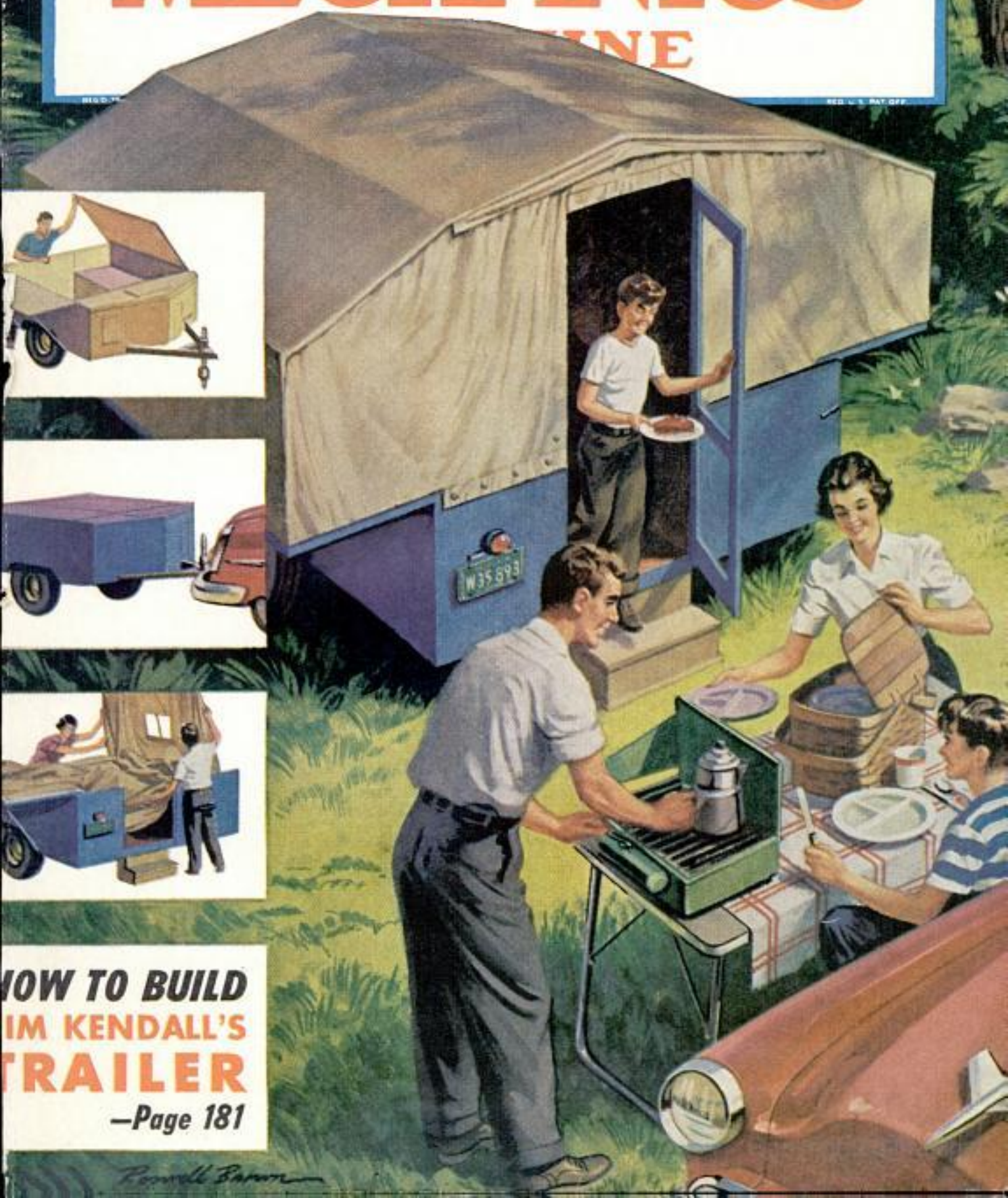


POPULAR MECHANICS

LINE



**HOW TO BUILD
MIM KENDALL'S
TRAILER**
—Page 181

Ronald Barron

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MAY 1954

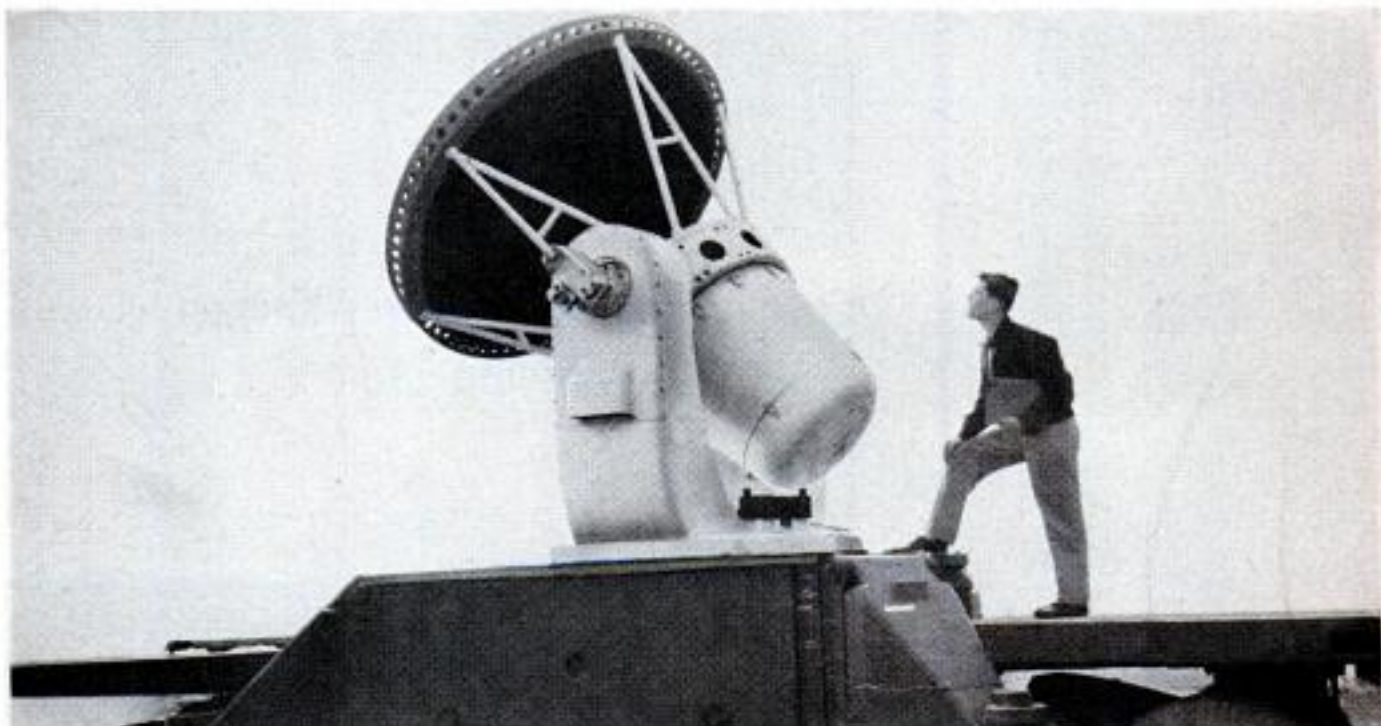
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ny gied material



TELEPHONE SCIENCE GUIDES A **PUNCH**

NO ENEMY CAN DODGE



(Upper left) — Nike's missile climbs to destroy an enemy, under guidance of complex electronic controls. A radar is shown at right. Nike (pronounced Ny'kee) is named after the Greek goddess of Victory.

Is it possible to guide an anti-aircraft missile so that it will track down and destroy a rapidly maneuvering target? No one knew the answer for sure when the U. S. Army put this question to Bell Telephone Laboratories in 1945.

The special skills and techniques developed to create the nation's communications network uniquely fitted Bell scientists to answer this question. They recommended a new system, Nike, and then worked to bring it into being with

engineers from Army Ordnance, Western Electric Company and Douglas Aircraft Company.

The first Nike installation has been made, and more will follow. Thus, America's defenses grow stronger through a new extension of frontiers in the communications art. It is a proud achievement of the knowledge and skills first developed at Bell Telephone Laboratories to make the nation's telephone service ever better.

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Popular Mechanics Magazine

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H. H. WINDSOR, JR., Editor and Publisher



this month's cover

Roughing it deep in the North woods is like camping in the backyard for the Jim Kendall family. Now they enjoy the independence of both motel and restaurant in a compact, collapsible camping trailer that sleeps four. Craftsman Jim, who teaches machine shop at Oak Park High, Oak Park, Ill., tells how you, too, can rough it in style with a copy of his "motel on wheels"

next month . . .

It's one of the forgotten stories of human ingenuity—the logging of the biggest trees on earth, 50 years ago. With little more than a hand ax, how could you fell and move a tree 30 feet in diameter and 300 feet high? You'll learn how it was done in the story "When the Giants Fell"

Information not listed on articles in the index, starting on page 12, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge. A copy may be obtained by writing to the Bureau of Information, Popular Mechanics, 200 E. Ontario, Chicago 11, Ill.

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Volume 101 MAY 1954 Number 5

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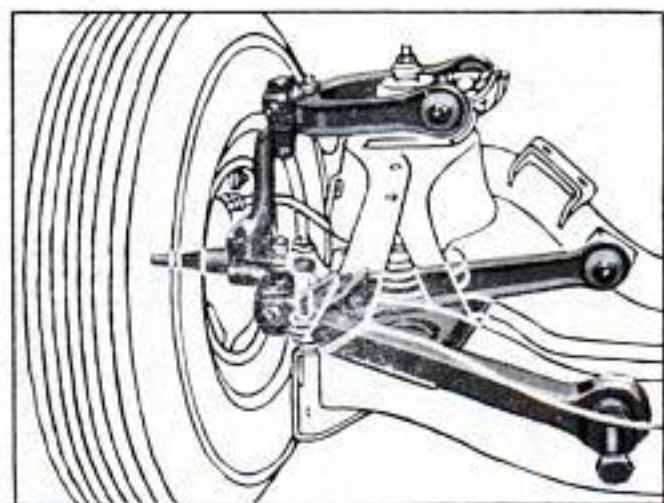
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Quick facts about

Ford's new Ball-Joint Front Suspension



SIMPLER DESIGN

The kingpin on which each front wheel turns right or left in conventional systems has been replaced. Gone, too, are the "hinges" on which the wheel moves up and down. Two simple ball joints now take care of *both* motions.



LONGER LIFE

Ford ball joints (two for each front wheel) are completely sealed against dirt and water by a unique rubber-and-metal shield at each joint. This keeps wear at a minimum . . . aids in retaining that new-car "feel" longer.



It's the greatest riding and steering advance since independent front wheel suspension. It makes all handling easier . . . absorbs road shocks far more effectively . . . keeps wheels in line longer.
And only Ford in the low-price field has it!



EASIER HANDLING

In steering, each wheel turns on ball joints instead of on a conventional kingpin. Ford ball joints are self-aligning, can't stick or bind. They're spring-loaded, too, to compensate for wear and keep steering consistently easy.



QUICKER SERVICING

Ford's new ball-joint system eliminates 12 of 16 points of wear found in conventional suspensions. Thus, there are only four lubrication points. Rubber bushings at inner ends of control arms insulate chassis from road noises.

IT'S JUST ONE OF FORD'S MANY "WORTH MORE" ADVANCES

Ford's new Ball-Joint Front Suspension, teamed with Ford's all-new chassis, new springs and shock absorbers and hulltight Crestmark Body, brings you the most comfortable ride ever in a low-priced car. And Ford's new 115-h.p. I-block Six and 130-h.p. Y-block V-8 are the most modern engines in the industry!

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in this corner.....

THE EDITORS



"Cat" Inspires "Kitten"

Walter G. Lamb, an engineering student at U.C.L.A., has designed and built a miniature catamaran powered by an outboard motor. Lamb's craft was prompted by Gar Wood's big catamaran *Venturi* (PM, Oct. 1949). The designer of the miniature "cat"



Gar Wood's 188-foot *Venturi* inspired Lamb to build a 20-foot catamaran powered by an outboard motor

says he'll match her against any conventional hull of similar size, weight and power. The top speed for his craft is 25 miles per hour when powered by the 16-horsepower motor. There's a roomy cabin and a large open cockpit astern for fishing. Now Lamb is designing racing runabout versions of the catamaran.

Army Maps Fish

Servicemen serving in the American Occupation Zone of Austria are participating in a unique fish-reporting program. The goal is to restock the lakes, rivers and brooks in the Zone while enjoying good fishing. Every serviceman who wants to fish pays a small fee to the provost marshal for a license. The money thus collected is turned over to the Austrian government for the restocking program. The real novelty of the plan is the compulsory fishing

(Continued to page 8)

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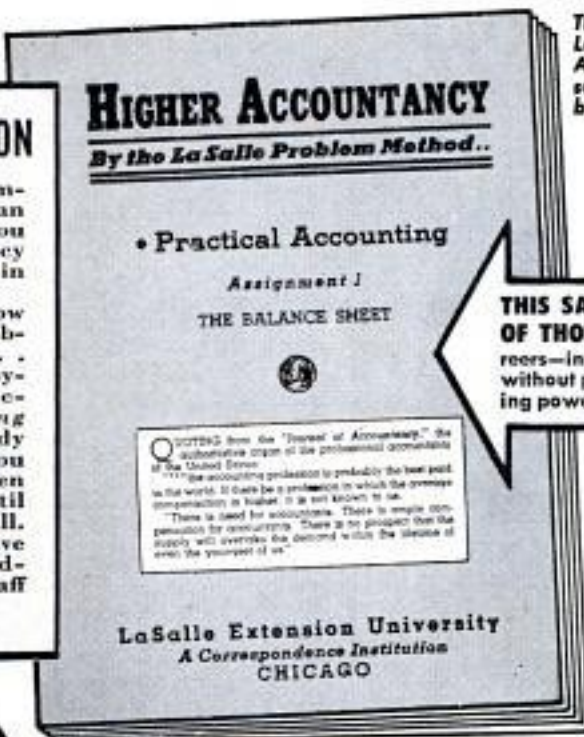
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(Continued from page 6)

map. Each serviceman who has any luck must report his catch on a standard form, listing the species, length or weight and geographical area where the catch was made. On the back of the form is a map of the Zone with each fishing area numbered,



so he can locate his catch geographically. By tabulating the information on the forms and plotting it on the map, military authorities can indicate to Austrian officials the areas that might become "fished out." This greatly simplifies the restocking program. The result: Better catches for servicemen while they're in Austria, and lakes and rivers teeming with fish when they leave.

To the Editor:

Scientists claim that at 300 miles from the earth's surface the temperature is 4000 degrees, increasing outward as a result of cosmic-ray activity. If this is so, there is no metal that could withstand disintegration in outer space. This seems borne out by the disintegration observed in the long trails of matter following comets. Meteors are reduced to relative pebbles when they reach the earth occasionally as meteor remnants. This condition never seems to be mentioned in the stories and speculations about interplanetary and space travel. Of course, if it is so, it would nip all such space fancies in the bud. Does this disintegration by cosmic rays constitute an insurmountable obstacle?

Alliston Cragg
Charleston, W. Va.

Individual molecules of air at 4000 degrees would strike the hypothetical space ship, but there would be so few of them that one authority says the heat in thousands of cubic miles of this thin air would not raise the temperature of a space ship by a thousandth of a degree.

(Continued to page 10)

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(Continued from page 8)

To the Editor:

The picture of the "Electrical Music Mentor" in the October, 1953, issue reminded me of the trouble encountered in learning to play a piano. To make this possible I designed a device which projects a moving score of music on a screen. The score



appears in one of two forms, classical or simplified. Familiarity is acquired by running the machine at slow speed. It shows the player what to do and when. The picture shows the writer playing the piano with the aid of the device. Only one of them has ever been built.

F. Thannhauser
 Royal Oak, Mich.

To the Editor:

A long time ago a certain saying rang through the households of this country: "What this country needs is a good five-cent cigar." Every time a woman gets into my small car she says, "Now this is what I need."

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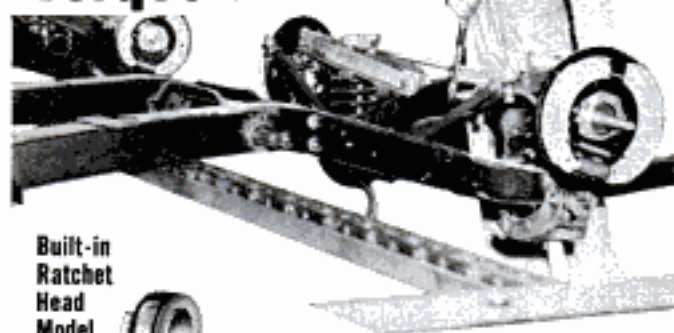
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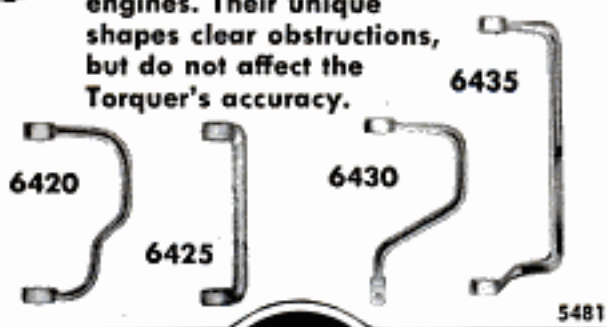


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INVENTORS

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.

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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.

CLARENCE A. O'BRIEN & HARVEY JACOBSON

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Radio-Television, Electronics

Television today (Color TV sets in production: Admiral Corp., 3800 W. Cortland, Chicago; Midget private-wire TV system: RCA Victor, Radio Corporation of America, Camden, N. J.; Tubes for color TV receivers: General Electric Corp., Syracuse, N. Y.)	161
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☛ The capture of a six-foot shark more than 2300 miles from the ocean, in the Peruvian headwaters of the Amazon River, has been reported recently by Stanford University ichthyologist George S. 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.

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(Continued from page 10)

The small car also requires seat covers that can be washed with soap and water, stainless-steel trim or no trim and enough room for the children and market bags. This small car should be short and narrow. On the errands of a woman there are many parking problems.

A woman does not ordinarily buy a car in the way her husband buys one. He likes to buy the most powerful, shiniest, fanciest and longest. When a lady buys a car she looks at the dashboard and the upholstery. She then asks the salesman about the motor and brakes. He explains everything. Most of this she does not understand but she tries to look wise. She wants to know how many miles to the gallon. The salesman tells her the length of the car and he closes the front door so she can hear how solidly it is built. She asks again about the length. His statement will haunt her every time she parks this beautiful car. She asks him if he has anything shorter as she just wanted something in which to go to the store.

Eventually she wonders what she is doing in this powerful machine. She wonders why she averages only 15 miles a gallon. She wishes she had a small car but her husband said the big car was safe.

Every driver of a small car will vouch for its safety. When a woman drives a small car over 50 miles per hour she feels as if she is in a jet plane and slows down. She finds that when a driver wishes to pass her he will blow the horn. She can be as far over to the right as she can get—but he will still blow the horn. He is afraid he might hit the little thing and he *does* want her to see a *big* car go by. If the small car wiggles itself ahead in traffic—and it usually can—the driver to be afraid of is the one you just passed. He is going to show *you* when the light turns green. He almost hits another car to prove that his car has IT, and he smiles at you in his rear-view mirror.

The small car is a necessity to suburban living. Give women a car they can skip around in. Give it an all-steel body, a short wheel base and, if trim is necessary, stainless steel. Give it a washable interior, a four-cylinder motor, a small gas tank, excellent brakes and paint it a color which can be seen—no middle-value colors.

A few months ago you featured an article on the future of small cars in this country. The opinions of the three or four men discussing the situation resulted in the statement that there was not too much possibility of marketing such a car.

Nobody even asked the women!

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How to banish the fear of Unemployment



I know the thoughts that go through the heads of men who work for others. I was in that spot myself. What if a depression comes? What if we have a strike? What if the boss turns against me? What would happen if I got sick — or hurt? These are the thoughts I had — the thoughts that must come to any serious minded man who has the responsibility of a family. My problem was solved the day I started in business for myself. Might that be your solution, too?

By Raymond E. Brandell

Years ago when new acquaintances asked me what I did, I used to reply with a laugh, "I'm a wage slave." Inside me I was pleased with my lot because it gave me a feeling of security to know that that same pay check was coming in every Friday, rain or shine.

"Rain or shine" was what I thought until the blow struck. I wasn't among the first to be laid off because I had been on the job three years. Some of the "juniors" went first. But eventually my day came, too. For many weeks I looked for other work. Finally, one grim night, I sat down in my bedroom alone and faced the facts. I was a dependent. I was dependent on the vicissitudes of business. I was dependent on the whims of a boss. I was no more important than a tool that could be picked up or laid down. And, when the foreman laid me down, it was no more important to industry or to the world than if a man had laid down a screw driver. The joke about being a "wage slave" had turned on me.

That black night was the turning point. I decided then that my only salvation was to start a business of my own. Even if I had to half starve, at least I would accomplish two things: I'd free myself from the ups and downs of other peoples' businesses. And I'd be a slave no longer. I would taste the sweet nectar of independence. What I made would be my own. The hours I worked would be my decision. Suddenly, for the first time, I knew the fierce joy that comes to every small business man when he looks around his shop and says, "This is mine."

The decision was one thing. The accomplishment was another. And many and many's the time I thought, "If I had only started a little business on the side before all this happened—how much further along I would have been when the shop closed down."

The going was rough. The opportunities then were not what they are today. Today there are a dozen

small business opportunities to fit the skills and leanings of almost anyone. There are many little businesses that can be started at home, in spare time, without risking the job or sacrificing the pay check. One of the liveliest of these is a particular branch of the Plastics business. And one of the most interesting, too.

When you think of Plastics, you probably think of the enormous plants that have sprung up around the magic of today's synthetics. Plant equipment alone calls for investments of millions of dollars. Obviously not a business for a beginner. But this one special branch of the business is one that will never be invaded by the big moguls of the trade. They can't touch it. And, fortunately, it's a branch of Plastics that can be fabricated on a small, inexpensive machine that can be set up in any corner of a room where you have an electrical outlet and a cold water faucet. Kitchen, garage, basement, even a spare room if there's a sink and an outlet.

I have been a success in my business. What is even more important, I have been a happy person, because it worked out so that the business that made me independent was the business of helping others become independent, too.

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700-16	6.12	760-15	5.82	750-15	10.52	900-20	17.02
750-16(6)	8.62	800-15	6.32	825-15	12.62	1000-20	17.52
825-16	4.62	820-15	6.32	600-20	8.52	1100-20	17.02
550-17	4.62	670-16	6.22	650-20	9.92	1100-22	18.32
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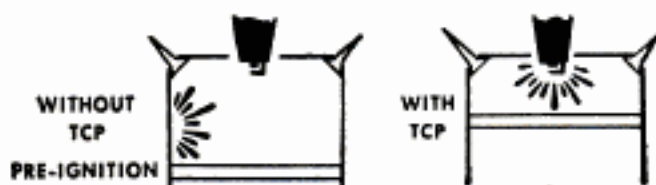
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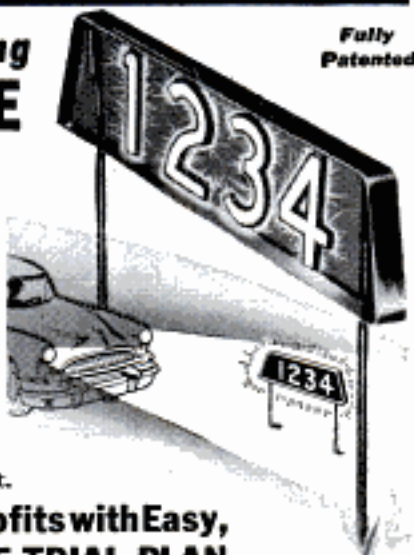


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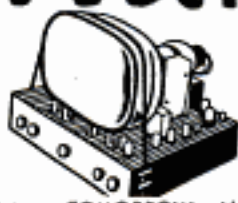
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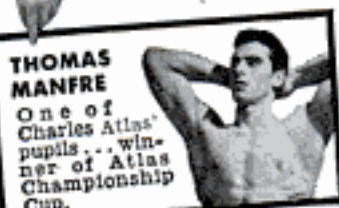
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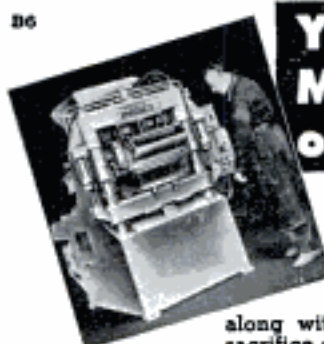
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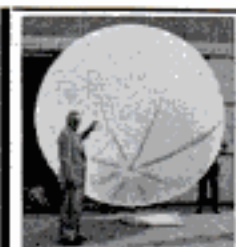
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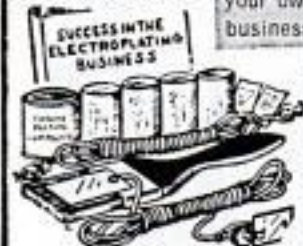
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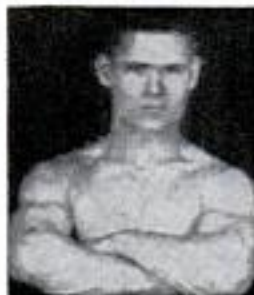
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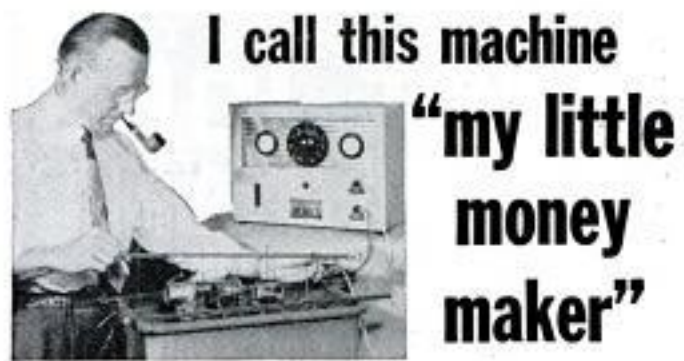
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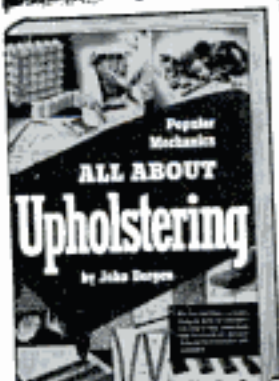
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- prevent loss of power, compression
- save 15%-25% on oil . . . without ever changing your oil filter

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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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 and fittings (install on any car in 10 minutes), send make, year and model of your car and \$12.95 (we pay shipping).

For conversion kit, which replaces your present filter pack with Lifetime bronze, send make and number of filter and \$6.95 (we pay shipping).

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. FPM-5
CONTINENTAL MANUFACTURING CORP.
Washington Blvd. at Motor Ave., Culver City, Calif.

Ship complete unit conversion kit

Make, model, year of car: _____

Present filter make (if known) _____

I enclose \$12.95 for complete unit (\$18.95—chrome)

\$6.95 for conversion kit

\$2.00 deposit; send C.O.D.

Name _____

Address _____

City _____ Zone _____ State _____



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SUCCESS In mailorder if you follow our suggestions. Informative treatise 25c. Griffie Enterprises, Box 91, Station D, Toledo 8, Ohio.

MAKE Rubber stamps. Big profits. Instructions 25c. Scoone's, Box 664P, Miami 38, Florida.

MAILORDER Home business using free advertising method. Information free. H. F. Seidel, 7070 Hollywood Blvd., Hollywood 28, California.

IMPORT-Export: Opportunity, profitable, world-wide, mail-order business from home, without capital; or travel abroad. Established world trader ships instructions for no-risk examination. Experience unnecessary. Free details. Mellinger 705, Los Angeles 24.

SEWING Machine—Repair, sales, servicemen needed. Previous experience unnecessary. Operate home setup. Spare, full time. New zigzag machines, motors, parts, etc., supplied. Write today. Taylor Service Co., Hamilton PM-5, Ohio.

MONEY, Typing, sewing! Details free. Edwards, 3915-PM, 12th, Des Moines 13, Iowa.

EARN \$2 Hour! I do—making sandals. Young's, 1308-PM, South First, Arcadia, California.

MONEY Getter's magazine! Read it! Learn how you can make money at home by mail! Crammed with money-making ideas, discounts, benefits, special services included free! Sample, 25c; 6 months, \$1; year, \$2. Magazine, G.P.O. Box 972, New York 1.

\$1.00 GUARANTEES You a life time business or your money back upon returned catalog before ten days. This is an appliance business. All popular brands including popular brand jewelry. You buy direct from the wholesale house. This is no gyp outfit. You can start selling to your friends, then go into your own mail order house business. You cannot be undersold. You buy direct from the wholesale house. We are not at liberty to give you the wholesaler's name until you get the catalog. F. Reiser, 19-21 White St., Paterson, N. J.

OPERATE Escalator mailorder system, selling our products or any products. Fastest, most revolutionary mailorder system known. Write: Selbyco, Decatur 156, Ill.

START A lettershop on a shoestring! Sales \$56,000. Started \$36.00. Information? Merritt, Box 13, Basking Ridge, N. J.

START Proven home business with little or no capital, without risking those hard earned dollars. So simple you begin making big full or sparetime profits at once. No stock, no advertising. Complete plan only \$1. D. J. Manning, 120 West 56th St., Bayonne, N. J.

\$1,000 MONTH Raising earthworms. Instructions 25c. Wiggler Farms, Burt 3, Michigan.

MAKE Big money! Operating home mail-order business. Sparetime, small capital. Jackson, Newfoundland 8, Kentucky.

NEWSPAPERS. Turn them into cash. Eighteen methods. Instructions 50c. Charles Company, 12-DBY, Norwood, Ohio.

"MAIL Order World" and "Opportunities Preferred" combined. Become a co-publisher. Low cost. Earn profits on advertising and subscriptions. Sample copy 25c including detailed instructions. Beecher Publications, Box 2161-B, Cincinnati 1, Ohio.

RAISE Orchids—At home. Big profits. Fascinating. Year 'round any climate. No greenhouse. Instructions, including blooming-size orchid plant, sent for no-risk examination. Free details. Flowerland, 4622-DY, Wilshire, Los Angeles 5.

NEWEST Spare, full-time home business. \$5 to \$10 hour possible. Paint with suede—The finish with touch and eye-appeal. Beautify auto dashboards, signs, radios, toys, figurines, lamps—1001 others. Complete, step-by-step instructions sent for no-risk examination. Free details. Coast, 1004-MT So. Los Angeles St., Los Angeles 15.

FREE! "301 Profitable Small Businesses!" Amazing shoestring plans! Work home! Start sparetime! Deumant Surveys, Kenmore 23-PM, N. Y.

OWN A garden golf business. Experience unnecessary. Brockway, Seaside, Oregon.

PRINT Without a printing press! Amazing new method! Print colorful signs, banners, cards, posters, glasswear; anything at home. Big profits. Money-making opportunity! We supply everything. Beautiful sample, home-business plan free! Write Screen-Print Company, Los Angeles 15, California.

SAWDUST. Turn it into cash. Twenty methods. Instructions 50c. Charles Company, 12-DBW, Norwood, Ohio.

\$900 A Year sparetime sharpening saws at home. No selling. Hardware stores get saws on commission basis. Free booklet tells how. Victor Foley Company, Columbia Heights, Minnesota.

START Your own business at home. Sell subscriptions for popular magazines. Liberal commissions. Send for supplies, etc. DeSales Magazine Service, 60 East 42nd St., New York 17, N. Y.

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. 500B, Mount Morris, Ill.

OVER 700% Profit making finished photos in 2 minutes on the spot in daylight without darkroom. No experience needed. Simple directions teach you quickly. Write P D Q Camera Co., 1161 N. Cleveland Ave., Dept. PM, Chicago 10, Illinois.

TIN-Cans. Turn them into cash. Nine methods. Instructions 50c. Charles Company, 12-DBX, Norwood, Ohio.

IMPORT! Export! Profitable details free. Warner's, Box 6, Ft. Scott, Kansas.

BE Independent! 20,000 words \$2.00. Satisfaction guaranteed. Taylors, Box 206-T, Three Lakes, Wisconsin.

EARN \$5 Hourly contracting floor sanding; evenings, weekends, fulltime. Machinery sold. Nothing down, balance monthly. Rader, Box 8436, Kansas City 14, Missouri.

MAKE Money! 50 ideas free. Boyer, 65 Uptown, Hoboken, N. J.

LEARN Auctioneering. Sample lesson free. Homestudy or residential. Nelson Auction School, Renville, Minnesota.

SELL Popular Mechanics and all other magazine subscriptions. Free catalog, supplies. Subscription Service Company, Dept. A, P.O. Box 2070, Birmingham, Alabama.

\$26,500 SALES in two weeks! Amazing radio-mail order method. Free details. Broadcast Service, 1413-P Great Northern Building, Chicago 4, Illinois.

NO Investment. 1000% profit. Complete laminating outfit, 25 salesplans, mailorder, \$1.00. Permaco, Box 6346PM, Philadelphia 39.

MONTHLY Repeat business which you can operate in your own community. For free details write Grosak, 321—28th Street, McKeesport, Penna.

WANTED! Home producers, by manufacturers in our clearing house service. Become subcontractor, casting plastic products for these companies. Thousands of easy-to-make items required for consumer-industrial use. Cash in at home, without previous experience. Plastic Service Associates, Dept. 5-PM, East Boston 28, Mass.

ELECTROPLATE Auto parts, novelties, mirrors, baby shoes. Easy, inexpensive home processes. Free booklet. Tyco Metals, Box 12321-MM, Houston 19, Texas.

PROFITABLE. Fascinating mailorder opportunities in your own home. Free brochure. Lorimer's, Box 2429, Greensboro, N. C.

EXCLUSIVE Franchised distributor. Amazing crushed cedar! Applied like paint. Cedarizes closets, chests, drawers. Hardware, paint, builders' dealers, contractors large buyers. Low cost, big profit potential! Attractive bags. Write for sample, details. Plant, 90-A Summit Ave., Brookline, Mass.

MINIATURE Trees—Why pay \$2.00—\$10 for growing secrets? Free details. Tiny Trees, 5038 N. Winthrop, Chicago 40.

MAILORDER—Can be operated from any home on very little capital. For free information write R. A. C., Box 103, Elkhart, Ind.

MAKE Perfumes, other products. Sell mailorder. Formula catalogue free. International, 6347 Farnell PM-5, Chicago 21, Illinois.

WHAT'S Your field of interest? Whatever it is, specialized magazines will help you get ahead. Examine current copies of those covering your field through our easy-to-get-acquainted service. Choose from 4,387 covering all fields—business, trades, agricultural, professions, insurance, real estate, music, educational, hobbies, sports, etc. Current list free. Commercial Engraving Publishing Company, 34C North Ritter, Indianapolis 19, Indiana.

ADVERTISING Book matches—Cash in on big demand; sell union label matches. Cuts for all businesses and political parties. Free powerhouse selling kit, low prices, protection guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. MX-554, 7530 Greenwood, Chicago.

MONEY Getters club! Receive 1,000 or more different money-making propositions. Year's membership now only 25c. Satisfaction guaranteed or money back. Storm-Associates, Cedarville, New Jersey.

FLORIDA Opportunities! Hundreds of jobs, businesses, farms, groves, homes. Free details! Florida Opportunity Bulletin, Box 456-N14, Coconut Grove, Miami 33, Florida.

BUILD Luggage and cases at home. We sell your products. No special equipment needed. Free details. Cascraft, 805-P5 Sunset Blvd., Los Angeles.

MAILORDER. Operate profitable home business. Free details. Guymon Direct Sales, Dept. 25, Box 535, Guymon, Okla.

BOOKKEEPERS. Keep books, small firms spare time. Manual latest technique by C.P.A., \$3.00. Modern Business, Box 406, Youngstown 1, Ohio.

FREE Literature describing many money-making plans. H. A. Steinmetz, 132 Berkshire Ave., Bridgeport 8, Connecticut.

REINK Typewriter ribbons. Special black ink with applicator, 50c coin. Feature Service, Drawer 791, Chicago 90.

HAVE Home mail business—Get red hot plans, ideas that assure big earnings. Write: Norman, 896 W. Aldine, Chicago 13A, Ill.

BUILD 3 Bedroom home—\$590.00. Itemized details free. Buildit, Box 322, Arkansas City 1, Kans.

MAKE Money at home doing easy pleasant work. Everything furnished. Good earnings. Write: Murray's, Box 4006, Mott Park Station, Flint 4, Michigan.

SELL To women by mail from your home—Repeat order merchandise. Everything furnished. Big profits. Mohawk, 37A, Second, Amsterdam, N. Y.

EARN Extra cash operating sparetime circular mailing service. Money-making information furnished. Jennings, 1540 First, Sarasota, Florida.

DEPRESSION-Proof business—Make tough, durable plastic of waste, easily. Makes attractive, resilient floors, walls, built-ins. Stucco. Build for half. Bays Laboratory, Oklahoma City 9.

GET Newest, best merchandise, book mail selling offers. National, Box 88A, Dorchester 22, Mass.

BUY Wholesale. Hundreds nationally advertised products. Watches, housewares, jewelry, appliances, etc. Save. Make money. Free details. National Buying Service, Radio City Station, Dept. M, Box 324, New York City 19, N. Y.

PRINT For profit at home. Amazing new method prints colorful posters, banners, greeting cards, glasswear—anything. Hundreds at time. No press needed. No art. Fantastic profits! Need representative your area immediately! Free home-business plan. Screen-Print, Los Angeles 15, California.

MAKE Money at home—Mail cards, circulars feature real merchandise. Everything furnished. Big earnings. Philip's, Box 3-P, Boston 22, Mass.

MAKE Money by mail order. Free catalogue shows how. Details free. Opportunities Unlimited, Dept. 6, Box 1576, Boston, Mass.

MAKE Perfumes, other products, home. Carelabs, 1914 Chouteau-PM5, St. Louis 3, Missouri.

SELL By mail to auto owners—Everything furnished. Eastern, Box 142P, Dorchester 22, Mass.

FREE Wholesale catalog! Make up to 500% profit! Novelties, gifts, premiums, costume jewelry, wrist watches, housewares, name brand merchandise. No junk, sell to stores or individuals. Write for catalog No. 5. Heath Distributing Company, 306 Broadway, Macon, Georgia.

QUATEMALAN Typical handmade products: Excellent gift shop items. (Leather bags, belts, skirts, Indian dolls, baskets, etc.) Mail orders filled. Dealers inquiries invited. Write airmail for free catalog. Mapilon, Box 268, Guatemala, C. A.

MAKE Perfumed stationery. Profitable local-mailorder business. Sample free. Renzi Press, 24-R North 7th, Newark 7, New Jersey.

BREED Parakeets at home. Sensational big profit opportunity! Free confidential details. Parakeets, Box 2127, Inglewood, Calif.

EARTHWORM Breeding! Extra money! Big money! First get unusual true story, "An Earthworm Turned His Life." Send dime. Earthmaster System, 8D, El Monte, Calif.

EXPORT American products to Middle East markets by mail. New ways to import Eastern goods. Write to: A. Majid Shamkani, Margil, Basrah, Iraq.

COMPLETE Rubber mat factory. Power machines. Make mats for homes, factories, stores, etc., from cheap junk tires. In double garage space two people can make \$200 profit per six hour day! We show you how. Total investment only \$2,650 complete. Easy terms. Simmons & Sons, 1619 Prospect, Indianapolis 3, Indiana.

ESTABLISH Profitable automatic shoe shine route. Proven. Write Jiffy Shine, 1630 S. 2nd St., Philadelphia, Penna.

UNUSUAL Mail order ideas, sources. Details free. Fax, Box 241, Brownwood, Texas.

SENSATIONAL Reworking offer. \$44.75 value for only \$8.65. Professional equipment and course. Rush postal for thrilling free details. Invisible Reworking Institute, Dept. 456B, La Mesa, California.

START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, 627-P Linden, Buffalo, N. Y.

AMERICA Is still the land of golden opportunities. Fortunes are still begging to be made. Learn how to establish and operate the business of your own choice. Complete business kits only \$5.00. Details free. Golden Opportunity Business Kits, 2096 Stanley Ter., Union, N. J.

ALASKA Business opportunities. \$1 brings catalog of listings. Write Samuel Fairchild, 246 4th Avenue, Anchorage, Alaska.

DON'T Be Mr. Average Man. Operate your own business. Very desirable, non-perishable, no chemicals or liquids, highly profitable. Write for details. Protecto Products Company, Box #543, Oak Park, Illinois.

START Your own mail business at home in your sparetime with small investment. Proven merchandising methods. No crackpot schemes. Write, Craig, Southern Pines 1, North Carolina.

MAKE Candy at home. We teach by mail to make delicious candy, operate candy shop. Send card for details. Richards Candies, 420 Main St., Stroudsburg, Penna.

BIG Money! Start your own plastic business at home. Spare or full time. (Also valuable liquid marble information.) Free catalog. Write: Bing Products, PM-553, Watertown 72, Mass.

UNCLE Sam tells how to finance and operate many businesses. Copyrighted folio revealing many bargain manuals, \$1. Loan booklet included. A-B Enterprises, 9814 McMillan Avenue, Silver Spring, Maryland.

LIQUID Rubber, make flexible molds. Free sample. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

AMAZING Opportunity! Start profitable collection agency! Become co-partner. Valuable franchise available. Write: Edmondson, Box 4865-P, Atlanta 2, Ga.

MEXICO! Imports! Curious wholesale! Giftshop, collector's items! Sample and price list, 50c! Filmer, 910 Marion, Pharr 10, Texas.

FORTUNES Made raising crickets and fishworms. Sell by mail. Raising and marketing instructions, \$1.00. Breeder redworms, \$5.00 per 1000 postpaid. Carter Farms, Plains, Georgia.

RECAST Old batteries into new. Latest achievements. Battery Laboratories, Minneapolis.

LEARN Metalizing baby shoes, gifts, etc. Bronze, gold, silver. Folio free. Kiktavi, 7217-PM South Broadway, Los Angeles 3.

WHOLESALE Of sensational nationally advertised appliances, silverware, watches, cameras, etc. Start your own business. Full details. Send 50c for catalogue. International Sales Co., 175 Fifth Ave., New York 10, N. Y.

TERRIFIC Home business opportunity. Mail literature featuring real merchandise to new mothers. Everything furnished. Schlott, 219C 5th Ave., Brooklawn, N. J.

START Venetian blind laundry. Profitable lifetime business. New machine. Free booklet. F. C. Co., 442 N. Seneca, Wichita 12, Kansas.

LATEX For molds. Free instructions casting statuary, novelties. Major Chemical, 21 Allerton St., Boston 19, Mass.

CO-Publish wonderful mailorder magazine. Work home. Sample, instructive manual 25c. Dispensa, 2020 Harbor, Ash-tabula, Ohio.

RAISE Rose bushes. Full instructions \$1 cash, check, m.o. Marvin Todd (Nurseryman), Route 7, Box 572, Tyler, Texas.

UNUSUAL Homework opportunity, spinning Angora spartime for us. Men, women. Angora House, PM, Springfield, Illinois.

HOME Business mailing literature to new mothers. Details free. K & M Products, 3634-A Homewood, Toledo 12, Ohio.

12 PRACTICAL Mail order plans 50c. Box 631, Canton, Ohio.

CO-PUBLISH Reliable mailorder magazine. Sample 25c. Details free. Rockaway-Hall Company, Box 95B, Rockaway, Ore.

MILLION Articles wholesale. Supply source directory 25c. Idealer, Park Ridge, Illinois.

HOW And where to obtain capital. Particulars free. Star Service, Wapakoneta, Ohio.

MAKE Money at home. Write, Falcon House, Winnebago 2, Ill.

TO \$40.00 Weekly. Sparetime, home operated mailorder business. Successful beginner's plan. Everything supplied. Lynn, 10420-M National, Los Angeles 34, Calif.

SPARE Time business. No investment. Details free. Howell, 1320 St. Andrew, New Orleans 13, La.

COPUBLISH Mail Sale Advertiser, leading mail order paper. Details, latest copy, dime. Vanroy Shirk, Lebanon, Penna.

EARN Money at home! Homemaker Magazine tells how. Sample, 25c. Sizemore, Box 7, 4917 Kostner, Chicago 30.

DOLLARS In personalized baby record books. Sell by mail. Eleven thousand new prospects daily. Use same literature we do. No-Co-Ro, Oakland 6, California.

MAKE Rubber stamps, repair dolls; learn silk screen printing; invisible reweaving. Catalogue (60 ideas) free. Universal, Box 1076-A, Peoria, Ill.

SCHEMER Magazine, Canfield 1, Ohio, monthly mailorder ideas, plans. Year \$1.00. Sample 20c.

NATURAL Molding rubber, extra thick. Free sample. Flock, tinsel, candle wax. W. Wooley, 115-A Donald, Peoria, Ill.

PLASTERCRAFT Molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Blue Rapids Supply, Blue Rapids, Kansas.

EARN Money! Amazing plans! Easily mastered. Details. Brunst, 216-B West Jackson, Chicago 6, Illinois.

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay \$3.50 lb. We paid Babbitt \$4,165.00 in few weeks. Free book. Washington Mushroom Ind., Dept. 172, 2954 Admiral Way, Seattle, Washington.

COLOR Concrete with chemicals. Marble-glaze cement benches, pottery, garden ornaments. Home — shop. 10c brings sample, pictures. Hollywood Cementcraft, 8527-R Wonderland, Hollywood 46, Calif.

POPCORN And potato chip equipment. Leco, Box 933-A, Springfield, Ohio.

BUY It wholesale! Manufacturers, distributors offer \$30,000 items. Literature free. Olsen, 1231-A East Third St., Duluth 5, Minn.

BOOKKEEPERS. Increase earnings operating sensational bookkeeping service. Kern, 4942 Vineland, North Hollywood, Calif.

\$46 FROM Square foot plywood; jigsaw necessary. Write: Woodarts, Bridgewater, Mass.

BUY Wholesale thousands items. Lists free. Cottage Industries, Omaha 12, Nebr.

\$23 WEEKLY Working two hours daily at home. Lycke, Box 2471-A, Cleveland 12, Ohio.

START Your own profitable home mail-order business! We supply everything! Write today! Studio Products, Box 564-A, Glendale 5, Calif.

BREED Rare tropical fish at home. Earn big money! Learn secrets! Help fill huge demand. Amazing opportunity! Free plan. Tropicals, 1008-F Los Angeles St., Los Angeles 15.

INCOME From local information. No selling. Write Neberco, La Verne, Calif.

RESILVERING Mirrors, formula 50c; two-way lookout mirrors, (No one sees you), 50c; coppered mirrors, 50c. All \$1.00. Nelko-Mir, Box 3462-J, Chicago 54.

START Home manufacturing business. Make cleaners, soaps, polishes, cosmetics. Free literature. Kemix, Park Ridge, Ill.

LIVING Miniature ("Ming") trees only 10 to 20 inches tall. Grow at home. Big profits! Spare time opportunity. Fascinating! Amazing! Write for free seed and plan. National Nursery, Dept. FC, Inglewood 4, California.

MAKE Money spare or full time, casting metal toys and novelties. Big wholesale and chain store demand for autos, soldiers, ashtrays, banks, etc., keeps manufacturers busy. Production moulds furnished for up to 100 and more castings per hour. No experience or special place necessary. Write for information and illustrations of patterns needed. Metal Cast Products Co., Dept. A, 1696 Boston Road, New York 60, N. Y.

NEW Exceptionally profitable plans, ideas for home operated mail business. Rush name. Miller, 1772-P Carlyon Road, East Cleveland 12, Ohio.

GOOD Paying business silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc., by late method. No tanks or shop required. Outfit furnished. Free booklet. Gunmetal Co., Ave. H, Decatur, Illinois.

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

MINK Raising information free. Complete. Lake Superior Mink Farm, Superior, EEL, Wisconsin.

COLORGLAZED Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries Company, Grand Rapids, Minnesota.

FREE Book "505 Odd, Successful Businesses." Work home. Expect something odd! Pacific, Oceanside, Calif.

FIX Typewriters. Free booklet describes our modern, inexpensive home-study course. Factory methods taught. Write Typewriter, Building 1, Tarentum, Penna.

MONEY In new greaseless doughnuts. Start in kitchen. No smoke. Sell stores. Free recipes. M. Ray Company, 3605 South 15th Ave., Minneapolis 7, Minn.

VENDING Machines — No selling. Operate a route of coin machines and earn amazing profits. 32-page catalog free. Parkway Machine Corporation, Dept. 72, 715 Ensor St., Baltimore 2, Md.

BRONZED Baby shoe supplies, instructions, mountings. Metal bookends, \$1.50 pair. Free catalog. National Bronze Supply, Box 56, Los Angeles 32, Calif.

MONEYMAKING OPPORTUNITIES

OPERATE Profitable home mailorder letter shop. Write. Continental Publishers, 1332 So. 61st, Milwaukee 14, Wis.

MEXICAN Featherbird pictures. Big profits! Hot sellers! Edmunds, 3009 Weaver Ave., Baltimore 14, Md.

WINDSHIELD Wiper rebuilding brings big profits. Free particulars. Hardy's Service, 878 East Waterloo, Akron 6, Ohio.

PRINT Without a printing press! Amazing new method! Print colorful signs, banners, cards, posters, glassware — anything at home. Big profits. Money-making opportunity! We supply everything. Beautiful sample. Home-business plan free! Write Screen-Print Company, Los Angeles 15, California.

FRENCH-Type perfume really sells! \$1.00 brings \$4.50 flacon, details (refundable). Elliott-Stuart, 4616-A Hollywood Blvd., Hollywood 27, Calif.

FREE! "301 Profitable Small Businesses!" Amazing shoestring plans! Work home! Start sparetime. Deumant Surveys, Kenmore 23-PM, N. Y.

EARN Money evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 1, Wisconsin.

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. 500C, Mount Morris, Ill.

FREAKWOOD Lamp kits, ming tree kits, planter kits, abstract art kits. Ming Company, Box 373, Reno, Nevada.

DO It with "Floating Henryburgers." See ad under "Business Opportunities."

\$10,800 PROFITS! Your own mailorder business! No risk! Success plan free! Treasury, 709 Webster, New Rochelle, PM-23, N. Y.

PRESERVE Living flowers to last indefinitely. Interesting, profitable! Maxson, Falls Church 18, Virginia.

PROFITABLE Enterprises. Work home. Free literature. Thomas Walker, 3042 Madeline Street, Oakland 2, California.

LET'S Strike it rich. Write Alliance Sales, 568-O, Alliance, Nebraska.

THREE Terrific items. Big profits. Penants for auto dealers, gas stations, etc. New pocket-cushion for sport fans. Color television screens. Erteo Sales, P.O. Box 2205, Port Wayne, Ind.

CONVINCE Yourself: Hundreds of Ways to Make Money. Milmac, 724 E. 260, Euclid 23, Ohio.

CHINCHILLAS Rented, we pay up to \$300 each for offspring. Write: R. Rau, Route 2, Jeannette 4, Penna.

BUY Wholesale — Thousands nationally advertised items. Save — Make money! Free details. Durex Company, Box 672-P, Chicago 90.

GET Free copy of "Opportunity," the magazine that shows you the way to unlimited profit possibilities. Gilbert, Room 1700, 28 East Jackson, Chicago 4.

TYPEWRITER Owners. Make handsome profits. Get details today. Groves Company, 682, Hastings 8, Nebraska.

MAKE Money. Surefire mailorder. Write Dexter, Box 208, Culver City, California.

DOLLARS In your mail box daily. No stock investment. Particulars free. Gem, 44-B Atlantic, Pleasantville, New Jersey.

CIGARETTES — Roll 200 mild, tasty, guaranteed to please for 75c. Details free. Pete Moberly, Box 881, Owensboro, Ky.

ADDED Income selling by mail. Roblin Sales, 1001 Curtiss, Downers Grove, Ill.

MAIL Letters featuring real merchandise. Get \$10 orders in every mail. 100% profit. Everything furnished. Products, Box 23, Boston 17, Mass.

ALUMINUM Awnings, baked enamel colors. Wholesale factory prices. Install yourself. Write Groff Awnings, Box 10254, Tampa, Florida.

MECHANICS, Filling station operators. How to make up to \$800 more profit per month. Rush \$2 for complete details. Northern Mechanics, Box 13, Faribault, Minnesota.

"TYPEWRITER Profits." Copyrighted. Guaranteed. \$1.00. Gimbirt, 1454 West Washington, Petersburg, Virginia.

START A profitable subscription business in spare time! We need men and women (young or old) as representatives for all leading national magazines. Liberal commissions paid for new and renewal subscriptions. Start earning money in this pleasant work at once! Clip this ad and send with your name and address to: Agency Bureau, Dept. PM, Hearst Magazines, 250 West 55th St., New York 19, N. Y.

MONEY Raising hybrid earthworms. Prolific breeders. No overhead. 100% profit. Free instructions. Write today. Earthworm Gardens, 14 Peacock Bldg., El Monte, Calif.

MONEY Found. Be our agent in your community. Top quality watches, diamonds, jewelry, etc., at wholesale prices. Amazing profits. Lifetime income. Experience unnecessary. Send for free catalog. Zerah Bros., 602 Mission St., Dept. M31, San Francisco 5, Calif.

TYPISTS! Make money at home! Write R&M Service, 2 Madison, Greencastle, Ind.

INCREASE Your income, turn your spare time into cash — Making quick-selling, highly profitable lamps and fiber glass shades. Every home a prospect for one or more. Hundreds already doing it, so can you. No experience needed. No special tools required. Gearon's big, new 72 page 1954 illustrated Catalog No. 8 will show you how, quickly. One special 8-page section shows 6 beautiful lamps in kit form, ready for you to assemble. Another 12-page section shows you how to make stunning, ultra-modern fiber glass shades. Page after page filled with wide variety of other attractive shades, shade frames, figurines, and lamp bases. Also oil lamp converters, boring compound, and all kinds of cords, sockets, pipes, harps, finials, bases, and hundreds of other parts. Everything you need. And you can buy everything wholesale, sell at retail, make big profits, fast. Send only 25c right now for Gearon's big 1954 catalog and wholesale price list. Like hundreds of others, you'll be glad you did. Gearon Co., Dept. 503-B5, 27 S. Desplaines, Chicago 6, Ill.

EARN Extra income at home. Honest, dignified, steady self-employment. Local or mailorder. Graham Company, 1236 Granger Ave., Lakewood 7, Ohio.

BIG Profits selling used cars. Free details. James E. Smith, 601 N. Willow, Chattanooga 4, Tenn.

MEN, Women: Add \$50 weekly to present income. No selling or collecting. Chamber of Commerce approved. Write today for information. Independent Driver Training, 1801a Shaftesbury Road, Dayton 6, Ohio.

OUR Service solves "What to sell by mail" problem. Information 25c. Market Specialist, Box 76, Washington 4, D. C.

START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, 630-P Linden, Buffalo, N. Y.

IN Your spare time earn 100% profit on plastic lamination. Every adult a double prospect. 25c brings samples and details. Presto Sales, Box 171, Breton Woods, N. J.

PROFITS Guaranteed for sparetime. No investment. Not mail order. Canvassing unnecessary. Nothing to make or learn. New plan. Free details. Transamerican, Dept. 70, Box 815, Atlanta 1, Georgia.

HOUSEWIFE'S Delight. Apron with two matching potholders. Terrific sales appeal. Details-sample 70c. Step Saver Mfg. Co., 1671 Milwaukee Ave., Chicago 47, Ill.

CASH Profits for you operating a candy kitchen in your own home with exceptional profits. Details free. Heasty, 917 Galardon Dr. N.W., Albuquerque, New Mexico.

PRINTING And office supplies wholesale. 20,000 items. Literature free. Royal, Box 363-A, Cleveland 27, Ohio.

CHINCHILLAS: Profitable. Raise in spare room, cellar. Terms. Ross Chinchilla Ranch, 749 Rincon, El Sobrante 11, California.

MONEY At home! Opportunities, offers. Free details. Rockaway-Hall Company, Box 95A, Rockaway, Oregon.

BUY Wholesale! Nationally advertised products. Tremendous discounts. Particulars free. Econ-O-Mart, Box 535-B, Morristown, New Jersey.

FLEXIBLE Rubber moulds for plaster and Marbleite figurines. Sample and large illustrated catalog 25c, refunded on first order. K-C Novelities, Dept. 4, Easthampton, Mass.

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay \$3.50 lb. We paid Babbitt \$4,165.00 in few weeks. Free book. Washington Mushroom Ind., Dept. 173, 2954 Admiral Way, Seattle, Washington.

SPARETIME Profits taking subscriptions, all magazines. Wholesale catalog free. Cassell Agency, Westfield 2, New Jersey.

EARN \$50.00 Daily making mats, shoes and mud guards from old tires. S and S Patents Inc., 1307 North Clark St., Chicago 10, Ill.

SELL Titania gems; \$9.75 carat wholesale. More brilliant than diamonds. Free catalogue. Diamondite, 1404-M Mitchell, Oakland 1, California.

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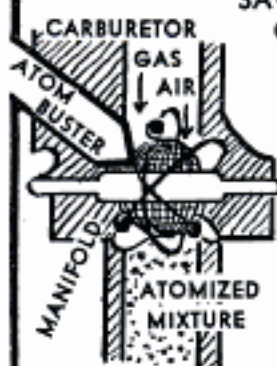
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Inside an engine?



Inside molten lava?

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**HOW TO
GUARD YOUR
HOME AGAINST**

fire

National Board of Fire Underwriters photo

Here's advice
from the experts on
fire extinguishers
and detectors

FIRE-PREVENTION experts are appalled by one startling fact: there is less protection against fire in the average home than in any other building in which people spend a portion of their days.

Every year, fire safeguards reach new heights in factories, schools, churches, business institutions and hotels, but the home—the place closest to the heart of mankind—remains neglected in millions of cases. The experts believe the reason for this is the old and faulty psychology of: "It can't happen to me."

The tragedy is that it does happen. There

is an average of 1100 home fires every day in the United States, according to the National Fire Protection Association. The toll in lives per day is 30 persons (a high percentage are children) and the property loss runs into millions.

The causes of home fires are so varied that they emphasize the uncomfortable fact that a home without fire protection is a dangerous place. The careless use of matches and smoking materials is responsible for 30 percent of home fires from known causes over a 10-year period. Other causes on the list are: Accumulations of rubbish



in basements and attics, faulty wiring, defective chimneys and furnaces or other heating equipment, careless use of combustibles such as flammable cleaning fluid and roofs which are not fireproof. Ninety percent of home fires are due to carelessness or negligence and could easily have been prevented or checked in an early stage before much damage was done.

"Homeowners are wrong if they think they have to spend a lot of money to get a minimum of fire protection for their homes," says John J. Ahern, director of the department of fire protection and safety engineering at Illinois Institute of Technology. "In fact, a great deal of protection can be had without spending a cent or by the use of materials and equipment found in every home."

Here are some safeguards suggested by Ahern: The knowledge by every member of the family (old enough to use the telephone) of how to call the fire department; family fire drills with and without the use of ordinary exits from the home—this is important in an emergency; strategic placement of fire buckets that can be filled with water to be tossed on a fire; availability of the garden hose for putting out fires the year 'round; the storage of a plentiful supply of ordinary baking soda in the kitchen for putting out grease fires.

Ahern stresses the importance of keeping the garden hose handy and ready for use. If attached to the outside of the house in summer, some arrangement should be made so it could be pulled quickly through a window. In winter, the hose should not be put away in some remote corner, but attached



Class A Fires

Paper, wood and similar combustibles. Extinguishers: Bucket spray pump, hand-operated pump tank, soda-acid, foam.

Class B Fires

Flammable liquids or greases requiring smothering effect. Extinguishers: Foam, vaporizing-liquid, carbon-dioxide, dry-chemical.

Class C Fires

Live electrical equipment. Extinguishers: Vaporizing-liquid, carbon-dioxide, dry-chemical.

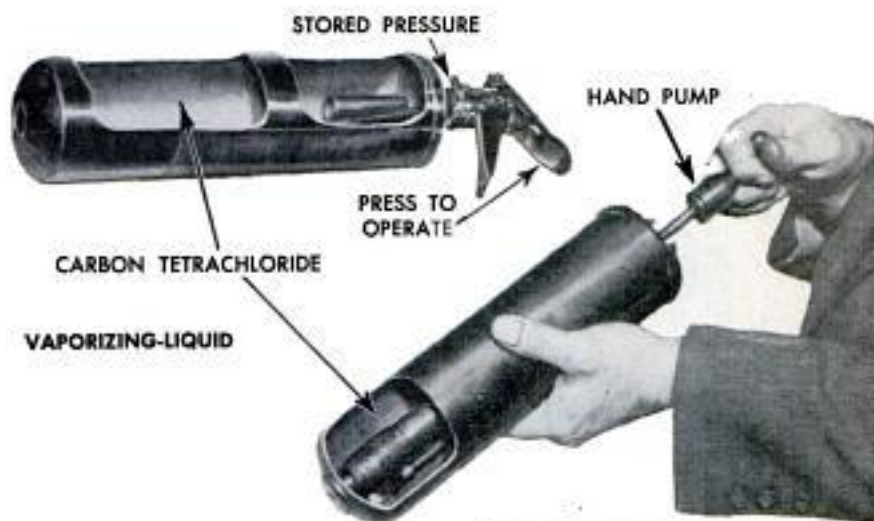
to a basement connection awaiting an emergency.

The second step in fire protection requires a small outlay of money—especially small in proportion to the protection it will afford. This is the purchase of a bucket spray pump or a portable extinguisher. The spray pump, familiar to most gardeners and owned by many, is a handy and inexpensive gadget (from \$8 to \$12) for putting out a small blaze. All you have to do is fill a bucket with water, stick the pump in the bucket and start to pump. The bucket can be refilled by a helper without diminishing the 20 to 30-foot spray of water.

There are scores of portable fire extinguishers on the market, certainly more than enough to confuse the average homeowner. His problem, however, is simplified by studying the kinds of fires he may encounter in the home and the half-dozen basic types of extinguishers and what they can do. Good portable extinguishers range in price from \$20 to \$40.

A preliminary "must" in the purchase of any extinguisher is that it bear the label of approval by Underwriters' Laboratories or Factory Mutual Laboratories. These labels are a guarantee to the buyer that the product has been carefully tested and approved for a specific use. The National Fire Protection Association and other such organizations highly recommend that homeowners purchase only approved equipment. They report that numerous extinguishers on the market are no more effective than a can of warm beer would be if it were shaken up and punctured.

In the language of the fire experts there are three classifications of fires: A, B and C. Class A fires are confined to ordinary combustible materials such as paper, wood or cloth where the quenching and cooling effects of quantities of water, or solutions containing large amounts of water, are of major importance. Class B fires are defined as fires in flammable liquids or greases where a blanketing or smothering effect is essential. Class C fires occur in live electrical equipment where a nonconducting extinguishing agent must be used. The use of water on a Class C fire





Underwriters' Laboratories photos
Underwriters' experts test dry-chemical extinguisher in lab



Engineers use a one-quart vaporizing-liquid extinguisher to put out blaze in cotton waste soaked with gasoline. Below, testing a carbon-dioxide extinguisher on a fire made by igniting two gallons of gasoline in a four-foot iron container



Here are two means of fire protection at low cost—bucket spray pump, garden hose

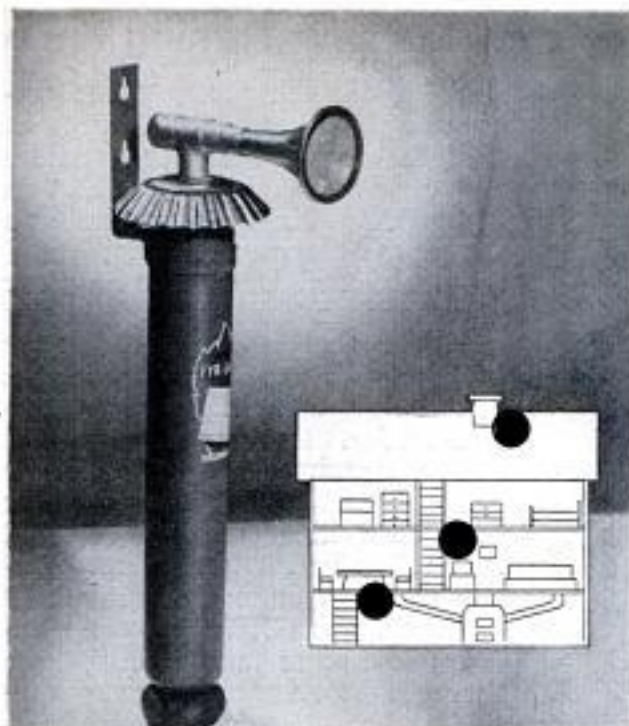
is dangerous and not advisable.

Most home fires are in Class A or B, but most extinguishers which are effective on Class B are also useful for Class C. The basic types of extinguishers are the hand-operated pump tank, soda-acid, foam, vaporizing-liquid, carbon-dioxide and dry-chemical.

For ordinary home use the most highly recommended and inexpensive type is the 2½-gallon hand-operated pump tank. A five-gallon size is also available, but the smaller tank is more desirable because it is easier to carry around and can be refilled by a helper while in use. The tank is filled with plain water or a nonfreezing solution. It produces a stream that will travel 30 to 40 feet. The experts like this tank for its simplicity of operation and ease of maintenance. A variation of this model is the stored-pressure tank with an attached carbon-dioxide cylinder which saves pumping. The gas is released into the cylinder by pressure on the handle. For adequate protection, a two-story home should have two extinguishers of this type with one kept on the second floor.

Another favorite for Class A fires is the 2½-gallon soda-acid extinguisher. It contains water in which bicarbonate of soda has been dissolved. A bottle in the top of the tank holds sulphuric acid. When the extinguisher is turned upside down the chemicals mix to form a gas which forces the water out.

The foam extinguisher closely resembles the soda-acid type. It contains a metal cylinder filled with aluminum sulphate. When



Fyr-Larm Company photo

Whistle-type detector goes off with blast when the temperature climbs. Sketch shows the best locations

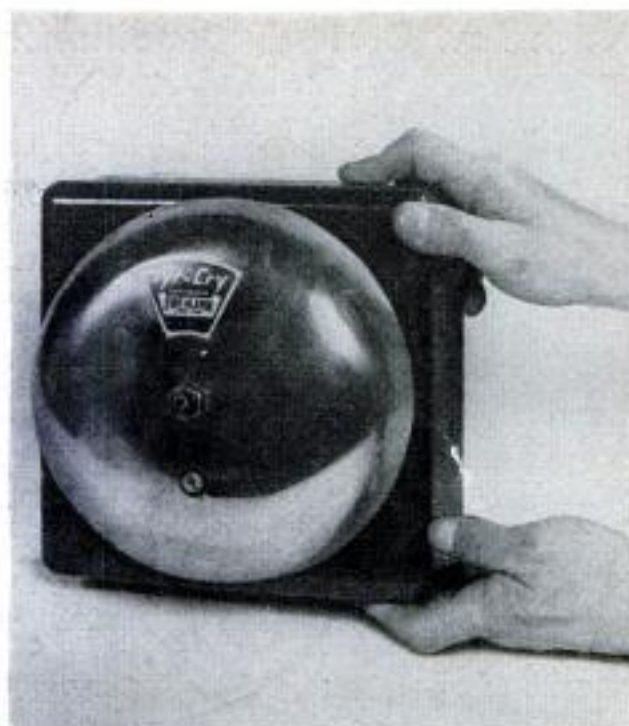
the extinguisher is tipped over, the aluminum sulphate mixes with the soda water and a foam-making ingredient. A 2½-gallon tank expels about 20 gallons of foam. The foam smothers Class B fires, but due to the water content is also used for Class A.

The vaporizing-liquid extinguisher is available in both hand-pump and stored-pressure models. Recommended for both Class B and C fires, it contains carbon tetrachloride under pressure. The most common size contains a quart of liquid and the stream will travel 20 feet or more for about 30 seconds. The gas formed by the vaporization of the liquid is toxic and this extinguisher shouldn't be used in confined areas.

Also recommended for both Class B and C fires, is the carbon-dioxide extinguisher. It has a hornlike nozzle through which carbon-dioxide gas escapes when a valve is opened. The extinguisher has a maximum range of about eight feet, but it should be held as close to the fire as possible.

The dry-chemical extinguisher is available in several styles, all depending on a small cartridge of carbon dioxide for pressure. The dry chemical used is ordinary bicarbonate of soda which is expelled in a cloud that travels 20 to 25 feet. It is effective for Class B and C fires.

Safeguards that reach into the realm of superior home protection are the fire detectors. Many families are suffocated by smoke before they ever have a chance to use an extinguisher. One simple and inexpensive detector (\$12.50) is a whistle that gives forth a shrieking blast when the temperature rises to 136 degrees F. The cylin-



Fyr-Fyter Company photo

This gong produces loud noise for five minutes if set off by temperature rise. It's wound like a clock

der attached to the whistle is filled with a harmless gas held back by a link of fusible metal. The manufacturer recommends the placement of these whistles in areas where heat would gather in case of fire such as the top of the basement stairs, the ceiling of the stairwell in a two-story house and in the attic at the peak of the roof.

Another fusible-link type of detector sets off a bell alarm when the temperature climbs to 133 degrees F. This simple and effective alarm is wound like a clock.

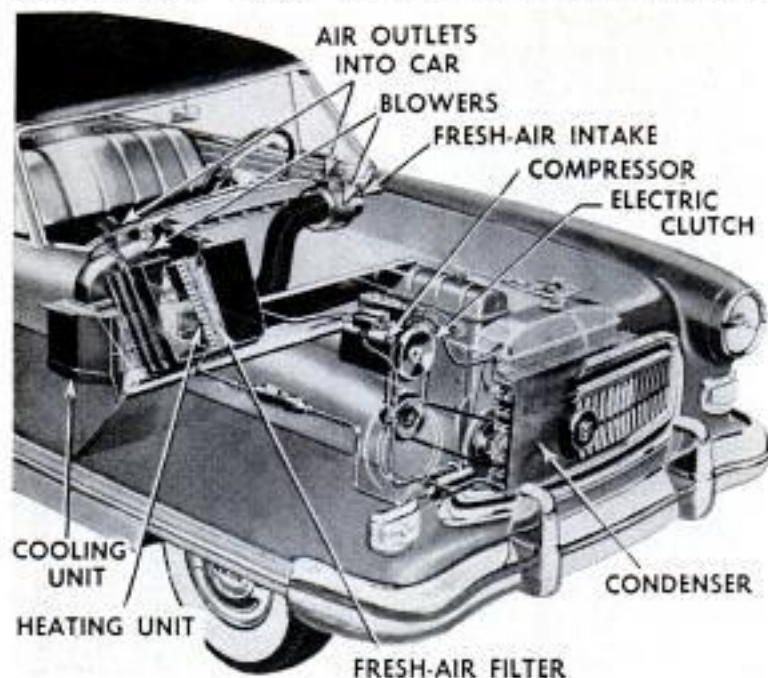
Most other types of detectors are connected with the electrical system. One consists of small thermostats (\$1.25 each) placed against the ceiling of every room and installed with a closed-circuit system on a series loop using a relay with a dry battery for current supply or a trickle-charger wet battery. On an open-circuit system a direct connection can be made to the electric source of supply or a dry or wet-cell battery.

Another simple detector is formed by two thinly insulated wires. When the insulation melts, the wires complete a circuit to set off an alarm. Then there are rate-of-change detectors which set off an alarm when there is a rapid rise in temperature.

Other elaborate and expensive electronic smoke detectors can "smell" flammable gases in the air or "see" smoke in the space between a lamp and a photocell.

All the experts agree that adequate safeguards are available to suit every home and pocketbook. The hardest part is to convince the average homeowner that "it can happen to me." ★ ★ ★

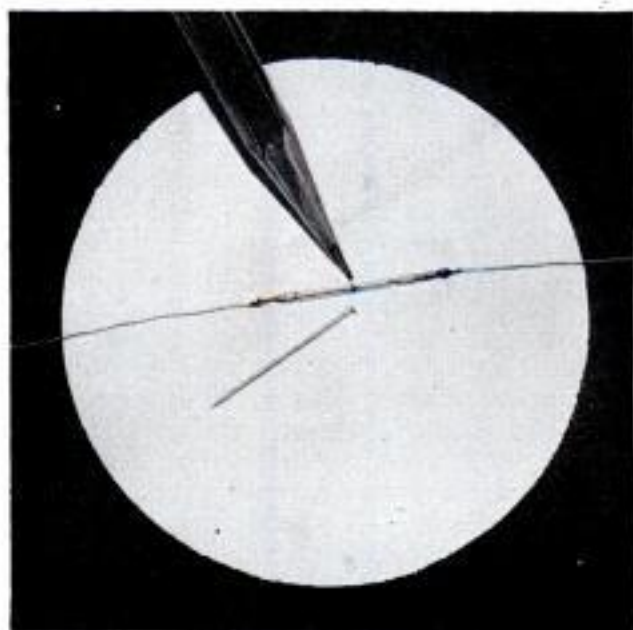
Nash Low Cost Air Conditioner Cools or Heats by Turning Knob



Nash, the company that pioneered the heater that brings in air from outside the car, now offers the industry's first combination heater and air conditioner. The entire system mounts forward of the dashboard. There are no parts in the trunk. Pricewise, it is the lowest in the industry, selling for \$395 factory installed or almost \$300 below competitive combinations. One knob controls both heating and cooling. Fresh air enters the cowl intake, passes through a filter to remove dust and pollen and is intermixed with air from within the car (ratio: 30 percent fresh air, 70 percent interior air). The air then passes through a cooler (or heater in winter) and out two dash outlets.

Pin-Size Neon Glow Lamp Aids Timing of Film

No bigger in diameter than a pinhead, a tiny neon lamp developed by Westinghouse will be used to time pictures taken during guided-missile tests. It also can be used for similar camera work in laboratories where space is cramped. The neon bulb is $\frac{1}{50}$ of an inch in diameter and an inch long, and generates a $\frac{1}{40}$ -watt glow between two electrodes spaced $\frac{1}{25}$ of an inch apart. Fifty of the tiny lamps are to be situated along a strip of 35-mm. motion-picture film to provide the timing data needed. According to Westinghouse, the lamp is the smallest in the world. It has only $\frac{1}{3}$ the diameter of the grain-of-wheat lamp, previous holder of the world's smallest-lamp title since 1932. It can be powered by hearing-aid batteries.



Plastic Shield for Police Offers Protection From Bullets

Light enough to be held in one hand (11 pounds), a plastic shield for police and other law-enforcement officers stops bullets fired from as close as 20 feet. Made of laminated glass fiber, the shield effectively stops slugs fired from a 12-gauge shotgun, a .38-caliber pistol and a World War I Mauser. The shield is fitted with a small, bulletproof glass window that allows observation while giving protection. As a bullet plows through the various plies of the plastic shield, its velocity is spent by the absorption of energy.

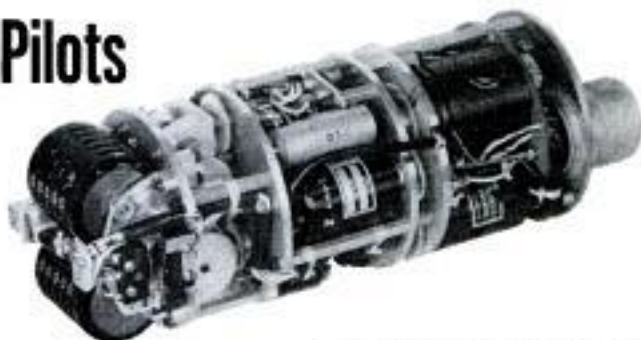
☐ Visitors to national parks in 1953 totaled 46,224,794—a new high.



In display built to demonstrate robot navigator, white dot on map simulates aircraft it would be mounted in and its present position is indicated on bottom-left box. Only four boxes mounted on console are in the airplane

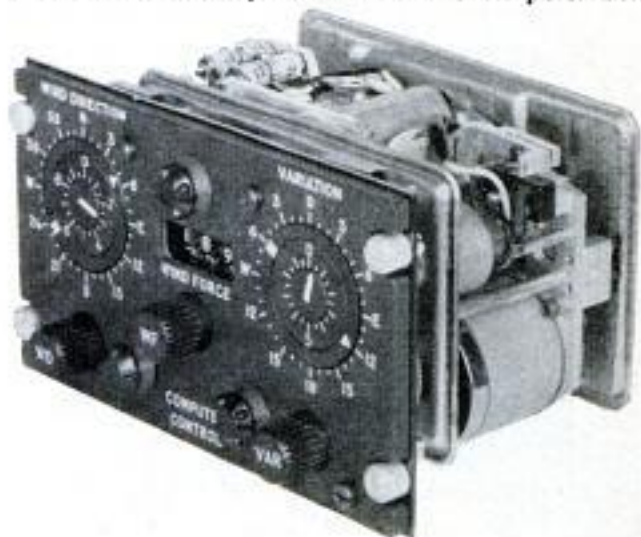
Robot Navigator Guides Jet Pilots

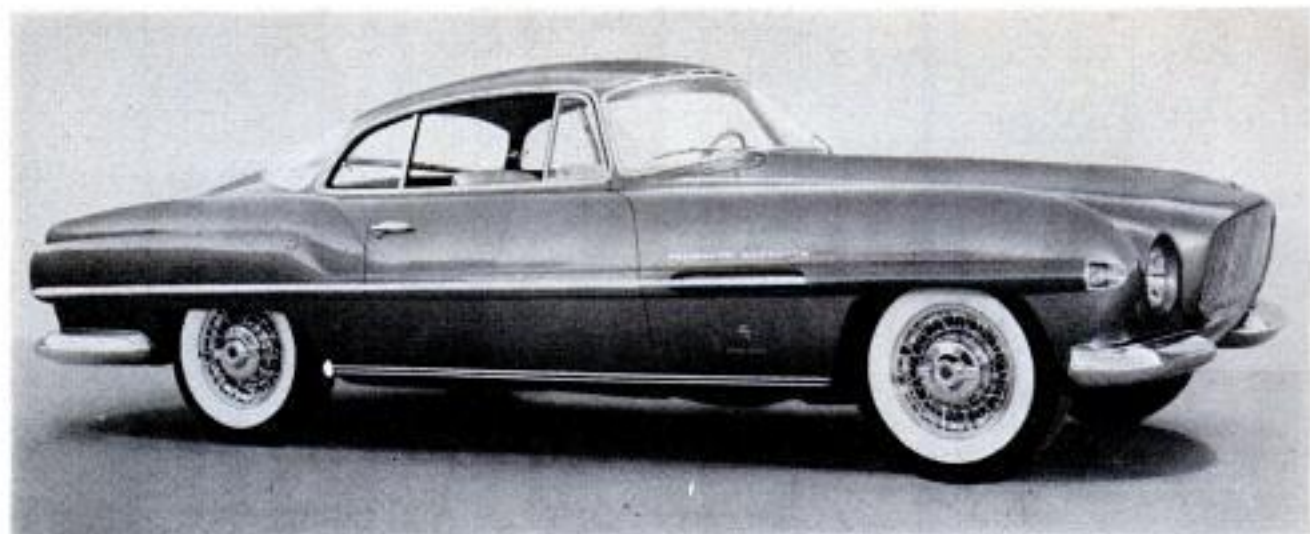
SITTING IN A WELTER of wavering needles and spinning dials as he hurtles through space, the harried jet-fighter pilot has no time to sit around casually plotting positions with pad and paper. Newest aid for the supersonic "flyboys" is an electronic wizard that continually plots the plane's position—on the wing and without any ground contact whatever. Two sets of rotating numbers that look just like the mileage and trip totalers on the speedometer of your car tell the pilot his exact latitude and longitude at any given instant. Developed by the Ford Instrument Company for the Air Force, the new "ground-position indicator" is a compact, 45-pound set of four little black boxes: Indicator (which the pilot reads); computer control (where information is fed in); computer (that does the calculating) and an amplifier (to supply power). Before taking off, the pilot dials his wind speed and direction, and magnetic variation, on the knobs of the computer control. On the indicator he sets in his take-off longitude and latitude. The robot does the rest. From the plane's compass and air-speed indicator, changes in the speed and direction are fed into the computer.



Ford Instrument Company photos
Counters at left end of indicator unit, above, tell pilot the aircraft's present latitude and longitude

Information needed by robot navigator, such as wind force and direction, is dialed on the computer box

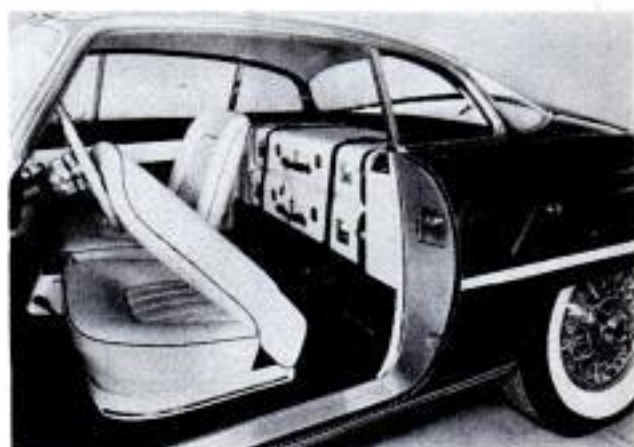




Only 54 inches high, the Explorer has almost as much headroom as a production Plymouth. It is 185 inches long. Right, matched luggage fits neatly behind seat

Plymouth Sport Coupe Has Matched Luggage

Chrysler stylists have given the experimental Plymouth sport coupe a forward-slanting grille and recessed headlights. One of the newest so-called dream cars which Detroit turns out with regularity these days, the Explorer was built on a standard Plymouth chassis. The power plant is the 110-horsepower Plymouth engine. Ghia of Turin, Italy, made the body and it is recognizably Italian in character. No production plans are contemplated, Chrysler says. The interior is especially luxurious. Two individual seats, upholstered in white leather, are separated by a leather-covered compartment for maps and



other items. The ash tray is there also. Behind the seats are two pieces of matched luggage with tie-down straps. Unusual also are the combination taillight-tail pipe assemblies. The twin exhaust pipes end within a chrome housing that also encircles the taillights.

Adapter Converts Black-and-White TV Set to Color for \$100



Converting your black-and-white TV set to color may cost less than \$100 with a system developed by electronics engineer Robert P. Benjamin. The adapter converts the color signal to a system which can be used with a three-color wheel. The wheel rotates before the black-and-white tube and is synchronized with the color signals so that the appropriate filters pass before the screen as the successive color information is transmitted. The only modification of the black-and-white set is the addition of four simple connections to the base of certain tubes in the receiver. The converted receiver works well under the present compatible-color television system, in which color signals are broadcast with black-and-white signals, but are not picked up by standard receivers. Benjamin used a five-year-old set in a recent demonstration to bring in a full-color network program. The device is not yet in production.



EGG for an ATOM ENGINE

By Richard F. Dempewolff

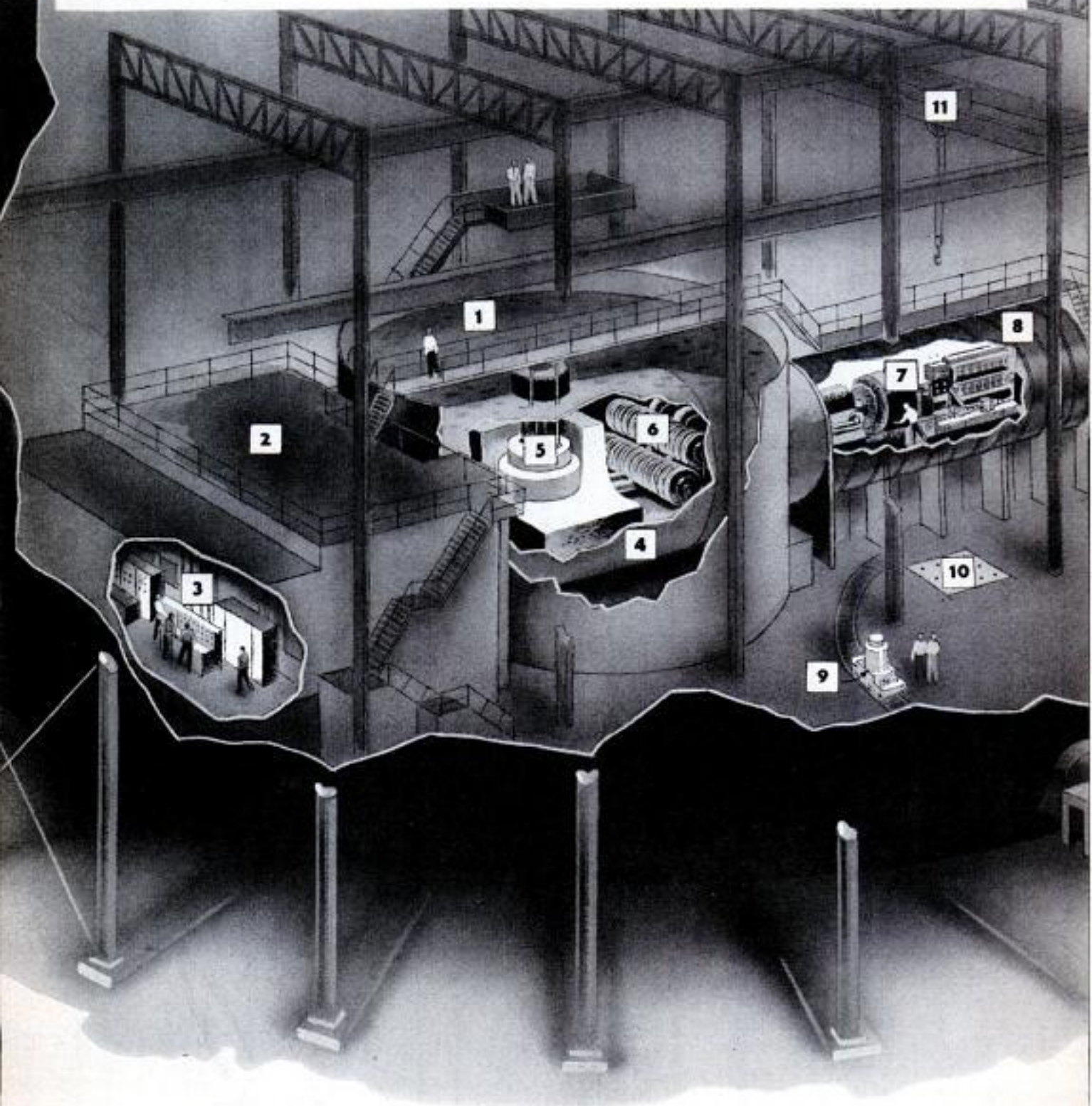
Artist's conception depicts "launching" scene as hull section containing *Sea Wolf's* prototype engine is rolled into giant steel egg for atomic baptism

WHEN THE BLUNT-NOSED *Nautilus*, world's first atomic-powered submarine, skidded into the Thames River at New London, Conn., last January, an even more curious hull was being readied for an even more curious ride this spring. No cheering, fanfare or champagne was to mark the strange new "skidding," however. There would not be a splash, either, because the nearest open water is 20 miles away.

The "hull" section, a long cylinder banded by steel ribs encircling its 20-foot girth, looks more like a half-finished section for a vehicular tunnel than part of a ship. Actually, it is the pressure-hull section enclosing a prototype of the engine and reactor compartments of the *Sea Wolf*—atomic submarine number two. Until recently, it was resting on a slab out of doors on the rolling fields near West Milton, N. Y.

Cutaway drawing of sphere, hull and fuel-service section shows water-filled tank (1) to shield the reactor, and cell (2) that holds liquid metal used as heat-exchange fluid. Also shown are the control panels (3), reactor section of hull (4), with the atomic pile (5). Molten sodium passes through the pile and heats water to steam in the boiler (6). The steam drives turbines (7) enclosed in the end section of pressure hull (8). Lead container for uranium rods (9) rides dolly to service cell. Near by is the fuel storage pit (10) and above is the traveling crane (11) for refueling and servicing. On the opposite page the fuel storage tunnel is shown below the fuel-element service cell which

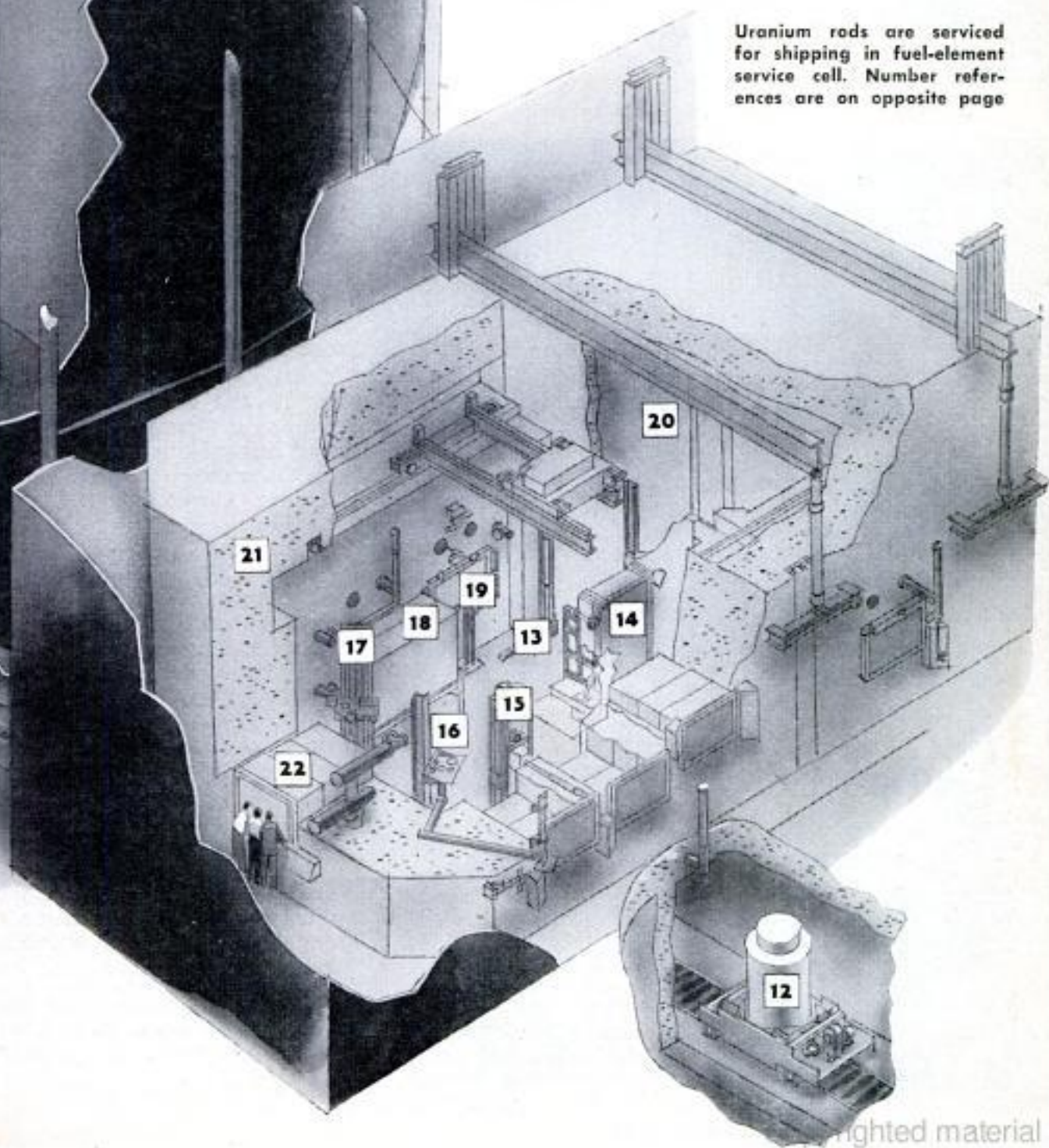
has massive concrete walls. Until needed the uranium rods are stowed in a heavy lead container (12) and pulled out of the tunnel through a hatchway by a mechanical hand (13) which passes them to cleaning station (14) where tons of water wash the rods. At scanning station (15) electric eyes examine them for flaws. Next stop is the inspection and measuring area (16). Robot hands (17) pull them apart and the rods pass to the sample cutting station (18) which chops off a chunk. At the adjoining station (19) "burned up" portion of rod is canned for shipment to a reprocessing center. Also shown are decontamination area (20), concrete walls (21) six feet thick, and shielded monitor station (22)



But, a few months ago, against a backdrop of empty land and sky, the odd hull rumbled slowly on steel rollers. It slid about 200 feet, through a hole in the curving wall of the world's biggest manmade ball—a \$2,000,000, 225-foot shell of steel that had been built close by to receive it. Welders swarmed in to seal up the hole, and a mantle of secrecy dropped over the great egg.

Inside the giant sphere, where during construction hollow echoes bounced 'round and 'round off the curving wall until they merged with an incessant background roar, General Electric Company scientists from KAPL (Knolls Atomic Power Laboratory) will install a new kind of atomic engine in the ribbed-hull section. A vast tank for water will be built around the reactor portion. "This," explains one scientist, "is not a big bathtub to simulate 'ocean conditions,' as many folks like to imagine. It's additional shielding to absorb any stray radiation from the reactor."

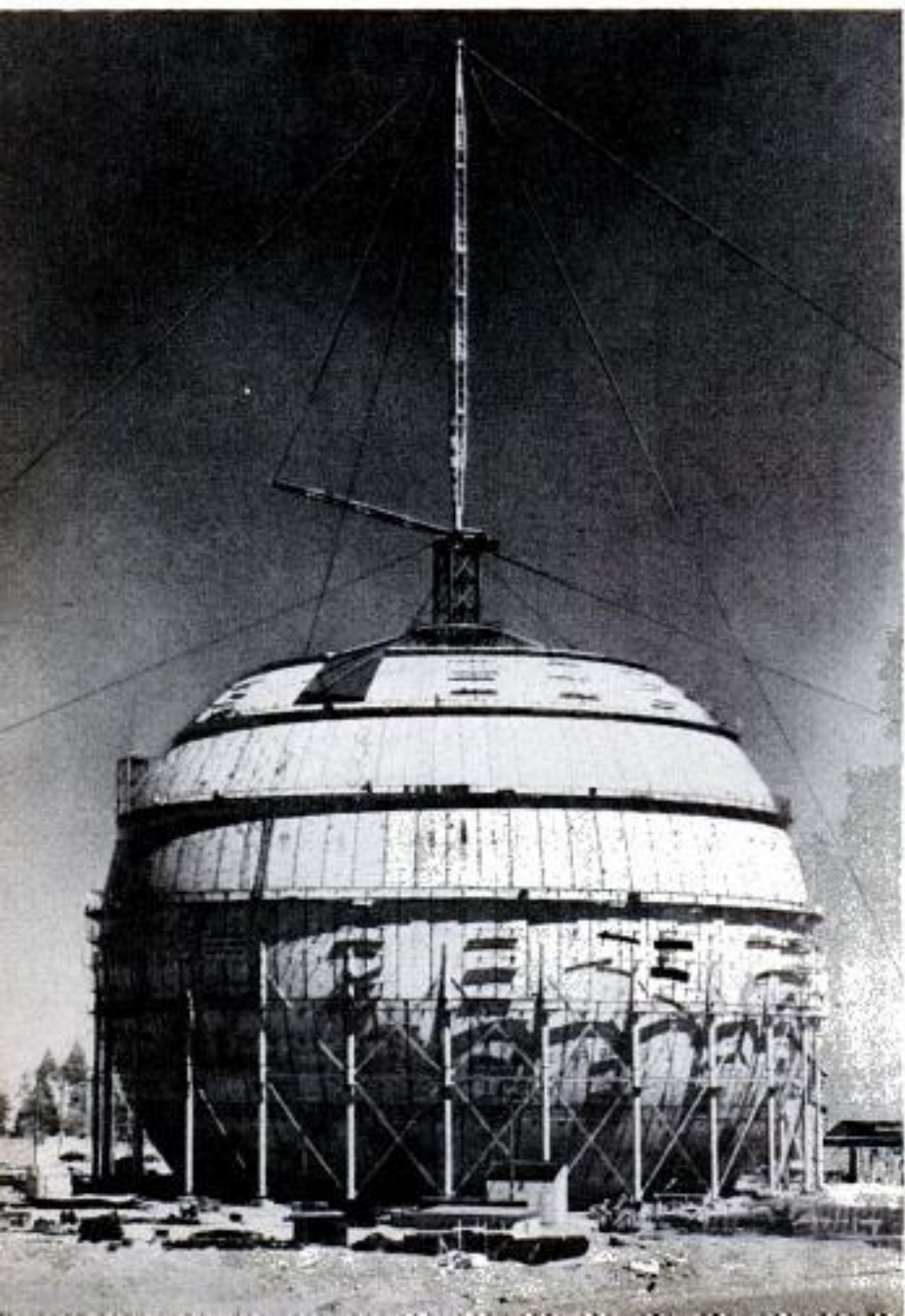
Uranium rods are serviced for shipping in fuel-element service cell. Number references are on opposite page



lighted material



Five miles of welds on exterior of steel sphere were brushed with a soap solution to test for air leaks



One day this year, the atomic furnace will "go critical," or begin its self-sustained chain reaction. Cranes, dollies and elaborate controls inside the huge globe will enable men to service their "hot" power plant remotely, and to eliminate the "bugs" in it. Sometime in 1955 or 1956, if all goes well, a similar atomic engine will be installed in the completed 300-foot hull of the *Sea Wolf*, now on the ways of the General Dynamics Corporation in New London.

Like the *Nautilus*, the *Sea Wolf* will be a revolution in underwater craft. Both of the submarines will reportedly burn about a pound of uranium fuel (a chunk the size of a golf ball) each month. Since atomic engines need no air to keep them going, as diesels do, these subs will be able to cruise below the surface without snorkels for weeks or months—limited only by the ability of their crews to "take it." "Around the world submerged" is the hopeful phrase you hear. The *Nautilus*' engine reputedly will drive her over 30 knots. Although both

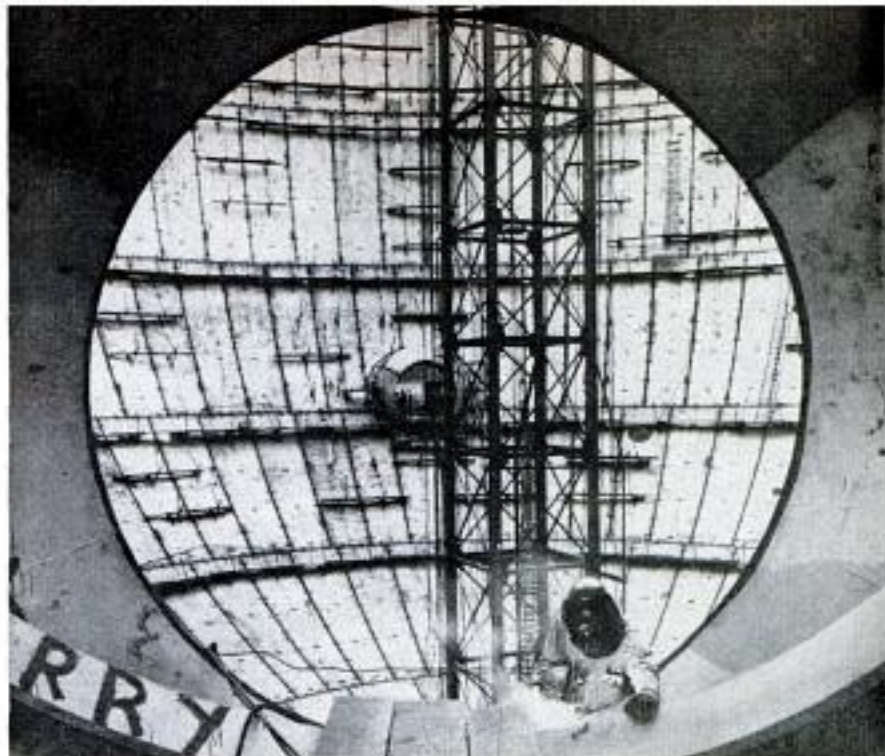
Last sections of 225-foot steel sphere are fitted into place. It's as high as a 20-story building, cost \$2,000,000

have the same horsepower, rumor puts the *Sea Wolf* as high as 60 knots (destroyers make only 35 knots under ideal conditions).

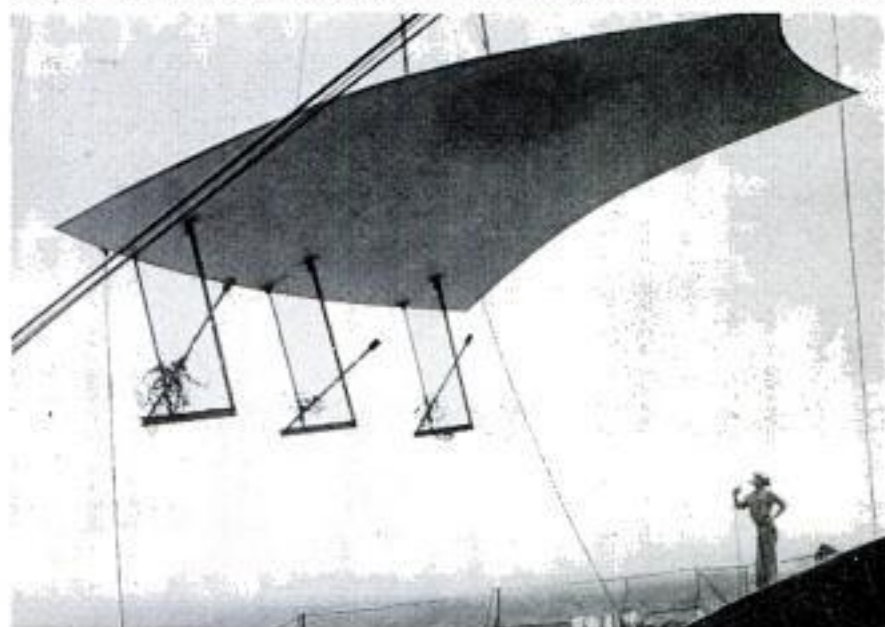
Interior design of the atom-age underwater ships will raise the eyebrows of old submariners, accustomed to deflating their chests and sucking in their stomachs when passing each other in companionways, to whamming shins and foreheads against the rims of hatches made for midgets and to sleeping in cranies between and around live torpedoes.

Though a third of each sub's football-field length is occupied by atomic engine and propulsion gear, they'll have more and better use of precious space than any undersea craft known. They'll be the first subs with a full-fledged staircase for two-way traffic. They'll abound with unique design tricks. Crews will sleep in tiered, built-in bunks with foam cushions that convert to lounges when not in use. Each man will boast his own fold-away, Pullman-type lavatory with fluorescent lighting, built into his locker side. After chow, mess tables will fold away overhead. Behind a sliding panel in one bulkhead will be hidden movie projectors, TV, radio, record player and other equipment to make a recreation room. Bright-red leather seat cushions, yellow walls, soothing tans, greens, browns and soft lighting will replace the hospital-white enamel and glaring bulbs of the standard underwater fleet.

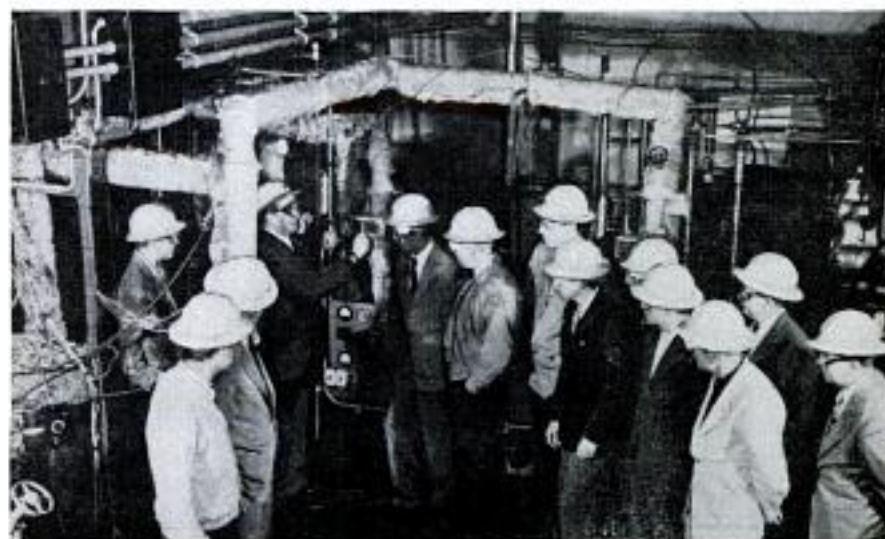
One of the trickiest features in the atom subs—besides their engines—is the fact that the helmsman will "fly" his ship like an airplane. In the control room of ordinary

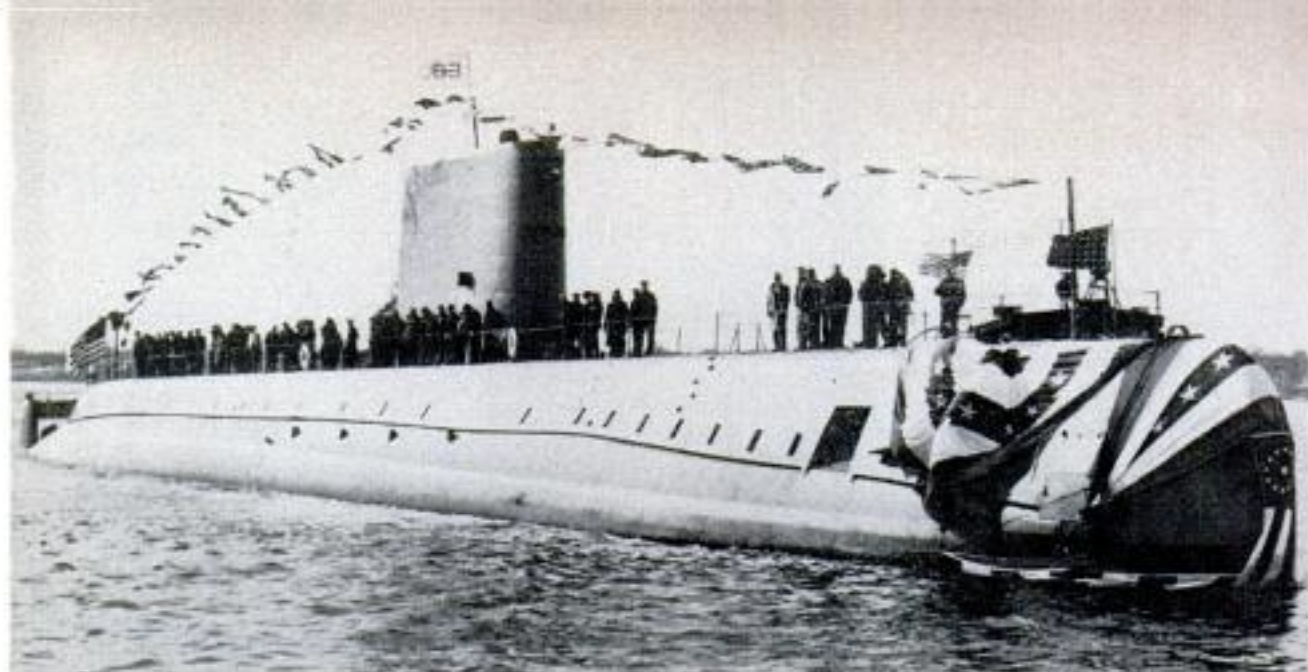


A welder works on circular opening in which one of the entrance locks to sphere was placed. Another opening for emergencies is in the background



An inch-thick 20-ton steel plate is hoisted into place to form sturdy shell for giant egg. Dangling projections beneath are built-in supports for catwalks that were later removed. Below, future atomic sailors study system that carries hot liquefied metal from atomic reactor to boilers





World's first atomic-powered submarine, the USS *Nautilus*, launched early this year, may make 30 knots

subs during diving or surfacing operations, you'll find one man handling the bow diving planes, another at the stern plane controls and a third at the helm. Now these three positions have been linked to "single stick" control like an aircraft. The positions can, however, be handled individually in emergency, and ballasting is still a separate operation.

So much for similarities between the two new subs. What's different about the engine that will drive the *Sea Wolf*? And what's the idea of the gigantic egg from which it will be hatched?

"The *Nautilus*," explains Dr. Kenneth H. Kingdon, technical director of KAPL, "has what we call a 'thermal reactor.' The speeding atomic particles that create heat by collision with other atoms are slowed down by water. It might be called a 'slow' reactor, in contrast to the atom bomb, which is the 'fastest' reactor of all. The atomic pile that powers the engine for the *Sea Wolf*, on the other hand, will produce fissions by means of particles that have been only partly slowed down. It's called an intermediate reactor."

That, incidentally, is where the *Sea Wolf's* atomic power plant gets its project name, "SIR"—for Submarine Intermediate Reactor.

There's another difference, too. The *Nautilus'* power plant uses water to carry heat from atom pile to machinery. In SIR, the atomic pile will produce heat, but molten sodium metal will be used to carry heat to the boilers, where it will pass through a shielded exchanger to nonradioactive steam that can spin the turbines that turn the sub's propellers.

Instead of using regular pumps to push the radioactive fluid metal through the closed system, SIR's builders can use electromagnetic pumps with no moving parts that might break down. The metallic liquid

can be pulled through the system by magnetic pulses from outside the pipes.

If air or water gets to sodium, it will erupt in violent flame. Hence, SIR's plumbing will have a superleak-detection system as a safety backstop. And for a superbackstop while the tricky engine is being constructed; General Electric built the giant sphere to house it.

"We believe nothing can possibly get out of hand," one of the GE project men points out, "—certainly nothing serious. But we're fooling with materials that are radioactive and flammable. So, to play extra safe, we decided to put our engine in a powerhouse that could be sealed up tight—like a big pressure vessel—to prevent *anything* from escaping."

That's just what the 3850-ton sphere does. Billowing out of the earth like a satellite come to rest, the vast steel ball enclosed 5,800,000 cubic feet of space. But you could pump an extra 8,000,000 cubic feet of air inside, and nothing would happen. The 682 plates of one-inch steel are built to withstand an inside pressure of 20 pounds per square inch (about what you put in your car tires).

You get some idea of the colossal proportions of the structure when Gordon Harman, one of the field engineers engaged in putting it together, leads you in through one of the two tiny entries. Both are small steel tunnels piercing smaller spheres that are inserted in the shell of the big sphere—like globular gun blisters in the side of a bomber. "Two spheres intersecting make the strongest kind of opening," Harman explains.

Ship-type hatches slam shut behind you with a resounding clang that booms back a dozen times from the interior of the giant orb. High overhead, the black steel dome is lost in blue haze. Harman reels off

(Continued to page 262)



Rear portion of dome is a club lounge for 18 people. Also on top level are 57 angled seats. Stainless steel covers exterior

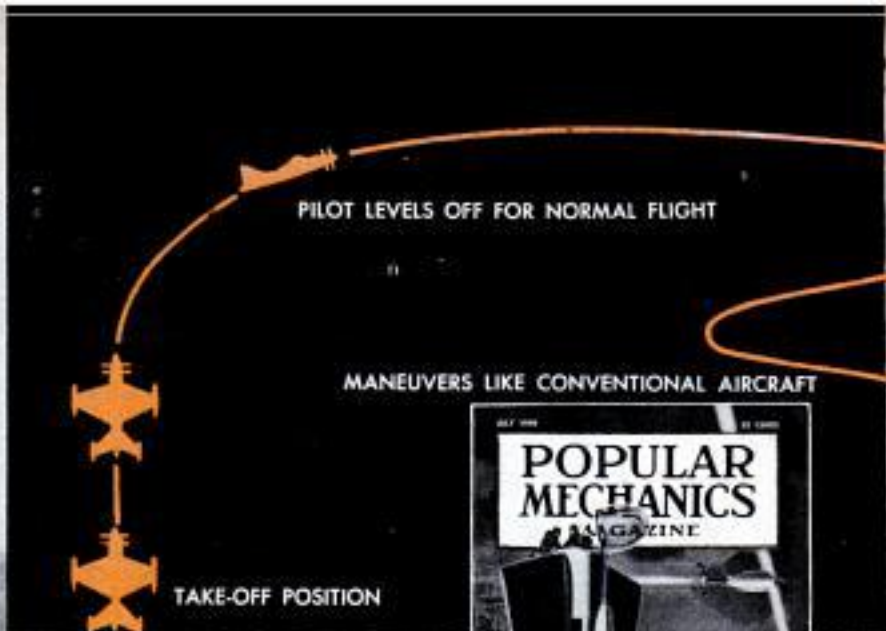
Dome Car Has Upper Lounge

FULL-LENGTH DOMES top a set of new coaches designed for Santa Fe's Chicago-Los Angeles and Chicago-Oklahoma City runs. Each of the streamlined lounge cars will seat 103 passengers—57 in angled seats on the upper deck, 18 in an upper lounge and 28 in a club lounge on the lower level.

Features of the car include fluorescent lighting, a public-address system for music and announcements, finger-tip-controlled doors and a solar control that automatically regulates dome temperature in relation to the amount of sunlight. Decoration is in bright colors.

Lower level contains a lounge in Indian motif seating 28 passengers. Decorated Lucite panels divide area





Landing and taking off, the Lockheed XFV-1 stands upright, using four fins as "feet." Right, *Popular Mechanics'* July 1949 cover forecast vertical take-off craft, with an article by helicopter manufacturer Stanley Hiller, Jr., explaining how they would operate. Hiller proposed rocket-powered ascents



Heads-Up Fighters

TWO EXPERIMENTAL fighters, built to fly straight up from standing starts on their tails and then level off for conventional high-speed flight, are now being tested by the Navy. The Convair XFY-1 and Lockheed's XFV-1 both land by backing straight down onto a plot of ground the size of a tennis court, or even onto the deck of a ship. The former has a delta-wing shape and the latter a modified straight wing. Each has been under construction for nearly three years and they are equipped with specially designed contra-rotating propellers, powered by twin-tur-

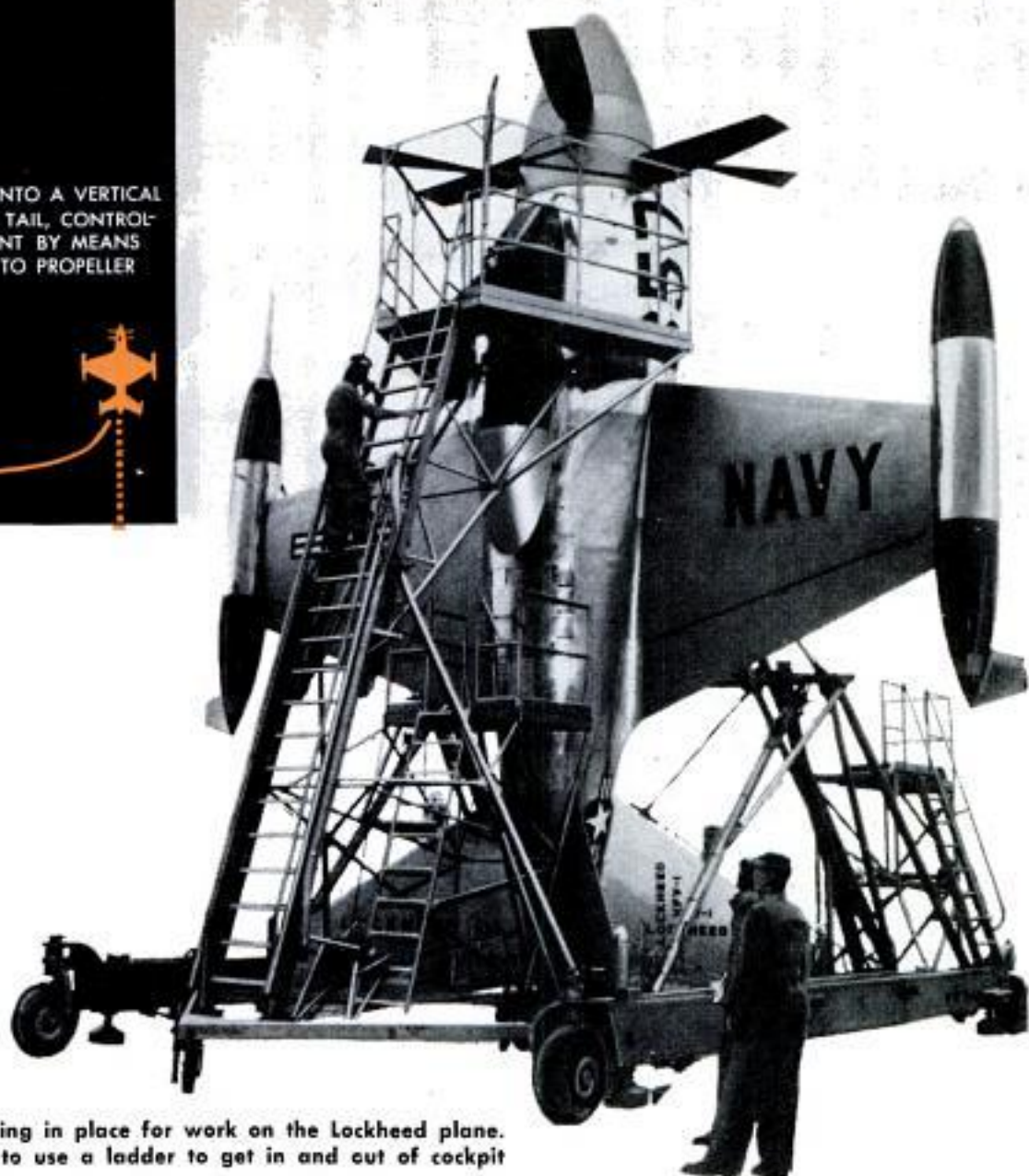
bine Allison engines. A tilting seat permits the pilot to be semiupright while the aircraft is vertical and in his normal position during level flight. Because both planes land in an upright position, extra strength and weight were built into their tails. This also prevents them from being blown over when parked in a high wind. They rest on steel landing legs projecting down from shock absorbers. Convair's plane, nicknamed the "Pogo Stick," has undergone tethering tests inside a 200-foot-high hangar, climbing and descending on a steel cable stretched from floor to roof. ★ ★ ★

Initial thrust power of delta wing Convair XFY-1, below, almost equals that of four Sabre Jets at take-off

Consolidated Vultee Aircraft Corp. photo



PILOT PULLS PLANE INTO A VERTICAL STALL TO LAND ON TAIL, CONTROLLING RATE OF DESCENT BY MEANS OF POWER APPLIED TO PROPELLER



Special scaffolding in place for work on the Lockheed plane. Pilot will have to use a ladder to get in and out of cockpit

High, old-style landing gear will be used on the XFV-1 during its first test flights and then discarded

Lockheed Aircraft Corp. photo



Detroit Listening Post



By Leo Donovan

THAT FORD FX Atmos, the "dream car" with no engineering but lots of styling including pistol grips instead of a steering wheel, may not be such a flight of fancy after all. Edward R. Dye of the Cornell Aeronautical Laboratory believes that the steering wheel and its post may be replaced by aircraft-type levers.

Dye believes that cars eventually will be designed so the occupants will walk away from crashes occurring at 50 or 60 miles per hour. This will require car-body material that will absorb much more crash impact than today's steel does.

A psychological obstacle to sales has been public reaction to the dream cars and the promised beauty of next year's models, say some dealers. At the auto shows, the customers look at the dream cars and decide that the 1954 production models look mighty dull. So they decide to wait for next year.

"Putting the advertising so far ahead of the current models has sort of backfired," says one sales executive.

Chrysler has been so plagued with rumors that it will come out very early with 1955 models that it is issuing firm denials. It definitely will not happen, says Tex Colbert, Chrysler president.

Foreign-Car Sales Down

In 1953 imports of European-made cars declined one percent from 1952 after a series of annual increases. The decline began last June and continued gradually through December. Total European-car imports for 1953 were 29,178. The MG was the most popular, the Hillman Minx second, the Jaguar third, the English Ford fourth and the Austin fifth. The Volkswagen doubled its sales over 1952, but still didn't make the top five.

Detroit gossip about further mergers often includes some truck manufacturer. Actually, Nash has been doing development engineering on trucks for quite a while. Packard has in the works a V8 engine which could be the power plant for

several cars should there be a further merger with American Motors (Hudson and Nash). One reason for the consolidation of independents is the economies that result from interchangeable components.

Chrysler surprised everybody (including itself) with the sudden success of its Plymouth-installed gas turbine (see page 107). Even the most optimistic engineers at Chrysler expected there would be delays due to minor operational problems once the turbine was installed in a car. But the whole power unit worked like a charm.

The company claims to have solved both the exhaust-heat and fuel-economy problems, but at this writing won't give definite figures about economy. Previous turbines have been extremely wasteful of fuel at low speeds and while idling.

The wonderful characteristic of the turbine is its high torque and power over a large speed range as compared with an internal-combustion engine. It may be that future cars will operate with only one gear ratio, the transmission being used merely for reverse operation. Other advantages include light weight, fewer parts (about a tenth of those in a conventional engine), no cooling system needed, electric ignition needed only for starting and a wide choice of usable fuels.

Be Careful of That Plastic Top

Ford advises new owners of the Skyliner with the transparent plastic top not to dust it with a dry cloth because the rubbing action sets up an electrostatic charge which attracts more dust. Also the top scratches easily if wiped while dry. Grease spots may be removed by rubbing lightly with a kerosene-dampened cloth, then washing with soap and water. Don't use acetone, carbon tetrachloride, alcohol, benzine or gasoline as they may soften the plastic.

Brake manufacturers contend that price-cutting tactics in the brake-replacement business have resulted in inferior materials showing up on the market. This includes both linings and hydraulic fluids. Apparently, you get what you pay for.

Of course, some original-equipment brakes offer more, or at least different, safety features than others, but the cold fact is that in the Daytona stockcar race almost all the cars suffered brake troubles at some time during the contest.

Another big problem is lubrication of the new high-compression engines. Valve springs are stiffer and cams lift higher in the new engines creating more friction, which means more wear unless the oils stand up under the terrific pressures. Factory engineers say no single oil has been produced to accomplish the results they seek.



Variable-Pitch Propeller for Outboard Motor

You change the pitch of a new outboard-motor propeller with a simple control lever. The variable-pitch propeller gives the boat a wide range of power and speed variations, both in forward and reverse. For example, you can set the motor to run at its most efficient speed, and use the pro-

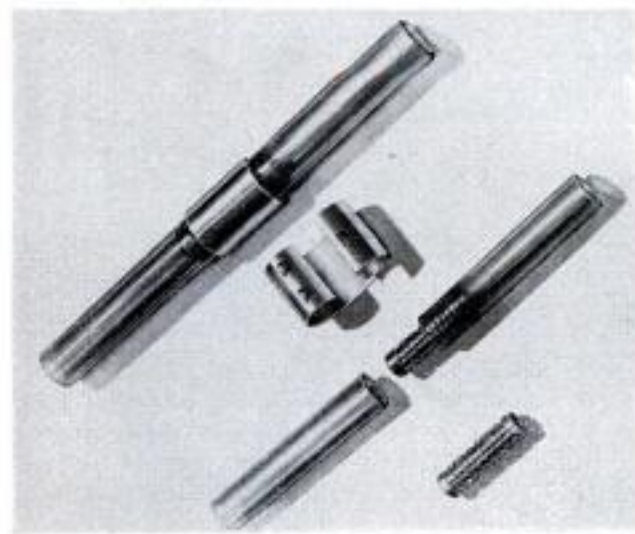
PELLER to cut down the boat speed for trolling. The control lever, mounted on the motor cowling, enables the operator to change the blade pitch without lifting the propeller out of the water. Various models of the propeller are available to fit standard motors from 3½ to 10 horsepower.

You Can Be Your Own Highway Patrolman With Buzzing "Speedometer"

You will have no excuse for breaking the law when you equip your car with an audio "speedometer." The device attaches to the present speedometer cable and notifies you by intermittent buzzing when you exceed a preset speed limit. Of course, this limit is under your control. You set it into the machine at any time. To set in a speed, you merely drive your car at the desired speed and then turn a dashboard knob

until you hear an intermittent buzzing. After that, whenever your car exceeds the speed, the buzzer warns you—the greater the excess, the louder the buzzing. It is designed to help you stay within the speed law in busy traffic areas where you can't take your eyes off the road to look at the speedometer. Also available is a dash-mounted light that flashes when you exceed the self-imposed speed limit.

Two-Piece Kit Seals Breaks in Plastic Garden Hose



Plastic garden hose is quickly repaired with a simple two-piece kit. The hose is cut in two at the leak, dipped in hot water and reconnected with a brass nipple that fits inside the hose. A rustproof steel clamp fits over the joint and snaps into place to form a permanent seal.

Computers Use Costly Metal

Metal that costs \$2,000,000 a ton now goes into the small memory cores of high-speed electronic computers. But the individual sheets of metal have only ¼ the thickness of a human hair. The metal is 79 percent nickel and four percent molybdenum, combined with steel.



1. STAGGERED front wheels of rotary power mower allow contour cutting on hilliest lawn. Handle brackets permit the handle to be removed easily for storage

2. LAWN TRIMMER powered by electricity is operated from a standing position and is easy to maneuver. Slip clutch prevents damage to rotary cutting blade

3. ROBOT MOWER is operated from a simple remote-control panel attached to a 40-foot cord. Motor is electric. Carrying arm keeps cord out of way when mower turns

4. LEAF BURNER on wheels lets you burn leaves anywhere in the yard, ends piling and carrying. Shielding prevents heat damage to rubber tires or to the lawn



NEW TOOLS

5. EXHAUST SILENCER for four-cycle gasoline motors quiets power mowers, garden tractors, pumps, compressors and generators. It will not plug up with carbon, cause overheating or result in loss of power

6. SOIL AERATOR replaces roller on power lawn mower, punctures turf with star-shaped spikes. The spikes leave small holes in the lawn which prepare the soil for seeding, aerate turf and hold moisture

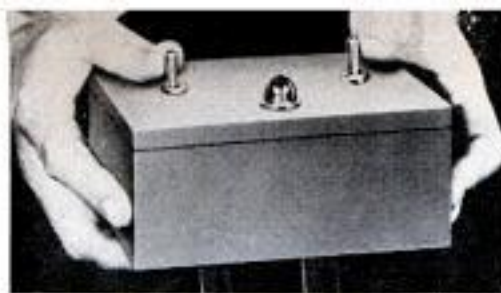
7. ROTARY MOWER that picks up its clippings blows grass and leaves into a lightweight catcher mounted on the chassis. Air blast compacts the load of cut grass, doubling the normal capacity of catcher

8. ADJUSTABLE SPRINKLER can be set to cover any area between 10 and 50 feet in diameter. The double-headed sprinkler rotates on 22 ball bearings, assuring smooth sprinkling even at low pressures

9. "WHIP END" garden hose connecting faucet with main hose saves wear and tear on the longer length, is inexpensive to replace. The short length, if left on the faucet, aids connection of the main hose

10. ROOT SOAKER can water five widely separated shrubs or plants at once with multiple tubes. Soaker attaches to faucet or garden hose and consists of three nine-foot lengths and two twelve-foot lengths





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FOR YOUR LAWN



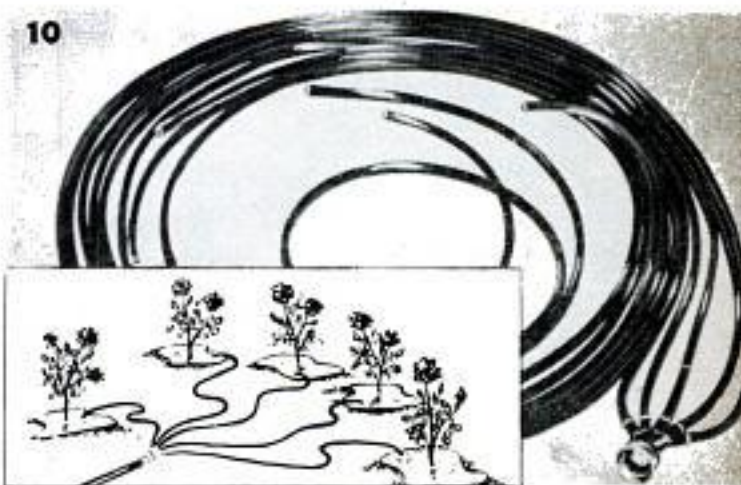
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The OWNERS REPORT:

The true test of a car begins when the owner takes the wheel. *Popular Mechanics* asked Mercury owners from coast to coast about their cars. Here is what they say



New Overhead-Valve Engine

"Very good. Idles rough at times, but may need a carburetor adjustment."

Overland Park, Kans., salesman

"I like the extra horsepower, but don't like the overhead valves. Noisy."

Sanford, N.C., businessman

"Good. I like solid valve lifters, but they are a bit noisy. Engine slow to start when hot."

New Orleans, La., contractor



Ball-Joint Front Suspension

"I like the cornering qualities."

Klamath Falls, Ore., truck driver

"I like it. No tire noise on curves."

Boulder, Colo., salesman

"Seems to handle better on rough roads."

Keupston, N.D., farmer

Transparent Plastic Roof



"Needs a curtain at times."

Oxford, Kans., farmer

"Excellent. A convertible without the wind."

New York City Aviator

"A very weird sensation to be driving through a snowstorm. Makes the car seem colder."

*Minneapolis, Minn.
used-car dealer*



MERCURY'S NEW V8 ENGINE RATES HIGH WITH THE OWNERS

By Floyd Clymer

BIGGEST NEWS at Mercury for 1954 is its overhead-valve V8 engine, an all-new design that develops 161 horsepower. What do the owners think of it? Let's look at the results of our survey of 1000 Mercury owners.

More than half (56 percent) of the owners responding are enthusiastic about the power plant—have nothing but praise for it. About a third (30 percent) like the engine but with minor reservations. Only a small fraction (3 percent) state that the engine is disappointing. The other 11 percent are reserving judgment until later, they say.

"My '54 Mercury really has get-up-and-go over last year's model."—Greentown, Ind., bookkeeper.

"Wonderful pickup. Easy on gas. Doesn't take a back seat to competition."—Buxton, N. D., contractor.

"Reserve power of engine at high speeds is really tremendous."—Jacksonville, Fla., sales engineer.

"The way it performs from 50 to 80 miles per hour is what I like best. It will get you around a car and back on your side of the road with the best of them."—Siltcoos, Ore., sawyer.

"I think it is going to hold up fine as I have already driven it hard for 8000 miles."—Richland, Ind., plant superintendent.

"I drove my 1954 Mercury at 105 miles per hour with five adults in it. It felt as

safe at 105 as at 55."—Salem, Ore., lineman.

"Power is perfect for weight of car."—Oakridge, Ore., engineer.

What are the factors that make the engine just a little less than perfect, according to 30 percent of the owners? Valve noise and poor gasoline economy lead the list.

"A very powerful engine, but makes too much noise."—Brooklyn, N. Y., plasterer.

"Should get better gas mileage. Hydraulic valve lifters should be used to silence tappets."—New Orleans, La., fireman.

"Gas economy sacrificed for performance to too great a degree."—Newark, N. J., attorney.

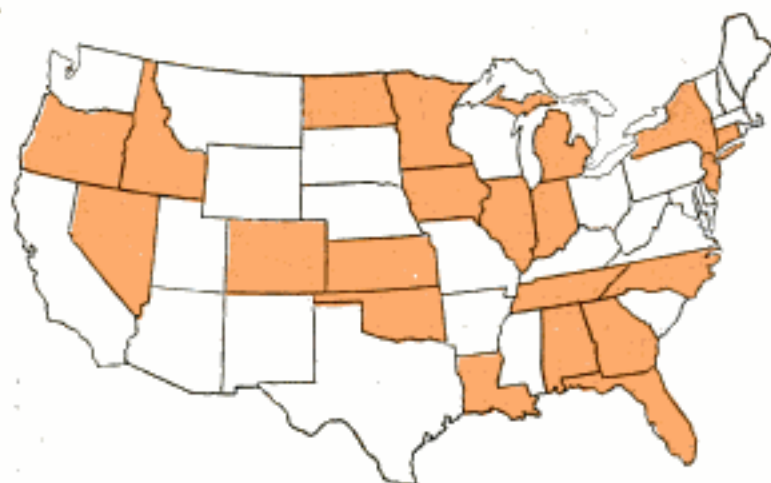
Owners Report No Bugs in Engine

One of the frequently heard warnings to new-car buyers is to beware of a new engine in its first year because of possible bugs in production. Prospective buyers don't have to worry about this in the 1954 Mercury, according to the owners. There doesn't seem to be any chronic fault in the engine. Ninety percent of the owners have had no trouble at all. There were 10 percent who reported that engine work had been done, but in most cases it involved minor jobs like tightening down valve covers to stop oil leaks. Another fault among the 10 percent of engines that had to be worked on was automatic-choke trouble.

"Automatic choke sticks a lot and you

Off-road tests by Clymer demonstrate the Mercury's hill-climbing ability. Note the new rear-fender shape





Owners in 21 states from Atlantic to Pacific report on the new Mercury's performance

Percentages from PM Poll of 1954 Mercury Owners

OVER-ALL RATING OF THE MERCURY BY THE OWNERS

excellent	56%
good	36%
average	6%
poor	2%

Previous Mercury owners	68%
Owners of 5 or more Mercurys previously	7%

Owners rating of dealer service

excellent	39%
good	20%
average	22%
poor	19%

Would buy another Mercury?

yes	70%
might	26%
no	4%

Ratings on particular features

	Like	Acceptable	Dislike
Exterior styling	92%	7%	1%
Visibility, forward	90%	10%	0%
Interior styling	86%	14%	0%
Visibility, rear	86%	12%	2%
Riding comfort	78%	19%	3%

Owners opinion of ball-joint front suspension

Like	79%
Dislike	3%
No difference	2%
No comment	16%

Average miles per gallon

	Merc-O-Matic	Overdrive	Conventional
city	13.4	14.7	15.1
country	16.6	18.2	18.1

Oil consumption per 1000 miles

No quarts	71%
1 quart	5%
More than 1 quart	5%
Did not answer	19%

Average mileage for change of oil

	1640
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Handling

excellent	83%
good	16%
unsatisfactory	1%

Roadability

excellent	72%
good	26%
unsatisfactory	2%

Structural rigidity

excellent	54%
good	41%
unsatisfactory	5%

Acceleration from 0 m.p.h.

excellent	66%
good	30%
unsatisfactory	4%

Acceleration from 50 m.p.h.

excellent	71%
good	27%
unsatisfactory	2%

New overhead-valve engine

good to excellent	56%
good with reservations	30%
poor to fair	3%
no comment	11%

BEST-LIKED FEATURES

Engine performance	47%
Styling and appearance	37%
Ease of handling	36%
Riding comfort	18%
Roadability	13%
Economy of operation	6%

MOST FREQUENT COMPLAINTS

Body fitting and assembly	33%
Low gas mileage	14%
Engine—noise and carburetor trouble	7%
Poor dealer service	3%
Lack of interior room and comfort	3%

Owners with no complaints at all

	11%
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REASON THEY BOUGHT MERCURY

Previous satisfactory Mercury ownership	25%
Styling and appearance	23%
Engine performance	21%
Trade-in and resale value	9%
Reputation and recommendation from other owners	3%
Ball-joint front suspension	3%

can't start the engine for a while."—Newark, N. J., chauffeur.

"Oil leak in valve cover. Gas leaks from carburetor on hard right turns."—Stillwater, Minn., physician.

There was no evidence of unusual oil consumption—a fault that sometimes shows up in our surveys of new engines. Only 5 percent of the owners state that they add more than one quart in each 1000 miles; 71 percent add no oil between changes; 5 percent add one quart. The other 19 percent did not answer the question.

Engine Faults Mentioned

But, overwhelming as the praise is, there were some owners who reported troubles.

"Have had both heads blow gaskets and the transmission go out because of lack of dealer service."—Hermiston, Ore., truck driver.

"Just had a new block assembly installed (at 1200 miles) due to cracked piston which ruined the block. Both cylinder-head gaskets were leaking."—Gibsonville, N. C., service-station operator.

"Had a porous block. This defective en-



Clymer says of the new Mercury suspension: "Corners can be taken at high speeds with little body roll"

gine replaced immediately with a new one. Car is now in good shape."—New York technician.

"Until I had different jets put in the carburetor, my best mileage was 13.1. Now it is 15.3. Spark plugs gave out at 3000 miles. Must use premium gasoline to keep engine from knocking."—Ellerbe, N. C., parts manager.

Among the tiny minority of owners registering dissatisfaction with the new engine, some claimed performance was little, if any, improved.

"Does not seem to have more than average power. Not as much as advertising claims lead one to believe."—Essex Falls, N. J., engineer.

"Takeoff and acceleration only slightly increased, though it does seem to climb hills with more ease."—Cleveland, Tenn., technician.

"Can't see where increasing horsepower

to 161 has increased pep and speed at all over the old engine."—Atlanta, Ga., aircraft inspector.

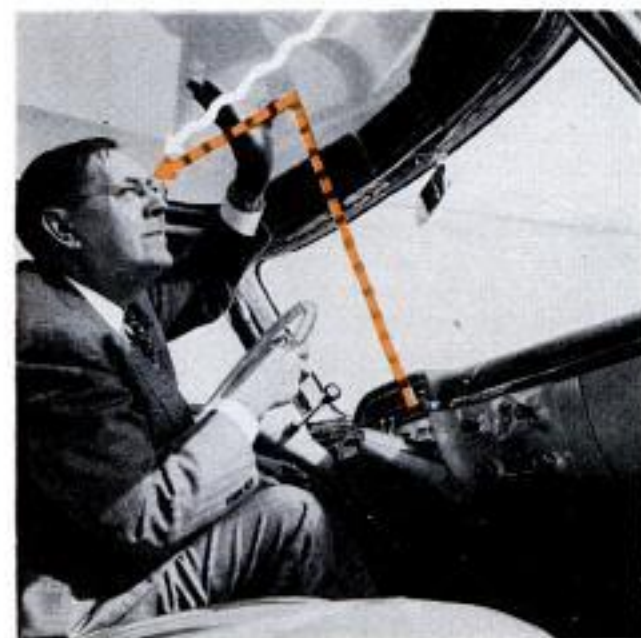
Average Gasoline Mileage

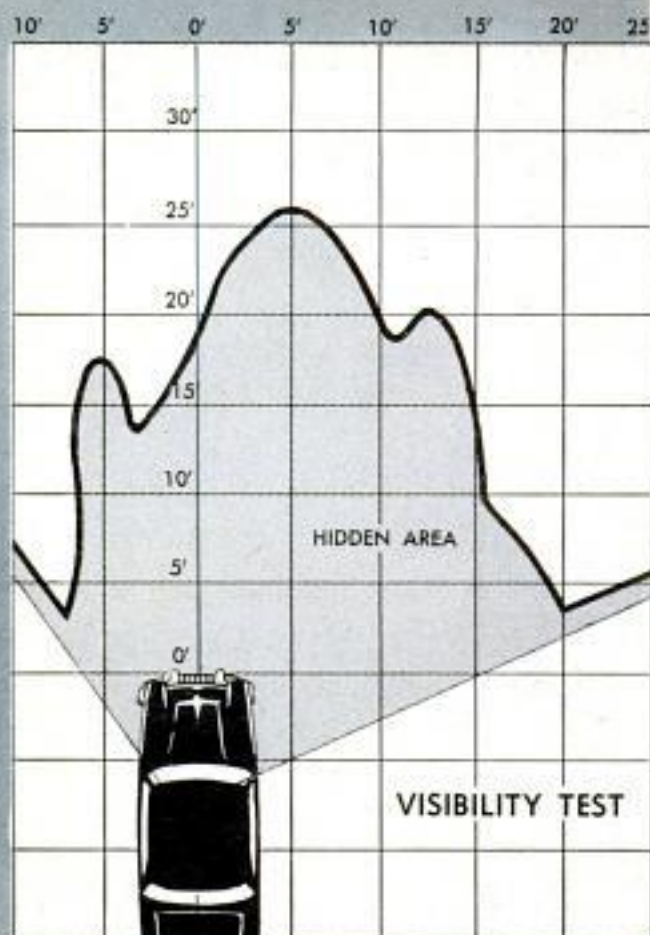
There is no question but that many owners are disappointed in the gasoline economy of the new engine. It was second only to poor body assembly in the list of most-frequent complaints, with 14 percent saying gasoline mileage is too low. Average mileage of owners reporting was 13.4 miles per gallon in the city and 16.6 miles per gallon in the country (both figures for cars equipped with automatic transmissions). The owners of overdrive and conventional transmissions reported slightly higher averages. ([See Percentage Table, page 104](#), for details.)

"I like everything about it except the gas mileage. I think I have a bum carburetor."—Clarksville, Tenn., club manager.

Plastic roof lets sun glare through (wavy line) and reflects instrument lights at night (dotted line)

Clymer admires the new overhead-valve engine. Arrow points to power-brake unit available on Mercury





ACCELERATION TEST

1954 MERCURY SUN VALLEY
with Merc-O-Matic Drive

¼ mile from zero	21.3 sec.	Drive range only
	20.1 sec.	Low range only
½ mile from zero	32.8 sec.	Drive only
	32.3 sec.	Low and Drive
0 to 30 m.p.h.	3.9 sec.	Low only
0 to 60 m.p.h.	16.3 sec.	Drive only
	15.9 sec.	Low and Drive

Top speed by speedometer.....102 m.p.h.
Actual top speed about 8% less

ECONOMY TEST

MILES PER GALLON
Constant-Speed Mileage

At constant 30 m.p.h.	24.3
At constant 50 m.p.h.	18.2
At constant 60 m.p.h.	17.1
At constant 75 m.p.h.	12.9
Cross-Country Mileage	
Detroit, Mich. to Springfield, Ill. (cold weather, some snow and ice)	16.8
Springfield, Ill. to Kansas City, Mo. (traffic, level highway)	17.2
Denver, Colo. to Las Angeles (mountains and desert)	19.3

✱

Who are the owners in the Owners Report? They are 1000 persons chosen at random from owners of the 1954 Mercury all over the country. The names are taken from state registration lists by an independent agency. PM exerts no control over the selection

"Surprised at low mileage obtained in city driving. Actually 4 miles per gallon less than a 1950 Mercury owned by my parents."—Chicago truck driver.

"Got very good gas mileage on my '50 and '53, but am very much dissatisfied with mileage on the '54. Had it back for service several times. They either cannot do anything about it or don't know how."—Tampa, Fla., contractor.

Transparent-Plastic Top

Mercury was the first production model to offer a transparent-plastic roof insert. It accounts for only a small percentage of the total ownership, but it is different and, therefore, of interest. Of the owners reporting, only 10 percent have the plastic-top model, the Sun Valley.

Generally, the reaction was enthusiastic. Most owners were happy that they bought the Sun Valley.

"You have the advantage of a hardtop, the next thing to a convertible."—Johnson City, Tenn., owner.

"Excellent. A convertible without the wind."—New York Naval aviator.

"Sure beats convertibles in this climate."—Cary, Ill., railroad agent.

"Fine now, but in July and August?"—Flushing, N. Y., distributor.

"A lot of glare at high noon."—Newington, Conn., pharmacist.

"It's just a novelty. I would not buy this model again."—Prospect Heights, Ill., salesman.

"A very weird sensation to be driving through a snowstorm. Makes the car seem colder."—Minneapolis, Minn., used-car dealer.

Ball-Joint Suspension

General approval of the new ball-joint front suspension system was registered by the owners, with 79 percent stating that they like it, only 3 percent disliking it, 2 percent stating they could see no difference, and 16 percent making no comment.

"Greatest improvement in years. Steers and handles on curves at 60 as if only doing 35. Absorbs great deal of road shock."—Irvington, N. J., law student.

"Like it due to no tire noise on curves."—Boulder, Colo., salesman.

The 3 percent who dissented complained that the suspension is noisy at times.

"Knocks over rough roads."—Detroit, Mich., repairman.

"Okay except when turning into a drive where there may be a small break in pavement at the curb. There is an extreme jerk on the steering wheel."—Clearwater, Fla., manufacturer.

"I haven't noticed any difference from

(Continued to page 250)



Fitting neatly under the hood of a Plymouth, the turbine is simple, has a fifth as many parts as a piston engine



President L. L. Colbert of Chrysler demonstrates how cool the exhaust is

Gas-Turbine Plymouth

By Arthur R. Railton
Automotive Editor

CHRYSLER ENGINEERS have done the "impossible." They built a gas-turbine engine that fits in a Plymouth without changing anything but a few brackets and, even more amazing, they have eliminated the bugaboo of high fuel consumption and high exhaust temperatures.

Secret of the new turbine is a regenerator or heat exchanger that uses hot exhaust gases to preheat the compressed air before it enters the combustion chamber, cooling the gases and, at the same time, increasing fuel economy. The trick was to make a regenerator that would be efficient and yet occupy little space.

The engine will burn a wide variety of fuels. In tests, unleaded gasoline was used and economy equaled that of a piston engine. Being pistonless, it has no knock problem, making unnecessary high-octane fuels.

Power output is 120 horsepower, but its torque equals that of a 160-horsepower piston engine. Having some characteristics of a torque converter, the engine could be used without a transmission. It is 200 pounds lighter and has one fifth as many parts as a piston engine.

Noise seems to be no problem. There is a noticeable hiss or whine, most of which comes from the front end, not from the exhaust. It is the sound of huge volumes of air being compressed by the whirling blades.

Production will depend upon the availability of strategic materials needed to withstand the high temperatures of the engine. Other big problems include costs of machining and fabricating these metals.

Engine is lowered into car. Heat exchanger is visible atop engine

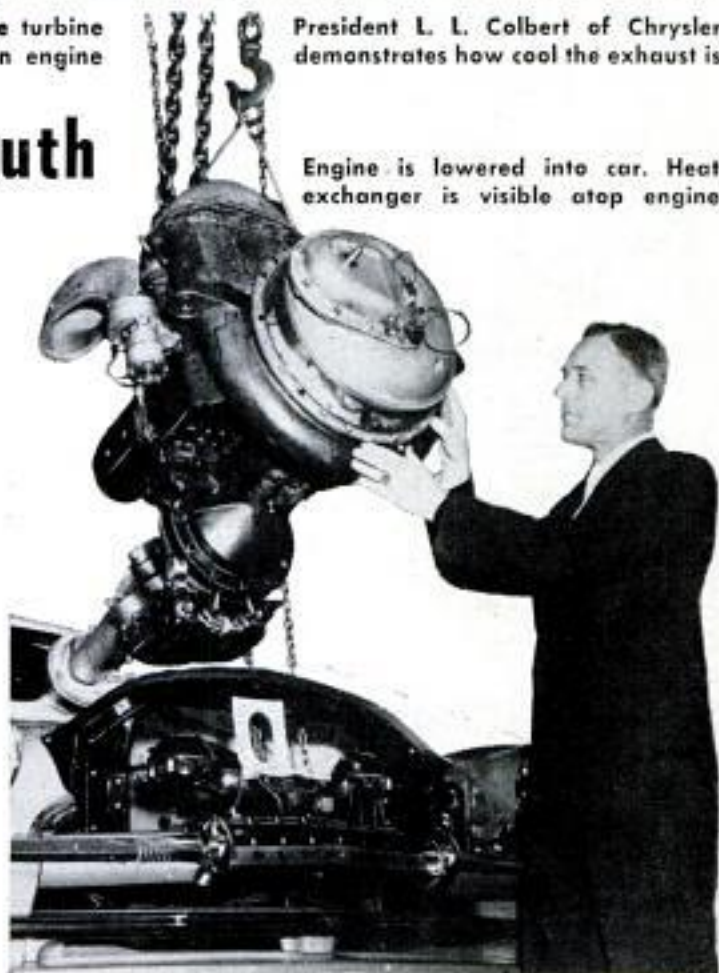
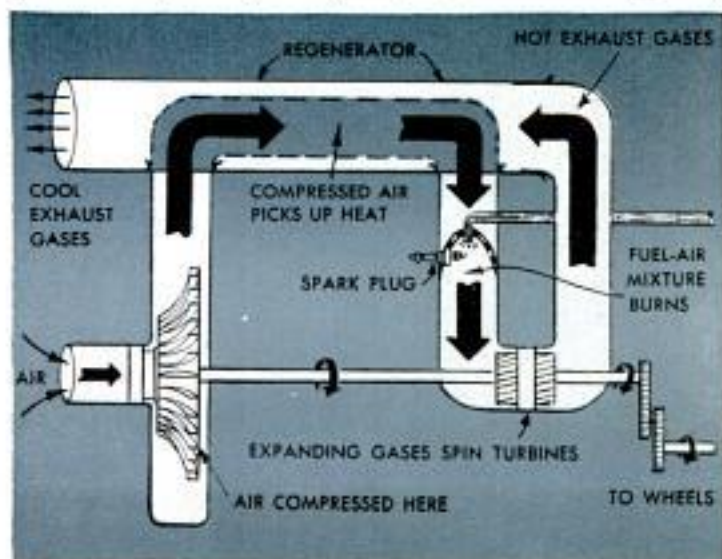


Diagram of turbine, which idles at 20,000 r.p.m., has a top speed of 50,000 r.p.m. Spark plug is for starting only





Streamlined Aluminum Upper Berth Clamps to Automobile Roof

Sportsmen, salesmen and vacationists can now add a comfortable upper bunk to their automobiles. A streamlined aluminum unit that fits firmly on any hardtop car roof serves as a weather shelter, a bed and an extra storage compartment. The

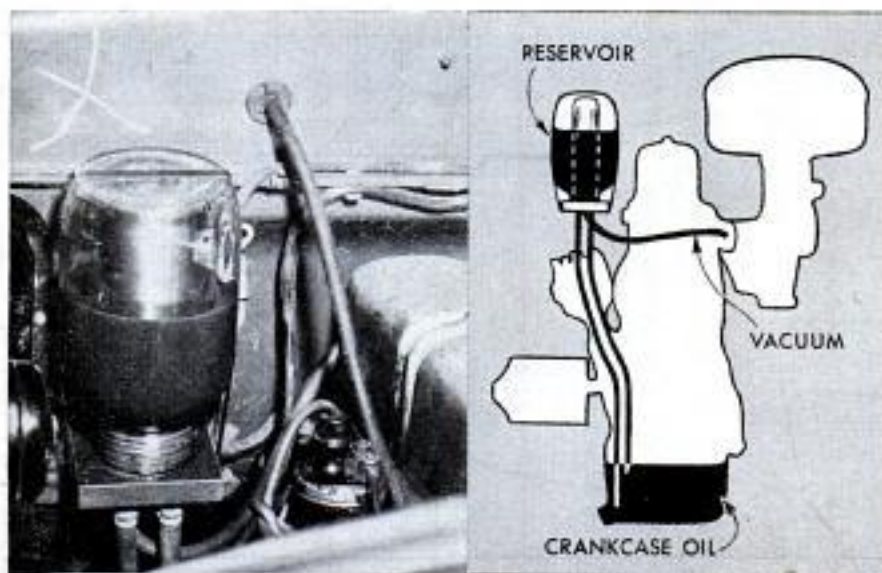
metal top springs up to expose a canvas shelter with watertight Zippers on both sides, a screened window and a 48-inch-wide mattress. A light but sturdy snap-on ladder gives easy access to the bed. The unit is both dustproof and waterproof.

Crankcase-Oil Reservoir Fills Engine Automatically

You throw away the dipstick when you install a crankcase-oil reservoir system in your automobile. The system consists of a large jar that mounts on the firewall behind the engine. Two lengths of tubing run down into the crankcase through the dip-

stick hole. A third tubing hooks into the intake manifold for a vacuum supply. Whenever the crankcase level drops below the proper mark, oil from the jar is introduced to bring it back to the correct level. To check the oil level, you simply look at

the jar. If there is oil in it, you have the proper amount of oil in the engine. When the oil level drops in the jar, you add a quart in the normal way and the excess oil is drawn up into the reservoir for storage until needed. Because the motion of the car keeps the oil level going up and down continuously, there is a constant interchange of oil between the crankcase and the reservoir, so you can also tell the condition of the oil in the system by inspecting the jar.



Models Replace Surveyors in Planning New Jersey's Highways



Using a method developed during World War II, the New Jersey Highway Authority has replaced the slow and expensive surveying method of highway planning with models based on aerial photographs. A 2000-foot-wide strip along the proposed route is photographed from an airplane using stereoscopic cameras. Contour maps are made from the three-dimensional photographs. Contours are traced on wallboard, cut out like a jigsaw puzzle and assembled as a scale model of the terrain. With the model, engineers determine the best route for the new highway, computing average elevation of the roadbed, plotting bridge sites and planning drainage systems.

Heart-Lung Machine Does Both Jobs During 26-Minute Surgery

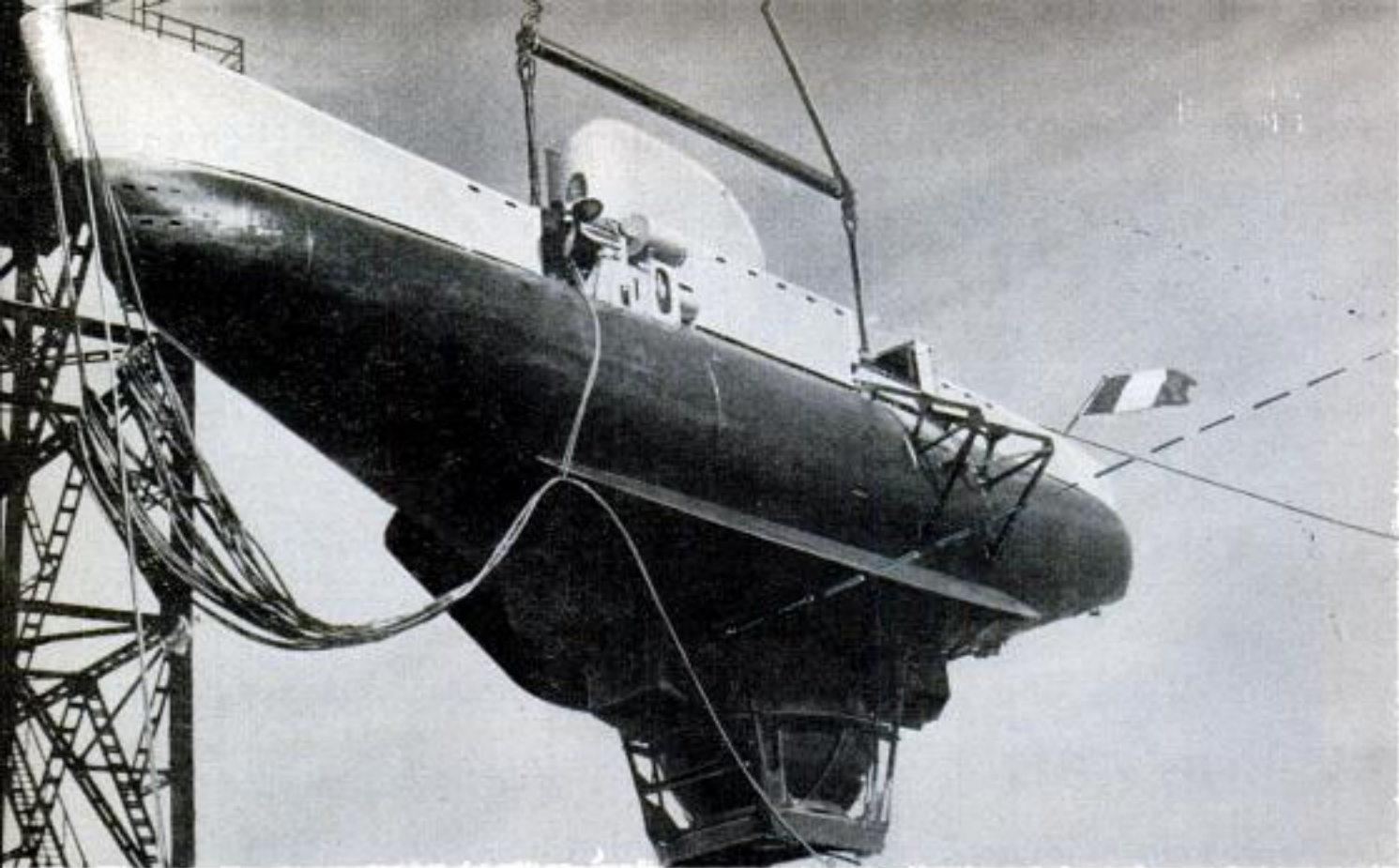
For what is believed to have been the first time, a machine took over the functions of both the heart and lungs of a patient during surgery. The apparatus pumped an 18-year-old girl's blood and oxygenated it while one of the inner walls of her heart was sewed up. The operation took 26 minutes. Dr. John H. Gibbon, Jr., of Jefferson Medical College, Philadelphia, the inventor of the machine, performed the surgery.



Root-Crop Spray Prevents Sprouting

Potatoes and onions won't sprout in the storage bin if they are sprayed before harvesting with a new chemical. Absorbed by the leaves, the growth inhibitor works down into the bulbs, stopping further cell division. The spray, maleic hydrazide, is the same solution used to retard the growth of grass along lawn edges. Properly stored potatoes are kept from sprouting for up to 12 months, Spanish onions up to eight months.





Bathyscaphe is lowered into ocean for test dive. Sphere on platform at bottom is the only watertight section

13,000 Feet Under the Sea In the French Bathyscaphe

SCIENCE REACHED new heights—or, more properly, depths—of exploration a few weeks ago when two French naval officers, manning one of the weirdest vessels ever constructed, plunged to a record depth of 13,284 feet under the sea. Called a bathyscaphe, it resembles a crude sub.

At midmorning the two men, Lt. Comdr. Georges Houot and Lt. Pierre Willm, dropped down through the conning tower and disappeared into a metal sphere fastened beneath the superstructure. Closing the hatch after them, they started the slow, vertical descent into the depths of the Atlantic off Dakar. No cable connected the vessel with the surface. About three hours later a guide rope beneath the bathyscaphe bumped the ocean floor, and the two men had set a new depth record for underwater exploration. Approximately two hours later they bobbed to the surface, determined to make other dives as soon as possible. The bathyscaphe is designed primarily for deep-sea research, and not just as a means of setting a new depth record.

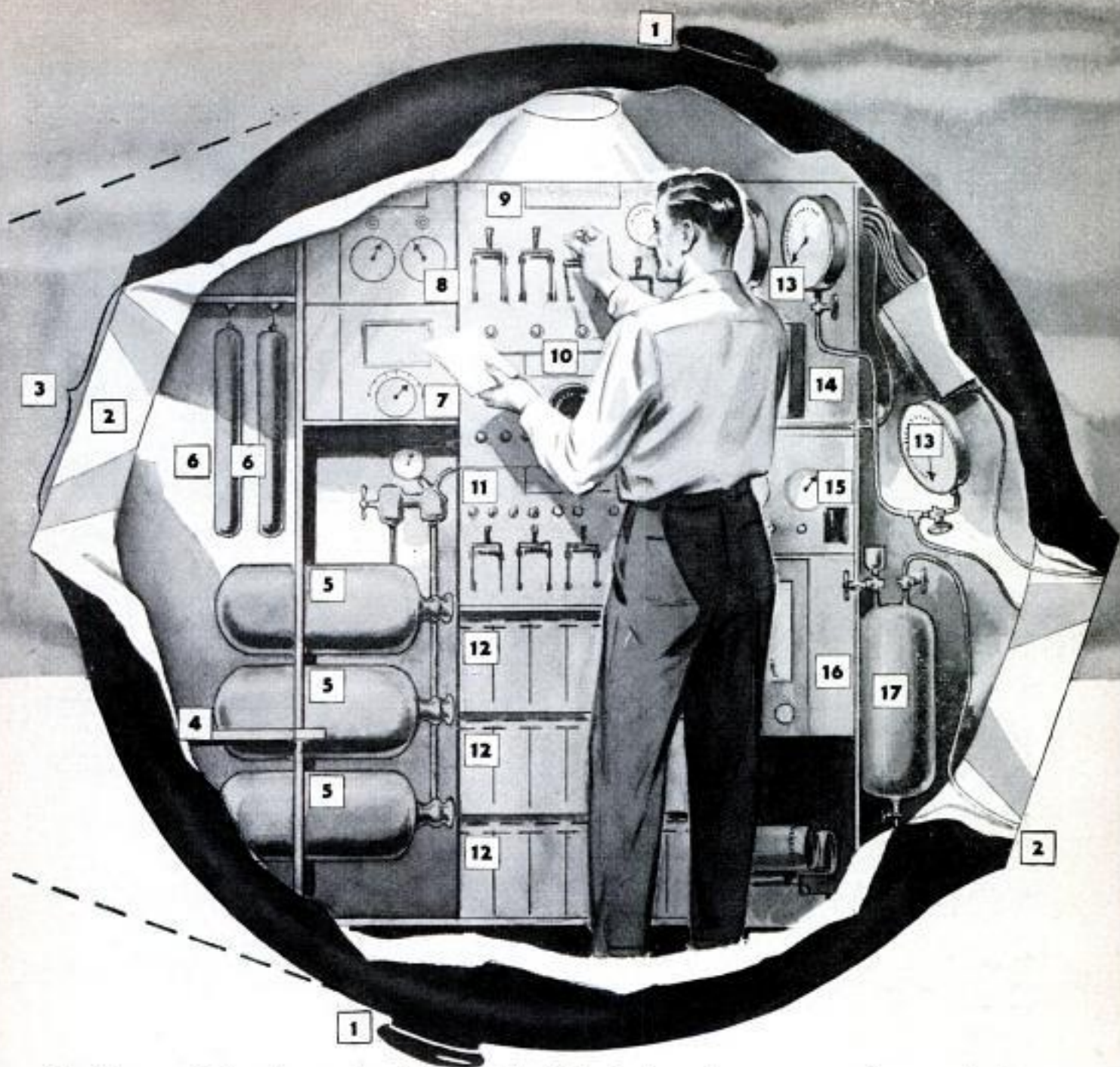
Actually the vessel is a free balloon in reverse. The only watertight portion is the steel sphere, designed to withstand a pressure of 5676 pounds per square inch. Most of the superstructure consists of tanks filled

with gasoline. An opening connects these tanks with the sea water, so the inside and outside pressures are virtually the same. Since the gasoline is lighter than water, it remains in the top of the tanks and provides buoyancy for the vessel.

When the men are ready for a dive they enter the sphere through a vertical lock. The lock then is filled with water, causing the bathyscaphe to sink. The farther it sinks the faster it descends because the gasoline is compressed by the sea water.

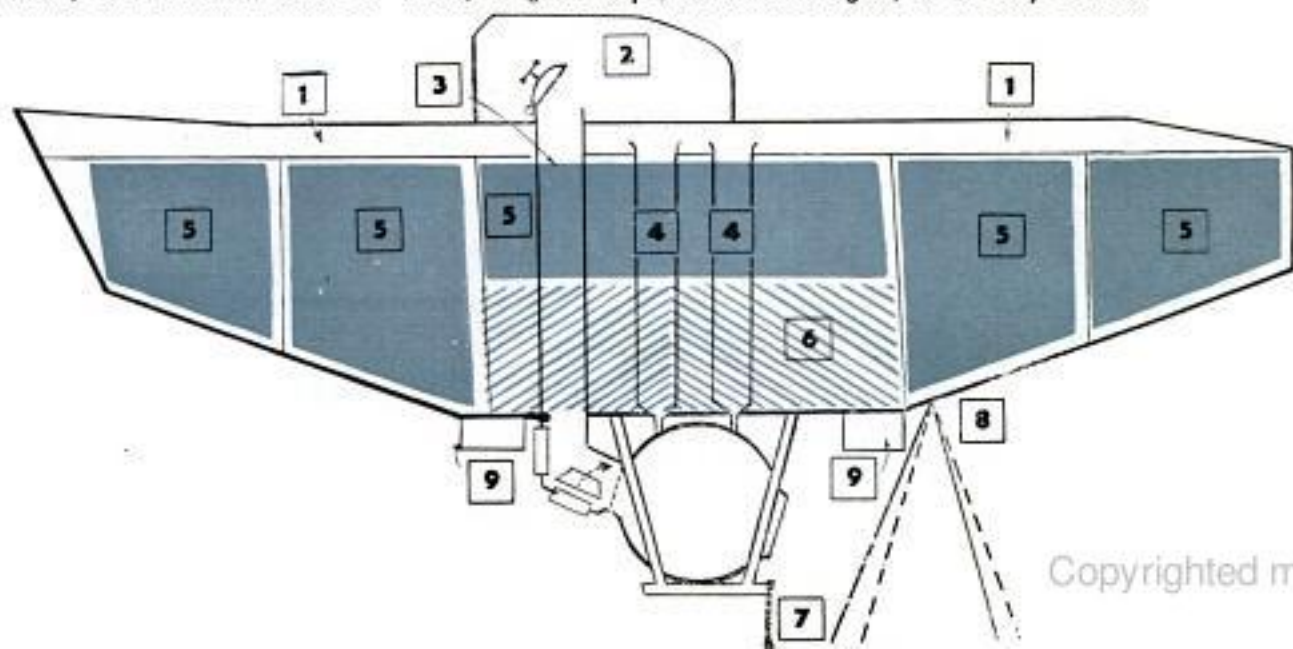
Aboard the vessel are four containers filled with iron shot. This ballast gives the men a means of controlling the rate of descent and also of returning to the surface. They throw magnetic switches which cause the iron pellets to pour slowly out of the containers, slowing the descent. When the divers are ready to leave the ocean bottom they dump more ballast until the bathyscaphe becomes lighter than the sea water (because of the gasoline) and begins to ascend. In this way the state of near equilibrium between the weight of the vessel and the buoyancy of the gasoline can be controlled.

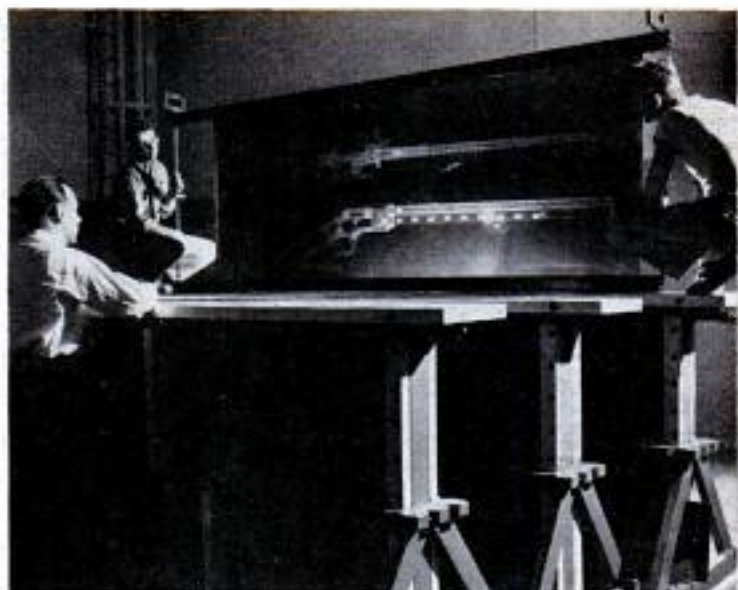
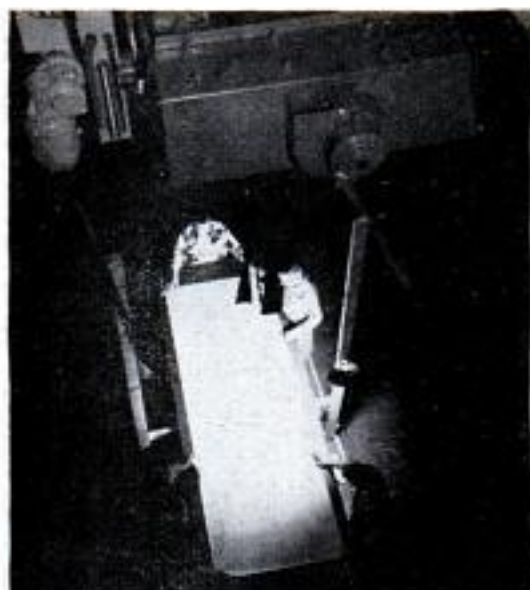
The greatest known ocean depth is 35,435 feet, and the men believe that depth can be reached in a bathyscaphe.



↑ 1. Clamps seal joints between hemispheres; 2. Portholes; 3. door; 4. entrance step; 5. oxygen bottles; 6. sodium carbonate, which absorbs carbon dioxide; 7. temperature gauges; 8. vertical compass; 9. electric switches; 10. shot gauges; 11. Ballast control; 13. pressure gauges; 14. automatic ballast release; 15. water-gasoline level gauge; 16. sounding instrument; 17. mechanism for sampling sea water

↓ 1. Nonwaterproof superstructure; 2. conning tower; 3. access hatch; 4. iron-shot containers; 5. gasoline tanks; 6. area filled with sea water; 7. guide rope; 8. exterior lights; 9. security ballast





Rifles are suspended between betatron, top left, and film platform, below. Right, finished X-ray picture

Ten-Foot X-Ray Picture Reveals Minute Flaws in Steel Castings

Just to show how big an X-ray picture they could take, technicians at an Allis-Chalmers laboratory in Milwaukee used a single film 10 feet long and 40 inches wide. Subjects of the picture were two big-game rifles which were suspended eight feet above the film and four feet below the X-ray source to magnify the image three times. A 22,000,000-volt betatron swept an X-ray beam back and forth along the length

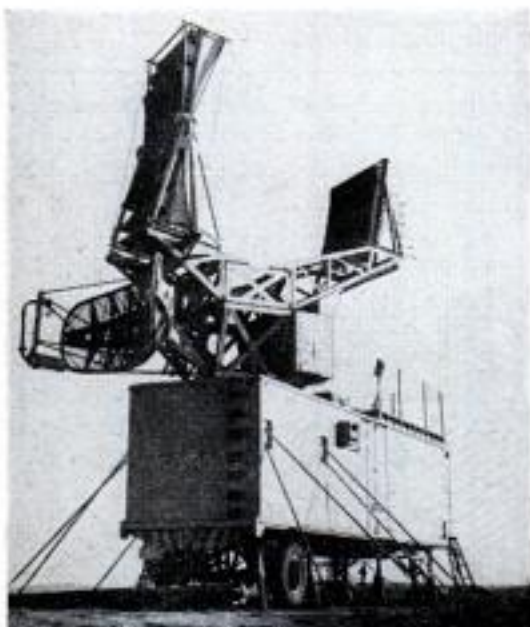
of the rifles to produce sharply defined images of both guns. The film lay on a fiber-board platform and was covered with a sheet of 16-gauge steel which absorbed secondary radiation and served as an intensifying screen. After the exposure, the film was developed and fixed in three 90-gallon rectangular tanks. The experiment demonstrated the ability of the method to reveal minute flaws in steel castings.

Electronic System Used By Air Force Lands 120 Planes Per Hour

Called "Volscan," a new automatic control system developed by the Air Force can handle 120 incoming aircraft per hour, compared with a top of about 40 which can be brought in by manual systems. It was designed to avoid the "stacking up" of jet

aircraft at busy bases since their rate of fuel consumption increases rapidly as soon as they lose altitude. At Fort Dawes, Winthrop, Mass., the control room is in an underground concrete bunker, hundreds of yards from the radar truck and antenna.

"Volscan" radar truck and antenna are hundreds of yards from control room, right, in underground bunker





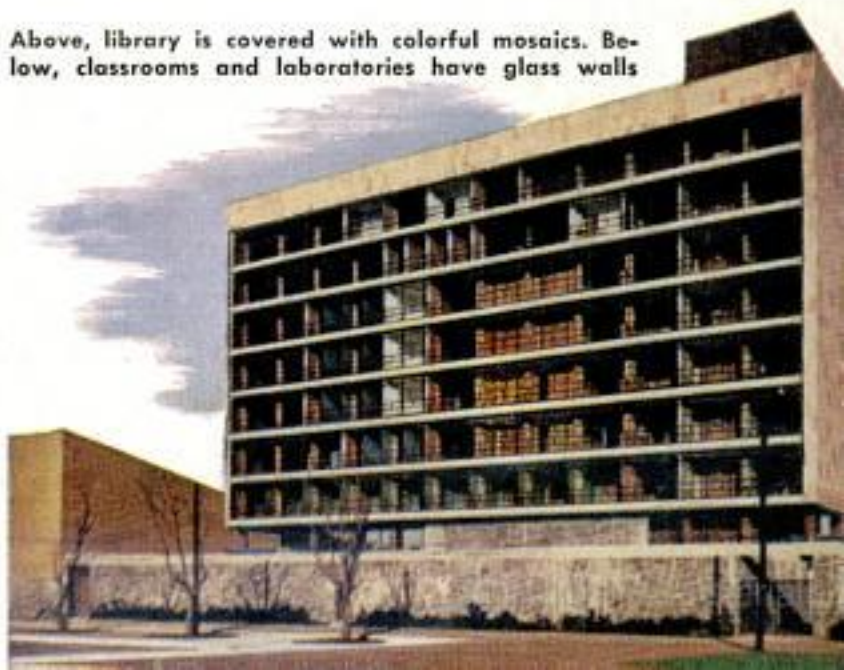
MEXICO BUILDS A *Reprinted from Highlights* GLAMOUR CAMPUS

By Thomas E. Stimson, Jr.

ONE OF THE strangest buildings ever constructed, it stands on stilts, its thin concrete roof pulled taut around the entire structure like the canvas of some ultramodern covered wagon. Beneath the roof, ionization chambers and automatic neutron counters keep a 24-hour watch on the cosmic rays that strike through the thin concrete with virtually no interference.

The building is the Pavilion of

Above, library is covered with colorful mosaics. Below, classrooms and laboratories have glass walls





Artists worked from scaffolding on medical building. Aztec mosaic of glass tiles depicts Life and Death

Cosmic Rays at the University of Mexico. In a way, it symbolizes the rest of the campus, for here, blazing with color, are some of the most unique school buildings ever to welcome a student.

"Magnifico! Fantastico!"

This year tourists and educators from many parts of the world are echoing those words as they visit the new campus.

Recently housed in an assortment of ramshackle structures, North America's oldest university has just moved into the brand-new group of buildings conceived by Mexico's greatest architects and engineers and dedicated to the proposition that school buildings can be beautiful as well as useful.

The results are so spectacular that most

visitors feel a real envy for the 25,000 students who will be studying literature or engineering, architecture, medicine or other courses on the new campus.

The university traces its history back to 1551 when the "University of New Spain" was granted a charter by the King of Spain. Shortly afterward the name was changed to the "Royal and Pontifical University of Mexico" and was supported by endowments from Mexico's gold mines. The school was abolished during various revolutions, and in recent years has operated on funds from the sale of land grants. The present campus consists of more than 1500 acres of ancient lava flows, called the Pedregal, at the southern edge of Mexico City.

The new campus represents the largest

single construction project in Mexico since ancient times and was built at record speed. It was started in 1950 during the regime of President Miguel Aleman, and a huge statue of him stands at one end of the main esplanade. Most of the buildings are of the modern "international" style. The stadium and some of the sports facilities are deliberately styled to resemble Mexico's volcanoes and her ancient Indian pyramids.

About \$25,000,000 has been spent to date and a similar sum is being used for furnishings and equipment. The whole project is so vast that it is known officially as "Ciudad Universitaria" or "University City." Eventually a civic center complete with stores, markets and theaters will be erected for the convenience of students and professors.

The magnificent new stadium is suitable for football and for all track and field events. Authorities hope Mexico will be chosen as host for one of the future World Olympic Games. Some coaches don't believe their sea-level athletes could put on a good show in the 7500-foot elevation of Mexico City, but Mexicans explain that almost anyone becomes acclimatized after about 10 days in the thin air. Most Olympic teams spend that much time in practice at the scene of the games. Next year the Pan American Games, comparable to a regional Olympics, will be held at the university.

In designing the stadium the engineers noted that everyone likes to sit near the 50-yard line, so they created a structure that is low at each end and has a high sweep along each side. This puts more than the customary



Huge Olympic Stadium was designed to resemble the crater of a volcano. High sides are opposite the mid-field marker, giving more of the spectators seats on the 50-yard line. Seating capacity of the stadium is 103,000

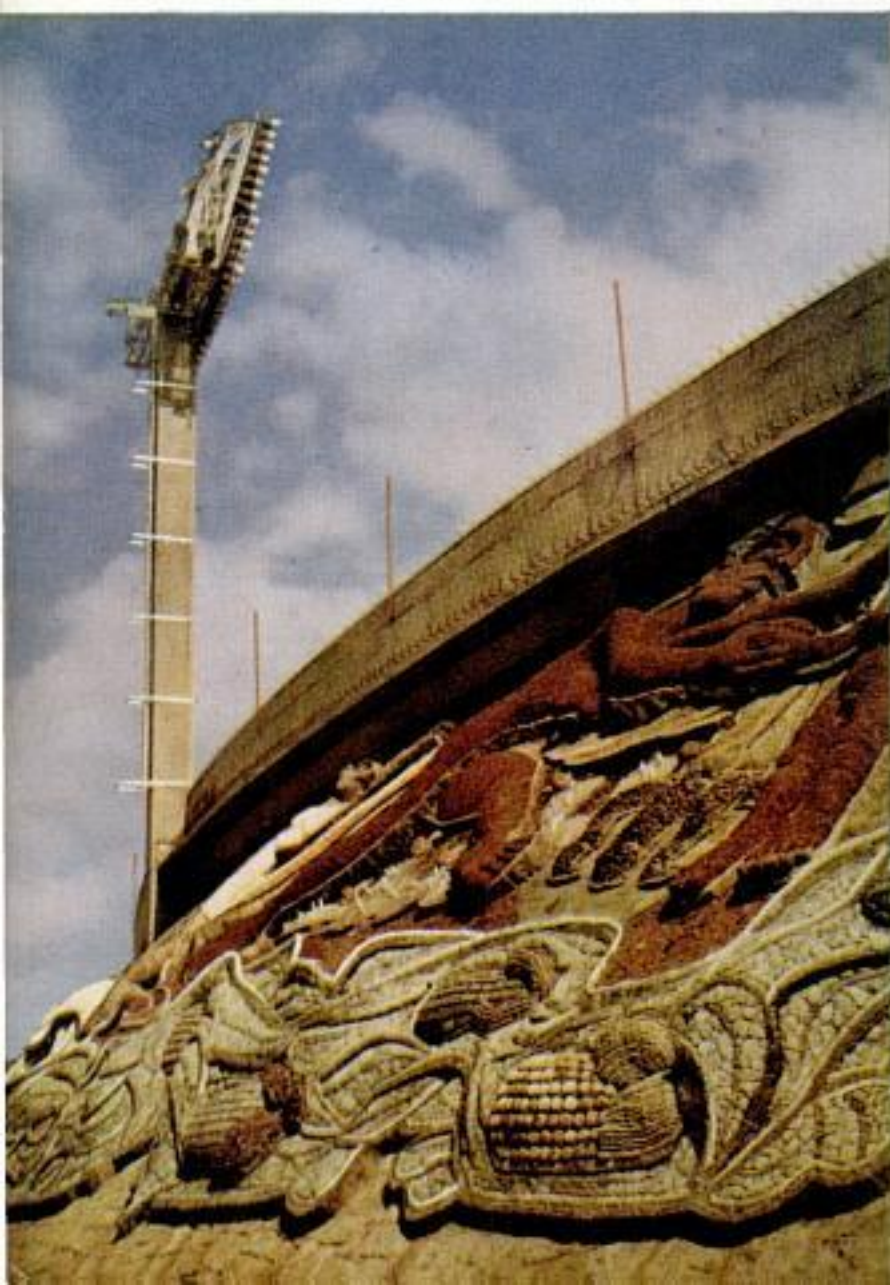


Seating areas are reached through 48 tunnels. Running track of the stadium is surfaced in black volcanic crushed rock. Below, three swimming pools are interconnected so casual swimmers can wander from one to another. Underwater windows help the coaches train their student swimmers





Entire end of one science building is a painted mural which depicts the combining of knowledge from various civilizations. Bas-relief by famed artist Diego Rivera decorates side of stadium. It is made of thousands of pebbles stained with acids



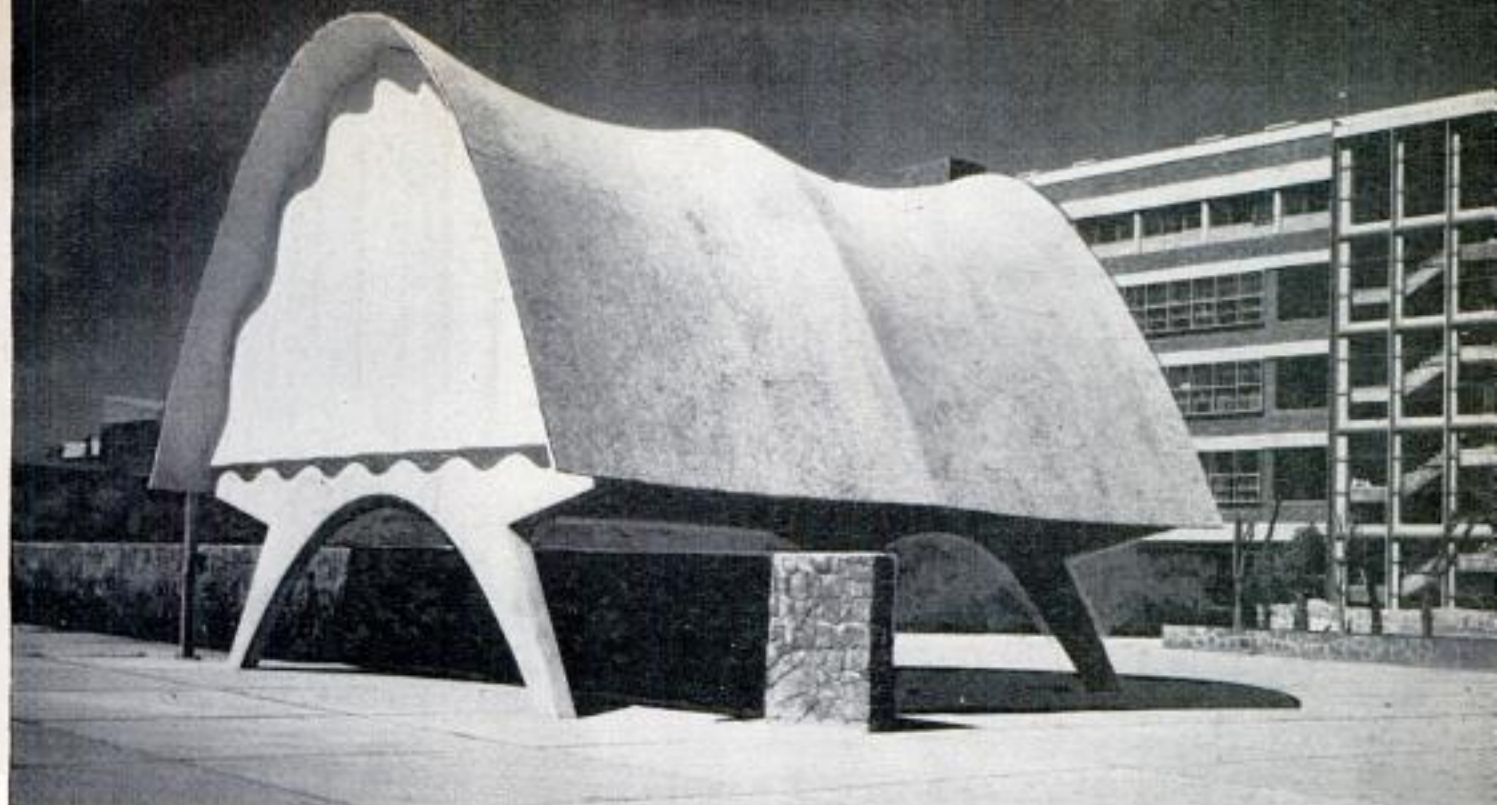
number of spectators in the most desirable zone. Seating is in two tiers, with a capacity of 103,000.

The stadium was shaped by scooping out soil and lava rock from the middle and using this material to build embankments along the sides. Not only did this method cut ordinary construction costs by more than half, but it provided a desired craterlike resemblance to Mexico's volcanoes. Very little steel or concrete was required except for facing the compacted dirt fills and for the cantilevered balcony and the 48 access ramps and tunnels.

The stadium has a complete floodlighting system, a public-address system that reaches all areas, a 200-foot-long press box and outlets for television cameras at strategic points in addition to telephone, telegraph and teletypewriter facilities.

On another part of the campus are an eight-lane Olympic championship swimming pool, a huge practice pool and a championship diving pool. All three pools are connected by water channels spanned by low bridges. Casual swimmers can wander from pool to pool.

The water is heated, chemically purified and automatically circulated. The championship diving and swimming pools have underwater lighting and underwater

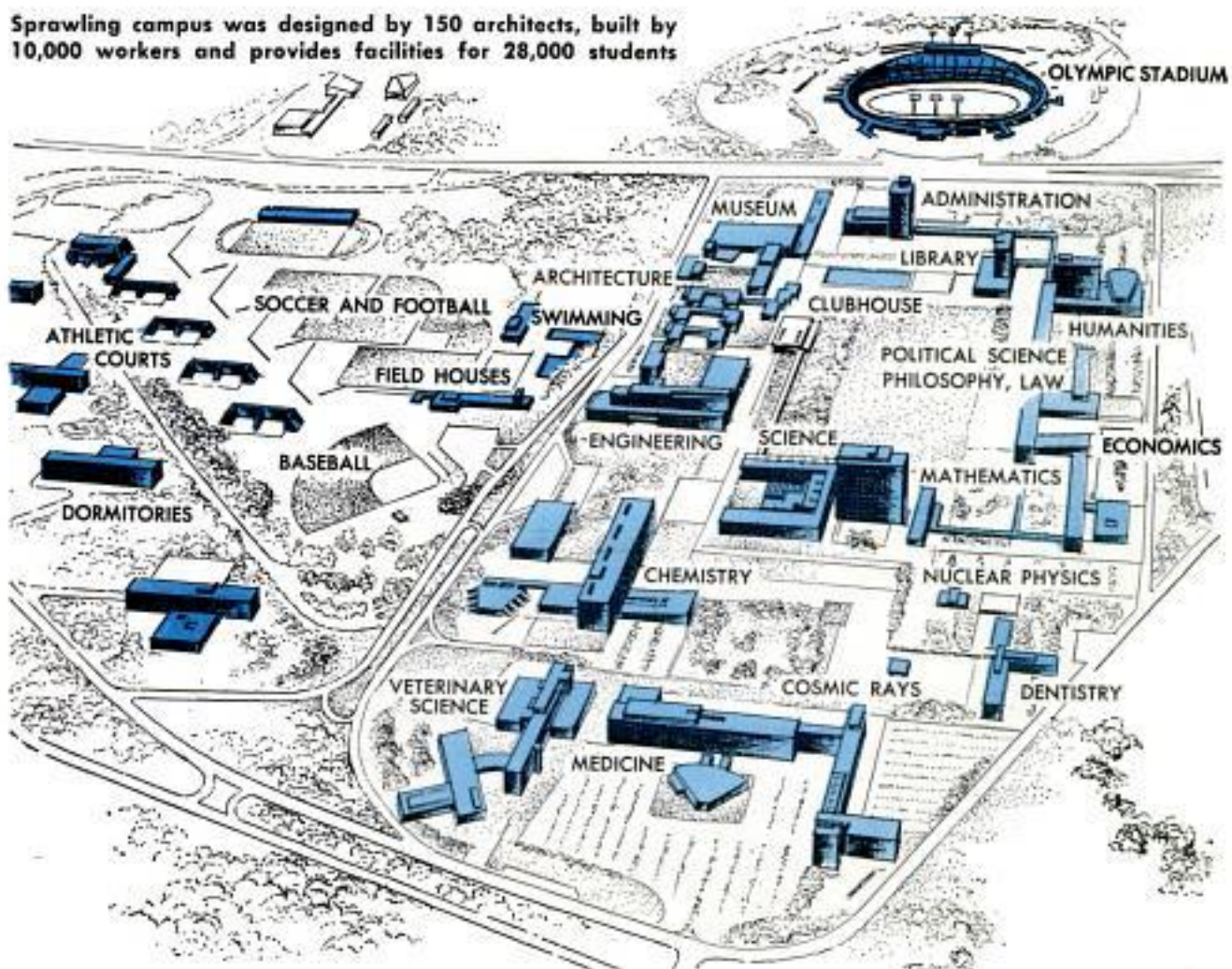


Mounted on stilts, the Pavilion of Cosmic Rays houses automatic neutron counters and ionization chambers

windows from which the coaches can watch the form displayed by their students. Spectators were seated on a few rows of stone steps when the pools were first used. After the first big water meet was held it was found necessary to add a spectator stand.

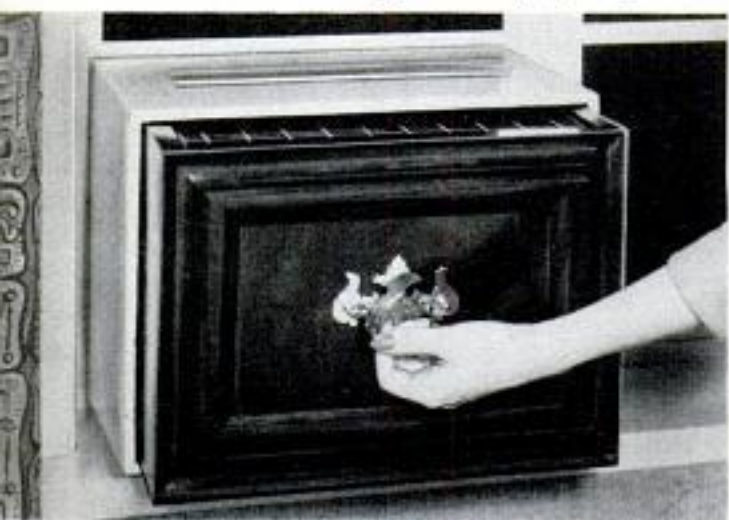
Other sports facilities on the campus include a baseball stadium with seats for 3000 spectators, a practice stadium for field and track with bleachers seating 4000 people, three practice fields for soccer or
(Continued to page 242)

Sprawling campus was designed by 150 architects, built by 10,000 workers and provides facilities for 28,000 students





Casement-window unit by Chrysler Airtemp takes the place of one of the windows, doesn't project outside. Servel's casement unit masquerades as a wall cabinet, is set in three cooling positions by pulling drawer

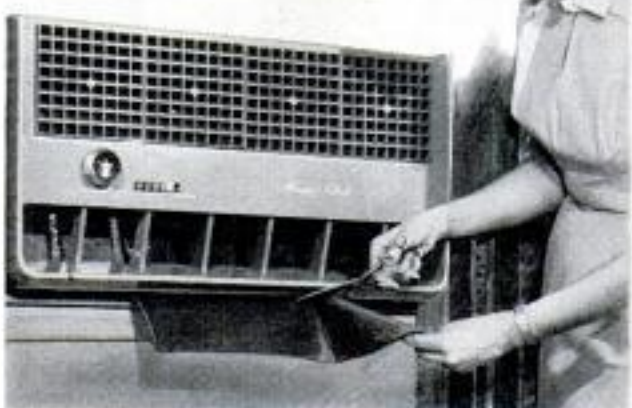


Wood-cabinet "consolette" by Philco fits casement windows and city codes which bar projecting units

Magic Boxes Fight Heat

SLEEPLESS NIGHTS and sweltering days don't have to be a part of the "good old summertime," as more Americans are finding out every year. Air-conditioner sales are skyrocketing. Many people, because of cost or a radiator-heating system that can't be converted to central air conditioning, are installing room air conditioners. The 1954 units not only chill a room, but dry and filter the air, and can be set to bring in fresh air or exhaust stale air. Some are regulated by thermostat and some can be run at reduced speeds for quiet night operation. Optional features include heating coils and heat pumps for spring and fall and a device that switches the unit on at a preset time. Costs range upward from the \$200 price of the smallest unit.★★★

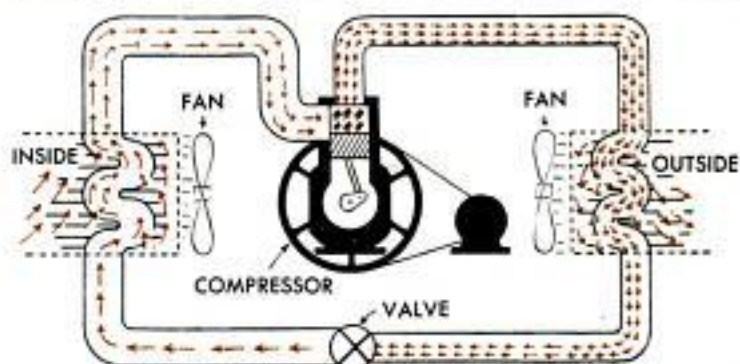
Clip-off filter of mineral wool is fed from a roll. When used section becomes dirty, it is pulled down and cut off. This is a Magic Chef feature. Some filters are reusable





Carrier's portable, designed originally for hospitals, is also handy for anyone who wants his bedroom cooled at night and his living room air conditioned during the daytime

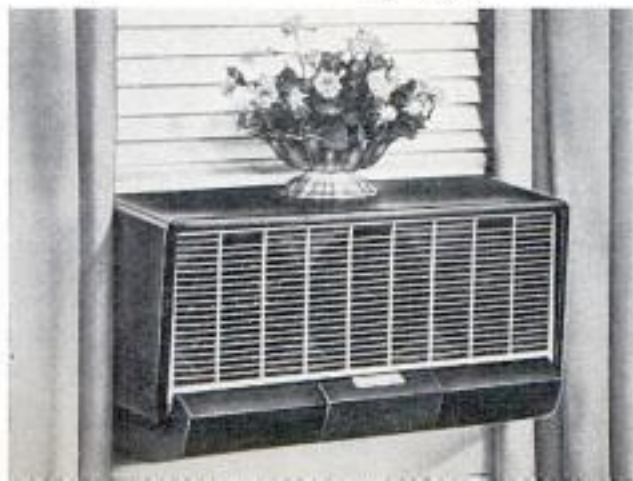
Diagram shows how a unit soaks up heat on one side, blows it out the other. Heat pump—now on many models—just reverses flow with valves. Compressing refrigerant releases heat



Fabric-covered International Harvester blends with decorating scheme, can be covered with any drapery material. General Electric, below, offers increased cooling and dehumidification, quiet, gentle air flow



Flush-mounted Mitchell projects only two inches into room. Special insulation muffles sound. Coils supply heat for fall and spring. Fedders has lift-out glass-fiber filter, grille that is turned to direct air flow





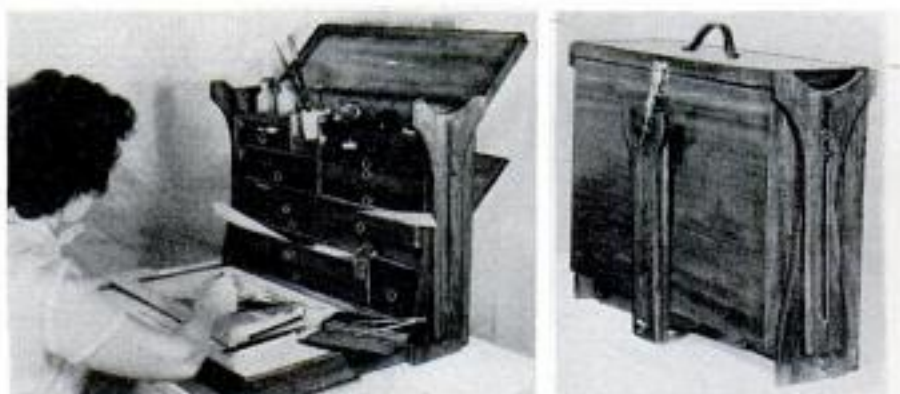
Midget Pusher Sports Plane Can Fly 200 Miles Per Hour

Less than six feet high and only 18 feet long, a midget pusher-type aircraft has made its initial trial flights at Los Angeles. The builders, Hugh Crawford and Roger Keeney, estimate the 85-horsepower Con-

tinental engine will provide a top speed of 200 miles per hour and a cruising speed of approximately 165 miles per hour. The tiny sports craft, identified as the Serra S-1, has a wing span of 20 feet.

Portable Chest Unfolds to Provide Table for Drawing or Drafting

All the supplies for drawing or drafting can be packed away in a portable chest that opens to provide a convenient working surface. The chest has adjustable drawers for holding bottles of ink and paints, brushes and paper. It may be placed on a table or self-supported on three legs which unfold.



Tiny Railroad With Only 156 Feet of Track Spans Oceans



U. S. Navy photo

Though its route length is only 156 feet, one of the world's most unusual railroads has been operating between Korea and America for more than a year. It is an HO-gauge type, owned and operated by crew members of the aircraft carrier *USS Lake Champlain*. The model railroaders operate their colorful handmade engines and cars in a space about 70 square feet. An elaborate electric block system, employing 21 electrically operated switches, is used throughout the trackage. The control panel, mounted on red Plexiglas, is entirely homemade. The layout includes a passenger terminal, a freight yard and a village.



Aircraft Engine and Propeller Blow Aluminum Craft Along Water

Literally blown along the water by an aircraft engine and propeller, a homemade aluminum boat skims the surface at speeds up to 40 miles per hour. Albert A. Johann and his son Jack, both of Milwaukee, Wis.,

built the boat in their spare time. More than 5000 rivets went into the construction. Power for the craft is supplied by a four-cylinder airplane engine which turns a five-foot propeller.

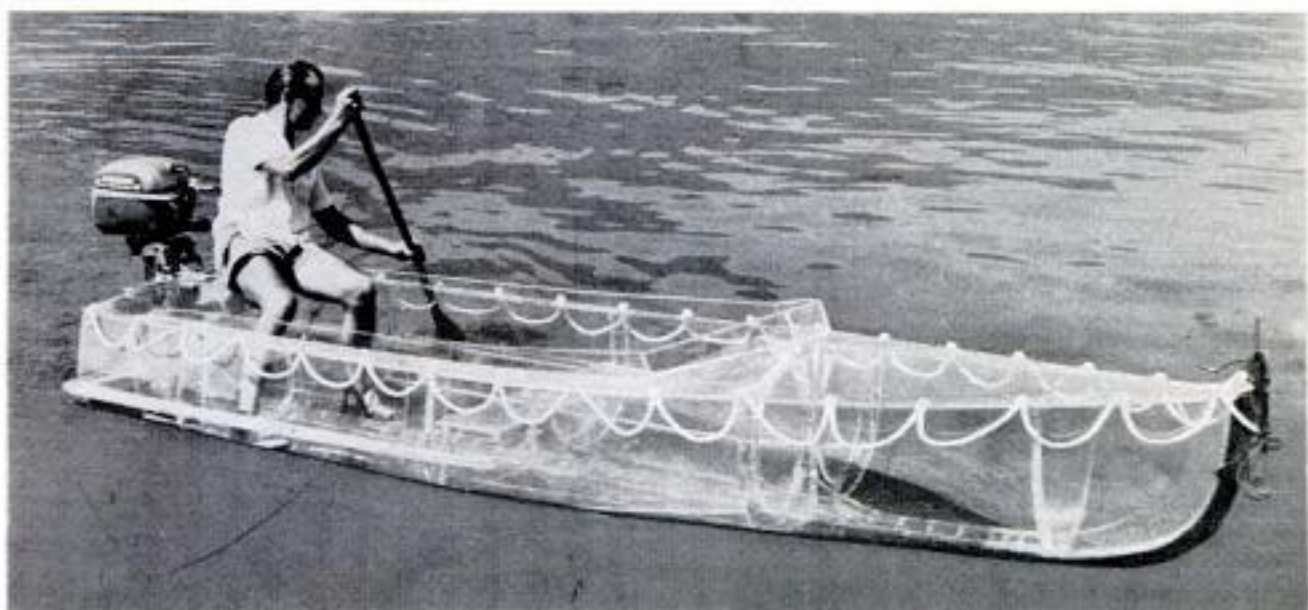
Electrons Photograph Stars to Produce Sharper and Faster Pictures

Clearer and faster pictures of the stars are made by a new method that combines electronics with photography. In the usual method, light from a star is focused through a telescope on a photographic plate. In the new method, developed in France, the light strikes a light-sensitive plate which gives off electrons. On the average, the plate emits one electron for every four photons,

or units, of light. The electrons are focused on a target photographic plate by a potential difference of 30,000 volts to produce the picture. When light falls directly on a photographic plate, only about one out of every 200 light units causes a reaction, so the new method has a 50-to-1 advantage over the conventional method. Its advantages resemble those of the electron microscope.

Transparent Plastic Boat Passes Tests in France

Completely transparent, a plastic boat built by Jacques Jaham of Paris has been successfully tested in France. It is 13 feet long and weighs 390 pounds. It seats four comfortably, and is powered by outboard motor



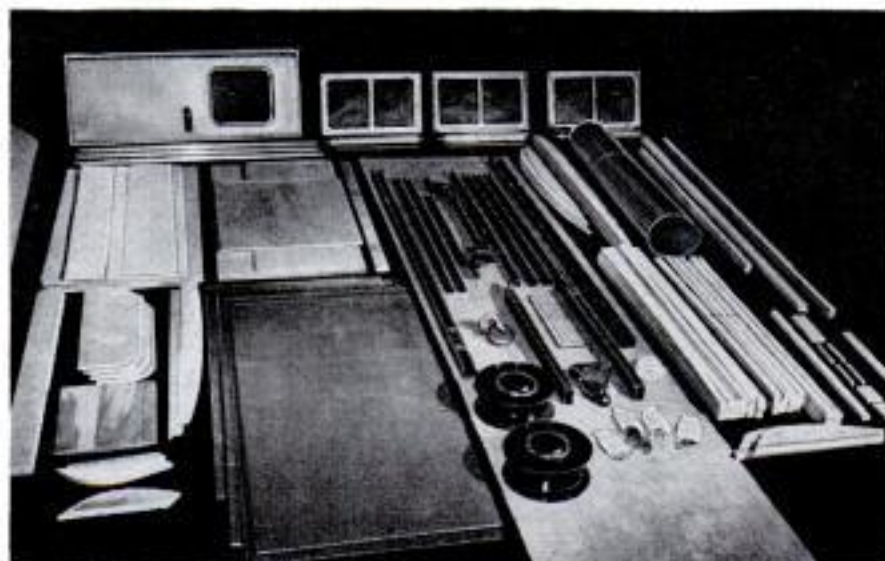
Radio Waves Hold Robot Helicopter in Fixed Hovering Position



Remotely controlled by radio signals and an automatic pilot, a helicopter has been held in a hovering position over a selected point to an accuracy of better than five feet. The aircraft was controlled with equal precision at both low and higher altitudes, and was landed several times within two feet of the central point. Four ground-relay stations using Raydist, a continuous-wave radio-location system, were used for the demonstration with a twin-rotor helicopter. A transmitter was installed in the helicopter. Signals from two Raydist stations were compared in one instrument to indicate longitudinal movements of the helicopter, while signals from two others were compared in a second instrument. Any deviations from the preset control pattern caused the autopilot to reposition the craft.

You Can Assemble Your Own Four-Bunk Vacation Trailer With Kit

Following the trend started by the motorboat industry, vacation trailers are now being sold in kit form. You buy the trailer as a collection of precut parts, some of which are partially assembled, and put it together yourself. Birch paneling for the interior is supplied as well as aluminum exterior sheets, door and windows. Everything needed to assemble the trailer is included except tires and tubes. Once assembled, the trailer has ample headroom as well as space for a dinette, kitchen area, a closet and bunks to sleep four persons. Interiors are furnished by the owners.



Information not listed on articles in the index, starting on page 12, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge. A copy may be obtained by sending a postcard to the Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11



Auto transport with engine between front and middle wheels carries seven cars instead of six. Relief driver, left, sleeps in recessed bunk between seats



Rear-Engine Auto Carrier Mounts Bunk Under Cab

Instead of an engine, a sleeping bunk for relief drivers is mounted beneath the cab of a snub-nose auto carrier. The 200-horsepower horizontal-type diesel engine is located low in the frame midway between the front and center wheels. The unusual design allows an additional car to be carried above the cab. The motor has two radiators located just behind the front wheels; the vent at the front of the truck is a fresh-air intake for the bunk. Clearance height of the loaded unit is 12½ feet. Cost of the custom-built carrier: \$21,000.

Mexican Suspension Bridge Built in Shape of Basket Handle

Slender arch ribs shaped like the handle of a basket support with cables a 250-foot bridge spanning the Rio Blanco River near Vera Cruz, Mexico. The all-welded bridge was built by Mexicans from an American

design. Strength and safety factors are as high as conventional constructions. The bridge flooring is a diagonal gridwork. As striking as its design is the bridge's color scheme—bright orange and cherry red.



FIRING ALUMINUM with COLOR

By William Dinwoodie



Winter exhibits brightly colored bowls, plates, tumblers, plaques, trays and panel of fired aluminum. Designs are cut through the enamel or consist of gold-leaf decoration

A NEW LOOK for offices and homes of the future is promised by a process of fusing brightly colored porcelain enamel to aluminum.

Edward Winter, a pioneer craftsman in the field of enameled metal, is conducting a test of the new process in Cleveland.

In three months he designed and completed a full line of dinnerware attractive enough to hang on the wall and so durable that it can be dropped on concrete without

denting or scratching. Another Winter product is an enameled aluminum panel that may some day be used to surface the interior walls of offices and homes. Finished plain or with a design, in one or several colors, the panel could also be used in lawn furniture, stoves or table tops.

Winter starts with sheet aluminum, cutting it to shape and molding it to form on lathes. The metal is dipped in dilute sulphuric acid and rinsed in a hot alkali bath.

Pieces are baked in a huge box-type furnace, receiving four six-minute firings at 1000 degrees Fahrenheit





Complete buffet table service is of aluminum fired with porcelain enamel. Colors range from chartreuse to gold

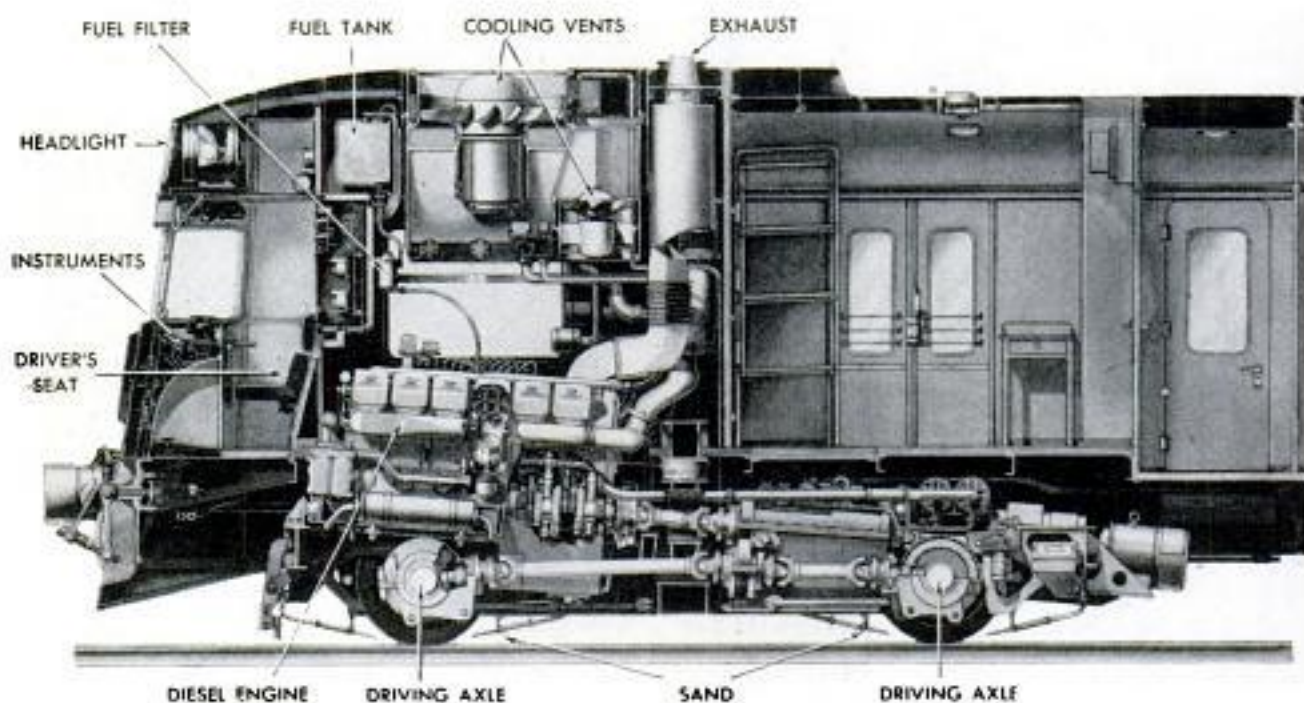
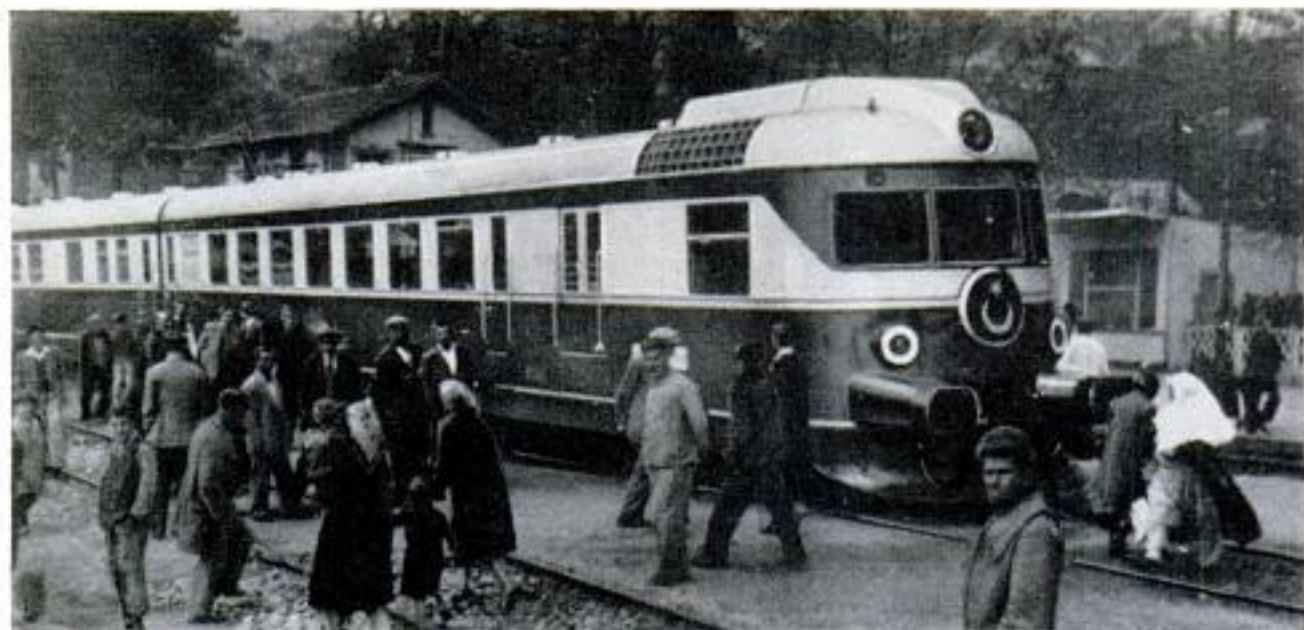
Spraying with colored enamel base follows. A dentist's sharp-edged prober is used to scratch out the design in the enamel. Then, after a 30-minute drying period at 350 degrees Fahrenheit, the article is fired at

1000 degrees for about six minutes in a large furnace, and this step repeated three or four times. Exposed parts of the design are polished, and the edge polished and stoned. ★ ★ ★

Prior to decoration bare aluminum bowls are stacked in dipping rack and pickled in dilute sulphuric acid

With a dental tool Winter cuts design in opaque enamel surface of mixing bowl to expose aluminum beneath





Train for Turkey Has Compact Diesel Engine Built Into Truck

Virtually the entire diesel engine of a new European train is built into the truck. The train, built in Germany for the Turkish Railways, has three articulated coaches. The compact 12-cylinder diesel engine is installed between and above the two axles of the front truck. Both axles are drive

axles. Above the engine is the cooling system and the fuel supply. The three coaches are made of lightweight alloys to reduce weight and thereby boost the horsepower per ton. There are two engines in the complete train, each developing 550 horsepower at 1500 revolutions per minute.

H-Bomb Element May Help War on Cancer

Cancerous tissue cells may soon become the most important targets of hydrogen-3, or tritium, which has gained such ill fame as the main constituent of hydrogen bombs. According to Dr. Dietrich E. Beischer of the U.S. Naval School of Aviation Medicine, its radioactivity may be used to remove cancerous cells without damaging normal cells. Tritium, now available in

quantity, has an extremely short range of radiation, making it particularly suited to the selective destruction of cancer cells. Certain chemical compounds are taken up by cancer cells more readily than by healthy cells. If these compounds are "tagged" with tritium, the short-range rays will reach only the cells which take up the compound, leaving other cells undamaged.



"Tennis Net" Crash Barrier Halts Jet Planes at End of Runway

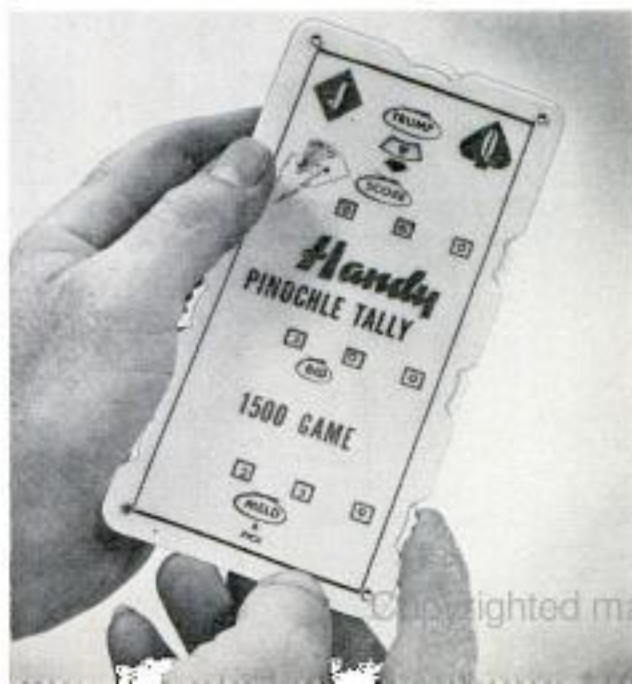
Similar to an aircraft carrier's arresting gear, a new "tennis net" barrier keeps airplanes from rolling off the end of the runway after landing. It was developed by the Air Force for use on tiny airstrips in Korea, primarily to halt crippled jets after emer-

gency landings. When the nose of a plane touches the nylon net it triggers an arresting cable that engages the main landing gear. The cable drags heavy chains along the sides of the runway to slow the plane's roll.

Plastic Pinochle Tally Keeps Changing Record of Game Progress

Score, trump, bid and meld information are recorded on a flat plastic pinochle tally that fits in the hand. As the game progresses, numbered wheels inside the double card are rotated to expose the proper number combinations. An automatic locking mechanism prevents rotation of the disk when the device is placed on the table.

Information not listed on articles in the index, starting on page 12, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge. A copy of this list may be obtained simply by sending a postcard to the Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois



GUARDING THE



IT'S MIGHTY ROUGH tonight." The young seaman of the U. S. Coast Guard's *Triumph* looked worried. But John Cathers, stocky chief boatswain's mate and skipper of the motor lifeboat, grinned reassurance.

"Plenty rough—and that's good. None of these fishing boats will try crossing the bar till flood tide . . . I hope."

The bar was one that seafaring men from 'round the world have talked about—respectfully if sometimes profanely—since 1792. That was the year Captain Gray, a Yankee fur trader, sailed his ship *Columbia*—after many frustrating attempts—across the bar. It lies at the mouth of the Columbia River, which gathers strength for 1210 miles through seven western states, and smites the sea between Washington and Oregon shores. At crest periods, a million cubic feet of water per second rushes against the sea. And the mightier

sea pushes back with its tremendous force.

This then—with the linked coastal areas—has been called the "graveyard of ships." More than 150 ships lie buried there. But ship deaths have been few in recent years, due in good measure to the rugged men of the U. S. Coast Guard and their rugged craft such as the *Triumph*—*Semper Paratus*, "always ready."

"Look, skipper . . . that crabber . . . she's heading in. Somebody aboard must have a heavy date in Astoria."

Cathers didn't bother with reply, but ordered full speed ahead. Soon both *Triumph* and crabber were being smashed by waves that shattered timber and men. Roaring



GRAVEYARD OF SHIPS

down upon the crabber came a 15-footer. When the crabber nosed clear, its engine was dead.

"We'll have to get a line aboard her," said Cathers.

And get a line aboard they did. The crabber, with soaked crew of two, was towed back out to sea.

"You fellows all right?" megaphoned Cathers.

"Yeah. We got plenty of time to get the engine started—now."

"Just routine" is the way this incident was described to us as we sat in the snug warmth of the Coast Guard station at Point Adams near the mouth of the Columbia. But it's just such routine as this—along with expert shepherding by members of the Columbia River Bar Pilots Association, millions of dollars spent in jetty construction and channel maintenance, and modern technical equipment—that has cheated the graveyard of many a corpse.

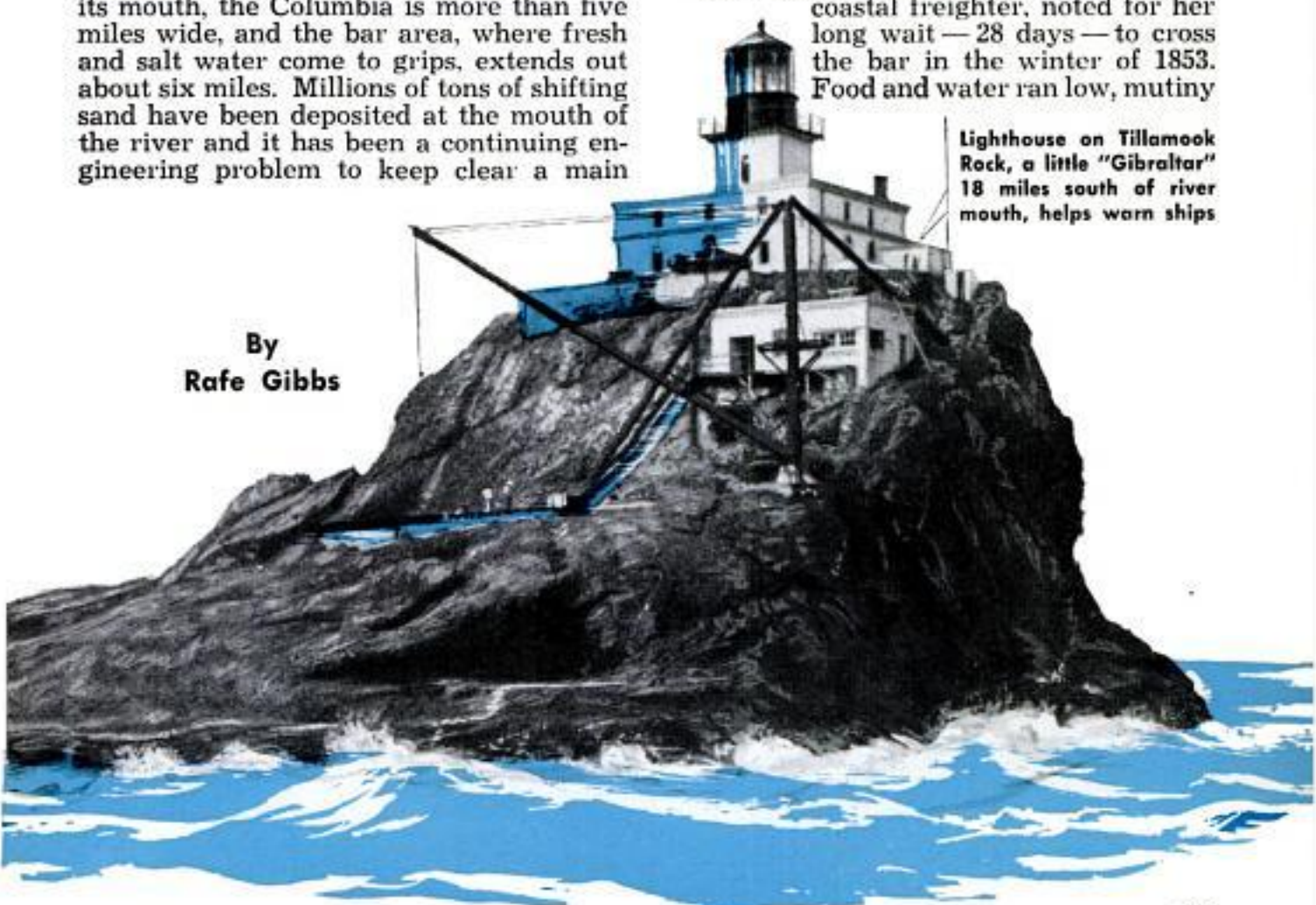
Most persons think of the bar as merely a thin strip to be crossed to safety. But, at its mouth, the Columbia is more than five miles wide, and the bar area, where fresh and salt water come to grips, extends out about six miles. Millions of tons of shifting sand have been deposited at the mouth of the river and it has been a continuing engineering problem to keep clear a main

channel—about 40 feet deep and some 2000 feet wide.

If there were headstones for the buried ships they would carry many distinguished names — *Tonquin*, *Isabella*, *Desdemona*, *Great Republic*, *Peter Iredale*, *Peacock*. . . The *Peacock*—now, there was a sturdy craft. She was a United States Navy ship, an 18-gun sloop of war, which started across the bar July 18, 1841. Missing the main channel, she plowed into sand, and was fast at the mercy of pounding waves. Desperately, the crew pitched all cargo overboard. Cannons and shot went, too.

Then the anchor chain broke, and the *Peacock* twisted broadside to the waves. The pounding grew more intense, pumps clogged, crew members struggled on the gun deck in water to their waists. The ship's launch—last hope of escape—was washed away. Then riding high, came a huge Indian war canoe. In two trips, the natives aboard paddled all seamen to safety, but the *Peacock* was gone.

Then there was the *Mindora*, 400-ton coastal freighter, noted for her long wait—28 days—to cross the bar in the winter of 1853. Food and water ran low, mutiny



Lighthouse on Tillamook Rock, a little "Gibraltar" 18 miles south of river mouth, helps warn ships

By
Rafe Gibbs



Coast Guard's nonsinkable motor lifeboat *Triumph* stands always ready for action at mouth of Columbia

Below, fresh batteries are lowered into a bell buoy. An electrically operated buoy weighs about 35,000 pounds



threats high. On Jan. 12, a temporary calm prevailed, and the *Mindora* tried the crossing that was her last. Crew members escaped in a lifeboat.

Tragedy marked the crossing of the trader *Industry* in 1865. When she cracked up in a storm, some crew members and eight passengers set off in two rafts. Six of the passengers, including a 12-year-old girl and four crew members, were swept overboard. A fifth crew member died of exposure.

On Jan. 19, 1947, the steamship *Drexel Victory* struck an obstacle that cracked her hull and eventually sent her down. It is believed the obstacle may have been the iron skeleton of an early wreck.

The Coast Guard's *Triumph* helped rescue the crew during the night of the *Drexel Victory*'s demise. But it is the prevented wrecks in which the Coast Guard takes particular pride. "Cheating the graveyard," they call it.

We asked Chief Boatswain's Mate Cathers to tell us of a day with the *Triumph*. But he insisted first on talking about the *Triumph* herself—for good reason. There is only one more like her in the entire Coast Guard, and this sister craft also plies Northwest waters, working out of Grays Harbor, Washington.

Nonsinkable, noncapsizable, the *Triumph* is a 52-foot motor lifeboat, double-planked with mahogany and teakwood for sturdiness. Her frames are of bent oak. Her electronic equipment, including



Coast Guard crew from Port Adams struggles to pull a pleasure craft from rocks and cheat the graveyard

depth and direction finders, is the last marine word. She is powered by an eight-cylinder, 170-horsepower diesel engine. In her are seven watertight compartments—any two of which will float her. On the keel is fastened a seven-ton piece of bronze as a counterbalance.

"She's rolled over 100 degrees in the curl of a breaker—without capsizing," said Cathers.

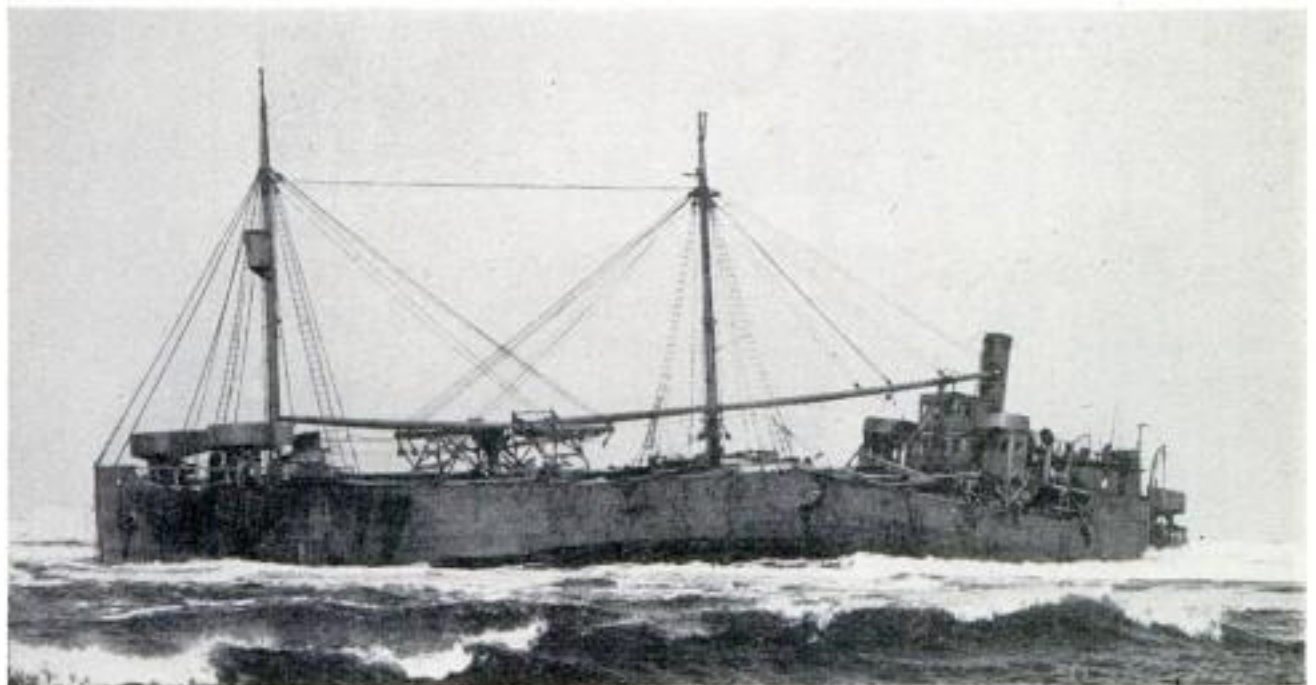
A day with the *Triumph*?

"Well, I'll try to make short a day that turned out to be a long one," nodded Cathers, downing coffee that would—and did—scald your correspondent. "Early one morn-

ing we went out to Tillamook Rock to service the lighthouse there. There were southeast storm warnings, but not too serious—then. Heading back we got a distress signal from the fishing craft *San Antone*.

"A 70-foot dragger, the *San Antone* was disabled 10 miles northwest of the Columbia Bar. We took her in tow, and started across the bar on the first of the ebb tide. Then the winds came—60 to 70 miles per hour. Gusts up to 80. For three hours all we did was hold our own. We rode out swells ranging up to 40 feet in height. It was 3:30 a.m. when we towed the *San Antone* into safe harbor. We didn't have a

Broken and twisted lumber schooner lies aground in the turbulent waters near mouth of Columbia River





Nine-ton concrete block used in anchoring huge buoys is loaded aboard one of the busy Coast Guard ships

dry stitch on us for more than 13 hours. Say, the coffee tasted good—when we finally got a cup.”

Commercial-fishing boats—and there are hundreds which work out of Astoria—give the Coast Guard the most business. Bigger craft can stand rougher water, and they are usually under the guidance of Columbia pilots who know the bar like an old friend

Radar reflectors placed on buoys can be “picked up” by ship’s radar at twice the distance of ordinary buoy

U. S. Coast Guard photo



or treacherous enemy, as the case may be.

Probably the most red-faced fisherman was the one who got lost in the fog recently while coming into the river on a strong ebb tide, and happily sighted a big vessel ahead of him. For hours, the fisherman kept his boat just behind the other ship. Came the sun, and the fisherman saw what he had been “following”—the Coast Guard’s light-ship *Columbia*, which stays anchored the year-round out in the mouth of the river. The current had been just strong enough for the fisherman to think he was moving.

Then in the summer comes Astoria’s famed Salmon Derby. Several thousand boats a day clog the mouth of the Columbia as fishermen seek the biggest of king salmon.

“A man could almost cross the Columbia by leaping from boat to boat,” said Chief Boatswain R. C. Van Hiene, commander

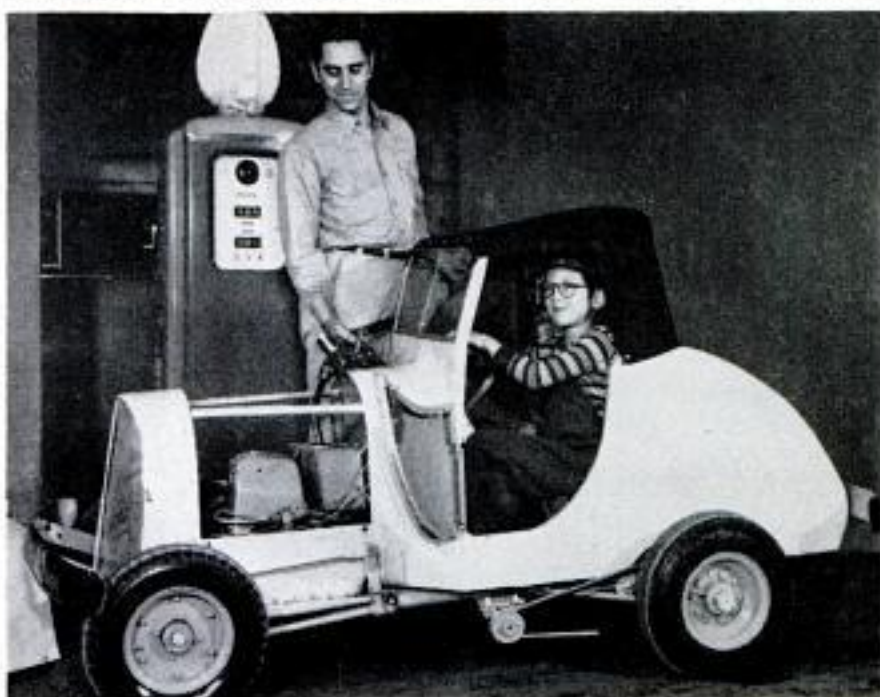
(Continued to page 230)

Ship’s “skeletons” are washed ashore from the graveyard of ships. This one was once the *Peter Iredale*



Air Force Sergeant Builds Convertible for Son at Cost of \$125

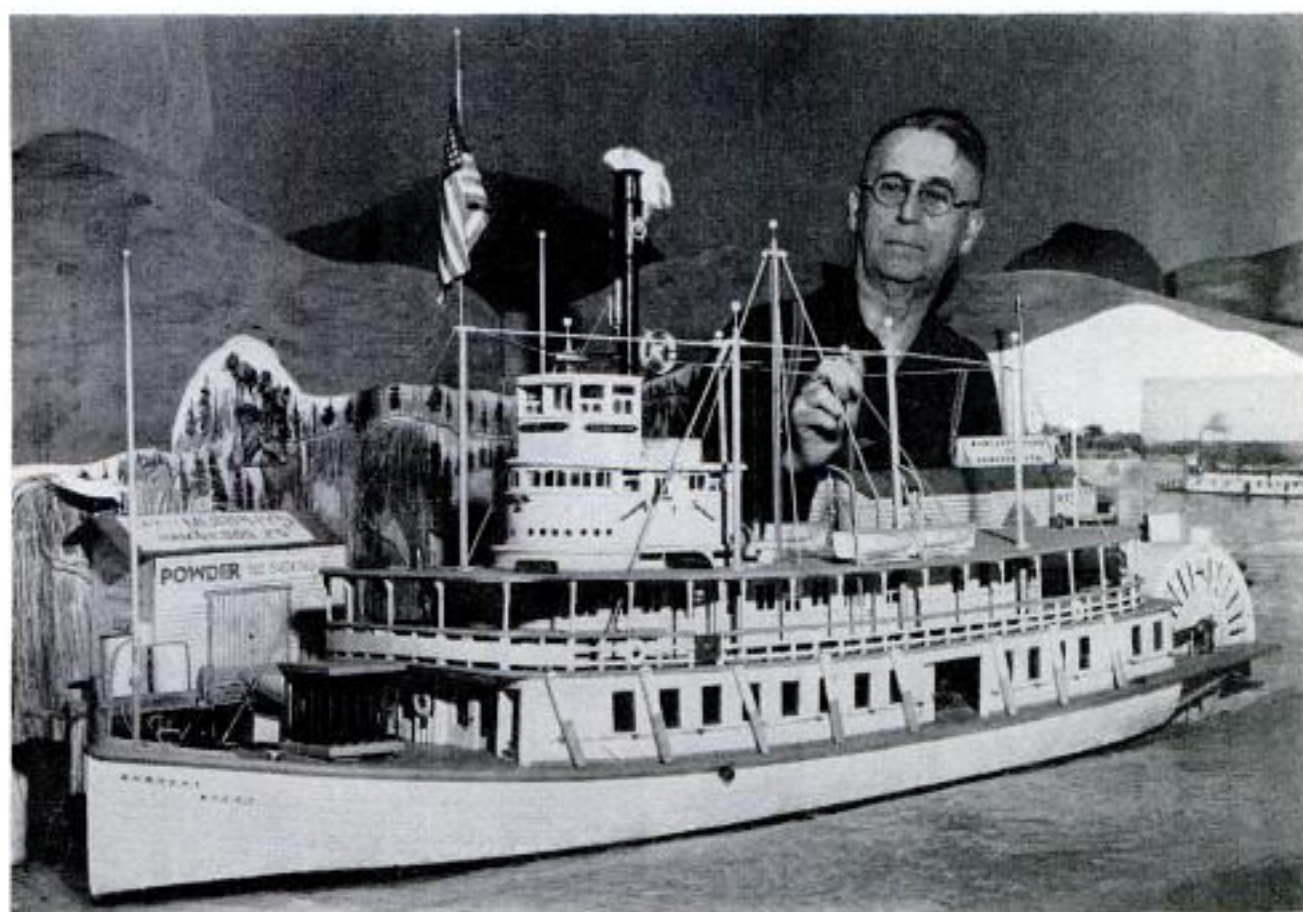
Powered by a motor-scooter engine of four horsepower, a miniature convertible was built by M/Sgt. Charles E. Robinson of Nashville, Tenn., for his eight-year-old son. Total cost of parts was \$125. The frame of the car is made of two-inch pipe, the body of galvanized sheet metal and the radiator grille of heavy wire mesh. It has a 53-inch wheelbase. Top speed is 20 miles per hour, but a governor holds it down to 10 miles per hour when the boy is driving. The gasoline tank holds one gallon, making a full tank cheap even at today's prices!



Working Model of Columbia River Steamer Complete to Last Detail

When George Young of Seattle saw a picture of the *Harvest Queen* in Tom Riley's article, "The Sternwheeler Still Rules the River" (*PM*, June 1948), he started work on a six-foot replica of the famous Columbia River steamer. After 13 months he produced an exact model scaled at 1:32 with tiny gangplanks, fittings, berths, boiler and

engine. In the ship's lounge are armchairs, tables and lamps—even a grand piano. Lights go on in the cabins and artificial smoke pours from the stack. An electric motor drives the paddle wheel which can push the craft along at 18 miles per hour. The boat is "moored" before a replica of the old-time Astoria, Ore., wharf.



Lumber CAFETERIA

A SELF-SERVICE lumberyard in Van Nuys, Calif., makes it easy for home-workshop enthusiasts to pick out just the materials and tools they need for any job. It's one example of a new kind of business that is springing up around the country.

All types of lumber are stored in open racks, with each kind and grade of wood clearly marked on a placard, together with the price per foot or per piece. On a busy Saturday afternoon (the yard does 60 percent of its business on week ends) you'll find stars of radio, television and the movies mingling with other customers who may have driven 50 miles to make purchases.

The idea got its start three years ago when Ed Goldsmith was placed in charge



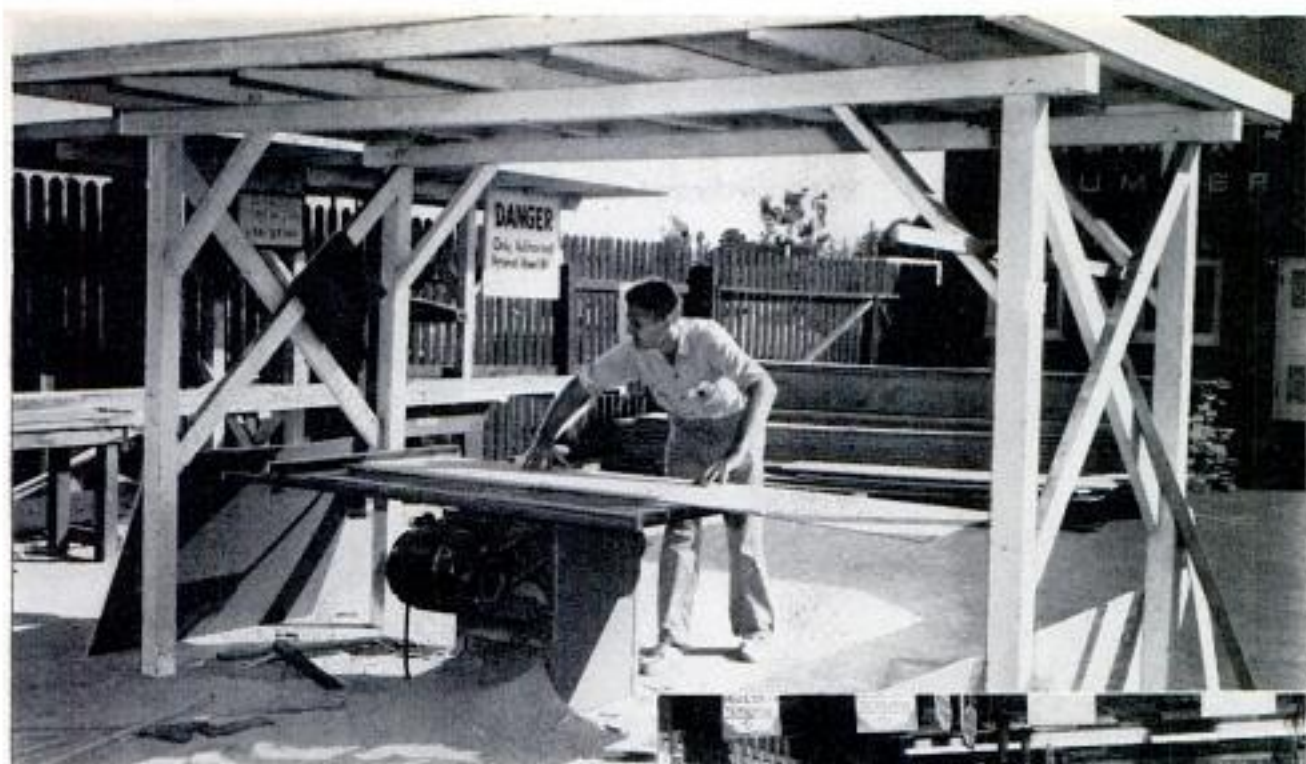
Large overhead signs identify the different types of lumber. Gil Mershon, TV singing star and home craftsman, selects some framing material for a cornice

Standard sizes of plywood and other hardboards are racked in the yard, each rack carrying a placard that tells the price. Mershon inspects sheet of plywood

Huge advertisement for the self-service lumberyard dwarfs man who has just purchased a screen door and is carrying it to car in parking lot that adjoins the yard



of retail sales. One of the first things he did was to dress up the small area in the yard office where building sundries were on display. Since then the whole building has twice been doubled in size to accommodate sales that have increased up to 100 per-

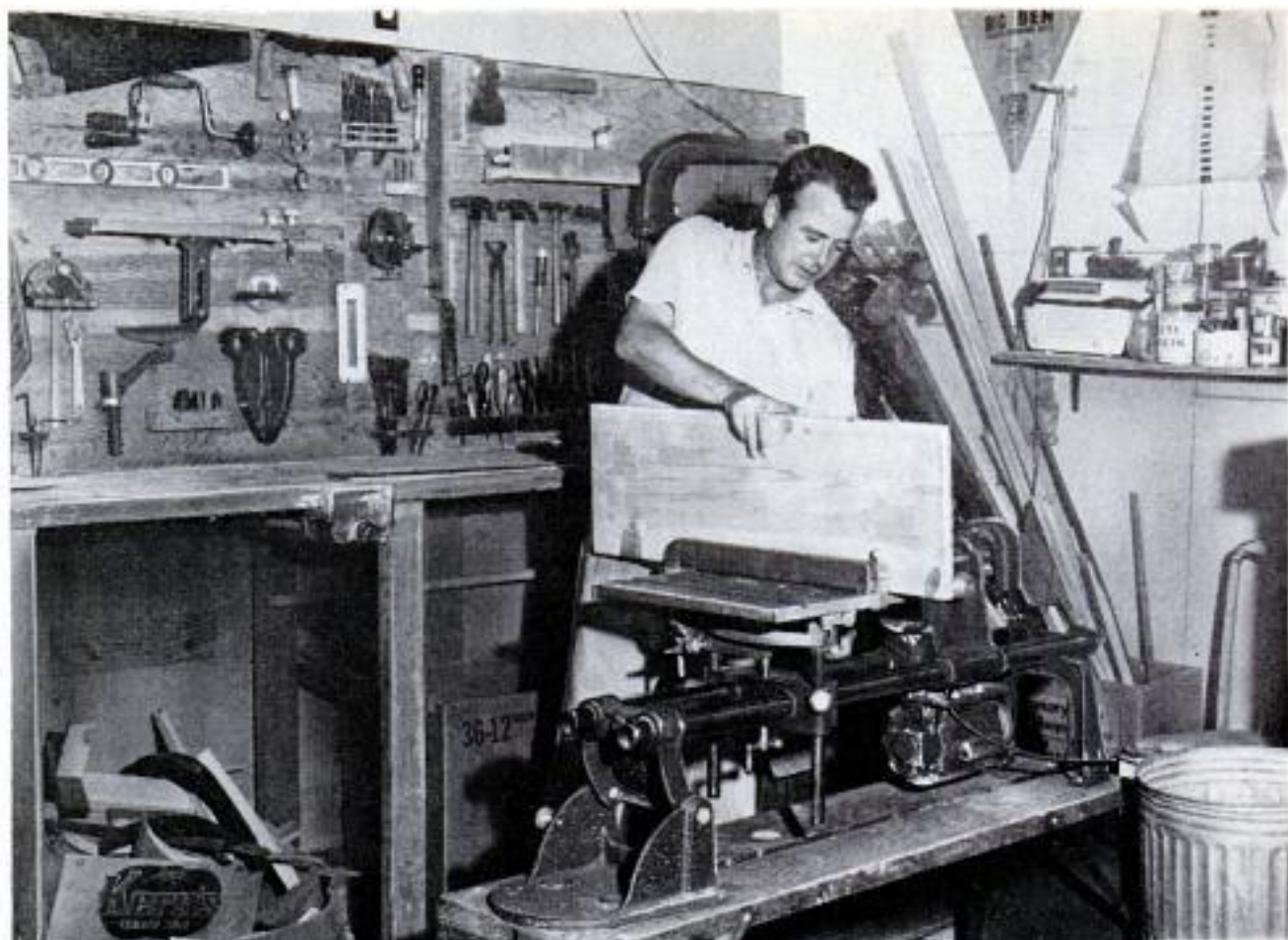


Yard employee cuts lumber to exact specifications of customer. Another employee will itemize materials that you need to install a shelf or build a house

Retail store includes thousands of items displayed in self-service racks and bins. Decorators' corner includes paint, supplies, even adhesive wallpaper

Customers can find the details of almost anything they want to build from *Popular Mechanics* do-it-yourself books and other publications in library





Back home, Gil Mershon prepares to shape some wood he bought at the self-service lumberyard

Spare-time craftsmen like Mershon are clients of the lumber cafeteria



cent every few months. The whole yard has been revamped to cater to its home-workshop trade. Now Goldsmith finds that space is running short once more.

If you visit Neiman-Reed you'll find an attractive retail store with thousands of items displayed on self-service racks and bins. Complete lines of electrical and plumbing supplies are on view, as are

paints, garden equipment, power and hand tools.

Out in back, near the racks on which lumber is stacked, is a "bargain pile" of scrap wood that once had to be burned. In it you may find just the small piece you want, priced at a few cents. Out in back, too, is a big table saw on which a yard man will trim your purchases to the exact size you need.

Ed Goldsmith attributes the fantastic growth of the self-service lumberyard to three kinds of service in particular. One of these is the library corner where

Popular Mechanics do-it-yourself books and similar publications are loaned and sold. Here a customer can find necessary construction details.

If he needs still more advice he can get all he wants, free, from a builder who is on duty every week end. The third service concerns hours. The yard is open on Saturdays until 5, on Sundays until 2.

It is estimated that home-workshop enthusiasts spend half a billion dollars a year on their hobby, and Ed Goldsmith is ready to believe it. ★ ★ ★



Depositor signs withdrawal slip on telautograph. Signature is duplicated by similar unit at main bank



In main bank, 40 blocks away, depositor's card is placed under the lens of closed-circuit TV camera

TV Links Bank and Branch To Speed Operations

Closed-circuit television, a telautograph, and an intercom system link a branch office with the New York Savings Bank. Bank officials say that the hookup cuts personnel requirements, 25 percent of the operating costs and half the floor space that would ordinarily be needed by the new branch bank. The telautograph allows you to write your name at the branch office and have it duplicated by a writing machine at the main bank. Signatures and balances recorded at the main bank are photographed with a television camera and the picture sent by coaxial cable to a receiver at the branch bank for checking.

Picture of depositor's card appears on television screen at branch office. Teller compares signatures



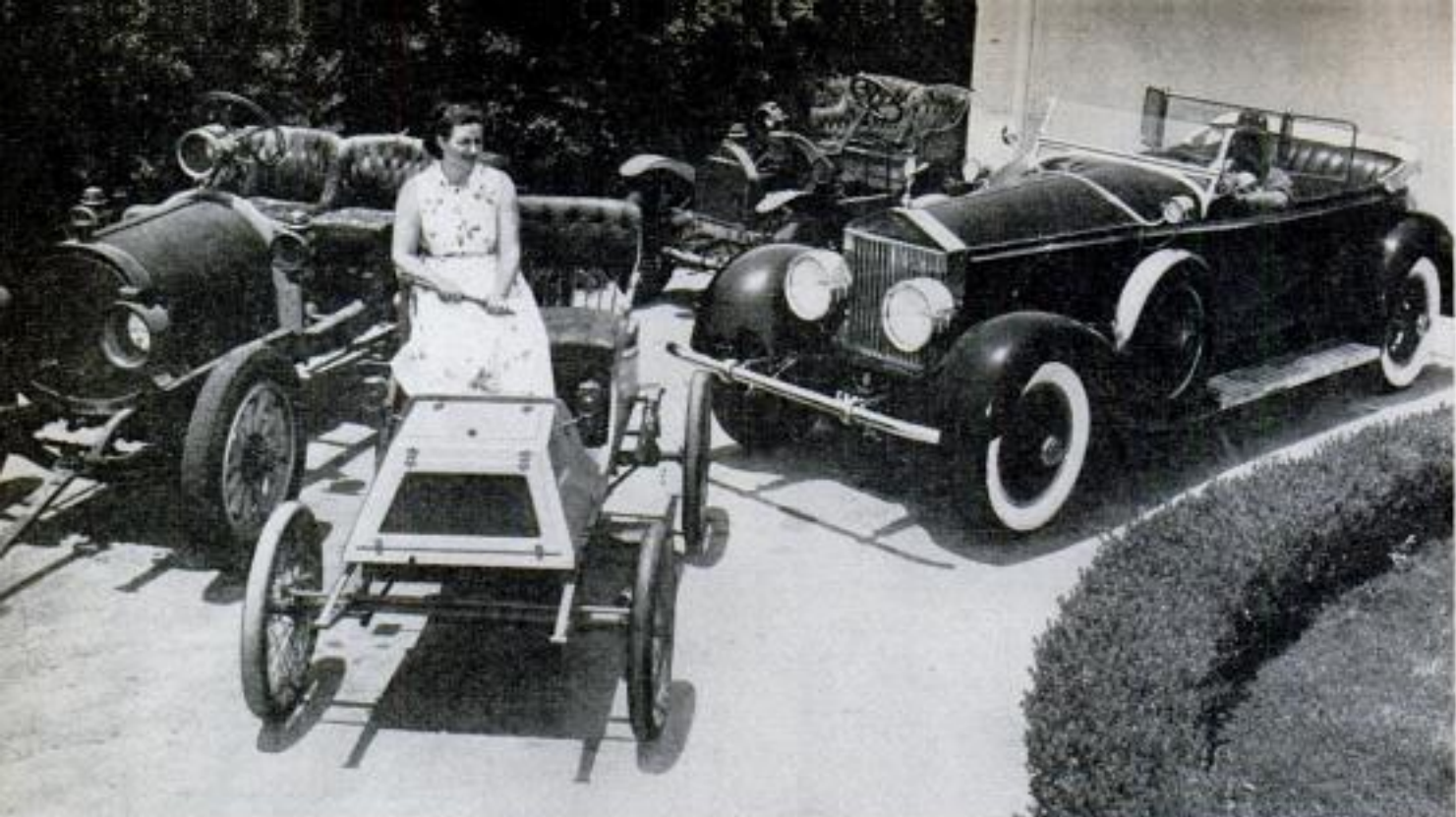
Quickly Erected Portable Grandstand Will Seat Nine Spectators

For field trials and events held where there are no stadiums, a portable grandstand devised by an English family may be the answer. Nine persons can be seated on its three levels. The device can be carried in a station wagon and erected in a few minutes.

Silicon Transistor

Silicon instead of germanium is used to make a transistor that should solve a pressing heat problem in airborne electronic equipment. Germanium transistors can't resist the heat of conventional vacuum tubes in such compact installations. Silicon is also far cheaper than germanium, which costs \$500 a pound. Not yet in production, the indium-coated silicon transistor, developed by Philco, must wait until improvements can be made in silicon refinement.



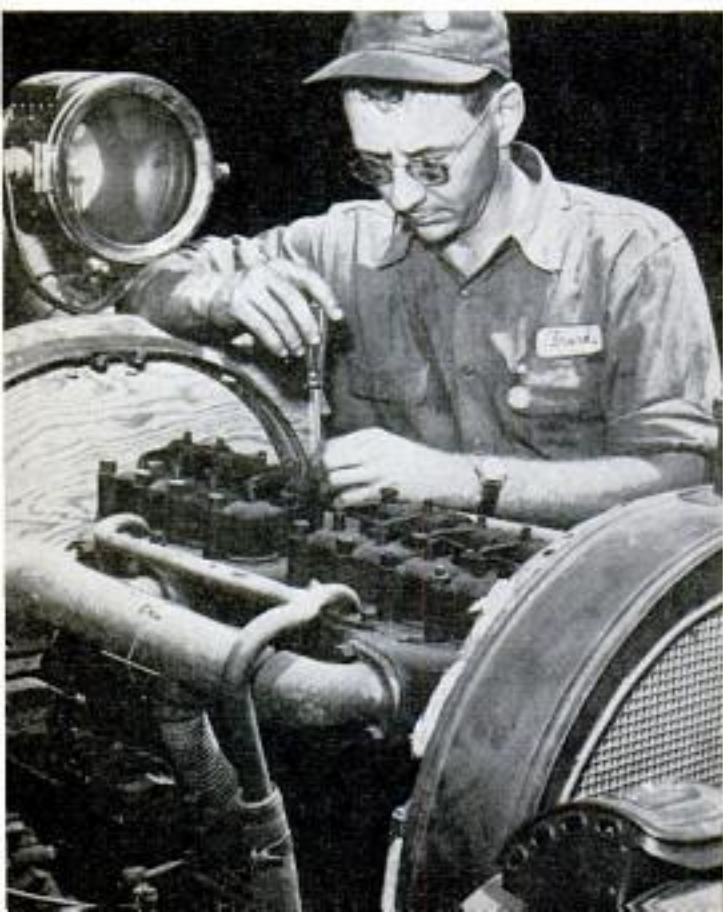


The author's wife holds the tiller of a 1900 Tuckermobile. Other cars: Pope Hartford, Brush, Rolls Royce

RESTORING ANTIQUE CARS IS MY HOBBY



Presently the author, Frank Stokes, is working on a 1913 Pope Hartford. It has a 35-horsepower engine



By Frank Stokes

As told to Andrew Hamilton

AS THE OWNER of a small orange grove in Covina, Calif., just about 25 miles east of Los Angeles, I do a lot of swapping with other citrus growers. One day in 1944, while trading some farm equipment, I acquired four 30 x 3½ tires. I couldn't use them, so I advertised them for sale.

Next day when a man bought them without haggling over price, I was curious.

"What are you going to use those skinny little tires on?"

"Got a 1910 Brush," he replied. "These will fit perfectly."

I didn't realize it, but the antique-car bug bit me right then. A couple of weeks later, I found a 1906 two-cylinder Buick for sale in a Claremont garage for \$150. It was in pretty bad shape, but I hauled it home on a trailer. During the next few months I found a good radiator, had some fenders made and replaced the tires. I was hooked—good.

Since the end of World War II, the hobby of owning and restoring antique cars has snowballed. ("Antiques" are usually considered of pre-1915 vintage.) Today there

are about 3000 old-car fans in the United States and 300 in southern California where I live—perhaps the most active center in the country.

It used to be that antique-car collectors were mostly well-to-do personalities but today you'll find them on all social and economic levels.

Most antique-car fans belong to one or more of the three largest clubs—the Horseless Carriage Club, the Antique Automobile Club of America and the Veteran Motor Car Club.

These clubs are valuable because they publish magazines with information about old cars and parts suppliers and sponsor meetings at which you can get acquainted with other hobbyists and hear talks by old-time auto builders. In addition, they sponsor trips in antique cars.

The Horseless Carriage Club each summer runs at least one long week-end trip—to San Francisco, to San Diego or to Riverside and Long Beach. Our club also meets once a year for an annual field meet—where cups are awarded for the best restored cars and races are held.

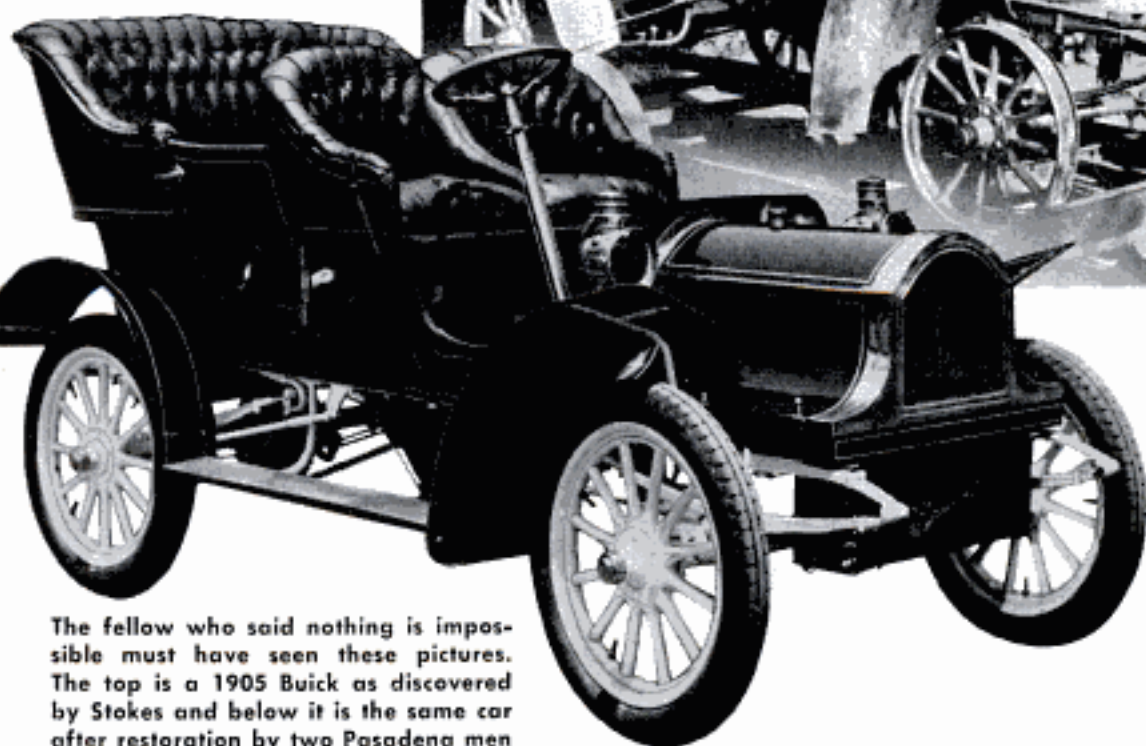
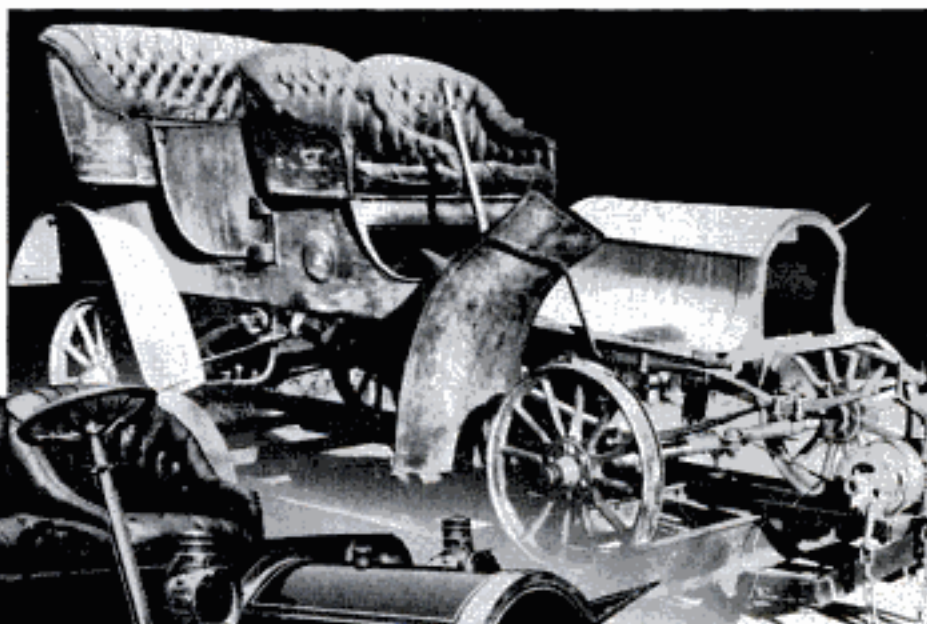
But the biggest thrill I get out of the hobby is fixing the cars up—nursing an

old piece of junk back to the proud status it once enjoyed. In the past 10 years, I've had about 25 old cars—including some dimly remembered names like Pope Hartford, Flanders, Metz, Overland, Burtnett-Brunell and Saxon, and more famous ones like Model-T Ford, Stutz and Pierce Arrow.

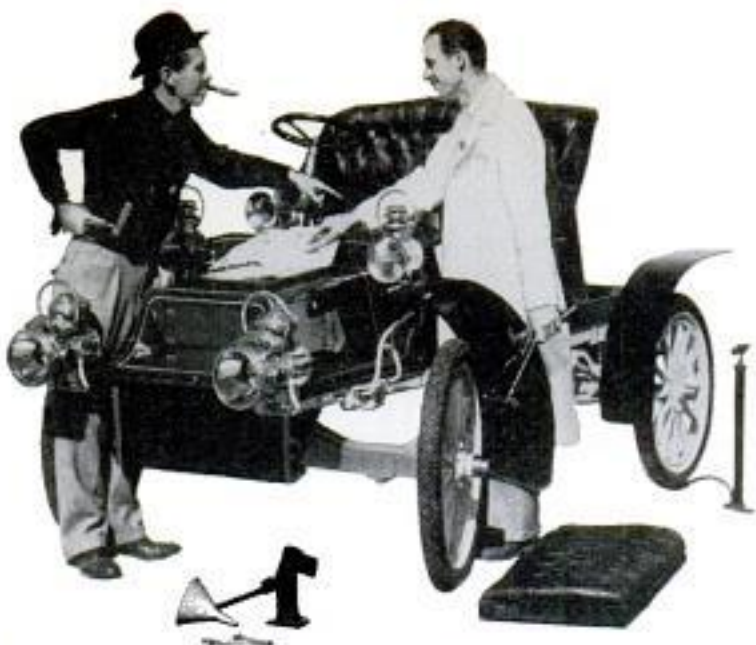
One of my most interesting cars was a 1911 Cadillac that I picked up for \$400 along with a 1917 Franklin. I traded the Franklin to another collector but the Cadillac I kept. Then, the Cadillac wasn't the prestige car that it is today, being outranked by Locomobiles, Pierce-Arrows and others. But with a coat of Brewster Green paint, the upholstery refurbished, brass lamps polished, a new set of tires and a new top on it, the Cadillac was a Queen of the Highways.

Another interesting antique of mine, believe it or not, is a Tucker. This one was built about 1900 by J. O. Tucker of Santa Clara, Calif., and it bears no relation whatever to the ill-fated Tucker car of the post-war years.

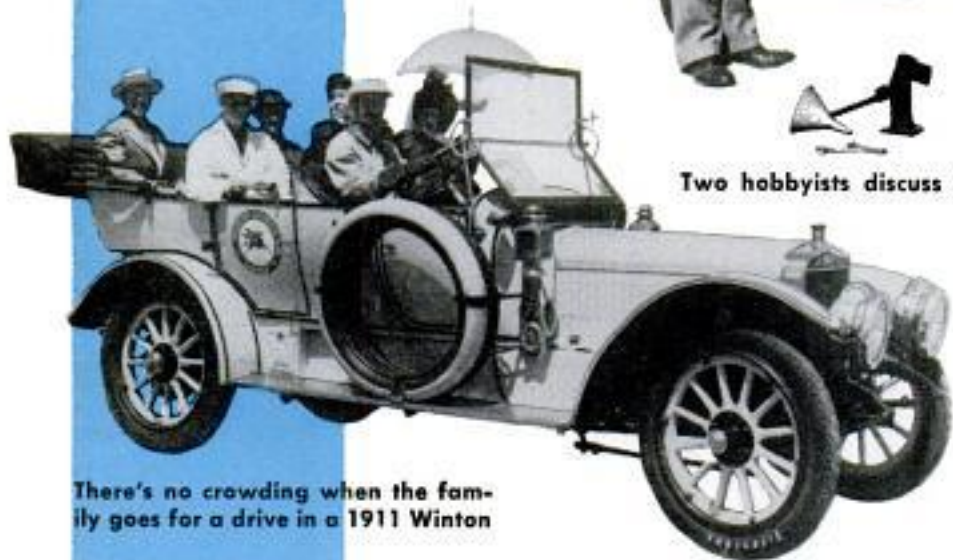
J. O. Tucker built exactly six Tuckermobiles and the curator of the Los Angeles County Museum has helped me to establish the fact that mine is No. 2. It looks like a



The fellow who said nothing is impossible must have seen these pictures. The top is a 1905 Buick as discovered by Stokes and below it is the same car after restoration by two Pasadena men



Two hobbyists discuss the restoration of a 1904 Cadillac



There's no crowding when the family goes for a drive in a 1911 Winton



The author and his wife, wearing the styles of the year, pose in front of their 1911 Cadillac



Model T Fords, like the 1914 model, are popular with collectors because so many are still around

real "horseless carriage"—with a 5-horsepower, two-cylinder opposed engine under the seat, a tiller instead of a steering wheel and a crank on the side. It passed through several hands before I bought it from a dealer in Long Beach for \$350.

A recent trend in old cars is the sudden popularity of what are called "classic cars"—roadsters or touring cars built in the period approximately 1925-1942. They include such proud old names as Rolls Royce, Pierce-Arrow, Lincoln, Cadillac, Duesenberg, Stutz. The Classic Car Club of America was organized recently and already has nearly 1000 members.

About three years ago, I picked up one of these "classics"—a 1929 Rolls Royce Ascot Sport Model Phaeton, which originally sold for \$25,000. The previous owner had spent \$1500 trying to get it back into good running shape, but he hadn't relined the brakes properly, had left some parts out of the carburetor so that it coughed and sputtered and couldn't make more than 45 miles per hour. He had put the steering assembly together wrong so that it turned only to the left.

After I'd taken this Rolls off his hands, I tore it apart and reassembled it. I had been afraid that the aluminum head was pitted (it will do that unless you use distilled water), but it wasn't. The motor was in excellent shape. But I did have to write to the Rolls Royce headquarters in England for new parts and exploded views of the carburetor. The one-shot lubrication system was fouled up. But all that was wrong with the steering assembly was that the Pittman arm was hooked up wrong. It now runs perfectly.

When you fix up an antique or classic car, you can figure on putting out up to \$1000 or more—depending, of course, on what shape it's in and how much of the work you do yourself. But most antique-car hobbyists look upon this not as an expense but as an investment. You can realize much if not all of your money out of the deal any time you want to sell or trade—and antique-car fans do a lot of both.

An antique-car fan usually specializes in one or two

kinds of car restoration. My particular bent is mechanical and I like to repair motors. Some like to do the leather-upholstery work, some like to cast hard-to-find parts, some like to paint. Very few are skilled in all phases of restoration. So when one of my cars needs painting or upholstery, I send it to a member of the Horseless Carriage Club who specializes in that sort of thing. A hobbyist himself, he'll take infinitely more pains with the job than a regular commercial outfit with no knowledge of or love for ancient cars.

Here's a rough idea of some of the prices you'll have to pay for having old cars restored: Motor overhaul, at least \$200; new upholstery in the diamond-shaped, tufted-leather patterns of bygone days, \$200-\$250 for a roadster; new top, \$100; tires, \$200-\$250; new radiator, \$100; body work and fenders, \$50-\$100; painting and striping, \$150 or more; miscellaneous items like brass acetylene lights, rubber-bulb horn, etc., \$50-\$75.

An antique or classic car will be in better shape after a complete overhaul than the day it first rolled out of the factory. Why? Because the parts will be made out of better metal, the motor will be dynamically balanced, it will be using better grade oil, the paint, upholstery and tires will be of better quality. Because today's gasolines just don't digest well with the old-type carburetor and manifold, many antique-car hobbyists put modern carburetors and heated manifolds on the old cars. This is considered "ethical" if you bolt them on so that the original parts can be easily put back whenever desired.

How good a rebuilt antique can be is

One of the early nickel jitneys was a 1914 Ford. It is still taking trips with the auto hobbyists





Amidst smoke and clatter, Mr. and Mrs. Stokes race a 1905 Buick and 1910 Maxwell in the 1900 Tuckermobile

illustrated by what happened at Corona, Calif., not long ago. This little community, surrounded by a three-mile circular track (now a paved street), was once the site of some famous road races in which Barney Oldfield, Ralph DePalma and other racing greats competed.

In a recent reenactment of these races, some ancient cars were being paced around the track by a 1953-vintage police car. One of the drivers, at the wheel of 1908 custom-built race car, just couldn't resist the urge. He stepped on the gas and roared ahead of the police car. It never did catch him.

Because of the recent popularity of restoring old cars, the antique buggies are getting scarcer. But you can still find rare specimens of the 2700 models that have been manufactured by American auto makers since the turn of the century, some of them in surprising places—on old estates or on farms where storage space exists. And there's nothing that excites an antique-auto fan like the rumor of a stored car.

Why do people become antique-car hobbyists? The reasons are many and varied: Some people get a creative kick out of breathing life into a chugging, clanking monster; some like the fascinating history that is wrapped up in these old buggies; some enjoy the attention it brings them

when, clad in goggles and linen duster, they proudly drive a 50-year old car down a modern highway.

You'll find that the general public is keenly interested. On the highway, you're a marked object. Cars give you plenty of room even though some of them shout good naturedly, "Get a horse!" You can't leave an antique car parked for one minute. People will steal your horns or headlights, kids will get their sticky fingers all over the brass and nickel work and there's one species of human being that loves to give your hood a resounding whack with his fist and announce, "They don't make cars like this any more!"

Every antique-car hobbyist has a gleam in his eye—like the mountain climber contemplating an unscaled peak, the fisherman who knows about a pool where the "big ones" lie, or a garden enthusiast who has just planted a new species of dahlia. The lure of any hobby lies in work yet undone.

In my barn I've got the remains of an old Pope Hartford with a custom speedster body. It cost \$3000 new in 1913 and is just like the Pope my Dad had for his first car. I hope to pass it on some day to my son (now three years old). He'll have a car that will scorch down the highway at 80 miles per hour and make other drivers sit up and take notice!

★ ★ ★



Carriage body lifts out and is carried by strap handles. Bottom can be folded or loaded with heavy packages

Two-Part Baby Carriage Divides to Carry Groceries or Parcels

Versatile is the word for a German baby carriage that separates into two parts for special uses. The carriage body can be lift-

ed out of the frame and used as a market basket. The carrying frame can be folded or used to carry bags and cases.

Atomic By-Product Gauges Irrigation

Radioactive rubidium—an atomic by-product—tests the efficiency of irrigation on Hawaiian sugar plantations. Rubidium is introduced into the irrigation lines and is carried by the water to all parts of the irrigated area. A radiation counter is used to determine the amount of rubidium absorbed by the soil at any one point in the field. The method, by determining how much irrigation water is absorbed by the soil, also measures the distribution of fertilizers introduced into the irrigation system.



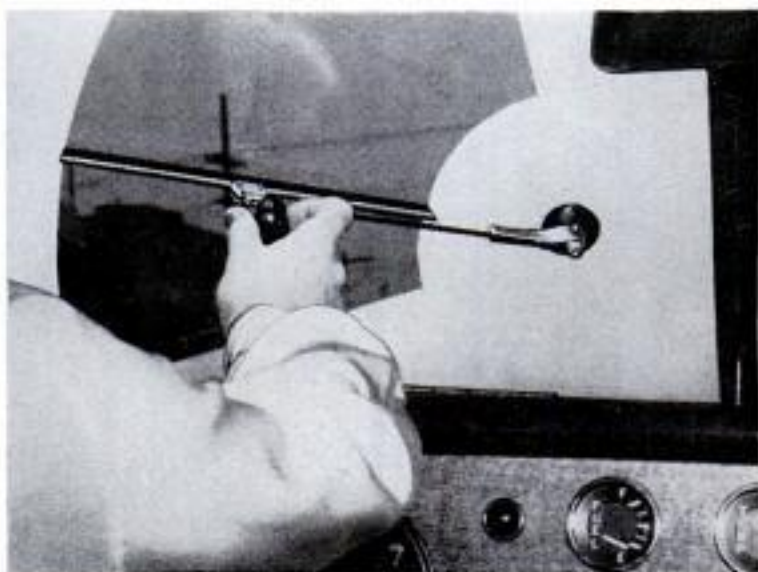
Bedside Air Conditioner Purifies, Cools and Dries Air



Wheeled to the side of a patient's bed, an air conditioner for hospital use feeds air directly into a transparent-plastic canopy about the patient. In addition to supplying extra oxygen to seriously ill persons, the machine relieves the distress of various kinds of respiratory cases. Temperature, humidity, purity and oxygen content are controlled. Fully automatic controls maintain a steady supply of clean air or oxygen, which is water-screened as it passes through a sealed cleaning chamber. A sturdy refrigeration unit keeps the air at a constant temperature, and a specially designed evaporator unit removes excess moisture from the air. Transparency of canopy prevents a shut-in feeling.

Inside Windshield Wiper Anchored to Suction Cup

If you've ever wished for a windshield wiper that cleans the inside of your windshield of mist or steam, a California manufacturer has the answer. It's a hand-operated wiper with the arm attached to a suction cup. Only seconds are required to take the wiper from the glove compartment and attach it to the windshield. The metal parts of the wiper are chrome-plated; its total length is 12 inches. The wiper squeegee can be detached and used to clear back and side windows inside and out.



Airborne Baby's Berth Suspended From Wall

Comfortably situated in a wall berth next to his mother, the infant tourist aboard a trans-Pacific airliner finds that traveling isn't much different from nursery life. Two sturdy hangers on one side and an overhead arm supporting the opposite side hold the airborne cradle firmly against the wall. Result is a more pleasant trip for both mother and child. Installation or removal of the cradle is easy.

☐ Antibiotics added to the fillings of tooth cavities help prevent further decay, according to a report given before the American Dental Association.

Auto Penthouse Will Sleep Four

YOU DON'T have to be rich to live (temporarily, at least) in a penthouse that perches atop an automobile. Designed to sleep four in comfort, the canvas-sided cabin folds into a unit low enough so you can drive into your garage without having to take it off the car. Opened up in five minutes or less, it has four bunks, storage space for bedding and clothing and four screened windows for light and ventilation.

No great strength or skill is required to fold and unfold the cabin and, according to the maker of the cabin, a woman can operate it as easily as a man.

The two ends of the cabin are of lightweight water-resistant plywood. The bunks are of canvas. The two sides are also canvas. When opened up, the unit has considerable rigidity. There is a ring on each corner of the top to which guy ropes can be secured in case of a severe windstorm.

The forward end of the cabin is supported on the roof by nine suction cups. The rear end is held up by tubular brackets that clamp to the bumper. They do not interfere with access to the trunk.

A canopy is available to be attached to the rear of the cabin at ground level to provide a cooking and eating enclosure.



You can drive into your garage with the cabin in place on roof. When you store it, it hangs from the garage rafters above car.



To set up cabin, you remove the ladder from its special storage compartment, climb up and raise roof by unfolding plywood ends.



Ladder has a safety handrail. Door of cabin opens onto a small stoop. Canopy at rear provides an enclosed area for cook. Food is stored in trunk of car.

WHAT'S NEW FOR Your Home

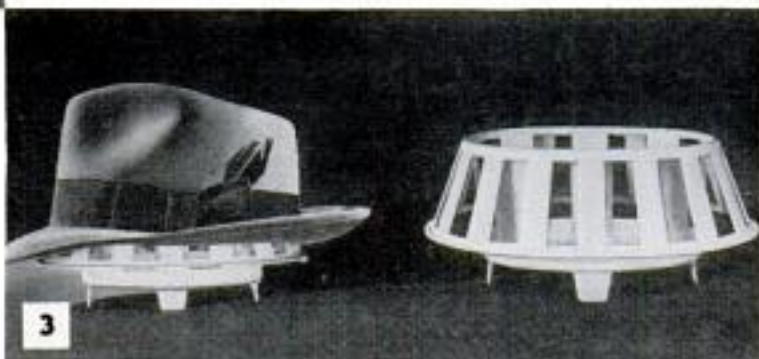


- 1. RESERVOIR** for steam iron that weighs only 2 $\frac{3}{4}$ pounds attaches to edge of ironing board, holds 40 ounces of water and feeds it to iron for two hours of steady ironing. Constant supply assures full steam at all times. Removing tube converts iron to dry operation



- 2. PICKUP CORD** permits children to retrieve cups and toys they have tossed away. Two-foot cord anchored to suction cup checks toy's fall just short of floor

- 3. HAT HOLDER** protects shape of hat when it's not being worn, prevents the rim from becoming dented or curled. Pocket in center of the plastic rack holds gloves



- 4. FEED-DOWN RACKS** in door of vertical home freezer store various-width food packages like bars in a candy machine. As bottom box is removed, next drops into place. Door holds 96 packages of food, 20 cans of juice concentrates

- 5. ELECTRIC FRYING PAN** cooks foods at exactly the right heat with aid of thermostat. Proper dial settings for various foods are listed on handle. Pan can be set on the table





6

6. ADJUSTABLE GLIDE levels tilted furniture, allowing jammed drawers and doors to open easily. Upper shaft is driven into leg and the proper height obtained by twirling an adjusting nut.

7. WALL REFRIGERATOR stores food at handy height, has magnetically sealed doors, partial thin-wall insulation. Refrigeration mechanism is in the top. Model is experimental, not in production.

8. KNIFE SHARPENER also buffs tarnished silver. Pressure on lid of motor spins shaft on which are mounted sharpening and buffing wheels. Plastic guard covers one wheel when other is used.

9. PLUNGER clears drains entirely by suction instead of forcing stoppage further down in pipe. Rubber cup rests on plate with hole in center. Valve drops over hole when cup is depressed.

10. CANDLE CARBURETOR assures a steady, smokeless flame. Coil around wick causes air turbulence for maximum efficiency. Glass guard stops drafts and dripping, smotherers flame in candle stub.

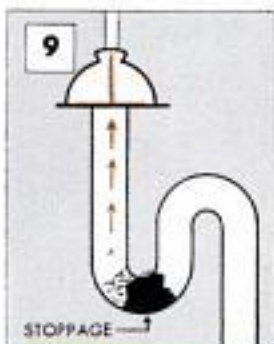
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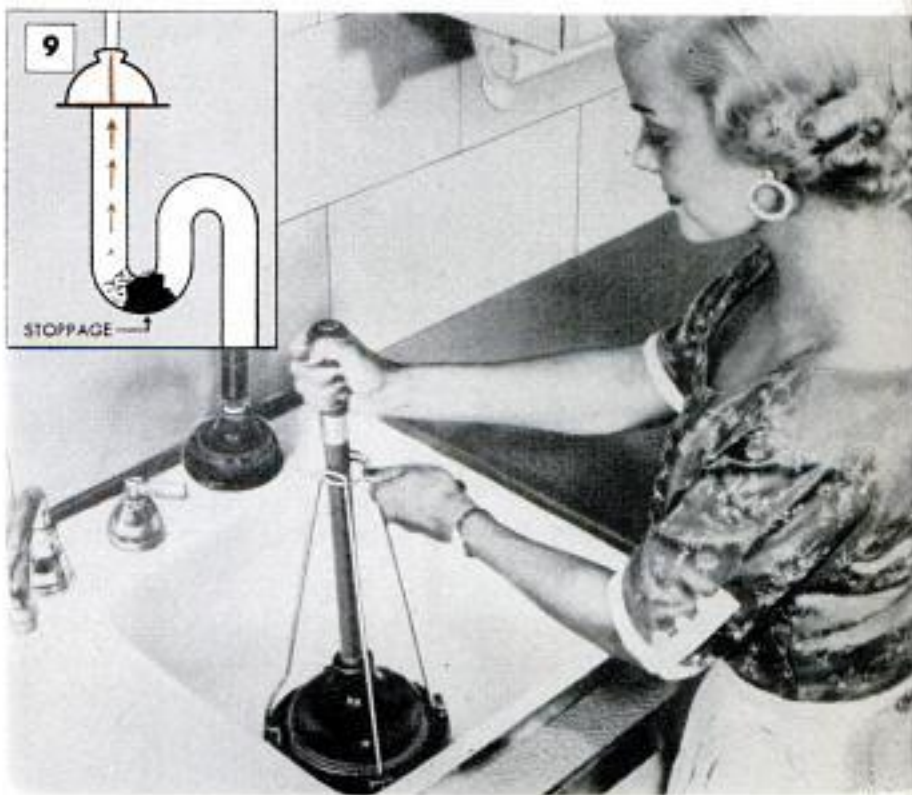
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Architect's attractive home on hillside lot seems to float on air but actually rests on sturdy steel beams

Three 32-foot-long tapered I-beams support the house. They are partly buried and anchored in concrete caissons. Trench under beams is for long retaining wall

Photo by Julius Shulman

House Suspended in Space Rests on Tapered Beams

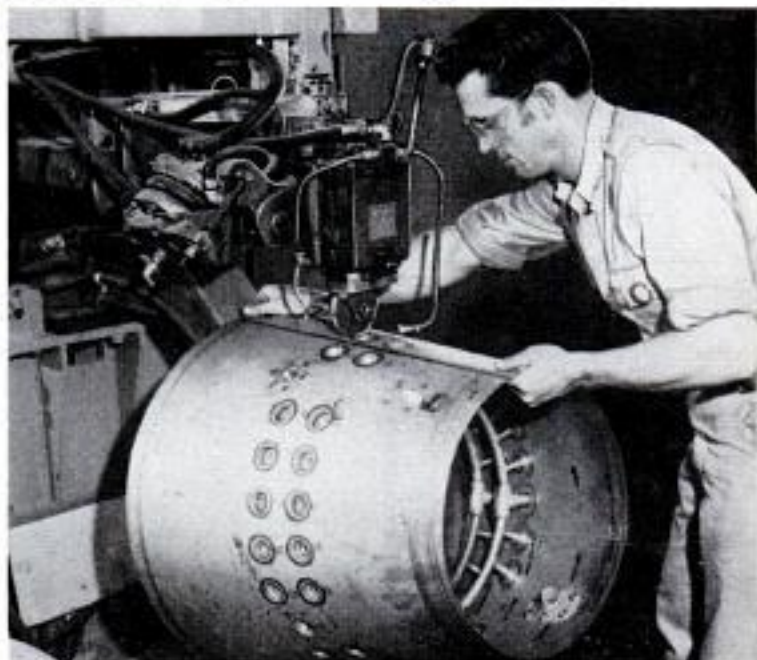
William Alexander, California architect, solved the problem of his sharply sloping hillside lot by building a studio-home with no vertical supports. The house is suspended in space and supported by three steel I-beams that taper from three feet to six inches. Tail ends of the beams are bolted and welded to steel plates set in 22-foot-deep rock-cut caissons filled with concrete. Almost a third of the beams are buried underground. A 60-foot retaining wall of reinforced concrete braces the hill from which the beams protrude. Floor supports made of 2 by 16-inch wood joists span the girders and extend eight feet on each side. Interior finish includes cork floors and plywood walls and ceilings.



Roller-Welder Unit Does Work of Seven Spot-Welding Machines

While the work remains stationary, a specially designed roller-welder zips around the work to make circular welds at greatly lessened cost and time. Built at a cost of \$14,000, the device replaces seven spot welders costing \$49,000 and cuts the cycle time from 4 hours to 45 minutes in welding seams on an exhaust cone for a jet engine. It requires only one operator against the seven needed for the spot welders. The upper electrode, carrying 14,000 amperes, revolves around the work; the lower electrode is mainly an air-operated clamp.

Four tons of earth must be moved for every carat of diamond mined.





By A. B. Kennerly

IF YOU LIKE to work in the woods and have the patience to wait for cash-producing trees to mature, then the business of growing and managing a forest is the business for you.

An excellent market is waiting for you. The pulpwood industry alone needs more than 14,000,000 cords of pulpwood every year to keep paper plants supplied in the South. Everything points to an increase in the need for pulpwood in the future according to Southern Pulpwood Conservation Association. In fact the pulp and paper industry now ranks among the leading businesses in the South.

Forest managers can make a good living from the sale of products from the forest, especially with the start of a good timber stand. Many operators have set aside a tract of timber from which they expect to derive college funds for their children.

You can make a start by acquiring and developing a timber tract. Earnings will start the first year if you can afford to buy a tract with merchantable trees. Your alternative is to buy abandoned farm land to start a new forest.

The minimum acreage you will need depends on whether or not you will work in

the forest yourself, and what profits you expect from it. A safe minimum from which to figure is about 160 acres per man. Since one man can hardly work in the forest alone, but needs a helper for sawing and other kinds of work, the smallest tract should be 320 acres.

The other factor in determining the size of your operations is the amount of return you expect. You can safely figure a net return of three to four dollars per acre per year. Two sections (two square miles) are not unusual in forest holdings and could return as much as \$5000 a year.

Patience required is borne out by figures which reveal the rate of growth of saw logs. From time of planting to age of 25 years, pine trees will grow to a diameter of 10 inches and will contain about 32 board feet of lumber. But during the next six years these same trees will grow to 12 inches in diameter, and will contain 60 board feet of lumber, or just about double the yield. Obviously, it would not be good business to cut the tree at 10 inches, then wait another 25 years to accomplish what could be done in another six years by waiting.

The surprising thing in timber management, however, is that by waiting still



Small trees culled from timber tract in thinning can be cut into posts, and there's a never-ending demand for them in farm areas



Small operators usually air-dry their lumber before marketing it. This lumber will be planed to finish it, then sold either direct to a customer or shipped to a lumberyard. Below, the use of forest lands for grazing can be another source of profit



another six years, the number of board feet will again be doubled. Trees that had 32 board feet of lumber at 25 years will now have four times that amount or 125 board feet at 37 years, according to the Texas Forest Service.

Since the average operator cannot or is unwilling to wait so long for returns, the obvious thing to do in good timber management is to sell some and save some.

This calls for partial cutting in the timber tract every few years. "Partial cutting of timber is like making withdrawals from a savings account," suggests the Southern Pulpwood Association. "A portion may be withdrawn whenever needed, and the remainder continues to bear interest in the form of growth."

It doesn't pay to harvest trees for only one product. The tallest and straightest trees usually bring the most money when sold for poles. It would be foolish, therefore, to sell them for pulpwood. The next in quality sell for saw logs and veneer blocks, and the remainder for ties, pulpwood and fence posts.

The value of the pulpwood market is mainly for cash income from what otherwise would be a waste product. During the development of a forest it is necessary two or three times to thin the stand in order for trees to have room for growth. It does not pay an individual to grow timber altogether for pulpwood. The price it brings does not offset the cost of bringing it up to a pulpwood stand. But with the main income being derived from poles and saw logs, the sale of thinnings and saw-log tops for pulpwood brings income from parts of the forest that could not be sold before pulpwood markets were developed.

The more processing the timber owner can do to his harvest, the greater will be his profit. Many owners of timber land rig up small sawmills to cut the logs into boards. The boards then are air-dried and either processed still further by planing, or they are shipped to big mill operators and lumberyards.

Small trees cut from the timber tract in thinning can be sold as fence posts. Such posts usually are shipped to a commercial treat-



Timber can be cut and then sold as is, but the timber owner who also has a small sawmill can boost his profits. He then can offer semi-finished or fully processed lumber to customers or yards

ing plant where they are processed to minimize moisture absorption and lengthen their life. Every farmer in the area is a potential customer.

Logs which are too rough to be worked into finished lumber can profitably be cut into railroad ties. And another good source of income to the owner of a timber tract is the using or leasing of forest land for grazing. Timber tracts will not support the

beef production of good pasture land, but the grass is there and might as well be turned into a profit. Timber owners who don't want to go into beef production may lease their land to neighboring farmers.

For the investor who wants the highest return on his money in the shortest possible time, the best opportunity offered in forestry is the purchase of 25-year-old stands of timber. These would average about 10 inches in diameter. Such timber with 100 trees to the acre would have a timber value of \$96 an acre figuring stumpage at \$30 a thousand. In 12 years the trees will have grown to the extent that they would be worth \$375 an acre, giving a return of about 32 percent each year.

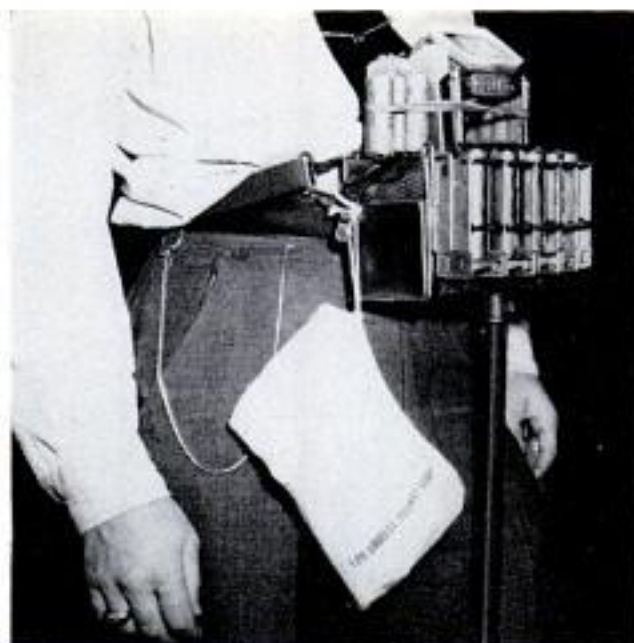
While money may not grow on trees, a good forest manager can get a lot of money out of trees. ★ ★ ★

Hinged Wings on Automobile Mirror Increase Rear Vision

Two hinged wings that attach to the existing rear-view mirror provide the driver with a wide-angle view to the rear and eliminate dangerous blind spots in that direction. The hinged principle enables the driver to adjust the two smaller mirrors for maximum view, not only to the rear but also on each side. No tools are required to install the device. It is also said to be a boon for the driver who is trying to watch the actions of children in the back seat.

☐ Africa's first television station, opened in December, is located at Casablanca, Morocco.





Los Angeles Bus Loaders Use "Pogo-Stick Fare Boxes"

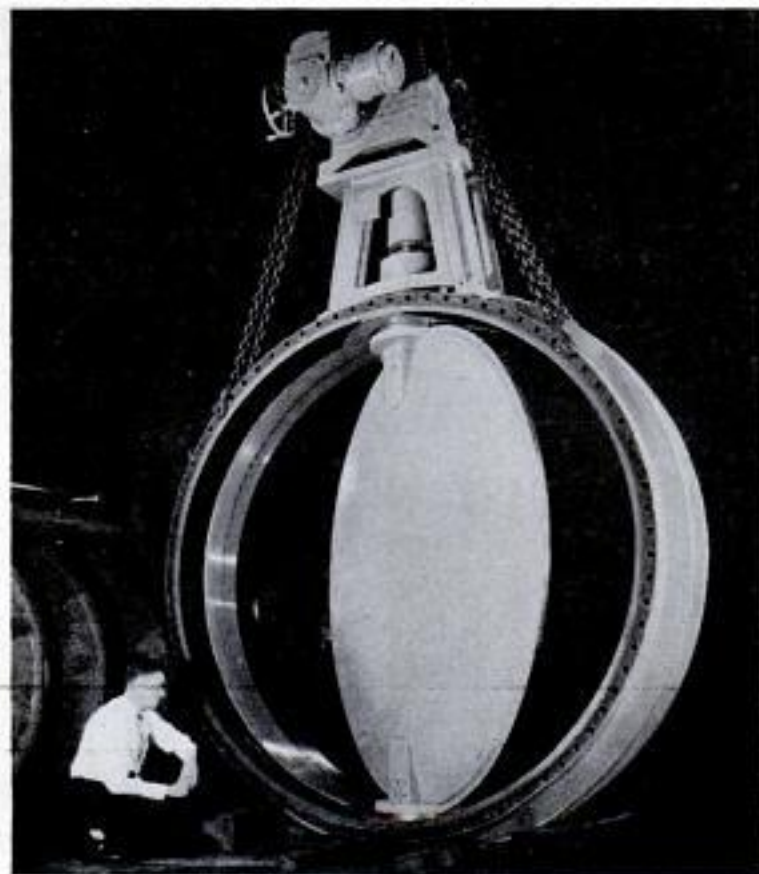
Popularly called "Pogo-stick fare boxes," a new type of collection box is being used by traffic loaders for Los Angeles buses. Traffic loaders are at busy stops to collect fares from riders before the buses arrive. Strapped to the waist and supported by a steel post, the unit consists of a fare receiver box that empties into a sealed safe, and a money changer. It has separate compartments for transfers and zone tickets.



Balloon-Type Seat Cushion Folds to Fit Shirt Pocket

You can tuck a new inflatable seat cushion into your shirt pocket for carrying. No larger than a pack of cigarettes when deflated, it is blown up like a toy balloon to form a comfortable, attractive, full-sized pillow. Sport fans, tourists, automobile drivers and servicemen find it suits their many needs. The pillow is made of tough, durable plastic for long wear and is available in solid colors or plaids.

Pressured Fluid Forms Tight Seal Around Supersonic Wind Valve



Tremendous air pressures and extreme temperatures ranging from minus 65 degrees to 750 degrees Fahrenheit make the job of sealing valves in supersonic wind tunnels doubly difficult. A new 108-inch butterfly valve solves the problem with a continuous stressed-steel band welded to the inside of the valve body. When the valve is closed, the flexible steel band is inflated by a pressured fluid until it contacts the disk edge and prevents air leakage.

Algae "Seasoning"

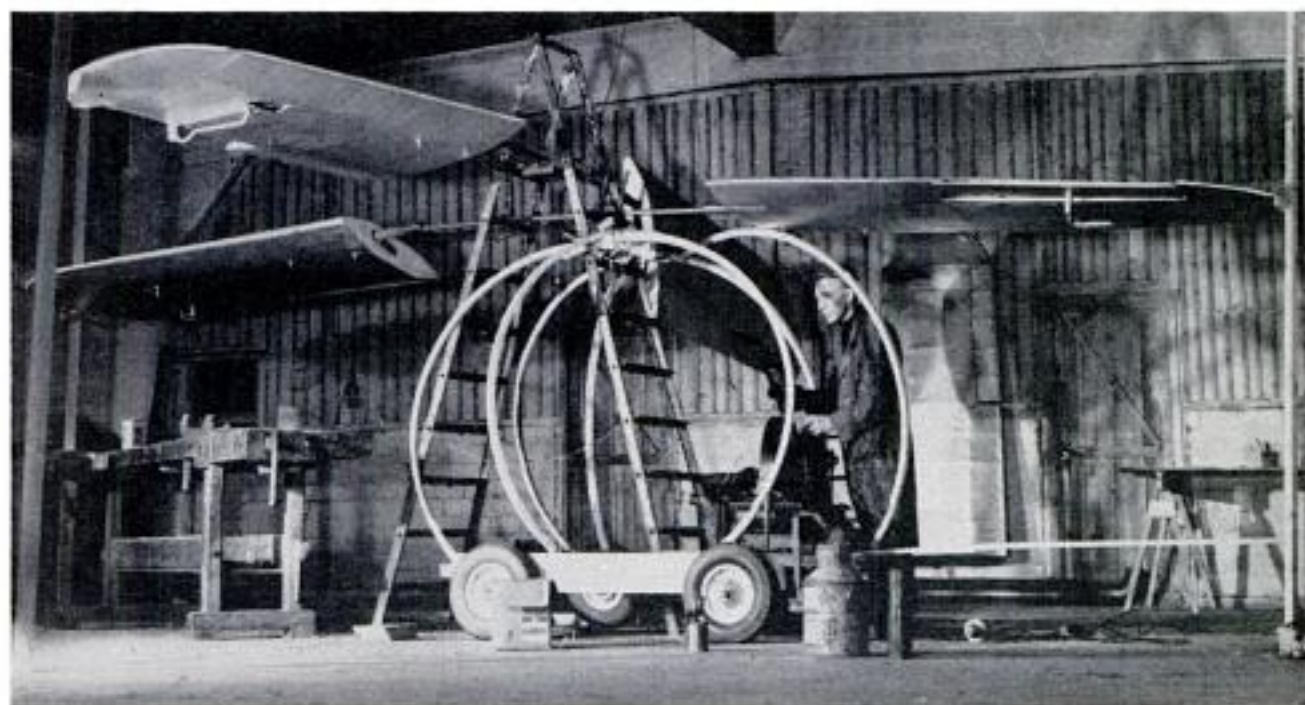
Food is improved in taste when enriched with high-protein algae, according to a recent report. Chlorella, the one-celled plant that promises to be a low-cost food source, was added to soups, breads, jelly rolls, noodles and ice cream. Tasters found that all the foods were improved in taste and that the enriched breads and ice cream were particularly good.



German Pilot Builds "Windmill" for Ground-Sky Travel

Flight at up to 110 miles per hour and ground travel at 45 is expected of an "air scooter" patented by a former German fighter pilot. Resembling a helicopter, it will have five seven-foot rotors revolving over the cabin at 200 revolutions per min-

ute. Inventor Walter Wiesske, who has been testing a model with eight rotors, believes full-scale production models will sell for approximately \$1000. American, Canadian and Australian firms have indicated interest in the versatile vehicle.



Lamp Mounted on Typewriter Floods Paper With Light

Eye strain is reduced for typists by a new light that attaches directly to the typewriter. Made of $\frac{5}{8}$ -inch aluminum tubing, the tubing folds back with the paper holder.

☐ Fatalities per 100 million passenger miles on U.S. scheduled airlines have dropped from 15 for the five years 1932-36 to 1.7 for the five years 1947-51.

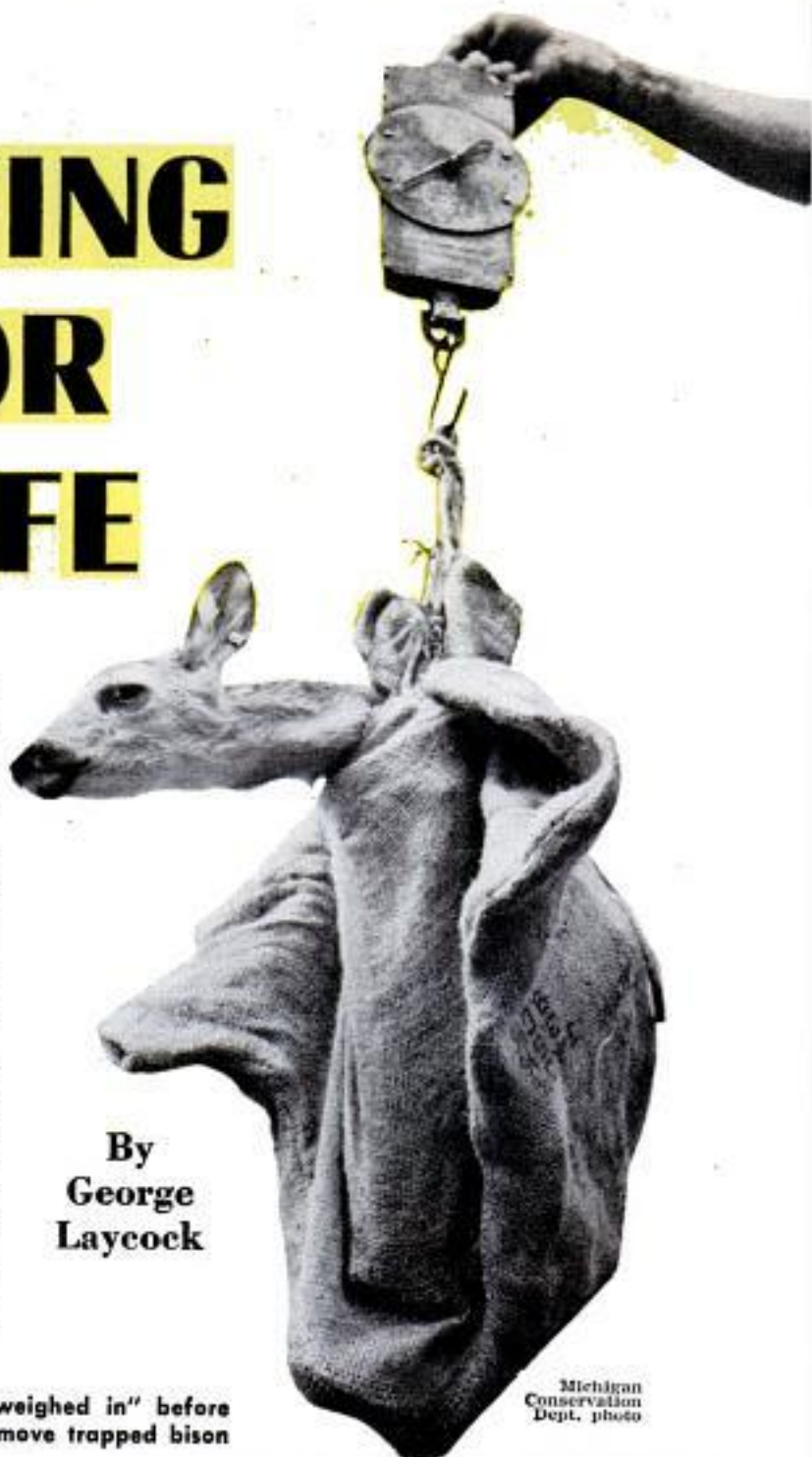


IT'S MOVING DAY FOR WILDLIFE

A MOUNTAINEER with fire in his eyes recently bearded some Kentucky wildlife specialists in their offices in Frankfort. "First you fellows passed a law to make the kids go to school," he said. "Then you turned deer loose to eat the gardens so the kids wouldn't have anything to eat. Then you turned bear loose, and panther and other varmints to eat the kids on the way to school. This," he thundered, "has gone fur enough!"

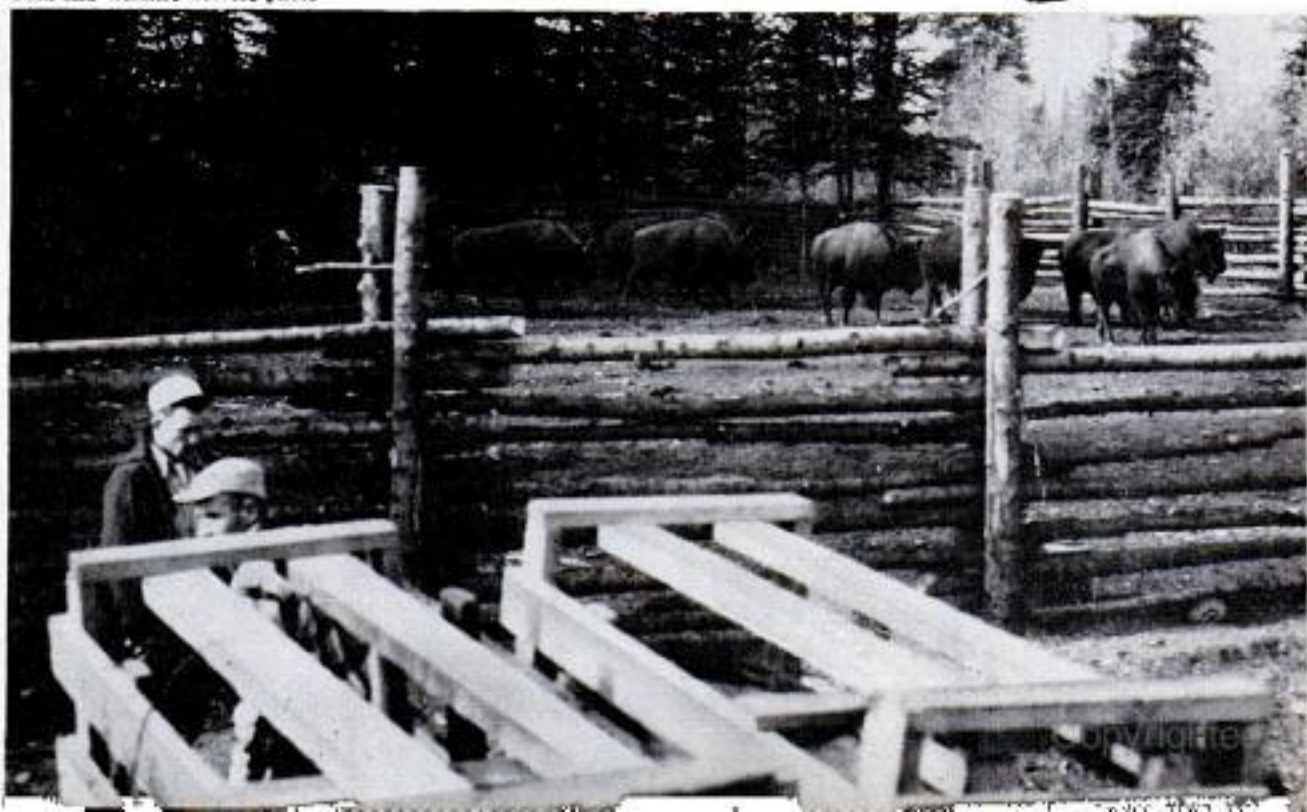
The game managers couldn't deny that they released deer and even bear in the mountains, for this transplanting of wildlife has become one of the favorite and one of the best ways of improving hunting. There is widespread belief among professional game managers that, contrary to the old mountaineer's opinion, this big manmade game migration still hasn't gone "fur" enough.

Above right, little deer tied in burlap bag is "weighed in" before trip to new home. Below, crates are hauled in to move trapped bison
Fish and Wildlife Service photo



By
George
Laycock

Michigan
Conservation
Dept. photo





Fish and Wildlife Service photo

Wary handlers slipped rubber hose over horns of mountain goat which was trapped at Kodiak Island, Alaska

Game technicians in every part of the country are gathering up everything from bobwhites to bighorns. Then they're hauling them across the state, and sometimes halfway across the country and dumping them where there is food and cover but a scarcity of game. Because they've learned to fit the animal to the environment they can thin out game surpluses and build up thin populations all in one operation. They've developed this live-trapping and

transplanting into an art, for experience has shown that this method can mean quick build-ups in game population and better hunting for the license buyer.

Man now knows a great deal about a game animal's needs. As one wildlife expert explained it, "We've changed the complexion of the land. We're going against nature. The game and the people are both living under artificial conditions, and the laws of the wilderness no longer apply."

"Eager beavers," destined to restock an Oregon area where there is a scarcity of game, are loaded aboard truck

U.S. Forest Service photo





Fish and Wildlife Service photo

Chukar partridge are trapped in grain-baited pens, then transferred to crates. Every trapped bird is banded before release

Drumming grouse investigates another bird. Actually it is a mirror hung inside the trap. Grouse triggers door behind him

Colorado Game & Fish Dept. photo



Captive should read "Photo by Fred Harvey, Kentucky Division of Game & Fish"

"Live-trapped animals that grew up in the wild survive better than game raised in captivity, and they are far less expensive," says Don Strode, in charge of Kentucky's Pittman-Robertson projects.

Practically every type of game in the country has been trapped and moved. Bobwhite, raccoon, grouse, rabbit and deer have been transplanted by the hundreds. During the winter of 1947-48 Wyoming game specialists trapped and moved eight moose. By 1939 Colorado had trapped and moved 152 mountain sheep, plus another 16 which she traded to Montana for eight mountain goats.

Texans have used airplanes to help round up more than 2600 antelope and chase them into long funnel-shaped traps. This technique has made a big change in the national antelope population in the past quarter century, for 25 years ago there were plenty of people willing to predict that the antelope was doomed to extinction. Today the antelope is secure and it's largely because wildlife experts have learned how to fit the animal to his environment.

In the early days of antelope trapping they were herded into traps made of wire fencing. But when they dashed against the fences and broke their necks in large numbers, the game technicians searched for a better way to trap them. This led to a funnel trap in which the smaller areas at the rear of the trap are made of six-foot fences of three-inch cord mesh. The antelope still dashes crazily against the traps but now he bounces back like a trapeze performer who missed his partner. At the back of the traps the antelope herders drive their catch into narrow crowding pens darkened by canvas curtains. From there they go into net loading chutes one or two at a time, where they're caught by hand, crated and hauled off to new range.

And what Texas and some other states have done for antelope, Arizona has tried with bison. Two thriving herds in that state started with 42 of the lumbering animals trapped and moved a few years back.

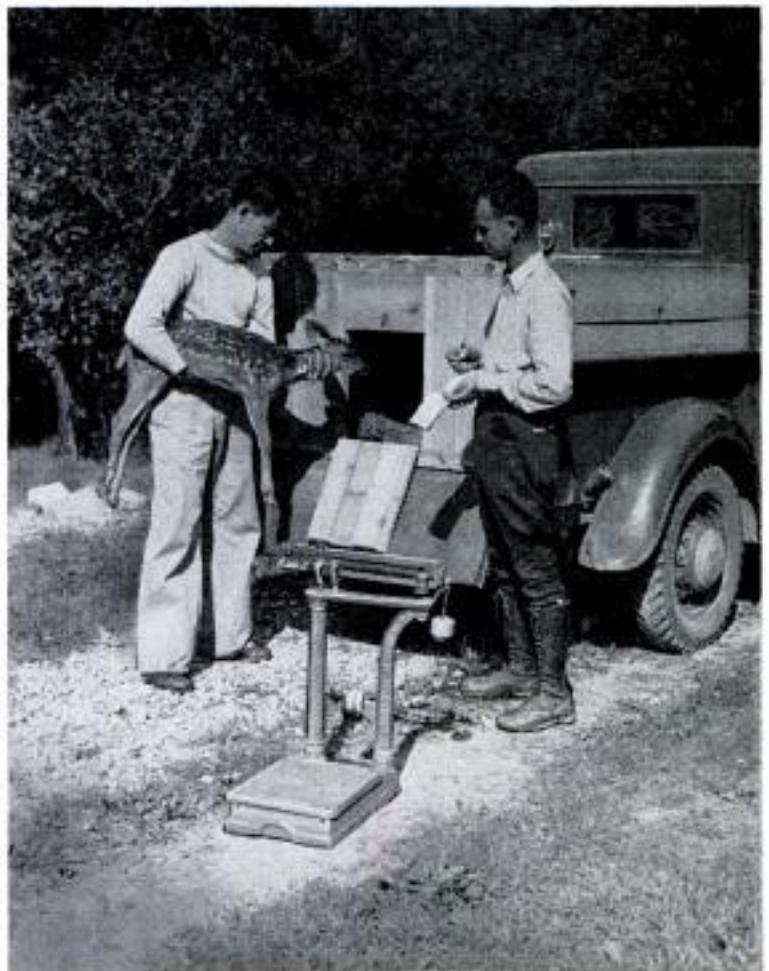
Nine states have trapped and moved wild turkeys; Texas alone has transplanted some 3000 of the

big birds. Seventeen states moved 8470 beaver, some of which were even parachuted into isolated waters from bush-hopping planes.

In the winter of 1940-41 South Dakota trapped and released in better range some 8500 ringnecks. The Wildlife Management Institute said of the project, "Each of these wild-wise ringnecks is worth a half dozen of the pen-reared innocents. In these moves, however, the first step is to size up the landscape and only release game where it has a chance of success."

Kentucky learned this lesson well when she imported game-farm pheasants and turned them loose in her rather meager river bottoms. These birds soon left their Old Kentucky Home to the bobwhites and the grouse. The pheasant has steadfastly refused to live in the hill lands, although pressure from sportsman's groups sometimes forces the technicians into making another try at an experiment that has consistently failed. One of the Kentucky immigrants left the river bottom where he was released and headed straight for the Ohio River and the corn fields of the Midwest. He flew more than 40 miles and in a careless moment crashed through a school-house window in Louisville.

Kentucky has done other jobs of wildlife moving to the satisfaction of everyone. "Since 1945," Don Strode says, "we have released 570 deer, 92 turkeys, 70 beaver and 10 black bears."



U.S. Forest Service photo
Six-months-old fawn raised at Pisgah Game Refuge in North Carolina will be shipped hundreds of miles to another state

Bear are generally taken in boxlike traps. The big difference between a bear and deer trap is the strength of the box, for a self-respecting bear could tear his way out of a wooden deer trap. The sides and ends of bear traps are generally reinforced with

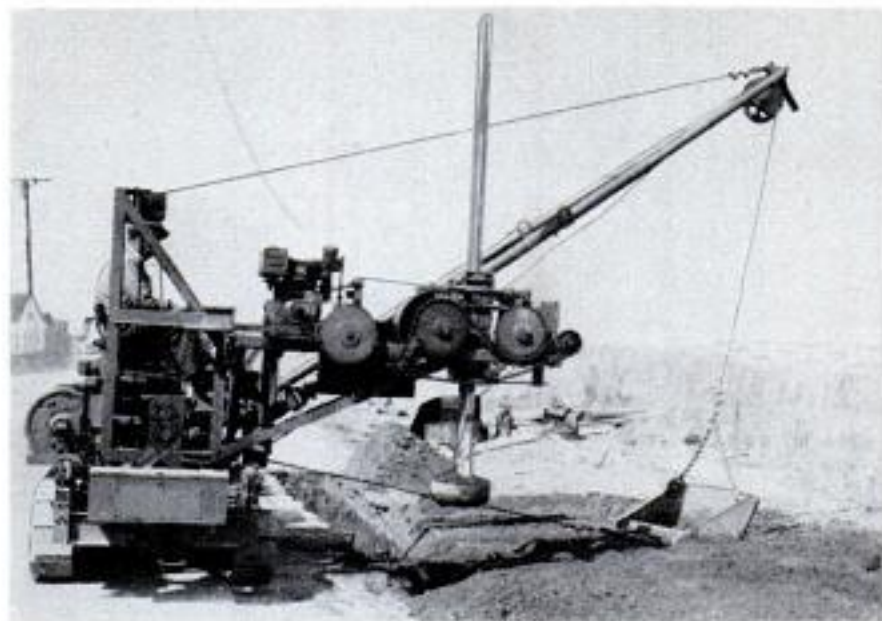
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Antelope rounded up in Montana are driven into pens made of nets. They will be transplanted to another area

Fish and Wildlife Service photo



Earth Tamper Mounted on Trench Filler Packs Automatically



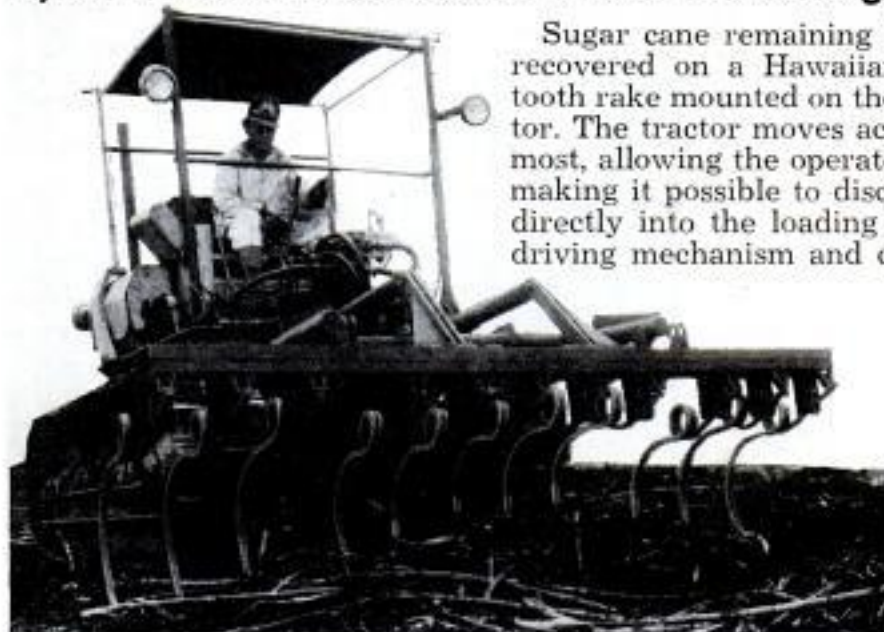
No operator is needed to control an earth tamper which is mounted on a trench filler and packs the earth down as fast as the back filler dumps it. From the machine projects a boom supporting a bucket, or "hoe," which scoops the earth into the trench. Mounted on a frame behind is the automatic tamper, powered by its own gasoline engine, which packs the loose dirt into the ditch as the machine rolls along. The rig was developed by a Cleveland firm for laying pipe.

Burlap Grain Bin For Outdoor Storage

King-size gunny sacks holding 600 bushels each are serving as economical outdoor-storage bins for surplus grain. The mammoth sacks are made of waterproofed burlap and lined with paper. Each bin is about 18 feet across at the base and 14 inches in diameter at the top. A 30-inch neck that facilitates loading can be folded down against the side for sealing. Grain stored in the burlap bin brings up to 30 cents more a bushel than grain stored on the ground—and storage in the bin costs only about 10 cents a bushel.



Hydraulic Rake Mounted on Tractor Clears Sugar Cane From Field



Sugar cane remaining in the fields after harvest is recovered on a Hawaiian plantation with a spring-tooth rake mounted on the rear of a crawler-type tractor. The tractor moves across the field back end foremost, allowing the operator an unobstructed view and making it possible to discharge the accumulated cane directly into the loading windrow. The driver's seat, driving mechanism and controls are repositioned for backward driving. Hydraulically operated, the oversize rake is raised to discharge its load and elevates itself automatically when an obstruction is encountered.

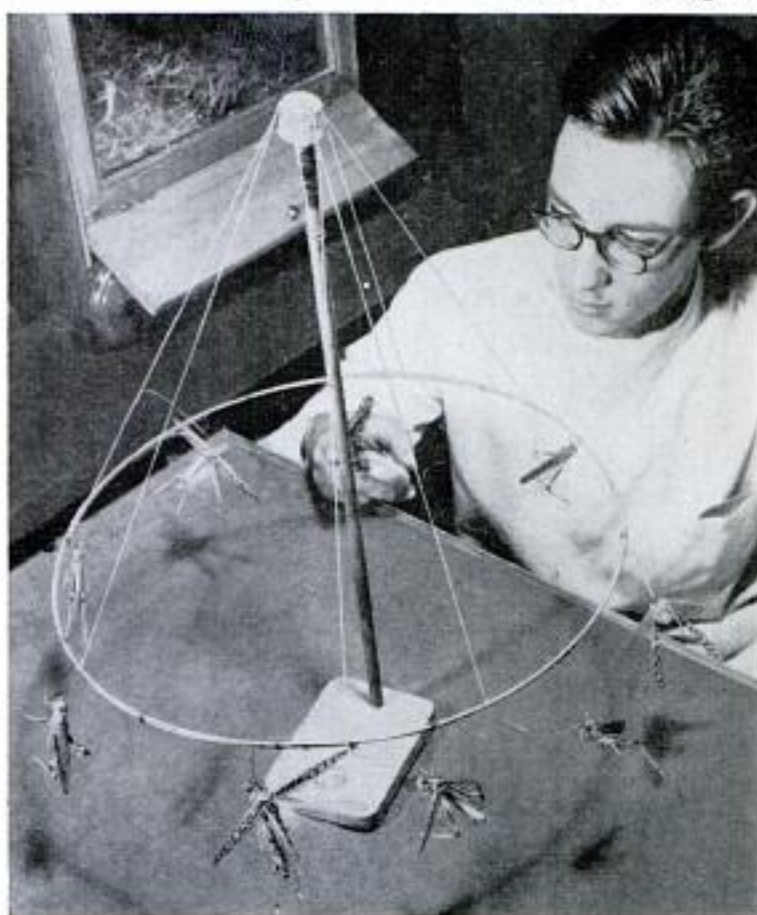
Three tons of industrial diamonds worth \$50,000,000 were imported by the United States in 1953.

Locust Carousel Checks Duration and Speed of Insects' Flight

Flying locusts hitched to an improvised merry-go-round tell scientists at the Anti-Locust Research Center in London's Natural History Museum the insects' speed and duration of flight. Suspended from a circular wire frame that turns on a central pivot, the insects instinctively beat their wings and start the frame going. As they fly about the circle, they are carefully watched by scientists engaged in a detailed study of the insect.

Titanium Plentiful in Hawaii

Much sought after as a jet-engine material, titanium may be more plentiful in Hawaii than in Brazil, where the United States now gets most of its supply. More than 80 percent of the soil in some areas consists of the ironlike material, according to Dr. G. Donald Sherman of the University of Hawaii's soil department. Closeness of the ore to the surface and its density will make it an easy material to mine.



Aluminum Golf Cart Has Numbered Slots for 14 Clubs

Fourteen golf clubs have individually numbered slots in a cart that eliminates the need for a golf bag. Balls, shoes, tees and other items are carried in a Zippered bag attached to the handle. The clubs rest head down, putting the weight over the wheels

where it is easier to move. The clubs cannot rattle or become marred. A metal plate on the cart's aluminum frame serves as a seat between shots. Weighing 12 pounds, the complete unit can be folded for storage in an automobile or locker.



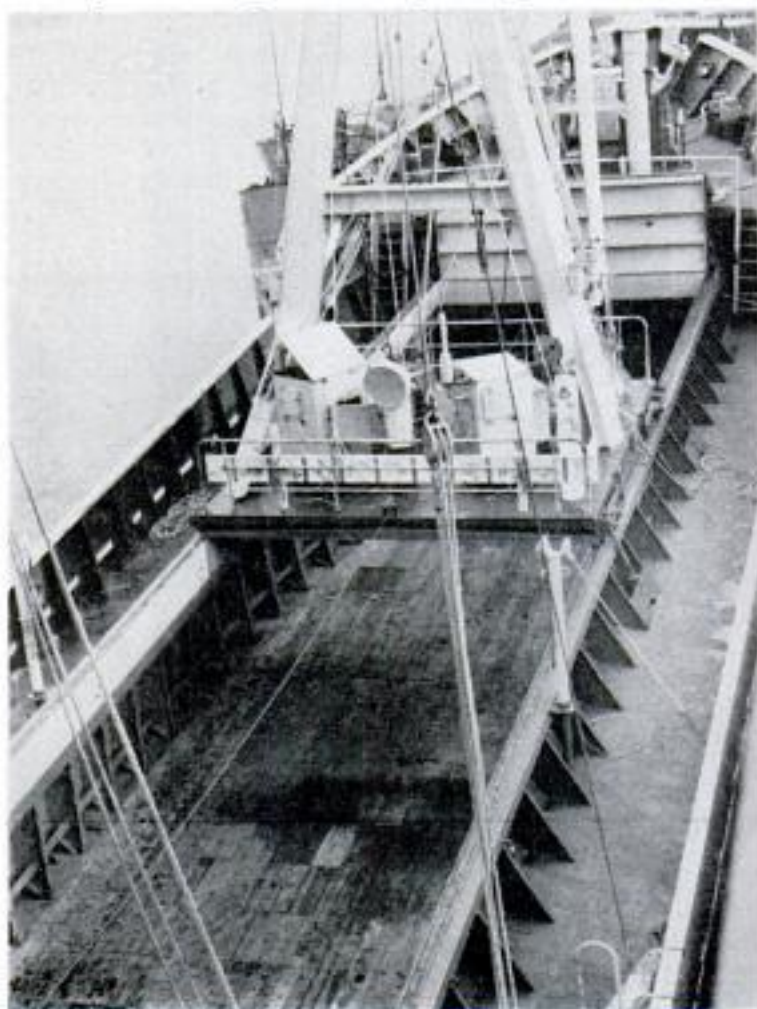
Self-Contained Electric Heating Shaft Installed Between Studding



Economical and efficient electric heating is the purpose of a built-in wall unit that extends from floor to ceiling. Air enters the top and is discharged from the bottom of the self-contained heating shaft, which mounts its own fan, thermostat and heating coils. Even distribution of heat is the reason given for the economy of the unit; each shaft takes about the same amount of electricity required by a flatiron—a total of about 7400 watts is needed for heating a small five-room basement home in northern climate. One or more units is installed between the studding of each room, but as there is no connection of ducts and no central furnace, installation cost is low and space is saved. The units may also supplement present heating systems when extra rooms are built into a house or when garages are to be heated. The heating element may be turned off in the summer when only ventilation is required.

Rolling Mast Platform Permits Easy Loading of Long Cargo

Extremely long loads may be lowered directly into the hold of the Dutch freighter *Muphrid N* by simply rolling the mast forward, out of the way. Raised up on four wheels which travel in grooves along the side of the hold, the mast platform is pulled aft or forward with the aid of one of the diesel-driven winches mounted on either side. Rolled completely forward, the platform clears 72 feet of the 90-foot hold.



Chemists Synthesize Sugar

Two Canadian researchers have solved a classical chemical problem—the synthesis of sugar. Since all the energy of the sun which is used by nature starts out as sugar, formed in plants by photosynthesis, the feat is a chemical milestone. Knowledge gained during the project promises to aid in the synthesis of many substances. Malt sugar and trehalose as well as sucrose—common table sugar—were synthesized for the first time. Glucose, the central compound in nature, forms a portion of the sucrose molecule.

160 Dr. Raymond Lemieux
Dept. of Chemistry
Univ. of Ottawa
Ottawa, Ont.-Canada

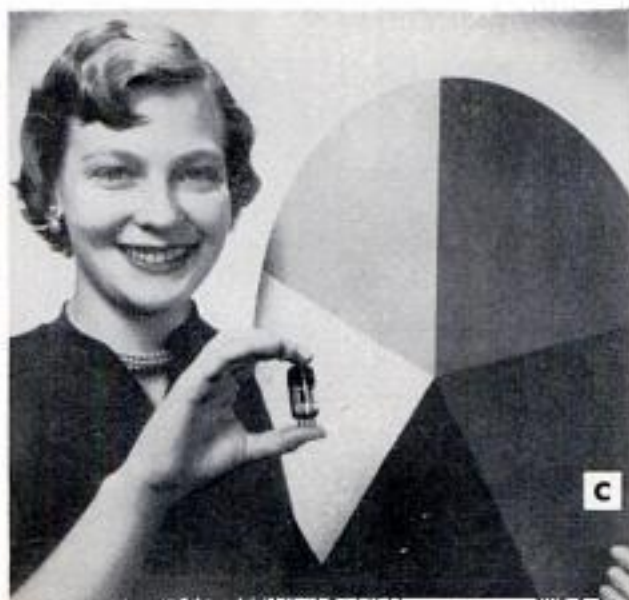
Radio Television Electronics

TELEVISION TODAY

PRIVATE-WIRE television systems are now being demonstrated in salesrooms of electronic-parts distributors throughout the country. These midget "TV Eye" cameras, shown in photo A, are in production at the RCA Victor Division in Camden, N. J. The operator is shown inserting the Vidicon pickup tube which is the heart of the simplified 4-pound TV camera. Any home-type TV receiver can be used without modification as a monitor, the system connecting through the set's antenna terminals by means of a cable. Applications include remote observation in hospitals and factories; promotion of products and services in stores and hotels; also detailed demonstrations in classrooms.

Manufacturers of color-television receivers are giving special attention to provisions for easy access to chassis for picture tube and other service adjustments. The top of the Admiral color-TV set lifts off as illustrated in photo B. The main controls from left to right are as follows: Tiny knob at extreme left adjusts color intensity; the large knob controls volume and contrast. The dial knob at the right tunes the various channels, the same as on standard black-and-white television sets. Photo D shows a subassembly area in the Admiral plant where inspectors are checking power-supply units and video components.

One of General Electric's newly developed receiving tubes for color-TV sets is displayed by the young lady in photo C. This tiny tube will regulate the average brightness of the three primary colors on the picture screen. The large color wheel is televised in test transmissions. ★ ★ ★



First-Aid Hints for



OWNERS of table-model radio receivers often have several around the house that are in need of slight repairs. Many times you can save dollars—and have fun—by making such minor repairs yourself. If you are an average radio-set owner you probably do not know much about the various components and circuits, so this does not mean that you should tamper with a valuable console radio. Even an inexpensive table model is a complicated device for the beginner and it is subject to damage.

However, if you are careful and can restrain the urge to experiment, the accompanying photos will show you several simple dollar-saving repairs that anyone can easily make at home. First, never attempt to repair a set with the power connected. As with a lamp, or any other electrical device, even though it is turned off, the switch terminals carry 110 or 115 volts, ready to "bite" unwary fingers. So the first thing to do is to pull the power-cord plug out of the wall receptacle. With the radio turned "on," high voltages are present in the set, so do not take a chance even though you are only replacing tubes or a pilot light. Never plug in a radio set to test a repair without first sliding the chassis back into the cabinet; this is a simple precaution against shock. Also, never attach an external ground wire to an a.c.-d.c. set. Most table-model radios are of this type. The use of any kind of external antenna wire is okay, but do not connect the wire to anything that makes metallic contact with the earth. This means radiators, water pipes, gas pipes or similar earth-connected metallic bodies.

To function properly, radio tubes should make good contact in their sockets. The tube prongs sometimes corrode slightly and make poor contact. They may be dusted off and cleaned with carbon tetrachloride as illustrated in photo A. Remove the

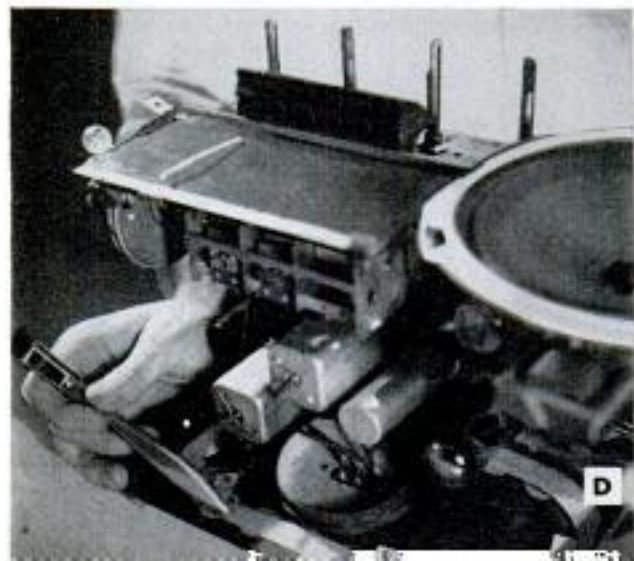
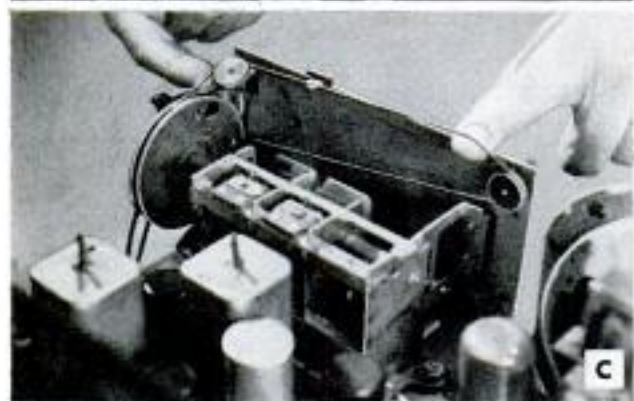


Table-Model Radios

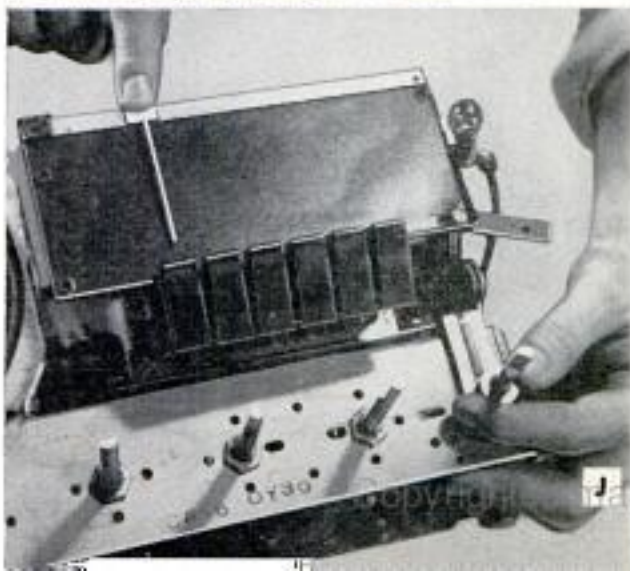
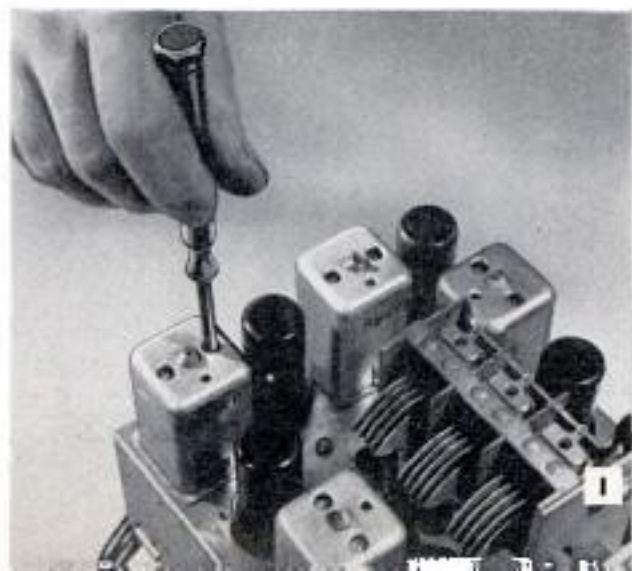
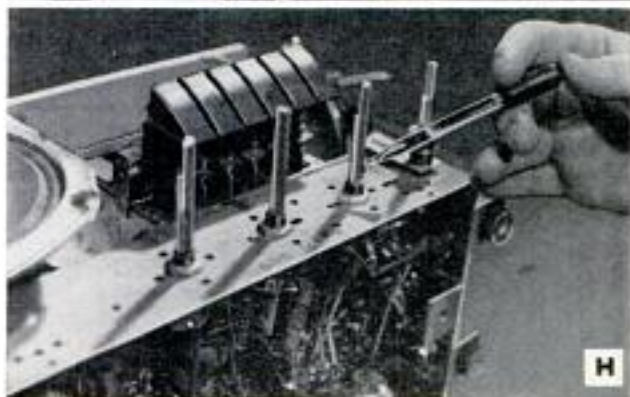
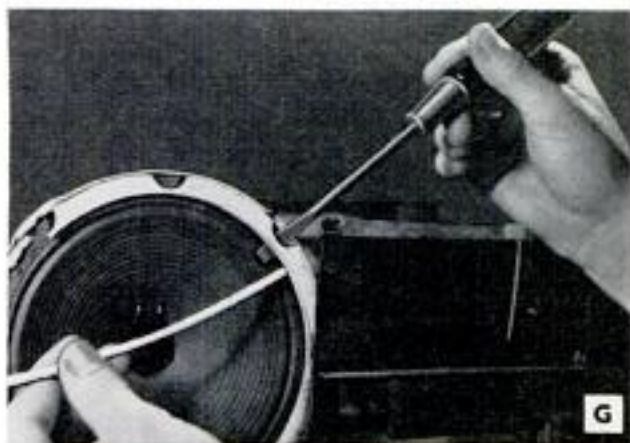
tubes one by one to be sure you get them back in their proper sockets. If each socket is not identified with its tube number, and there is no tube-position chart on the inside or underside of the cabinet, mark the tube positions on the chassis with ink or scratch the numbers on with an ice pick or similar sharp tool. This is important if you take all the tubes out to have them tested. Any tube that is not making good contact in the socket will cause set noises, and may even make it inoperative. A good stiff brush and a little carbon tetrachloride, applied as shown in photo A, is recommended when servicing old sets.

Bent tuning-condenser plates are a frequent cause of trouble. These may be straightened with a knife blade as illustrated in photo B. Unless the plates are actually touching, do not try to straighten them as some manufacturers bend the plates deliberately. A loose dial cord is shown in photo C. Tighten the cord and retie the knot if possible. Unless the cord is too loose, a simple method is to use some of the "no slip" preparations which increase the friction of dial cords and pulleys. These are to be found in all radio-parts house catalogs.

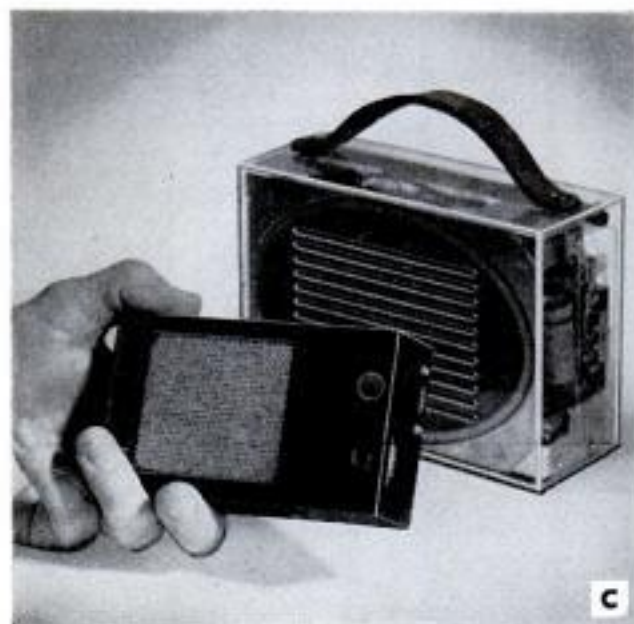
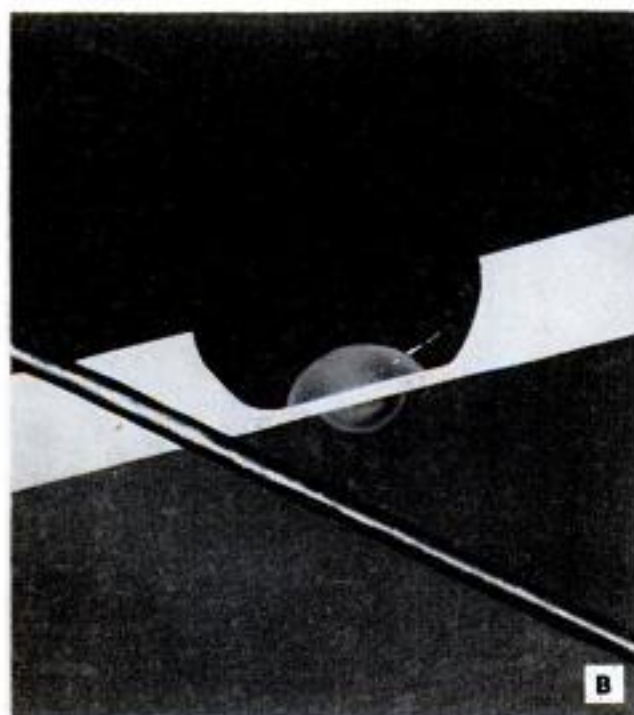
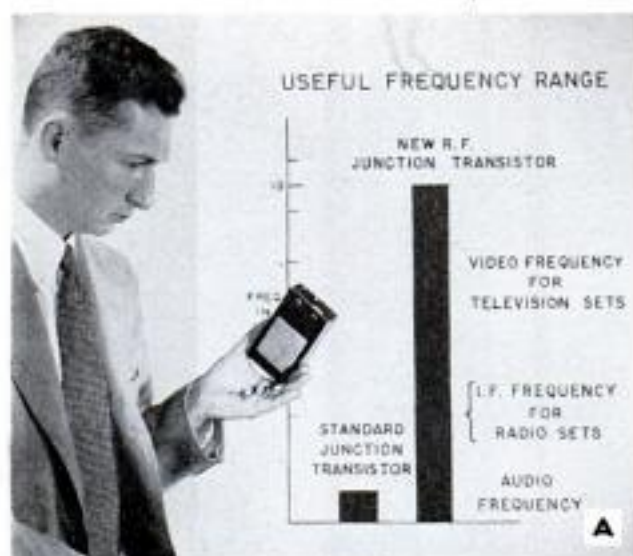
If volume is lacking in a set of the type using a built-in loop antenna, add a 15 or 25-ft. length of small insulated wire. If the set has no external antenna post marked A or ANT., wind two turns of similar wire around the edge of the antenna loop, see photo D, to provide greater pickup. Connect one end to the outer end of the main loop winding, or anchor it at some convenient point for inductive pickup. Then run the wire around the room or connect it to an outside antenna.

Contacts on a short-wave band-changing switch should be kept clean with a brush and a little carbon tetrachloride, as shown

(Continued to page 228)



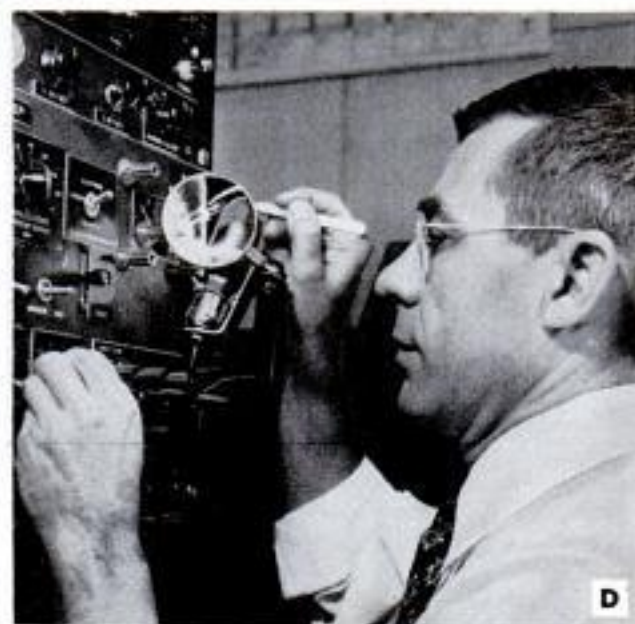
High-Frequency Transistors In Experimental Receiver



LABORATORY technicians have fun in demonstrating some of the new transistor-operated radio devices that are being developed in the David Sarnoff Research center at Princeton, N. J. One demonstration that recently attracted attention in Times Square, New York City, was made by an engineer walking along the street with a radio blaring away full blast from an inside pocket. The experimental 6-volt receiver weighed one pound.

This vest-pocket model shown in photos A and C employs eight new high-frequency-type junction transistors which would probably cost about \$80.00. Other parts, which include a 2-by-3-in. speaker, are all standard. The receiver measures $5\frac{1}{2}$ in. long, $2\frac{3}{4}$ in. wide and it is only $1\frac{3}{8}$ in. deep. It will probably not be in production for nearly two years and by that time these expensive transistors will no doubt be reduced in cost by mass production.

The chart in photo A indicates the greatly increased scope of future applications for these new h.f. transistors which amplify at frequencies up to 10 megacycles. The working area is thinner than the human hair; a comparison cross-section, illustrated in photo B, shows a "well" drilled in the center of a germanium crystal wafer leaving an extremely thin layer of crystal $\frac{1}{500}$ th of an inch thick. This is done with a drill vibrating at supersonic frequencies. Wire connections are embedded in each of the two gray "dots." The dots form junctions for transistor action. A larger experimental receiver using the new transistors also appears in photo C. In photo D, Dr. C. W. Mueller of the research staff is shown checking one of these new h.f. transistors that operate on tiny batteries. ★ ★ ★



the POPULAR MECHANICS CRAFTSMAN



By Hi Sibley

Young TV cowpokes have a bunkhouse all their own when



A BOY'S ROOM GOES WESTERN

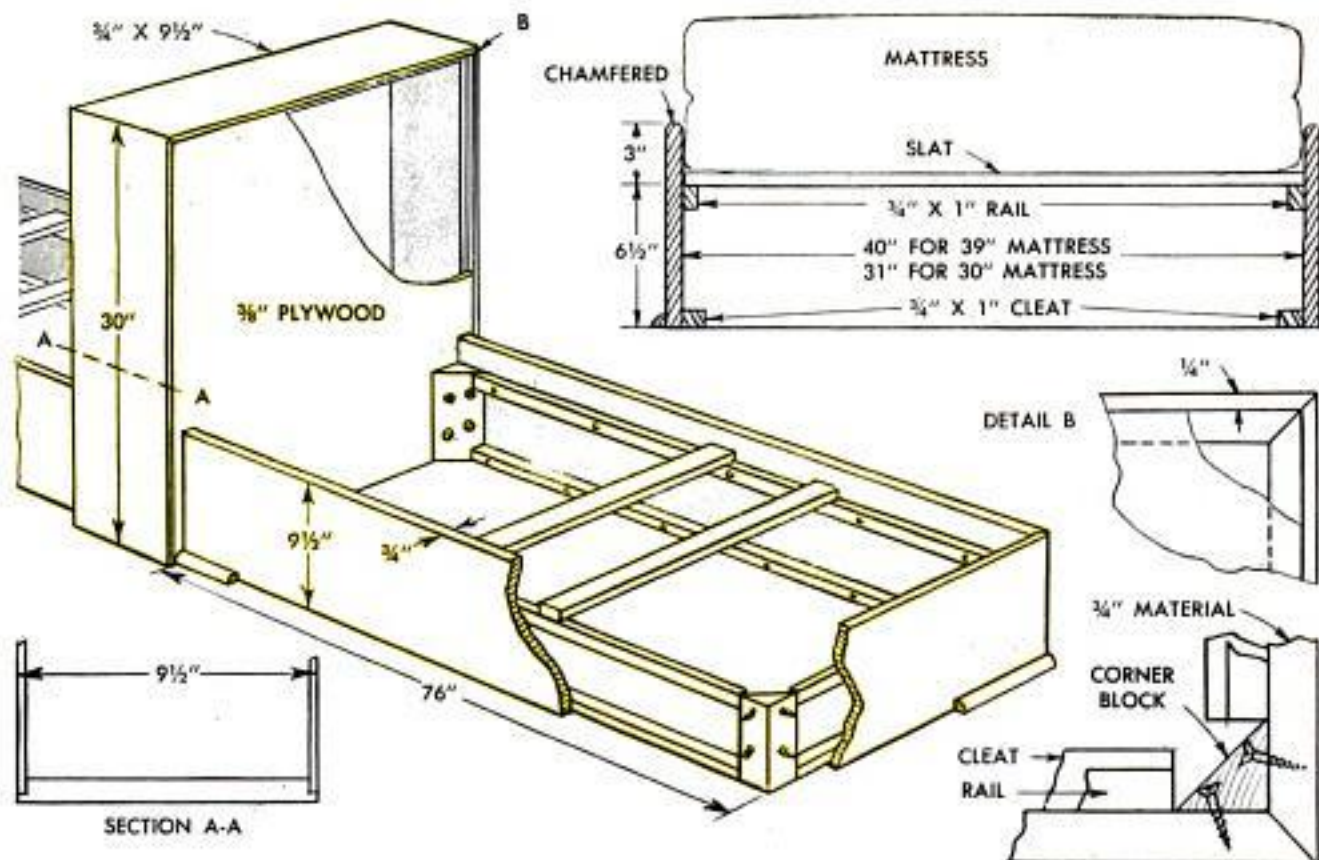
IF YOU HAVE some gun-totin' cowboys in the family, you can make their make-believe world a near reality by converting their room into a TV ranch house, complete with built-in bunks. Such a transformation need not be costly. False beams of second-grade knotty pine added to the ceiling and stained to give a rustic effect, a photomural of a western scene applied to a wall, hooked throw rugs and an old-fashioned, lantern-type fixture all add to the over-all atmosphere of the old West. Imitation knotty-pine paneling of gypsum can be used to treat the walls, and a few pieces of pine or maple furniture will provide the final touch.

Photomurals can be obtained in black and white or tinted. You can even have them made from your prize negatives. Unmounted prints are attached to plastered walls with ordinary wallpaper paste. Usually, the print is moistened on both sides with a sponge and then paste is applied to the back. The print is hung like wallpaper, wrinkles being smoothed out quickly with

a soft brush. Excess paste is wiped from the face of the print with a dampened sponge. When the print is made up of several sections, the sections are usually marked from left to right and matching edges are lapped $\frac{1}{4}$ in.

Knotty-pine gypsum paneling, which is 16 in. wide and 8 ft. long, is exceedingly easy to apply. Applied vertically, the individual panels are cemented in place and held at top and bottom with a single nail, which is later concealed by a baseboard at the floor line and a molding at the ceiling. The panels come prefinished.

The built-in bunk beds pictured in the photo at the top of the page are not difficult to make. Featuring a dual headboard, the two bunks are an integral unit which can be permanently fastened to the floor or left free to pull out. For added convenience in making the beds, the headboard can be an individual unit permanently fastened in place, with each bunk being a separate unit. This is hinged to the dividing headboard at the front to permit each bunk to be swung



out on casters. The bunks are built for either a standard 30 or 39-in. mattress. The headboard consists of 1 x 10 lumber, rabbeted along the edges to receive $\frac{3}{8}$ -in. plywood panels flush. Where you do not have a means of cutting a rabbet, the latter can be formed by adding cleats to the three inside faces. The same-size stock (1 x 10) is used for the side and end boards of the bunks. Note that triangular corner blocks are used to strengthen the mitered corners and to attach the side members to the head-

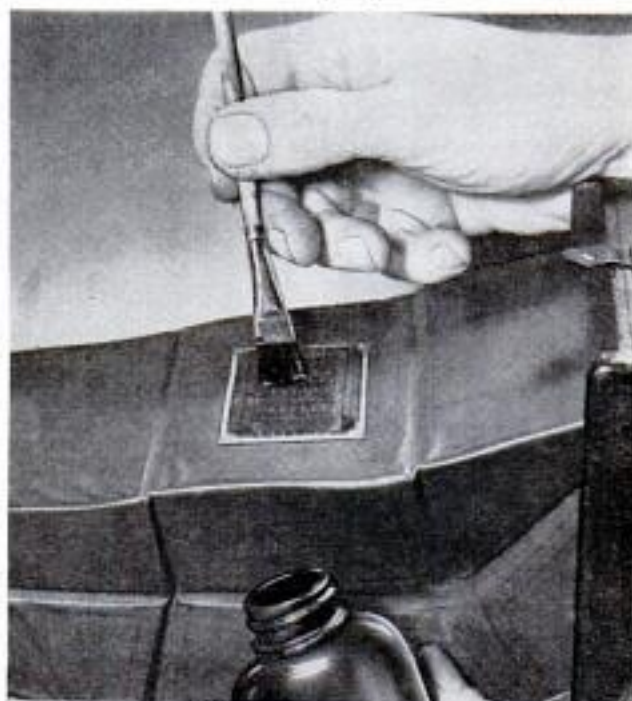
board. Rigidity is added to the side members by two longitudinal cleats, the upper ones serving also to support three or four 1 x 3 bed slats. You'll note that the corner blocks are kept even with the upper cleats. The lower cleats provide a means of fastening the bunks to the floor with a couple of screws. Finally, sections of quarter-round are added to the lower edges of the side and end members. The completed job should, of course, be stained dark to blend into the room's Western atmosphere. ★ ★ ★

Refinish Metal Name Plates With Lacquer and Sandpaper

Metal name plates having raised lettering, such as the data plate on a motor or the shutter-speed chart on a reflex camera, can be refinished easily. First, the surface is cleaned with lacquer thinner or other solvent, then an even, not-too-heavy coat of dark-colored lacquer is brushed over the entire surface. After the lacquer has dried, use small block of wood wrapped with fine sandpaper or abrasive cloth and polish the raised portions of the plate. This will make the lettering stand out brightly against the dark background. Finally, spray a protective coat of clear lacquer over the plate, or wax and polish it.

Walter E. Burton, Akron, Ohio.

☐ An easy way to remove corrosion from inside the ferrule of a fishing rod is to wrap a small wad of medium-fine steel wool around a dowel chucked in an electric drill and carefully run it into the opening.



Protect Knees When Gardening With Pads Cut From Inner Tube

To protect your knees when working on wet or rough ground in the garden, you can cut neat, lightweight protectors from a length of inner tube. Cut the back of the section so that two straps are formed, as shown in the detail. These should be spaced so one strap grips the leg above the knee and the other below it.

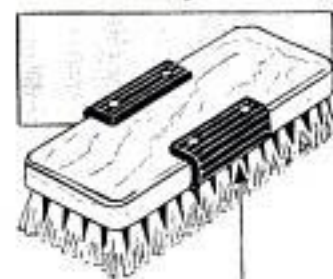
W. P. Barenz, Milwaukee, Wis.

Dip-Painting Irregular Objects

Time and money may be saved by dip-painting irregular-shaped objects with enamel or oil-base paints floated on water. Dip-painting saves time and trouble, as compared to brush or spray, because it thoroughly coats all hard-to-reach surfaces. By floating the paint on water in a fairly deep container, the necessity for a large quantity of paint is eliminated. The objects to be painted are dipped beneath the surface through the film of paint, then slowly lifted. The excess paint is allowed to drain.

Henry G. Borchardt, Chicago.

Hand Grip for Dairy Brush



RUBBER HOSE

Split sections of corrugated garden hose nailed to the opposite edges of a scrub or dairy brush will provide grips to ease hand strain. The grips will be appreciated especially when the brush is used

for long periods and the hands are wet and slippery, requiring a tight grip.

G. E. Hendrickson, Argyle, Wis.



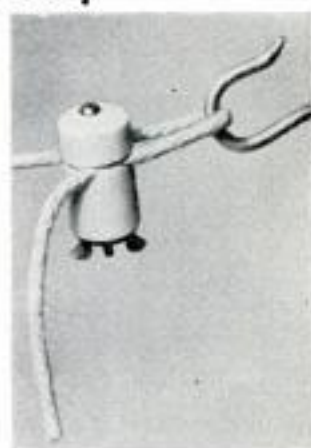
MAY 1954



Porcelain Insulator Converted Into Clothesline Clamp

A simple clamp that will eliminate tying knots when tightening a clothesline is made by using a porcelain insulator of the type shown. A $\frac{3}{16}$ -in. round-headed bolt with wing nut and washer converts the insulator to a clamp. If the head of the bolt turns when tightening the wing nut, place a sharp-tooth lock washer between the bolt head and the top of the insulator.

Arthur Trauffer, Council Bluffs, Iowa.



Black Tape on Automobile Antenna Stops Reflected Spotlight Glare

A chromium automobile antenna won't reflect the glare of your spotlight if you put a narrow strip of black masking tape along the side of the antenna facing the driver's seat. The momentary blindness resulting from such glare, if you are driving with the spotlight on, can be a serious hazard. Masking tape used in this manner has the advantage of being easy to put on and take off.—Ken Murray, Colon, Mich.

□ Besides providing a handy "pincushion" for preventing tacks, brads and small nails from being lost on the job, a cake of household soap also lubricates the points, making them easier to drive.

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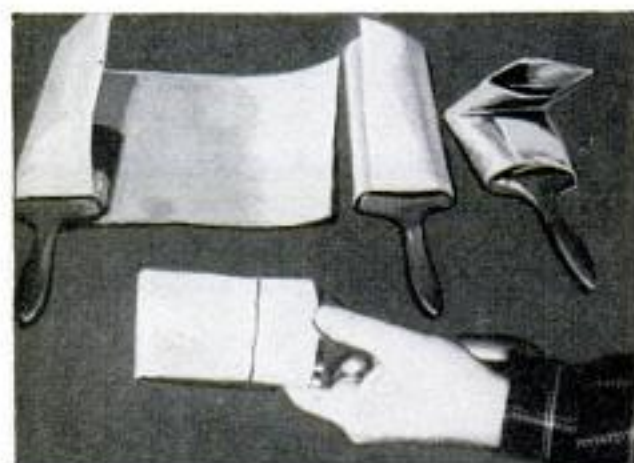
PAINTBRUSHES

Will do a better job and last longer if you know how to select, use and care for them

By Bernard Gladstone



After brush has been spun dry, bristles are combed out as above, to remove kinks. Below, wrap the brush in heavy paper and lay it flat for long storage



Enlarged view of bristles, below, shows "flags" on good brushes. Flags are visible when brush is held up against light. Brush without flags leaves marks



IN PAINTING, as in other types of work, the quality of the finished job depends to a large extent on whether or not you use the proper tools. Economy when purchasing a paintbrush is no substitute for quality, as an inferior brush cannot possibly turn out a good job. And a top-quality brush, when properly handled, will produce a smooth, streakless finish and will outwear several of the cheaper variety.

The best paintbrushes are made of 100 percent pure Chinese hog bristles which have been carefully selected and blended. There are also nylon brushes of excellent quality on the market, which wear well on rough surfaces such as raw lumber. However, they should never be used with shellac, as the alcohol in the shellac will soften the bristles. The bristles can be restored by immersing for 30 min. in boiling water and then drying thoroughly.

To compare brush values, run a pencil through the bristles at the heel of the brush next to the ferrule. Carefully separate the bristles to expose the setting, which is a block set into the ferrule to separate the bristles and to provide a well for the paint. In a good brush this is no wider than absolutely necessary, and is often split into 2 or 3 dividers. This will provide the user with a fully stocked brush and cause the bristles to lie together at the tip to form a good cutting edge. If the block is too thick, the edge of the brush will split lengthwise.

Grasp the brush as for painting and press down with moderate pressure on a flat surface. A good brush will form a sharp chisel edge. Now hold the brush up to the light and examine the bristle tips. Little split ends or "flags" can be seen on a good brush. Without these "flags," a brush will leave streaks in the finished job. A fine brush has flagged bristles in staggered lengths, so that a new set of bristle ends is presented as the longer ones are worn down.

You want not only a good quality brush but also the right brush for the job. The most common types are shown in the accompanying illustration to help in determining your needs.

Having purchased a new brush, it's important to break it in properly. Unwrap



the brush and, holding firmly in one hand, slap the bristles vigorously across the other hand. Then hold it up to the light and remove any loose bristles you see. Spin the handle rapidly between the palms and again remove any loose bristles. Then comb the bristles straight to remove any curl. Now wrap the bristles in heavy paper and suspend the brush in linseed oil for at least 24 hrs. The oil should overflow the top of the wrapper and saturate the bristles. Nylon brushes do not need to be soaked, but this is very important with hog bristles, as they are porous. Soaking in linseed oil seals up the bristles, helping to keep them flexible, and makes the brush easier to clean. Remove most of the oil by dragging the flat side of the brush against a wire fastened across the top of the can. Take out the remaining oil by twirling the handle between the palms, with the brush held well down into an empty can. Then wash in two rinses of clear turpentine and spin dry again. Finally, comb out any kinks.

To use a paintbrush properly, dip about $\frac{1}{3}$ to $\frac{1}{2}$ the length of the bristles into the paint. Dip it slowly to allow time to soak up the maximum amount of paint. When removing the excess paint, draw the brush flat across a wire fastened across the top of the can. Never draw it edgewise, as this



Above, two methods of suspending brushes in solvent. Brushes should not be allowed to rest on bottom of can, as resulting curled bristles cannot be straightened



After soaking new brush in linseed oil for 24 hrs., it is spun dry by rolling rapidly between palms. Brush is held well down in empty pail for spinning



- 1—Flat wall, long haired, 3-5 in.
- 2—Flat wall, short haired, 3-5 in.
- 3—Oval varnish, 2-3 in.
- 4—Flat varnish, 2-3 in.
- 5—Flat sash, 1-2½ in.
- 6—Angular sash, 1-2½ in.



Above, a wire stretched across the paint bucket offers a double advantage. Excess paint is removed by drawing brush across it, and when brush is not in use wire acts as a rest

Proper procedure of dipping brush is shown at the left. One-third to $\frac{1}{2}$ of bristle length is dipped slowly, so that brush can absorb maximum amount of paint. Paint with end of bristles



Never paint with the edge of a brush, as this will cause "fingering." For sash and other narrow places, use a sash brush, which is made to be used edgewise



The photo above shows a badly "fingered" brush which has been used edgewise so often that its normal brushing characteristics have been ruined

When washing out a brush after painting, work it vigorously against the sides and bottom of the solvent container. Change the solvent several times

Use the thumb and forefinger to help remove all of paint. Squeeze from the ferrule down toward the tip of the bristles, dipping in the solvent each time



will cause it to "finger" or separate into clumps. Professional painters often prefer to tap the tip of the flat side of the brush lightly against the inside of the can, which leaves the brush more fully loaded.

Brushing varnish, enamel and lacquer calls for a fully loaded brush and a minimum of brush strokes. Brush out the paint in smooth, parallel strokes, and then cross it once to smooth out any brush marks. On vertical work, finish up with long light strokes running the length of the work. Keep checking back for 15 or 20 min. to catch any runs. Hold the brush at a 45-deg. angle and brush with $\frac{1}{2}$ to $\frac{1}{2}$ of the bristle length. Don't press down hard, as you will then be painting with the sides of the bristles instead of the ends, causing a streaky job. Never use a brush edgewise, because it will "finger," ruining its good brushing characteristics. If you have narrow surfaces to cut in, use a sash brush, which is made to be used edgewise. If occasionally you have to use the edge of the brush always finish up with a few flat strokes to remove the fingering.

When painting up into a corner, never poke the brush into it. Start the brush a little way from the joint, apply moderate pressure to fan out the bristle, and gradually work the cutting edge into the corner.

If brush cleaning is done immediately after use, it is a comparatively simple task. First wipe off as much of the excess paint as possible and then wash thoroughly in the appropriate solvent by working the brush vigorously against the container sides and bottom. Squeeze the bristle out with the thumb and forefinger, working from the ferrule to the tip. Repeat the process several times, using fresh solvent each time. Then spin the brush dry, between the palms and comb out. If the brush is to be used again in a day or so, wrap in heavy paper, saturate in linseed oil and lay it flat. If the brush is being stored for a longer time, after using the solvent wash thoroughly in warm water and neutral soap. Clean carefully around the ferrule and heel of the brush. Separate the bristles to expose the block and scrape the plug clean of any paint. A wedge of hardened paint will cause the brush to bulge at the ferrule and flare at the tip, making it difficult to spread paint evenly. When the brush is clean, rinse in running water, spin dry and comb out. Then allow it to dry thoroughly. Never dip a paintbrush that is damp into oil or paint, as this will cause the bristles to lose their spring. After the brush is dry, wrap in heavy paper, soak in linseed oil and lay flat in a cool, dry place. If the brush is stored for a lengthy period, unwrap it occasionally and resaturate with linseed oil. ★ ★ ★



A wire brush can be used to scrape dried paint from the handle, around the ferrule and from the heel. In stubborn cases, wire brush is used on bristles



Before storing a paintbrush for a long period, separate bristles as shown above and clean paint from the well with a screwdriver or narrow putty knife

Sometimes a badly-caked brush can be salvaged but it will never be as good as a brush which has been well cared for, and reclaiming it is a lot of work



Chrome Kitchen Chair Converted to Temporary Youth Seat

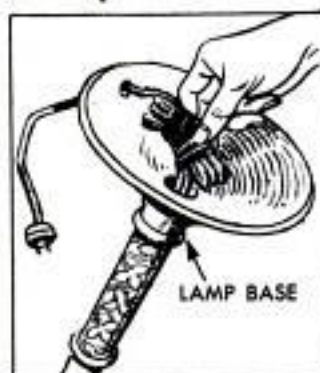


By modifying one of the chrome-tubing chairs from the kitchen set, one father improvised a practical "youth chair" for his young daughter. The chair seat was removed from the tubing frame and two lengths of 2 x 4 were cut to the width of the seat. Holes were drilled and countersunk in the 2 x 4s which were then fastened to the chair bottom with long flatheaded wood screws. Next, the 2 x 4s were fastened to the tubing frame by using the wood screws that originally held the seat to the frame. The youth chair matches the kitchen furniture, and can be quickly changed to its original size when the child outgrows it.

Mrs. C. A. Anderson, Port Huron, Mich.

Cord Shortened Without Cutting By Taping Inside Lamp Base

Pulling the extra cord inside the lamp base and taping it in flat loops will solve the problem of shortening an excessively long lamp cord. Besides permitting a neat appearance, the hidden loops can be quickly unwound, should the lamp be moved to a location that requires a longer cord to reach a receptacle. Twine also could be used to hold the loops.



Hugh Lineback, Stillwater, Oklahoma.

Emergency Plug for Small Leak Cut From Sheet Rubber



A pinhole leak in a pan or pail can be plugged in an emergency by using a wedge-shaped sliver of rubber cut from sheet rubber or an inner-tube. Force the point of the

wedge into the hole and pull it through from the other side. When you release tension on the wedge, the rubber will expand and fill the hole.

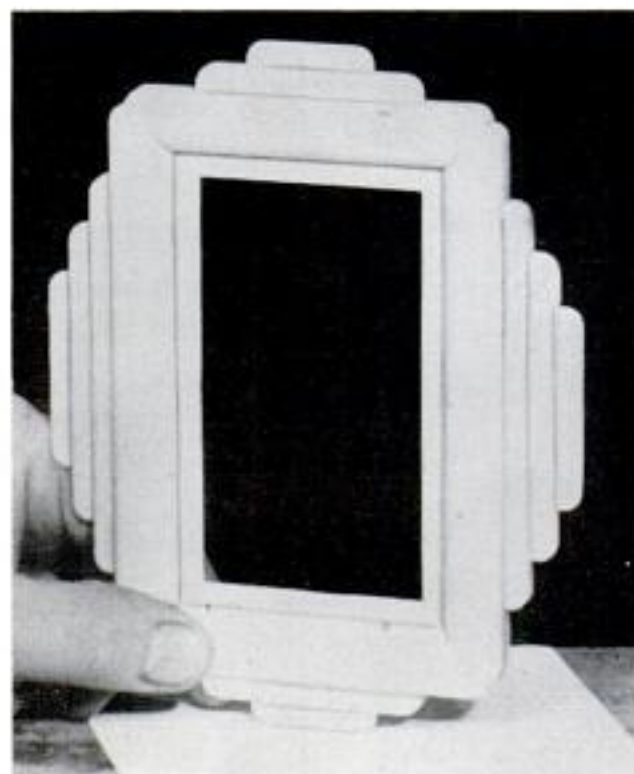
W. F. Schaphorst, Newark, N. J.

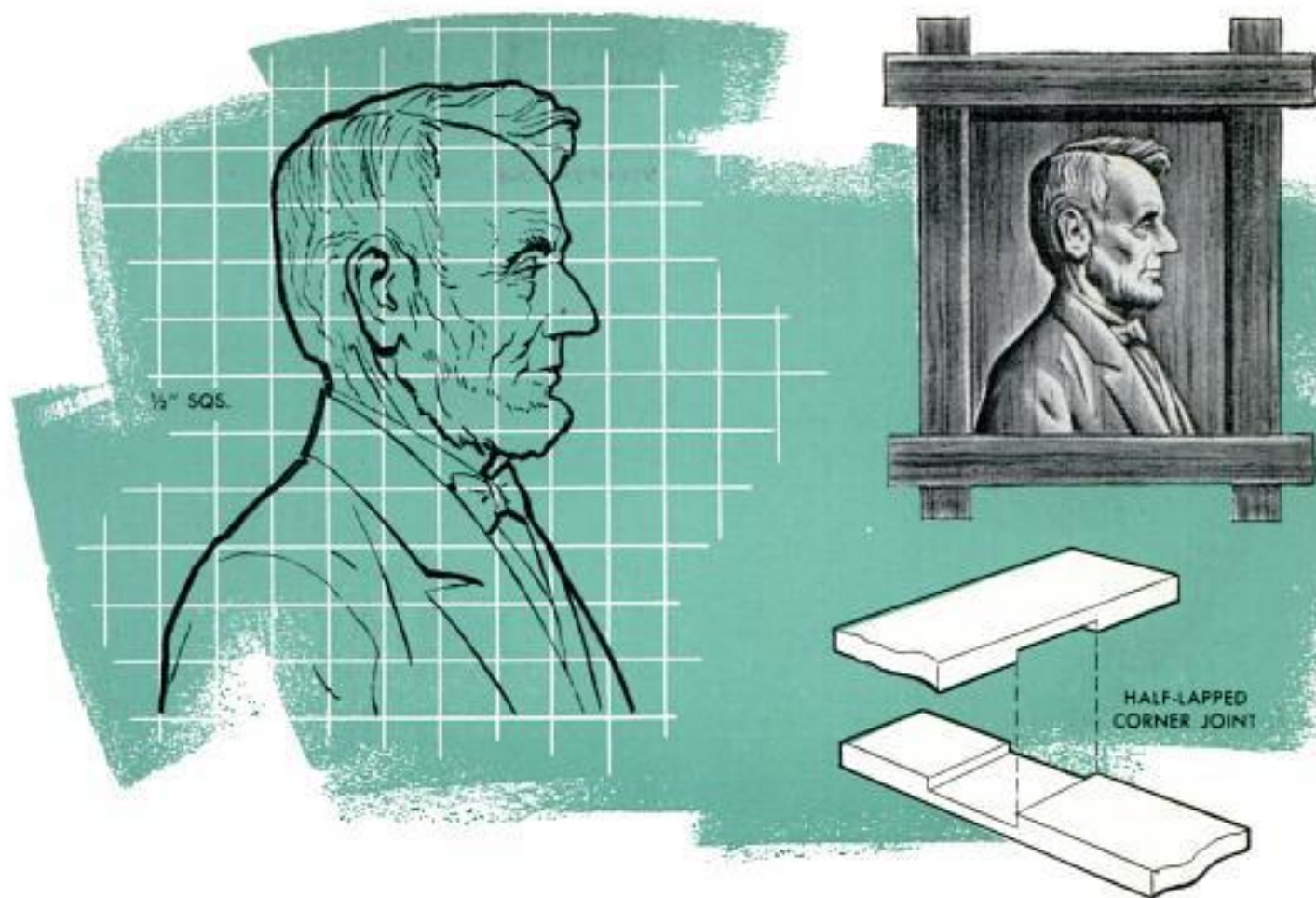
Ornamental Plastic Switch Plate Masks Photographic Prints

To give an unusual border to small photographic prints, mask them with an ornamental plastic switch plate of the type available in most hardware and dime stores. Lay the switch plate over a 5 x 7-in. sheet of enlarging paper and print the picture in the 2½ x 4-in. opening. Thus, when the printing is completed, the picture will be framed by a white ornamental border in the shape of the switch plate, and the edges of the enlarging paper will be black. Similar frames can be cut from ¼-in. plywood if special patterns are wanted.

H. Leeper, Canton, Ohio.

☐ The most weathertight method of applying roll roofing is to lay it horizontally, lapping each course at least 2 in. Building paper used as an underlayer for shingles should be put on the roof at a 45-deg. angle.





BAS-RELIEF CARVING OF LINCOLN BUST

A hand-carved bas-relief of Lincoln, complete with matching rustic frame, makes a unique wall decoration and will add to your reputation as a skilled craftsman. Actually, however, more patience than skill is required to carve it. The carving can be made smaller or larger, but the original was carved on a piece of $\frac{3}{4}$ x 14 x 16-in. mahogany. Any close-grained hardwood, suitable for carving, may be used. The figure can be transferred to the wood by drawing $\frac{1}{2}$ -in. squares on the work and then copying the drawing from this page. Or, a suitable picture of Lincoln may be traced onto the wood with carbon paper. Although the carving can be done with an ordinary pocketknife, three wood-carving chisels — a

By **I. M. Fenn**

straight, a V-shape and a gouge—will make the work easier. Clamp firmly to workbench and use both hands on the chisel, guiding with one hand and pushing with the other. The direction of cut should be away from you. Start from the outside of the figure and work in. When removing larger pieces of waste wood, cut across the grain, not with it. To get a better idea of the proportions and curves of the face, have someone pose for you. The finished carving is framed with matching wood, the corners being half-lapped as shown above. Both the frame and the carving are rabbeted on all four sides so the backs of the frame and carving will be flush. The completed job is rubbed with boiled linseed oil, then polished with wax.

Ventilator for Photo Darkroom Made From Stovepipe Elbows

Assembled in a plywood panel cut to fit a window in a photo darkroom, two stovepipe elbows will provide a novel lightproof ventilator that is inexpensive and easy to install. Fastened together at one end, the elbows are turned in opposite directions to prevent as much light as possible from passing through them. If some light is reflected through the opening, the addition of semicircular baffles of light plywood or

hardboard wedged into the ends of the pipe will prevent this. They should be placed opposite each other about 2 in. apart. The panel may be mounted in the window permanently or secured in such a way that it may be removed whenever desired.

Hugh Lineback, Stillwater, Oklahoma.

☛ Grease stains on a rug can be removed with carbon tetrachloride and a clean cloth.

MAKE IT A MAGIC PARTY

ENTERTAINING MAGIC can be made the theme of your next party if the stunts shown on these pages are used as games. Explain to the guests that each stunt is based on simple physical principles and let them try to figure out how they work. For example, a coin dipped in water and placed over the mouth of an empty bottle will lift when the hands are used to warm the air inside the bottle. The expanding air forces its way out. A full glass of water will hold quite a few small nails or pins before running over, surface tension permitting the water to rise above the rim of the glass. A burning match dropped into an empty tumbler consumes the oxygen, thereby reducing the volume of air and creating a partial vacuum if the hand is placed tightly over the glass before the match burns out. This allows the tumbler to be lifted with the palm of the hand. Sugar normally does not burn when a match is applied to it, but it will burn if white cigarette ash is dusted on the cube beforehand. Break a yardstick in half with a single sheet of newspaper as pictured on the opposite page. The yardstick is slipped under the paper, atmospheric pressure on the paper holding down one end of the stick while the other is struck. For the final stunt, a match is frozen to an ice cube to permit lifting it out of water. ★ ★ ★

The young lady below lifts a heavy water tumbler by placing her palm flat across the top. Flame of a match dropped into the tumbler consumes oxygen, thus reducing gas volume. A partial vacuum results



"Squeeze" the bottle to lift the coin on top. Moistened coin lifts when warmth of hands expands air in bottle and excess pressure is forced out past coin



Due to surface tension, water in full tumbler can be displaced to rise above rim without overflowing





Cube of sugar burns readily when heated with a match flame. But your guests won't be able to do it



Add pinch of white cigarette ash to sugar cube before heating. Invisible ashes will assure a flame



Break a yardstick in two with a sheet of newspaper. Place the paper flush with the edge of a table, slip yardstick halfway under paper and strike it a quick blow. Air pressure on the paper holds yardstick



Using just a paper match, lift the ice cube from the water. This one is a real fooler. Drop a pinch of table salt on the ice and hold the match against it. Ice melts and refreezes to "cement" match to cube



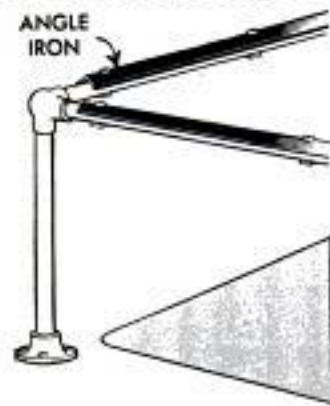
Make Handy Offset Weeding Tool From Ordinary Table Knife



An ordinary table knife makes an excellent weeding tool, especially around low-growing shrubbery. An offset is bent in the steel blade by clamping it in the vise. The offset allows the gardener to get beneath the weed roots to lift the whole plant out. Friction tape is wound around the handle to provide a better grip.

Hi Sibley, Nuevo, Calif.

Steel Angle on Stairwell Railing Prevents Dangerous "Perching"



A steel angle bolted to the pipe railing around a stairwell will discourage the dangerous practice of sitting on the rail. The angle is bolted with the heel up to assure an extremely uncomfortable seat for anyone trying to sit on it.

Replace Venetian-Blind Cord By Using Old One As Guide

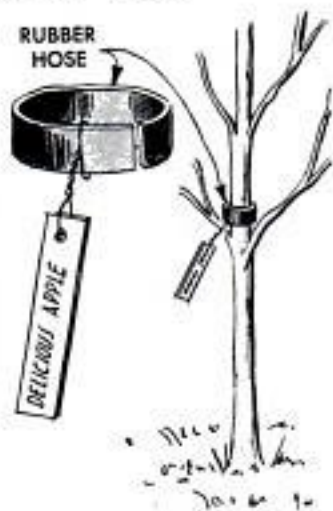
The worn cord in a Venetian blind can be replaced in a few minutes' time if it is done before the old cord breaks. Butt the end of the new cord against the old one and fasten it with staples or by sewing. Then wrap the joint with cellulose tape to make

a smooth connection that will not snag in the slats or over the pulleys. When the cord is pulled through to the side of the blind, be sure to allow enough cord to make the loop as long as the blind is high.

Ed Packer, Chicago.

Tags Attached to Young Trees With Split Section of Hose

Damage to newly planted trees from the wire with which the name tag is attached may be avoided if the tag is first wired to a split section of rubber hose. It is sometimes desirable to leave the tags on young trees, but the wire eventually will cut into the tender bark as growth takes place. However, the section of hose slipped over the trunk or branch of the tree will expand with the growth and cause no damage.



Mirror Used for Emergency Notes When Paper Is Not Available

A vanity mirror of the type carried by many women in their handbags, makes an excellent emergency "memo pad" when pencil and paper are not available. A lipstick or eyebrow-pencil message can be readily erased from the glass with cleansing tissue.—Wm. I. Todd, Burbank, Calif.

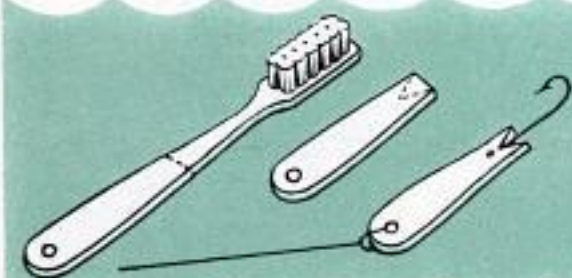


Before refinishing any wooden surface, the old finish should be completely removed down to the raw wood.

Let's Go FISHIN'

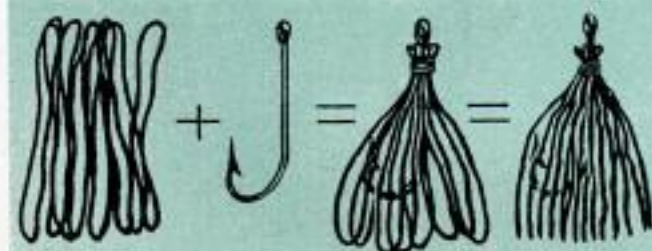
By Russ Jenkins

Good fishing doesn't depend on expensive equipment. Sometimes a little homemade lure will get the bigger ones when fancier varieties won't. This lure consists of a number of brightly colored sequins threaded on the shank of the hook, with a bit of bright-red rubber as a tail or wiggler to attract attention. Most notion stores have sequins



Red worms often are more gray than red by the time they are put on a hook as bait, which may make them less effective, since the color is a part of their attraction. To get that bright color back again, paint the worm with Mercurochrome, using a small water-color brush. With these bright worms on your hook, watch the number of strikes increase

The colorful plastic handle of an old toothbrush can be transformed with very little effort into a fine wobbling minnow to fool even the warriest of pan fish. Cut off the end of the handle as shown and notch it. Then embed the hook in the notch and hold it in place with a pin through the handle. The leader is attached to the handle eye



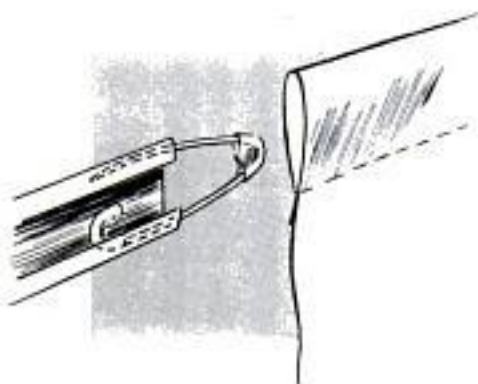
Most fish get hooked because of curiosity. They will investigate almost anything that catches their eye and, for that reason, flashing baits are good fish-getters. Here is one you can add to your collection with only a few moments of labor. Bend a paper clip as shown, to form a loop and two small hooks. Put it through the eye of the fishhook and wire it in place. Then slip polished bits of metal over each hook of the clip and bend arms to hold

Here's another kind of wiggler that you can use to disguise your hook. A number of small rubber bands are fastened to the shank of a hook with fine wire, and then the lower ends are trimmed off. If they are available, use red or other colored bands. This is simple to make, yet seems to get the attention of even wary big-mouth bass

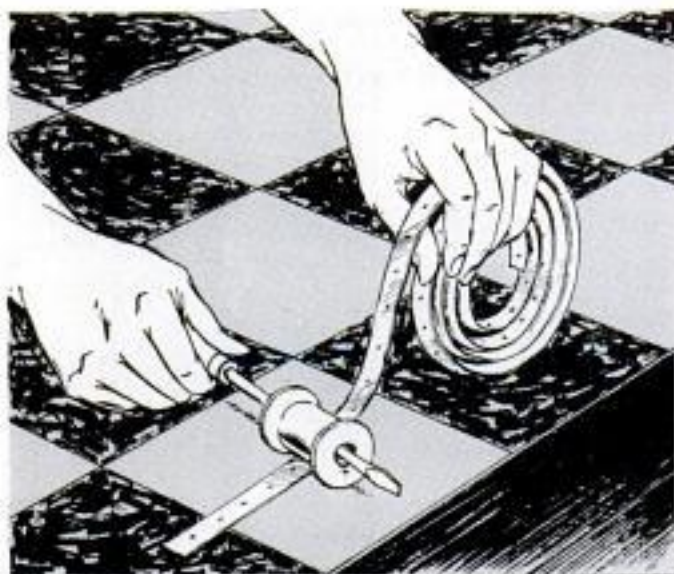


Solving Home Problems

CURTAIN ROD is easier to push through hem of curtain if a safety pin is inserted in end of the rod to serve as a guide. Simply open safety pin and wedge its arms between sides of the rod



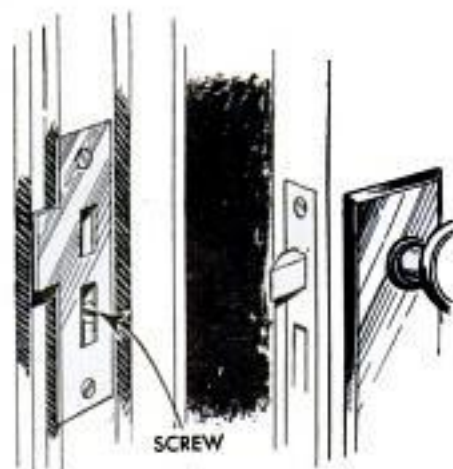
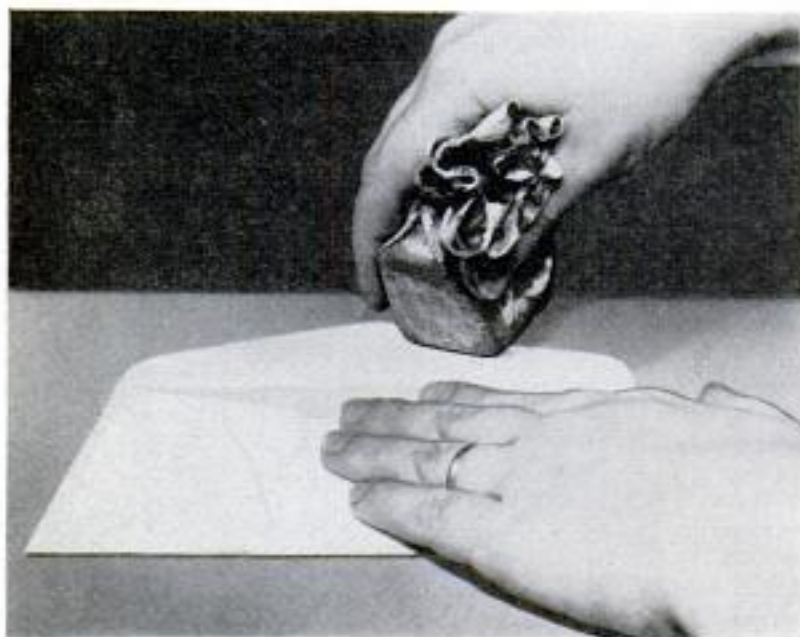
LINOLEUM-BINDING TAPE purchased in roll form can be straightened before use by means of a thread spool and screwdriver. Slip spool over screwdriver blade, as at right, and pass tape under the spool against the direction of curl



MILK CARTON filled with sand provides door-stop for holding screen door open when carrying packages or furniture through doorway. Use a quart-sized carton and tape closed after filling

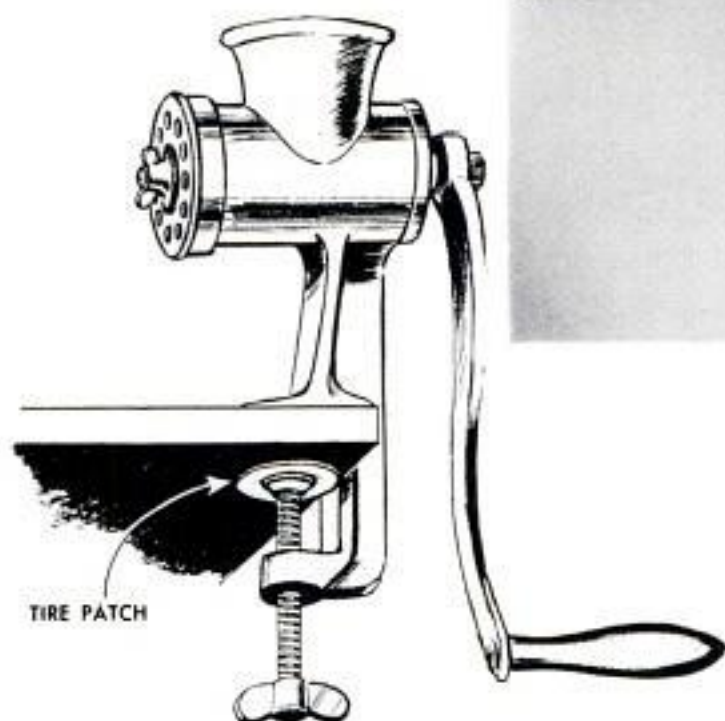
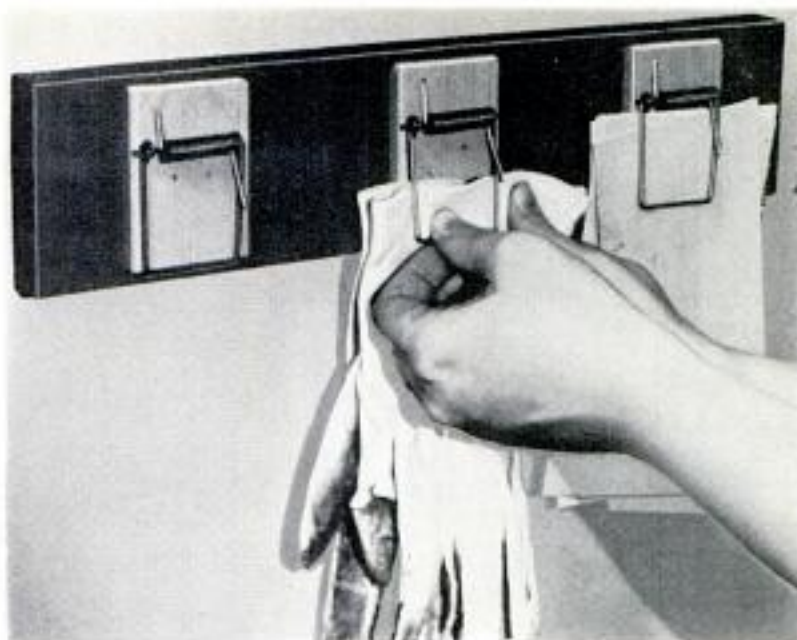
INDIVIDUAL SALTCELLARS for picnicking are had by using either metal or paper milk-bottle caps. Just wash and dry bottle caps, and then store so you'll have a number of them for picnics

SEALING ENVELOPES for a large number of greeting cards or letters, below, is speeded and made more pleasant by moistening flaps with ice cube wrapped in clean cloth. The ice normally will melt fast enough to keep the cloth damp while using



CHILDREN CAN'T LOCK themselves in the bathroom if screw is used to keep lock bolt from engaging strike plate. Drive screw through slot in plate and into doorframe so head of the screw is flush with the surface of the plate

HANDY BASEMENT RACK for work gloves and notes or receipts can be improvised from several ordinary mouse-traps. Wooden bases of the traps are cut to length and screwed to scrap lumber. Rack is mounted in convenient spot

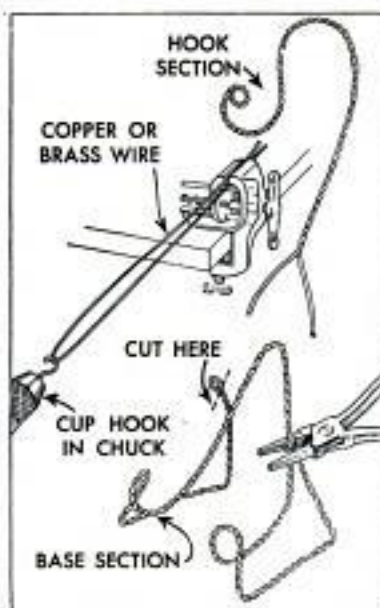


RUBBER PAD for food-chopper clamp assures nonslip grip on table top. The pad is made by cutting a disk from a piece of old inner tube and cementing the disk to the underside of table-top overhang, positioning disk so clamp will tighten over it

STORING CANNED GOODS in unusually small amount of space is possible by installing these sliding shelves in kitchen base cabinet. Shelf sides are of 1 x 2 and bottoms of hardboard or plywood. Cleats fastened to sides of cabinet serve as guides, and the shelves are spaced varying distances to suit can sizes



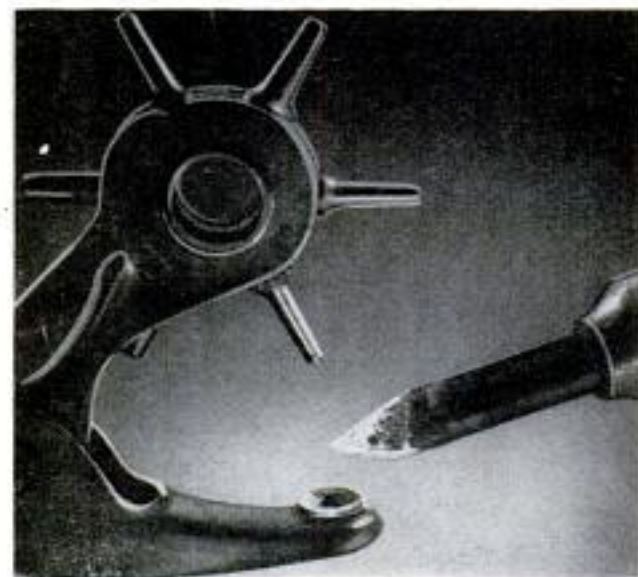
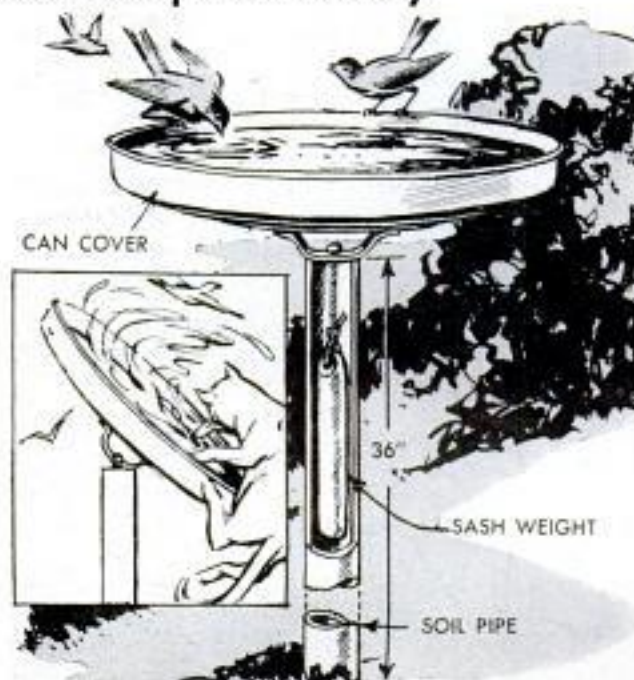
Cup-and-Saucer Rack Fashioned From Brass or Copper Wire



Fashioned of bright brass or copper, this twisted-wire rack will display a prized cup-and-saucer set to excellent advantage. Two lengths of 16-ga. wire, one 68 in. long and the other 24 in., are looped double and twisted in a vise, as shown. Allow the ends of the short length, which forms the hook, to extend about $2\frac{1}{2}$ in. These ends are used to tie the hook to the base section. The required dimensions may, of course, vary.—Roberta L. Fairall, La Crescenta, Calif.

Tipping Bird Bath Attracts Songbirds and Keeps Cats Away

If you want to put a birdbath in your yard to attract song birds, and at the same time save the birds from being molested by prowling cats, this tipping birdbath will serve both purposes. A 5-ft. length of soil pipe is set in the ground so that 3 ft. of it projects above the surface. The bowl of the bath, which is a cover from a garbage can, is held on the base by a sash weight tied to the handle and suspended inside the soil pipe. When a cat attempts to get at birds in the bath, the cover tips and spills water on him. The sudden loss of support, plus the water bath, will discourage even the most persistent cat. The cover will right itself as soon as the weight is removed, because of the sash weight. The soil pipe and garbage-can cover could be painted a bright color, or stones and colored bits of pottery might be cemented around the soil pipe as decoration.—Jerry Dunham, Chicago.



Solder Refaces Punch Anvil

The useful life of a leather punch can be effectively increased by refacing the worn surface of the anvil with solder. The solder should be applied heavily, keeping the soldering iron on the anvil until the solder flows into a smooth surface. After this refacing, future repairs are easily made by reheating the solder until it melts into a smooth surface.

☐ Mixed nails, screws and other small parts may be sorted easily if they are dumped on a sponge-rubber pad, such as a chair cushion or kneeling pad. The resilient surface permits the parts to be picked up easily, and prevents rolling or skidding.

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WTM 56
+
SERVICE FILE
BOOKLET #200



Craftsman Jim Kendall, high-school shop instructor at Oak Park, Ill., tells how he built his . . .

FAMILY CAMPING TRAILER

LIKE SO MANY outdoor-loving Americans, my family thoroughly enjoys spending its vacations and long week ends camping out—roughing it, so to speak—while exploring the many lakes and back trails of this great U.S.A. After having roughed it several summers in true Boy Scout style, we decided to design and build a camping trailer that would incorporate “all the comforts of home” in a compact, two-wheel job capable of being trailed safely at highway speeds.

Having two boys, Bruce and Craig, I knew that the trailer would have to sleep at least four. It would have to be small enough to park in my two-car garage, and it would need a roomy ice chest to handle an ample food supply. It also would have to afford adequate protection in bad weather and, preferably, be collapsible, which meant finding a way of erecting and dis-

Part I

mantling it without a lot of work. In short, a fold-away “tent” on wheels was what we needed.

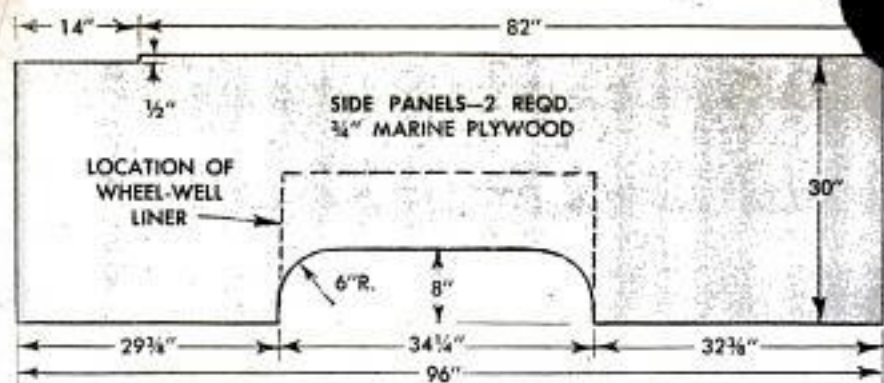
The trailer you see pictured below fulfills all these requirements. And, after having put it through a tour of the West last summer (a grueling test of some 5000 miles), we found the trailer towed beautifully, provided all the comforts we had hoped for and caused a mild sensation wherever we set up camp or pulled stakes. When open, each overhanging wing of the trailer to which the tent is permanently attached, accommodates a full-size air mattress to provide comfortable sleeping for four. The deep insulated ice chest at the front of the trailer is easy to reach both when the trailer is open or closed. The boys found this feature especially convenient for getting Cokes and other treats while on the road. Likewise, two lock-fitted

Independent of motel and restaurant, the Kendall family are enjoying camp life at its best with their trailer

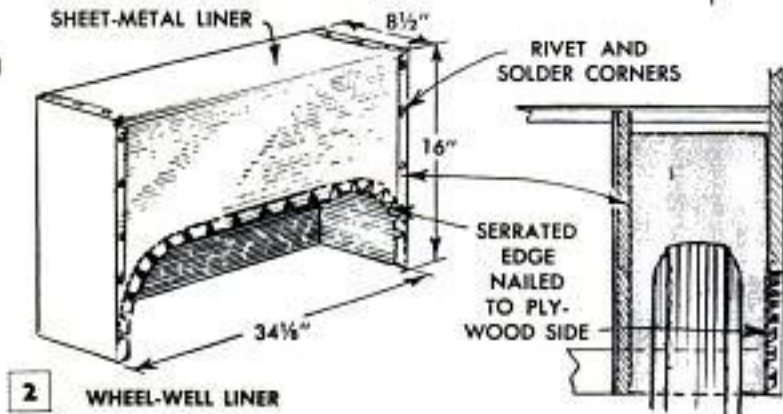
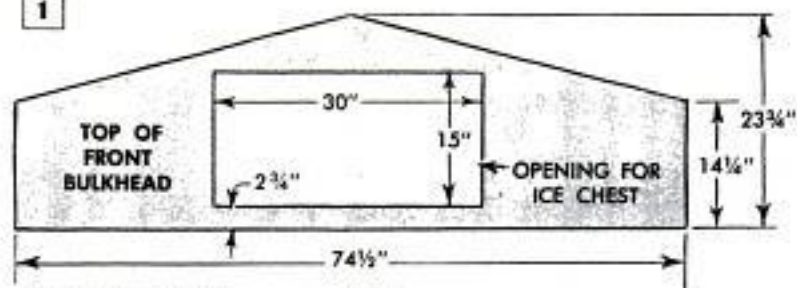




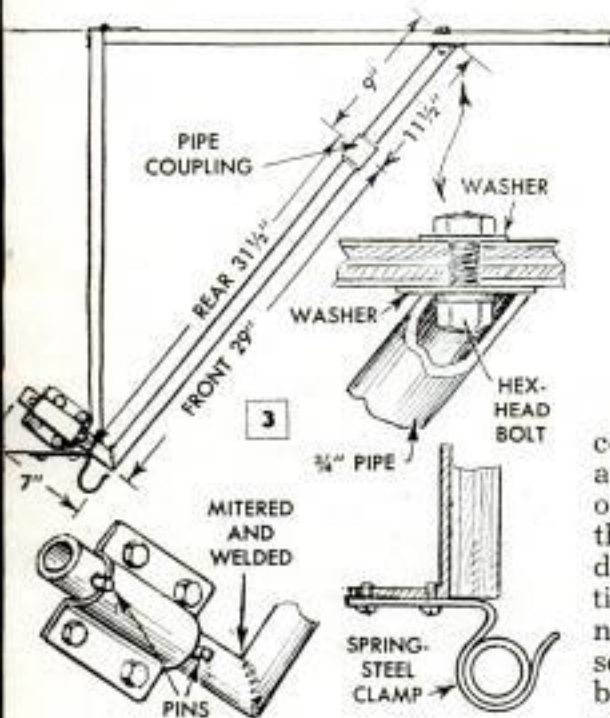
Pipe extensions are screwed on lid supports to increase their length



1



2 WHEEL-WELL LINER



3

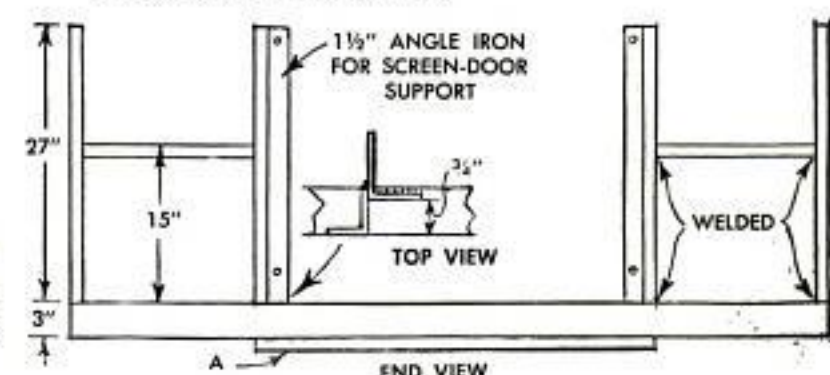
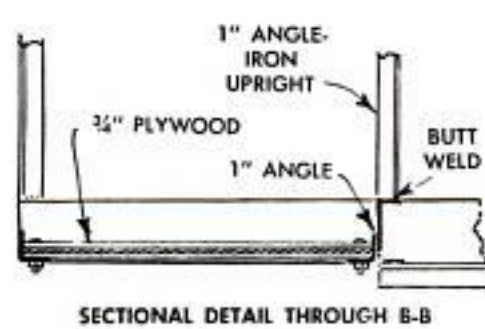
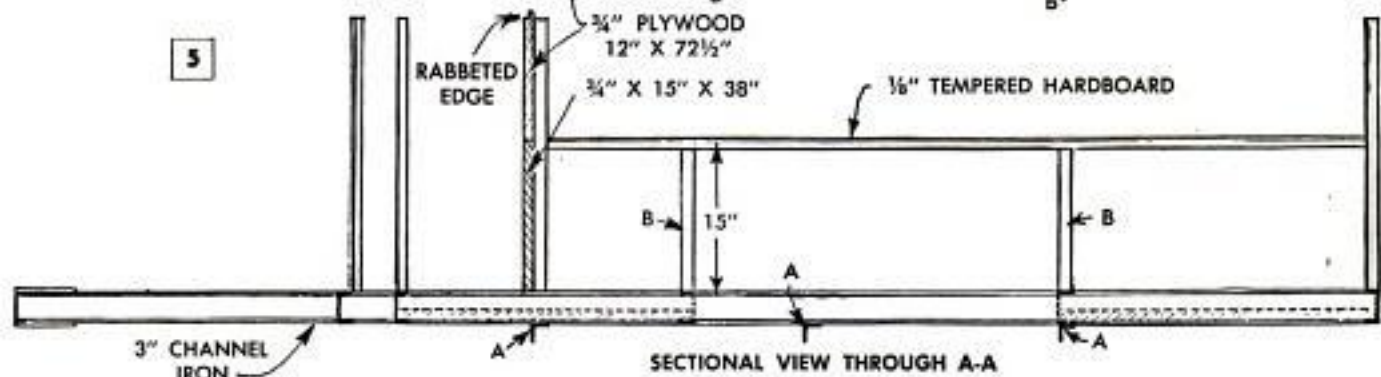
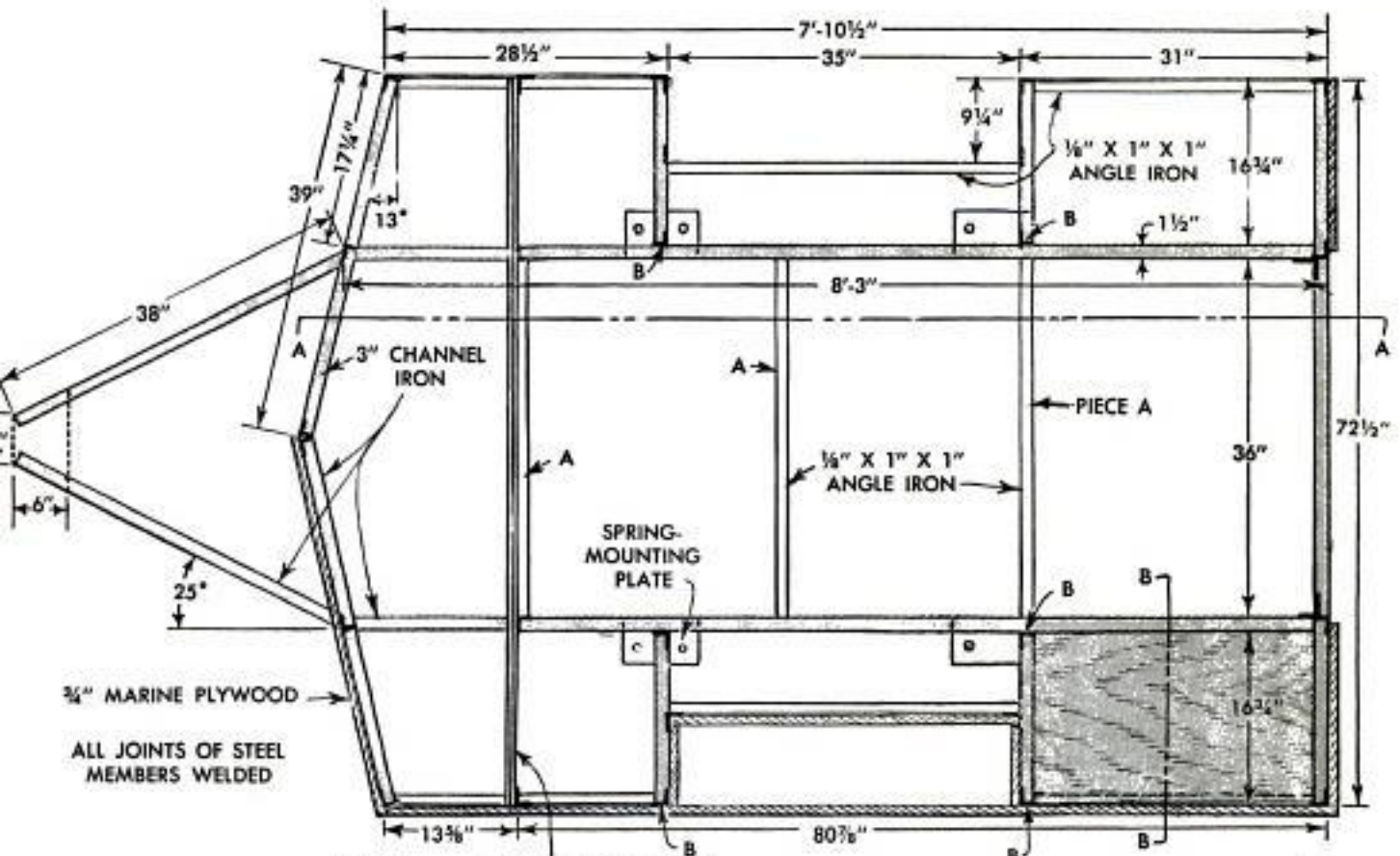
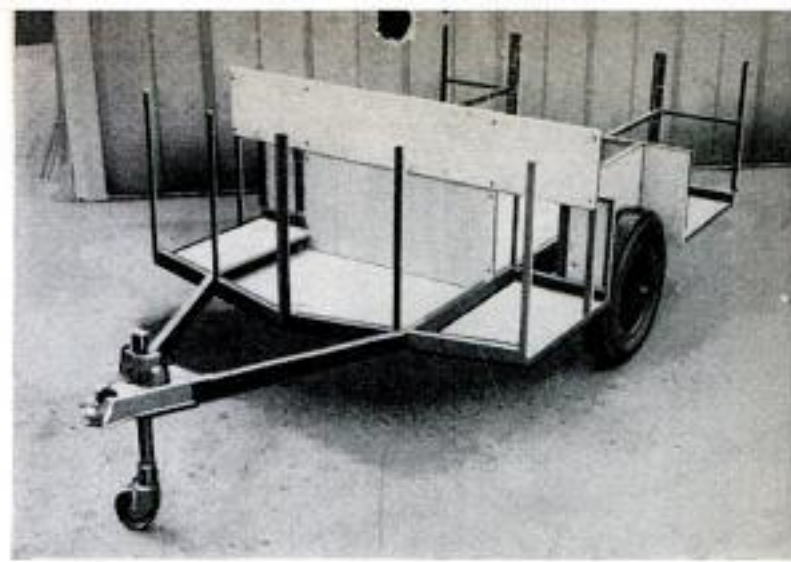
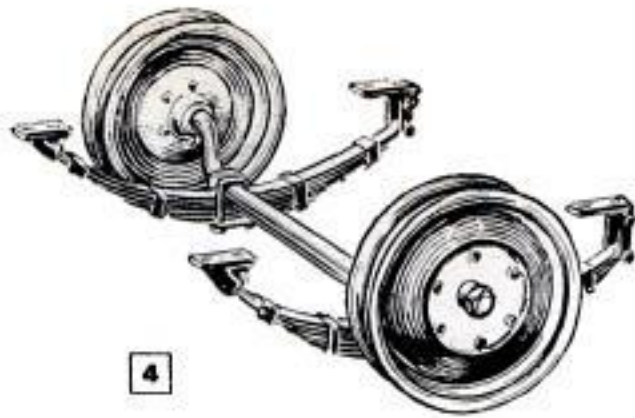
Below, bolt-head studs project from lids to engage ends of pipe supports

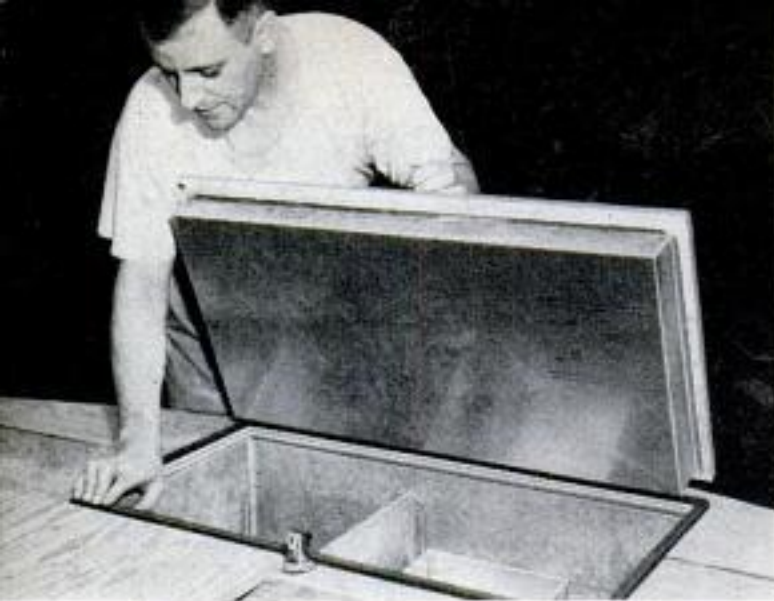


compartments in the nose of the trailer permit quick access to items that might be needed en route without opening the trailer itself. Two persons can easily erect the canvas top in a few minutes, and a full-length screen door keeps flies and mosquitoes outside. The center portion of the trailer interior affords space to store an aluminum table-and-chair set, as well as a camp stove. The screen door stows away in a trap door in the floor, and built-in compartments with sliding doors provide plenty of room for cooking utensils, bedding and clothing.

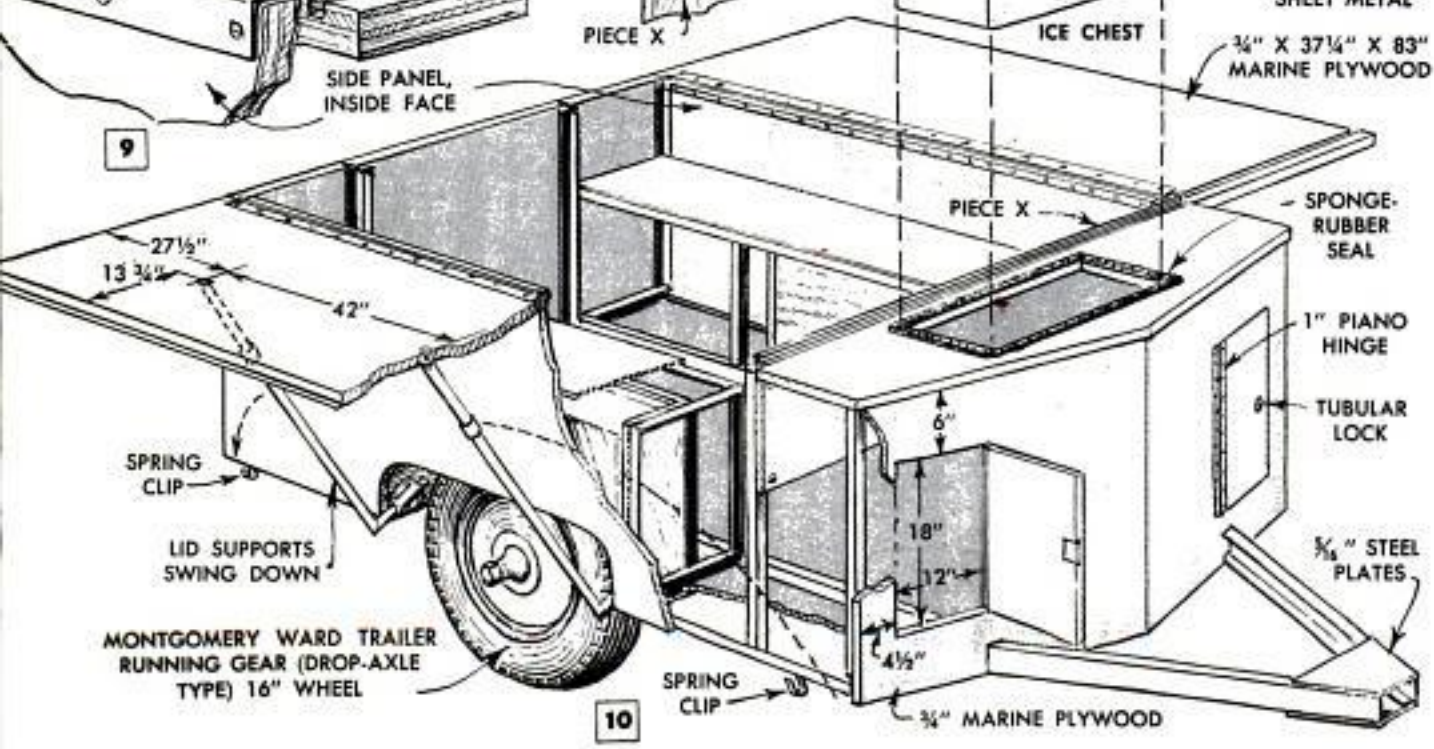
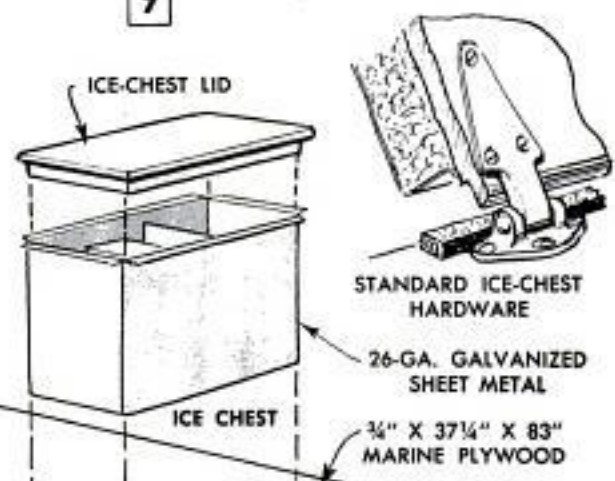
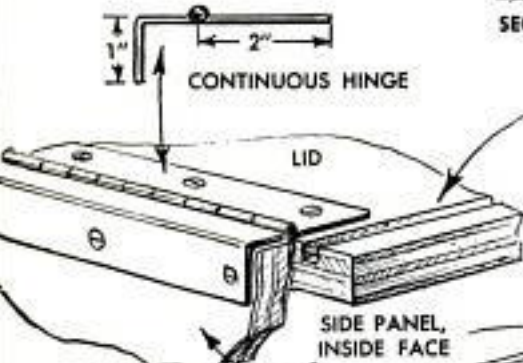
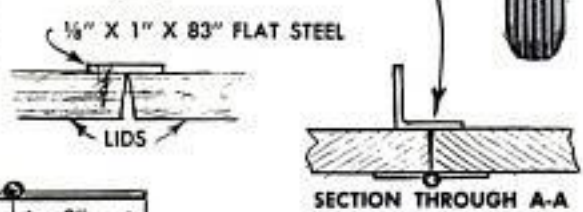
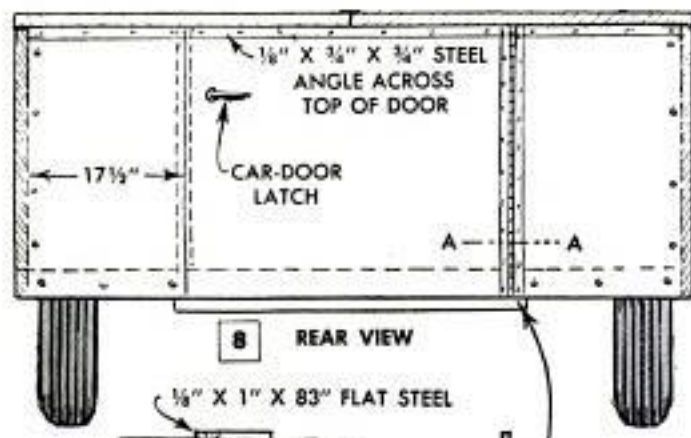
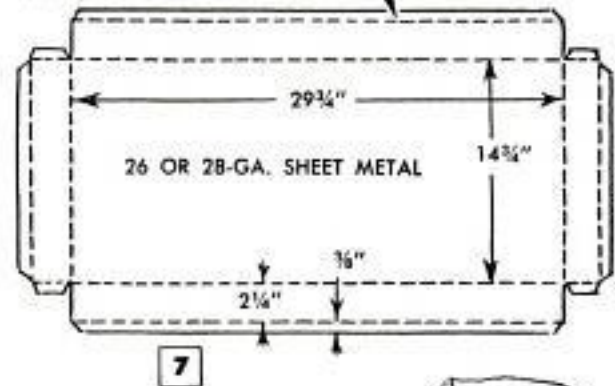
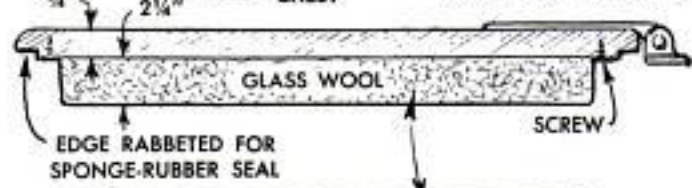
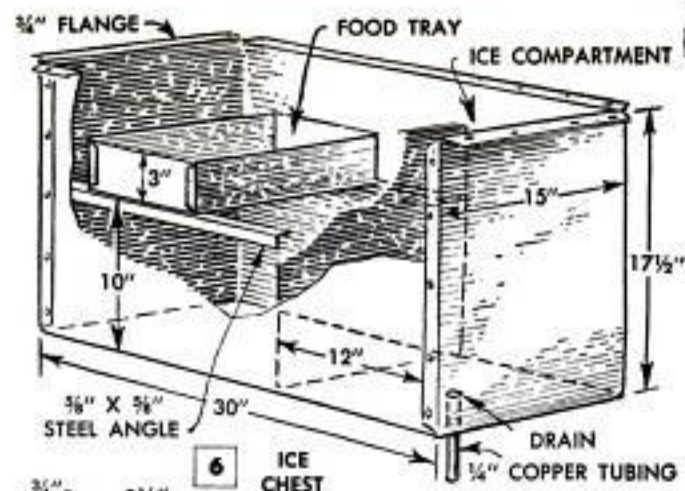
Down to the last nut and bolt, the trailer cost me \$457.31 to build. However, we later found we could have saved as much as \$30 on the cost of the canvas top (\$133) by having the awning makers sew it together during their slack season. If materials can be salvaged and a second-hand running gear purchased, the cost can be reduced considerably.

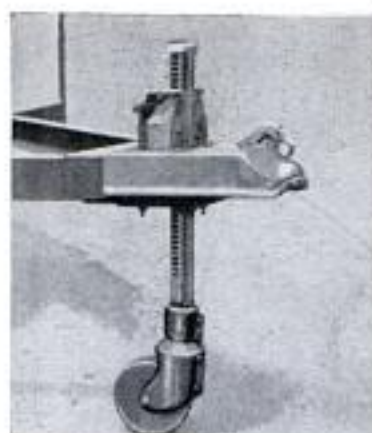
I made the bed of the trailer body from lengths of 3-in. channel iron and 1-in. angle iron, and welded the 18 separate pieces into a rigid framework. The channel stock is used for the main members of the bed and the tongue, these parts being shaded in the plan drawing, Fig. 5. Note that the forward ends of the two center members of the bed are cut at a 13-deg. angle to match the slant of the two front members of the bed. I laid out the members squarely on my garage floor to assure a flat assembly when welding the joints. The various members are placed in position, with the flat side of the channel facing outward. The two center channels are spaced 36 in. apart and butt-welded to the front and rear members. Two short lengths of channel, 16 3/4 in. long, are butt-welded to the center members on each side of the bed to form the wheel wells.





Weather stripping provides a seal for ice-box cover





I used an Atwood commercial trailer hitch that bolts to the channel-iron tongue. Hitch permits easy rolling

Three pieces of angle iron, marked A on the drawing, are cut 39 in. long and welded to the underside of the two center channels. These pieces provide support for a $\frac{3}{8}$ -in. plywood floor. Lengths of angle iron also are welded along the center channels and along the outer edges of the bed at the sides as indicated in section B-B, Fig. 5.

You can use any suitable two-wheel running gear, Fig. 4. I purchased a 58-in., drop-axle type having 16-in. wheels from Montgomery Ward for about \$60. Spring-mounting plates, $\frac{3}{8}$ x 6 x 8 in., are welded to the bed on the underside at the points shown and drilled for the shackle bolts.

The locations of the angle-iron posts to which the sides of the body are bolted, are spotted on the plan drawing. These are cut from 1-in. angle iron. A total of 24 are needed, ten of these being 27 in. long, two 29 in. long and twelve 14 in. long, the latter ones being located at the wheel wells, B in Fig. 5. All posts are merely butt-welded on end at their respective locations. If you study the plan carefully, you can see the way each post faces. Holes for bolting the plywood sides to the posts should be spotted and drilled before the posts are welded in place. Drill six holes for $\frac{3}{16}$ x $1\frac{1}{4}$ -in. carriage bolts in each 27-in. post, spacing them about 5 in. apart. The two 29-in. posts are butt-welded to the edge of the 1-in. angles along the sides $13\frac{5}{8}$ in. back from the front corner posts. These particular posts support the plywood bulkhead, marked X in Fig. 10. Note that this piece is rabbeted along the top edge to engage a groove on the underside of each trailer lid to give a watertight joint. Looking at the end view, Fig. 5, you'll notice that the 1-in. posts at the rear-door opening have a second post of $1\frac{1}{2}$ -in. angle iron welded to them. These are set in $\frac{3}{4}$ in. and provide a bolting surface for attaching the frame of

the screen door to be described later. Finally, lengths of 1-in. angle iron are welded across the tops of the 14-in. posts and between the posts at the rear of the bed. Study section A-A, Fig. 5, and the end view. These members form a shelf on each side which is covered with hardboard.

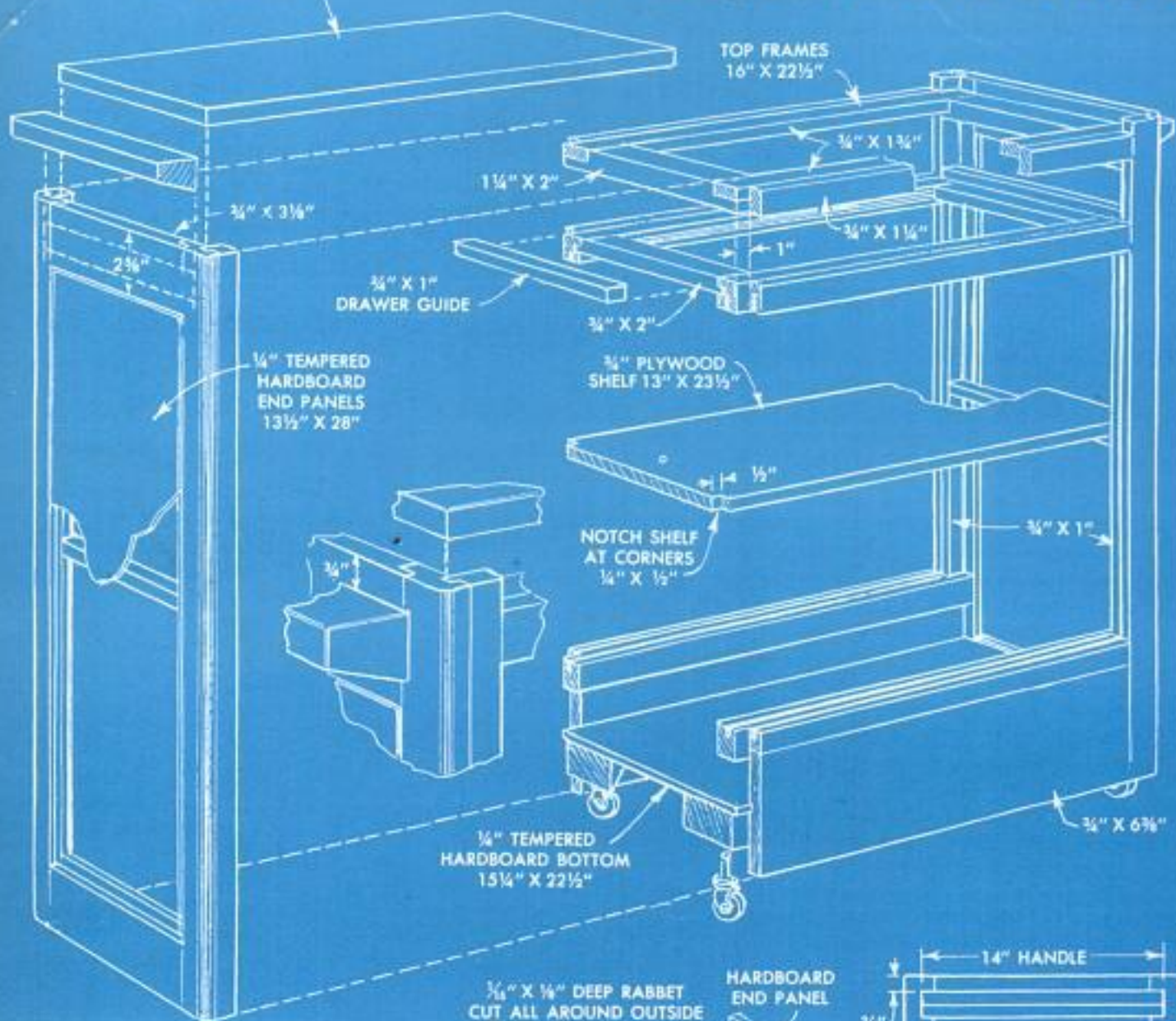
The outside is covered with $\frac{3}{4}$ -in. marine plywood. Figs. 1, 8 and 10 give the sizes for the various panels. Exact lengths should be taken directly from the trailer bed, adding $\frac{3}{4}$ in. to the length of the side panels to lap the plywood applied to the back. Before the side panels are permanently bolted in place, the wheel wells first are lined with plywood and then fitted with a sheet-metal liner. This is soldered and riveted as in Fig. 2, the cut-out edge being serrated to form tabs for nailing the liner to the edge of the plywood side panel.

Figs. 6 and 7 detail the ice chest and its cover. You'll notice that the plywood part of the cover is rabbeted around the edges to bear against a length of sponge-rubber weather stripping applied around the opening in the bulkhead cover board. Standard ice-chest hardware is used to hinge the cover and provide a positive seal. The ice chest itself hangs in the opening by flanges, and glass-wool insulation is packed solidly around it. The lids, or doors, which overhang the sides when the trailer is open, are hinged with lengths of 4-in. continuous hinge which I bent in a sheet-metal brake, as indicated in Fig. 9. I could buy this hinge only in 6-ft. lengths so I made up the difference by adding a section to it. Fig. 3 shows how the pipe supports for the lids are installed. These pivot in brackets located in the wheel wells and swing up from spring clamps to engage bolt-head studs projecting from the top surface of the lids. Pipe extensions are stowed separately.★★★

(To be continued)

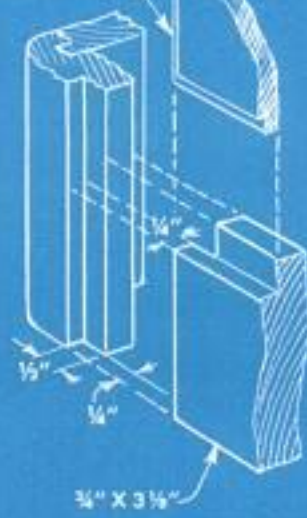
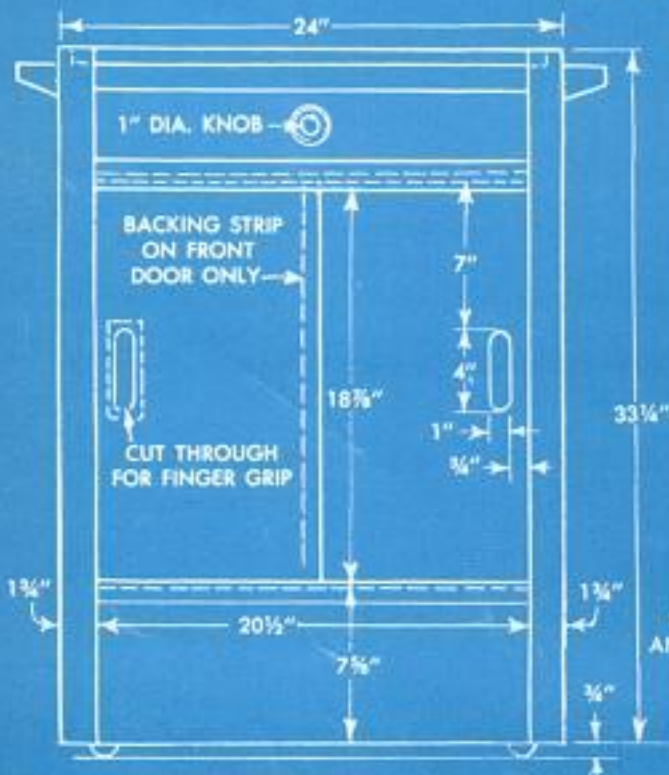
PLAN of the MONTH..

REMOVABLE MAPLE TOP
 $\frac{3}{4}$ " X $14\frac{1}{2}$ " X $22\frac{1}{2}$ "

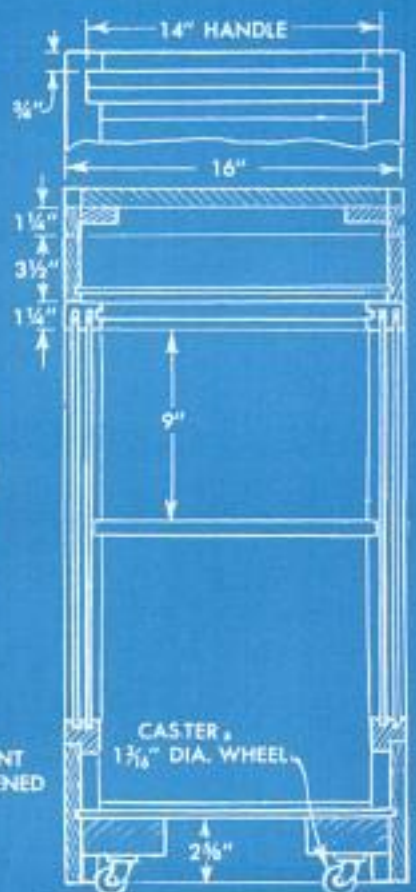


$\frac{3}{8}$ " X $\frac{1}{4}$ " DEEP RABBET CUT ALL AROUND OUTSIDE EDGES OF END PANELS

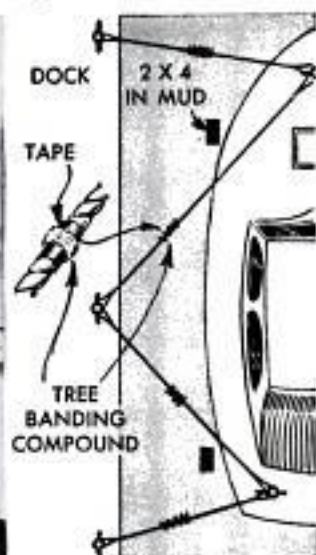
HARDBOARD END PANEL



NOTE: SLIDING DOORS ON FRONT AND BACK, DRAWER CAN BE OPENED FROM FRONT OR BACK



Antproof Docking Facilities Improvised for Cabin Cruiser



Ants won't be able to board a cabin cruiser if the boat is kept away from the dock by 2 x 4s driven into the mud about 18 in. from the dock. The lines, water hose and electric cable that must run from the boat to the dock are wrapped for several inches, between the dock and the boat, with friction tape, and a tree-banding compound is smeared on the tape. The tree-banding compound will stop all crawling insects from coming up the lines and each application will last for two or three months even under a hot sun.

Mixing-Spoon Handle Graduated To Measure Photo Solutions



To permit accurate measurement of photo-solution ingredients being mixed in an ungraduated crock, one photographer graduated the handle of his mixing spoon. For mixing 1 gal. of solution, he poured 3 qts. of water into the crock. Holding the handle of the spoon down in the

crock until it touched the surface of the water, he painted a thin stripe at the point where the handle contacted the lip of the crock. Then he poured another quart of water into the crock and repeated the marking process. With the handle thus marked he can accurately mix the solution.

Arthur Trauffer, Council Bluffs, Iowa.

Plastic Food Boxes Protect Film When Stored in Refrigerator

If you store photo film in the family refrigerator to protect the emulsion against deterioration, store the film in regular plastic food containers. The containers will prevent possible food spillage from damaging the film and are available from most stores that handle household accessories.

George B. Harran, Westfield, Mass.

☐ Dip the end of a tube of shaving cream into water, after removing the cap, and you will find that the cream has less tendency to adhere to the end of the tube.

Emergency Darkroom Safelight

A simple, inexpensive darkroom safelight that can be put up quickly for emergencies can be made by covering a 10-watt bulb with an ordinary kraft-paper bag. The bag should be fairly heavy and fit over the bulb without



too much play. This type of safelight is good only for use with photographic printing papers and should not be used when loading film. The paper bag also presents a fire hazard.—Robert C. Florian, Chicago.

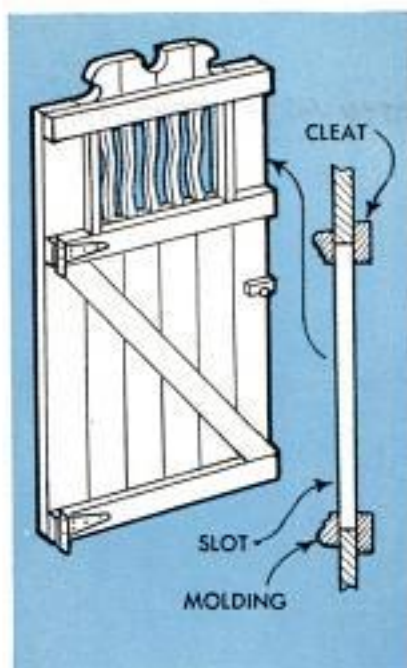
Garden Watered From Leaky Hose

A leaky garden hose that seems worthless can be used to irrigate gardens and flower beds. With a leather punch, make holes all along that section of the hose which will lie in the garden when it is stretched out. Then turn on the water at low pressure.



Inexpensive and Decorative Patio Gate Insures Privacy

To assure privacy in his patio, and yet have an inexpensive door of neat appearance that would permit quick identifying of callers, one homeowner designed and built the one shown. It is made of shiplap or tongue-and-groove boards assembled on 2 x 4 braces. The irregularly jigsawed bars of the window grill are installed between cleats and decorative molding as in the sectional detail. The gate may be painted a bright color, or perhaps treated with a dark stain to simulate an antique door.



Speed Graphic Operating Steps Noted on Parallax Finder

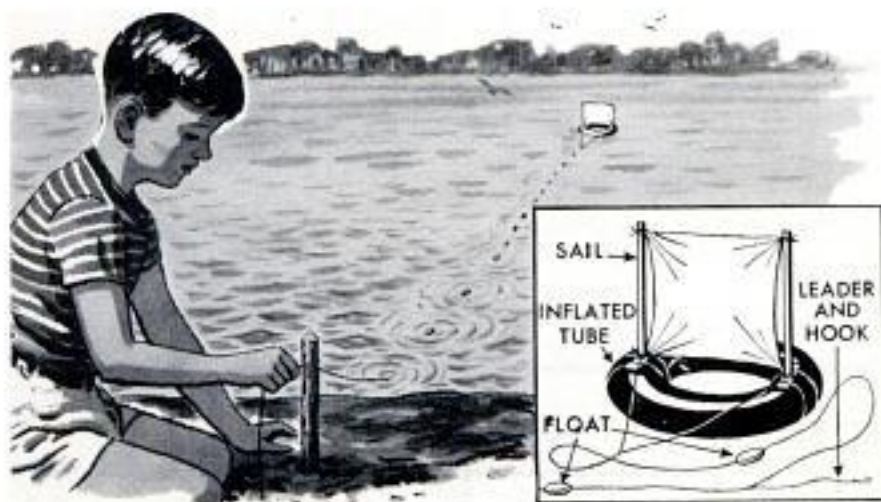


The letters OPACSF, printed on a piece of masking tape and stuck on a parallax finder, serve as a reminder of the steps to be taken in operating a Speed Graphic camera. It is necessary then only to memorize that the letters stand for the following: O, open focal plane; P, parallax set; A, aperture set; C, cock shutter; S, slide withdrawn; F, focus. This method of learning routine operations in their proper order can be applied to many other jobs in photography.—A. M. Wettach, Mt. Pleasant, Iowa.

Inner Tube With a Sail Tows Heavy Fishing Line Offshore

When no boat is available, an inflated inner tube rigged with a sail will carry a heavy fishing line out into a lake or river beyond where it could be cast by hand. Fastened to each side of the sail, a yoke, to which the fishing line is tied, keeps the

sail facing the wind. The line is supported by floats spaced about 10 ft. apart, between which leaders and hooks are tied. The depth of water and type of fishing will determine the length of the leaders. With an offshore wind blowing the inner tube away from the beach, the fishing line is played out the desired distance. This method also could be used to keep a youngster busy fishing from the shore, thus eliminating the hazards of the child using a boat alone. In some states "trotline" fishing, as this method is called, requires a special license or is prohibited by law, therefore carefully check your own state's game laws before using.—H. M. Springstun, Corpus Christi, Texas.



PLAN #101
\$2.00
(full size)

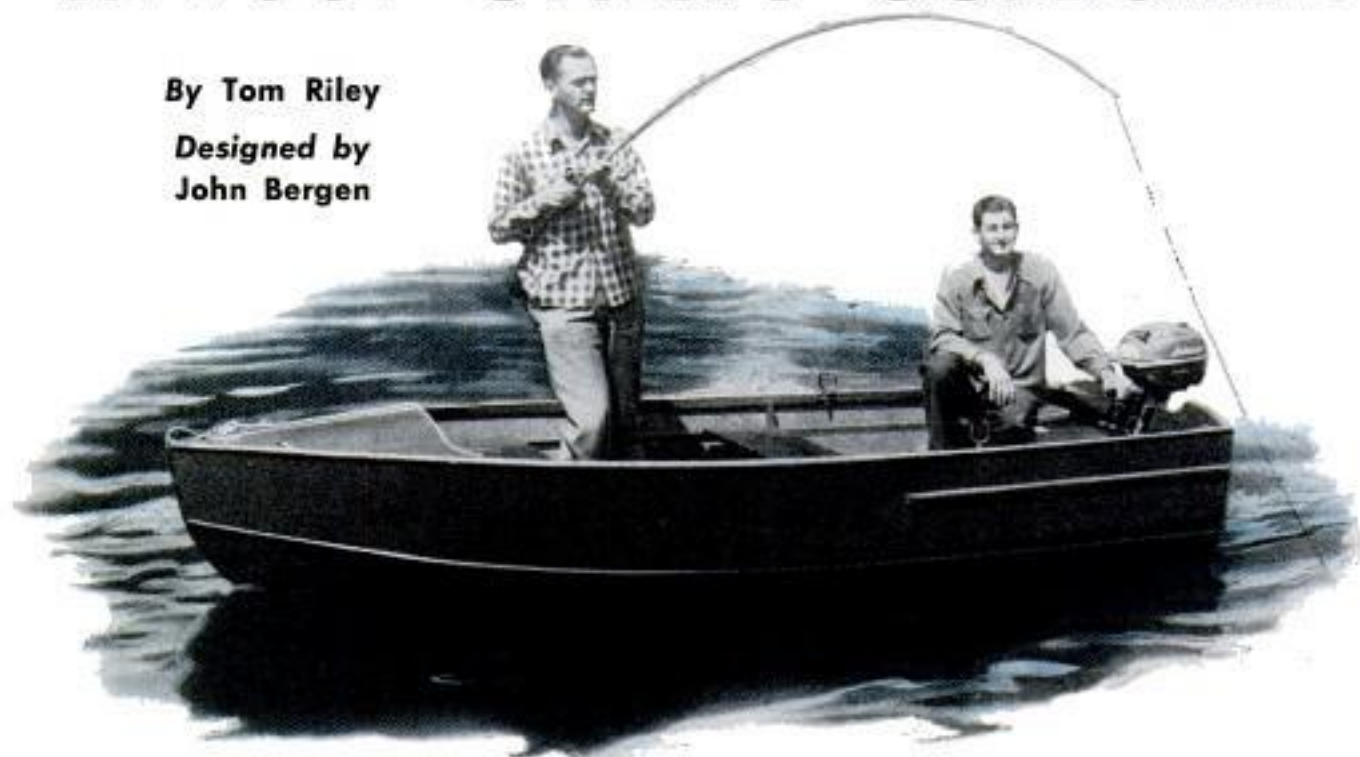
SEE CLASSIFIED LETTER
FILE

CRUSETTE WTM '56

12-FOOT UTILITY OUTBOARD

By Tom Riley

Designed by
John Bergen

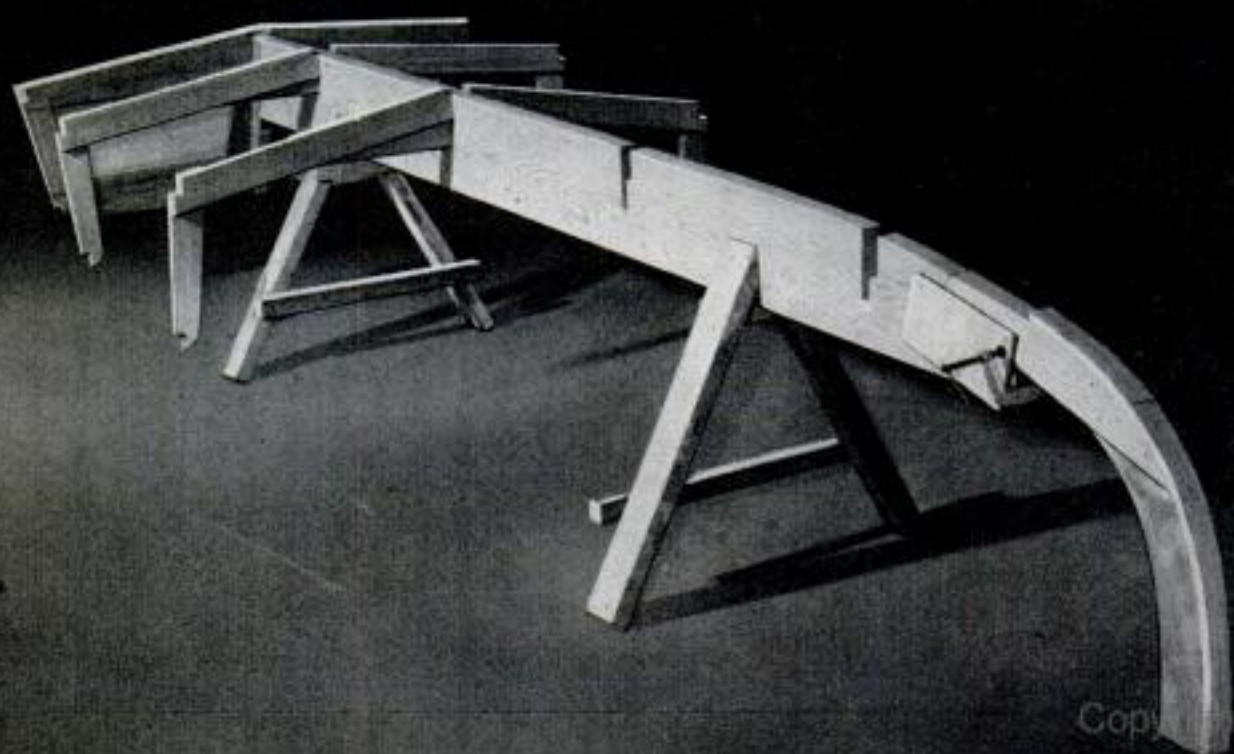


CRUSETTE is an ideal 12-ft. utility outboard for those who want a seaworthy craft for fishing and family outings, plus a hull that is capable of an occasional burst of speed. With clean bow, V-bottom hull and high sheer, Crusette can be trusted in rough weather, and her 4½-ft. beam and sharp chines give unusual stability. She is powered satisfactorily with a small motor, although a more powerful motor (10 to 15

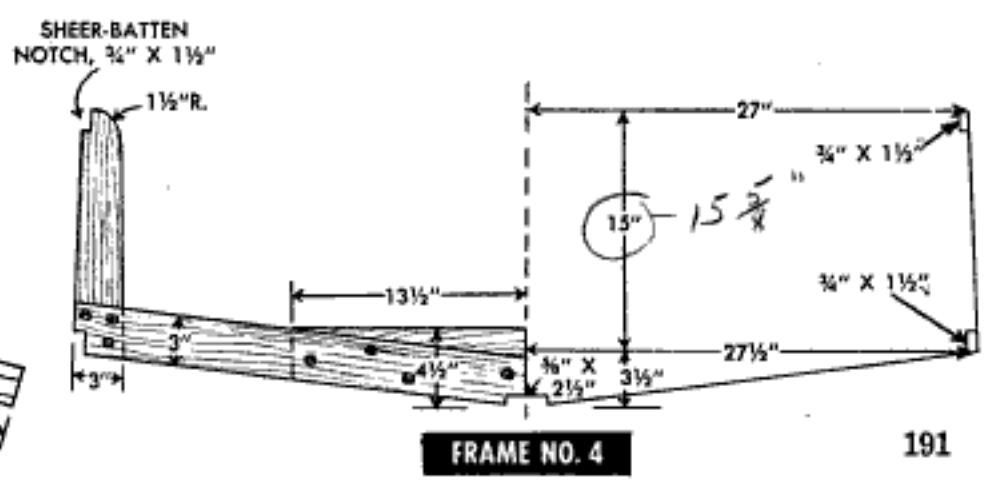
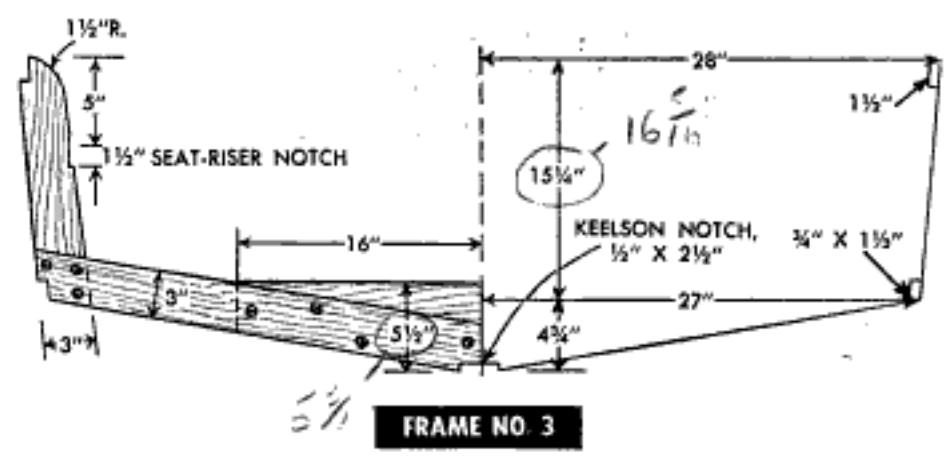
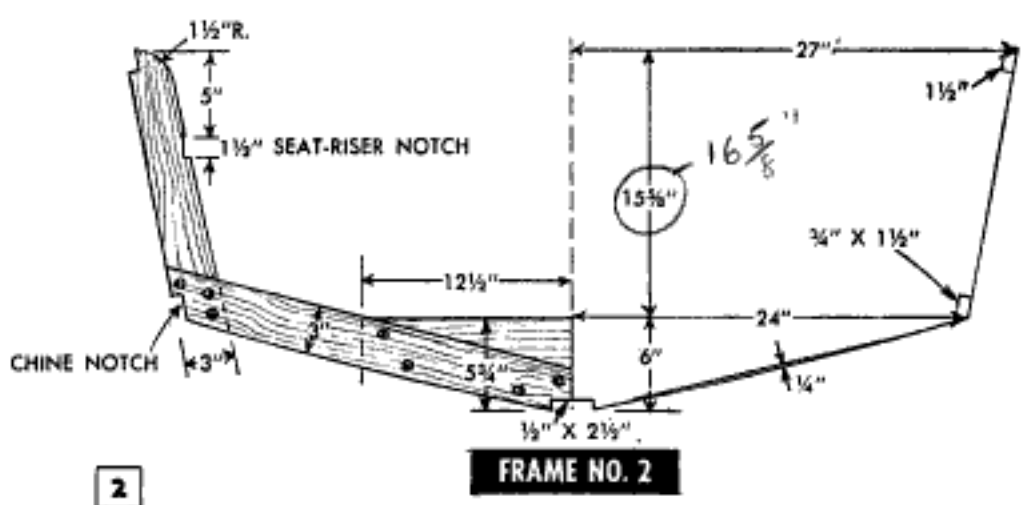
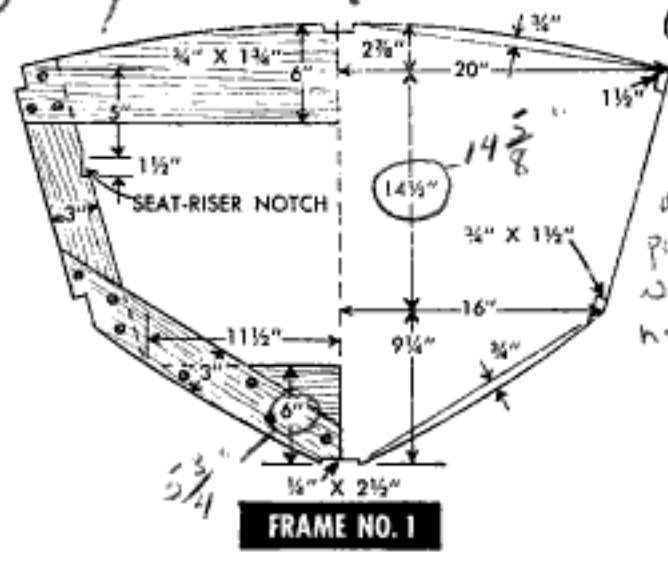
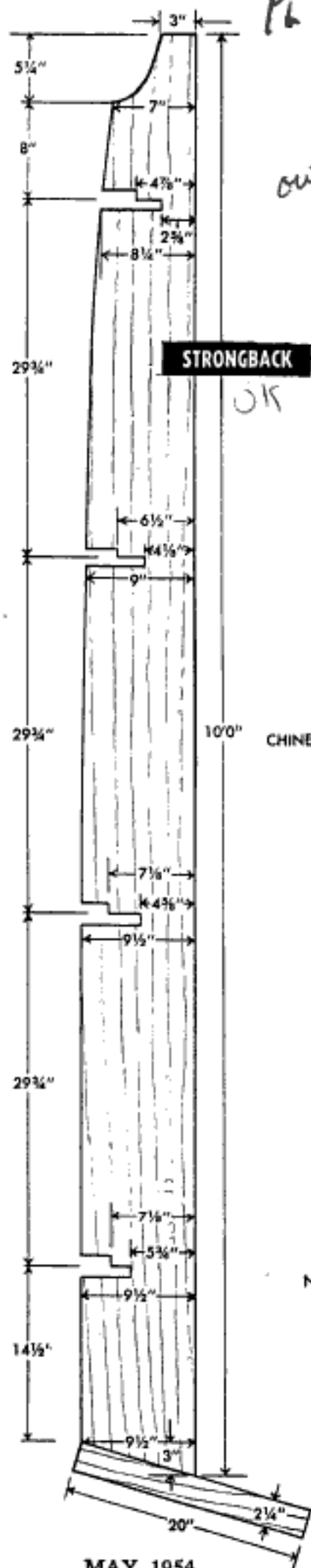
hp.) will give her real speed when wanted.

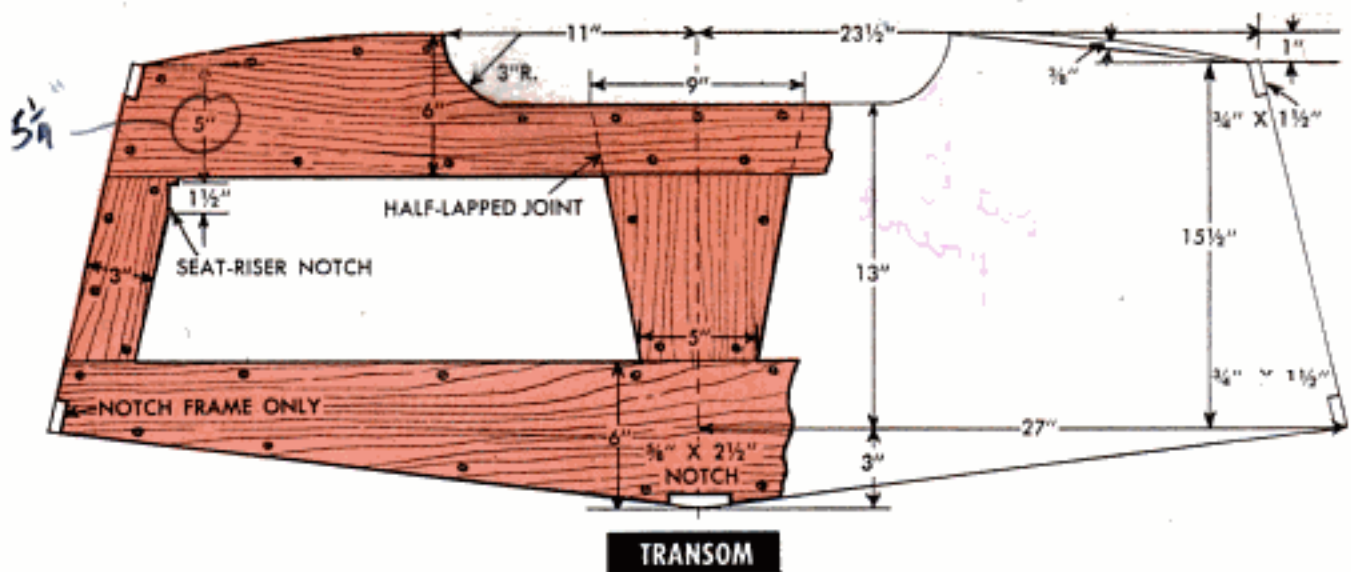
The plywood hull is built easily on a 2 x 10 strongback, locating the frames as in Figs. 2 and 8. The side and bottom panels may be cut from two 4 x 14-ft. sheets of ¼-in. waterproof fir plywood. On the original craft, ⅜-in. marine plywood with the outside surface of vertical-grain fir was used. Oak or mahogany should be used for the outer stem, outside keel, spray rails and

Crusette is built upside down on a strongback which is later removed. Legs hold boat at working height

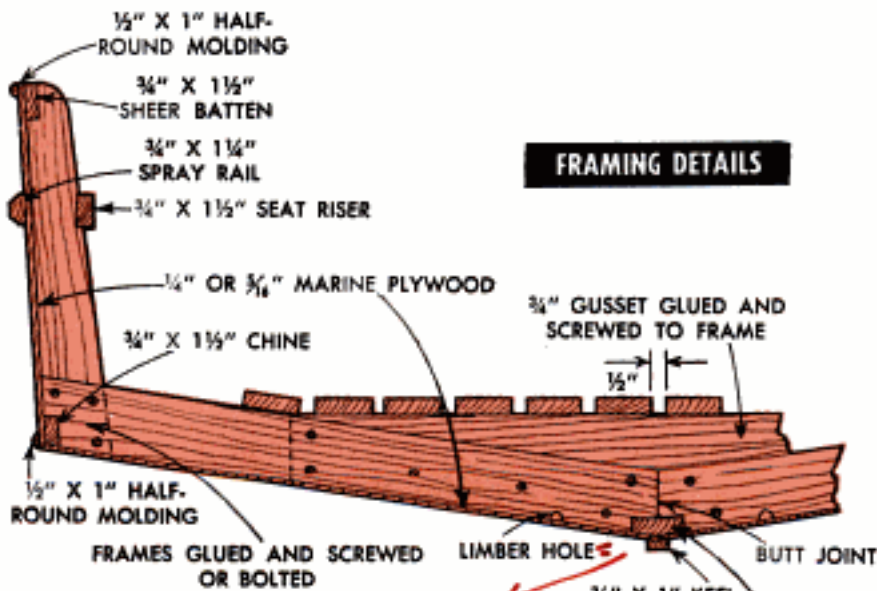


Plans #101 further info. in Classified Letter
 (overwritten) on Dimensions were made on full-size pattern (1/10) which are how exact





TRANSOM

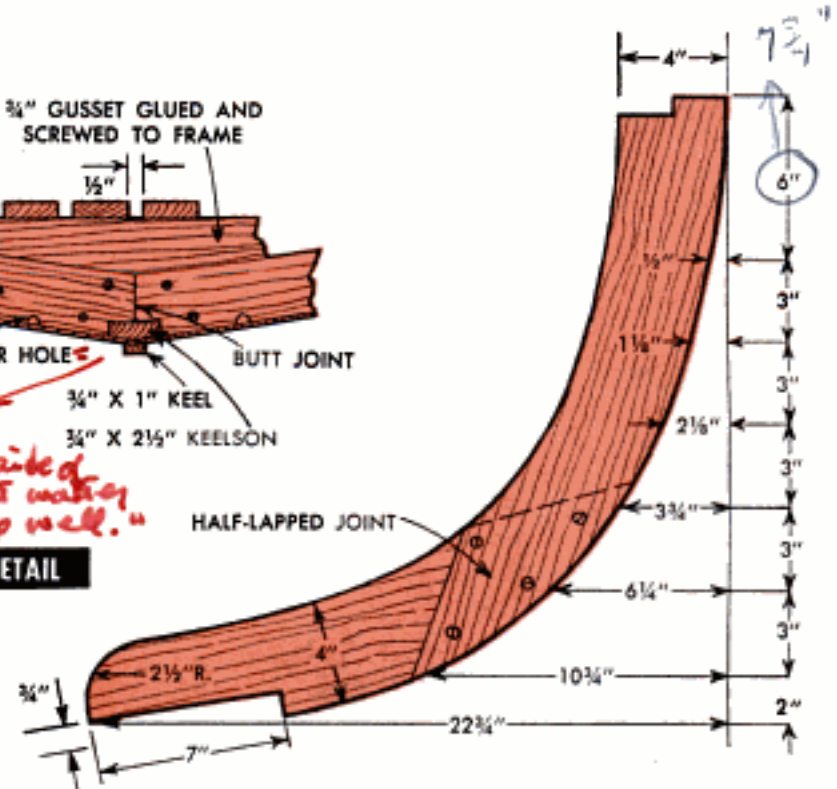


FRAMING DETAILS

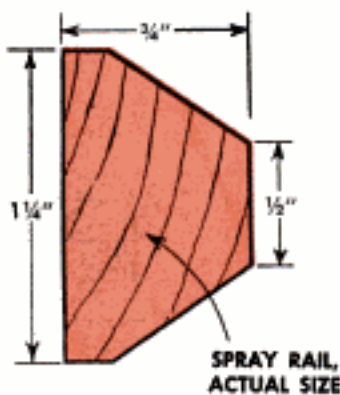
3

"Conduits or gutters on either side of keelson to permit water to drain to pump well."

STEM DETAIL

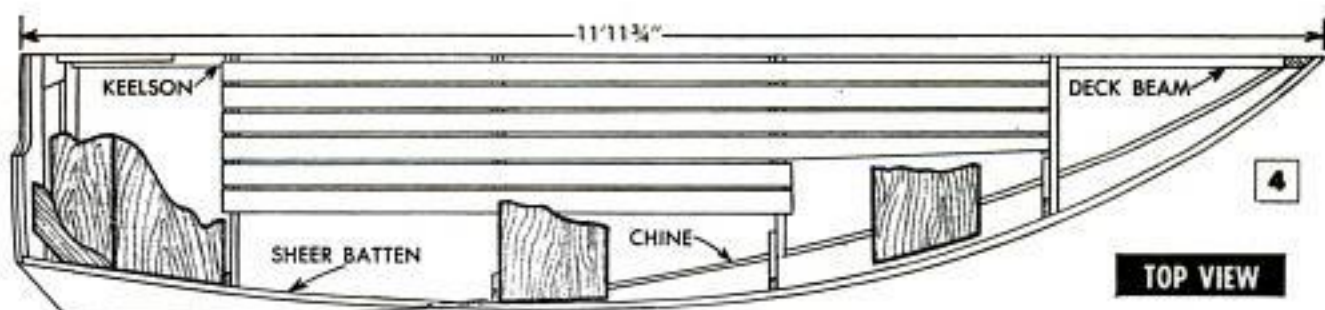


PROFILE



SPRAY RAIL, ACTUAL SIZE





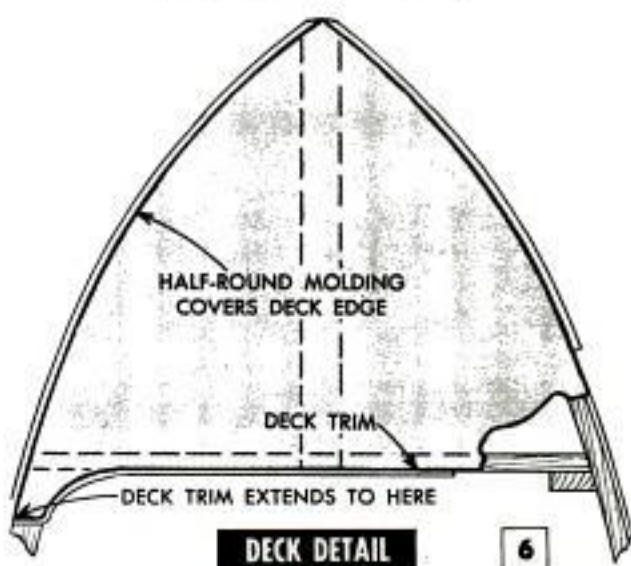
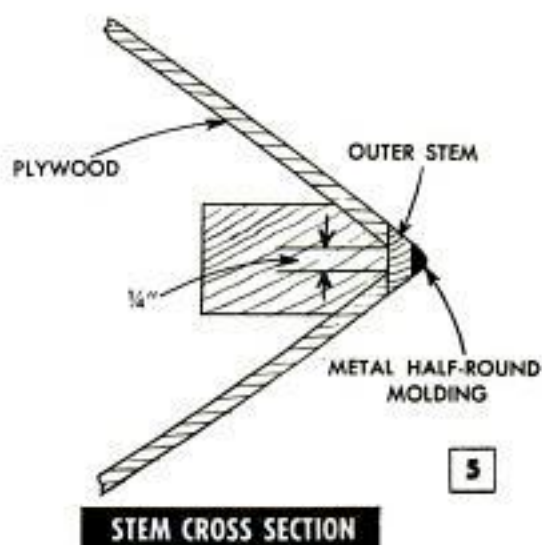
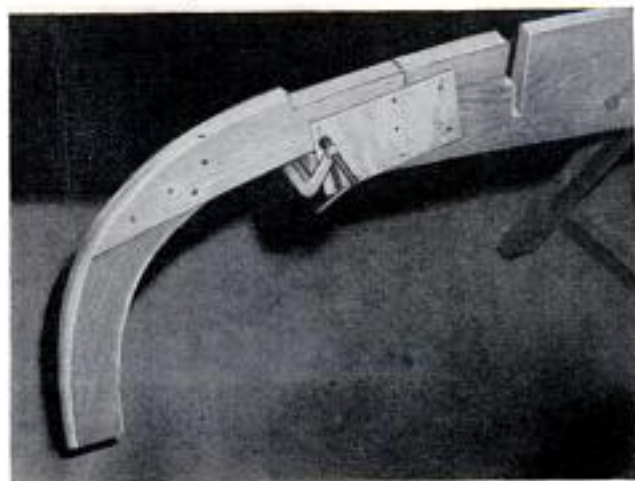
half-round moldings, while frames, seats and floorboards can be of any clear boat-building lumber. If softwood is used for these parts, the boat can be "dressed up" with a mahogany-plywood foredeck, sheer battens and upper moldings.

To build the boat, first cut the strongback from a length of 2 x 10, as detailed in Fig. 2. Screw the transom brace to the stern end of the strongback and notch the bow end roughly to receive the finished stem. Set up the strongback on a fairly level surface, Fig. 1, attaching the legs with screws.

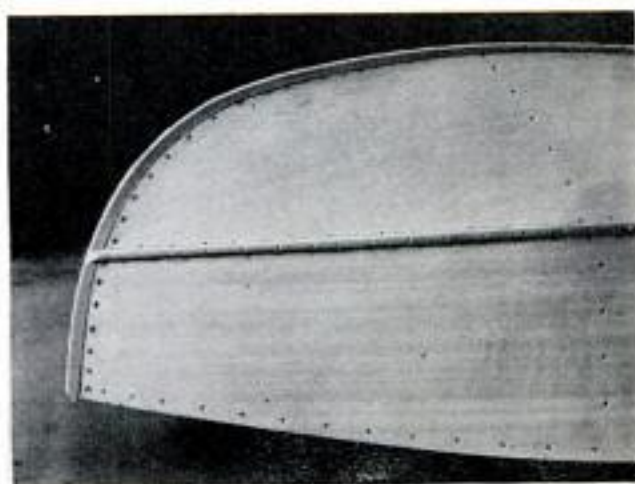
Next lay out the frames and stem full-size on wrapping paper, laying out all the frames, one over the other, on the same sheet of paper. This is done by using a different-colored pencil for each frame. In this way, errors can be detected quickly. Cut the frame members to size and assemble with waterproof glue and screws. Rough out all the notches for the chines and sheer battens. Assemble the transom frame **similarly**, Fig. 3, and then glue and screw the frame to the 3/4-in.-plywood transom. Do not notch the plywood transom; the chines, sheer battens and keelson butt against it.

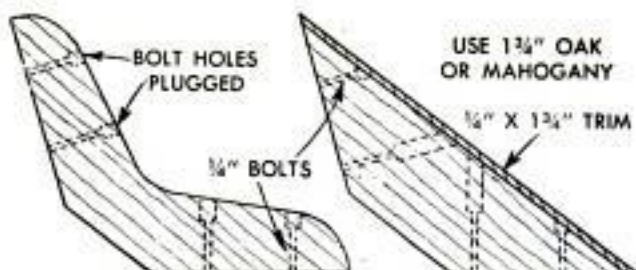
Set the completed frames in the notches of the strongback and attach the transom, clamping it to the transom brace. Then make the stem, Fig. 3, and clamp it to the strongback, using a C-clamp and two plywood gussets, as in Fig. 1. The gussets are nailed only to the strongback so it can be

Stem is held to strongback with two plywood gussets and a C-clamp. Gussets nailed only to strongback

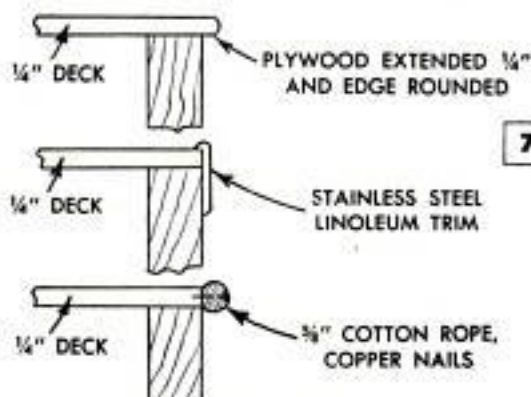


Outer stem is faired into outer keelson. Metal half-round screws onto stem and keelson, extending 5 ft.





ALTERNATE METHODS OF CUTTING KNEES



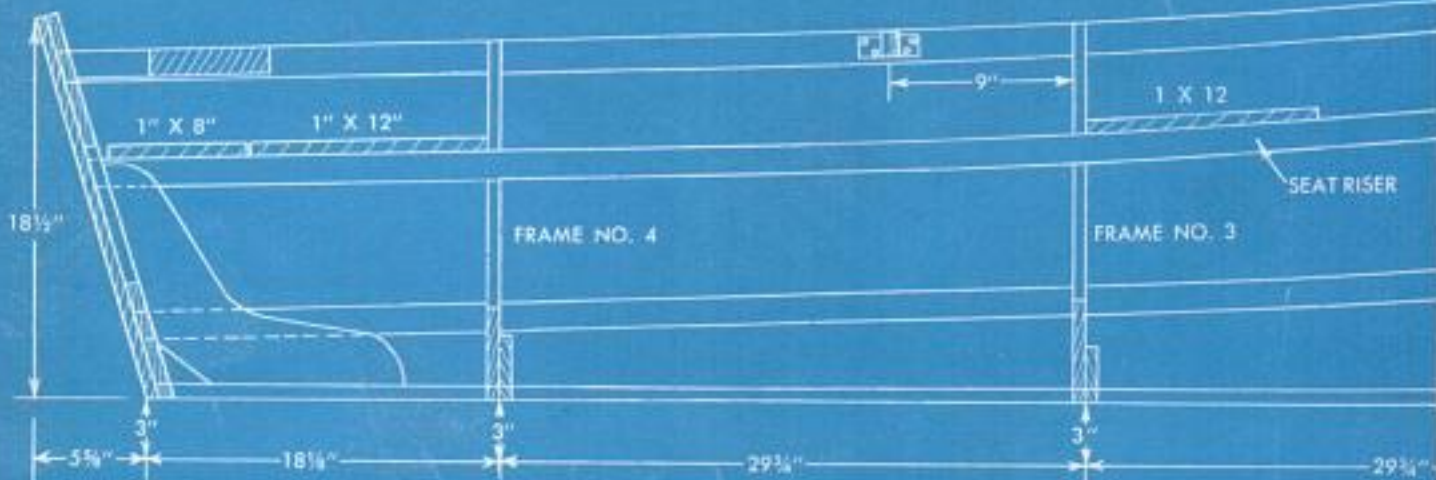
DECK-TRIM METHODS

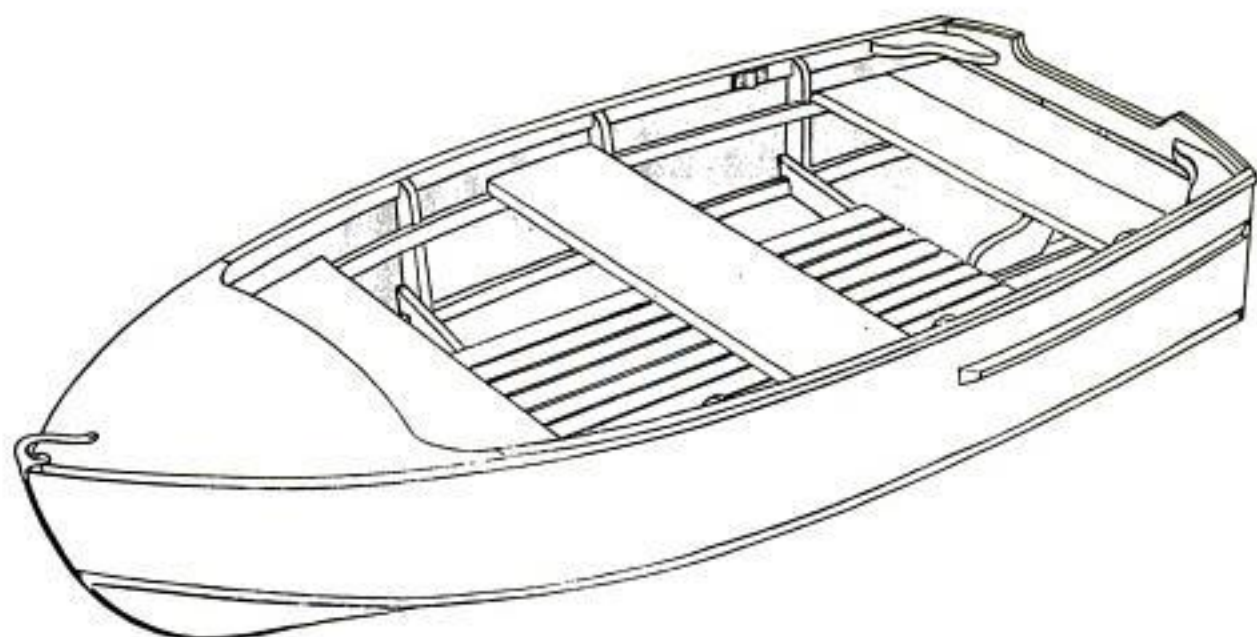
Alternate methods of cutting transom knees and finishing edge of plywood decking. Waterproof deck seam

removed easily from the completed hull.

To prevent frames No. 2, 3 and 4 from warping as the battens and plywood are applied, clamp or screw boards across the gunwale ends of the frames. Also, install both of the chines, side planks, etc., at the same time to equalize strain. Attach the keelson to the transom first; then work forward, screwing it to each frame with two 1½-in. screws. Next, add the chines and sheer battens and fair down all the surfaces with a plane so the planking will rest properly at all points. Cut the plywood side pieces first and install them together, beginning at the transom. Drive a ¾-in.

flat-headed screw every 2 in. along the chines and transom, 1½ in. along stem and every 3 in. along the sheer battens and frames. Attach the plywood bottom panels, spacing the screws 2 in. apart, except on the frames where the spacing should be 3 in. Screw the outer keel in place and then the outer stem which is faired into the keel (Fig. 3, profile view, and Fig. 5). Attach the half-round molding at the chines, turn the boat over and remove the strongback. With the hull rightside up, install the seat risers, the deck and the transom knees, Figs. 4 and 7. Mahogany plywood makes the most attractive decking, Fig. 6. ★ ★ ★





MATERIAL LIST

Marine plywood:

- 2 pcs.— $\frac{1}{4}$ " or $\frac{5}{16}$ " \times 48" \times 14"—Bottom and sides
- 1 pc.— $\frac{3}{4}$ " \times 21" \times 5"—Transom
- 1 pc.— $\frac{1}{4}$ " \times 36" \times 43"—Deck (or use waste)

Mahogany or oak:

- 1 pc.— $\frac{3}{4}$ " \times 1" \times 12"—Keel
- 2 pcs.— $\frac{3}{4}$ " \times 1 $\frac{1}{4}$ " \times 54"—Spray rails
- 1 pc.— $\frac{3}{4}$ " \times 1" \times 48"—Outer stem
- 1 pc.—1 $\frac{3}{4}$ " \times 5" \times 30"—Knees
- 4 pcs.— $\frac{1}{2}$ " \times 1" \times 14"—Half-round moldings

Mahogany, oak, spruce, pine, cypress or fir:

- 2 pcs.— $\frac{3}{4}$ " \times 1 $\frac{1}{2}$ " \times 14"—Sheer battens
- 2 pcs.— $\frac{3}{4}$ " \times 1 $\frac{1}{2}$ " \times 14"—Chines
- 2 pcs.— $\frac{3}{4}$ " \times 1 $\frac{1}{2}$ " \times 10"—Seat risers
- 1 pc.— $\frac{3}{4}$ " \times 1 $\frac{3}{4}$ " \times 36"—Deck batten
- 1 pc.— $\frac{3}{4}$ " \times 2 $\frac{1}{2}$ " \times 12"—Keelson
- 3 pcs.— $\frac{3}{4}$ " \times 3" \times 12"—Frames
- 2 pcs.— $\frac{3}{4}$ " \times 6" \times 12"—Frames
- 1 pc.— $\frac{3}{4}$ " \times 9" \times 10"—Motor board
- 1 pc.— $\frac{3}{4}$ " \times 12" \times 12"—Seats
- 1 pc.— $\frac{3}{4}$ " \times 8" \times 48"—Rear seat
- 1 pc.—1 $\frac{3}{4}$ " \times 6 $\frac{1}{4}$ " \times 24"—Stem

- 1 pc.—1 $\frac{3}{4}$ " \times 5" \times 24"—Stem
- 8 pcs.— $\frac{5}{8}$ " \times 2 $\frac{1}{2}$ " \times 8"—Floorboards
- 4 pcs.— $\frac{5}{8}$ " \times 2 $\frac{1}{2}$ " \times 6"—Floorboards

Common lumber:

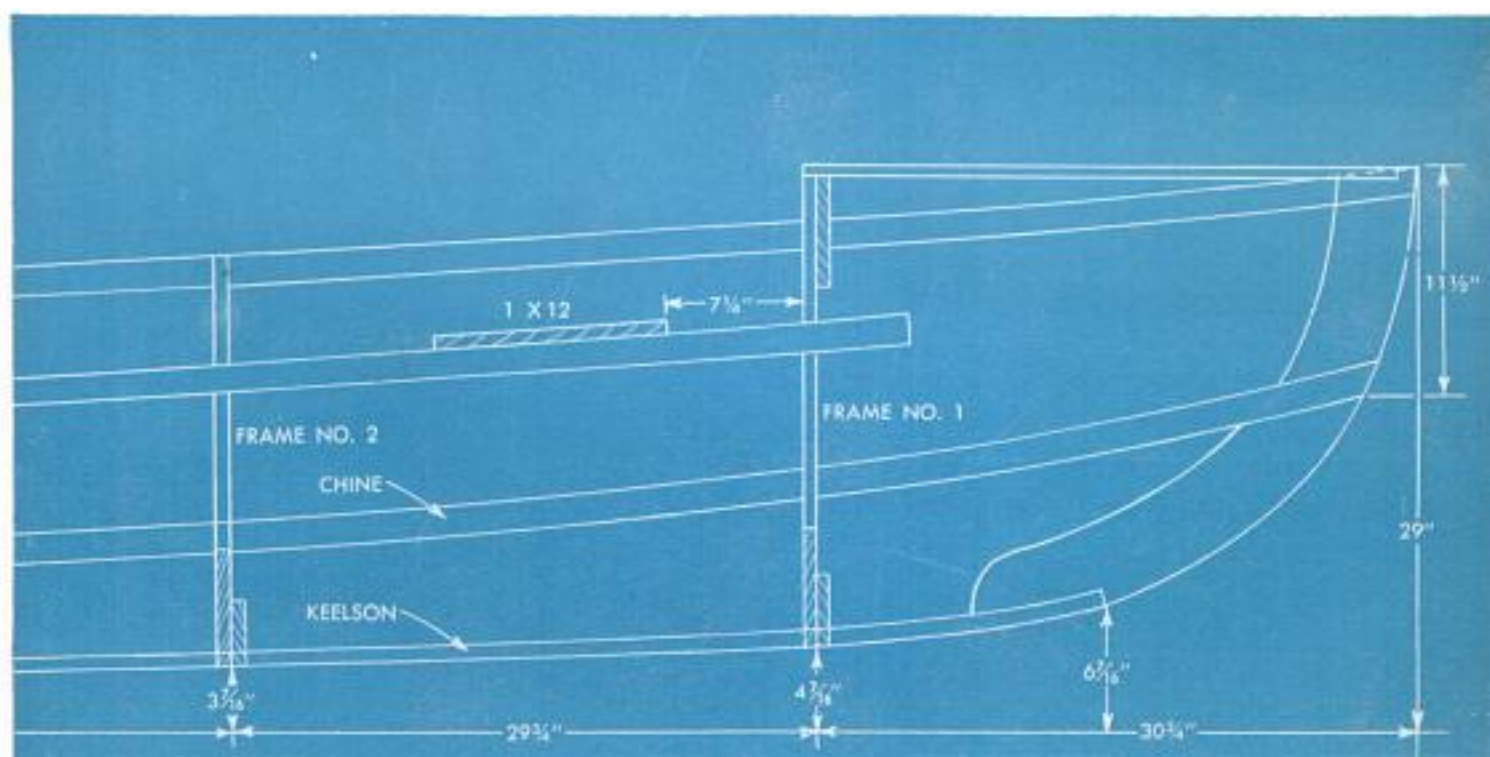
- 1 pc.—1 $\frac{3}{4}$ " \times 9 $\frac{1}{2}$ " \times 10"—Building form
- 1 pc.—1 $\frac{3}{4}$ " \times 2 $\frac{1}{4}$ " \times 21"—Transom form

Miscellaneous

- 1 lb. Waterproof resin or marine glue
- 1 pt. Emulsified rubber joint sealer or "C" quality marine glue
- 1 pr. 6 $\frac{1}{2}$ " oars
- Primer coat and paint or varnish

Brass or galvanized hardware:

- 5 gross 1" No. 8 flat-headed screws
- 1 gross 1 $\frac{1}{4}$ " No. 8 flat-headed screws
- 1 gross 1 $\frac{1}{2}$ " No. 8 flat-headed screws
- $\frac{1}{2}$ gross $\frac{3}{4}$ " No. 6 oval-headed screws
- 1 lb. 1 $\frac{1}{4}$ " Shingle nails
- 5 ft. $\frac{1}{2}$ " Metal halfround (stem)
- 1 Bow lifting handle
- 1 pr. Oarlocks





Light Attached to Lawn Mower Powered by Small Generator

When rainy weather and overtime hours kept one man from getting his lawn cut in full daylight he added a generator-powered bicycle light to his power lawn mower. He clamped the headlight to the handle so the beam of light would shine over the motor and onto the lawn ahead of the mower. The bicycle generator used is the type having a friction drive wheel that runs against the bicycle tire. The generator was mounted so the drive wheel would bear against the drive belt of the mower.

Metal Shelf Brackets Modified For Use as Temporary Supports

Temporary shelf supports that are easily removed can be made by filing the screw holes in standard metal shelf brackets to a keyhole shape. The brackets then can be hung on screws that project slightly from a wall.



When the temporary shelf is no longer needed, the brackets are removed by lifting them slightly so the screwheads will pass through the larger part of the keyhole.

Water Tanks Decorate Driveway

Old hot-water tanks can be used as sturdy, decorative corners for a driveway entrance. They are set in the ground in the same manner as a post, and then painted. To lengthen the life of the tank, fill it with a watery cement after setting it in the ground.—Walter Shutok, Uniontown, Pa.

Yellow Laundry Soap on Fingers Aids Rapid Handling of Papers



A bar of yellow laundry soap is an excellent substitute for glycerine often used by printers and others whose work requires the rapid handling of sheets of paper. Occasionally rubbing the fingers over the soap will coat them with a rosin-like

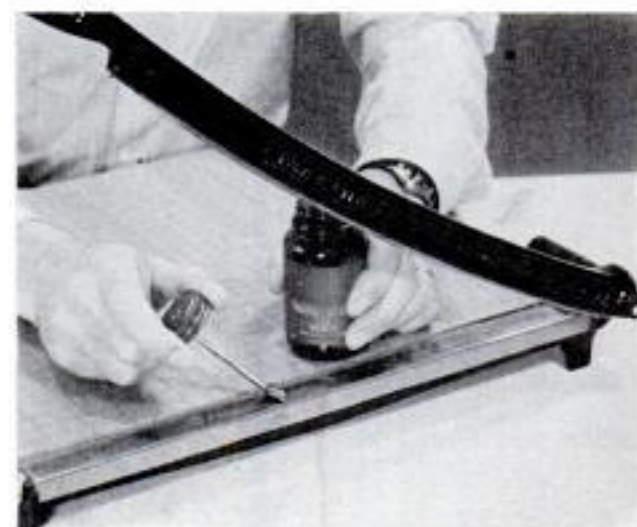
substance which the soap contains. Single sheets of paper may then be quickly picked up from a stack.

The Luxury of a Porch...

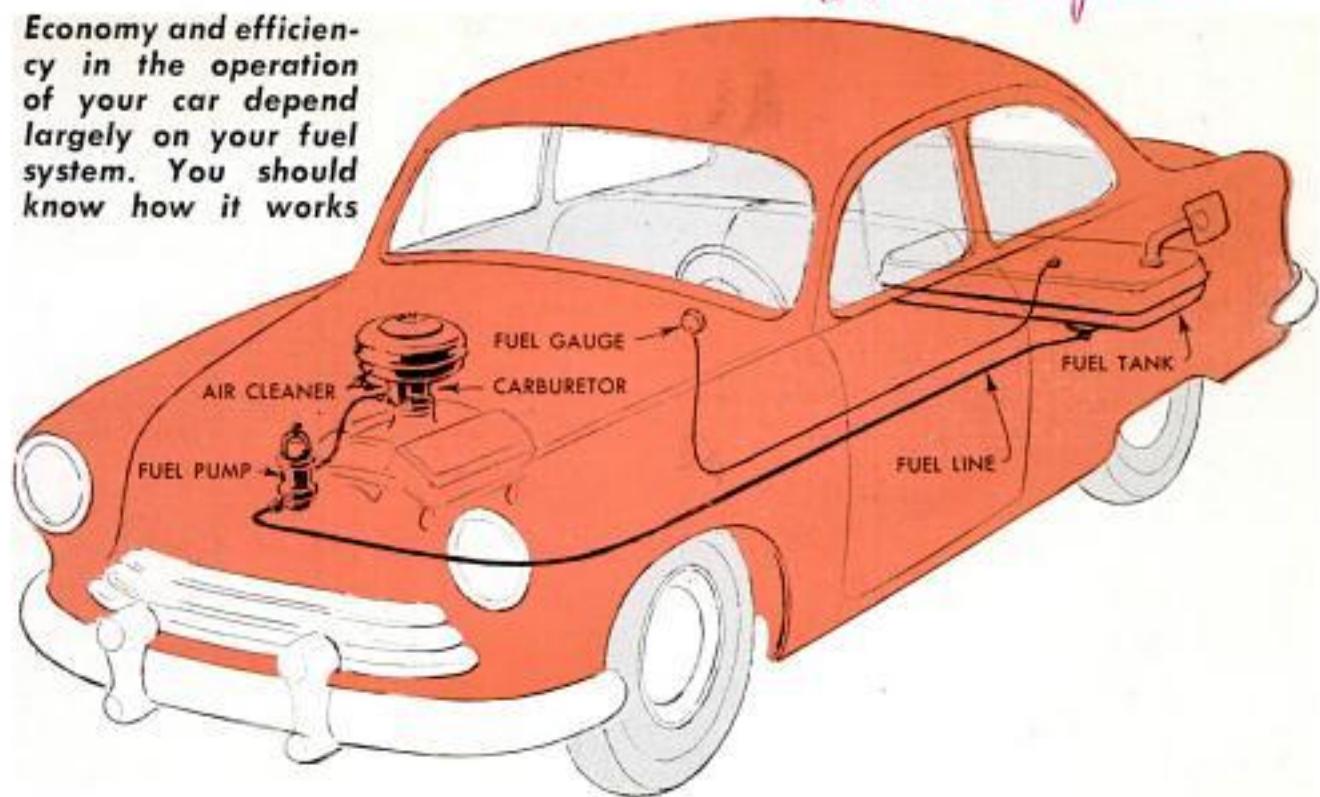
To be outdoors in a refreshingly cool breeze yet shaded from the hot sun and insects, lounging in downright comfort, is a luxury any homeowner can enjoy by adding a porch or breezeway to his home. Read the detailed story in next month's issue that tells how to do it yourself

Keep Prints From Slipping

The annoyance of having prints slip when cut on a trimmer can be eliminated by applying rubber cement along the edge of the board as shown. The cement should be allowed to dry before beginning the cutting operation. One application lasts for months.—Clyde Allison, Cadillac, Mich.



Economy and efficiency in the operation of your car depend largely on your fuel system. You should know how it works



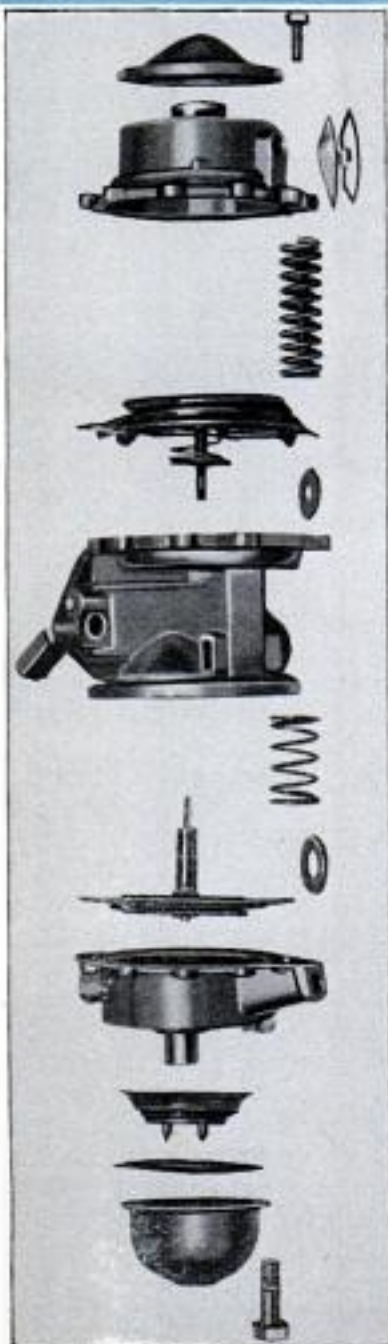
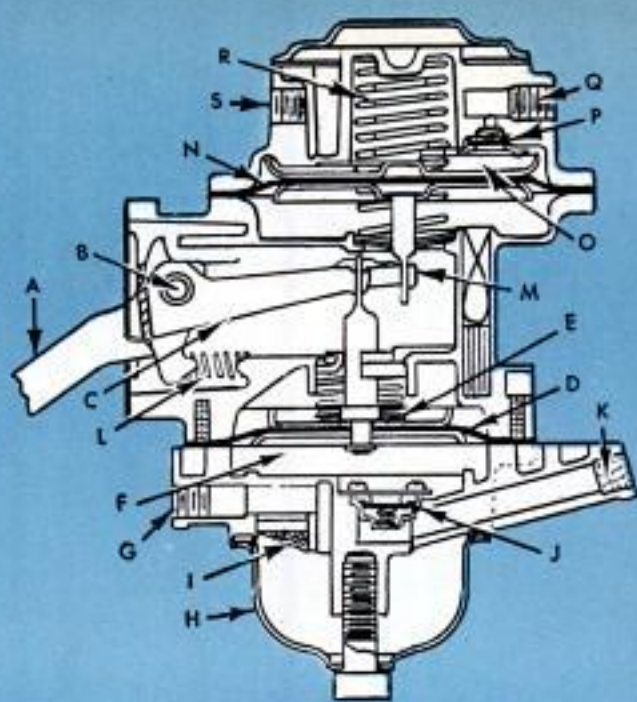
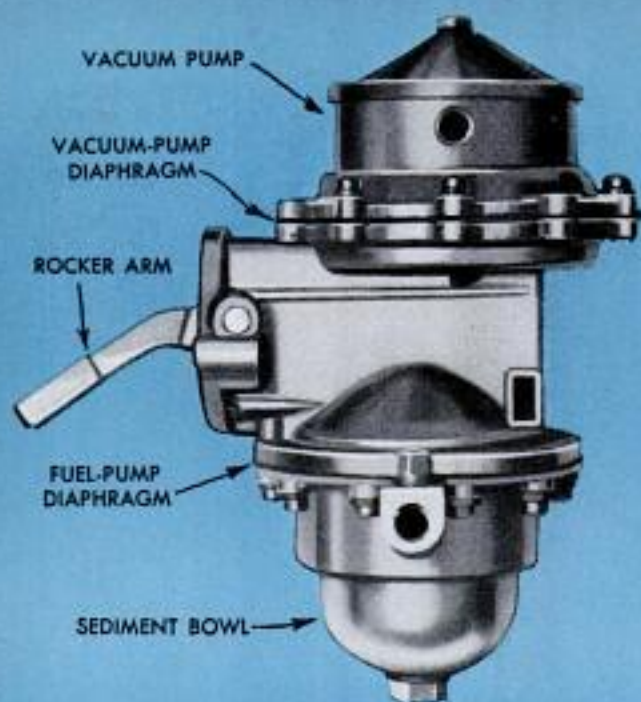
FROM TANK TO CARBURETOR

BEFORE GASOLINE, the lifeblood of your automobile engine, is utilized as heat energy, the fuel system must provide several definite and necessary services. A typical passenger-car fuel system, shown in the phantom drawing above, consists of a tank, pump, carburetor, fuel line, air cleaner and a manifold-heat control valve. The fuel line runs from an outlet at the bottom of the tank to the pump. The outlet generally is fitted with a strainer and sediment trap to keep the fuel as clean as possible. The pump in the majority of modern passenger cars is of the diaphragm type and is actuated by a rocker arm which is moved by an eccentric on the engine camshaft. The pump usually is located as near to the carburetor as possible, but away from the manifold heat. In some cases it is necessary to install a metal shield between the pump and manifold to prevent vapor locks from manifold heat.

Electric fuel pumps, although sometimes more expensive than the diaphragm type, have advantages over the latter. An electric pump can be installed near the tank itself or in any comparatively cool spot, thus minimizing vapor locks. Also, the electric pump starts supplying gasoline as soon as the ignition is turned on. The starter is not required to turn over the engine several times before gasoline is pumped to the carburetor. However, a diaphragm-type fuel pump, if properly serviced, will give years of good service.

Quite often the fuel pump contains a secondary unit, which is the vacuum-booster pump, operated by the same rocker arm that actuates the fuel pump. Three views of a combination fuel-pump vacuum booster are illustrated. The booster serves to increase the vacuum needed to operate the windshield-wiper motors when the engine manifold vacuum is low, as when the engine is being accelerated rapidly. All fuel pumps, with or without a vacuum booster, have a filter and sediment bowl at the bottom, which collects dirt and other foreign matter. The sediment bowl is easily removed by loosening the bolt that passes through its center. When the bowl is removed for cleaning, the gaskets should be replaced if they are not in good condition.

Operation of a typical fuel-pump vacuum booster combination can be followed by reference to the lettered sketch. Rotation of the camshaft eccentric actuates rocker arm A, pivoted at B, which pulls link C and diaphragm D upward against spring pressure E. This creates a vacuum in pump chamber F. This suction stroke of the pump causes fuel from the tank to enter sediment bowl H through inlet G. The fuel passes through strainer I and enters pump chamber F. On the return stroke, spring pressure E pushes the diaphragm D downward, forcing fuel from chamber F through outlet valve J and out through discharge K to the carburetor. When the carburetor bowl is full, the carburetor-float valve is closed,



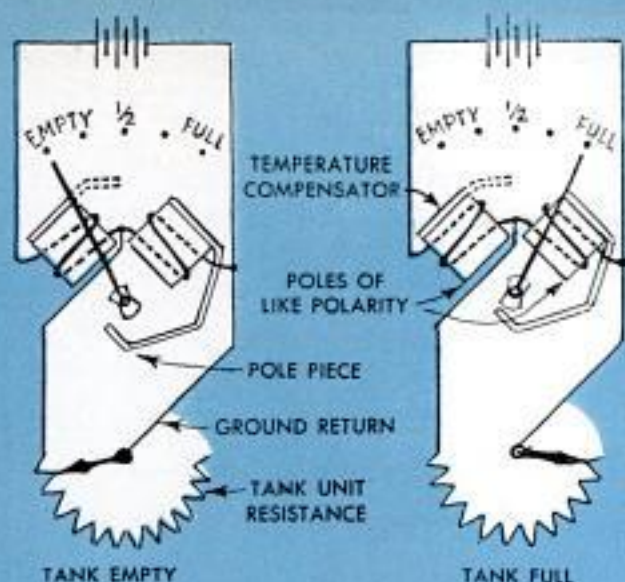
Below left, is exploded diagram of combination fuel pump-vacuum booster. Above left, assembled unit is shown with parts named. Drawing, above right, is cross section with all parts lettered for reference

thus setting up a back pressure in pump chamber F. This pressure holds diaphragm D upward against spring pressure E. Thus, the fuel pump is inoperative until the carburetor-float valve opens and the back pressure is released. Spring L simply serves to keep the rocker arm in constant contact with the camshaft. Hard starting or a "flattening out" of engine speed in highway driving indicates that the fuel pump should be tested.

Operation of the vacuum booster, which is actuated by the same arm as the fuel pump, is as follows: Rotation of rocker arm A, pivoted at B, pushes link M and diaphragm N upward. This expels the air in the chamber O through the exhaust valve P and out Q to the intake manifold. On the return stroke, spring R pushes diaphragm N downward, creating a suction in chamber O, thus drawing air through inlet S from the windshield-wiper motor. When the windshield wipers are not being used, manifold vacuum holds diaphragm N upward against spring pressure R so that the diaphragm does not make a complete stroke for every stroke of rocker arm A. When manifold vacuum is greater than the vacuum created by the pump, air will flow from the windshield wiper through both valves of the vacuum pump and the operation of the wiper motor then is the same as if the pump were not connected. Sluggish windshield wipers or a sudden excessive oil consumption calls for a check of the vacuum booster.

The carburetor receives the fuel from the pump, mixes it with the proper amount of air and distributes the vaporized mixture in the correct proportions to the engine. The carburetor and choke were discussed in the July, 1953 *Popular Mechanics* and require no further description in this article.

An air cleaner is clamped to the top of the carburetor. A typical cleaner is pictured. Air entering the carburetor first passes through oil-soaked wire mesh to remove dust and impurities. The oiled mesh also quiets the rushing sound made by the air as it enters the carburetor. In extremely dusty areas, a heavy-duty type air cleaner which contains an oil bath is used. Air entering the cleaner is first directed



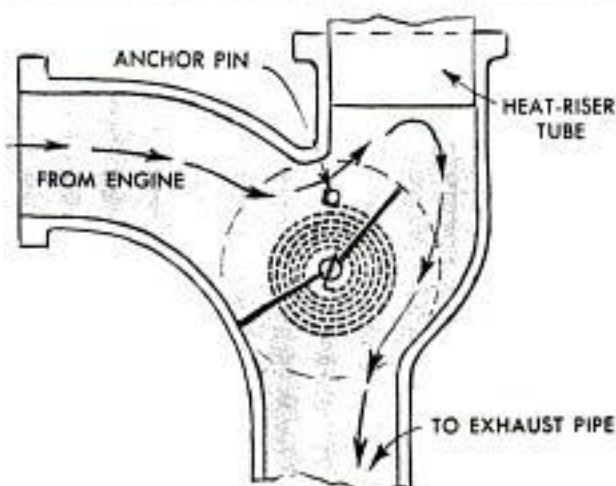
THE A.C. FUEL GAUGE



Photo, above right, shows disassembled air cleaner. Maintenance consists of cleaning the filter element with gasoline, then re-oiling. Below right, representative manifold-heat regulator valve is shown

against a pool of oil which removes the heavier particles of dust. The velocity of the air also causes a small amount of oil to be carried up into the mesh strainer, thus keeping it lubricated.

A representative type of manifold heat-control valve is shown in the sketch. The heat-control valve permits hot exhaust gases to heat the incoming cold fuel-air charge during starting and warm-up periods. The action of the valve is automatically controlled by a thermostatic spring, assisted by a counterweight. When the engine is cold, all exhaust gases are directed against the intake manifold at a point just below the carburetor. Sometimes this area is part of the intake-manifold casting, and the intake and exhaust manifolds are bolted together with a gasket used to prevent exhaust gases escaping. In other types, such as the one shown, the manifolds are open to each other, but a heat-riser tube extends down into the exhaust manifold from the intake, thus preventing the exhaust and intake gases from mixing. The heat-riser tube is simply a one-piece cylinder with the bottom end sealed. The cold-air-and-gas mixture drops into this tube, is heated and then drawn into the engine cylinders. When the engine reaches operating temperature the thermostatic spring and counterweight close the valve so that heat no longer contacts the heat-riser area. Do not use oil on the shaft of the manifold heat-control valve. It will cook to a gum and jam the shaft. Occasionally apply a small amount of baking soda mixed with



kerosene to the shaft of the valve. Shown above, left, is a sketch of one type of electric fuel gauge. The motion of the tank float causes the movable contact to slide over a rheostat. The tank unit is grounded out of the gauge circuit when the tank is empty and the float is at its lowest position. Current then passes through only the coil on the empty side of the dash unit because the coil on the full side is of a higher resistance. The pointer is attracted towards the energized coil which causes the dial to register an empty tank. When the tank is filled and the float rises, the rheostat is placed back in the circuit by the movement of the tank-unit contact. The rheostat places resistance in the circuit which causes current to flow through the coil on the full side of the dash gauge. The indicator on the dash gauge then moves toward the full side in direct ratio with the amount of current running through the coil. Compensators are wired into the circuit to allow for changes in air temperature and fluctuations in voltages.

★ ★ ★

Small Doll's Bed Is Assembled Quickly From Two Cigar Boxes



Small but attractive, this doll bed is made from two matching cigar boxes and their tops. First the tops are removed and then the sides are cut with a coping saw as shown in the drawing, any desired design being used. The head and foot of the bed are made from the tops of the boxes. Finally the bed is assembled with glue or brads and given a suitable coat of enamel or lacquer.

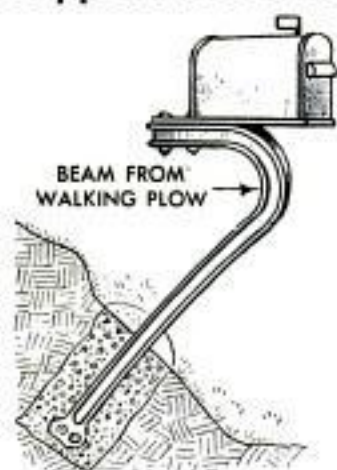
Stair Tread Protects Window Sill Against Flowerpot Stains

Cut to fit a window sill on which potted plants are placed, a rubber or plastic stair tread will protect the paint or varnish from stains and discoloration. It also will prevent warping of the wood, caused by water which is spilled from the watering can, or which seeps through the drain holes in the bottoms of the flowerpots.



H. Radzinsky, New York City.

Junked Walking-Plow Beam Supports Rural Mailbox



An excellent rural mailbox support that is especially suitable for erection on a sloping roadside bank can be made from the steel beam of a junked walking plow. A steel flat is bolted to the top of the beam to support the mail box, and the beam is set in concrete.

Pencil Ferrule Pits Cherries

The chore of pitting fresh cherries for pies and other desserts is less arduous when a simple cherry pitter made from a common lead pencil is used. The eraser is carefully removed from the brass ferrule of the pencil, and the ferrule cavity is cleaned and sterilized either by boiling or by holding for a few moments over an open flame. Pushing the ferrule through each cherry quickly removes the pit.

Harry Lawson, Pulga, Calif.

Wooden Strip Used as Handle For Small Magnifying Glass

A small magnifying glass that is difficult to hold between the fingers will be much easier to handle if attached to a wooden strip such as a tongue depressor. A thin strip of adhesive or masking tape is used to bind the lens to the strip. To make it even more convenient to use, determine the height above the printed page at which the glass is in focus. Then measure this distance on the strip and tape the glass to it at that point.



Discarded Hacksaw Blade Made Into Effective Garden Weeder

This handy weeder and cultivator for use in the flower garden can be made from a 10-in. hacksaw blade by bending the blade and attaching it to a handle as shown in the photograph. The handle is made of 1x3x5-in. hardwood. To fasten the blade to the handle, two screws are put in each side.



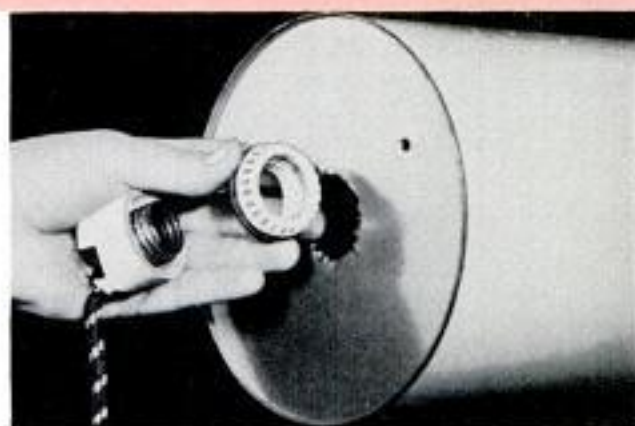
PHOTO LAMP from ODD PARTS



Photo at left shows completed lamp. Those above picture how drapery rod serves as adjustable column. In center photo lower end of rod is being attached to wooden base

By H. Leeper

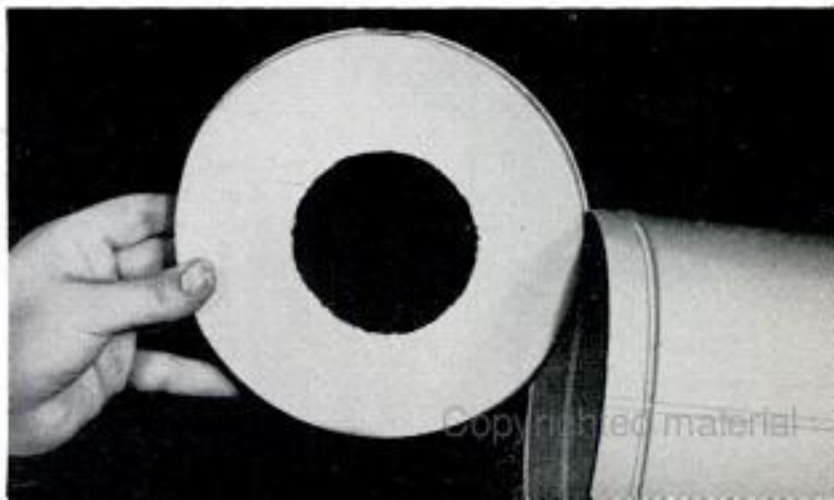
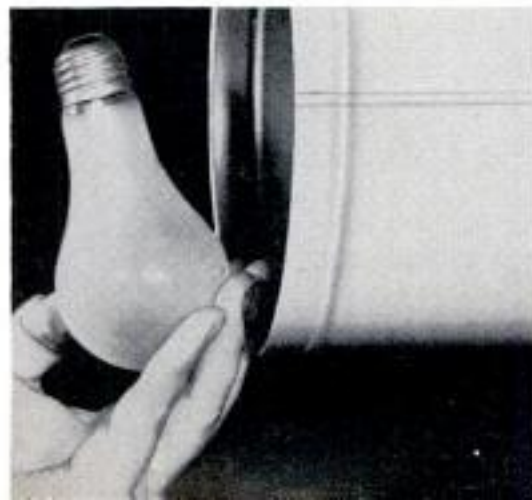
UTILIZING common household items which normally are discarded after serving their purpose, you can assemble a practical photo lamp in a single evening. The body, or housing, of the lamp is made from a potato-chip can. This is supported on a telescoping drapery rod, the lower end of which is attached to a heavy wooden block. A metal base also can be used; the round cast-iron base from an old hot-water tank is just the thing. Several holes are drilled through both sections of the drapery rod so that a pin can be inserted to hold the lamp at the desired height. A hole cut in the bottom of the potato-chip can (housing) takes the two-piece porcelain lamp socket as in the two photos at the right. After the socket is in place it is protected by a small can cut in half, leaving two short ears, or tabs. These are bent outward for attachment to the bottom of the housing with sheet-metal screws. A number of small holes are drilled in a pattern through the top of the housing to permit heat to escape. A No. 1 photoflood bulb gives the proper amount of light. By cutting a 3-in. hole through the lid of the can and using this as a "lens," as in the lower right-hand photo, a fairly sharp spot will be obtained.



Above, two-piece porcelain socket of type used in signs is inserted in hole cut in bottom of can. Below, socket is protected by cover cut from small can. Metal tabs on can are drilled for metal screws



Lower left, No. 1 photoflood bulb gives ample light without excessive heat. Lower right, a hole about 3 in. in dia. in can lid gives fairly sharp spot. Can lid is removed when lamp is used for floodlighting



Camera Support Is Improvised With Two Chairs and Book



In the event a tripod is not available when taking pictures requiring steady support for a camera, a couple of straight-backed chairs and a book or length of board can be combined to do the job. Place the chairs at an angle and set the book across them as shown to form a platform.

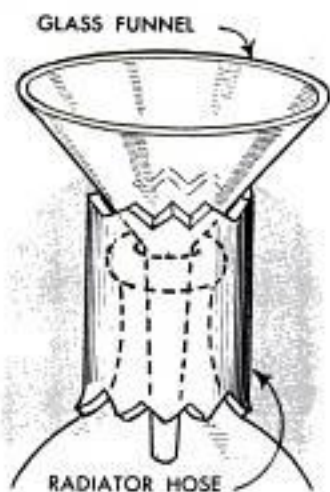
Negatives Stored in File Box

Negatives can be stored in standard card file boxes to preserve them and to keep them readily accessible. Index cards made for the file box are used as dividers, and the negatives are indexed according to subjects or to the date a picture is taken, whichever is most convenient. To make finding of the exact negative easier, the subject and date of each can be marked in the margin in white ink. Then the negative

is stored with that margin up so that it can be read at a glance and without removing it.—Blanche Campbell, Las Vegas, Nev.

Hose Used as Funnel Holder

Photographers and others who use glass funnels in their work will find that there is less danger of breakage if a short piece of radiator hose is used to support the funnel in a jug or bottle. The hose should be notched at both ends to permit air to escape from the container when liquid is poured through the funnel. The hose should be just long enough to support the funnel slightly above the neck of the bottle, as shown in the sketch.



Hot Water Softens Sponge For Wiping Photoprints

When used on films or for wiping down prints, the new viscose-type sponge may prove a little too coarse. One way to make the sponge soft is by immersing it in hot water—which won't damage the sponge in any way—and the hotter the water is the softer the sponge will become.

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PRINT DRIER

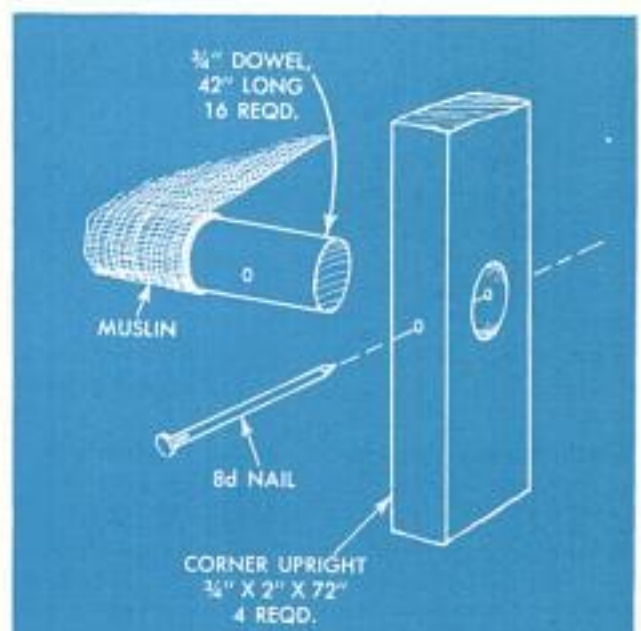
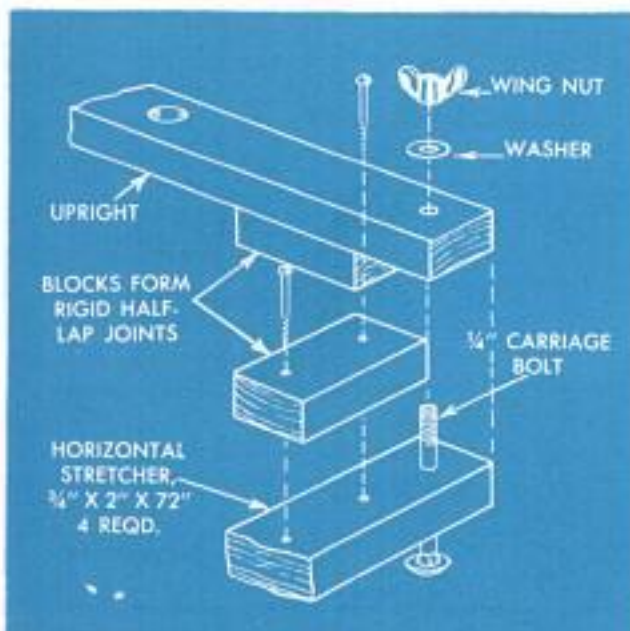
By Harry J. Lance

WITH LIMITED SPACE available, drying a large batch of photo prints can become a real problem, especially if time also is limited. To overcome the difficulty, one photographer designed and built this unusual print drier. It consists of 8 muslin or mosquito-netting "shelves" 36 in. wide and wound on adjustable rollers so that tension can be maintained. The supporting frame is made collapsible by means of bolts and wing nuts, permitting it to be disassembled and stored when not in use. As detailed, the unit provides space for nearly 200 prints in the 8 x 10-in. size. It can be made larger or smaller to suit individual requirements. Details below show the construction. Four uprights are joined to four stretchers as in the left-hand detail, and the joints are blocked in two directions to provide the necessary rigidity. Drill bolt holes in the two pieces, then bolt together and screw the blocks in place. A few spots of glue under each block will help to strengthen the joint. Now clamp the uprights together and locate holes for the dowels 8 in. apart, measuring from one end. Note that the right-hand detail below specifies $\frac{3}{4}$ -in. dowels. For greater rigidity drill the uprights for 1-in. dowels. Reassemble the frame, cut the dowels to length and fit them in the holes. Then drill small holes from the edge of each upright, each hole located so that it passes through the center



Drier can be set up indoors or out and can be made larger or smaller to suit requirements. Fabric "shelves" are 36 in. wide

of the dowel. These holes should be slightly larger in diameter than an 8d nail. The latter serves as a key to prevent the dowels from turning. Cut the muslin or netting in 9-ft. lengths, making sure that the ends are square. Tack the ends to the dowels, spacing the tacks about 1 in. apart. Then remove the nail keys at the ends of the dowels and wind the fabric equally on each dowel. Number one end of each dowel so that they may be replaced in the proper order when the unit is reassembled after being stored.



Sill-Cock Unit Provides Handy Drinking Fountain for Children



When the hot-weather thirst of two small children kept their parents busy providing drinks, their father made this outside drinking fountain which attaches to the sill cock. The parts are obtainable at most hardware stores and can be assembled in a matter of minutes to produce the fountain. The L-shape swivel connector is the type used to prevent kinking the hose at the faucet. It is screwed onto the faucet, then the automatic nozzle is screwed onto it. The filter is the slip-on type, usually used on kitchen faucets to aerate the water. The automatic nozzle has a spring-loaded handle and can be adjusted as to amount of flow. A pan may be placed beneath the fountain if no drain is present. This also assures the family dog of a supply of water.

Darrel Ward, Topeka, Kans.

Plant Cuttings Rooted Easily In Plastic Wrapper

Plant cuttings can be rooted easily by starting them in wrappers cut from thin sheet plastic. First cover the end of the stem with damp sphagnum moss and then wrap with the sheet plastic, binding it around the stem with string or a rubber band. If sealed tightly, the wrapper will retard evaporation of moisture from the moss sufficiently to allow roots to develop in a few weeks.—John Krill, North Lima, Ohio.

Curved Tin Deflector on Tray Permits Uniform Print-Washing

When washing prints, some amateur photographers simply arrange a developing tray beneath a water tap so the water strikes one of the slanted sides and is deflected along the bottom of the tray. With some trays, this creates enough turbulence to keep the prints off the bottom and in continual motion. However, a more dependable method which can be used with practically any kind of glass or enameled tray, pan or small tank is to bend a piece of tin so it hooks over the edge of the tray, with the remainder bent in a curved shape



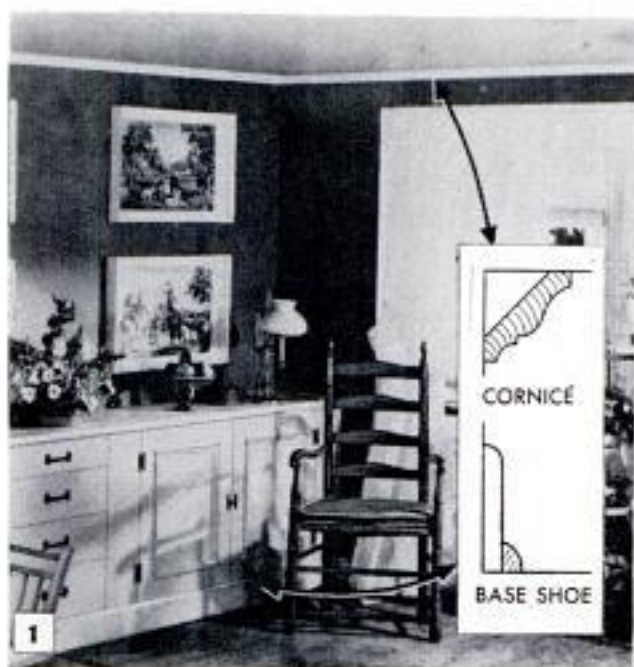
inside the tray as shown. Due to the broad curvature of the sheet metal, the stream of water is deflected uniformly along the bottom of the tray, thus creating sufficient turbulence to keep even large prints in continual motion.

□ If the doorway of your garage is a little narrow, it's a good idea to nail lengths of garden hose to corners of the doorframe to prevent marring the finish of a car.

Release Clutch of Bar Clamp By Using C-Clamp



The use of a C-clamp to loosen the jammed clutch leaves of the adjustable pad of a bar clamp will prevent cracking or breaking the casting of the pad. Forcing the leaves with hammer blows is definitely not recommended because of the danger of breaking the casting. A C-clamp, used as shown, will provide a strong, even pull.

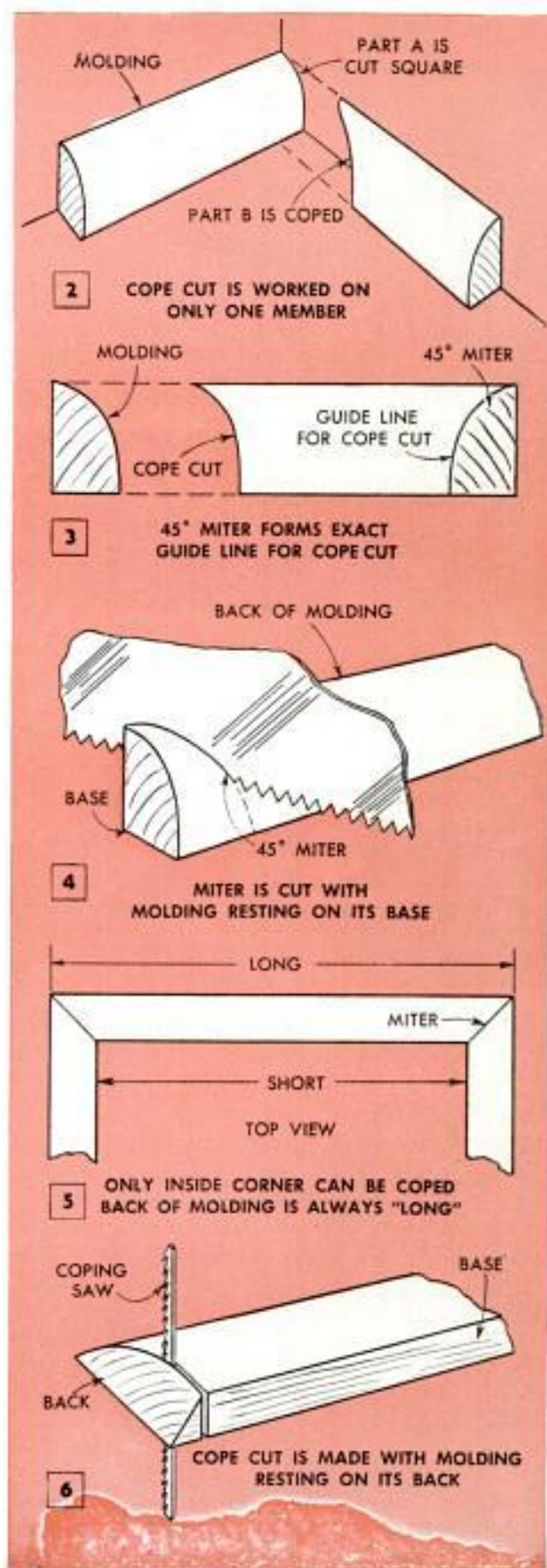


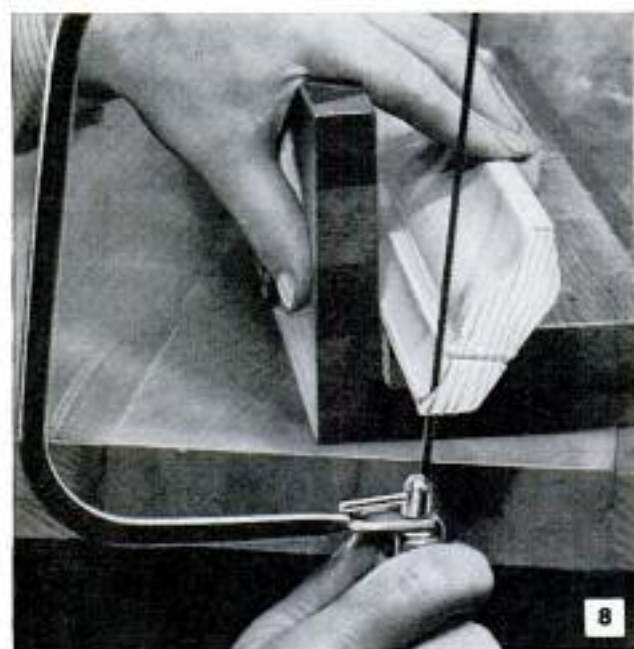
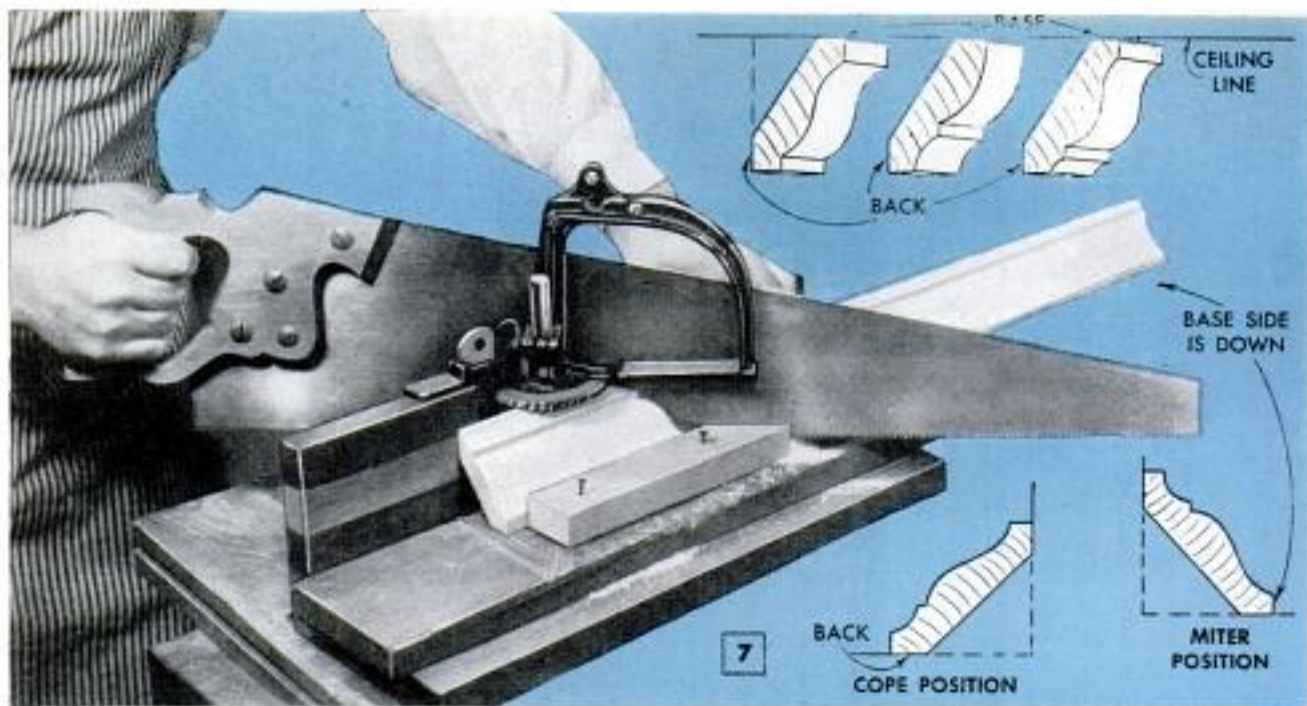
How to Cut COPED JOINTS

By Sam Brown

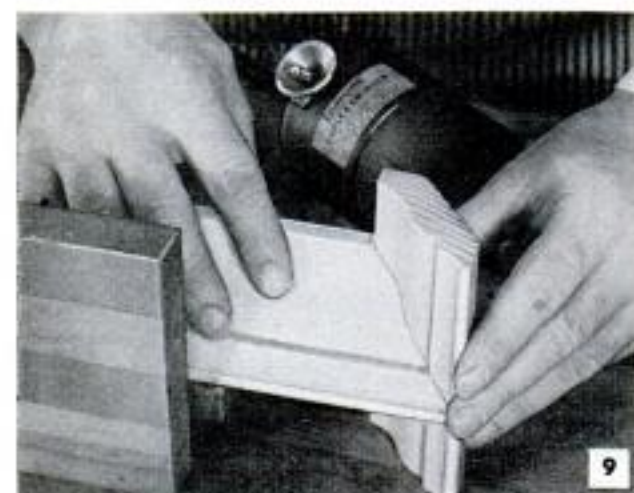
A **COPED JOINT** is made by cutting the reverse shape of the molding on one end of a piece of molded stock and then joining this to another piece at right angles, as in the corner of a room. The resulting joint has the same appearance as a mitered joint on identical pieces of molding but, in addition, has the advantage of not showing a crack between the joining members should the wood shrink after installation. Two common applications of the coped joint are the cornice mold and base shoe shown in the photo and detail, Fig. 1.

Basic procedure: Figs. 2 to 6 inclusive show the procedure in making a coped joint. First it is necessary to fix in mind the differentiation between the base and back of the molding. In the shoe mold shown in the detail, the narrow, flat side is the base and the wider, flat side the back. When the miter is cut, Fig. 4, the base is always down as indicated. In the crown molding, Fig. 7, the base is the flat side that fits against the ceiling. After cutting the miter on the shoe mold, the cope cut is made by following the miter line with a coping saw, the molding



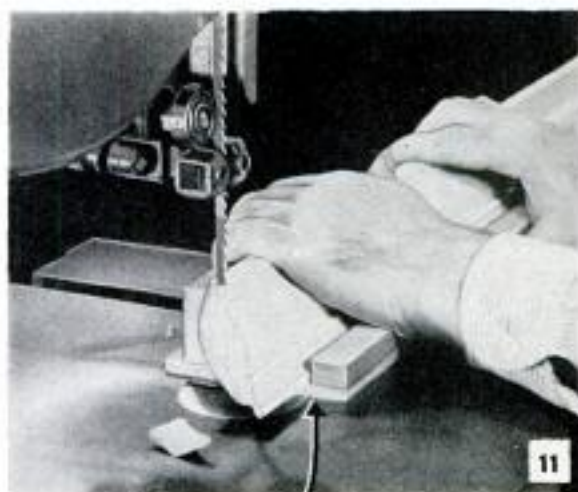


Above, making the cope cut after mitering the end of the molding. Miter cut is guide for the cope cut. Below, checking the accuracy of the joint after coping. When coping the stock is slightly undercut



resting on the back as in Fig. 6. Care must be taken to follow the line of the miter precisely as otherwise the joint will not fit snugly when the parts are placed at right angles. The edge will be somewhat easier to follow if blackened by rubbing with a carpenter's pencil. Use a fine-toothed blade in the coping saw as it is easier to control.

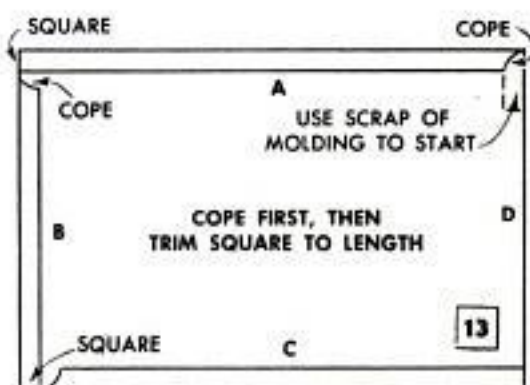
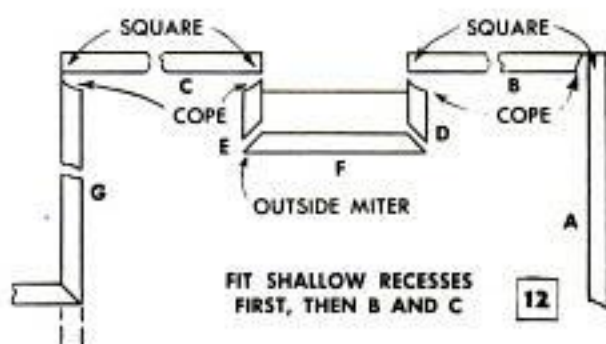
Coping crown molding: Typical crown moldings are shown in Fig. 7. Many shapes and sizes are available. One of the most common applications of the crown mold is that of room trim, Fig. 1. Generally such cornices consist of one molding, but in some cases the cornice may be built up of several moldings of varying sizes. If the job is new to you and if you are working with moldings of fairly large size, then it's well to keep in mind that as a rule the predominating curve of the cornice molding generally gives the best appearance when placed at the top. The three sections in the upper detail, Fig. 7, are examples of this basic rule. However, the rule applies more specifically to one-piece molded cornices. Also, identifying two of the three flat surfaces as base and back is simply a convenient way of keeping the parts in order on a given job. The terms do not in any way designate the type of moldings used. It's a good idea to mark the moldings before you begin fitting as this will help to eliminate the possibility of error. After marking all pieces, follow the basic procedure in cutting—hold the base side down for the miter cut and place the molding with the back down for the cope cut. Note the cope and miter positions in Fig. 7, also Fig. 8. Cutting is done generally in a miter box as pictured, the molding being supported by a stop nailed or clamped to the bottom of the



Moldings can be mitered and coped on power tools, using the circular saw for the miter cut and the bandsaw and simple jig for the cope cut

box. If a power saw is used a stop is clamped to the crosscut guide as in Fig. 10. Coping cuts also can be made on a bandsaw by making a simple jig as shown in Fig. 11. When fitting, it is best to make the first cope cut on a short piece of waste molding so that the fit can be carefully checked as in Fig. 9. The accuracy in following the guide line formed by the miter cut determines the fit when the parts are placed together in their proper relation. Because of this, carpenters and interior trimmers usually undercut very slightly when coping, although some workmen prefer to do this as a separate operation, using a rotary file, or burr, driven by a flexible shaft or hand grinder as in Fig. 14. On some types of moldings the rotary file is suitable for undercutting.

Order of fitting: Although experienced carpenters and trimmers often fit moldings on the two long sides of a room and then cope both ends of the two shorter pieces to fit, less experienced workers usually will find it easier to fit the pieces successively around the room. Figs. 12 and 13 show how to proceed in this manner by coping one end of each piece and fitting mitered joints at outside corners. Fig. 13, details A to D inclusive, shows how to cope the molding in a square or rectangular room. Fig. 12, details A to F inclusive, shows how molding is fitted when an offset in the wall is involved. One thing to keep in mind while carrying out the installation in any room is that the molding has a "long" and "short" side after mitering, Fig. 5. When fitting the lengths of molding that have square-cut ends, avoid forcing into the corners as the pressure may break the plaster. If a piece must be coped and at the same time cut to length, the initial miter cut is made to the same length as would be required were the joint a simple miter. It's a good idea to make careful measurements of the walls before cutting stock. ★ ★ ★



Some workmen prefer to undercut the cope with a rotary file, or burr, driven by means of a hand grinder





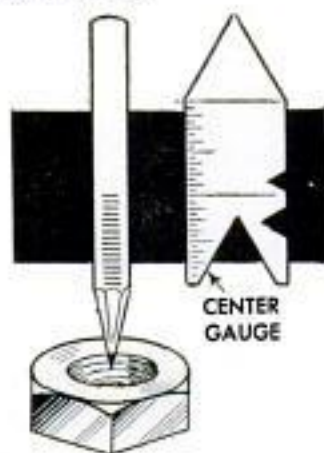
Movable Light Over Workbench Slides Along Overhead Wire

To provide a good light for the entire length of your workbench, attach a bench light to a spool that slides on an overhead wire as shown in the illustration. The wire is extended the length of the bench at a convenient height. The slider can be made from either a large thread spool or from a porcelain insulator. The electric cord just in back of the socket is wrapped once around the spool and taped in place. To keep it from getting in the way, the cord is supported along the wire by several small hooks or loops.

Richard Somerville, Corona, Calif.

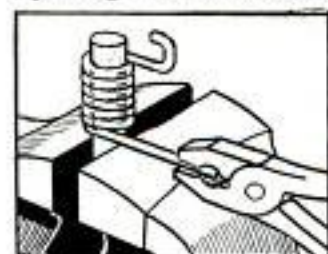
Internal Screw Threads Measured With Aid of Lead Pencil

To measure internal screw threads that are in an awkward location or are difficult to see, use a short length of dowel or a round lead pencil to take an impression of the threads. Press the pencil firmly against the threads to make a sharp indentation in the wood, then use a center gauge to determine the number of threads per inch from the impressions. As a rule, the hardwood dowel will give a cleaner, sharper impression than the softwood of the pencil.



E. J. Gilkerson, Columbus, Ohio.

Spring Unwound on Steel Rod

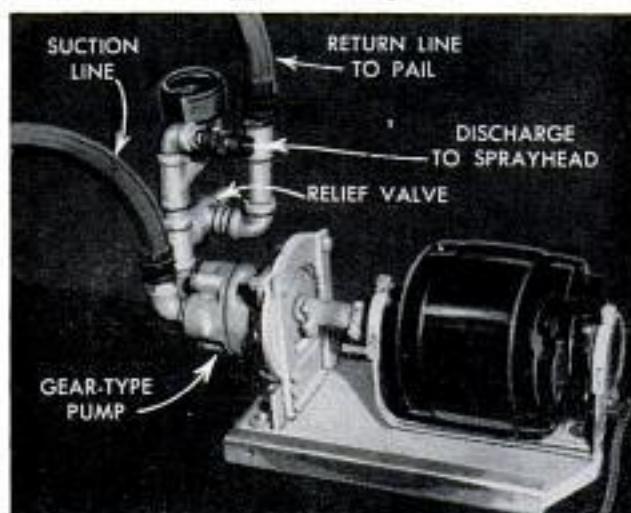


If a light coil spring must be unwound so that a new hook can be formed on the end, first slip the spring over a steel rod. Clamp the rod in a vise and grip the

end of the spring with a pliers. A steady pull will unwind the coils without kinking the wire. Unwind only enough to provide sufficient wire for the hook.

High-Pressure Insecticide Sprayer Utilizes Gear-Type Pump

Because his low-pressure, tank-type insecticide sprayer was slow and inefficient, one farmer built his own high-pressure unit utilizing a gear-type pump purchased as war surplus. A relief valve, set to open at 85 lb. pressure is installed in the line to the spray head. When the line pressure goes over 85 lb., the relief valve allows insecticide under pressure to pass through the return line to the supply pail, where it keeps the insecticide solution mixed thoroughly. A 1/4-hp. electric motor is used to drive the pump. The original spring valve on the spray-head pipe was replaced by a high-pressure air valve. The higher pressure required a small orifice in the spray head, so the original hole was brazed shut and a No. 60 drill was used to make the new orifice. Air-hose couplings are used on the hose lines.—F. Clements, Seattle, Wash.



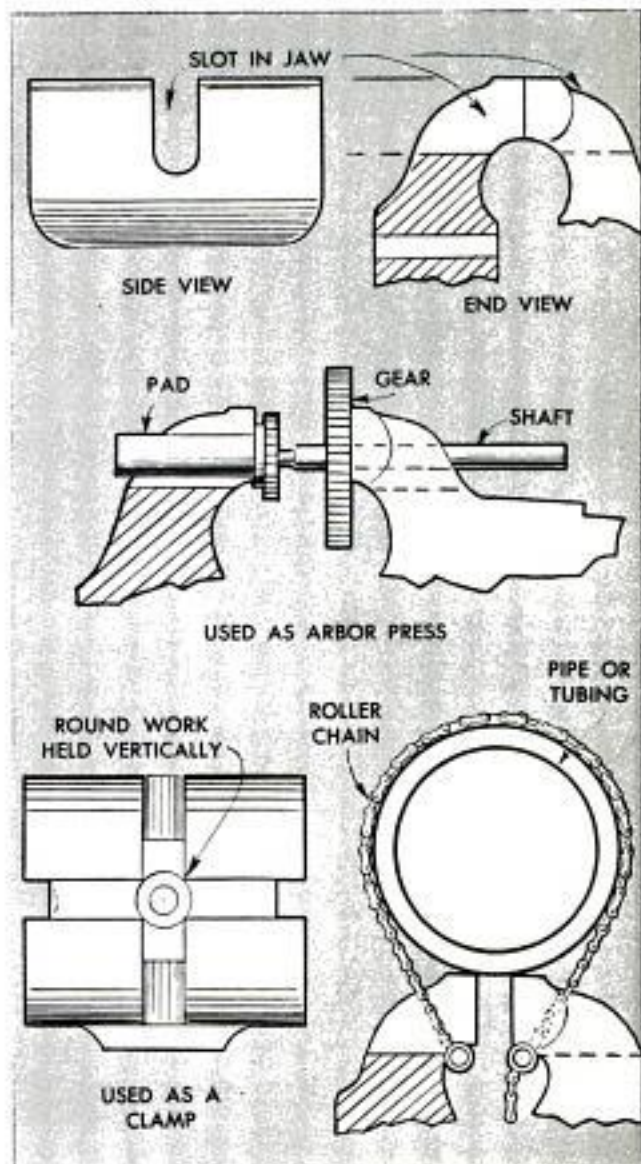
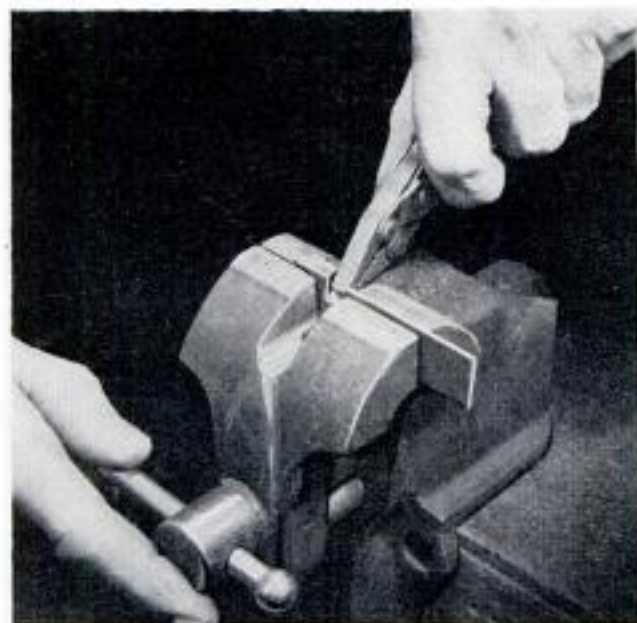
☐ Clothes can be hung on nails which have been driven through corks without danger of tearing.

NOTCHED JAWS IMPROVE VISE

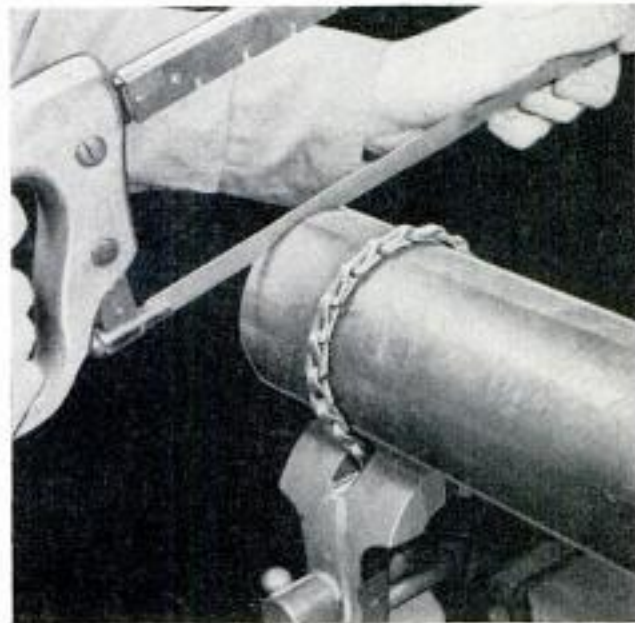
By Walter E. Burton

REGISTERING SLOTS cut into the jaws of a small vise from the top greatly widen the range of its usefulness, especially in the home shop. Small vises of the clamp-on type having solid jaws are the most suitable for altering. Vises having hardened jaw inserts can be altered by substituting inserts of mild steel. The two photos below and the upper detail at the right show how the jaws are slotted. The width and depth of the slot are not given as they are determined from the size of the vise at hand. Note in the upper detail that the slot is cut to a depth that brings the rounded bottom of the slot just below the lower inside corner of the jaw. When the slot is cut to this depth, the vise can be used for clamping operations such as that pictured in the lower right-hand photo. By fitting a flanged pad, the vise will serve as an arbor press for a considerable range of work. In order to drill and slot the jaws it usually is best to dismantle the vise so that the jaws can be drilled separately. Drill $\frac{3}{8}$ or $\frac{1}{2}$ -in. holes through the jaws to form round-bottom slots. Then cut out the waste by sawing down from the top of the jaw with a hacksaw. Two cuts will be necessary to form the sides of each slot. Then smooth the sides with a file. Reassemble the vise and check the register of the slots. For such an operation as that in the lower left-hand detail it is important that the corners of the slots register. If this is off when the jaws are tightened, it can be corrected by filing.

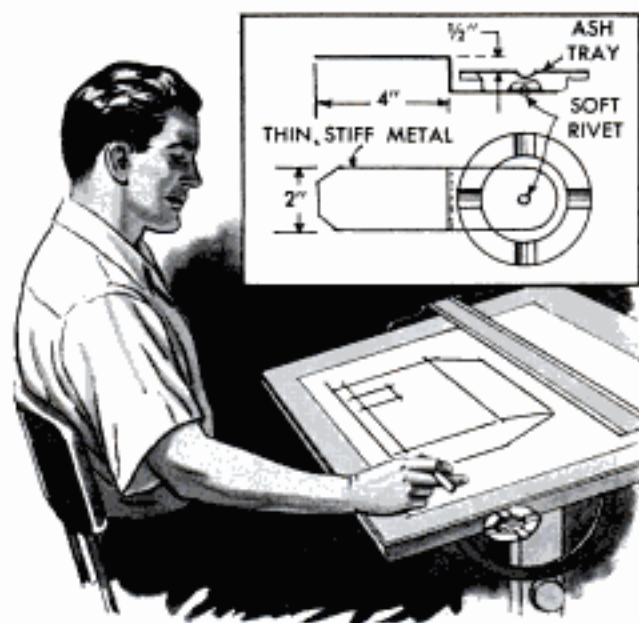
Slotted vise jaws aid in making certain complicated bends in sheet metal. Bending a tab as in the photo below is an example. Note depth of slots in jaws



By using length of chain as in photo below and detail above, pipe or tubing can be held securely. Pins passing through chain links engage vise jaws



Ashtray Beside Drawing Board Keeps Work Space Clear

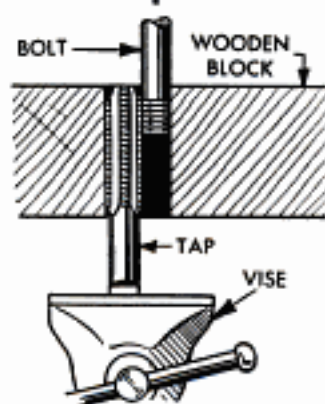


A draftsman who smokes finds it is difficult to place an ashtray where it will be convenient to use, yet out of the way when using the drafting tools. A small ashtray riveted to an offset strip of light sheet metal solves this problem. The sheet metal is thin enough to slip under the linoleum top without interfering, and the offset allows using the T-square without danger of knocking the cigarette off.

L. E. Reichenbaugh, Tulsa, Okla.

Left-Hand Thread on Round Stock Cut With Right-Hand Tap

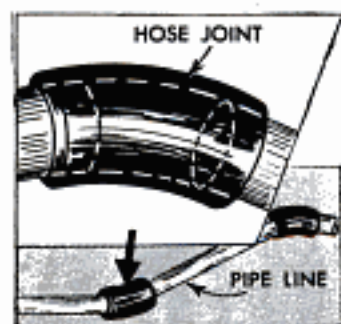
When left-hand dies are not available, a left-hand thread can be cut on round stock for emergency use, by turning the stock against a right-hand tap. Select a tap of the same diameter as the rod to be threaded, then drill two



overlapping holes through a block of hardwood to take the tap and the rod. The holes should overlap a distance approximately equal to the depth of the threads. Insert the tap in one of the holes in the wooden block and lock the squared end securely in a vise. Break, or chamfer, the sharp corner at the end of the rod with a file so that the tap will start easily. Then insert the chamfered end of the rod in the hole adjacent to the tap and turn slowly to the left.

L. M. Lefler, Abilene, Texas.

Flexible Water-Pipe Joints From Auto-Radiator Hose



Leaks from broken joints, often experienced when a temporary water line is laid above ground, can be avoided by using lengths of automobile radiator hose as flexible joints. A garage or

service station often has a scrap pile of discarded hoses, available without charge. If the hose is slightly too large for the pipe, regular radiator-hose clamps can be used.

Roughened Surface of Triangle Takes Pencil Marks Easily



Accurate reference or comparative-measurement marks may be penciled on the edges of a draftsman's plastic triangle if the surface is slightly roughened with fine emery cloth or sandpa-

per. The triangle will remain transparent enough for all practical purposes and the pencil marks are easily erased.

☐ To loosen rusted screws, hold a nail set with the point near one end of the slot so that striking it with a hammer will break the rust seal and start the screw in a counter-clockwise direction.

Battery Cable Quickly Attached By Using Grip-Type Pliers

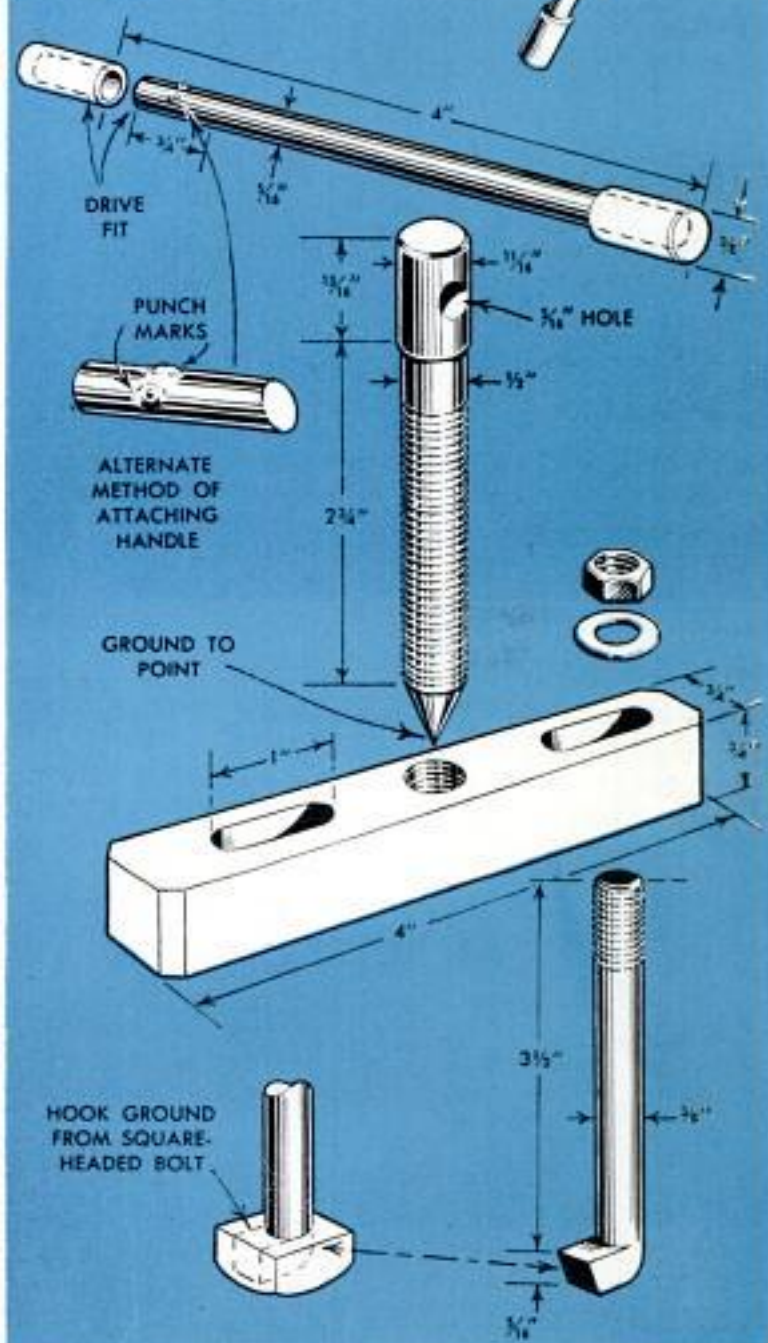
Tow-truck operators have found that on emergency calls when they must attach cables to the battery of the stalled car, the cables are much easier to attach and detach if they are soldered to grip-type pliers. The pliers quickly clamp to the battery post, making a good connection.

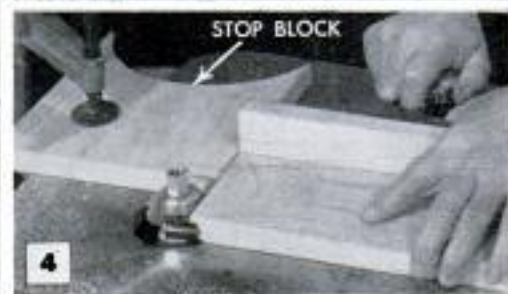
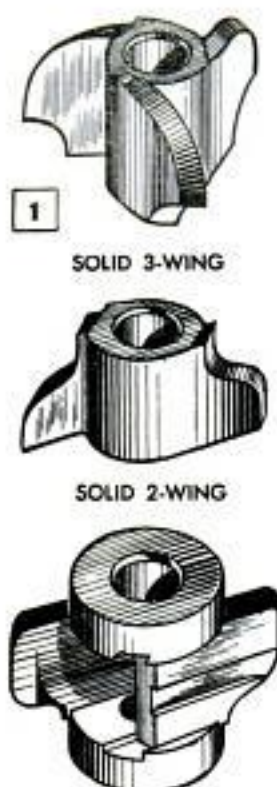


WHEEL PULLER

By C. W. Woodson

IT TAKES ONLY a minute to change pulleys on motors or other shop equipment when you have this wheel puller handy. It does the trick without any damage to the pulley or shaft. As dimensioned in the details at the right, the unit is suitable for small pulleys or gears, 3 in. or less in diameter. By simply making the bar longer the tool can be made of sufficient size to handle pulleys up to 6 in. in diameter without increasing the sectional size of any of the parts. Slots in the crossbar are formed by drilling adjacent holes and then filing out the waste. The slots permit a range of adjustment on the hook bolts for pulleys of varying diameter. Hook bolts are made by filing or grinding away the square head of a machine bolt, leaving a lug as shown in the lower right-hand detail. The pressure screw is shouldered to $\frac{1}{2}$ in. for a $\frac{1}{2}$ -13 thread. This is standard practice but is not essential. Where a lathe is not available you can simply thread a length of $\frac{1}{2}$ -in. rod, grind one end to a sharp point, at an angle of about 60 deg., and then drill a hole transversely near the other end for the sliding handle. Ordinarily, sliding handles are made of drill rod with machined end caps drilled and reamed to a drive fit over the ends of the rod. The caps can be eliminated and punch marks made near each end of the rod to prevent it from sliding out of the hole in the pressure screw. When removing a pulley, especially one of larger diameter, be sure that the lugs engage the rim of the pulley correctly so that pressure is exerted in line with the shaft.



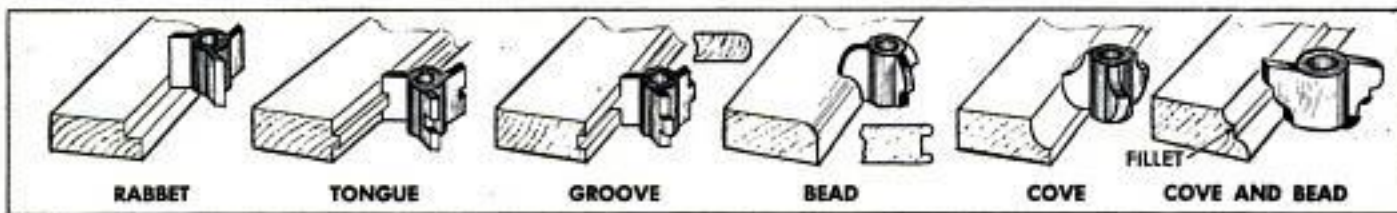
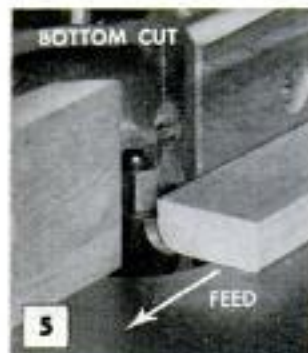


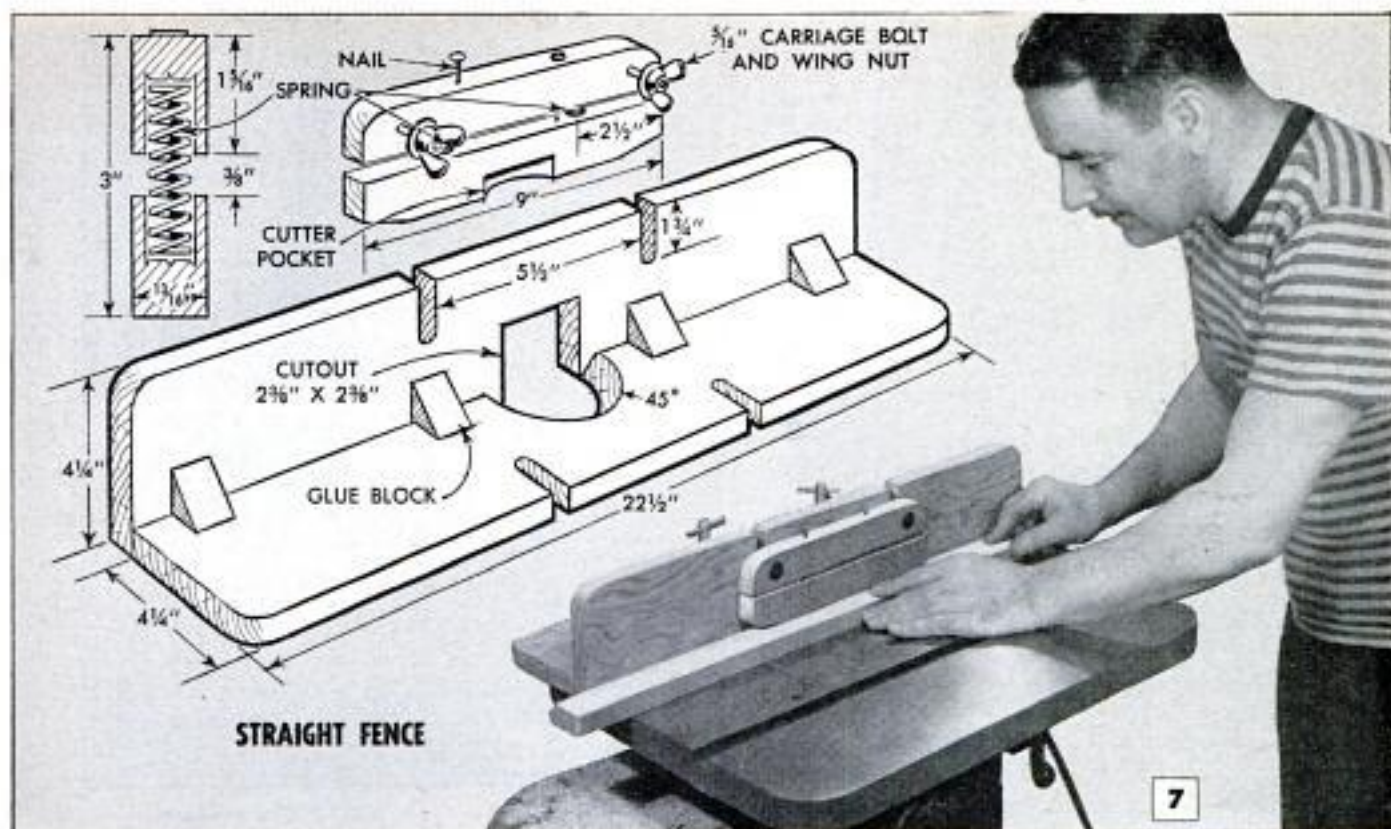
The how of STRAIGHT SHAPING

STRAIGHT MOLDINGS in a variety to suit almost any requirement can be run on a small spindle shaper. Practically any molding shape required in ordinary cabinet joinery can be made if a suitable set of cutters is at hand. Cutterheads and knives are available which incorporate several shapes on a single cutting edge. This enables the operator to combine the cuts on one strip of stock to produce the molding shape desired. Combination cuts made with the knives running on the upper and lower edges, or corners, of the stock are detailed in Fig. 11. Some moldings made in this manner will require the use of two or more knife shapes. The same knife shape also can be used to produce different sizes and types of moldings. Note, for example, the use of the knife A in Fig. 11. Then compare with the use of the same knife in Fig. 47. The letter designations in Figs. 11, 14, 17 and 18 are intended merely as a convenience in comparing the various setups in which the same knife, or knives, are used. The letters are not in alphabetical order. Nearly all machines are supplied with a guard. In the accompanying photos, guards have been removed for clarity.

The standard shaper fence, Fig. 2, is used to guide the stock in common straight-shaper cuts running with the length of the material. Where a cut must be run across end grain on narrow pieces the stock is guided by a miter gauge as in Fig. 3. On certain cuts it is necessary to use a stop block as in Fig. 4.

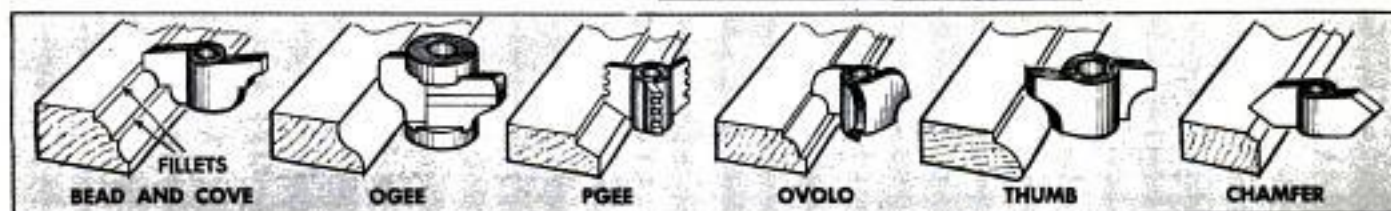
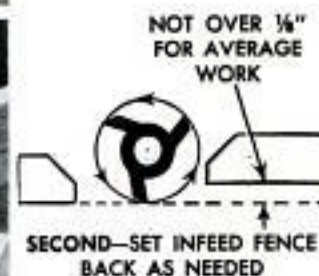
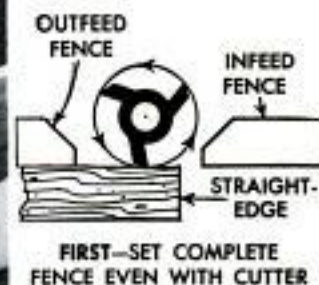
Cutter equipment: For use on small machines the most popular are the two and three-wing cutters, Fig. 1. These are solid cutters having integral knives. The industrial type of shaper head consists of two collars and two separate knives as in the lower two details in Fig. 1. The edges of the knives fit in grooves milled in the collars. On some heads of this type the grooves are milled with the bottoms at only a slight angle as shown. On others the grooves

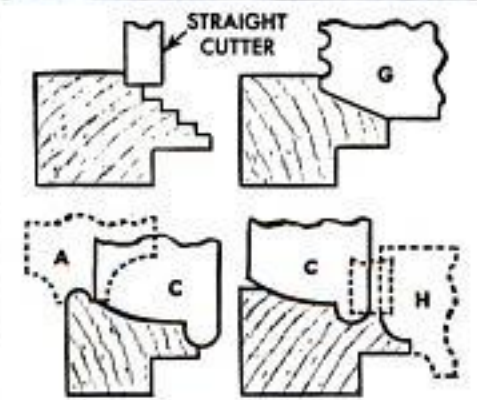
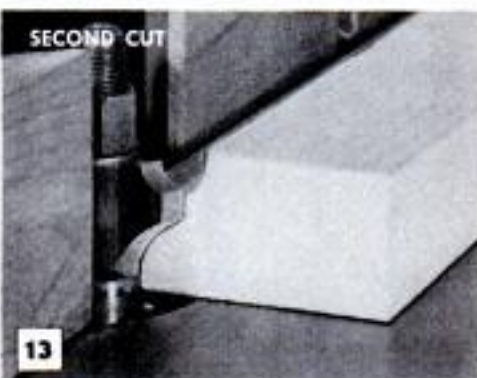
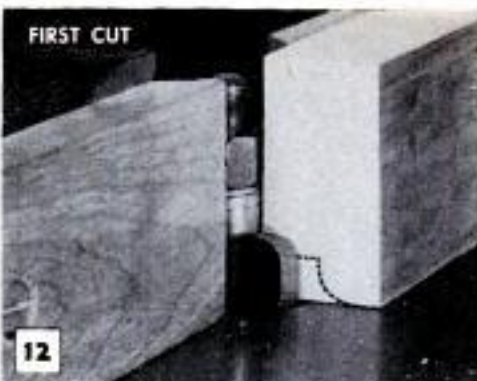
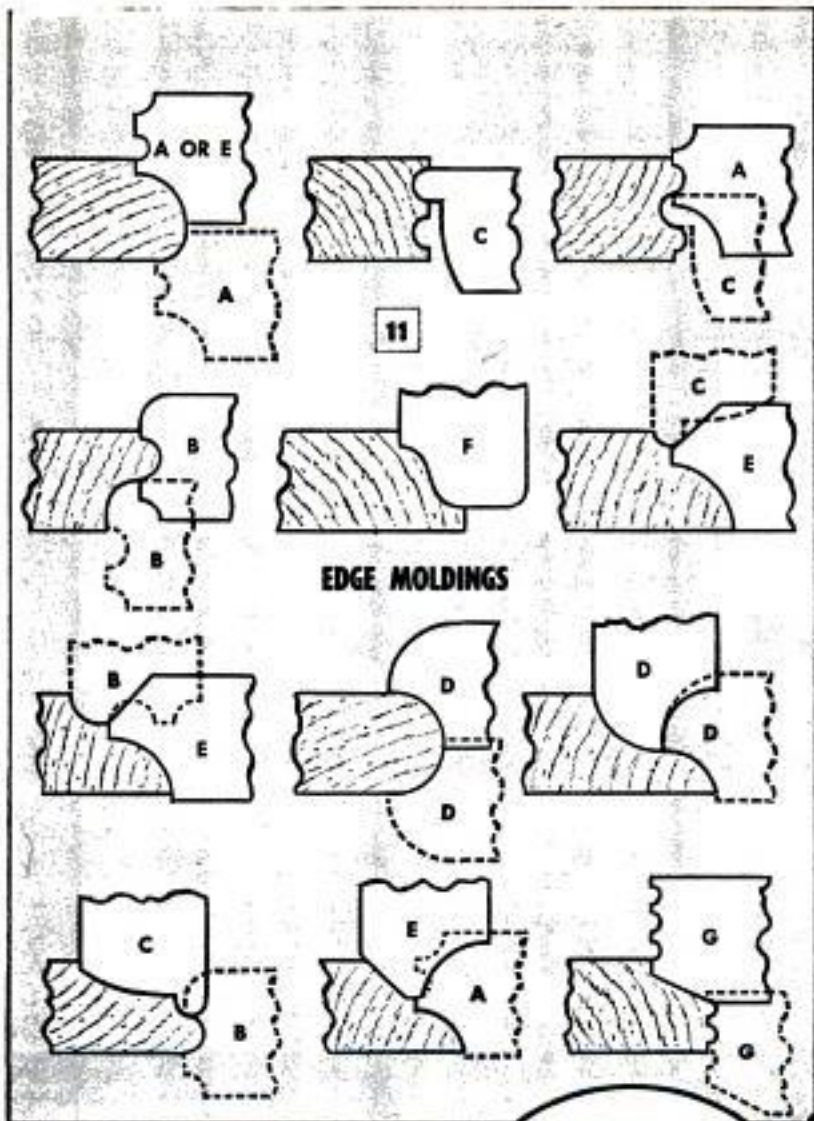




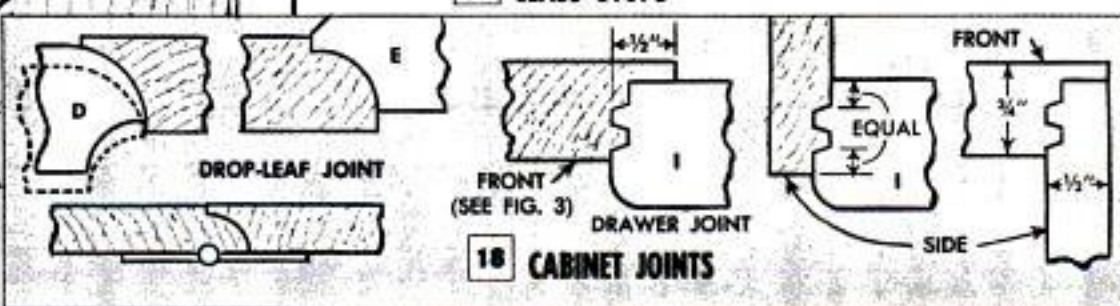
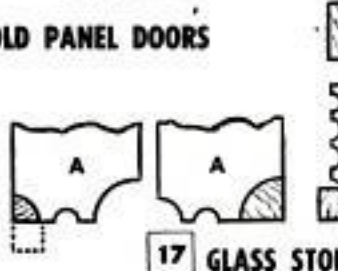
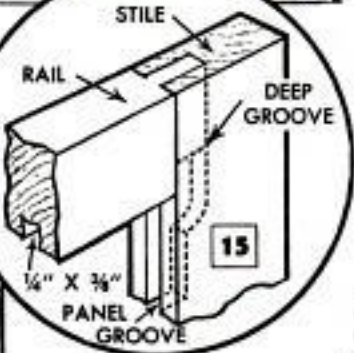
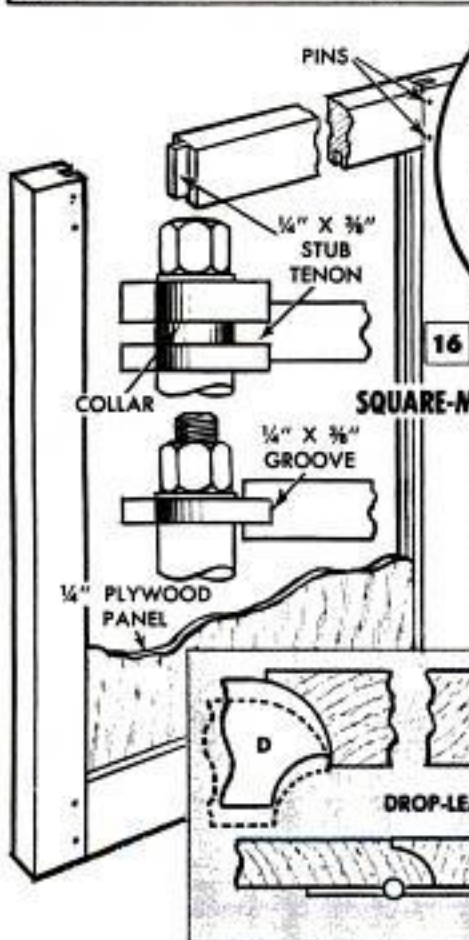
are V-shaped with one side vertical, the other milled at an angle. Cutters are milled with corresponding bevels. Some collars of this type are fitted with a pin as in the lower detail, Fig. 1. The pin engages a hole drilled in one edge of the cutter as indicated. This feature is valuable in that it returns the cutter to the same position each time it is removed for sharpening.

Work feed: Normally the work is fed from the right with the cutter rotating counterclockwise. Adverse grain in the wood may make it necessary to reverse the shaper spindle or the cutter and feed from the opposite direction, Fig. 21. However, spindles on late-model machines are driven at high speeds and this makes it possible to feed against the grain with comparatively little danger of tearing or splintering the wood. Wherever practical, the cut should be made with the cutter running on the underside of the stock, Fig. 5. Top cutting, Fig. 6, is always avoided by careful operators whenever possible as there is danger of damaging the molding should the





14 PICTURE FRAMES



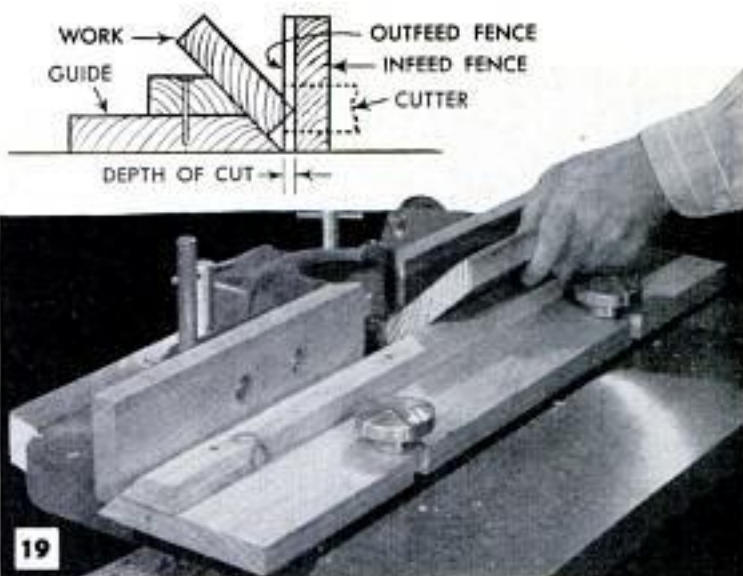
stock tilt slightly on machine table.

Auxiliary fence: Many shaper operators make an auxiliary straight fence with a pressure shoe, or hold-down, for use when shaping straight work. Such a fence can be used on all molding cuts which do not remove all the stock from the edge, Figs. 11, 14, 15 and 18. When all the stock will be removed in either the first or second cuts, Figs. 12 and 13, it is necessary to use the adjustable fence with which the machine comes equipped. This fence is set for the cut as in Figs. 8, 9 and 10. Note that it is set to support both the cut and uncut wood.

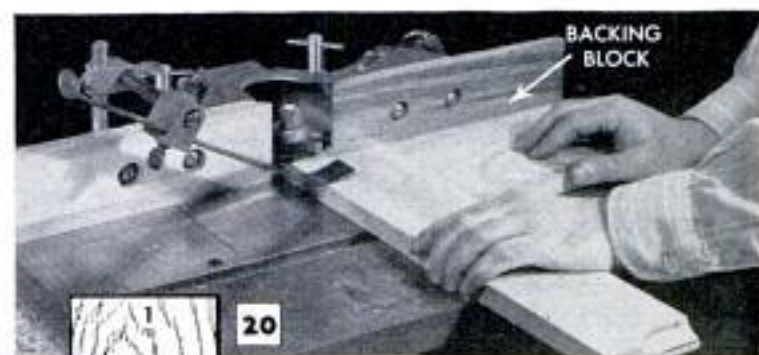
Bevels and chamfers: Such cuts are run with the auxiliary table, or guide, shown in Fig. 19. A straight cutter is commonly used. The table is supported against the outfeed fence and the adjustment of the fence itself determines the depth of cut. This should not exceed $\frac{1}{8}$ in. for each pass.

Crosscuts: These are run with the stock supported against the miter gauge, Fig. 3, or a backing block, Fig. 20. When the crosscut also is a face cut, the use of an auxiliary guide, or fence rider, is necessary, Figs. 22 and 23. The job can be done as in Fig. 24 but the method shown is not always satisfactory except on stock wider than 6 in. This is due to the poor support across the fence opening. Another method is to support the stock vertically against an auxiliary fence patterned after that detailed in Fig. 7. This type of fence spans the shaper cutter and permits face-molding narrow stock. Use a wooden spring, or hold-in, as in Fig. 24.

Door-lip molding: This type of molding is run with the setup



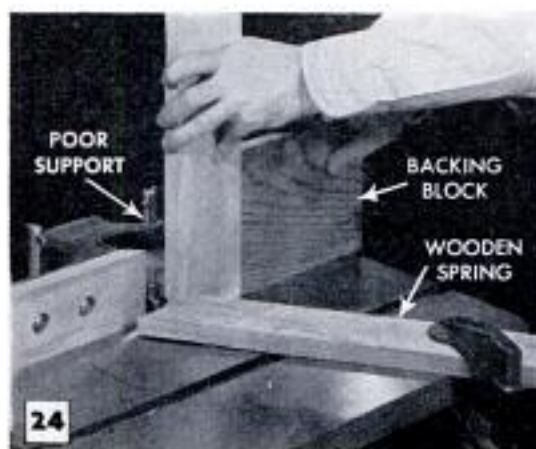
Beveling and chamfering cuts are run on shaper with a special angle guide. Adjustable shaper fence determines depth of cut

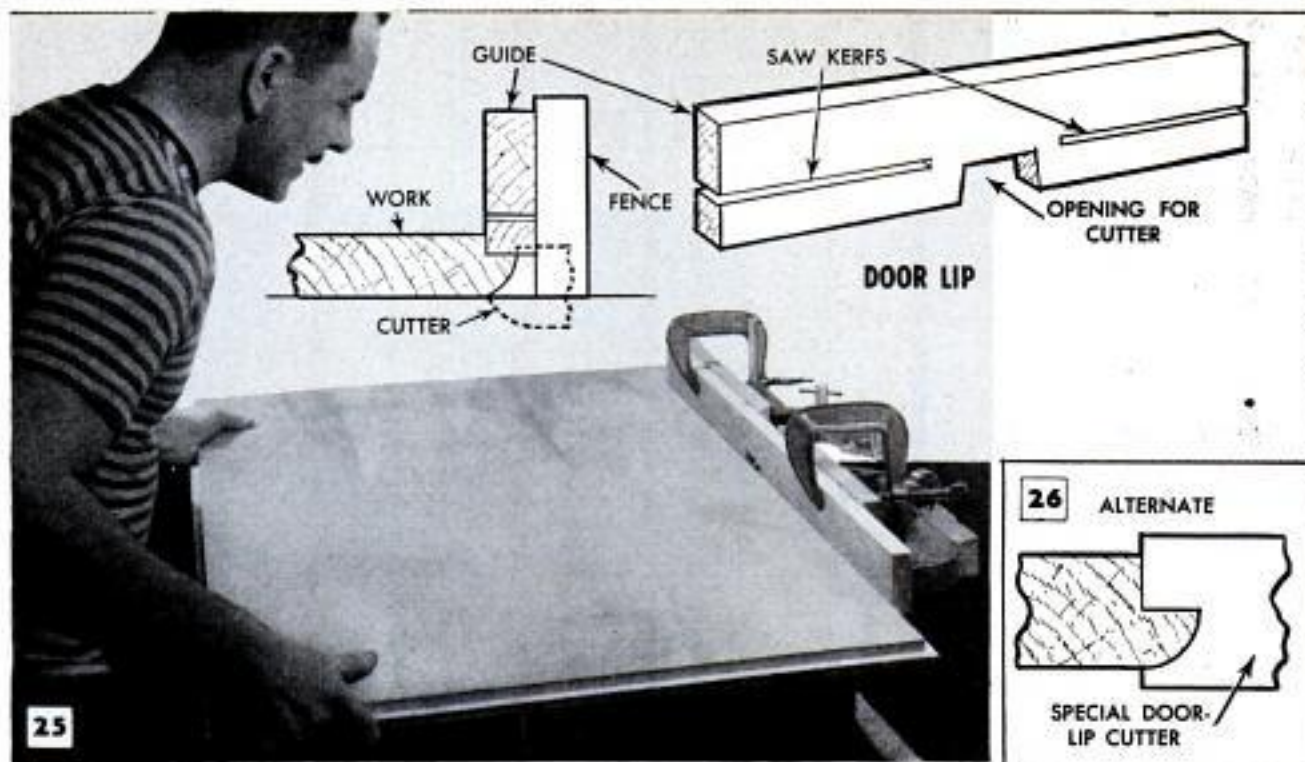


Molding cuts across end grain should be worked with a backing block to prevent splintering. Note use of a spring hold-down



When the molding cut must run across the grain and on the face of the stock, use the setup pictured above. The setup shown at the left is permissible only on stock wider than 6 in.





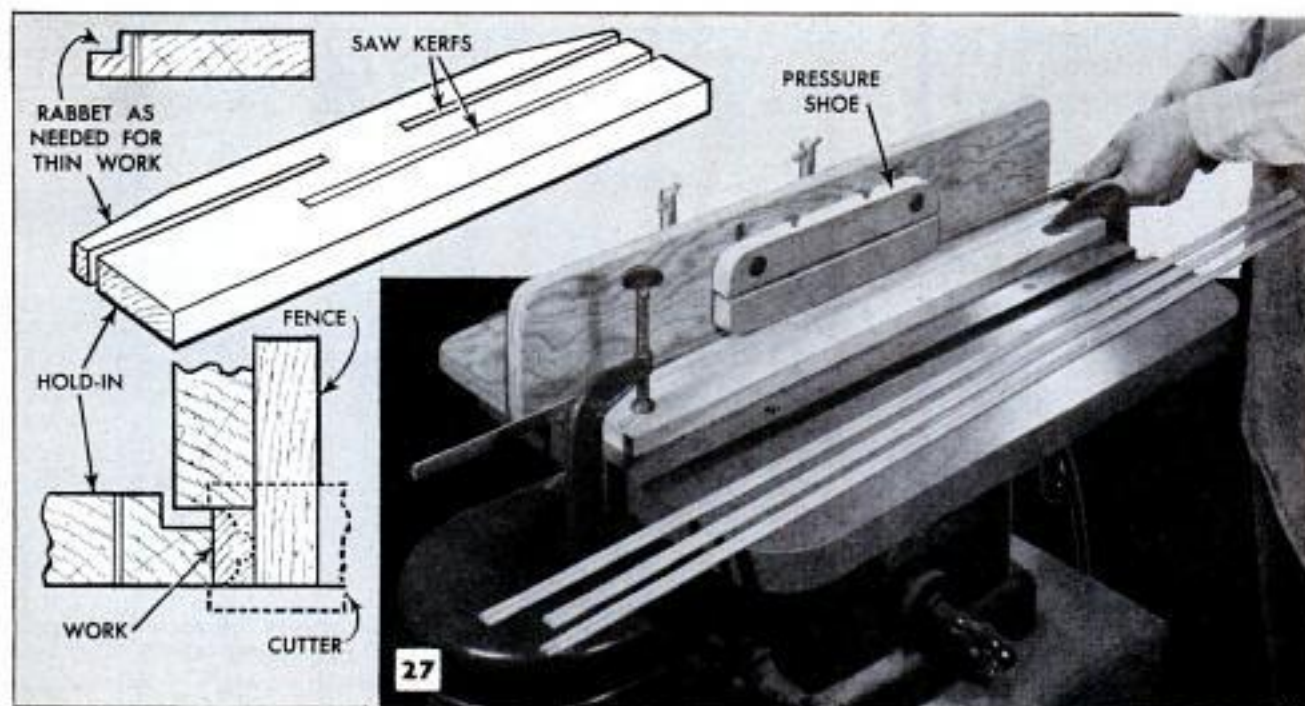
Running a door-lip molding in two operations is best practice on small machines. Sectional detail shows setup

shown in Figs. 25 and 26, the latter showing a special door-lip cutter which runs the shape in one pass. In the first method, which is the most reliable on small machines, the rabbet is run first with a straight cutter, Fig. 25. Then a guide is clamped to the shaper fence and adjusted to a height that will permit the lip of the stock to slide under it as in the sectional detail. The lip is rounded with a second pass of the stock, using cutter A or D, Fig. 11. This type of setup also works well when running the stiles and rails for square-mold panel doors, Fig. 16. The combined guide and hold-down

strip clamped to the fence prevents the stock from lifting through warp or manipulation which, of course, will result in a wavy cut.

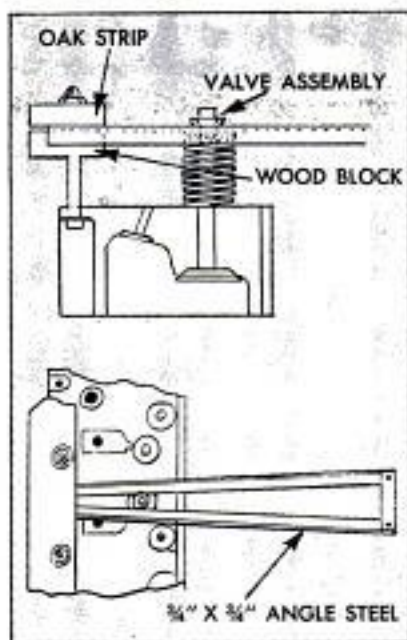
Strip moldings: Short runs of narrow strip moldings are usually carried out by shaping the edges of wide boards and then ripping off the strips to the required width or thickness, as the case may be. On longer runs the use of precut strips is faster. Using a hold-in and hold-down as in Fig. 27 the job is simple and safe. Stock to be precut should be carefully selected for straightness of grain and freedom from knots. ★ ★ ★

Where a number of strip moldings are to be made, the job is worked with the setup detailed and pictured below



Angle-Steel Spring Compressor for Valve-in-Head Engines

Because his valve-spring compressor did not furnish enough leverage to compress the springs on a valve-in-head engine easily, one home mechanic made his own with $\frac{3}{4}$ x $\frac{3}{4}$ -in. angle steel. A wooden block $1\frac{3}{4}$ x 3 in. was cut from 1-in. stock and bolted to the narrow end of the compressor, with the 3-in. measurement in line with the angles. A $2\frac{1}{2}$ -in. length of the angle then was bolted to the wide end of the compressor frame, which was thus a closed triangle. In use, the narrow end of the angle frame is slipped under a length of 1 x 3-in. oak which is bolted to the head on the side opposite the valves. With the angle frame adjusted to clear the keepers, a light pres-

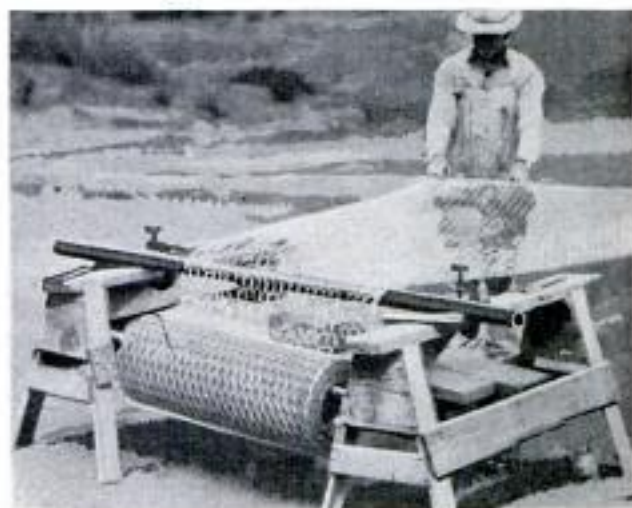


sure will compress the spring. Support the head at each end when replacing the valves, so they can be held in place.

Perry W. Trout, Kansas City, Mo.

Rack Formed With Sawhorses Aids in Cutting Fence Wire

To overcome the tendency of poultry wire to curl back toward the roll as it is being unrolled for cutting to the lengths required, one farmer assembled a rack from lengths of pipe laid across two sawhorses as shown. With the roll mounted to turn on a pipe rested across bracing members of the sawhorses, the end of the wire is drawn up over a second pipe laid across top members and then pulled back sharply to bend it in the opposite direction. This usually is sufficient to cause the wire to lie flat for cutting. The second pipe is held in place by means of a stop formed by a 2 x 4 clamped to the sawhorses, which also prevents the horses from moving apart.



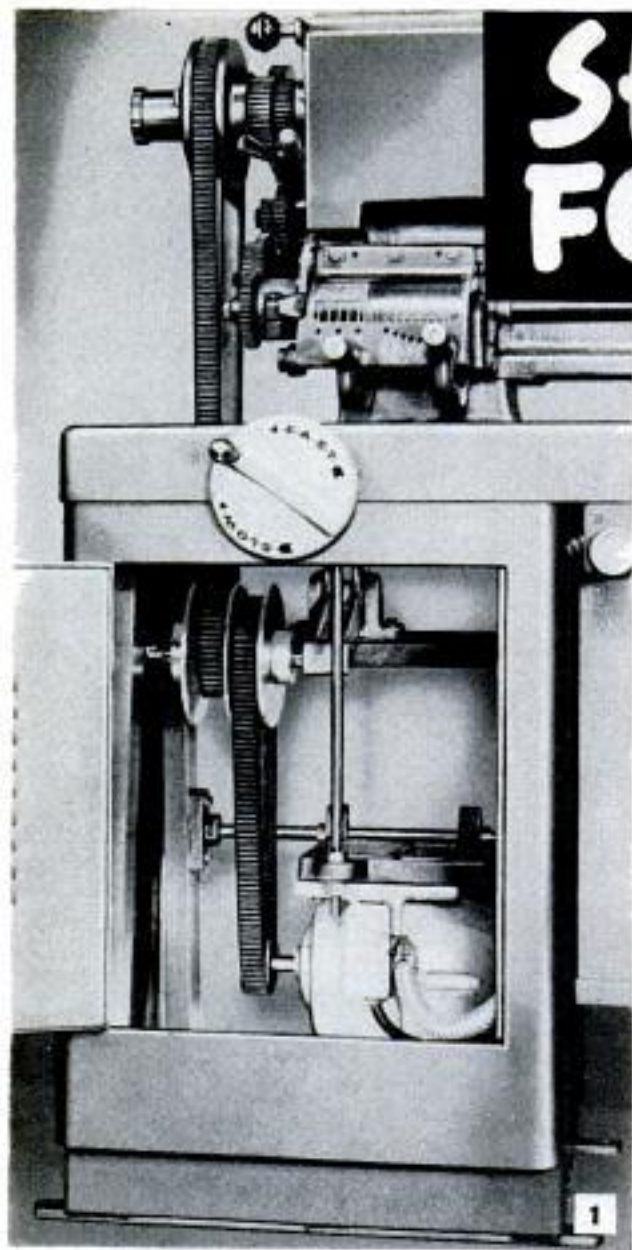
Trailer-Mounted Cornsheller Driven by Tractor Take-Off



A light, cylinder-type cornsheller is easily adapted to power take-off drive by mounting it on a low-wheeled trailer and fitting it with a jackshaft mounted on the sheller frame as pictured. The power take-off shaft is connected to the jackshaft by means of a splined sleeve and universals. The jackshaft runs in self-oiling bearings and is flat-belted to the cylinder shaft of the sheller, the size of the flat-faced driving pulley being determined by the regular speed of the tractor take-off. An idler pulley running on a spring-tensioned shaft automatically maintains belt tension.

A. M. Wettach, Mt. Pleasant, Iowa.

SHOPPING FOR TOOLS



1. VARIABLE-SPEED DRIVE for a popular 12-in. lathe gives infinite speed variation between 38 and 1575 r.p.m. without stopping the lathe. Speed is changed throughout entire range by turning handwheel. With back gears engaged speed range is 38 to 295 r.p.m.

2. ROLLING TOOL RACK provides storage space for 100 tools used by auto mechanics, maintenance men and machine rebuilders. Sloping racks have 360 holes for attachment of spring clips with self-tapping screws. Kit, or rack, is 12 x 12 x 22 in., weighs 9 lb.



3

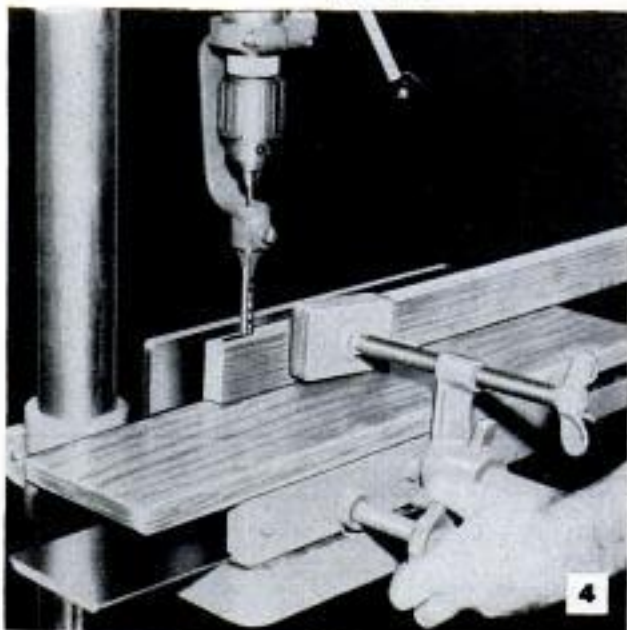
3. HOLE SAW is adjustable to any diameter from 1 1/4 to 2 1/2 in. Calibrated dial indicates settings of the three cutting blades. Cuts circular disks, washers, gaskets and plugs with clean, sharp edges, in metal, wood and plastics. Can also be used as wood planer

4. MORTISING TABLE for hollow-chisel mortising, routing and planing operations on drill press or mortising machine. Fits table of any small drill press and provides horizontal table travel of 12 in. Work is clamped securely in position against a steel fence

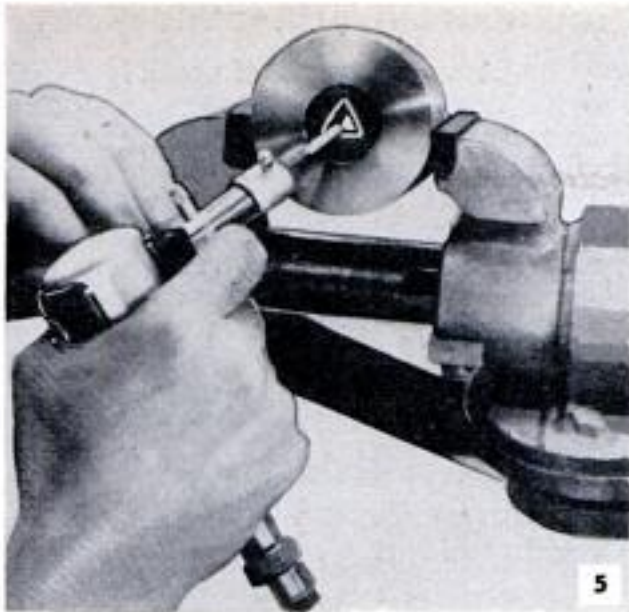
5. VIBRATIONLESS FILING MACHINE for hand finishing operations, die filing, profiling and all delicate operations where close work is necessary with a hand-held tool. Gives both reciprocating and rotary motion to special files, burrs and various grinding cones



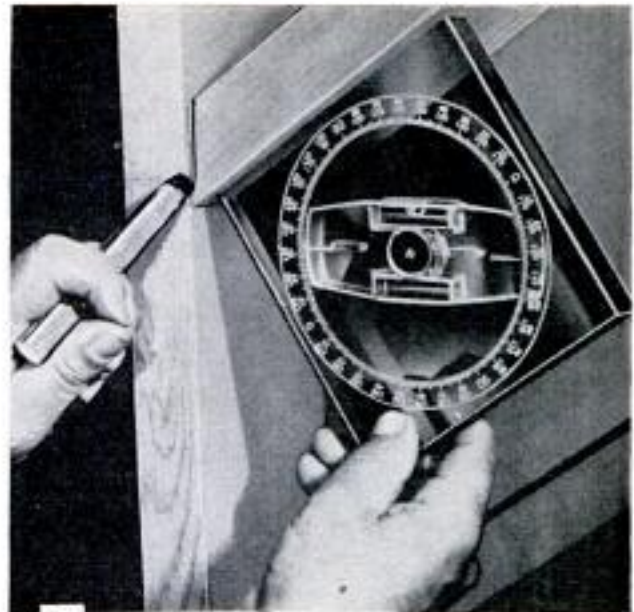
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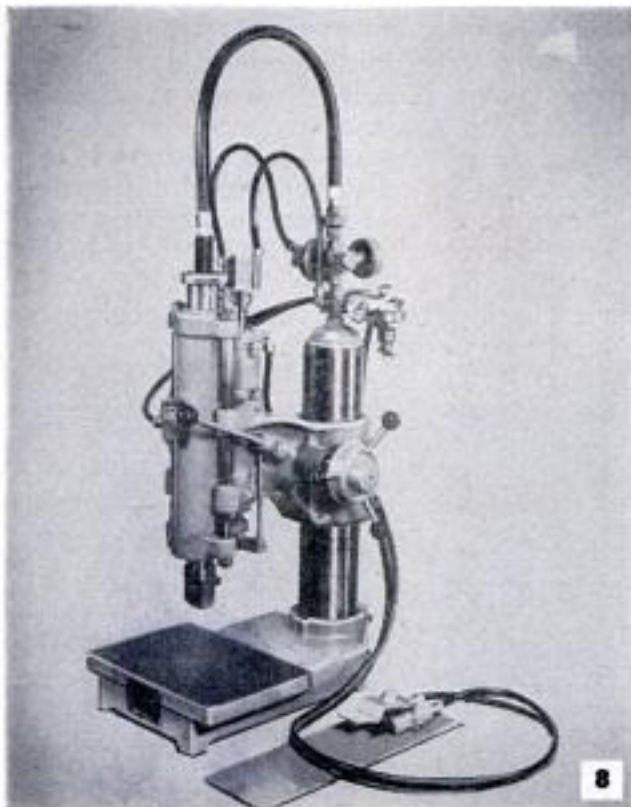
4



6. ANGLE GAUGE has movable circular dial, one side showing all angles in degrees while the reverse side of dial translates degrees to inches-per-foot drop, carpenter-square measurements and percentages of grade. Saves time when figuring roof framing, leveling floors and foundations. Degree meter also is used to survey rough ground, grade ditches and roads



7. DOUBLE-CUT LINOLEUM KNIFE utilizes two cutting wheels with overlapping edges instead of the conventional blade. Overlap of the cutting edges keeps them sharp, due to the honing action as they rotate. Oil-impregnated felt disks, or wipers, keep the cutting edges clean. Knife frame is made with an offset which aids in guiding the knife along guide line



8. IMPACT PRESS gives positive uniformity of impact force and speeds up to 10,000 complete cycles per hour. Press is air-operated; handles uniform work with a clearance of as little as .005; delivers an impact which can be varied from 30 to 30,000 lb.



Fence Opening for Farm Dogs Provided by Suspended Tire



Burned Distributor-Cap Contact Causes Misfiring of Engine

Here's one to think of when your auto or tractor misses regularly on acceleration and all the ordinary checks fail to locate the trouble. Uniform clearance between the rotor arm and the contacts in the distributor is important. Remove the cap and examine it carefully for arc streaks which look like shallow scratches. These generally lead away from a badly burned contact, which may be the cause of excessive clearance. More rarely, the offending contact has been damaged by other causes or is slightly misplaced in the cap. Check for excessive clearance by placing a small piece of wax on each contact in the cap, then turn the engine over with the cap in place. The rotor arm will cut through the wax and thus indicate the variation in clearance. A damaged cap should be replaced, but engine performance can be restored by placing a drop of solder on the contact having the widest clearance and filing to the correct spacing.

Hayrake Teeth Divide Trough



Permanent dividers on a hog trough make it difficult to clean. To avoid this, one farmer made dividers by setting hayrake teeth in the concrete feeding floor, spacing them the proper distance apart. For unobstructed cleaning it is only necessary to slide the trough out through the row of dividers.—G. E. Hendrickson, Argyle, Wis.

To eliminate the risk of possible injuries to his dogs whenever they jump over a barbed-wire fence, one farmer rigged up an old tire as shown at a point where they most frequently attempted to traverse the barrier. The tire was slotted so that two adjacent strands of wire could be spread apart and caught over and under it, suspending the tire in the air while at the same time providing a cushioned opening through which the dogs could jump.

Screwdriver Holds Small Bolt To Loosen Rusted Nut

When the head of a small bolt is inaccessible to a wrench, a slot sawed in the threaded end will permit it to be held with a screwdriver while the nut is removed. Make the cut deep enough so that the screwdriver won't slip as pressure is applied to the nut. If the nut is rusted to the threads tightly, a little kerosene or penetrating oil, preferably the latter, will aid in loosening it.

Richard Hanscom, Elmhurst, Ill.



Hypodermic Syringe Lubricates Small Electric Motors

An inexpensive hypodermic syringe and needle will provide a means of accurately measuring the application of small quantities of lubricating oil. Ideal for use when repairing or servicing small electric motors, such as those used in working models and electric shavers, the hypodermic will apply as little as one drop at a time. The needle may be embedded in a cork to protect it when not in use.





Weep for poor Willie,
 who thinks he's done fine
 If he gets nothing more
 from car polish - but shine...

So when it starts raining,
 this well-meaning fella
 Has to let his wife drive
 while he holds an umbrella.



But look at Joe Robust!
 His sagacious selection
 Is an easy-on wax
 that gives rock-hard protection!

For Bodygard wax
 holds off nature's barrage
 And his paint job's as safe
 as if in a garage!

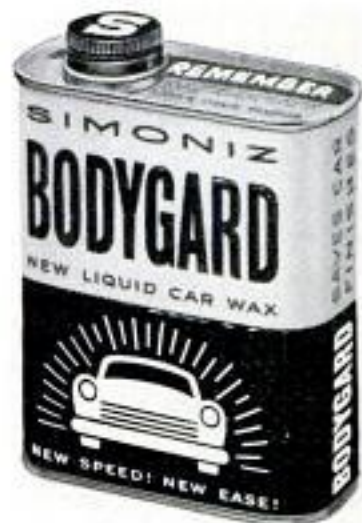
(He feels extra breezy, 'cause the job is so easy.)

**MORAL: Use New Liquid Bodygard -
 the first, easy wipe-on wax that
 protects your car with this
 rock-hard finish. Protects 9 times
 longer than skimpy-shine polishes.**

YOU CAN'T SHINE DIRT,
 SO CLEAN YOUR CAR FIRST.

Every car must be cleaned before it's waxed.
 Simoniz Liquid Kleener cleans better, faster.

Copyright 1954 by Simoniz Company



True Simoniz Quality in
 a Liquid Car Wax. **Only 98¢**

Here's the inside story on Kodak carrying cases

by **A. E. Lechleitner**
Supervising Design Engineer
Eastman Kodak Company



**We buy the best top-grain leather
obtainable—and even then only 70%
passes our inspectors**

When people visit our factory, they are surprised to see how particular we are about the quality of our carrying cases.

Here you see the inside story on a camera case (this one is for the Kodak Signet 35

Camera). And opposite are highlights in the production of a "hard" case for a Kodak movie projector. There's a fine Kodak case for nearly every Kodak camera and projector. At Kodak dealers.

Stylists design new models

When Kodak engineers create a new camera, the next step is for stylists to take over and fashion a carrying case. A new case must not only protect; it must also add to operating ease and complement the camera's beauty.



40 operations for average case

It's hard to believe, but a leather case like the one for the Kodak Signet Camera goes through 40 precise manufacturing steps. The final product is unsurpassed for quality and what we call "hidden values."



Only top-grain leather

We buy only the best top-grain cowhide. And even then, 30% is rejected in

final tests as not being quite good enough to meet our high standards.

Vegetable-tanned for moisture-proofing

The primary function of a leather case is protection. Each piece of top-grain leather that eventually goes into a Kodak case has been vegetable-tanned. This process interlocks the leather fibers to provide maximum durability. This is the acme of leather processing. We never sand or fill-in cracks either. In the long run these flaws would show up and weaken the whole case.

Many rigorous laboratory tests

Kodak has one of the most extensive research labs for testing leather. There are literally dozens of tests that all leather samples must pass before being accepted for use. On the right you see the bursting-test machine that subjects the leather to a pressure of several hundred pounds per square inch. We know that leather passing this test will withstand hard knocks and will take plenty of abuse for years.



We also test for ability to withstand flexing in cold weather. The picture at left shows finished leather cases in a refrigerator room where the temperature is 0° F. If the leather shows no cracks after exposure to this test, it passes.

And so it goes. It's a matter of test after test. Sample leather is tested for finish, fading, and aging. At right you see leather cases being tested in an aging oven. Inside this oven, sample cases are left for long periods of time. Terrific heat simulates years and years of deterioration. This severe test subjects a case to the most rigorous conditions it might meet during a lifetime.



Machines cut leather to perfect pattern

The approved leather is now ready to be cut into bottom, top and side pieces. Precision tools (right) insure a perfect fit for each model.



Skilled workers sew with long-staple cotton thread

Durable thread is used for joining the pieces of leather to form the case. Corners are lock-stitched.

Metal reinforcements are rustproof



In cases for some camera models we insert metal reinforcing for extra support. This metal is rust-proofed to insure long-lasting protection. And the leather lining is finished smooth for better wear and appearance. Also makes it scuffproof.



You get top value for your money

As you can see by now, there's no compromise on quality of materials or smartness of design when Kodak makes a carrying case for your camera. Even in our simulated-leather cases for inexpensive models, the materials and workmanship are of the best. These cases also are tested for aging, peeling, fading, cracking.

With all this "to-do" about building a carrying case, you might expect the price to be exorbitantly high. Not at all! Over the years we have been able to introduce new economies all along the line. The end result is absolutely top value in camera cases.

A Kodak "hard" case for projectors will support a 180-pound man

You'll never do it, most likely, but you *could* safely stand on top of our projector cases—those for both movie and slide projectors. They're that strong and rugged. And a good thing too, because optical systems and lamps are fragile at best. They deserve the utmost protection—a Kodak carrying case.



Carefully select materials

Shockproof plywood—and a product called heavy chipboard—are our best materials today for these cases.

Lock corners for long life

The simplest way to make

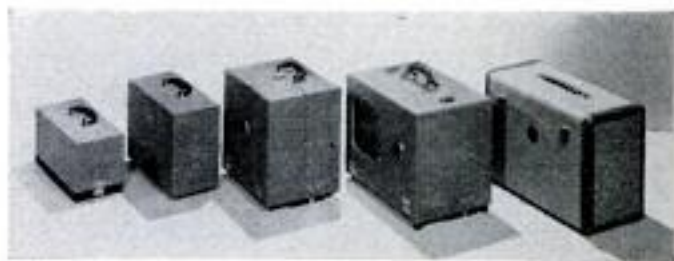
a box is to take pieces of wood, slap them together, and glue or nail. But that's not the way we do it (see picture above).

Fine-quality hardware

We find customers with cases that are 20 years old and older getting the same good service out of them as when they were first made.

Sanforized® linings won't shrink

Our research lab learned that ordinary cotton lining shrank too much. Now all Kodak hard-case linings are shrinkproof (shrinkage will not exceed 1%).



Wide assortment of Kodak hard cases

We make all our own cases for our slide and movie projectors. The next time you're in the market for a projector, check the quality of the cases you see. And when you look at the Kodak cases, remember the inside story of "hidden values."

Eastman Kodak Company
Rochester 4, N.Y.

Kodak
TRADE-MARK

REJOICE !!

With
Millions
of



HAPPY USERS!

Enjoy The Latex Paint with Everything BUILT IN!



SATIN LUMINALL

With Satin Luminall the job is done when common paints have just begun. Thanks to exclusive concentrated formula, one coat primes, seals, undercoats and finishes! No thinners, wall-dopes or solvents to buy! Scrubbable!

FREE! 50 REAL PAINT CHIPS IN
"MATCH-A-CHIP"
BROCHURE . . . COLORS EVERYONE LOVES

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Please send FREE "Match-a-Chip" Color Chart and complete information on Satin Luminall, the latex paint with everything built in.

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Luminall Paint Dealers Throughout the
U.S.A. — See Yellow pages Phone Book
MILLIONS OF HAPPY USERS KNOW THE LUMINALL
LABEL IS THE FINEST GUARANTEE IN PAINTS

Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of Popular Mechanics invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

Finishing Problem

Q—I have an old oak dining set, both chairs and table having rope-turned legs. The filler appears to be almost black. However, all the pieces are in very good condition. I'd like to remove all the old finish back to the bare wood and finish in the newer limed oak. Can you advise and give the correct procedure?—R. Y., Vt.



A—Lack of space will prevent us from giving you complete instructions. Remove the surface coatings of the old finish with varnish remover. The remover will take off the surface finish quickly but will not lift the filler. This must be scraped off with a cabinet scraper on all flat surfaces. On the curved surfaces use a coarse sandpaper to get back to the bare wood. Finish up with fine sandpaper. Then apply a white filler (some finishers apply a thin wash of white shellac as the first coat) and, before the filler sets, wipe off to expose the grain of the wood. Use a coarse cloth, such as cheesecloth or burlap, and rub across the grain until all excess filler has been removed. Follow with the finishing coats. This method removes all the filler from the surface of the wood, leaving it only in the pores of the grain pattern. Much of the wood is exposed in its natural color. Some finishers prefer a lighter color and use white lead as a filler. Paste white lead is reduced to the consistency of heavy cream and brushed on the wood. After partially setting it is rubbed off lightly to expose only a small proportion of the wood in the natural color. We suggest that you try test panels.

Removing Oil Stain

Q—My garage has stucco walls. Some time ago I had the misfortune to spill a quantity of crankcase oil on the stucco making a stain spot which is about 2 ft. wide and approximately the same height. At the time I wiped off the excess oil but the discoloration so far has defied all efforts at removal. Have you any suggestions?—C. M., Okla.



A—Usually such stains yield to a vigorous scrubbing with a brush and a strong solution of trisodium phosphate. Several separate applications may be necessary, especially if the stain is old and the

(Continued to page 226)

Texaco Tips

on car care

How to help keep your brake system in safe condition

Your car's hydraulic brake system is your No. 1 safety guard while driving. To keep it in good operating condition, see your nearby Texaco Dealer for inspections. He will check brake lines, making certain there are no leaks. He will check the fluid level in the master cylinder. If necessary, he will add fluid. Your Texaco Dealer's know-how helps make your driving safer — and more enjoyable.



A



B



How to wear-proof your engine

Nature's best motor oil couldn't keep up with today's high-compression engines. So Texaco engineers developed a motor oil that actually wear-proofs your engine for the life of your car — *Advanced Custom-Made Havoline*. With its *Balanced-Additive* formula, Havoline keeps your engine clean, free from harmful sludge, rust and acids. Notice the difference between these two piston pins after a tough 21 hours of stop-and-go tests. Pin "A" shows rust deposits even with a good heavy duty motor oil. But pin "B" remained clean and rust-free — proof that today's best motor oil is made . . . not born. Drive in for *Advanced Custom-Made Havoline* today! See your Texaco Dealer . . . the best friend your car has ever had.

THE TEXAS COMPANY
TEXACO DEALERS
in all 48 states

Texaco Products are also distributed in Canada and in Latin America



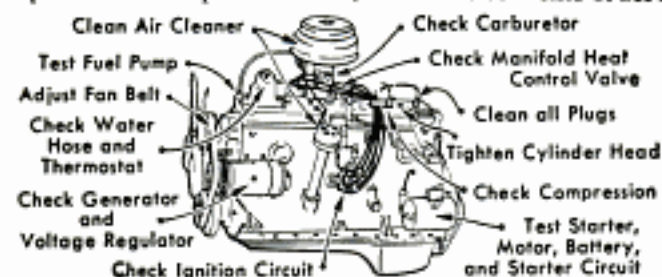
Care and Feeding of Engines

BY
S. P. CORP



ENGINE TUNE-UP

A thorough engine tune-up, to bring all working parts up to standard performance, should follow this order:



Tighten cylinder head bolts to engine specifications. **Remove spark plugs** and test cylinder compression. Reading on first stroke should be 75% of total reading. If not, poor valve operation is indicated. Compression should be equal on each cylinder.

Clean, inspect, adjust spark plugs. Replace any burned or corroded. Check battery cables. Clean, fill, and test battery. Test starting motor circuit for speed of engine turnover and correct current draw.

If battery won't stay charged or drinks too much, check charging circuit, adjust fan belt, check generator output and calibrate voltage regulator.

Check ignition system for high resistance through poor connections or burned contacts. Test coil and condenser to see if they are up to specifications.

Test fuel pump. It should deliver 5 to 6 ounces in 15 strokes, or 1 pint in 45 seconds at idle speed.

Clean gasoline filters. Free up and lubricate manifold heat control valve. Clean and refill air cleaner with engine oil.

Check carburetor with vacuum gauge, a tachometer for engine speed, and a combustion meter for correct fuel-and-air mixture. Adjust idle speed to specifications. *This is a must for cars with automatic transmissions.*

Inspect water hose connections and water pump. See that thermostat is assuring correct engine temperature.

Make final road test. Engine should operate smoothly from idle speed to top speed, and accelerate without hesitation, to assure your summer driving pleasure.

FREE MANUAL ON CAR CARE

When you re-ring use Sealed Power KromeX Ring Sets, factory-seated for fast break-in and immediate oil control. Top compression ring and side rails of steel oil ring are chrome-faced to fight heat, friction, abrasion, and corrosion. Write for your copy of the illustrated manual, "MORE POWER, Less Gas, Less Oil." It contains many valuable hints on car care. Just address a card to Sealed Power, Dept. G-5, Muskegon, Mich.



Sealed Power

PISTON RINGS

(Continued from page 224)

oil has penetrated to a considerable depth. However, in some cases this treatment is not fully satisfactory. A second method is to spray the affected area with a lacquer reducer (thinner). This procedure usually is effective in washing away the oil stain, but has two serious objections, the cost of the reducer and the fact that it is highly flammable. For these reasons we would hesitate to recommend its use, unless special precautions are taken to lessen the fire hazard. Nonflammable carbon tetrachloride also may be used but again the cost of the solvent may be prohibitive. A third method, safer and fully as reliable, is the use of fuller's earth saturated with kerosene. This mixture is plastered over the stained area and allowed to stand until it "dries" to the point where it can be brushed off. More than one application will be necessary.

Staking Tomatoes

Q—Several friends have suggested that I stake tomato vines to obtain larger and more perfect fruit. However, others say that this causes what they call sunburn. I'm also told that staking materially reduces the yield from each plant. What are the advantages and disadvantages, if any? What type and variety of plants are best for staking?—M. R., Ind.



A—As you have suggested, there is considerable difference of opinion among home gardeners on whether or not to stake, or otherwise support, tomato vines. A practical reason for staking the plants is the lack of space in the average home garden. This alone usually is sufficient reason for recommending the practice. There are different methods of staking. Some gardeners prefer to train individual plants to a single tall stake; others set four plants equally spaced two ways so that the plants are about 2½ to 3 ft. apart. A stake is driven close to each plant and the upper ends of the stakes are bent inward and tied or wired together, forming a teepee-like structure or framework. This arrangement has much to recommend it as each vine can be individually trained (tied) to its own stake. Any common variety of plants can be staked.

Removing Concrete Spatters From Flagstones

Q—Recently I had some remodeling done on my home and in the course of the work, concrete was spattered on the smooth flagstones of a walk that passes near one wall. So far these spatters have defied all my efforts at removal. Is there any other way?—S. B., Mo.

A—Dilute muriatic-acid solution usually does the trick but we would hesitate to recommend its use due to the danger of etching the smooth surface of the stones. A safer way, although it involves more time and labor, is to wet the flagstones thoroughly and then rub the concrete spatters with the coarse side of an oilstone (emery stone). Use plenty of water to prevent the emery stone from glazing. When nearly all the spot has been removed, turn the stone over and rub with the fine side. The coarse side of the emery cuts fairly fast and care should be used to prevent "grooving" of the surface of the flagstone.

Cleaning White Tile

Q—I have a ceramic-tile floor in the bathroom which is discolored after many years of use. Scrubbing in the usual way does not remove the discoloration. Is there any way to clean it thoroughly?—W. T., Pa.

A—One way to clean white tile is to make a thin paste, about the consistency of thick cream, of white portland cement and water. Spread the mixture with a brush or cloth and then rub with a coarse cloth or a piece of burlap. When the paste film thickens during the rubbing, add a little water. Then wipe dry with a clean cloth, preferably burlap. This treatment not only cleans the tile but brightens the joints between the tiles.

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MODEL 554**

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MODEL 404



Better See the Motorola TV Hour on ABC-TV Tuesday nights in most cities

Better See **Motorola** Golden Voice Radio

First-Aid Hints for Table-Model Radios

(Continued from page 163)

in photo E, to insure good reception. Crackling noises heard while tuning are often caused by dust between the variable-condenser plates. A simple way to solve the problem is to blow it out, using a short length of rubber tubing as shown in photo F; a pipe cleaner also may be used for this purpose. Loose speaker cones cause rattles which can often be eliminated with a little household cement under the rim as indicated in photo G. Tears in the paper cone can be patched with cellulose tape. A few drops of carbon tetrachloride applied with a medicine dropper, as illustrated in photo H, will sometimes quiet a noisy volume control. Photo I indicates something that a novice should never attempt. The adjustment of small screws in the tops of i.f. transformers. They must be set in proper relation with each other and such adjustments should be made by a radio serviceman as they require special equipment. To repair a broken dial cord, use strong fish-line. Before removing the broken cord see if you can trace out the winding method used. Make a sketch of the pulleys and the cord-winding details. Now remove the old cord. In most cases there will be three turns around the tuning-dial control shaft. Use the same tension spring and the station-indicator pointer that were attached to the old cord. Now tune in a station of known frequency, preferably at the high end of the broadcast band. Hold the dial-tuning shaft firmly with one hand as illustrated in photo J, and then fasten the station-indicator pointer on the dial cord so that it points to the proper frequency for that station.

When replacing the chassis in the cabinet, see that all control shafts are lined up with their respective front panel holes. If the dial opening is provided with a clear plastic window, clean this first. After the chassis is in position, replace the chassis-mounting screws on the underside of the cabinet. If these screws are provided with soft-rubber mounting bushings do not fasten the screws down tight.

If your set is an a.c.-d.c. type and it does not operate when you plug it into the wall receptacle, merely reverse the line plug in the wall socket. Some table-model sets tune to both the broadcast and short-wave bands. Servicemen are often called because the set will not tune in the broadcast band only to find that some member of the family has tuned the band-selector switch to short-wave bands. ★ ★ ★



This 100% Pennsylvania motor oil with *the Tough-Film* stands up under intense heat, resists formation of oil-wasting engine deposits. Your engine stays clean, smooth-running, *uses less oil*. And because Pennzoil lasts so long, it guards against costly wear caused by acids and friction. Switch to Pennzoil now!

As big a difference as ever!

Most motor oils now contain detergents. A detergent's job is not to lubricate, but to improve conditions under which oil lubricates. Pennzoil, too, contains detergents, but its basic lubricating quality, resulting from superbly refined Pennsylvania crude, still provides an extra margin of safety.

Sound
your Z
at this sign...



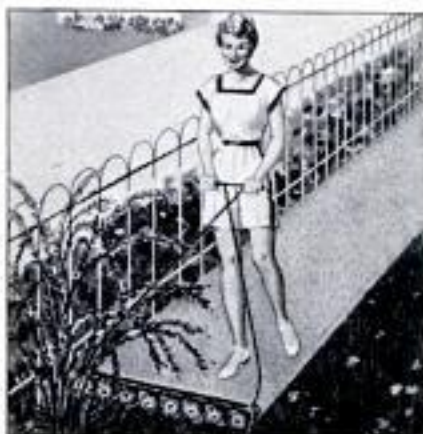
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You can do the whole job with a **MONTA MOWER**



The MontaMower smoothly cuts a full 16" swath of grass, cleanly cutting all the dandelions and tall lawn weeds which the reel-type mower leaves standing . . . no more going back over the lawn with a whipper!

The MontaMower "Trims-As-It-Cuts" right up close to fences, trees, buildings, walks, shrubs, flower gardens and cement walls. Practically eliminates all hand trimming!



The MontaMower is so light (9½ lbs.), so sturdy and responsive that even women and teenagers can mow steep terrace banks up, down, or across, with scarcely any effort!

ONLY MONTAMOWER TRIMS AS IT MOWS -- IN ONE EASY OPERATION

The versatile MontaMower is actually "Two-Tools-In-One" . . . an efficient lawn mower and a very fast lawn trimmer. Due to its unique, patented design, it is the only machine that does the whole job of lawn cutting and trimming in one easy operation. Its live, precision mechanism first gathers, then smoothly cuts a clean 16" swath through grass, dandelions and tall lawn weeds as evenly as a pair of keen-edged shears. It cuts right up to trees, walls, fences and borders . . . "Trimming-As-It-Cuts" . . . leaving practically no back-breaking, time-consuming work to be done by hand. Enthusiastic owners throughout the world tell us the MontaMower

is the most practical hand lawn mower ever designed! Even power mower users say it's a "Must" for close-quarter mowing and all the trimming.—SOLD WITH OUR WRITTEN GUARANTEE!

HERE'S HOW IT WORKS

Eight pairs of newly designed, Self-Cleaning and Self-Sharpening, precision made and fitted, tool steel cutting discs revolving toward each other gather the grass and cut it cleanly with a new shearing action at the intersections of the discs.

TRY THE VERSATILE MONTAMOWER ON YOUR OWN LAWN . . . ON APPROVAL

An actual trial on the lawn where it is to be used is the most convincing proof of the exclusive advantages of a MontaMower and its superiority to conventional mowers. We have, therefore, developed a most attractive "TRY IT ON YOUR OWN LAWN ON APPROVAL OFFER" for those who are definitely in the market for lawn mowing equipment of one type or another. Don't miss this opportunity to see for yourself how invaluable the MONTAMOWER would be to you! Act NOW! Fill out the coupon below . . . Mail it today!



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Gentlemen: Kindly send me (FREE OF CHARGE) completely illustrated, descriptive literature, price, guarantee information, and full details of your attractive "TRY IT ON YOUR OWN LAWN ON APPROVAL OFFER."

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HOWEVER, YOU CAN PAY FOR YOUR MONTAMOWER THRU OUR OWNER'S COOPERATION PLAN!

Gardeners you know:



Merton Wump

Merton is a booster. Gives his plants a big boost of some special concoction every week or so. Has the tallest grass and widest flowers for a short time. Then, no matter how many boosters he applies, everything fades out on Merton. Trouble is he never gets to the root of the matter. Isn't aware that only a complete plant food gives the over-all nourishment a plant requires.

Many gardeners, like Merton, don't realize that what goes on *underground* is every bit as important as what meets the eye.

In fact, the development of deep, foraging roots is the real key to gardening success. Thus, the popularity of Vigoro*.

For Vigoro feeds the entire plant—roots, stems, leaves, blades and all! That's why Vigoro-fed lawns and gardens come up sound and healthy and stay that way far longer. Vigoro actually helps increase the humus of your soil in lawns because it encourages new roots to replace old.

There are now *two* kinds of Vigoro. Regular and new water soluble Instant Vigoro. Both will make plants grow and thrive even in the poorest soils.

*Vigoro is the trade-mark for Swift & Company's complete, balanced plant food.



Regular
VIGORO
•
Instant
VIGORO

Guarding the Graveyard of Ships

(Continued from page 132)

of the Points Adams Lifeboat Station. "The fishermen are safe enough as long as they stay in the river, but we have to keep herding back 200 to 300 strays a day. The fishermen show up in every type of craft you can imagine."

Two small boys probably came up with the most novel—and dangerous—craft. Lashing together two telephone poles and attaching an outboard motor to them, the boys were fishing their way well out to sea when the Coast Guard caught up with them.

During the derby, a transient fishing village springs up on the Washington bank of the Columbia. It is called appropriately Derbyville.

One day two fishermen, long on fishing enthusiasm but short on navigation knowledge, set out from Derbyville. They figured they would have no trouble if they hugged the Washington shore. Six hours later, however, they hailed a commercial troller. Much to their surprise, they were 20 miles up the coast from the Columbia. The troller signaled the Coast Guard, advising that it had customers.

Various navigational aids are used in cheating the graveyard of ships. To get first-hand information on them, we called on Lieut. C. D. Eubanks, commander of the Coast Guard Base at Tongue Point on the Columbia, which has the major job of keeping the navigational aids in top shape. He took us to the shop where buoys were being sandblasted.

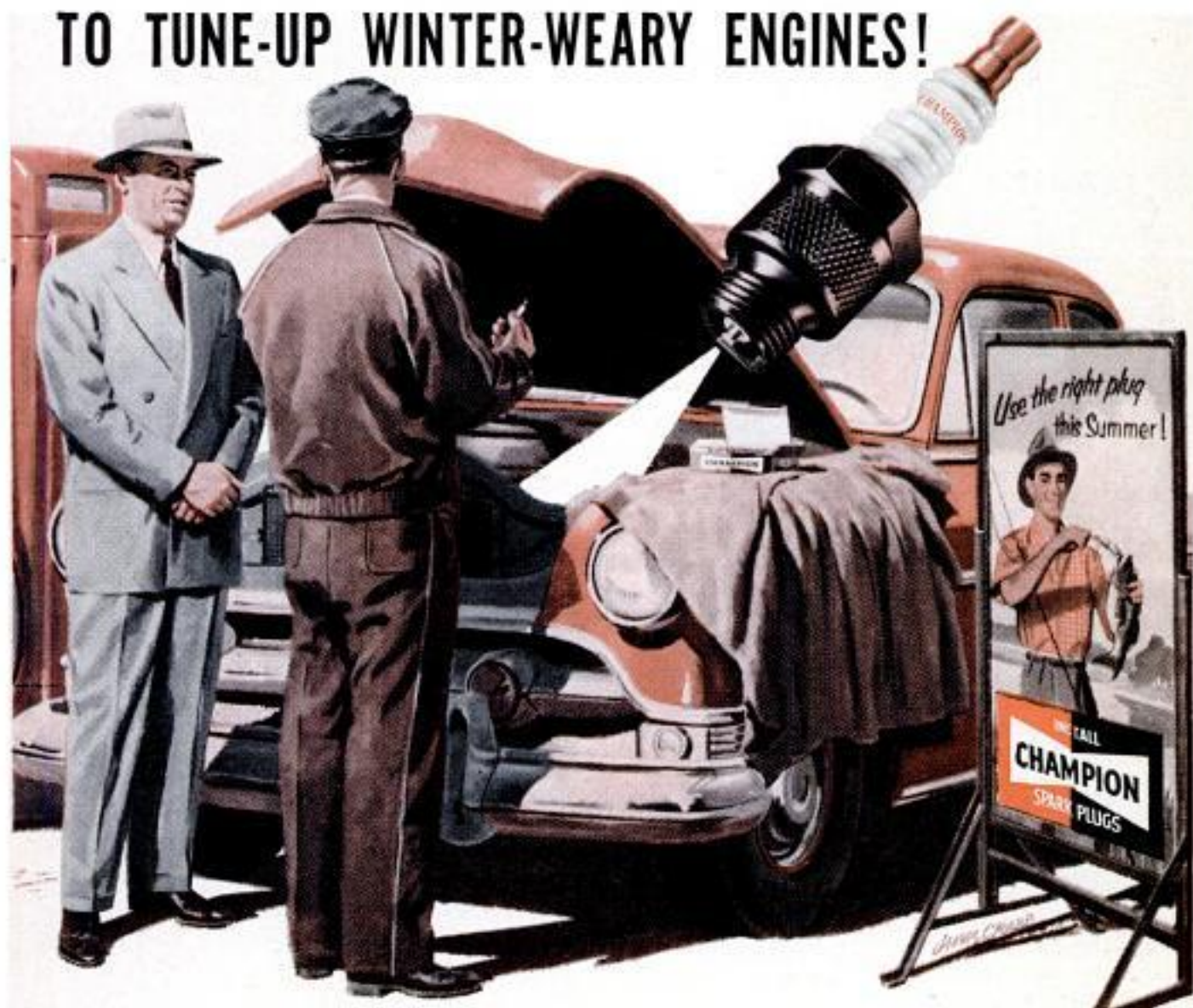
"Used to have to scrape off old paint, rust and barnacles with a wire brush before repainting them," he said. "Now the buoys are made slick and clean in a hurry with sandblasting, and their life in the water has been extended considerably."

You don't get an idea of the size of a buoy until you see one up for repairs. In the water, not much of a buoy protrudes. Some we saw on the Tongue Point dock seemed as big as a house—well, at least cabin-sized. Buoys vary from 7 to 38 feet in height, weigh from 1095 to 20,616 pounds. An electrically operated bell buoy, when loaded with huge batteries weighs 35,000 pounds. The largest buoys carry 72 batteries. Bell buoys in the Columbia are electrically operated because the swell of the water is not enough—except at the bar when the water is acting up—to ring the bell.

Eubanks pointed to old No. 8 up for repairs. It rides the thrashing waters of the bar and, to keep it in position, it must be anchored with two huge concrete blocks,

(Continued to page 232)

NOW IS THE TIME TO INSTALL FULL-FIRING CHAMPION SPARK PLUGS TO TUNE-UP WINTER-WEARY ENGINES!



Install new Champions now to offset the damaging effects of limited use or winter storage and help your engine do a first-class job for you this summer.

Quickest, surest way to wake up your engine for increased summer activities is to install a set of new Champion Spark Plugs.

Champion's full-firing spark—delivered through the finest insulator known to ceramic science to special alloy electrodes—turns every drop of gasoline into power. No unburned fuel remains to build up harmful deposits and thin your crankcase oil. That means you can drive longer, and harder this summer and still enjoy better performance and economy.

Now is a mighty good time to see your nearby Champion dealer and start getting all the power you're paying for!

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B. F. Goodrich Koroseal is the ONE floor tile that combines these 4 desirable features:

NEVER NEEDS WAXING! Minimum care — stays bright with an occasional washing and light buffing.

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ANTI-SLIP SURFACE! Safe to walk on, always!

MAXIMUM WEAR! The same material from top to bottom — no coating, no lamination.

You increase the value of your home when you install beautiful B. F. Goodrich Koroseal Floor Tile . . . and you can do the job yourself! The 80 gage thickness, made especially for homes, is easy to install when you use the B. F. Goodrich Installation Kit. Ask your dealer for guidance.



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each weighing nine tons, 36,000 pounds in all.

Not only are there different types of buoys, including those with whistles, but the buoys have different colors. The color of a buoy indicates the side of the channel to take. Lighted buoys have different characteristics, varying from 15 to 75 flashes per minute. Then there are short and long flashes. The idea in entering the Columbia is to know what particular buoy is where. That's where the professional river pilots come in.

On July 27, 1953, occurred an historic event. A tender, working out of the Tongue Point Base, placed in the mouth of the Columbia the first buoy with a radar reflector. Others were to follow. A radar-equipped ship approaching such a buoy receives a big "pip" on its radar screen.

In the early part of World War II, radar reflectors were placed on permanent structures to warn ships. These were known to the layman as "echo boards."

Aiding navigation at the Columbia's entrance was radio. Then came loran—long-range navigation aid. Ships equipped with special loran receivers can pick up electromagnetic waves far out to sea.

But, with all the scientific developments in recent years, men of the sea coming to the Columbia still count heavily on the lighthouses that have served them for many decades in good weather and foul.

Patriarch of the lighthouses serving the area is that on Cape Disappointment, whose craggy slopes jut out from the Washington shore. Completed in 1856, the tower light—more than 200 feet above the sea—casts a beam of 58,000 candlepower for many miles. Then, in 1881, came the light at Tillamook Rock—75,000 candlepower, and in 1898 the one at North Head—260,000 candlepower.

Tillamook Rock stands at a strategic point 18 miles south of the mouth of the Columbia. A little "Gibraltar," the rock rises 86 feet above sea level.

"It's 131 feet from the sea to the lantern," said A. E. Anderson, civilian supervisor of aids and navigation at Tongue Point Base, who did duty on the rock as a young man. "The book says 130 feet, but I measured the distance, and know better. Sometimes measuring was the most exciting thing a man had to do in his spare time."

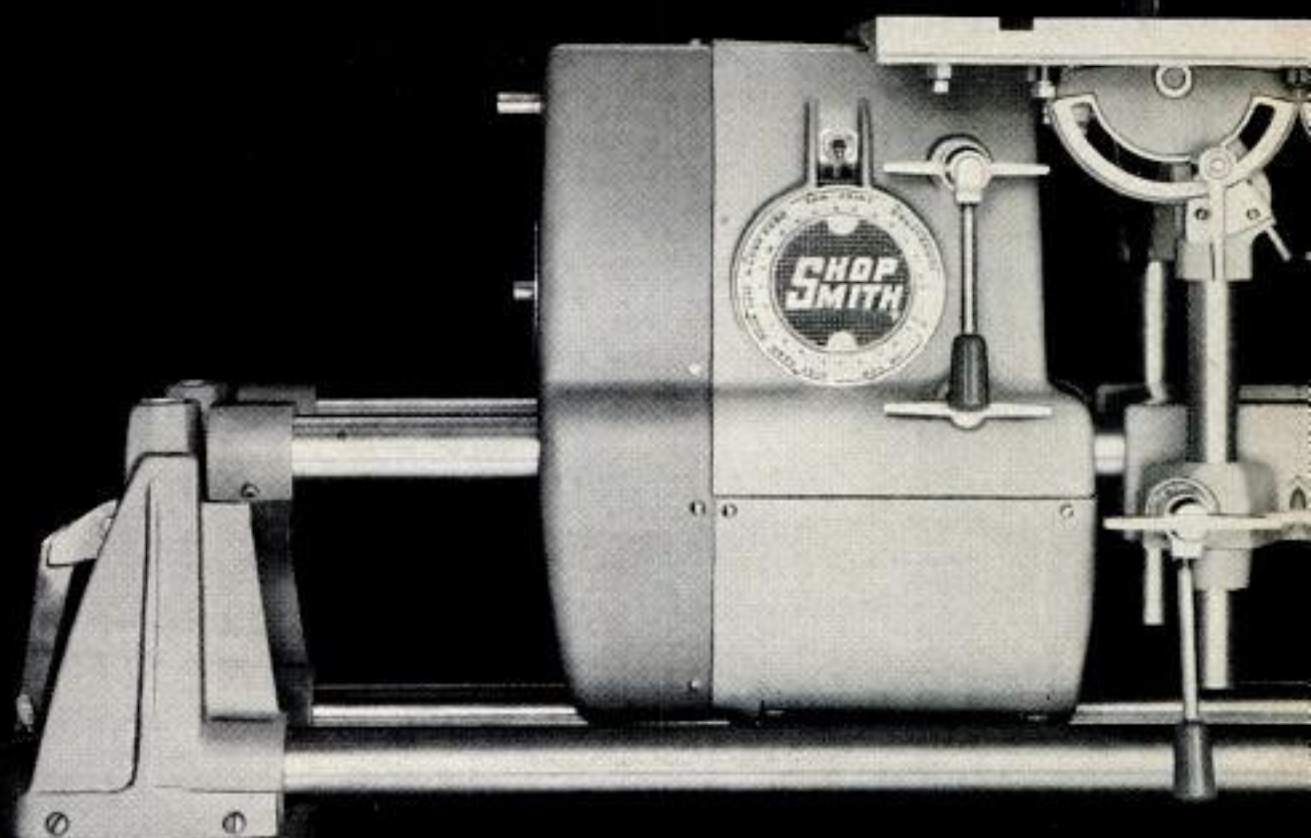
In fierce storms, waves break over the light. Wire mesh shields it on the seaward side to keep rocks from breaking it.

In 1948, when Coast Guard funds ran low, the Tillamook light almost went out. But commercial fishermen howled like a nor'easter. The light is still burning.

Three days after the Japanese plummeted bombs on Pearl Harbor Dec. 7, 1941,

(Continued to page 236)

INTRODUCING...

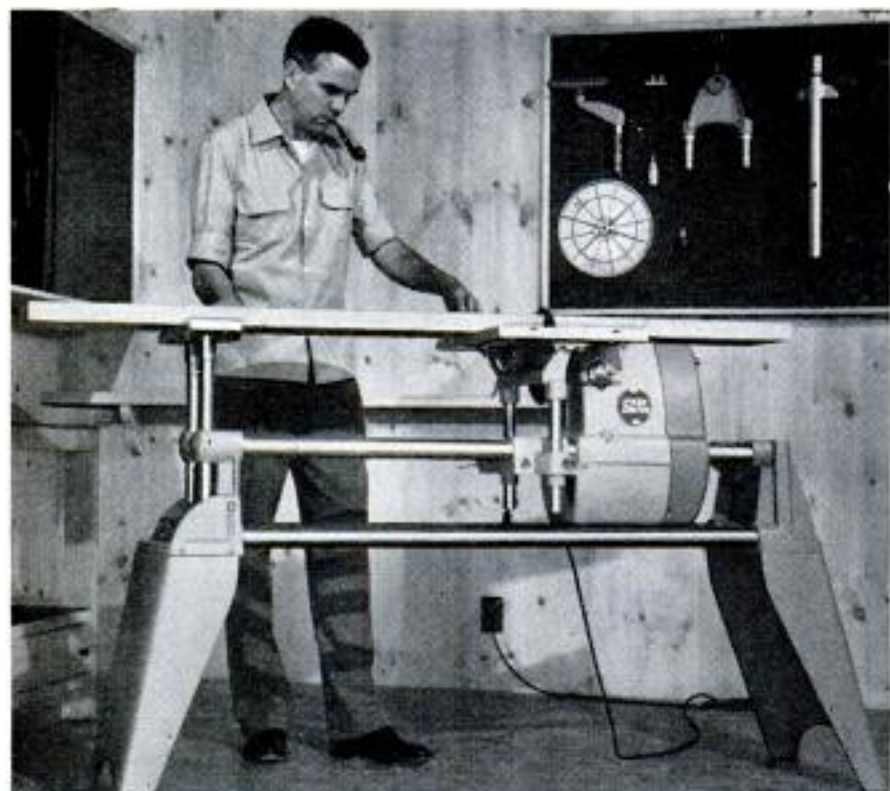


An entirely new concept in power tools . . . a change so significant that it outdates all former standards for judging tool performance. Imagine the very finest power shop you could buy, engineered into a single unit and delivered complete, ready to plug in . . . with a built-in $\frac{3}{4}$ -hp. motor . . . a revolutionary method for changing speeds without changing belts . . . plus many, many more exciting features.

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advanced engineering makes it the only power tool to put precision woodworking within the reach of everyone!



SHOPSMITH Mark 5 IS COMPLETE! It's delivered to you ready to plug in. And like your automobile, it comes factory assembled, factory adjusted, factory tested. No bench, motor and switch to buy. No belts, pulleys and wires to attach. No rust worries — rods and tubes are hard-chrome plated! Everything is an integral part of the compact unit *plus* all you need to make it a 9" circular saw, 12" disc sander, 34" wood lathe, 16½" drill press, horizontal drill. The price complete..... **\$269⁵⁰**

For six years, SHOPSMITH* has been the unchallenged leader in power tools. Over 150,000 owners enthusiastically acclaim the SHOPSMITH principle as the only truly practical basis for multi-tool operation.

And now comes the second great revolution in power tools — an entirely new SHOPSMITH! Here are standards of design you'll recognize as so advanced, you know it will take years to match them — standards of versatility, precision, convenience and safety so new and different, you'll appreciate why SHOPSMITH Mark 5 is the *one* tool for modern living — why it *alone* is the tool for *you* and *all* the things you want to do.

*Reg. Trade Mark

SHOPSMITH Mark 5 is built for hairline accuracy!



MITER GAUGE. It's accurate to the exact degree of angle. Locks in table slots as handy sanding and drilling jig.



RIP FENCE. Squares and locks front then back with single handle. Easily set off-square for special operations.

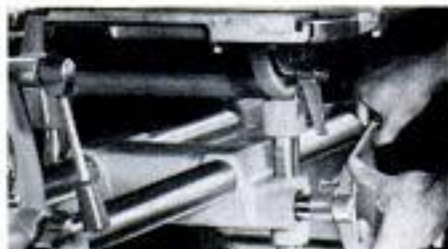


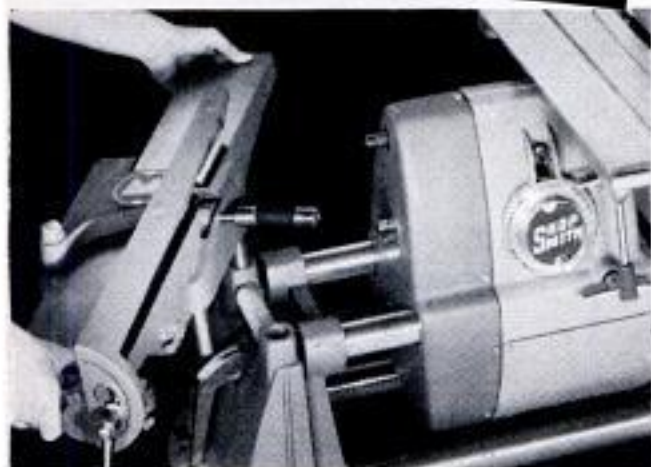
TABLE HEIGHT. Quickly, accurately set by lever-operated double rack and pinion. Faster than other methods.

MARK 5

SHOPSMITH Mark 5 HAS GREATER CAPACITY than any power tool at any price! Its $\frac{3}{4}$ -hp. motor has ample power for the toughest operations. 9" circular saw cuts 4' x 8' panels in half either way. Lathe has 16 $\frac{1}{2}$ " swing... 12" sanding disc has big 14" x 18 $\frac{3}{4}$ " table... drill press drills to center of 16 $\frac{1}{2}$ " circle... horizontal drill capacity is unlimited!

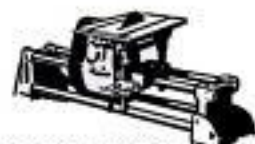


SHOPSMITH Mark 5 HAS SPEED-DIAL. By itself, Speed-Dial is the most significant power tool advance in years. It automatically selects the correct speed for the job at hand — does it with a twist of the dial. No more guesswork. No more belt changing. No makeshift operations with one-speed or wrong-speed spindles. Simply turn the dial to the place marked saw, jointer, sanding, jig saw, dadoing, etc. — or make infinitely variable settings from 700 to 5200 rpm.



SHOPSMITH Mark 5 HAS POWER MOUNT. Add a jointer, jigsaw, bandsaw, etc. — with one twist of a handle, one turn of a set screw. Set up useful tool combinations in seconds — saw-jointer, jigsaw-sander, band-saw-sander, lathe-grinder, many others! Power mount tools take no extra floor space — can be operated at optimum speeds.

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9" CIRCULAR SAW



12" DISC SANDER



16 $\frac{1}{2}$ " x 34" LATHE
16 $\frac{1}{2}$ " DRILL PRESS



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all lights at the mouth of the Columbia were ordered off—and their value was proved in a costly way. The steamship *Mauna Ala*, loaded with a \$750,000 cargo of 60,000 Christmas trees, turkeys and other holiday goods, was en route to Honolulu. Ordered back to the nearest port, she tried to enter the mouth of the Columbia in the blackout, and went down to a watery tomb in the graveyard.

In cheating the graveyard today, millions of dollars have been spent, particularly for jetty improvements. But the investment is considered a good one, because some 2000 ships annually carry heavy cargoes up river, mostly to Portland, Ore.

"When I first came to the mouth of the Columbia in 1917 as a ship's radio operator we had nothing to guide us except visual aids," said Edwin Lamb, base storekeeper at Tongue Point. "We had no depth finders on the ships, no radar, no loran. Now crossing the bar is not so tricky—that is, in the summer. But come winter with its bad storms—well, a skipper still better watch his Ps and Qs or his ship will be pushing up barnacles in the graveyard." ★ ★ ★

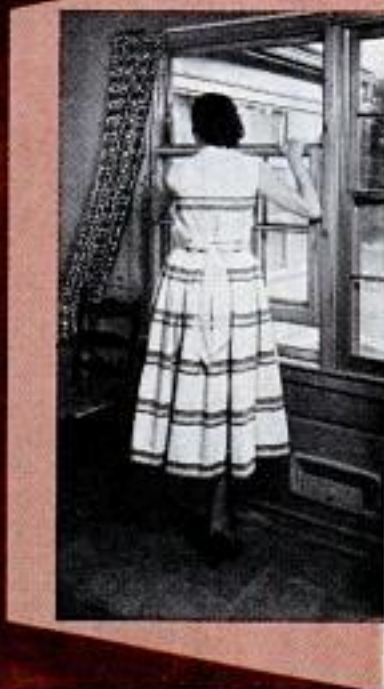
Clay-Extrusion Machine

Simulated chrome strips, instrument panel trim, door and window moldings are

extruded like spaghetti from a machine used by clay modelers at Ford design laboratories. Clay used in building experimental designs is forced through a tube capped by an aluminum disc. A slot punched in the disc determines the shape of the continuous clay ribbon which emerges.



BUILD BETTER FOR LESS!



Builders and buyers know that R·O·W windows offer the best in construction, materials, and beauty—plus the lift-out feature. Yet, R·O·W windows usually cost *LESS* than other quality wood windows *WITHOUT* the removable feature.



Look for the cups!

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THEY CAN'T **RUST** if you keep them in DRY VAPOR **PACKVELOPES**[®] with VPI*



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HERE'S positive RUST PROTECTION for circular saws • chisels • drills • auger bits
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hooks and flies • spark plugs • auto parts
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YOU NEED NO OIL, NO GREASE, NO FUSS OR MUSS • Just pack them and forget them.

Send for Berlin & Jones' big no-rust miracle package containing a dozen assorted VPI* envelopes, large size to protect circular saws, others for tools and small parts—plus a big 12 x 36 sheet of VPI* coated Kraft paper, enough to protect an average power tool or to line a large tool chest and drawers. You get the same rust protection used by the U. S. Government and leading industries in this no-rust miracle package for only \$2. Included free is a handy booklet of practical proven VPI* uses. Money back if not satisfied.

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Every hardware store can sell VPI packages on sight to their trade with our self-service, self-selling kit. Makes money for you and the retailer without effort. Write for complete details to Berlin & Jones, 601 W. 26th St., New York 1, N. Y., Dept. P, Wholesale Division.

No oil, no grease, no goo, no dirty degreasing job, no clean-up necessary—thanks to this miracle paper which turns destructive moisture into protective VPI vapor... giving you years of positive protection from rust.

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*T. M. Reg. U.S. Pat. Off.



UNITED STATES GYPSUM

the greatest name in building

It's Moving Day for Wildlife

(Continued from page 157)

metal and are sometimes made with iron bars like a miniature jail cell. These are covered with brush and baited with such delicacies as honey or cooked bacon. The bears trip them when they go in for a snack. Such traps are sometimes used in the national parks to remove bears that threaten tourists. The bears are taken, traps and all, back to the interior of the park areas and released and since the average black bear has little wanderlust, they settle down as though nothing had ever happened to them.

One reason the game specialists prefer live-trapped animals to game-farm stock is the fact that those reared in the open survive better when released. They usually expect a high rate of survival of live-trapped and transplanted game if it is put in habitat similar to the type it came from. The losses then are mostly limited to trapping mortality, for usually a few are lost in trapping and transit. One fall, Kentucky lost a couple of deer to poachers who killed them right in the traps. Another deer was killed by the trapdoor and a couple of antlered bucks did each other in when they were housed together in a holding pen. The trappers now eliminate this type of death battle by sawing the antlers off before moving bucks from traps to the holding pen.

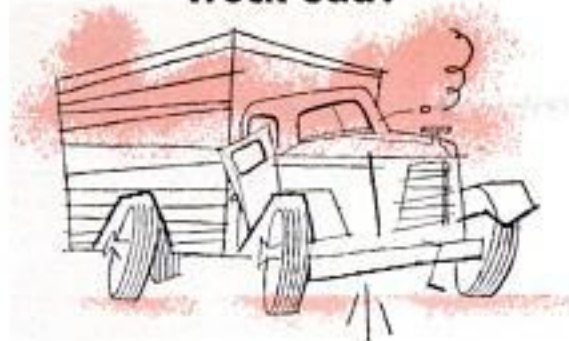
It's a guiding rule in moving live game from one place to another that you take only surplus animals and always leave plenty of "seed" stock to furnish good hunting and adequate breeding for the future. The game managers keep a sharp eye on these things. If a wildlife census shows an overabundance of rabbits, deer, pheasants or coons they begin to worry. They know that overcrowding can lead to plenty of trouble usually in the form of starvation or an outbreak of disease. Even if there is no disease outbreak few hunters want to walk all over the country tracking down a lot of game so thin you can "slit open the hide and shake out the bones."

For every surplus of game they can find the game managers usually know of several localities suffering shortages. If a state has depleted areas and no surpluses within its boundaries it will often buy stock from outside the state and release it where it will do the most good.

Fred Hardy, Kentucky's "grouse man," traps about 30 grouse a year in the course of his research work. He uses a small wire-box trap with a mirror fastened in one end. He sets the box on a drumming log. The strutting cock bird takes his position on the

(Continued to page 240)

Truck Sad?



Business Bad?



Competitor Glad?



Owner Mad?



**It's Time
You Had a
Look at the
New
'54 REO**



REO MOTORS, INC.
LANSING 20, MICHIGAN

Manufacturers of Commercial and Military Trucks • Buses • Power Lawn Mowers • Children's Wheel Goods & Play-ground Equipment • Inboard Engine Kits for Small Boats • Replacement Engines for Trucks • Industrial Engines

Don't let that old truck drive you into a rage or into the "red"...drive away in a brand new '54 REO. Thanks to Reo's *Gold Comet* power and more pay-load-design, you'll enjoy the lowest cost miles in trucking. And all the while, you'll be luxuriating in that comfortable new cab with increased head and leg room—full 30" doors—new steering wheel angle with unobstructed driver viewing—dependable wide angle electric windshield wipers...foam rubber seat available on all models. Get the facts, better yet, get the feel by taking the wheel of that outstanding '54 Reo.





Quit driving an oil-burner— get new piston rings!

Oil pumping is just the start of expense and trouble—the first danger signal from worn-out piston rings. The longer you let those old rings stay in, the more oil you'll use, the more power you'll lose, and the bigger your repair bill will be!

As your engine gets older, it runs hotter because of accumulations in the cooling system. The cylinders wear tapered and out-of-round—need more oil on the walls.

It requires a special type of piston rings—replacement rings—to deliver this extra oil, under full control, without waste.

Hastings makes replacement rings exclusively, devotes all its research on the highways and in the laboratory, to the particular replacement problems of each make and type of engine.

That's why Hastings Rings *stop* oil-pumping, *check* cylinder wear, *restore* engine performance—in re-ring, re-bore and re-sleeve installations.

So go to your motor specialist at the first sign of oil-pumping or performance drop-off. If rings are the trouble, ask him to install a Hastings Steel-Vent replacement set. Truly the best money you can spend on your car! Hastings Manufacturing Company, Hastings, Michigan; Hastings Ltd., Toronto; Piston Rings, Spark Plugs, Oil Filters, Casite, Drout.

HASTINGS STEEL-VENT PISTON RINGS



Regular or Chrome

Tough on Oil-Pumping
Gentle on Cylinder walls

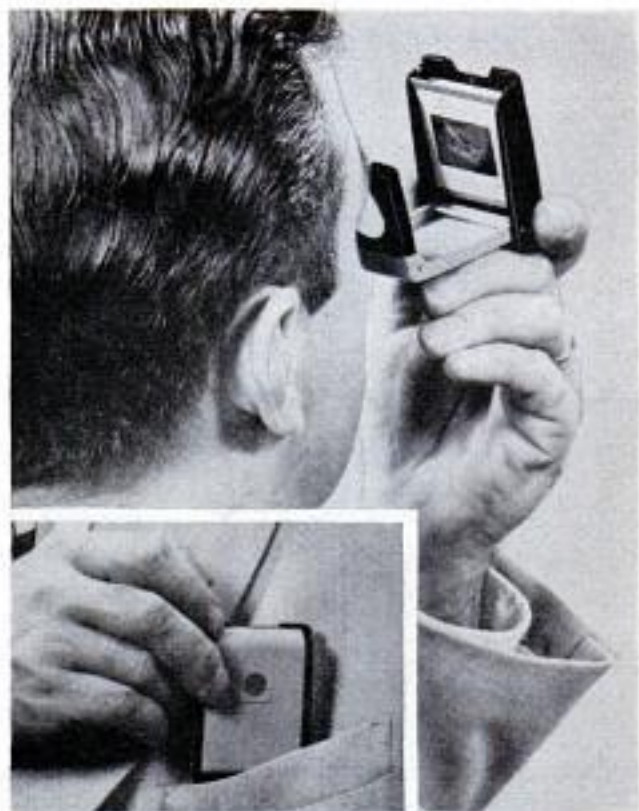
drumming log and starts beating the air with his wings and setting up his peculiar low-pitched music. Then he finds he's not alone and he enters the cage to do battle with his image.

"Live-trapped birds are worth a good price," says Don Strode. "Take turkeys, for instance. We figure every bird trapped and released is equal to \$1000 worth of game-farm turkeys. Turn a game-farm turkey out near a barnyard and first thing you know he's eating with the chickens. You've lost a turkey." A grouse may cost \$25; a turkey, \$50 to \$100.

This transplanting of wildlife is one of the most effective wildlife-management techniques the specialists have yet found for improving hunting. That's why the big wild-game move goes on year after year in practically every state of the nation. ★ ★ ★

Transparency Viewer Carried in Vest Pocket

Color photographers no longer have to carry bulky equipment around to show off their slides. Now available is a tiny pocket-size viewer that can be carried in the pocket of a vest, shirt or jacket. It accommodates two-by-two-inch cardboard mounts and glass slides. The polished optical lens gives a four-times magnification and the grained plastic screen provides over-all illumination. Folded, the viewer is less than three inches long and approximately two inches wide. It uses transmitted light for illuminating the transparencies.



Now in the famous MOUNTIE too!
**REVOLUTIONARY NEW MARLIN
 MICRO-GROOVE
 RIFLING***



**20% to 25% more accurate than small-game
 or plinking rifles with conventional barrels!**

WORLD'S ONLY .22 with split-second lever action—that's the match-
 less Marlin 39-A. Now both the regular 39-A and the 39-A Mountie
 come with Marlin's fabulously accurate new Micro-Groove Rifling.



CHECK! Two typical 10-shot patterns
 fired at 100 yards by a noted gun edi-
 tor and marksman. Note (at left)
 tight group from a Marlin .22 with
 revolutionary new Micro-Groove
 Rifling—exclusively Marlin's. Note
 wider dispersion of group at right,
 fired from new .22 of famous make
 with regular rifling. *Two years of in-
 tensive firing shows Micro-Groove
 increases accuracy 20% to 25%!*



THE REASON: Note that Micro-
 Groove Rifling (left) has SIXTEEN
 . . . SHALLOW . . . grooves as com-
 pared to regular rifling (right) with
 SIX . . . DEEP . . . grooves. Easy to
 see why Micro-Groove means faster,
 more even dissipation of heat
 through the barrel . . . far less gas
 leakage, too—a major cause of bul-
 let "flipping" at the mouth of the
 barrel. Far less barrel erosion, too.

• See Marlin Micro-Groove at your dealer now. Available in all Marlin bolt
 actions and semi-automatics, too. Same models also may be had with Marlin's
 long-famed Ballard type rifling. Sold in U. S. A. and Canada.

**Trademark and Patent Pending*

39-A MOUNTIE.
\$60.85. Straight—
 not pistol-grip (for
 swift removal from
 scabbard) and 20"
 barrel. Weight only
 6 lbs. (approx.).

Regular 39-A with
 pistol-grip and 24"
 barrel also avail-
 able. \$60.85. Other
 Marlin .22's from
 \$24.95. Prices
 slightly higher west
 of the Rockies.

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 SINCE 1870**

VALUABLE COUPON—MAIL TODAY!

The Marlin Firearms Co., Dept. 5-PM, New Haven, Conn.
 Send me catalogue with information and photo-illustra-
 tions of Marlin Guns, plus new cartoon booklet, "More
 Fun with Your .22 Rifle." Also send me a pack of (please
 check preference) single or double-edge Marlin
 Razor Blades. I enclose 10¢ for handling.

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City _____ Zone _____

County _____ State _____



edge
your lawn
permanently

with **NO-SEE**
GRASS BARRIER



STOPS GRASS
HERE!

Underground "fence" keeps grass in its place. Stops bluegrass (including new Merion), quack grass, Bermuda, St. Augustine, Bent and others from spreading into cultivated areas. Install NO-SEE around trees, shrubs, foundation plantings, flower beds; along fences, hedges and driveways. Mow right over it, trimming edge neatly. Gives your lawn that well-cared-for look with half the labor.

NO-SEE is made of corrugated, galvanized steel. Sections two feet long by 4 inches deep key together with special clips. Easy to install; just drive down to soil level. Bends around corners; follows contour of soil.

Eliminates grass trimming and edging



BEFORE—Mower leaves grass and weeds around trees. Hand trimming is necessary.

AFTER—Trim as you mow! With one wheel in cultivated area, you trim edges neatly.

If your local hardware, nursery, garden or department store cannot supply you, order direct from one of the following:

- Breck's Boston, Massachusetts
- Farmer Seed & Nursery Faribault, Minnesota
- Drumcliff Co., Dept. S.E. Towson 4, Maryland
- Montgomery Ward & Co. (All mail order houses)
- Security Feed & Seed Co. Greenville, S. Carolina
- Western Seed Co. 1425 15th St., Denver 2, Colo.
- Templin-Bradley Co. 5700 Detroit, Cleveland, Ohio
- Hallowell Seed Co. 519 Market St., San Francisco 5, Calif.
- Vannegut Hardware 402 W. Maryland, Indianapolis 9, Ind.
- F. W. Belgiano 411 New York Ave. N.E., Washington 2, D.C.
- Vaughan's Seed Co. 47 Barclay, N.Y., N.Y.; 10 W. Randolph, Chicago, Ill.

Manufactured by:

KEELOR STEEL, INC., 963 9th St. S. E., Minneapolis 14, Minn.

Mexico Builds a Glamour Campus

(Continued from page 117)

American football, and an indoor court for the fast Latin-American game of jai alai.

Also on the campus are two softball diamonds, a dozen tennis courts, a dozen outdoor basketball courts that also are suitable for volleyball, eight courts for the game called handball fronton, and eight larger courts for a Latin-American game similar to squash. The exterior walls of these courts are sloped like Mexico's ancient pyramids and are faced with rough volcanic stone taken from the site. An enormous gymnasium in which indoor basketball may be played will be built later this year.

Academic buildings on the campus are arranged in groups. Some are large enough to contain all the facilities for such subjects as dentistry or chemistry. This arrangement allows a student of dentistry, for example, to go from class to class without rushing from one part of the huge campus to another. Some of the classroom buildings are glass-walled skyscrapers, others are long and low, and still others rest on platforms that are supported above the ground on concrete pillars.

Near the Pavilion of Cosmic Rays is the Institute of Nuclear Physics with an adjoining "Garden of Radiation" surrounded by stone walls to absorb the rays from atom-smashing machines.

One outstanding building is the central library. From a distance it looks like a huge, oblong, intricately decorated cake. The structure is 116 feet tall, 190 feet long and 45 feet wide, and each of its exterior walls is ornamented with mosaic murals depicting stages in Mexico's history. Each mosaic consists of millions of bits of rock ranging from black obsidian to brown and pink marbles painstakingly cemented in place.

The two lower floors of the library contain reading rooms with windows of thin, translucent sheets of white marble. The 10 upper floors of the structure have no windows and contain storage stacks with a capacity of 120,000 volumes in addition to microfilm files.

Mexico is a center of mural art, and murals of various kinds are used for ornamenting large areas on many of the buildings. Some murals are painted in vivid plastic paints and others are composed of small glass tiles that were fired especially for the university. Still others, as in the case of Diego Rivera's ornamentation on the stadium walls, are made up of stones

(Continued to page 244)

An easier, better way to fine natural wood finishes

The full story of REZ — a remarkable group of products which actually become part of the wood! While they help you achieve beautiful natural-grained finishes, they also give you real protection against moisture—prevent swelling, warping, weather-staining.

No matter what you're working on—from new exterior siding to cabinets or furniture—you can get handsome finishes with all the warmth and rich beauty of natural wood *far easier*—with Rez.

Developed in the same Monsanto laboratories which serve the great West Coast lumber industry, Rez is made from a synthetic resin which has unusual properties beneficial to wood.

Penetrates the pores of wood

Instead of merely putting a layer of glossy material over the surface—instead of just penetrating lightly—the first coat of Rez sinks deep into the pores and bonds with the wood. Then a quick and easy finish coat of Satinwood (or High Gloss) Rez completes the job.

Result: Not just shiny surface beauty—but all the depth and gleam of hand-rubbed wood. Beauty that *lasts*, too, because it's moisture-sealed.

When you use wood — use Rez

Use **CLEAR REZ** first in finishing any type of wood interior walls; on the inside and outside of drawers and cabinets to prevent swelling,



warping, drawer sticking. Use it, too, as the best undercoat for paint.

Use **WHITE REZ**: for an easy 2-step way to achieve blonde finishes so hard to create any other way.

Use **REZ COLOR TONES**: for distinctive color finishes that do not conceal the grain—indoors and out. In redwood, mahogany, sage, driftwood and cedar; can be intermixed to create special effects.

Use **REDWOOD REZ**: for true redwood color that doesn't darken with years. The pigment in Redwood Rez creates a barrier against the sun's rays, prevents weather-staining.

LAUX [®]
Rez BECOMES PART
OF THE WOOD

Gives you deep-sealed protection—deeper, warmer natural-grained beauty, too.
Ask your dealer about REZ today

VALUABLE BOOK — "How to Create the Finest Wood Finishes." Complete step-by-step instructions; many illustrations. Mail this coupon with 25¢ to:

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**BAIT-CASTING RODS
PREFERRED BY EXPERTS**

\$45⁰⁰

Actionrod No. 3962-D
Deluxe Model



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Standard Model \$35.00

For the master fisherman—a tubular glass custom-made Bait-Casting Actionrod. Long-lasting Carboly guides and tip. Deluxe model has interchangeable medium and light action tips. Deluxe tube and bag included.

\$9⁴⁵



Actionrod
No. 1300

A top value at a moderate price with many deluxe features. Tubular glass tip, stainless steel guides and tip top, chuck handle with screw type reel lock, specie cork grip and polished aluminum fore-grip. Bag included.

ORCHARD INDUSTRIES, INC. • HASTINGS, MICH.

Actionrod

AMERICA'S FAVORITE GLASS ROD

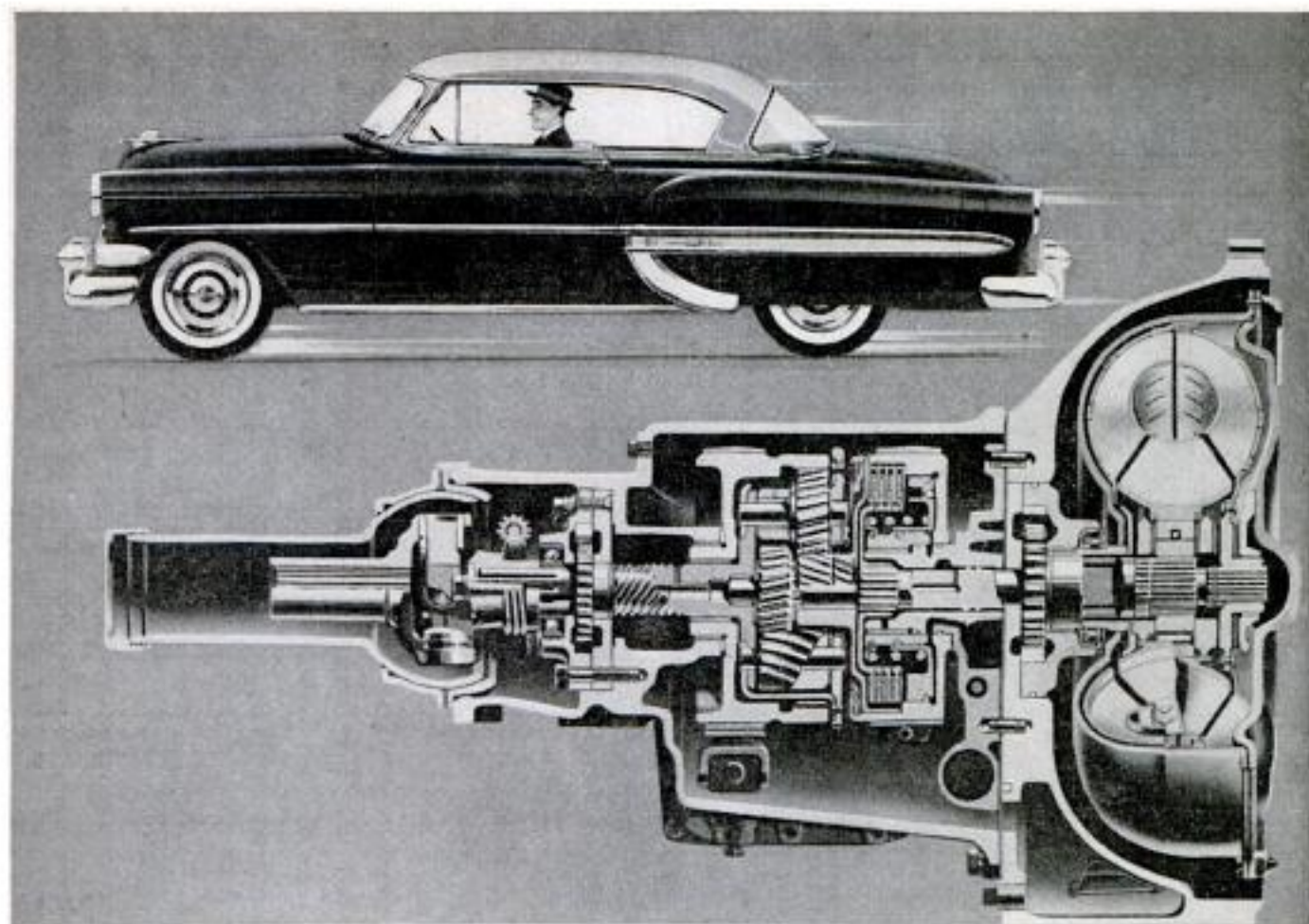
cut to shape and stained to the desired colors by means of acids.

It was a happy coincidence when Mexico decided to erect its new center of knowledge on the Pedregal. More than 80 centuries ago a strong civilization flourished there. Then a succession of lava flows from a near-by volcano buried all evidence of human existence except one pyramidlike temple that still projects up through the volcanic rock. Known as Cuicuilco, this temple is judged to be the oldest thing built by man that exists on the American continent. On the site of this ancient civilization now stands the newest campus in the world. ★ ★ ★

Hand-Held Pneumatic Tool Forces Tire Bead From Rim

Flat tires are forced off their rims with a small tool that is attached to a service-station air hose. A hooked plunger on the bottom of the tool is inserted between tire and rim. Air from the hose pushes the plunger down, forcing the bead off the rim. Stepping on the tire and pulling up on the wheel completes the job.

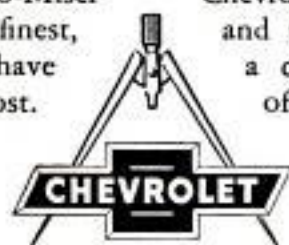




Advanced Chevrolet Engineering brings
LIVELIER, THRIFTIER PERFORMANCE
with a "stepped-up" Automatic Power Team

Thrilling new performance is yours, when you command Chevrolet's stepped-up Automatic Power Team. There has never been a Chevrolet that responded so eagerly to your touch on the accelerator. At the green of "go," its automatic getaway moves you ahead smoothly and positively. The automatic passing range gives you new safety in city traffic. You ease up hills almost as if they weren't there. Yet you obtain this spirited performance with money-saving gas mileage. In one extra-cost option, "Blue-Flame 125" valve-in-head engine, Powerglide automatic transmission and Econ-o-Miser rear axle are teamed to provide the finest, most responsive no-shift driving you have ever experienced in a car of such low cost.

The deep breathing valve-in-head engine—the most powerful Chevrolet passenger car engine ever built—develops 125 horsepower. And its 7.5 to 1 compression ratio, the highest in any leading low-price car, squeezes more work out of gasoline. In the transmission, the highly efficient, three-element hydraulic torque converter makes torque multiplication and cruising oil-smooth. Automatic Low provides swifter, safer getaway and pickup at a touch. Shifts to Low and Reverse are made through planetary gears. The Automatic Power Team is available in every Chevrolet model. See your Chevrolet dealer and try it. Discover how lively yet thrifty a car can be. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



EVER FINER ENGINEERING

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1

Add new beauty to your car with these top quality Wizard Country Club Plastic Seat Covers. Beautiful Saran plastic panels with harmonizing trim, top cap, sides and back. Stay lovelier longer. Wide choice of patterns and colors sure to please. All car sizes. Plastics from\$26.95



2

Wizard Quality Chamois adds new sparkling luster to auto, furniture, windows, silverware, glassware. Highly absorbent. Strong and durable, yet soft and pliable. Will not scratch finest surface when used wet or dry. Can be washed over and over again. 21" x 27" (3P48230) Ea. \$2.65



3

Wizard De-Sludge-Er oil filter cartridge has new filter agent of 100% cellulose. Out-filters either paper or cotton. Removes sludge-forming elements from oil. Won't clog channel or by-pass. For all cars, trucks, tractors with full-flow or by-pass systems. Chev. 1937-53 (RR5814)\$1.59



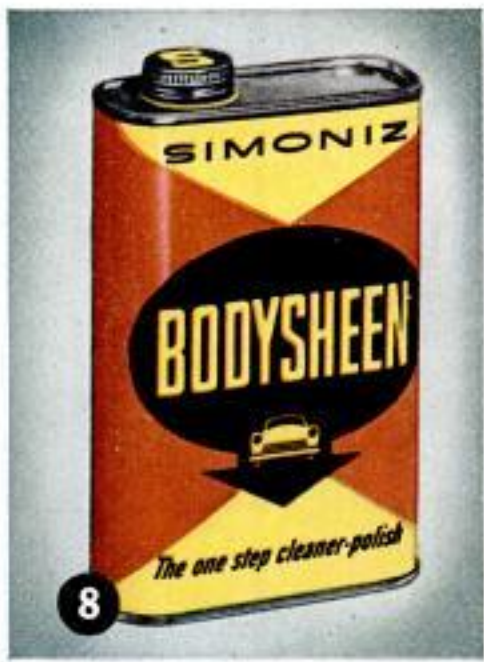
New Power...New Beauty...

Over 40 Years...Headquarters



7

Gleaming chrome exhaust deflectors and extensions give long-lasting beauty to your car. Keeps exhaust off bumper. Easy to attach and styled to fit your car. Western's Exhaust Deflector. Simple, flared design. (CR2806) 49c Exhaust Extension. (8" x 2 1/2") Straight-tube type. (CR2807) \$1.09



8

The one-step cleaner-polish! New Simoniz Bodysheen cleans and polishes, in one easy simple step. Wipe Bodysheen on, then wipe it off and see your car gleam. Brings out natural brilliance, enriches colors. Gives your car a tough, long-lasting, weather-resistant finish. (3P7112) 98c



9

Here's the quick easy way to replace brakes—Stop-Rite lined brake shoes, ready to slip right into drum. Wire-backed lining permanently bonded to shoe for positive "non-grab" braking, long quiet service. Trade-in allowance. All popular cars. Front or rear, as low as \$3.75 (each.)

FREE: Mail post card today for folder explaining how to get more horsepower



4

Drednaut Hydraulic Jack takes work and danger out of tire changing. Easy wrist-action lifts any car. Twist—it's down, safely and smoothly. Precision built to meet most severe passenger service requirements. Raises from 7" high to 14 $\frac{1}{4}$ ". Pumping handle included. (A6188) **\$9.95**



5

"Reddi-Rak" Car Top Carrier—new advanced design, complete, assembled, ready to install. Adjustable—mounts on any car top in a minute. Big 3 $\frac{1}{4}$ " suction cups can't slip. Heavy web straps anchor to rain guard—hold big load safely. Heavy gauge steel. Pr. (C5232) **\$7.95**



6

Why risk worn brakes? Reline with Stop-Rite Brake Linings. Designed for individual braking requirements of all cars. Pressure molded. Wire backed for extra strength. Will not absorb grease or moisture. With rivets and instructions. Easy to install. All popular cars from..... **\$3.45**

New Safety For Your Car At Western Auto

STORES AND ASSOCIATE STORES

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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 difference in local conditions. (PM54)



10

Deluxe magnetic dash tray keeps sunglasses, pencils, pad, maps, etc. conveniently within reach. Large enough to hold sandwich and drink, compact—fits any dash. Removable chrome-finish ash tray. Hidden compartment. Colorful plastic. Velvet-soft inside finish (C81378) ... **\$1.59**



11

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. All chrome shell prevents rust. Guaranteed 18,000 miles. Each, in sets..... **75c**



12

Why risk an overhaul? Replace your worn-out engine with a Wizard-ized Engine—get up to 3 times the miles! All moving parts brand new or fully remanufactured like new. New-car engine guarantee. Installation arranged. For Ford, Chev., Plym., and others. As low as (each) **\$149.50**

from your car. Write Western Auto, Dept. 200E, 2107 Grand, Kansas City, Mo.



BUY THESE NEW **POPULAR MECHANICS** DO-IT-YOURSELF BOOKS AT YOUR NEWSSTAND

Only 25c Each!

HOW TO PAINT INSIDE AND OUT: Complete instructions for all interior and exterior painting using all types of finishes. Covers every phase of painting technique, handling brushes, preparation of paint, painting metal, spraying, masking, importance of primers. Enables the amateur to do a professional-looking job the very first time. Also covers all necessary materials. **25c**

HOW TO LAY LINOLEUM AND TILE: Tells and shows you how to lay all types of tile including rubber, asphalt, etc., as well as linoleum and similar floor coverings. Complete instructions for the use of plastic wall tile. Step-by-step directions plus many show-how photographs, drawings and diagrams make it easy. **25c**

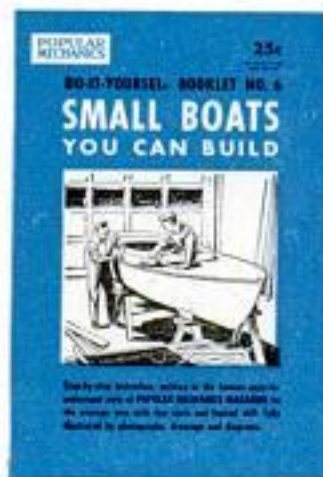
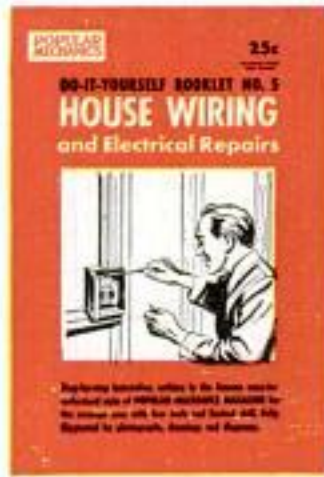
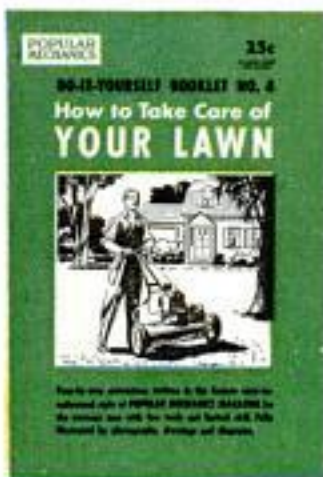
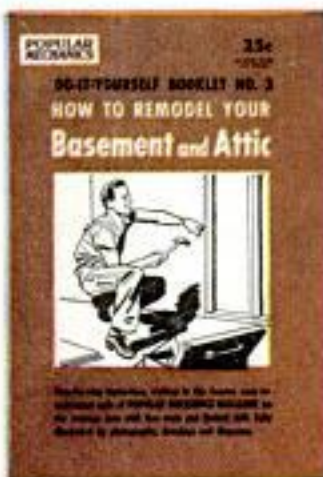
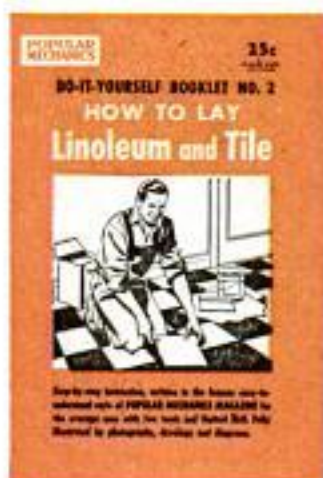
HOW TO REMODEL YOUR BASEMENT AND ATTIC: Transform wasted space into additional bedrooms or game rooms. Book covers dormer construction, unusual wall coverings, insulation, weatherproofing, installation of doors and windows, use of glass block, installation of plasterboard, and other approved building methods and materials. **25c**

HOW TO TAKE CARE OF YOUR LAWN: Be sure to buy this book if you want to have a better lawn this summer. Complete instructions for the establishment of a new lawn or the maintenance of an older lawn including fertilizing, raking, rolling, watering, mowing, weed removal, destruction of trees and stumps, various types of grass, etc. **25c**

HOUSE WIRING AND ELECTRICAL REPAIRS: Everything you have ever wanted to know about making household electrical repairs. Tells how to locate shorts, install fluorescent fixtures, rewire for modern living, repair electric irons and other everyday household appliances plus many valuable hints and kinks for every homeowner. **25c**

SMALL BOATS YOU CAN BUILD: Build your own boat and save! Complete step-by-step instructions plus diagrams and photographs for building the boat of your choice. Choose from a 10-foot plywood dinghy, a 16-foot plywood sailing scow, 15-foot sailing knockabout, 8-foot duckboat or a "marine mustang." Also contains many helpful hints for every boating enthusiast. **25c**

These books are now available at your favorite newsstand and will soon be on sale at your local IRHA Hardware store





Brig. General David Sarnoff, Chairman of the Board, Radio Corporation of America

Sees No. 1 wish come true!

Television Tape Recording by RCA Opens New Era of Electronic Photography

In 1956, RCA's General Sarnoff will celebrate his 50th year in the field of radio. Looking ahead to that anniversary, in 1951 he asked his family of scientists and researchers for three gifts to mark the occasion: (1) A television tape recorder, (2) An electronic air conditioner, (3) A true amplifier of light.

Gift No. 1—the video tape recorder—has already been successfully demonstrated, two years ahead of time! Both color and black-and-white TV pictures were instantly recorded on magnetic tape without any photographic development or processing.

You can imagine the future importance of this development to television broadcasting, to motion pictures, education, industry and national defense. And you can see its entertainment value to you, in your own home. There the tape equipment could be used for home movies, and—by connecting it to your television set—you could record your favorite TV programs.

Expressing his gratitude for this "gift," General Sarnoff called it the first major step in an era of "electronic photography." He said it was only a matter of time, perhaps two years, before the finishing touches would bring this recording system to commercial reality.

Such achievements as this, stemming from pioneering in research and engineering, make "RCA" an emblem of quality, dependability and progress.

RADIO CORPORATION OF AMERICA

World leader in radio—first in television



Get Out of the "Snapshot Class"!



Graflex Prize-Winning Photo by Doris Pinney

GRADUATE TO A...

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There's no trick to making fine portraits...action shots...and extra money, too, in your spare time when you shoot with a Pacemaker Graphic. These great cameras are as easy to use as less versatile cameras, yet can give you the large, clear pictures editors want. Have your Graflex dealer show you

why the rugged Graphics are the favorites of 93.9% of America's press photographers. See both the Pacemaker Graphics—Speed and Crown—each in three sizes. And be sure to see the amazing Century Graphic, now only \$122.50 with coated f/4.5 lens.

YOU CAN OWN A GRAPHIC PRESS OUTFIT FOR AS LITTLE AS \$29 DOWN!

Here's everything you need to start earning money with your photo skill! Complete outfit includes Pacemaker Graphic with lens and shutter of your choice—plus a sheet film holder; coupled rangefinder (installed); and a Grafite Flash with connecting cord. Ask your dealer about time payments.

GRAFLEX®

Prize-Winning Camera



For FREE Illustrated booklet on how to choose a modern camera, write Graflex, Inc., Dept. PM-21, Rochester 8, New York

The Owners Report on the Mercury

(Continued from page 106)

the old suspension."—Hialeah, Fla., pilot.

When asked to rate handling and roadability, both of which are influenced by the front suspension, the owners were virtually unanimous in praise of the Mercury. Slightly less than 1 percent rated handling unsatisfactory, while 2 percent said roadability was unsatisfactory. In fact, many owners (36 percent) gave ease of handling as the feature they liked most about their cars. And 13 percent gave roadability as the best-liked feature.

Most-Frequent Complaints

By far the most-frequent complaint was that assembly and workmanship were poor. There were 33 percent of the owners who mentioned this weakness and some were very outspoken about it.

"Delivered practically 'knocked down' and had to make repeated trips to dealer to get things to work. Door troubles. Leaks badly around windshield. Merc-O-Matic growls when standing still."—Nashville, Tenn., executive.

"Too many adjustments to be made after delivery, unable to tell who owns the car, you or the garage. Have added four spark plugs, new battery, reworked fuel pump, greased speedometer cable, new radio and have had in garage constantly for oil leaks."—Chattanooga, Tenn., executive.

"Very poor body. Probably due to assembly. Too many squeaks, groans and rattles. Looked like a butcher put it together."—Paterson, N. J., engineer.

"The car would be perfect if the doors wouldn't shake. Whole car rattles. I would love to talk to a broad-minded factory man who didn't think I was another crab."—Clearwater, Fla., motel operator.

Low gasoline mileage, engine noise and carburetor trouble and poor dealer service were the next most frequent complaints.

When asked about the quality of their dealer service, the owners were not very flattering. Only 39 percent said it was excellent; 20 percent said good; 22 percent said average; and 19 percent rated it poor.

A rather frequent specific complaint involved the front seat (not the four-way power seat but the manually adjusted type).

"Front seat slides forward momentarily when you make a quick stop."—Hickory, N. C., millwright.

"Front seat seems loose on track."—Nashville, Tenn., lawyer.

Comparatively few owners had absolutely no complaints at all to make about

(Continued to page 252)

Animals Protect Themselves

Swans protect their young by beating off their enemies with powerful wings—and by striking them with horny beaks at the end of long, muscular necks. Small enemies find swans very formidable opponents.



CAR ENGINES NEED THE EXTRA PROTECTION OF AC ALUVAC

Small but vicious enemies attack your car engine, too—a dozen kinds of dirt and metal bits carried in your engine oil could do great harm unless taken out of circulation. AC Aluvac traps them all—the dirt and sludge that clog rings and valves—the abrasives that wear down and damage finely engineered precision moving parts.

Therefore, millions of motorists now use Aluvac Replacement Elements regularly—and more new cars are protected by AC Aluvac Elements than by any other brand of oil filter element.

Aluvac's large filtering area and small filtering pores make it the finest engine protection available to motorists.



Standard Factory Equipment on

Cadillac



Standard or Optional Factory Equipment on
CHEVROLET, BUICK, OLDSMOBILE and GMC

AC SPARK PLUG DIVISION  GENERAL MOTORS CORPORATION

INSTALL IT

Yourself

and

SAVE!

YOU CAN GET

25 to 40%

**BETTER
RECEPTION**
on your present TV
Set... any make...
and you're ready
for **COLOR!**

ANTENNA KITS
FROM
Admiral
WORLD'S LARGEST TELEVISION
MANUFACTURER

Priced from

\$13⁹⁵

LIST

at your **Admiral**
dealer

UHF Kits
VHF Kits
All-Channel Kits

Kits contain everything needed...antenna, mast, mast mount, guy wires, insulators, lead-in...down to the last screw-eye. Step-by-step instructions are easy to follow. No experience or special tools needed. High-gain antennas get excellent reception. Finest quality, tested and guaranteed by Admiral. Buy from your Admiral dealer.



their new cars. Only 11 percent wrote "none" in the section labeled "Here are my specific complaints."

Best-Liked Features

Performance of the new overhead-valve engine was the best-liked feature among owners with almost half (47 percent) listing it.

Styling and appearance (both inside and out) were also among the best-liked features with 37 percent listing them.

1954 MERCURY SPECIFICATIONS

ENGINE

Type	8-cyl., V-type, OHV
Bore and stroke	3.62x3.10 in.
Piston displacement	256 cu. in.
Brake horsepower	161 @ 4400 r.p.m.
Torque	238 @ 2500 r.p.m.
Compression ratio	7.5 to 1
Transmissions	3-speed conventional, Overdrive or Merc-O-Matic torque converter with planetary gears optional.

GENERAL

Steering ratio (over-all)	25.4:1
Steering wheel, lock-to-lock	5 1/4 turns
Turning radius	20.43 ft.
Brakes	Conventional hydraulic
Tire size	7.10x15
Recommended tire pressure	26 lb. front, 22 lb. rear
Shipping weight (4-door sedan, unladen)	3650 lb.
Wheelbase	118 in.
Tread, front	58 in.
Tread, rear	56 in.
Height, over-all	64.1 in.
Width, over-all	74.4 in.
Length, over-all	203.7 in.
Road clearance	6.3 in.

CAPACITIES

Oil	5 qt.
Water	19 qt.
Gasoline	19 gal.

INTERIOR DIMENSIONS

Front-seat width	58.9 in.
Rear-seat width	58.9 in.
Front headroom	35.4 in.
Rear headroom	34.2 in.
Legroom, front	42.8 in.
Legroom, rear	41.5 in.

"Its smooth lines and fine exterior trim and color schemes are tops."—Livonia, Mich., salesman.

"My bittersweet-and-black Monterey hardtop is the best and most beautiful car I have owned of seven new ones since World War II—all of them in the same or higher price levels."—Grosse Pointe, Mich., housewife.

Equally popular with the Mercury's good looks are its fine handling characteristics.

"Steering is very good and car is excellent in holding the road around curves."—Cicero, Ill., tool and die maker.

"Excellent handling and roadability. Rides firm and not too soft."—Boonville, N. Y., power-station operator.

"It holds course on any kind of road at all speeds."—Klamath Falls, Ore., tractor operator.

However, there were a few dissents.

"Still too much roll to body, coupled with

(Continued to page 256)

Look what you can do with this New Black & Decker Saw!



\$64.50
B&D Utility 6"
Heavy-Duty Adjustable Saw
COMPLETE WITH BLADE

Try it yourself and get a chance to win \$1,000.00

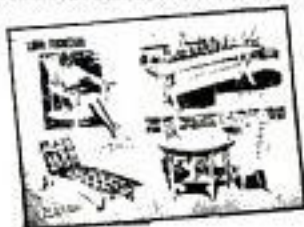
Get a demonstration of this wonderful new saw at your Utility dealer. Then fill out a free entry blank, describing the features you like best—and you may win \$1000 in Black & Decker's big Saw Contest!



Bob Davis says:

Send 25c for my "Handy Tips" booklet, full of home repair ideas plus information on patterns for projects like sample below. * (No stamps, please).

*T. M. Reg. East-Bild Pattern Company



For address of your nearest dealer see "TOOLS - ELECTRIC" in the Yellow Pages of your telephone book.

Need more living space? Do-it-yourself materials let you convert your attic or basement at far less cost than you ever dreamed! And the new Black & Decker Utility 6" Adjustable Saw takes the back-breaking work out of the job!

This new saw makes angle cuts, bevel cuts—every cut you need to add a beautiful room to your home, or make book-cases, cabinets, etc. You can get information on plans and patterns by mailing the coupon below, and your dealer will advise you on materials. When you visit him, ask to try the new Adjustable 6" Saw—as well as the larger 7-, 8- and 9-inch Heavy-Duty Utility Saws!



Fully adjustable for every depth and angle cut from 2" at 90° to 1 1/4" at 45°.



Powerful B&D-built motors take the tough spots without overheating or slowing.



New lever arm permits safe retraction of lower guard to make pocket cuts.



B&D saw-grip handle is always at natural sawing angle. Rugged, king-size shoe gives better balance.

Black & Decker

UTILITY® PORTABLE ELECTRIC TOOLS

Bob Davis, Home Service Dept. H5M, The Black & Decker Mfg. Co., Towson 4, Md.
Please send me "Handy Tips for Handy Men." I am enclosing 25c.

Name _____

Address _____

City _____ Zone _____ State _____



◀ **Traffic laws say: "Full Stop at Stop Signs."**

If you always stop, it can help you...

save up to 40% on your auto insurance!

Read why careful drivers get top-notch protection at rock-bottom rates with

STATE FARM MUTUAL

If you drive carefully, like the man in the picture (and his small friend on the sidewalk) . . . you're already well on your way toward reducing the cost of your auto insurance.

Now, all that's left to do is contact your State Farm agent. He will tell you how we seek to insure *careful drivers only* . . . how we save money on their accident-free driving . . . how we pass this saving back to our members in the form of *rock-bottom rates*.

If you qualify, he will quote you rates that are *as much as 40 percent lower* than the cost of equivalent protection from other good companies.

More than 3 million car owners (more by far than any other company insures) already save on our "careful driver" insurance. They buy it on a convenient semi-annual payment plan. If they *do* have an accident, they get prompt,

courteous "round the clock" service from State Farm's 7000 agents and 700 claim expeditors.

Want more information? Call the agent listed under "State Farm Insurance" in your classified directory, or write: State Farm Mutual, Dept. J-9, Bloomington, Illinois.

Can you qualify?

State Farm aims to insure careful drivers only. Drivers who can be counted on to:

- Make full stop at stop signs
- Heed crossing signals
- Obey speed laws
- Be extra careful on slick pavements
- Keep car in good shape
- Avoid passing on hills or curves
- Avoid mixing alcohol and gasoline
- Yield pedestrians the right of way

STATE FARM MUTUAL



FREE TO MEMBERS!

Ask your agent for your new State Farm insignia (like above) in bright red headlight-reflecting Scotchlite. Display it proudly on left rear car bumper to identify yourself as "careful driver, soundly insured" . . . to provide emergency reflection when parked or if taillight fails.

"the careful driver insurance company"

*State Farm Insurance is written only by the
State Farm Mutual Automobile Insurance Co.
and its wholly owned affiliates:*

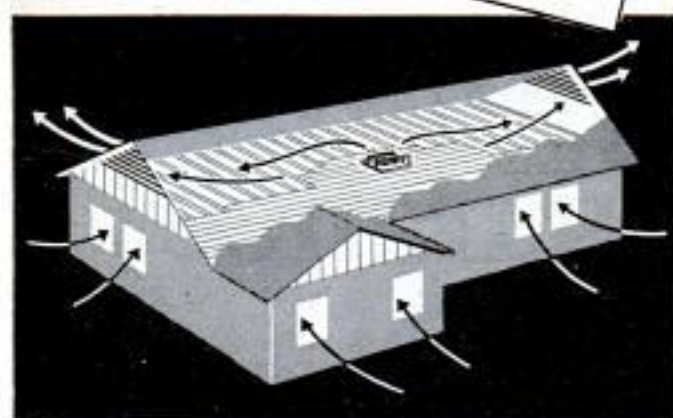
**State Farm Life Insurance Company
State Farm Fire and Casualty Company**

*Home office: Bloomington, Illinois. Field claim offices
in 300 principal cities. 7,000 agents in 40 states, District
of Columbia, and Canada*

Hear "Jack Brickhouse Sports News" Saturdays and "Cecil Brown
News Commentaries" Sundays over Mutual Stations.
Check local radio listings.

COOL YOUR ENTIRE HOUSE

For as little as
\$139.95



Hunter Attic Fan pulls in cool air through open windows, exhausting hot stuffy air through attic louvers. On hottest summer nights it circulates cooling breezes through every room. Cost of operation is only a few cents a night. Hunter's 67-year experience assures carefree performance. Sizes are available for small or large homes, with prices starting at \$139.95 including automatic ceiling shutter.



You can easily install a Hunter Attic Fan in your home. No special wiring is required. Compact unit requires only 18" to 26" attic clearance. Look in your classified directory and phone the Hunter dealer to enjoy cool comfort in your home at lowest cost. Mail coupon for copy of free booklet.

MAIL FOR FREE BOOKLET

Hunter Fan and Ventilating Company
Box 2858-BK, Memphis 2, Tennessee
Send a copy of "Change Your Home
from Hot to Cool" to:

Name _____
Address _____
City & State _____

HUNTER ATTIC FANS

the many turns due to high steering ratio. You can still get into trouble at speeds motor will deliver, although new suspension is vast improvement over earlier models."—Jackson, Tenn., plant manager.

Miscellaneous Comments

There are always many interesting, although sometimes not significant, comments from owners. Some of them are quoted below.

"Dislike dealers putting name plates on rear of car."—St. Augustine, Fla., bar owner.

"Heater controls very poorly constructed. Reflection from instrument panel on windshield. Nearly impossible to reach ashtray from the driver's seat."—Hammondspport, N. Y., insurance man.

"Sloshing noise in gas tank when it is full."—Jacksonville, Fla., welder.

"On crooked roads gasoline is slopping someplace and inside of car smells. Dealer cannot seem to correct it."—Yachats, Ore., manufacturer.

"Angle of accelerator pedal makes right leg uncomfortable on long drives. Low gas mileage."—Atlanta, Ga., minister.

"So far the '54 has been okay except for a fuel pump. Service on new cars no good until the guarantee has expired."—Foley, Fla., welder.

"Changing over to automatic transmission as all overdrives in this area have a definite roar at about 70 that nothing could solve."—Clarenda, Iowa, professional man.

"When you open the doors in the rain, the seats get wet because of the narrow top."—Oak Ridge, Tenn., inspector.

"Sports coupe is too low for tall people. Must remove hats in car."—Cazenovia, N. Y., machinist.

"Not enough room inside car."—Bismarck, N. D., salesman.

"Should have a decent-size glove compartment. Why is ignition on left side for right-handed persons?"—Old Forge, N. Y., insurance man.

We asked the owners if they would buy another Mercury. Only 4 percent said they would not; 70 percent said they definitely would; and 26 percent said they might.

When asked to give the Mercury an overall rating, 56 percent of the owners called it excellent, 36 percent good, 6 percent average and only 2 percent described it as poor. For additional details and percentages see the Percentage Table on page 104.

And now for my own test: I drove a 1954 Sun Valley (plastic top) Monterey coupe from the factory at Wayne, Mich., to Los Angeles via Kansas City and Denver—a distance of 2685 miles.

(Continued to page 258)



Crescent Standard Pattern Snip, No. S412, 12". Also in seven other sizes 7" to 14".



COMBINATION PATTERN
U412, 12" only.



HEAVY DUTY SNIPS
U416, 16" only.



CIRCULAR CUTTING SNIPS
T412, 12". Also in 7" size.

CRESCENT SNIPS

All Crescent Snips are forged of selected steel and blades ground on special grinding machines. They are hardened by Crescent's own selective induction process to insure long, satisfactory service. These easy-cutting, well-balanced snips are made in four patterns; standard, circular cutting, combination and heavy duty. *Sold by Industrial Distributors and Hardware Dealers everywhere.*



*Sign of the Artisan
Symbol of Excellence* [®]



Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by **CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK**

Wherever stops were made, the plastic top attracted attention. A filling-station attendant remarked, "Whew, more glass to clean." One important driving advantage I found was that it permits you to see overhead-hanging traffic lights easily. Everyone seems to think the plastic top will mean more heat inside the car in summer. My test was made in winter, so I cannot comment on it. There is considerable glare when driving against the sun—a sliding shade would eliminate this objection. The plastic is tinted and Mercury claims that even in hottest weather, it gets only two degrees warmer inside than in a conventional model.

It is fascinating to drive and, during storms, it is strange to see it being splashed by rain or snow. I noticed at night I could see the reflection of the instrument panel in the top, a distraction that you must get used to.

Mercury changed from the old L-head V-8 to the new overhead-valve design. The new engine has slightly better acceleration, power, top speed and gasoline mileage than the 1952 Mercury I previously tested. I found regular gasoline satisfactory, although I would use premium gas if I were a Mercury owner.

The compression ratio has been increased to 7.5:1, and horsepower from 125 of last

year to 161. Torque rating is 238 pound feet between 2200 and 2300 revolutions per minute.

In the first 500 miles I drove many miles in a heavy snowstorm. Later, on long open stretches of the West, I drove at extremely high speeds. Top speed by speedometer was 102. Like most speedometers, it was fast by about 8 percent.

(Incidentally, at Daytona Beach Speed Week, a stock Mercury averaged 96.665 miles per hour on the flying mile to win the 250-299 cubic-inch-displacement class.)

Roadability and maneuverability are extremely good. The car corners far better than the average 1954 automobile. The ball-joint front suspension is definitely an advanced design of which I approve. It makes for ease of operation, both in turning and up-and-down movement of the wheels. Mercury steers easier than any other car of its weight. Power steering is optional, but I see little need for it on a car that steers so easily. Corners can be taken at high speeds with little body roll because of the excellent suspension. It is very hard to make the car hit bottom on hard bumps at any speed.

I found little brake fading, regardless of speed or constant use on winding mountain highways in the Rockies.

(Continued to page 260)

Only \$6 for the LIFE of your Car  Truck  or Tractor 

Get a MOTALOY Ring & Valve Job While You Drive - for only \$6!

DO IT YOURSELF . . . This proven way . . .

- ★ INCREASES GAS MILEAGE
- ★ RAISES ENGINE COMPRESSION
- ★ STOPS COSTLY OIL BURNING

No work to do. No equipment to buy. Just drop Motaloy tabs in your fuel tank. That's all! Scientifically compounded tablets made of nine metals start immediate action to improve engine performance . . . saves you real money.

1954 MODEL CARS

Stop trouble in new cars before it starts and increase engine life. Motaloy helps retain factory compression and performance thousands of miles longer. Proven in over 263,400 cars — ask your mechanic!

MOTALOY IS GUARANTEED —
IF WORKS, OR YOUR MONEY BACK!

ORDER TODAY! MAIL COUPON RIGHT NOW!

ROBERT E. OLSON CO., INC.
Rm. 124, South Texas Bldg.,
San Antonio, Texas

I enclose \$6. Please rush me passenger-car size Motaloy prepaid. (No C.O.D.'s please). Please send me free literature ().

Name _____
Address _____
(Please Print)
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HERE'S HOW AMAZING MOTALOY WORKS



As you drive, Motaloy tabs create a metallic "dust". This passes to combustion chambers where heat creates a carbon-removing action. Then Motaloy actually replates pistons, rings, cylinders and valves. This is an anti-friction plating that gives a smoother, more powerful, quieter engine.

READ THESE LETTER EXCERPTS FROM OUR FILES

- INDEPENDENT LABORATORY, TEXAS: "Performance tests show by use of Motaloy, oil consumption was reduced; compression definitely increased." D.W.C.
- OFFICIAL STATE AGENCY, FLORIDA: "Remarkable improvement in compression, smoothness and quietness since using Motaloy." D.H.R.
- MECHANIC, STATE HIGHWAY DEP'T.: "By placing Motaloy in gas tank, noticed improvement in compression and gas mileage; decrease in oil consumption." J.B.S.

Available in 3 sizes.
\$6 size for vehicles
making more than 8
miles per gallon.



MOTALOY

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DISTRIBUTOR TERRITORIES AVAILABLE

Learn how homeowners everywhere save money by installing their own

MATICO TILE FLOORING



MATICO's New Improved Install-It-Yourself System Makes It Easy!

Yes, you can enjoy colorful, durable MATICO Asphalt Tile Flooring in your home at amazing low cost by installing MATICO yourself. You can't buy a more economical type of luxury flooring than MATICO. It lasts for years... is easy to keep sparkling clean and comes in 32 striking decorator colors that can't wear off because colors and marbleization go clear through the tile.

It's a cinch to install, too, with MATICO's tested install-it-yourself instruction booklet... tile calculator... and special tool kit. Why, you can finish a room in just a few hours.

Why put up with a dingy, worn-out floor when it costs so little to install a MATICO tile floor yourself.

See your classified telephone directory for the name of your MATICO dealer.



1—Mark straight lines through the center of the room in both directions, using a chalk and line.

2—With a notched trowel, spread adhesive evenly over floor and allow to "set."



3—Press tiles into position. You can walk on MATICO as soon as floor is in place.



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Joliet, Ill. • Long Beach, Calif. • Newburgh, N. Y.

Manufacturers of:

Aristoflex • Confetti • Parquetry • Asphalt Tile • Cork Tile • Plastic Wall Tile

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Dept. M2-5, P. O. Box 986, Newburgh, N. Y.

Please send me MATICO's money-saving install-it-yourself instruction kit and complete color chart.

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4C137



Service station proprietor, William Vasey, Greenwich, Conn., says: "If your filter's clogged like this, better put in a Purolator Micronic Refill right away!"

**"Right here, in the book that came with your car*, it says—
Change your Oil Filter every 5,000 miles"**

***17 out of 18 leading car makers recommend oil filter changes at least every 5,000 miles, on the average, depending on car and driving conditions.**

Grit and sludge in the oil can ruin any engine . . . run up expensive repair bills. A regularly changed Purolator[®] Oil Filter traps them and keeps them from damaging delicate engine parts.

If you've driven 5,000 miles since changing your oil filter, it's probably clogged. Install a new Purolator Micronic[®] Refill—fast! Costs as little as \$1.60. Takes a few minutes. *More car makers specify Purolator than any other oil filter.*

©Purolator Products, Inc., Rahway, N. J.; Toronto, Canada.

PurOlator

World's finest **OIL FILTER**

"Remember—there's a Purolator engineered for every make of car," says Mr. Vasey. "We recommend them for all the cars we service."

MONEY-SAVING RULE: Check your Oil Filter every time you change your oil



Merc-O-Matic drive operates smoothly and without jerk. At speeds below 58 miles per hour, intermediate ratio (passing gear) is brought into use by depressing accelerator pedal to the floorboard. The drive is constant through the torque converter, there being no lock up or positive drive such as there would be with a clutch. There is a parking lock with a lever indicator and this is good.

The interior finish is above average. Driving position is good, with plenty of arm and legroom even for a tall person. Mercury has thrown away the useless upper portion of the horn ring. No car of any make has better instrument vision than Mercury. The starter is operated by a twist of the key. I am right handed and dislike the awkward key location at the left of the steering column. Right-handed persons far outnumber "southpaws" and Mercury should relocate the key switch for right-hand convenience.

Front vision is good (see Visibility Chart page 106), although the hood is rather long and high. A shorter, or more sloping, hood would give closer ground vision in front of the car. Rear vision is adequate.

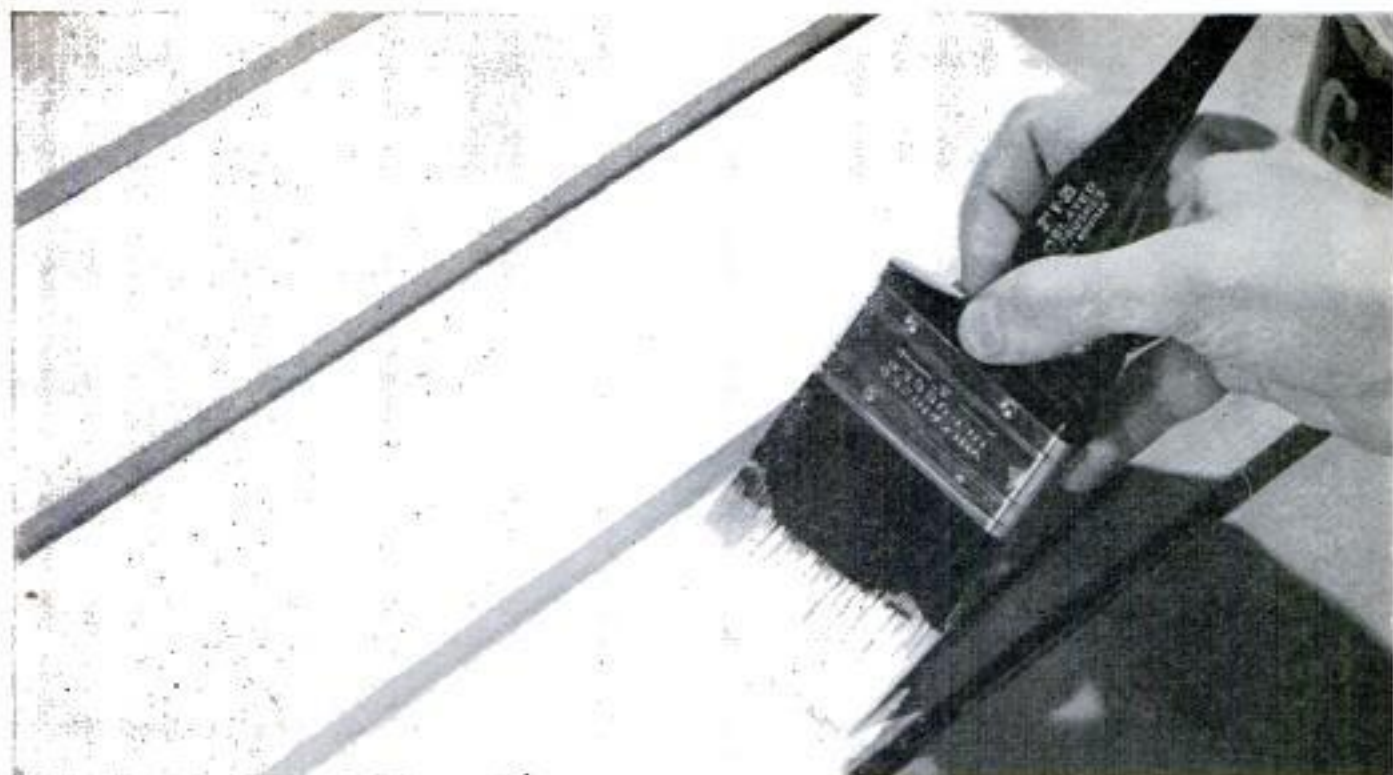
The body is tight and I found no rattles, squeaks or leaks during the test. Doors fit tight, but require too much pressure or slamming for closing.

The wide hood ornament is attractive and gives the impression that air is admitted through it. Unfortunately, I think, Mercury does not take advantage of this ornament. It should be slotted to let fresh air flow in over the top of the engine. This would increase performance and afford better hot-weather cooling.

I tested the Mercury Sun Valley under more varied weather conditions than usual, from bitter cold to desert heat (but not hot enough to test summer use of the plastic top). On gray, cold days, it felt colder inside the Sun Valley than in conventional cars, but it was only an illusion. ★ ★ ★

"Atomic" Microscope

With a new microscope which uses atomic particles as "eyes," scientists can "see" how a living or metal structure fits together. The microscope, developed at the University of Michigan, will help researchers discover where the atoms of one component of an alloy are located in the metal. The specimen to be examined contains some radioactive atoms which emit beta rays. The microscope discovers the area of greatest activity. The researcher then converts to an ordinary microscope-lens system for a visual examination of that section.



Proved by rigid tests!

NEW ONE-COAT HOUSE PAINT

saves you 1/2 the time, nearly 1/2 the cost!

Unretouched photo, above, shows how Glidden Endurance Imperial gives gleaming 2-coat whiteness in one stroke over siding with 15 years' accumulation of dirt and grime. Once around the house is all it takes with Glidden Endurance Imperial.



"TORTURE CHAMBER!" One-Coat Imperial outlasts other paints, regardless of coats, when exposed to continuous artificial sun and rain in the Weatherometer.

"BODY" MEASURING MACHINE! Imperial's formula leads the field with 90% pigment and vehicle solids. These ingredients — not thinners — give you protection.



Write now for a **FREE** copy of "How to Paint," the perfect guide for do-it-yourself painters.

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Glidden

ENDURANCE IMPERIAL

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Greatest
wood-boring tools
ever developed

Stay sharp
10 times longer
than ordinary
power bits

Even cut
thru screws
and wire nails



Set No.
8006

NEW

DYNO-MITE

**HIGH-SPEED
POWER BITS**

Here's the last word in wood-boring efficiency! "Dyno-Mite" Bits give you all the advantages of the modern flat-blade design that is rapidly replacing conventional auger bits for power drilling. And, in addition, "Dyno-Mite" Bits have high-speed steel blades — stay sharp ten times longer — even cut thru screws and wire nails without damaging their cutting edges!

Yet "Dyno-Mite" Bits cost no more than ordinary tool-steel bits!

Available in 6 diameters, $\frac{3}{8}$ " to 1", singly or in sets. All with $\frac{1}{4}$ " shanks. If your dealer cannot supply you, send check or money order for \$6.45 for No. 8006 Set of 6 sizes, postpaid.



Here's Proof of Amazing Cutting Power. One "Dyno-Mite" Bit, preparing demonstration blocks like the one at left, was still going strong after cutting thru 15 ft. of hard maple, 188 screws, 376 wire nails!

FREE at your hardware store, new Millers Falls Power Tool Catalog — or send 10c to cover mailing and handling.

MILLERS FALLS COMPANY
Dept. PM-2
Greenfield, Mass.



The Mark of Superiority

Egg for an Atom Engine

(Continued from page 94)

facts and figures that make your head spin: "It sits in a bowl-shaped concrete foundation like an egg in a cup," he says. "Thirty-eight feet of the underside is below ground level. The rest soars 5 stories higher than Niagara. It measures 706 feet around the equator," he adds, as though discussing another world. "It's so big that the barometer records .25 inches less mercury at the 'north pole' than at the 'south pole.' There's so much surface that queer things could happen if we didn't allow for them. Ordinary New York weather—a warm sun on one side and a polar wind on the other; a sudden low-pressure storm in midsummer—might create pressure differentials capable of pushing a mammoth dimple in the steel hide. Actually, size for size, the sphere is much thinner in proportion than the shell around an egg. We fixed all that by putting strain gauges on all the columns. They tell us when stresses are too great at any point. We equalize them by jacking procedures."

Erection of a building as unorthodox as the giant sphere called for plenty of American ingenuity. First, 26 tubular steel columns, each 76 feet high and two feet across, were set on the foundation rim. Then 78 big steel plates were welded to the column tops in a vast circle, forming the sphere's midriff. "Until the last gap was closed," Harman reveals, "everyone had his fingers crossed. You don't think of one-inch plate steel as something you bend or twist into odd shapes with ease. But those big plates flapped and twisted in the wind like limp sails. Once the circle was completed, of course, they formed a rigid belt."

So accurate was the engineering that only $\frac{3}{8}$ inch separated the last two plates raised into position. With the equator anchored, the bottom of the sphere was hung from it, and the dome raised on it, tier by tier. Each tier was held in place until welded by long steel arms reaching out from the derrick mast like spokes of an umbrella.

Then, one of the strangest operations of all took place. Section by section, welds over the entire ball were smeared with a soapy solution. Air was pumped into the tightly sealed sphere until 20 pounds' pressure was reached. Workmen peered over every inch of weld—looking for telltale soap bubbles that would indicate a leak. Not one was found in all the five miles of welded seams.

Once that was done, some 30,000 tons of fill cascaded into the sphere's bottom, bringing a flat, interior floor right up to

(Continued to page 264)

PENTA THE CLEAN WOOD PRESERVATIVE

DOW



You apply clean PENTA to wood in minutes,
get extra years of use and satisfaction

The Dow Chemical Company
Dept. PE 766N
Midland, Michigan



- Please send FREE BOOKLET—"Handyman's Guide to Home Wood Preservation."
 Send the name of my nearest PENTA dealer.

Name _____

Address _____

City _____ Zone _____

State _____

When you spend a few minutes in treating your gate and lawn furniture with a clean PENTA* solution, your final satisfaction with the job is multiplied many times over. Almost *any* wood article you can build *lasts years longer* with a PENTA treatment, because this modern preservative works in the *grain* to give effective protection against termites and decay. Simply flood clean PENTA on with a broad brush, or dip individual pieces before assembling. PENTA itself leaves a natural appearance, but does not interfere with finishing—leaves wood pleasant to handle and work.

Dow's free booklet, "Handyman's Guide to Home Wood Preservation", gives valuable information on how to use PENTA for protection of storm windows and screens, porches, fence posts and other decay-danger areas. Send for your copy today. Your local lumber dealer or hardware store stocks brand-name preservatives containing *PENTACHLOROPHENOL in both regular and water-repellent types. Look for the name PENTA on the label. THE DOW CHEMICAL COMPANY, Midland, Michigan.

you can depend on DOW CHEMICALS

DOW

So easy to Remove Paint



You'll be amazed at how thoroughly Wonder-Paste softens up paint, enamel, varnish, etc. Makes the old finish come off easily—not coat by coat, but all in one scraping. Use indoors or outside—on floors, trim, furniture, etc. Does not run on vertical surfaces. At paint and hardware stores.

Write for Wonder-Paste leaflet—and advice on your removing problem.

Wilson-Imperial Co., 119 Chestnut St., Newark 5, N.J.

WONDER-PASTE

Over 4 million cans sold—it must be good!

Science Speeds Shaving With "Canned Lather"!

That's right! They've invented a gadget that makes shaving faster, easier, more pleasurable! Now you can get rich, creamy lather right out of a can . . . ready to use!

No brush to slow you down . . . no greasy cream to clog your razor. Just push valve . . . out comes lather! That's AERO SHAVE . . . the wonderful new "canned lather" that contains 3 beard-softeners to wilt toughest whiskers in a jiffy . . . plus soothing lanolin to protect your skin against shaving irritation.

Get AERO SHAVE Lather Bomb today . . . in the handy metal container with the turret top that won't leak when you travel.

Big Bargain! Aero Shave is the lowest priced "push-button" lather bomb on the market today!

USE "PUSH-BUTTON" LATHER

AERO SHAVE



Also economical King Size—12 oz. only 98¢

ground level. This is the floor on which the strange, new engine will be built and tested—inside the biggest air-conditioned globe in existence. Most of its secrets will be sealed up tight. There's only one airtight globular entrance through which human traffic will pour. The other is reserved for the dolly on which rods of U-235 will ride in a gigantic lead container. Even atomic submarines must be refueled occasionally, and this is where the job will be done—in a unique concrete building called the fuel element service cell, right alongside the sphere.

In KAPL's laboratories, on an intricate cutaway model, you can see the process for handling the "hot" rods carried out in miniature. The machine that pulls the partially burned uranium rods from the reactor core in the sub is a sort of immense cap that is picked up by a 40-ton overhead traveling crane in the sphere and set down snugly over the reactor section of the hull. Under this heavily shielded "hood," the rods are pulled by robot mechanisms inside. No one will tell you how this is done or exactly what the rods are like. But when they're hauled out, they are dropped immediately into a ring of small tubular holes in a solid lead container five feet across and eight feet high. This case rides a tiny railroad, on the back of the dolly.

The tracks weave out through the sphere wall and into the fuel element service cell. Here, behind six-foot concrete walls, the uranium rods are handled by an army of robots, controlled by men looking at them through six-foot-thick windows filled with dense liquid to shield them against the deluge of atomic particles. An overhead crane outside the cell reaches down, lifts the multiton container off the dolly and drops it through a hole in the floor to a deep tunnel, onto another dolly where the hot material can be stored. One by one, the fuel rods are brought up by a robot arm. Once in the cell, a big manipulator that can grasp and lift one ton in its crushing steel grip, or pick an egg off the floor without cracking the shell, passes the fuel rod through a complex series of automatic machines. A long rod is seized in steel fingers and placed into a rack, where torrents of water wash it down. The arm grabs it and inserts it into a "scanning station," where radiation-sensitive eyes examine it minutely and record what they see. A third robot inspects and photographs it. Out comes the big arm again, to move the cylinder along to the disassembly station. Actually, only part of the rod is a fuel section. The disassembler removes this and pulls the rest of the rod apart. Most of it can be re-used.

(Continued to page 268)

Double Savings!

✓ Save on Price ✓ Save on Installation

Duo-Matic

"Do-It-Yourself"
TRIPLE-TRACK
All-Aluminum
Storm-Screen
Windows

\$29.95 Value **\$15.95**

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3-IN-ONE's Oil-Spra protects tools with fine mist of oil! Press button for penetrating oil spray! It's so easy to use!



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You get: ★ The Finest Cutting Edges
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Plastic pocket Kit - 4 Sizes \$9.40

Most complete line of Chisels, Gouges and Carving Tools
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1" - \$2.60

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AMERICA'S GREATEST "DO-IT-YOURSELF" SANDER!

New!

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LIGHTS
YOUR
WORK
AS YOU
SAND . . .

ONLY
\$39.95

The ONLY Portable
with ALL These Features!

(1) Motor guaranteed against burn-out during ownership or replaced free. (2) Removes more material with less upkeep than any other sander at any price. (3) Over 1000 hours of continuous sanding without breakdown in laboratory endurance trial. (4) Work-Light standard equipment — a Syncro "first" for portable sanders of its type. (5) Vibration-absorbing handle floats in rubber (Pat. Pend.). (6) Easy to use, hand operated, positive paper holding clamps. (7) One hand operation—no jumpy, twisty torque to fight. (8) Most powerful reciprocating sander motor (Patented). (9) No oiling—power unit floats in rubber—no cams, bushings, belts or gears to wear out.

'900' OFFERS
MORE
THAN ANY
OTHER SANDER
REGARDLESS
OF
PRICE!

Standard Models: 210-125 Volt AC. Other volt-ages, cycles available.



No. 504
\$19.95



No. 504-D
Deluxe Sander
In Metal Case: \$22.95

PRESENT, PROSPECTIVE SANDER OWNERS! This new husky '900' SYNCRO is the best portable for home use—costs less than many others! Try this superior, powerful tool on "do-it-yourself" jobs—save many times its cost! Because '900' is so new—and your dealer may be sold out—do this: Send \$39.95 and your dealer's name with coupon—we will ship '900' to you—and see your dealer profits from your purchase. Then—use your '900'—see how it sands better, quicker, easier, smoother one-handed than "bucking" torque-knobbed "Two-handed" portables do! If not 100% satisfied—return '900' prepaid, undamaged, within 10 days of receipt—we'll refund \$39.95 promptly! Or write for FREE facts today. (Dealers—See Your Jobber!)

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SYNCRO SANDER

INDUSTRIALLY RATED

Send Coupon for TRIAL ORDER or FREE CIRCULAR:

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TRIAL ORDER: I enclose: \$39.95 for No. 900 — \$22.95 for No. 504-D — \$19.95 for No. 504. Send sander prepaid, with accessories, on 10 Days Money Back Trial Offer.

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WRITE YOUR OWN NAME, ADDRESS BELOW!

FISH AND CAMP SPECIAL!



101 P.C. SPINNING OUTFIT!

AIREX "MASTEREEL" & H-1 REGISTERED SPINNING ROD & COMPLETE SPIN KIT

CERTIFIED
\$58.25
VALUE

\$29.95

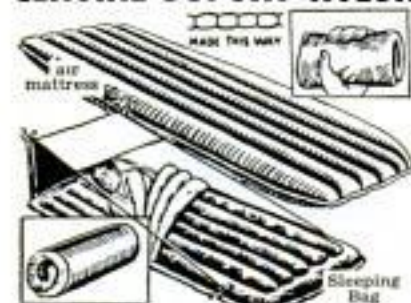
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For fishermen who want the biggest selling spinning outfit in the World—fine thoroughly dependable quality—yet Bargain Priced! Complete 101 p.c. outfit includes: (1) Brand new, first quality, latest model Airex "Mastereel" (\$22.75 separately), extra reel spool, Airex reel bag, brake dressing (2) Herrocks-Ibbotson's finest \$27.50 value individually Registered "Admiral De-Luxe" Spinning Rod. Your choice of 6 1/2 ft. Solid Power Glass, 6 1/2 or 7 ft. Tubular Power Glass. Canvas and solid fiber Rod Cases included. (3) Complete Accessory Kit includes 100 yds. finest DuPont Nylon Spinning Line, transparent plastic tackle box containing 6 famous lures, and snaps, swivels, line clips, anti-twist keels, plastic and cork floats, reel grease, fish stringer, disgorger, assorted hooks, sinkers, leaders. (4) Spinning Instruction Booklet. You get everything you need to go fishing! Certified \$58.25 Value, all for only \$29.95.

Buy 2 Complete 101 p.c. outfits and save still more... 2 FOR \$57.85

SEND \$1.39 ADDITIONAL ON EACH OUTFIT IF YOU WANT THE MASTEREEL "ARISTOCRAT" WITH FULL SAIL LINE PICKUP.

BRAND NEW, FIRST QUALITY! \$24.50 VALUE! GENUINE DUPONT NYLON AIR MATTRESS



\$9.95
EACH

3 for \$26.85
6 for \$47.70
12 for \$89.95

Save \$14.55 on each of these Supreme Quality Genuine DuPont 100% Nylon Air Mattresses! Don't compare these magnificent, long wearing Nylon Air Mattresses with the cheap and fragile plastic imitations you see everywhere! Every air mattress made to U. S. Army Quartermaster Specifications. The tough, durable Nylon fabric is rubber impregnated to lock in the air and take lots of abuse. Weighs only 2 1/2 lbs. Folds to small compact size. New type air valve permits easy filling without pump. Ends are slightly contoured to fit all sleeping bags. Big 25" x 73" inflated size. New, fresh stock. Here's real sleeping comfort for camping and outdoor use. Ideal for campers, outfitters, and surf-riders.

AIR MATTRESS AND ARKTIK SLEEPING BAG

America's finest sleeping bag value! Famous Arktik quality throughout! Air Corps Balloon Cloth top covering. Water repellent ground cloth. Warm red flannel lining. Full 100" heavy duty zipper. Filled with 4 lbs. of new Kapok. 34" x 63". Folds to compact bedroll. Has mattress pocket. Certified \$44.50 COMBINATION VALUE.

Sleeping Bag Only (no air mattress)
\$29.00 Value \$14.95

BOTH FOR
\$22.95

3 outfits
for \$59.85

AIR MATTRESS, SLEEPING BAG, AND TENT

Two Man Tent. (85" x 60") Roomy enough for 3 people. 5 oz. Oxford Cloth. Fire and Mildew Resistant. Meets Government Specifications. Sewed-in floor and mosquito bar. Weatherproof but weighs only 9 lbs. Stakes, Poles, Ropes included. You get Air Mattress, Sleeping Bag, and Tent, a Certified \$66.50 Value.

Tent Only (no mattress or bag)
\$22.00 Value \$13.95

ALL FOR
ONLY
\$34.95

3 complete outfits
\$99.85

SEND PAYMENT IN FULL OR AS LITTLE AS \$2.00 DEPOSIT ON COD'S

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Klein's gives you 30 Days Free Trial on all Mail Order Purchases with an unconditional Money Back Guarantee of Satisfaction. All articles are Brand New, First Quality, 1884 Models. Low Prices are due to our big volume and direct-to-you sales.

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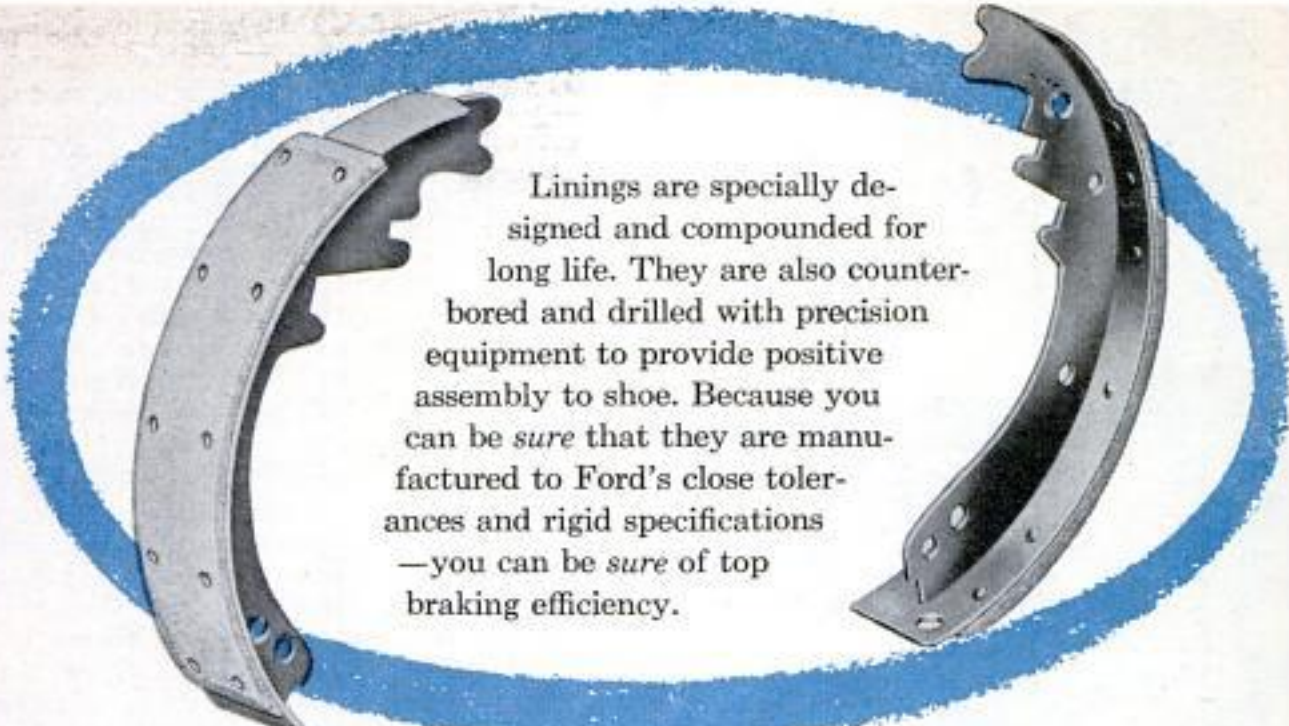


Nylon Boat Cover

Boatowners can protect their craft and motors from rain with a new boat cover made of treated nylon. The cover fits snugly down over the gunwales and the motor. Arched steel ribs prevent water from standing in pockets on the cover. The chemically treated nylon repels water and won't mildew. The cover simply is unrolled over the boat. In the event of a sudden rain it can be installed while the boat is out in the lake, protecting the occupants and their equipment. The cover is available in sizes to fit craft up to 22 feet long.

Telephone Transistors

Several telephone conversations can be carried on one rural party line with a system using transistors. Eavesdropping is impossible. The tiny battery-powered transistors, mounted on the telephone poles, place different calls on different frequencies. The conversations are sorted properly at the line's terminal. Bell Telephone, which plans an experimental installation at Americus, Ga., says the transistors should prove to be economical on telephone lines as short as five miles.



Linings are specially designed and compounded for long life. They are also counter-bored and drilled with precision equipment to provide positive assembly to shoe. Because you can be *sure* that they are manufactured to Ford's close tolerances and rigid specifications—you can be *sure* of top braking efficiency.



**Get the Brake Lining
that's made right
for your FORD**

**Every single Genuine Ford Part—like the brake lining shown above—is made *right!*
... to the same specifications set by the men who originally built your Ford!**

With fair-weather traffic "just around the corner," it's great to *know* your Ford will stop safely, smoothly, and surely. That's why *now* is the time to have worn brake linings replaced—and with Genuine Ford Brake Linings! They're made of materials specified by the men who built your Ford ... given 3,250 Track Tests before approval for manufacture. And they're made right to work right to last longer in your Ford.

"TRADE" WHERE YOU SEE THIS SIGN





**for fast,
clean work**

Greenlee Chisels

Let high-quality GREENLEE chisels help you speed jobs and put an extra-fine finish on your work. Each is carefully balanced, easy to hold. Blade is of selected tool steel that long retains its fine-cutting edge. Attractive green plastic handle provides comfortable, sure grip. Choice of Socket Butt, Socket Firmer, and Tang Butt types to suit your preference and requirements. GREENLEE chisels can be purchased singly or in handy sets packed in handsome wood cases, plastic rolls, or metal-edge boxes. See your hardware or building supply dealer.



SPECIAL OFFER... GREENLEE Woodworking Calculator only 25c. Converts linear to board feet, gives nail specifications, tool sharpening tips. Compares woods, gives bit sizes for screws, concrete mixes, painting information, etc. Convenient... simple to read. 6" diameter circular shape... heavily varnished cardboard. Send 25c (no stamps please).

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2105 Columbia Ave., Rockford, Illinois

The fuel section is then passed to the shearing station, where a punch and die separate the last bits of extraneous material from the portion that will be processed. What's left is grabbed by the robot arm again and passed to a mechanical gadget that puts each fuel section into a container and seals it. These are dropped into a bigger lead container, dollyed out of the service cell, and put on board a railroad car for shipment to some atomic center where the potent material will be renewed and made into fresh rods that can make the cosmic fire to drive the *Sea Wolf*—or any sub like her—for another 30,000 miles or so.

Needless to say, no ordinary crews can be expected to walk aboard a submarine like the *Sea Wolf* and run it. "Everyone, from cook to captain," explains Commander Neymark, project engineer formerly in charge of the crew at KAPL, "must learn how to work in the brand-new environment of radiation. It's safe enough if you know about it. The cooks must learn problems associated with long submergence. Certain cooking fats, combining chemically with other gases that have accumulated in the tight spaces after weeks of cruising below the surface, might poison the air faster than it could be replaced by new equipment said to separate oxygen from the sea water and bring it into the sub. All hands must be thoroughly informed on such things as radiation tolerances, and what to do if the pipes containing the incendiary, radioactive molten metal should spring a leak. Sodium will burst into flame on contact with air—or water. Every man jack must know exactly how to fight sodium fire."

A core of 40 men and four officers has been boning up on all the facts about the *Sea Wolf*. By the time she's launched, they'll have had three years of training. They will train the other 40 who come aboard to man the big sub—and they should be able to do a superb job. The handpicked enlisted men were high-school graduates who have already logged a B average in a college cram course on atomic physics, which they recently completed at near-by Union College. After touring KAPL and GE to study every phase of their reactor in production, they plowed through a half year of college math, thermodynamics, electrical engineering, reactor engineering, metallurgy and electronics. They helped fabricate reactor parts, and worked with the designers and engineers actually assembling the experimental engine at KAPL. They studied the reactors at Hanford and Arco, spent weeks aboard destroyers studying design and operation of

(Continued to page 270)

BRAND NEW WAR SURPLUS - BUY NOW SHOP by MAIL and SAVE

25 TON CAPACITY HYDRAULIC CYLINDER

- ALL STEEL CONSTRUCTION
- 8" BORE—15" STROKE
- DOUBLE ACTION



ITEM #1815

- 20,000 LBS. PRESSURE WITH 1000 P.S.I. PUMP OUTPUT.
- UP TO 70,000 LBS.—CAPACITY ON INTERMITTENT SERVICE.
- SOLID STEEL 2 1/2" PISTON ROD
- 1" PORTS
- OVERALL DIAMETER—10 1/2"
- DISTANCE BETWEEN CENTERS—28 1/4" CLOSED—43 1/4" OPEN.

IDEAL FOR:
 • HYDRAULIC PRESSES • DUMP TRUCK HOISTS • TD-18, TD-24 INTERNATIONAL HARVESTER DOZERS AND GRADERS • LEVELING RAMPS • INDUSTRIAL MACHINERY • ROAD MACHINERY • FARM MACHINERY • HYDRAULIC TAIL GATES

Replacement cost—\$300.00.
 Shipping Wt.—185 lbs.

SPECIAL PRICE 95.00

- 7 1/4" BORE—15 1/4" STROKE
 - 41,300 LBS. PRESSURE WITH 1000 P.S.I. PUMP OUTPUT.
- OTHER FEATURES SAME AS ABOVE
 Replacement cost \$260.00.
 Shipping Wt.—155 lbs.

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CENTRIFUGAL PUMP

Brand New GENERAL MOTORS —ALLISON
200 GALLONS Per Minute

- For Draining Basements
- Fire Fighting
- Irrigation
- Fuel Transfer
- Swimming Pools • Home Water Systems • Dewatering

For high volume commercial, home and industrial use. Standard 2 1/2" pipe thread inlet, twin 1 1/4" pipe thread outlets. Ball bearing supported 3/4" shaft. Easy priming. Rotation, counter-clockwise facing shaft. Gov't. acq. cost \$145.00. Complete with full instructions.
 Ship. wt. 35 lbs.

39.50

Will deliver 200 gals. per min. against 65 ft. head using 5.2 H.P. at 3500 R.P.M.

CONTINENTAL "RED SEAL" ENGINE

ITEM #97—Model No. AA-7, economical operating 1 1/2 H.P. engine for use with lawn mowers, garden tractors, pumps, generators, compressors, etc. Runs 5 hours on 1 gallon of gas! Single cylinder, 4 cycle, with 8:1 gear reducer at 3600 R.P.M. engine speed; shaft turns at 600 R.P.M. Complete with muffler, starter rope, oil bath air cleaner, killer button, and governor. Dimensions: 17" x 13 1/4" x 15".

Ship. Wt. 60 lbs.

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1954 CATALOG, 52 PAGES, chock-full of unsurpassed War Surplus Equipment Bargains for farm, home, factory, workshop. Write letter today.

GOV'T. SURPLUS! JUST RELEASED!

2-TON, 6-WHEEL HYDRAULIC LIFT TRAILERS

USE FOR: Conveyor ramp • Boat trailer • Lumber • Pipe • Pole trailer • Machinery trailer • Hydraulic dump for grain wagon • Coal truck • Lift truck • Variable height hydraulic work table • Removable rack permits use of hydraulic lift for other installations. Outstanding features of these trailers are—4000 lbs. pay load, 2 individual hydraulic lifts complete with hand pumps and valves. 18"x5.5 pneumatic tires included. Manual screw-down brakes. Ball-bearing axles. V-shape load rack—8' long. Towing tongue. 54" lift. Wheelbase 98". Ground clearance 4 1/2". Tread width—52". Overall width—58". Overall length including drawbar—167". Gov't. cost \$685.00. Ship. wt. 1400 lbs. F.O.B. Chicago.

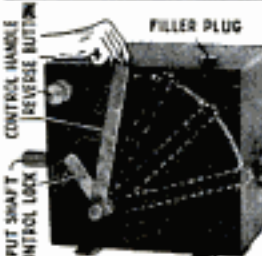


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Variable output speeds from 0 to input speed available by moving control handle. Locking handle maintains setting. Use input power of 1/4 to 1 1/2 H.P. This Westinghouse-Oil Gear Unit consists of a variable displacement hydraulic pump feeding a fixed displacement hydraulic motor. Adjustable relief valves set at factory for 100 inch pounds of torque may be reset up to 180 inch pounds. Independent reverse control allows full output power and speed selection in either direction of rotation. Shafts measure 3/8" diam., include keyway. Input rotation is counter-clockwise facing shaft. Recommended input speed not to exceed 750 R.P.M. Overall dimensions, 7 1/2" x 7 1/2" x 1 1/2". Gov't. acquisition cost \$428.00. Ship. wt. 31 lbs. Complete with 2 qts. of oil and full instructions. F.O.B. Chicago.



ITEM #115
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DOUBLE ACTING HYDRAULIC CYLINDER

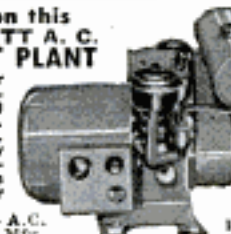
Item #1036—Double acting hydraulic cylinder, 3" bore, 36" stroke, 1 1/2" pipe thread ports. 1 1/2" solid steel shaft. Overall length closed 49", clevis mounting at base and shaft. FEATURES: • Cup & Chevron Packing • All Welded Construction • Precision Ground and Honed Construction • Will lift 7000 lbs. Gov't. acquisition cost \$428.00. Ship. wt. 57 1/2 lbs. F.O.B. Chicago.



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Compact Electric Plant suited for small homes, cabins, campers, hunting and fishing camps, trailers and small electrical home appliances. Operating costs! About 50¢ per hour. Runs exceedingly quiet. Sturdily constructed for dependable service. Net weight only 88 lbs. can be carried from place to place, or transported in trunk of car. 350 Watt — 110 Volt — 60 Cycle — A.C. Model—38.5, 38-3, made by Midget Mfg. Co. 1 Cylinder, 4 Cycle Engine complete with muffler, starting rope and oil bath air cleaner, direct coupled to a 350 Watt Generator with voltage control rheostat and twin outlets. Engine speed 1800 R.P.M. Shipping weight 116 lbs. Commercial List Price \$250.00



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A. C. ELECTRIC GENERATORS

Power these electric generators with your own gasoline engine, power take-off, or electric motor, and save the difference.

ITEM #G-3—3000 Watts, 120 Volt, 60 Cycle, 1000 H.P.M. single and three phase, for two or three wire circuits. Excellent source of electricity for portable or stand-by use for homes, farms, hatcheries, radio stations, factories. Built by Hobart Mfg. Co. to exacting specifications of the U. S. Army. Ball-bearing, generator, fan cooled. Equipped with standard 1 1/2" shaft with keyway for direct or pulley drive. Built-in Self-Exciter Foot Mounted. Gov't. Acquisition Cost: \$325.00, Dim.: 21"x13" Dia. Ship. wt. 280 lbs. New Low Price... **155.00** F.O.B. Chicago

ITEM #G-75—Electric generator, 7500 Watts, 120 Volt, 60 Cycle, 1800 R.P.M. single and three phase current, for 2 or 3 wire circuits, double ball-bearing construction, standard 1 1/2" shaft with keyway, and included at no extra price, 5-groove six inch pulley for belt drive. Direct connected Self-Exciter Foot Mounted. Gov't. Acquisition Cost: \$345.00, Dim.: 34"x11 1/2". Ship. wt. 420 lbs. Price Slashed To... **269.00** F.O.B. Chicago



ITEM #G-75

FOUR-WAY, OPEN CENTER CONTROL VALVE

Four-way open center control valve, with built-in adjustable relief valve factory set at 1000 P.S.I. Spring loaded neutral position. For use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Can be used as single unit or mounted in series. Has 3/4" pipe thread inlet and outlet. 1/2" pipe thread cylinder ports. Newly manufactured to our specification. Ship. wt. 8 1/4 lbs. An outstanding buy!..... **21.50** F.O.B. Chicago



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SELF-PRIMING HAND FLUID PUMP WITH STRAINER

ITEM #129—Type D-2—May be used as a boat balling pump, sump pump, barrel pump, fuel transfer pump, for water, oil, gasoline, insecticides, etc. Bronze and aluminum construction, 1/2 in. pipe thread ports. Fine general utility hand pump. Capacity—200 Gal. per hour. Ship. wt. 6 lbs. F.O.B. Chicago..... **11.95**



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ITEM #82. Perfect for Hydraulic Presses, Snow Blowers, Farm Wagons, Jacks, and Farm Pumps. A few easy strokes of the 20" handle and you can lift 5000 lbs., using item 355—Hydraulic Cylinder. Blackhawk Model P-151—complete with built-in oil tank and release valve. Rated 1200-8400 lbs. per square inch. Dim.: 10"x7"x6". Ship. wt. 35 lbs. Worth much more. F.O.B. Chicago..... **22.50**



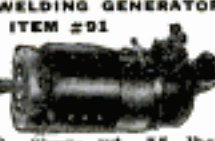
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300 AMP. D. C. GENERATORS

IDEAL FOR WELDING GENERATOR Type R-1, ITEM #91 rated 300 Amps. — 30 Volts. Mfd. by Jack & Heints. Gov't. Acq. Cost \$380.00. Ship. wt. 55 lbs. Dimensions 10"x10"x7". F.O.B. Chicago..... **35.00**



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steam machinery. Meanwhile, other Navy men spent a month sealed up in the submarine *Haddock*, tied up alongside a dock in New London—in an endurance “submergence” test designed to simulate problems that will be faced by crews who may cruise around the world without ever seeing the sky.

Not all the problems are technical. It isn't natural for man to seal himself in a container with 80 fellow men for weeks at a stretch. “The effects of long submersion on a man's ability in his job is something we don't know much about,” explains one human engineer involved with the problem. Under normal circumstances, the way a fellow next to you sucks at a tooth, taps his fingers or butters his bread may not even be noticed. But after 50-odd days of having to watch or listen to your bunkmates' nervous habits, such small things have a way of grating on temperaments and becoming almost intolerable.

None of these things has been overlooked in training and screening the crews for the two new subs. By the time the *Sea Wolf's* crew completes training at West Milton and takes off for New London to help put their ship together before taking it over, they'll be one of the most highly trained groups of men ever to move in on a piece of Navy equipment—the likes of which no

Navy man has ever had to run. These new subs are among the most formidable weapons in world history. ★ ★ ★



“Brief Case” Camp Kit Totes Shovel, Ax and Water

One wooden handle serves for both the ax and the shovel of a 7¼-pound camper's kit that can be carried like a brief case. The waterproof carrying case doubles as a two-gallon water bag. The metal-capped end of the handle is secured to the ax head or shovel by a bolted metal clip. The kit fulfills the legal requirement for tools required of campers in national parks and forest areas.

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“WHITE-TAPES”



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L-O-N-G “WHITE-TAPES”
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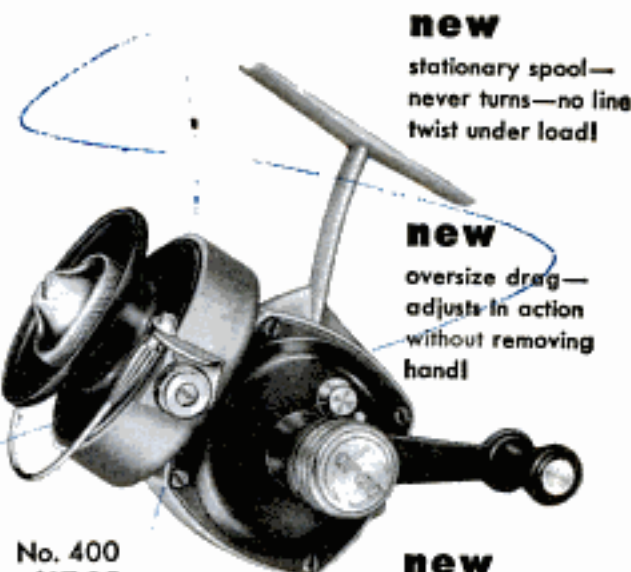
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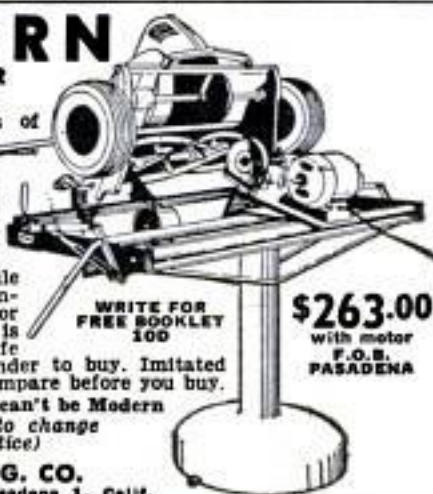
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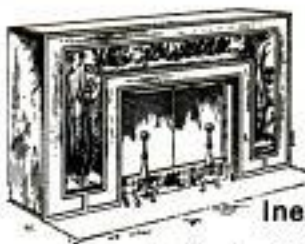
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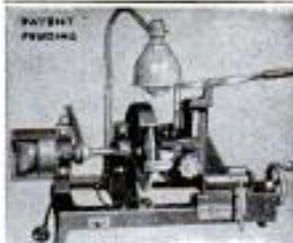
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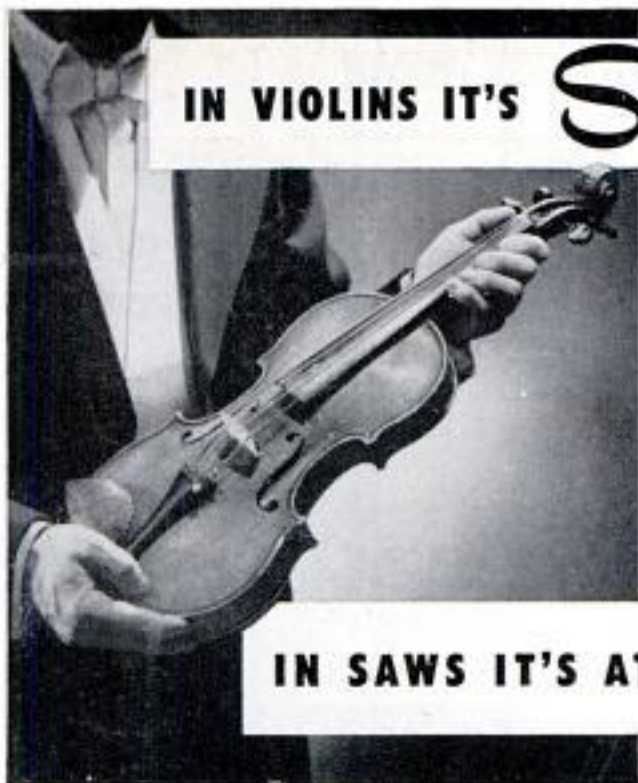
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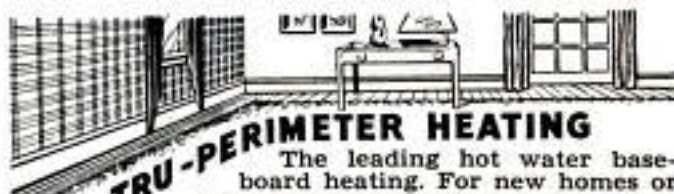


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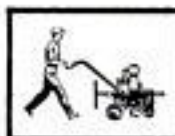


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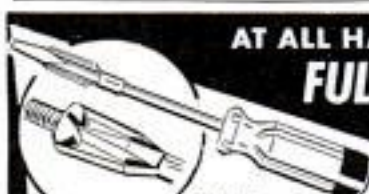
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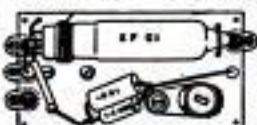


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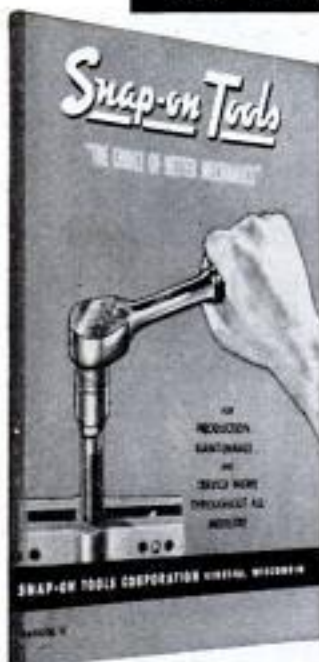
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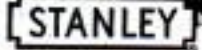
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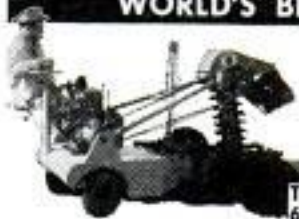


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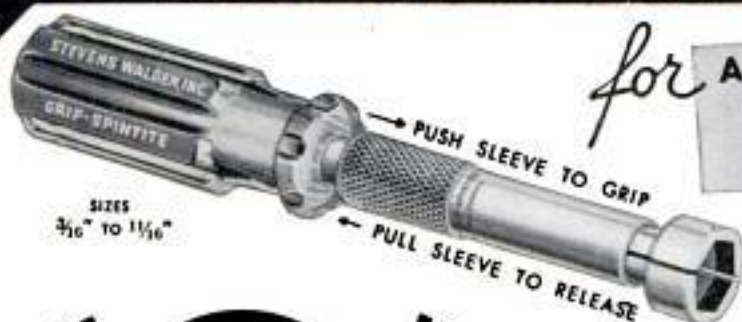
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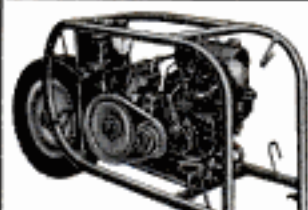
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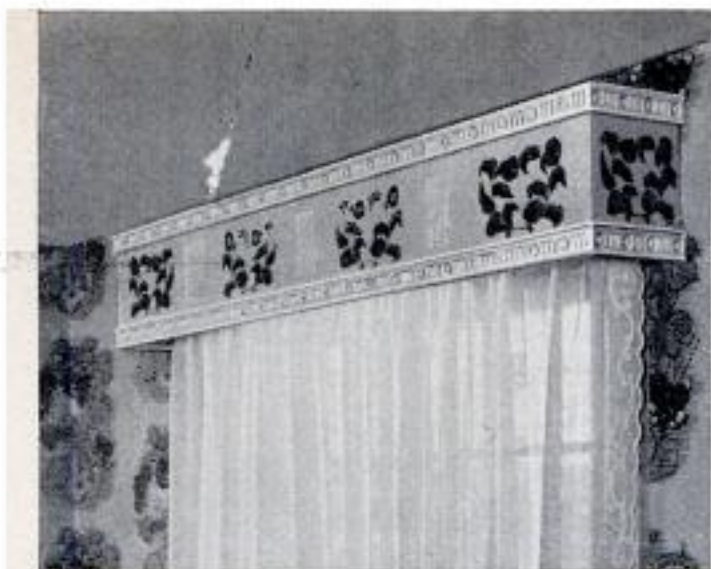


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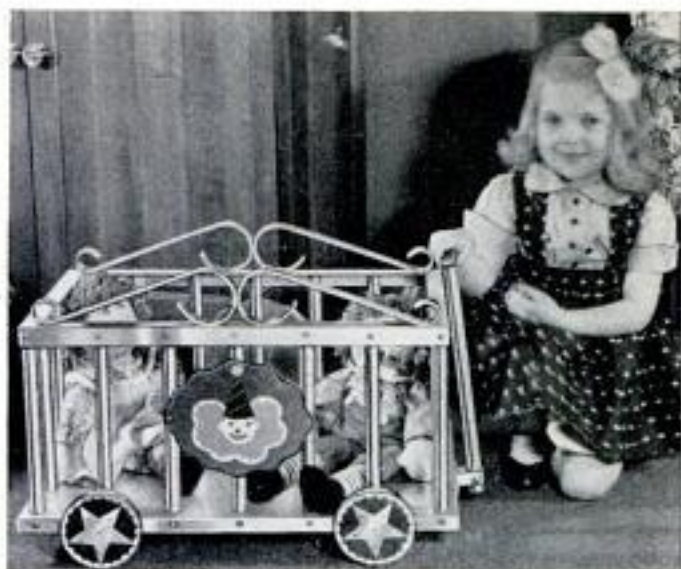
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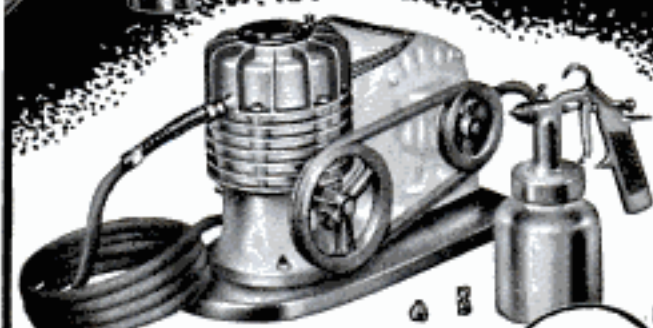
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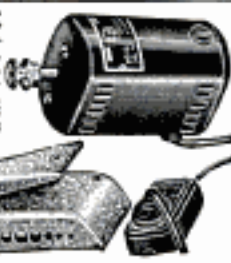
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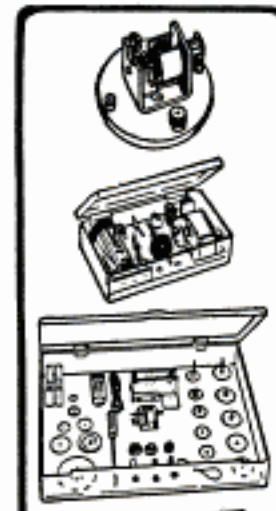
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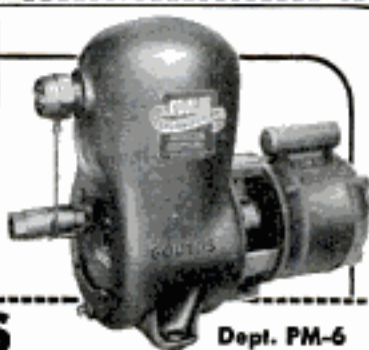
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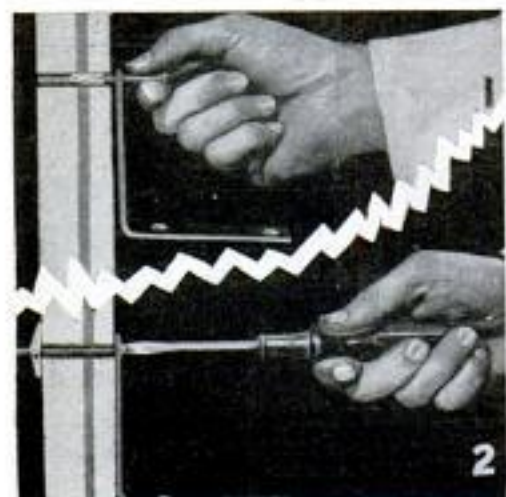
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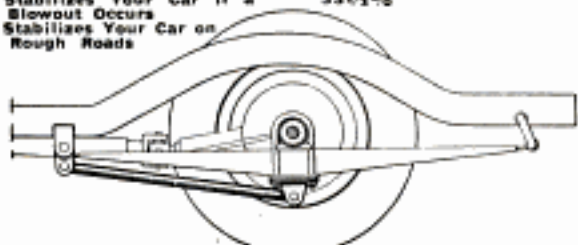
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The rear springs are the only things that hold the rear end under your car, and the flexible spring cannot cope with the torque surge coming down the drive line. When power is applied to move the car forward the rear end wants to rotate around its own axis. The spring actually bends in an arc in the forward half of the spring causing the right rear wheel to spin. Result: Loss of power and increased tire wear. **TRACTION MASTER PREVENTS THIS ACTION!** When the brake is applied, the opposite happens. The rear end is thrown downward around its own axis causing the rear half of the rear spring to bend in an upward arc. The rear wheels become unladen with weight, and most of the braking power is transferred to the front wheel brakes. Result: More rear wheel slippage and excessive tire wear. **TRACTION MASTER PREVENTS THIS ACTION!**

Miles Per Hour	Stopping Distance After Brakes Are Applied		No. of Feet Braking Improvement
	WITHOUT Traction Master	WITH Traction Master	
10	5.0	4.4	0.6
20	20.0	17.6	2.4
30	45.0	39.0	6.0
40	80.0	68.0	12.0
50	125.0	93.0	32.0
60	180.0	117.5	62.5

CAN BE SELF-INSTALLED WITHOUT SPECIAL TOOLS
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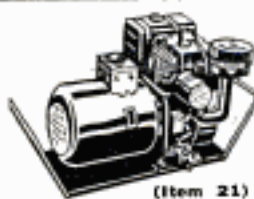
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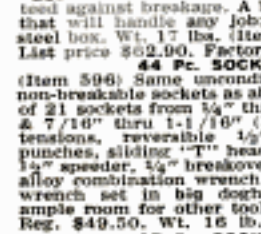
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(Item 507) Contains a complete set of 17 sockets from 5/8" thru 1 1/2" (1/2" drive) and 7/16" thru 1-1/16" (1/2" drive), 1 extension, reversible 1/2" ratchet, adapter bit, sliding "T" handle, 1/2" handle, 1/2" speeder, 5 pc. alloy combination wrench set, 8 pc. Allen wrench set and a big doghouse tool box. We challenge anyone to match this value. **\$16.95** Easily worth \$41.95. Wt. 14 lbs.



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