames, materials, fabrics, business tips, wholesale privileges, decorating magic AT NO EXTRA CHARGE. FREE Book, sample lesson pages show you how—no obligation—no salesman. Write TODAY.

UPHOLSTERY TRADES SCHOOL
(Div. of Tech. Home Study Schools)

Dept. 510-085, Little Falls, New Jersey 07424
(N. J. State Approved. Accredited Member National Home Study Council.)



Tools, Equip., Frames, Materials, Fabrics. Supplies yours with course.

MAIL COUPON TODAY

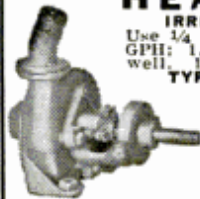
UPHOLSTERY TRADES SCHOOL, Dept. 510-085
(Division of Technical Home Study Schools)
Little Falls, New Jersey 07424

Established 1939

Please send me FREE book, "Your New Way to a Successful Career," and FREE sample lesson pages. No obligation—no salesman will call.

Name.....
Address.....
City..... State..... Zip.....

EXCLUSIVE DOUBLE-BEARING HEAVY DUTY PUMPS



IRRIGATE • DRAIN • CIRCULATE • SPRAY
Use 1/4 HP motor or larger... 1 HP for up to 5,200 GPH; 1,000 GPH 60' high; or 3,000 GPH from 25' well. 1 1/2" inlet; 1" outlet. Stainless shaft.
TYPE X—2 oil-less bronze bearings. \$10.95
Won't rust.....
TYPE XB—Ball bearing model. \$12.95
Best for belt drives.....
Postpaid if cash with order.
Don't delay—send for yours today!
MONEY BACK GUARANTEE
Centrifugal and Gear Pumps in All Sizes
LABAWCO PUMPS, Belle Mead 2, N. J.

B.S. DEGREE IN 36 MONTHS

Small professionally-oriented college. Four-quarter year permits completion of degree in *Engineering* or *Business Administration* in three years. One year *Drafting* and *Design Certificate* program. Founded 1884. Rich heritage. Excellent faculty. Small classes. Well-equipped labs. New library. Residence halls. 300-acre campus. Graduate placement outstanding. Modest costs. Enter Sept., Jan., Mar., June. For Catalog And View Book, write Director of Admissions.



TRI-STATE COLLEGE

485 College Avenue • Angola, Indiana

LEARN MEAT CUTTING AT NATIONAL Pay After Graduation

The steady dependable trade of Meat Cutting taught easily in 8 short weeks. YOU LEARN BY DOING under actual meat market conditions in big modern school at Toledo.

For beginners or men with experience. Get a profitable store of your own. Remember, PEOPLE MUST EAT! Big pay jobs. Free employment help. Thousands of successful graduates.

Buying, cutting, percentage, pricing, advertising, selling, etc. A complete retail meat education. National School established 42 years. Get National training now. Pay your tuition in easy monthly payments after you graduate. Send coupon for FREE 40 page school catalog—TODAY. G.I. approved.

National School of Meat Cutting, Inc., Dept. 50-X, Toledo 4, Ohio

Send me your FREE school catalog on National Training at Toledo in Meat Cutting, Meat Merchandising and Self-Serv-ice Meats. No obligation. No salesman will call.

Name..... Age.....

Address.....

City..... State.....

Approved for Veterans



Popular Mechanics Shopping Guide

Worth Writing For

Rusty? If the elements are causing rust problems with porch railings, downspouts, "sweating pipes" or appliances, an ounce of prevention may be worth a ton of cure. "101 Rust-Stopping Tips," a 36-page booklet, is packed

with ways to prevent or arrest that reddish-brown blight from covering your car, patio furniture, and even farm equipment. Copies are free upon request from Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill.

craftsmen fashioning molten glass into beautiful objects, the refining of sugar and the manufacture of toys.

(Please turn to page 42)

SECRETS of Teaching Yourself MUSIC
revealed in your own home this money-saving way



YES! Teach yourself Piano, Guitar, Accordion, Violin, ANY instrument—even if you don't know a single note now! No special "talent," no previous training needed. Famous low-cost U.S. School of Music Course, with step-by-step pictured lessons, make it simple as A-B-C. Everything is in print and pictures. First you are told what to do. Then a picture shows you how. No boring exercises, no tedious scales. You start by playing actual pieces. Sooner than you may imagine you'll amaze friends by playing your favorite music—popular, classical, jazz, country music, dance tunes, etc. Over 1,250,000 students all over the world.

Stop Cheating Yourself of These Joys

Popularity. New friends. Gay parties. Musical career. Extra money. Banish worries, frustrations. Satisfy self-expressions, creative urge. Gain self-confidence.

Write today for 36-page illustrated FREE book. U.S. SCHOOL OF MUSIC, Studio A308, Port Washington, N.Y. 11050. (Est. 1898. Licensed by N.Y. State Education Dept.)

Print Name
Address
City
State Zip Code



Off-beat travel enjoyment—touring America's top industrial firms—is becoming the educational and fun family activity. A Factory Tour Guide Book just published lists the names, addresses and tour times of hundreds of firms whose products range from candy to champagne. It's possible to see skilled

FREE GASKET MANUAL
32 pages of tips—hints—facts about gaskets and how to improve engine performance
Published as a service to the nation's mechanics, schools and car owners by Fel-Pro, Inc., one of the world's leading gasket manufacturers.
Write: **FEL-PRO, INC.**
7452 N. McCormick Blvd., Skokie, Illinois
Dept. PM-8
Division of Felt Products Mfg. Co.

- Valuable Facts for those who value Top Performance:
- Rear End Gasket Installation Tips
- Correct Way to Install Pump Gaskets
- New Type Gaskets for Valve Covers
- Important Steps in Head Gasketing
- Metal Shim Gaskets
- How to Make Sure Gaskets Fit

Stamp Your Name PERMANENTLY
\$3.95 ppd.
Identify articles you own
EVERSTAMP
DIE TOOL
Comparable to a \$9.00 die tool, now available at this special price.

- TOOLS
- LUGGAGE
- BOOKS
- SPORTS EQT.
- PAINT BRUSHES
- PIPES
- GUNS
- FLASH-LIGHTS
- DRAFTING TOOLS
- PLUS HUNDREDS OF OTHER ITEMS

Hardened tool steel 3" long. Up to 15 letters, last name only.
Name shown actual size
SMITH

Metal • Wood • Plastic • Leather, etc.
Stamp just about anything you own with one blow of a hammer. Made by the Henry A. Evers Co., Inc., makers of quality marking devices since 1898. Makes thousands of impressions. Send check or money order.
HENRY A. EVERS CO., INC.
Dept. P 72 Oxford St., Prov., R. I. 02905

AIR LIFT AIR SPRINGS

HANDLE ANY OVERLOAD

- The only air-adjustable overload spring — fits any car or light truck.
- A safe, level ride for vacationers, sportsmen, businessmen, trailerites.
- Quickly installed — no parts removed from car.

FREE literature: Dept. PM
OVER 1,000,000 SETS IN USE

AIR LIFT COMPANY
Lansing, Michigan

In Canada: 18 Hook Avenue, Toronto 9, Ont

ONLY \$14.95

Money Back Guarantee HEAVY DUTY-ARC WELDER Five Year Guarantee

The New 1965 Model Heavy Duty 110 Volt Arc Welder works on any 110 volt house line. You can not buy a better welder anywhere at this low price. No experience necessary. Now anyone can braze, solder, cut and weld any metal up to 1/4" thick. Generates heat up to 10,000 degrees for cutting through steel plate, etc. **NOTHING ELSE TO BUY.** Comes complete with 12 ft. of heavy duty power cable, 1/16" and 1/8" welding and brazing rods, rod holder, twin carbon torch, helmet, instruction book, etc. **MONEY BACK GUARANTEE.** Try it for 10 days, if you are not completely satisfied we will immediately refund your money without question. — **FULLY GUARANTEED FOR FIVE YEARS.** If inoperative, we will repair or replace it free of charge. **SEND ONLY \$2.00.** and when delivered, pay postman \$12.95 plus COD postage, or send \$14.95 and we will ship postpaid. Over 10,000 National Electric Welders are in use throughout the world.

Order Direct from factory: **NATIONAL ELECTRIC, Dept. PM-8, DELRAY, FLORIDA**

Материал, защищенный авторским правом

PREPARE NOW... CIVIL SERVICE

Police, fire department, sheriff, post office, general civil service, clerical—offer big opportunities now! Prepare for Civil Service! Ages 18 to 55 years. Do you have your high school diploma? If not, why study for 1 or 2 years? Our 90-day High School Equivalency Course (GED) is offered separately or can be combined with Civil Service preparation. Write today for FREE booklet. National Academy, 7200 Seville Avenue, Huntington Park, California 90258 Department PM-85



Transistor Radio with Battery \$1.96



17-Jewel Watch \$2.87



Derringer Pistol \$5.74

HOME-IMPORT BUSINESS—Make Big Profits

New Drop Ship Plan offers you first day profits! Deal direct with overseas sources at prices shown. Dazzling bargains with no investment. Full or spare time. Write for FREE BOOK today to...

MELLINGER, 1554 S. Sepulveda, Dept. P258, Los Angeles 25

REAL ESTATE BE A BROKER

PAYS BIG! SEND FOR FREE, BIG, ILLUSTRATED CATALOG NOW! Graduates report making substantial incomes. Start and run your own business quickly. Men, Women, all ages, learn easily. Course covers Sales, Property Management, Appraising, Loans, Mortgages, & related subjects. **STUDY AT HOME** or in classrooms in leading cities. **DIPLOMA AWARDED. Write TODAY for FREE Booklet!** Accredited Member National Home Study Council. (Established 1936) **WEAVER SCHOOL OF REAL ESTATE** 3521-P Broadway Kansas City, Mo. 64111

FREE BOOK TELLS HOW



CLEANS POWER MOWERS GARAGE FLOORS

BRUSH IT ON HOSE IT OFF

AT HARDWARE, FARM AND AUTO STORES

PROFIT IN YOUR SPARE TIME



SMALL ENGINE REPAIR PAYS BIG! Outboard • Powermower • Chain Saw • Tractor **MAKE EXTRA MONEY** — or fix your own engines and **SAVE!** Illustrated, easy-to-learn Home Study Course qualifies you as expert. Free information. Write today!

LINCOLN TECHNICAL INSTITUTE SUITE 8E, 472 MARKET STREET, NEWARK 5, N. J.

75 POWER TELESCOPE 25X-45X-75X \$3.98

NEW 3 in one telescopes. 3 variable 25X 45X-75X magnification. Brass bound. 25 power for ultra bright images 45 & 75 power for long range. Guaranteed to bring distant stars, moons, objects, sports 75 times closer. Most powerful scope sold anywhere near this amazing low price. American made, 5 sections. Opens 36", closes 1 ft.; contains 4 ground & polished lenses. Can also be used as powerful compound microscope. Mass production enables us to offer telescope complete at \$3.98 postpaid. Money back guarantee. **CRITERION CO., Dept. PBM-26, 331 Church St., Hartford, Conn.**

For more information on articles in this issue... Write Service Bureau, Popular Mechanics, 575 Lexington Avenue, New York, New York 10022

AUGUST 1965

53 ORIENTALS—FREE!



Imported from the farthest ends of the earth — these 53 valuable genuine postage stamps from Borneo, Burma, Hong Kong, Malaysia, Nepal, Siam, Sarawak, Singapore, Viet Nam, many other strange lands of the mysterious Far East. Supernatural Demon-God (half man, half bird), ferocious wild beasts, ceremonial dancers, weird oriental idols, other exotic subjects. Fabulous collection, guaranteed worth over \$1.50 at standard catalog prices. Send only 10¢ for mailing expenses! Extra: Bargain Lists, stamps on approval, Big Illustrated Catalog. **Jamestown Stamp Co., Dept. C85PM, Jamestown, N.Y.**

Jamestown Stamp Co., Dept. C85PM, Jamestown, N.Y. Rush my Collection of 53 Orientals and other offers. I enclose only 10¢. PLEASE PRINT

Name

Address

City, State & Zip Code

My name is Charles Atlas. I can't promise you'll win the title of "World's Most Perfectly Developed Man" as I did. But I do believe I can make a powerful He-Man of you -- in a very short time. You can prove it to yourself -- at my risk. My big free book tells how to do it.



FREE BOOK Mail coupon now for free 32-page book. Tells how I can give you "Stand-Out" muscles — how "Dynamic-Tension" can make you a new man — confident, popular, successful. Rush coupon to me personally: **CHARLES ATLAS, Dept. 88, 115 E. 23 St., N.Y. 10010**

CHARLES ATLAS, Dept. 88, 115 East 23rd St., New York, N.Y. 10010

Dear Charles Atlas—Here's the Kind of Body I Want: (Check as many as you like)

Broader Chest, Shoulders More Powerful Arms, Grip

More Weight, Solid More Powerful Legs

Slimmer Waist, Hips Better Energy, Sleep

Send me, absolutely FREE, a copy of your famous book showing how "Dynamic-Tension" can make me a new man. 32 Pages, crammed with photographs, answers to vital questions, and valuable advice. No obligation.

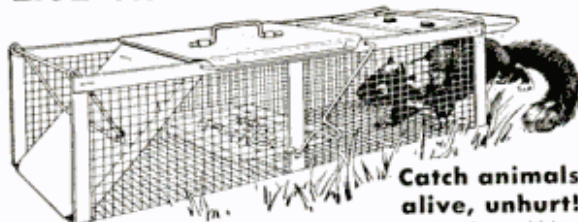
Print Name Age

Address

City & State Zip Code

In England send to: Charles Atlas, Chitty St., London W. 1

LIVE TRAP FOR FUN OR PROFIT



**Catch animals
alive, unharmed!**

Foolproof HAVAHART traps capture squirrels, rabbits, chipmunks, mice, possums, skunks. Take mink, coon without injury to animal or pelt. Sizes for all needs. Easy to use—open ends give animal confidence. Galvanized. No jaws or springs to break. Won't harm children, pets, poultry. Write for valuable guide with trapping secrets.

HAVAHART, 136-T WATER STREET, OSSINING, N.Y.
Please send me FREE new 48-page guide and price list.

Name _____
Address _____



Popular Mechanics

(Continued from page 40)

The nice thing about this is that the tours are offered at no cost, with free sampling in many places. Guides are available for one dollar; write to P.O. Box 8626, c/o Louis Kabran, Washington, D.C.

Total home comfort depends not only upon heating but also upon cooling, humidity control and even electronic air cleaning. A free, 10-page brochure outlines the facts to consider when installing or adding to your present heating and cooling systems. Advice includes selection of proper thermostats and planning for allergy relief. Write to the Inquiry Supervisor (118), Honeywell, 2701 Fourth Ave., S., Minneapolis, Minn.

"**Hillside Homes**" is a useful 128-page guide to being at home on a hill site. Hundreds of ideas are offered for handling the special problems involved (insurance, drainage, slides) and discussion is good on such questions as where the house

PROFESSIONAL TAX CONSULTANTS

► EARN BIG MONEY FASTER ◀

Clean, dignified, high pay Tax Consultant Practice waiting for trained graduates. Busy tax season pays \$1,000 to \$3,000 for spare time work... leads to profitable year 'round Tax Service Business with monthly fees of up to \$50 per client. No previous experience. Low cost home training course, shows you the way. Licensed by N. Y. Education Dept. and Acctd. by Nat'l. Home Study Council. Write for FREE LITERATURE. No obligation. No salesmen.

NATIONAL TAX TRAINING SCHOOL, Monsey, D20 N. Y.

You can make money in

WATCH REPAIR



Learn at home the low cost Sweazey Way

Watch repairing pays up to \$6 an hour, part time watch makers report on survey. Unique and modern Sweazey home study System starts you making repairs right away on Swiss and American watches. Professionally prepared training. No previous experience needed. Special tools provided for practice. Tuition only \$5 a month. Diploma Awarded. Free sample lesson and opportunity book give all facts. Write today. No obligation.

CHICAGO SCHOOL OF WATCHMAKING

Dept. 185, Fox River Grove, Illinois 60021

FREE BOOK and SAMPLE LESSON

CHICAGO SCHOOL OF WATCHMAKING
Dept. 185, Fox River Grove, Illinois, 60021
Please rush FREE BOOK and Sample Home Study Lesson.

Name _____ Age _____
Address _____
City _____ Zone _____ State _____

NEW CATALOG for CRAFTSMEN!



Workshop
Supplies and
Equipment, Kits
Power Tools, Spe-
cial Hardware
**All at Money
Saving Prices**

WOOD..

Get our new 132-page FULL COLOR Catalog. Finest domestic and rare imported hardwoods. Legs, mouldings, ornaments, mosaic tile, lamp parts, glue injector, upholstery supplies. Over 1,500 items. New project ideas and plans. Discounts on Stanley Tools. Send 25¢ for postage, handling.

CRAFTSMEN Wood Service, Dept. A-85, 2729 S. Mary St., Chicago 8

Largest land animal that ever lived, *Baluchitherium*, looked like a grounded blimp. It stood 17 feet high at the shoulder and was 24 feet long. It flourished some 30 million years ago.



ACCORDIONS

ALL TOP BRANDS
50-70% REDUC.

Spec. Imp. 120 B, 5 Sw. \$119

Write for FREE BROCHURE M

ACCORDION-O-RAMA

874 Broadway, N. Y. 3, N. Y. (cor. 18 St.)

BASEMENT TOILET FLUSHES UP



TO OVERHEAD SEWER OR SEPTIC TANK.

NO DIGGING UP FLOORS.

Write

McPHERSON, INC. BOX 15133 TAMPA, FLA.

HELP YOUR POSTOFFICE HELP YOU

Zip Code ALL your mail



ZIP!

(Code, that is)

When new Postal Regulations go into effect, your mail will be delayed if it doesn't show your Zip Code. Start now to give your Zip Code as part of your address on ALL your mail.

HELP YOUR POSTOFFICE HELP YOU

POPULAR MECHANICS

Shopping Guide...

should face, where the family car should be stored, what rooms should be planned for street level. Architect-designed home plans, floor plans and garden plans are included. The book costs \$1.95 from Lane Book Co., Willow Road, Menlo Park, California.

Outdoor decks provide great outdoor living. "Western Wood Decks," a brochure featuring 22 color photos, is primarily an idea book on how to add extra sun space or secluded nooks to your home. Send a dime to Western Wood Products Assoc., 526 American Bank Building, Portland, Oregon.

Six folders detail uses for Plexiglas acrylic plastic in the home. This material can be drilled, cut, sanded much the same as wood, but is also lightweight for sliding cabinet doors, break resistant for shower enclosures and translucent for luminous ceilings. Folders are free from Rohm & Haas Co., Plastics Dept., Philadelphia, Pa.



25 YRS. RESULTS 7 IN 10 PLAYS WON

Sensational book reveals secrets of 10 world's greatest professional race investors. 25 yrs. actual results included, showing 7 in 10 plays won and \$130 average race day profit with \$50. BOOK CONTAINS:—

THE WASHINGTON 'WONDER' SYSTEM—A PROVED FORTUNE SPINNER. Over 20 years were spent finding out exactly why horses lose, and exactly why horses win, and in even further perfecting and improving this wonderful professional backers method.

THE NEW YORK 'GOLDEN-DOLLAR' SYSTEM—A sparkling truly 'golden' and ingenious method with a really fantastic winning potential. Considered to be the 'zenith' of all systems. Invented after many years of the most scrupulous study and painstaking research.

THE IRISH 'GOLDEN-SHAMROCK' SYSTEM—A very fine money spinning system which has a terrific appeal because of its ingenious method of selection. The favorite system of the inventor—a professional backer in that country.

THE ENGLISH 'BRITISH-BULLDOG' SYSTEM—This is a veritable master plan, formerly used exclusively by the English highly successful backer who invented same. A truly wonderful piece of work.

THE GERMAN 'BERLIN-BEAUTY' SYSTEM—A very cleverly conceived and well tried method which the professional backer who invented same claims to be the best in the world.

THE ITALIAN 'TREASURE' SYSTEM—A highly ingenious method with an amazing potential of almost limitless winnings. Invented and perfected by the most clever professional backer in Italy.

THE CANADIAN 'EL DORADO' SYSTEM—Invented by a professional backer who has been acclaimed a racing genius, this system brings almost unbelievably wonderful results.

THE AFRICAN 'WONDER-DIAMOND' SYSTEM—Clever reasoning, countless years of investigation and research has made this system one of the very best in the world.

THE DUTCH 'HEAVENLY' SYSTEM—A method with a fantastic winning potential invented by Holland's top professional backer.

THE FRENCH 'MAGNIFICENT' SYSTEM—This one too is a real 'gold nugget' and truly 'magnificent'. The professional backer who invented same claims it to be unbeatable.

Genuine copyright book supplied only by publishers. Wins at all tracks, horses, harness, dogs. Send coupon for fascinating free brochure: Hithings, Box 5715, PM-C Carmel, Calif.

Hithings, Box 5715, PM-C Carmel, Calif.
(Please send Free Brochure)

Name _____
Address _____
City _____ State _____

LOOKING FOR A NEW AND BETTER JOB?

Learn all about a field offering high pay with little or no competition. Industry is desperately seeking trained men in all phases of Electrical Discharge Machining (EDM). Our training course is made available at the request of manufacturers throughout the United States. If you're looking for a secure job offering rapid advancement—a job that will not become obsolete as many are becoming today—clip and mail coupon NOW for free facts on how you can learn EDM in your spare time at home.

Electrical background is not required.

NO SALESMAN WILL CALL—ACT TODAY
EDM TECHNOLOGY CORPORATION, DEPT. P-101
13111 VENTURA BLVD., NORTH HOLLYWOOD, CALIF. 91604

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP CODE _____
OCCUPATION _____

BILL TROUBLES?

NOBODY REFUSED UP TO \$9,000.00

BAD CREDIT • NO PROBLEM—NOT A LOAN CO.
SEND YOUR NAME FOR FREE APPLICATION
ATLANTIC ASSOCIATES—DEPT. 43
144 WESTMINSTER ST., PROVIDENCE 3, R. I.

Spain produces one-third of all the world's olive oil. Olive trees grow in 37 of the country's 50 provinces.

BEAT THE RACES!

Sensational newly released "Lifetime Security System" consistently wins at all tracks on small capital. Used by a former "pro" who made his living by playing the races. Quick, easy to use. Only \$2.00 complete with 2 month workout. **MONEY-BACK GUARANTEE!**

PROFIT IMPROVEMENT ASSOC. Dept. 44B
51 West 35th St., New York, N. Y. 10001



REPOWER

with V-8 or 6 Cyl. engines.
H.D. ADAPTORS for TRUCK, CAR or COMPACT engines. Immediate del. Write, wire or phone TO-DAY. Free details.
HOOSIER MACH. Prods. Co.
312 SE 6th Pendleton, Oregon
Ph. 276-3442



STOP FRONT DRIVE DRAG AND WEAR ON 4-WHEEL-DRIVES!

WARN HUBS

Free-wheeling 2-wheel drive with Warn Hubs means big savings in gear, engine, tire wear, gas—plus more pep, performance, power in high, and easier steering. Rugged, dependable, proven, in billions of miles of use around the world. Choose Lock-O-Matics that change drive as you shift, or manual Locking Hubs. Models for all 4-w. ds. at dealers, or write for literature.

WARN MFG. CO. 9050-A Empire Way S. Seattle, Wash. 98118

ELECTRONICS

COYNE ELECTRONICS INSTITUTE

A quarter million dollars worth of equipment. Non-Profit Institute—Est. 1899. Courses: Electronics • Electricity • TV-Radio • F.C.C. • Electronics Engineering Technology. Mail coupon or write for FREE BOOK, "Your Opportunities in Electronics." No Salesman will call.

COYNE ELECTRONICS INSTITUTE Educ. Serv. Dept. C5-S
1501 W. Congress Parkway, Chicago, Ill. 60607

NAME _____ PHONE _____

ADDRESS _____ AGE _____

CITY _____ STATE _____

PUBLIC LAND AS LOW AS \$1.25 PER ACRE!

Own your own land for vacationing, prospecting or retirement. Obtain land sold for tax "arrears". U.S. and Canadian Land, north, south, east and west. Some government land available for as low as \$1.25 per acre. Send \$1.00 for fact-packed booklet, "Opportunities In Government Land". Address: North American Land, P.O. Box 165L, Northtown, Chicago, Ill. 60645.



WANT MORE MONEY? GET INTO PHOTOGRAPHY

Coast-to-coast, high-paying jobs in photography are waiting for people with the "know-how" to fill them. You can quickly, easily qualify at home with the world-famous NYI Learn-by-Doing Method. Write today for free catalog. Also resident training in New York. Our 54th Year.

NEW YORK INSTITUTE OF PHOTOGRAPHY
Dept. 49-8 10 West 33 St. New York 1, N.Y.

IF YOU HAVE HERNIA

Get this NEW FREE BOOK

Tells how Rupture can be treated by a mild Non-Surgical method that is backed by a Life Time Certificate of Assurance. This treatment method has a long history of use and is recognized by Authorities today. Men and Women from all over the country have taken the Non-Surgical Treatment and reported it is effective. Why put up with wearing a griping, chafing, unsanitary truss?

Write today for this FREE BOOK. Tells How, explains Why more and more Rupture Sufferers are using Modern Non-Surgical Treatment Methods. Act Now. No Obligation.

EXCELSIOR MEDICAL CLINIC
Dept. E6129 Excelsior Springs, Mo.

The abacus, a frame with beads strung on wires, is a forerunner of the modern electronic computers. Although it goes back several thousand years, it is still the most widely used digital computer.

FREE LIVE SEAHORSES

Have A hobby with hours of fun for all. Order LIVE MATED SEAHORSES sent Air Mail PPD. from Fla. Orders receive a kit with FREE food, catalog and instructions for raising these exotic pets in a jar or fish bowl. FATHER Seahorse gives birth to live "colts". A Fascinating, Educational, and Interesting hobby. GUARANTEED LIVE DELIVERY. PAIR \$2.25—3 PAIR SPECIAL \$4.48. Order TWO PAIR and receive (6) ONE PAIR FREE.

F. F. MARINE LIFE
P.O. Box 626-PM-58 DANIA, FLA.



WE'VE GOT the FORMULA For Solving Your Problems

Planning to build your own garage? Need instructions to make a burglar alarm or beds? Want help on household hints or workshop projects? Looking for plans for a model clipper ship or child's car?

SEND FOR YOUR FREE POPULAR MECHANICS SERVICE FILE

More than 300 subjects covered in Popular Mechanics library of books, booklets, blueprints, and patterns are listed in this tremendous reference file. Here's the handy guide which shows you where to find the answers to almost any do-it-yourself problem.

POPULAR MECHANICS, Service Bureau PM8,
575 Lexington Ave., New York, N. Y. 10022

Please send your free SERVICE FILE to:

Name

Address

City Zone State



CLASSIFIED ADVERTISEMENTS

Rate: \$1.40 per word payable in advance each insertion. Minimum insertion ten words. To be inserted under the proper classification, copy must be in our office by the 15th of the second month preceding date of issue. The next available issue to place an advertisement in America's No. 1 Classified Section is October. The closing date is August 15. Send remittance and order to C. A. Martin, Popular Mechanics, 575 Lexington Avenue, New York, New York 10022.

AUTOMOBILES, MIDGET CARS

WORLD'S Largest model car & racing catalog representing 90 manufacturers. 50¢ refundable. Auto World, Box 961-PM, Scranton, Penna.

AUTO SUPPLIES AND EQUIPMENT

ANTIQUE Car pistons, gaskets, gears, valves, etc. Catalogue \$1.00. Antique Auto Parts, Milwaukee, Wisconsin 53204.

FOREIGN Car parts. Discounts. Catalog. Box 7, Elmont, N.Y.

NEW And used parts savings. Complete guaranteed service all model cars and trucks. Largest in west. Jeep and Army parts specialists. Shifting hubs for all front-end drive vehicles. \$27.50 up. Foreign Parts. Fast service. Pioneer, 734 W. 13th Avenue, Denver, Colorado 80217.

CROSLY. New, used, parts. Discounts. Catalog. Box 7, Elmont, N.Y.

SAVE \$150! Ring-valve job while driving. \$6.00 postpaid. Safe! Guaranteed! Many mechanics recommend. Motaloy, Grantham, Penna. 17027.

JEEP Parts! For military and civilian. At great savings. Largest inventory. Catalog for owners and dealers. Inquiries invited. American Auto Parts Co., 1830-PM Locust, Kansas City, Mo.

SUPERIOR Ignition! Only \$5! Electronic Ignition, Box 405F, Syosset, N.Y. 11791.

JEEP Owners—V8 conversions. Read Jeep Owners ad, page 43.

AUTO Welding repair training in world's largest; non-profit welding school. Low tuition. Free booklet. Hobart Welding School, Box M-85, Troy, Ohio.

WINDSHIELD Wiper motors, window motors & cylinders, seat motors, convertible top motors & cylinders. All motors for cars, trucks, and boats. New or rebuilt exchanges. Windshield Wiper Service Co., 2101 W. 69th Street, Chicago 60636.

HYDRAULIC Jack repair kits and supplies. Catalog 35¢ (in coin). Hydraulic Jack Packing & Tool Co., P.O. Box 50, Bloomfield, N.J.

SPARE Tire covers. Sharp design. Washable fabric. State tire size or car model. Beige-brown or grey/black tu-tones, \$2.99 postpaid. Satisfaction or refund. Traveler Manufacturing, PB-1, Box 02071, Portland, Oregon 97202.

NEW! Dynatron! More car mileage, power, performance! \$6.95 or details. Box 13397B, San Antonio, Texas 78213.

AUTO, Truck, tractor owners replate worn engine parts while driving. Postpaid, guaranteed, \$6.00. Motaloy, Box 334, No. Little Rock, Ark. 72115.

AUTO Burglar alarms, Cars and Trucks, 2 year guarantee. Easy do-it-yourself installation. Brochure on request. \$29.95 (Quantity discounts available). Box 326, Merrick, N.Y.

BRAGE (Crosley) speed equipment new and used parts, catalog, 50¢. 1651 West 130 Street, Gardena, California.

TELL The more than 1,400,000 avid readers of Popular Mechanics about your products and services. It costs very little to place your classified message in front of these proven mail order buyers. For further details, write: C.A. Martin, Dept. 2, Popular Mechanics, 575 Lexington Avenue, New York, New York 10022.

AUTO TRAILERS

PICKUP Camper, trailer or pickup-cover. Build yourself, save! Complete plans \$3.95 each. Bus conversion (and houseboat interiors) Drawings \$2.95. Equipment catalog, \$1.00 (refundable). Satisfaction Guaranteed. Details 10¢. Viking Camper Supply, 94-F Glenwood, Minneapolis, Minn. 55403.

TRAILERS: All kinds—boat, box or camping. Also: All parts to build your own. Send 25¢ for catalog. Norjack, 616 S. 108th St., Milwaukee, Wis.

BUILD Your own camper or cover. Materials, aluminum skin. Information, 10¢. Campers, Box 263-F, Hopkins, Minn.

PICKUP Campers—prefab—freight prepaid. Details free. Dealers wanted. Barnes, Grove, Oklahoma 74344.

BUILD Compact bus camper unit, Volkswagens, Econoliners, Dodge A100, literature. Dot Campers, Box 67M, Saugus, California.

PLANS Now ready for family size travel coach camper. Brochure, \$1.00. H. Morphet, Box 23, Emo, Ontario.

TRAVEL Trailers, pickup campers, truck covers, working plans, \$3.50. Details, 25¢. Materials available. DuPage Coach, Box 86, Wood Dale, Illinois.

BUILD Aluminum pickup camper over-cab, hi-boy, lo-boy, blueprints, material, list, 3 models included, \$3.00. Bennett Custom Camper, 1104 W. Jefferson, Ft. Wayne, Indiana 46804.

PRE-CUT Pickup camper kits. Ready to assemble. Free literature. Snowy Mountain Campers, PM, Lewistown, Montana.

BUILD Travel, camping trailers, Circulars, 20¢. Kameraft, Box 1153, Milwaukee, Wis.

PICKUP Campers. Pre-cut kits. Blueprints. Supplies. Literature 10¢. Comstock Trailers, Parsons 4, Kansas.

MOTORCYCLES, BICYCLES, MOTORSCOOTERS AND SUPPLIES

BUILD Motorbike from Bicycle! Plans, \$1.00: Go-Byk Industries, Rothsay, Minnesota 56579.

HARLEY-Davidsons — Used bargains. New, used parts, accessories, all models. Bulletin 25¢. Knuth's (Factory Dealer), 1753 Muskego, Milwaukee, Wis.

KART \$5. MoPed \$15. Cushman Eagle \$20. Minibike \$17. Motorcycle \$15. Scooter \$10, less engines. Engines \$3.50 up. Whizzer engine \$5. Vespa scooter \$30. Kart \$25. Mailorder only. Send 25¢, 35¢ For First Class Mailing, for directory-catalogue number 125, listing these and hundreds of other bargains, homebuilders parts, plans etc. Midget Motors Directory, Athens, Ohio.

BANKRUPT Motorcycle bargains, repossessed machines. Harley batteries, \$13.45. Bulletin, 35¢. Bunico, 146X, Covington, Virginia.

RECONDITIONED Motorcycle motors. Large stock Indian Cushman Vespa Mustang NSU parts. Indian Motorcycle Sales, Kansas City, Missouri. 64127.

AVIATION

BE A Government licensed aviation mechanic. Practical training. Free information. Aero Mechanics School, Municipal Airport, Kansas City 16, Missouri.

AIRBOAT-Snowplane propellers, plans, kits, supplies. Gauges throttles, spark plugs, gas-oil hose, oil coolers, primers, wrenches, switches, Tachometers, propeller hubs, engine mounts, conversion parts, fittings, 125-190 Lycoming engines, manuals, gaskets, parts. Catalog 25¢. Banks-Maxwell, Box 3301E, Ft. Worth, Texas 76105.

HELICOPTER And autogyro aerodynamics for home builders. Emigh, \$3.00. P.O. Box 6574, Long Beach, Calif. 90815.

LIGHTPLANE Manual blueprints, etc. Circular, 30¢. Kameraft, Box 1153, Milwaukee, Wis.

FREE 48 Page catalog aviation books. Aero Publishers, 329-PM Aviation Rd., Fallbrook, Calif. 92028.

HOMEBUILT. Real enclosed helicopter, 24 pages ideas, information, \$2.00. Build "executive" helicopter drawings, specifications, \$1.50. Helicopter Development, Box PM147, Washington, New Jersey.

BATTERIES, GENERATORS

BATTERY Reconditioning kit, includes molds, material, complete instructions. The Battery Shop, P.O. Box 416, Palm Desert, Calif.

COMPLETE Rebuilding manuals! Batteries \$3.00. Hydraulic Jacks, \$3.00. Refundable. Bayer Publications, 938 Betty Avenue, Neenah, Wisconsin.

ELECTRICAL SUPPLIES

DC POWER components. Transformers, meters, voltage controls, selenium and silicon rectifiers, 100 amp., \$39.00. Assemble your own plater and save! Send \$1.00, refundable, for parts list and simplified schematics. H.B.S. Equipment Division 2, 3543 East 16th Street, Los Angeles, California 90023.

LAMP Parts. Catalog, prices, wiring instructions, 50¢. Refunded first order. Gyro, 5208P N.W. 35 Ave., Miami 42, Fla.

METERS—Surplus, new, used, panel and portable. Send for list. Hanchett, Box 1898, Riverside, Calif.

WELDING, SOLDERING, PLATING

CHROME Plating equipment, supplies. All other finishes. Home workshop and production sizes. Send \$1.00 (refundable) for formulas, operating data, equipment guide and catalog. HBS Equipment Division L50, 3543 East 16th, Los Angeles, Calif. 90023.

MACHINERY, TOOLS, SUPPLIES

SMALL Shop supplies. Production—hobby. Campbell Tools, 1424 Barclay, Springfield, Ohio.

PRECISION Universal square for professional and hobbyist. 180 degree adjustable blade. \$2.00 Postpaid. G-Tro Industries, Dept. A-1, 1432 Crestview Court, Los Angeles, California.

WEN Professional power tools at lowest prices. Send for complete catalog of Wen heavy duty power tools and accessories. Orders shipped promptly. B&B Wholesale, Three Forks, Montana 59752.

SHEET Metal press brake, 48". Including dies \$150.00. Western Specialty, 5221 Doreen, Temple City, California.

SHARPEN, Hone; chisels, knives, plane blades, lathe tools. See page 38 March Popular Mechanics. Microm Company, Box 2313, Santa Ana, California.

CONCRETE Mixer. Mixes 2 cu. ft. of wet mix. 1 cu. ft. dry mix, mixing devices are powered by carry wheels. Write for information. Box 5, Westphalia, Kansas.

SEND For free 28 page pocket size illustrated catalog on angle vises, drill press vises, milling attachments, and rotary tables. No shop complete without these tools. Palmgren Steel Products, 8365 South Chicago Avenue, Chicago, Illinois 60617.

STANLEY, Millers Falls, Skil, Disston, Wiss, Plumb, Channellock, Bonney, Herbrand, Ridgid, and hundreds of other nationally advertised brands at prices hard to beat. Send 25¢ for our big tool catalog today! Silvo Hardware, 107PM Walnut, Phila. 6, Penna.

ENGINES, MOTORS, DYNAMOS

WINDING Data. 275 motors, single and three phase \$1.10. Data Company, 512 Kensington, Kansas City 24, Mo.

REWIND Electric motors! Details free! Modern, Box 10025, Kansas City, Mo. 64111.

STEAM Engines, $\frac{3}{4}$ horsepower. Authentic, ready to run. Tufford, 8520 River-view Lane, Minneapolis, Minn. 55430.

REWIND Motors yourself. Complete instructions, \$1.00. Lewis Manufacturing, Howell, Michigan.

GOVERNMENT SURPLUS

GOVERNMENT Surplus. Complete sales directory \$1.00. Surplus Publications, Box 45781, Los Angeles 45, California.

GOV'T. Surplus. How and where to buy in your area. Send \$1.00. Surplus Information. Headquarters Building, P.M., Washington 6, D.C.

JEEPS low as \$62.50—Autos—Boats—Thousands Others, "as is" Direct from Government! "How to Buy in Your State and 1965 Directory," send \$1.00. Satisfaction Guaranteed! Surplus Disposal, 2230-PH Wisconsin, Washington, D.C. 20007.

JEEPS Low as \$53.90. Used. Buy one or more on bid from U. S. Gov't. Bidders information and our over 400 item, order by mail, surplus catalog, \$1.00. Deductible on \$10.00 order. Quality Surplus, 422 PM8 Washington Building, Washington, D.C.

JEEPS Low as \$53.90. Used. Buy one or more on bid from U. S. Gov't. Bidders information and our over 400 item, order by mail. Surplus catalog, \$1.00 Deductible on \$10.00 order. Quality Surplus, Box 22038 (PM-8), Indianapolis, Indiana.

JEEPS From \$53.90, trucks from \$78.40, boats, typewriters, airplanes, sporting equipment, 100,000 Bargains, as is, direct from Government in your area. Complete sales directory and surplus catalog, \$1.00. Deductible first \$10.00 order. Surplus Service, Box 820-A, Holland, Michigan.

WAR Surplus bargain catalogue. Illustrated, generators, blowers, pumps, gearboxes, hydraulics, winches, motors, etc. Send 50¢ refundable on first order. Surplus Trader, Box 8PM-8, Thomasville, Penna.

WAR Surplus catalogue, generators, pumps, gearboxes, hydraulics, winches, motors, 25¢ stamps or coin. Trader, Box 8-PM-7, Thomasville, Pa.

JEEPS! Government sells Jeeps \$50. For information on sale centers still open, send 25¢ to Jeeps, Box 531-PM8, Spring Grove, Penna.

CHEEP Jeeps. Buy from Gov't. Full information, 25¢. Box 789-PM8, York, Penna.

CHEEP Jeeps, \$53.00. Buy one or hundreds from U.S. Surplus. Official information plus free surplus catalogue, 50¢. Surplus, Box 208-PM8, Etters, Penna.

FACTS Concerning Government surplus, (stamped envelope required), #770(B), Hoboken, New Jersey.

BOATS, OUTBOARD MOTORS

KAYAKS—One-man \$16.50; two-man \$22.50; sail attachment \$16.50. Exciting Sitka Kayak kits known world wide for speed and safety. Assembled in one afternoon. Free pictorial literature. Box 78-P, Brecksville 41, Ohio.

FULL Size, cut-to-shape boat patterns, blueprints, 7 $\frac{1}{2}$ -38 feet. Big new illustrated "Build a Boat" catalog of 64 designs, including catamarans, cruisers, runabouts, skiffs, outboard boats, sailing, racing, houseboats, 50¢. "How to Build a Boat" booklet, \$2.50. Cleveland Boat Blueprint Co., Box 18250, Cleveland, Ohio.

30 H.P. Outboard motors or powerheads. Brand new 1963's \$185.00. Write: Motors, P.O. Box 111, Perry, New York.

NEW, Used, rebuilt marine motors. Marine conversions, fittings. Free catalog. Stokes Marine Supply, Dept. 24, Coldwater, Michigan.

MARINE Conversions, Ford, Chevrolet, Jeep engines. Catalog 25¢. Lehman Manufacturing Company, 800 Elizabeth Avenue, Linden 4, N. J.

VIKING Canoes factory direct. Four canvas covered precut kit models, under \$25.00. Uncomplicated assembly. Free information. Sportsraft, Box 8393C, Columbus 1, Ohio.

BUILD Your own boat from our large-scale blueprints. Books of plans give how-to-build help. Hundreds of professional designs—motor, sail or auxiliary—for amateur builders. Free catalog. MoToR Boat-ing, 959 Eighth Ave., Dept. RS, New York 19, N. Y.

FIBERGLASS Cloth and resin. World's finest cloth and non-run resin, at direct mill prices. Flotation foam. Complete line of plastics, silicon bronze and brass screws, save 60%. No sales tax. Free catalogue. Freight prepaid. Stiles Boat Supply, Box 11P, Linden Ave., Mantua Hts., N.J.

BOAT Kits! Factory molded fiberglass or pre-assembled plywood. 50 models, 12' to 30'. Free catalog. Luger, Dept. BC-65, 9200 Access Road, Minneapolis 31, Minn.

FIBERGLASS Canoes. Three exciting models. Easily assembled kits, \$29.95 up, factory direct. Free literature. Riverside Canoes, 5811G Victoria Ave., Riverside, California.

CHRIS-O-Matic motor & pump units rebuilt exchange. Windshield wiper motors, new or rebuilt exchange. Windshield Wiper Co., 2101 W. 69th Street, Chicago 60636.

FIBERGLASS Cloth, matt, polyester and epoxy resins. Lowest prices. Seifert's, Box 1206-M, Green Bay, Wisconsin.

SURFJET. Powered surfing for inland waters. 8 $\frac{1}{2}$ ' surfboard with Berkeley jet drive and 10 H.P. engine. Lightweight, easy to ride, entirely safe. Surfjet, 8502 E. Pasadena Ave., Scottsdale, Arizona.

INBOARD Engine kits, manifolds, reverse gears; Chevrolet, Ford, etc. Save money. Send for information now. Star Marine, Berkeley 10, California.

BOAT Plans, frame kits, full size patterns all prepared specially for amateurs. Send 50¢ for new catalog illustrating 55 proven designs including sail, inboards and outboards from 7' to 28'. Glen Designs, 9152 Rosecrans, Bellflower, Calif.

SPORTING GOODS, GUNS, FISHING, SKIN DIVING, ARCHERY

BIG Money raising crickets and 12 inch African fishworms. Free literature. Carter Ranch, Plains, Georgia.

FREE . . . Wholesale catalog. Beads, Spinners, Lure parts, Sinker molds, Jigs, Reels, Finnyports (ME), Toledo, Ohio 43614.

MOLDS For casting your own fishing sinkers. Free illustrated booklet. Reading Instrument Co., Box PM78, Reading, Penna.

FREE Wingshooter's handbook. New helpful facts on shotgun shooting, shotgun chokes and how to save ammunition. Write to Poly-Choke Co., Dept. 830C, Hartford, Conn. 06101.

MOLDS For fisherman's sinkers, jigs, squids, casting and spinning lures. Free catalog. Sweet's Molds, Tonawanda 1, New York.

FLINT Stick, survival fire kit for all outdoorsmen. Pocketsize kit. Basic tool for sportsmen, \$1.00. Northern Trading Co., Box 302, Bellevue, Wash.

TRANSISTORIZED Fish call. Guaranteed to attract fish to you in both fresh and salt water, \$14.95 postpaid, or write for free information. Hall of Products, 1906 Colgate Ave., Richmond, Va. 23226.

"BUGTRANIC" Fish call, transmits the sound of a live bug trying to escape, directly to fish hook, \$2.00. H. Johnson, P.O. Box 9206, Corpus Christi, Texas.

BINOCULAR Sale! Free color catalog 100 models, \$9.95-\$250.00. Write, United, 9043 So. Western BSPG-5808, Chicago 60620.

GUARANTEED Fishing jig multi-colored $\frac{1}{2}$ oz., \$1.00; $\frac{3}{8}$ oz., \$1.35. Write K. Roberts, 234 Linwood, Monrovia, Calif. 91016.

SHOTGUN Owners improve your score, bag more game with amazing optical gun-sight. Free details. Nydar, Box 45-285, Glenview, Illinois 60025.

POOL Tables. Complete & K.O. All sizes. Send \$1.00 for cost of prints. P.O. Box 303, Hopkins, Minn.

FISHERMAN'S Belt wallet: Stores lures, flies, tackle, pliers. Convenient! \$2.75. Highland House, 27174 Cole Court, Highland, California 92346.

GOVERNMENT Surplus Bargains, in guns, ammunition, edged weapons, hunting, camping, fishing items. Write for giant free catalog. P & S Sales, Box 155, Tulsa, Oklahoma.

YOUR Ad in this space will be read by more than 1,400,000 active mail order buyers. Join the march to greater profits, place your products and services in front of them today with a small low cost classified ad. For further details, write: C. A. Martin, Dept. 13, Popular Mechanics, 575 Lexington Avenue, New York, New York 10022.

ATHLETIC EQUIPMENT BODY BUILDING COURSES

"GIANT Arms." Dr. Young's, D.C. revolutionary discovery. \$2. Satisfaction or refund. Gaucho, Box 9309-S7, Chicago 90.

MASSAGER, \$10.45. Men and women relieve nervous tension and soothe tired muscles. Hanne's, 3030 East 8th, Gary, Ind.

JUDO-Karate. Unarmed self-defense. \$2.00. Box 2372, Kansas City, Missouri 64141.

KARATE-Judo supplies, equipment: Catalogue, 15¢. Nozawa Trading, Inc., 232 East Second Street, Los Angeles, Calif. 90012.

BAR BELLS, Courses, equipment. Catalogue 10¢. Good Barbell, B-1495, Hendersonville, N. Car.

ASTRONAUT Development, unsurpassed physical fitness, amazing invention available to public. Free information, MII, Box 924-P, Oakland, California.

BAR BELLS, Courses, equipment. Catalogue 10¢. Good Barbell, B-1495, Hendersonville, N. Car.

CAMPING EQUIPMENT AND TENTS

CAMPING Trailer kits. Sleep 6. Basic kit, \$140. Photos and circulars, 10¢. Stratford Trailers, Seymour St., Stratford, Conn.

CAMPING Equipment, unusual selection. Morsan's own quality tents (200 styles) finer fabrics; sleeping bags (80 styles); every camping convenience imaginable. Free giant catalogue-guide-handbook. Morsan, 810-R Route 17, Paramus, New Jersey.

PICKUP Camper, trailer or pickup-cover, build yourself, save! Complete plans \$3.95 each. Bus conversion (and houseboat interiors) drawings, \$2.95. Equipment catalog, \$1.00, refundable. Satisfaction guaranteed. Details 10¢. Viking Camper Supply, 94-FA Glenwood, Minneapolis, Minn. 55403.

BINOCULARS, TELESCOPES, MICROSCOPES, MAGNIFIERS

BINOCULAR Sale! Free Color Catalog 100 models \$9.95-\$250.00. Write United, 9043 So. Western, BCAT 5608, Chicago, Ill. 60620.

BINOCULARS Direct from manufacturer. Finest quality, tremendous savings! 7x35 ZCF, 7x50 ZCF, 7x35 Wide Angle from \$19.95 to \$29.95. All prism type, center focusing, beautiful case. Request Catalog. Koyu, 3860 Crenshaw Blvd., Los Angeles, California.

BUILD Your own reflector telescopes: Complete kits; mirrors, eyepieces, tripods. Free catalog F describing other accessories sent on request. Also free brochure describing amazing line, world famous "Dyna-scope" reflector telescopes. Criterion Manufacturing, Dept. KPM-29, Hartford, Connecticut.

SCIENCE Bargains! Lenses, telescopes, binoculars, microscopes, kits, parts, war surplus. Send \$1.00 for beginner's 10-lens kit with instruction booklet. Order Stock 2-CH. Request free 148 page Catalog CH. Edmund Scientific Co., Barrington, New Jersey.

PLANTS, NURSERY SUPPLIES

MAJIC Plantender, waters house plants automatically, natures way, resembles a log, 12" high, price, \$1.49. Write, Jost, Box 346, Youngstown, Ohio.

WANT Greatest cash crop working for you? Write Ginseng, Asheville 53, N. C.

EARTHWORMS, CRICKETS, FROGS

FREE Literature. Big money raising African Nightcrawlers, Redworms. Three Oaks Ranch, Dresden, Tennessee.

AFRICAN Nightcrawlers! 500—\$7.00, 1,000—\$12.50 postpaid! Dealers Wanted. Ozark Worm Farm-J, Willow Springs, Missouri.

SUCCESS For you! Raise fishworms and crickets. Write for free literature and our success story in Life Magazine. Let us teach you our secrets of success. Hybrid redworms 3000, \$5.95. Carter Redworms, Plains, Georgia.

FROG Raising. Young frogs and giant breeders. Stock your lakes, pond. Nu-Tex Frog Farm, Box 4029, Corpus Christi, Texas.

EARN Money raising fishworms for us! Exciting details free! Oakhaven—56, Cedar Hill, Texas.

MEN!—Women! Make money raising Bait for us at home. Wigglers, Warsaw 45, Indiana 46580.

HYBRID Redworms 1,000—\$3.00, 2,000—\$5.00, 5,000—\$8.00, 10,000—\$14.00. Bedruns 20,000—\$20.00. Postpaid with raising instructions. Brazos Bait Farms, Route 9, Waco, Tex.

FARMS, FARM LANDS, REAL ESTATE

400,000,000 ACRES Government public land in 25 states. Some low as \$1.00 acre. 1965 report. Send \$1.00 National Land, 422PM8, Washington Building, Washington, D. C.

FLORIDA Campsites—deep in the heart of the great Ocala National Forest. Good hunting and fishing. Free maps and photos. Howard Vernor, DeLand, Florida. AD646369D

\$1 ACRE—Canadian border—hundreds campsites, islands, farmlands, directly from tax authorities. (Non-profit). Lists, photographs mailed. Register, Room 203, 92 King St., E., Toronto 1, Canada.

ABANDONED Timber Leaslands! Choice 640 acre Sportsmen's paradises still available—\$20.00 plus \$6.50 Taxes yearly. Maps, pictures, \$1.00 (Refundable). Director, Erindale 4, Ontario, Canada.

CANADIAN Land, priced from four dollars an acre! Acquired through estate liquidations. Title guarantee, no mortgage, small monthly payments. Our lists describe finest properties in Canada. Best hunting, fishing locations, ideal for camps, cottages. Invest in Canada's minerals, farms and forests. Free descriptive booklet. Canadian Estate Land, 2788-P Bathurst Street, Toronto, Canada.

CANADIAN Vacation lands: Full price \$385.00. 40 acres, \$10 month. Suitable cottage sites, hunting, fishing, investment. Free information. Land Corporation, 3768-C Bathurst, Downsview, Ontario, Canada.

FREE Summer catalog! Bargains galore! Coast-to-Coast! Low prices, easy down payments! Safe-Buy Real Estate Agency, 712-PM West Third, Little Rock, Ark. (Please include Zip Code)

\$5 MONTHLY Buys 5 acres. Near town, good building site, excellent fishing. Price \$125.00. Free list. Box 425-P Carthage, Missouri.

THE Only "No-Risk Land Purchase Plan" in America, 10 year money-back guarantee on any vacation, retirement or investment homesite in Boiling Spring Lakes, the multi-million, 14,000 acre development on the Carolina coast. All facilities, electricity, roads, shopping center, motel, golf course, country club, already in. Private ocean beach. 1/4-acre homesites as low as \$435.00; \$5.00 down. Write for free literature. Boiling Spring Lakes, Southport 1-H, North Carolina, 28461.

GOVERNMENT Lands available in 25 States. Low as \$1.00 acre! For exclusive copyrighted report plus "Land Opportunity Digest" with current listings, send \$1.00. Satisfaction Guaranteed! Land Disposal, 2230-PH Wisconsin Avenue, Washington, D.C. 20007.

FREE Real estate catalog! 152-page issue! Over 1,700 pictures! Top values in 28 states coast to coast! Farms, ranches, homes, businesses, waterfront, recreational, retirement properties. Our 40th year of dependable service. Over 100,000 sales! United Farm Agency, 612-PM West 47th St., Kansas City, Mo. 64112. PLaza 3-4212.

COMPLETE Listings on hunting, fishing and vacation land available in the interior of beautiful British Columbia. Send \$2.00. Land Adm., Box 266, Penticton, B.C.

MONTANA, Riverfront lots for sale in the heart of the Montana Rockies—fish, hunt, swim, camp on your own land. \$10.00 down and \$10.00 per month. Mountain Empire Company, Box 203-P, Libby, Montana.

FREE Strout catalog, big 162 page Summer edition. Farms, recreation, retirement, ranches, businesses. Throughout 34 States coast-to-coast. Please zip code your address. Strout Realty, 7-CJ S. Dearborn, Chicago, Ill. 60603.

PETS—DOGS, BIRDS, HAMSTERS, ETC.

MAKE Money raising chinchillas, mink, rabbits, cavies for us. Free catalog. Keeney Brothers, New Freedom 2, Penna.

LIVE Seahorses, marine specimens aquarium supplies, illustrated catalog 15¢. Marine, P.O. Box 626-110, Dania, Florida.

PETS. Hamsters, mice, monkeys, squirrels, chipmunks, guinea pigs, skunks, raccoons. Picture catalog twenty-five cents. Moore's Hamster Ranch, Shepherdstown 25, West Virginia.

HUNTING Hounds, picture sales catalog, 25¢. Clayco Kennels, Henrietta, Texas.

HAWKS, Reptiles, raccoons, skunks, squirrels. Catalogue 25¢. Trails End Zoo, St. Stephen, S.C.

RABBITS—FUR BEARING ANIMALS

EARN \$10,000 Yearly raising Angora rabbit wool for us. Information 25¢ coin. American Angora Company, Malta 12, Montana.

RAISE Rabbits successfully by knowing facts. 48 page illustrated book describing 25 breeds. Housing, breeding, feeding, markets, marketing etc. 25 cents. American Rabbit Association, 36 Arba Building, Pittsburgh, Penn.

MINK Raising information free. Lake Superior Mink Farm, Inc., Superior EE1, Wisconsin.

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

BOOKS, PERIODICALS, PICTURES, POSTCARDS

BOOKFINDERS! All subjects. Send wants! Sydney Jaher, 175-45 88 Ave., Jamaica, N.Y. 11432.

BOOKS, Periodicals, Foreign, domestic. Free illustrated catalogs. Global Books, Grand Central, Box 1632-PM, New York, N.Y. 10017.

BOOKS, Free general catalog, 100 pages. Text, vocational, educational, instructional subjects. Millions of volumes, new and used. Bargain prices. Books bought. Est. 1902. Long's College Book Co., Dept. PM, Columbus 1, Ohio.

OUT-Of-print books at lowest prices! You name it, we find it! Fast service. No obligation. International Bookfinders, Box 3003-PM, Beverly Hills, Calif.

FREE Catalog of unusual books. Thousands of titles. G & A Books, Inc., Dept. B, 251, West 42nd Street, New York City 10036.

FREE Catalog, Self-help books. Write Wilshire, 8721 Sunset, Los Angeles 69P.

FREE Book! We've got what you've been looking for. Just send 50¢ to cover postage and handling and we'll send you a sample typical of the many titles in our stock. We'll also include, at no extra cost, our connoisseur's catalog listing many other books. We guarantee that you'll be satisfied. Connoisseur Publications, 10208 Euclid Avenue, Cleveland, Ohio 44106.

SAVE To 84% on books. Free Catalogue. Discount Reader's Service, M-5435 Upland Way, Philadelphia 19131.

THINKERS, Intellectual, science books, free catalog. Superior Books, Box 2832, San Diego, California 92112.

PUBLISH Your book! Join our successful authors: All subjects invited. Send for free appraisal and detailed booklet. Carlton Press, Dept. PMS, 84 Fifth Avenue, New York 10011.

PAPERBACKS. Send 10 and \$1.00, receive 10 similar. Box 3664, Richmond, Va.

FASCINATING Travel bargains. Free catalog. Bestseller Books, 40-21k Bell, Bayside, New York 11361.

BOOKS Successfully located! Atlantic Book Service, Cedar Street, Charlestown 29, Mass.

FIVE Golden keys to health, wealth and happiness. Details free. Sullivan, 305 Election, Benton, Illinois.

FREE Book catalogs. Thousands of subjects. 15¢ each and up. Midwest Mail Sales, 216-J West Jackson, Chicago, Illinois 60606.

PROPHET Elijah coming before Christ. Wonderful book free. E. Megiddo Mission, Rochester 19, New York.

MAILORDER Record Book. 30 pages. Records inquiries, orders, advertising expense, etc. Most complete. Just send dime for postage and handling. C. A. Martin, Popular Mechanics, 575 Lexington Ave., New York, N.Y. 10022.

MAGIC TRICKS, PUZZLES, JOKER NOVELTIES

LATEST Giant surprise catalog! 1000 Professional tricks, magic, jokes! Exciting! Thrilling! Only 10¢. Vick Lawton's Magic, Dept. PM65, 4018 N.E. Fifth Ave., Ft. Lauderdale, Florida.

WORLD'S Finest professional magic tricks. Joker's Novelties. Giant illustrated catalog 10¢. Top Hat, Evanston, Illinois.

VENTRILOQUISM! Information Free! Dummy Catalog 25¢. State age. Maher, Box PM-8, Kensington Station, Detroit 24, Michigan.

FUN 'N Magic catalog, 10¢. 1,500,000 tricks, jokes, novelties, puzzles, disguises, books. Elbee 7408-P, San Antonio, Texas 78207.

NEW Edition, 1965 catalog, 500 tricks, only 10¢. Fastest same-day service to magicians for 40 years. Send 10¢ today. Douglas Magicland, Dept. 21, Dallas, Tex.

SNUB-Nose detective revolver fires blanks, stage-movies, precision guaranteed, \$7.95. Catalog, 50¢. Richards, CX-393, Port Huron, Michigan 48061.

COMPLETELY Illustrated catalog, 84 pages, 25¢. Manhattan Magic, Box 334-M, N.Y.C. 11.

GAMES, TOYS, NOVELTIES

GAMES Inventors! We are interested in new and novel child and adult game ideas. Nationally-known game manufacturing and marketing firm. Send for details. Hagglund and Associates Research, Dept. A, 650 Ot-tawa Ave. N., Minneapolis 22, Minnesota.

STAMP COLLECTING

INTRODUCING Our better United States approvals we offer 15 United States stamps including Columbian, Bi-Centennials, famous American, airs, others: only 10¢. Ocean Stamps, Box 64-PM, Brooklyn 29, New York.

UNITED States commemorative collection containing 33 different—10¢. Approvals. White, 516-A Avenue L, Brooklyn 30, New York.

UNITED STATES price list, 132 pages, price 30¢. Mark Hanna, 335 Fifth Ave., Pittsburgh 22, Pa.

U.S. Mint specials! Flag set, complete \$1.00. 1¢, 2¢, 3¢ famous Americans (21 different) \$1.00. Free list. Brooks, 2601 Avenue "U", Brooklyn 29, N.Y.

THOUSANDS Of worldwide sets and singles on approval. Highest quality! Cole, Box 223A, Buffalo, N.Y. 14221.

U.S. Bargain, 50 different 10¢, with beautiful worldwide approvals. Stamps, Kennebunk, Maine.

GERMAN Commemoratives, 10¢ with approvals. Schaefer, Box 1704, Washington 13, D.C.

40,000 DIFFERENT. Amazing new plan builds your collection systematically, country by country. As low as 50¢ weekly. Ware, Monroe 75, Conn.

MILLION Foreign stamps! 2¢ each! Send for thrilling, giant approvals! ABC Stamps, Box 6000-MB, San Francisco 1, Calif.

FREE Surprise collection sent with approvals. Gould, 1784 Union, San Francisco 94123.

25 DIFFERENT United States Commemorative 1893 up 10¢. Approvals. K&B Stamp Company, Box 70, Brooklyn 23, New York.

105 DIFFERENT U.S. Stamps, 25¢, approvals included. Shelton, Box 187, Hempstead, N.Y.

BREATHTAKING, 50 Mint Monaco pic- torials, multicolors. \$1.00. Approvals. Stamp Exchange, Box 103, Fairfield, California.

FREE! Giant Bargain Catalog—New Edition listing thousands of bargains including U.S. and B.N.A. stamps, packets, mixtures, albums, accessories and supplies; sent with beautiful approvals. Jamestown Stamp, Dept. E-85PM, Jamestown, N.Y.

WOW! 110 All Different Germany 10¢! Zeppelins, Semi-Postals, Airmails, High values, etc. Giant Catalog, bargain lists included with beautiful approvals. Jamestown Stamp, Dept. A-85PM, Jamestown, N.Y.

50 YEARS Old, fifteen different United States, over fifty years old—10¢ with approvals. Jaxon, Box 145-P, Brooklyn, New York 11230.

PENNY Foreign stamps neatly mounted in jumbo books in Scott order. Bullof Approval, 1454 Coney Is. Ave., Brooklyn 30, New York.

"INVERTED Error," Dag Hammarskjold 5¢ with Approvals. Belmont Stamps, Washington, D. C. 20015.

OLD U.S. space-fillers, 1/8 Scott, Karl Swartz, Malden Bridge, New York.

RUSSIAN Space set 10¢. Russian approvals. Snedco, Box 68-P, Waldwick, N.J.

50 DIFFERENT Old U.S. Revenue stamps 50¢. Winchester stamps, Box 1592, Mansfield, Ohio 44907.

PIPEX, Tipex, Cipex, Ashville. Four miniature sheets used for \$1.00 if you ask for our bargain priced U.S. approvals. Triboro, 38 Park Row, New York, New York 10038.

133 DIFFERENT Colorful stamps 10¢, approvals. Krehl, 1708 Nebraska, Orlando, Florida.

FREE! Congo triangle set! Boy Scout beauty! 25 others, different. Approvals. Cambridge, Box 411, Cambridge, Ohio.

100 OLD United States between 1861 and 1935, \$1.00. Roush Stamps, 51 Chestnut, Mansfield, Ohio.

500 MIXED. Includes pictorials 35¢. Approvals. Knopp, Box 1381, Bristol, Conn.

225 STAMPS For only 10¢! This mammoth value includes airmails, pictorials; stamps from strange countries cataloging up to 25¢ each! Also approvals. Mystic Stamp Company, Camden 80, New York.

ATTRACTIVE Set free. Worldwide approvals. Gorliz, Drawer 388PS, Park Ridge, Illinois.

SELL Your surplus good grade stamps. Write, describing fully what you have. Vanroy Shirk, Lebanon, Pennsylvania.

FREE U.S. catalog. Mint # 704-15, \$4.00; #740-9, \$2.00; #29-93, \$6.00; #909-21, 90¢. Simmy Co., 40 Court, Boston, Mass.

121 DIFFERENT Flag stamps free. Approvals. W-B Stamps, Wilkes-Barre, Pa.

500 DIFFERENT Stamps, \$1.00. Smith, 508-A Brooks, College Station, Texas.

PENNY Stamps! 1000 Mounted in book at 1¢ each. Trust Stamp Company, P.O.B. 132-P, Jamaica, N.Y. 11435.

ONE Pound value Geo. VI Bermuda, plus 100 worldwide 10¢, approvals. Stevens, Box 105A, Homecrest Sta., Brooklyn 29, N.Y.

60 DIFFERENT U.S. (30 commemora- tives) 25¢. No approvals. Seidenberg, Salem 169, Oregon.

ABSOLUTELY Free 50 worldwide. Request inexpensive approvals. University Stamps, P.O. Box 326, Pompano Beach, Florida 33061.

U.S. Mint 859-893, \$6.00. Cooper, Box 3751M, Oak Park, Mich. 48237.

MAYFLOWER Stamp album 25¢. 407 illustrations, 64 pages. Approvals accompanying. Niagara Stamps, St. Catharines 701, Ontario.

U. S. Wholesale-retail list, 20¢. Eagle, 2221 Romine, Pittsburgh 26, Pa.

AMAZING OFFER! 200 United States stamps—including commemoratives, airmails, high denominations to \$1.00. Only 10¢ to approval applicants! Illustrated bargain lists free. Mystic Stamp Co., Dept. 80, Camden, New York.

PENNY! Approvals! Regardless catalogue! Kloster, 4164 52nd St., San Diego 5, Calif.

ERROR! Japanese Railroad error on both first-day cachet and stamp. Limit one, 10¢. Write: Overseas, Box PM-121, Hicksville, N.Y. 11801.

TRADE Your duplicates! (Toward foreign approvals.) Complete information 10¢. VSS, Box 98-P, Newton Highlands, Mass. 02161.

STAMPS 1/50¢ each! Free mixture list. Maxwell Philatelics, Drew, Mississippi 38737.

CARIBBEAN Treasure. Handsome West Indian collection. 10¢. Approvals. Fussell, Box 24015, New Orleans, La. 70124.

FREE, 1870, Canadian Victoria collections. (3) Offer accompanies. Preston, 46 McCormack Ave., Toronto 9, Ontario, Canada.

ATTRACTIVE Foreign mint set plus catalogue (U. S. Accessories), 10¢ with approvals. Bydahl, Box 1293-MH, Seattle, Washington 98111.

SCANDINAVIAN, 60 different, 20¢. Mint USA stamps. Kimber, Hägersten 6, Sweden.

SURPRISE Collection! Exotic mint British Colonials, absolutely free with approvals. Viking, Great Neck 8, N.Y.

STAMPS Free! New issues, new countries, triangles, rockets, Olympics, Scouts, birds, flowers, animals. Also old Canadian and U.S. stamps. Plus complete illustrated Canadian stamp catalog. Send 10¢ for mailing. Gray Stamp Co., Dept. PM, Toronto, Canada.

FREE 400 Genuine postage stamps! Worth \$10.00 at catalogue prices. Africa, Europe, Asia, British Emp.—a fascinating valuable mixture from foreign convents, banks, etc. Who knows what you will find. Also free valuable booklet. Adults only. Approvals enclosed. Frasek Co., PM-8, White Plains, N.Y.

100 BRITISH Commonwealth 10¢. Accompanying approvals. Niagara Stamp Co., St. Catharines 501, Ont.

100 DIFFERENT Stupendous worldwide 10¢. Attractive approvals. Linstamps, St. Catharines 401, Ontario.

CHURCHILL Memorial cover. Valuable collectors' item! Scarce memorial envelope bearing portrait and autograph of the great warrior-statesman. Postmarked with day-of-death cancellation at London, SW1—Post Office serving Houses of Parliament and official residence of British Prime Ministers. Also included to introduce you to the world's most rewarding hobby: (2) New collection of Churchill commemorative issues just released, (3) Illustrated collectors' catalog, (4) Stamps on approval, (5) "How To Collect Stamps" book. Free bonus, complete set of 42 English Kings & Queens! Send 25¢ Kenmore, C-876, Milford, New Hamp.

ISRAEL 25 Different 10¢. approvals. Box 505, Norristown, Pa.

FREE Mint set: Approvals accompany. Stamps, Box 22092, Memphis, Tenn.

NUDES. 25—\$1.00, 50—\$2.50. Approvals if requested. Powell, 1000 Broad, Wichita Falls, Texas.

OUTSTANDING World lot, \$2.00. No junk, no approvals. Eleanor Swain, Durham, New Hampshire 03824.

JOHN FITZGERALD KENNEDY Philip-pine Memorials, mint complete 10¢ Plus 101 bonus sets, approvals. William Deems, 226 Race, Ravenswood, West Virginia 26164.

111 DIFFERENT U.S. stamps, 25¢. Approvals if desired. Superioex, Litchfield, Ohio 44253.

SELECTED Beautiful foreign packets, \$2.00 cash with order. Aytes, LaFeria, Texas 78559.

163 WORLDWIDE, 10¢. Also approvals. Siegel, Box 92-PM, Brooklyn 18, N.Y.

U.N. POSTAL set. Among world's prettiest. Only 10¢. Approvals. Welles, 35-R Maiden Lane, N.Y. 38.

BEAUTIFUL Topical collection includes olympic sports stamps, wild animals, bi-color triangles, colorful birds, outer space stamps. Poland kitten stamp and others. 10¢ with approvals. Sunny Stamps, Fruitport 2B, Michigan.

QUEEN Elizabeth on stamps—A beautiful collection of 50 different stamps from 22 countries—all bearing the portrait of the Queen of England. 10¢ with approvals. Roseland Stamps, Spring Lake, 2C, Michigan.

MAILORDER Record Book. 30 pages. Records inquiries, orders, advertising expense, etc. Most complete. Just send dime for postage and handling. C. A. Martin, Popular Mechanics, 575 Lexington Ave., New York, N.Y. 10022.

COINS, TOKENS, CURRENCY

TWENTY Page 1965 retail price list of USA and Canadian coins 10¢. Our retail selling prices on thousands of coins and coin collectors supplies. Bryson Incorporated, 612A White, Toledo 5, Ohio.

LARGEST Coin magazine. 288 pages, 50¢. Scrapbook, 7320-J Milwaukee, Chicago 31.

40 PAGE Illustrated United States and Canadian coin list 10¢. Stoney, 260 Washington, Boston 8, Mass.

FREE Coin supplies! Giant coin list 10¢ (refundable). Economy Sales, Mansfield, Massachusetts.

COIN Date guaranteed. Restores dates on worn nickels, \$1.00 bottle. Box 276F, Mooreville, N.C.

CIVIL War specials: 1863 cent, \$1.75; 1863 civil war token, \$1.75; 1864 genuine confederate states of America \$10.00 bill, \$2.00. All three \$5.00. Rarcoa, 31 North Clark, Chicago 60602.

"S" MINT Lincolns! 25 different, \$2.00. 30 different, \$3.50. 35 different, \$8.00. post-paid! John Finneran, 22166 North 6th St., Castro Valley, California.

COINS For collectors lists, 10¢. Mathis, Box 33, Limerick, Pa.

10 INDIANHEADS \$2.90; 12 V-nickels \$3.15; 10 Morgan dimes \$3.50; 10 Morgan quarters \$7.50; 10 Morgan halves \$12.50. All different! Fairway, 121-M, Rye, N.Y.

HIGHEST Prices paid immediately for coins. Send 15¢ for 1965 buying prices. Wilnot's, 1067 F Bridge St., Grand Rapids 4, Mich.

NEW 1965 Official black book United States coins: Buying, selling, prices: Rush \$1.00, refundable. Stadri, Whitestone, New York.

10 DIFFERENT Indian cents. Bargain lists, \$2.25. Hobby Sales, St. Paul, Minnesota 55116.

FOR Sale! 30 Lincoln cents before 1941, all different, \$2.00. Gene Carlton, Chandler, Okla. 74834.

COIN Collectors! New scientific instrument detects buried coins, gold, silver, treasures, \$19.95 up. Free catalog. Relco-F40, Box 10563, Houston 18, Texas.

10 DIFFERENT Indian cents \$2.25. Hutchinson's, Box T-6256, Philadelphia, Penna. 19136.

25 COINS from 25 different countries—\$1.00 postpaid! Molzan, 3228 Fruitvale, Oakland, California 94602.

TRUNKFUL 25,000 Indian-Lincoln cents mixed (from the 1920's & older). Will pack "grab-bag" style. 400 mixed, \$25.00, sample bag of 20, \$2.00. Mrs. Fisher, Box 5490, Sherman Oaks 62, Calif.

LINCOLNS: 16 Different brilliant uncirculated in album, \$1.60. 22 different "S" circulated including rare 1955S, \$1.60. 28 different 1909-1939, \$1.60. All three: \$4.50. Harris, Box 1147P, Oceanside, California 92057.

"S" MINT Lincolns, 21 different, \$1.25. Dyer Honeycutt, 216 Sherwood Drive, Gadsden, Alabama.

100 DIFFERENT Lincolns, 1909-1964, \$4.25. David Bixler, Olin, Iowa 52320.

BARGIANS, \$20.00 gold uncirculated \$59.50, two different types \$115.00. 1964 proof sets \$15.00. General MacArthur set \$6.75. Latest guidebook (Redbook) \$1.75. Canadian \$1.00, world coins \$4.25. Gigantic bargain catalogue \$1.00. Bebee's, Inc., 4514 North 30th, Omaha, Nebraska 68111.

BUY, Sell, trade coins. Free list. Box 296, Greenlawn, N.Y.

COIN Collectors—"Numismatic News" tells what your coins are really worth. Send 25¢ for sample or \$4.00 for next 26 big issues. Water Street, Iola, Wisconsin 54945.

COINS Magazine—world's largest seller! Latest coin prices. 25¢ for sample—1 year (12 big issues) \$5.00. Water Street, Iola, Wisconsin 54945.

1878-CC SILVER dollar, extra fine, \$4.95 postpaid. 1879-O, 1888-O, 1881-O, 1882-O, 1883-O, all five choice AU, \$9.95. Benge, 1122 Burbank Blvd., Burbank, Calif.

TOPS! Free illustrated booklet, "How to collect coins." Plus large illustrated catalog. Approvals. Littleton Coin Co., Littleton El, N.H.

RARE Silver Dollars. 1879, 80, 81 S mint \$3.00 ea. Uncirculated. New Catalogue, 50¢; Shultz, Salt Lake, Utah 84110.

ANTIQUES, RELICS, INDIAN GOODS, CURIOS

TONS Of antique gun parts and supplies. All reproduction muzzle loading guns. Send 50¢ for thick illustrated 11th anniversary catalog. Dixie Gun Works, Union City 12, Tenn.

ARROWHEADS 10 for \$3.00. List free. Hyde's, Rosemar Rd., Parkersburg, W.Va.

ANTIQUES! Monthly magazine. Sample 25¢ or free circular. Antiques Journal, Uniontown, Penna. 15401.

SELLING 20,000 Ancient arrowheads, spearheads, etc. List free. Lear's, Glenwood, Arkansas.

HOBBIES AND COLLECTIONS

EUROPEAN And Nazi uniforms and equipment, medals and badges, all authentic and reasonably priced. Catalog with 600 illustrations \$1. Der Alte Oberst, Box 1393, La Jolla, Calif.

AMERICAN Newspaper, complete, original, dated before 1880. \$1.50. 25¢ stamps brings catalogue. D. R. Spaight, Book-seller Tall Timbers 1, Maryland 20690.

50 **JUNGLE** butterflies \$2.00. Giant nature hobbies catalog 25¢. Collectors Wonderland, Box 1170, New York 8.

PRECIOUS STONES, MINERALS

SEMI-Precious uncut gems. Ten different for \$1.00. Request list 30. Prospectors Shop, 201 San Francisco, Santa Fe, New Mexico.

DIAMOND, Guaranteed genuine, natural, \$2.00. Apprx. Weight 1/4 carat. C & J Diamond Company, Box 97-M, Plainview, L.I., N.Y. 11803.

NEW Transistor instrument detects buried coins, gold, treasures, metals. Free information. Relco-C40, Box 10563, Houston 18, Texas.

EARTH Science. Educational magazine. Subscription, \$2.50. Sample, 35¢. Box 550-PM, Downers Grove, Ill. 60515.

GEMSTONES, Over 75 different colorful stones. Mounted, individually identified, \$3.98 postpaid. Vista Enterprises, Box 993, Rochester, New York 14603.

GET Free catalog no serious rockhound, gem cutter, jewelry maker, hobbyist or craftsman can be without. Full of bargains, exclusive items, low prices from largest suppliers and authorities in the field. Free new catalog just off the press, yours for the asking. Write Grieger's, Dept. C-12, 1633 E. Walnut, Pasadena, California.

PHOTO FINISHING, CAMERAS, PHOTO SUPPLIES

FAST, Hi-quality finishing. Kodacolor rolls: eight jumbo prints \$1.98. Twelve \$2.49. Twenty \$3.49. Reprints 15¢. Also low B&W prices. Custom Quality Studio, Box 4838-PM, Chicago 60680.

AMAZING Values, film users write, Chal Photo Supply Co., 14-03 Berdan Ave., Fair Lawn, N.J.

COLOR Movie Fans! 8 MM expertly processed for just \$3.10 including fresh Kodachrome Film. All mailed back next day First Class. Craftsmanship guaranteed. Send exposed reel or request Free Mailers and Price List of complete services. Direct Mail Photo, Box 8352-PM, Pittsburgh, Pa. 15218

PHOTOGRAPHY For pleasure or profit. Learn at home. Practical basic training. Long established school. Free book. American School of Photography, 835 Diversey Parkway, Dept. 345B, Chicago, Illinois 60614.

FREE Illustrated photographic bargain book. Central Camera Co., Dept. 1-H, 230 So. Wabash, Chicago, Illinois.

QUALITY IN your color pictures! Proud of those color shots you take? Let us give you expert developing and printing for top quality results. For free catalog and mailing envelopes, write: Professional Color Laboratories, Dept. 22, Roselle, New Jersey.

A FREE Kodak roll returned with each black and white or Kodacolor developed and printed, fast service, lowest prices, guaranteed quality send for free mailers. Economy Photo Service, Dept. P. M., Box 1111, Albany 1, N. Y.

TELL The more than 1,400,000 avid readers of Popular Mechanics about your products and services. It costs very little to place your classified message in front of these proven mail order buyers. For further details, write: C. A. Martin, Dept. 31, Popular Mechanics, 575 Lexington Avenue, New York, New York 10022.

MOTION PICTURES AND SOUND EQUIPMENT

CAPTURED Nazi film. Guaranteed authentic. Sample 50¢. Sanford, Fairview, Pennsylvania.

16MM sound-projectors, films, new, used for sale. Free catalog, National Cinema, 71 Dey Street, New York City, N.Y.

MOVIE Film! Free catalog! ESO-R, 47th Holly, Kansas City 12, Missouri.

5,000 8-16 MM. Movie films. Free catalogues. International, Greenvale, N.Y.

16MM Sound films features and shorts. Bedner, 5300 So. Talman, Chicago.

8MM MOVIES. 2"x2" Color Slides—biggest selection anywhere! World's Fair, railroad, antique automobiles, circus, World War II, Hollywood classics, travel, wild life and many others. 16mm. new, used films also. Big Blackhawk catalog free. Blackhawk Films, 424 Eastin-Phelan Bldg., Davenport, Iowa 52805.

LAST Call, \$69.95 8mm sound stripe machine \$39.95, post paid, cash with order. 8-16mm processing, duplicating, equipment and supplies. Photo Shop, 614 Washington, Allentown, Pa.

MOVIES! Features, shorts, posters, stills. Write Dept. 21, Hollywood Movie Center, P.O. Box 29171, Los Angeles, California 90029.

FREE Catalog! Save on 8/mm.-16mm. film and supplies. Superior, 448 N. Wells, Chicago 10.

COLOR SLIDES

NEW YORK World's Fair, 1964 exclusive set 100 35mm. 2"x2" color slides, \$14.99 plus 28¢ postage. Biggest selection high quality slides available anywhere. Catalog free. Blackhawk Films, 423 Eastin-Phelan Bldg., Davenport, Iowa 52805.

TRANSPARENCIES Wanted! Learn free-lancing. American Color, Box 46372, Hollywood, California.

BUSINESS OPPORTUNITIES

WANT To make big money at home? \$10.00 profit in an hour possible with invisible mending. Make tears, holes disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 1585 Howard, Chicago 26, Ill.

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

LIQUID Molding rubber, free information. Chaney's, 5415-A San Jose Blvd., Jacksonville 7, Fla.

OPERATE Home mailorder business. Vosacek Printing, 4444AI Ute, San Diego, 17, Calif.

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

HUGE Profits! Mail order importing. Free information. ITIS-PM-8, Box 454, Hollywood, Calif. 90028.

DOLLS! Dolls! Dolls! We teach you to make, repair, dress and sell. Study at home. Earn while learning. Free booklet. Doll Hospital School, Studio MC-85, 11826 San Vicente Blvd., Los Angeles 49, Calif.

LEARN Landscaping and the growing of plants. Start a profitable business part or full time. Free information without obligation. Lifetime Career Schools, Dept. MC-85, 11826 San Vicente Blvd., Los Angeles, Calif. 90049.

AMAZING Manufacturing opportunity. Free list of manufacturing formulas. Presler Oil Company, Fostoria 16, Ohio.

SPARE Time earnings. With your table-saw, bandsaw or jigsaw. Write: Workshop, A3800 Harney, Vancouver, Washington 98660.

SELL Advertising book matches. Write us today; we put you in business by return mail, handling complete line ad book matches in demand by every business right in your town! No investment; everything furnished free! Top commissions daily! Superior Match, Dept. MX-865, 7530 S. Greenwood, Chicago 19, Ill.

FREE Book "990 Successful, Little-Known Businesses." Work home! Plymouth 872H, Brooklyn, New York 11218.

SIMPLE, Pleasant, mailorder can net \$12,000 year. Write Rutward, 2610 Bryant, Columbia Station, Ohio.

TO \$100.00 weekly! Mailing catalogs! Sample, instructions, 25¢. Costar, GPO Box 972-PM, New York 10001.

BAKE New greaseless doughnuts in kitchen. Stores buy output. Start spare time. Profit 29¢ dozen. Small appliance. Free recipes. Montgomery, 3605 South 15th, Minneapolis 7, Minnesota.

PROFITABLE Mail order business. Be independent. Details free. Ideal, Box 357-ED, Valley Stream, N.Y.

FREE "Franchise Profit Letter" tells how unique NFR service is helping thousands seeking profitable businesses. Write today. National Franchise Reports, W-528, 333 North Michigan, Chicago 1.

SECRETS! Secrets! Mail order success revealed by internationally famous expert who discovered how to make home business fortunes. Beginners: Get free copy "How to Make Money in Mail Order." Discloses free advertising, profitable products, everything! No obligation. Write Mallico, 1554 Sepulveda, Dept. P-708, Los Angeles 25.

PACKAGE At home for profit! We supply everything. No "selling." Free home business details. HPC, 807HPM Sunset, Los Angeles 12.

FREE Facts and descriptive bulletin. Be an air conditioning, refrigeration, and heating serviceman. High pay, jobs open everywhere, operate your own service business, no school or correspondence necessary. Write Doolco, Trouble Shooter, 2016 Canton, Dallas, Texas.

\$70.00 WEEKLY—home, spare time. Simplified mail bookkeeping. Immediate income, easy. Auditax, 34741a, Los Angeles 34.

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

EARN Money raising fishworms for us! Write: Oakhaven-38, Cedar Hill, Texas.

HAWAIIAN Jewelry sells fast because it is new and exciting. Details free. Chandlers, Wailuku, Hawaii, Dept. 385.

I MADE \$40,000.00 year by mailorder! Helped others make money! Start with \$10.00—Free proof. Torrey, Box 3566-Y, Oklahoma City 6, Oklahoma.

IMPORT-Export opportunity, profitable world-wide, mailorder business from home, without capital; or travel abroad. We ship proven plan, for no risk examination. Experience unnecessary. Free details. Melinger, P708, Los Angeles 90025.

MAKE \$32 From 49¢ piece vinyl. PMA-1834 Edgeland, Louisville, Ky. 40204.

PIANO Tuning learned quickly at home. Tremendous field! Musical knowledge unnecessary. Information free. Empire School of Piano Tuning, Box 327, Shenandoah Station, Miami, Florida 33145. (Founded 1935).

400,000 BARGAINS below wholesale! Many free. Liquidations, job lots, single samples. Free details. Bargainhunters Opportunities, Box 730-A, Holland, Michigan.

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

VACUUM Mold at home! Hundreds full 3-D plastic products. Big profit, new machineryless method. Free facts, samples. Nationwide Plastics, Box 23321-KA, Los Angeles 90023.

READ Progressive Mailtrade, the magazine that tells how to make money by mail. Quarter brings sample and special offer. Mailtrade, P.O. Box 357, Sheboygan, Wis. 53082.

\$60.00 DAY. Manufacturing concrete posts. Carlayne, 1803 Fremont, Rapid City, South Dakota 57704.

BUY Appliances, cameras, watches, etc. at factory prices plus 10%! Free details! Cam Company, 436-13 Bloomfield Ave., Verona, N.J. 07044.

COPUBLISH "Mail Sale Advertiser," leading mailorder paper. Copy and details 25¢. Vanroy Shirk, Lebanon, Pa. 17042.

MAILORDER Catalogs. No inventory required. Discounts 40% up, postpaid. Send 25¢ for 32 page sample catalog, featuring 150 unusual, fast-moving products and complete details. Satisfaction guaranteed. Gaylords, North Adams 7, Mass.

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

CONCRETE Facts: Cement artists make big money. Previous experience unnecessary. Home shop, simple equipment, copy-righted methods and formulas. Make, color and marbled beautiful cement pottery without moulds. Wishing wells, bird baths, waterfalls, rustic garden and patio items. Free illustrated brochure. Hollywood Cementcraft, 602 Athens Street, Altadena, California 91001.

MAKE Extra money — show friends, neighbors. Gifts, stationery, Christmas. All occasion cards. Experience unnecessary. Salable Samples on approval, free catalog, free name imprinted Christmas card album. Hedenkamp, 361 Broadway, Dept. PM-89, New York.

FREE! Exclusive import-export franchise! Home operated business. Full-part time. Age no barrier. No experience or large investment. Free training. Details \$1.00. (refundable). Trans-World Associates, 1730 Hamiel, Las Cruces, New Mexico 88001.

MAILORDER Laws, \$2.00. Calvin Kahn, Attorney, 4504-A Pine, Philadelphia, Pa.

\$400.00 MONTHLY Raising giant fishworms. Soilless method. Charlie Morgan, Bushnell, Florida.

MAIL Baby catalogs to new mothers for big profits! Details, catalog 25¢. Volz-PM, Ypsilanti, Michigan.

NET \$250.00 Week. Pleasant mailorder. Write Crestmore, 409 West Liberty, Rome, N.Y. 13440.

FREE Catalog of books on mailorder selling. Write, Goldmine, Box 183-A, Bloomfield, New Jersey.

AMAZING Method increases your income using power and personality. Details free. Leavell, 6528B S. Bishop, Chicago, Illinois 60636.

BE First! Sell new products. Write: Mampa, 1509 Barry, Chicago 60657.

RAISE/Board dogs for profit. New manual tells how to start on limited capital. Free details. Aven, Box 925-P, Jacksonville, Florida 32201.

"THE How of Mail Order." Manual explains mailorder laws. Regulations and essential information starting a home mailorder business, \$2.00. Robert Pivoroff, 2409 South 3rd, Phila., Pa.

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

BIG Money—Operate your own fix-it shop. Service all household appliances: irons, fans, refrigerators, automatic washer-dryer, etc. Know how they work, what goes wrong, and how to fix them. Learn how to do house wiring, commercial wiring, rewind motors of all sizes, sharpen mowers, skates, saws. How to get business, buy spare parts wholesale. What to charge for your work. Free Book. Christy Trades School Inc., Dept. A-7303, 3214 W. Lawrence Ave., Chicago, Ill. 60625.

INVESTIGATE Fires, storm damage, accidents for insurance companies, pays up to \$1,000 a month, part or full time. No college necessary. Car furnished; expenses paid. We train you at home in spare time. Keep present job until ready to switch. Pick your location. Men badly needed now. Full information free. Write Liberty School, Dept. C-518, 1139 W. Park, Libertyville, Illinois.

MAILORDER. No investment in Products. Free Brochure. Methods, 1811-FD, Lafayette Hill, Pennsylvania.

AVAILABLE, Franchise for unusual automobile service business. Be your own boss. For full details send \$1.00 to: Car Seal, 4674 Pearl Rd., Cleveland, Ohio 44109.

REPAIR Hydraulic jacks. Details free. Write: Hydraulic Parts Supply, Box 3645, El Paso, Texas.

BOOK Match mail order business; No selling! Lifetime commissions! Details, \$2.00. Westland, P.O. Box 4326, San Diego, Calif. 92104.

ADDRESSERS And mailers needed. Send stamp for information. Lindbloom, 1508 West Erie, Chicago 60622.

MEN—Women, Everybody likes fine candy. Make professionally home. (Our 51st year) Ragsdale Candies, B107, East Orange, New Jersey.

COLLECTION Agency, made easy. Complete set up service, training. Roberts, Box 492, Toms River, New Jersey 08753.

PROFITABLE Catalog Mailorder Business! Vikari's, 835-PM, First Avenue, Salt Lake City, Utah 84103.

FINANCIAL Aid. Loans, Grants, Cash to start a business. Free details, National Counselor, Box 2206, Harlingen 17, Texas.

BOOKKEEPERS Increase income. Operate bookkeeping tax service. Spare-full time. Universal Bookkeeping, Box 664, Springfield, Missouri.

AMAZING Profits can be earned from a successful small business. Details free. Chism, Box 635-A, Frankfort, Kentucky 40601.

FREE Book: "609 Unusual, Successful Businesses." Box 51-PN, Des Plaines, Illinois.

FREE Advertising in Playboy, True, others. Also: how to get started in mail order. Details free. Palmer Publications, Box 805D, High Springs, Florida.

MAKE Statuary, bookends, plaques, liquid marble, molds. 10¢ material makes dollar seller! Free details. Marbleizing Company, Box 170, Edwardsville, Illinois 62025.

AUTO Parts business! No investment. Full or part time. Profit opportunities, kit free. C. B. S., Tarentum 33, Pa.

100% PROFIT! Selling rubber stamps. Details free. Rubber Stamp, Box 102-H, Rantoul, Illinois.

AD Service turns junk into big fees. Free details. Ad Market, Box 331, Harlingen 1, Texas.

FRANKFURTER And refreshment vending carts, trucks, trailers are a profitable business. Be your own boss with a very small investment. Admar Corp., 47-22 37th Street, L.I.C., N.Y. 11101.

UNLIMITED Capital for any business. Details free. R.M. Cooper, 139 Bitterbush Street, Orange, California 92668.

FUND-RAISING Service. Start one. I'll help you. Fund-Counselor, Harlingen 1, Texas.

LEARN Bonsai! Duplicate exactly \$500 imported Oriental Tiny Trees in few hours! Grow living miniatures too; and tiny forests in bowls. Profitable home business! Request free fact pack, free sample seeds! Minitree, Box 23023-VA, Los Angeles 90023.

START Your own business on credit. Your own boss. Hundreds of dealers making \$100 to \$300 and more weekly. We supply stocks, equipment on credit. 300 home necessities. Sales experience unnecessary. Pleasant, profitable business backed by world-wide industry. Write Rawleigh, Dept. H-U-PPM, Freeport, Ill.

WORLD'S Largest wholesale supply. Buy from 7853 American, European, Japanese wholesalers. Tailormade suits from Hongkong. 123 dropship catalogs. Rock-bottom prices. Free details. International Buyers, 216-MM Jackson, Chicago 6, Ill.

MAILORDER Record Book. 30 pages. Records inquiries, orders, advertising expense, etc. Most complete. Just send dime for postage and handling. C. A. Martin, Popular Mechanics, 575 Lexington Ave., New York, N.Y. 10022.

MONEYMAKING OPPORTUNITIES

START Your own home mailorder business, sparetime! Easy; Fascinating, profitable! Alfano, 19-PM Pine, Closter, New Jersey.

LEARN The secrets of repairing junk batteries. "Fabulous Profits" at home. Details. The Batteryman, P.O. Box 416, Palm Desert, Calif.

MAKE Figurines, plaques, lawn ornaments, molds, plastercraft kits. Liquid rubber. Sample and catalogue 10¢. Wooley Company, Box 29-B, Peoria, Illinois.

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

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

CIGARETTES. Make 20 plain or filter-tip for 9¢. Factory-fresh pipe tobaccos. Mild tropical flavored Philippine cigars. Facts free. Moberly, Box 904, Owensboro, Kentucky.

SELL Titania gems: more brilliant than diamonds. Catalog 10¢. Diamonite, 2420-G 77th, Oakland 5, California.

EARN \$240.00 a month at home, spare time, doing only two \$5.00 invisible mending jobs a day. Big money paid for service that makes cuts, tears disappear from fabrics. Steady demand. Details free. Fabricon, 1532 Howard, Chicago 26, Ill.

MINK Raising information free. Lake Superior Mink Farm Inc., Superior, EE1, Wisconsin.

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

NEW Instant invisible mending. Learn in one hour, repair in five minutes. Make \$150.00 week. Literature free. Louis Rosenstein, P.O. Box 6136-6, Philadelphia, Pa. 19115.

HOT Money making line! Show line of business printing, advertising specialties, calendars. Watch orders pour in. All repeat items. Terrific commissions in full or spare time. No experience, no investment. Cash discounts to customers. Free bonus gifts to you. Free sales kits. Willens-David Lionel Press, Dept. W-27, Waukegan, Illinois.

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

\$500.00 MONTHLY Possible addressing envelopes. Write Wellings, R2, Phillipsburg, N.J. 08865.

SPARETIME Opportunity! Typewriter required. Refundable homework instructions. \$1.00. Interstate, 37-1 Besch, Albany 9, New York.

SELL By Mail! Rare opportunity! Fascinating facts! A. Nelson, 210 Fifth Avenue, New York, N.Y. 10010.

MAKE Plastic novelties for extra income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-3, Portland 12, Oregon.

WORK Home, part-time, mailing our catalogs! Free details! Cam Company, Dept. 53, Verona, N.J. 07044.

SWEEPSTAKES Contests. Let us help you win. Write for free information. General Contests, 1609-18 East 5th, Duluth, Minn. 55812.

MAKE Big money fast! H. B. price made \$7,118.90 first year spare time writing orders for Stark Dwarf and standard fruit trees, ornamentals, roses, etc. It's easy with big full-color free outfit—full or spare time. No investment. Every home a prospect. Stark Dwarfs bear giant-size apples, peaches, pears, cherries. Stark, Desk 30186, Louisiana, Missouri 63353.

EARN Big commissions full or part time. Show America's largest line low priced business printing and advertising specialties. Calendars in seasons. Big free sales kit samples hundreds items used daily by business people. Build profitable repeat business. Start right now. National Press, Dept. 19, North Chicago, Illinois.

Free, 206 Easy ways to make money in spare time taking orders for exciting new products. No charge. Just send name, age, for five months free subscription to Opportunity Magazine, 850 N. Dearborn, Dept. 17-GM, Chicago, Ill. 60610.

WIN Contests! Free sample copy. Prize-winner, Box 11569, St. Petersburg, Fla.

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

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

MAKE Money, while vacationing, instructions easy, results guaranteed, only \$1.00. Joe's, Box 1115-P, Modesto, California.

CASH In with your typewriter! Details! Liu-PM, Box 4759, Chicago 60680.

TELEPHONE Your way to money. Edwards, Room 5B, VFW Bldg., Kansas City, Mo.

MAKE Money reading your newspaper! LIU-PM2, Box 4759, Chicago 60680.

FLYING Saucer scale model. Terrific as cigarette desk box. 100% profit. Airmailed sample \$5.00. Perrin Company, Box 16, 1215 Cointrin, Switzerland.

MAKE \$5,000 Yearly, sparetime, raising mink, chinchilla, nutria, etc. Free booklet reveals proven plan. Write: Furs, Dept. E, Bewdly, Ontario, Canada.

FABULOUS Opportunity for women, any age. Earn \$25 day or more as beauty advisor. No experience. Get details, sample Hollywood cosmetics: Studio Girl, Dept. OP-345, N. Hollywood, California.

WROUGHT Iron furniture you can make easy, with our prefabricated parts. Hobby, big profits. Catalog, 25¢. Artiron Inc., 4120 Sepulveda, Culver City, California 90230.

DIRECTORY Of study courses; Money-making Opportunities, \$1.00. ABC Sales, 366 Rio Verde, Daly City, California 94014.

EARN \$60 Week part time analyzing handwriting! Amazing opportunity for students, housewives, businessmen. Rush \$1.00 for complete details. Badzgon, 5370 Library Road, Bethel Park, Pa.

BECOME A Notary Public! Win extra income, prestige, business contacts. Details free. Stationers Exchange, P.O. Box 617, Kilgore, Texas 75662.

FOREIGN Forum magazine, International trade publication incorporates "Wholesale Digest" and "Drop-Ship Gazette." Importers, exporters, agents, mailorder dealers, gift shops, salesmen, merchants, reach new markets, new contacts thru worldwide circulation. Sample copy, 35¢. 4 issues subscription, \$1.00. None free. Forum, Box 4361, Chicago-60680.

SHARP \$\$\$ Opportunity! One low-cost machine sharpens—serrates knives, scissors, pinking shears. Earn \$6-\$9 hourly in spare time. Professional results without experience. Free details. Beaver Machine, Box 121, Gardena, California.

YOU Can make big profits operating your own mail order business at home. No inventory necessary. Easy manual shows how. Free details. Laurins, 1137 Second Avenue North, Jacksonville Beach, Fla. 32050.

MAKE Money with honey. Big profits in beekeeping. Instructions on getting started 50¢. R&T Enterprises, PM-Box 66217, Mar Vista, Calif.

MAKE Money writing short paragraphs! No tedious study! I tell you what to write, where and how to sell, and supply list of editors buying from beginners. Many small checks add up quickly. Write to sell, right away. Send for free facts. Benson Barrett, Dept. C-27-HA, 6216 No. Clark, Chicago 26.

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

START A profitable subscription business in spare time! We need men and women (young and old) as representatives for all leading national magazines. Liberal commissions on all subscriptions. Supplies free. No experience needed. Send this ad with your name and address to: Popular Mechanics, Room 8-O, 250 W. 55th St., New York 10, N.Y.

PROFITABLE OCCUPATIONS

YOUR Own sign shop—Signs, 1017 W. Mulberry, Springfield, Ohio.

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

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

EARN \$240.00 A month at home, spare time, doing only two \$5.00 invisible mending jobs a day. Big money paid for service that makes cuts, tears disappear from fabrics. Steady demand. Details free. Fabricon, 1586 Howard, Chicago 26, Ill.

AUCTIONEERING—Resident and home study courses. Auction School, Ft. Smith, Ark.

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

INVESTIGATE Accidents. Earn \$750 to \$1,400 monthly. Car furnished. Expenses paid. No selling. No college education necessary. Pick own job location. Investigate full time. Or earn \$8.44 hour spare time. Men urgently needed now. Write for Free Literature. No obligation. Universal, CPM-8, 6801 Hillcrest, Dallas 5, Texas.

MANAGE Motel or resort. Man, woman, couple can make high salary plus apartment. Pick your own location with our employment assistance. Learn at home. Free booklet. Motel Managers Training School, Dept. PMC85, 612 South Serrano, Los Angeles, California 90005.

OIL Reclaiming. Plans, \$2.00. Holcomb, Box 681, Pampa, Texas 79066.

FREE Book "990 Successful, Little-Known Businesses." Work home! Plymouth 87H, Brooklyn, New York 11218.

PHOTOGRAPH Accidents for Insurance Companies. \$10.00 hour spare time. Not a school. Free information. Underwriters PMM, 7400 Pershing, St. Louis, Missouri 63130.

WHOLESALE Magazine subscriptions. Highest commissions. Bonus! Box 151HA, Freshmeadows, N.Y. 11365.

BECOME Independent with your own franchise business. Thousands earning handsome incomes. Request interesting facts today. National Franchise Reports, PM-528, 333 North Michigan, Chicago 1.

DISC-Jockey—\$20.00 year. Free details. Box 3364, Anaheim, California.

SCIENTIFIC Massage: Big earnings, uncrowded profession. Learn spare time at home. Diploma awarded. Free catalog. Write: Anderson School, Dept. J1-C, Princeton, Illinois.

MAKE Money writing short paragraphs. Information free. Barrett, Dept. C-27-HB, 6216 N. Clark, Chicago 26.

EARN Good money part time, repairing sewing machines. Easy. Dignified. Lincoln, Box 52, Hempstead, New York 11551.

CHROME Plating. Instructions, equipment and supplies. Platers' Supply, P.O. Box 565, Lugo Station, Los Angeles, Calif.

START A magazine subscription business. Earn generous commissions on Popular Mechanics, Good Housekeeping and all others. Best commissions, bonus, all material sent free. No experience needed. Write Popular Mechanics, Room 8-P, 250 West 55th St., New York 19, N.Y.

AGENTS WANTED

MAKE Up to \$50.00 daily soliciting delinquent accounts. Terrific commissions. General Finance Co., Dept. LG-77, Pickwick Bldg., Kansas City, Mo. 64106.

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

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

MAKE \$50.00 daily selling air operated vacuum cleaners to service stations. Free details. Inka Industries, 2401 Crocker, Houston 6, Texas.

MAKE Extra money—show friends, neighbors. Gifts, stationery, Christmas. All occasion cards. Experience unnecessary. Salable samples on approval, free catalog, free name imprinted Christmas card album Hedenkamp, 361 Broadway, Dept. PM-39, New York.

ESTABLISH Your own business. Low prices on used clothing, shoes, household goods. Unlimited profits. Free catalog. Northwestern Distributors, 2129 No. Western Avenue, Chicago, Illinois 60647.

EXOTIC Earrings! \$1.00, refundable. Free details. OHGA, PM-586, Sigakenkusatu, Japan.

AMERICA'S Biggest value wedding line! Big 40% profit showing wedding invitations and over 50 exciting accessory items. Ideal sideline for Christmas card, printing salesmen. Write for free display album. Elmcraft, Dept. EW-157, 7201 S. Cicero, Chicago, Illinois 60629.

CHRISTMAS Cards, business and personal. Customer's name imprinted. Earn unusually high commissions from this medium—and high-priced line. Free sample album, Process Corp., (our 44th year), 3430E S. 54th Ave., Chicago, Ill. 60650.

SALESMEN Make big profits selling "do-it-yourself" sign kits to merchants. Information free. Signmakers, Inc., Dept. PM4, Box 6626, Denver 16, Colorado.

FUN Spare time greeting card-gift shop at home! Show friends samples of new 1965 Christmas. All-occasion greeting cards, gifts! Take orders. Earn to 100% profit. No experience needed. Try without cost! Special fund raising plans for organizations. Rush name for samples on approval. Regal Greetings, Dept. 173K, Ferndale, Michigan.

AGENTS—300% Profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 1217-D West Newport, Chicago.

MAKE Money selling ties, regulars, slims, personalized ties with any name. Free literature. Philips Neckwear, 22 West 22nd, New York.

WANT To make up to \$100 a week spare time, and get free shoes for life, too? No investment. Rush card for free details. Mason Shoe Mfg., Dept. K-534, Chippewa Falls, Wis.

MEN! Show wife this amazing offer! Famous nationally advertised Hollywood cosmetics pay big. Make \$25 day up. For free samples, details, write Studio Girl, Dept. OP-343, N. Hollywood, California.

SEEKING New products? Get my outfit 47 money-making specialties. Latest conveniences for home, car. Send no money. Just your name. Kristee, 114 Akron, Ohio 44308.

NAMES Are worth money. I average \$200 a week renting mailing lists. Start on a shoe string budget. Details free. Kent Kirban, Bethayres, Pennsylvania 19006.

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

SALESMEN—DISTRIBUTORS

HOT Money making line! Show line of business printing, advertising specialties, calendars. Watch orders pour in. All repeat items. Terrific commissions in full or spare time. No experience. No investment. Cash discounts to customers. Free bonus gifts to you. Free sales kits. Willens-David Lionel Press, Dept. W-28, Waukegan, Illinois.

\$1,000.00 a month for making dramatic 3-second demonstration of amazing Lightweight Presto Fire Extinguisher. New chemical used by Airforce snuffs out fires instantly. Only \$4.95. Terrific commissions. Millions want it. Free Kit. Merlite, 114 E. 32nd, Dept. P-66M, New York 16.

LONG-Needed invention. Man to contact service stations. Huge profits. Cyclo Mfg., 3816 Dahlia, Dept. 140, Denver 1, Colo.

SENSATIONAL New longer-burning light bulb. Amazing free replacement guarantee—never again buy light bulbs. No competition. Multi-million dollar market yours alone. Make small fortune even spare time. Incredibly quick sales. Free sales kit. Merlite (Bulb Div.), 114 E. 32nd, Dept. C-73M, New York 16.

EARN Big commissions full or part time. Show America's largest line low priced business printing and advertising specialties. Calendars in season. Big free sales kit samples hundred items used daily by business people. Build profitable repeat business. Start right now. National Press, Dept. 18, North Chicago, Illinois.

FREE To salesman, descriptions and pictures 200 new, fast sellers for spare time cash or side line profits. No charge. Just send name, age, for sample copy Opportunity Magazine, 850 N. Dearborn, Dept. 17-G, Chicago, Ill. 60610.

JOBBER Selling car dealers quality blue diamond wax, good repeat two dollars trial can. Hasco Products, 7100 Schaefer, Dearborn, Mich.

DISTRIBUTORS Wanted; automatic house plant waterer, write Jost, Box 346, Youngstown, Ohio.

EARN Extra money selling advertising book matches. Sample kit furnished. Matchcorp, Dept. PM-85, Chicago, Illinois 60632.

SENSATIONAL New tool everyone wants, engraves any metal, retails \$4.98, has no competition, high steady earnings, write for free literature, Electra Pencil, Inc., 21826 Catskill, Torrance, Calif.

SELL Advertising book matches. Write us today, we put you in business by return mail; handling complete line ad book matches in demand by every business right in your town! No investment; everything furnished free! Top commissions daily! Superior Match, Dept. M-865, 7530 S. Greenwood, Chicago 19, Illinois.

EMPLOYMENT INFORMATION

FOREIGN Employment. Construction, other work projects. Good paying overseas jobs with extras, travel expenses. Write only. Foreign Service Bureau, Dept. PM, Bradenton Beach, Florida.

TREMENDOUS Opportunities. U.S.A. Overseas, choose jobs, locations, transportation. Free details. Occupations, International Airport, Box 100-C17, Jamaica 30, N.Y.

MERCHANT Marine. Men, women, ships and boats. High wages. Travel. Captain. Box 501-P, Reading, Massachusetts.

YOUR Skills needed to help build Australia. Government-assisted passage. Details \$1. Irving Heyer, 204 NW E, Grants Pass, Oregon.

DIRECTORY Reports. Construction, aviation, shipping, oilfields, government, manufacturing, trucking, etc. foreign—stateside. Helpful information plus job-getting tips on preparing application letters. Unconditional money-back guarantee. Only \$3.00 (\$3.25 airmail) Research Services, Box 6768-PM, St. Louis, Missouri 63144.

JOBS-High pay; USA, So. America, Europe, Africa. All occupations. Many companies pay fare, housing benefits, bonuses. Advancement. Write: Universal, Dept. 8B, Woodbridge, Conn. 06525.

TREMENDOUS Job opportunities. Foreign-U.S.A., construction, trucking, manufacturing, Government, shipping, thousands more. Up to \$2,000.00 monthly! Money-back guarantee. Directory plus sample application form. Send only \$1.00 (\$1.25 Air Mail). Worldwide Opportunities, Box 730-A, Holland, Michigan.

JOBS Galore! Alaska, U.S.A., Truck drivers, construction all phases, to \$2,000.00 per month, transportation some cases. Also urgent need for skilled workers in California, factory, office personnel, truck driving, constr. Rush \$3.00 to World Trade, Box 456, Santa Susana, Calif. 93063.

CIVIL Service handbook. Federal, state, local. 124 pages. \$1.25 postpaid. Hallmark Publications, 336-G East University, Baltimore, Maryland 21218.

MUSIC AND MUSICAL INSTRUMENTS

SONGPOEMS Wanted. Send poems for offer. Nashville Music Institute, Box 532-PM, Nashville, Tennessee.

RECORDS! Discounts on all LP's. Free details. Citadel Record Club, 545 Fifth Ave., Dept. 2, New York 17, N. Y.

ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin, PMM, Covina, Calif.

SONGS Poems wanted. Accepted songs published recorded at our expense. Ted Rosen, 17 Longwood Road, Quincy, Mass.

GUITAR, Banjo Making books, Plans, woods, necks, tools. List 15¢. Satinwood, 510 East 11th Street, New York 9, N.Y.

POEMS Wanted for new songs and records. Send poems. Five Star Music, 6M Beacon, Boston 8, Mass.

ACCORDIONS—Save ½. Standard and Electronic. Free Trial. Easy Terms. Trades. Free Discount Catalog. Accordion Corporation, 5535 Belmont, Dept. R, Chicago, 60641.

VIOLIN And guitar makers, send for latest Free catalogue of woods & accessories. International Violin, PM-8, 414 East Baltimore St., Baltimore 2, Md.

GUITARS. Big discounts. Famous makes. 5-Day trial. Terms. Free catalog. Guitar World, 2003 Chicago Avenue, Dept. R, Chicago, 60622.

GUITARS, \$11.95. Electric double pickups with tremelo bar, \$49.95. Accordions, \$125.00. Concertinas, \$350.00. Drums pearl set, \$99.00. Wind instruments, \$39.95. Free catalogs. Melody Music, 4951 W. 95th St., Oaklawn, Ill.

SONG Ideas wanted. Write with active professional songwriters with publisher contacts. Records made. Share royalties. Send ideas—free examination. Songwriters' Associates, 236 W. 55th, N.Y. 19-P.

ELECTRIC Guitar kits, patterns, parts. Send 25¢. Kits, 3526 California, Peoria, Illinois.

BANJOS! Custom made direct from factory; five strings, extra-long five string, tenor and plectrum. Complete series of replacement neck needs. Extra-long 5 string neck converts present tenor or plectrum banjo to popular "Pete Seeger" model. Catalog free. Stamm Instruments, Division Rock-Wood Carvers, Inc., Dept. FC-85, Oregon, Illinois.

USED Professional guitar, amplifiers, drums. Send 25¢. Hills, 3526 California, Peoria, Illinois.

KALIN Twins, million-selling Decca stars, need lyrics for hit records. Rush your poem. Free professional examination. Kalin Twins, 438 Woodward Building, Washington, D.C.

POEMS Wanted for new songs. Send poems. Crown Music, 49-C West 32, New York 1.

ITALIAN Accordions Manufacturing, 6343P, So. Ashland, Chicago 36, Illinois. Piano, Chromatics, Hohners, Concertinas. Wholesale catalogs free.

MUSICAL Instruments. Pay cash. Save. Illustrated brochure free. Lee Mountain, Henagar, Alabama.

INCOME Guaranteed two years for song-poems accepted! Free public releases! Castle's, 203PM West 46th Street, New York City 10036.

MUSIC Service for professional and non-professional songwriters. Songs and Records, Box 863, Burbank, Calif.

PIANO Self-Teaching Book. Includes popular, classical, harmony, theory, chords, scales. Price \$5.00. LaPont Publishing Company, Box 606-P, Franklin, Michigan 48025.

LEARN To write melodies. Popular songs or hymns. Easy, individual lessons. Anita Word, Box 9765, Dallas, Texas 75214.

SONGS. Songpoems: Wanted for radio show. Hollywood Music Productions, 6425-B10 Hollywood Boulevard, Hollywood, California 90028.

SWISS Musical movements. Mechanical, electrical. Spielman, 131 West 42nd, New York 10036.

ACCORDION-O-RAMA. Top brand accordions. Tremendous discounts. 120 bass, 5 switches for \$119.00. Trades accepted. Free brochure. Accordion-O-Rama, 874 Broadway, New York, N.Y. 10003.

PORTABLE 2 piece Accordion Organ. List \$1375. Assemble yourself, save \$800. Full descriptive brochure. Alas, 31 E. 18 St., N.Y.C., N.Y.

PLAYER Piano books. Free catalog. Vestal Press, Vestal 11, N.Y. 13850.

RADIO, TELEVISION AND ELECTRONICS

33¢ **RADIO & TV** tubes. Free list. Cornell, 4213-17 University, San Diego 5, California.

BRAND New tubes. World's lowest prices on radio, TV-industrial, special purpose tubes. Write for free parts catalog. United Radio., Newark, N.J.

SAVE Money on TV and radio repairs. Free catalog. Telefixit, Box 714, Manhasset 1, N.Y.

FAMOUS Channel Master antennas now available in kits. Do it yourself and save! Also rotators. UHF Convertennas, indoor TV, FM antennas. Free Catalog "M". Jefferson-King, South Fallsburg, N.Y. 12779.

STEREO Tape. Save up to 60% (no membership fees). We discount recorders, batteries, accessories. We mail prerecorded tap, prepaid, anywhere that United States rates prevail. Free 60 page catalog. Saxitone, 1776 Columbia Road, Washington, D. C. 20009.

GOVERNMENT Surplus electronics, infra-red equipment. Catalog 20¢. Meshna, Nahant, Mass.

FAST Transistor radio service. \$4.00 complete. Free, wholesale brochure. Twinlakes Electronics, Leitchfield, Kentucky 42754.

TAPE Recorders, hi-fi components. Sleep learning equipment, tapes. Unusual values. Free catalog. Dressner, 1523 Jericho Tpke, New Hyde Park 3, N. Y.

SAFEGUARD Privacy! New instrument detects electronic "bugs," wire-tapping and snooping devices. Free information. Dee Equipment, Box 7263-E4, Houston 8, Texas.

REMARKABLE Television magnifiers, sizes, fit 4" to 24" sets. Free brochure. "Magna-Lens," 2367 David Court, San Mateo, California.

RADIO Announcing. Learn home! Books, magazines: Disk Jockey, Box 11, Aberdeen, South Dakota 57401.

FREE 148-Page electronics catalog. Big 43rd Anniversary edition! Thousands of astounding buys on stereo hi-fi components, shortwave, citizens band, tape recorders, radios, parts, kits, everything you need at "wholesale low" prices. Write: Radio Shack, Box PM-8, 2727 W. 7th, Ft. Worth, Texas.

TRANSISTOR Radios repaired. A.M.—\$5.00 p.p.d. Guaranteed. Mail with remittance. Sebel Transistor, 208 East Tremont Ave., Bronx 57, New York.

YOUR Ad in this space will be read by more than 1,400,000 active mail order buyers. Join the march to greater profits, place your products and services in front of them today with a small low cost classified ad. For further details, write: C. A. Martin, Dept. 41, Popular Mechanics, 575 Lexington Avenue, New York, New York 10022.

SCIENCE & CHEMISTRY

CHEMICALS And apparatus for industrial, analytical, and private laboratories. Catalog 35¢. Dept. M-50, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N.Y.

ROCKETS: New illustrated catalog 25¢. Single and multistage kits, cones, engines, launchers, trackers, technical information, etc. Fast service. Estes Industries, Penrose 7, Colorado.

SEARCHING For economically priced chemicals and apparatus? Gift with catalog. 25¢. Starr Scientific, Manitowoc, Wisconsin 54220.

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

SKYROCKETS. Firecrackers, fireworks—Make your own! 60 simple formulas 1.00. Paloma Pyrotechnics, P.O. Box 247, Auburn 3, California.

UNDERWATER Fuse 3/32" diameter 9 feet, 40¢; 27 feet, \$1.00 postpaid. Christy, Box 85, Bergenfield, New Jersey.

CHEMICALS. Apparatus, Biology. Catalog 25¢. Mid-States Scientific, 7053 N. Clark, Chicago, Ill.

LABORATORY Conversion charts with discounts catalogue—25¢. Hagenow Laboratories, Manitowoc, Wisconsin. 54220.

UNUSUAL Chemistry books, courses, kits! Rare chemicals, cheap! Catalog, 25¢. NSC, Box 94, Redwood City, Calif. 94064.

UNDERWATER Fuse 3/32" diameter, 30 feet with plans and formulas, \$1.00 postpaid. Buy \$3.00 worth, get 10 feet free. Wayne, Box 182, Addison, Mich.

ROCKETS! Flight kits, testing equipment. Catalog 25¢. Rocket Development Corporation, Route 3, Seymour, Indiana.

FIREWORKS: Formulas, detailed procedures for every type with illustrations, \$1.00. C.R. Industries, 76 Dicknell, Germantown, Mass. 1101 Roble, Santa Barbara, Calif.

AMAZING New book of science experiments, formulas, and catalogue of laboratory supplies. Only 35¢. National Scientific Co., 13 So. Park Avenue, Dept. PM-8, Lombard, Illinois.

FORMULAS, PLANS, ETC.

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

PROFITABLE Manufacturing formulas. Literature free. Pontesso, 2625 South Eighth, Terre Haute, Indiana.

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

OUTSTANDING Encyclopedia of formulas, processes, trade secrets. Free literature. Cassill, Box 1535, Eugene, Oregon 97401.

FOR Proof of what you can do in specialty manufacturing get our literature. It's free! Miller, Chemist, 1517-P, Tampa, Florida.

PLASTICS

BOXES, Plastic. 200 sizes. Free list. Althor, 2260 Benson Ave., Brooklyn, N.Y.

VACUUM Forming, plastic sheet, machine, catalog, 25¢. Prent, 1168 Columbus Circle, Janesville, Wis.

NEW Liquid casting plastic clear colors. Embed real flowers, butterflies, photos, coins. Send 25¢ for two handbooks "How to Cast Liquid Plastics" and "How to Make Extra Money at Home." Castolite, Dept. 65-101J, Woodstock, Illinois.

PLASTIC Embedders, jewelry workers. We have everything. Findings, moulds. New catalog 25¢. David Co., 20 Garden St., Dept. M, Providence 3, R.I.

EXPORT — IMPORT

WATCHES! Airmailed direct from Switzerland. Free catalog. Neptune, 371 Rice, Elma, N.Y. 14059.

1966 **HONG** Kong, Japan trade directory, new products, drop shipments, quarterly revisions, \$2. 1401-M8, Burlingame, California.

HOW To operate importing business. Livingston's, Box 5332, North Charleston 1, South Carolina 29406.

AMAZING New 8MM movie camera. B & W, color, \$16.00 plus postage. Ernest J. Newsom Co., 12752 Montford St., Paloma, California.

IMPORT Fortunes: Directory listing over 100 Hong Kong, Japanese manufacturers, exporters. European directory included free, \$1.00. World Market Company, Post Office Box 816, Fort Walton Beach, Florida.

JAPAN: Mail-Order 26 page catalog, dolls, novelties, Manufacturers' names, addresses \$1.00; 1000 products illustrated trade directory \$3.00. Send cash. Yamagata Office, 814 Togin Bldg., Marunouchi, Tokyo.

BUY IT WHOLESALE

BARGAINS! Buy wholesale! Save money! Free catalog! Norris, 273-Dept. 115 Merrick, Lynbrook, N.Y.

NEW 6-Color deluxe below wholesale catalog. Automobile catalog and others. Housewares, clothing, furs, furniture, appliances, refrigerators, washers, dryers, vacuum cleaners, polishers, cookware, dinnerware, strollers, cribs, radios, stereos, phonographs, recorders musical instruments, organs, typewriters, books, binoculars, luggage, sporting goods, bowling, golf, game tables, motor scooters, motor golf carts, power mowers, chain saws, boats, motors, bicycles, clocks, watches, diamonds, jewelry. Huge discounts, hundreds name-brand items. For free list (factory prices) postcard: Selbyco-5, Decatur, Illinois.

USED And new watches \$2 up. Free list. Southern Watches, 5-PM So. Wabash, Chicago 3.

100,000 PRODUCTS Wholesale! Terrific bargains! Wholesalers, 1265-MR Broadway, New York, N.Y.

BUY 1964 Cars below wholesale from America's largest wholesalers of used fleet cars. Complete price from \$599. Terrific buys! Free! Write today for illustrated fact book and actual photos of cars. Universal Auto Wholesalers, Inc., 235-A Penhorn Avenue, Secaucus, N.J. 07094.

WORLD'S Largest wholesale supply. Buy from 7853 American, European, Japanese wholesalers. Tailormade suits from Hongkong. 123 dropship catalogs. Rockbottom prices. Free details. International Buyers, 216-M Jackson, Chicago 6, Illinois.

BUY Appliances, Cameras, Watches, etc. at factory prices plus 10%! Free details! Cam Company, 436-08 Bloomfield Ave., Verona, N.J. 07044.

BARGAINS! Buy wholesale and below. Name brands. Appliances, furniture, sports equipment, televisions, cameras, watches, jewelry, thousands more. Huge discounts to \$1,000.00 on new automobiles. All makes. Free details. Write today: Worldwide Bargainhunters, Box 730-A, Holland, Michigan.

RAZOR Blades, 50 finest Blue Blades, \$1.00 postpaid. Buhl, Princeton, Florida.

ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin PMW, Covina, Calif.

SPECIAL SERVICES

FACTS, Any subject—product. Research, surveys, reports, assignments. Information 25¢. Box 1431, Greenville, South Carolina.

INFORMATION On manufacturer, product, etc. B. Barsketis, 6540 So. Western, Chicago 60636.

EYEGLASSES! Wholesale laboratory established 25 years. Mail eyeglasses or prescription for quote. Global Opticians, 16 East 23 St., New York, N.Y.

TELL The more than 1,400,000 avid readers of Popular Mechanics about your products and services. It costs very little to place your classified message in front of these proven mail order buyers. For further details, write: C. A. Martin, Dept. 47, Popular Mechanics, 575 Lexington Avenue, New York, New York 10022.

EDUCATIONAL AND INSTRUCTION

USED Courses! Books! List 10¢. Smith's, 124 Marlborough, Salem, Mass.

FCC License in 6 weeks. First class radio telephone. Results guaranteed. Elkins Radio School, 2603D Inwood, Dallas, Tex.

WOODWORKING And cabinetmaking course for beginning and advanced home craftsmen. Only complete low-cost home training program available. Write for free booklet. Interstate Training Service, Dept. G-3, Portland 12, Ore.

SWEDISH Massage and Physical culture pays big profits. Learn at home. Diploma. Free catalog. National Institute, Dept. E85, 307 North Michigan, Chicago 1.

AUTOSUGGESTION, Sleep-learning headquarters! Tapes, records, books. Gigantic catalog free. Research Association, Box 24-PM, Olympia, Washington.

LEARN Technical Metaphysics—The ancient master's method of healing. Easy to learn, inexpensive. For free details write to: Premier College of Technical Metaphysics, P.O. Box 95, Ucluelet, B.C., Canada.

PIANO Tuning quickly learned with home study course. Diploma granted. American Tuning School, Gilroy, Calif.

LEARN Civil and criminal investigation at home. Earn steady, good pay. State age. Institute Applied Science, 1920 Sunnyside, Dept. 16C, Chicago 40, Illinois.

MASTER Watchmaking at home. Free sample lesson. Chicago School, Dept. YU, Fox River Grove, Illinois 60021.

USED Correspondence courses and books sold and rented. Money back guarantee. Catalog free. (Courses bought.) Lee Mountain, Pisgah, Alabama.

HIGH School diploma at home. Licensed teachers. Send age, highest grade completed for free detail. No salesman will call. Southern States Academy, Professional Bldg., Dept. 16, Decatur, Ga.

PENMANSHIP Corrector. Improve poor penmanship quickly. Details free. Ozment, Box 665-34, St. Louis 88, Mo.

COMPLETE Your high school at home in spare time with 68-year-old school. Texts furnished. No classes. Diploma. Information booklet free. American School, Dept. X-C45, Drexel at 58th, Chicago 37, Illinois.

MEN Wanted. Earn \$125 a week and up. Master a trade with a future. Learn auto diesel mechanics in our shops. You learn with tools on real equipment. Earn while you learn. Many of our graduates earn \$125 a week and up. Write for free bulletin: Dept. 256, Auto Diesel College, Nashville 3, Tenn.

OWN Collection agency. "Little Gold Mine!" Franklin Credit, Roanoke, Virginia.

LEARN To drive tractor, trailer, trucks, buses. Short concentrated courses available. Write for free brochure. Driver Training Institute, 794 Bedford Ave., Brooklyn, N.Y. Ja 2-5080.

LEARN Special investigation. 20 Lessons, credentials, diploma, future. International Academy of Police Science, Oklahoma City, Oklahoma.

LEARN Auctioneering. Term soon. Free catalog. Reisch Auction College, Mason City 15, Iowa.

FREE Education! Greater success. Information free. Cameo Enterprises, Carrolltown, Pa. 15722.

DETECTIVE Course. Free information. Universal Detectives, Box 8180F, Universal City, California.

LEARN Asleep or awake! Records, tapes, equipment! Free catalog! Drawer, PM-400, Ruidoso, New Mexico.

BOOKKEEPERS. Operate your own "Dollar-A-Week" system. Ellis, Box 200, Cedar Grove, North Carolina.

"STAMMER—Stutter—no more." (Dr. Young.) Write: Gaucho, Box 9309-S7, Chicago 90.

OIL Coloring photographs—A fascinating hobby or profitable sideline for those with artistic talent. Learn at home. Easy simplified method. Free book. National Photo Coloring School, 835 Diversey Parkway, Dept. 343C, Chicago (60614).

INVESTIGATOR'S Course. Credentials, diploma. Free information. Southwestern Institute Criminology, Box 201, Geronimo, Oklahoma.

BE A real estate broker. Insure security for yourself and your family. Study at home. Prepare for state examination. Write for free book today. Weaver School of Real Estate 3519-P Broadway, Kansas City, Mo. 64111.

PROFITABLE National Camera Repair School training at home! PM8, Englewood, Colorado.

LEARN Air freight. Unlimited opportunities! Fastest growing transportation industry. Licensed correspondence school. Free details. Air Freight Institute, 5267-PM North Natoma, Chicago 60656.

EARN High Pay, Job Security and Career Advancement as a Licensed Aircraft Mechanic. Pittsburgh Institute of Aeronautics, the nation's largest specialized aviation mechanics school, offers courses leading to FAA licensing as airframe and powerplant specialists. Over 47,000 young men have attended PIA and are now enjoying lucrative rewards working for airlines, aircraft manufacturers, and as corporation aviation mechanics. 92% of PIA's 1964 graduating class has already found placement in the field for which it trained. Housing Available—Financing Arranged—High School Diploma Required. For complete information, write: Pittsburgh Institute of Aeronautics, Allegheny County Airport, Box 10897, Pittsburgh, Pa. 15236.

PIANO Tuning pays. Big money in spare time. Learn at home. No musical knowledge necessary. Phonograph, records, tools and instructions furnished. Electronic tuning also taught. Free catalog. Capital Tuning School, 3160 S.W. 16th Court, Ft. Lauderdale, Fla.

ELECTRONIC Courses. Industrial training programs now released to the public. Low tuition. Fundamental and advanced correspondence courses. Free information. Huntington Institute, division of Lantec, Box 2244D, Huntington Park, California.

IDEAS. How to get 'em! 30 Step course with slide chart, \$5.00. Ritterby, 660 Pinecrest, Holland, Michigan.

PUBLIC Speaking guides, formulas, examples, \$1.00. Speechcrafters, 1202 West Broadway, Whittier, Calif. 90601.

COLLEGE Courses on records by world famous teachers. Work toward a college degree at home. Send for free catalogue. Institute for University Studies, Dept. 3, 76 Lincoln Ave., Bergenfield, New Jersey.

AMAZING: Penmanship book, "Ornamental and Business Writing." Big improvement overnight! Details free. T. Tevis, Chillicothe, Mo.

SWEDISH Massage. Foot technique. Post graduate. Home study. Residential. Diploma. Dr. Swanson's Illinois Licensed School, 3809-PL Alta Vista, Chicago 13.

EDUCATIONAL Shortcuts? Unusual guides, directories list vocational, graduating, professional opportunities. Aureab, Allenhurst, New Jersey.

EARN College credits and degrees through correspondence, residence, and examinations. William Darren University, Fourteen North Central Avenue, Phoenix, Arizona 85002.

ATTEND The Nation's finest. Write, Gallion Welding School, Gallion, O.

MISSOURI Auction School. Free catalog! 1330-03 Linwood, Kansas City, Mo. 64109.

PLAYS, STORIES, MANUSCRIPTS

WANT Your book published? Learn how we publish, advertise, promote, distribute. Many successes. Free booklet PM, Van-tage, 120 West 31, New York City.

WANTED Writers! Short stories, articles, books, plays, poetry. Will help place, sell your work. Write today, free particulars! Literary Agent Mead, Dept. 20A, 915 Broadway, New York 10, N.Y.

ADVERTISING AGENCIES, ADV. SERVICE, MAILING LISTS

DIRECT Mail advertising too expensive? Here's the way to reach 200,000 homes at an unbelievably low cost with your own quality direct mail catalog! For free information write: Jordan, Box 115m, Rancho Cordova, California.

MAILING Lists most all kinds 1000 \$5.00. Free folder. Your circulars mailed \$4.00 1000. Dixie Mailers, King, N.C.

ADVERTISING Ratebook leading newspapers, magazines, free. Chicago Advertising Agency, 28-E Jackson, Chicago 4.

MAILORDER Record Book. 30 pages. Records inquiries, orders, advertising expense, etc. Most complete. Just send dime for postage and handling. C. A. Martin, Popular Mechanics, 575 Lexington Ave., New York, N.Y. 10022.

TYPEWRITERS, DUPLICATORS, OFFICE DEVICES

TYPEWRITER, Adder, bargains. List 10¢. Columbus, 719 E. Pike, Seattle, 98122.

OFFSET, Letterpresses, varitypers, typewriters, mimeograph, multigraph machines. Bargains. DixieGraph, King, North Carolina.

RUBBER STAMPS AND OFFICE SUPPLIES

FREE Catalog. Metal pocket case—3 lines \$1.75 Scharer, Parkhill, Pa.

HARD Type for rubber stamp making and printing, free catalog. Barco Type, 237 S. Evergreen, Bensenville, Ill.

FREE 32 Page rubber stamp catalog. Signature stamps \$3.50. Youngers Stamp Shop, Princeton, Iowa.

STAMPS—Supplies. Overnight service. Free catalog. Twentieth Century, 1316 Stevens, El Paso, Texas 79903.

CATALOG: Rubber stamps, business cards. Martin, 1425 Major, Jefferson City, Missouri 65101.

SIGNATURE stamp \$2.88. Three lines \$1.00. Catalog. Jackson's, 133 Winnemac, Chicago, Illinois.

FREE Catalog: Rubber stamps, printing. Dowling Products, Dept. PM75, Pittstown, N.J.

CARTOONING, COMMERCIAL ART, SHOWCARD & SIGN PAINTING, TATTOOING

LEARN Sign painting at home. Free talent test. Ben Kerns, Box 812-PM, Greenville, S.C.

LEARN Profitable magazine cartooning. Free details. Hartman, Box 3097, Lincoln 10, Nebraska.

LIKE To draw? Splendid opportunities in professional cartooning. Write for free catalogue. No obligation. National School of Cartooning, Studio-H, Box 8958, Cleveland 36, Ohio.

LEARN Profitable, fascinating Tattooing. Illustrated information, \$1.00. Zeis, 2220-C Delcy Drive, Rockford, Illinois.

ART Lessons \$6.00 a month. Includes drawing, painting, advertising art, cartooning. Art kits (worth \$25) and materials. Assignments corrected with overlays, by mail, and returned to you. Write for free book. No obligation. Washington School of Art, Studio 148, Port Washington, L.I., N.Y.

PAINT Signs! Using patterns! Trial alphabet, \$1.00. Harwell's, PM-865, Byrdstown, Tennessee.

How To make money with simple cartoons. Everyone who likes to draw should have this book; Free. Send name, zip code. Cartoonists' Exchange, 98, Pleasant Hill, Ohio 45359.

SIGN Painting. Fascinating system. Straley, 410 South Western, Springfield, Ohio.

PRINTING, MULTIGRAPHING MIMEOGRAPHING GUMMED LABELS

MIMEOGRAPHING, Offset printing. Free samples. Pennway, Drawer 1340, Scranton, Penna.

OFFSET Printing 500 8 1/2 x 11 copies \$3.50 postpaid. 48 hr. service. Cisco Duplicating Service, Atlanta, Illinois.

QUALITY Offset printing shipped 24 hours after receipt of your camera ready copy. Modern equipment and latest techniques give you Top Quality at unbelievable low prices. We also have complete composition and typesetting service. Free brochure. Quality-Fast Printing Co., Box 141D, Ross, Ohio.

AMAZING Business printing values. Samples. Print Shop, Box 576, Greenville, R. I.

TWO-Color letterheads. Samples free. Clyde Williams, 6767 Plank Road, Charlotte, North Carolina.

FREE Catalog, samples. Dealers wanted, sell printing by mail. Sutton Printing, Box 853, Waycross, Georgia.

QUALITY Letterheads, samples. Parma Printing Co., 2902 Park, Parma, Ohio 44134.

1,000 THERMOGRAPHED, raised letter. Business cards, \$3.75. Free samples! 322 West State, Ithaca, New York 14850.

PRINTING—8 Page catalog—1 1/2¢; 5M 8 1/2 x 11, =1/S, \$15.00. Free price list. Copen, 288 Atlantic Avenue, Brooklyn 1, N.Y.

1,000 Raised cards \$3.85; 2-Color \$4.90. Quick delivery. High Quality. Dealers wanted. Bixlar, 752 Benson, Frankfort, Kentucky 40601.

QUALITY Printing: lowest prices. Samples. Dowling Products, Dept. PM75, Pittstown, N.J.

PRINTING & RUBBER STAMP OUTFITS & SUPPLIES

DO Your own printing. Save money. Simple rules. We supply everything. Print for others; good profit. Raised printing like engraving too. Have home shop. Details free. Kelsey Presses, V-11, Meriden, Connecticut.

NEW Type Catalog No. 11, 96 Pages. Send One Dollar. Deductible First Order. Acme Type, 732 Federal, Chicago, Illinois.

RUBBER Stamp outfits, supplies. Kiewiet, 2025 Barney Road, Kalamazoo, Mich.

90% PROFIT Rubber stamps. Complete outfit, \$99.95. Duckman, Avoca, Ark.

TYPE And supplies for rubber stamp makers. New wholesale price list No. 3 free. Star Stamp Supply, 732 Federal, Chicago 5, Ill.

MAKE Your own self-molding rubber stamps and printing cuts. Plexirubber, Argyle 1, Wisconsin.

RUBBER Stamp manufacturers supplies. New Products. Low prices. Catalog. Jackson Supply, 1433 Winnemac, Chicago, Illinois.

RUBBER Stamp presses, hydraulic operated, electrically heated. Sizes 5" x 8", 8" x 12", 10" x 15". Starting outfits, supplies. Printing presses. Type cases and cabinets. Custom Manufacturing, 1464-P East Commercial, Springfield, Missouri.

FOR INVENTORS

INVENTORS: Save time and money. Prepare and file your own patent application. Our complete "Patent Kit" makes it easy. Includes detailed instructions and all necessary material. Only \$14.75. Money back guarantee. Don't delay. Send check or money-order today to National Inventors Service, 1244—19th Street, N.W., Washington, D.C.

U.S. Patent Office Searches, 234 Broadway, Room 3615, New York. Free invention certificates.

TREMENDOUS—Savings! Prepare your patent application yourself—easily, with our New "Patent Kit." Complete instructions, materials, sample application—send \$8.95 for immediate delivery. Money-back guarantee! Congress Invention Company, 210 McKim Building, Washington 5, D.C.

INVENTORS: Your ideas and inventions (patented; unpatented) expertly searched and developed for commercial appeal and cash/royalty sales to manufacturers by professional Invention Developer with excellent record of experience. B.S., Industrial Engineering; U.S. Patent Office former Patent Examiner; U.S. Government former Patent Adviser. Second decade of reliable service! Free "Invention Record" and Important Information. Airmailed! Write: Raymond Lee, Invention Developer, 1606N Bush Bldg., New York City 36.

PATENT And invention development, by licensed professional patent engineer and U. S. Patent Office former examiner, and engineering specialists. Your inventions and ideas engineered for patent protection and commercial value. Inventions developed by us negotiated for cash or royalties with our nationwide contacts. Send for free protection "Invention Certificates" and further interesting, valuable patent information. George Spector, Licensed Professional Patent Engineer, Woolworth Building, New York.

PROFESSIONAL Patent searches, \$6.00, including official U.S. Patent Office copies of related U.S. patents! Prompt, dependable service. Certified, airmailed! For free "Invention Record Folio" and important patent information every inventor should have, write: United States Inventors Service Company, 1311 "G" Street NW, Washington 5, D.C.

PATENT-It-Yourself. How to search patents and prepare patented applications. Information about foreign patents, licenses, fees and costs. Examples. Send \$7.50 for "Inventor's Complete Guide," to: Malcom Press, P.O. Box 7115, Apex Station, Washington, D.C.

SAVE High fees! Prepare your patent application yourself! New "Do-It-Yourself" patent kit now makes it easy! Free "Registration Form." Miss Blaine, 306A Carry Building, Washington 5, D.C.

IMMEDIATE Cash, for patent applications. Free patent searches. Write for details. Universal Patents, 184-D, Marion, Ohio.

INVENTORS Wanted immediately for promoting on cash or royalty. Patented, unpatented. Free booklet outlines royalty rates, requirements. Write Kessler Corporation, C-58-FI, Fremont, Ohio.

INVENTORS, your invention made to order (confidentially) 26 years experience. Write Model Shop, Route #2, Box #1, Marion, Indiana.

PATENT Searches, including copies of related U.S. patents, \$6.00. Inventors, attorneys, manufacturers use my "world-wide" airmail service! "Invention Record" form and "Information Every Inventor Needs," sent free! Miss Hayward, 1029P Vermont, Washington 5, D.C.

INVENTIONS WANTED

INVENTIONS Wanted. Patented: unpatented. Tremendous manufacturers lists. Global Marketing Service, 2420G 77th, Oakland 5, California.

WE Either sell your invention or pay cash bonus. Write for details. Universal Inventions, 298-E, Marion, Ohio.

INVENTIONS Wanted immediately for promoting on cash or royalty. Patented, unpatented. Free booklet outlines royalty rates, requirements. Write Kessler Corporation, C-58-IW, Fremont, Ohio.

FEDERAL Trust Company, 4344 East Indian School Road, Phoenix, Arizona 85018.

PATENTS Needed. All kinds. Special connections in medical industry. No fees. Inventors Research and Marketing Corporation, Box 284, St. Charles, Illinois.

INVENTORS Wanted: Manufacturers need new items! Your inventions, ideas developed for cash/royalty sales. Free "Invention Record"; Information. Raymond Lee, 1606P Bush Building, New York City 36.

MANUFACTURING

WIRE Forming progressive dies, send print, part sketch, short run turning. B. L. Tool & Die, 413 26th St. Union City, N.J. B. Lindberg, prop.

INVENTORS Service. Model building. Research. Manufacturing. Top consultants in all fields available. William Parker, 32 Westminster, Worcester, Mass. 01605.

MODELS—Small lot manufacturing. Metals, plastics, etc. Milburn, Burlington, Kentucky.

MODELS—SHIPS, TRAINS, PLANES, ETC.

ROCKETS: New illustrated catalog 25¢. Single and multistage kits, cones, engines, launchers, trackers, technical information, etc. Fast service. Estes Industries, Penrose 2, Colorado.

SHIP Model kits and fittings: clippers, frigates, etc. Catalog paint-tool list, book list, 35¢. Model Shipways, Box 85, Bogota, N. J.

SHIP and yacht model fittings: Pine construction hull kits; blueprints. Send 50¢ for illustrated catalog. A. J. Fisher, Inc., 1002 Etowah Avenue, Royal Oak, Michigan. 48067.

SHIP Models. Kits, fittings, plans, books, tools, engines, motors. Big illustrated catalog 50¢. James Bliss & Co., Dept. SM, 342 Atlantic Avenue, Boston 10, Massachusetts.

UNUSUAL Tools for modelers, others. Free catalog. Brookstone, Worthington, Massachusetts.

BUILDING Materials, 1/4" & 1/8" scale, windows, doors, siding, roofing, lumber and structural shapes. Send 35¢ for catalog with samples. Small Sales Co., 6025 Martway, Mission, Kansas 66202.

HOME CRAFTSMEN

KNOCKDOWN Cedar chests, also over fifty kits. Catalog 25¢. Giles Kendall Co., Huntsville 2, Alabama.

SKIL-CRAFTS New '65-'66 catalog. Largest and finest selection of leathercraft, artist, hobby-craft supplies in the world. Free gift with first order. Send 50¢. Refundable with first order. Skil-Crafts, Box 105-P, Joplin, Missouri.

WALNUT, Cherry, silver maple, gun stocks, squares lumber, picture frame moulding. Midland Lumber Company, Box 262, Savannah, Missouri.

WOODWORKERS—Home craftsmen! Catalog containing lamp parts, veneers, lazy susan bearings, Swiss movements, chair cane, folding metal legs, wooden legs, mouldings, furniture hardware, finishing materials, etc., only 15¢. Barap Specialties, Box 2044-CS, Chicago 60609.

2512 PLANS, Patterns, things to make, do. Fun. Profit. World's greatest selection. New catalog 10¢. Craftplans, 18250-A Harwood, Homewood, Ill.

FREE "Do-it-yourself" Leathercraft Catalog. Tandy Leather Company, 1001 Foch—Dept. H55, Fort Worth, Texas 76107.

101 PATTERNS Of smart gifts, novelties, shelves, action windmills plus "Make Money Jig Sawing." \$1.00. Mastercraft, 85M, 7041 Olcott, Chicago 60631.

PLANS for pool table with extra two-face top for table tennis and model railroad. Blueprints B1209 and building instructions \$3.50. Popular Mechanics Service Bureau, 575-M Lexington Ave., New York, N.Y. 10022.

YOUR Ad in this space will be read by more than 1,400,000 active mail order buyers. Join the march to greater profits, place your products and services in front of them today with a small low cost classified ad. For further details, write: C. A. Martin, Dept. 60, Popular Mechanics, 575 Lexington Avenue, New York, New York 10022.

DO IT YOURSELF

ASPHALT Driveway. Great savings and satisfaction. Use spare time. Instruction schedule, \$2.00. National Maintenance, Box 3050, Milwaukee, Wisconsin 53218.

EASY & Fun to make your own wall plaques. Free catalog, plastic molds & plastercraft supplies. Arts Magic, 1200 South Congress, West Palm Beach, Florida.

SWIMMING Pool filter. Build your own Low cost, high capacity. Instructions, \$2.00. Pan-Eastern, Box 207, Totowa, N.J.

PIANO Parts Company, 21WO30 Shelly Dr., Itasca, Illinois. Free Information—Kits.

EXERCISE At home on build-it-yourself physical fitness equipment, including bicycle exerciser, rowing machine, belt massager, and abdominal board. Send \$2.50 for blueprints B1208 and instructions. Popular Mechanics Service Bureau, 575-K Lexington Ave., New York, N.Y. 10022.

FREE Check-list covering more than 300 classifications of projects, plans, instructions, service and repair information detailed in Popular Mechanics famous series of instructional booklets, books, patterns, and blueprints. List covers an extremely wide variety of do-it-yourself data on home remodeling, repair and improvement, hobbies, crafts, boating, games, lawn and garden, and hundreds of others. For your free copy of this helpful list, write: Service Bureau, Popular Mechanics, 575 Lexington Ave., New York 22, New York.

WATCHES, OLD GOLD, JEWELRY

HIGHEST Cash—Gold, jewelry, diamonds, silver, platinum. Mail articles. Free information. Chicago Gold & Precious Metals, 6 E. Monroe, Dept. 2258, Chicago 3.

WANTED, Gold, silver, platinum, scrap (any form), coins. Information free. Wilmot's, 1067D Bridge St., Grand Rapids 4, Michigan.

WATCH And clock repairing books. Free catalog. North American, Box 77-AH, Fox River Grove, Illinois 60021.

USED Pocket and wrist watches, needing repairs, 5 for \$10.00; in running condition, 5 for \$25.00. Joseph Bros., 5 South Wabash, Chicago 3.

CASH Immediately for old gold, jewelry, gold teeth, watches, diamonds, silverware, spectacles, platinum, mercury. Free information. Rose Industries, 29-A East Madison, Chicago 2.

TOBACCO

FREE Catalog. Big savings on pipes, tobacco, lighters, smokers accessories. Pipes, Box 125P, St. Ann, Mo. 63074.

CIGARETTES 12¢ Package postpaid. Information, 50¢. Refundable. Box 19, Waverly, Mass.

OF INTEREST TO WOMEN

800 BUTTONS \$1. Quiltpatches 200 \$1. Catalogue. Schaefer, Drummondville, Quebec.

WOMEN! Make big money at home. \$10.00 profit in an hour possible with invisible mending. Make holes, tears disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 1533 Howard, Chicago 26, Illinois.

\$200.00 MONTHLY Possible, sewing babywear! Write: Cuties, Warsaw 9, Indiana 46580.

GIFTS, Mother and baby. Free catalog. Hanne's, 3030 East 8th, Gary, Indiana.

BEAUTY Demonstrators—to \$5.00 hour, demonstrating famous Hollywood cosmetics, your neighborhood. For free samples, details, write Studio Girl, Dept. OP-344, N. Hollywood, California.

DRIVE New car, wear new clothes, buy color TV. Get daily cash income. Put spare hours to work. Write for free copy Opportunity Magazine; see hundreds easy ways to make money. Opportunity, Box B 17-Go, 850 N. Dearborn, Chicago, Illinois 60610.

LADIES Beaded bags, \$12.50; beaded dresslengths, \$12.00; beaded cardigans, \$13.50. Indo European Export, Box 14329 Hong Kong.

JEWELRY Worldwide. Imported direct to you. Free brochures. Lowell Anderson, 8634 Phoenix, Fair Oaks, Calif.

DOLLS! Dolls! Dolls! We teach you to make, repair, dress and sell. Study at home. Earn while learning. Free booklet. Doll Hospital School, Studio MC-85A, 11826 San Vicente Blvd., Los Angeles 49, Calif.

TREASURE FINDERS

METAL Locator kits and assembled models from \$39.90. Terms. Transistorized models available. Free catalog. Electronic Applications, Dept. M, Box 6095, Alexandria, Virginia.

SAVE! Build transistorized treasure finder. Details free. Del Research, Box 347-B, Alden Manor, Elmont, N.Y.

NEW. Coin locator! Free literature!
Howe, 811-C Kansas, Atchison, Kansas.

POWERFUL Metrotech locators detect gold, silver, coins, relics. Moneyback guarantee, terms. Free information. Underground Explorations, Dept. A, Box 793, Menlo Park, California.

NEW Supersensitive transistor models detect buried gold, silver, coins. Kits, assembled models. \$19.95 up. Underwater models available. Free catalog. Relco-A40, Box 10563, Houston 18, Texas.

TREASURE-Fone automatic. A new principle in electronic metal detection. Patent Pending, \$129.50. Write: Highlander Co., Dept. 23, 10308 Brenda Way, Rancho Cordova, Calif.

TRANSISTOR Treasure detectors, underwater detectors. Many models. Free catalog. Gardiner Electronics Co., Dept. 9, 4729 N. 7th Avenue, Phoenix, Ariz.

TREASURE Hunters, prospectors, beachcombers; pin-point exact location buried coins, relics, gold, silver with powerful metal locators. Free literature. Write: Goldak, Dept. B-8, 1544 W. Glenoaks, Glendale, California 91201.

TREASURE. Gold, silver relics. Find them with new 1985 models. Free information. Rayscope, Box 715, North Hollywood, California.

TREASURE. Prospecting magazine. Sample 25¢. Goldbug, Box 588, Alamo, Calif.

EXCITING Adventure locating hidden loot, treasure, relics, etc., with powerful, electronic M-scope locator. Lightweight. Guaranteed. Very easy terms. Send for free booklet, interesting customer reports. Fisher Research, Dept. AY, Palo Alto, Calif.

SAVE \$300.00. Build your own gold, treasure, coin locator. Easy illustrated instructions \$1.00. Locator, Ashland, Oregon.

AVAILABLE Now!—Four treasure maps—authentic lithographic copies of four maps from Treasure Map Collection, Library of Congress, Washington. =1. Spanish map (1701) locating over 100 missions in Southwest. =2. Northwest treasure chart. =3. Spanish Main treasure chart. =4. Hidden Treasure from South Carolina to Colombia. All four, \$2.00. Research Associates (MP Div.), Box 801, Perth Amboy, New Jersey.

TREASURE. Find gold, silver, relics with super, powerful Detelectron locators. Free information. Detelectron, Dept. 8-PM, P.O. Box 243, San Gabriel, California.

REMAILING SERVICE

SECRET Mail receiving system. Hedg-peth, 406-M South Second, Alhambra, California 91802.

BOSTON, Mass. Remails 25¢. \$3.00 monthly. Rodenhiser, 294 Lincoln St., Allston 34, Mass.

SECRET Mail receiving-forwarding service. Cox, 84 Chestnut, Saugus, Massachusetts 01906.

LOS ANGELES, Hollywood, San Fernando Valley—25¢ single; \$3.00 monthly. Confidential. 10437 Lanark Street P, Sun Valley, California 91352.

HOLLYWOOD Remail Service. Confidential. Any city, for business and personal reasons, 50¢ each or \$3.00 monthly. Hollywood Remail Service, 219 South Alta Vista, Hollywood, California 90036.

SECRET Receiving and remailing. Discreet and confidential. Remail 25¢ single. 8050 S. Main, Houston, Texas.

HAWAII Secret unadvertised address. Remails 25¢. Receiving-forwarding, \$3.00 monthly. Postcards. Souvenirs. Coe, Box 984, Kailua, Hawaii 96734.

NIAGARA Falls or Buffalo, N.Y. Remails 25¢, \$3.00 monthly. Alderman, 9000 Main St., Clarence, N.Y.

REMAILS 25¢, \$3.00 monthly. Hawkeye, Box 4, Eldridge, Iowa 52748.

HOLY City remails, 25¢ each. Walter, Box 66-A, Holy City, California 95026.

REMAILING 25¢ apiece, \$3.00 monthly. Marco, Box 5333 Sarasota, Florida.

PRIVATE Address, information 25¢. Remails 25¢, from Baltimore, Charlotte, Atlanta, Jacksonville, Tampa, Chicago, St. Louis, San Francisco, Mexico, Horton, 68 Kensington, Greenville, South Carolina 29609.

LOS Angeles mail address. Enarkay Enterprises, 1805 Wilshire, Suite 206, California 90057.

ITALY. Eight panoramic postcards of your choice: Capri, Florence, Naples, Pisa, Rome, Vatican, Venice, \$2.00. Re-Airmail, postage \$1.10 single. N. Capodilupo, C. P. Montesacro, Rome, Italy.

SECRET Remailing, 25¢ single. Dale, 2225 Coal S.E. Albuquerque, N. Mex.

SOUTH America remailing 25¢. Castrillon, Apartado Aereo 1700, Medellin, Colombia.

ARIZONA Remails, 25¢, \$3.00 monthly. MARC, P.O. Box 125, Phoenix 85001.

PERSONAL

BORROW \$1,233 Airmail! Repay \$54 for twenty-nine months. State licensed. Postal Finance, Dept. 17-L, Kansas City, Kansas 66117.

BIBLE Questions answered. Stamped envelope. Bylon, 17167 Bentler, Detroit, Michigan 48219.

SUBCONSCIOUS Conditioning remakes personality while you sleep. Free details. Sleep-Learning, Box 24N, Olympia, Washington.

NEED Money? Borrow \$100-\$1000 by mail. Confidential, repay in 24 months. Free loan application. Budget Finance Co., Dept. HB-125, 317 So. 20th, Omaha 2, Nebraska.

LOANS By mail, \$100-\$1000. Anywhere. Confidential. Write Union Finance, Dept. PM, 222 W. Osborne, P.O. Box 7457, Phoenix, Arizona.

FREE catalog of quality gifts for that special occasion. Modern Items Co., PM, 332 N. 81st, Seattle, Wash. 98103.

BORROW \$100 to \$1000 by mail. Quick, easy, private. No co-signers. Repay in 30 small monthly payments. For the amount you want write today to Dial Finance Co., 410 Kilpatrick Bldg., Dept. 8-001, Omaha, Nebraska 68102.

LOW-Cost loans by mail. \$6.00 monthly repays \$104.50; \$56 monthly repays \$1,321.39. Borrow any amount. Guaranteed fast, confidential. Write today! Bankers Investment 67-B, Box 1648, Hutchinson, Kansas 67501.

INVESTIGATORS. Free brochure, latest miniature electronic surveillance equipment. Ace Electronics, 11500-P NW 7th Ave., Miami, Florida 33168.

ESCAPE Debts. Bad credit. Fast relief. Counselor—331, Harlingen 7, Texas 78551.

BLITZ Reducing! 5 pounds overnight! Guaranteed! Bijou, Box 1727-BM, Hollywood, California 90028.

DENTURE Repair kit. Materials dentists use, \$3.98. Homeadente, Box 382 Riverside Sta., Paterson, N.J. 07524.

OCCULT Supplies and services, catalogue free. "Lodge" Brantridge Forest, Balcombe, Sussex, England.

WANTED—MISCELLANEOUS

WE Want good products for local distribution. Will answer only if interested. Z & R Company, 1860 Palma Vista, Las Vegas, Nevada 89109.

MERCURY. Gold, Silver, Platinum; Ores assayed. Wholesale Terminal, Norwood, Mass.

STAMP Collections, accumulations. Eagle Stamp Co., 2221 Romine, Pittsburgh 26, Penna.

FOR SALE, MISCELLANEOUS

ORIGINAL Oil paintings from Belgium. Information, \$1.00. Box 712, St. Thomas, V. I. 00802.

AUTOMATIC Rafter computer. Dial hip, common, jack lengths instantly. Free literature. \$4.95 postpaid. Satisfaction guaranteed. Emmert, Box 221, Sycamore, Illinois 60178.

HEARING Aid batteries wholesale. Free list. Habs, Box 51, York, Penna.

MISCELLANEOUS

YOUR Name sent to 1000 importers, publishers, mailers, wholesalers, etc. on our mailing list. Year \$1.00. Dixie Mailers, King, N. Car.

CIGARETTES—Make 20 plain or filter-tips for 9¢. Factory-fresh pipe tobaccos. Mild tropical flavored Philippine cigars. Facts free. Moberly, Box 903, Owensboro, Kentucky.

BOOKS On antiques and their prices. Free circular! P. Warman Publishers, Uniontown, Penna.

CESSPOOLS. Septic tanks restored to newness by miracle crystal pellets. Free literature. Electric Sewer Cleaning Co., Allston 34, Mass.

ORNAMENTAL Iron designs. Book of 1600 beautiful, practical designs for railings, columns, etc. Free literature. Cunningham, 3881 South 3200 West, Salt Lake City, Utah 84119.

LOANS By mail, \$100-\$1000. Anywhere. Confidential. Write Union Finance, Dept. PM, 222 W. Osborne, P.O. Box 7457, Phoenix, Arizona.

BIRTH Certificates, Marriage Certificates, Diplomas! 2 blank forms \$1.00. Sample 10¢. Standard Forms, Box 7228-M, Washington 4, D.C.

LETTERS In a jiffy with "500 Ideas for Easier Letter Writing." \$1.00. Guaranteed. Douglas Hoyt, Box 5891-G, San Francisco, Calif. 94101.

GIFT Catalog, Gift Haven, Box 142-C, RD-1, Clarks Summit, Pa. 18411.

SUPER Memory overnight! Success guaranteed! Bijou, Box 1727-M, Hollywood 28, California.

BRAND New! Paperback books. Low as 7 for \$1.00, postpaid. All subjects. Over 4000 titles. Catalogue free. Hallows, 14 Drexel, Cahokia, Ill.

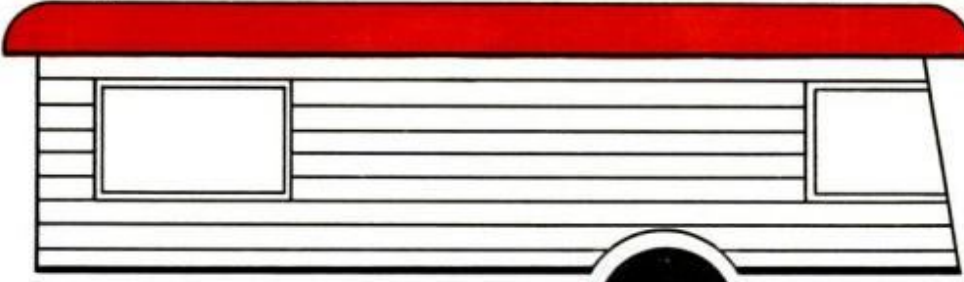
2 PADLOCKS, 1 Key guaranteed to fit both. \$1.00 each. Other systems available. Padlocks, Box 331, Sheboygan, Wisconsin 53082.

DEPENDABLE key ring with 5 years return service tag, \$1.00. Charles Tiefry, Box 490 Mt. Clemens, Michigan.

PERPETUAL Motion wheel runs by water evaporation continuously. Lifts 4 cups water each revolution. Plans \$2.00. Perpetual Motion, 33 E. 2nd So., Provo, Utah.

FREE Wholesale catalog! 100,000 products. Tremendous discounts! Taylor Distributors, Newton 2, New Jersey.

If your trailer roof leaks, absorbs heat, or just looks bad...



read about new **Alumi-Top**

It's a specially formulated aluminum roof coating for mobile homes, campers and truck trailers. Reflective *Alumi-Top* combines pure Alcoa® Pigments in a tough asphalt base.

Performance reports are all enthusiastic. Users say *Alumi-Top* seals out moisture, keeps coach interiors cooler in summer and greatly improves overall appearance.

Made by The W. W. Henry Co., Huntington Park, Calif., *Alumi-Top* has been tested and proved under the toughest Southwestern weather conditions—hot sun, cold nights, heavy dew, little rain.

Good aluminum coatings like *Alumi-Top* keep interiors cool in hot weather because the bright aluminum particles turn back most of the sun's radiant heat. Once applied, coatings stay firm on top, but pliant under the protective aluminum surface. This means no sag in summer or cracks in winter.

Easily applied with an ordinary roofing brush, aluminum coatings come ready-mixed, require no thinning or heating. And the surface stays bright and waterproof for years.

Alcoa does not make aluminum roof coatings, but Alcoa Pigments are used in the best brands. For copies of our free booklets, please send the coupon.



Alcoa Brings You America's Finest News Show... THE HUNTLEY-BRINKLEY REPORT, on NBC-TV



Aluminum Company of America
895-H Alcoa Building, Pittsburgh, Pa. 15219

Please send your free booklets:

- Aluminum Asphalt Roof Coatings*
 Aluminum Paint Manual

Name _____

Address _____

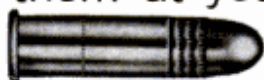
City _____

State _____ Code _____

22

22 ammo *isn't* all the same. Only Remington "Hi-Speed" 22's have super-hard "golden" bullets. Made to micrometer tolerances for tack-driving accuracy. With famous "Kleanbore" priming. In short, long or long rifle cartridges, solid or hollow point. Ask for them at your Remington dealer's.

"Kleanbore" is Reg. U.S. Pat. Off. and "Hi-Speed" is a trademark of Remington Arms Company, Inc., Bridgeport, Conn. 06602. In Canada: Remington Arms of Canada Limited, 36 Queen Elizabeth Blvd., Toronto, Ont.



Remington 

The Original "Wedge Type" Screwdriver

QUICK-WEDGE®

SCREW-HOLDING
SCREWDRIVER



**HOLDS
THE SCREW**



**STARTS
THE SCREW**



**DRIVES
THE SCREW**



Double blades wedge into the screw slot so firmly, the screw virtually becomes part of the screwdriver. Screws start easier and drive straighter. Save time, energy and frayed nerves. In 14 sizes — Unconditionally guaranteed.

Try one at your Dealers or write:

KEDMAN COMPANY, Box 267, Salt Lake City, Utah 84110



**HIGHLIGHT YOUR TRAVEL PLEASURES !!
CAPTURE EXOTIC SCENES AND EVENTS !!**

Buy your cameras (all brands and all models — world famous), at fantastic savings (when you visit Tokyo, or have your friends buy one for you if they plan a journey soon). PLUS TAX FREE PRIVILEGES!

An example: **Nikon F Photomic F:1.4**
at \$193.22 with case (\$458.50 Stateside)

For further particulars write to :

**FUTAMI Camera Co. (Est. 1926) : 2, 4-chome, Ginza,
Tokyo, Japan**

**HERO Camera Co., Ltd. : 5, 4-chome, Nishi-Ginza,
Tokyo, Japan**

**SANKEI Photo & Radio Service : Hotel Okura Arcade,
Tokyo, Japan**

**SUGA Photo Supplies Inc. : Imperial Hotel Arcade,
Tokyo, Japan**

L.T.P.*

***It stands for Lee Total Performance. And that stands for the revolutionary permanent press in Lee's new L.T.P. pants of 65% Dacron[†] polyester/35% cotton. The crease stays in. The wrinkles stay out. Permanently. No ironing. No touch-ups. Never again. That's the Lee Total Performance you'll get with L.T.P.'s. We make 'em with more strength and more stay-on-the-job features than any other workwear. And if you don't think so we'll take 'em back. No questions asked.**

[†]DuPont's reg. T.M.

H. D. Lee Company, Inc., Kansas City 41, Mo. World's Largest Manufacturer of Union-Made Workwear.



Lee[®]



**L.T.P.
Guaranteed, the hardest-working workwear**



From top to bottom, this GMC pickup looks like it costs a lot of money. Don't let it fool you.

The husky wood floor is quiet and long lasting. None of that annoying drumming and rusting.

Two walls of steel and a thick layer of insulation protects the GMC cab. Keeps out cold, keeps out heat, keeps out noise, keeps in comfort.

Other pickups have a nest of wires behind the instrument panel. GMC replaces those wires with a printed circuit. Only GMC has it.

The in-line engine works and works, yet requires little attention. Why? Because it has more torque, more cooling and lubricating capacity than most competitive engines.

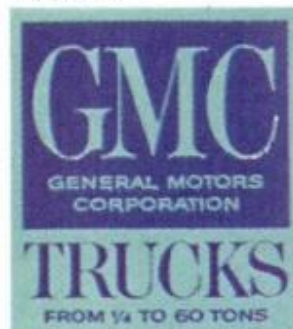
Four headlamps. Most other pickups have just two.

Independent front suspension soaks up shock from the road. Saves wear on the truck, the load and you.

These letters don't cause a smoother ride. But they do stand for three comforting things. Built by truck people. Sold by truck people. Serviced by truck people.

Heavy load, light load or no load at all, the GMC ride is steady and smooth. Progressive leaf rear springs automatically adjust to the load. For GMC pickups, this front-and-rear combination is not new. It's been proving itself on all kinds of jobs for years.

*Based on manufacturers' suggested retail prices, the GMC in-line six model pictured above is never priced more than \$49 over comparable competitive base models. Often the difference is less.



Its price is only \$49* more than others.



I was an 18-foot robot

Strapped in place, the author was the steel giant's brain. His motions were duplicated by the robot, but with enormous power

By James R. Berry

MY FIRST TASK was to learn how to balance. Confidently, perched in the body of an 18-foot, two legged robot, I leaned forward. The platform I was standing on, sensitive to my slightest shift of weight, moved too. With a loud sigh of hydraulic valves the automaton I was commanding sprang to life.

Instantly, it mimicked my move. Before

I realized what had happened, it pitched forward out of control. Using my toes for leverage, I frantically tried to stop our headlong plunge by throwing myself backwards. The robot's reaction was as quick as it was violent. Accompanied by a piercing shriek of valves, the automaton shuddered to a halt, then swiftly heaved back. Before I could react, it had crashed down on its heels with a jolt that rattled every bolt in its body.

Able to Rock

More warily now, I tried the maneuver again, this time successfully. After a few minutes of cautious trials, I was able to rock on my feet while the automaton, duplicating my moves, swung back and forth in slow, five-foot arcs. Soon, I could keep the machine where I wanted with a slight pressure of heel or toe.

Now, holding the robot in quivering equilibrium, I bent forward at the waist. The automaton's hips—controlled by a movable metal frame strapped to my back—moved and the machine dipped forward in a polite bow. I bent backwards and the

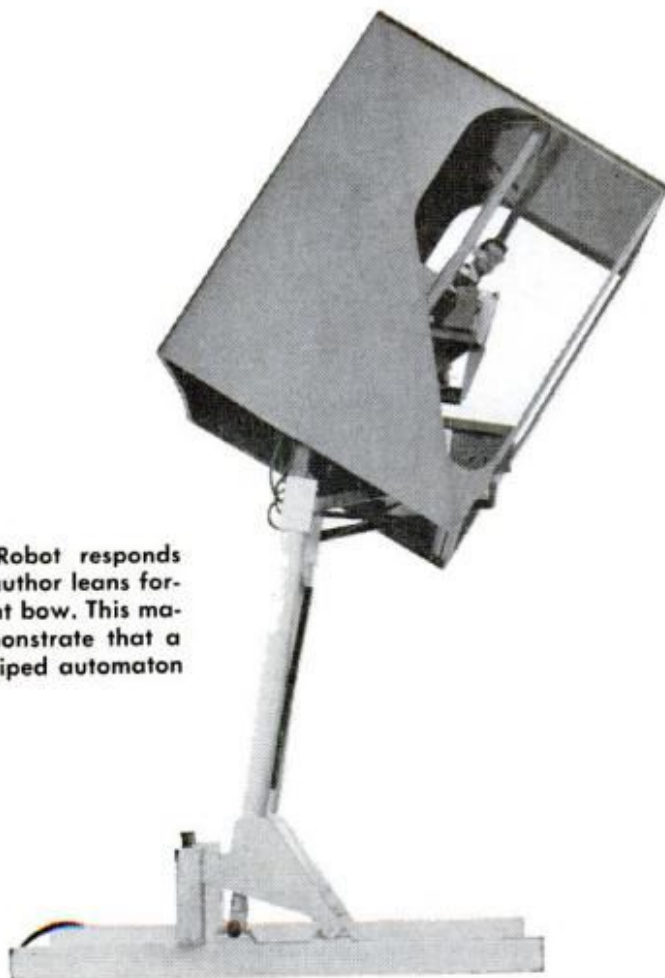
robot obediently did the same. Compared with balancing on my feet, this maneuver was a cinch. Inspired by my success, I raced through all the motions I had learned. The hydraulic system hissed, roared, and wailed as the automaton went through a series of movements as outlandish as the latest discotheque dance.

I was at General Electric's Advanced Technology Laboratories in Schenectady, N.Y., harnessed in the Pedipulator, one of an extraordinary new race of robots with the tongue twisting name of cybernetic anthropomorphic machines—CAMs, for short. This CAM, precursor of a generation of walking automatons, was built to demonstrate that a man can balance a bipod robot. Achieving balance is the first and most difficult part of walking. So, at the moment, the Pedipulator's feet are stationary and its arms, though developed, await being scaled up and bolted on.

What will the fully operating, walking robot actually be like? From the experience I'd just had and from what the GE engineers told me, I could easily imagine the robot at a building site or in a ship-



MONSTER COPYCAT. Robot responds immediately when the author leans forward and executes slight bow. This machine was built to demonstrate that a man could balance a biped automaton



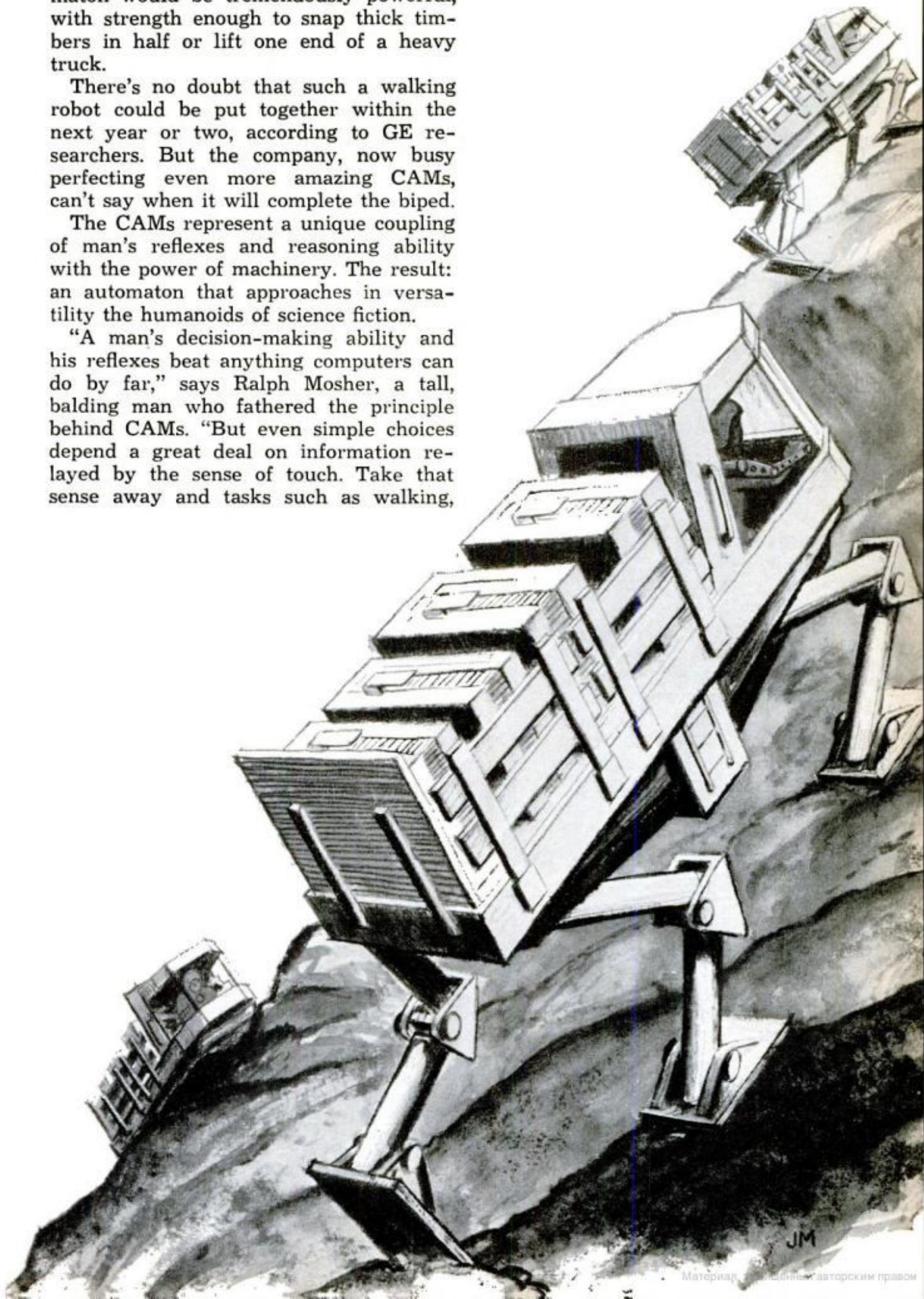
yard, clanging about on heavy steel feet, lifting bulky metal parts into place with its steel arms and making delicate adjustments with pincerlike hands. The automaton would be tremendously powerful, with strength enough to snap thick timbers in half or lift one end of a heavy truck.

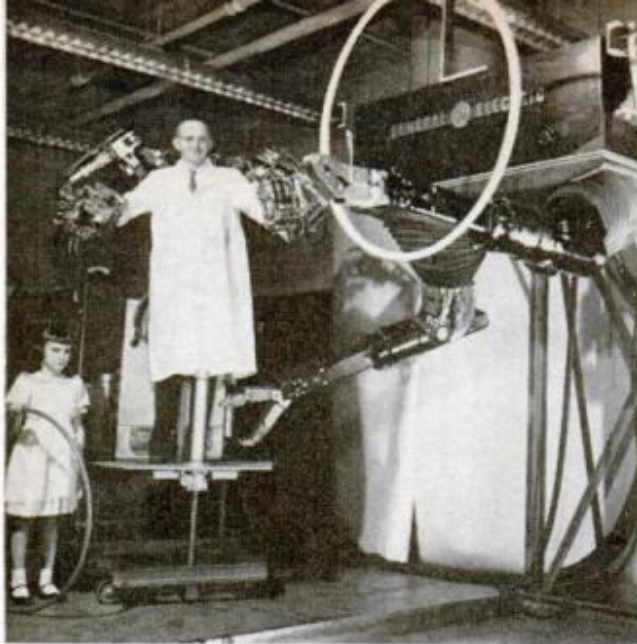
There's no doubt that such a walking robot could be put together within the next year or two, according to GE researchers. But the company, now busy perfecting even more amazing CAMs, can't say when it will complete the biped.

The CAMs represent a unique coupling of man's reflexes and reasoning ability with the power of machinery. The result: an automaton that approaches in versatility the humanoids of science fiction.

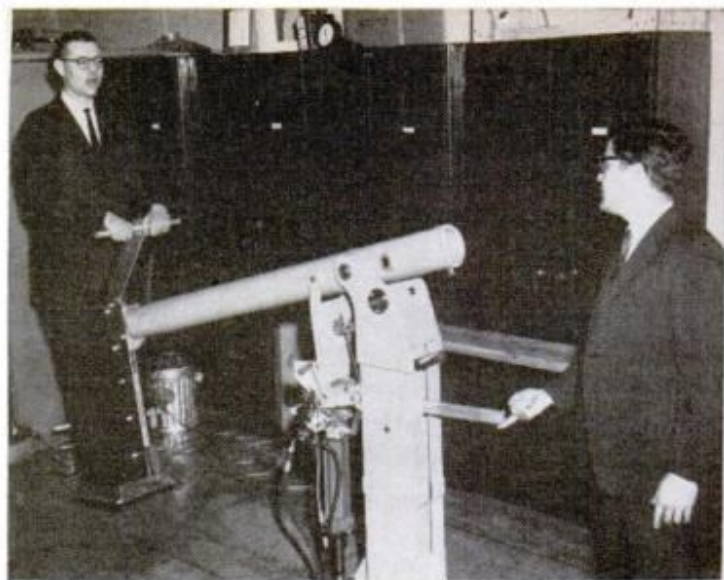
"A man's decision-making ability and his reflexes beat anything computers can do by far," says Ralph Mosher, a tall, balding man who fathered the principle behind CAMs. "But even simple choices depend a great deal on information relayed by the sense of touch. Take that sense away and tasks such as walking,

QUADRUPED ROBOTS, now under development for the Army, would be used primarily as cargo carriers in rough or marshy country, where even tanks bog down





INVENTOR RALPH MOSHER makes Handyman spin hoop. Machinery around Mosher's arms transmits every motion to the robot's arms and pincerlike hands



FINGER PRESSURE applied by author is enough to lift 150-pound man. This boom was used in the development of system for controlling robot's limbs

opening a door, or squeezing a tube of toothpaste become major problems."

CAMs incorporate a sense of touch. By a system called force feedback, the operator of a CAM feels the strains and stresses in the robot's limbs and body as though they were his own. The operator's arms, legs, and body are strapped into mobile, jointed frames called follower racks. Like an external skeleton, the follower racks pick up his every move, causing a corresponding, but amplified, motion in the CAM's analogous limbs and body.

But the follower racks serve another purpose. As the CAM does work, from balancing itself to carting boulders, its joints undergo stress. Part of this stress is hydraulically fed back to the follower racks, causing a proportionate strain in the operator's muscles. A simple adjustment increases or diminishes the amount of stress the operator feels.

Although CAMs haven't yet reached the stage of assembly-line production, they're already being eyed for scores of jobs that demand the reasoning power and dexterity of a man and the strength of a bulldozer. Some possible applications:

- Builders could use CAMs to lift steel girders into place, raise walls of prefabricated houses, tote materials around a construction site. CAMs with steamshovel-sized scoops replacing hands could dig tunnels, basements, or trenches, easily maneuvering where ordinary equipment couldn't be used. They would be especially helpful in archeological excavation where

their delicate sense of touch would be invaluable in uncovering ancient towns without damaging structures and artifacts.

- After disasters, CAMs could replace telephone poles, string cables, stack huge sandbags, and remove tons of wreckage at a throw. Others might simply wander through an emergency area on the lookout for survivors and remove them to safety.

- CAM artificial limbs might be linked to nerve centers and muscles in the stump of an amputee. The Woodrow Wilson Rehabilitation Center in Virginia is looking into just such a possibility. If successful, such limbs would pass a sense of feeling to remaining muscles, perhaps even to the nerves.

- Shipyards, auto and aircraft plants and other heavy manufacturing centers could use CAMs to assemble big but sensitive equipment. At piers, truckyards and rail terminals, CAMs could unload and load tons of cargo in a trip, putting it in place as easily as a child stacks blocks.

Improvements already envisioned would extend the range of the CAMs' usefulness even more. "There's no reason why the operator has to be inside his CAM," explains Mosher. "You could link the two by radio." Such a system, while probably at least a decade away from perfection, has incredible possibilities.

A remote-controlled CAM, for instance, could reconnoiter the ocean's floor, noting geological formations, locating mineral

[\(Please turn to page 202\)](#)

Solo from Start

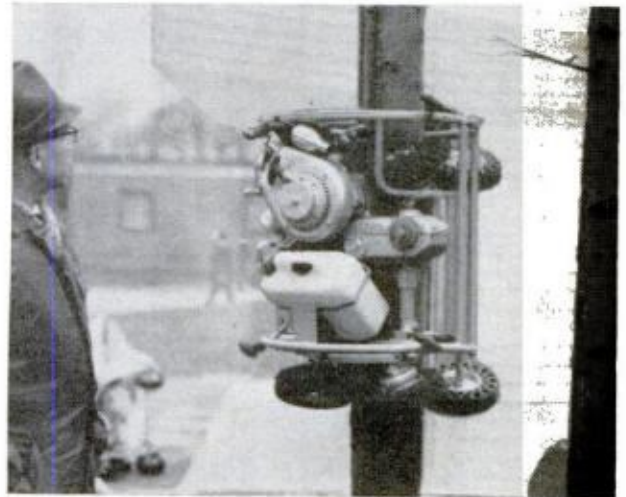
Learner-drivers go solo right from the start at a new driving school in Vienna, Austria. From a safe distance, the instructor gives direction on a two-way radio. The school's two-acre plot, complete with private roads and traffic signs, can accommodate up to 10 pupils. Instructors have found that pupils are more confident when driving alone. Teachers may feel that way too.



Saw Climbs Tree

A motorized chain saw that climbs trees with the nimbleness of a scared monkey was introduced at the Hanover, West Germany, Industrial Fair.

It automatically spirals up the tree trunk, chopping off the branches of average tree in a few minutes.



Earth-Study Lab Looks Like Moon Vehicle

This 8-ton vehicle provides housing for two people as well as a geology lab. Built by General Motors, it can do 25 mph and climb 2-foot-high obstacles. It will also be used to test instruments of the type that astronauts may be using on the moon.



HOW TO KEEP YOUR

THE NO. 1 PROBLEM of most lawns is not scraggly weeds, grasping crabgrass or hungry insects.

The No. 1 problem is human nature.

Come spring, most homeowners can hardly wait to get out in the warm sun and begin rolling the still-soggy turf, reseeding bare spots, spreading fertilizer, and swinging the first punch at crabgrass. Their enthusiasm carries into summer.

But come fall, most homeowners have had it. Mowing has become a tiresome chore, and crabgrass is fighting back. Besides, there are storm windows to hang and the kids are beginning to holler for help with their homework. Suddenly it's much easier to forget everything that needs to be done, including lawn work.

Yet fall is the prime time for renovating a lawn. A little work invested now will pay off in a vastly improved lawn next year. Lawn care is a round-the-calendar operation, but fall offers real opportunity.

Autumn is the key time because it is nature's own season for renovation. Get in

step with her rhythm. In the fall:

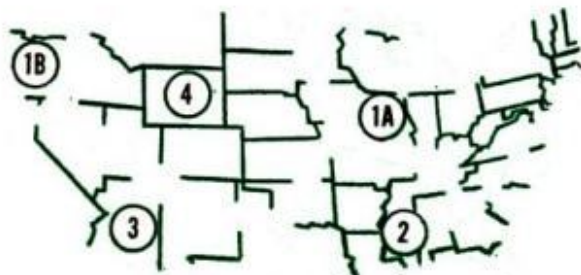
- Nature is shedding seeds herself, and offers a big boost to your own efforts.

- Grass has come out of its summer dormancy and is growing vigorously in an unconscious urge, established eons ago, to prepare itself for the winter.

- Weeds are again growing vigorously, and thus are prime targets for weed killers. If you kill weeds in spring and summer, the resulting bare spots are likely to be infested with an even worse enemy—crabgrass. If you kill weeds in the fall, crabgrass has begun to go dormant, and fine grasses will spread to fill bare spots.

Furthermore, seedlings established in the fall are much more likely to survive. Heat, not cold, is the biggest environmental threat to a seedling. If you reseed in the spring, some of your tender new plants will inevitably be killed by summer heat and drought; on the other hand, if you sow seed in early fall, seedlings will be well established by the time they are covered with an insulating blanket of

FIND YOUR AREA ON THIS LAWN-CARE MAP



The environment determines every step of good lawn care. Spot your location on this map. In the charts that follow, geographical areas are referred to by number.

Obviously the lines on the map are arbitrary, and lawn-care information suited to a spot on one side of a line may be equally applicable to a spot 20 miles away on the other side of the line. However, the lines are the result of long-term research; the map serves as the key to information for the particular spot of ground you call home.



LAWN LOYAL

By Clifford B. Hicks

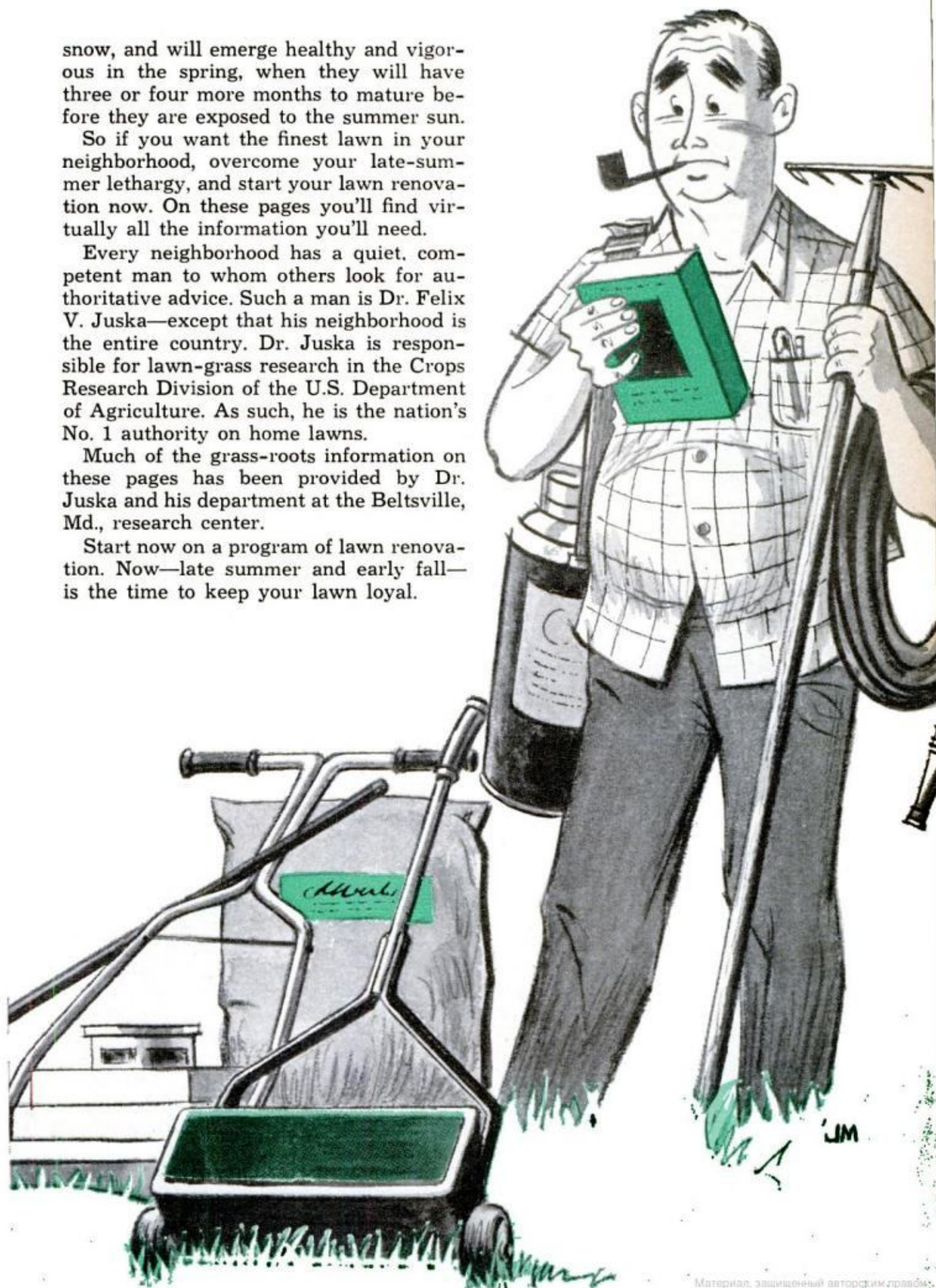
snow, and will emerge healthy and vigorous in the spring, when they will have three or four more months to mature before they are exposed to the summer sun.

So if you want the finest lawn in your neighborhood, overcome your late-summer lethargy, and start your lawn renovation now. On these pages you'll find virtually all the information you'll need.

Every neighborhood has a quiet, competent man to whom others look for authoritative advice. Such a man is Dr. Felix V. Juska—except that his neighborhood is the entire country. Dr. Juska is responsible for lawn-grass research in the Crops Research Division of the U.S. Department of Agriculture. As such, he is the nation's No. 1 authority on home lawns.

Much of the grass-roots information on these pages has been provided by Dr. Juska and his department at the Beltsville, Md., research center.

Start now on a program of lawn renovation. Now—late summer and early fall—is the time to keep your lawn loyal.



ARE YOU MISTREATING YOUR LAWN?

PROBLEM LAWNS become problems, in most cases, because they are mistreated. Over many years Dr. Juska has found that most problems are caused by the same errors.

If you have a tired, splotchy or otherwise disloyal lawn, chances are you're committing one or more of these seven sins:

1. IMPROPER USE OF FERTILIZER. Too little nitrogen starves your lawn, too much weakens the root structure. See the section "What's So Mysterious About Fertilizer" on page 72. Also, check the chart "Best Grass for Your Lawn" on page 72 to find the recommended amount of fertilizer for your turf.



2. IMPROPER WATERING. Wait to water your lawn until the grass actually shows signs of wilting: then water to a depth of six inches. Sandy soils require frequent watering in small amounts; clay soils require infrequent watering in larger amounts. Never apply less than an inch of water to an established lawn. If you are in doubt about how much water you are applying, simply place a coffee can within the sprinkled area and wait for an inch of water to appear in it. This is the **minimum** amount to apply. And if you live in map area 1A, don't expect an occasional watering to keep your lawn green during hot weather. Virtually all cool-season grasses in this area go dormant in midsummer. They'll turn green again in the fall.

3. POOR SEED MIXTURES. Only buy seed that is applicable to your area. Read "Tips on Buying Seed" (below) and don't try to save money on cheap mixes that contain undesirable seed types. You and your lawn probably will be living together for many years: don't choose a cheap companion.



TIPS ON BUYING SEED

BEST TIP OF ALL is to *study the label*. Look on the label for:

1. *The kinds of seed in the mixture.* Any type of seed present in excess of five percent must be listed. Beware of seed mixtures containing very high percentages of annual ryegrass, tall fescue and bentgrass. On the other hand, some mixtures are good. Most of the bluegrasses mix well together, and a bluegrass-red fescue mix is good for shady areas and sandy soils. Often a mixture is superior in disease resistance to a single variety.

2. *The percentage of weed seeds present.* This must be shown on the label. Compare labels, and avoid seed containing relatively large amounts of weed seed.

3. *The percentage of germination of*

each type of seed present. This is, in effect, your guarantee of performance, for it insures the viability of the seed at the time it was tested for germination.

4. *The date of the germination test.* This must also be shown on the label, and is of equal importance to the percentage of germination. The viability of seed declines fairly rapidly with the passage of time. For this reason the law requires that seed be shipped within five months of the date of the germination test. The more recent the date of this test, the more seeds will germinate. *Buy fresh seed.* Be particularly careful of grass seed on sale. It may legitimately be on sale; on the other hand, it may be so old that it is rapidly becoming worthless. Reputable seed companies regularly replace aging stocks in stores but, of course, there are disreputable companies.

4. POOR MOWING PRACTICE. Many homeowners commit the sin of mowing too closely. As a result there is not enough leaf area left to provide food for good root development. Never remove more than half the blade of grass at one time. See "Recommended Mowing Height" on the chart of lawn grasses.



5. TOO MUCH TRAFFIC. Most homeowners have the laudable philosophy that lawns are to be played on and enjoyed. Normal activity won't harm a good lawn. However, heavy traffic across certain areas, particularly during winter and early spring, will so compact the soil that it can no longer support grass. Don't fight the system. Pave or lay stone there.

6. TOO MUCH SHADE. Most grasses are not adapted to shady areas, and those that are recommended for shade must still compete for sun, water and nutrients. To help your grass in this fight for life, fertilize shady areas frequently but not too heavily; prune low branches from trees to allow more light (even indirect light) to fall on the grass; fertilize the trees four to five feet deep, so they won't steal the grass food; apply lime if needed (shady areas are more likely to become acid); remove fallen leaves and clippings frequently. In watering your lawn, remember that in shady areas trees are often competing for moisture.



7. POORLY DRAINED SOILS. Water will gather in natural depressions in your lawn; as a result the grass plants drown, or the continually moist soil becomes compacted. On the other hand, many slopes are so steep that water runs right off; as a result, grass gets little water, and the soil erodes. In either case, the only remedy is to regrade the lawn.

YOUR LAWN-CARE CALENDAR

(For regions 1A, 1B and most of region 4. Warm-season grasses grown in regions 2 and 3 require care only during the hot summer months.)

Early fall—If your lawn needs a complete renovation, do it now (see separate section). Apply herbicide to eliminate broadleaf weeds. Apply lime if needed. In September, apply half of your fall fertilizer allotment. Rake bare areas and reseed; water lightly but often.

Late fall—In mid-October, apply the other half of the fall fertilizer allotment. Continue mowing as long as the grass grows; do not leave the grass tall for the winter months. Mulch the leaves as they fall, or if they tend to clot on the lawn, rake and remove them.

Early spring—Rake trash from lawn. Apply lime if needed, and if you were too lazy to do it last fall. Apply a pre-emergent crabgrass killer. In late February or early March, spread a light application of fertilizer, or a heavier application of slow-release fertilizer. Reseed any bare spots you missed last fall. If the soil has heaved from frost, roll with a light roller but not a heavy one. Apply a herbicide for chick-

weed if that weed is a problem in your lawn. **Late spring**—Give your lawn another light shot of fertilizer. Kill the broadleaf weeds. Mow according to the recommended practice for your type of grass. You should have used a pre-emergent crabgrass killer a couple of months ago. If you didn't, bow your head in shame and apply a post-emergent killer now.

Summer—If you have a zoysia or Bermuda-grass lawn, feed it in July and again in August. Mow frequently enough that you remove no more than one-half the total leaf length. If you have a bluegrass lawn, don't worry if it turns brown—it's dormant as nature intended it to be. In long periods of drought, water deeply once a week. Take a vacation. When you return, if the grass is so long that the clippings may smother the lawn, remove them as you mow. Buy your wife a new rake, so she can help you when you really go to work renovating your lawn in the fall.

HERE YOU'LL FIND THE BEST GRASS FOR YOUR LAWN

NAME	GEOGRAPHICAL AREA	CHARACTERISTICS
1. KENTUCKY BLUEGRASS		
Common	1A, 1B, 4 under irrigation	Excellent cool-area grass; withstands abuse; not good for heavy shade.
Merion	1A, 1B, northern 2	Low-growing, short leaves, good color; thick turf; leaf-spot-resistant.
Park	1A, 1B	Vigorous and resistant to rust, particularly in far north.
2. RED FESCUES		
Common	1A	More tolerant of shade than bluegrass, narrow leaf, good color.
Pennlawn	1A	Better turf than common red fescues, more tolerant of leaf spot.
3. ASTORIA		
	1B	Beautiful bentgrass lawn, but requires continuous and expensive care.
4. ZOYSIAS		
Meyer	southern 1A, northern 2	Dense turf able to withstand hot, humid summer.
Emerald	2	Dense, relatively weed-free turf. Very slow to establish.
Manilagrass	2	Very dense, stands considerable shade.
5. BERMUDAGRASSES		
Everglades 1	southern 2	Dark green, fine textured, vigorous; excellent for Florida.
Ormond	southern 2	Blue-green, slow growing; resists leaf spot, but not dollar spot; excellent for Florida.
Texturf 10	2 and 3 in Texas	Medium texture, dark green; makes early spring recovery; slow spreading.
Tifgreen	2, 3	Dark green, fine texture, disease resistant.
Tiflawn	2	Dense, weed-free turf; tolerates heavy wear, used on many football fields.
6. ST. AUGUSTINES		
Floratine	2	Thick growth; adapted to sandy soils; year-round color.
Bitter blue	2	Blue-green; excellent ornamental turf, but does not withstand heavy wear.
7. BAHIAGRASS		
	2	Coarse, relatively unattractive turf, but easy to maintain.
8. CENTIPEDE		
	2	Easily maintained, good for heavy soils; has unattractive brown winter color.
9. BUFFALOGRASS		
	southern 4	Best grass where water is unavailable; thrives when mowed low.
10. BLUE GRAMA		
	4	Bunch-type grass, not as desirable as buffalo-grass, but drought-resistant.
11. WHEATGRASS		
	northern 4	Withstands long, dry periods and heavy traffic if not mowed closely.

WHAT'S SO MYSTERIOUS ABOUT FERTILIZER?

THERE HAVE BEEN so many claims and counterclaims about fertilizers that most homeowners have blindly settled on one brand that seems to do the job, and continue to use it year after year. There is a better, cheaper way to select fertilizer.

A complete fertilizer contains three elements: nitrogen, for stimulating leaf growth; phosphorus, for the formation of strong roots; and potash, which gives plants stamina and disease resistance. Every bag of fertilizer is labeled with the percentages of each of these elements. For example, a 10-6-4 fertilizer consists of 10

percent available nitrogen, 6 percent phosphorus, 4 percent potash—and 80 percent inert carrying material.

Since nitrogen is the most vital of these elements, and also the most expensive, the first figure on the label is the one on which you should focus your attention. Simply divide this figure into 100. The answer is the number of pounds of fertilizer you must buy to apply one pound of nitrogen to 1000 square feet of lawn. And a good rule of thumb is to apply no more than one pound of nitrogen per 1000 square feet of established turf at any one time.

MOWING HEIGHT	BEST SEEDING OR PLANTING TIME	NITROGEN, LBS./ 1000 SQ. FT. ANNUALLY
1½-2"	Fall	3-4
1½-2"	Fall	6-8
1½-2"	Fall	3-4
1-2"	Fall	2-3
1-2"	Fall	2-3
¾" or less	Fall	4-6
¾-1"	Spring	5-10
¾-1"	Spring	5-10
¾-1"	Spring	5-10
¾-1"	Spring	5-10
¾-1"	Spring	5-10
¾-1"	Spring	5-10
¾-1"	Spring	5-10
¾-1"	Spring	5-10
2-2½"	Spring	4-5
2-2½"	Spring	4-5
2"	Spring	4
1-1½"	Spring	2
1-2"	Spring	Seldom required.
1-2"	Spring	Seldom required.
2"	Fall	Seldom required.

One specific example: Suppose you have 5000 square feet of lawn. You look at one bag of fertilizer priced at \$3.98. It weighs 50 pounds, and has a 10-6-4 formula. Divide the first figure (10) into 100 and you find that you'll need 10 pounds of fertilizer per 1000 square feet. Because you have 5000 square feet of lawn, you'll need 50 pounds of this fertilizer (one bag), priced at \$3.98.

Down the counter is another brand, this one on sale. It is an 8-6-4 mixture, with a 35-pound bag priced at \$2.25. Divide the 8 into 100 and you get 13, the number of pounds you'll need per 1000 square feet. Multiply by 5 (because you have 5000 square feet) and you find you need 65

pounds to treat your lawn, or two bags of this fertilizer. The on-sale brand thus will cost you \$4.58. Obviously this on-sale fertilizer isn't as good a buy as the first.

By judicious shopping of this type, you can substantially cut the cost of fertilizing.

There are two basic *types* of fertilizer: organic and inorganic. Organic fertilizers are made from processed plant or animal materials such as sewage sludge and bone-meal. After application, they are broken down by the action of soil bacteria, a process which takes place over a period of time. In this respect organic fertilizers may be slightly preferable to inorganic. However, some organics have a slight offensive odor.

Urea-form and *resin form* fertilizers are synthetic nitrogen fertilizers that release their nitrogen slowly throughout the season, which is a big advantage. However, it is still possible to overstimulate the grass with slow-release fertilizer. Suppose you apply a healthy dose of one of the fertilizers in the spring. During the summer you decide that the lawn needs another light shot, so you apply either a smaller dose of the same, or a shot of quick-release fertilizer. Along comes a period of hot weather combined with good rains. *Both* fertilizers then are accelerated to release their nitrogen. This may well overstimulate and weaken the lawn.

The chart below shows various combinations of inorganic fertilizers, and some of the more common organic fertilizers. It indicates how much *total* fertilizer you'll have to buy to apply one pound of nitrogen per 1000 square feet of your lawn.

FERTILIZER	FERTILIZER NEEDED TO SPREAD 1 POUND OF NITROGEN OVER 1000 SQ. FT. AREA
5-10-5	20 Pounds
4-12-4	25 Pounds
5-10-10	20 Pounds
10-10-10	10 Pounds
8-8-8	13 Pounds
10-6-4	10 Pounds
8-6-4	13 Pounds
4-8-4	25 Pounds
6-12-4	17 Pounds
Processed sewage sludge	17 Pounds
Ammonium nitrate	4 Pounds
Ammonium sulfate	5 Pounds
Nitrate of soda	7 Pounds
Steamed bonemeal	50 Pounds
Cottonseed meal	17 Pounds
Peanut hull meal	50 Pounds
Cocoa shell meal	50 Pounds
Dried cattle manure	50 Pounds
Dried sheep manure	70 Pounds
Sewage sludge	50 Pounds
Tobacco stems	50 Pounds
Urea	3 Pounds
Processed tankage	13 Pounds
Soybean meal	17 Pounds
Urea-form	3 Pounds

WEED CONTROL

THE BEST WEED CONTROL is a thick stand of vigorous grass. Close mowing allows weeds to come into the turf, and frequent light watering helps the weeds more than the grass.

Chemical science has come up with a broad range of selective herbicides that make weed control much easier than it was a generation ago. These herbicides

Some herbicides are deadly poisons. Others have toxic effects. After mixing or applying any herbicide, always wash your face and hands thoroughly, especially before eating or smoking.

are available in liquid, powder and granular forms. All are effective.

Individual manufacturers package herbicides under their own brand names, and in differing concentrations. The chemical names which appear on the weed-control chart on page 75 will be on the label, despite trade names. *Always use the manufacturer's recommended dosage*, as it is the result of long research with that particular concentration. Never apply more of a herbicide than is recommended; you won't kill any more weeds, and you may well kill desirable turf.

Spraying and spreading are the easiest ways to cover large areas with a herbicide. For spot treatment at low cost, simply tie a small sponge to a stick. Dip the sponge in a solution of the herbicide and press it at the base of individual weeds.

Pre-emergent herbicides must be applied before weed seeds have a chance to germinate. A good rule of thumb is to apply such herbicides before the lilacs bloom or the first magnolia petals fall.

Broadleaf weeds can be treated spring or fall; again, fall is the most satisfactory time. As weeds curl their ugly arms and die, bare spots appear. After fall treatment, lawn grasses will fill such bare spots; after spring treatment, they are more likely to be plugged with crabgrass.

Any sprayer used to spread a herbicide should be thoroughly washed with a strong solution of household ammonia before other use.

YOU CAN WIN THE BATTLE AGAINST CRABGRASS

NO QUESTION ABOUT IT, with modern chemical controls you can eliminate all signs of crabgrass from your lawn.

The first weapons developed for the homeowner's crabgrass arsenal were post-emergent herbicides. These have the unique ability to recognize growing crabgrass plants and kill them. Two such chemicals are DMA (disodium, monomethylarsonate) and PMA phenylmercuric acetate). They are best applied in late spring and early summer, when crabgrass is actively reaching out its ugly tentacles. Usually two or three applications are required at 7 to 10-day intervals. They may cause a slight discoloration of lawn grass.

The big weapons developed more recently are pre-emergent crabgrass killers. These are applied in late winter or early spring. They offer excellent control because they kill each crabgrass seedling as it pokes its head through the ground. Crabgrass thus has no opportunity to go to seed and provide a crop next year.

If you genuinely want to get rid of crabgrass, apply a pre-emergent control for two or three successive years. Crabgrass seeds can lie dormant in the ground for 50 years, and then germinate. However, in two or three years most of them will be killed by pre-emergent control. You then can skip a year or two.

Some pre-emergents are available under trade names only; some by generic terms. They include calcium arsenate, Dacthal, Zytron, Betasan, Bandane and Azak.

The only difficulty with these chemicals recently are pre-emergent crabgrass killers. For this reason you cannot sow new seed until 60 days after treatment.

Within the past few months one new herbicide has made its appearance which also solves this problem. Marketed under the trade name Tupersan, it clearly distinguishes friend from foe. It kills up to 99 percent of all crabgrass seedlings before they get more than a half inch long, yet you can sow seed at the same time.

So far, Tupersan (under that name) is only available to professionals. However, a new product trade-named Trey is especially marketed for the homeowner. Trey includes Tupersan, along with a fertilizer and a soil-insect killer.

HOW TO CONTROL COMMON LAWN WEEDS

WEED	BEST TIME TO TREAT	CONTROL	EFFECT
Bermudagrass	Spring or summer	Methyl bromide (kills all plants)	Good
Bindweed, field	Spring, fall	2,4-D; silvex; MCPA	Good
Chickweed, common	Spring, fall	Silvex; 2,4,5-T	Good
Chickweed, mouse-eared	Spring, fall	Silvex; 2,4,5-T	Good
Crabgrass	Winter, spring, summer	See separate crabgrass section	Fair to good
Dandelion	Spring and fall	2,4-D; MCPA; 2,4,5-T; silvex	Good
Garlic, wild	Late fall, early spring	2,4-D	Good
Goosegrass	Spring, early summer	2,4-D	Poor
Ground-ivy	Spring, fall	Silvex	Good
Henbit	Spring, summer	Silvex	Good
Knotweed	Late winter, early spring	2,4-D; silvex; 2,4,5-T	Good
Nimblewill	Spring	Zytron (repeated treatments)	Fair
Plantain, Buckhorn	Spring	2,4-D	Good
Plantain, rugel	Spring	2,4-D	Good
Quackgrass	Spring, summer, fall	Dalapon (kills all plants)	Fair
Sorrel, red	Spring	Silvex	Fair
Woodsorrel, yellow	Spring	Silvex	Good

HOW TO CONTROL COMMON LAWN DISEASES

DISEASE	SYMPTOMS	CONTROL
Helminthosporium leaf spot	Kentucky bluegrass susceptible. Reddish-brown spots appear on leaves, which shrivel, and plant discolors and rots.	Acti-dione-thiram, Captan, Dyrene, Ortho Lawn and Turf Fungicide, PMA
Dollar spot	Affects many species, but particularly destructive to bentgrasses. Appears during cool, wet weather. Silver-dollar-size spots appear on lawn, black at first, then brown, then white. Grass dies.	Cadmium-containing fungicides, Dyrene, Ortho Lawn and Turf Fungicide, Tersan OM
Brown patch	Attacks virtually all species. Prevalent in warm, humid areas. Irregular circular spots from few inches to several feet in diameter appear and turn brown. If weather stays hot and humid, grass dies but leaves remain erect.	Mercury-containing fungicides, Dyrene, Ortho Lawn and Turf Fungicide, Tersan OM
Rust	Attacks many grasses, but particularly destructive to Kentucky bluegrass. Usually occurs late in summer. Yellow-orange powdery spots appear on leaves. If cloth is rubbed across leaf, spores will leave a yellowish or orange stain.	Acti-dione-thiram, zineb
Snow mold	Affects many grasses, but particularly bentgrasses. Appears on grass which is growing while still covered with snow. White cottony growth appears on leaves.	Dyrene, mercury-containing fungicides, Ortho Lawn and Turf Fungicide
Curvularia fading-out	Attacks many southern grasses when humidity is high. Damage severe on grass that has been covered by water. Older leaves die, but tips of new growth remain green.	Acti-dione-thiram, Captan, Dyrene, Ortho Lawn and Turf Fungicide, PMA
Gray leaf spot	Attacks St. Augustine grass. Small gray circular or elliptical spots appear on leaves. May spread to kill large areas of turf.	Acti-dione-thiram, Captan, Dyrene, Ortho Lawn and Turf Fungicide, PMA

HOW TO REJUVENATE A TIRED LAWN

ACCORDING TO DR. JUSKA, you can materially improve a shabby lawn if *approximately half of the area is still covered with good perennial grasses*. Crabgrass may be reaching its greedy fingers across the other half, or weeds may be clotted here and there, but if you have half a lawn, it's worth saving. Start in late August or early September.

Here are the steps in the process:

1. Apply 2,4-D (according to the manufacturer's directions) to wipe out broad-leaf weeds. If crabgrass is a major problem, make two or three applications of DMA. Don't apply grass seed for two or three weeks.

2. If no lime has been applied for four

(Please turn to page 188)

THIS IS THE YEAR everyone is making color television sets. It's the year General Electric is turning out an 11-inch color portable. It's the year Yaou Electric and Sony came up with small screen transistorized color portables, using a single-gun color picture tube that everyone said couldn't be made.

There's a myriad of color-TV screen sizes—there are sets with 7½, 11, 16, 19, 21, 23 and 25-inch screens; and by the end of the 1966 model year (which starts in September 1965) there may be even more varieties available. There's a color TV projection system that can fill a movie theater screen with pictures of special sports events, operas and Broadway plays.

The new sets are thinner, the colors on the screen are brighter and, for the most part, prices are lower than ever. (You can buy one for \$250.) The bulkiest set around is still the 21-inch model with that round picture tube. It may be one of the least expensive versions, but like the black and white 21s it may not be around much longer, although a proposed 21-inch rectangular screen is a possibility. The thinnest sets outside of the small-screen portables are the 19-inch sizes, with the 23-inch versions close behind. These measure a mere 20 inches from front to back. This means you can put a color TV into your living room and not have to walk around it as you go from one end of the room to the other. Also, it will fit a standard hi-fi cabinet.

Colors are delightful. Thanks to new phosphors with exotic names, you get color pictures that are brighter than ever before.

Prices are brand new. Where once the least expensive table model color set carried an \$895 price tag, that \$250 will buy an 11-inch set. A 16-inch goes for \$270 and a 21-inch set for \$389. The 19s will go for about \$400, the 23s for \$500 and the 25s for \$600. These are list prices. With careful shopping, you may be able to do a bit better.

The vicious circle of color TV has finally been broken, too. There was always the endless argument of not enough sets for more color programs and not enough color programs to warrant buying a color set. But a recent survey showed that among color set owners, the average color program got an 80 percent higher rating than that from black-and-white set owners. And with the number of color sets going up this becomes important to broadcasters.

As a result, NBC has announced that, with the exception of two weekly programs, all regular nighttime programs will be in color this fall. ABC and CBS have also climbed on the color bandwagon with announcements of expanded color broadcasting this coming season. Other local stations are starting color broadcasts too. This should soon develop into a three-way, all-color hassle which viewers will have to untangle for themselves.

Color 'Tinge' Is Out

There have been changes inside the set, too. You no longer have to "degauss" (demagnetize) your color set periodically to rid the set of color "tinges" caused by magnetization of the picture tube. The degaussing feature is built into the set and

By Larry Steckler

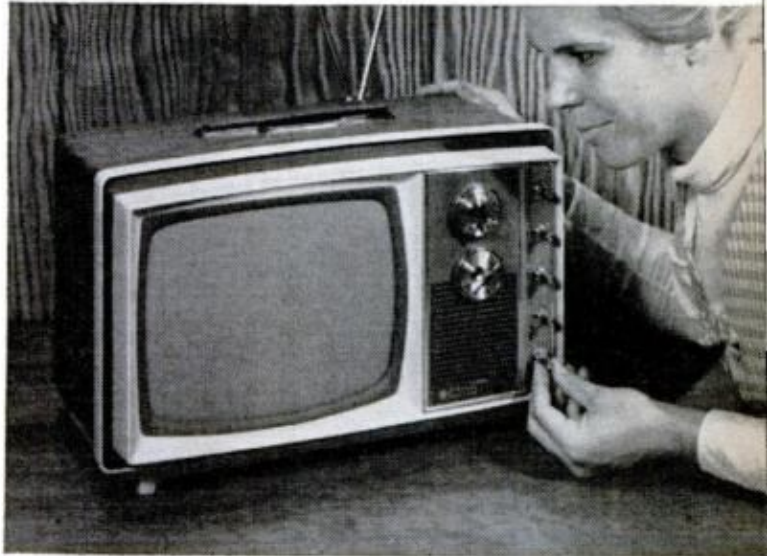
operates automatically every time you turn the set on. If you have an older set without this feature, your technician can add it with the aid of a simple degaussing kit.

The Chromatron picture tube is another new feature which may become standard equipment in all sets some day. It is simpler and, in quantity, less expensive than the RCA three-gun, shadow-mask type tube now being used by all American set manufacturers. The diagrams on page 79 show the difference. It will take awhile, so don't hold off buying a color set while waiting for the Chromatron to become available.

There's a new chassis in color sets this year, made by Motorola. They've managed to cut the number of tubes in their new color sets from last year's 24 to 18. This makes the chassis simpler and cooler. Eventually, it may even cut the cost. There are still about six more tubes than in the average black-and-white set, but they can't be eliminated without dropping the color.

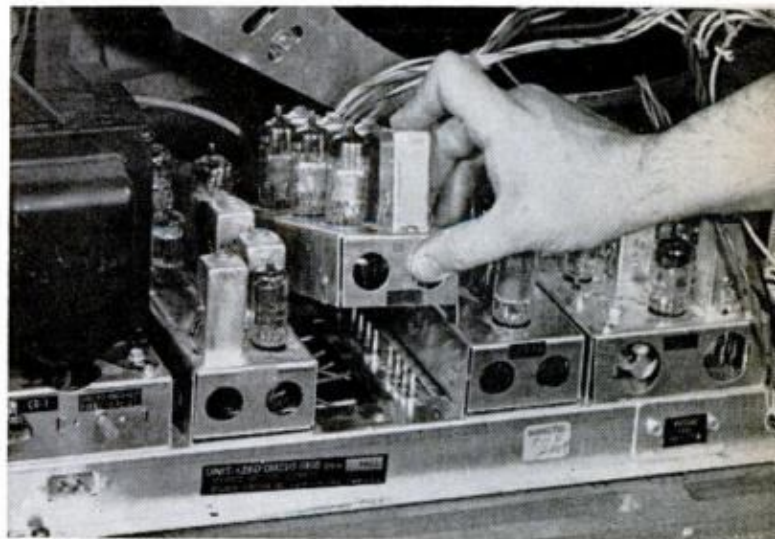
Color controls aren't adjusted as often either and some manufacturers are tucking them away behind fold-down panels. GE is featuring the fact that its three color controls are preset at the factory for easier tuning by the viewer. To tune the color circuits properly you simply turn these controls so the index marks point straight up. If you disagree with what GE feels is perfect tuning, you can reset the controls and the indexing.

Service controls are reachable from the front, too; some are hidden behind false



PORTA-COLOR TV is GE's new entry into fast growing world of color. Must be plugged in, but 25-pound set with its 11-inch color screen goes anywhere

PLUG-IN MODULES are used in Satchell-Carlson's new color chassis. There are five main assemblies and each one can be replaced in minutes when necessary



panels. This makes it easier for the technician to work on your set and makes his service bill lower too.

Plug-Ins for Quick Repairs

Setchell-Carlson is featuring a color set with plug-in modules. Each major section: tuner, intermediate frequency strip, audio circuits, sweep circuits and high-voltage section is mounted on a separate plug-in chassis. For rapid repair—vital if it's the middle of the ninth inning of the last world series game—the technician, or possibly the set owner, can unplug the bad module, plug in a good one and restore normal operation. He repairs the module later at his shop and you get billed a flat-rate repair depending upon which module was acting up. That's much better than having the set out of the house for a week or so when fixing is needed.

Already, a few firms are leasing color sets. They figure that your total leasing cost over a four-year period (you start off paying \$36 a month; last-year payments are reduced) is less than the cost of the set plus factory service, based on a \$400

price for the set and manufacturers' contract rates for unlimited color-TV service.

Now for a quick roundup to see what's going on. Admiral will feature 21, 23 and 25-inch sets. GE will start off with 11, 21 and 25 and will introduce a 19-inch model later in the year. Motorola has 21s, 23s and is also expected to turn out a 19-inch set. Magnavox will present a conventional line with 21 and 25-inch sets. Philco expects to push out a 19-inch model before the end of 1965 and, while it will come equipped with a handle, it won't be a lightweight.

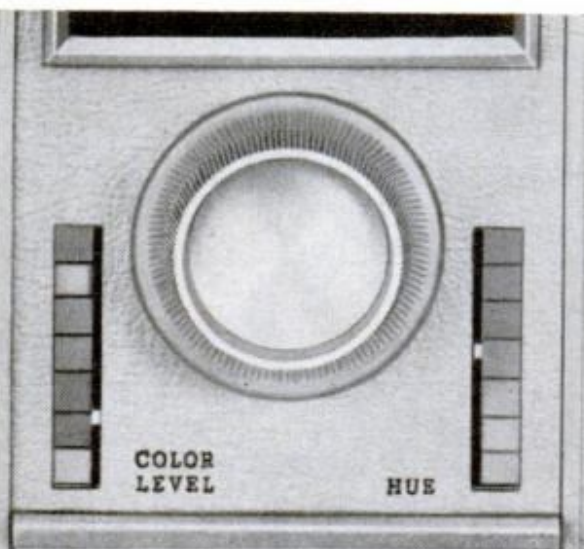
RCA will have its usual line and while 25-inch receivers will be available, it will still be boosting the lower-price 21-inchers. Setchell-Carlson has the 21-inch set and plans 23 and 25-inch versions. Sylvania is also in there with 21s and 25s. Zenith has 21s and 25s and will feature slide rule color tuning and ultrasonic remote control. Almost all makes and models feature automatic degaussing and use picture tubes with brighter phosphors.

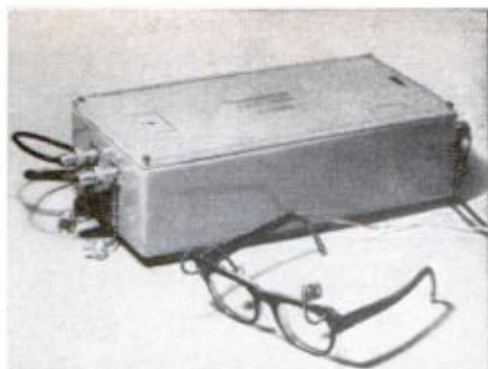
According to S. R. Herkes, vice-president and general manager of Motorola's

[\(Please turn to page 200\)](#)

SLIDE-RULE CONTROLS for color level and hue are new in Zenith sets. Indicator position shows what effect the control will have on the picture colors

MAGIC MEMORY color tuning is another GE feature. Set three color controls so index marks point straight up and you've got a good color picture





Eyebrow Auto Brake

A brake system invented in Yugoslavia is activated by muscles above the driver's eyebrow. It cuts the reaction time required by a foot-brake system by 75 percent. A silver electrode over each brow picks up the slight current generated in the moving muscle. The impulse goes to amplifier (above), where the voltage gain is sufficient to activate electromagnet. The magnet pulls brake pedal.



Backpack Boat

Just add air and the 21-pound pack shown at right becomes a 10½-foot canoe capable of carrying 550 pounds. Made of neoprene-coated nylon, its six flotation compartments are separately inflated for safety.

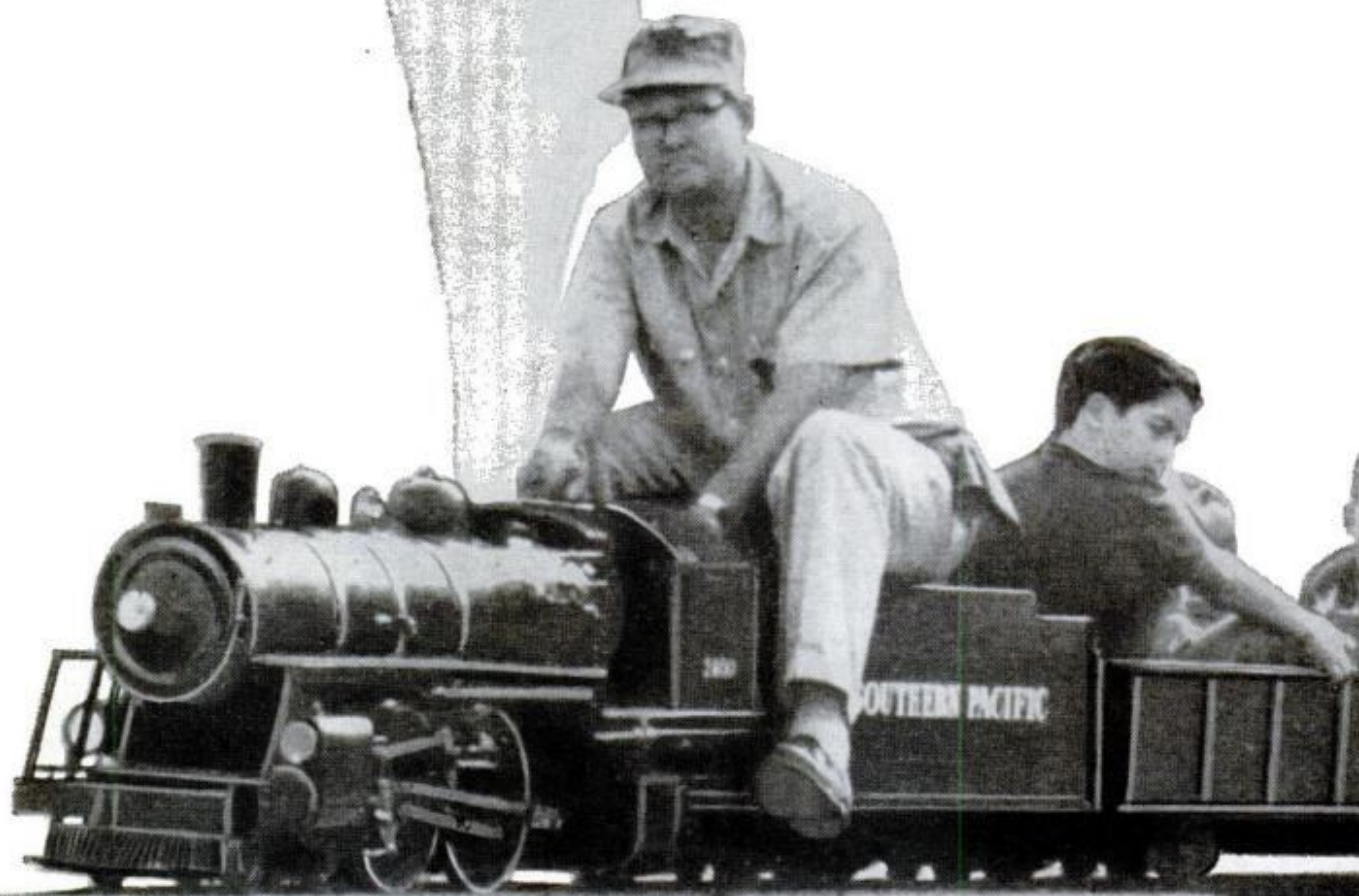
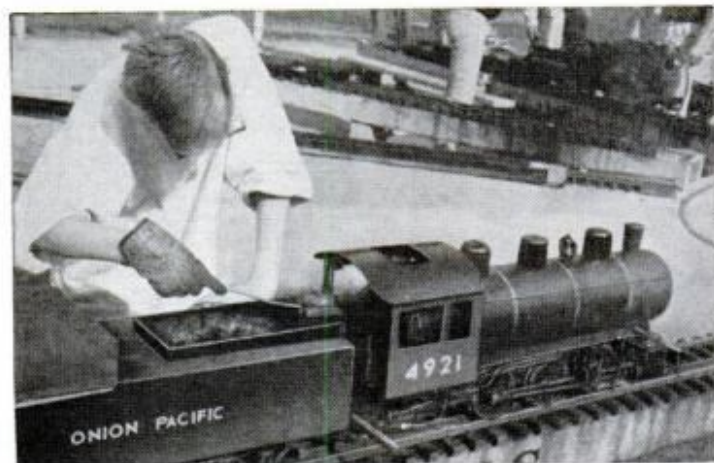
The Samoa Hike-A-Boat package includes paddles and inflating pump and sells for under \$150 from Rabion Imports, Inc. 208 E. Wisconsin Ave., Milwaukee, Wis. 53202. A special sailboat conversion kit is also available for the Samoa. With a 28-foot sail, it sells for \$68.



IRON COLTS

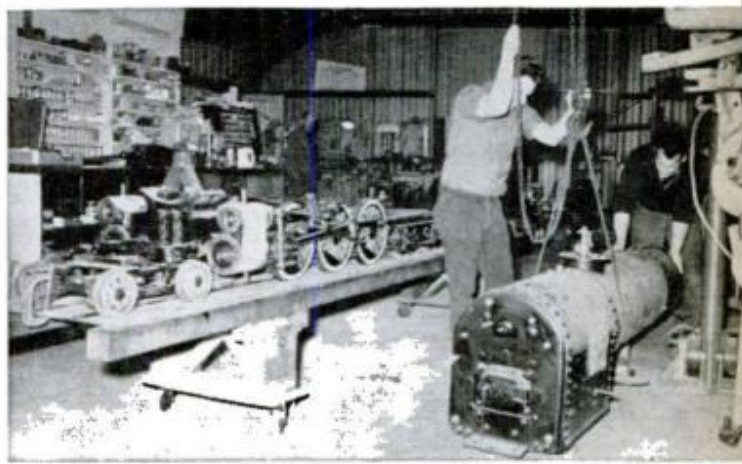
Baby brothers to the big iron horses of past years are fun for men who still love live steamers

By Jack B. Kemmerer



IN THE BACK YARD

OLD 97 RIDES AGAIN! Only it's more like .97. Scaled-down versions of the late and lamented steam locomotives that used to grace the nation's rails—and inspire such Americana as “Casey Jones” and “The Wabash Cannonball”—are chugging out of small roundhouses today, all



GRIFFITH PARK in Los Angeles has track facilities for live steamers to run their engines. Young man (left) stokes firebox with imported Welsh coal

OLD-TIME STEAMER (center) with bell-like stack represents several thousand hours' work. A 1½-inch scale, it was built by retired city employe

BOB HARPUR'S SHOP (right) is one of most complete locomotive works in world. Worker is lifting boiler for 3-inch scale Hudson shown behind him



steamed up and ready to roar at any time.

The price tags on some are enough to scare away millionaires, but railroad buffs are railroad buffs and the tiny toots appeal to a wide cross-section of men who remember B.D. (before diesels) when there was smoke up front, "clickety-clacks" down below, "choo-choo" sounds all around and romance on the rails.

One of the terminals for this new interest in miniaturized systems is the Harpur Locomotive Works in Wilmington, Calif. Bob Harpur, a railroad buff and model builder from childhood, decided to go professional about five years ago when a friend asked him to scale down an 0-4-0 switch engine. (For the uninitiated, engines are classified according to the number of leading truck wheels, driving wheels and trailing wheels. An 0-4-0 has no leading trucks, two pairs of driving wheels and no trailing trucks.)

Harpur, who started alone with borrowed tools in his father's basement, today has five employes and one of the most complete locomotive works in the world.

Most models are scaled down from actual blueprints of life-size engines—usually from 1/4-inch to 3-inch scale—almost. Harpur explains that a boiler, for instance, can't be fully scaled down because its walls would be too thin for safety.

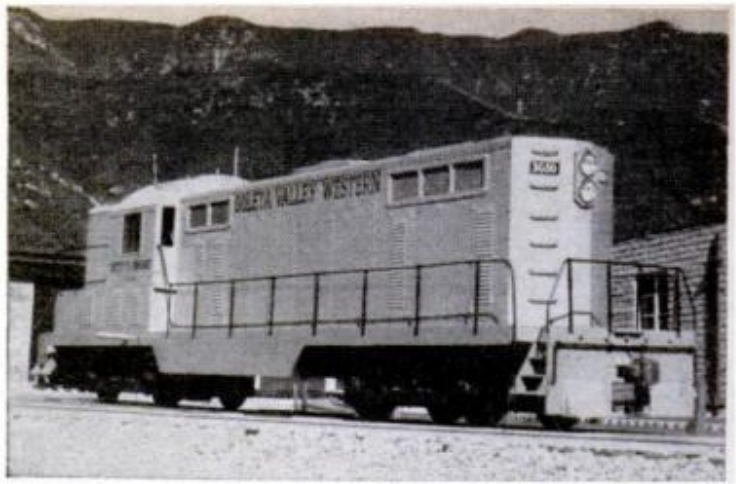
But almost everything else is from a real coal fire in the firebox to tiny steam gauges on the boiler.

And they cost money. On standard models—and Harpur has five of them—prices start at \$2400 complete for a simplified 1 1/2-inch-scale 2-6-0 Mogul, or \$1600 in kit form, or \$500 for rough castings for a man with skill enough to complete it.

On nonstandard custom models, prices go as high as \$35,000 for the 26-foot model of the New York Central's old 4-6-4 Hudson of years gone by.

Customers run the spectrum, from working stiffs to professional people. Walt Disney and musician David Rose, to name two names, are live steamers. Mel Terril and Seymour Johnson are two more.

Terril, a truck driver, discovered he had



MODERN DIESEL, frowned on by railroad buffs, was built for Seymour Johnson's wife who thought driving steamer was "unladylike." It's a 1 1/2-inch scale





STEAMING TRACKS on Johnson's layout are used to get engines up to steam before entering main line. Entire Johnson system will be ready by 1967 season



CLUB MEMBERS help install 1½-inch scale tracks at Johnson's mountaintop spread. Aluminum rails are held to redwood ties by miniature steel spikes

SEYMOUR JOHNSON rides astride diesel switch engine as he pushes steam locomotive and train over new section of 1½-inch track to check its accuracy





NEW CHAIR is placed inside 1½-inch scale caboose by club member at Johnson yards. Some members go into great detail to reproduce scale models exactly as original, both inside and outside

cancer not too long ago. One lung was removed and he was forced into retirement. Searching for a hobby, and strapped for funds, he bought one of Harpur's casting kits and went to work.

His health picked up immediately. "I had almost given up, but now I've got a new interest in life. My doctor says it's better than medicine."

Johnson, a millionaire in retirement, bought a mountain, leveled it off and is building perhaps the most expensive playground for adults this side of the Playboy Clubs. Two complete railroad systems, in 1½-inch and 3-inch scales, will crisscross

one another over five miles of track. Two complete roundhouses and steaming tracks, switchyards, five tunnels and eight trestles will complete the project.

Club members, some from as far away as 500 miles, help Johnson with the construction work on alternate Sundays. When completed, the two railroads will have as many as 50 engines operating.

Actually, the live-steam hobby is quite extensive. There are more than 25 clubs in the United States and most are affiliated with the National Brotherhood of Live Steamers. But, in recent years, their hobby seems to be picking up steam. ★ ★ ★



MINIATURE SWITCH is installed on 1½-inch track on Johnson's mountain. "Gandy dancers" work alternate Sundays. One club works on 1½-inch track and the other on 3-inch track, getting them ready



Airconditioner Becomes Refrigerator

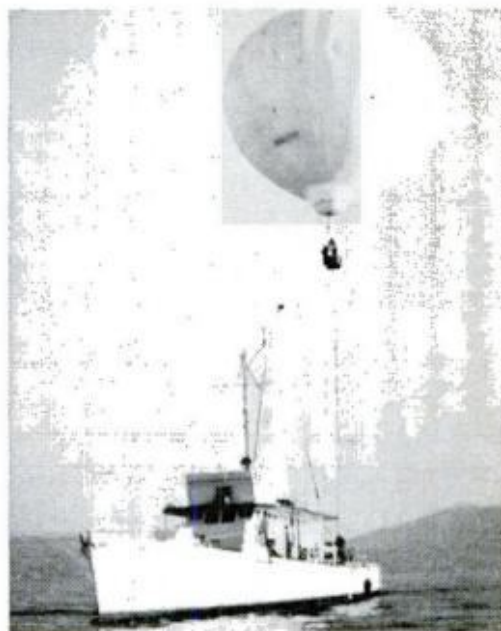
A new type of auto airconditioner on the market uses vaporized gasoline as its coolant. It takes only seconds to convert it into a refrigerator (lower left). Refrigerator shown at lower right is for use on boats. The machines are made by the Vapor-Freeze Co. of Fort Lauderdale, Fla., and cost \$99.50 each.

Fishing Balloonist

Fishermen may be operating from hot-air balloons if current tests in the Pacific are successfully carried out.

The balloonist goes up 600 feet or more to spot schools of tuna. A Dacron balloon 52 feet in diameter is tethered to a 110-foot tuna-boat in the tests. Once aloft, the balloonist maintains lifting power by reheating the air with a burner in the gondola.

The next step is to design a balloon with special "fishing" aerodynamic qualities.



Gary Player

GLASS-FIBER RODS SET the fishing world on its ear several years ago and, controversial or not, the glass-fiber vaulting pole has rewritten track records. So Gary Player may have something when he says, "I think glass shafts will improve golf."

We asked Player to back up his statement by playing a round of golf for *PM*. We wanted to find out what was really different about the clubs and how these differences might affect the game.

"A guy can get the ball higher into the air and get better backspin using these shafts," says Player. This increases the ability to "hold" a green, next to putting the most important capability in golf.

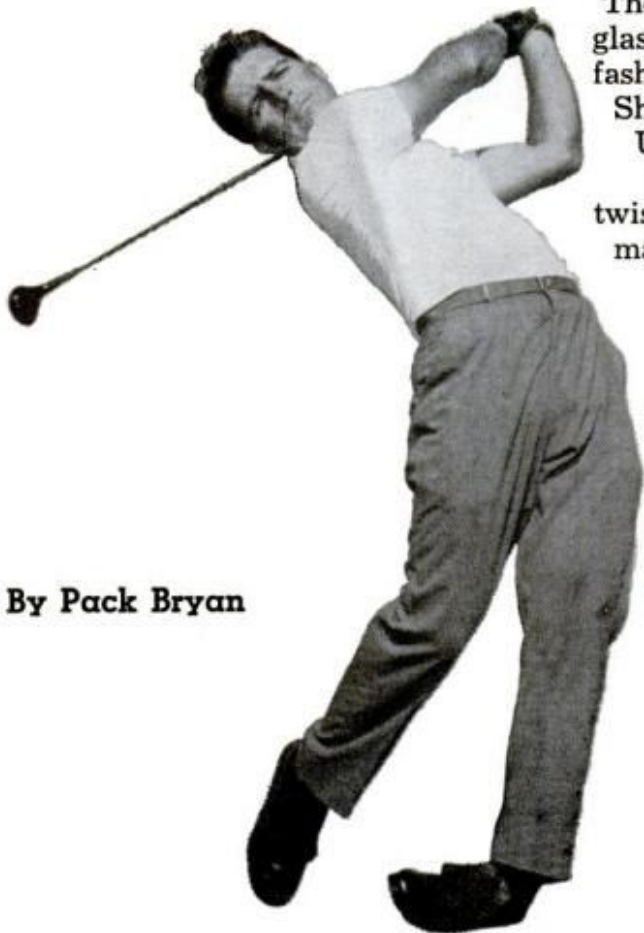
In the test round, glass-shafted drives carried farther on several occasions. Why? Player says that you can "stay with the ball" just a trifle longer with glass.

The glass shaft does not transmit the shock of the club face meeting the ball up through its length to the hands, eliminating bounce. The face just naturally stays with the ball a split-second longer, transferring more of its kinetic energy.

The key appears to be the composition of the glass shafts. Like the wood fibers in the old-fashioned hickory shaft, the glass fibers in Shakespeare's Wondershaft run longitudinally.

Unlike the steel shaft, whose composition is almost homogeneous, the glass shaft can be twisted. Unlike hickory, its twist resistance remains constant.

This "torque" gives the club head an extra snap as it comes through to hit the ball. Shakespeare claims that there are more than half a million parallel glass fibers in each shaft. As the strands are laid onto the shaft, a set of tape-wrapping machines spins a tight cover of cellophane tape over them. This tape compresses the strands tightly and prevents oxidation or uneven curing of the resin.



By Pack Bryan

Tests Fiberglass Clubs

Following a four-hour curing in a conveyor oven, the mandrel is removed from the shaft and a water blast removes the tape. This tape winding is what gives the glass shafts their ribbed appearance.

The butt section is then spiral wound with a thin layer of glass thread to simplify application of the grip; the shaft is coated with a polyester resin enamel, cut to appropriate length, and its tip sized on a centerless grinder to fit whatever head it is being made for. At another plant a finished head is attached with an epoxy cement. The end result is a club that is claimed to be stronger than steel and unaffected by weather.

How do these characteristics translate into golf scores?

To emphasize whatever differences we found between glass and steel shafts, we invited another pro, Johnny Kindred, to join Player on the round. Although a top scorer, Kindred does not play the violently competitive circuit and is not subject to the pressures that bother tournament players. Although he had used glass-shafted woods with some success, he had never played with the irons. The torque mentioned earlier gave him a little trouble at first. He kept hitting to the right. But he scored a nine-hole total of 35 with the glass versus 38 for steel.

Player carded a 34 for glass and a 36 for steel, so the results seem to favor glass. But a single round can't really tell the whole story.

On the round for *PM*, Player shot better with his glass shafts, but lost some of the

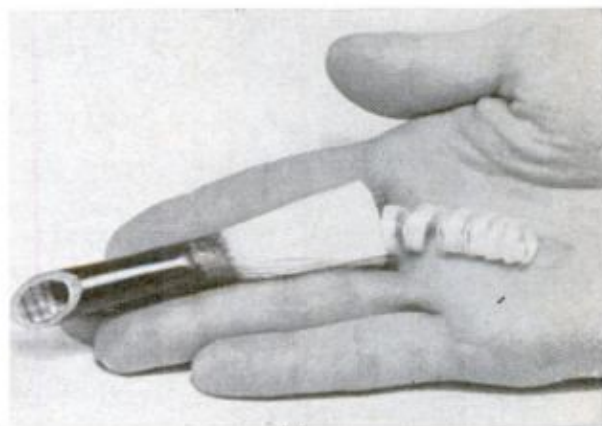
advantage with poor putting. Kindred, on the other hand boosted the apparent advantage of glass with his putter, saving a stroke for that side of the contest.

The round proved that some of the characteristics of glass are measurably different from steel and will give an advantage to the golfer who can utilize them, but may disappoint the one who can't.

Resistance to shock on impact with the ball is an important advantage. The high-handicap and the older players should find this feature tremendously attractive, since neither their physical condition nor their swing equips them with much built-in shock-absorbing capacity.

The true test will come when more top golfers experiment with the shafts. If the higher trajectory, greater backspin and control prove out as the evidence mounts, look out for the rush.

UNUSUAL STRENGTH results from baking half a million glass fibers, winding shaft with glass thread, finishing with a coating of polyester resin enamel



**PM Owners Report
Based on 1,270,684
Owner-Driven Miles**



CAVERNOUS TRUNK in the Fury gets extra space with the spare tucked well away; it's most accessible from the side. Note the low luggage lift height

THE BIG V8 IN OUR FURY III gave good acceleration, drank gas greedily. Non-California cars no longer recirculate crankcase fumes as anti-smog measure



PLYMOUTH

FURY

It's a grown-up car now, offering you power and room with appealing style, but owners say gas mileage, rattles and finish cause some disappointment

*Boldface comments by Ed Nelson,
PM's Automotive Editor*

IT HAS ALL-AROUND rugged plushness—good handling and roominess combined with response and reasonable economy.”

That's a Navy lieutenant with some Texas talk about his new Plymouth Fury. It doesn't sound as if he's describing a car we once thought of in the same breath with the Tin Lizzy, but Plymouth has departed as far from the Model T era as Ford.



The new Fury is a big car. Sedans this year are on a 119-inch wheelbase. Horsepower ranges from 145 to 365; weights from 3500 to 4000 pounds.

Its handling and powerful response top the list of features most often praised by the owners we surveyed; people who drive it day after day. But the lieutenant's "reasonable economy" doesn't square with the experience of the retired Michigan man who told us, "My '64 Chrysler 300 gave about 14 mpg; I expected the Fury to do as well or better." A reasonable idea. Other 270-hp Fury owners reported an average 13 mpg in town and 16 on trips. But the Michigan man is getting only 9 in town, 12½ on the road.

No wonder he's moaning.

Although fuel consumption topped the list of complaints, that's largely because many owners had little else to beef about. When we asked how gasoline mileage met

their expectations, 27.3 percent reported they were disappointed. That's barely above the average 26.8 percent disappointed with other '65s we reported on.

PM's test Fury III had a four-barrel, 383-cu.-in., 330-hp V8, and the staff was excited to find, *despite long stop-and-creep stretches during expressway rush hours plus a heavy dose of Manhattan traffic, that we were racking up a fat 14.95 mpg overall.*

I needn't have gotten so turned on—we found the odometer was reading 15.4 percent high. Pencil work brought that lovely 14.95 down to earth with a bang; I'd really been getting only 12.955 mpg.

There was a consolation, though. When I thought I'd been playing fast and loose with speed limits, I was actually rather conservative. The wrong pinion gear installed in the speedometer drive had the needle as well as the odometer lying to us. Alex Markovich calibrated the speedo for

MANY OF THE PRAISES given to Fury's styling noted that Chrysler held onto straight-line design, spurning the softly rounded General Motors approach



PLYMOUTH FURY GAS MILEAGE

Horsepower	Average Miles Per Gallon		
	City	Trips	Overall
145	15	19	17
230	14	17	15
270	13	16	15
330	13	17	15
365	11	15	13

SURPRISING RELATIVE ECONOMY from 330-hp engines, four-barrel versions of the 318-inch V8, suggests engineers achieved especially efficient combustion

the steady-speed fuel tests so we can show you the correction required along with the fuel figures:

True mph	30	40	50	60	70
Indicated	35	47	58	69	81
True mpg	19.32	19.15	18.20	16.03	13.78

With the generous praise owners had given to the Fury acceleration and handling, we looked forward to our performance tests. Our 383, with its 3.23:1 Sure-Grip rear end, gave more getaway than anyone but a bank robber would need. If the wheelman had the car ready and revving, he'd go from a standing start to a true 60 mph in 8.5 seconds, even leaving the transmission in Drive. Making the 1-2

BRAKE PEDAL PRESSURE required for hard stops in PM fade test is registered by the pressometer hanging on Fury's dash. Brakes faded but kept balance

shift at about 47 mph shaved this to 8.2.

In checking passing speeds, we did 40 to 60 in 3.4 seconds shifting the same way. We left the box in Second for our best 50-to-70 time, 4.2 seconds.

Although there's enough cornering lean to help you get religion, handling was surprisingly good for a standard suspension. The tires screamed in protest at Bridgehampton, N.Y. (the track we use for handling evaluation), but the car felt relatively solid, broke loose slowly.

Alex borrowed a car with the '62 Plymouth suspension for comparison and found the old system was firmer, gave a harsher ride and—as you'd expect—provided somewhat better handling.

Plymouth brakes have, in past years, been prone to fade. We checked these our usual way: successive hard stops from 60 separated by 30-second intervals. The power system gives your leg a helluva help; the first stop required only five pounds' pedal pressure. That jumped to 20 by the sixth stop as the heat caused the linings' friction to start fading. For curiosity, we ran the series to eight. Fade then was very bad, but brakes still didn't grab or pull.

GENEROUS HEADROOM in PM's test Fury was coupled with good rear kneeroom. The front bench seat was run to full rear position for this photograph



PM can test a car thoroughly, but we can test only one sample from a particular model run. Instead of relying too heavily on those results, *let's see what we hear from the people who bought Furies and use them day after day.*

To start, here are the owners' own words in statements selected to represent the five most popular praises:

"Handles well at higher speeds on twists and turns—the reason I didn't buy a Ford."—Michigan millwright.

"Good passing power; 230 hp seems more than adequate for my driving."—Georgia real estate appraiser.

"Clean lines with no attempt to be 'different.' . . . the 'planned obsolescence' racket feeds on gingerbread."—Maryland printer.

That's one reason I like the less chrome Fury I more than the III.

"I like pretty girls; my Fury III is a beauty."—Delaware stockman.

I'll agree with the first point; the second is your own responsibility.

"Seats are higher than those in our '58 Plymouth."—Kentucky assembly worker.

A simple adjustment by the dealer can do lots of good for seat comfort, moving
(Please turn to page 198)

CORNERING LEAN with our heavy four-door Fury III felt extreme, but the car drifted manageably even with tires at normal highway inflation pressures



SUMMARY OF OWNERS REPORT

EXCELLENT 53.8%									
GOOD 35.4%									
FAIR 8.5%									
POOR 2.3%									
PERCENTAGES	10	20	30	40	50	60	70	80	90

As expected	53.8%
Better than expected	11.9
Not as good	27.3
Handling and power	49.6
Ride, stability	35.0
Clean styling	33.5
Seating comfort	27.3
Mechanical functioning	12.7
Steering	11.5
Visibility	10.8
Dependability	10.0
Solid, quiet construction	8.0
Economy of operation	6.2
Fuel, oil consumption	14.2
Poor finish, paint	13.5
Noise and vibration	13.1
Poor assembly	11.9
Windows, wind noise	11.2
Over-sensitive steering	10.8
Door operation and locks	8.5
Most liked exterior features	
Transmission	4.6
Carburetor	4.2
Brakes	3.8
Shock absorbers	2.7
Most liked exterior features	
Styling and shape	47.7
Clean lines	29.6
Visibility	6.9
Headlights	6.5
Hood and front end	6.2
Grille	5.8
Least liked exterior features	
Rusting finish, bad paint	6.2
Bumpers	4.6
Overall styling	4.6
Profile at rear	3.5
Most liked interior features	
Seating comfort	41.9
Dash, instrument cluster	16.5
Passenger room	16.5
Interior styling	10.8
Visibility	9.2
Easy to clean	6.9
Headroom	5.0
Least liked interior features	
Dash finish, surface	8.8
Seats	5.8
Little headroom	5.0
No pushbuttons	3.5
Ashtray location	3.5
Glove box size, location	3.1
Plymouth fury decision based on:	
Style, design	41.2
Past experience, reputation	36.9
Trade-in value	33.5
Warranty	23.1
Ride and handling	11.5
Courteous dealer	11.5
Chrysler name	8.1
Chrysler on competitors of the	
Chevrolet	31.2
Ford	28.1
Pontiac	10.4
Dodge	9.6
Olds	4.6
Wishes on competitors of the	
Better quality control	6.2
Restore transmission buttons	4.6
Improve gas mileage	3.8
More headroom	2.7
Reduce noise	2.7
Use oil-pressure gauge	2.3
Excellent	52.3
Average	36.2
Poor	8.5
Yes	69.2
No	10.8
Yes	83.8
No	8.1

LOOK BACK AND...

... they told me as I leaped at 2500 feet. You can do it too, with 3 hours' instruction and \$35

By Larry Steckler

“WHEN YOU STEP OUT OF THE PLANE, look back up at me and *smile.*” This ludicrous order was the last thing I heard from Instructor Connie McDonough. A second later, I'd shoved off through the open doorway of the nine-passenger Norseman and was soaring through space on my first free-fall sport parachute jump.

During a three-year tour with the paratroopers, no staff-sergeant jump-master had ever ordered me or any other buck private trainee to “smile back up” at him!

That was *one* difference I found recently between the business of skydiving for fun, and the military version of leaping from airplanes. Paratroop jumping is designed to get a man down quickly and relatively intact; sport parachuting demands accurate control in free fall before the chute is opened, then landing as close as possible to a six-inch target.

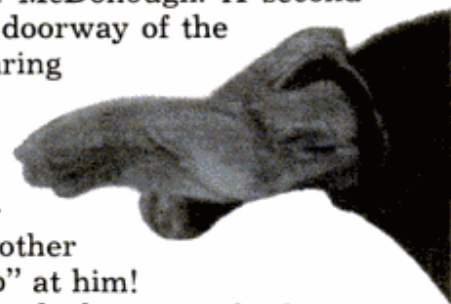
The 38 jumps I'd logged in the Army had been just enough to whet my curiosity about the fast-growing sport of skydiving. That's why I was here, in mid-air, now.

Early the previous morning I had arrived at the Lakewood, N.J. site of Parachutes Inc., a professional skydiving school. In three hours flat I'd completed my “ground training” and, as a fledgling skydiver, was perched in the Norseman 2500 feet above the countryside, preparing for my first “static line” jump along with three other novices.

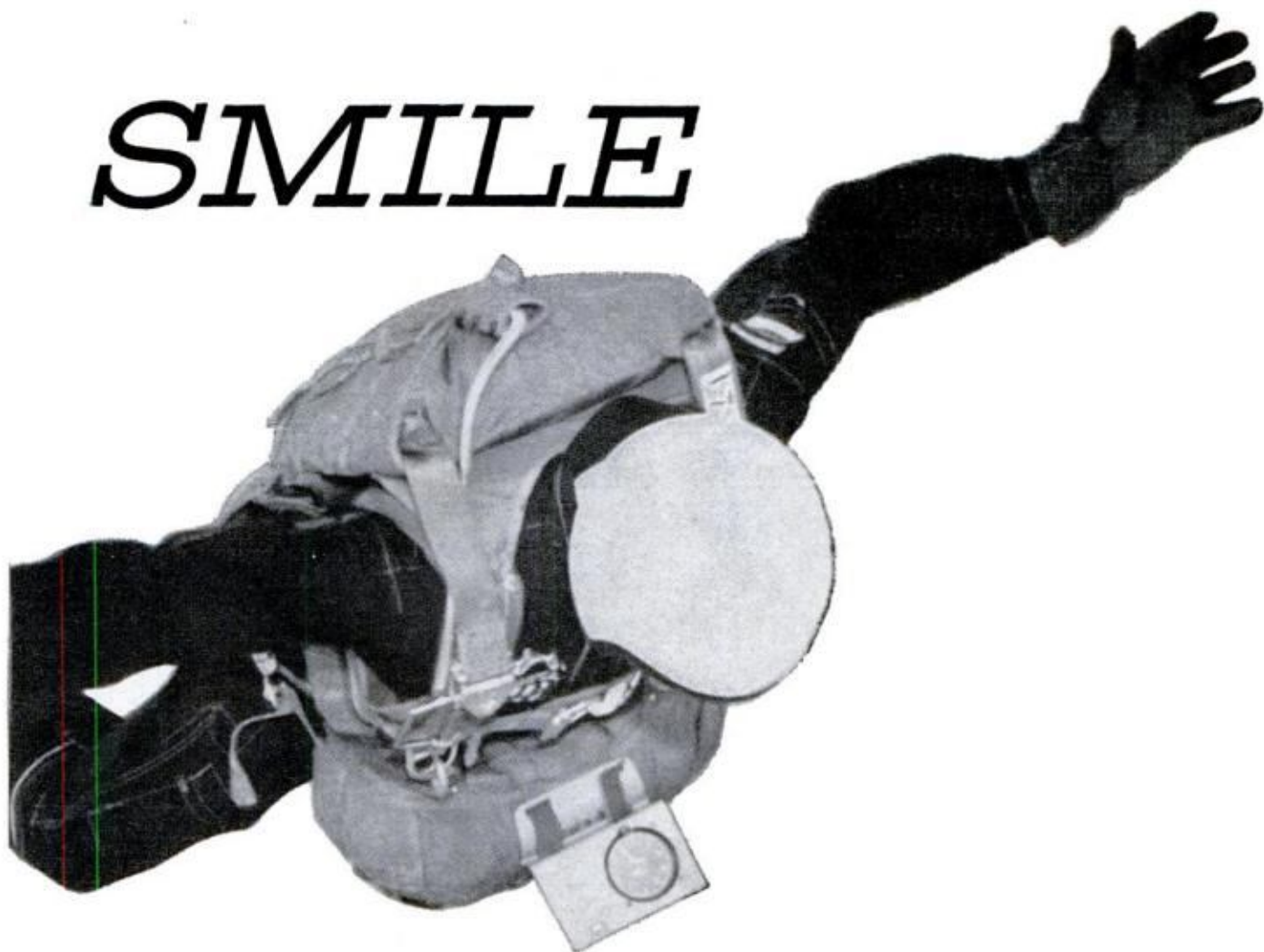
A static line jump is one in which a nylon cord connected from the parachute to the plane itself opens the chute *after* the jumper has cleared the plane. This is similar to military jumping. Three static line jumps are required of all beginning skydivers. During the last two, the novice *practices* pulling the ripcord. If he satisfies the instructor, he is ready to make his first free fall, in which the chute is opened during descent when the jumper pulls the ripcord.

The Norseman's engine roar died to a deep rumble as we reached jump altitude. McDonough called for number one man—me—to stand by the door.

I inched over to the gap in the side of the plane where the

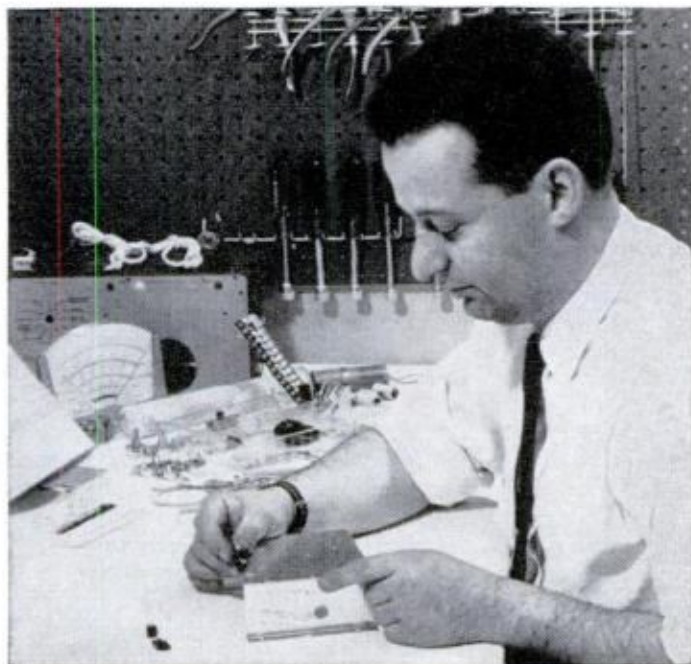


SMILE



FRIDAY AFTERNOON I was intent on assembling an electronic automobile engine analyzer kit. I'd soon be writing the copy for the story on the unit

SATURDAY MORNING I was hitting the dirt upon completing my 25th sport parachute jump. It was a good one as I landed only a few feet from target





JUMP GEAR ON, the instructor makes a final check to be certain straps are tight and equipment is in proper shape. There's no room for error in this sport



OUT ON THE STRUT is jump position from a three-passenger Cessna. I demonstrated it here for the photographer—then did it for real shortly after

door usually is, and dutifully assumed "ready" position—feet on the step outside the plane, the prop blast blowing into my face and Connie looking down over my shoulder at the drop zone we were approaching. Moments later he pushed a button beside the door to signal the pilot, to cut the engine. That's when he wise-cracked about smiling. It was time to go.

After a momentary hesitation, I took an involuntary deep breath and pushed away from the side of the plane, remembering to force my body into the unnatural arch I'd had drilled into me. It's the thing that keeps a skydiver steady. I spread my arms and legs wide, forgot to smile at Connie, and lost sight of the plane. Now horizontal with the ground I reached in for the ripcord, pulled it, resumed the arch and started to count: one thousand . . . two thousand . . . thr—the chute was open

and my body yanked upright. The worst—the waiting—was over.

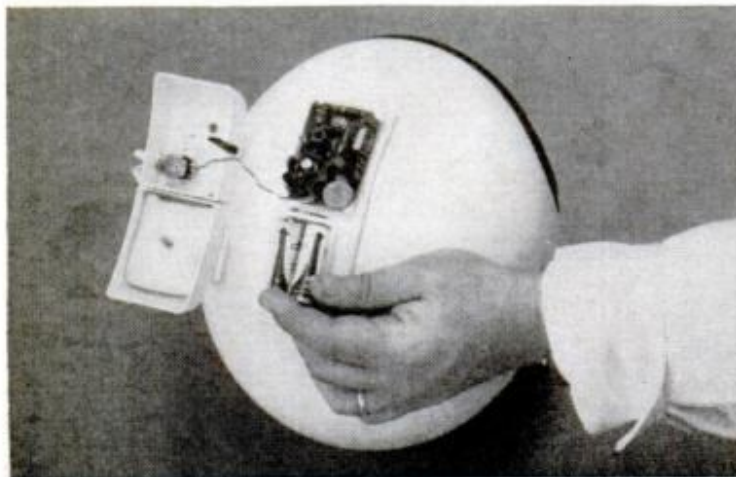
I made a quick check of the nylon canopy overhead; no extra holes . . . okay. A careful look down. Sure enough, just as Connie had said, there was the target behind me. It was about 2000 feet down and half a mile away.

The radio built into my helmet had been hissing softly in my ears. Now it crackled to life. "Number One, good jump so far. Now, pull down your right toggé and make a 180° turn to the right and face the target."

I complied and the voice continued, "Fine, Number One. Watch your rate of drift and try not to overshoot; we want to see you land right on that target."

My chute and I were riding with the wind about 12 mph in the direction of the

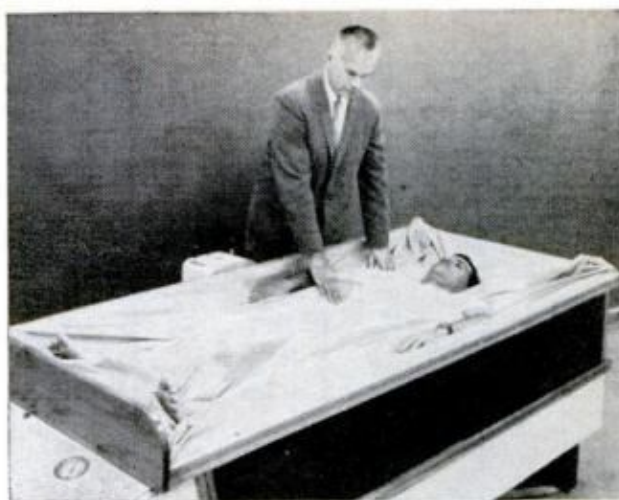
[\(Please turn to page 183\)](#)



RADIO IN MY HELMET put the instructor at my ear during my first five jumps. It makes possible second-by-second instruction and keeps the novice from landing in the trees that surround the drop zone. This added insurance also boosts student's confidence

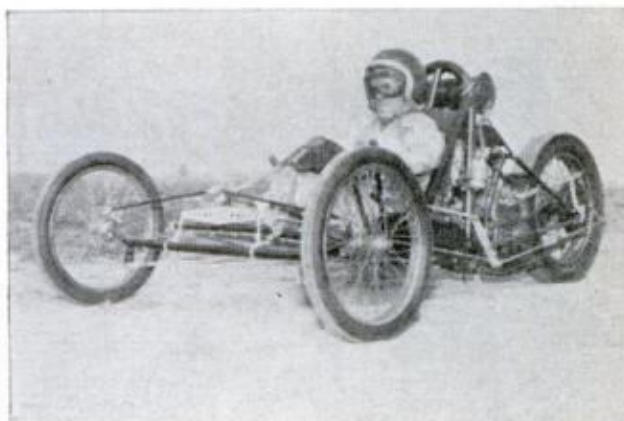
Float to Recovery

Hospital patients will float off to dreamland in this soft bed. Its mattress consists of water covered with a flexible sheet. Since the bed, developed by Convair, exerts no pressure on the body, it will be useful in treating skin, nervous and other disorders.



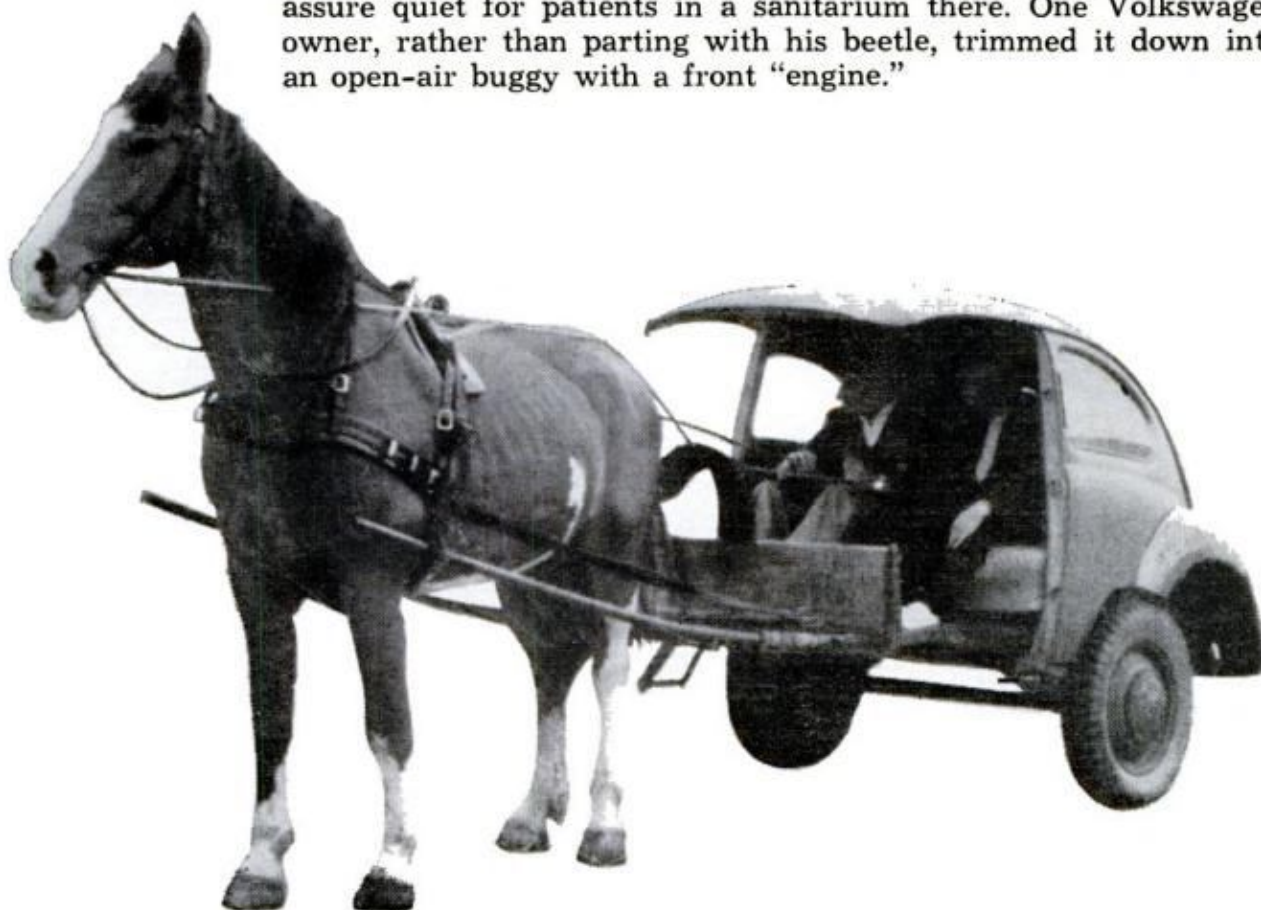
128-mph Tricycle

This three-wheeler is definitely out of Junior's class. It does 128 mph in 10.56 seconds in quarter-mile drags. Californian Mel Rossi uses a bored Triumph 40 cu. in. displacement, motorcycle engine with twin carburetors.



Volkswagen Develops One Horsepower

"Get a horse!" That, essentially, was the ruling by the authorities on the North Sea island of Borkum; they banned all autos to assure quiet for patients in a sanitarium there. One Volkswagen owner, rather than parting with his beetle, trimmed it down into an open-air buggy with a front "engine."



Fast-Reflex School for Patrolmen

*Could you stop without brakes
—or get out of a high-speed
skid? Here's how patrolmen do it*

By Martin Mann

I RAN over a child today. The road was dry, there was no traffic, and I was doing a careful 30 mph. The child flew in front of my car, about 50 feet ahead. I slammed on the brakes, but 50 feet isn't enough to stop a car from 30 mph.

Then I turned around and tried it again. I still couldn't stop in time.

Of course, this "child" was only a cardboard box. The road was the high-speed training track at the California Highway Patrol Academy and the incident a demonstration for PM.

The Patrol Academy is a collection of new one-story buildings sprawling across the sun-baked valley a few miles out of Sacramento, where every four months 80 to 100 raw recruits are transformed into polished and expert highway patrolmen. PM had asked me to see how the Academy's nationally famous Emergency Vehicle Operations Course (Evoc) trains cadet patrolmen to handle their cruisers safely under the toughest conditions. Could the same techniques help ordinary drivers? I was the guinea pig.

The rangy, articulate head instructor, Sgt. Bob Phillips, who is a veteran of dirt-track racing, sides with the growing number of auto experts who think every driver needs real practice in getting out of road emergencies—not just "safety tips." For too many people, the first blow-out is the last. When they skid, they unnecessarily wrap themselves around trees. They do the fatally wrong thing if an obstacle pops into the road.

In a few states, highway cops are trained to get out of such jams. California's program is the most elaborate. When a rookie graduates from Evoc, he can drift



a Dodge police special around mountain roads at 120 without killing himself. But high-speed road running is for the cops. All I wanted to know was: Could I regain control in a fast skid? Could I stop safely when the brakes fail? Could I avoid a real child who jumps unexpectedly off the curb?

Evoc proved that if you know what to do you stand a chance. If you have had actual practice—under conditions duplicating the real thing—you probably can make it.

Lesson No. 1 was given on the skid pan, an asphalt oval about a quarter-mile

around. Although the Sacramento Valley sun held the thermometer close to 100°, that asphalt track was as slippery as a New England back road during a freezing rain. A tank truck had sprayed on a thin film of oil, and sprinklers kept the surface wet.

I pulled onto this *ersatz* ice in an elderly patrol car fitted with asphalt slicks—treadless drag-racing tires that deliver lots of bite on dry pavement, but zero

CRUNCH goes the cardboard box—but it could have been a real child. Author found even panic braking couldn't stop him in 50 feet from 30 mph





A FLICK of the hidden valve, opening a brake-fluid bypass, and suddenly no brakes. Evoc instructors use the gimmick to test police cadets' reactions

traction in the wet. The car went everywhere except the way I pointed it. That was the idea. The effect was that of serious high-speed skidding even though the car seldom went over 25. Techniques could be tried with little risk to car or driver.

You have to fight your instinctive reactions to drive even at 25 mph on such a slippery surface, so the instructor comes after you in an ancient heap and plays bumper tag to nudge you along. After switching ends a few times, I began to appreciate what had been explained in advance. The standard instruction to turn in the direction of the skid doesn't go far enough. That alone may not bring you around in your lane after you lose traction on a curve.

Besides turning the wheel, you also have to accelerate ever so gently, even though it seems you are deliberately driving yourself off the road. The gentle acceleration gives back a bit of traction. Then you can tighten into the curve once more while slacking off on the gas. You

skid again. Now you repeat, turning and accelerating, skidding and decelerating. No brakes, ever. This alternation makes the car's weight shift slightly on the suspension. With precise control of the gas pedal and careful work on the steering wheel, you can make all four wheels slide. The car doesn't really skid around the curve: it drifts under your command and goes where you want it to. Mastering this takes practice, but even a few tries give a feeling for what should be done.

Lesson No. 2, showing how not to run over children, was an eye-opener. Off one end of the straightaway on the 2.2-mile oval main track, a mechanic waited with a string tied to a cardboard box that was out of sight across the roadway. That was the "child" I was supposed to miss.

I accelerated a Chrysler police special

WITH A "HELPFUL" NUDGE from behind by instructor, author (in patrol car) starts skidding on the wet, oil-slicked surface. Steering into the skid . . .

1. CAR SKIDS



2. DRIVER CORRECTS



from the other end of the straightaway until the needle stood at 30. On the instructor's signal, the mechanic jerked the string, yanking the cardboard "child" smack in front of me.

When this kind of emergency occurs on a busy street—traffic in the opposing lane, curb lined with parked cars—your instinct makes you rely on brakes alone. I was instructed to imagine that those were the conditions here, even though there were wide gravel shoulders on either side. When I saw the box in the roadway, I held the wheel straight and hit the brakes as hard as I could. My reaction time was fast; after all, I was all wound up for the signal. Rubber burned, but the front and rear wheels crunched right over that box.

After a few more tries had mashed sev-

. . . is correct procedure, he finds—but it's not enough. The tail swings around, swaps ends with the nose. Evoc students are taught also . . .

eral boxes, Sgt. Phillips climbed in to ride along with me. I ran up to 30, saw the box fly into the road, and hit the brakes. But this time the pedal mashed uselessly to the floor. No brakes.

Phillips, a brilliantly unorthodox instructor, had bugged this car with a bypass in the hydraulic line. He opened the hidden valve while I was accelerating.

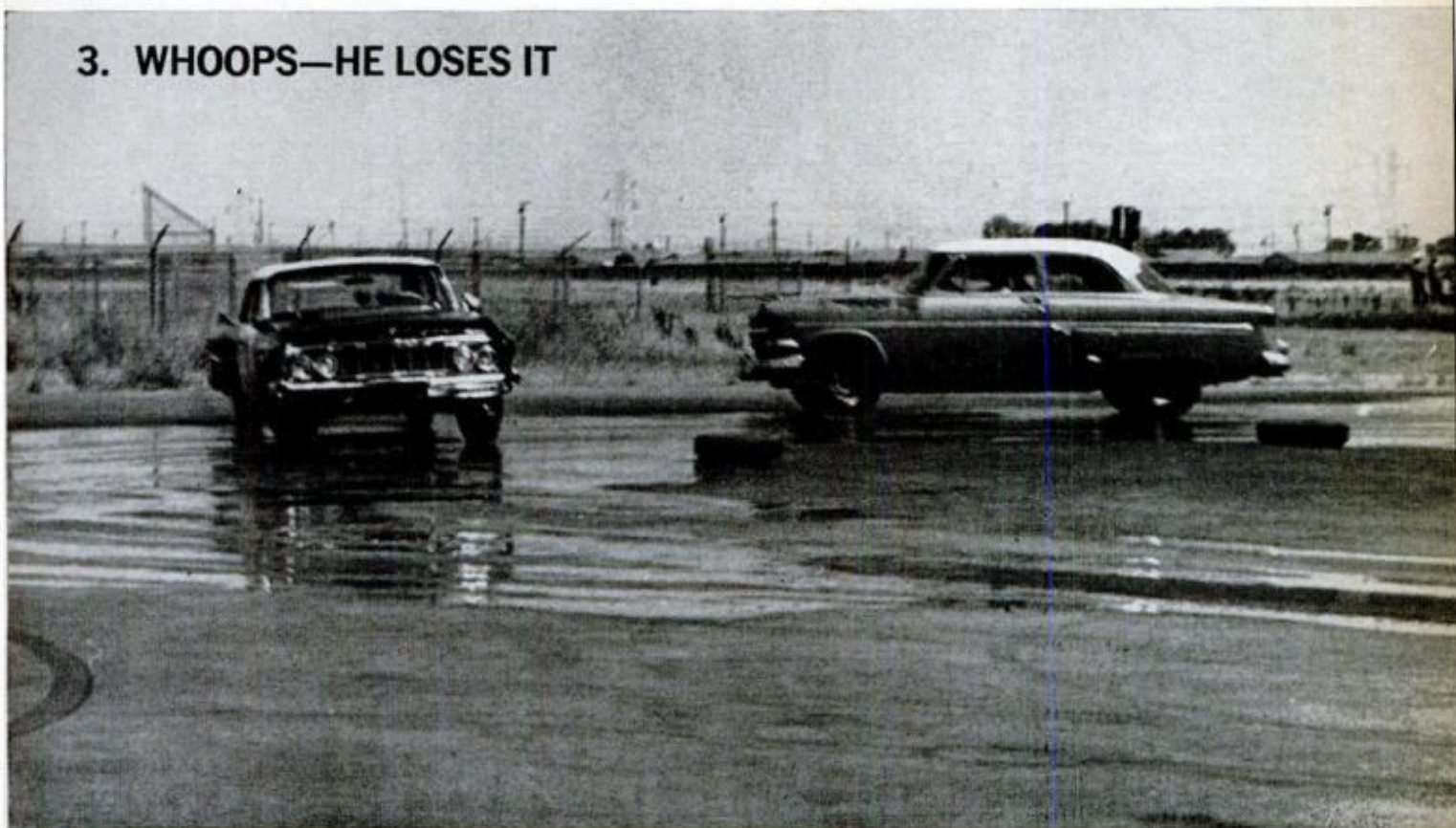
The braking loss was a shock. I instinctively steered left, and I almost—but not quite—missed the cardboard "child." I had yanked the wheel too late.

I made a couple more passes. When the box appeared, I immediately swung the wheel as hard as I could, and I got around the box without touching it.

That was the point: The best brakes and the fastest reaction time cannot stop you short enough when a child jumps into

. . . to alternately feed the throttle gently and let up. This causes car's weight to shift back and forth on the suspension, helps restore traction

3. WHOOPS—HE LOSES IT





STRING attached to cardboard "child" allows box to be yanked onto roadway without warning, directly in test car's path. This time, author relies on steering instead of brakes; he swings left and misses the box easily

your path close ahead. The only way to avoid hitting him is to steer around.

It takes forethought and will power to do the right thing when such an emergency is red hot. If the opposing lane is empty, you will swing left instinctively. But if cars are coming toward you, you can't afford a deliberate head-on crash. You have to overcome the temptation to rely on brakes alone. The only way out is to swing right.

That means you may have to run yourself into something on purpose. If it's a parked car, you're probably all right; the crumpling of the two cars should absorb the worst of the impact and leave you with little more than bruises, especially if you are wearing a seat belt. If there are trees or a wall to your right, you take a real risk. Even so, evasive action is your only choice. If you do run over the child, he is almost certain to be killed or seriously hurt.

The booby-trapped brakes suggested lesson No. 3: What you should do when your brakes fail. This emergency comes up more often than most people realize. Recent studies such as the research of A. L. Moseley at Harvard blame mechanical defects for a shockingly high proportion of fatal accidents. Many a poor guy scraped off a bridge abutment had not fallen asleep at the wheel, as police reports so often say, but died desperately trying to control a brakeless car.

When the regular brakes fail, gradual application of the parking brake sometimes helps, but not very much. The standard prescription is to downshift as quickly as possible. At speeds over 40 or 50, this may wreck an automatic transmission, but that's easier to repair than a busted skull.

"How fast can you stop by downshifting?" I asked Phillips. Characteristically, he said, "Let's go see."

I climbed back into the big patrol car and drove to the end of the track's straightaway. The California cops prefer automatic transmissions; this '64 Chrysler had the usual pushbutton shift. At 30 I took my foot off the accelerator, punched into Low and waited for the car to slow to a halt.

And waited.

And waited.

It seemed I could stop faster by dragging my foot out the door. Eventually the car did stop rolling. I climbed out of the car and walked back, counting paces. It had taken 394 yards—nearly the length of four football fields—to come to a stop after downshifting.

"You could have cut it a few yards shorter if you had switched off the ignition," Phillips said. "But engine braking isn't enough. Usually you can steer off the road into a field. The rough, soft surface will slow you down. Or look for an upgrade, either in the road or off it. An embankment or something."

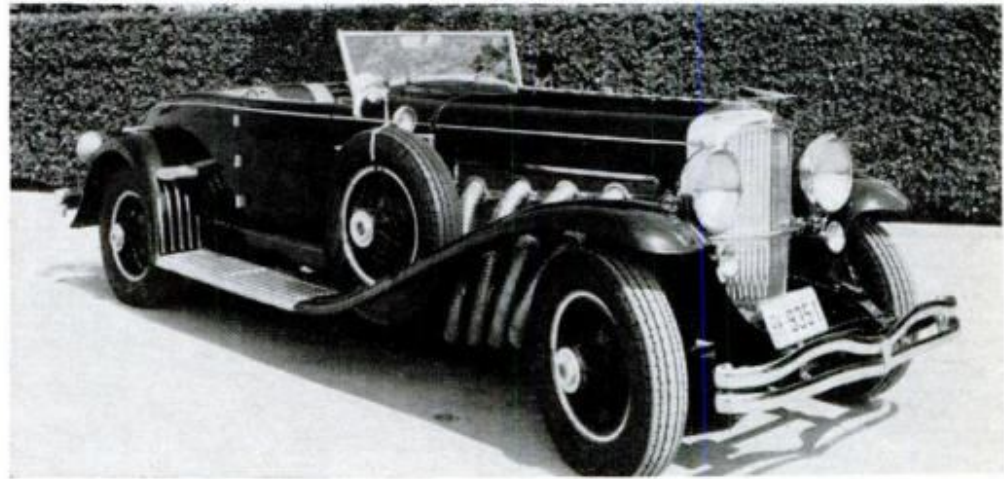
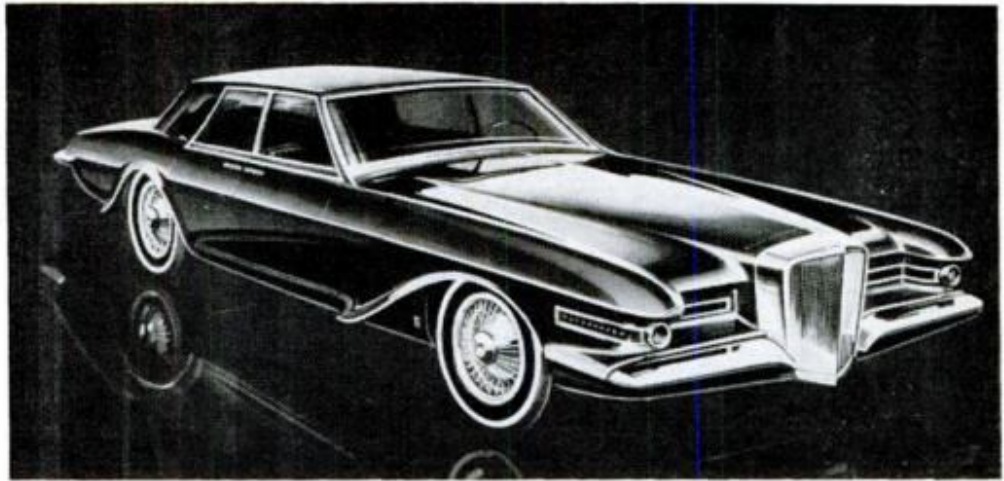
What about the racing driver's trick of brushing off speed by scraping the side of the car against a fence or bushes or even other cars?

"That works," Phillips said. "But it takes skill and two husky arms. You have to fight the wheel like crazy to keep from losing control. Still, it's better than doing nothing. The main thing is to take some kind of action. Whatever you do will probably help some, whether it's the ideal procedure or not.

"Don't just sit there. Do *something!*" Good advice for any emergency. ★★★

See Any Similarity in These Two Cars?

Here's the styling planned for the new Duesenberg, from the drawing board of Virgil Exner, former chief designer at Chrysler. He describes the style as "in the modern, classic manner . . . with some 'nostalgic' feeling . . . traceable to the older Duesenberg influence." Below is a '31 model SJ for comparison.



Up the Sleeve

Here's the latest fashion note for office workers: A new shirt manufactured in England is designed to solve the old problem of where to carry your pack of cigarets, pen, pencil and notepad when you shed your suit jacket. The "Shacket" has four pockets set into the sleeves, thereby eliminating bulging trouser pockets. It's claimed that a man can wear a jacket over his "Shacket," and still keep something up his sleeve.



Water Highway to the Top of the World

Following the route of the sourdoughs, a new ferry system carries tourists and cars from British Columbia to Skagway

By Steve McCutcheon

TEXANS, TAKE NOTE! The Alaskans have added insult to injury.

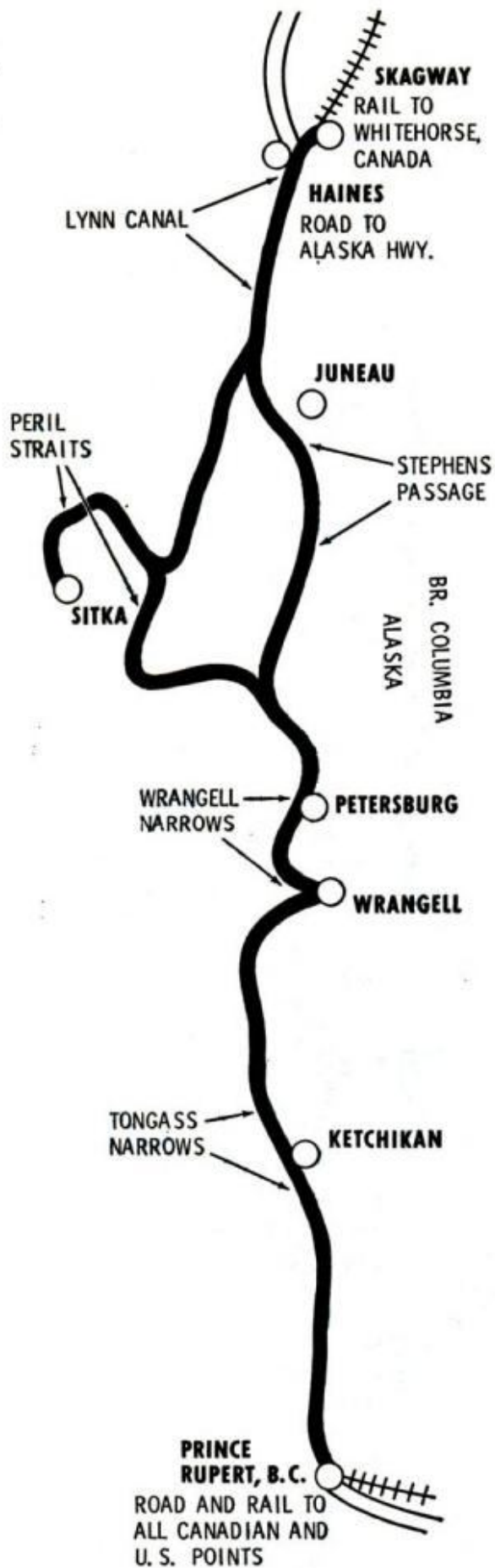
It was like a stab in the panhandle when they took over as the largest state, and it was like swallowing cacti to hear them chortle about the highest mountain in North America, and the largest live glacier. It was a punch below the gunbelt to have them compare a Kodiak bear to a peccary, and the Yukon River—which runs more water than the Mississippi—to the Rio Grande.

But now those upstarts are gloating over a ferryboat that carries 500 passengers and 105 autos, trucks and trailers, and totes the whole kit and kaboodle on a 500-mile trip from Prince Rupert to Skagway. And to make matters worse, they're inviting tourists—including Texans—to travel in comfort to the "last frontier."

Wearing the state colors of blue and gold, three ferries—*Malapsina*, *Matanuska*







and *Taku*—make daily sailings six days a week, one boat embarking each day from opposite ends of the marine highway.

Sporting Liianen controllable-pitch, twin props, the identical 353-foot vessels are powered by 4000-hp twin Enterprise diesels and make 20 to 22 knots. When fully loaded they draw 15 feet of water. Just aft of the bow on either side and in the stern are huge hydraulically-operated doors that will accommodate any vehicle that can drive on a continental U.S. highway without a special permit. Passenger accommodations are plush and modern, and there is no limitation on luggage.

Regular passenger fare from Prince Rupert to Skagway is \$30, with various rates for between points. The charge for transporting a regular passenger car, camper or pickup truck is \$122.50 to Skagway and a compact car is charged \$98. Children under 6 travel free and children from 6 to 12 are charged half fare.

Sailing from Prince Rupert, the southern terminus in British Columbia, the ferry covers the first 105-mile leg of the journey in five hours, putting in at Ketchikan, the largest salmon-fishing center in the world, where visitors can tour a cannery and a pulp mill. Wrangell, next stop on the

LINING THE RAIL of the boat, passengers watch the huge 353-foot vessel, guided by reverse props, glide effortlessly up to a specially constructed pier



CARRYING PASSENGERS and vehicles, the Alaskan ferry plies inland waterway of Pacific Northwest, passing 11,000 islands and making seven ports on 500-mile excursion that takes 30 hours to complete

route, is one of the oldest towns in Alaska, founded as a Russian fort in 1834. This picturesque fishing village boasts an authentic Indian tribal house on Chief Shakes Island, ancient petroglyphs and nine authentic totem poles.

Three hours out of Wrangell the ferry puts in at Petersburg, a community of neat Scandinavian-type houses and a harbor filled with halibut schooners.

The next port-of-call is Sitka, the last capital of Alaska under the Russian czars and the first under the United States flag. Speeding up through Frederick Sound and Stephens Passage, the ferry trails its wake through magnificent fjords of icy blue water and passes in the shadow of towering glaciers, their icy crests a sun-glittering explosion of color.

Then comes Juneau, the state capital and the center of Alaska's gold-mining heritage that goes back to 1880 when Joe Juneau and Dick Harris made the strike that sparked the gold rush. Here, too, is the famous Mendenhall glacier, part of the sprawling Juneau icecap, and visitors can view it from a modern observatory built by the U.S. Forest Service.

Haines-Port Chilkoot, the twin cities of Alaska, is the next stop, where ferry trav-

elers are introduced to the customs and crafts of the Chilkat Indians at Totem Village, plus special dance performances.

The end of the 30-hour trip, northern terminus of the marine highway is Skagway, the "Gateway to the Klondike," where visitors can visit the graves of Soapy Smith, the Colorado gambler who ruled the lawless town back in '98, and of Frank Reid, the U.S. marshal who killed Smith in a gunfight and brought law and order to the frontier. And each night you can see a re-enactment of "The Shooting of Dan McGrew," a story made famous by Robert Service's verse.

Ferry travelers can take a change of pace in Skagway with a 100-mile trip to Whitehorse, capital of Canada's Yukon Territory, on the narrow-gauge White Pass & Yukon Ry.—"the cliff hanger."

A popular feature of the ferry trip is that passengers may embark at any point, stay as long as they like, and then continue on the next ferry with no change of ticket or extra charge.

Last year the ferry system carried a total of 74,603 passengers and 14,042 vehicles. On one trip of the *Malaspina*, there were tourists in automobiles from ten states—two of them were Texans. ★★

COMING DOWN a special loading ramp, a camper drives into one of the hydraulically-operated doors that are situated just aft of the bow of the vessel



PARKED IN THE BOWELS of the vessel, pickup campers serve as private staterooms for their owners. Each of the boats has a capacity of 105 vehicles



MAN THE BILGE PUMPS!

WE'RE BEING SWAMPED

Many rules and regulations are antiquated, unfair and downright ridiculous, says this experienced boater, author of several books on boating. Here we've given him a chance to shout his dissent. Any contrary opinions?

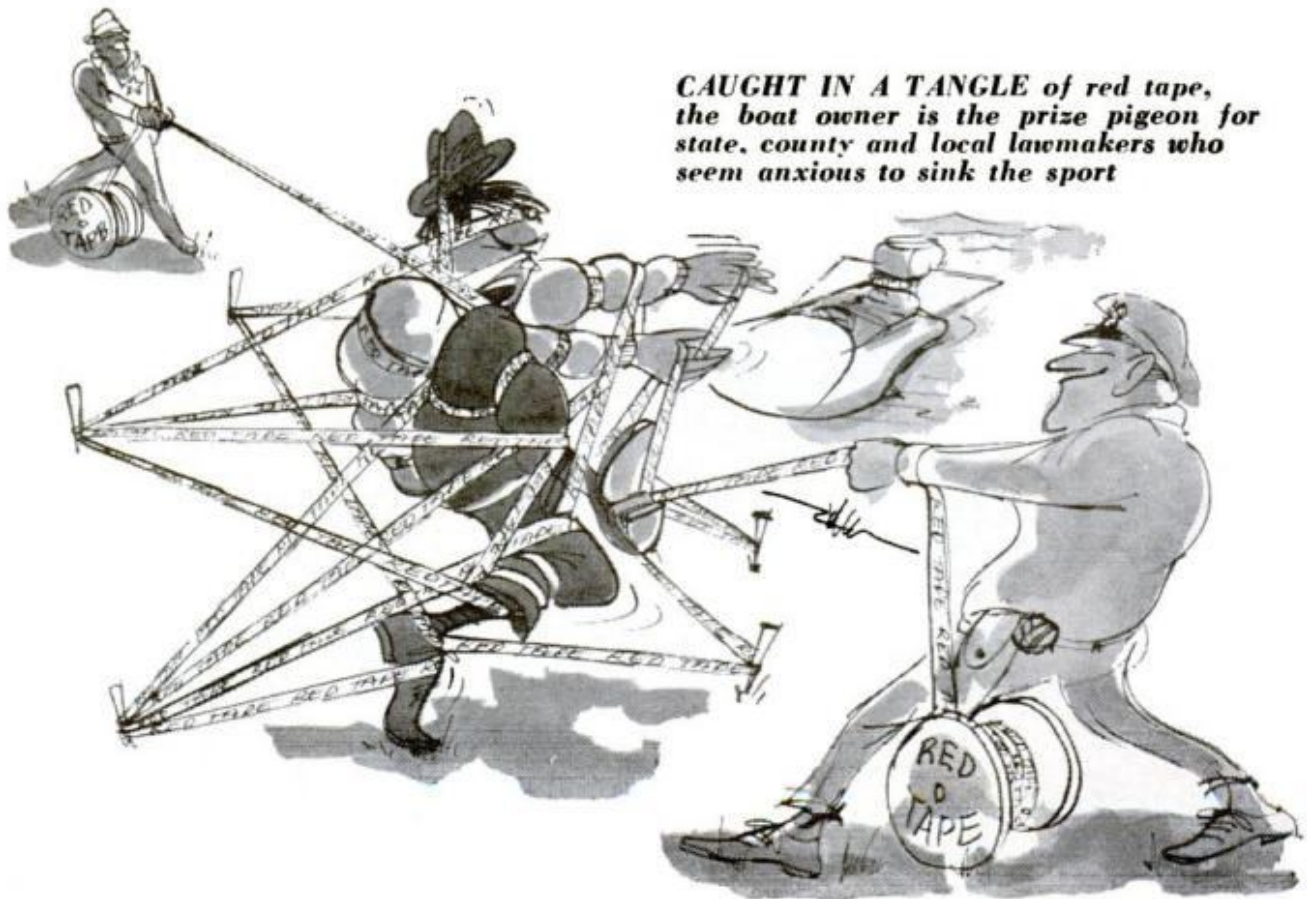
By Jack Speirs

IN THE UNITED STATES TODAY, a minister of the gospel who owns a boat is more likely to run afoul of the law than is a dope-peddling tax dodger.

This country is sitting in the middle of the biggest boating boom in history. And yet practically every wet place in the nation is surrounded by a shoreline of red tape, a hodgepodge of unnecessary statutes.

It's time for a big clean-up of antiquated, unfair and downright ridiculous boating laws. Yet unless boaters start fighting back at once, things will be worse instead of better in the future.

Right now, in such states as New York, Ohio and California, "public servants" are



CAUGHT IN A TANGLE of red tape, the boat owner is the prize pigeon for state, county and local lawmakers who seem anxious to sink the sport

WATERBOATERS

saying to themselves, "A man has to have a license to drive a car, so why can't we force him to buy a license to operate a boat?" If these officials have their way, you are going to have to pass various tests, and pay a fee, and be fingerprinted and photographed, and then carry your unexpired license with you before you can fire up the putt-putt on your 12-foot skiff.

This is the same skiff on which you now pay property taxes, registration fees, insurance, an annual trailer license to haul it around and, on many waters, inspection and launching fees.

The fact that pleasure boaters are against licensing means nothing at all to Big Brother. "This is for your own good, Comrade," is the official attitude. They tell you that licensing is a safety measure—even though the accident rate already is going down in relation to the number of boats in use. They say it would weed out incompetents—although most accidents occur to experienced boatsmen who could pass an examination with their eyes closed.

Accidents are decreasing because of two things: the worthwhile safety education programs conducted by the Coast Guard and by other groups, and the intelligent enforcement of safety rules by the Coast Guard and other water police agencies. Some authorities go so far as to say they are afraid that, if operators' licenses are required, the emphasis on safety education will lag. Result: More accidents could oc-

cur because of licensing the operators!

Coast Guard spokesmen find no need for licensing. And, at a meeting of the southeastern state boat law officials in 1964, it was resolved that "licensing of motorboat operators is *not* recommended."

Yet 1965 is a critical year. If even one state gets away with this new kind of regimentation, others would follow. In New York the opening wedge is agitation to license all boat operators under 16 years of age, as the first step toward licensing *all* operators. In California, there are indications that behind-the-scene pressures for licensing are building up. As a result, officials of boating clubs are warning that

DESPITE THE FACT that a water skier might be a world's champion and an Olympic swimmer, in some states he must wear a life jacket or belt



"This article deals quite effectively with a very serious problem for boatmen. . . . We don't believe much will be done until public indignation is aroused to the point where something MUST be done."

—Fred B. Lifton, Executive Director
Outboard Boating Club of America



SPORTSMEN HAVE IGNORED ridiculous horsepower regulations by merely altering the rating on their motors—but they're violating the law

"boaters must fight back by (a) operating their boats safely and (b) actively organizing against the licensing threat."

Perhaps the real truth for the license drive in California was unintentionally let out of the bag in a recent, expensive two-volume government-financed report on a grandiose "California Boating Plan." The report recommends a broader role by the state's Division of Small Craft Harbors in the development of harbors and other boating facilities, to reduce possible shortages in the future. The report baldly states that possible sources of funds include "higher boat registration fees" and "licensing fees for boat operators."

The old arguments about safety are forgotten, and licensing is looked upon as a way of grabbing more money from pleasure boaters, to be spent as the state decides.

The fact is that there are too many laws that are designed to defeat boating pleasure on the books already. Let's look at some of the typical, restrictive regulations that govern hundreds of recreational waters today. They are so taken for granted that they are worth analyzing in depth—if they have any depth.

Antiquated Laws

Boats shall operate at not over 5 miles per hour within 200 feet of any dock or shoreline.

This is a hangover from the time when displacement hulls ruled the waves. Those low-riding tubs went plowing along, pushing a big bow wave in front and trolling an immense stern wash out behind. At



THERE ARE such conflicting laws and regulations in many states that a boater is taking a chance if he doesn't have a lawyer along as his guide

speeds above five mph, such a boat was likely to leave dinghies capsized, docks battered and even tall schooners flailing their masts like admonishing fingers.

Not so today. Practically all the small craft that account for today's boating boom have planing or semi-planing hulls. At low speeds they, too, mush along and make waves that rattle the water and sig-alert the fish. But at higher speeds they level off into a smooth, relatively low-wake plane that little more than ripples the water. Boating officials of Nevada and Utah know this and so they simply call for "no wake" operation or "slow-no wake" under some circumstances.

One national boating organization asks, "How can an official prove a boat was 199 feet from shore when the boat operator contends he was 201 feet away? And there is no speedometer accurate enough to make a court case stand up. Why not simply enforce the basic law that the boat operator is responsible for any damage caused by his wake?"

Motors may be run only between 8 a.m. and nightfall.

This is intended to protect resort residents against "excessive noise" but it's about as archaic as three-button spats.

It dates back to the time when an outboard was noisy enough for a machine 10 times its size, an unmuffled monster that bellowed clear into the next county.

But today a big, baffled underwater exhaust, an air intake silencer, a rubber-sealed cowling and neoprene mountings give any except the largest outboard a



LEGISLATORS are setting their sights on boating as a prime target for extra revenue, and in many places the "taxation tiger" is already taking such a bite from the boater's wallet that many may be forced to give up the sport

muted purr that can't begin to match the decibels of dozens of accepted noises.

A law that punishes the current generation of well-bred outboards for the din of its ancestors makes as much sense as a law requiring Klaxon-mufflers on all '65 cars.

A life jacket must be worn while water skiing.

Show that a skilled water skier and swimmer is additionally protected by a life jacket, and win a crocheted surfboard.

Any boat towing a skier must have, in addition to the driver, an observer at least 12 years old.

The driver can be 12 months old; there's no age restriction on him. In some enlightened areas such as Michigan a rear view mirror for the driver is all that's required. In that state a man can take his son water skiing without hauling around a passenger

whose extra weight hardly lets the boat get up to ski speed.

No boat with a marine head allowed on this water supply impoundment.

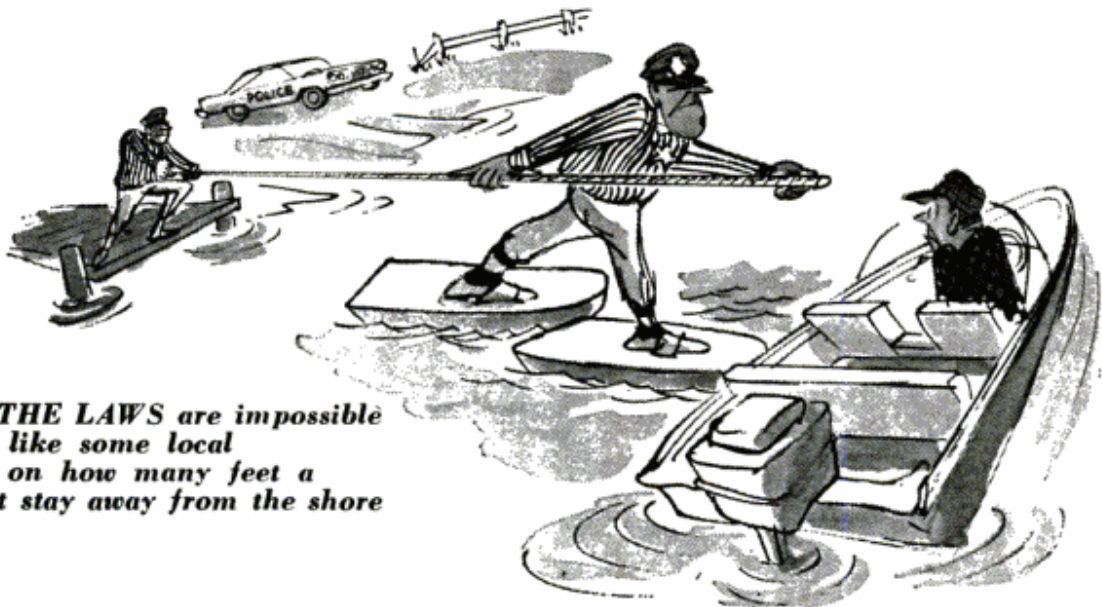
This is undoubtedly anti-pollution motivated, but shucks, is it more sanitary without one?

No motor over 5½ hp may be used.

This outlaws such motors as the Mercury 5.9 or the Elgin 6, as well as all of the new 1965 6 hp models. Yet if you bring any of these "fractional violators" to some waters you damn well row. And this also applies to some lesser known brands, rated at up to 7½ hp at 4000 rpm, a power and speed which most of them couldn't possibly hit with the lower unit disconnected.

Some years ago when Evinrude and Johnson upgraded their 5-hp "fisherman's

(Please turn to page 194)

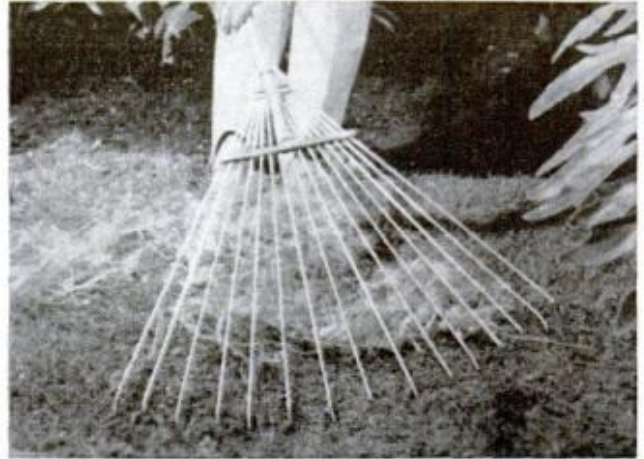


MANY OF THE LAWS are impossible to enforce, like some local regulations on how many feet a boater must stay away from the shore



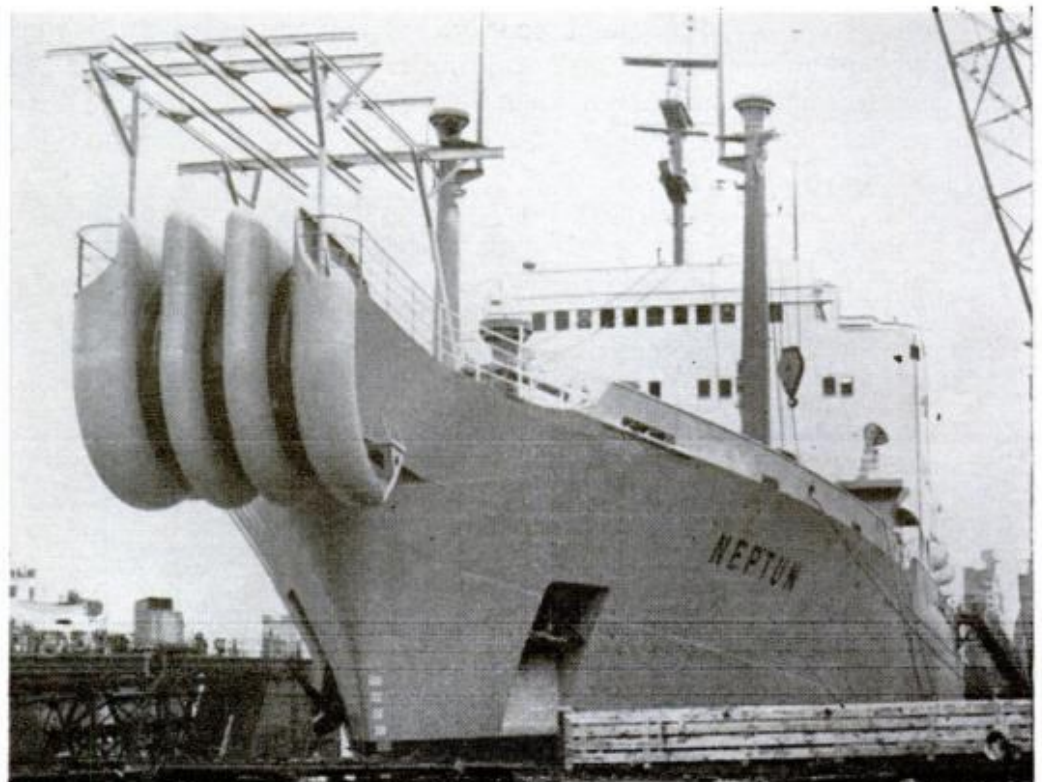
How Tines Do Change!

Sliding a bracket on the handle of this adjustable rake sets the tines for any width from 7½ inches (left) to 22½ inches (below). The Yardgroomer costs \$3.98 in standard model, \$4.98 in deluxe. Robert Sales, 4725 Excelsior Blvd., Minneapolis.



One-Trip Cable Ship

Without stopping, a new West German ship can lay a cable all the way between Europe and America. Five holds in the ship accommodate a whopping 3700 nautical miles of ocean cable more than an inch in diameter. Thus the ship can make one trip across the Atlantic and leave a completed cable behind. The new vessel already has laid a cable between Iceland and Newfoundland.



Peugeot's 204: From a New Mold

With crisper styling, front-wheel drive, and a transverse, overhead-cam Four, Peugeot's new little 204 signals a company departure from old, conservative thinking. Sun roof and front disc brakes (with non-vented rotor) are standard.



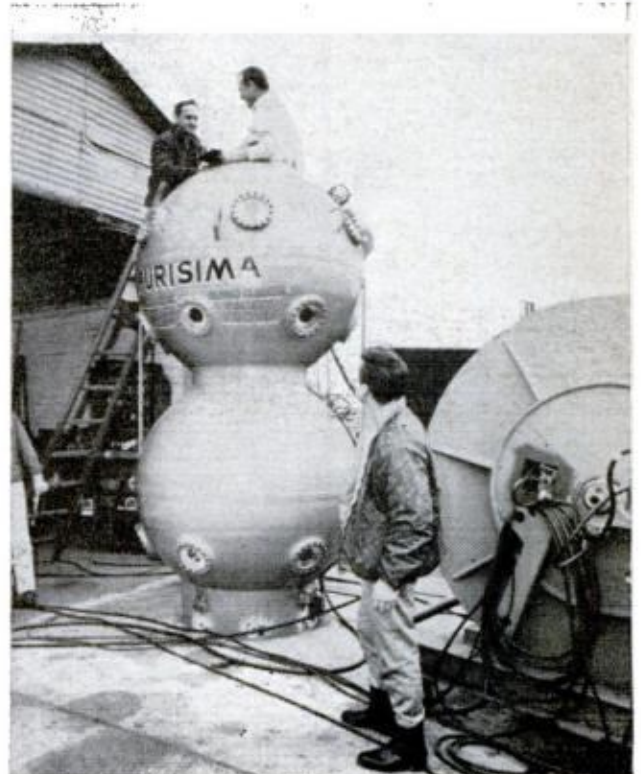
The engine develops 58 hp at 5800 rpm for an unexciting 32.3 pounds per horsepower. The 204 spins around in a 33.2-foot-diameter circle on a 102-inch wheelbase. It's to be imported into the United States but date and price aren't yet known.



Piggyback Diving Bell

The hourglass figure of a new diving bell permits two divers to work together or independently. The *Purisima* consists of one sphere mounted atop another, piggyback fashion, with an airtight hatch between. In addition, each sphere has its own entry

port. Thus a different pressure can be maintained inside each sphere, and one diver can be going through decompression while observing the other at work. Each chamber (inside of top unit shown at left) has its own instruments and tools.



Please Don't

The flowers in your garden shouldn't be on your diet. Some of them pack a wallop. Here's a rogues' gallery of some dainty—and potent—plants

By Nils Nilsson

THE WOMAN was in intense pain when admitted to the emergency room of a Cleveland hospital. The left side of her face was swollen and her speech was thick, almost unintelligible. Examination revealed that her tongue and mouth membranes were so badly swollen that she couldn't swallow.

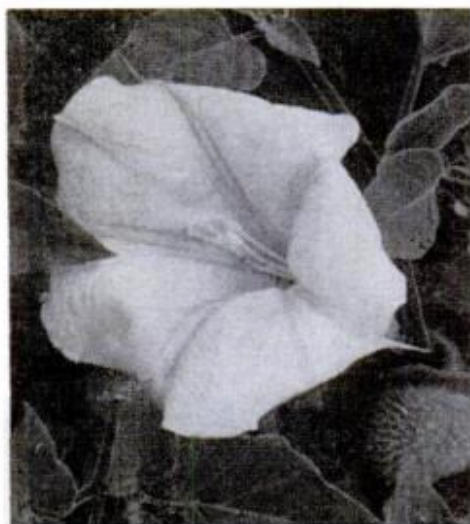
Was this the dramatic onset of a virulent disease? Not at all. The woman had fallen victim to as commonplace a thing as a house plant.

Stumbling over her words, she admitted that early that afternoon she had bitten into the stalk of a dumbcane plant. She said she had spit out the pulp and juices almost immediately and hadn't swallowed anything.

(Dumbcane is not an exotic growth. It sprouts in many a living room and is favored as a decoration for somber hotel lobbies. It grows from three to six feet high and has elongated green leaves that may be spotted or streaked with white or shades of green. Its scientific name is *Dieffenbachia seguine*.)

Just what had impelled the 40-year-old woman to nibble on the plant isn't stated in the medical report of her case. Perhaps it was simply curiosity—to find out if the plant lived up to its unusual popular name. If so, she learned that dumbcane can make a per-

ALL PARTS of the yellow oleander are said to be toxic. Blossoms are yellow or dull orange and about two inches in length



Eat the Oleander

son quite speechless, at least temporarily.

The flesh of the plant contains small needlelike crystals of calcium oxalate, which cause an intense irritation of mouth tissues. Though painful, the condition isn't dangerous unless the tongue swells so much that the air passages of the throat are blocked. In the Cleveland case, the woman was fully recovered within a couple of weeks.

Dumbcane is not the only nasty plant you may be nurturing in your home or in your garden. Take a walk around your house and you're likely to find at least half a dozen plants that could fell you and your children if their leaves or fruit were ingested.

That is not to say that many deaths

occur this way. Far from it. But, say health experts, some deaths in this country are attributable to the ingestion of toxic plants. Accurate statistics do not exist.

Still, there are many plants that can make an adult sick and cause a child to become dangerously ill. It isn't the intention of this report to provide you with a list containing every plant known to be toxic—that would be impossible—but to make you aware of the problem.

In your walk around your garden you may well encounter a daffodil, narcissus or other lily-like plant. They're all bulbous plants and the bulb is the potent portion. It contains chemicals that produce nervous symptoms and extreme digestive

FRAGRANT lily-of-the-valley contains a compound similar to digitalis, a heart stimulant. It also acts as a purgative

OLEANDER, a common shrub, contains a drug that affects the heart and respiratory system. One leaf can be lethal to child

JIMSONWEED produces big white flowers and the basic ingredients of a powerful drug that can paralyze the motor nerves





CASTORBEAN seeds are extremely potent. Only a few of them may be a fatal dose for an adult. Though tropical, the plant is grown as an annual in the North, the seeds often being sold at supermarkets

distress. During World War II the Dutch tried feeding cattle with bulbs during a feed shortage. The result was a lot of sick cows.

Lily-of-the-valley is a well-established favorite for both house and garden. It has white, bell-shaped flowers and a sweet fragrance. Look at it and sniff it, but don't eat it. It contains a drug similar to digitalis, the heart stimulant, and is also irritating to the digestive tract.

And while we're on the subject, where do you think digitalis comes from? From the foxglove, of course. Foxglove (*Digitalis purpurea*) is an ornamental plant that grows from two to five feet high and has purple flowers. The drug is prepared mostly from the leaves.

Another plant that contains a compound that affects the heart is oleander (*Nerium oleander*). A leading authority on toxic plants warns that a single leaf can be a lethal dose for a child.

Oleander is a common outdoor shrub in the warmer parts of our country and is grown as a house plant up North. It may grow as high as 10 feet and can have pink, white, copper or dark-purple flowers.

Here is a list of other plants to be wary of:

- **Gloriosa** or climbing lily (*Gloriosa superba* L.) is a slender plant that grows from five to seven feet tall and has yellow and yellow and red flowers. It's native to Asia and Africa but is widely used as a garden flower in states such as Florida. All parts of the plant are poisonous and can cause diarrhea and nausea; a

feeling of numbness in the lips, tongue and throat; giddiness and loss of power in limbs, and convulsions and loss of consciousness.

- **Milk Bush** (*Euphorbia tirucalli* L), also known as pencil cactus, malabartree, euphorbia. A native of India, this plant is grown in our warmer states. It is a shrub or many-limbed tree that can reach 15 feet. It has small oval leaves, one inch or less long, and produces small, inconspicuous flowers. Its milky sap contains a substance that is quite irritating to the skin of many people. If eaten, the plant parts are reported to be poisonous.

- **Mountain Laurel** (*Kalmia latifolia*) is a bushlike shrub that grows to five or six feet and has sweet-scented white to rose flowers. It can be found in many parts of the country. The Delaware Indians used laurel to commit suicide. It contains a compound that produces nausea and vomiting, depression, difficult breathing, prostration and coma.

- **Jimsonweed** (*Datura stramonium*) has a related species known as angel's trumpet or Gabriel's trumpet (*Datura suaveolens* H. & B.). Jimsonweed grows wild, but the angel's trumpet often is found in gardens. It has large, white pendulous flowers. Both species contain atropine, a drug that paralyzes motor nerves and can produce respiratory and heart failure.

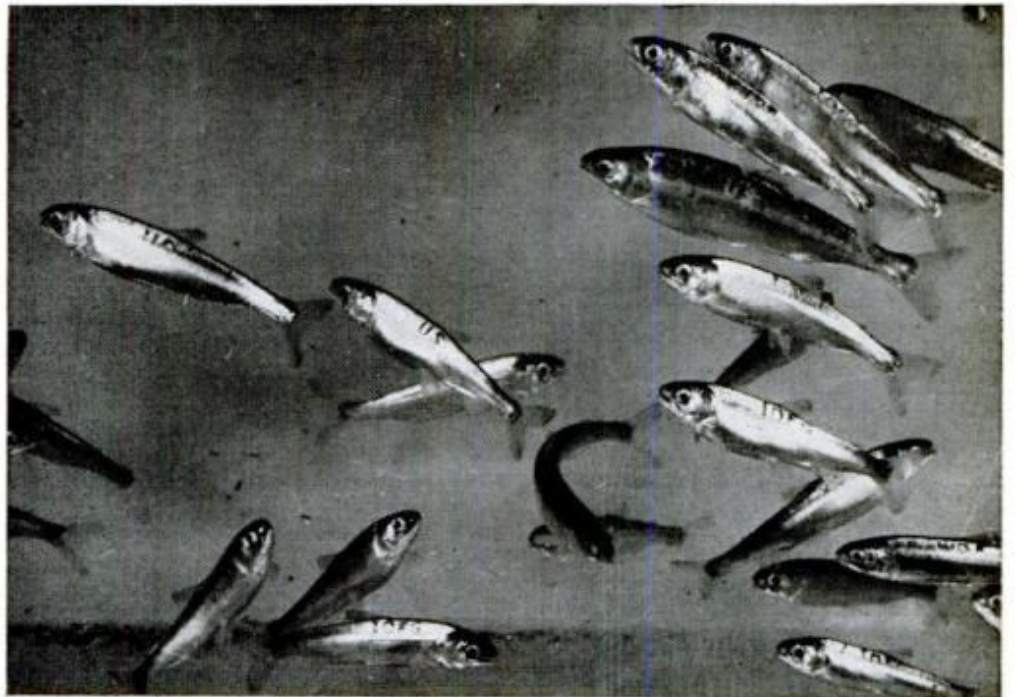
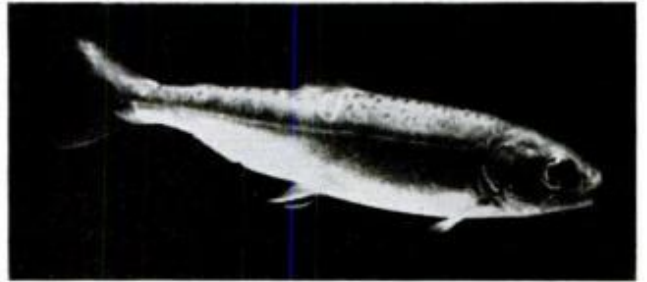
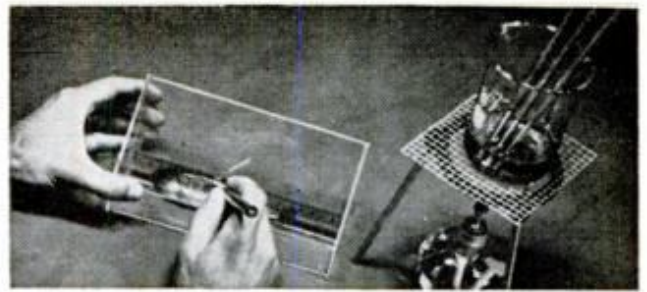
- **Wisteria** (*Wisteria* species) is a tough vine that grows in many sections of the country and produces clusters of showy

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

Brand-New Brand

A new method for marking salmon fingerlings is much like cattle branding.

With a rod heated in water, serial numbers are burned on each fish (top photo). The fish at right displays a six-months-old brand, and those below were marked three months earlier. The work is that of U.S. Bureau of Commercial Fisheries.



Inside Track

Indoor cycling on your own bicycle is possible with the new Roller Cycle. Just place your bike on the folding roller unit, climb aboard and start pedaling at whatever speed that suits you.

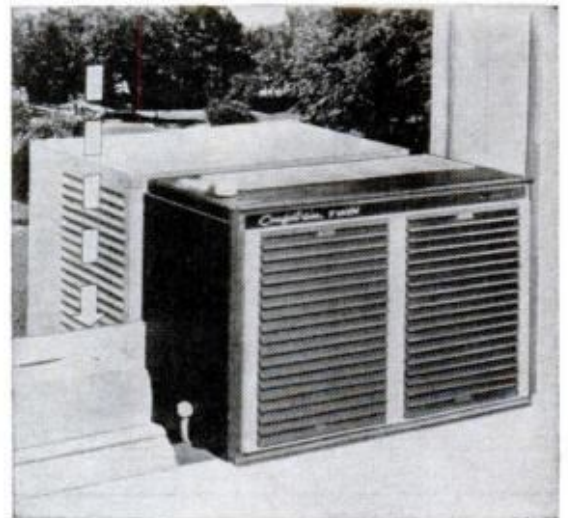
Like regular cycling, it develops your sense of balance and helps keep you fit. The Roller Cycle sells for \$69.99 f.o.b. Johnson Kart Co., 4918 N. 32nd St., Milwaukee, Wis.





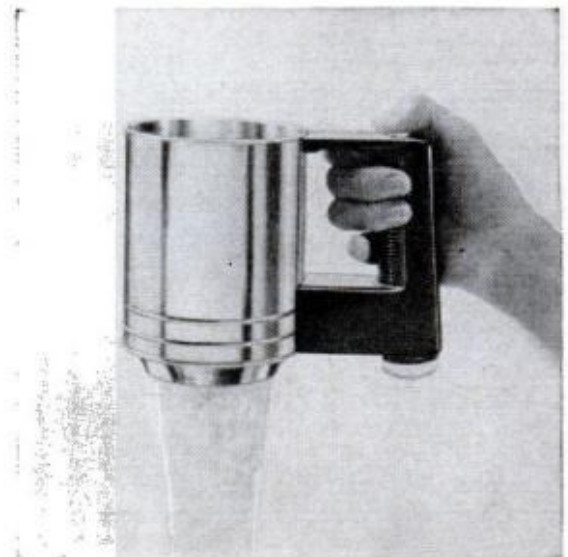
ELECTRIC BACK SCRATCHER and massage set lets you do it yourself. Remove back scratcher, snap on desired part (for scalp, face, body or feet), plug in, relax under vibrating action; \$11.95. All-over Clipper, 1745 Flett, Racine, Wis.

AIR CONDITIONER houses compressor system outside, a circulation fan inside. Unit anchors on sill and operates while window is closed (noise stays outside). Aluminum conditioners start at \$170. By Heat Controller, Jackson, Mich.



CARRIES LIKE A LADDER, acts as scaffold, sawhorse or platform. Aluminum unit weighs 27 lbs., includes extension legs, rail, knee braces, folds to form 48 by 8-inch platform. \$48.40 f.o.b. U.S. Metalite, 1800 Canal, Lafayette, Ind.

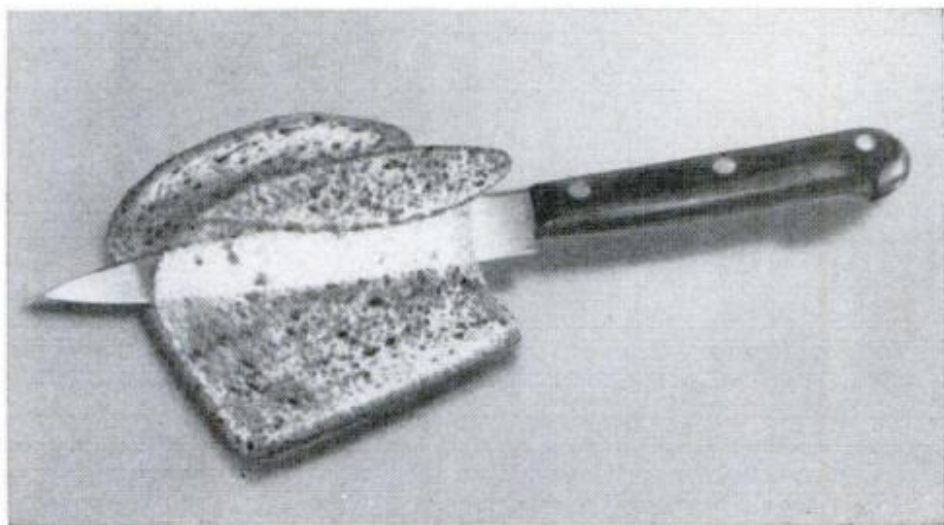
CORDLESS ELECTRIC SIFTER takes squeeze and cramp out of sifting. Press button and dry ingredients are sifted quickly (and silently due to nylon gears). Two C batteries run \$5.35 stainless unit; Hammacher Schlemmer, N.Y., N.Y.



NEW FOR YOUR HOME

By Marion Morey

HERE IS A KNIFE with blades of high-carbon cutlery steel that will cut a wafer-thin slice of bread, turkey wing or hunk of cheese. Handles are of laminated wood and the tang extends the full length. Wedge-honed by hand, the blades also have a stain-free finish. Four basic kitchen knives—utility, cook's, slicing and paring (shown below)—plus a handy magnetic rack cost \$19.95 from Breck's, Comus Div., 765 Breck Building, Boston, Mass.



PATIO WARMER converts quickly into barbecue when 2-piece stainless steel grill is set on top of the coals. Rubber-tired wheels make the unit easy to move from garage to terrace, etc. Both 32 or 42-inch-across models burn large firewood, Presto logs or briquets. Made of heavy gauge steel and finished in matte black or red porcelain, the warmer starts at \$39.50. It's offered by the Condon-King Co., 5611—208th S.W., Lynwood, Wash.

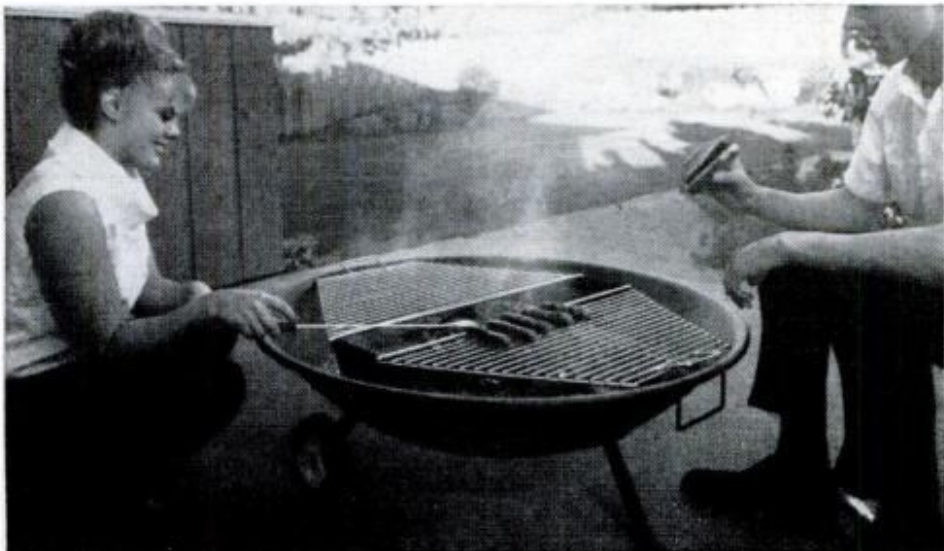
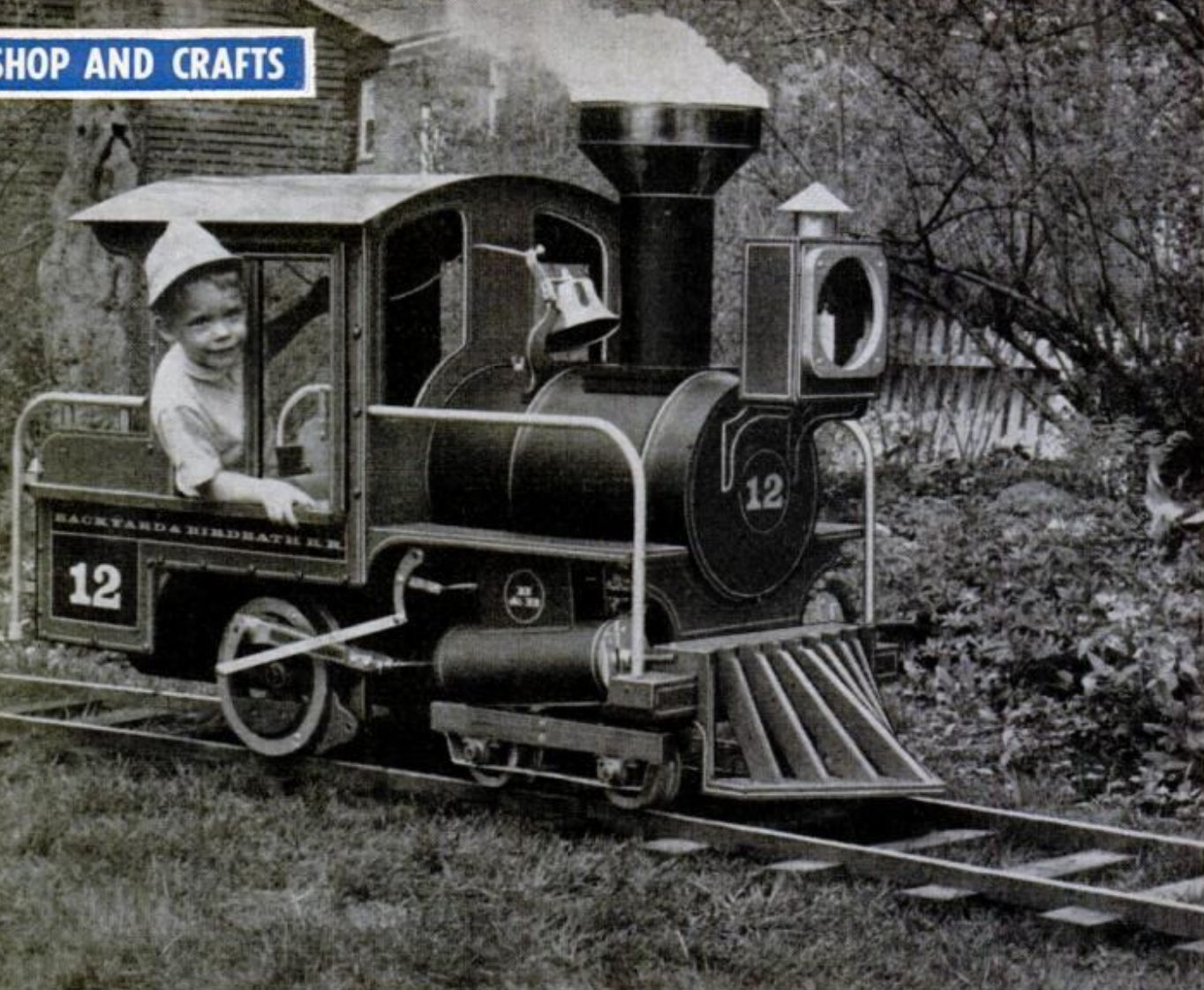


TABLE LAMP 13 inches high provides direct and back-ground light, using frosted version of 12-volt bulb. Base contains transformer. Tensor Corp., 333 Stanley Ave., Brooklyn, N.Y., offers it for \$14.95.





Backyard & Birdbath R.R.

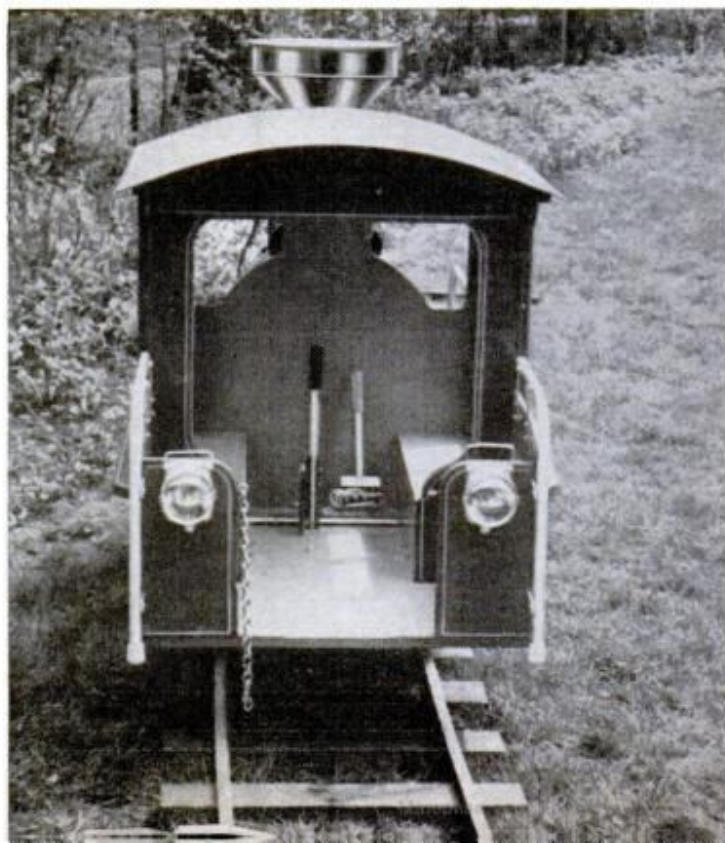
By W. Clyde Lammey

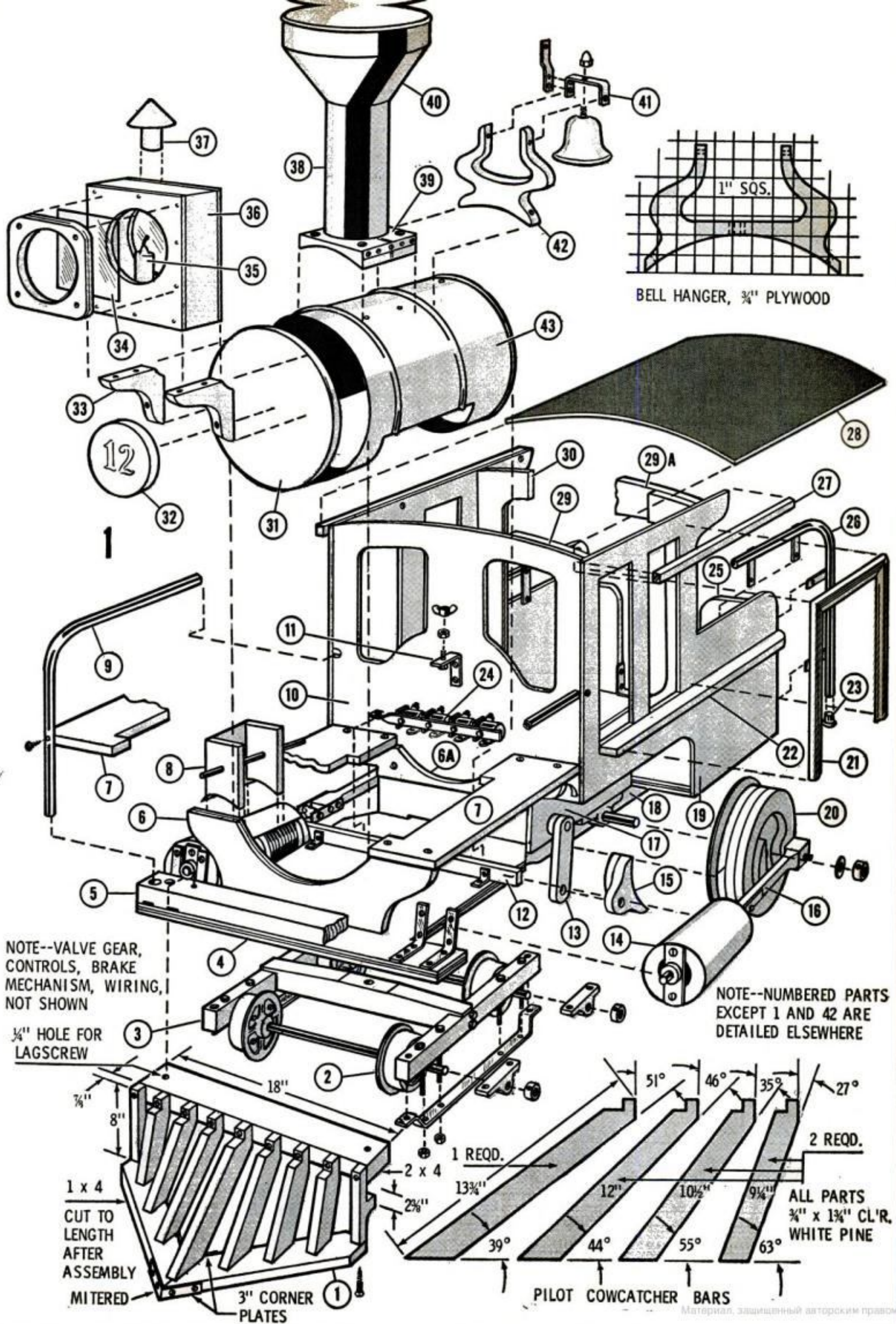
ROBERT WOOLSON, Chicago TV advertising man, could easily qualify as the little old toymaker, but to him designing and building playthings for children is little more than just a fascinating hobby.

To his growing list of popular back-yard toys which have appeared in *PM* (you'll certainly recall his *Sidewalk Classic* car, page 146, Nov. '63 *PM*), he now adds this delightful replica of an old-time steam locomotive—the cutest thing on rails for small-fry engineers.

The smoke from its milk-strainer stack is no tip-off as to what makes it start, stop and reverse, or what keeps it chugging along on its 1 x 2 track at a merry 5 miles per, with all the realism of the real thing;

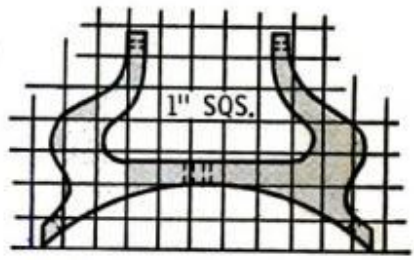
THIS INTERIOR VIEW of the cab shows the brake and "throttle" levers. Actually, the engine has but one speed, the throttle is a forward and reverse switch





NOTE--VALVE GEAR, CONTROLS, BRAKE MECHANISM, WIRING, NOT SHOWN

NOTE--NUMBERED PARTS EXCEPT 1 AND 42 ARE DETAILED ELSEWHERE



BELL HANGER, 3/4" PLYWOOD

3/4" HOLE FOR LAGSCREW

1 x 4 CUT TO LENGTH AFTER ASSEMBLY MITERED

3" CORNER PLATES

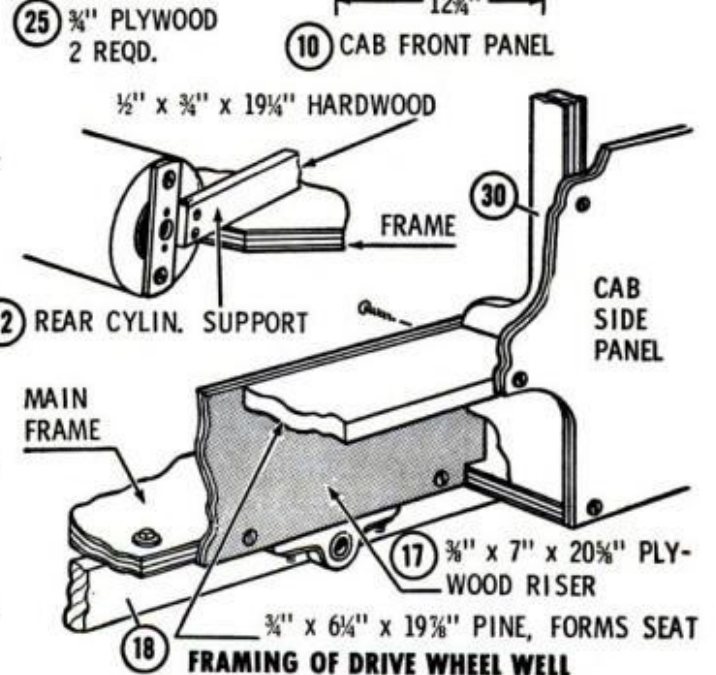
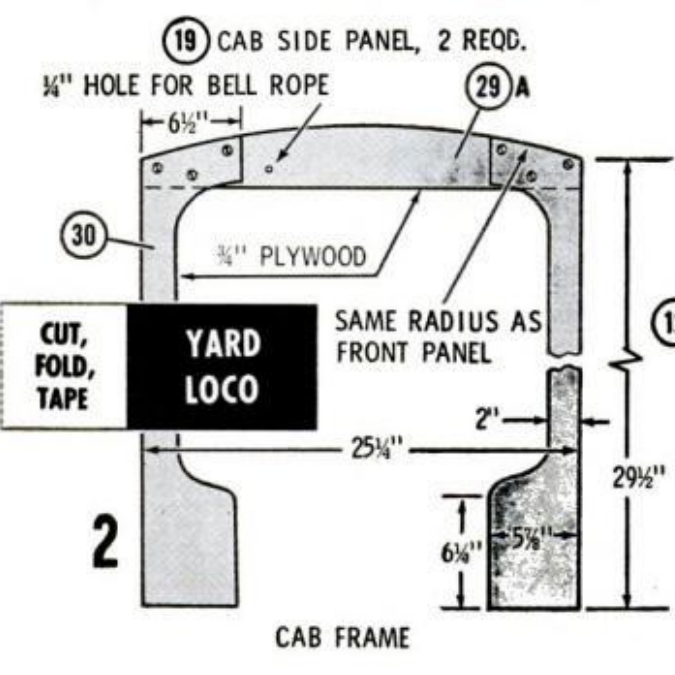
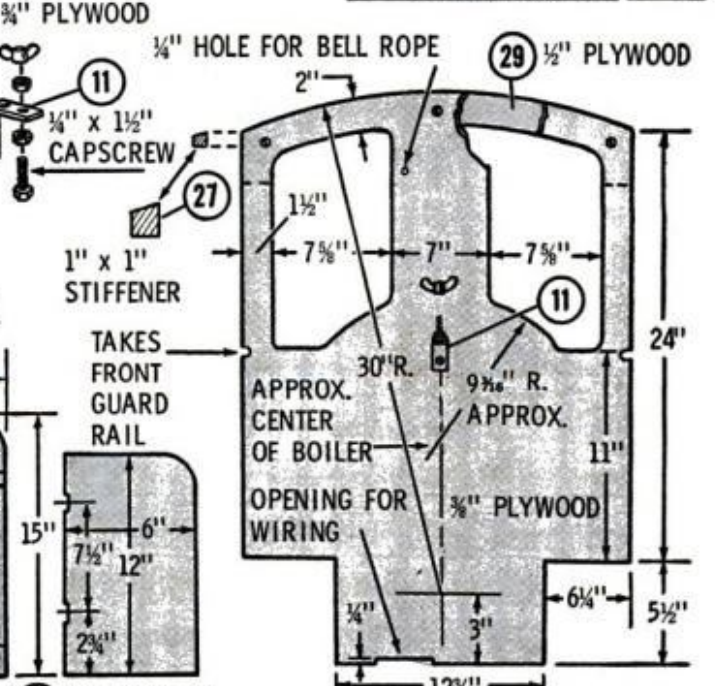
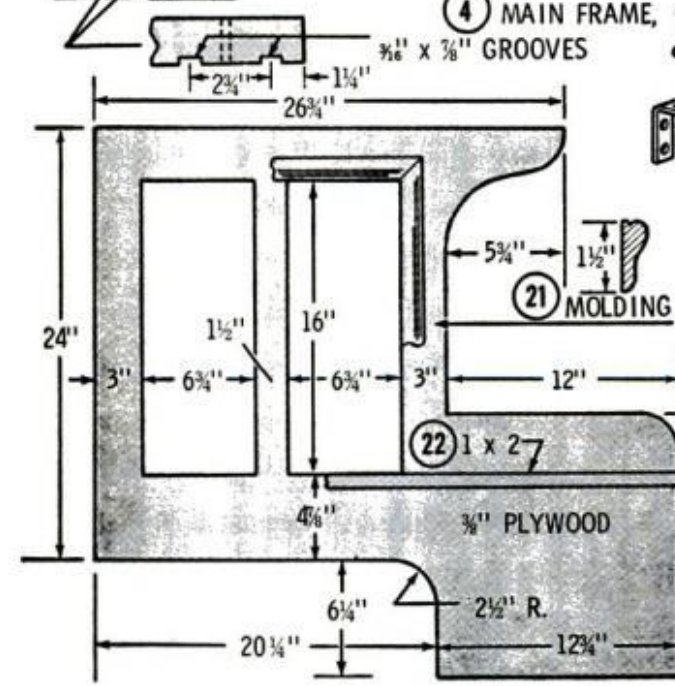
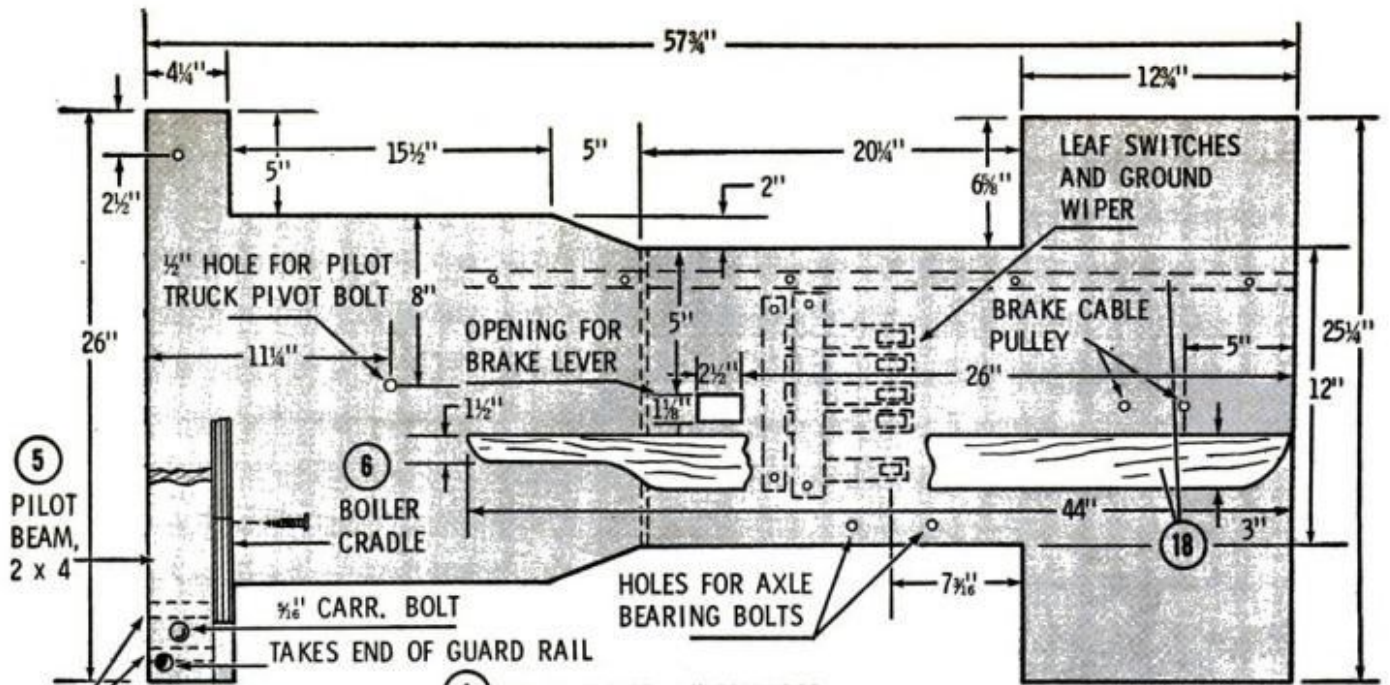
1 REQD.

2 REQD.

ALL PARTS 3/4" x 1 3/4" CL'R. WHITE PINE

PILOT COWCATCHER BARS

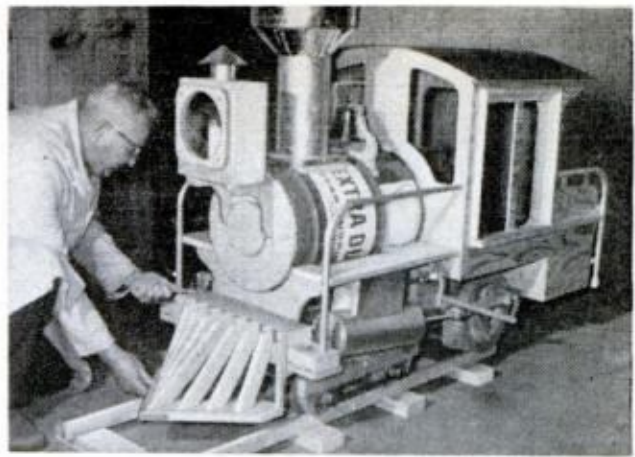
Material, защищенный авторским правом



the push-pull pistons operate the drive-wheels in true engine fashion, but they're not powered by steam. The secret?—a couple of king-size solenoids which are energized by two auto batteries hooked in tandem and hidden under the hinged oil-drum boiler. As for safety, there's a hand-brake that will stop the engine in less than a half turn of a wheel.

Much of its eye appeal can be credited to Dade Ellison, a friend of Woolson, who picked the dashing colors and painted and trimmed the model you see on our cover.

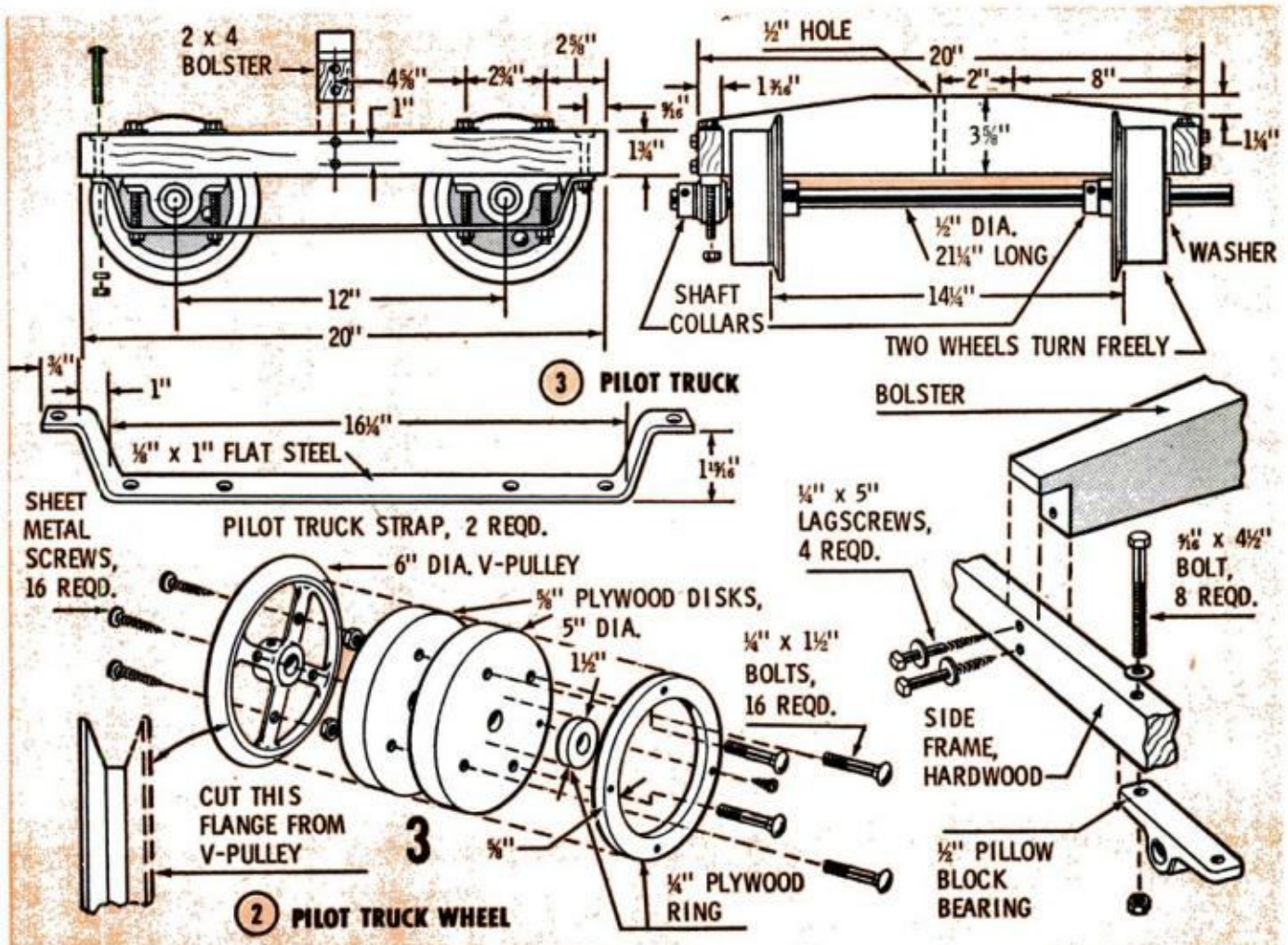
Dad, of course, is in for some fun too in building it and he can get a good idea of the basic construction from the exploded view in Fig. 1. You can pick up everything you'll need—except the electricals and a few odds and ends—from your local hardware and lumber dealers. The first step is to cut out the frame from a piece of plywood and this should be no problem as you'll see from Fig. 2. Only the through holes and an opening are shown; the holes you will later drill for screws are not shown, as it's best to locate these at the time of placement of the parts. Notice that there are two stiffeners, or stretchers, under the frame, the rough location of one shown by dotted lines. These parts should be cut from hardwood. Before attaching them, locate the pillow block bearings

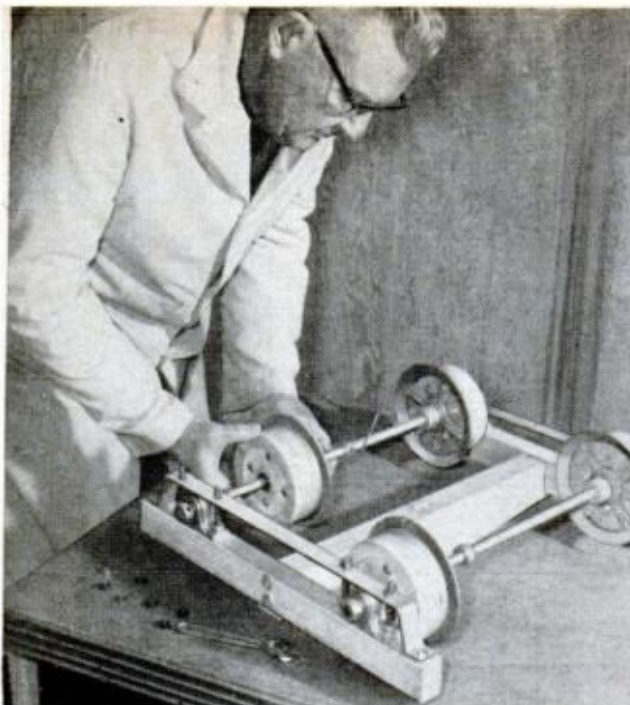


READY FOR PAINTING, here is what your locomotive will look like in the raw. Final step in construction is attaching cowcatcher. Base is short track section

for the driver axle and bolt temporarily in place so that you can locate the holes in the stretchers for the axle.

Next step is building the pilot truck, Fig. 3. Note first the construction of the flanged wheels. Each wheel consists of a V-pulley, two plywood discs and a plywood ring assembled with bolts and screws. Cut one flange off the V-pulley, assemble the sandwich—and there you are: a perfect, flanged rail wheel approximately 5 in. in diameter. Of course, the parts must be made with care so that you

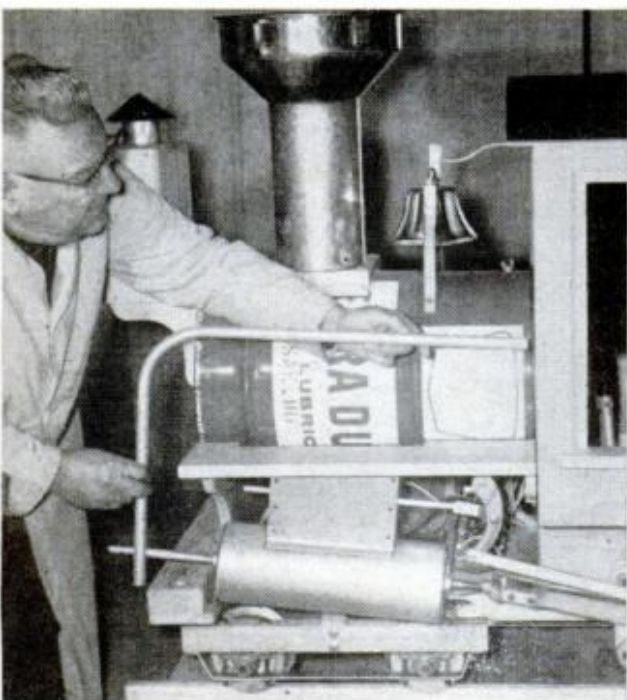




TWO TRUCK WHEELS are collared on axles so they can turn freely to reduce rolling friction and eliminate drag on curves. Allow slight endplay in assembly

obtain a true running wheel. Although the diameter of the discs is given as 5 in. (the usual diameter of a 6-in. V-pulley at the bottom of the V-groove), it's a good idea to check this diameter before cutting the discs, as there may be some variation. The truck frame construction is simply a matter of cutting the parts accurately. But note the $2\frac{3}{4}$ in. spacing of the bearing holes. This dimension may vary, so check up before you drill the holes for the bearing bolts in both the frame pieces and the

WHEN ASSEMBLY is reduced to placing front guard rails you're nearly ready for trial run. Rails are fastened at three points: cab, catwalk and pilot beam



122

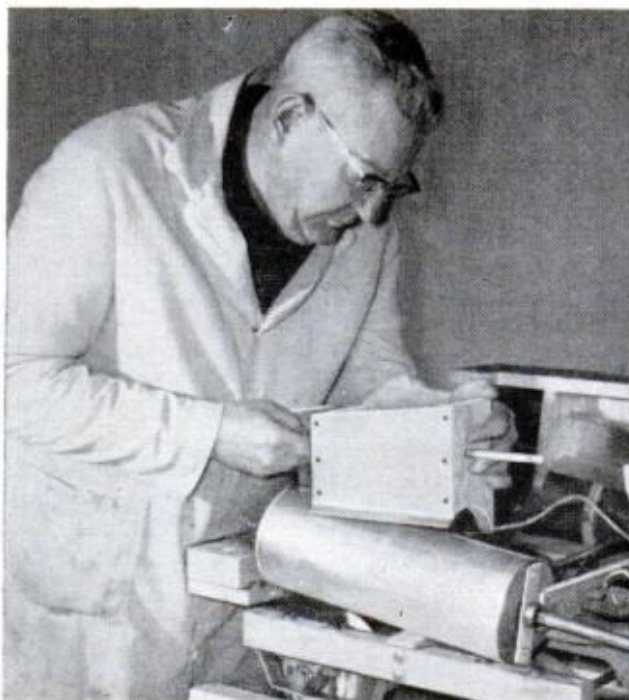


CYLINDER COVERS are light sheet metal rolled to provide friction fit over coil ends and separators. Dummy steam chests hold covers securely in place

straps. Note also that two wheels are collared on the axles so that they can turn freely in rounding a curve.

The drivers, Fig. 4, are made in much the same way, except that each wheel is spoked and fitted with a dummy counterbalance. Make sure that you drill the holes for the axles and crankpins (or siderod pins) on $3\frac{7}{16}$ -in. centers to give a stroke of just $6\frac{7}{8}$ in. Also, before assembling each wheel, drill and tap the hub of each V-pulley to take a second setscrew as in-

PRE-ASSEMBLED PARTS should be trial-fitted before final placement. Steam chest attaches only to catwalk and must be prefitted before final assembly

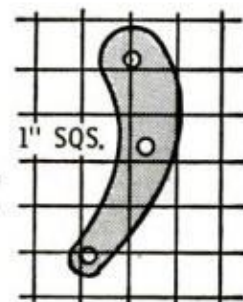
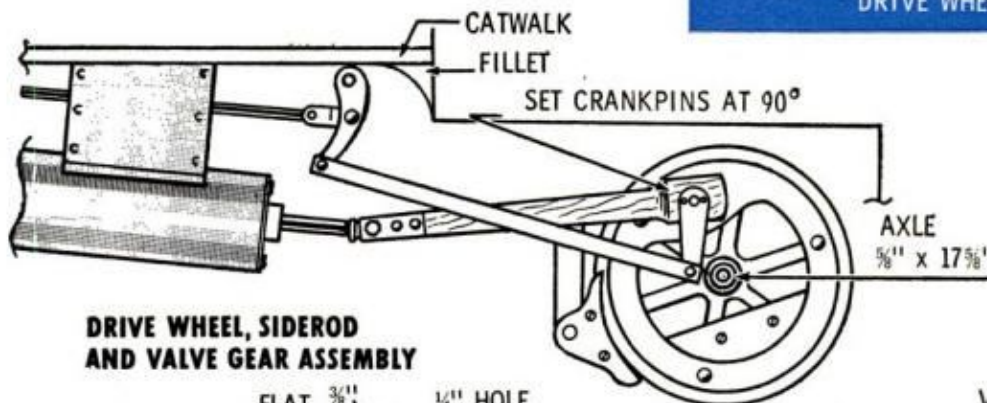
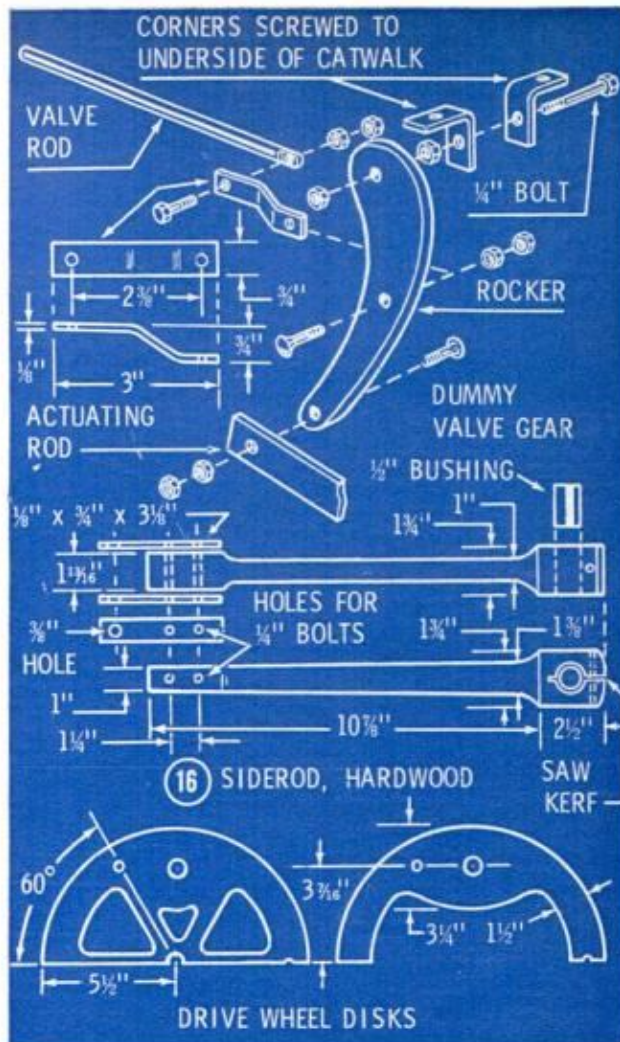


POPULAR MECHANICS

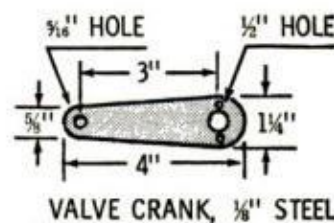
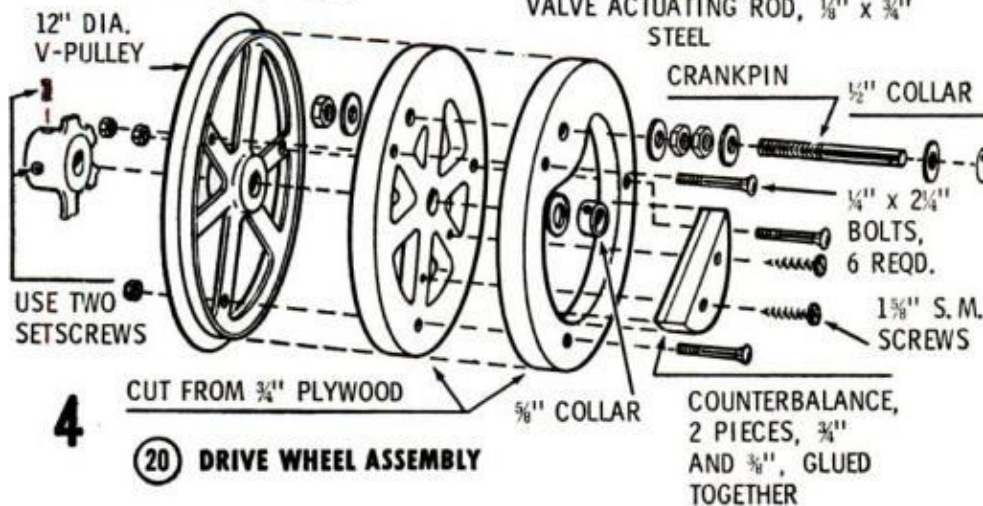
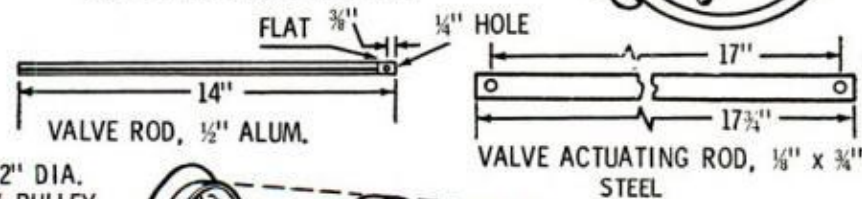
icated. When assembling on the axle, spot-drill the latter for the points of the setscrews and turn the screws up tightly. This will prevent the wheels from shifting on the axle when in operation and throwing the crankpins off the 90° position. It is not necessary to turn the wheels to size. Just use care in bandsawing them round.

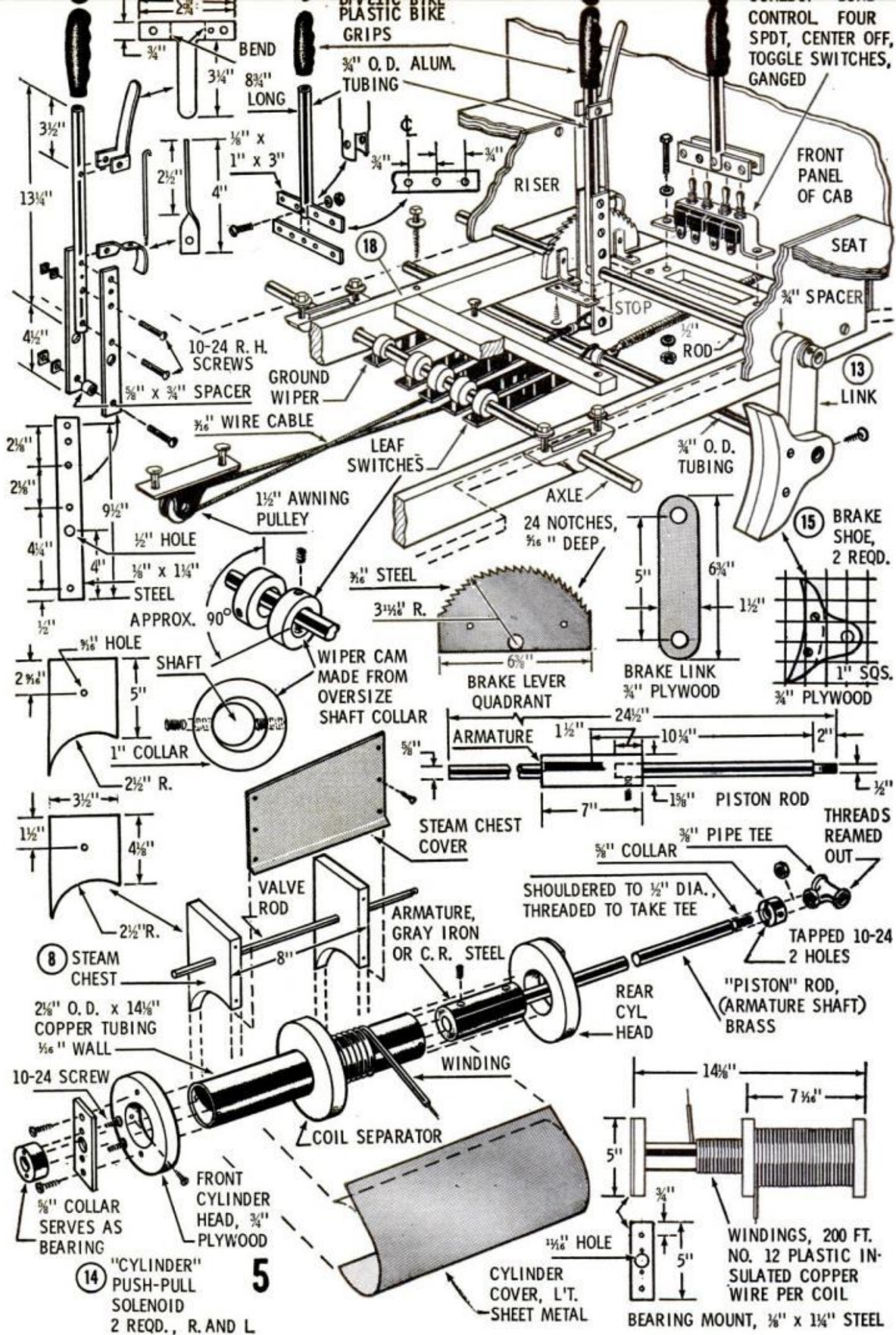
Note especially the assembly of the crankpin in Fig. 4 and the method of riveting the valve crank to the collar, which serves the twofold purpose of holding the big end of the siderod in place and of anchoring the valve crank in the proper position on the pin. Use care in drilling the holes for the rivets in both the valve crank and collar to get them in register, then countersink the holes so the upset ends of the rivets won't protrude.

Fig. 4 also details the dummy valve parts and the siderods and while these may be made at this stage, they are not assembled until later on in the construction. The valve rocker was originally made from plywood but you can also make it of aluminum or 1/4-in. hardboard. Use straight grained hardwood for the siderods and fit the big ends with an oilless bushing as indicated. To hold the bushing in place and prevent chance splitting of the big end of the rod, saw-kerf the end and drill for a



VALVE ROCKER, 3/8" PLYWOOD (OR 1/8" ALUM)

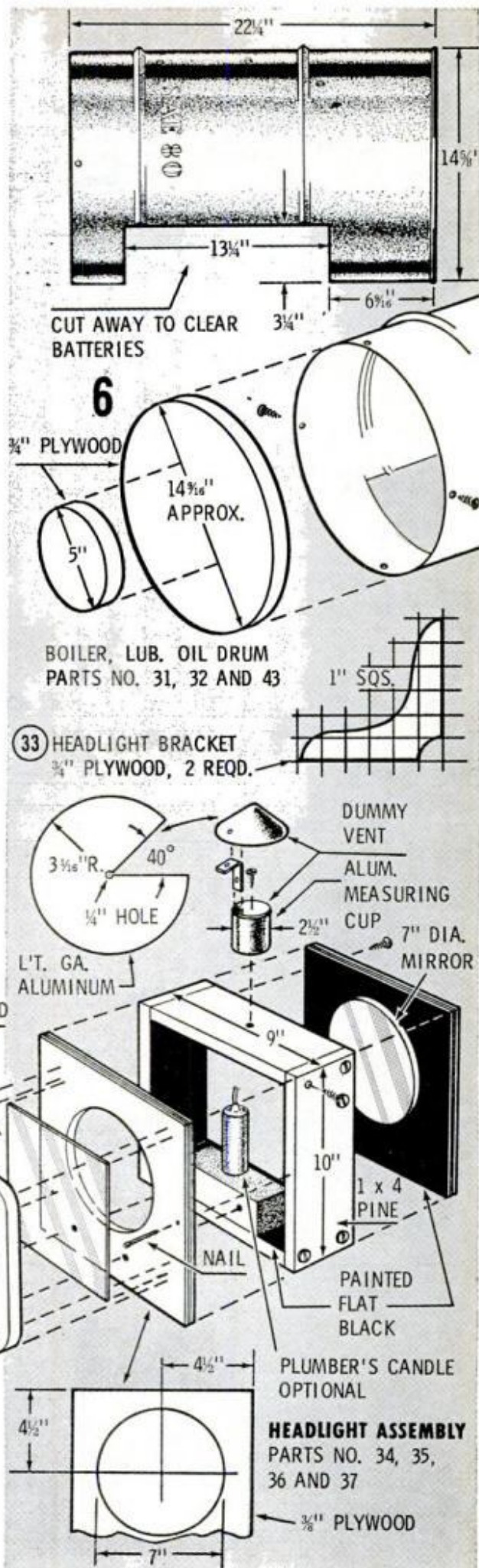
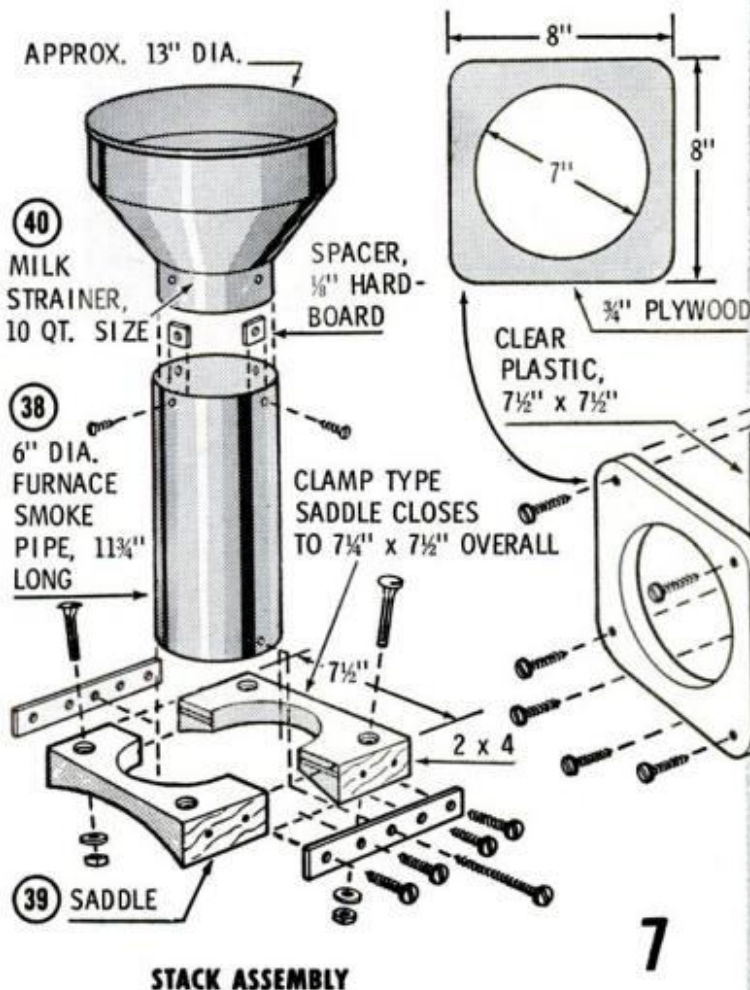


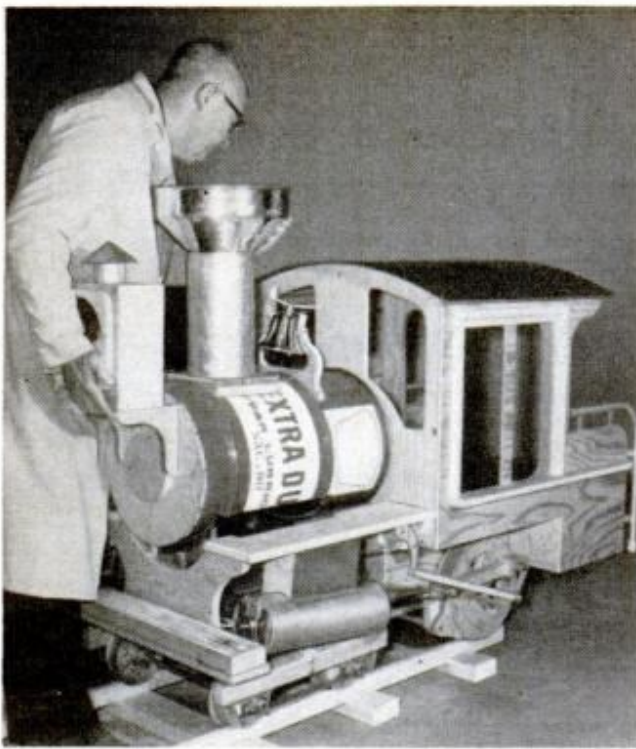


small bolt or rivet as detailed. Plywood parts for the cab, front and side panels and the cab frame member may be cut at this time but shouldn't be completely assembled until the cylinders (solenoids) and other electricals are installed, since placement and attachment of the latter is made easier when the frame is clear. Note in the lower right-hand detail in Fig. 2 the framing of the drive wheel well. The riser and seat serve as anchor parts for the cab panels and frame members.

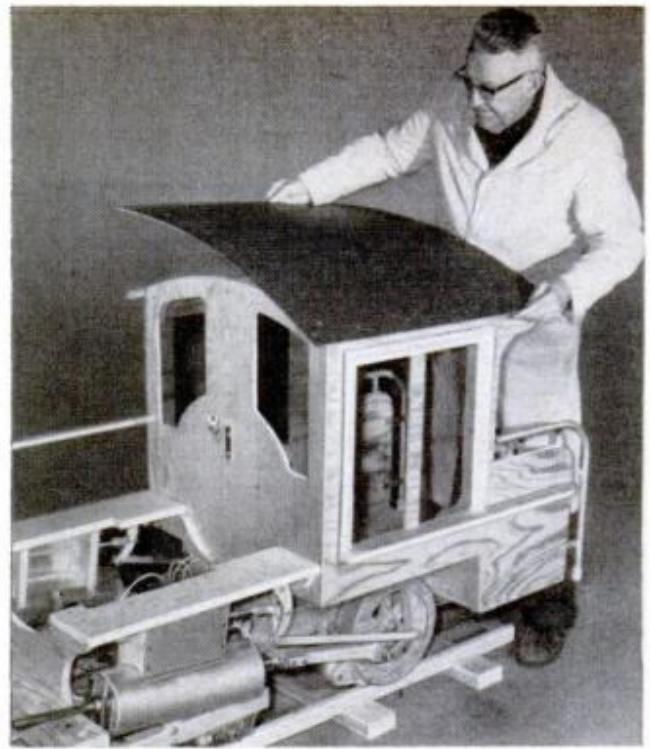
When joining parts wood-to-wood or metal-to-wood, use sheet metal screws with binder heads. These turn in easily and hold more securely in fir plywood. The binder heads also make a neat assembly job and are especially attractive as fasteners wherever visible.

Now that you have the pilot truck, drive wheels and frame ready for assembly, you're ready to tackle the cylinders (solenoids) and the control assemblies. Note first in Fig. 1 that the front ends of the cylinders are held in place by pairs of 4-in. inside steel corners and that the rear ends are supported by a cross member, Part No. 12 in Figs. 1 and 2. Assembly of the cylinders (solenoids) is shown in the lower details, Fig. 5, and assembly of the controls in the upper details. Be especially





BOILER ALSO, with headlight, stack and bell in place, should be trial-fitted to determine placement of clamping bolt which is attached to front of cab

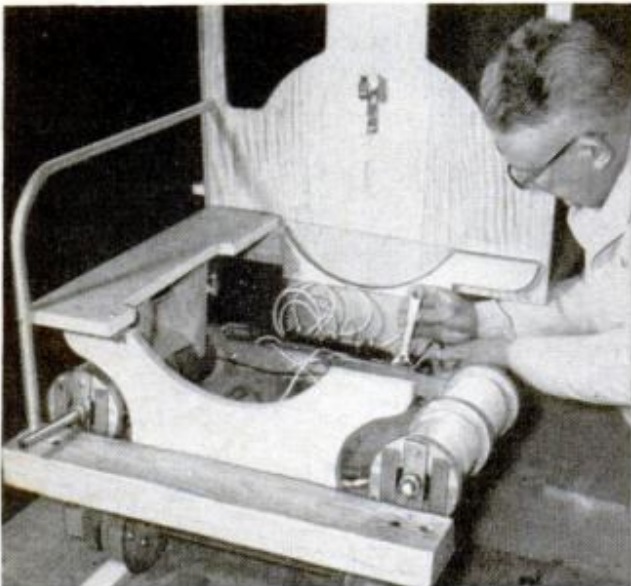


HARDBOARD ROOF finishes the cab. Note beveled strip along each side of cab which serves as stiffener and as anchor strip for screws holding cab roof

careful when winding the solenoid coils to get the same amount of wire on each and to end up with a neat, level winding. Note that the armature is end-drilled to take the ends of the two-piece piston rods, which are held in place with headless setscrews. Top ends of the setscrews must be flush or just below the surface of the armature when turned in. Spot holes near the ends of the rods to take the setscrews. Ordinary shaft collars serve as bearings, and these must be positioned so that the armature will center in the copper core.

Before the cylinders are mounted, turn the frame upside down and place the main

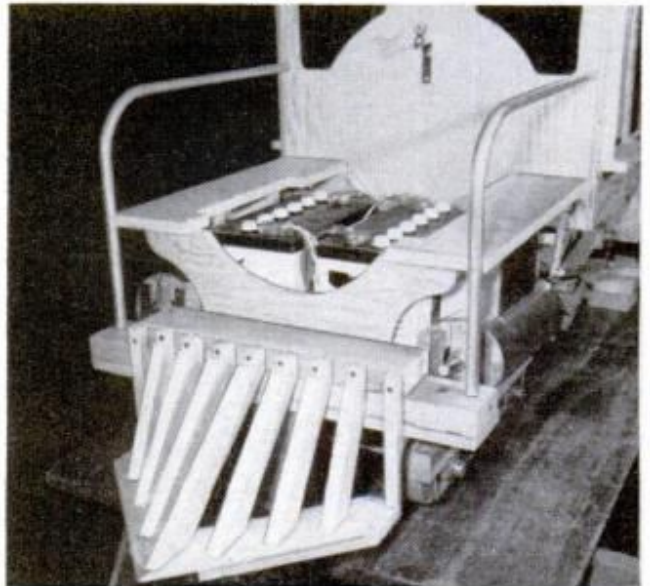
REMOVAL OF PARTS after trial fitting makes wiring job easier. Here the cab side, catwalk, rail and steam chest have been removed for access to electricals



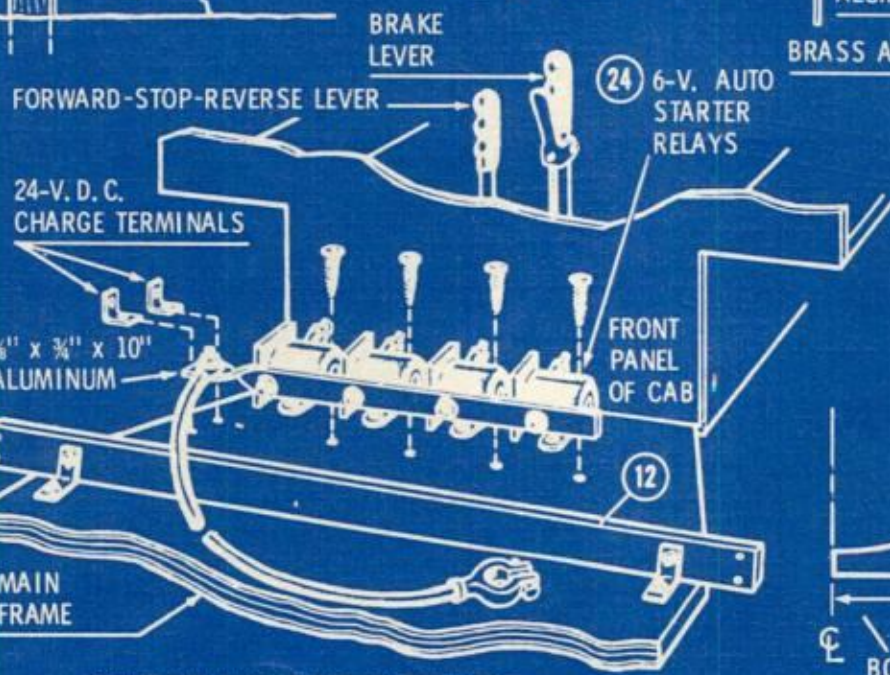
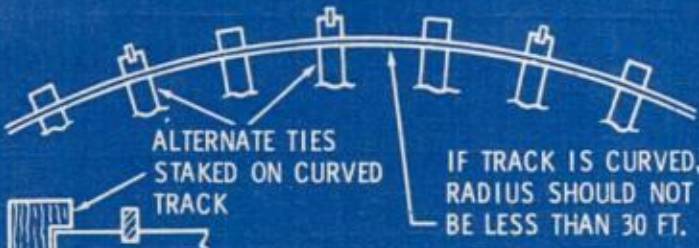
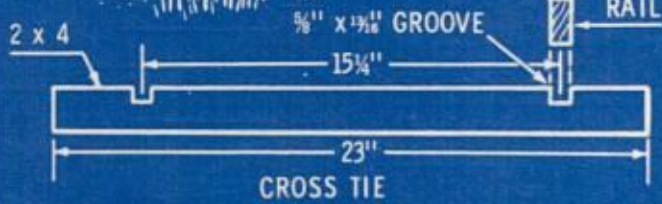
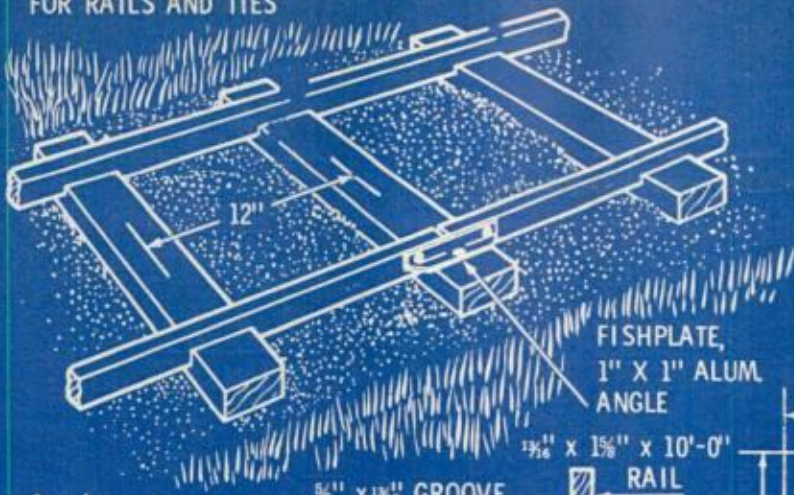
axle, starting it through one bearing and a stretcher, then placing the five wiper cams on the axle before sliding it through the second bearing to its final position. Next, fit the risers (upper details in Fig. 5) and locate and drill holes for the rod carrying the brake lever and brake links. The rod should center over the opening for the lever. Then make the lever as detailed, the quadrant, which can be made from flat steel as indicated or 1/4-in. hardboard, and the links and spacers. Assemble all the parts as indicated, but don't add the brake shoes until later.

Center the four wipers on the axle,

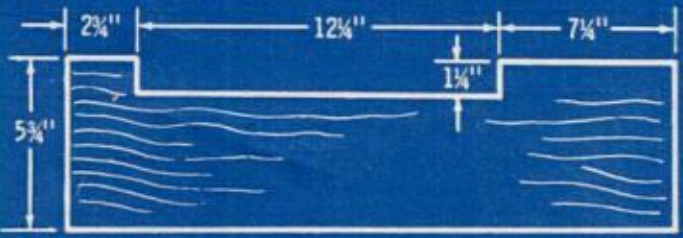
READY FOR TRIAL, even without the boiler, with batteries in place and all connections made. Coat all wood with suitable plywood sealer before painting



NOTE--IF TRACK IS LAID PERMANENTLY ON GRAVEL OR SAND BALLAST, USE TREATED STOCK FOR RAILS AND TIES

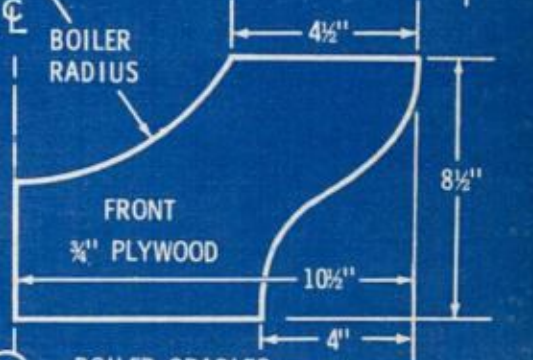
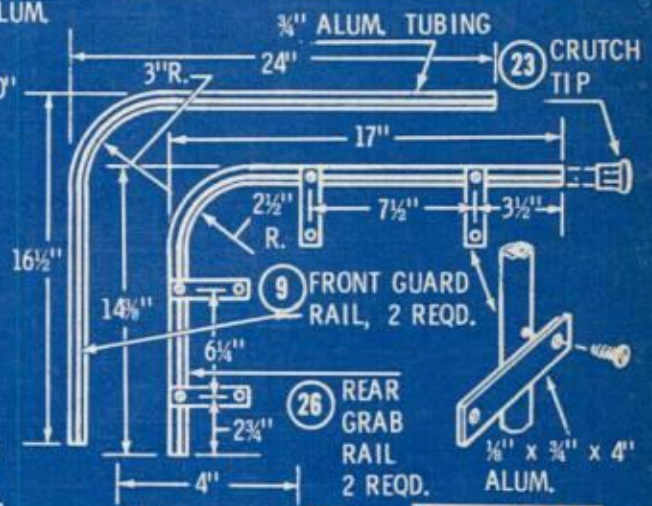


ASSEMBLY AND LOCATION OF RELAYS



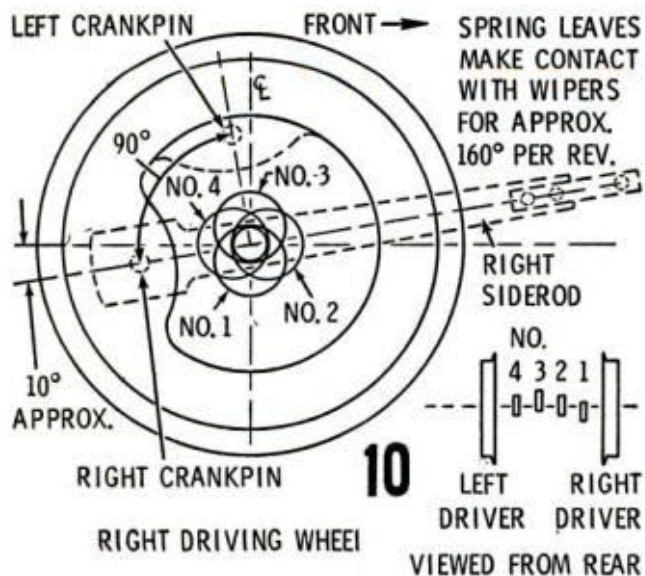
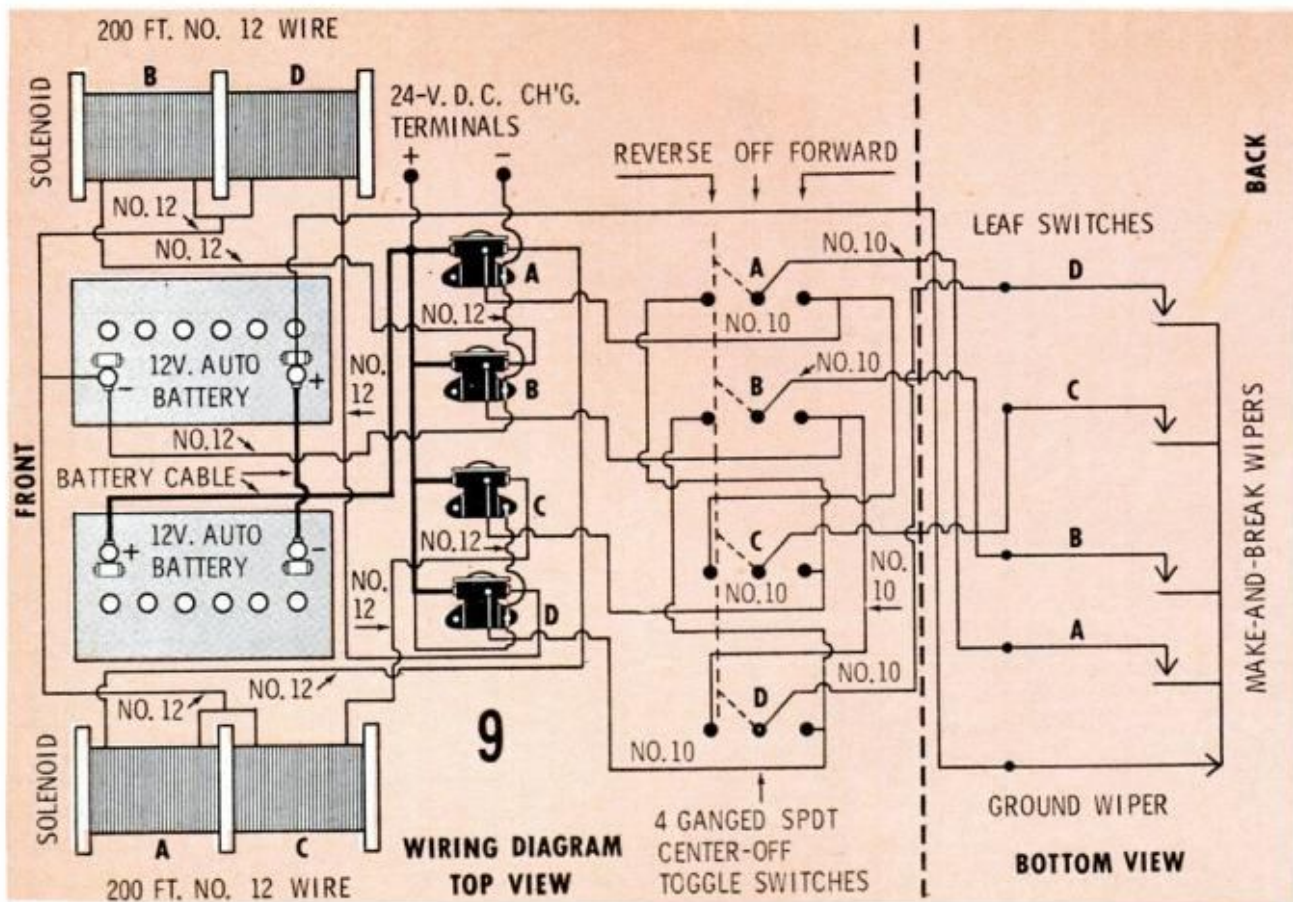
7 CATWALK, 3/4" PINE, 2 REQD.

28 CAB TOP, 1/4" X 29" X 30 3/4" TEMP. HARDBOARD



8

6 6A BOILER CRADLES



spacing about 2 in. apart, center to center, then cut leaves from $\frac{1}{8}$ x $1\frac{1}{4}$ -in. copper to about 7-in. lengths and screw to a strip of hardwood, spacing them so they center under the wipers when you bolt the strip to the frame. Position the ground wiper, which is a $\frac{5}{8}$ -in. shaft collar, then screw a second strip to the bottom of the frame as shown, to carry the ground wiper leaf, which is 1 in. shorter than the first four. Drill holes through the four leaves and into the second strip for screws, one in each leaf. These provide an adjustment for setting the leaves for proper make-and-break contact. Set the four wiper cams at approximately 90° intervals, be-

ginning with No. 1 as in Fig. 10 at left. The ground wiper makes continuous contact. The leaf should be fastened with two screws to prevent it from shifting.

This done, place the drivers in position on the axle and make the brake shoes. The latter are two thicknesses of $\frac{3}{4}$ -in. plywood, shaped and joined with two screws as in the crosshatched detail. A screen door spring attached to the brake shaft and to the frame maintains a constant tension on the linkage, keeping the brake shoes clear of the drivers when the brake is released. Then gang the four single-pole, double-throw, center off, toggle switches and mounting as indicated. Make and attach the lever, or "throttle," which throws all four switches simultaneously. Finally, mount the pilot truck, placing a washer between the bolster and the bottom of the frame and two nuts on the bolt.

Turn the assembly right side up and you're ready to mount the cab, boiler cradles, catwalks, the guard and grab rails; then make and fit boiler, stack, headlight,

(Continued on page 184)

Singing Steel Guitar

By Roy L. Clough



Plug this multichord instrument into any good speaker and you'll make music like you never thought you could. It's as easy to build as it is to play—and the materials will run you under \$20

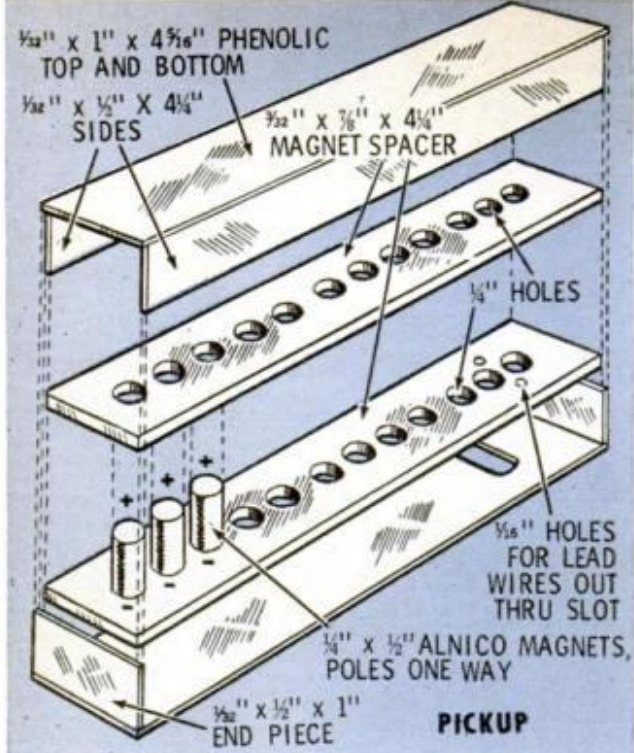
OKAY, SO MAYBE it's not an authentic Hawaiian guitar. But what is? That amplified vibrato we associate with blood-stirring hulas and plaintive island tunes was really, alas, invented in California. At any rate, the sound has become part of American music—you hear it in hootenannies, dance bands and those weird sound effects in science-fiction movies.

That sound is yours for about \$18—less, if you've got the usual workshop scrap kicking around—and a couple weekends' work. This standing model perches on 24-in. legs, leaving both hands free for playing. Since the strings are "stopped" with a straight steel bar instead of the fingers, the choice of cords is limited to those that can be covered with the steel—plus a few open-string-and-steel combinations. Early

guitars were limited to major chords and a few bobtailed sevenths. Efforts to overcome this resulted in guitars with several banks of strings, or with mechanical tone changers to alter the tuning.

In both cases, provision had to be made for "damping" unused strings, to prevent them from vibrating sympathetically and producing unwanted dissonances. This involved some sort of mechanical or electrical switching method to take the unused strings out of play. Then, if you suddenly wanted to include the dead strings while playing, you had to switch them back on. This meant kicking a foot or hand lever.

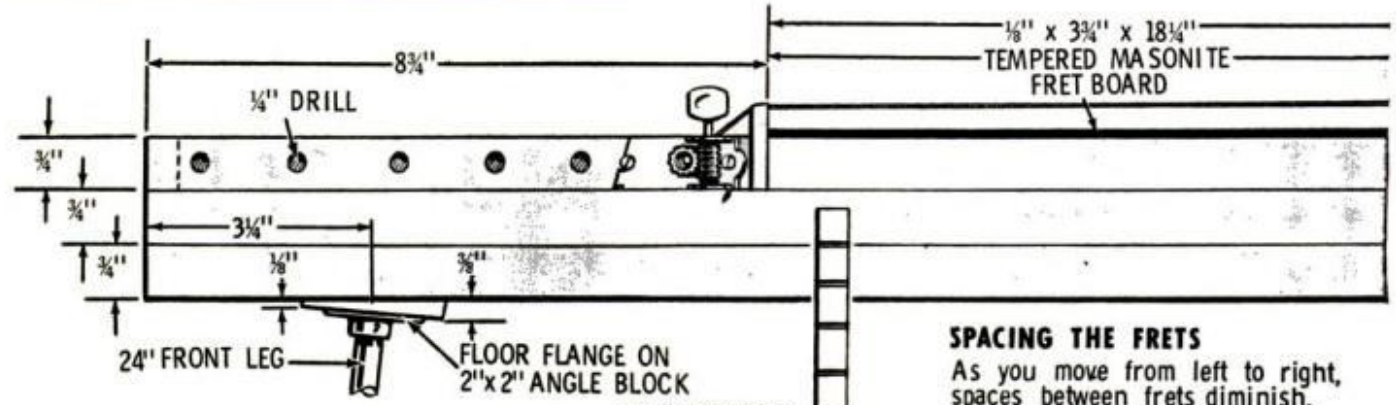
Our model avoids all this by using just one bank of 12 strings, hardly wider than a simple guitar. Thus, all damping can be performed as in classical steel technique



—with the edge of the hand. Strings are arranged in three groups: The first five form the melody or major chords; the next four, a diminished seventh; and the last three—farthest from the player—make up the less-frequently-used minor chords. The result is a close-knit fingering arrangement which makes playing much easier. It also simplifies construction.

Laminate the body from three pieces of exterior plywood or any 3/4-in. kiln-dried stock. Cut out the recesses for volume and tone controls and phone jack.

The headstock should be hardwood, preferably maple. After it's cut, you'll have to make up a taper block to hold it in position on the drill press while you bore clean, accurate holes for the shafts of the machine heads which are used for tuning the strings. When you've done the other drilling and slotting, check all parts for clearance and glue and screw the head in place, with a scrap of 1/4-in. Plexiglas between it and the top lamination, so

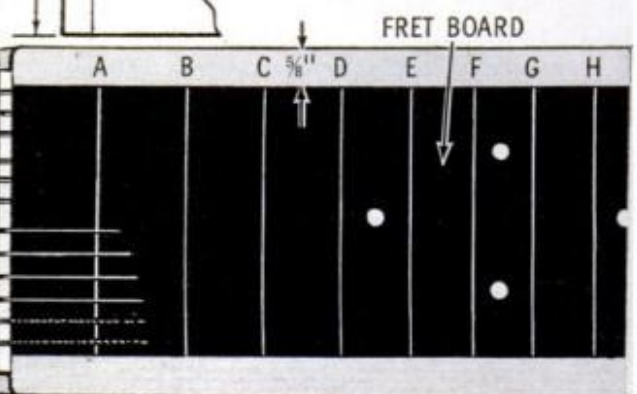
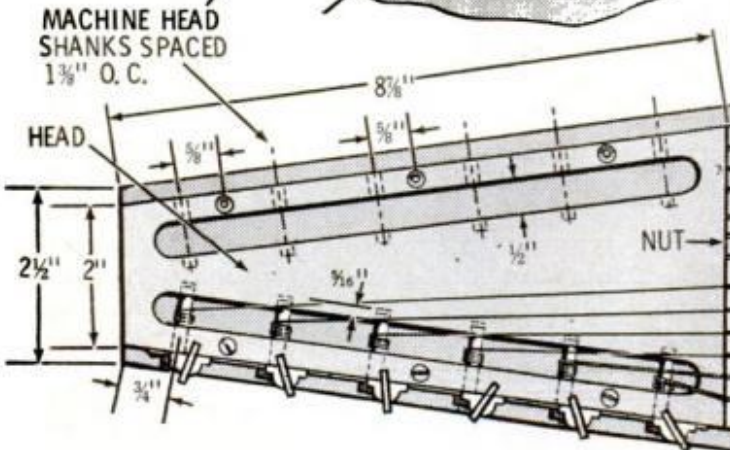
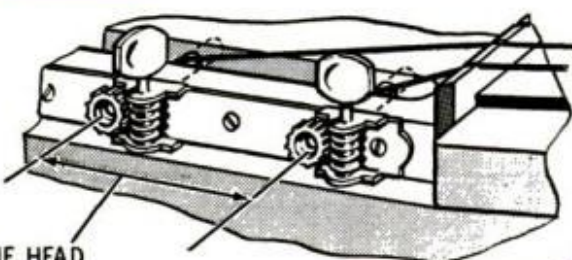


SPACING THE FRETS

As you move from left to right, spaces between frets diminish. The center of the first fret is 1 1/4" from the nut. The other spaces (l-r) are:

FRETS (on center)	SPACE	CUMULATIVE MEASURE
A-B	1 7/32"	2 1/32"
B-C	1 7/32"	3 7/16"
C-D	1 7/32"	4 21/32"
E	1"	5 21/32"
F	19/16"	6 19/32"
G	19/16"	7 17/32"
H	27/32"	8 3/8"
I	13/16"	9 9/16"
J	3/4"	9 19/16"
K	3/4"	10 11/16"

CUT, FOLD, TAPE
STEEL GUITAR



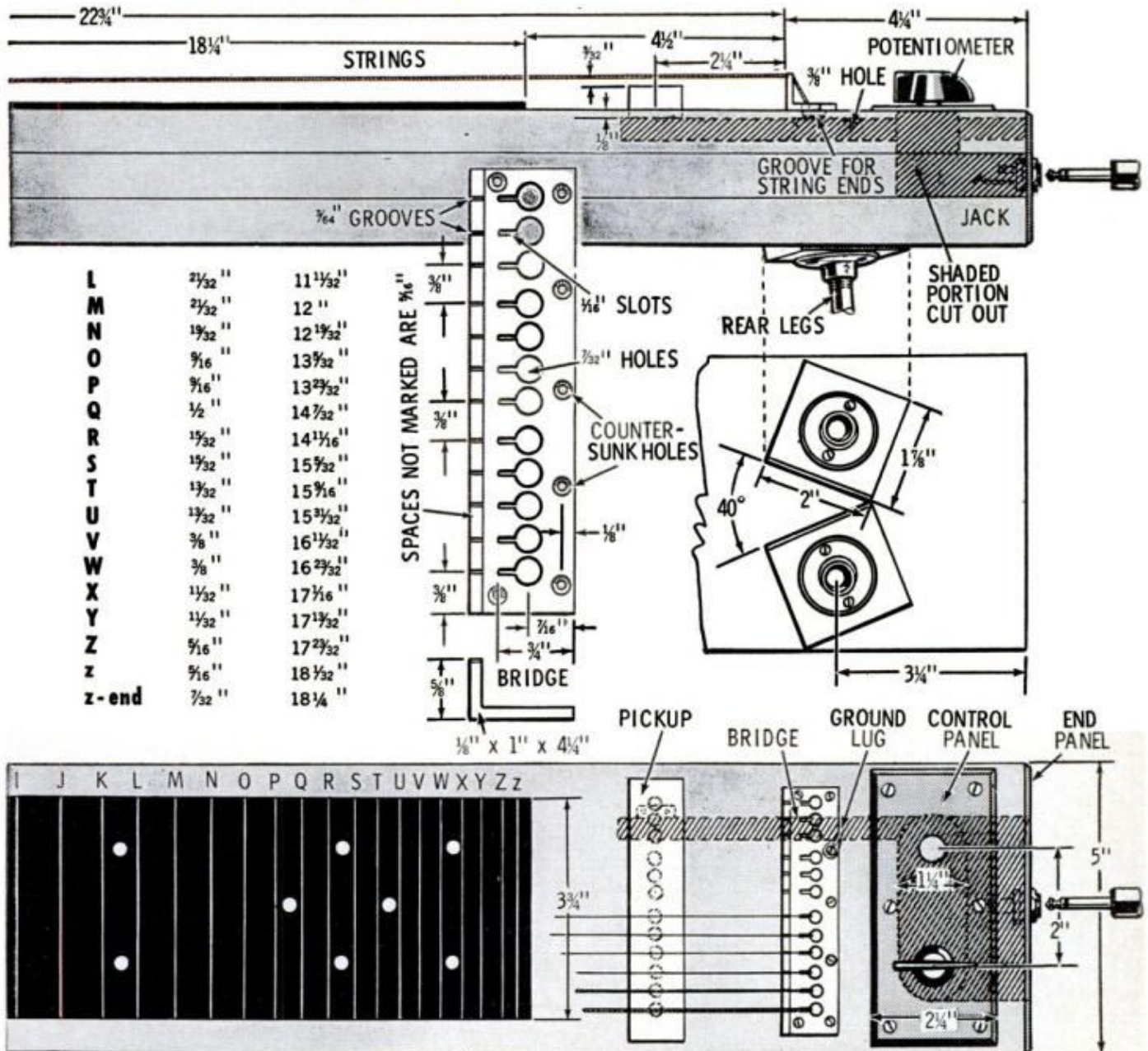
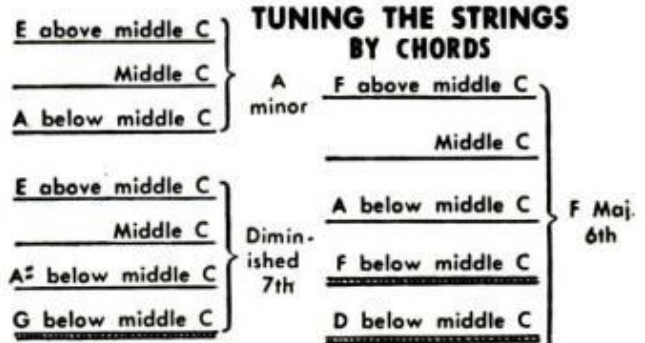
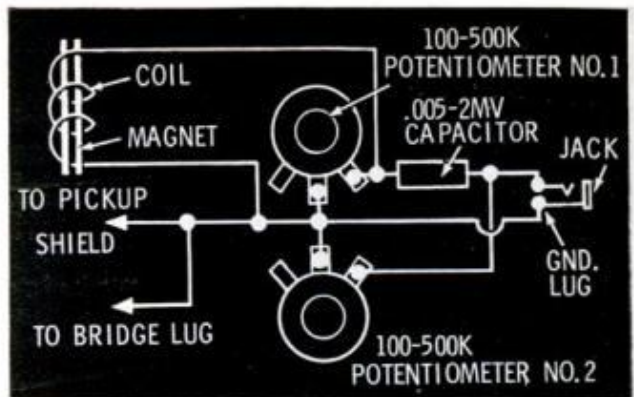
you'll be able to slip in the nut later on. Finish and paint the guitar body now.

Paint the hardboard fingerboard flat black and line off the fret positions with white ceiling-coater type paint in a draftsman's ruling pen. Follow the spacing chart carefully—these positions govern the pitch of the notes. Glue the fret board in place.

The bridge must be iron angle—not brass or aluminum—because of the heavy load on it when the strings are taut. The nut, on the other hand, can be Plexiglas. The grooves in the beveled top edge are just deep enough, for now, to catch the strings. Push the nut into the slot between top lamination and headstock, using a paper shim for a tight fit, if necessary.

The pickup core consists of two identically-drilled pieces of $\frac{3}{32}$ -in. plastic sheet (styrene or acrylic). Cement in the twelve alnico cylinder magnets with poles facing the same way, then take one turn of electrical insulating tape around the magnets

(Please turn to page 192)



Garden on Wheels



IF YOUR SHOP is equipped with power tools, the flower cart probably won't take more than an evening's time to construct

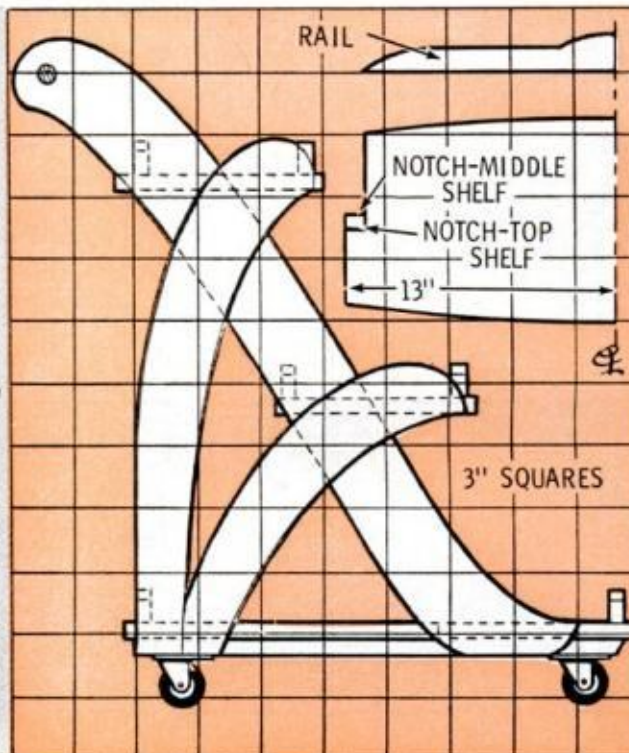
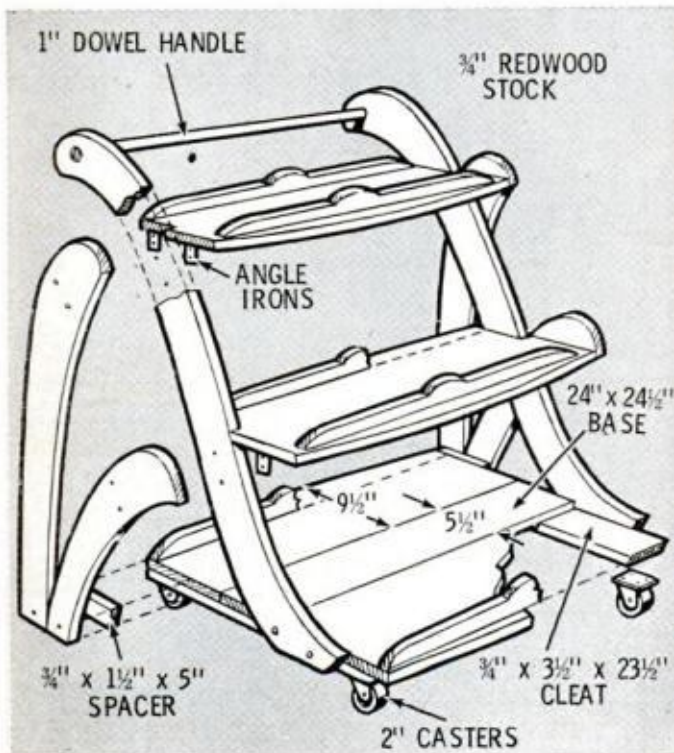
FLOWERS ADD a bright spot to any room but it's usually inconvenient to move them around to catch the sun or to lend cheer to another part of the room.

The gracefully designed cart shown here makes it easy to show off your indoor garden to best advantage—and it's an attractive piece of furniture besides.

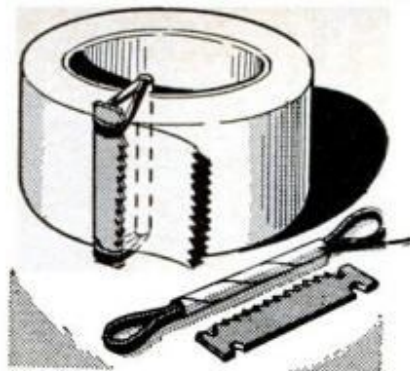
Solid stock, $\frac{3}{4}$ -in. thick, is used throughout. Redwood is especially suitable for this project, particularly when finished with a couple of coats of marine spar varnish.

Begin work by laying out a full-size pattern for the sides. Half-patterns are sufficient for the shelves and railings, as indicated in the grid drawing below. After transferring the pattern to the side pieces, tack the corresponding side members together through the waste portion so that when band-sawed, both pieces will be identical in shape.

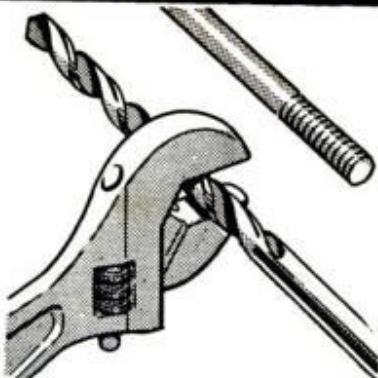
When assembling the pieces, first join the curved outside members to the handle sections. Next, attach the baseboards with wood screws. Then insert the dowel handle and join the sides to the bottom. Finally, position the railings and attach with glue and screws.—*Roberta L. Fairall*



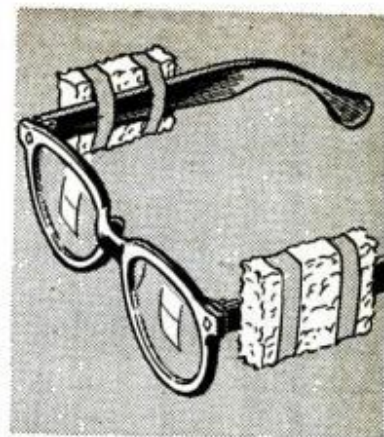
TAKE A HINT FROM READERS



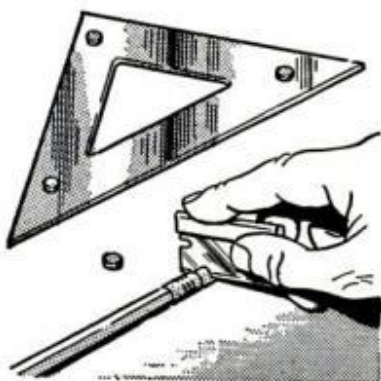
STRAIGHT EDGE for tearing masking tape is made by notching the ends of a short length of hacksaw blade and mounting it on tape roll with short rubber band inside a soda-straw roller



WHEN DRILLING a hole for a bolt, an adjustable end wrench will serve as a substitute for calipers. Simply tighten the wrench on the bolt and use jaws as a gauge for measuring bit



SAFETY FLOATS for eyeglasses are simply small blocks of Styrofoam taped to the bows. Perfect for fishing or water sports, the floats can be removed without difficulty when no longer needed



SKIDPROOF FEET for an artist's triangle will prevent it from slipping off the board. Cut thin slices of rubber from a pencil eraser and cement them to the triangle where indicated

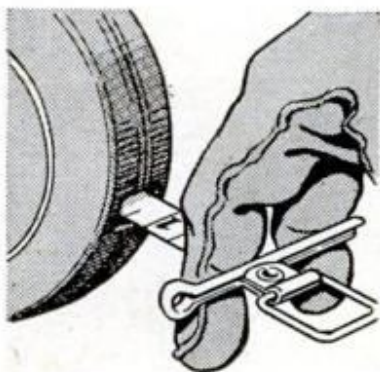


FINGERTIP magnifying glass for modelmaking or other hobby use can be made by filing a slot in the end of a thimble and cementing a small magnifying glass in slot with plastic metal

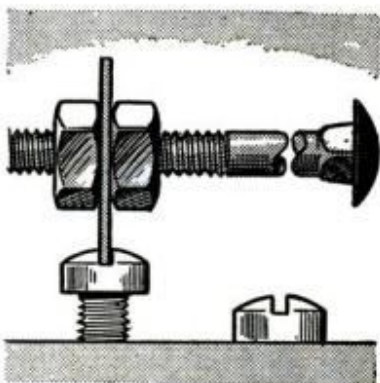


TO CONVERT any machine screw so that it can be tightened with the fingers, add a wing head by soldering a side piece from a bicycle chain link to it. Motorcycle chain links also work

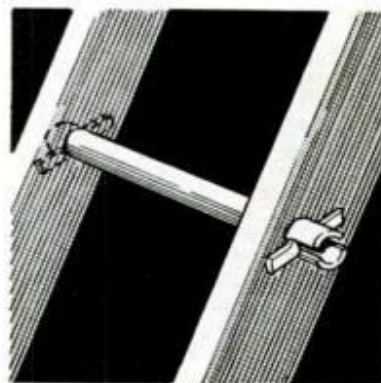
WHEN WORKING outdoors in cold weather, you'll find that a measuring tape will be much easier to hold if you slip a cotter pin over the end to serve as a bar grip for your fingers



IF YOU DON'T happen to have an offset screwdriver handy when needed, you can assemble one from a bolt, two nuts and a washer. Just position washer near the end and tighten nuts



TO MAKE A SAFE substitute for a broken ladder rung, cut a length of 3/4-in. pipe to project a couple of inches on either side, then cut and bend the ends as shown to form holding flanges



How to Tell a

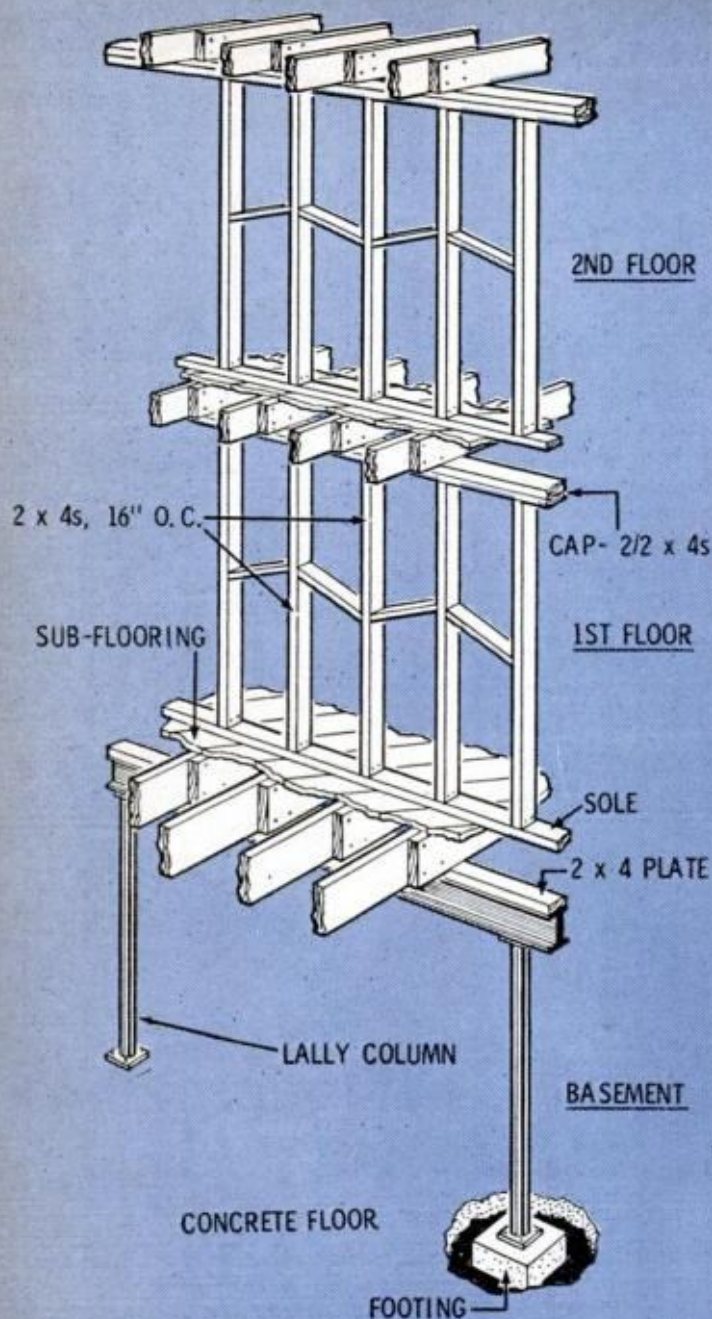
FRRIEND OF OURS had to move away, last month. Couldn't stand the ribbing of his neighbors. Matter of fact, he didn't have much to stay for, anyway. He'd caved in his roof.

Seems he got tired of the long, old-fashioned hall that split the first floor of his house in two and was so dark you expected to meet the Munsters halfway down it. So he knocked out a solid wall in order to add the hall space to the living room. It turned out to be a load-bearing partition, and he barely had time to make the front door before the master bed came through the ceiling. Fortunately, his wife wasn't in it.

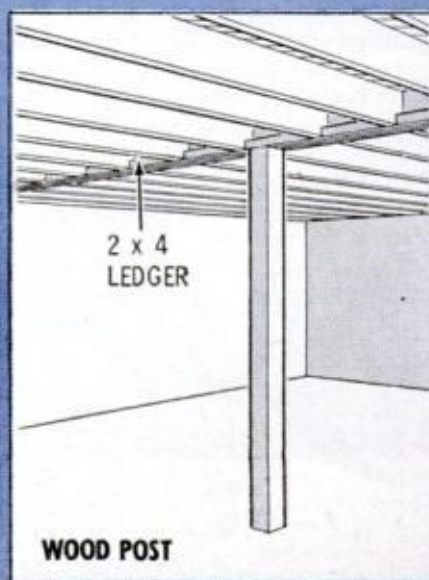
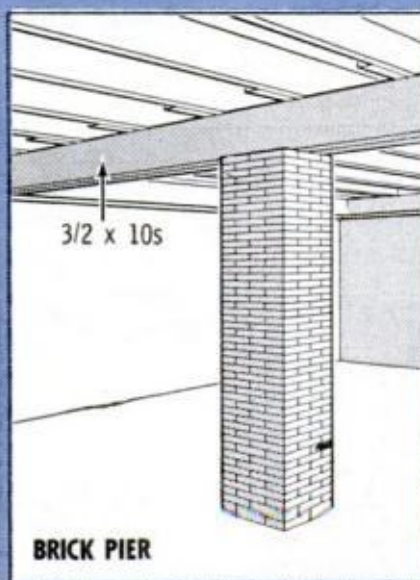
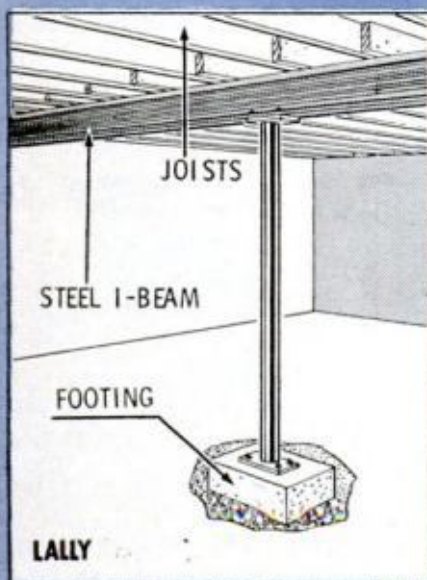
He learned the hard way that, although interior walls all *look* pretty much alike, it's important to know there are two kinds. Some are merely partitions to divide areas, but others may be bearing walls that help hold up the house. Our friend found *one* way to tell which is which, but there are less drastic methods.

Bearing partitions act as intermediate supports within exterior walls; they shore up the joists over which upper floors are laid, and carry some of the weight of the roof. It's easy to identify such partitions if you know what to look for. They should be located directly over basement girders which, in turn, are supported by the foundation walls and intermediate columns. These columns have a spread footing to help carry the weight of the house, even though they may seem to be resting on the basement floor.

Most house girders are wood—usually 2x8s, 2x10s or even 2x12s, and in older



ALWAYS ALIGNED, bearing partitions stand atop each other like acrobats in a balancing act. Roof load bears on basement posts of three types shown



Bearing Wall

houses you'll see wood, brick or even stone columns propping up these girders. In newer homes, however, you'll find steel I-beam girders supported on Lally columns, which are merely 4-in. iron pipes, usually filled with concrete.

Once you've got the girders spotted, go upstairs and determine which partitions stand over them, as in the typical house section, far left. If your house has a second floor, you'll find the bearing walls directly over their counterparts on the first floor. As a further test, go on up into your attic to locate the 2x4 plates or caps under the exposed beams; these indicate that the wall beneath them is helping to support the roof. Of course, if your attic has a floor, or insulation between the beams, you won't be able to see these plates.

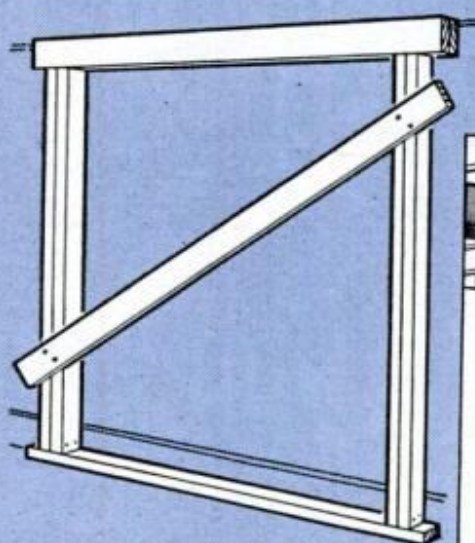
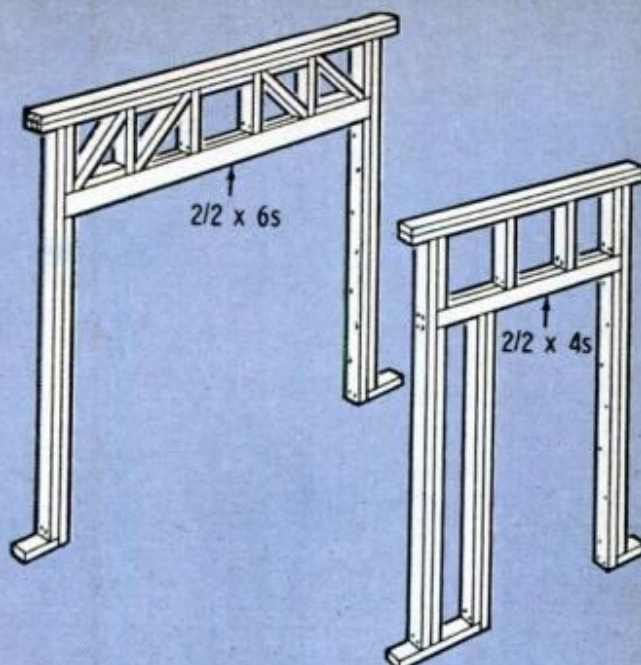
Though a bearing partition should never be removed, *openings* can be cut through it, or existing openings can be widened. Above right are sketches of two methods of framing these new openings. If the gap is no wider than a standard door, you can settle for a header consisting of a pair of 2x4s on edge, supported by doubled studs on either side. If the width of the opening is to be greater than door width, 2x6s should be used across the top. Also, you can appreciate that heavier bridging will be required for a first-floor opening in a bearing partition that supports both second floor and roof, than in a second-floor partition that supports the roof only.

But before you begin cutting into a bearing partition, erect a temporary support, as shown at right, on the opposite side of the wall. This will take the weight until you can get the opening framed.

Some homes, of course, *have* no bearing partitions. One-story houses with low-pitched roofs may have braced trusses, as shown in the bottom sketch. These are a sign that *all* roof-weight is carried by the outside walls. But to be on the safe side, you should still use at least a pair of 2x4s on doubled studs when you frame a new opening in a partition that's near the center of such a house.

If your house is old, your search for girders may have turned up one that is badly sagging. If so, shore it up with a steel jack post set on a new footing poured over well-tamped gravel. Jack the girder up only as much as is absolutely necessary, then check to see if you've hiked up the old posts. If loose, shim them tight again where needed.

★★★

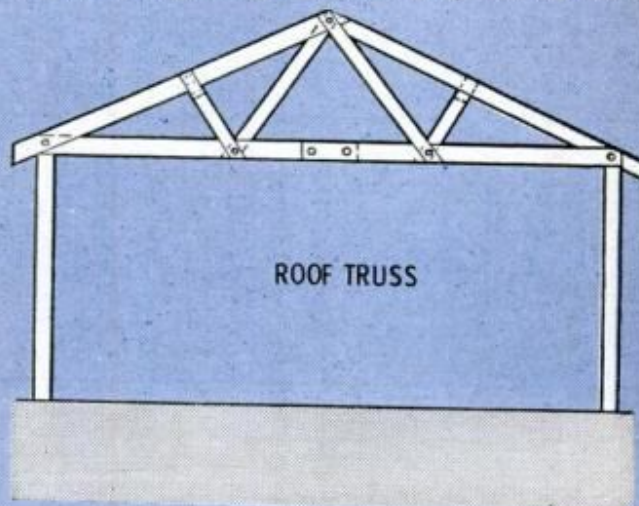


TEMPORARY PARTITION
SUPPORT

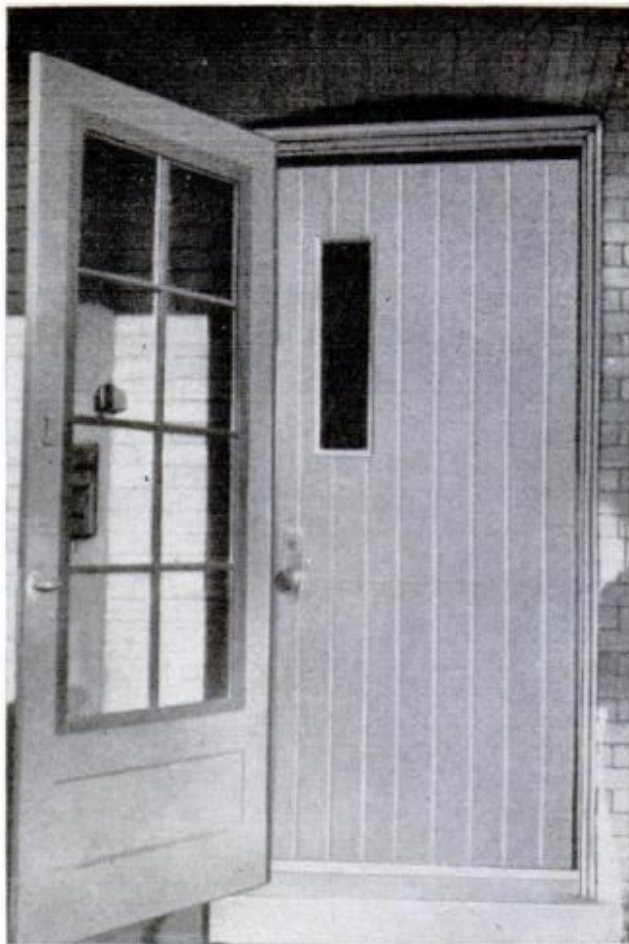
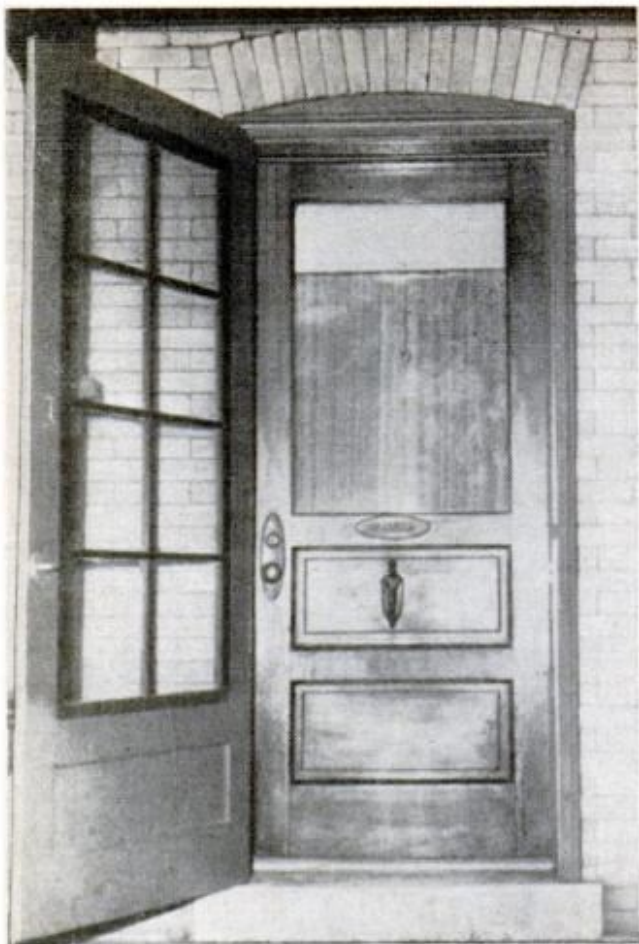


STEEL JACK
POST

LOW-PITCHED ROOF on one-story house with trusses braced as shown below won't have load-bearing partitions; roof weight is carried by outside walls



ROOF TRUSS



Old Door into New Door

By Dave Swartwout

FIRST IMPRESSIONS are strongest. And your front door is the first thing visitors notice about your house, since they must linger there until you answer their knock. Unsightly and outdated doors, like the one above left, are still common on older homes, and they lead the visitor to expect table scarves and antimacassars inside.

Yet, even though the finish may be battered and the joints cracked open, the structure of these old doors is usually sound—and buying and fitting a new door is a major project. The solution is a face-lift that modernizes the door with minimal new material. That “new” door on the right, above, even gets its smart new “eye” from the glass panel of the old door. The flush-panel treatment is given *both* sides, so the door is as handsome inside as out.

The first step is to remove the glass to avoid breakage; then tap out the hinge pins and lean the door back onto a couple of sawhorses. Remove all hardware, and

strip the old finish from both sides with the application of a paste remover, or by scraping, to assure a good glue bond between the old frame and the hardboard panels. The door shown is faced on each side with a one-piece panel of Masonite, grooved to simulate plank—a $\frac{7}{16}$ -in. exterior panel on the front and a $\frac{1}{4}$ -in. prefinished “woodgrain” on the back.

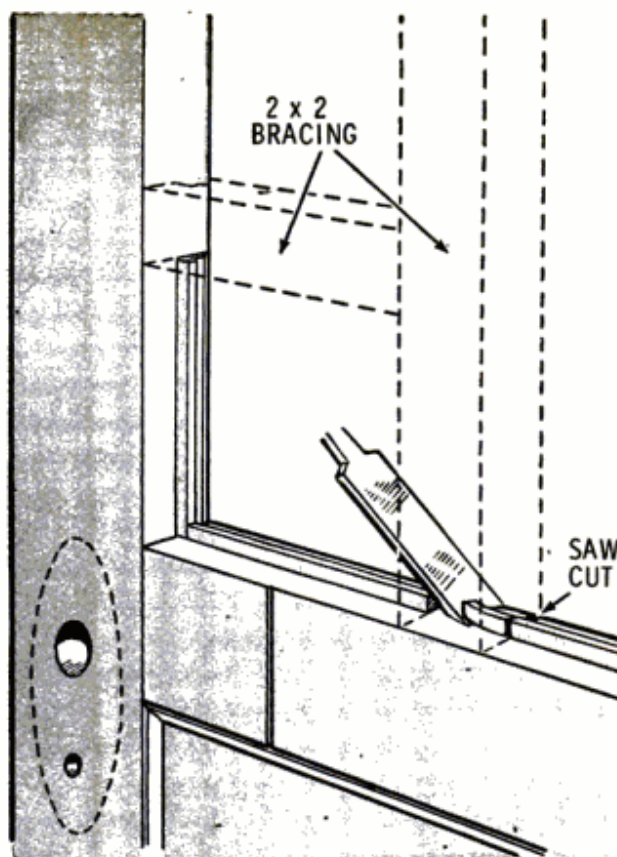
If the old door has recessed panels, as shown, it's important to make vertical cuts across the rails to let air escape, and to prevent future buckling. Just lay the door on the 4x8 hardboard panels and mark them to size, indicating at the same time any holes that must be cut for the door latch. If you want to avoid relocating the door stops, cut the front panel undersize (as indicated in the sketch at right) to clear the stops at sides and top.

Next, determine the new window location. In the example shown, next page, a side of the old window frame was used. The rest of the area was bridged with 2x2s. The 26-in. height of the new window

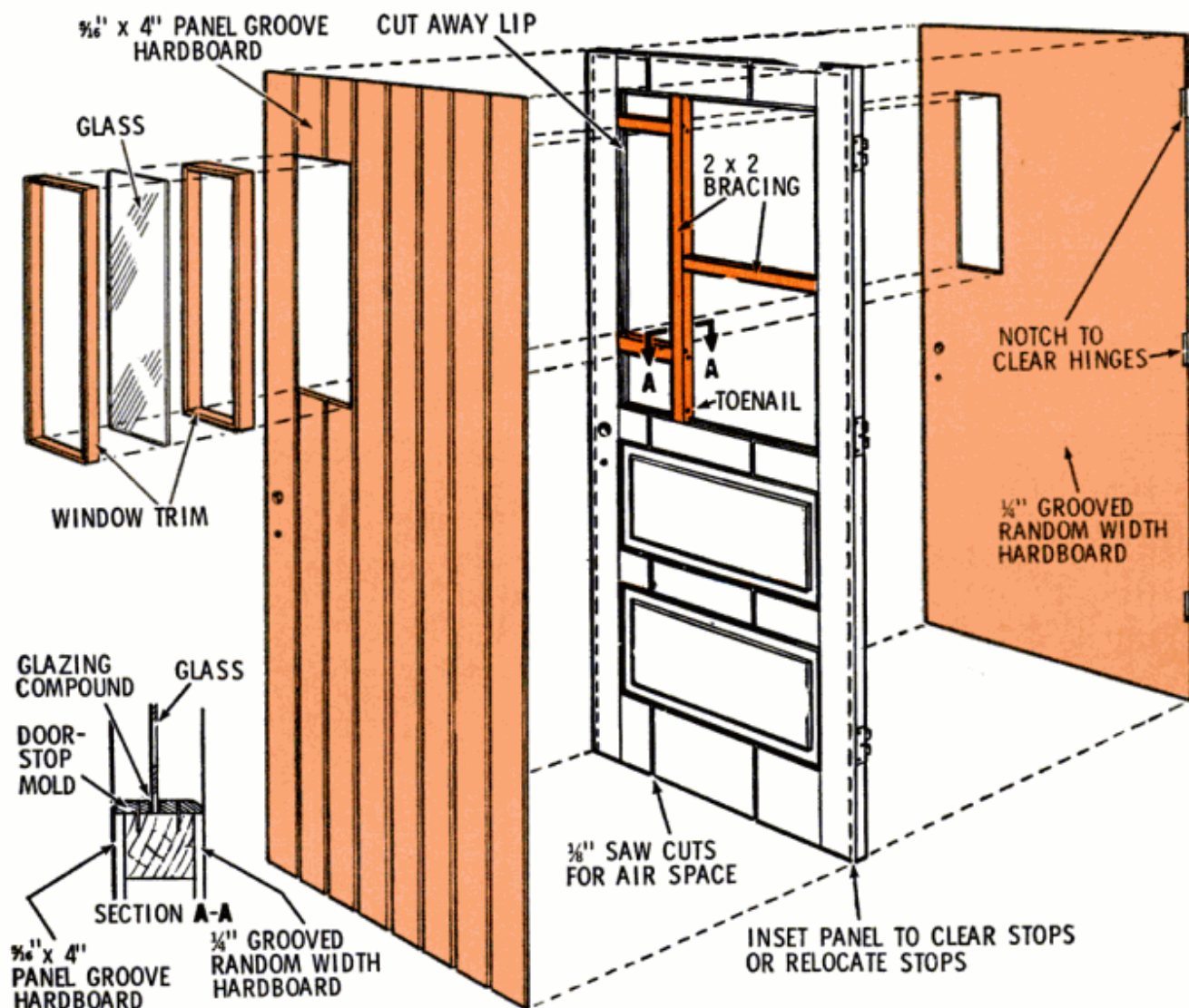
was determined by the *width* of the old pane so that cutting the glass was a simple matter of a single stroke. You might prefer a longer slit—or even an additional window or two. At any rate, the framed openings should be exactly the size of the cut panes.

After gluing both facing panels to the door with contact-bond cement (or waterproof glue), make up two identical frames by mitering pieces of doorstop molding. The outside dimensions should match the pane size and provide a snug fit within the framed window opening. Install the inside frame first, butter the front edges with glazing compound, set the glass in against them, add more compound and tap in the outer frame. The cross section, below left, shows how frames are bradded in place (a piece at a time); here, the molding is flush with each surface, but you may prefer a projecting frame on one or both faces.

When you rehang the door, you may find longer screws are necessary to prevent sag. Since the inside panel is notched to clear the hinges, no relocation should be necessary. Paint the exterior panel to match the house trim and replace the old hardware—or buy a modern set. ★ ★ ★



ORIGINAL STOP is left in frame when old window pane is removed—but it must be chiseled away to take the new stop (top left) and outline bracing





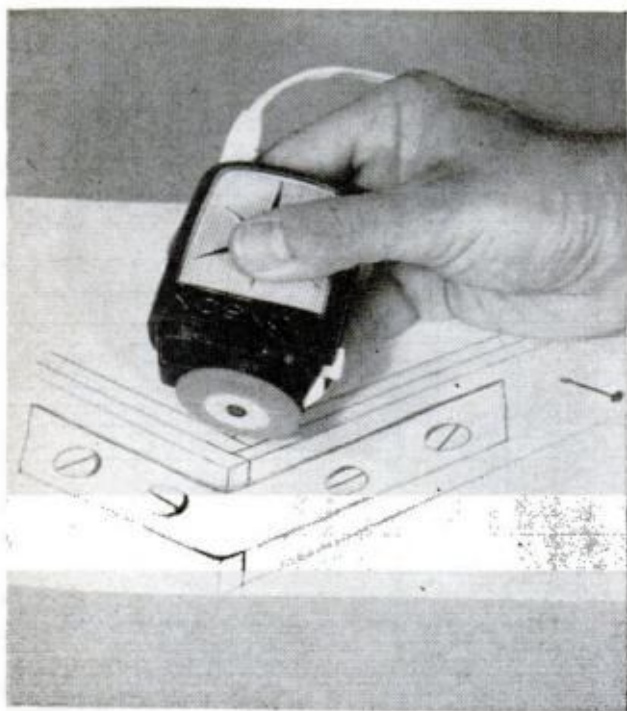
PAINT BUCKET CADDY for use when painting from a tall ladder can be made by bolting a 9-in. metal strap to an empty can and bending the end to form a hook for slipping over rung. Bucket rests on rung below



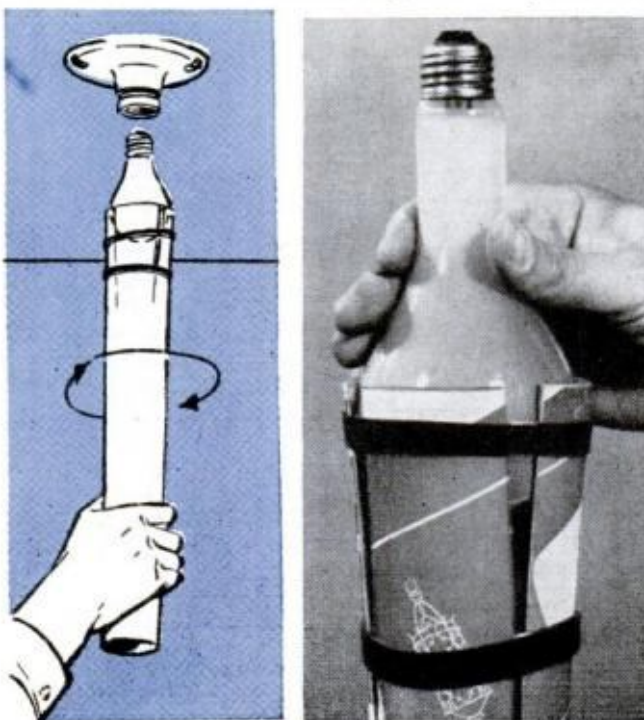
BLOCK GARDEN is a decorative solution to the problem of an eroding slope. Simply set tiers of single-core concrete blocks into the face of the slope, fill each core with top soil and plant as desired

Solving Home Problems

ELECTRIC ERASER made from discarded electric razor is a desk or drawing-board luxury. Make it by removing the comb and cutter to expose the vibrator arm and fastening a typewriter eraser to the arm

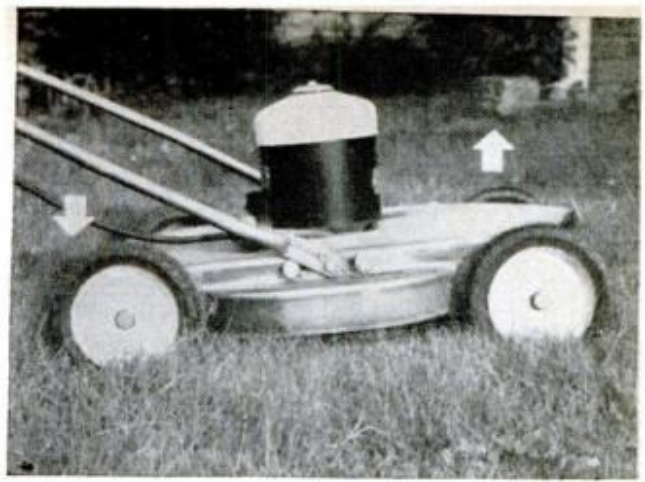


NO NEED TO BOTHER with a ladder when replacing a burned-out bulb in a stairway. Instead, slit a large mailing tube, as shown in the drawing, slip rubber bands over it and use this long arm to replace bulb

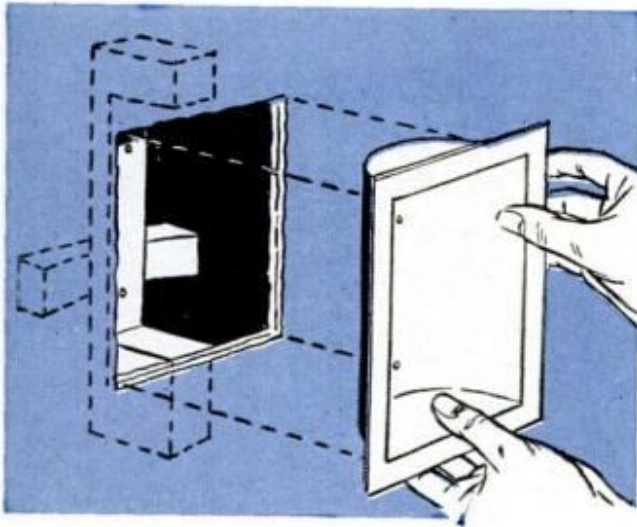




WINDOW TREAT for youngster's room is a drawing or picture mounted on venetian blind. Simply cut the picture into strips and mount on exposed portion of blind when it's closed. To a child, it's magic



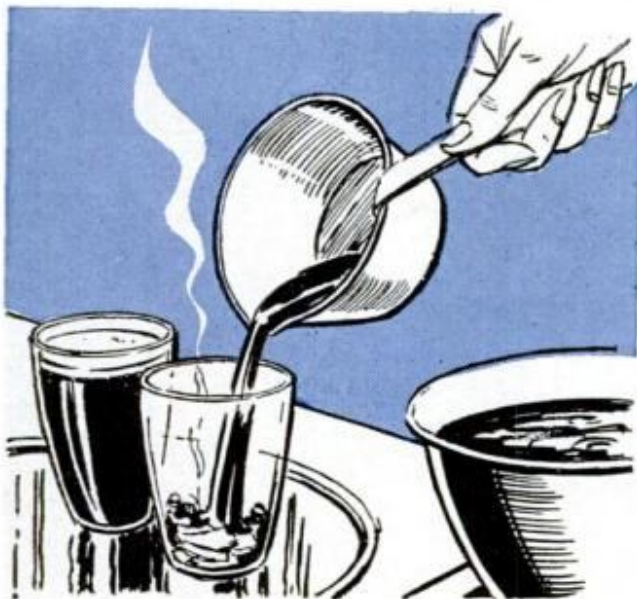
WHEN MOWING high grass, set leading edge of mower higher than rear. This gives at least two cuts to each long blade of grass, leaving shorter cuttings which work down through remaining grass easier



SECURE MOUNTING for a recessed bathroom accessory involves wedging a backing block in place in the cutout. Once screws are installed, block will be drawn up tight against inner surface of the wall



BEGINNING TYPISTS will find that it's much easier to keep the fingers properly positioned on the keys if the F and J reference keys are marked with a cross of tape. It's an instant reference by touch



TO AVOID DANGER of burns when sealing jelly jars with melted paraffin, cut paraffin shavings into the bottom of each glass and pour jelly into it. Paraffin will float to the top, cool and solidify



TO PREVENT the contents of a cracked egg from oozing out during boiling, add a teaspoonful of salt to the water. This will balance the osmotic pressure and prevent transfer of fluids in either direction



King-Size Lawn Lounger

NO RACE to get there first, when you've got this twin-size chaise longue—there's loads of room for two to sprawl side-by-side without crowding. And the two-position back lets you flatten out for a sunbathing snooze, then sit up to read or sip a cool drink after you wheel the unit into the shade.

The rugged redwood simplicity makes it a snap to construct. The "springs" under the double mattress (two standard chaise pads) are nothing but crossed strands of plastic-covered clothesline wire. You'll need three pieces—one 85 ft. long, for across the bed; one 35 ft. long for across the back; and 120 ft. for stringing lengthwise. Note when drilling for the wire that only *one* of each pair of parts marked A and G has "start" and "end" holes. And only one Part C has threading holes at all.

The lengthwise threading is done last, with the back frame in down position, moving back-and-forth between Parts C and L, over and under the cross-wires. Pull all wires taut and secure with knots snugged up against the inside faces of the frames.—*Steve Ellingson*

AUGUST 1965

MATERIALS REQUIRED

AMOUNT	LUMBER	PARTS KEY
4	Redwood s4s	
1	2x6, 8 ft. long	A, B, C & G
1	2x6, 6 ft. long	K
1	2x8, 4 ft. long	D & E
1	2x4, 6 ft. long	H
	Dowels	
1	1/4" x 12"	
1	1 1/2" x 6 ft.	
1	1 1/4" x 5 ft.	
1	3/4" x 5 ft.	
	Hardwood	
1	1x3 x 2 1/2 ft.	F
	Ext. Plywood	
1	3/8" x 2" x 6"	J
	Carriage Bolts (with nuts, washers)	
2	3/8" x 4 1/4"	
2	3/8" x 3"	
	Lag Screws (with washers)	
16	1/4" x 3"	
	Wood Screws	
8	#14 x 2" FH	
4	#14 x 2 1/2" RH	
240 ft.	Plastic-covered clothesline wire	

FULL-SIZE PATTERN

Though all dimensions for laying out the lounger are shown on our plans, you may prefer the ease of tracing the parts from a full-size pattern sheet. Send \$1 for Pattern No. 182 to Steve Ellingson, Popular Mechanics Pattern Dept., Box 2383, Van Nuys, Calif. 91409

141

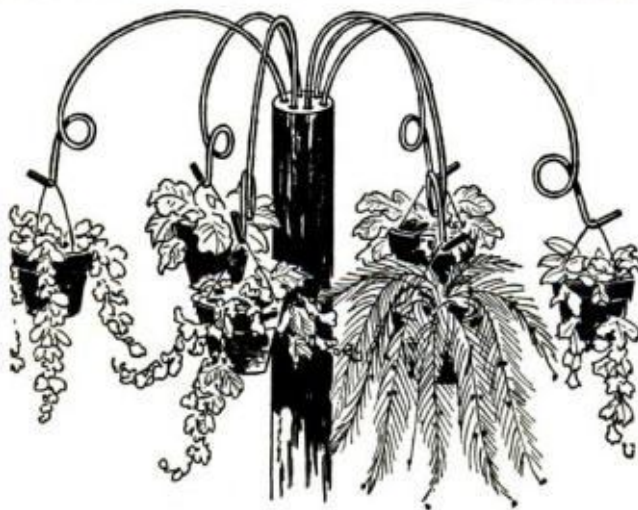
Sunken Patio Sandbox Makes Cleanup a Breeze



Half the fun of a sandbox seems to be had in dragging the sand out of it, but it's far from fun to have to clean up around it, later. No matter how careful you are in scooping up spilled sand, you're bound to get dirt, leaves and twigs back in the box.

Richard E. Londgren of Tacoma, Wash., solved the clean-up problem for good when he built the sandbox in a pit, sunk flush with the surface of his patio. Now to put spilled sand back in the box, he simply sweeps it back in. A plywood cover keeps the sand dry and clean and prevents someone from accidentally falling into the sand pit when it's not being used.

Lacking a lock washer you can easily bind the nut by upsetting the last couple of threads as follows: Place the ball end of a ball-pein hammer in the nut and tap it with a mallet to compress the threads.



Flower-Pot Tree for Your Yard

What can you do with a few spring tines from an old hayrake? One ingenious farmer came up with this delightful flower-pot tree by using the tines as branches to support a cluster of potted plants. The tree trunk is simply a fence post with holes bored in the top to receive six tines. Plastic flower pots were used so they could be drilled for wire handles to hang them from the ends of the springy tines. A coat of paint will keep the tines from rusting. The completed tree when planted in your yard will become a conversation piece for all to enjoy.—A. Weber

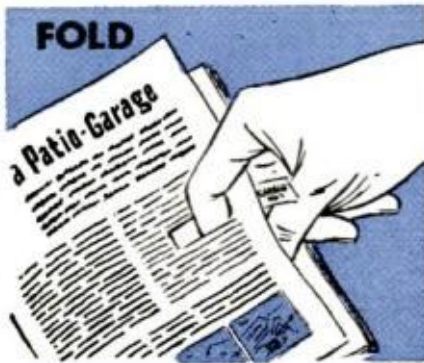
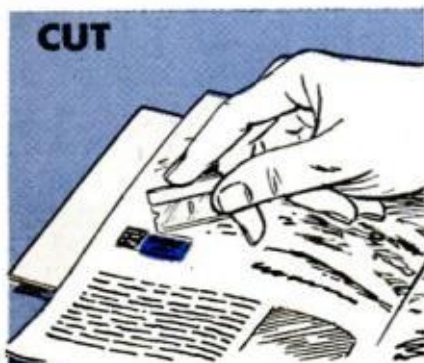
Fold-Out Tabs Make Each PM Issue Self-Indexing

If you missed our April 1965 issue in which we introduced a new PM built-in tabbing system that makes each issue self-indexing, you perhaps are wondering how the cut-fold-and-tape tabs (sample at right) you see on certain craft features of this issue are to be used.

Called File Flags, these

tabs let you flag the articles you want to refer back to, later. Then, if you keep a file of all issues, you'll be able to locate articles you remember seeing by thumbing the tabs. You tab the pages for quick reference by following the three easy steps shown below. In no case will you cut into vital information.

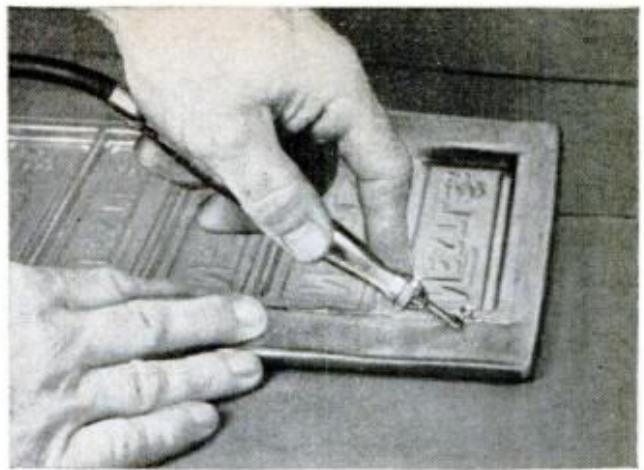
**CUT,
FOLD,
TAPE** **GARAGE
PART II**



Shopping for Tools

By Robert B. Berger

Air-Powered tool may be used to engrave steel, plastic, glass and other materials. The Air-Scribe weighs less than 5 ounces and can be powered by any ¼-hp compressor. The tool's hammering action also makes it suitable for deburring, trimming and peening. The cost is \$69.50. Chicago Pneumatic, 6 East 44 St., New York, N.Y.

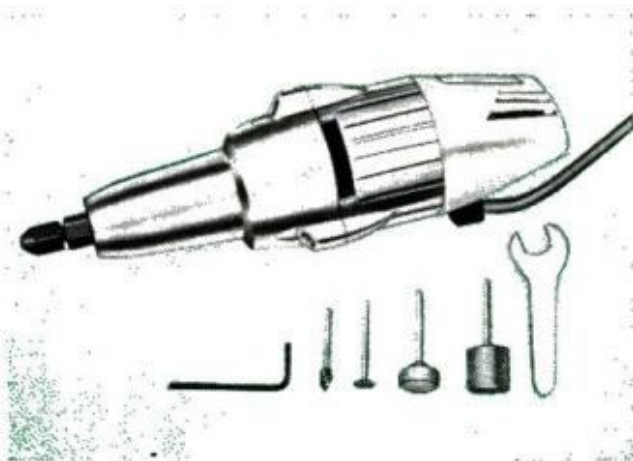


Metal Work is simplified when you use the Little Giant 4 in 1 tool. Stock up to 1 in. wide and 16-ga. thick can be formed, riveted, sheared and punched. The dies used for riveting and punching are replaceable when worn. The tool sells for \$12.95 prepaid. Albert J. Tatu Company, P.O. Box 707, Naples, Fla.

Saw Guide (lower right) assures accurate angle cuts with a portable electric hand-saw. After adjustment, the tool can be locked at the desired angle. The all steel guide, which doubles as a protractor, folds flat for storage. It is priced at \$4.95 post-paid from Glen Ridge Tools, 112 S. Clifton Ave., Park Ridge, Ill.



Hand Grinder (below) comes with 21,000-rpm motor and sealed ball bearings. Its collet can accommodate any accessory having a ⅛-in. shank diameter. The Shopmate Model 1896 T-1 grinder weighs less than 2½ pounds. It lists for \$34.95. Portable Electric Tools, Inc., 1200 East State St., Geneva, Ill.





Better Flash Portraits

When shooting portraits with flash, you can get better results by taking the gun off the camera and aiming it downward at the subject. However, it takes a lot of practice and wasted film before you can anticipate just how the facial shadows will look in the finished shot.

To overcome this problem, I fastened six clear Christmas tree lights around the head of my electronic flash by means of a strap metal hoop. Now, before tripping the shutter, I can get just the effect I want by moving the flashgun around while observing the shadows cast by the lights. The inset shot of the flash head (left) shows how a single screw provides the necessary clamping action of the hoop. The sockets were fastened to the hoop by means of their own clips. For using the flash outdoors, hoop and sockets come right off by loosening the clamp screw.

—G. B. Yarmoluk



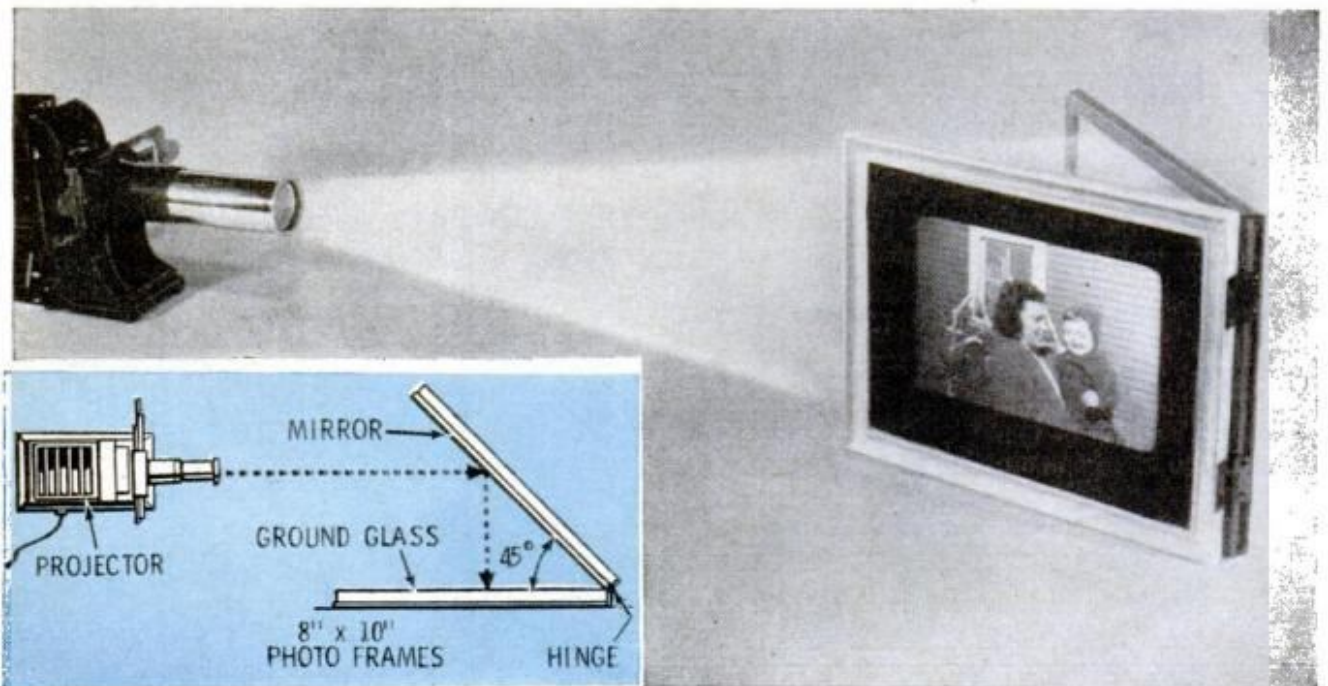
Pencil Stamp Keeps Image Right

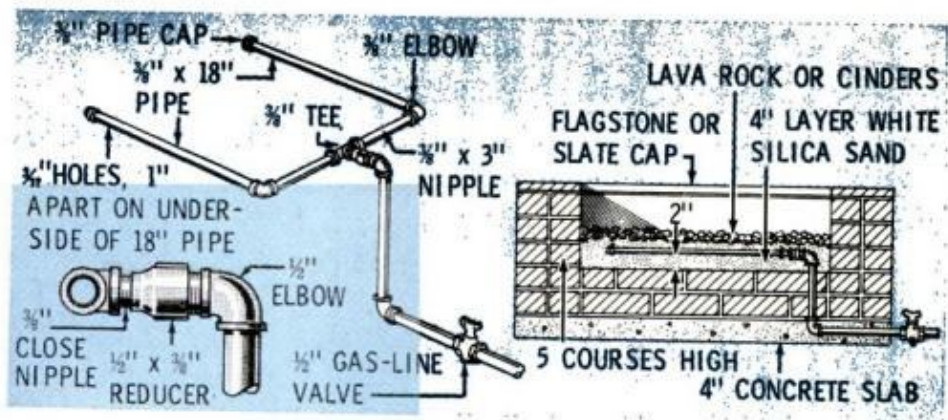
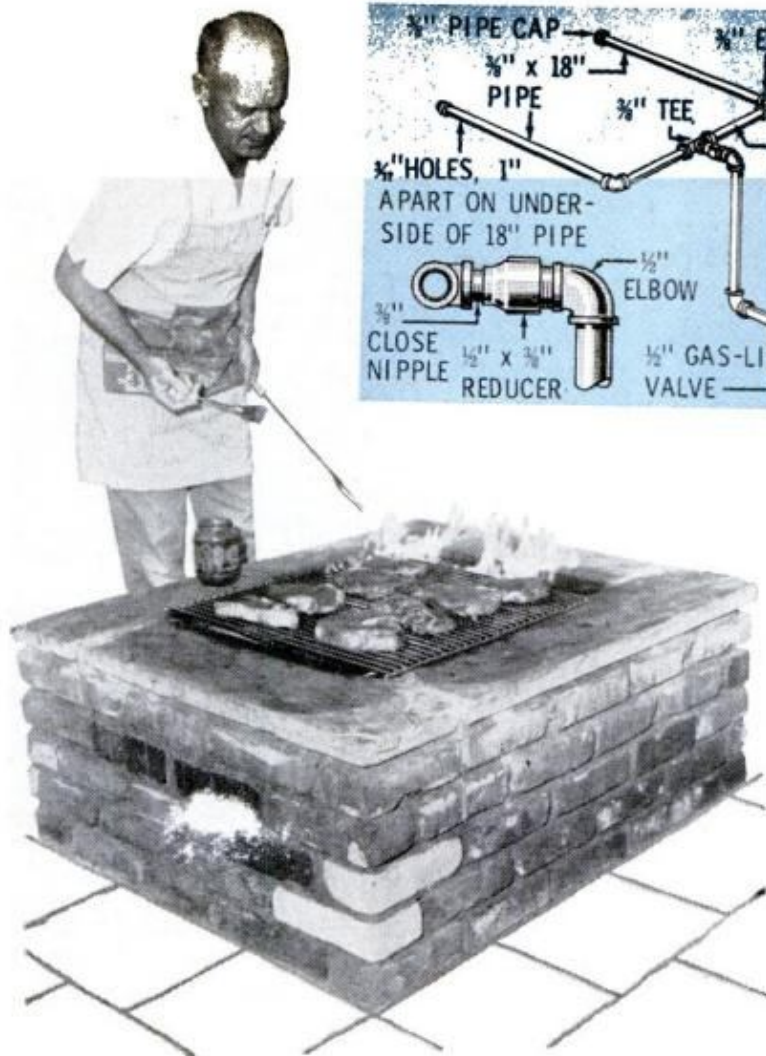
To avoid upside-down and backward images when projecting color slides, many camera buffs mark the corner of the slide which should be at the upper left when placed in the projector. An easy way to make the mark is to stamp it on in color using a stamp pad and the eraser end of a pencil.—L. Reissman

Make Your Own Table-Top Rear-Projection Screen

With the help of two 8 x 10 picture frames you can make a projection screen that will let you put on a picture show without going through the usual bother of darkening the room. After removing the glass from the frames, insert a mirror in

one of the frames and a ground glass in the other, then hinge the frames together. When in use, the projector is aimed at the mirror which is set at a 45° angle to the ground glass. Most photo supply stores stock ground glass.—Salvatore Stella





YOU CAN BUY white silica sand in 100-lb. sacks from almost any sand and gravel company. It holds and reflects the heat

LAVA ROCK or cinders will catch some meat drippings, but both sand and rock must be replaced when grease accumulates



Gas-Fired Barbecue Pit

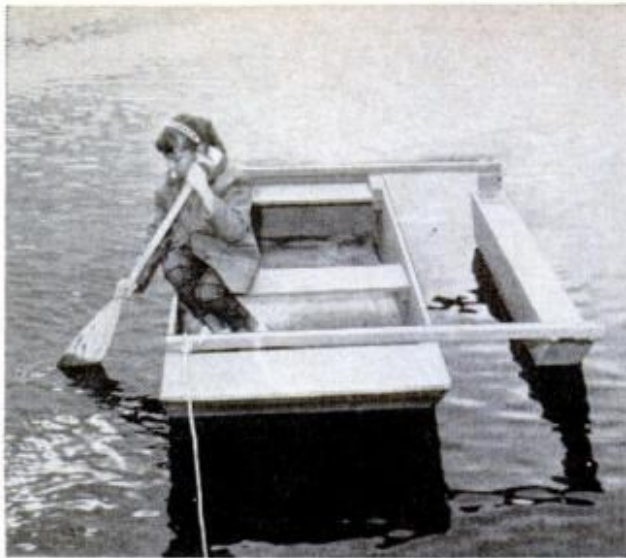
YOU CAN FORGET about charcoal with this barbecue pit. It cooks with natural gas fed through burner pipes buried midway in a 4-in. layer of sand. A layer of lava rock or cinders on top of the sand holds heat and catches meat drippings.

Construction of the pit is detailed in the drawing at the top of the page. Be sure to leave small drain holes between the second and third courses of brick to allow rain water to escape. And if you want to avoid the expense of having a special grill made for your barbecue, don't make the inside width of the pit any larger than 19 in. You can purchase 22-in. grills almost anywhere patio supplies are sold, but larger ones are more difficult to find. If you require more grill space, increase the length.

Your gas barbecue pit will also make an efficient patio heater for chilly evenings. Just take off the grill, turn the flame up and you have a cheery outdoor fireplace which costs pennies to operate.

—Edward Widdis

Beach Mooring



FOR SMALL BOATERS, the pontoon serves as easy-to-mount bit of insurance against accidental capsizing

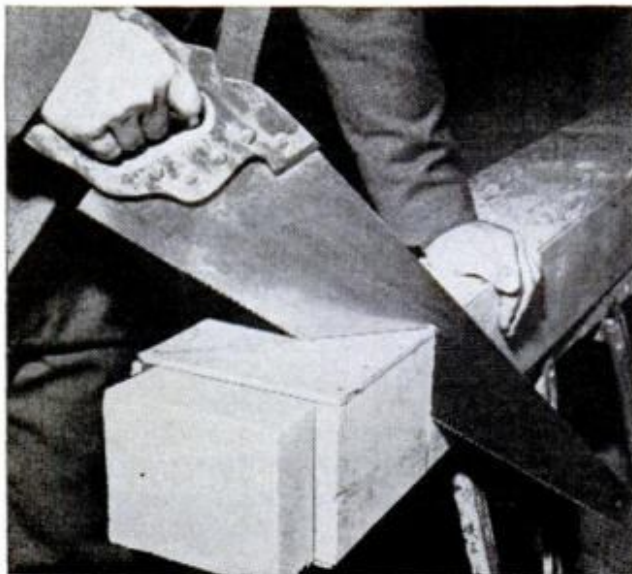
An Outrigger

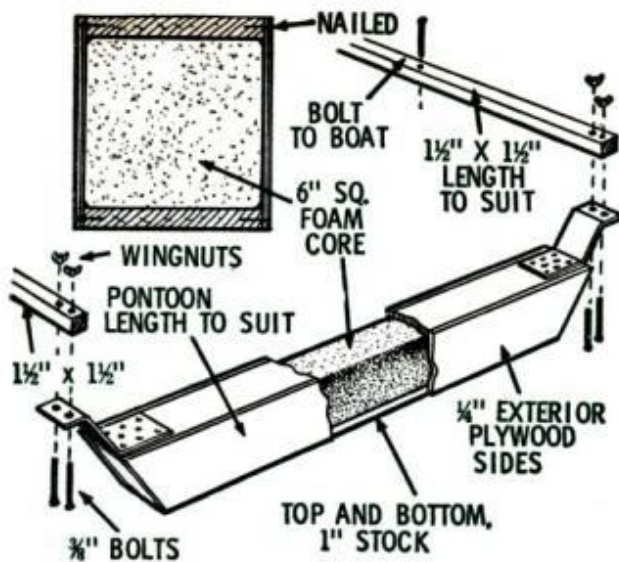
It's the next best thing to a slip for holding your boat securely in one spot, so the next time you run into an anchoring situation which doesn't allow swinging room, try this approach. Drop the anchor offshore as you run in toward the beach and make sure that it's firmly set. Play out sufficient line to produce a shallow angle (four or five times the depth of the water) and tie it to a plastic bleach bottle, about the cheapest float you can find. Finally, run a line between the float and a stake driven into the beach and moor the boat to this. A couple of bumpers hanging from cleats fore and aft can be tied to the line to hold the boat parallel to the line and absorb the small shocks produced by wave action.—*Pat Perrett*

WHETHER you're standing up to make a cast or swinging on a passing mallard, you'll appreciate the extra stability provided by this easy-to-build outrigger. It turns any dinghy or pram into a better platform for fishing or hunting and also makes a fine safety accessory for small rowboats used by children.

The dimensions of the pontoon stabilizer will depend on the size of the boat with which it's to be used. However, the 6-ft. pontoon shown here is about right for the average small craft under 12 ft. in length. It's formed around a 6-in. core of Styro-

BOW AND STERN are cut to an angle of approximately 45° after the pontoon has been assembled





WHEN MOUNTING pontoons, drill holes through ends of bolts for safety wires so nuts can't drop off



PONTOON BRACES should reach across gunwhales and bolt to mounting blocks screwed to inside of hull

Stabilizer for Small Craft

foam or urethane foam which strengthens the structure and eliminates the possibility of the pontoon filling with water and dragging should it be damaged. The whole pontoon is fiberglassed.

The height at which you mount the pontoon is quite important, since a too-low mounting will increase drag and mounting it too high will have an adverse effect on trim. It's supposed to provide a counterbalance, so the metal mounting plates which secure the pontoon to the braces should be bent to an angle that positions the bottom of the pontoon so that it will be

about level with the waterline of the boat.

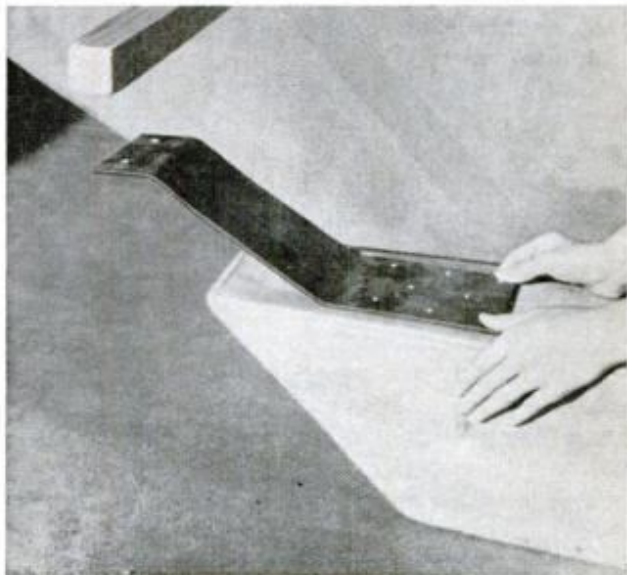
The distance between the hull and pontoon is less critical. Theoretically, the farther away from the boat, the greater the stabilizing influence. As this distance is increased, however, the boat becomes more cumbersome to handle and the problems involved in storing and attaching the pontoon become greater. A separation of from 18 in. to 24 in. seemed to work well on the boats with which the original pontoon was tested. If you need extra space, mount a cargo platform on the pontoon braces to hold gear or game.—*V. Lee Oertle*

FIBERGLASSING the pontoons seals the ends. First cut cloth to fit and then apply polyester resin

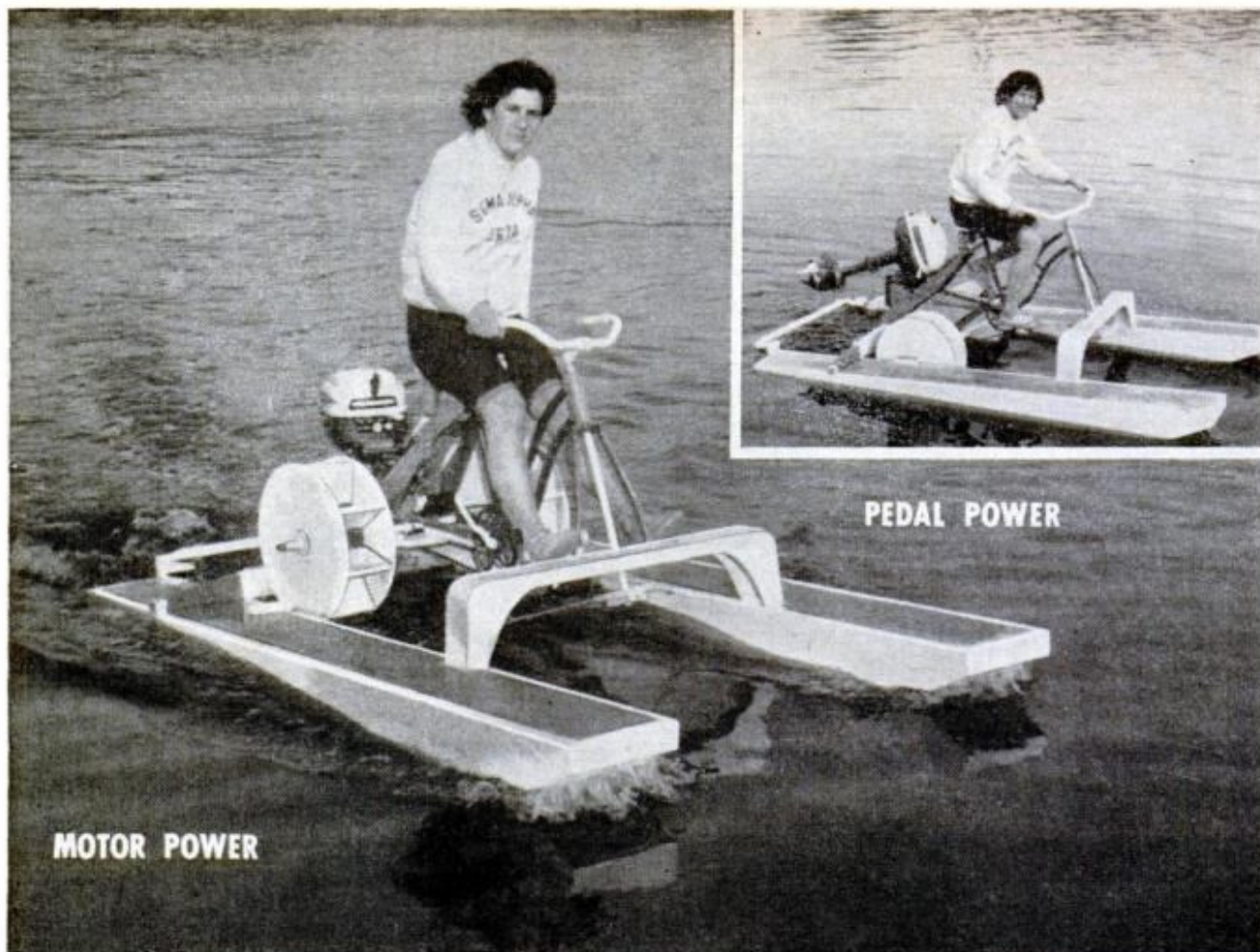


AUGUST 1965

MOUNTING PLATES should be bent to locate bottom of pontoon approximately even with boat's waterline



147



Power or Pedal Water Bike

By Hank Clark

TAKE YOUR CHOICE: putt-putt-putt or puff-puff-puff. Whether you decide to build up those leg muscles by pedaling or relax and let the motor do the work, you'll have a ball with this either-or bike boat. It's a two-weekend project that offers season after season of low-cost fun on the water.

When you feel energetic, just tilt the motor clear of the water and drop the paddle wheels in by lowering the "lift-lock" arm from its hook. This same arm anchors the paddle wheels in the down position. Use the handlebars for steering—they're linked to two rudders astern—and back pedaling when you want to stop or back the boat.

To switch to power, haul the paddles up clear of the water with the lift-lock arm and hook it in the stowed position. Then lower the motor into the water, give a yank on the starter and you're off to the races at a breathtaking 8 mph.

Normally, you'll steer with the handle-

bars, since the motor is set in a straight-line position with an adjusting nut to keep it from swiveling. To be on the safe side, however, leave that adjusting nut loose enough so you can reach around and override it if a sudden change of direction is necessary.

If you can build a box, you can probably complete the two floats in a couple of evenings. First cut and assemble the sides on the transom, bow block and bulkhead. Note that the width of each sidepiece is 8½ in. at its widest point. Next, install the top piece, by gluing and nailing every 1½ in. The hole for the spreader support may be cut before nailing the top down or when mounting the diagonal braces for these supports.

Once you've installed all the necessary supports, backing blocks and braces, the bottom can be added. Note that the photo on the opposite page shows a 1 x 4 cross brace between the sidepieces at the end of the bow curve. While not absolutely

necessary (it's not shown on the plans), this simplifies the job of planking the bottom since it holds the sides in place during nailing. The bottom, like the top, is secured with glue and boat nails spaced 1½-in. apart. To complete the pontoon, mount the keel and transom filler block, both cut from 1-in. stock.

After sanding all edges slightly round, seal the seams (including those around the spreader support) with fiberglass tape.

The next step is to join the two floats. Set them flat on the ground the proper distance apart and mark the top of each spreader support for cutting, so that it will fit flush against the bottom of the spreader. When you've made these cuts and shaped the spreader, mount the front spreader on the supports by gluing and toenailing through the curved end. The joint is then covered with ¼-in. plywood gussets glued and nailed to both faces to form a rigid arch.

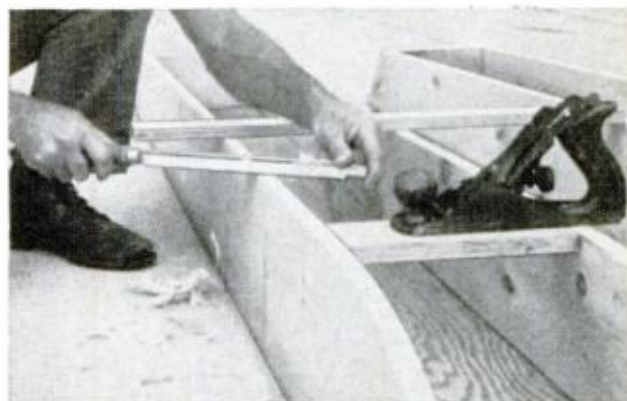
The rear spreader may now be cut to shape. However, its exact location will depend on the bike used, so don't mount it as yet.

The bicycle must be taken apart and modified for mounting on the floats. Begin by removing the wheels and spreading both front and rear forks approximately 1 ft. to provide a more stable support. Then, while propping the rear fork so the bike is level, bend the ends of the front fork to fit flat on the front spreader. Drill holes for bolts in the spreader and bolt the front fork to it.

Before the rear fork can be mounted, the paddle wheels must be constructed. After removing the sprocket from the rear wheel, clean it and take it to a welding shop to have it welded to the ½-in. pipe axle. Once the axle is made up slip the two slitted pipe bearings over it and turn flanges on the ends. The inner axle should be 18 in. long when these are in place. After turning the two short nipples into the other pair of flanges, lay these aside while you assemble the paddle wheels.

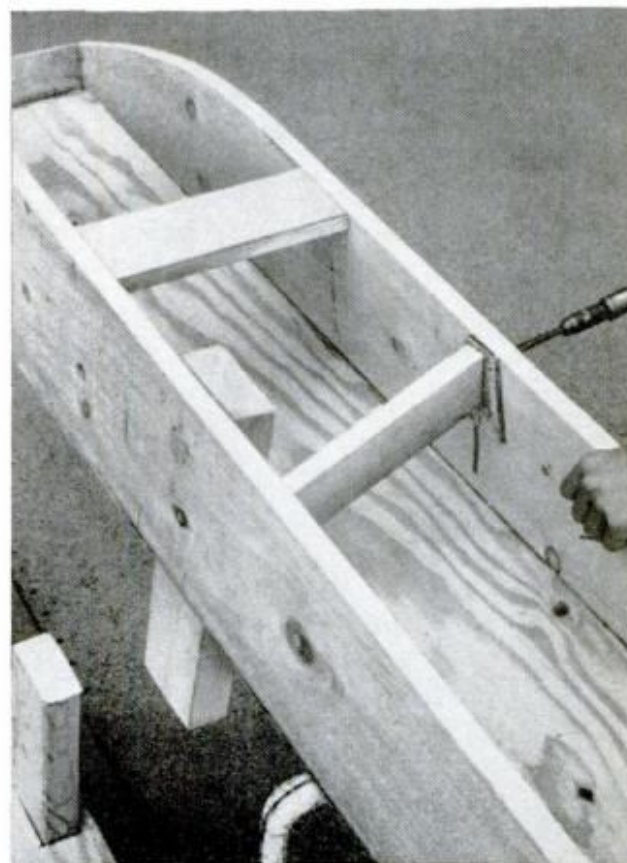
Cut out the four 18-in. plywood discs and 14 paddle blades. To locate the blades on the discs, pencil off seven equally spaced radial lines on two discs, and drive three nails along each line so they barely protrude on the opposite side of the plywood. Then apply a generous coat of waterproof glue to one end grain of each blade, allow enough time for it to be absorbed and give it another coat. One at a time, place the blades on the nail points, flip the disc over and drive the nails home into the end grain.

To complete each wheel, treat the opposite end of the paddle blades with glue, place a second disc over the blades and



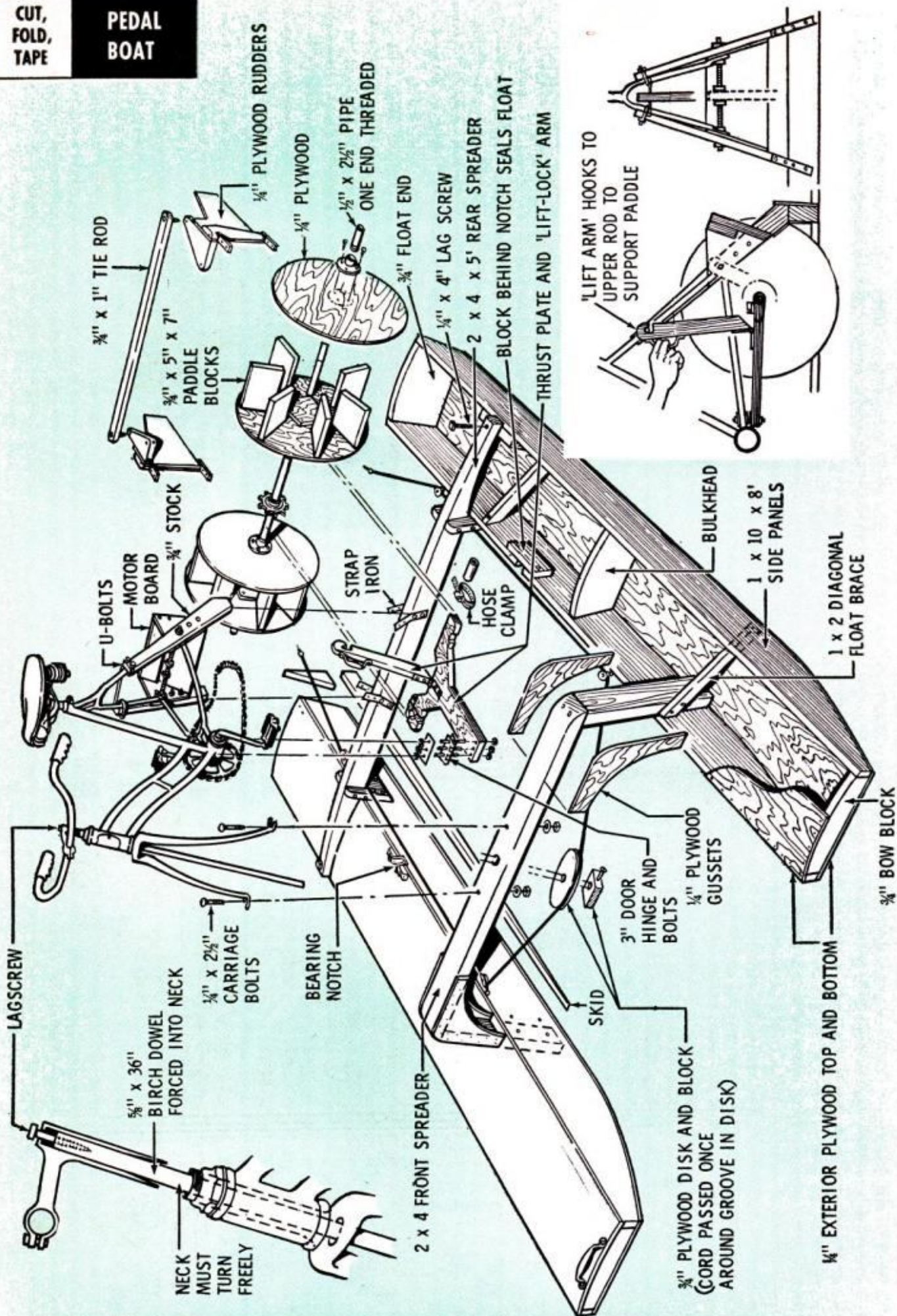
FAIR TOP AND BOTTOM edges of sidepieces so they will fit tight against the ¼-in. plywood planking

FRONT SPREADER supports are glued and screwed to float sides. A 1 x 3 cross brace is also required



CUT,
FOLD,
TAPE

PEDAL BOAT



nail it in place. However, remember to nail plywood doublers to the inner face of each disc before you secure this second disc. These are needed to provide a grip for the flange screws.

With the two paddle wheels completed, you can now mount the four flanges on them. The completed assembly should measure 37½ in., with about 1 in. on each end for bearing into float notches yet to be cut.

The length of the chain will govern the axle location. With the bike propped level, run the chain onto both sprockets and pull the paddle wheel assembly back until the chain is taut. Mark the location of the pipe axles on the floats, for this is where the axle seats should be.

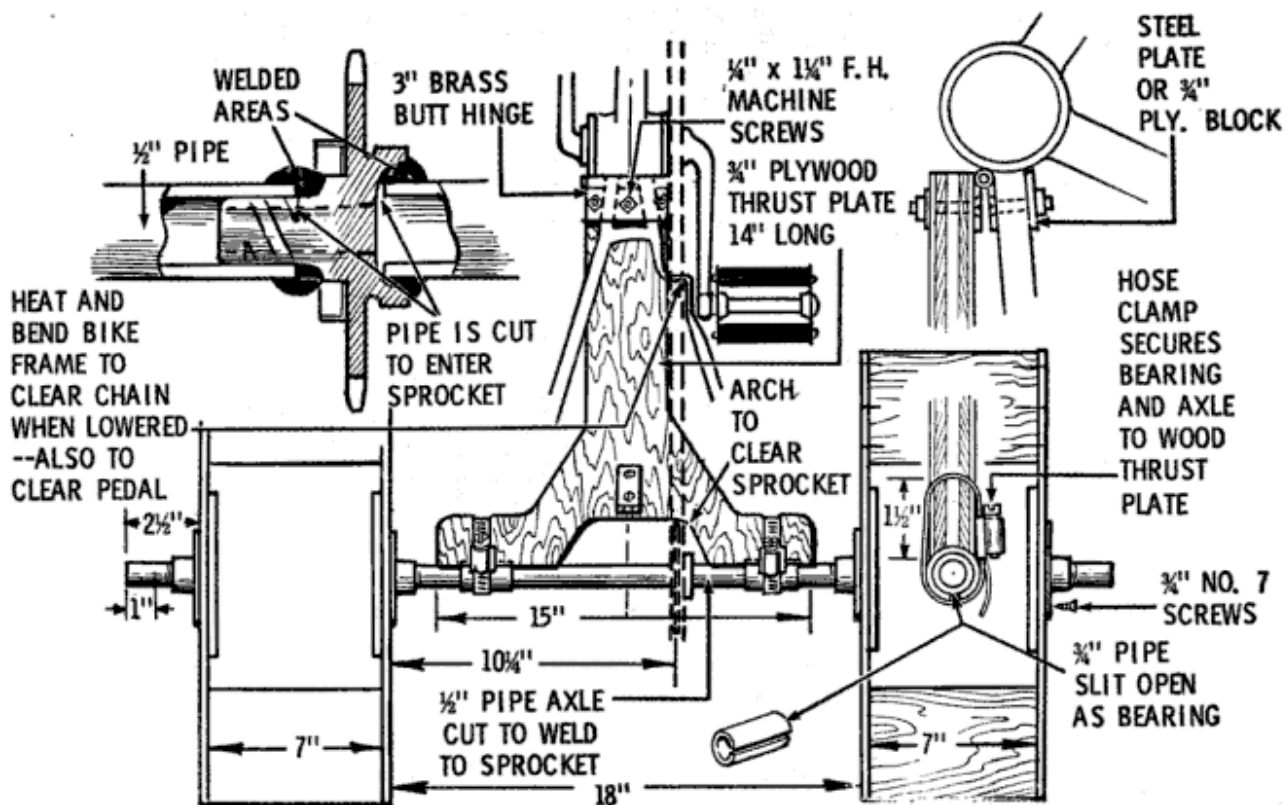
You will probably find that the chain rubs on the fork since the axle has been lowered. To provide sufficient clearance for both chain and pedal throw with the axle in this new location, you'll have to heat the frame and twist it with a hammer and wrench. After modifying the frame, make a final check of paddle wheel rotation to make sure that everything is square and then, with the chain still taut, swing the paddle wheel assembly up so that it will clear the water. The rear spreader should be mounted just aft of this unit, so that it won't hinder paddle-wheel movement when lifting or dropping.

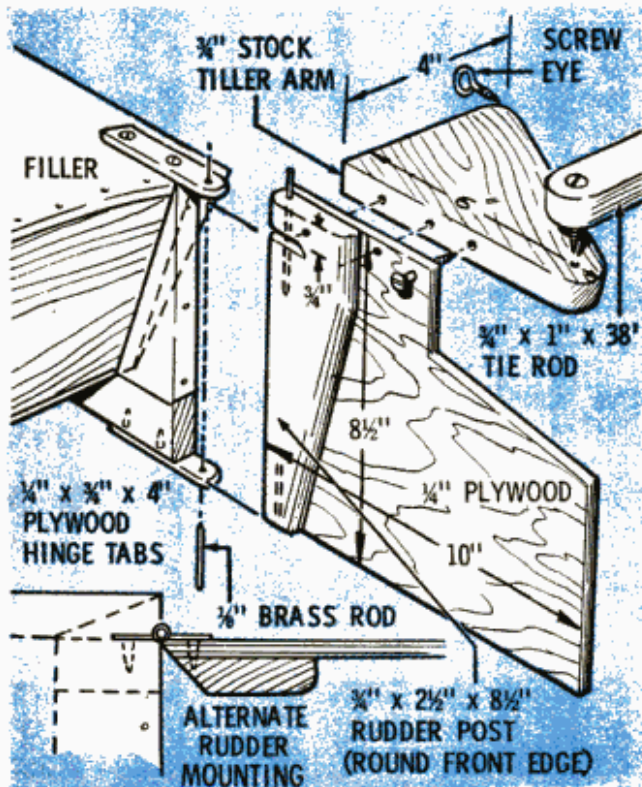
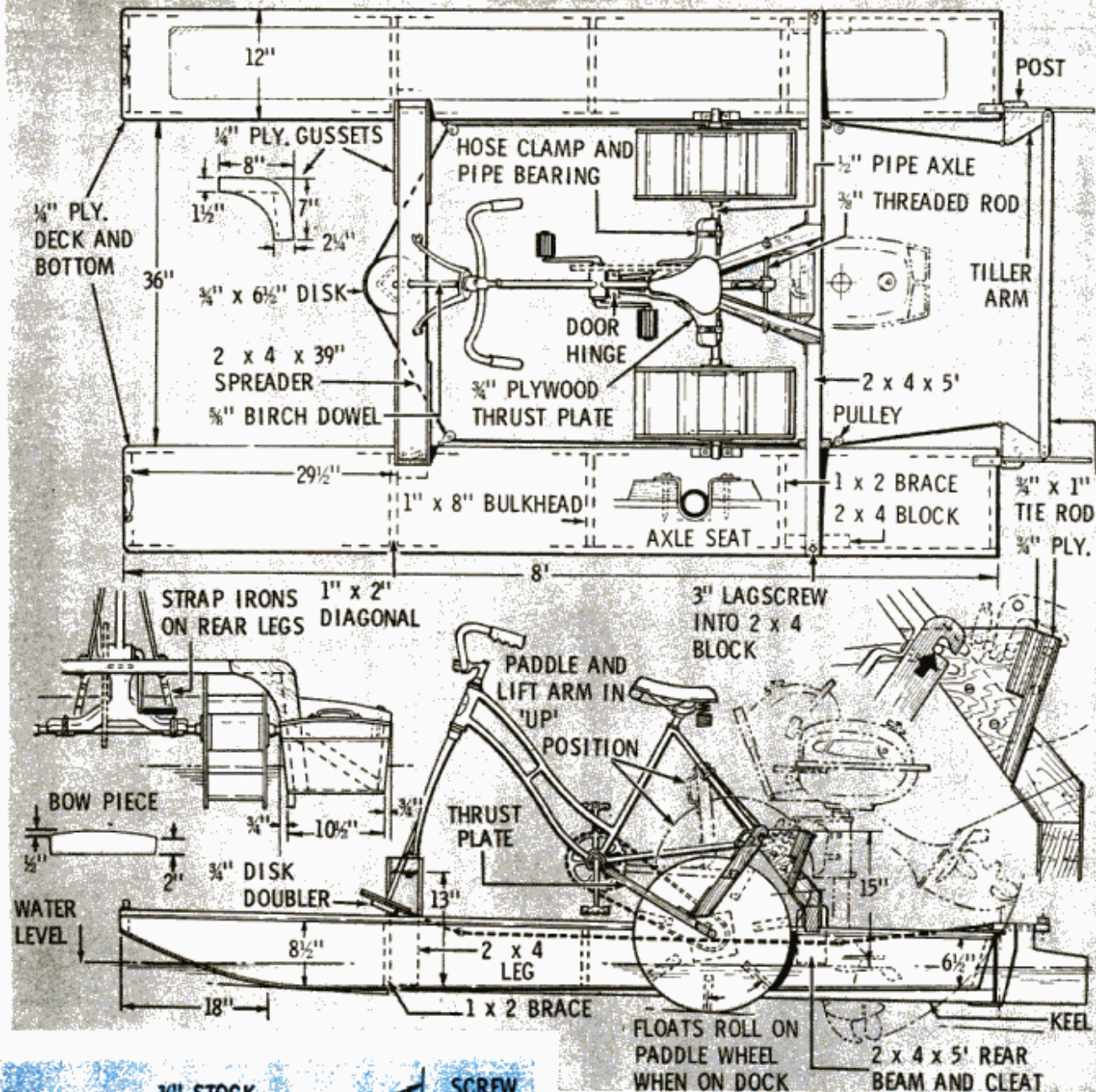
Now cut the tapered 1 x 3 stilts and fasten them to the rear spreader with strap irons. The upper ends are clamped to the fork with U-bolts. To provide support, the rear fork rests on a threaded

WATER BIKE MATERIALS LIST

	AMT.
PLYWOOD	
¼" x 4' x 8' Exterior (AB)	2
¼" x 4' x 4' Exterior (AA or AB)	1
¾" x 2' x 2' Exterior (AA or AB)	1
LUMBER	
1 x 10 x 8' Pine or fir	4
1 x 8 x 6' Pine or fir	1
1 x 5 x 10' Pine or fir	1
1 x 3 x 6' Pine or fir	2
2 x 4 x 7' Fir	2
¾" x 36" Birch dowel	1
MISC.	
½" x 18" Galv. pipe (ends threaded)	1
½" x 2½" Galv. pipe (one end threaded)	2
½" Galv. pipe flanges	4
¼" x 2½" Carriage bolts with nuts	2
¾" No. 8 f.h. woodscrews	16
¾" x 1' Threaded rod with six nuts	1
¾" x 1' Rod	1
½" x ¾" x 5" Strap iron	4
¾" x 1½" Galv. pipe (slit)	2
2" Hose clamps, screw type	2
3" Brass butt hinge	1
¾" x 1¼" Machine screws (for hinge)	6
¼" x 4" Lag screws	2
1" Eye pulleys	4
20' Steering cable	1
1" boat nails, waterproof glue, primer and exterior finish	

PADDLE WHEEL DRIVE assembly makes use of an old sprocket welded into the pipe axle. If obtainable, a one-to-one ratio between this and the pedal sprocket is best, since this makes pedaling a lot easier





rod running through holes drilled in the stilts. Nuts inside the fork and outside the stilts hold this in place.

The thrust plate, the final drive item, is designed to take strain off the axle assembly. After cutting this to fit, secure it to the crank housing with a heavy door hinge and machine screws, as shown in the drawing above. The lift-lock arm is hinged to this plate near the rear axle and notched at its upper end to fit over the unthreaded 3/8-in. rod running between the U-bolt clamps. This same arm serves as a "down lock" when hooked over the threaded rod.

The motor-board assembly is cut to fit between the stilts and bolted rigidly in place. Note that the board itself is doubled at the top to fit the motor clamp.

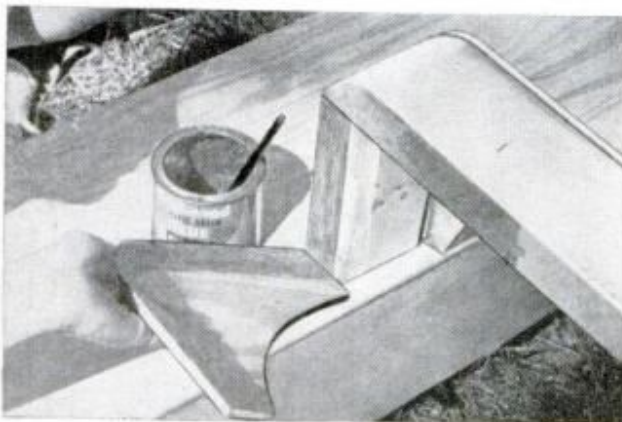
Follow the detail shown at the left when you are constructing and mounting the rudders. These are controlled

from the handlebars by means of steering cables running through pulleys mounted on the floats. First, however, the handlebar unit must be modified.

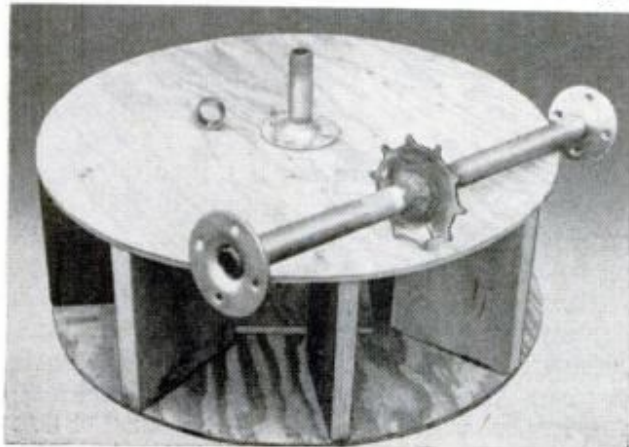
After removing the handlebars and discarding the old taper nut and bolt, drive a heavy dowel up into the neck and secure it in place with a lagscrew plus epoxy. Then drill a hole through the crotch of the fork to allow the dowel to slip through the front fork. Oil the neck so it will swivel freely before you replace the handlebars in the fork assembly. Once these are in place, mount the grooved disc on the end of the dowel, install the steering cable and the boat's ready for a test run.

Take it easy on your first few trial runs with the motor, leaning inside all turns to make sure that the outer float doesn't dig in. Speed is controlled by a lever on the motor, but if you find it inconvenient to reach behind you every time you want to change speed, it's a simple matter to run a cable from this lever to a remote gas control up on the handlebars. An old bicycle handbrake or auto choke control makes a fine remote throttle. Also, oil the chain lightly to prevent rust. Happy cycling! ★★★

PLYWOOD GUSSETS glued and nailed in place reinforce joint between spreader and spreader support



WHEN ASSEMBLING paddle wheels, be sure to glue backing blocks inside for screws used to mount flanges



AUGUST 1965

Outboard Clinic

Q My engine's a museum piece—a 1941 5-hp Elto—but it's been in mothballs since 1947, so it's a real gem. The only thing I can find wrong is a weak magnet in the flywheel. Is it possible to re-energize such a magnet? I'm pretty sure a new flywheel for this oldtimer would be impossible to find.—H.L.C., Ohio

A There is such a thing as a magnet charger, but few dealer shops are likely to have one. However, don't be so pessimistic. I've found a source where you can buy a new flywheel, and I'm airmailing you the address.

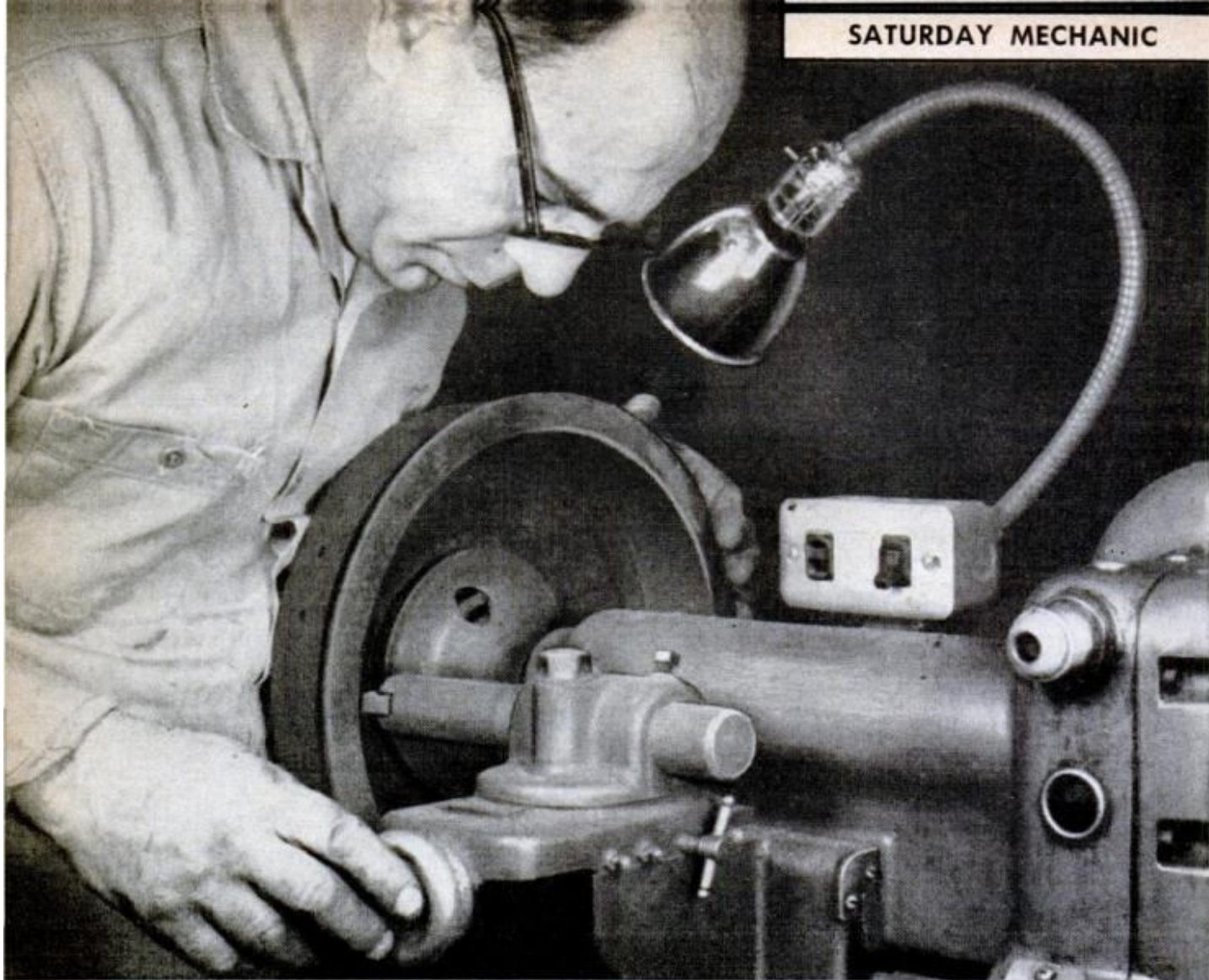
Q I'm thinking of buying a tachometer for my 60-hp Johnson. Do you think the expenditure is worth it?—D.B., New York

A You bet I do. A tach's one of the most valuable instruments you could buy. Used properly, it'll help cut fuel bills, tell you whether you're running the right prop and generally help you to get the most out of your motor.

Q I have a 16-ft. wood lapstreak runabout equipped with a 75-hp outboard. The boat porpoises at full throttle, and I'm beginning to think I've got too much power. What's your opinion?—B.T.G., Louisiana

A This column isn't set up to cover anything beyond engine problems, and your letter is a good example of why I can't go into more general questions. Without knowing the boat's lines, hull condition, prop, tilt-pin setting, running load and distribution, etc., only a wild guess is possible. I won't guess at the cause of your problem, but no matter what it is, you can probably pull the bow down by adding trim tabs. However, in the future, let's stick to engines. Okay?

As a service to the readers of *POPULAR MECHANICS* in solving problems relating to their outboard engines, you are invited to submit your questions to this column. All questions will be answered, either in the column or by mail. Address Outboard Clinic, Popular Mechanics Magazine, 575 Lexington Ave., N.Y., N.Y. 10022, enclose a 5-cent stamp.



A BRAKE JOB should always involve a light cut on each drum to remove any high spots, dirt and roughness

Give Your Brakes a Break **Part II**

By Morton J. Schultz

APPARENT BRAKE FAILURE, the trooper's report read. "Seven-year-old passenger dead on arrival at Memorial Hospital. Driver of Car B in serious condition suffering possible skull fracture and fracture of left leg.

"Car A, going east on Route 4, applied brake to avoid . . ."

On it went, terse and coldly factual. Another accident, another death, another injury. All so tragic, and all so totally unnecessary.

"In accidents like this," the trooper told me, "it's hard to play 'let's place the blame.' Who can you finger when the reason is a sudden mechanical failure?"

But the sad fact is that when it comes to brakes, seldom is there such a thing as

sudden failure. Brakes usually give plenty of advance warning—in the form of a spongy pedal, hard stops or the like—before breaking down completely.

Furthermore, too many drivers put price ahead of quality. The car owner who believes he can get quality and save money at the same time by buying brake shoes selling for 25 percent less, or having the brake drums turned down once too often, or having the brakes adjusted just one more time before rebuilding them, is creating safety in his mind only—not in his car.

Another thing you can't skimp on is workmanship. Let only the most skilled, conscientious mechanic you can find work on your brakes. If you've had experience and know what you're doing and have

access to the proper equipment, you can do it yourself. But there are some catches to this approach. For one thing, brakes now vary so widely from car to car that you must have *full* information about your particular model. Overlooking just one important fact could lead to a serious accident. Also, as pointed out last month, only certain phases of brake work are really within the scope of most amateurs' skills and equipment. Therefore, it's probably best that you use Part II of this article as a basis for evaluating a brake job, rather than doing one.

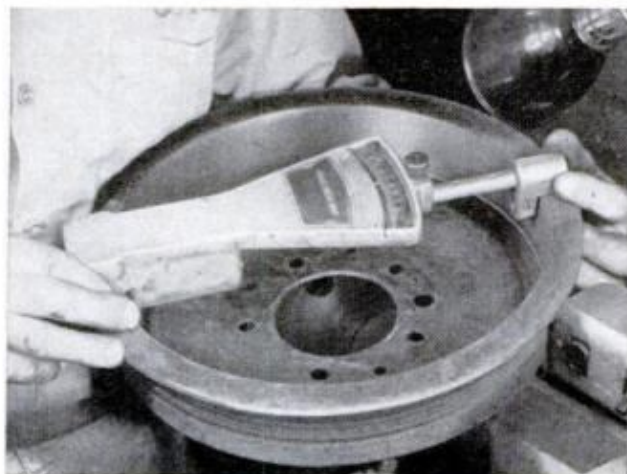
A thorough brake job starts at the master cylinder and progresses to the heart of the braking system—the "stopping parts." A quality overhaul of these parts should guarantee:

- Trueness of the brake-drum surfaces and assurance that the drums have sufficient thickness to withstand the heat and forces of braking.
- Trueness of the brake shoes.
- Proper matching of brake shoe thicknesses to brake drum diameters.
- Assurance that anchor-pin holes of the brake shoes are not worn.
- Replacement of hold-down springs that have lost their tension.
- Smoothness and cleanliness of shoe platforms on the backing plates, and that they're of equal height and lightly lubricated before shoes are installed.
- Installation of new grease seals *every time* the brakes are relined.
- Correct adjustment of brake shoe-to-drum clearance and of anchor pins.

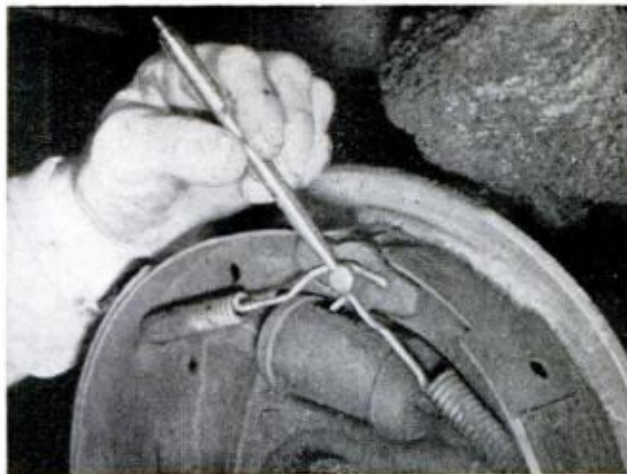
When you come right down to it, the most critical parts of a brake, and the parts which take the most punishment, are the drums and linings. Both, therefore, need particular attention.

Every time you make a stop, the friction between the brake linings and the drums generates heat. Normal temperature on the

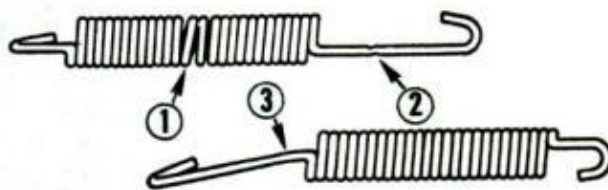
CUTTING TOO MUCH METAL from the drums invites disaster. Here, mechanic is miking the drum diameter



AUGUST 1965



WHILE ANCHOR PINS seldom come loose (above), it can happen. Check all of them, just to play it safe



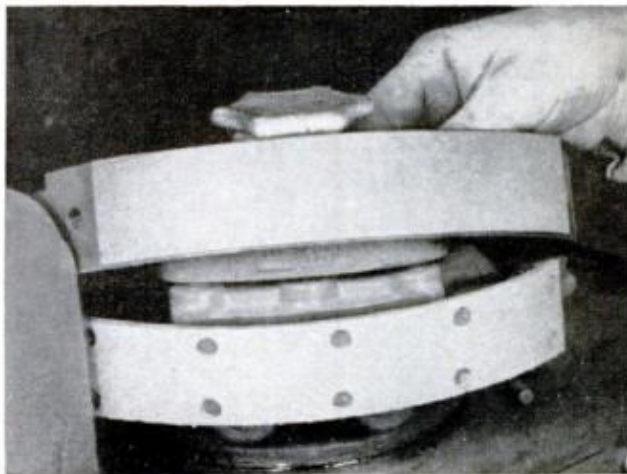
DAMAGED SPRINGS are common source of trouble. Replace any that are sprung (1), chewed (2) or bent (3)

drums is considered to be about 220° to 260°. However, the faster the stop, the higher this temperature goes. If something's amiss in the system, temperatures could reach 1400°.

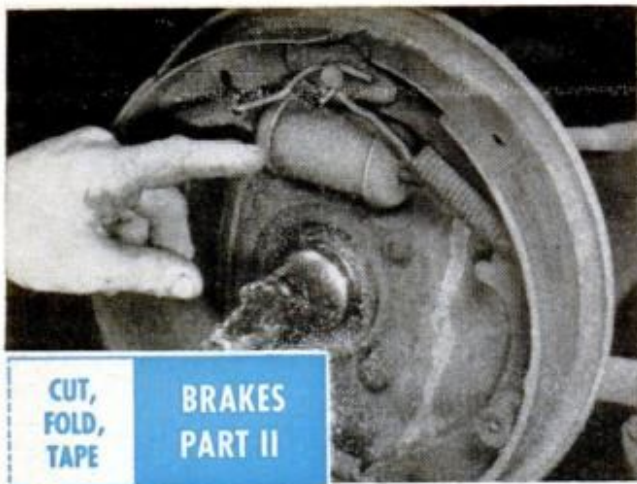
Double Check the Drums

Besides providing the surface which creates the necessary friction, the drums must also absorb about 90 percent of this heat and dissipate it. In doing so, they can become scored, roughened, distorted, bell-mouthed, barrel-shaped or out-of-round. Any one of these conditions leads, of course, to erratic and unsafe braking. If extreme, they can lead to brake failure. Yet, when brakes are overhauled, the

BONDED OR RIVETED? Both types of lining work if properly installed. Always get best quality available



155



CUT,
FOLD,
TAPE

**BRAKES
PART II**

MOST BRAKE EXPERTS say it's best to replace or rebuild all wheel cylinders when brakes are relined

drums seldom get sufficient attention. After 10,000, 20,000 or 30,000 miles of use, one cannot simply look at the drums, nod contentedly on finding nothing and press them back into service. Although rough or scored spots might not be visible readily, they can still be there. Furthermore, the drum can be slightly out of round without your noticing it.

Many experts say, therefore, that the drums should receive a light cut on a drum-turning lathe every time the brakes are overhauled.

But suppose you've had the drums turned down in the past. How much more metal can you safely remove, and what can happen if you remove too much?

The other day, I visited a shop where these questions were answered quite vividly. A man pulled in to have his brakes adjusted; he had a low pedal. A mechanic adjusted the first three wheels in the usual manner, without trouble. When he got to the fourth wheel, however, and turned the adjustment (star wheel) to where the wheel should have started to drag, nothing happened.

GREASE SEALS TOO, say the experts, should be replaced as part of major brake job—leaking or not



Closer examination revealed a part of the brake drum had separated from the web. The web was rotating with the wheel while the drum stood still. There was absolutely no brake action.

Another look revealed a crack in the drum in a direction parallel to the axle shaft. Tightening the star wheel did nothing but widen the crack.

A micrometer check of the drum showed there was only 1/16 in. of metal remaining at the cracked point. But get this: Just a casual look at the drum showed nothing wrong—no crack, nothing! What would have happened if this driver had to make a panic stop?

Upon questioning the driver, I learned he had the car in other shops twice before for brake work. Each time, the drums had been turned, but the second man had not miked them to make sure enough metal was left.

Taking too much metal off a drum, of course, weakens it and doesn't leave enough strength to absorb and dissipate the heat. What happens is easy to visualize; the weakened metal cracks.

So, always be sure the drums are miked *before and after* turning to make sure no more than 0.060 in. of metal has been removed from the original thickness of the drum walls, as specified by the manufacturer of your car. Authorities stress the 0.060-in. figure is the *absolute maximum*.

Here's another critical point: In matching new linings to a drum that's been turned, make sure the lining is not too thin for the drum, or it won't make full contact. Usually, if less than 0.030 in. of metal has been turned off the drum thickness, standard linings (those specified as "standard" for your car) can be used. If, however, 0.030 to 0.060 in. has been removed, get shimmed or oversized linings.

A word now about cleanliness: It's important. Whether you press old brake drums back into service or install new ones, they should be cleaned to minimize brake squeal problems. To clean old drums, remove small nicks and scratches with fine emery cloth and blow away dust and dirt with an air hose. Then clean with high-pressure steam or a non-oily solvent. With new drums, a cleaning with high pressure steam or solvent is sufficient.

Insist on Quality Linings

In selecting new brake linings, keep one word in mind: quality! Whether you prefer bonded linings or the riveted type, buying anything less than the best is only cheating yourself, especially since the difference in price between the best and the cheapest is comparatively little.

What about bonded vs. riveted linings?

Despite all the noise, it's a matter of personal choice. Some people say a riveted lining is less likely to come loose from the shoe when overheated and is less likely to squeal. Others argue that a bonded lining provides more uniform contact with the drum. The fact is either type gives fine service if well made and installed.

Here are some points to keep in mind when having new linings installed:

- Replace all linings, even if only one needs replacement. Assuming normal wear, if one or two linings are worn out, it can't be too long before the others reach the same point. So you might as well do the whole job at once. Besides, it's tough to get the correct adjustment and the proper braking distribution unless all linings are uniform.

- You just don't slap in new linings. Because it's imperative to have the correct lining-to-drum contact, today's re-lining jobs should all be "custom," with each lining being ground to the proper diameter to fit each individual brake drum. Otherwise, you're asking for brake chatter, uneven application, brake drag and a hard pedal.

- Backing plates must be absolutely clean, free of nicks and burrs, and lubricated.

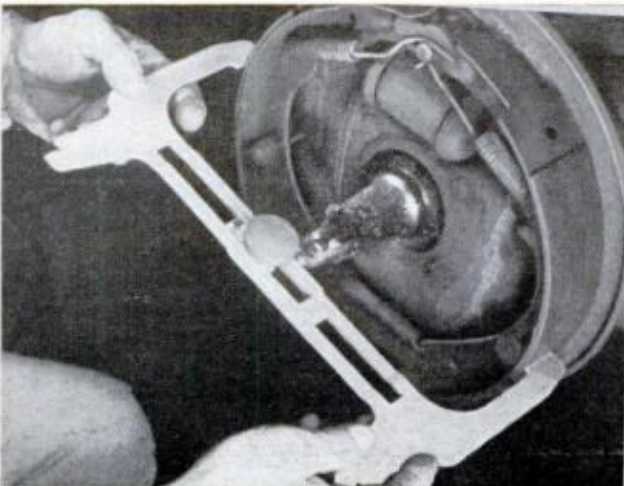
- With new linings installed, they must be adjusted just right in relation to the drums to avoid rubbing, premature wear.

Examining old brake linings can tell you much about the overall condition of the brake system. For example, if a lining is thicker on one side of a shoe than the other, it means the drum is bell-mouthed or the shoe platform isn't at right angles to the web. Similarly, if the lining is thicker at both ends than in the center, the shoe arc wasn't correct.

Beware of Weak Springs

Among the most neglected parts of a brake system are the return springs.

WITH LININGS IN PLACE, adjust brake drum clearance to manufacturer's specs, to avoid rubbing, drag



AUGUST 1965



PROPER MATCHING of brake lining thickness to drum diameter generally demands grinding of the linings

Truckers tell me they've found weak springs to be the primary cause of brake trouble with their rigs. And, believe it or not, weak springs can cause every known braking problem, including pulling, diving, excessive wear and drum scoring.

So, examine the springs carefully, feel them for tension and replace any that seem the least bit damaged or worn.

After the brakes have been rebuilt, of course, they must be adjusted and bled in the usual manner.

Now, when you begin driving with your newly rebuilt brakes, remember that new linings require about 250 to 500 miles of breaking-in. During this period, avoid high speed and panic stops. ★★★

ANALYSIS OF WEAR pattern on old linings can reveal such brake defects as cocked shoes, uneven contact



157

goes between the tower and pedal. Ask for part No. COAZ-9784A.

Q I recently bought a 1958 Chevy V8, 283 CID engine, with automatic transmission. Within three weeks, the transmission broke down four times. The third time, the dealer completely rebuilt it and attached a 3/8-in. copper tube on the side of the filler tube, extending it back to the transmission. He said this would lessen the pressure which was building up. But the car broke down again after 50 miles. What's the trouble?—J.P., Kansas

A Probably one of the rarest of all malfunctions for a transmission in this car—heat. An oil cooler in the bottom of the radiator is supposed to cool the transmission. If it's not operating, the transmission overheats, and you'll get breakdowns. Have that cooler examined and, if need be, replaced.

Q I'm getting only 12 miles to the gallon with my 1961 Rambler Classic six, despite repeated tune-ups. As I'm no hot-rodder, I doubt it's my driving. Any theories?—A.F., Illinois

A Poor gas mileage was a major complaint with the '61 Rambler. The company soon determined that less-than-strong valve train parts were at the root of the problem. New and stronger parts have been issued and, reports indicate improved mileage. A Rambler dealer naturally would be a logical source of the new parts.

Q What would cause a vibration which I feel in the gas pedal of my 1963 Ford Galaxie? I don't hear a noise, but it sure tickles my foot.—C.S.P., Pa.

A Foot-feed tickle is not uncommon with the 1963 Ford. In fact, Ford's issued a new part to eliminate the trouble. It's a special piece of linkage that

Q I lose a quart of oil every 300 miles through the crankcase breather cap of my 1963 Ford Fairlane if I travel at sustained speeds of 50 to 70 miles an hour. If I hold my hand over the pipe at idle, the pressure practically blows it off. Can you explain?—R.L.S., Texas

A One good possibility is that a faulty emission (anti-smog) valve is stuck closed and is plugging up the breathing system. If so, replace the valve. It'll cost about \$2.30 plus labor.

Q My 1958 Cadillac diesels a few times when I shut her off. How come?—J.L.A., Wisconsin

A This is one all owners of big engined cars should keep in mind. The most common cause of this condition is that the rpm's are set too high. It'll just keep that engine running for a few seconds after you shut off ignition.

On '58 Caddies, however, the reason might be a sticking gas pedal. This is caused by the rusting of a hinged metal affair beneath the pedal.

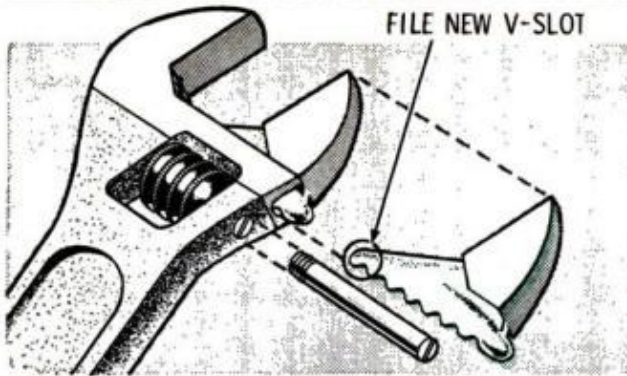
Q I replaced the rear main seal of my 1961 Chevrolet Bel Air, because she was leaking. She still leaks. What now?—D.L.T., Wisconsin

A Six-cylinder Chevys have a way of leaking from the rear of the valve cover and looking like a rear main seal leak when the oil's thrown. See if it isn't this. It's also possible that the breather pipe is clogged. Again, this will throw oil out and fool you into believing it's a main seal.

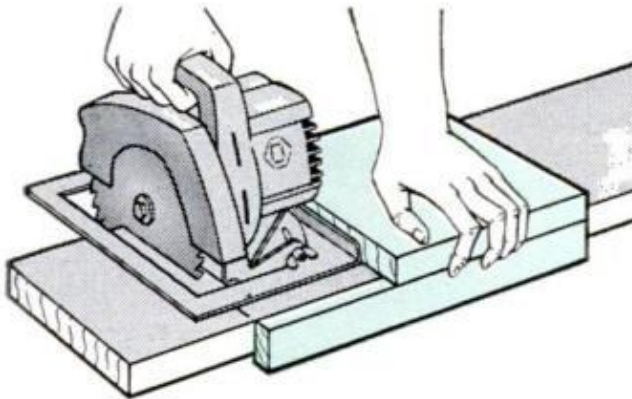
If neither is the case, see if the seal has turned because of excessive bearing clearance. If so, you'll have to replace the upper and lower seals and, of course, the bearing.

EDITOR'S NOTE: When we began Auto Clinic we had no idea how popular it would be with our readers. Little did we think we'd be so swamped with letters that we'd have to set up a special system with additional help to handle the answers. But that's what has happened. Much as we would like to continue the clinic as a free service to our readers, we find we reluctantly must make a nominal charge to help cover the cost of diagnosing and handling your car problem—if we are to continue to answer all inquiries personally. Write Auto Clinic, Popular Mechanics Magazine, 575 Lexington Ave., New York, N.Y. 10022, enclosing a self-addressed envelope and 25 cents in coin

TAKE A HINT FROM READERS

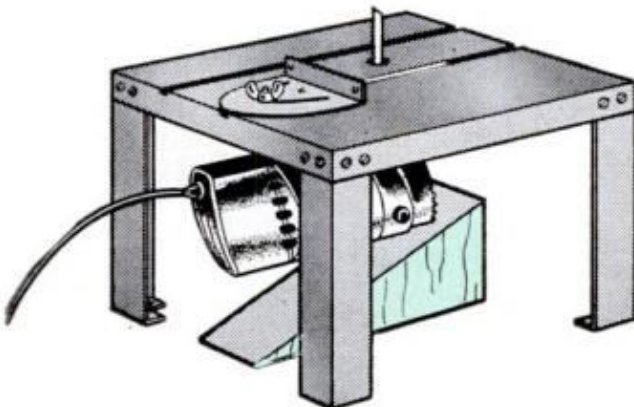


EVER NOTICE how many things are just barely beyond the jaw capacity of your favorite adjustable wrench? To avoid future frustrations, remove the screw and slide out the movable jaw. File one more V-slot in the bottom edge, as shown, and jaw will accommodate as much as an extra $\frac{1}{8}$ in.

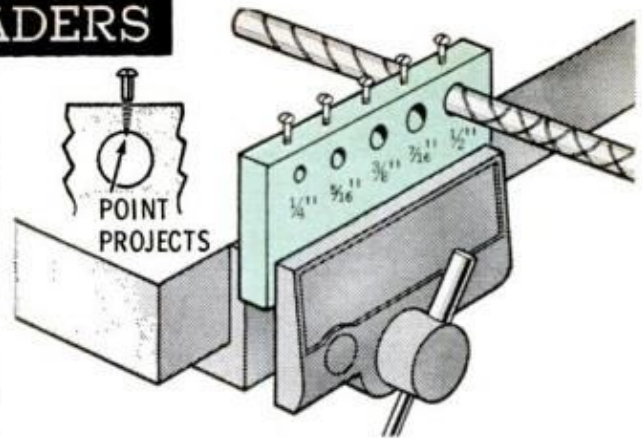


SQUARING GUIDE for portable circular saw lets you crosscut squarely to a simple layout mark, without having to guide the saw along a line scribed with a square. Nail a 1x2 under one edge of a square of 1-in. stock, letting 8 in. extend. Excess trims off accurately with first trial pass

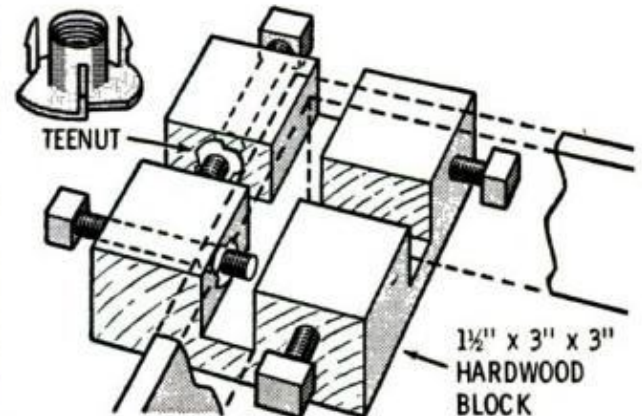
TAPERED BLOCK wedged under a saber saw that's clamped under a table (to convert it for jigsaw use) tames most of the vibration and steadies the tool for accurate cutting. The table must, of course, be firmly anchored to your workbench. After wedging the block tight, hold it with one nail



AUGUST 1965

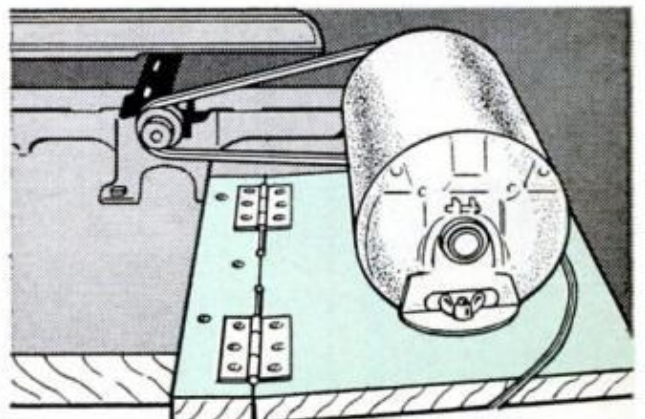


SCORE DOWELS in this jig and they won't squeeze all the glue out. Bore a series of holes (to match the dowel sizes you use) $\frac{1}{4}$ in. from one edge of a hardwood block. Drive No. 6 x $\frac{3}{4}$ in. roundhead wood screws through the edge so they project enough to score $\frac{1}{16}$ in. deep. Twist dowels through twice

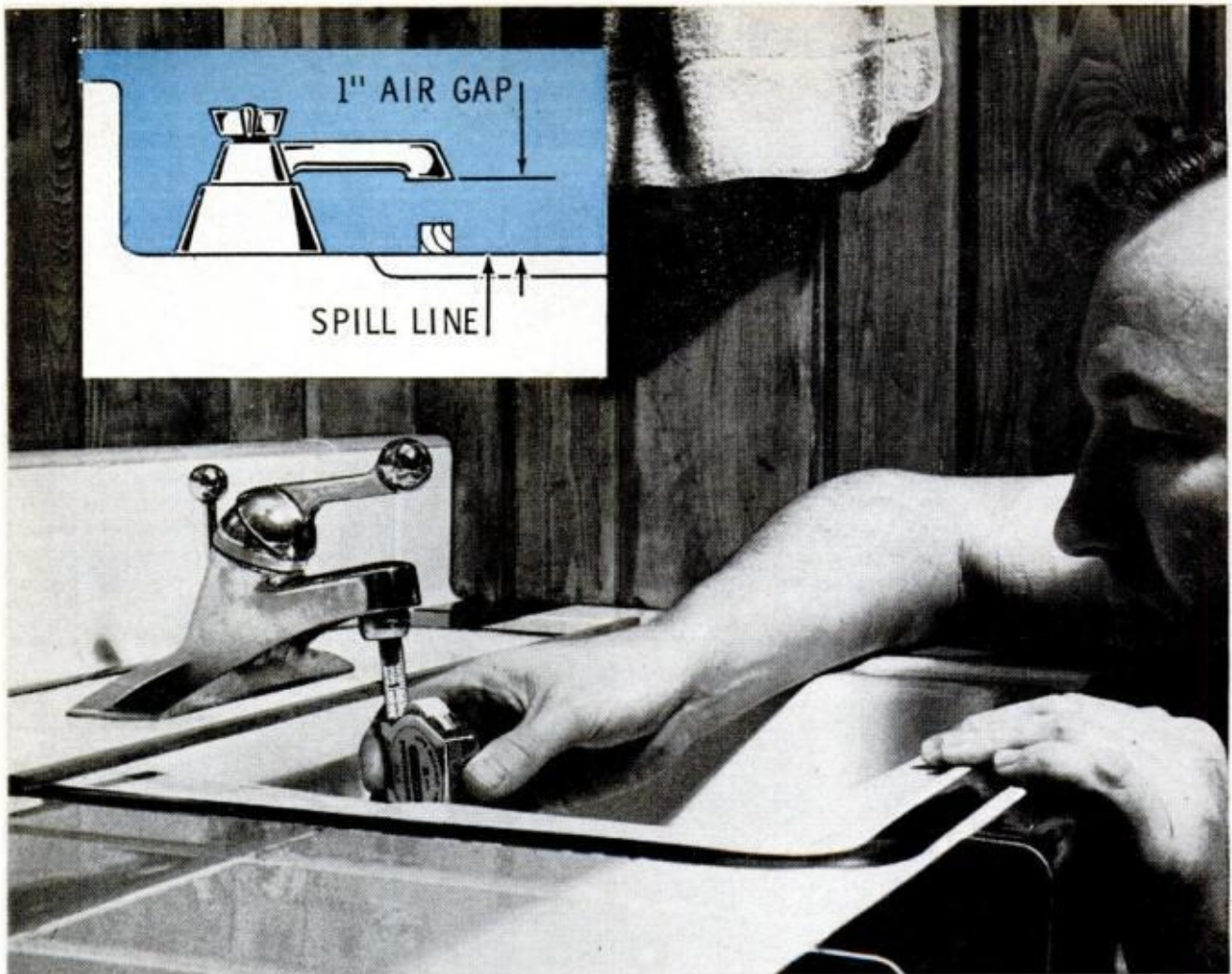


CORNER CLAMP for assembling box joints will hold small stock firmly while you brad and glue. It also clamps T and cross joints. To make it, just cut $\frac{3}{4}$ x 1-in. slots on the centerlines of a hardwood block, then drill holes to take $\frac{1}{4}$ -20 Tee-nut barrels. Draw nuts flush with clamping bolts

ONE MOTOR can hop around your shop to power many tools if you mount it on a $\frac{3}{4}$ -in. plywood panel as shown. Fasten half of a pair of loose-pin hinges at the edge and mount matching halves on cleats nailed to the bench near the drive pulley of each tool. The pivoting weight puts tension on the belt



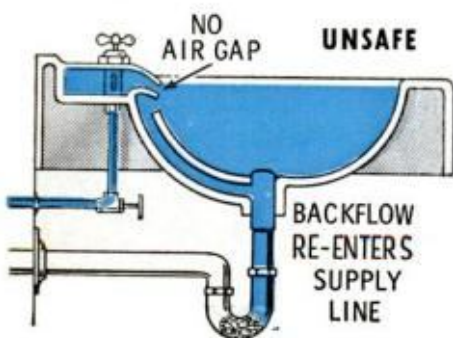
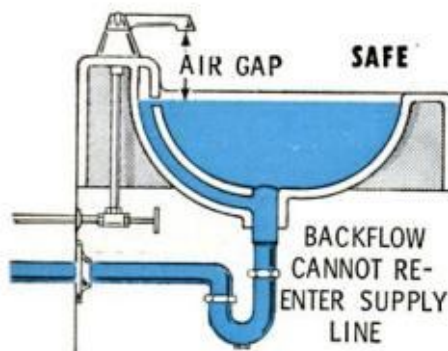
159



TO MEASURE AIR GAP at a sink or lavatory, place a straightedge across top of bowl and check space below faucet. Drawings below show why gap is needed to assure clean water. Minimum gap is indicated above

By Richard Day

Is Your Plumbing



ONE BRIGHT MORNING, a suburbanite on the West Coast was spraying his lawn with an arsenic weed killer from a bottle attached to a sprayer on his garden hose. When he was through, the man disconnected the hose and took a drink of water from the tap. He died of arsenic poisoning within hours.

This man was double-crossed by his home plumbing. His death was caused by what experts call a cross-connection between the potable water inside the house and the arsenic-laced water in the sprayer. A temporary, unnoticed reverse flow drew arsenic into the house piping.

A cross-connection is any arrangement whereby water that is either unfit to drink or of questionable potability can contaminate the household supply.

The worst of it is that not one home in a thousand is equipped to prevent what happened to that hapless suburbanite. We Americans have developed a childlike faith about our water's purity and we forget that it takes proper control and vigilance to keep our water pure.

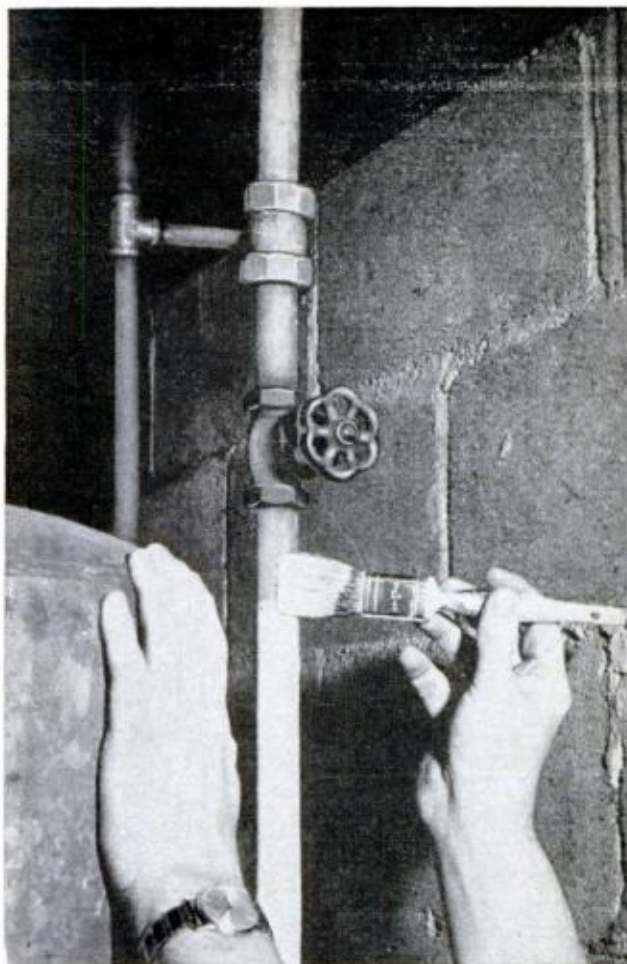
Two simultaneous conditions are necessary to contaminate your house water: (1) the existence of a cross-connection at any time there is (2) a backflow

of used water toward the potable water system. Backflow can be caused by *back-pressure* on the impure water that forces it into the house system. Or, its cause can be a vacuum in house water lines that draws in contaminated water like soda up a straw. This is called *back-siphonage*.

Back-pressure is not common in residential plumbing; back-siphonage is. It can occur whenever part of the city main has to be shut for repairs. And during a fire, water can be used so rapidly that a vacuum is created in the city mains. Open a faucet and, instead of water coming out, air rushes in. Another cause of back-siphonage is improper sizing of your house pipes. In that case, turning on a large tap in the lower part of the house can drop the pressure in the risers.

Epidemics of cholera, typhoid fever, gastroenteritis and dysentery all have been traced to cross-connections in home plumbing systems. While the probability of a backflow taking place in a given home at a given time is very small, just one occurrence where contaminated water is present can be a catastrophe for the people affected. And, most frightening of all, there is no warning. Sickness or death may be the only indication.

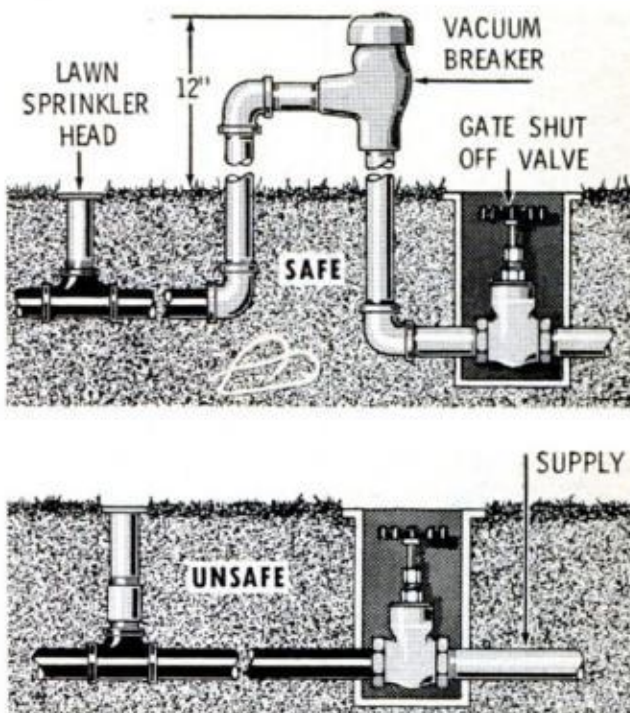
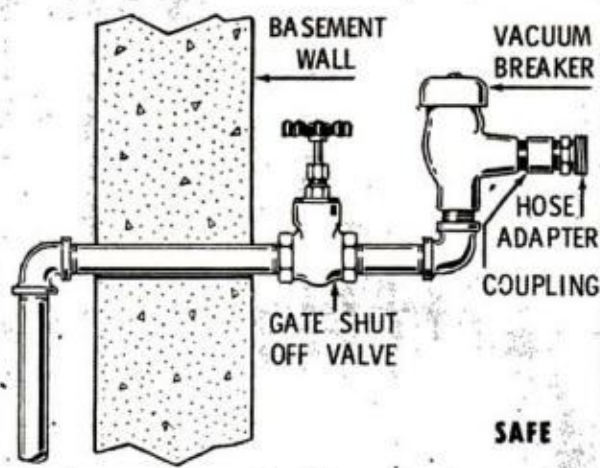
A manual published by the U.S. Public Health Service says that enteric infections caused by cross-connections may occur in almost any city on any day. In Newton, Kans., for a specific example,



A COAT OF YELLOW PAINT on all pipes in your home which carry non-potable boiler or cistern water will remind the plumber not to connect the pipes accidentally to those carrying family's drinking water

Double-Crossing You?

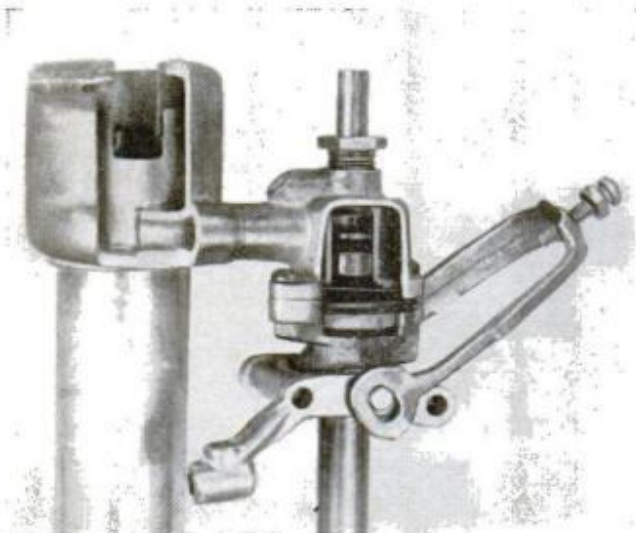
LAWN SPRINKLERS and hose cocks can permit backflow of water laden with fertilizers, weed killers and other poisons into house water supply. This danger is easily avoided, however, by installing vacuum breakers. Drawings at right show safe and unsafe way to install underground sprinklers. Below, a typical setup for hose cock. In most cases, vacuum breakers are installed on the "off" side of valve





HOOKED TO A SHOWER HEAD, instead of a lavatory faucet, shampoo rinse hose is high enough so that its nozzle can't cross-connect with the water in tub

HERE'S A CUTAWAY VIEW of toilet tank valve designed to prevent backflow of water from tank. Ports at left admit air if vacuum develops in supply line



cross-connections let sewage from ten families to flow into a temporarily closed water main. As soon as water service was restored, an epidemic broke out in which 2500 people went through the miseries of enteric disorders.

The American Standard National Plumbing Code calls for measures that will eliminate *all possibilities* of cross-connections. However, this code is merely a recommendation. Many rural areas have no codes at all. Some cities that do have codes have not applied them to houses built before the dangers of cross-connection were recognized.

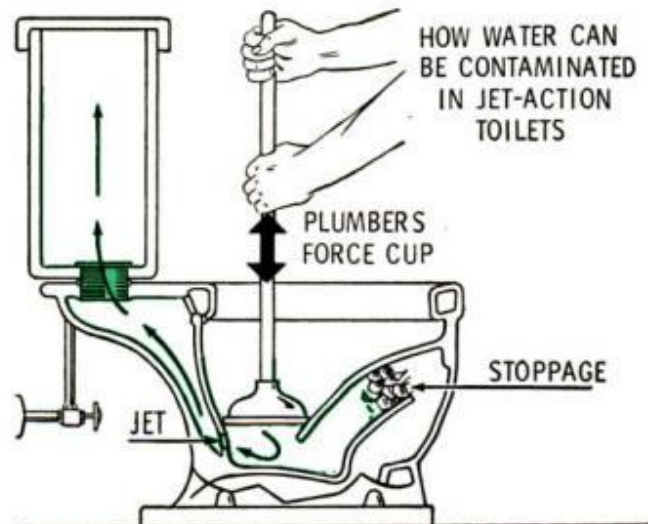
Another attack on the problem is to minimize chances of backflow. In residential plumbing, the most common backflow-preventer is the air gap. An air gap is the distance that a faucet discharges above the highest possible level of water in a bowl, sink or tub. In most cases, this would be the faucet's distance above the bowl's rim. What the gap does is prevent siphon action from drawing water from the tub or sink into the fresh water.

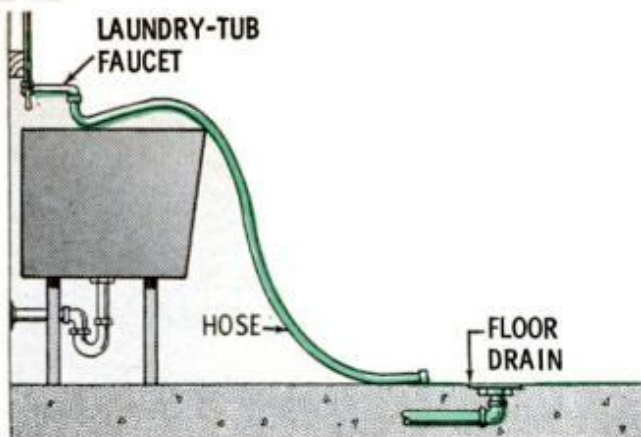
An air gap should generally be twice the diameter of the faucet or pipe opening. Thus, for a lavatory, the tap should discharge at least 1 in. above the rim of the bowl. Air gaps for kitchen sinks and laundry tubs should be at least 1½ in. They should be at least 2 in. for bathtubs.

Where an air gap is not practical, as in sill-cock connections, a useful means of stopping back-siphonage is the *backflow preventer*. A number of types are made. Because each is designed for a particular application, selection and installation of these devices is a job for the plumber.

The most common backflow preventer in house plumbing is a *vacuum breaker*. This patented device has one or more

PLUMBER'S FRIEND can be your family's enemy. Plunging action can force contaminated water from clogged bowl of siphon jet toilet upward into tank





HOUSEHOLD HOSES are a frequent cause of cross-connection. Here, careless use of hose permits back-flow in pipe to draw dirty water from around drain

valves that let air enter whenever water pressure drops below atmospheric pressure, breaking up siphonic action inside the pipes.

A vacuum breaker is ordinarily located a minimum of 6 in. above the highest level of water that might be backsiphoned. It is usually positioned on the discharge side of the faucet. Here, it is under pressure only when the faucet is turned on. Plumbers warn that an ordinary check-valve is not acceptable as a backflow preventer, though there have been many attempts to use check-valves in this way.

Tour your house and grounds right now and look for cross-connections. Measure the air gaps on all your bathroom, kitchen and laundry fixtures to see that they meet the minimums. Many old fixtures have submerged inlets which discharge water below the fixture rim. A clogged drain in such a fixture creates a direct cross-connection between dirty and clean water. A closed faucet offers only partial protection in such situations, since bacteria can pass through even the most minute, unobserved leak. So, if you have a fixture with a submerged inlet, replace it.

Check for other locations where a pipe or hose from the house water supply might have its outlet submerged in contaminated water. Inspect washing machines, dishwashers, aspirator sump pumps, float valves, floor-drain trap primers, air-conditioning cooling towers and frostproof toilets. Look at outdoor pools, such as swimming pools, fish ponds and lily ponds. Provide air gaps for the water supply pipes at all such spots.

Underground lawn sprinkler systems *must* have vacuum breakers to keep water poisoned with fertilizers, weed killers and insecticides from being drawn into the house supply. The vacuum breaker should be at least 12 in. above the highest sprinkler head. Some municipal codes call for



ALL FAUCETS connected to cistern water or other non-potable supply should be clearly labeled. And, of course, children should be warned of the hazard

even higher placement of the breaker.

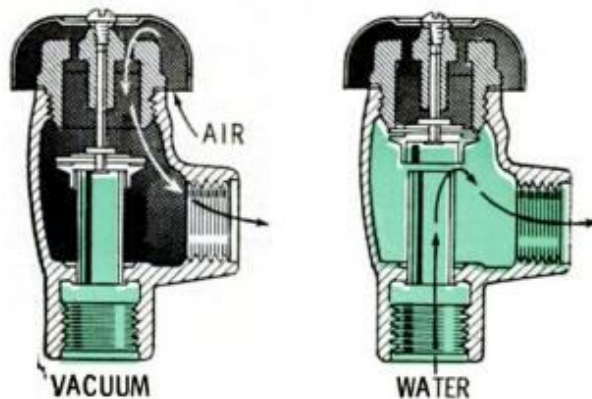
Avoid what one southern homeowner did. Because his city water pressure wasn't high enough for his underground lawn sprinkler, he put in a booster pump to ram water from a nearby swamp through the sprinkler system.

Unfortunately, he left the sprinkler connected to the house plumbing. Disease-laden swamp water was forced into the fresh-water piping, contaminating his own and the neighborhood water supply for several blocks around. His family and a number of neighbors came down with dysentery. Had the homeowner applied for a permit before installing his pump, city officials would have alerted him to the danger.

Yard Hose Can Be Dangerous

The common yard hose represents a subtle cross-connection that endangers
(Please turn to page 190)

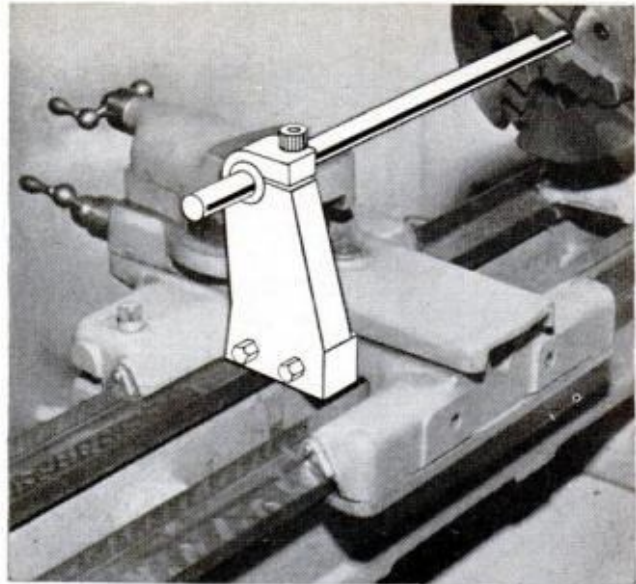
HOW VACUUM BREAKER WORKS: Normal water pressure (right) holds plunger tight against air inlet. Low pressure (left) lets plunger fall, letting in air



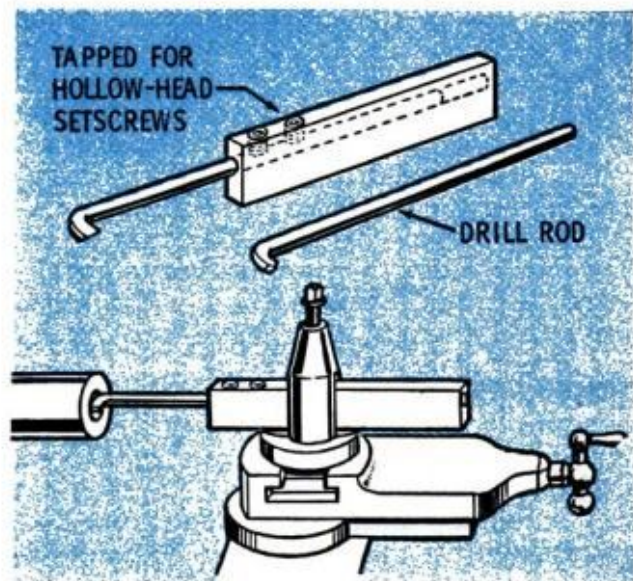
HOW VACUUM BREAKER WORKS

Lathe Accessories for the Metal Worker

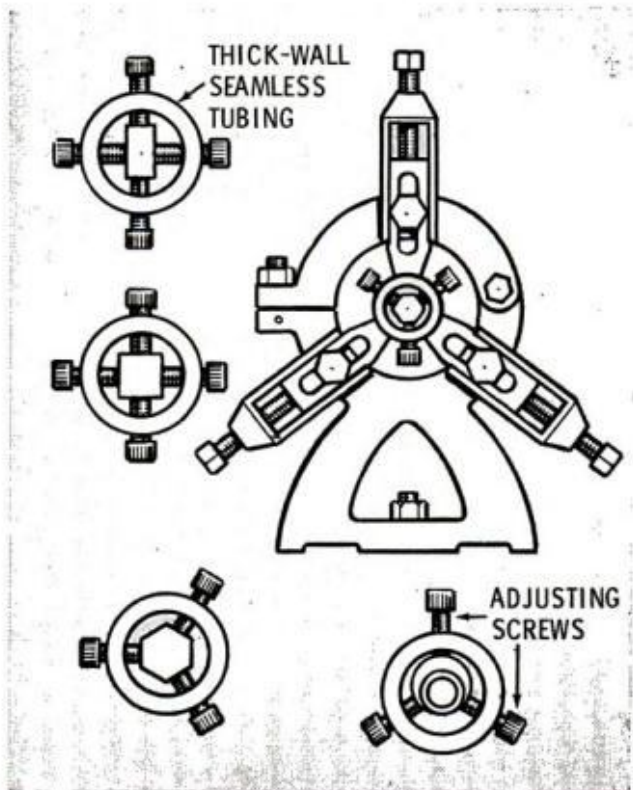
LONG LENGTHS of small shafting tend to chatter while being machined. This difficulty can be overcome by using a follower rest made from a cold-rolled steel blank drilled to fit the tapped holes in the tailstock side of the carriage. The blank is temporarily mounted and the carriage moved until the tailstock center makes contact. The back of the blank is then lightly hammered to mark the exact lathe-center axis. From this mark the layout can be made and the bushing hole drilled. The bushing, of steel or bronze, should be an easy running fit on the work. A setscrew holds the bushing in place. In use, the rest travels with the carriage.



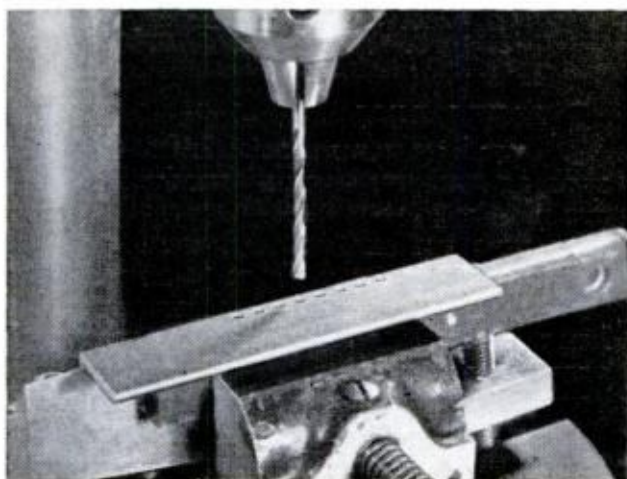
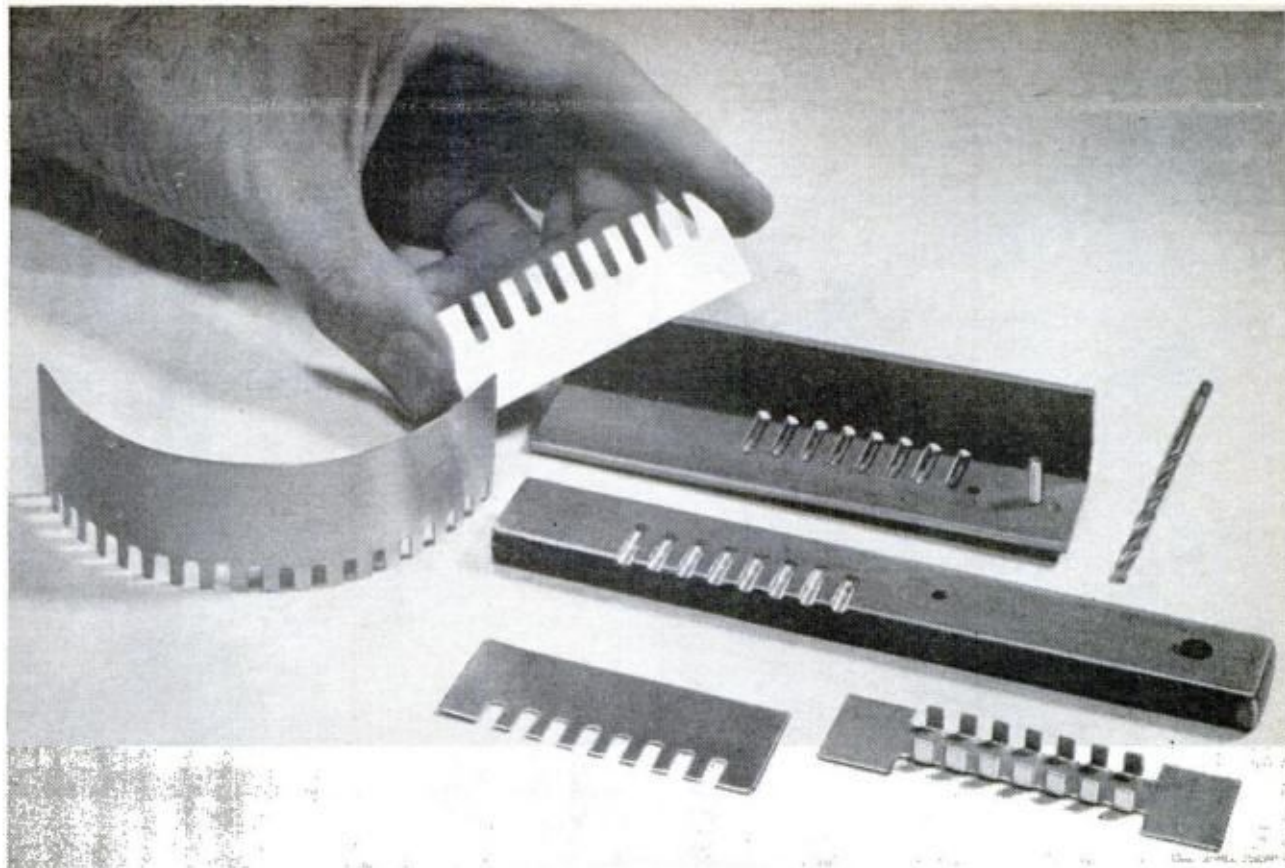
BORING TOOL HOLDERS for small diameter, close-tolerance work can be made from cold-rolled steel flats. The holder is drilled lengthwise to accommodate the boring bar. It is then cross-drilled and tapped at one end for two hollow-head setscrews as indicated in the drawing. The boring bars, and internal threading tools as well, can be easily made from drill rod. One end is heated and bent at right angles, filed roughly to shape, hardened and the temper drawn. The tool is brought to final shape on a grinding wheel and honed to a keen cutting edge with a hard, fine-grained oilstone. In clamping such bars in the tool-post holder, watch to see that they engage the work at lathe-center height.



LONG, OUT-OF-ROUND or odd shaped rods and shafts are easy to support and machine between centers if you use a cat-head in conjunction with a lathe steady rest. The cathead is nothing more than a short length of thick-wall seamless tubing fitted with lock screws, which when slipped over the work, provide a smooth true surface for the jaws of the steady rest to ride on, regardless of its sectional shape. Three adjusting screws are needed on each end of the tube for gripping out-of-round, hexagonal or offset work. For square or flat stock, four screws on each end are required. The two rows of screws must be set far enough apart to clear the steady-rest jaws. Oil the jaws occasionally.



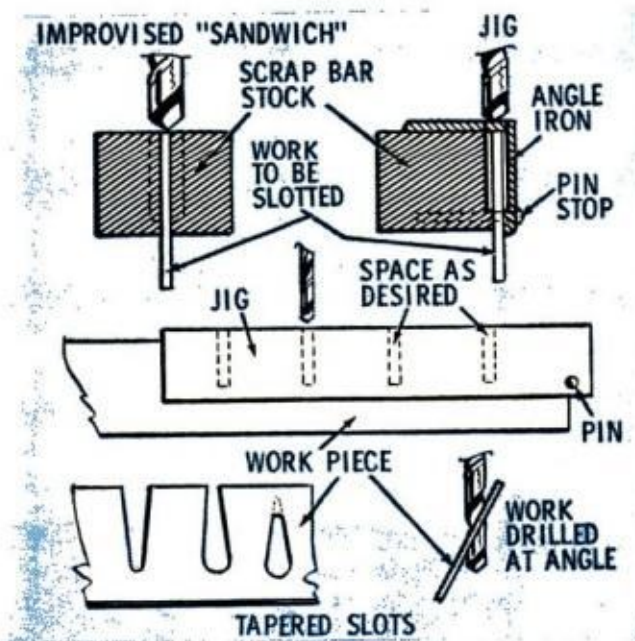
QUICKEST WAY to make a tool rack is to thread plastic clothesline through holes in a 1-in. strip of perforated hardboard so that loops are formed on both sides. Knot the ends and use mounting blocks to space out from wall.



Twist-Drill Slotting

LOOKING more like the product of a stamping machine, the above samples actually are the work of a twist drill. The simplest way to slot a piece of sheet metal by drilling is to sandwich it between two pieces of scrap metal and drill a hole into the edge of the sheet, so that the bit—of greater diameter than the sheet thickness, cuts equally into each scrap piece.

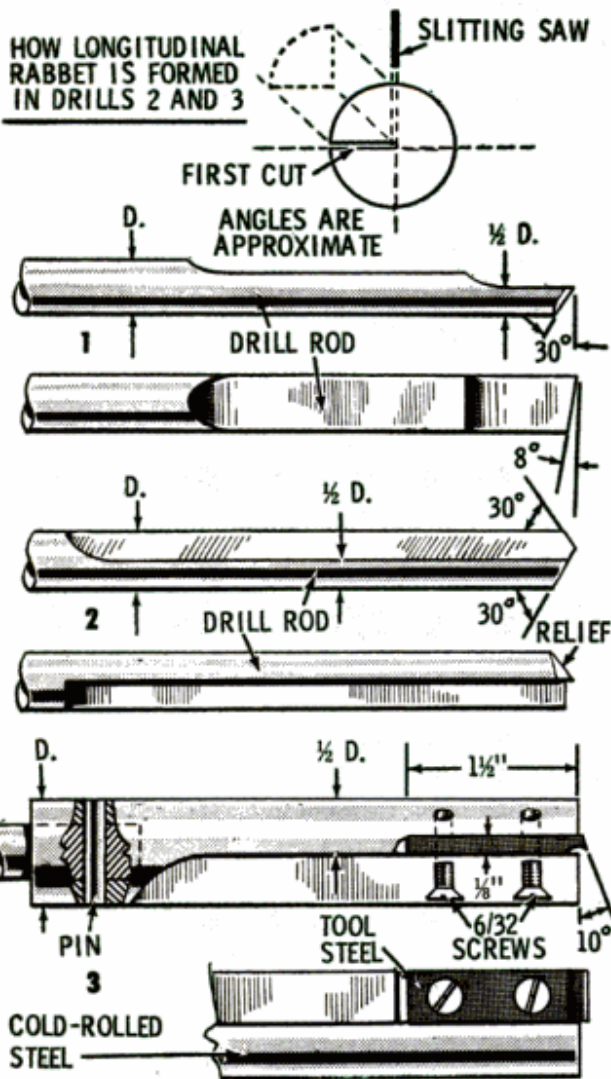
To do this requires a jig made from a piece of angle iron and bar stock. First, remove any inside radius (fillet) from the angle so that the bar and work will fit snugly inside. Then install a pin in the bar or angle to engage a hole in the other part, so the jig halves can be assembled in alignment for each slotting job. Place the metal to be slotted between the bar and inner surface of the angle iron and clamp the entire assembly in a vise. The holes are drilled through the angle iron and edgewise into a scrap of sheet stock to the required depth. When all the holes are drilled, the jig is completed and ready for repetitive slotting.—Walter E. Burton



You Can Make Your Own Deep-Hole Drill



By **Walter E. Burton**



ORIGINALLY, deep-hole drills were used only for special industrial work such as boring out rifle barrels. But there are plenty of jobs that these drills can do in your shop and around the house. For example, they can bore through thick walls, drill longitudinal holes in wooden lamp columns, and bore holes where obstructions prevent the brace or drill from being brought close to the hole location.

Three types of deep-hole drills are illustrated at the left. The first two are made of high carbon-steel drill rod. The third type, suitable for boring large diameters, can be made from either mild or high-carbon steel; the cutting is done by a removable blade. In the model shown, this blade was made from a worn-out file, but high-speed tool steel or tungsten-tipped carbide steel could have been used instead.

Drill No. 1 is easiest to make. Simply machine, grind, or file a flat extending 3 in. or more back from the end of a length of drill rod, then shape the cutting end as shown. After the flat has been cut, the thickness at the tip should be exactly one-half the rod diameter. By leaving a somewhat greater thickness for the remainder of the flat, you can save some work and also make it easier to grip the rod in a vise along most of the length of the flat while milling or grinding. When using the drill, you should start the hole with a conventional drill bit wherever possible.

As with all deep-hole drills, use plenty of cutting oil when drilling steel. It is necessary also to withdraw the drill periodically for chip removal. In general, a drill of this type cuts rather slowly compared to a conventional one.

Drill No. 2 has a V-shaped groove extending back from the tip, to provide chip space. In commercial drills of this type, the groove is full length, and parallel to it there is a hole through which cutting fluid is forced to the tip. But for home shop purposes, the hole is omitted and the groove can be limited to a few inches—at the minor inconvenience of having to withdraw the bit now and then to clear out chips and apply cutting fluid, such as sulphurized cutting oil.

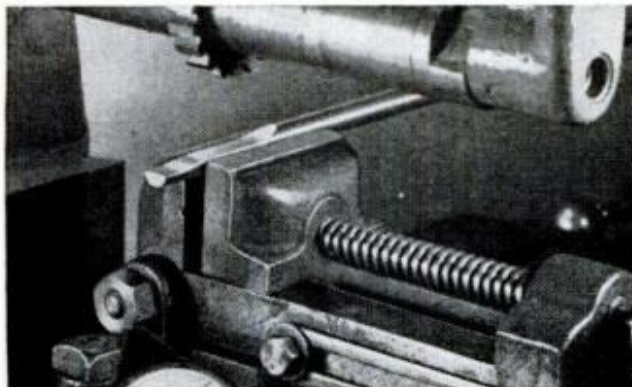
The drill has two cutting edges forming an angle of about 120°. In forming the tip, grind sufficient relief behind the cutting edges to enable them to bite into the work. The groove is a right angle V, made by milling or grinding; its two sides intersect along the drill centerline. The drill is self-starting in wood, but you'll need a starting hole to bore metal.

Drill No. 3 has a right angle V-shaped groove extending back from the cutter end. The model shown has a head measuring 1 in. in diameter and 5 in. long, fitted to a shank ½ in. in diameter. An accurate method for finishing the blade to the proper width is to mount it, before hardening, in position, chuck the drill head in a lathe, and machine the cutter edge flush with the drill circumference. Without its shank, the drill head is handy for chucking in a lathe to bore holes directly in wood, hardboard and plastic. For metal, a starting hole is recommended.

The cutting ends of the drills, and the removable blade of the big-bore model should be hardened and tempered according to the type of steel that has been used. This usually consists of heating until cherry red, quenching in water, reheating and quenching again.

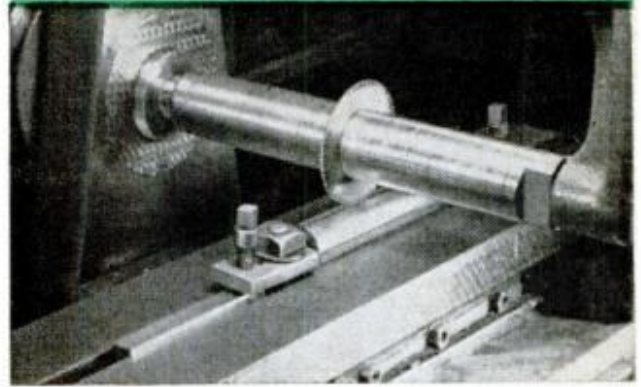
If your shop lacks milling equipment,

MILLING MACHINE makes short work of machining flat on end of ¾-in. drill. Tip was machined to .189 in.

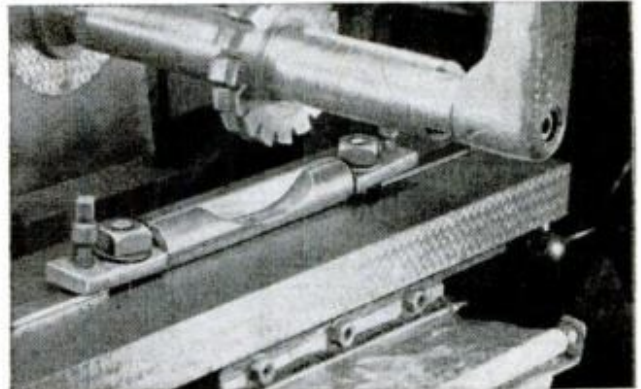


AUGUST 1965

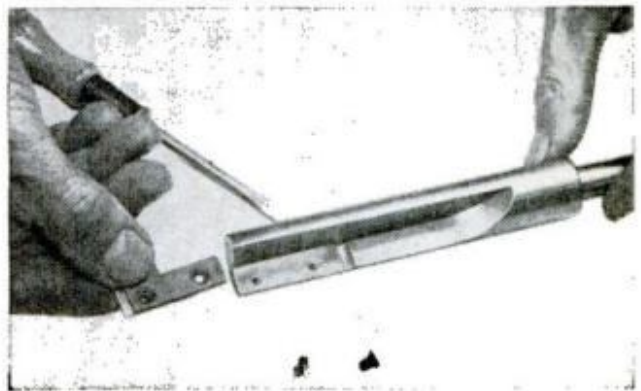
STEPS IN MAKING A DRILL



FIRST STEP in making big-bore drill is to make two right-angle cuts in drill head using a slitting saw

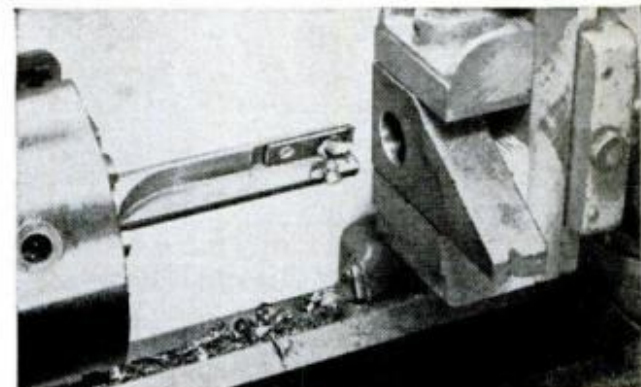


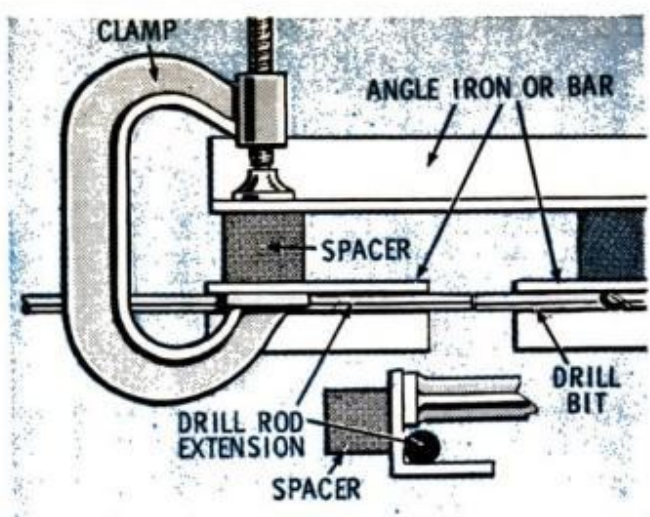
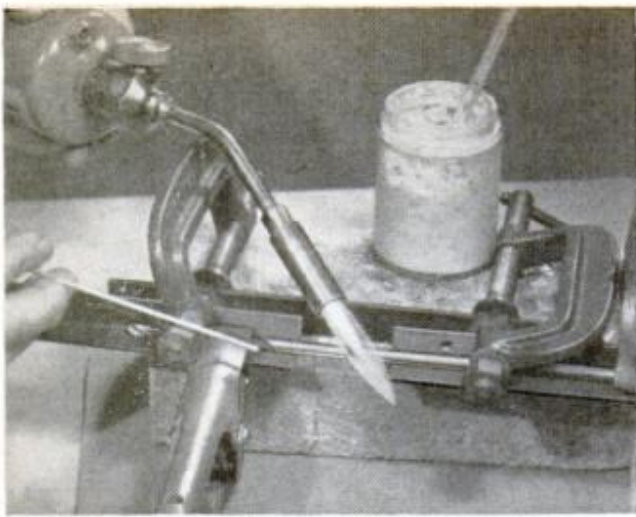
AFTER CUTTING, the 90° segment can be freed by milling with a cutter of the type shown, or an end mill



THE BLADE is fastened with two flathead screws. Cutting edge extends a fraction beyond the drill head

BIG-BORE drill head may be removed from shaft for use in lathe as either a boring or bottoming tool



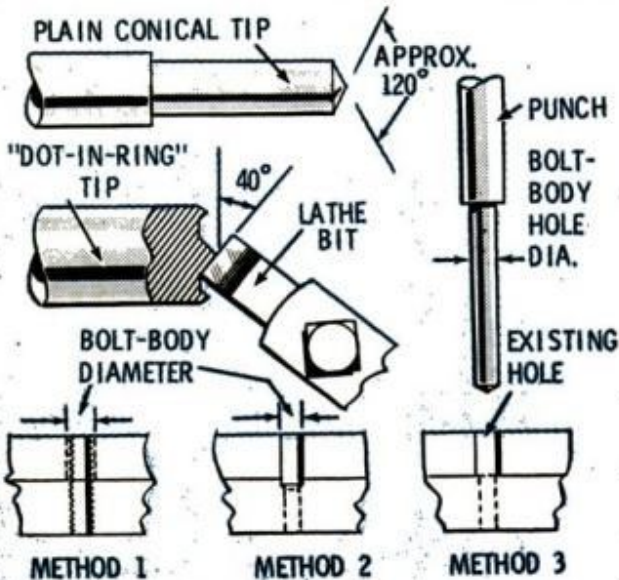
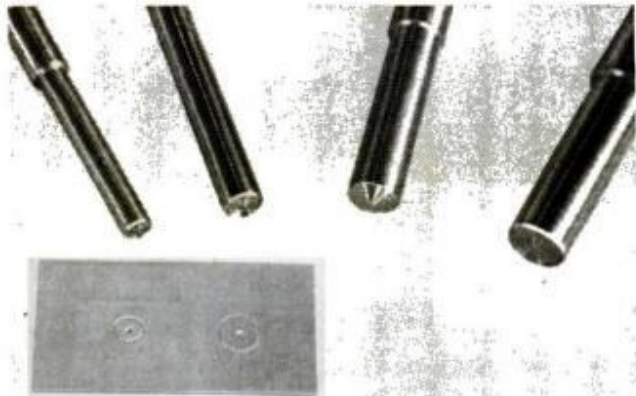


A PROPANE TORCH may be used to braze or silver solder a drill-rod extension shank to an ordinary twist drill. To assure accurate alignment of drill and extension, the simple jig detailed in the drawing is required

there's another way to make a deep-hole drill. This alternative method consists of simply brazing an extension shank on a conventional twist drill. A special jig is used to hold the drill bit and extension in exact alignment while the two pieces are being brazed together. The jig is assembled from three lengths of angle iron, two spacing blocks (large nuts are ideal for this

purpose), two C-clamps and two spring-action clamps. The C-clamps hold the angle iron and spacers together; the spring clamps keep the drill bit and extension in position. Note that a 2-in. space is left between the two short sections of angle iron for the torch flame, and that the end of the drill-rod extension should be chamfered like the end of the twist drill.

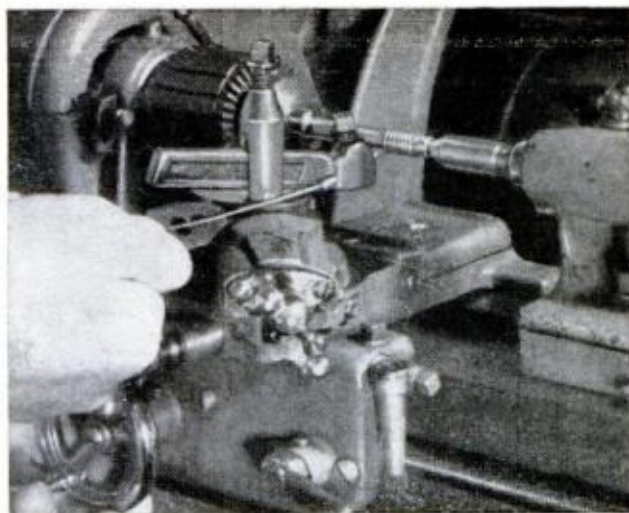
Shop-Made Punches Help Align Bolt Holes



A PROBLEM that often arises in the shop is the alignment of tapped holes in one workpiece with body-size bolt holes in another piece. One method is to clamp the pieces together in the desired position and then drill through both with the tap-size bit. After that, the hole in one piece is enlarged with a bit the same diameter as the bolt body.

When the body hole already exists, a different technique is required. The body hole can be used as a drill guide for starting the matching hole with a body-size bit, then a tap-size bit is used to complete the drilling. A third method is to use an aligning punch which fits snugly inside the body hole. When struck with a hammer its point makes a mark to guide the starting of the tap-size hole in the matching piece. Drill rod is an ideal material for making such a punch as detailed at the left. Two kinds of points are shown; one is cone shaped, it makes a dot to mark the hole center. The other type has a similar point plus a sharp edge that stamps a ring around the dot. The ring makes it possible to detect drill run-out when starting the hole. Diameter of the ring is not critical. It is somewhat smaller than the body hole and may or may not be close to the size of the tap-drill hole, depending on the bevel given the cutting edge.—Walter E. Burton

Winding Coil Springs in a Screw-Cutting Lathe



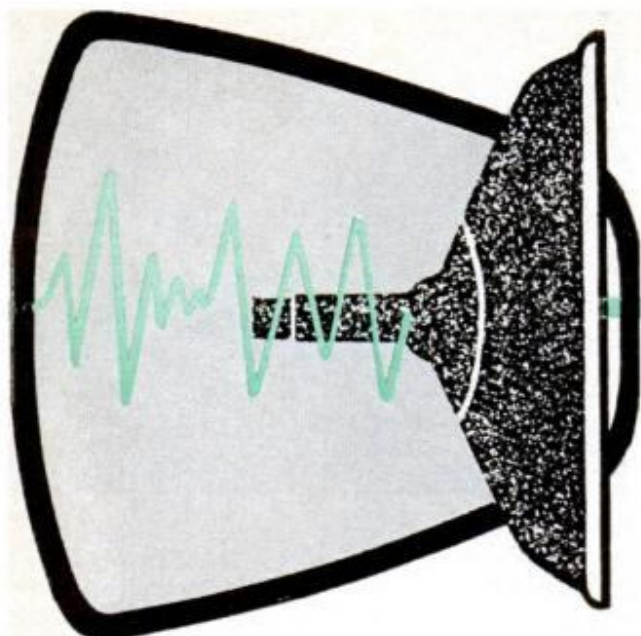
IF YOUR SHOP is equipped with a screw-cutting metal lathe you'll find it easy to turn out accurately wound springs of various lengths and diameters. The spring wire is wound around a mandrel which has been turned to the desired size from scrap steel rod. One end of the mandrel is center drilled and supported by the tailstock center; the other end is held in a three-jaw chuck. A guide to feed the wire onto the mandrel is made from a short length of bronze welding rod drilled lengthwise for the wire and turned to fit either a right or left-handed tool holder.

The procedure is simple: If for example, you want to wind a spring having ten coils per inch, set the lathe to cut ten threads per inch and engage the back gears for the lowest speed. The tool holder with the guide inserted is adjusted in the tool post

to feed the wire under the mandrel. The spring wire is then threaded through the guide and a short right angle bend is made on the end. This end is inserted in a small hole cross-drilled near the end of the mandrel. The lathe cross feed should be set so that the guide is about $\frac{1}{4}$ -in. away from the mandrel. Keeping the free end of the wire under tension with pliers, the saddle feed is engaged, the lathe started and the spring wound to the desired length. Before disengaging the saddle feed the lathe should be stopped. For compression springs with ends ground flat, wind the first turns closely, turning the lathe by hand, with the saddle feed disengaged, then proceed as before. When removing the spring from the mandrel, cut the wire at the bend with the edge of a thin file.—Gordon Douglas

NEXT MONTH IN SHOP AND CRAFTS

- ★ **BONUS HOBBY SPACE.** Got a hobby but no convenient place to work at it? Don't despair, there's waste space in every home that can be turned into hobby centers. Where?, you say. Could be on the back of a door, in the nook of a dormer, tucked in a closet. In the September issue, Frank Jacoby, PM's new design consultant and noted New York industrial designer, shows how you can create clever hobby centers in space you never thought you had
- ★ **IT SURE BEATS RAKING!** You don't have to be lazy to appreciate this how-to-build-it project. It's a leaf blower that not only does a better job of collecting leaves, but also does it faster and with less work. The blower is powered by a 3-hp. gasoline engine and generates an 80-mph wind. You'll find complete plans in the September issue
- ★ **NAVIGATION TRICKS.** Any small-boat skipper will enjoy impressing his guests with these easy-to-remember cockpit calculations. How far away is that lighthouse? What will the tide level be in two hours? There's a simple formula for most such questions, and you can usually come up with the answer in less than a minute. It's all in the September issue
- ★ **MODEL TESLA TURBINE.** Any student of mechanics is probably familiar with Nikola Tesla's fantastically efficient steam turbine. Neglected for over 50 years, this design is now being considered for use in atomic power plants. You'll find complete plans for building a working model next month—and since no critical tolerances are involved, it's not tricky to make



Picture-Shooting

Your set comes with a built-in technician—the picture on the TV screen—to tell you what's wrong when it refuses to work

By Larry Steckler

GRAINY COMPOSITION of this picture is caused by snow, which results when the tuner input tubes are not operating properly. Check radio frequency amplifier. If good, check antenna, then the antenna line and antenna terminals at the rear of your set



WHEN THE TV GOES FLOOEY, don't run for the telephone. Try finding the trouble yourself. After all, you've got a built-in serviceman that came with the set—the picture on its screen.

To picture-shoot your set you'll need two things: a tube layout diagram like the one shown on page 173, normally found pasted inside the set cabinet, and a little down-to-earth common sense. Eleven of the most common TV faults are shown in the photos. Still more troubleshooting appears in the text following.

One screen fault we haven't shown is a blank screen—no picture and no sound. When this happens to you, look through the back of your TV. If none of the tubes are lighting (including the pilot light), check the a.c. outlet first. Plug in a lamp you know is good and see if it goes on. You'd be surprised how often a blown fuse is the only trouble. At the same time, make

DIM, FLAT PICTURE like this one can be caused by an incorrectly-set contrast control or weakened video amplifier tube. If neither of these corrects the trouble, picture tube itself may be bad. If the latter, replacement is the only satisfactory repair



Your Television Troubles

absolutely certain the set is plugged in.

If everything checks out, the chances are your set has a series filament circuit. In such a hookup, all tube filaments are connected in series across the a.c. line; if one tube burns out, they all go out. Now you'll have to check the tubes to find the bad one. Use a simple continuity tester or take the tubes down to the drugstore. For details on this procedure see "The Truth About Tube Testing" (page 172, July '65 PM).

If the screen is dark but you do have sound, the trouble is either in the horizontal circuit, the high-voltage rectifier, damper or the video output tube. You can find these tubes on your tube layout diagram. Pull out those that are in the indicated circuits and get them tested. Replace any that turn up bad. (By the way, you might also check the brightness and contrast controls. If one of the kids turned

them down last night you won't get a picture either.)

Once more you've got a blank screen and no sound, but the tubes are lit—every last one of them. This time you should look to the low-voltage rectifier for trouble. If it's in a tube, you can change it yourself. If it's a silicon rectifier soldered into the circuit, you had best call that serviceman for skilled assistance.

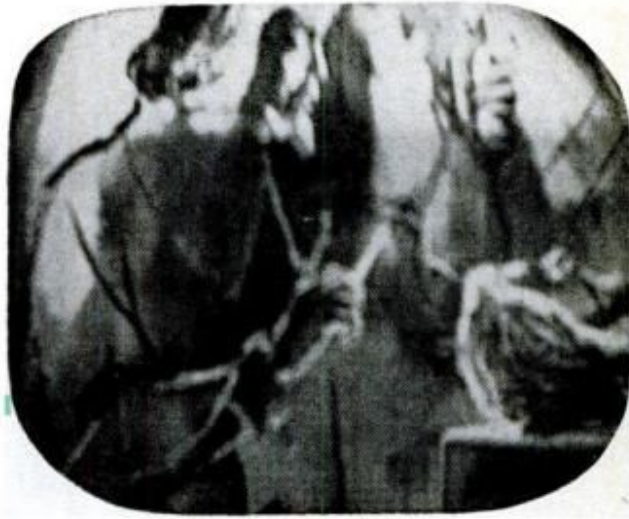
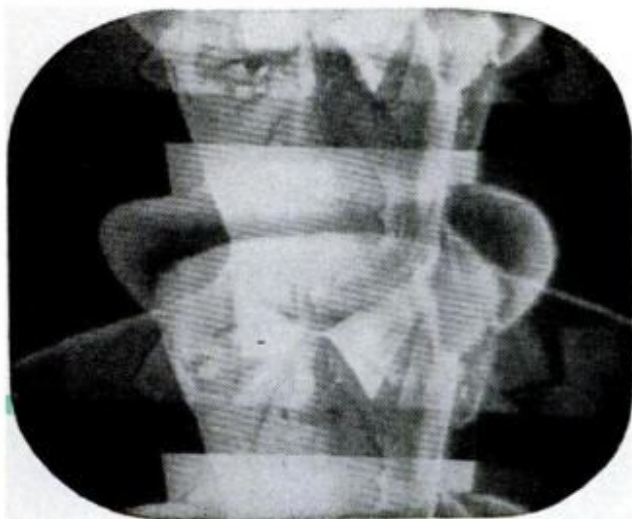
Another symptom of a weak rectifier lets you see the picture on the screen and hear normal sound. The rub is that the picture is shrinking; it doesn't quite fill the screen on all four sides.

Tube and Circuit Language

Now before I turn you loose on a TV trouble hunt of your own, a few timely words of advice. Your tube layout diagram probably won't be the same as the one we've illustrated. So, to avoid confusion,

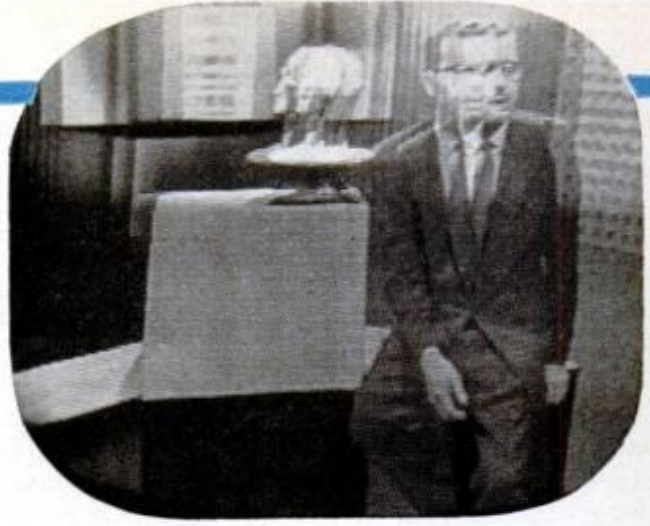
FLOPPING PICTURES are due to poor vertical hold. Check the vertical hold control first. If it cannot lock the picture into place, test the vertical section tubes—vertical oscillator, vertical output. If trouble persists, check all of the sync tubes for defects

PICTURE OUT OF FOCUS is one trouble not tied to a bad tube. Find the focus control and reset it. At times, this may occur when yoke bracket works loose. Make certain that the yoke on the picture tube neck is pushed forward just as far as possible





LACK OF BRIGHTNESS is responsible for this dull, blackish picture. Make sure the brightness control is set properly, then check the video output tube. If neither of these help and set is about 3 years old, you'll probably have to replace picture tube



DOUBLE IMAGES, a familiar sight to most owners, are called ghosts. If you never had them before, inspect your antenna setup. The brackets may have loosened and the antenna moved out of position. If you've always had them, there's not much you can do

here's a short glossary of the terms used to identify tubes in your set:

Horizontal tubes are often identified as **HORIZ**. Output tubes may be labeled as **OUT** and oscillator tubes as **OSC**. This results in such combinations as **HORIZ OUT** and **HORIZ OSC**. **VERT** is a common abbreviation for vertical; **SYNC** represents synchronization and **SYNC CLIP** is synchronization clipper.

Picture circuits may be labeled **PIX** or **VIDEO** and sound circuits may be tagged **SND** or **AUDIO**. **H.V. RECT** is high volt-

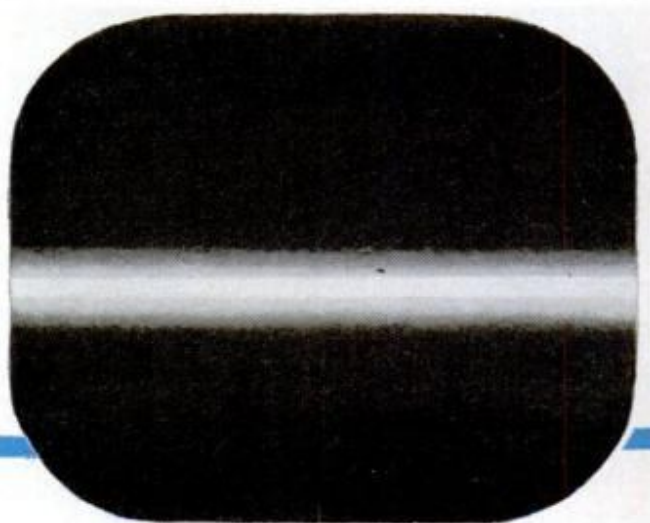
DIAGONAL LINES through the picture are the sure sign of no horizontal hold. Sometimes a turn of the horizontal hold control is all that's needed. Otherwise, check the horizontal output and oscillator tubes and any tubes labeled synchronization or sync

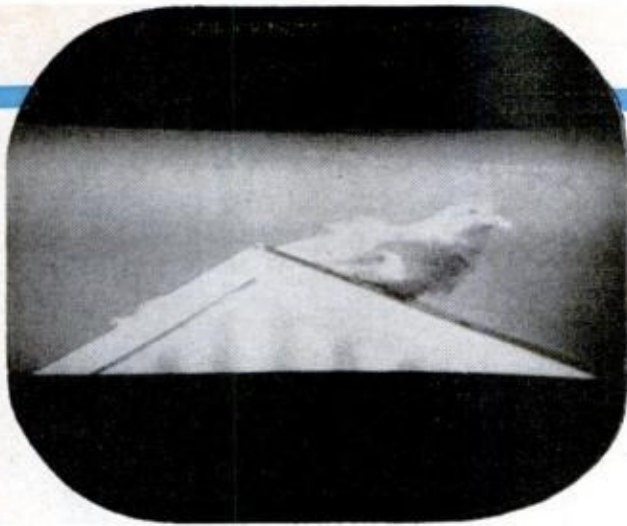
age rectifier and **L.V. RECT** is low-voltage rectifier. **SIL RECT** is silicon rectifier.

Toolwise, not much equipment will be necessary. You should have a screwdriver, socket wrench or pliers to remove the screws holding the back of the set in place and a long, insulated screwdriver for shorting out metal caps on the horizontal output and high-voltage rectifiers before removing them for testing.

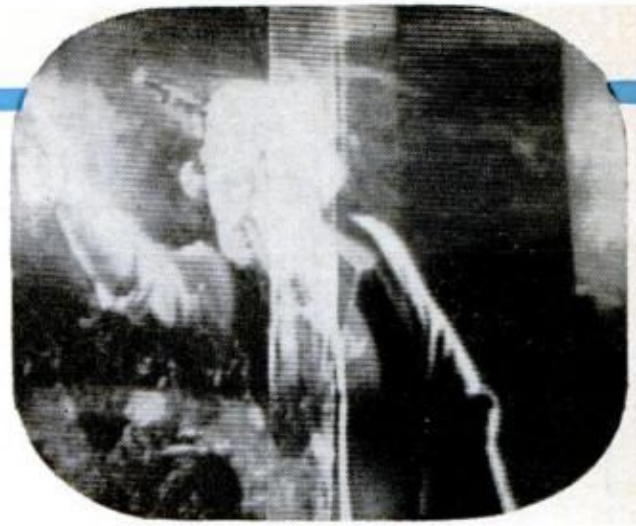
As you know, removing the back disconnects the set. Leave it this way as long as the back is off. *Don't use a cheater cord.*

CIRCUIT OR TUBE TROUBLE is indicated when this turns up on the screen. Adjusting controls won't help a bit. Test the horizontal oscillator and output tubes. If replacements won't restore picture, you have a circuit fault and require skilled help





VERTICAL CIRCUIT TROUBLE is indicated here. If you're lucky, this may be only a control problem—of height and vertical linearity. Chances are, though, that you'll have to replace either the vertical output tube or vertical oscillator to clear this one up



HORIZONTAL FOLDOVER results in this strange looking picture. Occasionally a slight adjustment of the horizontal drive control will fix it; otherwise, you'll have to replace the horizontal output tube. In this event, replace oscillator tube, too

There are dangerous voltages inside that cabinet so don't go looking for trouble.

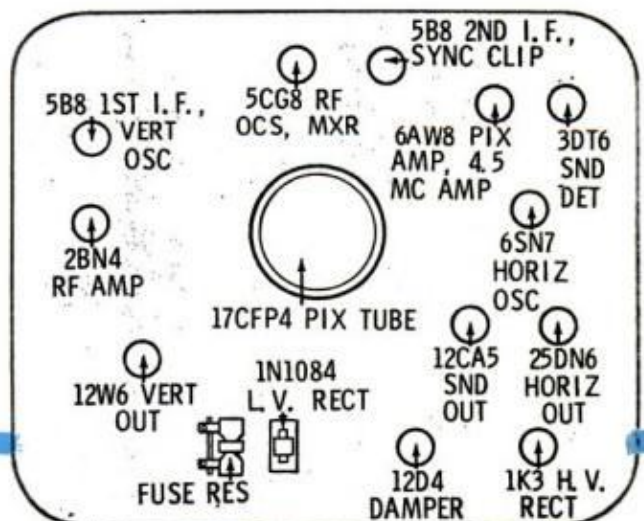
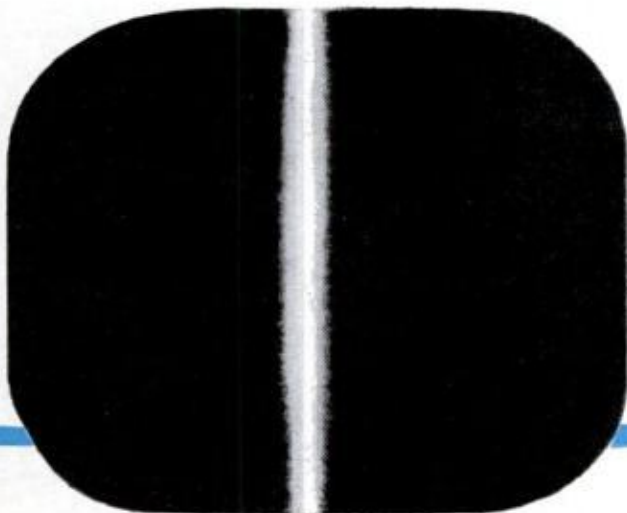
When you aren't sure if a particular tube is lighting or not, put the back in place and turn the set on. Let it stay on for four or five minutes and then remove the back again. Touch the suspected tube with your hand. If it isn't hot, it isn't good. Like any rule, however, there are exceptions. High-voltage rectifiers such as 1K3, 1B3 and 1X2 use very low filament voltages and it is hard to tell if they are lit or not. These tubes must be tested if the set

trouble makes them suspect.

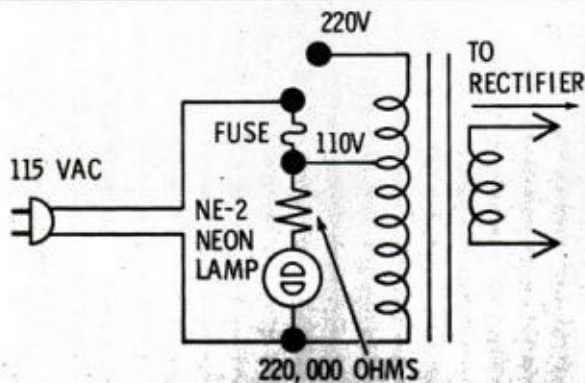
Naturally, tube changing will not solve all your TV troubles, but it will take care of a substantial percentage of them. Any problems that are not solved by tube changing must, of course, be referred to an experienced repairman. Also, keep in mind that when new tubes won't cure your troubles, the serviceman will probably have to remove the set from your home, so don't be too surprised when he says so. The rest of the time, fix the set yourself and keep down repair bills. ★★★

SINGLE VERTICAL LINE spells out trouble in the horizontal output circuit. Adjustments won't be of any use. If replacement of the horizontal oscillator and output tubes doesn't work, then you have a circuit problem. Give the job to a skilled technician

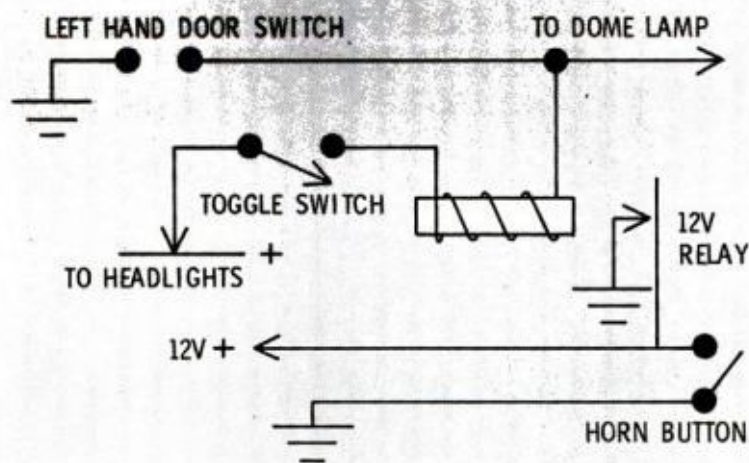
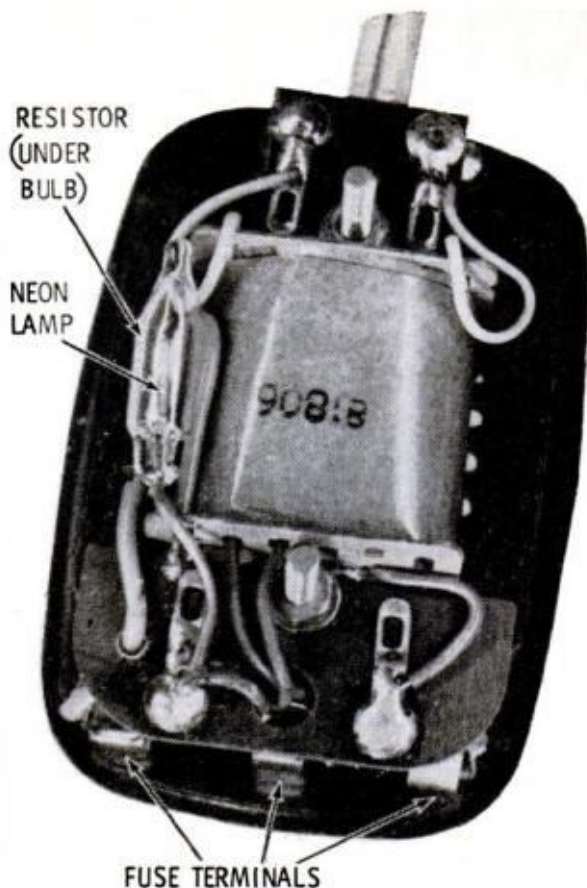
TYPICAL TUBE LAYOUT CHART looks like this. You should find the chart for your set attached to the back cover or just inside the cabinet. You may need a flashlight to read it. If you can't find the one for your set, request the manufacturer to supply it



electronic kinks

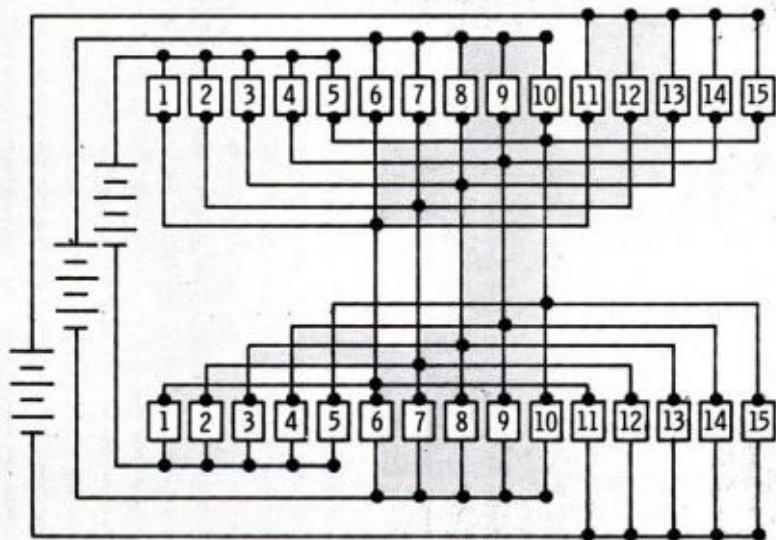


PHOTOFLASH RECHARGERS a problem? Can't tell if a.c. is getting to the unit? Add a pilot light. All you need is a tiny NE-2 neon lamp and a 220,000-ohm $\frac{1}{2}$ -watt resistor hooked up as shown. Tuck the two small parts into some convenient corner and drill a small hole in the case, over the lamp.—*Elmer C. Carlson*



FAIL-SAFE HEADLIGHT alarm tells you when you've forgotten to turn off the car headlights. Get out of the car with lights on and ignition off and the horn sounds a reminder. All you need is a 12-volt relay and a s.p.s.t. toggle switch hooked up as shown. By the way, explain it to your service station attendant—if you're not around, this can get confusing if he tests your headlights with the door open.—*James M. Thorne*

SAVE A HEAP OF WIRE by using eight conductors to make 15 circuits. Sounds impossible? Study the diagram and you'll see just how it's done. The only requirement is that three independent power supplies be used. These can be separate banks of batteries or separate a.c. stepdown transformers. Note that while some circuits share the same lines they are activated independently. Typical use is for remote signaling.—*Joseph Braunstein*



Look Back and . . . Smile

(Continued from page 94)

target. Wind speed was 4 mph and the chute had a forward speed of 8. The way things looked, I might just overshoot it at that. Again a crackling in my ears: "Number One, you're coming in too fast. Turn around to slow down."

The ground was getting close. I was about 100 feet up and tearing in fast, or so it seemed. "Number One, turn into the wind and get ready to land"—my final instructions. I was turning before the voice stopped. An instant later, legs pressed firmly together, I plowed into the frozen ground, rolled over on my back and shoulders to take up the landing shock, regained my feet and collapsed the parachute. My first sport jump had been completed.

Human Glider in Free Fall

Some 20 jumps later I was ready for the real fun in skydiving: long-term free falls. My first lasted 30 seconds, a respectable amount of time in which to act the part of a human glider, traveling about 120 mph and in perfect control every second of the way.

This time the Norseman climbed to 7500 feet. From this height, you will fall more than 4600 feet in a 30-second delay before opening the chute. Once more, engine roar was cut back to a full rumble and I was in the door again. At this altitude the drop zone looked tiny indeed. The pilot cut the engine. I punched the stopwatch and leaped into space.

Body arched horizontally with the ground, I was ready to maneuver. Seconds ticked by while I reached gliding speed. It no longer felt as though I were falling. It was more like being a leaf wafted along on a midsummer breeze.

It was time to try a right turn. I lowered my right hand and pushed down against the rushing air. This deflected air to my left and my body glided around to the right. Like steering a ship, it takes a moment before your body starts turning. When I resumed the normal arch, it took another moment to stop turning.

I tried the same thing with my feet, turning them so both pointed to the left; again my body slowly began to turn. By resuming normal position, I could stop turning. Next, I tried a couple of left turns by reversing the procedure.

The clock told me that 22 seconds had gone. I was down to 3300 feet, according to the altimeter. Eight seconds later it was time to open the chute. I looked down for the ripcord, reached in with both hands, pulled it and started counting. The

chute opened smoothly. I began a gentle drift down the last 1500 feet to the target.

Landing was easy. The target was fairly close, about 20 feet off. I was in at the fringes of the cross. I have yet to hit that little 6-inch disc right on the nose, but I have come within a few feet of it. One of these days, I'll score a bull's-eye.

No Feeling of Falling

Looking back, there's something unreal about skydiving. Once you leave the plane and assume a good arch, you seem to be in a private world of your own. There is no real sensation of falling or, for that matter, of any real movement at all. The ground appears to move up steadily, but not fast enough to worry you. The only actual signs of movement are the wind rushing by, the stopwatch ticking off the seconds and the altimeter dial dropping toward zero. In fact, when you reach parachute-opening altitude, you tend to wonder if it's really necessary. Until you get within a few hundred feet of the ground, that feeling of falling isn't noticed.

How does all this differ from paratroop jumping? The Army spent 80 hours, at eight hours a day for two weeks, teaching us how to jump, how to operate the chute, and what to do in the event of an emergency such as the parachute not opening. Skydiving school required only three hours of ground training before making the first jump.

Military jumping required top physical condition—not a requirement for skydiving, although it helps. Military jumping never gave me any aches and pains, but I have spent a full week being stiff and sore after experiencing a hard landing on a sport jump.

In skydiving you open the chute yourself after a delay of as long as one minute—or more. You fall, controlled but free, from altitudes of 10,000 feet or above down to 2500 feet before opening your chute. Military jump altitude is 1000 feet with no delay in opening, although there are specialized groups of military skydivers which offer superior skills to meet certain situations.

One further point. Anyone can learn to skydive. It isn't difficult. But it is strenuous and the cost is fairly high. You'll spend \$35 making that first jump, including all equipment and training. By the time you make that first 30-second delay dive, using rented gear, your total cost will run between \$250 and \$325. With your own gear, the total charge should be substantially lower.

One thing is certain: You'll enjoy it thoroughly as a source of brand-new, unexpected sensations. ★ ★ ★

Backyard & Birdbath R.R.

(Continued from page 128)

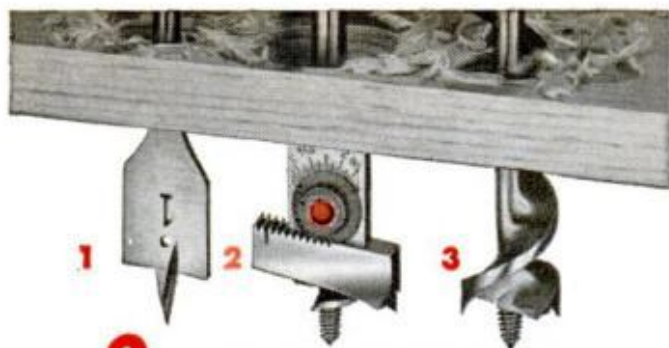
bell and cowcatcher. Begin this stage by cutting and fitting the seats, attaching these to the risers. Then screw the cab front panel to the seat end, fit and screw the cab frame in place and add the sides.

Boiler cradles and catwalks are detailed in Fig. 8, but before you place the catwalks, make and fit the boiler, stack and headlight as in Figs. 6 and 7. These parts are improvised from a lubricating oil drum for the boiler, Fig. 6; a milk strainer and short length of furnace smoke pipe for the stack; and a round mirror, a measuring cup and an enclosed box for the headlight, Fig. 7. The cut end of the lube drum is closed with a disc of plywood. A smaller disc of plywood is screwed to the large disc to serve as a number plate, Fig. 1.

Use house numerals for the numbering, which can be any combination that suits your fancy. Make the bell hanger, Fig. 1, and assemble the stack with its clamp in place before drilling the mounting holes in the boiler. Then use the clamp and the hanger as locating patterns. Construction of the headlight is clearly shown in Figs. 6 and 7. The boiler is held in place by a clamping bolt and wingnut, the bolt attached to a corner iron, Part No. 11, Figs. 1 and 2. Drill a slightly oversize hole for the bolt near the rear end of the boiler. Assemble the catwalks, dummy steam chest and valve gear, add the rails front and back and the bunker ends, Parts No. 25, Figs. 1 and 2, and then finish up with the cab roof and the cowcatcher, made as in Fig. 1. This readies the job for wiring, which includes installation of the 6-v. relays, Figs. 1 and 8.

The electrical system is 24-volt d.c. but is set up to provide 12 volts to actuate the 6-v. auto starter relays. Experimentation may be necessary to determine exact positioning of the wiper cams on the axle to give the correct "make-dwell-break" sequence for maximum power impulses to the solenoids. Note that No. 10 and 12 wire is used throughout the system. Be sure before trial that all connections are tight and that wipers are locked on the axle.

Trackage can be almost anything desired within the limits of the space available—straight or curved, straight across or lengthwise to the yard, or perhaps a large oval. Curves should not be less than 30 ft. radius. If trackage is laid more or less permanently on ballast, the rail ends may be joined with fishplates as in Fig. 8. Otherwise, just press rail ends into the grooves in the crossties, alternating the butt joints of the rails. ★★★



3 easy ways to bore holes faster

1. Irwin Speedbor "88" for all electric drills. Bores faster in any wood at any angle. Sizes $\frac{1}{4}$ " to $\frac{3}{16}$ ", \$.75 each. $\frac{5}{8}$ " to 1", \$.85 each. $1\frac{1}{8}$ " to $1\frac{1}{2}$ ", \$1.30 each.

2. Irwin No. 22 Micro-Dial expansive bit. Fits all hand braces. Just dial your size. Bores 35 standard holes, $\frac{7}{8}$ " to 3". Only \$4.20. No. 21 small size bores 19 standard holes, $\frac{5}{8}$ " to $1\frac{3}{4}$ ". Only \$3.80.

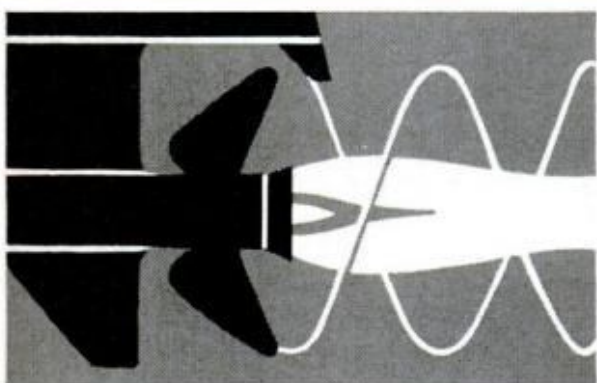
3. Irwin 62T Solid Center hand brace type. Only 16 turns to bore 1" holes through 1" wood. Double-cutter boring action. Sizes $\frac{1}{4}$ " to $1\frac{1}{2}$ ". As low as \$1.15 each.

EVERY IRWIN BIT made of high analysis tool steel, heat tempered, machine-sharpened and highly polished, too. Buy from your independent hardware, building supply or lumber dealer.

Strait-Line Chalk Line Reel Box only \$1.25 for 50 ft. size

New and improved Irwin self-chalking design. Durable aluminum alloy box. Practically damage-proof. Fits pocket or hand. 50 ft. and 100 ft. sizes.

IRWIN every bit as good
as the name
at Wilmington, Ohio, since 1885



We put the "pro" in propellers

Who knows better than Mercury how to manufacture props for Mercury motors? Nobody... and that's why we make our own Quicksilver Propellers. Mercury offers a complete selection of aluminum or bronze propellers for every model and any load... over 185 sizes and pitches. Mercury has the newest props first—prototype-tested at Lake X and ready before the motor hits the market. Mercury... the company that knows outboards best... knows and makes the best propellers.

QUICKSILVER
ACCESSORIES

from your Mercury and MerCruiser dealer

©1965, Kiekhaefer Corporation, Fond du Lac, Wisconsin, and Toronto. Subsidiary of Brunswick Corporation.

To Home or Shop...
for business or personal use!

"Messenger" Citizens Radio opens up the exciting field of personal communications to everyone — in any application. Used by builders, contractors, trucking, delivery services, garages on-the-job—ideal for sportsmen, hunters, fishermen and campers! Anyone can operate — license issued on request. Investigate the "Messenger" line — nation's most popular, most reliable Citizens Band equipment!

YOUR OWN 2-WAY RADIO



JOHNSON



Write Today

E. F. JOHNSON CO.

1521 10th Ave. S.W. • Waseca, Minn. 56093

Locke TRACTOR



This is a tough tractor. Longer wheelbase. More weight. More traction and power. Rear PTO. Hydraulic Lift. Rear 48" Mower. Snow Plow. Sickle-Bar Mower. Plow. Tiller. 10- or 12-hp.

WRITE FOR BOOKLET!

1075-T Connecticut Avenue
Bridgeport, Connecticut

Locke Manufacturing Companies, Inc.

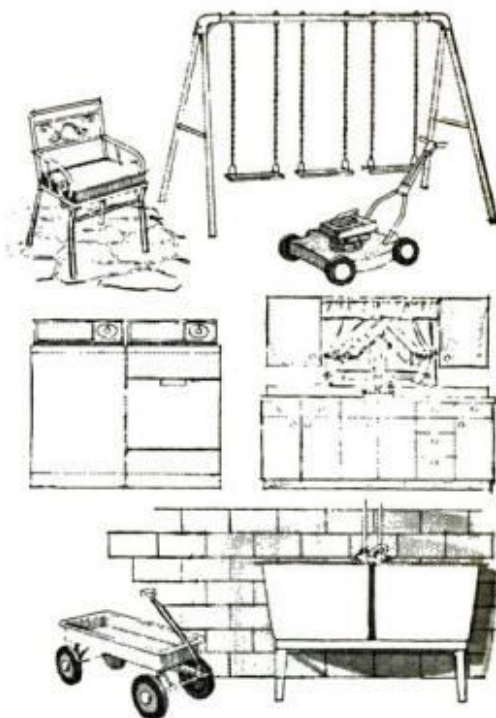
Popular Mechanics writes about Cloroben for worry-free Septic Systems.

See article pages 154-160 June issue.

Available at your local plumbing contractor or write
Cloroben Chemical Corp.
Kearny, N. J.

AUGUST 1965

Don't paint it...



Mira-Plate it!



Rustproof,
waterproof,
miracle epoxy
coating lasts
5 times longer
than paint!

If you can paint it—you can Mira-Plate it and get a surface that far outlasts any conventional finish. Rustproofs metal toys, tools, lawn furniture. Re-news appliances, boats, pools. Beautifies cement, plaster, wood, etc. . . . with non-porous, tile-like finish. Goes on like paint with brush, spray, roller. Non-toxic. Fire-resistant. Wide range of colors.

O'BRIEN PAINTS

TOP QUALITY SINCE 1875

O'Brien Corporation, Dept. PM-8
South Bend, Indiana 46621

Send me your free color card explaining Mira-Plate polyamide epoxy coating and its thousands of uses.

Name _____

Address _____

City _____

State _____ Zip Code _____

Please Don't Eat the Oleander

(Continued from page 114)

flowers. Seeds from wisteria pods are reported, in recent years, to have produced mild to severe digestive upsets in children. Wisteria is a relatively new addition to the list of poisonous plants.

- Yellow Oleander (*Thevetia peruviana* Schum.) is a shrub or small tree with a dense crown. A native of tropical America, it is also grown in the warmer sections of this country. It has yellow to dull orange flowers. Despite its name, it isn't a true oleander. All parts of the plant are said to be poisonous. Two of the compounds found in it act as heart stimulants.

- Larkspur (*Delphinium* species) is a tall spiked plant with feathery green leaves that's frequently planted in flower gardens. All varieties reportedly contain compounds that cause digestive upset and nervous excitement. In Western states, larkspur is said to cause more losses of cattle than any other poisonous plant except locoweed.

- Rhubarb (*Rheum raphonticum*) is okay if you eat only the stalks, as countless rhubarb fanciers are well aware. But the leaves of the plant contain oxalic acid, which crystalizes in the kidneys, plugging

and rupturing the tubules of the organ. Human deaths have occurred from using rhubarb leaves as food.

The plants mentioned above, as well as many others we didn't have space to list, have been with us for a long time. And they'll continue to be part of our environment. Obviously, it would be futile to try to rid our gardens of every suspected offender. But we can be aware of the danger and take precautions to safeguard children.

"The danger in a poisonous plant depends mainly on whether it is likely to be eaten," explains John M. Kingsbury, a botanist and expert on toxic plants. "The attractiveness of a plant is much less easily measured than its availability. Children tend to be attracted to berries and fleshy plant parts. Every child should be taught never to eat any part of a plant or any berry not commonly used as food."

More a Suburban Problem

"Any plant, unless known to be edible, must be considered toxic. Toddlers have to be constantly watched outdoors or kept behind a suitable barrier." That's the advice of Dr. Howard C. Mofenson, director of the Poison Control Center in Nassau County, N. Y. Like other suburban areas,

Stick'em up, match'em up,



New Weldwood® Panel Adhesive is the successor to hammer and nails, and 50% faster, too, for installing paneling on studs or furring. No scratches, no dents, no holes to putty, either.



Weldwood® Color Tones® assure the perfect match of trim to paneling. No guesswork. No measuring. 138 shades assure you of the exact wood tone you want.

the country has its share of plant poisonings. (Cities, with their general lack of vegetation and gardens, don't have as great a problem.)

In 1964, Dr. Mofenson reports, there were 17 emergency cases treated at the hospital where the center is located. In addition, advice was given over the telephone in 191 other cases. Though most of the calls involved berries, a good share of them stemmed from the ingestion of mushrooms. You would think that the danger of eating wild mushrooms would be obvious, but some people never seem to learn.

An Unwise Present

One call involved castorbean seeds, which are extremely potent. Four seeds may prove to be a lethal dose for an adult. The castorbean contains ricin, a powerful poison that produces abdominal pain, diarrhea, loss of appetite and a burning sensation in mouth and throat.

The victims were three high school girls. One of them had received a Hawaiian necklace as a present and, naturally, wore it to school. Not only was it made of castorbeans, but it was poorly strung. It broke and the girl and her two friends chewed several of the interesting looking

beans. Fortunately, all three survived.

If you suspect plant poisoning, the first thing to do is call a doctor. Don't try to make the victim vomit unless the physician advises it.

You can prepare for an emergency by learning the names—preferably the scientific names—of all toxic plants in your neighborhood. You can get help in this by contacting your local poison control center or by writing to the department of agriculture in your state. ★ ★ ★

Another "Stonehenge" Found

A new "Stonehenge" has been discovered at Callanish, Scotland—on Lewis, the northernmost island of the Outer Hebrides.

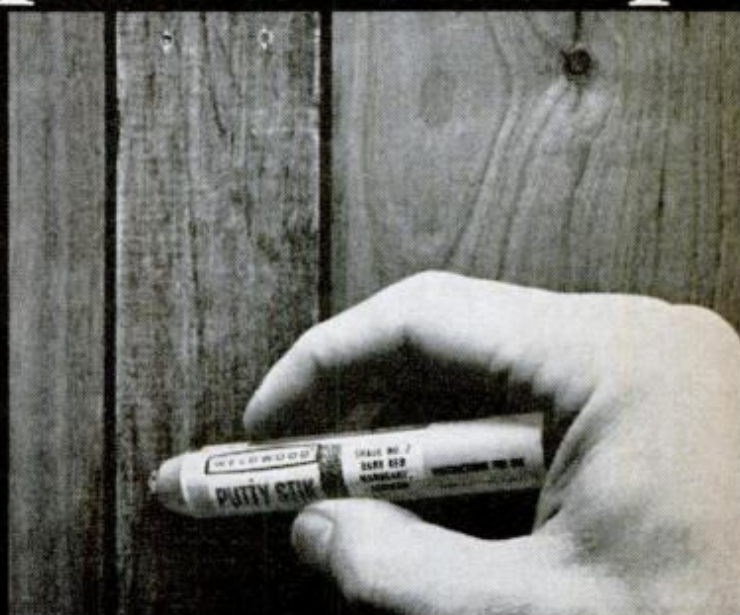
It consists of a ring of 13 stones with a central great rock, an avenue and other deliberately set rows of stones. The stones are aligned to show the direction of the rising and setting of the sun and moon at solstice (beginning of winter and summer) and equinox (start of spring and fall).

According to Dr. Gerald S. Hawkins of Boston University, Smithsonian Astrophysical Observatory and Harvard College Observatory, the astronomical lineup is "indisputable." The pattern could also have been used to compute eclipse seasons.

slick'em up, patch'em up!



Weldwood® Satinlac® is the perfect finish over Color Tones, gives trim the clear, smooth finish that matches your paneling. Brush on Satinlac for the glow of satisfaction.



Weldwood® Putty Stik® gives trim the final touch, fills and colors nail holes, blemishes and miter joints in door frames and moldings. 36 colors to match Weldwood prefinished paneling.

Weldwood® products sold only by United States Plywood

UNITED STATES PLYWOOD, Protection Products Division, Kalamazoo, Mich.

How to Keep Your Lawn Loyal

(Continued from page 75)

to six years, apply agricultural limestone, preferably dolomitic (calcium and magnesium) at the rate of 50 to 75 pounds per 1000 square feet of ground. Your garden-supply dealer will have it.

3. Apply a strong dose of fertilizer—10 to 15 pounds per 1000 square feet, if the first number on the bag is a 10. If it's less than 10, you'll need correspondingly more fertilizer.

4. Mow closely, and rake the bare areas to loosen the soil.

5. Seed perennial grasses—bluegrasses and red fescue—in bare areas at the rate of one to two pounds per 1000 square feet, and rake lightly. If you live in map areas 2 or 3 you may plant stolons instead of sowing seed; it depends upon the type of grass you have, and the type you want to establish.

6. Water seeded areas lightly, and keep soil moist until seedlings are established.

7. Continue to mow whenever the older grass requires it.

8. Early in the spring, apply a pre-emergent crabgrass killer, and another shot of fertilizer.

Is It Right—or Wrong—to Leave the Clippings on the Lawn?

If they are not too thick, grass clippings make a desirable mulch that retains moisture. They also decompose over a period of time to provide nutrients to the lawn. On the other hand, clippings that are too thick tend to smother the lawn and foster fungus diseases. A good rule of thumb, according to Dr. Juska, is to let the clippings lie 24 hours. If, from a short distance away, they have become invisible, you're better off to leave them. If they are still readily visible, they should be removed.

How About Fallen Leaves? Should I Mulch—or Remove—Them?

If they sift down from the trees gradually, remain dry, and leave few traces after they are mulched, it is better to mulch them. They provide excellent humus for the grass. However, if they are so thick and wet that they remain in globs on the lawn, even after mulching, it is best to remove them. Often it is a good practice to rake and remove the leaves immediately under thick shade trees, and mulch the remainder of your lawn. If you mulch the leaves instead of removing them, you should add lime $\frac{1}{3}$ to $\frac{1}{2}$ again as frequently as normal, because decaying leaves tend to make the soil much more acid.

How Can I Tell Whether My Lawn Needs Lime?

The only certain method is to test your soil yourself or send a sample of it to your county agent, state agricultural college, or state department of agriculture for testing. In some states, such tests are made free; in others, there is a nominal charge, but you can be sure it *will* be nominal. (See next question for further information.) However, for about a buck you can get a soil-test kit that will tell you wheth-

er your lawn needs lime. It's a simple test that you can make in three minutes. If you need lime and your soil is sandy, you should apply ground agricultural limestone every two or three years. In clay soils, apply it every five or six years. The rate of application should be 50 to 75 pounds per 1000 square feet.

Where Can I Get Answers to Specific Questions About My Lawn?

Most homeowners fail to realize the information and help that is available to them at state and local levels. Every state publishes bulletins and other information to answer specific questions for particular areas. In most states this information comes from the state agricultural college. Furthermore, most states have extension services which go right down to the county level. Very likely there is a man in your county called a county agent or farm adviser (depending upon the state) whose function is to help answer questions concerning agricultural crops. And grass definitely is considered an agricultural crop; as a matter of fact, in terms of investment, more money is spent on turf than on corn, wheat, cotton or any other crop. In most cases, a call to the man at the county level will yield an answer to your specific question, or bring the man right to your home to analyze your problem. The titles of such public servants and the departments they represent vary from state to state. Try a local telephone listing for your state college of agriculture, or the department of agriculture for your state. If you still can't pin down your man, drop a postcard to your state department of agriculture, and ask for the name, address and phone number of your county agent or farm adviser.

His help is available to you; it's the best there is because he knows the local problems; and it's free.

Plumbing Double-Cross

(Continued from page 163)

nearly every home. If the nozzle end is submerged in dirty water, a cross-connection is created. In filling a wading pool, watering a tree or drawing a pail of water, a hose end is often submerged.

A length of hose attached to your laundry-tub faucet creates the same condition as a submerged inlet. So does a kitchen-sink rinse hose, if the end is left in the sink. A shampoo rinse attachment slipped over the bathtub or lavatory faucet is a cross-connection whenever the spray head is left in the bowl.

While it is possible to use a hose without creating a cross-connection, people often forget. Therefore, the U.S. Public Health Service says that every faucet to which a hose will be attached should be equipped with a vacuum breaker. Then there's no need to worry about whether you've unhooked a hose each time you're through using it.

Jet-Action Toilets

Another cross-connection exists inside most toilet tanks. To prevent noisy splashing while filling, the toilet-tank water supply tube empties near the bottom of the tank. Thus it is submerged at all times. Because the water in a toilet tank ordinarily is not contaminated, this common cross-connection is too often taken lightly. However, in jet action toilets it is possible for tank water to become contaminated when a plumber's force cup is used to unclog a blocked-up bowl. The powerful plunging action in the bowl can force contaminated water back through its jet, up past the tank valve and into the tank. Then if a backflow from the toilet tank takes place, house drinking water can be contaminated.

Because there are a lot of "ifs" to toilet-tank cross-connections, many plumbers think they represent a relatively minor danger. For that reason, not all fixture manufacturers have made their toilet tanks fail-safe. Public health authorities advise that tanks should have antisiphon ballcock water supply valves. Part of this device sticks up out of the tank water and contains ports for air to enter in case of back-siphonage.

The new low-tank toilets all should be equipped with vacuum-breaker water supply valves. Their integral water storage tanks are partly below the bowl's rim. In the event of a bowl stoppage, contaminated water can flow by gravity from the full bowl into the near-empty tank.

Homes with water or steam boilers need special cross-connection protection. Other-

wise boiler chemicals can be back-siphoned through the boiler intake pipe into the house plumbing. Usually the installation of a double-check/double-gate valve type of backflow-preventer at the boiler water intake does the job. This unit has multiple drain cocks for periodic tests of its effectiveness.

Label Cistern Water

Homes using nonpotable cistern water at some faucets have special cross-connection problems. Separate water systems containing pure and impure water should never be piped into each other, even with a valve between. Valves too often leak or are left open by mistake. Neither should impure cistern water and potable water be piped into a combination mixer faucet. Instead, the two water systems should have separate faucets.

A faucet serving nonpotable drinking water should be clearly labeled to prevent accidentally drinking from it. Also, pipes carrying nonpotable water should be painted yellow to prevent accidental connection to fresh-water pipes.

Owners of farm homes should look for cross-connections between house plumbing and watering tanks, cleaning tanks, cooling tanks, slop tubs, livestock watering systems, water storage tanks and auxiliary nonpotable water pumping systems.

If your home plumbing inspection tour turns up anything that looks like a cross-connection, call a plumber. Have him check it and recommend corrective measures. While the danger from some cross-connections may seem remote, the possibility is still there. As the U.S. Public Health Service says, *any* chance with your family's health or your community's health is too much to take. Before you realize what's happened, it may be too late. ★★

Selective Tree Killer

Pellets the size of aspirin tablets can destroy unwanted trees and keep young trees thriving—all in the same forest.

Fenuron, a chemical herbicide, did this in forests of undesired scrub oak under which grew valuable pine seedlings, Dr. Robert D. Shipman of Pennsylvania State University reports. The herbicide is absorbed by the roots of the older trees and depletes the chlorophyll supply of the leaves which wither—causing the trees to die gradually. They can then be harvested for paper pulp, while the young seedlings gain space, water and nutrients.

This new method of selective tree killing may provide the way to convert stands of pole-sized worthless hardwoods into valuable coniferous plantations.

TUNE UP ELECTRONICALLY ANY CAR EVER MADE...

domestic or foreign; compact or limousine; 4 cylinder, 6 cylinder or 8 cylinder; 6 volt or 12 volt.

With New
Improved
Model BT-162

DWELL TACHOMETER



NOTE:
GIANT 6½"
METER FOR
EASY,
ACCURATE
READINGS

At last a streamlined instrument designed to provide the most important services for "tuning up" any and every car ever made from a Model A Ford up to and including the current automatic transmission cars produced today. The Model BT-162 includes the very latest design Dwell Meter, working in conjunction with a dual range Tachometer and incorporating all modern improvements in circuitry design.

Assure easy starts, optimum performance and maximum gas economy with Model BT-162.

The Model BT-162 will perform the services specified below in addition to many other tasks too numerous to mention:

- Assure precise adjustments of points that are slightly worn or pitted.
- Indicate the most effective point setting without removing the distributor cap.
- Indicate the correct settings for external adjustment type distributors. (A feeler gauge cannot be used for making correct adjustments on this type of distributor since many manufacturers' specifications do not list the point gap in inches. They list only the dwell angle in degrees.)
- Insure maximum gas economy and quiet engine running. Read the exact RPM while the engine is in neutral position. Then adjust the carburetor in conformity with the car manufacturer's recommendations.
- To locate a "miss" you need only disconnect or "short" the spark plugs one at a time with the Model BT-162 switched to the Tachometer position.
- Cars with automatic transmissions function efficiently only if the fluid pressures are correctly maintained and since manufacturer's instructions always refer to RPM, the Model BT-162 (or an equivalent tachometer) is required to properly service automatic transmissions.

The Model BT-162 is the most complete unit in its price range ever produced. It comes absolutely complete, ready to use. Only

\$29⁹⁵

SEND NO MONEY WITH ORDER PAY POSTMAN NOTHING ON DELIVERY

Try it for 10 days before you buy. If completely satisfied then send \$5.00 and pay the balance at the rate of \$5.00 per month until the total price of \$29.95 (plus small P.P. and budget charge) is paid. If not completely satisfied, return to us, no explanation necessary.

ACCURATE INSTRUMENT CO., INC.

Dept. D-415, 911 Faile St., Bronx, N.Y. 10474

Please rush me one Model BT-162. If satisfactory I agree to pay \$5.00 within 10 days and balance at rate of \$5.00 per month until total price of \$29.95 (plus small P.P. and budget charge) is paid. If not satisfactory, I may return for cancellation of account.

Name _____

Address _____

City _____ Zone _____ State _____

Save Money! Check here and enclose \$29.95 with this coupon and we will pay all shipping charges. You still retain the privilege of returning after 10 day trial for full refund.

See how little it costs to add beauty like this to your home



Patio Floor—10' x 12' SAKRETE Cost—\$45.00



Pool—4' x 6' (inside) SAKRETE Cost—\$42.15



Fire Pit—32" dia. SAKRETE Cost—\$9.90



Lawn Edging—20' Long SAKRETE Cost—\$4.95



Setting Post—32" Deep SAKRETE Cost—\$1.70

It's fun and easy to build with **SAKRETE**® Cement Mixes

Want to add new beauty and enjoyment to your outdoor living area quickly, easily and inexpensively? No problem at all when you use SAKRETE Cement Mixes. Projects like these—planned individually or combined to form a fun-dedicated patio or garden area—are not only inexpensive, but fun to build as well. There's no measuring, laborious mixing, muss or fuss when you use SAKRETE.

To assure your success—every time—SAKRETE Cement Mixes are laboratory controlled, and have up to twice the strength of concrete or mortar ordinarily required. You can build or repair a little at a time, start and stop anytime, for SAKRETE Cement Mixes store indefinitely until you add water. Use them to patch sidewalks, set or repair brick or stone work... for any concrete construction or repair. For best results, INSIST on the bag with the yellow diamond.

FREE

Plan Booklet—Easy-to-follow instructions on patio and cement repair projects. See your dealer or write Sakrete, Inc., Dept. PM, Box 873, Dayton, Ohio 45401.

SAKRETE®
concrete and mortar mixes



SAKRETE IS A REGISTERED TRADE MARK OF SAKRETE, INC. © 1965
SOLD THROUGHOUT THE UNITED STATES AND IN EASTERN CANADA.

Singing Steel Guitar

(Continued from page 131)

before winding on 1200 ohms' worth of #40 Nylclad magnet wire. A ¼-lb. spool should do it, but you determine the amount with an ohmmeter, since the frequency response changes if you wind on too little or too much. For the winding, pin the assembly to a block of wood chucked in a lathe; it'd take you forever by hand.

Use short lengths of stranded hookup wire for leads. Cement the wire's insulation into the pickup body so the leads won't pull out. Close in the pickup with thin phenolic covers and wrap the whole unit in aluminum foil, rubber-cemented in place; leave a tab of foil to twist up in the wire that comes from the outside windings of the pickup. Cement the foil-covered pickup into a recess which you can now mark and cut to fit it—making it deep enough to provide the proper clearance between the top of the pickup and the strings. You can check this by laying a straightedge across the bridge and nut.

The control panel and end plate can be cut from ⅛-in. hardboard—or more elegant opaque plastic, if you've some on hand. The plates are similar, except that there's only one ⅜-in. hole in the end one.

When you install the machine heads (available from any musical supply house) in the headstock, note the position of the worm drive. Measure off the bridge location from the nut, as shown; this is a critical dimension for pitch—it shouldn't be over 22¾ in. or under 22⅛ in. Note there's a grounding lug under one of the screws; feed a bit of hook-up wire from it to the outside braid of the pickup cable. Wire up the control pots and the phone jack as shown in the schematic on page 131, and screw their plates in place. The guitar plays through any standard amplifier and speaker system. In stringing and tuning it follow the diagram just below the wiring schematic, bearing in mind that in each group the lightest-weight string is located farthest from the player.

After tuning, pull lightly on all strings, to take out the initial stretch, and retune. They'll stay tuned, now. Check the level of the strings by laying the steel bar across them. Squeaks mean a high string. Loosen it and file its nut groove a bit deeper—a touch-up operation that's necessary because the diameters of strings vary.

The way the strings are located and tuned puts the major with its seventh and relative minor in a straight line across the fret board. This means no groping around for related chords. They're right under your fingertips—leaving you free to watch the hula your music inspires. ★ ★ ★

REPAIR ANYTHING
BUILD ANYTHING

STICKS LIKE A
Leech

CEMENTS • GLUES • ADHESIVES

ALL-PURPOSE GLUE KIT \$1.00
YOU SAVE 27c. CONTAINS ADHESIVES FOR
WOOD, PAPER, FABRICS, GLASS, LEATHER,
POTTERY, ETC. SEND DEALER'S NAME, ADDRESS.
LEECH PRODUCTS, INC., HUTCHINSON, KANSAS



TRANSEAL

STOPS LEAKS
IN AUTOMATIC
TRANSMISSIONS

at Service Stations, Auto and Hardware Stores

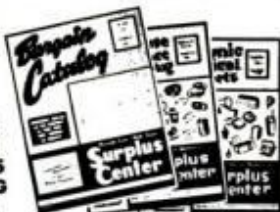
SAVE
UP TO **85%**

**GOV'T SURPLUS
and NEW EQUIP'T**

Send 25c For 3 Big Catalogs

PUMPS
WELDERS
WINCHES
SURVEYING
TELEPHONES
HYDRAULICS
GENERATORS

ELECTRONIC
BINOCULARS
GEAR MOTORS
COMPRESSORS
SPEED REDUCERS
WEED SPRAYING
MANY OTHERS



SURPLUS CENTER Dept. PM85 Lincoln, Nebraska

**If FALSE TEETH
get on nerves**

use special powder



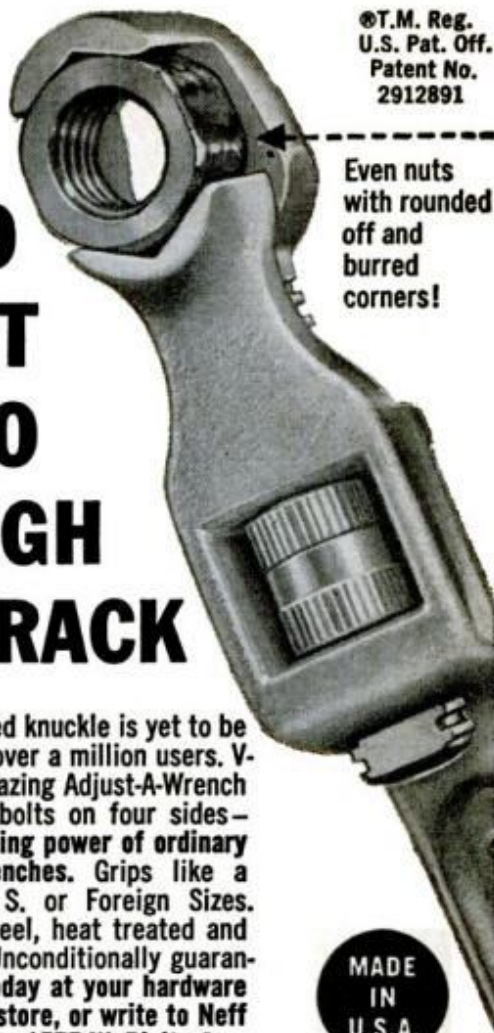
When false teeth get on your nerves many dentists give special FASTEETH powder. It helps hold teeth in place — helps keep them from slipping or dropping down when you talk — makes you feel more secure. FASTEETH cushions tender gums so you can bite harder and eat easier, faster with greater comfort. FASTEETH helps you laugh and speak more clearly without embarrassment. FASTEETH is alkaline (non-acid). Checks "plate odor" (denture breath). At drug counters everywhere.

AUGUST 1965

©T.M. Reg.
U.S. Pat. Off.
Patent No.
2912891

**NO
NUT
TOO
TOUGH
TO CRACK**

Even nuts
with rounded
off and
burred
corners!



The first skinned knuckle is yet to be reported from over a million users. V-Jaws of the amazing Adjust-A-Wrench grip nuts and bolts on four sides — twice the gripping power of ordinary adjustable wrenches. Grips like a "Bulldog". U. S. or Foreign Sizes. Forged alloy steel, heat treated and nickel-plated. Unconditionally guaranteed. Test it today at your hardware or auto supply store, or write to Neff Enterprises, Inc., 1575 W. Rialto Ave., San Bernardino, California.

MADE
IN
U.S.A.



**The Amazing
ADJUST-A-BOX**

WRENCH DOES THE WORK OF 8 DOUBLE-END
BOX WRENCHES OR 16 SOCKETS. IT'S A
COMPLETE SET OF BOX WRENCHES IN 1 TOOL



8" model adjusts from
1/4" to 1" \$3.98



10" model adjusts from
3/8" to 1 1/8" \$5.95



12" model adjusts
from 7/16" to
1 1/16" \$7.95

NEFF ENTERPRISES, INC.

1575 West Rialto Avenue, San Bernardino, Calif. 92410

Swamped with Boating Laws

(Continued from page 109)

friend" to 5½ hp, they found they'd lost much of the state of Ohio as a market. A 5 hp limit had been imposed on many of Ohio's lakes. So the manufacturers figured out a simple carburetor restriction, scratched out the "½" in "5½" and shipped to the Buckeye State a batch of motors that, for as long as the law lasted, were mockingly known as "Ohio Fives." Owners, of course, simply removed the carburetor restriction and restored the power they'd lost.

In the opinion of the Outboard Boating Club, such limitations on horsepower can be "patently unsafe . . . because in bad weather a motorboat will require as much horsepower as the hull can safely accommodate in order to hold a course. . . or to assist other boats."

Even though OBC's announcements tend to be influenced by its manufacturer members (who you could hardly expect would carry on a crusade *against* horsepower) this organization is still about the only one that consistently carries the flag for boatmen, and its point of view is worth considering. The fact is the OBC's "Horsepower Curve," which recommends a proper combination of horsepower to hull, is claimed by some as being too conservative.

Nuisance Regulations

Twenty-two states now call for the registering—for a fee, of course—of all boats powered with a motor of 10 hp or more. And so, outboard manufacturers have brought out a flock of new motors ranging from 9 to 9.8 hp.

These scaled-down motors have been designed for the thousands of fishermen-boaters who merely want to go fishing in their spare time instead of spending it filling out forms, writing checks, mailing letters, and buying license numbers and attaching them to their boats, and complying with other nuisance regulations.

In some states such as California a boat owner is now a law violator if he merely fails to report to a state agency, at a particular address, in writing, and within five days, that he has sold his boat, or within 15 days if he has junked it, or within 30 days if he has simply changed his address! The penalty? Not more than a fine of \$50 and/or imprisonment in the county jail for not more than five days for each violation.

Boating was a lot of fun only a few years ago, an innocent hobby. Today it is becoming an invitation to being fined or jailed if you forget to observe a lot of fine print.

Many local boating regulations are made by local lawmakers, and often their judgment is about as helpful as the Ladies' Aid at a missile launching. There's the case of the little town in America's water-blessed Dairyland where the law demanded there be no more people than seats in a boat. So, the story goes, a trailerboating vacationist was fined for cruising, all alone, in a Snipe-class sailboat. No seat, you see.

In another case the city fathers of a West Coast town instructed the harbor police to enforce a local version of the U.S. buoyage system and to issue citations to small craft operators who passed a black-and-white mid-channel marker "on the wrong side."

It's hard to say how many operators forfeited a \$27 bail until one of them adjourned to court and pointed out that the international rule for a mid-channel marker is ". . . pass on either side, close aboard." The judge dismissed the charge, ending that annoyance.

You Need a Lawyer

In the list of "ideal boating laws" optimistically prepared by OBC, one of the most urgent recommendations is "no local control." As one OBC official points out, "Where every township and village can make laws for the nearby waters, it's not really safe to go boating unless you have a lawyer on board. Recreational waters in any state should be governed by the state, and state laws should agree with federal laws whenever possible."

Another time when a lawyer is needed on board is when you haul your boat across a state line. This becomes a real legal jungle. On some Colorado and Arizona waters, for instance, you can make-do with nearly any life belt (one per person) but in some other states only Coast Guard-approved lifesaving devices are allowed. Utah requires an anchor and line for each boat; most states don't. Many states demand a paddle or oars on all small craft; in Wyoming these items are required only after dark!

The trailer on which you tow your boat across a state line may be legal in your home state but not in the state you are visiting. Some states require only one red tail lamp, others call for two lamps. Again, in some states you are required to have trailer directional signals and a safety chain. Speed limit for a boat trailer also depends on where you are, from 50 mph in some states to as much as 70 mph permitted by statute in others.

The states got their big start in the boating business under the Federal Boating Act of 1958, which had been carefully

(Please turn to page 196)

GOVT. SURPLUS AND OTHER BARGAINS SAVE UP TO 90%

REDUCTION GEAR MOTOR 160-1 ratio. Make your own winch or hoist for beaching boats or as a golf cart or electric car drive unit. 1000's of other uses. Contains DC motor clutch and reduction gear box. Easily reversible. Wiring diagram furnished. Hit-torque runs on 6, 12, or 24 V.D.C. Turns approx. 50 RPM @ 12 V. Shpg. wt. 50 lbs. Approx. GOV'T COST \$300. Like new, tested prior to shipment. **\$17.50**



*Also available 140-1, **\$21.50**



HEAVY DUTY BATTERY WINCH Rugged, deluxe winch with ball bearing construction throughout motor & gear train. High gear reduction. Rated cap 3000 lb. pull. Contains reversible switch. Rugged 3/4" plate steel mounting base with outrigger support. 22" L x 9" W x 8" H. Handles 250' of 1/4" cable. Built for 12 V battery operation; also operates on 6 V. at reduced cap. & speed. A must for Scouts, Jeeps, Trucks, Boat loading trailers, etc. Shpg. wt. 80 lbs. Approx. GOV'T COST \$490. NEW. 90-day guarantee. Model E-D **\$79.50**



ELECTRIC PUMP WITH CONTROL SWITCH For boats, campers & trailers. Output 200 GPH. Can be used in fuel or water. 1/2" pipe bronze inlet. 12 or 24 V.D.C. Explosion proof motor. Shpg. wt. 9 lbs. Complete with wiring diagram. Approx. GOV'T COST \$200. NEW **\$10.95**



NEW! BIG! 1965 CATALOG

Send 25c (no stamps please) for copy of amazing catalog with 1000's of bargains in hydraulics, electric precision tools, marine & automotive items, etc. for hobbyist or industry. Order from this ad. All prices FOB Culver City, Calif. 50% deposit for COD. Send check, cash or money order in confidence — we've been satisfying mail order customers throughout the world since 1945.

AIRBORNE SALES CO. PM865

8501 Stellar Drive • Culver City, Calif., Box 2727



If you had to hang a **BABY ELEPHANT—**

you could with the new **WELL-NUT®**

An All-Purpose FASTENER—a modern Wall Anchor that holds in any wall—thick or thin. Ask your dealer or send 3 dimes for samples.

DARAS-ROCKWELL DIVISION

United Shoe Machinery

455V West Market St., Newark, N. J. 07107

To Make and Sell Ornamental Concrete Items

You Need **MOLDS**

For Thorough Info On Over 300 Different Molds You Can Buy And Use Plus Complete Start To Finish Professional Instructions RUSH \$2.00 for book



TURN CONCRETE INTO GOLD

CONCRETE MACHINERY COMPANY, INC.
839 Lenoir Rd. - P. O. Box 99 - Hickory 2, N. C.

AUGUST 1965

Save time on all tube cuts with a fast-action **RIGID® No. 205 TUBING CUTTER**



Cuts all Copper, Brass, Aluminum Tube and Thin-Wall Conduit

LOOK AT WHAT YOU GET:

1. Slide-to-size feed gives instant adjustment to tube size.
2. Enclosed feed can't jam.
3. Fold-in reamer is always handy, but out of way.
4. Grooved rollers let you cut tube right at flare . . . stops waste.
5. Extra-wide tube size range . . . 1/8" through 2 3/8" O.D.
6. Rollers smooth tube ready for soldering.
7. Feed screw handle holds spare cutter wheel.

You can't get more in any tubing cutter made, so for fast, perfect tube cuts everytime get a **RIGID® No. 205 Tubing Cutter** from your Dealer today!

THE RIDGE TOOL COMPANY
ELYRIA, OHIO, U.S.A.



saves heat



DAP® Architectural Grade CAULKING

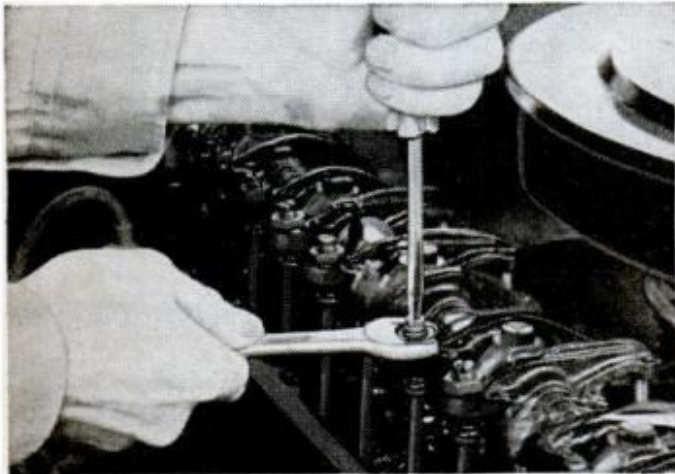


Fills heat-wasting cracks around windows, doors, construction joints. Gives airtight, watertight seals that last and last. Sticks tight to wood, brick, glass, stone, tile, cement. Stays flexible. Sold at leading hardware, building supply, paint and specialty stores.

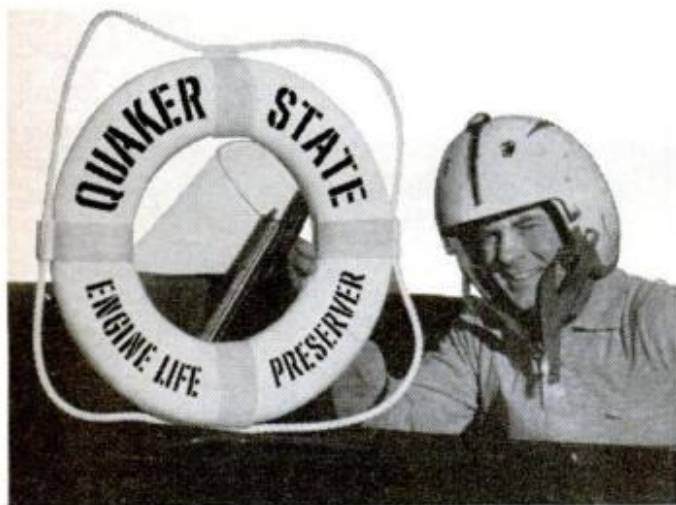
DAP® DAP INC., Dayton 31, Ohio
SUBSIDIARY OF *Abough, Inc.*

195

Test your automobile I.C.E.



What's this man doing?



What does this symbol stand for?

Adjusting hydraulic valve lifters. The life preserver stands for Quaker State Motor Oil—the best engine life preserver for your car. Made from 100% Pure Pennsylvania Grade Crude Oil, Quaker State helps keep your car on the road and out of the repair shop. Keep your car running young. Insist on Quaker State Motor Oil. Always ask for it by name.



QUAKER STATE OIL REFINING CORPORATION
OIL CITY, PENNSYLVANIA

Swamped with Boating Laws

(Continued from page 194)

worked out to protect boaters from sea to shining sea. The law empowered the states to act for the federal government—and to charge fees for doing so—in the registering of small craft.

Boatsmen were enthusiastic about the law at first, then became disenchanted by the way some state bureaucracies took over its administration.

Double-Billed for Tax

And suddenly the boat owners began getting personal property taxes for their boats. Some lucky souls got *two* bills, one from the county they lived in, one from the county they moored in.

One irate taxpayer tried to fight the new assessment with simple logic.

"I've owned a boat for 12 years," he told officials. "I've never been taxed for it before. What's more, my neighbor has a fortune in golfing equipment. Another has bowling balls and trampolines. They're not taxed. How come I get assessed for recreational equipment I've owned for years?"

"Same answer to all your questions, sir," said the collector with bureaucratic blandness. "We don't know who owns golf clubs or trampolines, so we don't tax them. But now that the state is registering boats, we have a list of all the boat owners in the county. So now we're taxing your boat. Next, please?"

It's just one more variation of the basic constant: any kind of bureaucratic solicitude usually winds up as a stranglehold—and if you don't believe us, ask any Navajo.

It's a dreary picture, but not an entirely hopeless one.

Those gentlemen who enact legislation, who appoint small craft officials and do endless other good deeds for the public, are vote-conscious and pressure-sensitive.

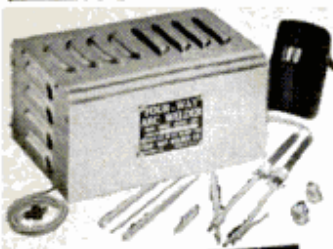
They'll respond to indignant campaigns by organized boating clubs and dealer organizations.

Every politician, from senator to town constable, must constantly be reminded that boaters are voters.

A lot of steadying with that kind of ballast by boater-voters and boating regulations, and taxes can be placed on an even keel, now and for the future. ★★★

For a list of state and territorial agencies responsible for boat numbering and safety laws, write the Outboard Boating Club of America, 307 North Michigan Ave., Chicago, Ill. This organization also has regional Handbooks of Boating Laws covering the southern, north central, northeastern and western sections of the United States and priced at \$1 each.

**BEST LOW COST ELECTRIC WELDER
MONEY CAN BUY ONLY \$14.95**



**5-YEAR GUARANTEE
10-DAY MONEY BACK
TRIAL. WELDS, BRAZES,
SOLDERS, CUTS
ANYTHING OF METAL**

No comparison for performance and value. No experience needed to make or repair auto bodies, fenders, trailers, boats, furniture, farm equipment, garden tools, anything of metal. Use up to 1/8-in. welding rods and 1/4-in. carbons on up to 1/4-in. metal. Operates on any 110 V. line. **WORLD'S GREATEST WELDING VALUE.** Over 500,000 in use by home owners, farmers, hobbyists, mechanics. **5-Year unconditional guarantee.** Order on 10-day moneyback trial, if not satisfied return for refund. **LITERATURE FREE**

SEND ONLY \$2.00

You Get: **FULL FACE SHIELD**, heavy metal cabinet, ground clamp, 12 ft. of heavy duty welding cables, twin carbon arc torch, rod holder, carbons, welding and brazing rods, flux, solder, instructions. **SEND ONLY \$2.00.** Pay \$12.95 plus C.O.D. charges on delivery or send only \$14.95 and we will ship prepaid. Order today.

FOUR-WAY WELDER CO.
DEPT. W2-H, 1810 S. FEDERAL ST., CHICAGO, 60616

Be free as the breeze for only **\$225.00***
Take a test ride on the new Harley-Davidson M-50. See your dealer today.
*Suggested retail, F.O.B. Milwaukee

DRAINS cellars, cisterns, wash tubs; **\$ 8.95**
IRRIGATES - CIRCULATES - SPRAYS



1,001 uses. Stainless shaft. Won't rust or clog! Use 1/6 HP motor or larger . . . 3/4 HP for up to 2,400 GPH; 450 GPH 80' high; or 1,800 GPH from 25' well. 1" inlet; 3/4" outlet. Coupling included free. **\$8.95.** **HEAVY DUTY BALL-BEARING PUMP.** Up to 5,200 GPH; or 3,000 GPH from 25' well. 1 1/4" inlet; 1" outlet. **\$12.95** Postpaid if cash with order. **MONEY BACK GUARANTEE**

Centrifugal and Gear Pumps in All Sizes

LABAWCO PUMPS, Belle Mead 7, New Jersey



YOUR OWN BIKE
\$119.50 to 179.50

Even Mom'll go for this one—costs less, runs for just pennies (nearly 100 miles on a gallon of gas). And it's American made! It's the popular **CAMPUS BIKE!**

FOX

Literature FREE • Parts Catalog \$1.00
Box 797PM • Janesville, Wis. 53546

**640 ACRES OF
WILDLIFE - \$20**

\$20 plus \$6.00 taxes yearly gets you a private retreat on a mile-square untamed wildlife paradise near Canadian border. Thousands of acres of abandoned leaseholds and forfeited grantlands now for sale or lease, some with rivers and private lakes, accessible by road, teeming with wildlife, including bear, moose, deer, muskie, northern pike, ducks, geese. Send \$1 (refundable) for instructions, maps, pictures. Gov't regulations, application blank, to: Director, O.S.C.A., Room 597, 56 Church, Toronto 1, Canada. (Add 50¢ for special handling rush air mail.)

AUGUST 1965

**HOW TO SELL
YOUR INVENTION**

If you have an invention (whether patented or unpatented) that you believe has commercial value, our Free Booklet entitled "How to Go About Selling Your Invention" may help you save time and money.

We are specialists in representing inventors and submitting their inventions to manufacturers. We work with scores of manufacturers who are seeking new products or new product ideas, and we therefore know which firms may be interested in your particular invention. Our service is designed to do all those things the average inventor lacks the knowledge or facilities for doing, or does not have time to do. We prepare your sales letters, folios, duplicate drawings, handle correspondence, select the firms.

We charge the standard commission (on sales) and a modest fee for the submitting service. This fee is refunded if a manufacturer buys your invention through our efforts. We are a nationally known concern with an impeccable reputation for ethics and integrity.

The Free Booklet we have prepared especially for inventors contains such information as current royalty rates being paid by manufacturers, discusses many types of inventions, the possible market for them, tells the effective methods of presenting your invention for sale, whether you employ us or do it yourself, and outlines how we may be able to help you.

You can obtain this booklet "How to Go About Selling Your Invention" by mailing the coupon below. And if you wish to write us for comments on your invention, please do so. We make no charge for consultation. But please do NOT send drawings or models. Just describe the purpose and nature of your invention. Mail the coupon to K. O. Kessler, Pres., Kessler Sales Corporation, Dept. D-58, Fremont, Ohio.

You are welcome to ask your lawyer, local Bank, Chamber of Commerce to carefully check on our reputation for honesty and fair-dealing.

MAIL THIS COUPON

Mr. K. O. Kessler, President, Dept. D-58
Kessler Sales Corp., Fremont, Ohio 43420

Please mail me a copy of your Free Booklet "How to go About Selling Your Invention." It is understood that this does not obligate me in any way to use your Service.

My Name.....

Street Address.....

City..... State..... Zip Code.....

Owners' Report—Plymouth

(Continued from page 91)

it in any direction.

"The most comfortable car we ever drove; I'm sold."—Illinois minister.

"Big-car ride, excellent stability."—Michigan plant controller.

In a car more than 17 feet long you wouldn't expect a sports car ride. It is big.

"This wagon has been converted to an ambulance. Even our patients (who are hypersensitive) remark on the fine ride."—Michigan mortician.

"Gauges and speedometer are very easy to read."—New York claims adjuster.

As easy as anything out of Detroit, but moving the gradations to the outside edge of the dial would help still more.

We haven't reached heaven on earth, however, so there are complaints to record, too. Here are five:

"Low gas mileage (13 mpg overall) and high oil consumption."—Missouri high school principal.

That fuel figure isn't bad for a 330-hp, 383-inch V8 unless you are a cautious driver. Our results were worse.

"Slight problem with minor rusting on body."—Michigan technical manager.

I don't think that's merely a slight problem when it crops up in 2300 miles.

"Very poor paint job; bad body finish."—Michigan clerk (for Chrysler Corp.).

"Paint started to rust in two months and the car is garaged every night."—Pennsylvania investment counselor.

"Loose trim around the windshield makes a terrible noise."—Kansas housewife.

"Car rattles more than other cars I have driven."—Georgia insurance agent.

Makes you wonder whether the test Fury we got was a special job getting special care on the assembly line.

"Workmanship is poor. Practically every bolt and screw inside and out was loose."—New York computer programmer.

"Quality check not so good; windows rattle."—New Jersey pipefitter.

The Dodge with the 121-inch wheelbase and the big Ford and Chevy all earned more workmanship-and-assembly complaints; the full-size Olds drew fewer.

"I don't know the reason for the wind noise, but it's the most troublesome feature of the car. Conversation impossible at freeway speeds."—Iowa teacher.

"I'd like to see somebody make vent windows less noisy."—Virginia machinist.

Farther down the list are another five praiseworthy features. Here's what the owners have to say about these factors:

"I decided against Ford, Merc and Chevy because of the spaciousness of the Fury—North Dakota mechanical engineer.

And we found headroom generous, although a few owners disagreed.

"Engine and transmission seem trouble-free, smooth and quiet—except for the sound of plenty of power."—Illinois railroad freight agent.

He's talking about the two-barrel 383 V8 with automatic. Our 4-bbl. 383 was smooth, too, but surged during hard right bends.

"I have power steering and it handles like a dream."—Kentucky mechanic.

Handling should be credited to torsion bar suspension as much as anything. I find power steering blocks off any feel of the road. The advantage: a faster ratio.

"I get a good view; you sure can see well over the steering wheel."—Retired Indianan.

The bench seat is just a touch higher than the buckets. That and the lower hood line help vision.

"Nicest interior of any car I have ever owned. Plush—sporty—comfortable."—Iowa manufacturing engineer.

Not everybody is so enthusiastic about either the steering or the seats, although the number of complaints trails the number of praises. Here are samples of five more items from the brickbat list:

"I have power steering. The car has wanderlust; needs continual wheel correction."—Rhode Island boilermaker.

A system that makes the driver do more of the work could be preferable.

"I've had trouble with the water pump, transmission adjustment, and an electrical short."—Michigan clerk.

"Engine surges at 50-60 mph. Dealer says this is common with 318-cube engine."—Georgia civil service worker.

I'd be more likely to blame it on the carburetor. We had a bit of the same problem.

"Dashboard finish is rough."—Nebraska insurance manager.

If you're talking about the crackle finish, don't complain. It keeps glare out of your eyes.

"Door locks don't work too well after rain or snow."—Ohio salesman.

"Vinyl upholstery is hot in summer, cold in winter."—New York traffic manager.

You want washable upholstery with the comfort of woven fabric? Plastic with a short nap might do it, but it sounds like money.

Here's a final group of features owners praised, reported in their own words:

"I've had Plymouth products since '32 and got good service from them all."—Tennessee securities salesman.

No matter what make you talk about that shows either a high degree of luck or a low degree of expectation.

"It's not in a garage every five minutes. Most new cars have kinks to be ironed out, but so far this one is perfect."—Vermont beautician.

Plymouths can be problems, too, but it's less likely that this will happen late in the model run.

"Seems solidly built; not too many rattles and squeaks noticed so far."—Retired Michigan man.

"My upholstery is rich looking and it's very easy to clean."—Minnesota paper-hanger.

Ah—and is it also hot in summer?

"Vertical headlamps seem to give as good light spread as the horizontal and the car looks as if it were wider."—Alabama mechanic.

Congratulations. You've duplicated the styling department thinking exactly.

"I like the upkeep costs—haven't had any."—Retired Indianan.

We'll close with the dark side. Here are samples illustrating the last group of complaints heard from the owners we surveyed.

"The ceiling is too low. I can't wear my western hat."—New Mexico telegrapher.

Shucks, podner, hang it on the antenna.

"Manual transmission locked up but was repaired under warranty."—Maryland secretary.

"Bumpers are too close to the body for protection: the bumper has lost its function."—New York model builder.

"As on all cars, the bumpers, although attractive, are more decorative than functional."—New Jersey accountant.

We'd still be relatively safe from body damage if bumpers were strong. But Flexible and Close make a bad combination for most of us.

"Hood ornament looks as if it's made out of a coat hanger."—Kansas homemaker.

What'll you bet Plymouth thought it would remind you of luxury?

"My '59 Plymouth had better styling; now they've tried to copy GM."—Illinois factory supervisor.

For my money, they're midway between Ford's sharp edges and GM's bulbous curves.

"I get carburetor icing on damp mornings until the car warms up."—Maryland chemical engineer.

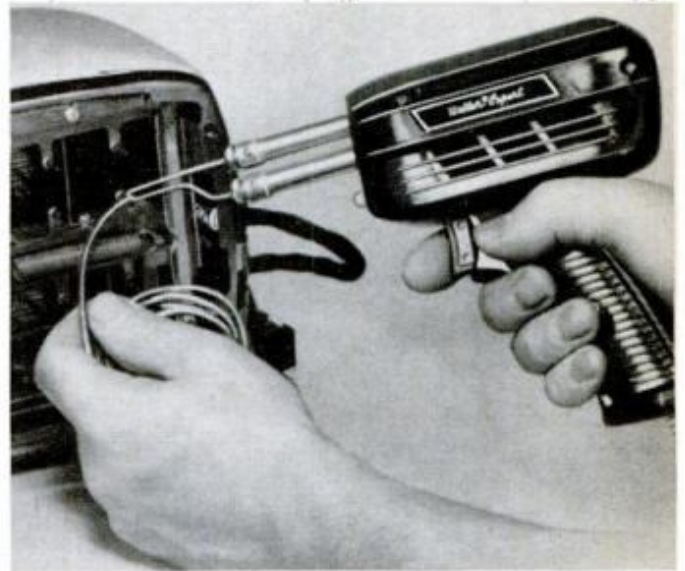
There you have the reactions of owners who have totaled over 1¼ million miles in the new Plymouth Fury. ★★ ★

AUGUST 1965

FASTEST HEATING

soldering gun in the world

Reaches full soldering temperature up to 40% faster than other guns.



Weller® DUAL HEAT SOLDERING GUN

Fastest, easiest, surest way to solder. Heat and spotlight come on instantly when you pull the trigger. Two trigger positions let you switch instantly to low 100 watt heat for electrical soldering and high 140 watt heat for metal mending. In addition to exclusive Dual Heat, a Weller gun gives the most heat per watt. Buy Weller—first and best in soldering guns—and the choice of professionals.



COMPLETE KIT

Includes Expert gun, 3 soldering tips, tip-changing wrench, flux brush, soldering aid, solder and plastic case. **\$895** list
Model 8200 PK.

WELLER ELECTRIC CORP., EASTON, PA.

In Canada: Kingston, Ontario—In England: Horsham, Sussex.

WORLD LEADER IN SOLDERING TECHNOLOGY

Color TV Is In

(Continued from page 78)

Consumer Products Div., color set production for 1965 is anticipated at 2.2 million sets. In 1966, it will be nudging 3 million and could be higher if color tube manufacturers manage to get their plants rolling. By the end of 1968, more than 15 million families will be watching color sets. That means one out of every four sets will be color. In dollars, color will account for more sales than black-and-white sets starting this year.

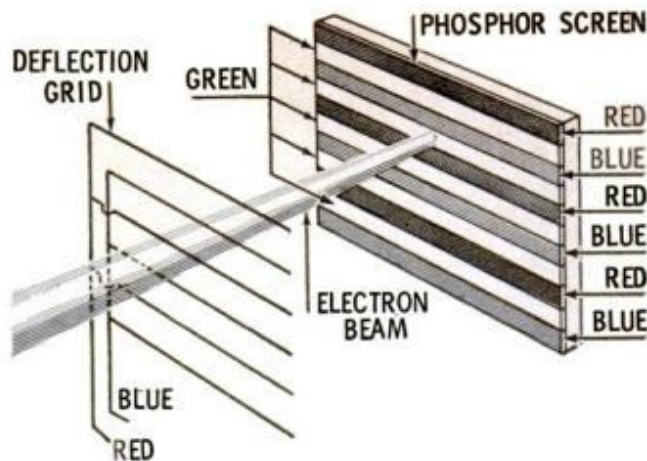
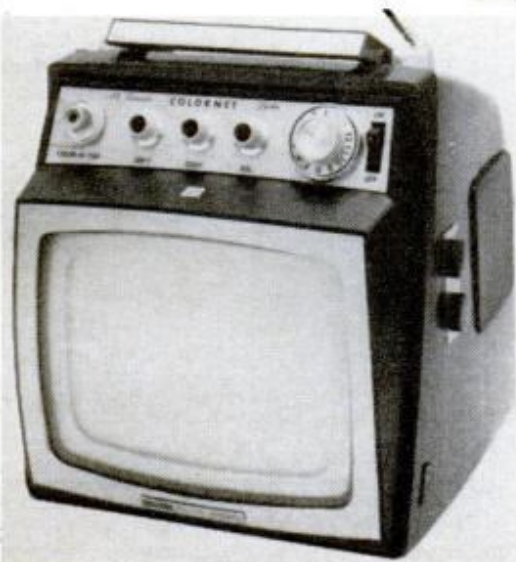
Just a short while ago I spent a number of color TV viewing hours with GE's little 11-inch set and Sylvania's big 25-inch set. Amazing as it may seem the little portable delivers good color pictures indoors and out at locations close to and far from the transmitter. The best way to define range of the set is to say that any location where you can get good black and white pictures with a conventional set, the portable will deliver good color pictures. Also, that small screen seems to deliver a brighter picture than that available from any of the larger-screen sets.

The 25-inch screen was a monster by comparison. But even close-up viewing showed pictures sharp and clear. For the viewer who really likes to be a part of the picture the 25-inch screen is worth the extra dollars you'll spend for it.

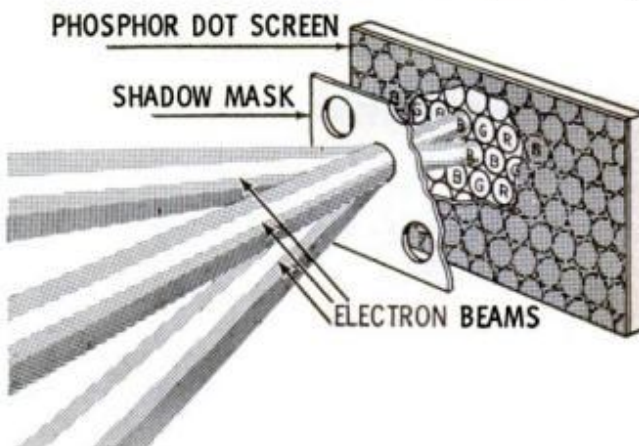
Let me take time out here for a note about reception requirements for good color. First, color depends upon ghost-free pictures. A ghost which is tolerable in a black and white picture becomes unbearable

YAOU COLOR PORTABLE has 7½-inch screen, single-gun picture tube. Will sell for \$385 initially, \$275 a year later. U.S. introduction planned this fall

Electronics



CHROMATRON PICTURE tube uses only one electron gun and a special beam deflection grid to produce color picture. Result—lower cost and brighter viewing



SHADOW-MASK TUBE is conventional type. Uses three electron guns and shadow mask to produce color pictures. Complex arrangement is current standard

able in color. This happens because color ghosts cause color mixing and blending, creating strangely hued faces and, in general, destroying the picture quality. On a set tried here in *PM* offices using an indoor antenna, ghosts made color pictures unpleasant to watch.

Antenna systems are another area in which color sets are having a strong influence. The trend seems to be toward antennas designed to be used with coaxial cable. This makes the impedance of the antenna 72 ohms, rather than the conventional 300 ohms of the familiar flat TV lead-in. The change is in the works now with one set manufacturer (GE) already offering a choice of input terminals on the set and one antenna manufacturer (Jerrold) pushing the antenna system.

The new antennas improve color viewing, by eliminating all pickup of noise and other interference by the lead-in. The shielded cable does this.

Yes, this is the year for color. Have you thought of putting a new color set in your living room? ★★★

FIRST TIME EVER
AT THIS PRICE...
EXPENSIVE
LEAKPROOF CON-
STRUCTION ON...

HIGH PERFORMANCE PUMPS

SAVE! BUY DIRECT
FROM FACTORY!

Quickly Drain Pools and Cellars!
Fill Tanks! Irrigate! Spray!

Now... a pump for under \$50 with permanently leakproof ceramic-lapped precision mechanical seal construction... the same as in pumps for atomic submarines. Forget about the leaks and constant adjustments necessary with conventional gland seal pumps. Precision made to pump up to 5,000 GPH. Up to 60 ft. ht. Maintenance free, rust-proof aluminum castings. 1 1/4" intake, 1" discharge. Fits any motor. Threaded suction discharge. Quality guaranteed by one of America's leading manufacturers of precision tools and pumps. Send check or M.O., or \$1 deposit on C.O.D.'s. Flexible drive coupling \$1 extra.

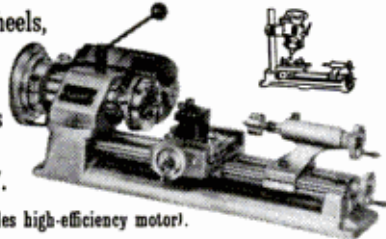
MONEY BACK GUARANTEE!

AMERICAN MACHINE & TOOL CO., Dept. PM-85, Royersford, Pa.



INCREDIBLE UNIMAT!

Makes gears, bearings, wheels, axles, pinions, etc. Turns, threads, bores, drills, mills, grinds, buffs, polishes... 900-7200 rpm. Complete machine shop in 16".

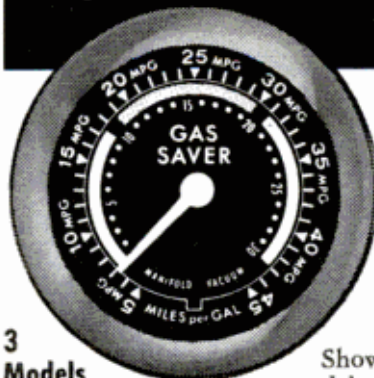


BASIC UNIMAT: \$139.50 (includes high-efficiency motor).

WRITE FOR FREE CATALOG.

AMERICAN EDELSTAAL, INC., Dept. G-H5, 350 B'way, N.Y. 13, N.Y.

NOW! SAVE up to 40% on GAS



New
DIXCO
GAS SAVER
GAUGE

3 Models

No. 131: Standard 2" size fits in dash, or in dual or triple panels. Stainless bezel, slot for illumination. Ppd. \$19.95

No. 132 is No. 131 plus polished chrome panel, hardware, illumination parts. Ppd. \$23.60



3" DELUXE MODEL No. 135 for steering post or above dash. Handsome chrome bezel and bullet housing. Ppd. \$24.95

Shows miles per gallon as you drive, enabling you to adjust speed, acceleration for maximum mileage. Sets precisely to your engine — easily pays for self in improved driving practices, more efficient engine operation. Connects to engine manifold, mounts in, above or below dash. All necessary fittings, tubing included. Anyone can install. Dixco precision quality. 10-day money back guarantee if not satisfied. Order through dealer, or direct. Send cash, check or M.O.

DIXSON, INC., Dept. G5
Box 1449 Grand Junction, Colo. 81502

don't leave us behind WHEN YOU MOVE!

Postal regulations require that you pay extra postage on all magazines forwarded to you at a new address. Copies will not be forwarded free, and we cannot replace lost copies.

To insure delivery at your new address PLEASE NOTIFY US NOW, OR SURELY 6 WEEKS IN ADVANCE OF YOUR MOVING. Write in old and new address, if possible include the address label from your last issue. Thank you.

Please mail this form today to:

Popular Mechanics
Subscription Department
250 West 55th Street
New York 19, N. Y.

AUGUST 1965

ATTACH LABEL HERE
OR
write old address below

Old Address

Name _____ *Please Print*

Address _____

City _____ State _____
zone

Magazine _____

Be sure to give us your

New Address

Name _____ *Please Print*

Address _____

City _____ State _____
zone

Magazine _____

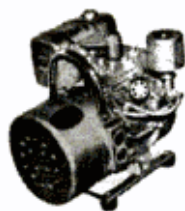
Sure beats smoking!



Enjoy Copenhagen: Place a small pinch between cheek and gum. No chewing.

United States Tobacco Company

EVERLITE* World's THRIFTIEST Light Plants



THE CHAMPION 1200 WATTS, 115 VOLTS AC

Now a Service Free Light Plant built with a transistorized alternator. Offers 30% greater efficiency—more power for less fuel. Ferric service life—no brushes to arc and burn. No more commutator to wear, no collector ring trouble. And best of all it costs no more to "go modern with Everlite." Thrifty 1200 watt, 115v. AC plant powered by a rugged easy starting 4 cycle engine—leader priced. Model 869-12T. Wt. 65 lbs. as illustrated **139.95** f.o.b. factory

*Trade-Mark Registered. All sizes available—can finance. Write for catalog. Special models for public utilities—Approved for Civil Defense. Write

MASTER MECHANIC MFG. CO., Dept. A-865, Burlington, Wis.
Southern Customers Write to Dept. A-865, Box 65, Sarasota, Florida

ENROLL—EARN YOUR DEGREE

of Bachelor of Bible Philosophy (B.Ph.B.), Master of Bible Philosophy (M.Ph.B.), Graduate of Bible Philosophy (G.Ph.B.), Doctor of Metaphysics (Ms.D.), or Doctor of Divinity (D.D.). Chartered by State, Correspondence Courses only. Please write for FREE BOOKLET.

AMERICAN BIBLE INSTITUTE

Dept. PM, 408A W. 75th St., Kansas City, Mo. 64114

HYDRAULIC JACK REPAIRS



Earn While You Learn at Home

Earn while you learn at home. Trained and qualified mechanics needed NOW to service inoperative hydraulic jacks. BIG opportunity for ambitious men. We show you HOW—in your basement or garage, spare time cash income in an expanding industry. Don't wait, ACT NOW! Get the facts.

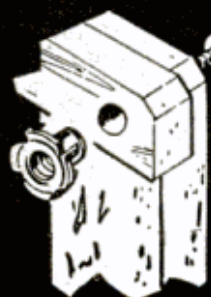
Write for folder No. PM-8 and free bonus offer.

HYDRAULIC JACK REPAIR MANUAL CO.
P. O. BOX 50 • BLOOMFIELD, N. J.

FAMOUS



TEENUT® FASTENERS



- Can't slip, flush-mounted, strong. ONLY nut that gives steel threads in wood!
- Now available in bright NEW finish!
- NEW red and yellow, skin-pack cards!
- Look for colorful NEW display carton, too!
- Handymen need TEENUTS!
- Sold at hardware stores.

COLUMBIA FASTENER

TEENUTS is a registered trademark of United-Carr

SUBSIDIARY OF UNITED-CARR
3229 South Ashland Avenue
Chicago, Illinois 60608

I Was an 18-Foot Robot

(Continued from page 66)

deposits, charting current changes, exploring—perhaps even salvaging—ancient wrecks. The operator, probably linked by cable in this case, could control his automaton from a ship miles above. Similarly, far-flung scientific outposts in the arctic, jungle, or desert could be manned and run by radio-controlled CAMs, their human masters comfortably lodged hundreds of miles away.

Useful on the Moon?

Employing CAMs to aid space exploration opens up the most dramatic possibilities. Once established on the moon, astronauts could use CAMs to explore the terrain, pick up crash-landed supplies, repair data transmitting equipment. CAMs could even build, staff and operate other moon stations, guided by the movements of spacemen strapped to follower racks deep within a safe shelter or even orbiting in a rocket.

The idea of CAMs originated nine years ago when the General Electric Co. was in need of an especially delicate manipulator to handle experiments with an atomic aircraft engine. Manipulators with the theoretical dexterity to turn screws, fit parts and assemble close-tolerance components were available. But they always turned out to be clumsier and more inefficient than expected. The company asked Mosher, a mechanical engineer in the General Engineering Laboratory, to try to design a manipulator that could handle the task.

"I realized that after a certain point improvements in mechanical dexterity added little to a manipulator's performance," says Mosher. "So I began wondering why a human being is so efficient and a slave robot so awkward. Soon it was obvious that the manipulator's operator was missing what he ordinarily experiences, a sense of feel."

Mosher toyed with several methods of restoring a tactile sense to a manipulator's operator before he hit on force feedback. The idea itself wasn't new; power steering, for example, which became popular in the early 1950s, uses the same principle. But no one had ever applied it to a high performance slave robot. When Mosher did, the difference was dramatic. "We didn't just make a better manipulator," he says. "Adding touch created an entirely new kind of robot."

From Mosher's work came Handyman, a pair of arms with pincer hands sensitive enough to pack eggs, strong enough to crush golf balls, and adroit enough to light

a match. The robot proved to be the most effective linking of man to manipulator ever built.

But it did have serious drawbacks. One was the electronic force feedback system, which used sensors in the robot's pincers and arms to pick up and relay stress. The electronic equipment was bulky and far too complex to be practical. In addition, the cost of the servo mechanisms and follower racks was prohibitive for anything but specialized projects. General Electric put Handyman and similar CAMs to work in its own plants. But their complexity and expense nixed plans for continued development.

Then, Army tactical problems, especially those growing out of the Vietnam conflict, revived interest in the robots. Tanks, trucks, mobile guns and other vehicles work fine on even rarely traveled trails. But muddy or potholed roads of a 10 percent grade or more often stop them in their tracks. Millions of dollars worth of high-horsepower equipment becomes hopelessly mired in spots where a mule or horse could walk through easily. Worse, brush-fire skirmishes often occur where there are no roads and equipment has to be laboriously carried in by hand.

To get more mobility from military hardware, the U.S. Tank and Automotive Center in Michigan had experimented for years with hopping, creeping, jumping and walking vehicles. All had been too clumsy and mechanically complex to really be efficient. Then, three years ago, top brass heard of Handyman and asked GE if the idea of force feedback could be used to develop a truly practical walking machine.

The company asked Mosher to find out. Substituting a more efficient and simpler hydraulic feedback system for the electronic relays, he came up with the Pedipulator, built in 1964. The machine proved beyond a doubt that a man could master a walking CAM. "In fact, I'm personally convinced that biped CAMs can ski," says Mosher.

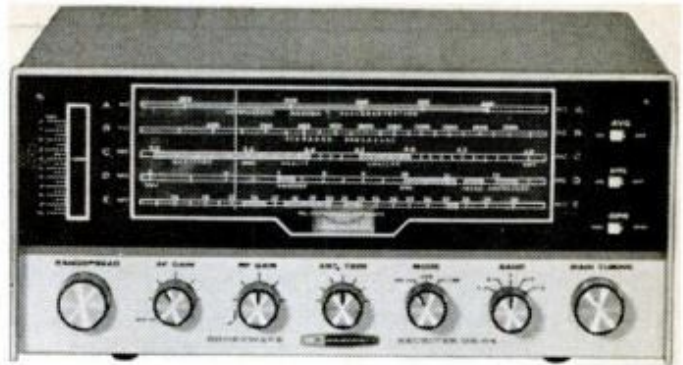
Army to Test Four-legged Unit

Impressed, the Army studied the full potentials of CAMs. Result: The Department of Defense and the Army Tank and Automotive Center asked GE to investigate the possibilities of constructing a semiamphibious four-legged, cargo-carrying CAM.

There appear to be several reasons for the Army's interest in a quadruped, all involving tactical usefulness. A four-legged CAM can't be knocked over as easily as a biped. Its silhouette will be

(Please turn to page 204)

EXPLORE...



The World Of Shortwave With This NEW HEATHKIT Radio . . . \$84.95!

COMPARE IT TO SETS COSTING \$150 AND MORE!
 5 bands cover 200-400 kc, 550-1620 kc (AM) and 2-30 mc . . . Tuned RF stage . . . Crystal filter for greater selectivity . . . 2 detectors for AM and Single Sideband . . . Tuning meter . . . bandspread tuning . . . Code practice monitor . . . Automatic noise limiter, automatic volume control and antenna trimmer . . . 4" x 6" speaker . . . Headphone jack . . . Low-boy styling . . . Free SWL antenna.
 Kit GR-54, 25 lbs. \$84.95



Get Details In FREE Catalog!

HEATH COMPANY, Dept. 17-8, Benton Harbor, Mich. 49023
 In Canada: Daystrom, Ltd., Cooksville, Ontario

- Enclosed is \$84.95 plus shipping. Please send Kit GR-54.
- Please send FREE Heathkit Catalog

Name _____

Address _____

City _____ State _____ Zip _____

Prices and specifications subject to change without notice.
 CL-209

BIG CATALOG! FREE DECAL

BIKES • KARTS • PLANS • PARTS
 Save up to 50% on karts, scooters, mini-bikes! Plans, drawings, parts, engines, clutches, wheels, helmets, etc. — plus ready-to-ride units . . . all at factory prices! Build it yourself at home! Order catalog now — get free decal!

Go **Kart** SEND \$1.00
 BOX 797F



Janesville, Wis

FREE! How to Improve Your Fishing Skill

Complimentary full color BROWNING catalog not only illustrates and details fishing rods—but ALSO contains helpful information on fishing equipment and techniques. Hints on spinning, bait casting, fly casting and two handed casting. Shows preferred line, lure, reel sizes:

FOR FREE COPY WRITE:

Browning Arms Co., Dept. B64, St. Louis, Mo. 63103
 IN CANADA: Browning of Canada, Dept. B64, P.O. Box 991, Montreal 9, P.Q.

Name _____

Address _____

City _____ State _____

8 times more power to stop pain of **HEMORRHOIDS!**

Soothing Nupercainal concentrates on pain!
Prolonged relief of pain, burning and
itching starts in minutes.

If you suffer from the misery of hemorrhoids, remember this about remedies you can buy for temporary relief. The leading "shrinking" preparation contains no anesthetic to relieve pain.

No wonder so many doctors recommend Nupercainal. Soothing Nupercainal stops pain, itching, burning fast . . . gives prolonged relief . . . because it has over eight times more pain-killing power than the other most commonly-used topical anesthetic!

Nupercainal quickly puts raw nerve ends to sleep . . . thus puts pain to sleep. Lets you go about your business . . . relieved of the stabbing pain, burning and itching torment of hemorrhoids. Get Nupercainal Ointment today—handy applicator with each tube. Start to live again, in comfort!



Nupercainal®
OINTMENT

Hey Kids!

NEW GAS ENGINES \$25

Amazing directory tells
where to buy discount
mini-bike, kart parts etc.!

RUSH \$2 for directory
or send 25c for brochure
describing new edition!

BARGAINS, PO BOX 4408, DEPT. PM8 CHICAGO, ILL. 60680

FREE!
BONUS COUPONS!
with directory order
Mini-Bike Plans . . \$1
Racing Kart
Plans . . \$1
**OVER 100
BARGAINS!**



Ever have
"VAPOR LOCK"
TROUBLE?

Better get

AUTOPULSE

ELECTRIC FUEL PUMP

CASS CITY MICHIGAN
A Walbro Division

Ask your Auto Mechanic
Model PEG for Regular Driving
"Custom Chrome" for Road and Track
Exp. Sls.: Geon, Woodbury, N.Y., U.S.A.



I Was an 18-Foot Robot

(Continued from page 203)

lower, making travel through low-lying jungle underbrush easier. Then, most important, a quadruped will be able to carry (on its back) more equipment than a biped could.

If plans for this CAM are approved, the final machine will probably shape up something like this: The quadruped will be about 4 feet wide, 10 feet long and 10 feet tall. The operator, in a cab at the robot's head, will sit upright and use a crawling motion to run the vehicle, his legs governing the robot's hind members, his arms controlling the forelegs. The cargo rack, directly behind the control cab, will take a payload of 500 pounds. A gas turbine engine will probably power the hydraulic servo and feedback system. The CAM will travel at about the speed of a man's brisk walk.

Eyeing the Civilian Market

Even though GE is currently focusing on a quadruped, there's little doubt work will continue on a biped CAM, too. Since much of the research and development needed to build the quadruped can be applied to a biped as well, spin-off from military-oriented research will probably hasten the appearance of economical two and four legged CAMs on the civilian market.

Far-out scientific speculation suggests the next big, if distant, step in CAM development. Simply thinking a movement sends a small electrical current to the muscles normally used for that motion, a current that present medical technology can pick up from the skin. With electronic sensors replacing follower racks, a man might someday be able to control his CAM by just *thinking* an action. The force feedback, in this case, would have to be induced in his muscles by a current sent directly by the CAM instead of the operator's brain. If and when this development ever arrives, most physical work, from painting a house to fighting a war, could be done from comfortable armchairs. ★★★

First torpedo capable of being launched from airplanes going at speeds up to 400 knots has joined the Navy. It's the Mark 46, the Navy's first torpedo to use solid rocket fuel for propulsion. It is "capable of overtaking the most elusive submarine target known," the Navy said. It tracks its victim by both sending out sonar waves and listening for echoes or by merely listening for underwater engine sounds. The torpedo can also be launched from ship tubes and drone helicopters.

ALL FAMOUS BRANDS! **FARM TRUCK AUTO** **AT LESS THAN WHOLESALE**

TIRES! SAVINGS NEVER LESS THAN 50% up to 70% OFF REG. PRICE!

HEADQUARTERS for ALL SPORT CAR TIRE SIZES
FREE - SEND FOR YOUR FREE CATALOG - FREE!

RELIABLE TIRE DIST., 1111 Chestnut St., Camden, N. J.

Liquid
WRENCH

LOOSENS RUSTED NUTS, BOLTS, PARTS IN SECONDS
at Service Stations, Auto and Hardware Stores



Walvis Ridge on the bottom of the South Atlantic forms a barrier that prevents ice-cold Antarctic bottom water from entering the eastern Atlantic.

BUILD YOUR OWN CAMPER AND SAVE!
ALSO TRAILER OR PICKUP-COVER

Complete, easy to follow plans, instructions, material list... **\$3.95 ea.**

Bus Conversion and Houseboat interiors drawings... **\$2.95**

EQUIPMENT CATALOG—\$1.00 (Refundable on first order)

Satisfaction Guaranteed! Send Check Or M.O.—For Details Send Dime.

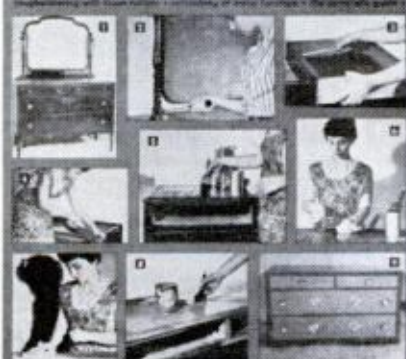
VIKING CAMPER SUPPLY 94-B Glenwood Av., Minneapolis 3, Minn.



NEED NEW FURNITURE?

The POPULAR MECHANICS Home Book of Refinishing Furniture

Methods of finishing - choosing materials - fully illustrated - simple step-by-step methods - general all wood home - special finishing for special types of finishes - staining and finishing techniques - finishing instructions - tips on modern finishes - new paints and varnishes - refinishing articles - color photos and illustrations - instructions with clear photos - simplicity of repair techniques - the complete guide!



Arthur M. Mikesell

LOOK IN YOUR ATTIC
The Popular Mechanics Home Book of Refinishing Furniture—\$4.95
Popular Mechanics Book Dept.
575 Lexington Avenue,
New York, N.Y. 10022

ELECTRIC ARC WELDER \$14.95!

MAKE—REPAIR MOST ANYTHING MADE OF METAL!
LIFETIME BURNOUT GUARANTEE—10 day money back trial!

Works on 110 volt plug in 10 WAYS! WELDS, BRAZES, SOLDERS, CUTS, MELTS most ALL metals! HEATS, SOFTENS, LOOSENS, THAWS, BENDS most ANYTHING. COMPLETE READY TO USE WITH face mask, clamps, arc torch, rod holder cables—and supply of welding, brazing carbon, solder rods, flux and ARC WELDING INSTRUCTION BOOK—Tells how YOU can use for CARS—HOME—FARM—SHOP or FACTORY all 10 WAYS—NO EXPERIENCE NEEDED!

SEND ONLY \$2.00 (cash, ck. M.O.) and pay postman \$12.95 plus COD postage or send \$14.95 for PP del. in USA. **BEST WELDER FOR THE MONEY IN THE WORLD. FREE EXTRA "Helpers" dark goggles** of your order from this ad. Sold ONLY by **MIDWAY WELDER, Dept. DPM-8, Kearney, Nebraska.**




PORPOISE JAW OIL

The incomparable lubricity of the dolphin oils has led to over 100 years use as superb lubricants for timepieces, micrometers, fine instruments, electrical contacts and all delicate mechanisms. Remains fluid at —20°F. Resists oxidation, gumming, evaporation.

MAIL \$1 for the multipurpose oil formulation in the famous 1/4-oz. round bottle.
WILLIAM F. NYE, INC., P.O. Box 927, New Bedford, Mass.
Precision Lubricants for Delicate Mechanisms Since 1844.

FREE! Learn how you can buy engines \$15.00, wheels \$5.00, etc. with Confidential List!

- BUILD THIS MINI-BIKE!** Plans reveal step by step details!
- BUILD A RACING KART!** Complete frame for less than \$10!



RUSH 25c for Brochure Describing Plans
PLANS, Box 478, Dept. P M 8 Denver, Colo.

TABLE-TOP CAR RACING

FIRST AUTHENTIC GUIDE to the exciting new indoor sport that is sweeping America — GRAND PRIX RACING IN MINIATURE

TABLE-TOP CAR RACING



A POPULAR MECHANICS BOOK
by Richard F. Dempewolf

A Popular Mechanics book tells how the fun started . . . how you can build the scale model cars, realistic track and scenery . . . and how to race these free wheeling little cars in a wide variety of scale sizes. It is all here including a list of manufacturers of parts and components. \$4.95 plus postage. Popular Mechanics Books, 575 Lexington Ave., New York, N.Y. 10022

DON'T JUST SIT THERE!



Ever see a man get to first base in his job and then "die"?

He camps there, waiting for something or someone else to advance him. And all too often, he just waits... and waits... and waits.

In the competitive game of business and industry, it's every man for himself. You advance on your own. And the best way to get ahead is to make yourself better qualified than the next guy.

But how? For the man with a family to support, a job to hold down, there's no more sensible method than spare-time training with I.C.S.

It's convenient! It's fast! It's low in cost! *And it works!*

Give us the chance to prove this and we'll send you three helpful and valuable booklets—*free!* We'll demonstrate the I.C.S. method with a sample lesson—we'll show you in an illustrated catalog how quickly and thoroughly you can master any of 250 courses. And you'll get the rewarding career guidebook, "How to Succeed."

Don't just sit there! Mark and mail the coupon!

Clip coupon here—and take your first big step to real success! I.C.S., Scranton, Penna. 18515

Accredited Member
National Home Study Council

INTERNATIONAL CORRESPONDENCE SCHOOLS **I C S** 75th YEAR

Dept. 1220, Scranton, Penna. 18515

(In Hawaii: P. O. Box 418, Honolulu. In Canada: I. C. S. Canadian, Ltd., Montreal.)

Without cost or obligation, rush me **FREE** Success Kit, with **3** valuable booklets: (1) How to Succeed; (2) opportunity booklet about the field I've checked below; (3) sample I. C. S. lesson.

Write for new **W. I. C. S.** package for women.

ARCHITECTURE and BUILDING TRADES

- Air Conditioning
- Architecture
- Arch. Drawing
- Building Contractor
- Carpentry & Millwork
- House Planning
- Painting
- Plumbing & Heating

ART and DESIGN

- Commercial Art
- Interior Decorating
- Illustrating
- Show Card & Sign
- Painting
- Sketching and Painting

AUTOMOTIVE

- Auto Electrical Technician
- Automotive Mechanic
- Engine (Gas & Diesel)
- Engine Tune-Up
- Transmission Specialist

BUSINESS

- Accounting
- Cost Accounting
- Public Accounting
- Bus. Administration
- Executive Training
- Marketing
- Personnel-Labor Relations
- Practical Accounting
- Programming for Digital Computers
- Purchasing Agent
- Real Estate
- Salesmanship
- Sales Mgmt.
- Small Business Mgmt.
- Traffic Mgmt.

CHEMICAL

- Analytical Chemistry
- Chem. Engineering
- General Chemistry
- Chem. Lab. Technician
- Nuclear Energy
- Plastics
- Pulp, Paper

CIVIL ENGINEERING

- Civil Engineering
- Highway Blueprints
- Highway Engineering
- Structural Blueprints
- Sanitary Engineering
- Structural Engineering
- Surveying & Mapping

DRAFTING

- Architectural
- Drafting Technology
- Electrical and Electronic
- Mechanical

ELECTRICAL

- Elec. Appliance Servicing
- Electrical Engineering
- Elec. Motor Repairman
- Industrial
- Telemetering
- Instrument Technician
- Practical Electrician
- Practical Lineman

ELECTRONICS

- Automation
- Electronic Computers
- Electronics Technician
- General Electronics
- Hi-Fi Stereo and Sound Systems
- Industrial Electronics

ENGINEERING (Professional)

- Chemical
- Electrical
- Mechanical

ENGLISH and WRITING

- Better Business Writing
- Introductory Technical Writing
- Short Story Writing
- Practical English

HIGH SCHOOL

- High School Business
- High School General
- High School Math
- High School Secretarial

- High School Vocational
- College Preparatory

LANGUAGES

- (Edited by Berlitz)
- French
 - German
 - Italian
 - Spanish

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
- Legal Secretary
- Medical Secretary

- 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

- Textile
- Other (please specify)

Name _____ Age _____

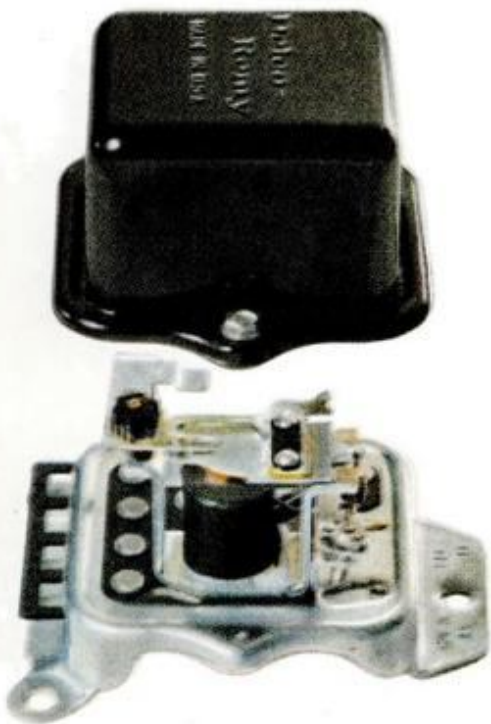
Address _____ (Please indicate whether Mr., Miss or Mrs.)

City _____ State _____ Zip Code _____

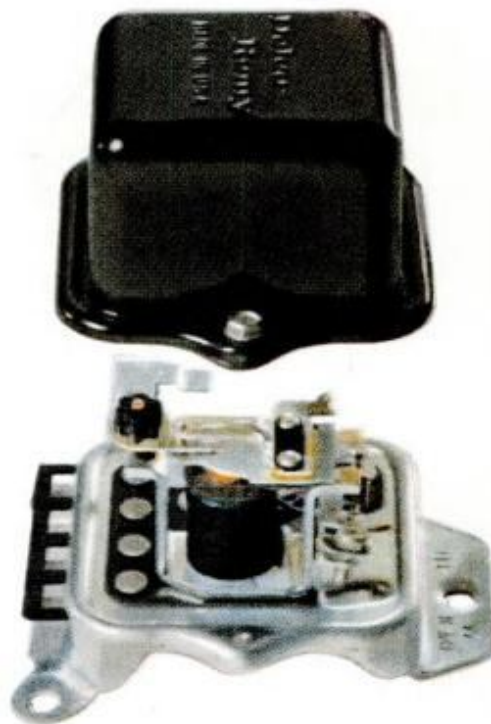
Employed by _____ Working Hours _____ A.M. to _____ P.M.

Occupation _____

Special low rates to members of the U. S. Armed Forces!
Special training programs for industry.



**This is a GM Original:
Your car depends on it.**



**This is a GM Replacement:
You can depend on it.**

You can depend on it because the genuine GM replacement part does exactly the same job as the original. And does it the way your car's designers want it to.

And what goes for the voltage regulator goes for *any* part in your car or truck: It makes good sense to use a genuine GM part when a gen-

uine GM part needs replacing.

Another thing, you can depend on getting GM Parts just about anywhere you can drive. So go where you know they use them and ask for Genuine General Motors Parts in the distinctive GM and United Delco packages—a sign of good parts *and* good service.

GENUINE GENERAL MOTORS PARTS

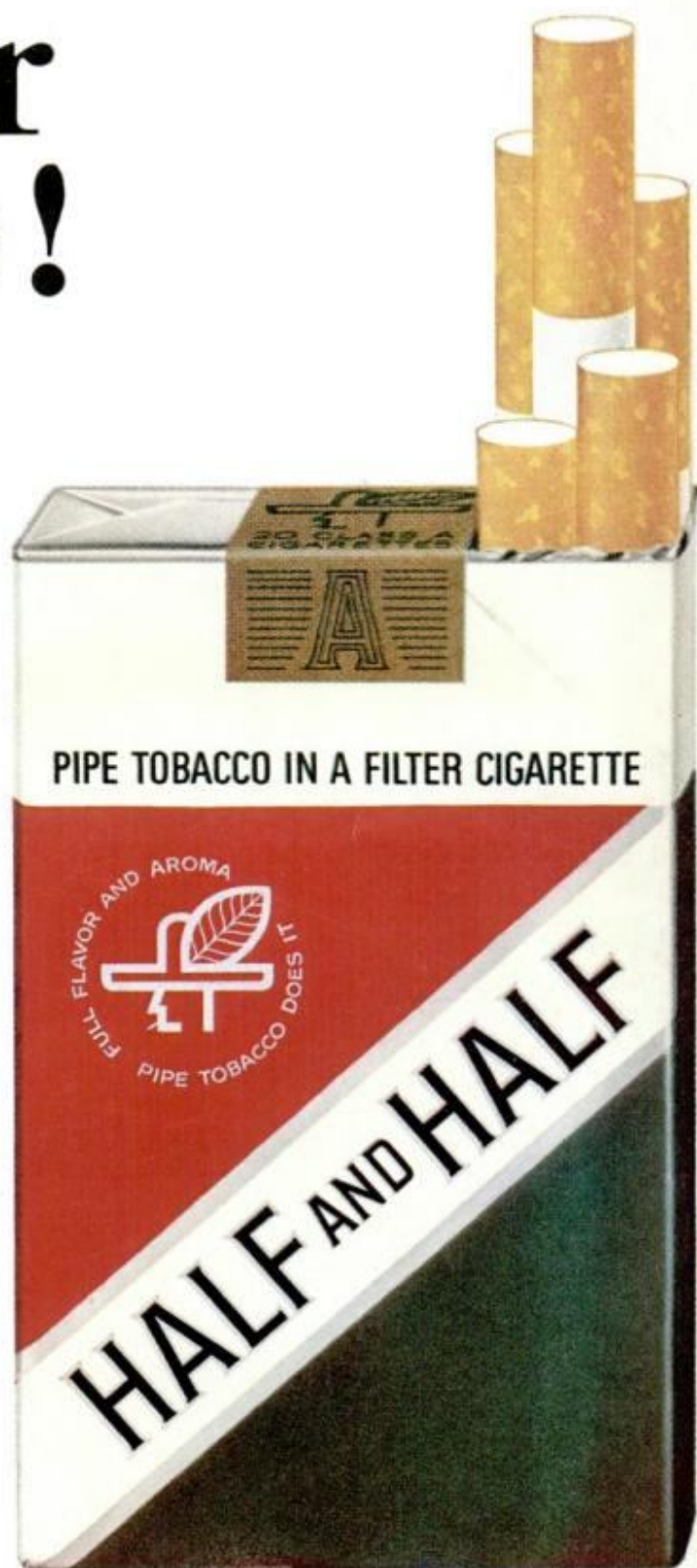


CHEVROLET • PONTIAC • OLDSMOBILE • BUICK • CADILLAC • GMC TRUCKS

United
Delco



Great new taste: pipe tobacco in a filter cigarette!



You get pleasing aroma—and a great new taste! The secret? This filter cigarette is packed with America's best-tasting pipe tobacco—famous Half and Half! Smoke new Half and Half Filter Cigarettes. You'll enjoy a cargo of full flavor and aroma.

Product of *The American Tobacco Company* © A.T. Co.