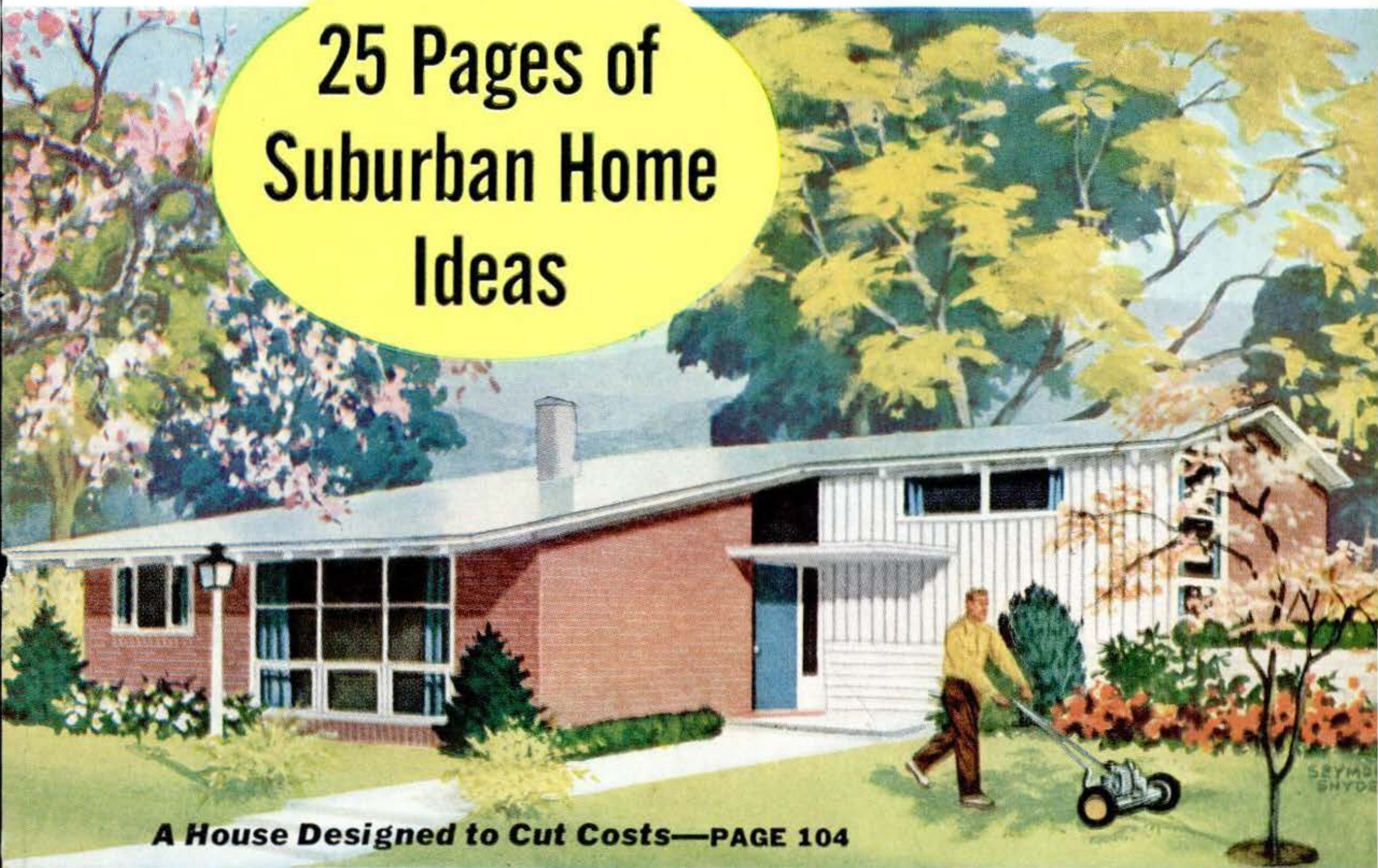


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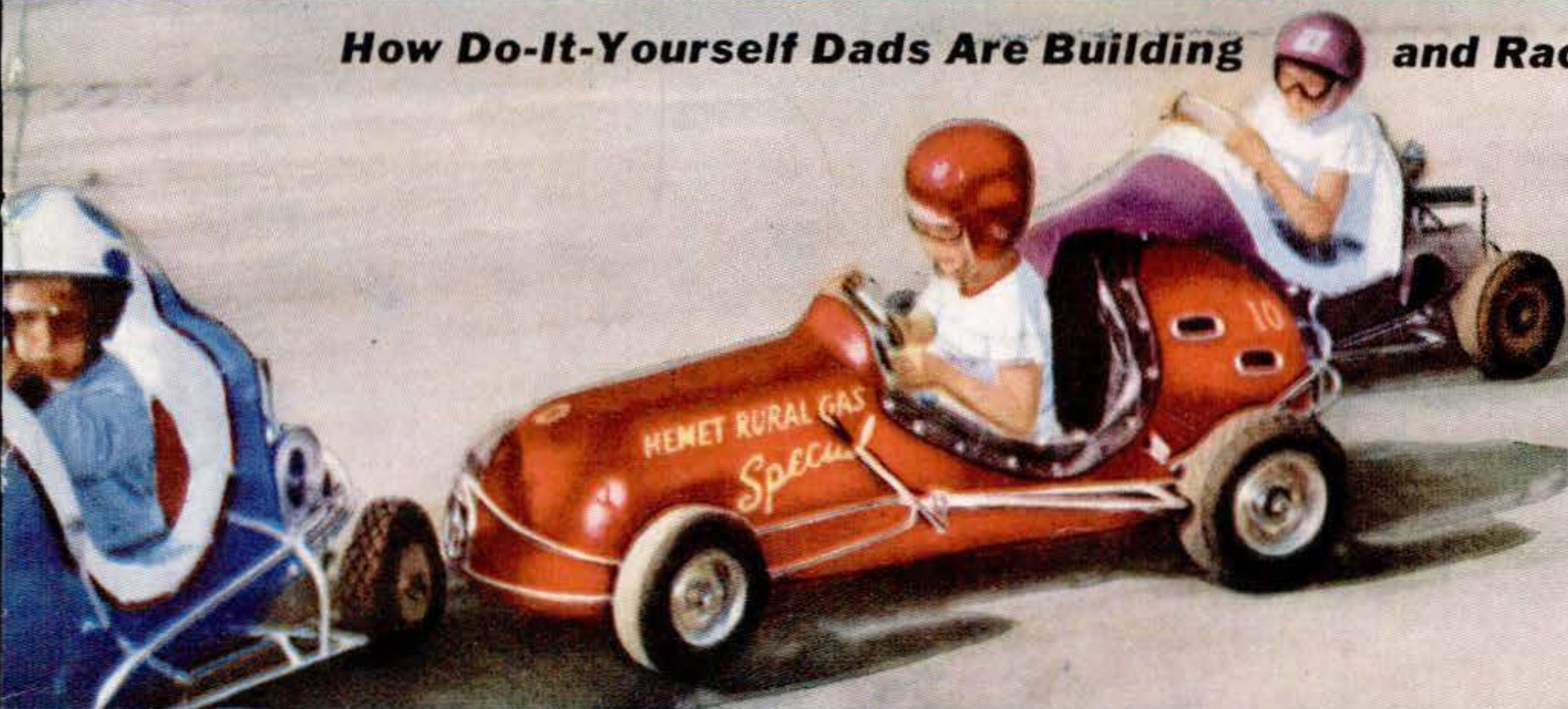


A House Designed to Cut Costs—PAGE 104

HORSEPOWER-RACE NEWS

PAGES
122 to 132

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Midget Midgets

PAGE 166

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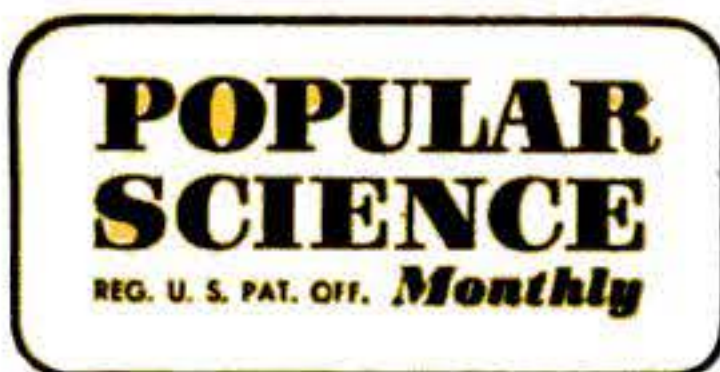
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Mechanics and Handicraft
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Page



SUBURBAN HOME IDEAS

Architects Salute 7 Fine Homes..... 98

Pros and Cons of Split-Level House..... 102

Uncle Sam Designs Low-Cost Home..... 104

It's Fun to Have a Garden Pool..... 199

A Storage Fence for Your Tools..... 205

Does Your Home Need a Raincoat?..... 206

The Easy Way to Pave a Terrace..... 209

How to Cure a Wet Basement..... 212

Indianapolis Racer Hits the Highway..... 107

This Summer You Can Stay Cool..... 112

How to Wear Artificial Clothes..... 113

Atomic Clocks Surpass Earth in Accuracy.... 120



HORSEPOWER-RACE NEWS

Mechanic Wins Horsepower Race..... 122

What Horsepower Really Means..... 126

Detroit's Most Powerful Car..... 128

Chrysler Sets Speed Mark..... 131

Tune Yourself In on the Rocketmen..... 138

How the H-Bombs Spread Radioactivity..... 144

Radio Hams Serve Nation Now..... 146

What Really Happened at Texas City..... 151

Gus Fixes a Reluctant Wagon..... 156

Science Arms You Against Snake Bites..... 160

Florida Plans New-World Fair..... 164

Youngsters Race Midget Midgets..... 166

Need an Extra Shower? Try a Prefab..... 176

A Mechanic Checks a Rattletrap..... 179

He Runs a Shipyard for Amateurs..... 185

How to Use TV Lighting for Home Photos.. 188

This Man Makes Dots..... 215

Prospecting with a Geiger Counter..... 231

(More features and departments are listed on page 4)

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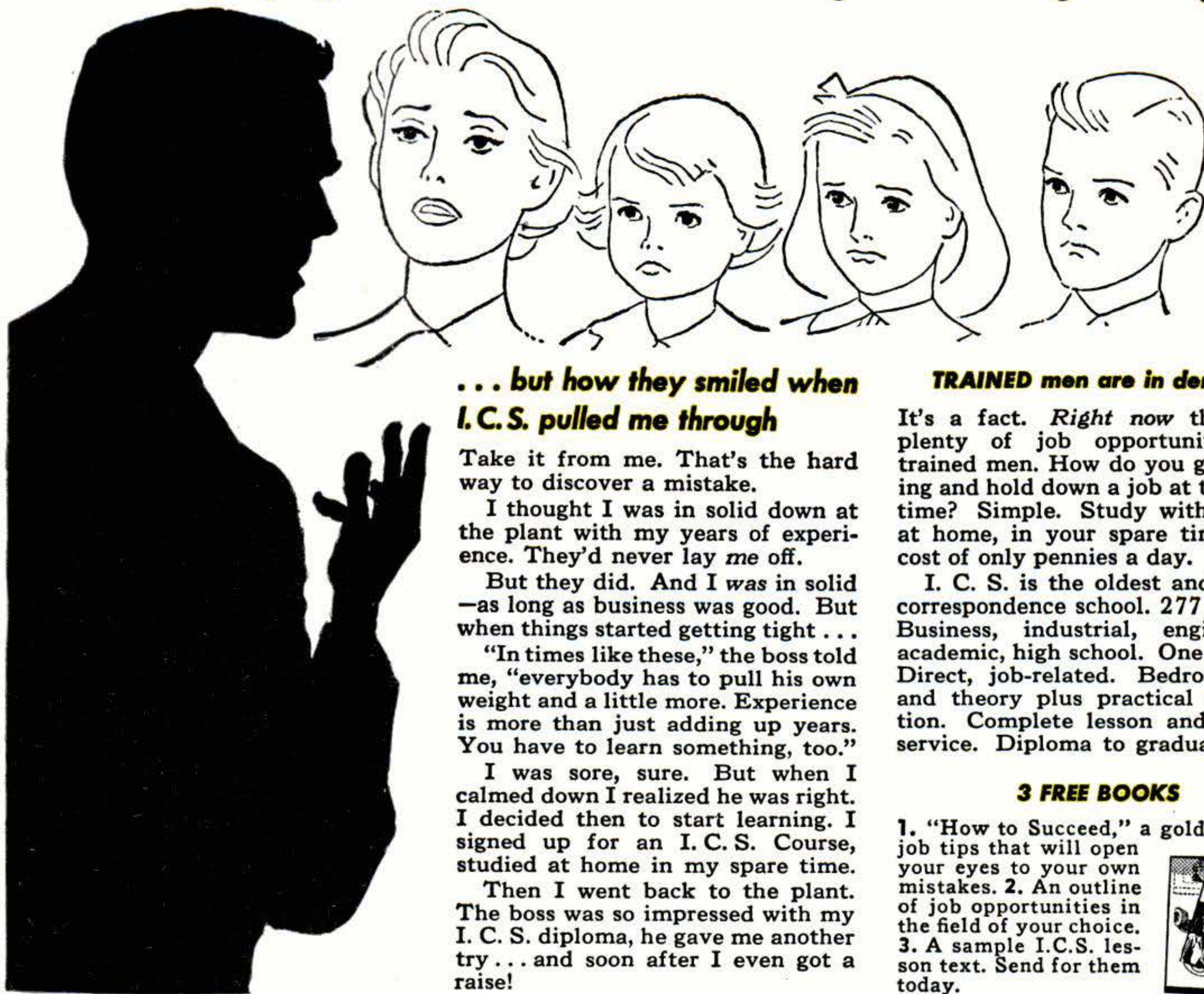
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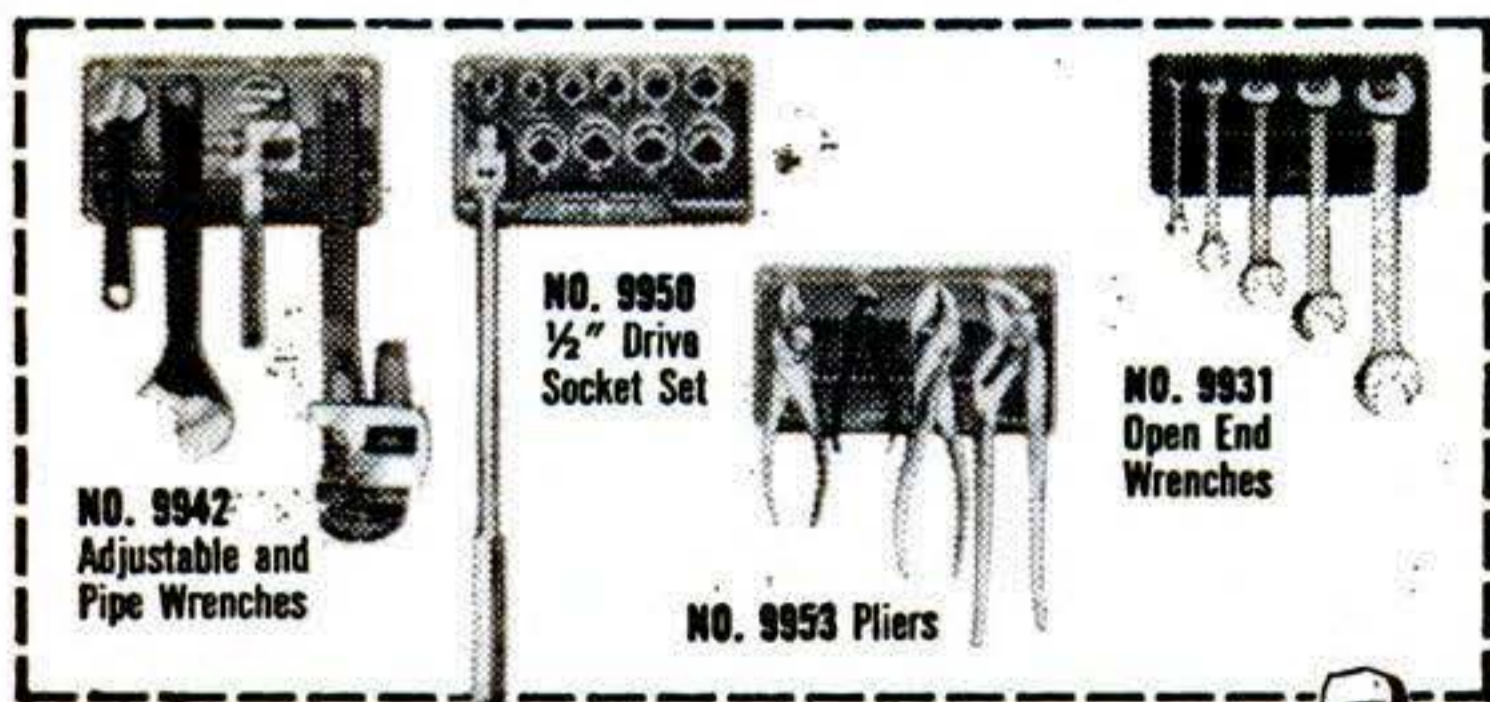


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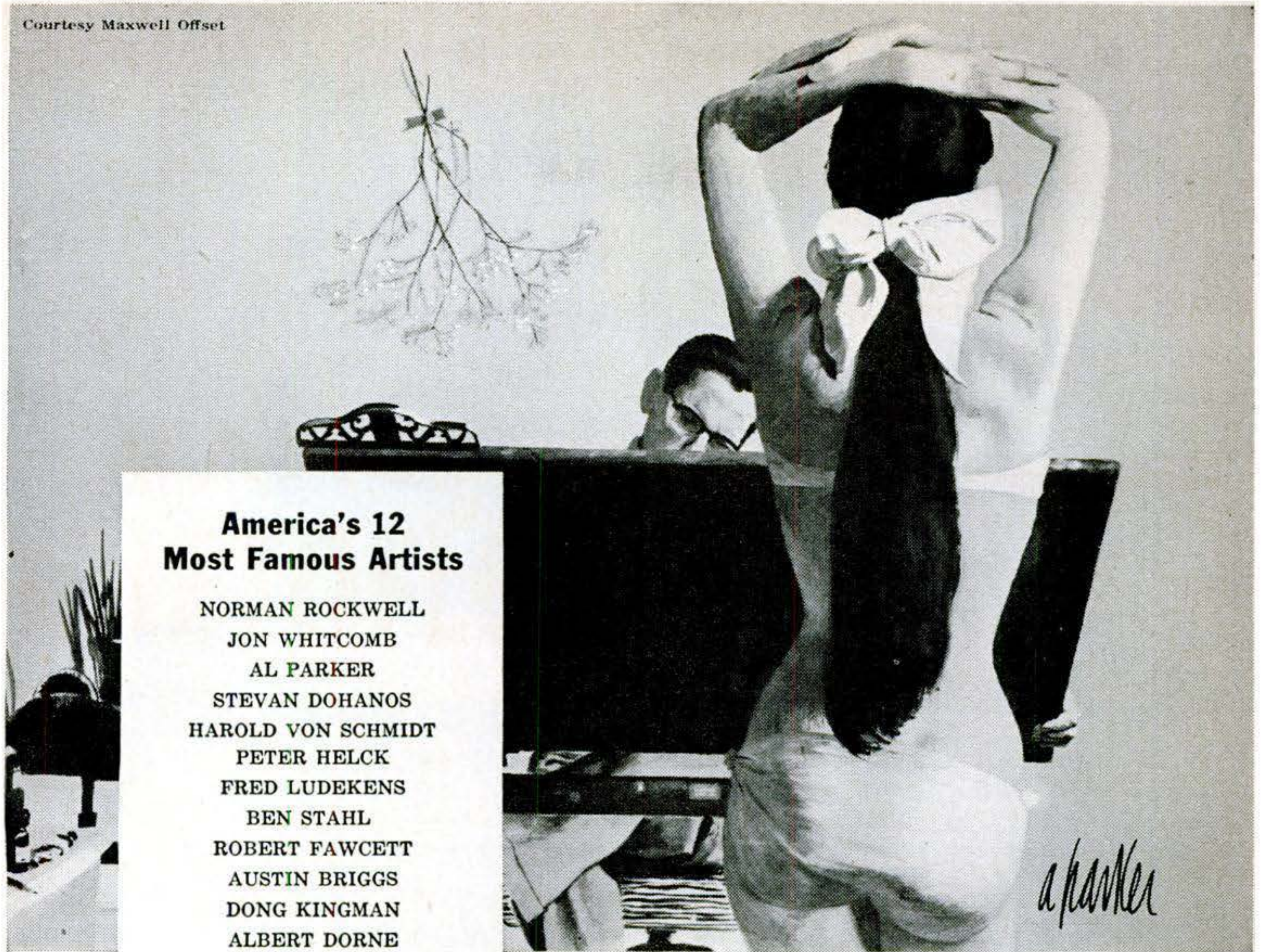
Giant Steel Fingers Pick Up Logs.....	109
Electronics Stunt Makes Music.....	110
Helicopter or Airplane?.....	110
Multiple Photos Show Bombs' Behavior..	111
Radar Pinpoints Enemy Mortars.....	116
New Nylon Armor to Shield GIs.....	116
Trains Made Safe from Small Boys.....	117
Jet Is Revved Up Inside Hangar.....	118
Planes Get Fast-Firing Rocket Guns.....	118
Big Basket Transfers Men from Blimp....	121
Machines Speed Rose Raising.....	136
Wooden Sitter Holds Baby Safely.....	136
Movie Tells the Inside Story.....	137
Designers Make Trucks Do Tricks.....	142
Pipeline's Wings Keep It Steady.....	143
Bubbles Mark Trail of Atomic Bullets..	143
Rocket Hoists Radar Target.....	149
His House Is a Hangar.....	149
Big Saw Has Power Steering.....	150
"Dinghy" Scooter Is Mounted on Car....	150
Lessons on Tape Teach Three "Rs".....	159

Mechanics and Homebuilding

Going Fishing?	183
8 Boating Tips.....	184
How We Built a Corner Table.....	194
Boat with Wheels Needs No Trailer.....	196
Saw Cuts Hold Drill on Tubing.....	196
Wringer Rollers Protect Boat.....	197
Want to Make Gluing Clamps?.....	197
Fuse-Box Shelf Takes Extra Supplies....	198
Hose Stored for Use on Fire.....	198
Washing-Machine Hose Makes Pump....	220
Dog Tether Is Tangleproof.....	220
Yard Tools Are Jacks-of-All-Trades.....	223
Lazy Susan Turns Scrabble Board.....	226
Jar Lid Paints Picket Bottoms.....	226
Bar Breaks Tire Bead Loose.....	227
Ruler Draws Large Circles.....	227
3 Smart Kitchen Accessories.....	228
Balsa Buoys Mark Mooring.....	230
Twine Forms Spray Stencil.....	230

Departments

Letters	12
Last-Minute News and Notes.....	94
Craftsmen at Work.....	96
New Ideas from the Inventors.....	133
I'd Like to See Them Make.....	155
New for Your Car.....	174
New for the Handy Man.....	175
Almanac for Motorists.....	182
Wordless Workshop	192
New Tools.....	219
Keeping the Home Shipshape.....	221
New Shop Ideas.....	238
Hints from the Model Garage.....	246

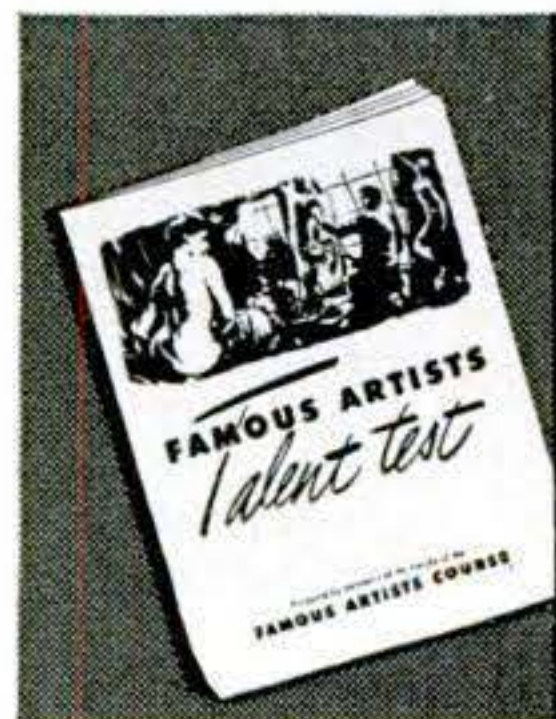


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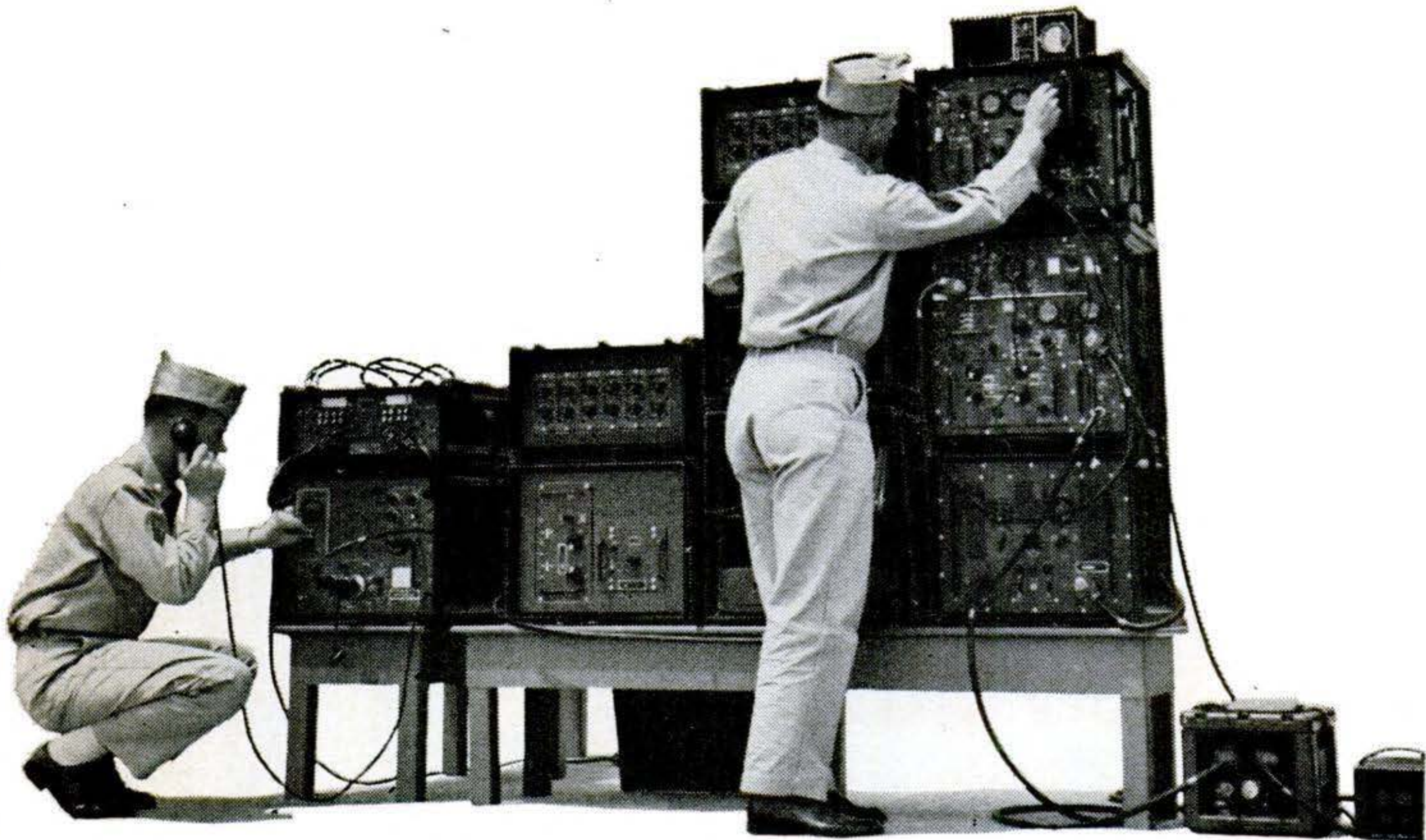
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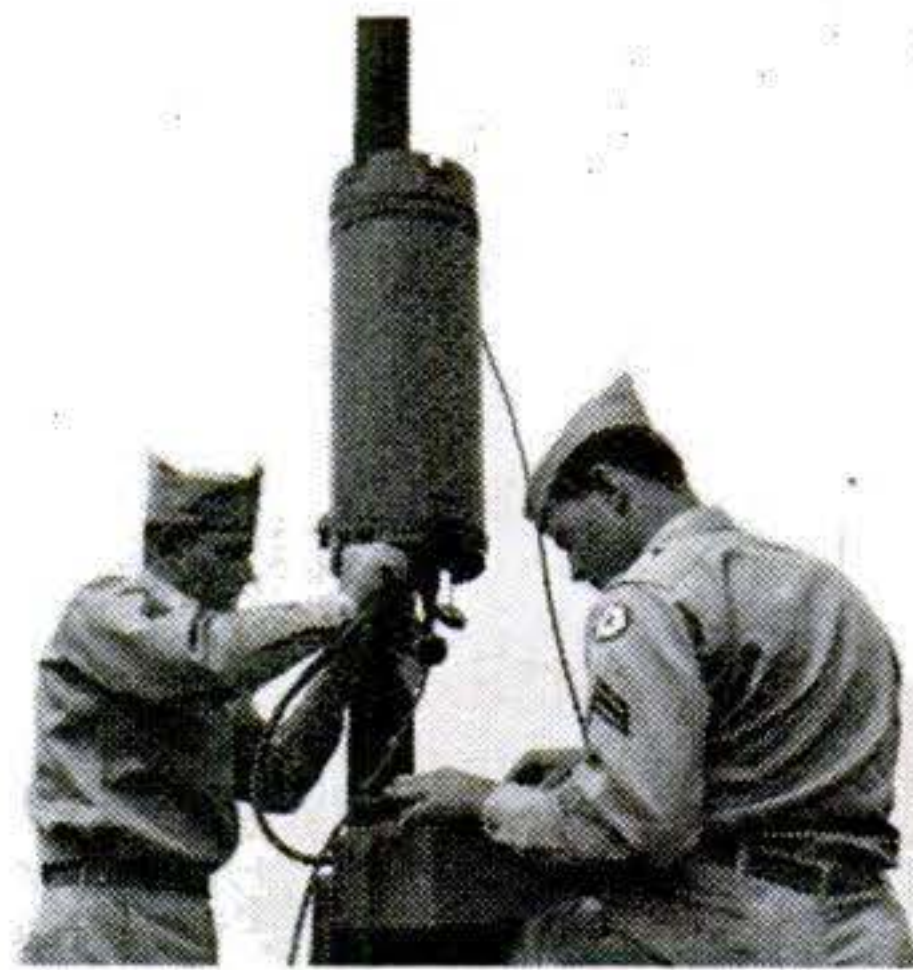
This is the first time a completely integrated wire and radio system of this large a channel capacity has been available for tactical use by the Armed Forces. It is already in production at Western Electric, manufacturing and supply unit of the Bell System.

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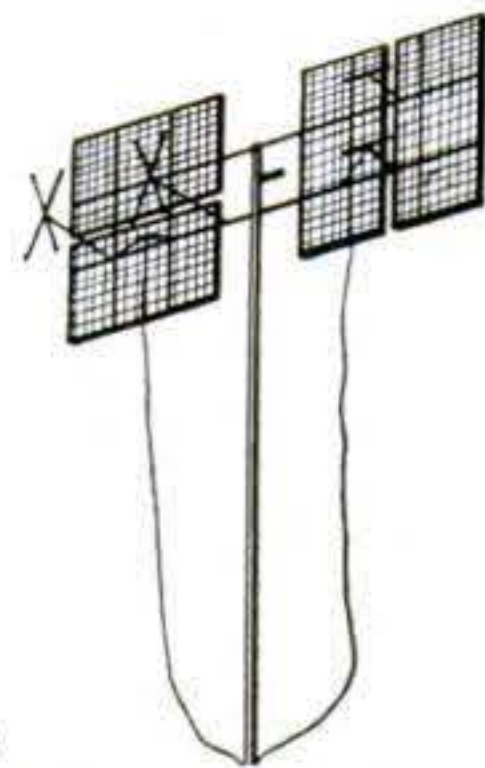


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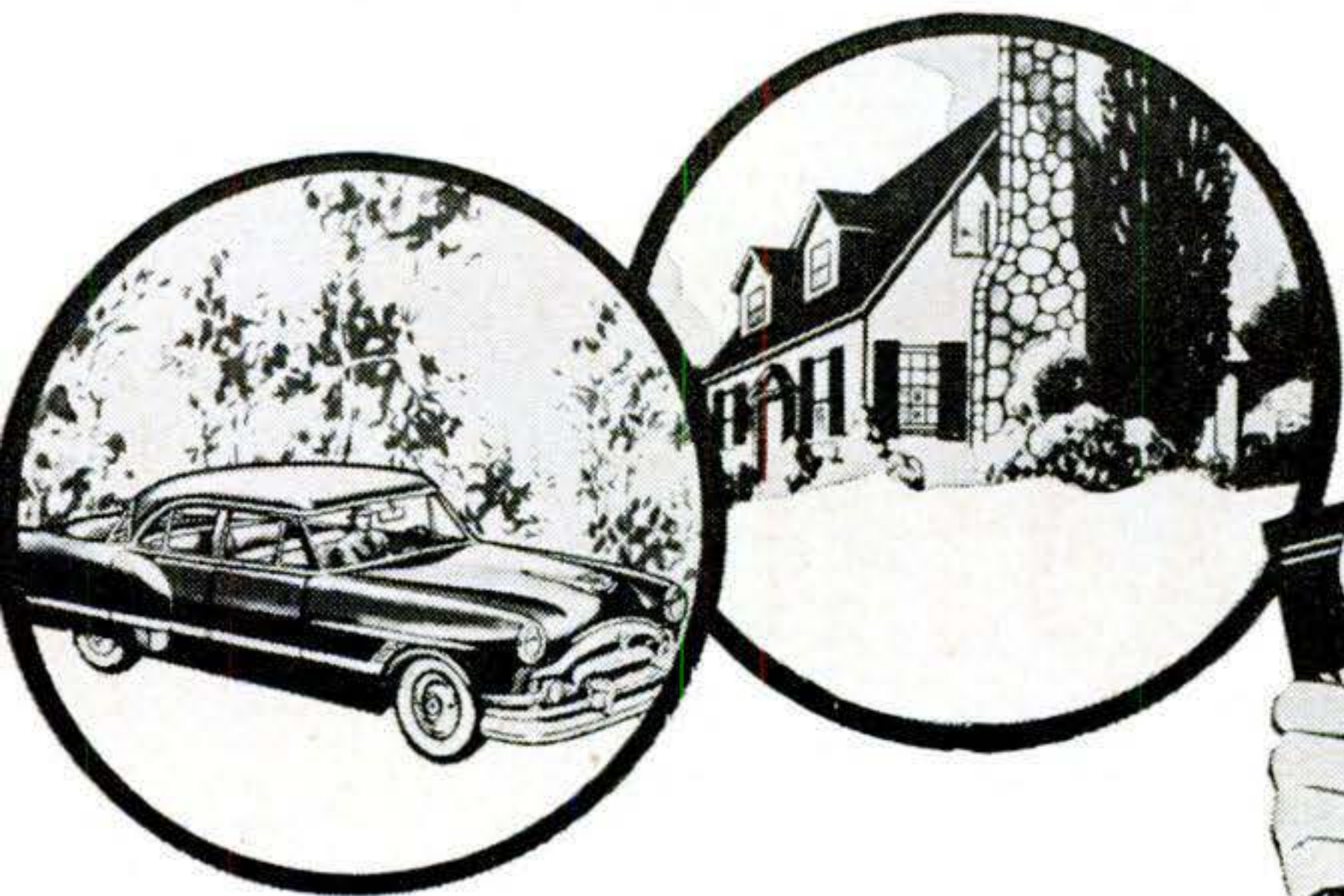


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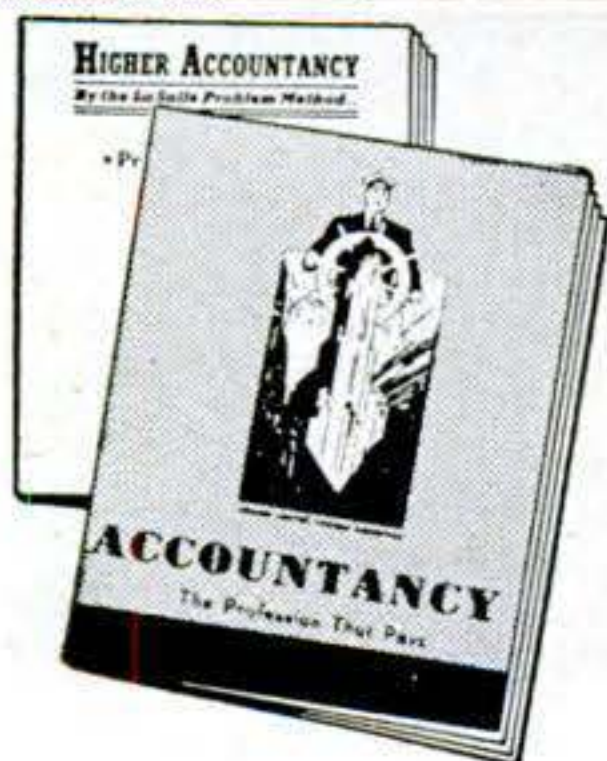
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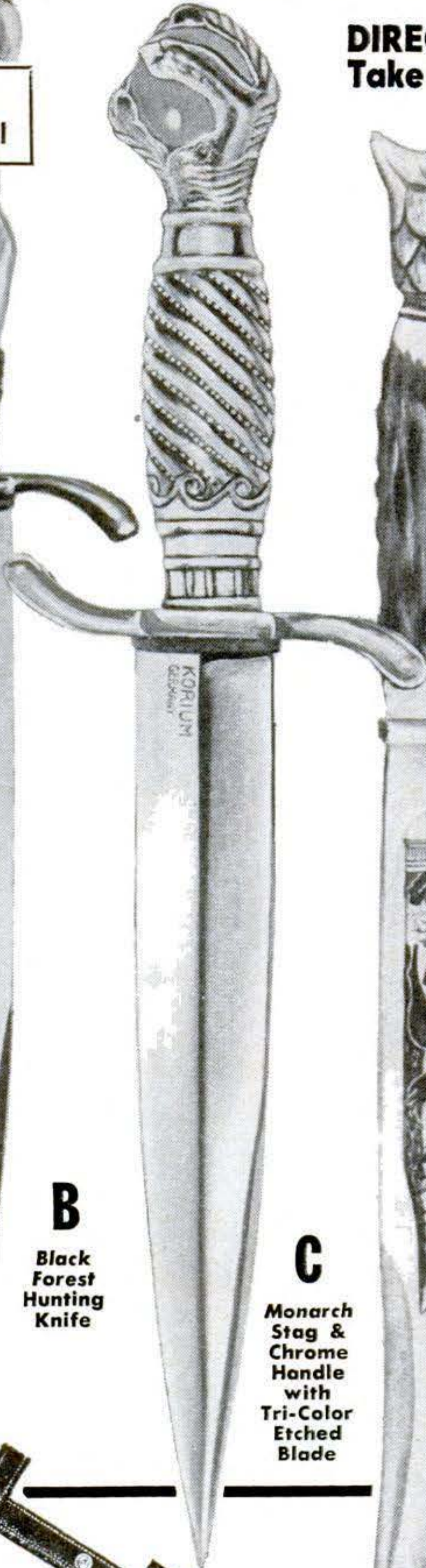
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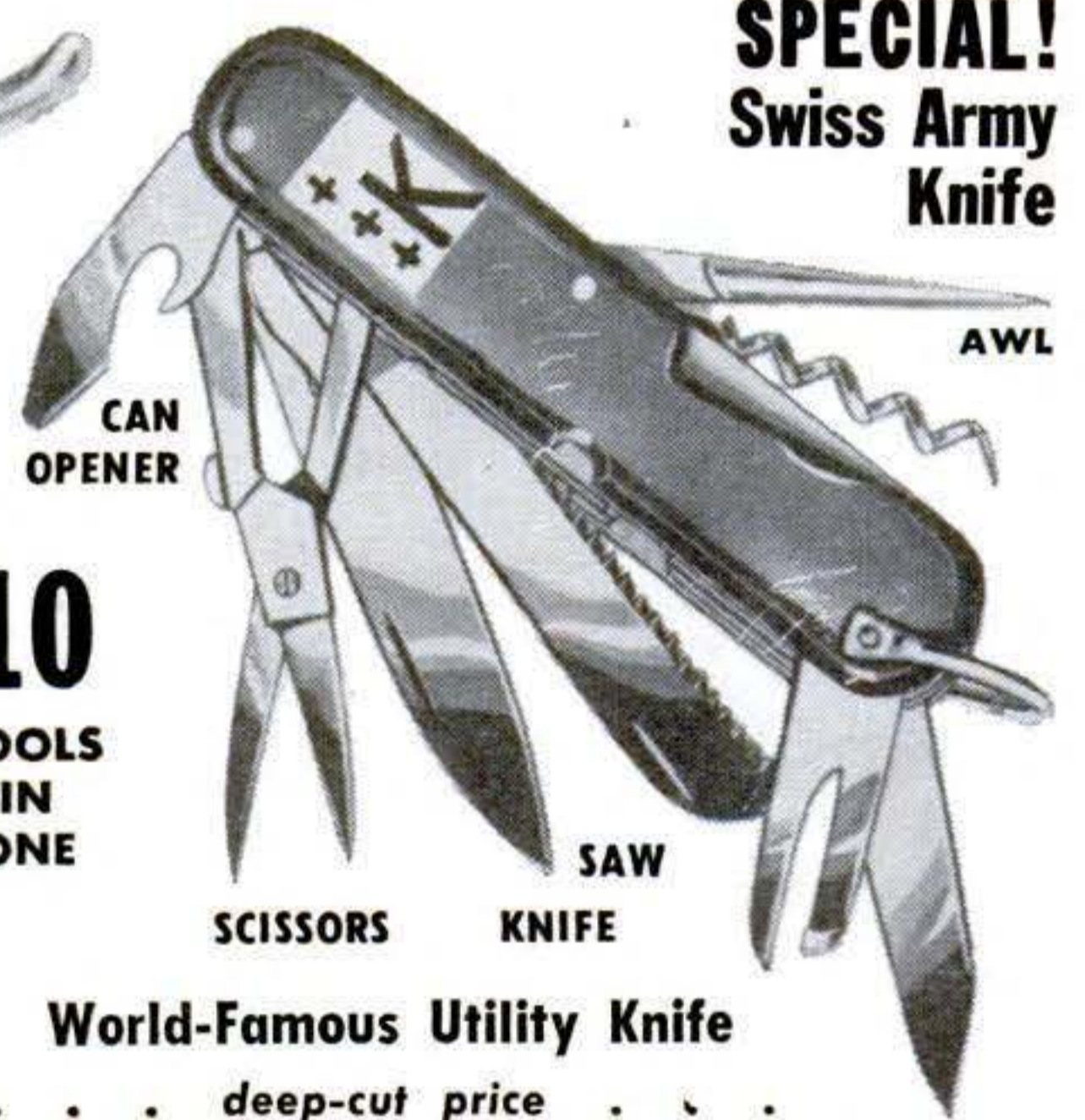
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Not ordinary kind—but superfine leather sheath is supplied with your choice. Tailored to fit. Sharp pointed models have metal tip. Made with painstaking care by skilled workers. Order your knife NOW to avoid disappointment. Supply limited. Each knife is fully guaranteed to delight you, or your 3.95 back. First come, first served. RUSH coupon TODAY!

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352 Fourth Ave., New York 10, N. Y.**

RUSH the KORIAM Knife checked in coupon below on 5-day home trial. If I am not delighted with the quality and value, I shall return it for FULL REFUND of my 3.95. () 3.95 enclosed. Send postpaid. () Send C.O.D. plus postage

CHECK MODEL DESIRED:

() A () B () C () Swiss Army Knife

NAME.....

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Jigs to Ships in a Jiffy!



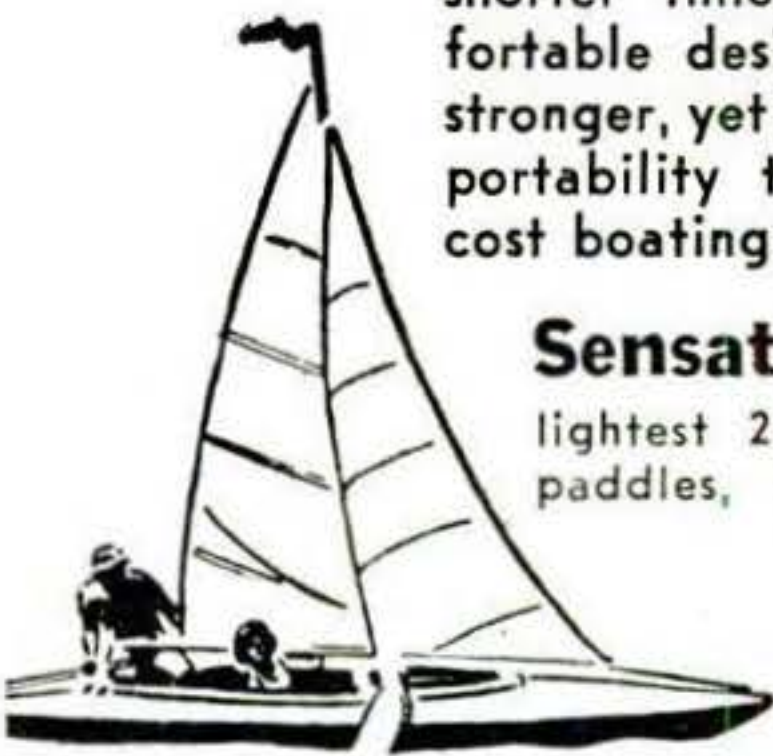
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Funpacked FOLBOT Way

NOW for real Joy, Folbot's scientifically developed precision parts of handier size and FREE from stresses, SET-UP so much EASIER in shorter time. Smarter, seaworthy, more comfortable designs, ultra super construction with stronger, yet lighter materials GIVE YOU utmost portability to provide better, lifetime, lower cost boating anywhere.

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lightest 2 to 3 seater, motors, paddles, sails like a feather.



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STARK INDUSTRIAL PARK, PS CHARLESTON, S. C.

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Address.....
City..... State.....

New central heating system has a thermostat in every room

Steam turbine operated fan in each room heater circulates filtered warm air. Thermostats are non-electric

Why didn't someone think of this long ago? Once in many years a new idea is born; one so simple, so logical, and so practical that it wins immediate and wide acceptance. People constantly tell us that the SelecTemp heating system is just such an idea.

Home comfort beyond anything you've ever known. SelecTemp is the ultimate in modern heating—every room a zone, with its own thermostat. Every member of the family has just-right warmth, from 65° or so in mother's busy kitchen to tropical warmth for grandmother. Each room has a separate steam-fed heating unit, which constantly circulates filtered warm air. There is no wiring; fans and thermostats are non-electric. (See diagram at right.)

Economically installed. Fuel cost low. SelecTemp heating is very economically installed in new or old homes or buildings, since small flexible copper tubing carries steam to room units. SelecTemp eliminates *overheating* and *unnecessary* heating. Rooms not in use can be kept cool and quickly reheated when wanted. SelecTemp boiler with immersion coils will provide plenty of hot water, winter and summer, at low cost.

Continuous, modulated heat. The speed of the fan and the amount of steam supplied are constantly and automatically adjusted to room needs. No more heat than is needed, and no less. No pop-on, pop-off. Just steady heat, accurately metered.

Learn more about this revolutionary heating system. Mail the coupon. You will receive a 32-page booklet "12 Plans for Home Heating," describing SelecTemp heating, as well as accurate information on all principal types of modern heating.

CLIP AND MAIL

IRON FIREMAN MANUFACTURING COMPANY
3016 West 106th Street, Cleveland 11, Ohio.
In Canada: 80 Ward Street, Toronto, Ontario.
Please send me your free booklet "12 Plans for Home Heating."

Name _____

Address _____

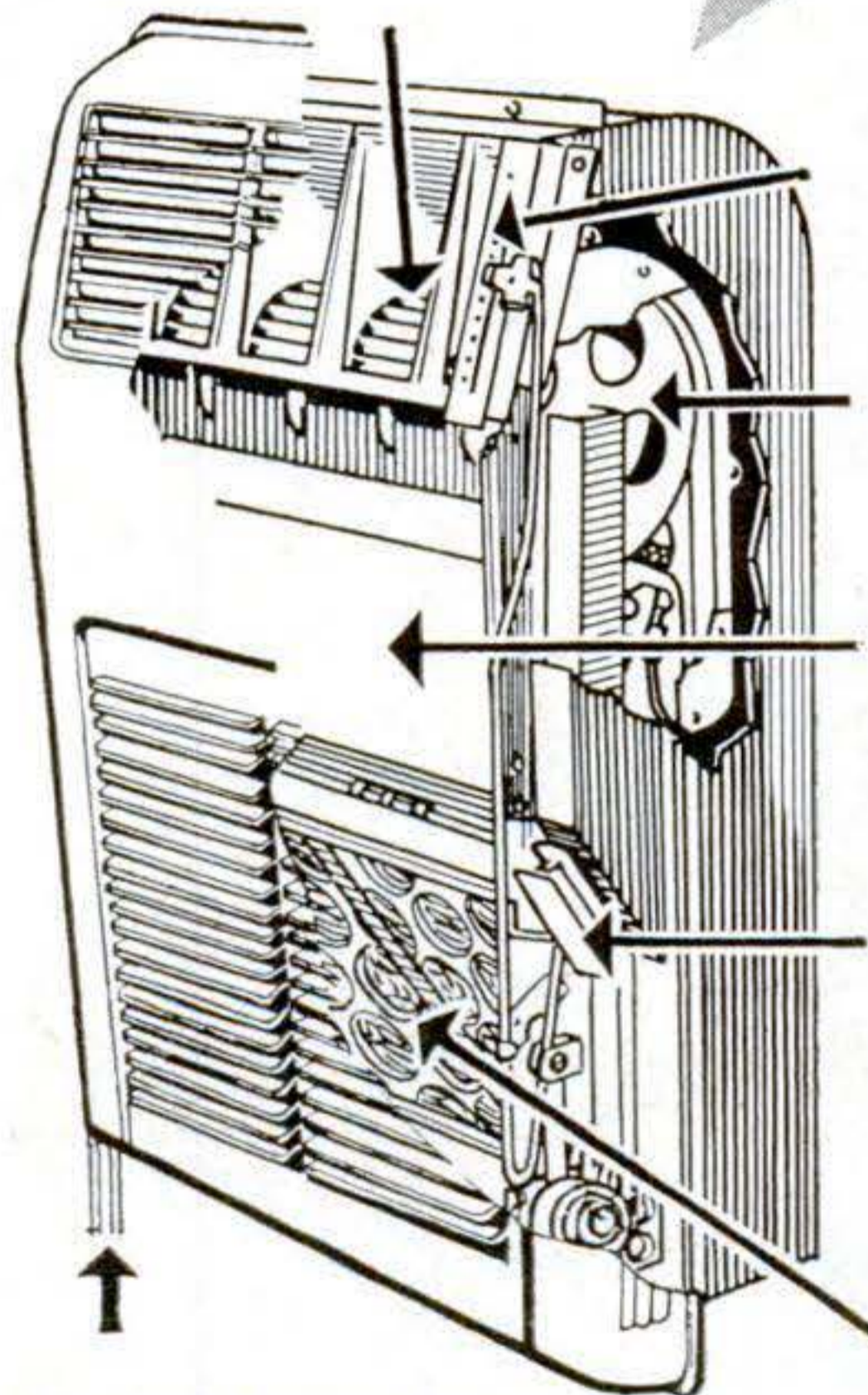
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10 POPULAR SCIENCE



SelecTemp room units, only 18 inches high, are recessed into wall and can be painted to match color scheme. Three sizes: 6,000, 12,000, and 18,000 Btu output.

Air circulating fan continuously draws room air through SelecTemp unit, quietly filters and re-circulates it.



Supply and return lines are of flexible copper tubing, only 1/4 and 1/8 inch, I.D.

Thermostat control lets you choose desired room temperature; any warmth level from 40° to 90°.

Small steam turbine operates air circulating fan faster or slower, as thermostat calls for more or less heat.

Heat transfer core. Efficient copper core heat exchanger converts steam heat to warm air heat.

Air sampling chimney constantly samples temperature of room air.

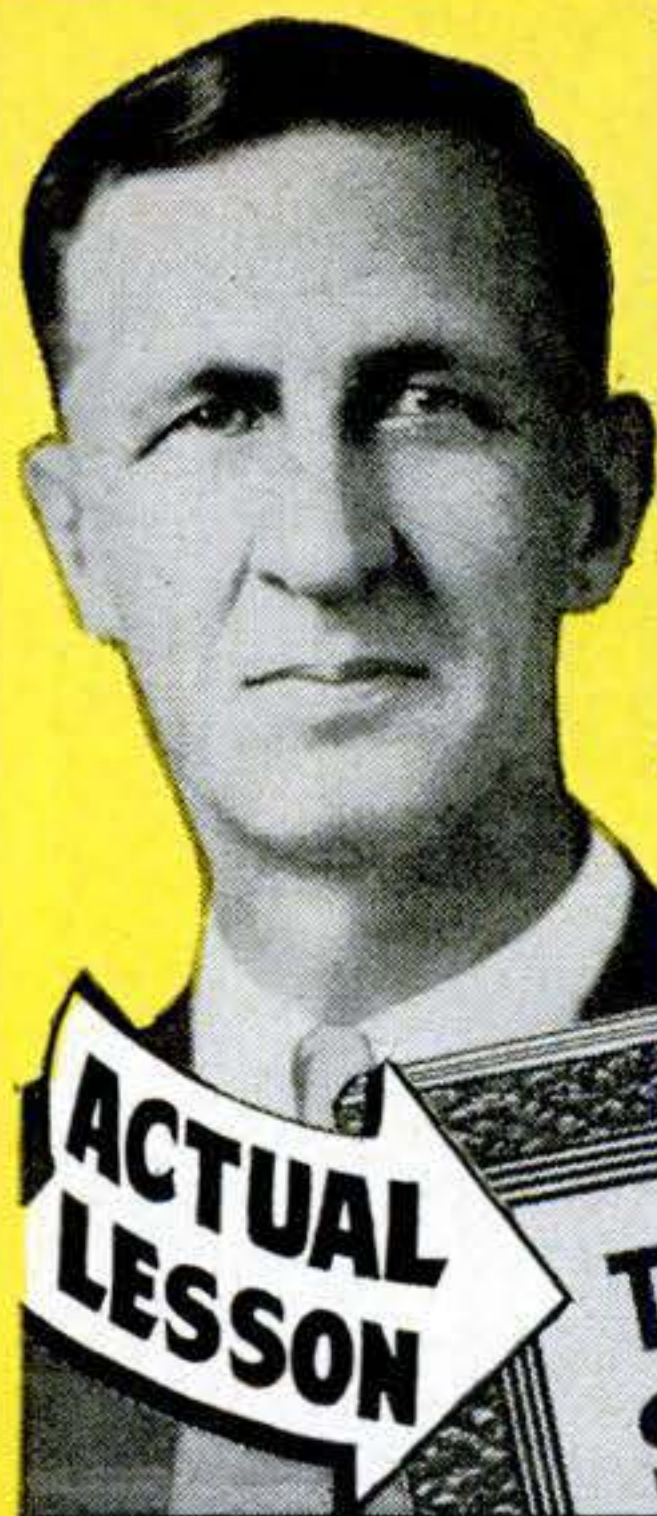
Spun glass filter cleans circulating air; prevents smudged walls and draperies.

IRON FIREMAN®



SelectTemp®

MODULATING ZONE HEATING



I Will Send You BOTH FREE

J. E. SMITH, President
National Radio Institute
Washington 9, D. C.

ACTUAL LESSON

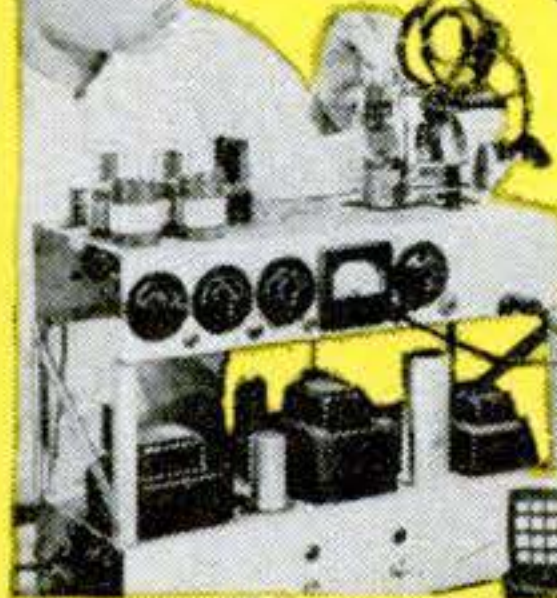
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How to be a SUCCESS in RADIO-TELEVISION

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See How I Train You at Home in Spare Time for Good Pay Jobs in RADIO-TELEVISION

You Practice Broadcasting with Equipment I Send



As part of my Communications Course I send you kits of parts to build the low-power Broadcasting Transmitter shown at left. You use it to get practical experience putting this station "on the air," to perform procedures required of broadcasting station operators. An FCC Commercial Operator's license can be your ticket to a better job and a bright future. My course gives you the training you need to get your license. Mail coupon below. See in my book other valuable equipment you build and keep.

You Practice Servicing with Equipment I Send

Nothing takes the place of PRACTICAL EXPERIENCE. That's why NRI training is based on **EARNING BY DOING**. You use kits of parts I furnish to build many circuits common to both Radio and Television. With my Servicing Course you build the modern receiver shown at right. You also build an Electronic Multitester which you can use to help fix sets while training at home. Many students make \$10, \$15 a week extra fixing neighbors' sets in spare time, starting soon after enrolling. I send you special booklets that show you how to fix sets. Mail coupon for 64-page book and actual Servicing Lesson, both FREE.



TRAINING plus **OPPORTUNITY** is the **PERFECT** combination. The sample lesson I send will prove to you that it is practical to keep your job while **TRAINING** right in your own home for better pay and a brighter future. My 64-page book should convince you that Radio-Television is truly today's field of **OPPORTUNITY**.

TELEVISION MAKING JOBS, PROSPERITY

Radio, even without Television, is bigger than ever. 115 million home and auto Radios create steady demand for service. 3000 Radio stations give interesting, good pay jobs to operators, technicians. **NOW ADD TELEVISION.** 25 million Television homes and the total growing rapidly. 200 Television stations on the air and hundreds more under construction. Color Television soon to be a reality. Government, Aviation, Police, Ship, Micro-wave Relay, Two-way Communications for buses, taxis, trucks, railroads are growing fields providing good jobs for men who know Radio-Television. All this adds up to good pay now, a bright future later for men who qualify.



START SOON TO MAKE \$10, \$15 A WEEK EXTRA


An important benefit of Radio-Television training is that you can start to cash in fast. Many men I train fix neighbors' sets, make extra money, starting soon after they enroll. Multitester built with parts I send helps locate and correct set troubles. Read at left how you build actual equipment that gives you practical experience, brings to life, what you learn from my lessons.





MEN OF ACTION NEEDED MAIL COUPON TODAY


Act now to enjoy more good things of life. Get the benefit of my 40 years' experience training men at home. Take NRI training for as little as \$5 a month. Many NRI graduates (some with only a grammar school education) make more in two weeks than the total cost of training. Find out about this tested way to better pay. Mail coupon below today for Actual Lesson and 64-page Book — **BOTH FREE**. J. E. SMITH, President, National Radio Institute, Dept. 5DB, Washington 9, D. C. **OUR 40TH YEAR.**


I TRAINED THESE MEN AT HOME

 "Started repairing Radios six months after enrolling. Earned \$12 to \$15 a week, spare time." — **ADAM KRAMLIK, JR.**, Sumneytown, Pennsylvania.

 "Am with WCOC. NRI course can't be beat. Passed exam for first class Radiophone license with no trouble at all." — **JESSE W. PARKER**, Meridian, Miss.

 "I've come a long way in Radio and Television since graduating. Have my own business on Main Street." — **JOE TRAVERS**, Asbury Park, New Jersey.

 "Am with WNBT as video control engineer on RCA color project. Owe a lot of my success to your textbooks." — **WARREN DEEM**, Malverne, N. Y.

 "Manager of meat market when I began. Answered ad for Radio serviceman. Got job. Pay increased 50% in year." — **C. CARTER**, San Bernardino, California.

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Mr. J. E. SMITH, President, Dept. 5DB
National Radio Institute, Washington 9, D. C.

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Letters

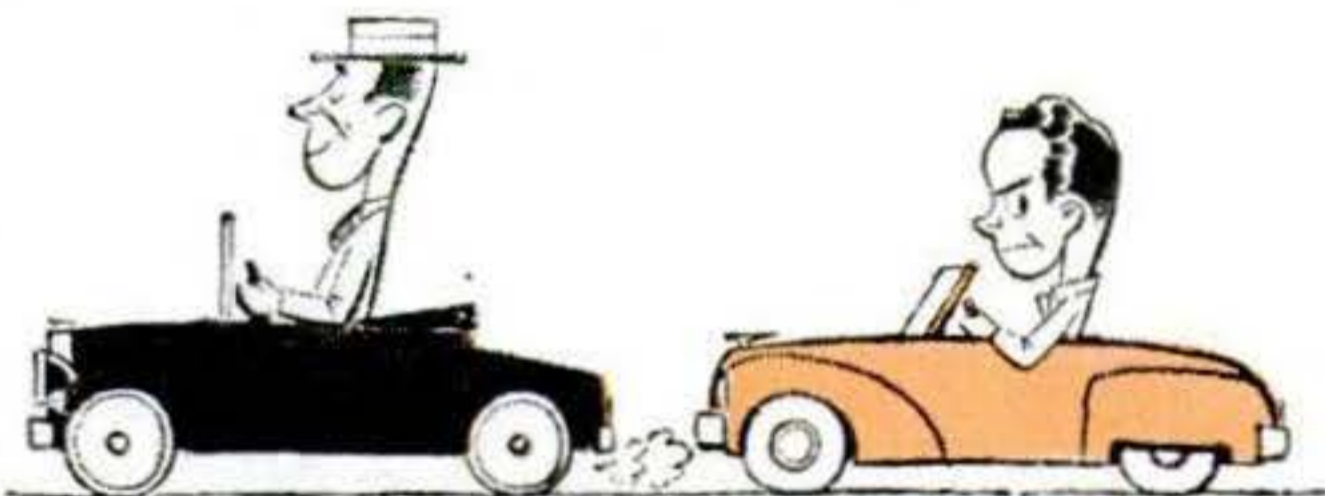


Teen-Agers Are People

I am a teen-ager, and I drive.

In your February issue [p. 216] you show a device intended to limit accelerator pedal travel of a car. The device would be locked in place when a teen-ager is behind the wheel, and would be unlocked for adults.

This is as unsafe a device as I have seen for a long time. There are many times when a little extra torque, obtained by floorboarding the accelerator, can pull you out of a tight situation. What happens if you want to pass another car on a two-lane road? Are you supposed to live in that oncoming traffic lane and endanger your own and other lives? Or are you supposed to crawl behind the



creeper for miles just because you happen to have a few less birthdays under your belt than the next guy? No person, teen-aged or otherwise, should operate any vehicle over which he does not have complete control.

If a parent thinks that his son or daughter can't be trusted with an automobile, then that teen-ager shouldn't be allowed to drive. The parent is not doing his kid any favors by letting him use what amounts to an unsafe auto.

Please stop dividing American drivers into three classes: men (considered great), women (look out), and teen-agers (absolute poison).

EDWIN G. SOLOV, Flushing, N. Y.

Not "Independent" Enough

Between 1946 and 1952 I bought seven cars, the majority of which were "independents." I did this in search of mechanical improvements which I felt would be more

STEP UP YOUR PAY Learn to Fix Appliances

AT HOME IN SPARE TIME

Fast Growing Field for Men Who Know This Profitable Trade

Get into a field where there is important work and the security that comes from knowing a good trade. The electrical appliance repair business offers OPPORTUNITY FOR YOU. Every wired home today has an average of 8 electrical appliances. Up to 10 million new appliances are sold every year. Owners pay well to keep them in repair and enjoy the convenience they provide. Here's your chance to qualify for a better job or be your own boss!

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This course includes the parts to build a portable, sturdy Appliance Tester that helps you locate electrical defects quickly and easily. You use it to learn and do actual electrical and appliance repair jobs. It helps put you in the professional technician's class. Use it to start making money doing repairs soon after beginning the course.



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Start soon to fix electric toasters, clocks, fans, vacuum cleaners, etc., for neighbors and friends. Work in your basement, garage, or spare room. Earn \$3 to \$5 an hour *in your spare time*. See how easy it is to increase your earning power—how you can pay for this training many times over with your spare time earnings.

Train Now for Greater Security Low Price — Easy Terms

The day when the tinkerer could do the job is past. Today's automatic electrical appliances need expert servicing. Start now to learn a good trade like appliance repairing. No need to give up your present job while you train. Only \$2.50 starts you, and you pay only \$5.00 a month. A small price to pay for increased earnings, a more secure future. Mail coupon now.

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APRIL 1955 13

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AGAIN!



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CLEANER and CONDITIONER

A COMPLETE COOLING SYSTEM SERVICE IN ONE PACKAGE!

1. Cleans out rust and scale
2. Dissolves grease and oil
3. Prevents rust from reforming*
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*Exclusive!

Clean out your cooling system this spring the easy all-in-one way with all new Permatex Cooling System Cleaner and Conditioner. Cleans out rust and scale—puts grease and oil in suspension and carries it out—and, as a plus, prevents rust from re-forming and seals all leaks. Two compartment containers with cleaner in top and rust preventative, sealer, and neutralizer in bottom.



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OVER 50 CHEMICAL PRODUCTS FOR BETTER AUTOMOTIVE MAINTENANCE

likely to come from the "underdogs" of the industry.

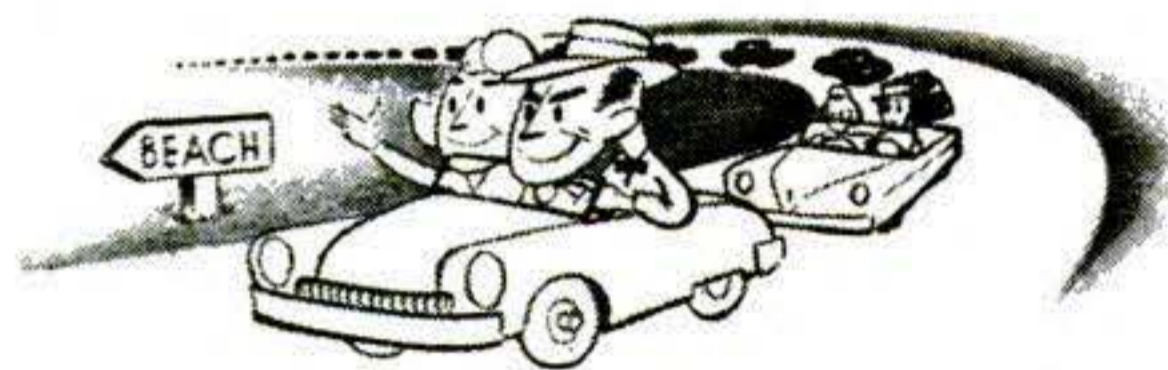
One time in all those years I got partly what I bargained for. As a rule the independents were simply aping the Big Three.

I sincerely feel for the "small" car maker: I am a small businessman myself—really small in comparison to them. But I wonder if these firms deserve to survive if all they can accomplish is to build a car as good—at best—as the Big Three.

ERIC REISFELD, Silver Spring, Md.

A New Calendar? Some Vote "No"

In regard to your article on the new World Calendar [Jan., p. 110], I believe the increase in the number of three-day holiday



weekends would increase traffic accidents. Give the public more long weekends to travel on and we will raise our accident rate. Otherwise the calendar sounds good to me.

JOSEPH A. BOLSTER, S. Easton, Mass.

. . . I should like to voice my objection. This calendar with its roaming religious day would bring hardship to people who are adherents to the seventh day of worship.

HARRY J. FUNK, Collegetown, Pa.

Divide, Don't Multiply

In your December article, "Calipers Give Radius of Segments" [p. 222], you incorrectly state "Read the caliper and divide the reading by half." Dividing "by half" would actually multiply the number by two. Your statement should read "divide in half" or "divide by two."

A. E. CLARO, Norwalk, Conn.

Sky Show Enrolls PSM Picture

Could you, please, satisfy a PSM fan's curiosity?

A striking color picture of the sun as it appears to radio telescopes was projected recently at the Hayden Planetarium. It looked like the illustration in your July 1954 issue, accompanying a British scientist's article on radio astronomy [pp. 80-81]. Did the Planetarium use your picture?

GEORGE HARRINGTON, NYC

Yes. This picture was the work of a POPULAR SCIENCE MONTHLY artist, from

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

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APRIL 1955 15

editorial-staff sketches, and we feel complimented by its use in one of the Hayden Planetarium's renowned sky shows.

No Time to Lose

Please return my Geiger counter to me as soon as you have obtained your photographs. There have been new uranium finds near here.

EDWARD J. GAUSS
University of Colorado, Boulder, Col.

The article describing Mr. Gauss's Geiger counter appears on p. 231 of this issue.

Lincoln Hesitated Too Long

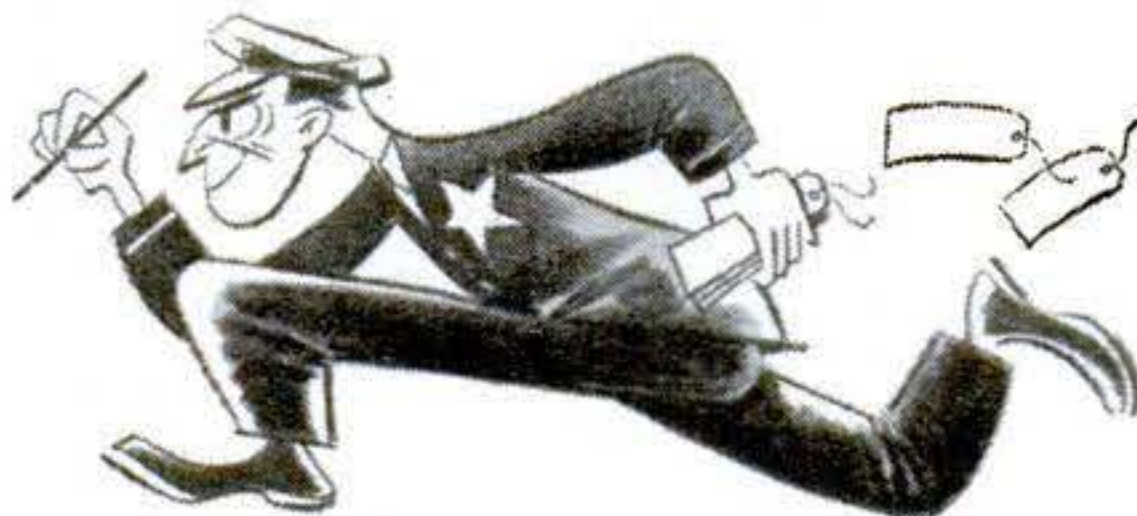
Pardon my curiosity, but will someone kindly tell me why Henry Ford installed wrap-arounds in most of his '55s but left his pride and joy, the Lincoln, with last year's curved windshield [Dec. '54, p. 135]?

L. A. HEIDE, LeRoy, Sask.

The sheet-metal die shops in the Detroit area were overloaded with work for a year prior to the announcements of the '55 cars. Lincoln delayed a decision on the kind of wrap-around it wanted until the die shops were too busy to handle Lincoln's order.

Old Idea from the Inventors

That long-handled tire marker for motorcycle cops checking on parked cars ["New Ideas from the Inventors," Feb., p. 147] may be new to you, but it's old stuff to Salt Lake City policemen. They have been using it for years. When it comes to handing out



traffic tickets Salt Lake City policemen are always first with the fastest.

REID E. BUSHMAN, Salt Lake City

Only the Timing Was Wrong

Did Devon Francis make a mistake on the horsepower ratings of the Cadillac [Dec. '54, p. 135]? I have a Cadillac booklet that states that the regular Caddy has 250 hp. and the Eldorado 270. Who is right?

JERRY BROCATO, Pensacola, Fla.

Oddly enough, both. At the time PSM went to press, Cadillac was figuring on 240

"No grizzly-bear hair for me! I keep my hair neat all day the new greaseless way"



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ANOTHER FINE PRODUCT OF BRISTOL-MYERS

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

McMORROW, BERMAN & DAVIDSON

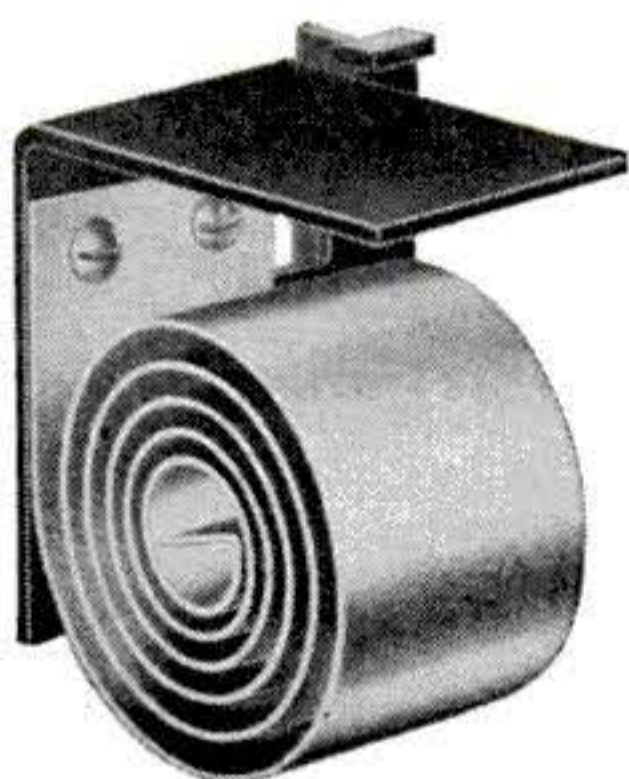
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Here's how it works:



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For complete information on how Perfection with Regulaire delivers *full time* comfort, write for free booklet, "If It's Comfort You Want". Perfection Stove Company, 7638-B Platt Avenue, Cleveland 4, Ohio. *Pat. pending

YOUR HOME DESERVES
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AUTOMATIC HEATING

hp. for the standard job and 265 for the optional engine in the Eldorado convertible. Both were hiked at the last minute before they were shown to the public.

He Catches Catfish, No Doubt

A friend of mine, a successful salt-water fisherman, attributes his luck to a trick way of using "chum." He takes a can of cat food, punches it full of small holes and tows it



behind his boat. The fish are attracted to the cat food, he claims, and get caught on his baited hooks.

R. M. WOODBURY, Natick, Mass.

Carrier Planes in the Air Force?

In "How to Make a Jig-Jet Puzzle" [Jan., p. 207] you mentioned the Panther jet plane, and in front of it was the term "Air Force." I've always been under the impression that only the Navy used the Panther.

WALTER COHEN, Patchogue, N. Y.

Right. It's a carrier-based Grumman fighter.

They Already Make 'Em

In your page, "I'd Like to See Them Make" [Dec. '54, p. 149], Mr. R. R. Rundell, Miami, asked for "A special shank, one end shaped to fit bit braces, the other square to take sockets." For more than a year we have been manufacturing this item.

J. A. GARDNER, President
Cincinnati Tool Co., Cincinnati

Dazzling Burst of Speed

You state that the Olds digs from 0 to 60 in 10.8 seconds [Dec. '54, p. 124] and you award it the "take-off title." Last year's Buick Century got there in 10.6 with no alterations on the transmission, and certainly the '55 can burn faster than a '54. What about it?

WILLIAM G. KYLE, New Orleans

That take-off you report must have been the record of the century, if you'll pardon the pun. The best that the Century could do on the POPULAR SCIENCE stop watch was 12.3 seconds, 0 to 60.

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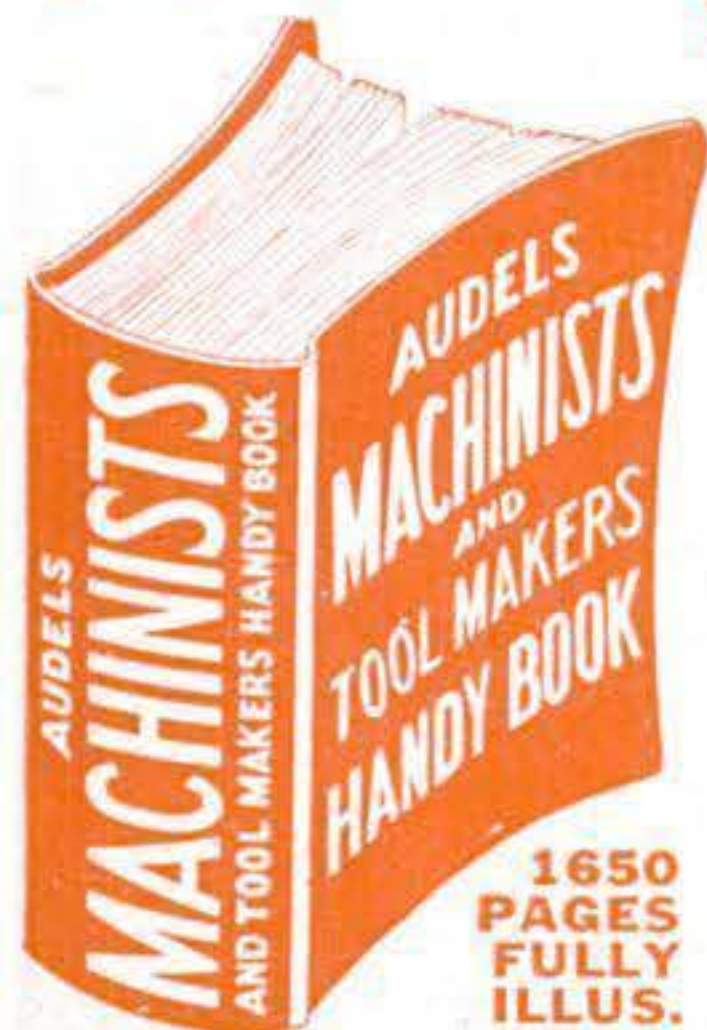
How to use the steel square—How to file and set saws—How to build furniture—How to use a mitre box—How to use the chalk line—How to use rules and scales—How to make joints—Carpenters arithmetic—Solving mensuration problems—Estimating strength of timbers—How to set girders and sills—How to frame houses and roofs—How to estimate costs—How to build houses, barns, garages, bungalows, etc.—How to read and draw plans—Drawing up specifications—How to excavate—How to use settings 12, 13 and 17 on the steel square—How to build hoists and scaffolds—skylights—How to build stairs—How to put on interior trim—How to hang doors—How to lath—lay floors—How to paint.



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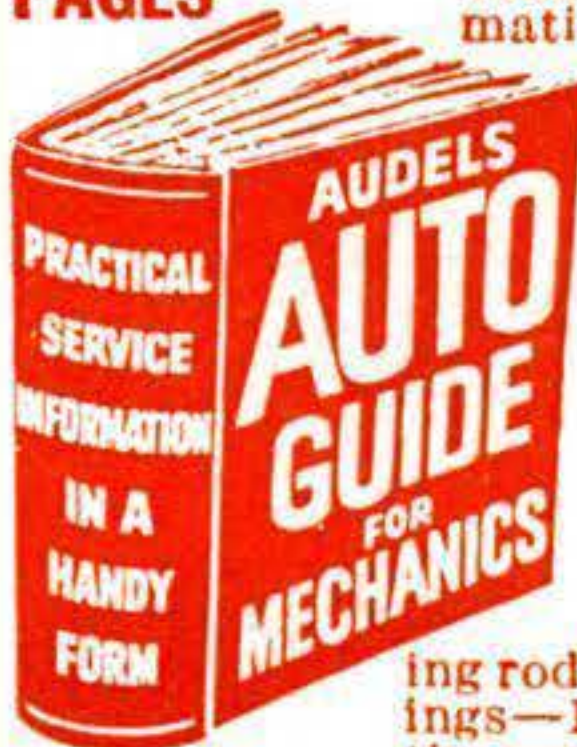


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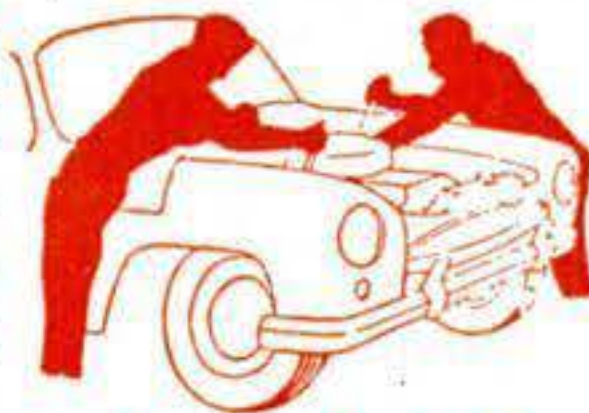
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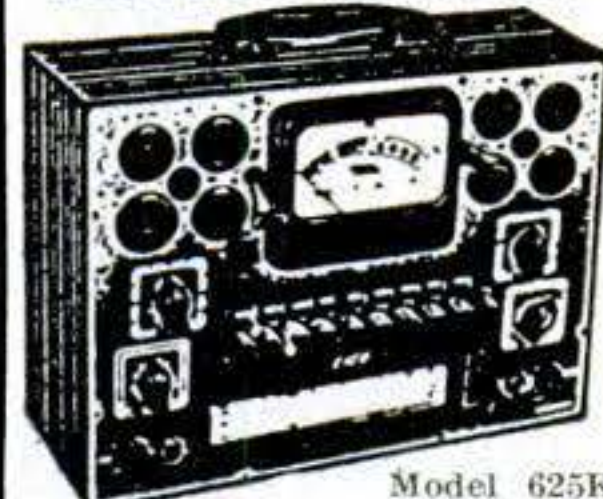
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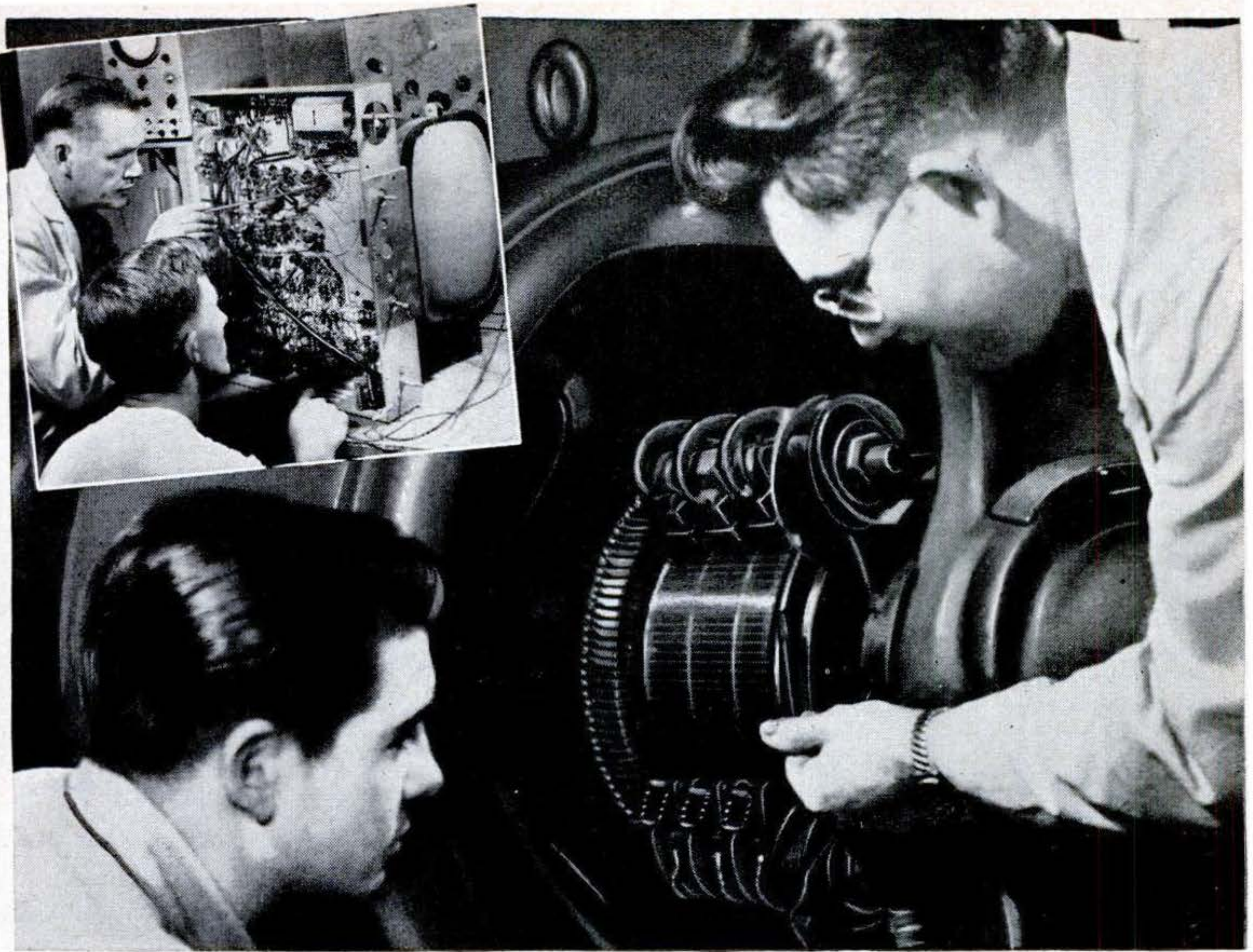
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Why you should clean your car's cooling system NOW

YOUR car's radiator and cooling system need a good cleaning twice a year—and Spring is one of the best times to do this job. That's because you probably still have your winter anti-freeze in, and automotive engineers agree that anti-freeze should be drained when Winter's over.

Here's why: Anti-Freeze, while very valuable in the winter, does not have as effective heat transfer properties as water. It makes your engine run hotter, especially in the Spring and Summer, and has the effect of cutting up to 6 points from the octane rating of your gasoline. And this reduction in octane rating can mean the equivalent of a loss of 1½ gallons of premium gasoline in every tankful!

What goes on inside?

Ideally, your cooling system is a closed or sealed system. Exhaust gases, however, often get into the coolant, forming acids that corrode metal parts. Rust and scale also form due to the natural characteristics of water. And although your anti-freeze may be permanent, the rust inhibitor in it is not! So you have the second problem: you must take steps to clean out old rust, scale and grease, and keep them from forming in the future.

What can you do about it?

Here's what the Society of Automotive Engineers recommends, "Where anti-freeze has been used, drain the solution in the spring; flush the system thoroughly and clean if necessary; then install a fresh filling of summer rust inhibitor and water."

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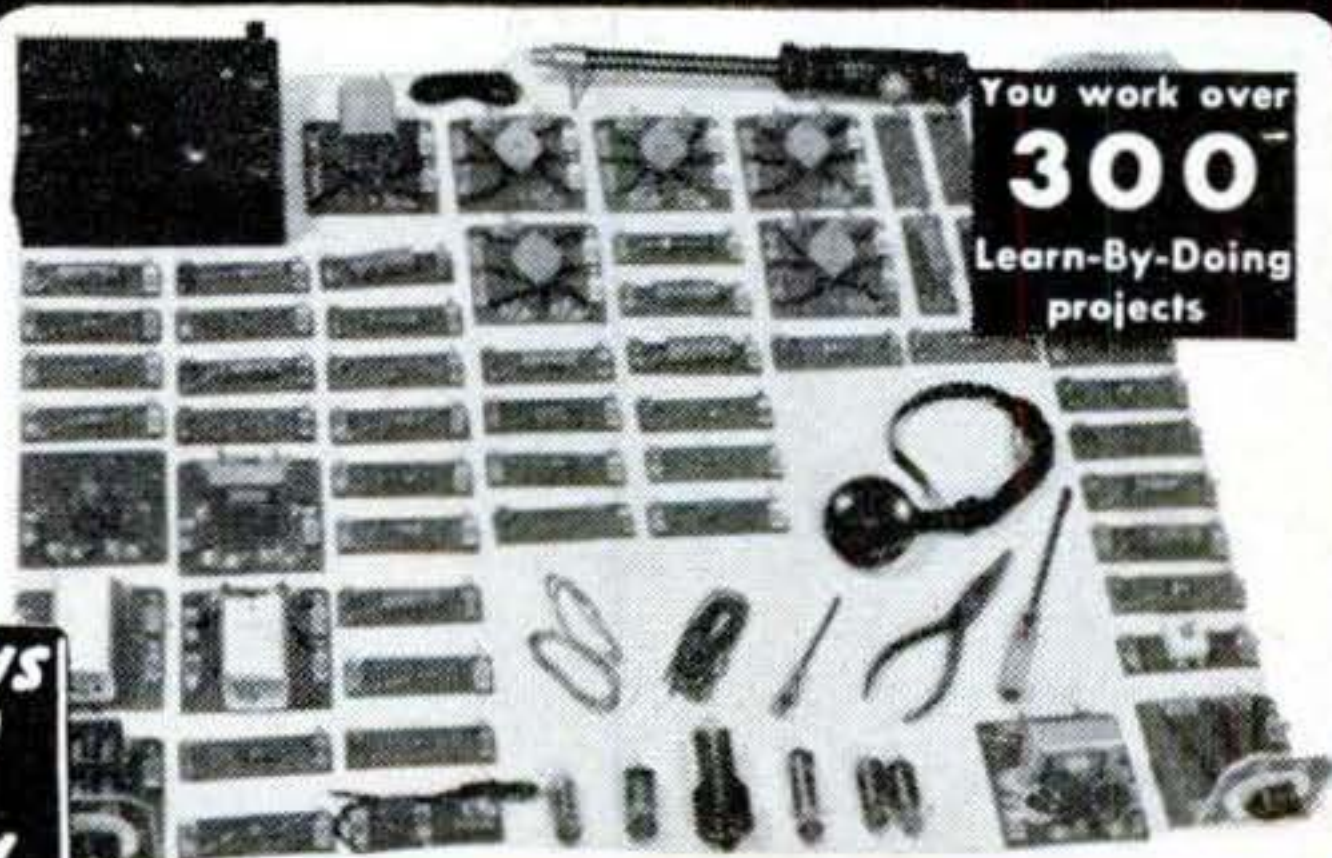
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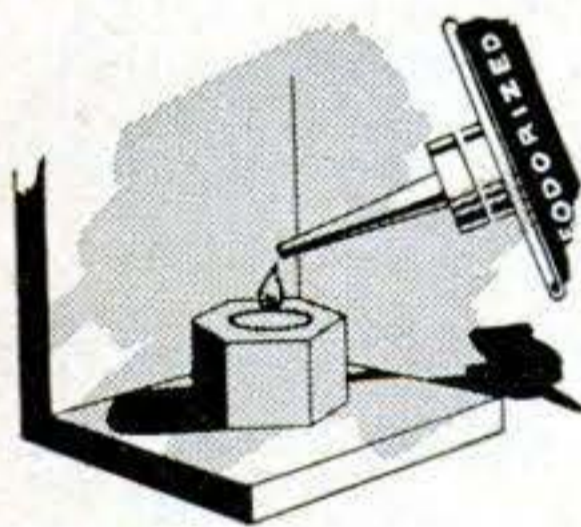
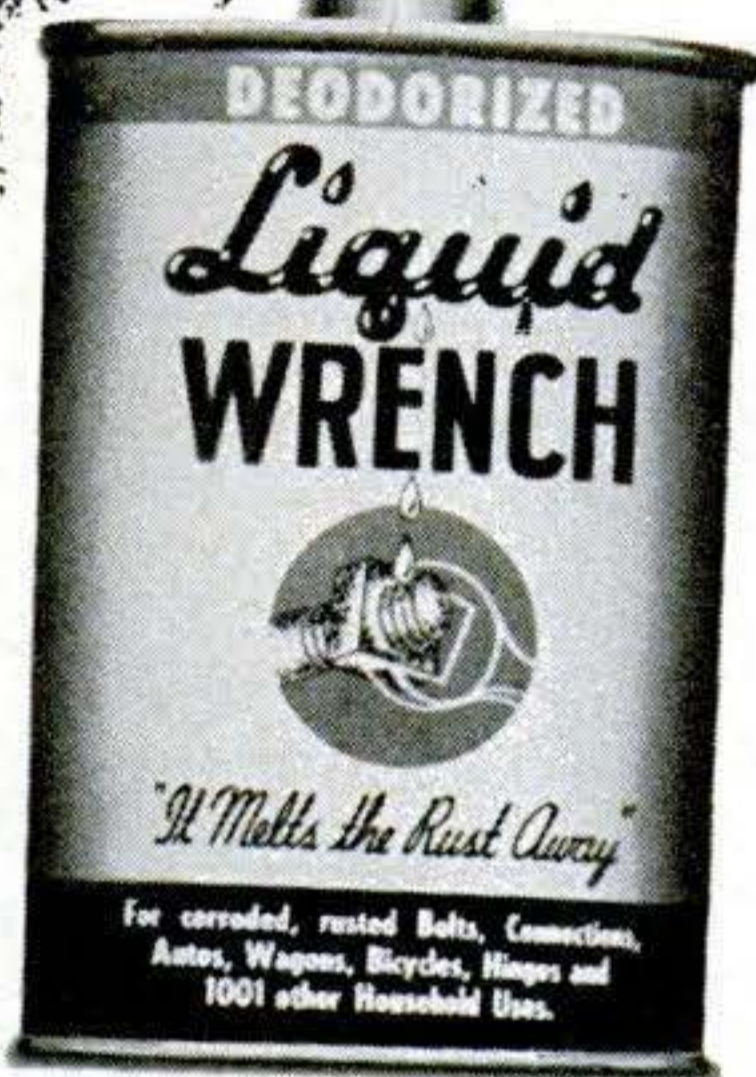
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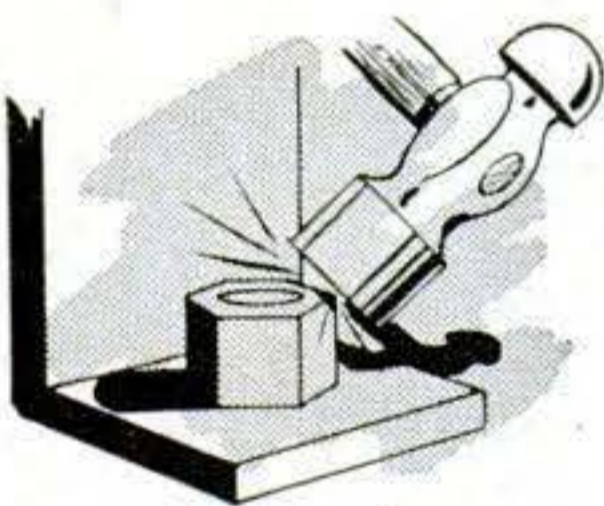
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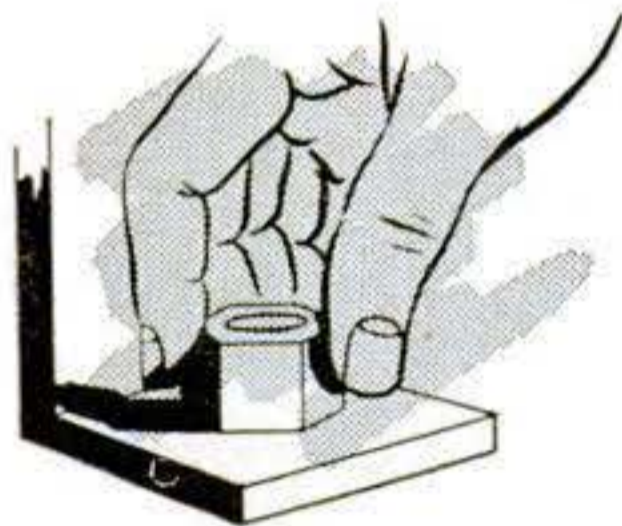


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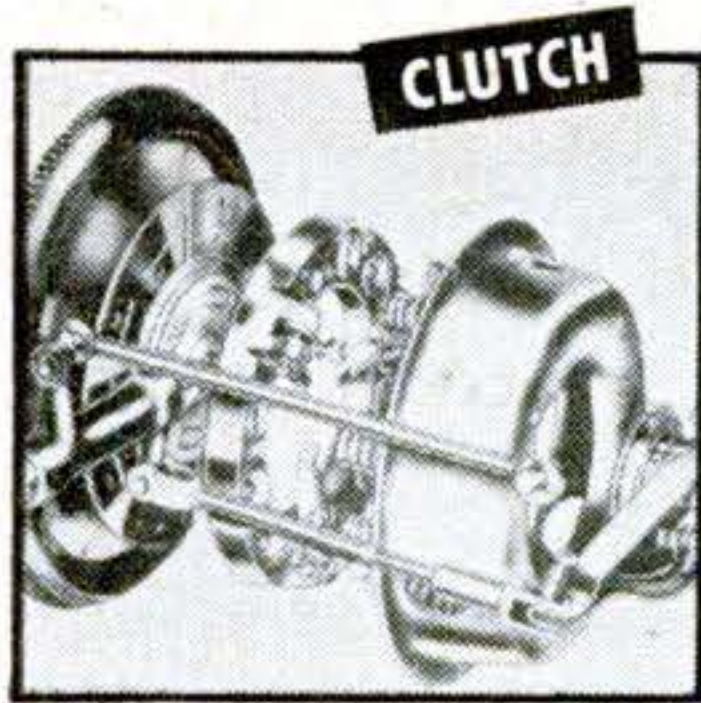
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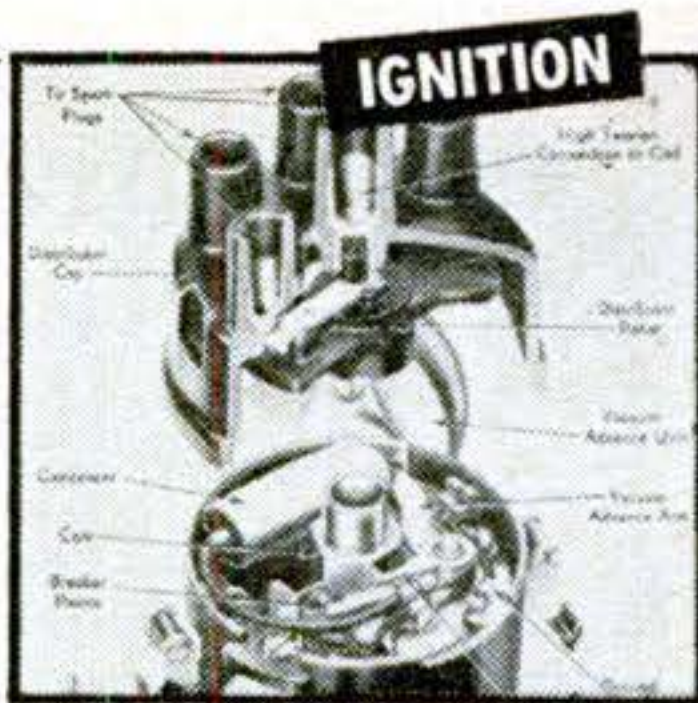
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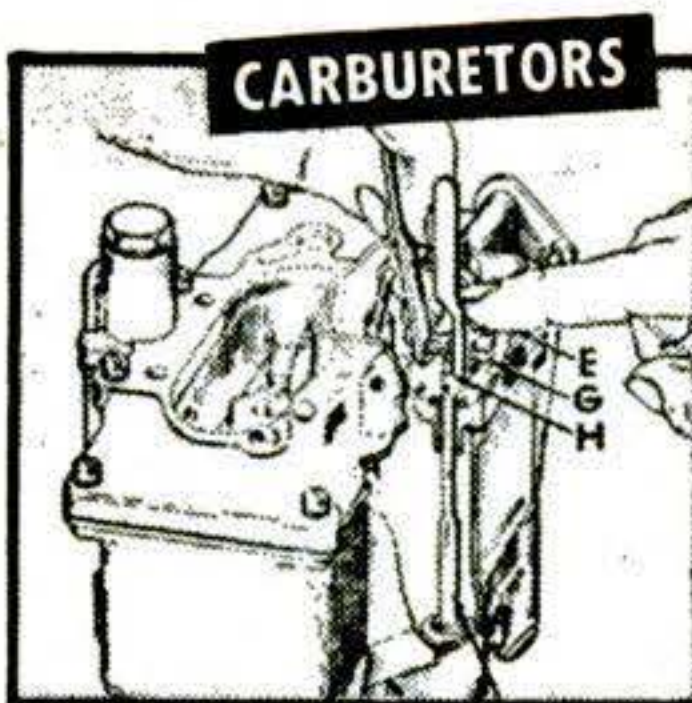




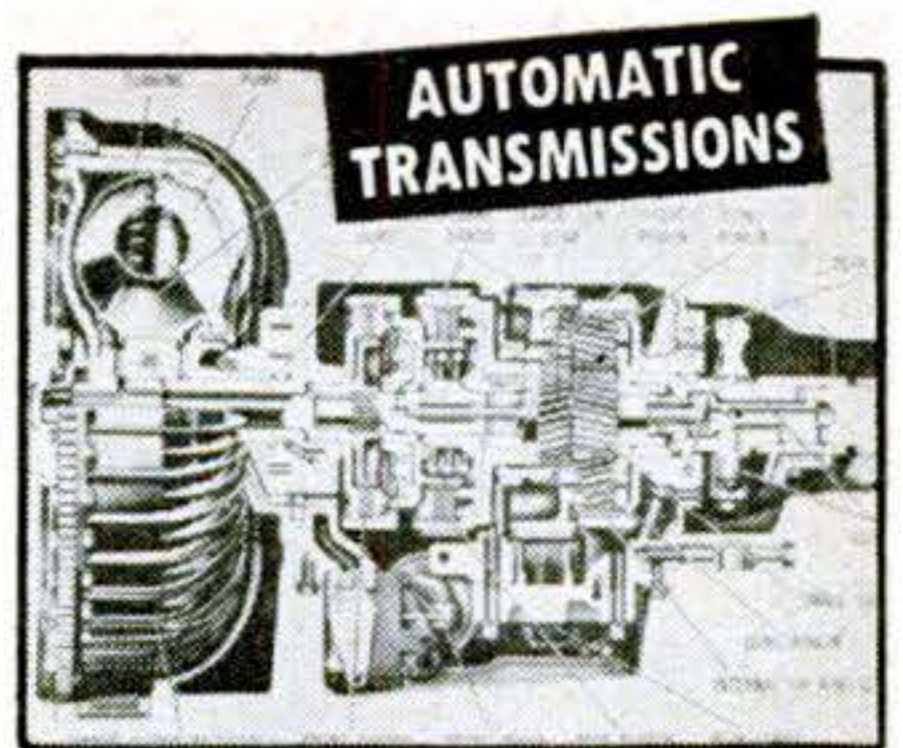
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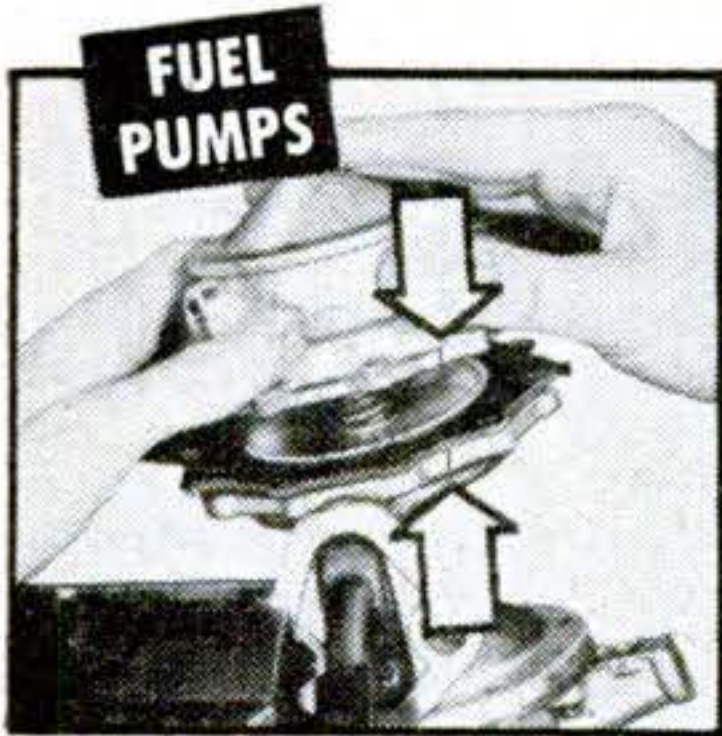
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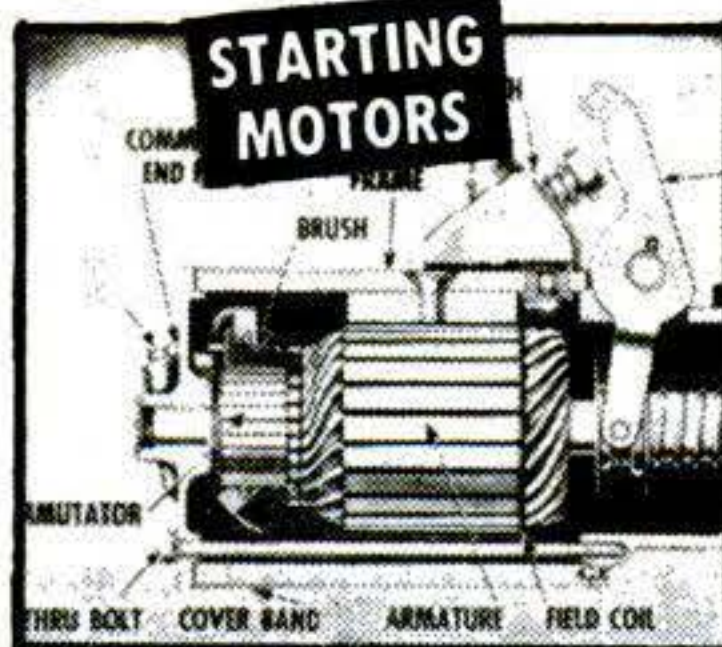
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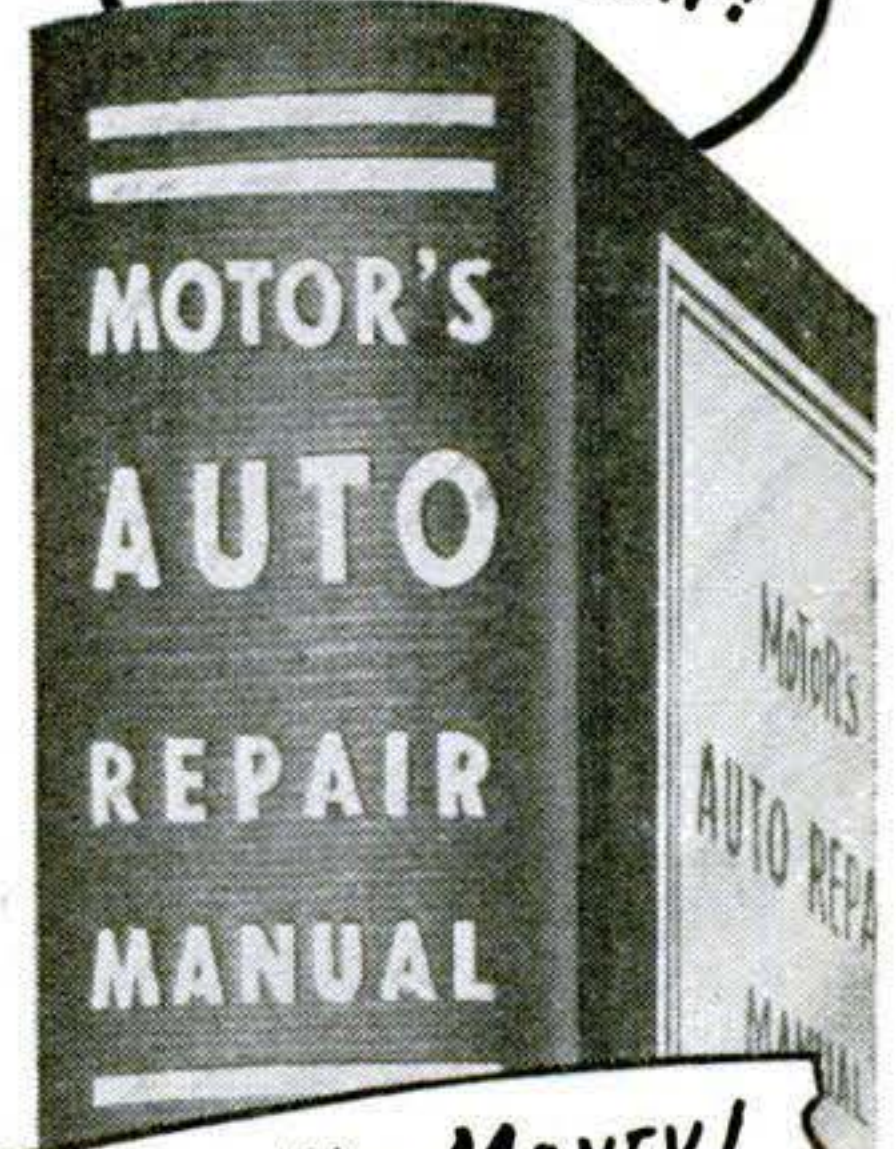
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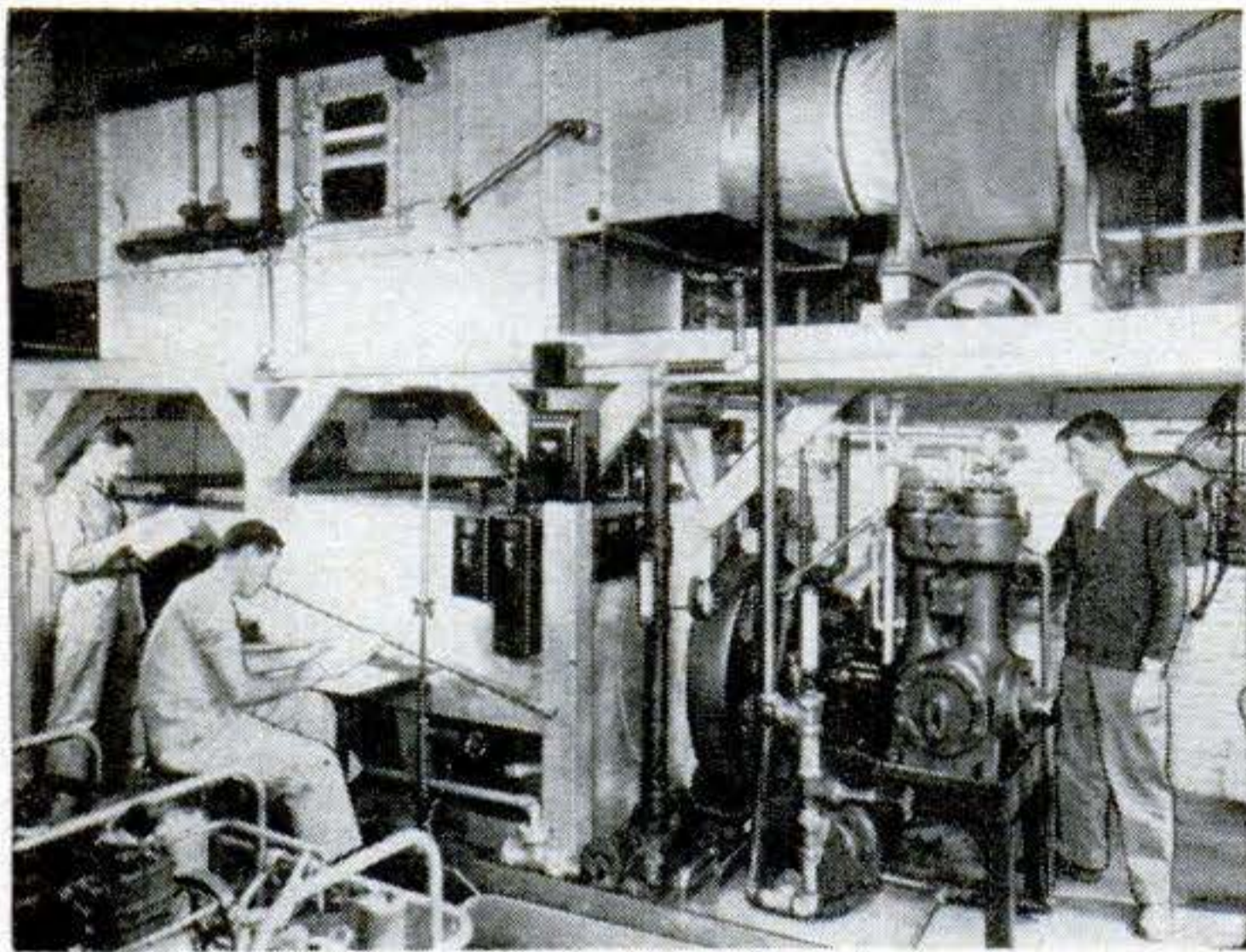
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- NEW Phono records, 78 & 45 r.p.m., 7¢ each!
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- New 20" T.V. Pic. tubes, \$21.95 each!
- Famous brand \$18.75 perfume, \$1. each!
- 49¢ Xmas window decorations, 10¢ per set!
- \$1-\$3 Hard cover books, 20¢ each!
- \$200.00 Surplus typewriters, \$23.00 each!
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- \$1.95 Men's Silk Ties, 12½¢ each!
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- \$15.00 Electric Percolators, \$5.00 each!
- \$1.75 Rudolph Reindeer kiddies toiletry sets, 35¢ each!
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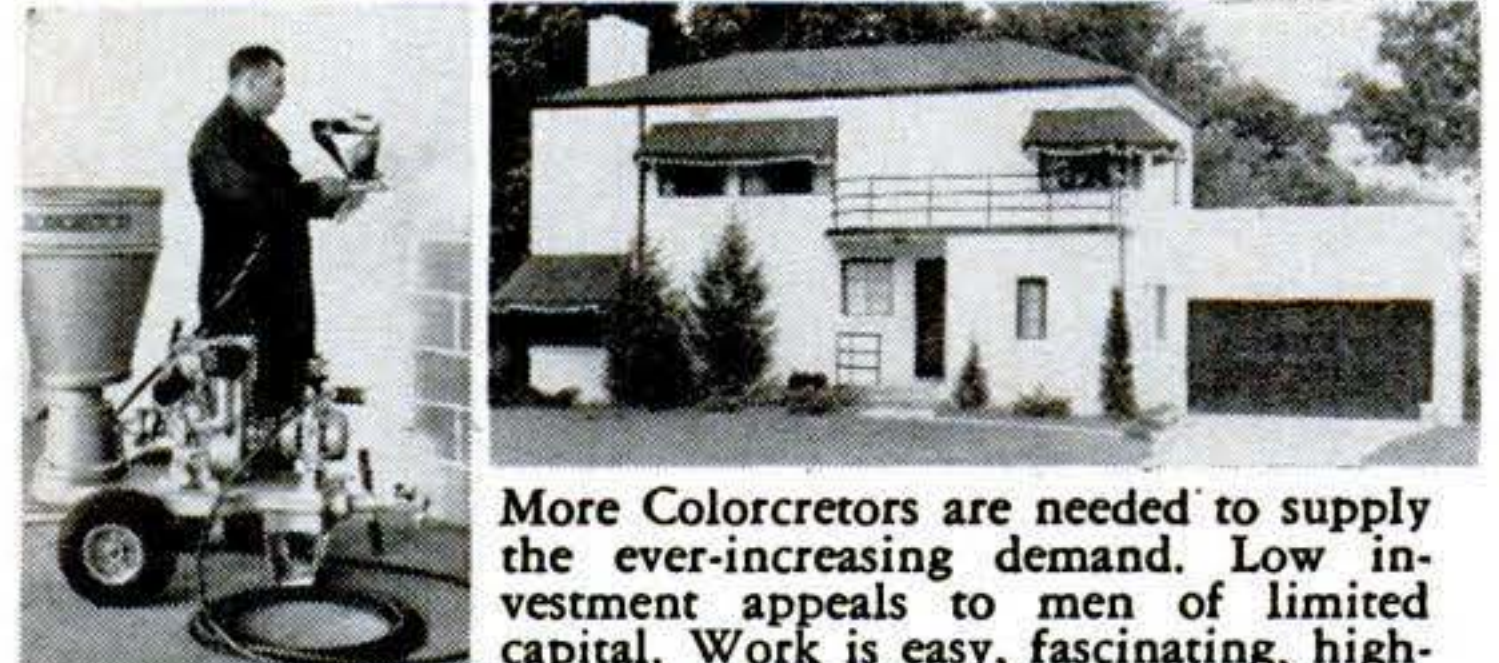
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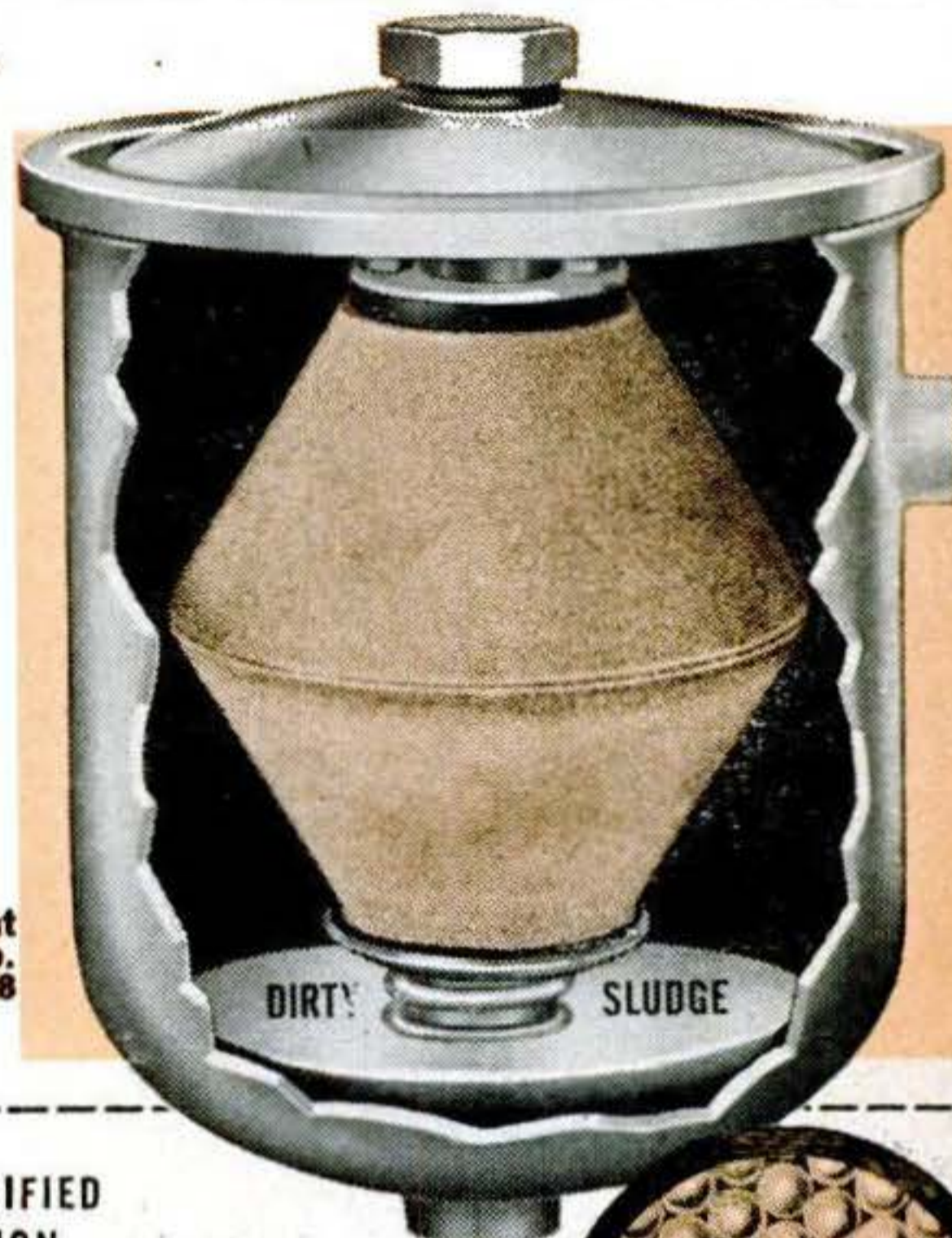
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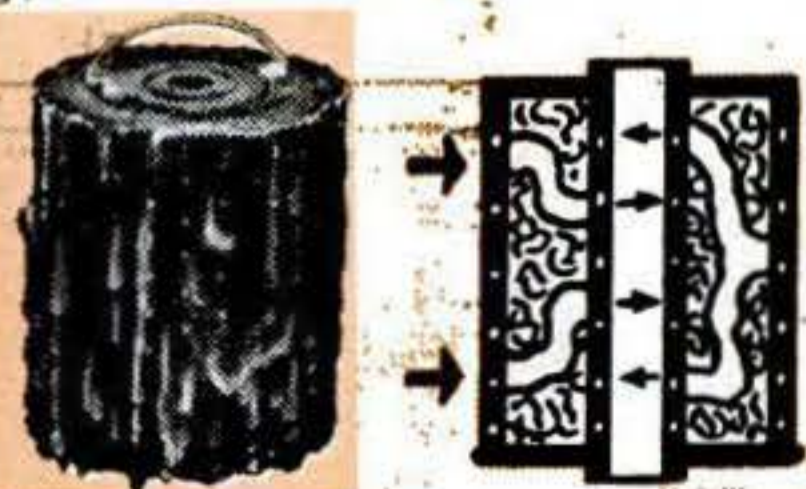
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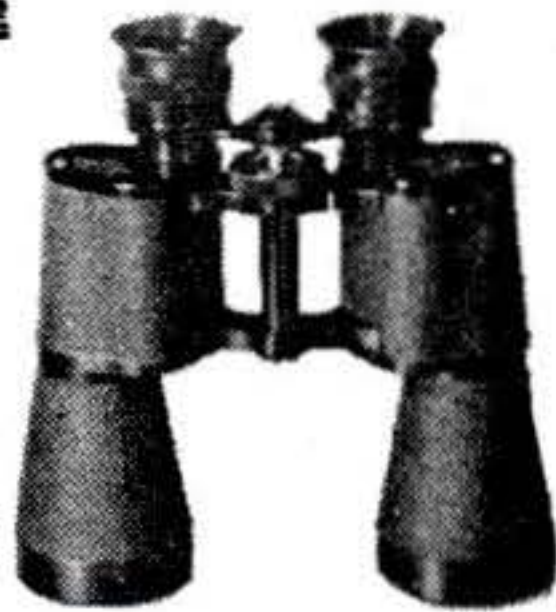
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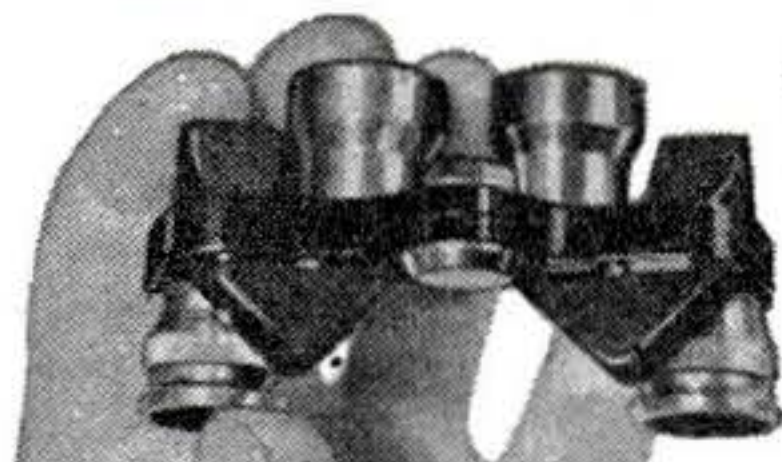
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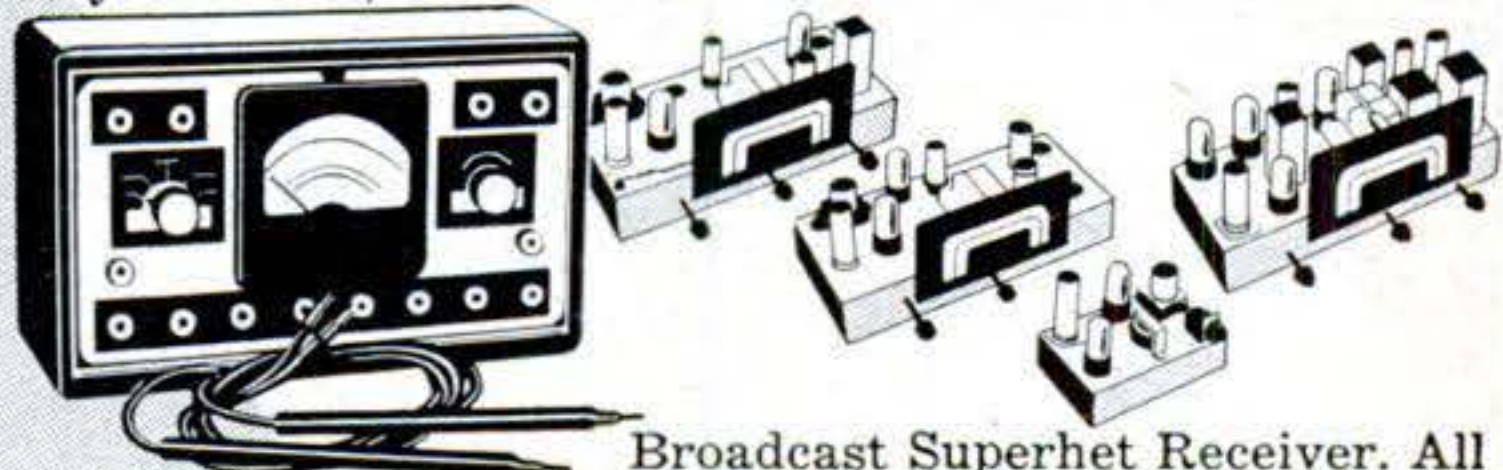
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Power Test

W Life-Time 17 Pt. Spark Plug

FULL THROTTLE OPERATION AT -	LIFE-TIME		CONVENTIONAL	
	BEFORE SERVICE	AFTER SERVICE	BEFORE SERVICE	AFTER SERVICE
1000 R.P.M.	64	72	12.2	12.4
2000 R.P.M.	65	67	11.5	11.9

Above comparison made between LIFE-TIME and conventional 2-point spark plug.

Recommendations

Right horsepower increase, 10% fuel improvement noted with LIFE-TIME spark plug. No other engine adjustments made in conducting above test.

TESTED BY *James G. ...*

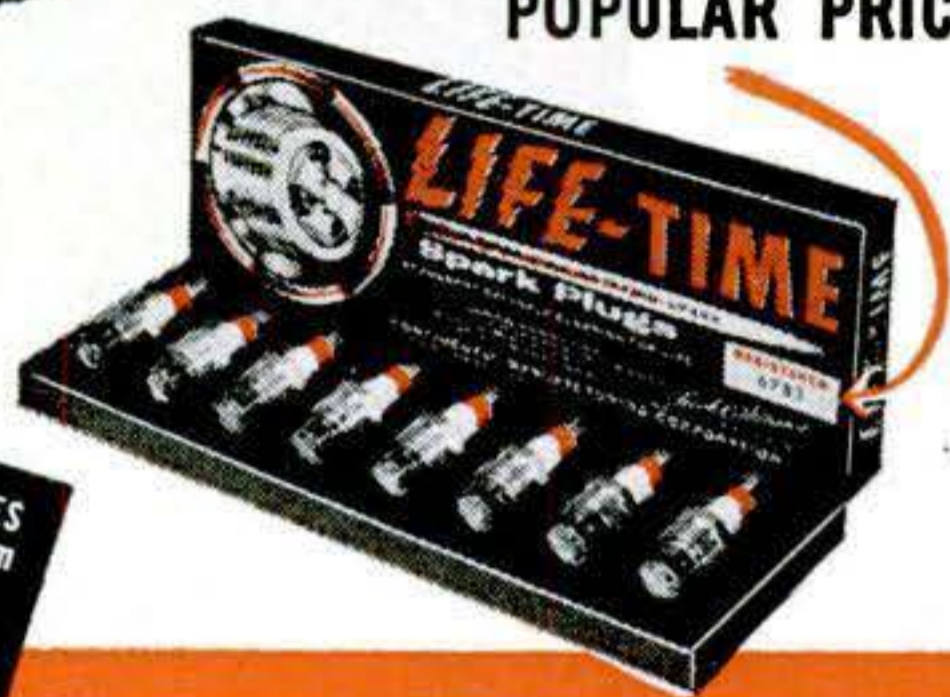
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IN A TEST that echoed through the farthest corners of the automotive world, this LIFE-TIME Spark Plug still fired clean, hot and steady at 50,000 CAR-MILES!

SPECIAL SINTERED CORUNDUM INSULATOR—Made of gem-like mineral which conducts heat 20 times better than ordinary porcelain. Special shape is designed to vaporize and exhaust wet carbon and oil.

NOW... ORDER REGISTERED SET FOR YOUR CAR AT POPULAR PRICE



PERMANENT GAP—After months of use LIFE-TIME Spark Plugs mike at exact factory pre-gap. The new design improves slow speed and idling performance.

SELF-CLEANING FOR LIFE—Confined gasses exploding in chamber formed by multiple electrodes reclean arcing surfaces with each firing stroke.

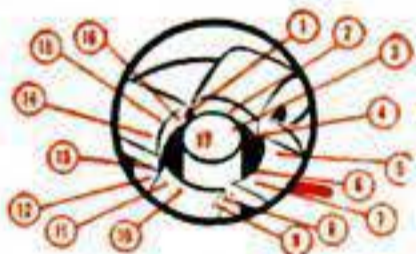
PLATONIUM-NICKEL ALLOY ELECTRODES—Metallurgists' first major step beyond platinum aircraft plug electrodes. Arcing points of this material have continued to function after the equivalent of 120,000 car-miles.

ELECTRODE RESEARCH, it can now be definitely stated, has probed far into one of the last remaining frontiers of knowledge about the internal combustion engine. Before LIFE-TIME development the spark plug was the most often replaced part of your car. In building the LIFE-TIME Spark Plug's radically advanced electrode design, our engineers knew, from periodic tests that we were on the track of something that would greatly increase plug life. We also suspected that electrode design could actually increase the horsepower of an engine.

HOW PLUGS CAN CAUSE POWER LOSS: Most engineers agree "creeping paralysis," gradual electrode disintegration, carbon build-up, gradually widening gap, all cause premature firing, misfiring and power loss — enough in many cases to waste one gallon in every ten you buy. But there were and are some fine engineering minds who feel that certain conditions of pressure and turbulence within the cylinder cause misfiring even with new conventional plugs.

It was this "suspicion" that clinched Continental Manufacturing Corp. executives' decision to gamble the necessary money and years of time. The end product of this decision is now in mass production, available for your automobile — an amazing spark plug that has — by test — fired clean for 50,000 miles and increased the horsepower of a familiar American car by 12½ per cent at 2,000 RPM.

HOW 17 PT. FIRING WORKS. Note LIFE-TIME's electrode design closely. A circular arcing area consisting of four concave segments. Distance (gap) to center electrode being the same from all points. Electricity has property of arcing from coldest point. Current also arcs more readily from the apex of two planes than from the face of a flat, metallic surface. Note that there are 16 apexes (places where two planes meet) on the outer electrode system — all the same distance from the center electrode. Normal heat and spark erosion are spread



around the entire 360 degrees and around the whole circumference of center electrode.

FULL ROTATING SPARK allows overall cooler electrode temperature for greatly increased life. Also allows a hotter spark to prevent fouling yet the rotating and cooling effect minimizes the common faults of burning, erosion, blistering and resultant insulator failure. Compare this principle with the conventional 2-point spark plug design. Most spectacular spark plug research breakthrough in 50 years allows us to include this unique and unprecedented warranty with every set of LIFE-TIME Spark Plugs. **WE GUARANTEE GREATER GAS MILEAGE — GREATER ACCELERATION — A MAJOR POWER INCREASE — OR YOUR MONEY BACK.**

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DEAR CAR OWNER: The company has finally gotten this plug out of the race, test and economy-run class and made it available for your car at your price. And believe me, it is all we expected. Everyone knows how to make a miles per gallon test and it is an eye-opener with LIFE-TIME plugs, but here is a way you can make a test 15 minutes after you receive your set. Set the brake and block or jack up the rear end. Engage shift in high and shim accelerator pedal with a stop somewhere in the 25-45 MPH range. Take MPH reading with old plugs and then with new LIFE-TIME plugs at same stop. I figure you will show from 3 to 10 MPH increase.



Frank E. Williams
FRANK E. WILLIAMS, M.E.
Inventor of LIFE-TIME Spark Plugs

Many thanks!

LIFE-TIME Spark Plug Division, CONTINENTAL MANUFACTURING CORP.
Washington Blvd. at Motor Ave., Culver City 19, California

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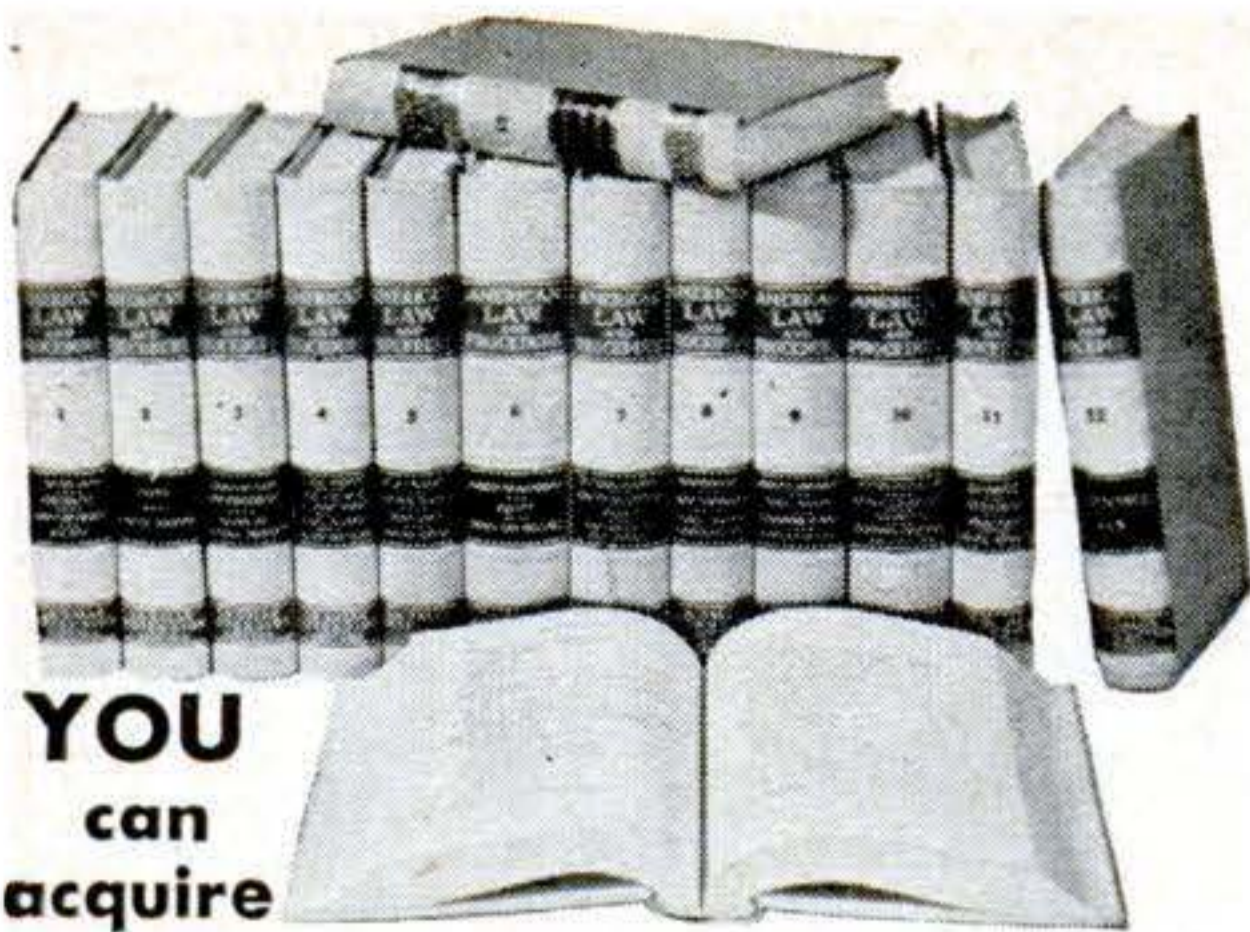
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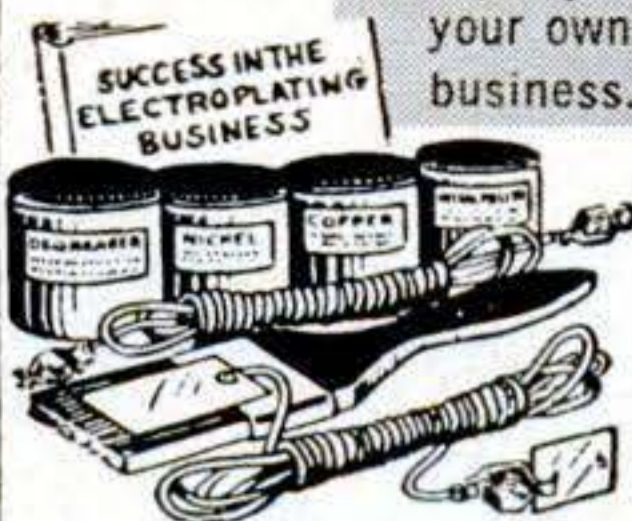
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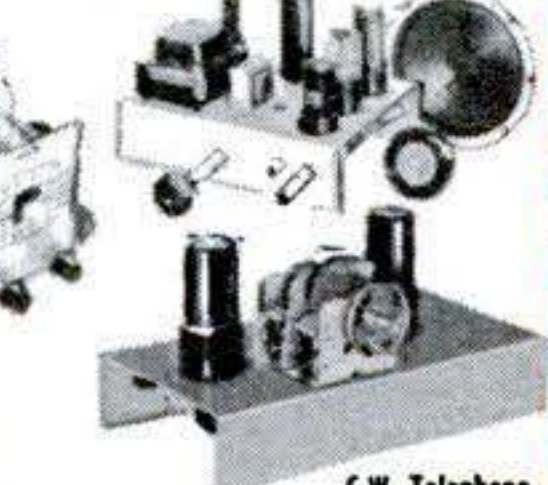
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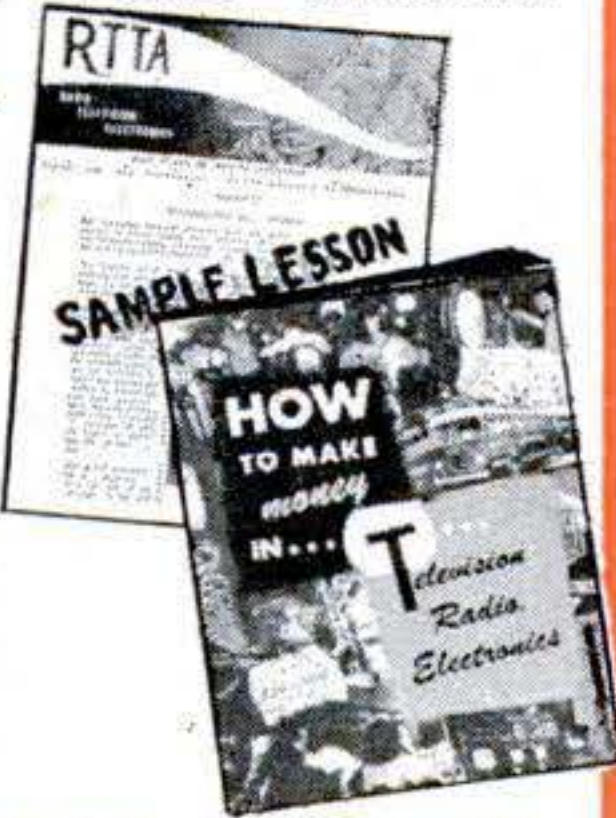
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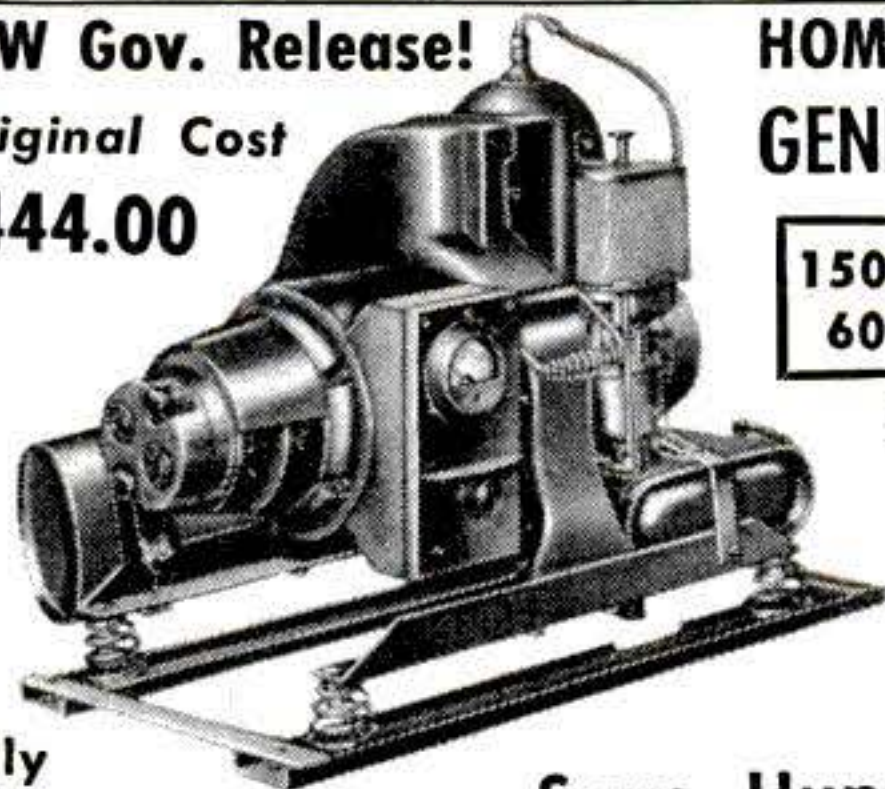
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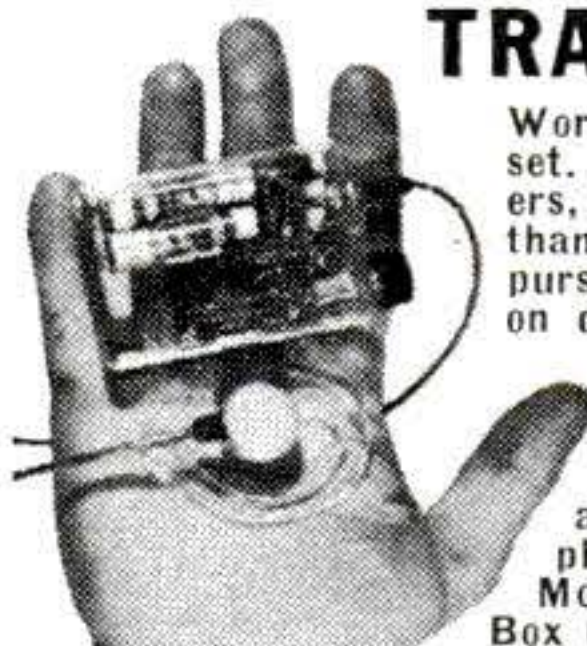
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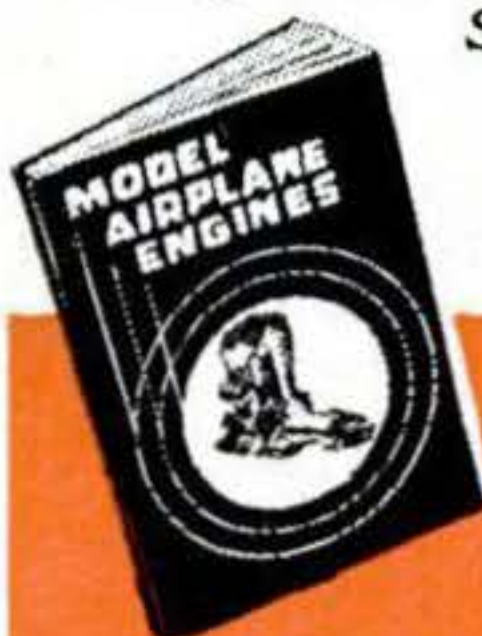
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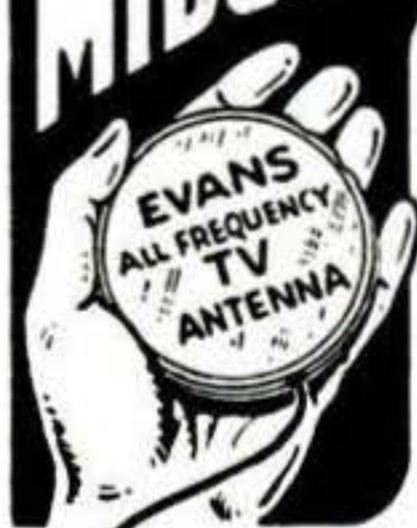
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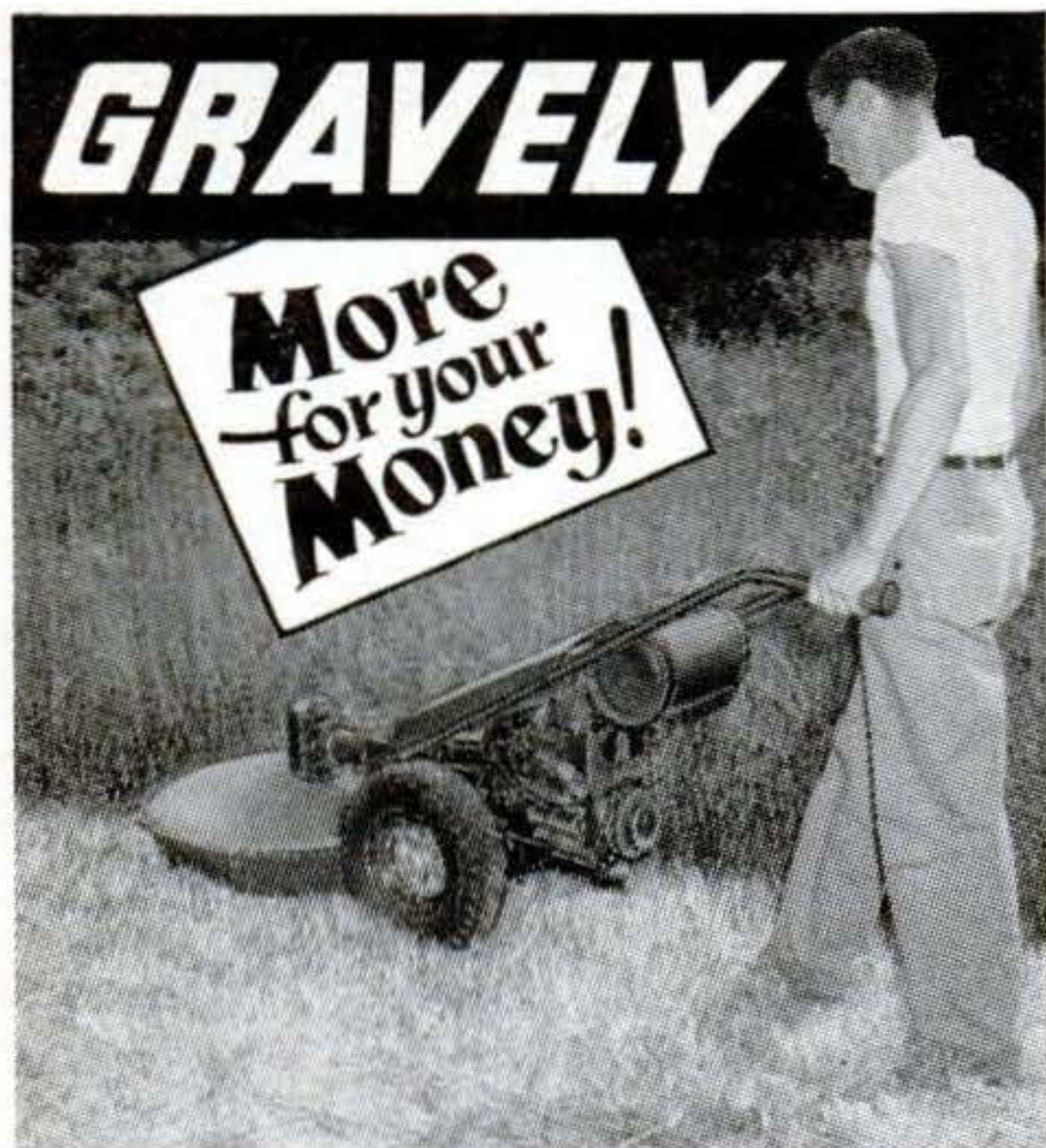
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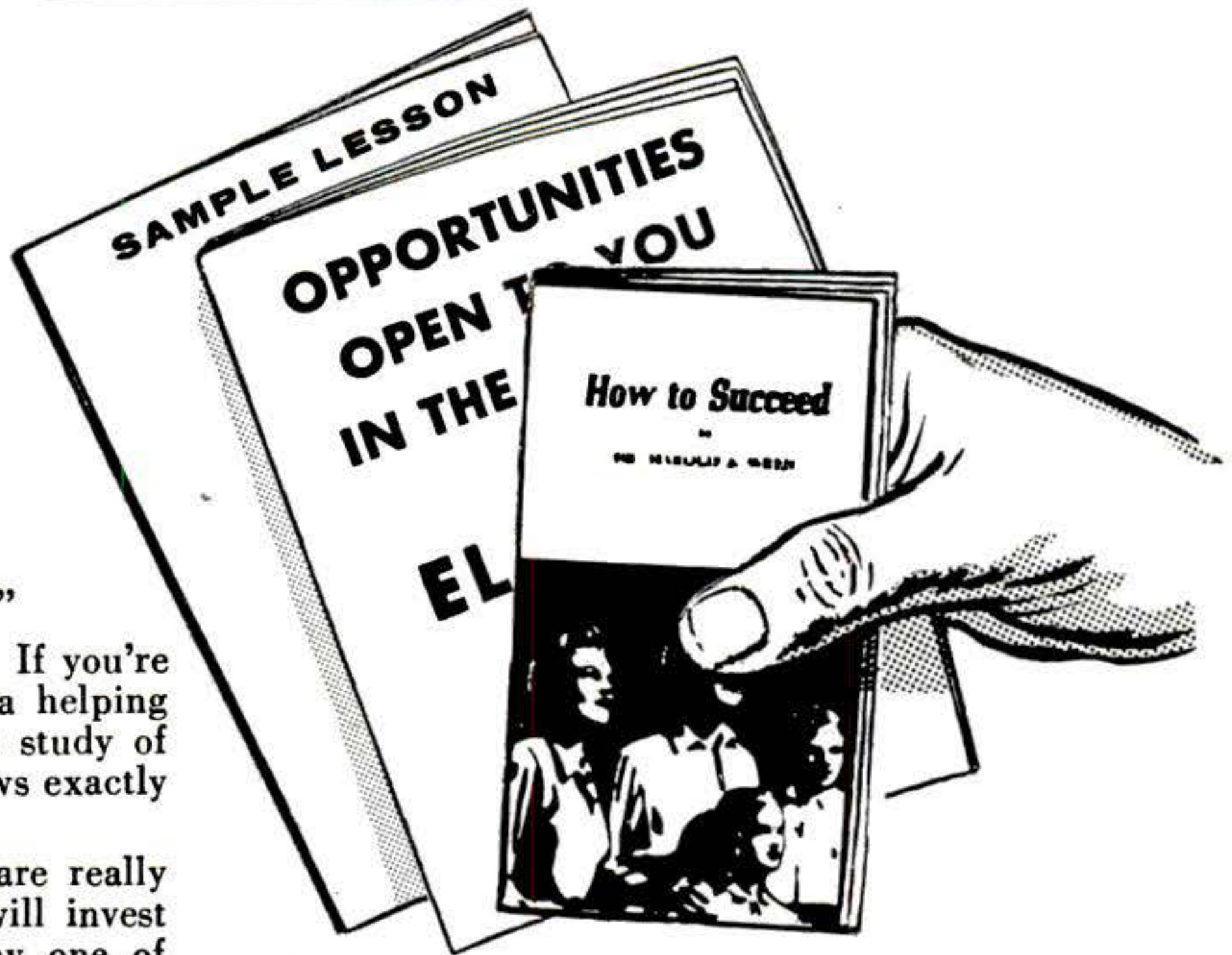
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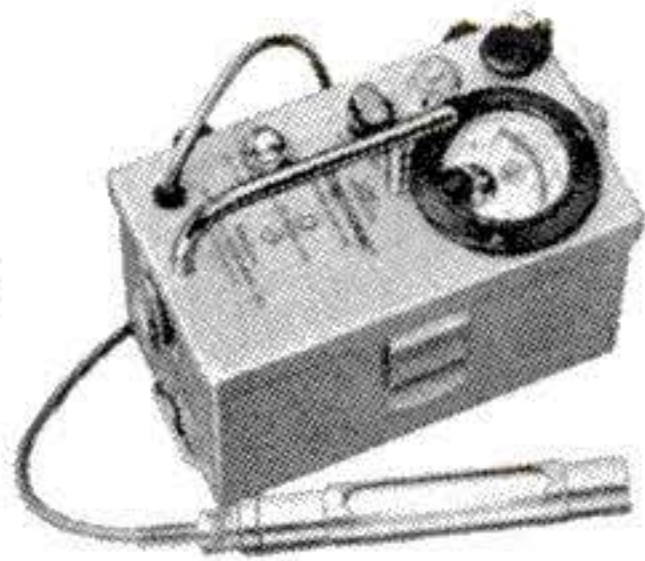


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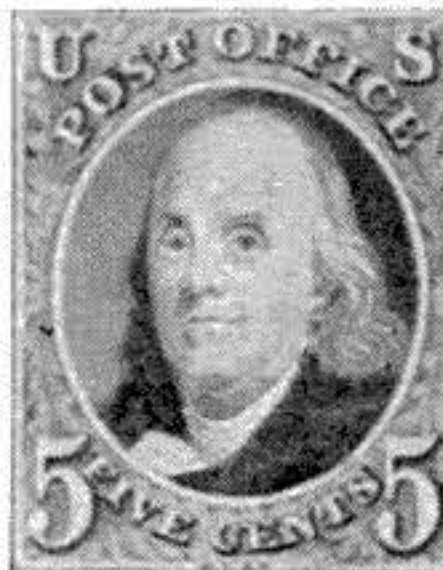
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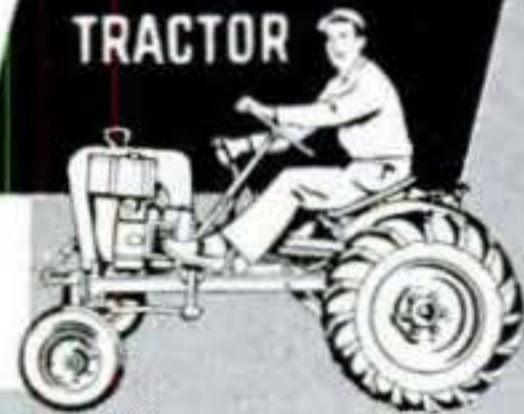
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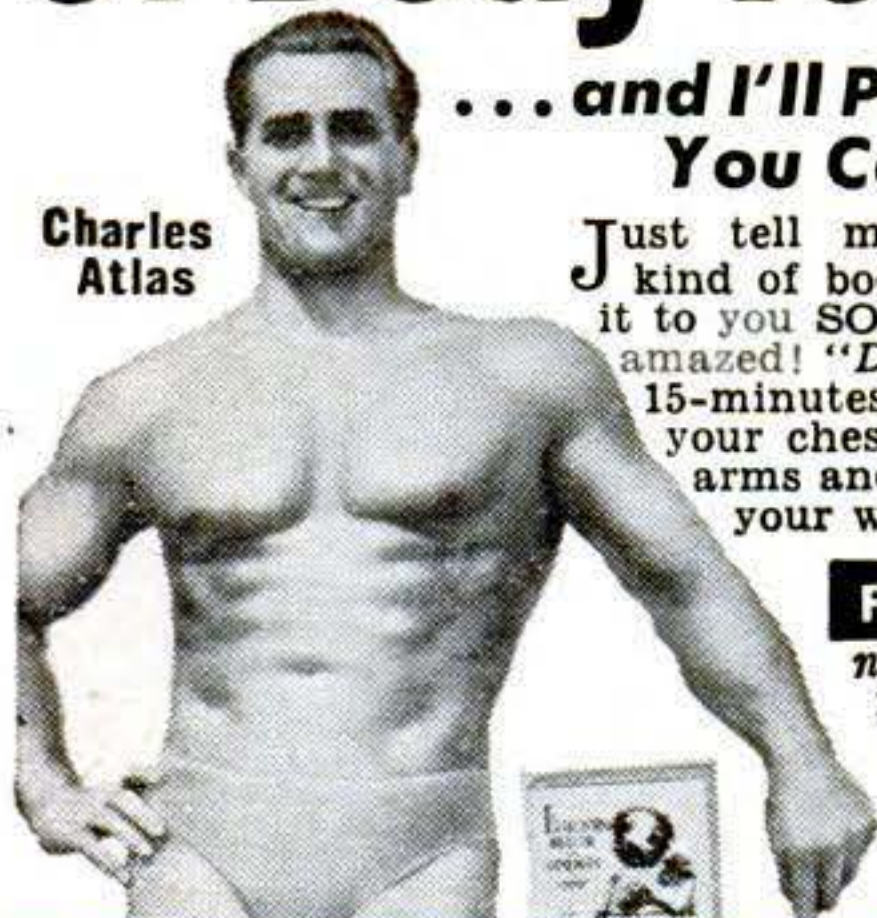
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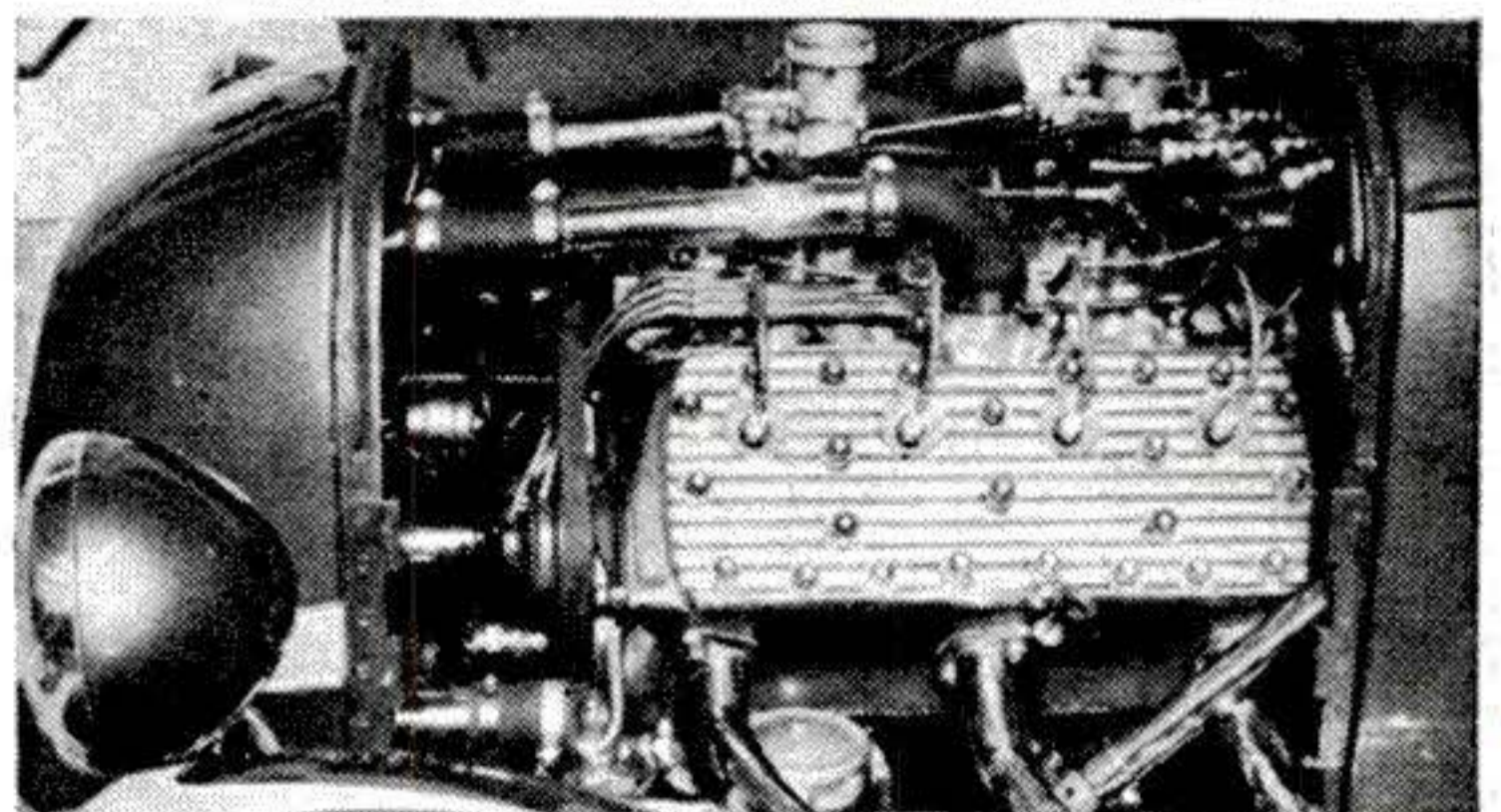
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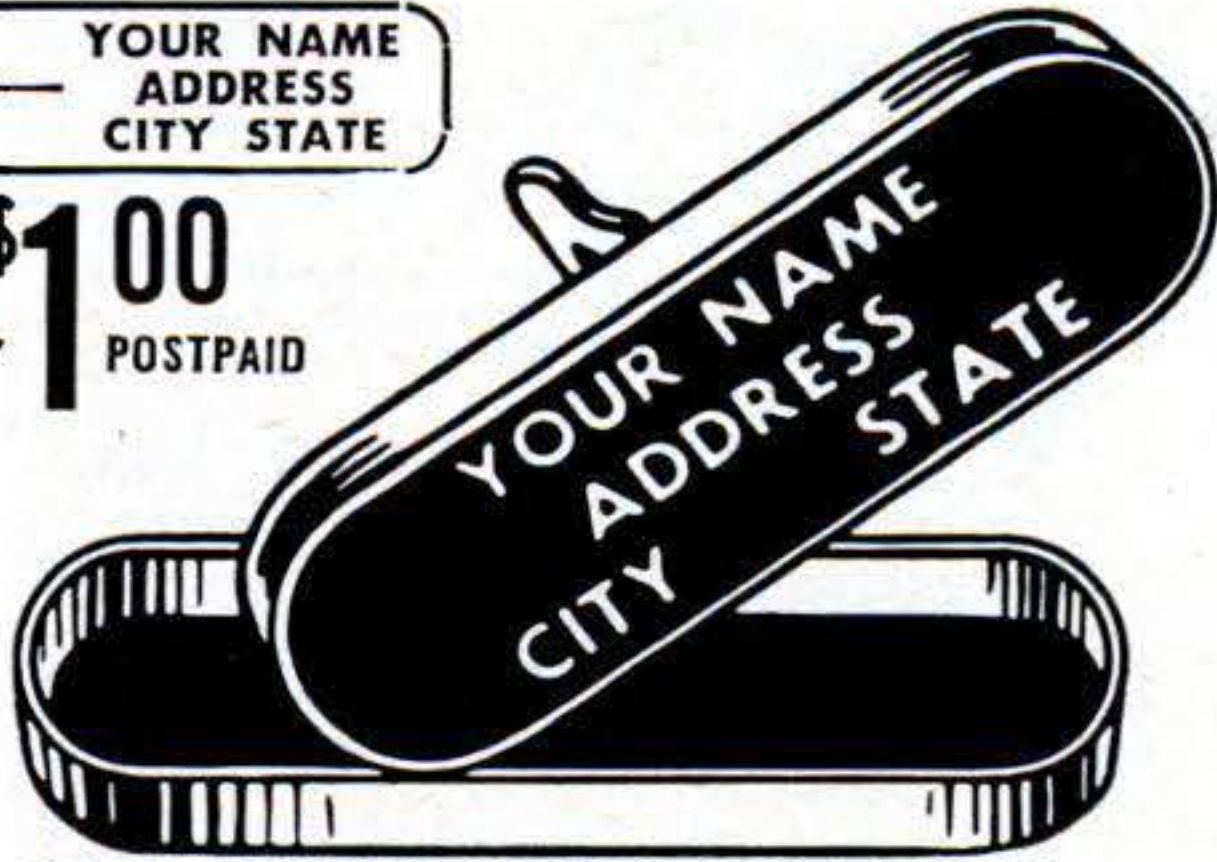
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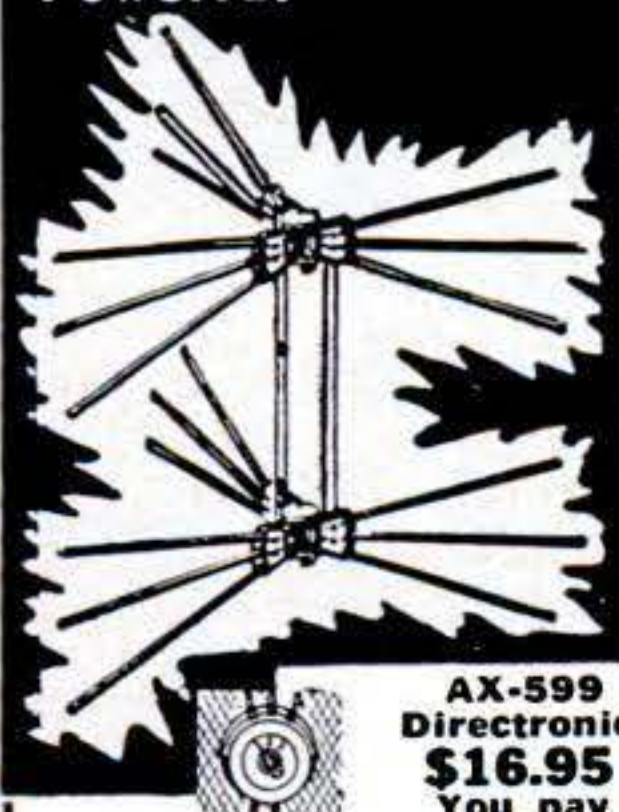
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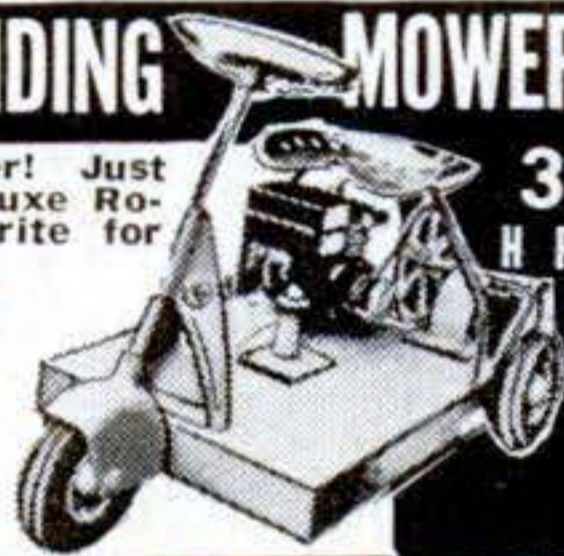
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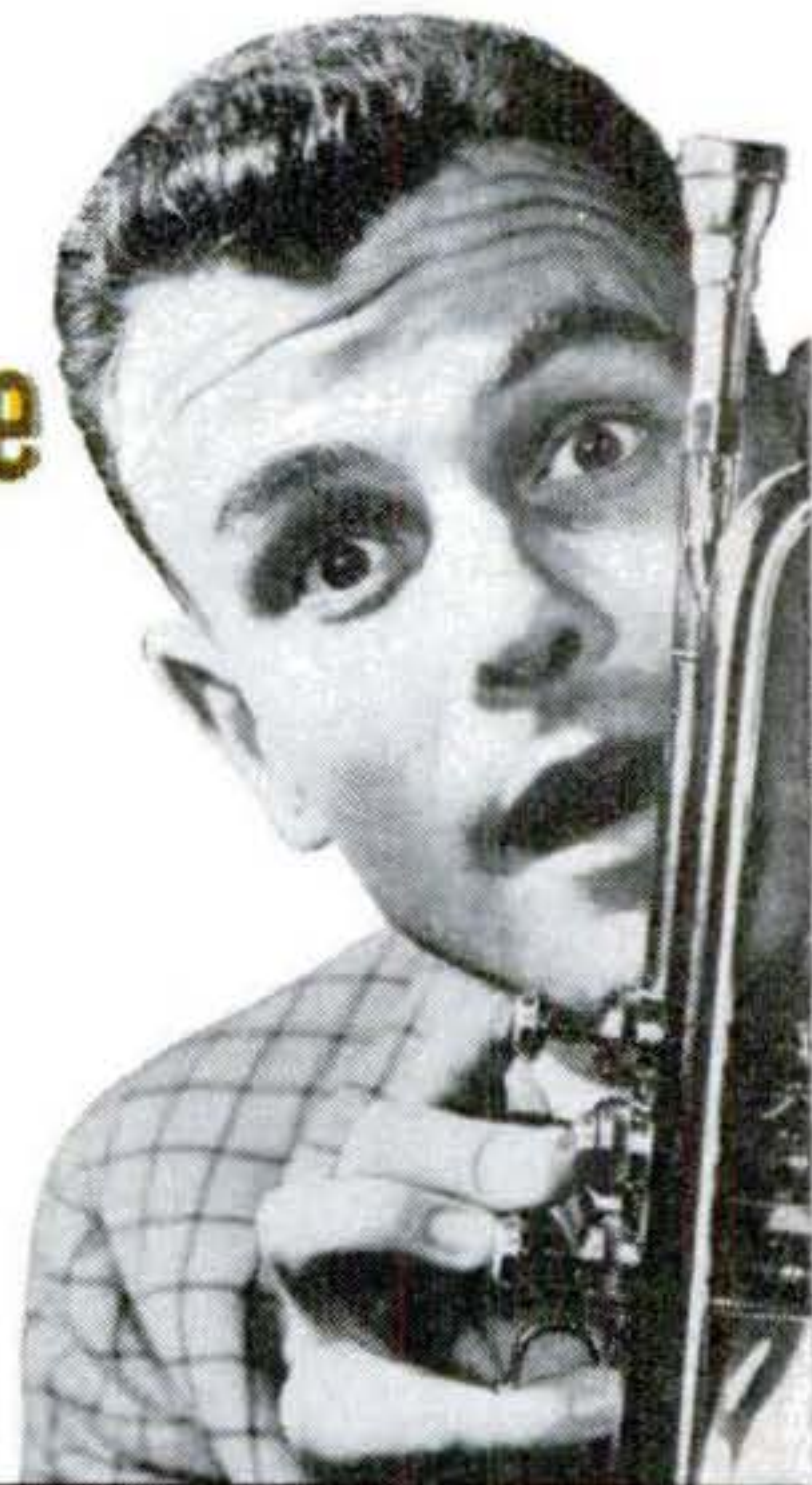
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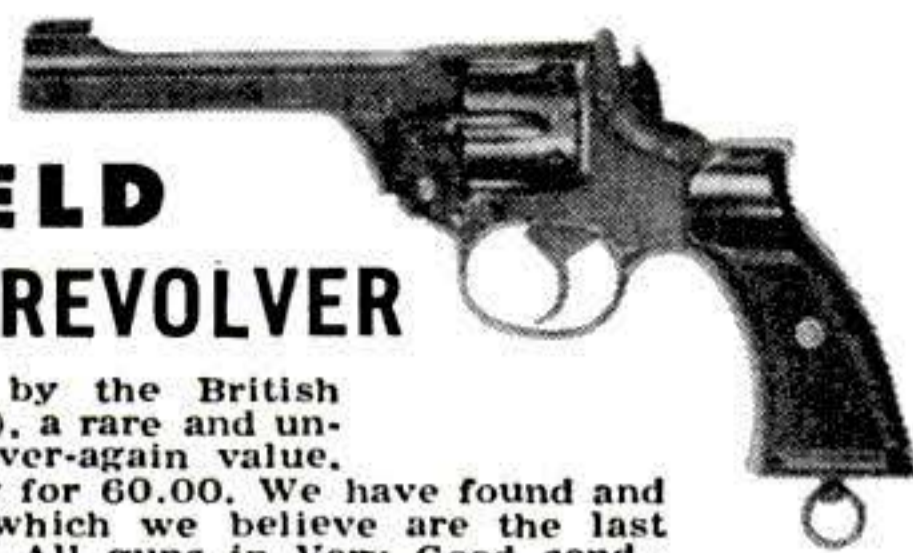
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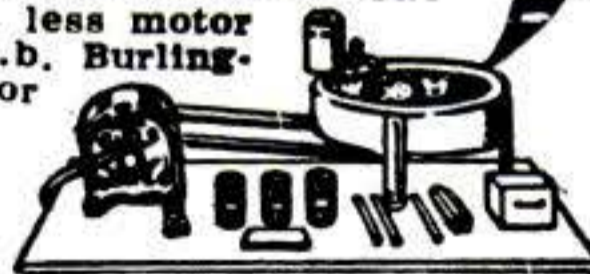
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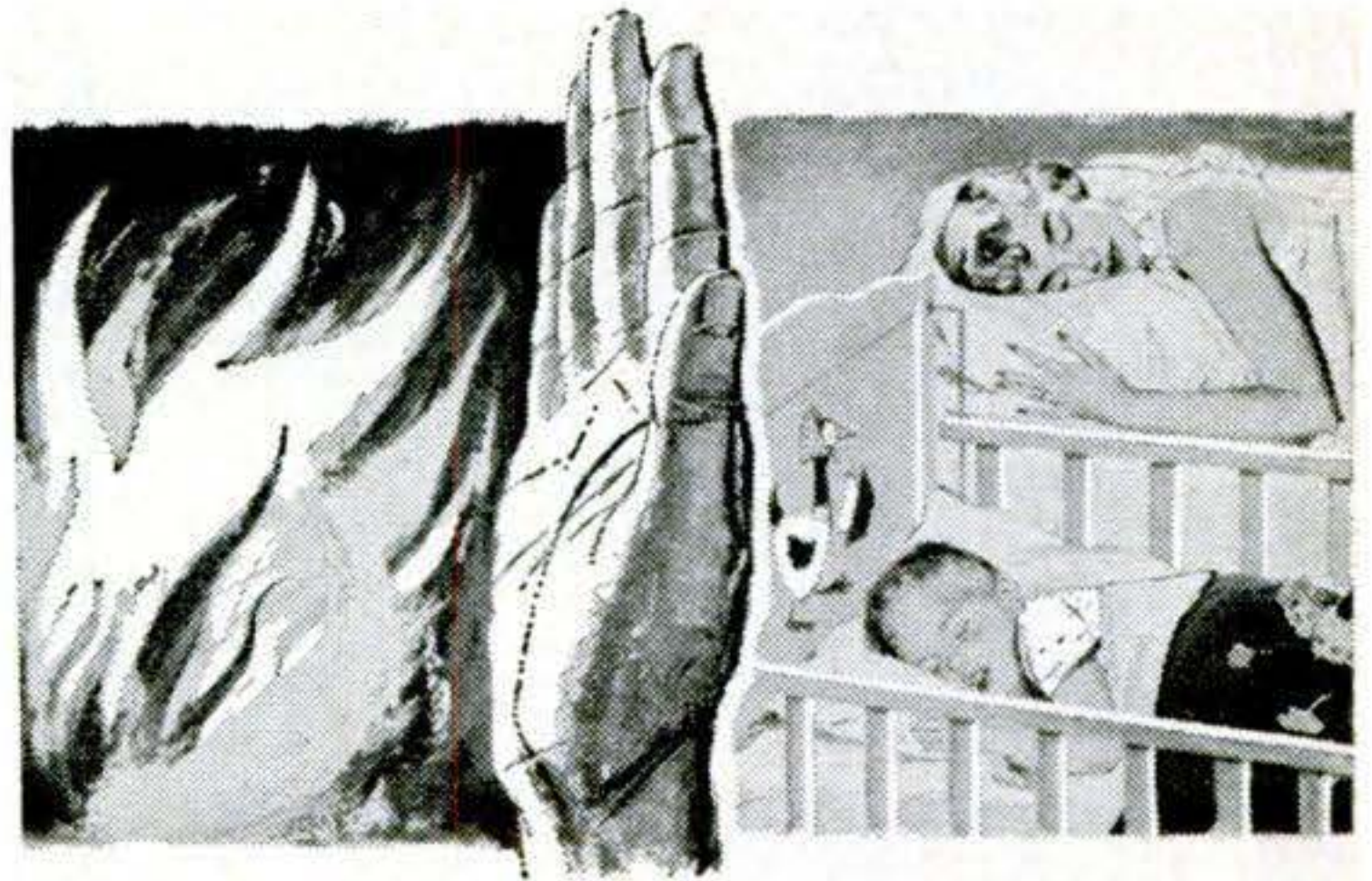
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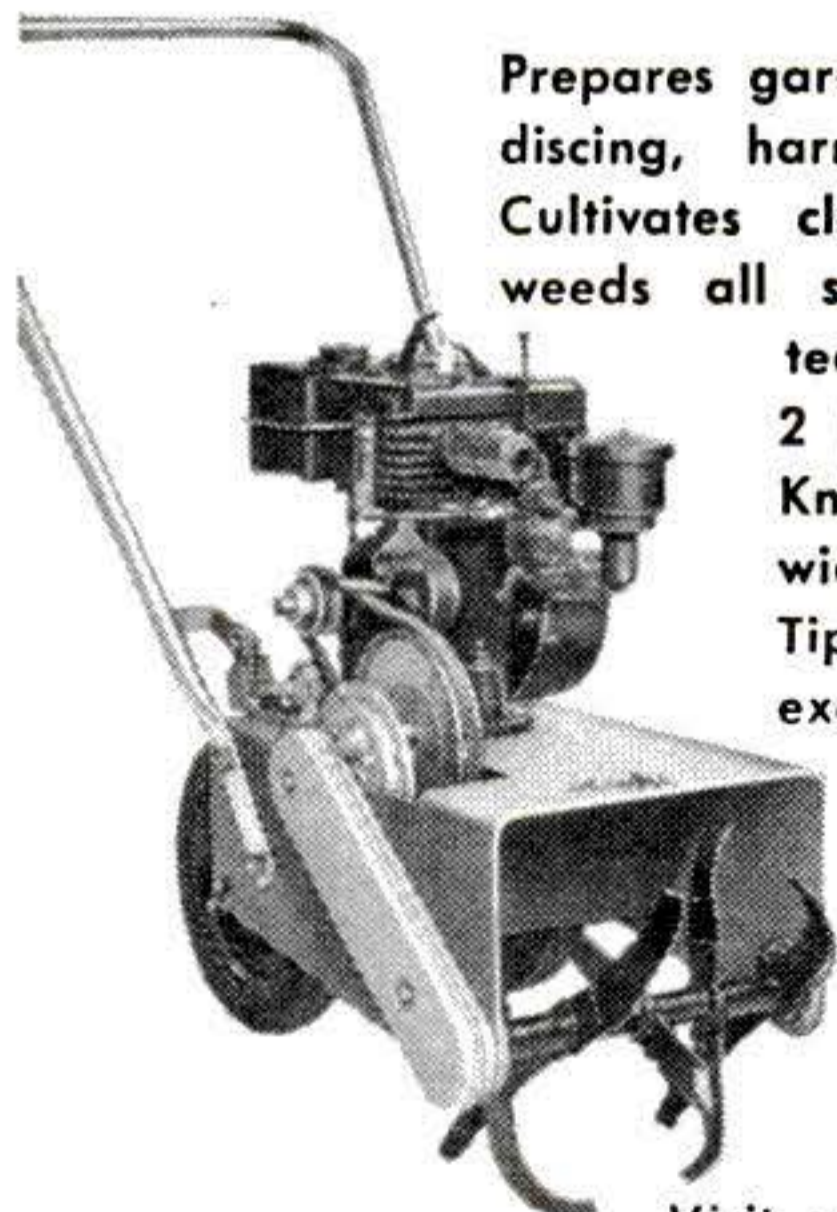
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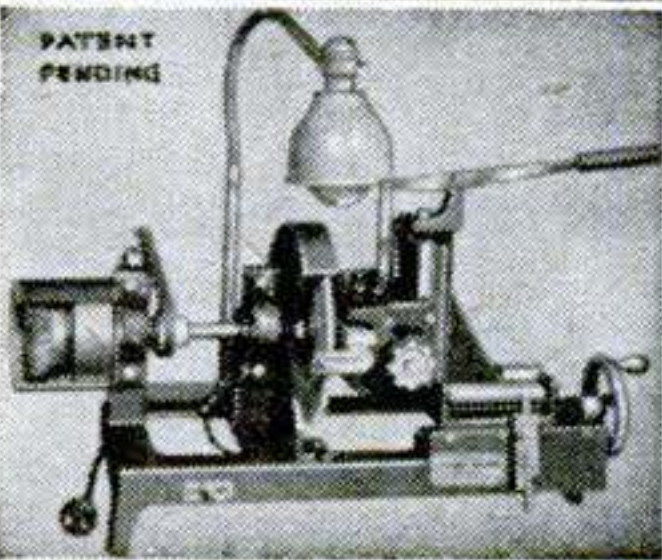
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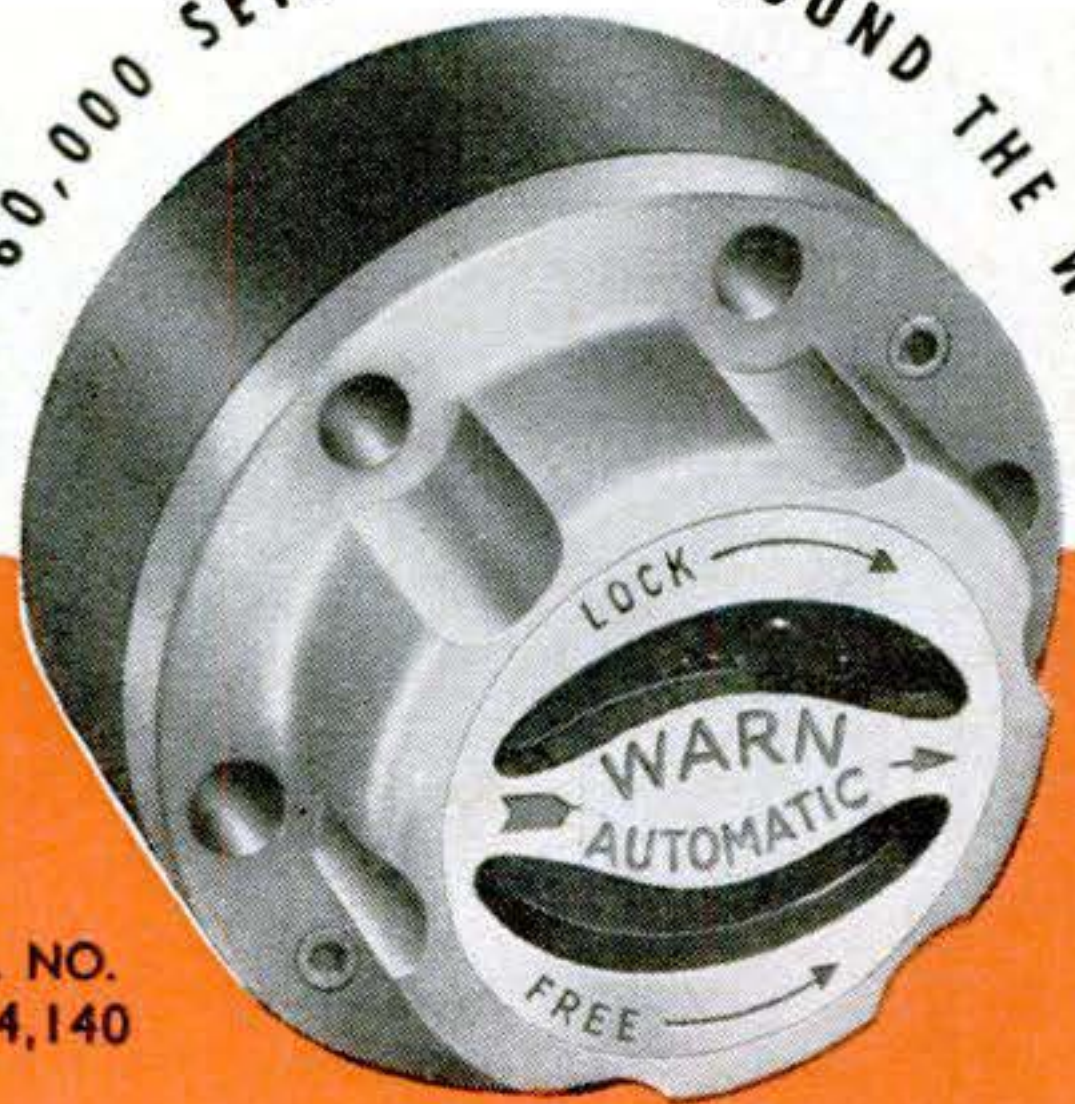
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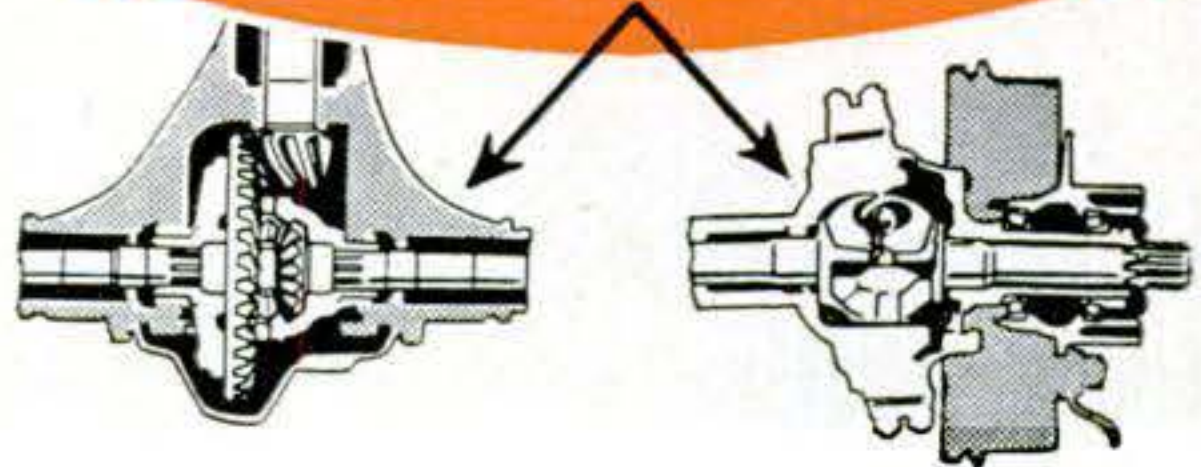
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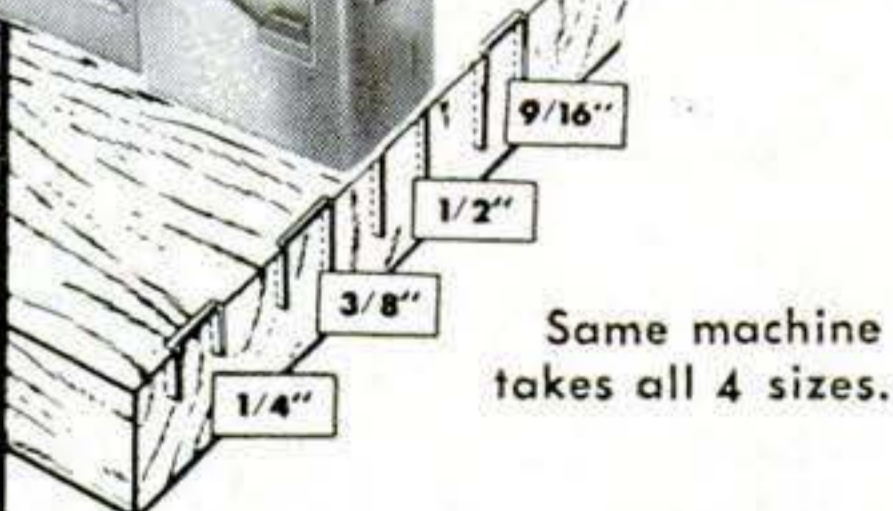
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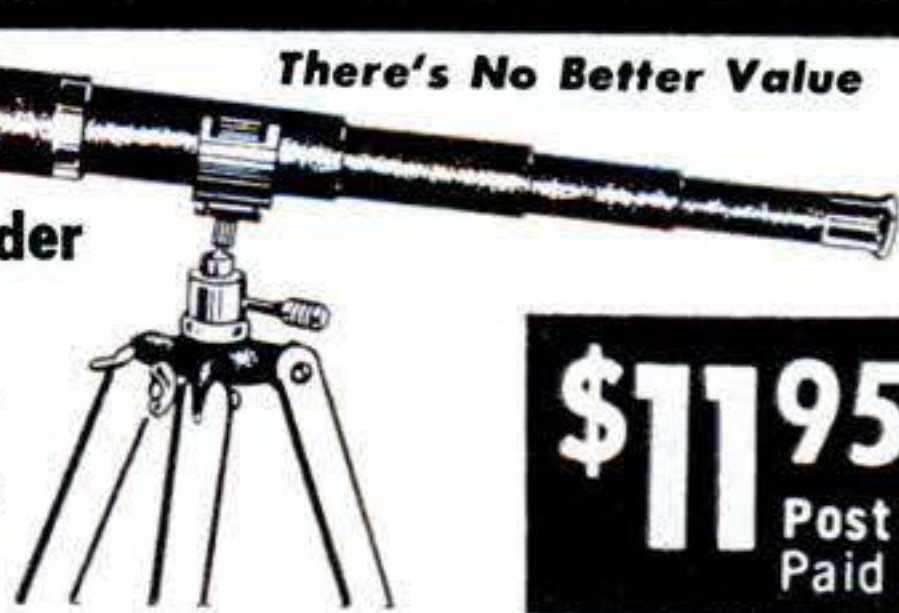
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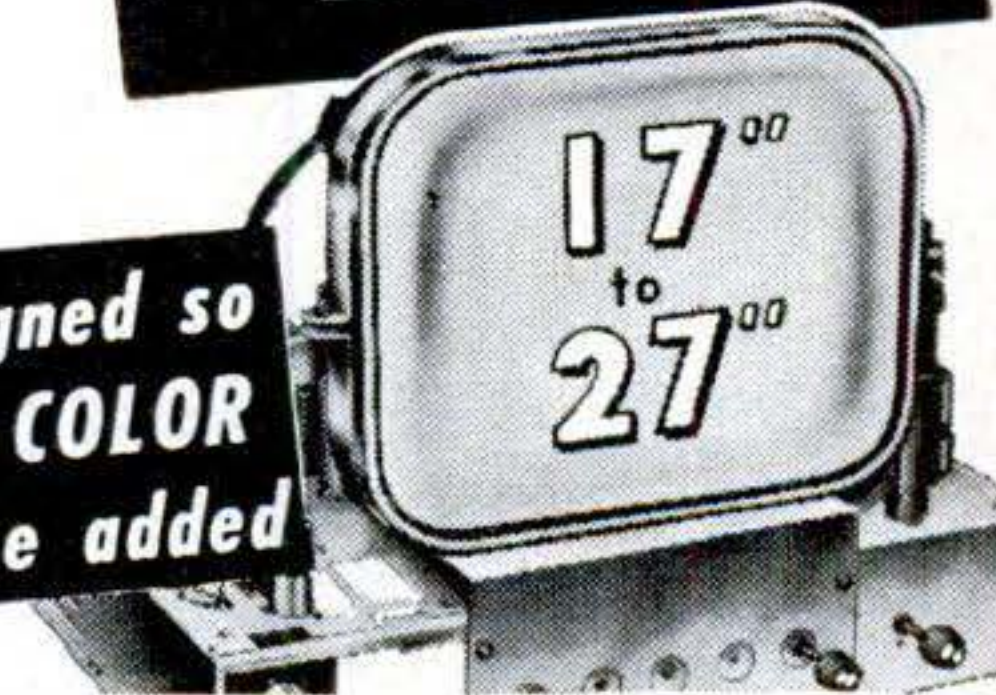


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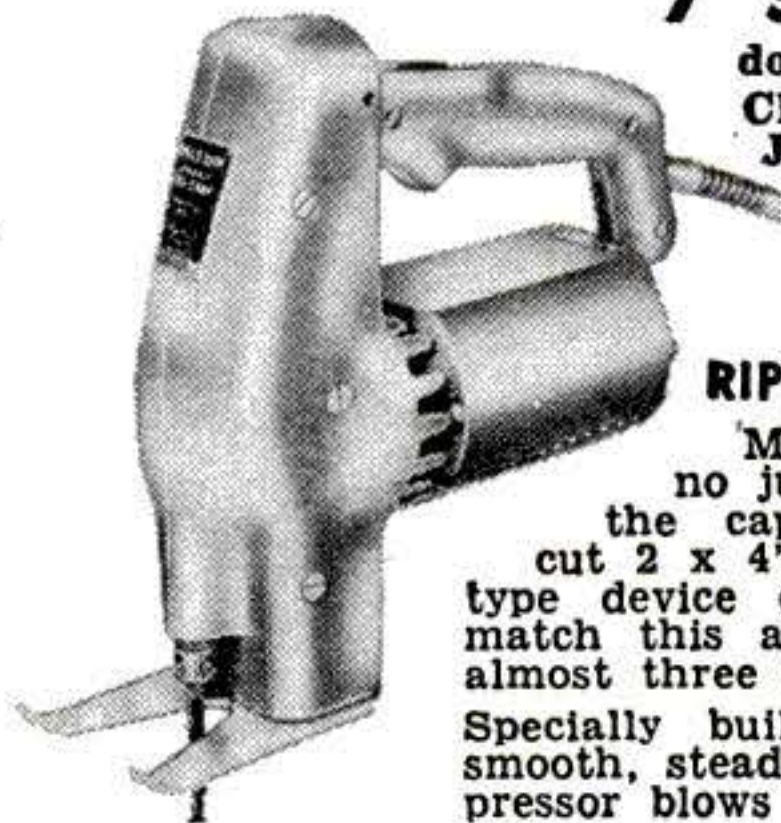
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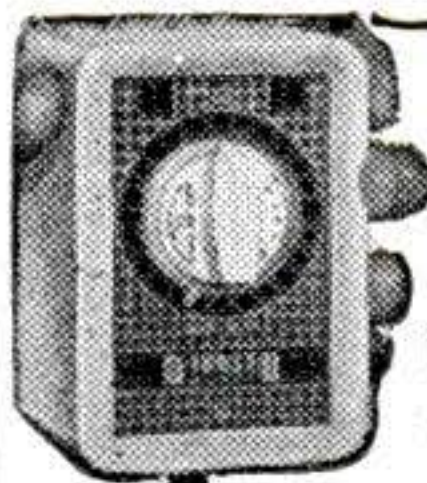
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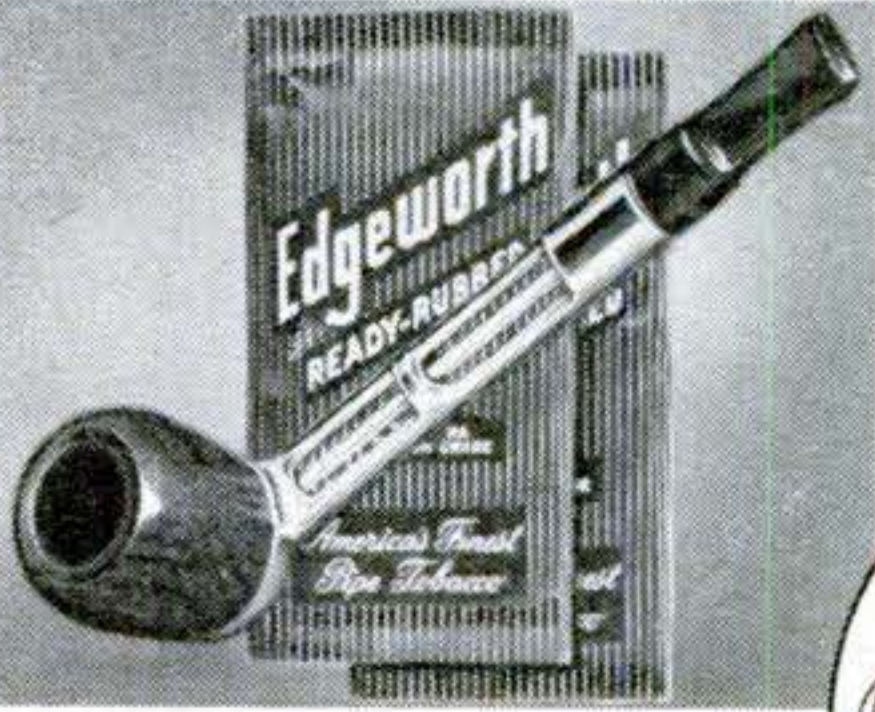
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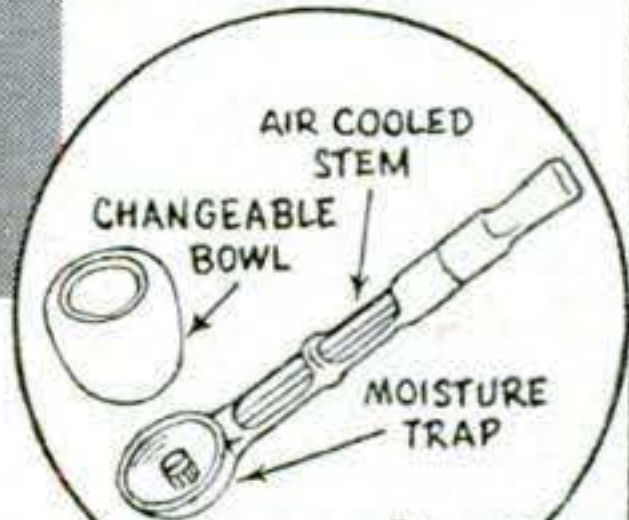
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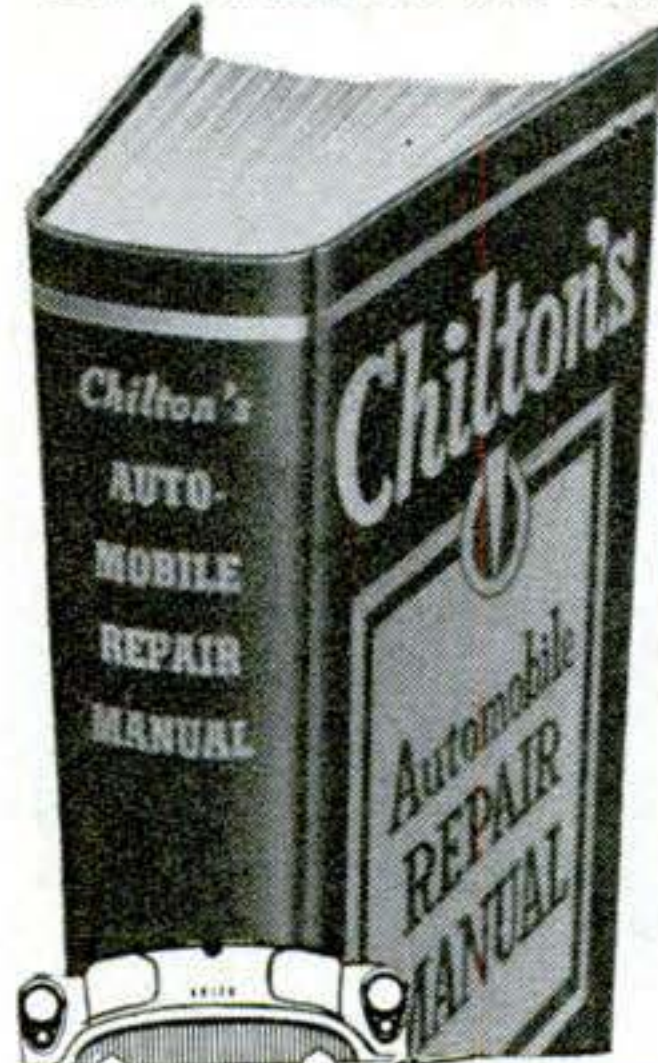
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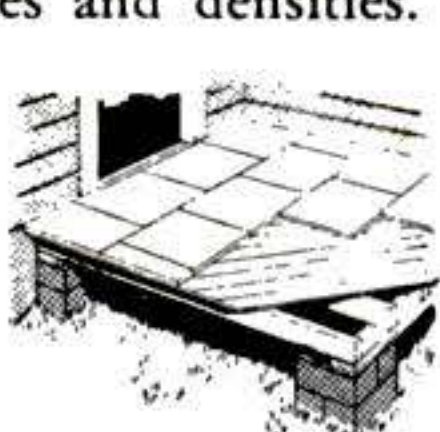
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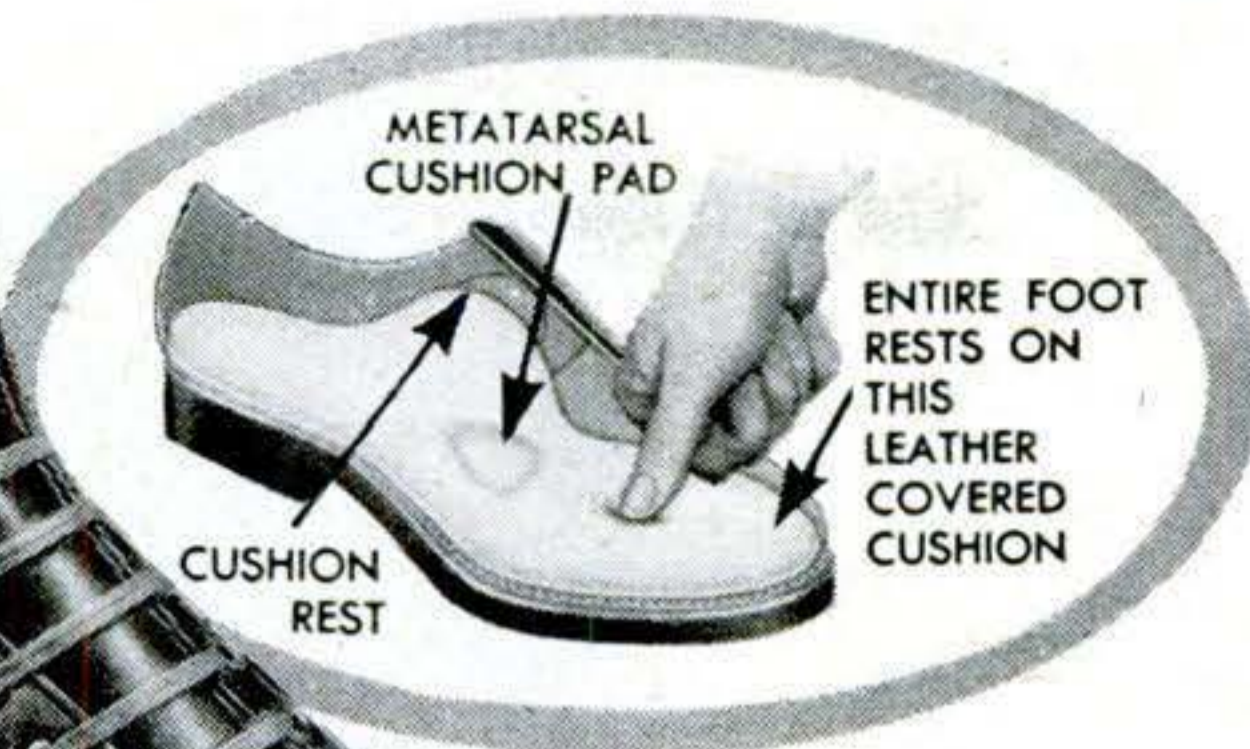
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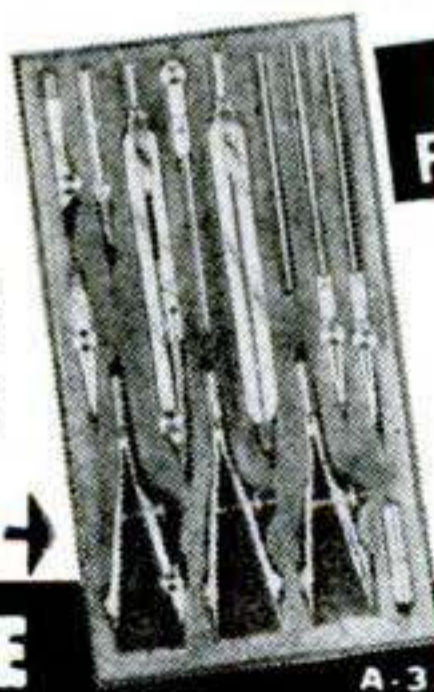


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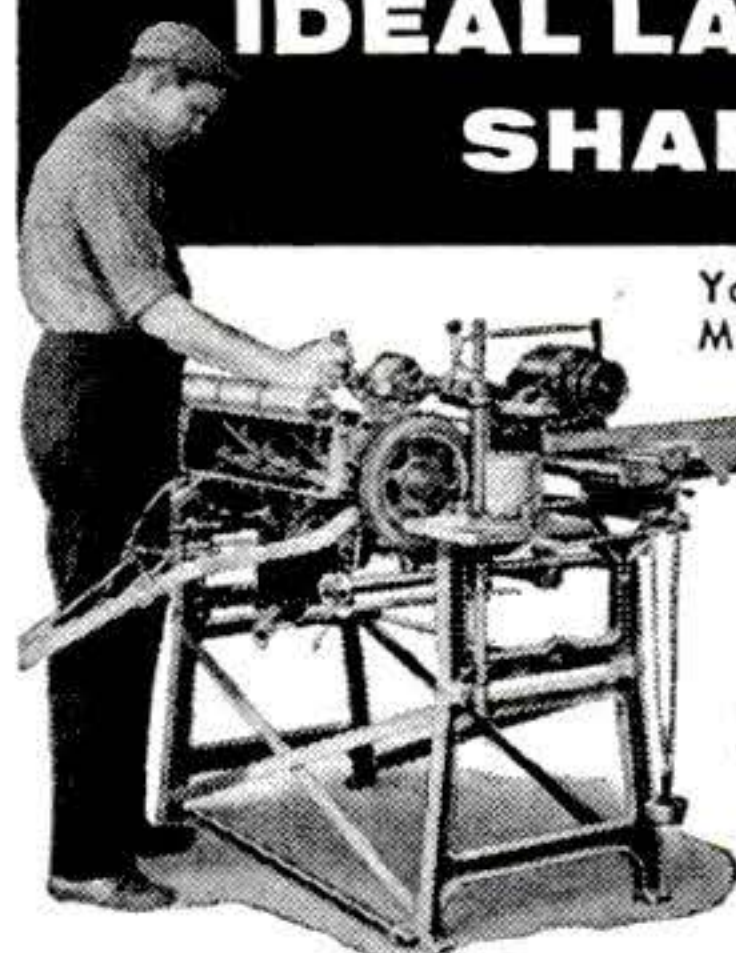
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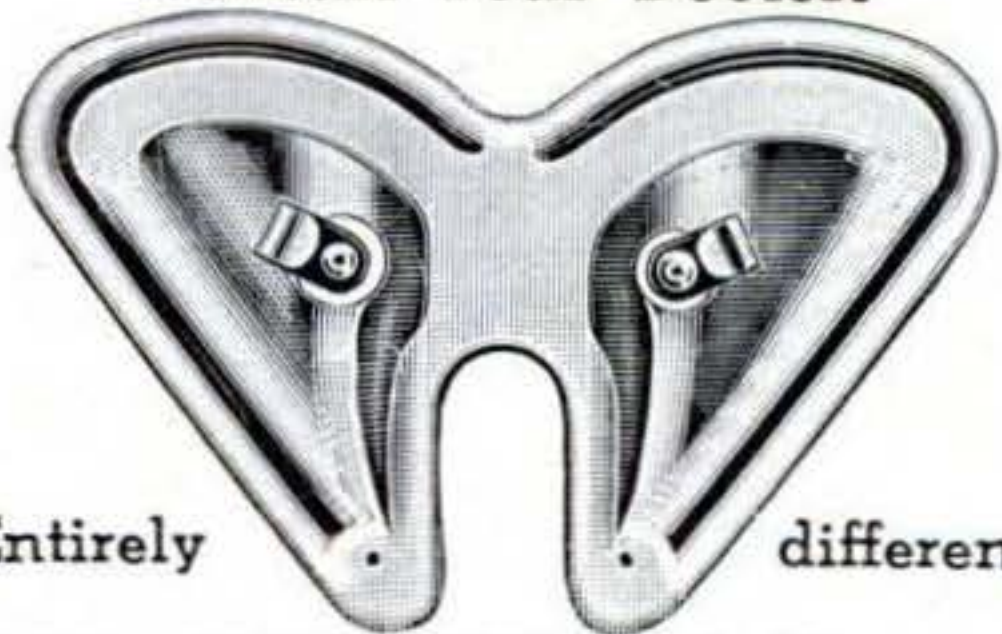
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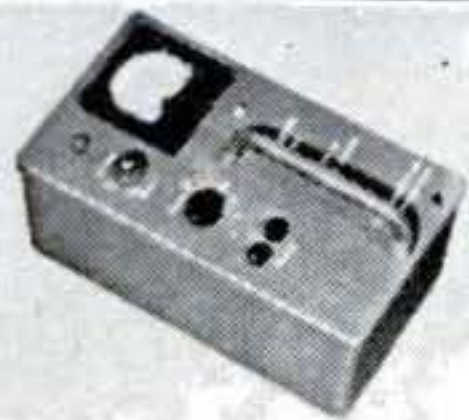
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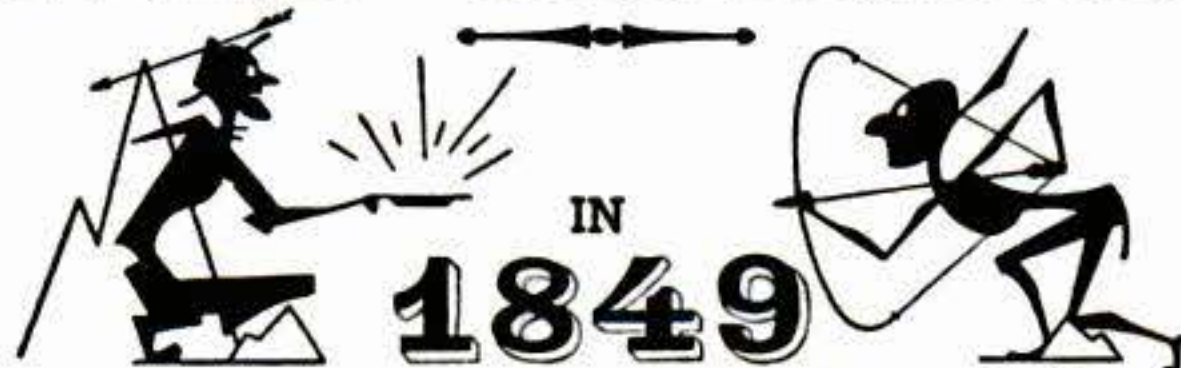
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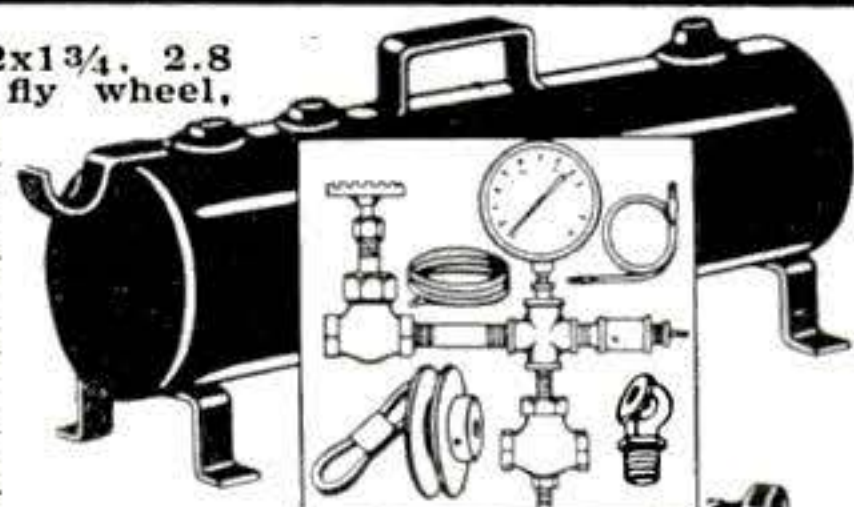


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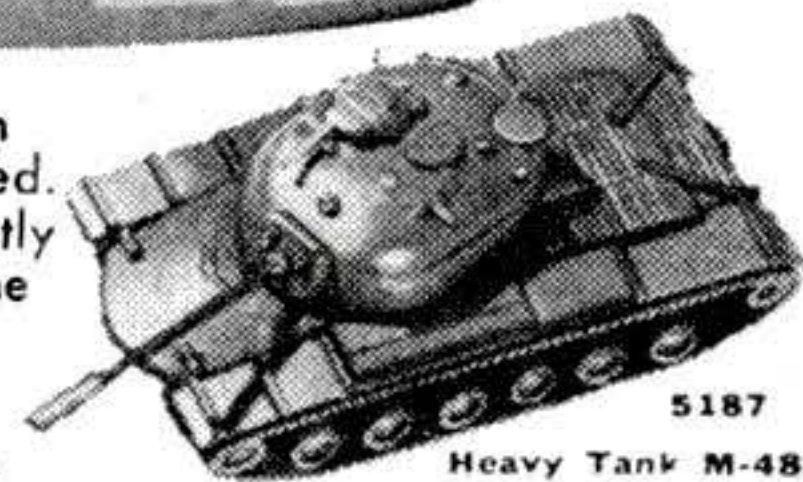
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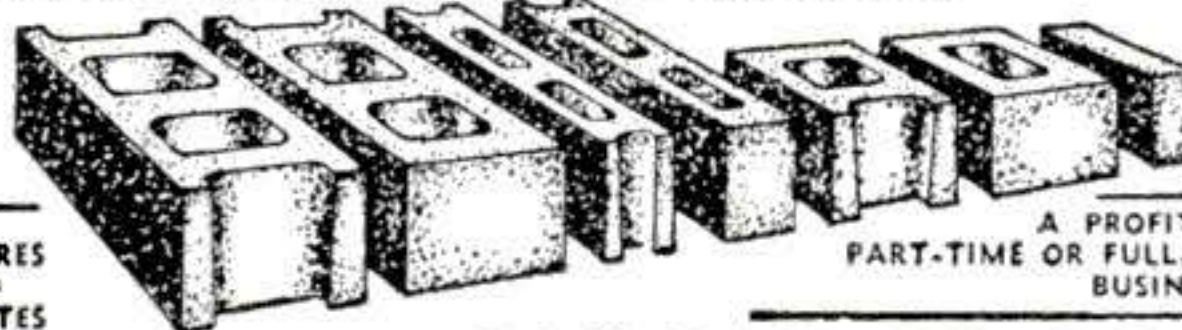
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600x16(6)	6.05	640x15	4.25	750x16(8)	8.75	750x20(10)	15.75
650x16	4.85	670x15	4.45	700x17	9.65	825x20	17.55
650x16(6)	6.75	710x15	4.45	750x17	10.85	900x20	17.55
700x16	5.25	760x15	4.75	825x15	10.85	1000x20	17.55
750x16(6)	7.55	800x15	5.15	600x20	7.85	1100x20	18.25
700x15	4.65	820x15	5.35	650x20	9.25	1100x22	21.55
550x18	4.75	670x16	4.05	32x6(8)	11.75	1000x22	20.95
550x17	3.85	760x16	7.05	32x6(10)	12.55	1200x24	26.95
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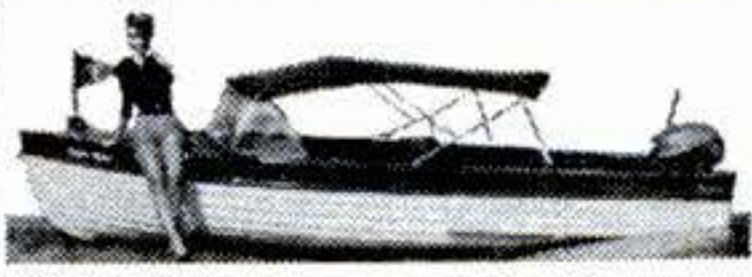
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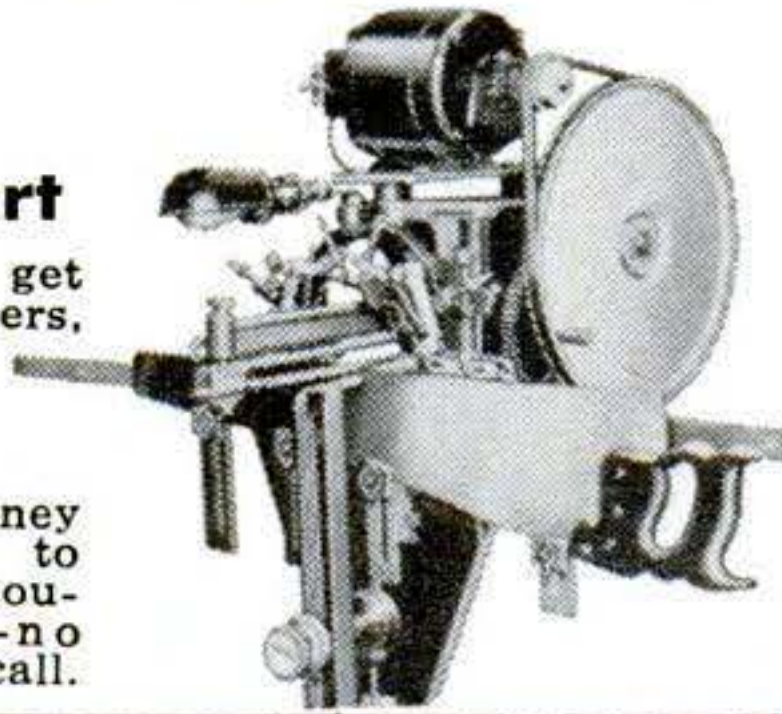
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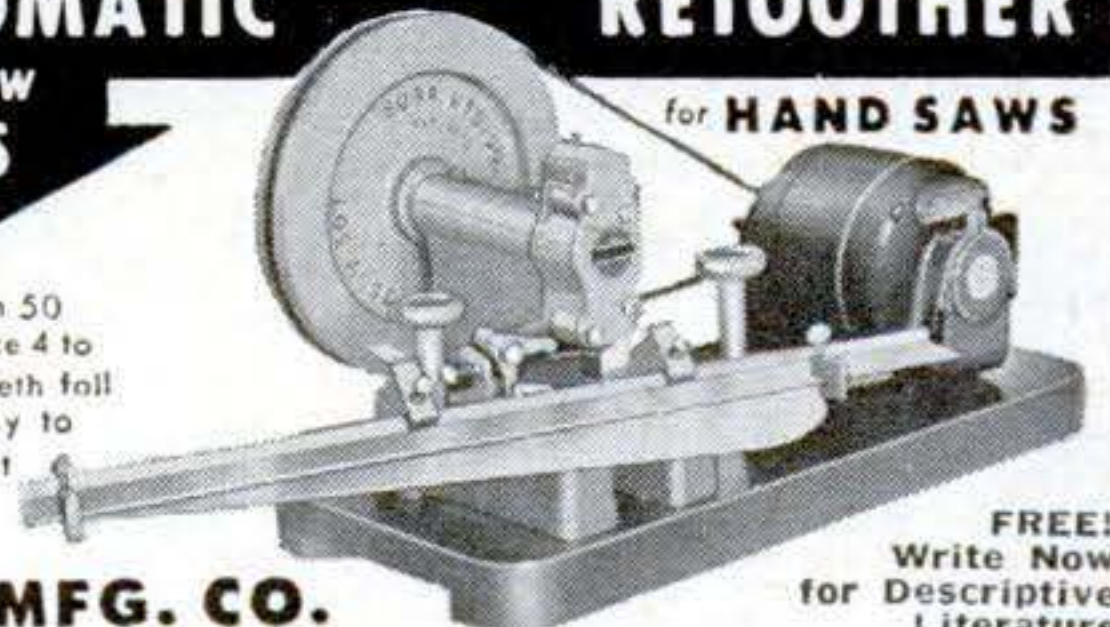
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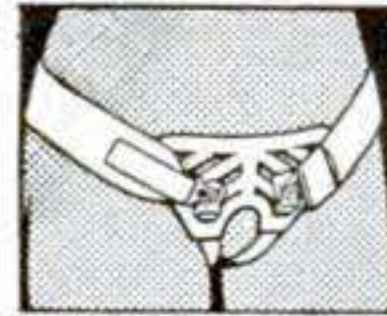


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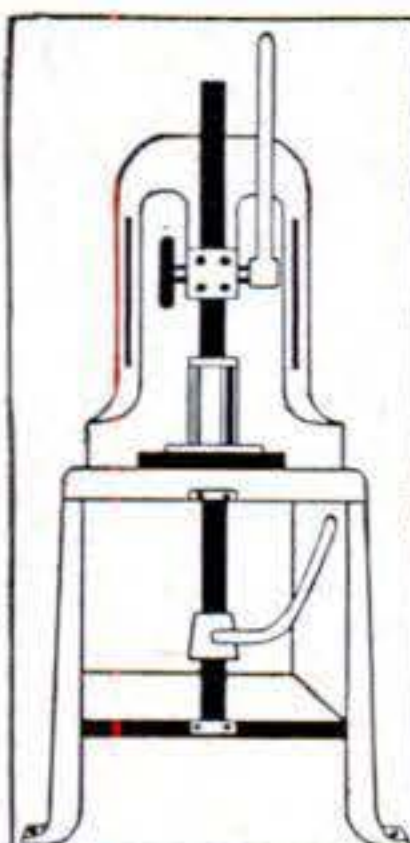
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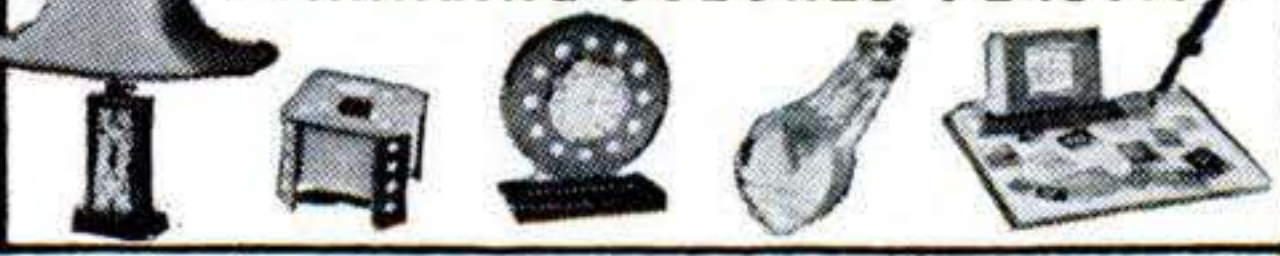
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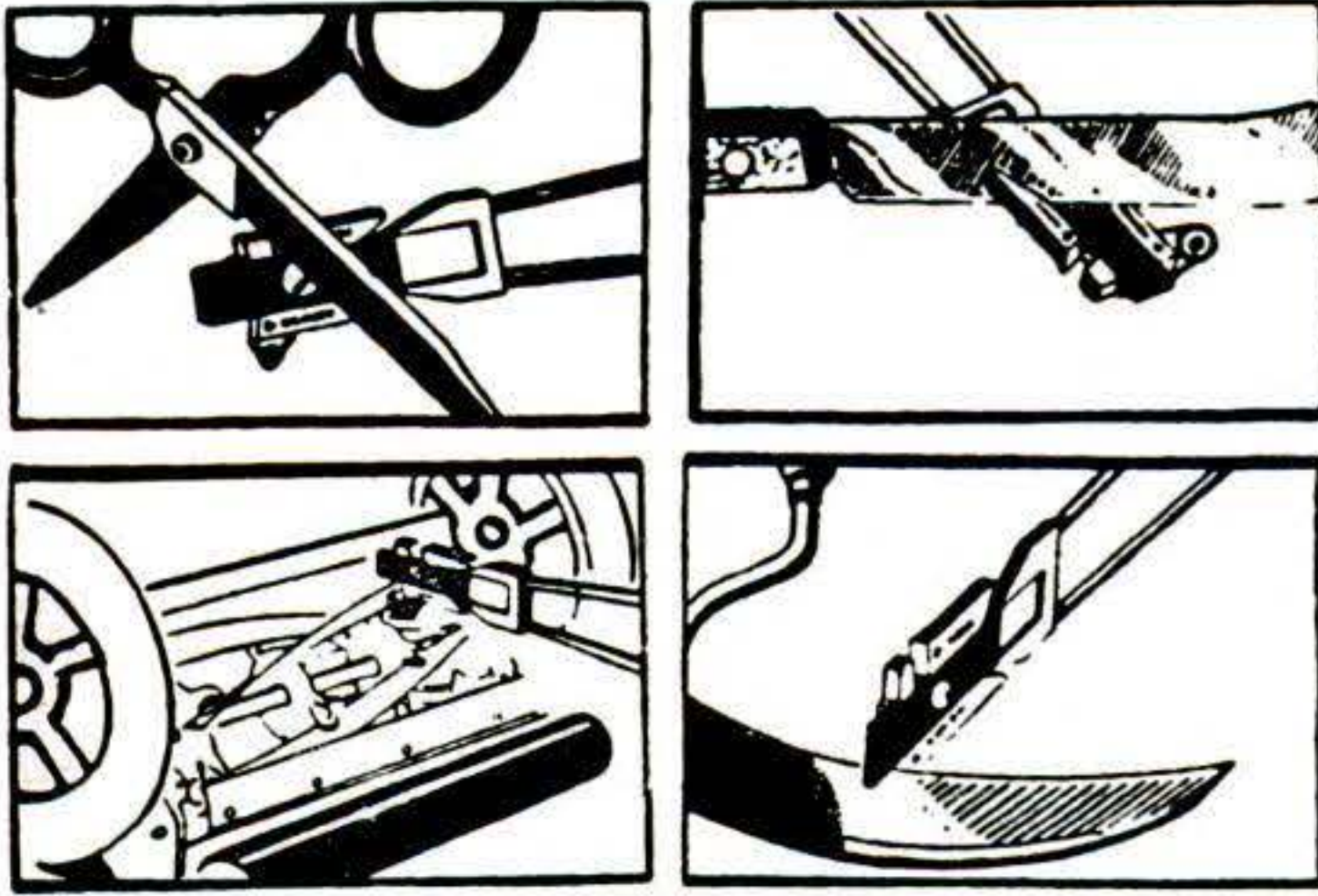


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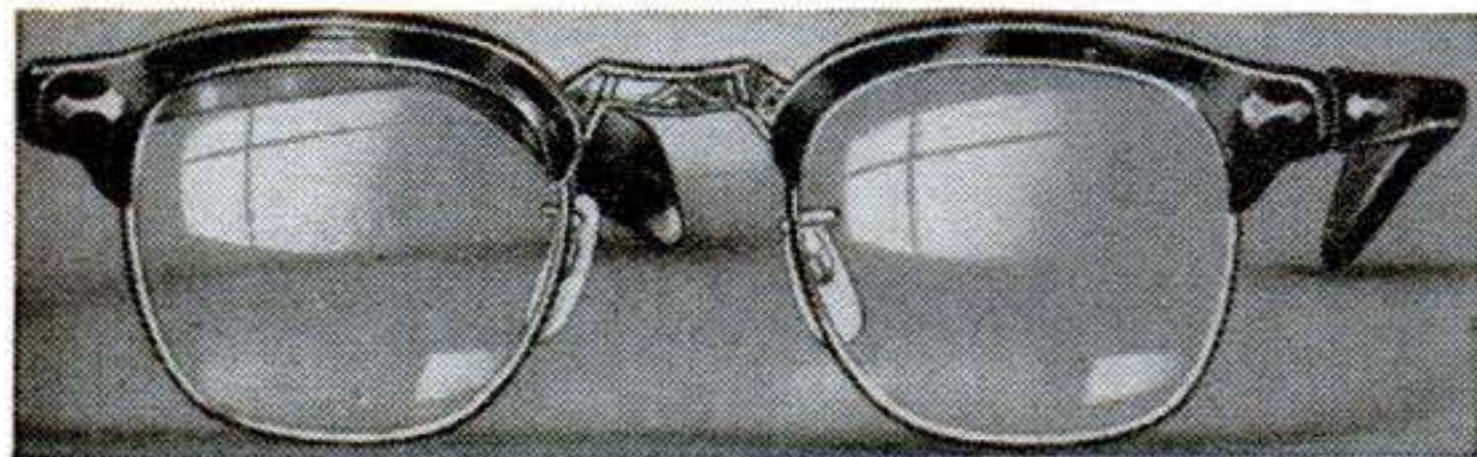
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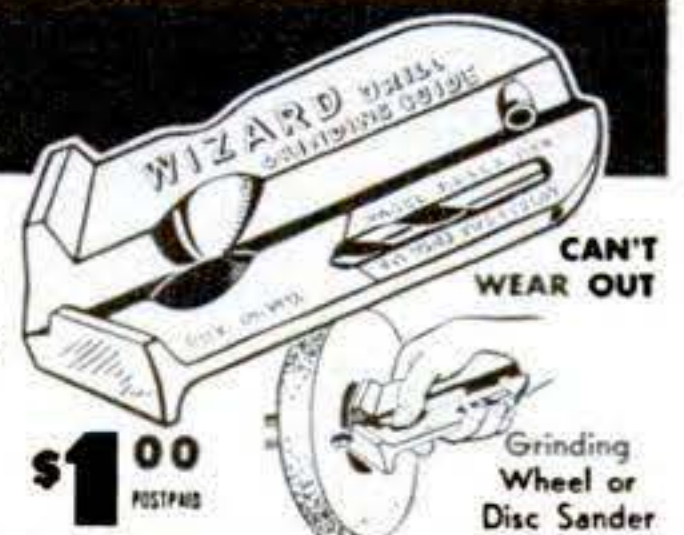
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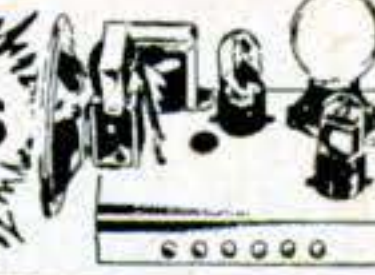
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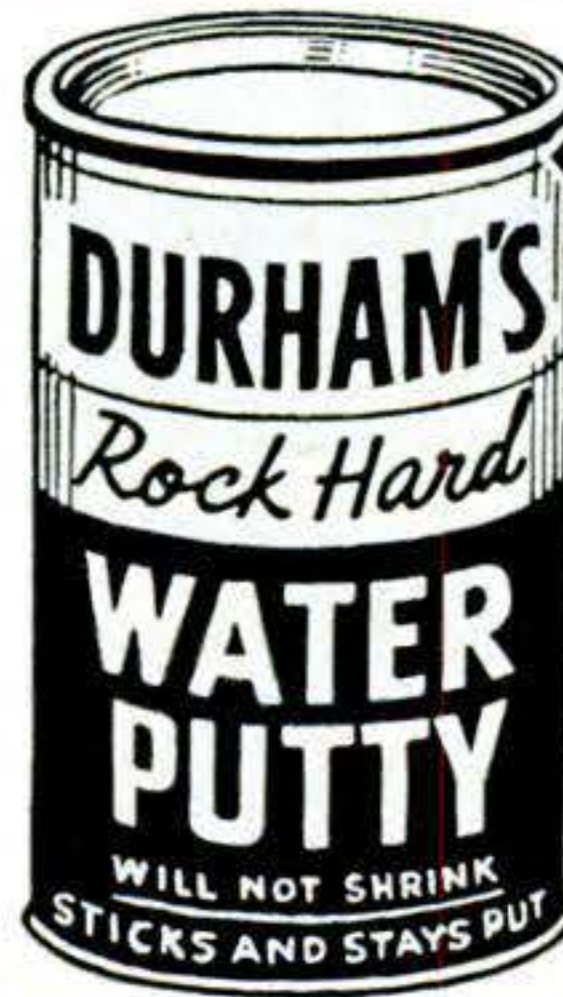
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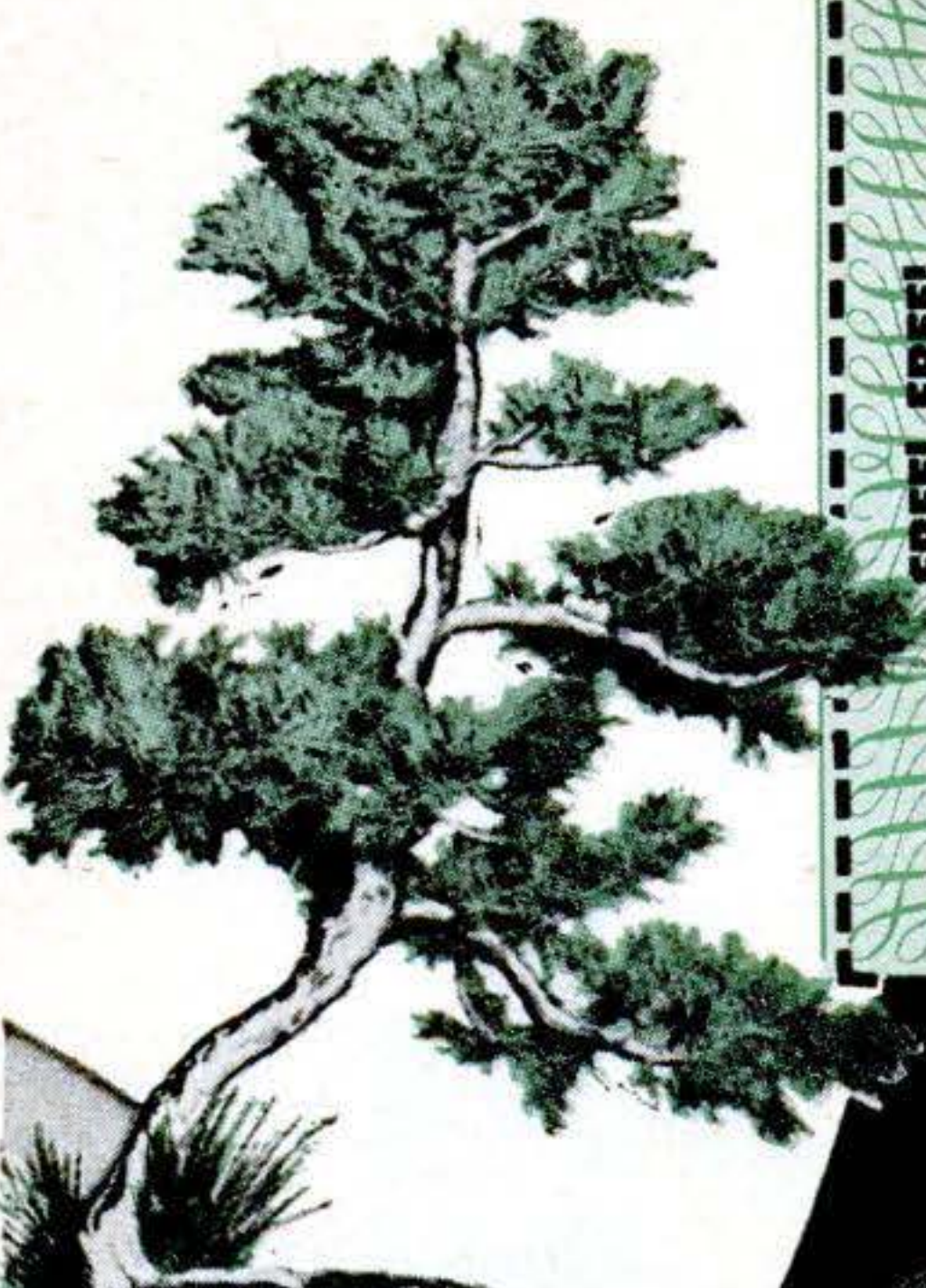
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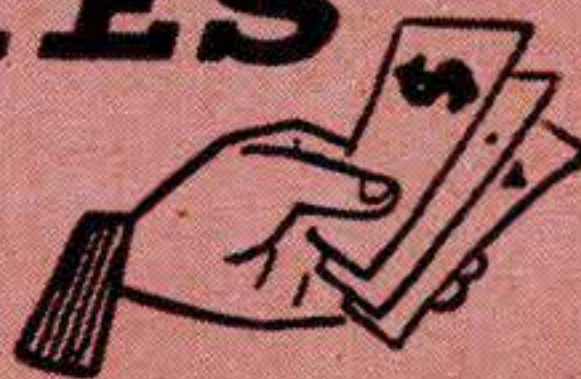
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USE THIS HANDY INDEX TO FIND WHAT YOU WANT

Advertising, Agencies for Advertisers . . .	53
Agents Wanted . . .	43
Authors Service . . .	52
Antiques, Relics & Indian Goods . . .	29
Auto Supplies & Equipment . . .	2
Auto Trailers . . .	3
Automobiles & Midget Cars . . .	1
Aviation . . .	5
Batteries, Generators, Etc. . .	6
Boats, Outboard Motors . . .	11
Body-Building Courses, Jiu Jitsu, Etc. . .	12
Books & Magazines . . .	23
Build It Yourself . . .	66
Business Opportunities . . .	37
Business Service, Information, Name Lists . . .	50
Cameras, Photo Supplies . . .	34
Camping Equipment & Tents . . .	16
Cartooning, Sign Painting, Chalk Talks . . .	54
Chemistry & Physics . . .	41
Claim Investigators . . .	37A
Coins & Currency . . .	26
Contests . . .	46
Detectives . . .	47
Dogs, Birds, Hamsters & Pets . . .	17
Drawing Supplies & Equipment . . .	76
Educational & Instruction . . .	45
Electrical Supplies & Equipment . . .	7
Engines, Motors, Etc. . .	10
Farms, Other Real Estate . . .	19
Field Glasses, Telescopes . . .	14
For Inventors . . .	60
For Sale Miscellaneous . . .	71
For the Home . . .	69
Formulas, Plans, Etc. . .	39
Frog Raising . . .	18
Geiger Counters, Treasure Finders . . .	77
Help Wanted . . .	42
High-grade Salesmen . . .	44
Hobbies, Collections . . .	31
Home Craftsman . . .	65
Hypnotism . . .	24
Insurance Investigators . . .	38A
Inventions Wanted . . .	61
Language Outfits . . .	48
Machinery, Tool Supplies, Etc. . .	9
Magic Tricks, Puzzles, Etc. . .	25
Manufacturing . . .	63
Minerals & Precious Stones . . .	30
Miscellaneous . . .	79
Models, Model Supplies . . .	64
Moneymaking Opportunities . . .	38
Motion Pictures, Slides, Sound Equip. . .	33
Motorcycles, Bicycles & Supplies . . .	4
Music, Song Writers & Records . . .	35
Of Interest To Women . . .	70
Old Gold, Jewelry, Watches . . .	67
Old Stamps Wanted . . .	27
Patent Attorneys . . .	59
Patents For Sale . . .	62
Personal . . .	80
Photo Finishing, Photocopies, Etc. . .	32
Plastics . . .	40
Plays, Stories, Etc. . .	49
Poultry & Supplies . . .	21
Printing, Multigraphing, Etc. . .	57
Printing Outfits, Supplies . . .	58
Profitable Occupations . . .	22
Radio, TV, Supplies & Equipment . . .	36
Razor Blades, Shavers . . .	74
Rubber Stamps & Office Supplies . . .	56
Special Services . . .	51
Sporting Goods, Guns, Fishing Tackle, Etc. . .	15
Stamp Collecting . . .	28
Tall Men's Section . . .	73A
Tattooing Supplies . . .	75
Taxidermy . . .	13
Tobacco & Pipes . . .	68
Trees, Shrubs, Roots & Herbs . . .	20
Typewriters & Office Machines . . .	55
Wanted to Buy & Swap . . .	72
Watch Repairing . . .	78
Wearing Apparel . . .	73
Welding, Soldering . . .	8

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DEALERS Wholesale catalog. Postage 3c. Franksco, 5031 Queensbury, Baltimore 15, Maryland.

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100 MILITARY Official shoulder patch insignia. Free album. \$5.00. All different. Wolf Appleton, Inc., 566-E Broadway, New York 12.

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32 PHOTO FINISHING, PHOTOCOPIES, ETC.

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DISCOUNTS to 40%—cameras, projectors, tape recorders, lenses. Write for individual quotations, no catalogs. Classified Camera E, 2375 E. 65 St., Brooklyn, New York.

BUY wholesale nationally advertised cameras, photo supplies, thousands other products at big discount. Free "Wholesale Plan." American Buyer's, 629-SS Linden, Buffalo 16, N. Y.

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POEMS Wanted for musical setting. Send poems. Free Examination. Five Star Music Masters, 646 Beacon Bldg., Boston, Massachusetts.

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FREE Records of your song—Your words—My Melody. Free information. Johnny Mack's Melody Mart, 1094 West 39th Street, Dept. K, Los Angeles 37.

POEMS Wanted to be set to music. Free examinations. Send poems. McNeil, Master of Music, 510-PS, S. Alexandria, Los Angeles, California.

POEMS Wanted for musical setting. Send poems. Free examination. Crown Music Company, 1472-P Broadway, New York City 36.

POEMS needed for new songs. Send poems for free examination, details. Immediate consideration. Songcrafters, 2724 Arcade Station, Nashville, Tenn.

SONGWRITERS: Large recording company may record your song. National sales and promotion if selected. No Charge for Melodies. Send song material to Music Makers, Dept. G-8, Box 2507, Hollywood, California.

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CHORDS & shorthand. \$1. Stackpole, 2110-12 West Venango, Phila. 40, Pa.

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BUILD Super crystal radios, Electrotonic crystal, detector, instructions 50c. Electrotonics, Box 98S, Dixon, Missouri.

PRINTED Circuit Kit—All materials, equipment and instructions for designing and etching your own boards. Satisfaction guaranteed—\$19.55 postpaid. Tele-Diagnosis, 155 West 72nd Street, New York 23, N. Y.

BUILD 15 Radios—Progressive Radio "Edu-Kit" only! \$19.95 complete. Free Radio Tester, Electric Soldering Iron. No experience required. 30-day unconditional money-back guarantee. Order direct or send for free descriptive literature—no obligation. Valuable Radio & TV Repair Guide sent on request—no charge, no obligation. Progressive "Edu-Kit" Inc., Rm. 28-A, Progressive Bldg., 497 Union Ave., Brooklyn 11, N. Y.

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GENUINE Scotch recording tape, 1200'—regularly \$5.50—Special \$4.29. Three rolls \$11.75 postpaid. Bronxville Camera Shop, 94 Pondfield, Bronxville, N.Y.

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ENJOY Color television now! Non-inflammable multicolor screens for all black-white sets. Easily attached. Complete details. Free. Zingo Products, Johnstown 98, New York.

SUPER Pocket radio. Owners report coast-to-coast reception. Complete kit \$2.99. Batteries \$1.10. Tiny hearing-aid earset \$2.95 or use any regular head-phone. Will ship C.O.D. with \$1.00 deposit. Rush order to-day. Satisfaction guaranteed. Transi-Mite Labs, Manteo, North Carolina.

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\$1,000 MONTHLY possible in collection agency business. Free details. Write Cole Associates, Syracuse 2, New York.

ESTABLISH Automatic shoe shine route. Jiffy Shine, 1630 South Second, Phila. 48, Penna.

GROW Orchids at home—profitable—fascinating. Year 'round. Maine to California. No Greenhouse. Gorgeous Cattleyas, Cymbidiums, etc. Successful home grower shows you how. Free—full details. Flowerland, 4622-TX Wilshire, Los Angeles 5.

OPERATE profitable mail order business. Write Walter Service, 4159-B East 112th, Cleveland 5, Ohio.

MEN Wanted—Build Luggage And Cases At Home. We sell your products—supply complete instructions, materials, everything. No special equipment needed. Free details. Casecraft 805-H4 Sunset, Los Angeles 12, Calif.

\$25 WEEKLY working two hours daily at home. Lycke, Box 2471-B, Cleveland 12, Ohio.

BRONZE Baby Shoes. Instructions, Equipment and mountings for genuine electroplated process. Free catalog. Hollywood Bronze Supply, Dept. B-1, 1624 East First Street, Los Angeles 33, California.

ENVELOPES addressed accurately, reasonably. Fast service. We have capable addressers in your city. Glenway System, 5713 Euclid, Cleveland 3, Ohio.

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MEN.—Income from local information. No selling. Neherco, LaVerne 6, California.

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MAKE extra money. Address, mail postcards. Spare time every week. Write Box 14, Belmont, Mass.

BOOKKEEPERS. Increase earnings operating sensational bookkeeping service. Kern, 5632B Lankershim, North Hollywood, California.

MAKE Money At Home as renewal headquarters for all magazines. Liberal commissions. No experience—no capital needed. Supplies furnished. Write for Free Catalog. McGregor Magazine Agency, Dept. 510B, Mount Morris, Ill.

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BREED Rare Tropical Fish at home. Earn Big Money! Learn Secrets! Help fill huge demand. Amazing Opportunity! Free Plan. Tropical Fish Breeders, Los Angeles 61, Calif.

HOW and where to obtain Capital? Free details. Star Service, Wapakoneta, Ohio.

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MAIL Circulars. 100% commission. Free details. Fisher's, Dept. S4, 4750 So. Central, Los Angeles 11, California.

GROW Mushrooms, anywhere, anytime, for business, extra cash, hobby. Mushroom Lab, 32nd A Kendrick St., Lawrence, Mass.

YOUR Own name brand business. No investment; no inventory. Part time or full time. Sell famous brands of appliances, housewares, silverware, radios, vacuum cleaners, lamps, tools, clocks, watches, jewelry, etc., over 1,000 items. Join thousands of successful independent dealers. Send for Free catalog and dealer price list. H. B. Davis Corp., Dept. F, 145 W. 15 St., New York City.

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BECOME A game warden, professional hunter! Join forestry, park, fishery services. Good pay! Opportunities open! Free!—revealing "Select-Job Chart," details, job-getting secrets. Write "Home-Study Institute" AL, Los Angeles 19, California.

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MAKE Money growing miniature trees on your window sill. Free seed and plan. National Nursery, Dept. GC, Inglewood 4, Calif.

FREE booklet "Money Making Facts" tells mechanically-inclined men how to start sparetime business at home. Charles Foley Company, Columbia Heights, Minn.

REPAIR Dolls; make rubber stamps. Catalog "60 Ideas" Free. Universal, Box 1076-B, Peoria, Illinois.

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"MAGIC Secrets of Wheat Trading," complete course, Pugh's Publications, Ambass. Station, Los Angeles 5, California.

\$1,000 MONTHLY, home, mailorder, free advertising method. Revealing information. Seidel, 6000-B Sunset, Los Angeles 28.

OPPORTUNITY Mails three months 25c. Donovan, 793 Greebelt, Levittown, N.Y.

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N.Y. Classifieds airmailed \$1. Valentine, Box 493, White Plains, N.Y.

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EARN Money at home! Must have good handwriting. Write for details. Atlas, Box 188-P, Melrose, Mass.

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REAL Manufacturing Formulas Lists Free. Cumming, Chemist, Gordon Avenue, Syracuse 4, New York.

FREE Formula Catalog. Anything analyzed \$35.00. Western Chemical, Salem, Ore.

FREE Formula list—anything analyzed. Northwestern Laboratories, 2316 Brown, Evanston, Illinois.

MODERN formulas for today's fastest selling big-profit products. Literature free! Miller, Chemist, 1517-A, Tampa, Florida.

40 PLASTICS

LEARN Plastics at home. Complete kit—\$5.98 postpaid. Dime brings sample plastic, three experiments, full details. Plastic Projects, Box 5151, Detroit 35, Mich.

PLASTICS home-craft course for Men and Women. Tells and shows how to make hundreds of fast selling plastics products. All plastics and materials for 23 projects included in course. No special tools needed. Course pays for itself. Write for Free booklet. Interstate Training Service, Dept. D-2-D, Portland 13, Oregon.

PLEXIGLAS, Lucite sq. ft. (12"x12") cost 1/16" \$1.14, 1/8" \$1.50, 3/16" \$1.85, 1/4" \$2.20. Add 10% for postage. Almac Plastics, 600 Broadway, New York 12, N. Y.

NEW Liquid casting plastic. Clear, colors. Embed flowers, insects, coins. Saw, drill, carve. Send 25c for "How to Cast with Liquid Plastic" and proved Success Plan showing how to make money at home. Castolite, Dept. D-102, Woodstock, Illinois.

VINYLLITE. Price list sent free. Solomon, 46A Cornhill, Boston 8, Mass.

HIGH Profits—Jewelry, gifts, novelties. Free catalog. Pilot Plastics, 67-B Fulton, New York 38.

PLEXIGLAS sheets—cut to size—clear, all thicknesses—standard outdoor translucent colors. McClarin Plastics, P.O. Box 168B, Hanover, Pa.

PLASTIC Sheets, Rods, Tubes; etc. Free List. Plastic Supply Co., 2111 Olive St., St. Louis 3, Mo.

BUTTERFLIES locked in plastic lampshade material included in our complete catalogue. VanHorn Plastics, 1905 Ingersoll, Des Moines, Iowa.

PLEXIGLAS, Fiberglass, Polyester, Acetate, Vinylite. Fast service. Wholesale-retail. Catalog—15c. Gem-O'-Lite, Box 6862P, North Hollywood, California.

PLEXIGLAS, Lucite. Square foot cost 1/16"—\$1.10, 1/8"—\$1.45, 3/16"—\$1.75, 1/4"—\$2.15, 3/8"—\$3.28, 1/2"—\$4.38. Colors add 10%. Send 15% for postage. Aristocrat Plastics, Inc., 55 Clarkson St., New York City.

MIRACULOUS New Vers-Ac hardens itself in minutes. Handle like putty or pour in molds. Form bearings, threaded anchorings, nuts, model parts. Extremely strong. Hard as metal. Single unit \$1.00. Vers-ac Mfg. Co., Broadway, Va.

41 CHEMISTRY & PHYSICS

NEW idea chemical and apparatus outfits for home experimenting. Photo-scales, microscopes, chemicals, biologicals, and laboratory supplies in small quantities. Catalog 25c. Established 1931. John H. Winn, 124B West 23rd St., New York, N. Y.

AMATEUR Chemists—Have you seen our monthly paper? No Charge. Write: The Amateur Chemist, Westwood, Lassen County, Calif.

SPECTROSCOPE For quick chemical analysis \$3.00. Cutting Sons, Los Altos, Calif.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology 20c. Tracey Laboratories, Evanston, Illinois.

GEIGER, Scintillation counters, calibrated for uranium. Catalog, 10c. Atomic Laboratories, Box 343, Berkeley, California.

"FUTURE Chemists of America." Home study for beginners. Exciting. Practical. First lesson 25c. Parkway Laboratory, R. =1, McKees Rocks, Pa.

NEW Catalog, lists, 25c. Laboratory Sales, Box 161-B, Brighton, Mass.

AMAZING New Book of Science, Experiments, Formulas and catalog of Laboratory Supplies. Only 25c. National Scientific Co., Dept. PS-4, 2204 W. North Ave., Chicago 47, Illinois.

CHEMICALS and apparatus for industrial, analytical and private laboratories. Catalog 25c. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N. Y.

EXPERIMENTERS Supplies catalog: 20c. Hagenow Laboratories, 2414 Clarks, Manitowoc, Wisconsin.

42 HELP WANTED

MAKE extra money. Address, mail postcards. Spare time every week. Write Box 14, Belmont, Mass.

OVERSEAS, Latin American, Alaska, Canada Employment. Originator 1955 "Foreign Service Directory" Up-To-Minute Report on Military & Civilian Construction; Oil Companies; Aviation; Transportation; Steamship; Mining; Government Job Info. How-When-Where to apply. Listing Firms Hiring. \$1.00. Global Reports, Box 883-S, Hollywood 28, Calif.

FOREIGN Employment Construction Work. If interested in foreign projects with high pay, write Foreign Service Bureau. (Dept. P.S.), Metuchen, New Jersey.

CALIFORNIA jobs. San Francisco classified airmailed \$1.00. Hubbard, Box 1442, Palo Alto, Calif.

PORTLAND, Oregon, help wanted column air mailed \$1.00. Pacific Employment Information Service, Brightwood, Oregon.

SAN Francisco Selected Job Digest airmailed \$1.00. Two weekly sequences free. Hoffmann, 880 Glen, San Leandro, Calif.

MONEY-making sensation; 100% duPont nylon stockings wear like original pre-war nylons. We guarantee 3 pairs to wear 3 months or replaced Free. Every woman wants them. Write for free Kit. American Mills, Dept. 463, Indianapolis.

SUNNY Tampa's largest Sunday help wanted section airmailed \$1.00. Craigs, 4219 Barcelona, Tampa 9, Florida.

ADDRESSING Typing Materials furnished rush 25c. Hustlers Club, Alger, Mich.

N.Y.C. Help Wanted columns, large Sunday Edition airmailed \$1.00. Box 2253, Paterson, N.J.

LOS Angeles help wanted columns airmailed \$1.00. Menick, Box 222S, Whittier, California.

LOS Angeles help wanted columns airmailed \$1.00. Art, Box 775, Inglewood, Calif.

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NEW Job catalog. 56 pages, illustrated. Pay to \$240 weekly. Overseas, U.S.A. Detailed opportunities: truck drivers, office, construction, guards, laborers, Alaska cannery workers (hiring 12,500), clerks, others. Wages, overtime, conditions, transportation, Women's opportunities. Catalog. "Firms Seeking Applicants" bulletin, applications, complete, \$1. Jobservice Publishers D-1, Stevensville, Montana.

\$1300.00 MONTHLY for truck drivers. \$1400.00 monthly for carpenters, electricians, plumbers, mechanics, \$1200.00 for clerks and laborers. Full information and complete foreign listings, with current information on Spain, Korea, Australia, Alaska & Canada. \$1.00. Current information on stateside projects. \$1.00. Dept. 4-D, Opportunities Unlimited, 1110 Commerce Bldg., St. Paul, Minnesota.

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LOS Angeles Times help wanted columns airmailed \$1.00. Jolly, 5157 Chesley, Los Angeles 43, California.

ANCHORAGE, Alaska, Help Wanted Columns airmailed \$1.00. Box 3022, Anchorage, Alaska.

ELECTRONICS. Job opportunities. Company addresses \$1. Trifiletti, Box 1236, New York 17, New York.

LOS Angeles help wanted ads airmailed \$1.00. Letters remained 25c. Box 104, South Pasadena, California.

INDUSTRIAL Cincinnati help wanted column airmailed \$1.00. P. O. Box 1102, Cincinnati, Ohio.

DENVER Help and business wanted columns. Air-Mailed \$1.00. P. O. Box 186, Penrose, Colorado.

AVIATION Jobs—Names and addresses of companies to contact. \$2.00. Fitzgerald, Dept. A-19, 815 Countryside Drive, Wheaton, Illinois.

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YOUR own business—Suits \$1.50; Overcoats 65c; Mackinaws 35c; Shoes 12½c; Ladies' Coats 30c; Dresses 15c. Enormous profits. Catalog Free. National, 1218-J South Jefferson, Chicago 7.

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MAKE extra money. Address, mail postcards. Spare time every week. Write Box 14, Belmont, Mass.

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30,000.000 WOMEN want amazing new Automatic Refrigerator Defroster. You sell 8 out of 10 on sure-fire Free Trial. \$250.00 weekly profit not uncommon. Rush postcard for guaranteed plan. D-Frost-O-Matic, Dept. D-103, 173 W. Madison St., Chicago 2, Illinois.

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\$1.00 PROFIT selling \$2.95 photo en- largement offer. Allen Studio, Reigler Bldg., Little Rock, Arkansas.

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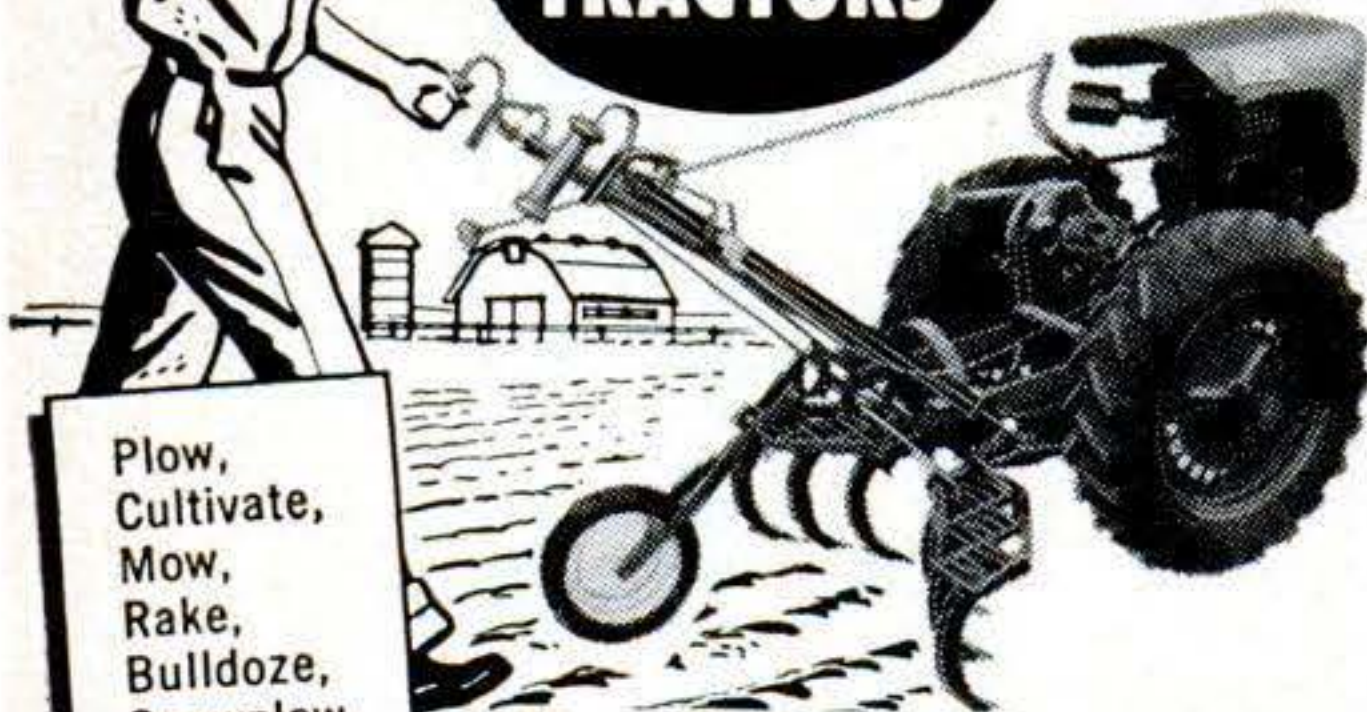
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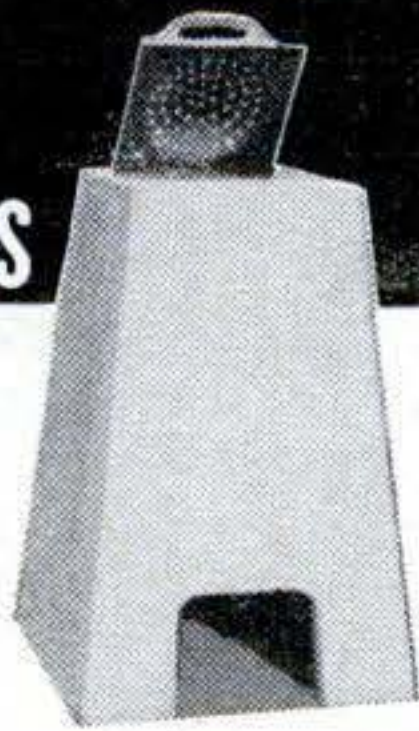
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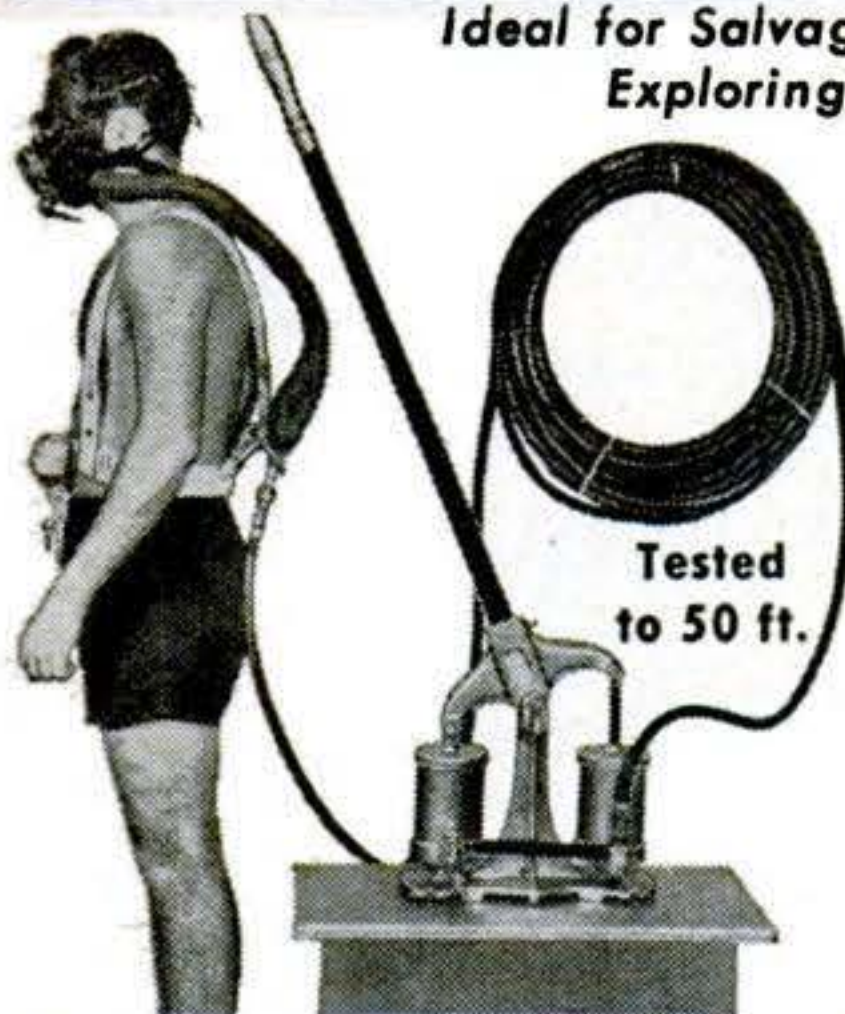
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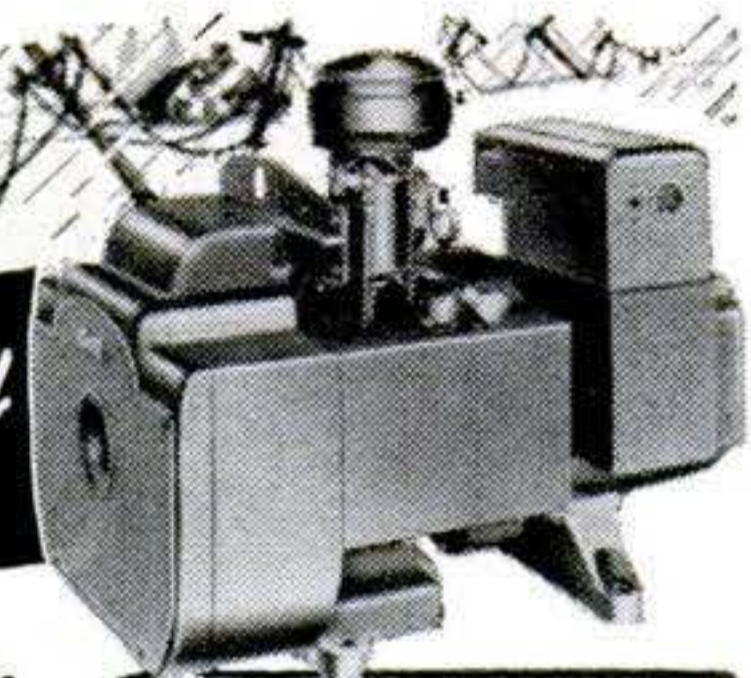
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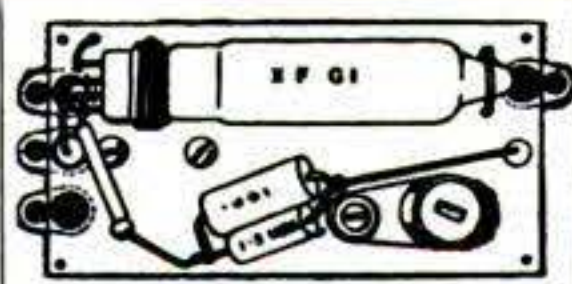
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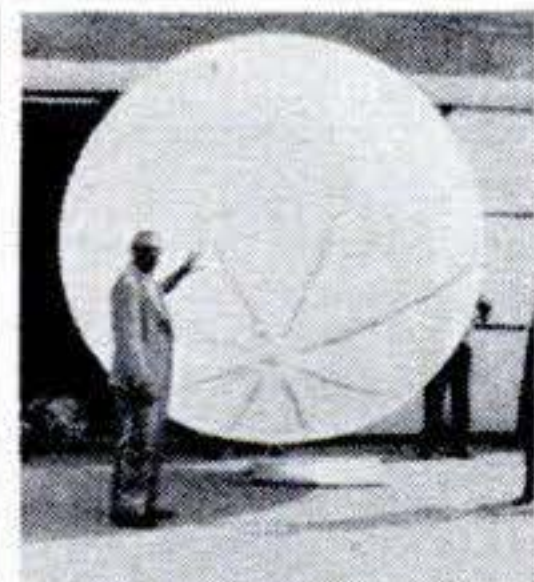
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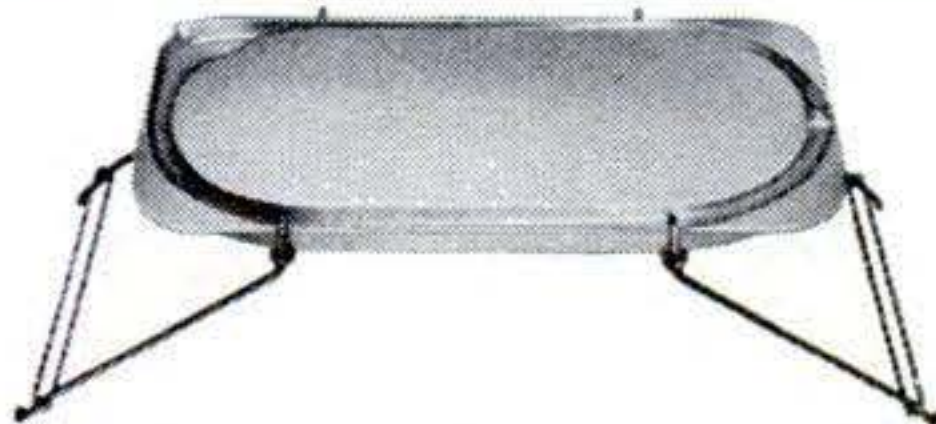
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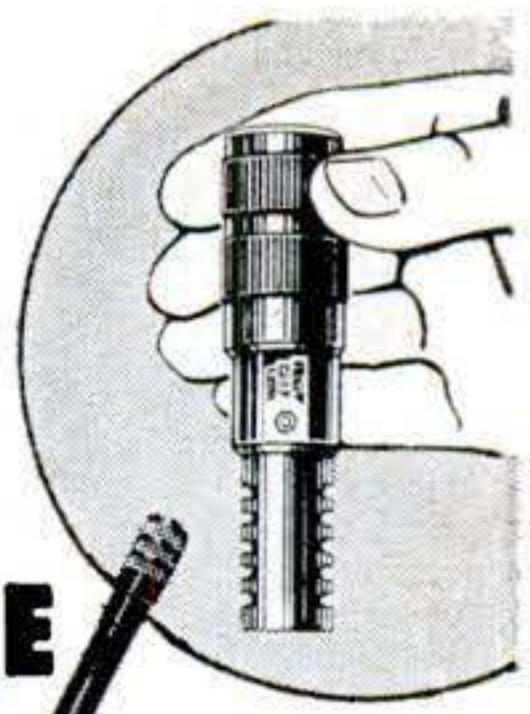
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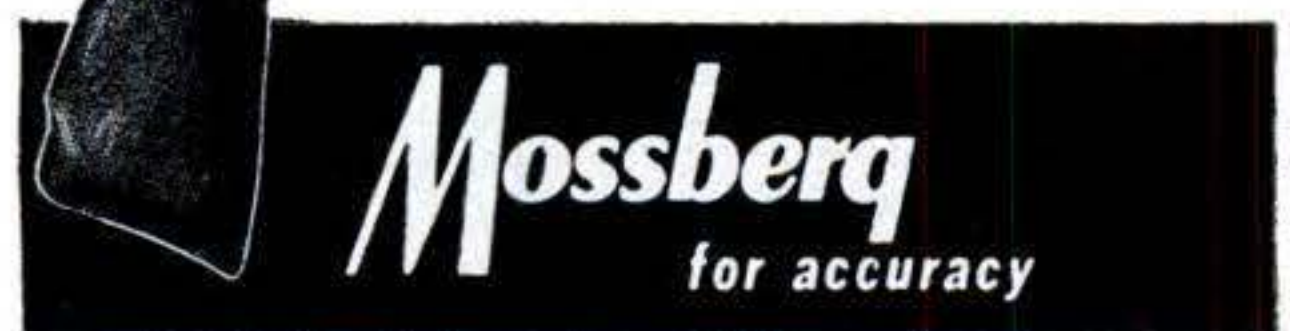
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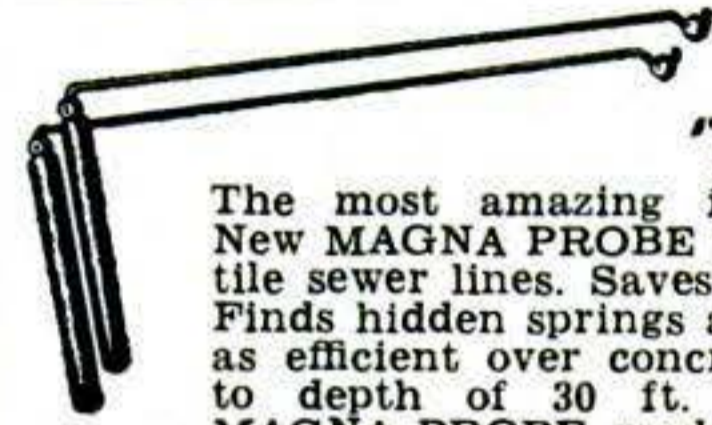
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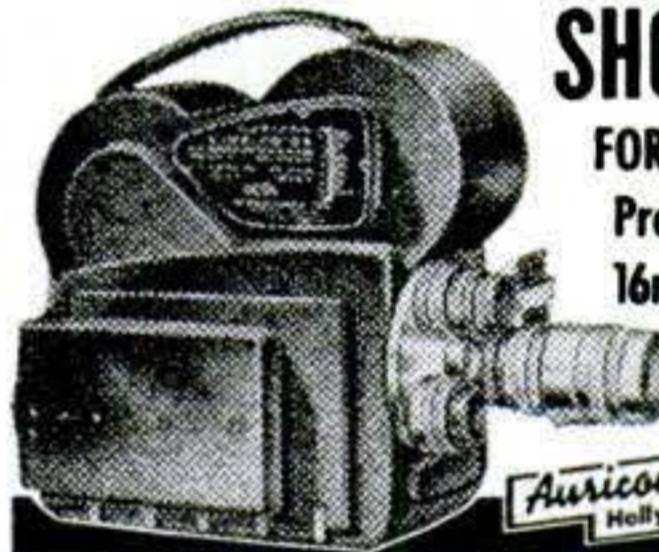


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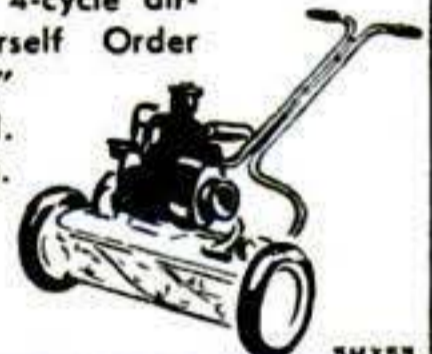
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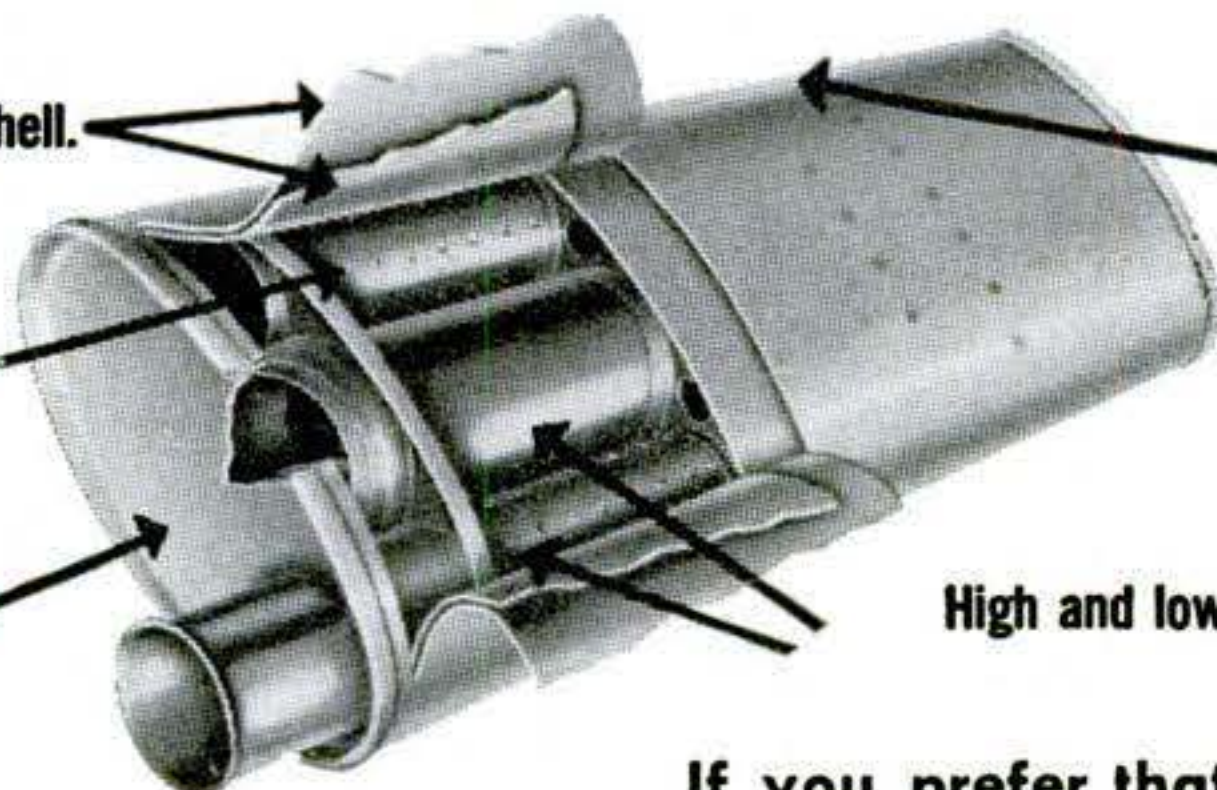
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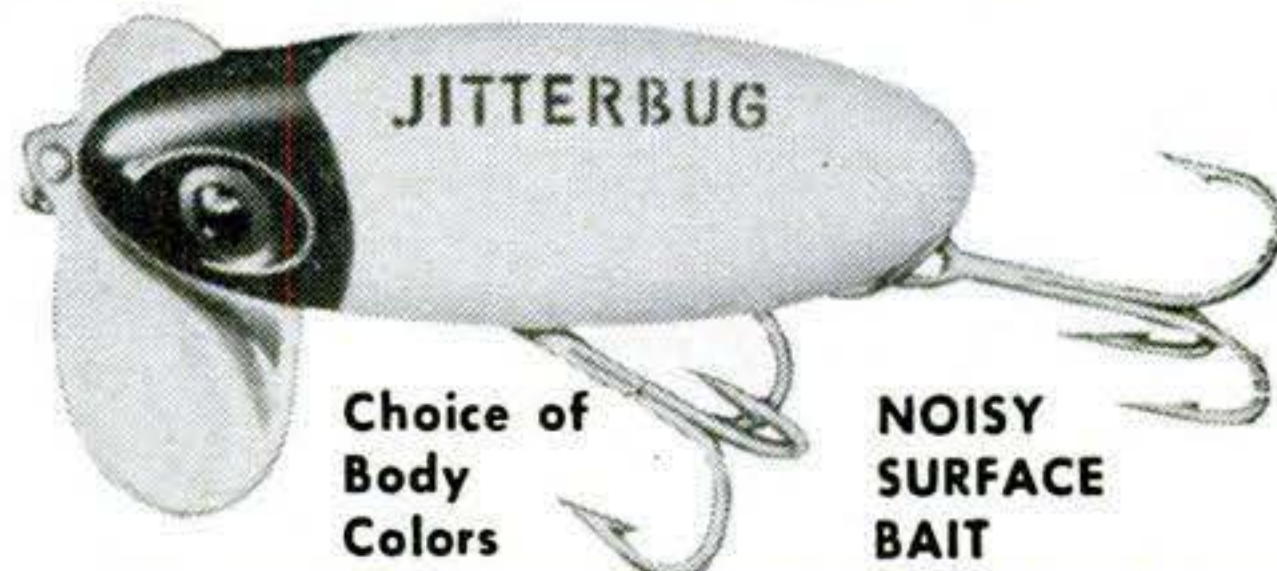
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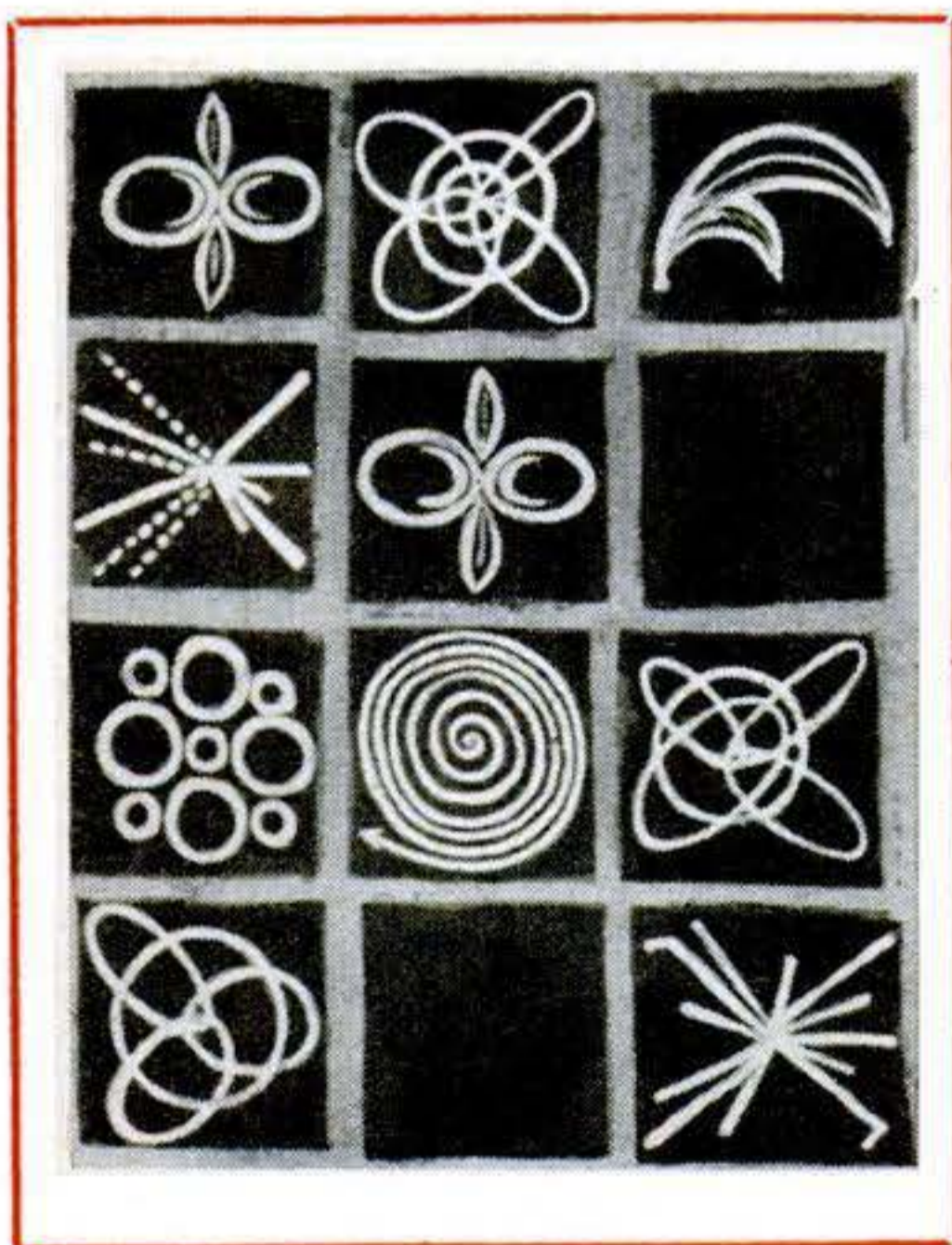
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news & notes

YOU GET EXTRA HORSEPOWER AT HIGH SPEED with a new coupling for your car's fan and generator. It's a centrifugal clutch that permits slippage at high speeds, when accessories otherwise steal more engine power than they need. Lipe-Rollway Corp., Syracuse, N.Y., developed it...THE ARMY HAS A DREAM TRUCK made entirely of aluminum, even to wheels and axles. The Chrysler-built T55 weighs 6,000 pounds less than similar models. It has a 200-hp. air-cooled engine with fuel injection, and an automatic shift...AN ALL-MAGNESIUM AIRPLANE is being tested by the Air Force. One advantage: The supply of magnesium is inexhaustible--it is extracted from sea water.

CONCRETE BLOCKS WITH DECORATIVE FINISH ALREADY ON THEM now make it easy to build a completed wall in one operation. Some blocks have surface designs, others come in colors. One type has a glazed, tilelike surface...BALL-POINT LEAD PENCILS--they never need sharpening--are now on the market (Scripto, Parker). They work like ball-point pens but use liquid graphite instead of ink. Their writing is erasable.

SHOULD YOU USE HEAT OR COLD TO KILL THE PAIN after a tooth extraction? Makes no difference, a study at University of Pittsburgh indicates--one is as good as the other...A HELICOPTER SHOOTS PAINT AT BUFFALOES to tag the big animals for study of their migrations across a Canadian game preserve...EXPLODING ATOMS DECORATE THE DRAPERIES at Sweden's Gustav Werner Physics Institute. The Institute's head, Nobel Prize winner Theodor Svedberg, couldn't find suitable fabric, so he designed his own. Prof. Svedberg calls his pattern (shown at left) "Atomics"...A NEW RADAR IDENTIFIES AS WELL AS DETECTS airplanes as far off as 200 miles. The beam triggers an automatic radio that broadcasts an identification code. Lake Central Airlines uses the Melpar development.



NEW BOOKS BY PSM CONTRIBUTORS include: "Radio-Control Handbook," by Howard G. McEntee, published by Gernsback Publications, 25 W. Broadway, NYC; "The Story of Tire Beads and Tires," by Walter E. Burton, McGraw-Hill Book Co., 330 W. 42d St., NYC.

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Mrs. Petty and their sons Maurice (L.) and Richard.
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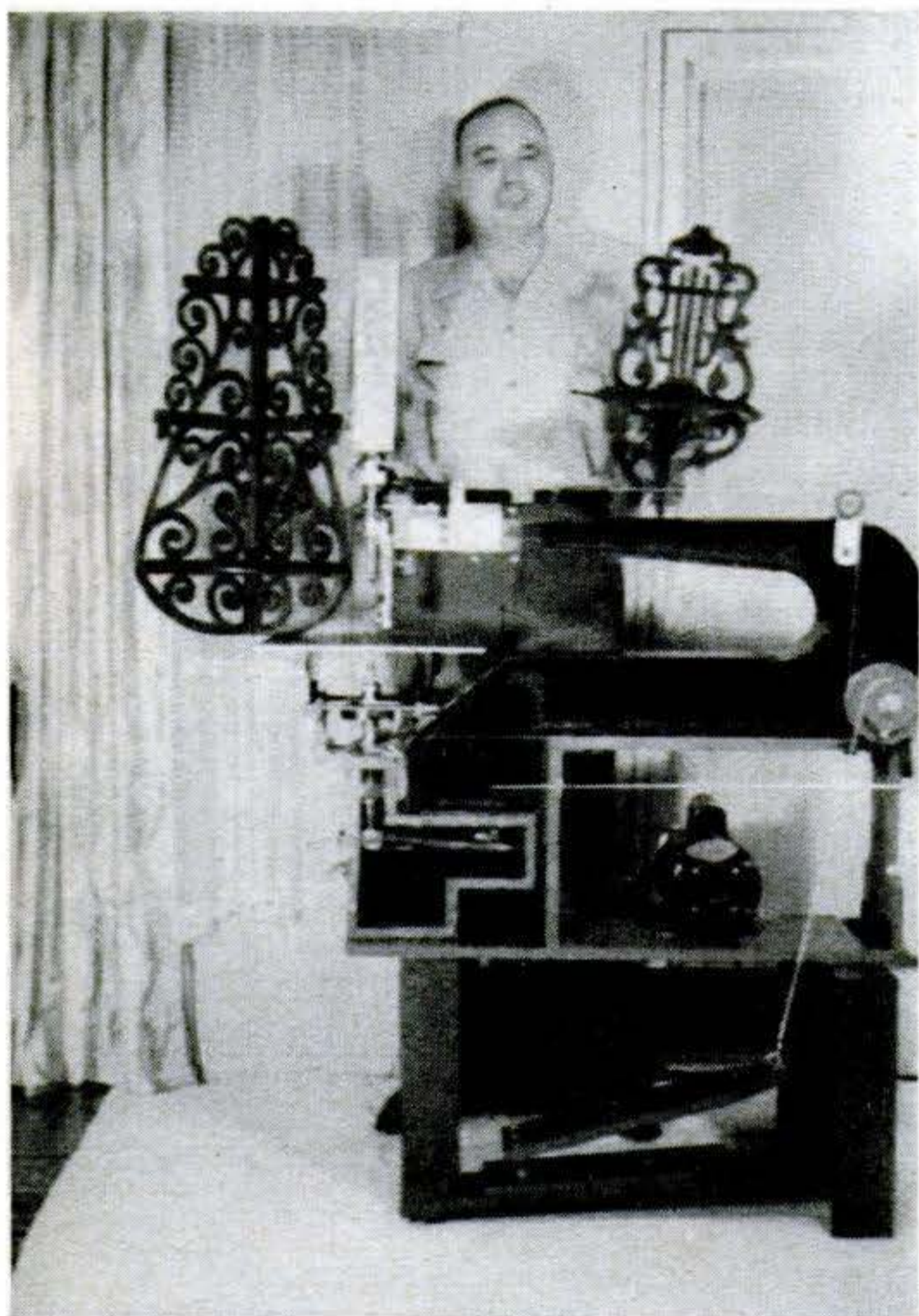
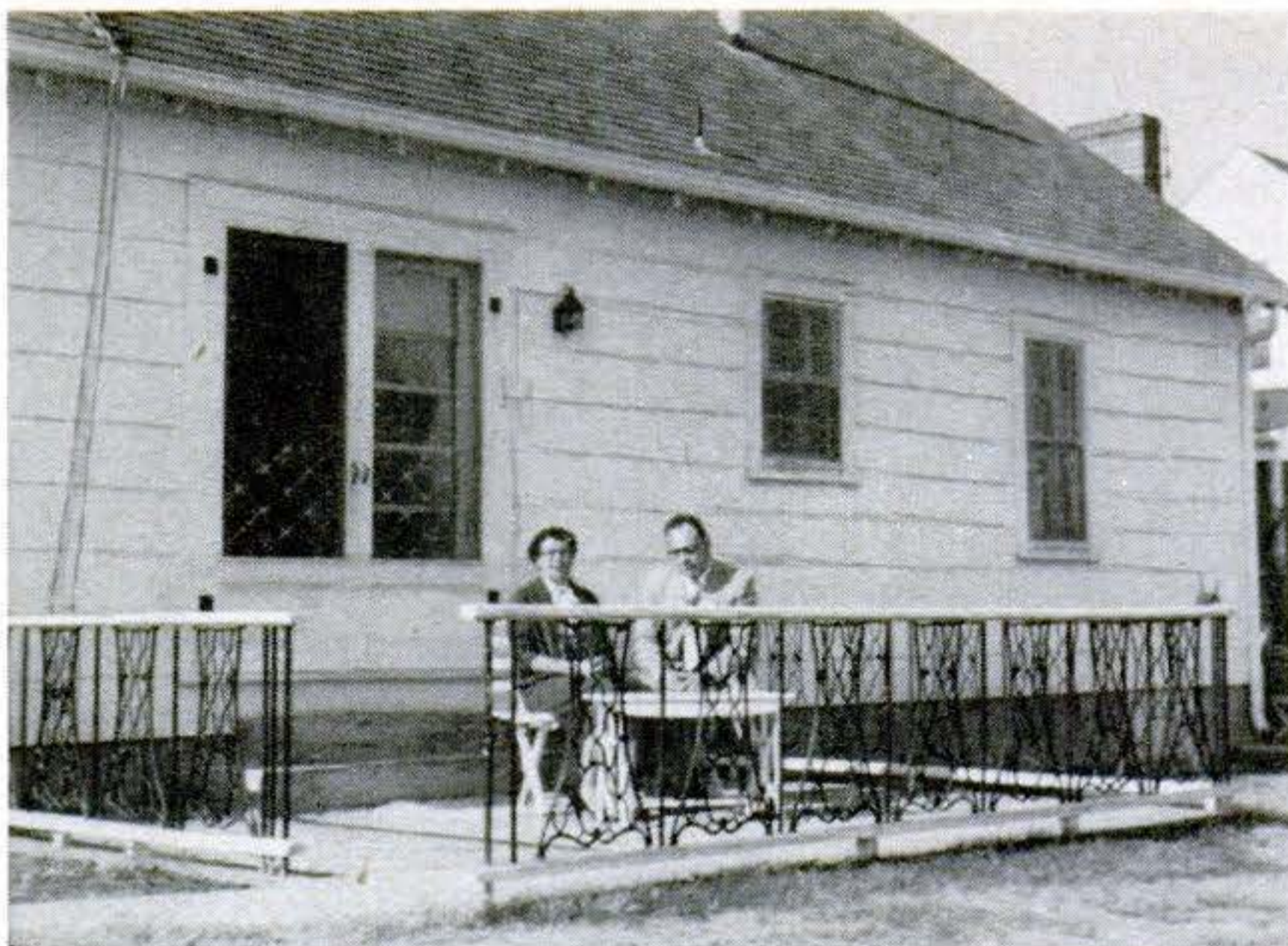


JACK JESSEE—DAYTONA BEACH NEWS-JOURNAL

CRAFTSMEN AT WORK

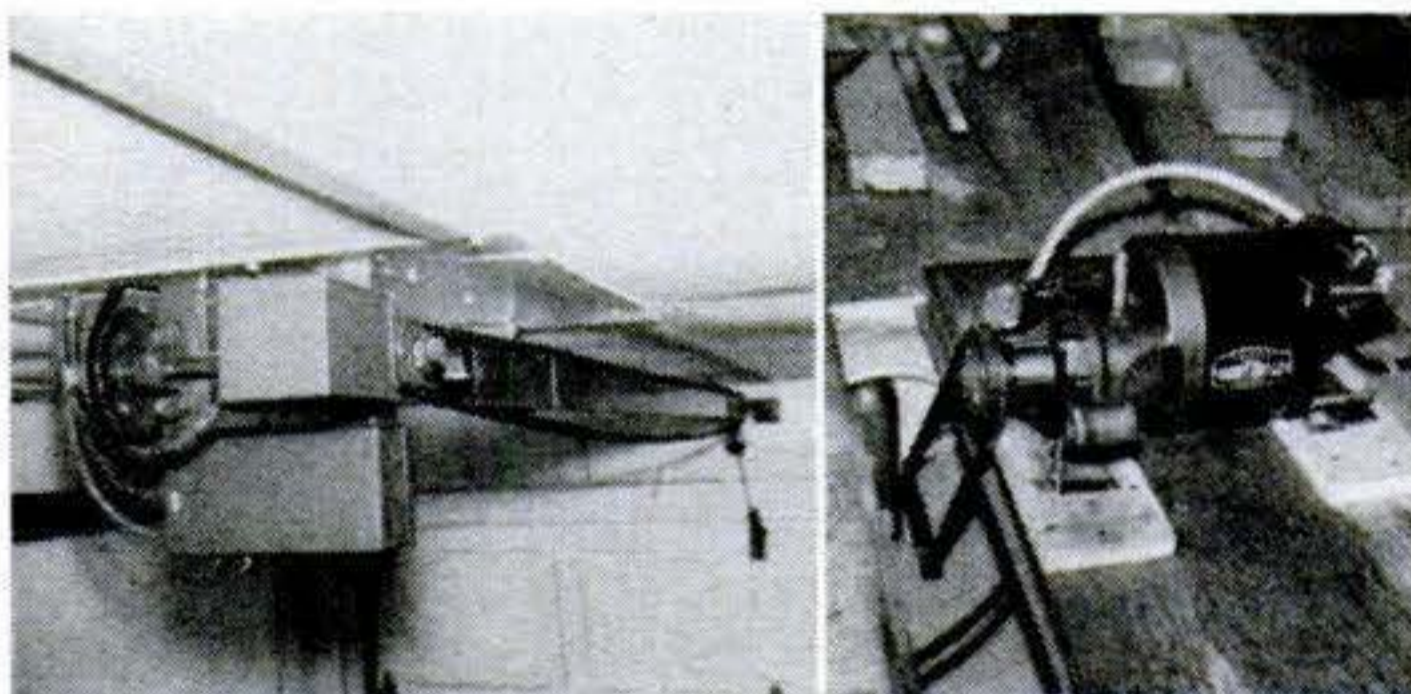
Novel Fence Encloses Patio.

A supply of treadle sewing machines inspired Paul Jolly, a sewing-machine dealer of Glasgow, Ky., to fence in his patio with the iron-grille stands. The grilles were screwed to a top wooden rail and set in slots in a bottom rail. Between them and at corners he used ordinary pipe.



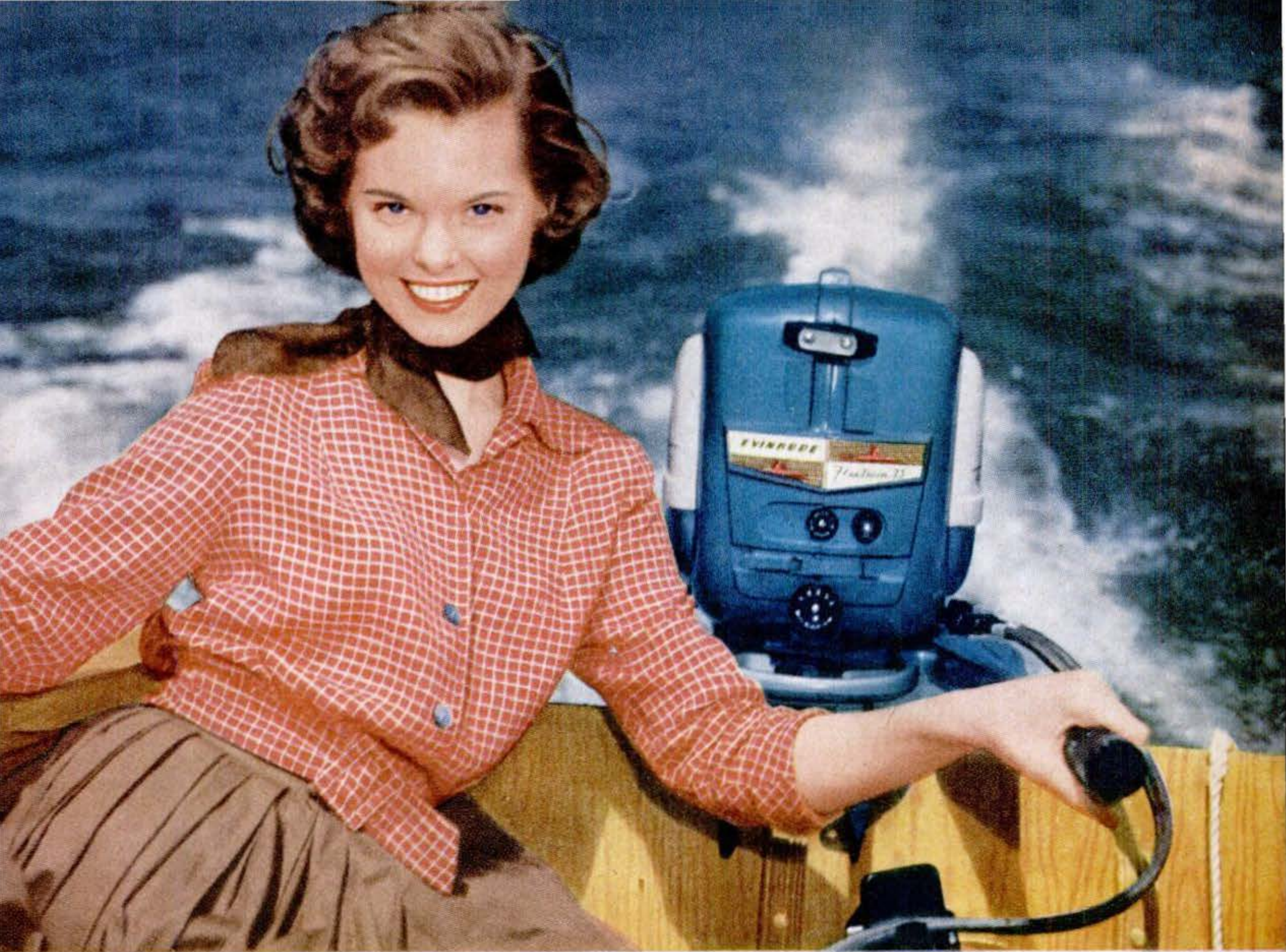
Pedal Controls Jigsaw Angle. Intricate scrollwork is done by Charles Gaines of Vallejo, Calif., on a jigsaw he built himself. Instead of turning the work to cut complex patterns, he changes the angle of the blade by means of a foot control.

Chair Rocks on Springs. Built by E. J. Pelletier of Retsil, Wash., for \$5, this rocking chair utilizes flat springs for its rocker. Construction is chiefly of scrap stock, with wheels and axle of hard maple. The springs are oak boards, but they are soon to be replaced with spring steel.



Washer Motor Opens Garage Door. Taking the motor drive transmission from an old Bendix automatic washing machine, Alex R. Minelli of Hibbing, Minn., uses it to operate a chain drive for opening and closing his garage door.

He installed the motor on the floor of the garage attic, and just below it on the ceiling located the limit box, clutch and relay box along with an 8' track and door linkage. Operation is by a key switch which he installed in the driveway.



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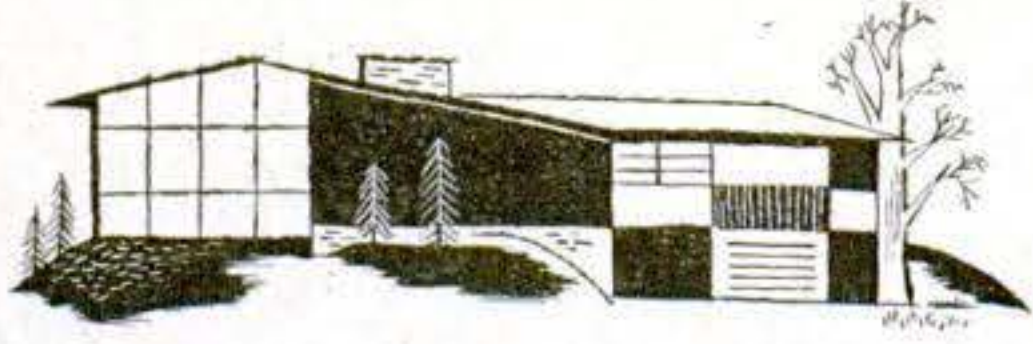
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Architects

Suburban Home Ideas



“Best development house” expands from the inside

1 A split-level, this low-cost Techbuilt house is designed so that it can grow with the family without costly outside additions. It is built around a core consisting of utilities and immovable fixtures such as stairs, chimney, fireplace, bathrooms. The

rest of the space is free and flexible. All partitions can be moved at will, thus increasing or decreasing either living or sleeping areas to fit a family's varying needs throughout the years. Architects: Carl Koch and Associates, Cambridge, Mass.

salute 7 fine homes

Low-cost houses and mansions are becoming more beautiful as U.S. suburbs continue to grow.

THE great exodus of American families from cities to suburbs, and from rapidly congesting suburbs to those just emerging from fields and woods, is changing the nation's appearance. It has spawned the century's biggest and longest construction boom. Since 1940, it has added 15,000,000 residents to areas 10 to 40 miles from the hearts of U.S. cities.

This year the building industry ex-

pects 1,300,000 new homes to be built. Some think this figure will be matched every year for the next five years.

Not only more, but finer, homes are rising. Pictured here and on the next two pages are seven homes that were chosen as outstanding by a panel of architects and building experts.

Awards of Merit from the American Institute of Architects were won last year by the designers of six of these houses. A prized First Honor Award went to the striking, custom-built residence shown below. Pictured in color at left is "the best development house."



First Honor Award home is mirrored in a man-made pool

2 Of this residence of Mr. and Mrs. James D. Moore, located in the semi-arid Ojai Valley in California, the A.I.A. jury said: "This house gets its special quality from a beautiful play of light and shade, the handling of materials and textures, the use of

water and landscape to enrich the lives of the people who own this very handsome residence. The problem was the creation of an oasis and this was achieved." Architect: Richard J. Neutra; Dion Neutra, collaborator; Los Angeles.



Spacious activity room planned for family work or whoopee

3 In a walnut orchard at Roseda, Calif., are the Blue Ribbon Tract houses. They have three bedrooms and two baths, all on one floor. High spot of these homes is the "family" room, shown above, made from floor space usually taken up by the break-

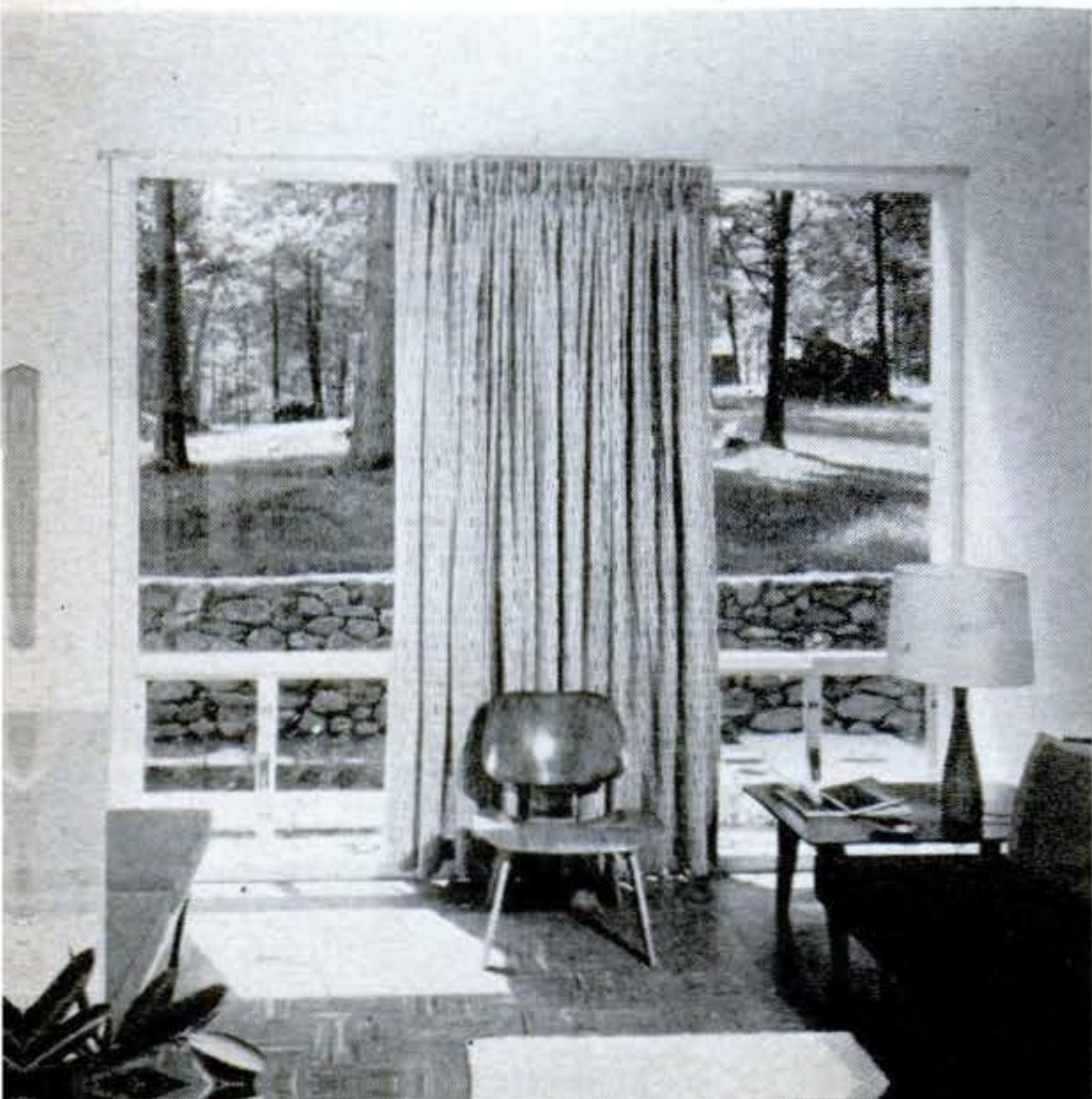
fast room, bedroom hall and service porch. Ideal as play space for the children, it also serves as mother's laundry and sewing room, dining nook for the whole family, entertaining room in the evening. Architects: Smith & Williams, Pasadena, Calif.

Glass gives big-room look

5 The three bedrooms in this Hollin Hills, Va., house are small, but outside glass walls give an illusion of space. The sleeping area is separated from the living zone by a service core. Architects: Charles M. Goodman Associates, Washington, D.C.

Passageway is put to work

6 A long corridor giving access to four bedrooms is no waste space in the Sunshine Meadows homes, Santa Clara, Calif. It houses the laundry facilities, water heater, broom closet and storage space. Architects: Anshen & Allen, San Francisco.





Hollywood hilltop home has open view in all directions

4 This city home, although only four blocks from busy Hollywood Boulevard and in the middle of a thickly populated residential district, offers all the privacy and charm of country living. The house is so placed on its hilltop lot that a visitor, ap-

proaching by a spiral road, cannot see the house until he is almost on top of it. This made possible the use of large window areas on all sides to take advantage of magnificent views. Architect: George Vernon Russell, Los Angeles.

Stilts give upper floor a lake and mountain vista

7 This low-budget house, built for a young Seattle couple, faces the Cascade Mountains and Lake Washington, but from the ground the view is blocked by one-story houses in front of it. Raising the living area one flight above the ground, however, made

it high enough to look over the tops of these view-obstructing homes. There is a balcony off the living room and, running on two sides of the house at the upper level, a window washer's walk. Architects: Bassetti and Morse, Seattle.



Split-level houses are

Here are the PROs and CONs of this versatile and popular design that fits house to lot.

By John L. Springer

IN MANY sections, builders report, new houses designed with split levels now outsell one- and two-story houses by a margin of five or six to one. Operators of some million-dollar developments have stopped building conventional houses in favor of splits. Here, living and sleeping areas are not on the same floor, as in ranch homes, or separated by a full flight of stairs, as in two-story houses, but are a mere half-flight of stairs apart.

Houses are being split in different ways. Some are split sideways, with one section of the front higher than the other. Some are split from front to back and look like ranch houses in the front and two-story colonials from behind. Others, split from back to front, have a deceptive Cape Cod look.

“What’s good and bad about a split-level?” I asked architects and realty salesmen. Here’s how their score sheet adds up:

PRO It is ideal for a problem lot—and since most bargain lots have a terrain, water or rock problem, it often provides an easy solution where every dollar counts.

In a typical split design, half the house is built over a crawl space. The other part is raised half a story to rest over a cellar area. But the footings for the cellar are generally level with those for the crawl space, so little excavation is necessary. If the land slopes, you place your cellar on the downside and avoid some of the cost of buying fill.



RANCH-STYLE SPLIT

CON A split-level adds little to a level lot where excavation is easy—building one on a level plot may create dirt-moving problems.

PRO By keeping half the cellar above grade, the split-level makes it possible to use windows generously, avoiding the dank darkness common in older-style houses. In Eastern housing developments, this space is generally used for a garage, laundry area and recreation room.

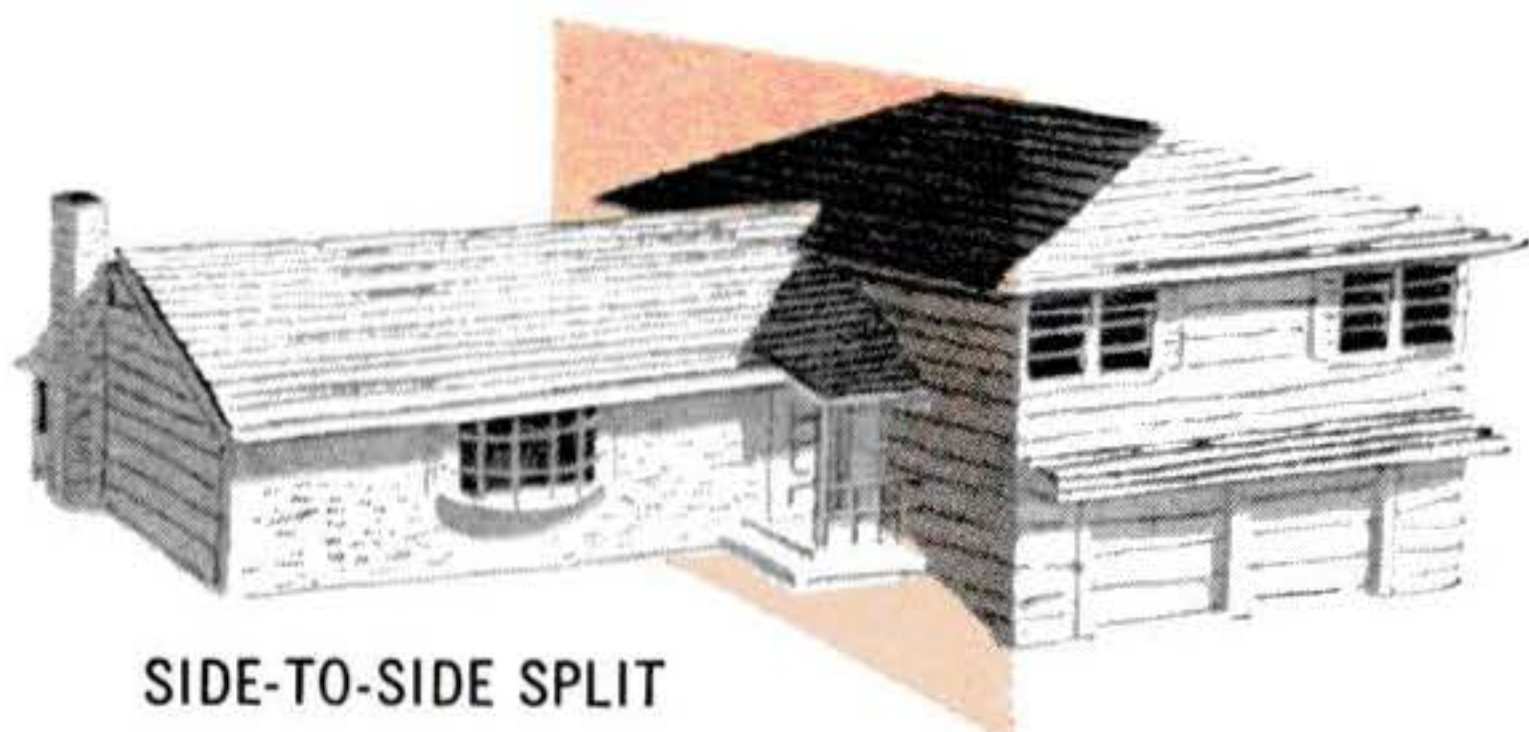
CON The extra space of a split-level is a needless expense if you cannot use it effectively. In the South and on the West Coast, year-round weather may be mild enough so that you do not need a closed-in garage or an indoor recreation room for children or grown-ups.

PRO Some splits, especially those broken from side to side, give a big-house look. Half the house has a two-story appearance.

CON Artistically, the side-to-side split is not generally as attractive as a one- or two-story house. Houses split from front to back do retain much of the artistic appeal of ranch and colonial homes, but appear smaller.



best-sellers nowadays



SIDE-TO-SIDE SPLIT

PRO A split-level enables you to pack more house on a lot. "Many persons object to the all-on-one-floor living of a ranch house, preferring to keep sleeping and living quarters apart," says Louis Licht, president of the Lane Realty Co., sales representatives for 22 developments in the New York area. "Splits provide this convenience because generally a half-flight of stairs separates the bedrooms from noise-making areas."

CON "Splits require more lumber than ranch houses and are usually harder to frame," says Herman H. York, architect for the fashionable Windmill Farms development in Westchester County, N. Y. "Generally, in a split-level, you have two separate roof sections to frame and join. Arranging so that you have adequate headroom in half a flight of stairs is troublesome."

PRO Most modern homes, except those in the lowest price range, are now built with two bathrooms. This creates a plumbing problem for the average ranch house with attached garage. In a split-level, plumbing lines can be run in the wall where the house splits, making it possible to serve two or even three bathrooms, laundry and kitchen with the same sewage and water-supply lines.

CON "Split-level may be inconvenient if there are not enough bathrooms," says Mr. York. "In a one-story house, the bathroom is generally accessible from both living and sleeping areas. In the split-level with a recreation room, you would need bathrooms on different levels to get the same convenience."

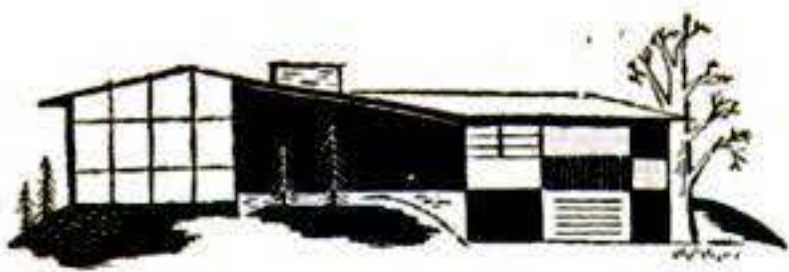
PRO Split-level design is ideally suited to a house with three or more bedrooms. Most architects place bedrooms and baths over the garage-recreation room area, and the space needed for both levels is usually about the same.

CON Many families want only two bedrooms. The space below may then be too small for both recreation room and a garage. "Split-level designs are extremely rare in houses selling below \$12,000," says Frederick Jackson, mortgage officer of the Dime Savings Bank of Brooklyn, which finances tens of thousands of new homes every year. "Builders have found that the relatively small area gained by raising the bedrooms half a flight may not compensate for the additional floor, ceiling and roof framing needed."

When you weigh all the pros and cons, what do you gain from a split-level?

"A split-level with the same amount of living area as a ranch can be built on a level lot and will give you the recreation room as an extra," says Mr. York. "On a lot ideally suited for a split, the gain is even greater."

"The way home seekers respond to the idea of a separate recreation room indicates that it is no passing fad," he adds. "It will be popular as long as there are small children and television." **END**



Suburban Home Ideas

A split-level designed to cut costs

Model shows how tricks used in mass housing can pay off even when you build a single home.

By Herbert O. Johansen

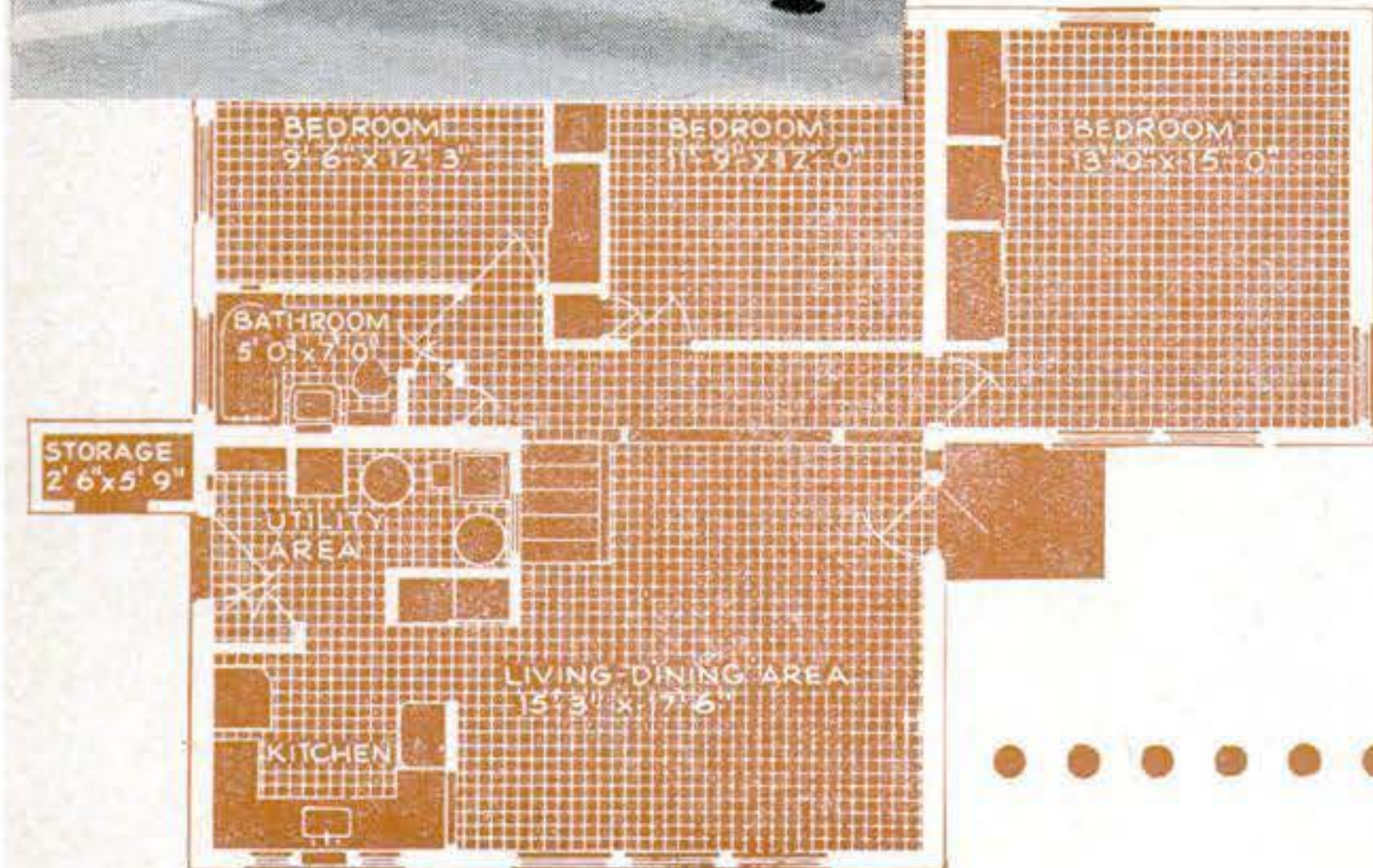
HOUSES obviously are cheaper by the dozen. But suppose you don't want just another pea-in-the-pod house in a big development. What good, to you, are the cost-cutting tricks that have been worked out by the mass builders?

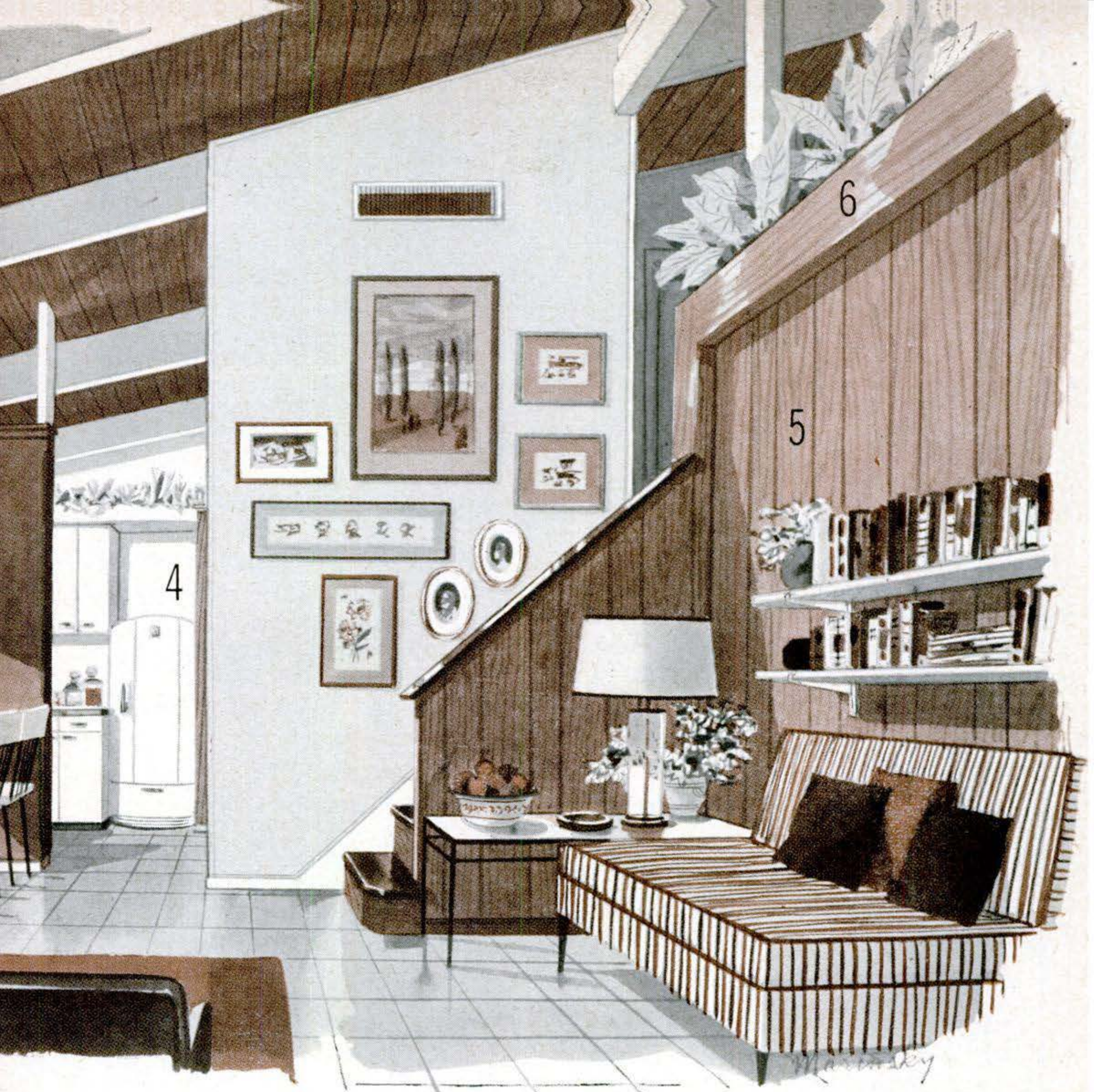
Plenty, says the U. S. Government. The



Uncle Sam built this "farmhouse" that would grace any suburb

SIMPLICITY OF DESIGN and construction is a big factor in keeping the cost of this split-level way down. It's intended to be built as a basic two-bedroom unit, but provision has been made for adding a third bedroom, which is shown in this floor plan and also in the cover drawing (reproduced at left). At the same time, interior doors and other features might be added. The basic unit was built by the Department of Agriculture at Beltsville, Md.





MAJOR COST-CUTTING FEATURES: 1. widely spaced rafters and exposed plank ceiling; 2. walls of oversize brick, not covered on the inside; 3. partitions do double duty; 4. kitchen

and other doors are eliminated; 5. wall between lower and upper levels is of redwood, needs no painting; 6. fluorescent lighting trough at top of wall is also a planter box.

proof: A handsome, two-bedroom brick house constructed on a sloping site in Beltsville, Md.

Solidly built despite its low cost, and thoughtfully planned for comfortable living, this home—intended originally only as an experimental modern farmhouse—might well have been designed for any young family planning to build in the suburbs on a small budget.

Where labor and materials come fairly high, as they do in this area 15 miles north of Washington, D. C., it can be

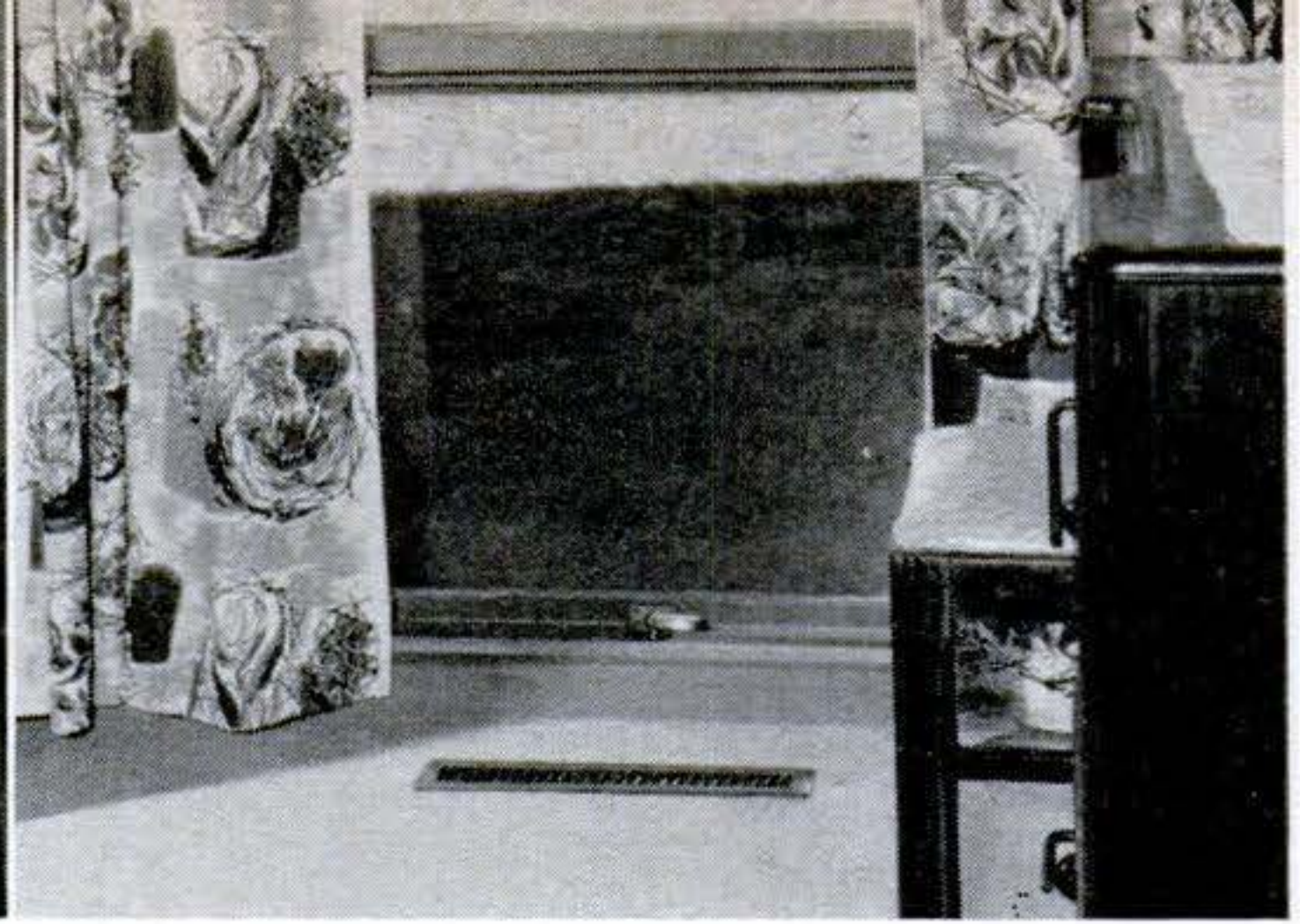
built for \$9,800. The split-level plan provides for adding a third bedroom, as the family grows, for an additional cost of about \$2,000.

“How was this cost-paring done?” I asked J. Robert Dodge, supervisory architect with the Department of Agriculture, which built the house near the dairy farm of its Beltsville research station. “What was the one big money-saving item?”

“You’ve got it in reverse,” he told me. “No one item will save enough—unless



EXPOSED WIRING, painted to match ceiling, is unobtrusive. Nonmetallic cable, permitted in most states, is used. The bubble lamp pulls down for dining and Junior's homework stint.



WARM-AIR OUTLETS for heating are placed close to the walls. This one, at the bottom of a floor-length window, creates a blanket of warmth in front of the large glass area.

you leave off the roof or a couple of walls. You have to cut costs on almost every item—labor and materials—that goes into the house. That was one of the first things we learned.”

Mr. Dodge then took me on a leisurely tour of the house and pointed out some of the features that kept costs down.

Bricks used for the outside walls are over-size, 6" thick and 12" long, known as S.C.R. (Structural Clay Research). Conventional bricks are 4" thick and 8" long. With S.C.R., the walls need only one thickness of brick, as against a double wall with ordinary brick. And since the S.C.R. is longer, a bricklayer can lay a course faster. Also, these bricks have holes in them. This provides air space that prevents condensation, making it possible to leave the brick bare on the inside of the house. Savings: less brick, less labor, no inside furring.

Exposed plank-and-beam ceilings save, first of all, the cost of a false ceiling. Then, the rafters, or beams, are spaced four feet on centers instead of the normal 16 to 20 inches. That means

less lumber for rafters, fewer labor dollars to put them up. To compensate for the heavier loads the rafters have to carry, heavier rafters are used—four-by-eight instead of two-by-six.

There are no doors, except the outside ones and those to the bathroom and closets. Since the bedrooms are on the

upper level, out of view from the living area, it was felt that none was needed for a young couple with one or two children. For added privacy, curtains are cheaper than doors, and easier to hang.

Partitions pay their way. All, except one between the bathroom and the smaller bedroom, serve a functional purpose. Double partitions separating the two bedrooms form

closet space, with sliding doors. The one between the kitchen and living room has a window through which the housewife can talk to her family or guests as she cooks, and then serve the meal when it is ready.

Warm-air heating ducts, six inches square, are made of paper—heavy paper,

[Continued on page 266]

How to Get the Plans

WORKING drawings for the Department of Agriculture split-level house may be obtained through the Extension Agricultural Engineer at many State Agricultural Colleges. Ask for Plan No. 7128, consisting of 10 sheets. The price varies in different states, but the average cost is 25 cents a sheet. If plans are not available in your state, send inquiries direct to the U.S. Department of Agriculture, Farm Buildings Section, Beltsville, Md. You don't have to be a farmer to get them.

Does your house need a garden pool, a terrace, rain-proofing? A special section of Home Improvement Ideas begins on page 199.

Indianapolis Racer Hits the Highway

Now you can have a slick, ground-hugging speedster that comes straight from the famous Speedway—with road comfort added.

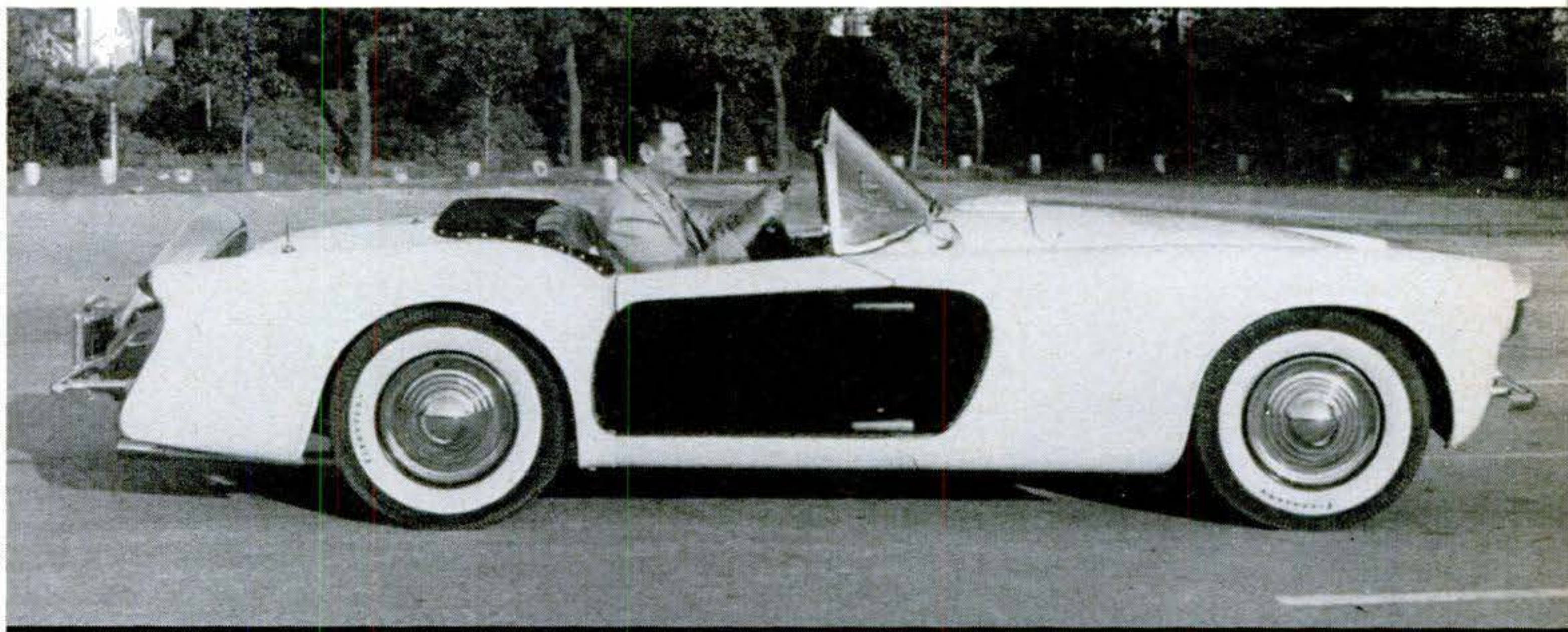
HOW would you like to own the racing car in which Billy Vukovich won the Indianapolis 500-mile classic? Great, you say—but not very practical unless somebody throws a speed track in with the deal.

That is why Frank Kurtis, builder of more “500” winners than any other sheet-metal bender, has turned this streak of lightning into a comfortable roadster that will behave like a gentleman on the highways or in traffic—but can still scat

away at better than 125 miles an hour if you get in the mood for a bit of competition racing.

His newest venture in car building is this 500-M, a sports job with an unusually low silhouette and smooth-flowing lines. You can pick it out by the distinctive black, recessed doors.

For bad weather, there is a plastic-fabric top. Even with the top up, the car stands only 49½ inches high. It is 171 inches long on a 99-inch wheelbase, and



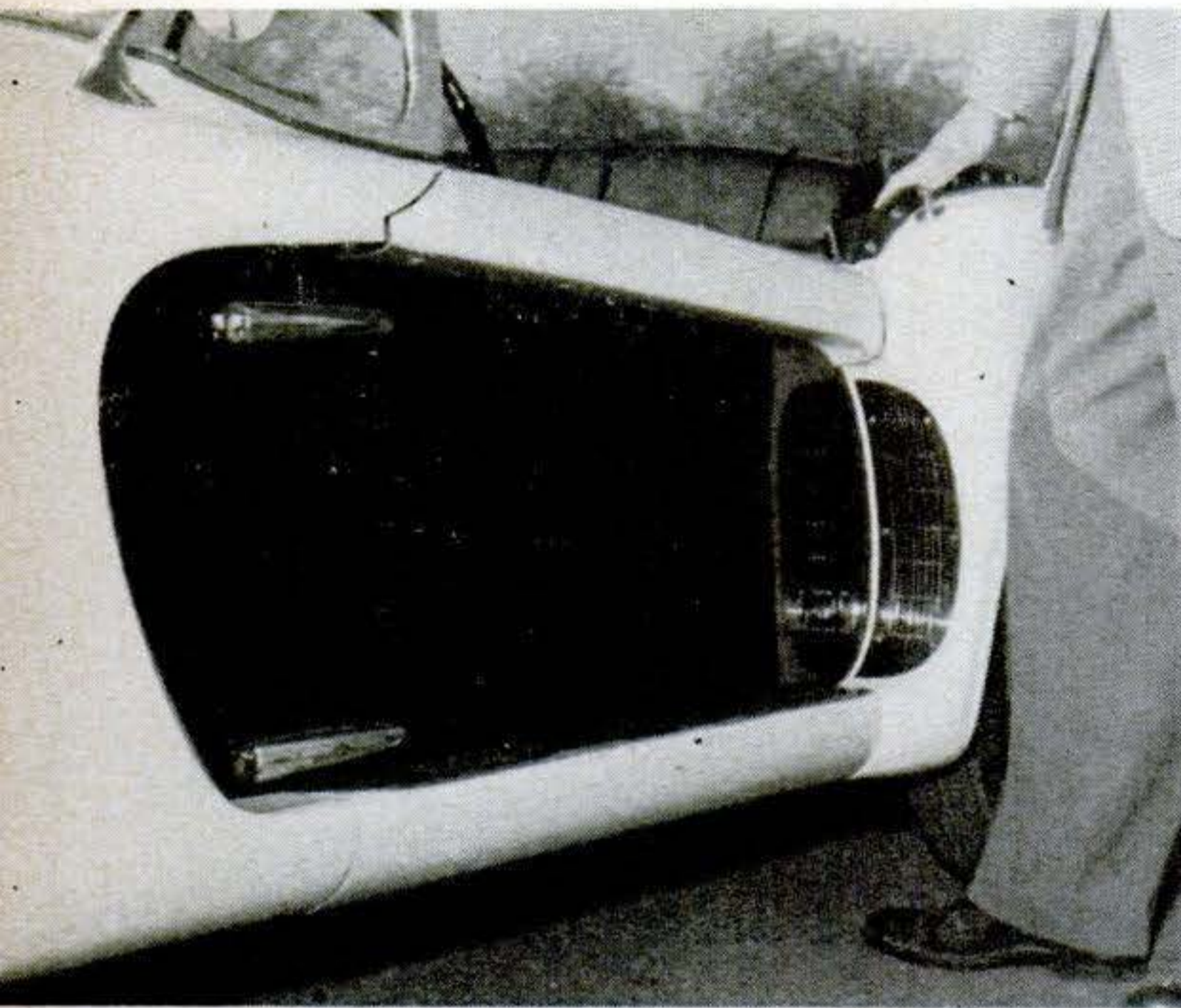
weighs 2,500 pounds. Still, there's plenty of room in the cockpit for the long-legged.

Patterned after the Billy Vukovich Indianapolis winner is the combination steel and glass-fiber body, mounted on a tubular-steel chassis. When driving gets rough, especially in road racing, torsion-bar springing, front and rear, levels the bumps and makes for stability.

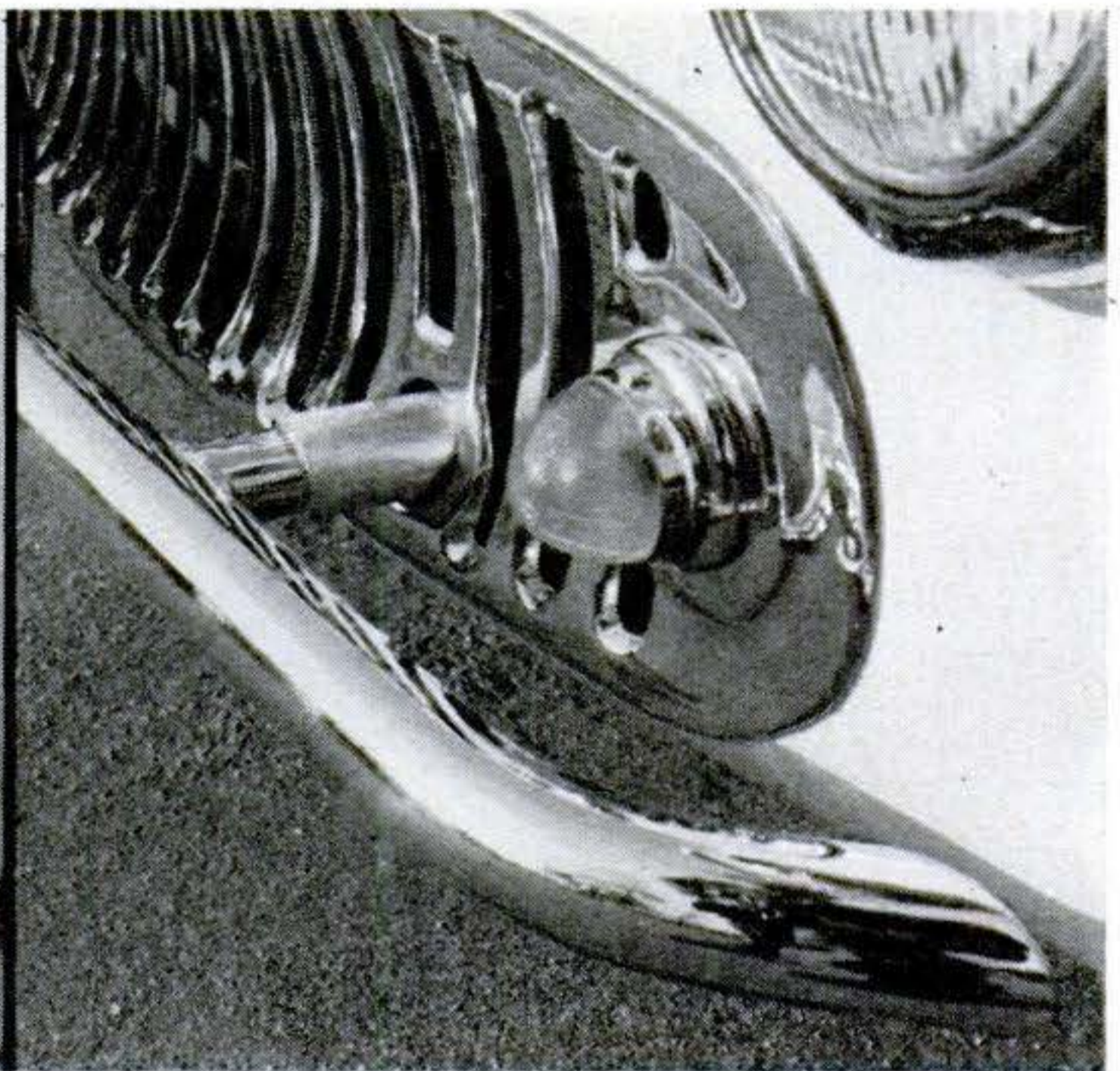
A steering ratio of 12:1 and a 16-foot

turning-circle radius means good driver control when cornering at high speed. Tread is the same, front and rear: 56 inches. Tires are 6.70 by 15.

Kurtis plans to produce the 500-M in quantity in his Glendale, Calif., factory. With a choice of Cadillac or Buick engines, Hydra-Matic or Dynaflo transmissions, the price is about \$6,000. Or you can buy any of 22 parts, singly or in combination, and build your own.



RECESSED DOORS are inset for a reason: Grilles at either end, usually closed, can be opened for racing. One exhausts air from front brakes, the other pulls air into rear brakes.



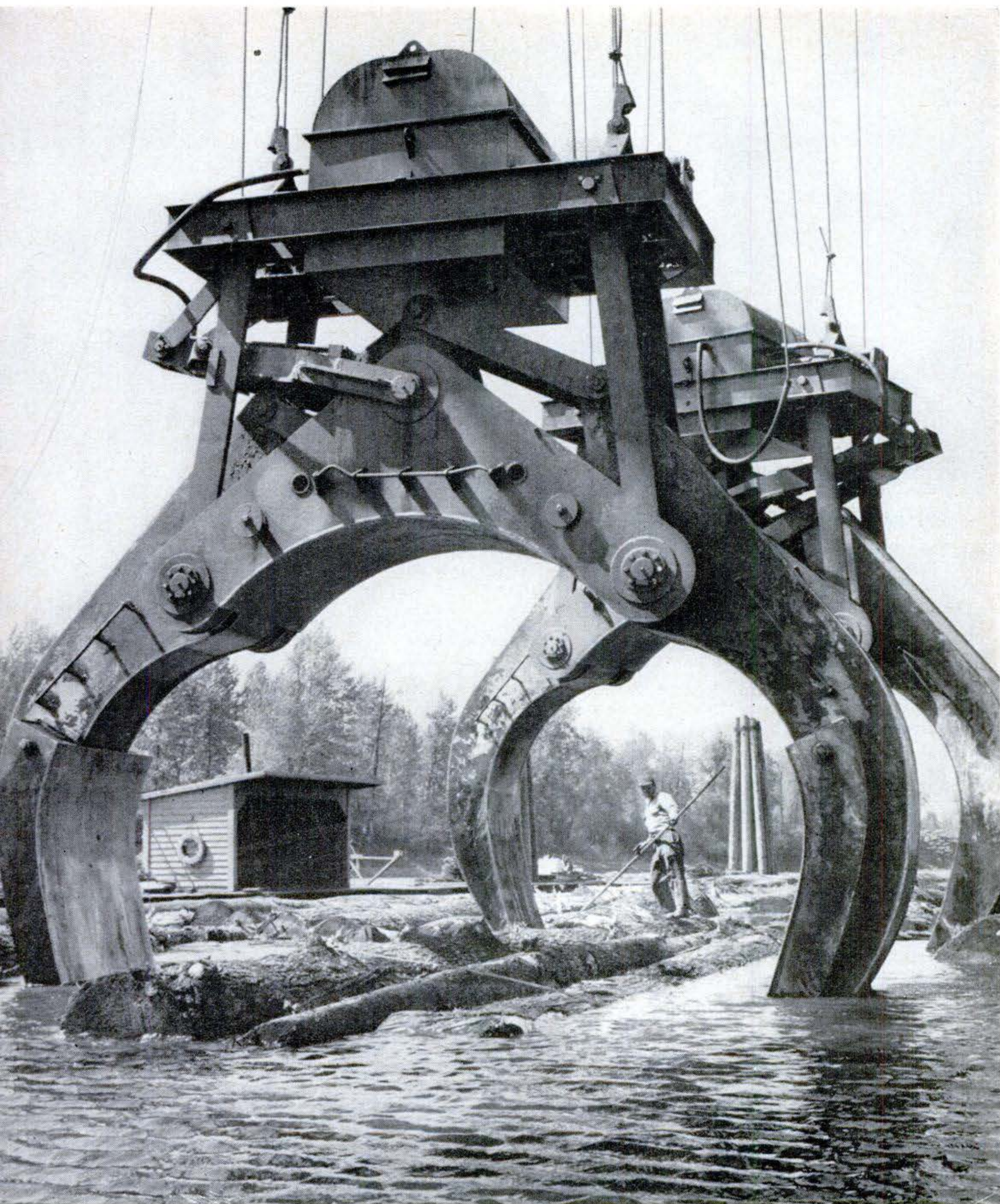
SINGLE FRONT BUMPER of tubular chrome-moly emphasizes low silhouette. The grille is designed to deliver lots of air to scoops for cooling brakes and tires at high speeds.



SIX INSTRUMENTS, including tachometer, line the dash. There is a choice of transmissions. Here control for Hydra-Matic is mounted on a tunnel between driver and passenger seat.

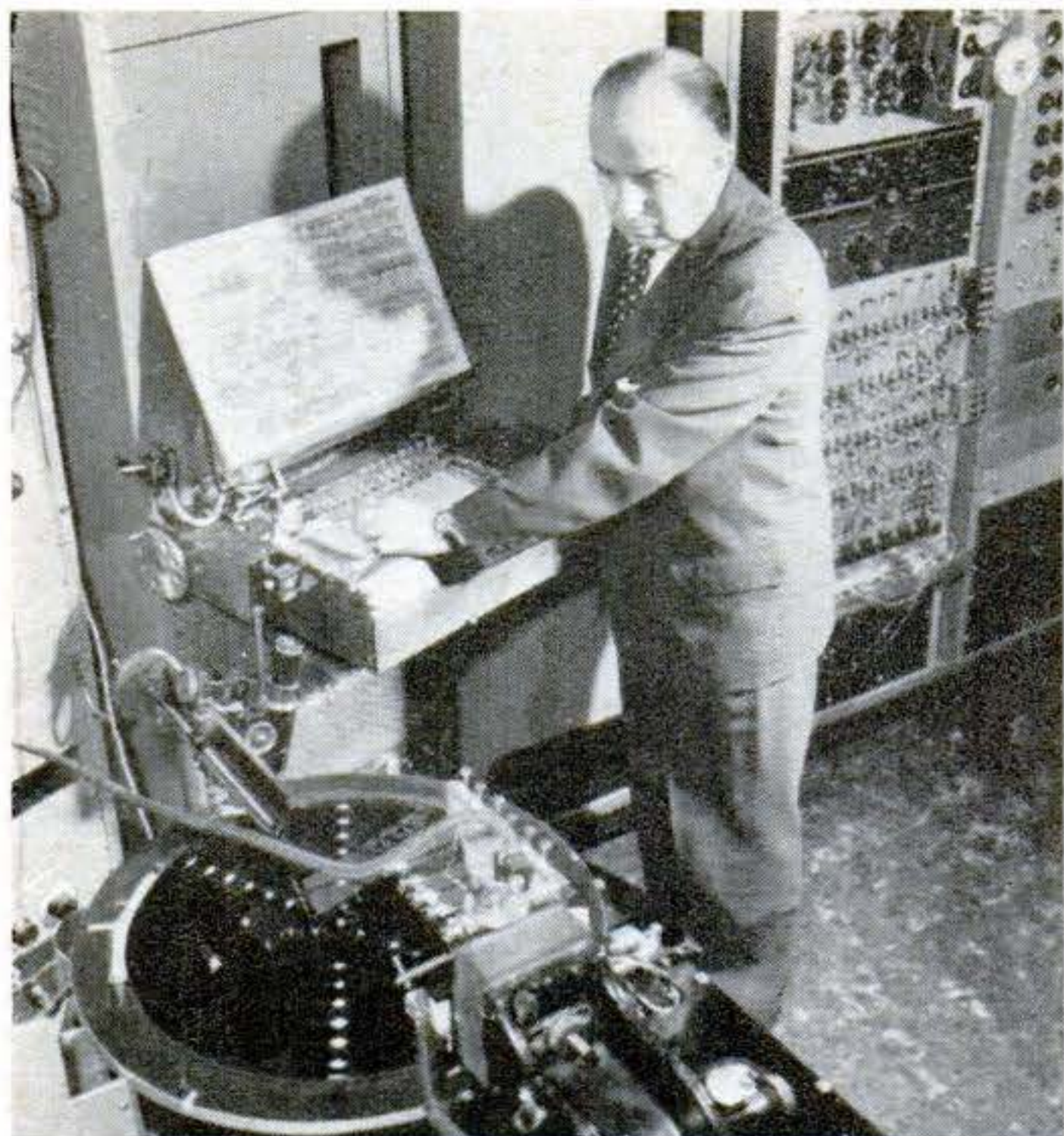


ENTIRE ENGINE COMPARTMENT is open for inspection or repairs when front-hinged hood is raised. (That's a Caddy mill in this car.) Wrap-around windshield gives wide visibility.



Giant Steel Fingers Pick Up Logs by the Fistful

THIS mechanical Paul Bunyan clutches 50-ton bundles of logs, lifts them out of the Columbia River and drops them on a mill deck 63 feet above. Its mighty fists—tandem grapples weighing 14 tons apiece—open and shut hydraulically. The oil pumps and driving motors above them are waterproofed so the steel fingers can dive for loads that sink. Crown Zellerbach lumbermen strap the logs into bundles to make it easier to latch onto them if they become waterlogged.

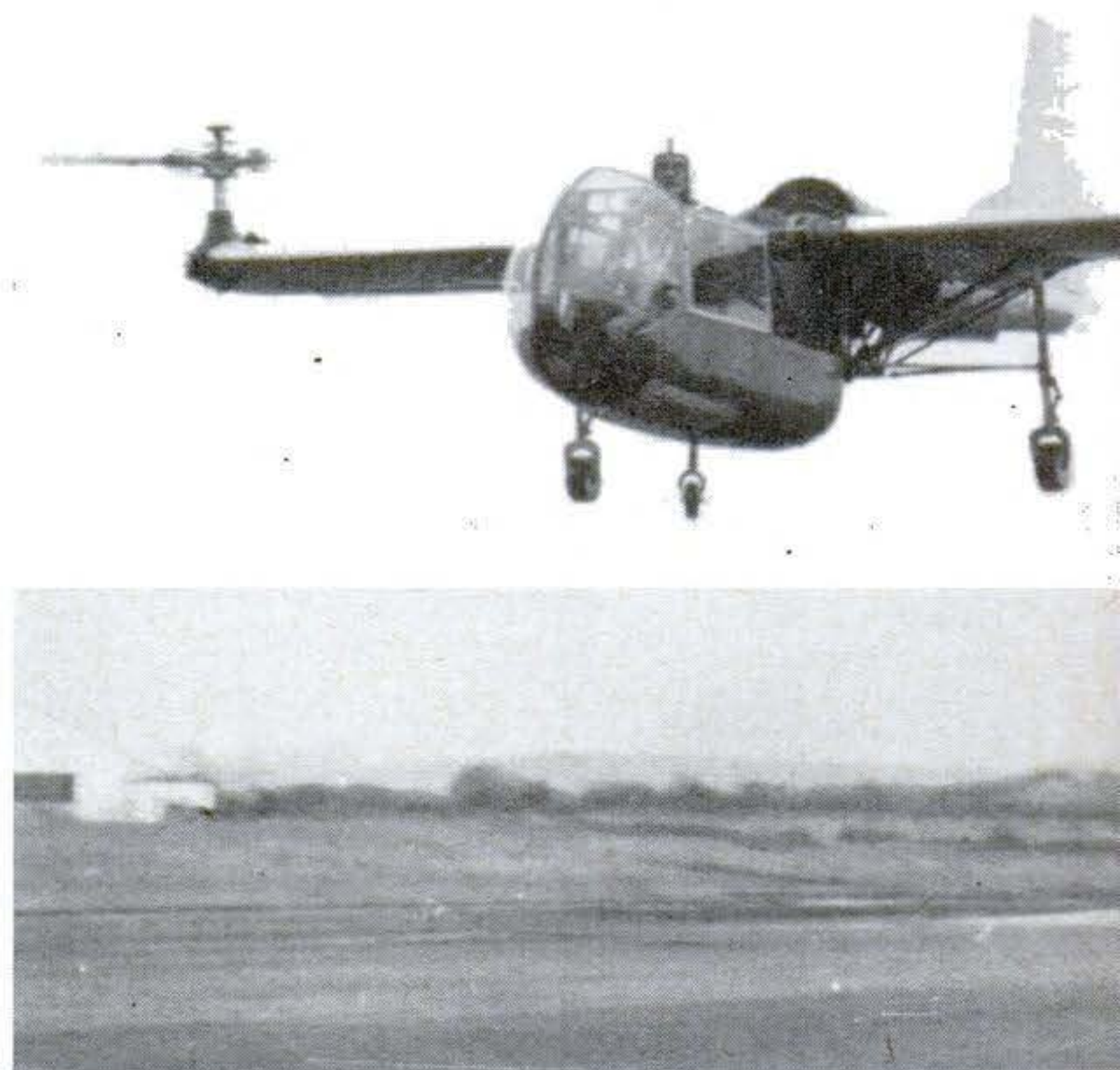
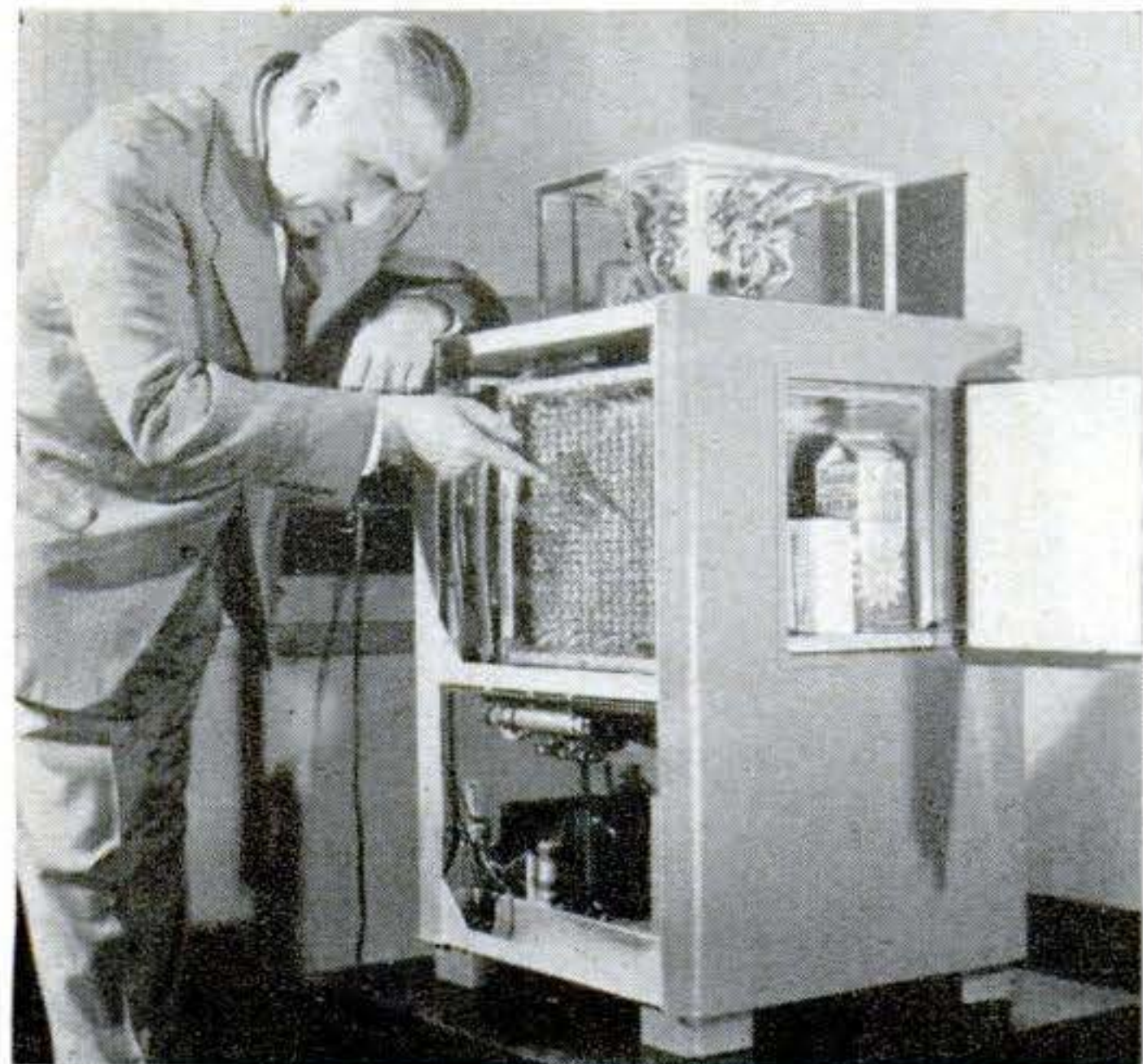


Electronics Stunt Makes Music, Another May Keep You Cool

Two new marvels lifted from the bottomless bag of electronics are electrifying musicians and electronizing refrigeration.

The music synthesizer above can make like a hillbilly band or a symphony orchestra. As the engineer punches a keyboard backed with two tons of radio tubes, coils and dials, RCA's electronic musician imitates any single instrument or combination. It can even mimic a specific singer or "invent" musical sounds never heard before.

The experimental electronic refrigerator below uses the Peltier effect, until now a laboratory curiosity. Current passing through a junction of dissimilar metals does the cooling; no pumps or flames are needed. RCA says ceiling panels of these wires could one day air condition homes.



Helicopter or Airplane?

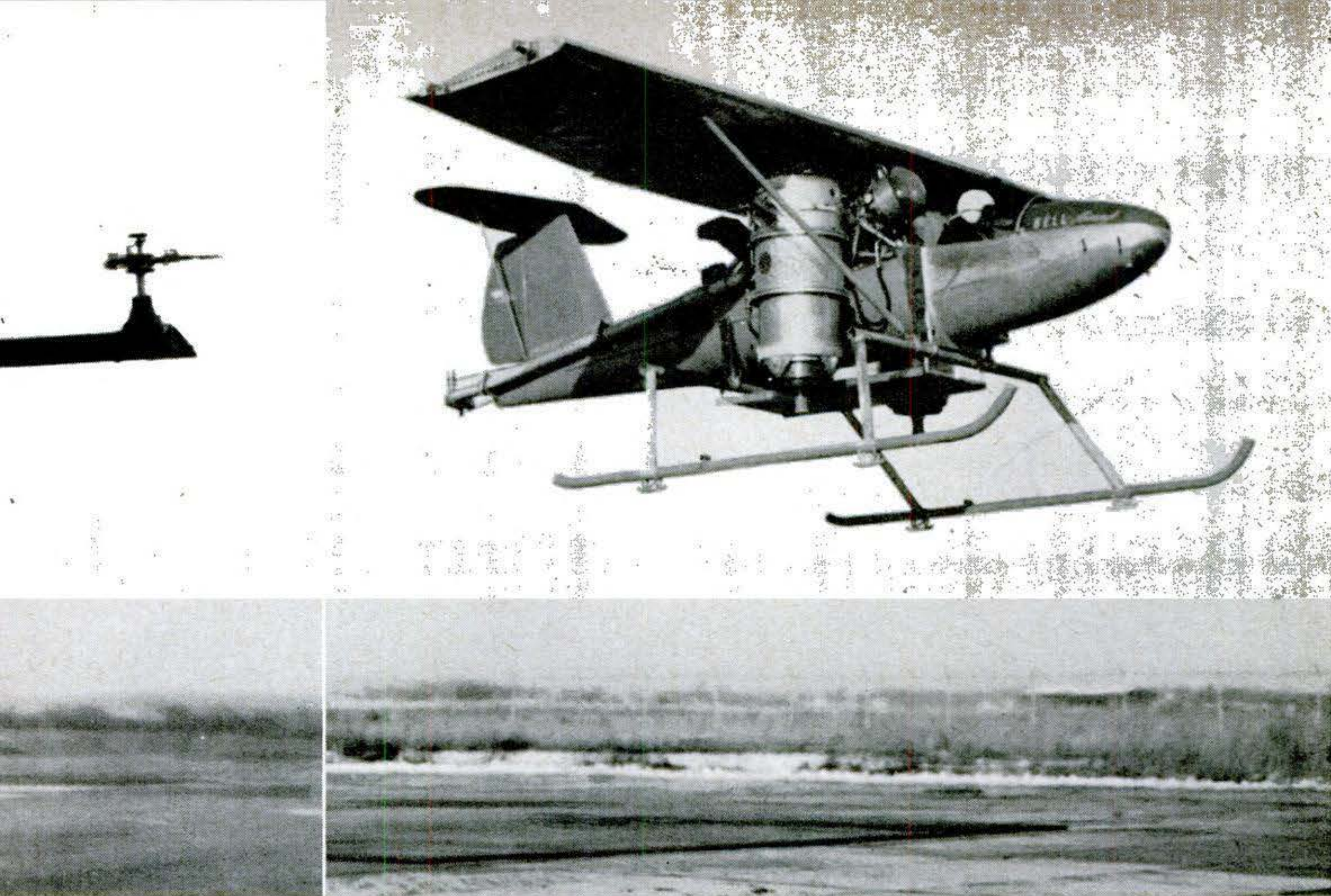
A cross between helicopter and airplane, these strange craft take off straight up and then fly straight ahead. They always stay level, do not have to take off and land sitting on their tails as the Pogo plane does (PSM, Oct. '54, p. 140).

Bell Aircraft's VTOL (above right) has



Bobbing Decoy Really Lures 'Em

PLANT this mechanical duck in the water with regular decoys and the wisest old bird will drop down to feed. Run by a battery, the decoy ducks its head to imitate the feeding movements of a live duck. The riffling of the water stirs the other decoys to action. Robert M. Riley of 2212 Onyx St., Eugene, Ore., makes the mechanical decoy.



These Craft Are Both, Flying Straight Up, Then Ahead

twin turbojet engines under its wings. The jets point down for take-off and landing, swivel to a horizontal position for forward flight. When the plane is flying vertically, control is maintained by compressed air nozzles in wing tips and tail—the ordinary control surfaces won't work until the craft

has gained normal forward flying speed.

A propeller-driven convertiplane (above left) is being tested by Transcendental Aircraft Corp. It looks and works like a helicopter while taking off and landing. The propellers and shafts flop forward in the air to pull the plane forward.

▶▶▶ Bacteria and fungi from the soil “fly” the Atlantic from west to east in moving air. Scientists from Canada's McGill Univ. found organisms in every air mass sample.

▶▶▶ 230,000 furred, scaled or feathered passengers flew BOAC planes last year. One “flying ark” took aboard a tiger, a leopard, storks, mongooses and cobras (stowed far apart), hyenas, monkeys, squirrels, bears and—appropriately—a flying fox.



Station Wagon from Britain Is Easy to Load

A BARGAIN-PRICED station wagon with unusually accessible cargo space is Britain's latest bid for the U.S. autoist's dollar. Hillman calls it the Husky. It sells for less than \$1,500 at any U.S. port and can carry four passengers plus 250 pounds of baggage, or, with rear seats folded away, two passengers plus 560 pounds. Instead of a tail gate, it has a full-size side-swinging rear door.

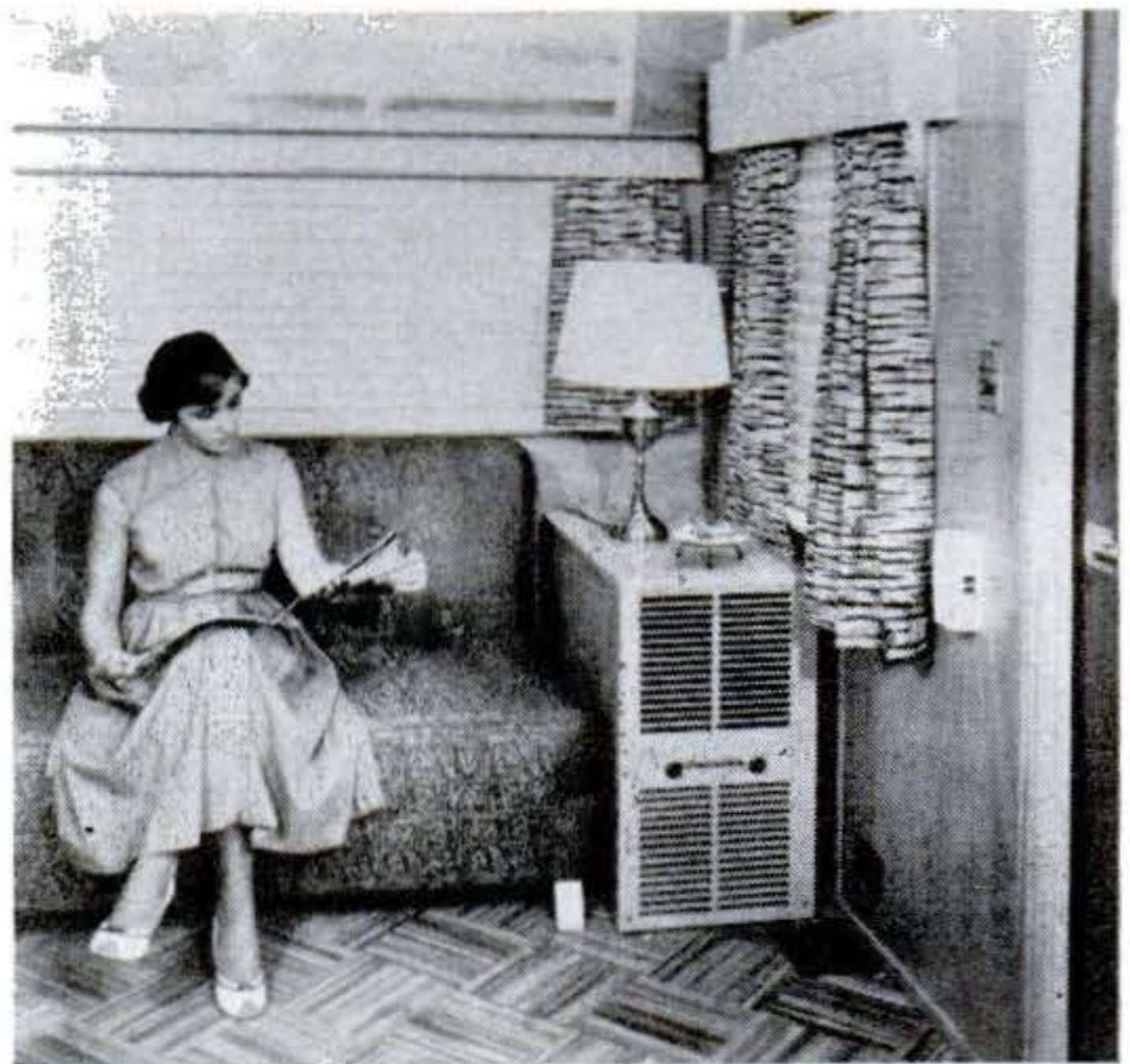
FOR YOUR HOME: This compact model, Carrier Corporation's Summer Weathermaker, needs no existing ducts. It comes with its own. There's no water bill either—the outdoor refrigerating unit is air-cooled.



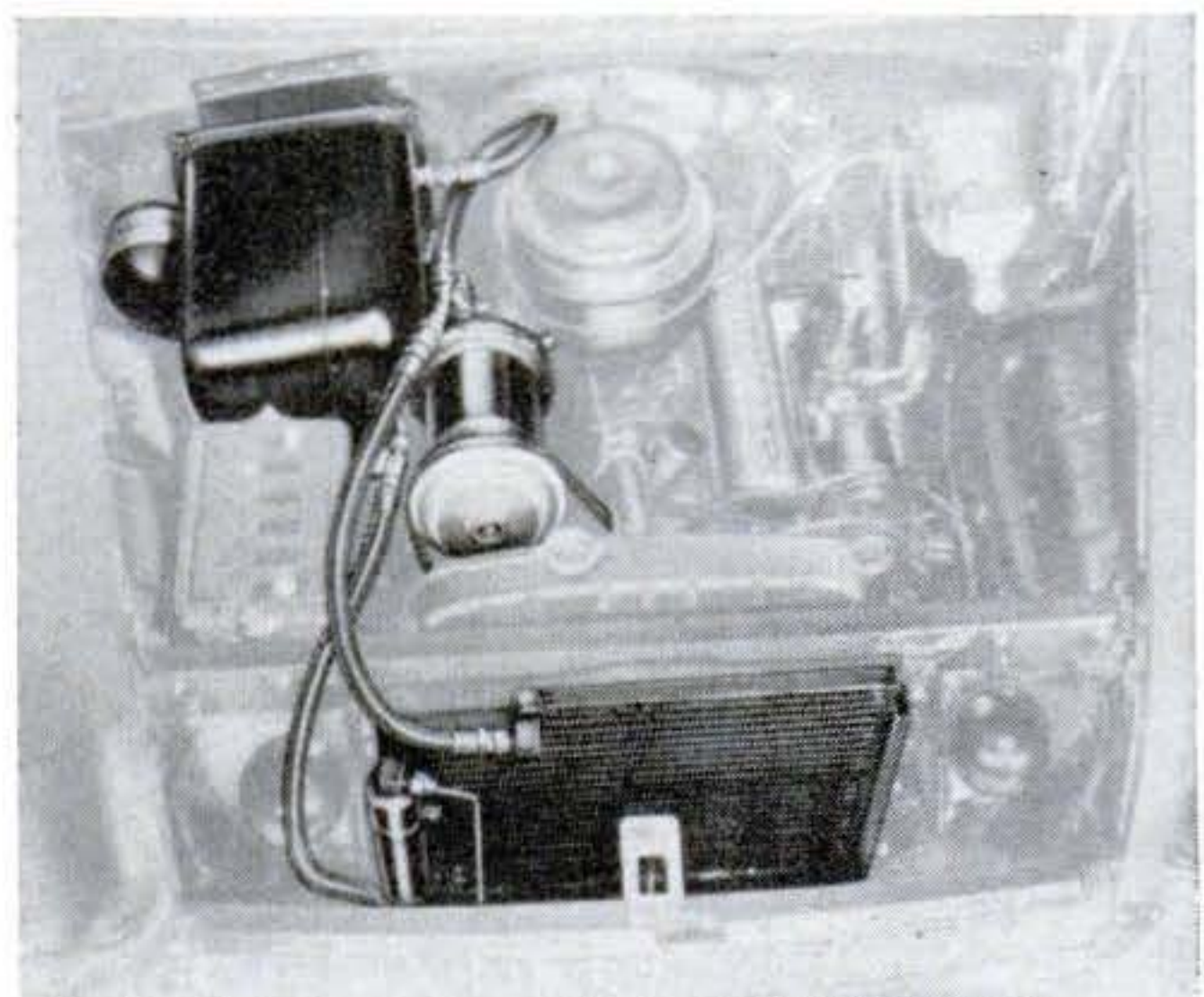
This Summer You Can Stay Cool—Wherever You Are

WHETHER you're vacationing or at home, this year's selection of air conditioners promises summer comfort. Leading makers' 1955 models include cooling units for cars, trailers, and anything from a single room to the whole house. Pictures on this page illustrate just a few examples of the wide range of designs available.

FOR YOUR TRAILER: "End-table" Carrier model (right) permits closing doors and windows against the heat and dust of trailer parks.



FOR YOUR BEDROOM: Tucked behind window drapes or Venetian blinds, General Electric's room cooler (below) fits flush with wall.



FOR YOUR CAR: Combination cooling and heating system, offered by Frigidaire for use in General Motors cars, is shown here installed under '55 Chevrolet hood.

An expert tells you

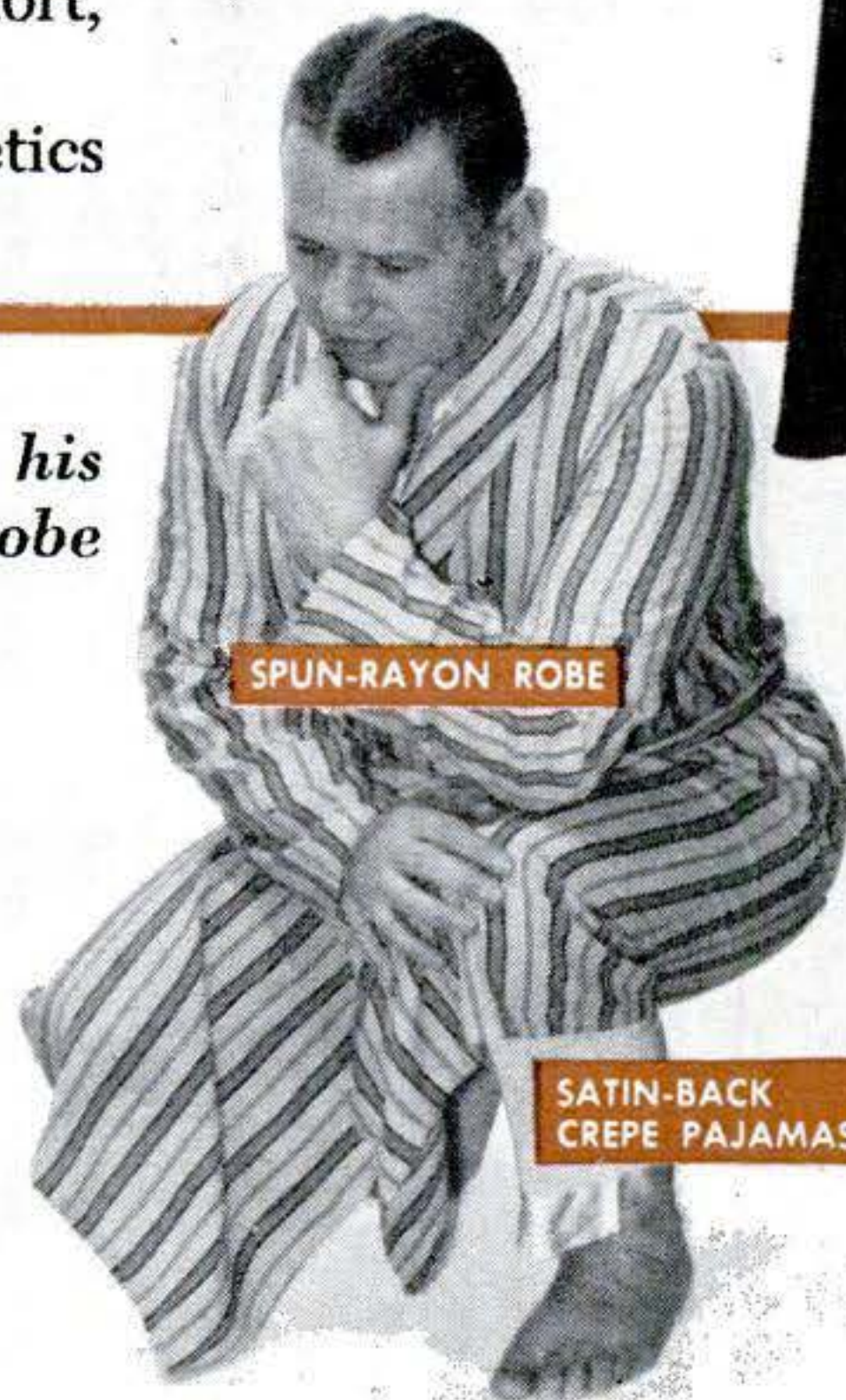
How to Wear Artificial Clothes

By Gardner Soule

C. W. (BEN) BENDIGO, 43, lives in a synthetic world. His job is developing synthetic textiles. He buys clothes of nothing else. He uses synthetic materials wherever he can: for boat covers, blankets, curtains, fishing lines, and a long list of other articles. He is, in short, the synthetic man.

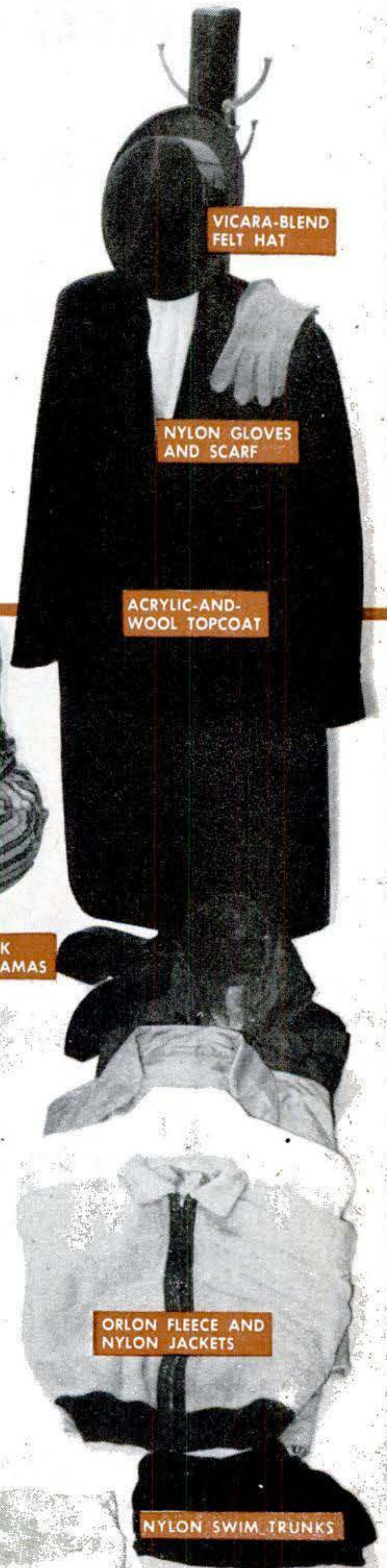
For better and for worse, synthetics

Ben Bendigo and his all-synthetic wardrobe



SPUN-RAYON ROBE

SATIN-BACK CREPE PAJAMAS



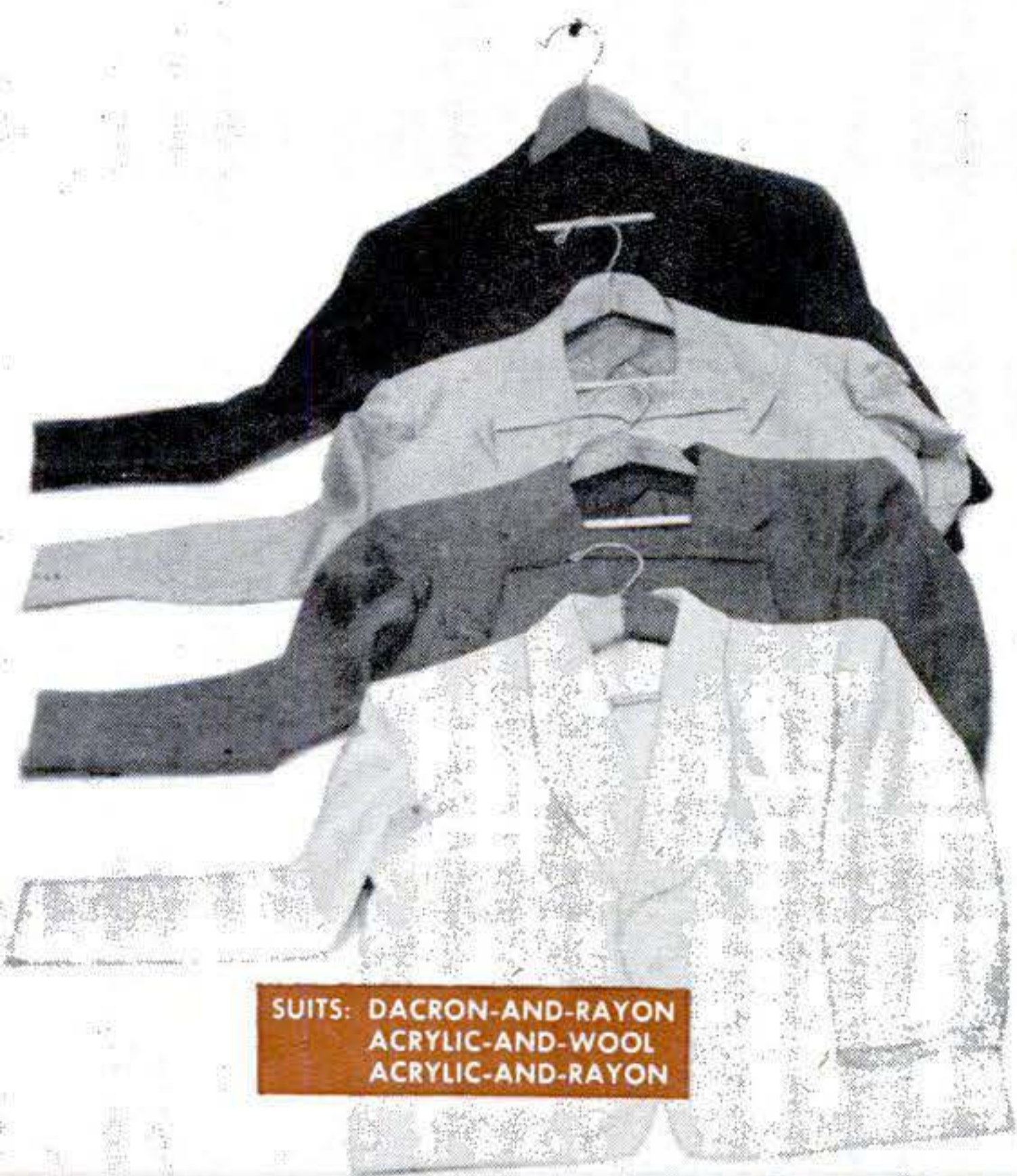
VICARA-BLEND FELT HAT

NYLON GLOVES AND SCARF

ACRYLIC-AND-WOOL TOPCOAT

ORLON FLEECE AND NYLON JACKETS

NYLON SWIM TRUNKS



SUITS: DACRON-AND-RAYON
ACRYLIC-AND-WOOL
ACRYLIC-AND-RAYON



ACRYLIC, ACRYLIC-BLEND SHIRTS



DACRON AND ACRYLIC TIES



NYLON STRETCH AND NYLON-VICARA SOCKS



ACRYLIC AND NYLON UNDERWEAR



FILES OF SYNTHETIC MAN hold samples of artificial cloth instead of the usual letters. Ben, dressed in synthetic suit, and his secretary, Dorothy Gordineer, check swatches.

have changed Bendigo's whole life. They brought him, for instance, the worst day of his business career: the day he dyed an assistant vice-president blue.

Ben works for the American Cyanamid Company. He asks its executives to test new fabrics by wearing them, and he had given the assistant v.p. a blue shirt to try out.

The color was not fast, and it ran off onto the man. Once upon the man's skin, though, nothing would get it off. The assistant vice-president had to wear it off. He stayed blue for weeks.

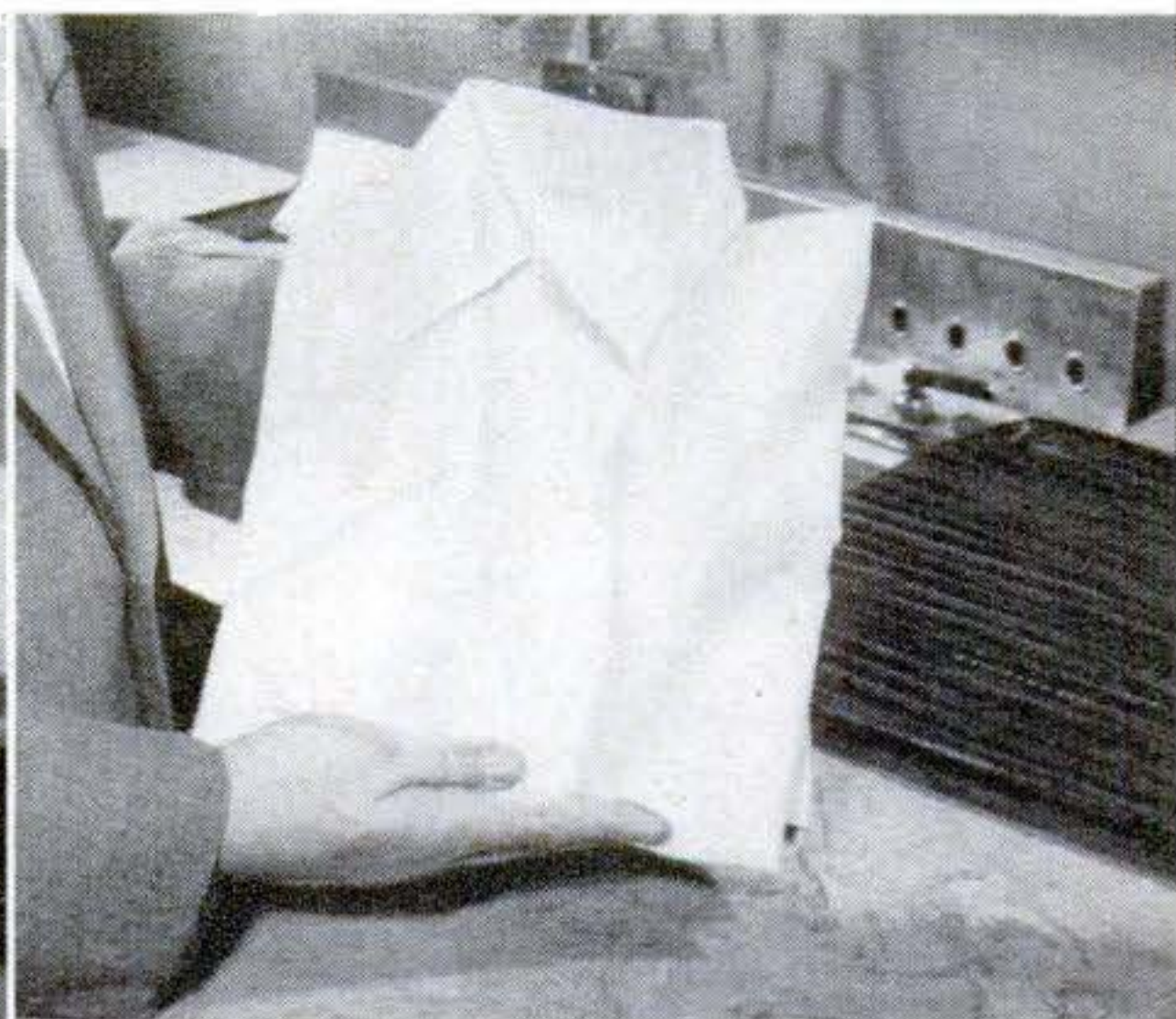
This is the way Ben washes a shirt



USING TEPID WATER, Ben first soaps particularly the collar, underarms and cuffs. Then he soaps the shirt all over.



AFTER RINSING, (no wringing) he hangs shirt on wooden or plastic hanger. Then he tugs tails to get out wrinkles.



NEXT MORNING, shirt is perfectly dry, and collar is smooth. Without ironing, Ben can wear shirt anywhere.

Despite the dismay he felt at this incident, Ben proceeded to build a complete synthetic wardrobe of his own. "I had to," he said. "People were always asking, 'What's that suit you have on?' In my job, I simply could not answer, 'One hundred percent wool.' "

Today Ben can dress from the skin out through his topcoat entirely in synthetics. His undershirts and shorts, his business shirts, his ties, his suits, his socks, even his breast-pocket handkerchief are artificial.

His artificial suits effected a devastating change in his relationships with cleaners.

Ben does his own cleaning now. Does it, mostly, in men's rooms from coast to coast, and you may meet him at it any day behind the door marked "Gentlemen" in

Houston's Shamrock Hotel, New York City's Biltmore, Boston's Parker House or Miami's Flagler. He is the stocky, gray-eyed man scrubbing a spot off his suit at the washstand. He first moistens the soiled place, then works up a lather with a handkerchief or paper towel, washes the soil away with the lather, then rinses.



By the time of his next appointment, Ben says, the darkness due to moisture will have disappeared. The suit will be dry.

Once he had a crisis, though. He dumped blue-black ink on a light-colored suit. The ink frightened him because its label said "permanent." It washed right out, though, with plain water—no soap.

Synthetic suits also changed Ben's pressing arrangements. Today he uses a coat hanger instead of ringing for the valet.

New Wrinkle—No Wrinkles

He hangs up his suits every time he takes them off—much more important, he says, in the case of artificial clothes than in the case of wool suits. It helps hold the crease, but mainly it gets the wrinkles out.

Ben has had his American Cyanamid job for three years, long enough to make him the synthetic fabrics expert in his own family—and to change his life at home.

For one thing, his wife, Irma, no longer goes with him to help him pick out a new suit. Instead, he now accompanies Irma to help her select *her* clothes.

For another thing, he has a new argument ready in case Irma wants to toss out any of his old clothes. He happened upon this just the other day.



He noticed, at the end of a season's wear, that a three-year-old artificial suit had "a better crease than most suits do when they come back from the cleaner."

"That synthetic suit," he says, "had improved with age. It is a better performer now than when it was new."

For trips up to 10 days, Ben takes only the synthetic suit he's wearing, plus an extra shirt, a set of underwear and a pair of socks.

Each night in his hotel room he does his washing—shirt, underwear and socks.



TEST FOR ARTIFICIAL SLACKS: Ben had a shoeshine boy wear these. It took eight months for the boy to wear a hole through the knee that was on floor during each shine.

He soaps, then rinses; he wrings out underwear and socks; he hangs up the shirt without wringing. He has timed himself, and says his washing takes about five minutes.

Another way synthetic clothes have changed Ben's life is that he now likes formal dinner parties. He wears a white orlon-and-rayon tuxedo. "I can perspire all I want," he says, "and it still looks good." For another thing, for the first time in his life he always has something to talk about. "You always have," he says, "if you're wearing synthetic clothes."

Nylon? Never!

Bendigo got into the textile business before he got into high school. At 13, he was a bobbin boy in a Northern mill. At 16, he was a foreman. Twenty years ago, after college, he decided synthetics were the coming thing. He decided, too, some years ago, something he'd just as soon forget now—that there would be no future for nylon except in women's hose.

His synthetic wardrobe today shows how far off this guess was. He owns all or partly nylon bathing trunks, gloves, socks, shirts, shorts, a scarf, and a storm suit. His boat covers are partly nylon. His fishing lines are all nylon. "You don't

[Continued on page 256]



GIs Get Radar That Pinpoints Enemy Mortars

ARMY ground troops have a new radar set designed to defend against mortars instead of airplanes. The radar "sees" mortar shells in the air—after they have been fired—and follows their path. The information on the shells' path is fed to a computer mechanism that figures out where the path started: the location of the mortar itself. Our artillery can then go into action and destroy the mortars.

The new mortar radar, developed by the Signal Corps and Sperry Gyroscope Co., is already in service with U.S. troops in several parts of the world. Early models were battle-tested in Korea, where they helped stop a major enemy offensive.

New Nylon Armor to Shield GIs

GIs will get more protection from an easier-to-wear armored vest developed by the Quartermaster Corps. Made like a super-Dagwood sandwich—12 layers of heavy nylon laminated with plastic, plus plastic film, plus nylon covering—it shields nearly all the upper torso without hampering action.

Swinging Bed Tests Heartbeat

EVERY time the sergeant's heart pulsates, this delicately suspended bed swings a bit, measuring the strength of his heartbeat. The Air Force's Aero Medical Lab uses the instrument—called a ballistocardiograph—to test the effect that pressurized flying suits have on the heart.





Big Trains Made Safe from Small Boys by Curved Bridge Rail

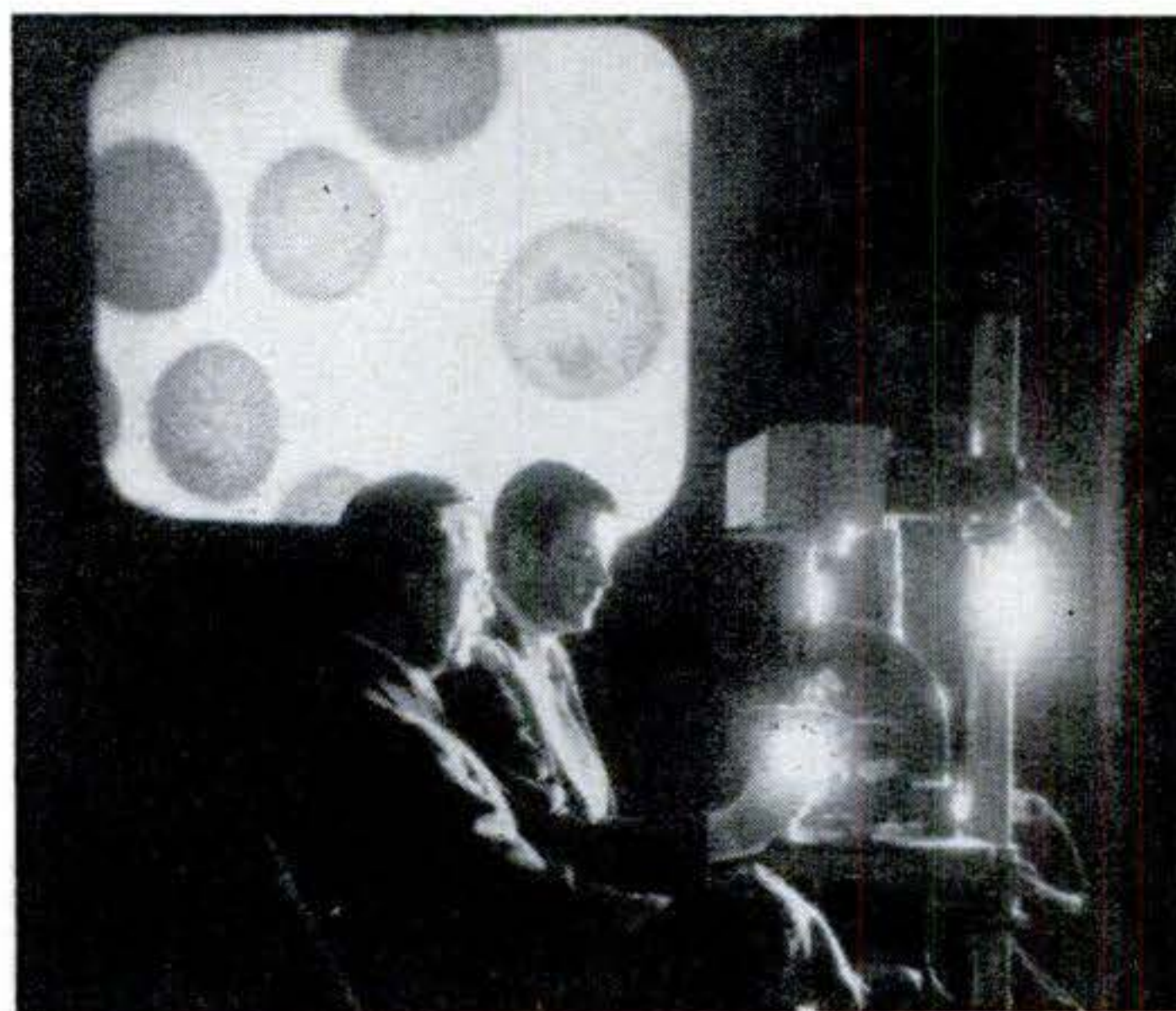
AS IF things weren't tough enough already, a kid can't even lean over the bridge and watch the trains roll by any more. At least not on the Washington-Baltimore Park-

way. The solid guardrail in this photo arches in a smooth curve eight feet over the sidewalk, to stop boys from tossing things onto the Pennsylvania Railroad tracks below.



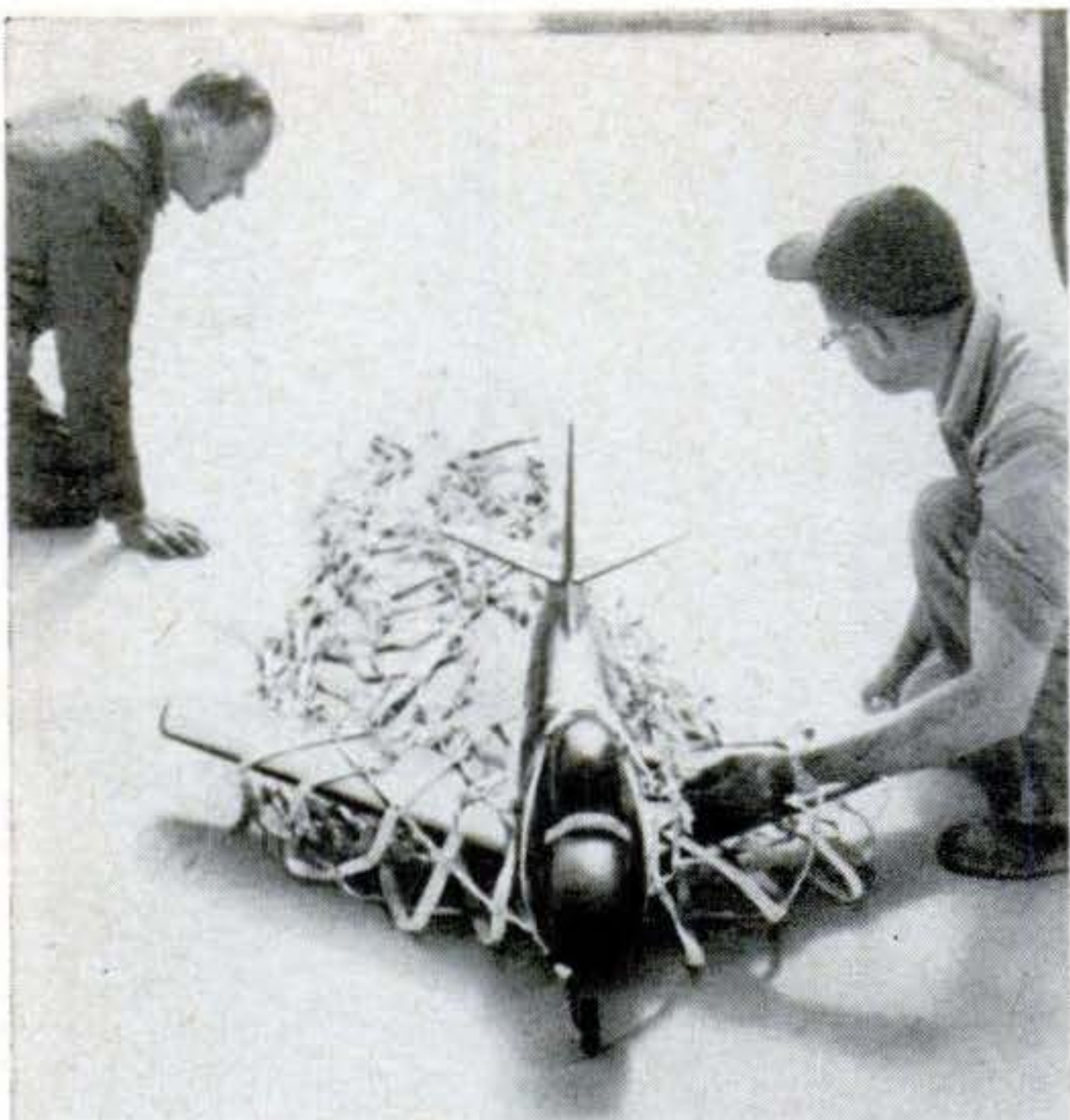
Wheel Folds to Let You Get In

IT'S easier—for stout parties anyway—to get behind the wheel of this version of the high-performance Mercedes-Benz 300 SL. The steering wheel is hinged to drop down out of the way while you climb into the driver's seat. This model of the German-made sports car with the upswinging doors was displayed recently in Brussels, Belgium.



TV Gives Microscope a Boost

THOSE big balls on the screen above are tiny bits of pollen, magnified in full color 4,000 times by a new combination of microscope and color television devised by CBS. A small color TV camera connected to a microscope feeds a color TV projector, which can put a 15,000-times-enlarged picture on a lab or lecture-room screen.



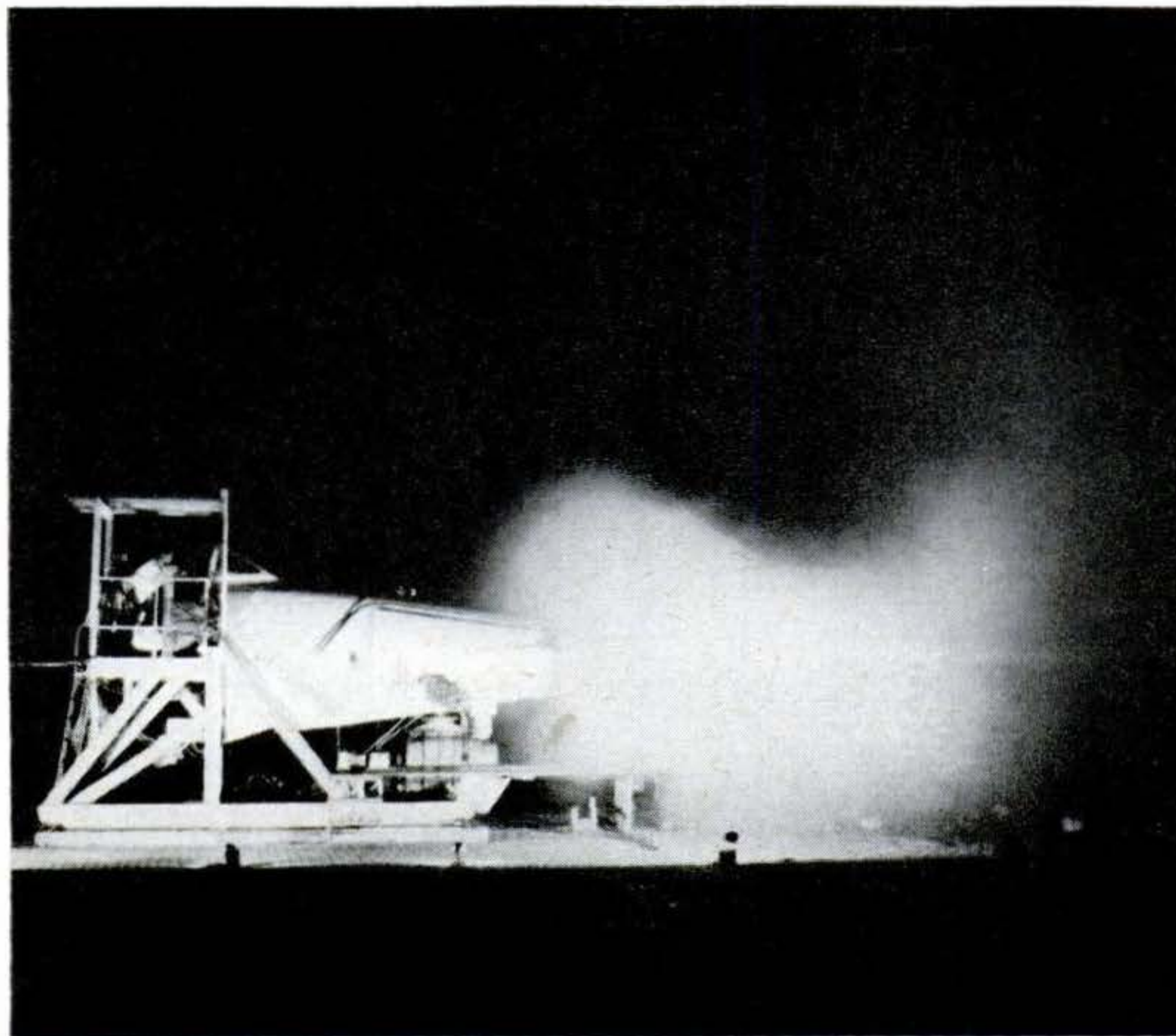
Net to Brake Plane on Runway

THIS model jet was catapulted into a net at 126 m.p.h. and came to a stop undamaged. Such barriers—dubbed rabbit catchers—may soon be stretched across runways like giant tennis nets to halt big Sabres and Scorpions. If a jet fails to become airborne or the pilot overshoots the strip, the plane will plow into the stretchable nylon net. The All American Engineering Co., Wilmington, is working with models before testing a full-size barrier.



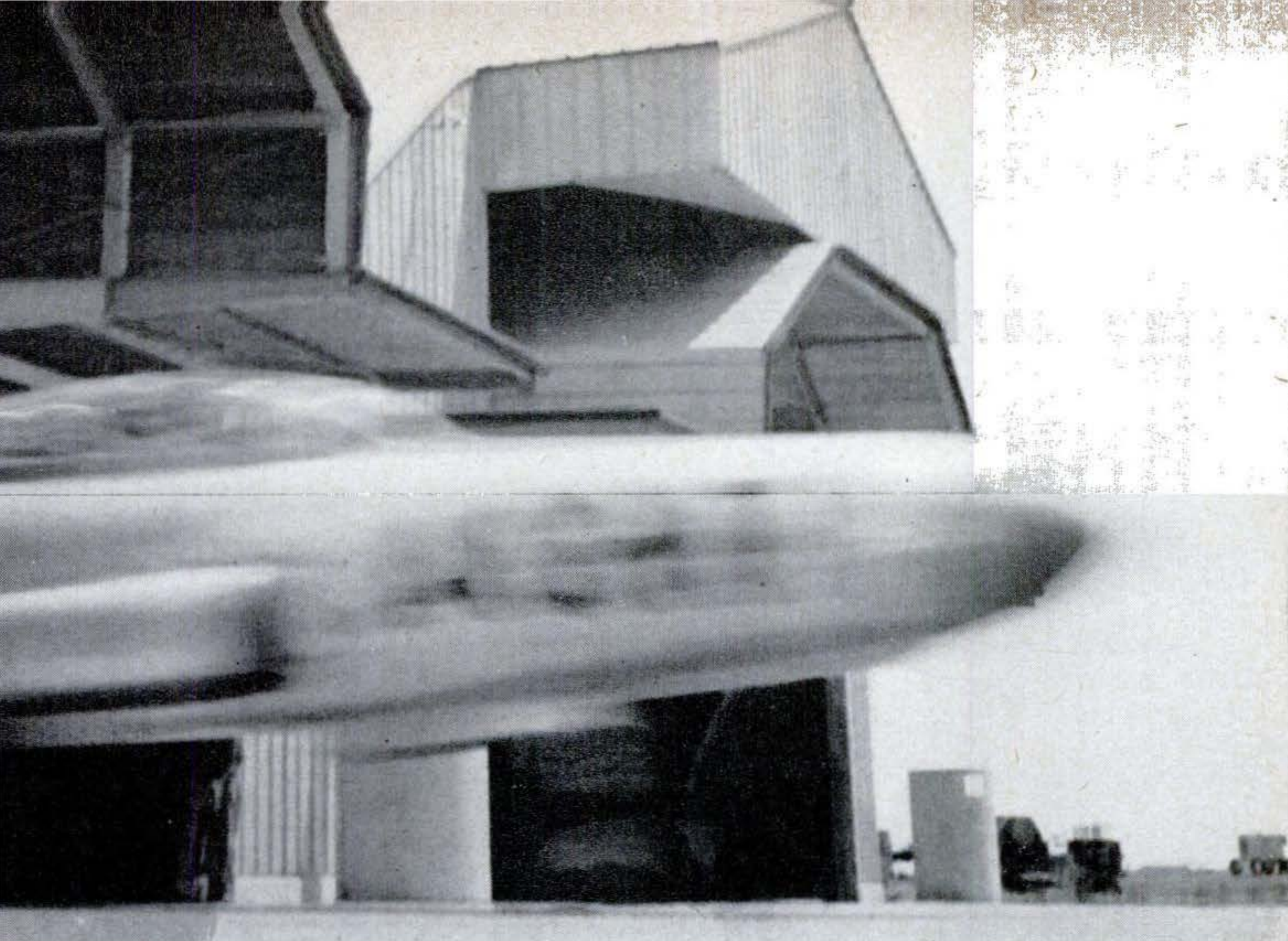
Revved Up Before It Leaves

JUST 2½ minutes after the scramble bell sounded a fighter alert, this speeding Starfire was in the air. The jet fired up inside



Fighter Planes Get Faster Gun To Fire Rockets

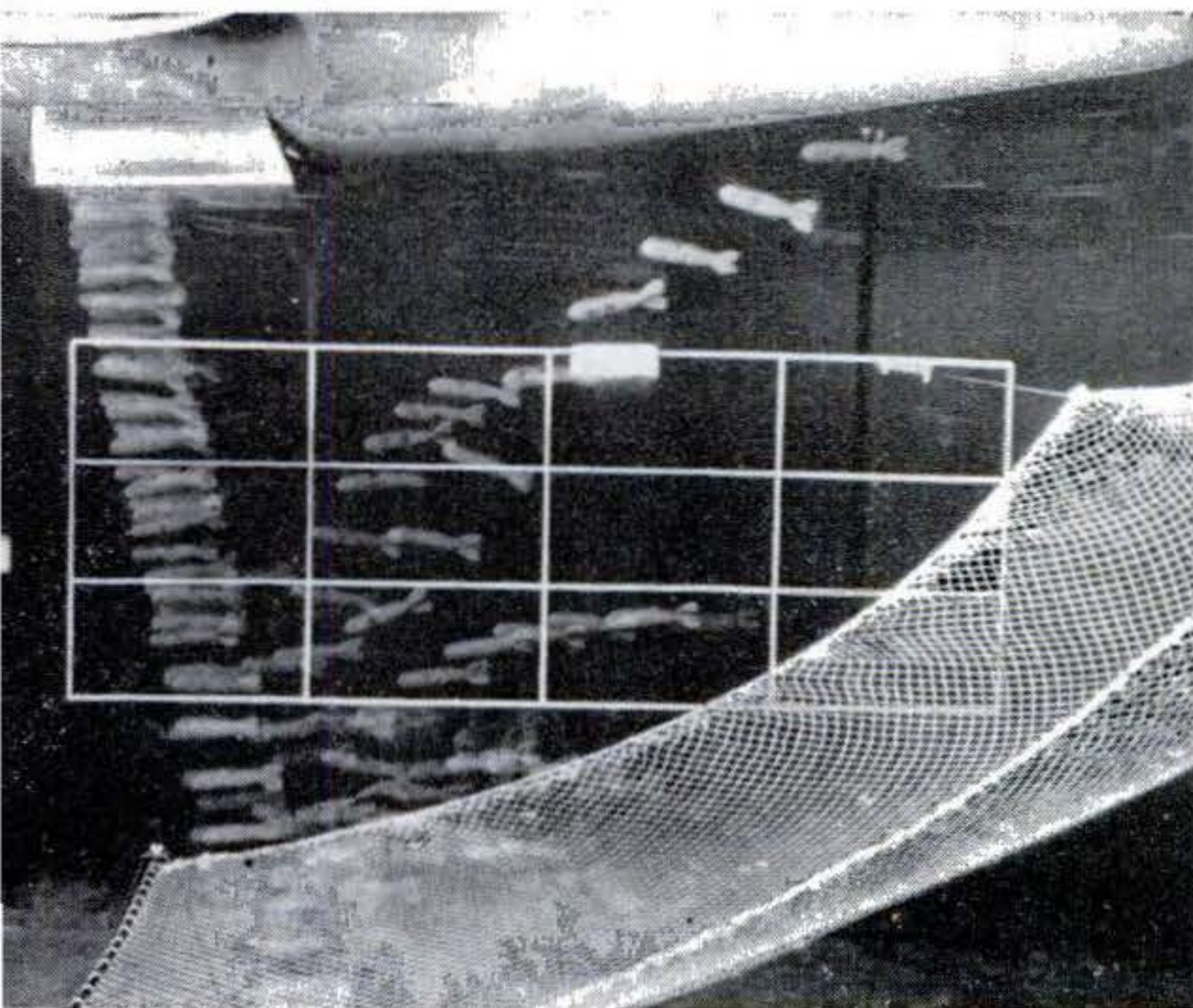
A SOLID sheet of flame whips out from a new kind of rocket launcher being tested by the Air Force. The T-110 gun automatically fires its rockets at a fast clip when the fighter plane gets within range of its target. Shown at left being tested in a Northrop F-89 Scorpion at Eglin Air Force Base, Fla., the new gun was developed by Armour Research Foundation of Chicago. Range and rate of fire were not revealed.



the Hangar, Jet Fighter Gets Off to a Flying Start

the hangar—which has doors at both ends for this purpose—and taxied to the runway under its own power for a quick getaway.

It does not quite take off from the hangar, although the blurred photograph seems to show the wheels already retracted.



Multiple Exposures of Tiny Bombs Show How Big Fellows Behave

TO FIND out how big bombs behave when they cut loose from jet bombers, Boeing engineers take multiple-exposure shots of tiny bombs falling from a model bomb bay.

Six slots in a whirling disk on a still camera (above) admit light to put 10 shots on one negative. Wall grid helps observers spot drift before bombs bounce from the net.

Ultra-Accurate Atomic Clocks Surpass Earth As Timekeepers

NEW atomic clocks, soon to aid radio and navigation, keep time with fantastic precision. It would take them more than 300 years to gain or lose a second. This makes them 100 times as accurate as the best of previous timepieces.

They are even said to be 10 times as reliable as the earth itself. Slight variations in the speed of the earth's spinning, still to be fully explained, are known to lengthen or shorten a 24-hour day by amounts up to more than 1/1,000 of a second. So unwavering are the new clocks that they will tell just how much the earth is "off."

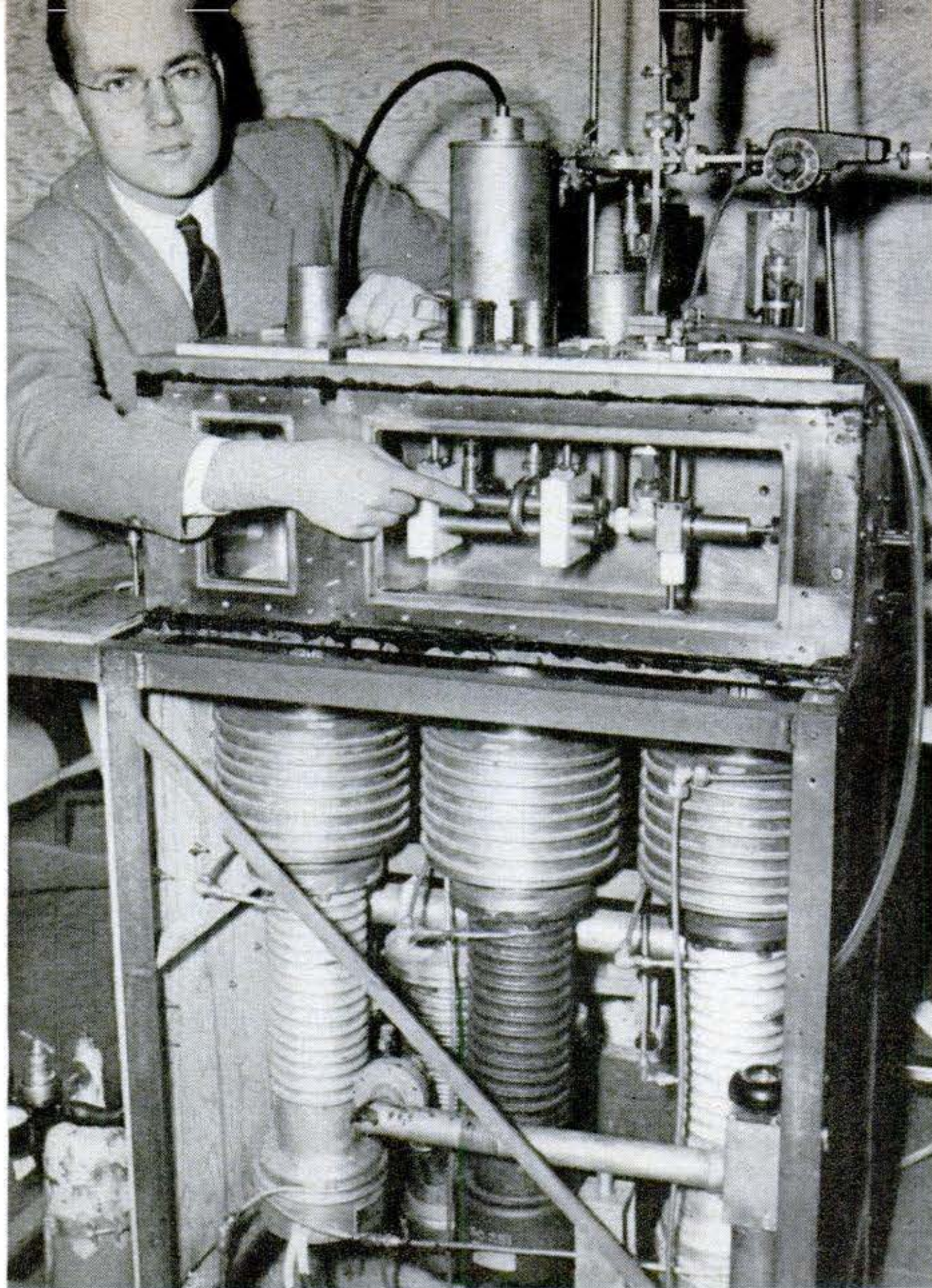
Outwardly they don't look like clocks at all. The present models have no hands or dials, because highest accuracy calls for applying their electrical timing impulses directly. There are two rival types: the Maser (short for Microwave Amplification by Stimulated Emission of Radiation) and the Cesium Atomic Frequency Standard.

The Maser was invented by 39-year-old Prof. Charles H. Townes, Columbia University physicist. To learn how well it kept time, he had to build two, and check one against the other. This test showed that the Maser was accurate to within one part in 10 billion.

Most Precise Measurement Ever Known

The test procedure itself, for comparing the clocks, was rated even higher in precision—to one part in 100 billion. Never before, it is believed, has time or any other physical quantity been measured so exactly.

An oblong brass box houses the Maser, and ammonia from a small cylinder, outside, serves as its pendulum. Within a



Atomic timekeeper Charles H. Townes demonstrates a Maser.

thimble-shaped chamber of silver-plated invar alloy, the concerted vibrations of ammonia-gas molecules produce microwaves of an unvarying frequency, which flow out through a hollow metal conductor, called a waveguide, for use in timekeeping.

The new Cesium Atomic Frequency Standard differs in principle from the Maser, but the current model is said to equal the Maser's precision. It was perfected by Dr. J. H. Zacharias of MIT. Instead of ammonia, it uses the metallic element cesium. Gentle heat, applied to a pinhead-sized piece of the solid material in a metal crucible, furnishes an ample stream of cesium molecules for an almost limitless time.

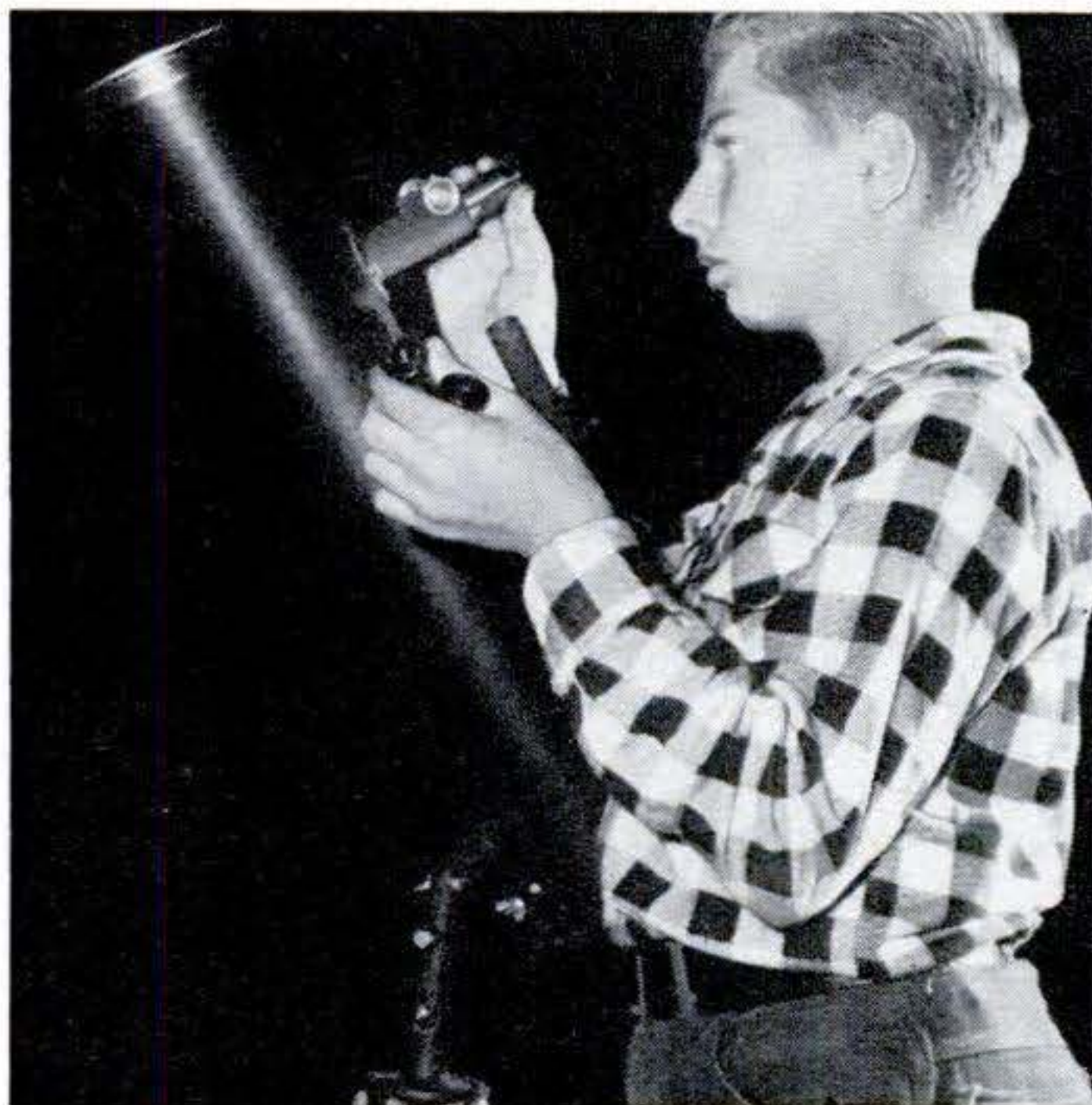
Practical applications of surprising variety are foreseen for the atomic clocks. They may keep radio and TV stations on correct frequency, and provide new navigating instruments for ships and planes. The Maser also makes a virtually noise-free amplifier for weak radio microwaves, promising improved equipment for military radar and for radio astronomy.



Up-and-Down Breeches Buoy Gets Men from Blimp to Ship

IF YOU'RE in a blimp and want to get down to an aircraft carrier at sea, you can now just climb into a big basket and let a winch lower you to the ship's deck below.

The Navy tried the scheme recently as a means of transferring relief crewmen to and from its airships. That's the XZSG-4 above, lowering sailors to the USS *Tarawa*.



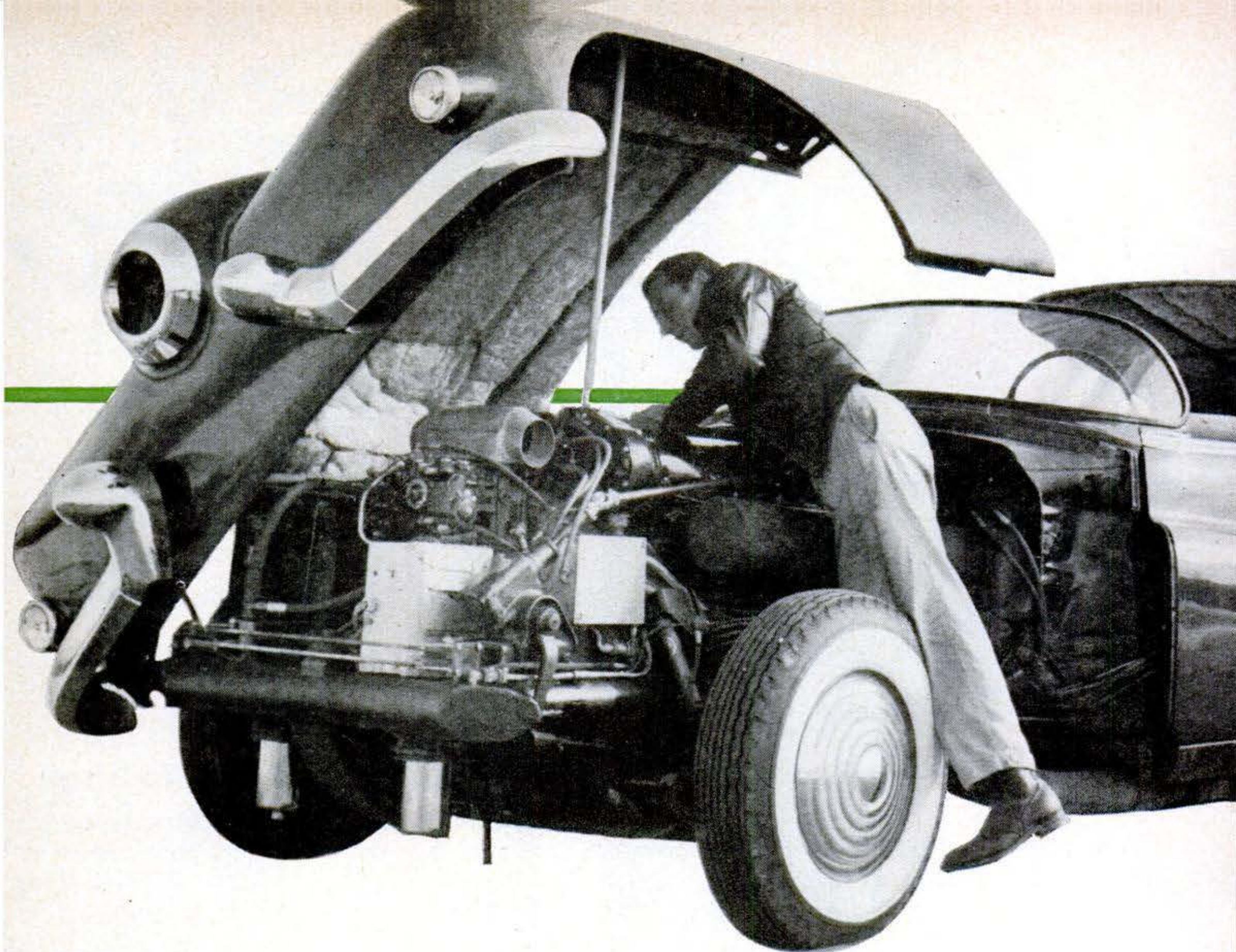
Amateurs Get New Telescopes

NEW inexpensive telescopes are making it easier for amateurs to get into astronomy without building their own instruments. The Dynascope above is a reflector type with a four-inch parabolic mirror, three eyepieces, view finder and tripod. It sells for about \$45. Criterion Manufacturing Co., 331 Church St., Hartford 1, Conn., makes it.



Machines Speed Rail Tickets

ROOMS full of machinery now produce your railroad ticket faster and easier. At the Pennsy's Philadelphia station, a clerk slides a metal plate into the machine above and out comes a printed ticket. Pullman space is handled by facsimile machines connecting a central desk to the ticket sellers. Clerks even have automatic timetables.



Omaha Mechanic Wins Horsepower Race

By Kenneth Wylie

EVEN though the nation's motor moguls continue to spar over power, jabbing increases of 10 and 15 horses at each other, they've lost the day. In Omaha recently a young mechanic and garageman let go a roundhouse that should flatten everybody in sight. His roadster has *more than four times* the horsepower of the most potent car Detroit sells today.

Come take a ride with him.

Out in the garage district of Omaha you stop by a canopy lettered "Cramer

Brothers Service." Walking through an office packed with customers, salesmen, truckers and mechanics, you enter the garage. And there it is, like a blue and silver crack of lightning: the 1,350-horsepower, Allison-engined Cramer Comet.

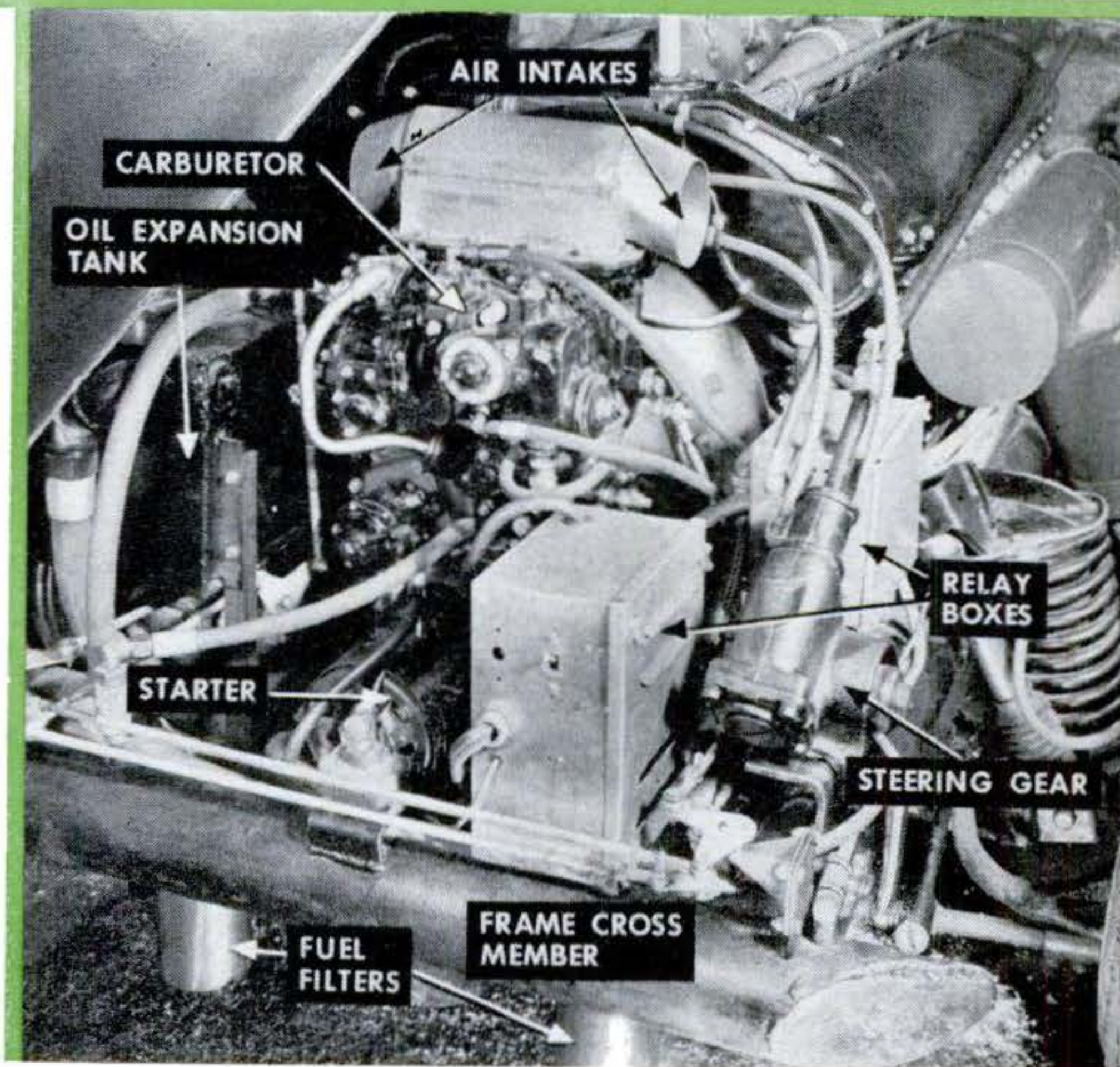
It is a handsome, sculptured roadster, with a clean-drawn body hovering over heavy-duty white sidewalls—a car weighing 5,200 pounds and stretching more than six yards from front to rear.

He wanted performance. This is no racing car, even though it has burned rubber on a drag strip a few times. Tom Cramer, 32 years old and co-owner of

BOOMING UP A HILL, the Comet accelerates faster than ordinary cars can when going downhill. Cramer's stiff, underhung suspension stays flat under big torque. Snout is for carb air; radiator is in back.



MUCH MACHINERY is shoe-horned under the hood. Allison engine itself, at 1,380 pounds, isn't much heavier than beefy stock-car ones. Auxiliary equipment and heavy-duty chassis bring gross weight up to 5,200 pounds. Car's showy 3.85 pounds per hp. compares with 16 to 20 for hottest stock cars.



A 1,350-hp. airplane mill lets this homemade juggernaut laze along, blowing exhaust fumes at the fastest U.S. stock cars.

the big Cramer Brothers towing and repair shop, built it solely as a two-place, high-performance passenger car.

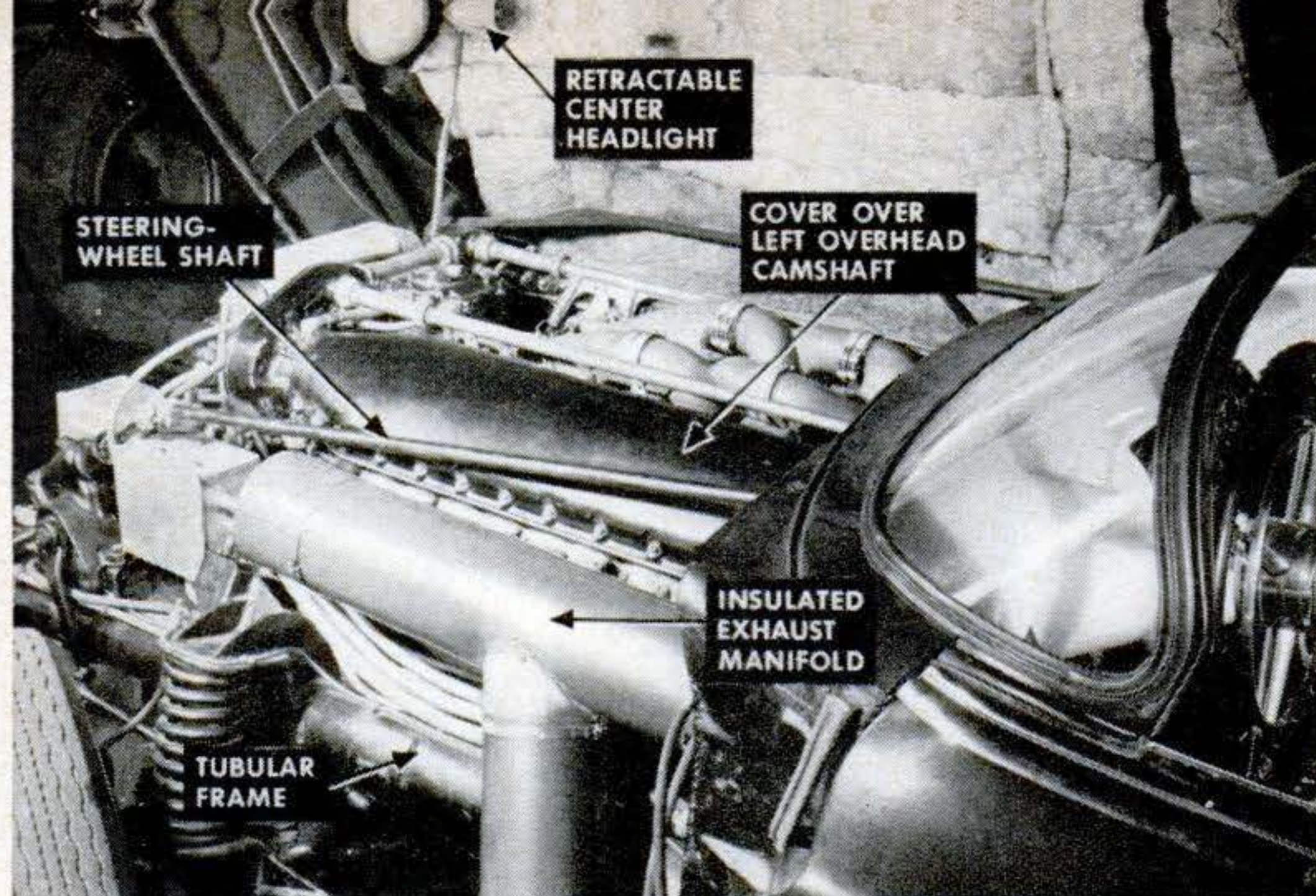
His aim was to "build something a little different. I wanted to see what would happen if you put a really high-powered engine in a chassis."

With a boyish grin he continues: "Of course, there's something nice about going a little farther than others have gone, trying something untested and new."

This, Cramer has plainly done. His blue roadster will spin its heavily loaded back wheels at 125 m.p.h. At this speed

the 1,710-cubic-inch aircraft engine, a type that once powered such fighters as the P-38, is lazing over at a mere 2,500 revs. This gives him plenty of room to stretch, for the big mill is factory red-lined at 3,400 r.p.m. for continuous duty, with still more allowable for short bursts.

Plenty of torque. So far, clutch troubles have burned out his plans for a flat-out, hunched-down speed run. But he figures that the car might begin to level off somewhere above 250 m.p.h. Cramer feeds his beast ordinary pump gas (its compression ratio is 5.75:1) and



THUNDERBOX gave off so much heat at idle, despite oversize cooling system, that Cramer had to insulate and jacket exhaust manifolds, and pad hood. As workmanship shows, car is no lash-up. Its engine can be pulled in 45 minutes by disconnecting nine lines and four main bolts. The luxuriously designed Allison is a V-12 with overhead camshafts, four valves per cylinder, and a mirror finish on all contact surfaces.

calculates that the torque peak, occurring at 3,200 revs, gives him 1,500 pounds-feet to play with. That this is big torque indeed can be gauged from the fact that only the bulgiest-muscled 1955 cars can boast of more than 300 pounds-feet.

Cramer is a self-taught near-engineer. When he got word that there was a factory-fresh Allison to be had in Chicago, he snapped it up. From then on—construction took 10 months—it was a story of patient amalgamation of aircraft and truck parts. Automobile bits were used only when nothing else would fit. Lending Cramer help on the aircraft side was Chief Warrant Officer W. O. Leger, from nearby Offut Air Base, who worked on many an off-duty hour.

It goes backwards. The big V-12 rides turned around, compared to what it would have done in the air. It feeds its power first to a truck universal, and then to a 32-inch chrome-molybdenum steel drive shaft, another universal, a flywheel, a truck clutch, and a four-speed synchromesh truck transmission. Everything from the shaft on back rides behind the driver and passenger.

Cramer explains to you that firing it up is going to take you some time—maybe three minutes after some practice. You flip the electric door switch and climb into one of the lushly upholstered bucket seats. Not counting familiar controls or a line of circuit breakers, 32 air-

craft controls and gauges stare at you.

Starting ritual. As the military says, you fire up by the numbers:

1. Going to the throttle quadrant down by your right foot, set the hand throttle at *10 percent open*.

2. Set the fuel-mixture lever at *full rich*.

3. Set the spark lever at *retard*.

4. At the small switchboard atop the drive-shaft hump, flip the master switch *on*.

5. At the main switchboard, turn the magnetos *on*.

6. Back at the smaller board, flip the fuel-boost switch *on*. Check in 30 seconds to see if you have the required 15 pounds' pressure at the mammoth carburetor.

7. Turn the primer switch *on*.

8. Move the starter control first to the *energize* notch and then bravely on to *start*. Brace yourself for a brief whine followed by a really serious roar as the V-12 blasts on.

The next thing to do is to avoid lingering in the garage. Not only does the Allison sound like a blitzkrieg, but in an enclosed space it puts out enough heat, despite special insulation on its exhaust manifolds, to brown a strudel in nothing flat.

Gauges galore. Outside, the Comet trembles gutturally. You look at all the instrument lights, like the marquee of the Bijou back home. You look at all the gauges wiggling at you: tach, mani-

fold pressure, oil pressure, oil temperature, fuel capacity, fuel reserve, oil capacity, ampere input, ampere output, hydraulic pressure, coolant temperature (left system), coolant temperature (right system).

You shift into low and trundle away. Other cars look small, even though the Comet, with a 135-inch wheelbase and 62 inches across the hip, isn't so much bulkier than some current stock plush-bottoms. Perhaps it just seems bigger because of that magnificent 80-inch hood.

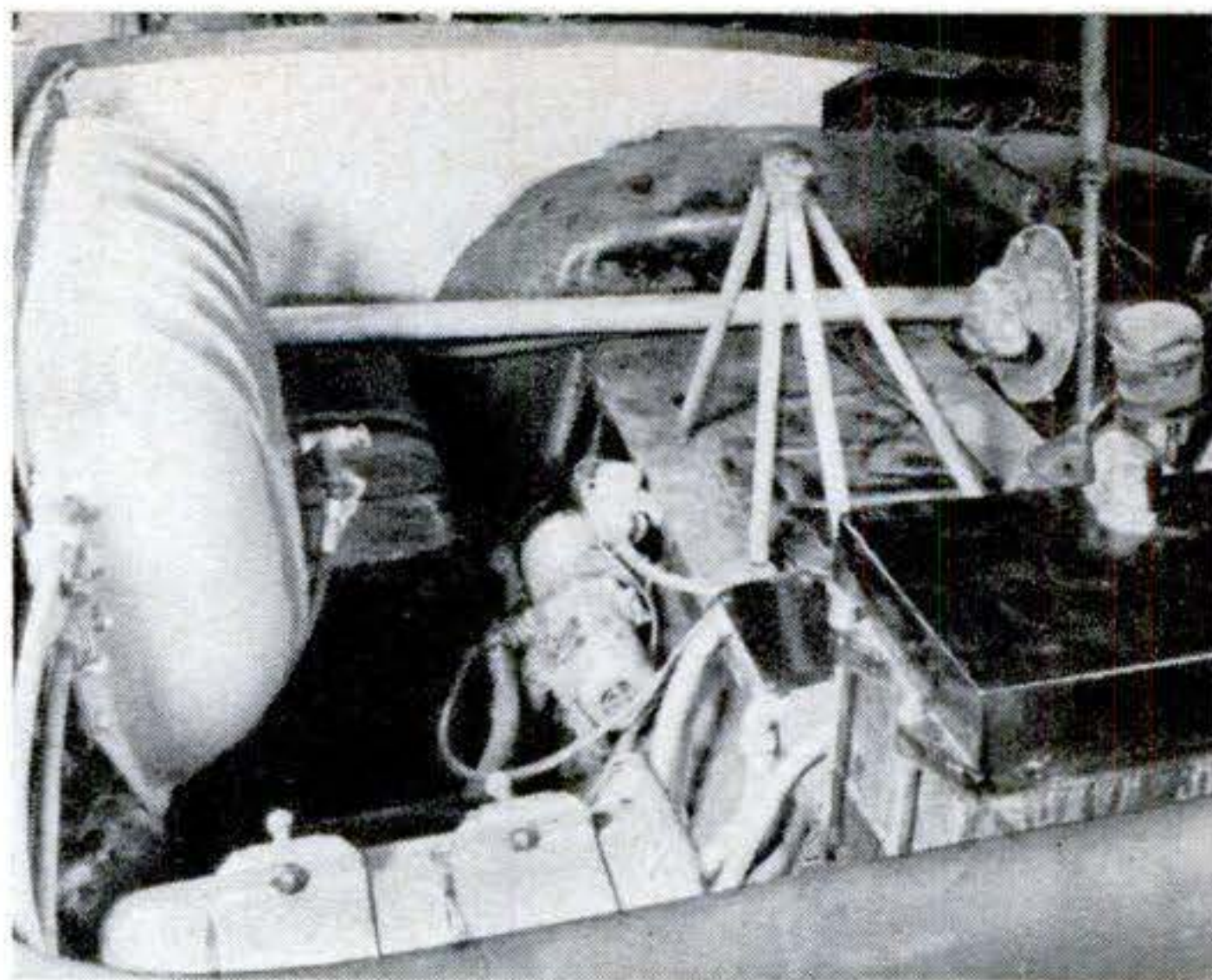
Skin grafts. As you cut across town, Cramer explains the parentage of body parts. The windshield began life as the back window of a '53 De Soto. Front fender skirts are Dodge; cowl and hood parts are Olds, with skin grafts from Buicks and Studebakers. From the doors on back, the body is mainly Buick Riviera, Cadillac, Lincoln and Ford, except the rear deck, which had as many parents as a random litter of pups.

You note admiringly that the body looks as slick as though it had come from its own dies, and that the car runs rattle-free. As you get out of town and hit it up, wind noise is practically nil, indicating that the Comet is on good terms with the air it splits. As the Allison ticks over at a 1,500-r.p.m. pace, you are hurtling down the concrete at better than 70 m.p.h. Touch the accelerator and it's no trick at all to bring the tach up to the 2,000-r.p.m. mark, at which point the scenery blurs alarmingly.

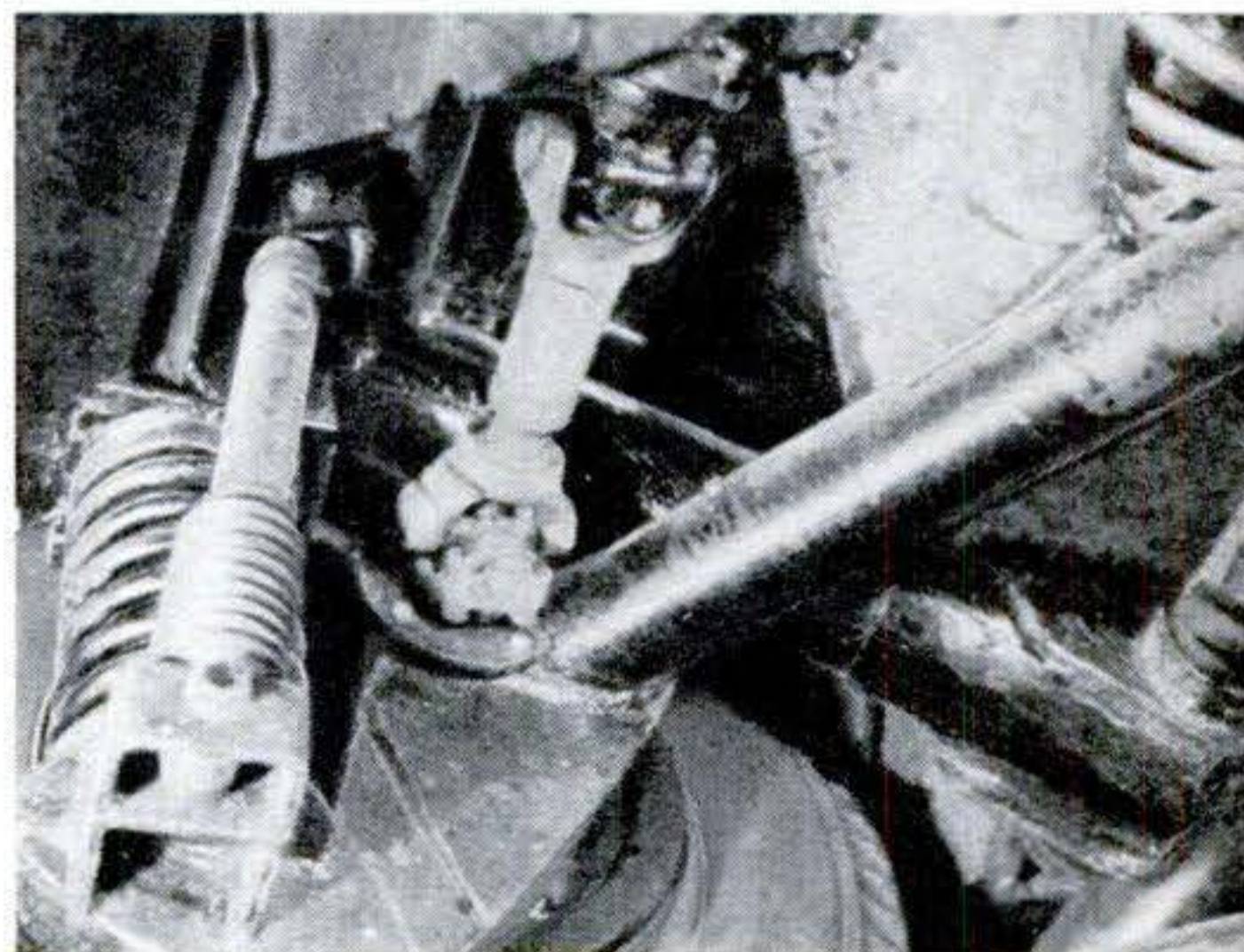
As you back off for a turn you note that the steering is tight and finger-ready. Still you can tell that this is a big bundle of machinery. There's a faint dragging noise on curves: it's one of the rear wheels, depending on which way you're turning. That's because Cramer's rear axle isn't a true differential but rather a highly modified Timken two-speed truck axle. Its ratio currently is 2.45:1.

Flat and solid. Braking the Comet slams you into a fast, flat stop. Fast, because Cramer has big Chrysler brakes

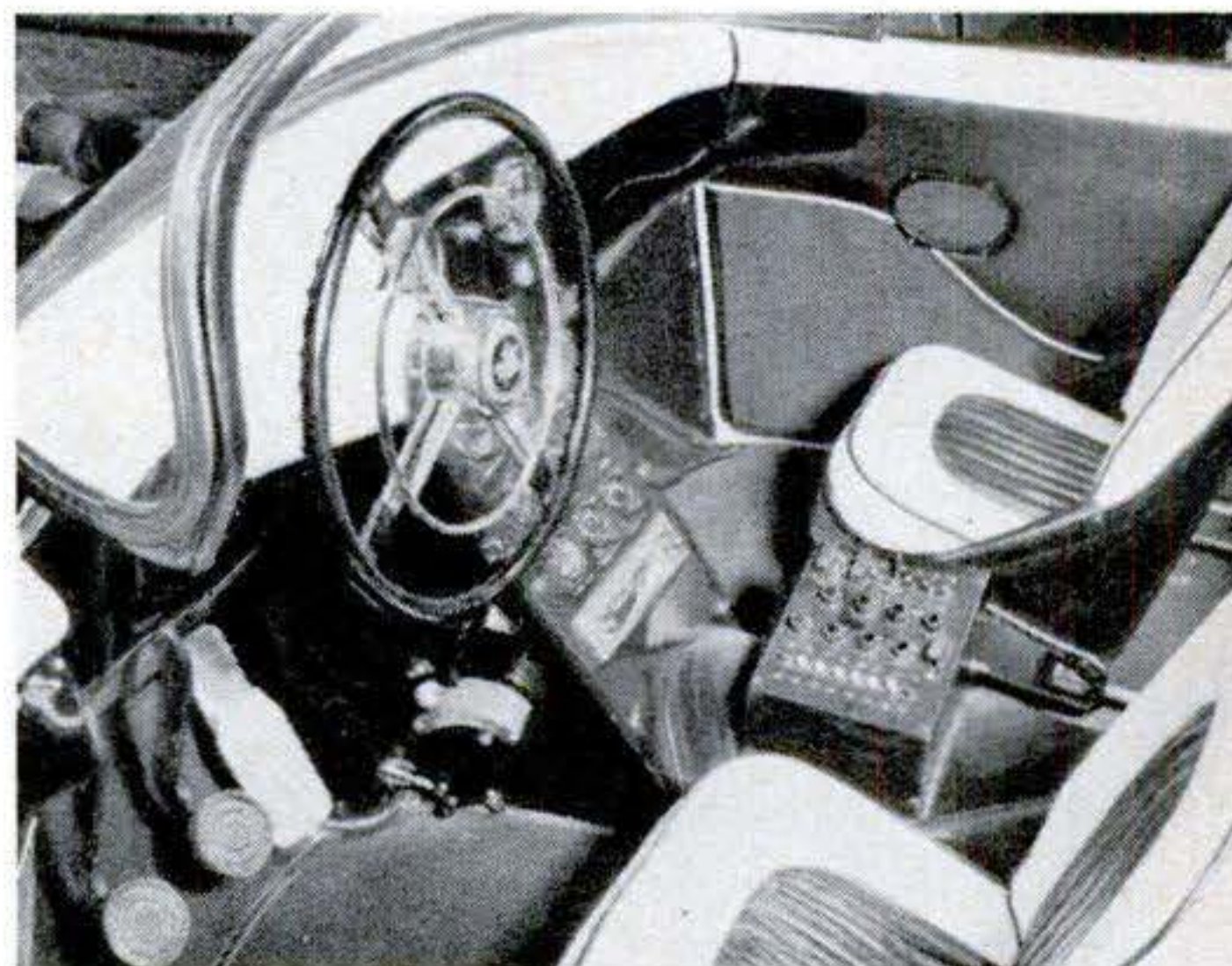
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NOT MUCH LUGGAGE could fit in the auxiliary-packed rear compartment. Tank at left is part of the 35-gallon cooling system, which is 90 percent antifreeze. Lube system is also enormous: the engine needs 32 gallons of oil.



STUBBY HALF-SHAFTS feed 1,500 pounds-feet of torque to the rear wheels. Cramer didn't skimp on solidness, as this spring mount and radius arm attest. Clutch, though a beefed-up job from a big truck, has been weak link so far.



SLICK COCKPIT reveals close attention to detail. Most of the instruments and controls are aircraft types. Note throttle quadrant on side of main console. Jutting from behind it, just over lower wheel rim, is four-speed shift lever.

What

By
Frank Rowsome Jr.



Two-horsepower engine running Vermont drag saw, around 1914.

WHEN Chrysler brought out a 180-hp. engine in 1951, a 45-hp. jump that promptly boosted sales, other auto makers speedily followed suit. In the last six years, peak horsepower has shot way up. Samples:

<i>Make</i>	<i>1950</i>	<i>1955</i>
Plymouth	97	177
Chevrolet	105	180
Ford	100	182
Pontiac	108	180
Studebaker	102	185
Cadillac	160	270
Packard	160	275
Chrysler	135	300

The end is not in sight: most makers are reportedly planning power increases for 1956 models. And except in the case of discontinued engines, there is virtually no Detroit precedent for *reducing* power.

What is horsepower?

IT'S a measurement of the rate of doing work. Specifically, it is performing 33,000 foot-pounds of work a minute.

James Watt started it. He needed a measurement that would be meaningful to prospective purchasers of his steam

overrated horses, his engines would especially please their buyers.

If you feel frisky, load up your pockets until your gross weight is 220 pounds, and locate a straight flight of stairs. Discarding your dignity, race upstairs full tilt. If you can make 10 feet vertically in four seconds, you will have been exerting one horsepower en route.

What kinds of horsepower are there?

AT LEAST eight different horsepower terms are applied to auto engines:

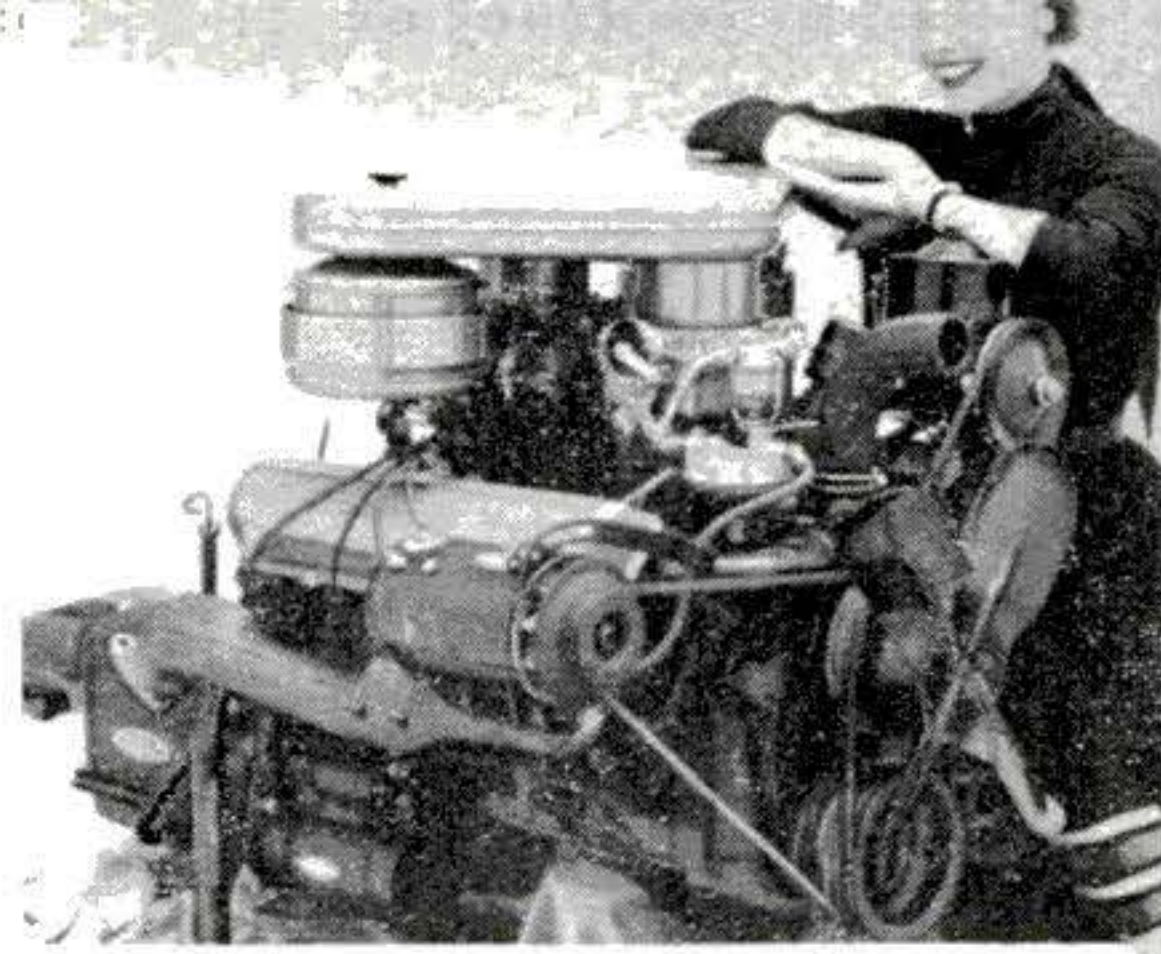
1. *Taxable horsepower*: This is an anachronism, a legal figure based on obsolete design premises. But in a few states it determines the cost of your car registration.

2. *Indicated horsepower*: Engineers' lingo for theoretical maximum power generated, figured on combustion pressures and engine dimensions.

3. *Friction horsepower*: A calculation of how much of an engine's power it uses up itself.

4. *Rated horsepower*: A measurement, under prescribed laboratory conditions, of an engine's output. It's the advertised figure.

Horsepower Really Means



Cadillac 270-hp. engine, 1955.

5. *As-installed horsepower:* Detroit lingo for what may be delivered to the transmission in a car on the road.

6. *Wheel horsepower:* What's available at the far end of the power train to make a car go.

7. *Road-load horsepower:* What's needed to keep a modern car moving at constant speed on a level, windless road. It varies greatly with speed.

8. *Accelerating horsepower:* A calculation of what's left, after deducting road-load demands, to accelerate a car. It varies greatly with speed.

How do they measure rated horsepower?

THIS is done on an engine dynamometer, a hydraulic or electric device for absorbing and measuring power. It also reports the engine speed at which power is produced.

The power of a gasoline engine varies greatly with its speed. At idle, even big engines give only a little power. At moderate speeds, they give only a third or so of their nominal output. Modern engines generally have to wind up to an excited 4,500 or so revs before they put out their rated power. They'll turn a little faster than their peak-power speed, but output will fall off a little.

Must I drive at extremely high speeds to use all of my engine's power?

YES, in high gear. If you stay in low, you can "peak" an engine at moderate car speeds—34-39 m.p.h. in most cases. But an engine sounds so hysterical at maximum-output revs that you won't like it.

It isn't strictly accurate, however, to think of an accelerator as a car's horsepower controller. The throttle governs horsepower only to the extent that an engine is free to speed up to its most powerful speed. Suppose you have an engine that peaks at 250 hp., provided it can wind up to 4,400 r.p.m. If you load it severely at low speeds—try to get up a steep hill in high gear, say, without downshifting—the engine will only give the full-throttle power for the r.p.m. it can reach. This may be just a small fraction of the rated amount.

How accurate are manufacturers' advertised horsepower figures?

THEY are quite unrealistic, but they are roughly comparable. All makers stick pretty close to a Test Practices Code established by the Society of Automotive Engineers. But engineers study the code for loopholes like tax lawyers working over a new revenue law. Air cleaners, generators and fans are often taken off engines under test; manifolds are carefully worked over "to be sure the foundry didn't give us a rough one"; and manifold heat valves are shimmed tight lest a wisp of warmth get through to weaken the charge. One testing room is reported to have applied vacuum to the exhaust of engines under test, a procedure that can make the most docile engine put out like a cocained horse.

But auto makers keep a sharp eye on each other, and the effect of individual code interpretations is comparatively small. Most test engineers queried recently, though indignant about "those

[Continued on page 260]

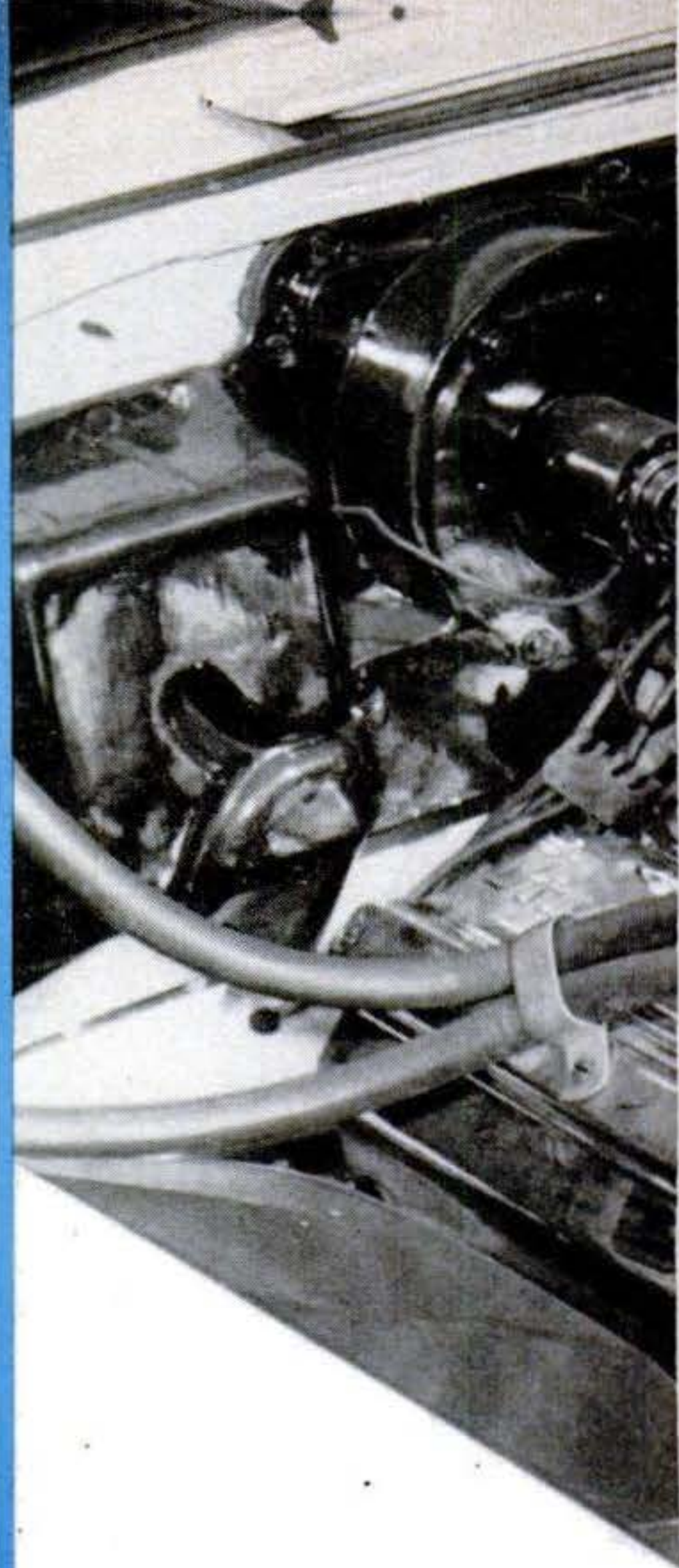
Driving Detroit's Most Powerful Car

The Chrysler 300's speedometer is calibrated to 150 m.p.h., and belting the accelerator feels like blasting off with a TV spaceship.

By Devon Francis

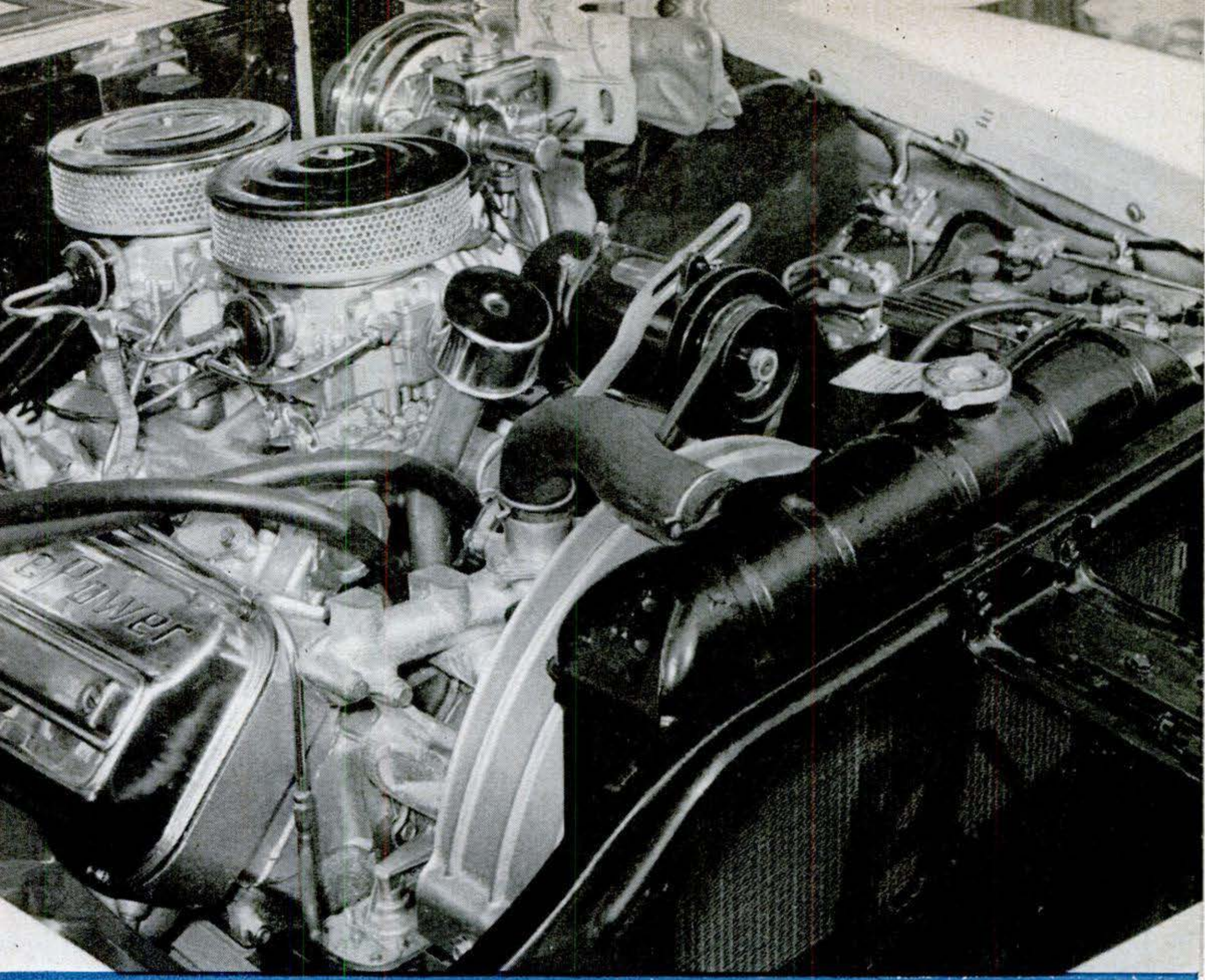
ONLY a thousand American motorists are going to get their hands on this year's most powerful Detroit automobile. It's the Chrysler 300. The figure stands for horsepower.

The manufacturing schedule calls for just 1,000 of these cars in 1955. As far as I am concerned, that's good. Let's face it—this job's a hot rod. The number of



MOST OBVIOUS CHANGE in engine is special air cleaners on twin, four-barrel carbs. Four barrels are automatically locked out during warm-up period. Cams are long-dwell type. Copper-lead, heavy-duty con rod and crankshaft bearings are used to avoid fatigue.

CAR CORNERS beautifully, rear wheels fighting against break-loose. But even with 300 hp., it won't scrub rubber at take-off. That's due to cushioning effect of torque converter. Grille is same as Imperial's.



drivers with the skill and judgment to handle that much car without stumbling into trouble is, I suspect, limited.

Chrysler's next-highest horsepower is 250. Cadillac's highest is 270, Packard's 275, Lincoln's 225.

I drove the 300. It's deceptive. You have to wait for about two seconds, after belting the accelerator, for anything to happen. The car seems well-behaved, even docile. The automatic drive takes hold smoothly. Engine noise is low.

The 300 Digs In

Then the roof falls in on you. The engine roars. You are plastered against the seat. If you have passengers aboard, their heads snap back. Fleeting, you get the impression that you are blasting off in one of those TV spaceships.

In runs with and against the wind, from zero to 60 m.p.h., I clocked the car out at 9.9 seconds average. It did just a

bit better than that because the speedometer registered only 59 m.p.h. when the car reached a true 60.

That's fast. It's impressive in an automobile weighing more than two tons *and* equipped with a torque-converter drive. Among production cars, only an Olds 98 or Super 88, weighing some 200 pounds less and driven by a mechanical-type Hydra-Matic transmission, can better that time, and then only by a small fraction of a second.

It's only fair to the Olds to add that it has almost 100 fewer horsepower.

Comparing the innate accelerative efficiency of Hydra-Matic with a torque converter is like comparing apples and oranges. They are two different things. The motorist pays for the converter's smoothness with reduced performance.

The take-off from a standing start actually is not the chief feature of the 300's performance. That occurs in the

acceleration at cruising speeds. That's where the car lays its ears back as the horsepower begins asserting itself.

This is what the 300 will do:

40 to 60 m.p.h.	4.4 seconds
40 to 70	7.6
40 to 80	12
50 to 80	10

To complete the catalogue of the acceleration performance:

0 to 20 m.p.h.	2.7 seconds
0 to 40	6.5
0 to 80	18.4

It would be avoiding the obvious not to mention that the 300 also has road speeds that reach way up on the dial. The speedometer is calibrated to 150 miles an hour.

The car won't go that fast. At the Chrysler Proving Ground, they have had the prototype up to a true 140 miles an hour. At that pace, it takes about a dozen additional horsepower for each extra mile per hour.

Production 300s—they started making them last month—will do upward of 130 m.p.h. To get that in perspective, 130 is only 10-odd miles an hour more than the standard Chrysler New Yorker is capable of.

Engineers Modify Standard Block

Chrysler got 300 horsepower out of its standard V-8 block, with 331 cubic inches of piston displacement, by a series of modifications.

First, the engineers removed the hydraulic valve lifters to do away with "pump up." That term means only that at the heat generated by exceptionally high engine speeds, the lifters expand and tend to hold the valves open.

Removal of the lifters was necessary because the engine has to be revved up to 5,200 r.p.m., 600 more than the 250-hp. job is called upon to produce. Engine speed is further helped by a

smaller-diameter torque converter that offers the crankshaft less resistance.

Next Chrysler added a second four-barrel carburetor and installed a camshaft substantially similar to the type used by sportsman Briggs Cunningham in the same engine for the famous Le Mans race.

Other engine changes, including one in the intake manifold to accommodate the second carb, are only refinements.

Two inches lower than the New Yorker, the 300 has excellent roadability. Roll off the shoulder of the road, and it

keeps its feet like a burro. The power brakes are like silk. They won't grab. At idling speed, the engine delivers a delectable mutter at the tailpipes. The hiss from the air cleaners is the beast in bonds.

Despite harder-than-normal springing, the 300 takes ordinary washboards like a baby carriage. It rounds curves without apparent roll.

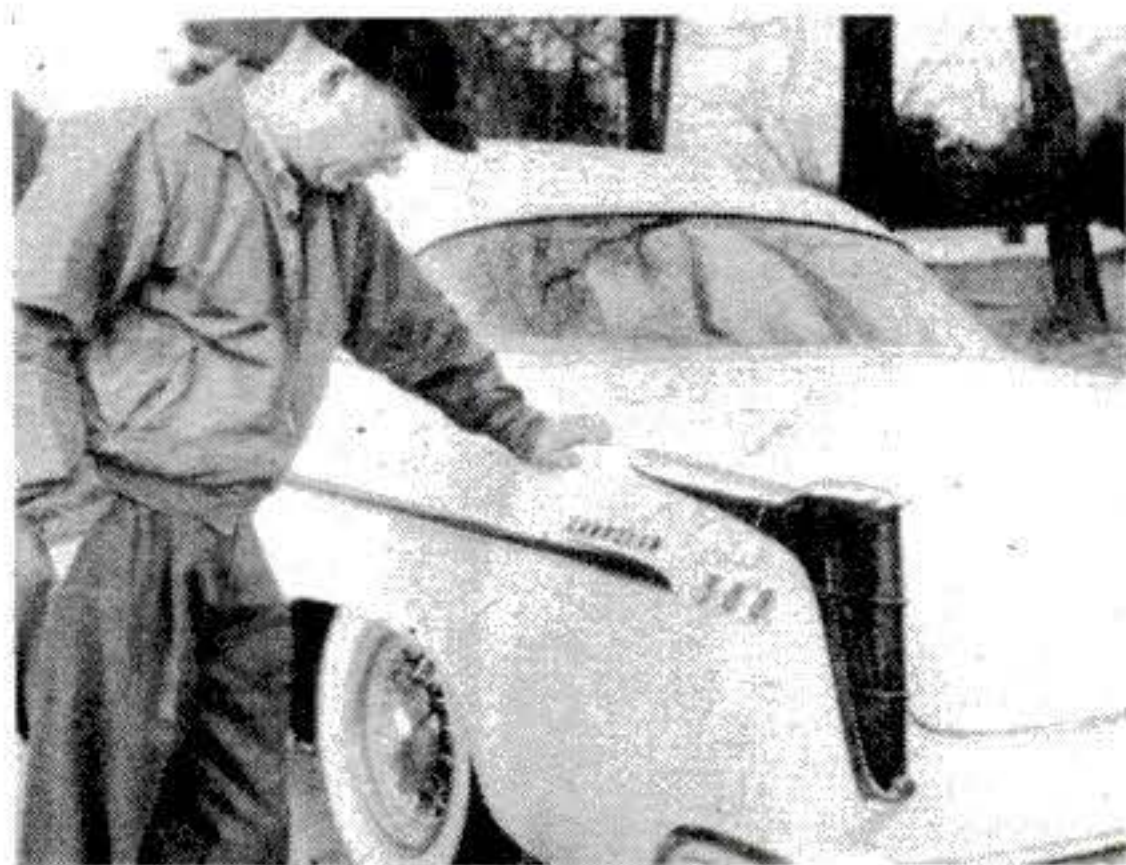
In looks, the 300 is striking in its simplicity. Gewgaws are lacking. The sports-type hood is unornamented. The car's basic lines have the same grace as those of the New Yorker—the two cars use the same body shell.

There are debits. With the throttle closed, the engine idles rough. That's due to the racing-type cam. The reduction in car height is at the expense of headroom. The driver can see no more than 200 feet behind in the rear-vision mirror.

And why this boat doesn't have bucket seats is more than I can fathom. The seats are leather-covered and easy to slide on. Mash the accelerator in cornering left, and unless you hang on to the wheel with an iron grip, you'll wind up over by the glove compartment.

Finally, the 300 is hard on gas.

But if you've got \$6,000 to spend for a car, who cares about gas? **END**



AUTHOR looks at "Chrysler 300" on rear fender. The grille and deck lid also carry 300's identifying symbol, a small shield in checkerboard design.

Chrysler, Chevrolet Star in Speed Runs



Chrysler 300 outran its big-car competitors for a record two-way average of 127-plus m.p.h.

DeSoto shaded Chevrolet, followed by Studebaker, among cars with middle-size engines.



THE question encountered from gas-station guys, small boys, and the young-in-spirit everywhere—"How fast will she go?"—was answered at least temporarily on the sands at Daytona

Beach recently. There most makes of 1955 cars lined up to whistle through a measured-mile timing trap—with two miles in front to get cracking and two afterwards to get uncracking on the



Chevy 8s swept a special low-price class, taking first four places plus sixth and seventh.

slithery sand. A Chrysler 300, a deceptively decorous-looking hardtop (page 128), was decisively rapid. Averaging 127.580 m.p.h., a new record, a brand-new 300 driven by airline pilot W. J. Koechling of Miami, managed to hit 130.766 m.p.h. on its downwind run.

The only car to breathe closely down the neck of the fastest was another Chrysler 300, driven by Brewster Shaw, last year's winner, who was about a mile off the pace at 126.452 m.p.h. Next spot went to Lewis Hawkins in a Cadillac, at 120-plus. Following these were a Buick Century (116); another Cadillac (116); a Chrysler New Yorker (114). Oldsmobile, fast in other years, was still brisk (111) but well down the list.

Among cars with middle-sized engines (250-299 cubic inches), a DeSoto carried the honors at an average 112.295 m.p.h., closely pressed by a Chevrolet V-8 at 112.131, and a Studebaker at 111.855. Mercury was eleventh (105); Ford V-8 fourteenth (103); and Plymouth nineteenth (100).

Sports-car speeds varied greatly. The quickest was a D-type Jaguar that clocked 163, well ahead of a 4.9-liter Ferrari (154), Cunningham (149), and

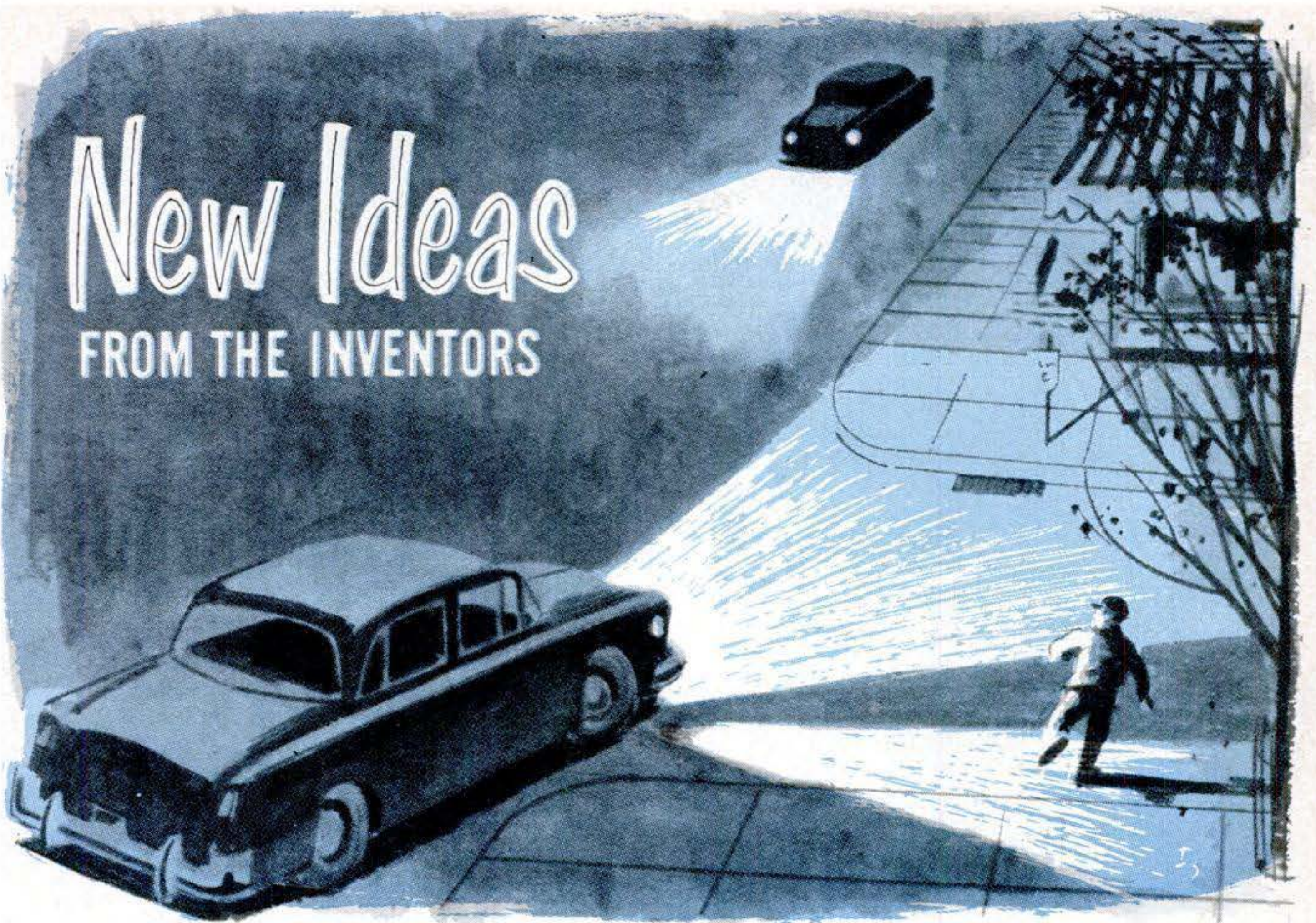
Mercedes-Benz 300SL (133). Less costly sports cars were led by Ford Thunderbird (124), Jaguar XK140 (119), and Austin-Healey (111). A Corvette was clocked at 103, but it was a 1954 six-cylinder model, and thus perhaps entitled to be some nine m.p.h. slower than the zippy 112 turned in by the '55 V-8 Chevy sedan.

In acceleration runs a Cadillac topped all comers, outside the sports-car field, by covering a mile from a standing start at an average speed of 80.428 m.p.h. A Chevrolet came next with 78.158 and a Buick Century third with 77.436. A Ford Thunderbird out-scattered other American sports cars with an 84.666 average, and a big 4.9-liter Ferrari led the unlimited sports field with a rubber-burning 96.102.

How accurately the Daytona speeds represent what an owner can get is problematical. While the cars are scrutinized closely for adherence to stock rules, they *do* have the benefit of all factory options, and, in some cases, of factory engineers and mechanics. But against these benefits must be listed the handicap of wheel slippage on the sand.
—Frank Rowsome Jr.

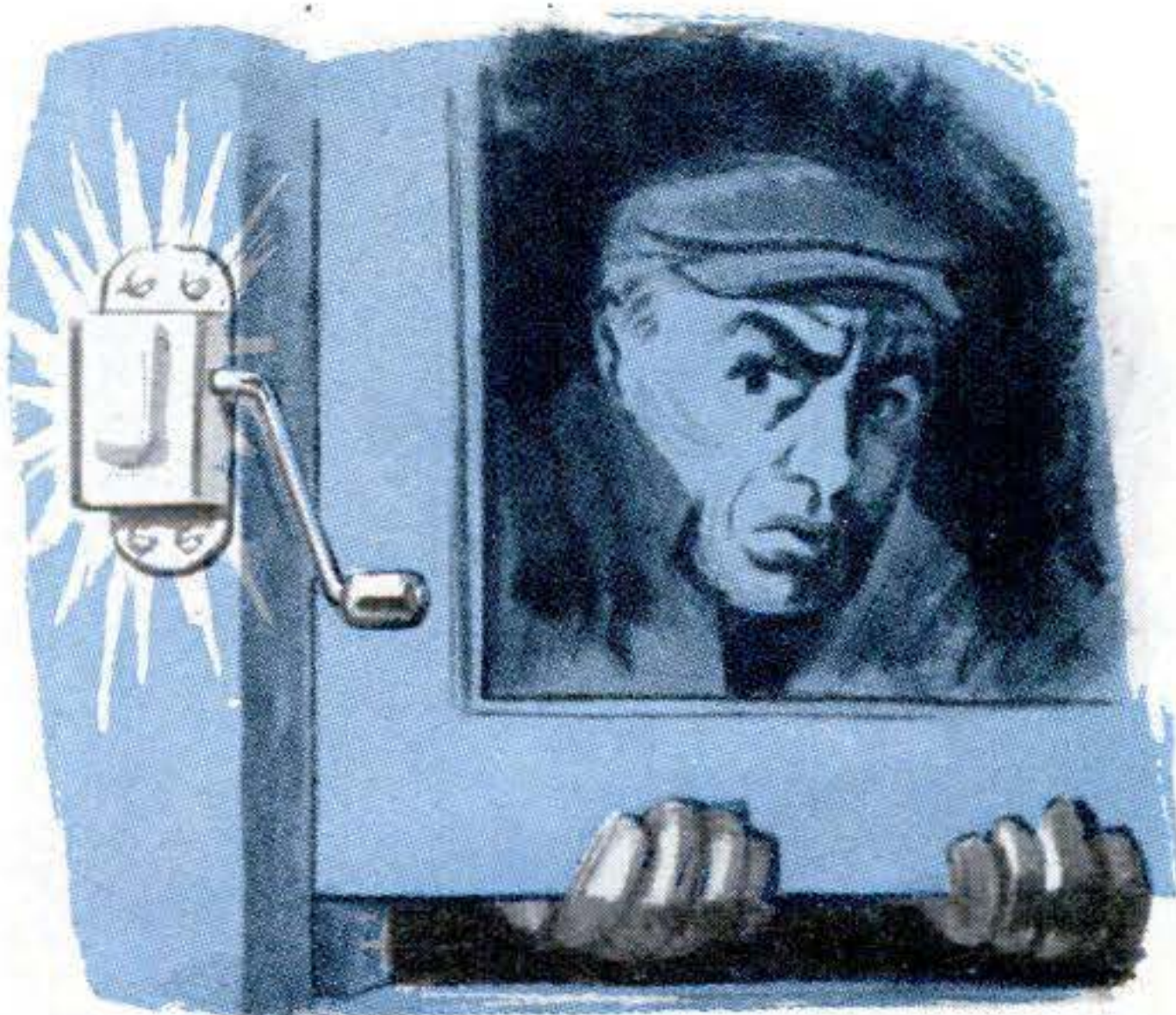
New Ideas

FROM THE INVENTORS



1 Car Lights to Turn Corners. These auxiliary side beams would light your way around dark turns. The lights would be recessed in the fender corners, and the control switches mounted on the steering

column. Turning the wheel more than five degrees would switch on the proper light. In addition to banishing blind spots, the beams would warn pedestrians that the car was about to turn.



2 Alarm to Guard Window. A thief who mistook this partly open window for an unguarded one would be in for a noisy surprise. Lifting the sash would set off an alarm. Once triggered, the bell would ring until its spring ran down or it was silenced by a special key. The mechanism could also be used as a door signal.



3 Mattress to Keep You Warm. You wouldn't be snarled by electric-blanket wires if you slept on instead of under the bed warmer. A heating unit molded into a foam-rubber mattress would take the chill off your slumbers. And body movements, says this inventor, would help circulate the warmth rising through the porous foam.

Please turn the page for more new ideas

APRIL 1955 133

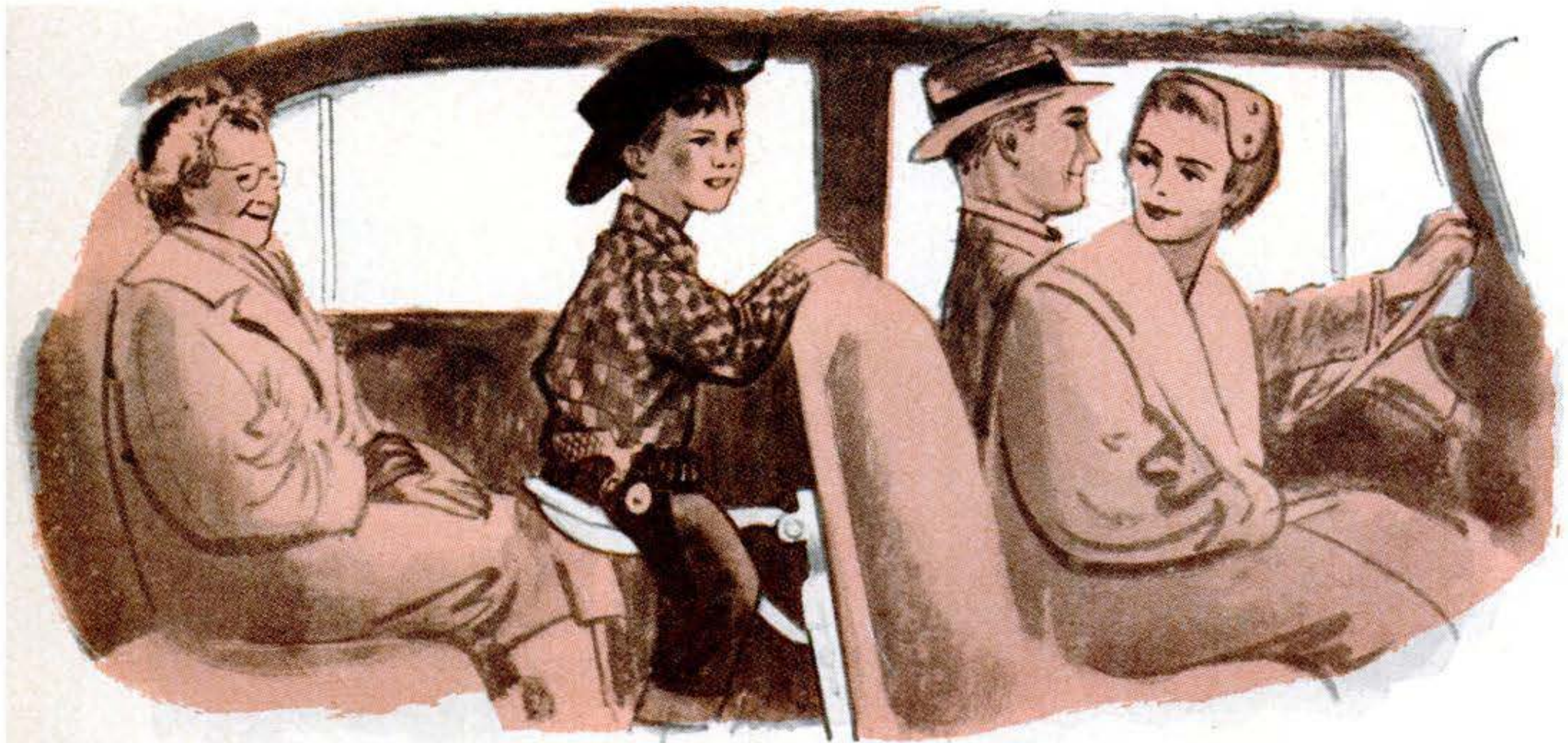
MORE New Ideas from the Inventors



4 Cart to Spare Gardener's Back. A push-while-you-sit gardening cart might take some of the stoop out of weeding and lawn trimming. The gardener would straddle this low, narrow, broad-wheeled cart and push it along with his feet. The lower part of the wagon would hold a basket for cuttings and a space for tools.



5 Pipe to Sit on Built-in Rest. A pipe that had this self-contained stand carved or cemented on the corner of the bowl could be "racked" on any table. The angled corner piece would hold the pipe upright. If the pipe were laid flat, the squared bottom of the stand would keep it from tipping and spilling its ashes.



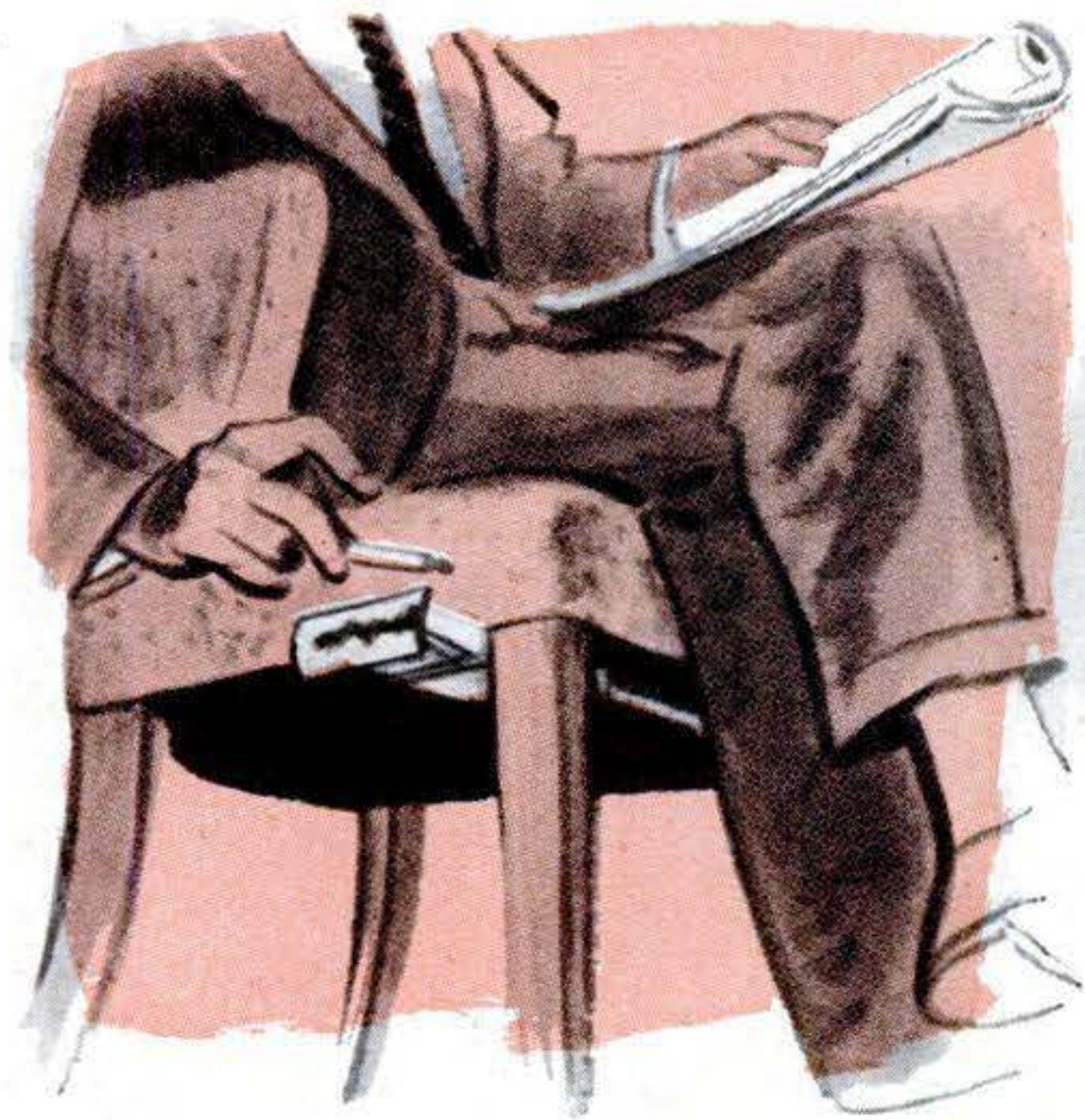
6 Saddle to Seat Extra Riders. Fold-away bucket or saddle seats might solve the recurrent problem of what to do with those extra passengers who usually end up on someone's lap. This adjustable, collapsible seat would be bolted to the back of the front-seat frame where the headroom is generally greatest. When not in use, it

would fold up snugly, but when extra passengers came aboard, the saddle portion could be let down. In open position it would clear the knees of those on the back seat, and the saddle itself could be adjusted vertically to permit either youngsters or longer-legged adults to ride with their feet touching the floor.

U. S. patents on these inventions have been granted to: 1. E. C. Pederson, Los Angeles; 2. R. Belanoff, Brooklyn, N.Y.; 3. A. L. Freedlander, Dayton, Ohio; 4. J. Dracos and J. W. Williams, Monterey, Calif.; 5. R. L. Sessoms, Asheville, N. C.; 6. A. B. Bell, Philadelphia; 7. F. Chalmers, Grosse Pointe, Mich.; 8. R. and D. Fischer, Kirkwood, Mo.; 9. W. Van Hook, Maxwell, Iowa.



7 Mower to Double as Barrow. A platform like this could make your lawn mower serve as a hand truck, too. The attachment, made of wood or light metal, could be adapted to fit a variety of mowers. Its front would rest on the raised roller; a notch at the back would lock around the mower handle.



8 Ash Tray to Hook Under Chair. You wouldn't have to juggle an ash tray on your lap or aim your cigarette flakes at the nearest table if there were a receptacle like this hooked under your chair. A decoratively faced pull-out drawer would fit into a box-like container, and this would be attached to a spring or to an adjustable elastic strap. Hooked pins at both ends, and the tension of the band, would secure the ash-tray attachment to the chair bottom.

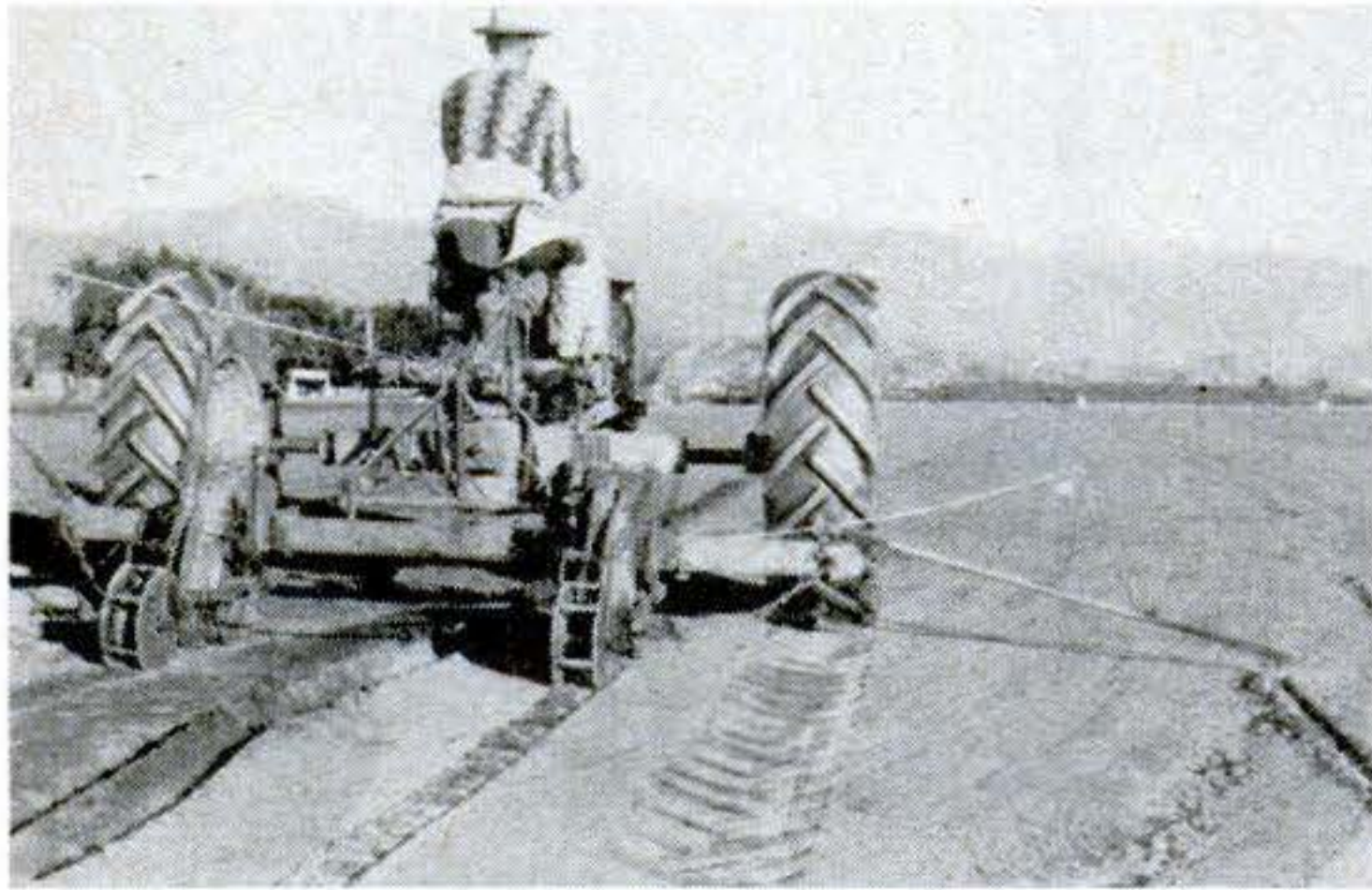


9 Glove to Adjust Welder's Mask. A welder usually has to flick his dark-glass eye shield down each time he strikes an arc, then raise it by hand. This outfit would raise and lower his shield automatically. Induced current from the gun handle would pass through wires embedded in the glove. A spring would normally hold the shield in raised position, but when current started to flow to the electrodes, a solenoid would pull it into place.

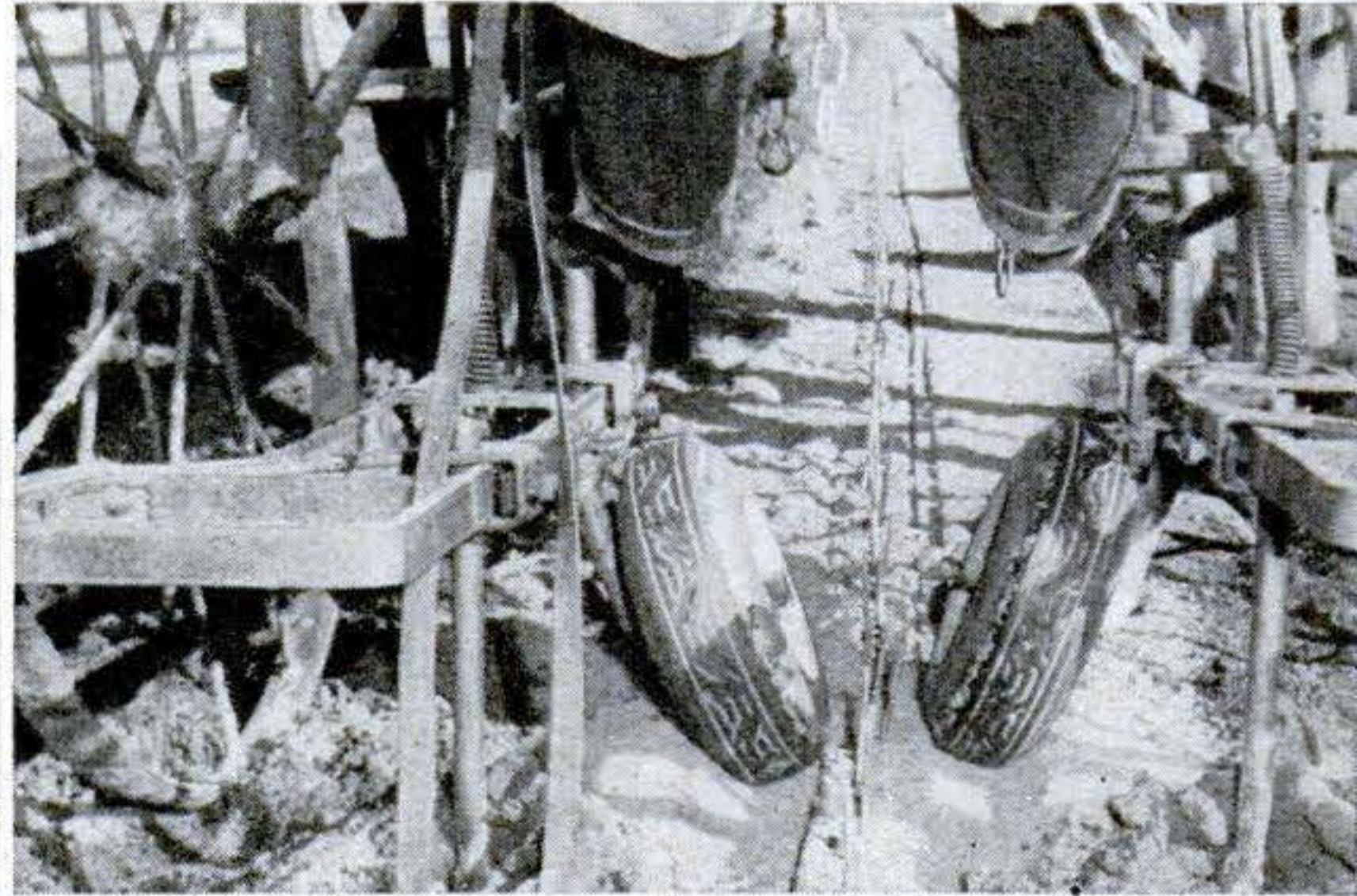
Nursery Machines Speed Rose Raising

RAISING rose bushes has been mechanized at the Howard Nursery in Hemet, Calif., with ingenious machines built by the nurserymen themselves. In the one below, drawn by a tractor, twin disks with crossbars both

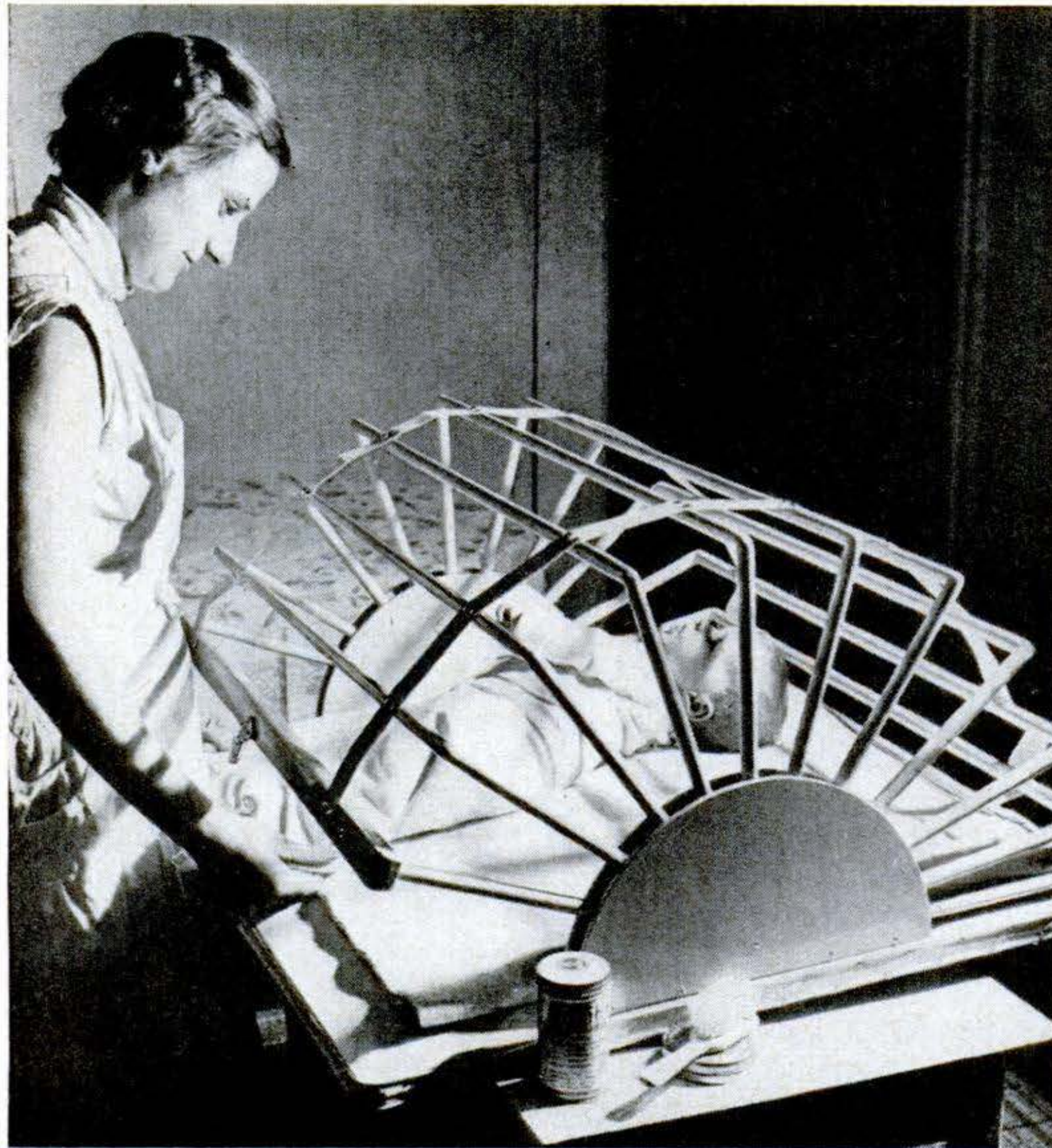
mark rows and break up soil for planting cuttings. Bigger rimmed disks ahead of them keep the cutters from going too deep. There's also a digger (not shown) for loosening bushes so they can be lifted by hand.



OUTRIGGER makes guide line for tractor's return trip as row marker breaks up soil.



TAMPING WHEELS, drawn by horses, pack the soil around the newly planted cuttings.



Wooden Sitter Holds Active Baby Safely

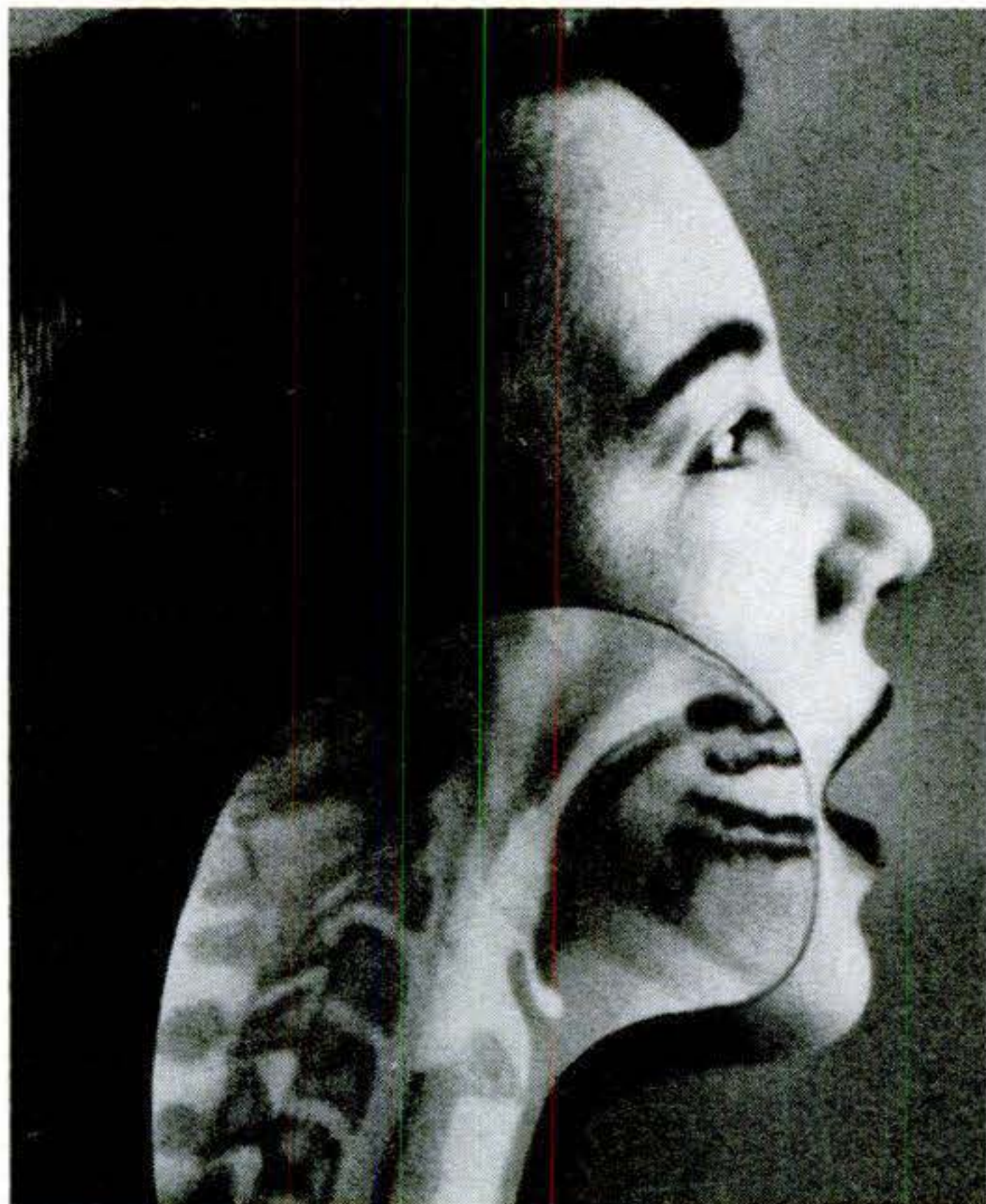
THIS barred contraption is a German inventor's answer to a crying need of the carriage trade. Called a "Baby Safe," it's designed to keep Junior from rolling off the table when Mom turns her back to take a telephone call or leaves the room to answer the doorbell. To release baby, you press a button and the wooden frame folds back over the base like the hood on a perambulator.

◀◀◀ Plumbers now use atomic techniques—they find pipe leaks with radioactive isotopes and Geiger counters.



THRESHER HARVESTS SEED. Machine reaps two rows on each trip. Paddles force bushes against

mowing bar that cuts off tops. Chaff is blown out through the stack at the rear.



Movie Tells the Inside Story

THIS X ray and conventional image were taken on a single negative. Devised at the University of Rochester, the technique is used in speech studies. It lets doctors view motion pictures of the face and X rays of the vocal organs simultaneously.

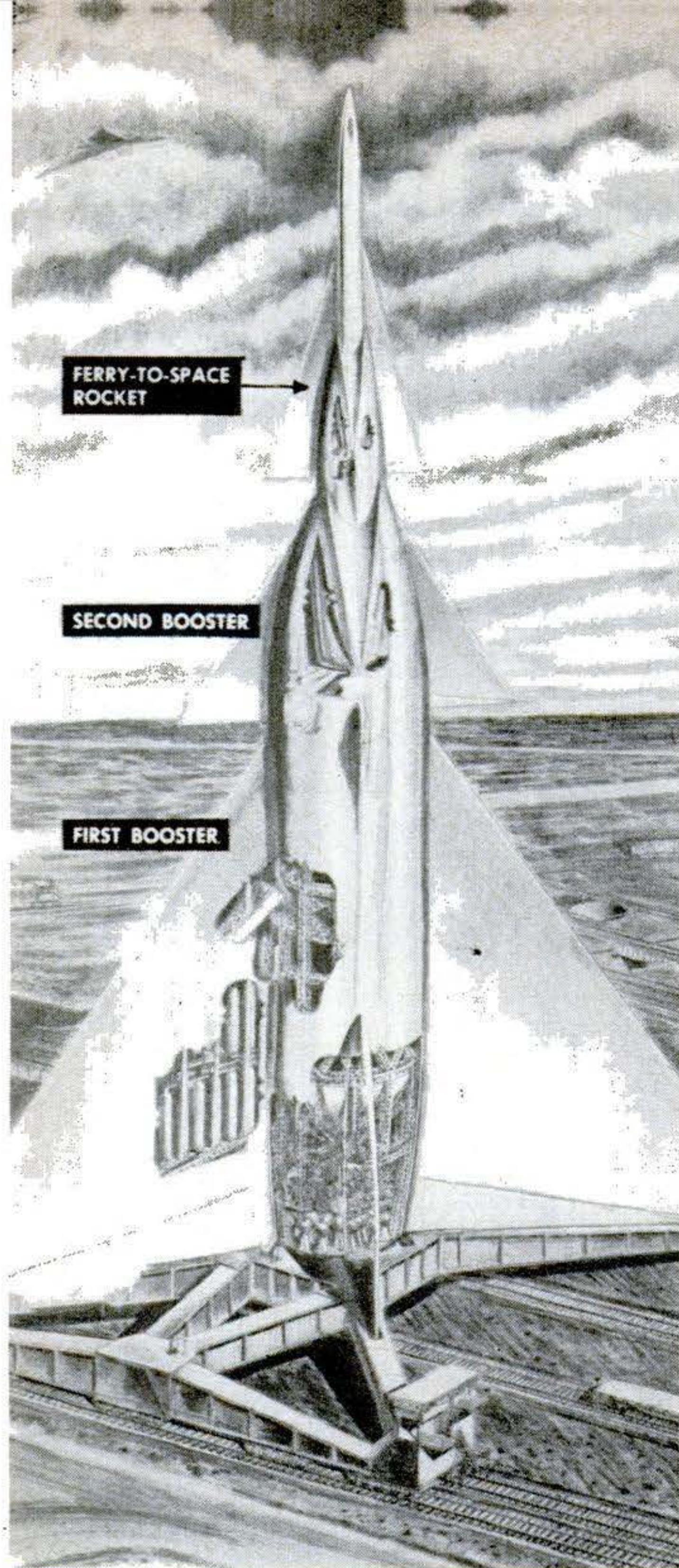


Vacuum Powers Gentle Lift

A LOT of nothing grips this big TV tube to hoist it from one spot to another. When the vacuum cup is lowered, the same air that runs the hoist creates the vacuum that locks the Ingersoll-Rand Vac-Lift to the smooth surface of the tube.

Tune Yourself

by Bob



THE booster rocket that got me off on a three-day space flight was an express elevator to the 24th floor of the Hotel McAlpin in New York City. Several hundred scientists and engineers were up there holding the ninth annual convention of the American Rocket Society.

Space-flight talk filled the air.

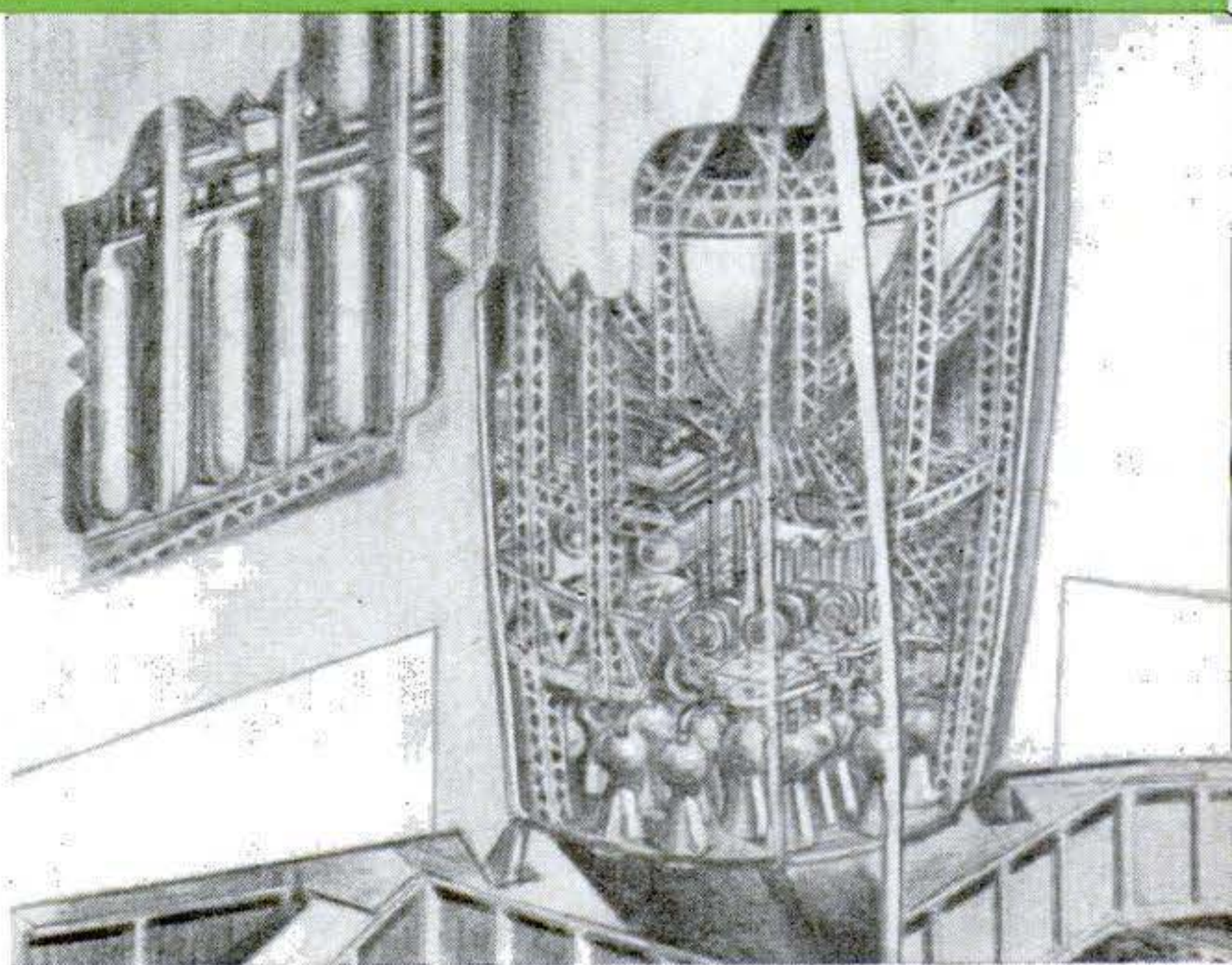
"I could blast you to smithereens the day you started building a station up in space," came a strident voice from a group in one corner.

"I'd do it like this," Strident Voice continued. "I'd let you send up hundreds of costly supply rockets with construction materials and equipment. I'd wait while you paid big overtime to hundreds of workmen floating around in space to put it together. I'd watch until you had spent your four billion dollars, or whatever—then I'd send up my homing rockets and blow your station to bits."

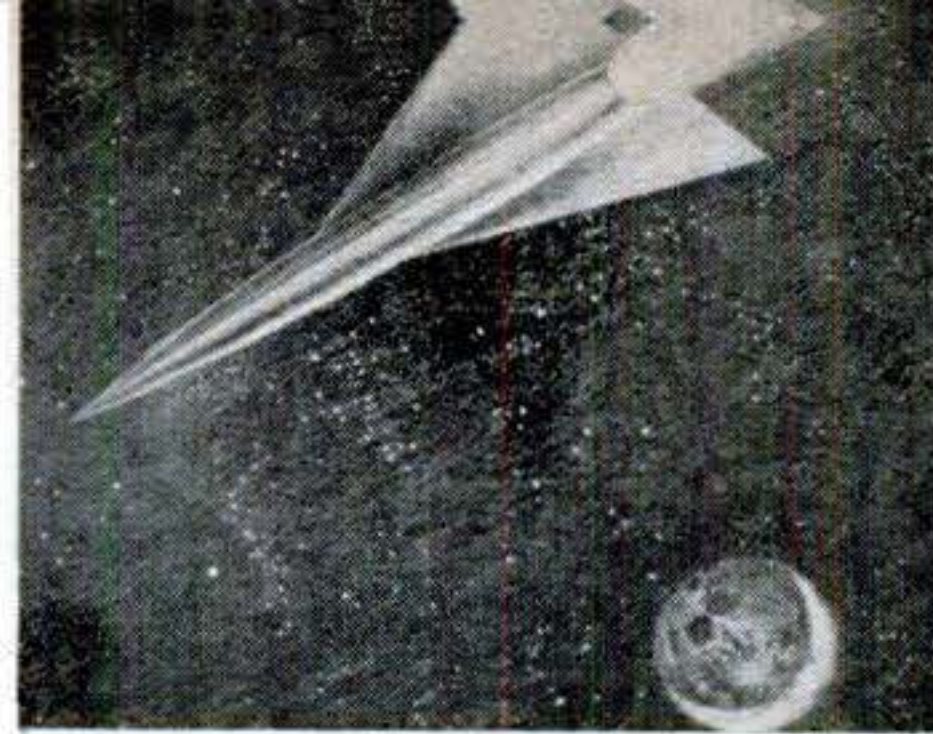
Strident Voice paused for breath, then added, "Anyway, that's what any enemy

Rocket planes riding tandem would keep space stations supplied

THREE-STAGE ROCKET pictured above would ferry men and supplies to a satellite station circling the earth 500 miles up in space. Each stage would carry a crew; delta wings would make it possible for all three to come back to earth in glider flight. On returning to earth, the two booster rockets would be fitted with jet engines for conventional airplane flight back to the take-off base. The top, or final, stage, would carry passengers and supplies to the space station. Picture at right shows details of construction, including rocket engines and rocket-fuel tanks in the wing. A design study for the space ferry was presented at American Rocket Society meeting by three engineers of the Goodyear Aircraft Corp.



Space-station enthusiasts are debating whether to build their own satellite or use one that's already circling Earth.



the Rocketmen

By Herbert O. Johansen

nation would do if we tried to build a big platform out in space."

"Suppose the space station were able to steer an evasive course when you sent up your space-station-blasting rockets?" a skeptic asked.

Lying in Wait—a Deadly Cloud

"Wouldn't make any difference," spoke up Strident Voice. "A direct hit isn't necessary. I could use the method proposed by Professor Thomas of Columbia for the destruction of satellite vehicles: fill the warhead of the rocket with several billion tiny pellets, or shot, and shoot it up into the orbit in the opposite direction of the artificial satellite. The warhead would explode and disperse the shot into a vast cloud through which the space platform would have to pass twice during each earth-orbiting. Before long the space station would be perforated into a lace station."

"But don't we all agree," a peacemaker asked, "that it would be a good

idea to have a manned space station?"

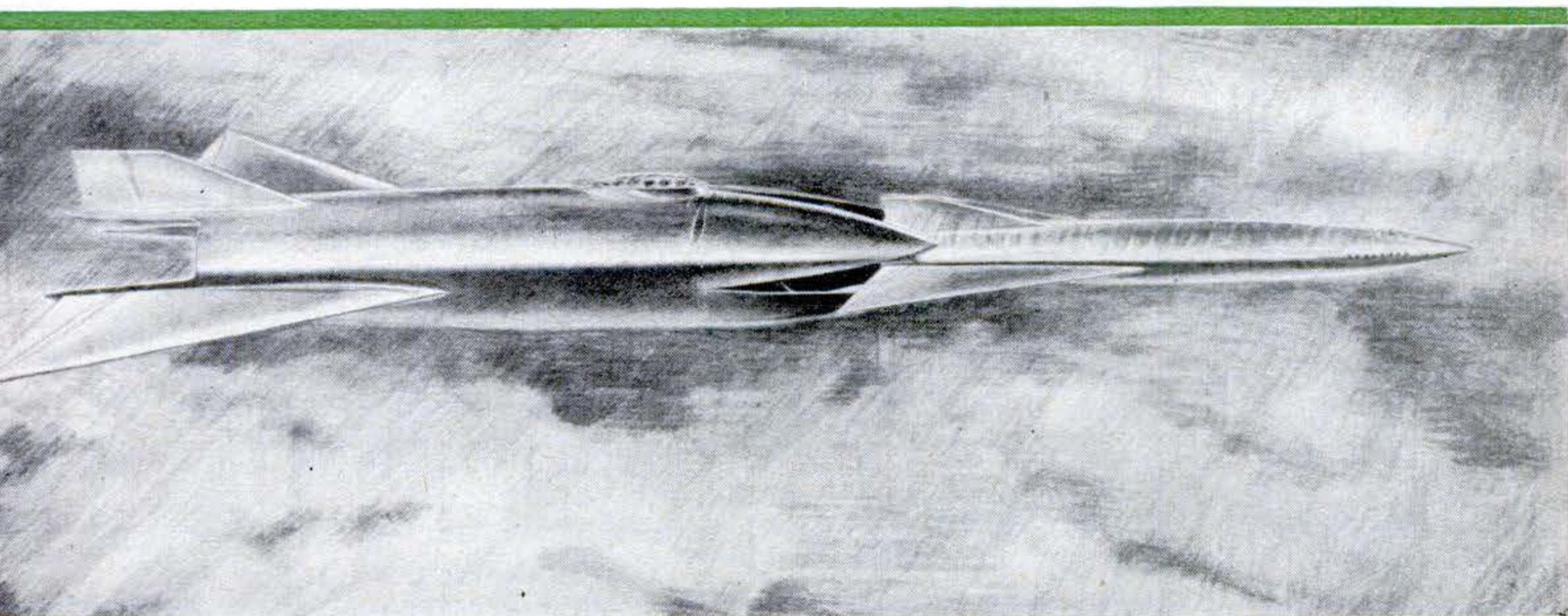
Everyone did. "Why, though," a gravelly voice asked, "do we have to build it? Couldn't we use a natural extra-terrestrial object, such as an asteroid, that's already circling the earth as a satellite? Then we would only have to send up supply ships with men and scientific equipment. A satellite of that size and mass—bigger than anything we could build—would be a Rock of Gibraltar in space. It just couldn't be destroyed."

"Yes, but we would have to find such a natural space body first," he was reminded.

He Looks for Tiny Worlds to Conquer

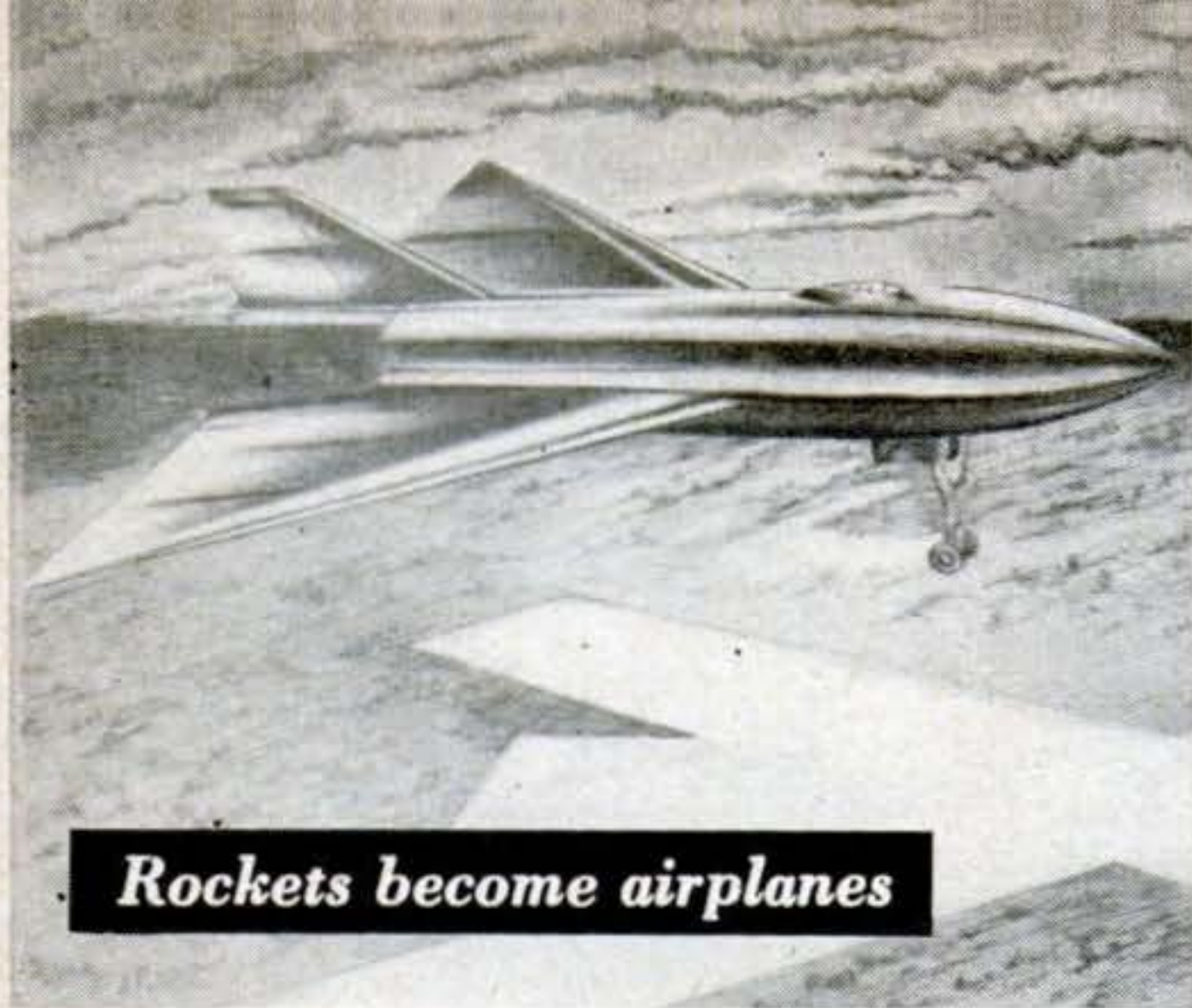
"I think our friend Dr. Tombaugh over there could take care of that for us. If his new telescope-camera can see a tennis ball 1,000 miles up in space, surely he would be able to find an asteroid that's big enough for us to colonize—if there is one up there, of course."

Gravelly Voice was referring to Dr.



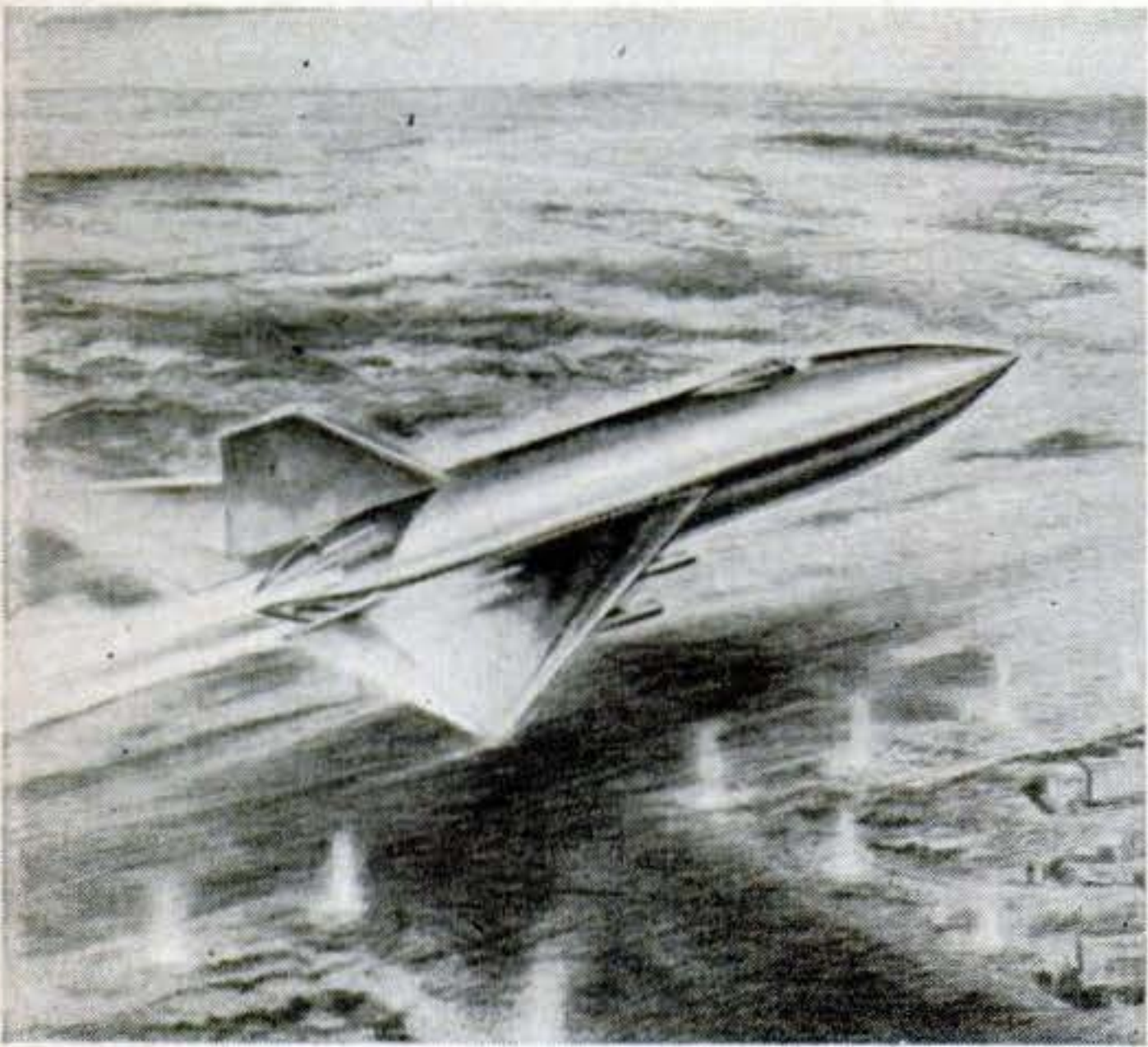
WINGED ROCKET is shown at point where it would separate from the second booster at an

altitude of 40 miles. It would then speed on out into space at more than 15,000 m.p.h.

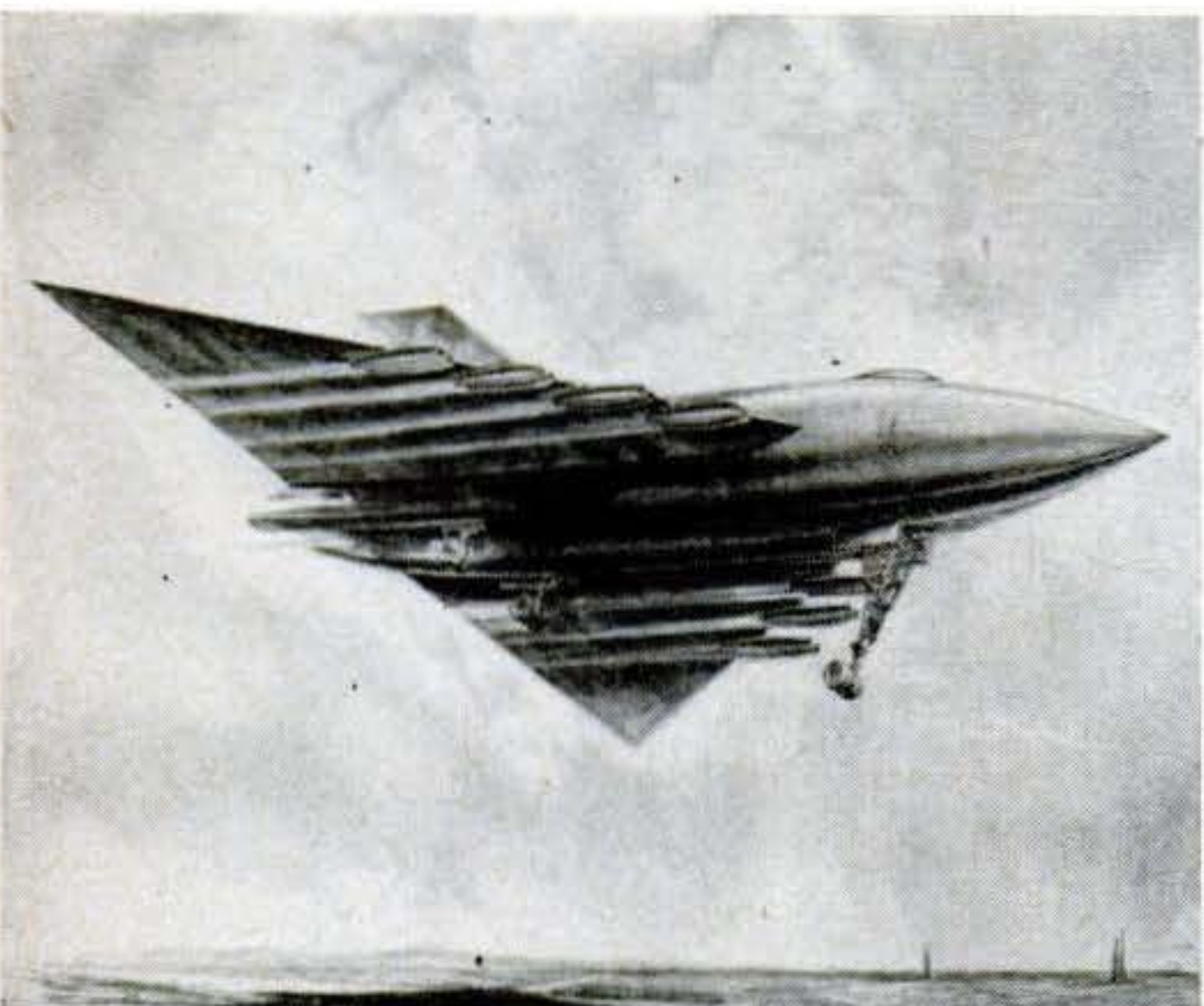


Rockets become airplanes

SECOND BOOSTER ROCKET, its landing gear lowered, makes a normal glide approach at an airport. The pilot would have some rocket fuel left for power flying in an emergency.



FITTED WITH JET-ENGINE PODS and added tail surfaces, the second booster takes off in conventional airplane flight for the return trip to its original take-off base.



FIRST BOOSTER is the giant of the space ferry. Here, fitted on first landing with four twin jet-engine pods on each side of its delta wing, it prepares to land at home base.

Clyde W. Tombaugh, the distinguished astronomer who discovered the ninth planet, Pluto, in 1930. He is now in charge of a satellite search for Army Ordnance at White Sands Proving Ground in New Mexico.

Whether his camera has picked up anything of significance, Dr. Tombaugh will not say. But he believes that "the chances that there are such natural earth satellites are just as good as the chances that there aren't any."

I moved on to another group, attracted by the startling remark: "We must have a regular, dependable and safe passenger-cargo rocket-ferry service into space—perhaps daily—if we expect to have a permanently manned station."

"How about the Romick-Knight-Van Pelt system?" another speaker suggested. "Their winged glider-boosters sound very practical."

I soon heard more about this Romick-Knight-Van Pelt system from Darrell C. Romick of the Aerophysics Department of the Goodyear Aircraft Corp. His contribution to the meeting was a paper, prepared in conjunction with Richard E. Knight and John M. Van Pelt, also Goodyear engineers, outlining a plan for a space-station ferry service. Theirs is the plan pictured on these pages.

A 500-Mile Hitchhike—Straight Up

The vehicle they propose would stand 285 feet high and be made up of three rockets. Each stage would have airplane delta wings, extendible landing gear, and carry a crew. The second (center) booster rocket would nestle between open doors in the nose of the bottom rocket. The top rocket would snuggle into the open doorway of the second stage. Total weight would be 9,000 tons, of which 7,807 tons would be rocket fuel. The top rocket would carry 35 tons of passengers and cargo 500 miles above the earth for its rendezvous with the orbiting space-station satellite.

For a take-off base, they suggest the Army's White Sands Proving Ground in New Mexico. When the first stage fired, it would boost the monster rocket pyra-

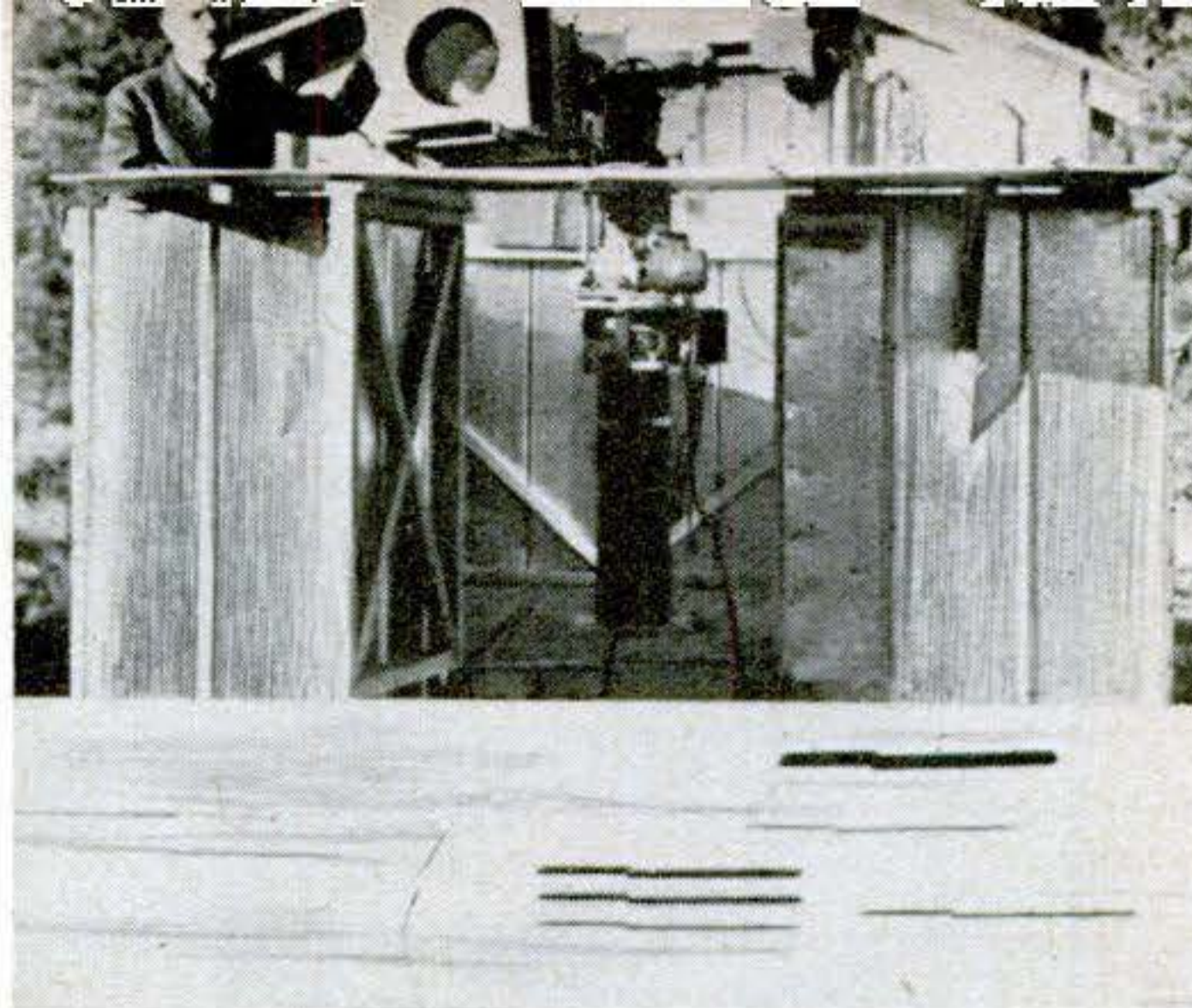
mid straight up, slowly at first, then heading eastward as it gained speed. At a height of 25 miles, the first booster would cut its fuel, drop off and close its nose doors. It would then glide back to earth, landing as an airplane just north of Big Spring, Tex., about 300 miles east of White Sands.

Meanwhile, the second booster, at an altitude of 40 miles, speeding at 15,000 miles an hour, would similarly drop off and glide back to earth, landing just north of Prentiss, Miss., some 1,000 miles east of White Sands.

The final stage, burning its own fuel in a brief burst of speed, would then rocket in free flight to the 500-mile altitude of the orbiting satellite. After transferring its passengers and cargo to the space station, it would glide back down and land at White Sands.

The two booster rockets, as they landed, would be fitted with jet-engine pods and flown to White Sands as conventional airplanes. And there the three stages would be put together again for another ferry flight into space.

A new approach to sending up a small unmanned "moon" was made by Kurt R. Stehling of the Bell Aircraft Co., and Raymond M. Missert of the Uni-



A TENNIS BALL 1,000 miles above the earth could be photographed by this telescope-camera developed by Dr. Clyde W. Tombaugh (shown in photo), discoverer of the ninth planet, Pluto. Just above are unidentified "sky tracks" shot by the camera.

versity of Iowa. They suggest shooting a small, three-stage rocket combination from a huge plastic skyhook balloon that would launch it at 75,000 feet.

An unmanned earth satellite, however, would be too much of a temptation for the rocketmen to leave alone. That was the opinion of Lt. Comdr. George W. Hoover of the Office of Naval Research.

"If we get an unmanned satellite," he pointed out, "someone will soon decide to cut a hole in it, call it a cockpit, and stick a man in it." **END**

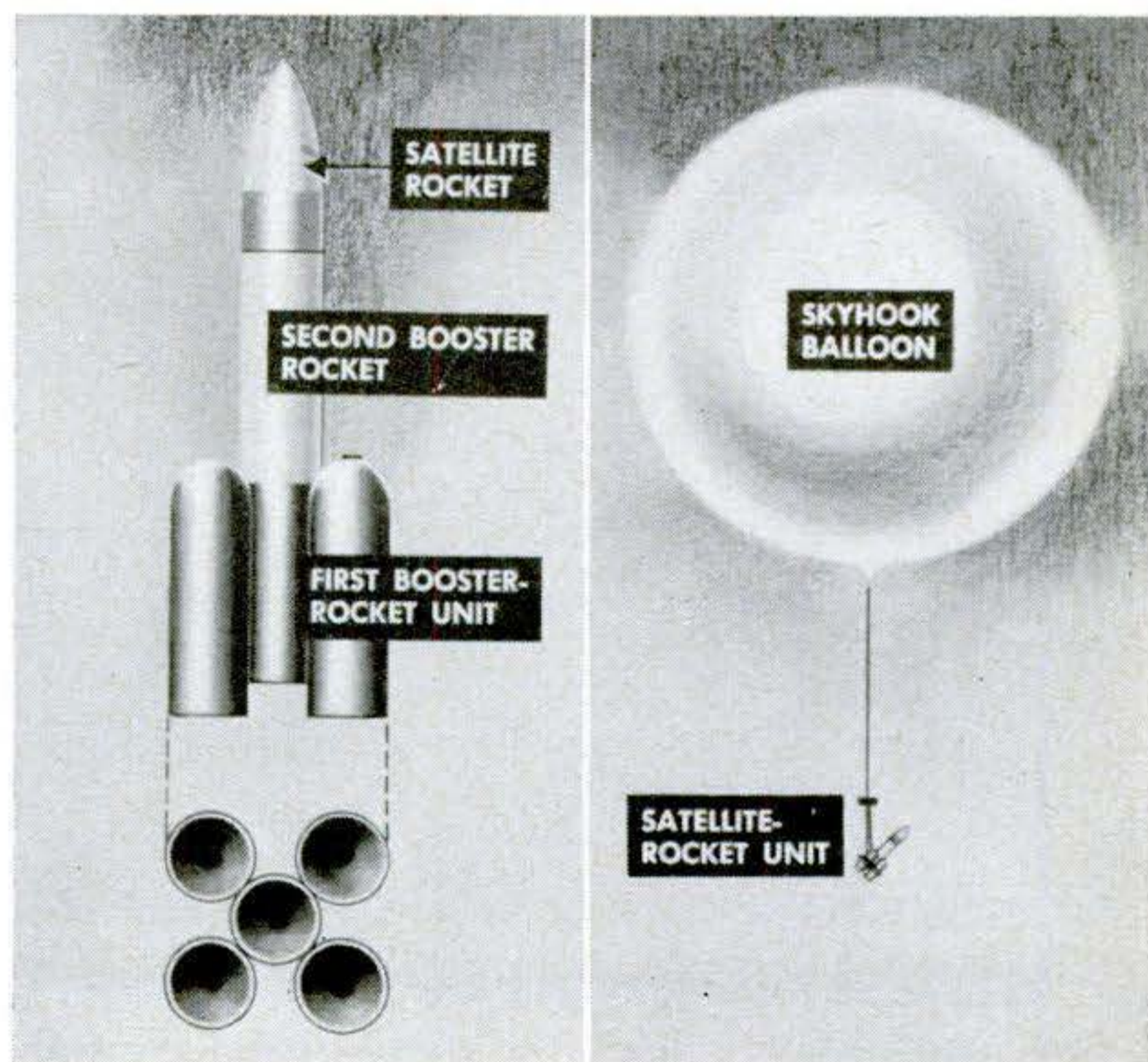
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Skyhook balloon would launch small space station for scientific research



AIR DRAG at low altitudes would make it costly in fuel and weight to rocket-launch even a small, unmanned space station that would circle several hundred miles above the earth as an artificial moon. To overcome this drag, scientists propose sending up a small three-stage rocket at the end

of a big plastic balloon, from which it would be launched at an altitude of 75,000 feet. This skyhook balloon method has been used successfully for launching high-altitude research rockets to explore the ionosphere, as shown in the photograph inset here. (See PSM, Dec. '54, p. 114.)

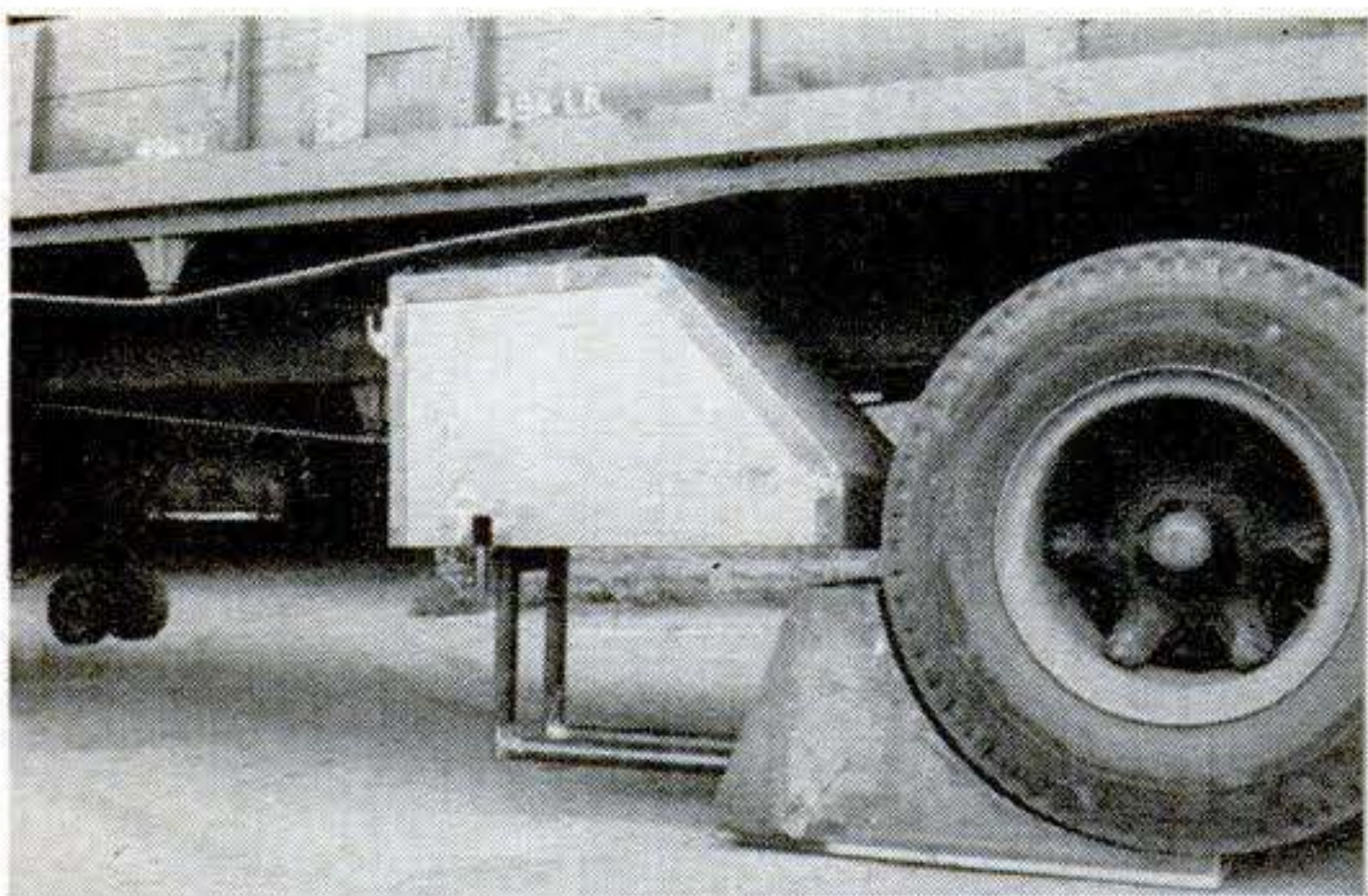




NEW TWIST gets flexible Truckstell truck over "impassable" terrain. Car and body coupled by tube of alloy steel can tilt opposite ways to follow uneven ground, as pictured above.

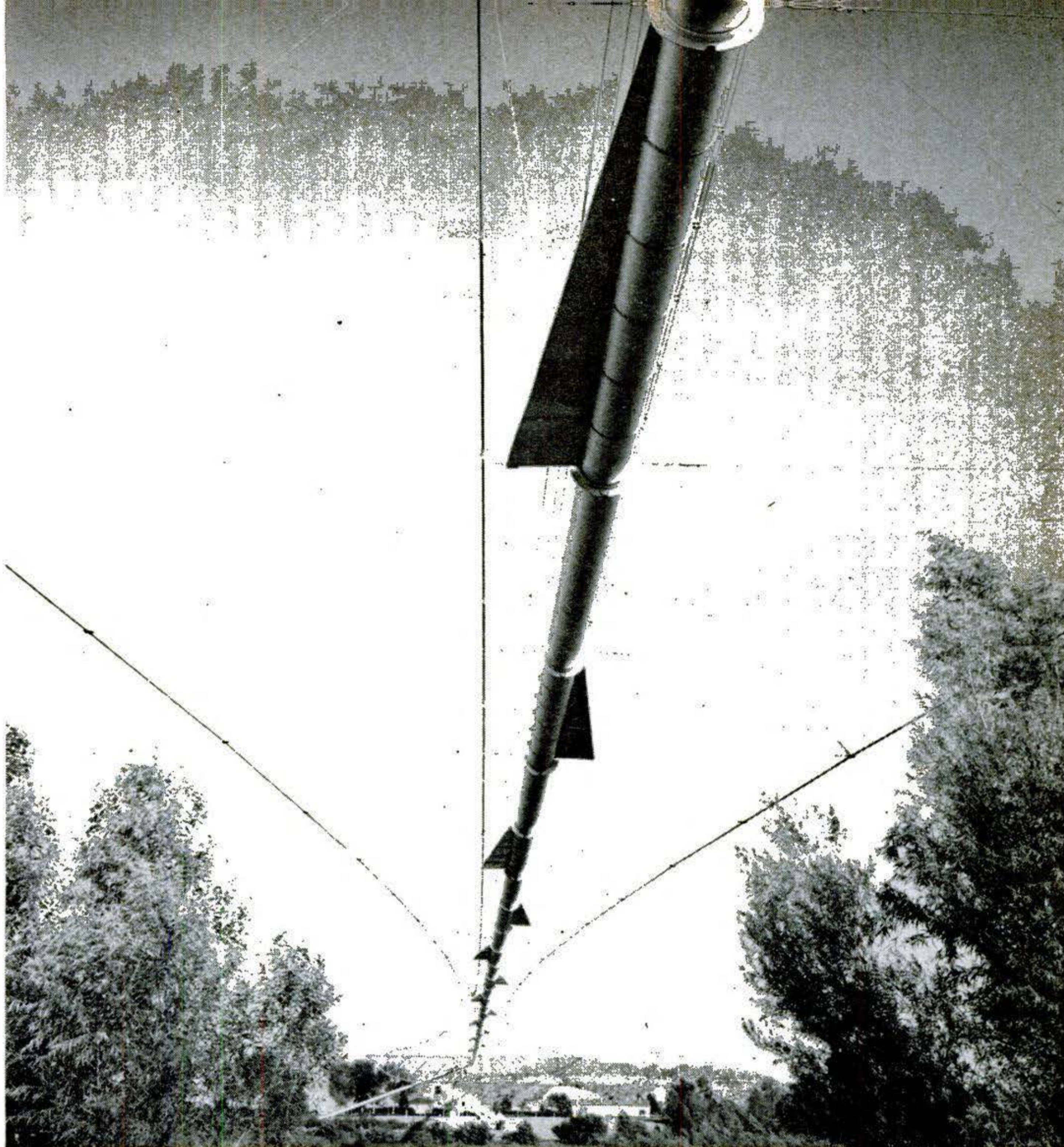
Designers Make Trucks Do Tricks

EMERGENCY STOP saves lives if brakes of the truck trailer (left) fail on hill. Release cable drops heavy steel chocks curved to engage rear wheels, and runaway is dragged to a halt.



"ROAD TRAIN," threading perilous route, carries 80-ton turbogenerator rotor (in crate) on 67-foot-long tractor to new hydroelectric plant

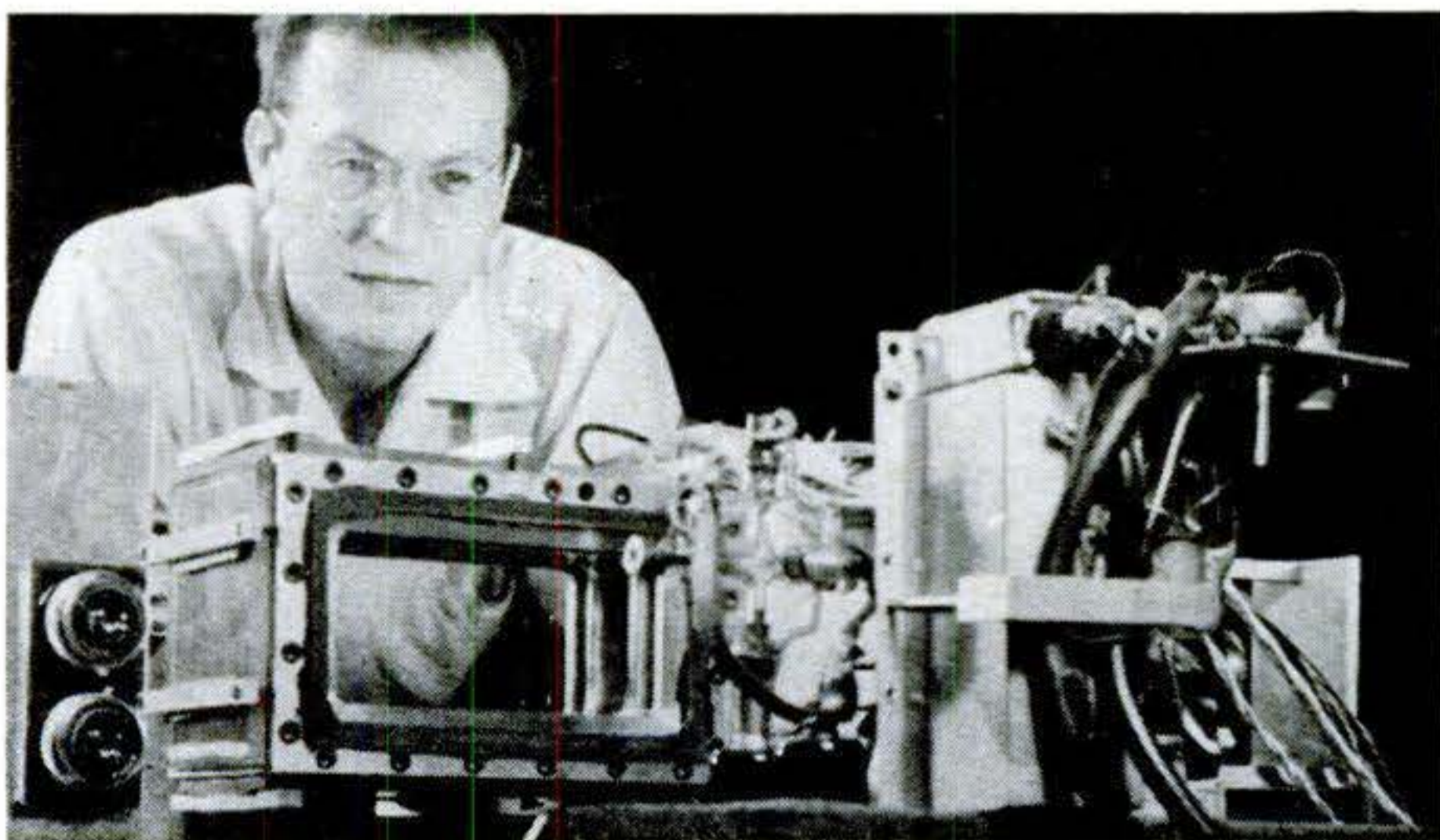
in Australia's Snowy Mountains. Radio links steersman of trailer (foreground) with drivers of two 250-hp.-tractor "locomotives."



Pipeline's Wings (Not for Flying) Keep It Steady in Wind

WINGS on the pipeline above help to keep it stable as it bridges the Colorado River. Engineers added the triangular metal pieces

to break up the pipe's round contour, which had made it buck in the wind. The Texas-California pipeline carries natural gas.



Bubbles Mark Trail of Atomic Bullets

A NEW atom catcher marks the path of atomic bullets with tiny bubbles. Its tank holds a hot liquid pressurized to prevent boiling. When pressure is released, bubbles form along the bullet path just before the liquid boils. Prof. D. A. Glaser, University of Michigan, developed it.

How the H-Bombs Spread Radioactivity

An official report reveals the facts about perils of fall-out from thermonuclear weapons.

ONE large H-bomb blankets an area nearly as large as New Jersey with lethal radioactive dust. Far outranging other casualty-causing effects, the lingering radioactivity of this fall-out poses a staggering defense problem.

Long cloaked in secrecy, the facts about fall-out now are revealed in an authoritative U. S. Atomic Energy Commission report. It takes the U. S. H-bomb of March 1, 1954, as an example. Radioactivity heavily contaminated an elliptical or cigar-shaped area, downwind from this blast, of 7,000 square miles. Had the zone been a populated one, instead of open sea, everyone failing to flee or take cover would have risked death.

From H-bomb-threatened cities, this shows, either people must be evacuated to much greater distances than civil-



PATTERN OF "DISTANT" FALL-OUT over U.S. from A-bomb tests at Nevada Proving Grounds is shown by shading on map, based on official measurements at monitoring stations. A-bombs' minute radioactive particles, widely scattered by winds and losing radioactivity while airborne for weeks or months, are called no hazard outside immediate vicinity of blast.

defense planners had figured on—or else they must take shelter, in cellars or hastily dug foxholes, while the worst of the radioactivity “cools off.”

The report reveals two fission products, radiostrontium and radioiodine, to be the most dangerous radioactive contaminants. These are among the “ashes” of an A-bomb, and so of an H-bomb, since it uses an A-bomb as a detonator. Why are they more dangerous from H-bombs than from A-bombs?

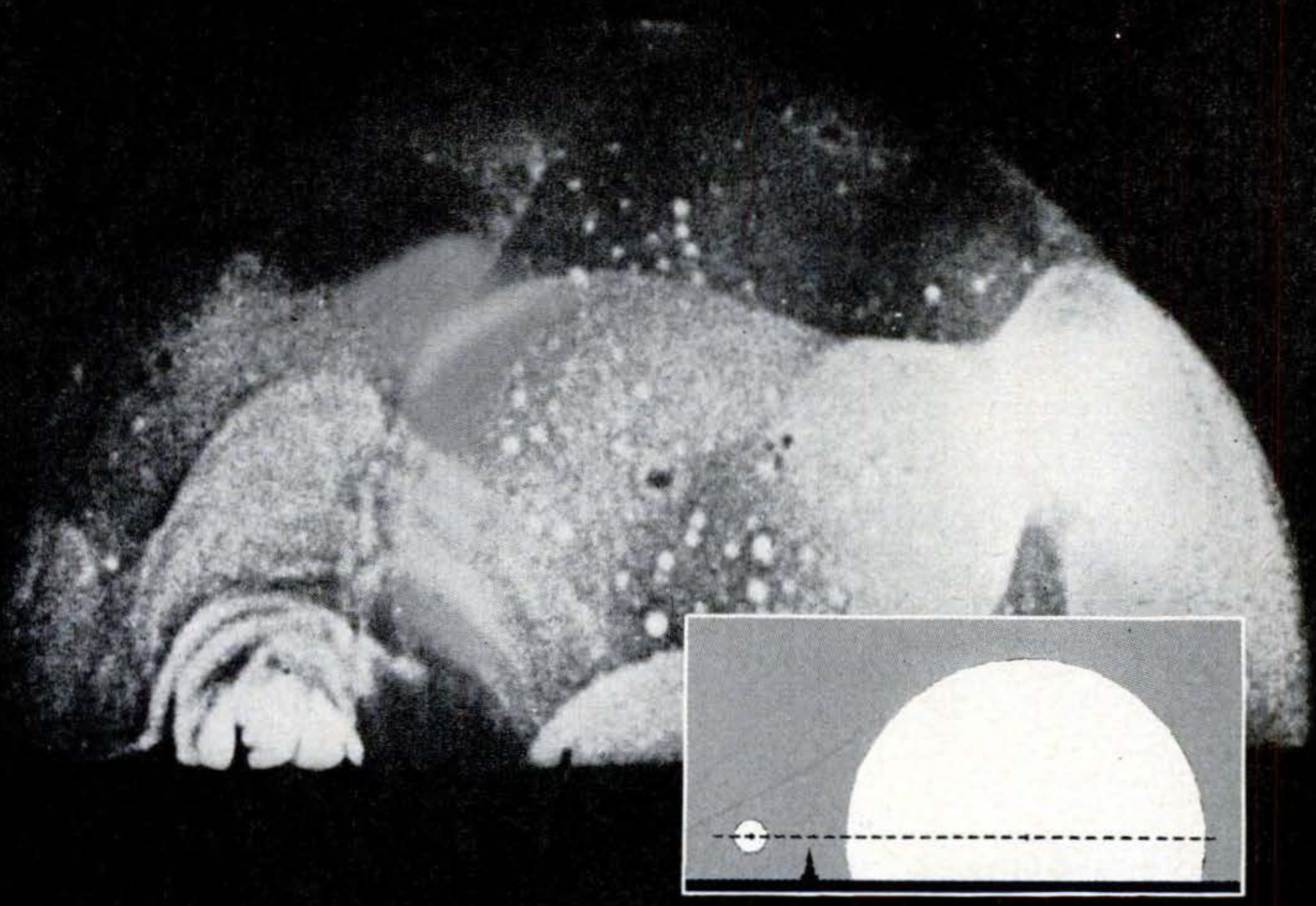
Giant Fireball Sucks Up Particles

The H-bomb's relatively enormous fireball makes the difference. Even from 2,000 feet, the altitude of a burst for maximum blast effect, the fireball envelops the ground. So a huge amount of debris like earth or coral is sucked into the bomb cloud. Coarse particles of it, coated with condensing fission products, settle rapidly and heavily to earth in a downwind zone.

From the same height, a moderate-sized A-bomb's fireball does not reach to earth. Fission products condense largely on dust that happens to be in the air, and form tinier particles that may be airborne for weeks or months before settling to earth. By then they are widely scattered and most of their radioactivity has died away.

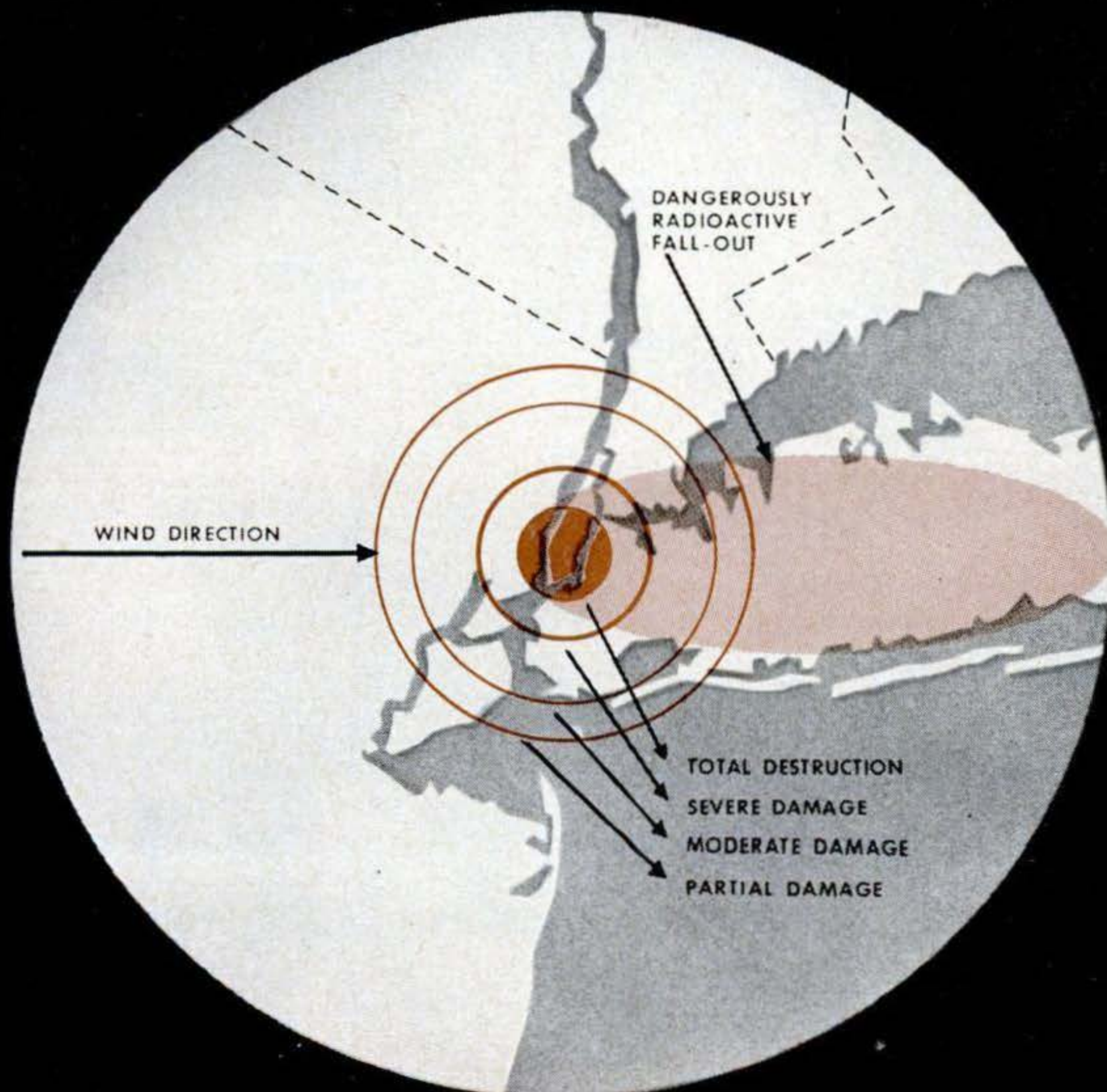
Nowhere in the world outside testing areas, the AEC adds, is radioactivity currently being deposited in dangerous amounts. From all A-bomb and H-bomb tests in all countries, an average American's exposure to abnormal radioactivity has totaled about 1/10 of a roentgen or about as much as from one chest X ray.

—Alden P. Armagnac.



H-BOMB'S FIREBALL, pictured here, measures more than three miles in diameter. Fireball of Nagasaki-type A-bomb, in contrast, has diameter of 900 feet. If both bombs were exploded at 2,000-foot altitude for maximum blast effect (inset above), A-bomb would produce no serious radioactive contamination. But H-bomb,

with fireball touching ground, draws debris into cloud, and heavy "local" fall-out follows. It blankets cigar-shaped area outranging circular zones of blast damage, shown below for a 10-megaton H-bomb. Fall-out zone varies with winds, and size of ellipse arbitrarily assumed here may be conservative.





The dah-dit men, a pestilence on the air waves 45 years ago, now fill the ether with signals to spark the nation's defense.

CIVIL DEFENSE banks on radio hams with mobile transmitters and receivers to maintain vital communications in case of enemy attack. The hams above, photographed in the "field" during a CD test last June, are representative of the 120,000 amateurs available in any national emergency.

SOMETHING SPECIAL in "rigs" (below), at East Braintree, Mass., cost its owners more than \$25,000. They are G. Burton Davy (left), a shoe-leather manufacturer, and Fred S. Lakewitz, an electronics engineer. Their call letters are W1UAR and W1RXR respectively.

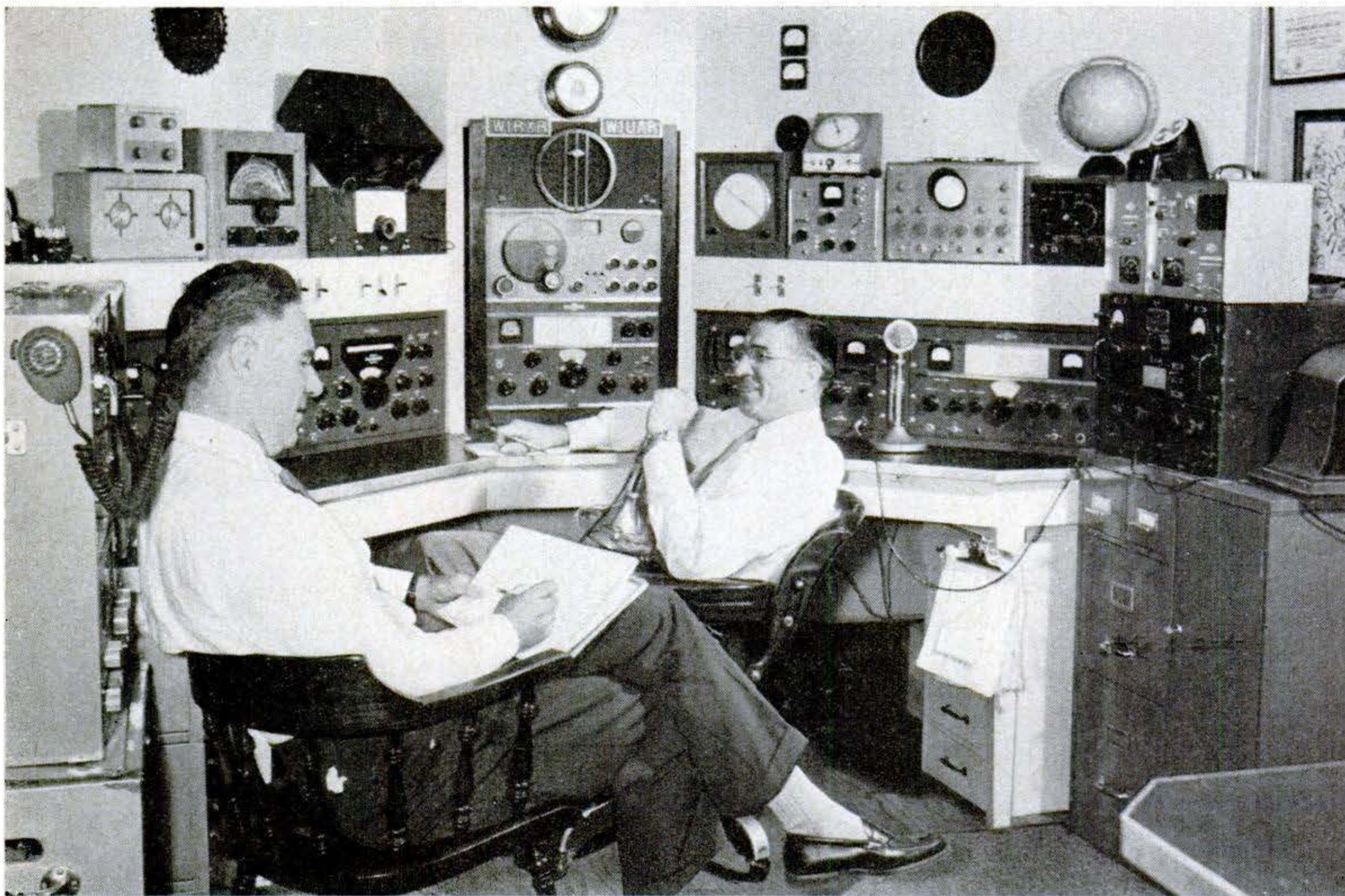


"BUTT out, bud, butt out!" the Navy's wireless transmitter at Charlestown, Mass., cracked angrily.

A Boston amateur was blotting out an urgent message to the Portsmouth, N.H., naval base with a great, fat blob of a signal on the same wave length.

"You Navy people think you own the ether?" the ham snapped back in his dots and dashes. "Beat it."

That was almost a half-century ago. Now the military services and civil-defense leaders are heaping praise on the same amateurs who once messed up the air "like mischievous boys splashing around in a pond."



THEIR TARGET WAS THE MOON, and they astounded radio engineers by bouncing 650-watt signals off it in 1953. First, though, Ross Bateman (left) and Bill Smith, hams from Falls Church, Va., had to do some precise surveying in order to aim their beam antenna at a calculated position of the satellite.



The Edison Radio Amateur Award for 1954 went to a ham named Benjamin S. Hamilton, 35, who designed equipment, wrote specifications, and trained personnel to give his 750,000 neighbors in San Diego County, Calif., one of the country's finest emergency communications systems. Civil Defense Administrator Val Peterson watched, during the presentation ceremonies in Washington this spring, while Mr. Hamilton tapped out a message to the nation's 120,000 hams praising them for their helpfulness to their government.

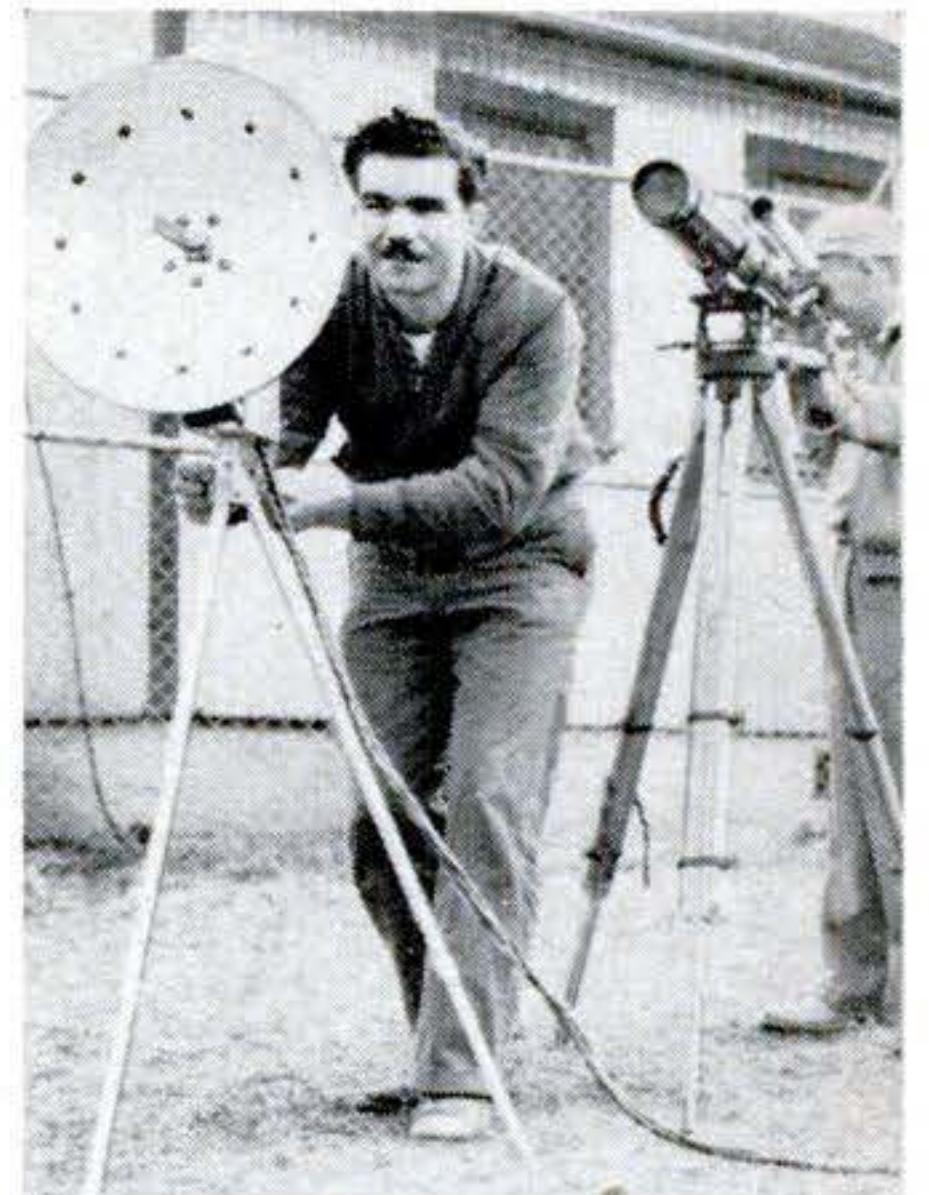
When the American Radio Relay League was organized in 1909, hams shared air channels with military and commercial wireless operators. Their spark-gap transmitters were a frightful nuisance. But even in those days the hams were teaching the pros new tricks. In 1911, for example, two young New York hams, Frank King and George Eltz Jr., broadcast music—for the first time in history, probably—and startled the wireless operators wearing earphones on nearby naval vessels.

Government Clamps Down

Such frivolity led to action limiting the hams to 1,000 watts of transmitting power and forbidding them to stray above the 200-meter mark in wave length. This was supposed to curb them. But the hams soon turned those supposedly barren wave lengths into a remarkably fertile field.

They led the way to such future developments as police radio systems, over-water telephone transmission, short-wave rebroadcast pickups and the single-signal receiver, now used in almost all communications systems.

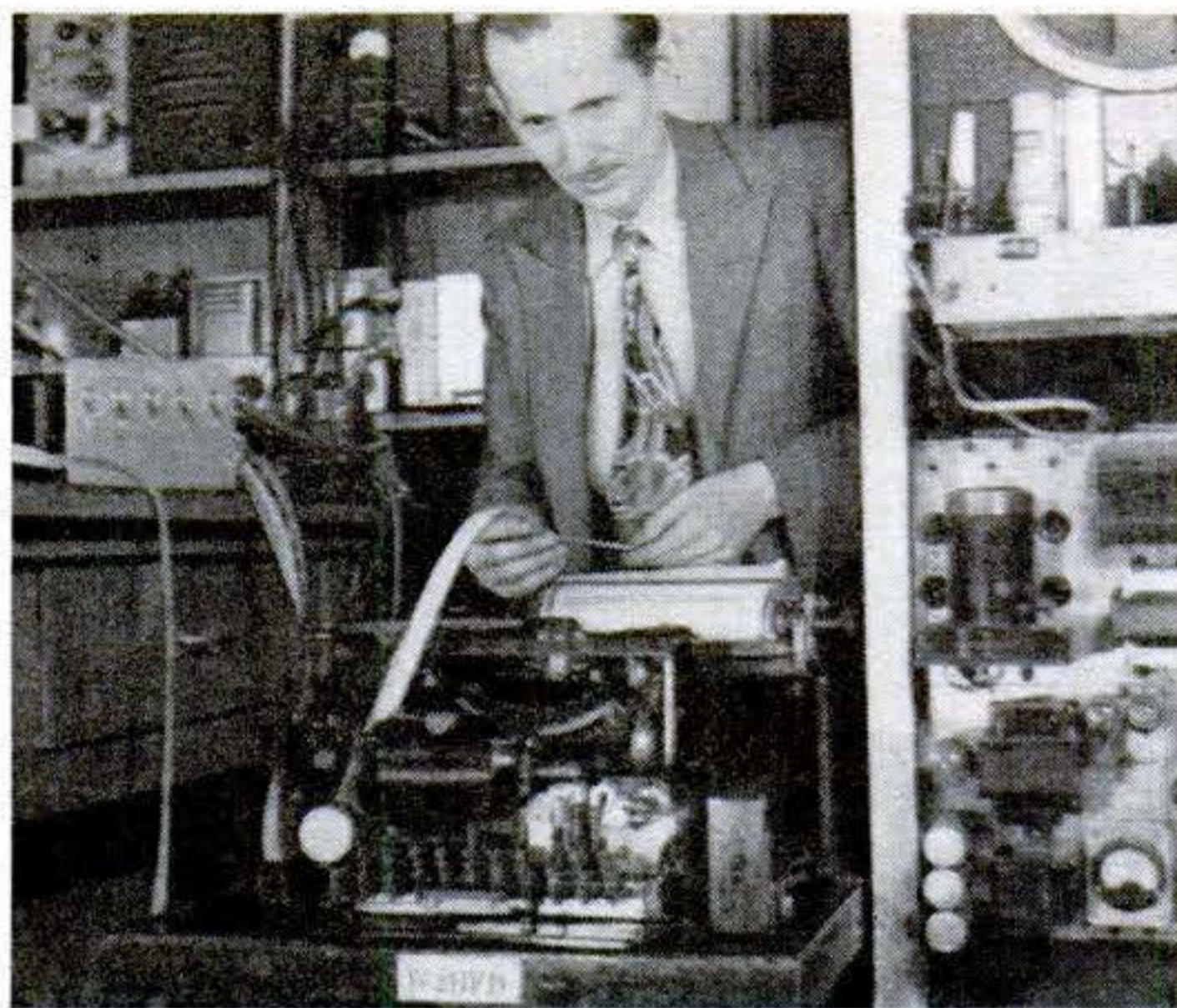
As aerial counterspies, they have been especially valuable. Even before the U.S. entered the First World War, an alert ham caught the Germans sending un-neutral messages from a big wireless station at Sayville, L.I. During World War II, when 25,000 hams



SETTING A WORLD'S RECORD for amateur microwave transmission, the Oregon hams above recently communicated over a distance of 47.4 miles in the vicinity of Portland on a frequency of 10,000 megacycles. Their equipment consisted of converted military surplus, a homemade 118-power reflecting telescope (top) to line up stations, and hand-built parabola (bottom).



OUTSTANDING AMATEUR OF 1954, Benjamin S. Hamilton, won a GE public-service award for organizing hams of San Diego County, Calif., into an outstanding civil-defense radio system.



IN A CLASS BY THEMSELVES are the 2,000 U.S. amateurs who own radio-teletype equipment. One of the pioneers was John E. Williams of the VHF Teletype Society in Woodside, N.Y.

were in military service, other amateurs manned the FCC's Radio Intelligence Division. They located lost planes, helped catch enemy agents in South America and tracked down and helped silence several hundred illegal or subversive radio transmitters.

Right now a great many hams are practicing a cops-and-robbers technique with mobile transmitters (PSM, June '52, p. 73) that would enable them quickly to locate Fifth Columnists or parachuted enemy radio operators in case of another war. These mobile transmitters, independent of commercial electrical lines, would be of the utmost importance, too, in maintaining communications in the event of atomic attack.

Doorbell Batteries Powered His SOS

When the great Vermont flood of 1927 had destroyed the utilities of one town and threatened to wipe it out altogether, a radio amateur there summoned aid by using the power of doorbell batteries.

When earthquakes nearly shook the life out of Long Beach, Calif., and surrounding towns in 1933, silencing all telephones, telegraphs and commercial radio stations for hours, a schoolboy who had just received his ham license sent out the first call for help.

U.S. hams range in age from nine to 90; the average ham is 34. Usually he

has built his own transmitter but bought a commercial receiver. Though a rig can be put together for as little as \$50 or as much as \$100,000, a typical outfit costs about \$900.

Both the amateur and his station must be licensed. He can get a novice license if he can send and receive international Morse code at the rate of five words a minute and pass a simple examination on the fundamentals of radio. To be a full-fledged ham, he must be able to send and receive 13 words a minute and pass a stiffer examination. He must satisfy the code requirements even if he intends to transmit by voice.

Because of the work hams are now prepared to do if the nation is attacked, civil-defense authorities are urging that the Government lend them a hand in the future, rather than concentrate on curbing them. END

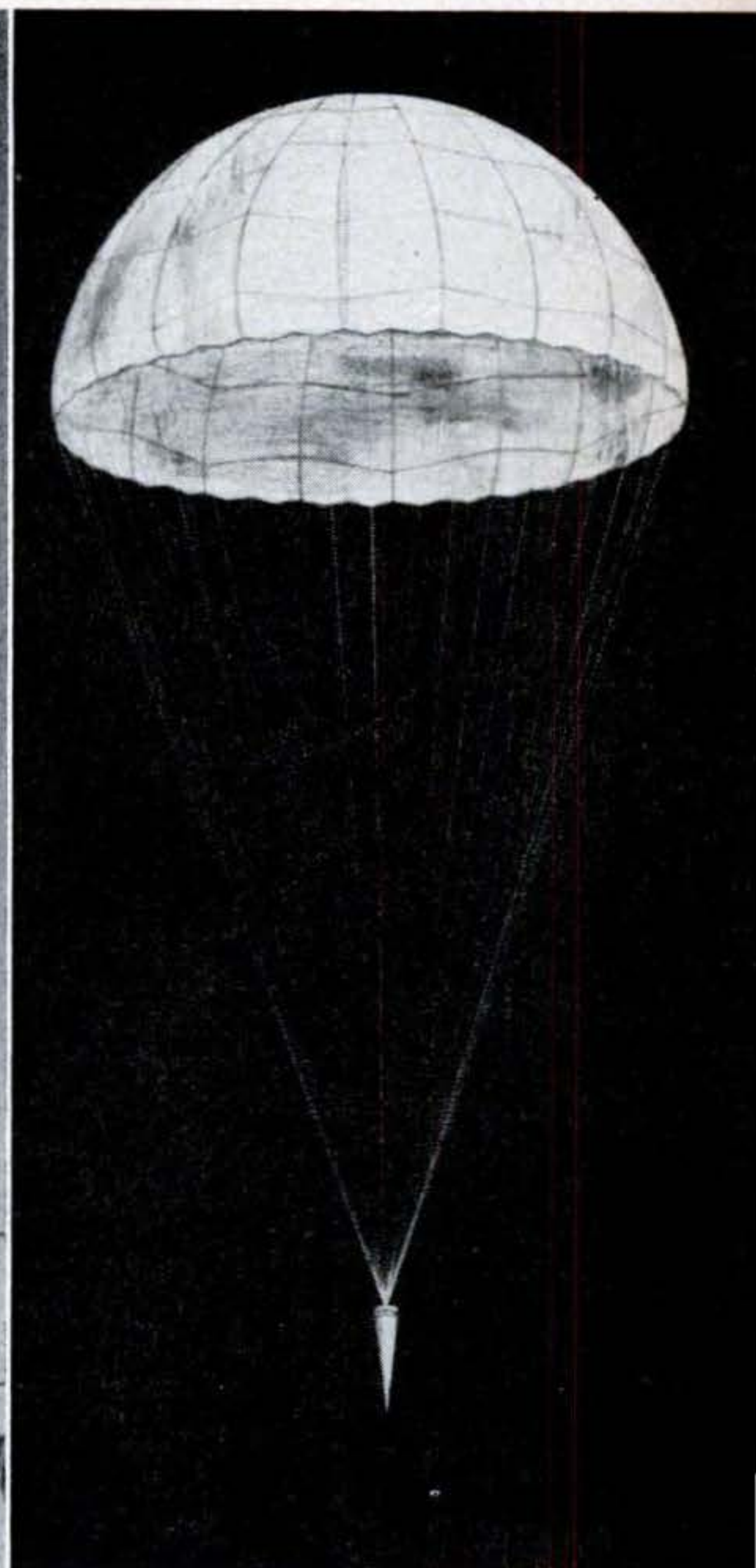


BENEFACTOR to his fellow hams and to TV watchers everywhere is Don E. Norgaard of General Electric's Knolls Laboratory. He invented the "harmoniker," which he is holding here. It greatly reduces possible TVI (television interference) from radio transmitters.

Rocket Hoists Radar Target For Missiles

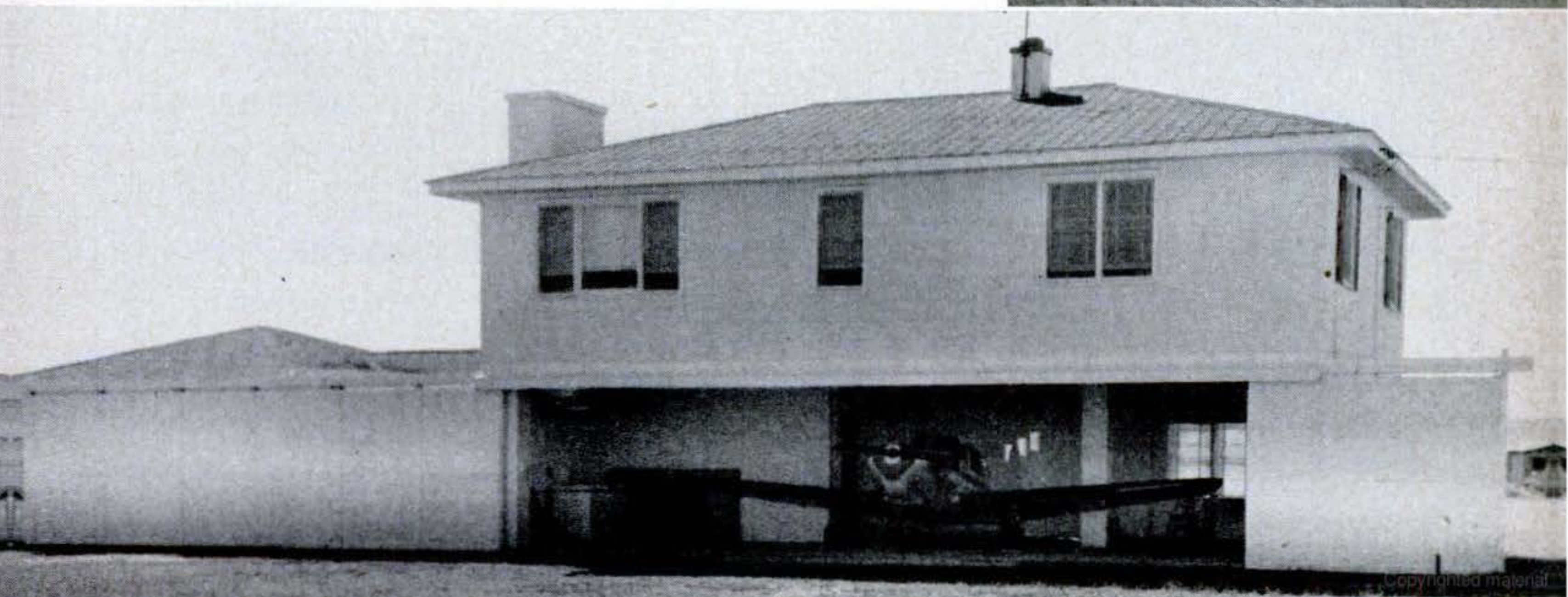
THAT rocket heading straight up at right is the newest practice target for guided missiles. At a preset altitude, the 17-pound nose is blown off by a powerful spring and drags out a silver-coated parachute from the rocket. The nose stabilizes the chute as it floats down (far right). The metalized silk chute reflects radar waves, so the target is easily "seen" by the missile's guiding mechanisms.

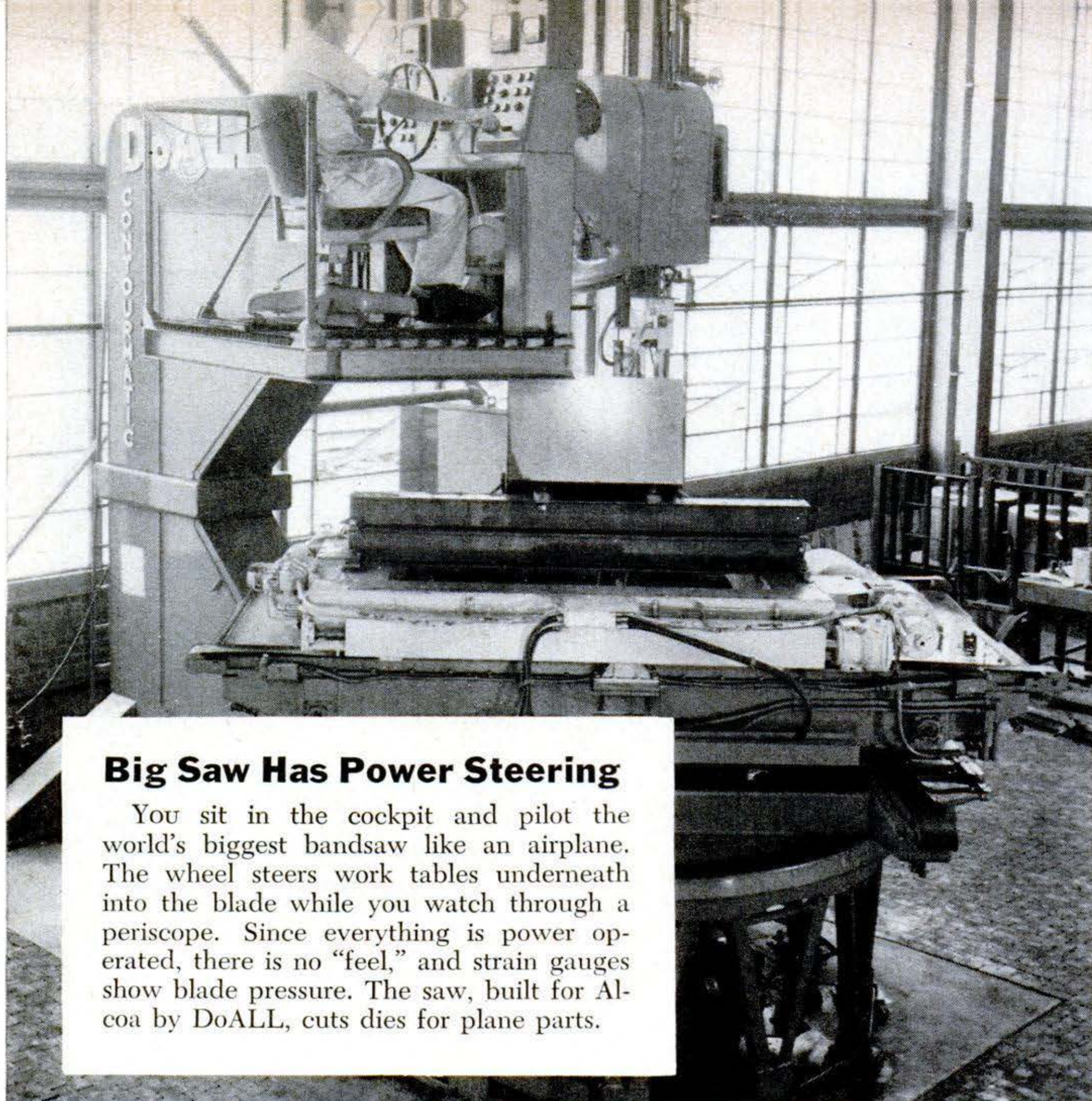
The 212-pound rocket, 163 inches long and seven inches across, is powered by a solid rocket fuel. Developed at the New Mexico College of Agriculture and Mechanical Arts and now under test by the Navy, the rocket costs less than the radio-controlled planes presently used as targets.



His House Is a Hangar with Living Quarters Upstairs

WALK through the front door of Charles Vellines' home in Beaufort, N.C., and you walk smack into the tail of an airplane. Almost all the first floor is a hangar for a 125 Swift, which rolls out through sliding doors in the rear. Entrance to the upstairs living quarters is through the breezeway. Vellines, a repair official at the Cherry Point Marine Corps Air Station, did a lot of construction work on the house himself.





Big Saw Has Power Steering

You sit in the cockpit and pilot the world's biggest bandsaw like an airplane. The wheel steers work tables underneath into the blade while you watch through a periscope. Since everything is power operated, there is no "feel," and strain gauges show blade pressure. The saw, built for Alcoa by DoALL, cuts dies for plane parts.

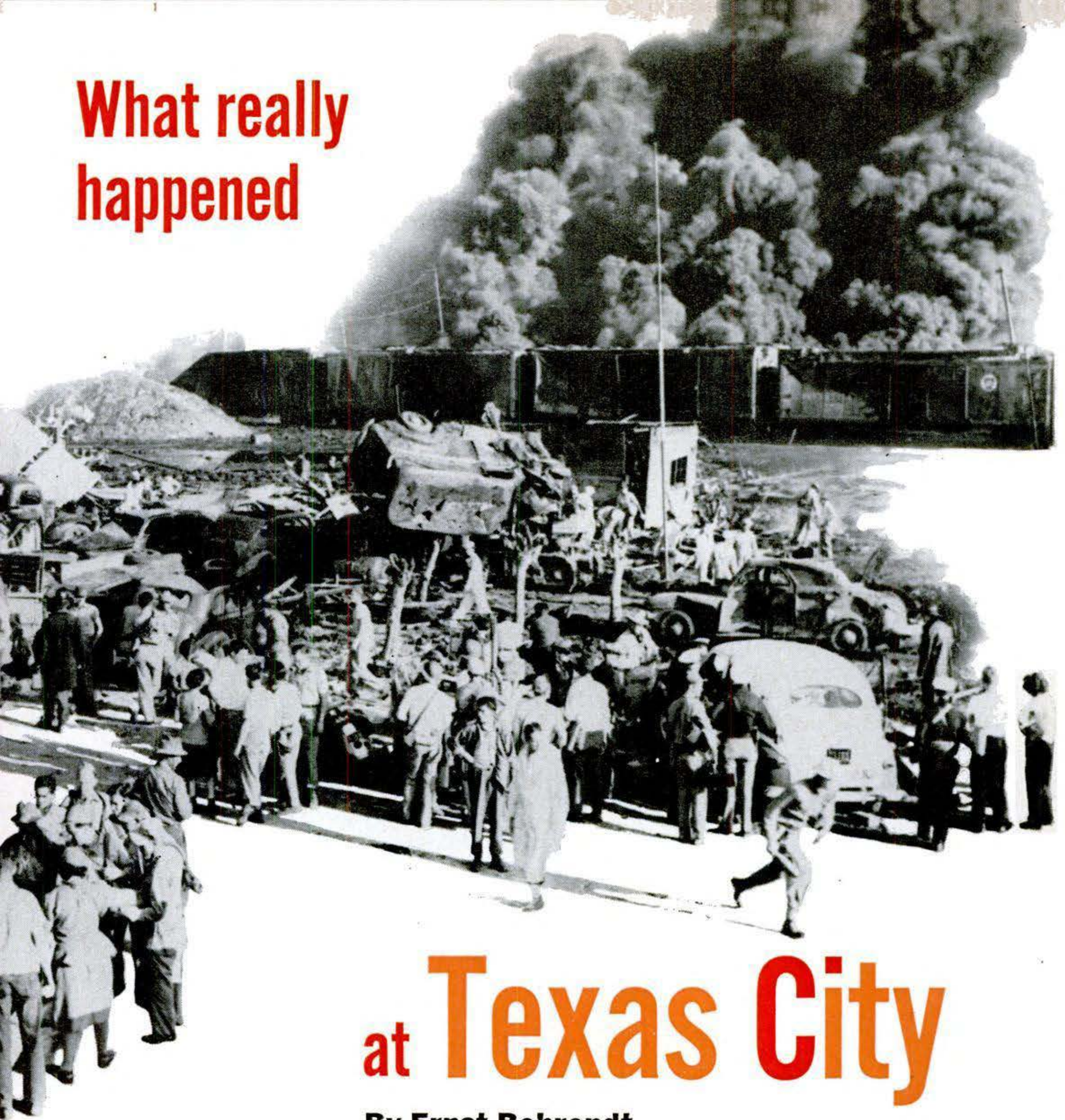


"Dinghy" Scooter Mounted on Car May Beat City Traffic Jams

A SCOOTER carrier is Sweden's answer to city traffic. The wheeled dinghy hangs on two arms that swing out (left) from under

the car to support rear wheel and front fork. You park the car on the outskirts of town and chug in on two wheels.

What really happened



at **Texas City**

By Ernst Behrendt

A team of persistent scientific detectives, at work in a laboratory 1,500 miles away, has tracked down the mysterious cause of America's most disastrous explosion. What they found should insure that there will never be another catastrophe like the one that struck Texas City, Tex., on April 16, 1947.

About eight o'clock that morning just eight years ago a longshoreman aboard the French freighter *Grandcamp* in the port of Texas City saw a wisp of smoke curling up from a hatchway. He grabbed a jug of water and poured it down into the hold. The longshoreman was unwittingly trying to prevent the explosion of 2,300 tons of ammonium nitrate fertilizer.

A little later, crew members of the *Grandcamp* squirted a few



Troops blocked off the blast area.

more jugfuls of water, and even the contents of a small fire extinguisher, down into the hold. But by now fumes were escaping from the bags of fertilizer in fairly dense orange-brown clouds and it was obvious that the fire was making headway.

Someone dragged a fire hose to the hatch and pointed its nozzle downward. But no water was turned on. As far as can be established at this date, one of the officers is said to have been against using water because water might damage the cargo.

If the officer actually said that, he made a colossal mistake, because at this point probably nothing but large amounts of water might still have prevented the destruction of the *Grandcamp*, of the Monsanto plant across the quay from the burning freighter, and of Texas City itself.

About 8:30 the fire seemed out of control and everybody was ordered to leave the holds. The hatches were battened down and live steam was pumped into the ship. Thick fumes kept coming through cracks in the deck. Someone called the Texas City fire department. Someone else called Galveston and requested two tugs to tow the *Grandcamp* out into Galveston Bay, for it now seemed decidedly unsafe to leave the burning ship in the harbor. The fire might endanger other ships—the *High Flyer*, with 860 tons of ammonium nitrate fertilizer and 960 tons of sulfur on board, was anchored 600 feet from the *Grandcamp* in the next slip—and possibly the harbor itself. All hands were

Sometimes the stuff, set afire, Why? How two young

ordered off the *Grandcamp*. At the Monsanto plant they were readying their fire apparatus.

By nine o'clock the *Grandcamp* was spouting enormous quantities of black smoke, dense red-orange fumes, and flame. The deck had grown so hot that water running down the planks evaporated immediately. A few seconds later the hatch covers blew off. A puff of smoke billowed up. At 9:12 the *Grandcamp* exploded. A geyser of water, oil and metal shot hundreds of feet upward. Steel fragments smashed into two planes that had been circling the harbor area and brought them down into the water. The waterfront disappeared under a wave of water topped by patches of burning oil. The wave hurled a large steel barge 50 feet inland and then dropped a fire truck on top of it; the oil immediately started scores of fires.

Seconds after the explosion, the walls of the Monsanto plant caved in and the roof came down on hundreds of workers. Most of them were killed. The blast flattened plants and warehouses "so that not a splinter remained upright"; balls of hemp twine, catapulted from the holds of the *Grandcamp* where they had been stored, streaked across the town and turned distant roof tops into torches.

A two-mile stretch of waterfront was hopelessly ablaze. Metal splinters shot from the *Grandcamp* tore holes through storage tanks and pipelines. Gasoline, benzol, propane and ethyl benzene ignited. Explosions kept shaking the town for hours. Tin smelters collapsed and refineries disintegrated in a holocaust whose heat melted steel girders. The fire could be seen 25 miles away.

Sometime during the day fire broke out on the *High Flyer*, and hours later attempts to put it out had to be given

just burned. Sometimes—as here—it blew. scientists found the answer is a fascinating tale.

up; nor was it possible to move the burning freighter out to sea. Police cars and sound trucks cruised through debris-littered streets, their loudspeakers blaring incessant warnings: "Evacuate Texas City. The *High Flyer* will explode."

The *High Flyer* did explode at 1:10 the following morning, destroying what the *Grandcamp* had spared. In the two explosions, 560 people were killed, more than 3,000 were injured, dozens of plants and several thousand homes were partially or totally destroyed. The damage was estimated at more than 100 million dollars.

Fires were still burning and streets were still not cleared of debris when official investigations got under way. From the very first moment, everybody was struck by an inexplicable paradox: The effect of what had happened on the *Grandcamp* and the *High Flyer* was amazingly out of proportion to its cause. Fertilizer had caught fire, but the explosions could hardly have been more violent if the cargo had been TNT. By some process not yet understood, the seemingly harmless fertilizer had acquired the properties of a high explosive.

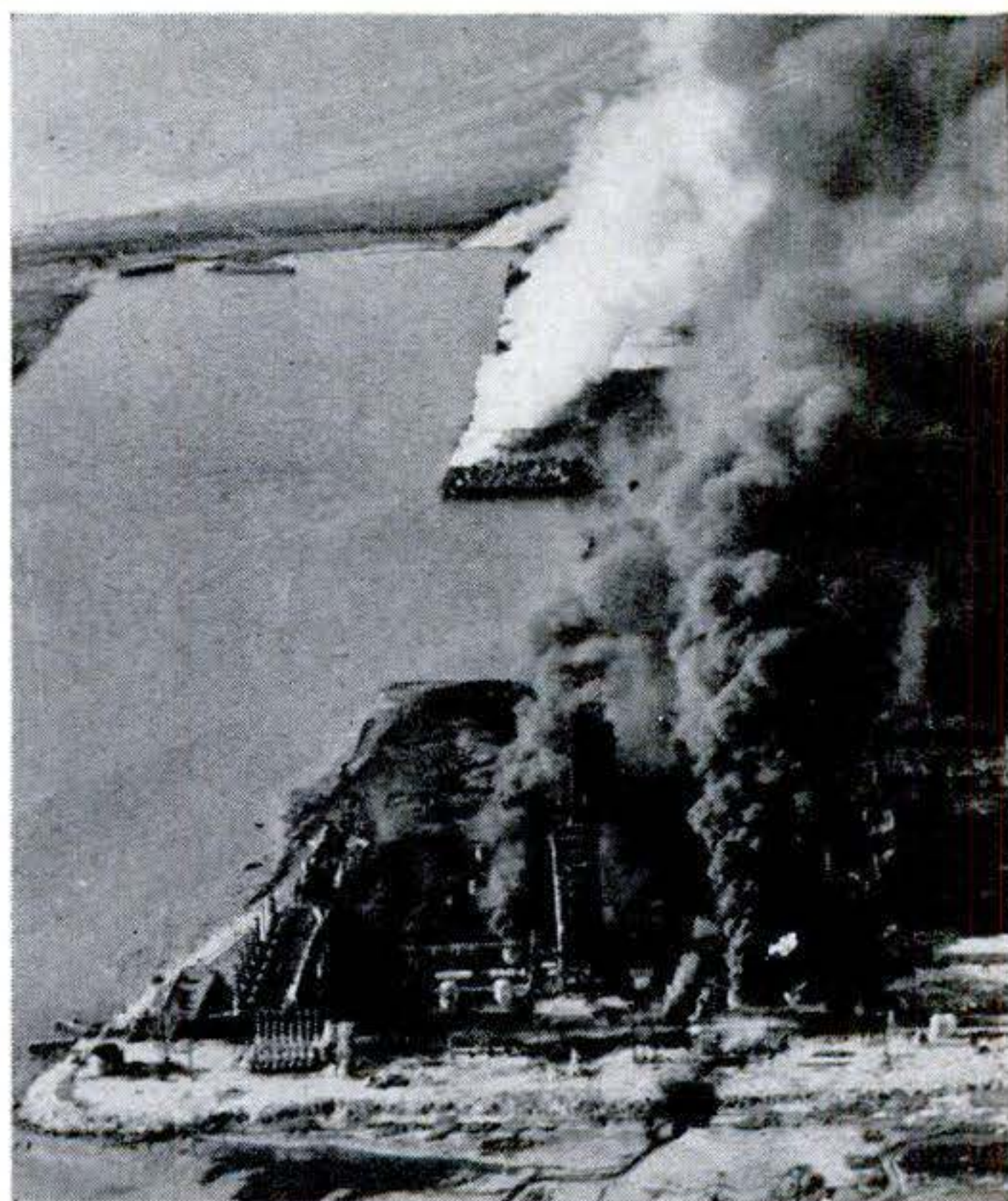
The first group to tackle the problem was the Inter-Agency Committee on Hazards of Ammonium Nitrate, appointed by the Secretary of the Treasury. In this committee a number of Government agencies and organizations were represented. But what the committee knew about ammonium nitrate was not enough to permit clear-cut explanations and recommendations. More research was needed.

On the face of it, this seemed simple enough. Ammonium nitrate is a common substance, and enough material on ammonium nitrate fires and explosions could probably be found in scien-

tific papers; all that had to be done was to collect and organize the data and announce: "Under such and such conditions the fertilizer will blow up."

But matters were not that simple.

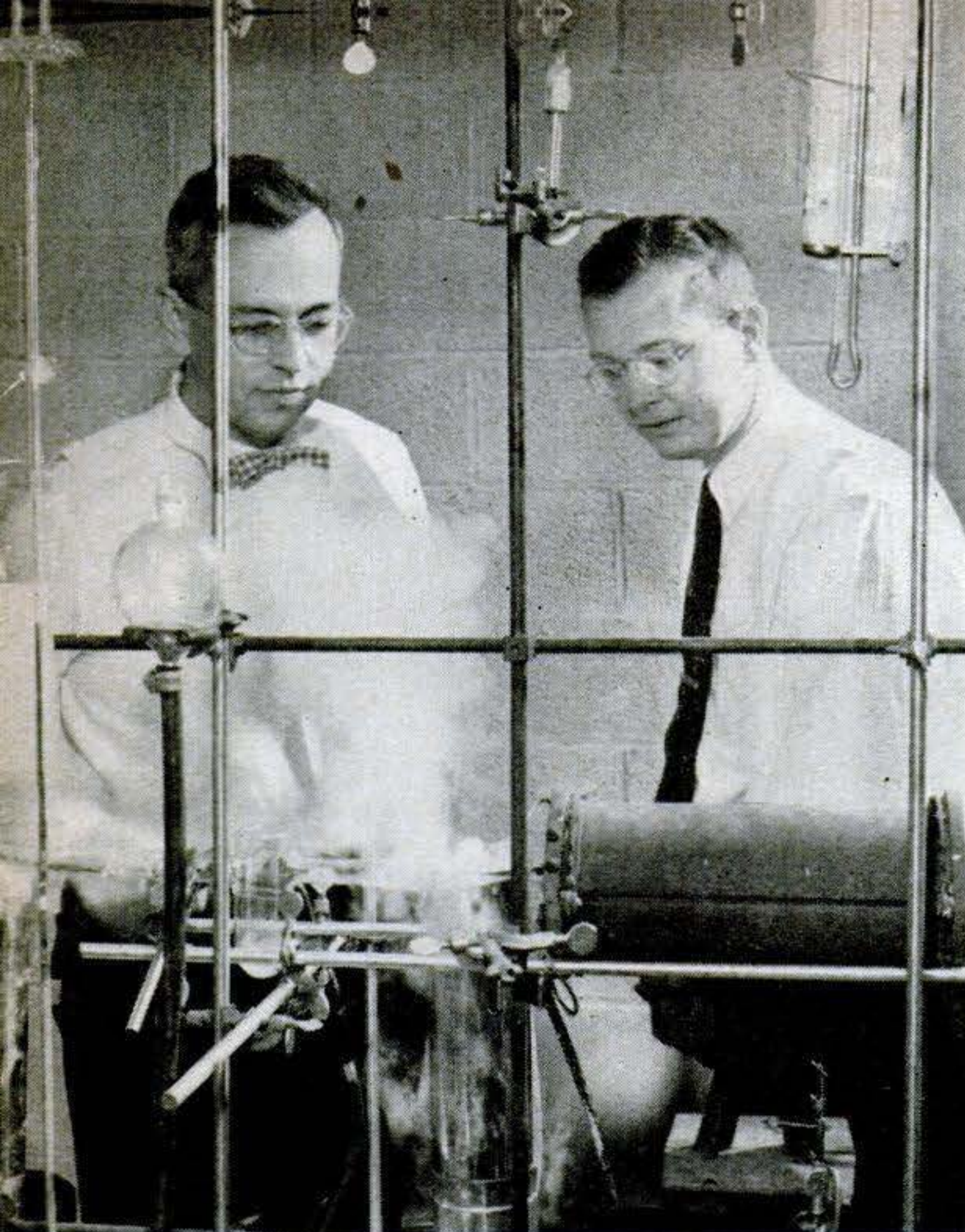
Research was undertaken by several organizations. In one elaborate set of experiments a group of researchers tried to find an answer by doing what seemed logical but really wasn't: They duplicated the conditions that had prevailed on the freighters. Naturally they could not handle ammonium nitrate in thousand-ton loads. Instead they decided to



Exploding ships set docks ablaze (center).

use a scale model. Everything was just the way it had been on the *Grandcamp*, except for size and quantity: six tons instead of many hundreds of tons. Then the ammonium nitrate was set on fire.

It was a glorious fizzle. The fertilizer burned fiercely enough, but the fire never made it explode. This seemed to prove that fire would not make the fertilizer explode. But as it had exploded



THEY SOLVED THE MYSTERY: Dr. Raymond M. Hainer, left, and George Feick in their laboratory at Arthur D. Little, Inc., Cambridge, Mass., where they cracked the Texas City case.

dramatically in Texas City, something was obviously wrong with the experiments. Another organization proceeding along somewhat similar lines also came up with unsatisfactory results.

It was not until 1950 that the U. S. Coast Guard obtained sufficient funds from Congress to initiate a large-scale research project. One of the groups to which the Coast Guard awarded contracts was the research and consulting firm of Arthur D. Little, Inc., in Cambridge, Mass. And to this organization belonged the two scientists who were to unravel the Great Ammonium Nitrate Mystery.

Neither of them could consider himself an ammonium nitrate specialist. Dr. Raymond M. Hainer had worked on problems of uranium chemistry for the Manhattan Project, on infrared spectroscopy, molecular structure, punch-card calculations and on an Information Theory of Olfaction—but not on ammonium nitrate.

His teammate, George Feick, had tested jet compressors, studied the bleaching of wood pulp, worked on a process for molding lenses from thermo-setting resin and specialized in the fields of heat transfer—high vacuum, liquid oxygen, and dyestuffs.

To learn everything there was to be learned about ammonium nitrate, they had to start almost from scratch.

They burned and blasted the fertilizer, and sometimes it exploded and sometimes it merely burned. Among hundreds of scientific papers dealing with ammonium nitrate, not a single one yielded the information they needed. They studied the case histories of dozens of fires and explosions involving ammonium nitrate that had occurred during the last 40 years. But in hardly a single case was the cause of the fire or of the explosion clearly stated.

Sometimes the fertilizer might have been set afire by a cigarette; sometimes chemical impurities might have started a reaction that ultimately led to a fire and occasionally, but not always, to an explosion. Sometimes it seemed that the fertilizer had been blasted by high explosives; sometimes it might have generated heat and ultimately caught fire all by itself.

Then Hainer and Feick made their first important discovery. All of the case histories showed that ammonium nitrate had burned in boxcars and warehouses and ships—but that it had exploded *only in ships* and never in warehouses and boxcars.

From this they reasoned, assuming that ammonium nitrate could actually explode under certain circumstances, that there must be a factor outside of ships that prevents that explosion. Or, to tackle the problem from the other end: If burning without explosion is the normal thing for ammonium nitrate, then confinement inside a ship must create a new factor that can bring about the explosion.

[Continued on page 268]

I'd Like to see them make...



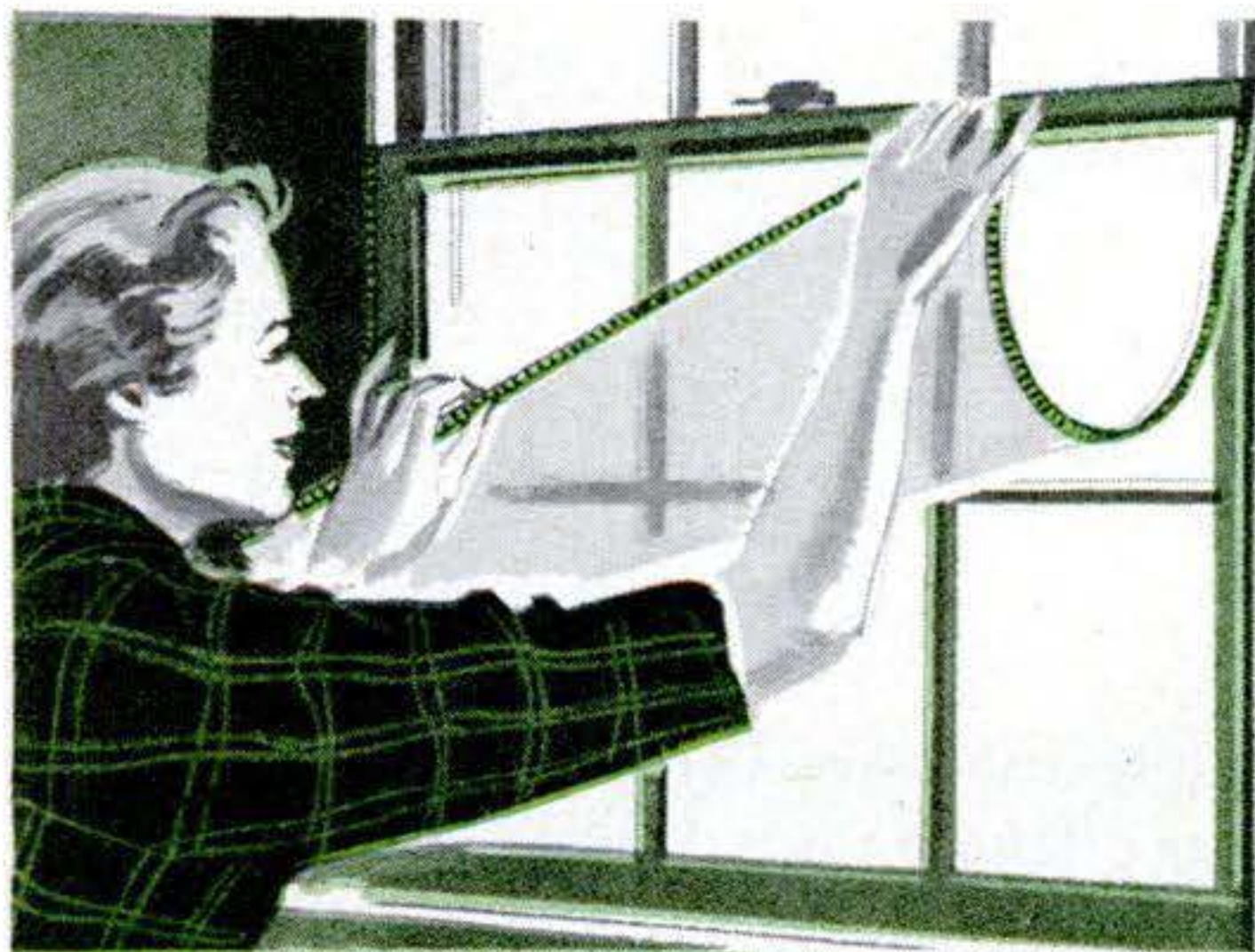
WALLPAPER IN TWO LAYERS, bonded together so top sheet could be peeled off when soiled, leaving room papered with another pattern.—*R. P. Caponi, Massapequa Park, N.Y.*



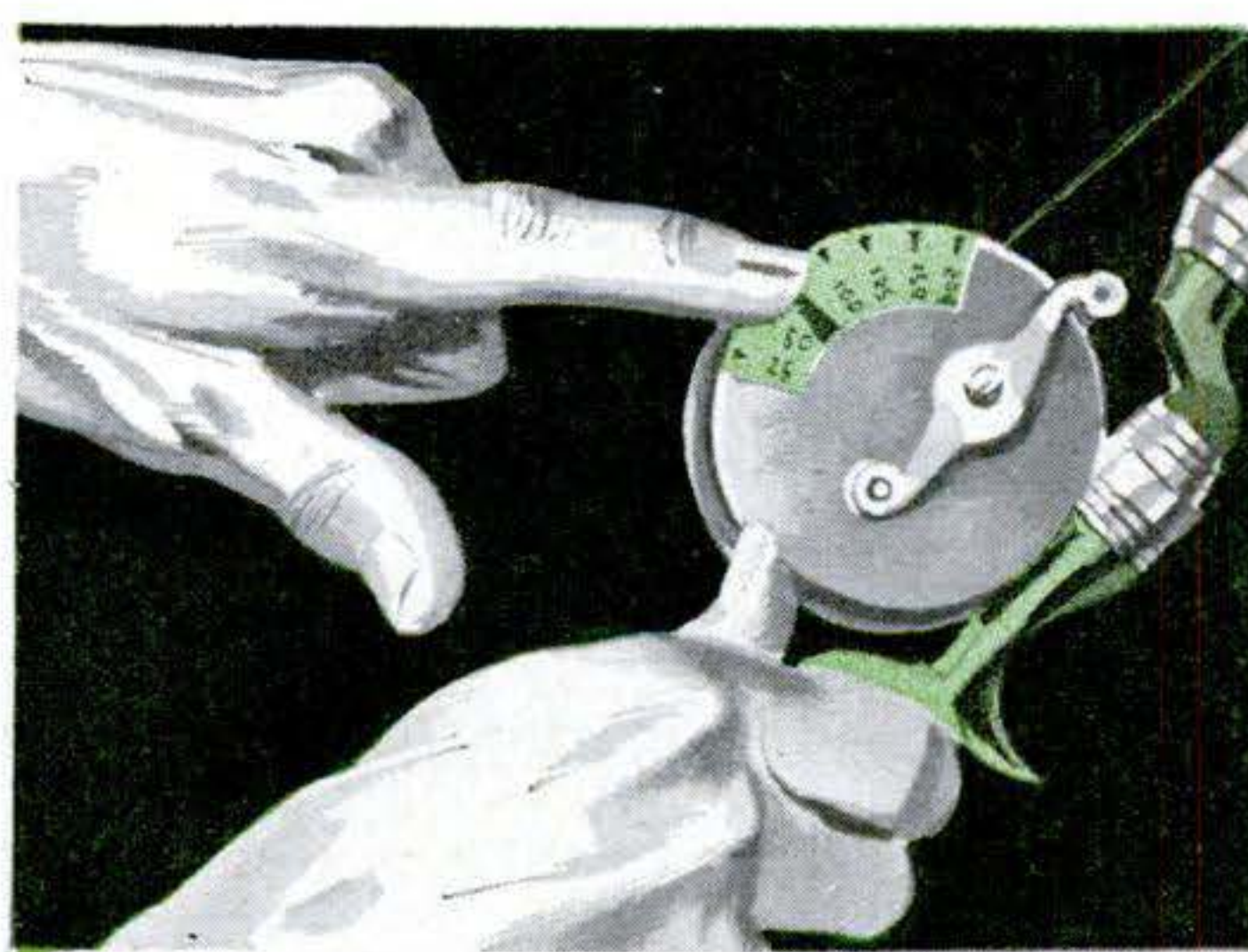
A TIRE-PRESSURE GAUGE that would give a temperature reading. Recommended pressures at various temperatures could be printed on case.—*Ray Welder, Wittenberg, Wis.*



HAND BRAKES ON TRICYCLES so kids would stop dragging their feet to cut speed when coasting downhill. They'd sure save on shoe leather.—*S. M. Glazier, Arlington, Va.*



ZIPPERS ON PLASTIC STORM WINDOWS. On a mild day, the zipper at the sill could be opened for ventilation, saving wear and tear on the tape.—*Edwin Weichman, NYC.*



A CASTING REEL WITH A CONTROL that could be set for distance. Then a fisherman wouldn't have to "brake" the reel with his thumb.—*Jerry Garrett, Clinton, Okla.*

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by POPULAR SCIENCE MONTHLY readers. What

is yours? We will pay \$5 for each one published. Please use Government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.



Gus Fixes a

For the kid's sake, Gus was bound he'd cure the mixed-up car that purred like a kitten until it warmed up—then quit cold.

By Martin Bunn

WHEN Barney Overholtz drove his 1952 station wagon into Gus Wilson's Model Garage, he was about as downcast-looking as anybody Gus had seen in a good while.

"How are you, Barney?" Gus greeted him. "I haven't seen much of you lately. Where have you been keeping yourself?"

"I've been pretty busy," Barney told him, "since I promoted myself from the paper route to delivering groceries after school and Saturdays for Eric Watt's market."

"That's how you tell it," Gus went on, poking the youngster playfully in the ribs. "The way I hear it is that you are spending considerable time chauffeuring Sadie Plevens around."

"Well, maybe I am," Barney admitted, flushing to the roots of his roan hair. "But I won't be able to much more. The way this car eats gas, I'll go broke and have to give up truckin'. Sometimes I wish I had my old 1941 Ford back again."

"That's peculiar," Gus said. "This six-cylinder job should give good mileage. Should get around 20."

"It should," Barney complained, "but it doesn't. I'm lucky to get 12. And sometimes she almost won't run."

Barney Does His Own Fixing

Gus didn't ask the young fellow why he hadn't brought the car in sooner. He knew. Barney had started his newspaper route with a third-hand 1941 Ford, with a crankcase full of water. Gus had managed to stop the water leak into the crankcase, but the old car had finally become worn out, and Barney had been forced to buy a newer vehicle for his

new job. You couldn't, Gus thought now, help support the old folks, buy a good car, take out a girl, and at the same time pay garage bills. Barney was inclined to do his own fixing. Gus sensed that he must have been pretty desperate to bring the car in now.

"We'll take a look at it," Gus told him, lifting the hood.

"I worked on it some myself," Barney said, "but it didn't seem to do much good. The only thing I found wrong was that the felt in the air cleaner was sort of charred and burnt. I put in a new felt—maybe some of the old one got stuck in the carburetor."

"Maybe it did," Gus said, perking up his ears. "I wonder how that felt got charred—must have ignited some time from a backfire, before you got the car."

Gus started the motor, idled it, gunned it, shut it off.

"Sounds all right to me," he commented, wheeling over his tool kit.

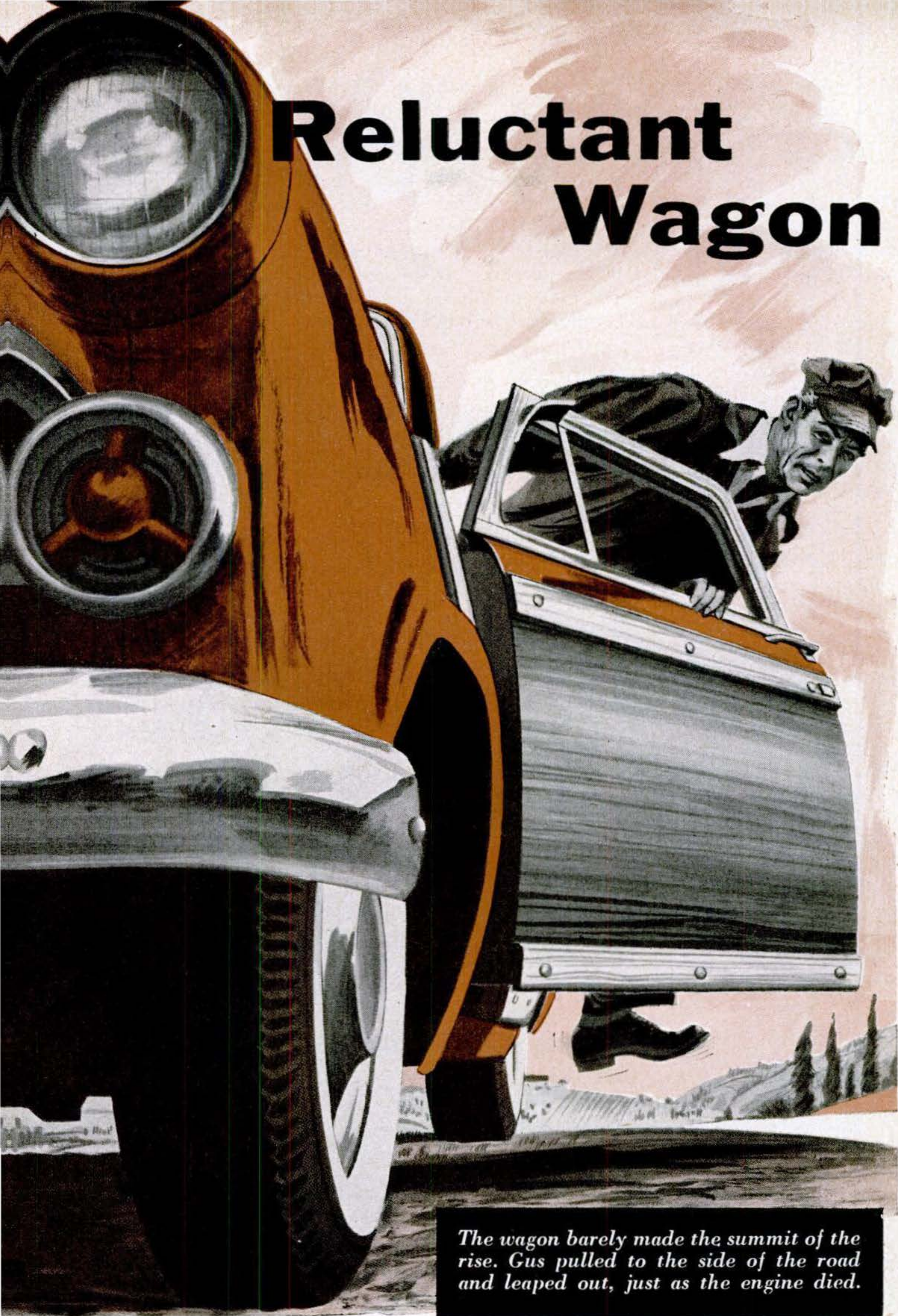
Gus Makes an All-Around Check

He removed the air cleaner, washed out the felt in solvent, cleaned the bowl and added fresh oil. He pulled the carburetor and cleaned it, carefully checking passages and screens, float setting. Replacing the carburetor, he snapped off the distributor cap, closed the points by rocking the car in gear, turned on the ignition switch, held the high-tension wire from the coil near the block, snapped the points with his thumb.

Noting the strong spark, Gus replaced rotor, cap and wire. He removed, cleaned, tested and set the plugs, made a compression test on all cylinders. Again he started the motor, listened to it with cocked ear.

"Sounds pretty sweet to me, Barney,"

Reluctant Wagon



The wagon barely made the summit of the rise. Gus pulled to the side of the road and leaped out, just as the engine died.

Gus told the youngster. "Full compression on all cylinders—good shape all around. Sounds like she's timed right, but we'd better check. Slow spark could cost you gas."

Gus cleaned the timing mark on the vibration damper, hooked up his strobe light, finding the timing only a hair off. He set the spark on the mark, made a routine check for loose wires, worn spots, battery terminals and ground.

"Let's drive her around the block, Barney," he said.

The car performed perfectly, and Gus turned it over to the youngster at the garage, charging him the smallest amount he dared without making him feel that he was getting special favors.

Stan Hicks, Gus's young helper, knowing his boss's weakness for helping out youngsters just starting out in life, smiled to himself.

"If all our customers were kids, Gus," Stan said, "we'd be broke in a month. What was wrong with the car, anyway?"

"Hanged if I know," Gus said. "I never did find anything really wrong. Maybe he had some charred felt in the carburetor passages. I might have failed to see it when I blew it out."

Barney Calls for Help

Gus felt satisfied that he had given the car a thorough check, and was considerably surprised when Barney drove in the next day.

"She wouldn't take it this morning, Gus," he said. "Pa had to break out his car and deliver my groceries. And was he mad!"

"How'd the car act?" Gus asked.

"It ran fine at first," Barney said, "and then when it got hot—it was a warm day yesterday, you know—it began to miss. The farther I went the worse it got. Wouldn't pull the hat off your head. I phoned Pa from the Nolan farm and he

came and picked me up. After we got the orders delivered we came back for my car. It ran all right then, but I brought it right in to you."

"Great!" Gus said, but he didn't feel that way. A stubborn look came into his eyes as he rolled up his tool kit and started the motor.

It seemed to Gus that he had never heard a motor that ticked them off better. But for the moment he was disinclined

to trust his highly trained ear. He abandoned his usual method of working, and began using his motor analyzer and test panel.

What, he asked himself, would cause a motor to miss when real warm, and yet work perfectly when cold or ordinarily warm? Vapor lock?

Too hot a type of plug? Faulty coil or condenser? Some sort of resistance building up in the ignition system? Loose connection or poor ground?

Gus went to work systematically. He tested the coil and condenser, installed new points, making certain that there were no hidden jokers in the distributor, such as a movable breaker point striking a screw head, or faulty insulation or ground. He checked valve setting, cam angle, wiring, connections. The further he went the more he became convinced that there was nothing whatever wrong with Barney Overholtz' car. Finally he buckled up everything and lowered the hood.

"Now," he said grimly to Barney, "let's really road-test her."

Twenty Miles and All's Well

It was a beautiful, mild spring day as they drove out of town. The morning sun was fast warming the air. Gus nursed the car along, varying speeds, hitting this hill fast, that one at slow pull, alert to the hum of the motor, the throaty

[Continued on page 250]



"Ran out of gas."



Lessons on Tape Help Students Learn the Three "R"s

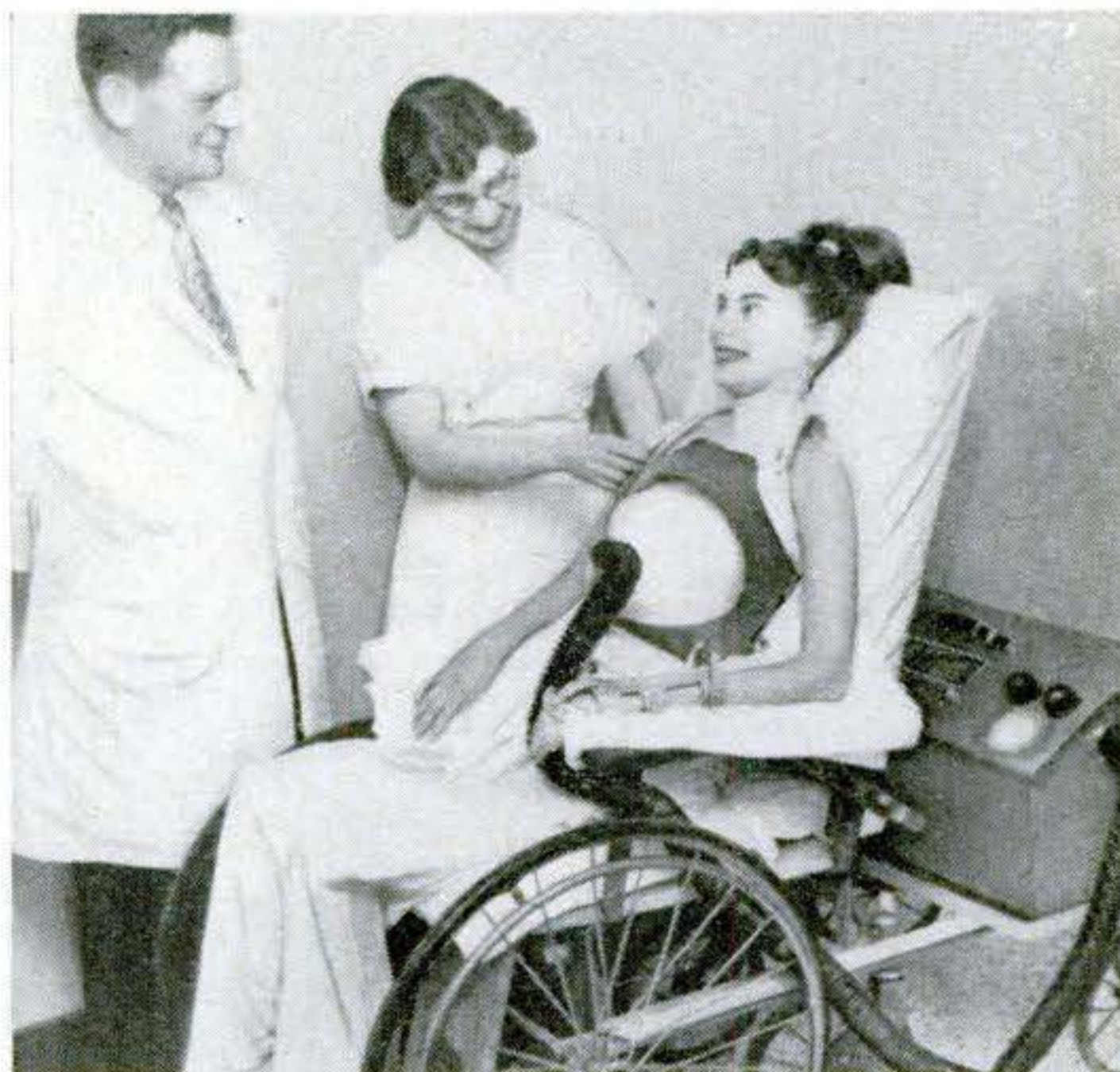
TEACHER is a tape recording for pupils at St. Scholastica Academy, Covington, La. As a supplement to regular instruction the youngsters listen to lectures recorded by

university professors. Since the master control (above right) handles seven tapes at once, bright students can move ahead fast while slower children get needed repetition.



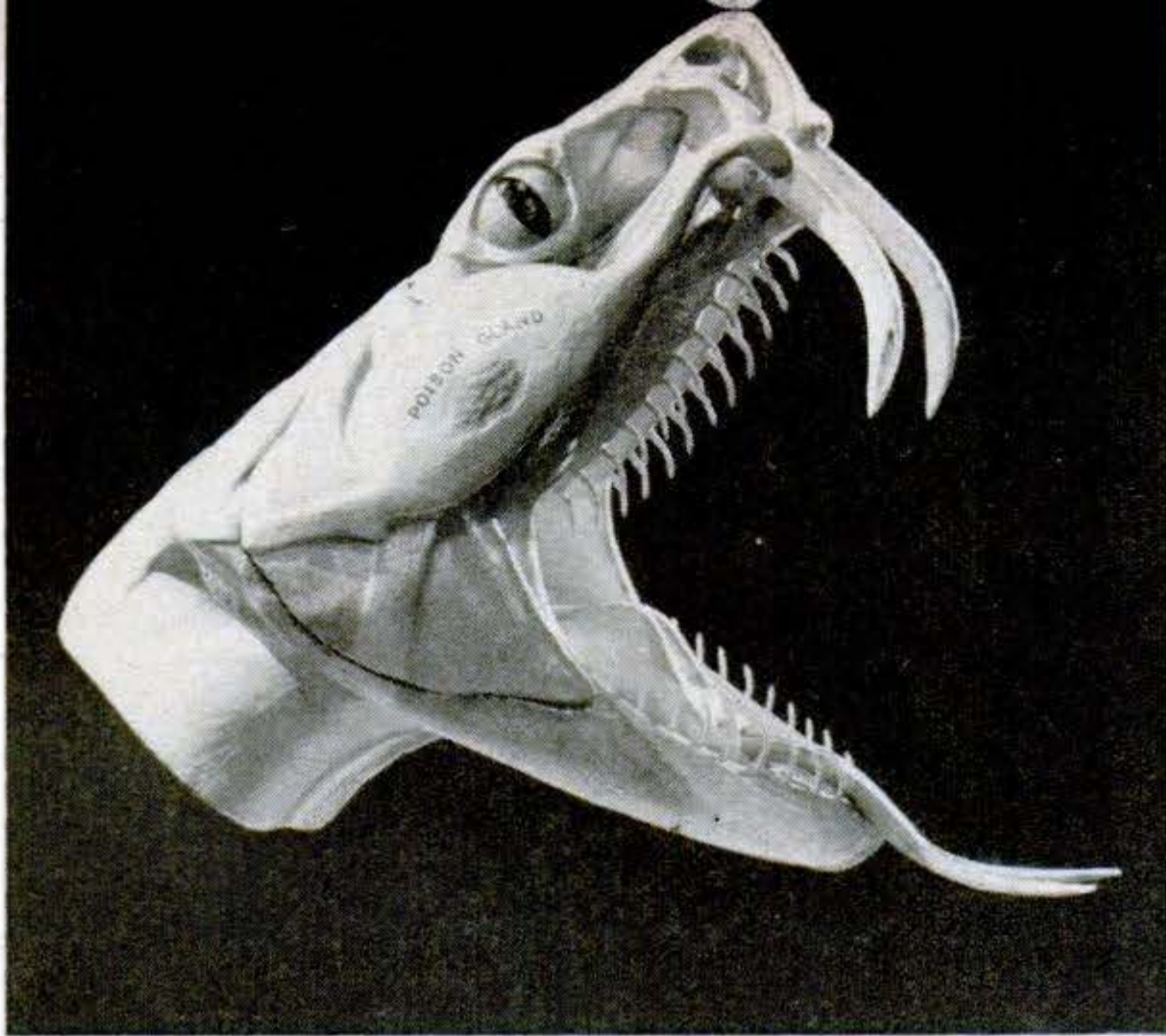
TV Helps Cure Eye Defect

BY WATCHING television on this set, cross-eyed children can learn to see with both eyes. The trick is a polarizing screen over the TV picture and polarizing spectacles. Unless the child uses both eyes, he sees only half the picture. American Optical Co., Buffalo, N.Y., devised it.



Chair-Lung Helps Polio Patients

POLIO patients move around with their iron lungs in Miami Valley Hospital, Dayton, Ohio—hospital attendants made a wheelchair with a chest respirator built into it. Above, young Janet Ruehling takes a trial spin in the unit after 15 months' confinement in bed.



THIS FEARSOME MODEL shows you a pit viper's catlike eyes, its pits (between eyes and nostrils), its flesh-puncturing fangs.

Science Arms You Against Snake Bites

A powerful new drug may save your life, but your best bet is still to walk with caution.

By Wesley S. Griswold

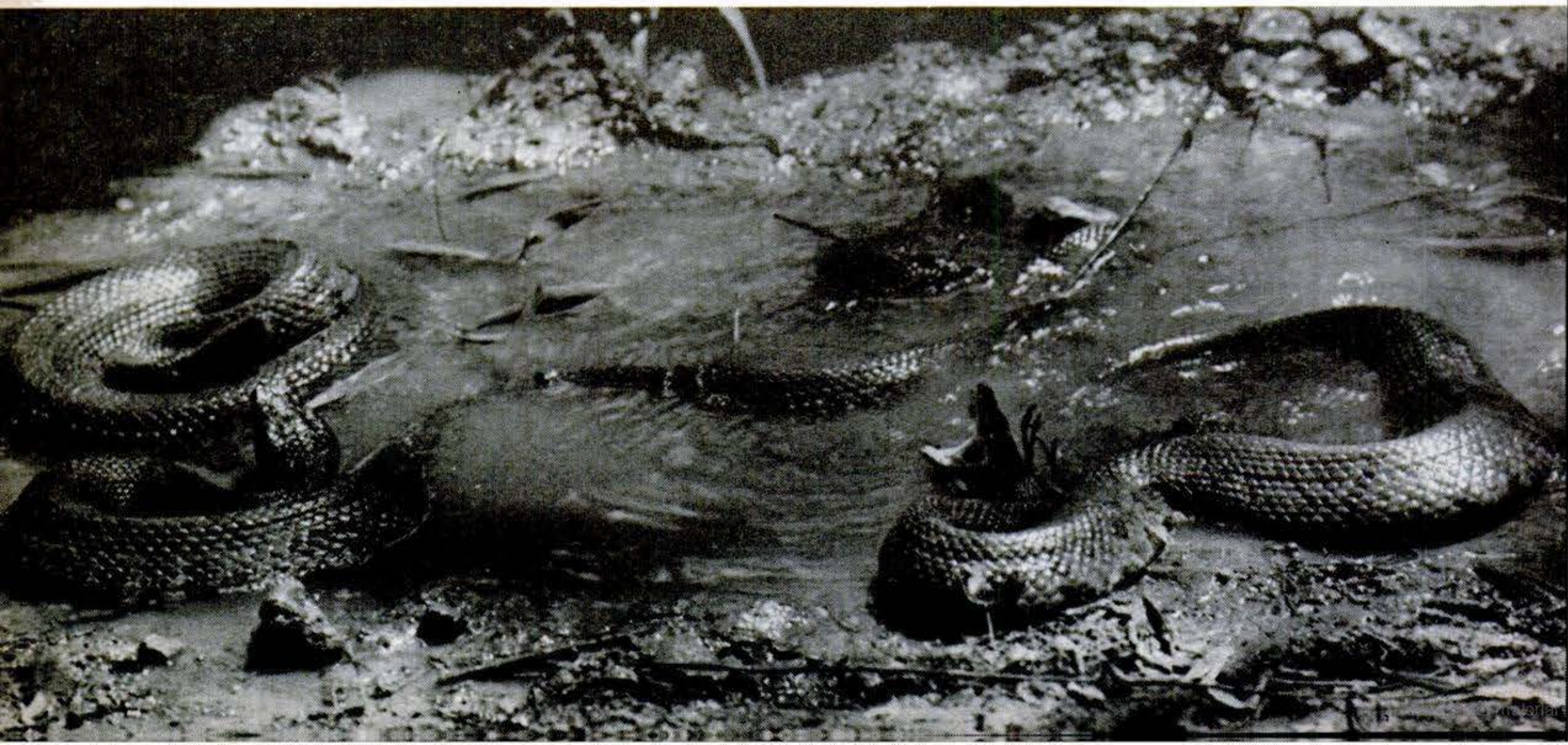
THOUGH 2,500 kinds of snakes share the world with us, fewer than 200 are worth worrying about. Of those 200, fortunately, only about three dozen—rattlers, moccasins and coral snakes—need concern those of us who live in the U.S. But they are among the

world's deadliest snakes, and one kind or another is on the loose in every state of the Union.

Each year around 40,000 people throughout the world—and several times that many horses, cows and dogs—die of snake bite. They top the list of victims of animal venoms of all kinds—snake (both land and sea), insect, lizard, fish and mammal. The venoms are sufficient cause for alarm to have led scientists to meet recently in California for the first international conference on the subject.

This spring, however, a powerful new

Cottonmouths stick to swamps and lakes but don't get north of Virginia's Dismal Swamp.





The careless rock climber may suddenly find himself face to face with an aroused rattler.

weapon, easy to use, is at hand with which to counteract the venom in case a poisonous snake bites you. Wyeth Laboratories have produced a readily applied antivenin—the technical term for an anti-snake-bite serum—that not only is 50 percent more effective than any previous one but neutralizes the venom of every pit viper in the world. That includes nearly every poisonous snake in North and South America.

The sole exception is the coral snake, a relative of the cobra. But, despite the fact that the young daughter of a New

York family managed to find one in Florida and bring it north safely in a candy box before an appalled scientist friend of her parents identified the pet, coral snakes are elusive and relatively rare.

All rattlesnakes and moccasins, and the tropical fer-de-lance and bushmaster, are pit vipers. The “pit” does not refer to a hole in the ground but a hole in the head—two, in fact. They look like nostrils but are cups for delicate membranes that are extremely sensitive to variations in heat. The pits function like a kind of radar. They and the reptiles’ keen sense of smell

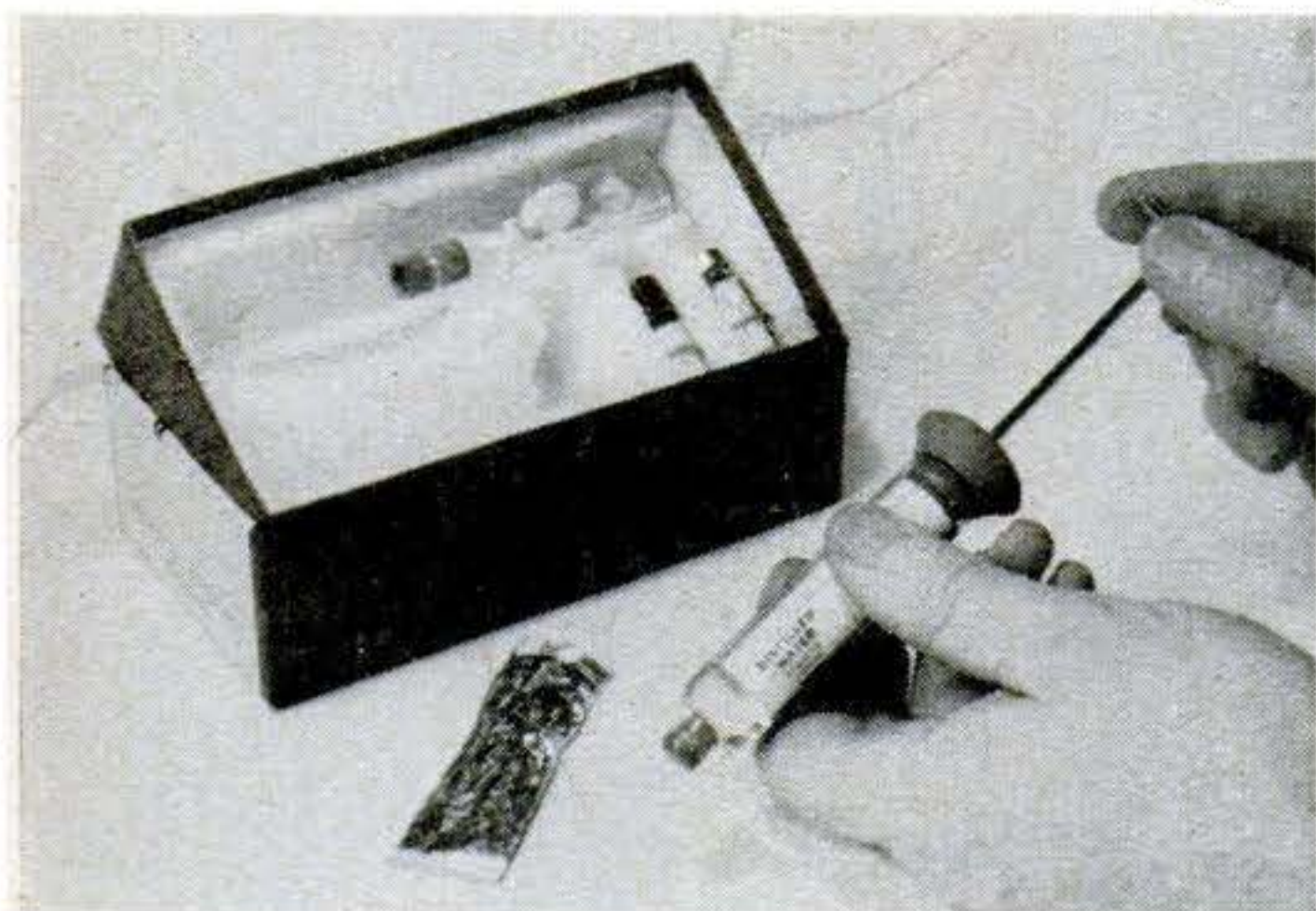
WHAT YOU MAY FIND under a cow’s skull, rock or chunk of wood makes it wise to lift objects at the top, and at the side away from you.



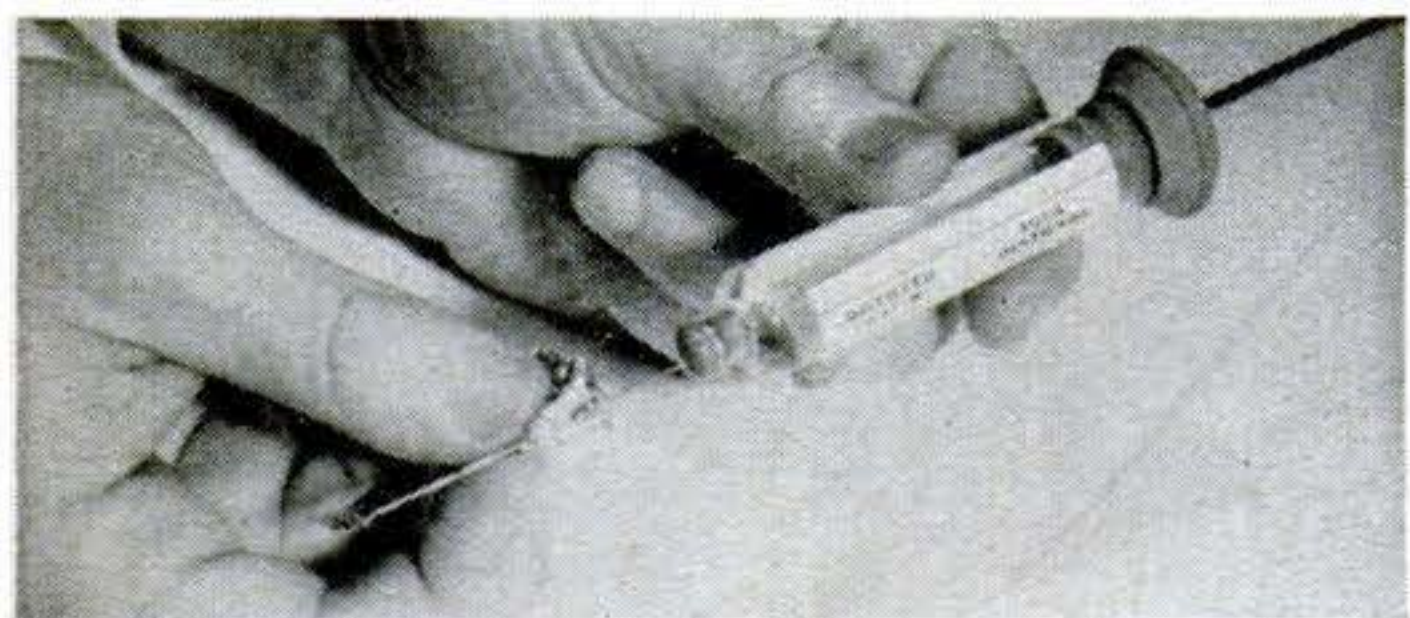
HIGH LEATHER BOOTS and long trousers are the best protection for your legs in snake country. The menacing reptile below is a copperhead.



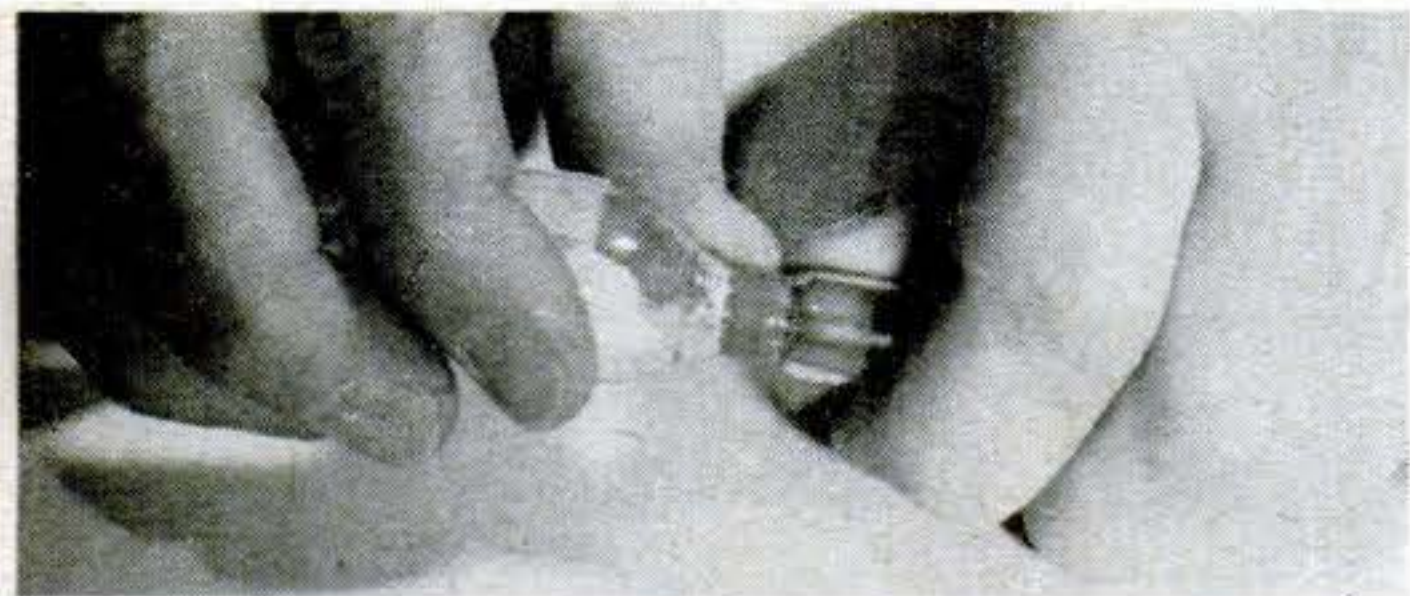
How to use new snake-bite remedy



ASSEMBLE SYRINGE by screwing plunger rod into vial of distilled water. Needle is in tinfoil.



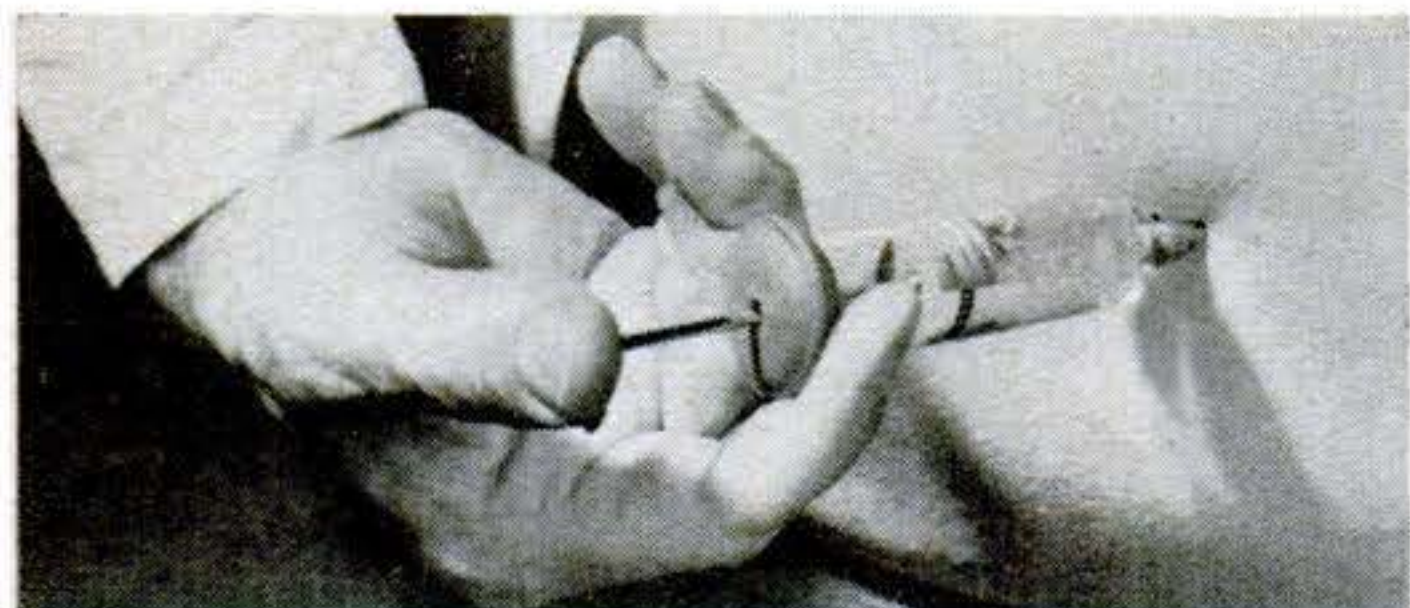
REMOVE FOIL from needle and insert its short end into the sealed stopper of the syringe.



BREAK PROTECTIVE NECK of the vacuum vial containing antivenin in dry, crystalline form.



THROUGH DOUBLE-END NEEDLE, vacuum draws distilled water in to dissolve the dry serum.



MAKE INJECTION in muscle above wound after drawing dissolved serum back into plunger.

more than make up for the fact that pit vipers, like all snakes, have no hearing and are so nearsighted as to be practically blind in the dusk or dark, when they usually feed.

To test the response of pits and nostrils, some brash experimenters once blindfolded a rattler and encouraged a well-protected man to walk back and forth in front of it. The snake struck repeatedly at exactly the strategic instant and with perfect aim.

Druggists Rent Out Kits

Wyeth packages its antivenin in a conveniently small kit. A series of photos at left shows how simple it is to use the outfit.

Since the antivenin is quite expensive (\$12.50), many a druggist in states where poisonous snakes are common has started renting kits to hunters, fishermen and campers for a small daily fee.

Actually, snakes would like nothing better than to stay out of men's way. Even as virulent a snake as the African boomslang is as skittish as a doe, streaking for cover at the faintest unfamiliar scent, as if it didn't have a drop of venom in its body. But a poisonous snake will halt and strike if it feels itself cornered, and it has a regrettable tendency to leap to that conclusion.

In spring, those poisonous reptiles that inhabit the northern half of the nation awake from a long winter's nap as soon as the frost has left the ground. They emerge fiendishly hungry and in no mood for fooling. Their poison glands are full of venom and their tempers are extremely short.

Spring Brings Out the Victims, Too

At the same time, pallid workers are emerging from offices and factories to try the streams for trout, burn brush, watch birds, hike or simply sit on rocks in the welcoming sun. Often a musing fisherman or a rapt ornithologist absent-mindedly crosses the path of a venomous reptile strictly intent on business.

If you boldly venture into snake coun-

[Continued on page 252]

*Meet—then avoid—the three
most common U. S. pit vipers*

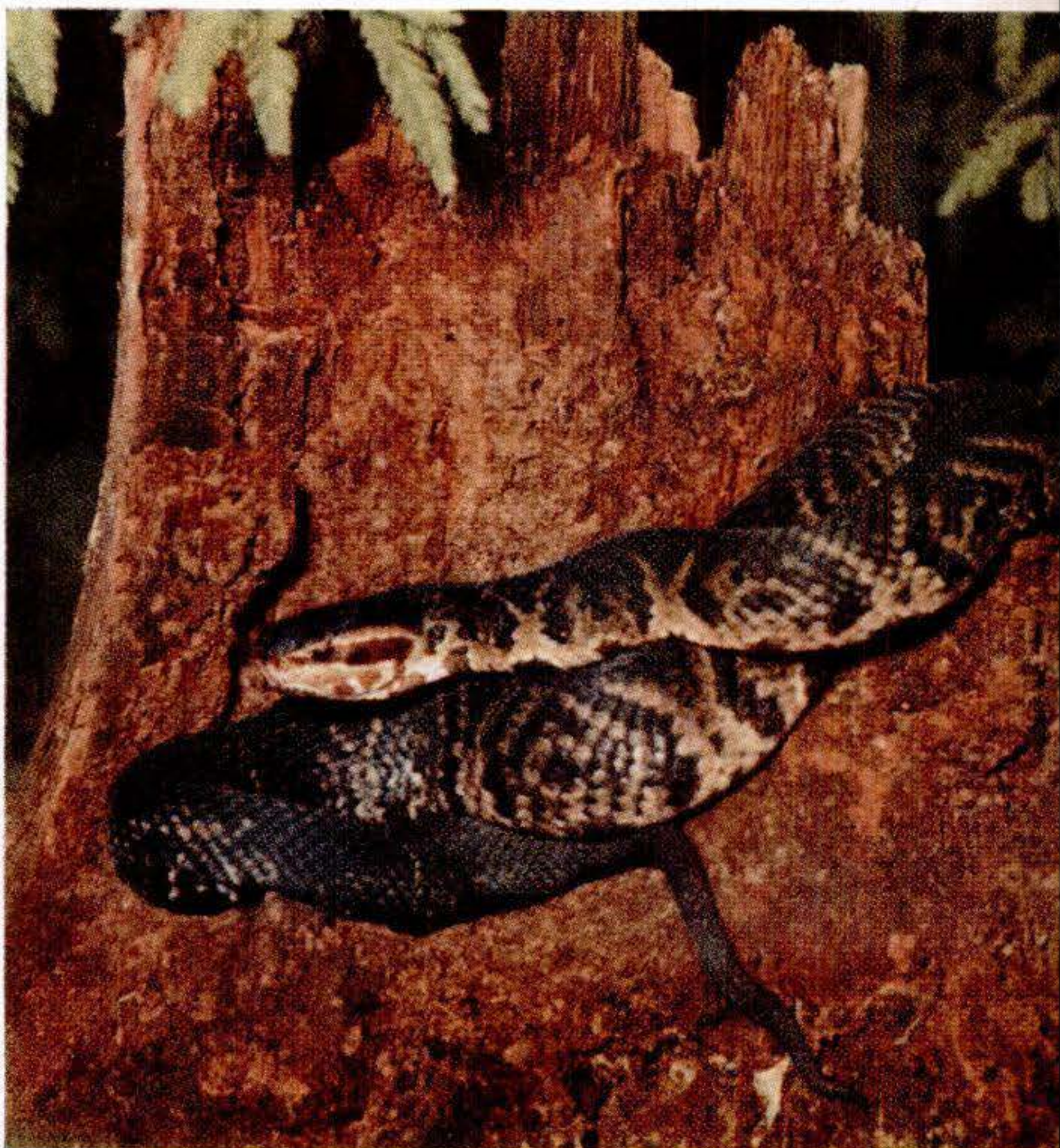


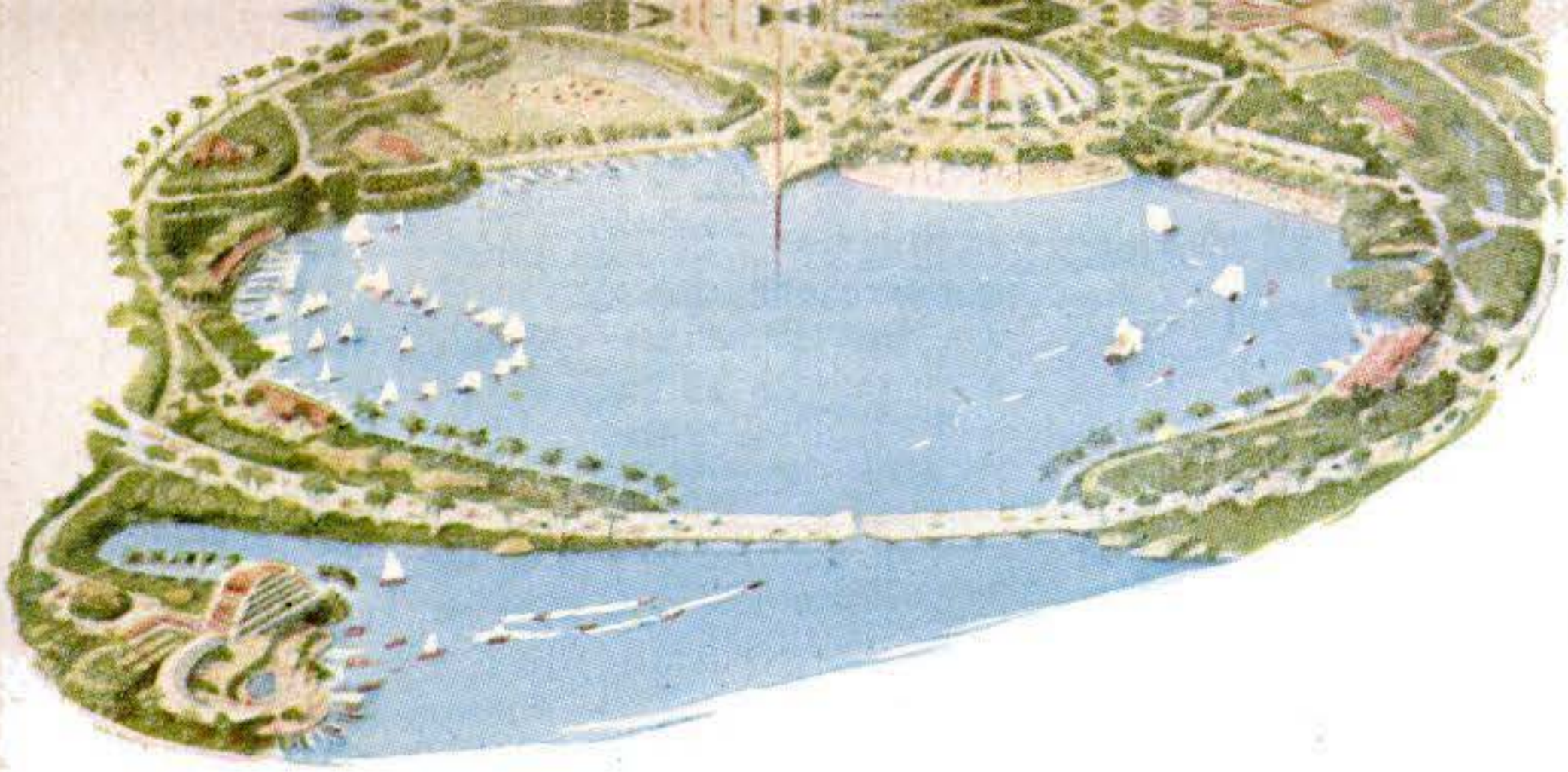
The deadly copperhead moccasin is one of the commonest poisonous snakes in the U.S.

TIMBER RATTLESNAKE (below), usually yellow or tan but sometimes black, is found from New England to northern Florida and as far west as Texas.



OUT OF ITS ELEMENT, this big water moccasin (right) fails to show the white lining of its mouth, which has earned it the nickname "cottonmouth."





CIRCLING A LAGOON 10 miles north of Miami, the Center will aim to look like a vast subtropical garden. An amusement section, picnic and swimming facilities, horticultural and agricultural exhibits, a zoo and a playground for children are intended features.

Florida Plans New-World Fair

HEMISPHERIC FELLOWSHIP will undoubtedly blossom in the Club of the Americas (below), a novel hotel and restaurant of concrete, steel and glass. The Center is expected to attract 15,000,000 visitors in its first year of operation.

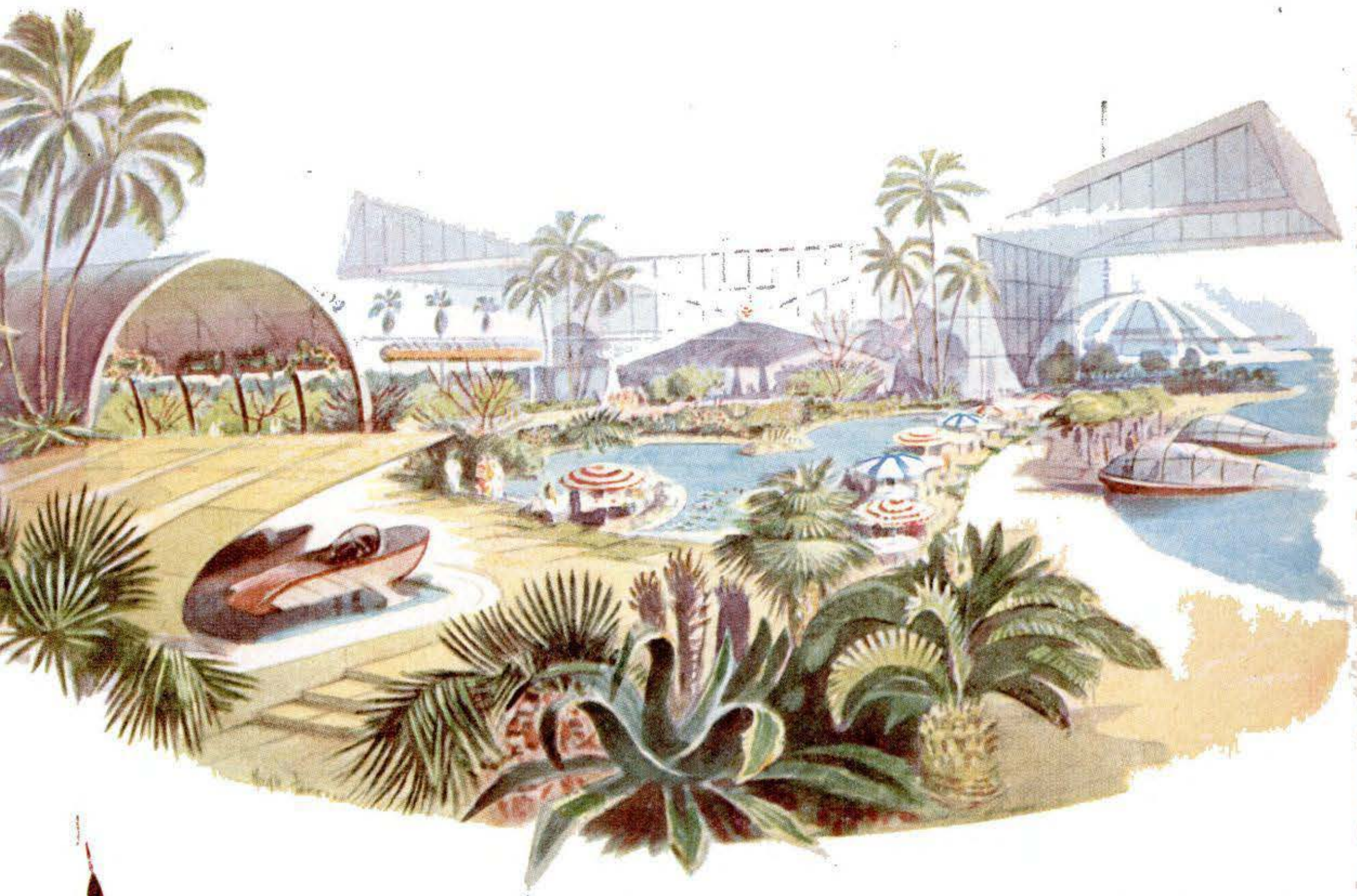


AN ENDLESS show, combining a trade fair with a fun fair and including top-grade cultural events as well, is expected to open beside a palm-fringed lagoon in North Miami, Fla., three years from now.

It will be a permanent world's fair that its sponsors hope will dwarf the

celebrated temporary world's fairs at Chicago and New York during the Thirties. Its name: Inter-American Cultural and Trade Center.

Planned to provide an enduring and beautiful showcase for exhibits from all the nations of North and South America, the Center will cover 1,800 acres.



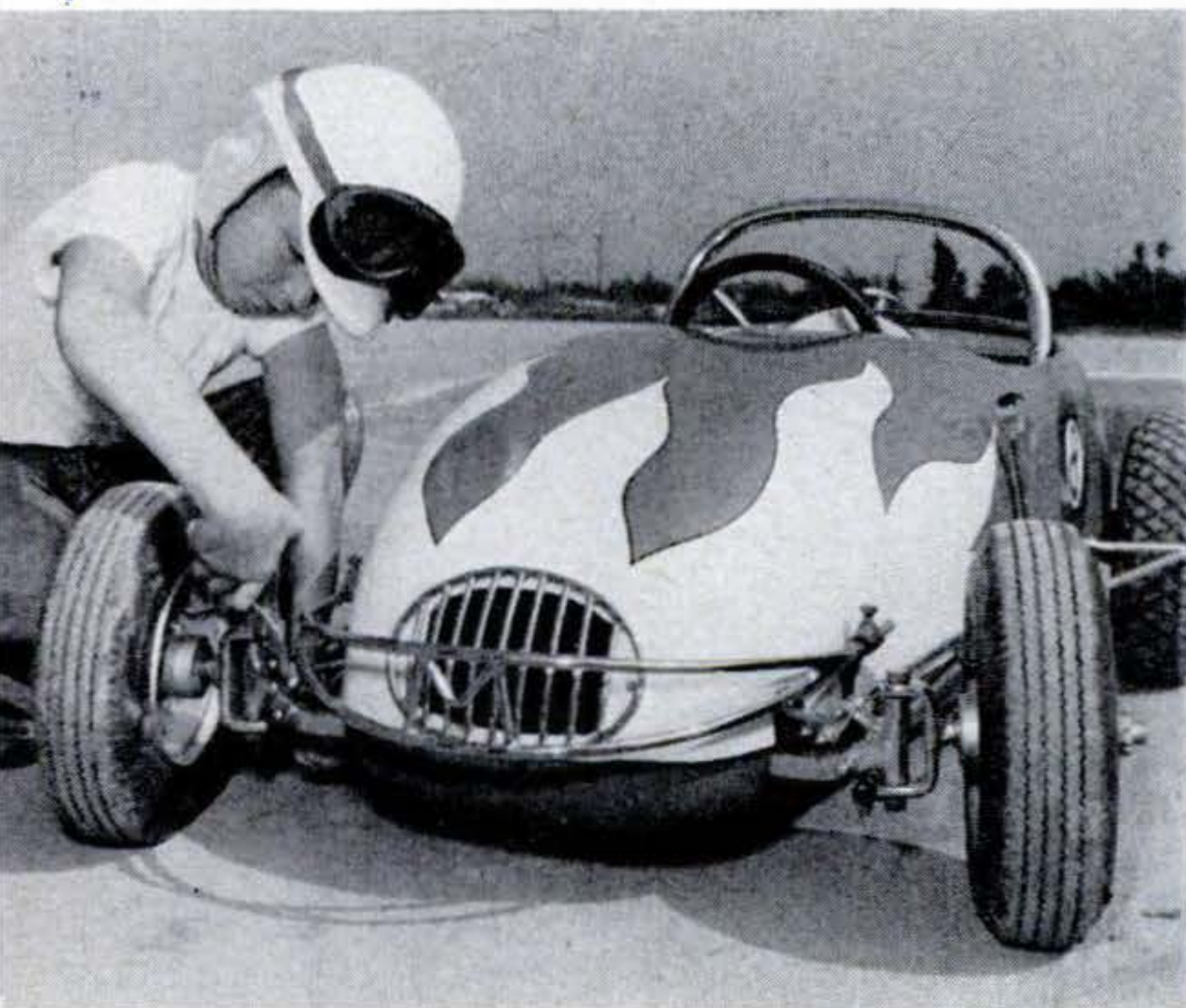
MONORAILWAY of aluminum and glass, barely visible under a row of palm-tree tops at left center in the drawing above, will carry sightseers for an elevated tour of the Center's grounds. Electronically controlled, air-conditioned boats are planned to cruise the lagoon and the Center's canals.

MANY-PURPOSE AMPHITHEATER of advanced design will be the theme center of the permanent fair, scheduled to open on Jan. 1, 1958. Restaurants will feature native dishes of the Americas. Entertainments will include ballets, rodeos, dramas, concerts, art shows, sports contests.

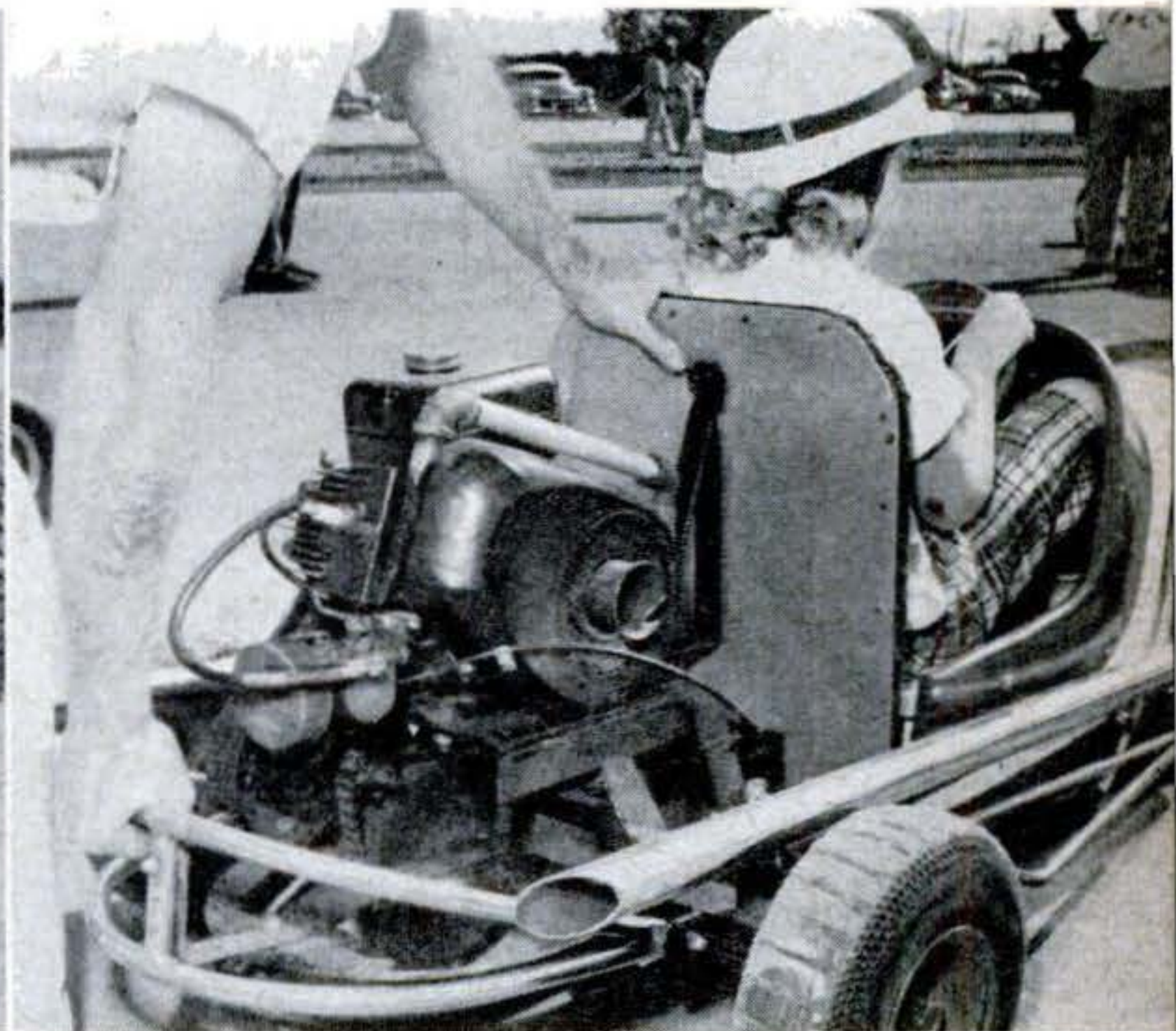




Youngsters Race Midget Midgets



DRIVING MECHANIC. Eleven-year-old Mike Olivero makes with a wrench on the front-end assembly of his car. Dad takes over on tough jobs.



WOMEN DRIVERS are in the running too. Donna Richards, seven, awaits flag as her father lifts the rear of her car for drop starting.

Dads build the cars, but America's youngest drivers take the wheel in this new racing fad that's fun for the whole family.

**By Hi Sibley
and Andrew R. Boone**

DIRT-TRACK racing is child's sport now—and the kids love it. So do the fathers who convert wheels, one-lung engines and junked auto parts into tiny hot rods. It's hard to tell who has more fun.

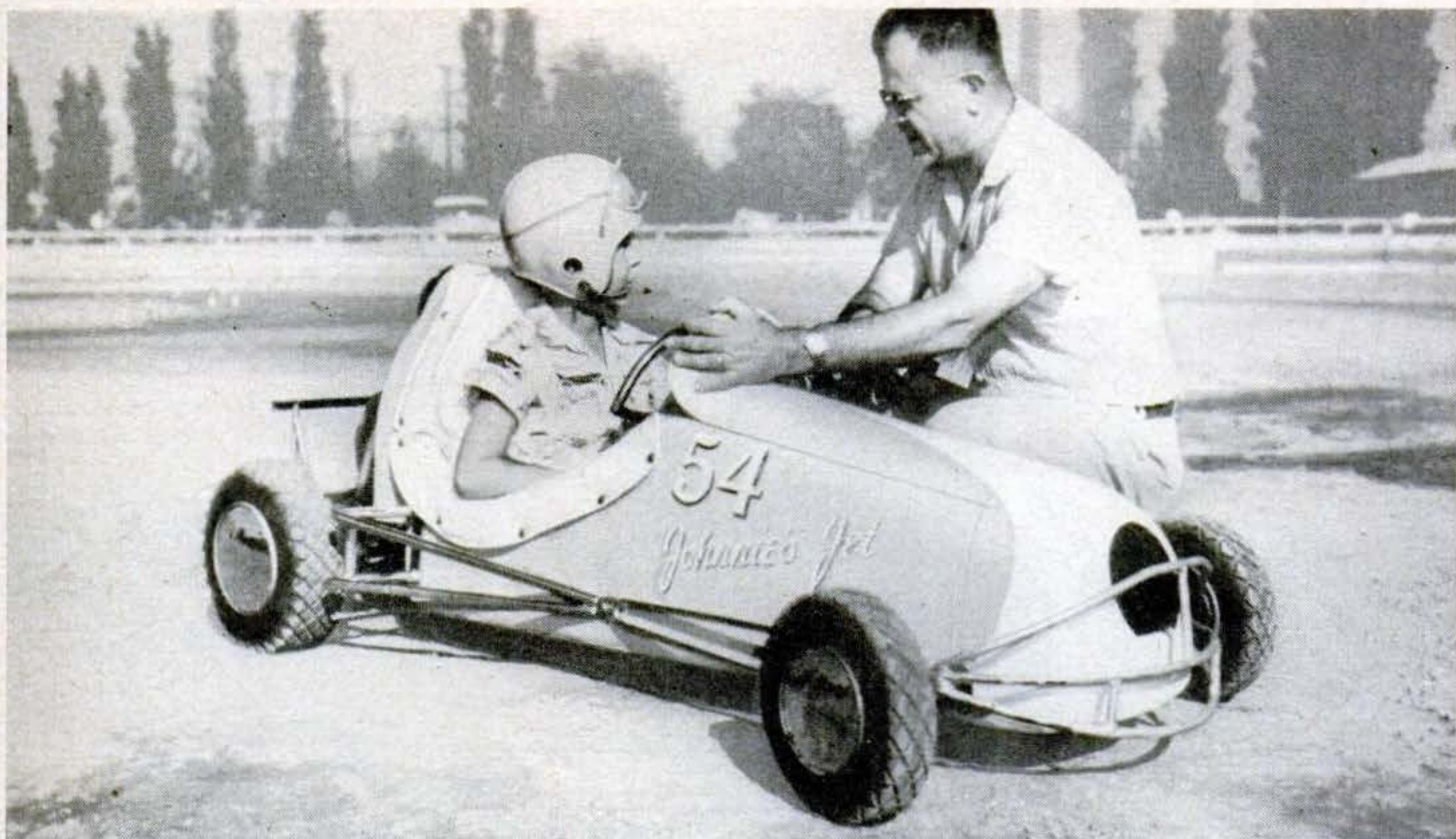
Few grownups could shoehorn themselves into these midgets. They're tailor-made for youngsters four to 12 years old. Some of these drivers can't read yet—but

they run real races on miniature dirt tracks, pitting their homemade cars and driving skills against each other like Indianapolis veterans.

Jams on the turns are frequent as drivers battle for the rail. On the straightaways, throttles are floorboarded for speeds up to 25 m.p.h.—plenty fast when you're sitting only 2½" above the track. The small fry quickly learn to steer out of skids, nurse the wheel around turns, and make a fast getaway on the break.

Born in California. Officially designated as one-quarter midgets, the little crates were first raced at Hemet, Calif. They are now running at Upland, Anaheim and Norwalk, too, with plans under

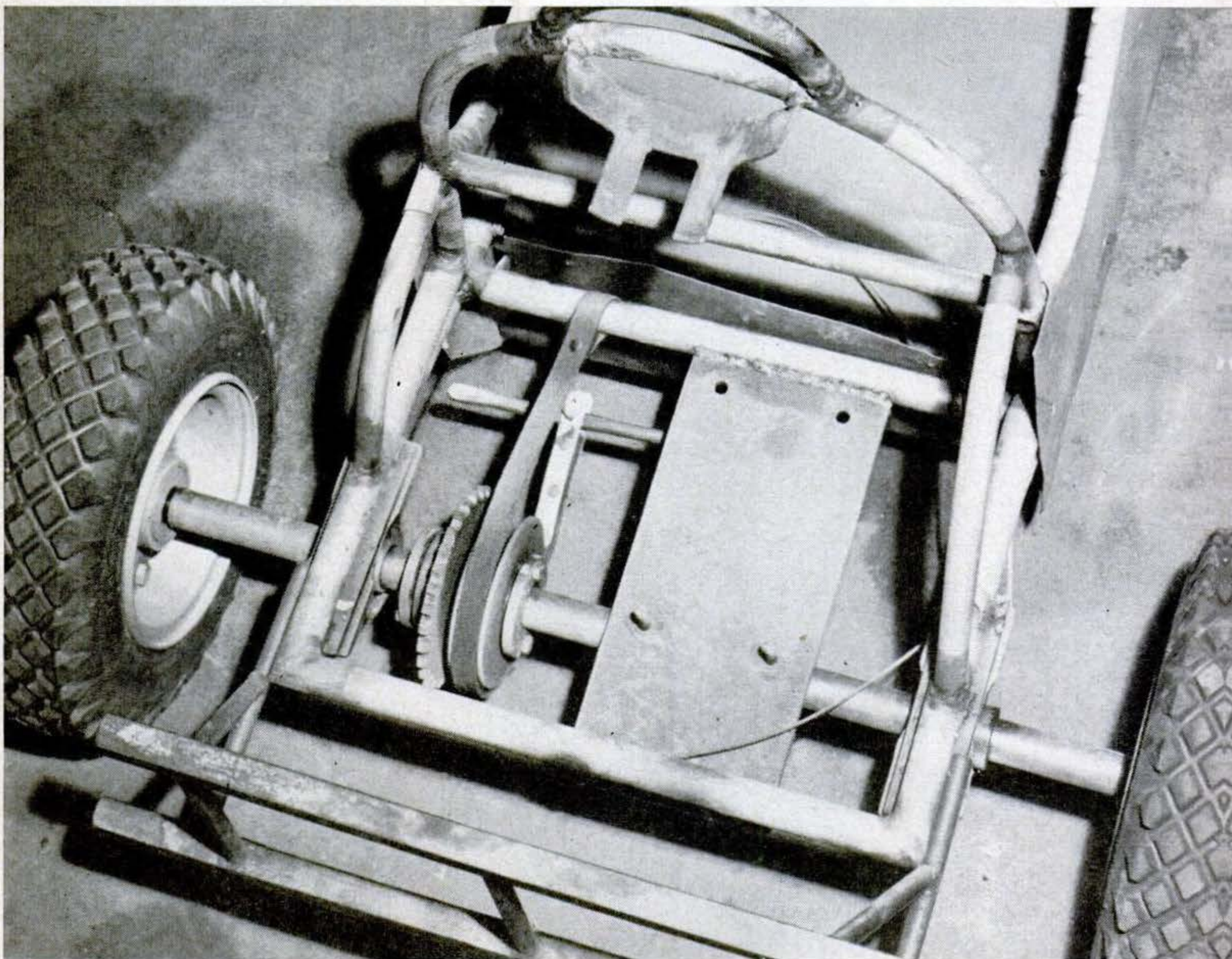
KIDS TAKE SKIDS as a matter of course around tight turns. Although races are in grim earnest, low center of gravity, crash guards and bumpers keep them safe. *Color photo by Walt Frisbie.*

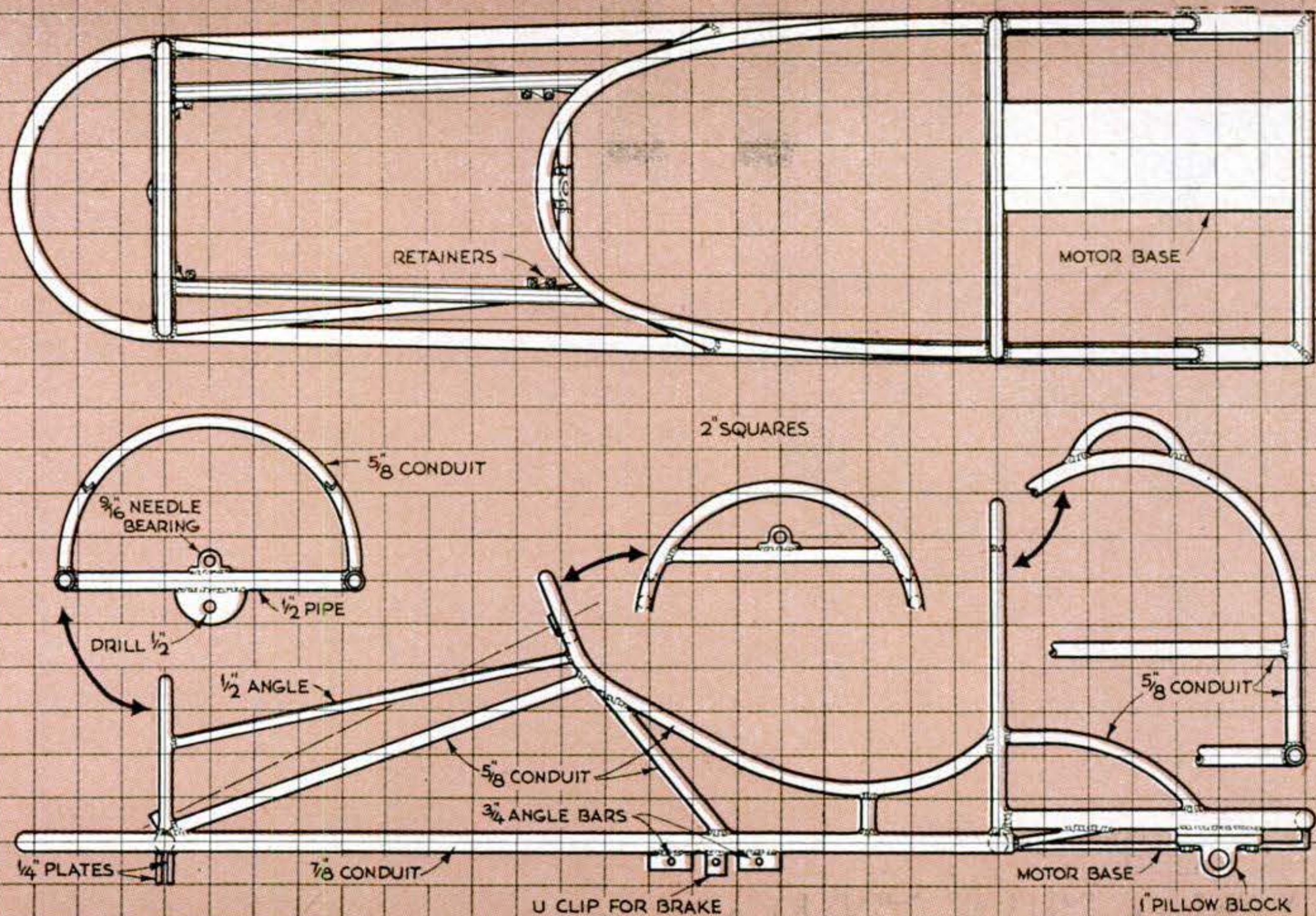


Johnnie Motte, nine, in the winning car his dad built. To date he has taken 15 trophies.

WITH ENGINE OUT, rear end of Johnnie's car shows single drive sprocket and simple V-belt brake. The comparatively heavy 1" axle runs in

pillow blocks bolted below the frame sides. The motor base is a light steel plate turned up at the rear and welded to the frame crosspieces.





ALL-METAL FRAME, required by One-Quarter Midget Racing Association rules, can be made of two sizes of electrical conduit. This can be shaped with an electrician's or plumber's bending tool. Use low current to arc-weld it, as it

burns easily. On the right side, the U clip is omitted and rear piece of angle set forward for bolting on the guard rail. Put the steering shaft through its bearings to align them when these are being welded on.

way to organize clubs at Riverside and San Bernardino. Chances are that the sport will jump state lines soon.

Cars are clutchless. The cars are just about as simple as they can get. There is no clutch or transmission; the engines are started by pushing, or by getting them to the compression stroke, raising the rear end, and dropping the wheels to the ground. Cars are stopped by cutting the ignition and applying a hand brake.

The usual drive is by V belt to a jackshaft (if the engine hasn't a built-in reduction gear) and by sprockets and a drive chain from the jackshaft to the rear axle. The problem of a differential is neatly solved by not having any. Only the right-hand wheel is driven.

When a driver steps on the gas, the car accelerates. When he throttles back, engine compression acts through the fairly high gear ratio (at least 8 to 1 by association rules) to haul the car up sharply.

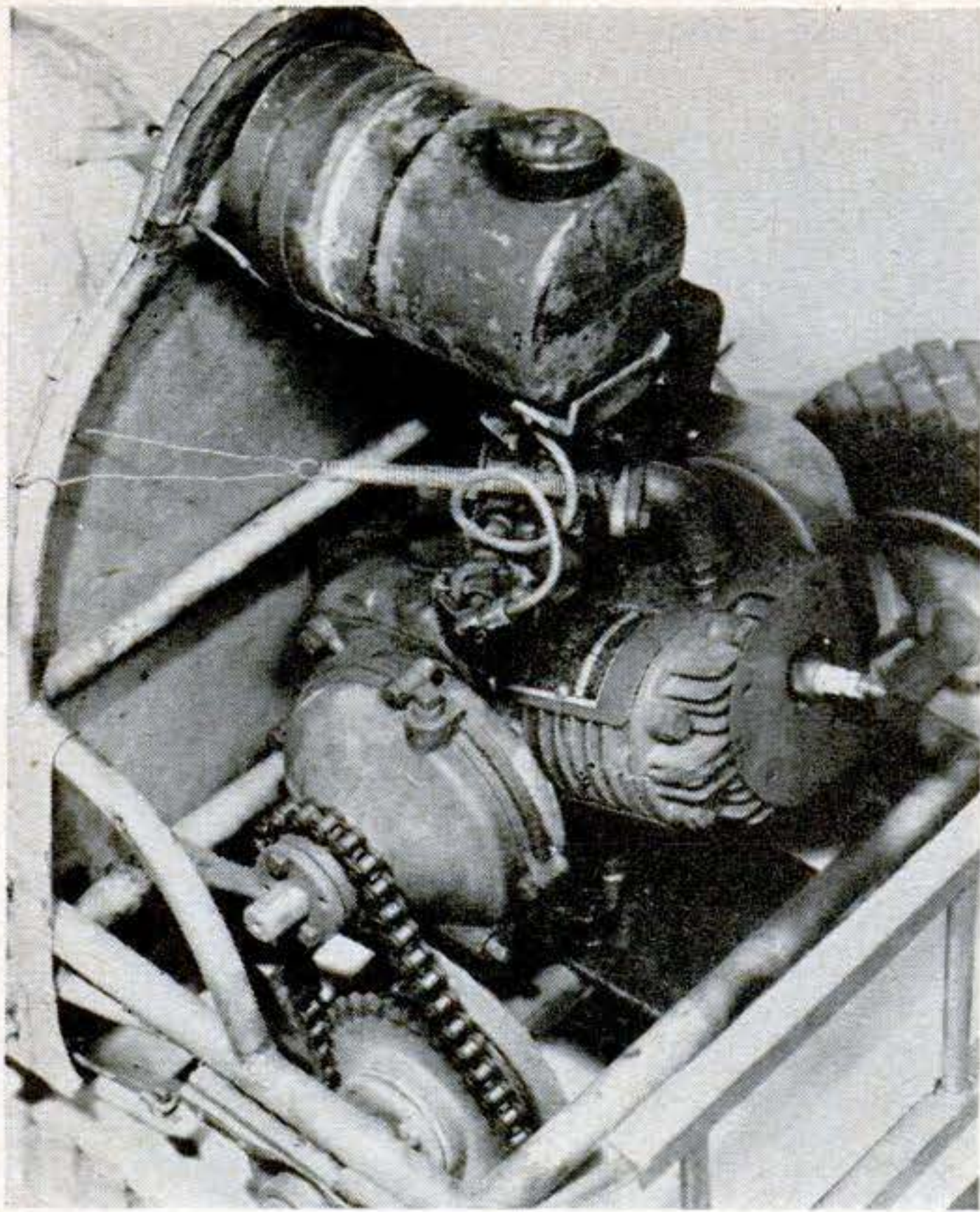
Steering is direct and hair-trigger

sharp, from a lever on the steering shaft to the wheel knuckle (watch that curve, kid!). Maximum wheelbase under association rules is 50", minimum tread 28", and greatest ground clearance 2½".

This adds up to putting the driver (and center of gravity) so low that none of the little cars has ever turned over. Front and rear bumpers plus knerfing bars (guard rails) at the sides prevent wheels from locking.

Only four-cycle engines are permitted. Although displacement is limited to 7.5 cu. in., which would indicate an output of about 2 hp., builders are allowed to remove the governors. This lets engine revs climb to about 6,000 r.p.m. The little mills then develop up to four hp., a right spry amount of power for a car not much bigger than a roller skate and weighing 150 to 300 lb. fully loaded.

Plans for a winner. One of the champs is nine-year-old Johnnie Motte of Nuevo, Calif., who has taken 15 trophies



to date and recently set a new lap record for the local track. His winning car, built by his father, John Motte, is shown in the photos and drawings on these pages.

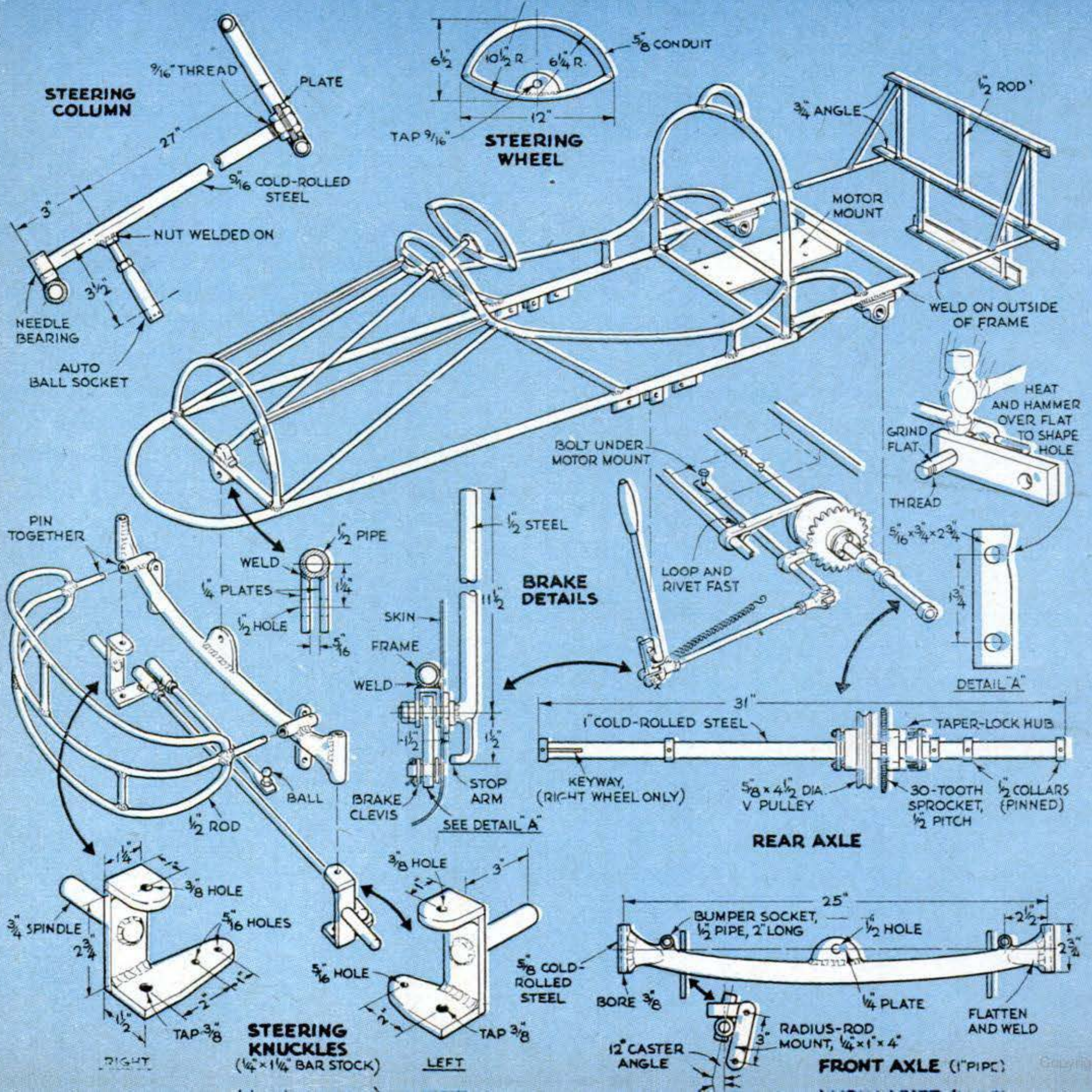
The frame is made of $\frac{5}{8}$ " and $\frac{7}{8}$ " electrical conduit, all joints being welded. Shaping can be done with a standard bending tool. If you haven't welding equipment, it will pay you to take the cut and shaped parts to a welding shop rather than to bolt or rivet the frame.

Two pieces of light angle stock that brace the cowl structure forward also serve as welding points for the body skin.

POWER PLANT in Johnnie's Jet is a Continental engine with built-in reduction gear. An approximately 3:1 chain drive brings the over-all ratio to the required 8:1 minimum. Removing governor increases engine revs, almost doubling power. Gas tank is mounted in a special cradle welded to back of fire wall.

FRAME IS WELL BRACED in front and back of the cockpit, virtually one piece because all joints are welded. Brake handle, which is

mounted after body is on, goes through forward hole in guardrail. The rear bumper is welded on, front one pinned in its sockets.



The foremost cross member is $\frac{1}{2}$ " pipe, and has two steel plates welded to it for the front-axle pivot. Short pieces of $\frac{3}{4}$ " angle are welded midway of the frame for attaching the radius rods and guard rails. On the left side, a U-shaped bearing supports the brake lever.

Autos supply fittings. The back of the frame is stepped upward about an inch, and the motor base dropped from it about the same amount. Welded to the forward and dash cross members are $\frac{9}{16}$ " needle bearings salvaged from automobile universal joints. The upper one has its cap cut off, so that the steering shaft (also from a junked car) can run through it.

Other steering parts such as the tie rod, ball-and-socket joints, and clevises can also be taken from old cars. Steering

knuckles are built up by welding pieces of $\frac{1}{4}$ "-by- $1\frac{1}{4}$ " steel bar together.

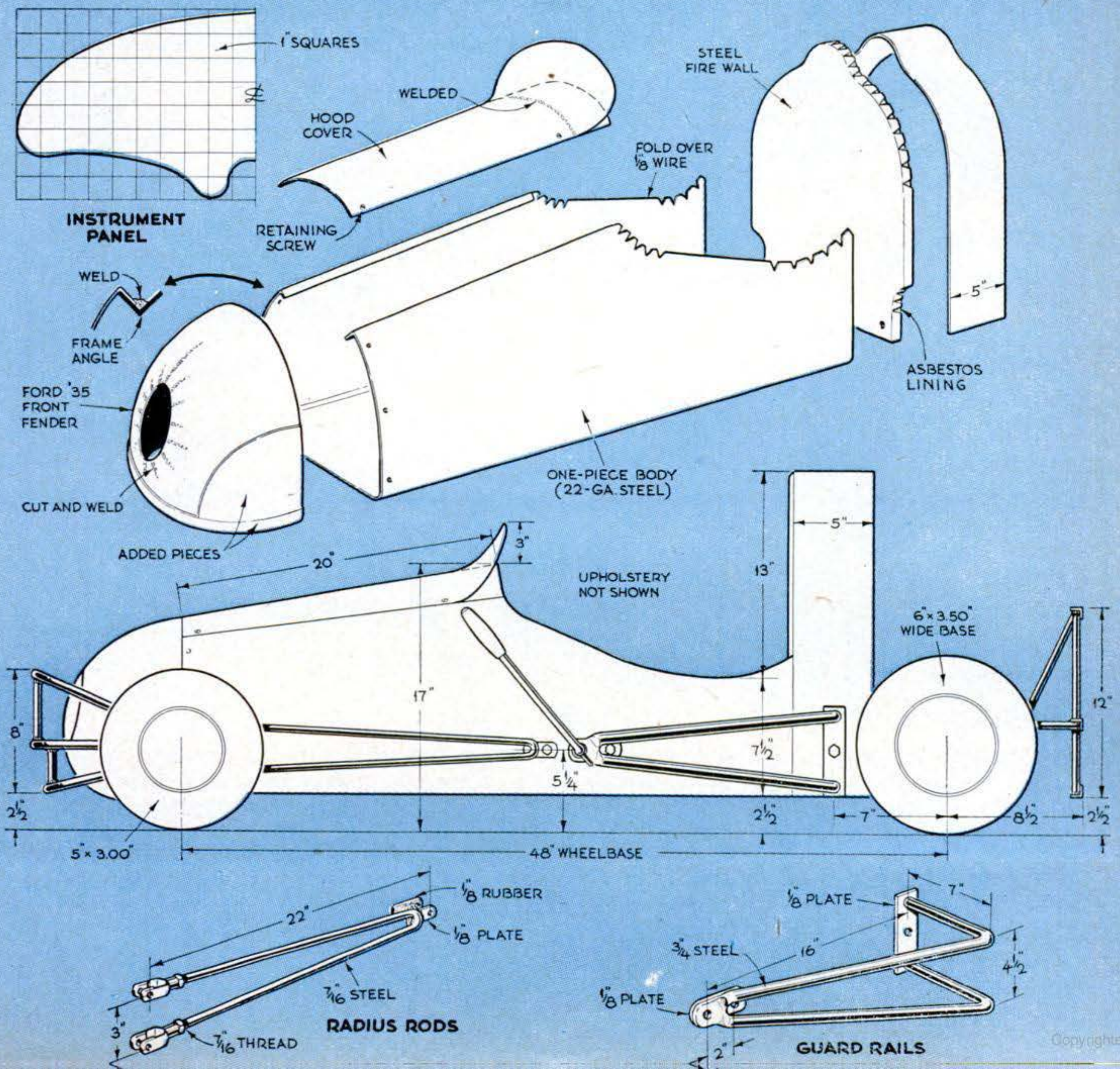
Spindles are made of $\frac{3}{4}$ " shafting. Shoulder each one down slightly $\frac{5}{16}$ " from one end. Drive it into a close-fitting hole in the knuckle, peen over, and weld from both sides.

Front axle is dropped. Bend the 1"-pipe axle so that a straight line would pass through the pivot hole and the center of each kingpin socket, as shown in the drawing. Hammer the ends of the axle flat before welding the sockets on. These should have a 12° rearward slant to provide front-wheel caster.

Pillow blocks are bolted to $\frac{1}{4}$ " steel plates welded under the frame members. They can be ball bearing or plain; some builders prefer babbit bearings because they are less easily damaged by track

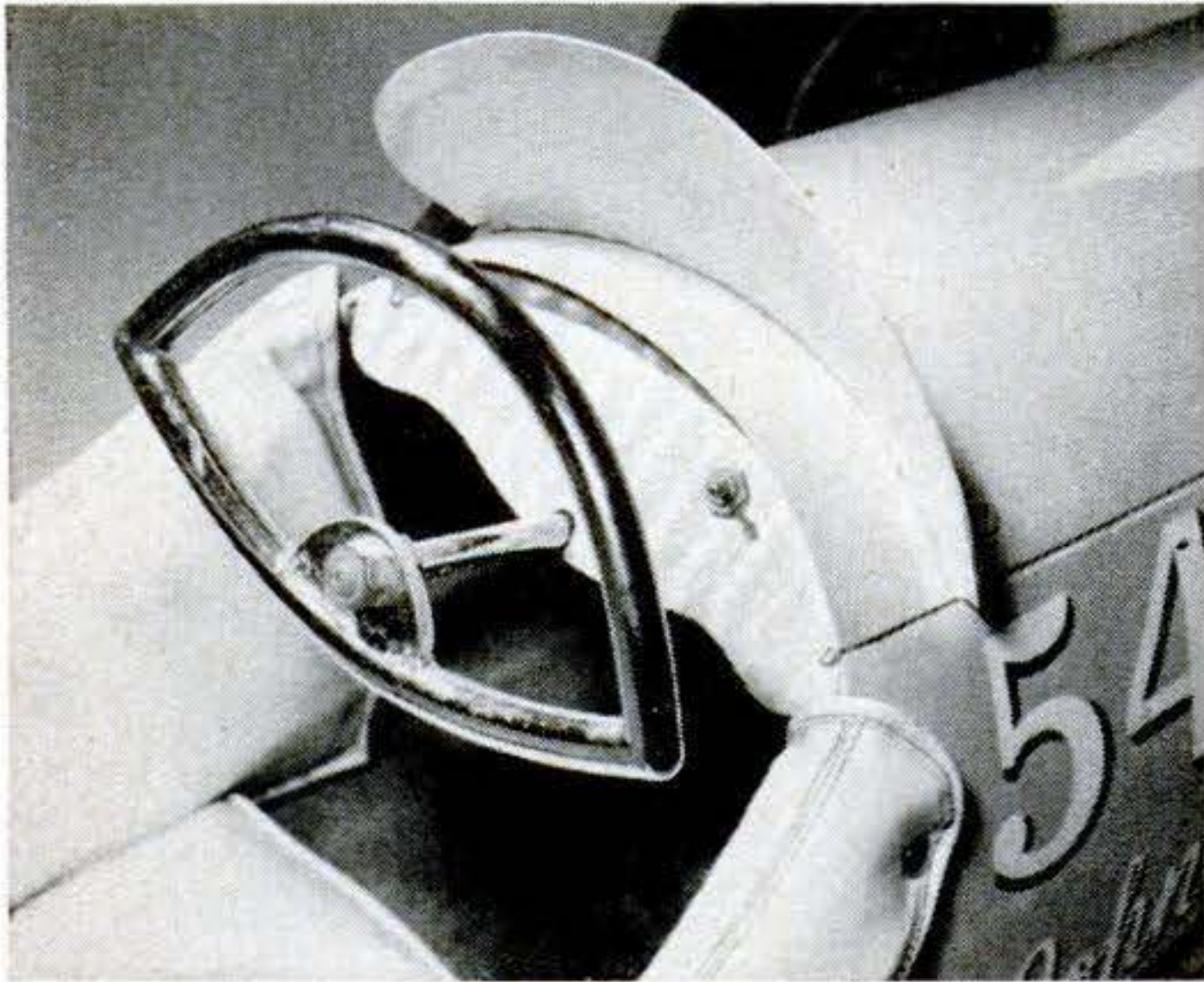
BODY IS IN FOUR PARTS, the largest a single sheet bent up to form the sides. Nose was made from an old fender end by cutting, rewelding

and adding pieces. Asbestos behind fire wall shields driver from engine. Edges are notched for bending over along curves.



grit. Make the axle of 1" shafting—lighter axles have been known to bend from rounding curves at high speed.

The keyway is needed on the right-hand end of the axle only. The other wheel may be bushed or provided with ball or roller bearings to turn on the axle.



STEERING WHEEL of Johnnie's car was made by welding conduit to a steel plate. This can be tapped to screw onto the steering shaft, and locked with a nut on each side. Crescent shape is practical because the wheel is moved only a fraction of a turn. Note padding on the cockpit edges, ignition switch on the dash.

Both wheels should be retained by collars pinned to the axle, not by setscrews.

The sprocket and the V pulley used as a brake drum must be positively locked on the axle. They can be bought with special hubs as shown. Loosened, these make it easy to align the parts.

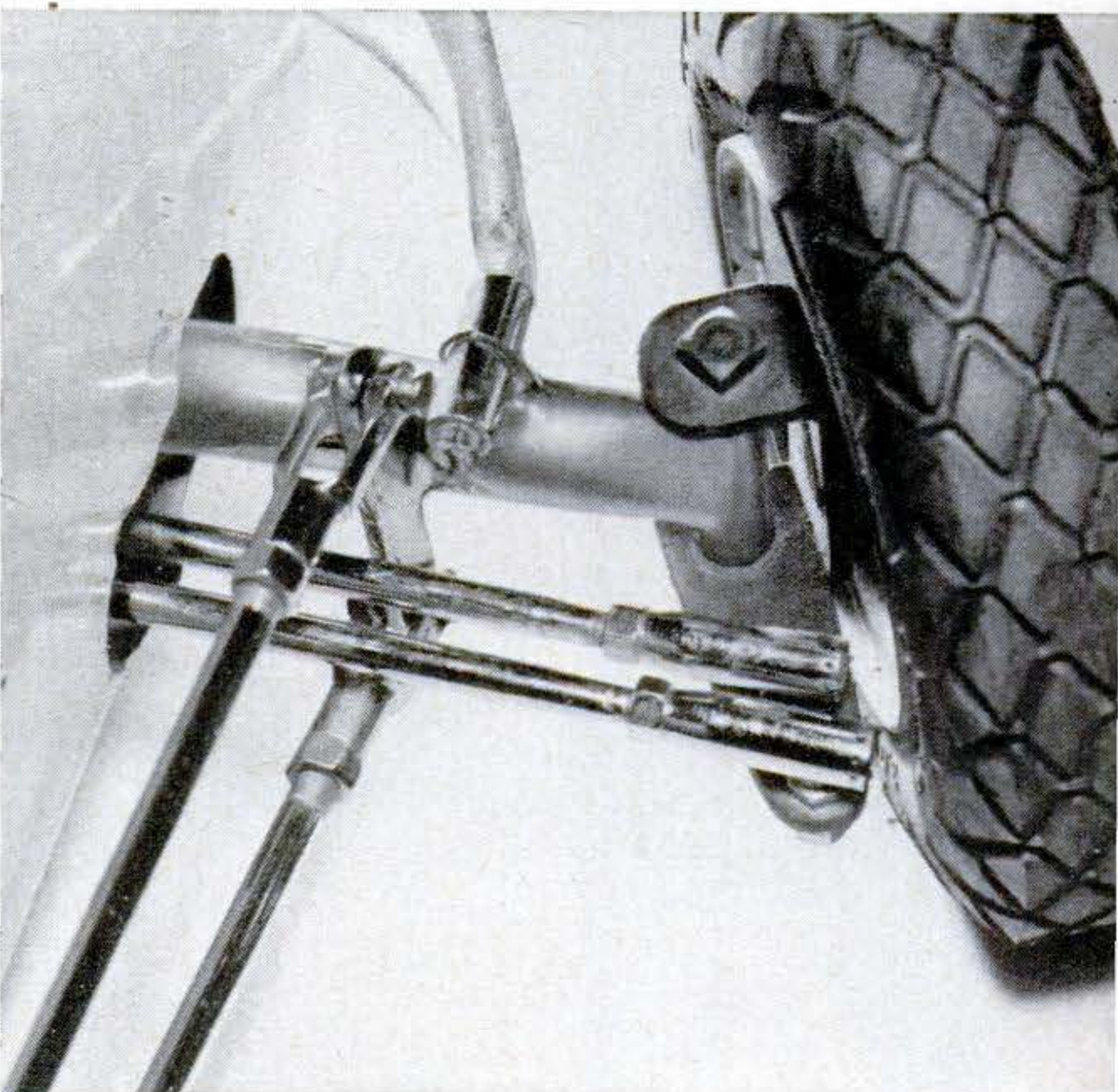
Brake band is a V belt. A piece of V belt, looped and riveted around a frame crosspiece, is similarly fastened to a lever that pivots on a bolt welded below the engine mounting plate. The other end of the lever is connected by a clevis and rod to the brake handle.

Motte used an ingenious dodge to assemble this without welding, for it had to be installed after the body was on. The short leg of the lever was ground flat, and the drilled clevis lever heated red hot and hammered over it to form a half-moon hole. A short stop arm keeps the brake handle from falling forward.

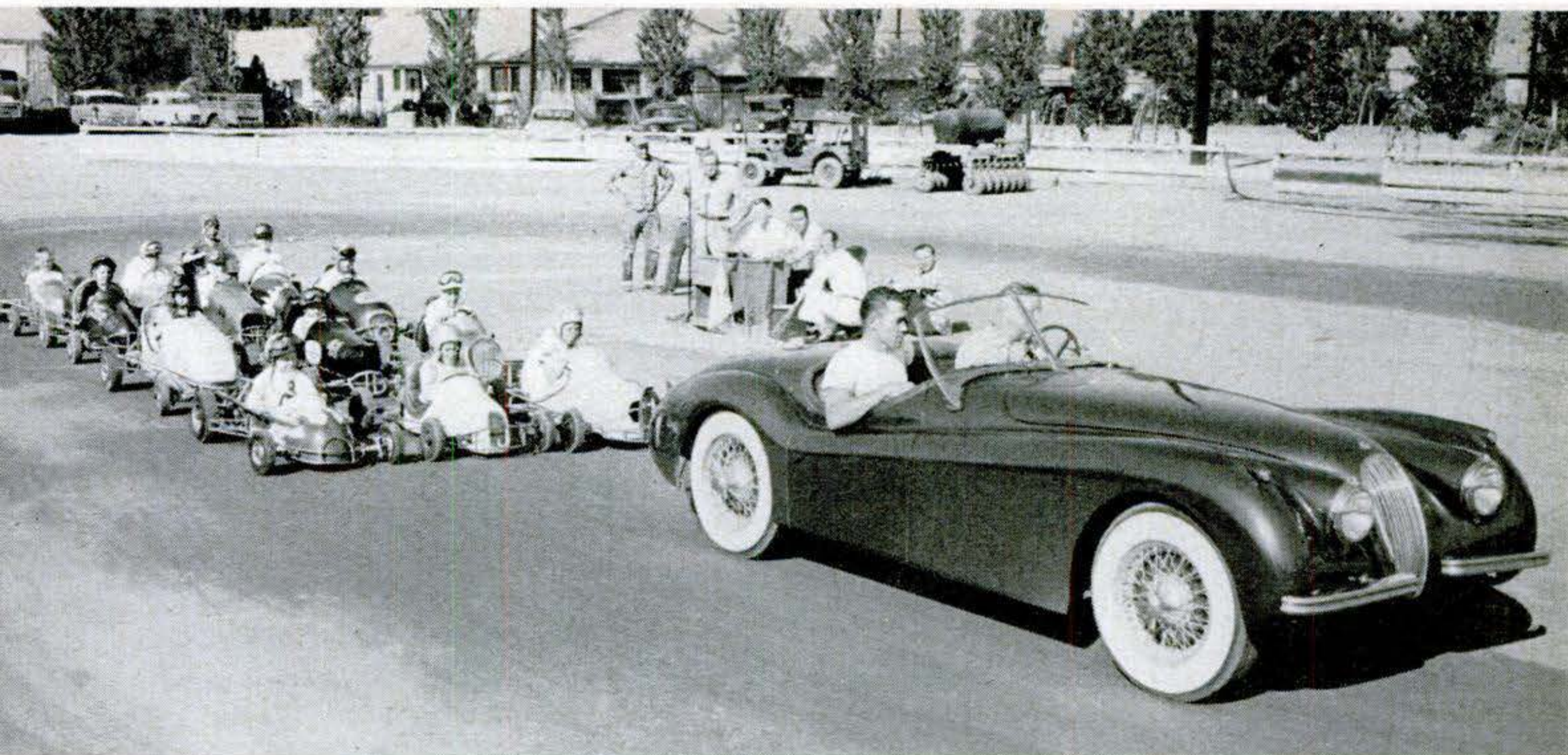
Shaping the body. Motte used a single sheet of 22-gauge sheet steel shaped to a U section for the main part of the body, the lower bends being



UNDER-THE-HOOD VIEW shows the bottom of the steering shaft in its needle bearing. This is welded directly above the semicircular plates in which the axle pivots. The steering lever screws into a nut welded to the shaft. The throttle (at lower right) is hinged directly to the sheet-metal floor of the body.



RIGHT FRONT END shows sturdy steering action. The front axle is free to tilt on its center pin. The radius rods, attached through auto clevises to the two ends of uprights welded to the axle, pivot on a single bolt at their rear ends. Tie rod and link have ball-and-socket joints from junked cars.



ROLLER-SKATE INDIANAPOLIS. A pilot car leads the pack for a lap, then pulls off to let the midgets fight it out. Being unlicensed, the

racers are hauled to the track on trailers. With Hi Sibley (driving big car) is James Ishmael, president of the association.

rounded. The straight top edges are turned into the angle struts and welded.

The hood cover is another piece shaped to a shallow curve, with the upswept cowl made separately and welded on. It can be attached with aircraft cowl retainers (Zues screws) or with ordinary bolts.

Toughest shaping job is the nose. Motte made it from part of a 1935 Ford front fender. Radial cuts in the front were rewelded to form the sharp radius there. You might find a large headlight shell or other part that can be adapted.

The radius rods and the guard rails

must be attached after the body is fitted. Both are made by welding pieces of plate to steel rods. Thread the radius rods for auto clevises so that they can be adjusted to maintain kingpin caster.

The throttle is a plate welded to a large hinge, which is bolted to the bottom skin. From it a woven-wire cable runs over two small pulleys to the carburetor. A spring shuts the throttle when foot pressure is released.

If the engine to be installed does not have a built-in reduction unit, you will need a jackshaft to bring the over-all engine-to-axle ratio to at least 8 to 1. END

.....

Official Specifications for Building One-Quarter Midget Racers

WHEELBASE: 50" maximum, center to center

TREAD: 28" minimum, 30" maximum, center to center

GROUND CLEARANCE: 2½" maximum to bottom of body

HEIGHT: 26" maximum

WHEEL DIAMETER: 12" maximum, 8" minimum

DRIVE RATIO: Minimum 8 to 1 over-all

STEERING: Direct

FRAME: All-metal construction

FIRE WALL: All-metal, between driver and motor

ENGINE: Four-cycle only, 7.5 cu. in. maximum displacement (not to be increased)

SWITCH: Off-on ignition switch

BRAKE: One-wheel brake

DRIVE GUARDS: Covers on all chains and sprockets exposed to drivers or handlers

CRASH GUARDS, BUMPERS: Guard rails at rear wheels; bumpers front and rear. Rear bumper strong enough to permit use of push car, with top bar 8½" minimum from ground, bottom bar maximum 2½" from ground

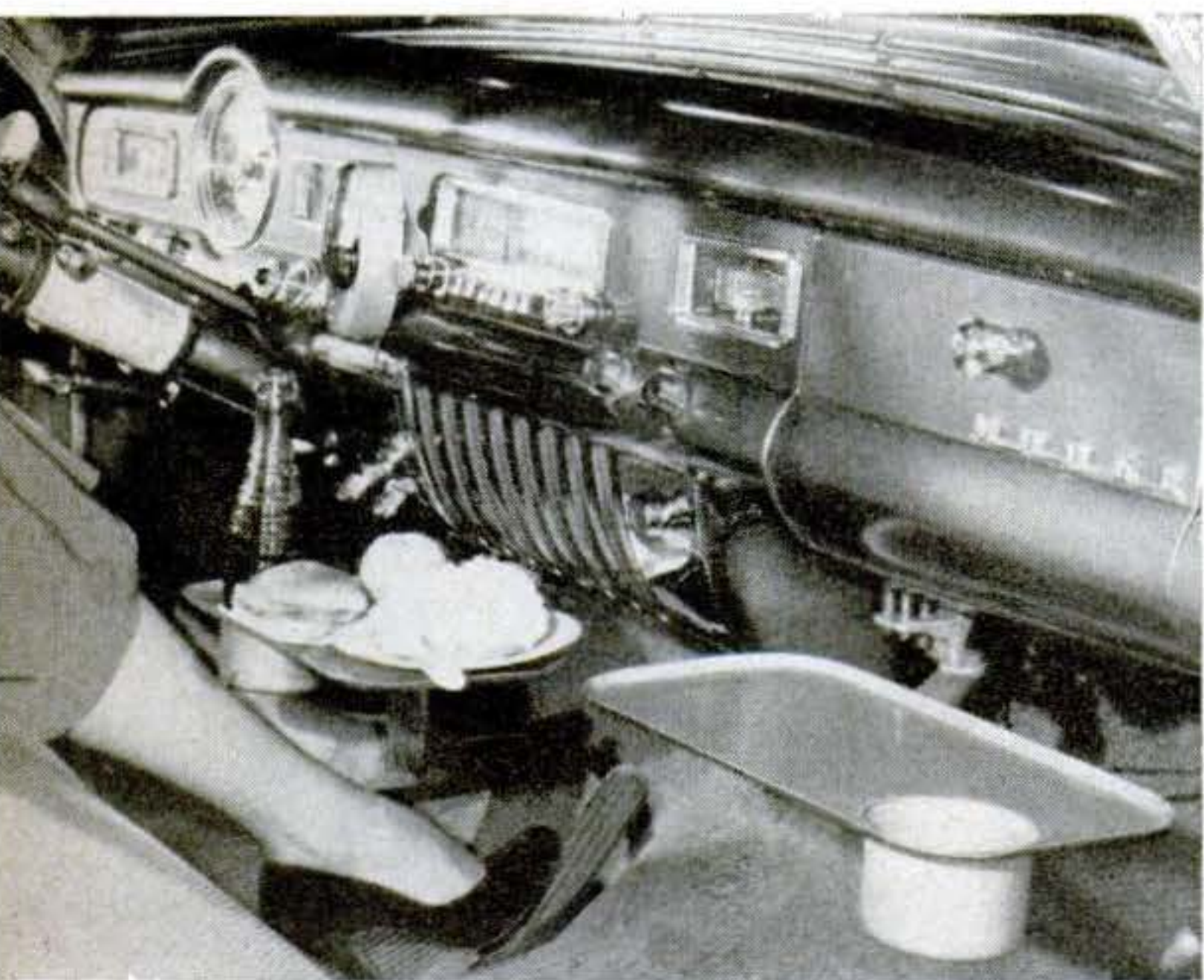
DRIVER'S EQUIPMENT: Driver must wear a safety belt, an approved helmet, and unbreakable goggles with no metal frames

For additional information, write Racing Chairman, One-Quarter Midget Racing Association, Hemet, Calif.

1. Clip-on Cables Boost Battery. Better than a push, especially if you have automatic transmission, a pair of clip-on cables will give a dead battery a boost from another car. Plier-type spring clips at the ends of each jumper make firm contact with the battery terminals for transfer of an emergency charge sufficient for getting the car started. The handles are insulated to prevent shock.



New for Your Car



2. Dash Tray Serves Snacks. A tray that clamps to the instrument panel and swings from under it simplifies lunch on the road. This one has a depressed cup to steady a pop bottle. Available for rear-seat passengers is a similar tray with a lip held between door and window glass.

Further information on these new car products can be obtained from: 1. Mueller Electric Co., 1600M E. 31 St., Cleveland 14; 2. Autotray Co., Inc., 3901 E. 26 St., Indianapolis 18; 3. Rockford Engineered Products Co., 2324 23 Ave., Rockford, Ill.; 4. Caltex Co., 4215 Troost Ave., North Hollywood, Calif.



3. Sun Visor Holds Road Map. Replacing either the left or right sun visor, this map case carries its maps on rollers that turn to the section of the country you are traveling in. It comes with a map of the United States on five north-south strips which are loaded like film in a camera. One of two models is self-lighted without glare.

4. Plastic Cloth Polishes Car. Chamois simulated from plastic now comes in a size marketed as a car polisher. According to the maker, it will outshine real chamois. It's washable when soiled.





1. Scaffold in Kit. Five working assemblies are possible with six 6' tubular-steel frames that come in kit form. You can make a 6' box-type scaffold, a 6' or 12' leaning scaffold, three 12' ladders, or a 4' worktable support by turning the box scaffolding on its side. Included are wall brackets and nonslip rubber feet. The design is for one-man assembly.

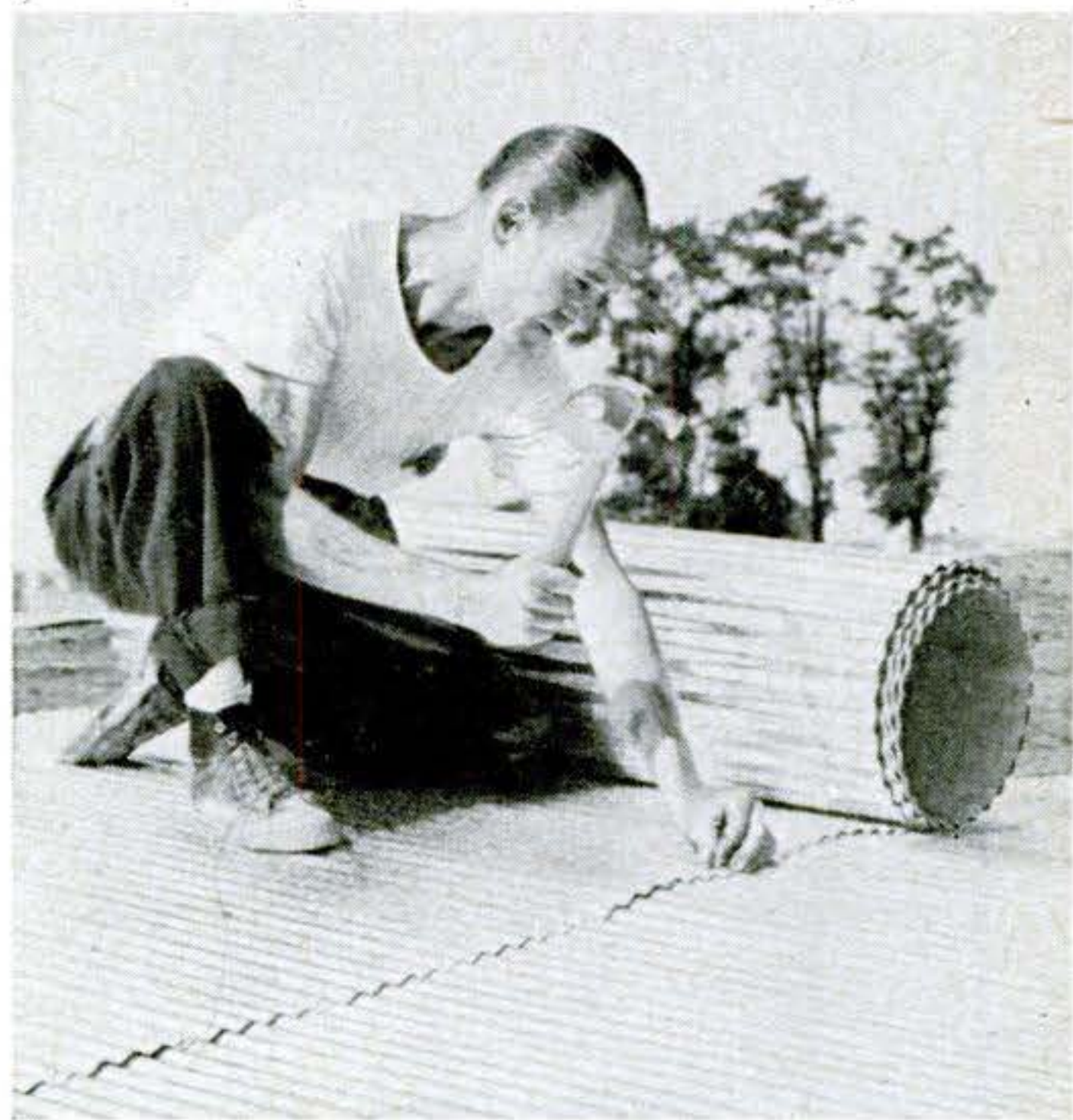


2. One-Coat Finish for Wrought Iron. Containing its own rust-inhibitor, a new outdoor metal finish saves you time by brushing on with one quick-drying coat. Available in quarts, pints and half pints, it comes in six pastel decorator colors plus black, white and aluminum.

3. Control Springs Repair Sash. If you'd like to remedy a broken sash cord without taking out the window, control springs can do the trick. They are also useful in stopping window rattle. The controls, in 1¼" regular or 1" width, are pushed up between sash and jamb where they are anchored by embedded prongs.



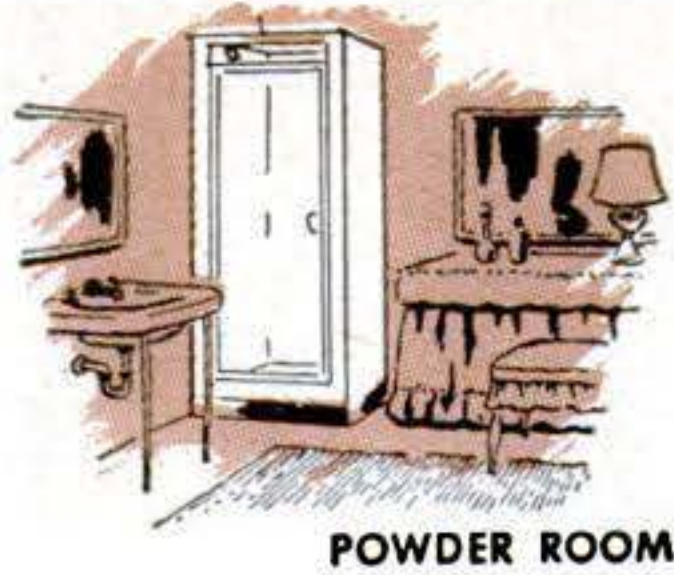
New for Your House



4. Aluminum Roofing Rolls On. You just roll out this corrugated-aluminum roofing and nail it directly to the rafters. Since it runs crosswise, it needs no sheathing for support, and it comes in long rolls so you don't have to make any end joints.

Further information on the products shown on this page can be obtained from: 1. Sajway Steel Products, Inc., 6234 W. State St., Milwaukee 13; 2. George Koch Sons, Inc., 2100 W. Ohio St., Evansville, Ind.; 3. Ideal Brass Works, Inc., 252 E. 5th St., St. Paul, Minn.; 4. Quaker State Metals Co., P.O. Box 1167, Lancaster, Pa.

Need an Extra Shower? Try a Prefab



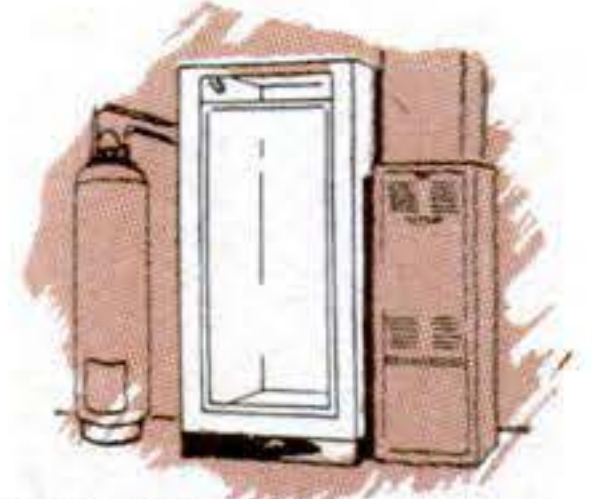
POWDER ROOM



BASEMENT



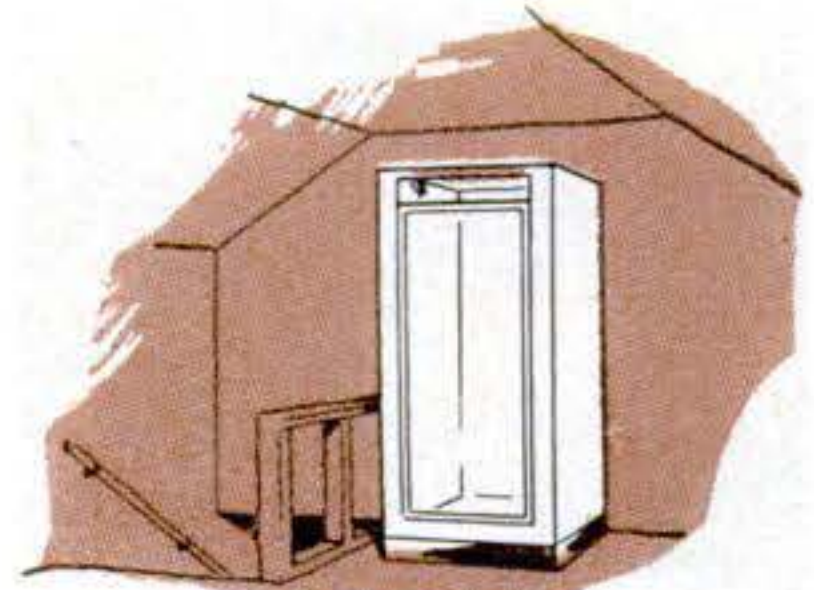
BACK PORCH



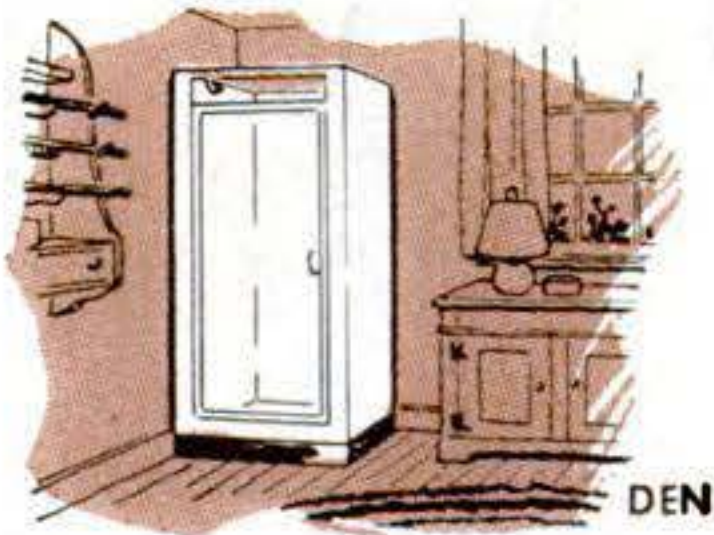
UTILITY ROOM



CLOTHES CLOSET



ATTIC



DEN

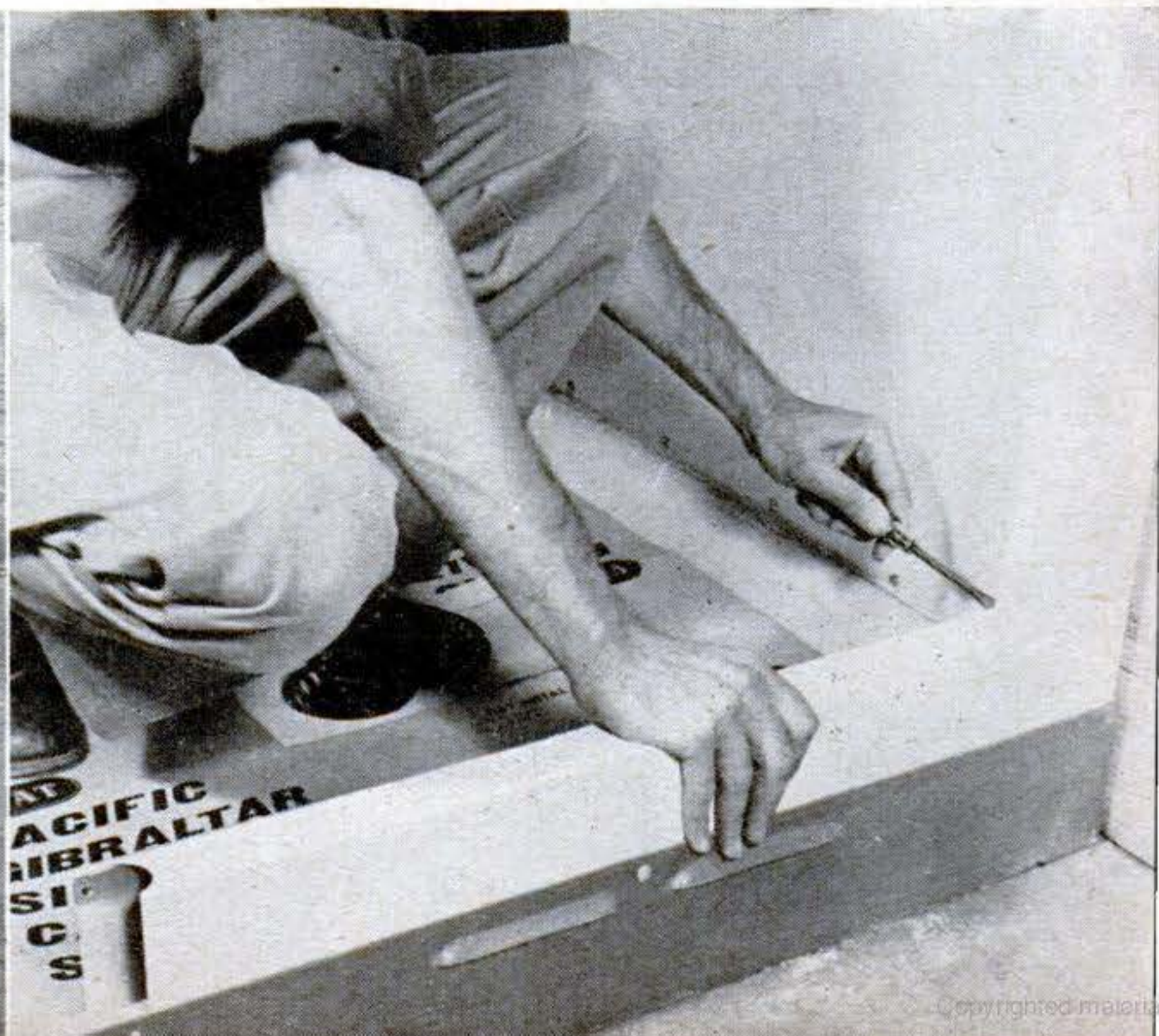
By Jerry Parker

Kiss those morning traffic jams in your bathroom good-by, with a shower you can put anywhere.

1 **FIXTURE PANEL**, with cutouts to take plumbing, goes up after the receptor unit is set in place and leveled. Screw on at either side. Some models require caulking of joint.

I **INSTALLED** a prefab shower after supper the other evening and used it before I went to bed. You've heard how some jobs are a lead-pipe cinch? Well, this was a bedroom-slipper snap.

2 **THRESHOLD COMES NEXT**, also screwed in place to receptor and first side. Then attach other side wall. Keep protective paper on the base until you've finished the job.





Prefab corner models with glass doors, as well as box designs, come in almost any color.

I wore slippers not only because it was easy, relaxed work, but also to protect the receptor, or floor, of my cabinet shower.

You're probably wondering how I hooked up the water connections and the

drain so fast. I didn't. The connections had already been roughed in according to the exact measurements supplied with the shower manufacturer's instruction sheet. (For do-it-yourself home-plumbing

3 INTERLOCKING BACK WALL is whacked into tight fit, working from bottom up. For a block I used a length of two-by-four wrapped in old toweling held on with rubber bands.

4 TOP FRAME helps hold shower together and gives the unit rigidity. Use your padded block for driving it firmly into place, and then fasten to the sides with screws.





5 FITTINGS INSTALLED, the shower curtain goes up. Fixtures are standard equipment with your prefab shower, include valve handles, soap dish and even a plastic curtain.



6 HAND ME THAT TOWEL, BUB. Only thing not built into my shower was a towel rack. Same night I installed the prefab job, I was able to use it before going to bed.

instructions, see PSM, March '55, p. 221.)

There's a unique thing about our shower—it's not in the bathroom. There was no space there, yet we had to have extra facilities. We put the shower in the dressing room, next to our bedroom. It's in line with the bathroom, so the plumbing wasn't difficult.

People who see our shower for the first time usually do a double-take but consider it a good idea. Most of my wife's friends go away with an I-must-tell-Joe-about-this gleam in their eyes.

Shower can go anywhere. I checked with an architect about our unconventional shower notion. He wasn't surprised. Prefab showers, he said, are installed just about anywhere in the house these days—basement, utility room, back porch, powder room, inside the entrance from a patio or in the recreation room.

"What about the attic?" I asked.

"Why not?" said the architect.

My friend expounded on the convenience of an extra shower in a part of the house other than the bathroom. He had statistics on how it speeded up bathroom traffic.

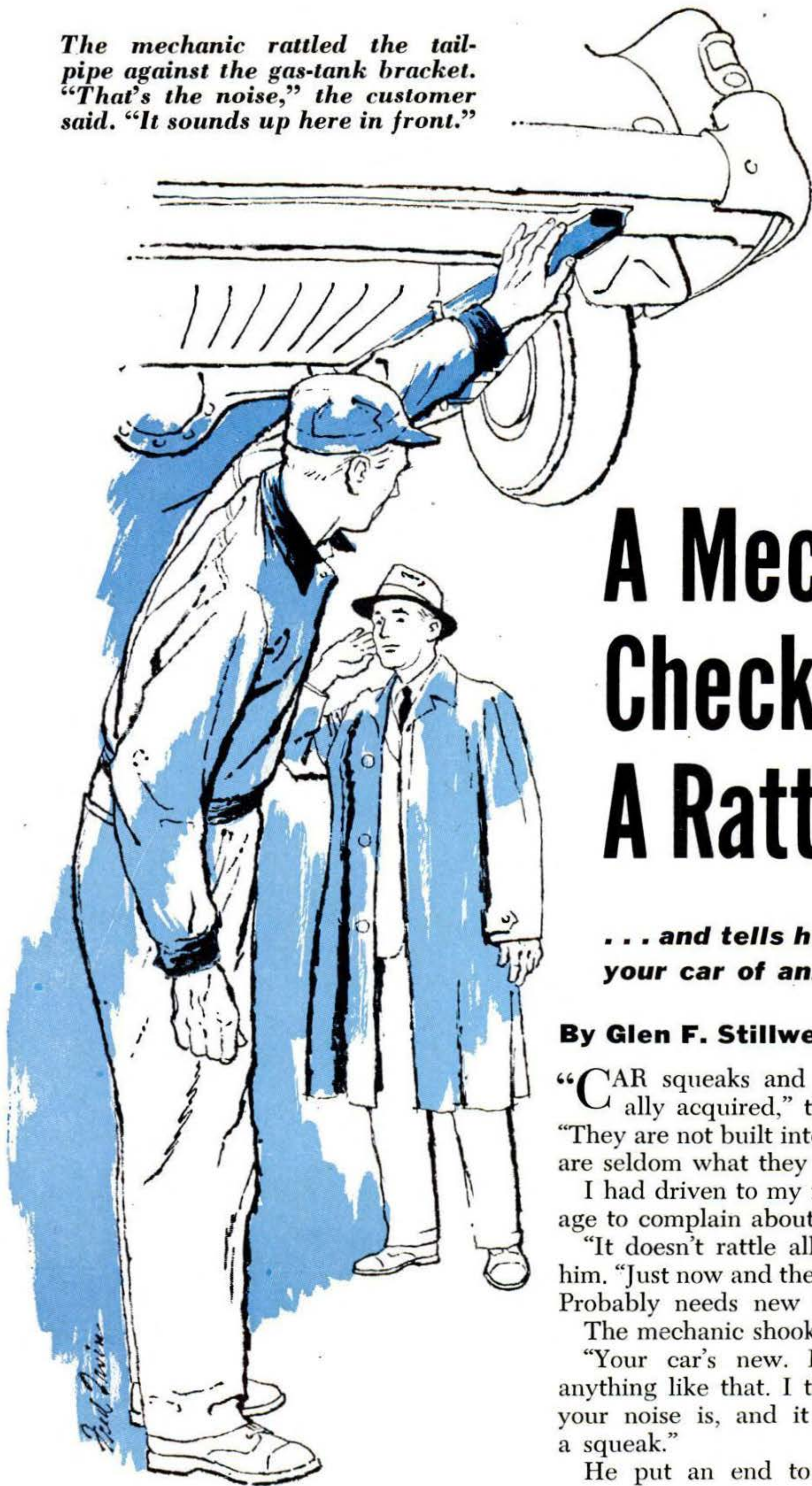
I smiled. "Wonder how I figured it out myself," I said.

Anyone who has mastered a toy construction set can put up a prefab shower. The only tools you need are a level, hammer, screwdriver, calking or putty knife, and a padded block.

The walls of a prefab shower and the receptor just screw together, with calking usually required in a few joints. The showers come neatly packaged with complete instructions for installation.

Designs for every need. Prefab showers range in size from 32" to 40" square and from 75" to 80" in height. You can get them in pastel colors. There are fancy corner models complete with overhead light and glass door. There are models you can build in. Prefab shower walls are made of sheets of porcelain-enameled iron or galvanized-bonderized steel. Receptors are of steel or precast concrete slab with stone or marble chips. You can get data and prices from any dealer in bathroom fixtures. **END**

The mechanic rattled the tailpipe against the gas-tank bracket. "That's the noise," the customer said. "It sounds up here in front."



A Mechanic Checks A Rattletrap

... and tells how you can rid your car of annoying noises.

By Glen F. Stillwell

"CAR squeaks and rattles are generally acquired," the mechanic said. "They are not built into the car, and they are seldom what they seem."

I had driven to my neighborhood garage to complain about a door rattle.

"It doesn't rattle all the time," I told him. "Just now and then when I start out. Probably needs new rubber bumpers."

The mechanic shook his head.

"Your car's new. It shouldn't need anything like that. I think I know what your noise is, and it isn't a rattle—it's a squeak."

He put an end to the "squeak" by

smearing a little glycerin on the rubber door lining.

"What happens," he explained, "is that all doors must have a certain amount of up-and-down motion or they'd be hard to open and close. When the rubber lining is new and dry, this motion makes a rubbing sound like a rattle. It disappears when the rubber wears smooth."

It was a warm spring day and I decided to loaf around the garage a while, an instructive pastime that I indulge in as often as possible.

Another customer had been waiting while I talked to the mechanic. After pulling my car to one side, I strolled over to the hoist where the mechanic already was starting a quick grease job for him.

A front-end rattle. The customer was poking his nose under the front end. "Maybe I can find that rattle," he said. "Guess I'll have to—if anyone does."

"Is it in the front end?" the mechanic asked.

"Sure thing," the customer replied. "Everyone says so—and I've had mechanics clear across the country try to find it."

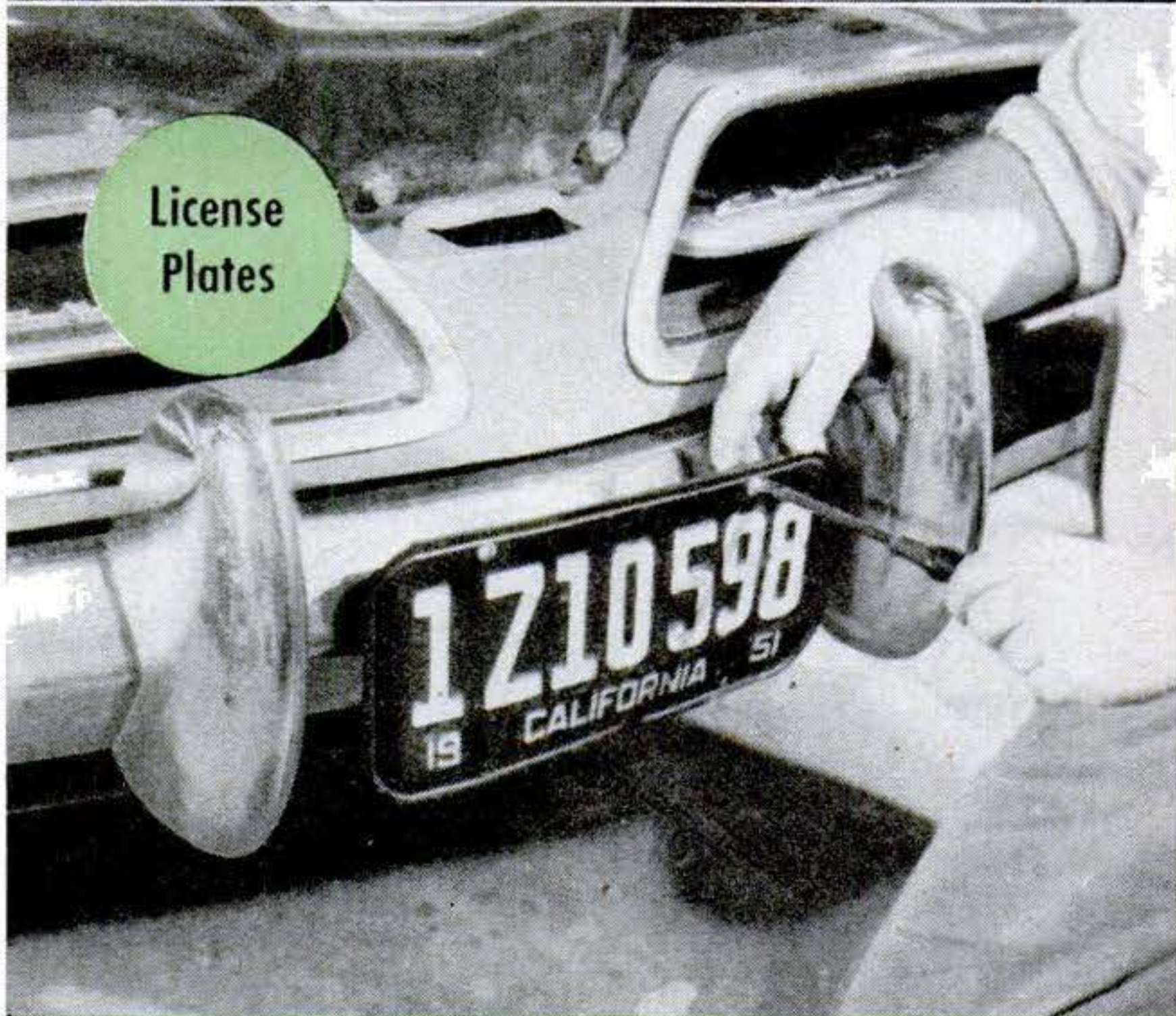
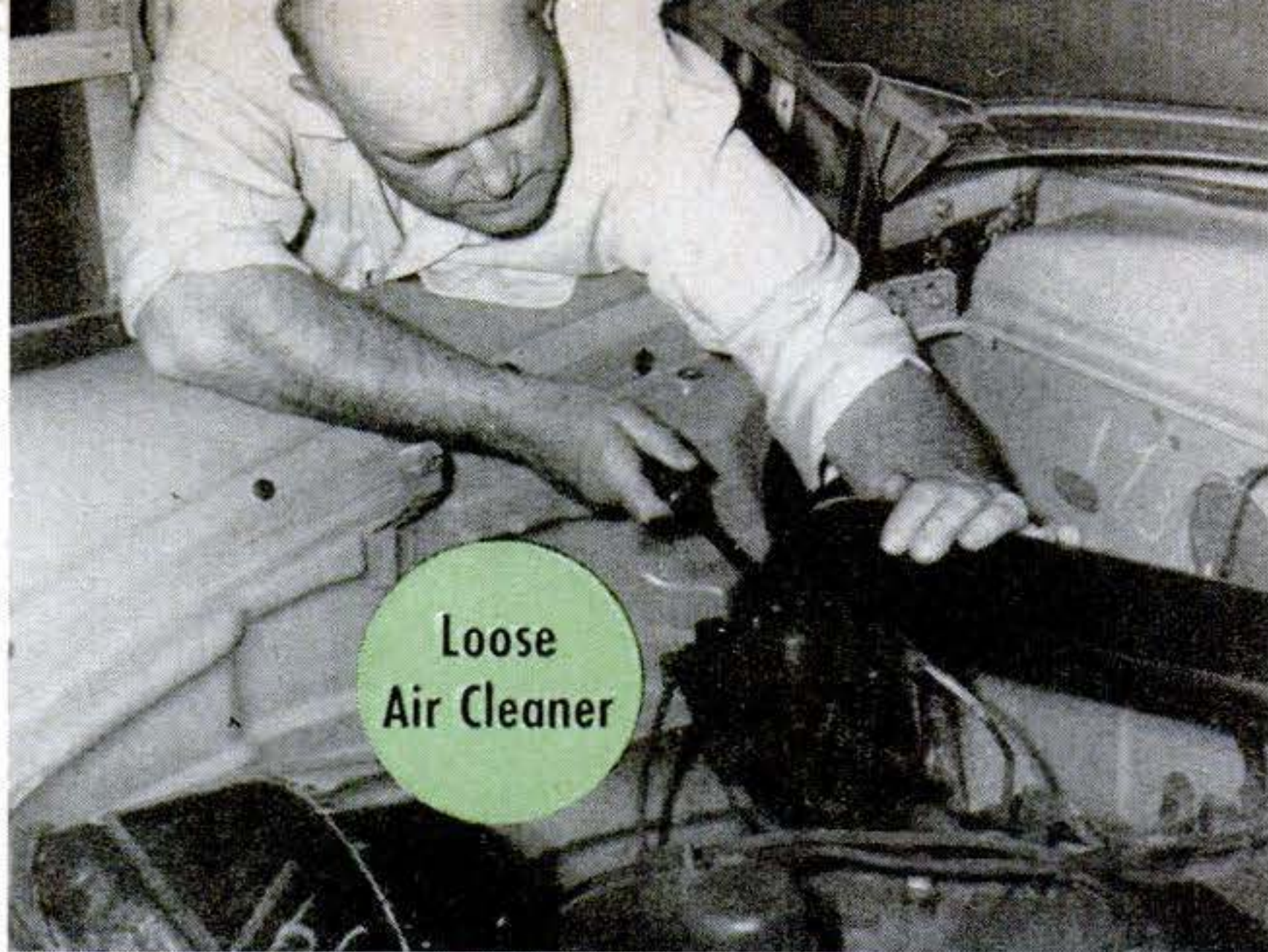
The mechanic, working at the rear of the car, suddenly put down his grease gun and I saw him looking closely at something. Then he glanced at the customer, still poking around the front end.

Sounds are telegraphed. Reaching up, the mechanic rattled the tailpipe against the gas-tank bracket. "That's the noise," the customer said. "It sounds as if it's up here in front."

"Afraid not," the mechanic said mildly. "It's here—this tailpipe is loose. Guess you and everyone else forgot just one little fact. Most car sounds are hard to locate because they telegraph from one area to another."

To me, this seemed a fine thing to know. So I followed the mechanic around for the next hour or so. Here are some things he told me:

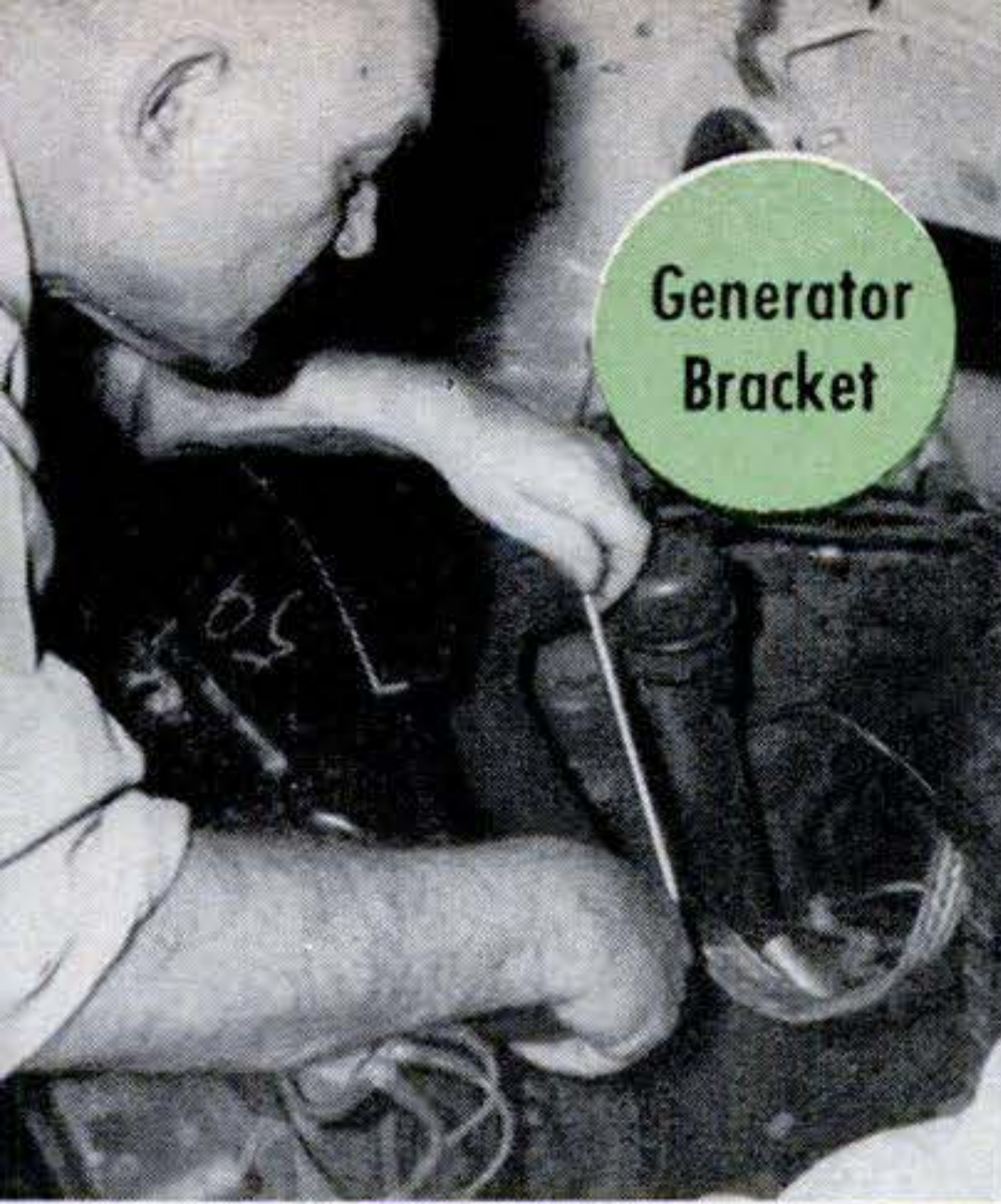
- Don't think a rattle or squeak isn't dangerous just because you've gotten used to it. If the noise comes from worn steering parts, for example, neglecting it may be inviting an accident.



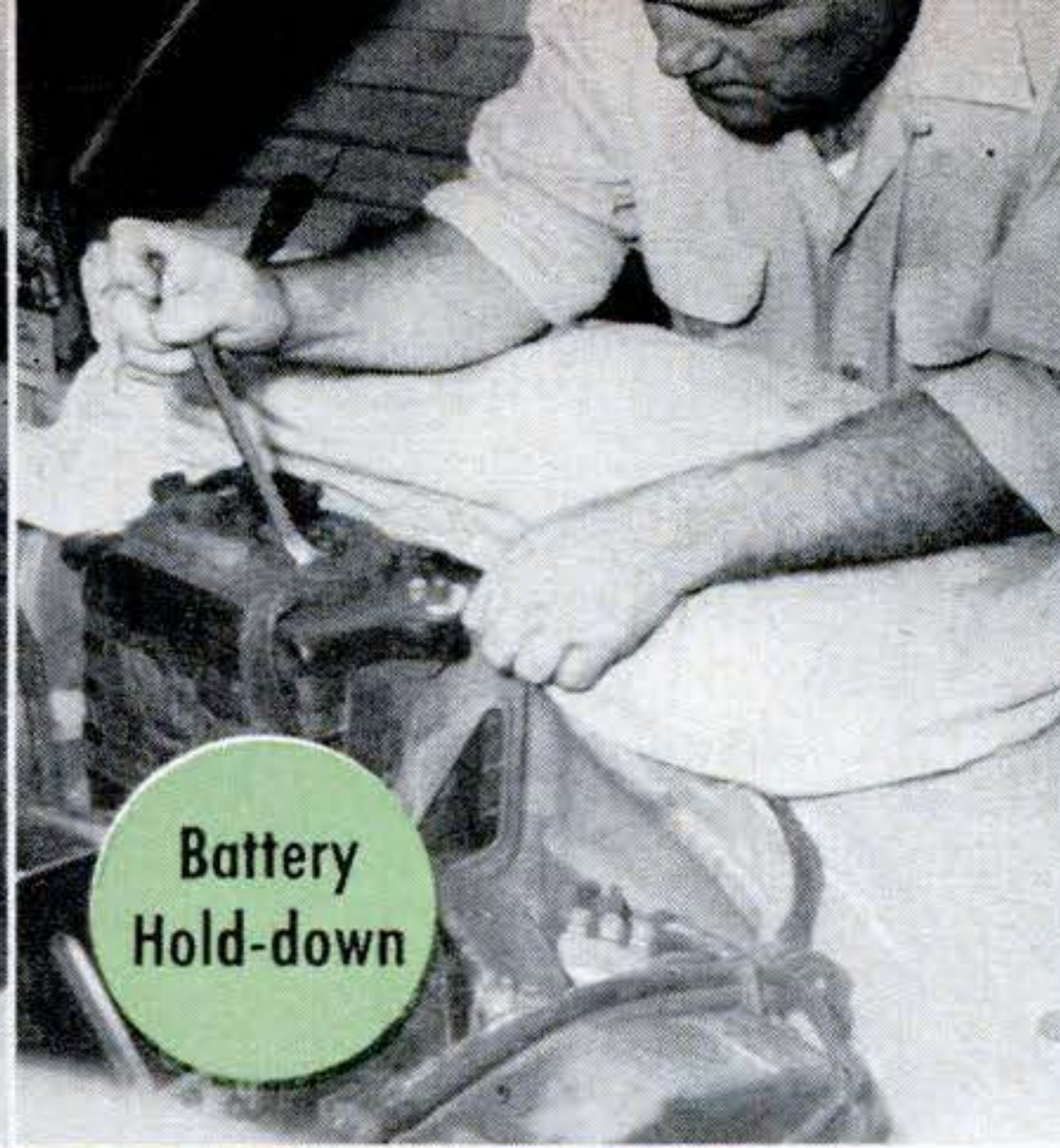
8 Places to Look

- Unusual noises in your car should not be disregarded. It is not difficult for anyone to determine that a remote-sounding, metallic knock heard at evenly spaced intervals originates in the power plant or driven units. If such a noise is heard, the water and oil should be checked immediately. If your water and oil are okay or the noise persists after filling, the car should be headed for the nearest garage.
- Even if you have no squeaks and rattles, it will pay you to check thoroughly at regular intervals for any looseness or undue wear.

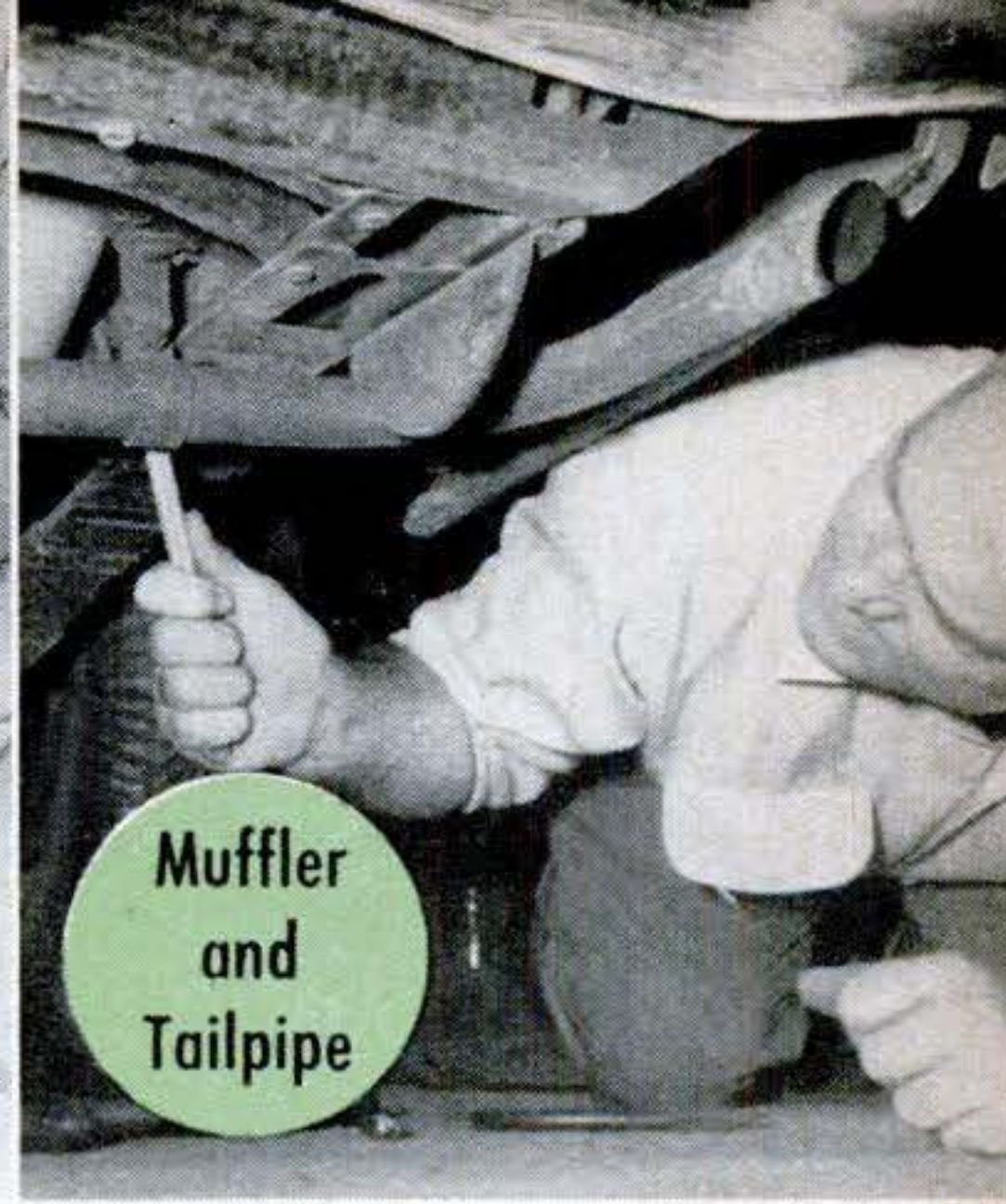
Body noises. These are frequent and usually easy to locate. Thumping noises and rattles often originate in doors and window-lift mechanisms. Check for loose



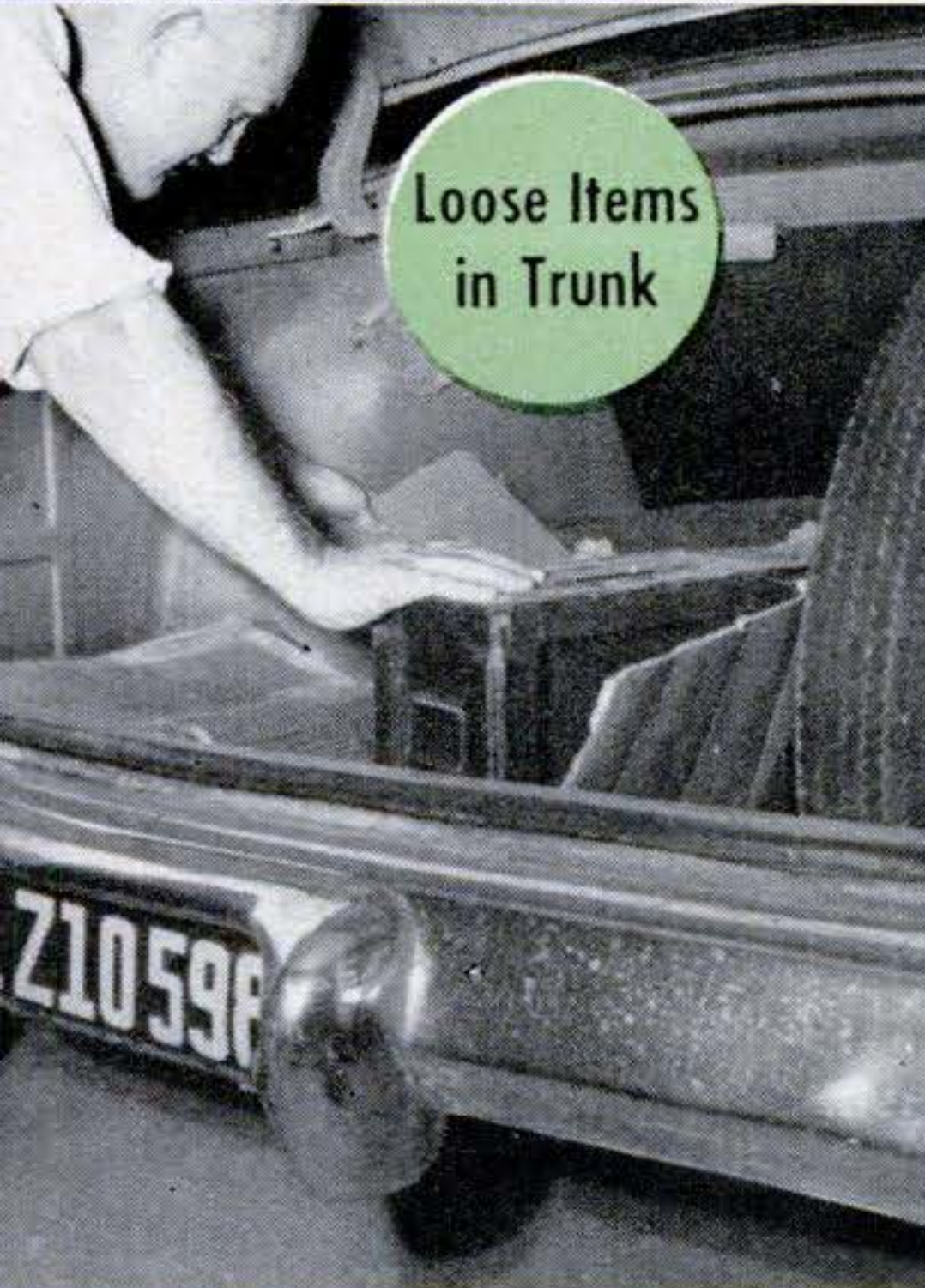
Generator Bracket



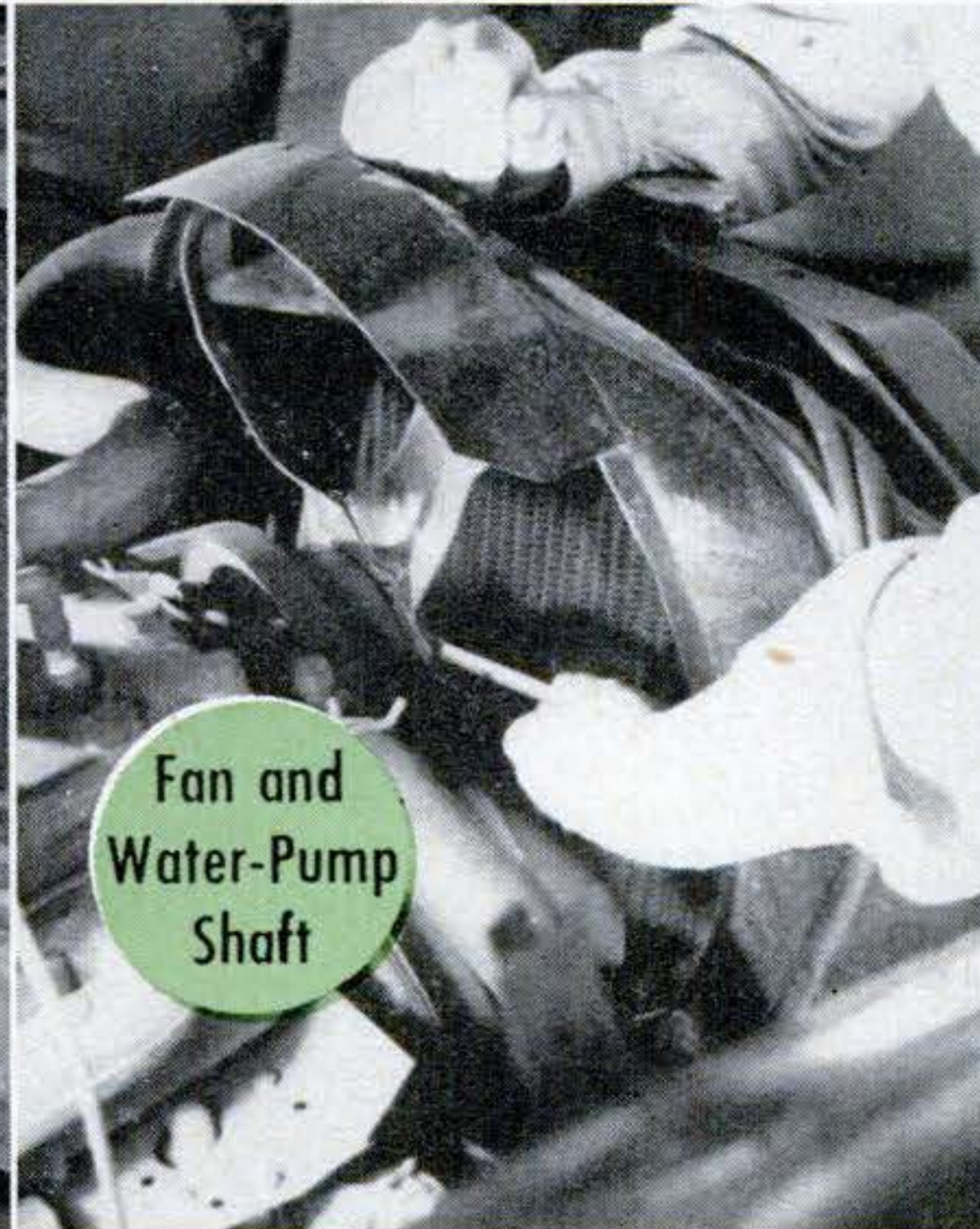
Battery Hold-down



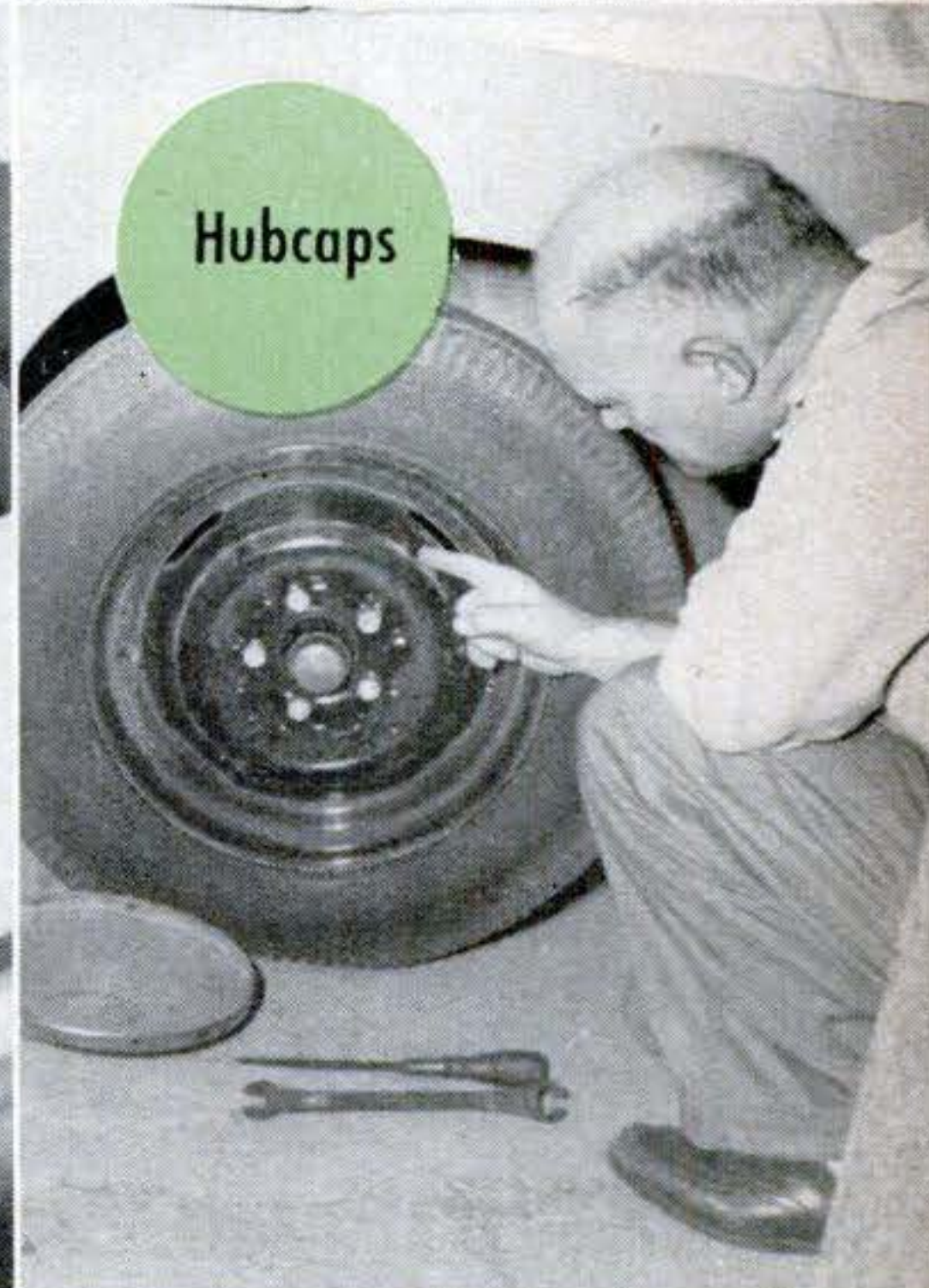
Muffler and Tailpipe



Loose Items in Trunk



Fan and Water-Pump Shaft



Hubcaps

for Disturbing Car Noises

hinges and missing door bumpers. If jingling noises are noticed, check the glove-compartment lid and ash trays. Or there may be a loose wrench or forgotten metal object under one of the seats. If the noise sounds more remote, search the luggage compartment, giving special attention to the spare-tire mounting bracket and any loose equipment that may be rattling around.

Engine noises. Raise the hood and begin at the front to check engine accessories for rattles or unusual noise. Test the blades of the fan and then the belt. A V belt should not be too tight, or excessive wear will result. But a belt that is too loose will cause a squeak or rattle when the engine is accelerated rapidly.

Engine dustpans, heater connections, pump and distributor shafts and air-cleaner components are frequent sources of strange noises.

Check pulleys, all mounting brackets, the throttle linkage, engine-mounting bolts and the gear-shifting mechanism for undue looseness. A check of this kind on one car disclosed that all the cap screws holding the fuel pump to the engine block were loose and one was missing. A few more miles without attention would have resulted in a stalled engine and perhaps a tow and costly repairs. Be sure to tighten the vacuum-pump housing and carburetor-flange cap screws to avoid starting difficulties and road trouble. Check bolts and brackets on the

ALMANAC FOR MOTORISTS

Pithy proverbs, provident counsel and omens and portents of interest to horseless-carriage operators.



►► **These are the days** when plenty of unhappy cars, caught in heavy traffic with easy-boiling antifreeze, give excellent imitations of Yellowstone's Old Faithful. Moral: cooling systems will really thrive on just a *little* attention.

►► **Now that the weather** is growing more amiable, you might check the throttle arm on your carburetor to see if there is an adjustable acceleration-pump link. If so, put it in the warm-weather position. The old boat will be a bit perkier.

►► **W h e e l i n g**

along at 60 some fine spring morning, Absent-Minded Abner is very likely to pop open the floor ventilator for the first time since way last October. Old Abner sure deserves what he gets: two eyefuls of dirt and grit.



►► **Two things to watch** next time you replace spark plugs: be certain the threads are engaged right before you touch a wrench, and look for grit under the gasket. Forgetting can make trouble.

►► **Don't jeer** at a woman's catch-all handbag without looking over your glove compartment. If it has no old envelopes, burned-out bulbs, stale tobacco and partly used lollipops, take a bow.



generator and starter and also on the storage-battery carrier.

Chassis noises. Get your car on a lift if possible, and begin with the front bumper, license-plate bracket, gravel apron and shock absorbers. Examine radiator-mounting bolts for undue looseness, and then go over the entire steering gear, making sure that all nuts are tight and fitted with cotter pins.

Run your hands along frame channels and engine pans for forgotten tools.

Examine the transmission supports, clutch and brake-pedal linkage. Clevis lock nuts should be tight and fitted with the proper size cotter pins. All modern cars have hydraulic brakes, but some have mechanical-linkage systems and equalizers that require attention. Evidence of brake-fluid leakage should be thoroughly investigated.

Strange, hard-to-locate noises often originate in the muffler or connecting pipes. Remember that shaky mufflers frequently leak and may fill a car with deadly, odorless carbon monoxide gas.

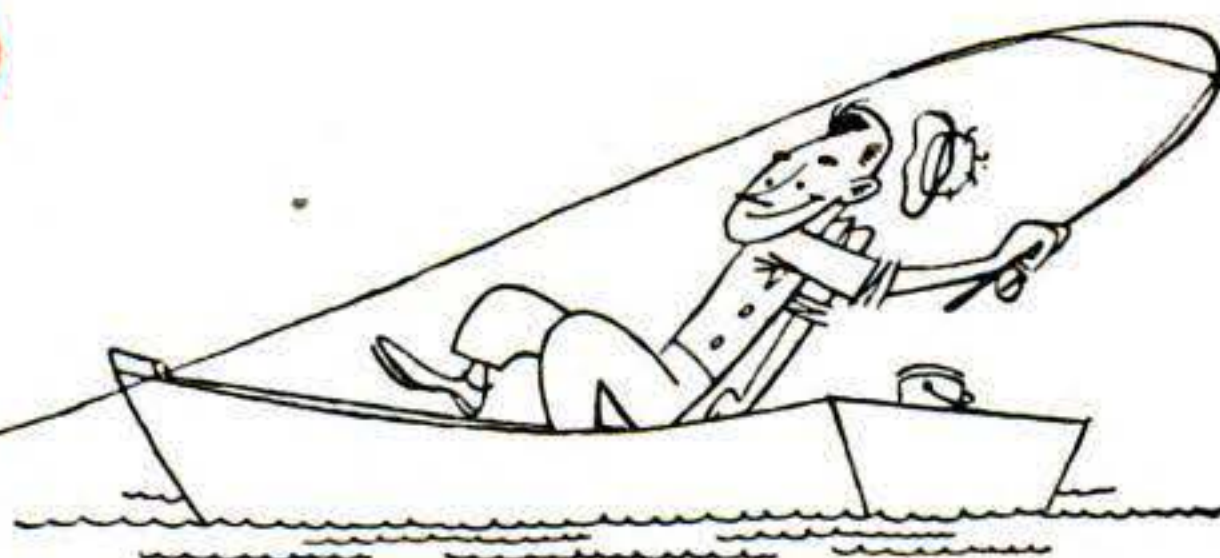
Play in the drive shaft. Ascertain the condition of your car's universal joints by checking the amount of play in the drive shaft. The expert often checks up-and-down motion by using an automobile jack under the drive shaft at the universal joint. There is always a certain amount of free rotation, but undue up-and-down movement may indicate a faulty universal joint that would certainly be the cause of a hard-to-find clanking noise.

Next, tighten body bolts, gas-tank support brackets, rear-bumper and license-plate-bracket bolts. Don't neglect differential and drive-shaft stud nuts and cap screws. All wheels should be given attention. Strange as it may seem, the hubcaps on modern cars are sometimes the source of that elusive squeak or rattle. Examine their flanges for shiny areas which may be an indication of movement resulting in noise. Check fender bolts and the gas-tank hinged cover for looseness.

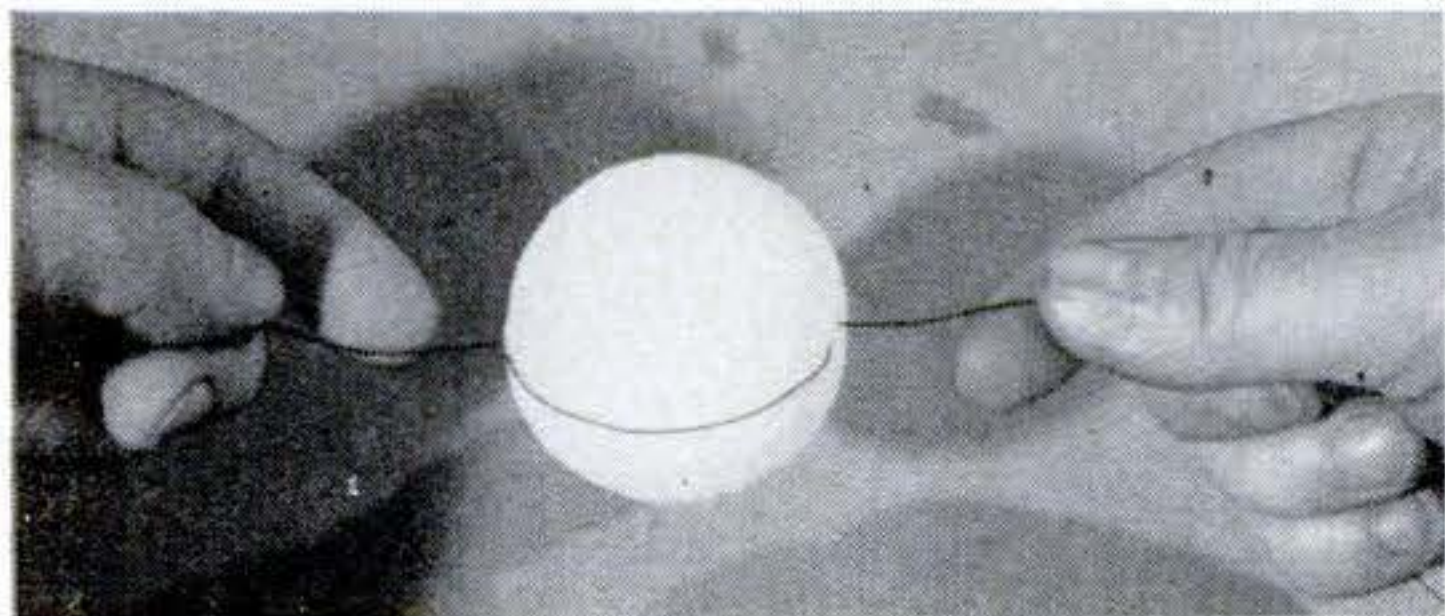
Work? It sure is—but you'll love that silence!

END

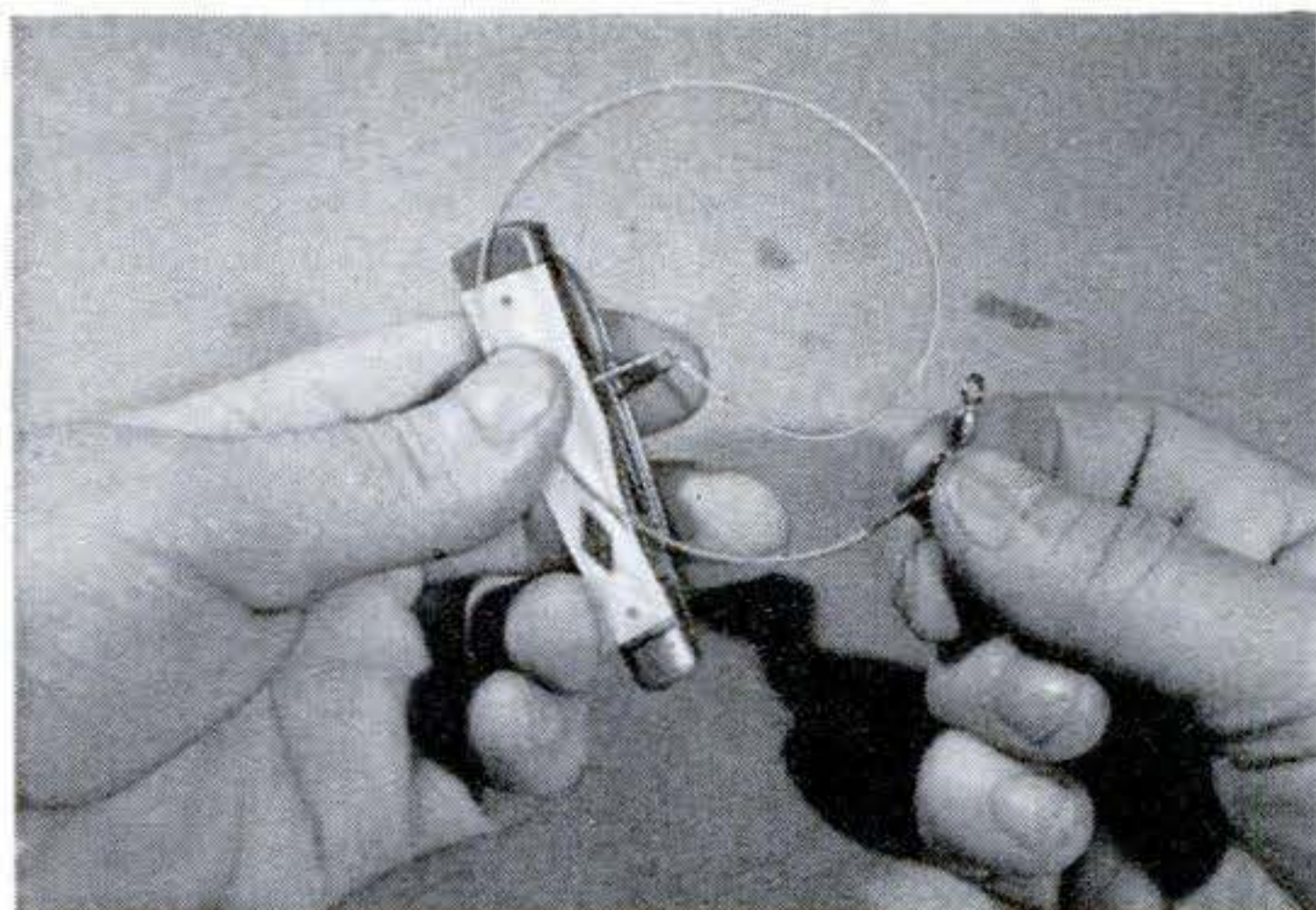
Going Fishing?



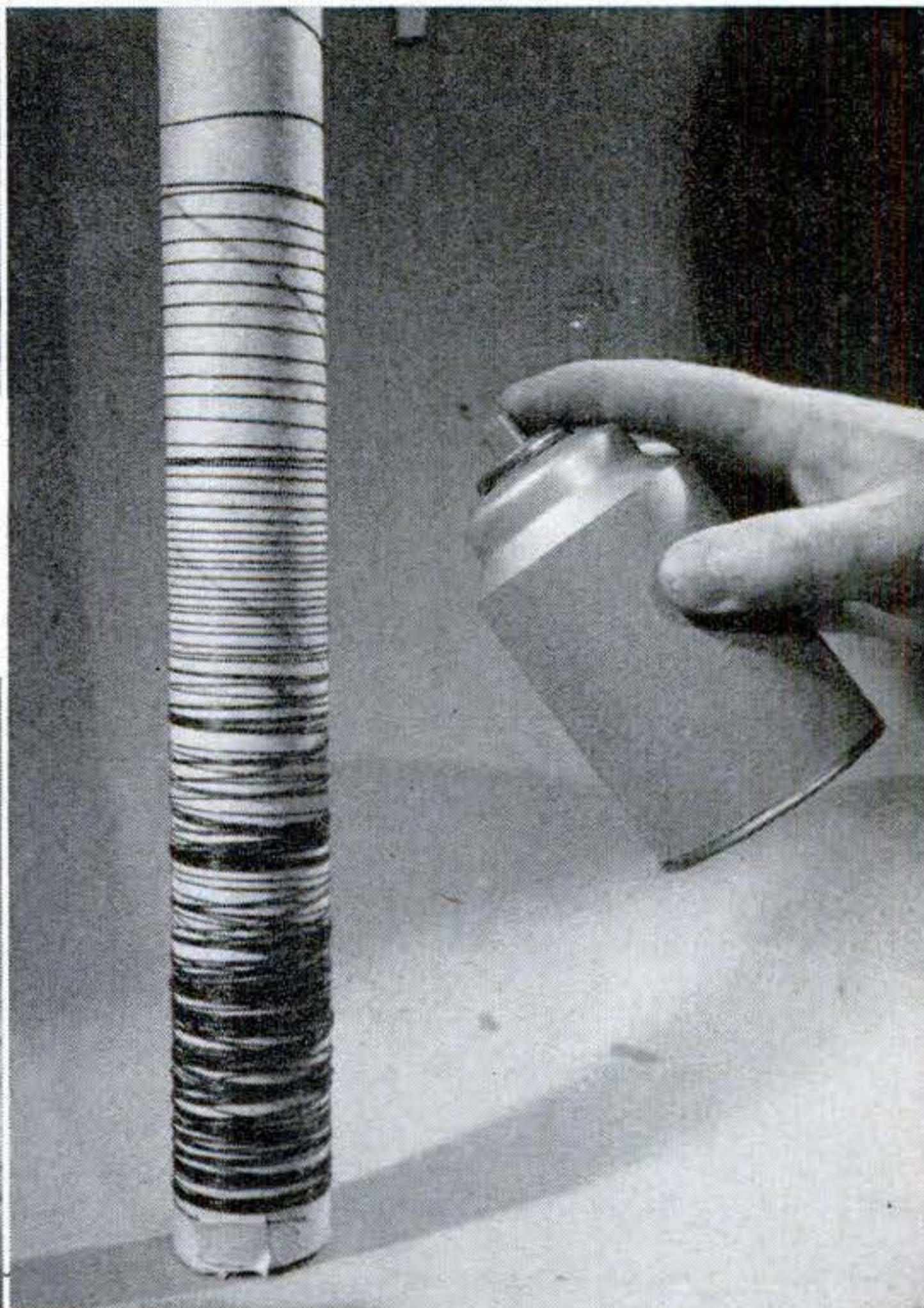
Simple tackle improvements may help you land the big ones.



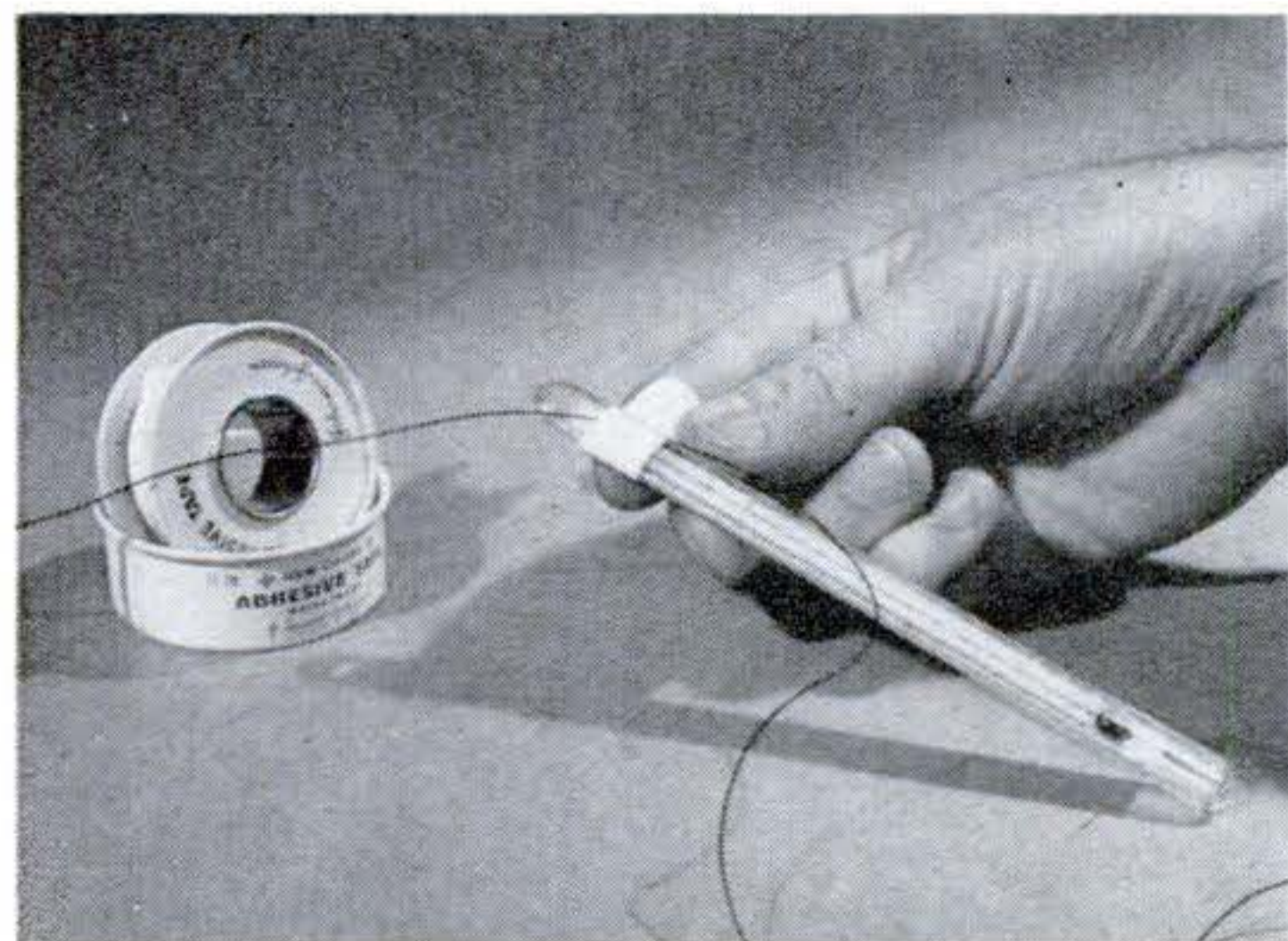
PLASTIC FOAM BOBBER is sensitive to the slightest tug on the line. This foam has recently become popular for decorative uses. A Christmas-tree "snowball" made of the foam can be quickly threaded on your line.



TO AVOID SOILING YOUR POCKET when delving for a knife with wet hands, slip the clasp of a leader over a blade and close it. Drop the knife into your pocket with the leader outside.



YOU CAN WATERPROOF A LINE by spraying it with a silicone compound sold for treatment of clothing and shoes. Use the spray can after winding the line loosely on a mailing tube.



CHECKING WATER TEMPERATURE at different levels is one way some fishermen locate the best fishing spots. A glass-enclosed photo thermometer is good for this. Attach it to the line with waterproof adhesive tape.



TO COLOR A LEADER, soak it in a food color. Use a single color, or mix several as desired. Dilute with water for a gut leader, with denatured alcohol for a plastic leader. Wipe the leader dry when it has the desired tint.

8 Boating Tips



CHEESECLOTH dipped in rust-resistant paint will cover all surfaces between links in a chain for a thorough coating. Take off any old rust first with rust remover; then rinse chain.



FOR A BACK-YARD TEST of your outboard's performance, fill a strong, clean ash can with water and mount the motor on the rim.

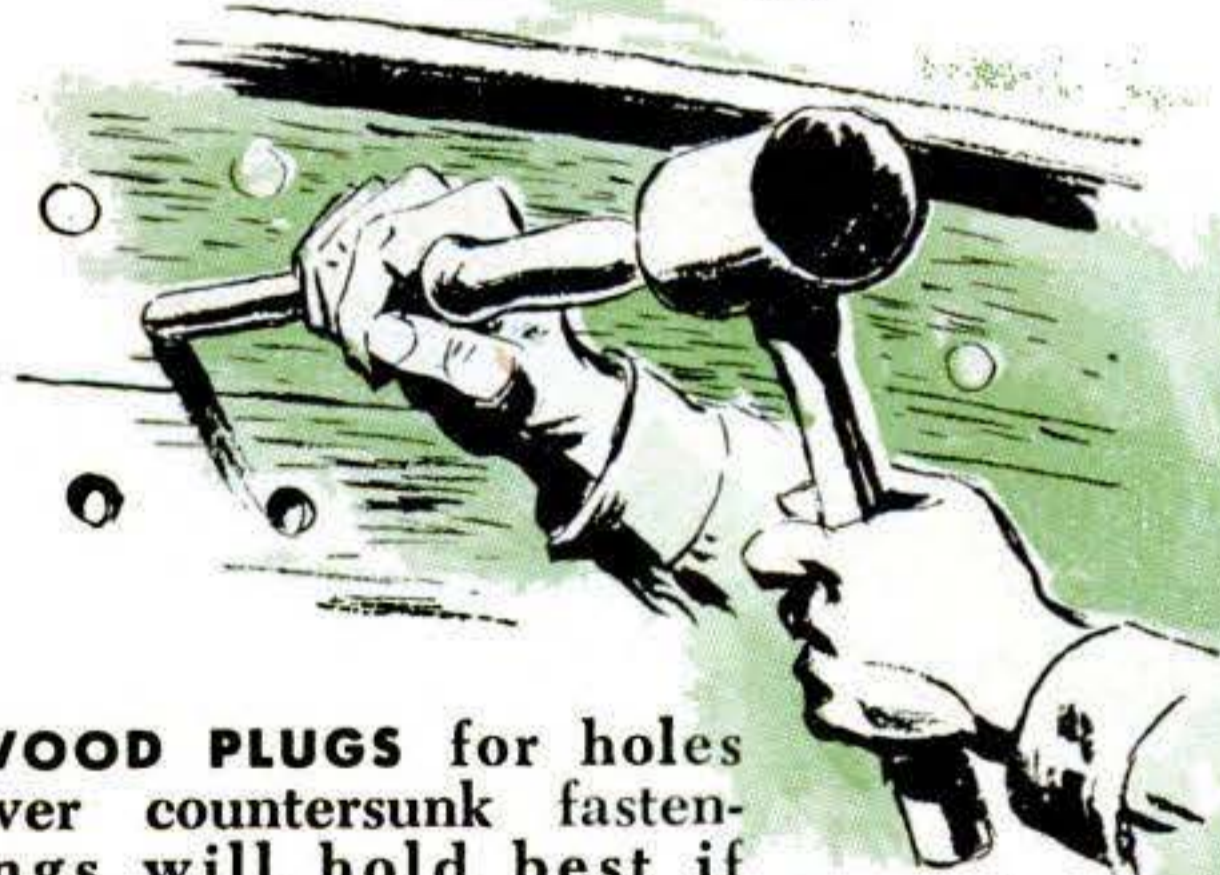
A LARGE PLASTIC CUP of the dime-store variety is useful in bailing. It won't scratch paint and is flexible enough to scoop up water in the corners.



A RUBBER STAIR TREAD folded and tacked over the transom will help absorb outboard vibration and keep the bracket from gouging the wood.

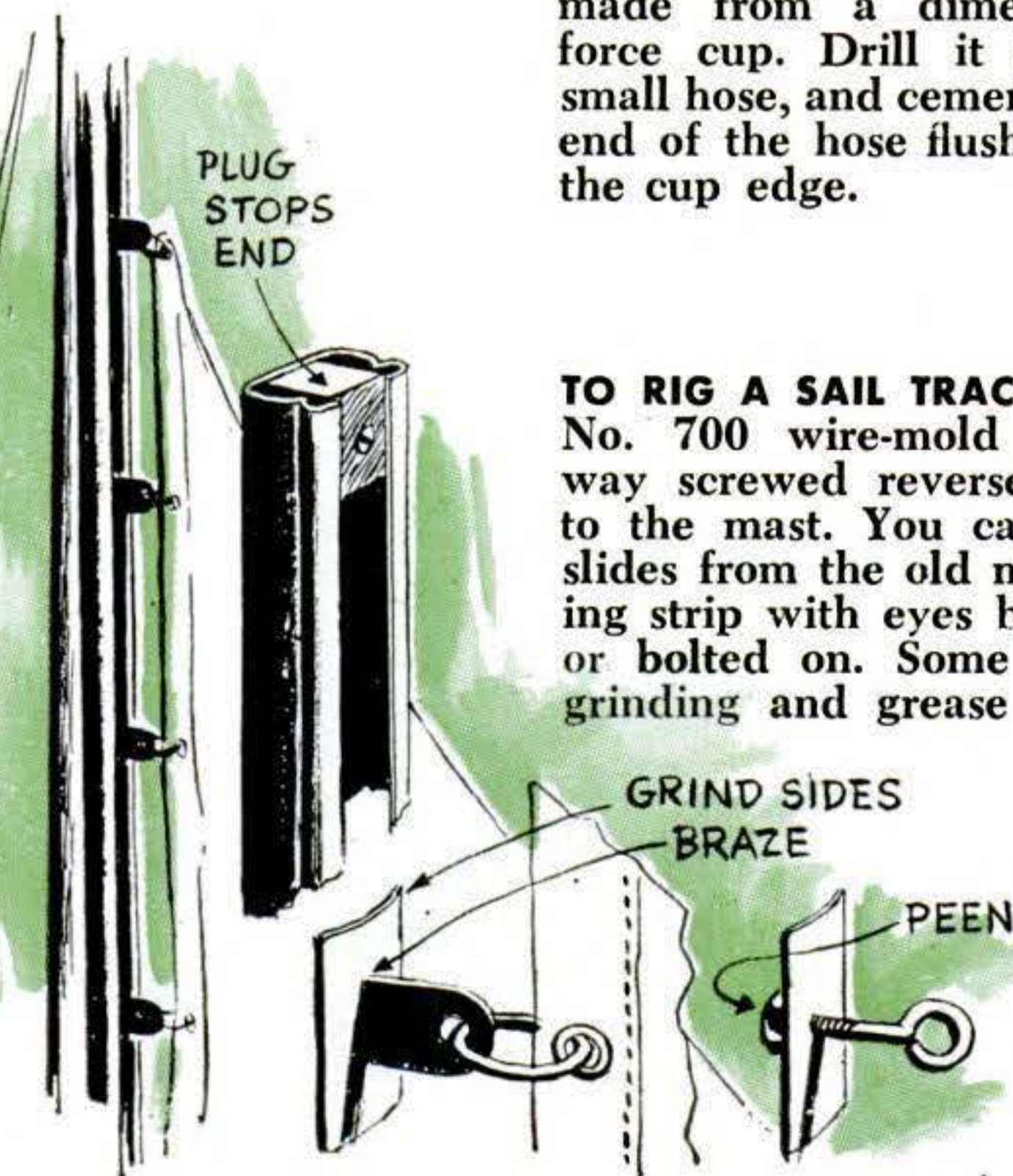


A BAILING PUMP can be made from a dime-store force cup. Drill it for a small hose, and cement one end of the hose flush with the cup edge.



WOOD PLUGS for holes over countersunk fastenings will hold best if dipped in heavy paint or marine glue before being driven in. Putty used as a filler sticks if you dab the holes with paint.

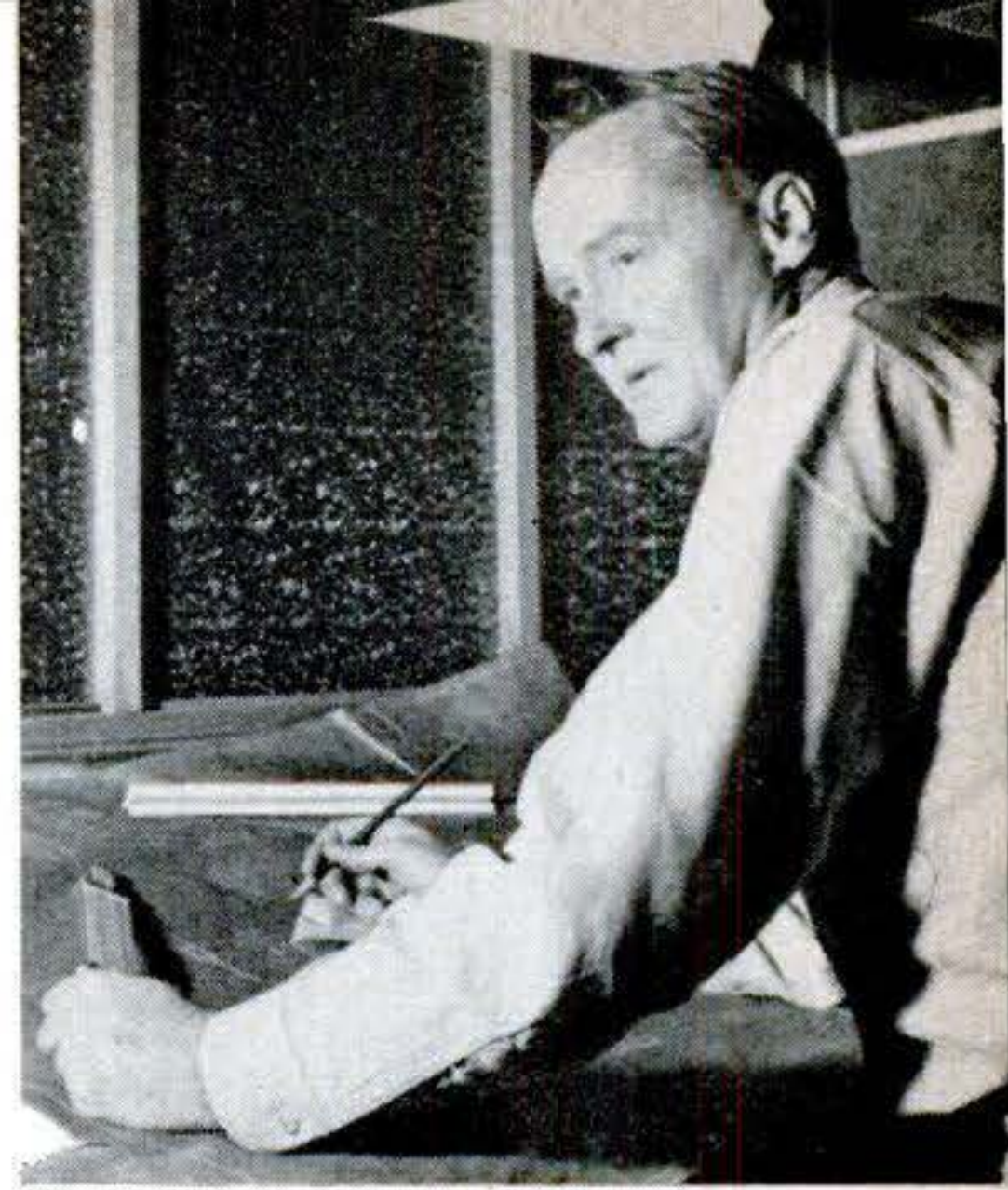
A SPARE STARTER ROPE may save you from rowing back to port. Keep it coiled under the seat.



TO RIG A SAIL TRACK use No. 700 wire-mold raceway screwed reverse side to the mast. You can cut slides from the old mounting strip with eyes brazed or bolted on. Some edge grinding and grease help.

He Runs a Shipyard for Amateurs

For \$1 an hour, Sam Thurston gives you space, tools and expert advice. Result: greenhorns are now building their own express cruisers.



By Paul Corey and Darrell Huff

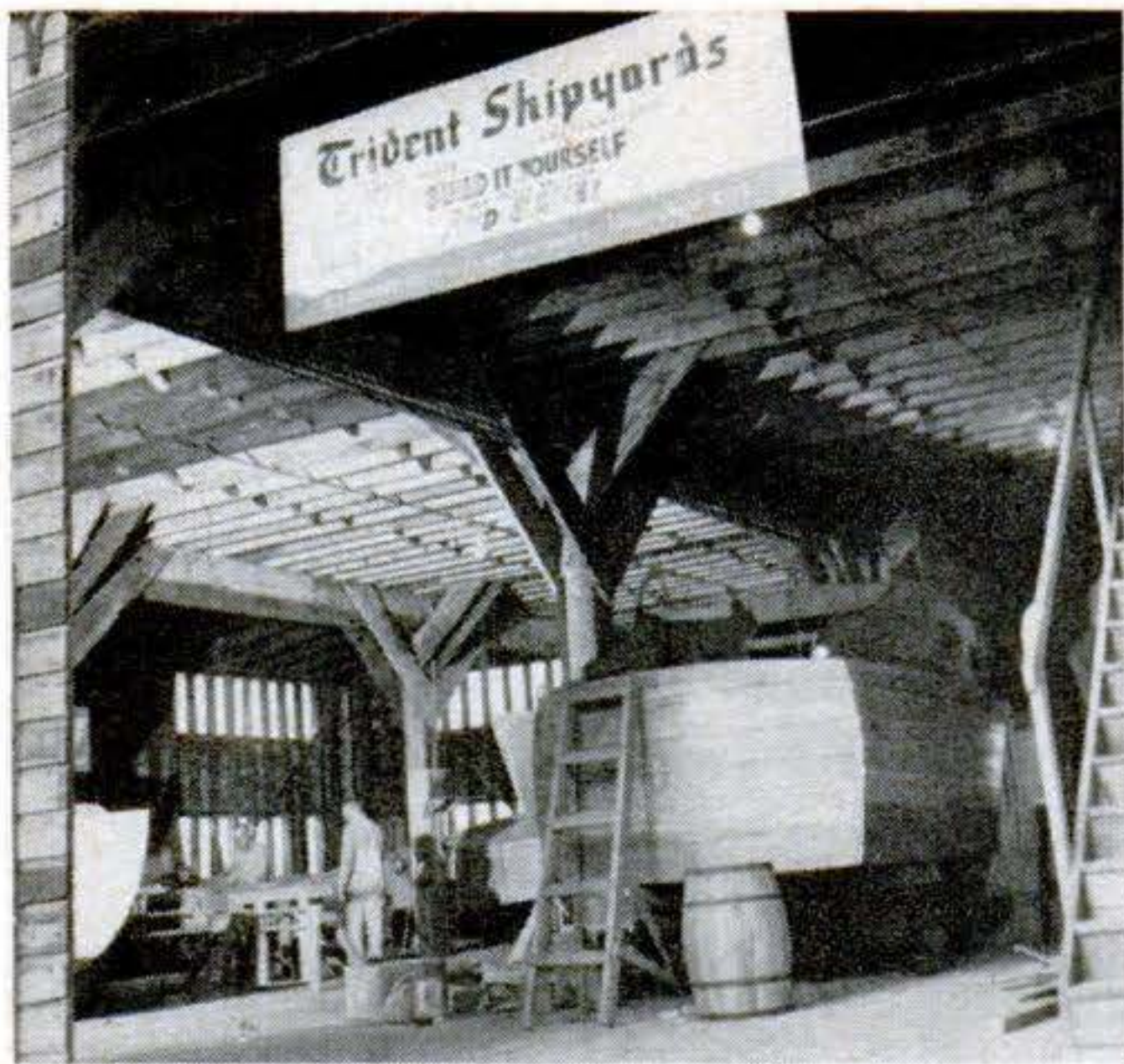
THE Trident Shipyard on San Francisco Bay is a place where a man who wants to build himself a boat can do it. The customer supplies the urge, the muscle and the money. Trident provides

the tools, the space and the experience.

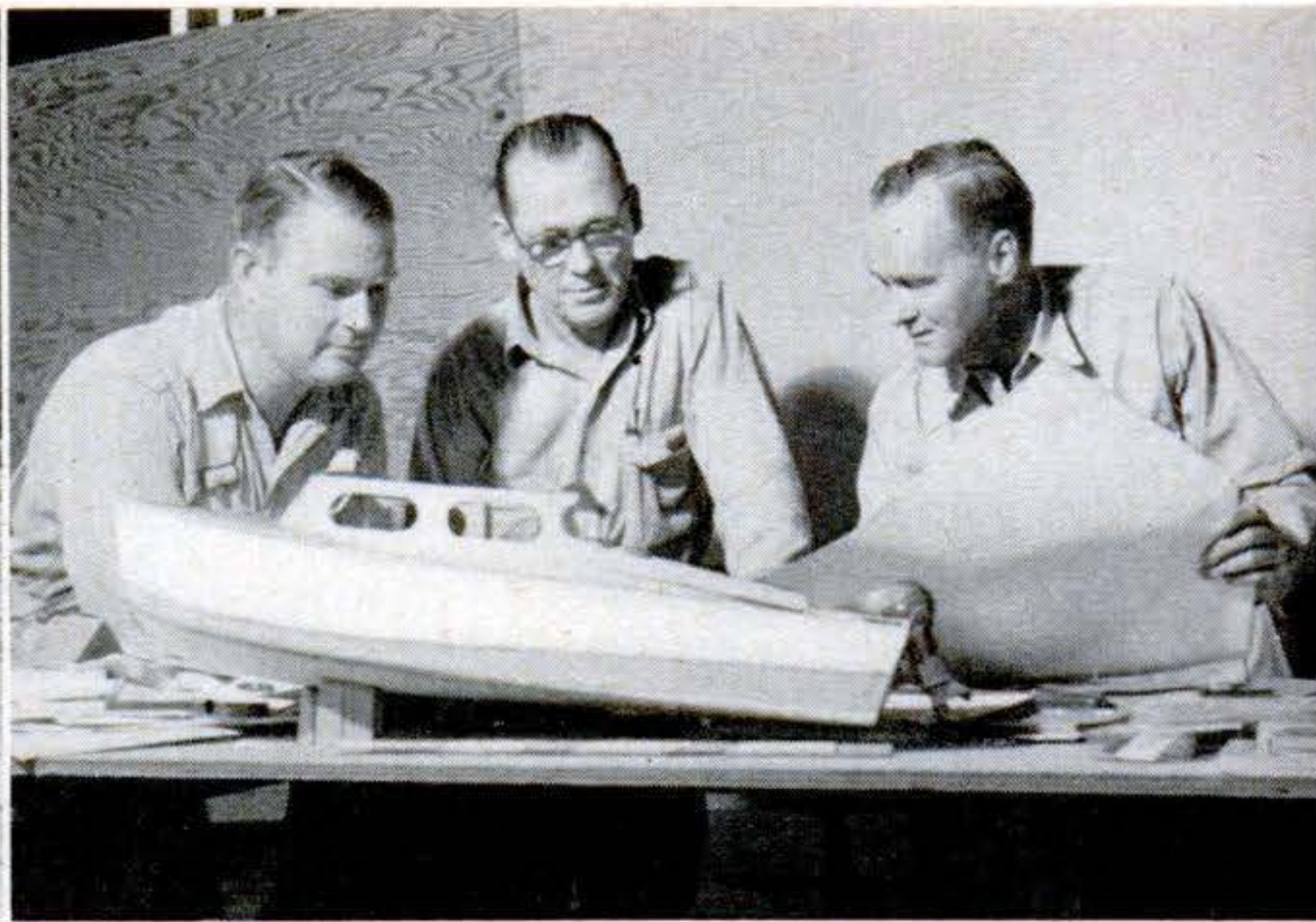
As proprietor, Sam Thurston now has a going concern that has, for him, the elements of a dream job: he gets paid for something that's fun to do. Being the highly professional mentor of some highly inexperienced builders involves an-

This will be a twin-screw 28-footer. Here, builder Mortimore asks Sam Thurston's advice.





MAIN DOOR at Trident is big enough to take the sting out of classic wisecracks about amateurs' building craft too large to get out to water.



NEW CUSTOMERS discuss with Thurston, right, the kind of boat they'd like to tackle. Boatyard has variety of blueprints builders can borrow.

other element of a dream job, too: it keeps him on his toes.

Space to spare. In a tough waterfront district, you'll find Trident humming under Sam Thurston's energetic supervision. The yard includes a loft, drafting room and office. The heart of the place is an impressively big room that contains seven boats that are well along, and another starting. One man is bandsawing an oak rib, another is running stock through a jointer, and out back there's the whir of electric drills.

"Not many builders around now," Sam explains. "They all have jobs, and must sandwich boat work into their spare time.

"None of them ever tackled so much as a water ski before. Right now we have, let's see, an orchestra leader, a postal clerk, a mechanic, a truck driver, a cop, fisherman, student, insurance broker."

Plugging 'em up. Thurston points out their boats. The gleaming 24-footer, freshly coated with glass fiber and plastic, belongs to police officer Cornelius Murphy. The 28-foot twin-screw cabin cruiser belongs to Teddy Yap, an orchestra leader, and he's working on it now, plugging screw holes instead of songs. From the remarkable number of plugs, you can see that driving fastenings is a big part of boatbuilding.

When you say as much, a head emerges from another 28-footer nearby. "Over a

hundred bucks of fastenings in this one already," says its owner. "Seventeen gross of screws so far, would you believe it?"

"That's Omer Mortimore," Sam mentions as you walk off. "He's a mechanic. Thinking of living on his boat. Figures he can take it to Alaska, work there during the season, and then cruise down the coast the rest of the year."

The big fellow installing an engine in the cabin cruiser near the door is Don Grone. He grew up with boats and now, an electrical-engineering student, works part time at Trident. He helped lay out the place and built the 10 identical one-man benches that line the walls.

What's provided. Each builder gets his own bench, fitted out with chisels, planes, saws and vise. He also gets his own electric drill with power screwdriver attachment and a set of those combined bits that simultaneously make a lead hole and a counterbore for a screw.

Besides the tools loaned to a builder individually, Trident has others for collective use. There's a radial saw, a big bandsaw, portable saw, Shopsmith, steam box, sanders, an air compressor, a small crane, and enough clamps to sink a boat.

Expert counsel. Sam helps each new patron balance ambition against cost, size against time, a kit boat against one built from scratch. He helps you choose

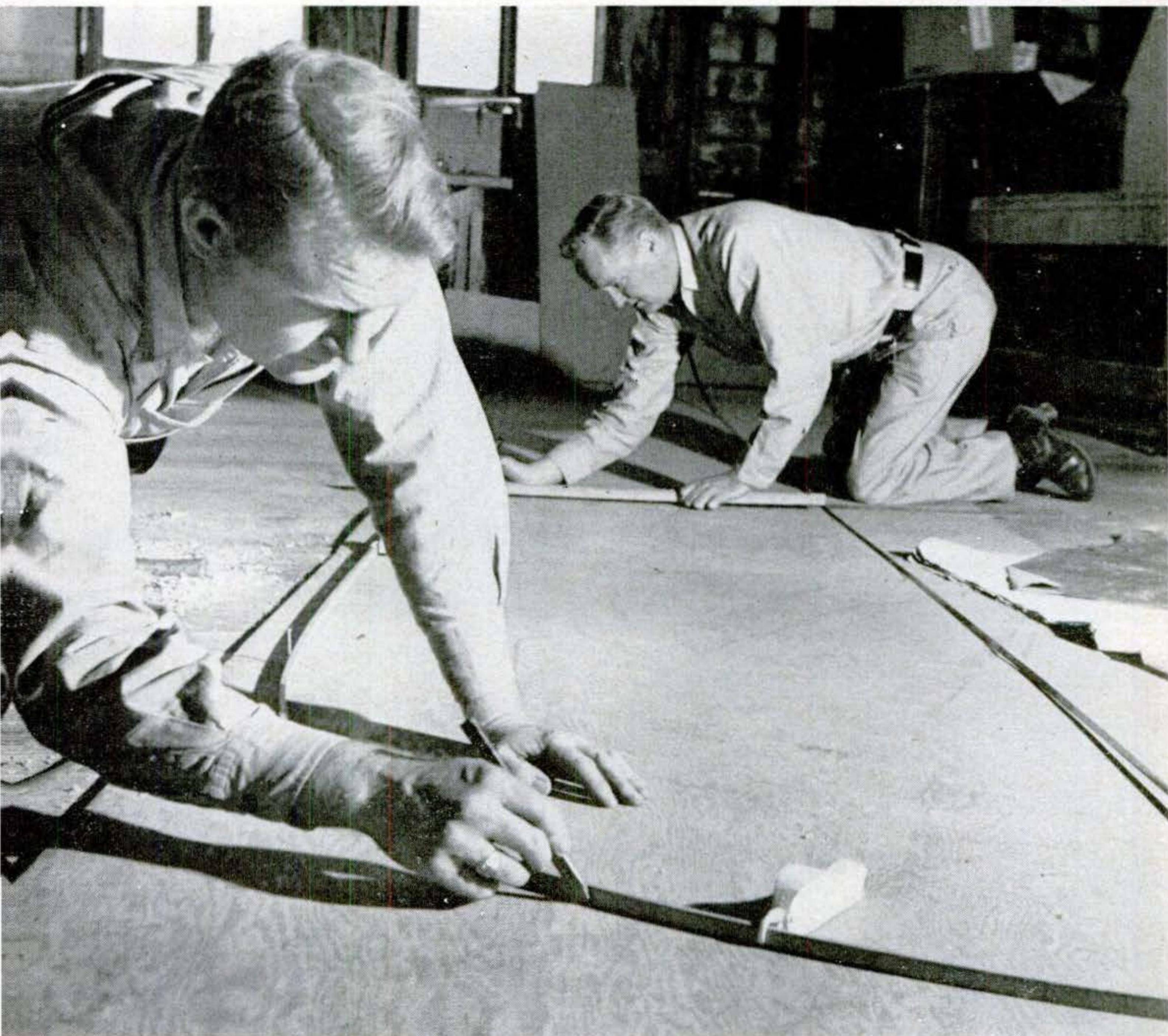
[Continued on page 242]



INSTALLING A POWER PLANT isn't the headache with Trident's facilities that it can be in backyard or basement sites for boatbuilding.



BENCH at which police officer Cornelius Murphy is planing a piece is one of those provided each customer. Tools shown come with it.



LOFTING sets out curved cutting lines and rib locations on the plywood sheets. Here Don

Grone, left, helps Thurston mark out a cut. With this done for them, builders get started fast.



How to Use TV Lighting

A simple setup using three small bulbs lets you stage your own "studio" portraits the TV way.

**By George H. Waltz Jr.
Photos by W. W. Morris**

"GEE," I thought, as I watched my TV set, "if I could only take pictures like that." Every close-up was a perfectly lighted portrait, even with actors all over the stage and the action hopping around hotter than a double-play

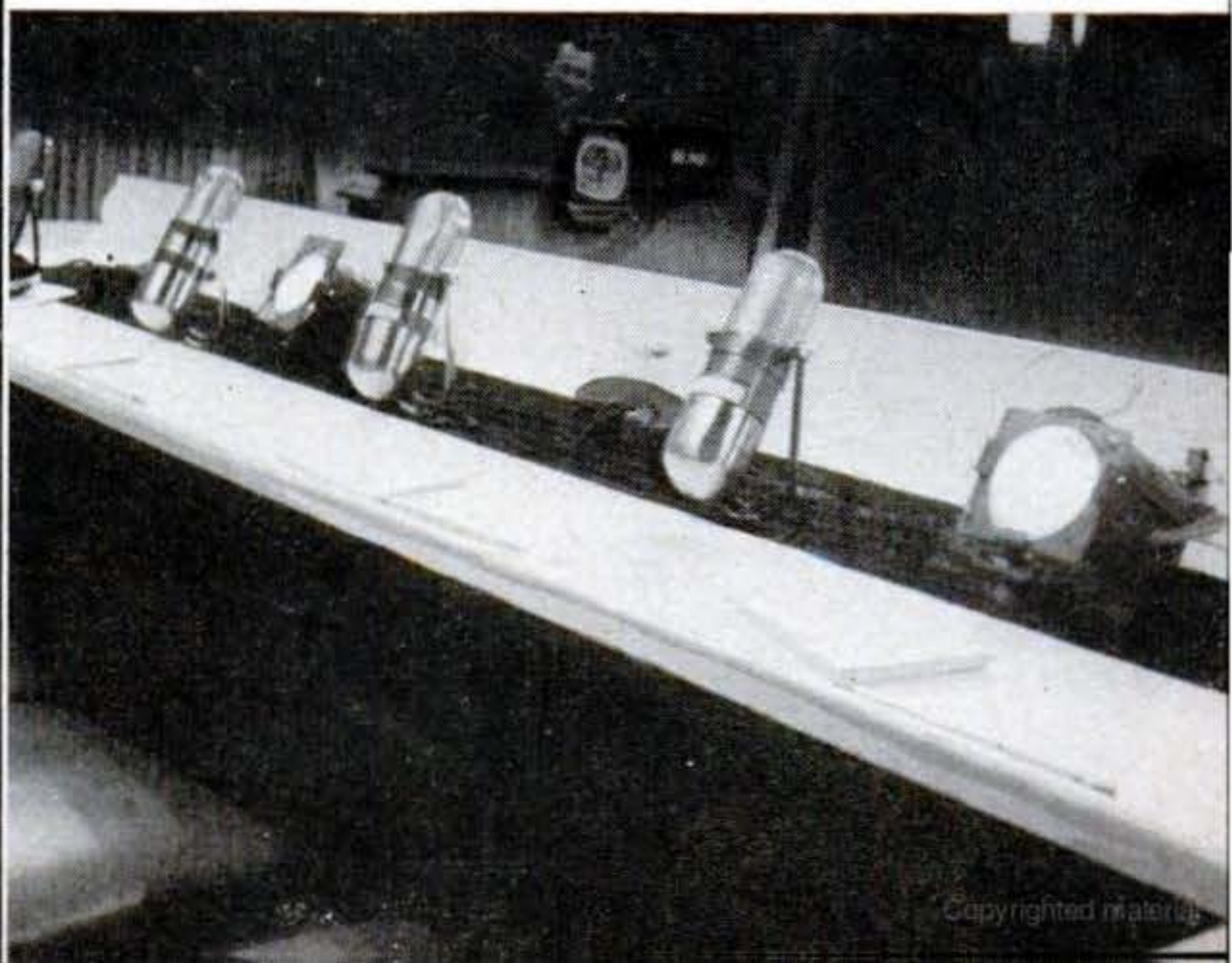
ball in the infield. It must take a mass of special lights and fancy equipment.

That was what I thought until I got a behind-the-screen look with PSM photographer Bill Morris. What we found out may surprise you. It sure did me.

If you've watched "What's My Line?" you've probably been impressed by the pleasant portraitlike lighting that's used in shots of the panel and of John Daly, the M.C. And that's just about what it is—good three-point portrait lighting.

Many small setups add up to one

LIGHTING LOOKS COMPLICATED for TV's "What's My Line?" but really isn't. As you can see in the diagram, each of the participants is illuminated by at least two "key" lights, at the front and sides, and a back light—just as if an individual portrait were being made of each one. This three-point lighting—as you can see in photos





for Your Home Photos

But you wouldn't believe it at first. When I saw the lights that flooded the stage, they all seemed to point in different directions. Then Bill started to show me that it wasn't as complicated as it looked. It was just the old principle of lighting a subject from three points, only it was done in multiple.

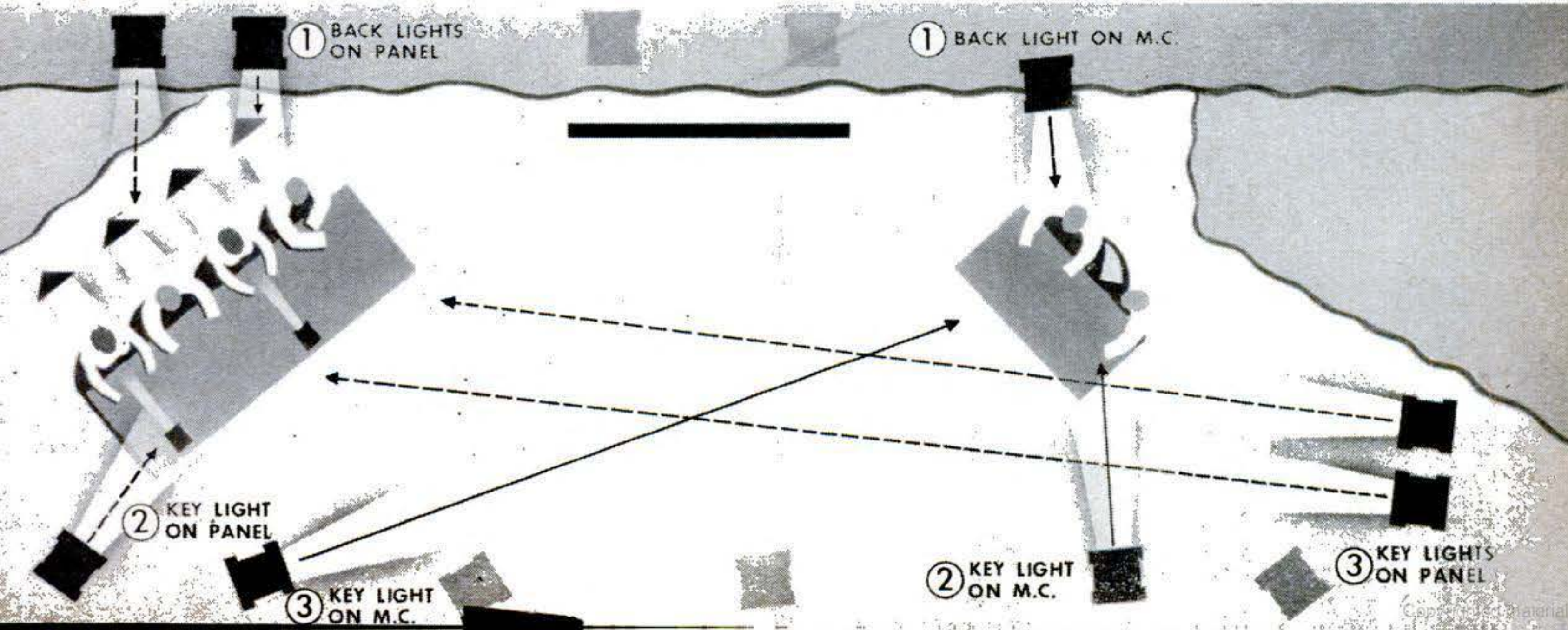
As you can see in the diagram, *each one* of the six principals in the show—Dorothy Kilgallen, Fred Allen, Arlene Francis, Bennett Cerf, John Daly, and the mystery guest—is lit by at least



big one—but it's the same simple system you can use at home

on top, made just before air time—eliminates deep shadows, highlights each panelist's hair, and separates him or her from the background. The "key" lights are mounted on overhead pipes in front of the stage. Back lights for the panel are mounted above the backdrop behind it. General back lighting for John Daly and the

stage comes from overhead lights at the rear. Spotlights on the panel's desk (below left) provide soft underlighting for Dorothy Kilgallen and Arlene Francis. In effect, the multiple lighting is used in such a way that just about any spot on the stage gets good three-point portrait illumination, the kind pro photographers use.



two forward "key" lights and a back light.

The lighting is so rigged that no matter where one moves on the set he or she is being lighted by some one of the three-point lighting systems.

When we visited the busy sets of "Studio One" we discovered again why shots of TV actors look so much like portraits. That's just what they are. Despite the dozens of lights used, the center of action is illuminated by two "key" lights and one or more back lights.

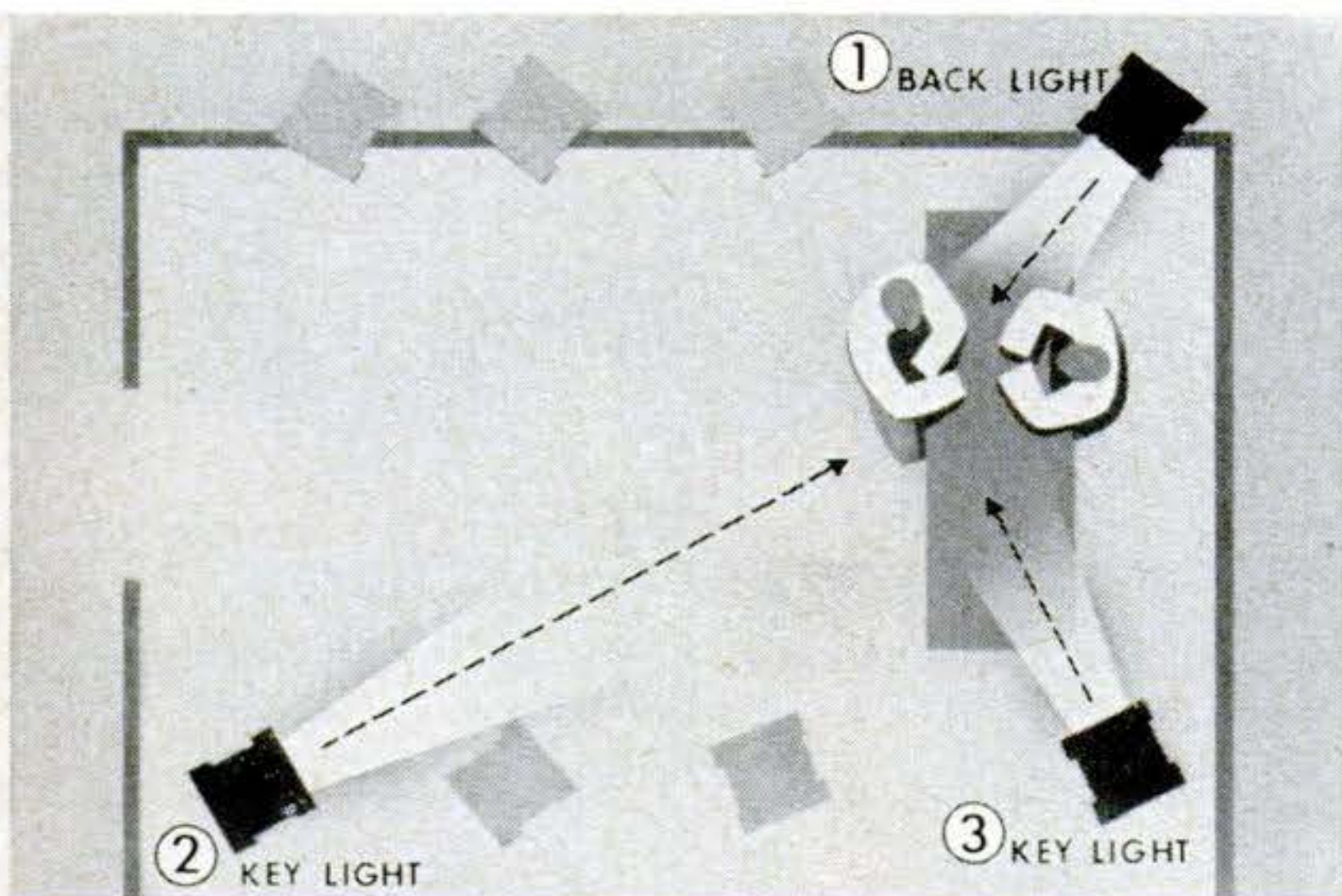
TV Lighting Has Extra Functions

Other lights are used for filling in, to create moods or dramatic light-and-shadow effects, and—here's one you don't have to worry about at home—to kill shadows cast by the long mike booms. Still, the basic lighting comes from the same three points that portrait photographers have been using for years—one light near the camera, one at the opposite side of the set, and a third, high and to the rear, serving as a back light.

I was in for another surprise, too. On both shows we visited, the sets, on the whole, were underlighted, not overlighted. In TV, it's the balancing of light, not the quantity, that counts, and the same holds true for home photo lighting. Overlighting not only puts an added strain on your subject, but it makes it harder to avoid deep shadows, unnaturalness and excessive contrast.

You can get the same TV portrait effect in your home photos with just these three lights—two lamps of the mushroom type with built-in reflectors and an ordinary open flood in a metal reflector. Use the open flood and one of the mushroom lamps as your side "key" lights, keeping the open flood closest to your camera. Place the second mushroom lamp high and behind your subject, aimed down at the head and shoulders.

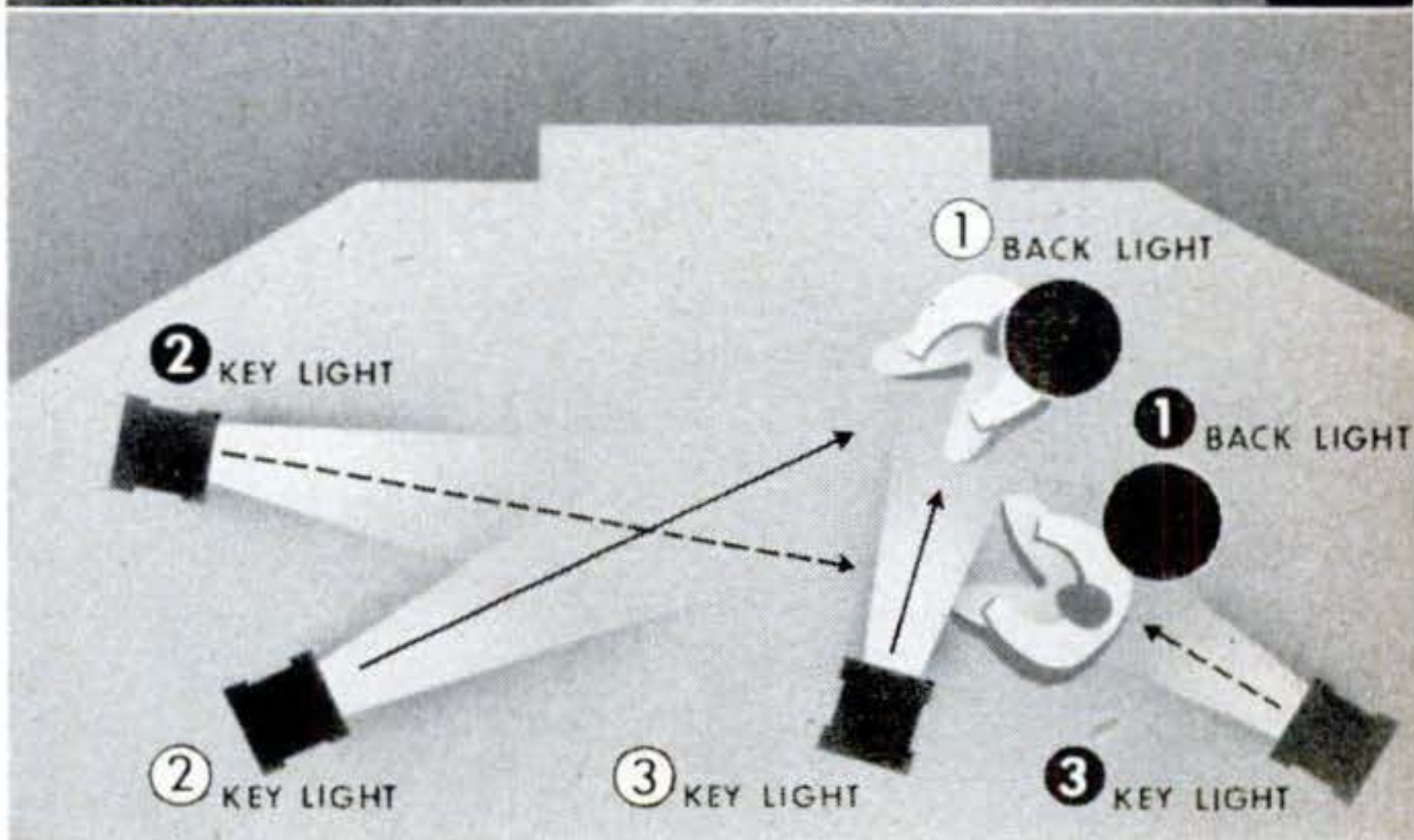
Experiment with the exact placing of your lights to get the effect you want—but stick to the basic three-point principle. What it does for television, it can do for you.



Even action-packed scenes are lighted like portraits

PLENTY OF ACTION went on in this tense scene from Westinghouse's "Studio One," yet the basic illumination came from a three-point lighting system, as shown in the diagram at upper left. Because TV shows consist of many dramatic close-ups, studio experts must rely on three-point lighting to give actors' faces a portrait quality. Only a few other lights are added for fill-in, to provide special effects, or to kill the shadows cast by the long microphone booms that ride in and out overhead to pick up the actors' voices.





Three-point lighting need not be bright, as these shots show

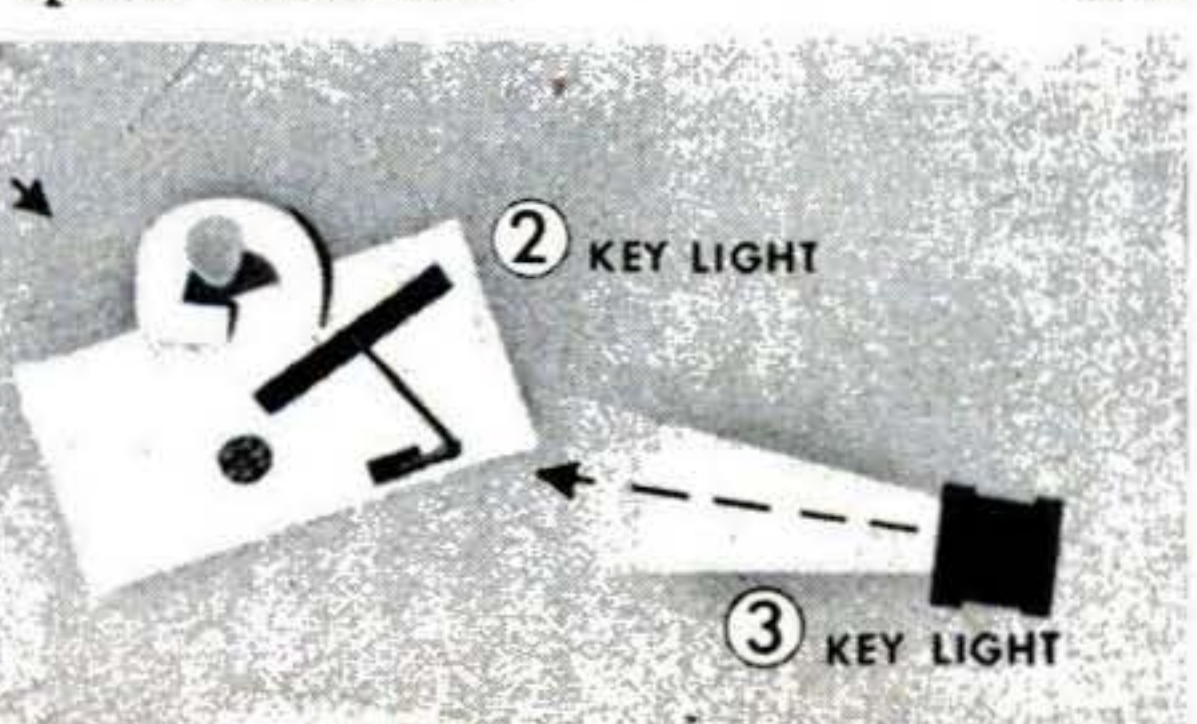
LOW-KEY LIGHTING was used for this police-station scene in "Studio One," yet, as in other scenes, the main illumination was provided by a three-point setup. Two "key" lights were placed in front and at the sides, while two hanging lamps—simply 300-watt floods in re-

flectors—provided top and back lighting. Additional dramatic lighting for the actor on the right was obtained with a small spotlight off to the left. Photos at left above show how lighting looked on home TV screens. They were shot at f/3.5 and 1/25 sec.

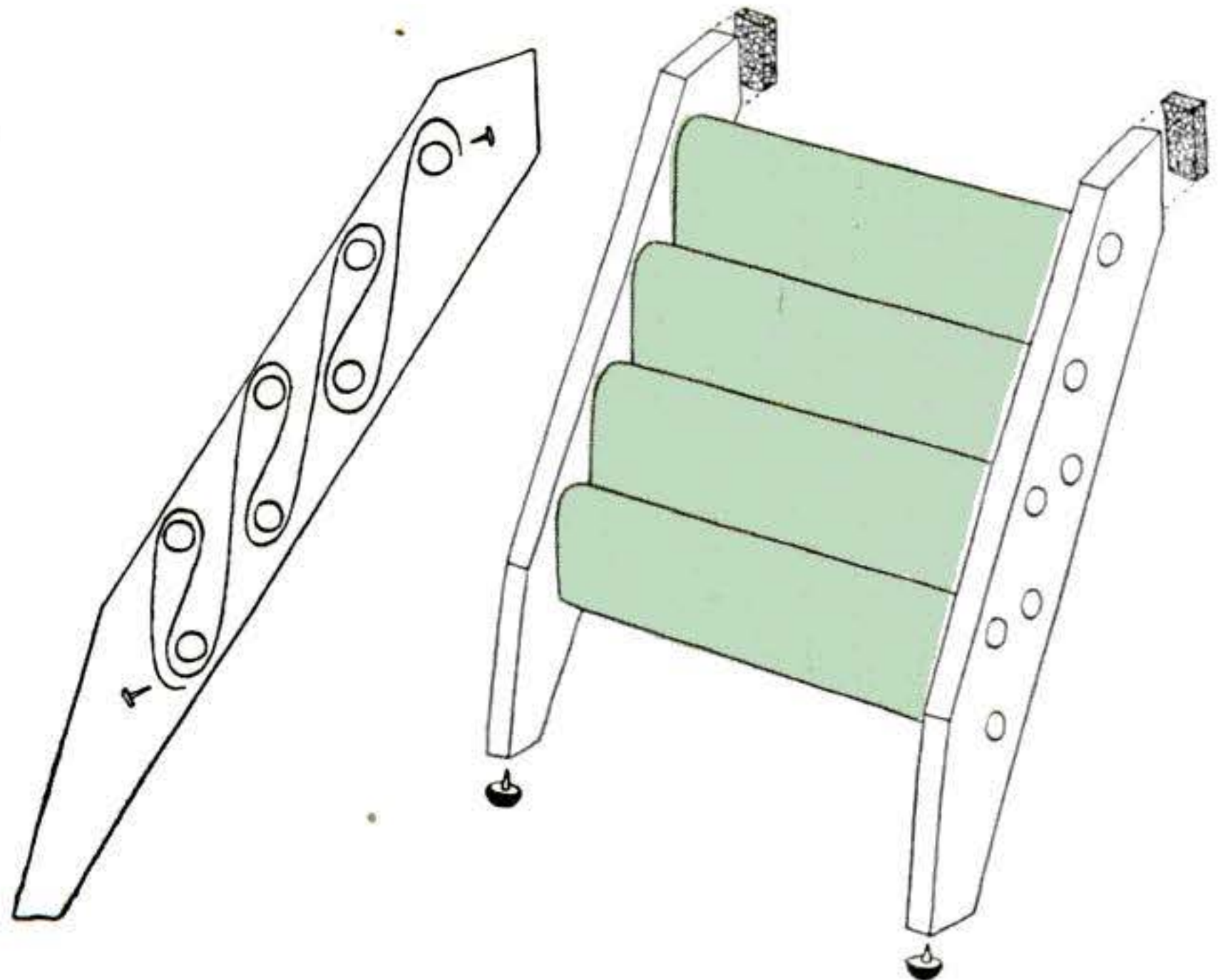
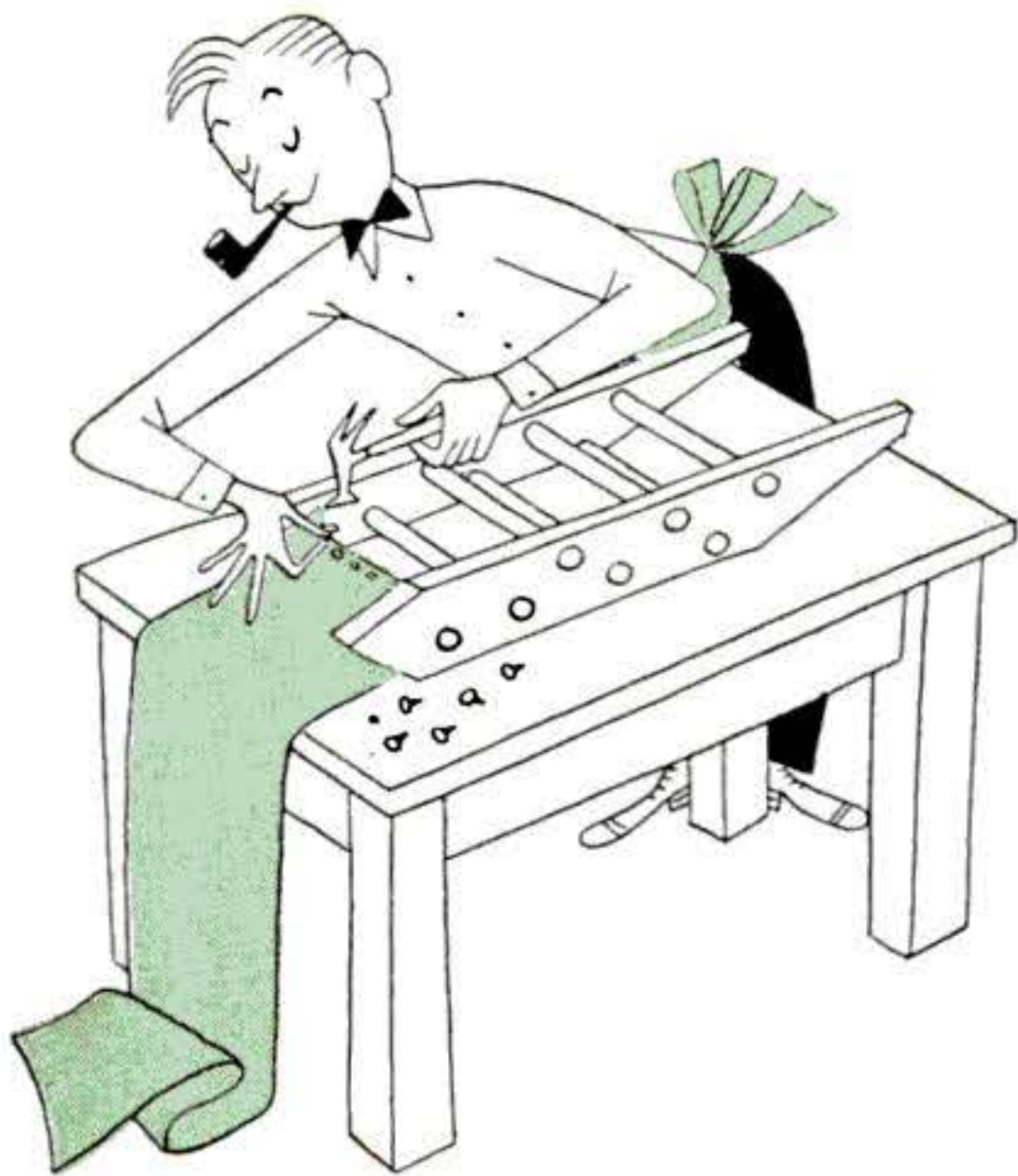
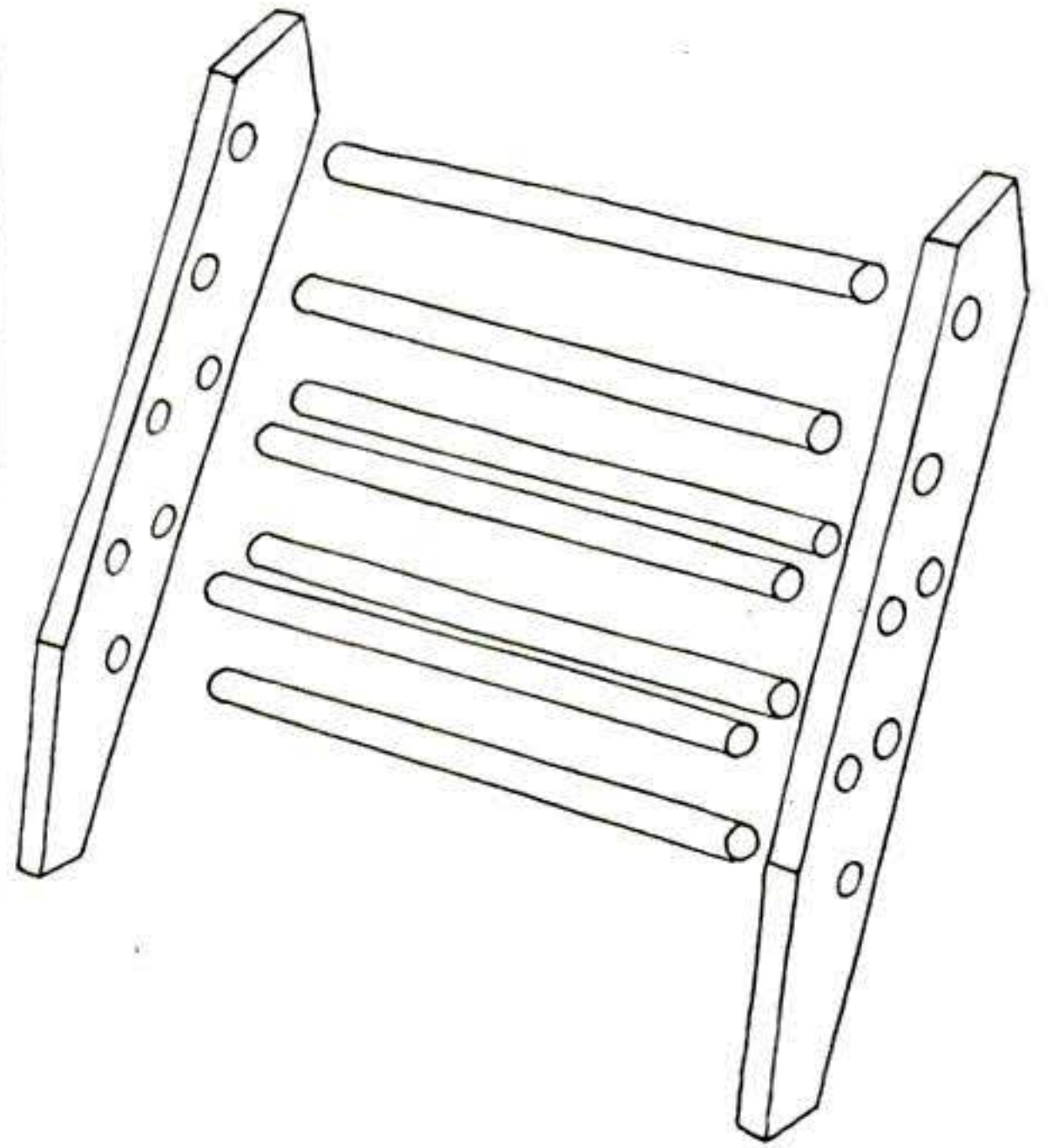
Here's how you can make home portraits

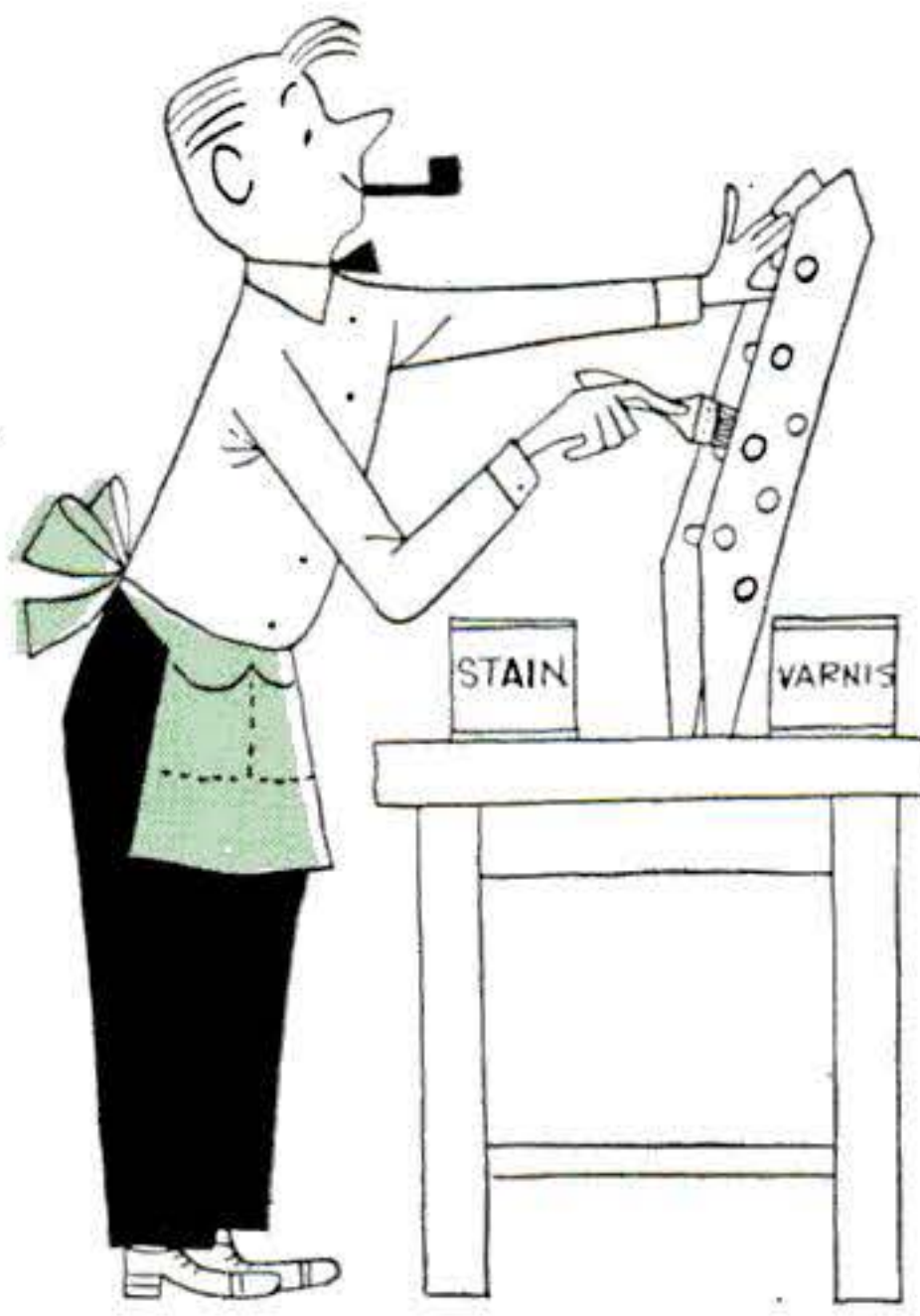
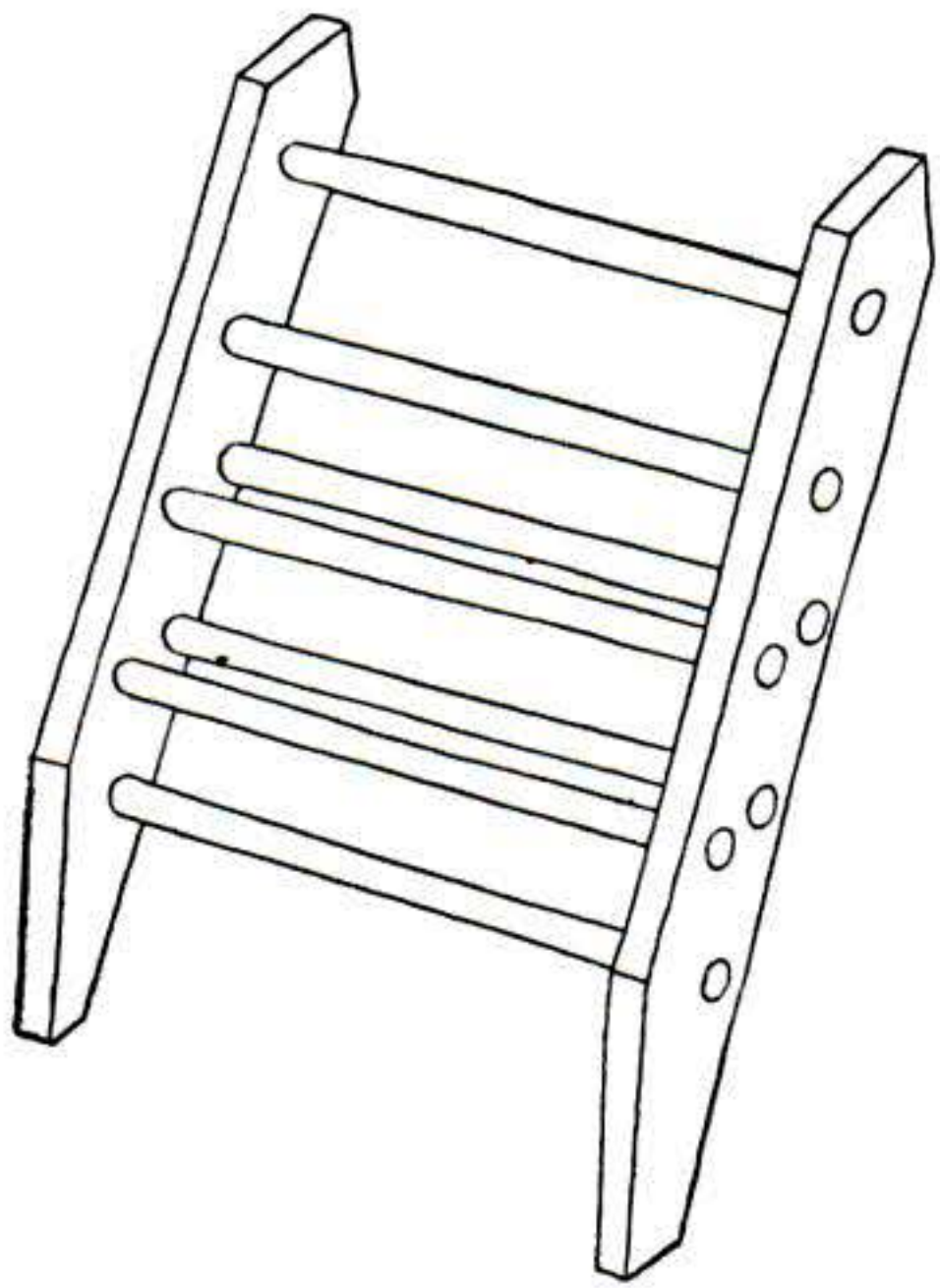
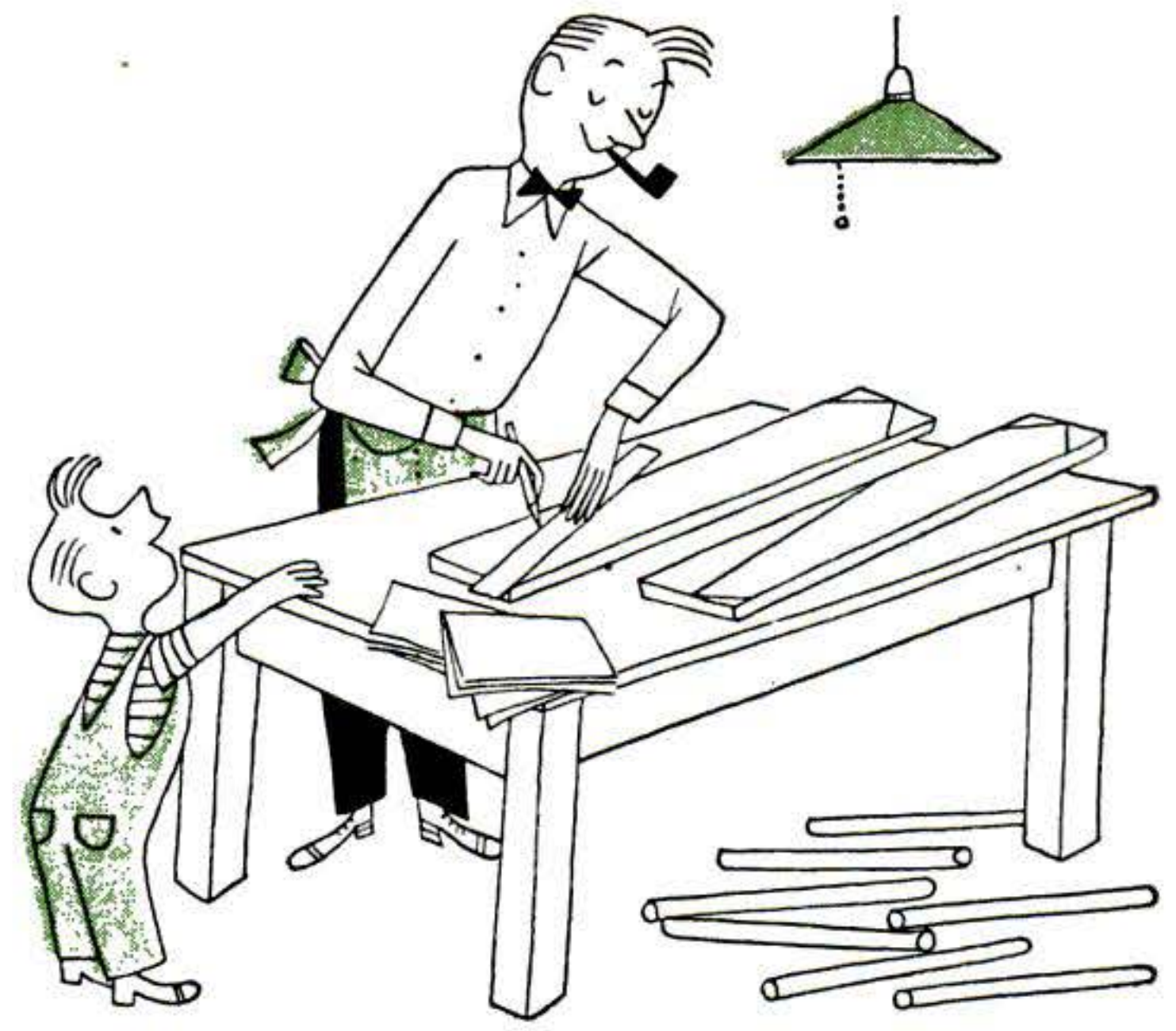


SKETCH BELOW shows how three lights were used to make portrait at right. Note how one at rear highlights hair, while two in front balance light on face, eliminating harsh shadows. In this case, third light was ordinary fluorescent desk lamp. Photo was made with new high-speed Tri-X film. **END**



Wordless Workshop





Next Month: A clothespin holder that slides on the line

APRIL 1955 193

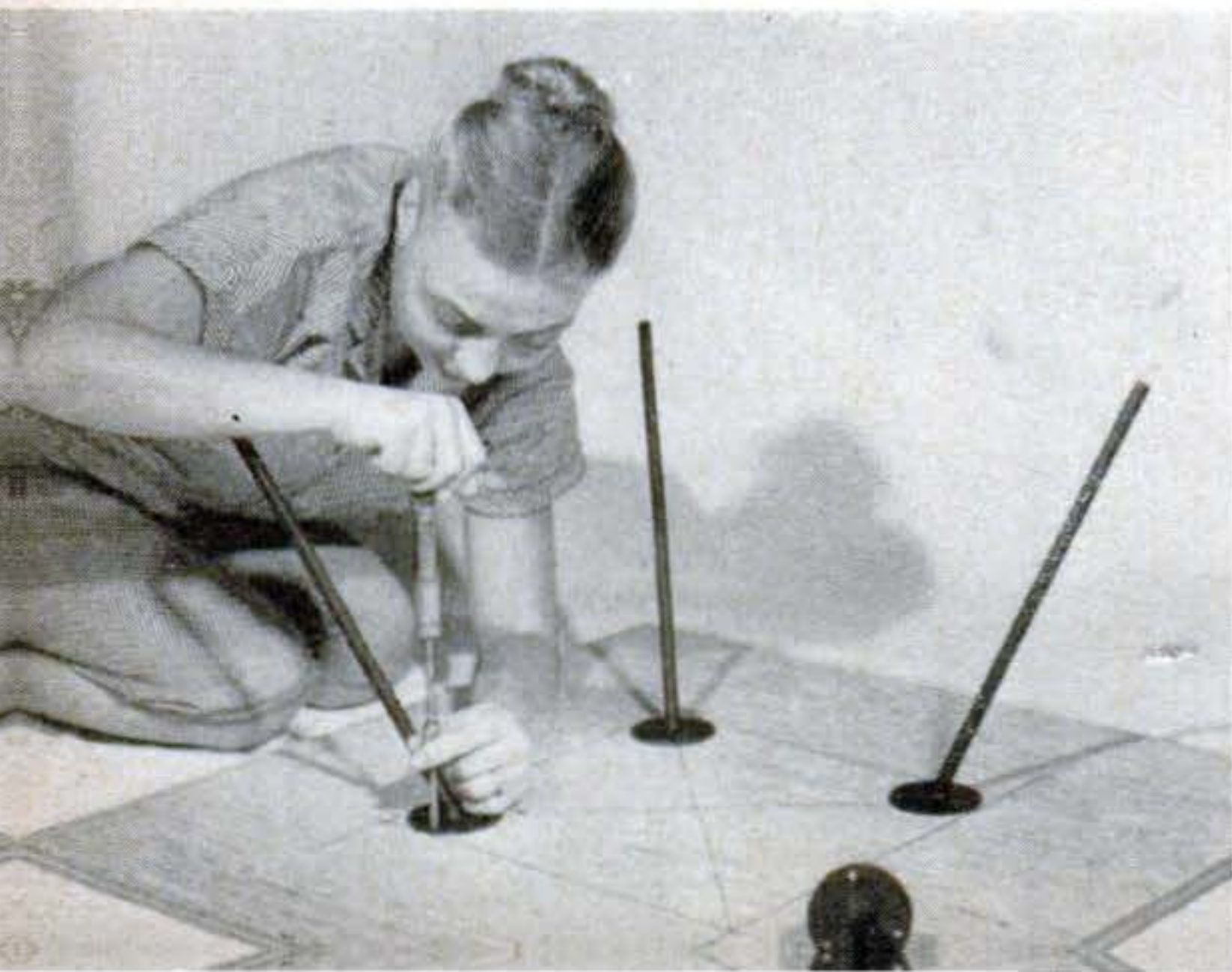


PLASTIC TILES provide a durable, damage-free top for our table. They completely hide the inexpensive plywood that was used underneath.

You could do the same job with ceramic tiles, but the plastic are considerably cheaper and come in brighter colors.

WE LAID OUT THE LEGS FIRST, setting them back 6" from the edge so that the slanting tips wouldn't protrude beyond the table. We chose the easy screw-on type, 15" high, which you can get from mail-order houses for \$1 apiece.

BUTTERING ON THE MASTIC was easy with this saw-tooth trowel that insures a uniform depth. Special tile-setting cement, available at tile and hardware stores, is slow-drying so you can cover entire table before you start tiling.



How We Built a Corner Table

Plastic tiles on a plywood base gave us that different touch.

By Ron and Marion Anderson

WE WANTED a corner table for our living room that was different, one that would really add life and color to the room. But after searching the furniture stores, we decided that originality came too high—especially when it was someone else's originality.

So we decided to build our own table. It had to be strikingly different, easily made, inexpensive and, of course, "look like a million dollars."

We found the answers to all these in a small square of $\frac{3}{4}$ " plywood, four metal legs and 49 pieces of plastic wall tile. The cost came to just under \$10.

The tile was the fancy icing on a plain cake that made the whole thing possible. It has a smooth, high-gloss, stainproof surface that's ideal for table tops and comes in a wide variety of vivid colors. The $4\frac{1}{4}$ " size cost six cents apiece, and the narrow strips we used to edge the table cost only three cents, so you can buy quite a few without denting the budget.

Laying out the pattern. We wanted a table about 30" square to match the depth of our sofa. By laying out seven tiles in each direction, we found that they added up to exactly $29\frac{1}{4}$ ".

By making the table to fit the tiles, you

WE STARTED AT THE EDGES, laying tiles around all four sides, then working toward middle. This saves centering the pattern, but plywood must be accurately cut to make the tiles fit. Press tiles in gently or mastic may ooze out.

save the work of cutting odd-size pieces and come out with a much neater job. If the size doesn't work out for you as luckily as it did for us, you can put one or two rows of the narrow tiles into your design, which would let you get within an inch or so of the desired dimensions.

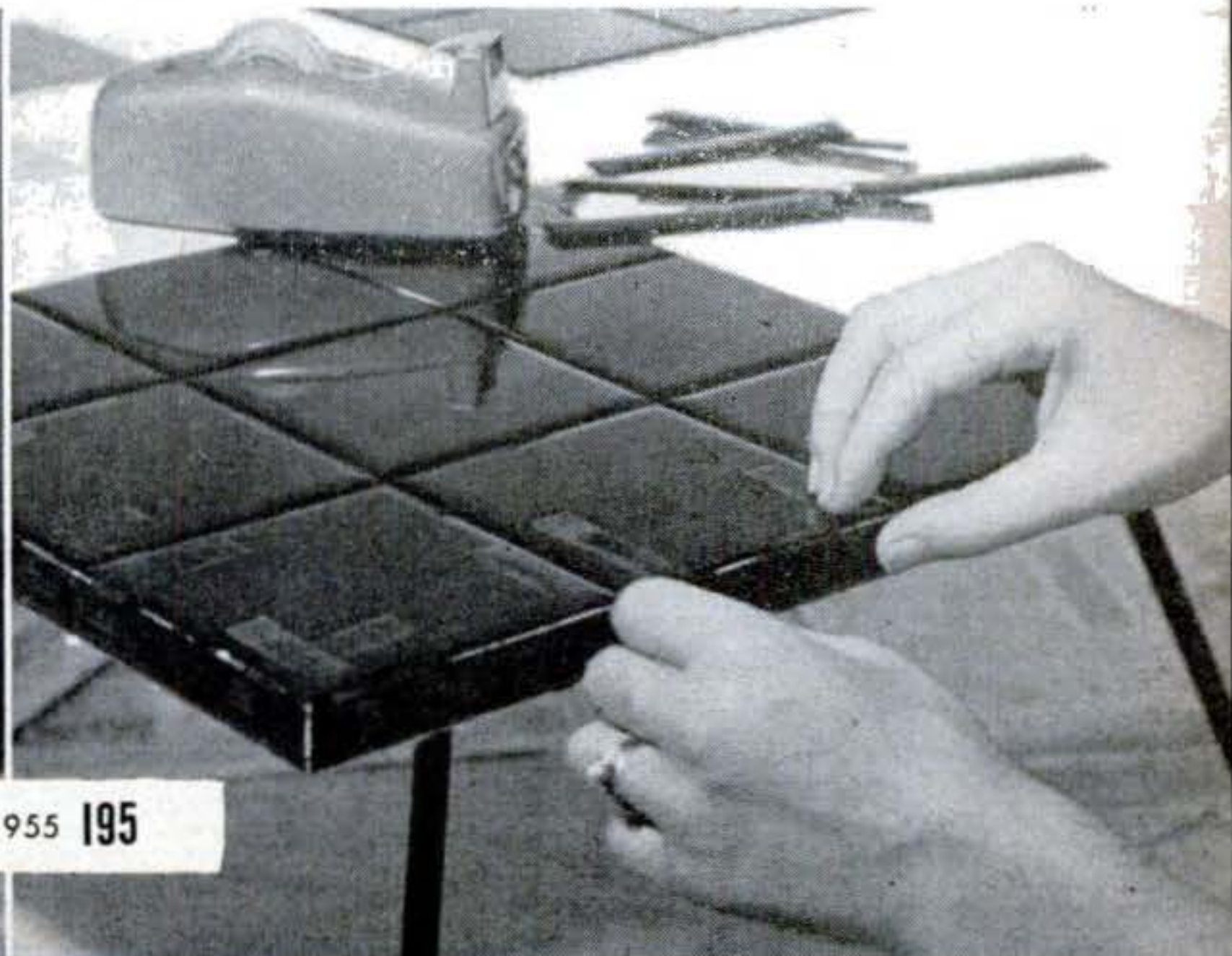
The most fun was planning the pattern. We spent several evenings with reams of graph paper, filling in the squares with colored pencils to help us visualize how the designs would look. The one we finally decided on took 26 white tiles, 21 black, and one red and one chartreuse for a real dash of color.

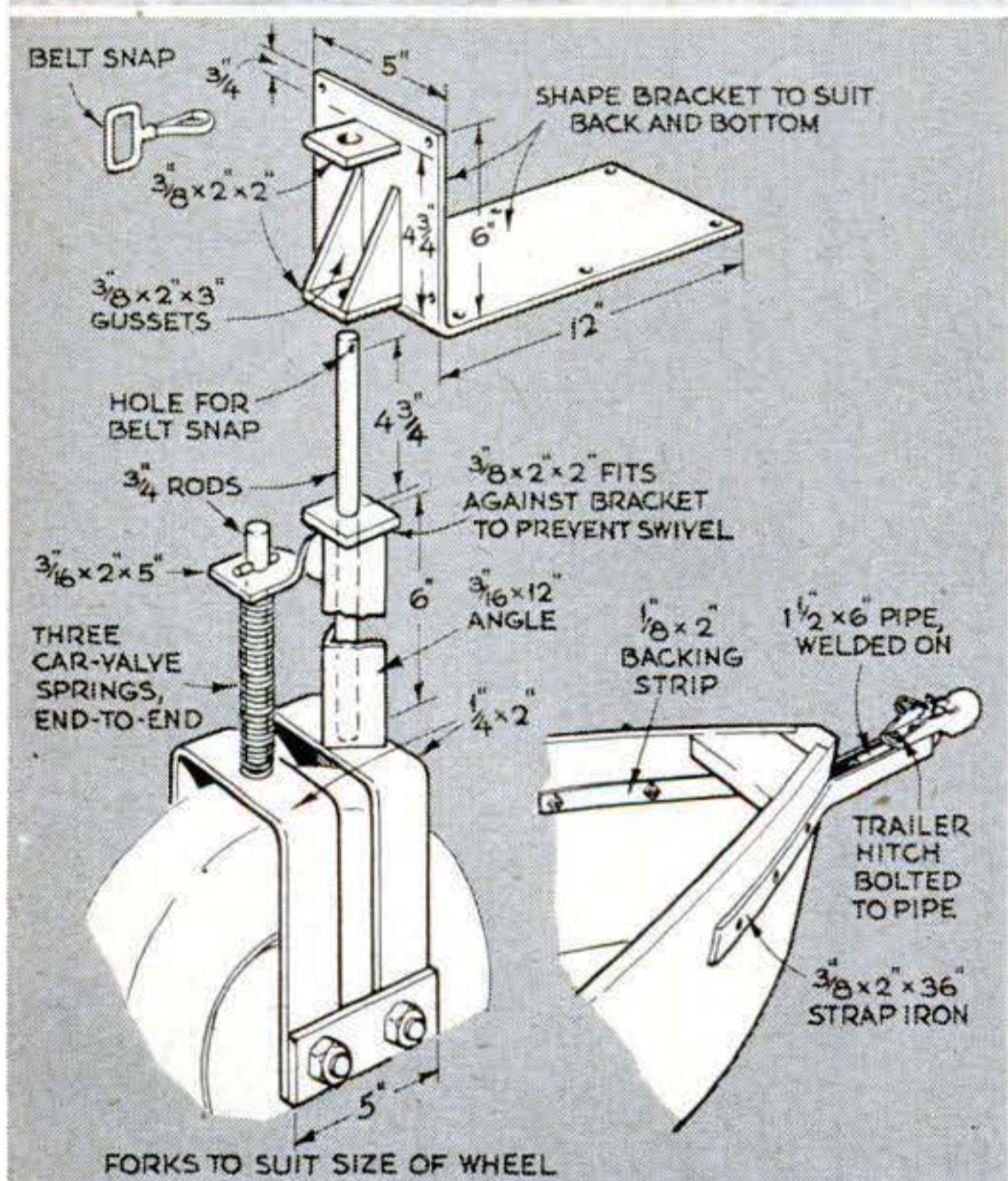
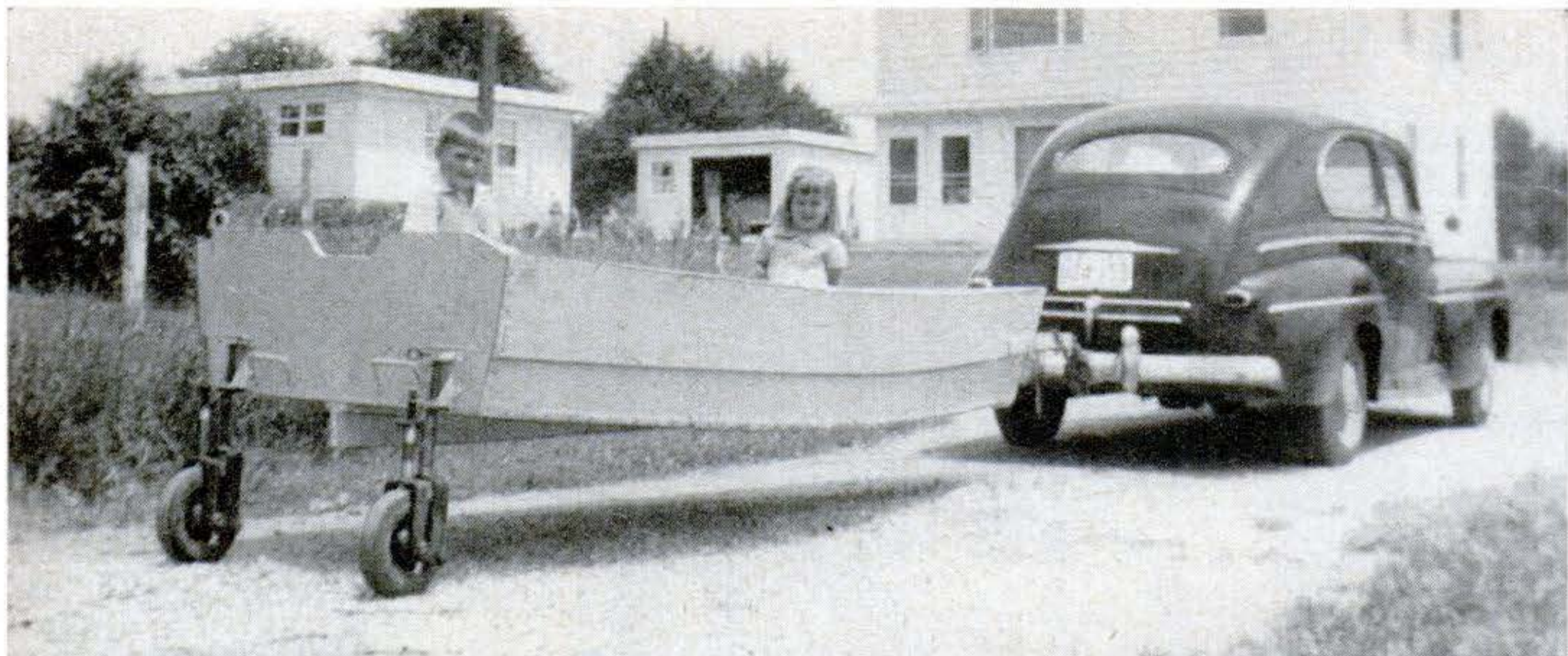
Setting the tiles. It is a simple matter to spread a special tile-setting mastic over the plywood, plop the tiles in the goop, and press them tightly together (you don't leave any gaps between joints as you do with ceramic tile).

The important thing is to make sure that the cement is spread evenly over the entire surface. The saw-toothed trowel will help you a lot on this. Some of the mastic may ooze up between the cracks, but you can wipe it off with tile cleaner.

The mastic is available only in quart cans (about \$1.25), which is a shame since you need only a little. So now we're trying to figure out where we could use another table, it looks so good. **END**

NARROW TILES, called feature strips, are just the right size to cover the $\frac{3}{4}$ " edge without trimming. We taped them on during drying so they wouldn't slip or warp. After a week to let cement set, our table was complete.





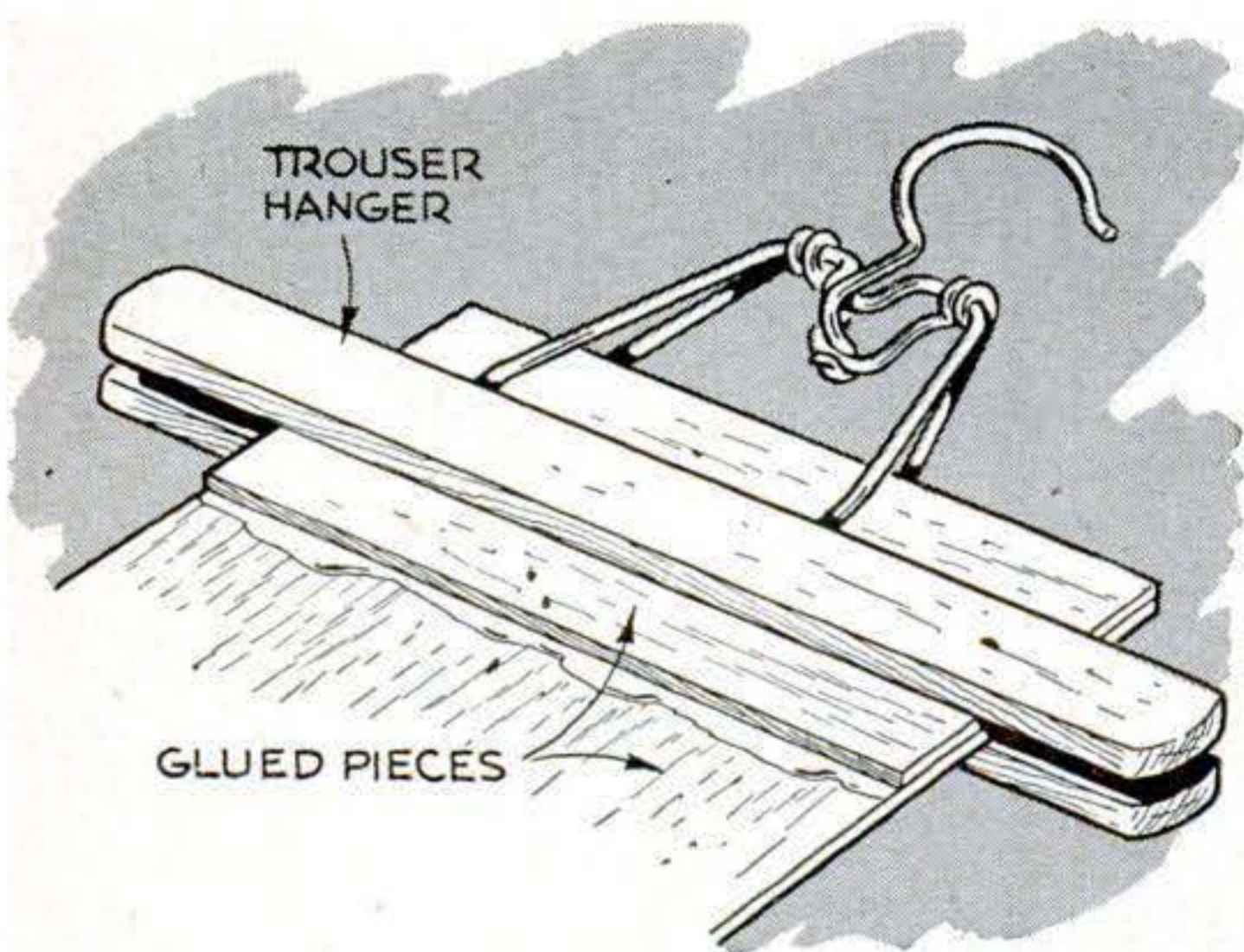
You Don't Need a Trailer if You Put Wheels on a Boat

IF YOUR boat has a sturdy keel and the distance to water isn't far, you can save investing in a trailer by putting wheels on the craft itself. But don't try it on a boat with a light frame. And check your state laws; you may need a trailer license.

Rear brackets shaped to the contour are bolted to the transom and screwed to the bottom. A trailer-hitch holder is bolted on the front. Calk all bolts.

Wheels fit the brackets like casters and are held by belt snaps. Swiveling is prevented by a plate under each bracket. All joints are welded.

When you reach the water, remove the belt snaps, unhook the trailer hitch, and push off.—Arvid Anderson, Racine, Wis.



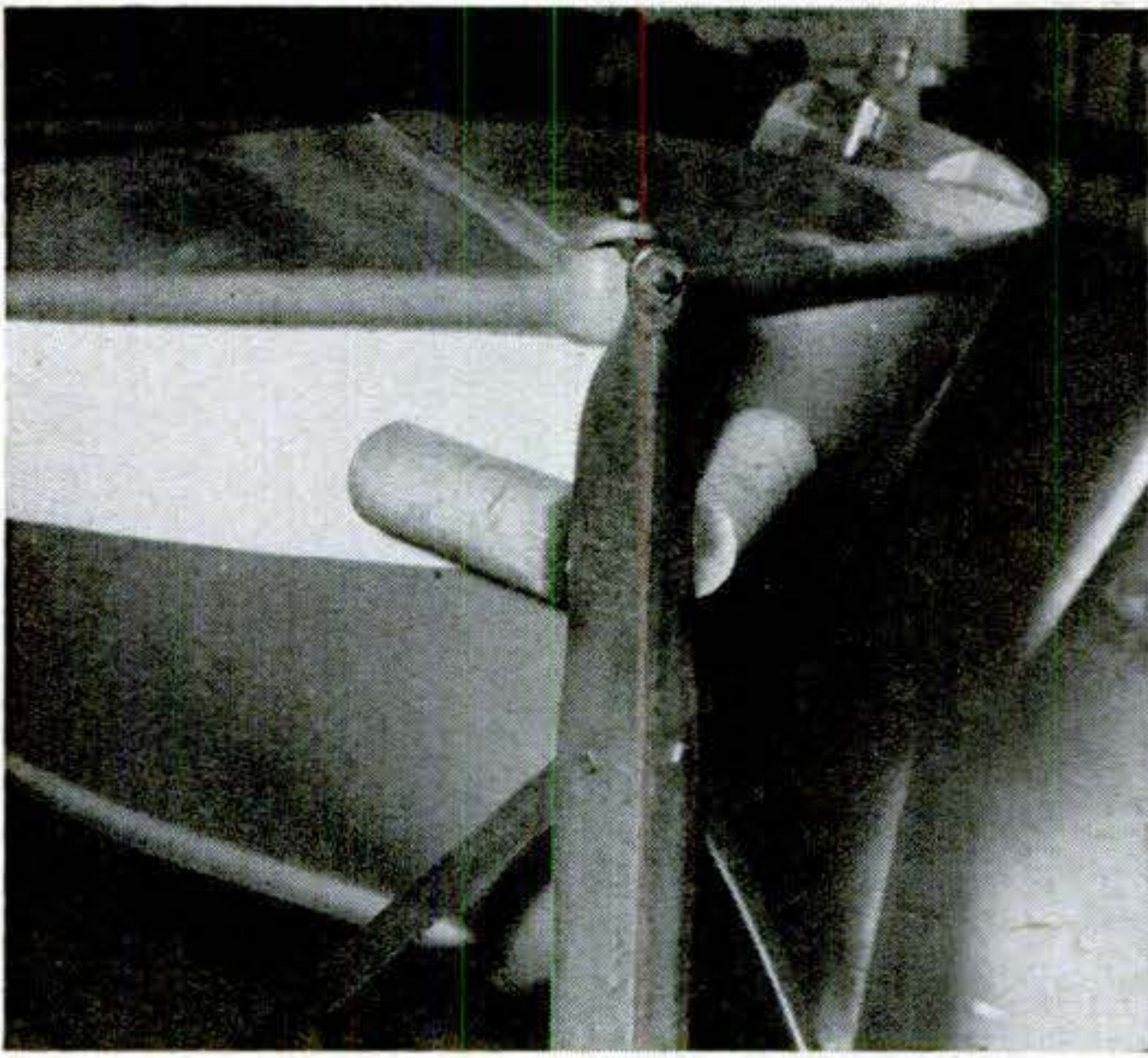
Hanger Grips Small Parts

IF YOU need an extra clamp for a light gluing job, try putting a trouser hanger to work. You'll find that it will hold small parts securely while the glue sets.



Saw Cuts Hold Drill on Tubing

THE bit won't slip as you drill tubing if you mark the hole center with a hacksawed cross. Start the bit where the lines meet.—Hugh Lineback, Stillwater, Okla.



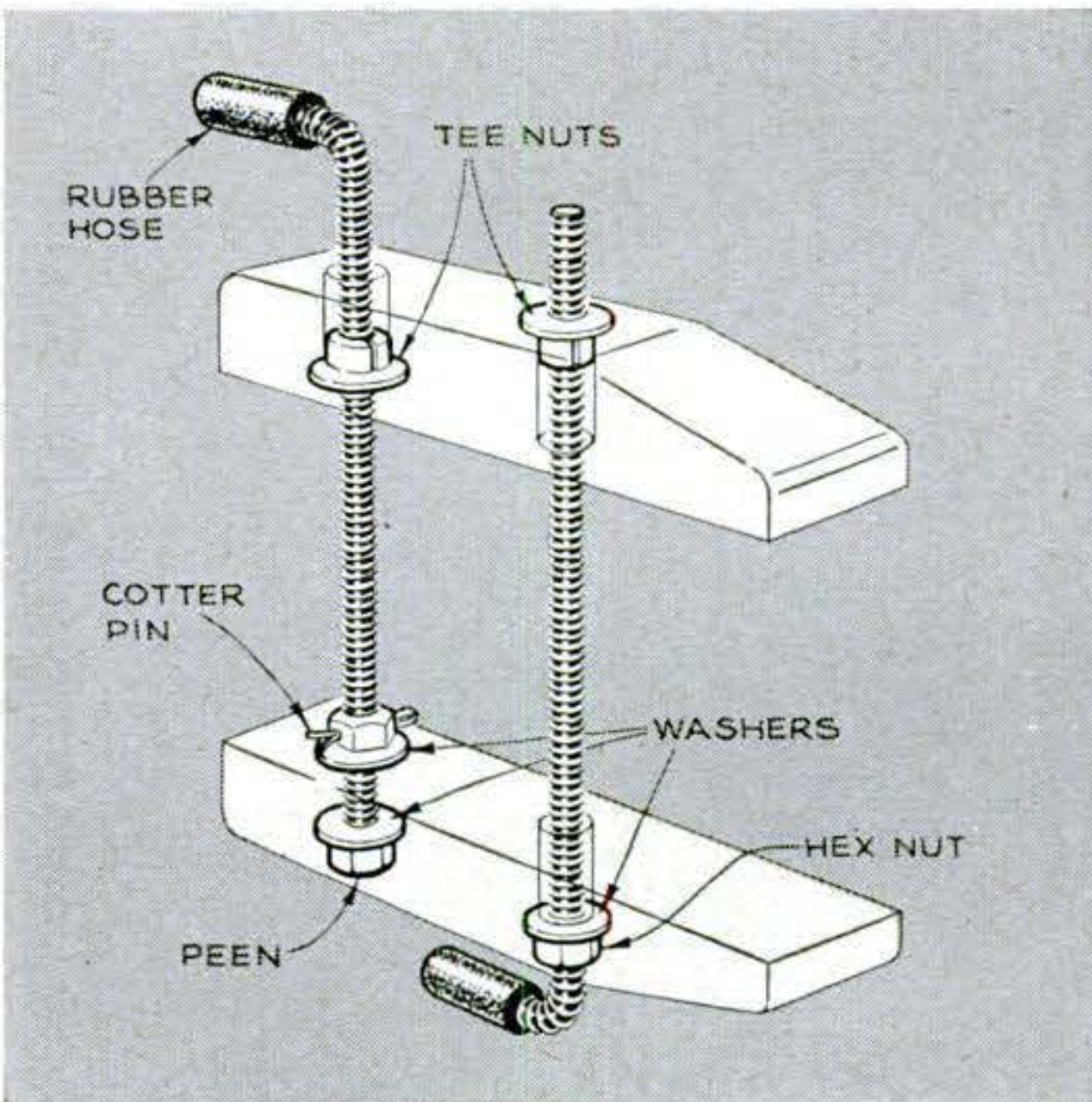
Wringer Rollers Protect Boat

Two rubber wringer rollers, cut in half and their shafts welded to a length of angle girder, will protect the bow of a boat carried on a trailer. You can anchor the boat with a hook bolt through the bow eye.—*Grover Brinkman, Okawville, Ill.*



Barrow Makes Portable Grill

WHIENEVER we decide to have a picnic in the back yard, we use my metal mortar barrow to build the fire in. With a piece of metal lath over the top, it makes a fine grill that can be rolled anywhere about the yard. When the picnic's over, we just wheel the barrow away and dump out the ashes.—*R. M. Woodbury, Natick, Mass.*



Want to Make Gluing Clamps?

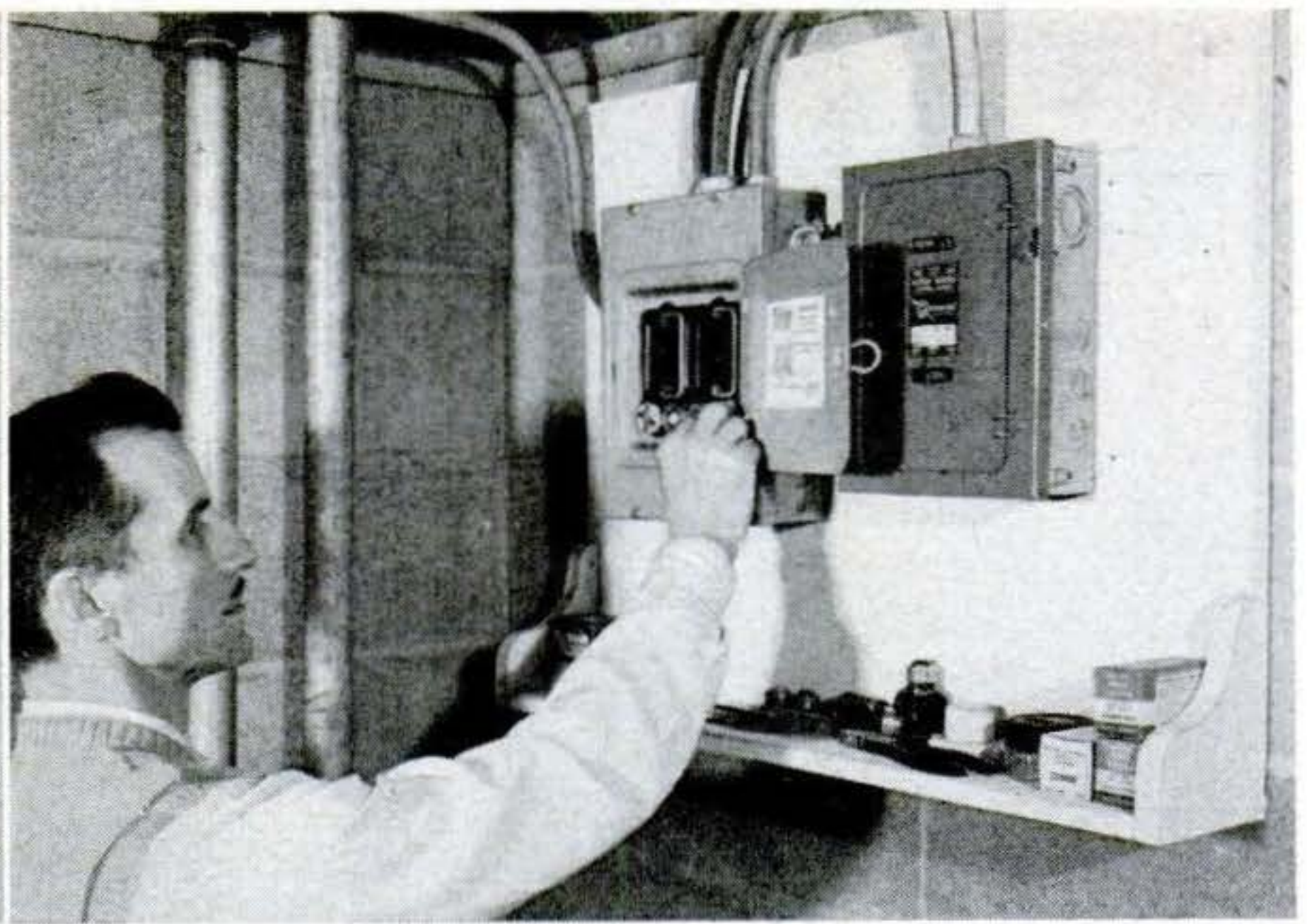
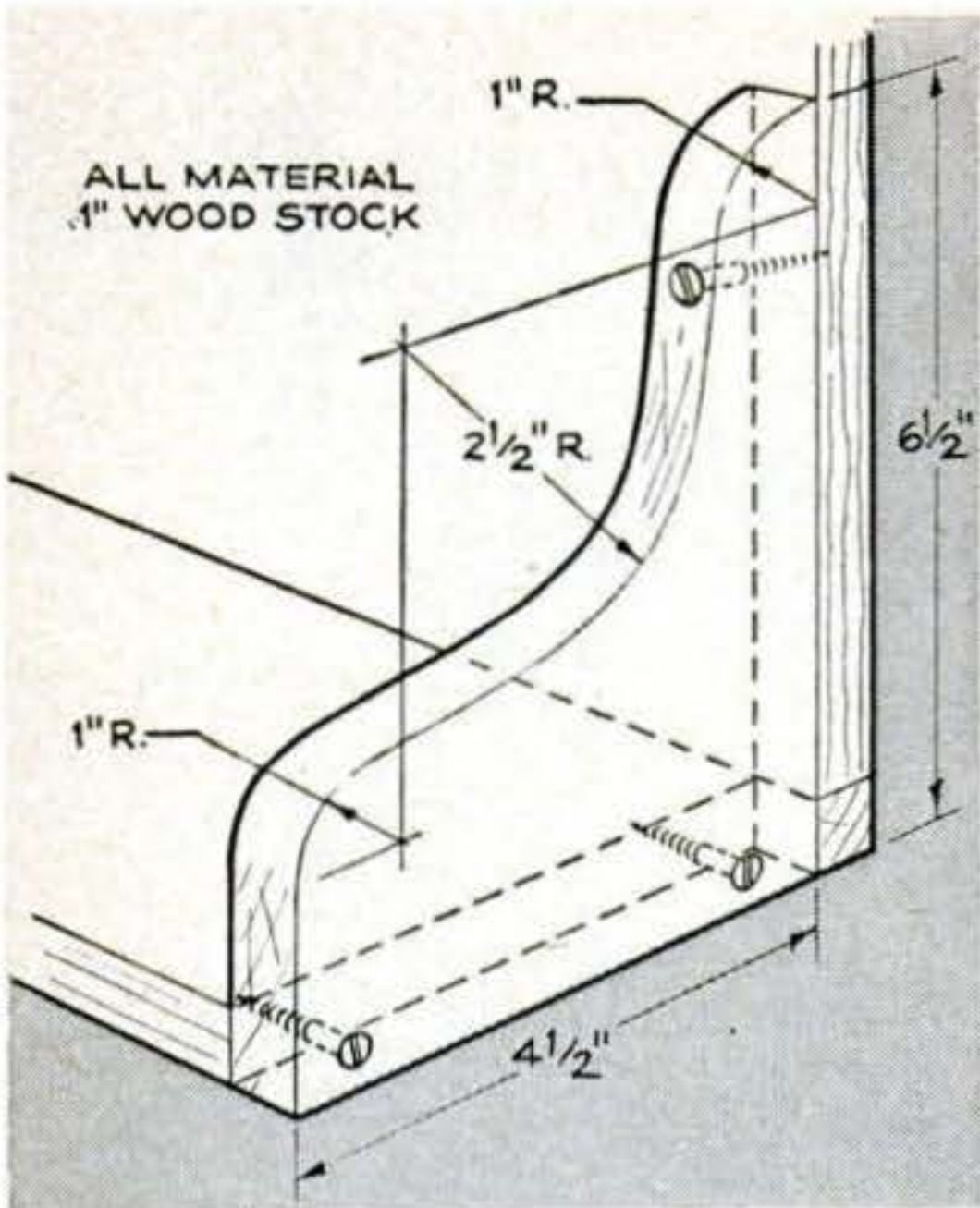
You can make a set of husky gluing clamps in an evening, using $5/16''$ threaded rods and Tee Nuts, both available at most hardware stores. Shape the clamp bars to any desired size from hardwood. Drill $7/16''$ holes through the upper bar to take the nuts, and $11/32''$ holes in the lower bar for the rods.

Heat and bend the ends of the rods to form handles, and arrange the nuts and washers as shown in the drawing.—*Randal B. Hathway, Thomaston, Conn.*



Pipe Braces Star-Drill Shank

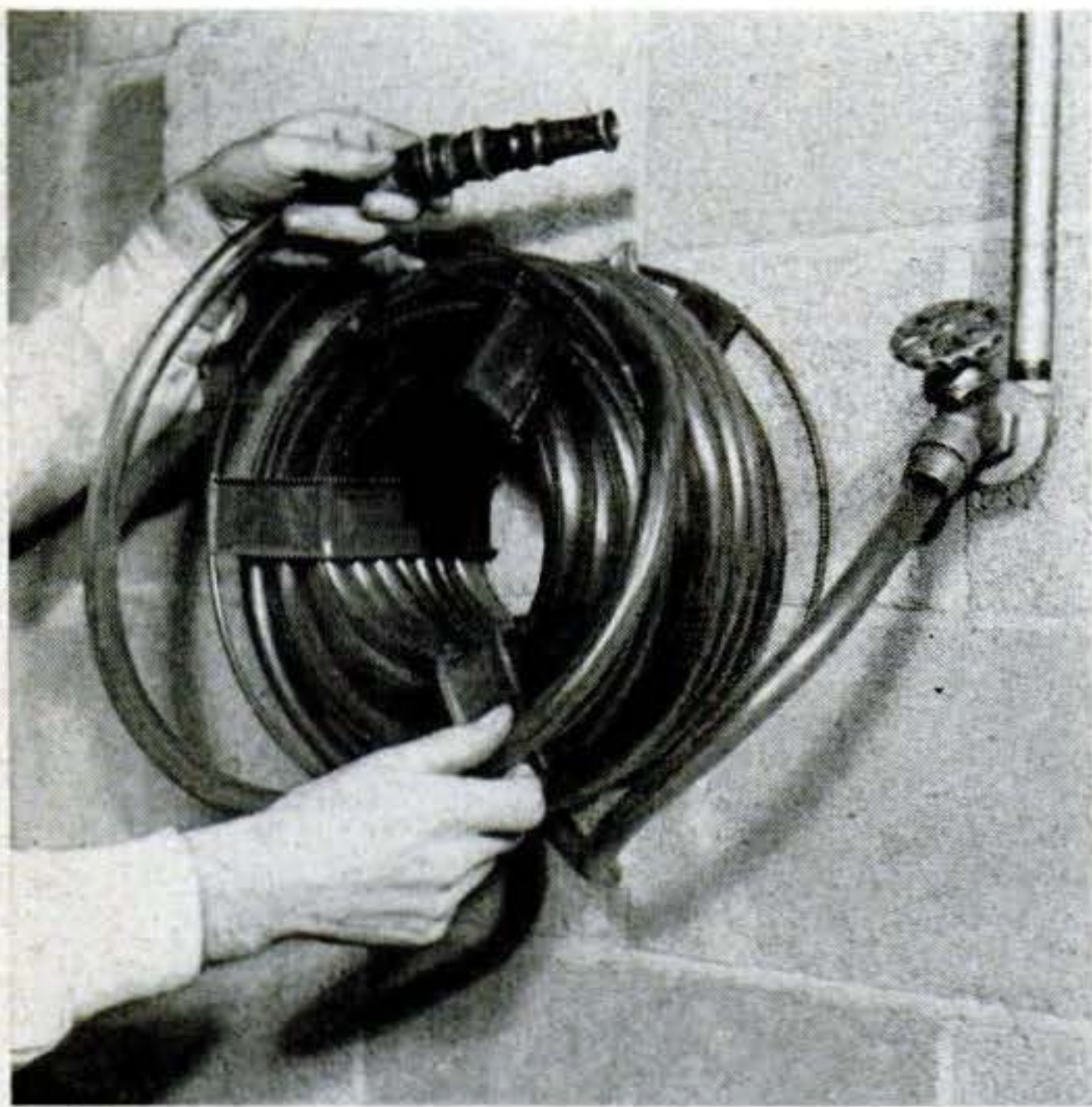
A PIECE of pipe will keep hammer blows from bending the long shank of a small star drill. You can wedge the pipe on the shank with wood for firm support, and knock it off again when the hole grows deep.—*Michael Ligocki, Gary, Ind.*



Household Electrical Needs Kept Handy on Fuse-Box Shelf

To store a convenient supply of fuses and other household electrical equipment, you can install a shelf on the panel on which the fuse boxes are mounted. Notch the ends

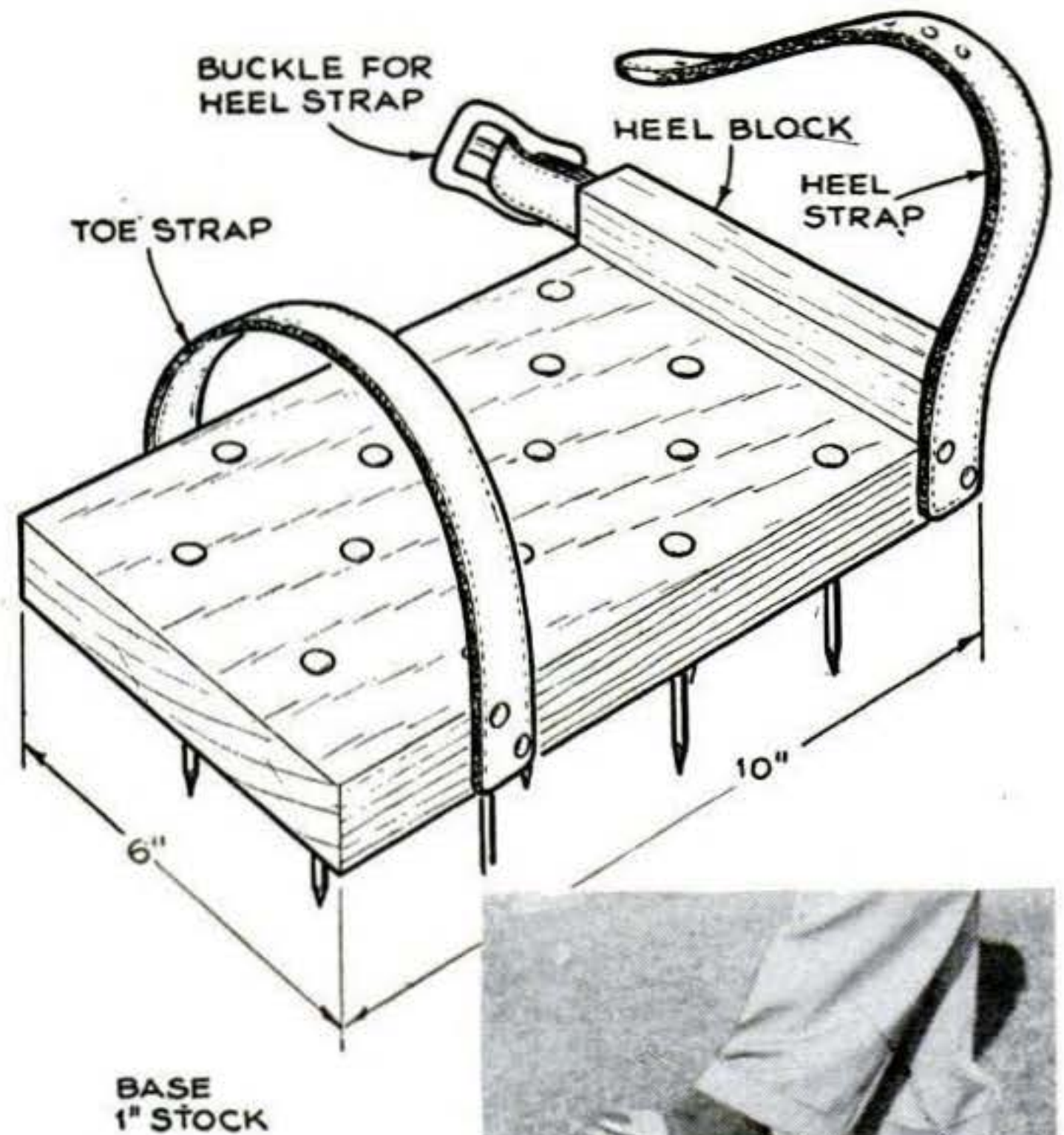
of a board for brackets, leaving a ledge at back to go under the bottom of the panel. Assemble the parts and attach with screws. —Michael Ligocki, Gary, Ind.



Hose Stored for Use on Fire

EMERGENCY fire protection can be given to your home by storing a garden hose on a reel in the basement stair well. Kept attached to the water supply, it is ready for instant use. When you need it for outdoor sprinkling, it is easily carried out to the garden or yard on the reel.

A 50' hose should be sufficient for a ranch-type house, 75' or 100' for one of two stories. For best protection install a water outlet near the stair well, and also keep extinguishers in strategic spots elsewhere in the house.



Lawn Aerators Fit on Shoes

You can aerate your lawn by walking around on these clogs. The holes let fertilizer or water reach the roots.

Eight-penny nails were driven through a piece of stock 1" by 6" by 10". Then 1/4" plywood was laid over to cover the nail-heads. The heel block is 1" scrap. The straps can be leather or any strong material. —R. V. Stewart, Cleveland.



It's fun to have a garden pool

Here's a project to wade into—a back-yard pond. Even a tiny one can add a lot to outdoor living.

By Darrell Huff

SPARKLING water will often turn an ordinary back yard into a charming recreation spot. A simple but carefully planned hole in the lawn can be used in three ways: As a wading pool for the children. Or as a decorative lily pond or fish pool. Or as a perfect sand box for the children.

The informal wading pool in the photo above

Four steps to a wading pool

1 USE ROPE OR HOSE to lay out free shape. Then dig a spoon-shaped depression about 2' deep, with sides sloping 45° and the bottom slanting toward a drain point. Chop out steps at one point to help tots enter. Install 1½" pipe and an elbow for the drain. Close the elbow with a plug so that dirt and concrete won't get in.



2 POUR MIXED CONCRETE, which should be dry enough to pack and stay on the shoulder slope. Trowel it to cover at least 4" deep (6" in freezing climates), leaving surface rough to bond well to next coat. Cover with wet burlap.



3 PLASTER COAT of sand - and - cement mortar is applied after the rough concrete has set no more than a day. Mix two parts of plaster sand to one of cement, with enough water to make it spread easily. Keep first surface wet as you trowel it on.



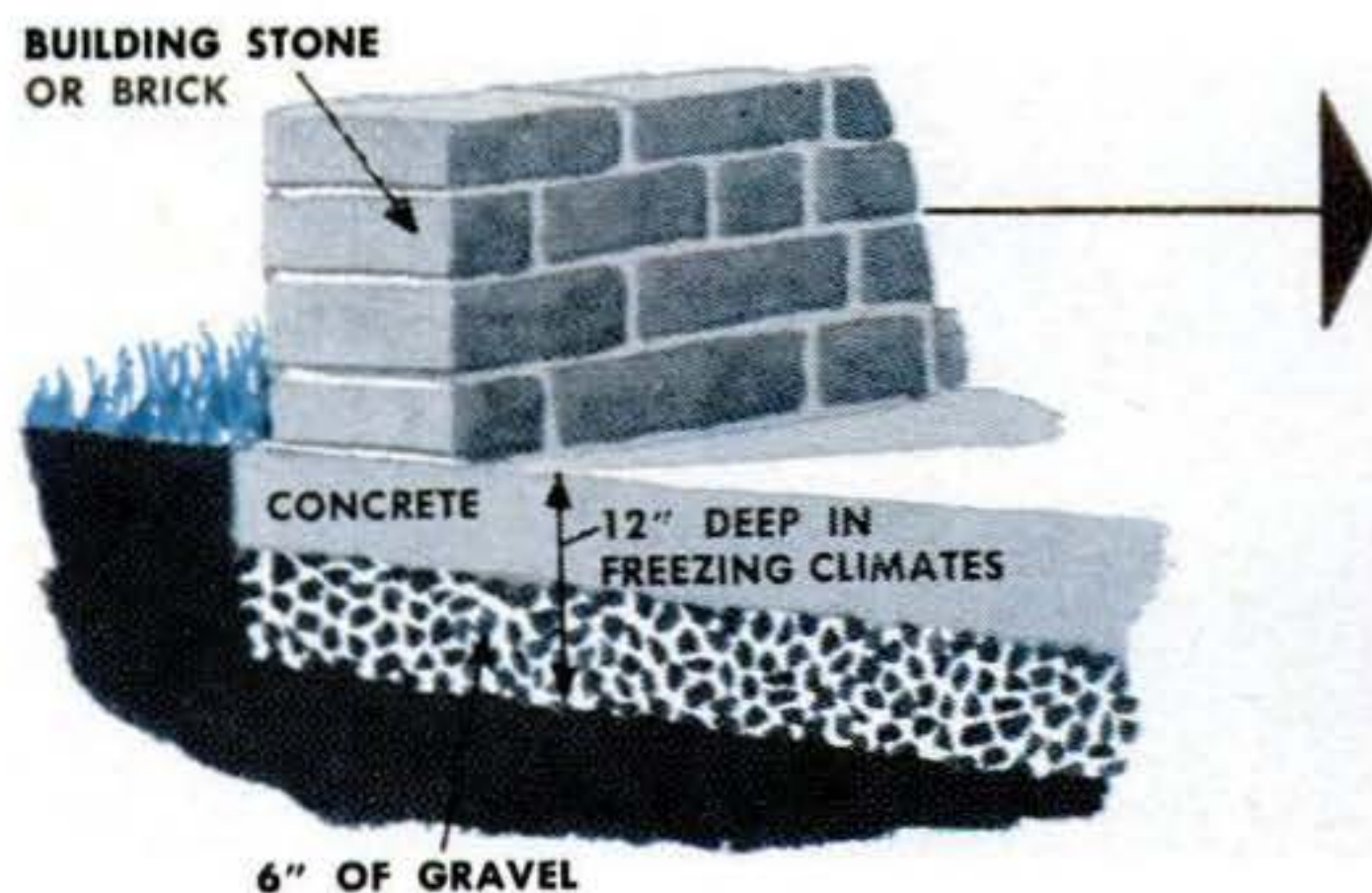
4 FOR A WHITE POOL, mix the plaster coat of white cement and white sand, sold for mixing glass-block mortar. Cure the concrete by keeping it damp for a week. Then, to paint it, treat with acid as described in the text, let dry, and apply rubber-base swimming-pool paint. It's easier if a helper picks up loose matter ahead of you with a vacuum cleaner.



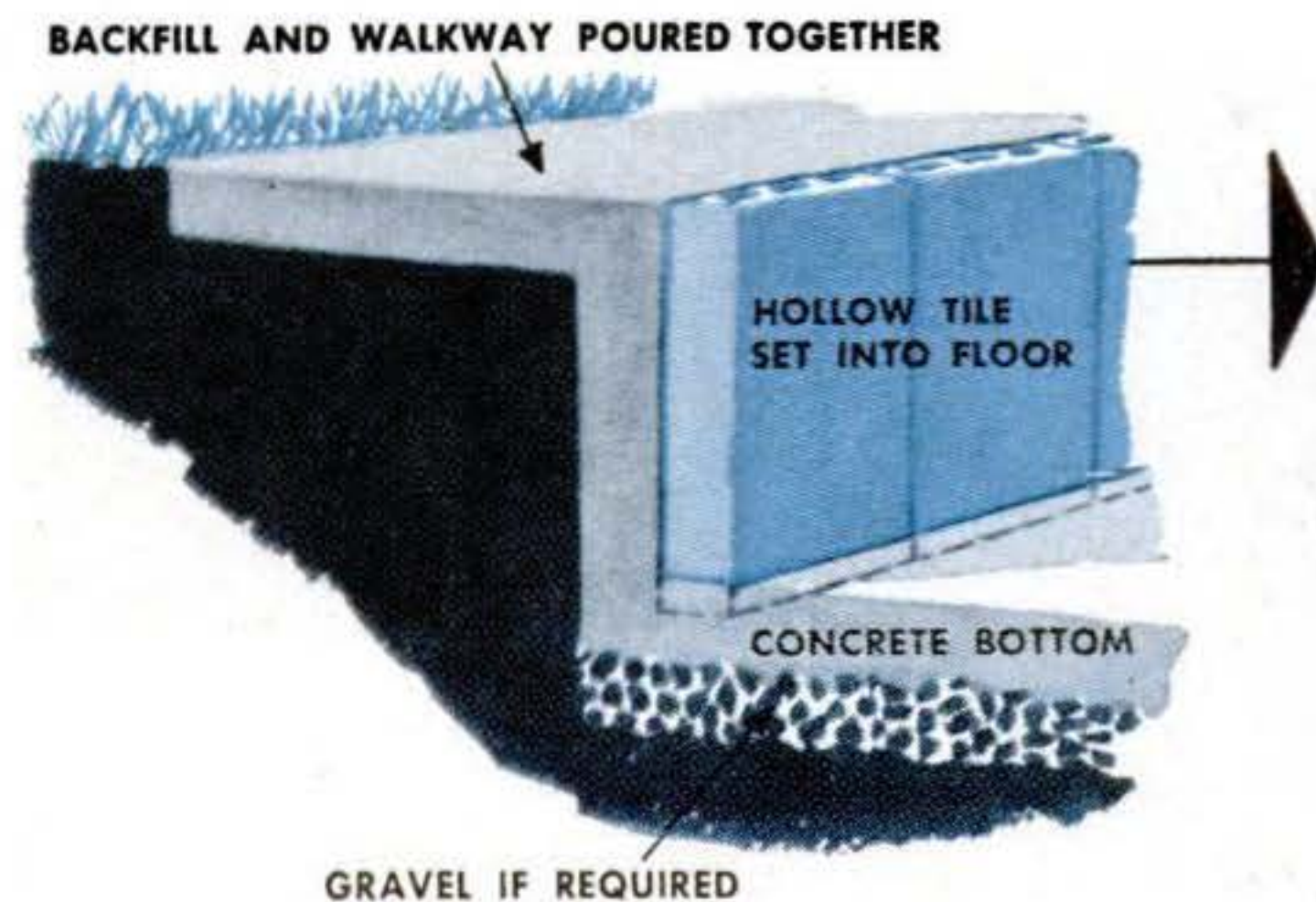
(and under construction at left) was built for less than \$15, and with an equally modest outlay in time and effort.

For purely decorative purposes, a pool need hold only a few inches of water. One for fish and plants should be from a foot to two feet deep, but it can be rough and rustic. A wading pool should be from one to 1½ feet deep, with smooth sides to protect small feet and make it easy to clean.

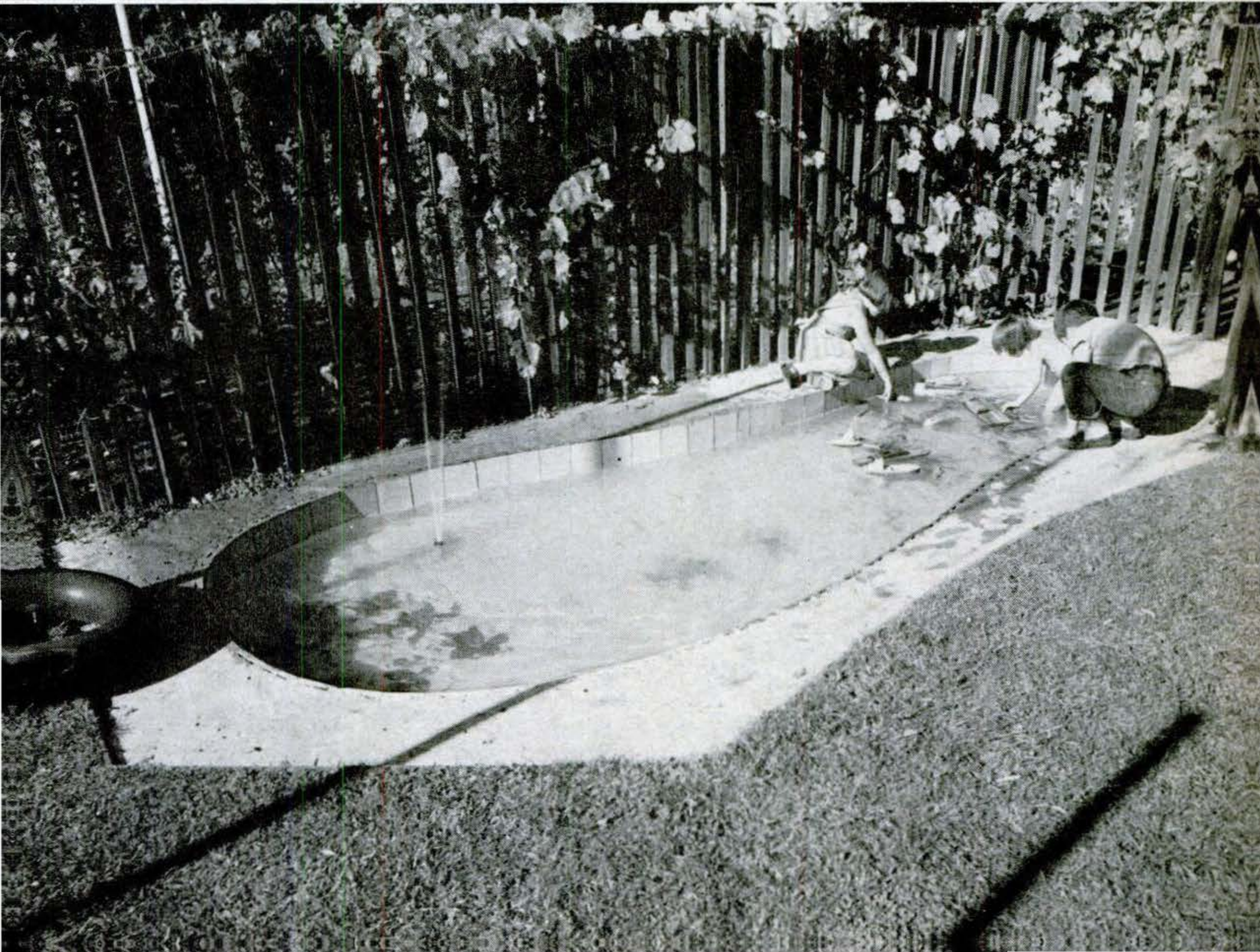
To lay out straight-sided shapes, drive stakes at the corners and run string between them. You can mark out a right-angle corner accurately by using the



ABOVE-GROUND POOL can be made by laying up brick or stone walls on a concrete slab. Excavate deeply enough for a 6" layer of gravel beneath slab in cold areas. Trowel 4" to 6" of concrete smooth and cure it by keeping it damp a few days. Use mortar to build the walls, just as you would for a house.



HOLLOW TILE can be used to make a big wading pool like this with a minimum of effort. Dig a straight-sided excavation 2" deeper than length of the tile units and 4" bigger all around than the pool is to be. Mark out and dig the walkway 4" deep. Pour the pool floor and stick the tile in, well inside the excavation walls. Trowel smooth; then let the floor cure for several days. Finally, backfill with concrete and at the same time pour concrete for the walk.



3-4-5-formula shown in drawing at right.

To mark out a circular pool, drive a stake at the proposed center, loop string over a nail in the top of the stake, and swing the string like a compass, driving stakes as you go. For a free form, just toss down a length of garden hose and rattle it around to suit your fancy.

Plan your plumbing. You can set the whole pool below ground level, or build it like a well housing, mostly above ground. If the pool is to have vertical sides, begin by excavating to approximate size. Where soil drains poorly or winters are cold, dig 6" deeper than pool depth and fill with 4" to 6" of gravel or broken rock, tamped hard.

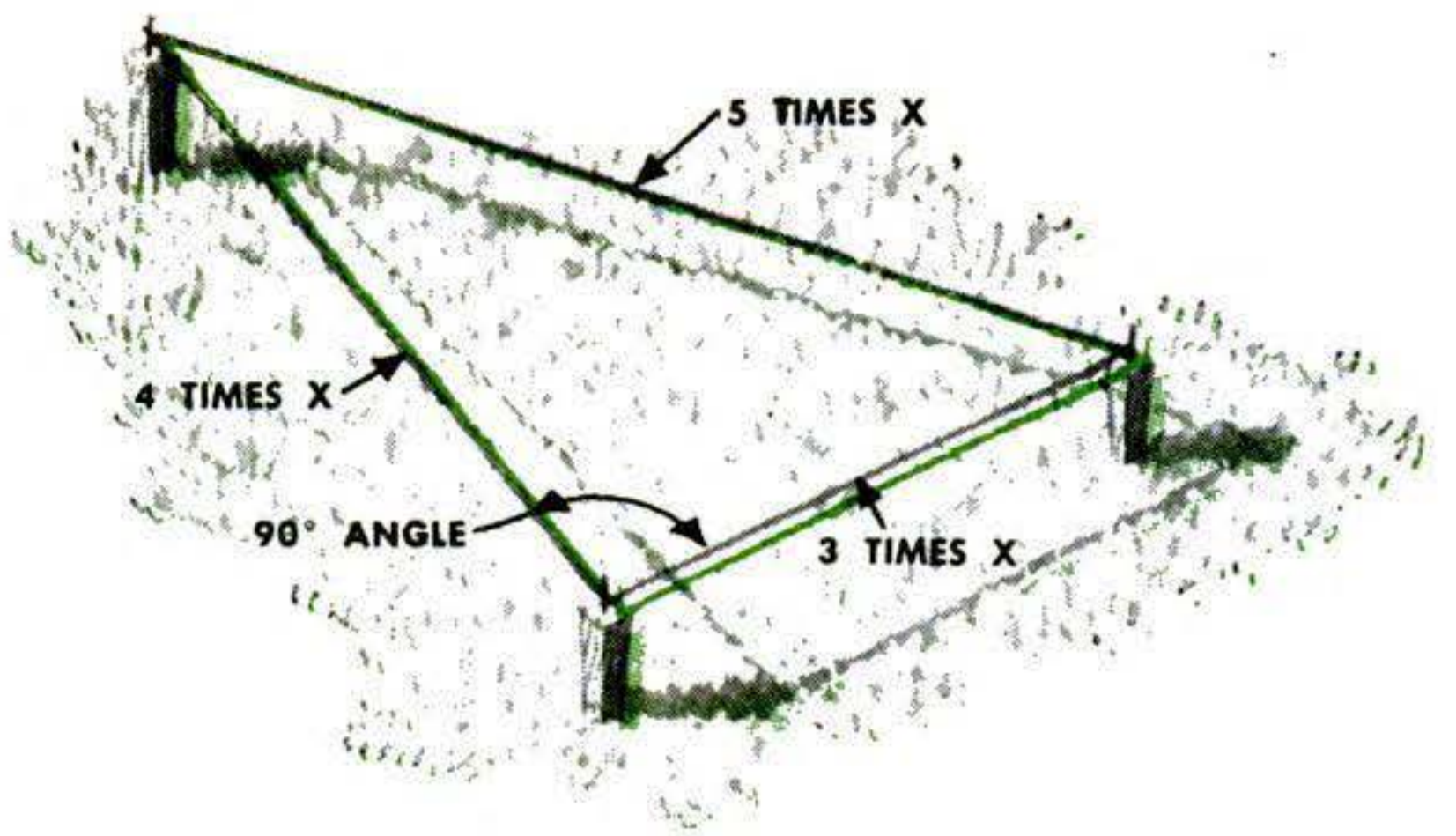
A fish pond should rarely need re-filling, but a wading pool may have to be cleaned out every day during the hot season. A water-supply line saves the trouble of handling a hose. But be sure that its opening is well above the highest level at which water can stand in the pool. Having the opening below the surface might permit contaminated water to be drawn back into the line.

Draining is simple when the surrounding ground is lower than the floor of the pool. You need only install a drain and enough pipe to lead waste water wherever you wish. Or you can omit the drain and use a siphon or jet pump to lift the water over the edge of the pool.

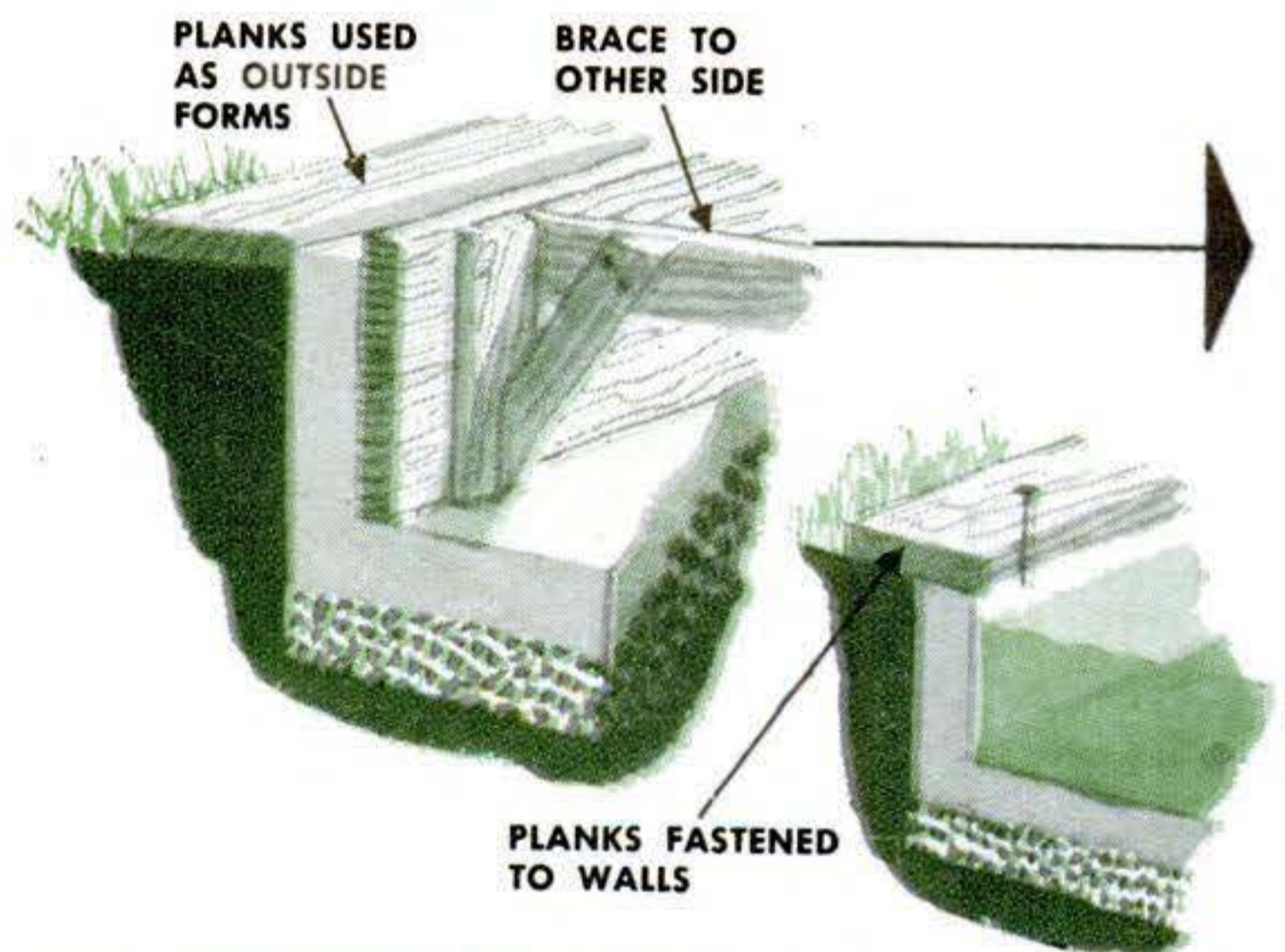
But if the pool is in a low spot, you must either pump it out or put in a drain running to a dry well. This may be made as in the drawing.

The simplest kind of drain is a galvanized-pipe elbow set, open end upward, flush with what will be the surface of the pool floor, and at its lowest point. A standard bathtub stopper can be used to plug a 1 1/4" elbow. In a fish or garden pond, which will rarely be drained, you can close the elbow with a pipe plug, or provide an overflow by screwing in a suitable length of pipe. To drain the pool, all you will have to do is unscrew the pipe.

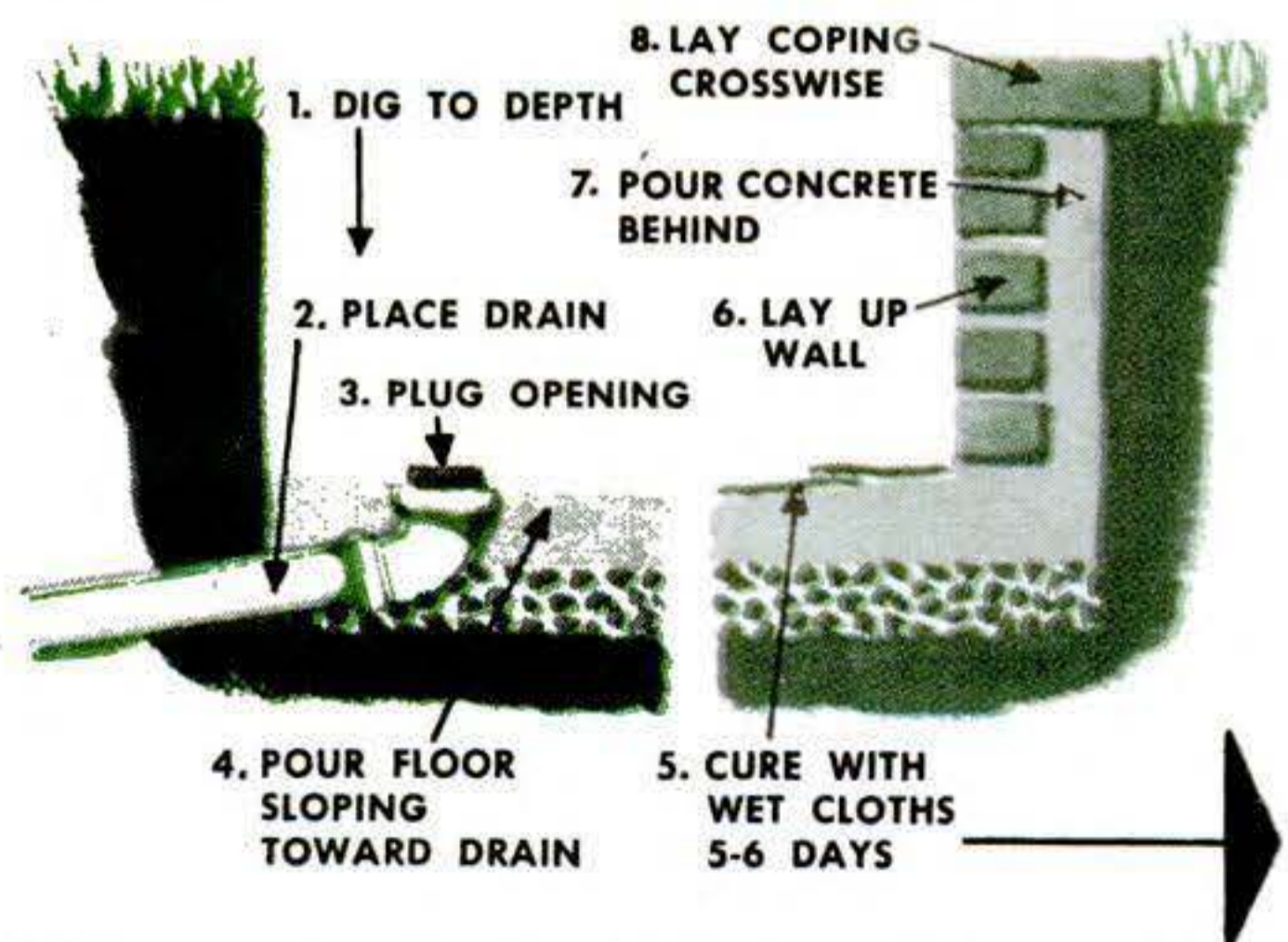
Reinforce the concrete. Ready-mixed concrete saves time and labor. For mixing your own, use a power mixer, mortar



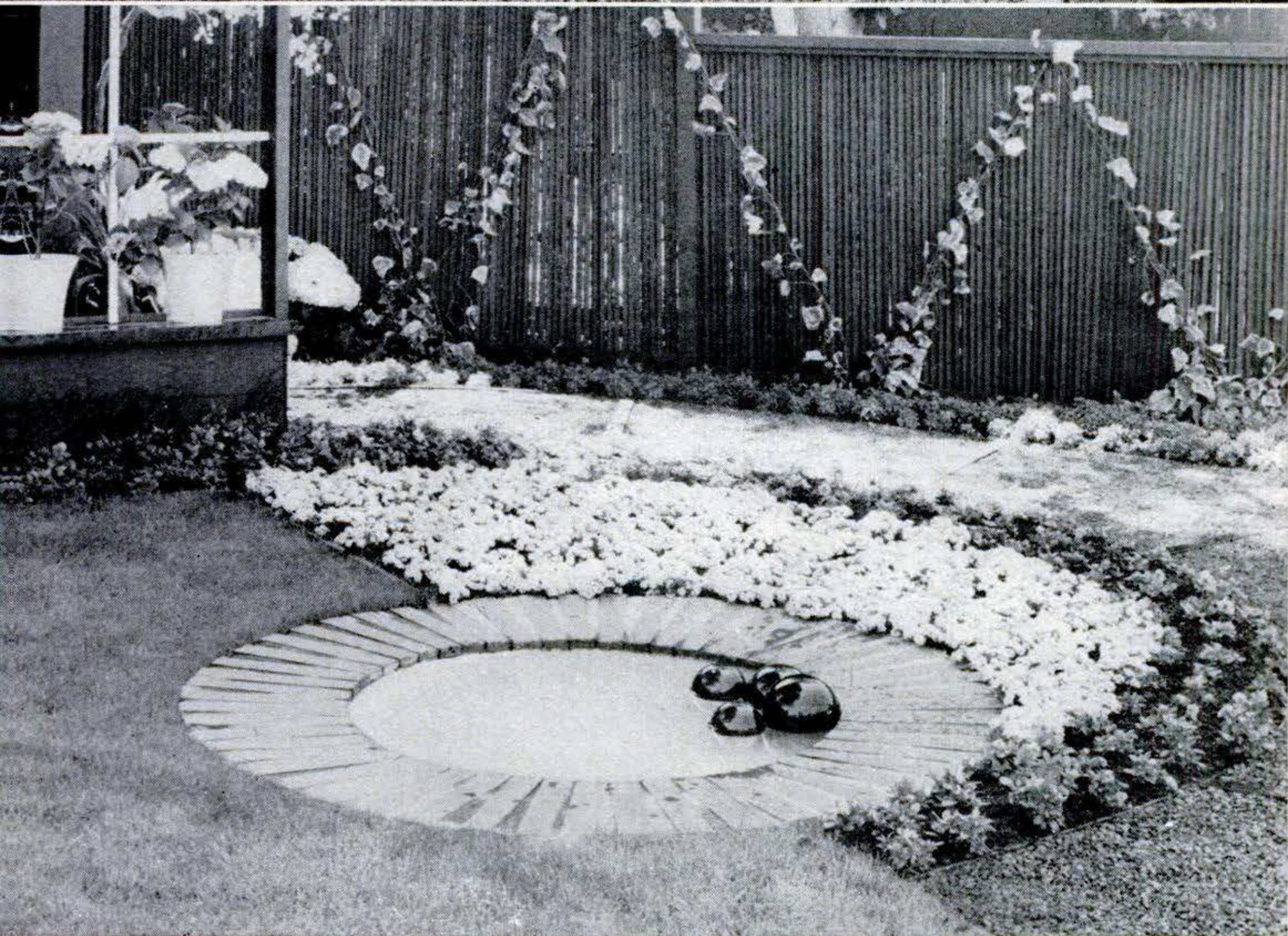
TO LAY OUT A RIGHT ANGLE, drive two stakes a distance apart you can measure as a multiple of 3 (3', 6' or 9'). Measure a cord the same multiple of 4 in length, and another the same multiple of 5. Attach one cord to each driven stake. Bring the free ends together. Where they meet, drive a third stake. The two shorter sides will form a 90° angle.



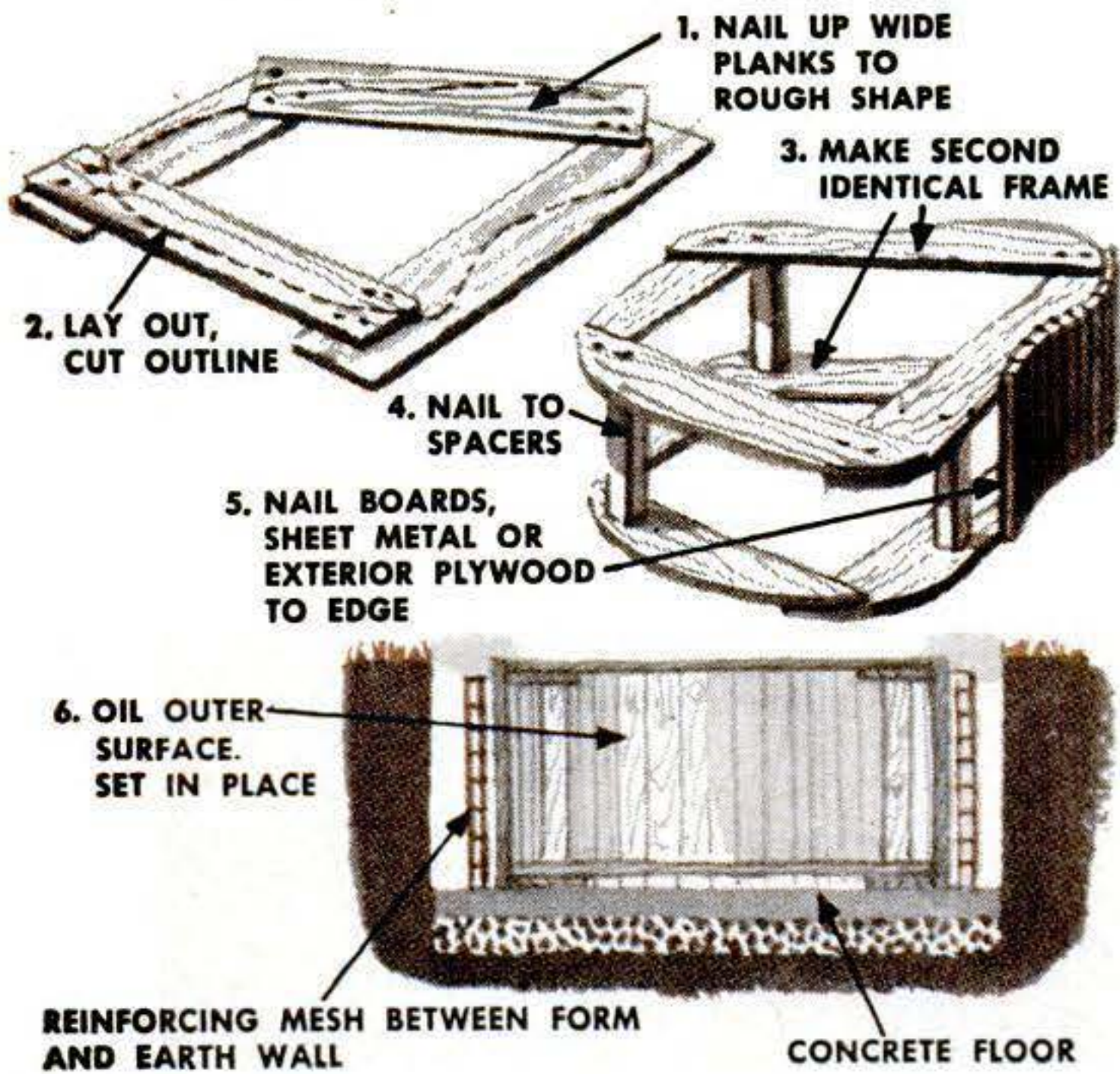
BOLD TRIANGULAR SHAPE (facing page) makes a striking wading pool, fine for a terrace location. To build one like this, cast a concrete floor. Then insert forms to pour the sides, as in the drawing above. Top with three-by-twelve planks of weather-resistant wood, anchoring them with bolts set into the concrete walls while wet, or with masonry nails.



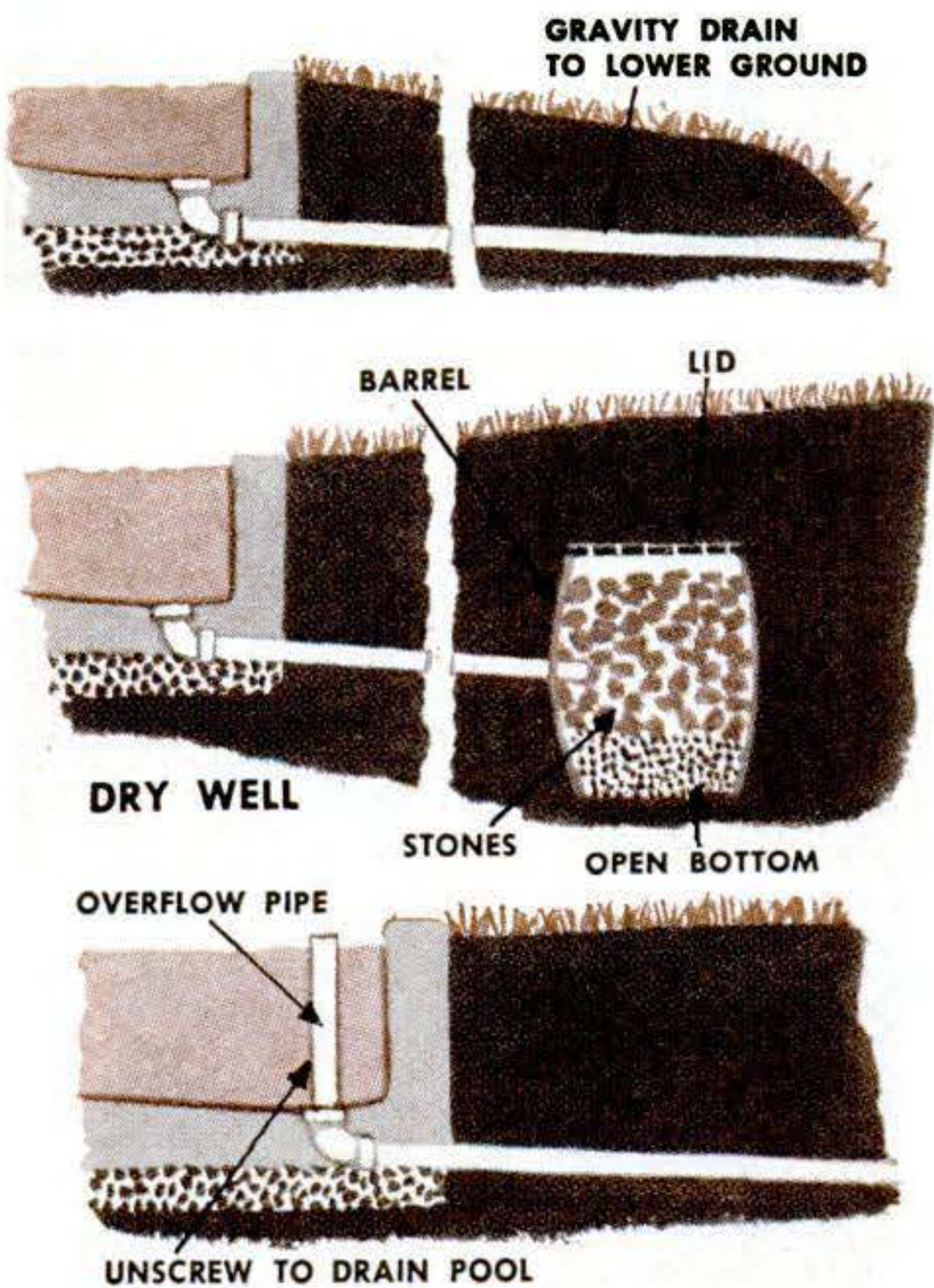
SUNKEN POOL can be built as above, with mortar used between bricks, or only to backfill behind close-laid brick. The coping of the pool at right consists of 2' lengths of redwood two-by-fours, laid in mortar and painted white.



Building an inside form



Pool plumbing is simple



ELECTRIC PUMP drains pool independently of gravity. This one comes ready to plug in for about \$16. It can be used partly or wholly submerged, taking less electricity than a 100-watt bulb. Smaller, cheaper pumps are also available. Besides draining, a pump can circulate water to a higher point to run back as a miniature fall.

box, or wheelbarrow having a metal body.

First thoroughly dry-mix one bag or other measure of Portland cement to two of clean, sharp sand and three of crushed stone or gravel. Gradually add water until the mix is uniformly moist.

Pour and spread concrete evenly to half the floor thickness desired. Then place $\frac{3}{8}$ " reinforcing bars or heavy mesh on it and pour the other half, to a total of 4" thickness in warm climates, 6" where freezing occurs. For a sloping pool, that's all you do.

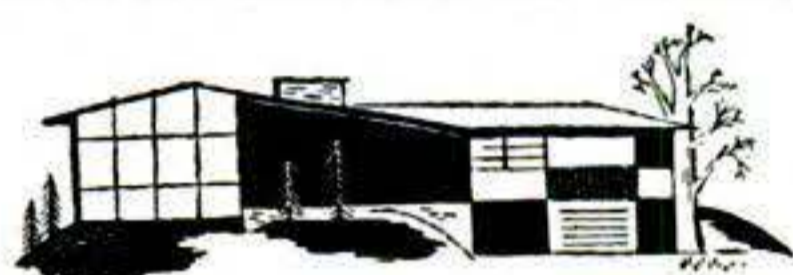
Vertical-wall pools are a bit harder. One way to make the walls is to lay up stone, brick or blocks with mortar, as for a building. Coating them inside with a rich cement mixture will make them hold water. Brick can also be laid dry, without mortar between. Lay one or two courses at a time, a few inches inside the excavation walls. Pour concrete between the brick and earth walls every other course or so. With smooth brick, this method can be used even for wading pools.

Should you want to cast concrete walls, you will need an inner form in the shape of a hollow box. For a rectangular or triangular pool, this can be built of boards. For a round, oval or free-form pool, build a top and bottom of 1" lumber. Nail sheet iron, plywood or planks to these as in the drawing. Paint the form with oil to make it release easily.

Concrete that is allowed to dry out and set quickly will be weak. Leave forms in place two days. Cover exposed concrete with wet burlap and sprinkle it occasionally for a few days.

Add a touch of color. A wading pool is easier to keep clean, as well as prettier, if finished with a good swimming-pool paint, for this discourages the growth of algae. One rubber-base type comes in several colors.

When the concrete has thoroughly set, wash out the new pool. Then etch the surface by scrubbing it with a 10% (1:10) solution of muriatic acid. Flush again with clear water and let it dry thoroughly. Apply two coats of the paint. **END**



Suburban Home Ideas

A storage fence for your tools

STORAGE walls in modern homes are so shallow you don't miss the space they use. Same with this storage fence. It is just a wide place in a fence—wide enough to store outdoor tools, yet narrow enough for minimum loss of yard space.

Ideally, a storage fence should utilize the same materials as the fence. It will then look like an extension of the fence instead of a separate, conspicuous unit.

Begin with a concrete slab. Make it the size and shape you like, remembering that the longer and narrower it is the less it will jut out into the yard.

Set standard sill bolts in the concrete every 4' while it is wet. They should stick up far enough to permit bolting on a two-by-four sill all the way around.

Nail two-by-four uprights to the sill 24" apart except in the door space. Top off these studs with two-by-fours, and

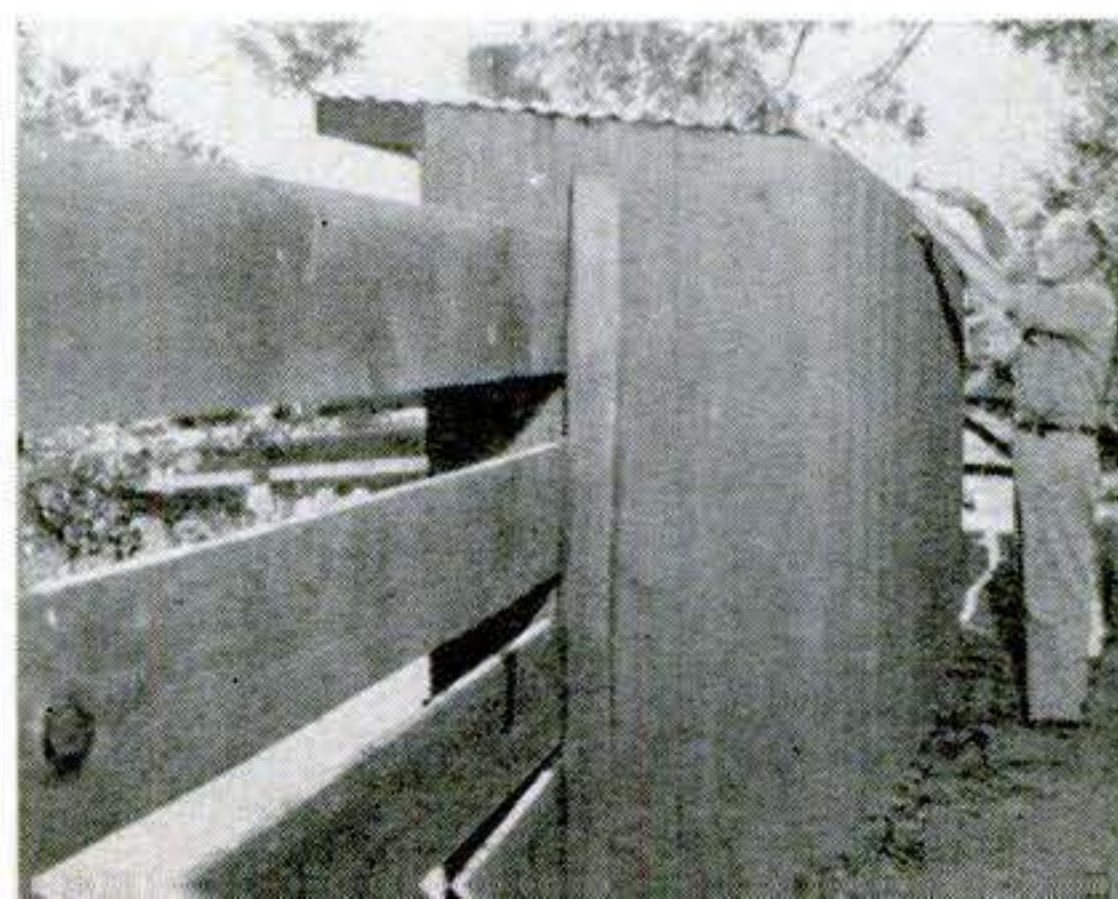
add two-by-four rafters long enough to provide a front overhang. Give the roof a slight pitch.

There's little point in using house-type double-wall construction. The logical material for walls is whatever has been used nearby—for the fence, of which it is part, or for your house.

If you make one side all doors, you'll find access easy. These can be made of boards or exterior plywood.

Interior arrangements are a personal matter, but usual requirements are plenty of shelves for paint and garden items and a compartment for large tools. You may also want a wide, low shelf for mixing chemicals and doing other garden chores under the roof.

THE SAME MATERIALS were used to build both fence and storage unit. The latter is 3' deep with a 12" overhang. A single sheet of corrugated aluminum 4' wide covers roof.





Does your

By F. A. Strenge

YOU put a tight roof on your house to keep rain out. But are you sure that your walls are equally rainproof?

There's a good chance that they aren't, science has found, if the walls are conventional painted wood siding. The rain doesn't get inside the house. But it does get inside the walls. And once there, it can blister the paint and discolor your house with unsightly streaks and nail rust.

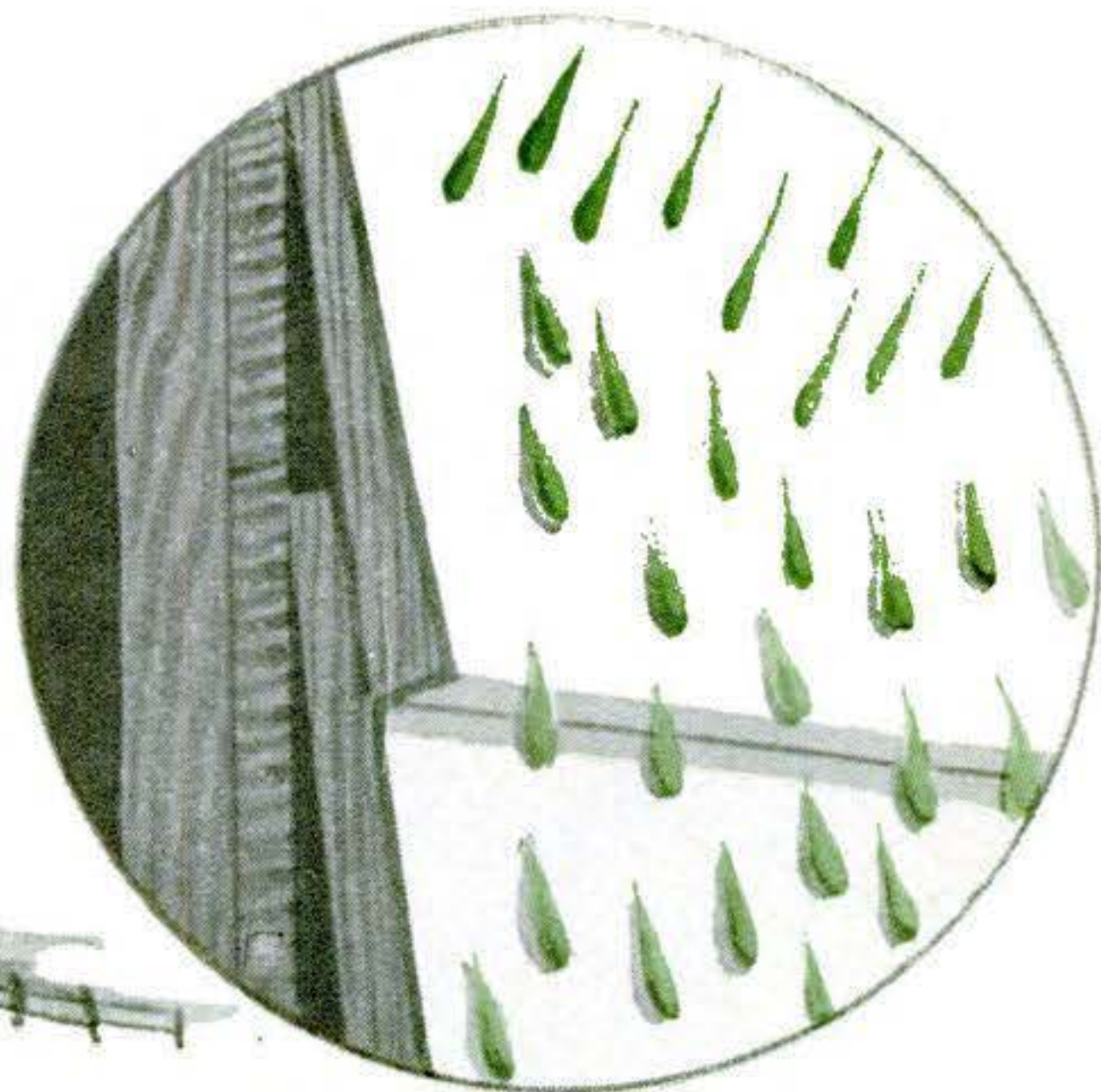
Capillary attraction is the culprit. This is the action that can make a liquid in contact with a solid flow uphill. In a home, raindrops climb *upward* under the siding.

This startling discovery was made in a new series of tests carried out at the U.S. Forest Products Laboratory, Madison, Wis., as part of a long-range study of ways to guard wood from decay and insects.

Of course, weatherboard blisters and stains that show up in the Northern states along toward spring may be caused by condensation, or ice that has



Rain water can climb up under wood siding, scientists report. The treatment? Water repellent.



Suburban Home Ideas



home need a raincoat?

dammed up the eaves and the gutters.

But these lines of moisture attack have been pretty well turned back by modern construction methods. Properly primed-and-sealed interior walls make vapor barriers that prevent inside warm air from getting through to cold outer walls where its moisture could condense. And adequate flashing and low-hung gutters greatly reduce the chances of water entering at the eave line.

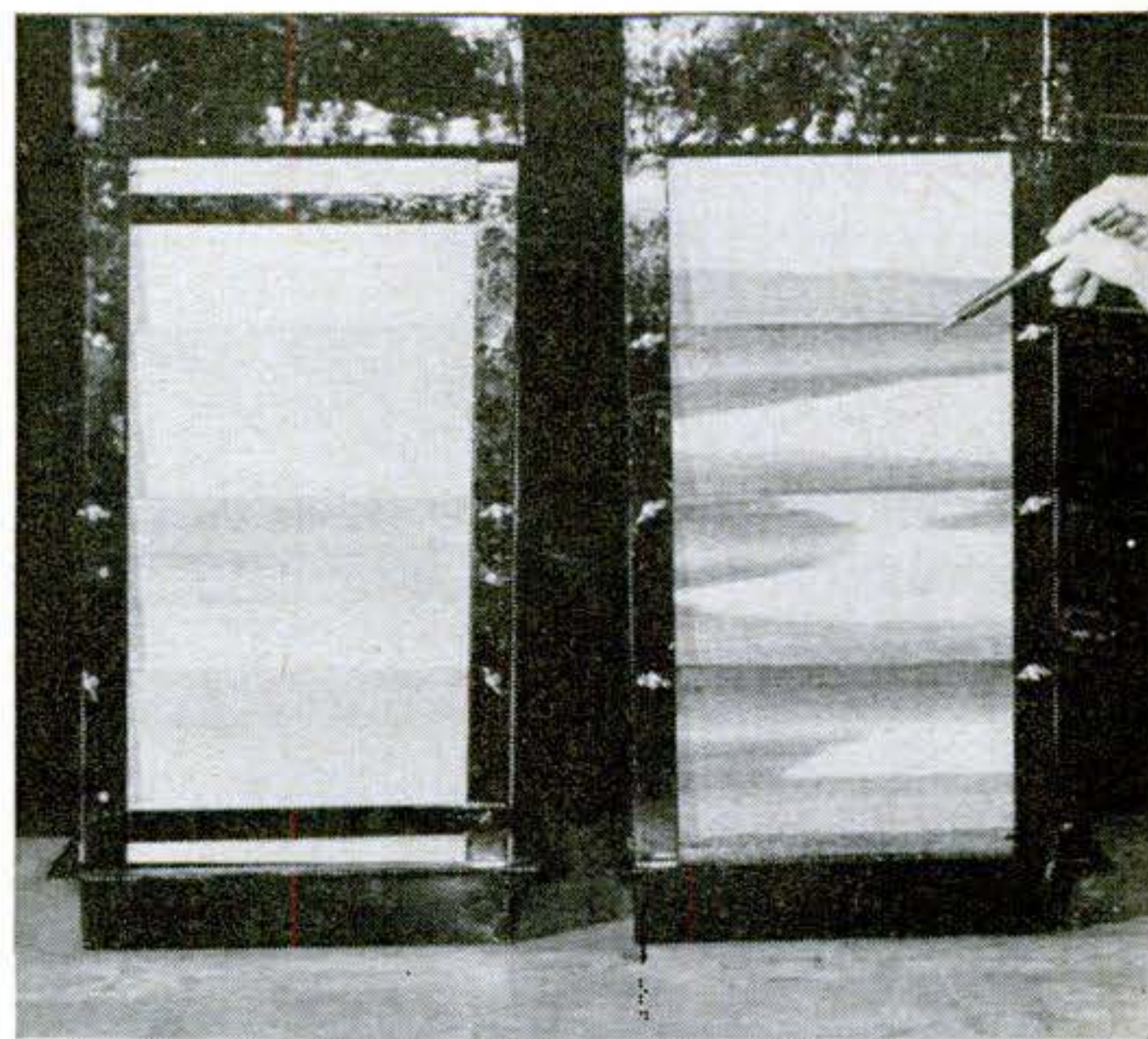
Lap joints are the Achilles' heel. In the Madison tests, scientists exposed siding panels to running-water and high-velocity spray tests. They found that where one course of bevel siding overlapped the one below, the joints soaked up water like sponges.

That was capillary attraction at work. Even the smallest crevice between boards offered a toehold for moisture to start its upward climb.

On a newly painted house, the chances are good that the overlap is covered with a paint film. But in a year or two the film cracks open and rain water starts up. Once behind the siding it "wants out" and works back through the siding until

it hits the painted surface. There it is blocked, but only until it can build up enough pressure to raise those blisters.

Some of the water that gets behind the siding may also drip out again through the same cracks that let it in; only this time it carries stains from the wood and



CONTINUOUS FLOW OF WATER over these painted panels produced dark stains on the one at right, showing that moisture had crept in at the lap joints. "Raincoat" of water-repellent preservative on its mate prevented capillary attraction, kept it unblemished.



APPLYING WATER-REPELLENT PRESERVATIVE to unpainted wood gives it a slippery surface that makes capillary attraction impossible. Brush liquid on exposed wood and into all butt and lap joints. Don't overlook the lines where old paint and wood meet.



FINAL STEP. Wipe off excess water-repellent preservative with a rag dampened with paint thinner and wait a day or two before applying new paint. If you are building a new home, have your contractor dip the siding and trim in the chemical before he puts them up.

building paper with it. Those streaky stains are the telltale signs that prove conclusively that water is getting back of your siding.

The treatment. Fortunately, the Forest Products Laboratory tests went further than just analyzing the extent of damage caused by capillary attraction. They proved that there is a simple and effective way to arm wood-sided houses against it.

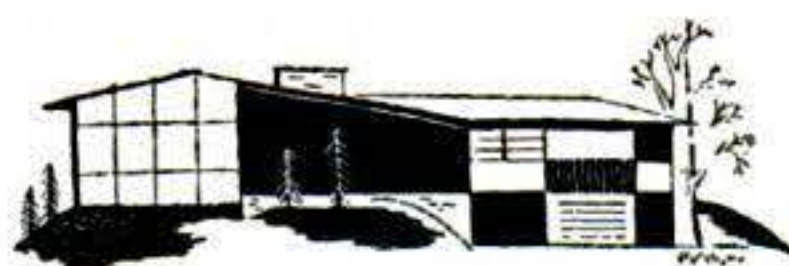
The armor is water-repellent preservative, now widely sold by lumber dealers. Trade names vary. But a good water-repellent preservative should have the following ingredients, in about the amounts listed: seven to 10 percent water repellents, sometimes called "inert ingredients" on labels; five percent pentachlorophenol ("Penta"), or other chlorinated phenols; and 85 to 88 percent mineral spirits. Wood preservatives that don't contain water repellents are not effective in blocking rainwater, so be sure to buy the kind that contains them. The label should tell.

Applying the preservative. If you are building a new house, the Forest Products Laboratory recommends that you tell your contractor to soak or dip the siding—and the exterior trim, too—in a

trough of water-repellent preservative. Or do it yourself. Brushing helps, although this is not as effective as dipping. If the siding is already in place, brush the water-repellent preservative on liberally, paying special attention to those overlap joints. What the chemical does here is to make the wood, just beyond those points in the paint film which may later develop cracks, too slippery for water to climb over.

If your house needs repainting because the paint has blistered and is peeling off, do the usual scraping and sanding job. Then, before applying new paint, brush the preservative into each overlap joint and into all end joints where siding boards butt together. Along window and door trim and at house corners are other butt joints that should get the treatment, too. It's also worth while to seal joints in window and door trim with water-repellent preservative, especially if the old paint has loosened.

Any excess that runs down over the paint should be wiped off with a cloth that has been wetted with a paint thinner. A day or so later you can repaint, with reasonable assurance that the new job will look shipshape for a long time to come. END



The easy way to pave a terrace



Tamping bricks or other paving material in sand gives a solid surface without a bit of cement.

TERRACES are a popular feature of modern suburban living. You can have one, too—easier than you think.

Given a reasonably level area, you can create a solid terrace without even a jigger of cement. Just set bricks, tiles, flagstones or other paving materials in sand and tamp them down. The method has been used for years to make walks.

The common brick, with dimensions around 2½" by 4" by 8", is commonly set flat but may be placed on edge. It takes 450 to cover 100 square feet. Five cubic feet of sand will cover the same area to the depth of one inch.

First grade the area. A pitch of at

least one inch in six feet is recommended for good drainage.

A border is needed to hold the job together. Bricks set in mortar make a fine edging. So does a ribbon of concrete. Redwood two-by-fours are a third possibility.

Laying the brick. Bricks may be laid in various patterns. A running bond, where the joints of successive courses are staggered, is easy to create. Herringbone and basket weave are other variations.

Try to lay out your terrace so there won't be any bricks to cut. Place a section of bricks experimentally to see how they will come out. If cutting is necessary, try to scrounge a brick set, the pro's tool.

After the bricks are tamped, some

You can set your paving material in sand. Use . . .



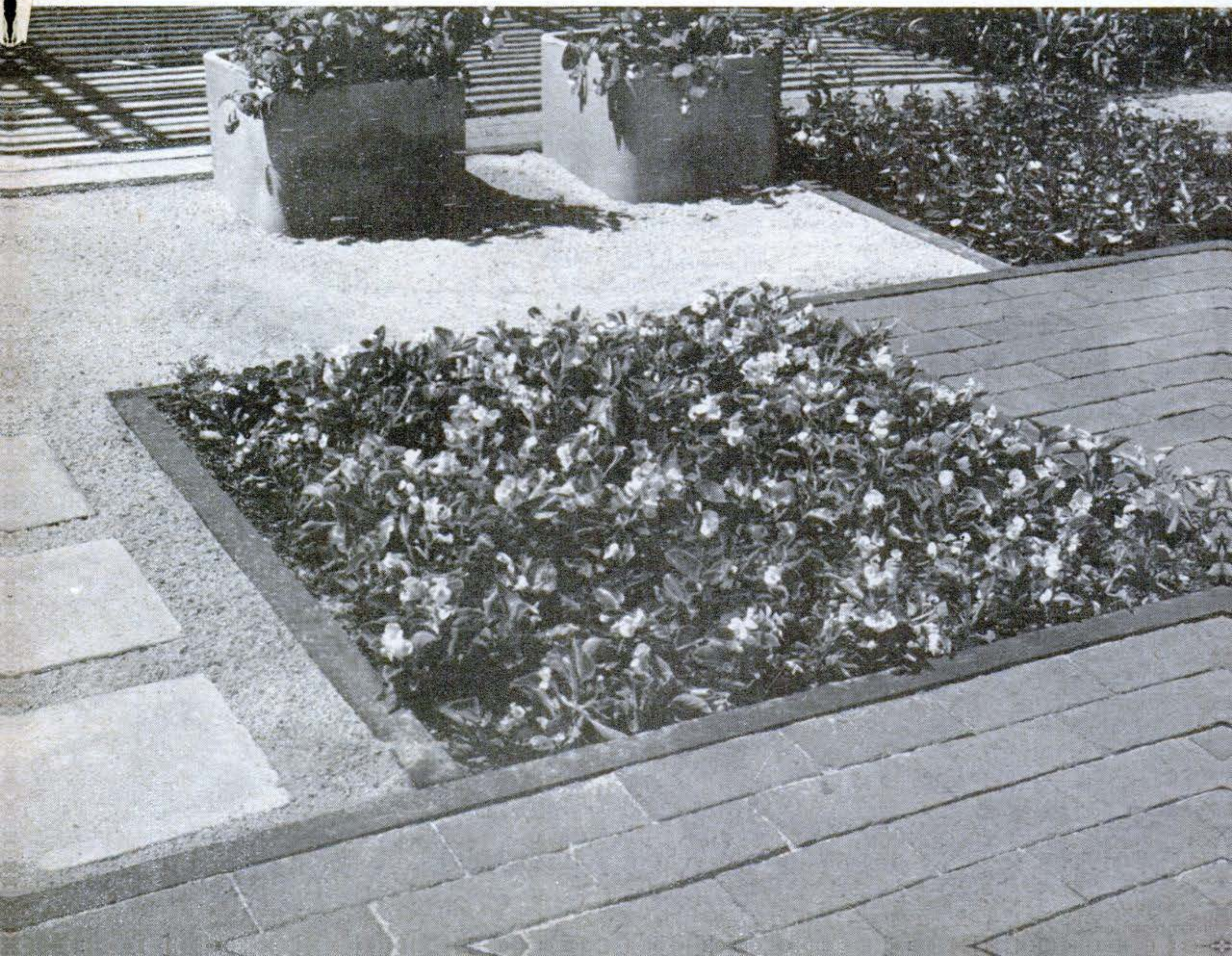
experts sweep sand over the surface to fill the cracks. Sometimes bricks are set with a half-inch of sand between. Wedging them tightly together, however, will give a more enduring floor.

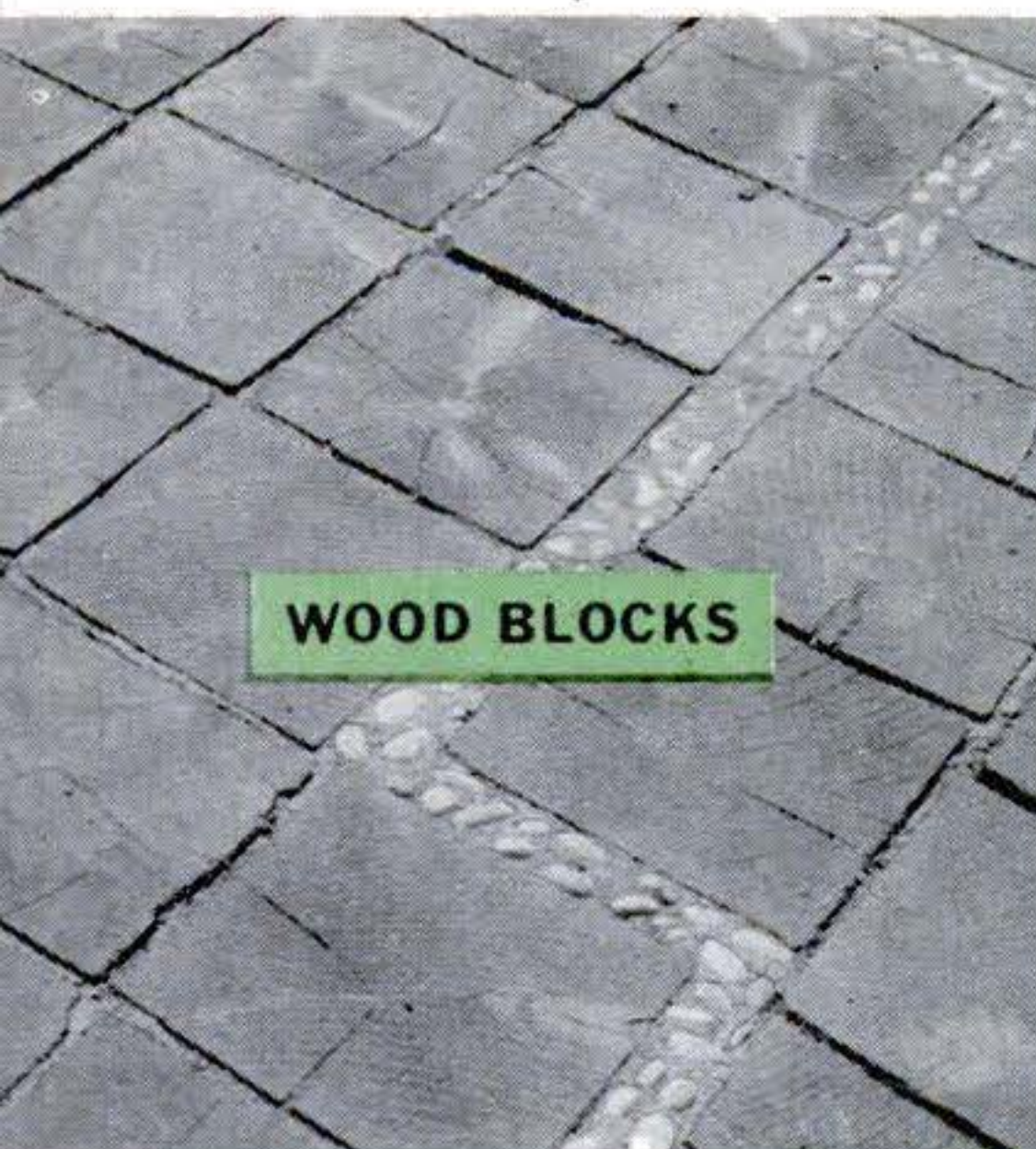
A severe winter may heave a few out of place, but the damage is easily repaired.

Big 12-inch-square red-clay patio tiles may also be laid successfully in sand.

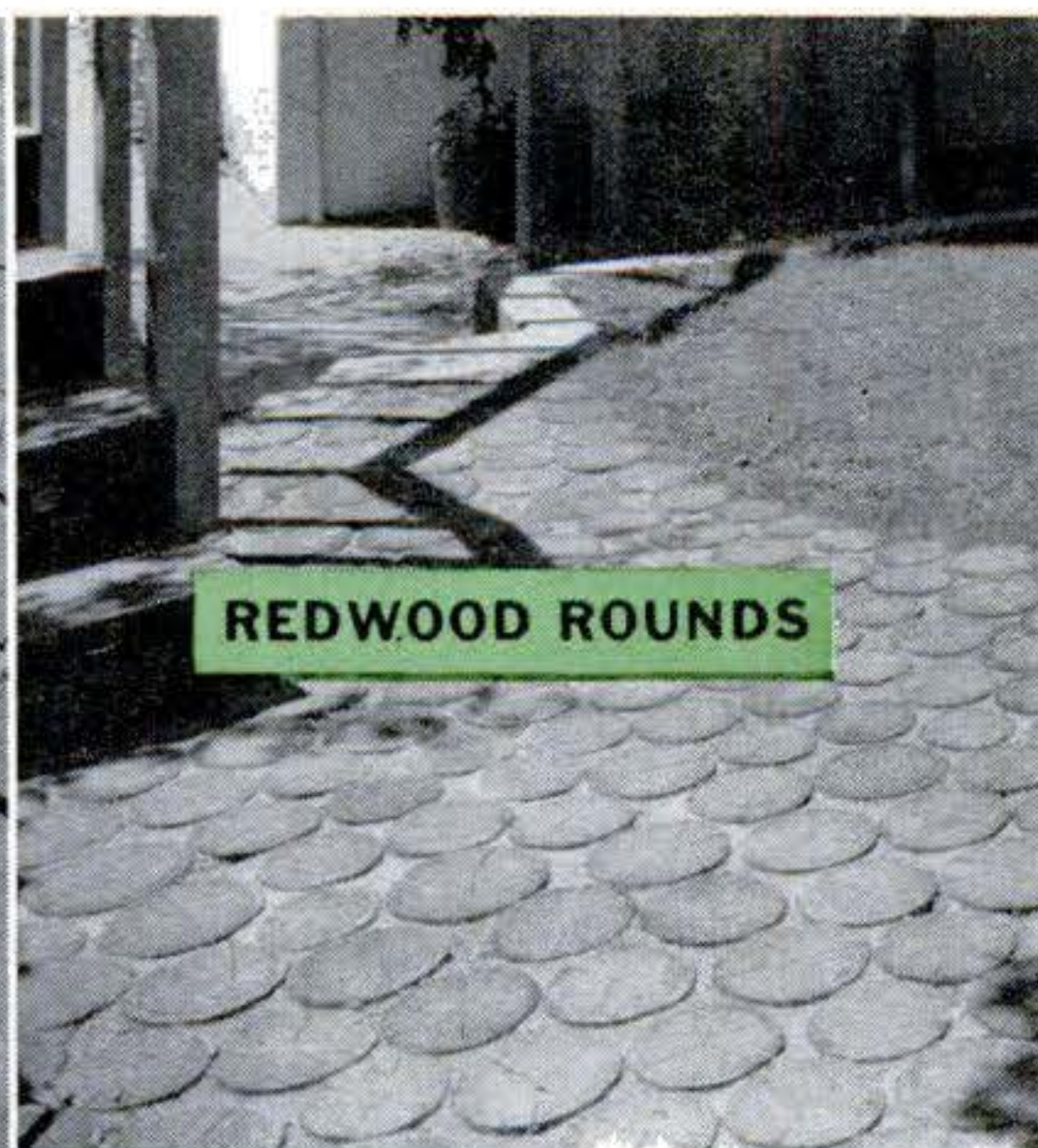
THREE PAVING METHODS are seen below—bricks in sand in the foreground, cement slabs

as stepping stones and a 3" layer of crushed stone tamped between redwood header boards.





WOOD BLOCKS



REDWOOD ROUNDS



BOARD SCRAPS

The same rules apply. One extra thing to remember: tiles vary slightly in size. So sort yours into groups of identical size and fit them together this way. Use butt joints.

Sawing a terrace. Rounds or end-grain blocks of redwood, cypress or cedar set in sand make an attractive path or terrace. Rounds are slices of tree trunk several inches thick and from four inches to over four feet in diameter. Blocks are four to eight inches square, cut from beams or railroad ties.

A space of one inch is suggested between blocks. Fill the spaces with sand, and tamp down. Spaces between rounds may be filled with soil, and grass or moss encouraged to grow.

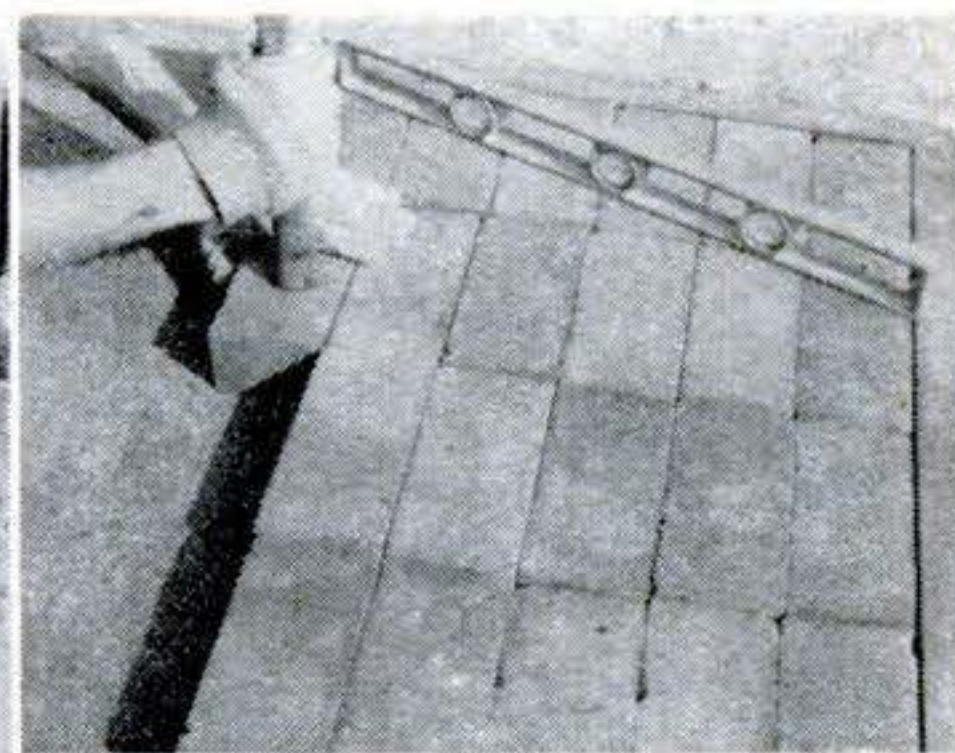
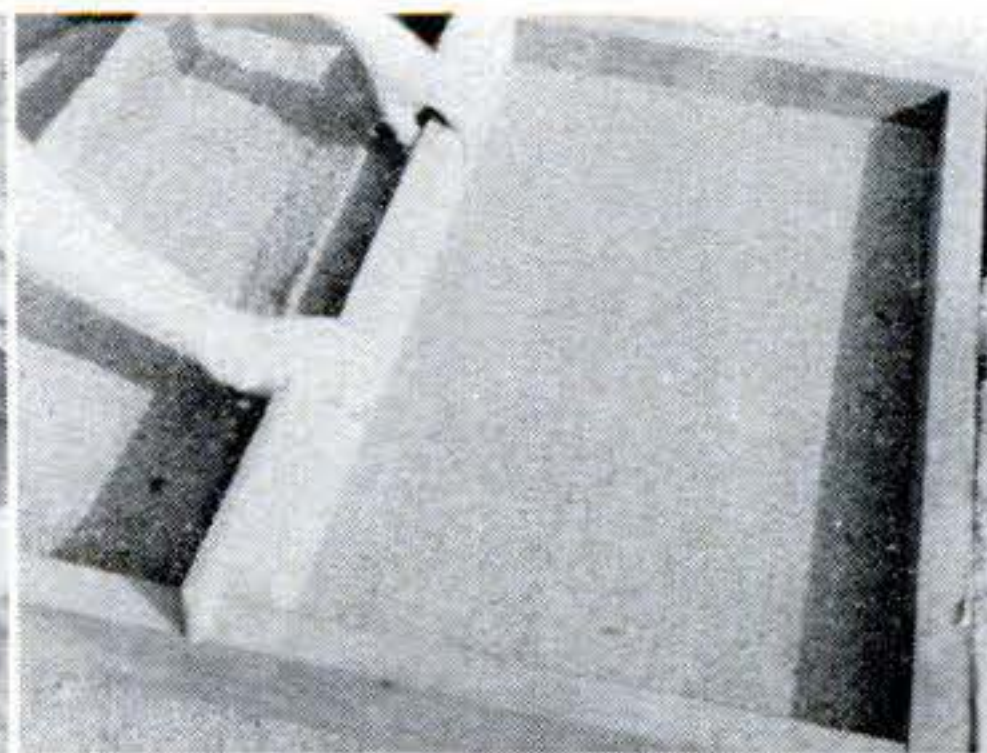
Blocks and rounds, of course, are susceptible to decay and insects. A good preservative should be used to treat them. Some preservatives, like penta-

chlorophenol, are good for wood but kill plants. A better choice might be zinc naphthenate, which doesn't hurt grass or flowers.

Cementing the easy way. There's an interesting variation on the sand-bed technique. Mix dry cement with the sand, about a sackful per 100 square feet. Then set the bricks and wet them down with a fine spray. This can be done with tile, too, but leave open 3/4-inch joints and fill with mortar.

Aggregates such as tanbark, gravel, crushed brick, decomposed granite or red rock, the latter a roofing material, may be used to create a terrace in a day. Set up header boards and toss the stuff in to a depth of three inches or so.

Aggregates are inexpensive and smart-looking but do not last long. When worn out, however, they make solid bases for more durable paving.—*Jerry Parker.*

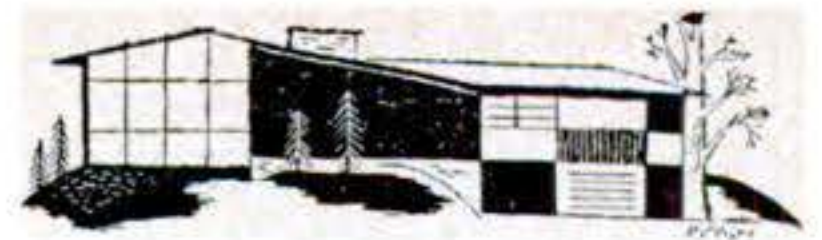


HOW TO SET BRICKS IN SAND. A terrace can be paved in easy steps if you divide the area into grids, using redwood two-by-fours, after putting down a 1" layer of sand. Make a screed

board with an ear at each end to gauge the depth for bricks and use it to level the sand. Tap bricks in place with a hammer handle. Later tamp whole terrace with a wood tamper.

A wet basement?... the





cure begins outdoors

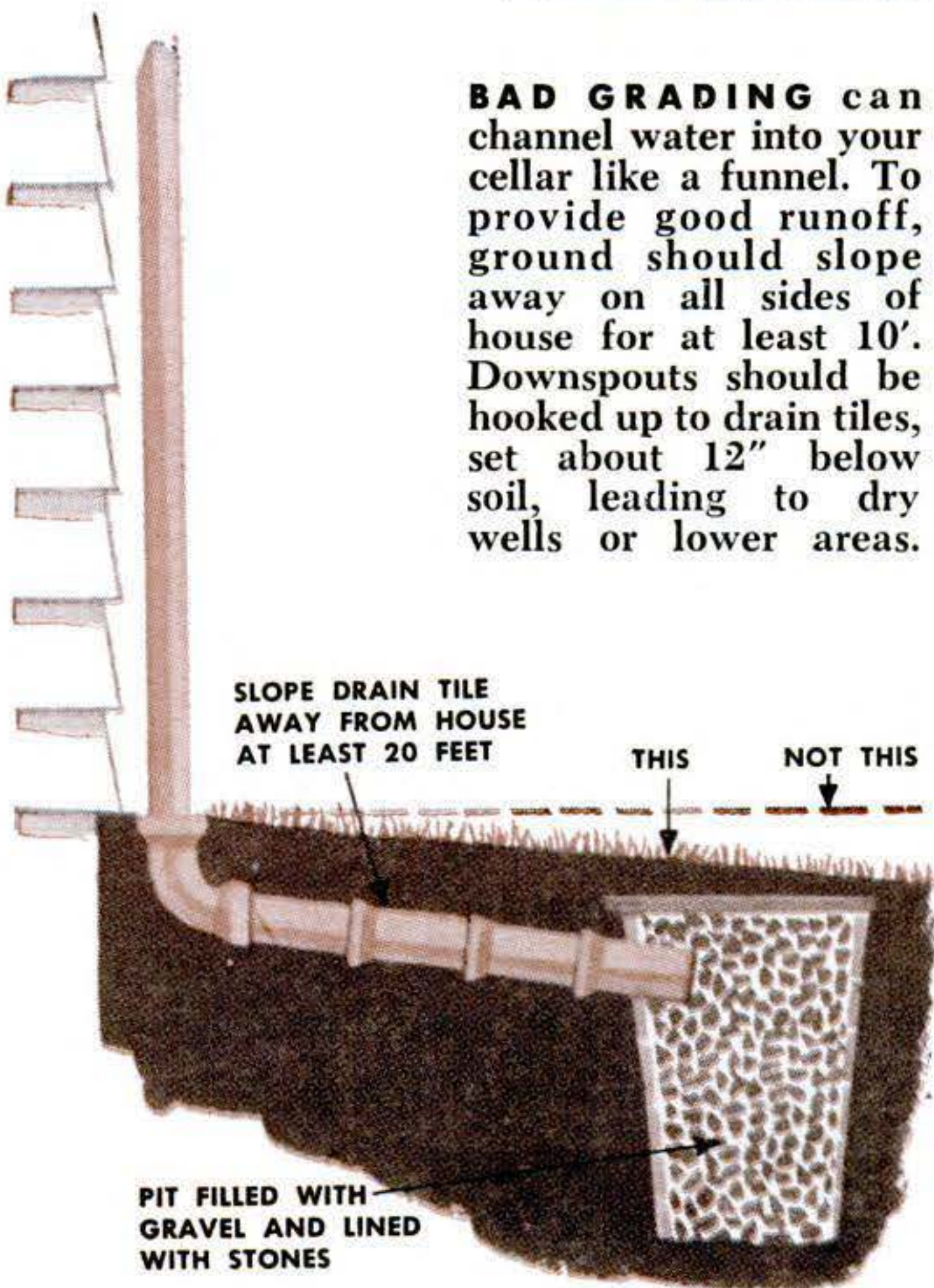
Avast, wet-cellar men! No need to man the lifeboats. Here's how to stop leaks and keep that yard water out of your house.

PORTRAIT OF A SUBURBANITE (left) inspecting his rain gutters—good insurance against a future flood in the basement. Cracked or clogged gutters let water spill onto ground beside foundation instead of out downspouts. Clean them regularly and patch inside cracks with asphaltum paint, outside ones with calking compound. Keep your downspouts clear, too, with pressure from hose or a stiff wire.

DON'T LET DOWNSPOUTS pour onto the ground next to foundation. Try to have them drain onto a sidewalk, terrace or garage apron that will carry water away from the house. If not, you can form shallow troughs of concrete or put in tile drains as shown below.



BAD GRADING can channel water into your cellar like a funnel. To provide good runoff, ground should slope away on all sides of house for at least 10'. Downspouts should be hooked up to drain tiles, set about 12" below soil, leading to dry wells or lower areas.



By Bernard Gladstone

A LOT of people forget that water in a basement comes from outdoors—and that's right where you can often stop it.

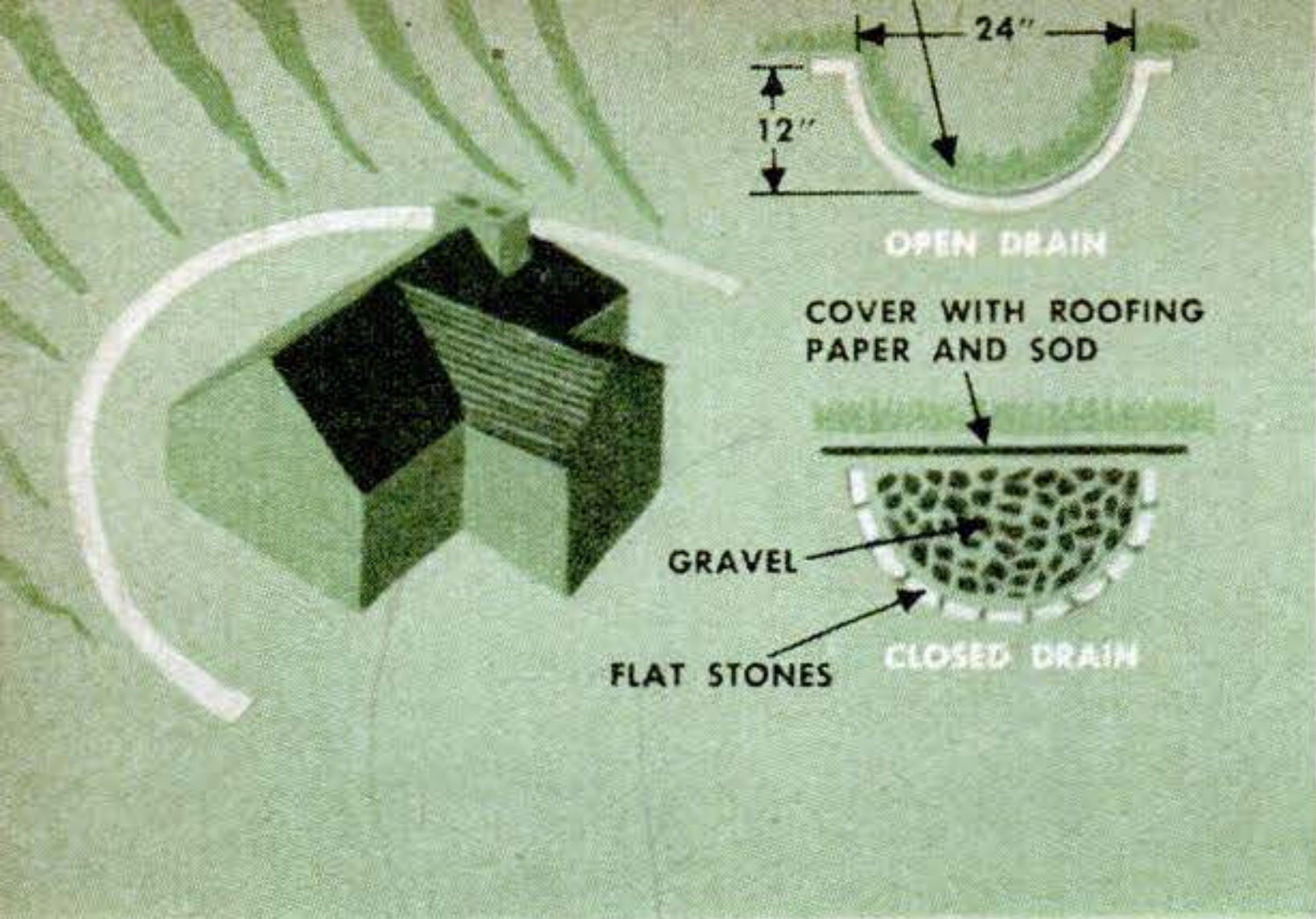
You can plug your walls until they look like a patchwork quilt, but water may still force its way back in if you let it stand outside. To keep a cellar dry, you should remove as many of the sources of water around it as you can find. Your problem may be as simple as a clogged downspout or a lawn that doesn't drain right—and you can correct these with a little work outside.

A wet basement means that you're wasting up to half your house—space that might be a pleasant workshop, a playroom for the kids, or a good, dry place for extra storage. Here's how you can put that space back to work by spotting the troublemakers and drying them up for good.

Where does it come from? The water that collects in your cellar comes, basically, from two sources—what's in the earth already, called ground water, and heavy rains.

The level of ground water, or water table, varies widely from one locality to another. After a rainy season, it may lie only a few feet below the surface of the soil in some areas. This water, pressing upward and inward on your foundation, forces its way in through cracks, small holes, even through your masonry. You may not be able to do much about ground water itself, but you can do a lot about the sources that feed into it.

In the spring, the gentle rains, babbling brooks and melting snows have an

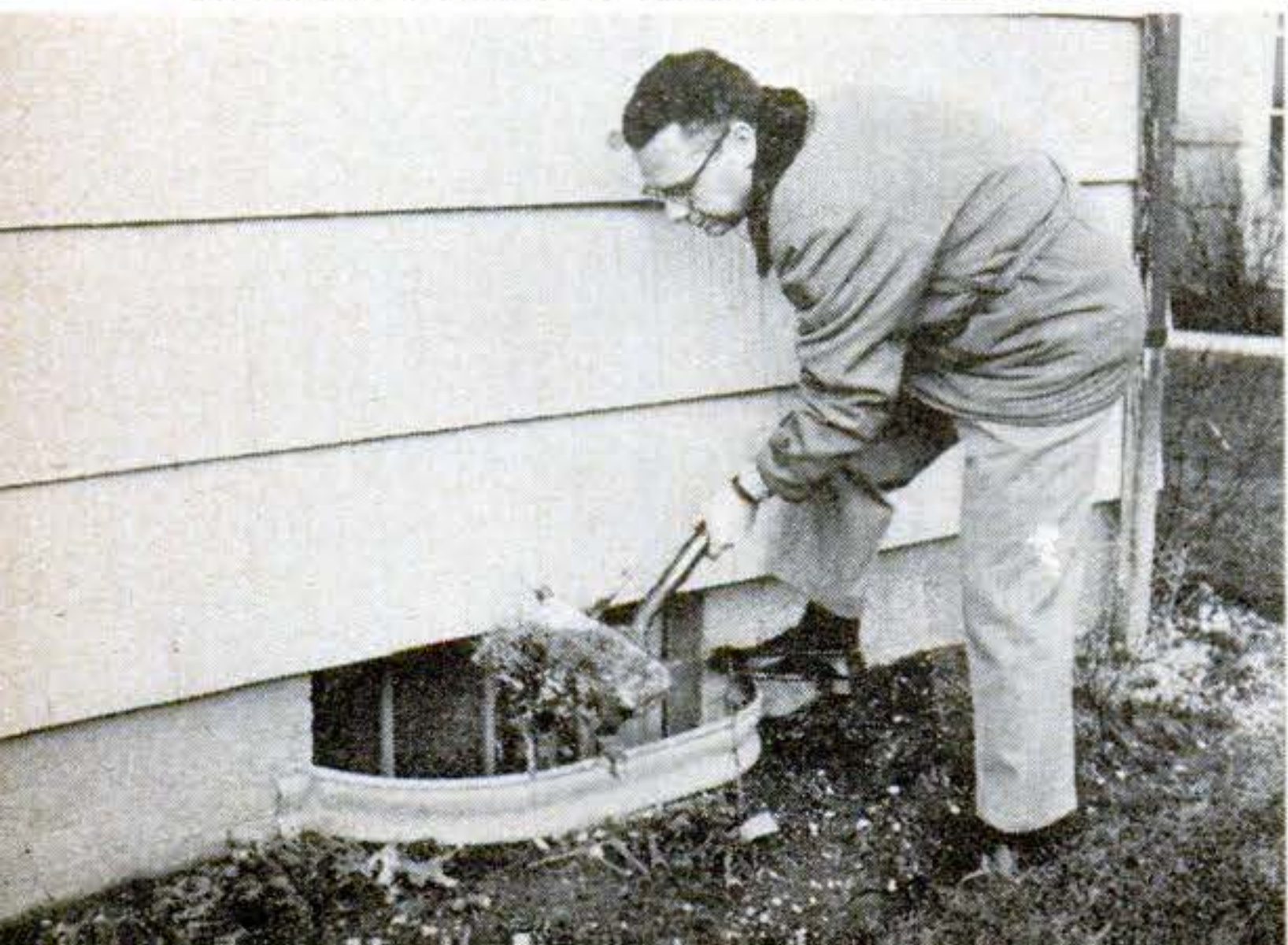


YOU CAN'T MOVE A MOUNTAIN, but you can move the water if there's a steep slope that drains into your yard. This shallow, U-shaped ditch channels it around your house instead of against it. Ditch drains better if left open, but can be filled in so you can walk on it.



EXPOSED MASONRY soaks up moisture during wet weather, must be sealed on the outside first before you start inside repairs. You can coat the parts above ground level with a clear silicone waterproofer, as here, or use the same cement-base compounds that are put on inside.

WELLS FOR WINDOWS below grade should be kept clear of matted leaves, paper and other debris that soak up water and keep it from seeping away. If dirt at the bottom is hard-packed and won't drain, you can dig it out for several feet and replace it with sand or gravel.



unromantic way of adding to and raising the level of ground water until a dry lot can become a quagmire.

If your basement is continually wet, or water is seeping up through the floor, an exceptionally high water table may be the culprit. But if it floods only during a wet spell or after a heavy rain, the chances are that the water is coming mainly from temporary sources.

Drains carry water away. If your house was built without roof gutters, as many new homes are today, there should be gravel drains under all eaves to channel the runoff away from the foundation.

You can put drains in yourself by digging trenches about 1' wide and deep and filling them with gravel, cinders or crushed stone. But such drains still let a lot of water seep down to the foundation, so it often is wise to add gutters.

With gutters, you can carry the water farther away, since you can hook up the downspouts to drain tiles, as shown in the sketch on the preceding page. Where obstructions aren't a hazard, simply add an extension to the downspout, using the same metal tubing, and let it rest on top of the ground instead of laying tiles.

Grade should shed water. If your land slopes toward your house, it will funnel water into your cellar. For best results, it should be regraded to slope away and planted with a thick, tough sod that will shed the rain before it can seep down.

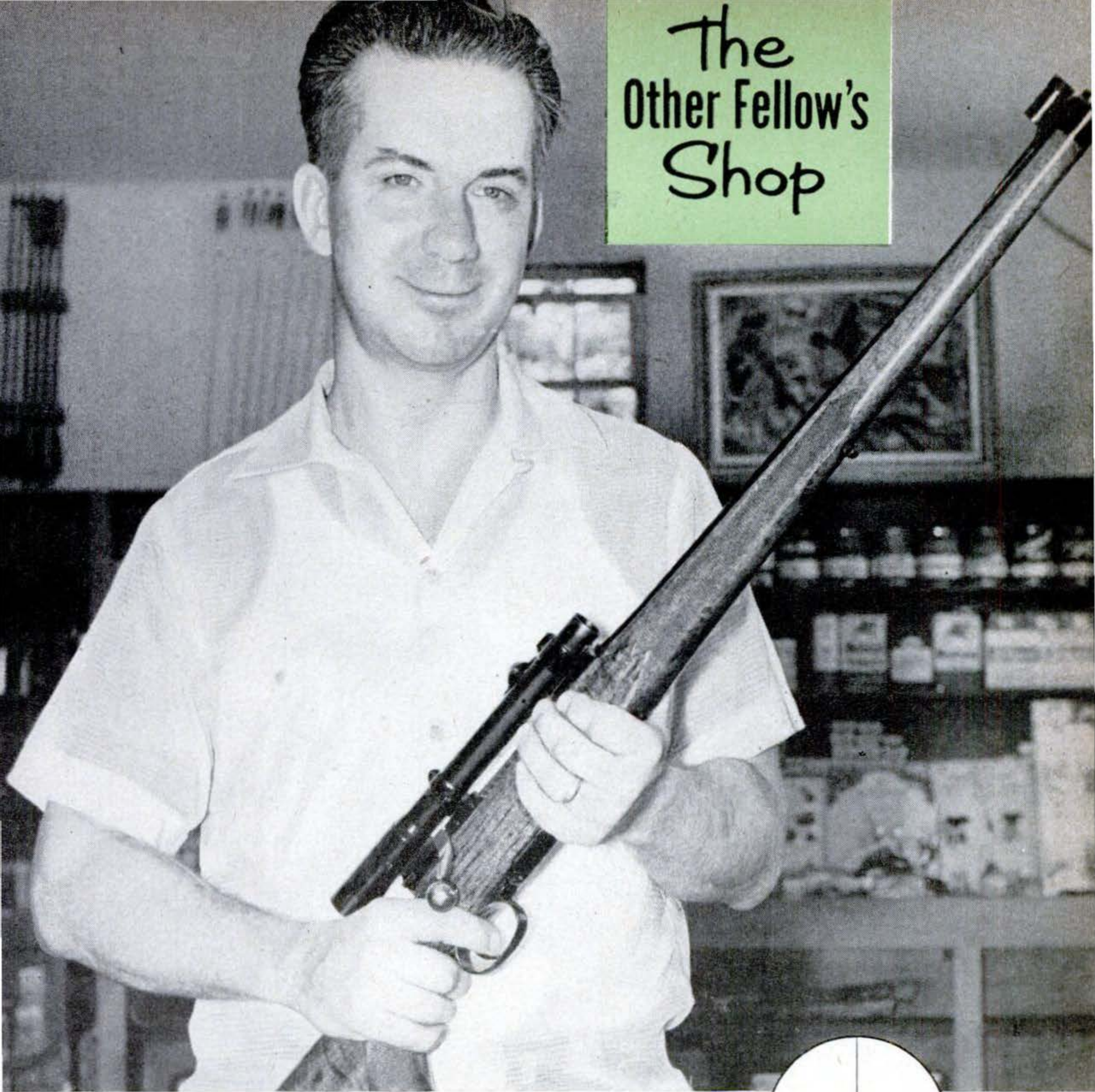
If this means an expensive bulldozer job or tearing up a brand-new lawn, you can still help a lot by installing drains. Start the tiles at the foundation and fan them out like spokes of a wheel at a slight downward pitch. You can put in solid tiles and lead them to dry wells, or for a quicker job use the perforated soil pipes that disperse the water into the ground along the way.

Once you've dried up the outside as much as you can, you'll have an easier job of sealing out the moisture from the inside.

END

NEXT MONTH: How waterproofing paints and cements that stick even when wet make it easier to keep your cellar dry.

The Other Fellow's Shop



This Man Makes Dots



Tiny, opaque and perfectly round, Bob Thomas' famous specks help hunters put small game on the spot with deadly accuracy.

By Louis E. Garner Jr.

A NEIGHBOR of mine makes dots in his basement workshop. He also "milks" spiders for their silk thread. He

uses it as cross hairs on which to mount the dots, which may be as small as three ten-thousandths of an inch (.0003) in diameter.

His name is Robert S. Thomas and his

APRIL 1955 215

handiwork is the Tommy dot. For the rifle hunter, that's 'nuff said, but if you are not a Nimrod, a few words of explanation are in order before I take you on a visit to Bob's unusual shop in Silver Spring, Md.

A Tommy dot is a type of reticle, or aiming point, required on all telescopic sights for hunting and target rifles. It indicates the exact spot on the target where the bullet will hit.

Among the three kinds of reticles in use today, the most common is a pair of cross hairs. These hairs, since they must be thick enough to be clearly visible to the eye, tend to cover a portion of the target. At short or moderate range, or where the target is fairly big, such as a deer, this doesn't matter. But where the range is long and the target small, as in "varmint" (small-game) hunting, the cross hairs may easily black out the killing zone.

He Dots the Cross Hairs

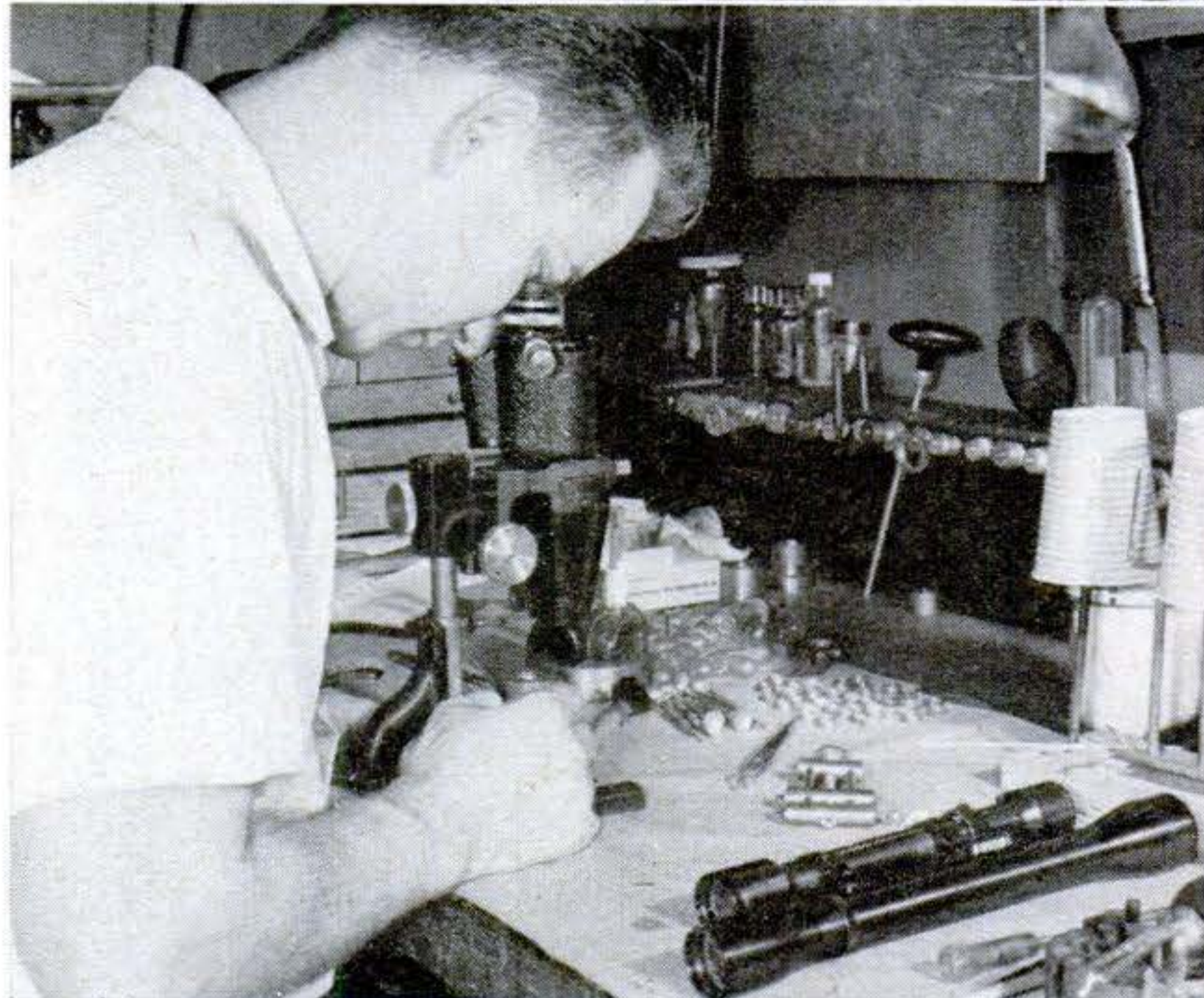
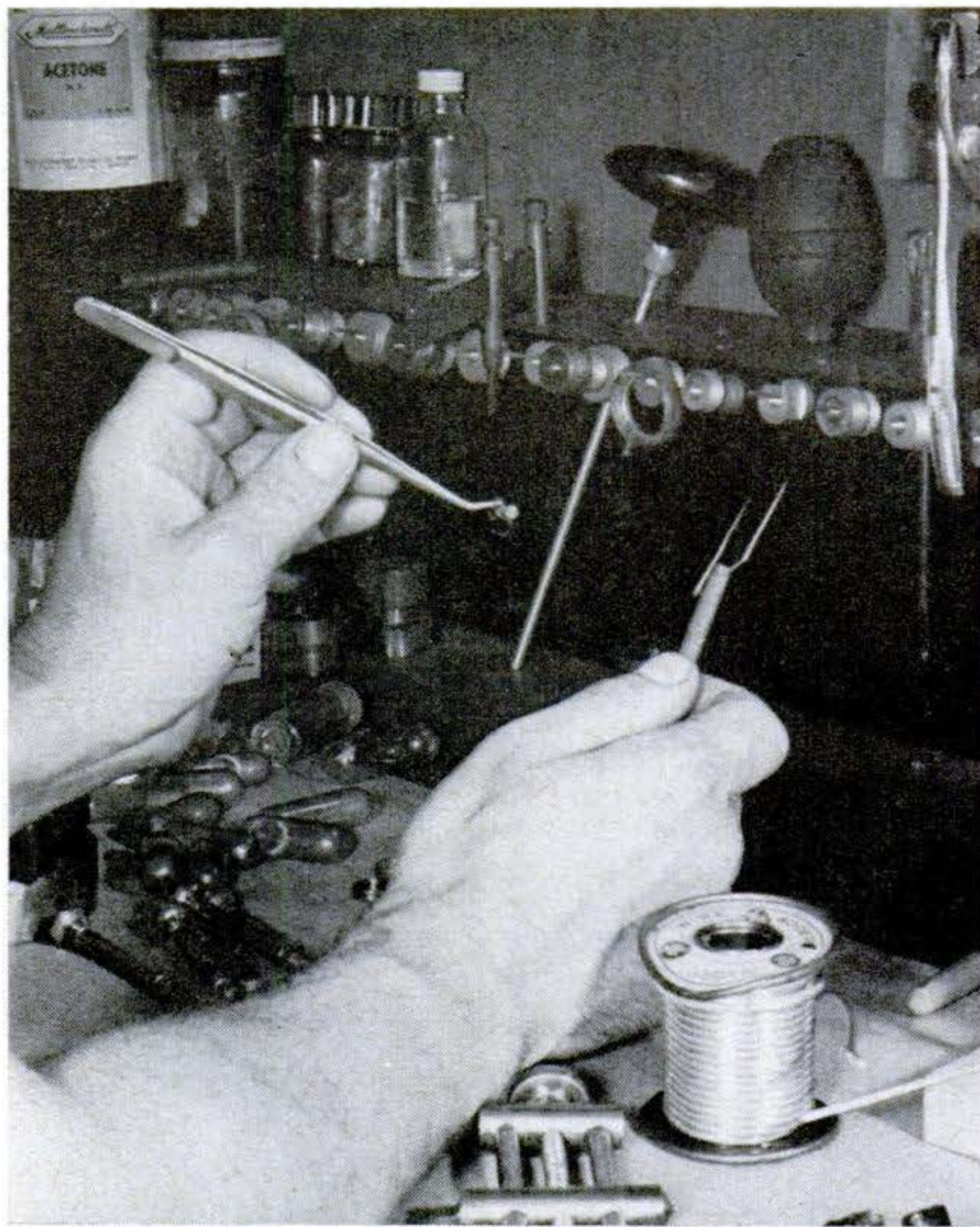
That's where the Tommy dot comes in. It is a tiny, opaque, perfectly round dot, suspended at the center of almost-invisible cross hairs fixed in the reticle cell of the telescopic sight. In use, the dot covers only the center of the target and makes possible accurate aiming on game as small as crows and woodchucks at distances of 300 yards or more.

As one of probably less than half-a-dozen makers of dot reticles in the country, Bob Thomas has his own trade secrets. One is the exact formula for the thermosetting material that goes into the dot. Another is how he gets the dot perfectly round.

Actually, Bob explains, dot-making is not too difficult, although he admits that it takes skills that are not acquired overnight—a modest statement. He developed and perfected the Tommy dot during the many years he worked as a precision lens and prism maker at the Naval Gun Factory in Washington, D.C. The tools you see in his shop are those of any well-equipped workshop—except for the important ones.

Ask him what these are, and he re-

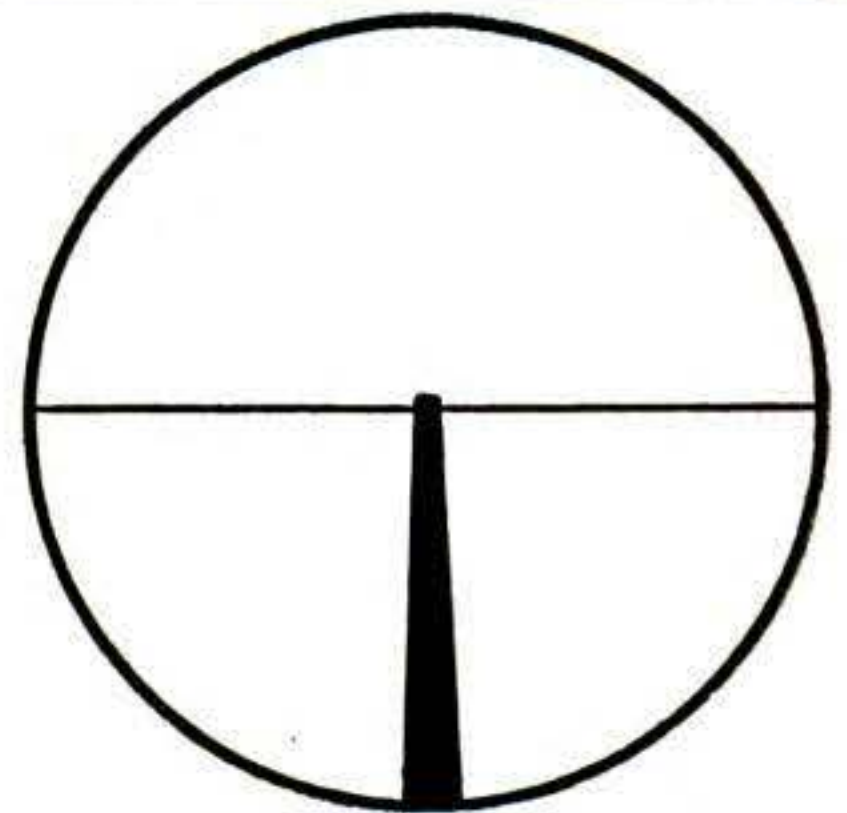
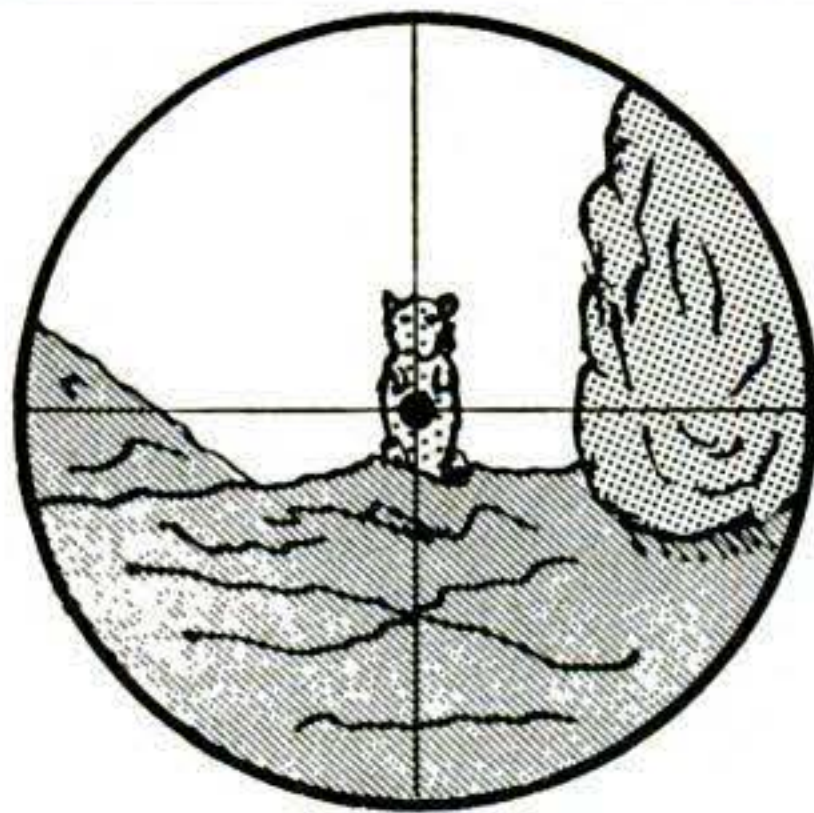
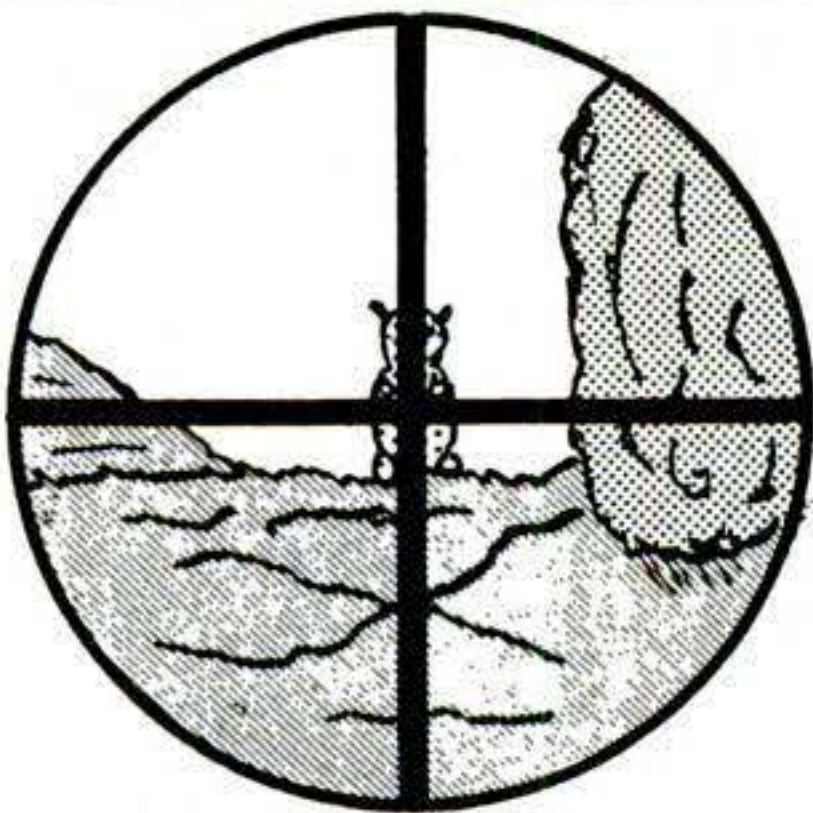
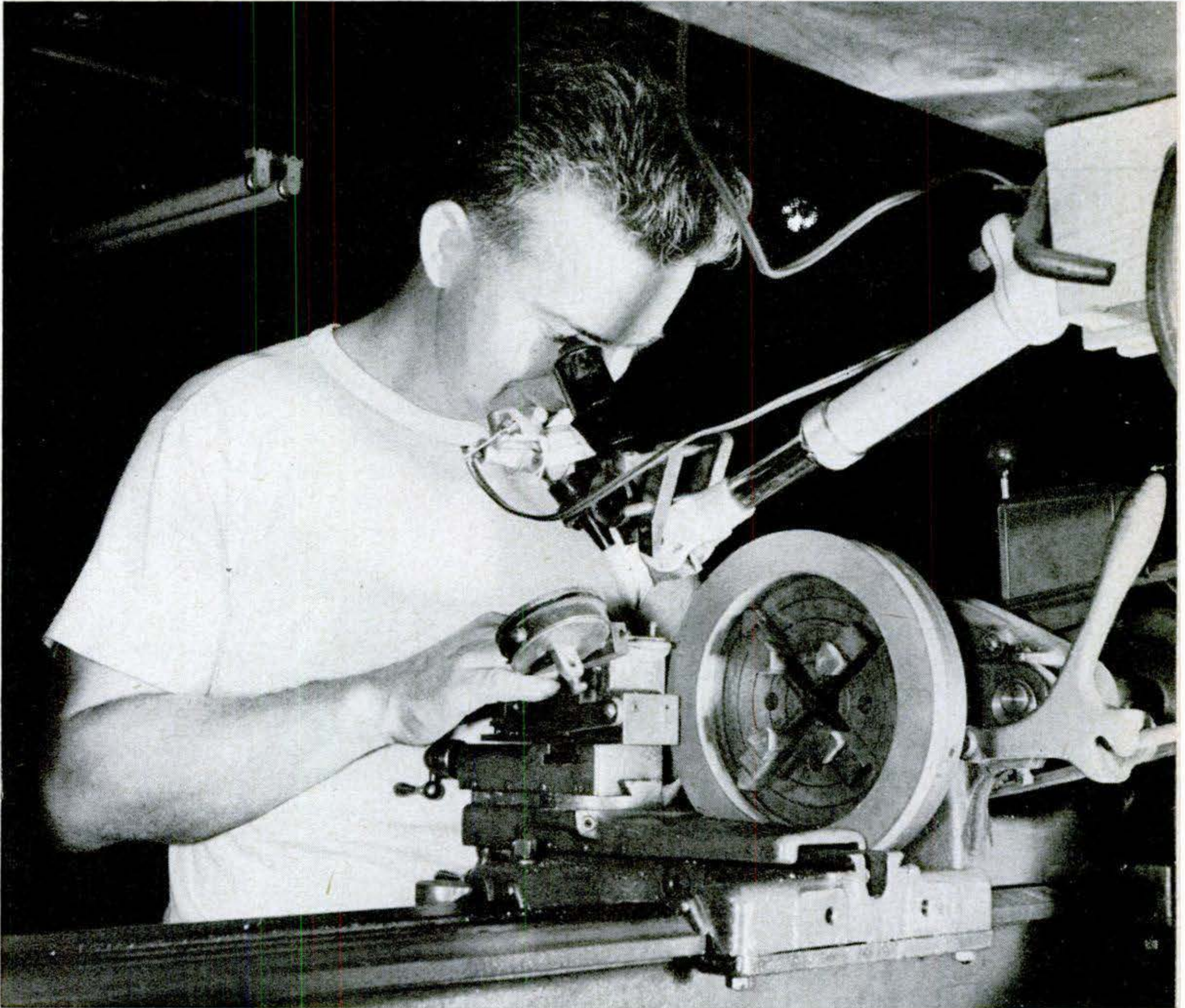
A SPIDER IS "MILKED" for its silk thread, which will be used for suspending Tommy dots. The insect is grasped by a pair of tweezers as the almost-invisible thread is drawn out and carefully spaced on the U-shaped holder. It is then minutely inspected; the silk must be single filament and free of gummy droplets.



THE TOMMY DOT itself is made under an 80-power binocular microscope. The dot made, Bob cements two short sections of spider silk at right angles across the reticle cell, or ring, of the telescopic sight. Final step is applying the dot to the junction of the two cross hairs, using a specially designed tool.

TAPERED-POST RETICLE calls for painstaking grinding. Below Bob is shown using a special jig and grinding wheel mounted on a lathe to give a preliminary taper to a piece of stainless-steel rod stock measuring .012" in diameter. Three grindings later, including a hand-shaping step, the rod will have a taper from

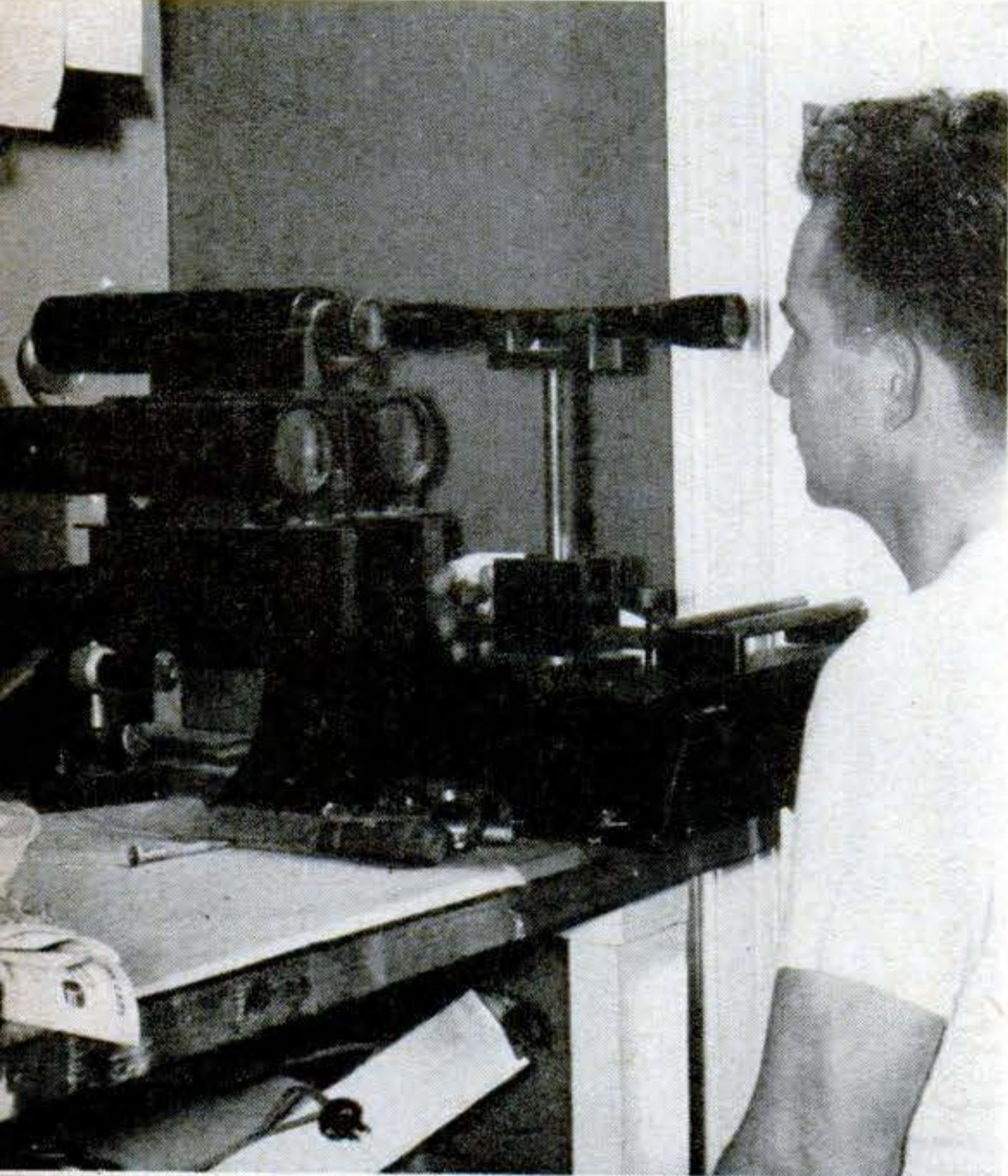
.010" to .003" in diameter. Also, the sides of the post must be perfectly straight, and the top absolutely flat, with no burrs. That is why he works under a microscope for this job, too. Length of the post varies with the size of the telescopic sight's reticle cell, but is usually in the neighborhood of 3/16".



THREE MAJOR DESIGNS for reticles—devices in the telescopic sight that indicate the point of aim—are illustrated here. Simple cross hairs, shown in the first drawing, are the most popular type of reticle. But where the target is small or the range long, the comparatively thick cross hairs may black out the killing zone,

or even the entire target. The dot reticle (middle drawing) covers only the center of the target. At right is the tapered post and single cross hair. Westerners and big-game hunters generally favor cross hairs; Easterners are usually tapered-post men. Dot lovers, however, are distributed all over the country.

TO CHECK THE SIZE of his dots, Bob Thomas uses a collimator custom-built for the job. Dot sizes vary with customer needs and with the power of the telescopic sight in which they are to be installed. He guarantees every dot for the life of the rifle sight.



MAKING TOMMY DOTS often keeps Bob busy in his basement workshop, so Gladys Thomas waits on this customer in their Silver Spring, Md., sporting-goods store. The bows and arrows in the background are an indication of one of Bob's outdoor hobbies, archery.

plies, "Steady hands, steady nerves, excellent eyesight—and patience."

Then there are the spiders. You would undoubtedly find spiders weaving their webs if you poked around in the dark corners of many workshops—but not working in the capacity of essential shop assistants.

Bob must have spider silk for his cross hairs. It is the strongest material available in the small diameters he needs. Substitutes such as tungsten and other metal wires have proved unsatisfactory.

Big as a Minute

The sizes of the dots are measured not so much by their actual diameters in thousandths of an inch as by the angle of arc they subtend in the line of vision. This, measured in minutes, determines how large an area of target is covered by the dot at increasing distances from the shooter. A one-minute dot in a 2½-power hunting scope, for instance, is actually much smaller than a one-minute dot in a 10-power target scope.

Unless a customer orders a special dot, Bob usually puts in a three- to four-minute dot in a low-power hunting sight, a one- to two-minute dot in a medium-power scope, and a three-eighths- to five-eighths-minute dot in target and varmint-hunting scopes.

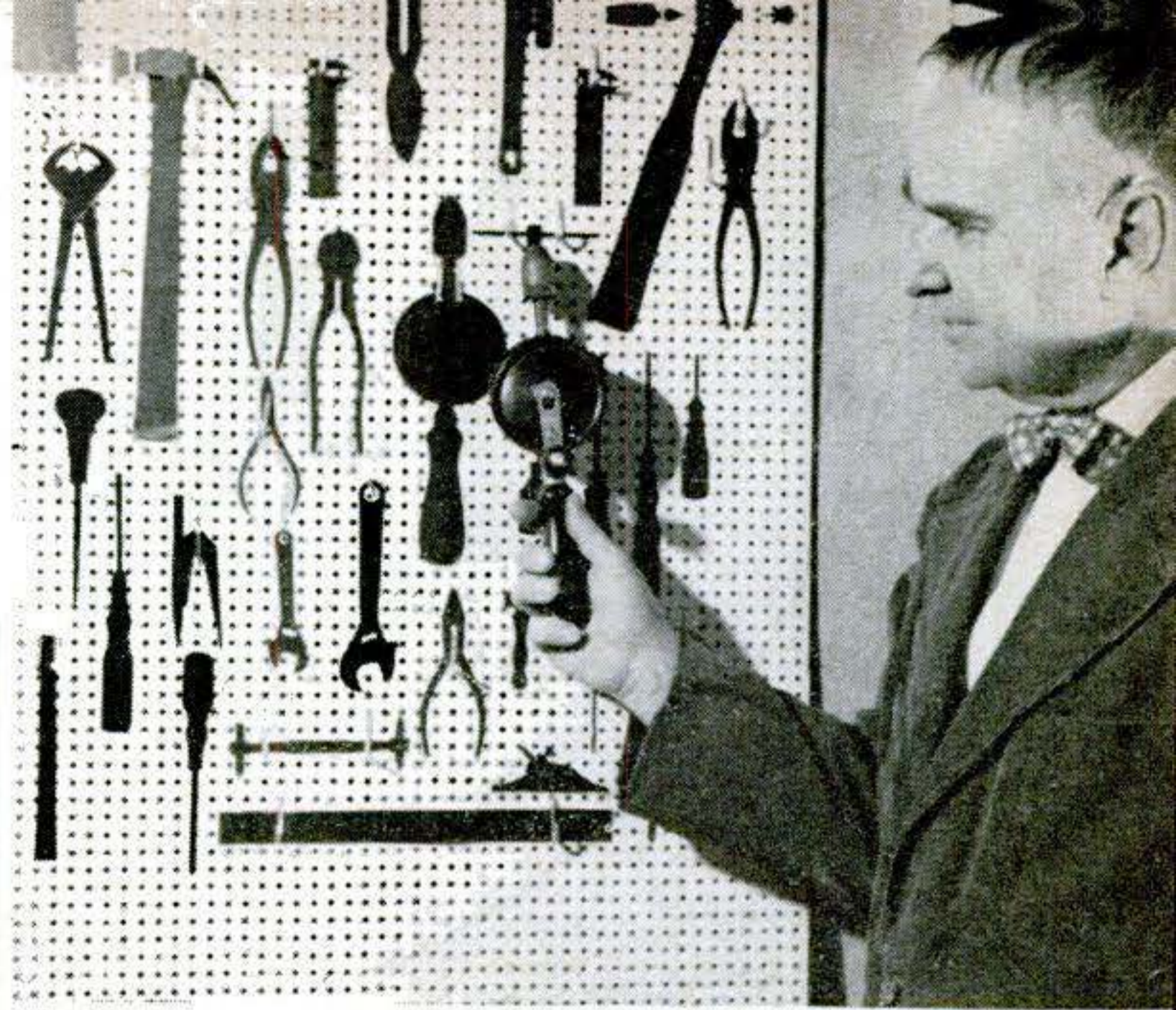
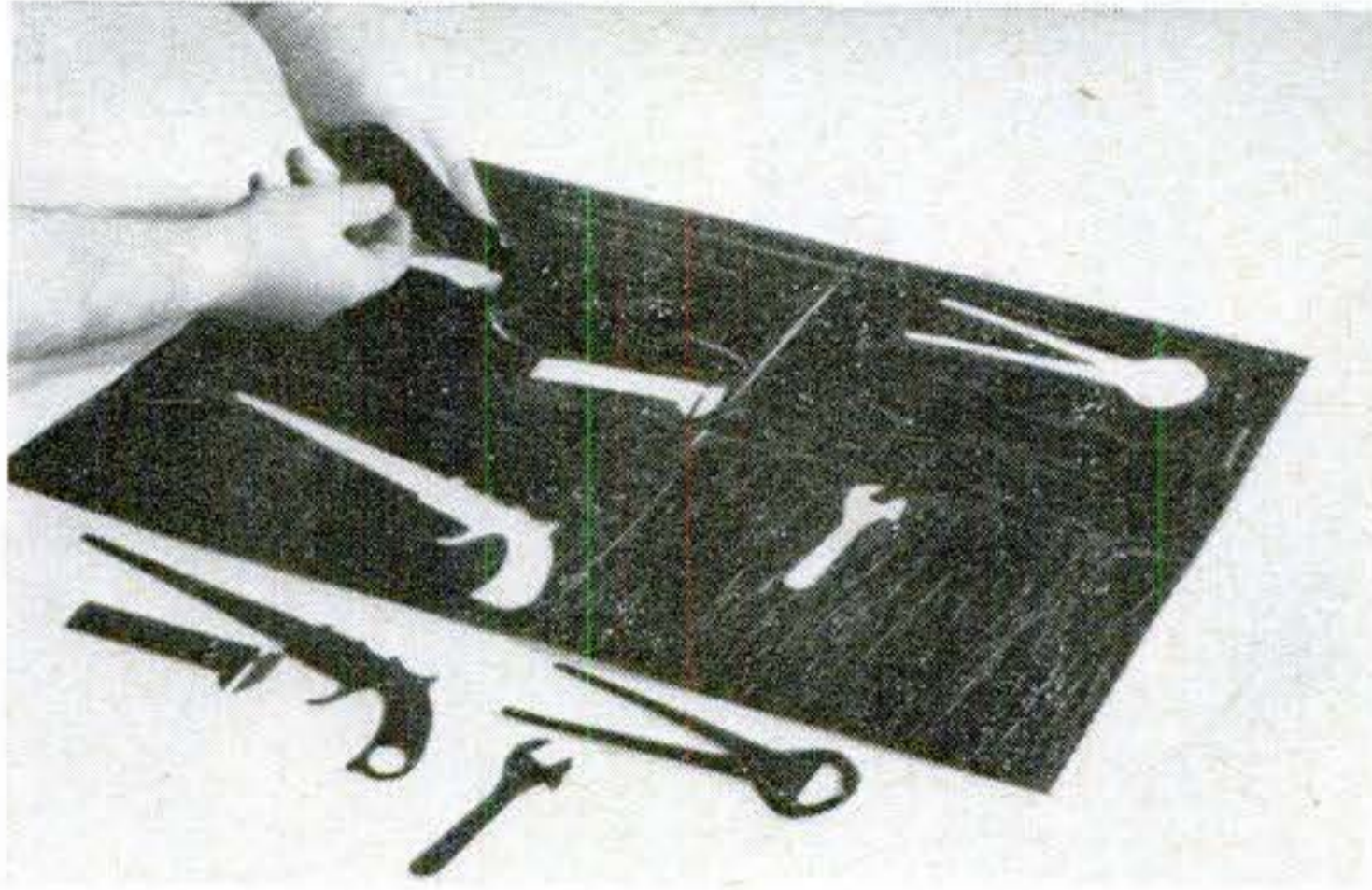
Although the 39-year-old dot-maker specializes in the Tommy dot (3,000 to 5,000 a year), he also makes the two other popular types of reticles, the cross hairs and the tapered post.

For Bad Light and Fast Game

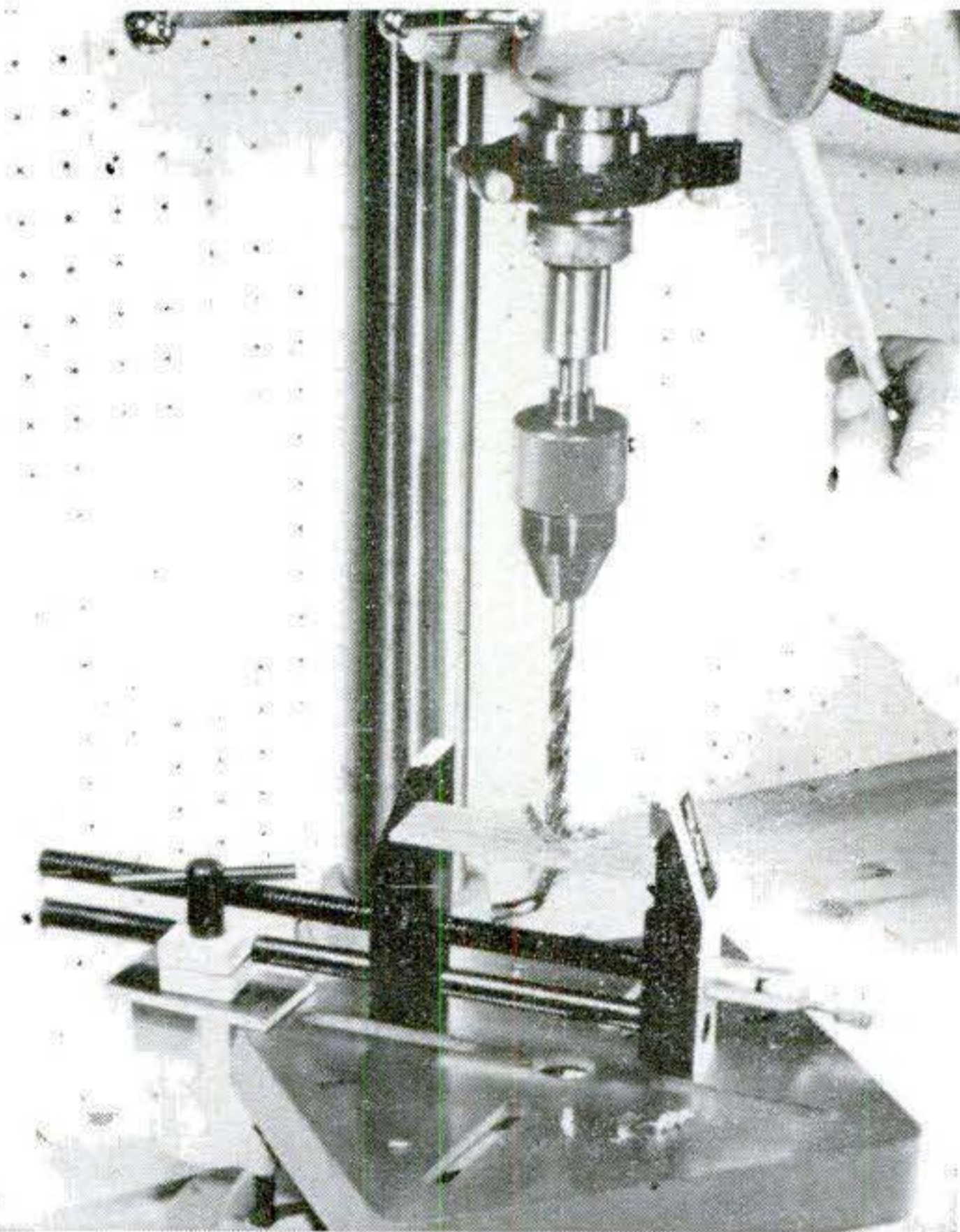
The tapered post is runner-up to the Tommy dot in Bob's business. It is in demand for low-power scopes, for hunting under poor light conditions or for hunting rapidly moving game. Shooters with less than perfect eyesight also like it.

From time to time Bob is approached by people who want to learn the secrets of his dot-making. I asked him what he would charge to teach someone how to make the dots. "Not under \$25,000," he said. Later he added, "And even at that figure I hope I don't get any takers." **END**

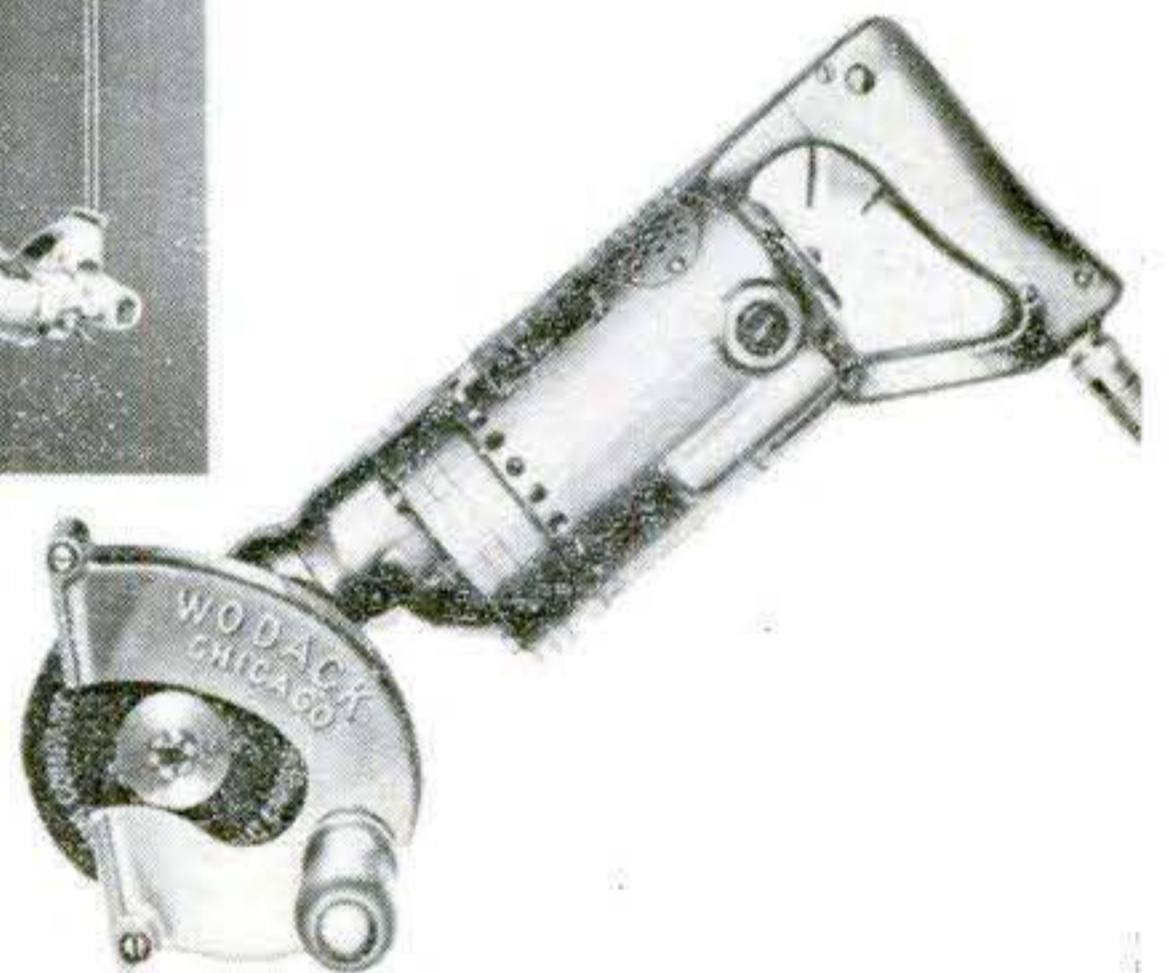
1. Silhouettes Show Where Tools Go. If you have trouble getting tools put back in the right place, these cutouts on the wall or rack provide an easy-to-follow chart. Full-size black or red silhouettes of 42 basic hand tools are available on die-cut adhesive sheets (below), or you can get blank sheets for making your own patterns.



New Tools

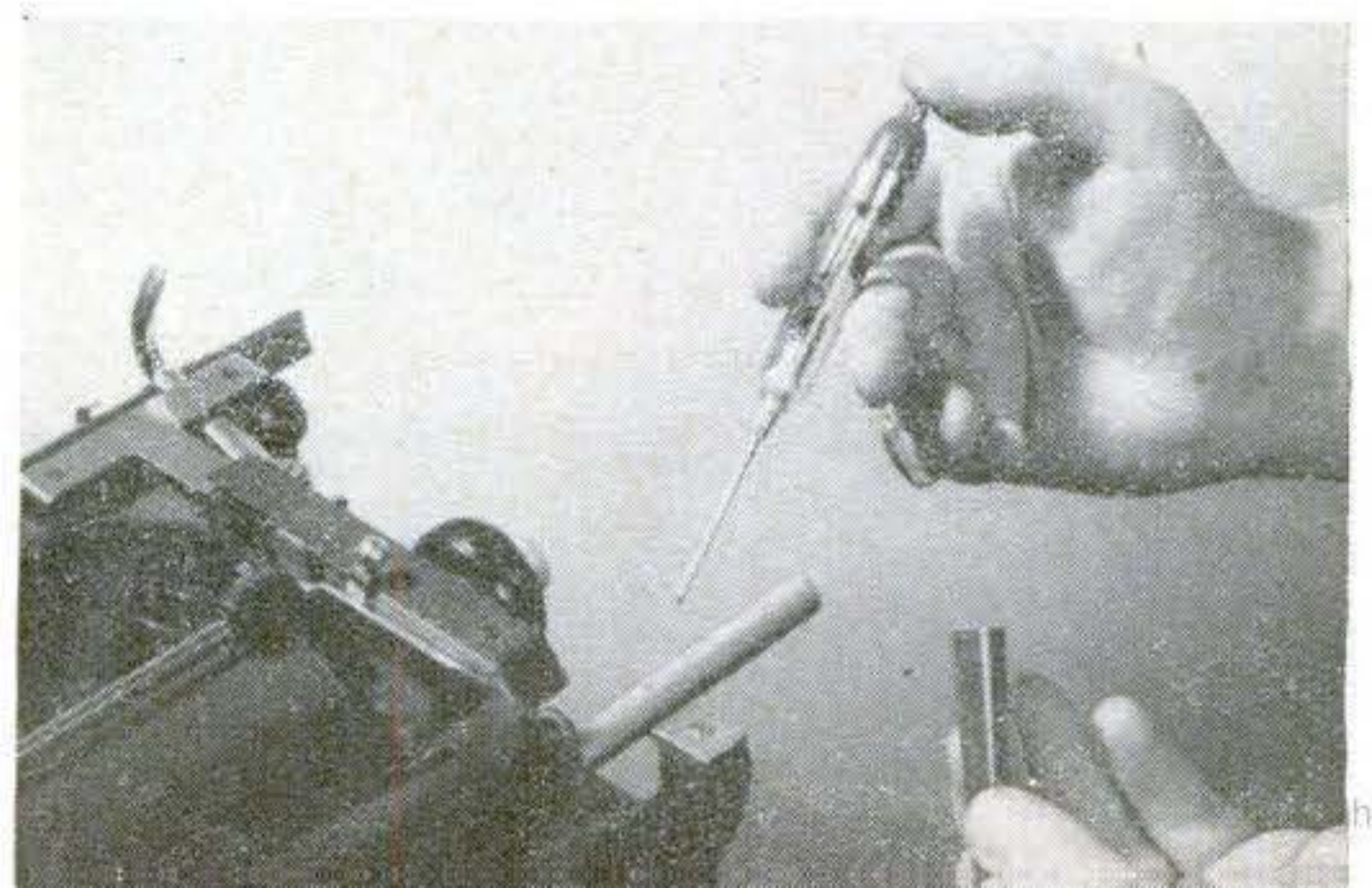


2. Vise Swings to Any Position. A flexible precision vise, modeled after a bigger brother, is now built for home workshops. Of all-steel, floating-type construction, it can be swung off the bench, swiveled, used on side or end or set at an angle. You can use it on a drill press, bandsaw, or bench and in various other ways.



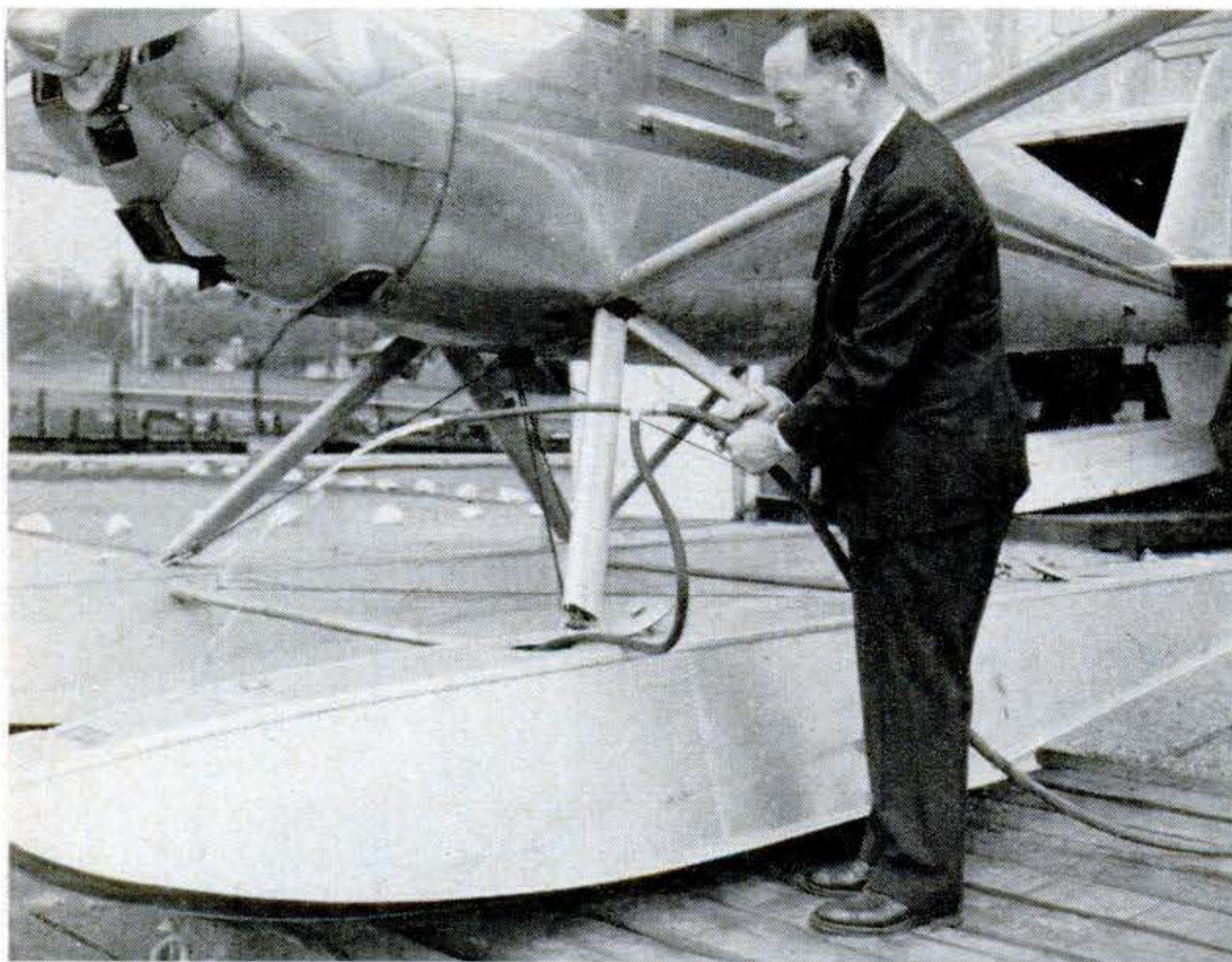
3. Cutter Makes Trench in Plaster. Two parallel 4" abrasive wheels on a trigger-grip cutter make quick work of grooving a plaster wall for new wiring. You adjust the wheels for width and depth, and finish with a chisel. It runs on AC or DC.

4. Pocket Oiler Counts Drops. Wherever oil is needed in drops, you will find this pocket-clip oiler convenient. It looks like a ball-point pen, and delivers a drop of oil each time the plunger is pressed.



Further information on the tools shown on this page can be obtained from: 1. Tool Shadows, 109 E. 81 St., NYC 28; 2. Float-Lock Corp., 261 Madison Ave., NYC 16; 3. Wodack Electric Tool Corp., 4627 W. Huron St., Chicago 44; 4. E. S. Tubin Engineering, 3906 Cohasset, Burbank, Calif.

Pump Made from Washing-Machine Hose Tee Drains Float

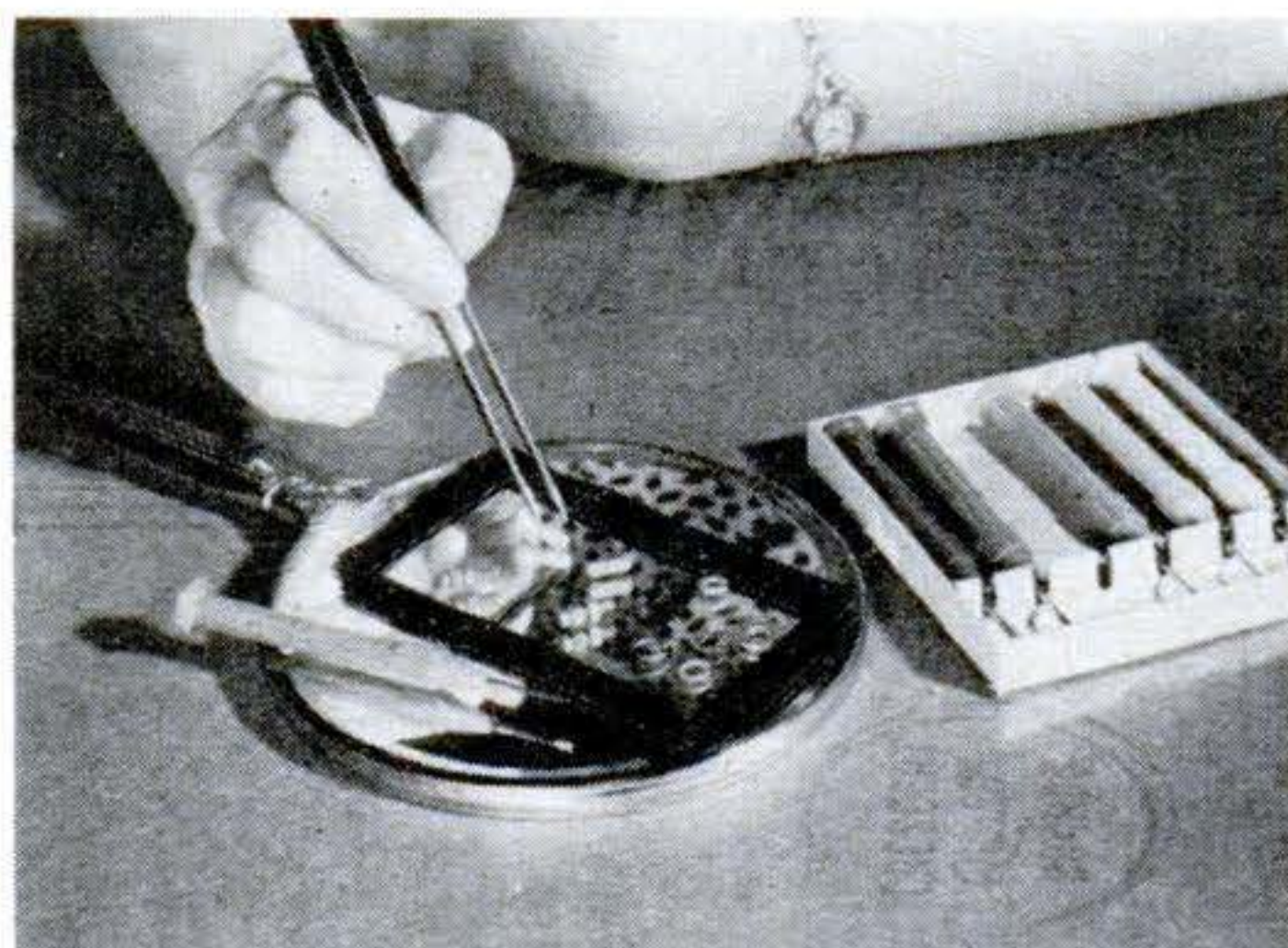
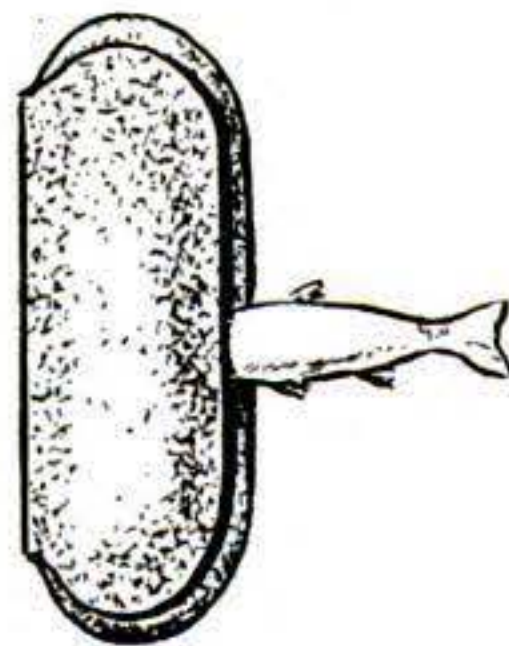


A PIPE tee that has been threaded for hose couplings, such as an aspirator taken from an old-fashioned washing machine, will enable you to drain a float, barrel or drum that is too large or awkward to tilt.

Insert the lateral hose in the float, connect one of the others to a hydrant, and turn on the tap. The flow tends to set up a vacuum in the lateral and sucks up water.—*Bob Blatt, Larchmont, N.Y.*

Eyeglass Case Holds Bait

WHILE fishing, I found that a spring-type spectacle case is fine for holding minnow bait in position until I get it fastened on the hook. Just place the wriggling minnow part way in the case and the fish won't slip away from you.—*Russell L. Card, Tweed, Ont.*



Mirror Helps Find Tiny Parts

TO KEEP track of small parts when you work on delicate mechanisms, use a mirror as a tray. The reflection helps you spot them. A taped section prevents spilling.—*Hugh Lineback, Stillwater, Okla.*



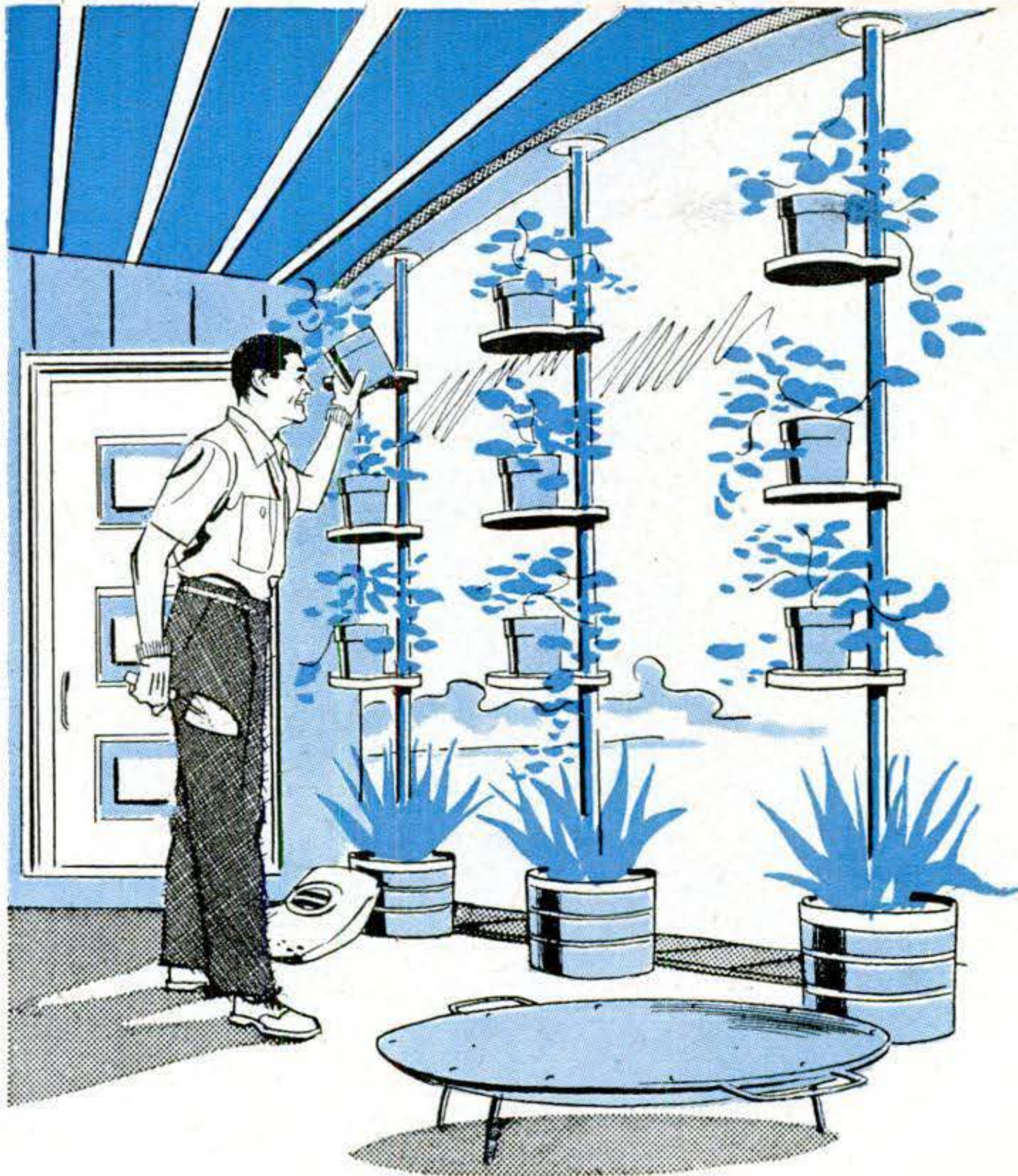
Dog Tether Is Tangleproof

HALF a bag of gravel-mix concrete, a harness ring and a length of old brass curtain rod will give you the makings of a dog tether which even a frisky pup will find tangleproof. Dig a small hole at the center of an open spot in your lawn and fill it to the surface with concrete. Double the curtain rod, slip the harness ring over it, and then embed it in the soft mix.—*John E. Weidner, Cincinnati.*

KEEPING THE

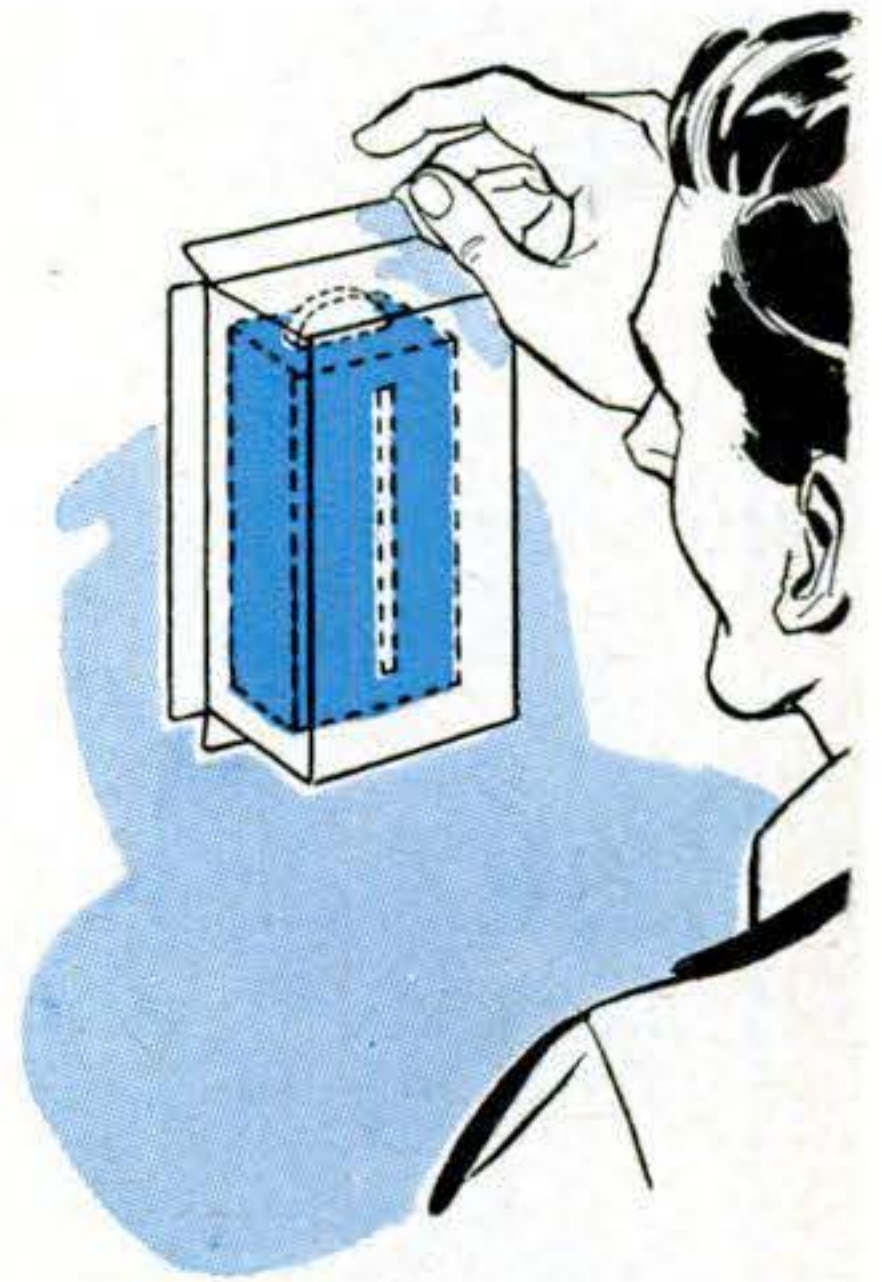
Home

SHIPSHAPE

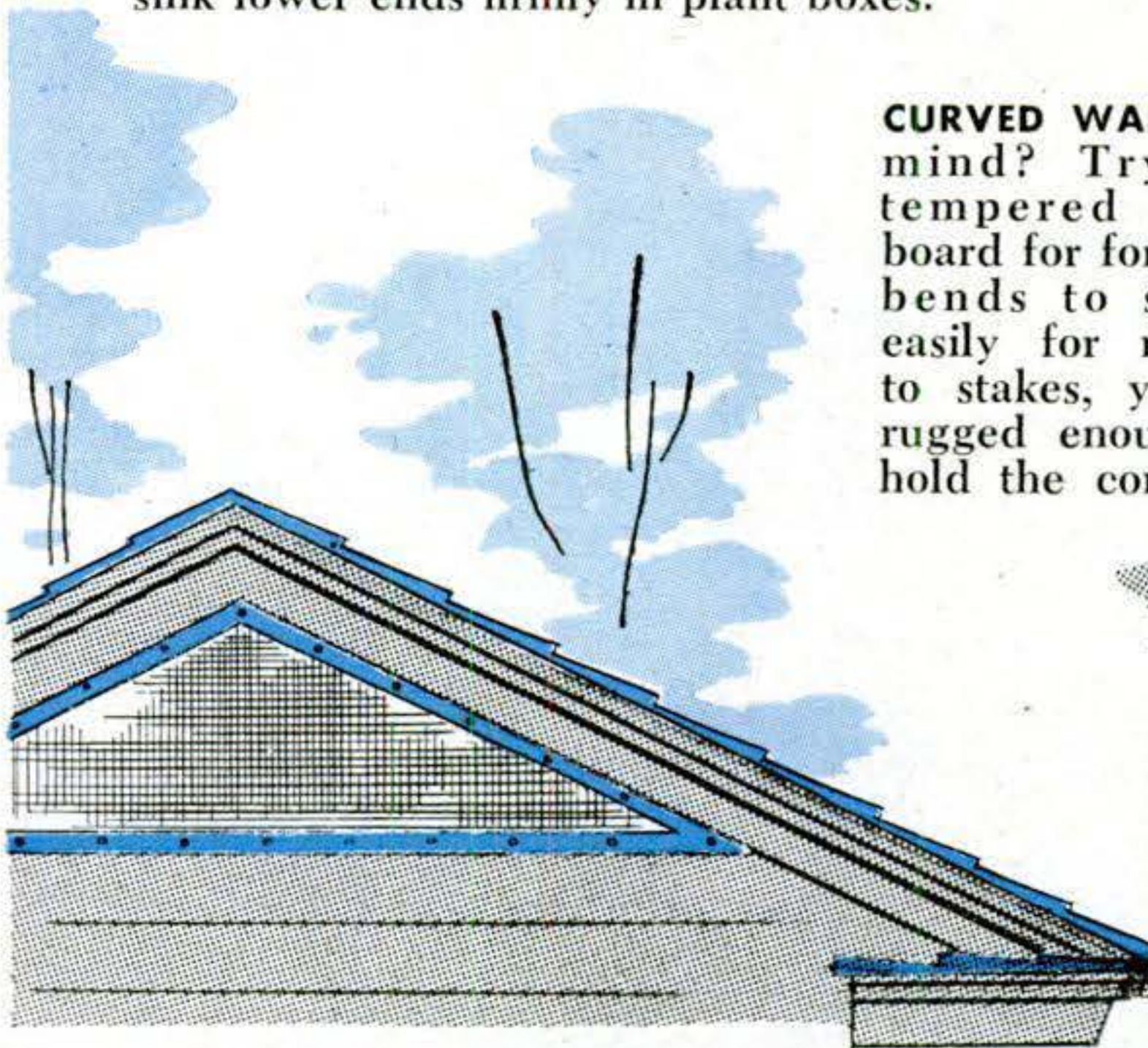


VERTICAL PLANT STANDS dress up a house that has an overhang. Slip holed shelves of oval or paddle shape over wooden curtain poles. Fix upper ends of poles to wood blocks and sink lower ends firmly in plant boxes.

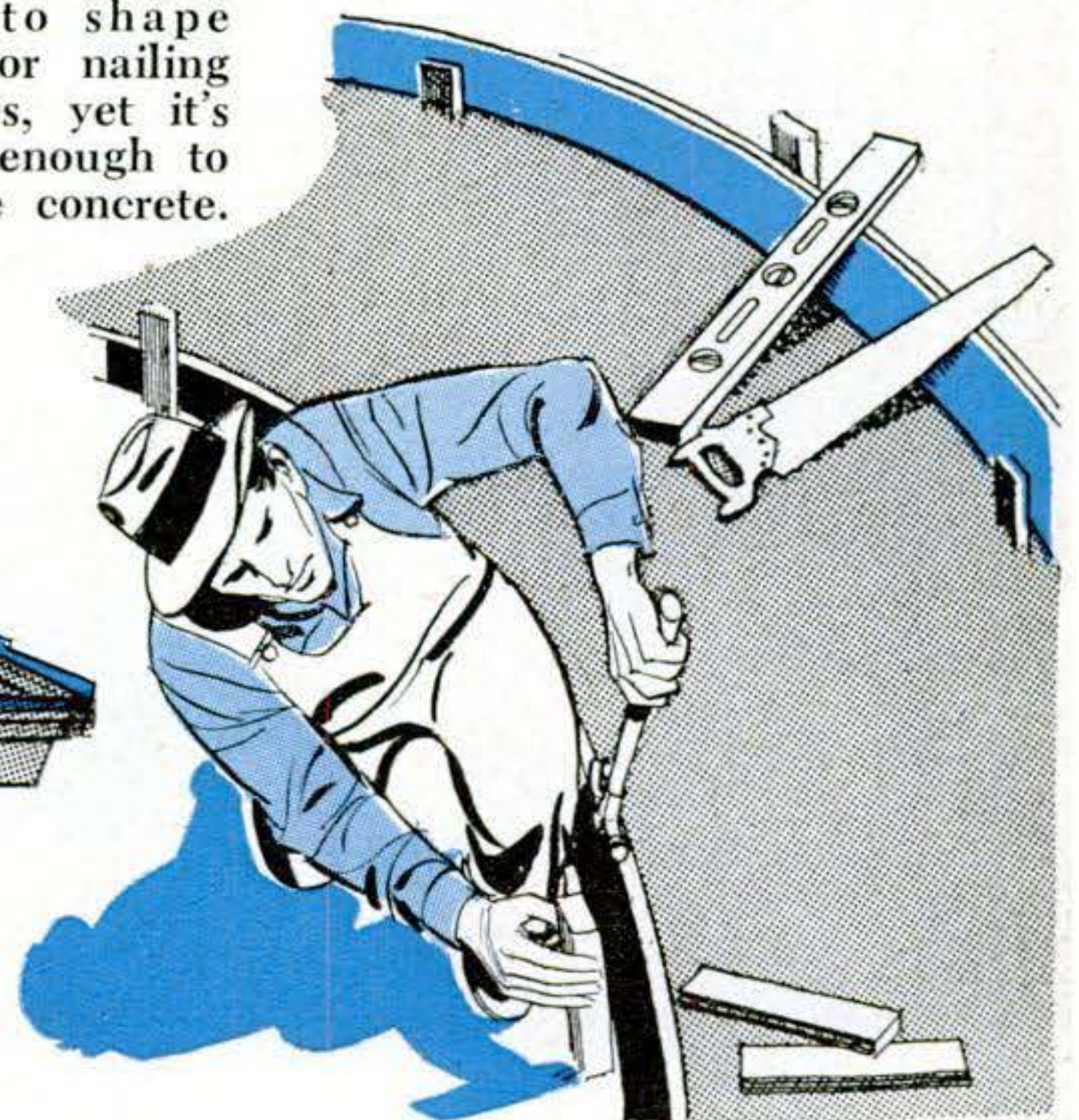
COVER THE THERMO-STAT to keep out dust when the screens go up. Tape a cut and bent matchbox over the instrument or wrap it with the plastic film used for wrapping food.



CURVED WALKS in mind? Try $\frac{1}{4}$ " tempered hard-board for forms. It bends to shape easily for nailing to stakes, yet it's rugged enough to hold the concrete.



TO FOIL WASPS that eye your attic for a home site, cover louvers with bronze or plastic screening. Brass tacks hold the screen in place.



Please turn the page for more home tips

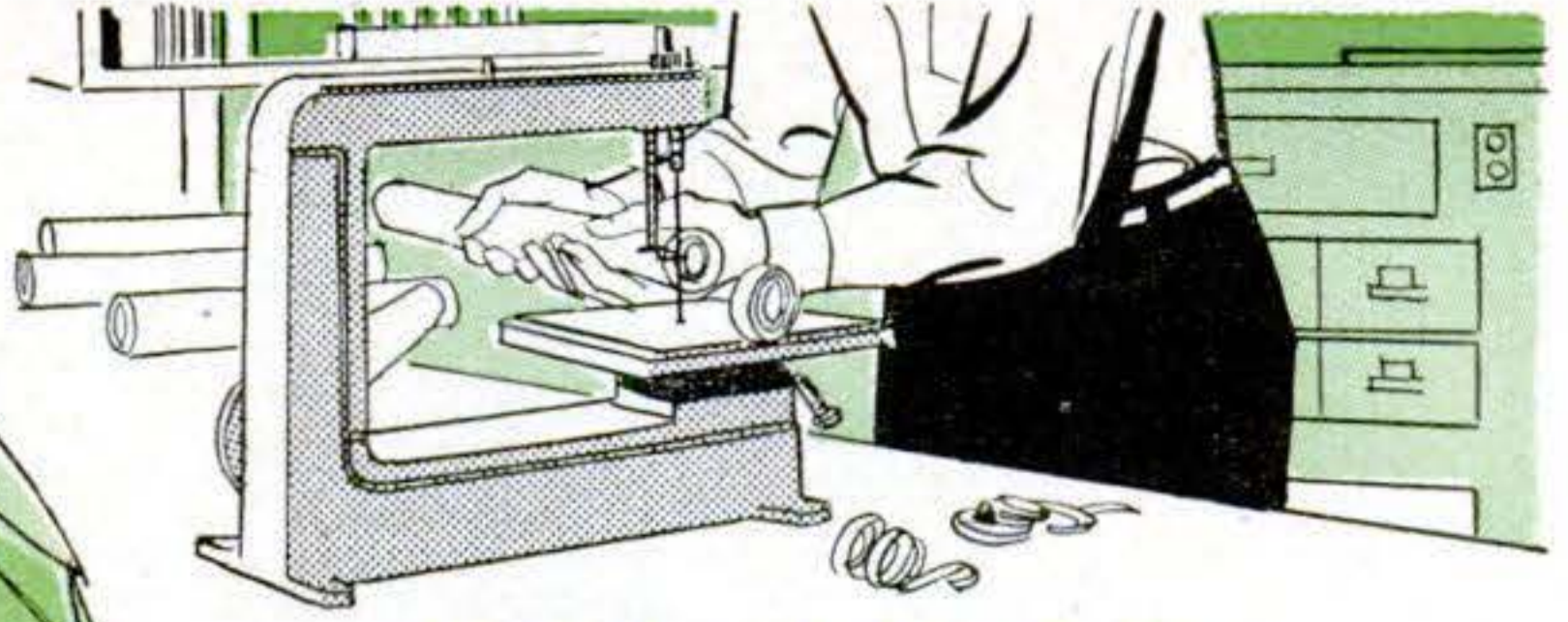
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More Home Tips



A WEAK CATCH on an umbrella won't give way unexpectedly if the top is filed off at an angle to support the sleeve.

WASHING WALLS? Start from the bottom and work up. You'll find streaks much easier to wipe off from a clean surface. Do ceilings last.

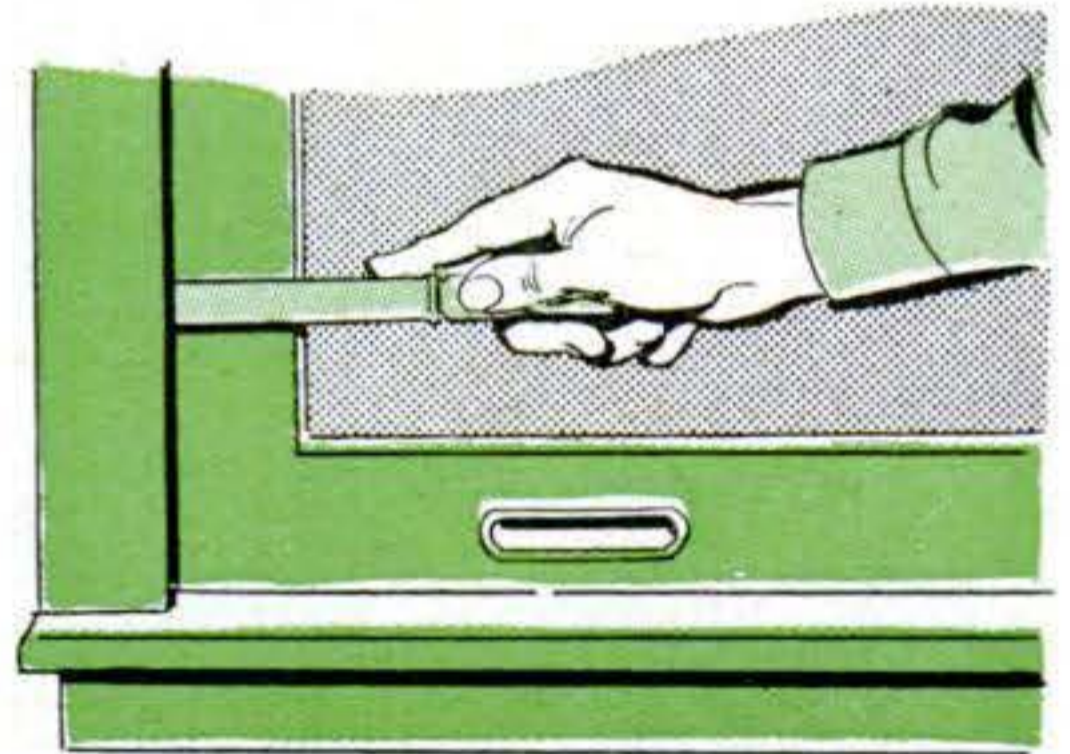


NEXT TIME YOU HANG PAPER get out your jigsaw and saw off the edges of the wallpaper before you unroll it. The saw does a smooth, fast job.

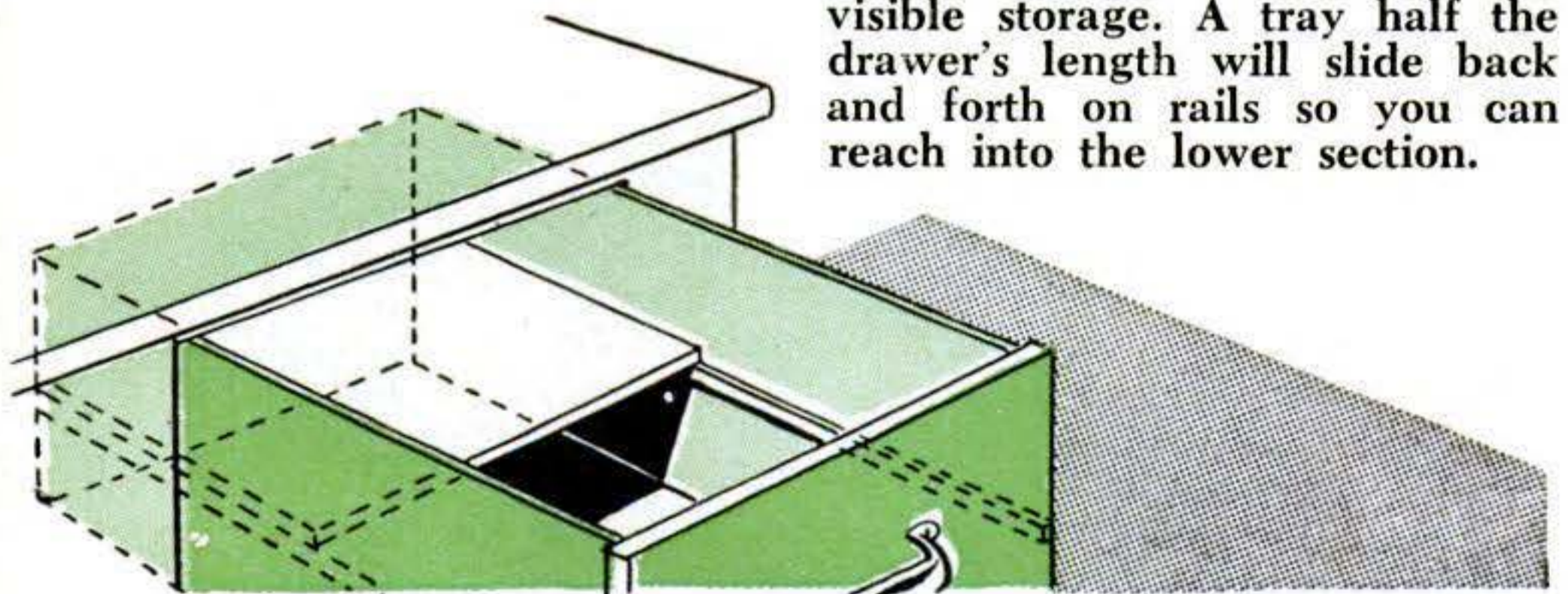


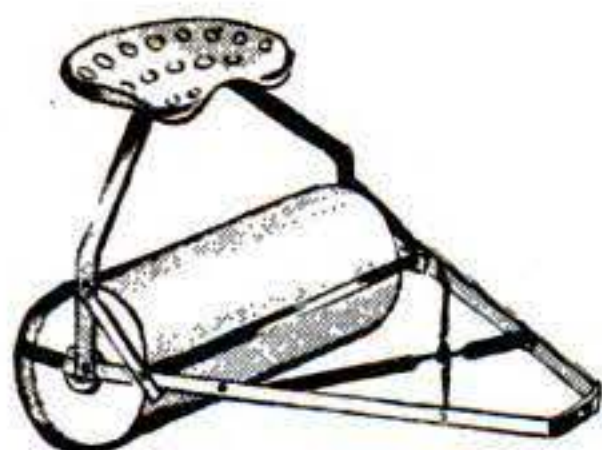
A MALLET RACK from a discarded croquet set makes a good holder for small-fry garden tools. It will also support a hose for shower-minded youngsters if the nozzle is drawn up through one of the holes.

IF A WINDOW STICKS because of hardened paint, run a knife around edge of frame and push up on center sash. To avoid breaking pane, push at sides, not middle.

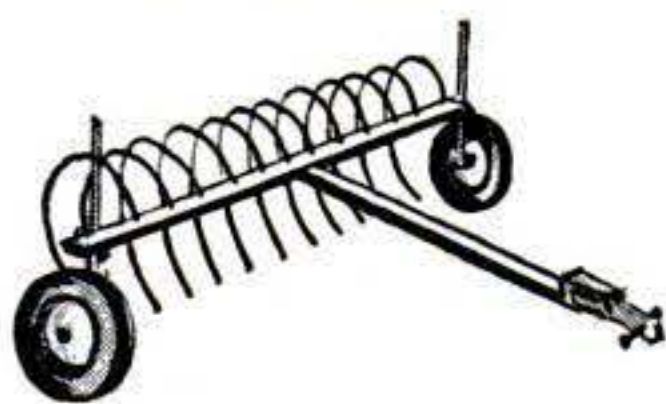


DOUBLE-DECKER BINS give more visible storage. A tray half the drawer's length will slide back and forth on rails so you can reach into the lower section.

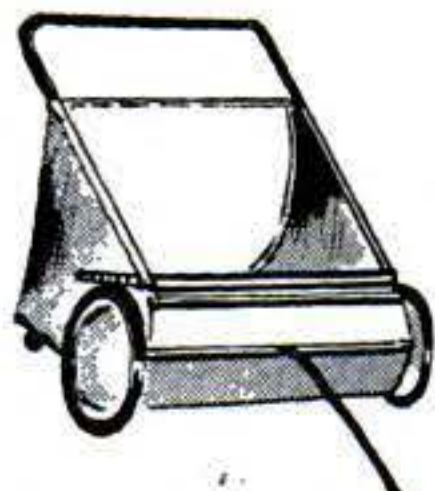




RIDING ROLLER



HAY OR LEAF RAKE



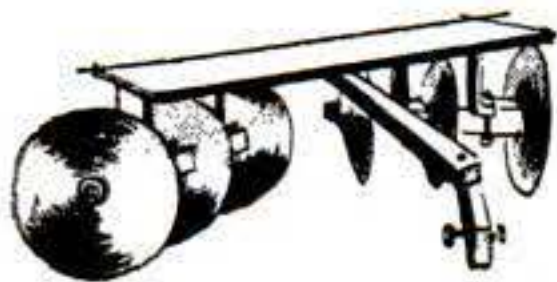
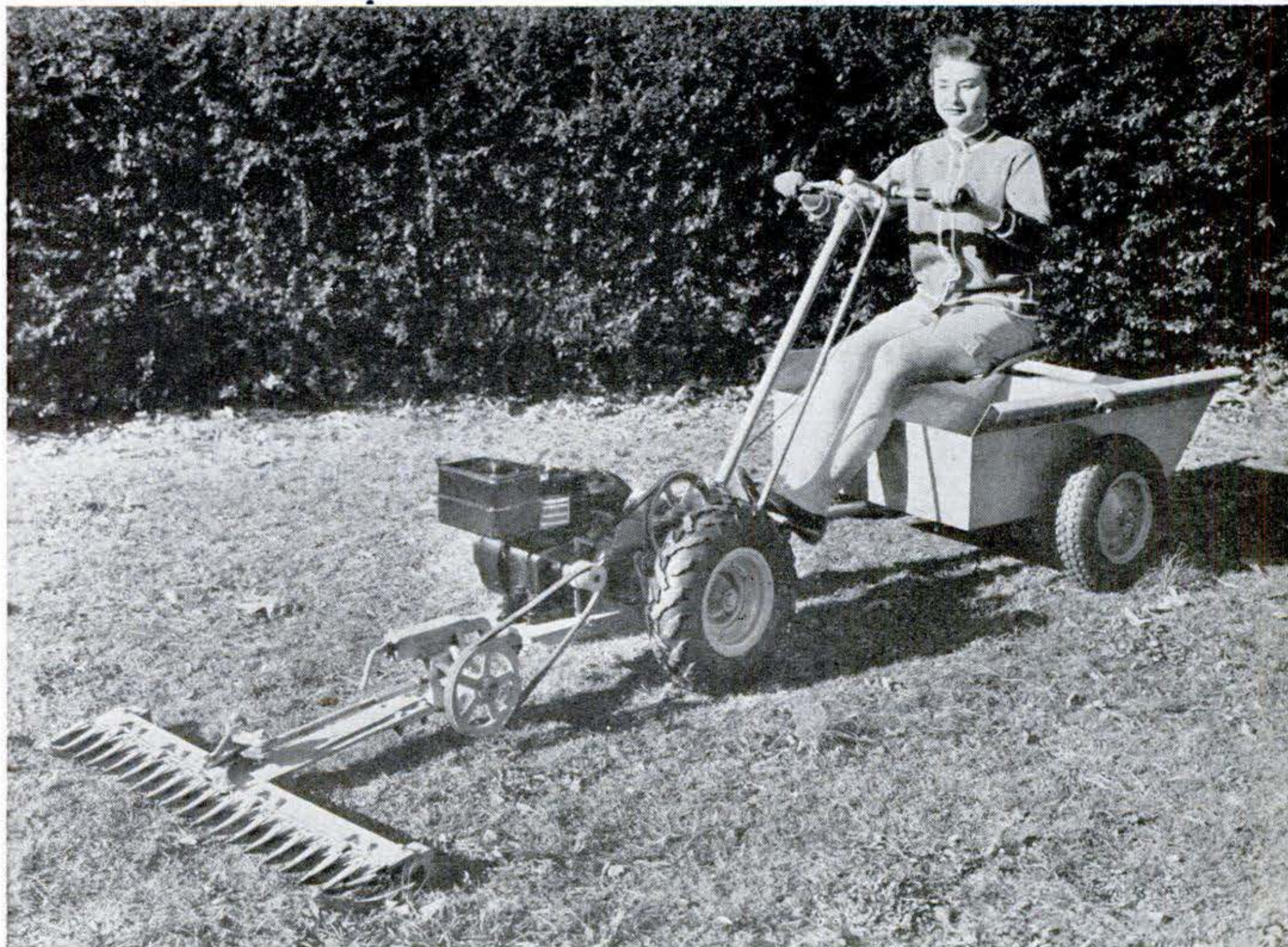
GRASS SWEEPER

New Yard Tools Are Jacks-of-All-Trades

Power packages with more accessories than a homemade hot rod speed your garden jobs.

By Sheldon M. Gallager

SATURDAY farmers are getting a brand-new crop of mechanical aids to lighten their weekend gardening chores. Now that power mowers and other basic equipment have been on the market for several years, many manufacturers are turning their efforts to new tools or to improvements that make old ones more versatile. Now,

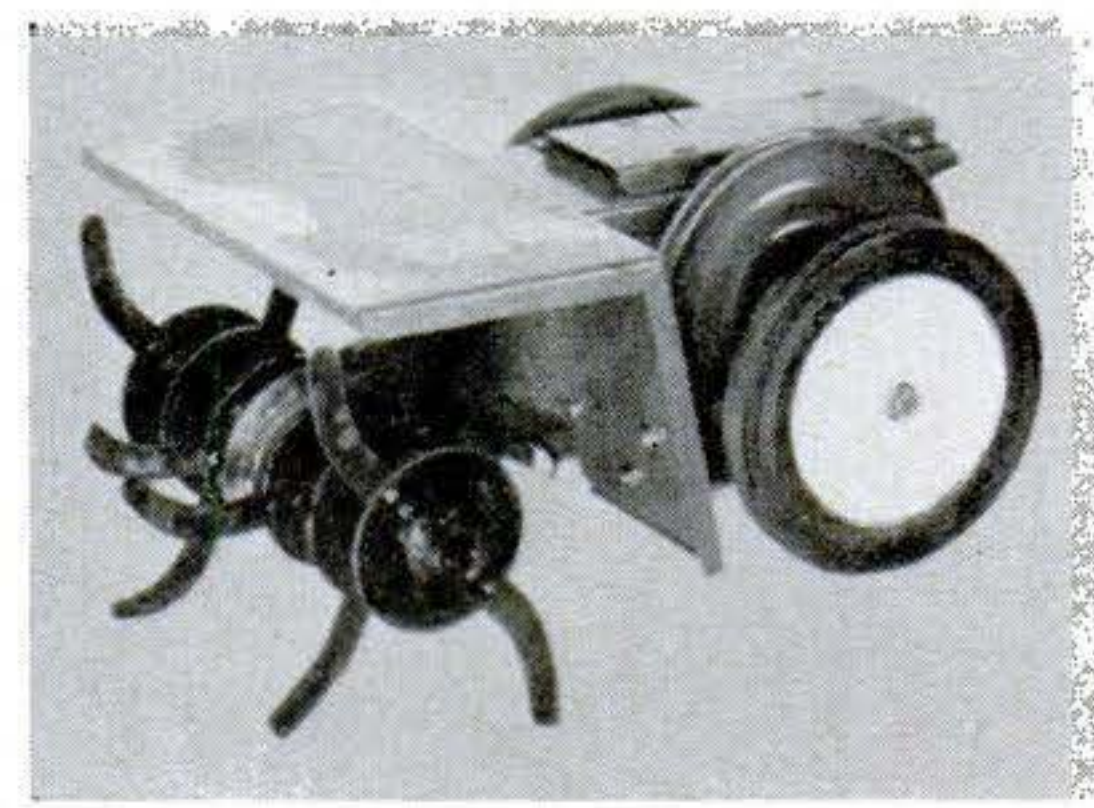


DISK HARROW

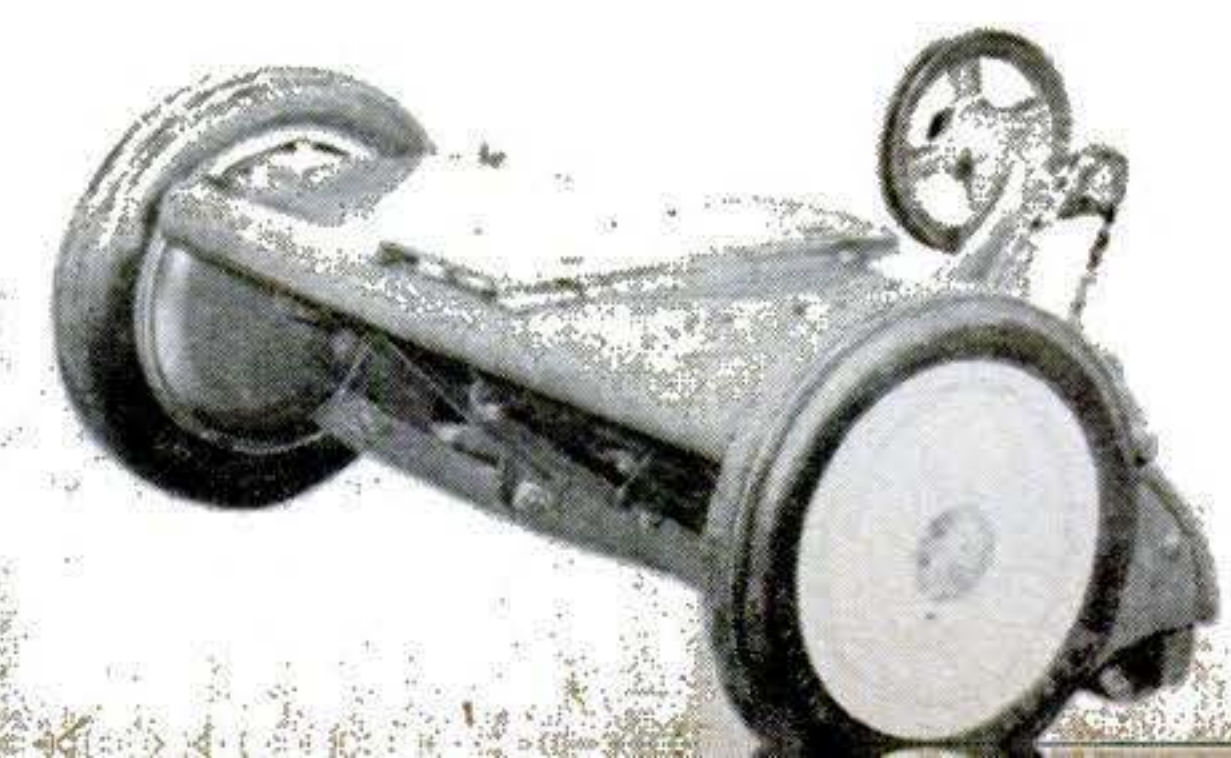
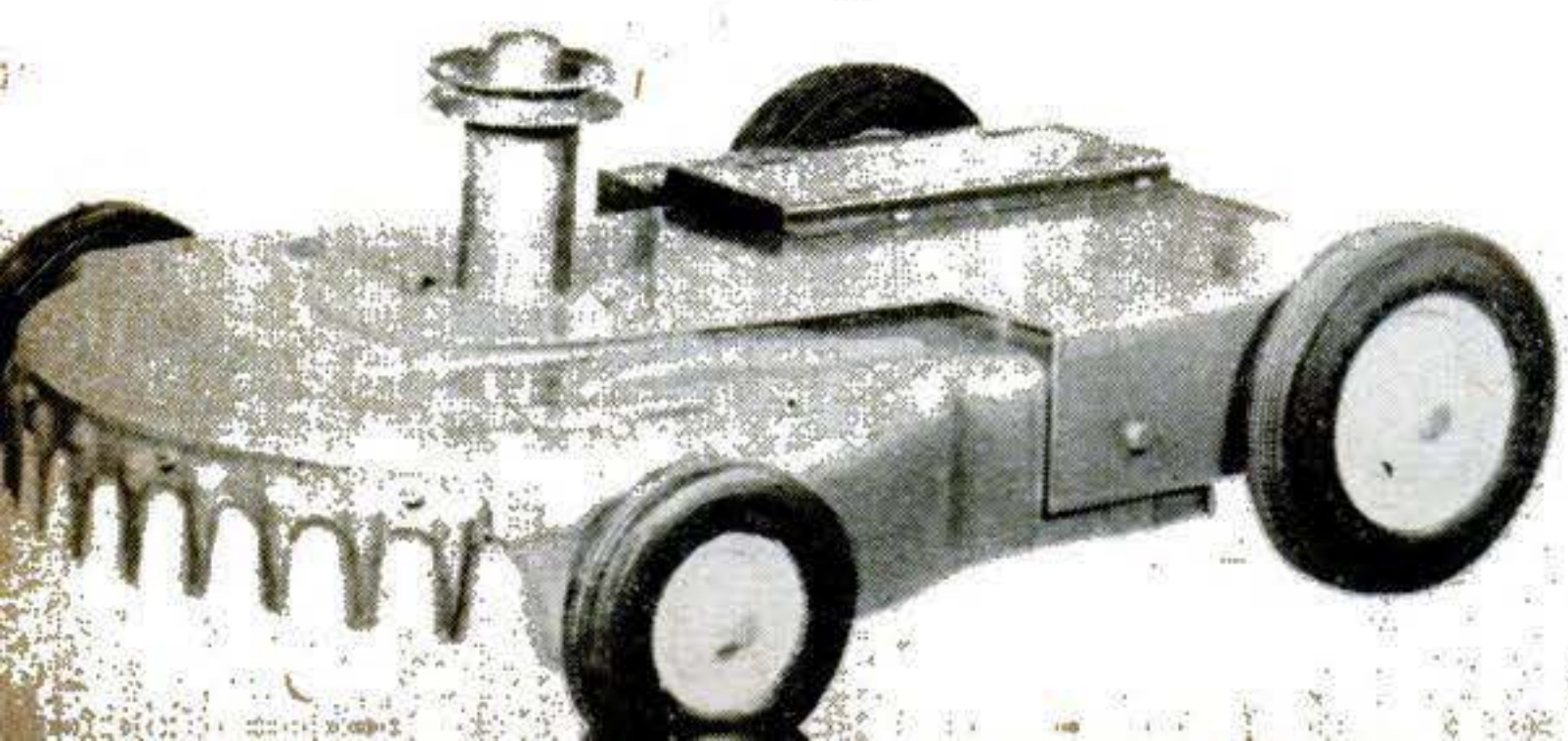
1 NEW LOOK FOR HOME GARDENERS. New and versatile power tools like this do a whole yardful of jobs without ever complaining of an aching back. This one will simultaneously mow the lawn, haul a cartload of earth, and give its owner a joyride. Basic two-wheel tractor can be fitted with either a reel or rotary mower, plus the sickle bar shown above. It will also roll your lawn, rake up leaves, sweep sidewalks, plow, doze earth or snow, saw wood, spray chemicals, or run a 2,000-watt generator.

Power packs add versatile attachments

2 TAKE YOUR PICK. This all-purpose 1½-hp. tractor will power any of 10 different accessories. On the tractor is a rotary tiller. Grouped around it, left to right, are a seed dispenser, cart, cultivator (on top of cart), rotary mower, fertilizer spreader, another seeder, another rotary mower, a reel-type mower and a dozer blade. The gasoline-powered tractor unit also comes in a one-hp. model that takes the same attachments.



3 MOTOR WITH A HANDLE is what you start out with. To this one, you can add a reel or rotary mower, a rotary tiller or a tractor unit, all belt-driven from the same drive shaft. With the tractor attached, you can also add a disk harrow, cultivator, dozer blade or fertilizer spreader, besides pulling or pushing many other accessories. All attachments are fitted to the engine with a universal quick-release latch that lets you put on or take off any unit in as little as 30 seconds. Throttle and clutch controls for the two-hp., four-cycle gasoline engine are mounted on the handle, which folds back out of the way for easy storage.



You can do more work sitting down

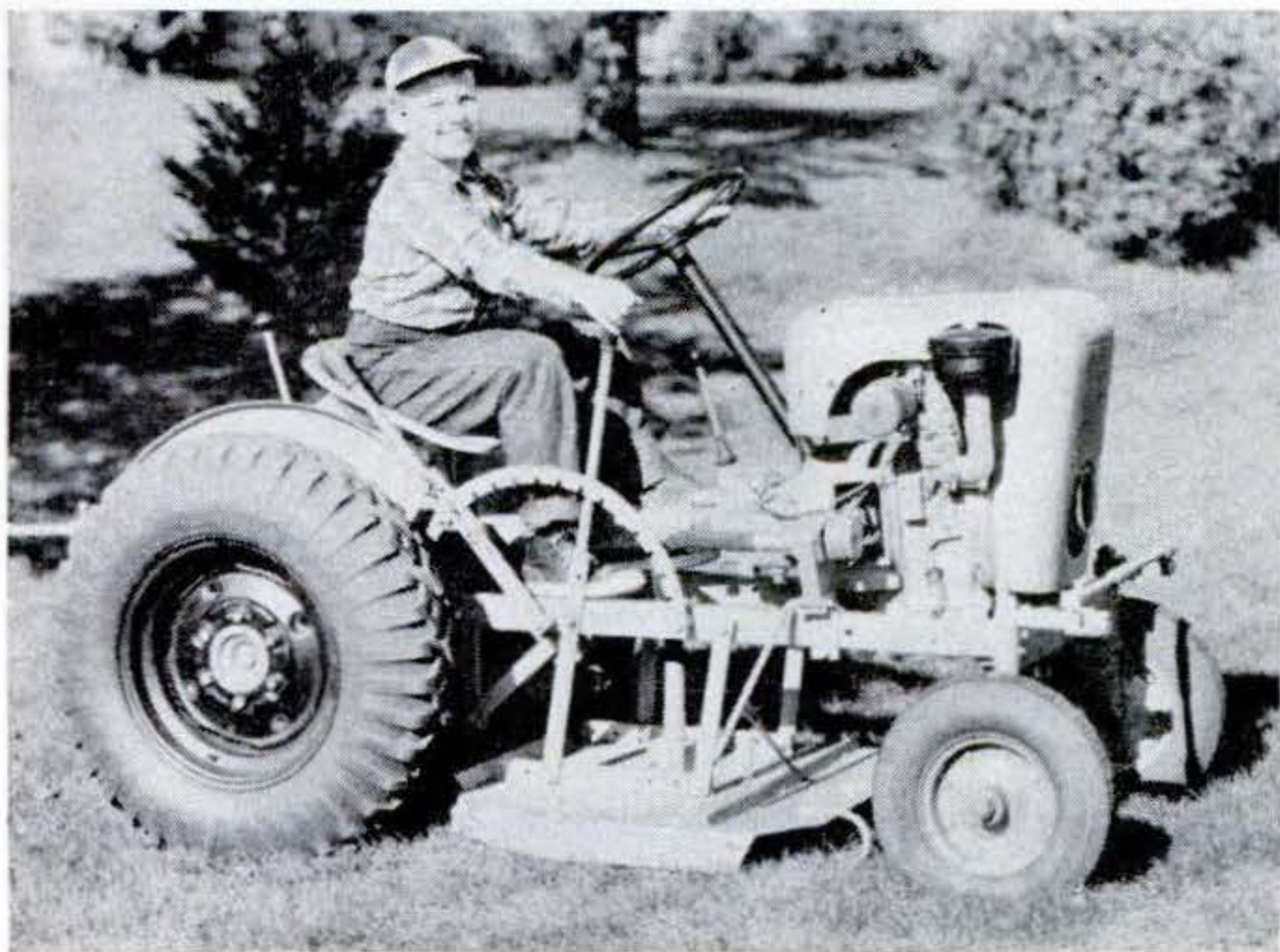
many mowers no longer merely mow. They've become basic power packages—or part of a package—that will run just about any outdoor tool you can name.

By adding interchangeable attachments, you can plow, till, seed, roll and spike your soil, saw wood, move earth, rake leaves and cart rocks—all without bending over or getting out of your seat. In winter, the same machines can be used to haul firewood, clear snow, or roll out a toboggan slide for the kids.

Farming on a 50-foot lot. Tractor units, once imposing hulks of iron-mongery, are being slicked up and slimmed down to do big jobs on small plots. They turn on a dime, climb steep grades, run well under the guidance of a wife or small boy, and are styled to catch the ladies' eyes like the latest chrome-plated lollipops out of Detroit. Even the small hand tractors are now available with riding attachments that let you work sitting down.

Whether your job is large or small, you have more tools to choose from than ever before. And you'll be able to do more work with fewer tools because each one does more work itself. END

4 MOWER ATTACHMENT for the 8.4-hp. tractor below is slung under the frame, can be put on or taken off in minutes. When you come to an obstruction, you just pull a lever that lifts the cutter off the ground. Blade rides on lawn like a sled, can't "scalp" grass.

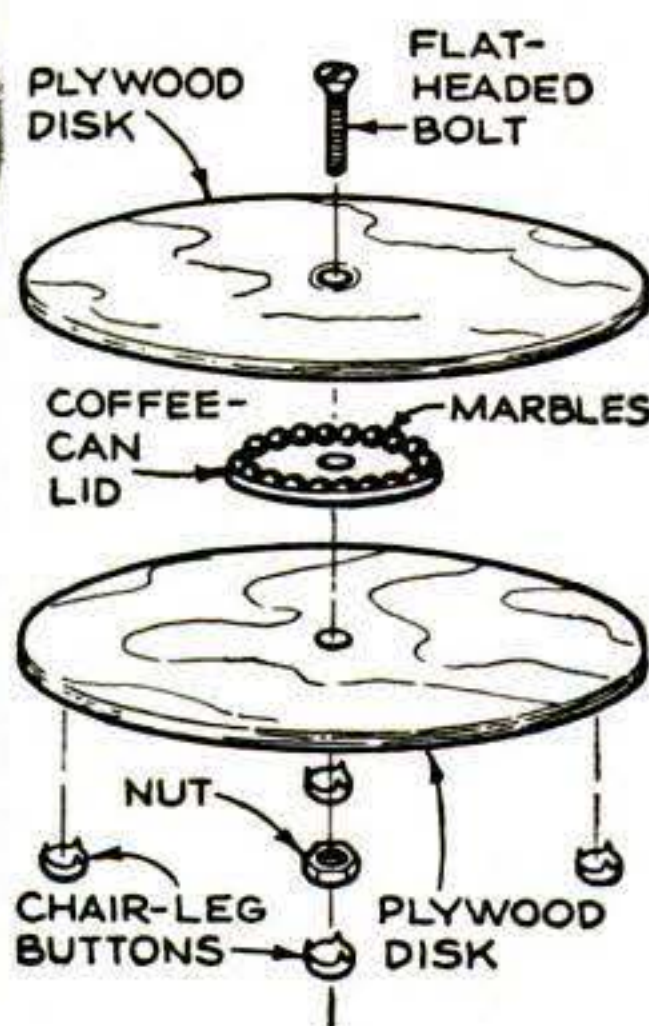


5 WHEELED FRAME fastened behind this reel-type mower converts it to a small riding tractor that will pull many other garden tools. It can also be fitted with twin outrigger mowers for cutting a wide swath.



6 OVERHEAD SEAT carries you at 4½-m.p.h. clip on top of this three-hp. rotary mower. Tractor-type body is built over blade guard, which serves as a footrest. It hauls a seeder, spiker, roller and small cart.

Further information about the garden tools shown on this and the preceding pages can be obtained from: 1. Cheston L. Eshelman Co., 119 Light St., Baltimore, Md.; 2. S. L. Allen & Co., 5th and Glenwood Ave., Philadelphia, Pa.; 3. Farm-Ette, Mantua, Ohio; 4. Country Squire Tractor Co., P.O. Box 107, Muskego, Wis.; 5. Reo Motors, Inc., Lansing, Mich.; 6. Musgrave Mfg. Co., 2755 Columbus Ave., Springfield, Ohio.

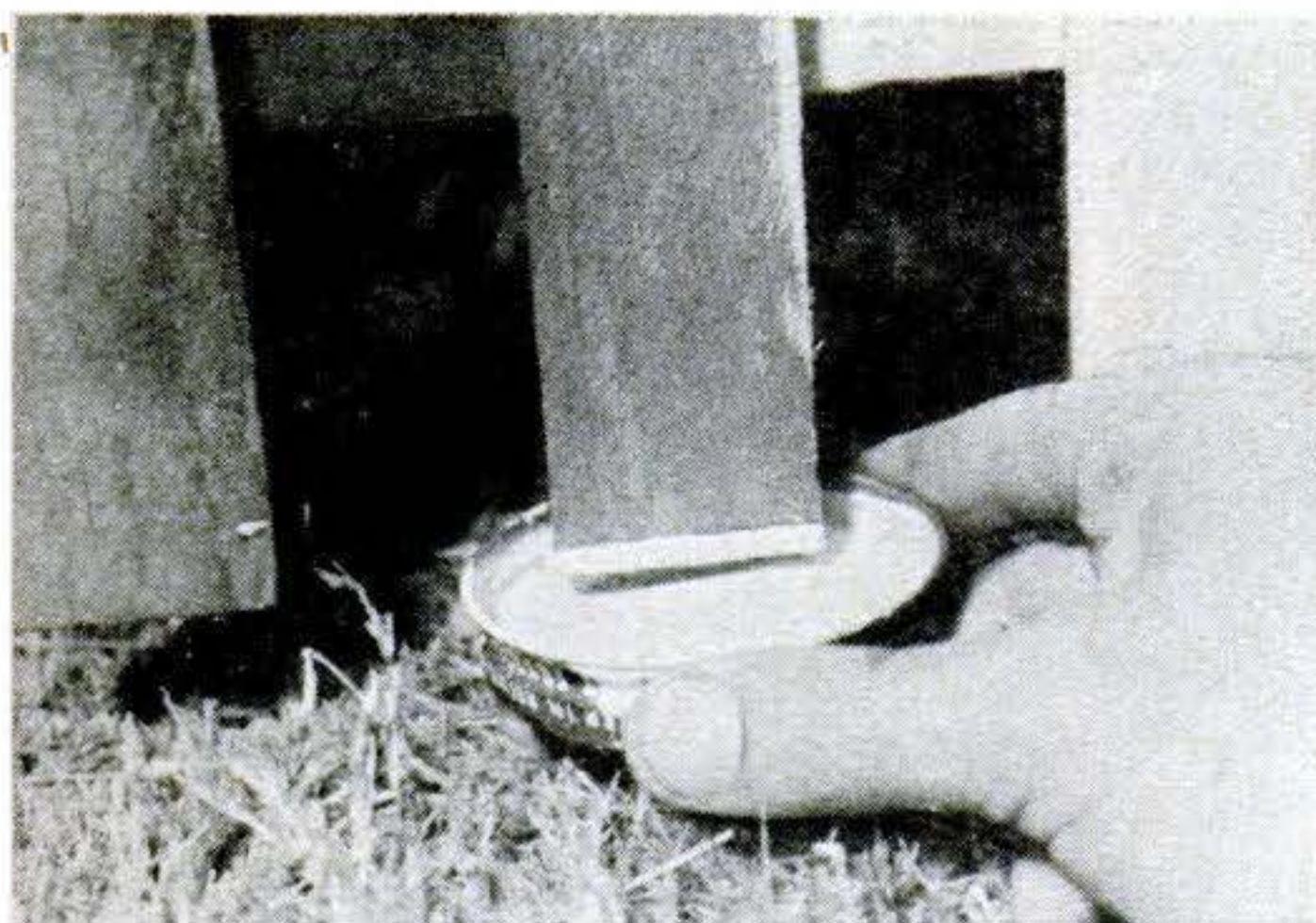


Lazy Susan Gives a New Turn to Your Scrabble Board

You can do away with the fuss of turning a Scrabble board from one player to another by building a Lazy Susan like the one shown here. All you need are two 16" disks of $\frac{1}{4}$ " tempered hardboard, the top of a coffee can, a dozen marbles, a flat-headed bolt, a nut and four metal chair-leg buttons.

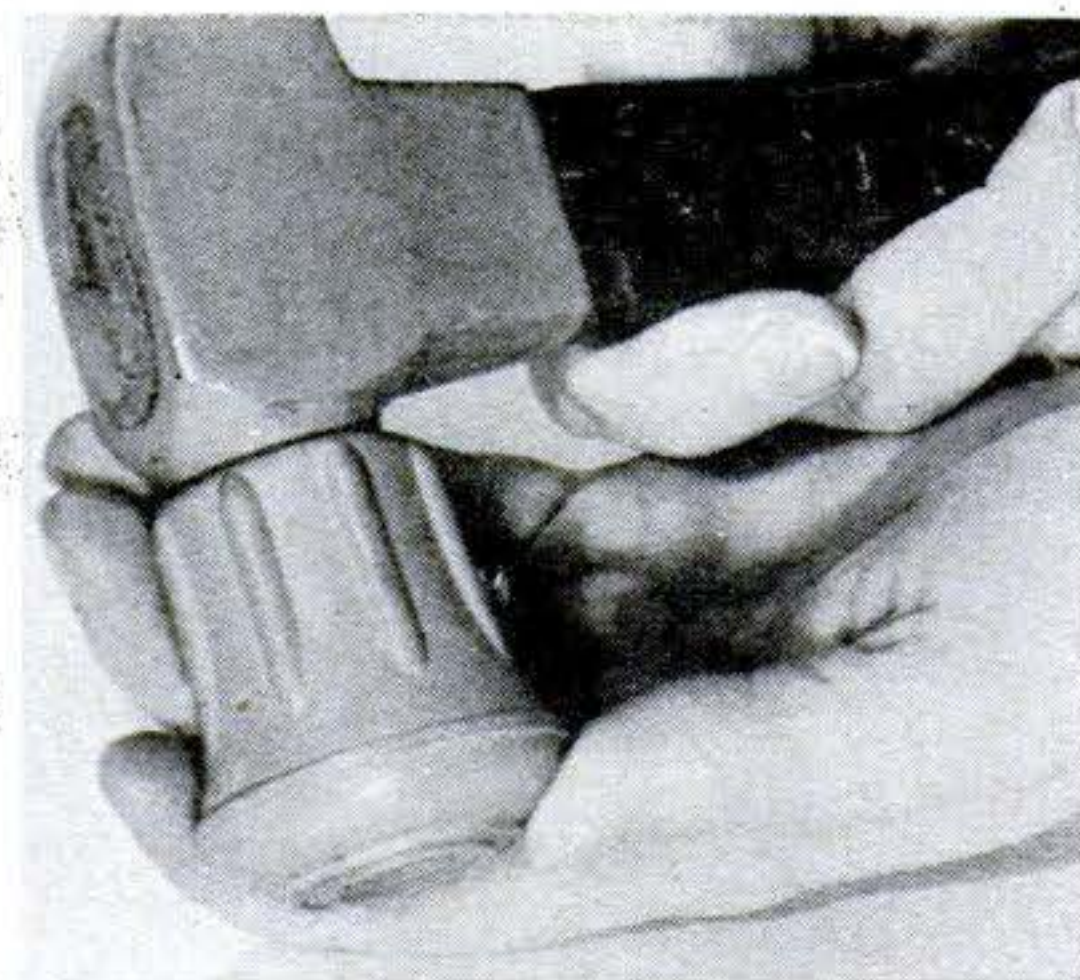
The tin-can lid, loaded with marbles,

serves as a turntable bearing. Pass the bolt through holes drilled in the disks and the can lid, and anchor the assembly with the nut. The metal buttons, which are attached to the bottom of the lower disk, provide clearance for the nut. Prime and paint the upper disk and, to hide the countersunk bolt head, glue a copy of the Scrabble rules or a decorative cutout over it.



Jar Lid Paints Picket Bottoms

PAINING the bottoms of fence pickets can be an easy job. Pour paint into a jar cover and bring it up against each picket. For wide pickets, use a shallow pan.—*Henry V. Lukas, Inglewood, Calif.*

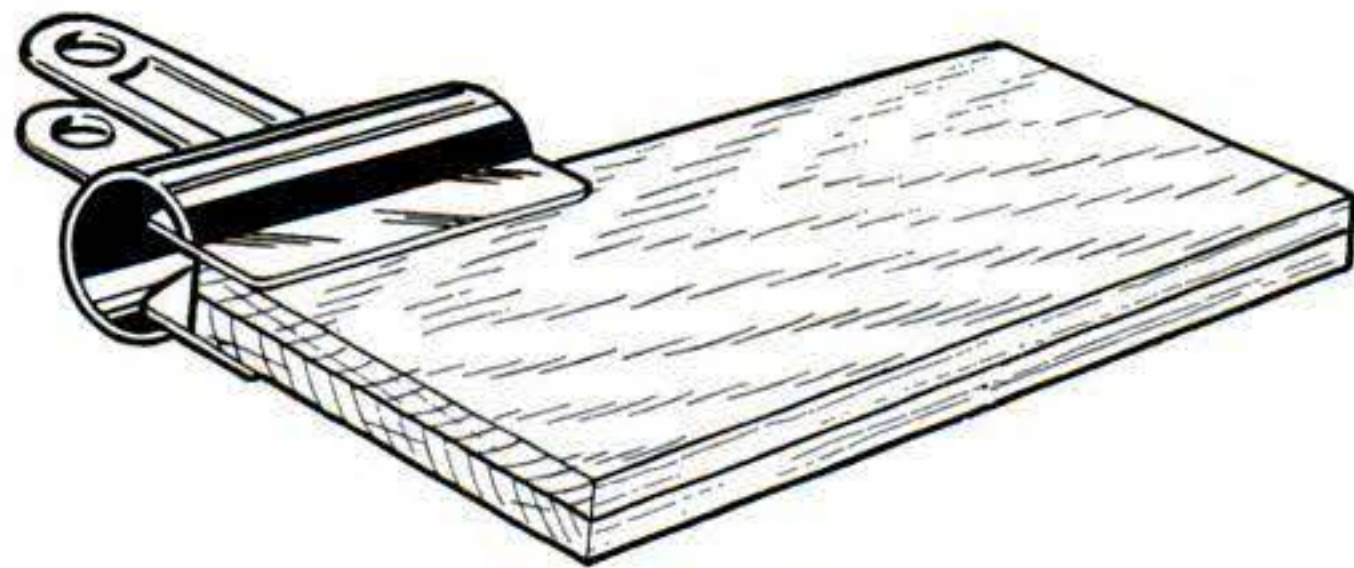
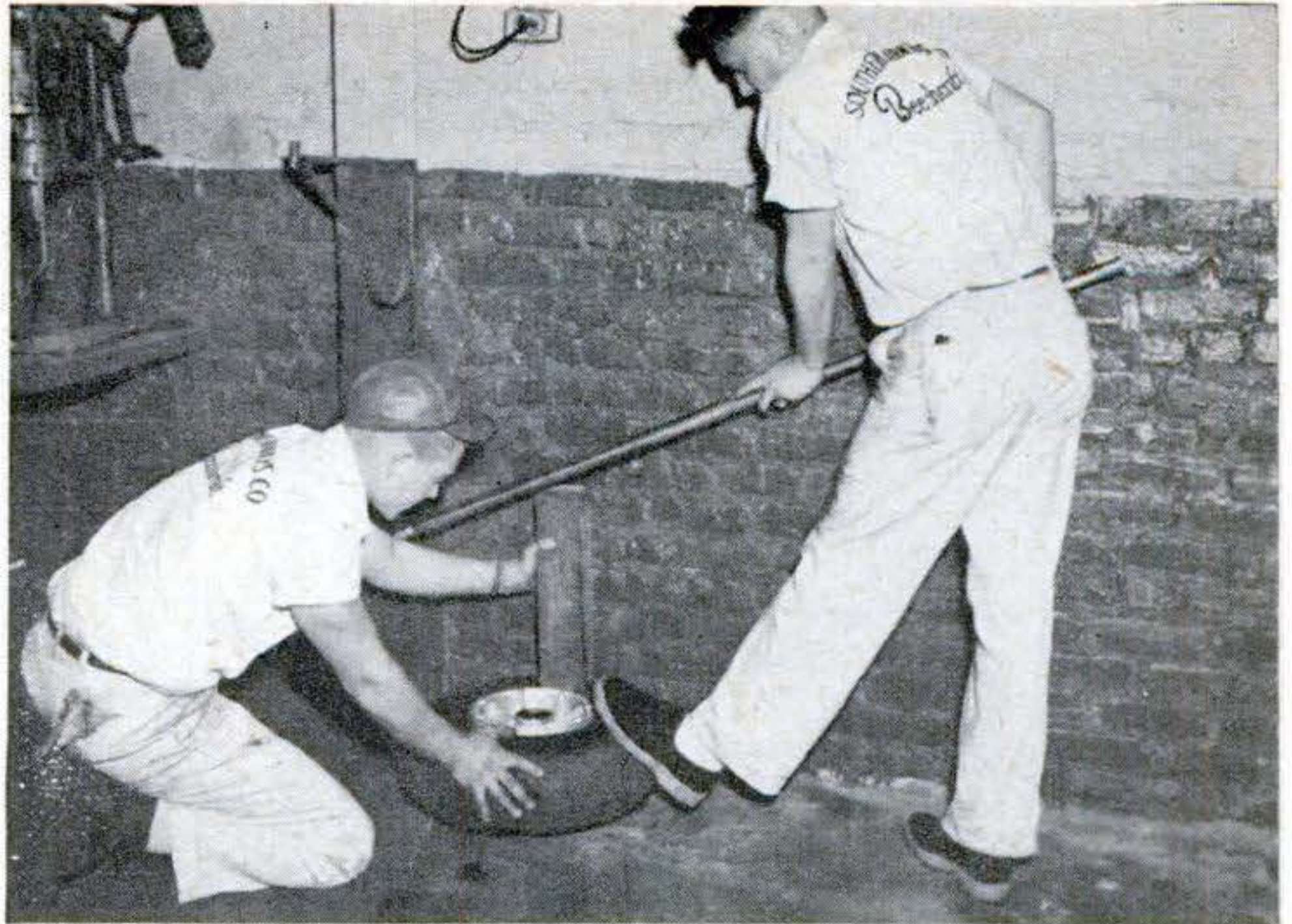


Crutch Tip Softens Hammer

THERE is no reason to invest in a rubber-faced hammer if your need for one is only occasional. Just slip a rubber crutch tip on an ordinary hammer.—*Frank A. Javor, North Bergen, N. J.*

Bar Breaks Tire Bead Loose

A STUBBORN tire bead can be broken away from the rim with this home-made device. It consists of a steel-pipe pry bar and a 12" piece of four-by-four. The pipe is drilled at the end and bolted to the wall to form a pivot. The wood block is notched at one end to keep the bar from slipping off as the tire changer bears down and leverage is applied.—*Bob Blatt, Larchmont, N.Y.*

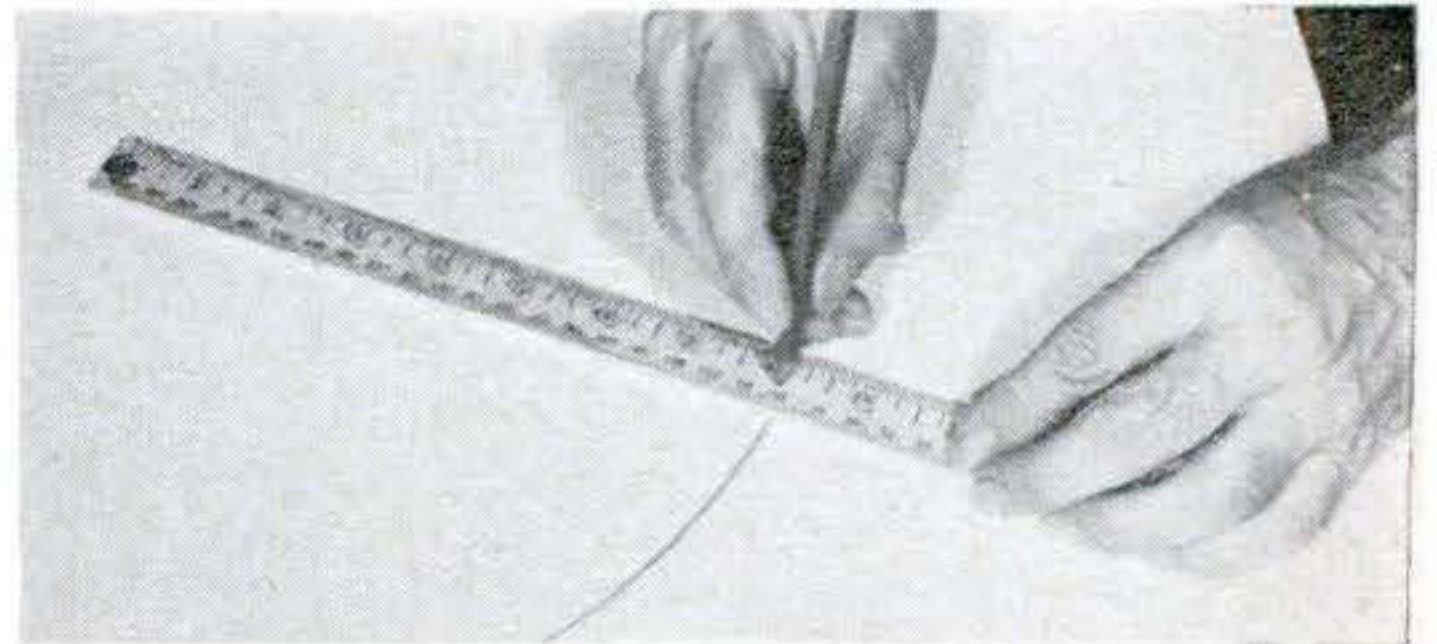


Paper Clips Clamp Balsa

CEMENTING thin sheets of balsa wood and other soft materials that would be damaged by ordinary C clamps is easy with spring-backed paper clamps. They exert gentle pressure over a large area and come in various sizes to suit different thicknesses.—*R. L. Clough Jr., Bristol, N.H.*

Ruler Draws Large Circles

A RULER used as below will make an inexpensive compass for drawing large arcs and circles. Drill a small hole at the end to take a thumbtack for a pivot, and a series of larger holes so you can insert a pencil point at any desired distance along the ruler.—*Eric R. Adams, Toronto.*



SPRING TERMS

ARBOR—A round, hardened rod or shaft upon which springs are wound. Also called a "mandrel."

COIL—To form wire into a helix in an automatic coiling machine.

PERMANENT SET—When any material is deflected so far that its elastic properties have been exceeded and it does not return to its original condition upon release of load, it is said to have taken a "permanent set."

PITCH—The distance from center to center of adjacent coils in a spring when it is free of load. Also called "lead" and sometimes expressed as "coils per inch."

RATE PER INCH—The load in pounds needed to deflect a spring 1". Also called "scale," "gradient" and "load factor."

REMOVE SET—The process of closing solid a compression spring which has been coiled longer than desired finished length, in order to increase the elastic limit. Also called "press" and "set."

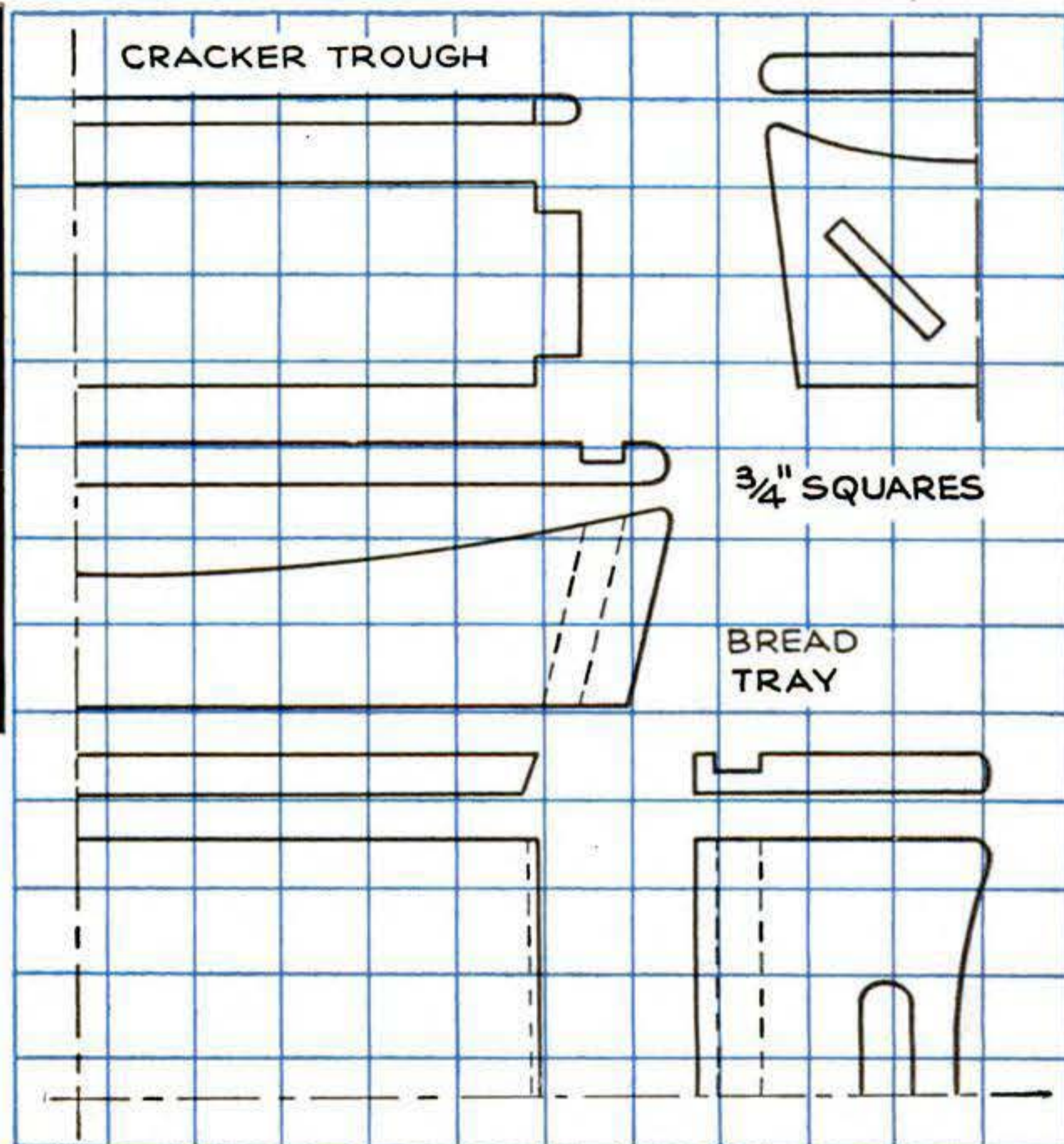
SOLID HEIGHT—Length of compression spring when under sufficient load to bring all coils into contact with adjacent coils. Also called "solid length" or "closed height."

SPRING INDEX—Ratio of mean diameter to wire diameter.

FOR YOUR POPULAR SCIENCE MONTHLY INFORMATION FILE

One- Evening Projects

3 Smart Kitchen Accessories

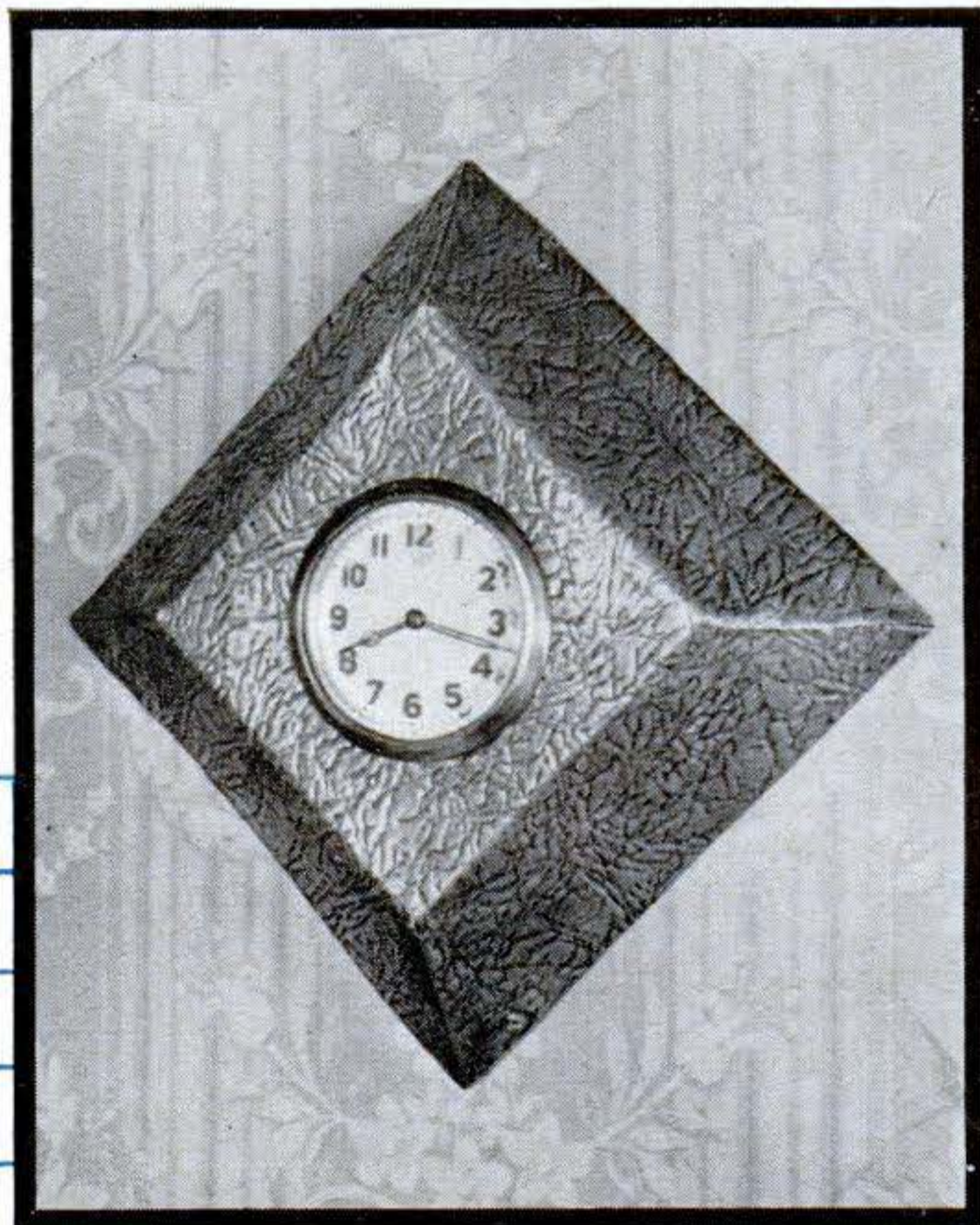
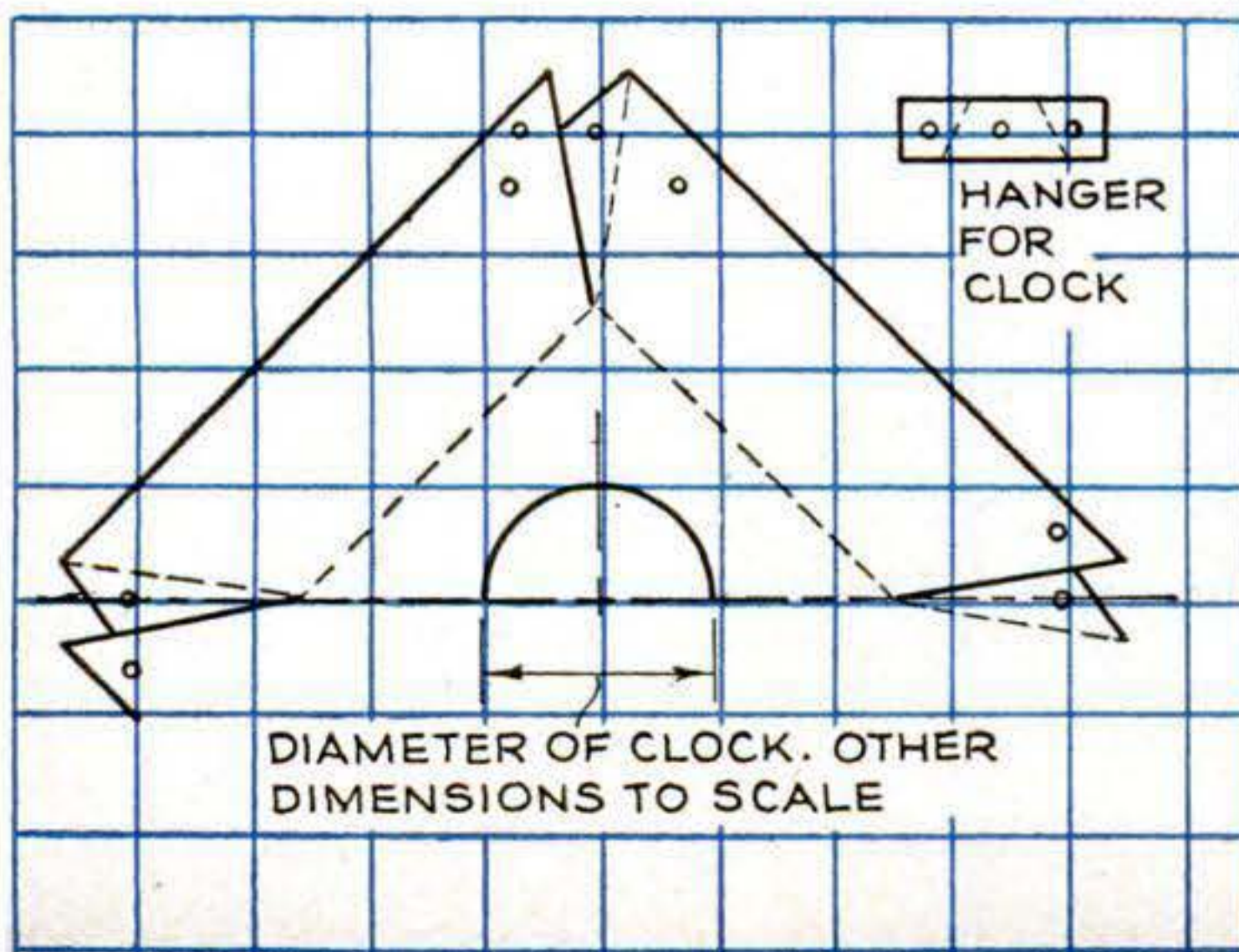


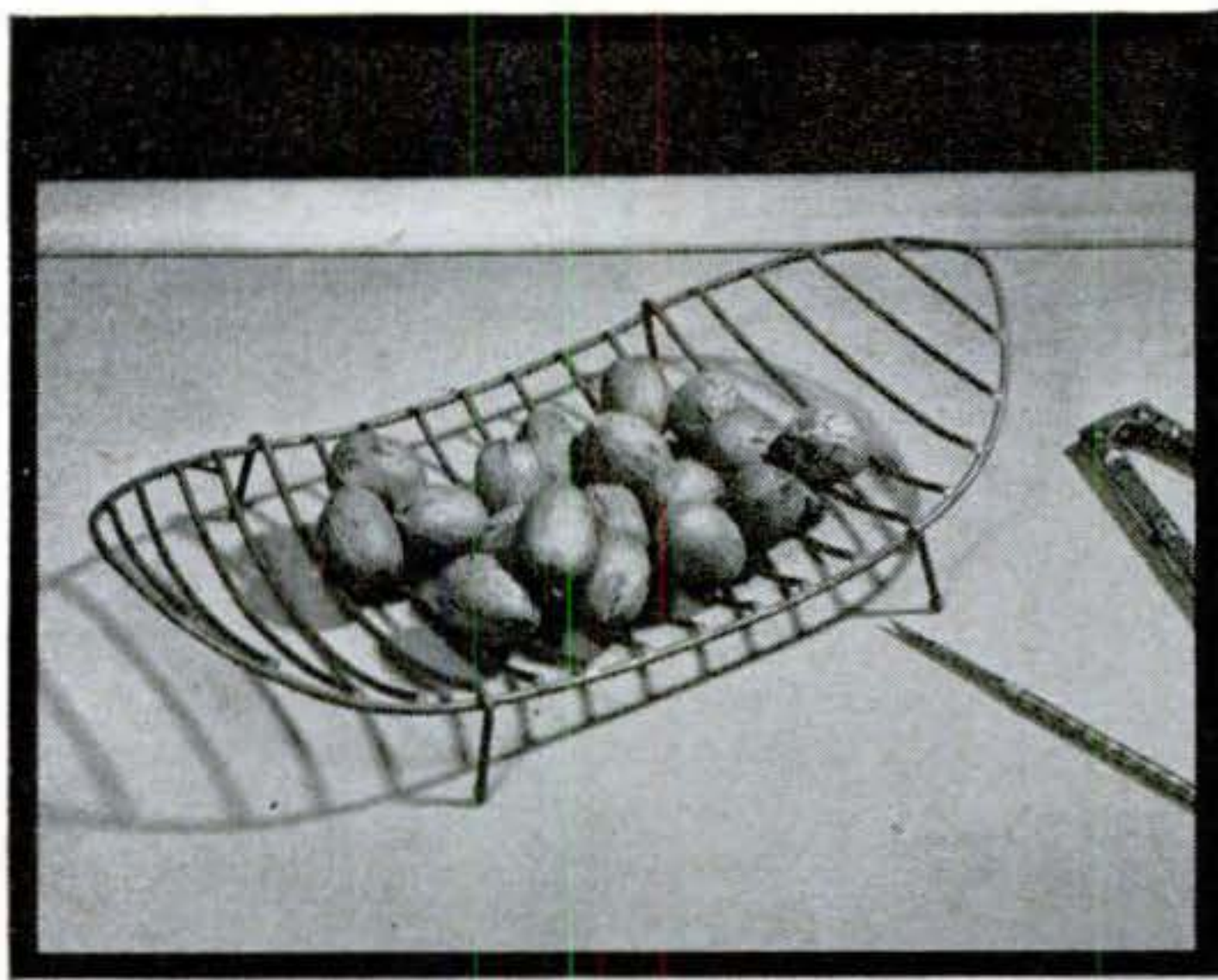
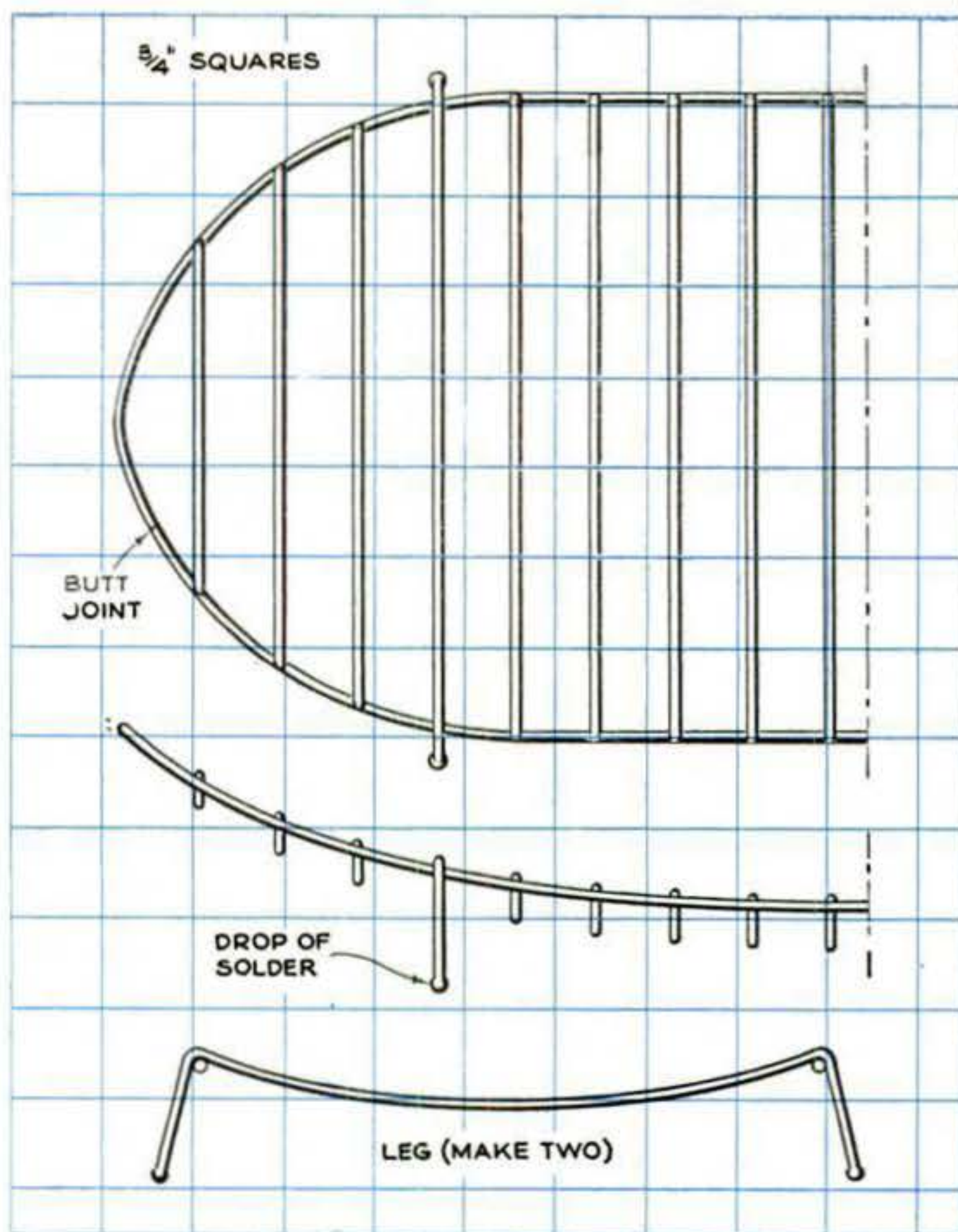
1 SCRAPS of boxwood, $\frac{3}{8}$ " and $\frac{1}{4}$ " thick, can be shaped into this colonial serving set in jig time.

Mortised joints in the cracker trough are glued; those in the larger bread tray are bradded for additional strength. Round all sharp edges and finish with maple stain and wax.—*Sam Grant, NYC.*

2 TO CONVERT that shabby desk clock into a handsome miniature wall clock, all you need is a small sheet of embossed aluminum and a few rivets. Scale up the pattern so the timepiece will fit in the circular hole, fold back the aluminum along the dotted lines, and rivet the flaps to the beveled sides. Rivet a strip of metal to the back of the case at one corner for a hanger.

Insert the clock, and anchor it in place, using the same fastenings which held it in its original case.





3 FRUIT, nuts or flowers look well in this modern wire dish, made from coat hangers. Bend the frame to shape, point the ends with a file, and solder or braze them to a smooth butt joint. Then give the frame a longitudinal bow so that the ends will be about $1\frac{1}{2}$ " higher than the center. Solder or braze curved cross ribs in place, using two that have projections for the legs. File or grind all of the other cross ribs flush with the frame at their outer ends.

Put rubber tips on the legs or solder or braze blobs of alloy to them to form foot knobs. Finish with flat enamel or lacquer.—*Walter E. Burton, Akron, Ohio.*





Balsa Buoys Mark Mooring

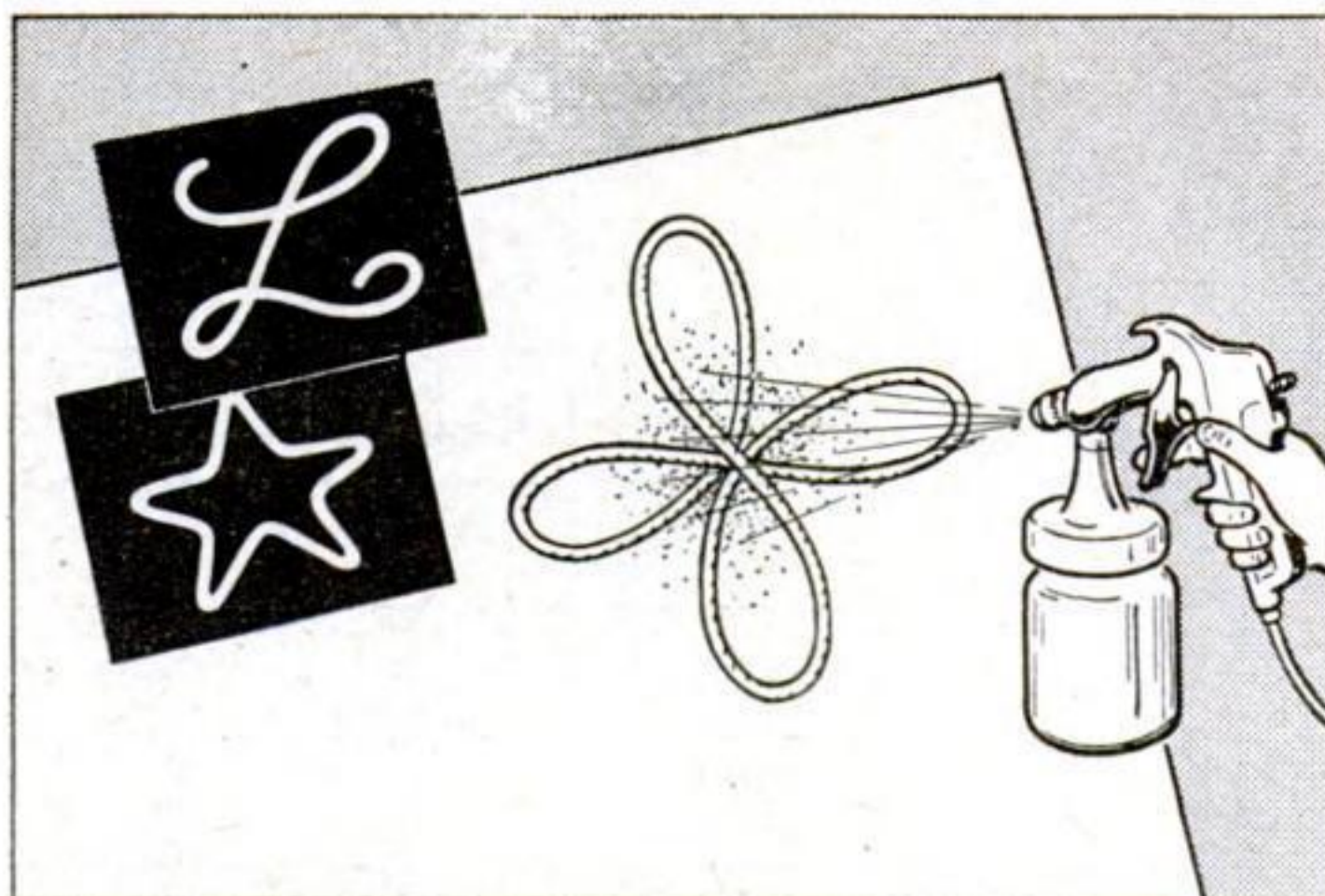
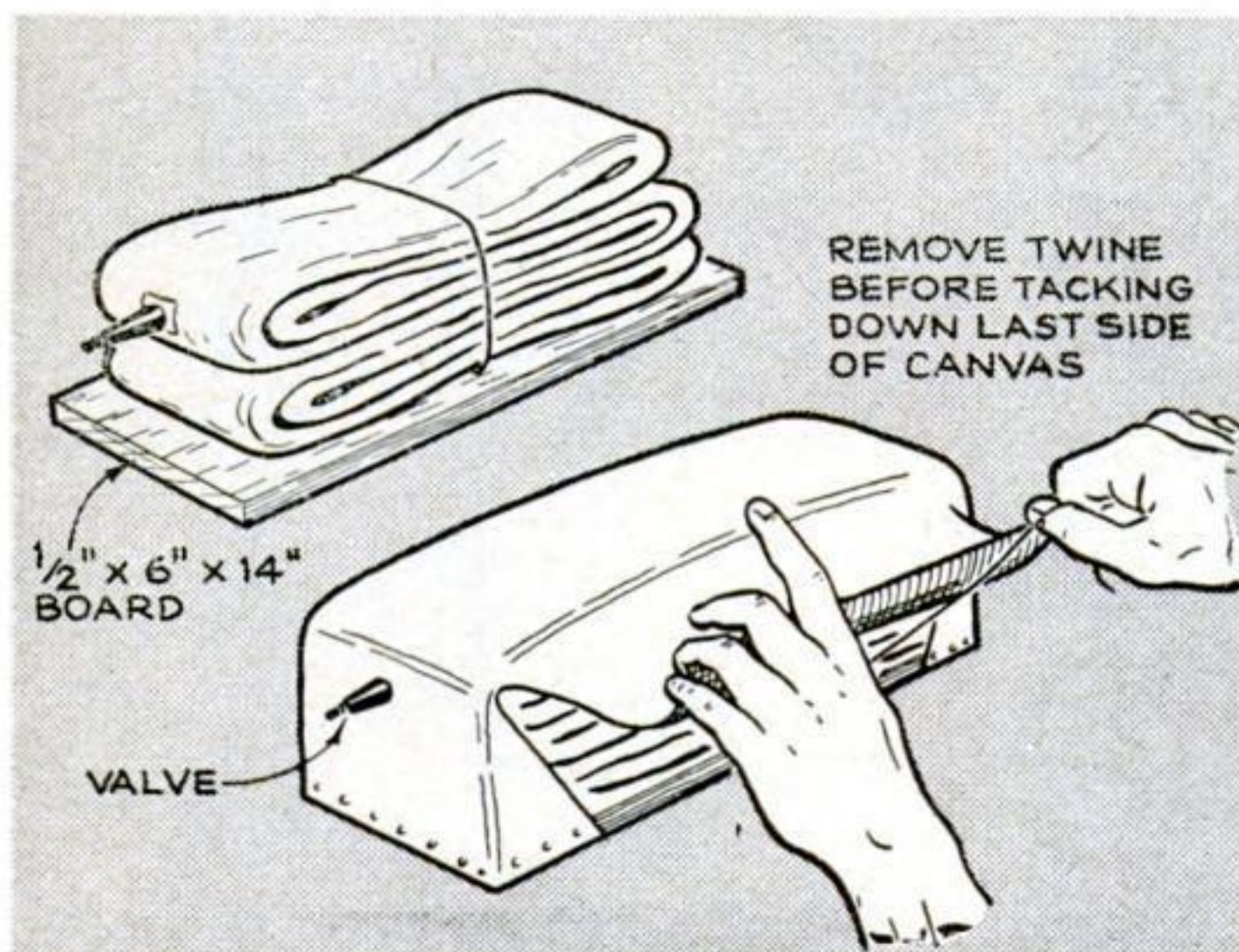
DISSATISFIED with commercial and make-shift mooring buoys, Frederic C. Jay of Baltimore made his own. It's a giant balsa bobbin with a white-oak center spike shackled at the bottom for a galvanized-iron ring. Impregnated to resist fungi and rot, the balsa was given several coats of filler and a brilliant marine-paint finish.

So distinctive is his buoy, Jay is kept busy filling orders from clubs and other boatmen.—*Ralph Reppert, Baltimore.*

Flashlight Bulb Is Good Bobber

A USED flashlight bulb makes a good fishing bobber. Attach the bulb to the line with a rubber band and you can slide the bobber up or down to different depths.

Inner Tube Attached to a Board Makes Garden Kneeling Pad



Twine Forms Spray Stencil

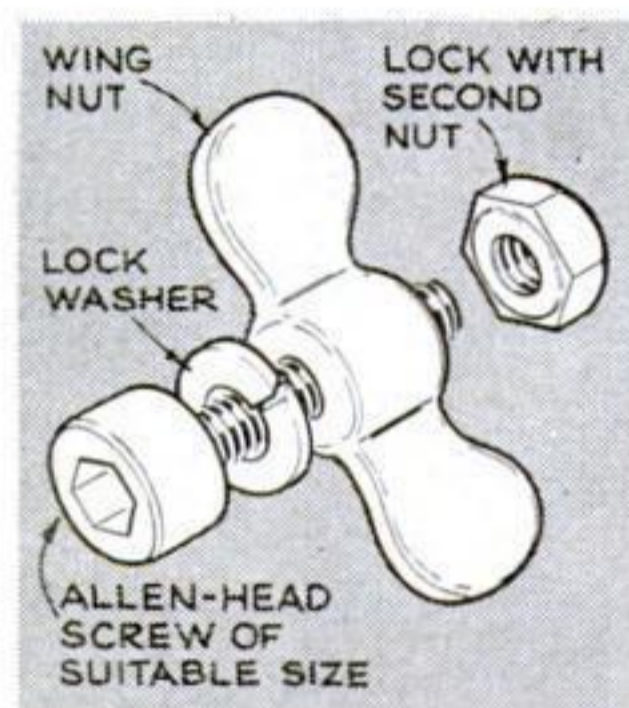
MODERNISTIC stenciled designs for use in spray painting may be formed with ordinary twine laid on work that can be placed horizontal for spraying. Because the twine is not completely flat, you will get a soft-edge effect that can be very pleasing. Be sure to spray lightly so the design will not fill in.

Initials can be added with gummed letters used for package decoration. Moisten them slightly so they will be easy to remove after the paint has dried.—*Charles L. Anderson, Burlingame, Calif.*

Allen Screw Used as Wrench

You can improvise a small socket wrench from an Allen-head screw if the need arises for one.

Slip on a lock washer and screw on a wing nut as a handle for light duty. For heavier work, back the wing nut with an ordinary nut.—*Alfred H. Fortier, Rockville, Conn.*



FOR a comfortable kneeling pad, or mat, inflate an old, patched inner tube slightly, double it over several times and tie together loosely with a piece of string. From $\frac{1}{2}$ " stock cut a baseboard about 6" by 14". Place the tube on the board and cover tightly with canvas tacked along the edges of the board.

Allow the valve to project through a hole in the side of the canvas cover and, before tacking down the last flap, cut the string which holds the inner-tube folds together. Finally, add a bit more air.—*John C. Craig, Edmonton, Alberta.*



In this atomic age, you need an electronic ear to strike pay dirt. This one will get you started.

Prospecting with a Geiger Counter

YOUR country needs uranium. Fortunes already have been made from it—and more will be. You may never be that lucky. But with a Geiger counter in hand it's easy at least to dream.

On these pages you'll find a small one, as easy to build as a one-tube radio. It's

mostly for fun, although its ticks will register even small amounts of radioactive ore.

Next month, if you are really serious about heading out into ore country, you'll want to read about—and probably build—one of the most efficient Geiger

counters yet devised. It's a worthy survey and prospecting tool for professional use.

The simple little counter you see here was designed and built by Edward J. Gauss, a staff member of the University of Colorado. It signals radioactivity by irregular ticks or clicks—the faster they come, the “hotter” your find.

You can buy the Geiger tube by mail for a little over three dollars; the other parts should be available locally. If all are bought from a mail-order radio-supply house, they will come to about \$11, including a single earphone.

Juice from flashlight cells. A Geiger tube requires upwards of 800 volts to work. Yet this compact little job has a self-contained power supply—a tiny 22½-volt hearing-aid battery and two medium-size flashlight cells. These latter supply both filament juice and the necessary high Geiger potential. It's all done with a push button.

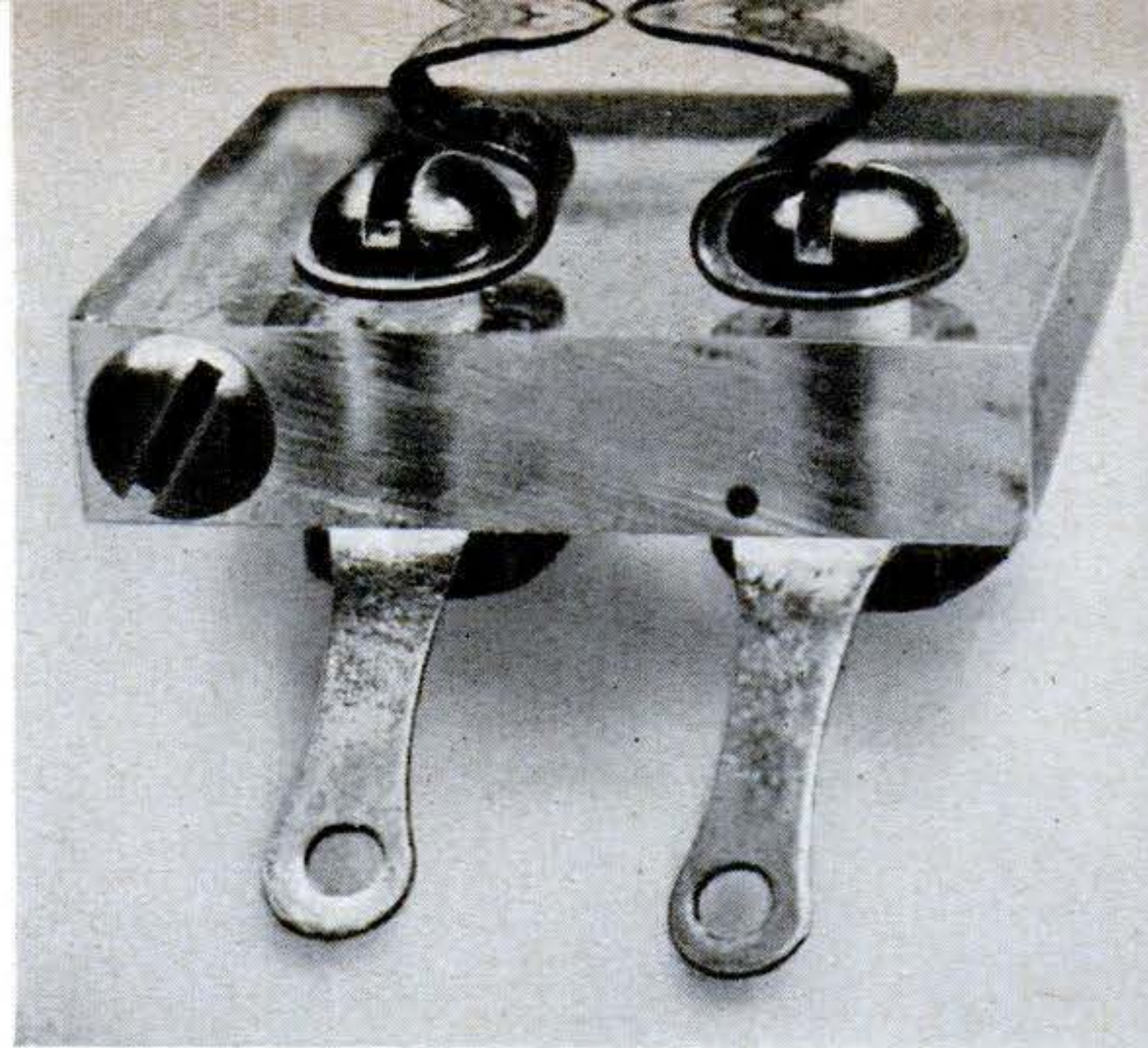
To use the unit, the switch is turned on and the push button tapped several times. Each time, a high voltage induced in the high-impedance transformer winding jumps the tiny spark gap, charging condenser C1. Between taps, the gap prevents discharge of the condenser back through the transformer.

Nine or 10 taps should charge the system enough to operate the Geiger tube; excessive charging may shorten tube life or break down the condenser (the Geiger tube should have a life of about 100,000,000 counts).

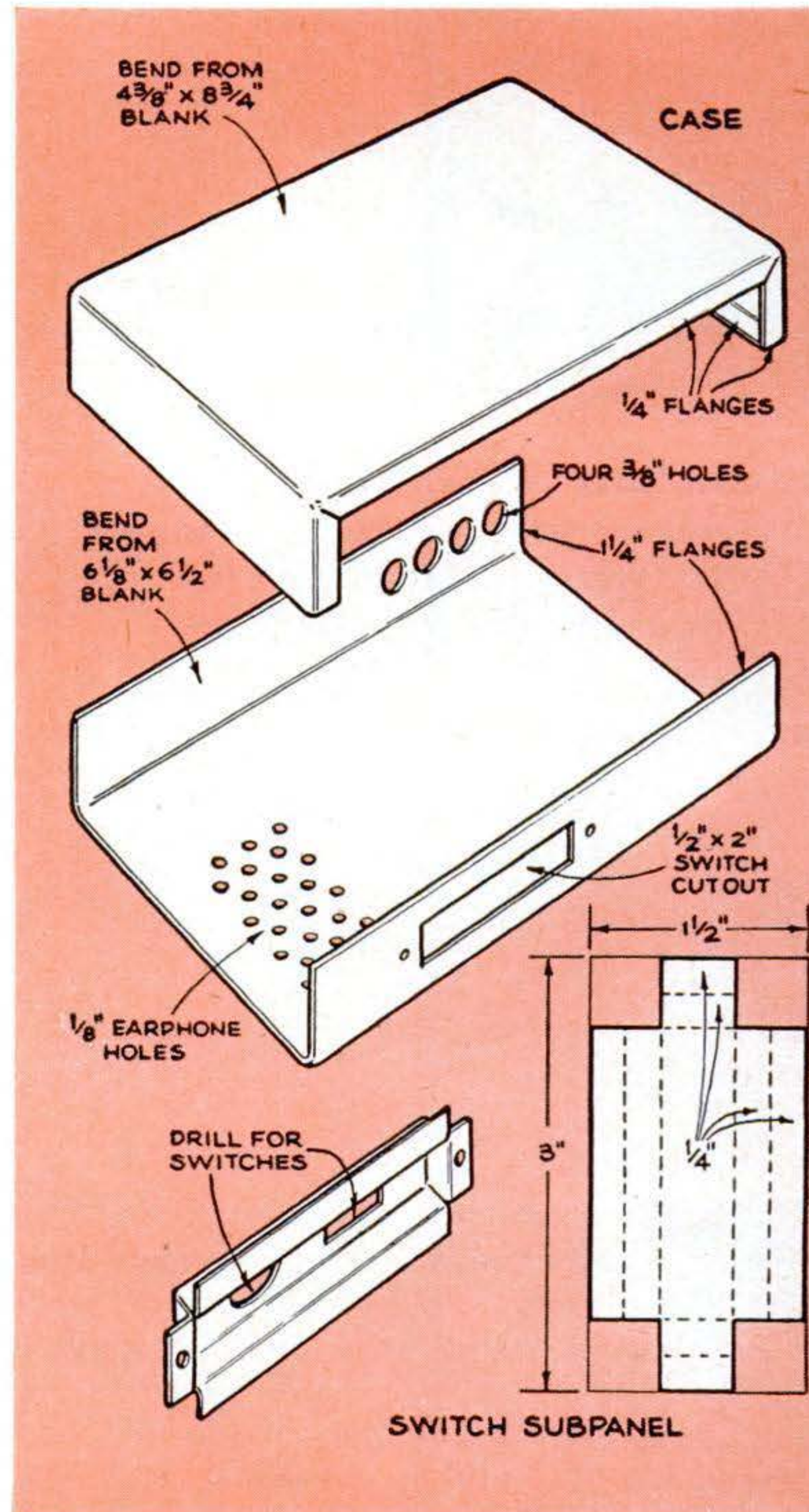
With the condenser charged, the tube will count for several minutes until voltage drops too low. Another tap or two of the switch will start it working again. Such booster taps can be repeated as often as necessary.

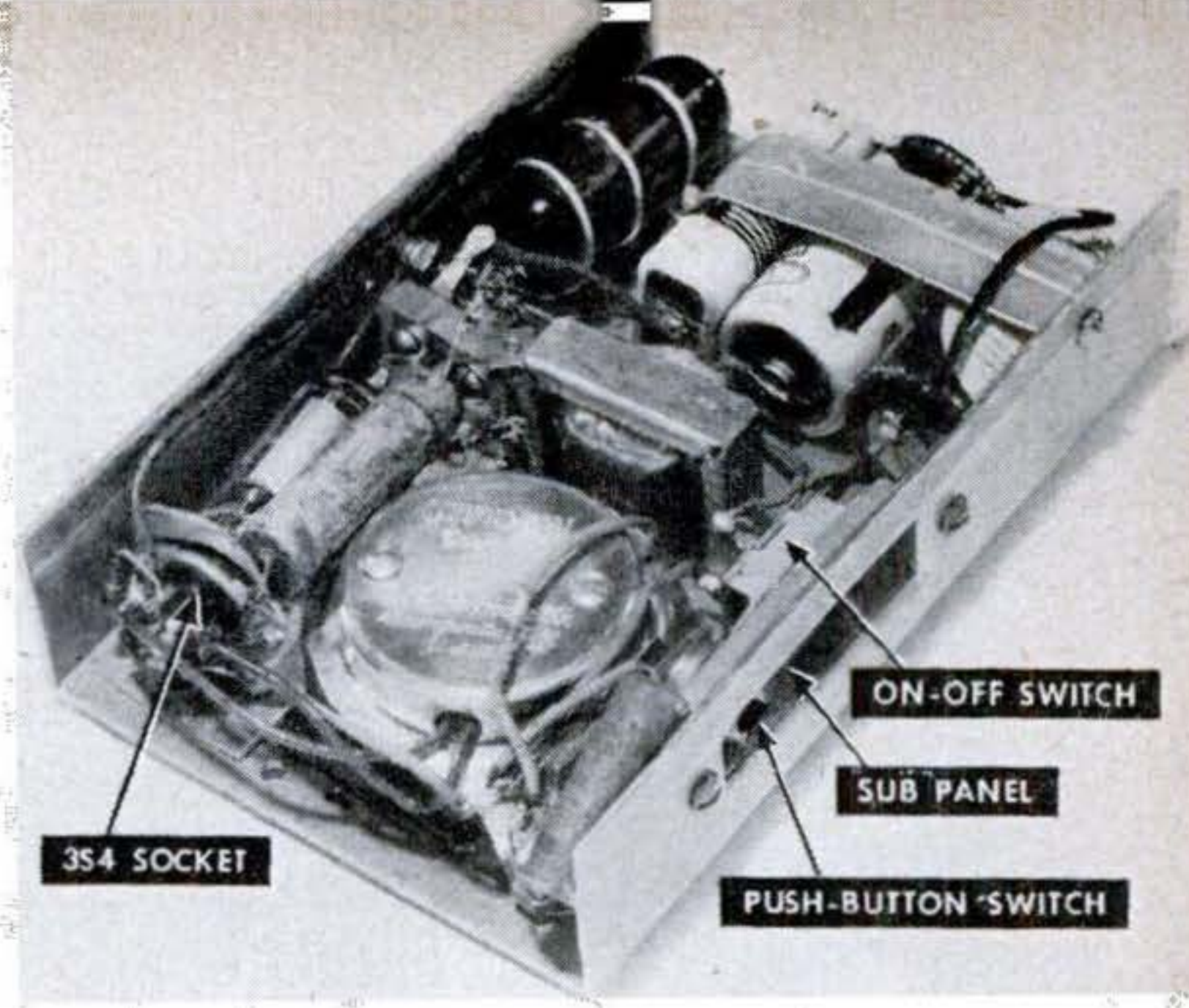
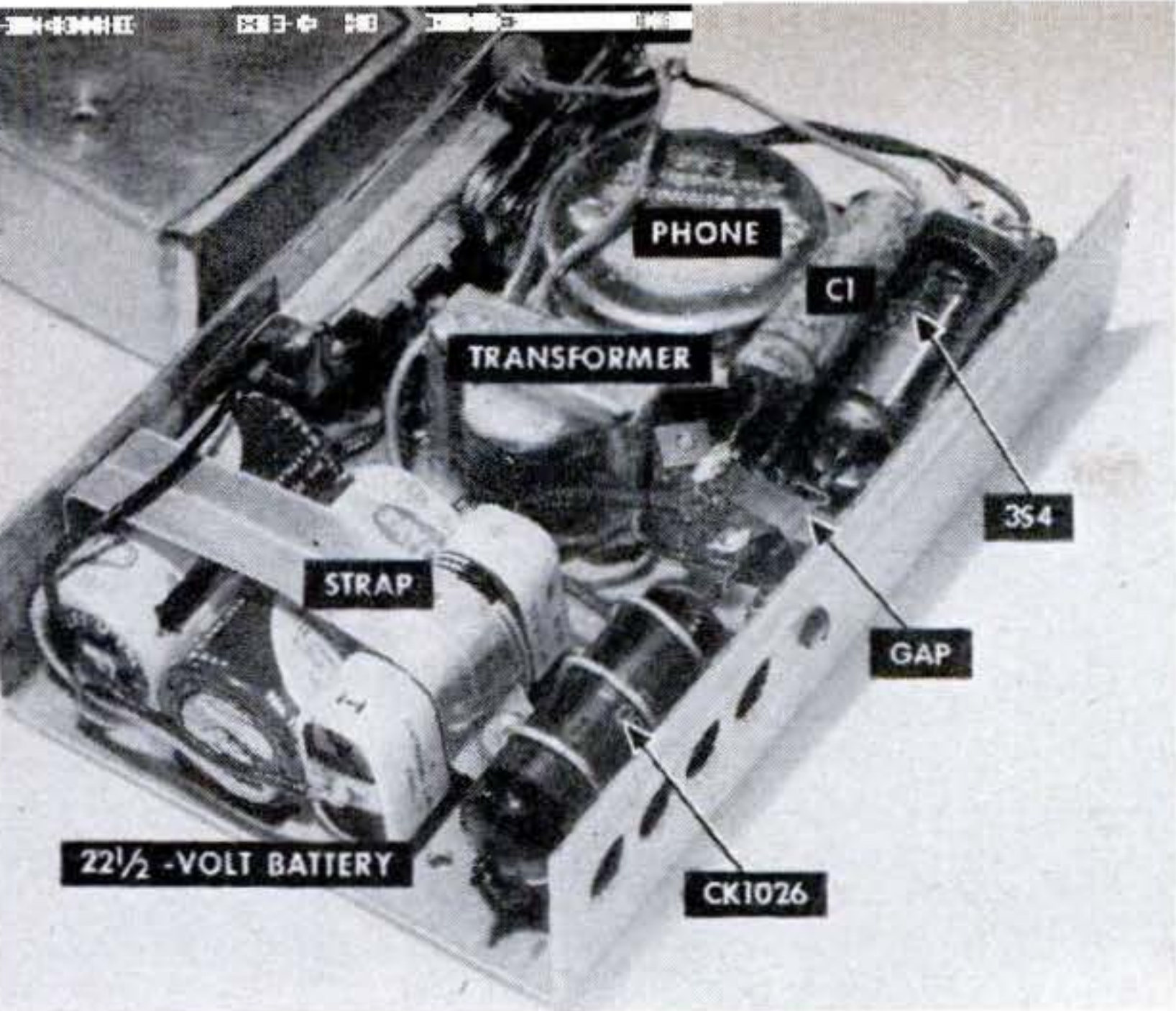
Case is pocket sized. The box shown was made by bending fairly heavy aluminum as in the drawing. Hold the halves together with bolts placed where they won't touch wiring or terminals.

You might use a pocket-sized plastic box of the kind sold for small parts, fishing tackle and the like. In this case, the Geiger-tube mount and other connections to ground lugs will have to be joined to a



MINIATURE SPARK GAP helps turn the trick of boosting flashlight-cell juice to 800 volts. Spark occurs between two bent lugs on top of plastic block. Bolt at left is for mounting.



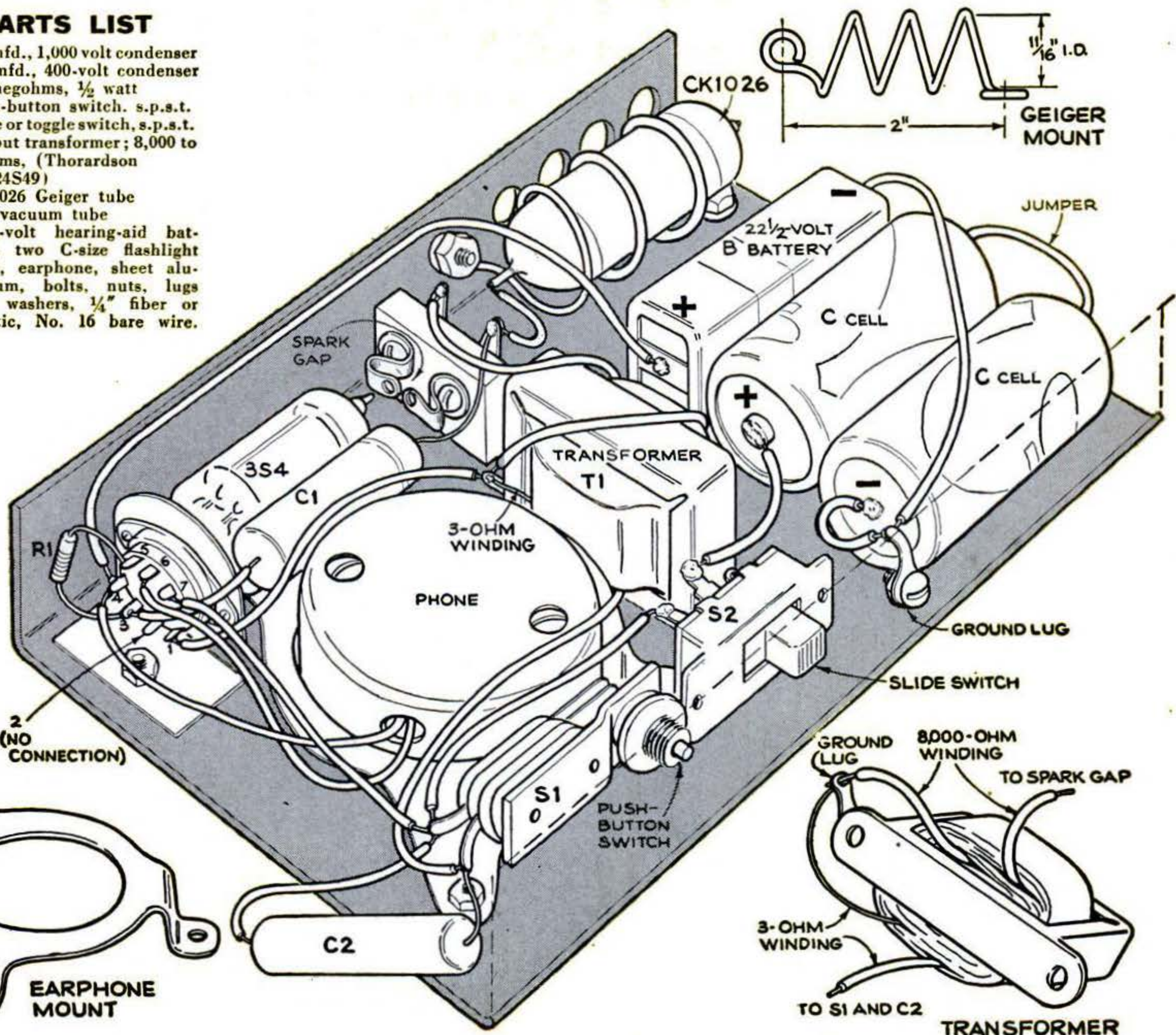


COVER-OFF VIEW shows compactness of the outfit. The three batteries are grouped under a common metal strap at nearer end of the case. Black Geiger tube in its spiral mount is beside

them. The earphone and 3S4 tube occupy most of the opposite end, as shown at right above. Switches are recessed so that they cannot be turned on accidentally in the pocket.

PARTS LIST

- C1 .05 mfd., 1,000 volt condenser
- C2 .03 mfd., 400-volt condenser
- R1 10 megohms, 1/2 watt
- S1 Push-button switch, s.p.s.t.
- S2 Slide or toggle switch, s.p.s.t.
- T1 Output transformer; 8,000 to 3 ohms, (Thorardson TS-24S49)
- CK1026 Geiger tube
- 3S4 vacuum tube
- 22 1/2-volt hearing-aid battery, two C-size flashlight cells, earphone, sheet aluminum, bolts, nuts, lugs and washers, 1/4" fiber or plastic, No. 16 bare wire.



common wire or to a metal panel inside the case.

The two switches are mounted on a recessed subpanel. This prevents the unit from being turned on accidentally.

Building the spark gap. Drill two 5/64" holes 1/2" apart in a small block of plastic, hard rubber or thick fiber. In these holes set two bolts, each with a large lug under the head and another under the nut. Bend the first lugs so as to leave about 1/100" between their inner edges.

Mount the gap with a bolt through the third hole that does not touch either contact. The single earphone can be held in place with a homemade clip and three bolts. A simple

right-angle bracket supports tube base.

Mounting the Geiger tube. The outer metallic coating on the glass bulb is the second (ground) terminal of this tube. Make a spiral from heavy bare or tinned copper wire such as 16-gauge, with two eyes for mounting bolts. Wind this around something slightly smaller than the tube. If this fits loosely, deform the spiral slightly until it is held firmly.

Solder in batteries. A strap holds all three batteries, and connections are soldered directly to their terminals. Use a hot iron and work fast to avoid overheating the cells.

All wiring from the gap side of the transformer carries high voltage, and should be well insulated from the case. The high voltage will jolt a careless finger, but is not dangerous.

It's best to use a new condenser for C1; an old one, even though it works in a radio, may not hold a charge.

Testing the unit. Turn on the switch and tap the button quickly 10 times. When struck by a cosmic or a gamma ray, the Geiger tube will conduct current momentarily. This forms a pulse at R1, which is amplified by the 3S4 tube and heard as a click.

In a quiet place, you should hear a

"background count" of five or more clicks per minute. This is usually due to cosmic rays, and at high altitudes may go to 50 per minute.

Now bring a radium-dial watch near the holes in the case, and the count should go up to several a second.

If you hear no clicks, discharge the condenser C1 with an insulated screwdriver and remove the Geiger tube to make the following tests:

1. With the switch on, tap the push button several times. If this produces clicks, the amplifier (3S4 and its 22½-volt

battery) is working. If not, recheck its parts and wiring.

2. Tap the push button again and watch the spark gap. In dim light, you should be able

to see the spark jump. If you don't, the gap may be too wide or the wiring faulty.

3. If sparks are seen in the previous test, leave both switches off for 30 seconds. Then short-circuit C1 with an insulated screwdriver. A lively spark indicates that the condenser is holding its charge.

4. Check the transformer connections; if nothing else works, try reversing the high-voltage leads.

Field use. Keep the switch off except when the counter is actually being used. In cold climates, carry it in an inside pocket, as the dry cells will give less juice and may even be damaged if long chilled.

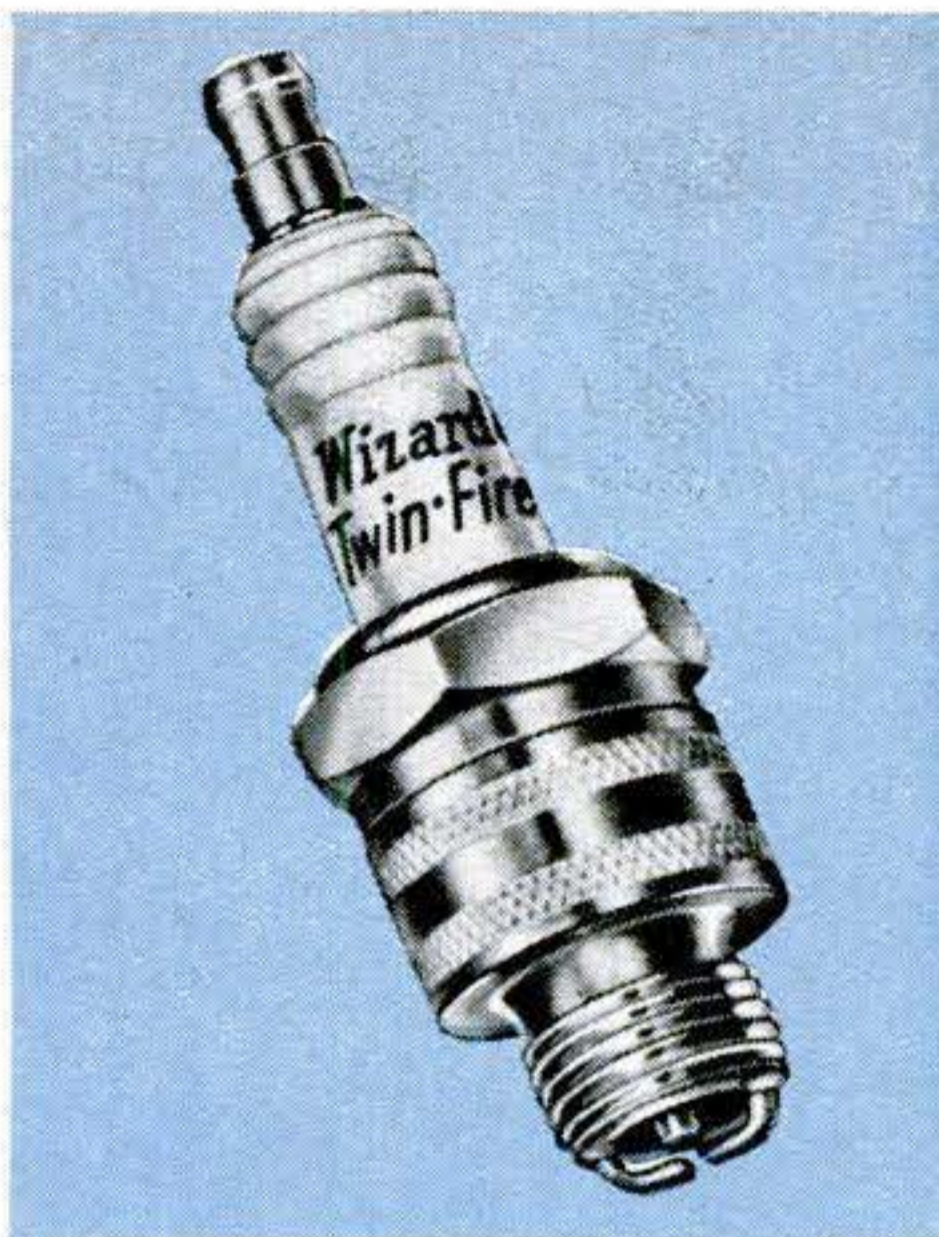
Information on using the counter may be found in several books. A popular one is *Prospecting for Uranium*, published by the Atomic Energy Commission and the Geological Survey. You can get it from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. by sending 30 cents in coin. END

NEXT MONTH: *A sensitive counter you can build with two to six Geiger tubes in cascade. It has a meter for easy sampling of specimens. The original circuit of this instrument was developed in the laboratory of the U. S. Atomic Energy Commission.*

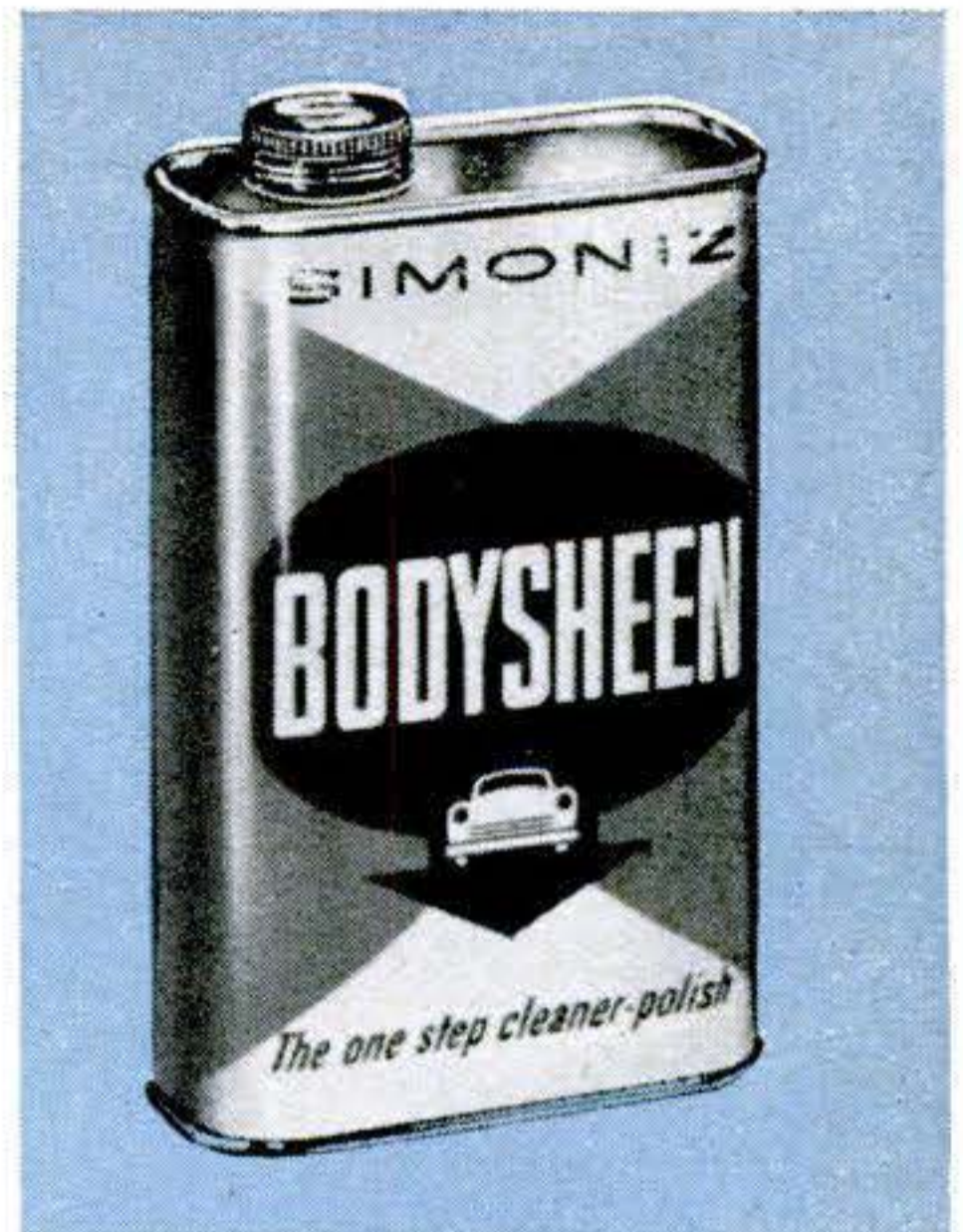
.....HINT TO AN UNHANDY HANDY MAN.....
: *Here's an old saw you can put in your* :
: *file:* :
: *A saw that you file saws in easier style.* :
: -BERTON BRALEY :
:.....



It's easy to repair brakes with Wizard Master and Wheel Cylinder Kits. Includes live rubber cups, boots; precision made valves, springs. For most cars, trucks. Master Cylinder Kits, less piston (55820-48) from..... **65c**
 Wheel Cyl. Kits (55905-28) from. **35c**



Wizard "Twin-Fire"® patented spark plug gives top performance twice as long as single electrode plugs. Each electrode fires one at a time while the other "rests", stays accurately gapped up to twice as long. Guaranteed 18,000 miles. Each, in sets..... **75c**

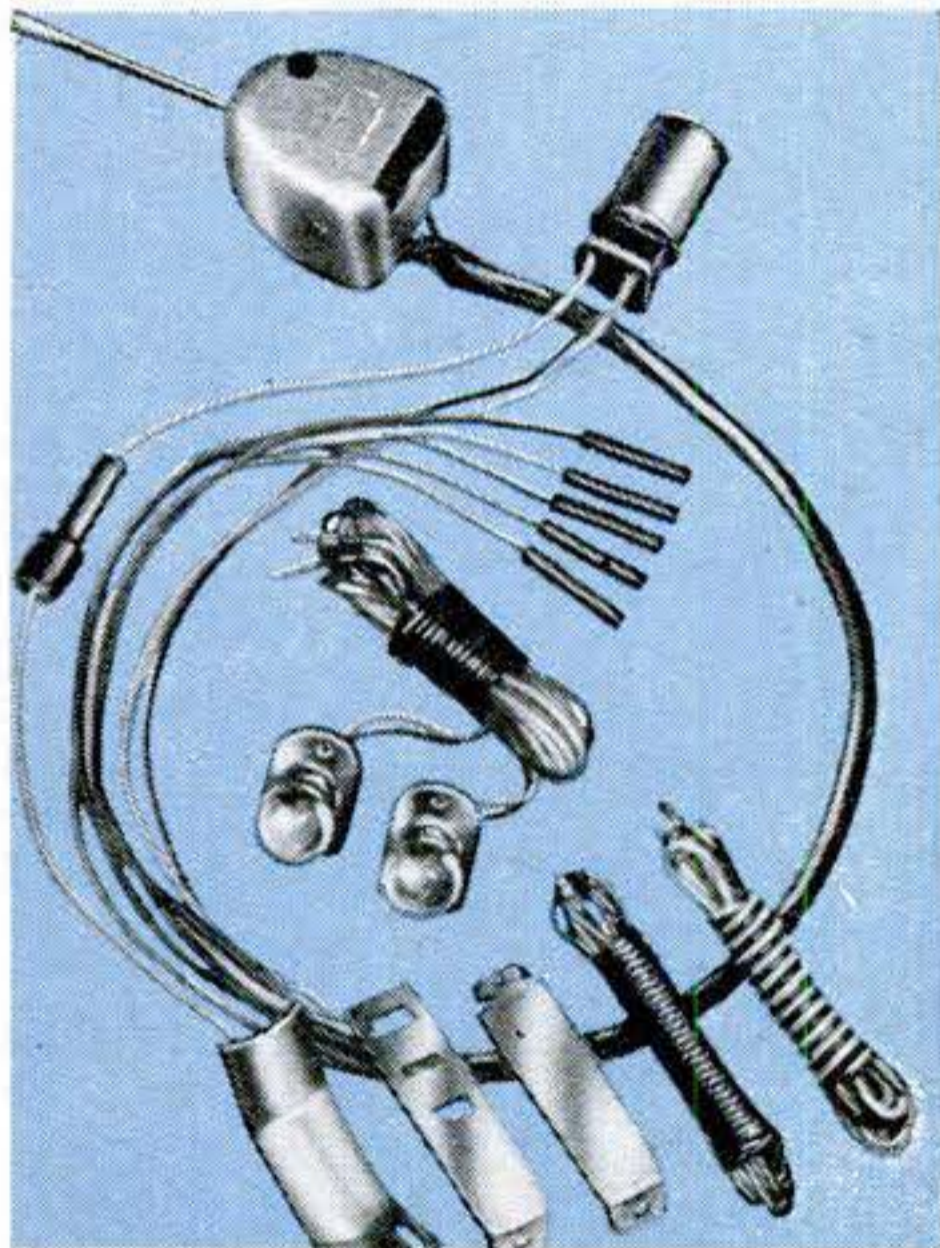


The one-step cleaner-polish! New Simoniz Bodysheen cleans and polishes, in one easy step. Just wipe on, then wipe it off! Brings out natural brilliance, enriches colors. Gives your car a long-lasting, weather-resistant finish. (3P7113)..... **98c**

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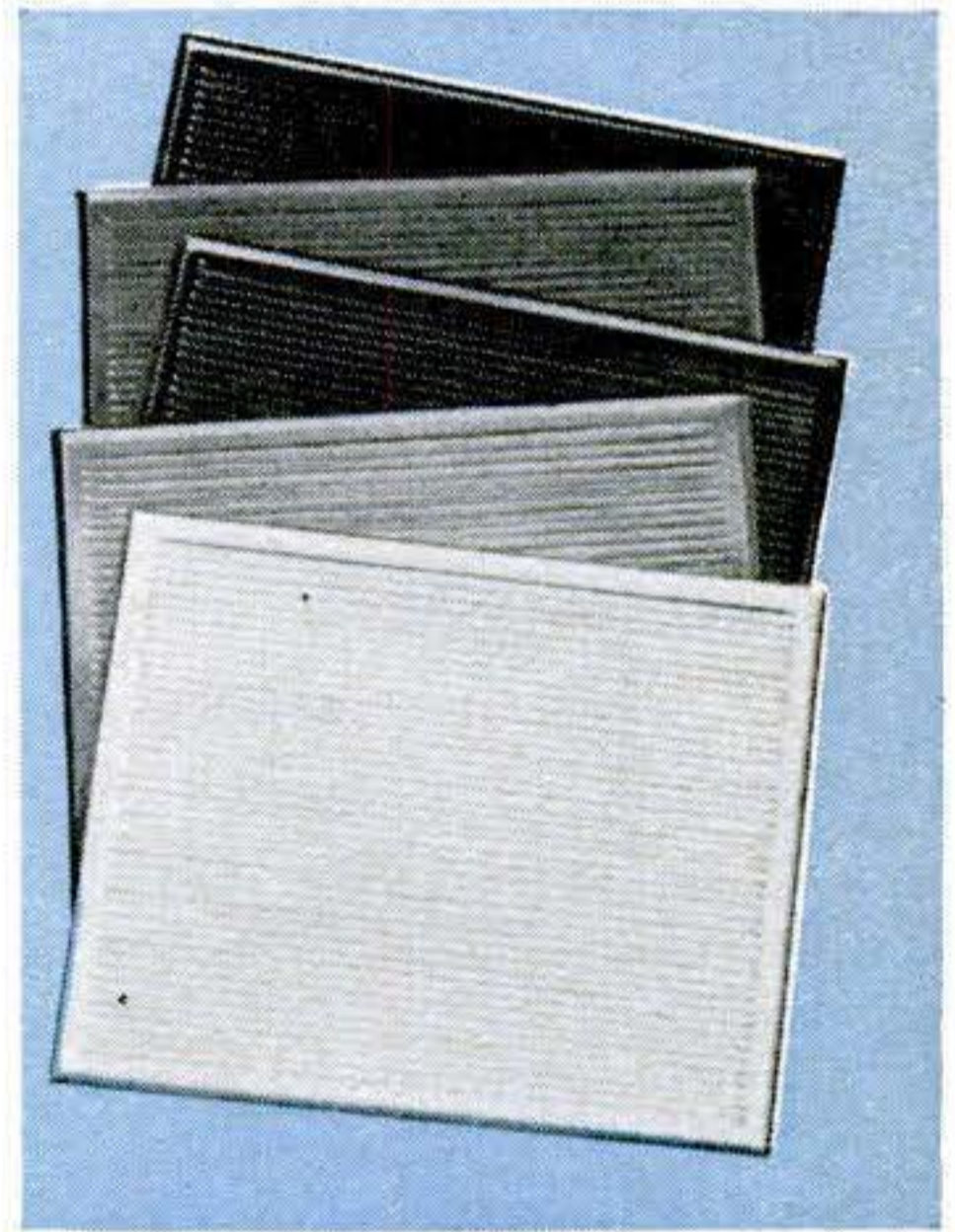
NOTE: Western Auto Associate Dealers own their stores and set their own prices, terms and conditions. Prices may vary due to differences in local conditions. (PS45)



Reduce driving hazards with this Turn Signal Set. Automatically returns to neutral position after turn is made. Blends with dash, steering wheel. Flashing red indicator light. (216176)..... **\$6.45**
Wiring kit, with all installation material.(216177-85) **\$2.98**



Car Top Carriers — complete, ready to install. Mount on any car top quickly, easily. Adjustable. Heavy web straps anchor to rain guard — Vacuum cups support and cushion any load. Strong steel 45" (C5232) Pr. **\$8.55**
 Hardwood — 48" (C5229) Pr. **\$6.35**

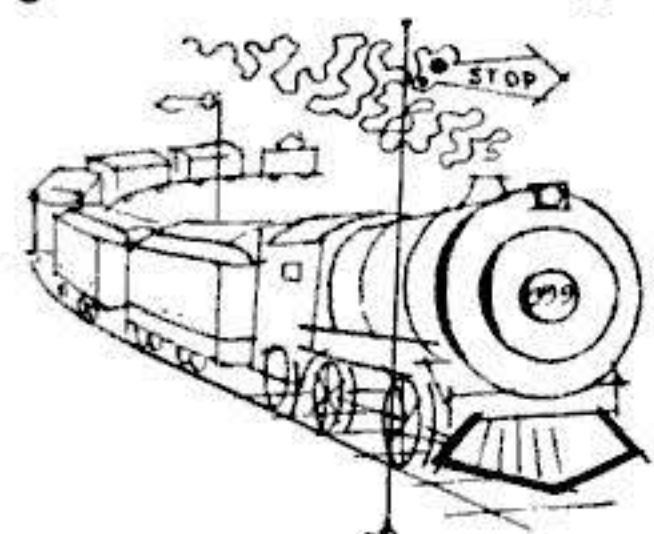


Add new beauty and style to your car's interior, and protect your floor mat from wear with these handy rubber Utility Mats. Also has many uses around the house. Choice of 5 colors. 17" x 17" (2N1105-9)Ea. **89c**
 17" x 20" (2N1110-14)Ea. **\$1.19**

FREE: Mail post card today for folder explaining how to get more horsepower from your car. Write Western Auto, Dept. 2005, 2107 Grand, Kansas City, Mo.

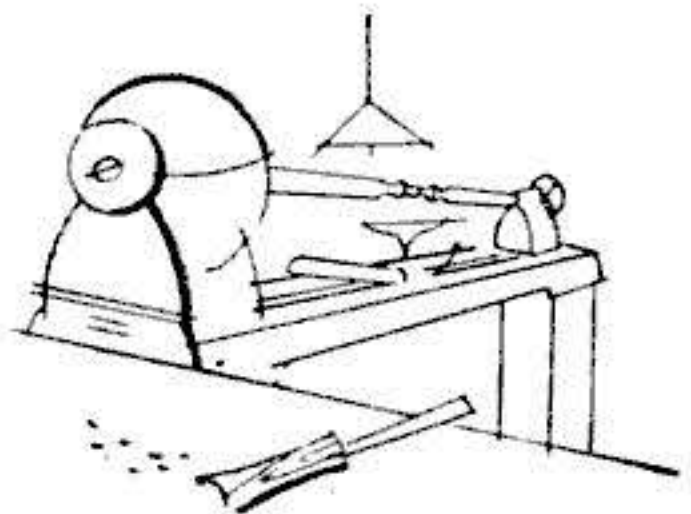
Pictures that make your hobbies leap to life!

Every camera owner with a workshop or a studio or an out-of-doors hobby sooner or later brings his lens to bear upon it. It just seems the natural thing to do—to record photographically for his own pleasure or to exhibit to others the boat he has built, the track layout he has designed or maybe just the new paint job on the family garage!



But now, something new has been added—the revealing and exciting realism of 3-dimension photography called *stereo*. If that new HO-gauge passenger train looked good in an ordinary snapshot, stereo makes it seem to leap to life. A gardenful of vari-colored blooms becomes so real you feel you're standing in the very midst of them. Those who make and enjoy Kodachrome slides will get a special thrill out of stereo. For in three dimensions the already magical effect of Kodachrome's rich and lifelike color is multiplied many times over by an utterly new and satisfying kind of realism.

To the hobbyist looking for a new twist to add to his favorite avocation—whether it's making things or doing things—the recording of it in full-color stereo is guaranteed to add some real zest. And for exactly the same reasons,

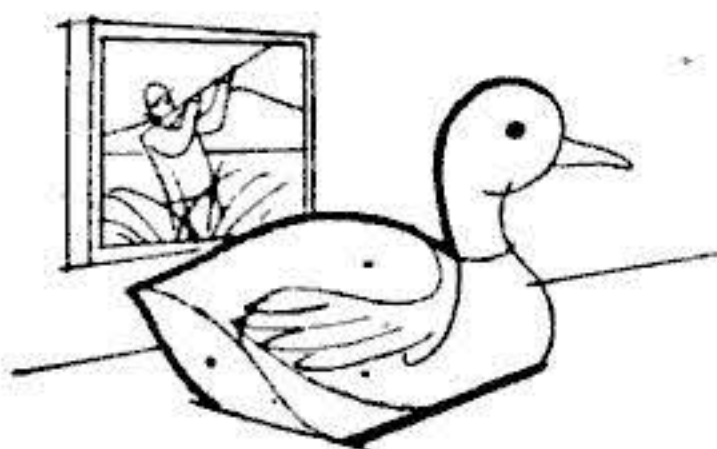


stereo snapshots of the family, of vacations and of travels will be enjoyed as family snapshots have rarely been enjoyed before.

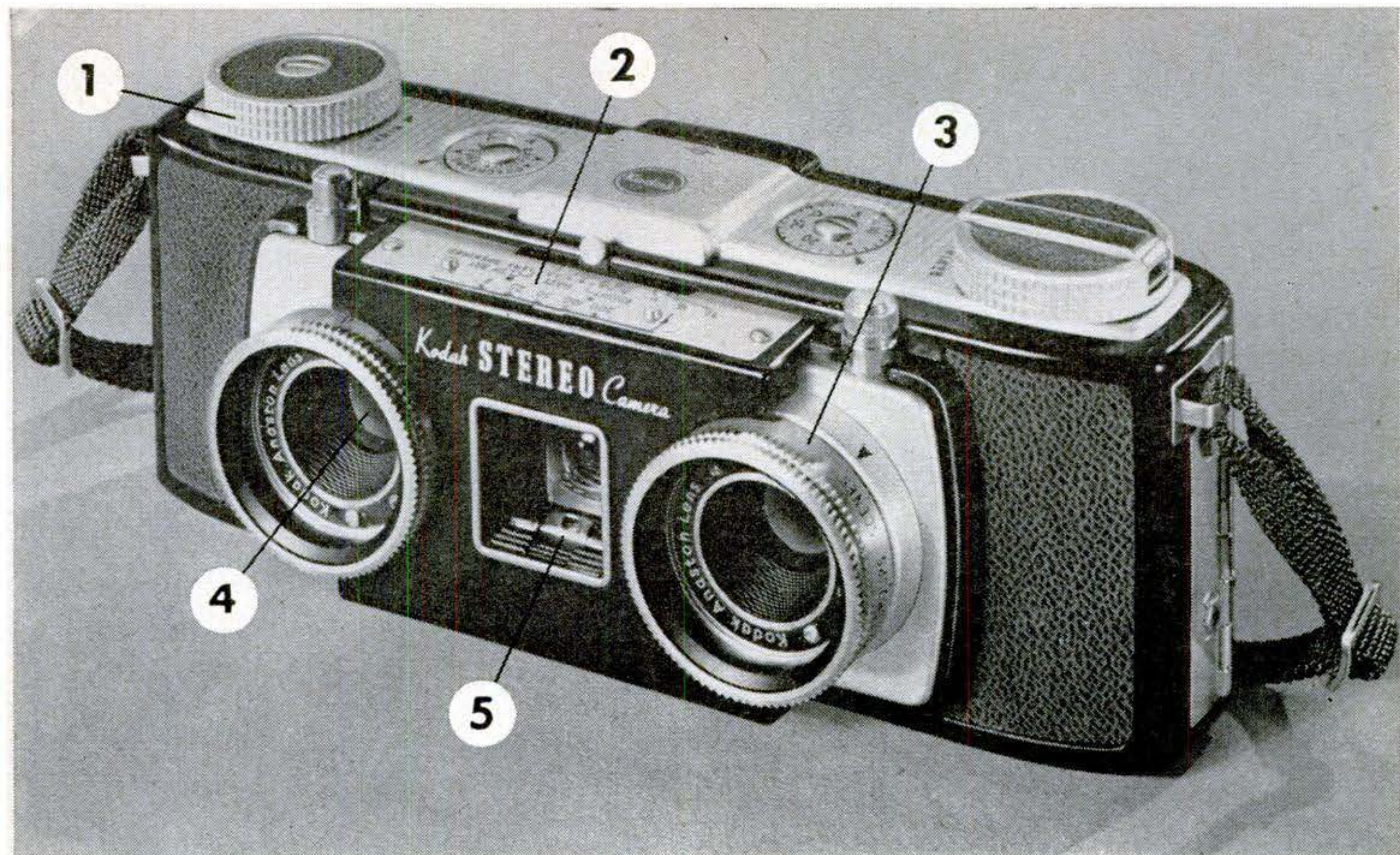
Today's stereo photography is nothing at all like the crude product of earlier days. To begin with, we have the magic medium of Kodachrome transparencies whose rich hues are viewed by transmitted light. But equally important is the new Kodak Stereo Camera—described on the next page—which has brought both an ease and a precision to stereo picture-making which will delight anyone who enjoys equally a fine piece of mechanism and the perfection of the work it can do.



Supplementing the camera are Kodak's two superb stereo viewers, which make Kodachrome images sparkle as never before; and, of course, they provide the optical precision by which stereo seems to lift you right off your chair!



Kodak dealers are pretty enthusiastic about this Kodak stereo equipment. The one you deal with can show you some of the exquisite results you can expect with it. They'll be pictures worth walking several blocks to see—Kodachrome transparencies which seem to draw you right out into three-dimensional space. The first thing you'll think of is what Kodak Stereo can do for the pictures *you* especially want to take. And you'll be right. They'll be wonderful!



The Kodak Stereo Camera only \$84⁵⁰

Probably the easiest-to-use precision camera you've ever had your hands on. Its designers thought of *everything*. It is beautifully balanced and its controls are so nicely located you can make finger-tip adjustments without changing your grip on the camera itself. Workmanship is really fine—the kind that makes an owner pretty joyful with his purchase. Here are operating details:

(1) Quick, simple loading. Lay film in position, close cover, wind. **(2)** No trick to exposure. Set shutter speed—selector automatically sets lens opening as you move pointer to light condition—"Bright," "Hazy," "Cloudy-Bright." **(3)** Zone focusing—Set scale on lens for "Close-Up," "Group," or "Scene," and lenses are quickly focused. Usual distance scale provided, too. **(4)** Matched, Lumenized $f/3.5$ lenses for sparkling color slides. Accurate shutter with speeds to $1/200$; synchronized for all popular midget lamps. **(5)** Scopesight viewfinder. Precisely centered, frames subject exactly as you'll see it in picture. Spirit level shows when camera is exactly horizontal. Other automatic features include film advance which prevents

double exposures, stops at next picture, counts each exposure, cocks shutter. And the price, \$84.50, is extremely moderate for a precision stereo camera.



Kodaslide Stereo Viewers

Model II (above, right) has fine 2-element lenses; brightness control; focusing knob; adjustable eyepieces; plugs into house circuit. \$23.75. Model I has single-element lenses; focusing knob; adjustable eyepieces, is battery operated. \$12.75.

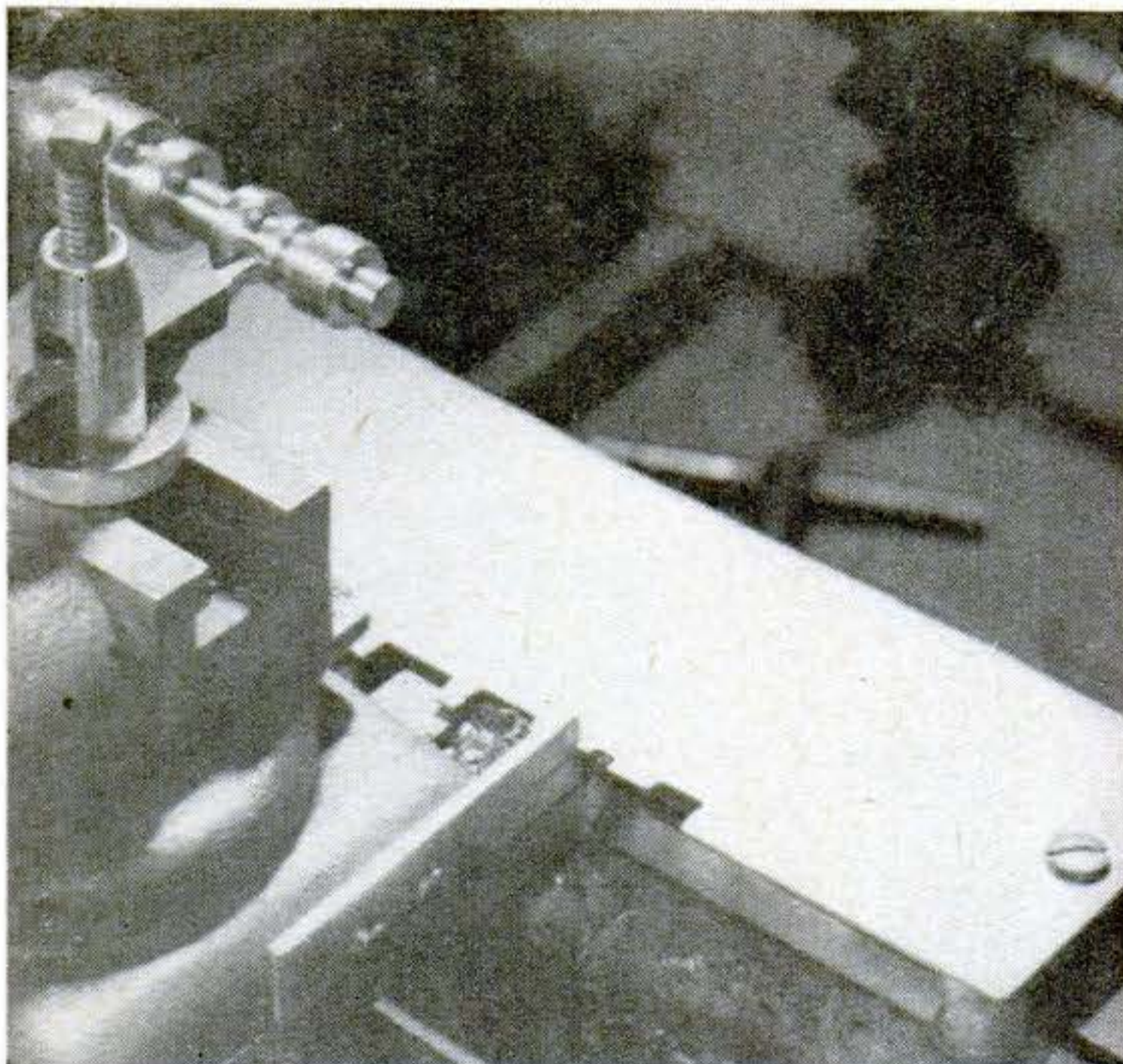
Kodachrome Film (K335 for daylight, K335A for indoors) is especially designed for stereo cameras. Takes 20 standard 23 x 24mm stereo pairs; is returned mounted, ready for viewing.

Prices are list, include Federal Tax where applicable, and are subject to change without notice

Kodak
TRADE-MARK

Eastman Kodak Company, Rochester 4, N. Y.

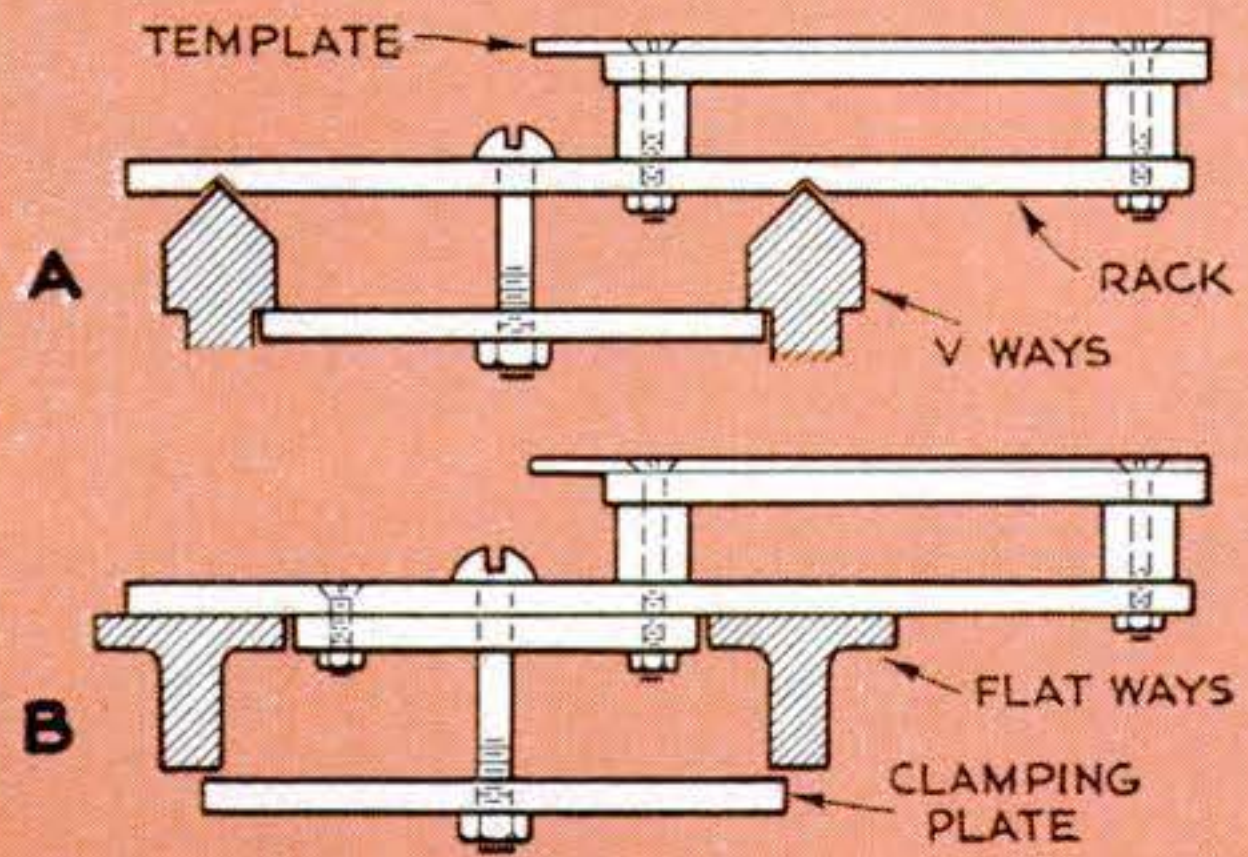
NEW Shop Ideas



Template Speeds Turning Duplicates.

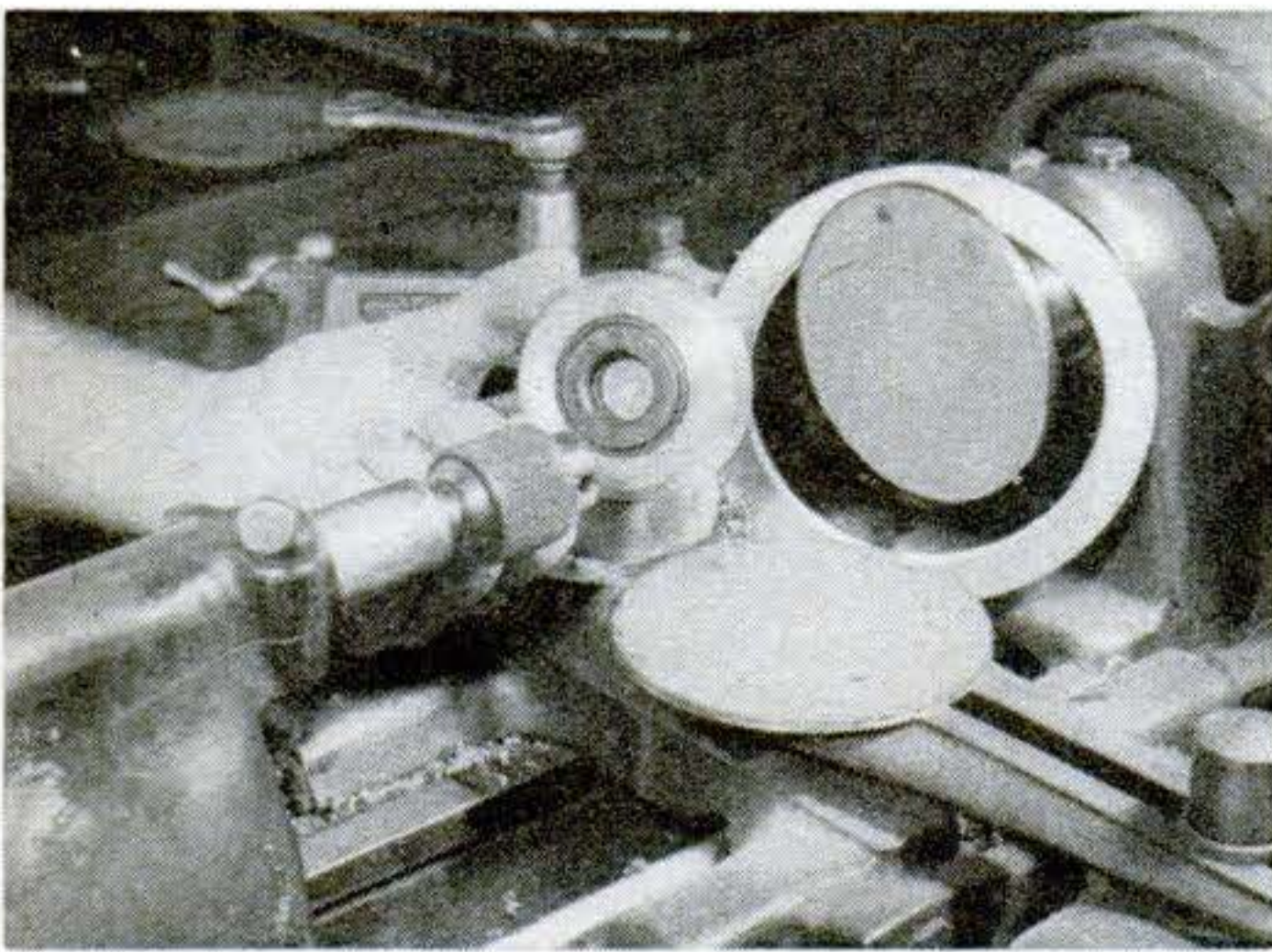
Identical pieces can be turned in quantity by using a template on the lathe. File it accurately to the required profile from sheet metal.

Mount the template by bolting it to two heavier strips, with spacers that will hold it high enough above the ways to let the saddle pass beneath. File the supports as at A in the drawing to fit V ways, or add a step block to fit between flat ways as at B.



Drill and tap the side of the cross slide for two screws to attach the follower or finger at template height. File or grind the end of the finger to the exact shape of the tool bit used.

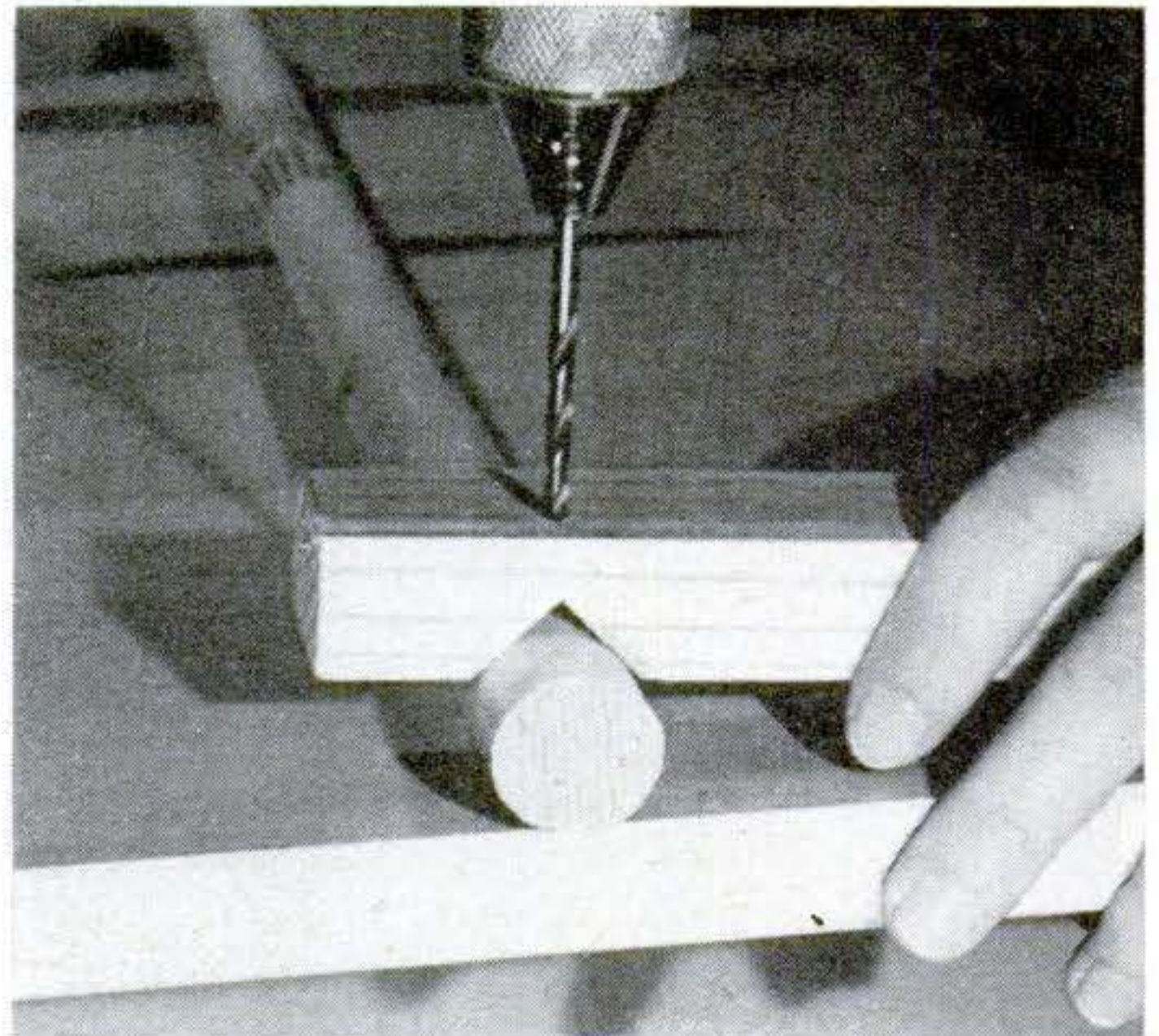
Set the compound rest parallel to the cross slide. With the compound feed, adjust the tool to turn one neck or shoulder to exact diameter. Then use the cross slide only to follow the template.—*J. M. Finn, Pittstown, N.J.*



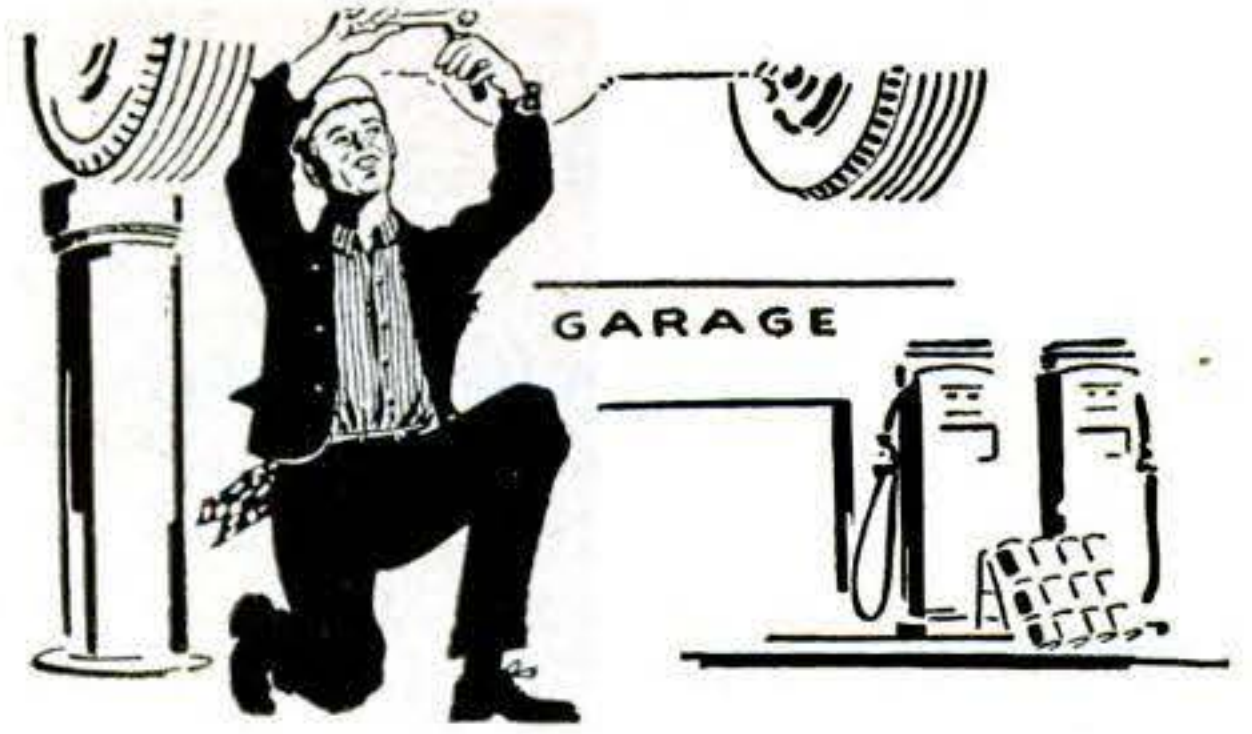
Pad Helps Turn Rings. With a simple live-bearing pad to clamp flat stock against the faceplate, you can turn rings, disks or washers. A fine-grit abrasive disk cemented to the faceplate provides enough friction grip for driving the work.

Find a scrapped ball bearing whose inside race fits the nose taper of the tailstock chuck or that of the dead center. Turn the pad body from aluminum or other stock thicker than the bearing. Bore a blind recess to a drive fit for the outer bearing race.—*H. L. Lockett, San Antonio, Tex.*

V Jig Centers Dowel Hole. It's hard to drill a dowel right on diameter by hand, but comparatively easy to drill a wooden V jig to do it. Cut a symmetrical notch in one face of a piece of 1¼" or heavier stock. Square a line from the point and drill a vertical hole through the apex of the V. Then place the notch over the dowel and drill away, as shown below.—*Frank A. Javor, North Bergen, N.J.*



Put your skills to work



Young men who are interested in mechanics, electronics or other technical specialties have an interest in the U. S. Air Force. As an Airman, you may have an opportunity to develop your technical ability and learn an interesting, exciting, and good paying skill. Act today and put your skills to work tomorrow. Put them to work where they'll do the most good...put your skills to work in the U. S. Air Force.

You go places—*faster* in the U. S. Air Force

You may train with the U. S. Air Force in one of these interesting specialties

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*STUDENTS—Graduate before
you enlist*

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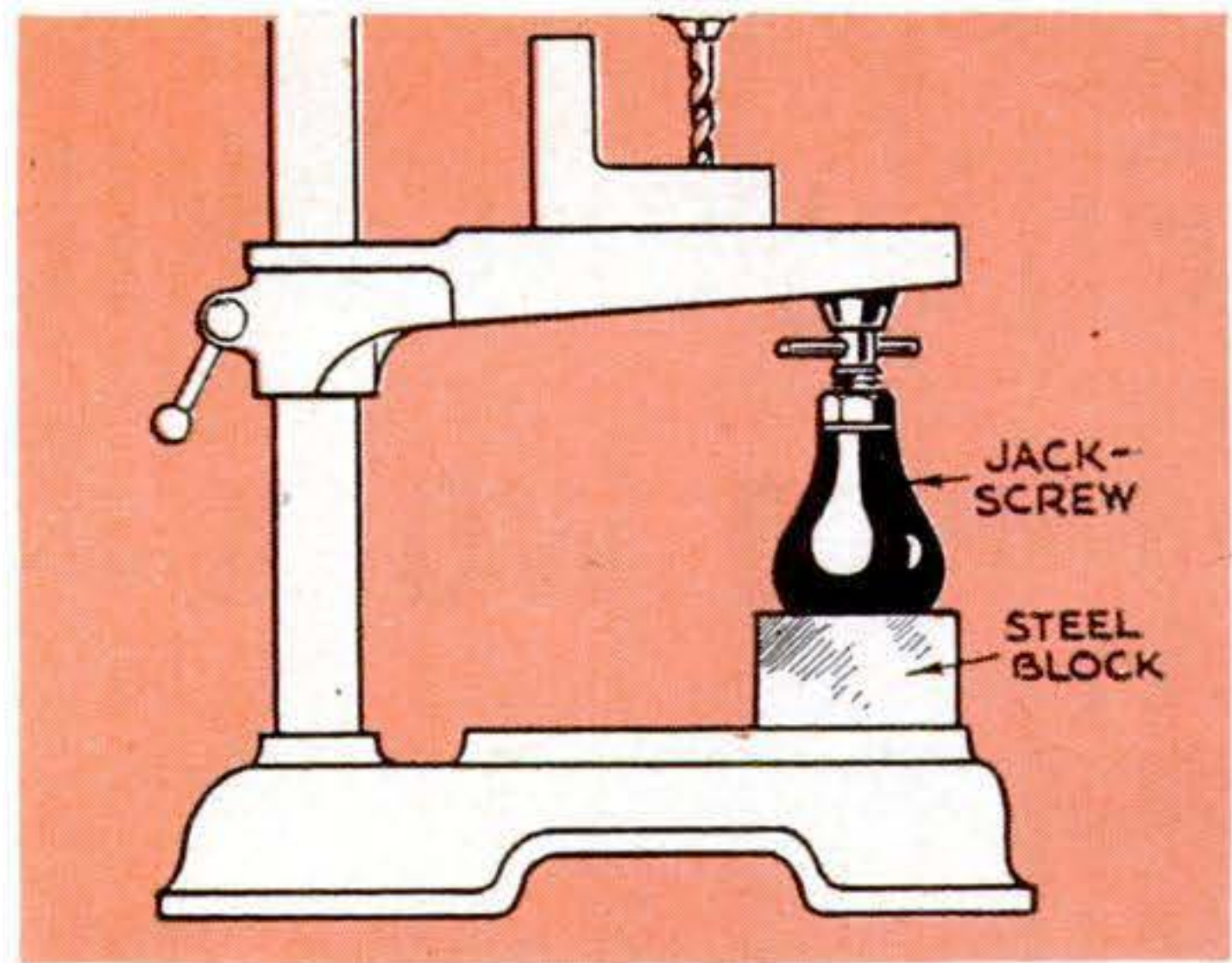
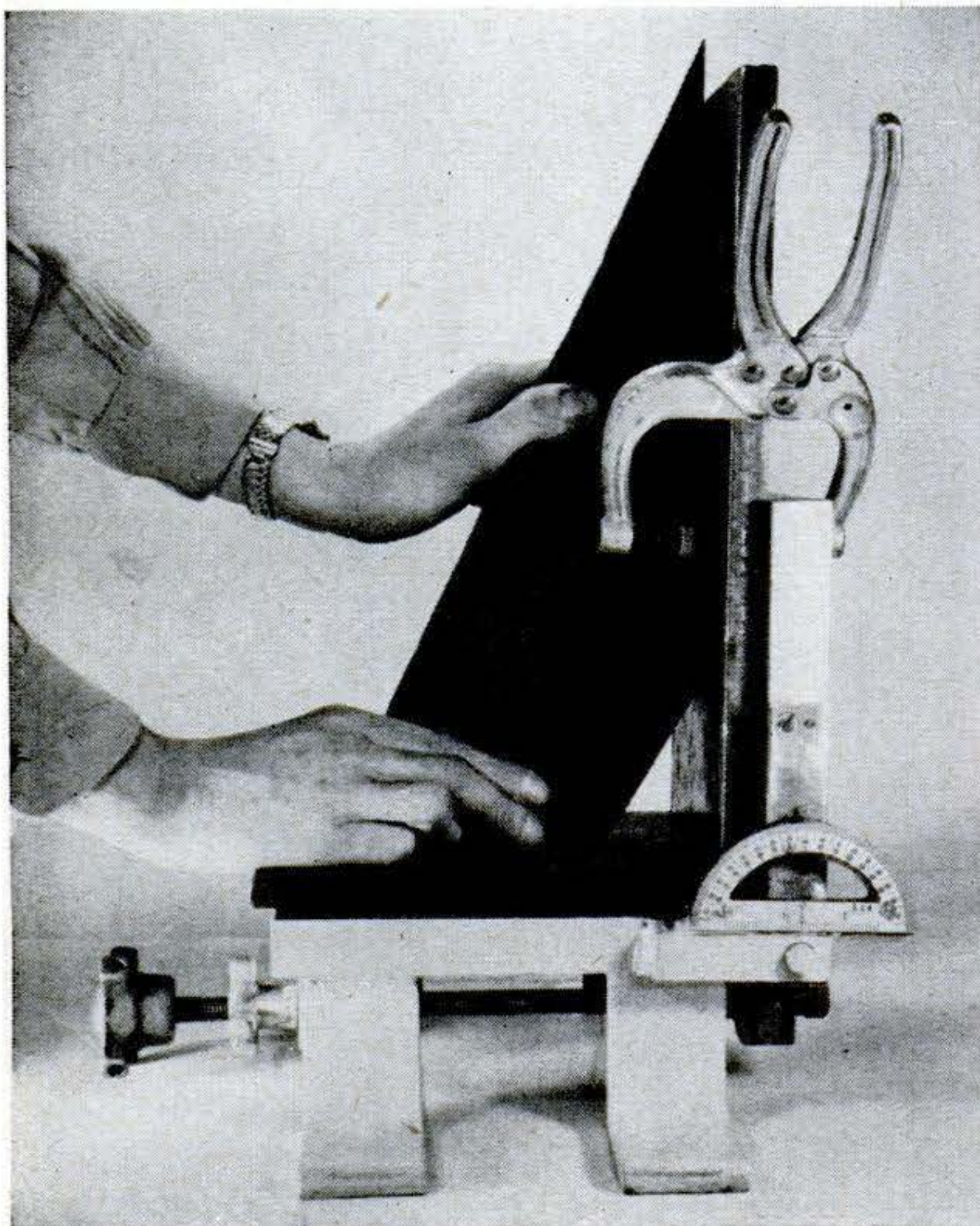
MORE SHOP TIPS

Make Screws from Nails. When you need an outsize length of screw in a hurry, you can often make it by threading a common nail. Nail diameters are surprisingly similar to those of ordinary screws, and their tensile strength is ample for most uses. The following table shows corresponding nail and screw sizes.

Nail	Nail Length	Screw
3d	1¼"	No. 2
6d	2"	No. 4
8d	2½"	No. 6
16d	3½"	No. 8
20d	4"	No. 10 or 3/16"
50d	5½"	¼" bolt

If the nailhead will not serve for the screw, cut it off, thread both ends, and use a nut on each.—*J. G. Jarvis, Webster, N.Y.*

Jig Positions Angle Welds. Heavy plates fixed in this jig are held at accurate angles for welding. Used at the Temco Aircraft Corp., Dallas, for making aircraft-construction jigs, it has been found to save five

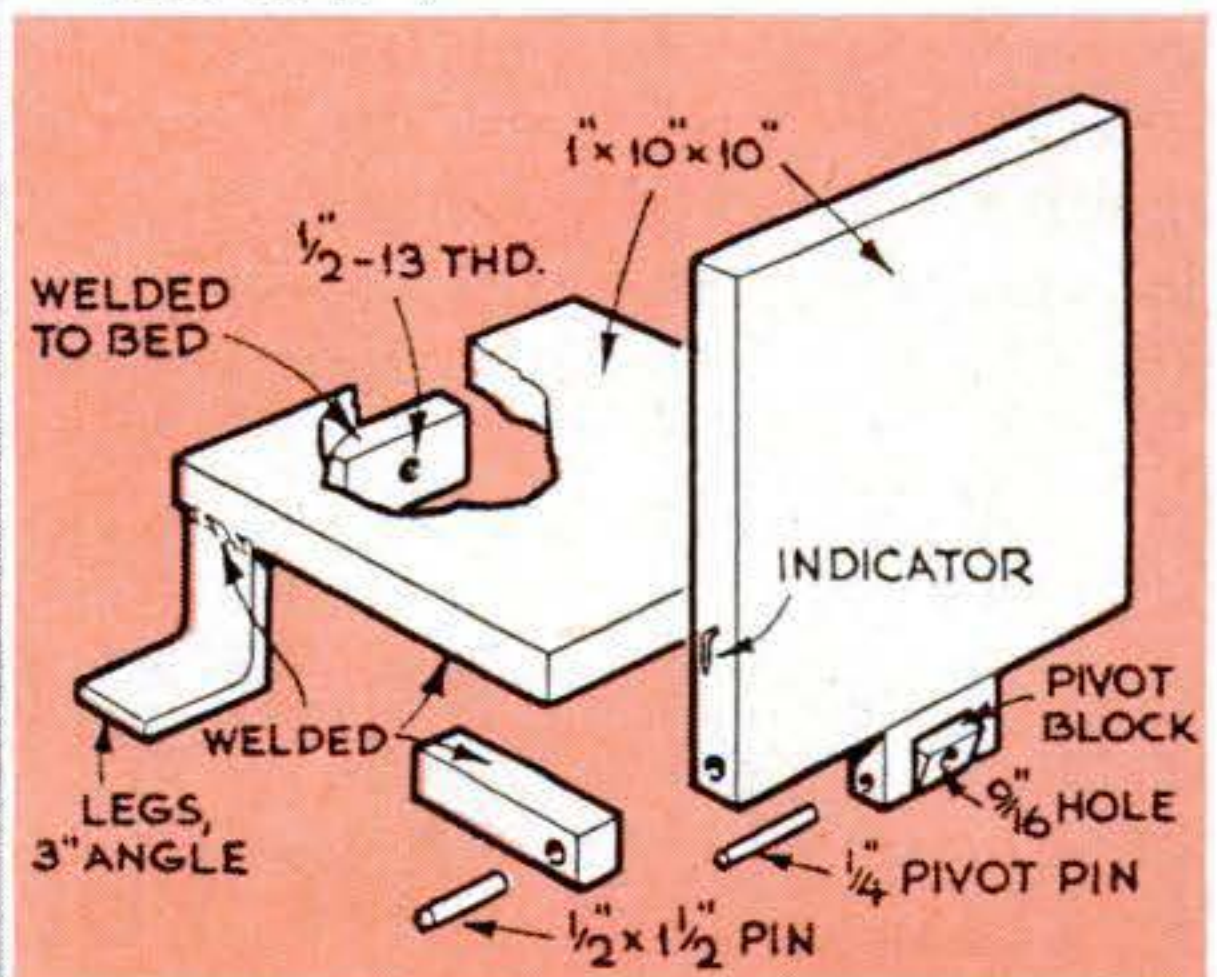


Jackscrew Braces Drill Press. When drilling or counterboring big holes on a light drill press, it's wise to take the strain off the table. A jackscrew or even a heavy cap screw and nut placed under the front end will prevent cocking and may save you from cracking the table casting. Use blocks or packing under the jack if necessary.—*Frank La Saracina, NYC.*

man-hours per unit on this type of work.

Jig builder Woodrow W. Keas, who devised the gadget, hinged bed- and backplate at one end with ½" dowel pins and welded on feet cut from 3" angle. A long ½" bolt threads into a plate welded under the front of the bed. It turns free in a pivot block pinned to the backplate, but is held against endwise movement by double nuts front and back. This bolt adjusts the jig angle. It is locked at the front by a star nut.

The angle is set by referring to a protractor fixed on the bedplate (visible in the photo at left). The two plates are clamped on, tack-welded, and then removed for final welding. Parts so fabricated are true to 1°.



Reading time: 3 minutes to learn how to

- cut engine wear up to 38%
- prevent loss of power, compression
- save 15%-25% on oil . . . without ever changing your oil filter

This Gadget is Worth \$320,000,000

...and I Discovered it by Accident!

by Albert Wells

IT ALL STARTED the day I got the bill: \$214.36 for an engine overhaul—and I had only 28,000 miles on the car!

I told my troubles to a neighbor—a lubrication engineer—told him how I'd always changed oil every 1500 miles, changed filters every 5,000 miles. His answer floored me.

"You've been wasting your money," he said. "We've spent millions developing oil additives that keep carbon, gum and abrasives from damaging your engine. Your oil costs about 15¢ more a quart because of those additives. Yet oil filters on the market today are made of rag or paper—they soak up additives like a blotter. The more often you change oil filters the more money you waste!"

"But don't I need a filter to take the impurities out of the oil?" I asked.

He took a deep breath. "This will really shock you. Engine damage is done by abrasives 10 to 40 microns in size (a micron is .000039"). Your oil filter can't take them out because rags or paper can't be packed tight enough without stopping oil flow when the fibers soak up oil and expand."

"Isn't there any kind of filter that does the job it's supposed to do?"

"No, except for the porous bronze filters they're making for supersonic aircraft. And you can't buy a filter like that for your car."

I asked myself: "Why not?" Next day, I tracked down the outfit that was making the filters for aircraft, and got the answer. These porous bronze filters were made by fusing together millions of tiny bronze balls. Non-absorbent, they didn't remove additives, yet they removed abrasives in the 10-to-40 micron danger zone. Could they be made for automobiles? Again, the answer floored me.

LIFETIME FILTER TESTED IN CARS, TRUCKS, BOATS

Test models had already been used in cars and trucks

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A dealer and distributor network is now being formed to handle demand generated by advertising and editorial features in national magazines. If you can qualify, you can be first with the most exciting automotive product of this decade, to win new customers and build a substantial business. These valued franchises are not being sold; they are awarded on the basis of ability to grow with us. For complete details, write or wire: Continental Manufacturing Corporation, Dept. FPS-14 Washington Blvd. & Motor Avenue, Culver City, Calif.

©1954



for millions of miles, proving the porous bronze filter: 1. Never needs replacing. 2. Saves the quart of oil thrown away with ordinary filter packs. 3. Increases engine life.

Trouble was, almost the entire production was being absorbed by military and industrial users.

That day I went to work on the biggest job of my life: setting up production of the Lifetime porous bronze permanent filters for cars and trucks (an estimated \$320,000,000 replacement industry).

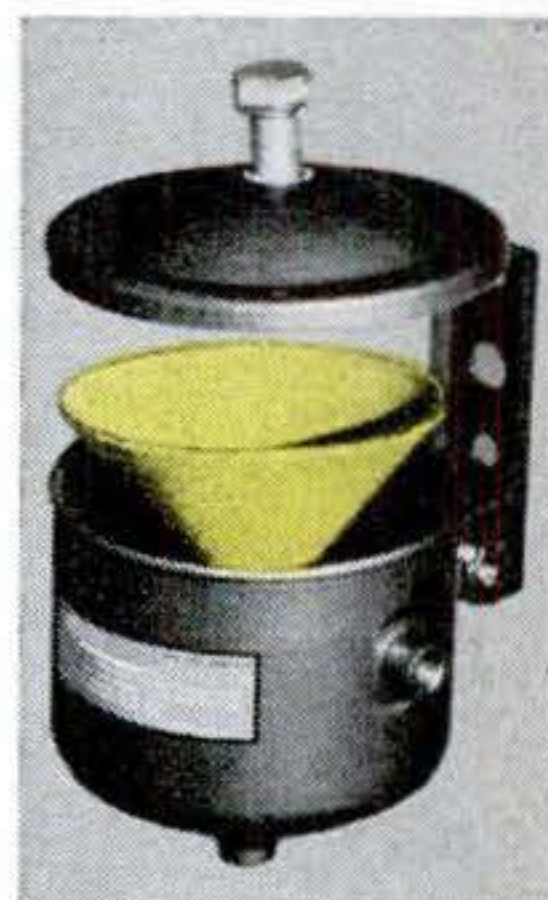
HOW TO GET A LIFETIME FILTER FOR YOUR CAR

Try the Lifetime filter on your car for 2 weeks: if it isn't all I say, you get your money back; if you keep it, you're through buying filter packs—the Lifetime filter is guaranteed for 10 years, actually will last many times that long.

For complete unit, including case (fits any car), send make, year and model of your car and \$12.95 (we pay shipping).

Conversion kit, which replaces your present filter pack with Lifetime bronze, is \$6.95 for most cars (send make and number of present filter when ordering). Conversion kits for Buicks with hydraulic lifters and for cars with full flow systems: \$13.95.

Or send only \$2 deposit, pay C.O.D. charges on arrival. But do it today—don't waste another cent on filter pack replacements!



Complete Lifetime Filter; fits any car.



Lifetime Conversion Kit; replaces ordinary packs with permanent bronze element.

Permanent Filter Division, Dept. FPS-14
CONTINENTAL MANUFACTURING CORP.
Washington Blvd. at Motor Ave., Culver City, Calif.

Ship complete unit for _____
make, model, year of car

conversion kit for _____
make and number of present filter

I enclose \$12.95 for complete unit (\$18.95—chrome)
 \$6.95 for conversion kit (full-flow, \$13.95)
 \$2.00 deposit; send C.O.D.

Name _____

Address _____

City _____ Zone _____ State _____

He Runs a Shipyard for Amateurs

[Continued from page 186]

a design, and he makes sure that you know what you are undertaking before you spend a dollar.

Then he "lofts" your boat. This is a kind of oversize drafting operation, with sheets of plywood laid out on the floor for marking with lines and offsets. With this ticklish part done, the cutting and fitting go together with far less chanciness.

A middle-sized, sandy-haired man with a determined jaw, Sam Thurston has been building or shipping on boats all his life. Among other things, he holds a chief engineer's ticket and a mate's license. He was a design engineer at a big shipyard when the do-it-yourself barnacle fastened on him.

Beginnings. It took two years of planning and dickering to make Trident a reality. Thurston leased a building on the waterfront. He arranged to become a dealer for boat kits. He scouted out sources of supply for plywood, lumber and hardware. With help from Grone, he built equipment. Then he ran a few advertisements.

His first customers provided a shock. He'd expected that they'd mainly want to assemble kits, and that the craft would be mostly 14- or 16-footers. But as each prospective customer got to figuring, up went his sights. The result is that almost

without exception they began toiling away at 21-, 24- or 28-footers, built from scratch.

Right now Sam is steadily turning away people whose notions in the 40-foot class are too big for Trident's facilities. He is toying with the notion of roofing over an area for such homemade monsters. But he's holding back, on the theory that the best customer is one who bites off something he can swallow in a reasonable time.

Prints and patterns. Thurston offers a choice of blueprints for builders who haven't already fixed on a design. He's also working up what promises to be a big timesaver: a line of permanent plywood patterns for a few popular craft. These will get builders off to a fast start.

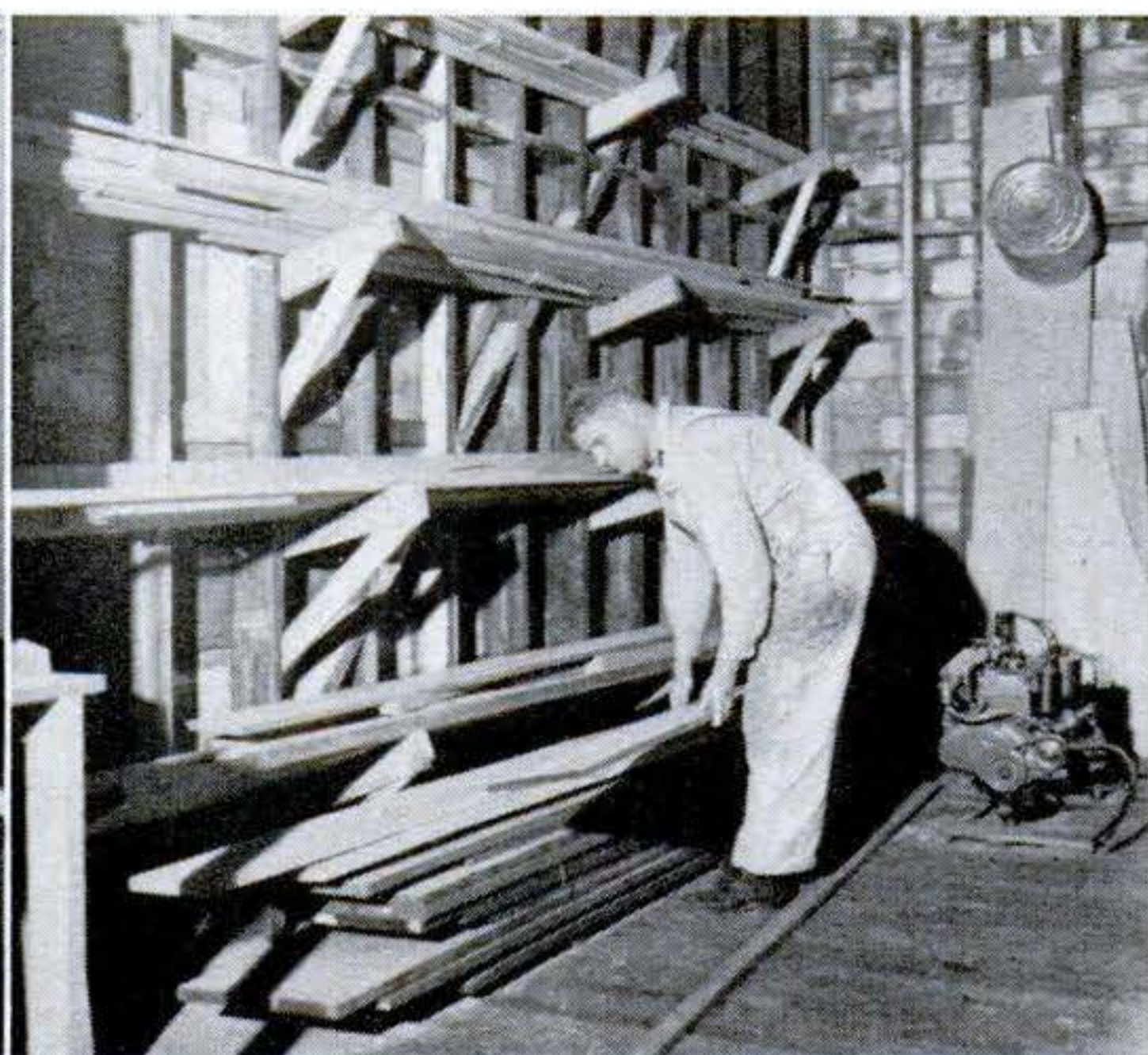
When you sign up to use space at Trident, you agree to pay a dollar an hour for the time you work on your boat, and another 50 cents an hour if you bring along a friend as helper. You also agree to pay for a stipulated minimum number of hours a month. This increases with the amount of space your craft takes up, and runs to between 60 and 100 hours monthly for big boats.

You settle up as you go on a weekly or monthly basis, also paying for any mate-

[Continued on page 244]



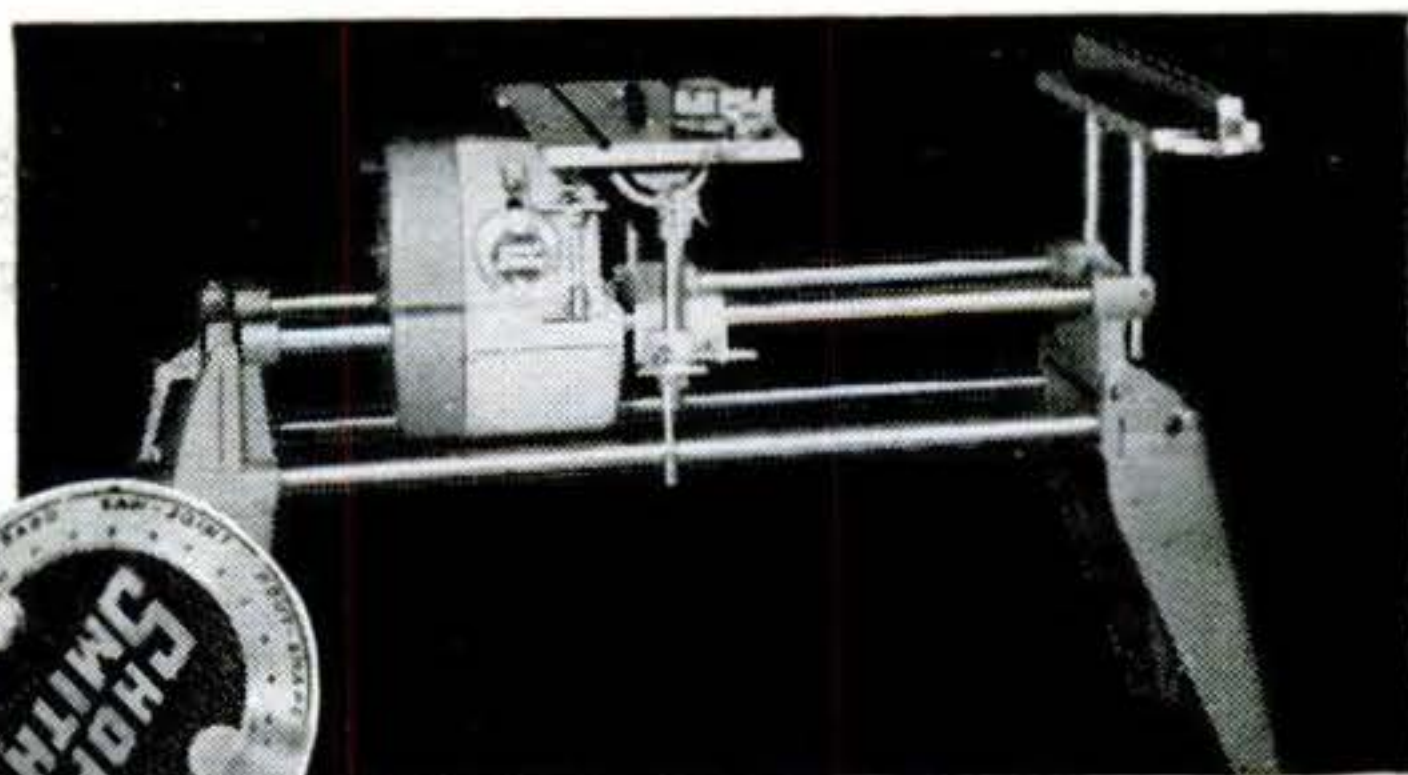
PUTTING IN SCREWS, a large part of boatbuilding, is speeded by power. Each customer gets electric drill with a screwdriving attachment.



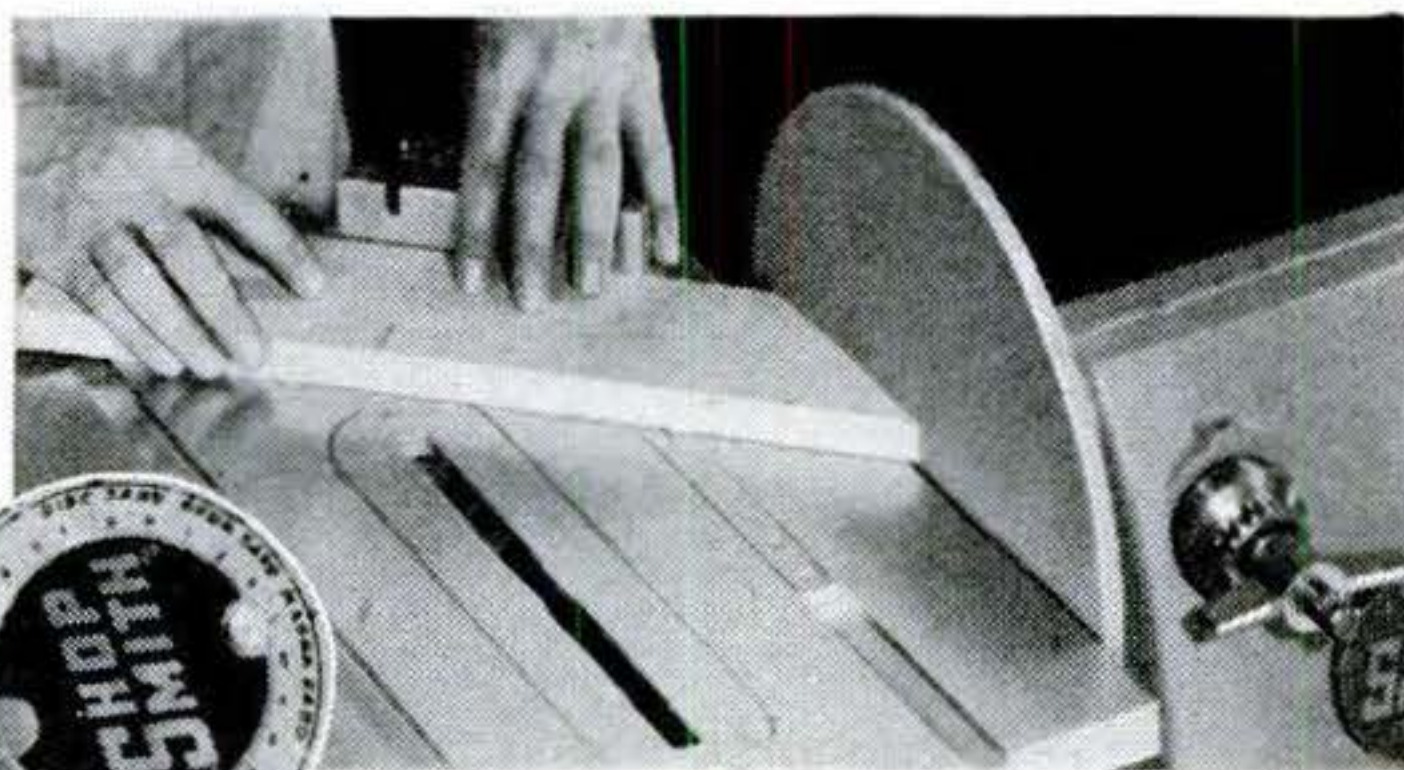
RACKED LUMBER of the right grades is always there when a builder wants it. Thurston takes pains to anticipate what each boat will need.

The best tool for every job

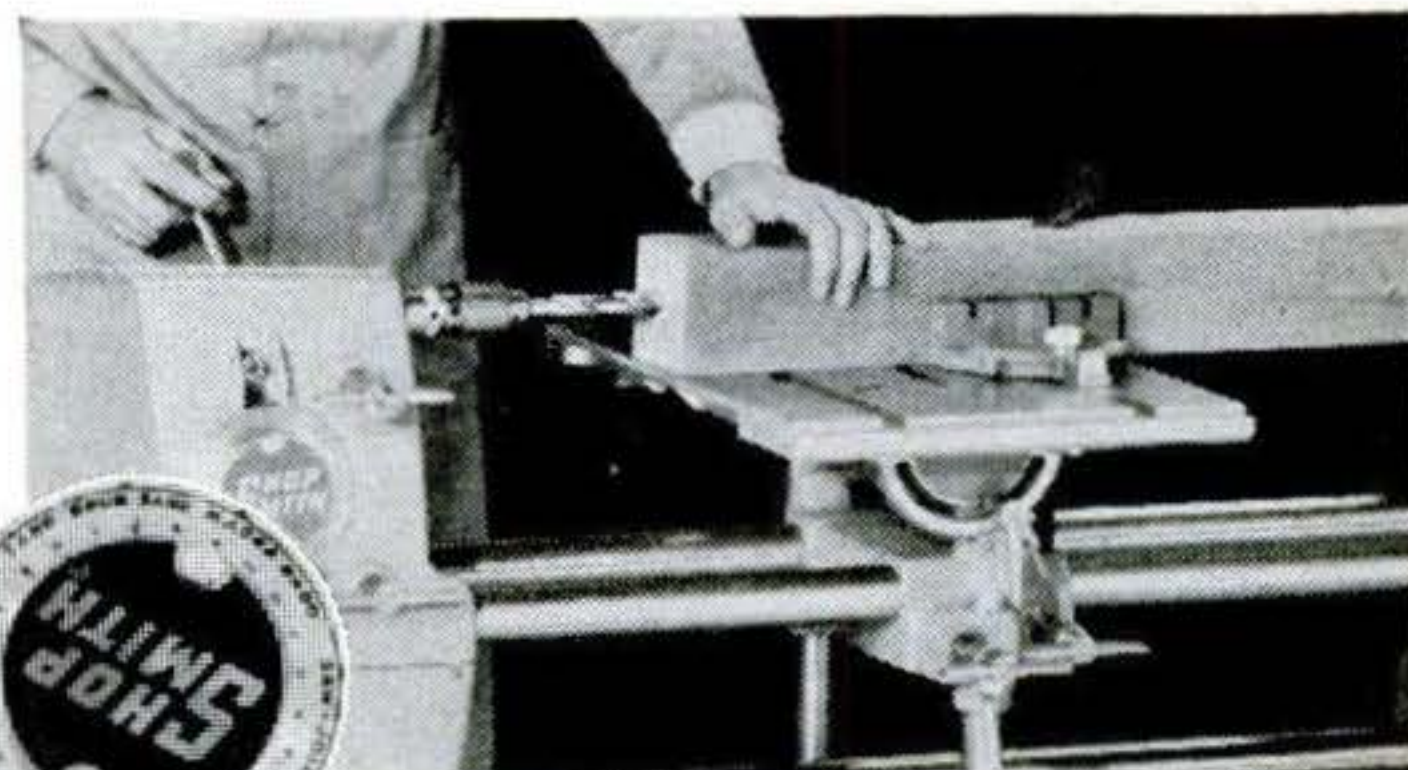
*and you can
dial them all
with SHOPSMITH**



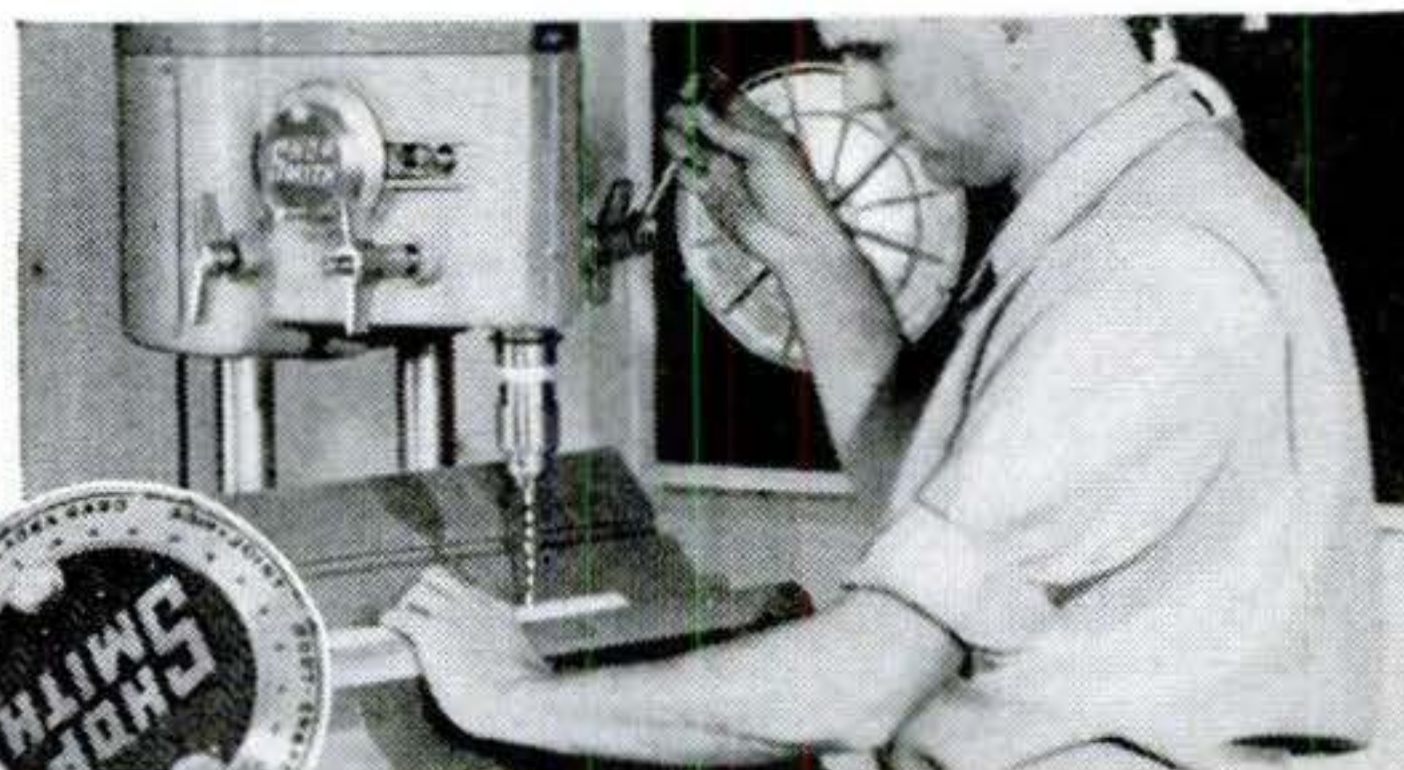
Saws! Speed-Dial settings for precision cross-cutting, ripping, dadoing, molding. 9" circular saw. Big tilting table. 48" blade-to-fence. Cuts 2 1/2" lumber—even at 45 degrees.



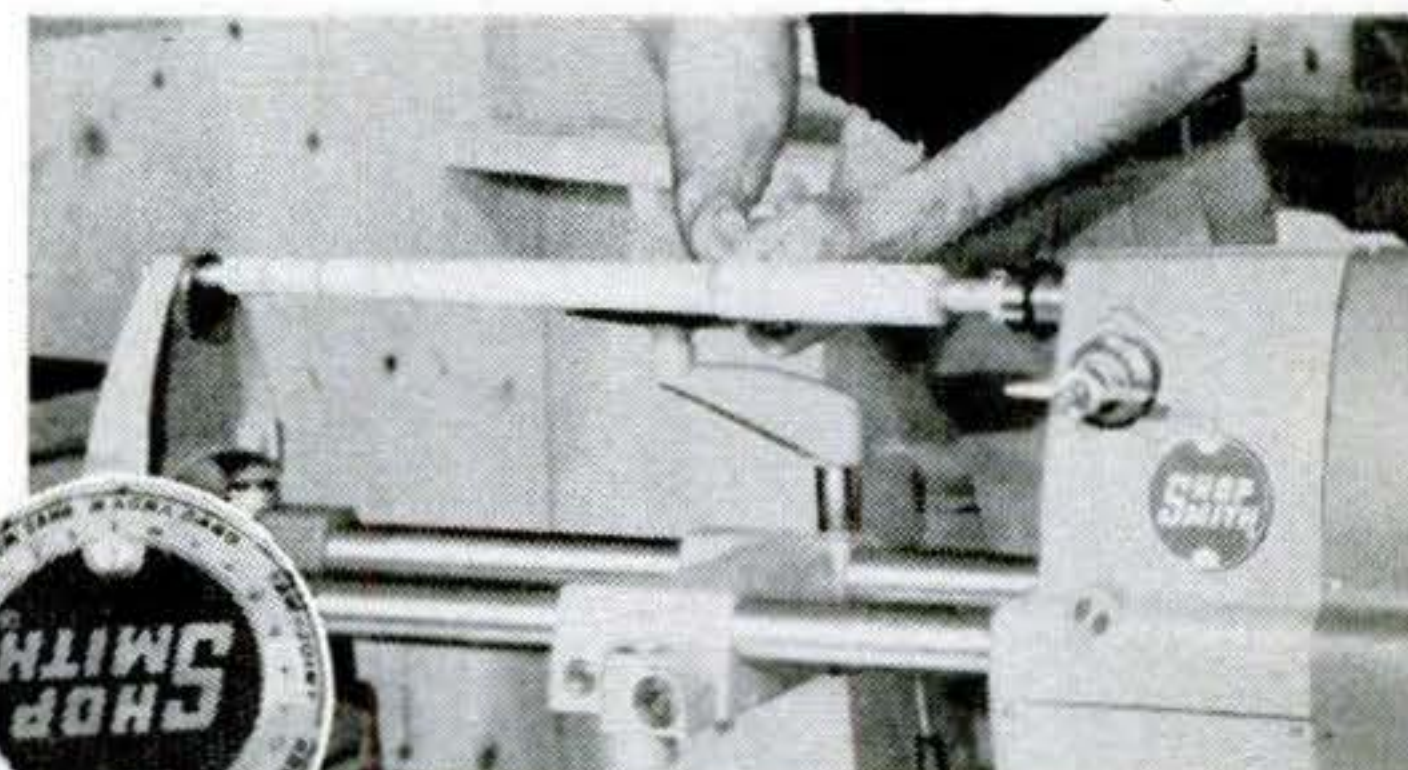
Sands! Correct speeds for coarse, medium, fine sanding of plastics, metal, all woods. Big 12" sanding disc. Depth control dial and built-in jigs for exact duplication of work.



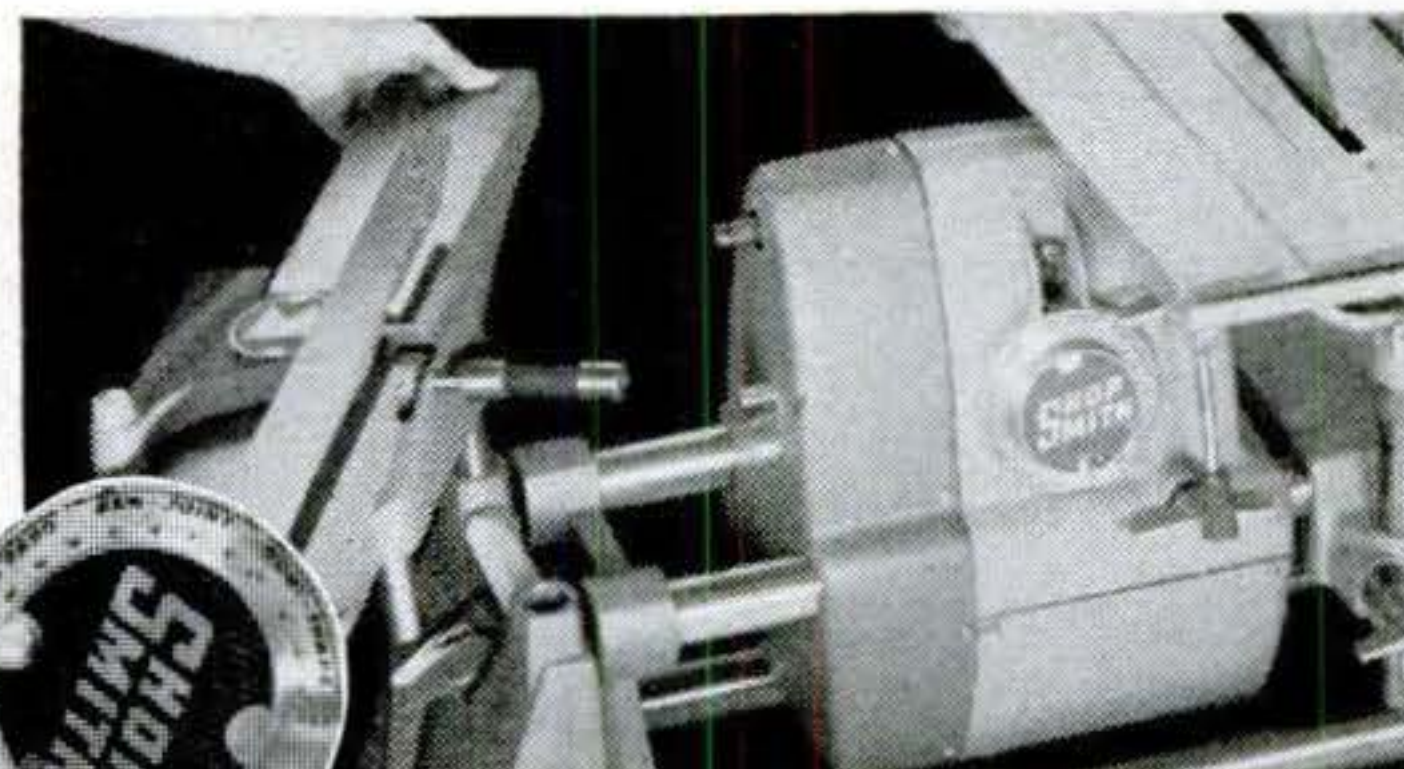
Bores! The only precision horizontal drill made for home shops! Unlimited capacity in horizontal plane. Speed-Dial settings for large diameter boring, dowelling, routing, shaping, etc.



Drills! Speed settings (700 to 5200 r.p.m.) for every operation from heavy drilling to high-speed routing. Drills wood, metal, plastics to center of 1 1/2" circle. 58" chuck-to-floor. 26" chuck-to-table.



Turns! Infinitely variable speed control with Speed-Dial for turning complete range of diameters. 1 1/2" swing. 34" between centers. Tool rest slides parallel to work without constant readjustment.



Exclusive POWER-MOUNT for quickly adding jigsaw, jointer, compressor. Another SHOPSMITH first! Add SHOPSMITH accessory tools with one twist of a handle. Power-Mount makes your SHOPSMITH a saw-jointer, jigsaw-sander, etc., with infinitely variable Speed-Dial settings.

See the all-new SHOPSMITH demonstrated at your local hardware or Montgomery Ward store. It's America's largest selling stationary power tool complete with rugged 3/4-hp. motor, bench, chrome rust-proofing . . . **\$289⁵⁰** (Comparable individual power tools with benches and motors would cost \$600!)

*Trademark Reg. U.S. Pat. Off. and in foreign countries

MAGNA ENGINEERING CORPORATION

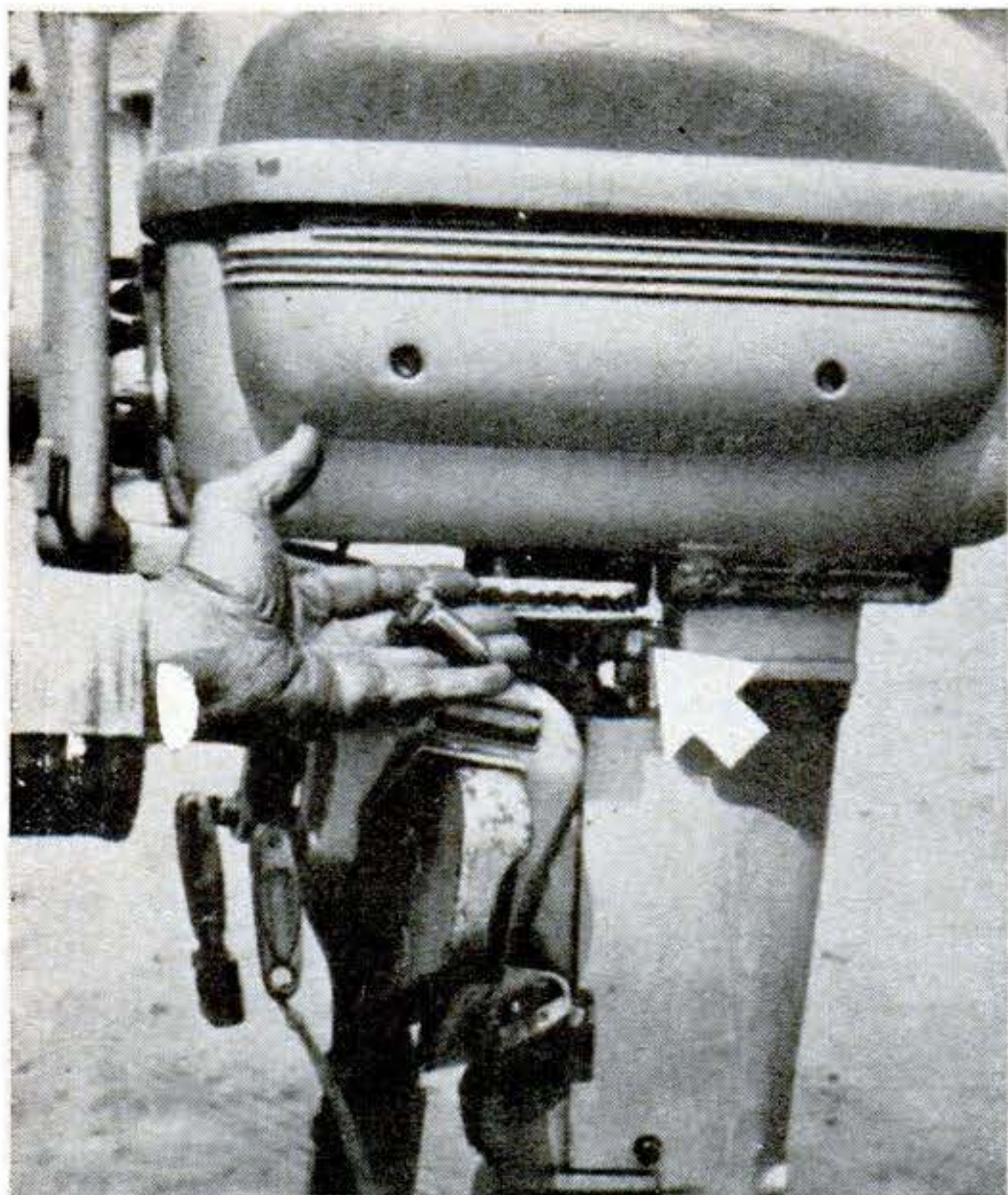
Dept. 294-A at factory nearest you:
12819 Coit Rd., Cleveland 8, Ohio, OR
Menlo Park, Calif.

Please send me 2 FREE BOOKS—24-page booklet, "What to Look for When You Buy Power Tools," and 20-page illustrated SHOPSMITH catalog.

Name _____

Address _____

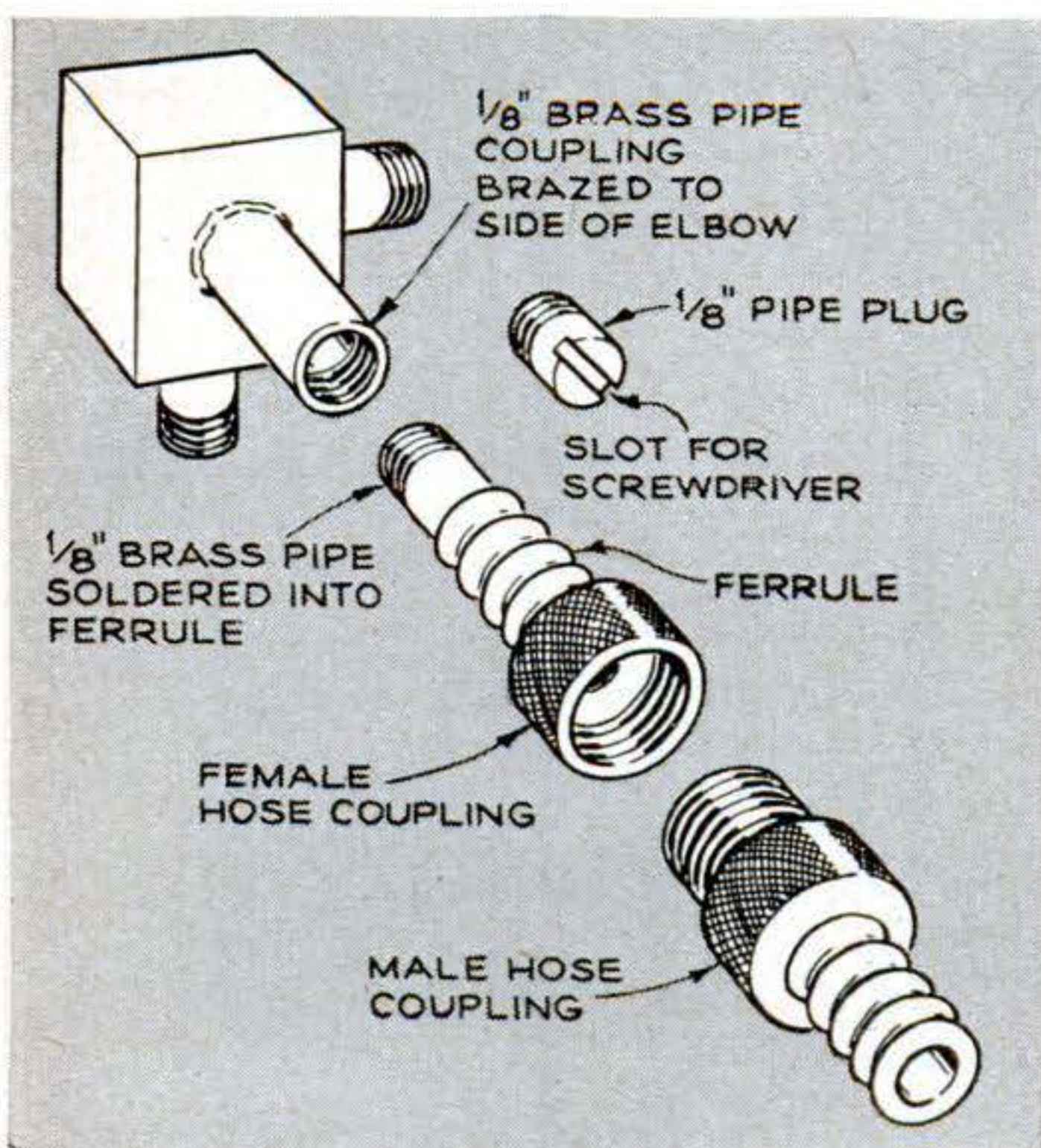
City _____ State _____



Fitting Aids Outboard Flushing

I HAVE found that this fitting makes it easy to use a garden hose for flushing a 14-hp. Evinrude Fastwin engine after a salt-water run. Remove the brass elbow (arrow) and braze a $\frac{1}{8}$ " brass-pipe coupling to its flat side. Then drill a $\frac{5}{16}$ " hole through the elbow wall inside the coupling. A piece of $\frac{1}{8}$ " threaded brass pipe soldered into the ferrule of a $\frac{3}{8}$ " garden-hose fitting makes the connection.

A $\frac{1}{8}$ " pipe plug, well greased to prevent sticking, closes the flushing opening when the motor is in use.—Clinton R. Hull, Costa Mesa, Calif.



He Runs a Shipyard for Amateurs

[Continued from page 242]

rials you have bought from Trident. You are free to buy your materials anywhere you like, but all customers so far—after a few costly buying expeditions on their own—have concluded that it's cheaper and simpler to buy through Sam.

The customer records his own time and materials used. "Nobody cheats," Sam says. "And if anybody loses track, I can pretty much tell what's gone into the boat since the last reckoning."

Sam's wife Alexandra, who is an experienced auditor and accountant, does the billing, ordering and other paper work. A friend to all the builders, she also sees to it that the coffee pot in the shipyard is kept filled and hot.

Trident is open every day in the week from noon until nine in the evening.

Mistakes. Launching a brand-new business almost inevitably involves misfiguring. Sam originally began with a slightly lower hourly charge. "I didn't really understand that I was working with amateurs instead of shipyard workers. The first time you see a costly tool slung around by the power cord it really hurts. Or a dull tool bit whacked down to half its size just because there's a grinder handy.

"I fretted something awful for a while. Then I just raised the hourly rate to a buck—and quit stewing."

Trident is now a paying proposition for Sam Thurston. But how is it working out for the customers?

The first man to get into the water is now contentedly fishing from his boat, a 16-foot cruiser. It took nine weeks a-building, and cost \$105 in yard fees and \$490 for materials. For a modest job—say a 14-foot skiff suitable for a $7\frac{1}{2}$ -hp. outboard—Sam guesses that materials might total about \$70. Yard time for a man of average skill might come to around 30 hours. This adds up to a hundred bucks for a boat that might cost \$215 in the showroom. The savings on the big cruisers are hard to nail down exactly but both Sam and his customers are sure that they are substantial.

END



brings you the **HOTTEST** news in



SPARK PLUGS



Exclusive BUTTRESS-TOP insulator design!

1 Provides a longer path of resistance to electrical leakage than any other make of spark plug. This is the much discussed electrical "flashover" length. Under unusual dirt or moisture conditions, this buttress-top design greatly reduces "shorting" or "flashover."

Exclusive COPPER-GLASS seal!

2 In AC Spark Plug manufacture the center electrode is sealed in the insulator by a *patented* copper-glass seal. This seal, comprised of powdered copper and glass, heated and compressed, is gas-tight, and the mechanical bond is more than equal to any condition of use. The seal is resistant to heat shock and vibration far beyond normal plug life.

Exclusive HOT TIP feature!

3 Not only did AC develop the modern ceramic insulator material that outmoded porcelain—AC engineers found a way to form this material into long, thin, recessed insulator tips. These tips heat up faster to burn away combustion by-products that would foul ordinary plugs. The HOT TIP plug is an AC exclusive.

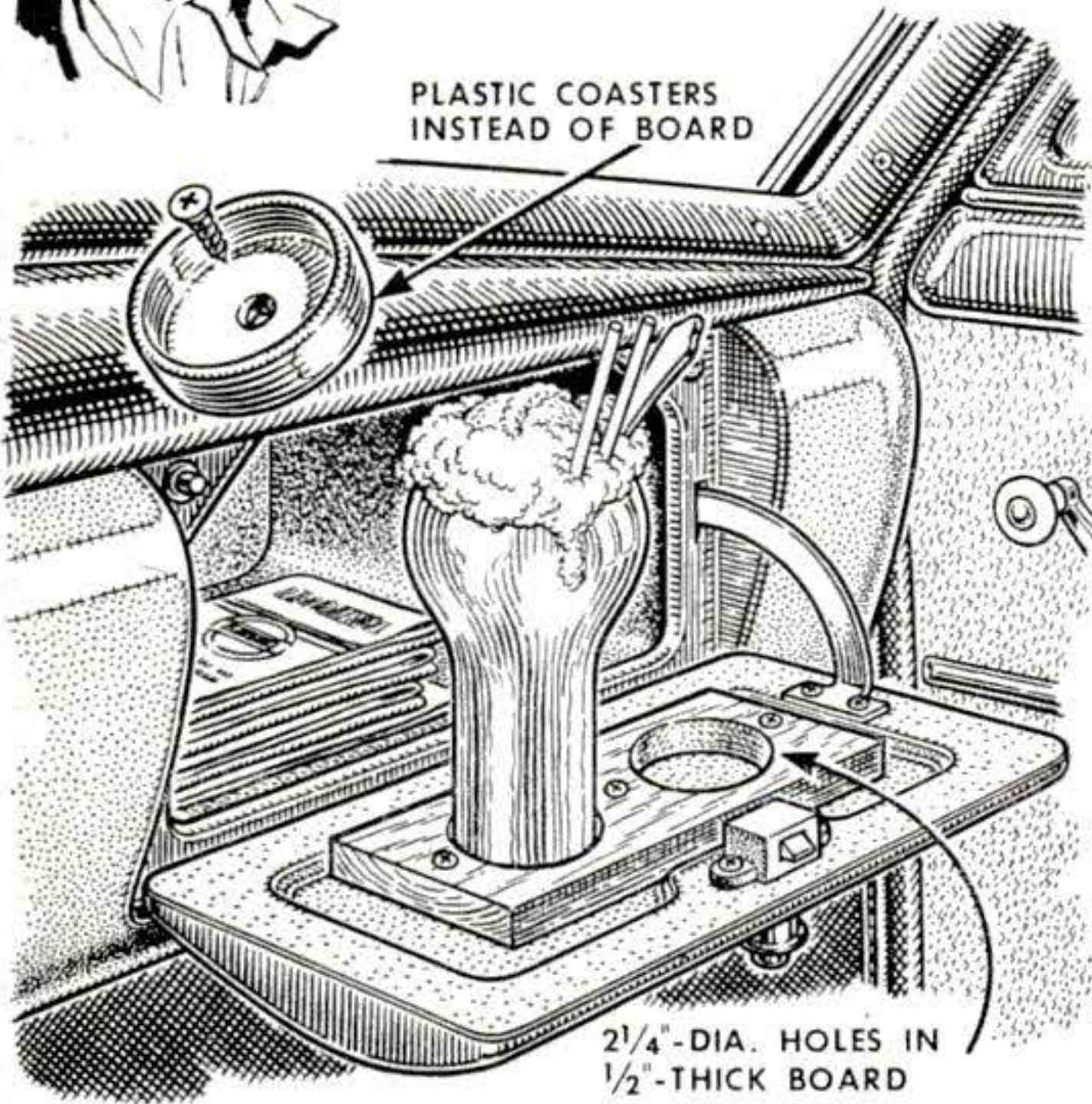


AC SPARK PLUG DIVISION
GENERAL MOTORS
CORPORATION

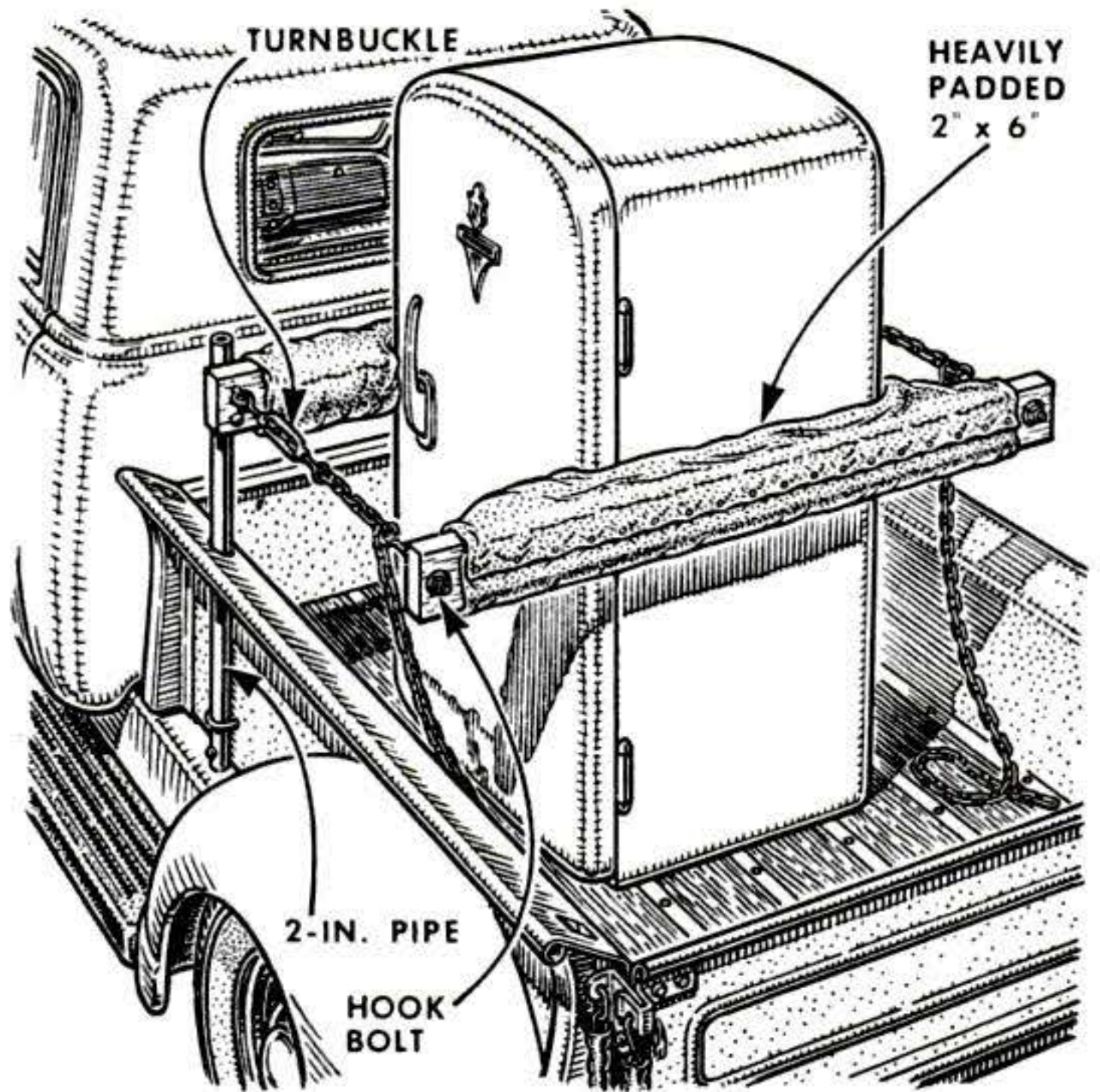
GM and AC means continued leadership



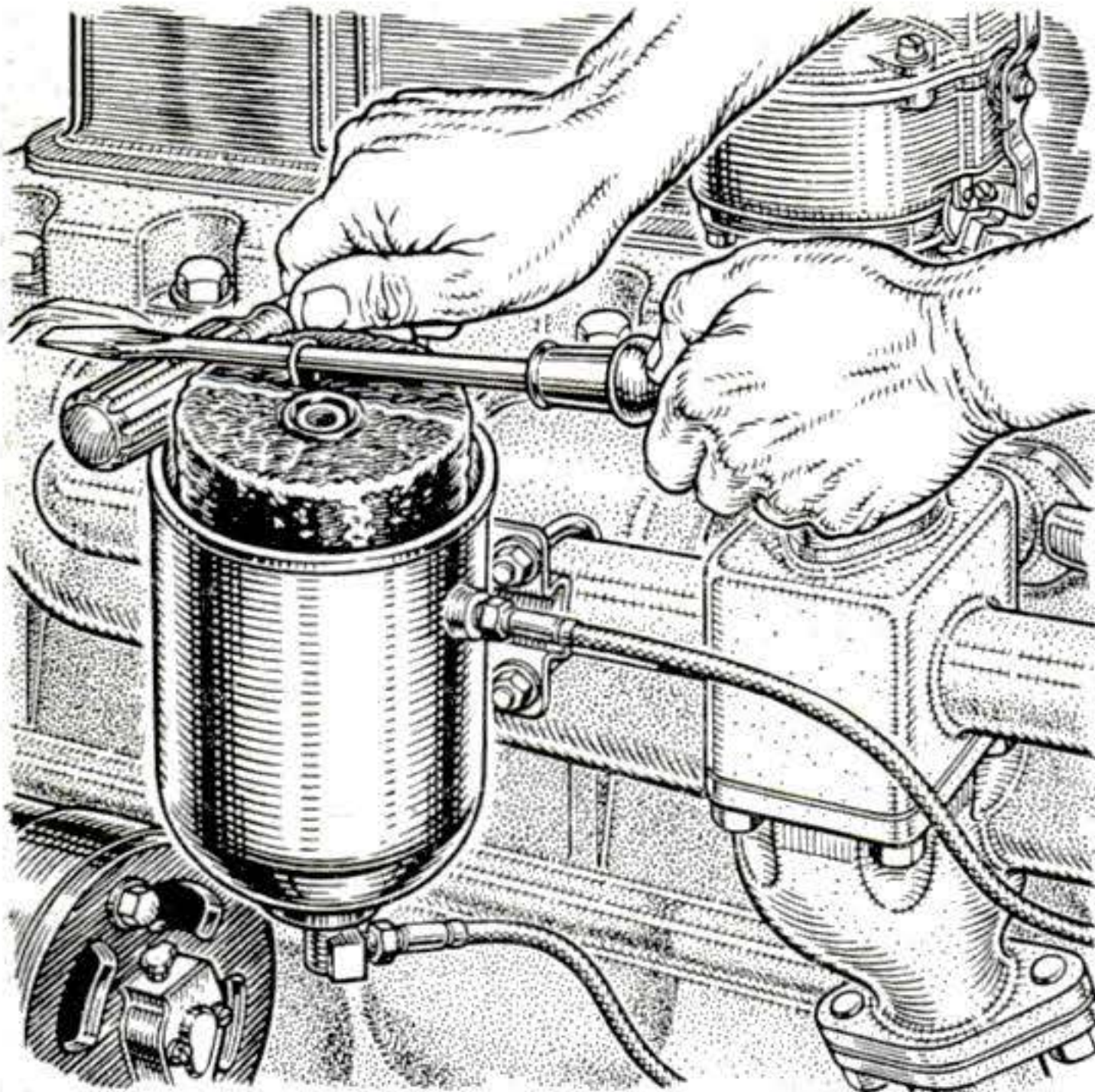
Hints FROM THE MODEL GARAGE



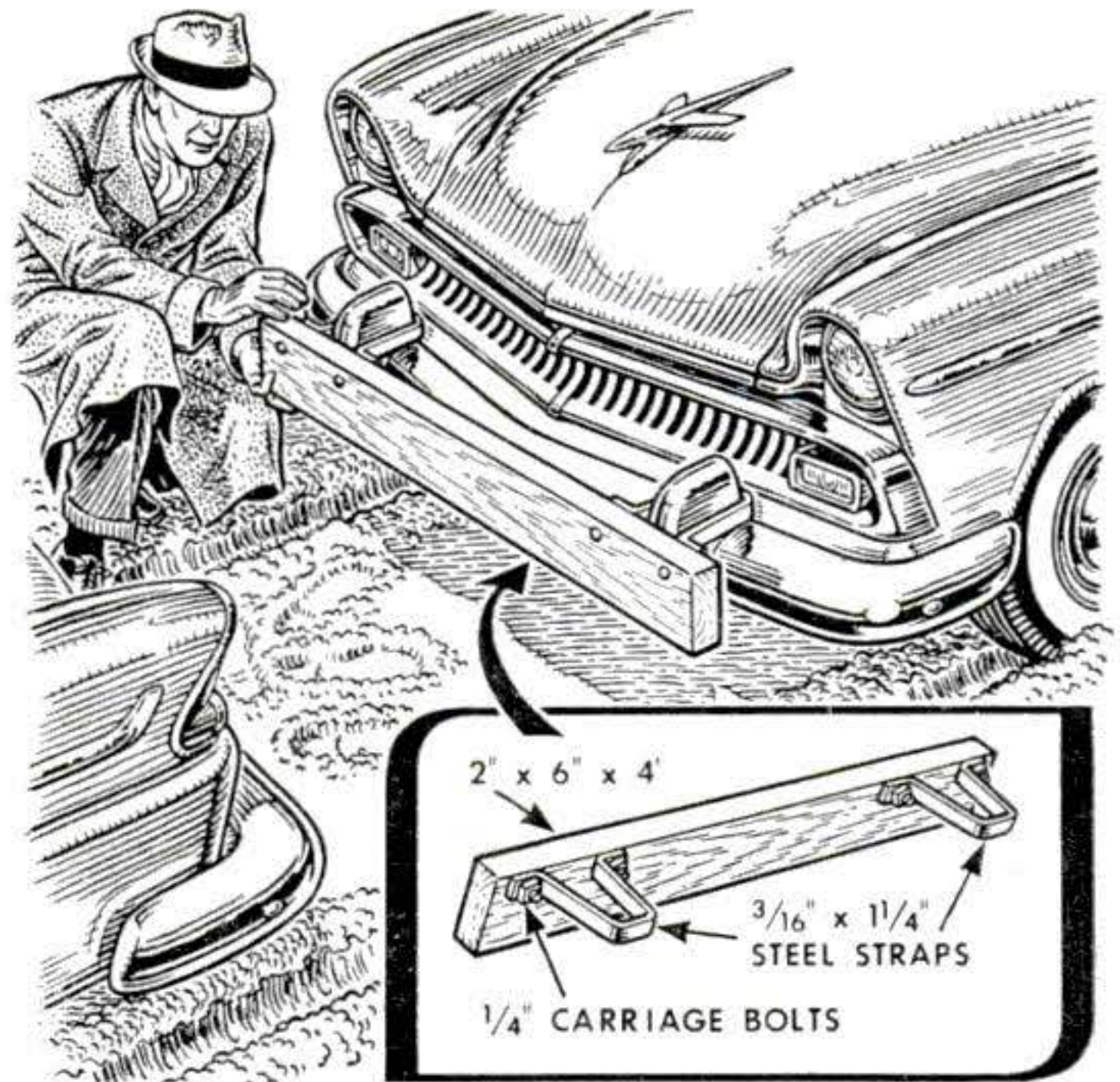
Balancing a soda glass while stopping for a roadside snack is no problem if you adapt the glove-compartment lid with a holder made from scrap wood. Deep-rimmed plastic coasters serve as well if attached with flat-head sheet-metal screws.



Heavy, padded braces at front and back prevent slipping and scuffing when you move a partial load in a truck. Link the holding chains as taut as possible to the free-riding rear brace, then tighten with the turnbuckles to hold the load fast.



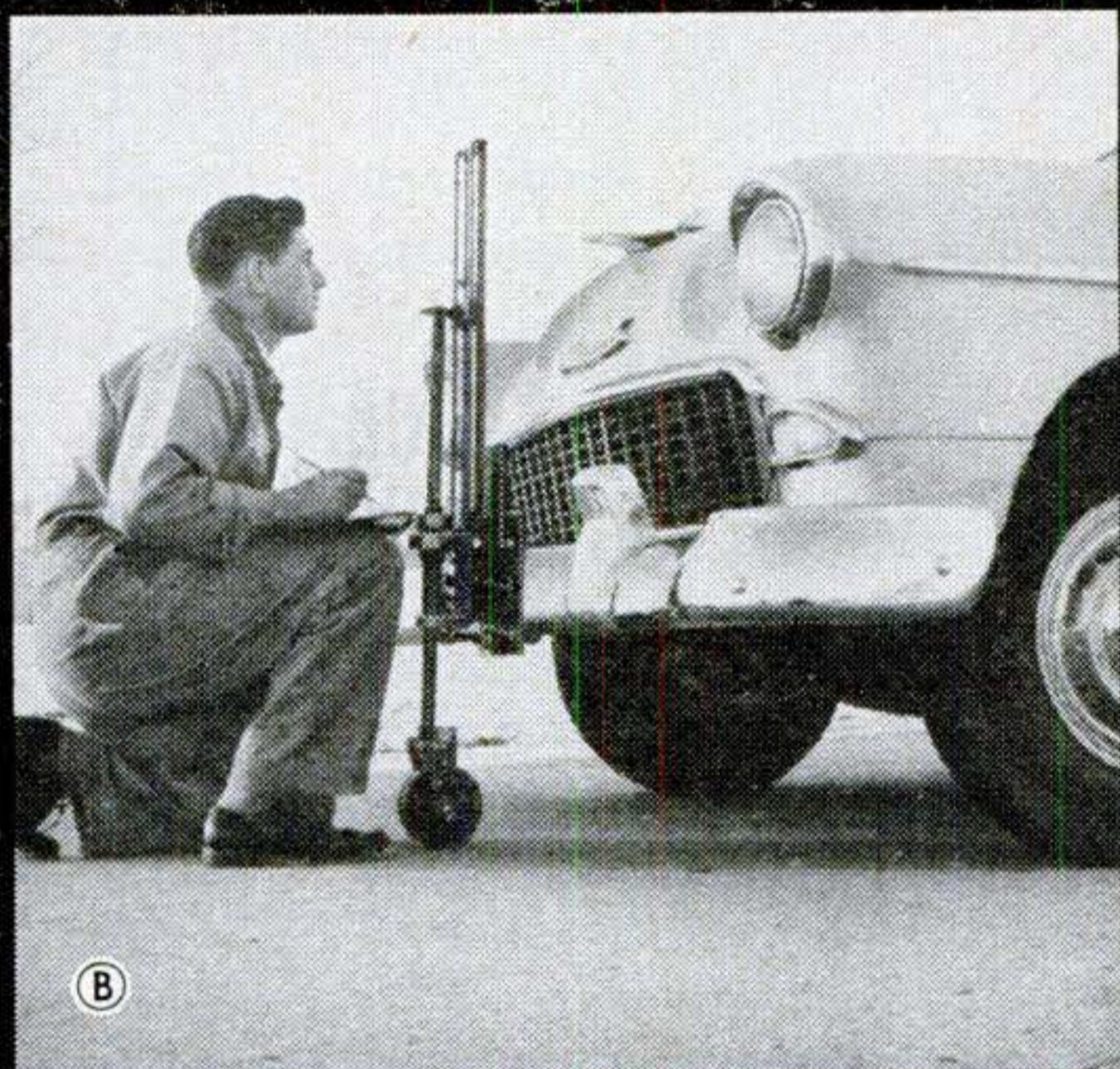
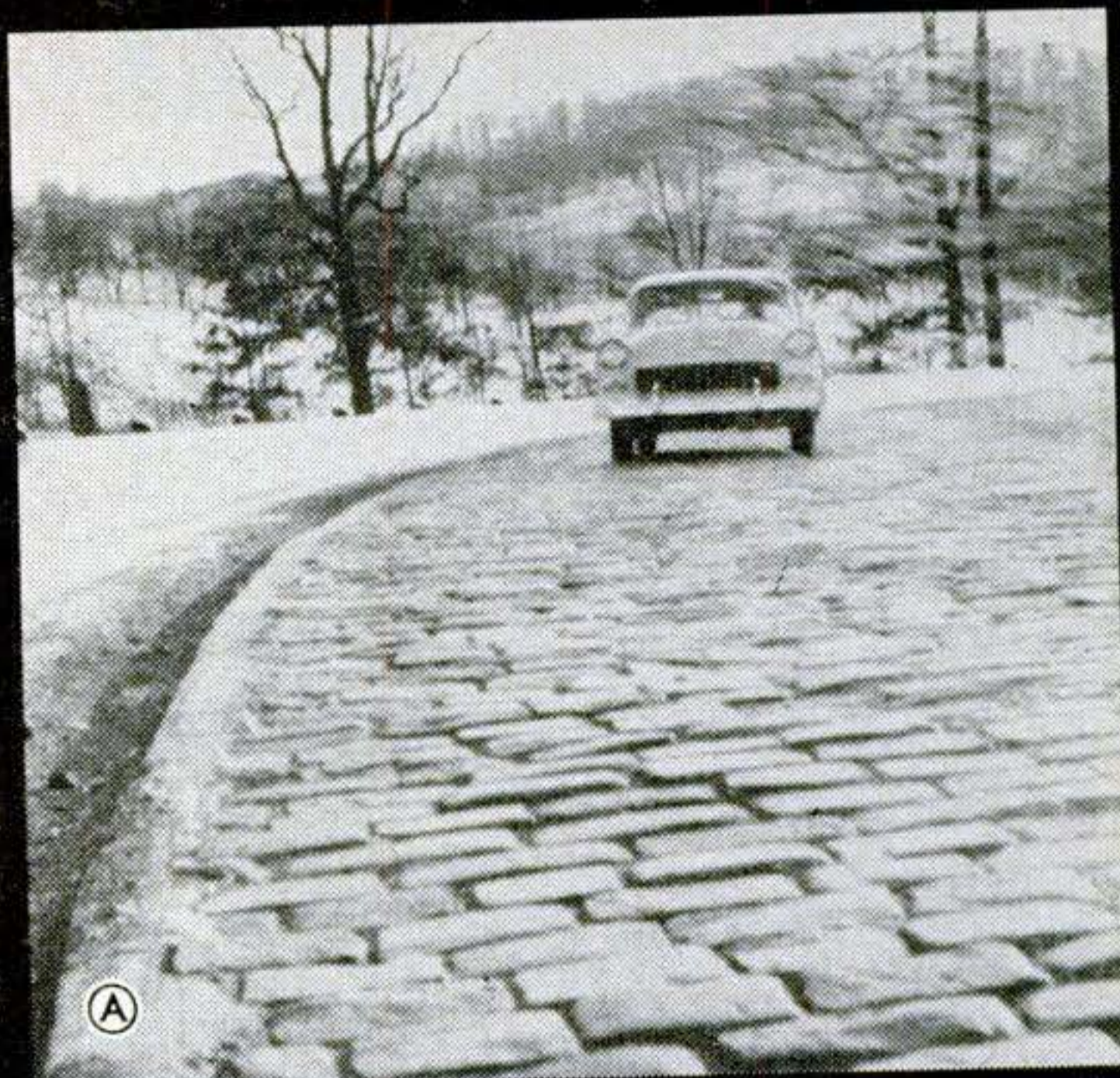
Two screwdrivers, with the handle of one used as a fulcrum, provide the leverage you need to start a stuck oil-filter refill without yanking off the wire handle. Take care not to nick the sealing seat of the housing, or leakage may result.



Bumper and grille protection when you are called upon to push—or need pushing—is carried in your trunk with a guard made from a short length of stout lumber. Bend and bolt on the steel straps so that they fit loosely over the bumper guards.

"How we engineered
this new Chevrolet
for smoother going
and
'heads up' stops"

By Ed Cole, Chevrolet Chief Engineer



- A** *Brutal Belgian-block roads condense years of wear into days.*
- B** *Special device measures amount of front-end "dive" under hard braking.*
- C** *Spherical-joint front suspension has only 4 grease points instead of 16.*

To give Chevrolet's new Glide-Ride front suspension its uncanny ability to sop up small, sharp road vibrations (as well as larger bumps) we had to create a really *free-flexing* unit. We completely eliminated all metal-to-metal friction so that the springs could react instantly to the smallest jolts. That's why the control arms are set in live rubber . . . and even the spherical joints themselves have non-metallic bearing inserts.

Spherical joints gave us other advantages—much less bearing area, so steering friction is minimized; reduced unsprung weight, so rid-

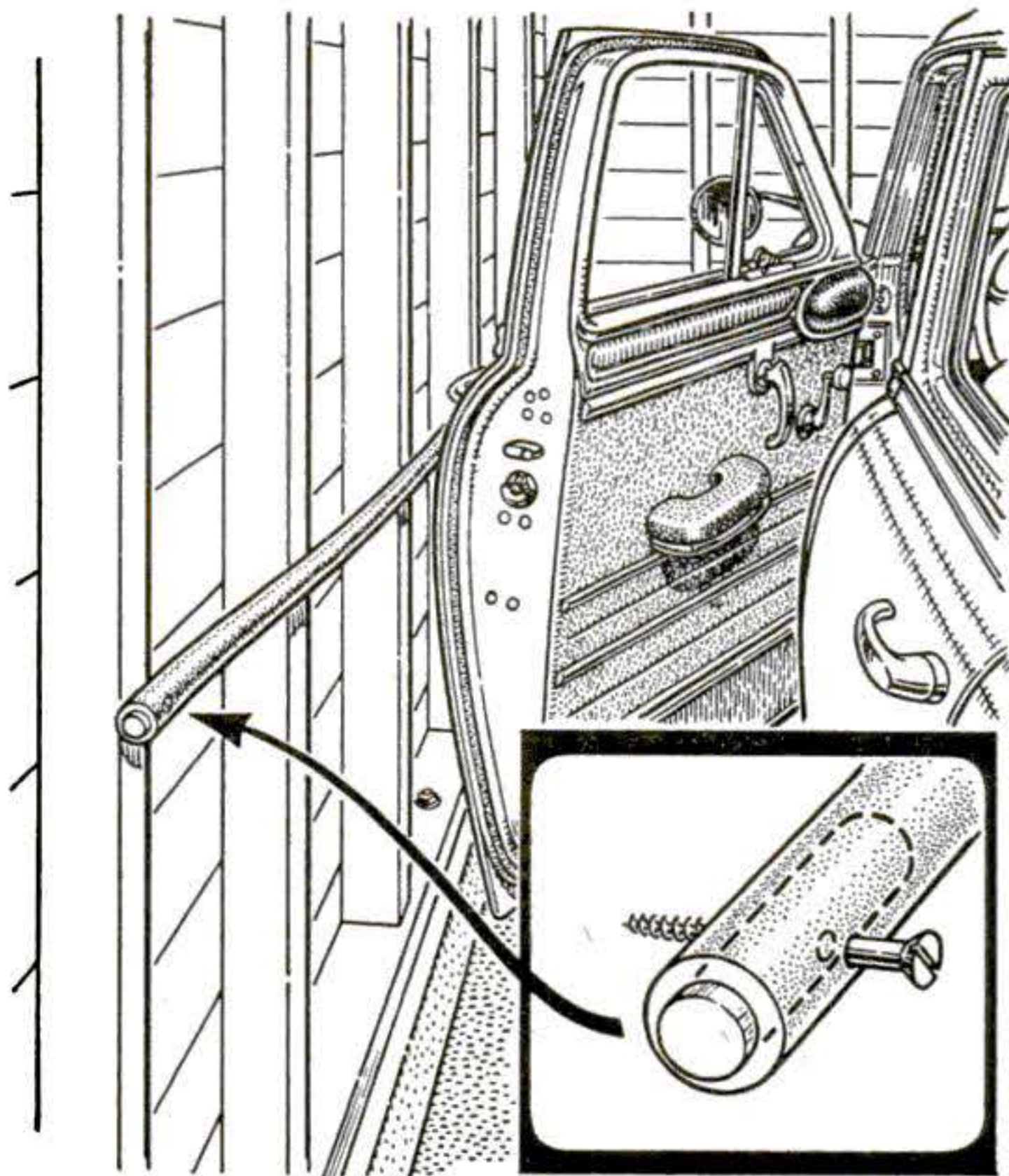
ing comfort is increased—and they also let us develop the exclusive Anti-Dive braking control, which drastically reduces that annoying nosing-down of the front end. There are scores of other advances in Chevrolet's new ride—but the *result* is what counts, and you can test that at your Chevrolet dealer's. . . . Chevrolet Division of General Motors, Detroit 2, Mich.



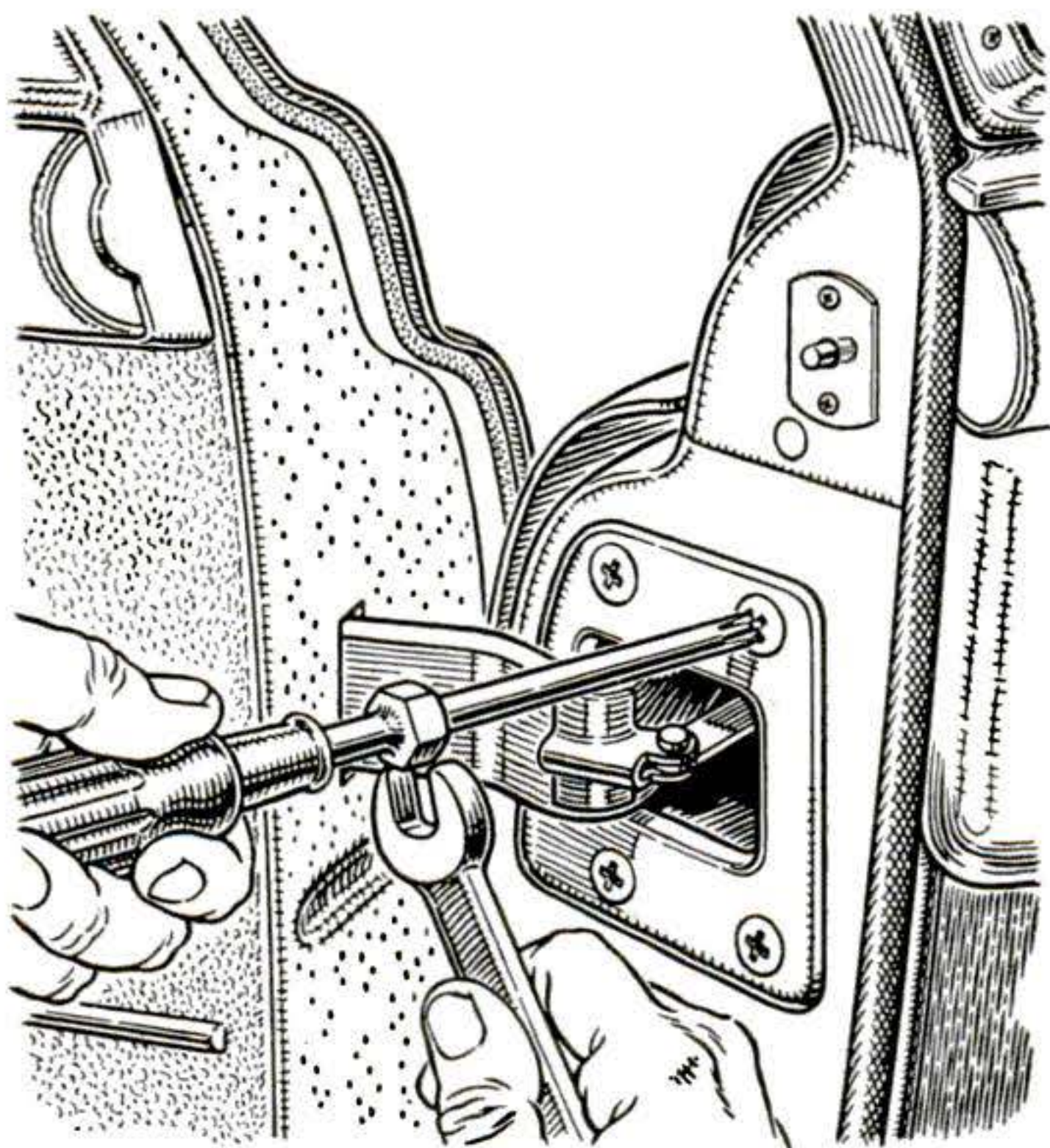
MORE Hints from the Model Garage



Rubber padding in the socket joint of the hitch will give you a nonrattling coupling that won't click and jerk when you pull a light trailer. Just lay a square of old inner-tube rubber on the ball before dropping the hitch on it.



Discarded garden hose used as a bumper on your garage wall protects the car door when you open it to get in or out. Drive a short dowel in each end and drill for a mounting nail or screw. Use a concrete nail or expansion bolt in a masonry wall.



Turning a screwdriver while tightening or removing a door hinge can be made easier if you braze a nut on the shank near the handle. Then put pressure on the end of the screwdriver and do the turning with a small open-end wrench.



Model-airplane dope or fingernail polish will cut down annoying glare from dash lights. Simply dip the bulbs in the red dope and let dry. Then, checking as you work, start at bottom and gradually scrape off coating until light level is just right.

Texaco Tips On Car Care



← Good uses for last winter's anti-freeze

If you have Texaco PT Anti-Freeze in your car radiator, you can put it to good use after it is drained out this spring. It makes an excellent preservative solution for storing wet paint brushes overnight or for short periods of time. It helps prevent rust when smeared on your car bumper and grille.

How to get → that "cushiony" ride

To ride smoothly, your car needs a lubricant that lasts. That's *Marfak*! Note the protective "collar" of *Marfak* on the front suspension (at right). *Marfak* stays on the job far longer. It's extra-stretchy...forms a tough coating between points of wear and friction. With *Marfak*, you get a *cushiony* ride that lasts for 1,000 miles or more. And remember this: your Texaco Dealer lubricates your car by chart, never by chance. Today, get *Marfak* lubrication. See your Texaco Dealer... the best friend your car has ever had.



TEXACO DEALERS IN ALL 48 STATES

Texaco Products are also distributed in Canada and in Latin America

THE
TEXAS
COMPANY

TUNE IN: TEXACO STAR THEATER starring DONALD O'CONNOR or JIMMY DURANTE on TV Saturday nights.

APRIL 1955 249

Gus Fixes a Reluctant Wagon

[Continued from page 158]

song of the exhaust. They drove 10 miles, 20.

"I guess you fixed it all right," Barney commented. "I knew you would."

"I hope so," Gus said, trying to sound confident.

Engine Sings a New Song

They came to the long, climbing slope of the Big Hill road, and were nearly to the top when Gus sensed a new sound developing in the motor. It wasn't something that he could instantly put his finger on, yet it seemed to him that he should be able to. It was a familiar yet momentarily elusive change in motor tone.

"Something wrong, Gus?" Barney asked quickly.

The words had hardly left his mouth when the car slowed, seemed to lose its power. Gus jiggled the throttle, watching developments warily. The motor began to miss and stagger, and the wagon barely made the summit of the rise. Gus pulled to the side of the road and leaped out, just as the engine gave one last gasp and died.

The burly mechanic looked ruefully at Barney, became very preoccupied with fumbling his pipe from his pocket, tamping it with tobacco with a horny thumb. He lit a match on the seat of his overalls, puffed reflectively.

"Nice view of the valley from here, isn't it?" he remarked.

Gus Takes Time Out

He seemed to be completely absorbed with the view, yet his mind was racing. He'd be hornswoggled, he told himself, if he'd lift that hood and make any more of a fool of himself before this kid, until he had some idea of what he was looking for. He'd checked and rechecked everything that could possibly cause trouble. There was nothing he could do but putter around like a jay bird, until he got a new slant on this deal.

Gus chewed thoughtfully on his pipe. That change in motor tone before the

engine started missing had been as familiar to him as the sound of running water . . . What was it, anyway? By golly, it had sounded as though the motor was choked.

Quickly Gus removed the air cleaner and peered into the carburetor's throat. The choke was wide open. Gus checked it with his fingers—there was no doubt about it. What now? Air cleaner? But he had cleaned and checked that thoroughly. Still, the suspicion of a choked motor, once firmly established, persisted in Gus's mind. He removed the top of the air cleaner, lifted out the felt. The piece of felt seemed somehow off base, too limp and floppy.

"Where did you get this felt, Barney?" Gus asked.

"I cut it out myself," Barney said, "from a piece we had around."

Air Cleaner Gets a Strangle Hold

"Ah!" Gus's exclamation held a note of disgust. "I should have noticed this when I cleaned the air cleaner," he declared. "Guess I'm getting addled in my old age. But both times you drove into my shop, you'd driven only a few blocks. The motor was still fairly cool, the felt fairly stiff. When this felt gets really warm it gets limp. It sags down and shuts off the air from your motor. No wonder the motor sounded choked to me and you got such poor gas mileage. We'll put in a factory-spec felt, and your troubles are over, Barney."

They were over. A week later Barney drove into the garage and announced no trouble. Moreover, he said with a happy grin, the station wagon was doing about 21 miles to the gallon.

"Goes to show," Gus told Stan Hicks, "that a man can't pinch pennies in the wrong places. It doesn't pay. It didn't pay for Barney Overholtz, and that's for sure."

"Yeah," Stan Hicks said disgustedly. "You really made him pay, didn't you. Two dollars, wasn't it?"

END

NEXT MONTH: Gus rescues a competitor.

THIS IS MOPAR CAR-CARE MONTH!



**NOW - RESTORE
"NEW-CAR" INTERIOR
BEAUTY EASILY -
FOR ONLY \$2.15***

**Amazing new MOPAR KAR KLEEN
removes stains, spots,
and dirt like magic!**



New MoPar KAR KLEEN brings back the beauty of your car's interior quickly, easily, magically. It removes stubborn stains and dirt from upholstery, headliner, visor panels, etc.—whether the materials are cloth, vinyl, or leather! *Everything* can be cleansed and beautified by MoPar KAR KLEEN. One bottle provides more than enough—and you need only a small brush or sponge to do the job!

MoPar Ru Glyde

will spark up your car's appearance by restoring that new look to rubber floor mats, tires, and rubber accessories! Ru GLYDE will do the job with less effort and at lower cost.



ONLY \$.65*

MoPar Cleaner and Auto Polish

combine to maintain gleaming exterior beauty. Simply clean exterior with MoPar Cleaner, then beautify in a jiffy with today's finest Auto Polish!



**CLEANER ONLY \$.70*
POLISH ONLY \$.65***

MoPar Radiator Rust Resistor

protects your cooling system against damaging rust and scale. Deposits a protective coating throughout the cooling system. Recommended for any make of car.



ONLY \$.50*

MoPar Chrome Polish

will restore brilliance and luster to the chrome parts of your car! Removes rust, corrosion, and tarnish . . . leaves a durable film which protects finish!



ONLY \$1.00*

MoPar Lustur-Seal Haze Cream



provides a hard, protective coating that preserves the color and gloss of new or old cars.

ONLY \$1.25*

MoPar Paint Applicator

touches up scratches in seconds! Stops rust before it can start . . . for cars, refrigerators, and stoves! Available in more than 100 colors, including white.



ONLY \$1.00* each

... all these materials are available from your nearby Plymouth, Dodge, DeSoto or Chrysler dealer and from better repair shops everywhere.

*Factory Retail Price At Factory

MOPAR is the identifying name of thousands of parts and accessories designed and built especially for your Plymouth, Dodge, De Soto, Chrysler or Imperial car, or Dodge "Job-Rated" truck.

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PARTS DIVISION • CHRYSLER CORPORATION • DETROIT 31, MICHIGAN

APRIL 1955 251

EVERY SKILLED CRAFTSMAN,
MECHANICAL HOBBYIST AND
DO-IT-YOURSELFER SHOULD
HAVE THIS **NICHOLSON**

HANDY FILE

Special low price during
HARDWARE WEEK
April 15-23

only 60¢

(Regularly 76¢)

Like those inseparable Siamese twins, the Nicholson **HANDY FILE** is *two files in one*. Either or both are always at hand . . . in the single-cut side for smoothing and edge sharpening; the double-cut side for fast stock removal.

Flat forged-on orange-colored handle makes the **HANDY FILE** easy to carry—in hip or leg pocket. Hang-up hole makes it easy to store and find. Cellophane wrapping brings it to you rust-and-moisture free. Made by the world's foremost file manufacturer, you can be sure it is unbeatable in long-lasting quality.

(Also made in Black Diamond brand)

At hardware stores everywhere

FREE new edition of Nicholson's famous 52-page book, "*File Philosophy*." Write to



NICHOLSON FILE COMPANY
19 Acorn St., Providence 1, R. I.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)



NICHOLSON FILES

FOR EVERY PURPOSE

Science Arms You Against Snake Bites

[Continued from page 162]

try without antivenin, there are a number of important precautions to take.

Wear good, stout leather boots, at least 14 inches high, and long trousers. Then, if a pit viper takes a dive at one of your ankles, its fangs and venom will be buried in your trouser leg instead of you. Wearing sneakers and shorts simply makes matters easier for snakes.

Make your camp before sunset. Snakes are most active after dark, and their favorite hangouts are under brush piles, rocks and logs. Hunt for your firewood while there is still light enough for you to see where you are putting your hands.

Look Before It Leaps

Don't slide your fingers under chunks of wood. Take hold of them at the top and lift the far side first. If there is a snake underneath, it will strike in that direction, and thus away from you.

Remember that a snake doesn't have to be coiled to strike. It can lash out from any position, in any direction. Also, a rattler doesn't always sound a warning. Its rattle may have been broken off in a family fight or an accident.

Never reach into a hole in the ground or into a tree or log without first probing with a long stick.

Don't sit down on a log or rock, or slide a leg over either, without a sharp preliminary glance.

Don't walk close to rock ledges. Snakes love to hide there, and might dart at your head if it comes too near.

You Can Outrun a Snake

If you suddenly see a wicked-looking snake near you, don't be paralyzed with fright. A snake can't strike with accuracy farther than a little over half its length. Besides, you can sprint 15 to 20 miles an hour. The best a rattler can do is two or three, and a coral snake can't even slither one mile an hour.

You can identify a pit viper by its flat, triangular head; oval, catlike eyes; and its prominent pits. A coral snake has

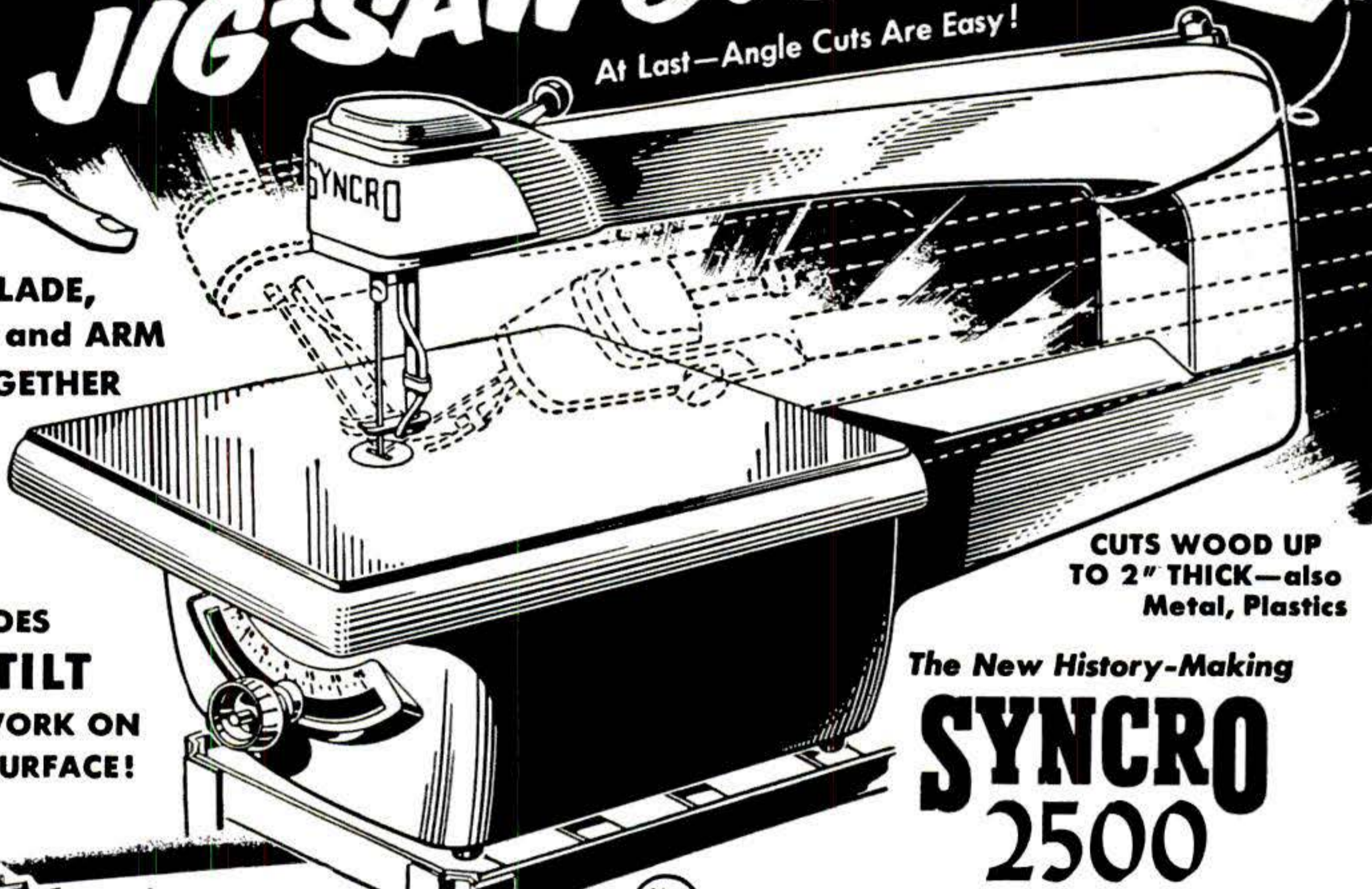
[Continued on page 254]



THE FIRST TILTING ARBOR JIG-SAW Ever!

LOW PRICE

At Last—Angle Cuts Are Easy!



BLADE, MOTOR and ARM TILT TOGETHER 45° TO EITHER SIDE

TABLE DOES NOT TILT—YOU WORK ON A FLAT SURFACE!

CUTS WOOD UP TO 2" THICK—also Metal, Plastics

The New History-Making

SYNCRO 2500

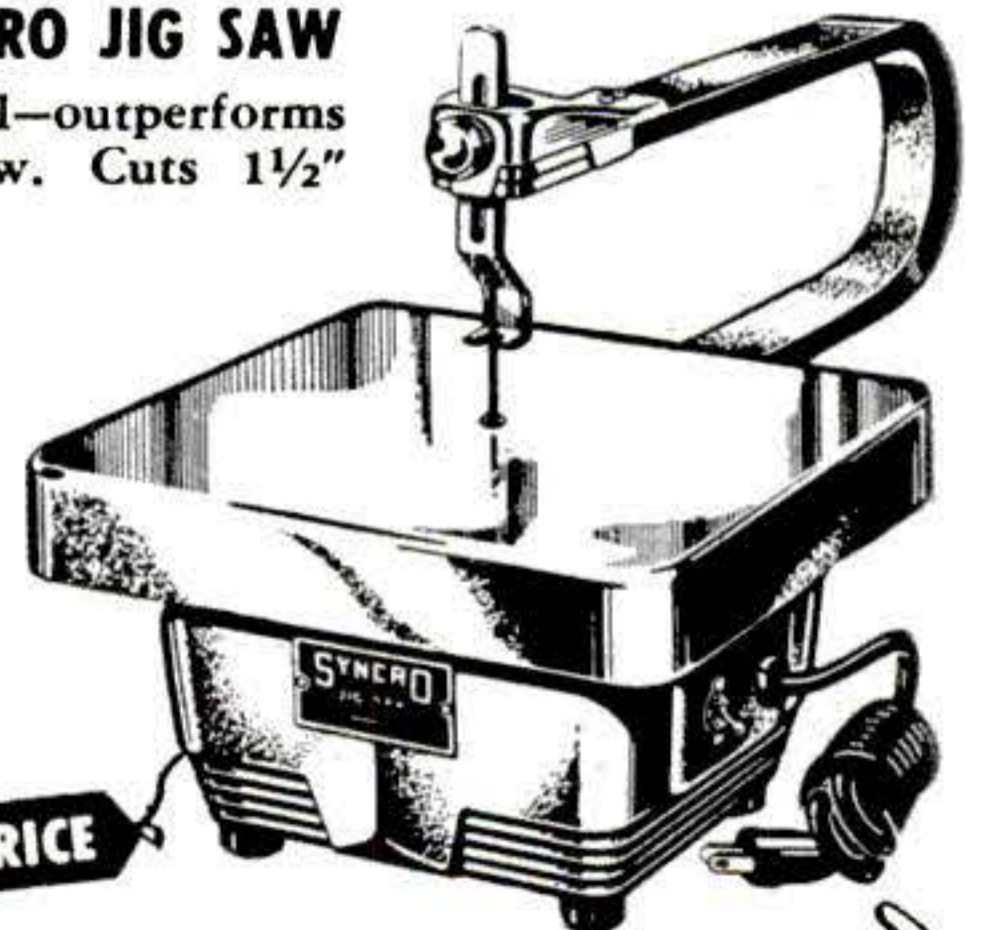
TILT ARBOR JIG SAW



DO-IT-YOURSELFERS! Here's the most important news in jig saw history! Syncro announces a heavy-duty jig saw featuring complete arbor tiltABILITY (first ever!)—20" throat clearance—180 sq. ins. table working surface that remains rigidly level for more accurate, easier sawing and lumber handling. Blower. Self-powered by SUPER-powerful, patented reciprocating motor built in and guaranteed against burn-out during your ownership. Industrially-rated. Weighs 65 lbs. Low cost. See it at stores—send coupon for Free Catalog—before you buy any jig saw!

NEW No. 208 SYNCRO JIG SAW

Basic do-it-yourself tool—outperforms any competing jig saw. Cuts 1 1/2" pine, 1" plywood, aluminum, plastic, linoleum. 15" Throat clearance; 100 sq. ins. table. Arm swings 90° for any length cut. Same type self-powered motor as 2500. Low cost. See at Stores—Send coupon.



Remember!

MORE

LOW PRICE

SYNCRO-MADE JIG SAWS HAVE BEEN SOLD THAN ANY OTHER SELF-POWERED MAKE!

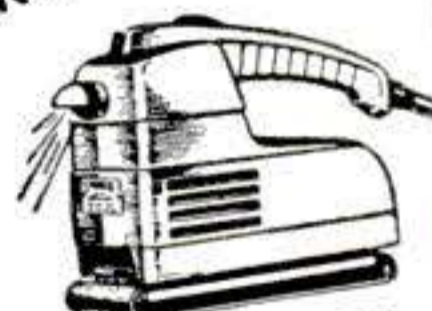
SYNCRO CORPORATION, Dept. 2-45, Oxford, Michigan, U.S.A.



FREE AUTHORITY 20-PAGE SANDING HANDBOOK
(Includes SYNCRO CATALOG)

No. 900

New heavy-duty Syncro sander has built-in sight-saver lamp—outsands all other portables per \$ cost. Removes paint, varnish. World's most powerful reciprocating sander motor (patented) included in low cost!



New Kit 900-D has heavy-duty sander 900 in sturdy metal case. **SPECIAL PRICES ON 900-D & 504 AT STORES DURING "HARDWARE WEEK"**



No. 504

New light-duty Syncro sander best for vertical, overhead and finish jobs. Contains 504 sander in metal case, etc. Low cost.

MAIL COUPON

SYNCRO Corporation, Dept. 2-45, Oxford, Mich.

Send Free Sanding Handbook and Catalog of Syncro Jig Saws and Sanders—Low Prices.

NAME _____

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Make your home look like new INSIDE and OUT with low-cost* Weldtex

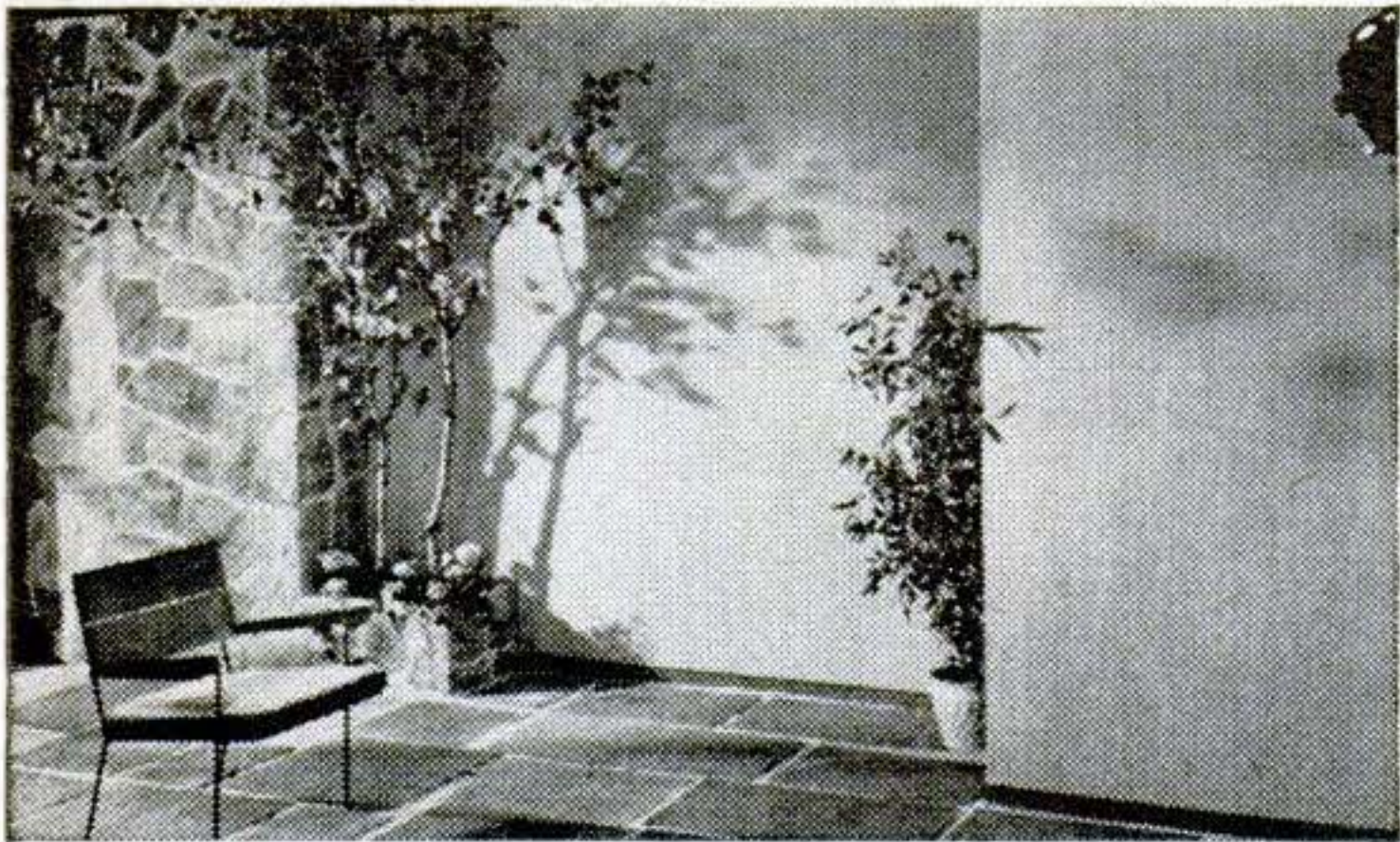
Easy to apply... deep-grooved surface hides joints and nails.



BEAUTIFUL Weldtex panels an 8' x 12' wall with real wood for only \$27*. Put easy-to-handle 4' x 8' sheets right over old wall. Stain it, paint it or finish it natural.



GIVE CEILINGS, walls new and dramatic beauty with Weldtex squares. Cover a 12' x 15' ceiling with 12" or 16" pre-cut squares for approximately \$50*.



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*Prices vary slightly in different areas

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REAL WOOD PANELING

United States Plywood Corporation

WORLD'S LARGEST PLYWOOD ORGANIZATION

Weldwood Building, 55 W. 44th St., New York 36, N. Y.
and U. S.-Mengel Plywoods, Inc., Louisville, Kentucky

254 POPULAR SCIENCE

Science Arms You Against Snake Bites [Continued from page 252]

round eyes, but if you are not close enough to make sure of their shape (heaven forbid!) you can't mistake the snake's flamboyant red, black and yellow stripes.

If, in spite of care and caution, you have the bad luck to be bitten by a poisonous snake, don't take a swig of whiskey to calm your fears. One of the oldest bits of bad advice in circulation is that hard liquor is a remedy for snake bite. It might put you in a cheerier frame of mind to die, but hastens that end rather than staving it off. It speeds up your circulation and thus spreads the venom faster than otherwise.

Standard procedure, if you don't have antivenin with you, is first to apply a

.....

Before a man starts climbing the ladder of success it helps to pick the right girl to stay on the ground and hold it steady for him.

—THE SIDEWALK SUPERINTENDENT

.....

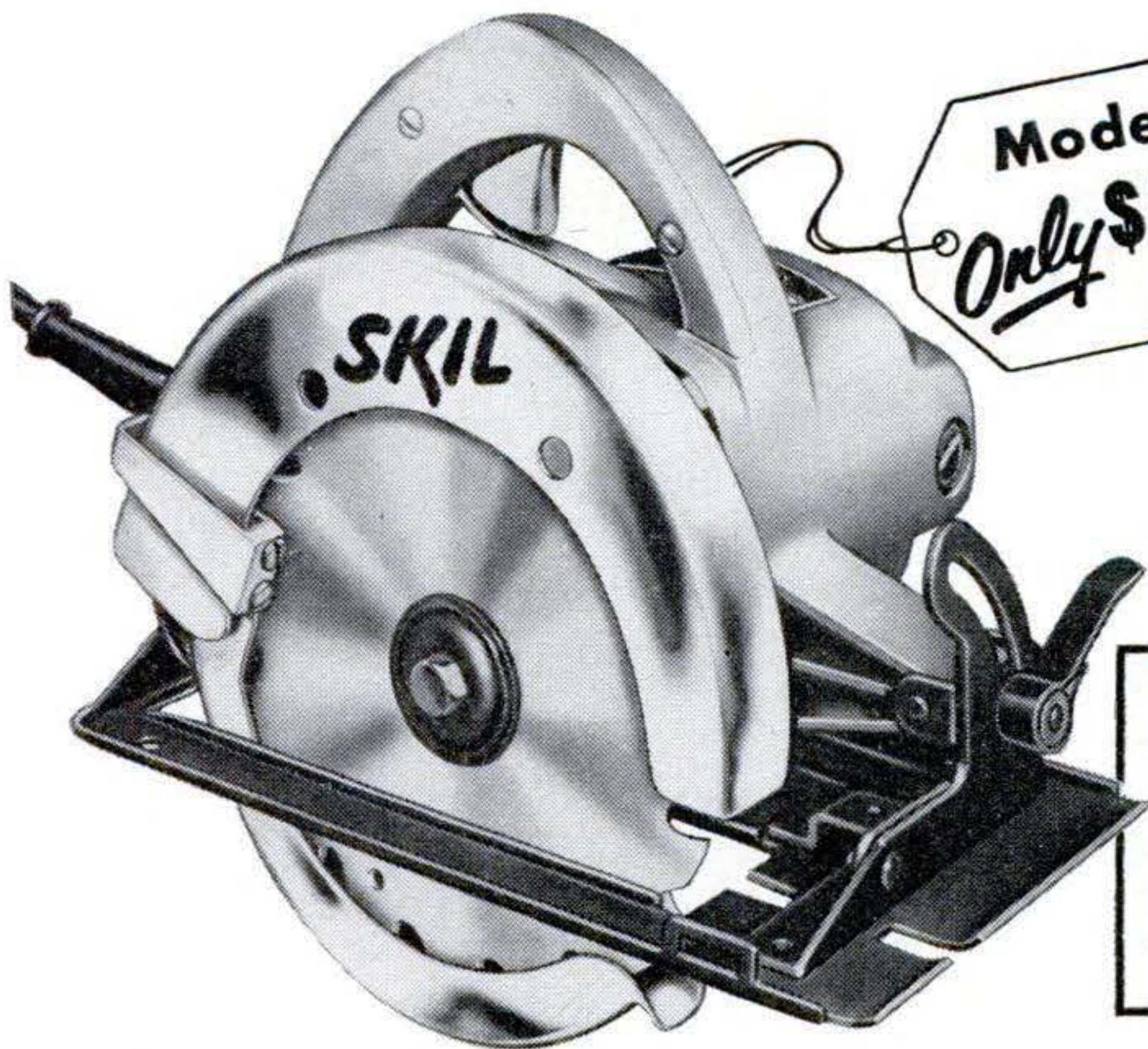
firm but not too tight tourniquet about two inches above the wound. Then cut an X about a quarter-inch deep where the fangs pierced your skin, and apply suction.

One fast-thinking victim was struck by a Florida diamondback rattlesnake within a few feet of his car. He disconnected one end of the vacuum tube leading to the windshield wipers, started the engine, held the tube to the wound and removed the venom most efficiently.

First-aid measures are strictly for emergency treatment, of course. It is essential that you get to a doctor as soon as possible, but don't run. That will stimulate your circulation faster than whiskey.

If you only lived in Iceland, Ireland, Chile, New Zealand, Madagascar, Cuba, Jamaica, Puerto Rico, Haiti, the Azores, or in the Polynesian, Canary, Orkney, Shetland or Cape Verde Islands, you wouldn't need to give poisonous snakes a thought. There aren't any there. END

Now! SKIL Professional Builders Saws at Homeowners' Prices!



Model 552
Only \$59⁵⁰



New! 6 1/2" SKIL Builders Saw!

With this extremely lightweight new SKIL 6 1/2" Saw you can cut dressed 2 x 4's at a 45° angle. Easy, fast cutting in any position. Has high-speed blade (6500 r.p.m.), heavy duty motor with die-cast housing. All ball and needle bearings. Quick setting depth and bevel adjustment.

Now you can have the real thing—a genuine professional carpenter's power saw at a price you would expect to pay for a home craft model.

These heavy duty SKIL Saws are *built* for builders. They have the ruggedness and handling ease that carpenters' saws must have for day-in, day-out use. They have the accuracy needed to hold down building costs. Yet SKIL prices them for every homeowner's pocketbook.

You can tackle any home building job confidently with a SKIL Builders Saw. It often will pay for itself on your first project. Build kitchen cabinets, furniture, whole

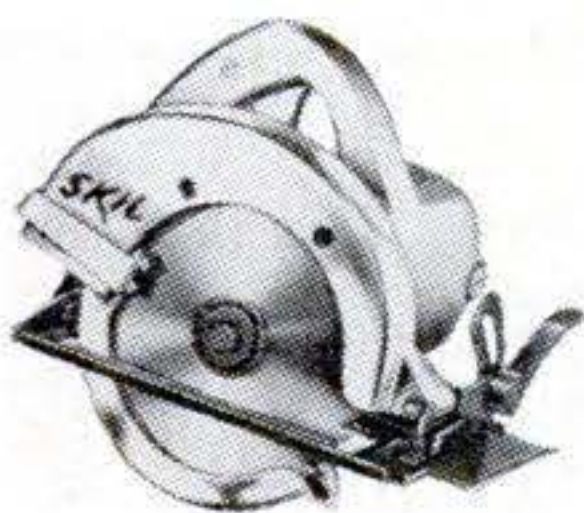
rooms—even a new garage or porch—with professional results. Cut plywood panels, sheeting, siding, easily and speedily. You can even cut stone, metals or compositions with special blades.

Have your hardware dealer, appliance dealer or department store show you these SKIL Builders Saws today!

No other saws at anywhere near the price boast all these features!

- Oversize Motor • Ball and Anti-friction Bearings
- Built-in Bevel and Depth Adjustment
- Telescopic Safety Guard • Trigger-type Switch
- Sturdy Die Cast Aluminum Housing

3 Other SKIL Builders Saws to Choose From



1. VALUE SPECIAL

SKIL 6" Builders Saw. Model 526. Here's a perfect tool with professional features. Ideally suited to the handyman who does not need a larger saw. Lightweight, sturdy, ready for 101 jobs that need doing. YOURS at a saving that spells real economy **\$49⁵⁰**

2. SKIL 7 1/4" Builders Saw

Same design as Model 552 illustrated above, Model 553 **\$69⁵⁰**

3. SKIL 8 1/4" Builders Saw

Same design as Model 552 illustrated above, Model 554 **\$79⁵⁰**

SKIL makes the most complete line of home and builders power tools. Every one of them offers you the very most—feature for feature—your dollars can buy! See them at your dealers or write for free literature.

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Made only by SKIL Corporation
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YOU NEED THIS TOOL!

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SAWZALL

PORTABLE ELECTRIC HACKSAW



**Works Fast
Saves Money
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**2250 STROKES
PER MIN.**

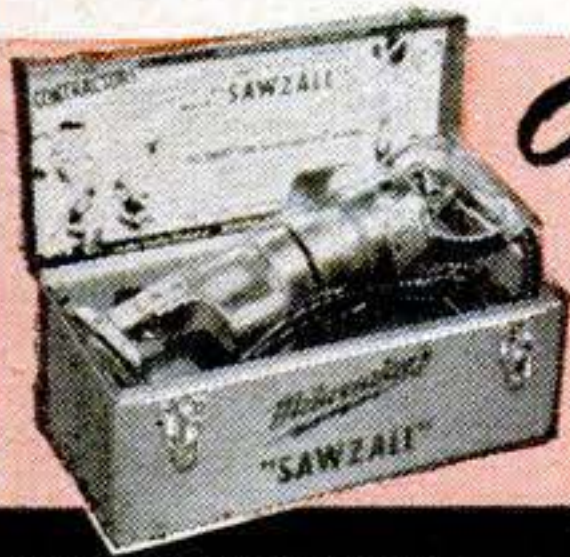
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- Does those extra-hard, tedious time-consuming sawing jobs . . . Fast and Easy
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How to Wear Artificial Clothes

[Continued from page 115]

have to dry 'em out after use," he says.

Orlon, acrylic, Dacron, rayon and vinyl are what his other synthetic clothes are made of: his suits, an Eisenhower jacket, ties, handkerchiefs, underwear, shirts.

At home, he sleeps under Dynel or acrylic blankets of jonquil, blue or rose. (The dyeing of synthetics, long a problem, has largely been licked—hence those bright colors.) Irma, he says, has taken the blankets off the bed, laundered them in the automatic washer, dried them on an outdoor line, and had them back on the bed in two hours.

If he looks out his window, he looks past acrylic drapes ("they're rot-resistant") and may see Irma or his two daughters dressed in their orlon sweaters, synthetic mouton coats or their permanently pleated synthetic skirts.

His whole family, he says, has found that synthetic fabrics are soft, warm and easy to care for. There is no moth problem. They do not shrink. Some of the girls' sweaters stretched, but came back to size when washed.

He's All Done with All Wool

"I myself," Ben says, "would never buy another 100-percent wool suit, because of the ease of maintaining synthetics." The constant use of a coat hanger and occasional scrubbing in washrooms are, he feels, not burdensome.

But not all artificial suits have been good performers, and no one has more reason to know this than Bendigo.

One day he was walking to work with a high company official. The official was wear-testing a synthetic suit.

The day was cold, much static electricity was generated, and the electricity caused the man's pants legs to crawl up, up and up. He would take a couple of steps and jerk them down. They went right up again.

The official, a dignified gentleman who had risen to eminence via the financial side of the company, entered the

[Continued on page 258]

New G-E *All-Weather* Headlamps help you see through fog, rain, snow

Make night driving safer than ever before—good weather or bad!

GREATEST advance in night-driving safety since the first sealed beam headlamp. New General Electric *All-Weather* Headlamps help you see through fog, rain and snow. Make it easier to see the road against oncoming headlamps. Give 25% more light!

SAFER IN FOG The photos at right, taken in simulated fog, show how much better you can see in fog, rain and snow with G-E *All-Weather* Headlamps. Regular headlamps (top photo) cause kick-back glare that obscures your vision. General Electric *All-Weather* Headlamps (bottom photo) greatly reduce kick-back glare.

MAKE THE ROAD EASIER TO SEE AGAINST ONCOMING HEADLAMPS New G-E *All-Weather* Headlamps have a new reflector and lens that focus the light more effectively. Especially the low beam. It hits the road farther ahead and more to the right. It extends your seeing distance along the side and shoulder of the road up to 80 feet!

BOTH BEAMS MORE POWERFUL 5 extra watts added to each beam, plus more efficient filaments, give about 25% more light in the 6-volt lamp. It



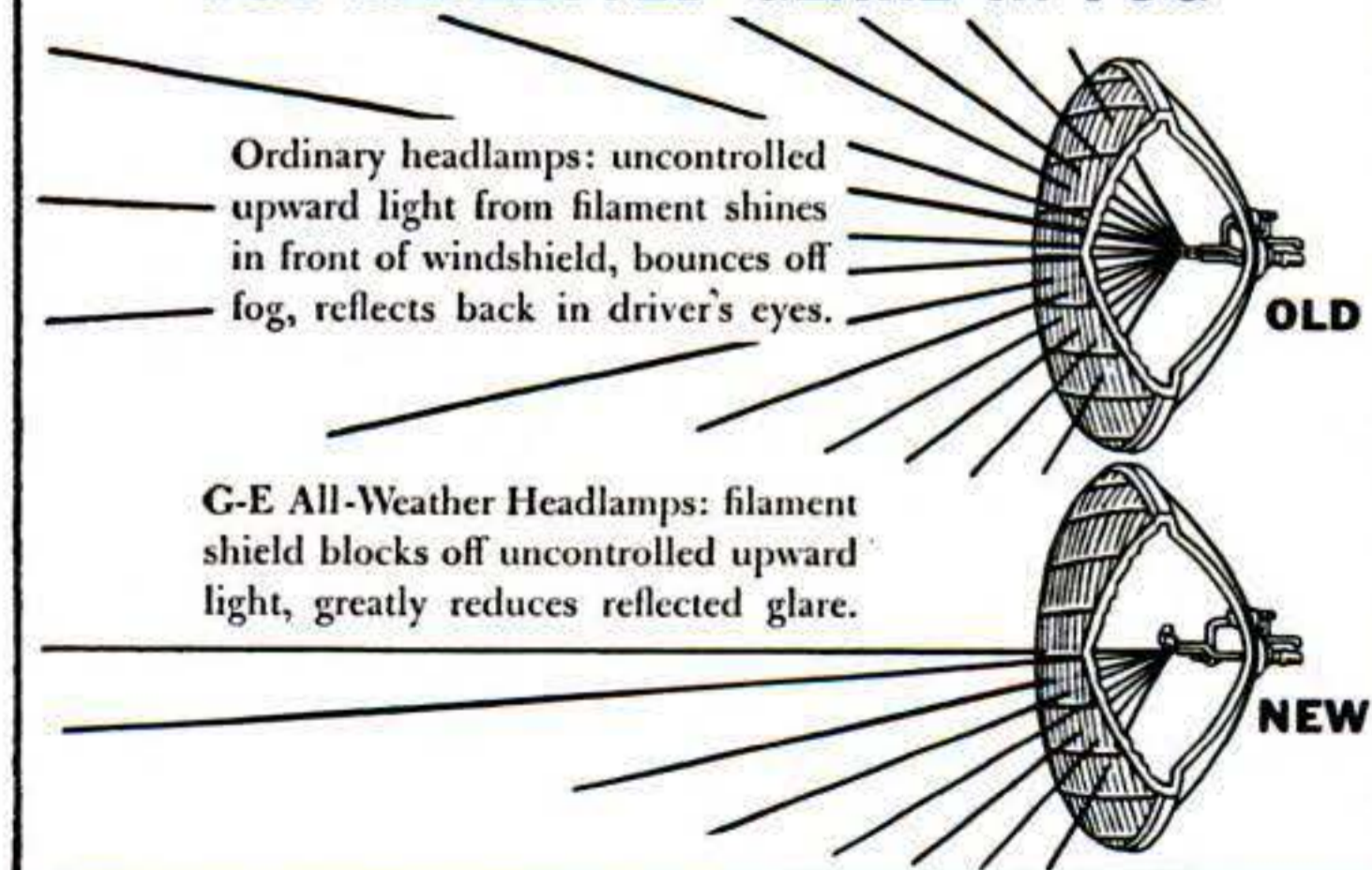
Photos of identical fog scene show difference in visibility between regular headlamps (above) and new G-E *All-Weather* Headlamps (below).



shows up obstacles that are out of range of ordinary headlamps.

You can't stop in time if you can't see in time. Why take chances? Replace ordinary headlamps with General Electric *All-Weather* Headlamps today! Most garages and service stations have them.

HOW G-E *All-Weather* HEADLAMPS CUT REFLECTED GLARE IN FOG

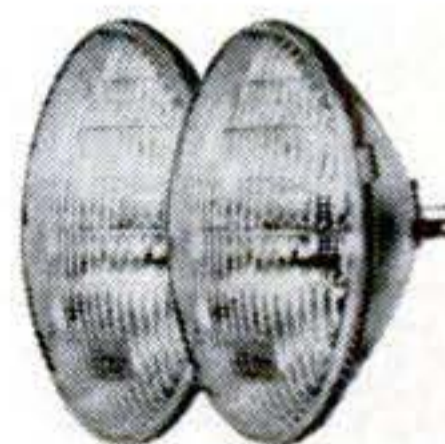


G-E *All-Weather* HEADLAMPS

6-volt PER PAIR

\$3.60 plus nominal installation charge

12-volt \$3.80 PER PAIR



Progress Is Our Most Important Product

GENERAL  ELECTRIC

How to Wear Artificial Clothes

[Continued from page 256]

crowded lobby of New York City's RCA Building with his trouser cuffs encircling his knees.

Other men had similar disasters with synthetic suits, particularly four or five years ago when the first ones came on the market. But the static headaches and other difficulties are largely things of the past, Ben says, and you are much, much safer in synthetics than you once were.

Combinations Are Best

Trouble with the official's suit, Ben says, is that it was 100 percent of a single synthetic. Ben recommends that you buy a combination: a synthetic-and-wool, a synthetic-and-cotton, or two synthetics. Buy a known label, he suggests, from a known clothier, and you'll be as safe as when buying any other fabrics. Ben advises you not to try to learn all there is to know about synthetic materials. They change too fast, he says, and what you

learn about them today may be useless tomorrow.

Because of the progress that has been made in artificial clothes, Ben thinks that he is only the first of a race of Americans who will dress entirely in synthetics.

He points out that synthetics this winter invaded men's heavy overcoats and winter suits, and that Pellon liners and pads for the first time made men's heaviest winter clothing completely washable.

"It is," he says, "only a matter of time till all-wool suits are as rare as they are common today." END

Quiet, Please

Boss: "I invite you to place your ideas in this suggestion box—I want this shop to run so that whenever I walk in I will find every man on the job."

When the box was opened the next day, this suggestion was found: "Don't wear rubber soles."—*Youngstown Merchandiser*.

Buy EVANS for EXTRAS in 6, 8, 10 and New 12 Foot "WHITE-TAPES"

This is the BUY for your money — the original, reasonably priced "White-Tape" by EVANS. Your measuring tape dollar goes further! Chrome plated, sturdy case. Snow-white Bonderized steel blades with jet markings, easy to read, last longer. Velvet push-pull action. Instant change replacement blades available. 12-foot size, made *only* by EVANS, has convenient new blade markings in feet and inches as well as regulation inches.

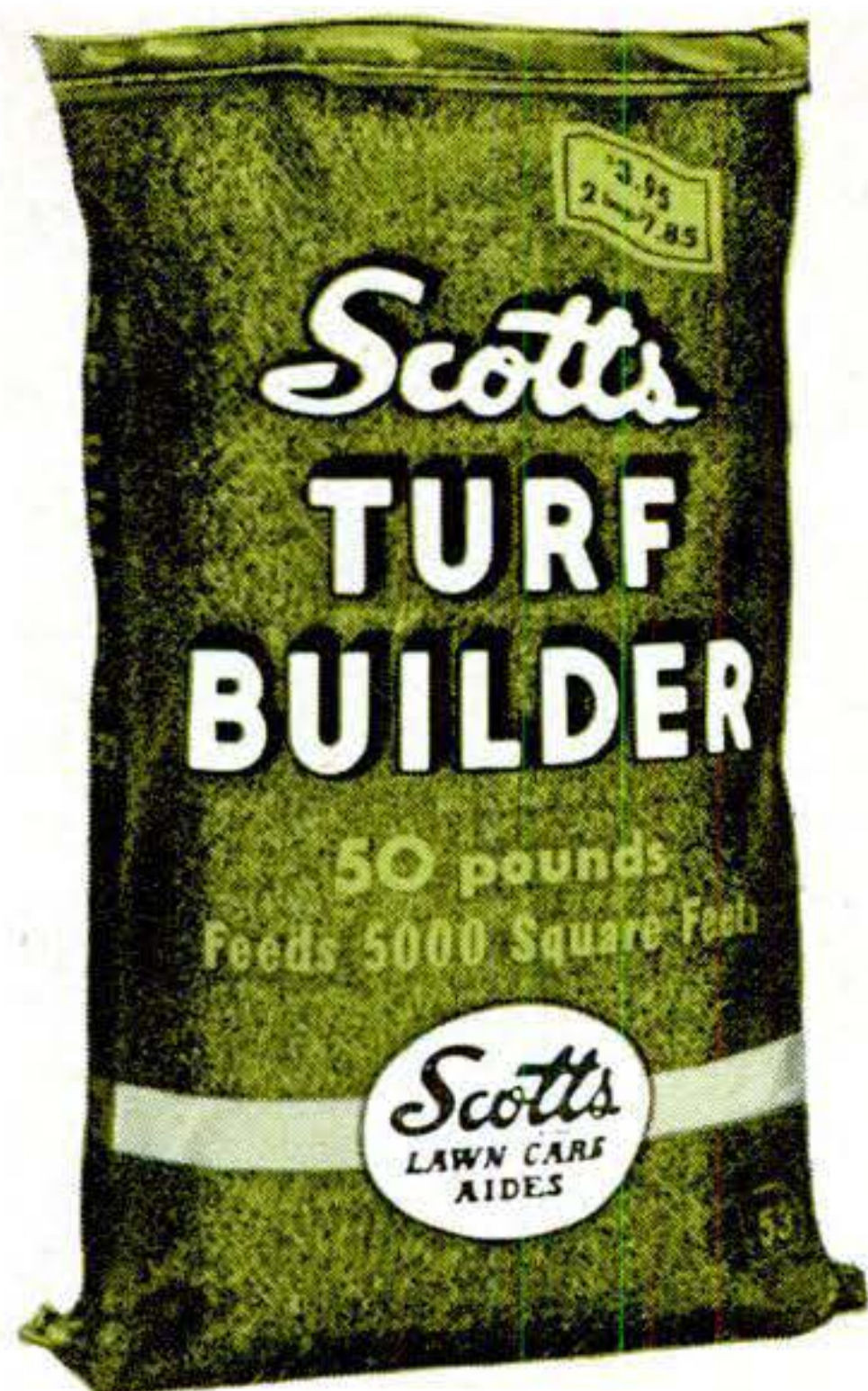
Evans & CO. 410 Trumbull St., Elizabeth, N. J.



FREE WITH EVERY TAPE
— this sparkling crystal
Tenite utility case.

**EVANS
L-O-N-G "WHITE-TAPES"**
25-50-75-100 Ft. Lengths. Sensibly
priced from \$3.49. In transparent util-
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Hook ring attachment no extra charge.
Sold Only Through Retailers

EVANS, THE LARGEST PRODUCERS OF STEEL TAPES WORLD-OVER

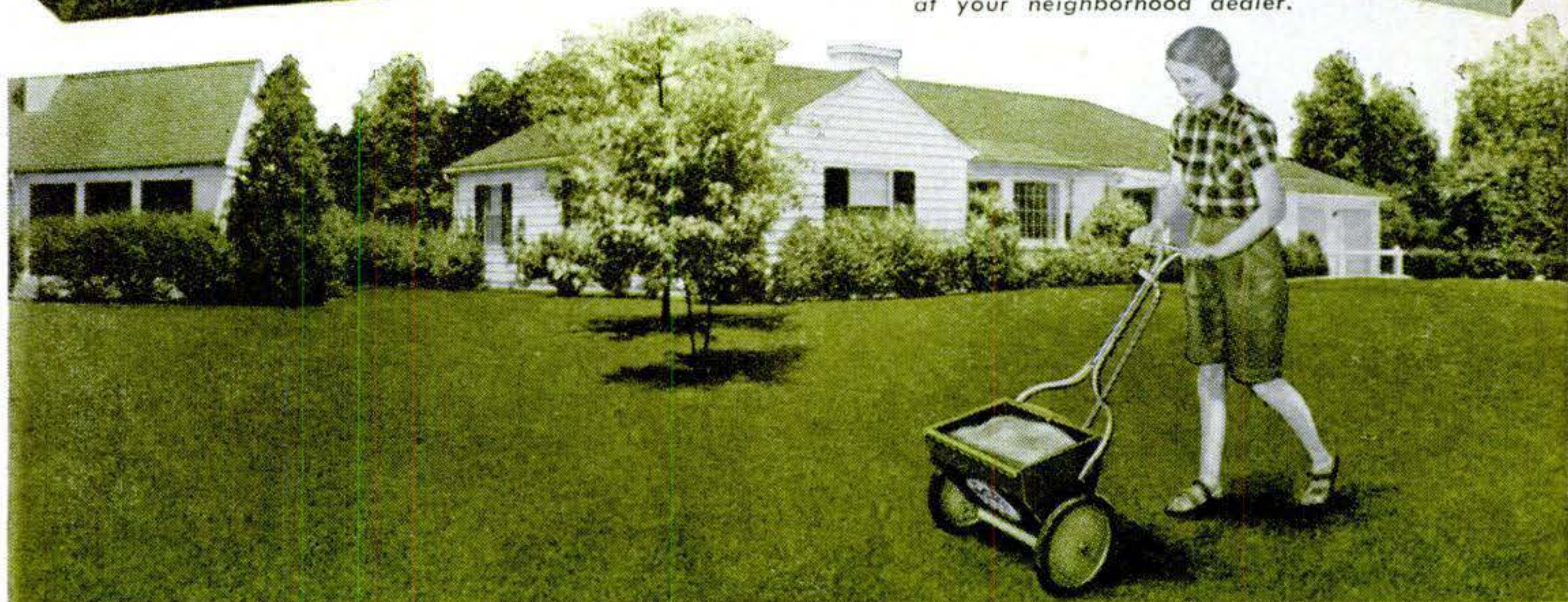


Makes your lawn **SPARKLE**

Lawns fed with *Scott's* TURF BUILDER® get a well-balanced meal, providing quick growing energy, plus lasting beauty growth which the whole family will enjoy all summer. TURF BUILDER is clean, granular, easy to apply, has no offensive odor, *costs less than a dime per 100 sq ft.* Comes in handy units up to 50 lb bags.

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Get *Scott's* Lawn Care Aides at your neighborhood dealer.



For your lawn's sake, read **LAWN CARE®**. It's the guide to greater year 'round lawn beauty. For a free 2-year subscription, just drop a post card to **O M Scott & SONS CO**, 31 Spring St, Marysville Ohio.

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in Delta Users' "Finest Home Workshop" Contest! Write *today* for entry blank to: Contest, Delta Power Tool Div., Rockwell Manufacturing Co., 504D N. Lexington Ave., Pittsburgh 8, Pa. Contest closes July 15, 1955.



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DRILL IT YOURSELF ... AND SAVE!

CON-SOL Well Driller saves much . . . costs little. Get investment back by rental, contracting or resale. Drills wells deep or shallow, outdoors, in cellars. Lightweight, easy to erect, operate, move. Specially tempered insert drill bit chews through hard rock. Used by U.S. Departments of Agriculture and Forestry; U.S. Navy.

For 4" casings, \$385 F.O.B. factory. Includes drill, bailer and 100' cable. Additional cable, up to 300', 3/4 hp electric motor or 1 1/2 hp gasoline engine available at extra cost.

HEAVY DUTY MODEL, for 6" casings, available with gasoline engine, at \$1295 F.O.B. factory.

90-day guarantee against defective materials and workmanship. Prices and specifications subject to change without notice.

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BLOCK, STRIP OR RANCH PLANK — Now it's easy and economical to give your home the new beauty of modern oak floors... with all the glamour of nationally-famous Bruce Prewinished Hardwood! In only a few hours, your living room, bedroom, dining room—or that unfinished room upstairs—will glow with a style as modern as tomorrow. You can choose Block, Strip or Ranch Plank design.

It's EASY! These floors are completely finished—even waxed—at the factory. Just cover old floor or smooth subflooring with felt paper and nail down this highest quality oak (or install in mastic over concrete). No sanding or finishing... no mess or smell. Ready for use as soon as it's laid... and your home will have the rich style and beauty chosen by leading decorators.

It's ECONOMICAL! A new Bruce Hardwood Floor will cost you less than a good rug or carpet... and will last the life of your home. The famed Bruce "Scratch Test" proves this durable finish doesn't scratch, chip or mar. Ask your lumber dealer for an estimate. Mail coupon below for colorful literature.

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Bruce Hardwood Floors

Product world's largest hardwood flooring maker

What Horsepower Really Means

[Continued from page 127]

so-and-sos working for the competition," conceded that loophole techniques amounted in general to only a few per cent in the rating.

What makes advertised figures unrealistic is the fact that the rated horsepower never reaches your wheels. An engine rated at 200 hp. may have an "as-installed" output of 185 hp., provided the car doesn't have many power-hungry accessories. But by the time the energy passes through such power-users as transmission, power train, rear axle and tires, actual maximum output may drop down to 100 hp. at the wheels. All this *provided* the engine is new but nicely broken in, and tuned to a gnat's hair. The ordinary wear and maladjustments that most of us put up with might cut the 100 hp. down still lower.

Doesn't torque mean more to performance than horsepower?

TORQUE is a measurement of rotary force, of the twisting energy applied to a shaft. It's given in "pounds-feet"—the amount of twist that would be applied to a shaft by a specified weight hanging from a lever arm of specified length. Unlike horsepower it is not a *rate*—there is no time factor to it—but simply a force.

Plot on a graph the way an engine's torque varies with its speed, and you will see that it changes much less than power does. Although it slopes off at both ends of the speed range, it is much more nearly a plateau, while horsepower is a mountain peak. Thus it is sometimes said that, at the moderate speed ranges where engines spend much of their time, torque is a much bigger element than the infrequently climbed power peak.

Where this generalization becomes shaky, however, is in its failure to recognize that automatic transmissions are now permitting engines to wind up high when you belt the gas. If you are driving a torque-converter car in a brisk boulevard steeplechase, not going over

[Continued on page 262]

New, faster way to strip off finishes



Non-inflammable
KLEAN-STRIP
peels off paint,
varnish, lacquer,
enamel, synthetics.

IT'S CLEAN—NO AFTERWASH!

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LOW COST Power Tool of 101 Uses

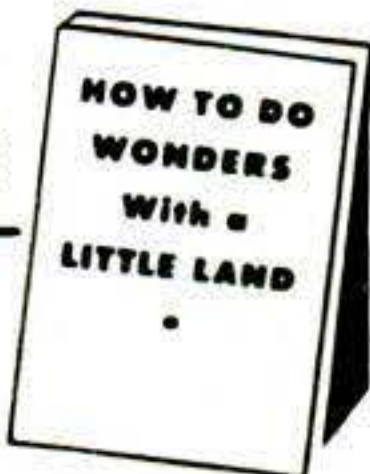
There never was a machine
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kit of outdoor-indoor power
tools. Saves time, heart, back.

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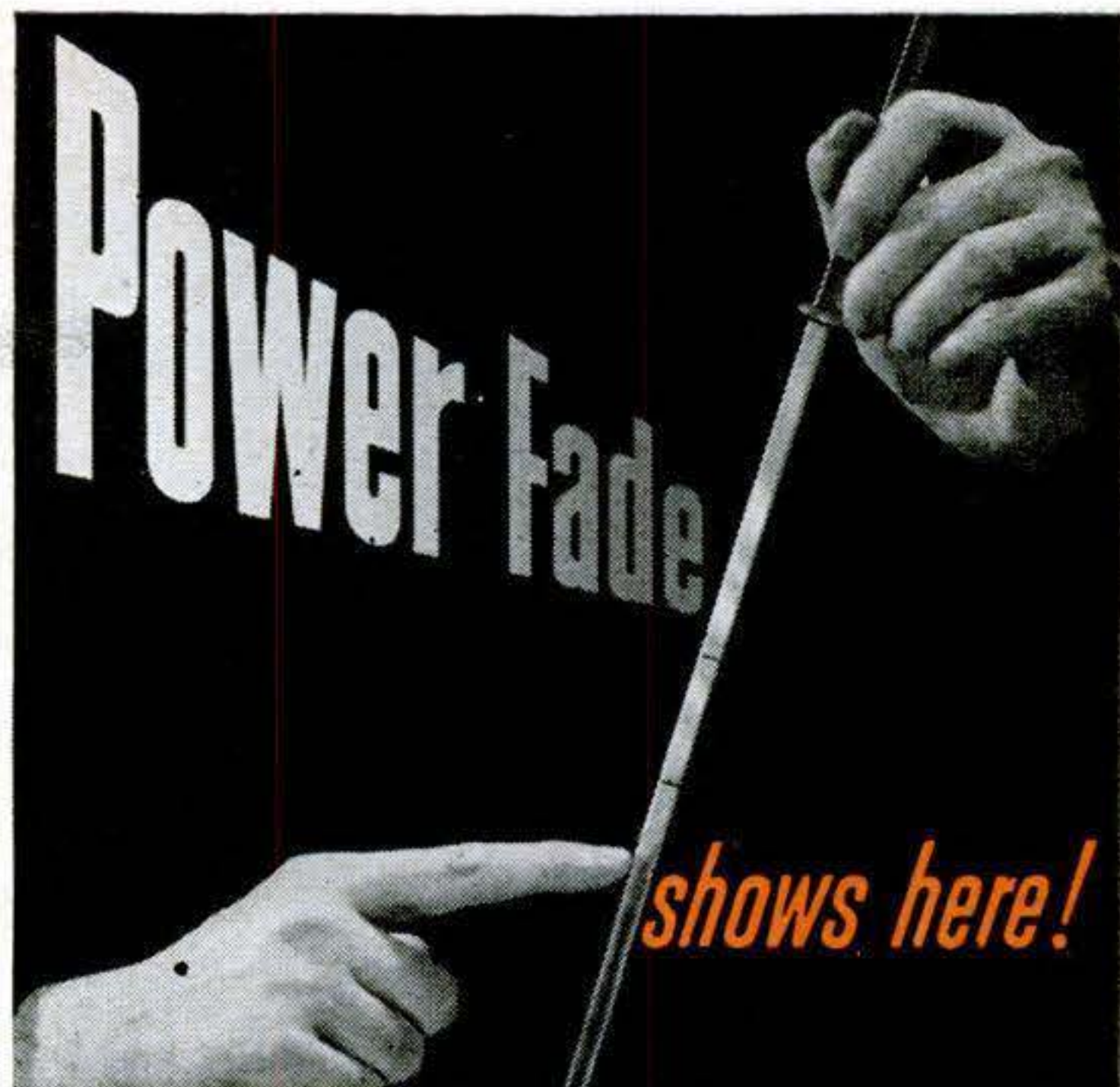
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*If your car's dip stick repeatedly
shows you need to add oil, your
power is fading . . . and it's
time to replace your Piston Rings!*

Having to buy too much oil and gas, and
slow pickup reveal **POWER FADE!** Your rings
are badly worn—you're wasting money on
lost power.

Top performance is gone. And despite
the extra oil used, vital engine parts remain
starved for oil. This is not only costly and
wasteful, but is a warning of expensive re-
pairs to come later.

See your motor specialist for a ring check-
up. If he recommends a ring change, it will
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rings. They're engineered exclusively for
worn engines to quickly stop power fade,
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Piston Rings, Casite, Oil Filters, Spark Plugs

**TOUGH but oh so gentle*



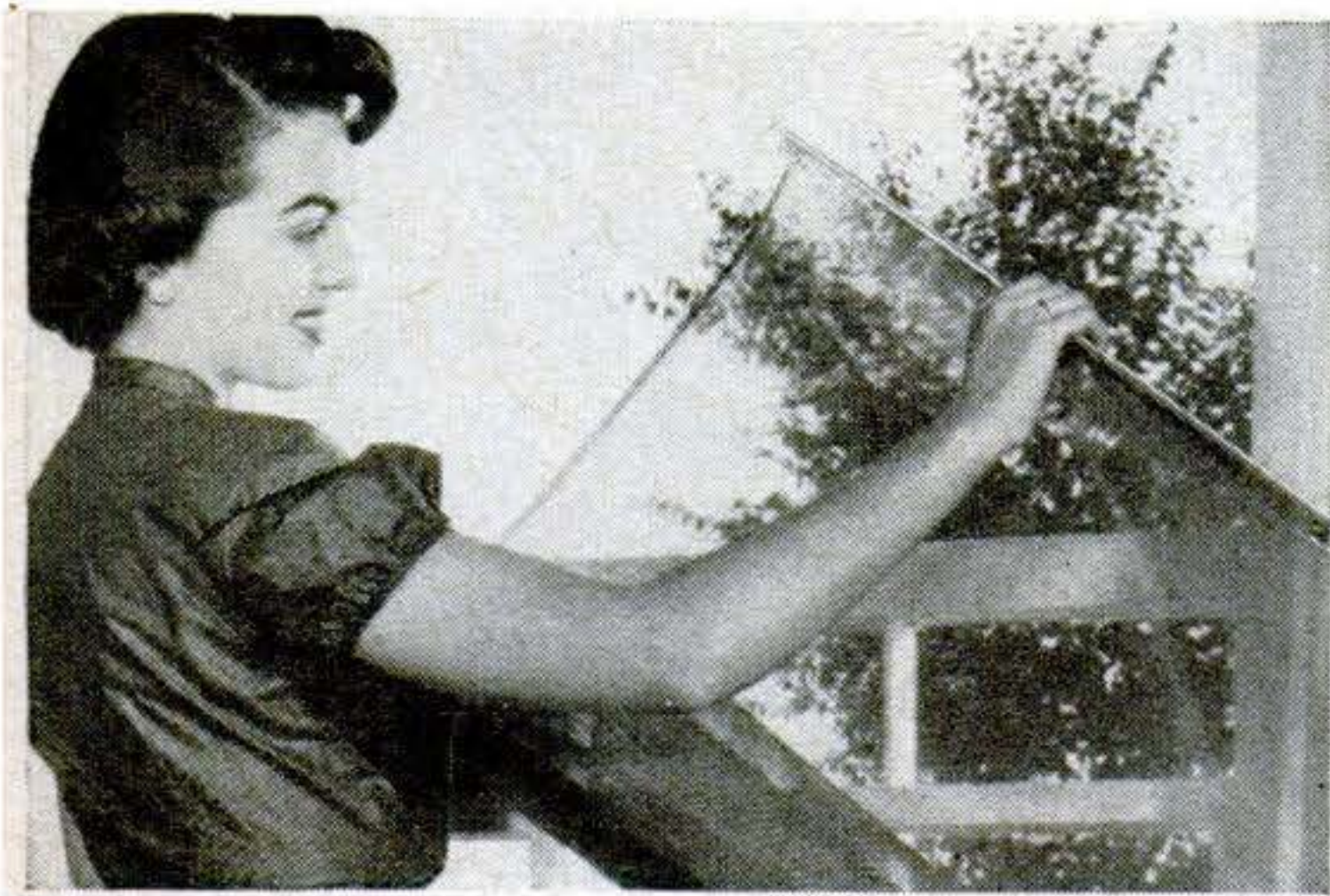
HASTINGS

STEEL-VENT PISTON RINGS

Regular or Chrome-Faced

***TOUGH on oil-pumping • GENTLE on cylinder Walls**

SCREENS you put up from inside in seconds



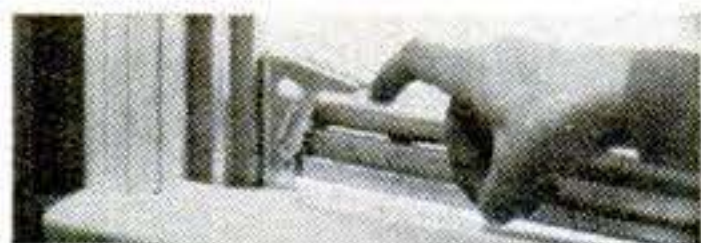
Columbia-matic TENSION SCREENS

Columbia-matics fit outside the window, just like ordinary screens, yet they go up from inside. They are the revolutionary new screening idea that saves you time and money and lets you say good-bye to old-fashioned screen troubles.

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Easily installed the first time—anyone can do it. They come in exact sizes, no fitting. All you need is a screwdriver. Rustproof aluminum* needs no painting, ever. Available with regular or Kaiser Aluminum Shade Screening.



Two patented tension locks anchor bottom rail securely to sill. Press down, they're locked. Flip up, screen swings free. No hardware on sill to snag clothing.

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Send facts on Columbia-matics

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In Canada write: Cresswell Pomeroy, Ltd., Montreal 28

What Horsepower Really Means

[Continued from page 260]

45 m.p.h. but still pushing it pretty hard, your engine often works high up on the power-curve slope. But if you have an overdrive car, and take it easy, the engine will spend much more time down in that part of the range where torque is the major component.

Do high horsepowers cost me gas?

THEY can, though they don't have to. The new engines are more efficient, and show up better on such measurements as fuel consumption per horsepower-hour. If you were to drive your 1955 car exactly as you drove your 1941 car, it would give you more miles per gallon. The difficulty is that you don't.

Do high horsepowers mean higher top speeds?

ONLY insignificantly. A passenger car's top speed, up where road load balances maximum power output, is boosted only slightly by big increases in power. Twenty or 25 more horsepower may mean only three to six more m.p.h. top speed.

Do high horsepowers affect safety?

NOT very much. Some critics of high-output cars complain that they go dangerously fast, but pre-1950 cars could do that too. Defenders of the trend cite high accelerations as a safety advantage, claiming that "you can get out of a tight spot faster." While this appears to be true, it is mainly important in that you can pass faster, so that wrong-side-of-the-road exposure is less.

There is one minor drawback to a high-output engine and its lazy rear-axle ratio: the car is deceptively quiet at fast cruising speeds. Where the 1946 car became shrill when you pushed it, the 1955 job minds its manners at whistling speeds.

END

Tip to Motorists

How to get rid of that noise in the rear of your car: Let her drive.

Only \$59⁵⁰!

New 3" belt sander MAKES TOUGH JOBS EASY!

You'll breeze through hundreds of sanding tasks with Porter-Cable's new Model 136 Homemaster Belt Sander!

Build and finish your own furniture and cabinetwork, or refinish antiques . . . remove paint and varnish, fit windows and doors . . . finish new or old wood, metals, plastics, ceramics . . . *get professional results every time!*

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Please send complete information on the Model 136 Homemaster Belt Sander.

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Here's the 1-2-3 of the New Fordomatic Drive!

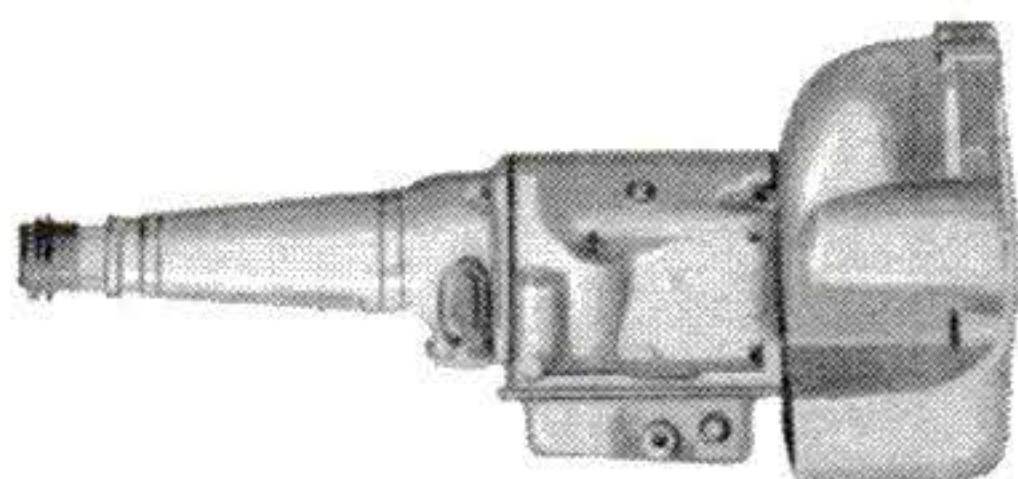
*New Speed-Trigger "low" gear gives Fordomatic
3 automatic forward speeds for the most
versatile performance in the low-price field!*

The big "automatic" news for '55 is the wider fully-automatic operating range of new Speed-Trigger Fordomatic Drive.

Fordomatic now has a new automatic "low" gear for fast starts and low-speed passing. And Fordomatic is the only automatic in the low-price field to bring you the all-speed versatility of an automatic

intermediate gear. But, automatic gears are only half the Fordomatic story. A highly efficient fluid torque converter provides an infinite number of drive ratios . . . *automatically* selects the right one to do the job. And because power is *always* transmitted through a cushion of oil, wear is reduced to a minimum, operation is always smooth and silent.

AVAILABLE WITH THREE MIGHTY ENGINES



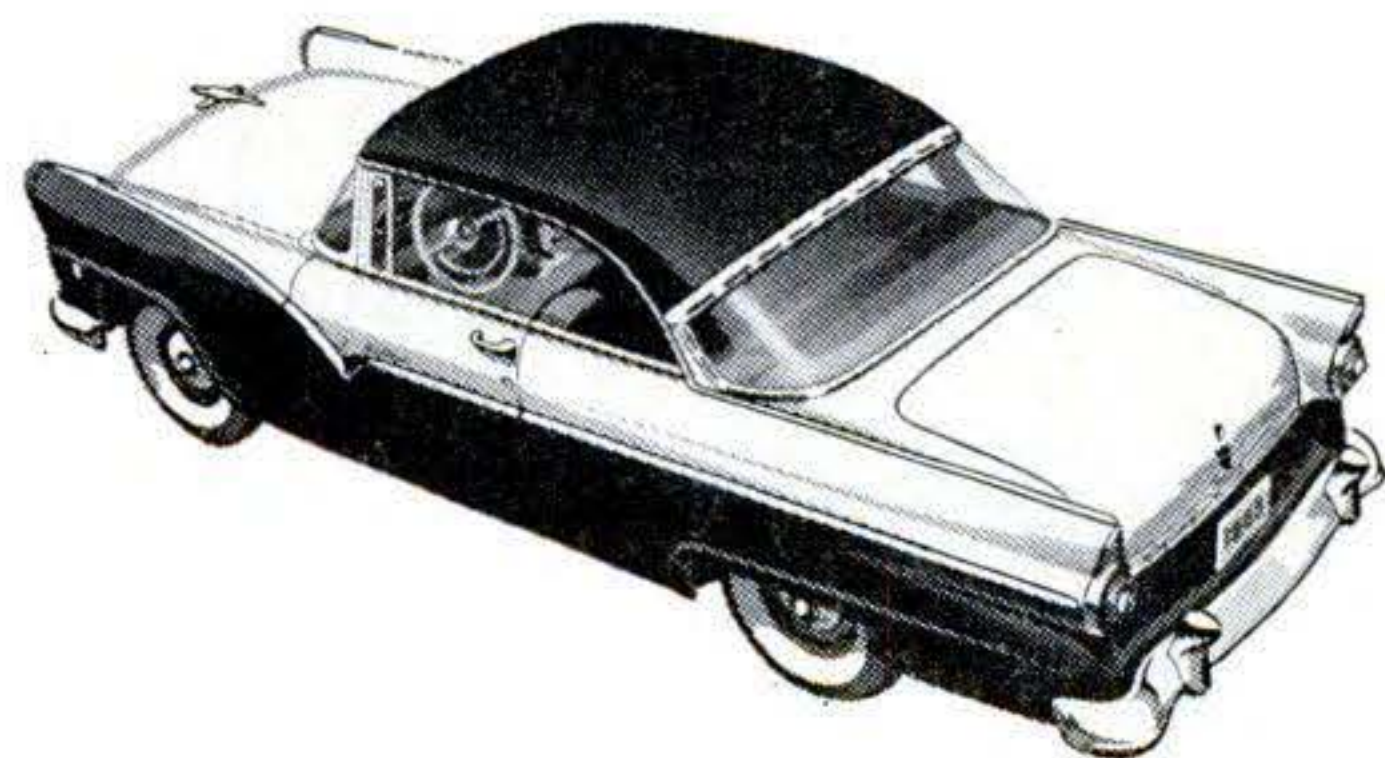
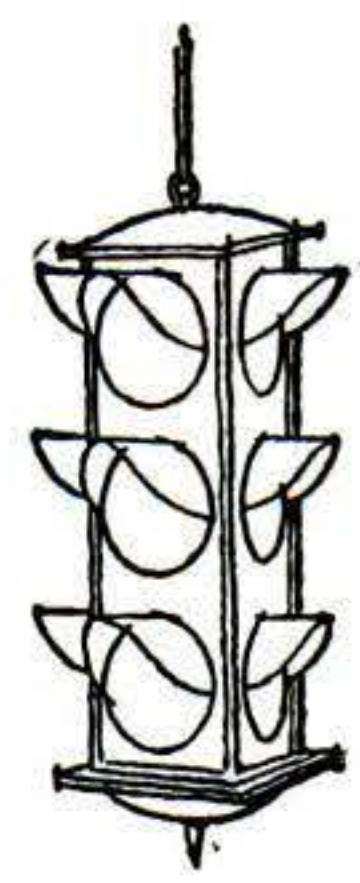
The brilliant new 162-h.p. Y-block V-8

**The even more powerful
new 182-h.p. Y-block Special V-8**

The modern new 120-h.p. I-block Six

1

Want a real Speed-Trigger start? Just press the accelerator to the toe board and you flash away in low gear, with Fordomatic shifting to intermediate and high *automatically* . . . all while the drive selector is at Drive (DR). For most of your driving, of course, starts will be through intermediate gear as in previous Fordomatics. Then if you want *extra* pickup at low speeds (under 18 m.p.h.) you can go quickly into "low" by pressing the accelerator to the floor.



2

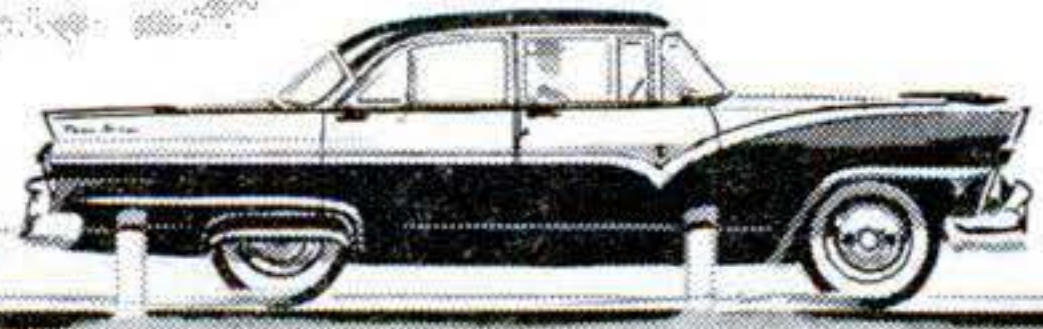
Want extra passing and hill-climbing "go"?

Merely step down on the accelerator (at speeds up to 60 m.p.h.) and Fordomatic "kicks down" into intermediate gear. You get the extra burst of power you need for passing or to pull you up a steep grade.



3

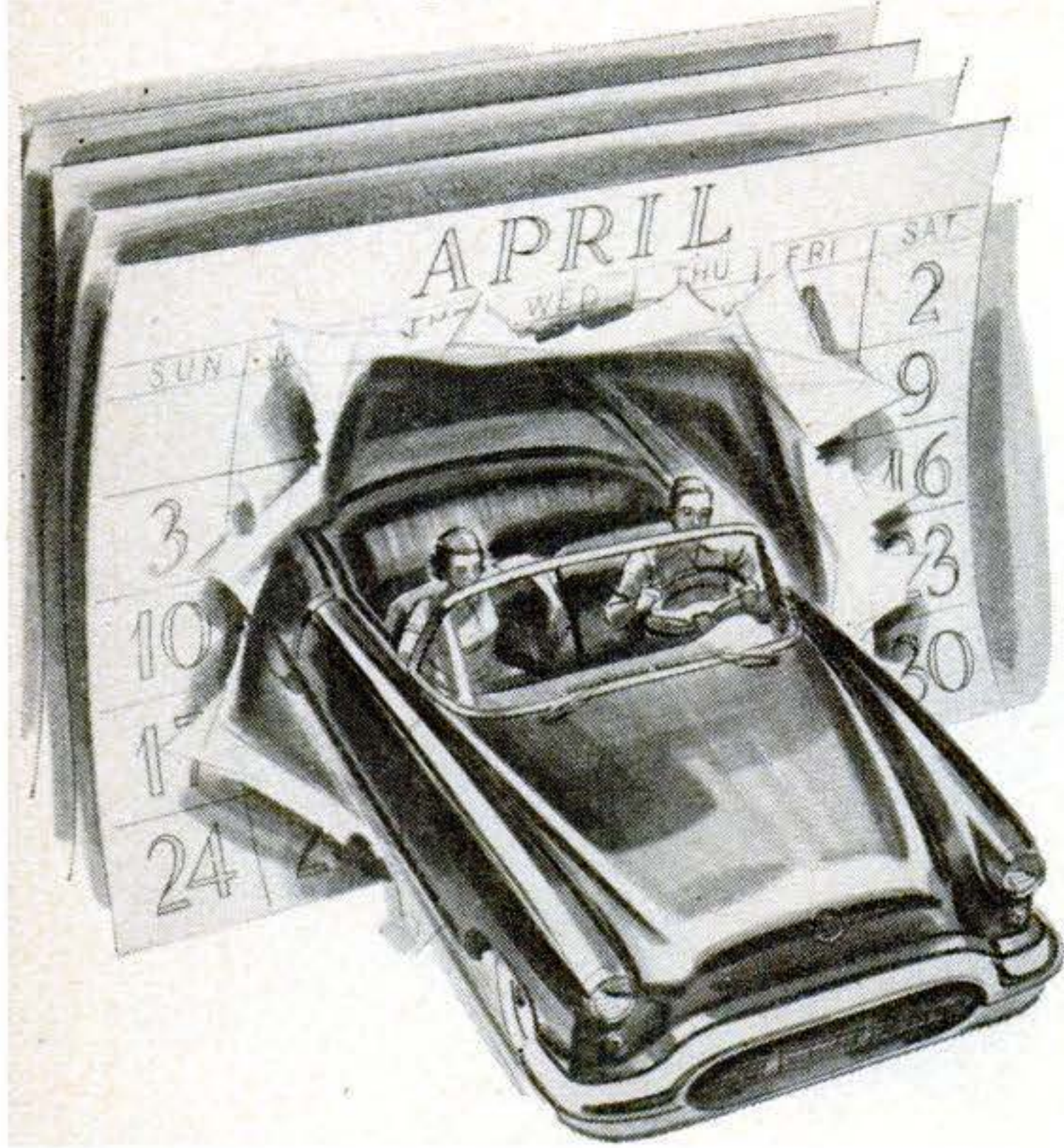
Want a new feeling of security on the road? With Fordomatic you can drive with added confidence. For example, downhill braking is smooth and easy at *any speed*. You simply move the selector lever into Low (Lo)! At speeds above about 23 m.p.h., Fordomatic will go into *intermediate* for smooth, effective engine braking, then shift to low *automatically*, when speed drops below about 23 m.p.h. If you haven't driven a Fordomatic Ford lately . . . see your Ford Dealer for a Test Drive.



FORD Division of FORD MOTOR COMPANY

APRIL 1955 265

NOW-change oil & Oil Filter...



IT'S NATION-WIDE OIL FILTER CHECK TIME!

Tell your service man to put in a new Purolator when he changes your oil

A Purolator Micronic filter and fresh summer-weight oil will put your car in shape for miles of trouble-free driving.

Insist on Purolator protection all year long to help prevent destructive engine wear. Tell your service man to install a new Purolator Micronic every 5,000 miles. There's one engineered for every make of car.



PurOlator

America's No.1 OIL FILTER

"Purolator," "Micronic," Reg. U.S. Pat. Off. Purolator Products, Inc., Rahway, N.J.; Toronto, Canada

A Split-Level Designed to Cut Costs

[Continued from page 106]

to be sure. These paper forms are buried in the concrete-slab floor, and carry the warm air from an oil-burning, down-draft furnace to registers in the floor.

The need for a lot of painting is eliminated by having attractive redwood in places where wood is used instead of brick. For the same reason, asbestos cement board is used in the utility area in the rear of the kitchen.

Simple, inexpensive steel straps tie the roof down to the frame of the house to keep it from blowing its top when the big winds come. This is especially important in a house with a low, flat-pitched roof like this one—as was dra-

.....

Nothing makes a motorist obey a traffic light like a cop standing beside it.

—THE SIDEWALK SUPERINTENDENT

.....

matically demonstrated by last year's hurricane Hazel and her sisters.

Small-item saving: Floor-length windows in the bedrooms, opening outward from the bottom, have friction hinges instead of crank-type, which are more expensive. The floor-length window in the bigger bedroom, incidentally, can become the door into the third bedroom.

Since the house was built by Department of Agriculture labor, a local contractor was asked to estimate what he would build it for. His price of \$9,800 works out to \$1.07 a cubic foot—lower than development homes in that area.

As a farmer's house, Mr. Dodge pointed out, this one was designed with basic simplicity throughout so that it wouldn't be beyond the construction skills of the rural carpenter and other labor. All materials are standard, can be bought in the local market and handled by a farmer. In fact, the idea is for the farmer to do a lot of the work himself, perhaps with the help of some neighbors.

Your architect for all this is the U. S. Department of Agriculture—for a fee of about \$2.50.

END

THE GREATEST INVENTION SINCE THE HAND SAW . . .

New **Amf** DeWalt "Power Shop" brings out the expert in you!

Today, AMF DeWalt® "Power Shop" is everywhere known and accepted as the one really safe, accurate, easy-to-use machine. It's so designed that even the inexperienced can *expertly* do everything in home woodworking.

Whether you're modernizing, decorating or repairing your home, AMF DeWalt is your best investment. See it demonstrated today. At your DeWalt Dealer's or fine hardware and department stores.

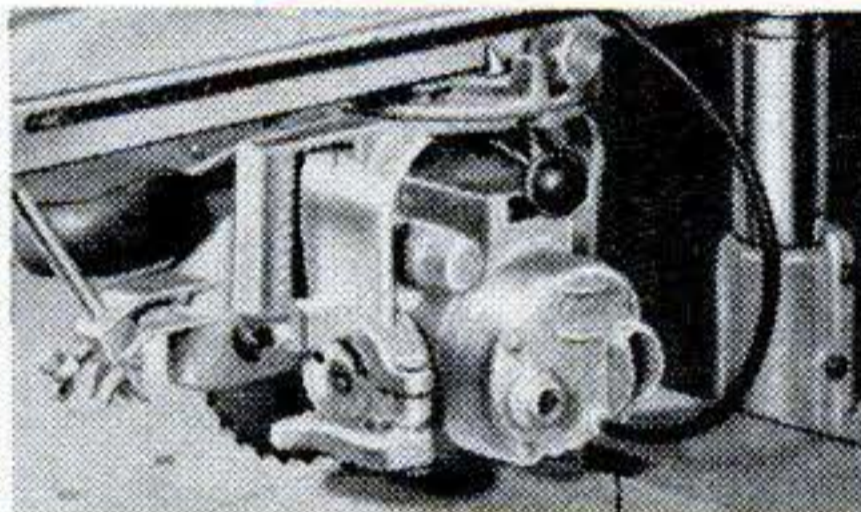


\$239 delivered (saw blade and custom-built 1/2 H. P. motor included). **EASY TERMS.**

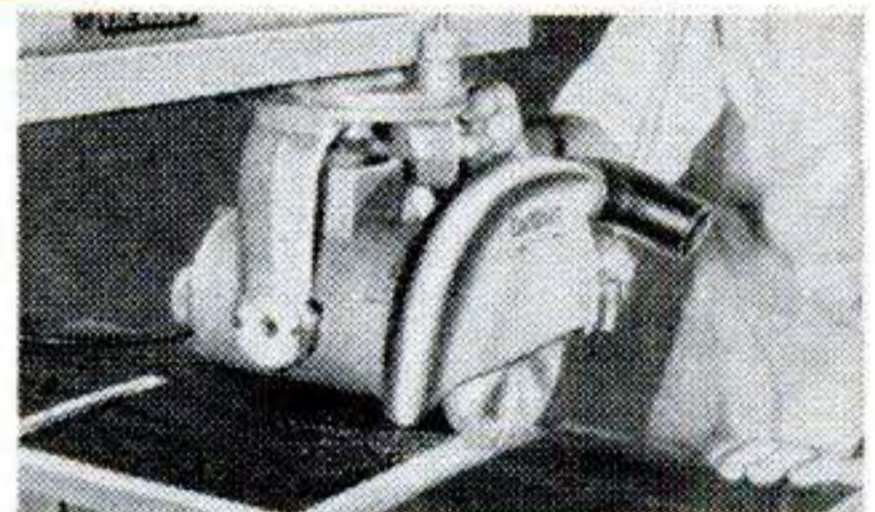
All these exclusive extra-value advantages!



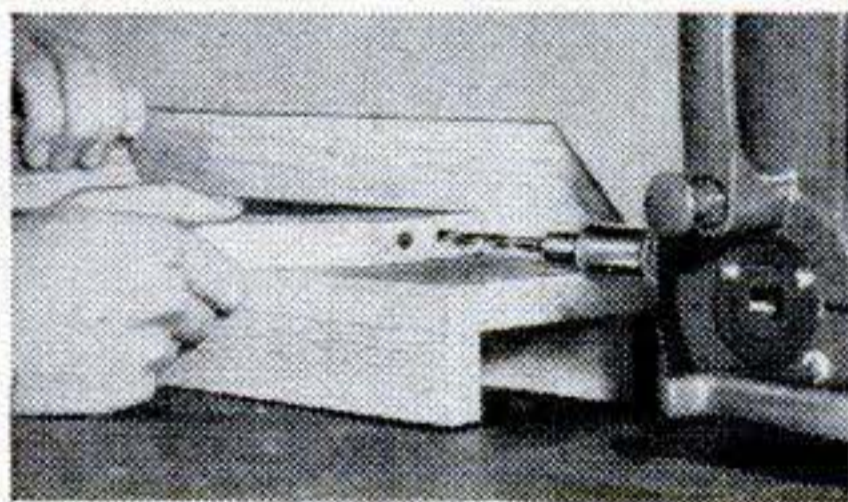
TOP-SIDE CUTTING! No guesswork—no mistakes. You always see the cut because layout marks are visible and easy to follow.



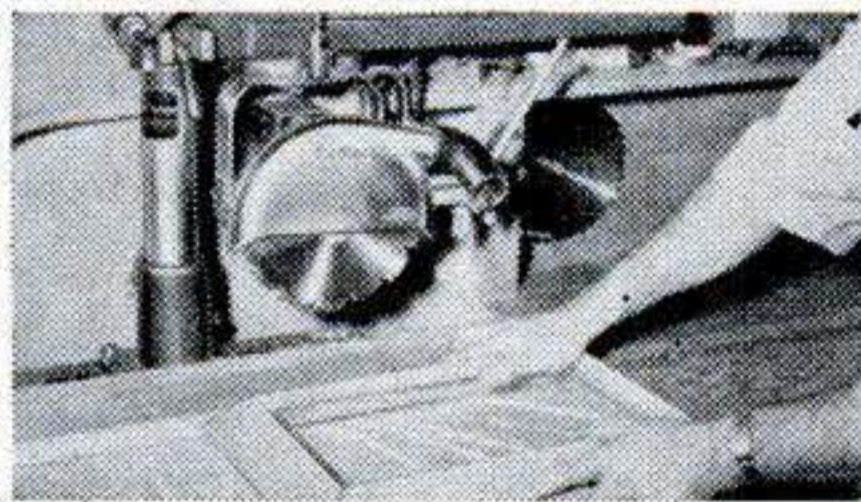
PROFESSIONAL ACCURACY! Calibrated scales for miter, bevel and rip are visible above table. Instantaneous settings!



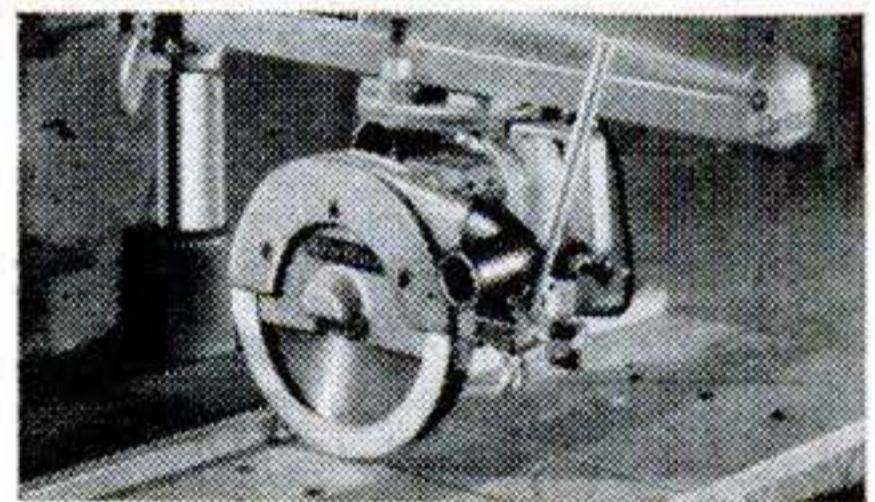
EASY TO USE! You control ball-bearing travel head in radial arm. Moves smoothly, precisely. All cuts perfect—no spoilage.



COMPLETE VERSATILITY! One powerful direct-drive motor accommodates any circular tool—gives full home workshop flexibility.



NO FLOOR SPACE NEEDED! Builds into your workbench! When not in use radial arm swings conveniently out of way, freeing work area.



HOME SAFETY FEATURES! "Stop" red controls, UL*-approved motor, safety key switch, auto-float safety guard (optional).

*Underwriters' Laboratories, Inc.



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AMF DeWalt, Dept. PS-55-4, Lancaster, Penna.

Please send me free illustrated booklet "The Greatest Invention Since The Hand Saw" showing how your Power Shop makes me a woodworking expert, saves money in my home.

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Performance

going up in smoke?



WORN ENGINE BEARINGS CAUSE OIL PUMPING!

Diagrams show sections of crankshaft (shaded areas) and increasing oil throw-off through wear.

HERE'S WHY:

1. Normal oil clearance (red). In this case, .0015". Normal oil throw-off (black area).



2. Wear increases oil clearance to .003". Throw-off increased 5 times (black area).



3. Wear increases oil clearance to .006". Throw-off now 25 times normal (black ring).



When excess oil reaches combustion chambers, it burns to engine-fouling carbon.

To restore performance, replace with Federal-Mogul engine bearings, engineered for the job of oil-control!

FEDERAL-MOGUL SERVICE

Division Federal-Mogul Corporation

DETROIT 13, MICHIGAN



What Really Happened at Texas City

[Continued from page 154]

The next logical step was to burn ammonium nitrate and watch exactly what was happening. They heated ammonium nitrate in laboratory flasks and saw the temperature come up very fast at first. Then it leveled off, and it did not rise beyond 292°. Copious white fumes appeared, visible evidence of a chemical reaction in which ammonium nitrate decomposes into gaseous ammonia and nitric acid. But the important thing was that the temperature would rise no further: 292° was the limit.

But it should have risen further. The chemical reaction is self-accelerating. Ultimately in a reaction of this type shock waves are sent out which travel faster than the speed of sound. When these waves start the material burning fast enough to continue the shock, the material detonates. Yet this did not happen at all in the flasks. So the question, as Hainer and Feick restated it, was not: "Why does ammonium nitrate explode?" but rather: "Why does it sometimes *not* explode?"

They now set out to find the heat-limiting mechanism that under normal circumstances kept the temperature at the safe 292° level and prevented the reaction from speeding up any further. Obviously that heat-limiting mechanism was present in boxcar fires and warehouse fires but not in an ammonium nitrate fire inside a ship.

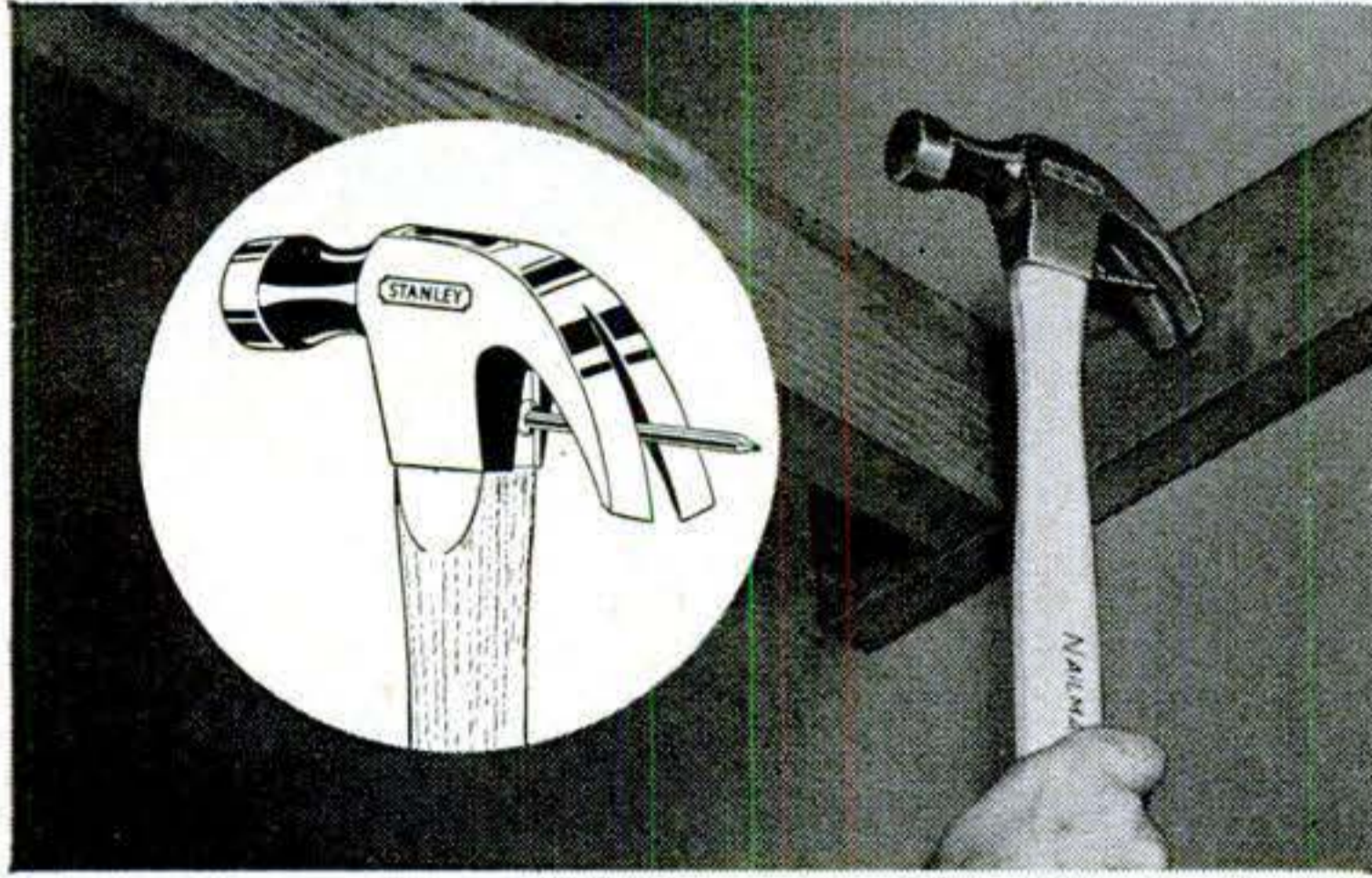
Finding the mechanism was not too difficult. It was the copious white fumes that were carrying off heat. As long as the fumes could do that, the temperature would not rise and there would be no shock waves. But if the fumes were held back, the pressure would rise, and so would the heat.

The process is roughly like that in a pot of boiling water. Even a blowtorch held under an open pot will not raise the temperature of the water above the boiling point. In water, the

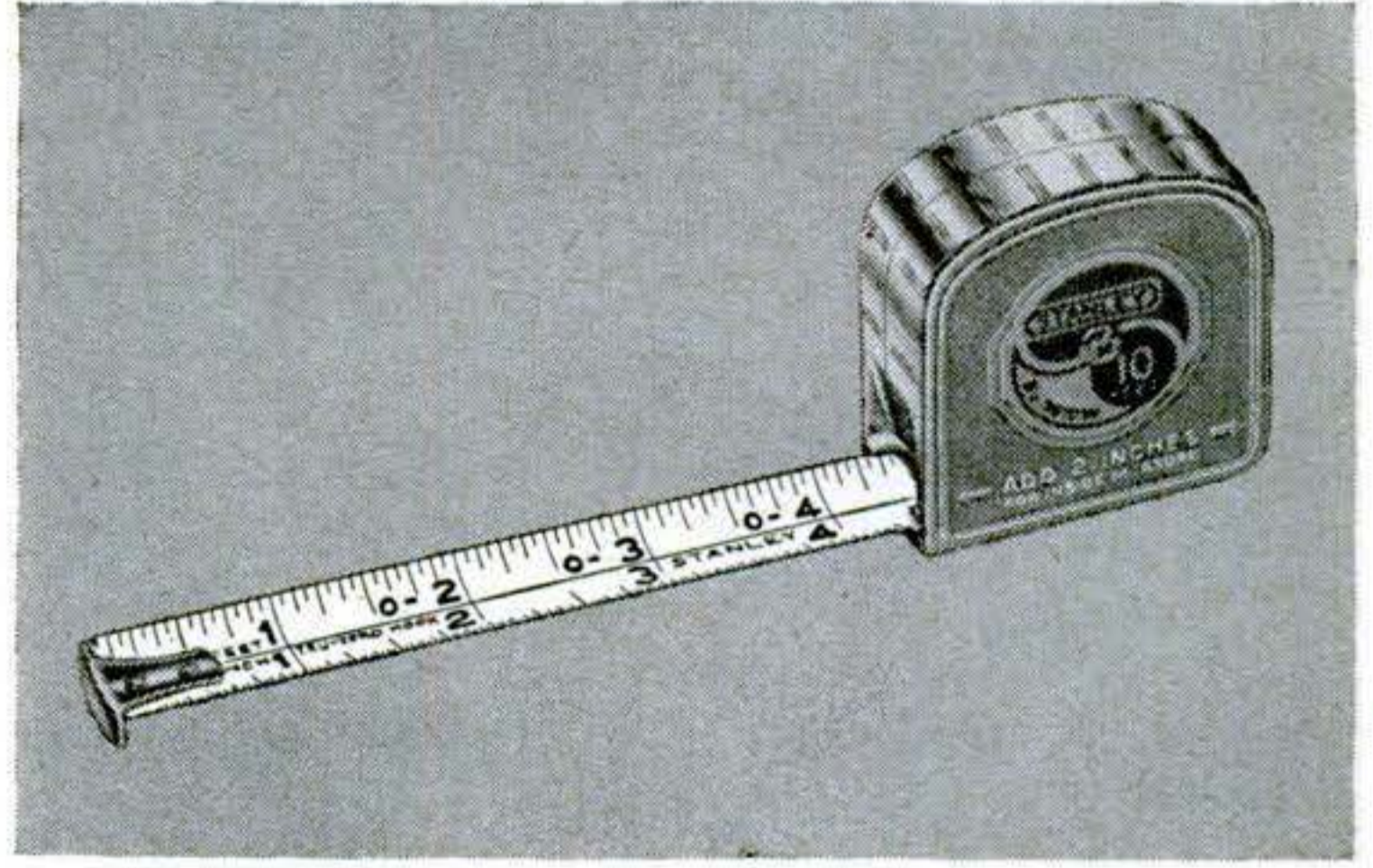
[Continued on page 270]



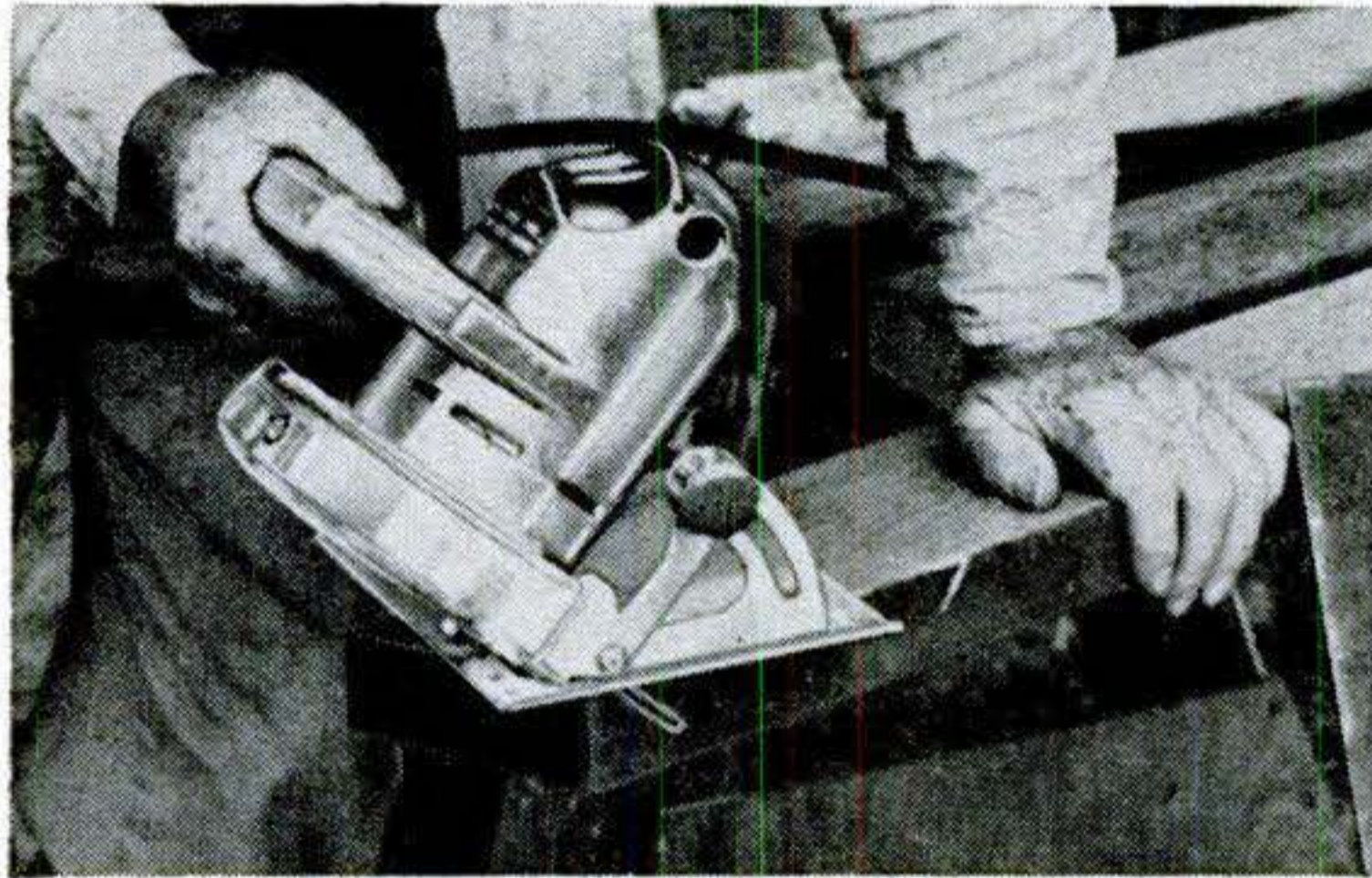
STANLEY PUTS SKILL IN YOUR HANDS



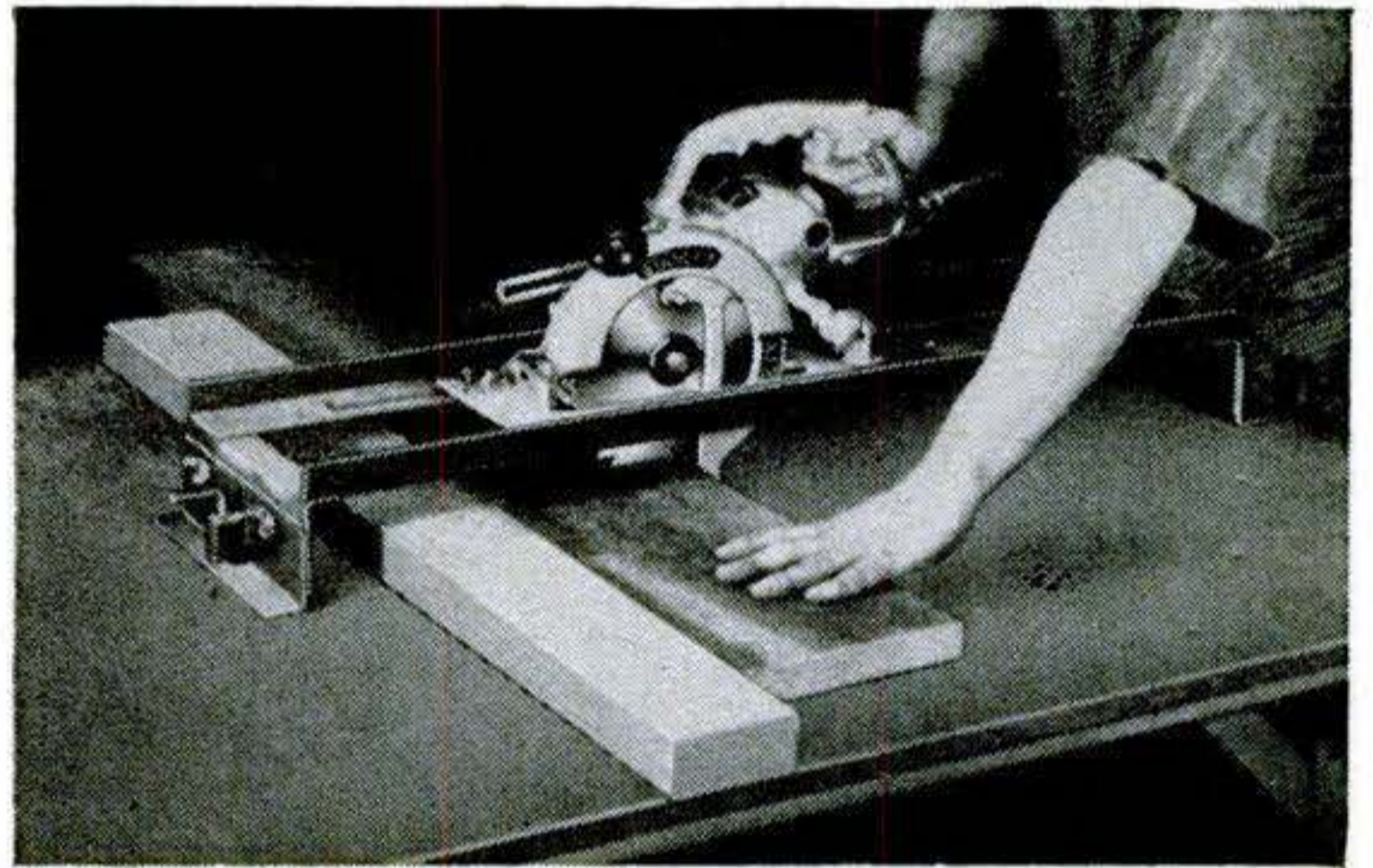
The Nailmaster. An extra foot added to your overhead reach. Holds nail while you start it. Super heat treated steel head and selected white hickory handle. 16 oz. No. N51 1/2 — \$3.35.



Long and Wide "Pull-Push" Rule. Stays rigid for hard-to-reach measurements. True zero hook, true reading mouth and double scale marking for accuracy. 10 ft. No. 3610W — \$2.39.



The 7" Builders Saw. This heavy duty, portable electric saw cuts 2 x 4's at 45°. It's a work-hungry tool, loaded with power and designed to make tough jobs easy. Exclusive Stanley "Motor Saver" protects motor from impact loads, as when striking a nail, etc. Multi-grip handle... convenient switch... automatic telescoping safety guard. No. H70 — \$77.50.



Saw Track for electric saw. This effective device is handy for many saw cuts where accuracy of angle is vital. It's virtually indispensable for production jobs like cutting rafters, fence pickets, etc. Recommended for cutting slate, marble, other stone with abrasive wheel on saw. No. H158 — \$25.75.

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634 Elm St., New Britain, Conn.

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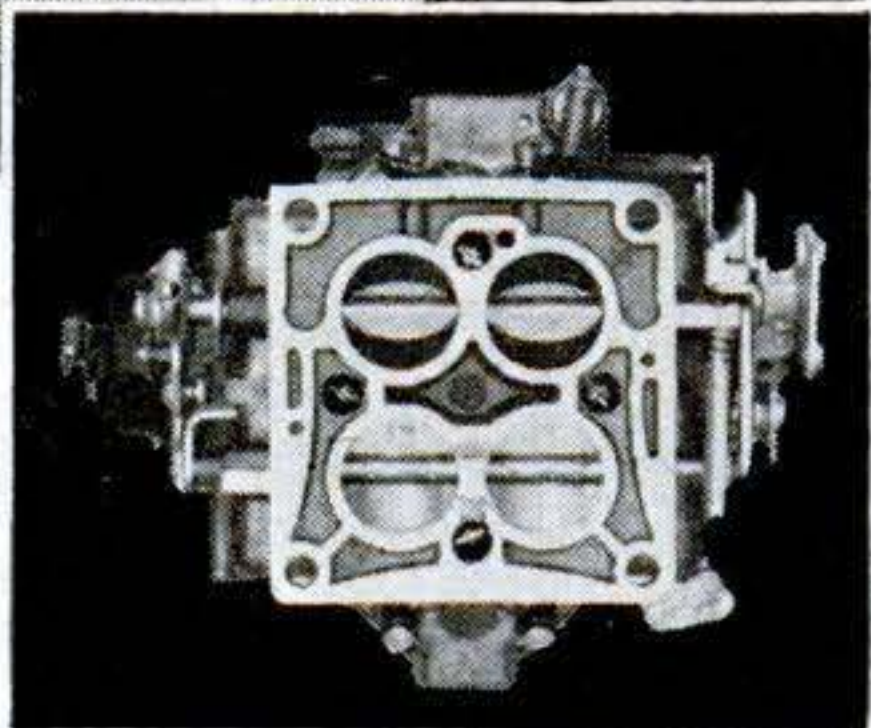
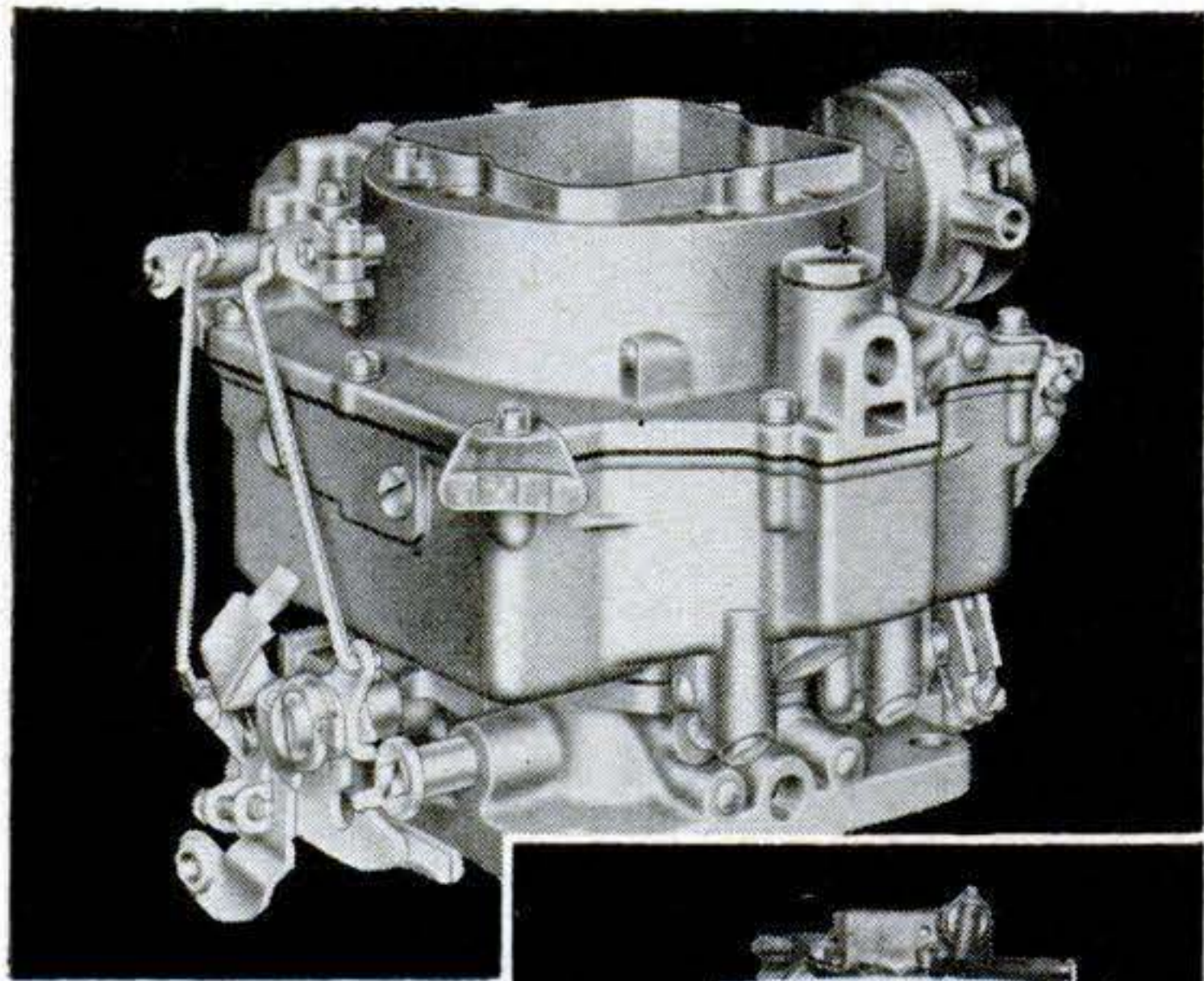
- free Tool Catalog 54
- free Electric Tool Catalog EH15
- 25¢ Pocketbook — "How to Work With Tools and Wood" — I enclose 25¢.

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Why a 4-barrel?



CARTER CARBURETER

Remember when dual carburetion was the talk of automotive circles? It made possible new efficiency and economy in feeding fuel to the engine of your car. Today's mighty CARTER 4-Barrel Carbureter gives you still more: *two more barrels* that go into action *only when you need them* to meet the added demands of rapid acceleration and high speed. A unit of power and economy!

Carter, pioneer of the 4-Barrel Carbureter, proudly keeps pace with the latest developments of automotive engineering.



CARTER CARBURETOR CORPORATION
St. Louis 7, Missouri
Division of ACF INDUSTRIES, INCORPORATED

What Really Happened at Texas City

[Continued from page 268]

temperature-limiting factor, or mechanism, is the evolution of steam. But clamp a tight lid over the pot to keep steam from escaping, and immediately the temperature and the pressure will rise. And you know what happens if this goes on long enough.

But why was there a lid on, so to speak, inside a ship, and why did the ammonium nitrate behave like boiling water *without* a lid when it was stored in boxcars or warehouses? Was there something in a ship that defeated the temperature-limiting factor—that clogged the safety valve built into the chemical make-up of ammonium nitrate?

The answer, Hainer and Feick reasoned, was this:

In a car or a building only relatively small quantities can be stored, and so much of their surface is exposed that the fumes can readily escape.

But inside a ship, with thousands of tons of ammonium nitrate packed tightly together in tens of thousands of paper bags, very little surface is exposed. Near the center of the mass, heat produced through spontaneous generation cannot readily escape to the surface. Thus the cargo becomes heated at an ever-accelerating rate which eventually leads to spontaneous combustion—flame. The burning ammonium nitrate gives off fumes that can't escape fast enough, and pressure builds up. More pressure means still higher temperatures. This in turn means still faster rates of reaction.

Finally comes the moment at which the reaction waves, traveling with the speed of sound, set off a detonation—and the ship blows up.

This chain reaction also explained why small-scale experiments must fail. No matter how closely the model simulates conditions in a ship, the mass-surface ratio is quite different. The built-in safety valve never gets clogged. The ammonium nitrate, ridding itself of its

[Continued on page 272]

FREE...THIS \$15 CALIBRATED MECHANICAL STAGE

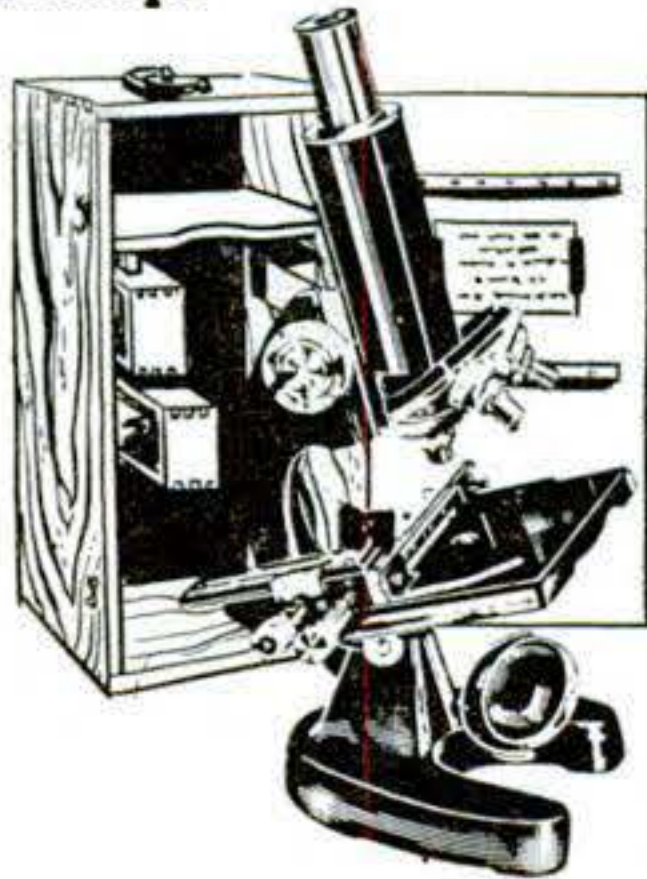
Model 635 150-300-600 Power Professional Microscope

(Our standard \$14.95 mechanical stage included at no extra cost only when your order is accompanied by this advertisement. Limit: one per customer unless your order is sent on school, institution or university letter-head or purchase order.)

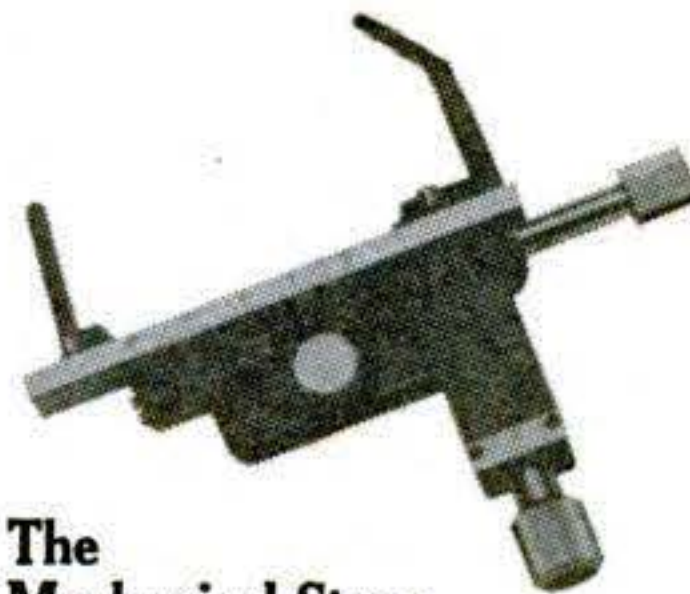
The model 635 microscope is the most widely used instrument in its class in the United States today. Extremely sturdy and well made, it is perfect for the heavy load of classroom and laboratory work. Its optics are excellent, focusing is smooth and positive rack-and-pinion. Equipped with condenser and 6-aperture rotating diaphragm.

Purchase price includes 15X eyepiece and triple revolving turret with 10X, 20X and 30X objectives allowing 150X, 300X and 600X magnifications. Additional eyepieces of various powers may be ordered from our catalog which accompanies your order.

This instrument is the favorite workhorse of microscopy. It is designed for biologists, botanists, hobbyists and students. It allows the study of cellular structure, microscopic plant and animal life. The model 635 has been stripped of all frills to sell at this price. Its basic performance is equal to many models costing over \$100. It is shipped insured and well packed in a fitted hardwood cabinet as shown with slides and manual.



\$29⁹⁵ *postpaid*



The Mechanical Stage

This is the Model 400 Mechanical Stage as illustrated and priced at \$14.95 in our catalog. Our inventory shows that we have an overstock of about 500 of this model. Rather than liquidate these very fine accessories in case lots we have decided to use them to obtain a great many new friends for Precision Optical instruments. If you are a prospective hobbyist you might not be familiar with the function of the mechanical stage. It allows you to scan an entire slide up and down, right and left, slowly or rapidly by simply turning one of the two calibrated knurled knobs.



Mark III Improved 20 Power Coated Lens Telescope

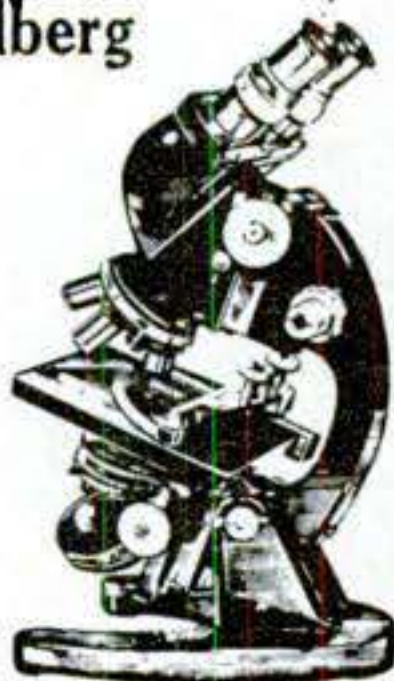
908 Sq. MM Coated front lens—a giant powerful eye for hunters, sportsmen, boat owners. All metal, rust and salt spray resistant. Calibrated spiral eyepiece plus regular telescope extension for brilliant pin-point focus. Shipped in genuine pigskin case. An excellent gift, a lifetime possession. **\$9.95** *postpaid*



300 Power—100-200-300 Power—Our most popular microscope model for schools and hobbyists. Brilliant optics, three precision ground optical glass objective lenses plus optically ground glass ocular X lens (eyepiece). Powerful enough to see and study microscopic animals in a drop of water. It is shipped to you postpaid and insured with slides, fitted hardwood cabinet and manual. **\$7.95** *postpaid*

Heidelberg

20 to
2000 Power



A superior research instrument for the professional microscopist. Purchase price includes both binocular and monocular heads, special Heidelberg mechanical stage. Ideal for micro-projection and photomicrography. Send for special Heidelberg brochure. **\$319**

*postpaid in U.S.
Inquire for export terms.*

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Our complete professional research instrument. Quadruple turret, revolving circular stage, full rotating consultation head, variable focus condenser, variable shutter iris, standard color corrected achromatic optics throughout. Latest "L" design body. Oil immersion available. Additional eyepieces available. See our catalog. Objectives identified by our exclusive color-keyed selector rods. Co-

axial coarse and calibrated fine adjustments. Shipped in finely finished fitted hardwood cabinet. A lifetime gift or purchase for the professional man or woman.

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OBJECTIVE LENSES	EYEPIECES	MAGNIFICATION CHART EYEPIECES							
		A	O	5	8	10	12	15	20
5X.....*	5X.....								
10X.....*	8X.....	5	25	40	50	60	75	100	
20X.....*	10X.....	10	50	80	100	120	150	200	
40X.....*	12X.....	20	100	160	200	240	300	400	
60X (oil)	15X.....*	40	200	320	400	480	600	800	
.....\$20.00	20X.....*	60*	300*	480*	600*	720*	900*	1200*	

Mechanical stage also free with Von Steuben microscopes ordered from this advertisement.

*These items included in purchase price of instrument.



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A popular book on the collection of micro-subjects, how to start a live micro-zoo, where to look, how to get the most out of your microscope. **\$1.00** *postpaid*

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Mailed with all orders or free on request. Microscopes from \$7.95 up to all ranges. Other remarkable bargains in optics of all kinds. Instruments made to our rigid specifications and designs by specially selected Japanese optical firms.

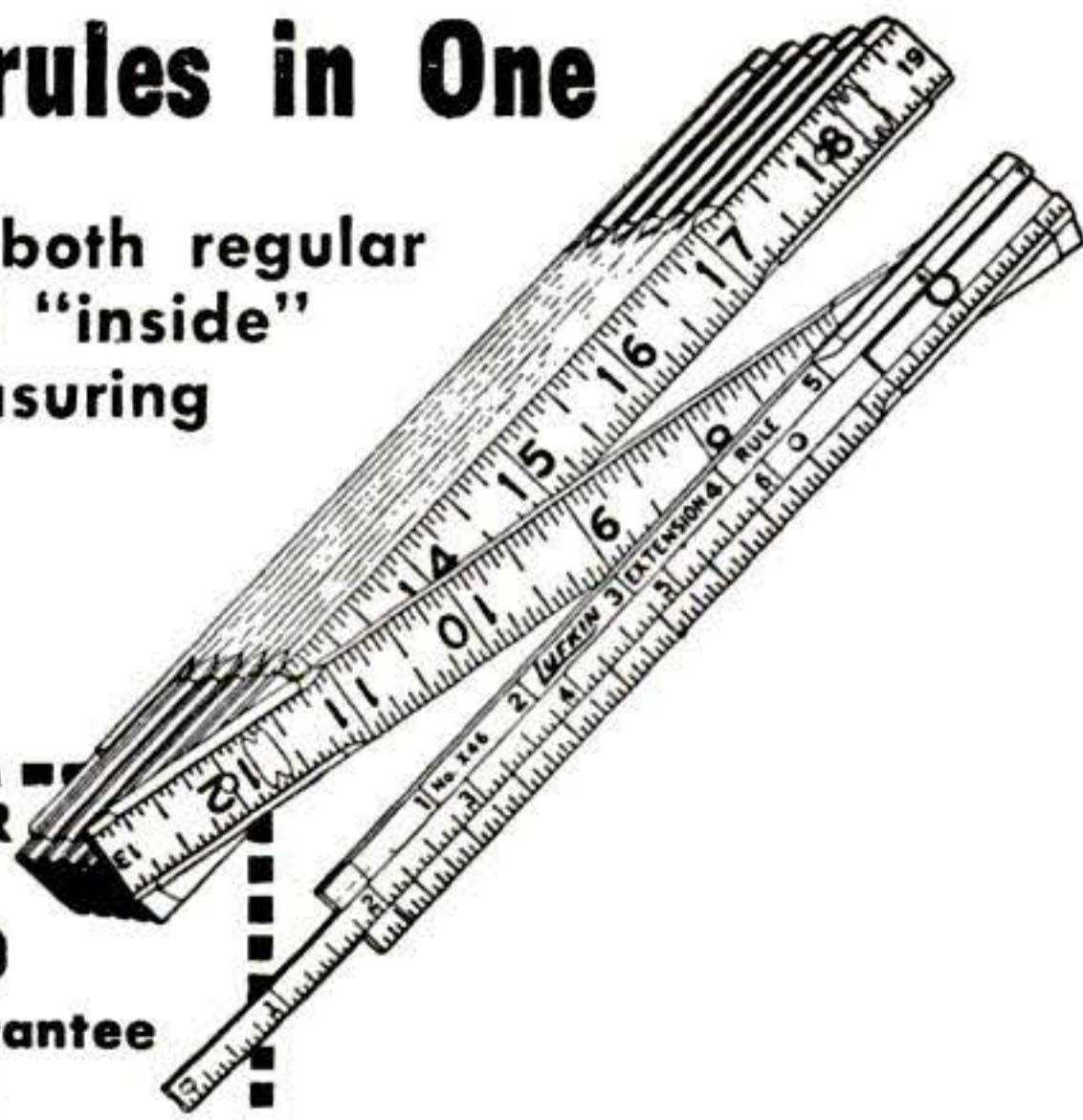
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for both regular
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LOOK FOR
THE
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your guarantee
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EXTENSION WOOD RULE

Hundreds of thousands of Craftsmen the world over prefer the Lufkin X-46 because . . . it's extra durable with sections 50% thicker than standard . . . it has rust-proof triple-locking joints that maintain accuracy . . . it has brass strike plates to prevent wear . . . it has bold markings embedded right into the wood . . . it's made of select straight-grained hard maple. Buy a Lufkin X-46 and be equipped for accuracy and speed on both regular measurements and inside measuring of doors, windows, etc. You'll find it the finest, most durable wood rule you ever used.

BUY **LUFKIN** TAPES • RULES • PRECISION TOOLS
AT YOUR HARDWARE OR TOOL STORE
354 THE LUFKIN RULE CO., SAGINAW, MICHIGAN

PUMP WATER FAST!

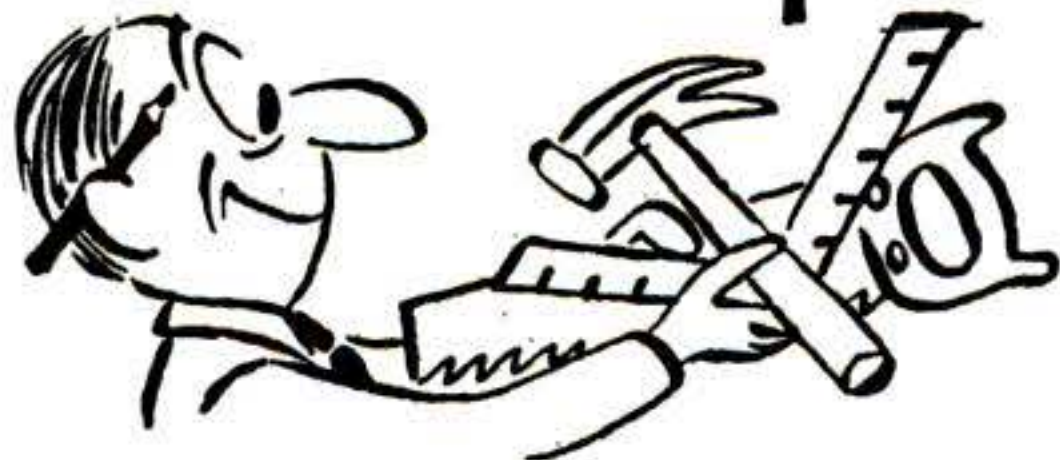
Drains Wash Tubs, Cellars, Cisterns. Famous #7 pumps 4000 gph. 700 gph. at 95' high, or 2400 gph. from 25' well. Sturdy rustproof alloy metal. Six blade impeller. $\frac{3}{4}$ " inlet, $\frac{1}{2}$ " outlet. Standard pipe threaded. Uses any $\frac{1}{8}$ to $\frac{1}{2}$ H. P. Motor. Will not leak or clog. Iron clad guarantee. Send check, M.O., or sent C.O.D. **\$8.95** IN U.S.

Irrigate, Fill Tanks, Draw Well Water. Heavy duty #8 pumps 9500 gph. 1200 gph. 95' high 5000 gph. from 25' well. Rustproof alloy metal. 8 blade impeller. 1" inlet, 1" outlet. Standard pipe threaded. Will not leak or clog. Iron clad guarantee. Send check, M.O., or sent C.O.D. **\$11.95** IN U.S.

Free Catalogue—Gear Pumps, Large Centrifugal Pumps, Deep and Shallow Well Pumps, Sump Pumps.

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YOU NEED "PLASTIC WOOD"®

What Really Happened at Texas City

[Continued from page 270]

surplus heat by giving off fumes, can never explode.

Still, there was a need for a practical test of the soundness of their theory. Obviously, Hainer and Feick could not take a freighter, load it with ammonium nitrate and wait for it to explode. The simple apparatus they rigged up consisted, basically, of a metal pipe filled with ammonium nitrate set afire and then closed. This practically duplicated temperature and pressure conditions inside the ship's hold; the pipe and its contents could be regarded as a core section of the cargo.

Two similar experiments took place. In the first, the entire contents of the pipe were blown out to a distance of over 150 feet. In the second, an explosion ripped off the pipe's cover, shooting a stream of fire in one direction and driving the pipe itself backward into the ground so hard that Dr. Hainer was unable to pull it out with his Chevrolet. He had to get a truck to do it.

Here was the answer the Coast Guard had been looking for—an answer to the question: "Why did the *Grandcamp's* cargo of ammonium nitrate explode from fire?"

Hainer and Feick, scientific detectives, have turned over to the Government a stack of reports full of chemical and mathematical formulas and diagrams plotting the reactions of various types of ammonium nitrate under various conditions of heat and pressure. These are serving as the basis for proposed new regulations for shipping ammonium nitrates. Once these regulations are in force, there should never be another disaster like that in Texas City. END

Modern Design

"There's a nice spot for a nest in that old barn," said one robin to another.

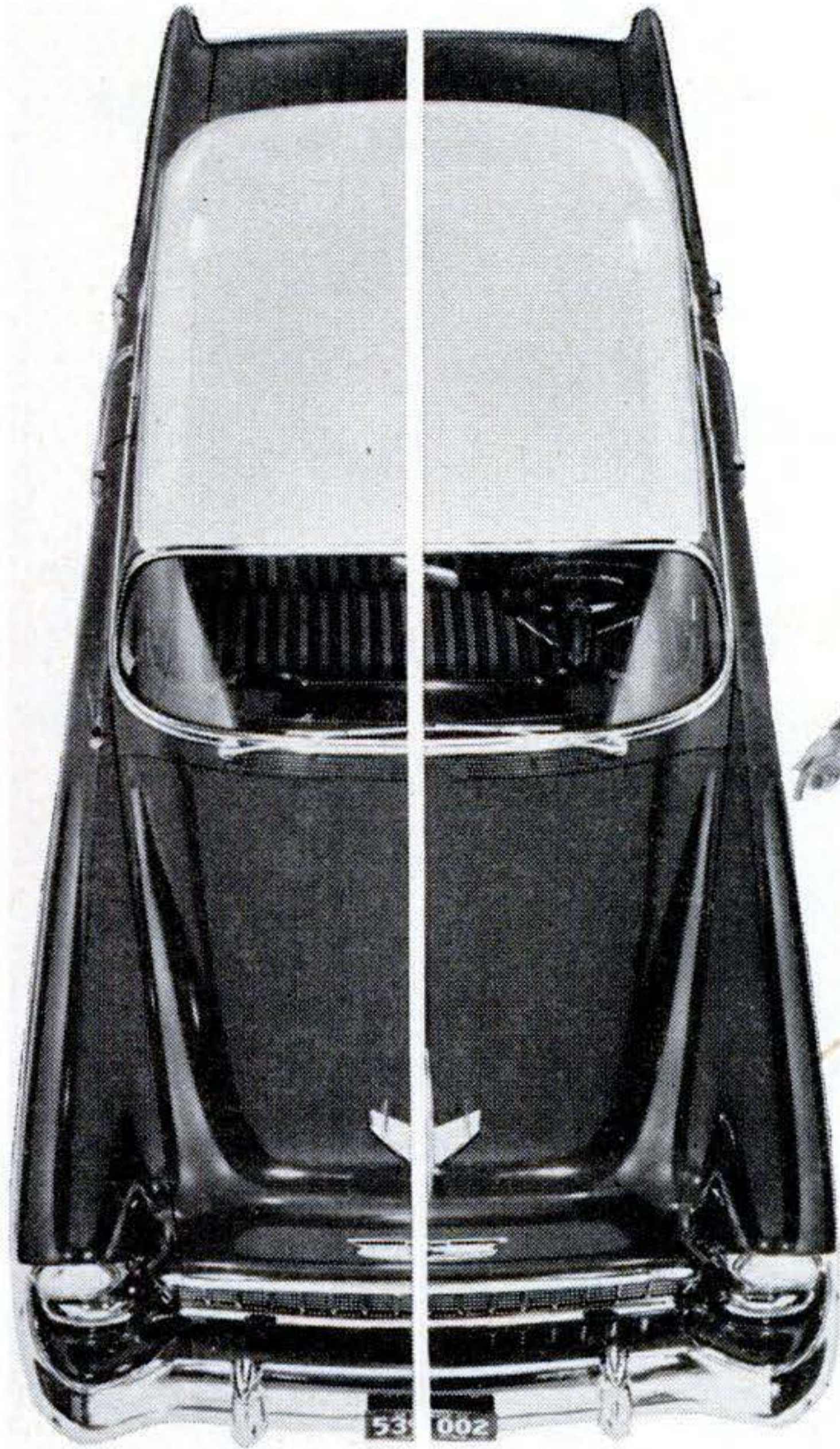
"No, thanks," came the reply. "We're thinking of a branch-type."—*Wall Street Journal*.

Here's what



found out about Car-Plate —

Easiest way to put on the toughest kind of wax



EVEN AFTER 3 MONTHS —
CAN YOU PICK THE CAR-PLATE
WAX SIDE FROM THE HARD-RUB
AUTO WAX JOB ?

HERTZ picked 20 of its rental cars in cities across the U.S. One side of each was waxed with liquid Car-Plate, the other with one of three well-known paste waxes.

HERTZ FOUND: *Car-Plate is far faster, easier to apply than any paste auto wax.*

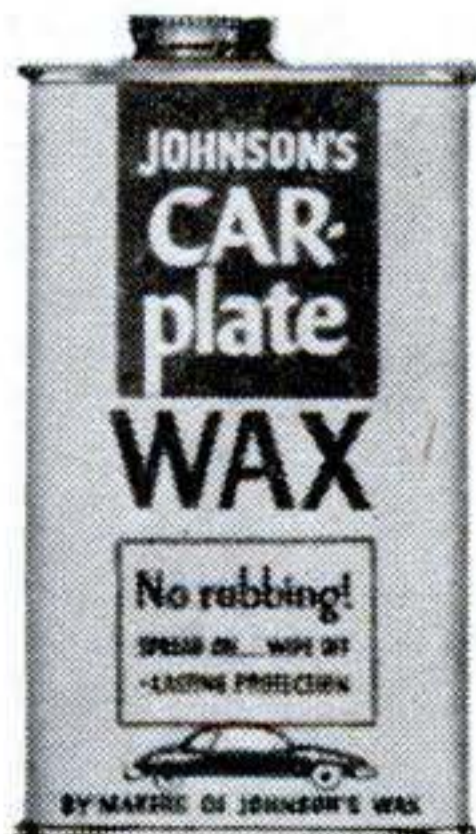
After months on the road, the sides were compared for wear and shine.

HERTZ FOUND: *Car-Plate lasts as long as the most durable paste auto wax.*

The reason: All the Car-Plate wax stays on your car—you don't rub wax off as when polishing paste wax. The Hertz test car shown here was driven 3 months, then simply washed and photographed. If you can't tell the Car-Plate side (left) from the paste side, why waste hours rubbing? Next time wax with Car-Plate!



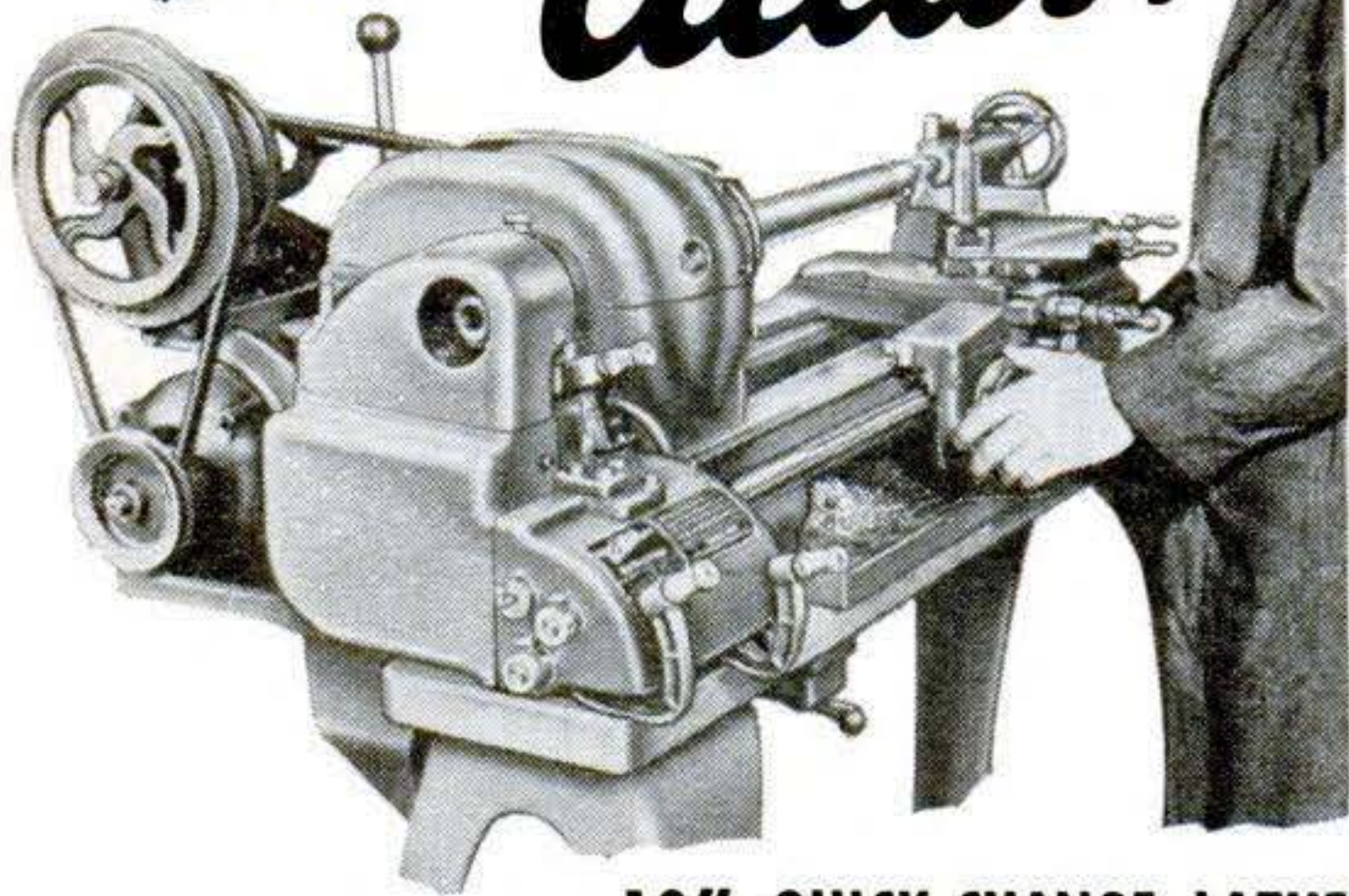
Before waxing use Car-Plate Cleaner. Wax will bond perfectly in a brilliant, long-lasting finish.



JOHNSON'S

CAR-PLATE WAX

Do more jobs better
 ... in less time...
 at lower cost
 with an **Atlas**



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QUICK-CHANGE GEARS



HEAVY-DUTY PRECISION GROUND BED

10" QUICK-CHANGE LATHE

For experimental, development and hobby work . . . or small parts production, ATLAS Precision Lathes give you many more important features that increase accuracy, speed production and cut costs than any other lathes in the lower price field!

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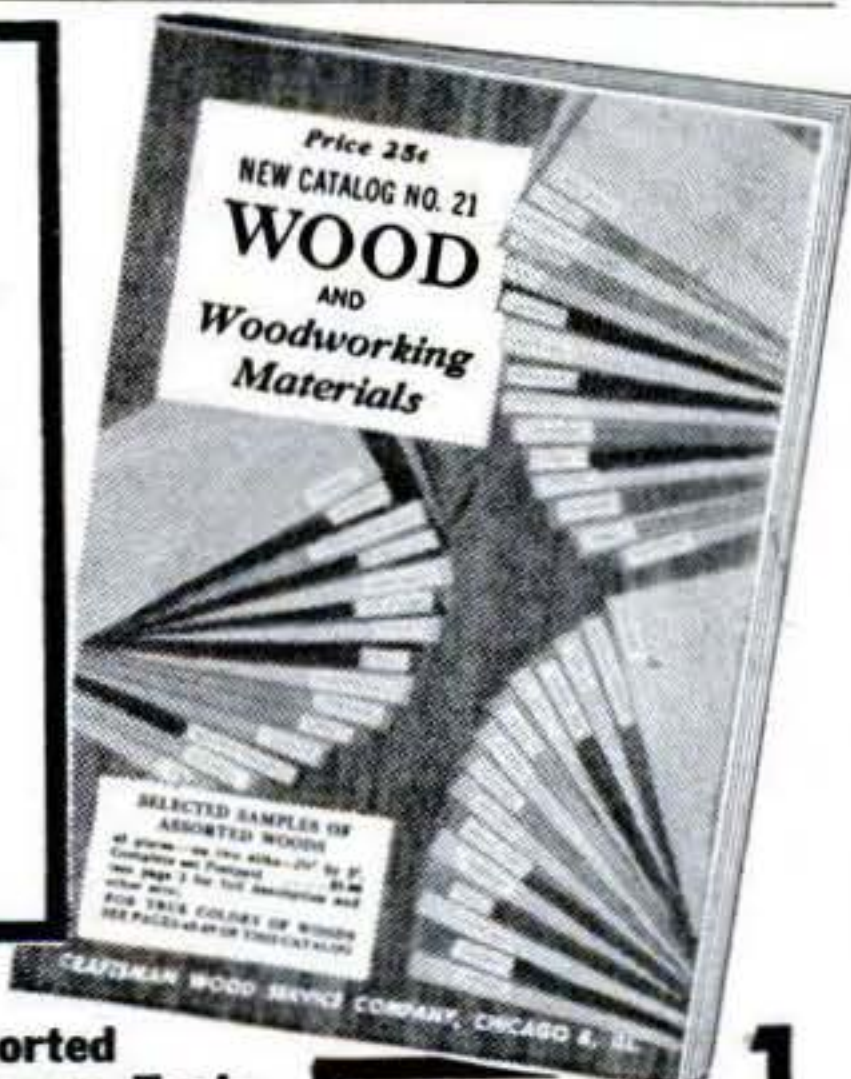
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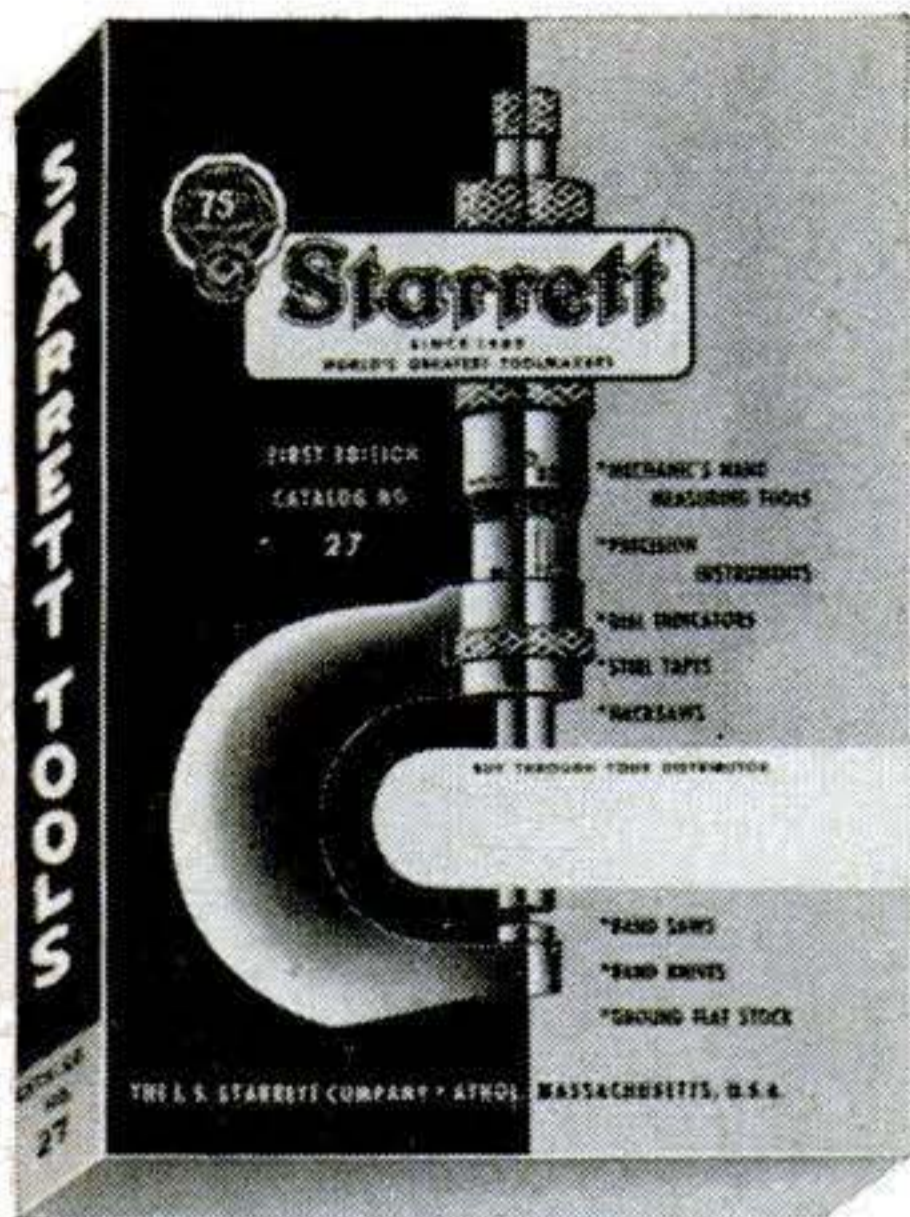
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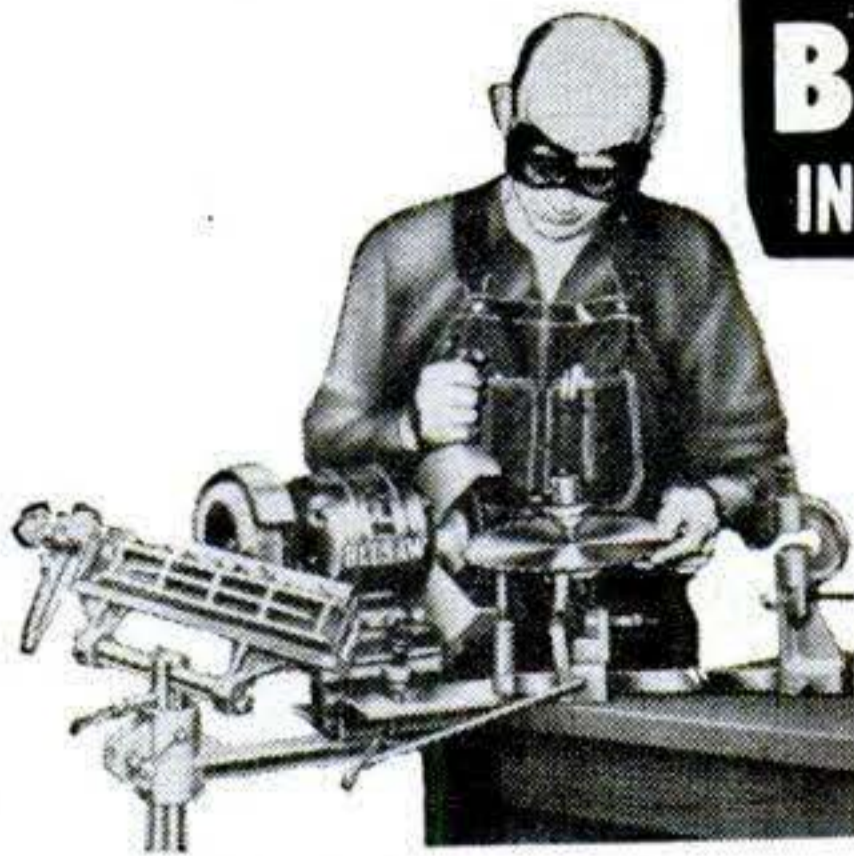
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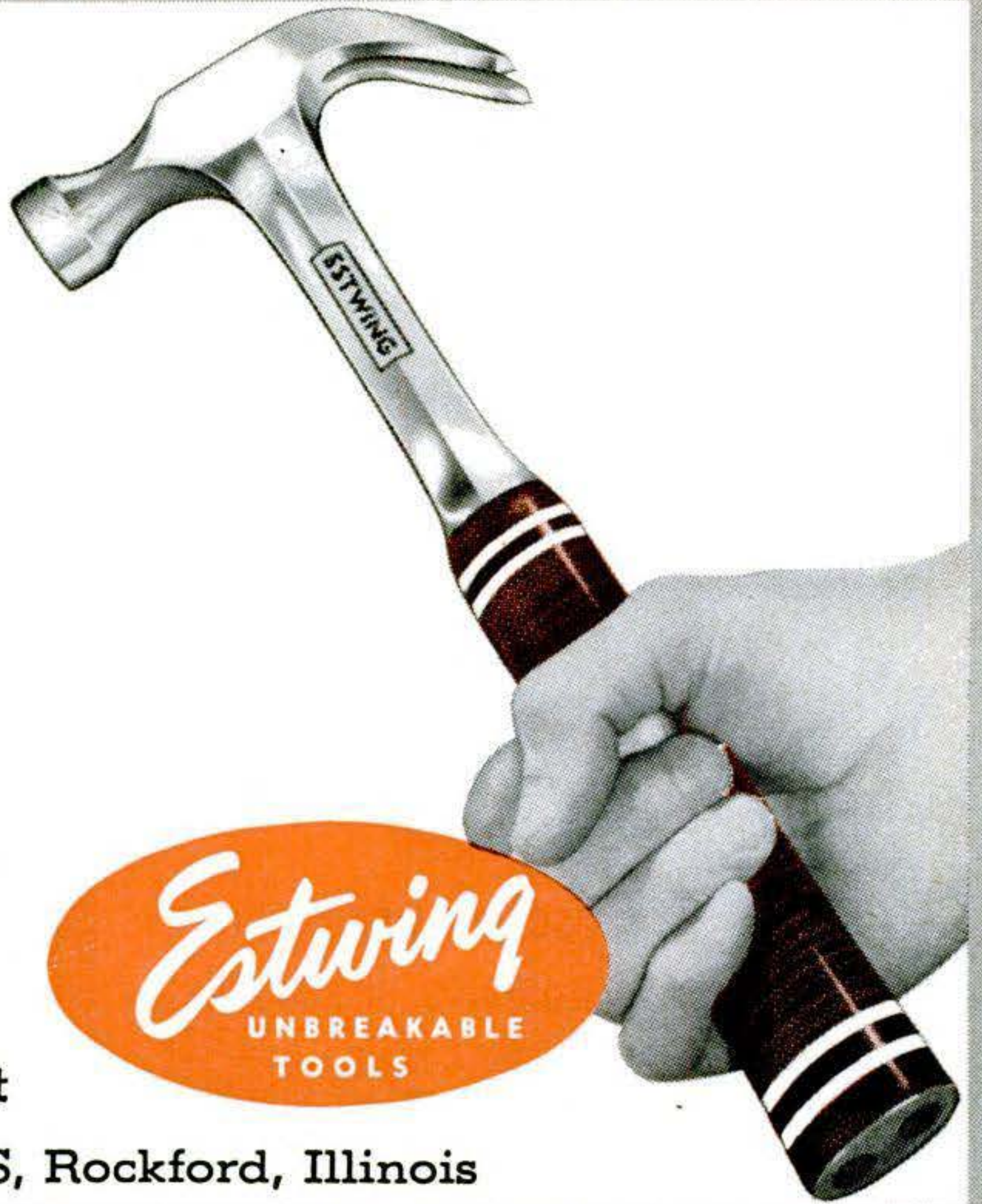
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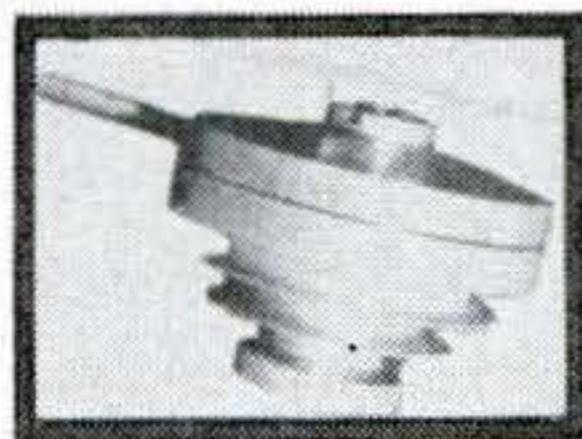
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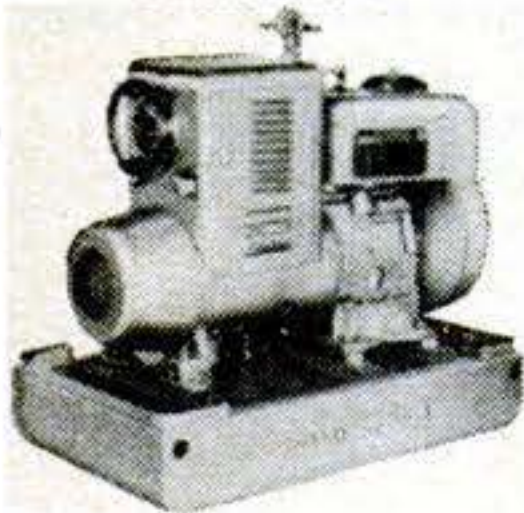
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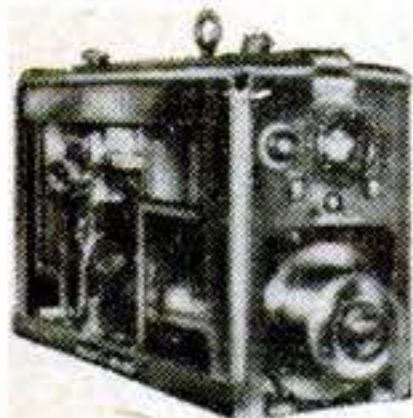
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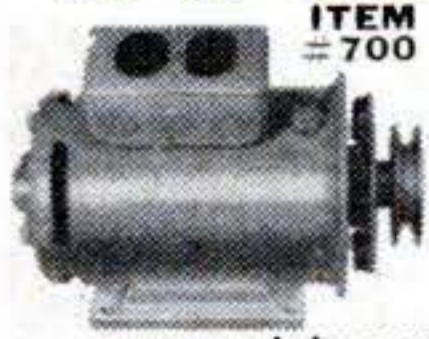
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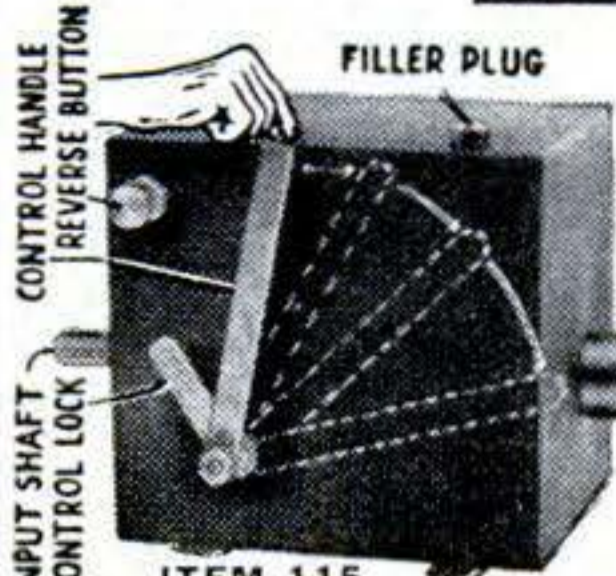
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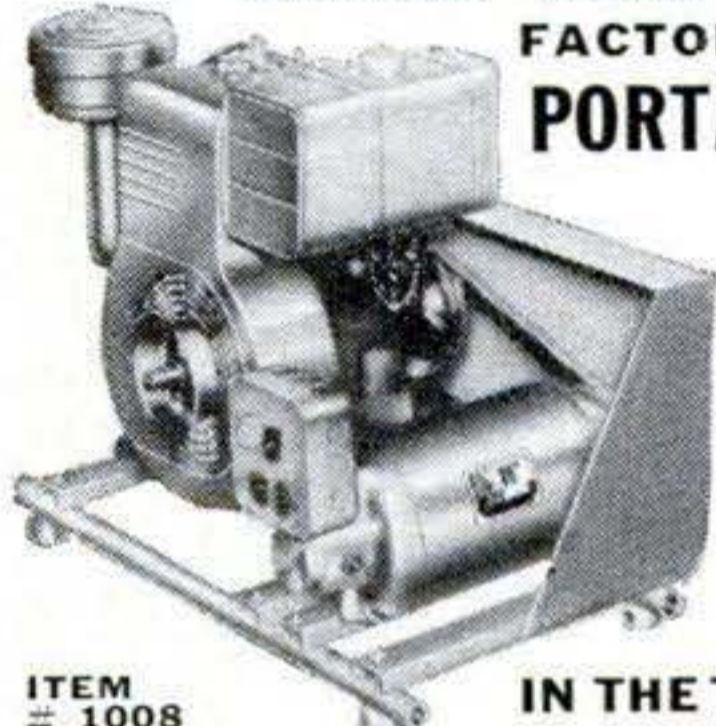


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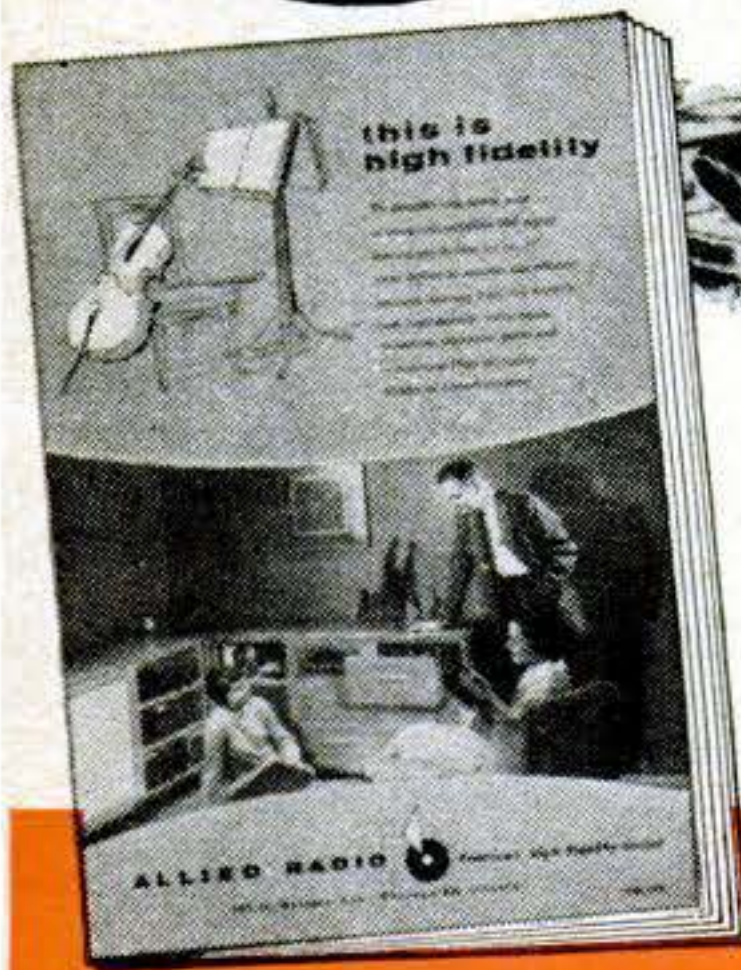
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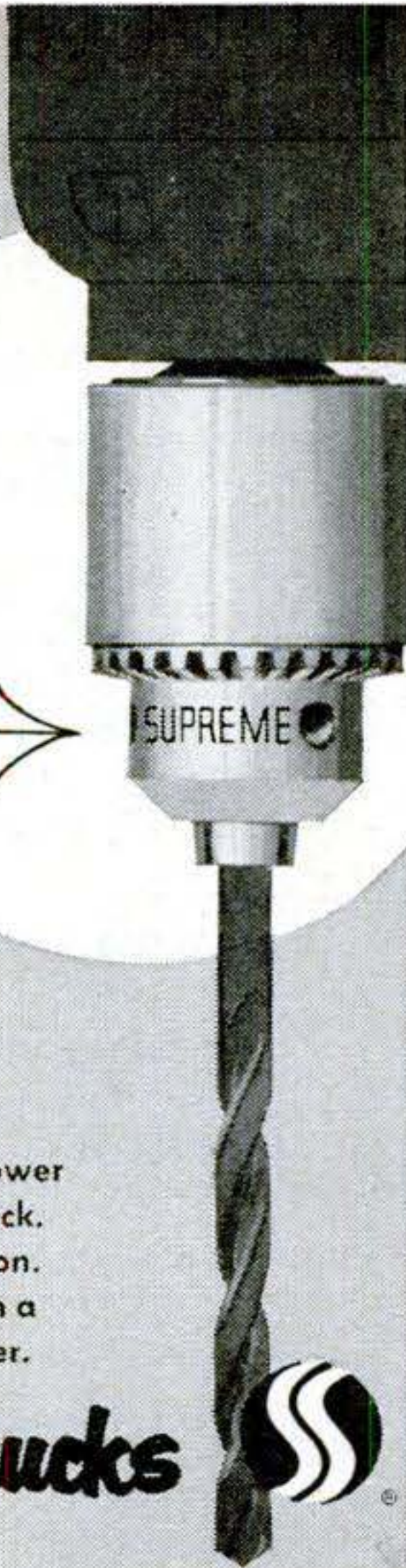
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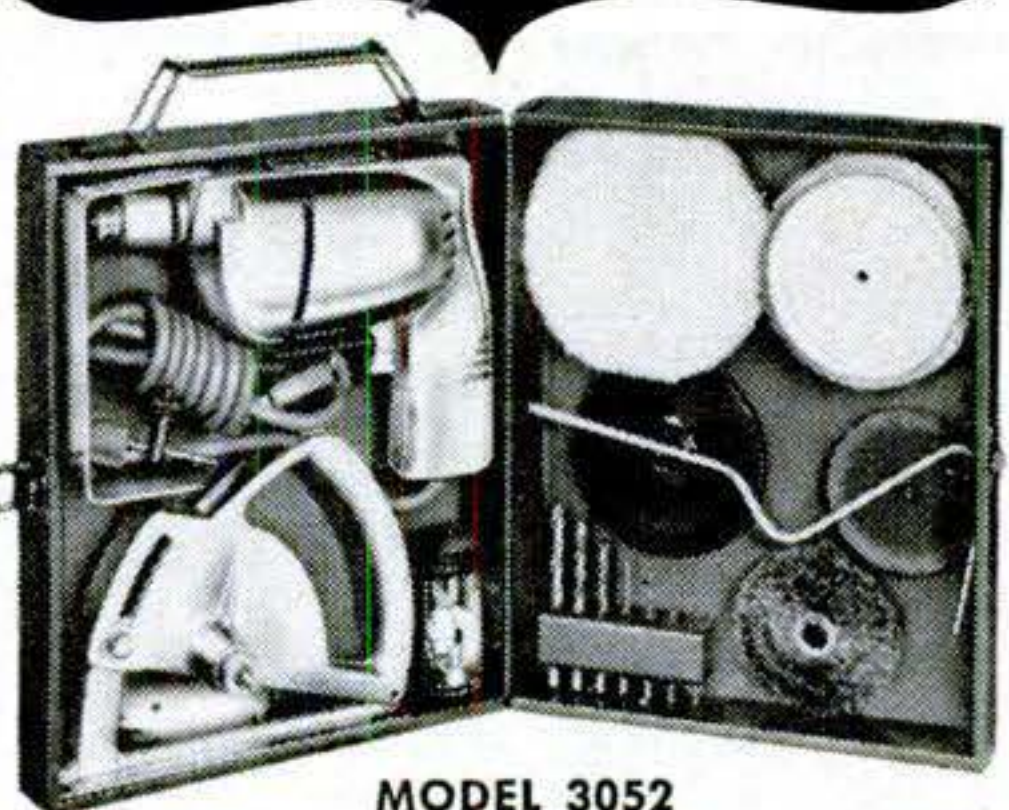
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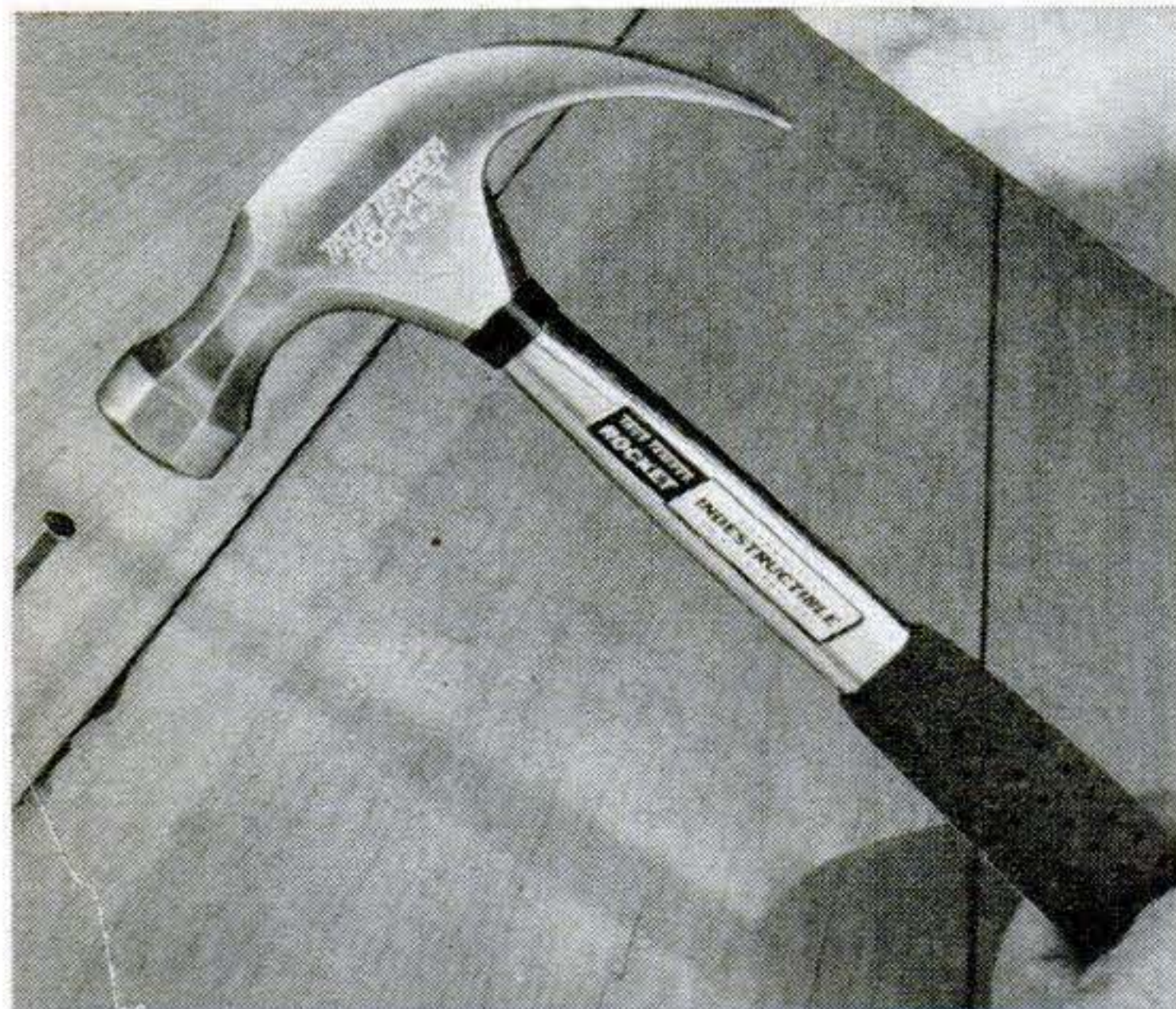
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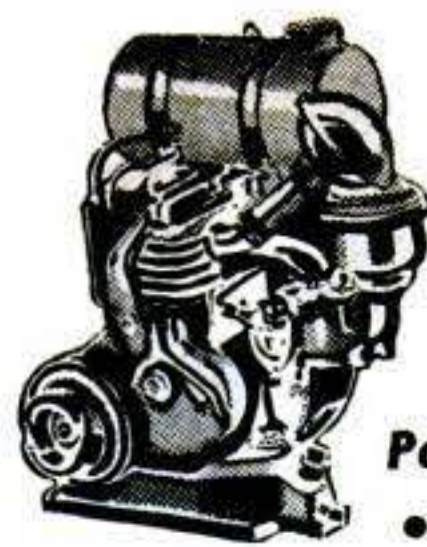
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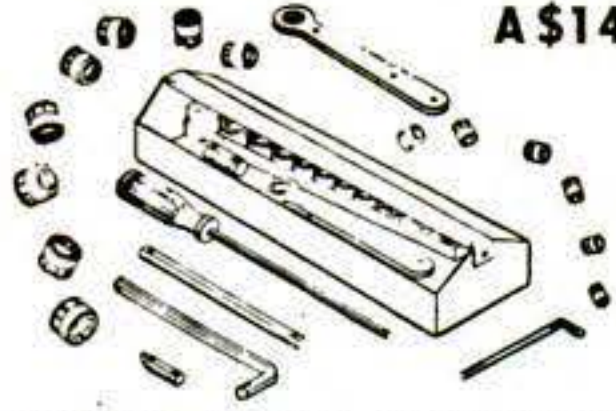


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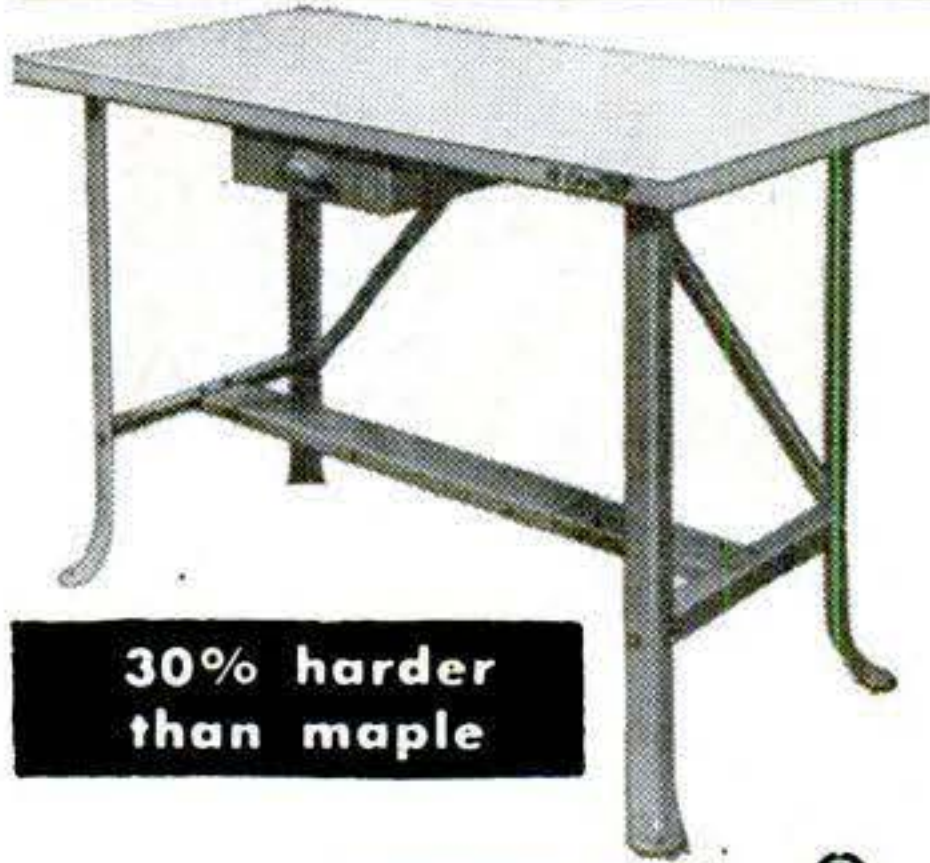
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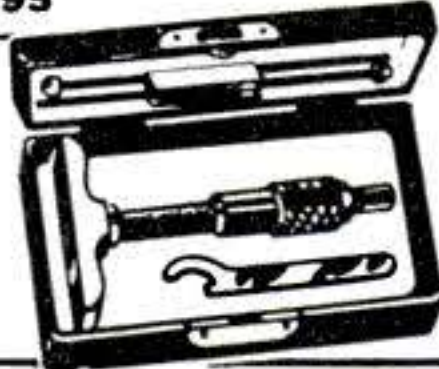
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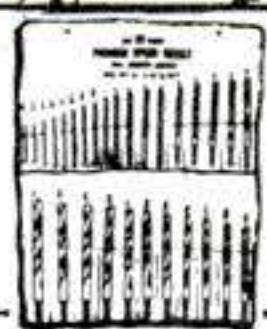
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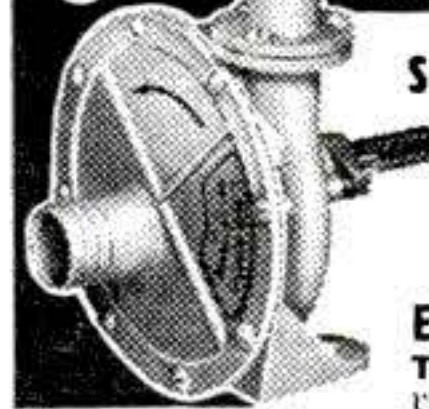
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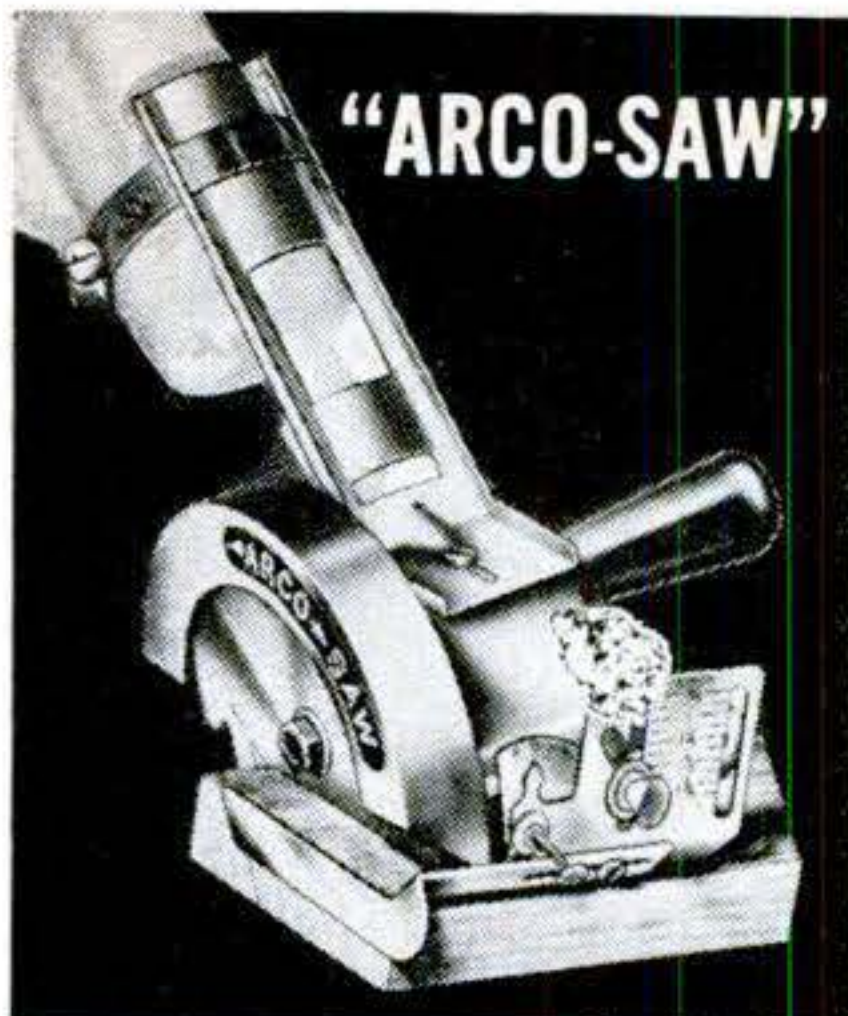


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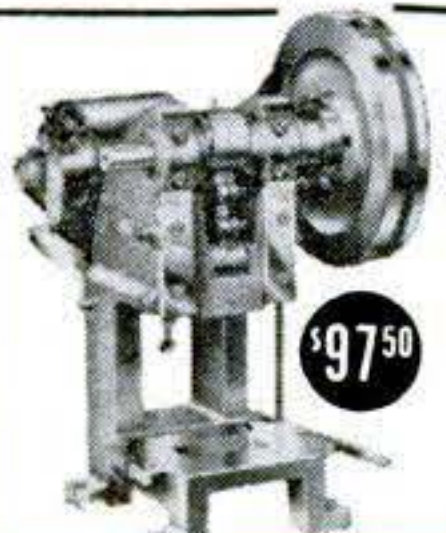
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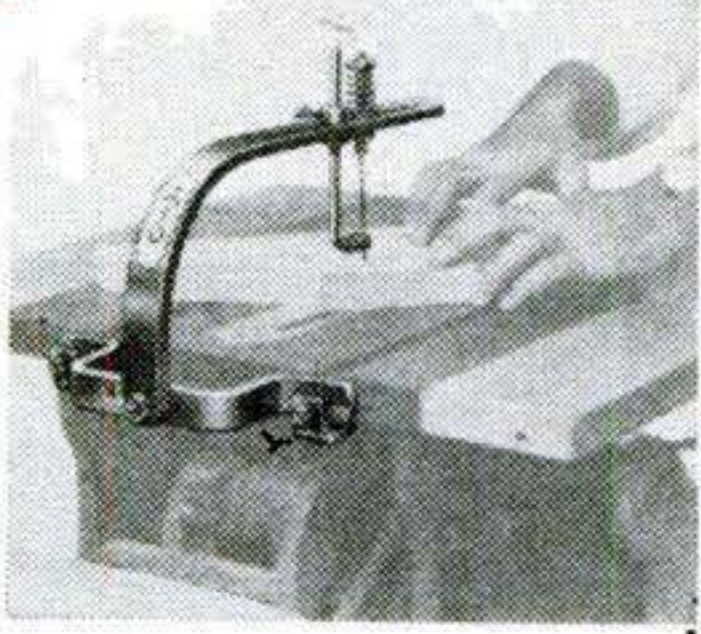
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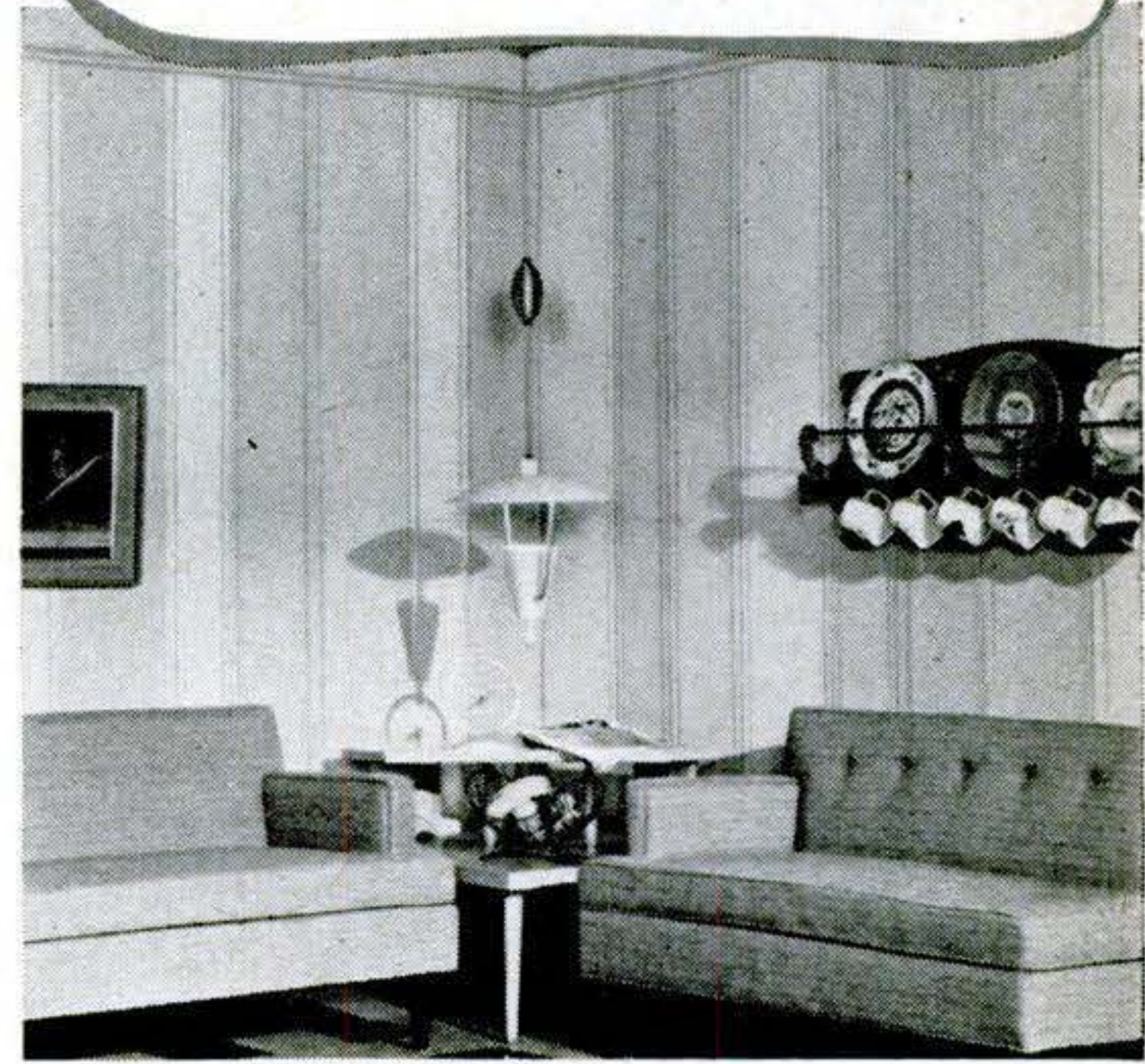
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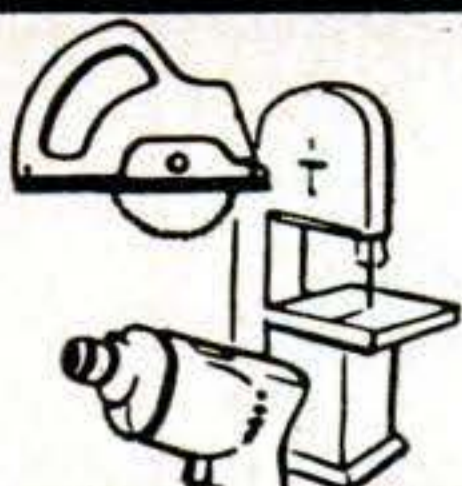
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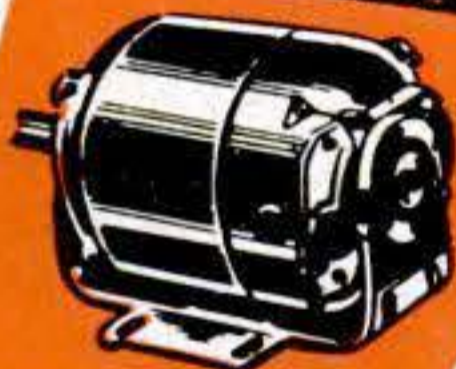
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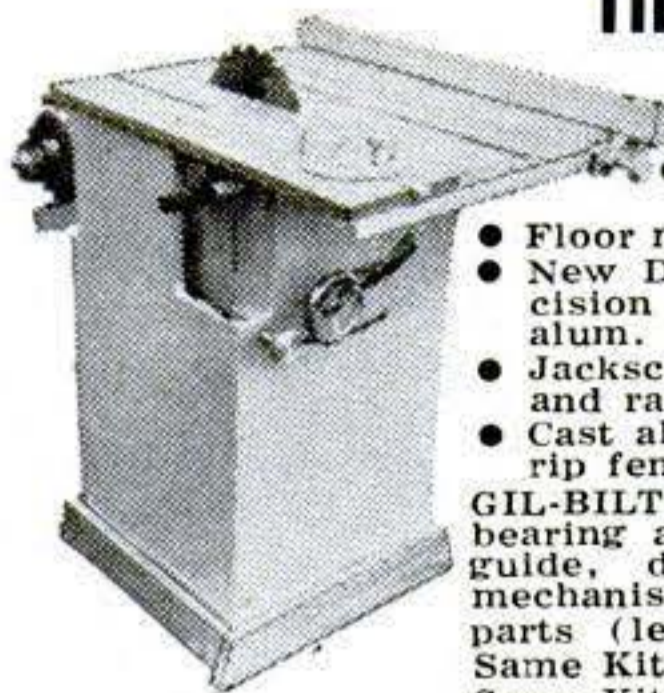
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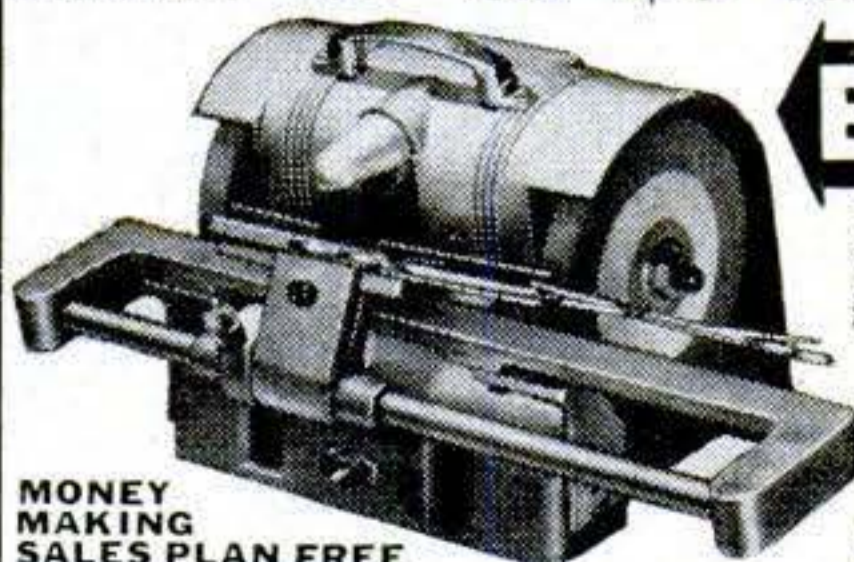
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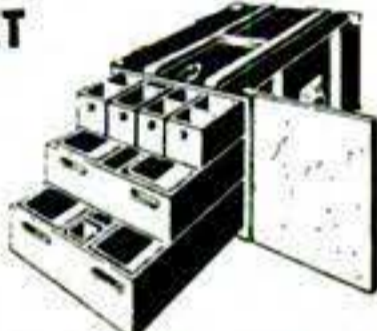
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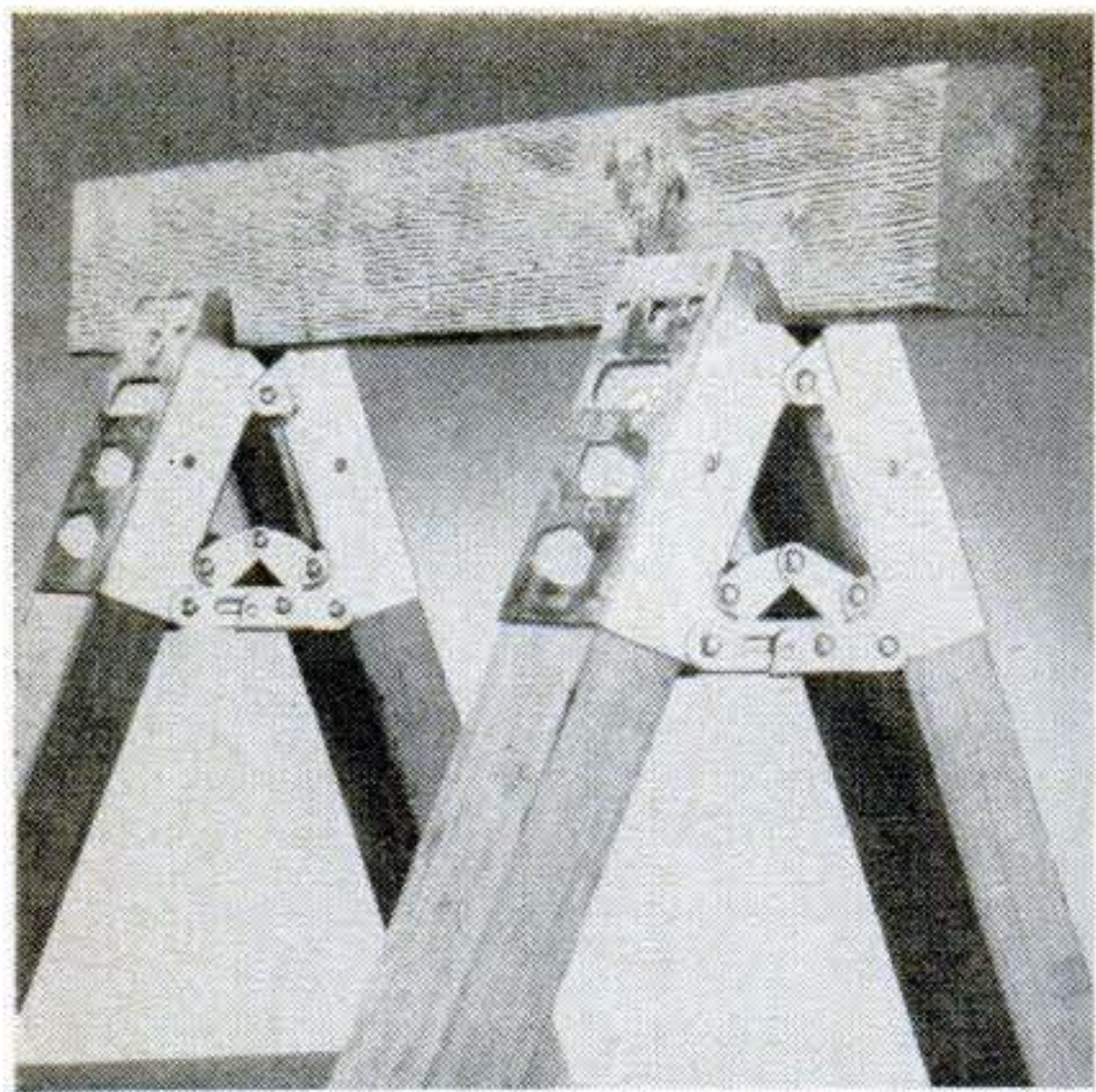
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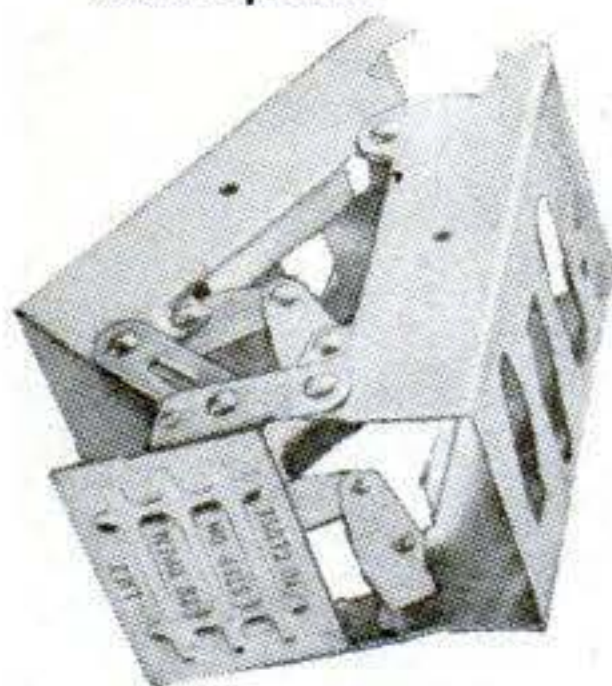
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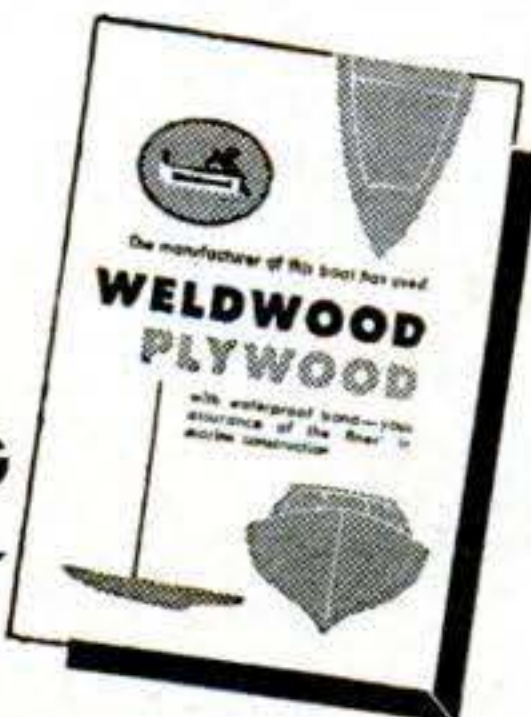
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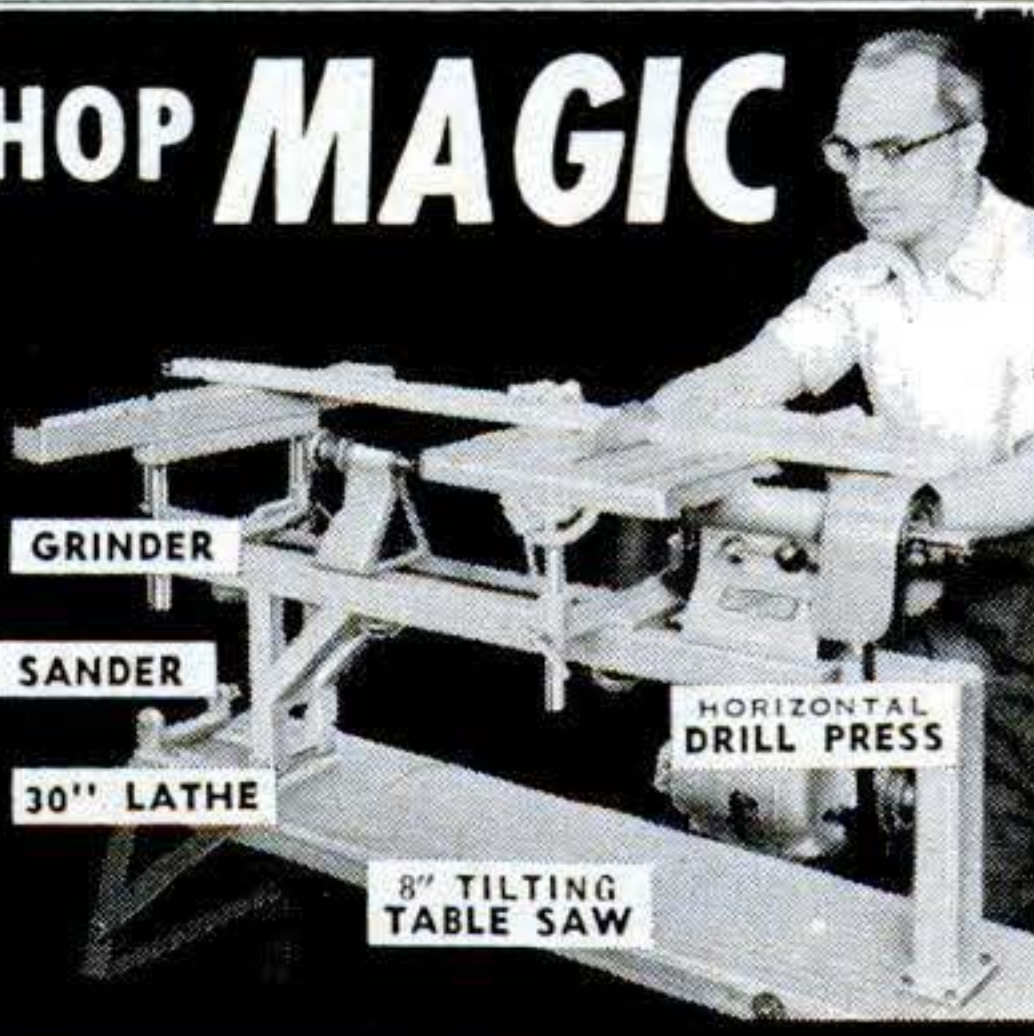
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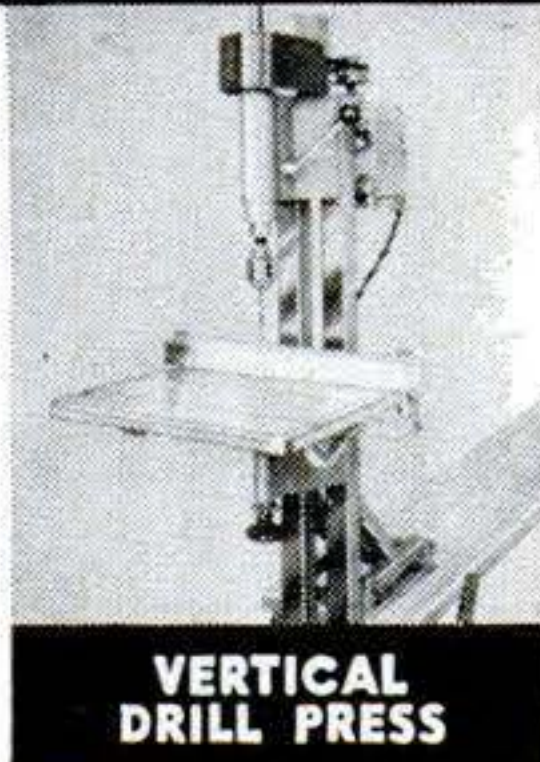
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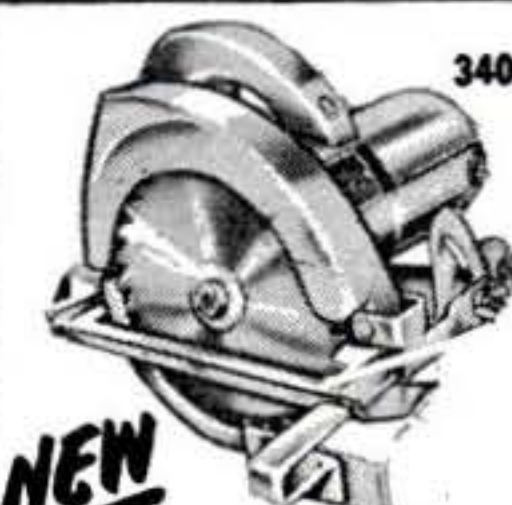
3 ft. x 6 ft. x 3/8 in approx. 1/8" thick
18 sq. ft. **17.95**
A \$5.00 VALUE FULL SHEET
Min. order 8 sheets

See for YOURSELF FREE SAMPLE on request!

All orders shipped by special truck for LOWEST rates. No order accepted for less than 100 lbs., (4) 1/4" sheets (8) 1/8" sheets

4 ft. x 8 ft. x 1/4" 32 sq. ft. A \$9.50 VALUE **4.95** FULL SHEET
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WORLD'S GREATEST DO-IT-YOURSELF TOOL BARGAIN!



3400 RPM 1/2 HP POWER SAW

compares to saws selling up to 49.50
Ideal for HOME SHOP

19.98 Complete with 5 1/2" Blade

RIPS - CROSSCUTS

A rugged, professional type, adjustable saw. Cut any angle, 0 to 45°. Has adjustable (0 to 6") rip fence. Safety-trigger switch on handle. Full 1/2 HP Universal AC-DC, 110-120 Volt, 60 cycle motor. Weighs only 6 1/2 lbs. A sensational Value - We sold over 700 Saws in Los Angeles in one week.

EXTRA SAW BLADES - Available in Rip, Crosscut or Combination. Please specify . . . price each **2.95**

SPORTSMAN'S 12 Pc. IMPORTED COMBINATION KNIFE

Complete with Genuine Leather Holster!



Eliminates 12 Individual Items from your Pack or Tool Kit!

(A \$12.95 VALUE) **4.95** COMPLETE CAMPKIT

Here is the Perfect Combination Knife-Tool for every Outdoor Sportsman, Hunter, Camper, Fisherman, Boy Scout, Ranger, Rancher, etc. Think of it! 11 Fine quality Steel Tools, precision made to fold easily into the heavy bone covered body. In one neat, compact unit you have (1) a regular knife, (2) a fork, (3) a spoon, (4) a draw-knife, (5) a bone-saw and fish-scaler, (6) scissors, (7) a can and bottle opener, (8) a cork-screw, (9) awl punch, (10) a screwdriver and (11) a metal file. All this PLUS a genuine leather, belt holster. ORDER NOW While We Can Guarantee Delivery at this Special Low Price

SURPLUS HI-PRESSURE PUMPS



PESCO HYDRAULIC PUMP

ONLY **14.95**
A gear type pump. Will deliver 2 gal. per min. at 1500 RPM with 1500 PSI. Delivers 6 gal. per min. at 4300 RPM with 1500 PSI. Has .375 cu. in. displacement per rev. 3/4" standard pipe ports. 5/8" male spline drive shaft. 4" pad mount.



VICKERS HYDRAULIC ANGLE PUMP

A positive displacement, piston type. Displaces .507 cu. inches per rev. Has capacity of 6 gal. per min. at 3000 RPM with 1000 PSI or 3 gal. per min. at 1500 RPM. **22.50**

Note: This is only a small sample of our tremendous stocks of Hydraulics which include Pumps, Motors, Valves, Tubing, Fittings, etc. Send for Catalog.



NEW 1/5 HP ELECTRIC MOTOR

A 1/5 HP, reversible series wound motor. Turns at 3800 RPM. Operates on 27 volts DC, 16 amps. Has a 12 spline, 9/32" diameter shaft. Size: 4-1/8" x 2-3/8". A NEW surplus bargain **3.95**



DC GENERATORS BENCH TESTED

Suitable for adaptation to home welding units, portable and rural lighting, power plants on boats, etc. Fully reconditioned and guaranteed serviceable.

TYPE	AMPS	VOLTS	PRICE
GI	140	30	17.95
PI	200	24	19.95
RI	300	24	27.95
310 NEW	50	15	19.75

NEA3 - 60 Amp DC - 28.5 Volts, or 10.4A, AC - 115V. **27.50**

V-BELT PULLEY KIT. To adapt V-belt pulley to above generators. . . . \$27.50

RHEOSTAT for control of above Generators. 150 Ohm, 100 Watt **7.50**



AVIATORS (AM-6530) WINDPROOF & DUSTPROOF GOGGLES

Chamois lined, rubber covered frames. Has REPLACEABLE GROUND LENSES in either clear, amber or green. Frames have special non-fogging breather slits. Nose bar is adjustable. **5.00 VALUE** **2.49** NEW

EXTRA LENSES - Choice of colors listed above. Price per pair **1.00**

SIGNAL CORPS SURPLUS FIELD PHONES

Can be used for a private phone or intercom system. Ideal for use on Farms, Mountains, Forests, Target Ranges or any place where portable two-way communication is desired. This is the famous EE8 type phone. Gives clear reception up to 15 miles. Uses two standard batteries. Set consists of a ringing generator, one phone, all contained in a genuine leather carrying case. Several of these phones may be hooked together on one line. Reconditioned & checked out. Price per each phone & case



14.95
29.50

Price for a system of two phones **750**
T-26 CHEST MICROPHONE & EAR PHONES - For use with above set. Plugs into Field Phone and leaves hands free. Has 3-way switch. NEW

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PALLEY SUPPLY CO 2263 E. VERNON AVE., DEPT. PS-4 LOS ANGELES 58, CALIF.

up front and Ford truck drums in back. Flat, because he has an intricate underhung suspension on the vehicle that discourages diving or rolling. Each pair of wheels hangs from suspension points five inches below wheel centers.

Getting back up to speed, you notice that the Comet has a good ride, neither soft nor stiff, and that there's little noise and no vibration at fast highway speeds. This could be a good distance car. If you want entertainment there's a 24-volt radio with speakers tucked in both doors. If the shadows grow long, you've got your choice of three headlights. Two are aircraft landing lights for ordinary duty. The third, hinged behind that Cyclopean open port in the hood, is a ferocious searchlight that will burn your hand at a foot's distance. Flicking a toggle swings it down into position.

Power deck lid. Driving a roadster can be pretty chilly. You glance at the temperature gauges and note that the coolant, 90 percent ethylene glycol and 10 percent water, is running at its normal 220°. There's plenty of heat in the machinery, but no heater. So at Cramer's suggestion you touch a switch on the smaller switchboard. A Chrysler convertible-top mechanism boosts the rear deck lid a few inches and warm air floods into the cockpit from the cavernous trunk area.

There's a lot of machinery out back, enough to outweigh the 1,380-pound engine by a great deal. You stop by the roadside and Cramer takes you on a tour of the trunk. Besides the big transmission and power train underneath, there are two 30-gallon fuel tanks, a hefty fuel pump, a large coolant expansion tank, an oil filter the size of a small keg to cope with the engine's 32 gallons of oil, two 12-volt storage batteries, and a huge radiator from a diesel truck, mounted almost flat.

Cramer touches a button and the rear deck lowers and locks. It occurs to you that it would be interesting to see the Comet streaking off at a distance. Its builder climbs behind the wheel and his hands deftly fly about the switchboards preparing for another crank-up. As he booms away, you start wondering:

Will anyone seriously concerned with ground transport ever try to catch up with the Comet in power? Or is it simply a beautifully executed one-shot custom car?

Watching him light out for the horizon, it seems natural to think of Cramer's Comet as forever bounding across the Nebraska plain, its torpedo nose flashing in the sun, its high tail fins leaving vapor trails. Surely here's one car that isn't ready for taming on an assembly line. END

.....

HOT WEATHER IS COMING....



NEXT MONTH:

Installing an Air Conditioner

WHERE you should locate it, what type you should buy, what size will give the greatest efficiency, how to tell whether your wiring is adequate—you'll find answers to these and other questions in an informative article in the May issue of POPULAR SCIENCE MONTHLY about installing a room-size air conditioner.

.....

PORTABLE LIGHT PLANTS

HI-LO Centrifugal PUMP

Completely self-priming! No foot valve required. Tremendous capacity—100 gal. per min. . . . Special impeller enables pump to handle muddy or sandy water. Simple to operate—simply start engine and watch the water go. Powered by a rugged, easy-starting 2 HP Briggs engine. Pre-lubricated sealed bearings for years of heavy low-cost service. Big 1 1/2" Model. Item 502. Wt. 70 lbs. Factory price. . . . **\$134.50**

2" Model (150 gal. per min.) with 2 1/2 HP engine. Item 502a. 90 lbs. Fact. Spec. **\$154.50**

JET STEAM MASTER

Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. off implements and road machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—milk equipment, etc.

Fully automatic—oil fired with new, built-in lifetime bronze water circulating pump. Draws water from faucet or bucket. Simple and safe—anyone can use it; built-in safety valve. Complete with 12 ft. of hi-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463. Special factory price. . . . **\$329.50**

HEAVY DUTY D-C ARC WELDER

Use as portable or shop welder. Up to 300 amps. Senior model. Made for years of trouble-free, continuous service. Will handle light or heavy jobs. Easily welds up to 3/4" plate using 1/4" rods. Built-in air cooling system. Arc is easy to strike and hold, because of specially designed arc stabilizer. Hi-lo switch and dial control gives wide range of welding heats. Run welder at 2600 rpm. with tractor, jeep or 15 hp. gas engine, or 7 hp. elec. motor. Complete with instructions, guar. and triple V belt or flat pulley. You can pay more, but you can't buy a better welder. Wt. 110 lbs. \$400 value **\$119.50**

WELDING KIT Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at. **\$10.50**

get **BEDROCK** factory prices from **MASTER MECHANIC**

(Item 24)



600-700 WATTS PUSH BUTTON START

115 v. 60 cyc. AC. Powered by a rugged 2 HP easy starting Briggs engine. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require

up to 700 watts. Ideal for television and radios. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24.) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. Reg. \$275 value. . . . **\$143.50**

1000-1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine with 50% greater output. . . . **\$199.50**

PORTO-POWER

1500-1750 Watt Plant 115/130 v. 60 cyc. AC. Push button start. Powered by a 4.5 HP Briggs engine. Combines compactness and easy portability with higher output for handling heavier starting loads. Ideal for operating oil burners, sump pumps, freezers, television, lights, communication systems, etc. Perfect for contractor's power tools. Wt. 146 lbs. (Item 20). . . . **\$279.50**

MASTER-LITE 2500 Watt Plant 110/120 v. 60 cyc. AC. A powerful plant, ruggedly constructed and yet designed for easy portability. Can be started by rope or built-in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.10 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacle. An ideal plant for permanent or stand-by service. Wt. 225 lb. Reg. price \$645.00 (Item 21) Factory Price. . . . **\$329.50**

Dual Voltage 110/220 available for above plant for \$30.00 additional.

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110-120 v. 60 cyc. AC. absolutely the best made—exclusive dynamically balanced armature; heavy windings develop up to 5000 watt overload for motor starting. Skid mounted—portable. Powered by an easy starting Briggs or Wisconsin 6 HP engine—complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty. (Item 31) Wt. 210 lb. Reg. price \$585. Special at. . . . **\$299.50**

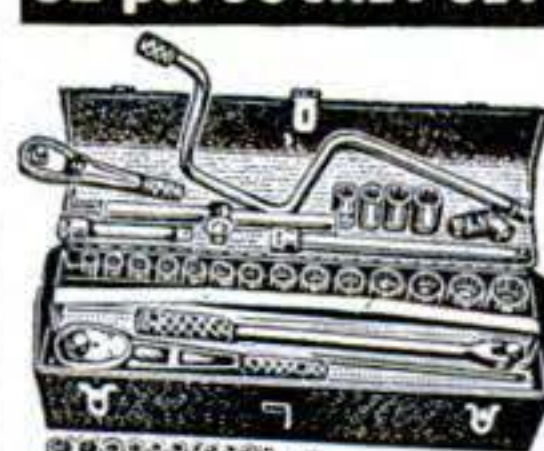


Variable Speed Selector

Heavy duty, made by B. F. GOODRICH for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists—any operation requiring variable speed. Employs reliable "trouble free" planetary system. No hydraulic power losses. Infinite range, smooth operation, easy installation. 3 sizes: 1/2-1 hp. 36 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs.; Reg. list \$228, \$252 and \$352. Our prices **\$79.50, \$89.50 and \$114.50**



52 pc. SOCKET SET



Highest quality, guaranteed non-breakable sockets made by Husky. Beautifully matched chrome thin wall alloy absolutely the best. Contains a complete set of 28 sockets in 1/2" drive, 3/8" drive and 1/4" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. A beautiful set of tools that will handle any job; in a big doghouse steel box. Wt. 17 lbs. (Item 205) List price \$62.90. Factory special. . . . **\$27.95**

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Send check or M.O. Prices f.o.b. Factory. 10 day Money back guarantee. SEND 10c for . . . **BIG 1955 Catalog** **MASTER MECHANIC MFG. CO., DEPT. 34-K Burlington, Wis.**

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TERRIFIC POWER

- Guaranteed Power Sander
- 25 Sq. In. sanding area
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- 14,400 strokes per minute
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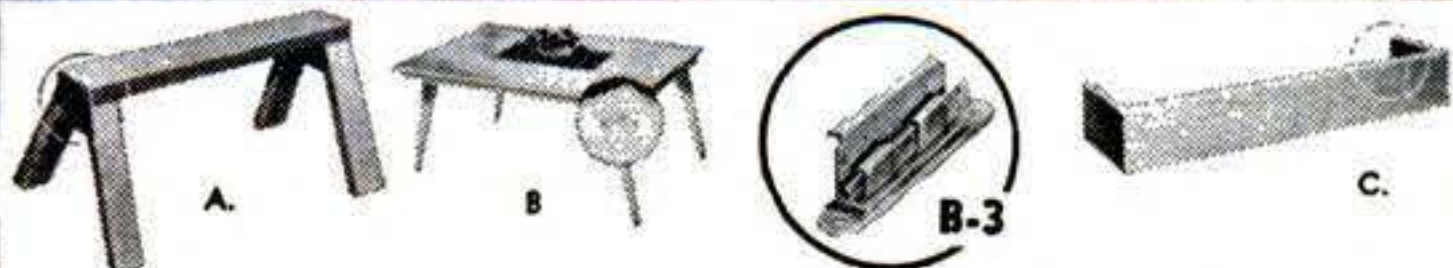
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- This soldering gun value unequalled on today's market

ACT NOW while these prices are still in effect!

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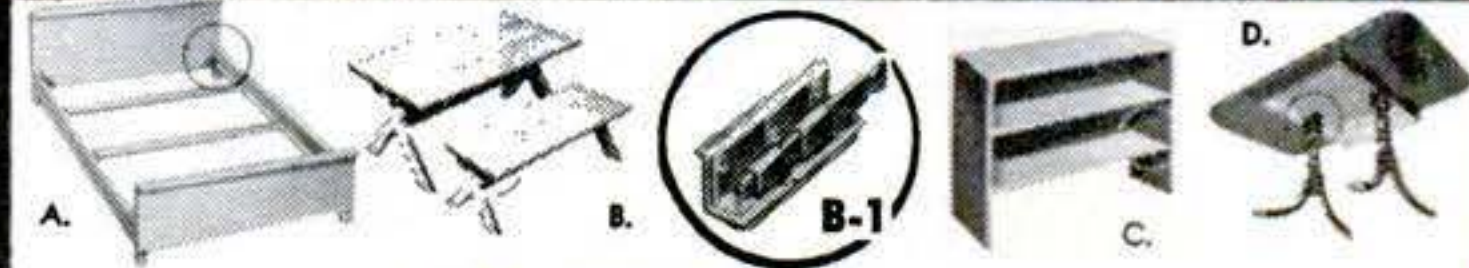
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- A. SAW HORSE—4 connectors needed.
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PRICE 25c EA.



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INTERLOCKING CONNECTORS permit easy, instant assembly and dis-assembly of furniture. No special tools required. Results in rigid construction and greater strength



8 connectors needed for all types of NOVELTY TABLES (2 connectors per leg).

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4 S-1 connectors and 4 S-2 connectors needed for all types of SHELF TABLES. Prices:

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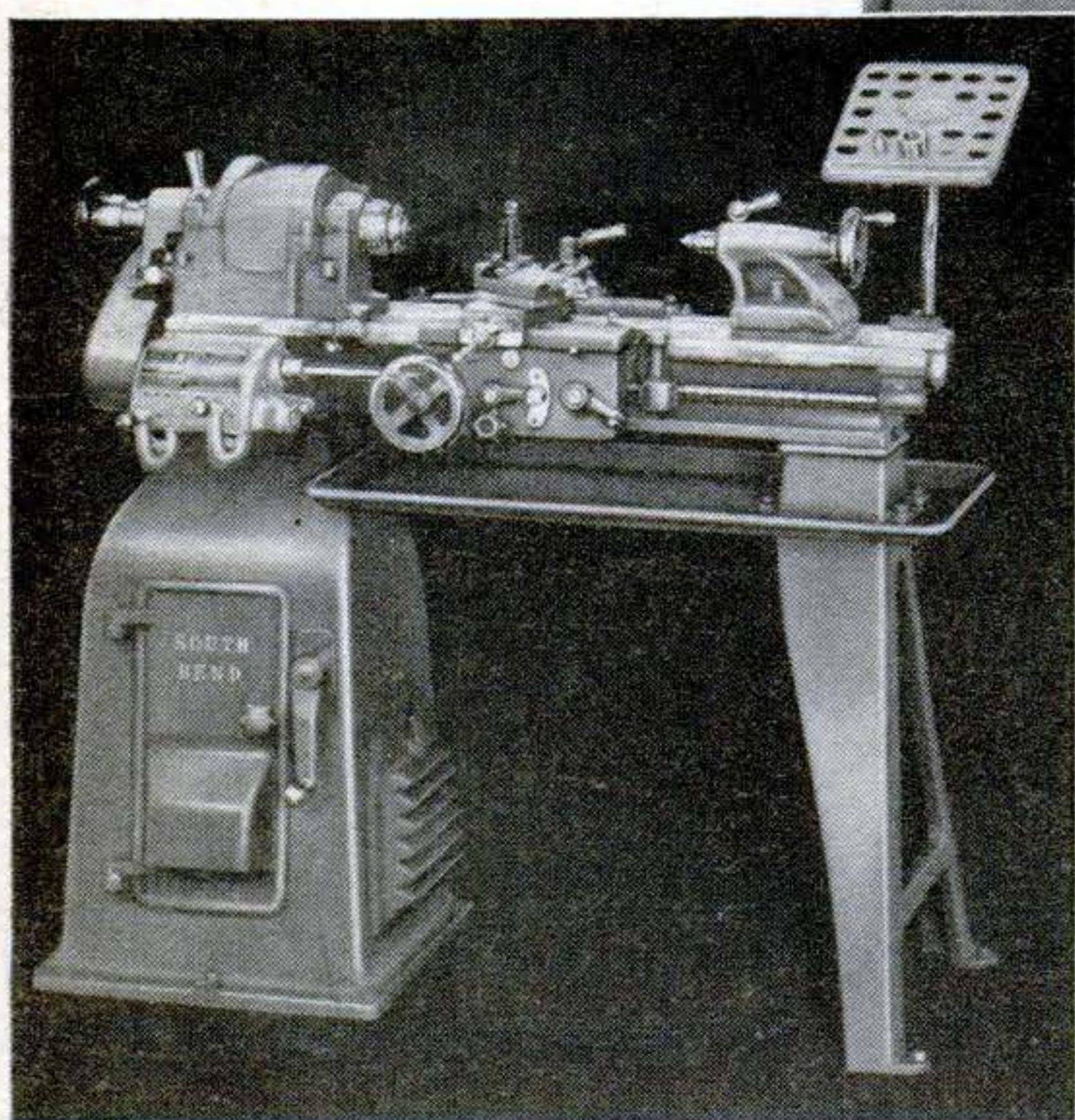
QUANTITY	CONNECTOR	QUANTITY	CONNECTOR
_____	B-1	_____	S-1 & 3/4" screw
_____	B-3	_____	S-1 & 1" screw
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Look what **FORMICA** did for Mother's Old Chest and Daddy's Army Foot Locker

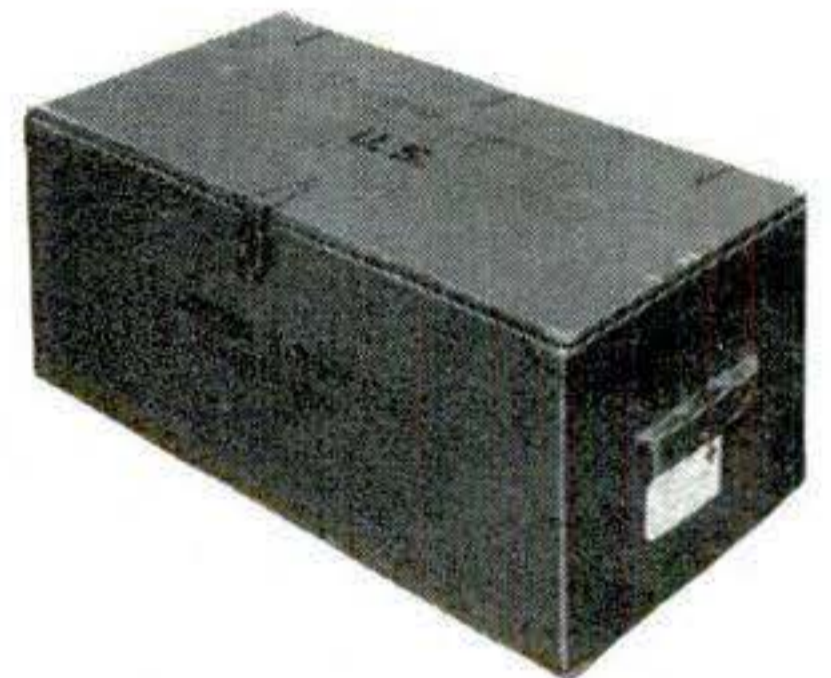
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NEW MOBILE**

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TRADE MARK

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OBSOLETES UNSIGHTLY OLD-FASHIONED TRASH BURNERS

Indestructible Armco Aluminized Steel . . . Attractive and Stays That Way . . . Can't Scorch Lawn or Driveway . . . Roll It Where You Want It . . . Light It and Leave It!

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Park it anywhere for handy accumulation of contents . . . holds 3 1/4 bushels.



Wheel it to the leaf pile — burn them on the spot — can't scorch lawn or driveway.

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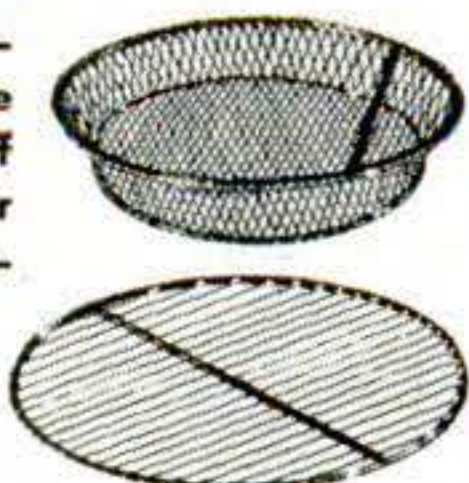
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Just invert combustion dome which seals off inside of burner and insert charcoal grill.



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