



ANNUAL AUTO SECTION

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN

FEBRUARY 1955
35 CENTS



PAGES ABOUT CARS —
THE '55 MODELS ON REVIEW ...
PAGE COLOR STORY ON STYLING
ARE FOREIGN CARS BETTER
ENGINEERED?... OWNERS REPORT
COSTS OF OPERATION




QUIET, EVERYBODY... IT'S THE YEAR'S BIG NEWS



1955 SEA-HORSES

SEA-HORSE 25	Electric Starting . 25 hp . .	\$525.00
SEA-HORSE 25	25 hp . .	\$430.00
SEA-HORSE 10	10 hp . .	\$310.00
SEA-HORSE 5½	5½ hp . .	\$210.00
SEA-HORSE 3	3 hp . .	\$145.00

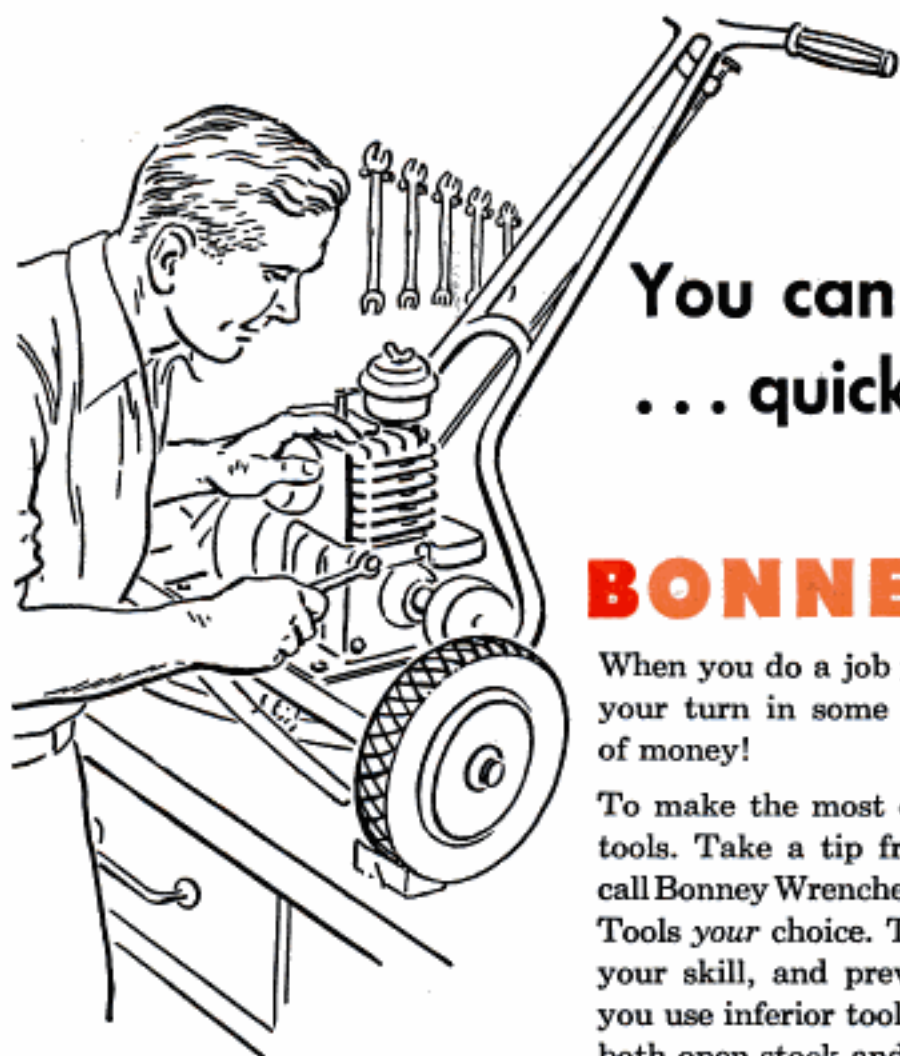

Prices f.o.b. factory, subject to
change. All ratings are OBC
certified brake hp. at 4000 rpm.

For 1955 Johnson presents Suspension Drive in the *new* Sea-Horse 10, the *new* Sea-Horse 25 and the *new* Electric Starting 25. Like the sensational Sea-Horse 5½, which was awarded a special citation by the National Noise Abatement Council, these motors are *float*ed in their stern brackets. They're *quiet*. Vibration disappears—and your hull rides the water with thrilling new smoothness... Your Johnson Dealer will show you. Look for his name under "Outboard Motors" in your classified phone book.

FREE! New Sea-Horse catalog gives complete details. All models fully described. Write for your copy.

JOHNSON MOTORS, 400 Pershing Road, Waukegan, Illinois
In Canada: Mfd. by Johnson Motors, Peterborough

 **Johnson** SEA-HORSES
FOR DEPENDABILITY



You can do it yourself
 ... quicker and better
 with
BONNEY TOOLS!

When you do a job yourself, you don't have to wait your turn in some busy shop; and you save a lot of money!

To make the most of these advantages, use *quality* tools. Take a tip from professional mechanics who call Bonney Wrenches America's finest—make Bonney Tools *your* choice. They help you make the most of your skill, and prevent injuries that happen when you use inferior tools. Bonney Tools are available in both open stock and complete sets. Ask your dealer, or write us direct.



**Start your collection of FINE TOOLS
 with this BONNEY A8 SOCKET SET!**

Here's the most practical basic socket set for home and shop. Contains twelve of the most useful $\frac{1}{2}$ " square-drive double-hex sockets, together with a 15" hinge handle and an 8" cross handle. Helps you make quick work of repairs on lawnmowers and garden tractors, automobiles, washing machines, and other household appliances.

Note! The economy-minded home mechanic or hobbyist will find Bon-E-Con Tools especially suited to his requirements. They are tools any man would value at prices anyone can afford. Bon-E-Con Tools carry the same guarantee as Bonney.



BONNEY FORGE & TOOL WORKS, ALLENTOWN, PENNSYLVANIA

FEBRUARY 1955

This one



6H03-OH3-CFQ0

1955 MERCURY

*Features the World's Most
Modern Spark Plugs . . .*

NEW TURBO-ACTION CHAMPIONS!



Greater clearance in the firing end permits turbulent gases to keep the insulator free of harmful deposits. Heat range, the temperature zone in which spark plugs operate efficiently, is extended to the widest limits in automotive history.

Exclusive, tapered Turbo-Action seating design forms a positive lock with a mating surface in the cylinder head without use of a gasket. Correct installation is automatic and Turbo-Action spark plugs remain firmly fixed and accurately positioned in the combustion chamber.

More evidence that the new **TURBO-ACTION** Champions are the spark plugs in your future:

Another producer of great motorcars—Mercury—now features these sensational new spark plugs as standard equipment on its power-packed 1955 models!

Champion **TURBO-ACTIONS**—with the widest operating range in automotive history—allow you to enjoy to the fullest extent the benefits of sharply increased compression ratios and horsepower of advanced-design power plants. And they supply the entire automobile industry with a key to increased efficiency for engines of the future.

The **TURBO-ACTION** principle involves a larger thread size and an exclusive seating arrangement without gaskets. Thus, these new Champions can be installed only in ultra-modern engines designed to use them.

Your present car will continue to give you peak performance with regular Champions.

With the new **TURBO-ACTION** Spark Plug, Champion once again demonstrates the leadership which makes Champions the first choice of motorists everywhere.

AT ALL LINCOLN, MERCURY AND OTHER CHAMPION DEALERS

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

The **FACTS** behind Ford's new Trigger-Torque Power

The world's greatest builder of V-8's brings you all the advantages of high-torque "Go" in 3 new and mighty engines for 1955!

FOR YOUR CAR to do all the things you want it to do—and do them well—it must have the ability to deliver just the right amount of "push" at the rear wheels when you need it. That "push," of course, is the direct result of engine *torque*. And Ford's new engines are capable of delivering much higher torque throughout the full range of driving speeds. The result is new Trigger-Torque power with trigger-quick response available to you in any traffic situation. On the highway, too, you'll pass with the confidence that you've got power to spare.

Ford's many new engine advances make this Trigger-Torque power possible. For example, all '55 Ford engines have higher compression ratios which mean greater efficiency. There are new free-flow induction systems for full breathing and even distribution of fuel. There are brand-new, deposit-resistant turbo-action spark plugs . . . and improved turbo-wedge combustion chambers for more efficient mixing and burning of the fuel-air charge.

In addition, there's Ford's traditional rigid deep-block construction for longer life and smoother operation. There's Ford's famous low-friction design for less wear and more economical use of gas. And every Ford engine features the exclusive power-boosting, fuel-saving Automatic Power Pilot.

NEW 162-h.p. Y-BLOCK V-8

If you haven't driven Ford's new, more powerful Y-block V-8 yet, you're in for some thrilling surprises. For this engine, with its greater displacement (the highest in Ford's field) and higher compression, is another engineering triumph from the world's leading builder of V-8's. In all Fairlane and Station Wagon models, this new engine has a dual exhaust system that reduces back pressure . . . releases more usable power to the rear wheels.

NEW 182-h.p. Y-BLOCK SPECIAL V-8

If you want even greater Trigger-Torque performance you can have Ford's Y-block Special V-8. It's available on all Fordomatic-equipped Fairlane and Station Wagon models. The compression ratio is 8.5 to 1. And the 4-barrel carburetor *really* opens up when you need GO. An "extra" pair of barrels boosts the flow of fuel-air mixture as needed to meet acceleration demands . . . cuts out automatically when a steady speed is resumed.

NEW I-BLOCK SIX

If you prefer sixes, Ford's new I-block Six is America's most modern. It's the only short-stroke, low-friction six in the industry today. And with its higher compression ratio and its improved carburetion system you get higher torque at all driving speeds.

WHY NOT MAKE YOUR OWN TEST DRIVE, THIS WEEK

3 MIGHTY ENGINES FOR 1955



162-h.p. Y-block V-8
272 cu. in. displacement,
7.6 to 1 compression ratio.

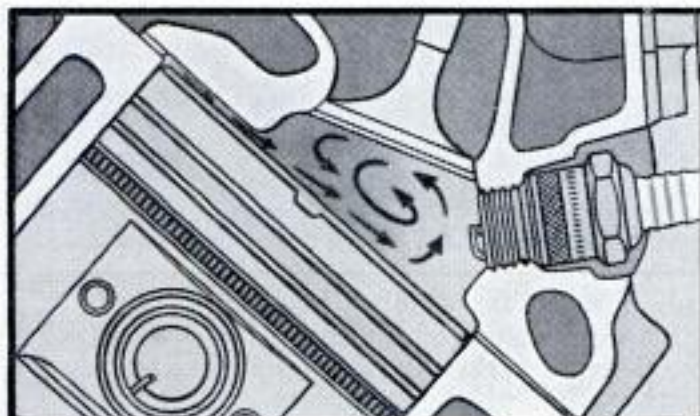


182-h.p. Y-block Special V-8
272 cu. in. displacement,
8.5 to 1 compression ratio.

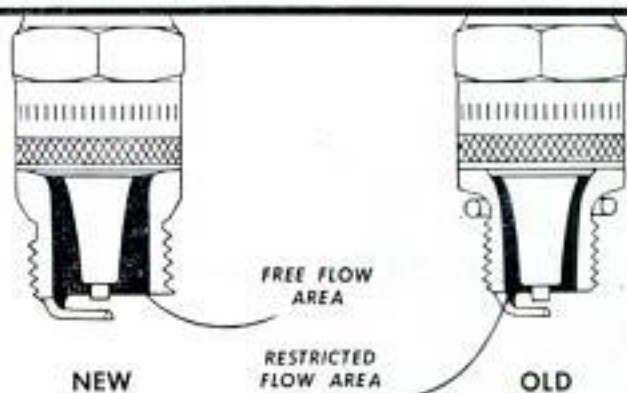


120-h.p. I-block Six
223 cu. in. displacement,
7.5 to 1 compression ratio.

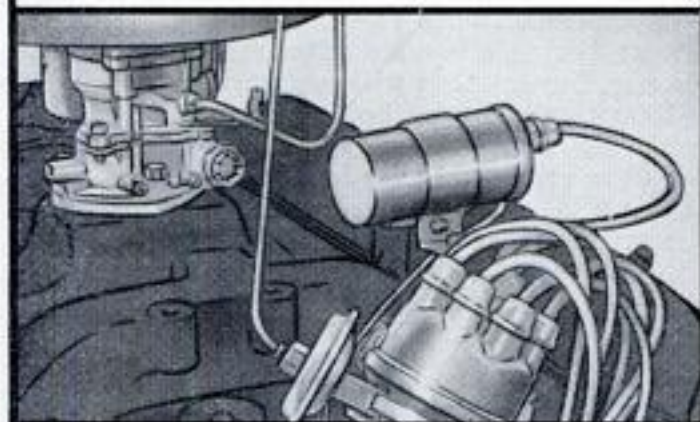
All 3 new Ford engines have these important advances



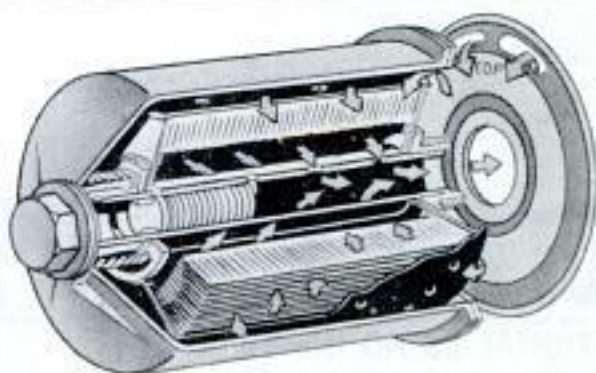
Turbo-Wedge Combustion Chambers are wedge-shaped to swirl fuel and air into a uniform mixture for efficient combustion.



New Turbo-Action Spark Plugs (a Ford "first") resist formation of deposits up to three times as long as conventional plugs.



Automatic Power Pilot makes sure just the right fuel-air mixture is ignited at just the right instant to give you more "GO"!



Full-Flow Oil Filter, available on *all* Ford engines, cleans *all* the oil *all* the time . . . protects bearing surfaces from harmful abrasives.

This **FREE SAMPLE LESSON** will prove you can become an expert **BOOKKEEPER... ACCOUNTANT** OR **C.P.A.**

FREE SAMPLE LESSON

We offer you this free sample lesson so that you can prove to yourself that you CAN master Accountancy—quickly, thoroughly—in spare time at home.

You will see exactly how LaSalle's famous "Problem Method" works . . . how you are led step-by-step through actual accounting work—learning by doing and not by study of theory alone. First you tackle easy problems, then more difficult ones—until soon you master them all. And at every step you have the close personal guidance of LaSalle's large staff of C.P.A. instructors.

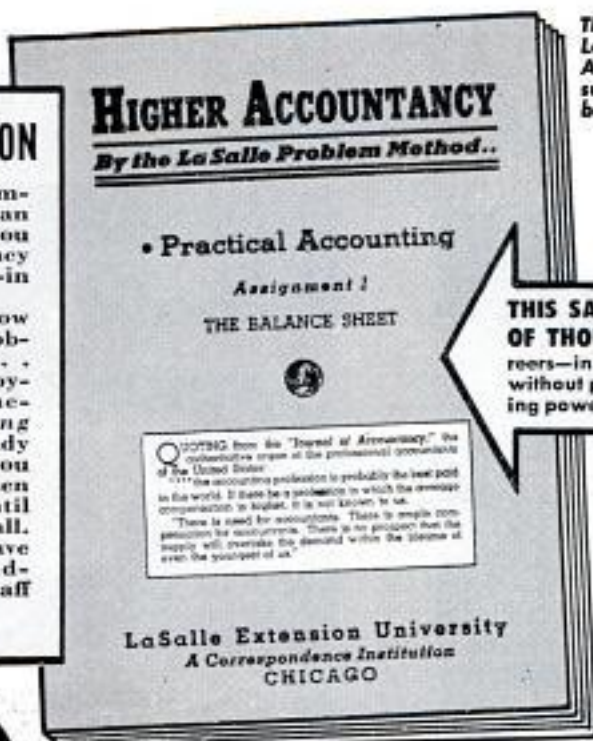
**Nearly 10%
of all C.P.A.'s
in the U.S. have
been trained by the
LaSalle Problem
Method**

GOOD-PAY JOBS IN 5 BIG FIELDS

If you were an expert accountant right now, chances are you would find yourself among the highest-paid of all professional men and women. Surveys show that accountants earn more than those in other major professions.

There are five big fields of opportunity open to Accountancy-trained men and women . . . opportunities that are wide open and highly inviting, offering maximum income and job security in good times or bad. And under LaSalle's "Problem Method" you can start earning while still learning—either in spare-time or full-time employment . . . or in business for yourself with no capital required.

Get the latest information by sending for our 48-page book, "Accountancy, the Profession That Pays" . . . plus free sample lesson. The coupon at right will bring both to you without cost or obligation. LaSalle Extension, 417 S. Dearborn St., Chicago 5, Ill.



This well-paid LaSalle-trained Accountant's success could be yours.



THIS SAME LESSON HAS STARTED HUNDREDS OF THOUSANDS toward well-paid accounting careers—in business, government, and as C.P.A.'s. Even without previous knowledge, progress is rapid—earning power climbs fast. This sample lesson shows why.

If you have been envying the high incomes and good jobs enjoyed by thousands of men and women Accountants today . . . incomes ranging from \$4,000 to \$10,000 and more per year . . . why not launch such a career for yourself?

Do you doubt that you can?

Then let us send you—without cost or obligation—the same Lesson Number One with which LaSalle

has started several hundred thousand men and women toward successful accounting careers. We want you to see for yourself how this remarkable method, originated by LaSalle, makes Accountancy simple, interesting, practical, and certain . . . how it leads you step-by-step to a complete mastery of Accounting—and on up to the coveted degree of Certified Public Accountant if you so aspire.

It doesn't matter whether you've had previous bookkeeping experience, or whether you don't know a debit from a credit. Whether you wish to qualify as an expert bookkeeper, advanced accountant, cost accountant, auditor, government accountant, income tax specialist, or public accountant . . . you'll find in LaSalle's Problem Method the exact plan to prepare you rapidly and inexpensively—in spare hours at home—without losing a day from your present job.

So right now, today . . . if you are an adult, employed, and earnestly ambitious for rapid advancement in this highest-paying of all professions . . . send your name and address on the coupon below. We'll send the free sample lesson—plus our 48-page book outlining today's career opportunities and how you can qualify for them. A coupon like this has started many thousands toward greater success. It can do the same for you. Mail it today!

Clip Coupon . . . Mail TODAY!

LaSalle Extension University . . . A Correspondence Institution
Dept. 264H, 417 S. Dearborn Street, Chicago 5, Illinois

YES, I want to see how LaSalle's "Problem Method" works . . . how I can qualify for high-pay Accountancy positions. Send Free Sample Lesson—also your 48-page book, "Accountancy, the Profession That Pays" . . . all without cost or obligation.

Name Age

Street Address

City, Zone & State

Present Position



AFTER SHAVING
**Dims Shine
 Feels Fine
 Doesn't Show**



Also available
 in Canada

Finishing touch for every shave!
 Neutral tint - crisp scent!

MENNEN
 AFTER-SHAVE TALC
FOR MEN

(Continued from page 6)

the nail. Congratulations to *Popular Mechanics* and to Mr. Haan.

J. R. Smolenske,
 Advertising Manager,
 Western Division,
 Colorado Fuel & Iron Corp.,
 Denver, Colo.

To the Editor:

Enclosed you will find a photo of a mid-gut car I built for my children. I have made two others for customers. This little car



is approximately 90 inches long, 36 inches wide and 24 inches high. It has a three-horsepower Clinton motor with a centrifugal clutch. The speed is 20-25 miles per hour. The weight is approximately 325 pounds.

Samuel A. Moorehead,
 826 Ute Ave.,
 Akron 5, Ohio

Dispatch From Pago Pago

I have in the past sent you several articles to examine, but all of them were not of any interest to you. I am enclosing photos with an article on the same subject from our local paper. I just want you

(Continued to page 12)



PICK YOUR OWN SUCCESS STORY FROM THIS PAGE

These are the true stories of people who seemed trapped in routine, low-pay shaky jobs. Handicapped by lack of proper training, they couldn't get the things they wanted out of life—more money, a job they liked, security and happiness.

They are a small sample of the thousands of men and women—young and old—who turn to I. C. S. for help. Their will-to-learn plus I. C. S. training have changed the course of their lives.

Are you discouraged with your job and pay and feel you can't improve yourself because of lack of specialized education? Well, these men and women were in the same boat. With I. C. S. training, one of these success stories could be about you.

I. C. S. is the oldest and largest correspondence school. 277 courses. Business, industrial, engineering, academic, high school. One for you. Direct, job-related. Bedrock facts and theory plus practical application. Complete lesson and answer service. No skimping. Diploma to graduates.



Wins \$3000 contest—"After my I. C. S. courses I secured a new position," says Mr. Cecil Rhodes. "My income has more than doubled and I recently won a \$3000 sales contest."



From clerk to Assistant Estimator, thanks to I.C.S. "Any way you look at it," writes Mrs. Edna James, "the time and money one spends for I. C. S. Courses will be repaid a thousandfold."



"As a college graduate, I found I. C. S. very valuable." Robert Lee took the I. C. S. Course in Advertising, is now Promotion Manager for a large corporation. "I. C. S. got me started on the way up," he says.



From \$152 to \$395 a month—"I.C.S. made my engineering work more interesting," Frank Bachtik tells us. "I was a Jr. Draftsman making \$152 a month. My present income is \$395.25 a month."

3 FREE BOOKS—a 36-page pocket-size guide to advancement, a gold mine of tips on "How to Succeed." Also a big catalog outlining opportunities in your field of interest and a sample I. C. S. lesson text.

For Real Job Security—Get an I. C. S. Diploma! ... Easy-pay Plan ... I. C. S., Scranton 9, Penna.

INTERNATIONAL CORRESPONDENCE SCHOOLS

ICS

BOX 92299B, SCRANTON 9, PENNA.

(Partial list of 277 courses)

Without cost or obligation, send me "HOW TO SUCCEED" and the opportunity booklet about the field BEFORE which I have marked X (plus sample lesson):

ARCHITECTURE and BUILDING CONSTRUCTION

- Air Conditioning—Refrig.
- Architecture
- Architectural Interior
- Building Contractor
- Building Maintenance
- Carpenter and Mill Work
- Estimating
- Heating
- Painting Contractor
- Plumbing
- Reading Arch. Blueprints

ART

- Cartooning
- Commercial Art
- Fashion Illustrating
- Magazine Illustrating
- Show Card and Sign Lettering
- Sketching and Painting

AUTOMOTIVE

- Auto Body Rebuilding
- Auto Elec. Technician
- Auto-Engine Tune Up
- Automobile Mechanic

AVIATION

- Aeronautical Engineering Jr.
- Aircraft & Engine Mechanic

BUSINESS

- Advertising
- Bookkeeping and Accounting
- Business Administration
- Business Correspondence
- Public Accounting
- Creative Salesmanship
- Federal Tax
- Letter-writing Improvement
- Office Management
- Professional Secretary
- Retail Business Management
- Sales Management
- Stenographic-Secretarial
- Traffic Management

CHEMISTRY

- Analytical Chemistry
- Chemical Engineering
- Chem. Lab. Technician
- General Chemistry
- Natural Gas Prod. & Trans.
- Petroleum Engineering
- Plastics
- Pulp and Paper Making

CIVIL, STRUCTURAL ENGINEERING

- Civil Engineering
- Construction Engineering
- Highway Engineering
- Reading Struct. Blueprints
- Sanitary Engineering
- Structural Engineering
- Surveying and Mapping

DRAFTING

- Aircraft Drafting
- Architectural Drafting
- Electrical Drafting
- Mechanical Drafting
- Mine Surveying and Mapping
- Plumbing Drawing and Estimating
- Structural Drafting

ELECTRICAL

- Electrical Engineering
- Electrical Maintenance
- Electrician Contracting
- Lineman

HIGH SCHOOL

- Commercial Good English
- High School Subjects
- Mathematics

LEADERSHIP

- Foremanship
- Industrial Supervision
- Leadership and Organization
- Personnel-Labor Relations

MECHANICAL AND SHOP

- Gas—Electric Welding
- Heat Treatment Metallurgy
- Industrial Engineering
- Industrial Instrumentation
- Industrial Supervision
- Internal Combustion Engines
- Machine Design-Drafting
- Machine Shop Inspection
- Machine Shop Practice
- Mechanical Engineering
- Quality Control
- Reading Shop Blueprints
- Refrigeration
- Sheet Metal Worker
- Tool Design Toolmaking

RADIO, TELEVISION

- Industrial Electronics
- Practical Radio TV Eng'ng
- Radio and TV Servicing
- Radio Operating

TELEVISION Technician

- RAILROAD
- Air Brakes Car Inspector
- Diesel Locomotive
- Locomotive Engineer
- Section Foreman

STEAM AND DIESEL POWER

- Combustion Engineering
- Diesel—Elec. Diesel Eng'g
- Electric Light and Power
- Stationary Fireman
- Stationary Steam Engineering

TEXTILE

- Carding and Spinning
- Cotton, Rayon, Woolen Mfg.
- Finishing and Dyeing
- Loom Fix'g. Textile Des'ing
- Textile Eng'g Throwing
- Warping and Weaving

MISCELLANEOUS

- Domestic Refrigeration
- Marine Engineering
- Ocean Navigation
- Professional Engineering
- Short Story Writing
- Telephony

Name _____ Age _____ Home Address _____

City _____ Zone _____ State _____ Working Hours _____ A.M. to P.M. _____

Occupation _____

Canadian residents send coupon to International Correspondence Schools, Canadian, Ltd., Montreal, Canada. . . . Special tuition rates to members of the U. S. Armed Forces.

Our 40th Year

NRI training is thorough, practical, up-to-date. When you enroll with NRI you benefit from our 40 years of successful experience training men at home.

J. E. Smith

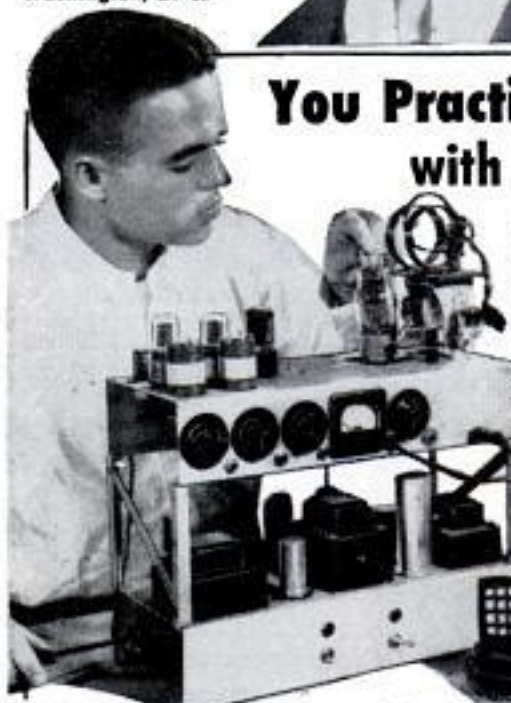
President
National Radio Institute
Washington, D. C.



I'll Train You RADIO-

You Practice Broadcasting with Parts I Send

As part of my Communications Course I send you parts to build low-power Broadcasting Transmitter at left, and other equipment. Use it to get practical experience. You put this station "on the air," perform procedures demanded of station operators. An FCC Commercial Operator's License can be your ticket to a bright future. My Course trains you to get your license. Mail Coupon now!



You Practice Servicing with Parts I Send

Nothing takes the place of PRACTICAL EXPERIENCE. NRI training is based on LEARNING BY DOING. You use parts I send to build many circuits common to Radio and TV. You build the modern radio at right. Use Multi-tester you build to make money fixing sets. Many students make \$10, \$15 a week extra fixing neighbors' sets in spare time, starting soon after enrolling. All equipment I send is yours to keep.



Television Is Today's Good Job Maker

Television now reaches from coast-to-coast. More than 25 million Television sets are already in use and require servicing; thousands more sets are being sold every week. About 200 TV stations are now on the air with hundreds more being built. This means new jobs, more jobs, better pay for trained men. The time to act is NOW! Start learning Radio-Television servicing or communications.

Make Extra Money in Spare Time While Learning

Keep your job while training. Many NRI students make \$10, \$15 and more a week extra fixing neighbors' Radios in spare time. The day you enroll I start sending you special booklets that show you how to service sets. Multi-tester you build helps discover and correct Radio troubles, gives PRACTICAL EXPERIENCE on circuits common to radio and TV. Mail coupon today.

I Trained these Men at Home



Thanks
NRI for
Wonderful
Start

"Right now I am doing spare-time repairs on radios and television. In the near future I intend to go into full-time servicing."—C. Higgins, Waltham, Mass.



Switched
from Studio
Work to
Service

"I switched from studio work and am now holding a position as TV service technician. Enjoy my work more and more."—Norman Ward, Ridgefield Park, N. J.



Paid for
Course
Before
Graduation

"By the time I graduated I had paid for my course, a car and testing equipment. Can service toughest jobs."—E. J. Streitberger, New Boston, Ohio.



\$10 to \$15
Week
Spare Time

"Four months after enrolling, was able to service Radios . . . averaged \$10 to \$15 a week spare time. Now have full time business."—W. Weyde, Brooklyn, N. Y.



Employed as
Transmitter
Operator

"A former employer recommended NRI training to me. Now employed as transmitter operator in Harrisburg."—Albert Herr, New Cumberland, Penna.

AT HOME for Good Jobs in TELEVISION

There is Success-Good Pay-Security for You in America's Fast Growing Industry



NRI Training Leads to These Jobs in RADIO-TELEVISION

BROADCASTING
Chief Technician
Chief Operator
Power Monitor
Recording Operator

SERVICING
Home and Auto Radios
Television Receivers
P.A. Systems

MANUFACTURING
Design Technician
Service Manager
Tester
Research Assistant

SHIP AND HARBOR RADIO
Chief Operator
Radiotelephone Operator
Assistant Operator

GOVERNMENT RADIO
Operator in Army, Navy, Marine Corps
Airways Operator
Forestry Dispatcher

AVIATION RADIO
Transmitter Technician
Airport Transmitter Operator

TELEVISION
Pick-up Operator
Television Technician
Remote Control Operator
Service and Maintenance Technician

POLICE RADIO
Transmitter Operator
Receiver Serviceman



Chief Engineer with Station

"I received my License and worked on ships. Am Chief Engineer at WARA, Attleboro, Mass. I am grateful to NRI for preparing me for this position."—R. D. Arnold, Rumford, R. I.

Available to **VETERANS** under G. I. Bills

DO YOU want good pay, a job with a bright future, security? Would you like to have a profitable business of your own? If so, find out how you can realize your ambition in the fast-growing RADIO-TELEVISION industry. Even without Television, the industry is bigger than ever before. Just think, over 115 million home and auto Radios, 3000 Radio Broadcasting Stations, plus 25 million Television sets and about 200 Television Broadcasting Stations. Expanding use of Aviation and Police Radio, Micro-wave Relay, Two-way Radio for busses, taxis etc., are making opportunities for Servicing and Communications technicians and FCC Licensed Operators.

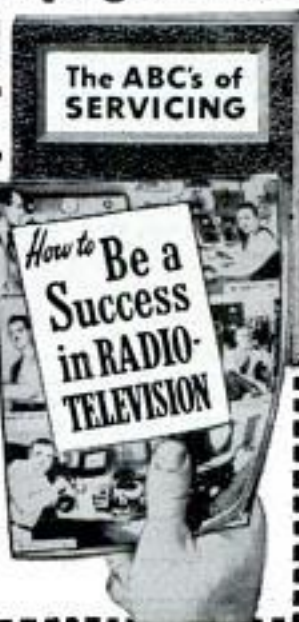
My Training Includes Television

You get practical experience by working on circuits common to both Radio and Television. My graduates are filling jobs, making good money in both Radio and Television. Many NRI trained men start their own Radio and Television servicing business with capital earned in spare time. Let me show you how you can be your own boss; earn \$10 to \$15 a week extra even while still learning. Now is the time to get ready for success in Radio-Television. Coupon below brings you Actual Lesson and 64-page book.

Find Out What Radio-Television Offers You

What will YOU be doing one year from today? Decide now that you are going to know more and earn more. ACT NOW. Send the coupon below NOW for my FREE DOUBLE OFFER. You get Actual Servicing Lesson. Also my 64-page Book, "How to Be a Success in Radio-Television." Read what my graduates are doing, earning, see equipment you practice with at home. Mail coupon now. Send in envelope or paste on postal. J. E. SMITH, President, Dept. SBA, National Radio Institute, Washington 9, D. C. Our 40th Year.

Actual Lesson and 64-page Book BOTH FREE



MAIL THIS NOW!

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

Mail me Sample Lesson and 64-page Book, FREE. (No salesman will call. Please write plainly.)

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Address.....

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

VETS write in date of discharge.....

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How to Give Yourself a \$168-a-Month RAISE!

**READ THIS, THEN RUSH
THE COUPON TODAY!**

Here's good news for the man who wants to make an *extra* income in "off hours"! We'll set you up in a proven money-earning business at *no cost to you!* We've helped thousands succeed, and we would like to do it for YOU, too!



Can You Spare an Hour a Day?

We'll provide a complete Shoe Business Outfit absolutely *free* and *postpaid*... so you can run from your home the best "shoe store" business in your town! Use this Outfit to take just **2** orders a day from friends, neighbors, relatives, people where you work. Within a month you'll have **\$168 extra** income! An hour a day should be enough! James Kelly of Ohio took so many orders for these popular shoes that he made \$93.55 in just **ONE** evening! Fred Mape of Utah regularly makes \$5 to \$10 every hour he devotes to his Mason Shoe business! There's no limit on what you can earn because **EVERYBODY** wears shoes!

It's *easy* with our famous way of selling shoes. We carry the stock and ship the shoes. All you do is show the styles to people you know and take orders. You'll have a profitable business with no rent or other costs. You keep **100%** of your profit!

Here's Why You'll Make Money!

The demand for Nationally-Advertised Mason Shoes is greater than ever! Yet folks in your community *cannot buy Mason shoes in stores*. These fine shoes will be available *only* from you!

People will fill your pockets with cash again and again for Mason shoes. Steady cash profits every month! Here are five good reasons why: ● You offer **170** fast-selling styles... far more than a store! Take orders for smart **dress shoes**... **sporty casuals**, over 30 kinds of **work shoes**, 70 popular styles for **women!** ● You have an amazing range of sizes and widths—**2½ to 14—AAAA to EEEE**. Even hard-to-fit people can buy from you! ● Because we carry over 200,000 pairs in stock, your customers get **exactly** what they want... no misfits or substitutions! ● You feature exclusive **Velvet-eez** shoes with foamy-soft **air cushion innersoles** that let people "walk on air"—plus other special built-in-comfort features! ● You save customers money and shopping time!

You Get Starting Outfit FREE!

As soon as we receive the coupon we'll send you a Shoe Business Outfit **FREE!** It features the entire Mason Collection in full color, contains 10-second Air Cushion demonstrator, valuable how-to-make money Booklet, Measuring Board... everything else you need to start making cash profits from the first hour! We'll also show you how to earn monthly **Bonus Checks** and win costly prizes **FREE!**

Want to see how much money you can make? For a 2c postcard try it **NOW**... start your exciting business *right away!* **MASON SHOE MANUFACTURING CO.**, Desk MA-538, Chippewa Falls, Wisconsin.

Send For FREE OUTFIT!

Mr. Ned Mason, Vice President
MASON SHOE MFG. CO., Desk MA- 538
Chippewa Falls, Wisconsin

Yes, I'd like to give myself a \$168 a month raise! Please rush my Shoe Business Outfit **FREE** and postpaid, so I can start making *extra money* from my first hour!

NAME.....
ADDRESS.....
TOWN..... STATE.....

(Continued from page 8)



to know that way down here a man is worshiping your excellent magazine. Therefore, I'm sending the enclosures.

T. J. Olotoa,
Pago Pago, Tutuila, Samoa

The single-sheet mimeographed paper told of the arrival in Pago Pago of William Willis, 61-year-old adventurer, aboard his balsa raft after a 115-day solo voyage from Peru. He was greeted by 500 cheering Samoans and Gov. Richard B. Lowe who praised him for surpassing the famed Kon Tiki expedition. The photos are of Mr. Willis being decorated by the governor's wife and of his raft.

To the Editor:

Motorists slow down when they see how seriously the town of Weldon, N. C., takes its mounting toll of traffic fatalities.

Harry J. Miller,
Sarasota, Fla.





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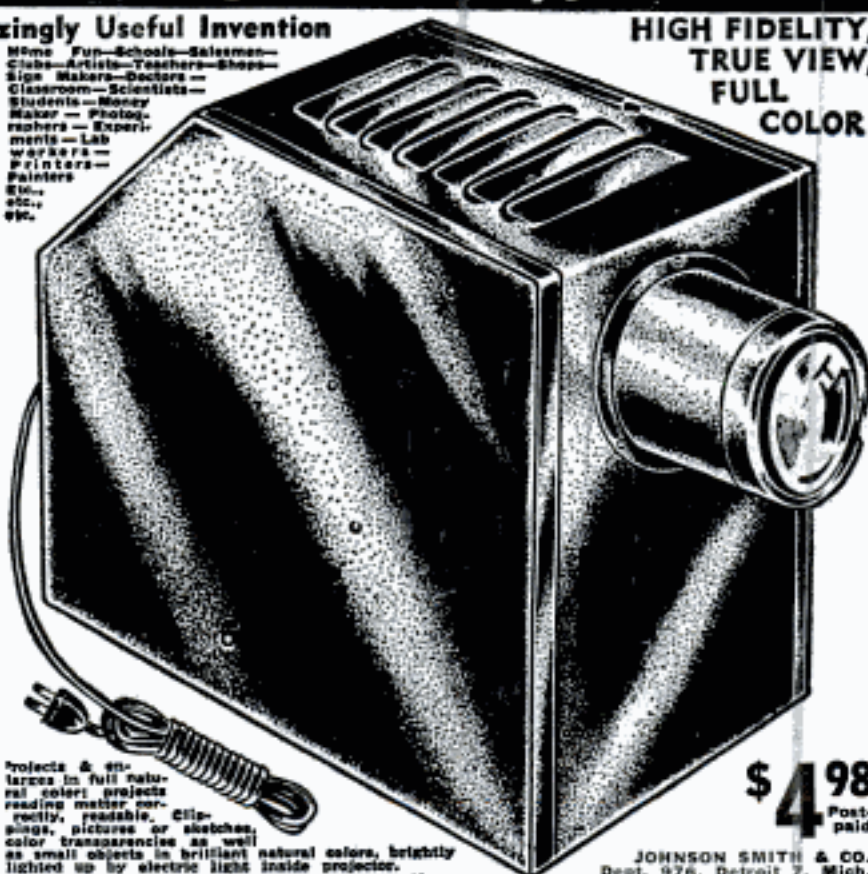
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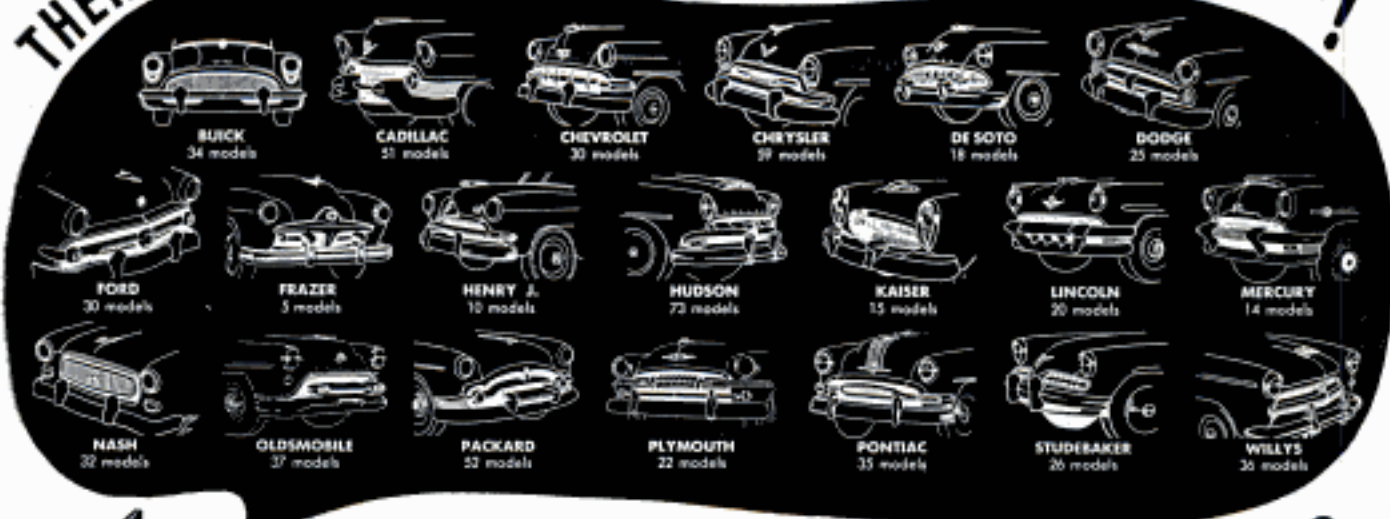
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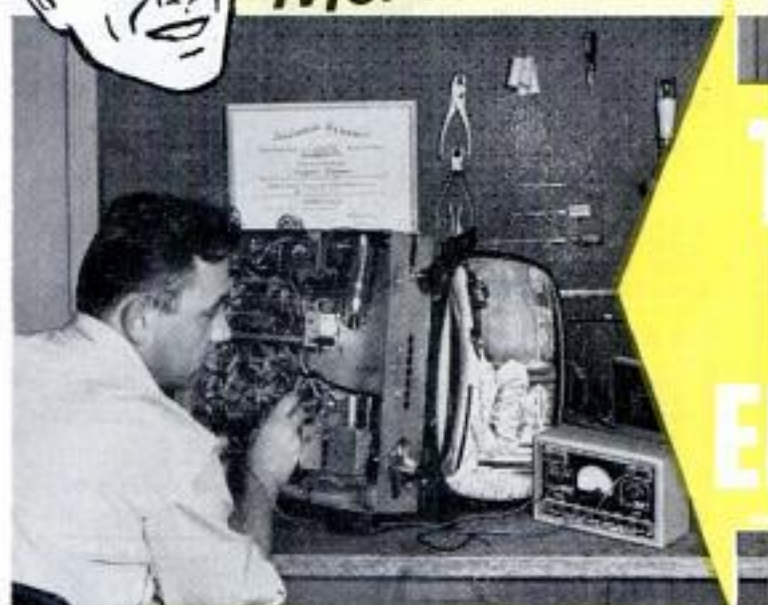


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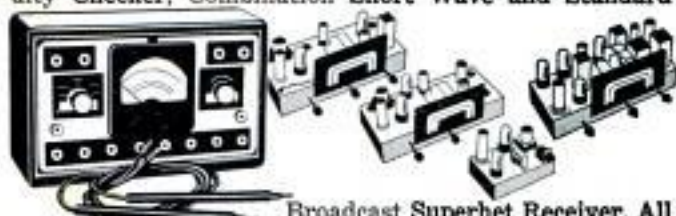
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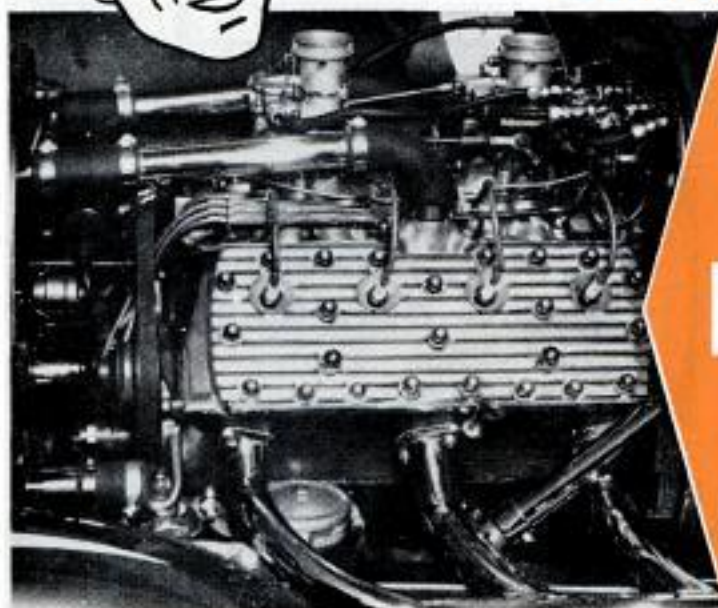
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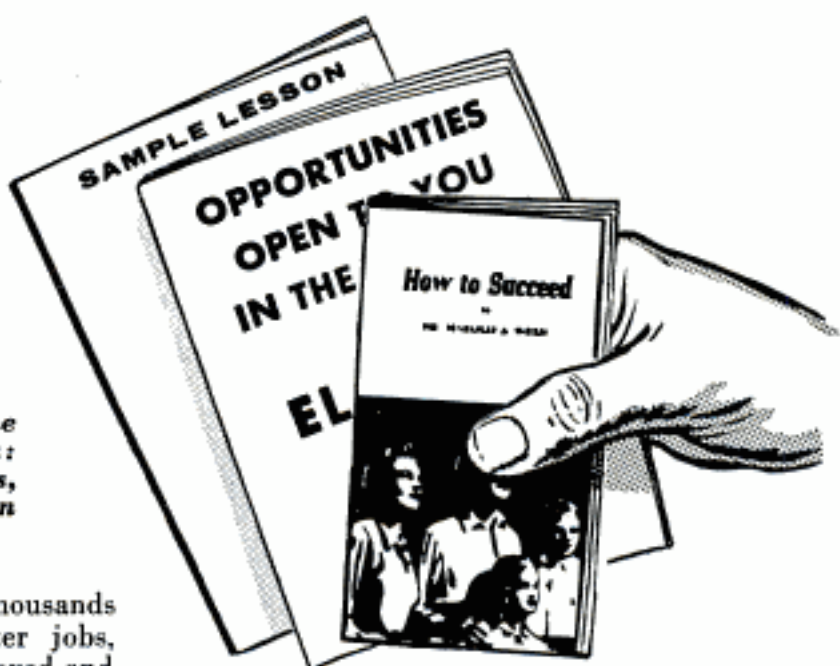
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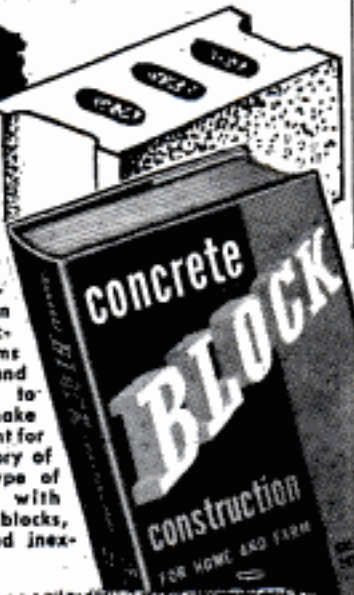
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4250x17	53.35	4250x17	53.75
4300x17	54.35	4300x17	54.75
4350x17	55.35	4350x17	55.75
4400x17	56.35	4400x17	56.75
4450x17	57.35	4450x17	57.75
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4950x17	67.35	4950x17	67.75
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5050x17	69.35	5050x17	69.75
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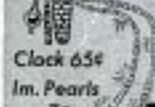
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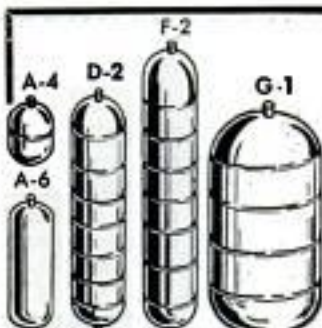
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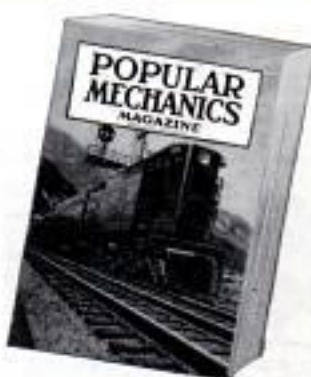
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Start in your basement, garage, attic, service porch, or even on a card table in your bedroom. With an hour's practice you can apply a few pennies worth of **FLOK-KRAFT MICRO FLUFF** to a yard or two of butcher paper, and make it look like \$15-a-yard velvet for window displays in the finest jewelry, gift, or department stores, etc. Takes only a few minutes and practically no effort.

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Truly the most amazing material you ever saw, **MICRO-FLUFF** comes in every color of the rainbow, is long lasting, has the **TOUCH** appeal of luxurious velvet or suede, and goes on practically any surface—paper, metal, wood, glass, plastic, plaster, rubber, even sponge-rubber. It is wonderful to line silverware or hosiery drawers, cover and line jewelry boxes, decorate lamps and lamp shades, finish the inside of auto trunks or glove compartments (to protect luggage and accessories from scratching) re-cover women's party shoes, phonograph turntables, etc. Apply to toys, figurines, wall plaques, signs, store displays and a thousand-and-one other items, new or old. **FLOK-KRAFT MICRO-FLUFF** makes old objects beautiful and salable — increases value of many new products by 500%.



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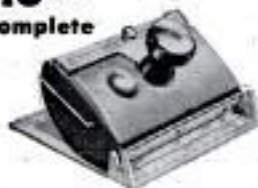
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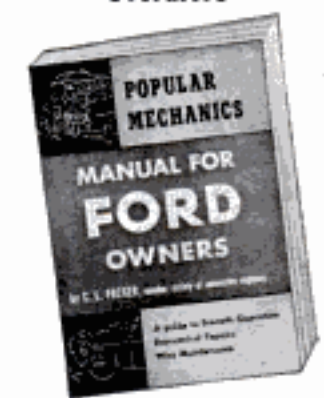
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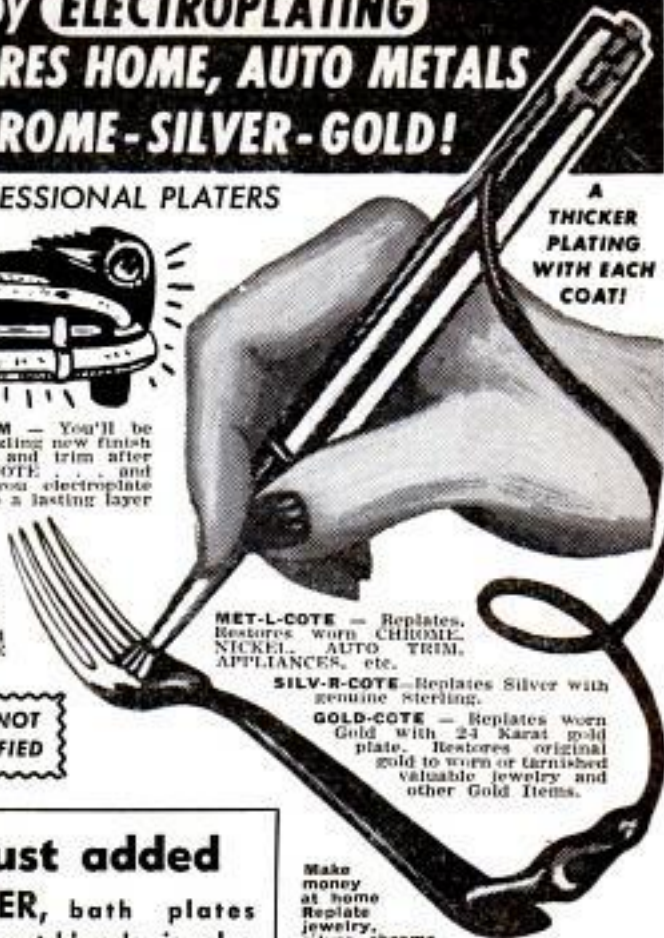
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Extra Anodes	.50	.50	.50	1.25	3.50
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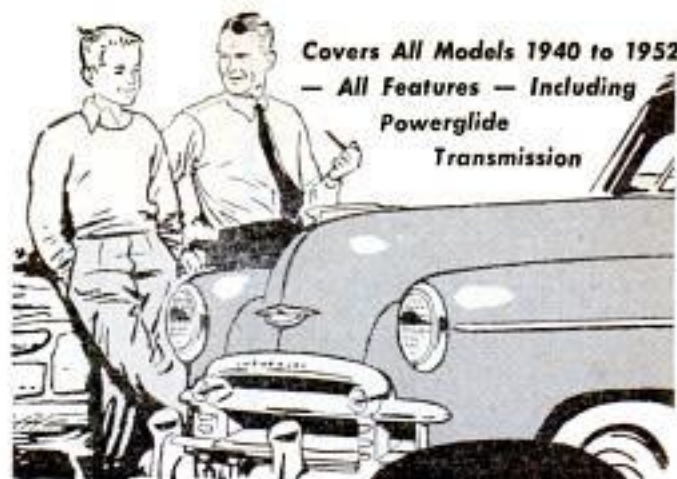
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By Jack L. Mason

What a fellow makes in his regular job today is hardly enough to make ends meet. Higher taxes, higher costs of food and rent and almost everything else raise hob with the savings account. And I say that what a fellow puts away is even more important than what he makes. It would worry me sick if I couldn't save a little against a rainy day.

And that makes it almost necessary to make some extra money. There are lots of ways to do it, too. The magazines and newspapers are full of ads for agents to sell things. But if I had to make a living by selling, from house-to-house, I'm afraid I'd starve to death. I like to make something with my hands and either sell it by mail or let the stores sell it for me. There are lots of people like me.



Another thing: Lots of men—and women, too—don't want to get mixed up with something that might hurt them on their jobs. They want a plan they can operate at home—in spare time—one that they can work at any time they please and one that doesn't need any rented store or hired help.

And that's where my little money maker rings the bell.

Let's say you're like me. You want to make some extra money but you don't want to do any selling. All right—take a look at what you can do with this machine. I'll give you some facts that I discovered and your own common sense will tell you they're true.

If you're going to make something, it ought to be something that lots of people want—something that lots of people buy. It shouldn't be something that sells at just certain seasons—but all year 'round. And, it shouldn't be any flash in the pan. It's got to be steady—year after year—something that's not here today and gone tomorrow.



Well, give a thought to this: What's more permanent than babies? Ever since I can remember there's been more and more babies born every year. Last year three and a half million. This year more. Next year, more yet. Then answer this question and tie it in with your thinking: What's stronger than mother's love for her baby? And what is more powerful than love or sentiment in making people buy things. Now you've got the idea.

Every year millions of mothers want their babies' first

shoes preserved as mementos. These mothers have the shoes "bronzed" as they call it—by electroplating. Electroplating coats the shoes with copper and preserves them forever. And there's no big company that has a corner on the business of metalizing baby shoes. Almost all of this work is done by little fellows in their kitchens or basements. Lots of orders come to you by mail when you send out circulars letting mothers know you can do the work. Lots of stores take orders, but they have to turn over the work to you. There are six or seven ways to get orders without making any house-to-house calls. The big job is keeping up with them.



You see, you can clean up six pair of shoes in a few minutes. In a few minutes more you can dip them in the hardening solution like you see in the picture. Then you spray them with a conductive coating and hang two pair in the tank on copper wires. Just turn the switch and walk away. The machine does the rest. Eight hours later those shoes are ready to take out of the tank, burnish and mount and ship or deliver. Two pair every eight hours, whether you are asleep, awake or at the movies.



The materials cost 54c a pair. The retail price you get for electroplating is \$6.00—so the profit is more than \$5.00 a pair. Since you can do six pair a day you can see what the profit is, and the beauty of it is that the machine doesn't cost much. Almost anyone can afford the equipment and the book you get tells how to run the machine and how to get orders. Anyone can follow the instructions.

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METALLIZED Baby shoe mountings, supplies, instructions. Foster, 1520 Ardmore, Chicago 26.

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MONEY Making Ideas Magazine tells how. Sample 25c. Franklin Publishing, Roanoke 7, Virginia.

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MAIL Cards, circulars for advertisers. Siegel, Box 183, Knickerbocker, New York City 2.

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RUN A spare-time greeting card and gift shop at home. Show friends samples of our new 1955 all-occasion greeting cards and gifts. Take their orders and earn up to 100% profit. No experience necessary. Costs nothing to try. Write today for samples on approval. Regal Greetings, Dept. 112, Ferndale, Michigan.

MAKE Big money selling Sunshine's exclusive everyday cards. Nationally famous assortment sells on sight for \$1.00. Many others. Beautiful stationery, gift wraps, novelties, deluxe 21 card assortment, etc. Send postcard today for sample kit on approval. Sunshine Art Studios, Inc., Dept. PM-2, Springfield 1, Mass.; Pasadena 3, California. (East of Rockies address Springfield office.)

WEDDING Invitations, personalized napkins. Wholesale prices. Sperry-Print, Williamsport 45, Penna.

SEND \$1.00 For 25 gold foil letters. Frank Watkins Signs, 1241 Overton Park, Memphis, Tenn.

NEW Sponge wall cleaner. Erases dirt like magic. Wallpaper, painted walls, ceilings. Saves redecorating. Lightning seller. Samples sent on trial. Kristee 68, Akron, Ohio.

EXTRA Money every week. I'll send you full-size Blair household products. Show them to friends and neighbors. You can make big extra profits. Write Blair, Dept. 31NB-1, Lynchburg, Va.

I Average \$125 weekly selling books by mail! So can you! Start sparetime! Work home! Cooper, 245-P Taunton, Buffalo, N. Y.

BUY Wholesale — 25,000 items. Catalog 25c. Matthews, 1472-B5 Broadway, New York City 35.

SEND Postcard for free money-making kit guaranteed direct-from-mill nylons, lingerie, blouses, men's and children's wear. American Mills, Dept. 448, Indianapolis.

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. 500A, Mount Morris, Ill.

CLEANS Windows without mess. Strange dry cleaning-cloth. Replaces liquids. Windows gleam. Samples sent on trial. Kristee 67, Akron, Ohio.

BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plan." American Buyers, 629-R Linden, Buffalo, N. Y.

REPRODUCTIONS Of customers' snap shots on lamp shades, tiles, brooches, plaques. Artistic, unique. Selling full or part time profitable and pleasant. Wells Studio, 14040 Euclid Avenue, Cleveland, Ohio.

POWER Mowers, \$42. Chain saws, \$129. Terms. Sales kit, free. Farmco-PM, Excelsior Springs, Mo.

WHOLESALE! 8000 Nationally famous products. 30-80% discounts! Large catalog. Sensational business plans included. Consolidated Distributors, 21-10, Lafayette, Paterson 15, New Jersey.

COLLEGE. High school students. Profitable opportunity. Free souvenir, details. Frontier, 2909 Pershing, El Paso, Texas.

BIG Money selling waitresses, beauticians, others, guaranteed uniforms \$3.98 up. Dacrons, nylons, cottons. Sizes 9-52. Free uniform and gift plans. Full, part time. Experience unnecessary. Free full color catalog. Upland Uniforms, 208 East 23rd, Dept. G-8, New York City.

MAKE Money introducing world's cutest children's dresses. Big selection, adorable styles. Low prices. Complete display free. Rush name. Harford, Dept. N-3341, Cincinnati 25, Ohio.

BEAUTIFUL Feather pictures. 200% profit! Free sample. Apartado 9036, Mexico 1, D. F.

PROFITABLE Deal selling magnetic pencils to waitresses, nurses. Sample \$1.00. Nicholson, Universal City 2, Calif.

BUY Wholesale. Catalog 35c (refundable). Carlton, 3007 Wharton, Philadelphia 46, Penna.

EASY Handwork makes fast-selling useful articles. Sample free. Sunmade Company, Brockton 64, Massachusetts.

HIGH Earnings, selling complete line of granite cemetery memorials. Artcraft Memorials, St. Cloud, Minnesota.

PROFIT 100%. Removes rust from guns, tools, machinery. Rustoff Company, 650 46th, Des Moines 12, Iowa.

MAKE Money giving away free hosiery! Introduce amazing nylon stockings (guaranteed against runs and snags) and men's children's hosiery (guaranteed one year) by giving away free trial pairs regardless whether or not final purchase is made! Earn up to \$3 hour spare time. Mail postcard today for free samples men's and women's hosiery with complete money-making outfits. Nothing to pay now or later. Absolutely no obligation. Kendex, Babylon 23, N. Y.

60% PROFIT On cosmetics — Famous nationally advertised Hollywood Cosmetics pay 60%! Make \$25 day up! Hire others. For free samples, details, write Studio Girl, Glendale, Calif., Dept. PM-25.

CASH In on tremendous demand for new low-priced burglar alarm for automobiles, homes, stores, auto service stations and other property. 288% profit. Unique sample offer. Northwest Electric Co., 132-B Main, Mitchell, S. Dak.

BARGAINS. Job lots, close-outs! Save up to 50% on clothing, hosiery, notions, drugs, toiletries, gifts, jewelry, television, etc. 2000 items. 25c brings wholesale bargain catalog with special get acquainted offer which includes free \$1.00 merchandise certificate. Reliable Jobbers, 311-B North Desplaines, Chicago.

APPLIANCES. Cameras, watches! Large wholesale catalogue! Cam Company, 6866PM—20th Ave., Brooklyn 4, N. Y.

THOUSANDS Articles wholesale. Supply source directory 10c. Idealer, Park Ridge, Illinois.

CALIFORNIA Sweet smelling beads. Sensational sellers. Particulars free. Mission, 2328 FR, W. Pico, Los Angeles 6, Calif.

PROFITS To 150% selling finest everyday greeting cards. New 21-card \$1.00 assortments, unusual gifts, 100 fast-sellers. Valuable gift bonuses. Assortments on approval, stationery samples free. \$1.00 gift free for prompt action! Creative Cards, 4401 Cermak, Dept. 525-A, Chicago 23.

MAKE Easy money. Sell famous \$3 CO-2 fire extinguisher. Wholesale or direct. Fast sales, liberal profits. Fire Killer Mfg. Co., Dept. E, 115 W. 17th Street, Hazleton, Penna.

TREMENDOUSLY Profitable. Sell religious articles. Different. New. Write J. Cross Company, North Attleboro, Mass.

FREE Wholesale kit guarantees you 33% to 60% profit on cameras, appliances, typewriters, etc. Arrow Distributing, 134G Nassau St., New York 38.

EASY Extra income — Sell sensational new silicone scorch resistant ironing board cover. Good Housekeeping approved. Terrific \$1.98 seller! Send for free complete selling kit. Sample cover \$1.10. Menell Products, Dept. P—P.O. Box 431, Midtown Station, New York 18, N. Y.

HAVE A complete store in your pocket. Buy wholesale and make big profits. Send for free general merchandise catalog now. Jay Norris, Dept. P, 445 Broome St., New York City.

PRINTING. Advertising salesmen — Excellent moneymaking sideline selling decalcomania name plates, small quantities. Automobile initials, sign letters. Free samples. Ralco, XL, Boston 19, Mass.

GOLD Or silver letters, numbers. Windows, doors, trucks. 1" to 6", 500% profits. Free samples. Atlas-T, 544 West 79th, Chicago 20.

MAKE Extra money. Sell front door name plates to friends, neighbors. Retail \$1.98; you make \$1.00! Free selling kit. Modern Engraving Co., P.O. Box 194, Boston 14, Mass.

SCHOOL Seniors — Be popular with classmates. Have spending money galore. Details free. Craftcards, Box 235-L, Pittsburgh 19, Pennsylvania.

\$1.00 PROFIT Selling \$2.95 photo enlargement deal. Allen Studio, Riegler Bldg., Little Rock, Ark.

AGENTS — 300% Profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 431-D North Clark, Chicago.

YOUR Own business—Used suits \$1.50, overcoats 65c, mackinaws 35c, shoes 12½c, ladies coats 30c, dresses 15c. Enormous profits. Catalog free. Moro, 1218AA South Jefferson, Chicago 7.

INCREASE Your income—Personal initialed buckles, belts, cap badges. Free information. Hook-Fast, Box 480 (PM), Roanoke, Va.

NEW Push button salt-pepper dispenser. Sprays it out! Can't clog. Can't spill. King, 55-P Oleander, West Springfield, Mass.

SALESMEN—DISTRIBUTORS

\$40 DAILY Commission and more, easily possible for hard hitting salesman to travel smaller towns securing slow pay accounts for collection. Demand is tremendous. No selling, no collecting, no investment. Fast moneymaking proposition for aggressive salesman. United Financial Service of America, 247 Plymouth Bldg., Dept. 99, Minneapolis 3, Minn.

WILL You wear new suits and topcoats without one penny cost and agree to show them to friends? You can make up to \$30.00 in a day even in spare time, without canvassing. Stone-Field, 532 South Throop St., Dept. X-926, Chicago 7, Illinois.

AMAZING Discovery, Master Glaze, puts brilliant glasslike surface on cars. Free sample, information. Big commission. Master Glaze, Dept. 821, 7720 Harwood, Milwaukee, Wis.

GET New shirt outfit free; make \$90.00 weekly on 3 average orders a day. Famous quality made-to-measure dress and sport shirts at \$3.95 up sell fast to all men. No experience needed. Full or part time. Write: Packard Shirt Co., Dept. 848, Terre Haute, Ind.

BE Independent. Sell Rawleigh products. Good nearby locality open. Write today. Rawleigh's, Dept. B-D-r-PM, Freeport, Ill.

ANYONE Can sell famous Hoover uniforms for beauty shops, waitresses, nurses, doctors, others. All popular miracle fabrics, nylon, dacron, orlon. Exclusive styles, top quality. Big cash income now, real future. Equipment free. Hoover, Dept. L-100, New York 11, N. Y.

RICH Opportunity for men in their 50's. Healthful, pleasant occupation. No investment needed. 150 of our men made \$500 to \$3,000 in one month; many just beginners. Heckman made \$104 first 2 hours; Crowley made \$224 first day; exceptional earnings. Openings available. (If you live in Canada write President, Dept. PM-2, 25 Industrial St., Leaside, Ontario.) In U. S. — President, Dept. PM-2, Box 711, Fort Worth 1, Texas.

BIG Money-making opportunity. Exclusive line work uniforms. Jackets, pants, shirts, coveralls. Advertising embroidered. Every business prospect. Outfit free. Master Div., 312 Water, Ligonier, Ind.

AD Matches! Sell amazing designs—10, 20, 30, 40 and 240-light book matches. Bigger spot cash commissions; every business a prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy nothing! Sales kit furnished. Match Corp., Dept. PM-62, Chicago 33, Illinois.

BIG Sales to stores. Plastic self-adhering letters and signs. Interchangeable. Reusable. 1208—20th Avenue, San Francisco 22.

NEW Chemical discovery. Pro Auto Wax, easy way to car beauty. Free sample, information. Amazing profits. Burford Auto Finishes, 1660-20th Street, Santa Monica, Calif.

FOUR \$3.00 Sales daily can be earning you \$1250 monthly in 12 months. Be first send \$1.00 for complete starting outfit. Levely Lady, Dept. A, Box 333, Baton Rouge, La.

BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plan." American Buyers, 630-DD Linden, Buffalo, N. Y.

SALESMEN Distributors. Introduce Barton's cannibalism remedy to poultry supply dealers. Guaranteed to produce results. Exclusive territory. Generous commissions. Lyles Products Co., Galesburg, Ill.

100% PROFIT. Fast money for you! Take orders for Sweet Georgia Brown cosmetics. Colored people buy quick. Free sample. Write Valmor 2451-PF Michigan, Chicago 16.

DISTRIBUTE Flashlights, electric lanterns to dealers. 10,000 available monthly. Samples \$2.00, refundable first order. Ashland Steel Company, Box 944, Ashland, Ky.

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. M-255, 7530 Greenwood, Chicago.

RETIRED Men earn extra money selling sales books, cafe checks, other forms for business concerns. Liberal commissions weekly. Order repeat regularly. Experience unnecessary. Write for easy plan. Kansas City Salesbook Co., 1018-B Baltimore, Kansas City 6, Missouri.

SALESMEN: Over \$50.00 daily. New colossal industrial and store deal. Samples furnished. Durawear, 53 West Jackson, PM-2, Chicago 4.

ADVERTISING Specialty salesmen—Show America's newest, sensational low-priced imprinted advertising specialties. Buyers everywhere. Big commissions advanced. Samples furnished. Charms & Cain, 37 West VanBuren, Dept. PM-25, Chicago 5.

TOP Men earn \$12,000 and more in a year in a profitable selling career. Call on owners and users of heavy duty equipment. Moly lubricants and other top quality specialized products provide repeat business regularly. Top earnings immediately. No collection or delivery worries. Write E. J. Baker, Dept. 789, Box 676, Dayton, Ohio.

MY Free outfit puts you in a fine business! Just 2 sales a day brings you up to \$217 extra a month in big money shoe business! Complete line of air cushion shoes for men, women. Just rush postcard for your powerful free selling outfit! Mason Shoe, Dept. MC 60, Chippewa Falls, Wisconsin.

SELL Thermojet—Sensational electrical appliance, attaches to cold water faucet. Converts cold tap water into hot in 2 seconds. Nothing like it on the market. Guaranteed for full year and will last a lifetime. Demonstrates instantly, no sales talk. Retail for \$19.95. Sample \$11.95. Quantity prices on request. Thermo Appliance Corp., 722 Middleneck Road, Great Neck, N. Y.

75c PROFIT On each dollar! Luxurious stainless steel tableware, guaranteed 50 years. Can't rust, tarnish or stain. Looks like sterling silver. 30, 50 and 75 piece sets, open stock, attractive chests. Write orders on commission or go in business for yourself. Use our catalogues with only your name. Have agents, others sell for you. Offer women set free for every two sets they sell to friends. Many other money-making plans. We can also ship under your label. Rush postcard for free catalogue, plans, etc. No obligation. Topval Corp., Lindenhurst 51, New York.

QUALITY Ties—Your profit 189%. Catalog free. Loren Specialties, 4351-A-2 Flournoy, Chicago 24.

NO Car needed. Let me prove you can make up to \$25.00 a day with one of America's finest line of cushion shoes direct. Daily commission, full or part time. We welcome men of mature years. Write Charles Eaton, President, Charles Chester Building, Brockton, Mass.

BIG Money selling amazing new spray-on-window light filter for factories, offices, stores, trucks, autos. Big profits. Sales plan free. Glasstint, Dept. PM-2, Consumers Bldg., Chicago 4.

30,000,000 WOMEN Want amazing new automatic refrigerator defroster. You sell 8 out of 10 on sure-fire free trial. \$250.00 weekly profit not uncommon. Rush postcard for guaranteed plan. D-Frost-O-Matic, Dept. D-102, 173 W. Madison St., Chicago 2, Illinois.

DISTRIBUTORS — Salesmen wanted. Very good profits. Steady repeat business. Write Favorite Records Company, Box 841, Chicago 90, Ill.

SELL Book repair shop service. National chain. Your own business. Professor Martin, Alsen, North Dakota.

EDUCATIONAL AND INSTRUCTION

WANTED: More new writers for TV-radio, magazines, business publications, motion pictures. Learn at home for extra income or exciting full time career. Many students earn while learning. Professional instruction. Send today for free lesson and book. Palmer Institute of Authorship, Desk TM-25, 1680 N. Sycamore, Hollywood 28, California.

IF You like to draw, sketch or paint write for talent test (no fee). Give age and occupation. Write, Dept. PM-25, 500 South 4th Street, Minneapolis 15, Minn.

LAW Trained men are business leaders—Learn at home in spare time. Low cost, easy terms. LL.B. degree conferred. Free catalog gives complete information. LaSalle Extension University, A Correspondence Institution, Dept. L 842, 417 So. Dearborn, Chicago 5.

IT'S Fun learning a language by Linguaphone's world standard conversational method. At home, quickly, easily learn to speak French, Spanish, German, Russian, Japanese, Modern Greek—29 languages available. It's like living in another country. Save time, work, money. Send for free book. Linguaphone Institute, 63025 Radio City, New York 20.

PRACTICAL Nursing—Learn easily at home, spare time. Big demand, good earnings. High school not necessary. Write for free booklet. Wayne School, Dept. PG-28, 2525 Sheffield, Chicago 14, Ill.

INVESTIGATE Accidents—Thousands of insurance companies, airlines, and steamship lines use claim investigators. Learn this fascinating work, easily, quickly. Free book, now! Universal Schools, Dept. 102, Box 8203, Dallas 5, Texas.

WANT A diesel job? New opportunities to increase income. Higher pay. More money. We can help you qualify. Tools. Shop method home training. Write today! Diesel, Tractor, Heavy Equipment Division, Interstate Training Service, Dept. B-3-B, Portland 13, Oregon.

X-RAY Technicians in great demand. Fascinating work. Good pay. We train you at home. Free catalog. National Institute, Desk 7, 4868 1/2 Sheridan, Chicago 40.

HIGH School—No classes. Study at home. Spare time. Diploma awarded. Write for free catalog HF-51, Wayne School, 2527 N. Sheffield, Chicago 14, Ill.

WELDING Training pays at Hobart Welding School, Box M-251, Troy, Ohio. VA contract. Best equipment. Catalog free.

MAILORDER Instruction course. Eliminate mistakes. Ransie, Box 1719-A, Richmond 14, Virginia.

BLUEPRINT Reading for machine and building trades. Train at home. Learn to read blueprints with confidence in 10 easy lessons. Literature free. Belton School, 1059M North Lawndale, Chicago 51, Ill.

UNHAPPY? Restless? Dissatisfied? Uncover your hidden abilities, aptitudes, personality with psychological testings. Do tests at home. Receive complete analysis prepared from tests by professional psychologists. Low cost, confidential. Write Psychologic Testing Institute, Dept. 234, 201 N. Wells St., Chicago, Illinois.

COMPLETE Your high school at home in spare time with 58 year old school. Texts furnished. No classes. Diploma. Information booklet free. American School, Dept. X245, Drexel at 58th, Chicago 37, Illinois.

OUTDOOR Work—Study for game warden, park, forestry, fish, lookout, guide, patrol and wildlife conservation service. Details free. Write Delmar Institute, D-5, Whittier, Calif.

DOCTOR Psychology degree by correspondence. College Cosmic Science, 7645 North Sheridan, Chicago 26.

U.S. Civil service jobs! Men-women, 18-55. Start high as \$350.00 month. Qualify now! 21,000 jobs open. Experience often unnecessary. Get free 36-page book showing jobs, salaries, requirements, sample tests. Write: Franklin Institute, Dept. A-24, Rochester, N. Y.

ART Airbrush, profitable. Free booklet. School, 341 Bridge Street, Brooklyn 1, New York.

MEDICAL Laboratory technique. Learn at home. Catalog free. Century College, Desk 4, 9 East Ohio, Chicago 11, Illinois.

CORRESPONDENCE Courses, educational books bought, sold, rented. Catalog free. Willard Bayles, 211 Essex, Hackensack, New Jersey.

WAKE Up with our thought and behavior motivation control plan and go, go, go! Be what you desire. Write for amazing free self-training "know-how" today. President Ballard, Box 1924-H, Louisville 1, Ky.

USED Correspondence courses, books, bought, sold, rented. Catalog free. Educational Exchange, Summerville, Ga.

CORRESPONDENCE Course. Overcome self-consciousness. Personal. Confidential. Free literature. The Leavitt Science, Clinton, Illinois.

CORRESPONDENCE Courses, educational books, rented, sold, bought. World wide service. Catalog free. Magnolia Press, Box 1272-P2, Burbank, Calif.

LEARN While asleep: It's easy. Results guaranteed. See "Personal" column.

SUCCESS In business, social life—Strengthen your voice! Free booklet. State age. Prefect Voice Institute, 210 South Clinton, Studio 2BV-2, Chicago 6.

OWN Collection agency office. Pays big! Free details. Franklin Credit, Roanoke 7, Va.

12 STEPS To success. New self-analysis technique shows you how to become successful by selling your strong points and overcoming your weak points. Send \$1.00 to Reeves-North, Personal Consultants, 8, 1129 Buena Vista Drive, Spokane 44, Washington.

APPLIED Success dynamics. Free details. A-D Psychology Ctr., Box 847, Ocean Park, Calif.

EARN College degree, remain employed. Write: Brentwood College, Box 19-721, Los Angeles 19, California.

CLERGYMEN'S. Laymen's courses. Free bulletin! Midwestern Bible School, 517 Merchants Bank Building, Indianapolis.

AVOID Failure! Six lessons small business management. Auditor-business advisor established 1929. Text distributed nationally. Write! Wm. Grosnick, 115 State, Springfield 3, Mass.

DRAFTSMEN—Urgent demand. Train now. Pay later. Free details. Industrial Training, 1704-A Frederick, Fort Worth 7, Texas.

POSITIVE Success. Secrets free! Write today. Success School, Sparta 7, Michigan.

INVESTIGATOR Training. Phillips Secret Service System, 1917-B North Keneth, Chicago 39.

GOVERNMENT Positions pay well. Home training for exam, \$9.95, entire cost. Refunded if don't pass, 47 years training experience. Order, or write immediately. Oment Instruction, Box 665-34CS, St. Louis, Mo.

AUCTIONEERING. Be an auctioneer. Earn big money. Term soon. Write for catalog. Kansas City Auction School, Suite 307, Shankman Building, 3119 Troost, Kansas City, Missouri.

BE A real estate broker. Study at home. Write for free book today. GI approved. Weaver School of Real Estate, 2020C Grand, Kansas City, Missouri.

LEARN Appliance service. Motors, washers, refrigeration, everything. Booklet. President, Box 73136, Los Angeles 3.

STUDY By correspondence for Doctor's degree in Psychology, Metaphysics and Divinity. College of Divine Metaphysics, Dept. P-M, 2811 North Illinois St., Indianapolis 8, Indiana.

HIGH School diploma at home. Licensed teachers—Approved materials. Southern States Academy, Box 144-MX, Station E, Atlanta, Georgia.

SECRET Investigation. Experience unnecessary. Investigators particulars free. George Wagner, M125 West 86th, New York 24.

PHYSICAL Therapy and massage. We train you at home. Earn big profits from your own private practice or work with hospitals and doctors. Free catalog. National Institute, Desk 4, 4868 1/2 Sheridan Road, Chicago 40, 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. 174, 2954 Admiral Way, Seattle, Washington.

EARN While you learn. Auto and diesel mechanics master this top paying trade. Many graduates earn \$100 a week and up. Approved for Korean veterans. For free information write Dept. No. 256, Nashville Auto-Diesel College, Nashville 3, Tenn.

BOOKKEEPERS! Increase your earnings! Operate your own simplified "Dollar-A-Week" bookkeeping and tax service. Full or spare time. Details free. No obligation. Ellis, Box 200, Cedar Grove, North Carolina.

MEDICAL Laboratory technicians in great demand. We train you in your own home. Catalogue free. Imperial Technical Institute, Box 973-J, Austin, Texas.

USED Correspondence courses and books sold and rented. Money back guarantee. Catalog free. (Courses bought.) Lee Mountain, Pisgah, Alabama.

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STORY Writing. Home training, for television; radio; short stories. Free 34-page sample lesson and outline. H. D. Balingier, Established 20 years, 1509 Crossroads, Hollywood, California.

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DETROIT Help wanted ads air mailed, \$1.00. Murch, 2205 W. Philadelphia, Detroit 6, Mich.

ENGINEERING Difficulties solved—Fifth year pregraduate mechanical engineers. Inquire Deltoid, Box 3055, University Station, Columbus, Ohio.

FREE 100 Items sources 25c. Variety Mart, P.O. Box 331P, McKeesport, Penna.

INFORMATION On anything. Ferguson Research Specialists, 119-14 141 St., South Ozone Park 36, N. Y.

PACIFIC Northwest job opportunities \$1.00. Baker, 1412 Jefferson Ave., Yakima, Wash.

CARTOONING, COMMERCIAL ART, SHOWCARD & SIGN PAINTING, TATTOOING

"HOW To Make Money With Simple Cartoons"—A book everyone who likes to draw should have. It is free; no obligation. Simply address Cartoonists' Exchange, Dept. 92C, Pleasant Hill, Ohio.

FREE Trial cartooning lesson. No obligation. V. Vande Linde, Madison, W. Va.

MAKE Money painting signs at home. Amazing, easy instruction tells how. With 324 illustrations (18 in colors.) \$5 postpaid. Literature free. Eric Matthews, 2325 Cass, St. Louis 6, Missouri.

PAINT Signs with our perforated patterns. Vande Linde Signs, Madison, W. Va.

BARGAINS: Wonderful courses, drawing, painting, cartooning, lettering. Free catalog. Art Book Shop, Arnold 8, Mo.

CARTOONISTS: Amateur, professional. Prepare for animation with Max Fleischer's plan. Write Vera Coleman, Lincoln Building, New York, N. Y.

CHALK Talks. Laugh producing program \$1.00. Catalog 10c. Balda The Cartoonist, Oshkosh, Wisconsin.

TATTOOING Course, supply brochures 25c. Zeiss, 728 Lesley, Rockford, Illinois.

LEARN Sign painting at home. Test lesson free. Ben Kerns, Box 812-PM, Greenville, S. C.

PAINT Signs with master patterns. Set 1 1/2" to 12" high \$1.00; sample 3c. Eyerly, B-583, Newton, Iowa.

9 ALPHABET, 3 Numerical pattern sets and raised wood letter catalog, \$1.00. Sign Letter Distributors, P.O. Box 101, Mineola, N. Y.

ARTISTS' SUPPLIES

IF Interested in artist frames, canvas, canvas boards, Red Sable brushes, etc., be sure to get our money saving price lists before buying. International Sales Co., 414 E. Baltimore St., Baltimore 2, Md.

WHOLESALE Prices — Drafting equipment, artists' supplies. Catalogue. Gordon's, 219-M Madison, Chicago 6.

ADVERTISING AGENCIES, LETTER WRITERS, FOR ADVERTISERS

24K GOLD Embossed leather key cases, with your 3 or 4 line ad. 1 post \$14 per 100, 2 post style \$18 per 100. Samples 50c. Arizadeo, Box 1456, Minneapolis 6, Minn.

ADVERTISING—Display, classified. Experts since 1893. Interesting budget brochure free. Newmark's Agency, 217-7th Ave., New York.

FREE Copy, layout service. Mailorder ad, 1,600,000 nationwide circulation, \$28.70 inch, 24-word classified, 20 big Sunday newspapers, \$30. Advertising ratebook free. Chicago Advertising Agency (Established 1900), Chicago 4.

FREE! 1955 Advertisers Rate and Data Directory, 52 pages! E. H. Brown Advertising Agency, 20 N. Wacker, Chicago 6.

500 RECENT Cash buyers \$2.00. McQuilian, Box 471, Baton Rouge, La.

MAILING Lists, most any classification. 1000 names \$5.00. 1000 your circulars mailed with ours \$4.00. 5000 your circulars printed and mailed \$12.95. Write Dixie Mailers, King, North Carolina.

ADS Placed in out of town newspapers and magazines. Low rates. Catalogue free. Ideas that pay. Baker Advertising Agency, Successors Ankrum Agency, 189 W. Madison, Chicago 2.

ADVERTISE: 24 Words, 100 Canadian newspapers \$3.50. Lists free. Advertising Bureau, 10511-C Springfield, Chicago 43.

RUBBER STAMPS AND OFFICE SUPPLIES

RUBBER Stamps 30c. Offset printing \$6.50—1000, 8 1/2"x11", 16 lb. Catalog 10c, refundable. Esco 125 Print, 8 Holt, Dayton 7, Ohio.

3 LINES Pocket or cushion \$1.00. Hansen, 4906-P Ohio, Chicago 44.

FREE Style list stock stamps. Criterion, Box 2326, Denver 25, Colo.

LINE 25c; 2-45c! 3-63c. Stamp Works, Auburn, Nebraska.

RUBBER Stamps by professional craftsmen, 3 lines \$1.00. Price list, South Coast Press, P.O. Box 2074, San Bernardino, Calif.

TYPEWRITERS, DUPLICATORS, OFFICE DEVICES

TYPEWRITERS, Reconditioned, largest stocks; bargains; "Addometers"; pricelist. Equipment, 2710 Tracy, Kansas City 9, Missouri.

RECONDITIONED Typewriters, duplicating, printing devices, \$25.00 up. Supplies. Appliances, DixieGraph, King, N. C.

PRINTING, MULTIGRAPHING, MIMEOGRAPHING, GUMMED LABELS

1000 EMBOSSED Cards, \$3.95. 4-line stamp, choice of 800 emblems, \$2.00 postpaid! Accuracy guaranteed. Samples. Parr, 426-F Ontario, Burbank, Calif.

1,000 STATEMENTS \$4.99. Free printing catalogs. Erco, Bronx 72, N. Y.

PRINTING, Photo-offset, mimeographing, prices, samples free. Mimeo, Madison, Tennessee.

1000 EMBOSSED Cards \$2.95 postpaid. Offset printing: 1000 8 1/2"x11, 20 pound, \$6.45. Samples, Jaynar, Box 723B, Oak Lawn, Illinois.

FREE Catalog business, personal printing. 500 8 1/2 x 11 letterheads \$3.50 postpaid. D & M Sales Co., Sebastopol, Calif.

PRINTING And office supplies wholesale. 20,000 items. Literature free. Royal, Box 368-X, Cleveland 27, Ohio.

100 8 1/2 x 11 LETTERHEADS, Printed carefully, \$1.00 postpaid. Envelopes same. Race Printers, Hudson, New York.

PRINTING By Ace. Samples, catalog free. P.O. Box 262, Lyndhurst, N. J.

OFFSET Printing, \$5.50—1000, 8 1/2"x11, 16 lb. National Letter, 1463 Broadway, New York City 36.

100 LETTERHEADS Or #6 3/4 envelopes \$1.00. Two colors \$1.50. Broadbrook, Botsford, Conn.

BUSINESS Cards. Printing. Reasonable. Free samples. Lites, 5352-PM Princeton, Chicago 9.

"STYLED-For-sales" printing, fairly priced (postpaid). Dollar-saving combinations. Mageeprint, Durham 2, Connecticut.

125 LETTERHEADS (8 1/2"x11), 125 envelopes, \$2.95. Fender Press-G, Carson, Iowa.

GET Our prices first. Crane, Box 7625-D, Kansas City, Missouri.

QUALITY Printing. Booklets, publication, catalogs, stationery. Free catalog. Adams Printers, 30 W. Washington, Chicago 2, Illinois.

MIMEOGRAPHING — Reasonable. Any copy. Mailers Service, Box 606-A, Chicago 90, Ill.

BUSINESS Stationery. Letterheads, envelopes, cards, invoices, statements, office forms. Samples free. Oren, Printer, Valliant, Okla.

ILLUSTRATED Business letterheads; catalog 10c. Howprint, 723-G Eunice, Webster Groves 18, Missouri.

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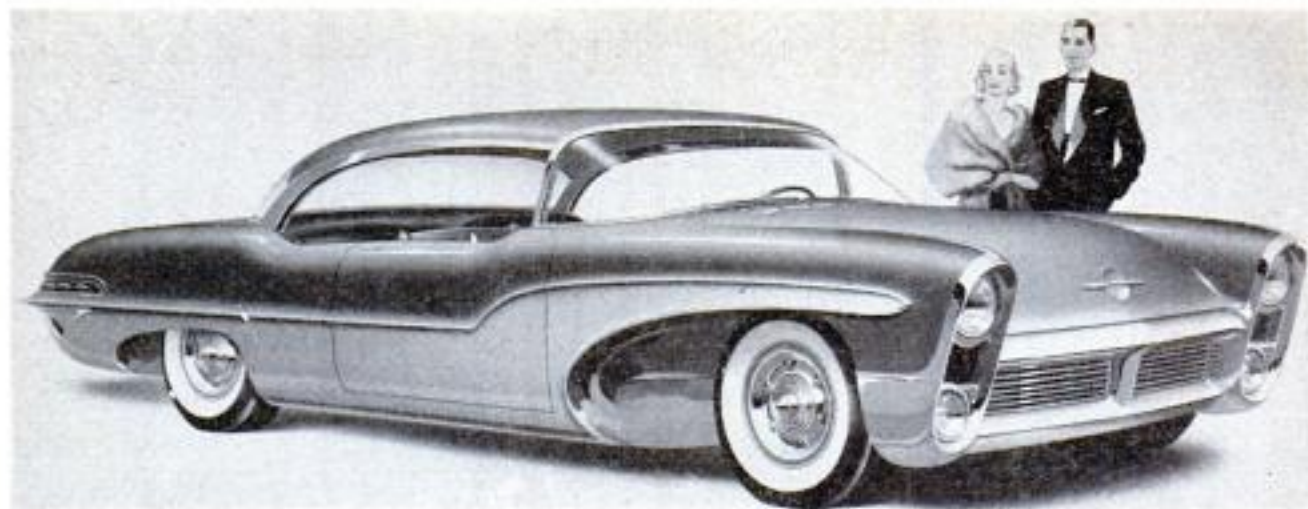
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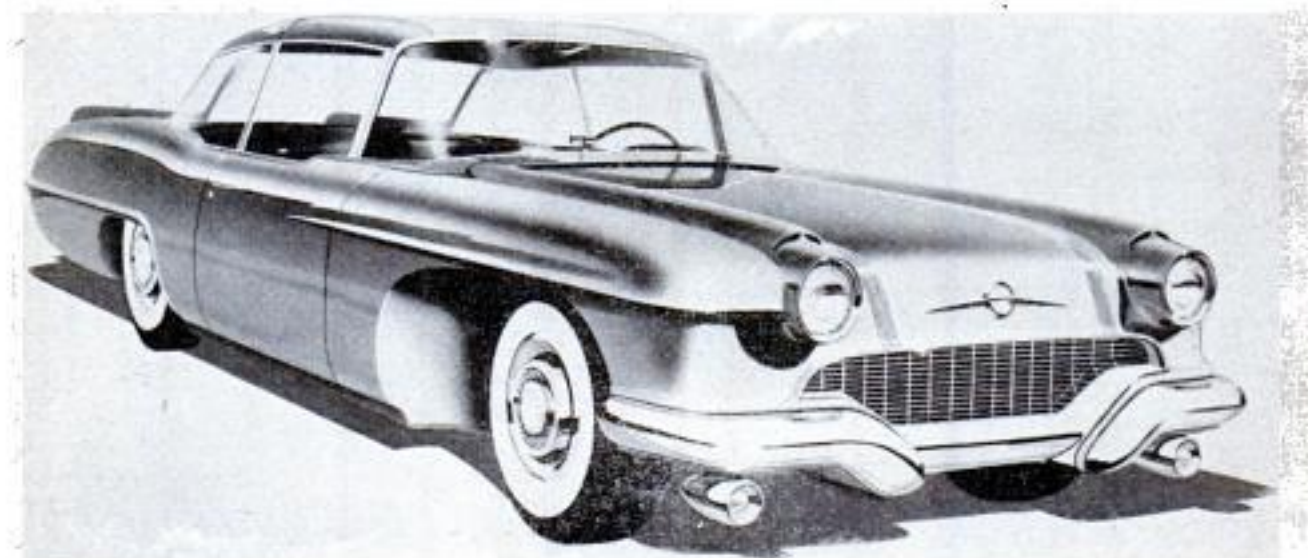
OLDSMOBILE 88 DELTA two-door has four individual seats, front two rotating for easy entry. All glass has blue tint. Scoops in headlight enclosures feed air to front brakes. Car even has built-in wastebasket

Three of 1955's Crop of Dream Cars

CHEVROLET BISCAYNE also has four separate seats. It's a four-door. Concave side panels, inboard headlights, Corvette-type bumper, absence of rear fenders and the "receding hairline" windshield are style features



PONTIAC STRATO-STAR has a roof that seems to float, so slender are the cantilever pillars that hold it up. Hinged panel in roof above each door lifts up automatically as door opens so you won't crack your skull





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BE YOUR OWN BOSS! Here's a proven, repeat, cash business you can start in your basement or garage in spare time. Make a good *extra* income with the Foley Saw Filer, right at home—no matter whether you live in a big city, suburb, small town or on a farm. Saws are used everywhere—in every home, by carpenters, farmers, schools, factories,—and there's a growing demand for saw sharpening from home owners working on "Do It Yourself" projects.

You can make up to \$3 or \$5 an hour—\$20 to \$30 a week in spare time—with the Foley Saw Filer, because of the speed and marvelous accuracy of this automatic machine. After buying a Foley Saw Filer, James Henson wrote us: "I have filed saws by hand for 20 years and considered myself *good*. I take it back—the Foley does a much better job than I could ever do by hand." It's the **ONLY** machine which sharpens ALL saws—all kinds of hand saws, band saws and cross-cut circular saws. No experience is necessary—no eye strain. "The first saw I sharpened with my Foley Filer came out 100%"—Clarence Parsons.

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—Harry Hawkins.

"My wife thought it was a waste of money to buy a Foley Filer. She wanted to buy furniture instead. The first year I made enough spare time to doubly pay for the machine, so we both won."
—Mr. Drye.

\$765 in Spare Time—"I made \$765 last year filing saws in my spare time and it sure comes in handy."
—J. B. Williams.

Sharpened 5,000 Saws—"I have done 4 or 5 thousand saws in my spare time in the 4½ years since I got the Foley outfit, and they are all coming back with repeat orders."
—Len Cresco.

1955 DREAM CARS



BUICK WILDCAT, a four-passenger convertible, has a curved-top windshield. Air scoops in front bumper and rear fenders cool its brakes



CADILLAC ELDORADO sedan is a four-seater, too. It has no center post between its doors. Front seats swing to side for easy entry and exit

More dream cars on
pages 72 and 78



LA SALLE coupe has four independently sprung aluminum wheels. Exhaust goes through frame member, comes out below the door

GMC EXPEDIER is a "dream truck" with a front-wheel drive so floor is a mere 13 inches above ground



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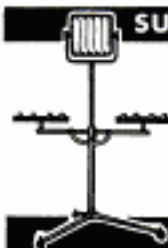
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A few months ago, a fleet of test cars pulled off the proving ground track and into the shops of one of the largest automobile manufacturers in the world. Outwardly, these cars still looked identical after their endurance runs. Then the mechanics tore down the engines and miked the bearings, rings and pistons. Most of them were ready for overhaul. But some of them still had three more lifetimes to run!

Special lubricants? They were all using oil you could buy anywhere for about 40¢ a quart.

The secret? Better oil filtration. Here's why: the moving parts in your engine never touch each other. They're always separated by a thin film of oil. Keep abrasives from getting into that film of oil and, *theoretically*, your engine should never wear out.

Today, the development of two inventions makes it possible for any engine to approach the life and performance that engineers know is theoretically possible. Here are the two inventions:

One is a simple \$3.95 Fuel Monitor designed to give you improved carburetion, more miles per gallon, smoother idling and increased speed and power.

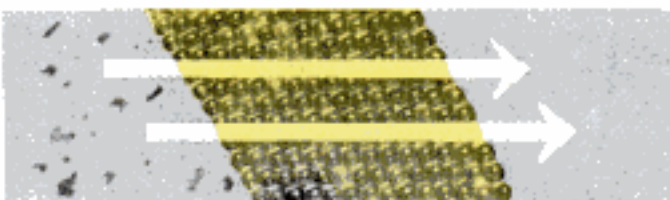
The other is a revolutionary anti-acid, anti-friction Life-Time oil filter which has already increased engine life to 250,000 miles in highway tests.

Both of these inventions are possible only because of the discovery of an amazing metal—sintered bronze.

What is Sintered Bronze and What Good is it?

We make sintered, or porous, bronze by fusing together millions of tiny bronze balls under heat and pressure. The result is an extremely fine screen—much finer than any screen that could be woven of metal or even cloth.

Originally, sintered bronze was used mainly to filter liquid oxygen and other extremely cold rocket and jet fuels, plus superheated gases.



Carbon and abrasives can't get through spaces between bronze balls; oil stays dark, proving no additives have been removed.

Our engineers used this experience to pioneer the development of the Life-Time® automotive filter you have read articles about in magazines like this one.

The Life-Time Fuel Monitor: How it Works

If you've ever dropped a lighted match into a pail of gasoline, you know that gasoline won't explode. Only gasoline vapor will explode. The more raw,

unvaporized gasoline your carburetor delivers to the cylinders, the more gas you waste. The more highly vaporized a mixture your carburetor puts out, the more mileage and power you get from your gasoline.

Increased Vaporization

Most improved carburetors try to increase vaporization by doing something to the gasoline *inside* the carburetor. The Life-Time Fuel Monitor simply tackles the same problem in a different

way *before* the gasoline gets to the carburetor. Attached to your carburetor just like an ordinary gas filter, the Life-Time Fuel Monitor has a porous bronze element which:

- (1) removes water from gasoline, plus tiny amounts of low-volatility petroleum tars which interfere with complete vaporization;
- (2) tends to equalize gasoline pressure;
- (3) removes gums, rust flakes and other impurities before they can foul carburetor jets permanently or even momentarily. Result: you save \$20-\$35 in periodic carburetor cleaning expense, and get improved mileage and performance.

MILES BETWEEN OVERHAULS



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ROAD TESTS in cars of all makes and models prove engine life is virtually unlimited when gums, tars and damaging abrasives are kept out of oil and fuel systems.

Genuine Life-Time Oil Filter Gives Your Engine 250,000-Mile Protection Against Acid, Abrasive Damage

Here's the original, genuine Life-Time® permanent bronze oil filter tested and approved by the editors of leading automotive and scientific magazines. The only bronze oil filter ever to pass government shock and vibration tests, the genuine Life-Time® filter removes all abrasives—including granular, diamond-hard carbon which gets through other filters—plus acid-producing water. In addition to preventing acid formation, the Life-Time oil filter has a special acid-neutralizing component which actually destroys residual acids that have already formed in your oil system.

How the Life-Time® Oil Filter Works



Test vehicles have already exceeded the 250,000 mile mark with the Life-Time® filter. You never change it; just rinse it out and it is good as new.

Dirty oil enters at top. Impurities, stopped by bronze screen, fall to bottom of case. Filtered oil, including additives, returns to lubrication system.

*Don't confuse the original, genuine Life-Time filter with imitations and "improved" substitutes. Only the original, genuine Life-Time filter has passed government shock and vibration tests and meets military filtering requirements. Look for this trademark: **LIFE-TIME**

Try the Life-Time Fuel Monitor and Life-Time Oil Filter for 30 Days at Our Risk!

You can try either or both on this guarantee: you must be convinced they do everything we say, or money back, no questions asked!

For complete Life-Time oil filter unit, including case (fits any car), send make, year and model of your car and \$12.95 (we pay shipping).

Life-Time oil filter conversion kit, which replaces your present filter pack with Life-Time bronze, is \$6.95 for most

cars (send make and number of present filter when ordering). Conversion kits for Buicks with hydraulic lifters and for cars with full flow systems: \$13.95.

Or send only \$2 deposit, pay C.O.D. charges on arrival. But do it today—don't waste another cent on filter pack replacements!

To try the Life-Time Fuel Monitor, simply send \$3.95 (we pay postage) or send \$1 deposit, pay C.O.D. charges on arrival. If you're not convinced in 30 days it's worth four times the price: money back, no questions asked!

LIFE-TIME PERMANENT BRONZE FILTERS



Continental Manufacturing Corporation, Dept. CPM-2
Washington Boulevard at Motor Avenue, Culver City, California © 1954

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Gentlemen:

I will road test the products checked below in my _____ (make, model, year of car)
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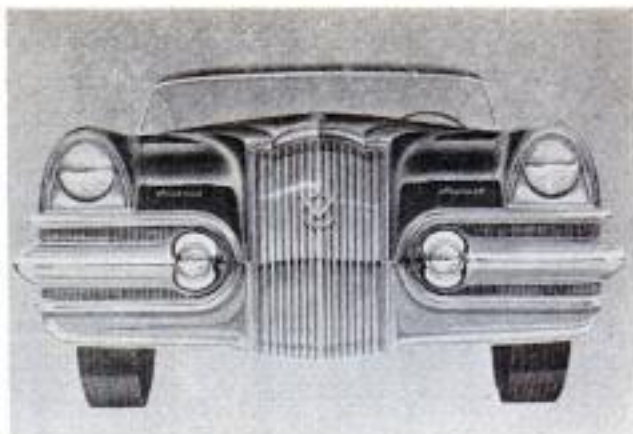
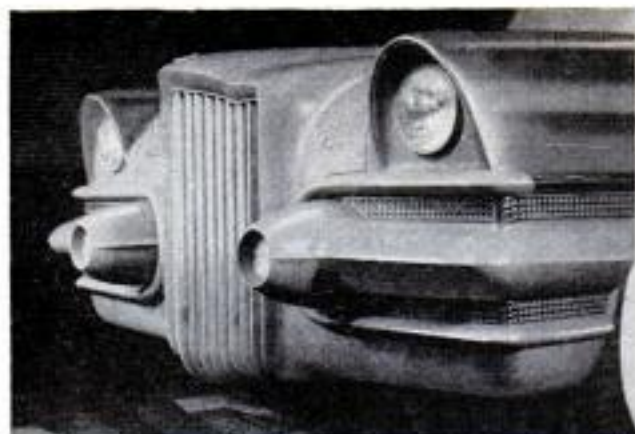
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1955 DREAM CARS



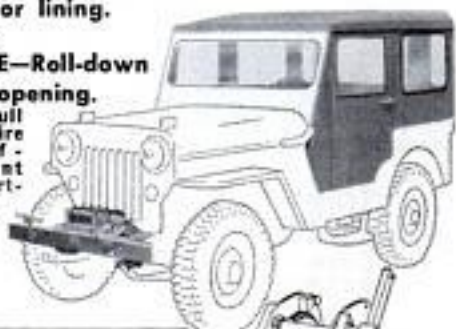
PACKARD'S REQUEST was designed to answer requests of many classic-car lovers who asked that the traditional Packard front grille be modernized. The chassis is regular 1955 Packard design

More dream cars on pages 72 and 74

LA SALLE sport sedan, left, has V6 fuel-injection engine, encloses all brake and fuel lines in a central structural tube of chassis. The emergency-brake unit is located behind the rear axle

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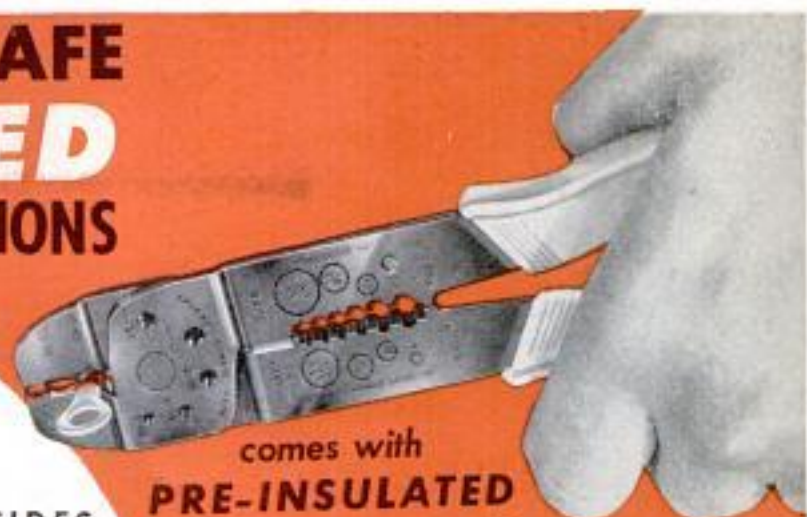
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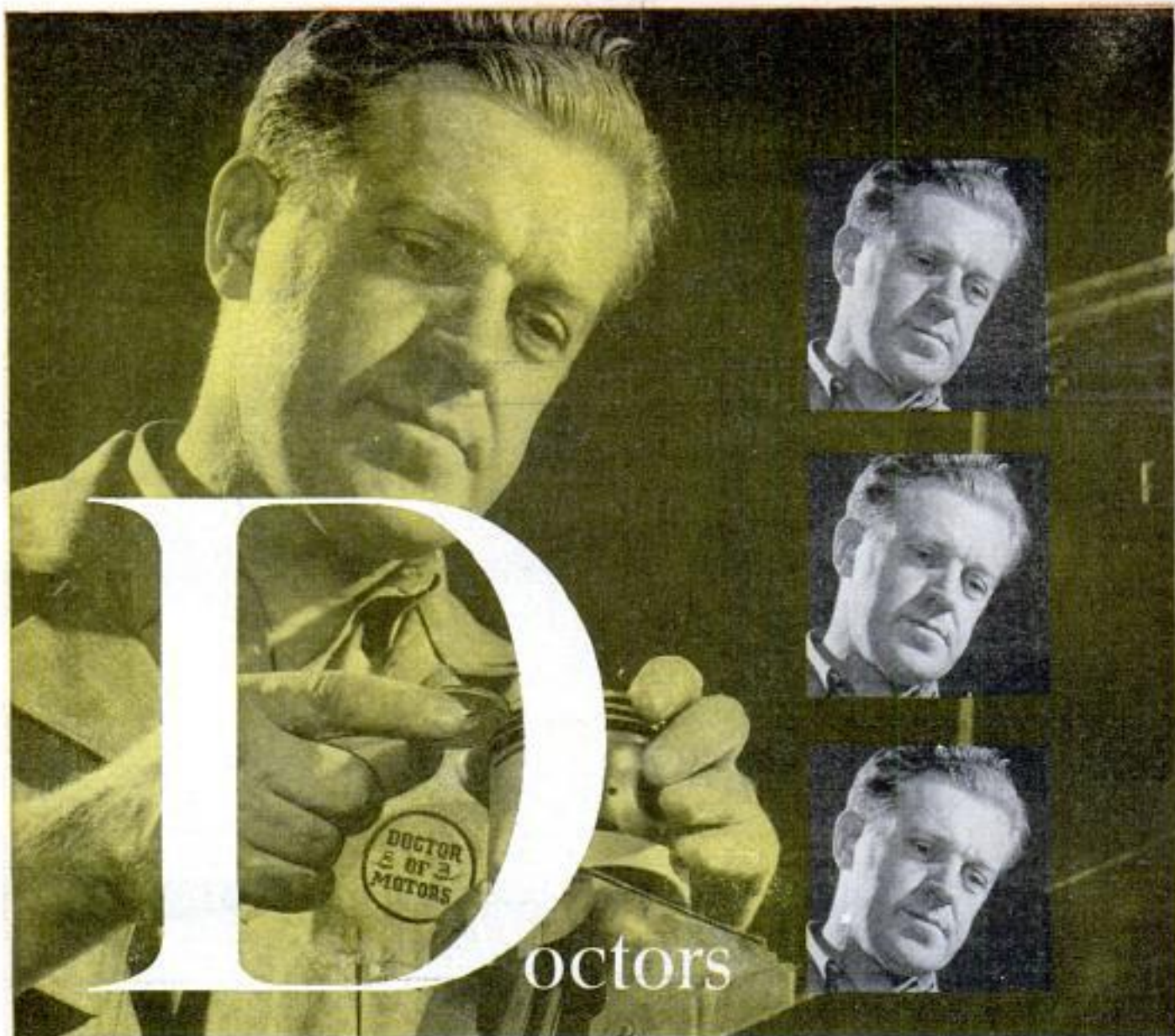
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CAP to the Rescue

By Frank Burnham

IT WAS MIDWINTER 1942. Twenty-four agonizing hours had passed since the four-engine Liberator gave up the ghost and crashed with a thundering roar on a wind-swept saddle near the crest of 13,000-foot Little Baldy.

The blizzard slashing northern New Mexico gave little comfort to nine survivors. Those less hurt did what they could to make their comrades comfortable, but the situation seemed hopeless. Having cheated death once they might easily succumb to cold and biting wind. A night and a day passed. One searching Flying Fortress spotted them but the food and medical supplies it dropped were snatched by the wind, to settle beyond reach on crags below the tiny saddle.

Back at the search base the mission commander was faced with what seemed an impossible task. Ground parties could never reach the scene in time. Helicopters couldn't cope with the

His plane nosed over in a simulated crash, the "survivor" in an Alaska winter exercise signals a CAP "rescue" aircraft





The CAP crew of an Air Force liaison plane, on a training mission, searches for "wrecked" aircraft



Spotting the "wreck," the search plane radios CAP headquarters where location is plotted on a map



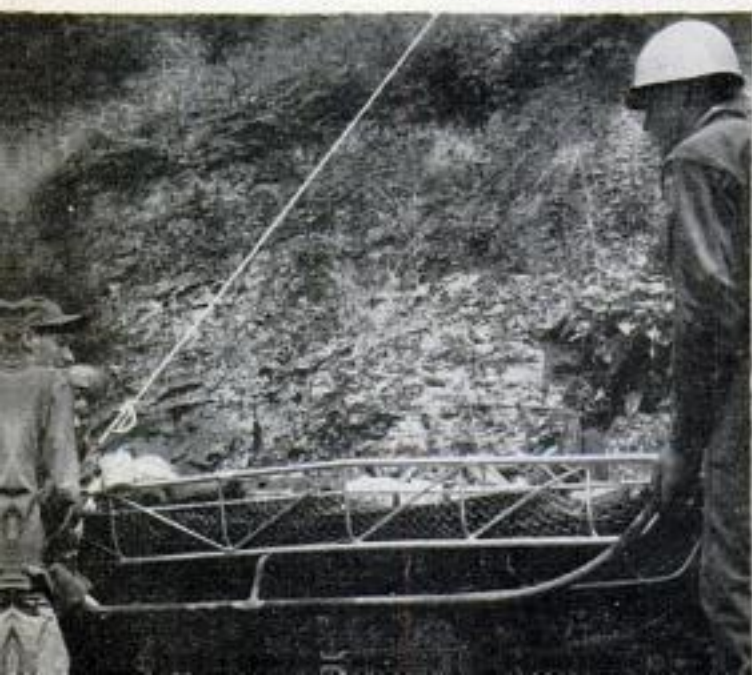
The map is shown to target-confirmation pilot, who flies to scene to radio directions to ground party

First aid given, "casualty" is placed in Stokes litter and lowered over cliff to waiting aircraft



Skilled woodsmen and first-aid specialists make up the ground team dispatched to aid "crashed" pilot

Stretcher bearers carry "patient" from evacuation plane to hospital in last step of rescue exercise





Injured 84-year-old Tom West (foreground) awaits CAP removal from Seldovia, Alaska, to Anchorage

13,000-foot altitude and swirling winds. The only hope was to turn the job over to the newly formed Civil Air Patrol.

In a short time Capt. Norman Kramer, CAP squadron commander from Alamosa, Colo., and his observer, First Lt. Arthur Mosher, were winging their way to the crash scene in their tiny, single-engine Taylorcraft. Mountain winds racked the little plane. The engine sputtered and gasped in what seemed a violent protest against the rarefied atmosphere.

Kramer nursed the plane to 13,000 feet

and swung in over the saddle. There lay the shattered bomber. He circled in closer, allowed for wind drift and dropped packages of medical supplies from less than 100 feet above the wreck. He saw them drift into the hands of the survivors, then turned his plane back to the base for another load of vitally needed supplies.

On the second trip Kramer and Mosher took a better look at the tiny saddle of firm ground. "I'm going to try and land, Art," Kramer told his companion. With misgivings the observer nodded, "Okay by me."

CAP ground-rescue units, using snowmobiles loaned by the U. S. Forest Service, make radio contact with search plane flying over rugged Rocky Mountain terrain





CAP ground teams work in all types of terrain. A Nevada Jeep squadron bivouacs in the desert country of Big Smoky Valley



This rebuilt wartime communications-command truck now serves the CAP, which does not confine its work to aviation. In time of flood (below), cadets operating a portable radio keep sandbaggers in touch with flood-control headquarters



The little plane dragged the area, then swung in. Fighting gusts all the way, Kramer cut power just as the landing gear touched. The plane bucked to a halt.

This heroic action did more to boost the morale of the marooned airmen than the actual delivery of the badly needed supplies. After a short conference, Kramer fired up his flying flivver and took off. The altimeter read 12,800 feet which he thinks may be the highest any light plane had ever landed or taken off.

Six times that day Kramer piloted his Taylorcraft up to the mountaintop bringing in more medical supplies, food and blankets. The miniature airlift made it possible for the injured crewmen to survive until the next day, when a ground party reached them.

The selfless action of the unpaid, civilian volunteers of the Civil Air Patrol like Norm Kramer and Art Mosher became one of the legends of World War II. Those legends have become a heritage which serves as an incentive for today's members of a new, streamlined Civil Air Patrol.

Recently, Navy Ensign John Meder's Banshee jet suddenly burst into flame at 26,000 feet. Seconds later the ejection seat had shot him from the smoke-filled cockpit. His parachute opened with a pop that burst its seams. Instead of lowering him gently toward the Illinois landscape it sent him plunging earthward.

The ground came up with a smash that knocked Meder out. When consciousness returned, Meder tried calmly to consider his position. Search planes probably would not see him in the brush where he lay. Using his elbows, he wormed foot by foot toward a near-by field. He saw a farmer plowing about a quarter of a mile away. He lit a smoke grenade and called wildly. The farmer did not notice, and Meder lapsed into unconsciousness again.

Meanwhile the 49th Air Rescue Squadron at Selfridge Air Force Base, Mich., had ordered every Civil Air Patrol squadron in Illinois and Indiana into action. Thirteen hours after Meder left his crippled plane, CAP pilots Vince Causeway and John Zonge, flying different planes, both spotted him



A CAP communications bus kept contact with the outside world after the 1953 tornado ravaged Flint, Mich.

lying in a soy-bean field more than nine miles from where his jet had crashed.

A half hour later Lt. Col. L. H. Whan, Director of Communications for the Illinois Wing of CAP, arrived in a radio car.

Today Meder is on the mend. His doctors say the full credit is due the volunteers of the Civil Air Patrol. A few more hours and he would have been dead.

The files at Civil Air Patrol National Headquarters in Washington are full of such stories. The unique outfit has been called our "neighborhood air force" and its members, "America's flying minutemen." No more descriptive names could be coined. The members of CAP fly from one-way grass strips and multimillion-dollar metropolitan airports in 2248 communities across the nation and in the territories of Hawaii, Alaska and Puerto Rico. They fly whenever and wherever needed.

In 1953 this organization of more than 80,000 (including 45,000 non-flying members) established an impressive record in search and rescue work. As the civilian auxiliary of the United States Air Force, CAP performed 12,290 hours of aerial search, 66 percent of the total search and rescue hours flown in the United States on missions ordered by the Air Force's Air Rescue Service. CAP's more than 7500 fixed, mobile, portable and airborne radio stations were indispensable in achieving this record.

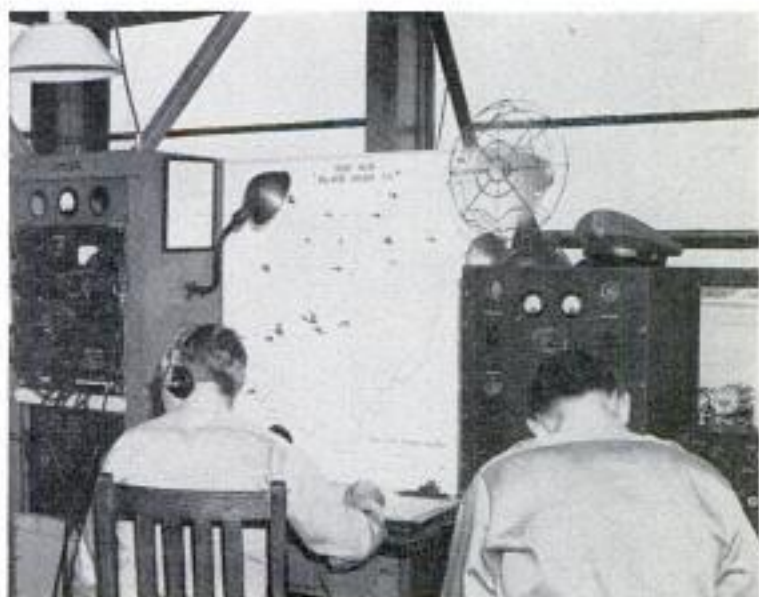
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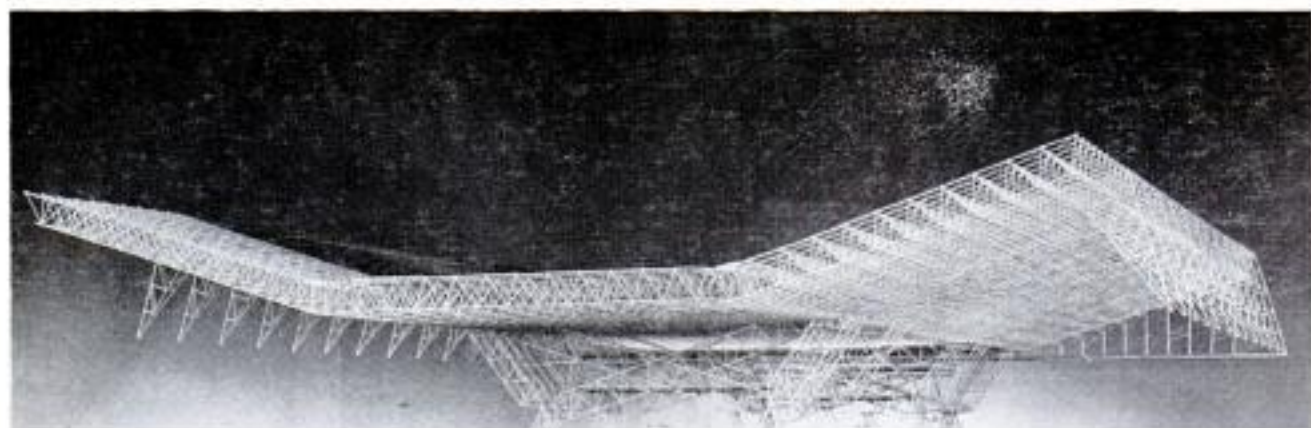
FEBRUARY 1955



Radio trailer of Richlands, Va., CAP squadron worked 24 hours a day contacting aerial observers during serious forest fire

More than 2500 fixed communications stations are operated by the CAP in all 48 states, Alaska, Hawaii and Puerto Rico

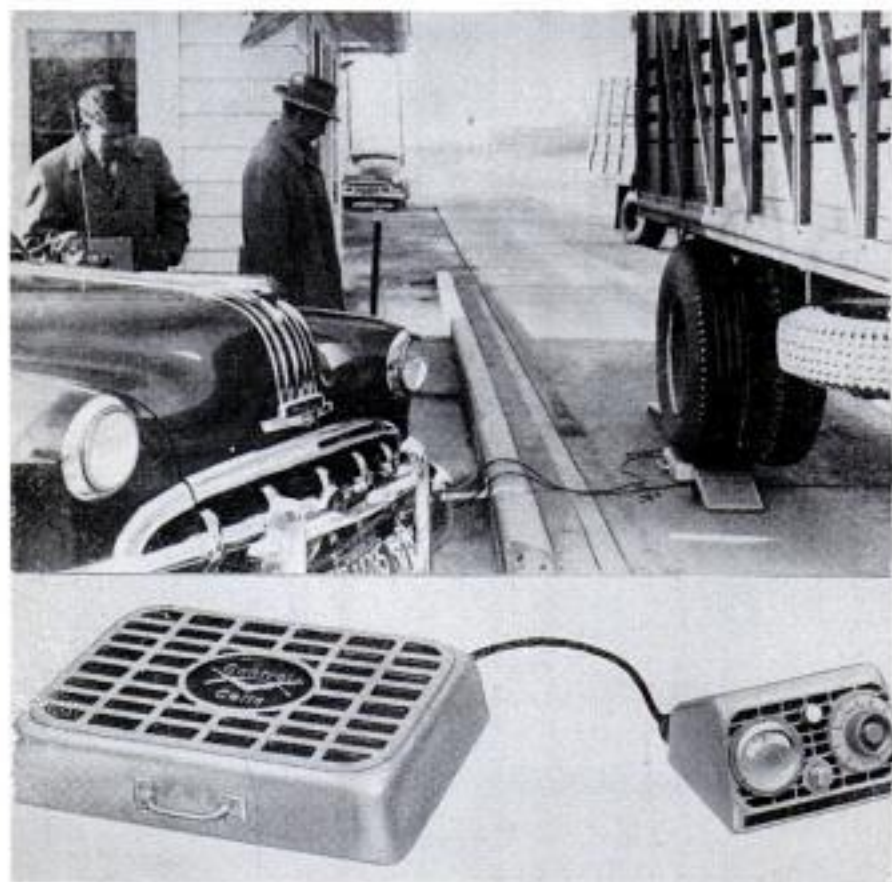




The tubular-steel framework of this big hangar is held together by a simple pin-locked coupling (below)

Giant Tubular-Steel Hangar Can be Folded Up and Flown Away

Capable of housing six huge B-36 bombers for repair or eight for storage, a hangar designed for the Air Force by Illinois Institute of Technology has no exterior supports and can be entered from any side as hanging doors slide out of the way. The hangar features a butterfly, or double-cantilever, roof structure of tubular-steel trusses resting on center supports of the same basic design. Heart of the structure is a coupling of interlocking forgings held together by wedge-shaped pins. The coupling holds the tubular members in place. Couplings can be assembled by unskilled labor. Each 10-foot modular section can be folded into a shipping package about 20 feet long by 10 feet deep by 3 feet wide.



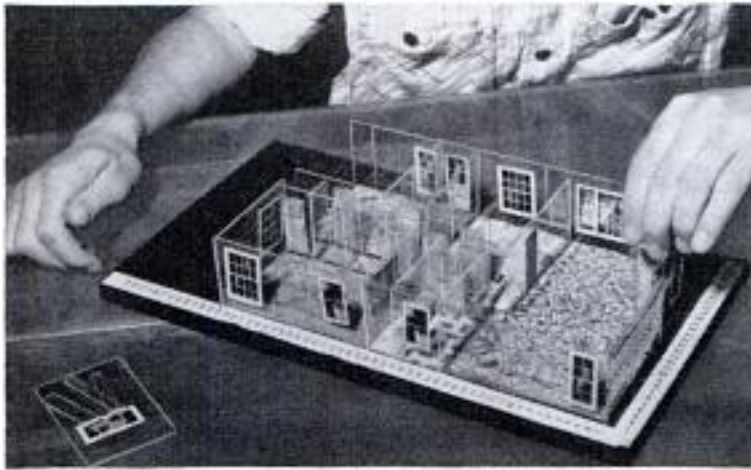
"Brief Case" Scale Weighs Big Trucks

Up to 10,000 pounds can be weighed on a portable scale that easily fits a brief case and has a weight of 35 pounds. The scale, which is electronic, operates on batteries or alternating current. Unaffected by weather or moisture, the scale withstands an overload of 4000 pounds and maintains accuracy within one percent. It can be used to weigh trucks, lumber, livestock and a host of other items.

Britain's newest television station is to be built beneath the site of the old Crystal Palace, with a 640-foot steel mast as the only major construction aboveground.

Surfboards Equipped With Motors Provide Water-Sports Thrills

"Motorized splinters" are becoming popular with water-sports fans. They are surfboards powered by outboard motors. Made of plywood, the "splinters" are 7 feet long and 3½ feet wide. They scoot along at up to 40 miles per hour under the thrust of a 10-horsepower motor. The motor is locked in a stationary position and the pilot turns his craft by shifting his weight from one side of the platform to the other. A slight shift produces a shallow turn and an abrupt shift all the way over to one side turns the craft sharply. Most of the owners equip their boards with throttle controls on the handles and with auxiliary gas tanks for long trips.



Model Aids Home Plans

Future homeowners can build a model of their proposed house with a new kit. Using plastic walls, windows and partitions, they can adjust rooms and locate closets, chimneys and fireplaces. A handbook helps to estimate the cost of any given arrangement. Charts, price lists and building information are furnished. After the model is made, it can be decorated and furnished with cutouts taken from magazine illustrations.

"Sugar Scoop" Antenna Catches Microwaves

Microwave antennas shaped like giant sugar scoops may soon appear on Bell-system relay routes. The horn-reflector antennas may eventually handle up to about 20,000 telephone circuits or 30 television programs at one time. At the same time, they would handle radio systems in certain megacycle bands. Microwaves are deflected from the curved back of the receiving antenna and fed into amplifiers at each station. The strengthened signals are changed to a different frequency and directed by a similar transmitting antenna toward the next station.

☐ The first gas-turbine military tank, the prototype of Britain's new Conqueror tank, is being demonstrated in England.



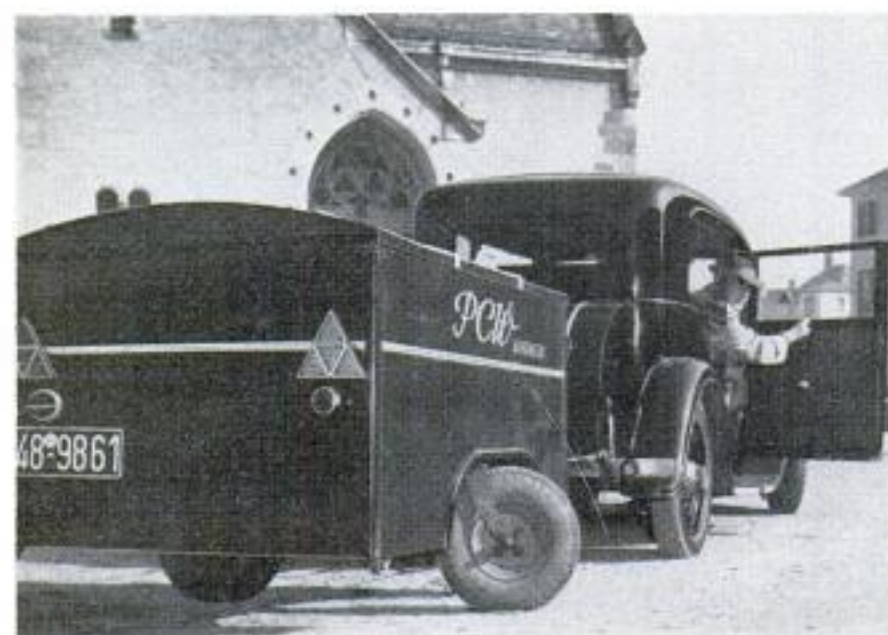
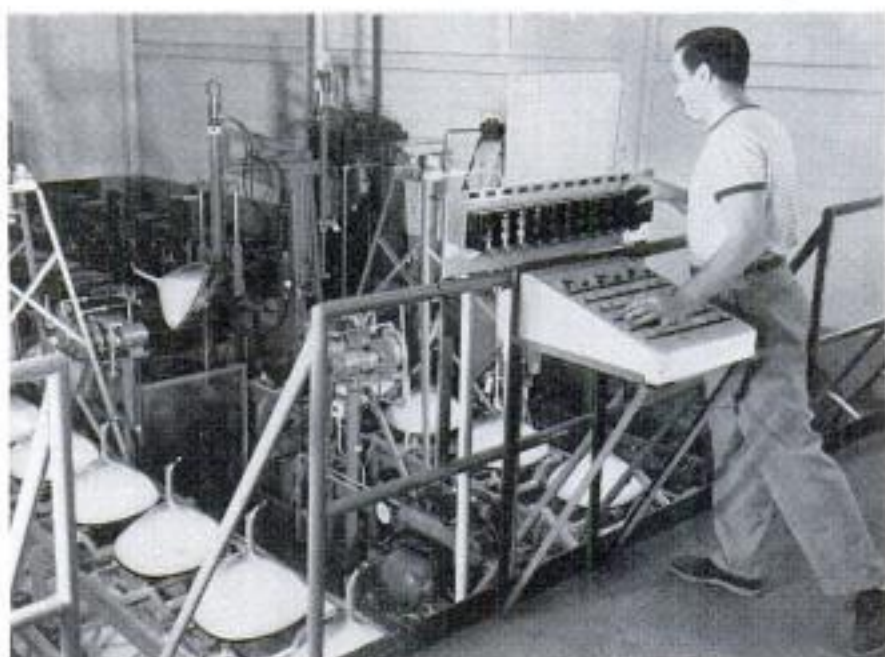


Competition Sled Gets Tunnel Test

Bobsledders normally catch plenty of wind in their teeth, but Arthur Tyler and Edgar Seymour of Rochester, N. Y., even go after artificial wind. Wishing to test the effect of streamlining on the speed of their sled, they took it to the New York University wind tunnel to reproduce wind conditions found on regular sled courses. Tyler and Seymour plan to enter the 1956 Olympic Winter Game competition.

Suction Cups Move TV Tubes on Line

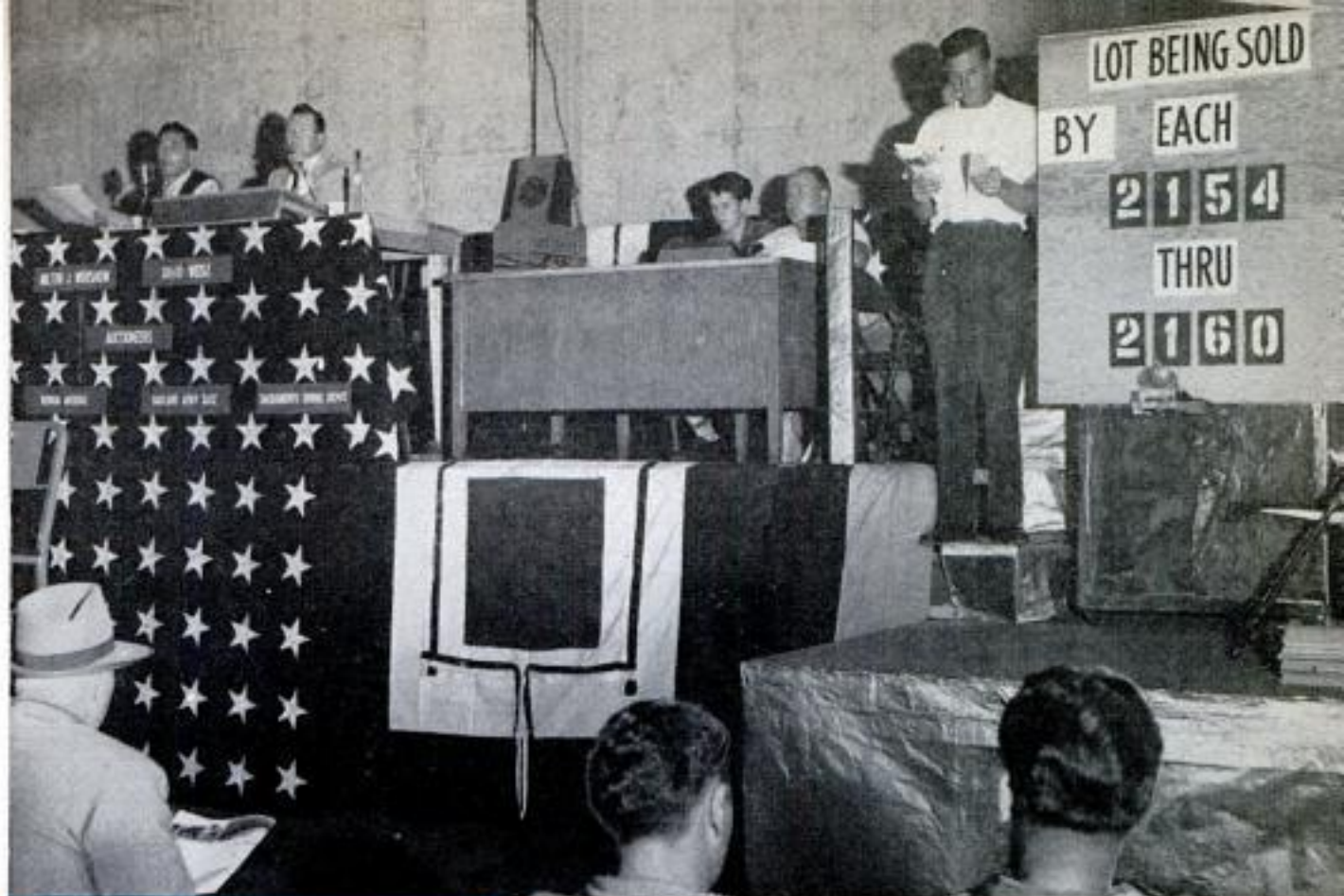
Deposit of chemicals on the screen surface of TV picture tubes is controlled by one man as the tubes move down Sylvania Electric Products' production line. The chemical, carried in solution, is deposited on the screen in a carefully controlled settling period. Then powerful suction cups lift the bulb from the line, overturn it to empty chemicals into a trough and place it on a drying conveyor. Cups replace hand turning of tubes.



Swiveling Wheels Make Backing Easy

It's easy to drive backward with a new German trailer, according to the manufacturer. The two small wheels of the trailer have a decentralized suspension. As a result, they give the motorist better control of the trailer when going backward.

☐ America's scheduled international airlines carried 2,670,000 passengers more than 3,660,000,000 miles in a year without a fatal accident.



The World's Biggest Clearance Sale

Billions of dollars in surplus Army, Navy and Air Force materiel are going under the auctioneer's hammer. You want a steel boat, dishpan, radar tube or an Army truck?

CAN YOU USE 200,000 pairs of brown shoelaces or a Signal Corps radio truck or 3429 pairs of mukluks? Do you need 40,000 pounds of crankshafts and differentials? A lift truck or a lifeboat? Or a railroad tank car?

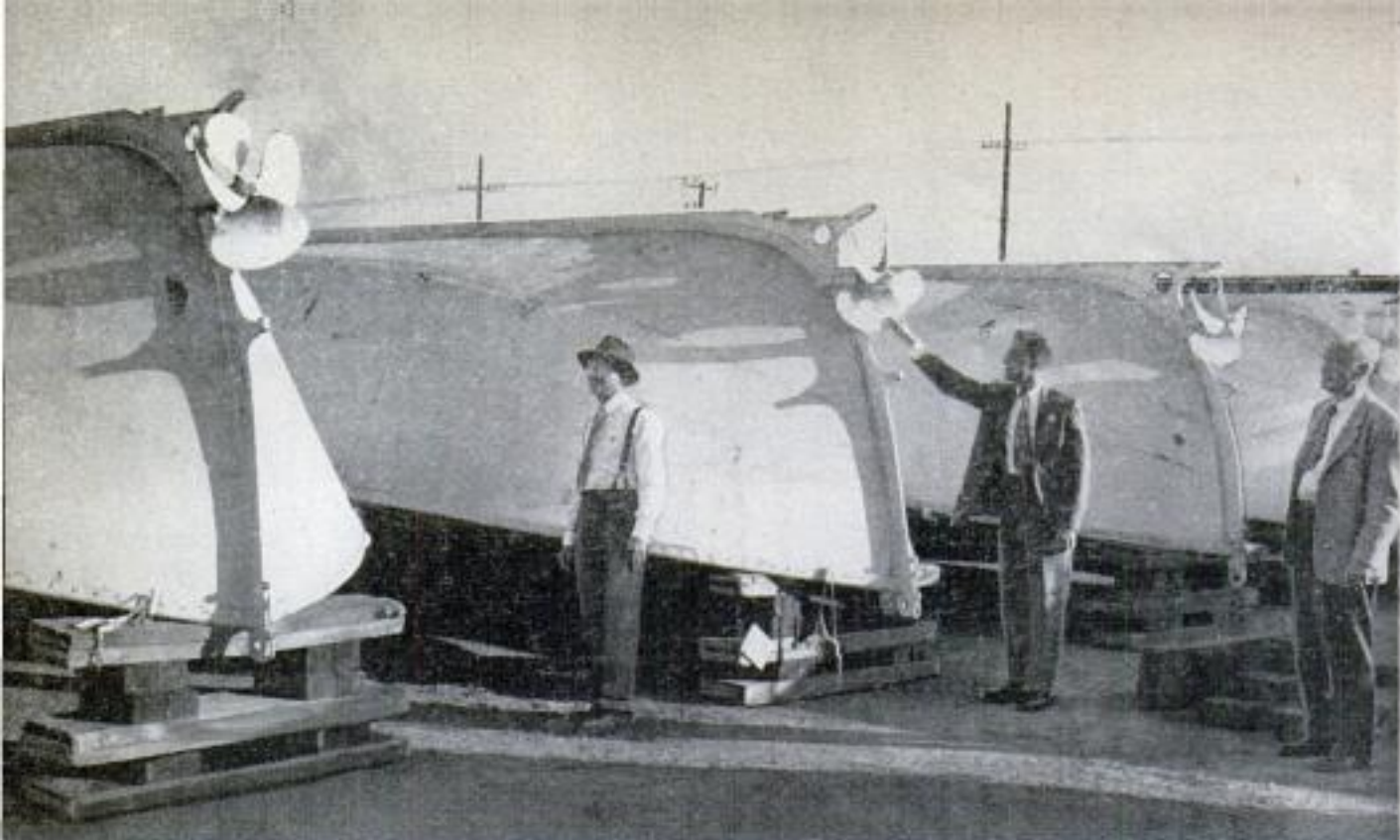
If so, see Uncle Sam the auctioneer. The government is selling these items and thousands of others to the highest bidders.

Right now our military warehouses and storage areas are crammed with \$5,000,000,000 worth of surplus war materials and these are being offered to the public in "Operation Cleansweep," the greatest clearance sale of all time. Eighteen months from now



By
Thomas E. Stimson, Jr.

Busy bidders at huge auction keep one eye on illustrated catalogue describing numbered lots and the other on auctioneers



Prospective buyers examine steel lifeboats no longer considered worth keeping by the Defense Department

the Department of Defense expects to have sold off all the materiel left over from the last war that no longer is needed.

Most of the commodities and equipment will be disposed of in a series of public auctions. To help would-be purchasers learn where and when the auctions will be held and what will be sold, the Department of Defense has prepared a booklet titled "How to Buy Surplus Personal Property from the U.S. Army, Navy and Air Force." It's available by sending 15 cents to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Don't expect to put in a bid for a single radio tube or half a dozen pairs of shoes that are just your size at one of the

sales. Unavoidably, items like those are offered in large wholesale quantities. Yet the government is doing everything it can to make it easy for small buyers to bid for no more than they need. Jeeps and trucks, for instance, are now auctioned off individually instead of in lots of 100 or more. You may be able to bid on a single bench grinder or one walk-in refrigerator; on the other

Radio tubes of all sizes originally costing some \$900,000 were auctioned off at one multimillion-dollar sale of surplus left over from last war





A variety of cooking utensils from potato mashers to meat cleavers is displayed in a military warehouse

hand, items like marine signal pennants or waterproof corrugated boxes are up for sale in lots of several thousand each.

In the largest single auction held so far, at Sharpe General Depot, Lathrop, Calif., equipment that originally cost \$26,000,000 was sold in three days' time. The property occupied so much space that it had to be displayed at depots in three near-by cities as well as at Sharpe. The items were so diversified that six weeks were required to make up the 48-page illustrated catalogue that described the property. The catalogue was mailed to 10,000 prospective bidders in the United States and in 13 foreign countries.

More than 1000 bidders visited the depots



These heavy-duty four-wheel-drive trucks were put on sale after close inspection by board of experts

Well, whataya know? Here a fascinated buyer discovers a motorized railroad scooter among some odd trucks





to inspect the goods and then assembled in a warehouse for the auction itself. Floor auctioneers walked the floor, trailing telephone cords behind them, and relayed individual bids to the auction platform. A sale was completed on an average of one every two minutes.

Many of the bidders were wholesale dealers in war-surplus materiel and most of their purchases will wind up on the shelves of retail war-surplus stores. Also present were individuals who bid for used staff cars and got them for several hundred dollars each. Farmers bought pickup trucks for around \$250, as well as machinery they could convert for agriculture. Construction firms were present to buy tractors and earthmoving equipment. Municipalities and irrigation districts sent representatives to bid on equipment they needed. Even a motion-picture company had a man present to bid for life rafts and life jackets needed for a forthcoming picture.

One wholesale dealer bought 96,000 pairs of wool socks for less than nine cents each, another paid \$7.50 for 50,000 waterproof matches. A third bought 25,000 brass cabin-door hooks for a dime apiece. Spare parts for a locomotive were auctioned off for \$1100, and 775,000 six-volt lamp bulbs went for \$56,000. An assortment of marine equipment including compasses, boat hooks, asbestos sheeting and signal lamps went for \$2100.

More than 3300 lots and items were sold in all. Commodities included beds and bedding, clothing, fire-fighting equipment, hardware, lathes and milling machines, office furniture and supplies, photographic equipment, plumbing, rope, tents and miscellaneous vehicles. Radio and radar tubes and an entire warehouse of electrical equipment ranging from whip antennas to wire went under the hammer.

A 1942 motorcycle sold for \$125. Ten tractor-mounted, hydraulic-powered, circular timber saws brought \$2000. Thirty dictating machines sold for \$1200 for the lot,

Acres of huge aircraft tires were sold at one auction for \$4 a ton. Discarded as unsafe, most of them will go into scrap



Some interested buyers inspect rows of gasoline and diesel power plants of all sizes lined up in a field

and a truckload of photo supplies including 2600 plastic funnels went to a bidder for \$600.

Occasionally, someone became excited and paid more for an item than he could buy it for on the open market. One man bid \$225 for a drill press, well used, that lists at \$175 brand new. Small power plants, too, frequently brought more than their original cost simply because their value has gone up since their time of purchase.

Much military equipment has no obvious use in civilian life and a man who is clever enough to figure out a way of converting it stands a chance of making a good profit. What can you do with a waterproof plastic cover for a rifle, for instance? One dealer bought a half million. Unless he figures out a better use he plans to chop them into one-foot lengths, seal the bottoms, and sell them as handy pouch bags.

If you were a rancher would you need a big Army searchlight? One rancher from Klamath Falls bought eight of them. He turns them on after dark and prevents the wild ducks from eating his barley crop.

Could you use \$250,000 worth of jungle hammocks? One surplus dealer could, because he already had arranged to dispose of them through stores in tropical countries. Why did another bidder pay \$1.90 each for 5600 second-hand cotton comforters? Because they are needed by furniture movers for use as padding.

The Department of Defense is out to get every cent that it can for its surplus materials and officials were greatly pleased when the big Sharpe auction

brought 13 cents for every dollar the government originally paid for the property. This seems a low return until you realize that everything is sold on an "as is" basis. A million dollars' worth of bomber tires sold for only \$4 per ton, but the tires were so worn out that they were no longer safe for use on aircraft. Cars and trucks that went for a couple of hundred dollars each were wartime vehicles no longer considered economical to operate.

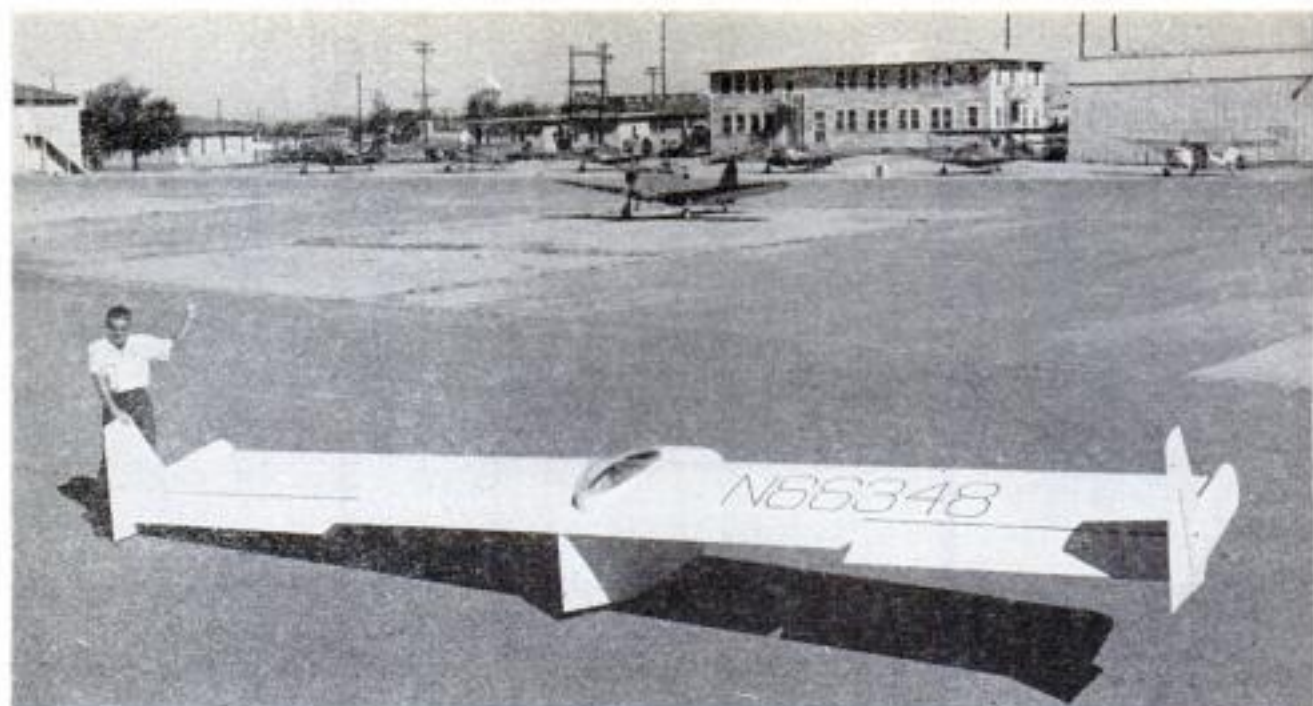
Much war-surplus materiel is new, of course, and Vincent C. Tolino of the Supply and Logistics Branch of the Department of Defense explains why it goes on the block.

"Why sell brand-new field boots, for instance? Because we are overstocked. The average soldier in Korea wore out a pair of boots every six weeks and we had to keep

(Continued to page 260)

This happy bidder finds himself the new owner of 500,000 plastic covers for infantry rifles. He must find a civilian use





Tailless "Flying Plank" Sailplane Has All Controls on Wing

Nicknamed the "Flying Plank," a radically designed sailplane without tail assembly has been developed by an aircraft test engineer. The sailplane consists pri-

marily of a 26½-foot wing, with vertical controls mounted at either wing tip, and a small cockpit in the center of the wing. Empty weight is about 180 pounds.

Kit Aids Camera Close-Ups

It's easy to shoot close-up color photographs of plants, stamps and other small objects with equipment that attaches to the Kodak Pony 135, Model B or 828 camera. An L-shaped frame mounted on six-inch rods extending from the front of the camera is placed directly on the subject. The sides of the frame indicate the edges of the resulting picture. A cover for the flash bulb reduces light intensity to ¼ normal brilliance, and guards the subject from heat. Special lens and filters are supplied.



Lever on Lawn-Mower Wheel Changes Height of Cut

On a new rotary lawn mower you change the cutting height without tools simply by moving a lever on each of the front wheels. This raises or lowers the wheels, changing the height of the blade from the ground. The lever has five different positions, varying the cutting height of the blade from one to three inches. Inset shows the easily adjusted lever.

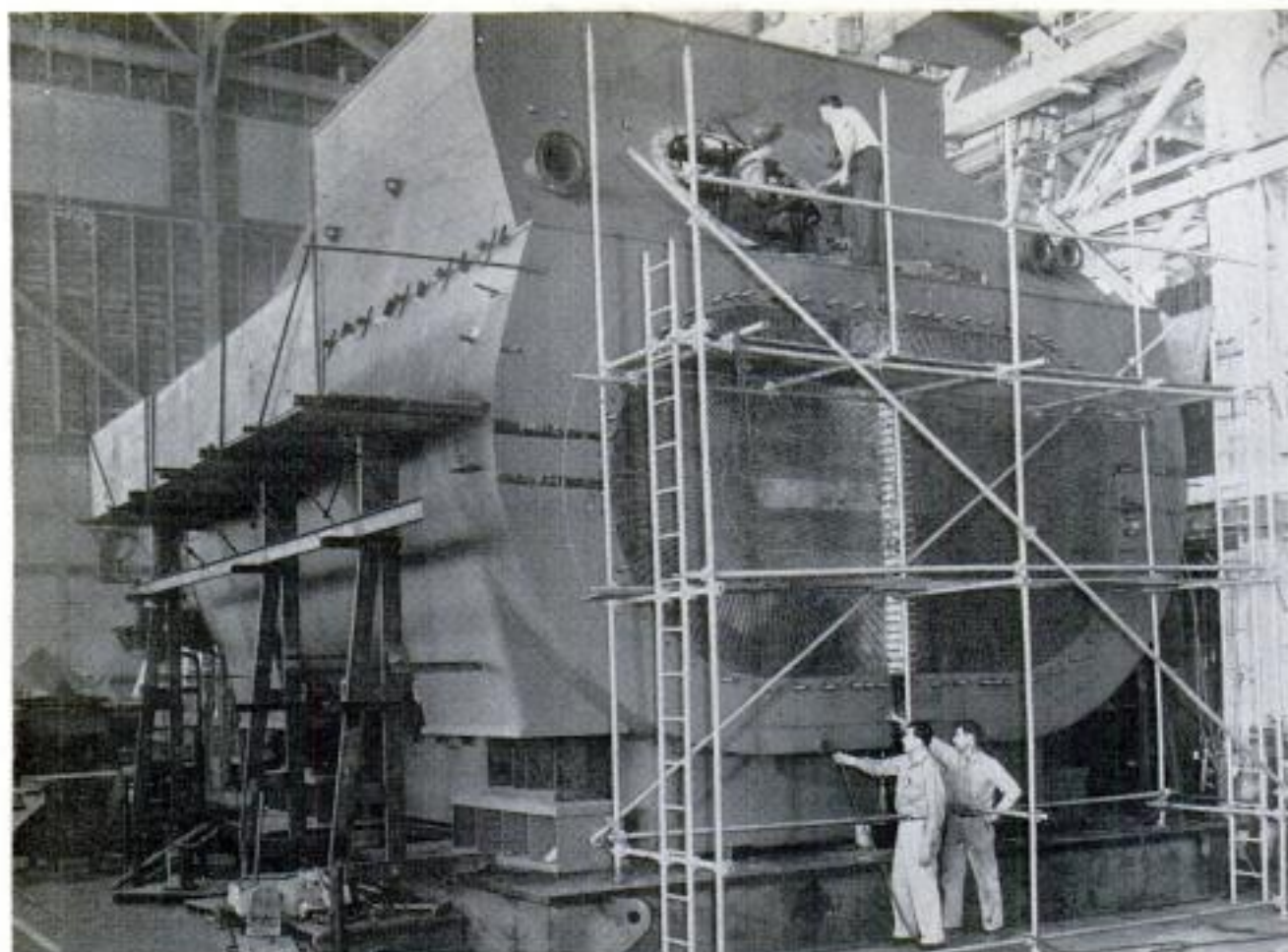


“Beehive” House Has 24 Sides

TAKE SOME CONCRETE and redwood, glass and rocks, stir with the imagination of an architect—and presto! You have a “beehive” house that makes headlines. The house is built around a freestanding rock fireplace and its domed roof has glass risers. There are 24 sides to the house, but they are angled so slightly the effect is round. Drawing a radius from the fireplace, folding partitions form pie-shaped living areas in the central part of the home. The kitchen and garage are located in a fan-shaped, flat-roofed section adjoining the dome. Most of the furnishings are built-in slabs of concrete that bisect the glass and redwood walls. The home was designed by architect George Frank Ligar for Louis Adrian, musical director of the Los Angeles Civic Light Opera, and built high in the Hollywood, Calif., hills where it has a breath-taking view of the city.

Top, Jane Adrian stands in pie-shaped bedroom separated from living room by folding partition. Right, chimney is encircled by skylight at top of dome. Below, kitchen and garage are in the fan-shaped section





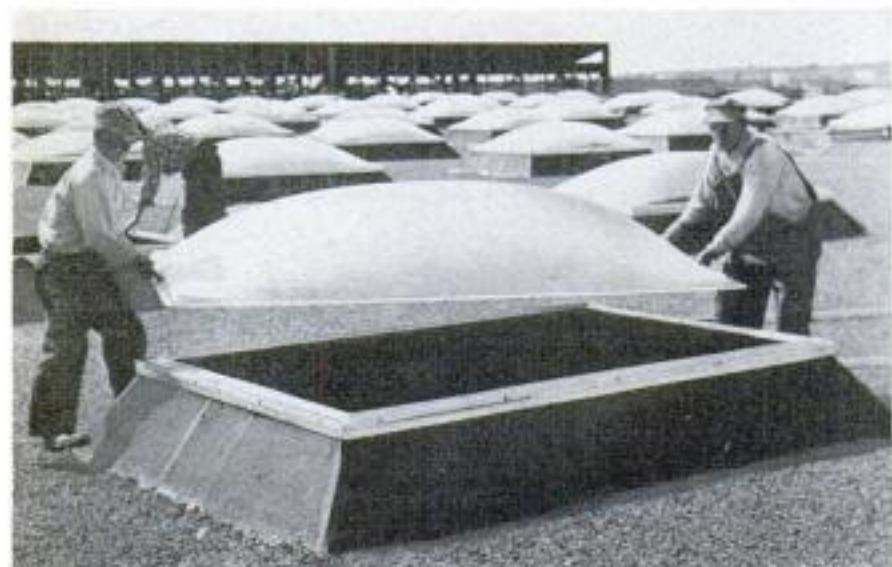
Ocean Water Distilled for California Steam-Generating Plant

Faced with a lack of adequate fresh water at the site of a new \$44,000,000 steam-electric generating plant at Morro Bay, Calif., the Pacific Gas and Electric Company has turned to the common marine practice of distilling sea water for use in its boilers.

Two sets of three-stage sea-water evaporators are being installed at the plant, one for each of the two giant boilers. Each evaporator system will have a capacity of 50 gallons of fresh water a minute, 72,000

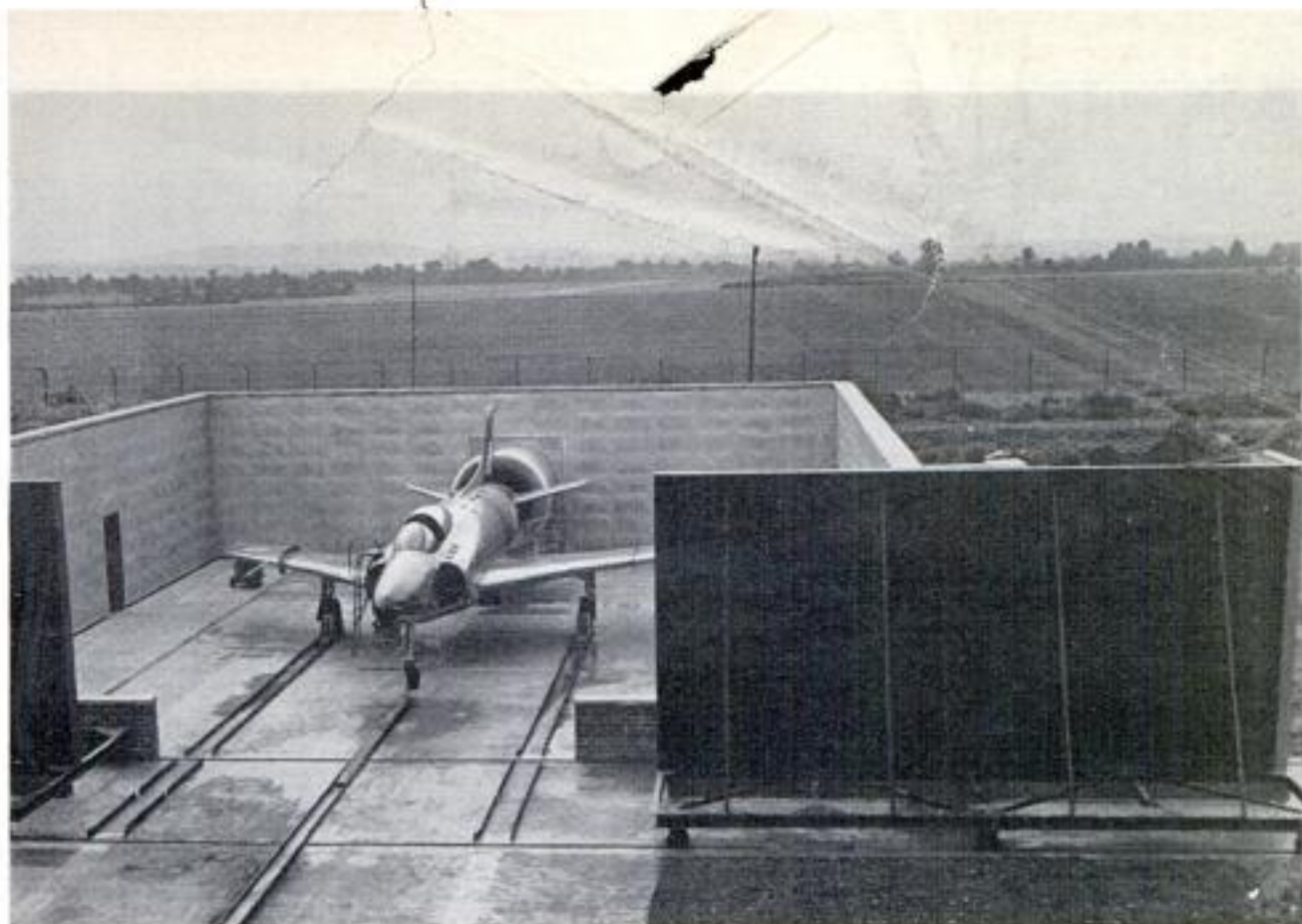
gallons a day, and the water will be run through condensers after leaving the boilers, so that it can be used again and again.

The stills will be heated by steam, the first stage by live steam from the boilers themselves, and the second and third will employ steam for heating from the first and second stills. They will operate at progressively lower temperatures, all below the boiling point and under vacuum, so that water can be evaporated at comparatively low heat.



Plastic Skylights

All interior natural lighting in the 400-by-500-foot administration building of the Army's new Tobyhanna, Pa., Signal Corps depot is provided by dome-shaped plastic skylights. The flat roof of the huge building is set with 585 skydomes, each 64 by 96 inches and having a rise of 19 inches at the center to provide natural drainage. The skydomes are set into aluminum frames.



Muffler Silences Jets

Anyone who has heard jet engines being tested can testify that when the afterburner is cut in, the noise is almost more than humans can endure. Faced with this problem, engineers at Britain's Supermarine works developed a pen in which planes can be enclosed while their jet power plants are tested or broken in. The muffler, which fits over the tail pipe of the anchored airplane, reduces the jet roar so greatly that near-by observers are not conscious that an engine is being tested at all.

Electronic Unit Lets Blind Read

Blind persons can read an ordinary newspaper with a unit that employs an electronic eye and translates words into coded vibrations. The subject holds a pickup device in one hand while resting the fingers and thumb of the other hand on vibrating prongs. An amplifier-relay unit changes the optical image, as seen by the pickup, into electrical impulses which cause vibrations.





Outdoor background is shot through a slightly tilting glass plate on which the letters of title are pasted

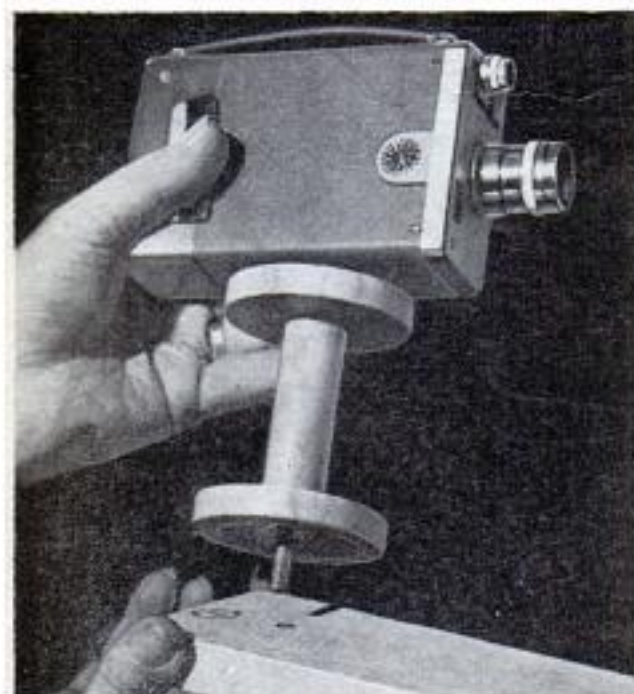


TITLE TRICKS

FOR HOME MOVIES

By *Shep Shepherd*

Fishing-line spool serves as base for camera on frame. Bolt threaded on both ends screws into camera-tripod socket and nut goes on other end to hold it to frame



IT'S A RARE amateur who adds titles to the home movies he produces, but good titling can multiply the interest of a film. A movie without titles is half finished.

Keep titles in mind as you shoot. Often, you'll find them ready-made in the form of signs, brochures and maps. Shoot them as you find them and splice them into proper position in the film when you edit it.

The best titles are made by using a commercial set of titling letters. They must be used on a flat surface with the camera pointing down or arranged on a perpendicular level in front of the camera lens. Align the lens with the exact center of the title area. Don't trust the view finder on close-up titling work. Buy a good titler or build one. Constructing your own titler is not difficult. Any arrangement in which the movie camera can be drawn backward in a direct line for three feet will serve the purpose.

The following table gives the field of view at various distances for a $\frac{1}{2}$ -inch lens on an 8-millimeter camera and a one-inch lens on a 16-millimeter camera:



Road signs are ready-made titles. They should be easy to read, so move in for a close-up if necessary

*Distance of lens
from title:*

10 inches
15 "
20 "
24 "
30 "
40 "

Field of view:

3 by 4 inches
4½ by 6 "
6 by 8 "
7½ by 9½ "
9 by 12 "
12 by 16 "

Letters of title seem to jump into place if step-by-step pictures are taken as they are moved into position

No supplementary lenses are needed when the last two title areas are used with universal focusing lenses and the last four with focusing lenses. Two sets of block letters, one inch and two inches in height, serve for almost any titling job.

A title should remain on the screen long enough to be read by the slowest reader. A good system is to read the title through twice as you film it. Don't cram a title with too many words. Keep it rather simple. If you can't say all that is necessary in one title, use two, for there's nothing to be gained by crowding too many words on the screen. But it's good to be concise.

The white letters should be used on a medium or black background for black-and-white film and on colored backgrounds for color film. By lighting the letters from one direction only, some interesting shadow effects will result, but don't overdo it. When a single light source is used it cannot be too near the title area or uneven lighting will result. Three feet is about as close as you should place the light for a 9-by-12-inch or smaller title area.

If the titling letters are used on a flat surface, other items may be added to make the title more interesting. For a hunting film you might add a couple of





Floral wallpaper used as background is in mood with the title and the movie itself. Use only one design throughout each movie



Missing letter in misspelled title rushes in at last moment, squeezes into place. It is moved between two-frame exposures

Invert camera, shoot as letters in title are tossed into tackle box. In reversed film, letters jump from box to fingers to title



shotgun shells, or put some lures in the title of a fishing film. Keep it simple to avoid a cluttered appearance. One interesting method of presenting titles is accomplished by photographing them on a miniature stage complete with curtains opened by hidden strings.

There are two methods by which titles may be made with moving backgrounds. One is by pasting the title letters on a sheet of clear glass and filming any desired scene with the glass in front of the camera. One objection here is that the focus must be on the title, which may result in an out-of-focus background. The universal focusing lenses used with some 8-millimeter cameras will produce good results with this method. The second and best method is to film the title against a black background, rewind the film and re-expose it on some appropriate scene. This second exposure should run a little longer than the first so the action background will still be seen after the title has faded out. Several titles can be filmed against the same background in this manner. The effect is best if the title changes are made by dissolves.

Dissolves are made simply by overlapping fade-ins and fade-outs. To make a fade-in, start the camera running on the title with the aperture completely closed, then open it to the correct reading as the camera runs. To make a fade-out simply reverse the process, closing the aperture at the end of the scene while the camera is still running. Fades should last no longer than about two seconds. The dissolve is made by first making a fade-out, then rewinding the film to the beginning of the fade-out and making a fade-in on the new scene or title.

A third method of creating moving backgrounds for titles involves the use of a projector and a transparent screen. A sheet of ground glass will serve as the screen. The title letters are arranged on the smooth side of the glass and a suitable picture is projected on the other, or ground side. The projector faces the ground side while the camera faces the smooth side. Both are started simultaneously. In this case there can be no light used on the title. A meter reading may be taken directly from the



Title is superimposed on moving scene by pasting it on ground-glass and projecting movie on rear of glass

projected image on the camera side of the glass.

A professional touch can be added to your movies by the use of animated titles if the animation isn't overdone. Here are a few examples: Using a horizontal surface, with camera shooting down, place the first letter of the title just out of view at one edge. Expose two frames and move the letter about $\frac{1}{2}$ inch into the camera view. If your camera does not have a single-exposure release a quick up-and-down movement of the regular release will do. Expose two more frames and move the letter another half inch. Repeat until the letter is in place. The second letter should follow the first by an inch or so, then the third, and so on. The letters may approach their respective positions from different directions if desired. Each letter should be lined up with a ruler when it reaches its proper place in the title, but the ruler must never show in the title. After the title is completely assembled, continue the exposure as for a regular title. On the screen the letters will be seen rushing into the picture and lining up where they belong. If you want to amuse your audience leave one letter out and have the title form itself with one word obviously misspelled. The missing letter

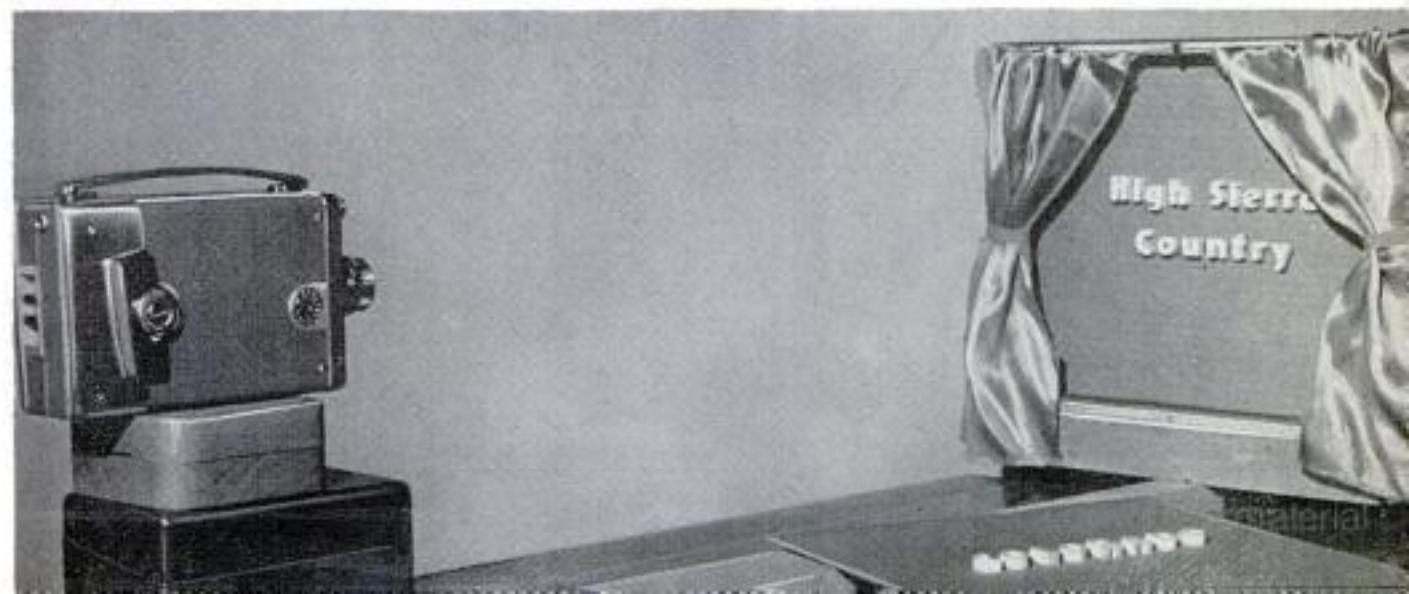
then comes rushing in, finds its place, nudges the letter already there, that letter moves over and the prodigal takes its place. A variation would have two letters end up in the wrong positions and then change.

The same effect can be accomplished by inverting the camera or the title and removing the letters one at a time as the two-frame exposures are made. In this case the complete title is sufficiently exposed before the first letter is withdrawn. In editing, this part of the film is cut out, turned end for end and replaced, and the letters then come in one by one and take their places.

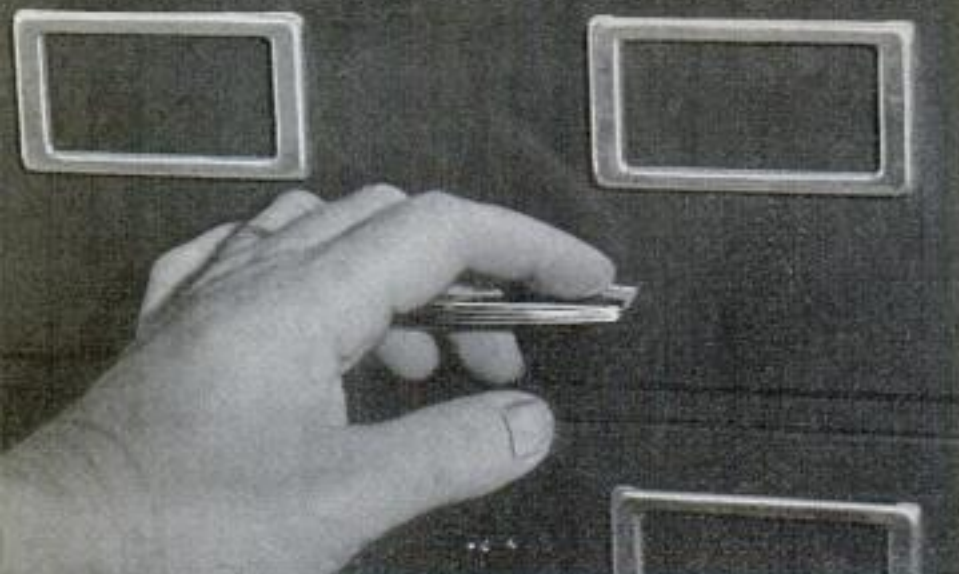
Animated maps can be created in a similar manner. Show the route of your trip by making a heavy ink line or pencil mark about $\frac{1}{4}$ inch long at the starting point, exposing two frames, extending the line another $\frac{1}{4}$ inch, exposing two more frames and so on. As the line reaches cities or parks, stop and write out their names.

For a fishing film spell out the title with block letters. Place an open tackle box or creel in the scene. Turn the camera upside-down and expose the film steadily as you pick up the letters one at a time and toss them back into the tackle box or creel. Reverse the film end for end and the letters are seen to jump out of the box only to be

A wooden box three inches deep serves as stage to display title. Curtains are pulled back by string or ribbon



ALBERTA



Letters of title seem to rise from floor and balance on edge of drawer in trick shot using inverted camera and reversed film. Actually, the title is first placed on the drawer. When it slams, letters fall to floor

caught in the fingers and put in place to spell out the title.

Vary this by opening a drawer part way and balancing the letters upright on its edge. Invert the camera and expose as you reach into the scene and close the drawer, knocking the letters to the floor. In the picture, when the film is reversed, a hand is seen opening the drawer and the letters leap up to balance on its edge.

Use this trick of inverting the camera on any title that can be made to disappear. Scratch a title in wet sand at the seashore. Invert the camera and make the exposure as waves wash over and obliterate the title. In the picture the title appears to be left by receding waves. A variation is to write the title in snow, film with the camera inverted as you wipe away the letters with a tree limb.

Your own imagination will discover

Route of trip moves across the map and place names appear as result of marking a half inch or quarter inch each time, then exposing two frames



many ways of applying the inverted-camera technique.

Your title animations should be smoothly and conservatively done. Use one method of animation throughout. A mixture of tricks calls too much attention to how the titles were made and not enough to what the titles had to say.

There should be a main title at the beginning of the film giving information as to the subject to follow. This might be "Pacific Fishing," or "Idaho Elk." It should be short but prominent. Follow with screen credits if desired and subtitles giving other pertinent information. Subtitles should

precede any change of location or activity in the movie. The "Pacific Fishing" film, for instance, might have been accumulated from several locations over an extended period of time. Thus there should be subtitles reading something like this: "Catalina Island, April 1954," and following the scenes taken at Catalina another subtitle reading, perhaps, "Balboa, May 1954," and so on. Subtitles will make the movie more interesting and there may come a time when you won't remember all the places.

Don't saturate a movie with titles. There should be just enough to supply needed information. A properly titled film needs not a single spoken word of explanation.

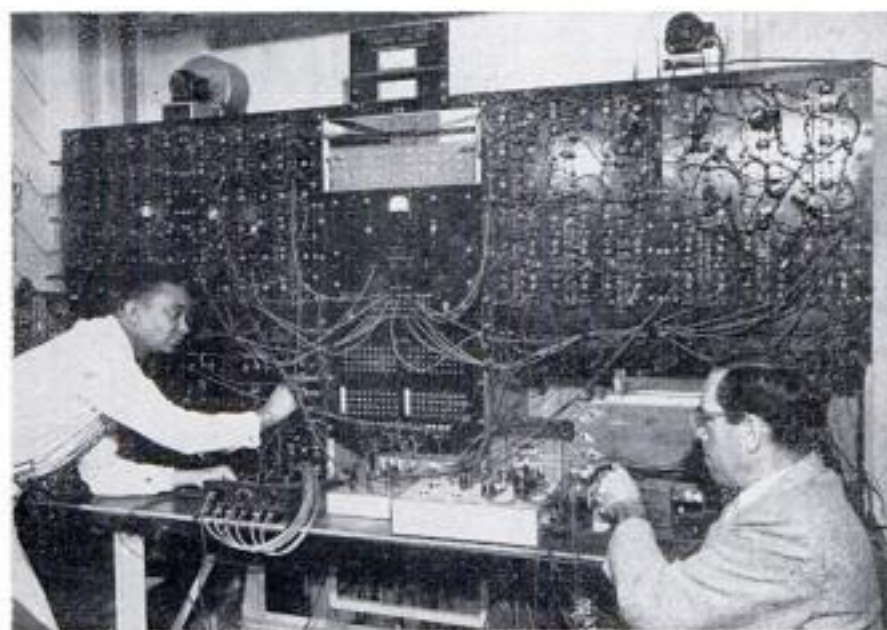
When the finished film is edited for insertion of titles, cut part of any scene that is too long. Cut out badly exposed and out-of-focus scenes entirely. You may have to be hard-boiled with yourself about it,

for sentimentality may temporarily outweigh such errors of photography, but get them out! There should not be a single scene left in that needs an apology or an explanation. No scene is so important that it rates spoiling the continuity of the whole.

In movie making as in still photography, the chief ingredient in the formula for success is horse sense seasoned throughout with a liberal sprinkling of know-how. ★★★

New Plane Hovers At Low Airspeed

Utilizing an airfoil that scoops air through the wing, from top to bottom, the Lanier Paraplane (derived from its wing features) can hover at the low flying speed of 19 miles per hour. The aircraft has a top speed of 120 miles per hour and can land or take off in 150 feet, according to its designer. It is powered with a 90-horsepower engine and carries the pilot and one passenger.

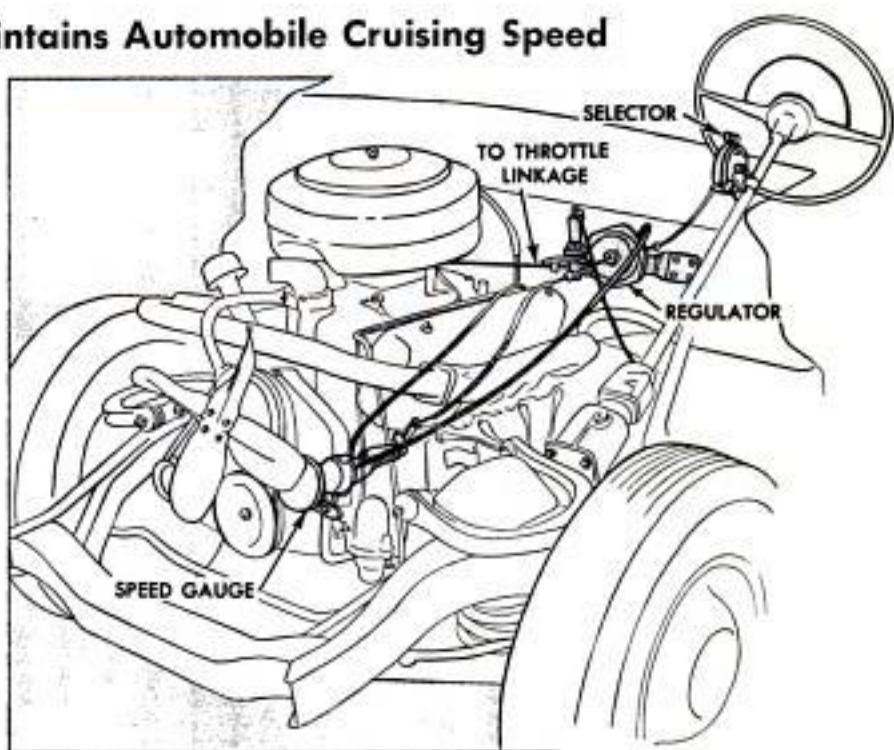


"Thermal Analyzer" Secures Heat Data

With a "thermal analyzer" used at U.C.L.A. you can turn the sun on and off, change the color of the roof and reproduce all the other conditions that affect the heating and cooling of a home. The complicated maze of tubes and resistors is actually an electronic model of a home. By twisting a knob, the effect of insulation in walls or ceiling can be determined. Operating other switches reproduces the effects of winds.

Automatic Control Maintains Automobile Cruising Speed

You can maintain a uniform speed on the road with a new auto accessory. A control mounted on the steering post is set at the desired cruising speed. For normal highway driving, you don't have to touch the gas pedal. A unit beside the fan belt measures engine speed and regulates vacuum in a line running to a unit mounted on the fire wall. This unit exerts pressure on the throttle rod to increase or decrease speed. You can go over your limit by pressing the accelerator or slow down by stepping on the brake.





You don't miss important calls when you are out if you have the Automatic Answering device. Your voice answers the phone and gives calling parties the message you dictated before you left. The machine then records any incoming messages (above)



Dialing in the dark is no guesswork with light that automatically illumines dial when handset is lifted. Light operates on current from baseboard-mounted transformer



The relaxed gentleman below is talking on the telephone, even though the handset remains on the base. He merely pressed an "on" button and started talking. A microphone in the base picks up his voice. He listens to small speaker on the desk

Look
**What They've Done
 With the Telephone**

No plugs to plug, no cords to tangle with a streamlined cordless switchboard like that at left. Operator makes connections through simple movement of key switches

It is no longer necessary to hide the telephone since it now comes in four two-tone combinations and eight solid colors, from bright yellow to soft neutral gray (below)

Bell System photos





Breitkreutz walker aids a toddler. Chair has adjustable legs, arms and back for practicing sitting balance

Handy Man for the Handicapped

By Jeffrey Fleece

ALBERT J. "Spike" Breitkreutz, 59-year-old Denver man, has overcome his own physical disabilities to develop a hobby in which equipment contrived and made in his small workshop has aided hundreds of handicapped persons.

An accidental miracle led Spike, after battling for years against arthritis, now overcome, and a weak heart, now simply ignored except for routine caution, to his place in society as handy man for the handicapped.

After a bout in the hospital in 1950, Spike Breitkreutz designed and made three little wooden hobbyhorses on wheels in his small garage shop. He turned them over to the city firemen to give away. And then the miracle happened.

One of the hobbyhorses was given to a three-year-old boy who had not walked since polio struck him. Despite his parents' doubts, the boy demanded to be put on the horse. In a few weeks he was

"riding" all over the house, propelled by his own weak legs. The exercise finally enabled him to develop enough strength to walk alone.

When Mr. Breitkreutz heard of this recovery, he determined to devote his life to helping the handicapped. The news of



Stationary bicycle permits leg exercise. Roller on rear wheel stiffens pedaling



Weakened muscles need special chairs even for resting. Victims of polio, cerebral palsy, multiple sclerosis, muscular dystrophy and other diseases have been helped by Breitzkreutz devices. Tricycles below are modified for use by crippled children



Spike's horses spread rapidly, and now crippled children from Vermont to California and even in Germany are riding the more than 400 hobbyhorses "foaled" in his garage.

The horses are especially useful for very small children with cerebral palsy, polio or other crippling ailments who cannot understand the necessity of dull and arduous exercises with normal equipment. With a horse to ride, exercise becomes play.

Spike has made over a dozen variations of the original hobbyhorse to suit individual children's capacities. Some are stationary, but most have swiveled ball-bearing casters so a child can move the horse in any direction his weakened muscles will allow him to go.

"One of the many nice things about this hobby of mine," Spike says, "is that so many different problems need working out. There are almost as many differences in these youngsters' abilities as there are muscles in the body, and nearly everything I make needs some special variation or adjustment."

As he saw more and more handicapped youngsters in his visits to homes and hospitals, Spike found more ways to help the handicapped with his skilled hands. Besides the horses, in four years he has made over 300 other devices to ease the lives of people of all ages who have physical disabilities.

It is no trouble to find people who need the help of a handy man like Spike. Few hospitals can afford all the equipment they need for physical therapy. Local chapters of organizations fighting polio, cerebral palsy, multiple sclerosis, muscular dystrophy and other crippling diseases know people who need help. Veterans' organizations keep in touch with men seriously disabled by war wounds.

In Denver, many of these groups frequently call on Spike for help. They are never refused.

Seat backs and pedal straps from Spike's workshop enable crippled children to ride tricycles, special chairs give their twisted muscles the greatest possible rest, all kinds of special devices and custom-made adaptations of normal equipment improve their strength and muscle control.

Spike has also found ways to help adults in their fight to overcome or minimize the effects of crippling diseases or accidents. A simple elevator powered by a 1/4-horsepower motor lifts a paraplegic veteran's wheel chair up onto his porch, a special typewriter table high enough to accommodate a wheel chair helps another veteran make his own living, various attachments on beds and even inside iron lungs enable the weakest victims of polio to exercise.

Spike works closely with doctors and physical therapists in every stage of his work, teaming his own ingenuity with their knowledge of patients' needs and abilities.

Many of the devices Spike makes could not be bought for any price, and those that could are usually too expensive for families whose budgets have been wrecked by long-term hospital bills. That is another reason Spike's hobby has been a blessing to so many—he does not accept a cent for his work from anyone. He has kept expenses down by figuring ways to use discarded lumber and parts from junked washing machines, roller skates, toys, bomber gun turrets, car differentials and lawn mowers. And when the expense for materials has become greater than his own limited income can stand, businessmen and organizations have always helped him out.



Just standing is hard work for this youngster, but the play table makes it fun. Breitkreutz accepts no money for the work he does



Special "duck shoes" for the crippled promote walking stability. The plywood play table at right can be adjusted up or down to fit children of different ages





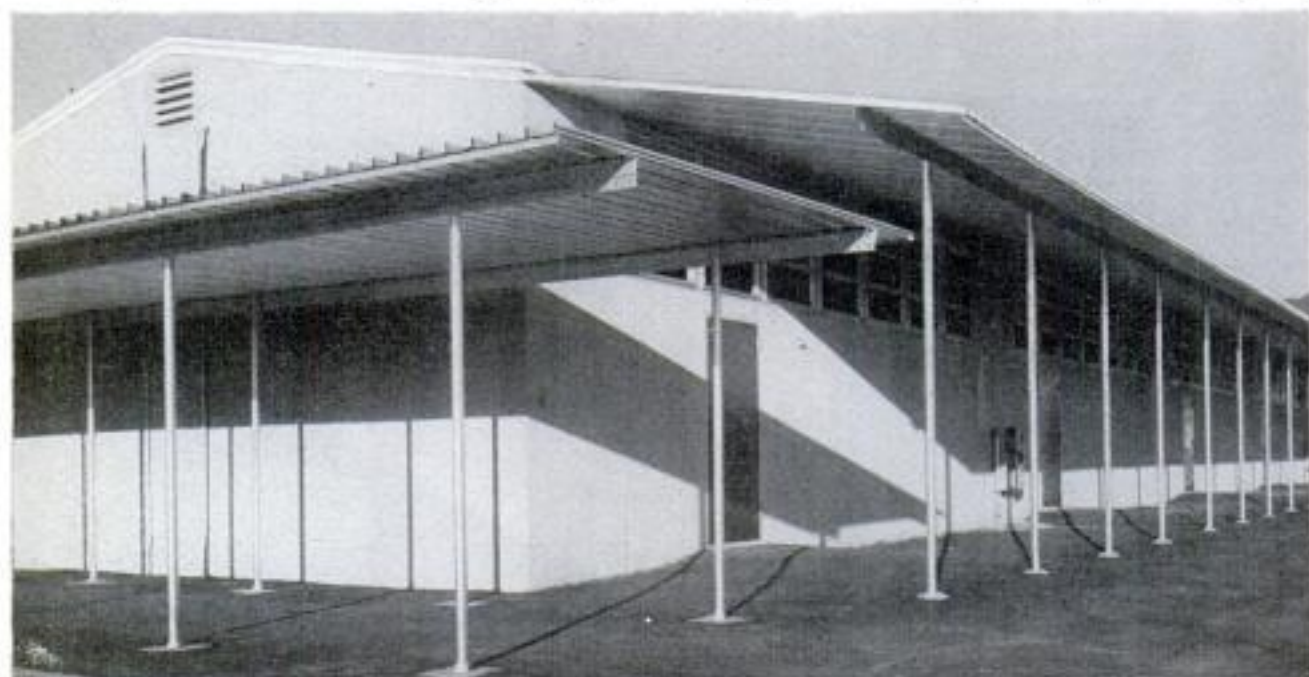
Lightweight steel framework of building goes up quickly. The finished unit can be transported in one piece

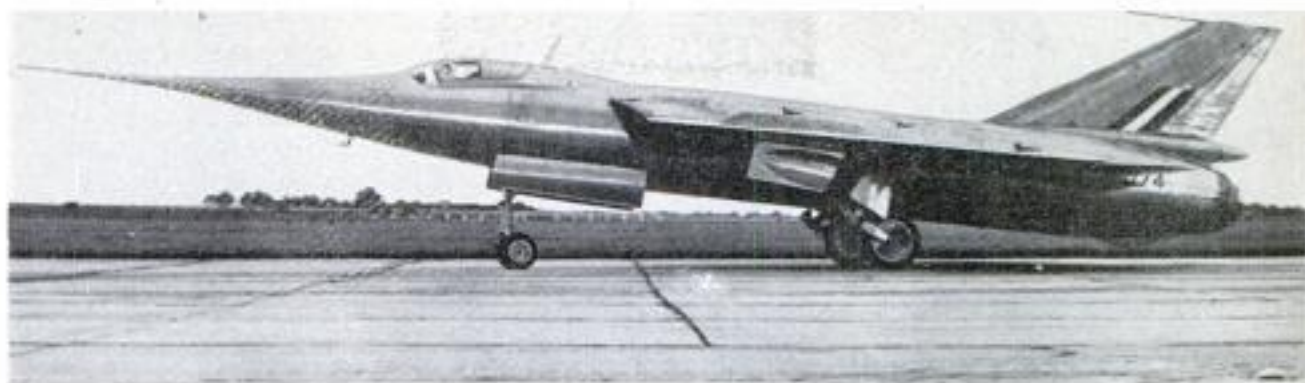
Portable Schools Solve Building Shortage

SCHOOLS THAT FOLLOW the children around meet shifting population problems in California. Forty-seven portable steel buildings, which consist of classroom, washroom and kindergarten units, can be moved quickly and set up end to end to provide the necessary facilities. The buildings have lightweight steel framing which is anchored to concrete piers with steel straps, plastered exterior and interior walls, composition-and-gravel roofing,

acoustical-tile ceilings and asphalt-tile floors. Chalk boards, tack boards, sinks and cabinets are built-in. Open walkways along one side of the buildings are covered with metal awnings which also shade the windows. Electric lines and wiring for the bell and fire-alarm systems are easily detached or connected to other buildings. Water, gas and sewer connections are quickly made. The low-cost schools are moved intact from one site to another.

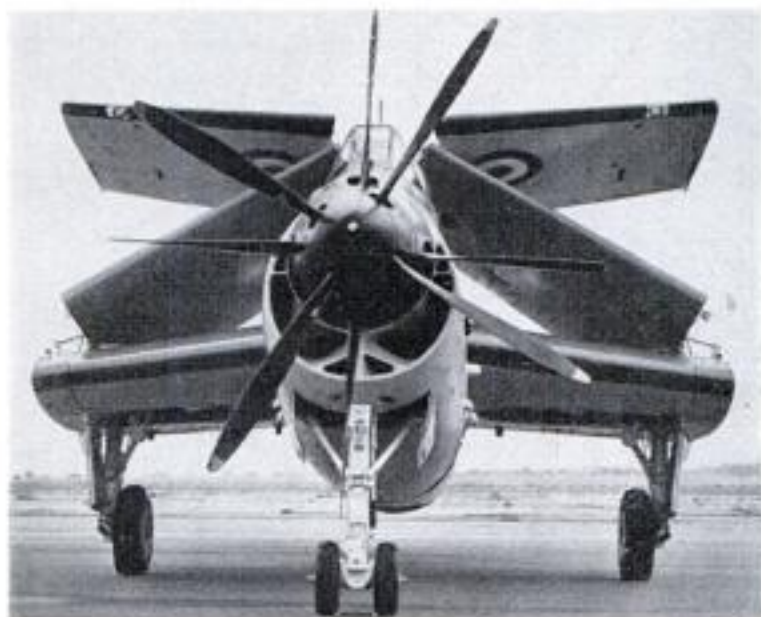
Sections placed end to end form one long building. Metal awnings shield walkways and keep direct sunlight out





The new Fairey Delta D-2 is expected by its British makers to exceed 1200 miles per hour in level flight

Double-folding wings cut storage space needed for the Gannet

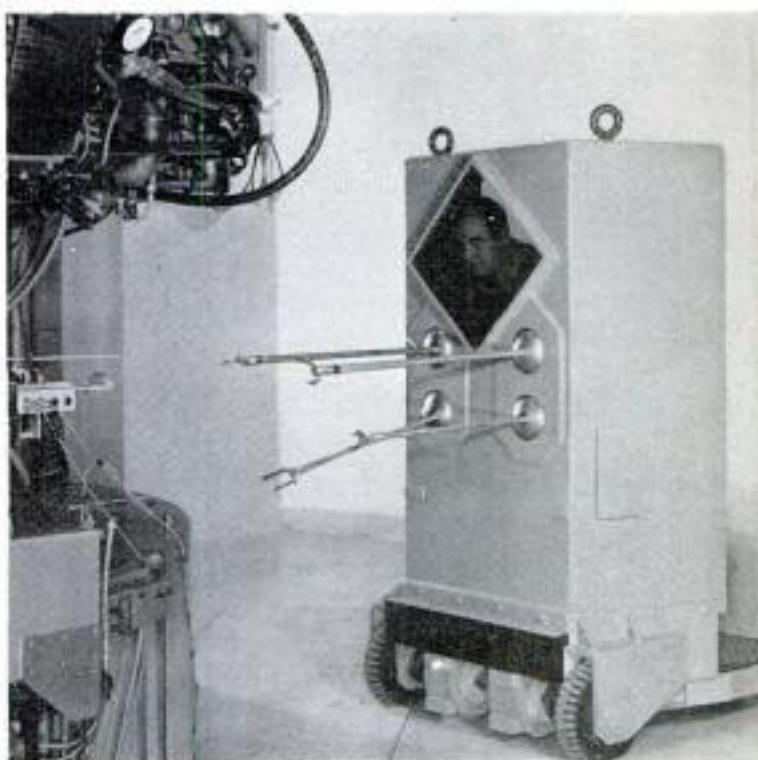


Two Novel Warplanes Produced in Britain

Two new British military aircraft are attracting world attention for different reasons. One of these, the Fairey Delta D-2, resembles the Douglas Skyrocket, rocket-powered speed-record holder. The Delta, however, is powered by a conventional turbojet engine. Because its long, needlelike nose can be lowered to give the pilot better taxiing vision, it has been nicknamed the "Droopsnoot." The other new British aircraft is the Fairey Gannet, driven by contrarotating propellers. Wings of the Gannet fold twice to make it extremely compact for carrier or hangar storage.

Lead Shield on Wheels Guards Atomic Worker

Electric motors propel a heavy, three-sided lead shield used in handling radioactive materials at Argonne National Laboratory near Chicago. The barrier, which is four inches thick, has a lead-glass window through which the operator looks as he manipulates "hot" materials with tools which pass through ball joints located below the window. By moving either of two handles located on the chassis, the operator drives and steers the five-ton unit. The handles control independent motors that move the front wheels, which allows great mobility. The unit is used in removing radioactive materials from a cyclotron while its 280-ton magnet is energized.





Operator of the world's largest metal-cutting bandsaw cuts die blanks from control station at head of machine

Giant Dies Cut on "Big Bertha" Bandsaw

Work is steered to cutting saw by wheel, which controls three power-driven tables holding and guiding die blank

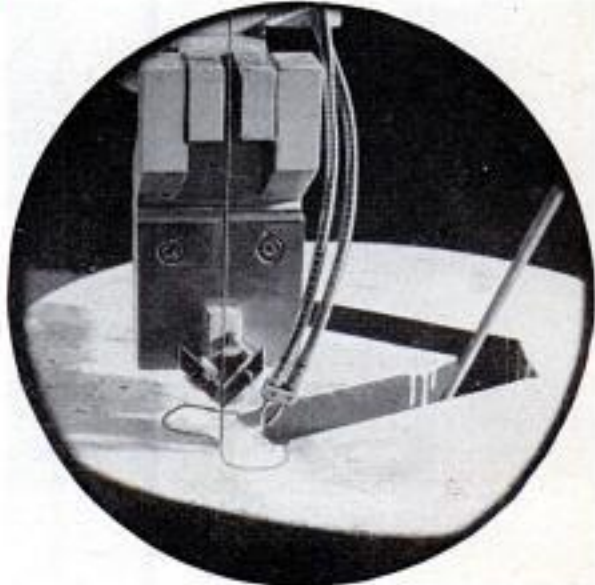


AIRPLANE-TYPE controls and periscope vision like that on a submarine feature the world's largest metal-cutting bandsaw, a machine essential to the tooling necessary for production of modern high-speed military aircraft. The big saw and its companion die filer, also the largest machine of its kind, produce the gigantic extrusion dies which form aluminum channels, spars and stress skin sections in sizes heretofore impossible to fabricate. Extrusion of aluminum members as long as 110 feet and up to 34 inches wide eliminates many man-hours formerly consumed in making small assemblies and then riveting them together.

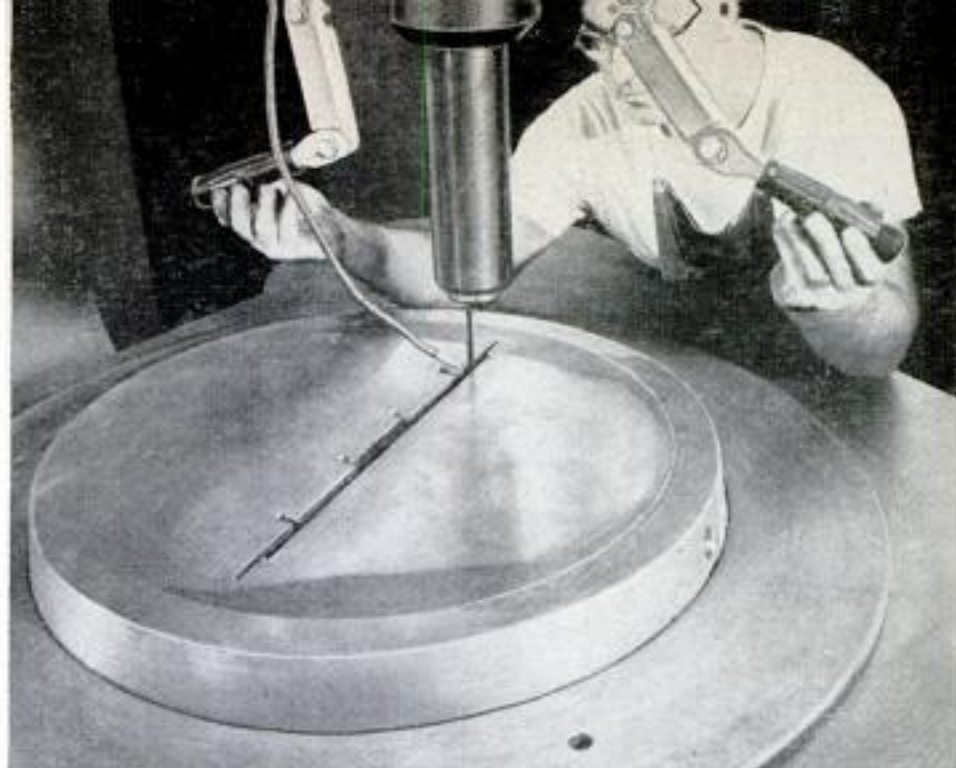
The "Big Bertha" bandsaw unit is 15 feet 10 inches high and weighs 16,000 pounds. It can handle 10-ton steel die blanks up to 26 inches thick and 52 inches in diameter. The operator sits in a control station at the head of the machine and guides the die blank against the narrow saw with an airplane-type control wheel. He watches his work through a periscope that projects an image of the cutting area into a mirror directly in front of him.

Made, like the saw, by the Do-All Co., of Des Plaines, Ill., the filer performs the final finishing operations on the contour-sawed dies. The filer is remarkable in that it directs the file toward the surface to be finished, rather than the work to the file, as is the case with many other similar but smaller machines. ★ ★ ★

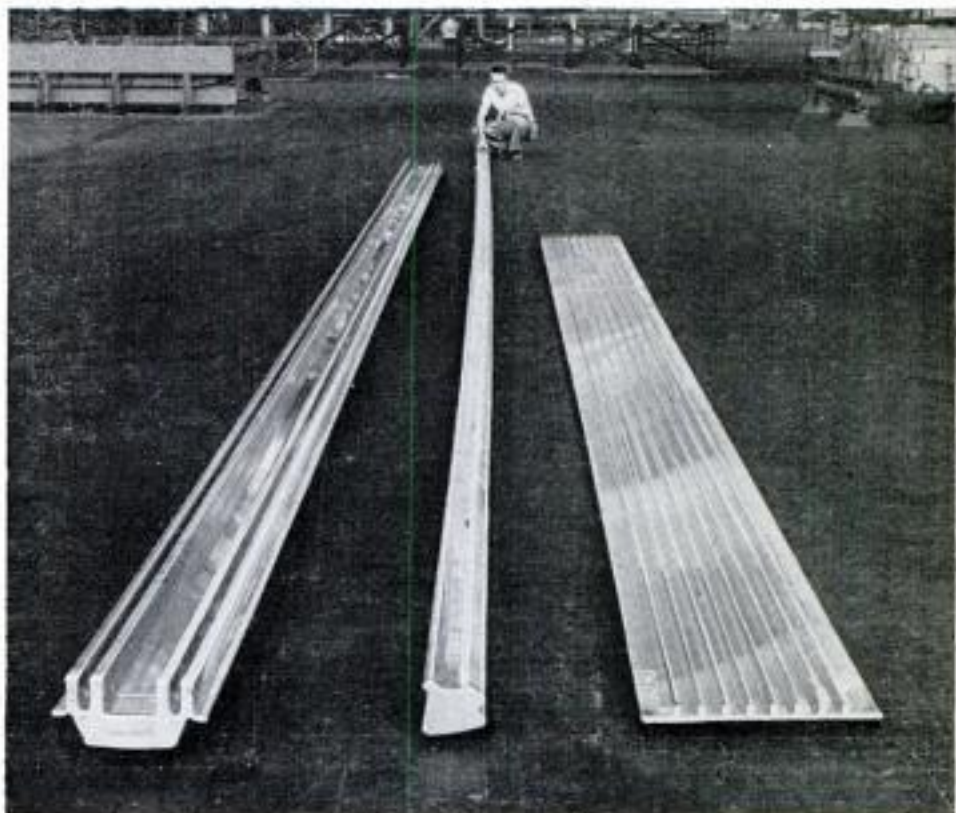
Operator gets close-up of work through mirror mounted just above control wheel



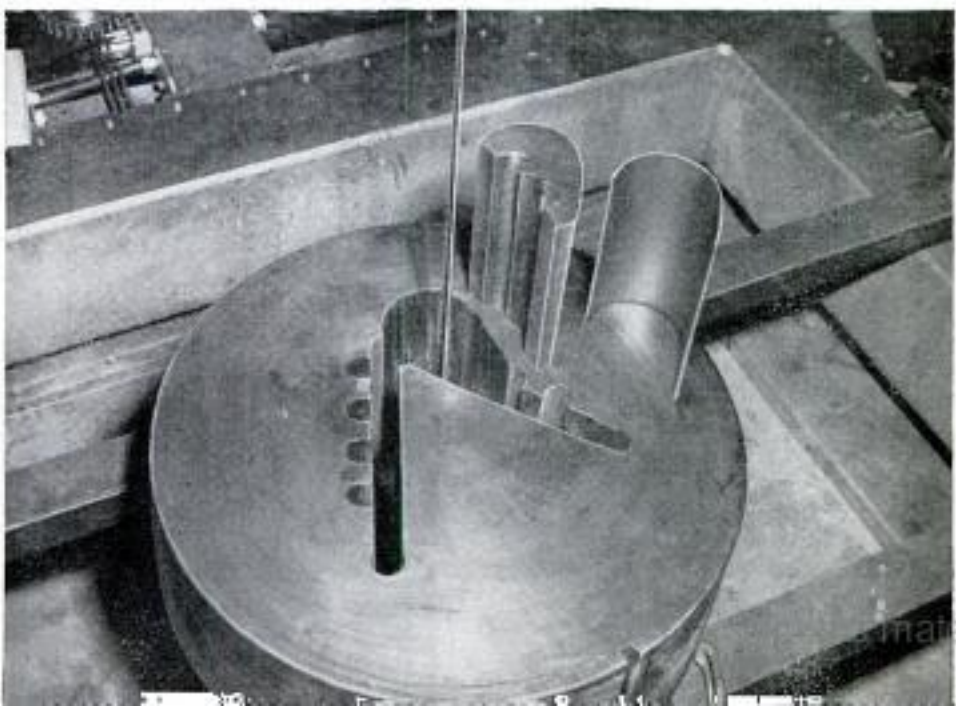
Final finish is given cut die on filer, which moves file against work, rather than the reverse, which is usual arrangement. Entire frame moves with precision at light touch on double control and guide handles



These aluminum extrusions were turned out by giant presses equipped with dies sawed and finished on the "Big Bertha" bandsaw and the moving-file jig filer. Extrusion of large members saves manufacturing time



Blade in the Big Bertha bandsaw is 40 feet long, and is welded into single piece after insertion in guide hole drilled in die blank. Contour-saw method allows cut directly along layout line drawn on work





Steeds in Snail Stable Start Race When Spurred by Sunlight

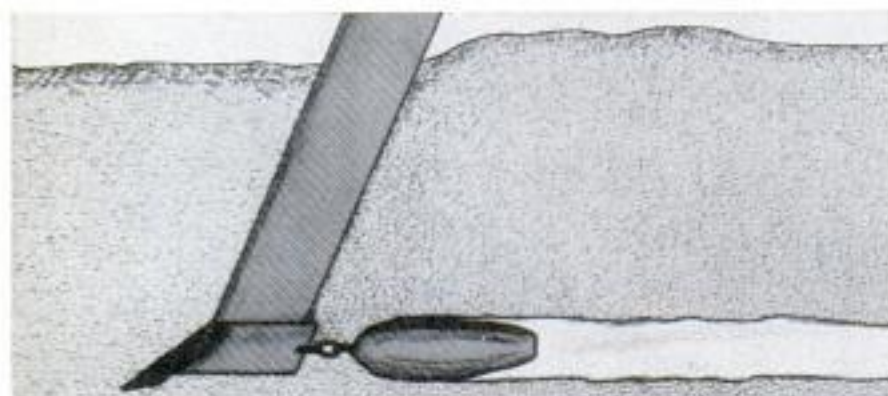
Martin Witter, age 10, of Lynwood, Calif., gets a snail's-eye view of one of his stable of racing chariots. Martin contends he has the only snail stable in the country, and he uses the mollusks as both steeds and

drivers. The snails are goaded into action when placed in the sunlight, which warms their shells. Record time for a snail chariot in competition over a three-foot course is five minutes.

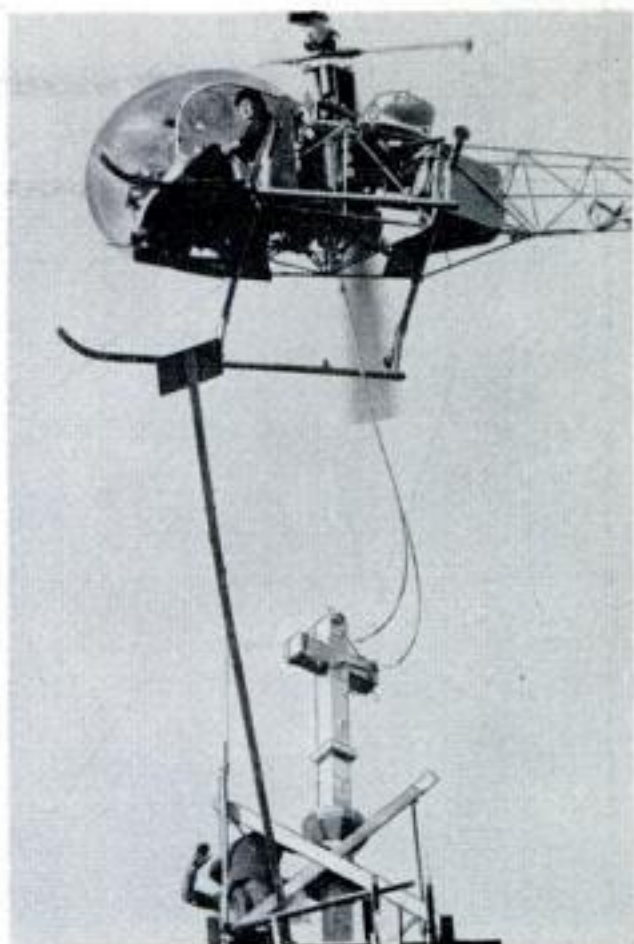
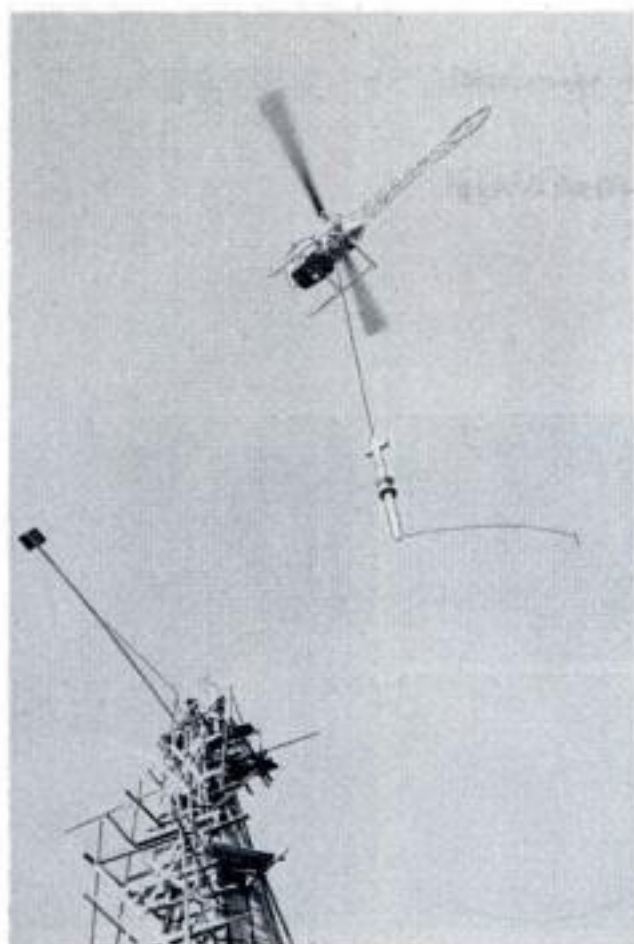


Mechanical "Mole" Helps Irrigation

Subsurface irrigation tunnels are dug by a mechanical "mole" that helps get water to the roots of crops planted in tightly packed clay soils. The mole, a torpedo-shaped metal object, is drawn through the soil behind a subsoiler blade 14 to 22 inches below the surface, the tunnels being spaced some 36 inches apart. Moling is done before the crop is planted, while the main irrigation ditches are shaped after the crop emerges from the ground. Earth from the ditching operation that plugs the tunnel entrances is removed or allowed to dry out to insure the flow of irrigation water into the tunnels.



Multiple-spindle drills that bore up to 300 holes per second are being used in the manufacture of acoustical tile.



Helicopter Used As "Skyhook" to Lift Cross To Church Steeple

Helicopters have been put to many odd uses, but it remained for the people of Avesta, Sweden, to use one as an architectural "skyhook." Wanting to put a new, 300-pound cross atop their church steeple,

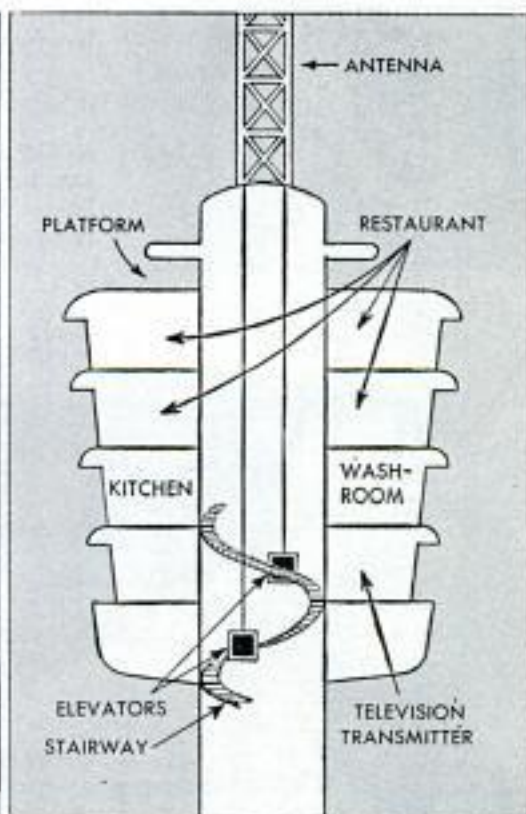
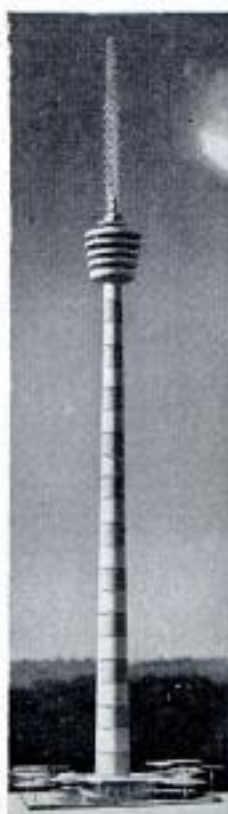
the builders sought an easy means of lowering it into place from above. The helicopter was the answer. It lowered the cross into the waiting hands of workmen on top of the steeple.

German TV Tower Houses Restaurant and Platform

Not content with the conventional built-up steel-girder construction, the South German Broadcasting System is planning a tubular television tower at Stuttgart, American Zone, that will house a restaurant and observation platform near its top. The platform and eating place will be reached by twin elevators running up the interior of the tube and the antenna itself will surmount them. The entire structure will be almost 500 feet tall.

Sets Helicopter Record

An unofficial world's helicopter-altitude record of 24,500 feet has been set by Army warrant officer Billy I. Wester, flying a Sikorsky XH-39. Previous record was 22,110 feet, achieved by the Air Force.



WHAT'S NEW FOR

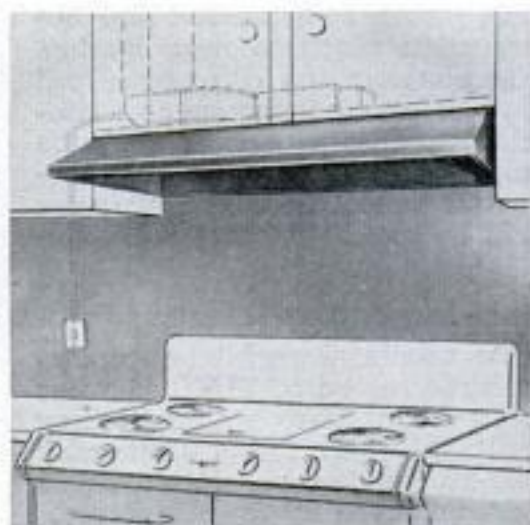
Your Home



WINDOW SASH can be tilted inward for cleaning. Pivots at bottom of each sash hold it in the channel during tilting or allow easy removal. Steel cables attached to coil springs allow raising or lowering in the normal sliding position. Unit is quickly installed in standard frame

SWITCH EXTENSION brings wall-light switch within easy reach of small children, permits them to get their own drinks of water after lights are out, or allows easy operation of a switch when it is obstructed by furniture. Shockproof plastic cord connects extension to switch

HOOD with ventilating fan which whisks away cooking odors and smoke can be installed under cabinets, requires only 4½ inches of clearance below them. Hood tilts for easy cleaning of its underside, or can be removed for servicing of fan. Built-in light illuminates range beneath



CHAISE LONGUE folds into a neat 12-pound package that is easily carried on trips. Headrest and cushions are inflated with a pump or by lung power. It adjusts to four positions to permit use as a lounge, cot or chair. The unit has lightweight steel-tubing framework and is covered with fadeproof plastic



SEAT-COVER ANCHOR holds cloth firmly in place, prevents bunching and wrinkling. Barbs of holder are pressed deep into chair covering. A locking barb secures the holder so it won't slip out. It can be used also on beds to hold sheets or baby blankets in place, or in autos to fit throw covers to seats



SAFETY RAIL and seat for bathtubs reduces accidents that happen when people are getting in or out of the tub. Especially useful for the handicapped and elderly, it fastens firmly to the side of the tub, furnishes a secure handhold. The seat is covered with colorful plastic. Steel rails are chrome-plated

VENEER "WALLPAPER" is so pliable it can be wrapped around a lead pencil, yet is genuine wood. Only 1/85 inch thick, it is bonded to a cotton backing and is applied to the wall in much the same manner as wallpaper. It comes in a variety of hardwoods and applies easily to any hard, smooth, dry surface





Cox relaxes in a lounge chair on the broad deck of the former PT boat while his wife feeds their canary



Living room still shows signs of their home's origin as a PT boat. They plan to install a ceiling soon



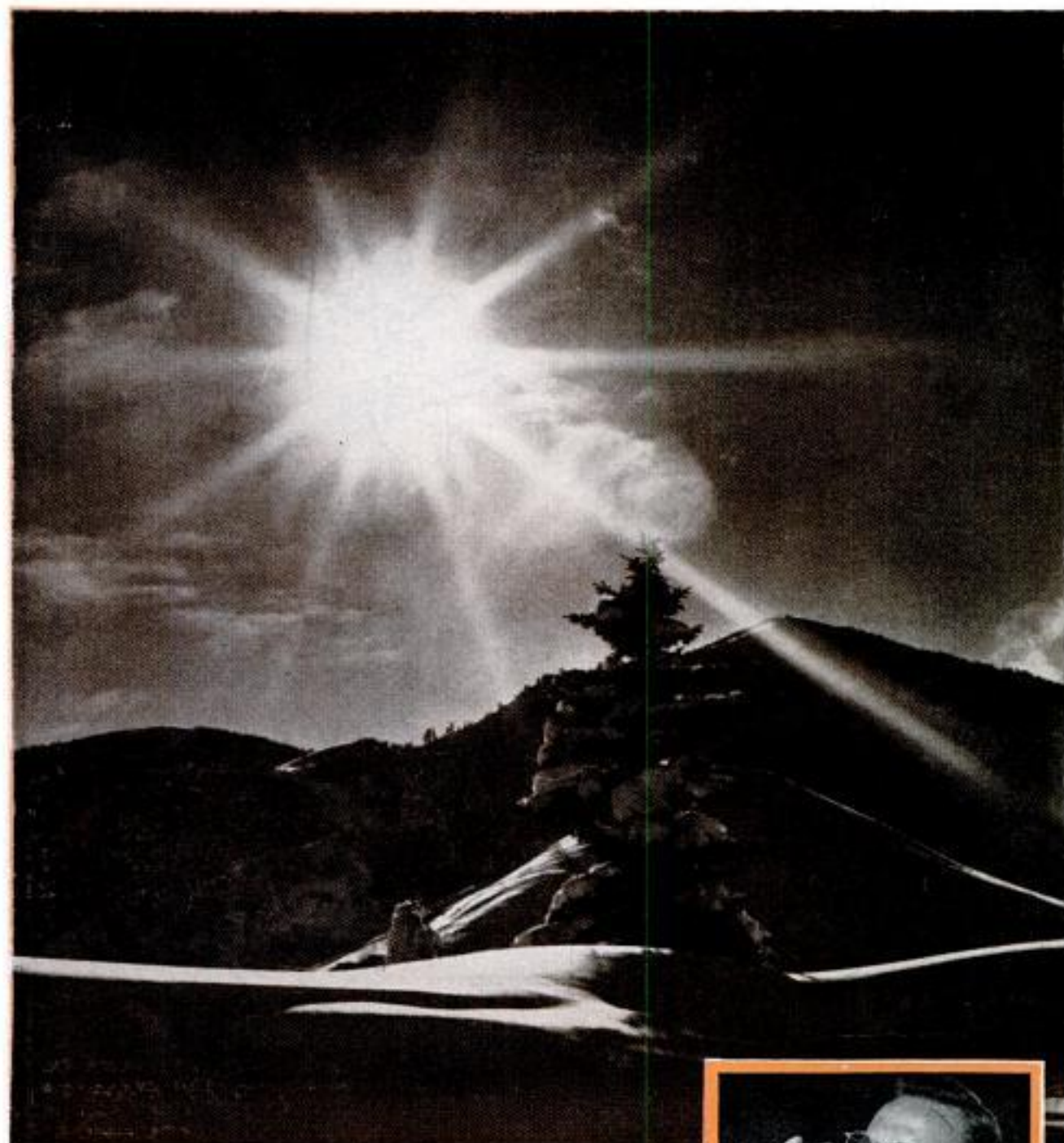
Eighty-foot craft, now a home, is tied up in the harbor near the Air Force base where Cox is stationed

Hull of Fighting PT Boat Becomes Floating Home

TO AIR FORCE Lt. Col. Homer Cox and his wife, home sweet home is a former PT boat. In the Air Force since 1930, Cox was a combat pilot in World War II and flew 25 missions in Korea. Two years ago he was assigned to Roslyn Air Force Base, Roslyn, L. I., N. Y. Unable to find a home, he located an 80-foot PT boat which had seen service against the Japanese in World War II. The craft originally cost the Navy about \$40,000, but the Coxes bought the hull for \$1000. It now is anchored in the harbor at Roslyn. Since they bought this boat, they have spent about \$3500 on interior renovation. They installed modern cooking equipment in the galley-mess hall. The deck makes a fine place to relax on warm days. The Coxes plan to put in a ceiling, and eventually to install motors. Then, in three years, when Cox is eligible for retirement, they plan to sail for the Canary Islands and make their home there.

Mrs. Cox prepares meals in the former galley, now equipped with modern stove and other conveniences





Convair photo
Flashlight reflector lights a cigarette to demonstrate solar energy

After the Atom— Power From the Sun

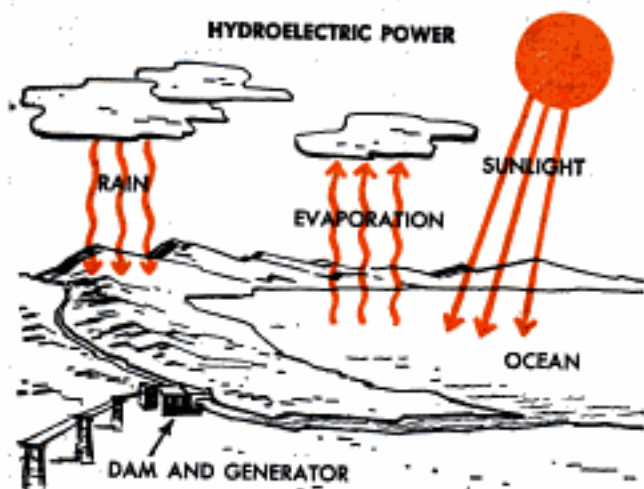
By Clifford B. Hicks

THE PRIESTS of ancient Egypt worshipped the sun as Amen-Ra, the God of Gods, and with good reason, for it is the greatest potential source of energy known to man. From this shimmering glob of gas, radiation showers out into empty space and goes on and on forever. An infinitesimal part of its radiant energy leaps 93,000,000

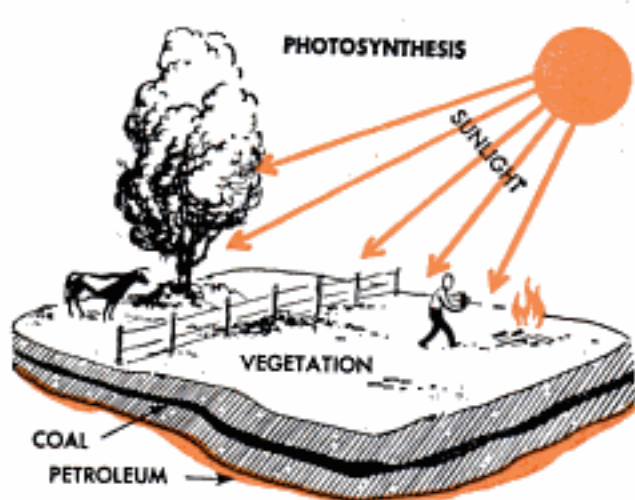
miles through empty space to impinge upon the speck of matter which man calls Earth.

Without this radiant energy—sunlight—life in any form would be impossible. Man burns sunlight, in altered form, in his body for food and in his machines for fuel. Nature converts sunlight into every kind of nourishment from hominy grits to sirloin

Man Now Uses Sunlight Trapped by Nature

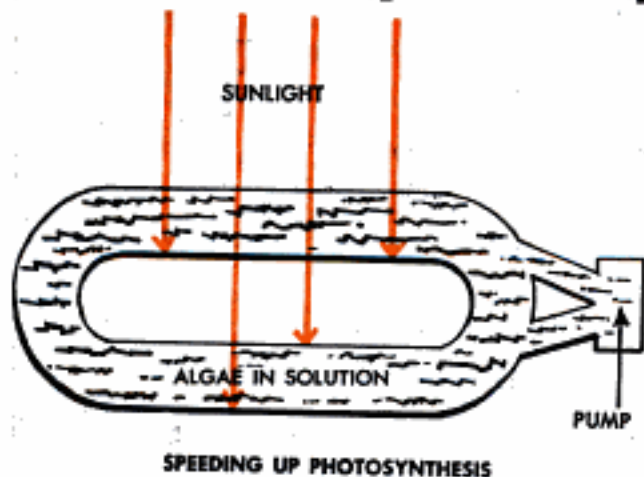


Solar energy evaporates water, which then falls as rain. We recapture energy with dam and generator

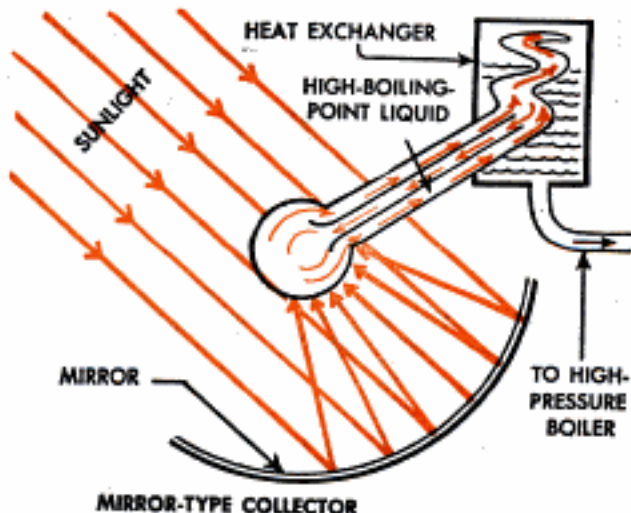


Green plants grow through photosynthesis, producing food and fuel. Coal, petroleum are trapped sunlight

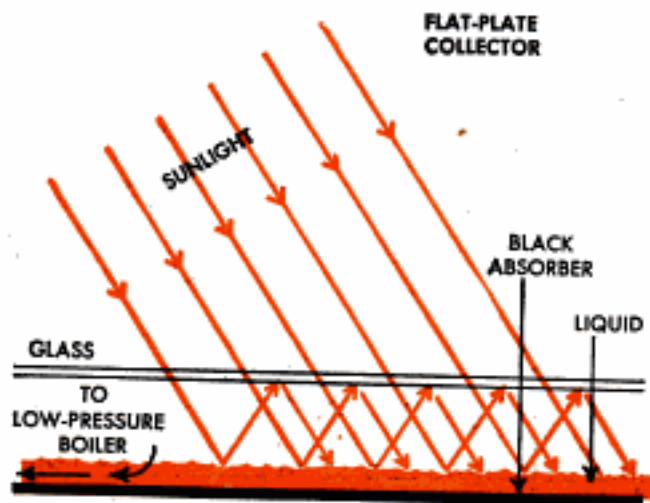
How Man Hopes to Capture More Solar Power



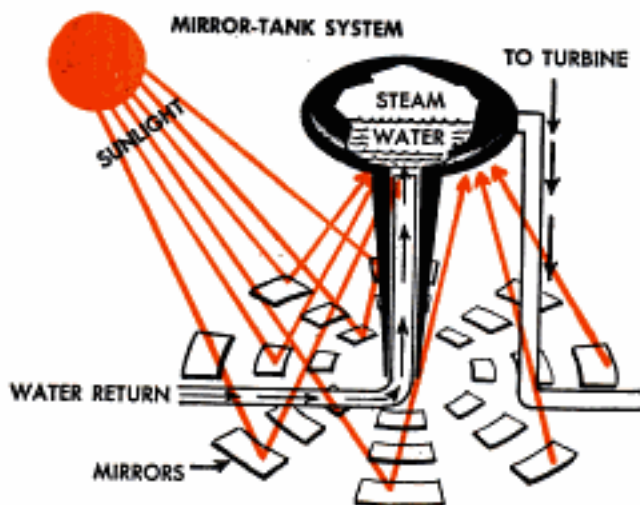
Algae—unicellular plants—are circulated in plastic tube. They can double their weight in a few hours



Parabolic mirror focuses the sun's rays on a small area to heat liquid, which runs high-pressure boiler



Rays penetrate glass to heat liquid. Absorber changes rays' wavelength so they can't escape through glass



One proposal is to focus sun's rays on a black tank, heating the interior to convert water into steam

steak, and into every kind of energy from gasoline to hydroelectric power.

If you could sell, at today's market value, all the energy that falls freely on your back yard, you could retire for the rest of your life. Those areas of the earth which are least valuable to man for other purposes receive the largest share of the sun's bounty; a 16-square-mile area of worthless Arizona desert receives enough energy to support the current power needs of all the people of this country. Every hour Old Sol pours down upon the welcoming earth as much energy as there is in 21,000,000,000 tons of coal.

Yet man has always been baffled in his attempts to trap this tremendous flow of free energy. It is as elusive as a handful of sand. So far he has been able to hold only a grain or two, for all his efforts. He has been forced to buy his energy requirements secondhand. A tree, through the magic of photosynthesis, converts solar energy into wood, and man burns the wood to recover the trapped energy. In days long before man strode the earth, mighty forests captured the sunlight, then died and were buried beneath the earth's surface. Today man feverishly digs this "sunlight" out of the earth in the form of coal, or pumps it out as petroleum. When the sun pours its energy down upon the vast oceans, the water evaporates into clouds, the clouds drift over the land, the water falls as rain, and man captures an infinitesimal part of the solar energy with hydroelectric dams.

For centuries man has known that he is paying dearly for his secondhand dealings. The process of photosynthesis is only one tenth to one half percent efficient, and when man burns wood, coal or gas he succeeds in liberating only a small fraction of the energy it imprisons.

Great minds long have tried to untangle the baffling knot of direct-solar-energy utilization. All man has to show for these efforts are a few cold-drink stands in the Arizona desert that use the heat of the sun to power air conditioners, and a scattering of water heaters in Florida.

Just within the past few years, science has started unraveling the knot. Men trained to take a long view of history point out that the

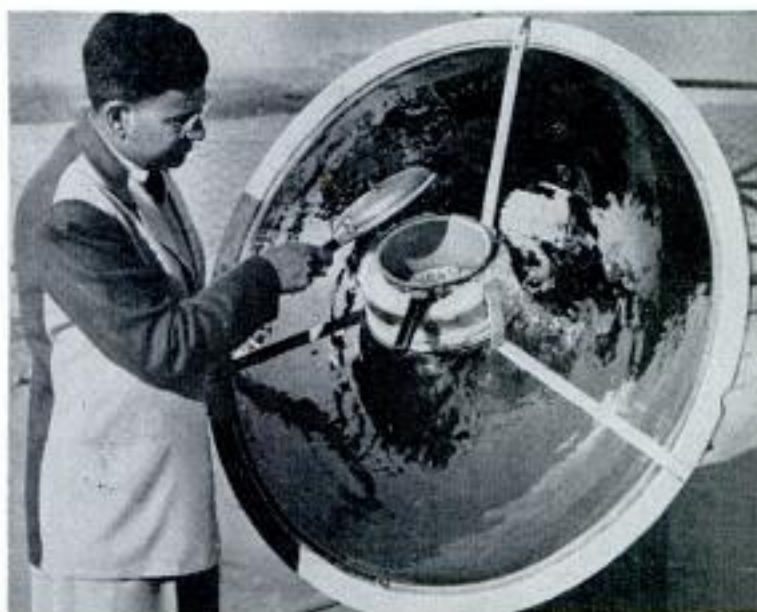


New York University photo

Doctor Telkes demonstrates experimental stove. Mirrors on flaps deflect rays to a heat-storage chemical inside the box

world is spending its coal and oil reserves with shameful abandon. Authorities disagree about the time we have left—a good estimate may be 160 years. All the reserves of atomic power might last another 75 years. The point is not precisely how long we'll have these reserves of power, but that the bank account is continually diminishing and it's inevitable that we'll go broke. Where will our grandchildren, or our grandchildren's grandchildren, find the energy resources necessary to survive?

Developed in India, this solar stove has a mirror four feet in diameter which focuses the sunlight on a pressure cooker





Coovair photos

Biggest solar mirror in this country is used as a research tool. Sun's rays are focused by 120-inch aluminum mirror to dime-size focal point. Furnace develops temperature of 8500 degrees F.

Specimens of metal and ceramic materials are placed in focal point to determine their heat resistance. After test they are so hot the operator must handle them with asbestos gloves



Many scientists — including those prominent in the field of atomic-energy research — feel that the harnessing of solar energy may well be man's biggest achievement, and it may come in the last half of the 20th century. They point to just a few recent developments that may be hints of things to come:

A solar furnace is being used to test metals and ceramics by melting them almost instantly.

A solar stove has been developed which shows great promise of giving underprivileged areas of the world free fuel for cooking. Other solar cooking methods are under development.

Ingenuous solar traps are capturing sunlight to heat homes at various spots in the United States.

Within the past few months man has succeeded in converting sunlight directly into electrical energy.

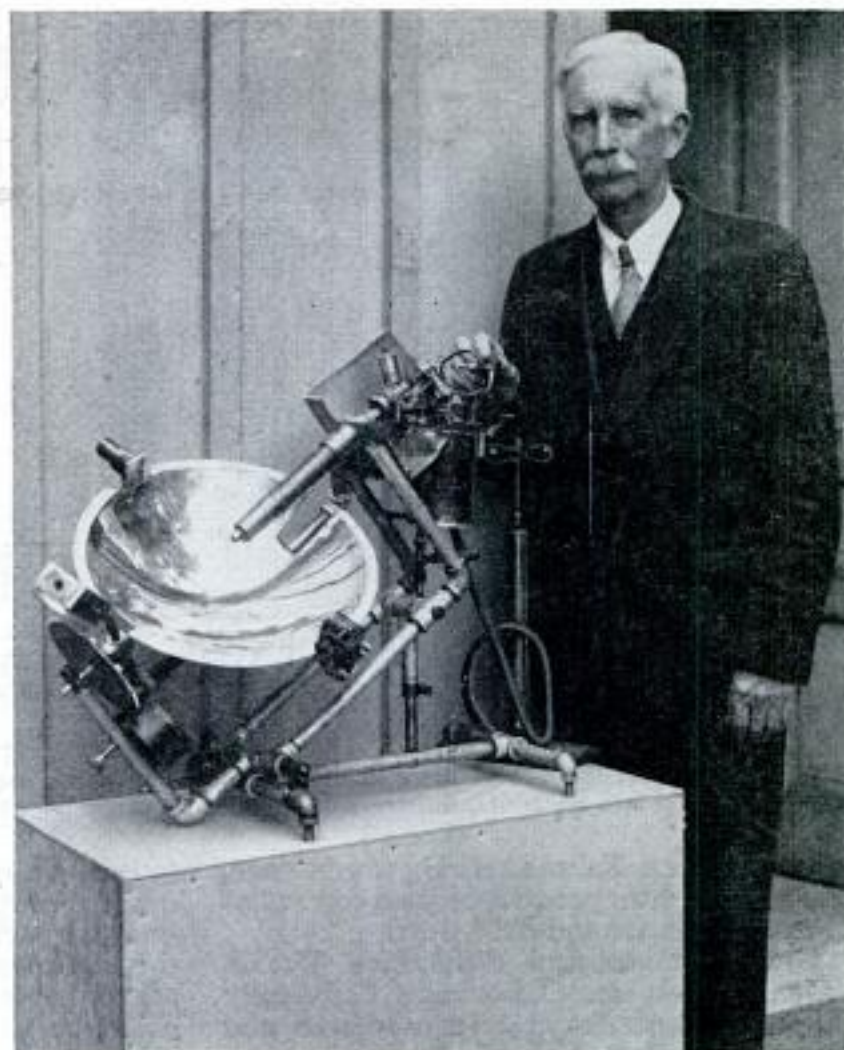
Man is currently trying to

capture the tremendous barrage of energy that strikes the earth in several ways:

1. *Solar mirrors.* When you were a child you probably used a reading lens to light a match or burn a hole in a piece of paper. You were using the same principle as a parabolic solar mirror which focuses the rays of the sun on one spot.

Dr. Charles G. Abbot of the Smithsonian Institution has done more work with solar mirrors than any other scientist. For years he has been working the kinks out of a solar-steam power plant. A mirror focuses the sunlight on a single point. Through this point circulates a liquid which is heated almost within a finger snap and passed on to a heat exchanger. Here the heat is transferred to water, producing steam which flows to a high-pressure boiler. The boiler operates a small generator to produce electricity. Doctor Abbot's power plant achieves the surprising efficiency of converting 15 percent of the intercepted solar energy to mechanical work and improvements promise to raise this to 20 percent. Doctor Abbot figures that a two to five-horsepower solar boiler of this type should produce electrical power at a cost of about one cent per kilowatt hour. Such a unit might prove feasible for a small home installation, but cost factors and the fact that the efficiency goes down as the size of the installation is increased make it unlikely that a big solar mirror will generate all the electricity for a city.

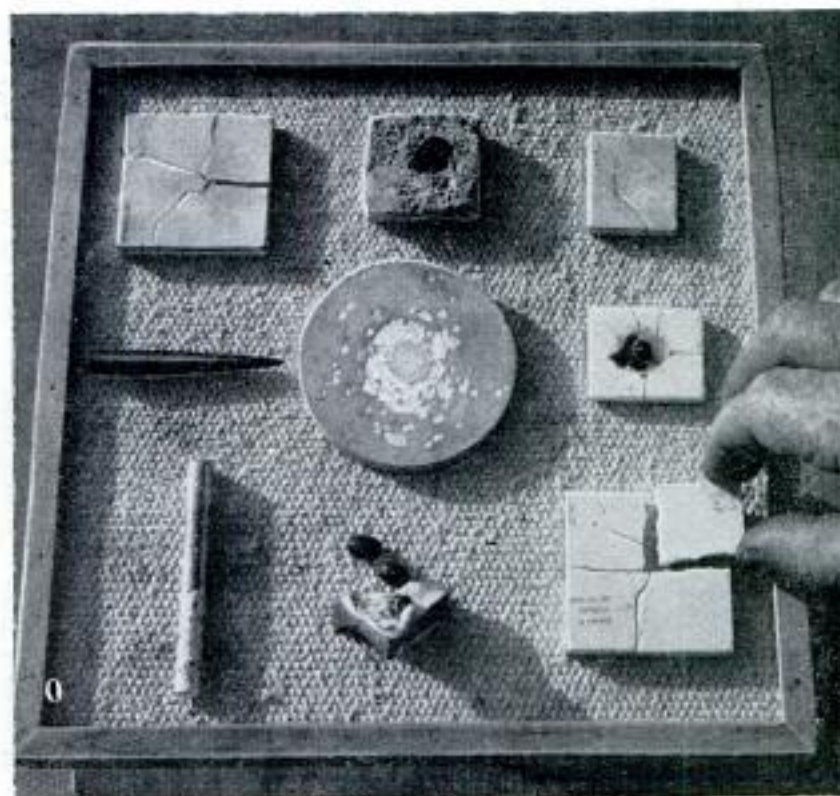
The largest solar furnace in this country is being used by Convair to study various metals and ceramic materials. Rays from the sun are collected by a 120-inch aluminum mirror and reflected to a dime-size focal point. The heat at this spot melts a steel bolt in seconds. When conditions are ideal, the furnace develops a temperature

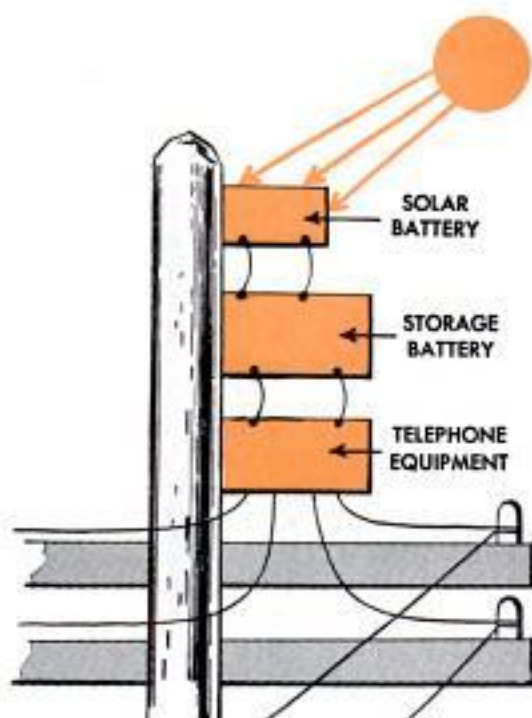
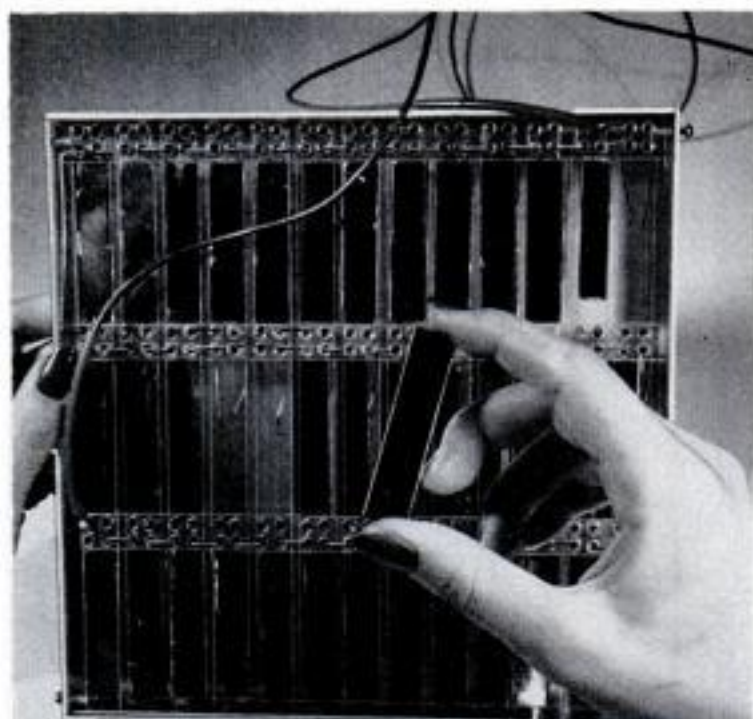


Smithsonian Institution photo

Doctor Abbot's solar-steam power plant uses a parabolic mirror. The little plant has the surprisingly high efficiency of 15 percent

Materials tested by the big solar furnace on the opposite page frequently crack or flake due to the thermal shock at the focal point





Bell Telephone Laboratories

Silicon strips about the size of razor blades are linked in series in the Bell solar battery. They convert sunlight directly into electricity. Battery may be used to power phone equipment through a storage battery

of 8500 degrees Fahrenheit. By comparison, the temperature produced by an oxyacetylene torch is around 5800 degrees.

Despite theoretical difficulties, Dr. J. Allen Hynek, an Ohio State University scientist, suggests that immediate and large-scale efforts be made to develop mirror systems for human needs.

"A black hemisphere, mounted on a tower and serving as an energy collector, could supply modest power needs at a relatively small cost," he says.

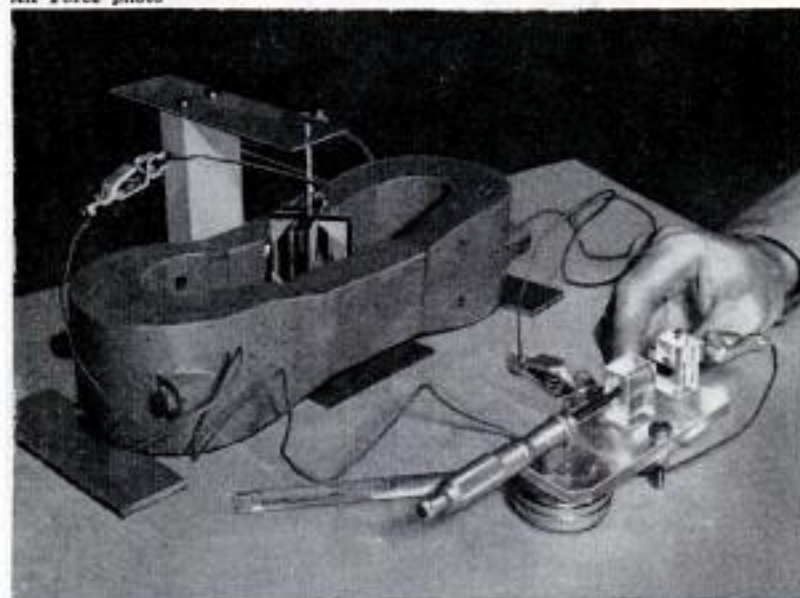
This hemisphere, he suggests, might look something like a water tower. Covering several acres around it would be an array of mirrors that would deflect the sun's rays

to the hemisphere. Sufficient heat would be developed inside the tank to convert water to steam, which then could supply an industrial plant with all its power needs. He also suggests that a much larger plant could be built in a valley. Ten-thousand mirrors, each a yard square, would be installed on the surrounding mountains. The mirrors would produce a 50-foot image of the sun a mile away, which would be focused on the 50-foot black sphere in which steam would be generated. This system theoretically would bring more than 100 gallons of water per minute to a boil. Its efficiency would be only 10 percent, but it could develop hundreds of thousands of horsepower for industrial purposes.

A smaller mirror system already seems practical for some purposes. One of the biggest problems of peoples in underdeveloped areas is the shortage of fuel for cooking. Vegetation is prematurely cut down for fuel in India and other countries, laying open the land to soil erosion. Millions of families in India and Egypt burn dried animal dung as fuel, depriving the land of natural fertilizer. Experts estimate that the use of animal fertilizer for cooking cuts the productivity of the land by nearly one half. One answer to this problem would be a stove that burned some other

(Continued to page 252)

In solar generator, small crystal between two Plexiglas posts catches sun's rays, produces electricity to run the motor at left
Air Force photo





Shadow in photograph at left, made with ordinary unit, is eliminated in right picture by Focalite flash

Lens-Mounted Flash Unit Eliminates Shadow From Photographs

Fitted around the lens frame, instead of being mounted on a separate bracket, a new photographic flash unit provides shadowless illumination. With ordinary

flash guns, the bulb is some distance from the lens and therefore casts a shadow. Focalite throws light along the same lines as those from the subject to the lens.

Inflated Protective Plastic Suit Shields Atomic Worker

Looking for all the world like an inflated robot, a British atomic-research worker poses in the latest thing in protective clothing. The protective suit is of plastic and completely sealed. To prevent contamination from radioactive dust or gases, it is filled with compressed air supplied through the hose entering the helmet at the throat.

Traffic Lights Change Color On Orders From Radio Station

Traffic lights in Greeley, Colo., turn red and green according to radio signals broadcast from police headquarters. Transcribed pulsations are fed into the transmitter by tape recorders and picked up by the receivers on the traffic lights. Decoding units and switches on the lights do the rest. Each intersection has a unit which automatically takes over control of the lights in case of radio failure. The system offers great flexibility in traffic control and can be installed for an estimated \$800 per intersection as compared with \$3500 for the conventional system.





Want Latin American drums? Bratman can find them on shop's shelves

Young lady vibrates string to produce a bear's growl in the drum



House of Noises

Pop goes the plunger and pop goes a champagne cork

Bells? Here's everything from sleigh to mission bells





Bratman, a former drummer himself, now has a collection of strange African and Latin American drums



Shop owner experiments with stack of bicycle bells. Below, rubbing blocks produces puffing locomotive

ON THE OFF CHANCE you ever need a pig's grunt, a Scotland Yard whistle or a lion's roar, you can find it in the New York shop of Carroll Bratman. He has all these and some 2000 other sounds in a collection of strange noises. Bratman, a former drummer, now provides exotic percussion instruments to orchestras, and everything from the roar of a jet plane to the wail of a baby for television and radio programs. If you want a fog horn or an ice-cream-cart bell, he'll provide the real thing, but if you want an owl's hoot he'll give you a whistle instead of an owl. Bratman feels that recordings don't sound like the real thing. ★ ★ ★



Whistles make animal sounds. Right, girl blows into fog horn



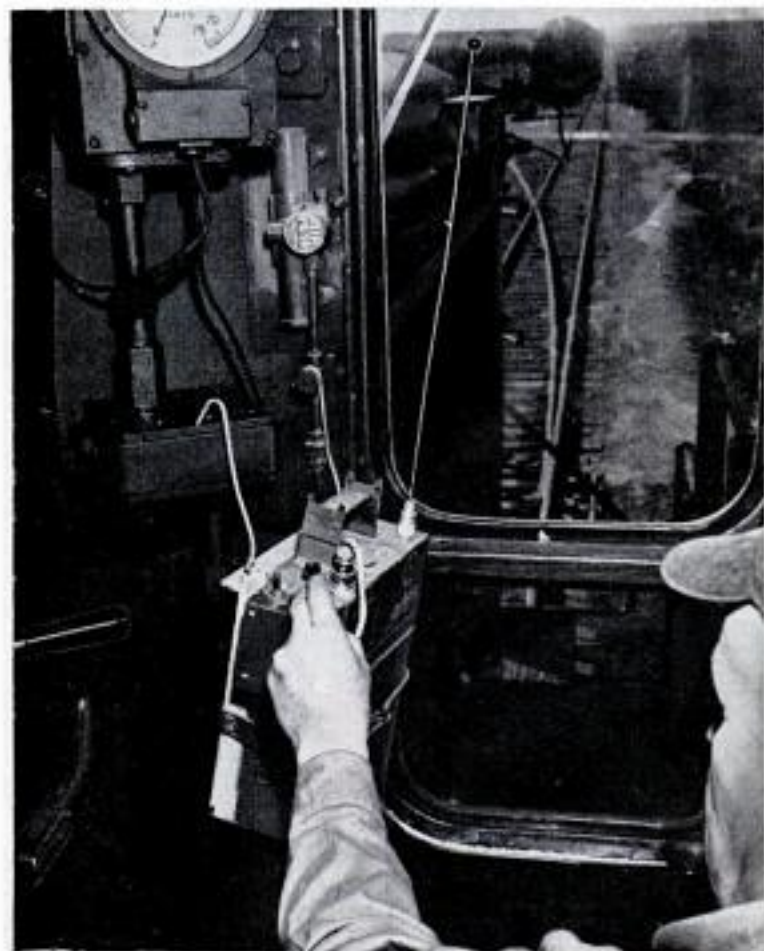


Inventor William A. Pruett demonstrates his kite yacht, which drops parachute or glider from kite altitude

Engineer Turns Inventor and Puts More Fun Into Kite Flying

Kites have been flown for thousands of years, and probably the third or fourth boy or man to fly one thought of sending "messages," perforated pieces of paper or leaves, up the string to the airborne kite. Now William A. Pruett, a Covina, Calif., refrigeration engineer and sideline inventor has come up with an improvement on the small boy's message. It is a "kite yacht," consisting of a mainsail like a kite itself

and a vertical pilot sail, all mounted on a stick that rides the kite string on pulleys. The advantage of Pruett's kite yacht is that a miniature parachute, glider or other object can be attached to it and released automatically to sail down or drop when the yacht reaches the kite itself. Upon release of the carried object, the yacht wings fold and it returns down the string for another run.



Operate Railroad Switches With Walkie-Talkies

Locomotive engineers now are using walkie-talkie radio transmitters to operate switches by remote control. The little transmitters are used in locomotives of the Santa Fe Railway. The transmitters have been modified by removing the microphone and replacing it with an oscillator which sends out two special tones. The engineer merely presses a red or green button. One of the tones then is broadcast to a receiver at the switch, which sets the switch as instructed.

New Transmission Has Fast Reverse

Capable of shifting from full speed forward to full speed reverse in $1\frac{1}{2}$ seconds, a new transmission for industrial machines has been developed by the American Gear and Manufacturing Co. It is a hydraulically controlled planetary compound unit.



Squeeze of Fingers Cleans Out Flexible Drain Made of Rubber

There's no need to call the plumber when the sink clogs up if it's equipped with a new rubber drain. All the housewife has to do is squeeze the flexible drain to force the particles down the drainpipe. The unit, developed in Austria, has only two parts which replace a dozen or more parts in the

conventional drain. The inner piece is a cone which forms an odor lock. The outer piece is the trap body, which can be fitted in place in less than five minutes without tools. The drain is unaffected by liquids at normal household temperatures, including lye and acids.



Heated Roller Irons Clothes

According to its German inventor, a new electric roller iron is easier to handle and as efficient as a standard iron. Exhibited at the Novelty and Inventions Fair in Nuremberg, it is not in production.

☐ Almost 13 civil aircraft a day are being built in the United States and more than 75,000 have been produced since World War II ended.

Elevator Tower For Movie Work

Stretching out to a height of 70 feet, a camera tower devised in Hollywood can be used for "up" or "down" shots. The six-ton tower is mounted on four wheels and is easily moved by truck or tractor. Its platform can accommodate both camera and sound men. The tower is designed particularly for outdoor shooting, as sound stages have numerous platforms on which cameras can be mounted for overhead shots.



The council rooms of the Pentagon can scarcely be more closely guarded than the styling studios of an automobile manufacturer. The fanfare that accompanies the first appearance of the gleaming new model in the show windows of dealers at year's end is preceded by more than two years of secret work by stylists and engineers, model sculptors and diemakers.

To bring you the story of a brand-new car, the 1955 Plymouth, from its very beginning to its assembly-line production, the Editors of *Popular Mechanics* have worked closely with the Chrysler Corporation for many months. We take you now behind the scenes for this story in diary form, accompanied by eight pages of color photographs made especially for *PM* readers. This feature begins our 48-page automobile section for 1955.

Diary of a New Car

By **ARTHUR R. RAILTON**
Automotive Editor

May 15, 1952

Chrysler Corporation executives meet to plan the 1955 models. They agree that the '55 cars must be all new, with all-new bodies and frames. Plymouth will have a new V8. Dimensions are tentatively set; all models must be longer and lower.

May 16, 1952

Styling director Virgil Exner briefs the heads of Plymouth, Dodge, DeSoto and Chrysler styling studios. He wants to see sketches of their ideas for 1955.

May 20, 1952

Studio heads bring in their sketches of suggested styles. Exner approves some, modifies others. The clay room is instructed to start working on $\frac{3}{8}$ -size clay models.

May 23, 1952

Full-size blackboard drawings are begun. These will prove out the proposed dimensions of the new bodies, making certain the lower lines still leave room for running gear and passengers.

May 29, 1952

Carpenter shop begins work on wooden skeleton that will support the full-size clay models.

June 6, 1952

Plymouth studio head, Henry King, asks chassis engineer to check full-size drawings to determine how much more the hood line can be lowered on the $\frac{3}{8}$ clay now being molded. Air cleaner keeps hood too

(Continued to page 137)

It starts as a sketch, an idea...

Styling begins on the drawing board. This painting was the start of the 1955 Plymouth ➤

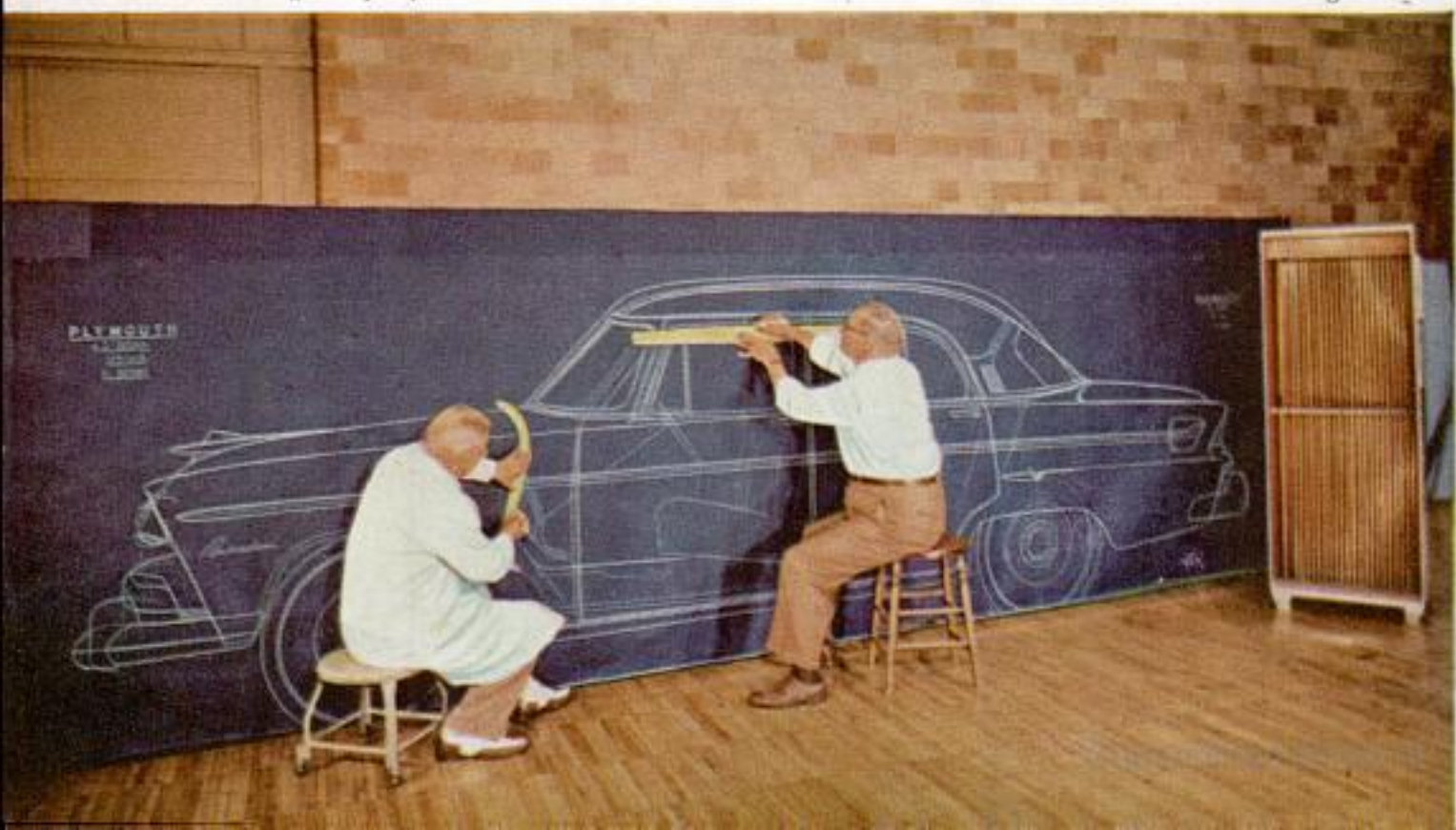


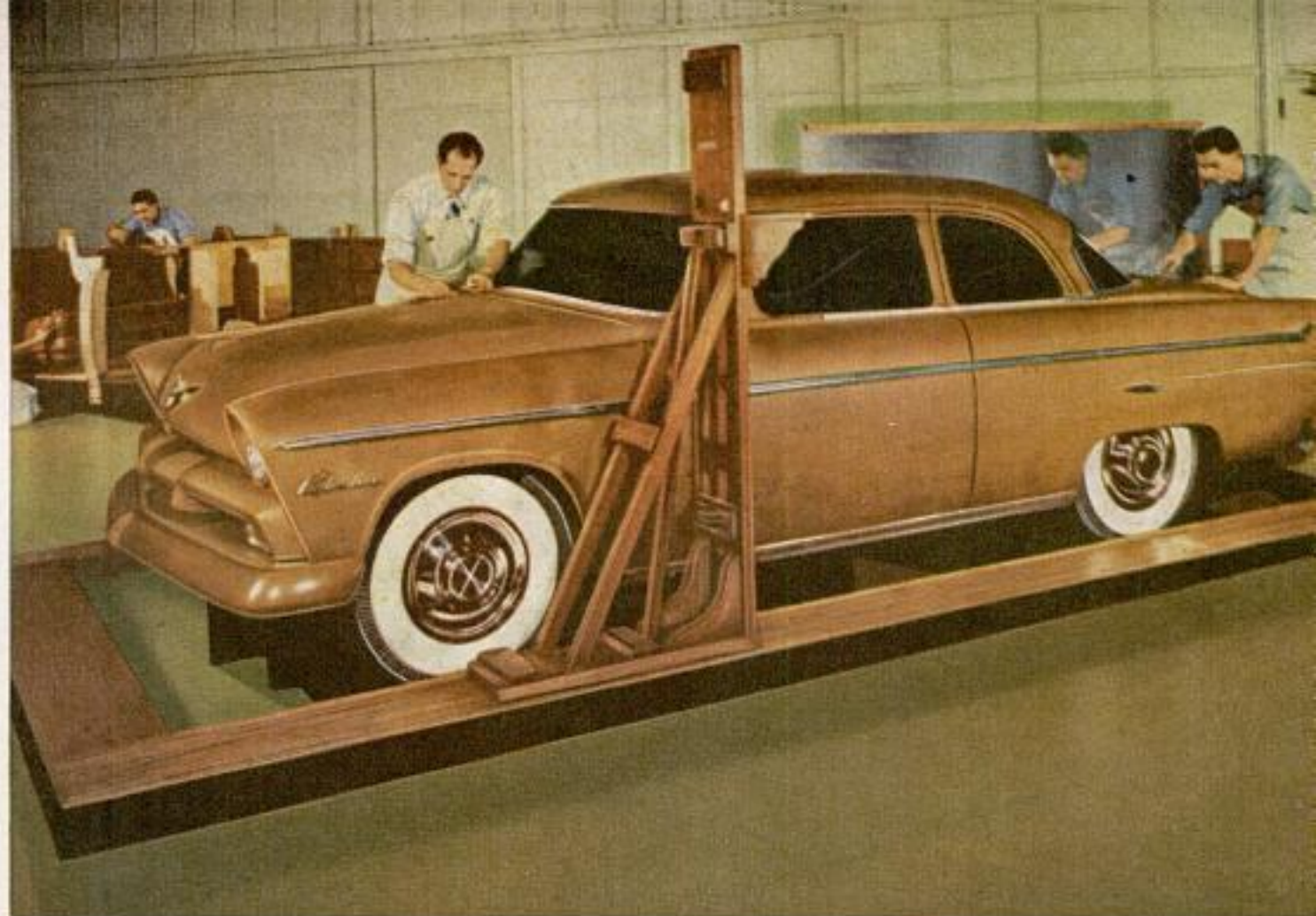


The first clay models are $\frac{3}{8}$ actual size. On them, basic flaws in proportion are spotted and corrected

... is worked in clay and on paper...

Scale drawings keep stylists in check—so the seats won't be too low or the hood too flat for an engine





Once $\frac{3}{8}$ -size clay is approved, designs are modeled in full-scale clays. Tin foil simulates chrome trim

... takes on a style, personality...

Full-size clay models, like this Dodge, weigh up to five tons. A wooden skeleton supports the weight

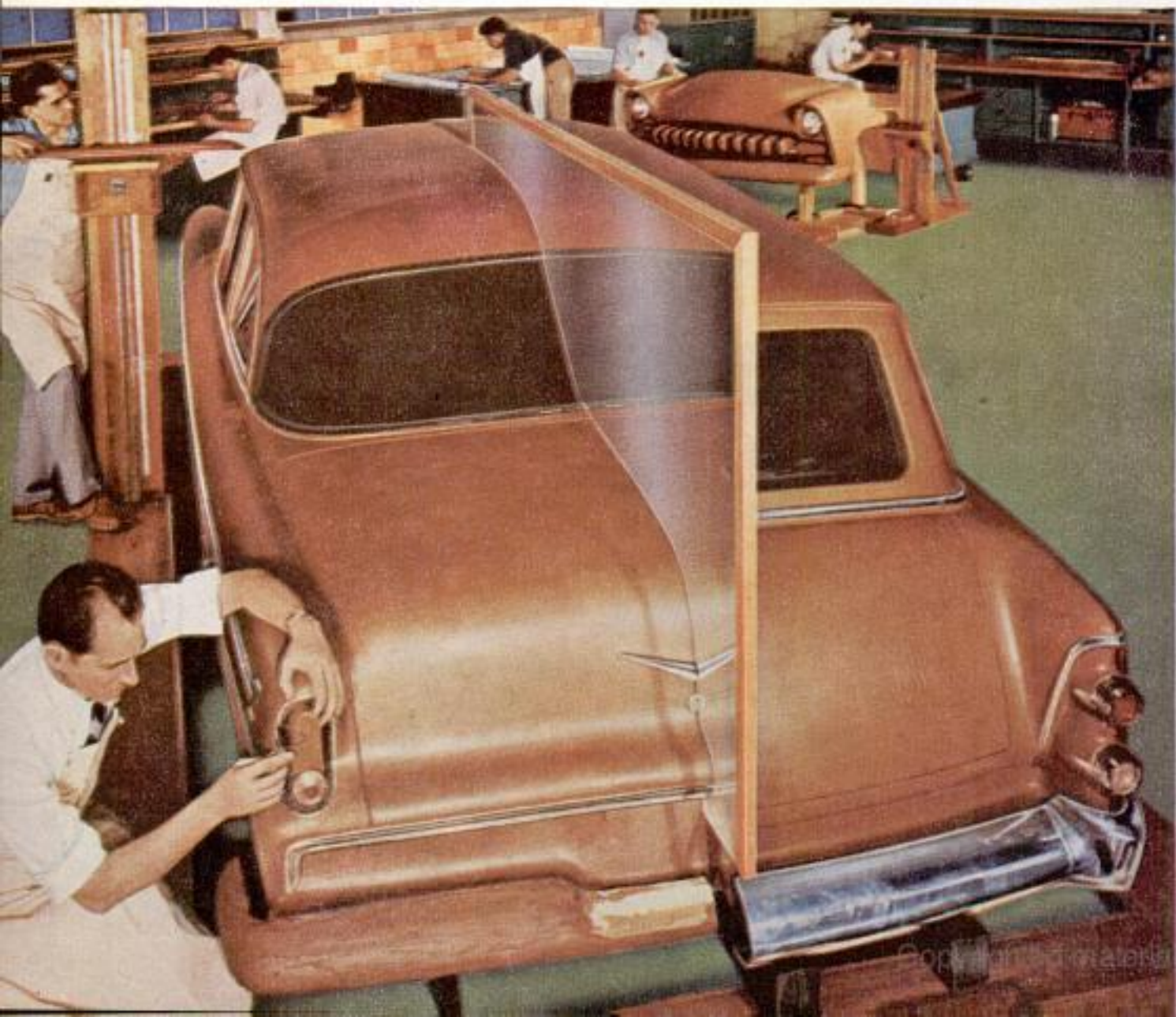




From many sketches, a taillight design is selected for Plymouth—it is the one on the brown background

... taillights are sketched, molded ...

By use of a mirror, two different bodies (right, station wagon; left, sedan) are formed on a single clay





Details chosen from precise artist's rendering are transferred in full size to a clay instrument panel

... dashboards, seats, the whole car, ...

Interior appointments are worked out in clay room. Half of each seat is in one style, half in another



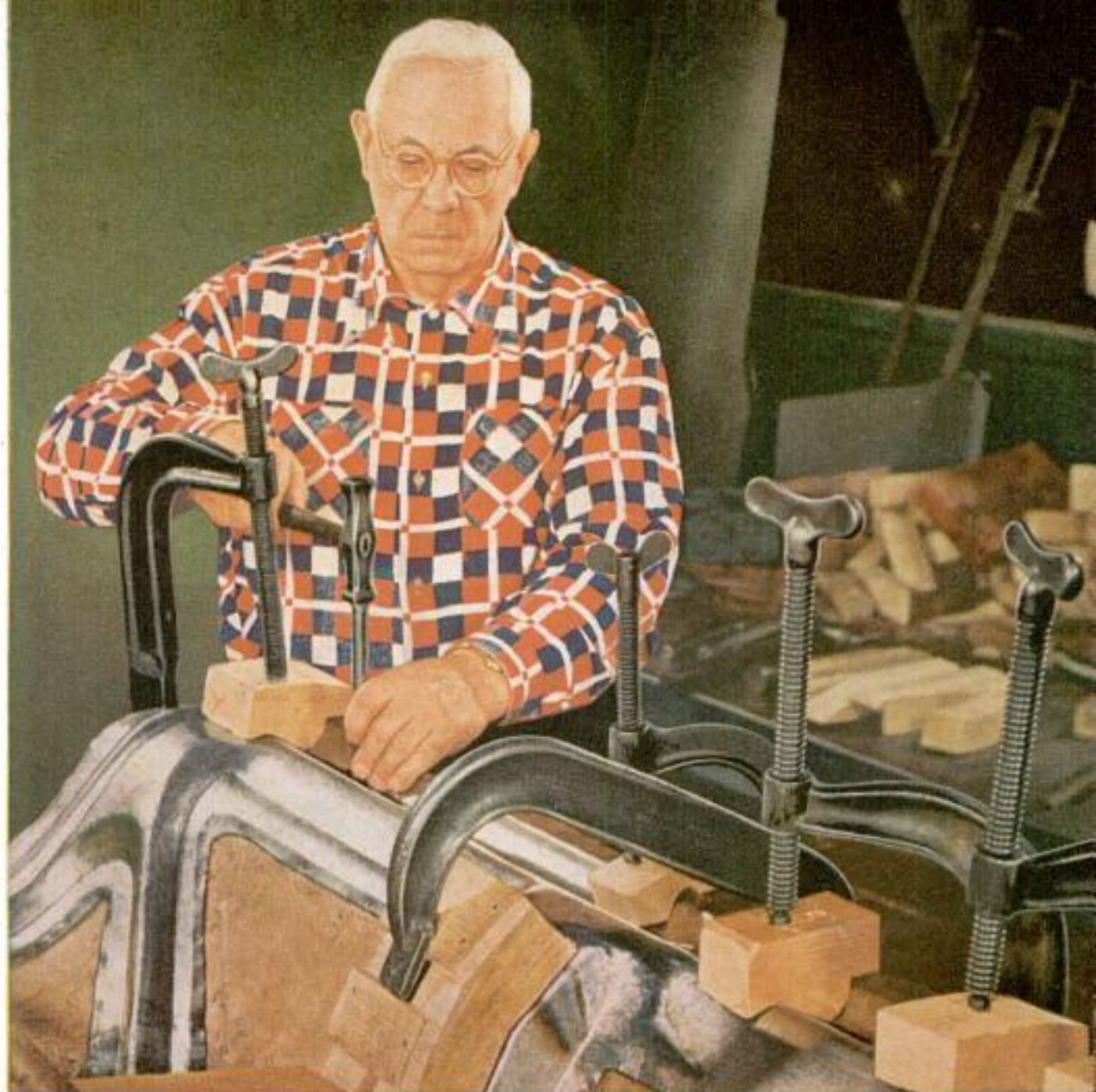


When the clay models have been okayed, plastic mockups are built. Until recently, these were wood

... body in plastic - a beautiful shell...

It looks real, but it is just the final plastic mockup. Full approval of the styling has now been given

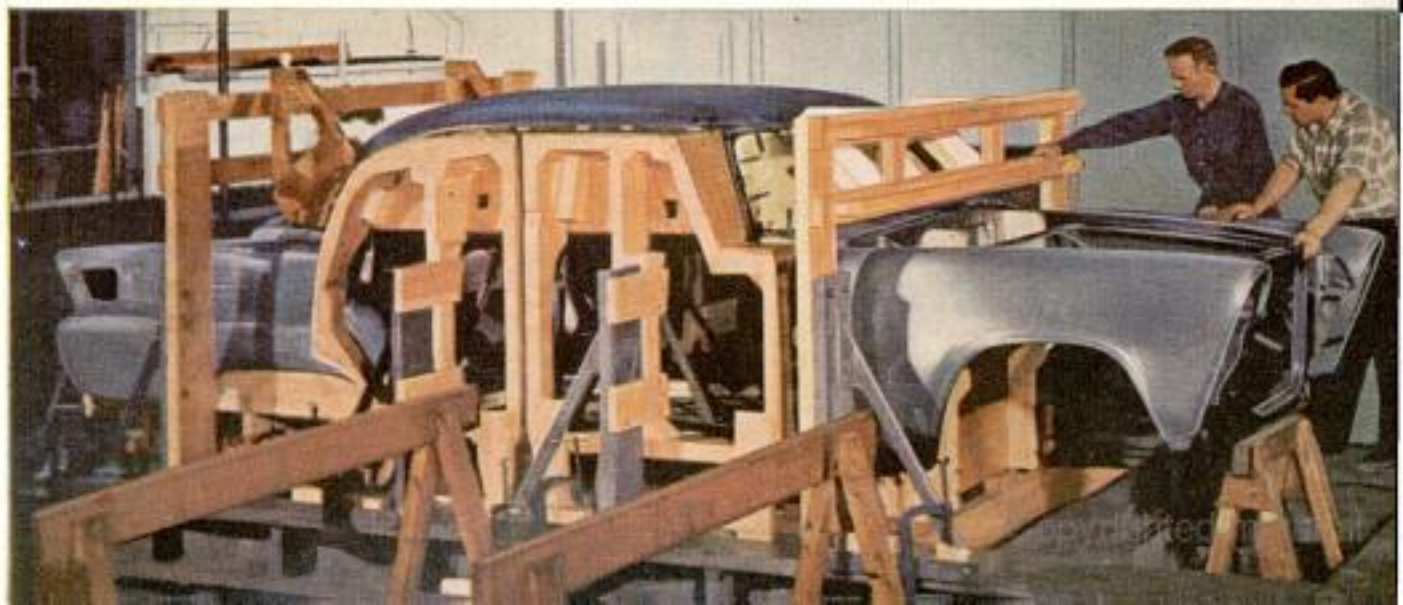




Hammer forms of hardwood are shaped and metal pounded around them, forming prototype parts

... sheet metal pounded and fitted ...

Prototypes take months to build. Handmade panels are laboriously fitted together, welded, painted





← While the prototype Plymouths are being produced, craftsmen are making die models of handsome mahogany from which production dies will be formed



With its V8 engine in place, prototype Plymouth is almost ready to be shipped to proving grounds

... Now complete - the car is born.

Stylist Exner steps out of a 1955 Plymouth. After months of work, it is now a reality



Diary of a New Car

(Continued from page 128)

high to suit the stylist. Engineers are asked to redesign it so hood line can be dropped.

June 10, 1952

Tin foil added to $\frac{3}{8}$ clay to simulate chrome trim. Exner says rear end sticks up too high. Clay is shaved off to lower it.

June 12, 1952

King suggests to Exner that the lowered hood line is now too low. It has a "down-cast" look, he says. Can it be raised slightly? Exner tells him to go ahead.

(NOTE: Designing in clay goes on continuously. Nothing is firm as of this moment. The stylists are striving for an okay on the major body surfaces so work can begin on roughing out the big body dies—a slow, time-consuming operation.)

June 16, 1952

Plymouth's $\frac{3}{8}$ clay models completed. Exner selects the two best designs and tells King to have them made in full-size clay, incorporating some changes suggested by Plymouth executives and other changes suggested by Exner.

June 23, 1952

Clay room reports wooden bucks for the full-size models are now covered with clay and are ready for shaping.

(NOTE: The buck is made of clear maple and is strong enough to support up to five tons of clay. This clay is modeled in an air-conditioned atmosphere. Summer temperatures would cause clay to sag.)

June 25, 1952

King gives Exner a selection of grille and taillight treatments. Exner chooses several to be modeled in clay. He asks for bolder, stronger shapes. "Heavy them up, they're too fragile looking."

June 30, 1952

Blackboard drawings are completed. Construction of seating buck begins based on these drawings.

(NOTE: The seating buck is an exact, full-size mockup of the interior. Designers can get in, sit down and sense exactly how the finished car will feel to driver and passengers.)

July 7, 1952

Tool engineers are consulted about the Plymouth rear-fender shape now on clay. They advise that the bend is too sharp. The

metal will probably tear or wrinkle in production stamping. That would mean an expensive metal-finishing job. Clay is worked down to soften the curve and eliminate this problem.

(NOTE: During the styling period, tool engineers are often called in to advise on such matters.)

July 11, 1952

Plymouth's top executive says more grille identification must be worked into the front end. The new car has to have some features to mark it as a Plymouth even though it is to be all new.

August 5, 1952

Exner selects two grille designs from among the clay models and tells King to work them into the four-door sedan now being clayed up. One is very simple; the other ornate. He suggests a different headlight treatment. Rear-deck line is now approved.

September 15, 1952

Seating buck completed. Body men feel that the forward overhang of the curved windshield is excessive. It gives a "basement window" feeling, they say. To correct it, the roof line is drawn back slightly. Seating position, pedal and steering-wheel locations are approved.

November 28, 1952

Full-size clay models completed for all divisions. Executives meet to okay them. Clays are moved out into the daylight. Current models (1953 cars) are driven alongside for comparison. Executives must decide: Are the 1955 designs hot enough? Will they look new two years from now when introduced? Imperial, Chrysler and DeSoto clays are approved with many minor changes. However, Dodge and Plymouth are rejected. Exner admits he is not satisfied with front-end sheet-metal design. He describes major changes he would like to make. Executives give him authority to go ahead.

December 1, 1952

Exner and King have worked all week end on new front-end sketches for Plymouth. Drastic changes are made in hood lines and fenders. No changes were necessary in major body panels.

(NOTE: There is no time for a $\frac{3}{8}$ clay. Work of remodeling full-size clay begins at once with styling changes being made right in the clay. Clay room works hours of overtime on the new front end and fenders.)

December 2, 1952

Work begins on the hammer forms for the major roof and body panels unaffected by front-end revisions.

(Continued to page 242)

Parade of 1955 Cars

By Leo Donovan, *PM's* Automotive Correspondent

IT WILL BE a long time before another year like 1955 hits the automobile industry. Let's see why.

These 1955 models boast of all-new bodies: Chevrolet, Ford, Plymouth, Pontiac, Dodge, DeSoto, Chrysler, Imperial, Mercury and Hudson. These models have new engines: Chevrolet, Plymouth, Pontiac, Dodge, Chrysler, Packard, Nash and Hudson.

Packard has a new torsion-bar suspension with an automatic load "levelizer" (see page 148 for details).

This is the year of the wrap-around windshield. It is the year of hooded headlights and reverse-slant taillights. It is the year that marked the end of the inner tube,

as tubeless tires became standard. It is the year of the four-door hardtop sedan (see photograph below).

In the industry, this may be the year known as 19V8 instead of 1955. The V8 engine has taken over, with every make except Kaiser and Willys offering the V-type engine.

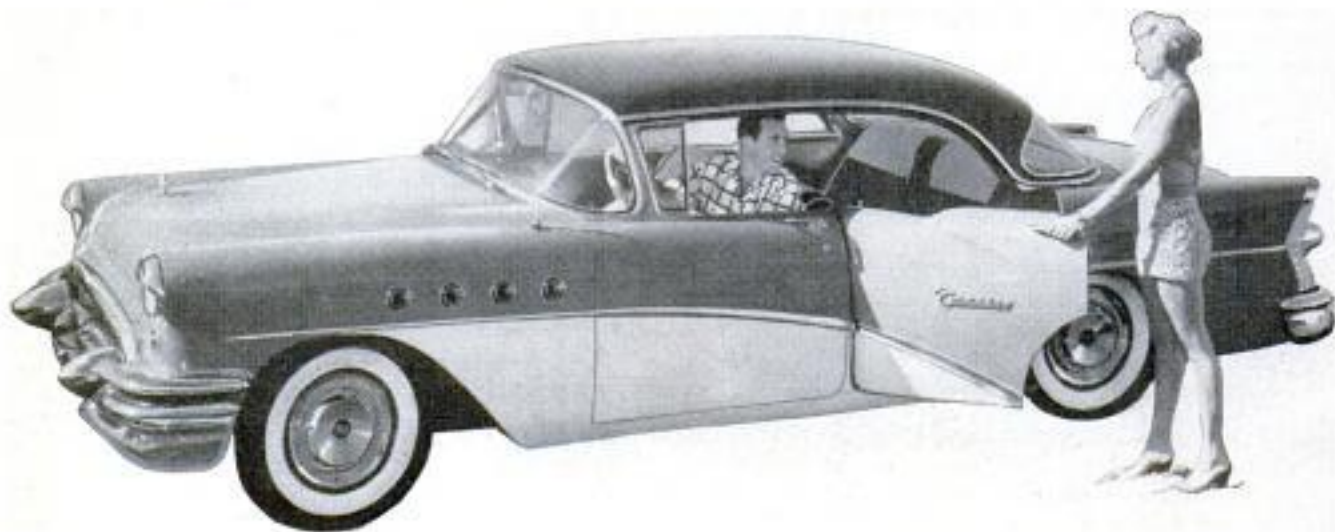
Almost without exception, the new cars have bounced horsepower upward sharply. Average horsepower for the industry this year is 181. Compare that with the 1951 average of 118—a jump of 63 horsepower in only four years.

It is literally the most colorful year in history. Colors once reserved for taxicabs
(Text continued to page 280)

Buick

Buick raised horsepower to 188 on the Special and 236 on all other models. A variable-pitch stator in the Dynaflo (see page 148) provides faster getaway

at wide-open throttle. It has announced a four-door sedan with hardtop styling (below). Body changes include a new mesh grille, straight-back rear fenders

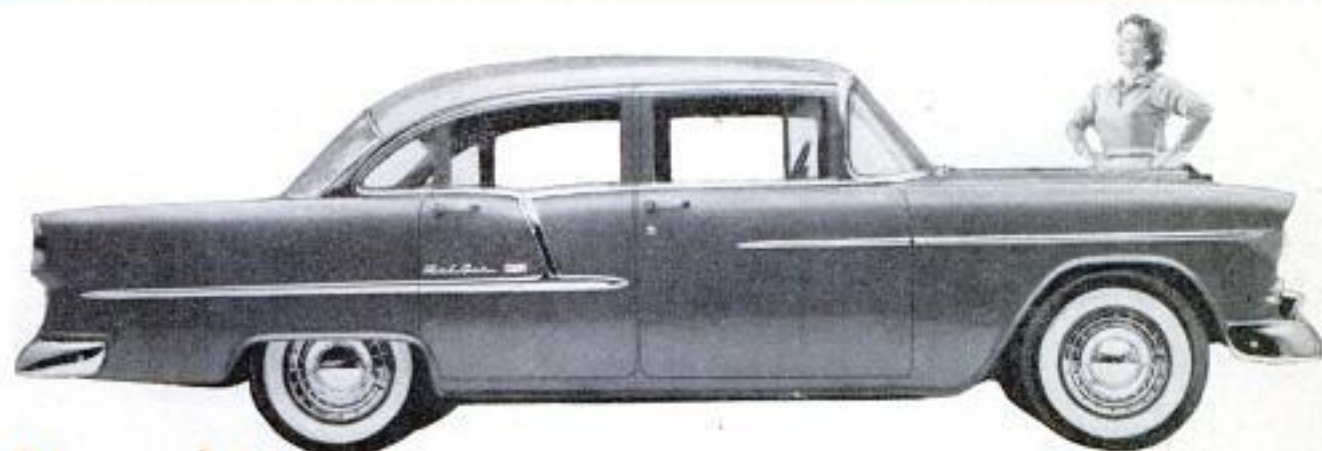




Cadillac

Cadillac also boosted horsepower. It is now 250 and the Eldorado sports convertible develops 270. The engine has a new carburetor, water pump and a more

rigid crankshaft. Hydra-Matic is improved. Tinted glass is now gray instead of green. The grille has been reworked a bit as has brightwork on the sides



Chevrolet

Chevrolet engineers have been busy. They cut weight of frame 18 percent yet it's 50 percent more rigid. New V8 engine weighs 30 pounds less than the six.

Front suspension reduces "nose diving" when you put on brakes. Body and frame are more integrated (page 149). Lower body looks longer—is actually shorter

Chrysler

Chrysler has a new body, featuring long, low lines, striking two-tone effects and prominent taillights. Mechanical changes are many: The Windsor's new V8

engine develops 188 horsepower on regular gasoline; the New Yorker V8 has 250 horsepower; rear springs are five inches farther apart, increasing stability





DeSoto

DeSoto is broad and low with a glued-to-the-road look. Front tread is almost four inches wider than 1954. Rear springs are five inches farther apart. The

V8 engine has hemispherical combustion chambers, uses regular-grade fuel. Four-barreled Fireflite has 200 horsepower; two-barreled Firedome has 185



Dodge

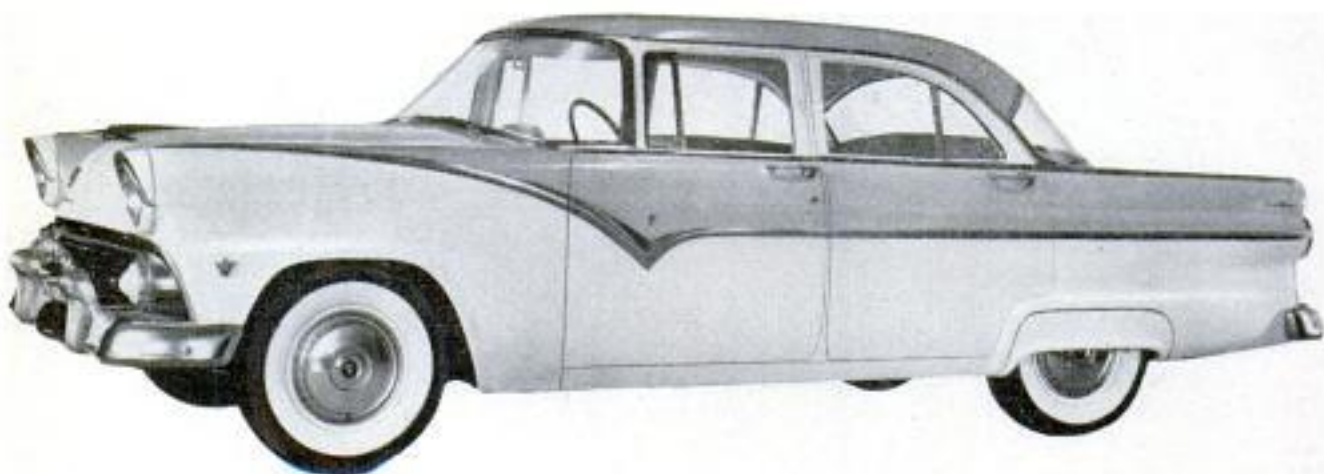
Dodge has horsepower variety this year. Take your choice of 123, 175, 183 and 193. As on all Chrysler Corporation models, the control lever of automatic

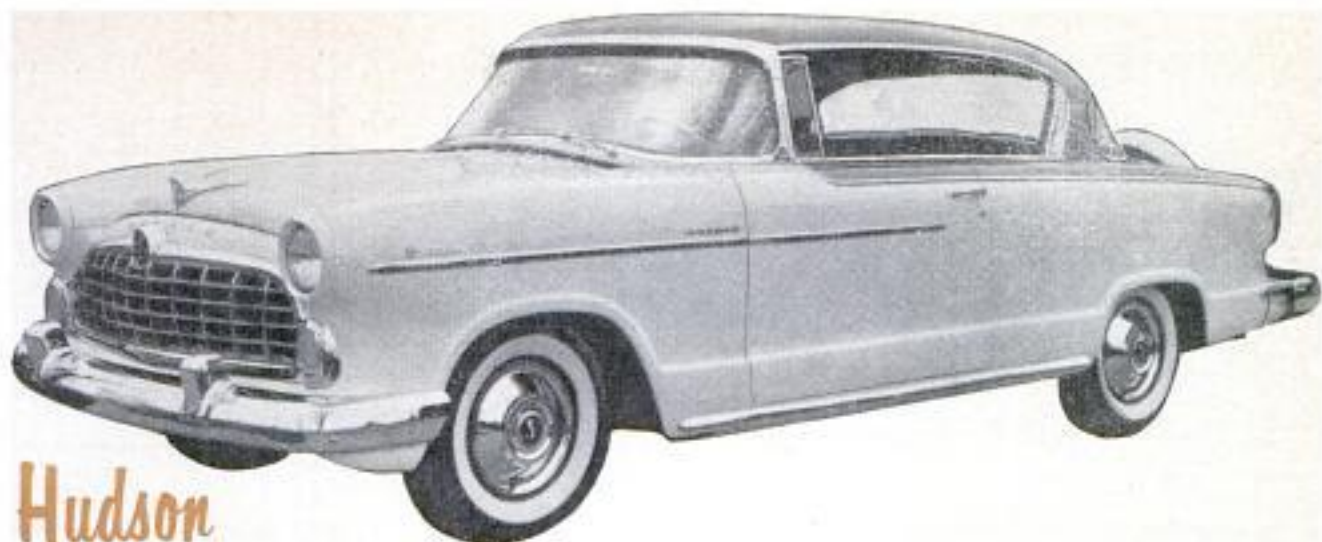
transmission is on the dashboard. The Lancer hardtop (above) features three-tone color combinations. Its style treatment emphasizes Dodge's long, taut look

Ford

Ford's top line, the Fairlane, has a curving chrome line (below) to set it apart from other Fords. The hardtop model is 2.4 inches lower than in 1954 and

has a chrome arch over its roof. All models have flatter hoods, longer rear decks. Hooded headlights, reverse-angle rear fenders make them appear longer





Hudson

Hudson, first all-new product of American Motors, offers three models for 1955: A Wasp 6, a Hornet 6 and a Hornet V8. Almost the only recognizable part

of the all-new styling is the Hudson insignia in the wide-mesh front grille. Along with Nash, it has the widest front seats in the industry (see page 168)



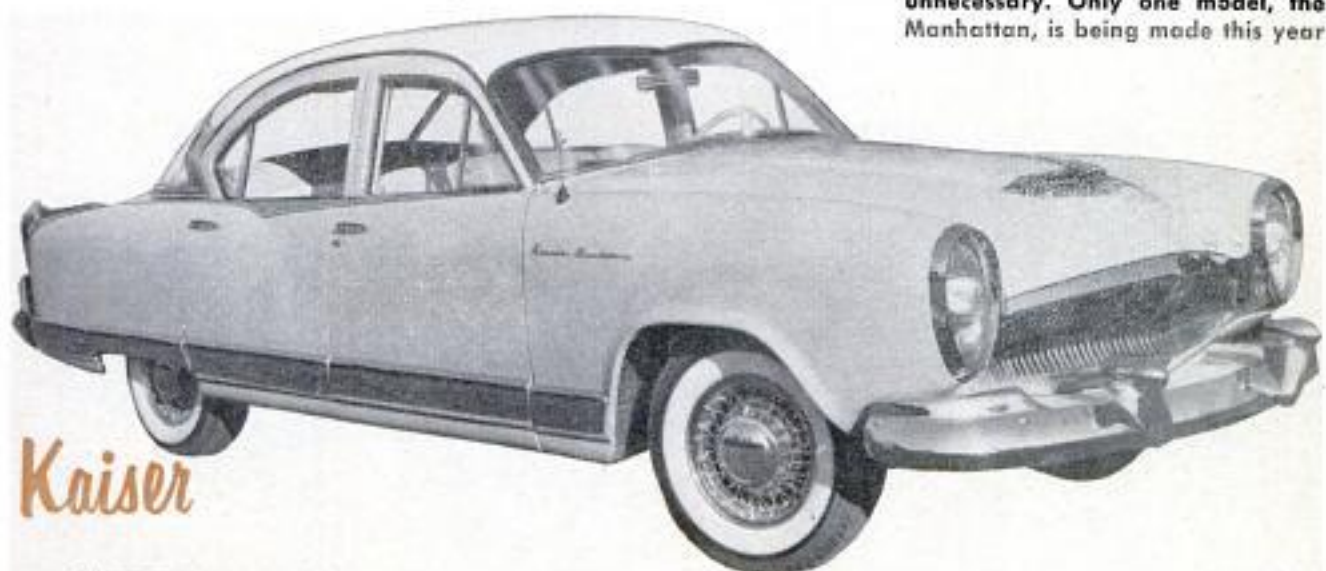
Imperial

Imperial is Chrysler's bid in the "ultra ultra" field. Entirely distinctive and built on its own assembly line, its styling is unlike that of other Chryslers.

Full-wheel cutouts in fenders provide a sporty look. Big taillights, mounted saucily atop rear fenders, quickly identify this prestige car from any angle

Kaiser for 1955 is only slightly changed after last year's restyling. Retained is the supercharger that

cuts in on demand to boost horsepower when needed, cuts out to save gasoline when the extra power is unnecessary. Only one model, the Manhattan, is being made this year



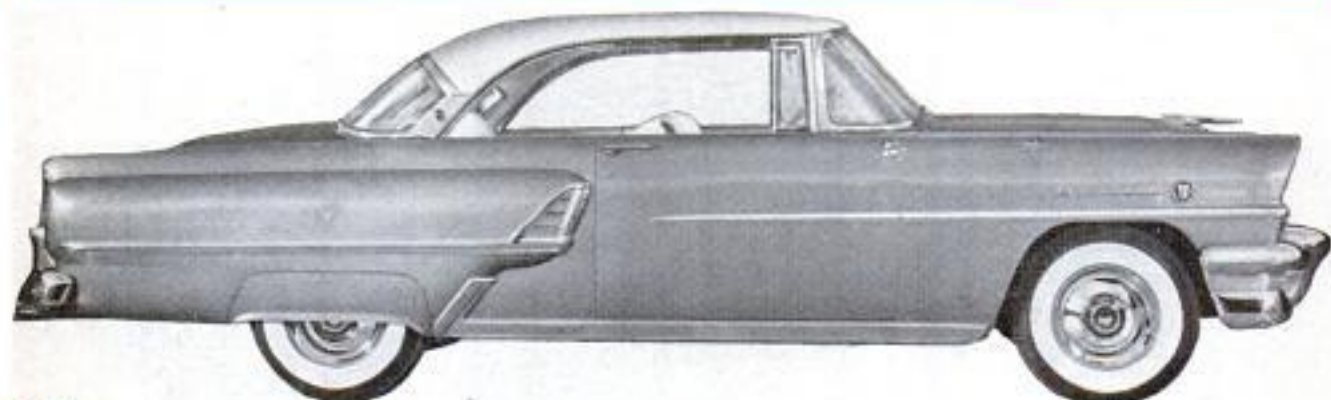
Kaiser



Lincoln

Lincoln's story is mostly mechanical as it offers greater displacement and power plus its own new automatic transmission that has a low-gear start at

wide-open throttle for faster getaway. Also new is a push-button lubrication system (see page 149). The front grille is restyled as are fenders, taillights



Mercury

Mercury has a longer wheelbase, a greater over-all length and more power than last year. The new body features canted headlights and bold character lines

in its rear fenders. The new top line, Montclair, is 2½ inches lower than 1954 Mercury and develops 198 horsepower. Other models have 188 horsepower

Nash has given its body styling a bold, new look with grille-mounted headlights, similar to those on the Nash-Healey sports car. The front fenders

sweep forward, their graceful curve unbroken except by small parking lights. Nash offers three models: the Statesman 6, Ambassador 6 and Ambassador V8



Nash



Oldsmobile

Oldsmobile, which began the trend toward striking color treatments last year, changed its two-toning

slightly. Its front grille has been restyled as have the taillights. Biggest news is the announced four-door hardtop sedan, out this spring. Power has been boosted by a high-lift camshaft, improved breathing



Packard

Packard came out with two major mechanical changes. It offers the industry's most powerful V8 and a new

torsion-bar suspension that has an automatic load levelizer (see page 148 for details). No matter how much weight is in the car, body height is constant. Bodies have new windshield, grille and rear fenders

Plymouth's 167-horsepower V8 engine has a new type of combustion chamber (page 149). Bodies are lower, wider and 10 inches longer than last year. Seats are

roomier: Front seat is 3.2 inches wider; rear seat is 5.9 inches wider. Reverse-angle fenders, both front and rear, make it look even longer than it is

Plymouth



Pontiac



Pontiac's bold grille makes it easy to identify on the highway. Behind the grille is a new V8 engine of 180 horsepower. The engine features a crankcase-ventilation system that forces harmful vapors out efficiently; a reverse-flow cooling system; full-pressure lubrication; ball-pivot valve rocker arms

Rambler



Rambler is now sold by both Nash and Hudson dealers. Biggest change for 1955 was the removal of the full skirts from the front wheels. This reduced the turn-circle diameter sharply. Now the Rambler is the most agile car in the industry. The front grille is also new

Studebaker

Studebaker has restyled its front end for 1955 and added considerable brightwork to emphasize its low

lines. It re-introduced the President with a new V8 engine of 175 horsepower. The Commander V8 has the industry's shortest stroke, an important factor in long engine life. Champion 6 now has 101 horsepower



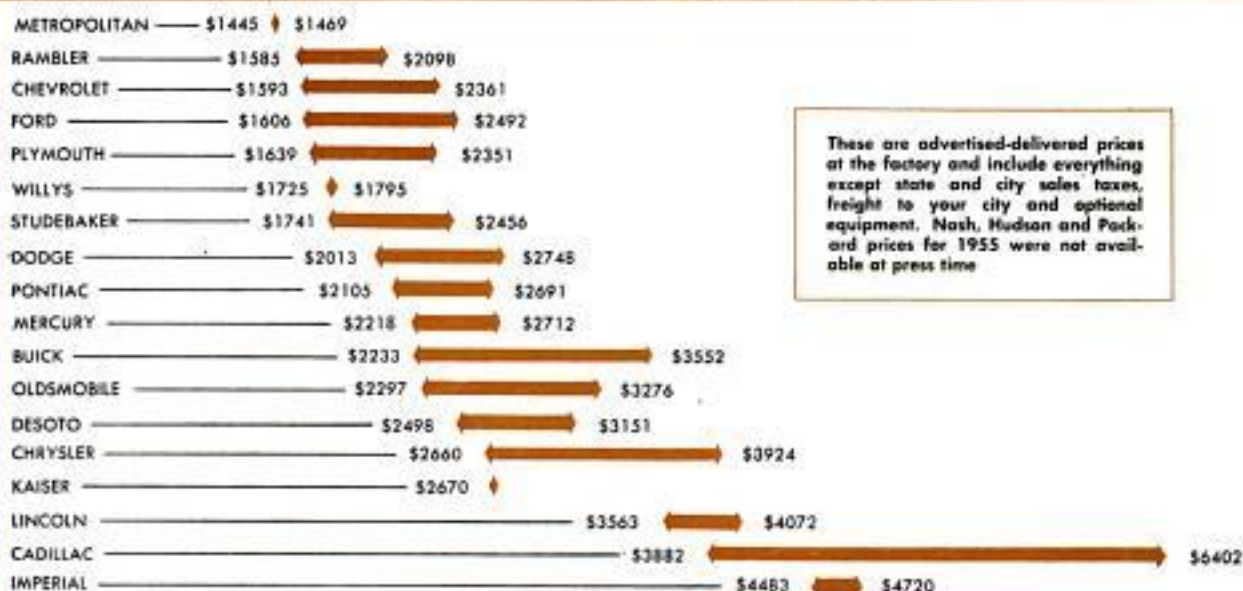
Willys



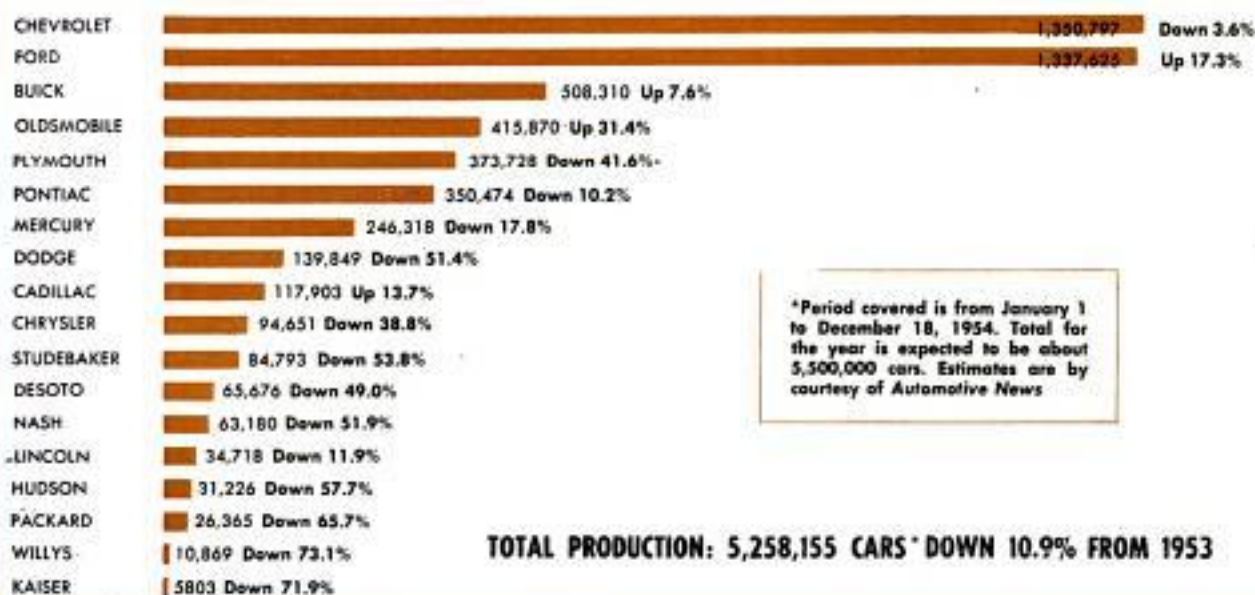
Willys has restyled the front grille and taillights on its 1955 models and cut prices to where its hard-

top (above) is the lowest-priced in the industry. Mechanically, the car is unchanged from last year

PRICE RANGES OF THE 1955 AUTOMOBILES



PRODUCTION OF AUTOMOBILES DURING 1954 BY MAKES



Specifications of the

	LOWEST PRICE 4-DOOR SEDAN	SHIPPING WEIGHT	WHEELBASE	OVER-ALL LENGTH	OVER-ALL WIDTH	OVER-ALL HEIGHT	OVER-ALL STEERING RATIO	TURN-CIRCLE DIAMETER	DISPLACEMENT	MAXIMUM HORSEPOWER	COMPRESSION RATIO	MAXIMUM TORQUE	BORE AND STROKE
METROPOLITAN Four	\$1445†	1875	85.0	149.5	61.5	54.5	21.0	36	73.2	42	7.2	62	2.58x3.50
RAMBLER Six	\$1695	2630	108.0	186.3	73.5	59.4	21.7	39	195.6	90	7.3	150	3.13x4.25
WILLYS Six	\$1725	2778	108.0	189.9	72.0	60.8	22.4	40	226.2	115	7.3	190	3.31x4.38
CHEVROLET Handshift Six	\$1728	3125	115.0	195.6	74.0	62.1	25.7	38	235.5	123	7.5	207	3.56x3.94
Powerglide Six	1906	3220	115.0	195.6	74.0	62.1	25.7	38	235.5	136	7.5	209	3.56x3.94
V8	1827	3095	115.0	195.6	74.0	62.1	25.7	38	265.0	162*	8.0	257	3.75x3.00
FORD Six	\$1753	3126	115.5	198.5	75.9	61.0	25.3	41	223.0	120	7.5	195	3.62x3.60
V8	1853	3236	115.5	198.5	75.9	61.0	25.3	41	272.0	162*	7.6	258	3.62x3.30
PLYMOUTH Six	\$1781	3129	115.0	203.8	74.6	60.1	N.A.	40	230.0	117	7.4	194	3.25x4.63
V8	1884	3246	115.0	203.8	74.6	60.1	N.A.	41	260.0	167*	7.6	231	3.56x3.25
STUDEBAKER Six	\$1783	2805	116.5	202.3	70.4	59.8	19.5	39	185.6	101	7.5	152	3.00x4.38
Commander V8	1919	3075	116.5	202.3	70.4	60.0	24.0	39	224.3	140	7.5	202	3.56x2.81
President V8	2311	3220	120.5	206.3	70.4	60.0	24.0	40	259.2	175	7.5	250	3.56x3.25
DODGE Coronet 6	\$2093	3295	120.0	212.1	74.5	60.3	N.A.	43	230.0	123	7.4	194	3.25x4.63
Coronet V8	2196	3395	120.0	212.1	74.5	60.6	N.A.	42	270.0	175*	7.6	240	3.63x3.26
Custom Royal V8	2473	3485	120.0	212.1	74.5	60.6	N.A.	42	270.0	183*	7.6	245	3.63x3.26
NASH Statesman 6	N.A.	N.A.	114.3	202.3	78.0	61.8	23.7	40	195.6	100*	7.5	155	3.13x4.25
Ambassador 6	N.A.	N.A.	121.3	209.3	78.0	62.3	25.5	42	252.6	130*	7.6	220	3.50x4.38
Ambassador V8	N.A.	N.A.	121.3	209.3	78.0	62.3	N.A.	N.A.	320.0	208	7.8	276	3.19x3.50
PONTIAC Chieftain V8	\$2164	3501	122.0	203.2	75.4	60.5	25.0	42	287.2	180	8.0	264	3.75x3.25
Star Chief V8	2362	3546	124.0	210.2	75.4	60.5	25.0	43	287.2	180	8.0	264	3.75x3.25
HUDSON Wasp 6	N.A.	N.A.	114.3	202.3	78.0	61.8	N.A.	38	202.0	104*	7.5	158	3.00x4.75
Hornet 6	N.A.	N.A.	121.3	209.3	78.0	62.3	N.A.	40Ⓟ	308.0	160*	7.5	264	3.81x4.50
Hornet V8	N.A.	N.A.	121.3	209.3	78.0	62.3	N.A.	40Ⓟ	320.0	208	7.8	276	3.19x3.50
MERCURY V8	\$2276	3450	119.0	205.5	76.4	61.2	25.4	42	292.0	188	7.6	274	3.75x3.30
Montclair V8	N.A.	3480Ⓟ	119.0	205.5	76.4	58.8	25.4	42	292.0	198	8.5	286	3.75x3.30

3.81

1955 Cars

	LOWEST PRICE 4-DOOR SEDAN	SHIPPING WEIGHT	WHEELBASE	OVER-ALL LENGTH	OVER-ALL WIDTH	OVER-ALL HEIGHT	OVER-ALL STEERING RATIO	TURN-CIRCLE DIAMETER	DISPLACEMENT	MAXIMUM HORSEPOWER	COMPRESSION RATIO	MAXIMUM TORQUE	BORE AND STROKE
BUICK													
Special V8	\$2291	3742	122.0	206.7	76.2	60.4	26.7	42	264.0	188	8.4	256	3.63x3.20
Century V8	2548	3807	122.0	206.7	76.2	60.6	26.7	42	322.0	236	9.0	330	4.00x3.20
Super V8	2876	4141	127.0	216.0	80.0	62.5	24.1†	43	322.0	236	9.0	330	4.00x3.20
Roadmaster V8	3349‡	4278	127.0	216.0	80.0	62.7	24.1†	43	322.0	236	9.0	330	4.00x3.20
OLDSMOBILE													
Eighty-Eight V8	\$2362	3711	122.0	203.4	77.8	60.5	27.5	42	324.3	185	8.5	320	3.88x3.44
Super 88 V8	2503	3762	122.0	203.4	77.8	60.5	27.5	42	324.3	202	8.5	332	3.88x3.44
Ninety-Eight V8	2833	3864	126.0	212.4	77.8	60.5	27.5	43	324.3	202	8.5	332	3.88x3.44
DESOTO													
Firedome V8	\$2498	3870	126.0	217.9	78.3	60.6	N.A.	44	291.0	185	7.5	245	3.72x3.34
Fireflite V8	2727	3940	126.0	217.9	78.3	60.6	N.A.	44	291.0	200	7.5	274	3.72x3.34
CHRYSLER													
Windsor V8	\$2660	3925	126.0	218.6	79.1	60.6	N.A.	44	301.0	188	8.0	275	3.63x3.63
New Yorker V8	3494‡	4160	126.0	218.8	79.1	60.9	N.A.	44	331.0	250	8.5	340	3.81x3.63
KAISER													
Manhattan 6	\$2670	3275Ⓞ	118.5	215.6	74.9	60.3	25.0	38	226.2	140	7.3	215	3.31x4.38
PACKARD													
Clipper V8	N.A.	3795	122.0	214.8	78.0	62.0	27.3	43	320.0	225	8.0	325	3.81x3.50
Clipper Custom V8	N.A.	3930	122.0	214.8	78.0	62.0	27.3	43	352.0	245	8.5	355	4.00x3.50
Patrician V8	N.A.	4355	127.0	217.4	78.0	62.3	30.9	45	352.0	260	8.5	355	4.00x3.50
LINCOLN													
V8	\$3563‡	4235	123.0	215.6	77.6	62.7	26.1	46	341.0	225	8.5	332	3.94x3.50
CADILLAC													
Series 62 V8	\$3977‡	4370	129.0	216.3	79.8	62.0	21.3‡	43	331.0	250	9.0	345	3.81x3.63
Series 60 V8	4728‡	4540	133.0	227.3	79.8	62.0	21.3‡	45	331.0	250	9.0	345	3.81x3.63
Series 75 V8	6187‡	5015	149.8	237.1	79.8	63.9	21.3‡	52	331.0	250	9.0	345	3.81x3.63
IMPERIAL													
V8	\$4483‡	4565	130.0	223.0	79.1	61.2	N.A.	45	331.0	250	8.5	340	3.81x3.63

NOTES AND EXPLANATIONS

All specifications, except the Metropolitan, are for four-door sedan models. All dimensions are in inches except turn-circle diameter (whole number of feet) and displacement (cubic inches). Torque is in pound feet. Prices include all charges except freight, state and local sales taxes and optional equipment.

† Two-door hardtop. No four-door model available.

Ⓞ Estimated

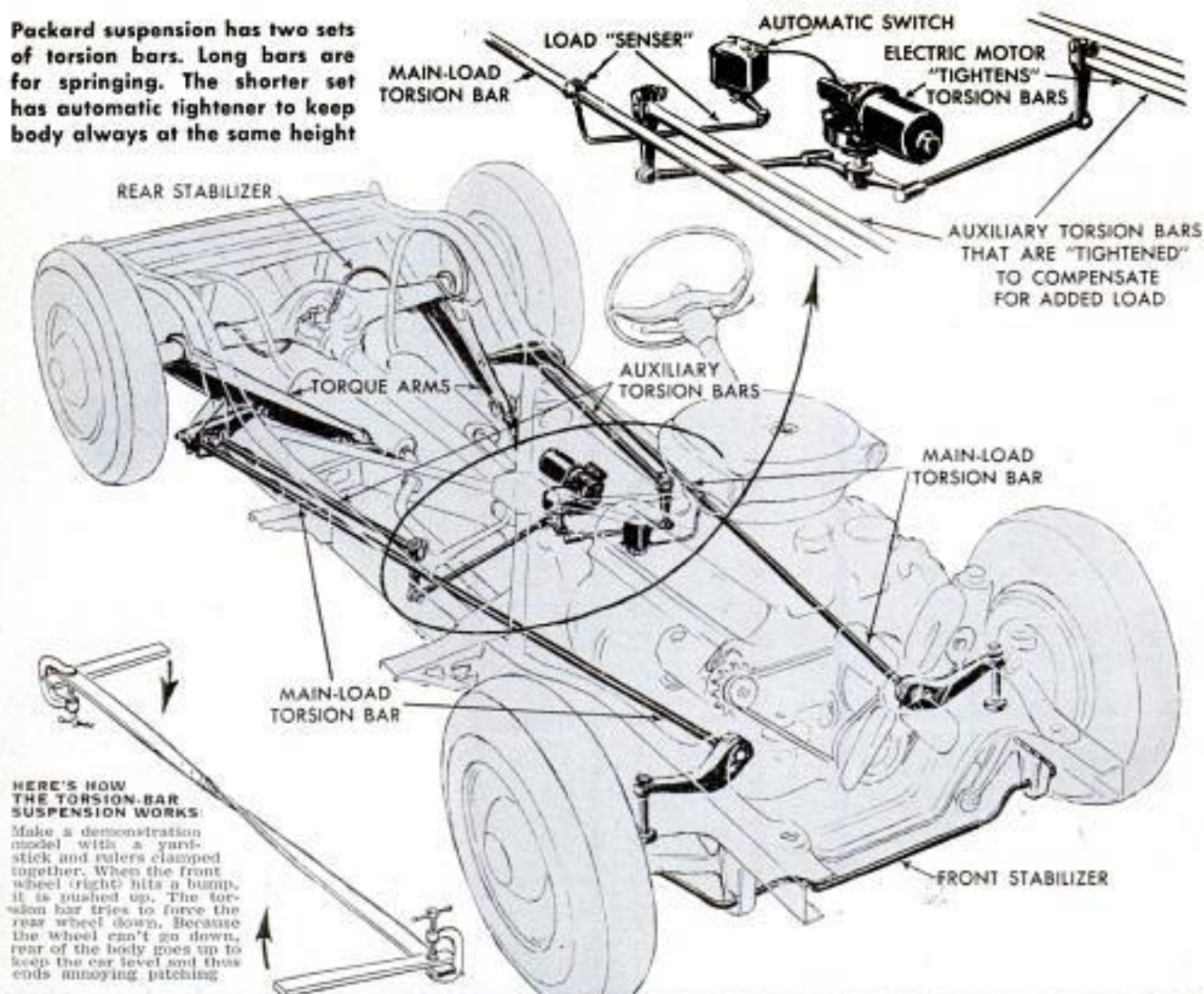
‡ Automatic transmission included in this price

‡ Power steering standard and included in price

* Power packs available: Chevrolet 180 hp.; Ford 182 hp.; Plymouth 177 hp.; Dodge 193 hp.; Nash Statesman 110 hp.; Nash Ambassador 140 hp.; Hudson Wasp 114 hp.; Hudson Homet Six 170 hp.

FOR INTERIOR DIMENSIONS SEE PAGE 168

Packard suspension has two sets of torsion bars. Long bars are for springing. The shorter set has automatic tightener to keep body always at the same height

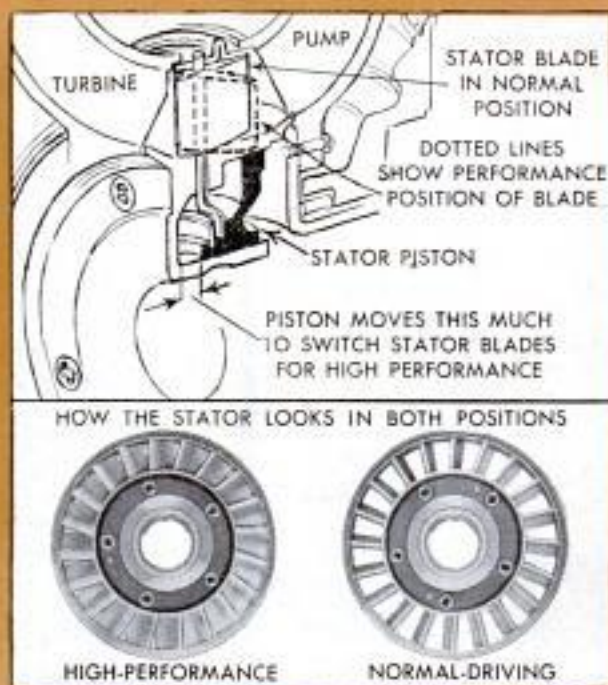
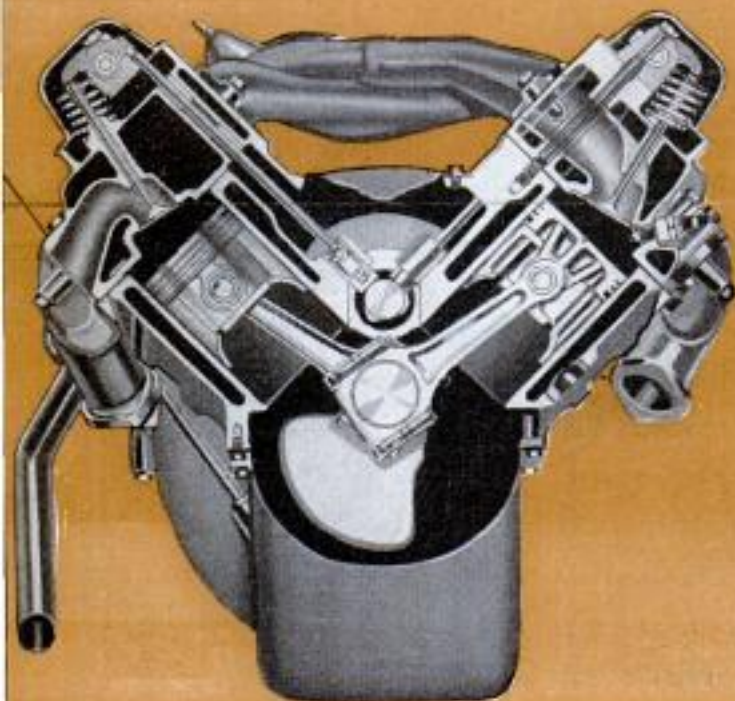


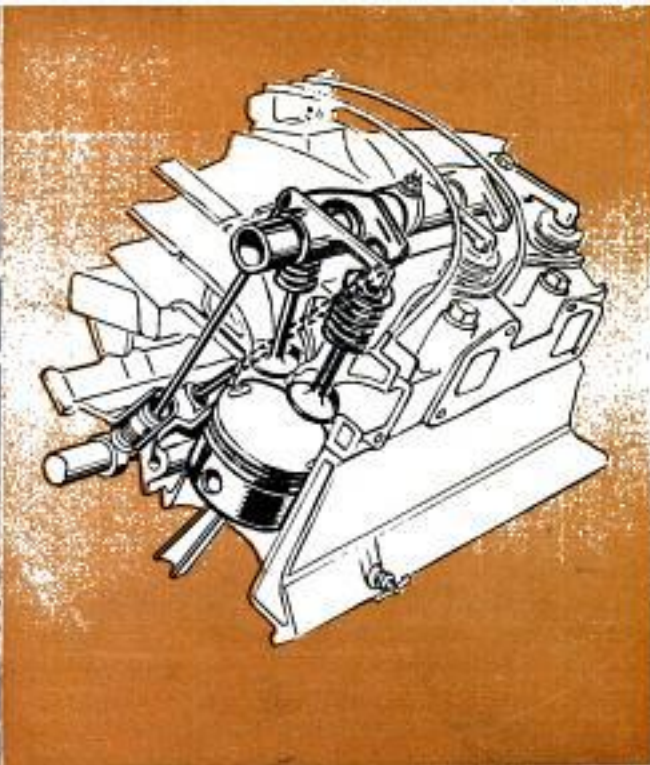
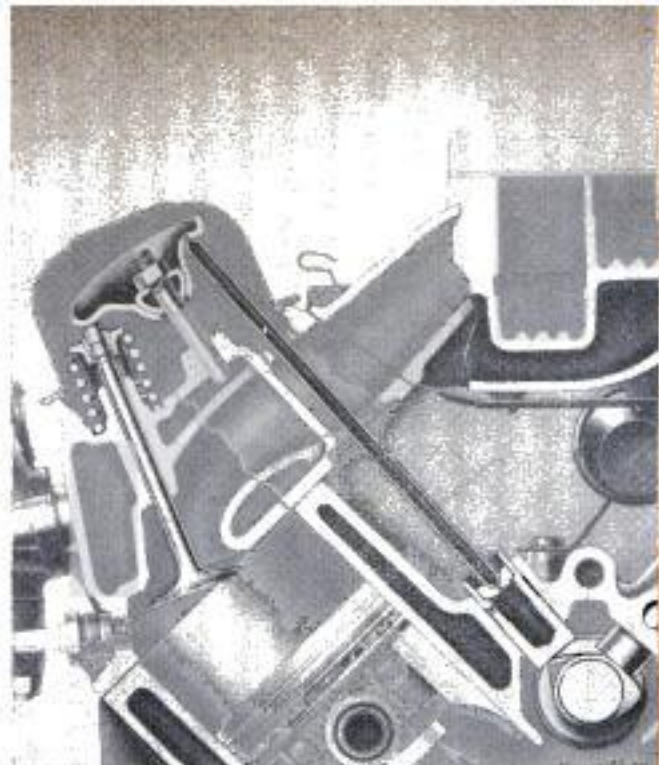
HERE'S HOW THE TORSION-BAR SUSPENSION WORKS
 Make a demonstration model with a yardstick and rulers clamped together. When the front wheel (right) hits a bump, it is pushed up. The torsion bar tries to force the rear wheel down. Because the wheel can't go down, rear of the body goes up to keep the car level and thus ends annoying pitching.

Some of the Year's High Lights

Biggest in the industry is Packard's V8 engine. It develops 260 horsepower, 355 foot-pounds of torque

Buick's Dynaflow gets more zoom by varying pitch on stator blades. Sketch shows how piston moves blades

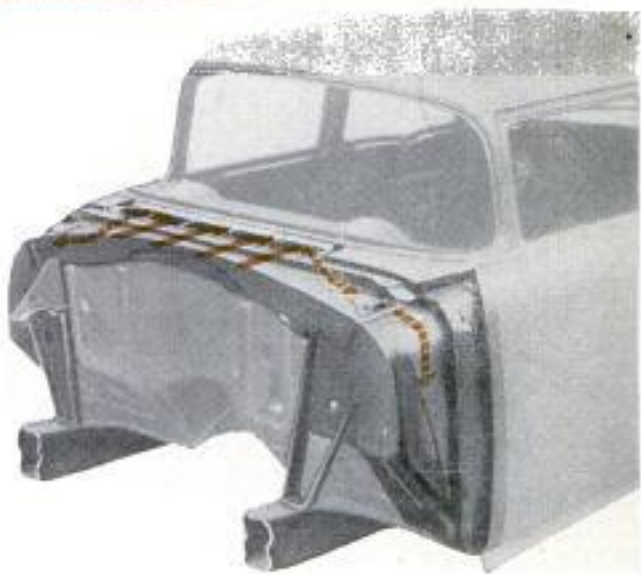




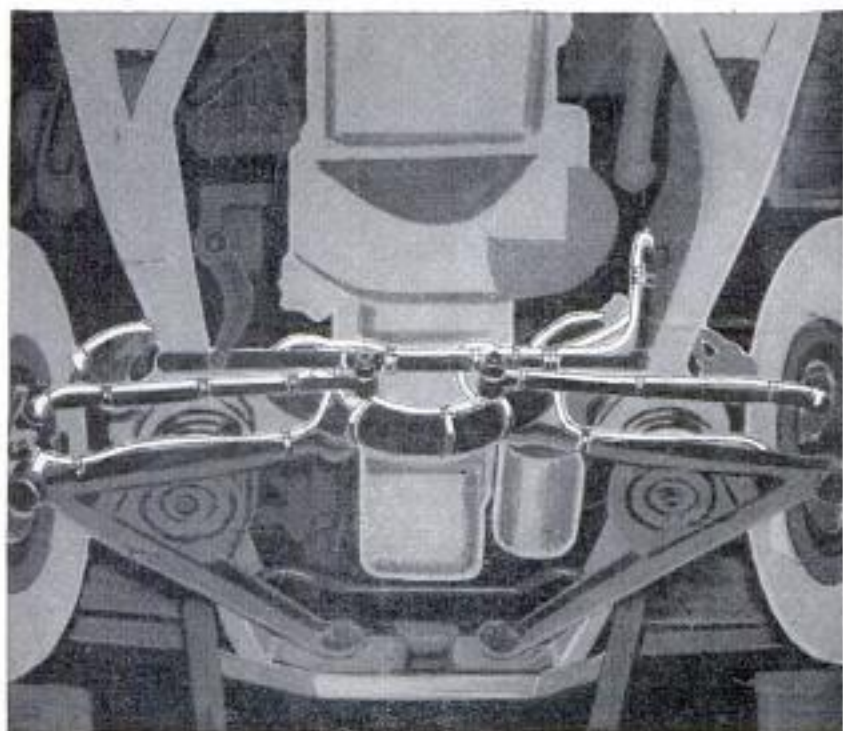
Above, Chevrolet came up with a new idea in valve-train design. Rocker arms are mounted on pedestals instead of pivoting on a shaft. This simplifies the design, helps make the V8 lighter than the old six

Top right, valve train on Plymouth V8 is new also. Note how dotted push rod cuts across under the shaft. This gives a modified hemispheric combustion chamber without requiring costly double rocker-arm shafts

Chevrolet's double-wall cowl assembly forms a strong structural arch as well as plenum chamber for heater (incoming air is shown by colored arrows). Arch provides solid foundation below wrap-around windshield



Below, Lincoln-Mercury offers a push-button lubrication system (extra cost). Plastic tubing (white lines on drawing) takes grease to 11 fittings each time you push button on dash. Once a year you fill reservoir





What Does It Cost to Own a Car?

Another Popular Mechanics Report by Owners from Coast to Coast

By Arthur R. Railton, Automotive Editor

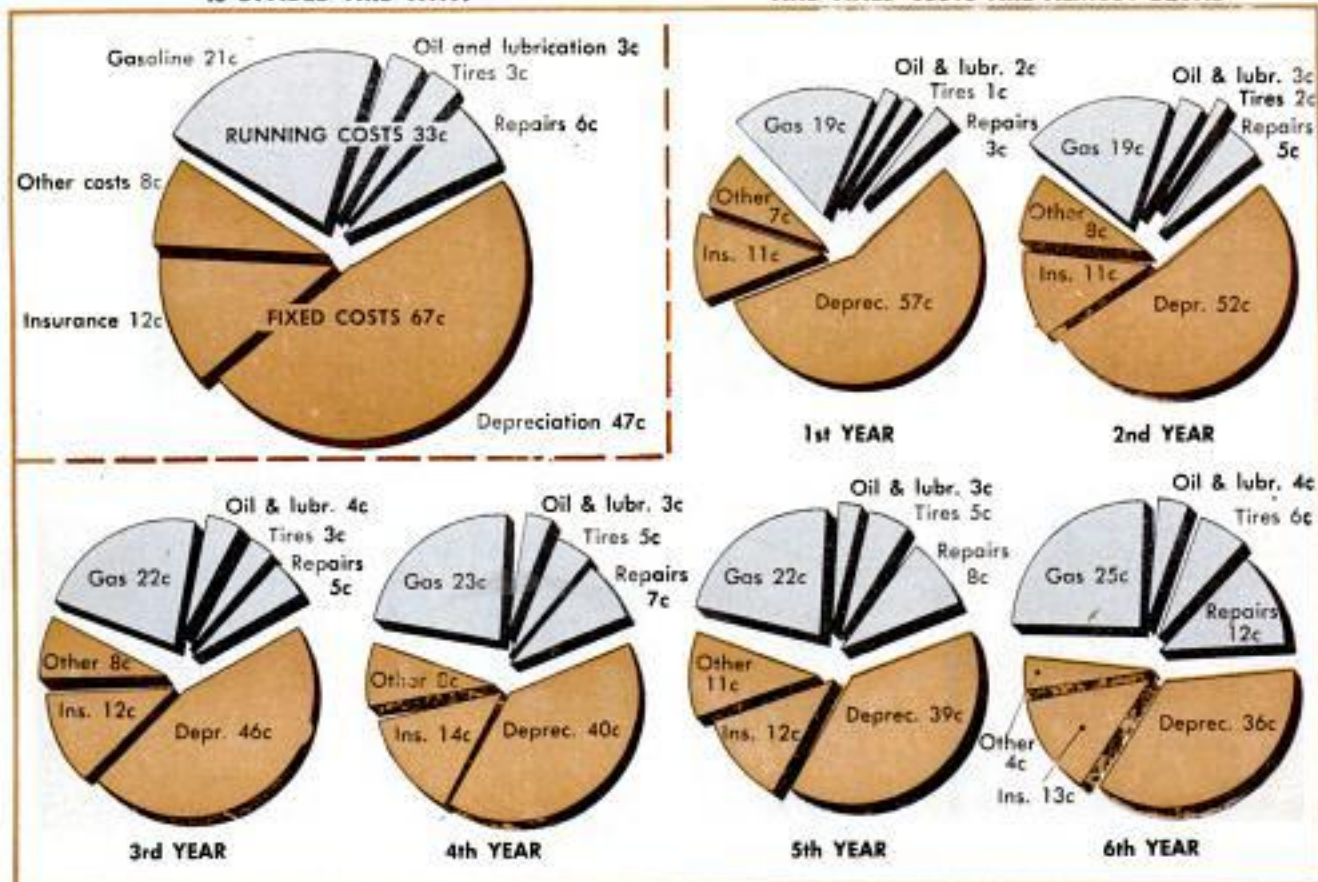
IF YOU KEEP wondering where your money goes every month, here's a suggestion: Look in your garage! The family buggy, new or old, costs an amazing amount of cash every year. The most recent PM Poll proves that!

We asked owners of all makes of automobiles (cars ranging in age from one to

six years) how much they had spent on their cars during the previous 12 months. The questionnaire mailed to these owners (selected at random by an independent organization) covered every possible expense except financing charges. Here, in summary, are the high lights of that nationwide survey.

EACH OF THE \$6130 THE AVERAGE OWNER SPENDS DURING HIS SIX-YEAR OWNERSHIP IS DIVIDED THIS WAY:

AT FIRST, MOST OF EACH DOLLAR GOES FOR FIXED COSTS, BUT BY THE 6th YEAR, RUNNING COSTS AND FIXED COSTS ARE ALMOST EQUAL



THE AVERAGE OWNER SPENDS A TOTAL OF \$6130 ON HIS CAR IF HE KEEPS IT 6 YEARS
(averaging 10,942 miles each year)



If you buy a car new and keep it for six years averaging 11,000 miles a year, you will spend \$20 a week for that privilege. At least, that's what the average owner in the survey spent—\$1055 a year. In six years that totals \$6130—two or three times the first cost of the car, in most cases.

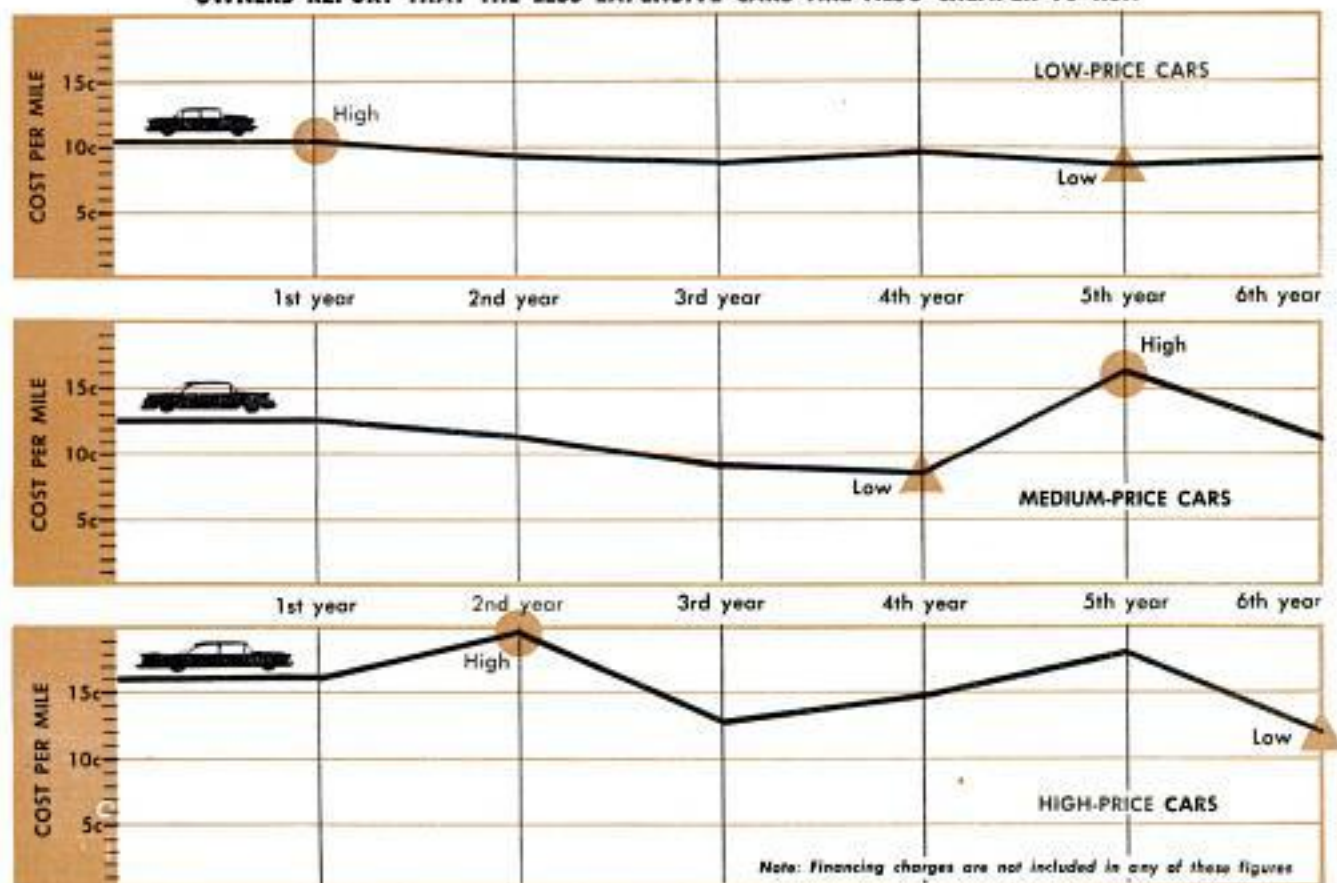
It cost the average owner 9.6 cents a mile over the six-year period for the convenience of riding in his own car. But, you say, that is only the average. What about the

HOW WERE COSTS COMPUTED?
Would you like to know how these costs were computed? *PM* will mail a copy of the questionnaire used by the owners in this survey to any reader sending in a self-addressed envelope.

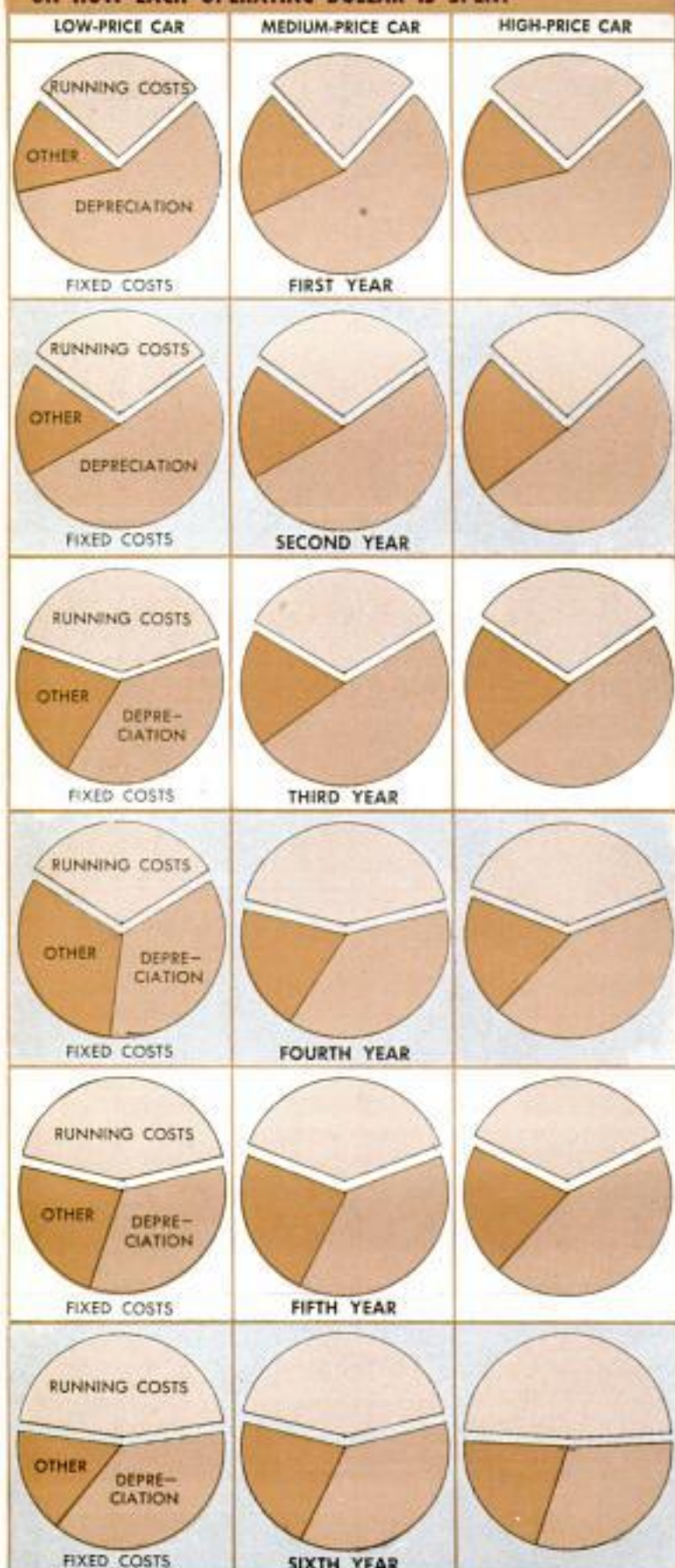
WALLET-SIZE SPECIFICATIONS
Available for 10 cents in coin is a table containing specifications of all the 1955 automobiles printed in wallet size for handy reference.

Address requests to Bureau of Information, *Popular Mechanics Magazine*, 200 East Ontario St., Chicago 11, Ill.

OWNERS REPORT THAT THE LESS EXPENSIVE CARS ARE ALSO CHEAPER TO RUN


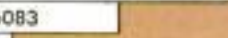



ORIGINAL PRICE OF THE CAR SEEMS TO HAVE LITTLE EFFECT ON HOW EACH OPERATING DOLLAR IS SPENT



BUT DRIVING A LOW-PRICE CAR DOES SAVE CONSIDERABLE MONEY, OWNERS REPORT

TOTAL EXPENSES OVER THE SIX-YEAR PERIOD

Average owner of high-price car spent \$7255	
Average owner of medium-price car spent \$6083	
Average owner of low-price car spent \$5019	

fellow who drives one of the low-price cars and gets pretty good gasoline mileage?

Well, right off, let's get this gasoline-mileage point cleared up. Out of the \$6130 the average owner in the survey spent in six years, the amount that went for gasoline was only 21 percent or \$1287—that's only one dollar out of every five spent on the car. It is about \$215 a year or just over \$4 a week.

If you discovered some miraculous way to double your gasoline economy—say from 14 to 28 miles per gallon (and let me know if you do)—you would end up saving \$2 a week. Your total weekly car cost would be \$18 instead of \$20. So you see gasoline costs are really only a small part of the total cost. An increase of 10 percent in gasoline mileage (from 14 to 15½ miles per gallon) would save you only 40 cents a week.

Or look at it this way: Suppose you are trying to decide on a new car and you have narrowed it down to two makes. One will get 20 miles per gallon, the other only 15. But the 15-mile-per-gallon car costs \$100 less to buy. If you decide on the 20-mile-per-gallon car for its operating economy, you will have to drive it 20,000 miles to get that \$100 back.

Of course, that's an oversimplification, because it is likely that the 20-mile-per-gallon car is lighter and would therefore cost less for tires, oil and other expenses. But it is a fact that gasoline costs are only a fraction of total costs and, in the average owner's mind, have been greatly exaggerated in their importance.

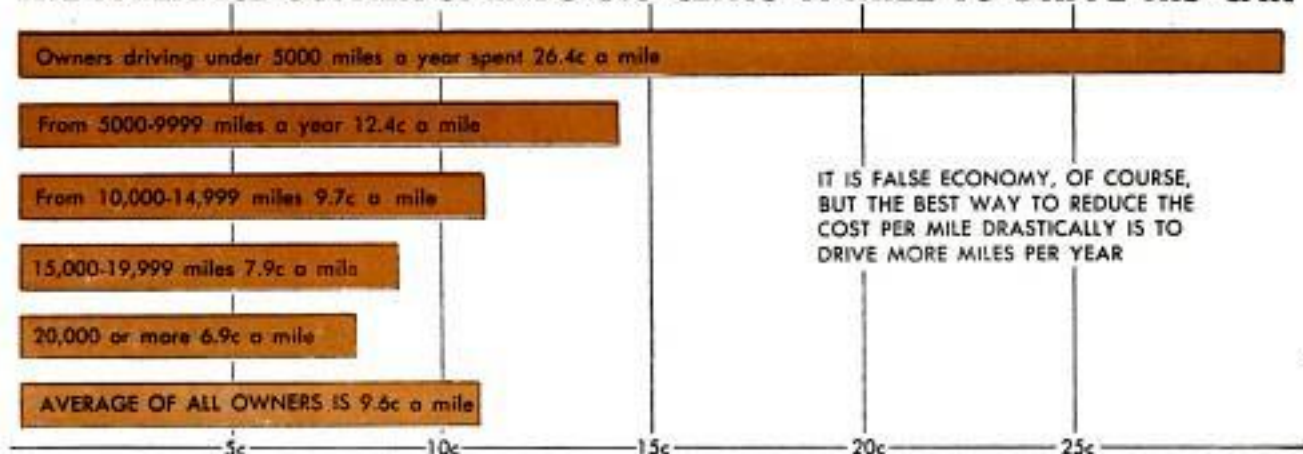
Does that mean we should all buy big cars? Isn't there any saving in the lighter, low-price cars?

Of course there is, but it is more than a gasoline saving. If fuel were the only saving, it would hardly be worth-while from an economy standpoint. Fortunately, all costs are less on a lower-price car—tires, repairs, taxes, depreciation, insurance—everything.

The owner of a low-price car spends an average of \$837 a year on his car; the owner of a medium-price car spends \$1014; the owner of the high-price car \$1209 a year.

So you see that the low-price car does save you money—almost \$400 a year over the high-price car and

THE AVERAGE OWNER SPENDS 9.6 CENTS A MILE TO DRIVE HIS CAR



nearly \$200 over the medium-price model.

Many owners refuse to believe that an annual cost of \$1055 is typical. After all, that's about as much as it costs per year to buy a house! They refuse to believe it, that is, until they start to add up the figures.

First, there are the fixed costs. These go on whether you drive 100 miles or 25,000 miles a year. And since these take the biggest chunk of your car's budget, there is little or no saving in not using your car regularly.

The first rule could be: If you own a car, use it!

Over the six-year period, these fixed costs ate up 67 cents out of every dollar the average owner spent. Since he spent \$6130, the fixed costs come to \$4107 or \$684 a year. That is \$13 a week, before you even take the car out of the garage.

Remember these are not wild guesses. These are actual costs as reported by owners.

The biggest fixed cost is the declining market value of the car—you call it depreciation. On the average, depreciation accounted for 47 cents in each dollar spent. It varies as the car gets older, starting out at 57 cents in the first year and dropping to 36 cents by the sixth year. But it is always the major cost of operation.

The second largest of the fixed costs is insurance (although some foolhardy owners in the survey reported that they didn't carry any). Insurance averaged 12 cents of each dollar.

Other fixed costs are taxes, licenses, parking fees, garage costs and so on. These add up to 8 cents on the dollar.

(Continued to page 298)

FOR EACH MILE HE DRIVES, THE OWNER SPENDS HIS PENNIES LIKE THIS:

Owners driving 1-4999 miles a year: Total 26.4c a mile

Running costs 8.2c a mile				Fixed costs 18.2c a mile		
Gas	Oil & lubr.	Tires	Repairs	Ins.	Others	Deprec.
4.0c	.8c	.8c	2.6c	3.7c	3.4c	12.1c

Owners driving 5000-9999 miles a year: Total 12.4c a mile

Running costs 3.7c a mile				Fixed costs 8.7c a mile		
Gas	Oil & lubr.	Tires	Repairs	Ins.	Others	Deprec.
2.2c	.4c	.4c	.7c	1.7c	1.0c	6.0c

Owners driving 10,000-14,999 miles a year: Total 9.7c a mile

Running costs 3.2c a mile				Fixed costs 6.5c a mile		
Gas	Oil & lubr.	Tires	Repairs	Ins.	Others	Deprec.
2.0c	.3c	.3c	.6c	1.1c	.6c	4.8c

Owners driving 15,000-19,999 miles a year: Total 7.9c a mile

Running costs 2.8c a mile				Fixed costs 5.1c a mile		
Gas	Oil & lubr.	Tires	Repairs	Ins.	Others	Deprec.
1.9c	.3c	.3c	.5c	.9c	.5c	3.7c

Owners driving 20,000 miles or more a year: Total 6.9c a mile

Running costs 2.9c a mile				Fixed costs 4.0c a mile		
Gas	Oil & lubr.	Tires	Repairs	Ins.	Others	Deprec.
1.9c	.3c	.3c	.4c	.6c	.5c	2.9c

Running costs 3.2c a mile				Fixed costs 6.4c a mile		
Gas	Oil & lubr.	Tires	Repairs	Ins.	Others	Deprec.
2.0c	.3c	.3c	.6c	1.2c	.7c	4.5c

AVERAGE OF ALL OWNERS:
Total 9.6c a mile

The Changing Automobile

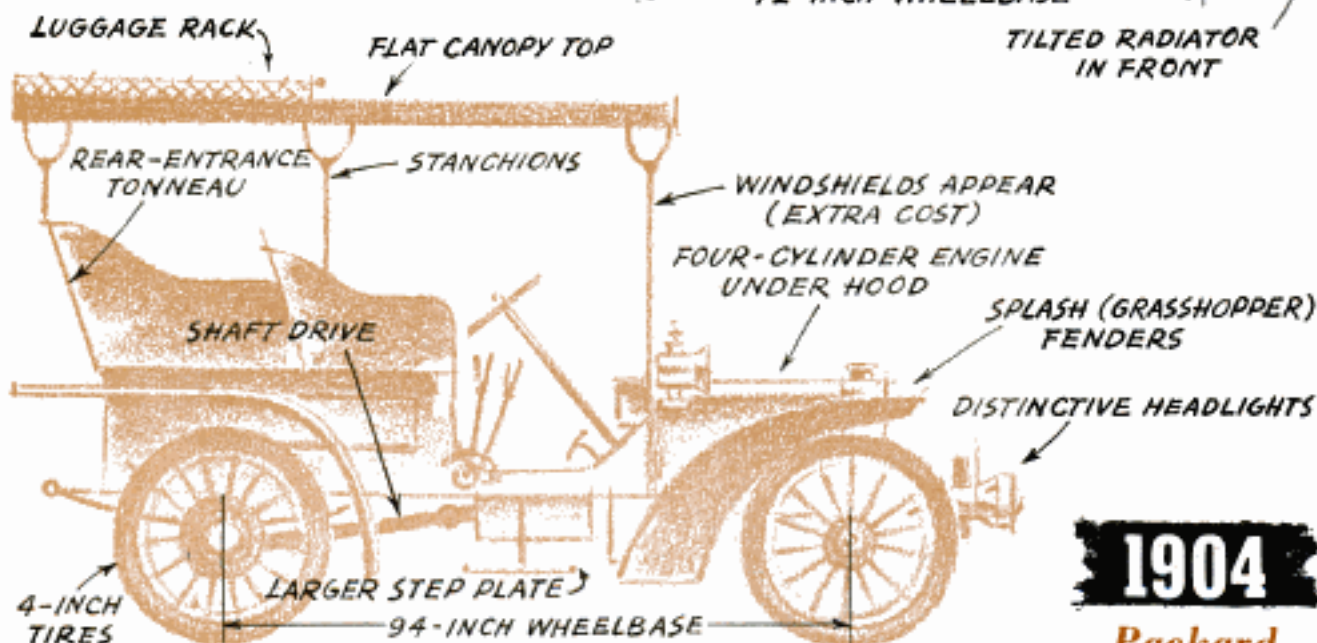
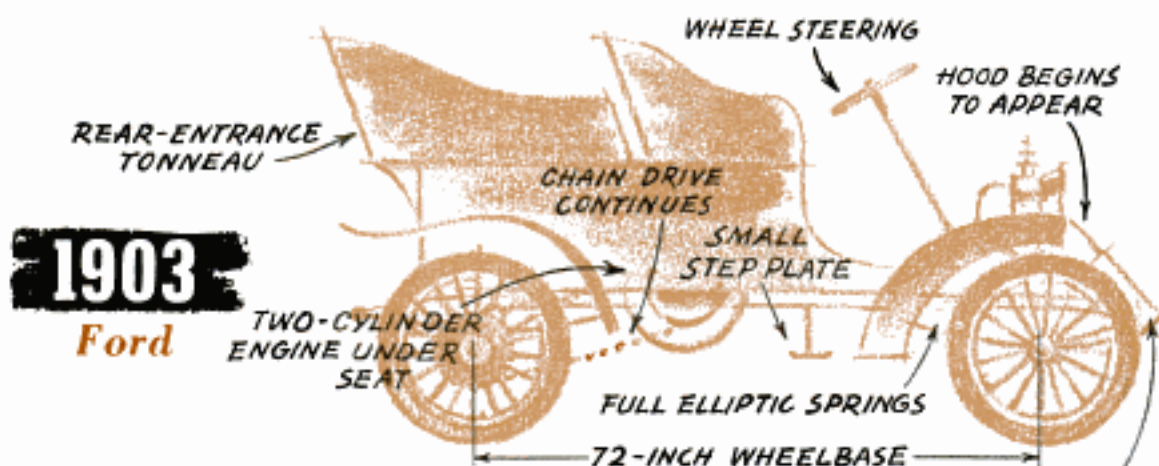
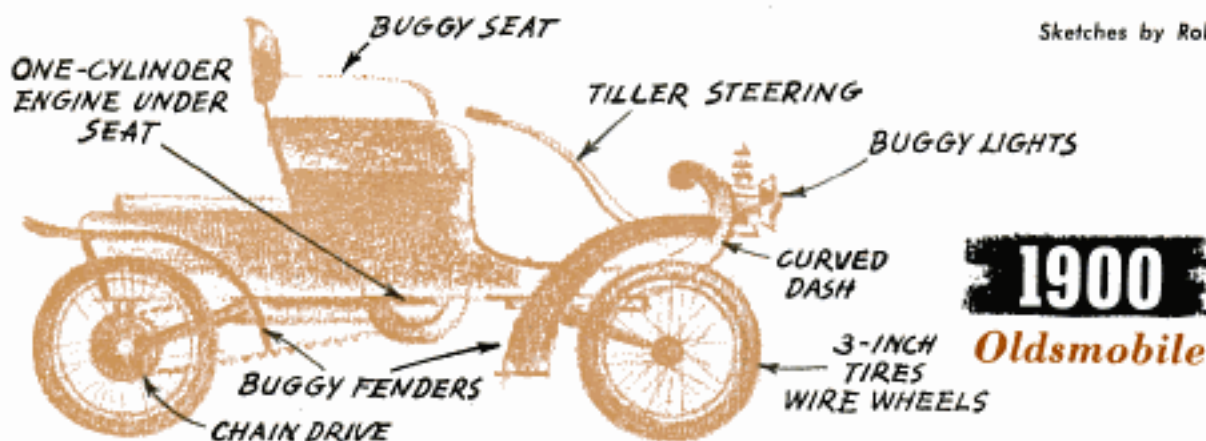
THE FIRST CARS weren't styled—they were just built. Early car makers were too busy making a machine that would run to spend time giving it style. Yet the early cars had an undeniable style.

Nobody knows exactly when the automobile stylist took over, but today he is on an equal footing with the engineer—indeed, at times he seems more influential.

To trace the evolution of styling, PM, helped by stylists at Chrysler, Ford, General Motors and Packard, selected representative models of the period from 1900 to the present and beyond. The cars are typical of the year in which they were made and are not necessarily pioneers.

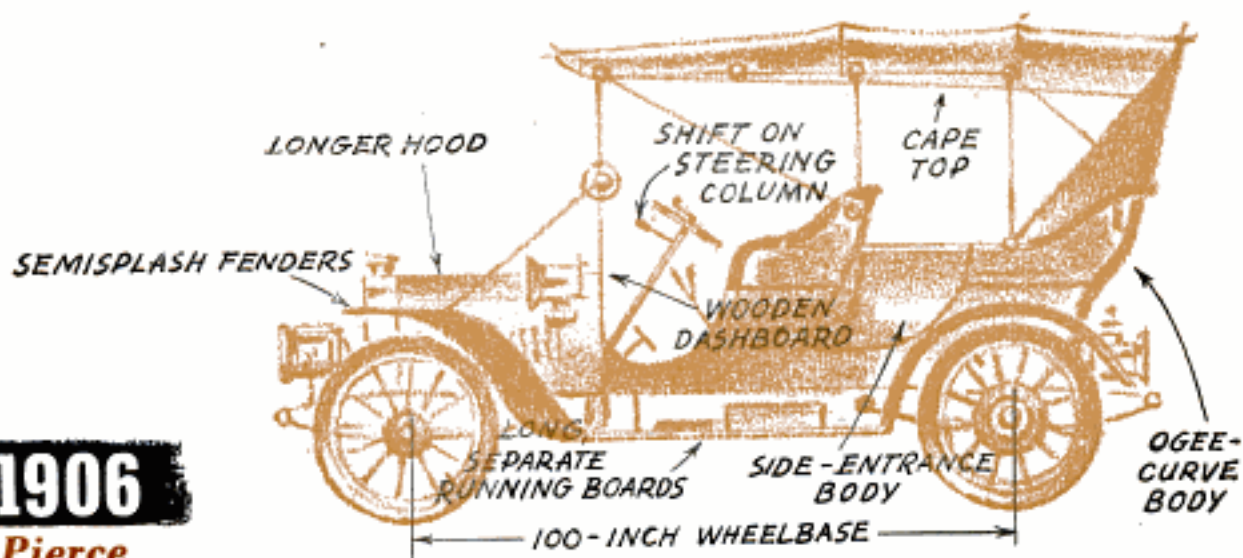
The 1960 prediction is by Richard Teague, Packard's chief stylist. ★ ★ ★

Sketches by Robert Korla,
PM Artist

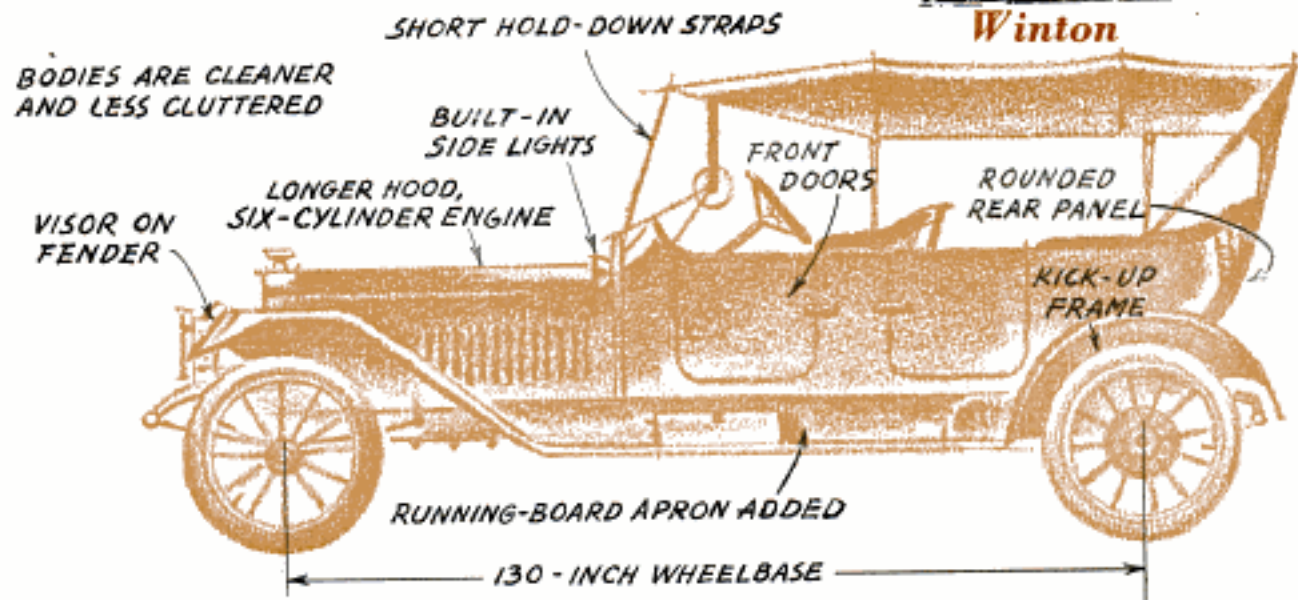


POPULAR MECHANICS

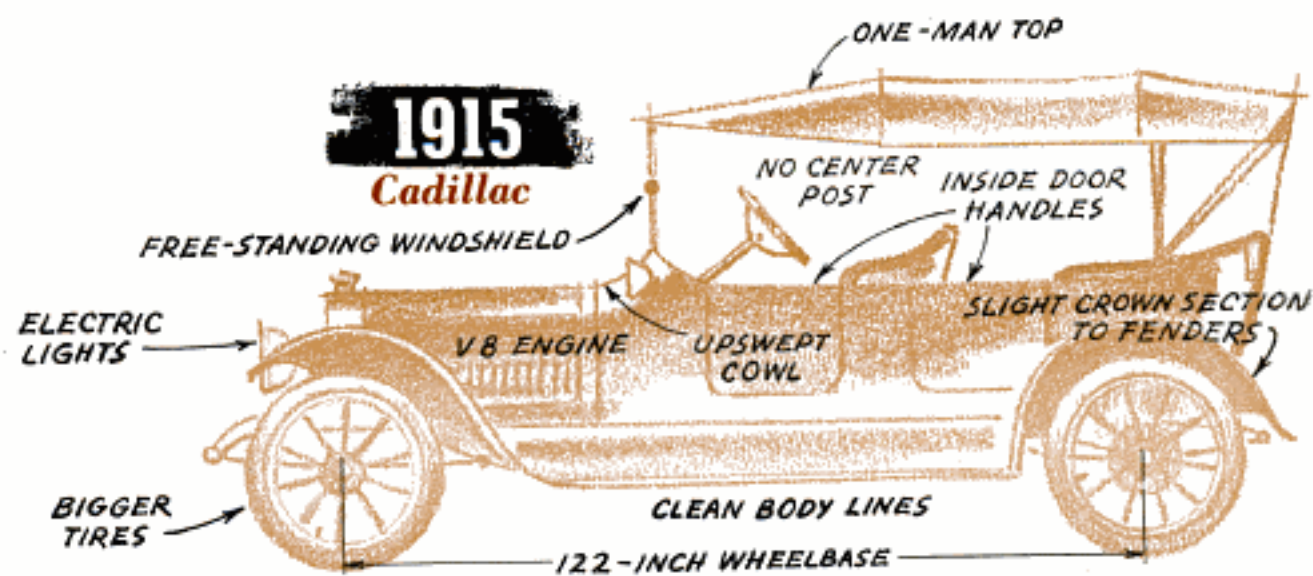
1906
Pierce



1912
Winton

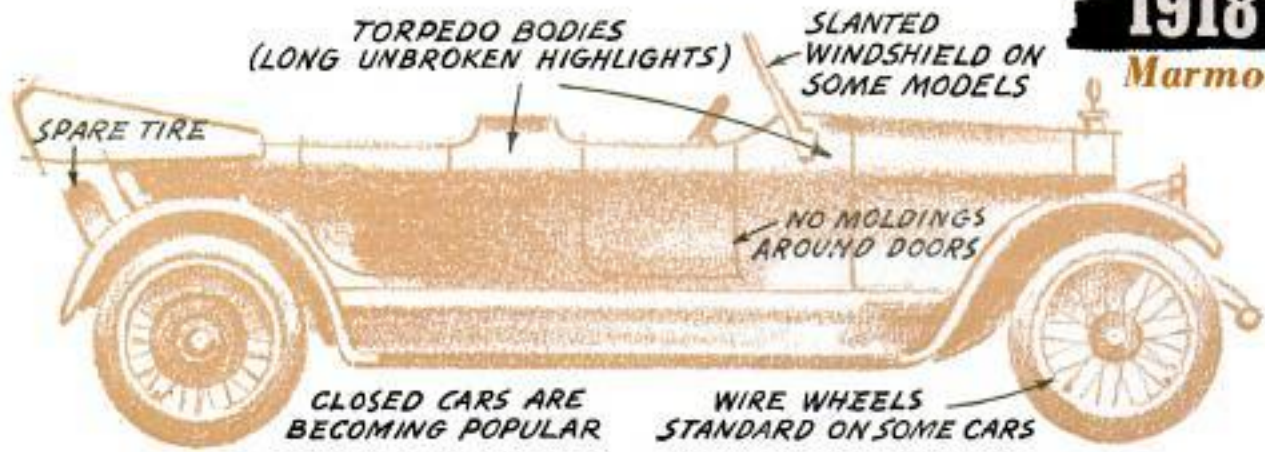


1915
Cadillac



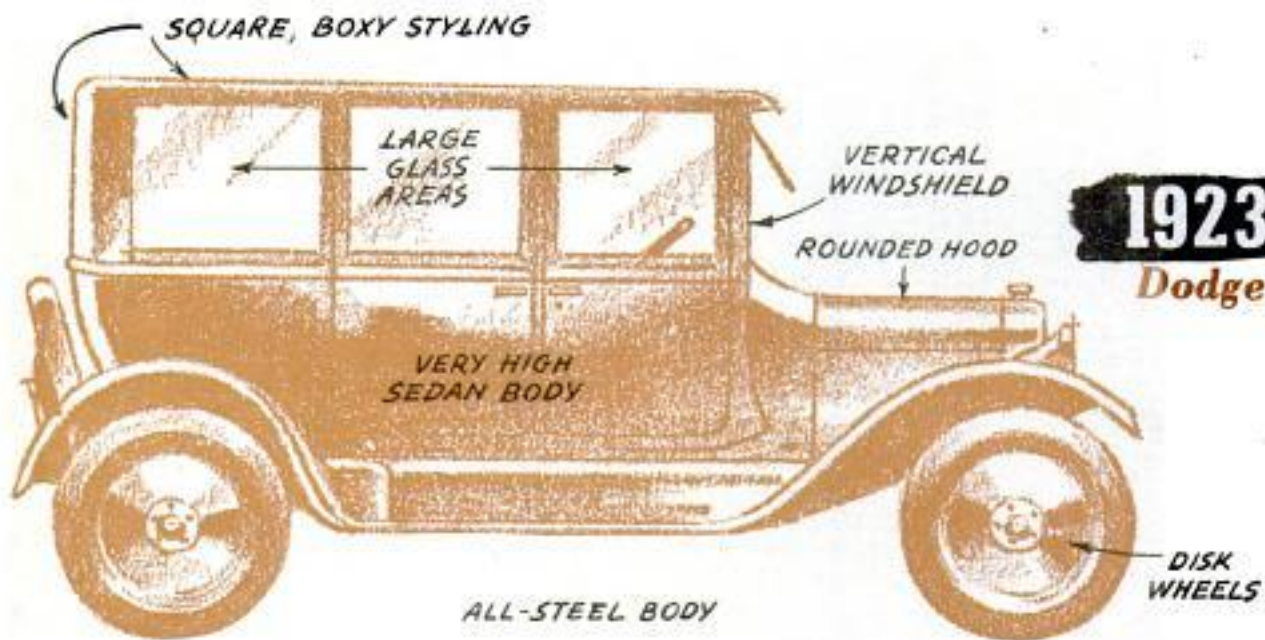
1918

Marmon



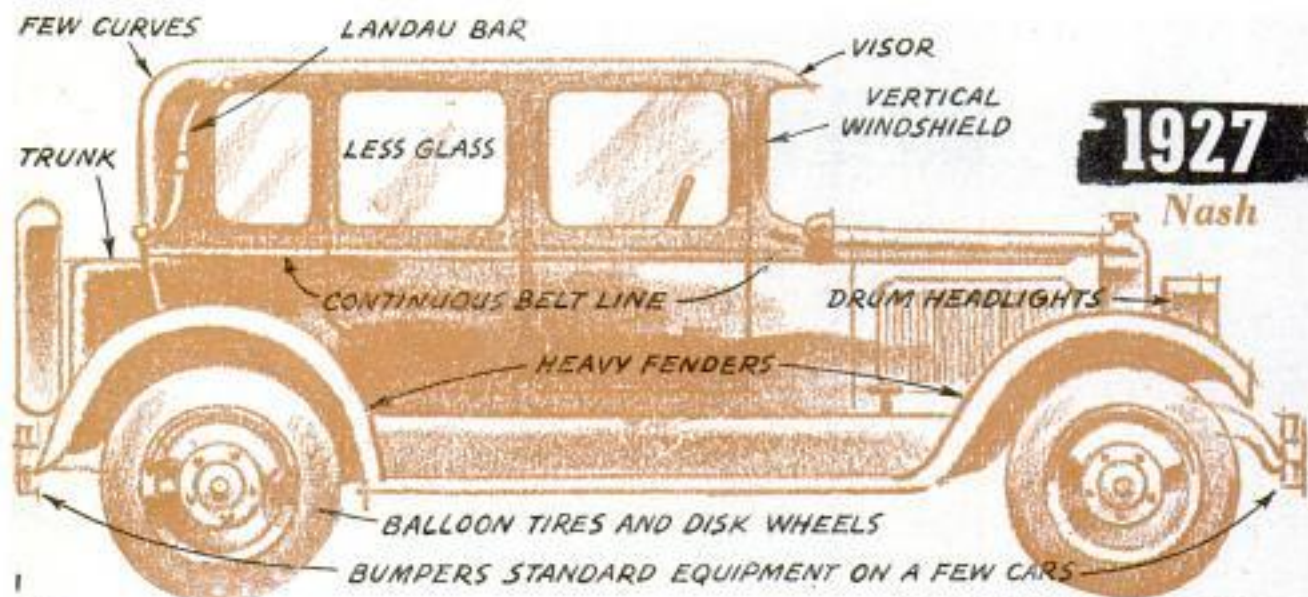
1923

Dodge



1927

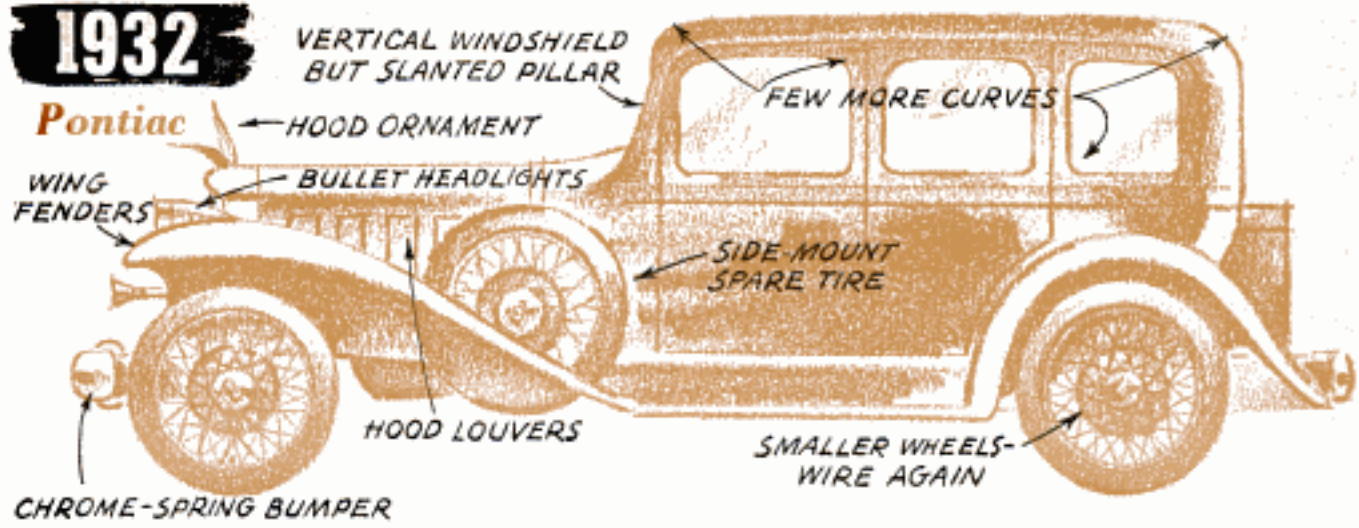
Nash



POPULAR MECHANICS

1932

Pontiac



VERTICAL WINDSHIELD
BUT SLANTED PILLAR

FEW MORE CURVES

HOOD ORNAMENT

WING
FENDERS

BULLET HEADLIGHTS

SIDE-MOUNT
SPARE TIRE

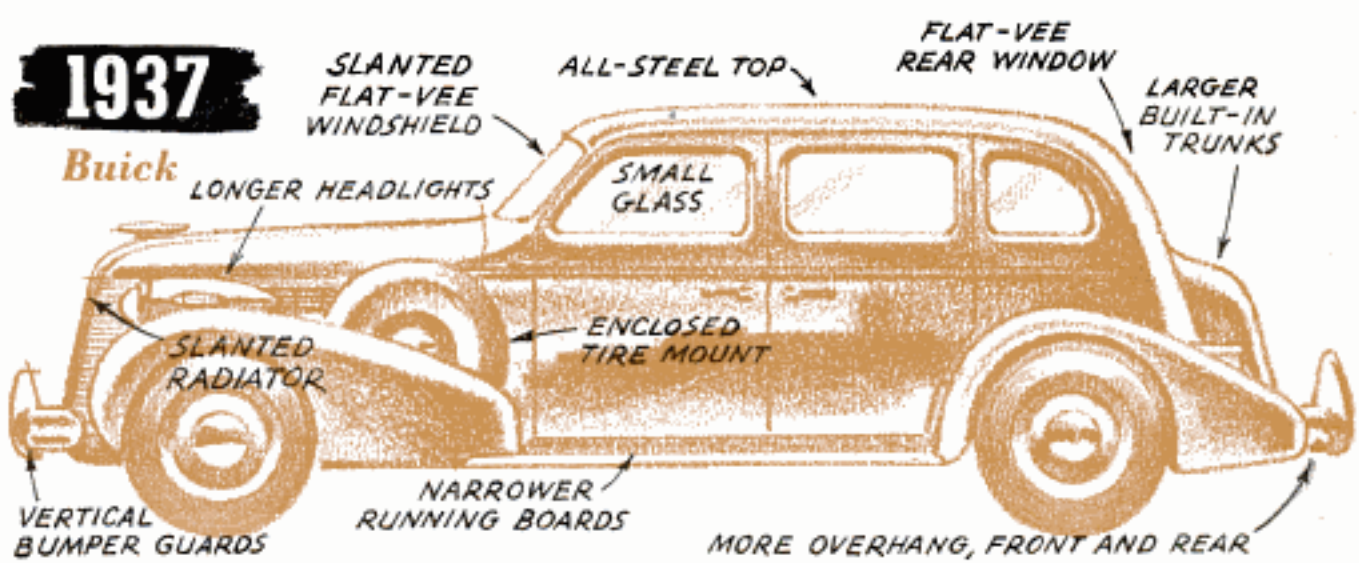
HOOD LOUVERS

SMALLER WHEELS-
WIRE AGAIN

CHROME-SPRING BUMPER

1937

Buick



SLANTED
FLAT-VEE
WINDSHIELD

ALL-STEEL TOP

FLAT-VEE
REAR WINDOW

LARGER
BUILT-IN
TRUNKS

LONGER HEADLIGHTS

SMALL
GLASS

SLANTED
RADIATOR

ENCLOSED
TIRE MOUNT

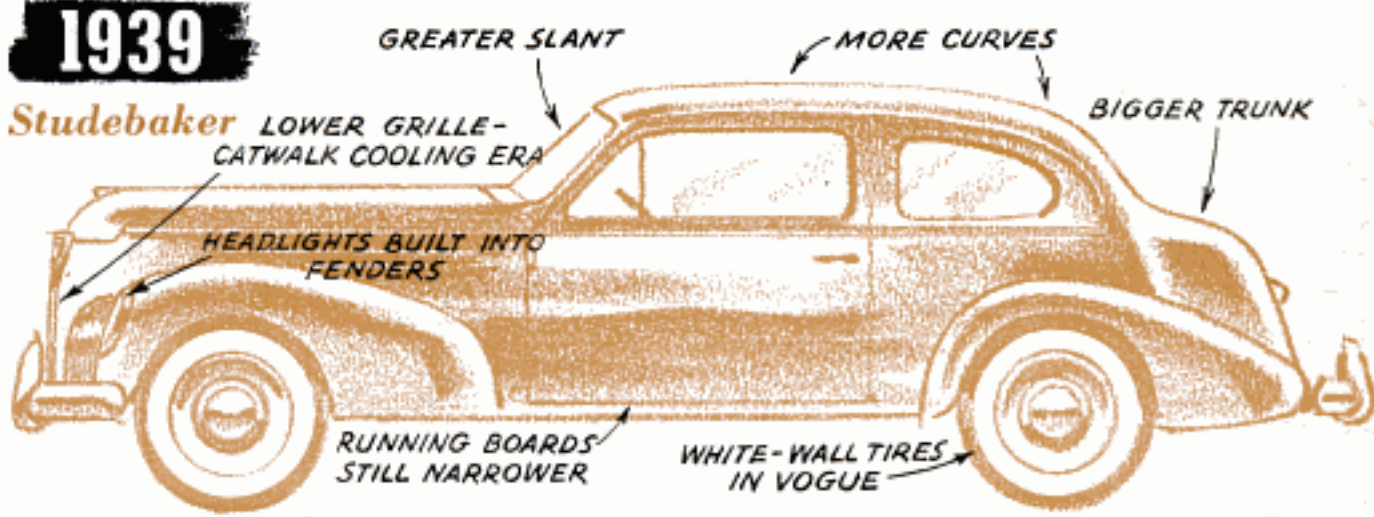
VERTICAL
BUMPER GUARDS

NARROWER
RUNNING BOARDS

MORE OVERHANG, FRONT AND REAR

1939

Studebaker



GREATER SLANT

MORE CURVES

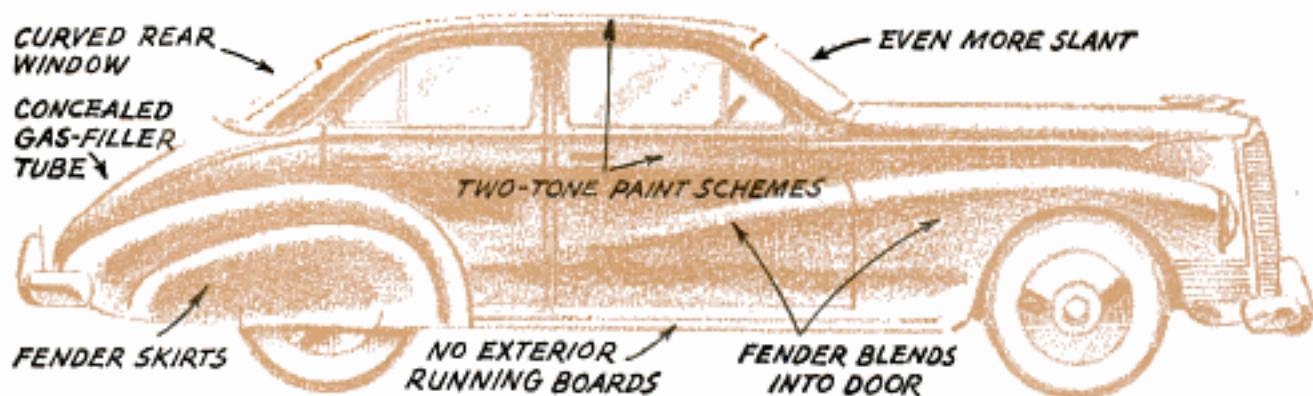
BIGGER TRUNK

LOWER GRILLE-
CATWALK COOLING ERA

HEADLIGHTS BUILT INTO
FENDERS

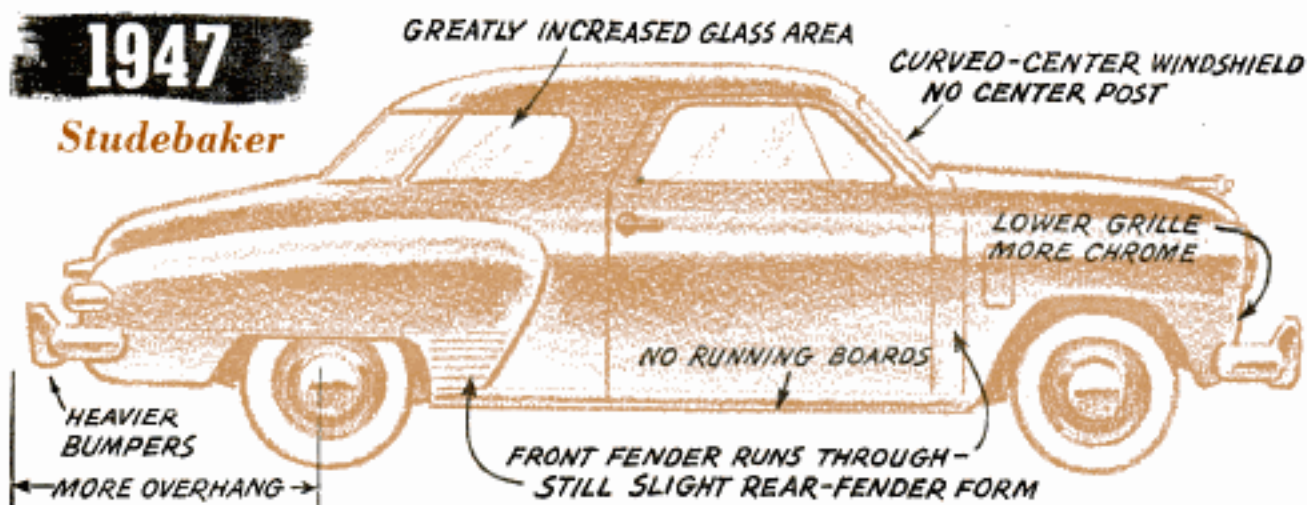
RUNNING BOARDS
STILL NARROWER

WHITE-WALL TIRES
IN VOGUE



1941

Packard

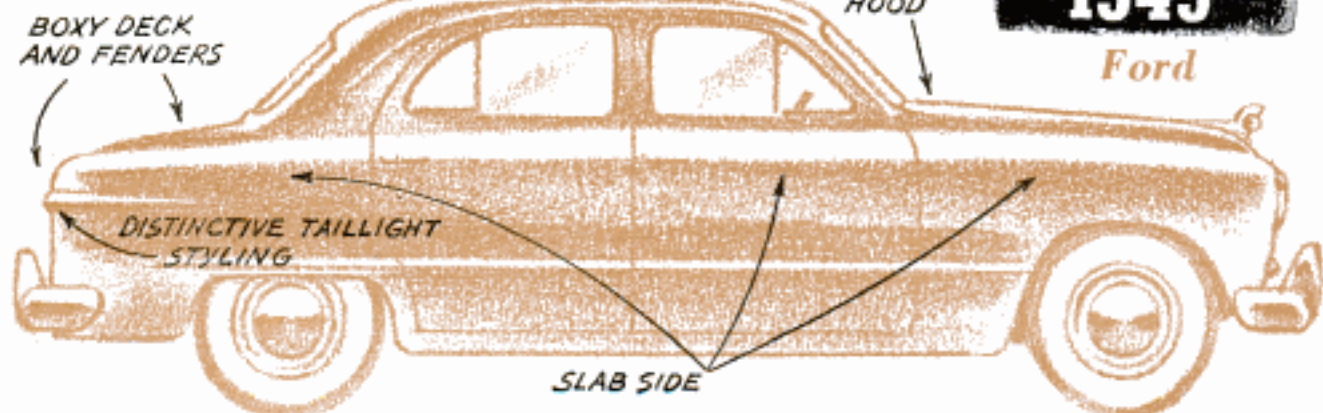


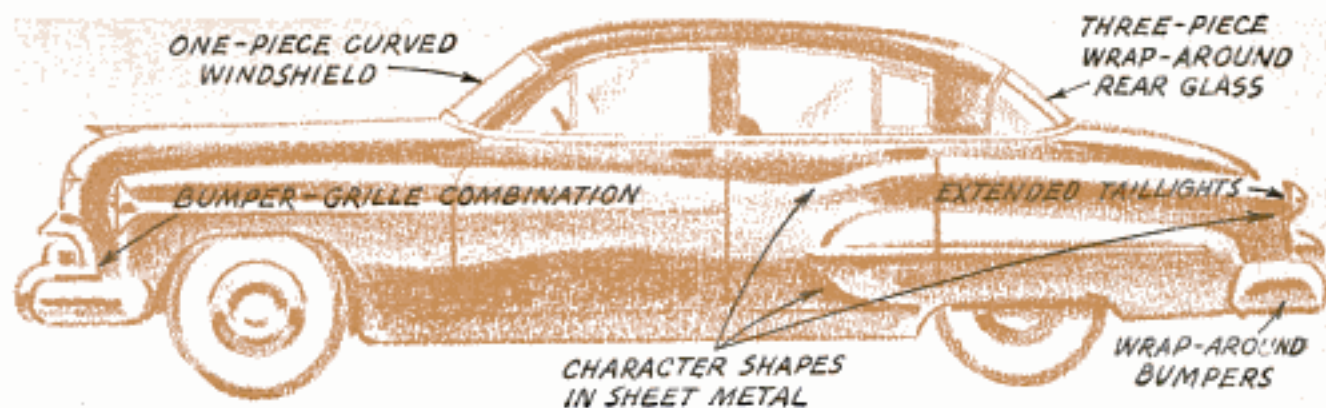
SQUARED PASSENGER COMPARTMENT

SHORT, FLAT HOOD

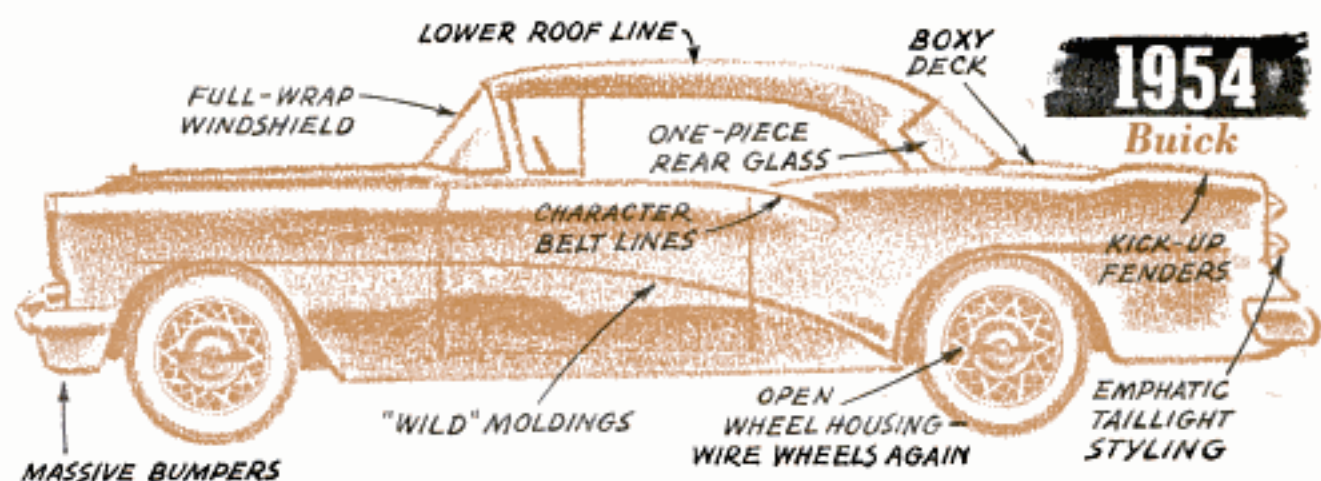
1949

Ford

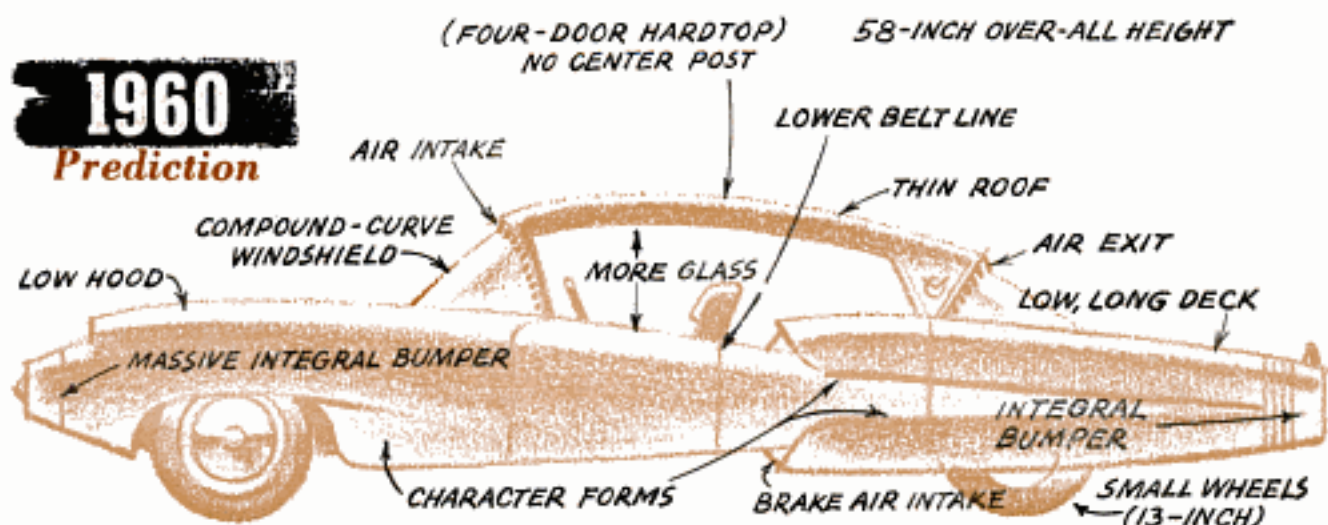




1950
Oldsmobile



1954
Buick



1960
Prediction



VOLKSWAGEN



ISO ISETTA



MERCEDES 300S

Are European Cars Better?



BENTLEY CONTINENTAL



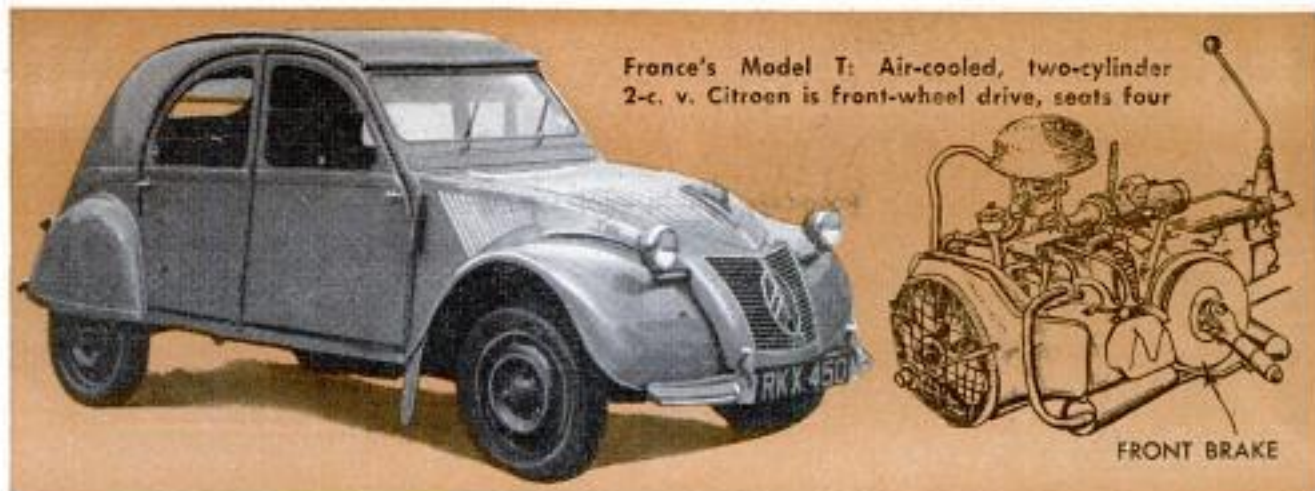
2 C.V. CITROEN



PANHARD



LANCIA lighted material



France's Model T: Air-cooled, two-cylinder 2-c. v. Citroën is front-wheel drive, seats four

FRONT BRAKE

By Roger Huntington

Member, Society of Automotive Engineers

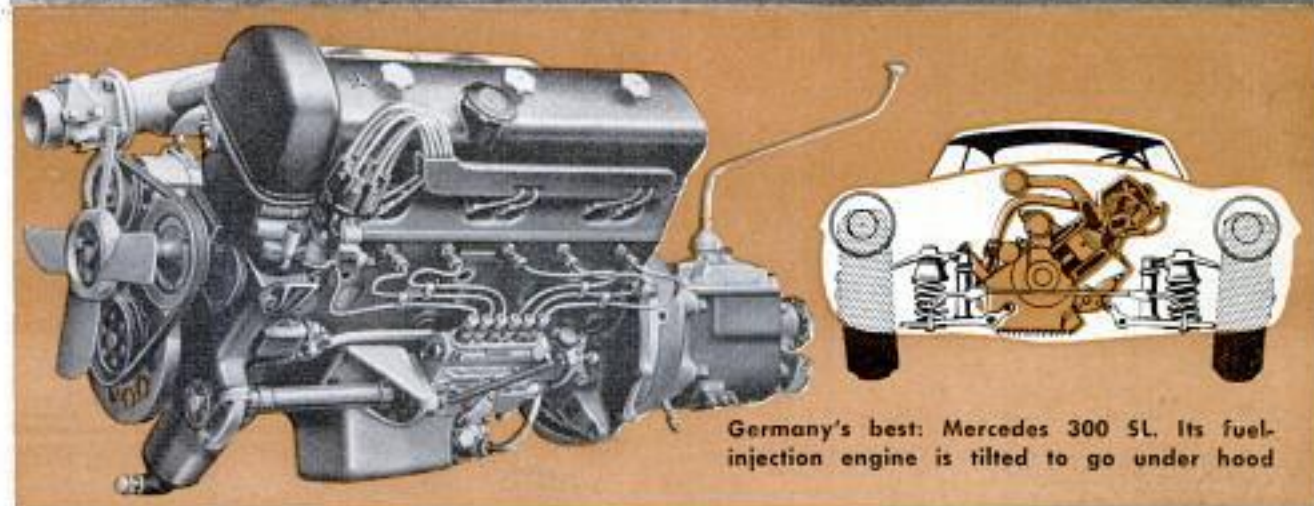
IS THE WEALTHIEST nation in the world—the one that operates three times as many cars as all the rest combined—dragging its feet in automotive engineering?

You could get that idea. We read about such European realities as V6 engines, independent rear suspension, torsion-bar springing, air-cooled engines, fuel injection and many others. Europe even has automatic chassis-lubrication systems, springs that adjust from the dashboard for a hard or soft ride, built-in hydraulic jacks and

oil-level indicators so you don't have to fuss with a messy dipstick.

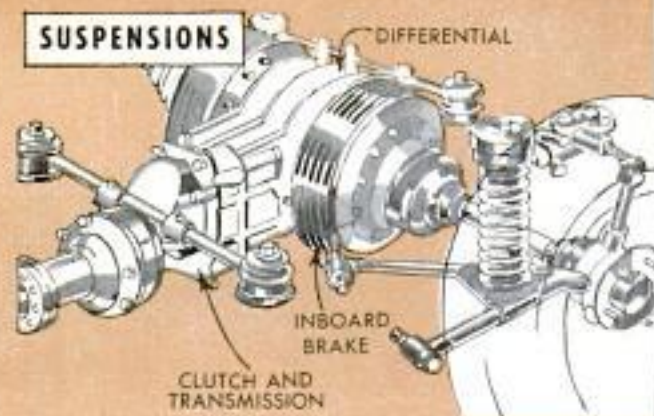
What do we have over here? The overhead-valve V8 is becoming standardized in our cars. Chassis layouts are almost stereotyped. Cars are as similar as men's hats—you have to be an expert to tell them apart. It almost looks as though the engineers are playing second fiddle to the artists in Detroit!

Probably the most striking example is the chassis. With open-road cruising speeds going up all the time (100 miles per hour

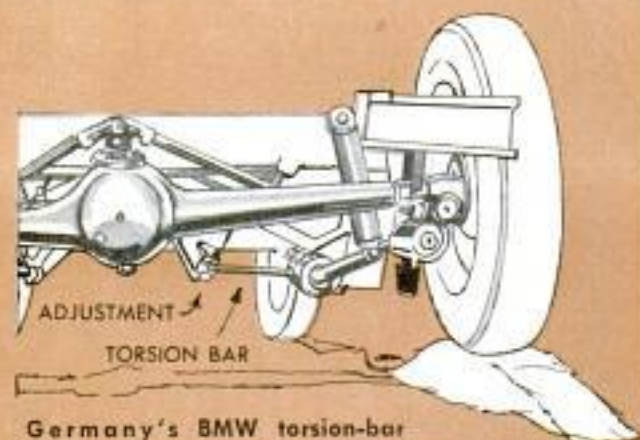


Germany's best: Mercedes 300 SL. Its fuel-injection engine is tilted to go under hood

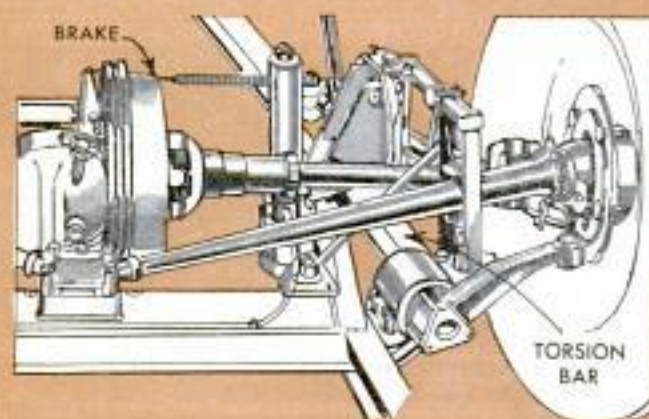
SUSPENSIONS



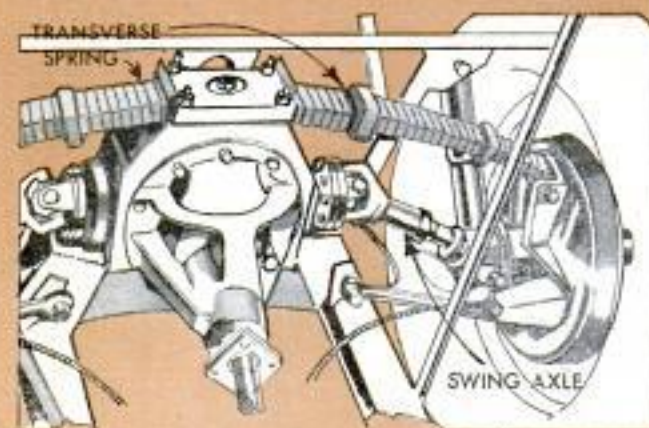
Italy's Lancia Aurelia V6 keeps unsprung weight at a minimum by this independent rear suspension



Germany's BMW torsion-bar suspension can be adjusted to suit the owner's preference



England's Lagonda has independent rear suspension, inboard brakes and torsion-bar springing



England's A. C. Ace uses a leaf spring with swing axles to provide independent suspension at rear

is not too distant), the present Detroit suspensions are just not going to be adequate to assure a good ride together with easy handling and reasonable safety at these speeds. And that is even allowing for the smooth superhighways of tomorrow.

What has to be done is no secret. Many experts agree that we must move the heavy mass of the transmission to the rear of the car to give better weight balance and less pitching at high speeds. And, very likely, the rear wheels should be independently sprung as the front wheels have been on our cars for many years. Unsprung weight (the weight that bounces up and down with the wheels) will be greatly reduced and the whole car will ride and handle better at high speeds. You might even mount the rear brakes inboard on the differential case to reduce unsprung weight even more.

If this is what we need, where can we find it today? We find it in Europe!

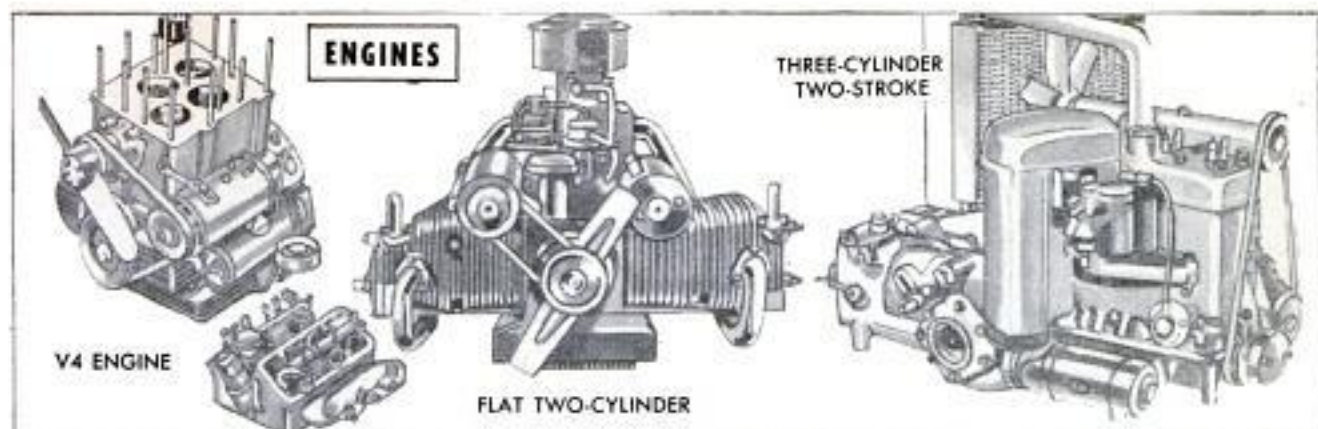
One of the most "roadable" cars today is the Italian Lancia and it has the chassis layout described above. Mercedes-Benz has had independent rear suspension for 20 years. The tiny, inexpensive Volkswagen has it. So does the German Borgward, the French 2 c.v. Citroen (the Model T of Europe which has a front-wheel drive with inboard brakes—it also has a unique front-rear linked suspension and a shift lever in the dashboard!).

Both the Citroen and the Volkswagen are low-price cars, so it can't be said that these are costly, handmade examples.

In brakes, the boys across the Atlantic are ahead, too. Huge finned drums with air scoops for cooling are common. Some cars use the patented "Al fin" process, in which an aluminum drum is bonded to a thin iron liner to give better drum cooling. Probably the most significant new development is the two-trailing-shoe brake from the famed Girling Company in England. The shoes are pivoted so there is no self-energizing effect, or braking force, caused by friction pulling the lining against the drum. The necessary extra force is supplied by a special vacuum booster. Performance of these brakes is said to be practically unaffected by changes in lining friction and temperature, so there is virtually no "fade" on the road during prolonged heavy braking.

Then there are disk brakes, used mostly on sports cars, but expected soon on the larger sedans—in England especially. Disk brakes get more air to the braking surfaces than conventional shoe brakes and provide excellent cooling. Good braking depends upon cooling.

Europe does some cute tricks with engines. Air cooling is found on many small cars. It is cheaper, gives a lighter engine and it eliminates worries about freezing in



Europe's engines have variety. Here are the Lancia V4, Panhard air-cooled flat twin, D.K.W. three-cylinder

winter and boiling over during the summer.

The little French Panhard has a tiny air-cooled two-cylinder engine with a front-wheel drive. In the 1954 LeMans race one of these two-cylinder cars was driven for 24 consecutive hours, averaging 80 miles per hour. This engine has a displacement of 45.4 cubic inches—the smallest American engine is four times larger with 186 cubic inches (Studebaker Champion).

Other famous air-cooled engines are the flat four of the Volkswagen (rear-mounted) and the two-cylinder 2 c.v. Citroen. The Citroen is an unadorned, basic car with evidence of careful design. It has a centrifugal clutch that prevents stalling in traffic. With this clutch you don't have to use the

clutch pedal when starting up or shifting. It carries four persons plus luggage. Of course, its top speed is just over 40 miles per hour, but it does average from 50 to 60 miles per gallon fully loaded. The two-cylinder overhead-valve engine has a 25.9-cubic-inch displacement—one seventh the size of the economical Studebaker Champion engine! The engine is a sealed unit. When it needs repairs, you trade it in for a new one for \$42!

Other interesting engines in Europe are the V4 and V6 of Lancia (Italy) and the three-cylinder D.K.W. (Germany), a two-stroke engine that drives through the front wheels. This tiny, three-cylinder engine

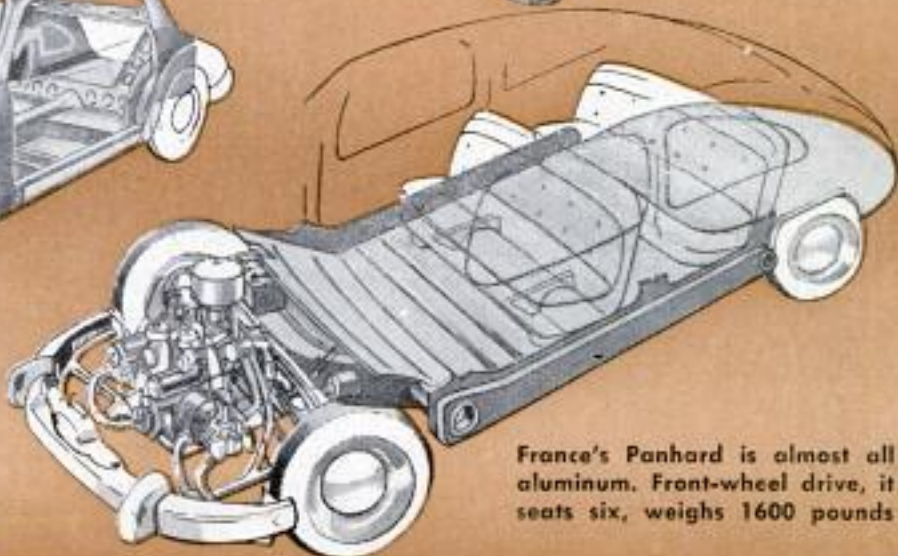
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BODY STRUCTURES

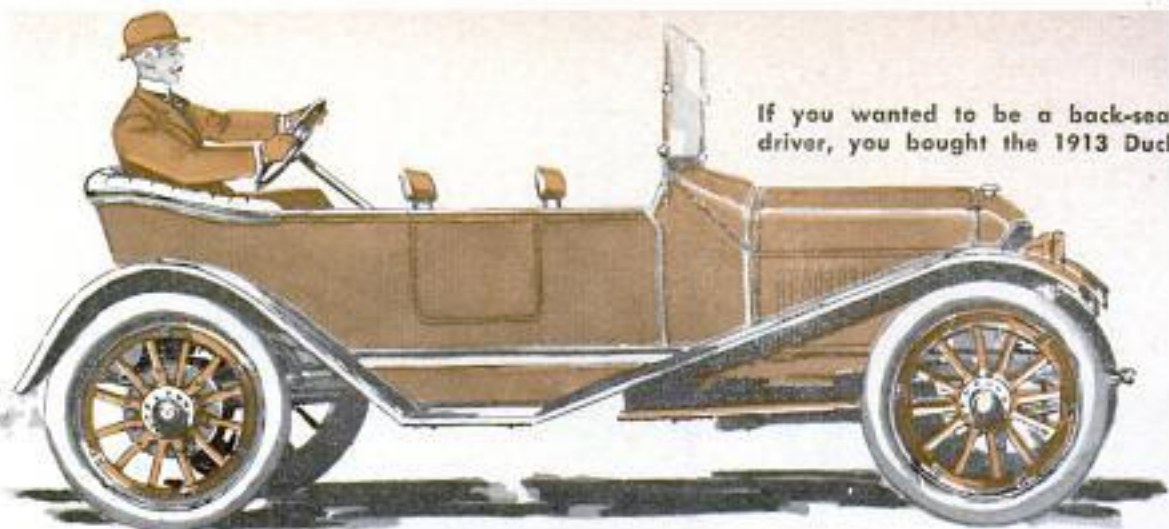
Volkswagen has a smooth underside as the controls are in center tube that is its main support



Like many foreign cars, Lancia, above, uses no frame. This four-door body also has no center post between doors. Weight: 1800 pounds. Much light alloy is used



France's Panhard is almost all aluminum. Front-wheel drive, it seats six, weighs 1600 pounds



If you wanted to be a back-seat driver, you bought the 1913 Duck

THEY ALSO RAN

By
**Floyd
Clymer**

THEY DON'T BUILD CARS like they used to!" How many times have you heard that? Or even said it yourself? Well, take it from me—it's a good thing they don't!

Building cars is a science today (with not just a little showmanship added). It wasn't always so scientific. There was a time when, with no more engineering training than came from a childhood spent with an Erector Set, an imaginative mechanic could bring out a "revolutionary" automobile—one that would (he claimed) make every other car obsolete in the morning.

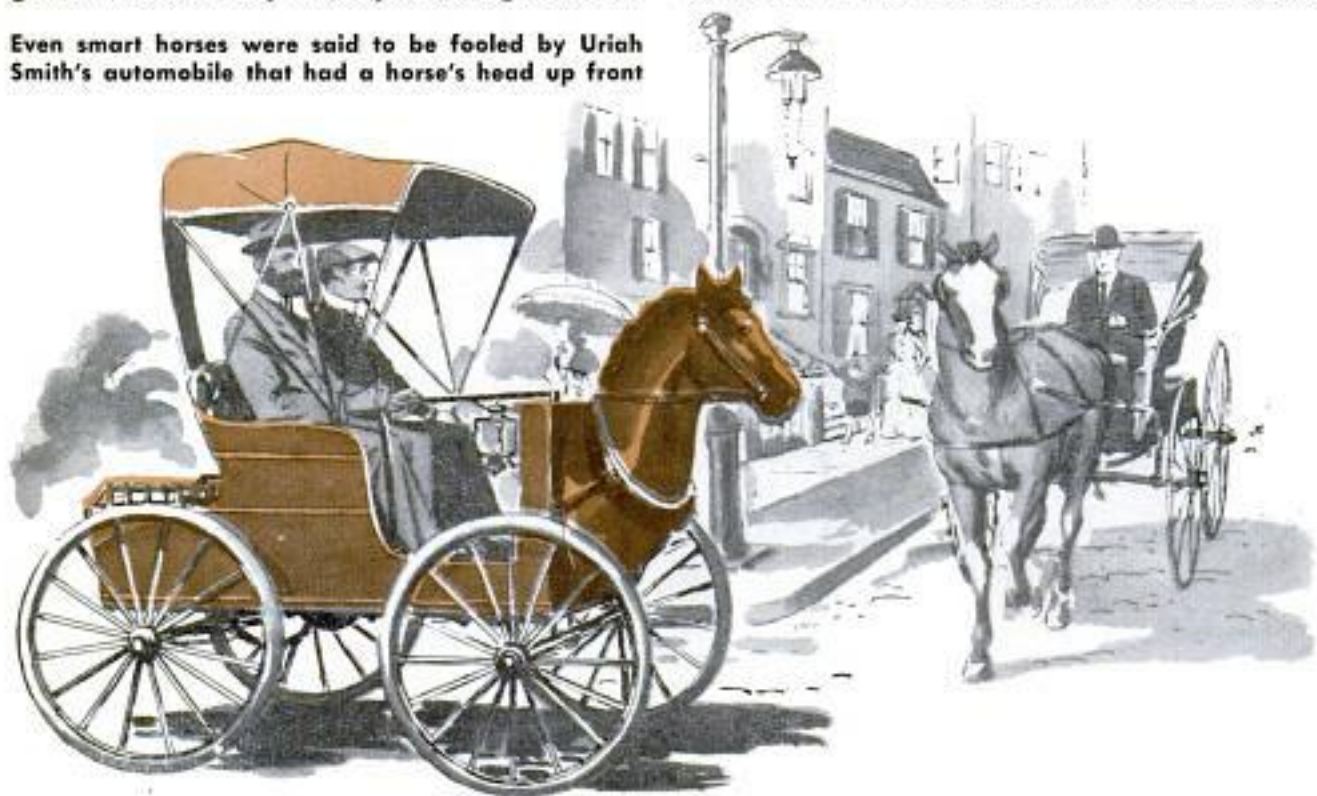
In 1955 you've got to be a graduate engineer before they'll let you design an ash

Even smart horses were said to be fooled by Uriah Smith's automobile that had a horse's head up front

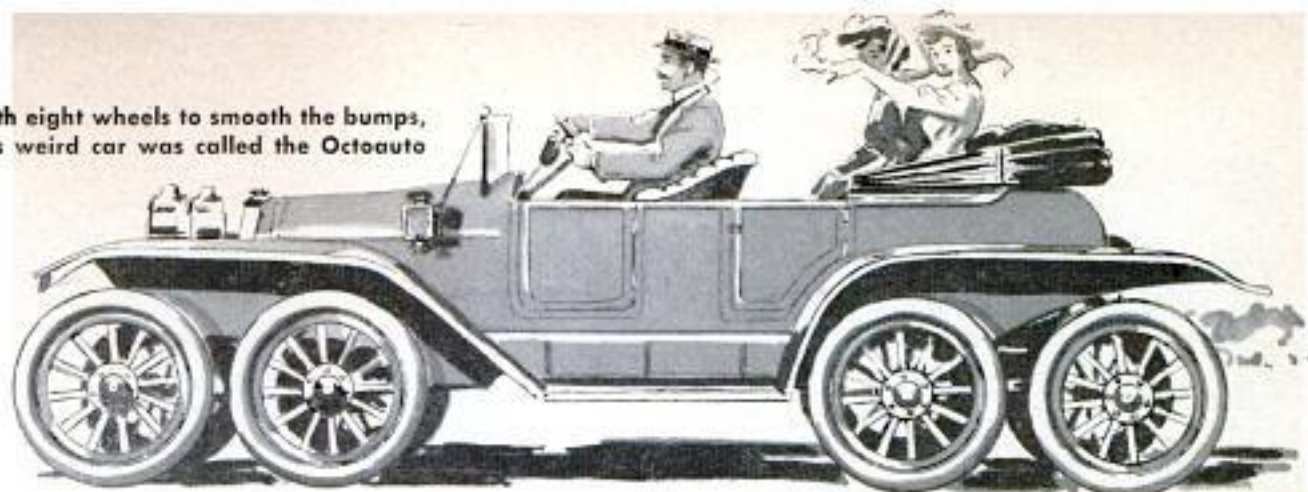
tray for the back seat. As a result, cars are better today. But, let's face it, they are a lot less exciting.

These Erector Set engineers came up with a load of ideas. Every month or so, a "new and revolutionary" machine was announced. Usually (not always, but almost always), the new and revolutionary car fizzled out and quietly became an "also ran" in the race for public acceptance.

Take the car designed by Uriah Smith of Utah. Gasoline buggies did frighten horses and no wonder—they even frightened humans at times. So Smith decided to fool the horse into accepting the automobile as a relative. To put over his deception, Smith mounted a fake horse's head on the front



With eight wheels to smooth the bumps, this weird car was called the Octoauto



of the automobile (which at that point in its evolution still looked like a buggy).

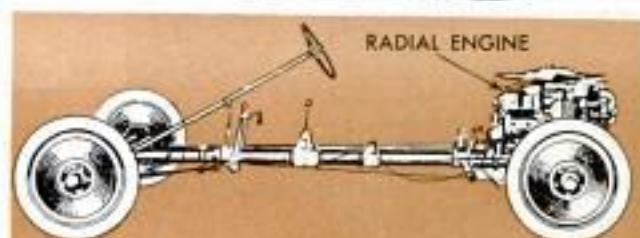
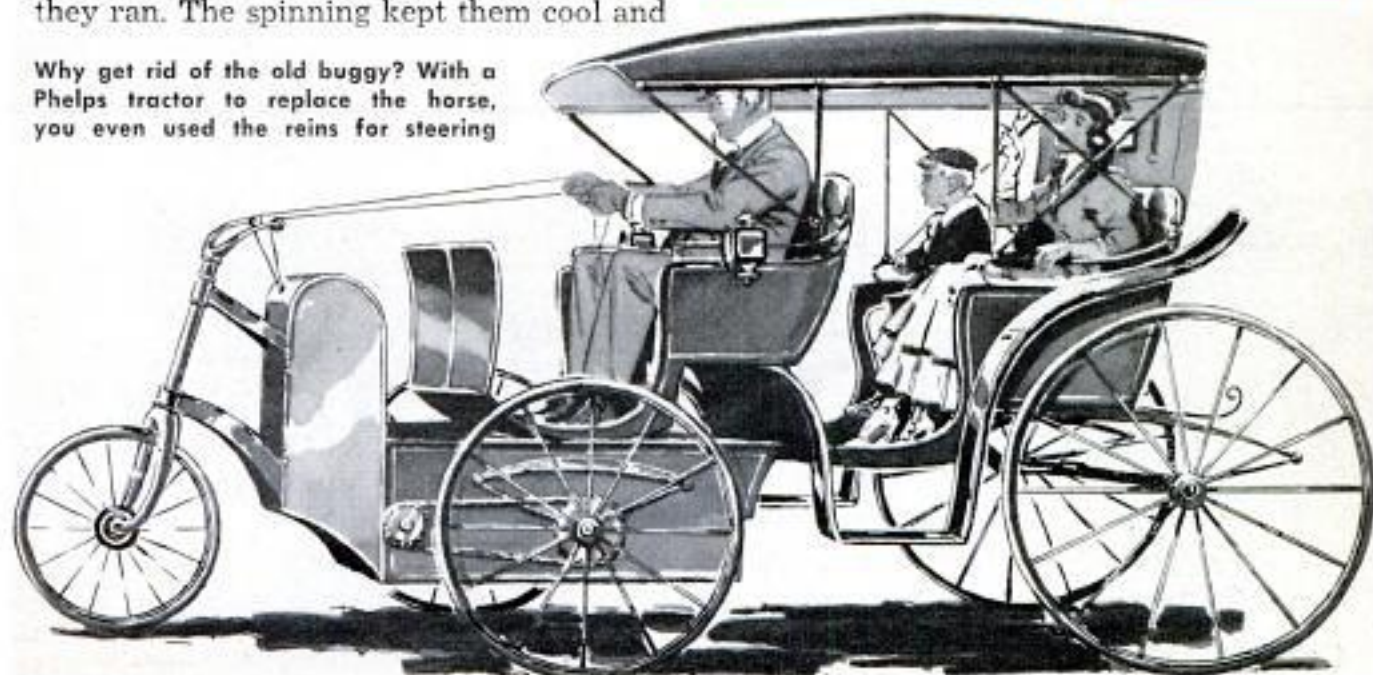
A horse, seeing this king-size hood ornament, was supposed to be fooled into passing it by undisturbed. Smith claimed his invention would fool horses. There's no evidence that it fooled people very much.

A New Jersey inventor named Phelps was also a man with an idea. He saw no sense in discarding the wagon just because the gasoline engine had arrived. After all, the engine merely replaced the horse, not the wagon.

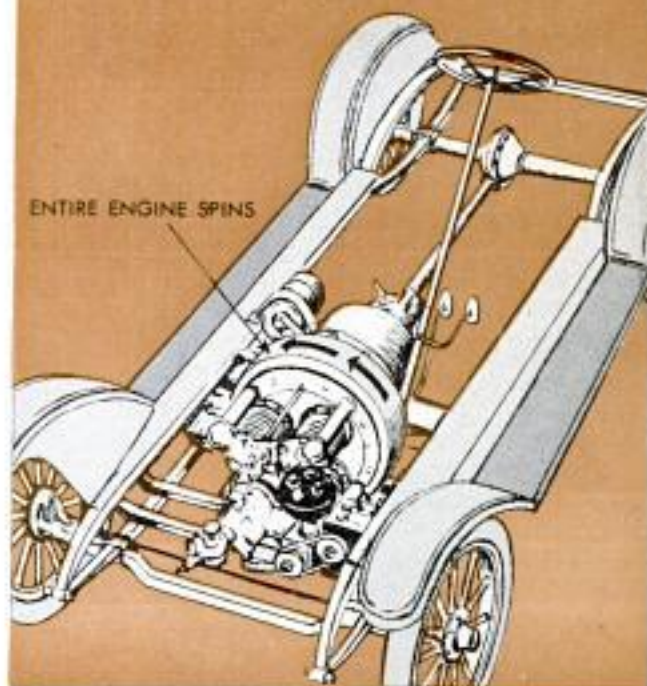
As Phelps saw it, the engine was simply a mechanical horse—something that should be hitched up like any other horse. He attached a tractorlike machine to the front end of a wagon. In that way, the family could sit in the same seats, enjoy the same ride, look out from under the same fringe as when Dobbin was around. But instead of the clatter of hooves, there was the rattle of valves and connecting rods. Father didn't even have to learn to drive—the tractor was controlled by reins just like the horse!

There was something appealing about the rotary engine. Inventors, professional and amateur alike, set out to make a fortune with it. Rotary engines were expected to solve all the problems of the temperamental automobile. They spun like a pinwheel as they ran. The spinning kept them cool and

Why get rid of the old buggy? With a Phelps tractor to replace the horse, you even used the reins for steering



Radial engine of 1922 Julian (above) did not revolve. Rotary engine on Eagle (below) did





Car bodies should be woven like a basket, said one manufacturer. They won't dent or rust and you can wash them with a hose

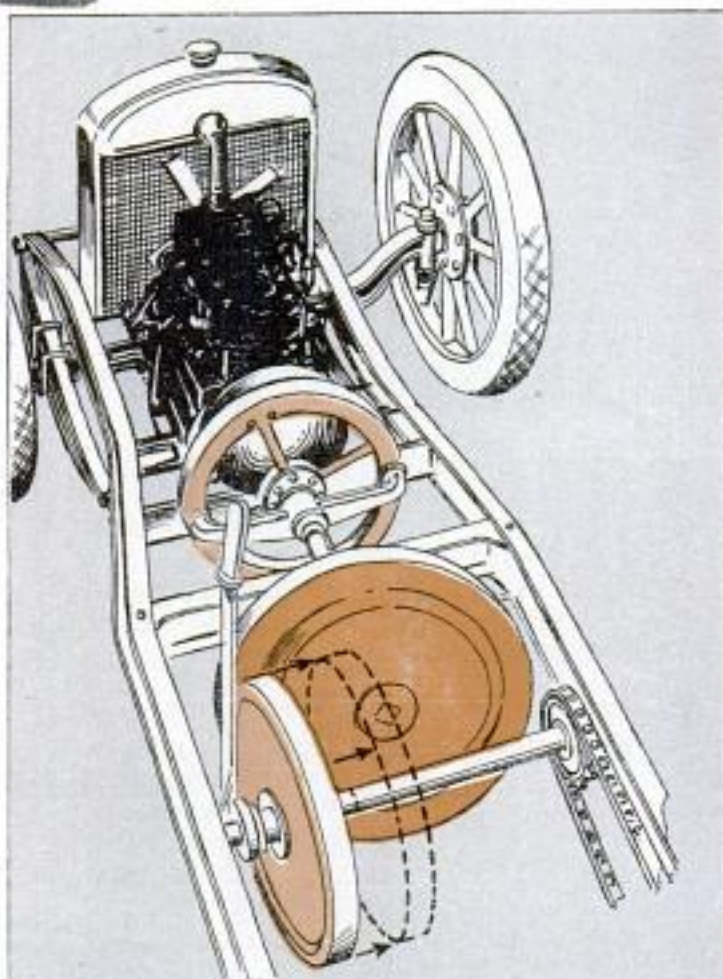
also had a gyroscopic effect that made the car stable on corners.

The Eagle car of 1915 boasted a five-cylinder rotary engine with horizontal cylinders. Other inventors arranged the cylinders vertically around a hub like spokes in a wheel (similar to the air-cooled radial aircraft engine of today except that these old engines spun).

But the 1915 Eagle had horizontal cylinders and the whole engine rotated like a log in a North Woods birling contest. It was easier to keep the cylinders lubricated when they were horizontal, the inventor claimed. A man named Adams had tried a similar idea years before in Iowa without much success. The Eagle had no more success in 1915.

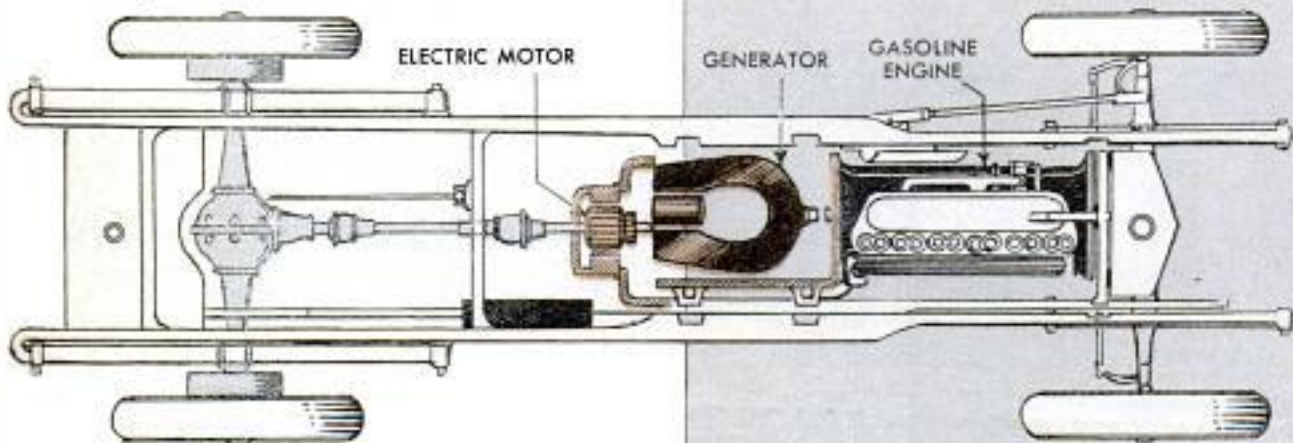
The gyroscope was another favorite of the inventors. One car was called the Gyroscope Car. Billed as "the simplest automobile in the world," it had a horizontal flywheel to give "gyroscopic stability in running. No skidding. Takes turns at any speed." That was in 1908—another also-ran!

Today's transmissions are standardized to a point where only an engineer can tell them apart. But years ago, things were different. There were

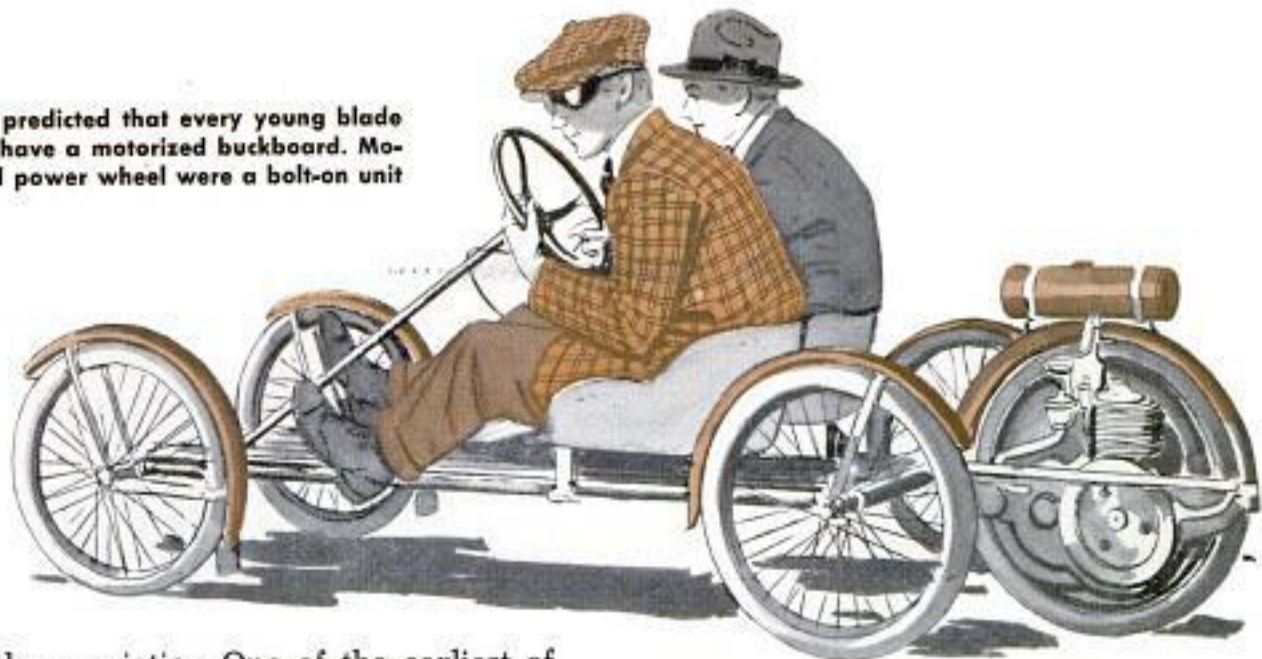


Friction-drive transmissions used a big sliding wheel against a disk to provide "gear" ratios

Best known gasoline-electric car was the Owen Magnetic. An electric motor turned drive shaft



It was predicted that every young blade would have a motorized buckboard. Motor and power wheel were a bolt-on unit

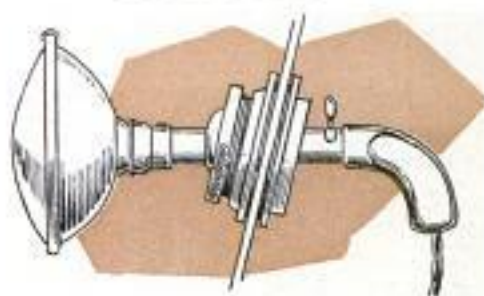


countless varieties. One of the earliest of these was certainly no also-ran. It was the planetary system, now an essential part of every automatic transmission. But we're not concerned here with those that survived. We're discussing those that dropped out along the way.

Definitely an also-ran was the friction-drive transmission. There were many designs in this field. The lack of gears and the simple construction made it appealing.

The Cartercar was probably the most successful of the makes using friction transmissions. It got an unlimited number of

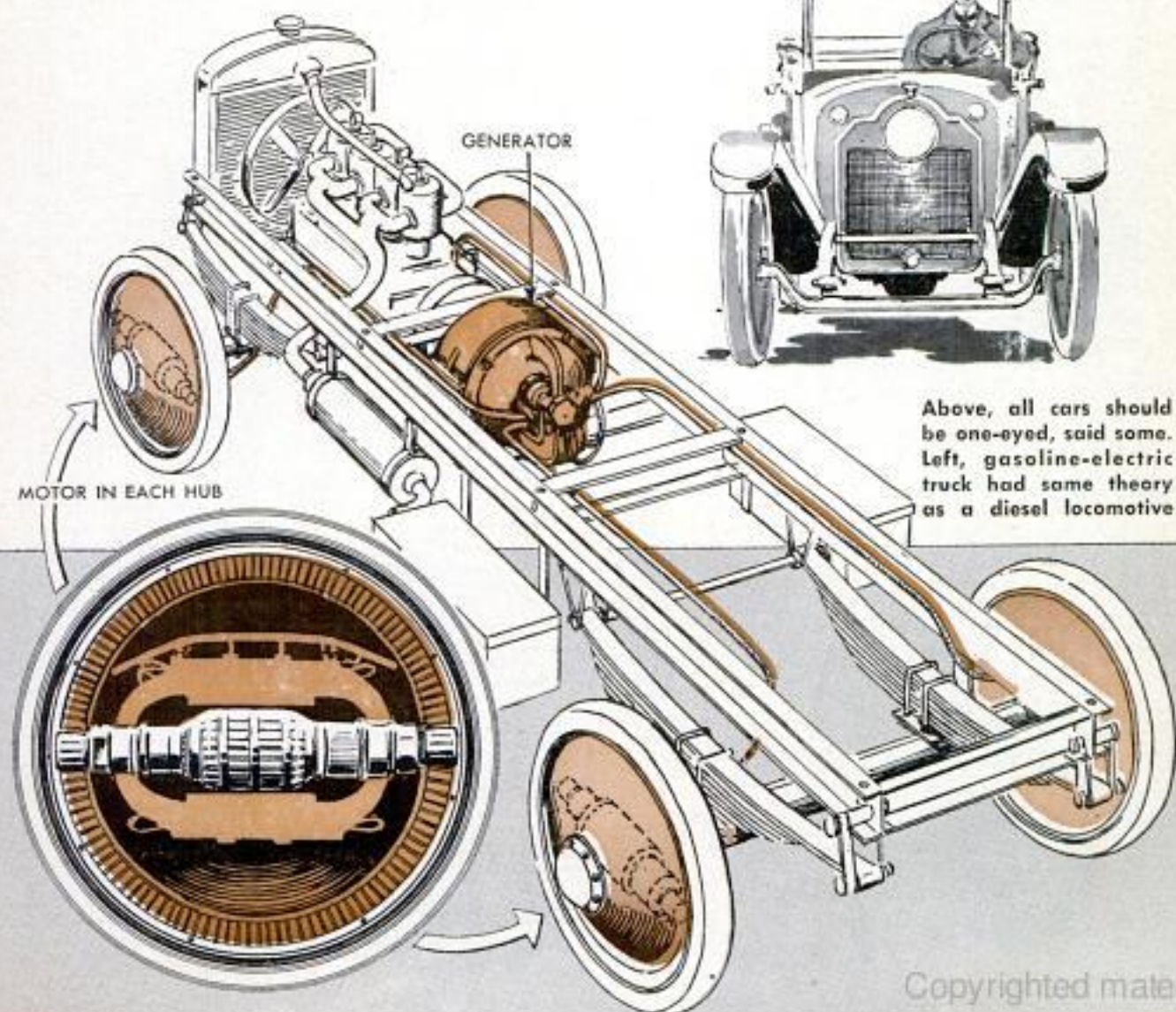
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Windshield-mounted spotlight, above, was author's contribution to the list of automotive also-rans



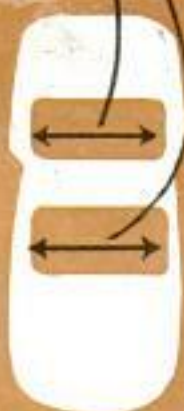
Above, all cars should be one-eyed, said some. Left, gasoline-electric truck had same theory as a diesel locomotive



COMPARE THE 1955 CARS

AVE.

HIP-ROOM



AVE.

HEAD-ROOM



AVE.

LEG-ROOM

FRONT-SEAT ROOM

HEADROOM (inches)		LEGROOM (inches)		HIPROOM (inches)	
Hudson	37.5	Kaiser	45.4	Hudson	65.0
Nash	37.5	Chrysler	44.6	Nash	65.0
Packard	36.7	DeSoto	44.6	Buick Super	64.9
Buick Super	36.6	Imperial	44.6	Buick Roadmaster	64.7
Cadillac 75	36.5	Dodge	44.5	Cadillac 75	64.4
Rambler	36.5	Plymouth	44.5	Cadillac 62	64.3
Clipper	36.0	Ford	44.3	Cadillac 60	64.3
Studebaker	36.0	Lincoln	44.3	Chrysler	63.3
Buick Roadmaster	35.9	Rambler	44.0	DeSoto	63.3
Cadillac 62	35.8	Mercury	43.8	Kaiser	63.3
Cadillac 60	35.8	Buick Roadmaster	43.6	Clipper	62.8
Kaiser	35.8	Mercury Montclair	43.6	Packard	62.8
Chevrolet	35.7	Clipper	43.5	Buick Special	62.5
Buick Special	35.6	Packard	43.5	Buick Century	62.5
Buick Century	35.6	Cadillac 75	43.4	Dodge	62.5
Oldsmobile	35.6	Cadillac 62	43.3	Imperial	62.5
Pontiac	35.6	Cadillac 60	43.3	Plymouth	62.5
Dodge	35.5	Buick Super	43.2	Lincoln	62.3
Lincoln	35.5	Chevrolet	43.1	Oldsmobile	62.3
Mercury	35.4	Oldsmobile 88	42.9	Chevrolet	62.0
Ford	35.1	Oldsmobile Super 88	42.9	Pontiac	61.8
Chrysler	35.0	Oldsmobile 98	42.8	Willys	61.0
DeSoto	35.0	Pontiac	42.7	Mercury	60.6
Imperial	35.0	Hudson	42.5	Mercury Montclair	60.6
Plymouth	35.0	Nash	42.5	Ford	60.5
Willys	34.6	Studebaker	42.5	Rambler	60.0
Mercury Montclair	33.5	Buick Special	42.3	Studebaker	59.5
		Buick Century	42.3		
		Willys	41.6		

REAR-SEAT ROOM

HEADROOM (inches)		LEGROOM (inches)		HIPROOM (inches)	
Hudson	36.0	Cadillac 75	55.0	Buick Super	65.7
Nash	36.0	Packard	48.8	Buick Roadmaster	65.7
Packard	35.9	Imperial	48.4	Cadillac 62	65.2
Pontiac	35.9	Cadillac 62	46.3	Cadillac 60	65.2
Cadillac 62	35.6	Cadillac 60	46.3	Hudson	64.5
Cadillac 60	35.6	Buick Roadmaster	45.6	Nash	64.5
Rambler	35.5	Buick Super	45.1	Chrysler	64.0
Chevrolet	35.4	Dodge	45.0	Kaiser	63.1
Buick Super	35.2	Chrysler	44.8	Pontiac	63.1
Buick Roadmaster	35.1	Plymouth	44.5	Chevrolet	63.0
Cadillac 75	35.1	Oldsmobile Super 88	44.3	Dodge	62.8
Studebaker	35.0	Oldsmobile 98	44.0	Plymouth	62.8
Dodge	34.9	Clipper	43.8		
Lincoln	34.7	Oldsmobile 88	43.8	Buick Special	62.4
Imperial	34.6	Lincoln	42.8	Buick Century	62.4
Oldsmobile 88	34.6	Mercury	42.8	Oldsmobile 88	62.4
Plymouth	34.6	Pontiac Chieftain	42.8	Lincoln	62.1
Chrysler	34.5	Pontiac Star Chief	42.7	Oldsmobile Super 88	62.1
DeSoto	34.5	Ford	41.9	Oldsmobile 98	62.1
Ford	34.2	Buick Special	41.8	Clipper	62.0
Mercury	34.2	Buick Century	41.4	Imperial	62.0
Willys	34.1	Studebaker Pres.	41.0	Packard	62.0
Buick Special	34.0	Chevrolet	40.8	Willys	61.0
Buick Century	34.0	Mercury Montclair	40.6	Mercury Montclair	60.5
Clipper	34.0	Hudson	40.1	Ford	60.3
Kaiser	33.8	Nash	40.1	Mercury	60.3
Oldsmobile Super 88	33.8	Kaiser	39.6	Rambler	59.5
Oldsmobile 98	33.8	Rambler	39.5	Cadillac 75	59.1
Mercury Montclair	32.2	Studebaker Champ.	39.0	Studebaker	59.0
		Studebaker Comdr.	39.0		
		Willys	37.9		

ENGINE SIZE AND POWER

DISPLACEMENT (cubic inches)	HORSEPOWER	POUNDS PER HP. (shipping wt. + hp.)	
Packard	260	Clipper Custom	15.9
Clipper Custom	250	Buick Century	16.1
Lincoln	250	Chrysler N. Yorker	16.6
Cadillac	250	Chrysler	16.7
Chrysler N. Yorker	236	Clipper	16.7
Imperial	236	Packard	16.7
Buick Century	236	Buick Super	17.5
Buick Super	236	Cadillac 62	17.5
Buick Roadmaster	236	Mercury Montclair	17.6
Clipper	225	Buick Roadmaster	18.1
Lincoln	225	Cadillac 60	18.2
Oldsmobile Super 88	202	Imperial	18.3
Oldsmobile 98	202	Studebaker Pres.	18.4
DeSoto Fireflite	200	Oldsmobile Super 88	18.6
Mercury Montclair	198	Lincoln	18.8
Buick Special	188	Dodge Royal V8	19.0
Chrysler Windsor	188	Chevrolet V8	19.1
Mercury	188	Oldsmobile 98	19.1
DeSoto Firedome	185	Dodge Coronet V8	19.4
Oldsmobile 88	185	Plymouth V8	19.4
Dodge Royal V8	183	Pontiac Chieftain	19.5
Pontiac	180	DeSoto Fireflite	19.7
Dodge Coronet V8	175	Pontiac Star Chief	19.7
Studebaker Pres.	175	Buick Special	19.9
Plymouth V8	167	Ford V8	20.0
Chevrolet V8	162	Cadillac 75	20.1
Ford V8	162	Oldsmobile 88	20.1
Kaiser 6	140	DeSoto Firedome	20.9
Studebaker Comdr.	140	Chrysler Windsor	20.9
Chevrolet		Studebaker Comdr.	22.0
Powerglide 6	136	Chevrolet	
Nash Ambassador 6	130	Powerglide 6	23.7
Chevrolet		Kaiser 6	24.1
Handshift 6	123	Willys 6	24.2
Dodge 6	123	Chevrolet	
Ford 6	120	Handshift 6	25.4
Plymouth 6	117	Ford 6	26.1
Willys 6	115	Dodge 6	26.8
Studebaker Champ.	101	Plymouth 6	26.8
Nash Statesman 6	100	Studebaker Champ.	27.8
Rambler 6	90	Rambler 6	29.2

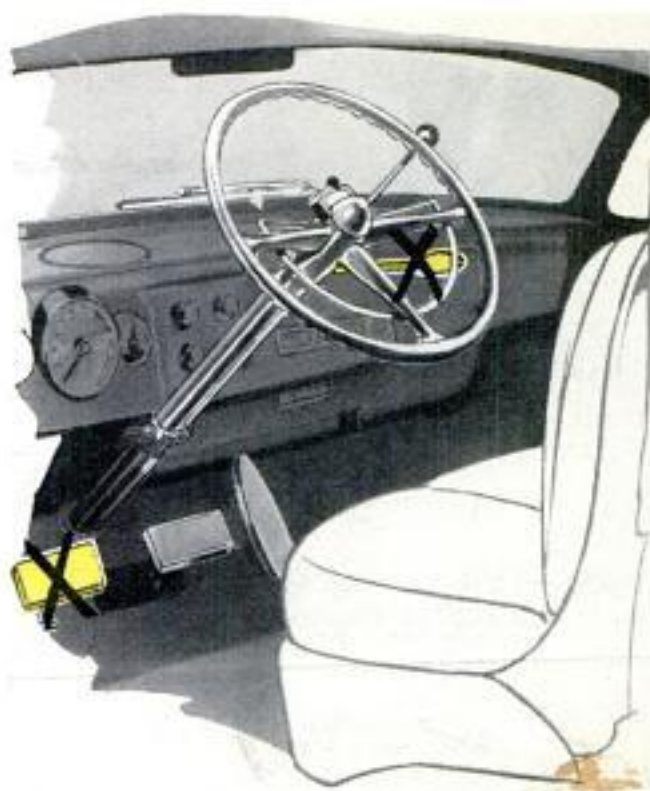
Note: Data on Nash and Hudson V8 engines not available

WHAT MAKES AUTOMATIC TRANSMISSIONS AUTOMATIC?

By Ed Packer

NOW THAT MOST CARS are equipped with automatic transmissions that require simply placing a speed-selector lever in one position and leaving it there for most driving conditions, the clutch pedal and gearshift lever are fast becoming as obsolete as running boards. But, what makes an automatic transmission automatic?

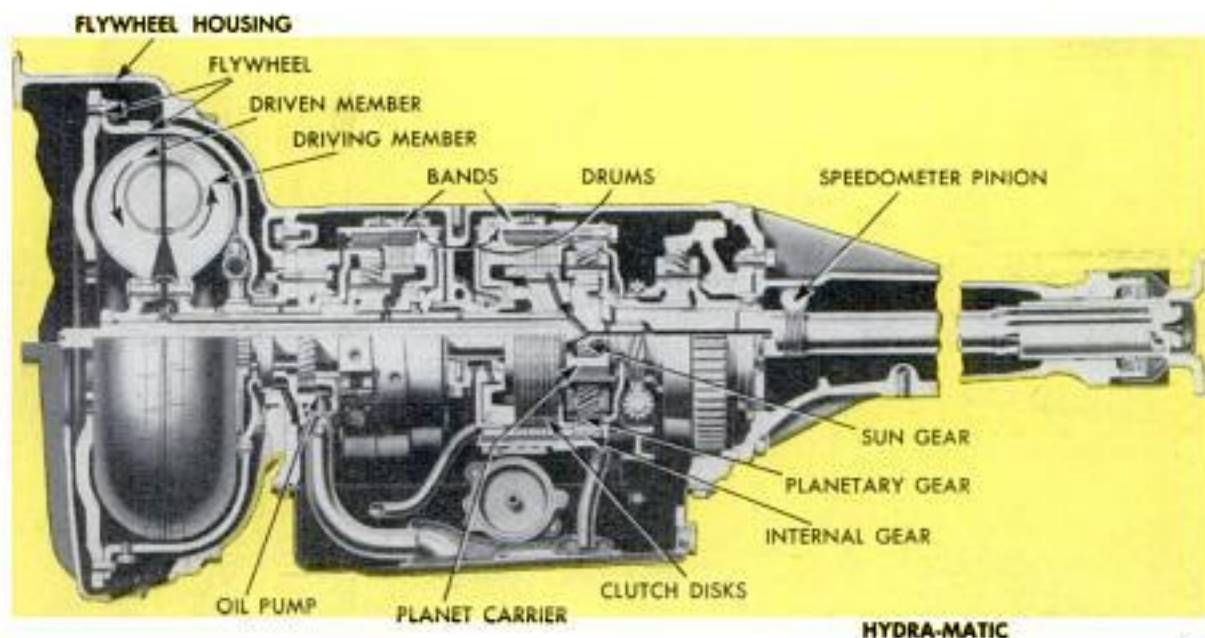
All automatic transmissions have three main parts. The first part is a fluid coupling or a torque converter, which replaces the conventional friction clutch. However, some of these transmissions retain a friction clutch which is located between the engine and the fluid coupling or torque converter. It is automatically released and engaged by hydraulic controls. At high speeds it is engaged for direct drive and the torque converter is ineffective. The second part of an automatic transmission is the gearing; planetary-gear sets replace the conventional sliding gears. The third, and most important, part of an automatic transmission is the hydraulic controls. Hydraulic controls make an automatic transmission truly automatic.



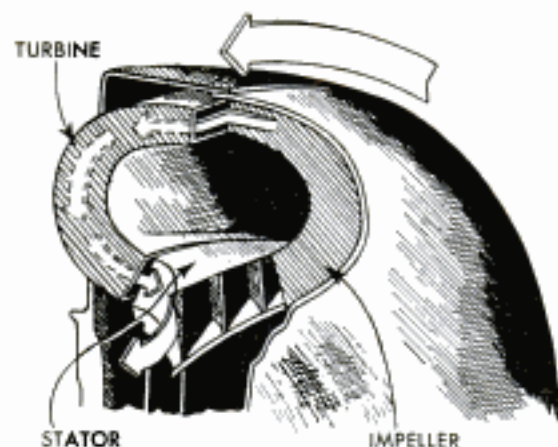
Disregarding friction clutches, which differ in operation from conventional clutches only because they are engaged and disengaged automatically, the first part of an automatic transmission will be either a fluid coupling or a torque converter.

The action of a fluid coupling generally is described as two fan blades facing each other in a closed housing containing oil. When one fan, the driving impeller which is connected to the motor, rotates, it forces oil against the other blade, the driven turbine which is connected to the transmission gears, and causes it to rotate.

The fluid coupling and torque converter



1



2

Figs. 2 and 3 show oil flow in torque converter. In Fig. 3, pin-wheel tips represent flow



3

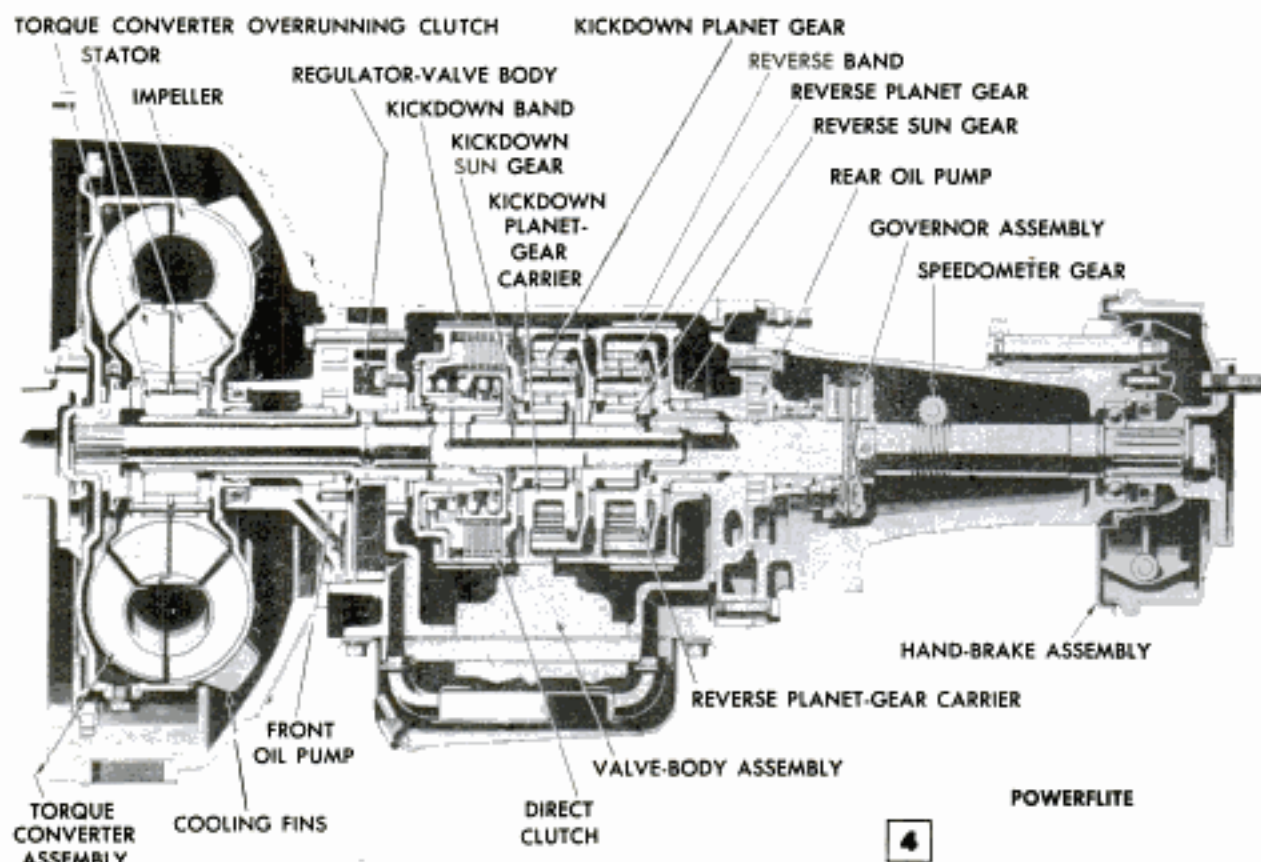
are similar in that both include a driving impeller and driven turbine, which receives the power for transmission. The main difference between the two is the use of one or more reaction members, called stators, in the torque converter. The stators have curved blades which change the direction of the oil. As shown in Fig. 2, oil leaving the turbine is discharged through the stator blades in a direction more nearly paralleling the direction of the rotation of the impeller. The oil then recirculates through the impeller and goes back through the turbine.

One late-model transmission has variable-pitch stator blades which function much like the blades on a variable-pitch airplane propeller. The pitch is controlled by the position of the foot throttle.

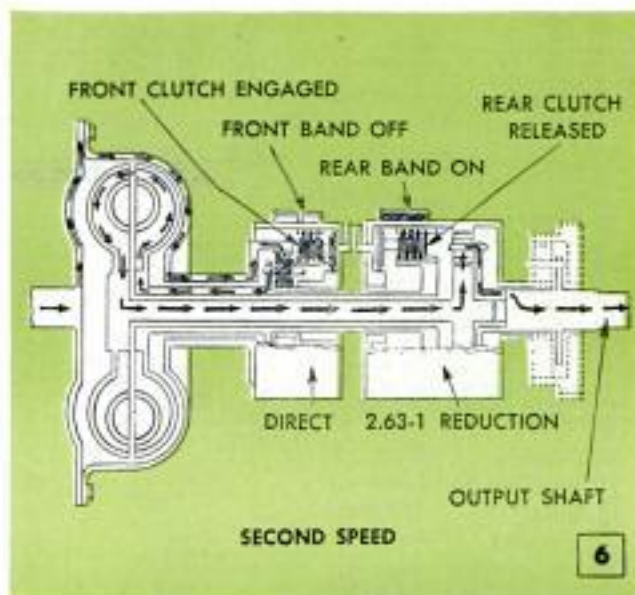
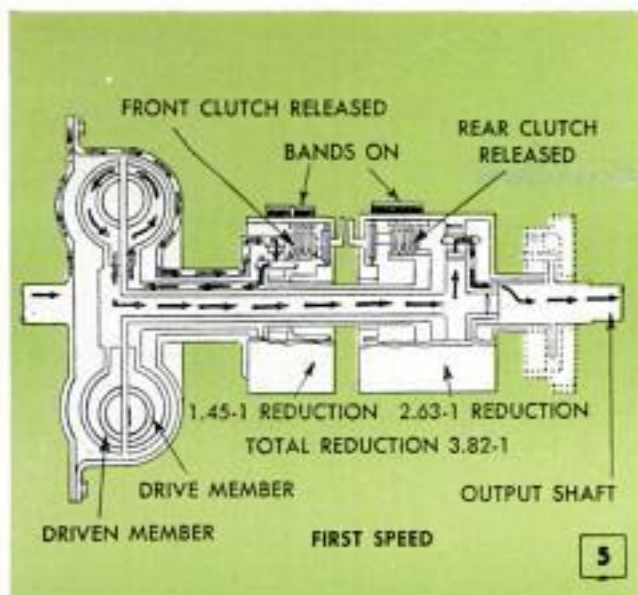
Fig. 3 is a rough diagram, showing the oil flow inside a torque converter, the tips of the pin wheel representing the flow of oil through the impeller to the turbine and back through the stator blades as the torque-converter assembly rotates.

Since the oil discharged into the impeller from the stator is already in motion, when it leaves the impeller it will have the energy added by the impeller, plus the energy it had when it entered. This is the reason for the seeming paradox of getting more torque from a torque converter than is originally given it by the engine.

As the turbine speed approaches that of the impeller, stator torque drops off toward zero; the effect being somewhat like a man pushing a sled down a snowy hill. At first he would push hard, then, as the sled picked up speed, it would run away from him. Because of this type of

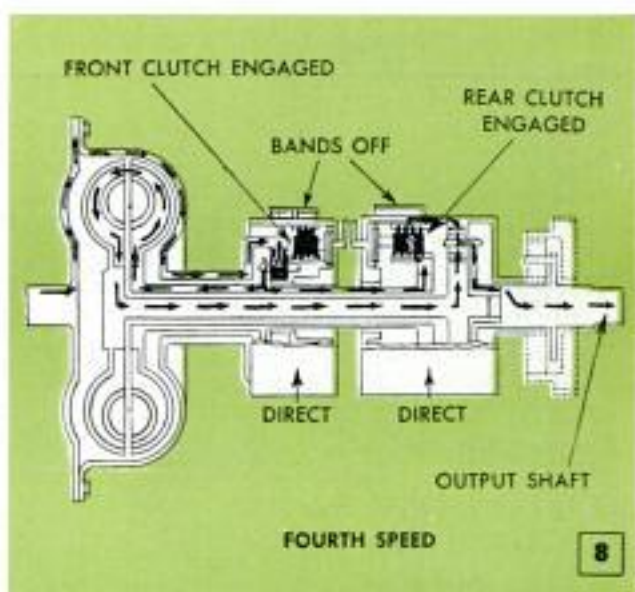
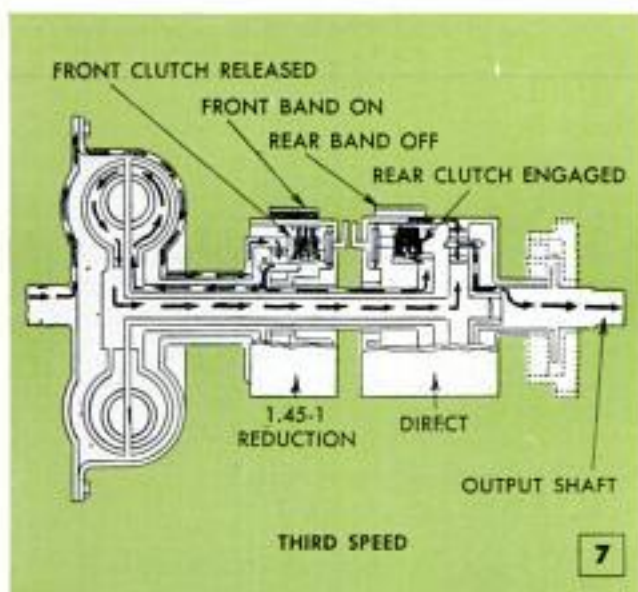


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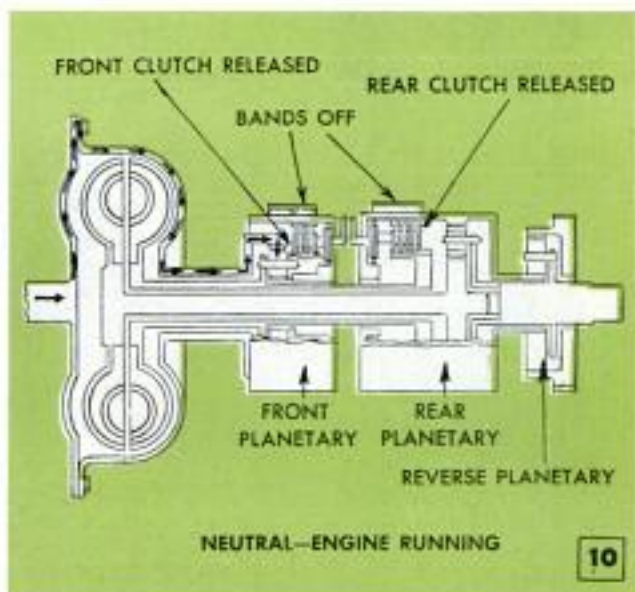
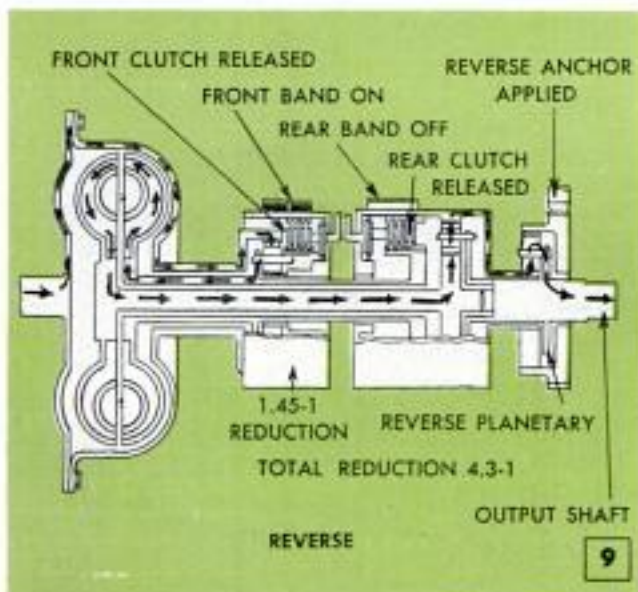
The sketches on this page show the paths of power flow through an automatic transmission with fluid coupling, two forward and one reverse planetary gear

Fig. 5 is first gear. Both bands on, both clutches off. Second speed, Fig. 6, has rear band and front clutch engaged, front band and rear clutch are released



Third speed, Fig. 6, reverses the setting of second. In third, the front band and rear clutch are engaged, front clutch and rear band released. For reverse, Fig. 9, below, reverse planetary is anchored, front band on

Fourth speed, Fig. 8, is direct drive. Both bands are off, both clutches engaged. Fig. 10, below, shows neutral. Both clutches off, both brake bands released. Reverse planetary gear idles except when anchored



COMPARISON OF AUTOMATIC TRANSMISSIONS

Name of Unit	Cars Using	Type of Fluid Drive		Positive Clutch	Torque Multiplication Available (to One)				
		COUPLING	CONVERTER (No. of Elements)		CONVERTER	PLANETARY GEARS			
					1st	2nd	3rd	4th	
Hydra-Matic	Cadillac Hudson (Jet)	X	—	No	—	3.82	2.63	1.45	1
	Kaiser								
	Lincoln								
	Nash								
	Oldsmobile								
Dynaflow	Buick		X -4	No	2.45	1.82	1		
	Packard		X -4	Yes	2.55	1.82	1		
Powerglide	Chevrolet		X -3	No	2.10	1.82	1		
Studebaker	Studebaker		X -3	Yes	2.15	2.31	1.43	1	
Fordomatic	Ford		X -3	No	2.10	2.44	1.48	1	
Merc-O-Matic	Mercury		X -3	No	2.10	2.44	1.48	1	
	Chrysler		X -3	No	2.60	1.72	1		
Powerflite	DeSoto		X -3	No	2.60	1.72	1		
	Dodge		X -3	No	2.60	1.72	1		
	Plymouth		X -3	No	2.60	1.72	1		
	Imperial		X -3	No	2.60	1.72	1		
Hudson	Wasp		X -3	Yes	2.10	2.31	1.44	1	
	Hornet		X -3	Yes	2.10	2.31	1.44	1	

characteristic, the stator has an over-running clutch that permits it to turn freely when it no longer provides a boost in torque. The torque converter then functions very much like a fluid coupling.

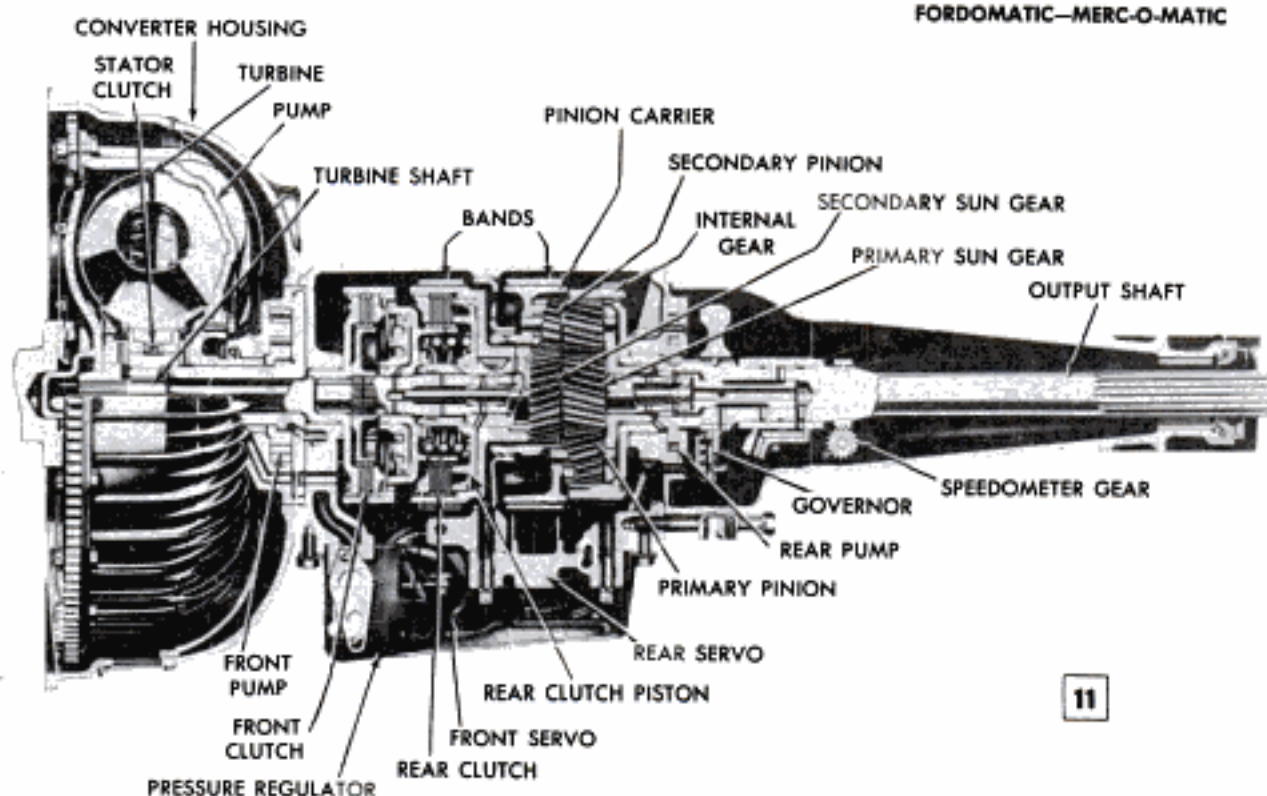
All automatic transmissions contain one or more planetary-gear sets, Figs. 12 and 13. The planetary gear consists of a center, or sun, gear, one or more planet gears (usually three) meshing with the sun gear and an internal gear whose teeth mesh with the planet gears. The planet gears are held by a planet carrier which permits

them to rotate on their own shafts. Thus, the sun gear, planet gears and internal gear all can rotate on their own shafts and also rotate around or inside each other.

In one automatic transmission, the sun gear is fastened to the input, or driving, shaft, while the planet carrier is fastened to the output, or driven, shaft. Other transmissions use various arrangements in coupling the parts of the planetary gears to the driven shaft and driving shaft.

A brake band is placed around the outside of the internal gear, so it can be held

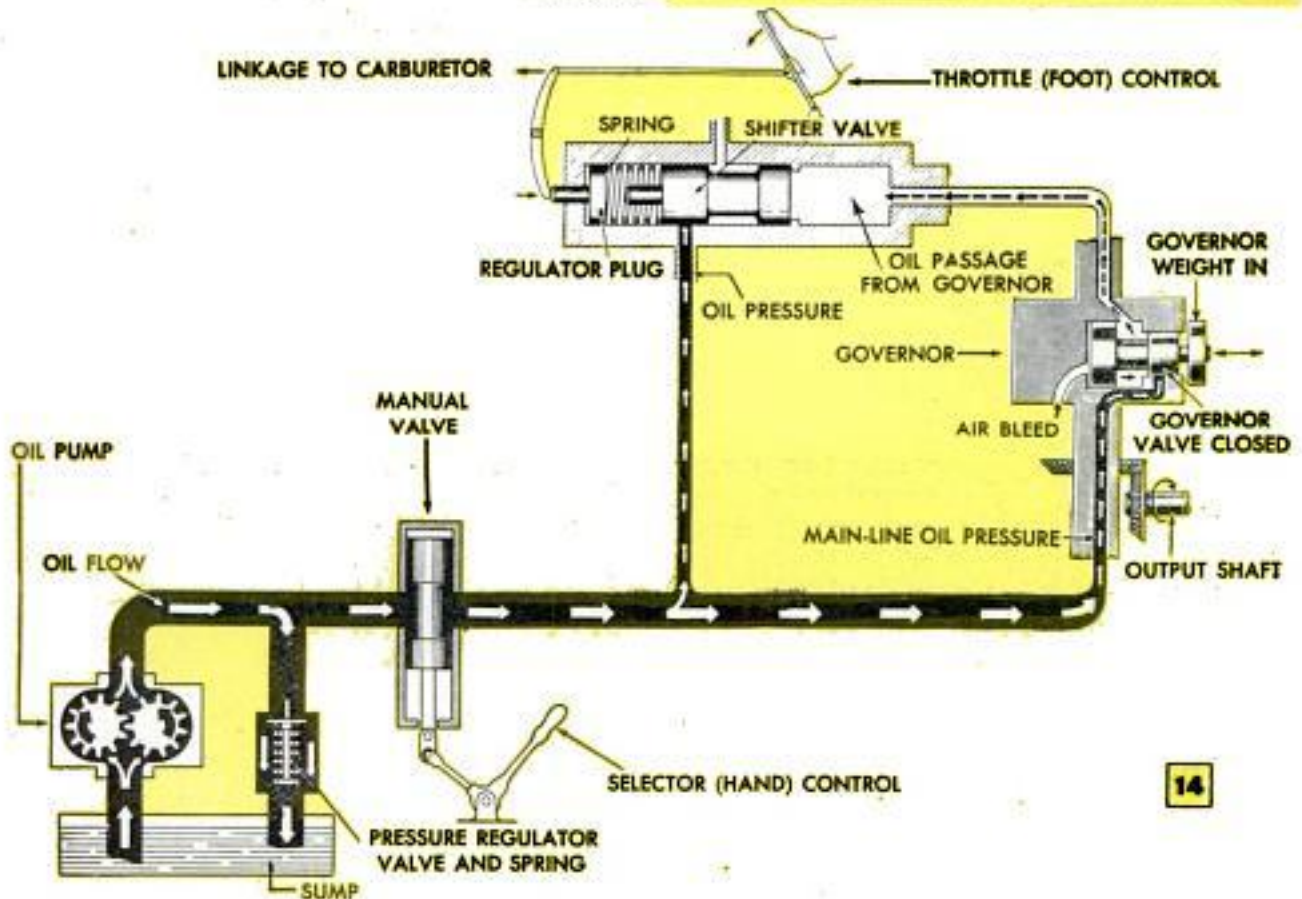
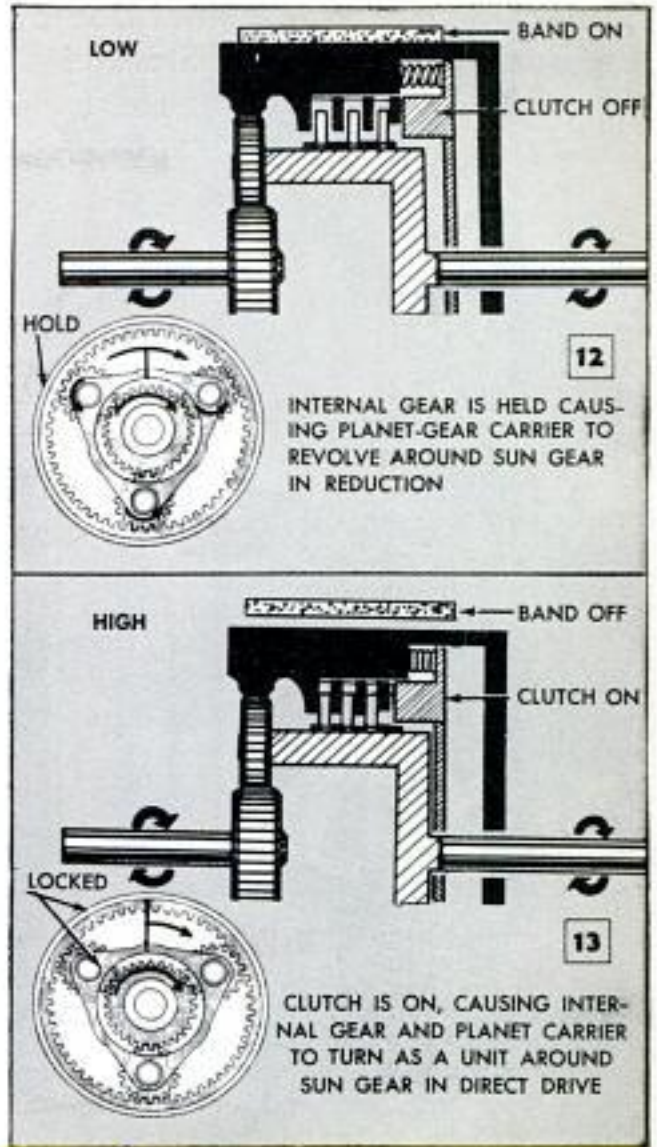
FORDOMATIC—MERC-O-MATIC



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stationary when desired. A multiple-disk clutch is fitted in the planetary-gear set to permit locking the planet carrier to the internal gear. A three-planetary-gear, including reverse, transmission is illustrated in Figs. 5 to 10, inclusive. Basically, when both brake band and clutch are released, a planetary gear is in neutral, Fig. 10. When the internal gear is held with the brake band, Fig. 12, the planet gears revolve around the sun gear inside the internal gear, resulting in a reduction of movement and an increase in torque to the rear wheels. When the brake band is released and the planet-gear carrier and internal gear are locked together with a multiple-disk clutch, Fig. 13, they turn as a unit with the sun gear, providing direct drive.

The third part of an automatic transmission is the hydraulic controls, Fig. 14. Oil, under pressure, must be available to actuate the various controls. It is kept at a constant pressure by a pressure-regulator valve in the hydraulic-control system. Maintaining this pressure is one of the reasons an automatic transmission requires extra engine power. The selector lever on the steering column controls the manual valve which directs the oil to the proper location for the desired speed or direction. Speed changes also can be made by using the foot throttle, which sometimes is linked directly to a shifter valve, Fig. 14. The shifter valve provides a means of downshifting when extra acceleration is needed.



Shelves on Kitchen-Cabinet Doors Provide More Accessible Storage



Much of the inconvenience of stooping to reach into kitchen base cabinets can be avoided by attaching shelves to the doors. Then, when the doors are opened, most of the items are within easy reach. The shelves are rounded at the corners to clear the frame as the door is opened and a railing of metal weather stripping is screwed to the edges to prevent articles from sliding off. Depth of the cabinet shelving is reduced to provide clearance for the shelves on the door.

Paper Match Against Candle Wick Aids Lighting in Wind



If you have difficulty lighting a candle because of wind or dampness, bend a paper match so it can be held with its head against the wick. When flame is applied to match, it will ignite and fire the wick.

Estimating Floor-Tile Needs

Here is a quick and simple method of determining the number of 9 x 9-in. tiles needed to cover the floor of a room. First

multiply the length of the room by the width to determine the square feet. Next, double the square footage and subtract 10 percent of the number. The difference will be the number of tiles required. For example: A room is 8 x 14 ft., or 112 sq. ft. Double the number is 224 sq. ft. Subtract 10 percent, which is 22, and the answer is 202 tiles.—Tom Riley, Portland, Ore.

Plastic Sheet Over Drawing Protects Against Smudging

To prevent smudging a pencil drawing when adding lettering, use a sheet of celluloid or clear plastic in which a "window" is cut, as a shield over it. The edges of the window will hold the paper smoothly in place, and the transparent plastic

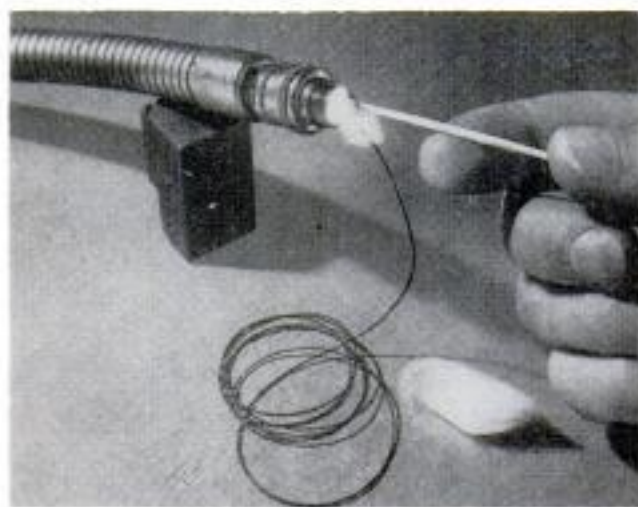


will permit more accurate spacing and location of the lettering than would a piece of paper used for the same purpose.

Wire Fed Through Lamp Column By Using Thread and Cotton

When ordinary methods do not permit feeding a wire through a lamp column which has a number of sharp curves and bends, a bit of cotton and a length of thread may be used to do the job. Tie the thread to the cotton which then is pushed into the lamp column with a toothpick or skewer. Now, feeding the thread carefully, blow into the column so the cotton is forced to the other end. When the cotton emerges, tie a heavy twine to it and pull it back through the column. The twine now can be used to pull through the wire for the lamp.

Ken Murray, Colon, Mich.



Whip Those Horses

By Fritz Springmann



WHEN "BREAKING IN" a new car, it should not be driven fast, nor should it be babied. High-speed driving will result in scuffed pistons and rings, and scored cylinder walls; consistently slow driving will guarantee an owner that his engine never will be properly broken in.

The drivers for the research department of the Union Oil Company of California, among others, use the "whip" technique when breaking in a new car; alternating periods of slow driving with a few seconds of fast driving.

Because modern heavy-duty motor oils give so much protection, they actually tend to retard proper break-in. In a new engine it is necessary, temporarily, to defeat the purpose of the tough oil film which coats the parts inside. The parts must be made to wear against each other. However, the wear must be controlled. Using the whip on the horses under the hood will provide a driver that means of control.

When a new car is ready to be broken in for test work by an oil company, a professional driver drives it for about 1/2 hr., or until the engine is thoroughly warmed.

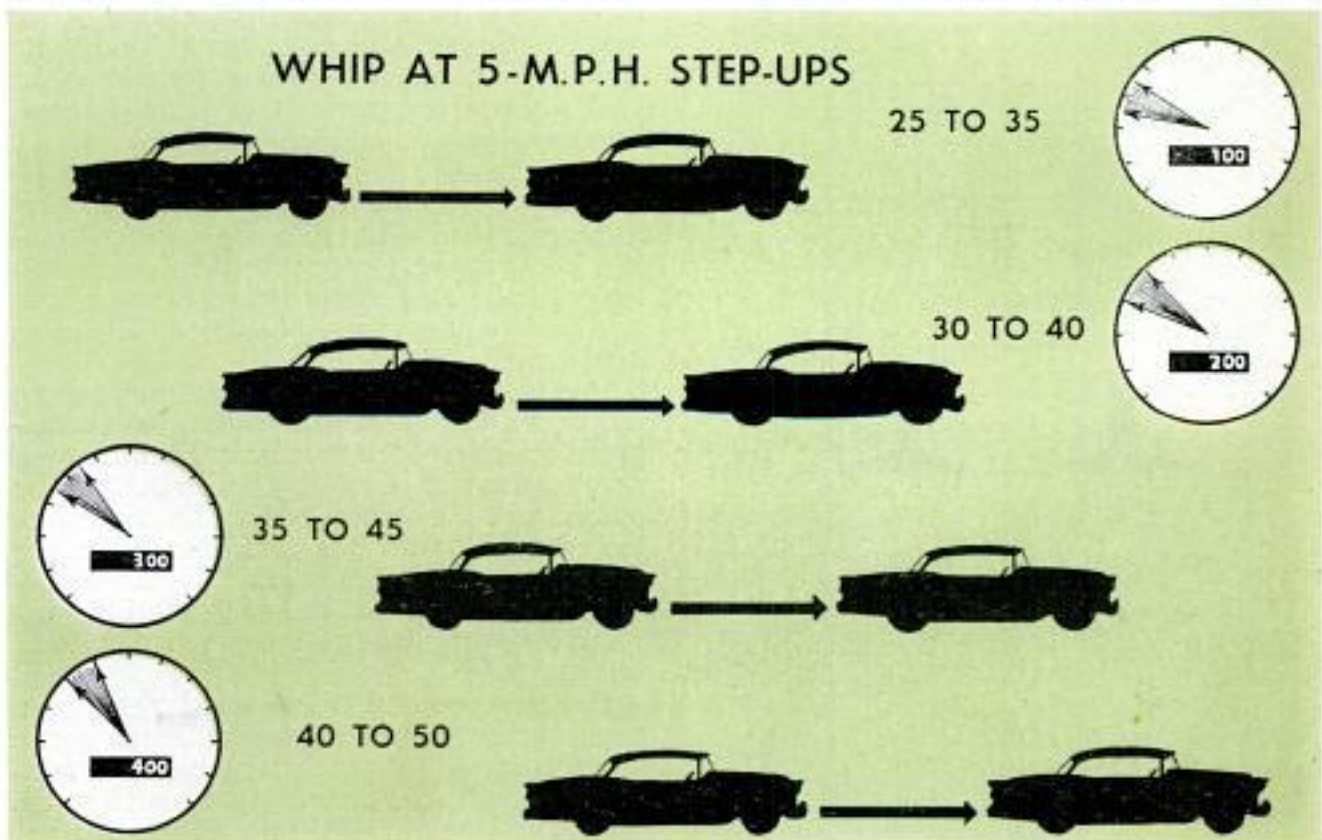
Usually, the driving is done on a stretch of highway where the traffic is light.

The stretch of highway is approached at a speed of 25 m.p.h. Then, using a half-

throttle acceleration, the car is whipped up to 35 m.p.h. At 35, the throttle is released and the car allowed to drop back to 25 m.p.h. After a short run at 25, the car is again whipped to 35. This procedure is repeated for 100 miles. At the end of each 100 miles, the whip is stepped up 5 m.p.h. From 25 to 35 in the first 100 miles, the whip is stepped up to 30 to 40 in the second hundred, then 35 to 45, and so on, until the legal speed limit is reached. Beginning at the 35-to-45-m.p.h. period, a full-throttle whip is alternated with a half-throttle whip.

The whip provides the proper break-in conditions because when the engine is started on the run, the oil film on the cylinder walls is hot and thin. When the engine suddenly is accelerated, it works harder and, for just an instant, the oil film on the high spots in the metal of the cylinder wall and piston is ruptured, upper detail, page 176. In that instant, tiny metal particles are ground off.

When the throttle is released, the engine "relaxes" and oil flows back to the cylinder



Do's and Don'ts for the New-Car Owner

Do:

Keep the engine hot and running during the break-in period. Plan a 3 or 4-hr. trip. Continuous driving is best for break-in.

Use high-octane gasoline during break-in. Detonation—knocking—resulting from low-grade gasoline, is particularly harmful to a new engine. The uncontrolled explosive force of the knock slams the piston against the cylinder wall, causing excessive wear at the top of the stroke. Also, there is possibility of damage to the rings.

Follow the manufacturer's recommendations. Thousands of miles on prototype engines have provided him with information unavailable to anyone else. It's in his interest, as well as yours, that the engine be broken in properly to assure a long and efficient life.

Have the engine well broken-in when it is taken in for the periodic new-car inspections. It is difficult, if not impossible, for a mechanic to diagnose possible difficulties in an engine that is not well run-in.

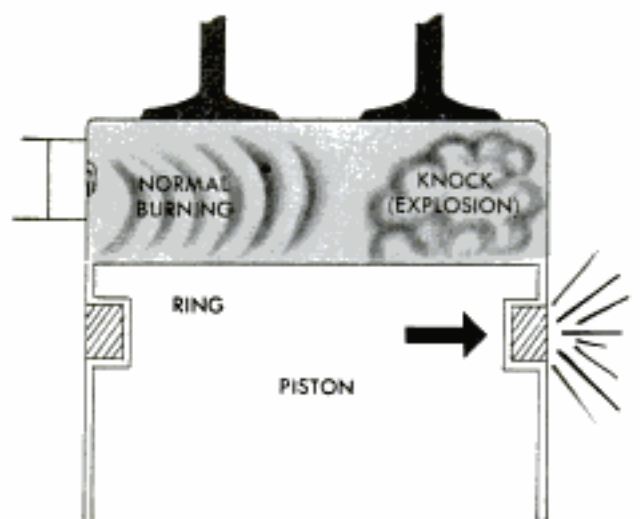
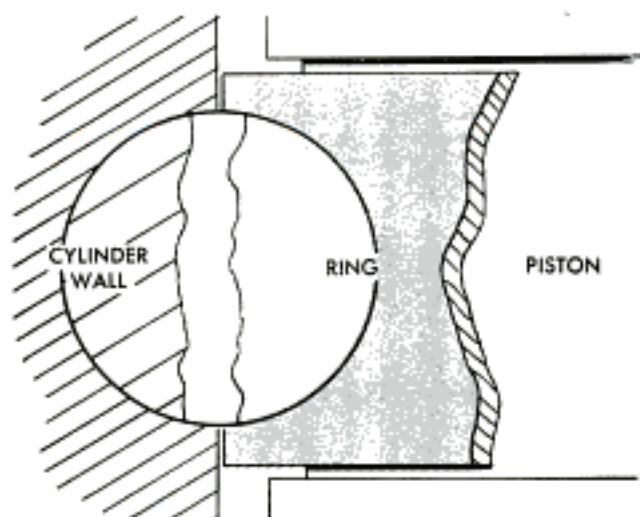
Don't:

Drive for long periods of time at high speeds. Steady, fast driving allows the metals to touch and wear, but there is no polishing action. Lift your foot occasionally and let the motor ease off so oil will get into the ring and cylinder-wall areas.

Idle the engine any more than is necessary. When a car idles, oil flow is low, no matter what the pressure gauge shows. Lubrication to the new, rough cylinder walls and rings is inadequate. Scuffing—localized wear—can result and cause permanent damage.

Warm up the car in the morning by idling it slowly. Start the engine, allow a half minute or so for the oil to circulate, then drive away. An engine warms best by working; it does not work at an idling speed.

Try jack-rabbit starts from a stop light. The sudden acceleration scrapes the oil from the cylinder walls and bare metal-to-metal contact occurs. Scored cylinder walls and broken rings are often the result.



walls. The oil, under pressure, polishes the spots where the metal has been ground off. Slow speed and slow acceleration are used to grind these first high spots. Then, as more metal is removed and polished, the engine is speeded up and the accelerations are more rapid.

The whip technique, in spite of its name, conforms with the recommendations of car manufacturers. Also, the normal conditions of heavy traffic fit the whip technique. In traffic there are periods of slow driving, alternating with sudden accelerations, or whips.

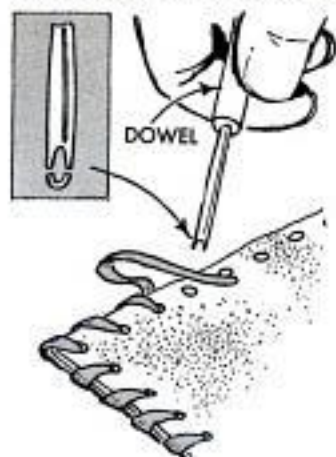
A few words of caution about breaking in an engine: Do not idle the engine excessively. Four or five minutes is much too long; piston-ring manufacturers specifically advise against long periods of idle with new rings.

Use a premium-grade gasoline during the break-in period. Detonation from low-grade gasoline is particularly harmful to a new engine; the explosive force behind the detonation slams the piston rings against the cylinder walls, causing faster wear near the top of the piston stroke, see lower detail at left. Normal-burning gasoline assures an even impulse over the full face of the piston.

The glass-smooth, well-fitted parts of a properly broken-in engine will not break down the oil film when the engine is suddenly accelerated or driven at high speeds.

Just remember, when the engine is new, whip those horses! ★★★

Tool Improvised From Needle Aids Leather Craftsman



A tool made by modifying a darning needle can be used by the amateur leather craftsman to speed the job of lacing or binding with leather thongs. First, the point of the needle is pushed into a short length of wooden dowel to provide a handle

for the tool. Next, the top of the needle is broken off to form a two-tined fork. The fork fits over the leather thong and is used to force it through the holes.

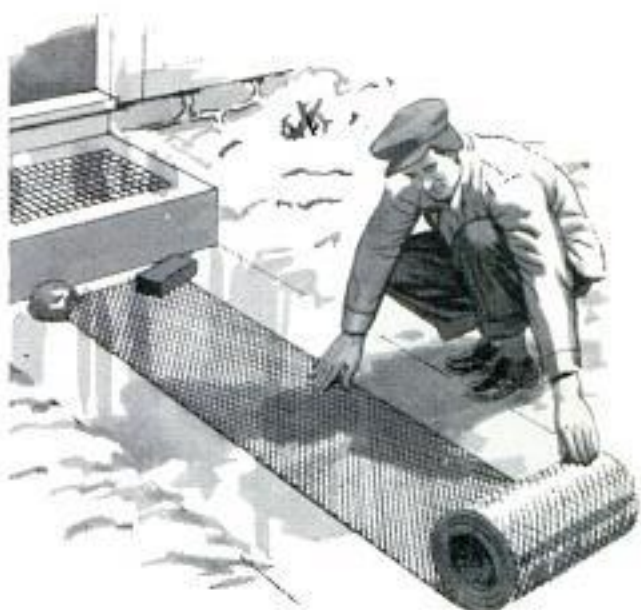
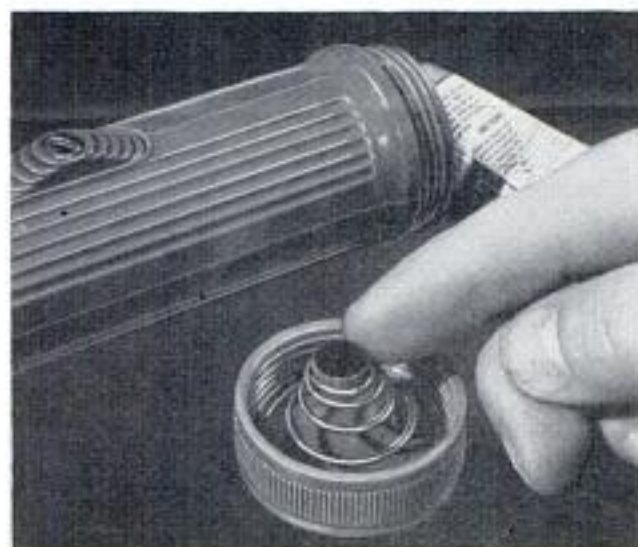
Rubber Scraper Spreads Glue

A rubber plate scraper, the blade of which has been notched saw-tooth fashion to a depth of $\frac{1}{2}$ in., provides a practical glue spreader. Such a spreader distributes the glue evenly over large areas and is easy to clean when the job is finished.

Plastic Cap Provides Insulator To Protect Flashlight Dry Cells

The dry cells in a flashlight will not be dead when the light is needed if it is stored with the plastic cap from a tube of toothpaste fitted in the contact spring at the bottom of the case. Even if the switch is turned on accidentally, the cap will effectively insulate the spring from the dry cell and prevent a complete electrical circuit. It takes only a moment to unscrew the end of the flashlight and remove the cap when the light is to be used.

Ken Murray, Colon, Mich.



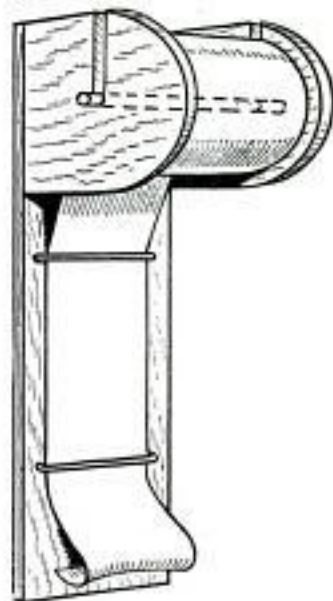
Ice-Glazed Sidewalk Made Safe With Wire-Mesh Covering

The danger of slipping on an icy sidewalk can be reduced if the sidewalk is covered with small-size wire mesh. A roll of the mesh 24 in. wide and the length of the sidewalk can be kept at hand and unrolled when necessary. To keep the mesh flat, weight the ends and points along the edges with bricks. A person's weight on the mesh will cause it to grip the ice and prevent it from slipping. The mesh has several advantages over the spreading of salt on the walk, the biggest one being that salt may kill grass near the sidewalk.

Adding-Machine Tape in Holder Used for Shopping Lists

A plentiful supply of paper on which to write notes and shopping lists is assured by a roll of adding-machine tape in this holder. The base of the holder is cut from $\frac{1}{4}$ -in. plywood, and is $3\frac{1}{2}$ x 12 in. The dimensions of the slotted brackets are determined by the size of the roll of paper, which should be purchased before they are cut. The roll is slipped over a $\frac{1}{4}$ -in. dowel which then is dropped into the slots. Lengths of coat-hanger wire are bent and fitted into holes drilled in the base to provide paper guides.

Dorothy Marshall, Palisades Park, N. J.



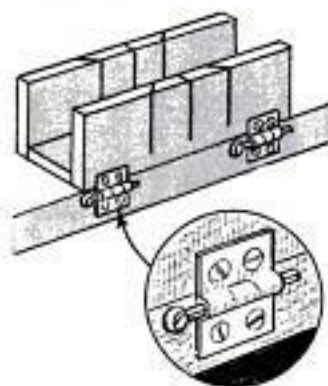
Pickets in Fence Kept Aligned By Sheet-Metal Gauge



Pickets are spaced evenly and parallel and the bottom ends all kept level with a gauge cut and shaped from sheet metal. The gauge, shown in the detail, hangs from the top rail of the fence, rests against the bottom rail and supports the bottom of picket being nailed. The width of the gauge will depend on the spacing desired between pickets. The length of the pickets and the distance they are to be kept above the ground determines the length of the gauge from the top to bottom bend.

William B. Eagan, Louisville, Ky.

Miter Box Held on Workbench With Cotter-Pinned Hinges



The problem of holding a wooden miter box firmly on a workbench top can be solved by using a pair of butt hinges with removable pins. The hinges are screwed to the miter box and to the front edge of the workbench at any

desired location. The regular hinge pins then are removed and replaced with cotter pins, to permit quick installation or removal of the miter box.

Applying Hardwood Grain to Pine

Pine and other inexpensive woods can be grained in imitation of more expensive woods by applying ground color and grain-

ing or top color, then using a graining comb. In the more common of several procedures, the ground color is brushed on first and allowed to dry completely. The graining color, which is of a thick, puttylike consistency, must be thinned with turpentine so it can be brushed. A teaspoonful of japan drier added to each pint of ground color and graining color will speed drying. Apply the graining color, then, while it is still wet, use the graining comb to get the desired grain effect. One or more coats of varnish should be applied over the graining when it is thoroughly dry.

Francis W. Henry, Pottsville, Pa.

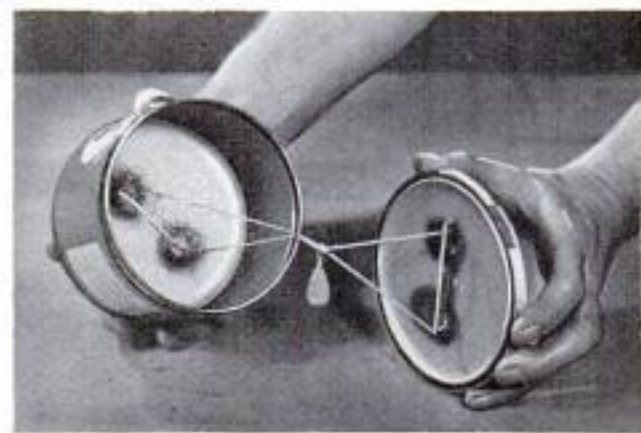
Reflective Tape Around Flagstaff Protects it From Damage

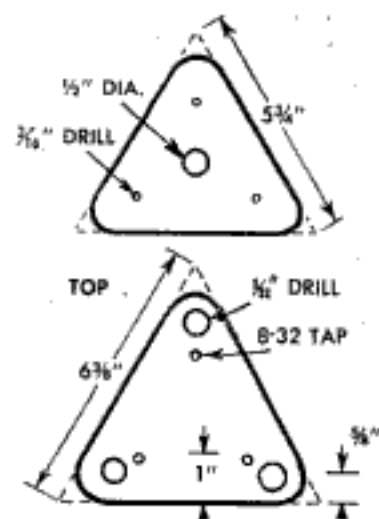
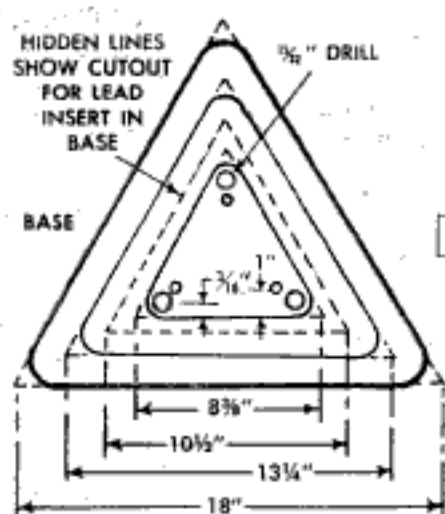
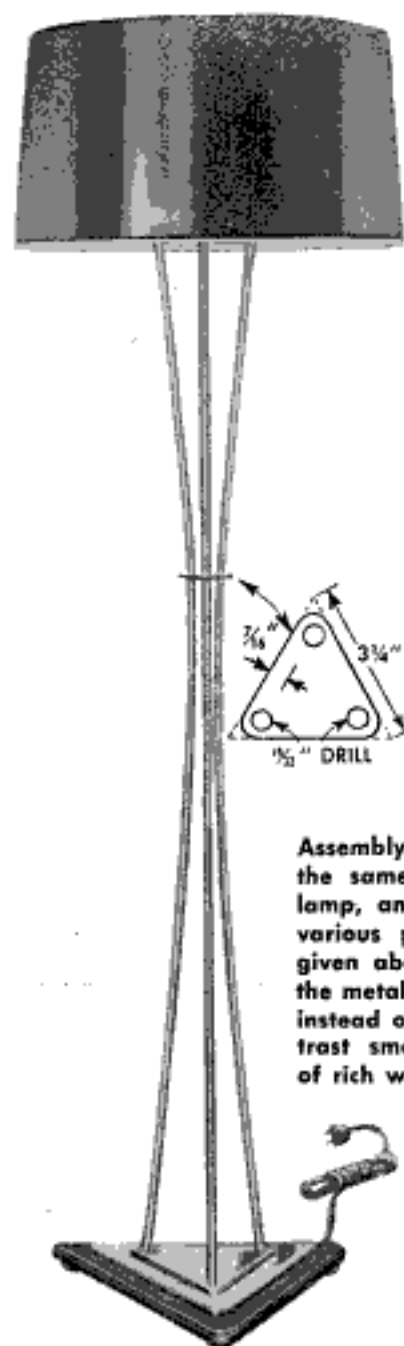
To reduce the chances of having a curb-mounted flagstaff broken or damaged by a carelessly parked car, one merchant wrapped it with reflective tape to make it more conspicuous. The tape was applied in a spiral from the ground up to a point clearly visible to any driver.



"Rollback" Toy for Small Tots Utilizes Empty Coffee Can

Mystifying and amusing to small children, this coffee-can toy will automatically return to the person who rolls it on a smooth surface. To make it, solder a length of wire to the inside of the lid and one to the inside of the bottom of the can. Bend the ends of the wires to form hooks into which rubber bands are fitted as shown in the photo. The two bands are tied together and a fishing sinker or other weight is tied or taped at the knot.





Assembly of the floor lamp is the same as for the table lamp, and the sizes of the various parts required are given above. If you prefer, the metal parts can be brass instead of aluminum to contrast smartly with a base of rich walnut or mahogany

birch plywood. The top assembly of each lamp consists of two triangular-shaped members of $\frac{1}{4}$ -in. aluminum. In the case of the table lamp, the bottom piece of the top assembly and the upper piece of the base assembly are drilled to take three $18\frac{1}{2}$ -in. lengths of $\frac{3}{8}$ -in.-o.d. aluminum tubing. The floor lamp requires three 56-in. lengths of $\frac{1}{2}$ -in.-o.d. tubing. Check the exact diameter of the tubing before drilling the holes so they will be a fairly tight fit over the ends of the tubes, and drill the holes at a 7-deg. inward angle. The tubes are locked to the top and base assemblies by slitting the ends for a distance of $\frac{1}{4}$ in. and then crimping the metal over as shown in Fig. 1. Collars sliced from larger tubing conceal the crimped ends and serve as spacers between the upper and lower aluminum plates. The tubes are held securely by the top plate which is drilled to set down

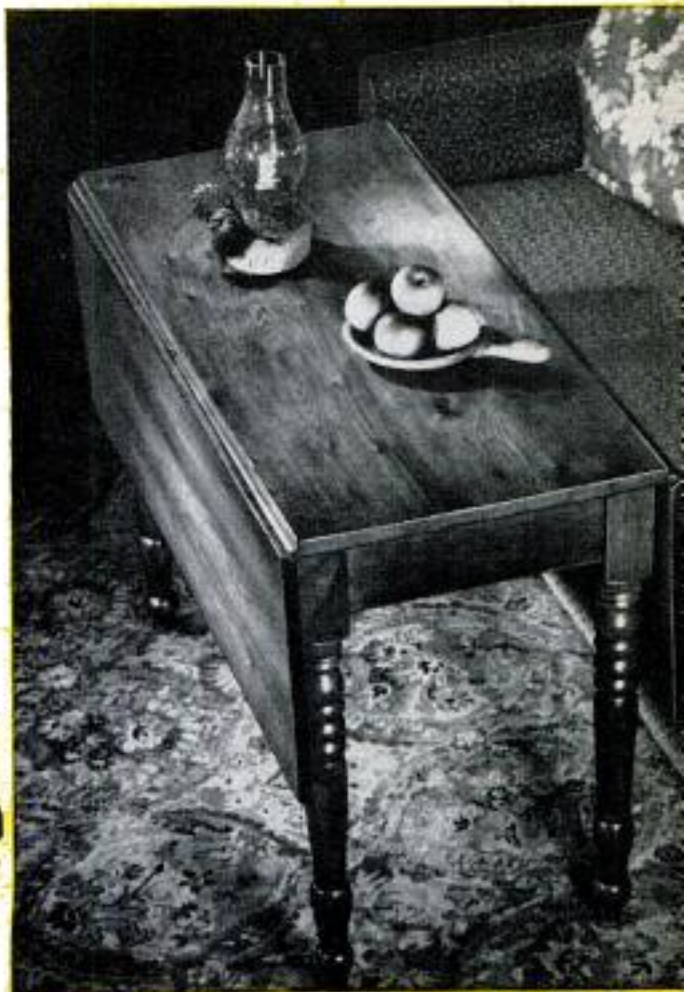
over a socket nipple and also drilled for three roundheaded chrome machine screws. Registering holes tapped in the bottom plate permit bolting the top plate firmly against the collars and crimped ends of the tubing. Notice that one of the collars, as well as the nut on the socket nipple, is slotted to admit the electric cord. Practically the same clamping method is used to hold the tubes to the base. Here, however, collars are omitted and shallow recesses are made in the second member of the base to house the crimped ends of the tubes so that the aluminum top plate may be pulled down flush with screws. Bases for both the table and floor lamp are weighted with lead which is held in a recess made in the underside of the base. Proper curvature of the tubing is maintained by a $\frac{1}{4}$ -in. spacer plate which is drilled as indicated and slipped over the ends of the tubes before the top assembly is attached. In the case of the table lamp, the plate should be positioned $6\frac{3}{4}$ in. down from the top and $17\frac{1}{4}$ in. down from the top of the floor lamp. It will be necessary to hand-bend the curvature of the tubes for the table lamp before assembly.

All metal parts of the lamps should be polished before assembly. If a soft finish is desired, simply remove any scratches in the metal with fine emery cloth and finish up with crocus cloth or Wetordry paper. If a buffing wheel is available, the aluminum parts can be given a chromelike polish. Either type of finish may be protected from tarnishing with a coat or two of clear metal lacquer.

Each lamp should be fitted with a three-way switch and bulb, the floor lamp being 100, 200, 300 watts and the table lamp 50, 100, 150 watts. A 20-in. shade is about right for the floor lamp, whereas a 16-in. shade, held by a 9-in. harp, is recommended for the table lamp. Rubber feet are added to the corners of the bases to provide clearance for the lamp cord.

Refinishing Old Tables

By
Walter E. Burton



ONCE A FAMILIAR ITEM in almost every home, the old drop-leaf table still can be found in many an attic or basement. These tables usually were made of fine cabinet woods, such as walnut or cherry, and are capable of being transformed into pieces of furniture welcome in present-day decorative schemes.

In fact, the drop-leaf table in restored condition is a popular antique-dealer item that usually commands a good price. These tables, however, often are over-restored,

the charming imprints of age having been ruthlessly planed, scraped or sanded away. In carrying out the refinishing process on such tables, or any other antique, you can save time and work while achieving a more pleasing appearance by taking it easy on the smoothing and sanding operations. A little unevenness and a few dents and stains lend an air of authentic age to the table. The photos on the following two pages take you through the steps of refinishing a typical drop-leaf table. ★ ★ ★

When refinished table in photo above is compared to the time-worn original in the photo at the right, the striking effects of refinishing become readily apparent. Natural beauty of the walnut grain was brought out, hinges repaired and joints reglued. Yet enough of the patina of age was allowed to remain in the table so it did not lose character as a fine antique piece

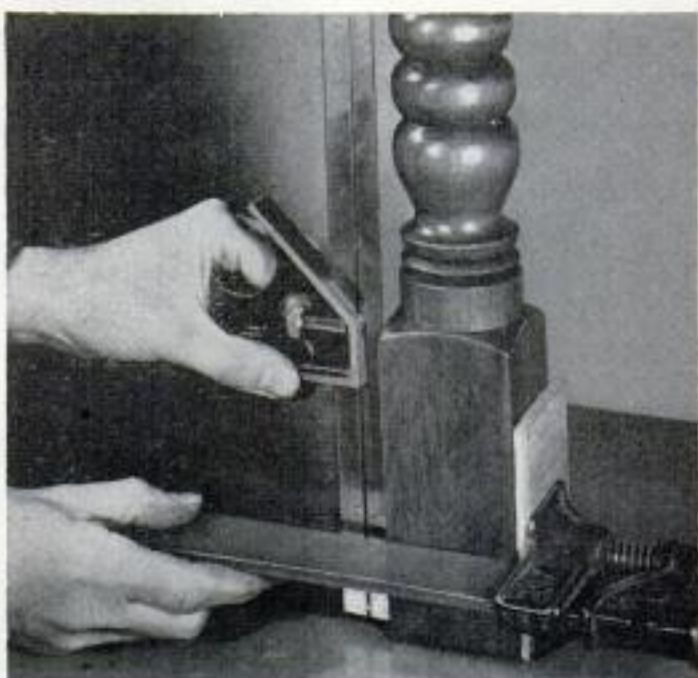




The first step in refinishing table is to take it apart. In this case, it was easy as the joints were fairly loose. Then the finish is stripped off with a commercial remover. A dull knife blade or a wad of steel wool can be used for removing the softened varnish from the turned portions of the legs. Wash off the remover with turpentine or other solvent. It is extremely important that all traces of remover be eliminated from the surface before the new finish is applied



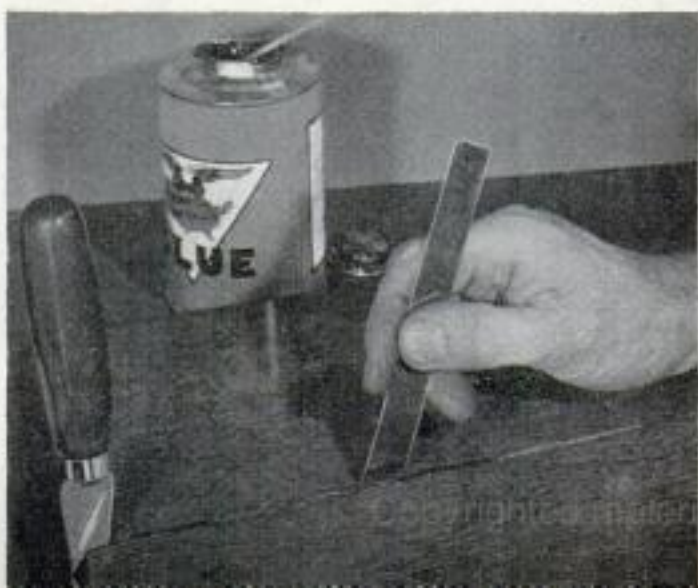
After all parts of the table have been cleaned of old finish and glue, reglue mortise and tenon joints of legs and apron. The groove noticeable in the apron may be used for clamping it to table top later



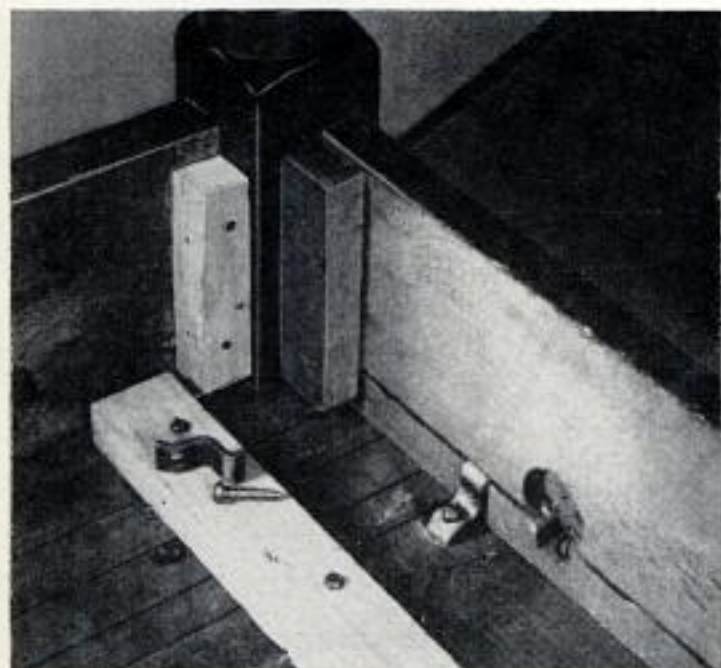
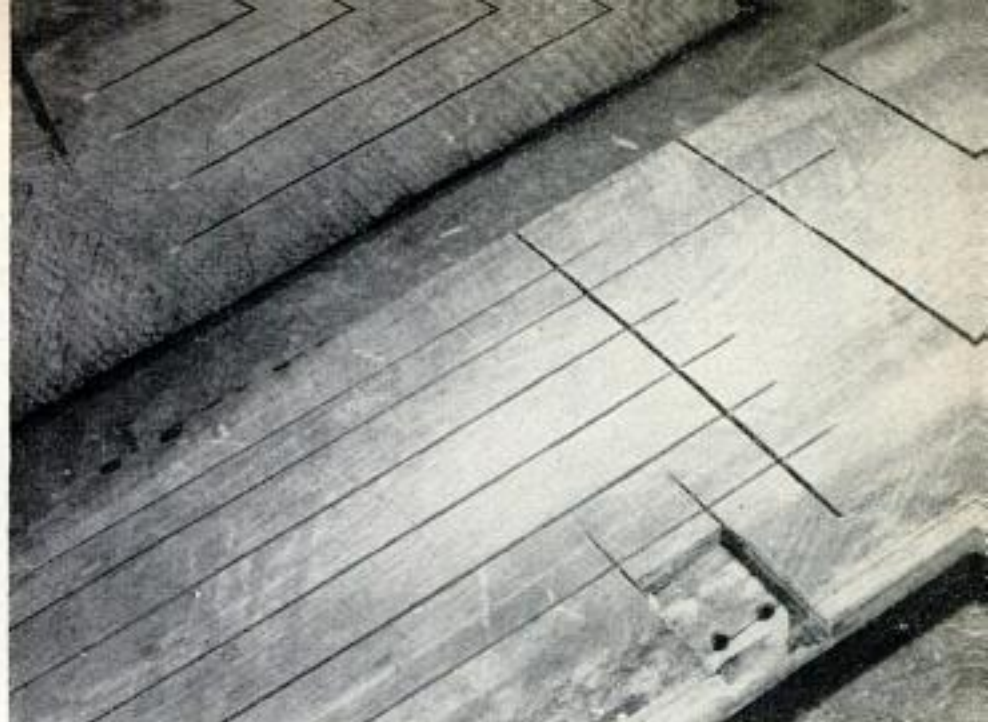
When gluing apron to legs be sure that parts are clamped at right angles. If alignment is not satisfactory, the leg usually can be swung into the desired position by shifting clamp pressure slightly

Joints of the table top and leaves each originally contained two dowels. Where boards are warped, two additional dowels are added between original pair. Glue is applied to board edges as well as to dowels

When leaf or table-top joint is sound except for a few inches at one end, pry open joint with knife, clean out with thin strip of steel or saw blade and apply glue with same tool. Then clamp joint for drying

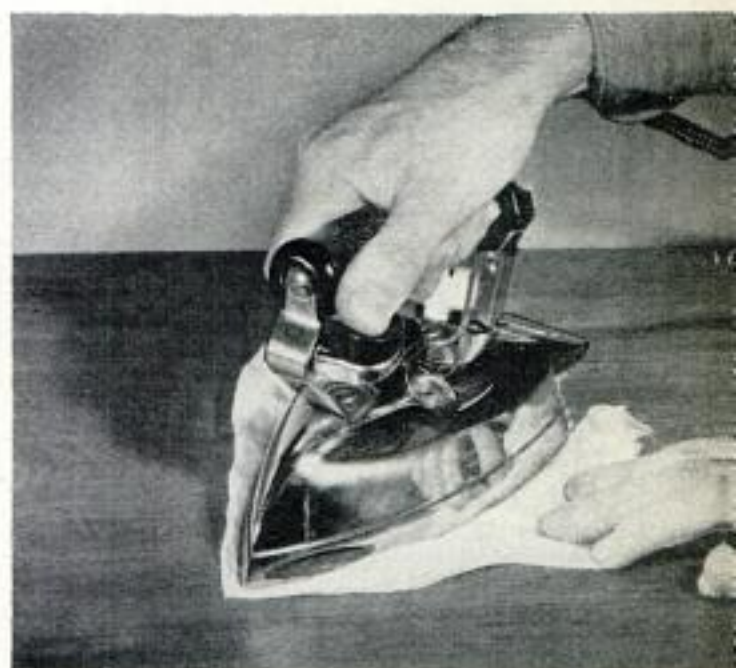
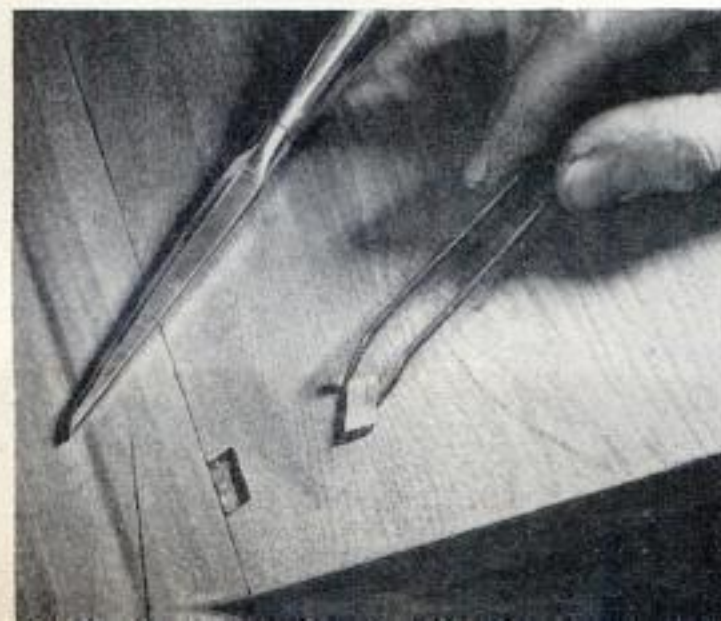


To straighten badly warped boards, make parallel cuts in the backs of the boards with a circular saw. Space cuts about 1 inch apart and make them in direction which will aid straightening. Cuts should be of a depth equal to $\frac{2}{5}$ to $\frac{3}{4}$ thickness of boards. Except in severe cases of warping, cuts should not run all the way to edges of wood. To straighten boards, lay them concave-side-down on several thicknesses of wet newspaper placed preferably on concrete floor. Paper should be directly under the warped portions only



After the boards are straight and before they have a chance to warp again, plane the edges, fit the joints, glue and clamp. Screw the table top to the aprons, reinforcing with steel clamps if necessary

Damaged spots that are objectionable can be filled with inlays of the same kind of wood. First cut recess, and an inlay to fit it snugly. Then apply inlay with quick-drying cement and sand flush with surface

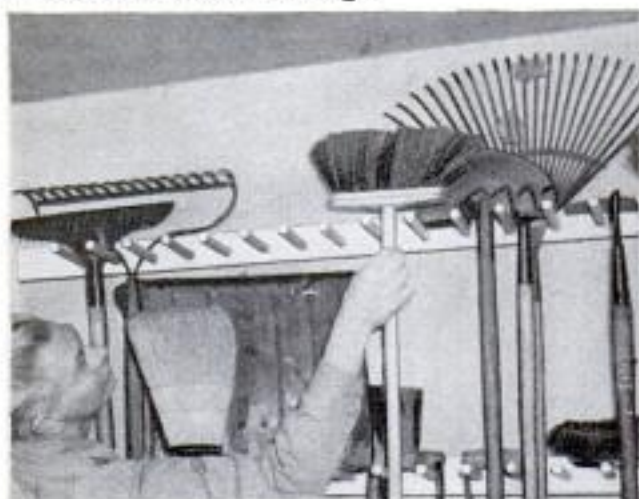


A few dents in table contribute to appearance of age. However, dents that you want removed can be "erased" by steaming the wood with a wet cloth and a hot iron. Raised area is sanded after wood dries

After table is ready for finishing, it is given three coats of shellac each of which is sanded. When shellac has dried, surface is waxed with furniture wax of proper color or a suitable wax-base shoe polish



Pegs in Narrow Board on Wall Provide Tool Storage



One method of hanging shovels, rakes, brooms and other outdoor tools in a garage or tool shed is to use rows of pegs spaced uniformly on a narrow board nailed to the wall studs. The pegs are $\frac{1}{2}$ -in. dowels about 8 in. long, glued into holes drilled at a slight downward angle. The pegs are long enough to hold even bulky and odd-shaped tools and several smaller tools may be hung on the same peg. Thus, maximum storage is provided in a minimum of space.

Bent Bolt Prevents Nut Turning

Turning a nut on a carriage bolt usually is quite difficult if the bolt itself turns in the hole in which it is inserted. This can be remedied by bending the shank of the bolt so it will become wedged against the side of the hole when the nut is tightened.

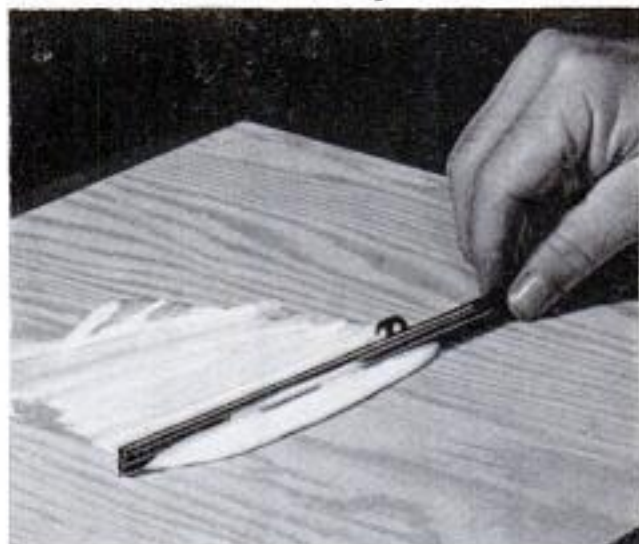
Radio Pilot Lamp Used To Replace Night Light



Often used as a night light, the small round bulb of the type shown at the left in the photo has a disappointingly short life. However, pilot-light bulbs, such as are used in radios, cost no more, provide as much light and last several times longer than the regular round bulbs. A radio pilot light is shown at the right in the photo,

fitted in the adapter which is required when the smaller pilot bulb is used in a regular-size socket. The adapter costs only a few cents and the bulbs are available either clear or colored.

Glue Spread for Wood Veneering With Windshield-Wiper Blade

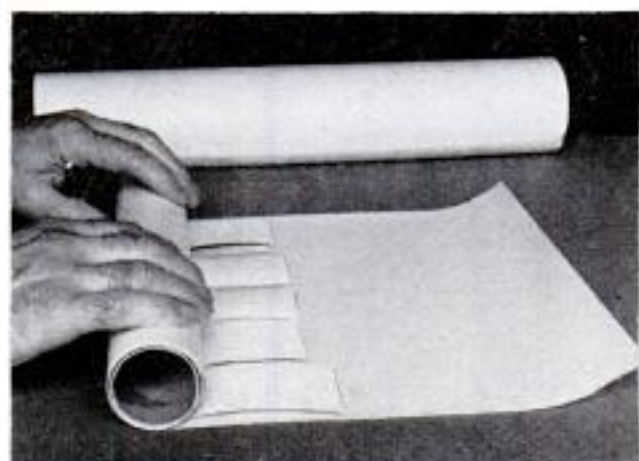


A windshield-wiper blade makes an excellent tool for spreading glue on a large surface when doing veneer work. The rubber of the blade passes over irregularities easily and produces a coat of glue of uniform thickness. Also, the chance of the glue drying more rapidly in one spot than another is reduced because a large area can be covered more quickly than with other types of applicators.

Curled Prints Straightened

Photographic prints which have a tendency to curl after drying can be straightened by rolling them in a roll of shelf paper. The prints are placed face downward, as shown in the photo, so that the curl is reversed. Two hours is sufficient time to straighten small photos; large prints should be left in the roll overnight.

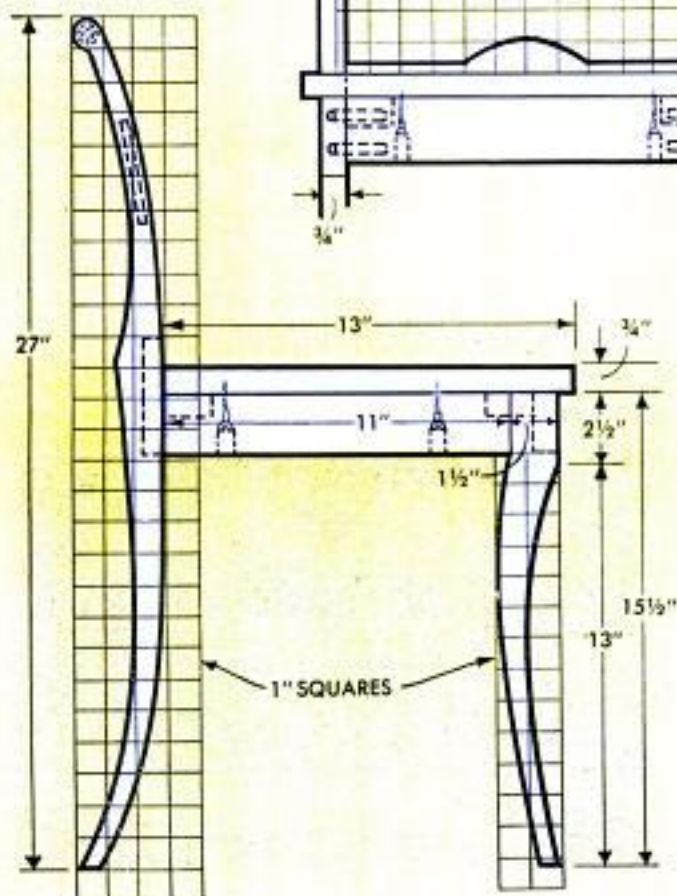
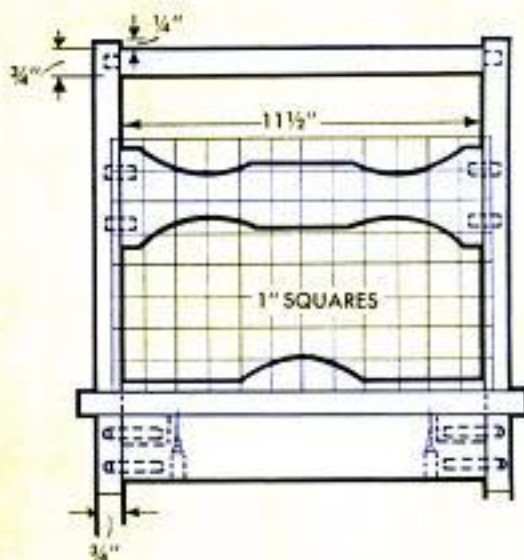
O. A. Nelson, Seattle, Wash.



TELEPHONE GOSSIP-CHAIR

By I. M. Fenn

GRACEFULLY PROPORTIONED to go well with a wall telephone shelf, this little chair can be nested under it when not in use. Walnut and mahogany are appropriate woods to use in the case of period furniture; birch and maple to match blond modern pieces. Start by making full-size paper patterns of all the scroll-cut parts. Both front and rear legs of the chair should be bandsawed in pairs, cutting two thicknesses of stock at one time and sanding the edges while both parts are still temporarily tacked together. Except for the seat, all the parts are doweled and glued. Before actual assembly, counterbored holes are made in the side and front seat rails for fastening the seat with screws. Corner blocks are added to provide rigidity.



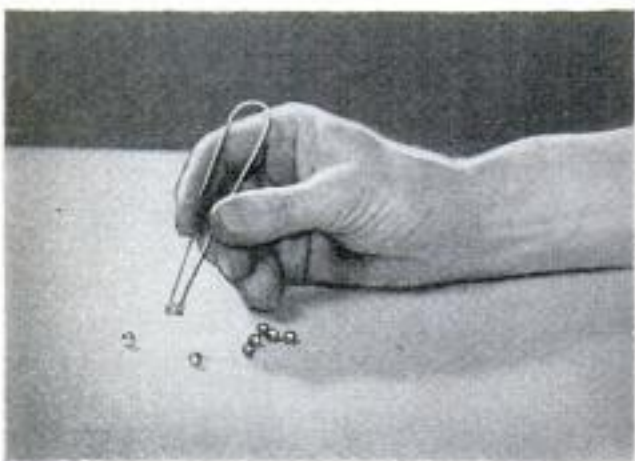
Simple Steel "Forks" Hold Screen To Aid Fitting on the Job



The problem of holding storm windows and screens on edge for planing, when fitting them on the job, was solved by one carpenter with a simple steel "fork." The fork is shaped from steel rod, as shown in the detail, and the bottom ends of the rod are ground to a point. In use, the fork is driven into the soil and the window or screen fitted inside. To provide firmer support and to permit planing in either direction, two forks should be used, one being placed at each end.

Ball Bearings Easily Picked Up With Wire "Tweezers"

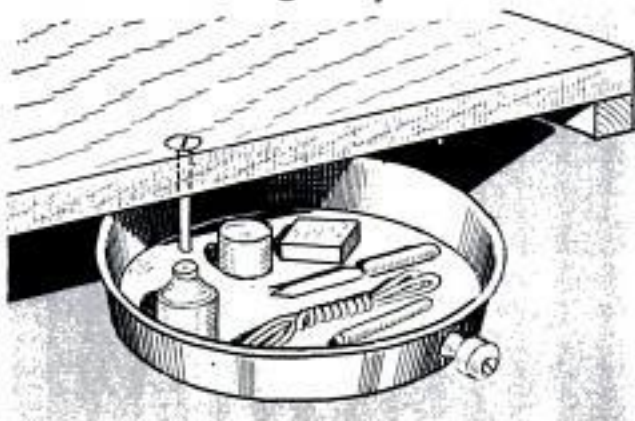
The usually frustrating job of picking up small ball bearings with your fingers and placing them in a bearing race can be sim-



plified by bending a pair of "tweezers" from wire. First, form a small eye in each end of a 10-in. length of 14-ga. wire. Next, bend the wire in a U-shape so the two eyes align when the tweezers is pinched together. The eyes will fit against the curved surface of the balls and they can be picked up with comparative ease.

Enno R. Haan, Evanston, Ill.

Cake Pan Pivoted Under Shelf Provides Sorting Tray



If the shelf of your workshop cabinet becomes crowded with nuts, bolts and odds and ends, install a sorting shelf to aid in sorting the items. Simply bolt a cake pan to the underside of the shelf, so that it may be swung out when needed, or back out of the way when not in use. For greater convenience, a wooden drawer pull might be attached to the outside of the pan to serve as a handle.

Handle for Vacuum-Bottle Cap

A metal or plastic vacuum-bottle cap which usually becomes too hot to hold comfortably when filled with hot liquid, can be handled easily when fitted with a paper handle. The handle is made by folding a piece of fairly tough paper to form a strip about $\frac{1}{2}$ or $\frac{3}{4}$ in. wide. The strip should be long enough to pass completely around the cup with the ends projecting far enough to provide a comfortable hand-grip for the user.

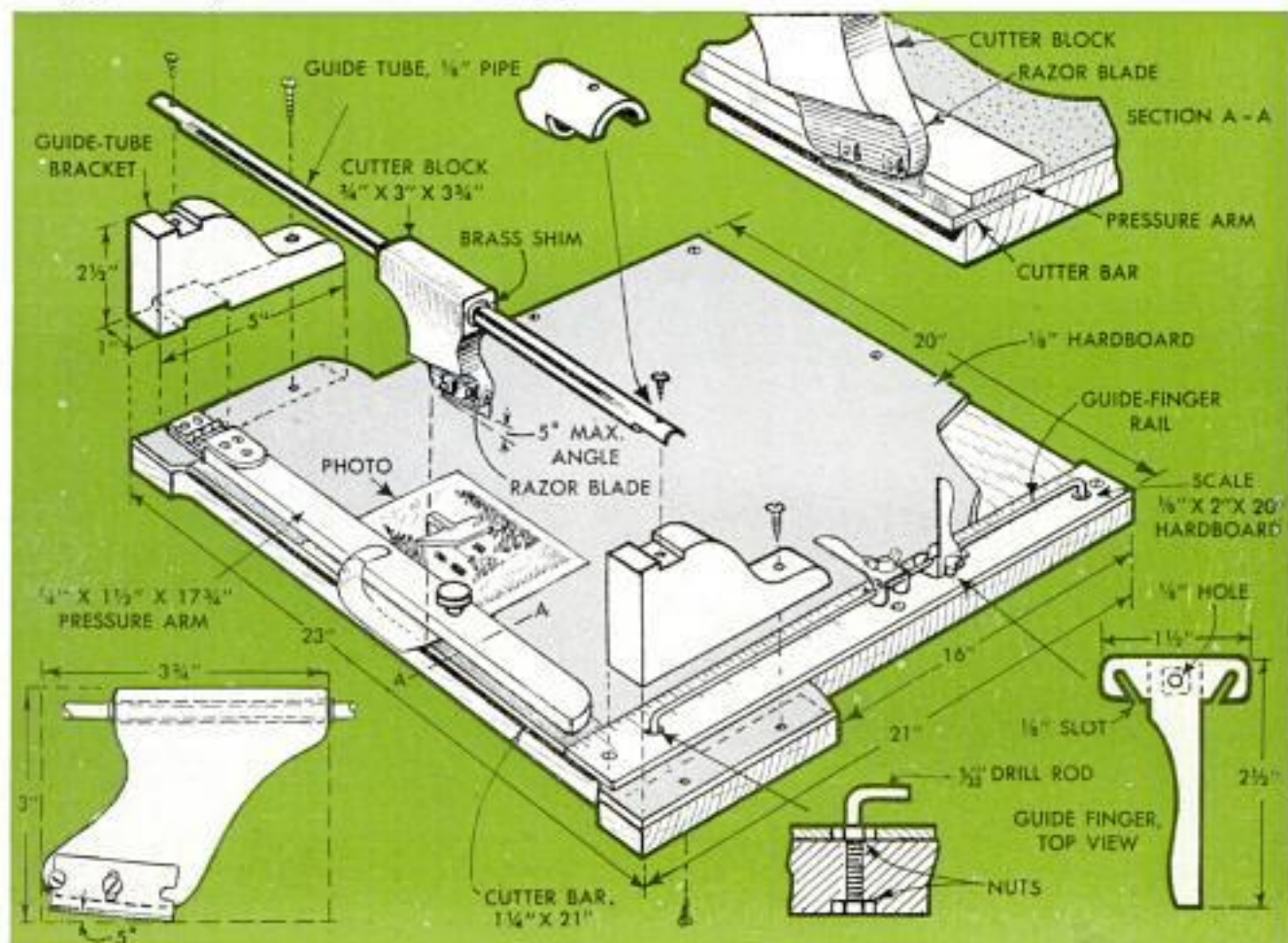
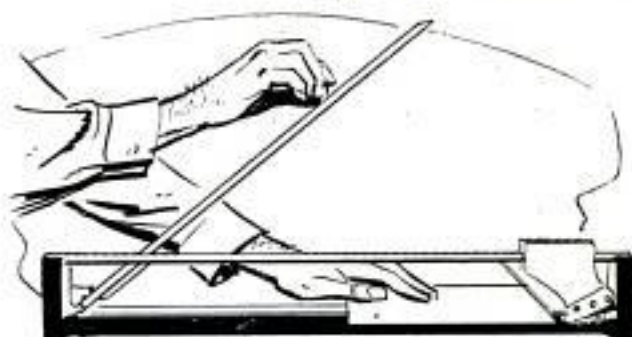


Razor-Blade Photo Trimmer

By E. Peter Smith

LARGE IN SIZE but small in cost, this cutting board uses a sliding cutting blade in place of the conventional arm.

The base is $\frac{3}{4}$ -in. plywood, cut to the shape shown. Screwed to one edge and allowed to project $\frac{1}{16}$ in., a length of $\frac{1}{8}$ -in. flat steel provides a cutter bar. A sheet of $\frac{1}{8}$ -in. hardboard covers the rest of the board. White-enameled hardboard with inked numbers is used for a scale and screwed to the board at right angles to the cutter bar. The guide fingers, shaped as in the detail, slide on a rail made of $\frac{3}{16}$ -in. drill rod. Each guide is held in position with a thumbscrew turned into a nut soldered on the inside of the guide. The rail is threaded at both ends and bolted to the board through the scale. The wooden guide-tube brackets are not notched to receive the brass guide tubes until the cutter block has been mounted and the blade aligned. The cutter block is drilled oversize and the hole lined with brass shim stock to provide a bushing. A single-edge razor blade is mounted on the block with screws so it can be adjusted. The pressure arm is screwed, or riveted, to a Z-shaped strip of brass which is soldered to a butt hinge. The hinge, in turn, is screwed to the base.



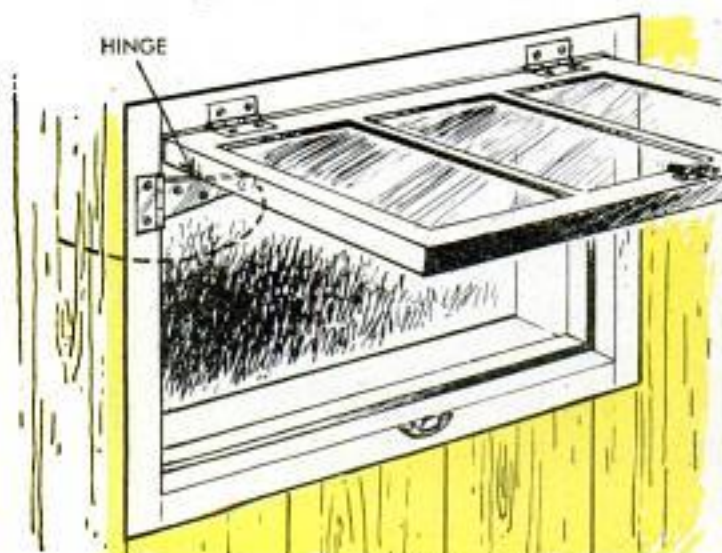
Solving

HOME PROBLEMS

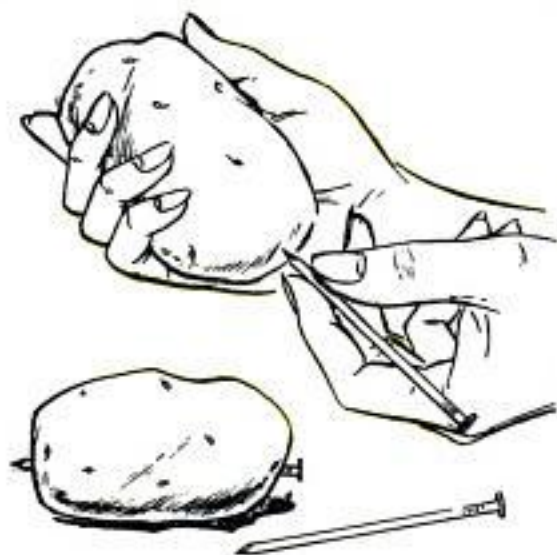


ACCURACY of a household scale can be checked by placing a known weight, such as a five-lb. sack of sugar or salt, on it. If the adjustment knob has been set properly at zero, the scale should be accurate within an ounce or two at this weight.

A LARGE T-STRAP HINGE can be used as a support to hold a basement window open. The hinge should be attached to one side of the window frame, so that it will swing out freely to hold the window open, as shown, or fold back flat against the frame when window is closed.



IDAHO POTATOES can be baked quicker and with better results if aluminum nails are inserted lengthwise through the potatoes before they are put in the oven. The nails conduct heat to the core of the potato and thus cut the baking time, improve texture and keep the skin from bursting.

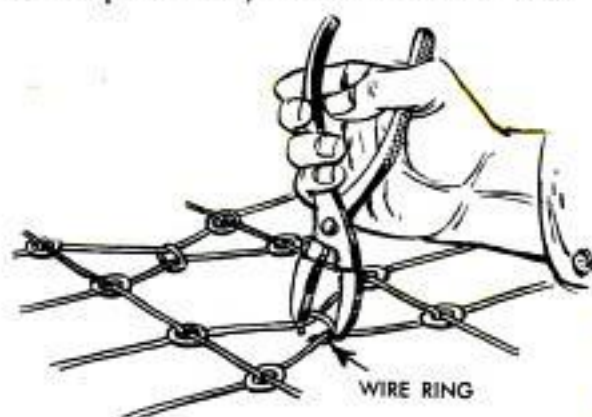


FINGER MARKS on piano keys often can be removed with an ordinary pencil eraser, which will fit easily between the black keys and get into all corners. For difficult spots, requiring cleaning fluid, wrap the eraser with a cloth soaked in the fluid. The eraser will make the application of fluid easier in difficult places.

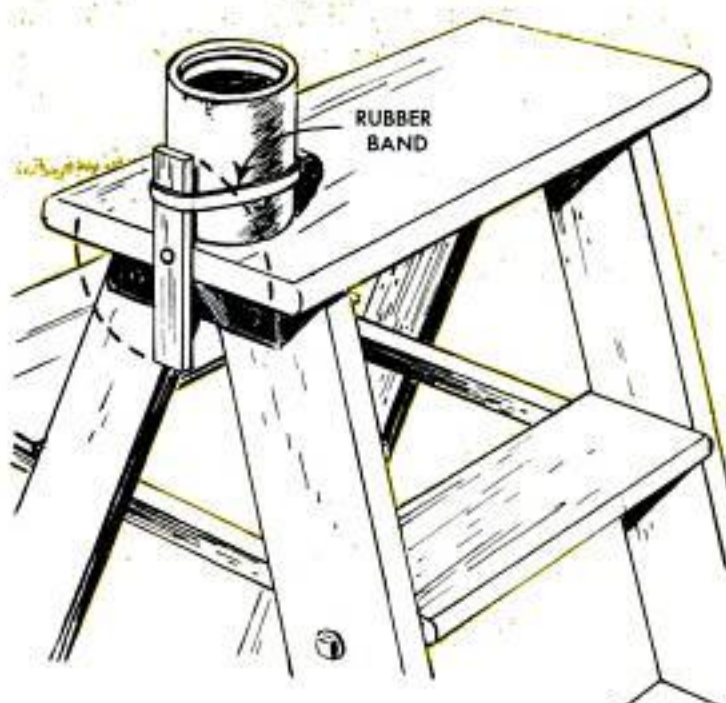
WHEN HANGING GARMENTS on a clothesline for airing, you can prevent them from sliding along the line by knotting a fruit-jar rubber over the line as illustrated and then hooking the hanger into the looped rubber



WOVEN BEDSPRINGS which have begun to sag can be renewed by clamping hog rings across pairs of wires in the sagging area. The illustration shows the manner in which the rings are applied. They may be purchased at many hardware stores and the pliers used to clamp them may be borrowed or rented



THE RAZOR BLADE used for sewing needs can be kept at hand and yet safely out of the reach of small children if it is inserted in a heavy-cardboard strip tacked to the back of one of the sewing-machine drawers, as shown. It requires only a moment to remove the drawer to find the blade, and it is not likely that the children will discover the hiding place



PAINT CANS used on a stepladder won't be overturned if the top step of the ladder has been equipped with a wooden turn button. With the turn button in a vertical position, the paint can is placed against it and held securely in place by means of a large rubber band

ATTACHED AS A HANDLE for a screen or storm door, a steel towel bar makes it easier for children of all sizes to open the door. The bar is long enough to be handy for adults as well as children





Pieces of Hose Strung on Rope Provide Bumper for Dock

Prevent scratched paint on boats and damage to outboard motors by installing this simple bumper strip along the projecting edges of a small dock. The bumper consists of a length of rope on which are strung a number of short pieces of rubber garden hose. The rope is stapled to the dock between the lengths of hose. Arrange the bumper so that a single length of hose fits around each piling, as shown in the detail.—Norm Jacky, Fond du Lac, Wis.

Paintbrushes Protected Under Plastic Sheet



To assure that paintbrushes which are stored in containers of solvent remain in good condition, seal the brush in the container with plastic sheeting. Wrap the sheet around the brush and seal it to the jar with a rubber band. When so sealed, the liquid in the container has much less chance of evaporating and allowing brush to dry.

Shaving-Cream Hand Cleaner

Brushless shaving cream makes an excellent waterless hand cleaner. A tube of the cream can be carried easily in the glove compartment of a car for "dry" washing the hands to remove dirt and grease after changing a flat tire. Also, using the cream

on your hands after working on greasy machinery will permit soap and water to do a better final job of cleaning. For extra convenience, wrap the tube in an old towel that can be used to wipe off the cream.

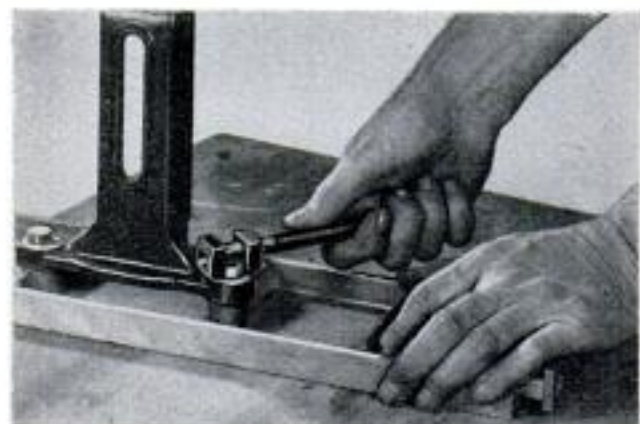
Chemical Agitated by Syringe Easier Than With Stirring Rod

Chemical mixtures that must be mixed constantly to prevent the precipitation of solids in a liquid, can be kept in agitation more easily with a bulb syringe than with a stirring rod. Drawing the mixture into the syringe and expelling it causes a more general movement and mixture of the solution than stirring. Also, the chemical can be dispensed with more accuracy from a syringe than when poured from a beaker or graduate.



Emergency Wrench Improvised From Bolt and Two Nuts

In an emergency, if no tools are available, an adjustable wrench can be improvised from a heavy bolt and two nuts. The two nuts, threaded on the bolt, provide the adjustable jaws. They should be set to a snug fit on the nut or bolt on which the "wrench" is used. Because of the shallow throat of such an emergency wrench, it sometimes is necessary to apply pressure downward with one hand to keep it from lifting. The longer the bolt, of course, the greater the amount of leverage.



ⓄAn effective scraper for use on paint that is peeling can be made by rolling a piece of screen wire and binding it with friction tape. The frayed ends of the screen wire make a serviceable wire brush.

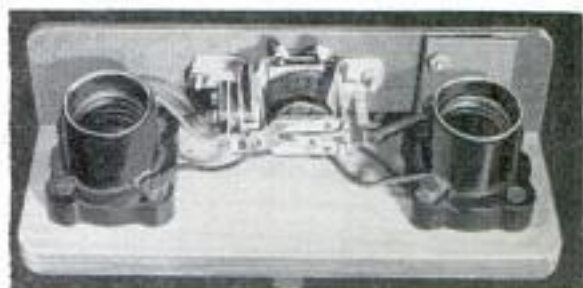
PILOT FLASH

for PORTRAIT WORK

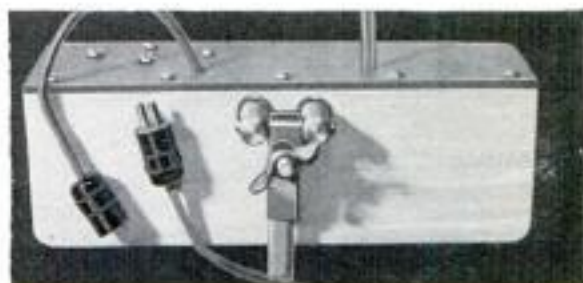
By John M. Avery

BEING ABLE TO OBSERVE beforehand the lighting effect on a subject when using a flash is a great help in taking portraits, especially of children. This is made possible with a unit the author calls pilot flash. It consists of a relay and two sockets of the cleat-receptacle type, the latter being wired in series to hold a flash-bulb adapter and a 100-watt bulb. The unit is mounted on a light stand, plugged into the 110-volt line, and used remotely from the camera. In use, the relay is opened by the current from the flash gun and the flash bulb fires. Then the relay closes and remains closed until the flash gun is fired again. This shorts out the flash-bulb socket, allowing a new flash bulb to be inserted in the socket without danger of firing. The 100-watt pilot light burns continuously except for the split second when the bulb fires. This arrangement tends to reduce the brilliance of the flash which startles children, since to them the light of the pilot bulb simply seems to become brighter momentarily and then to dim.

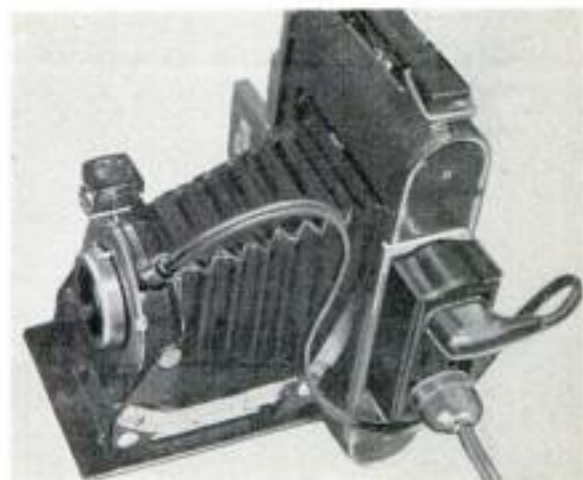
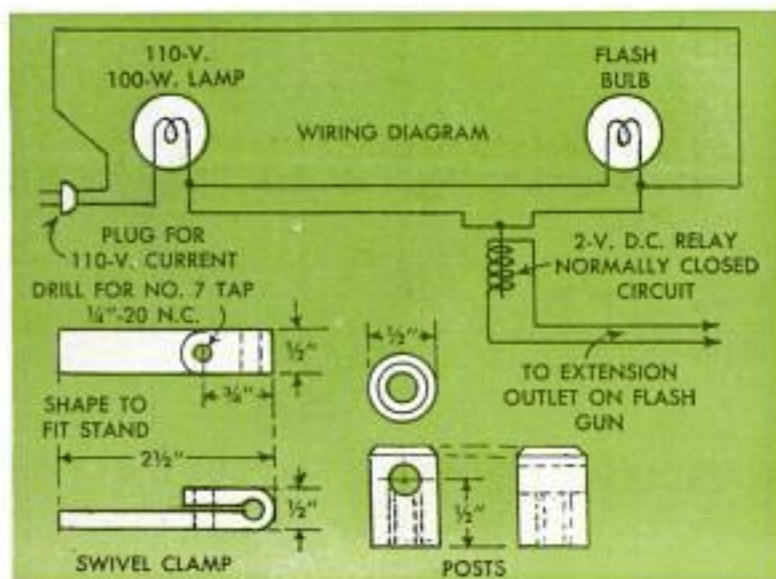
If your camera is equipped with a synchro-shutter, it will not be necessary to have a second flash gun. A double extension outlet can be mounted on the camera and both shutter cord and relay cord plugged into it. When this is done, it is advisable to add a couple of flash-gun dry cells to the pilot-flash unit to operate the relay. It is advisable also to put a midget connector in the relay cord to avoid plugging the relay into the 110-volt line since this would burn it out. Use a 100-watt bulb as it allows about one ampere to pass which is advisable where flash bulbs are fired in a 110-volt circuit.



Above, a 2-volt, single-pole, double-throw photo-flash relay having a d. c. coil is required in addition to two plastic cleat sockets. These are screwed to an L-shape wooden base, 8 in. long



Above, unit is attached to light stand with modified swivel clamp. Note midget connector in relay cord. Below, Graffite bayonet shutter cord plugs into receptacle on camera



WTM 56



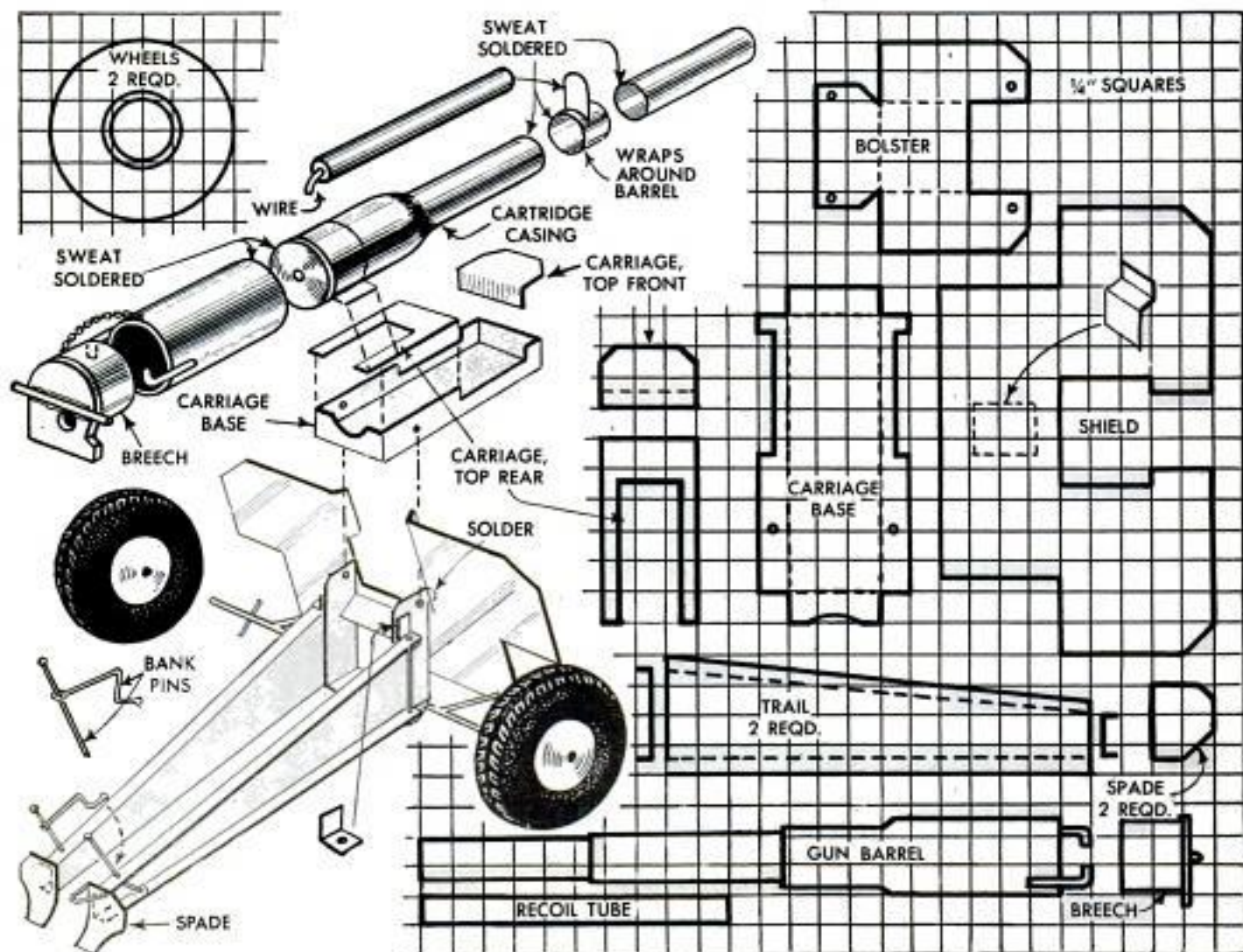
TOY ARMOR

By W. M. Dierks

MADE FROM "TIN CAN" sheet metal, this toy armor gives the little "general" some realistic equipment to wage his own war on the playroom floor. The four units pictured above can serve as prototypes for a battery of 105-mm. guns, the 1 1/2-ton trucks to pull them, plus as many armored cars and 76-mm. tanks as you might want to build. The drawings below and on the following three pages show how the parts for each unit are cut and assembled.

The barrels of the 76 and 105-mm. guns are made by sweat-soldering together sec-

tions of tubing and cartridge casings. The trails of the "105" are hinged to the carriage bolster with pins as in the details. Wheels for the gun, as well as the other units, can be taken from toy cars, turned from wood or made from metal disks fitted with hard-rubber tires. In all cases, axles are of heavy wire while small fittings are of light-gauge wire. Note that gun turrets pivot on the tank and armored car with pins soldered to the undersides of the turrets. The tank tread is made from 3/8-in. elastic tape. The olive-drab paint for the armor is obtained by adding green to red enamel. ★ ★ ★



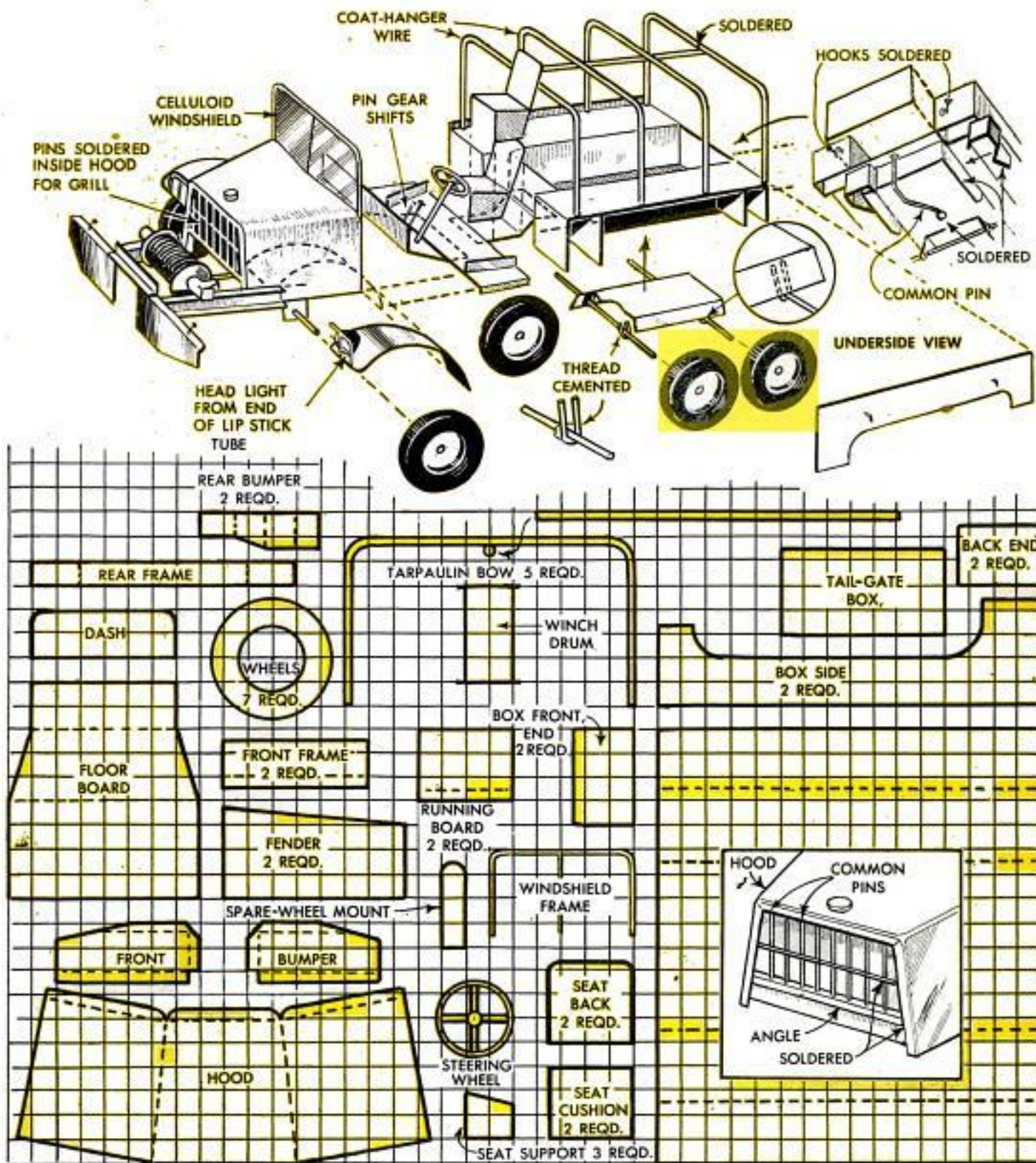
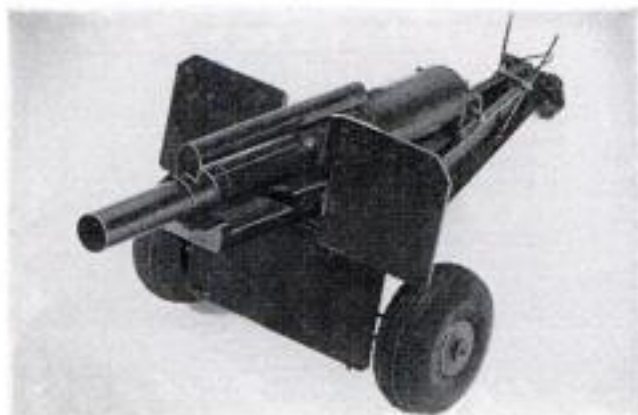
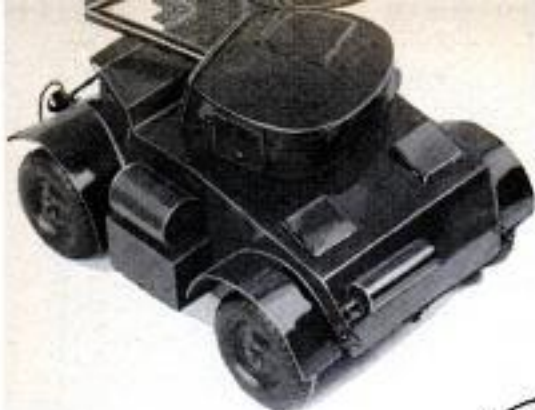


Photo below shows 76-mm. gun with trails clamped together ready for towing. Bent pins form trail clamp

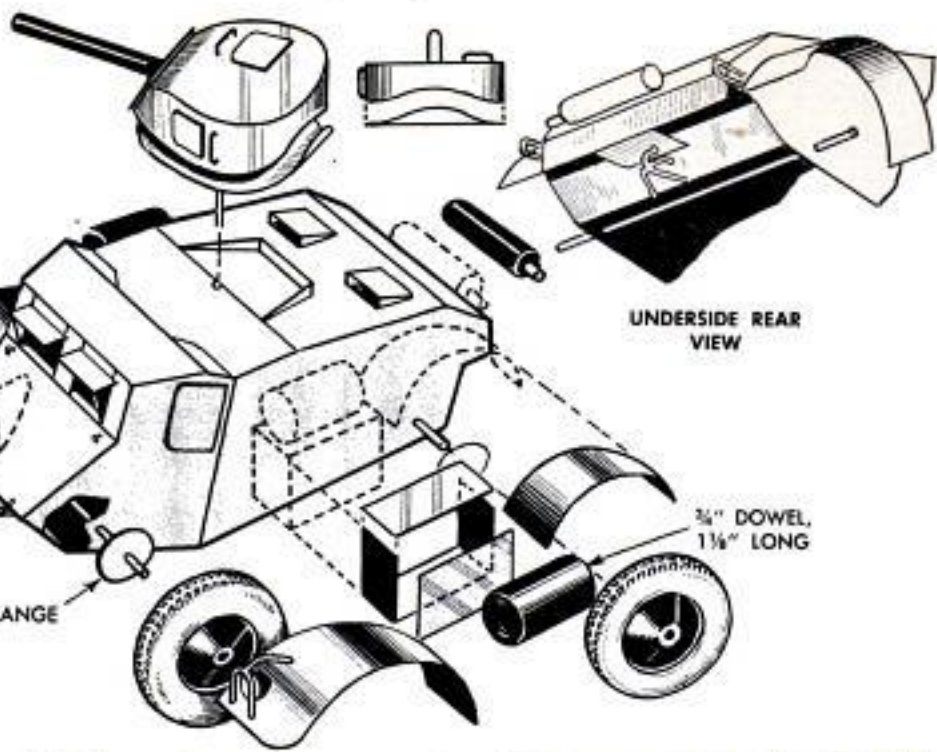


Tarpaulin of 1½-ton truck was made from old GI handkerchief. Any olive-drab material could be used





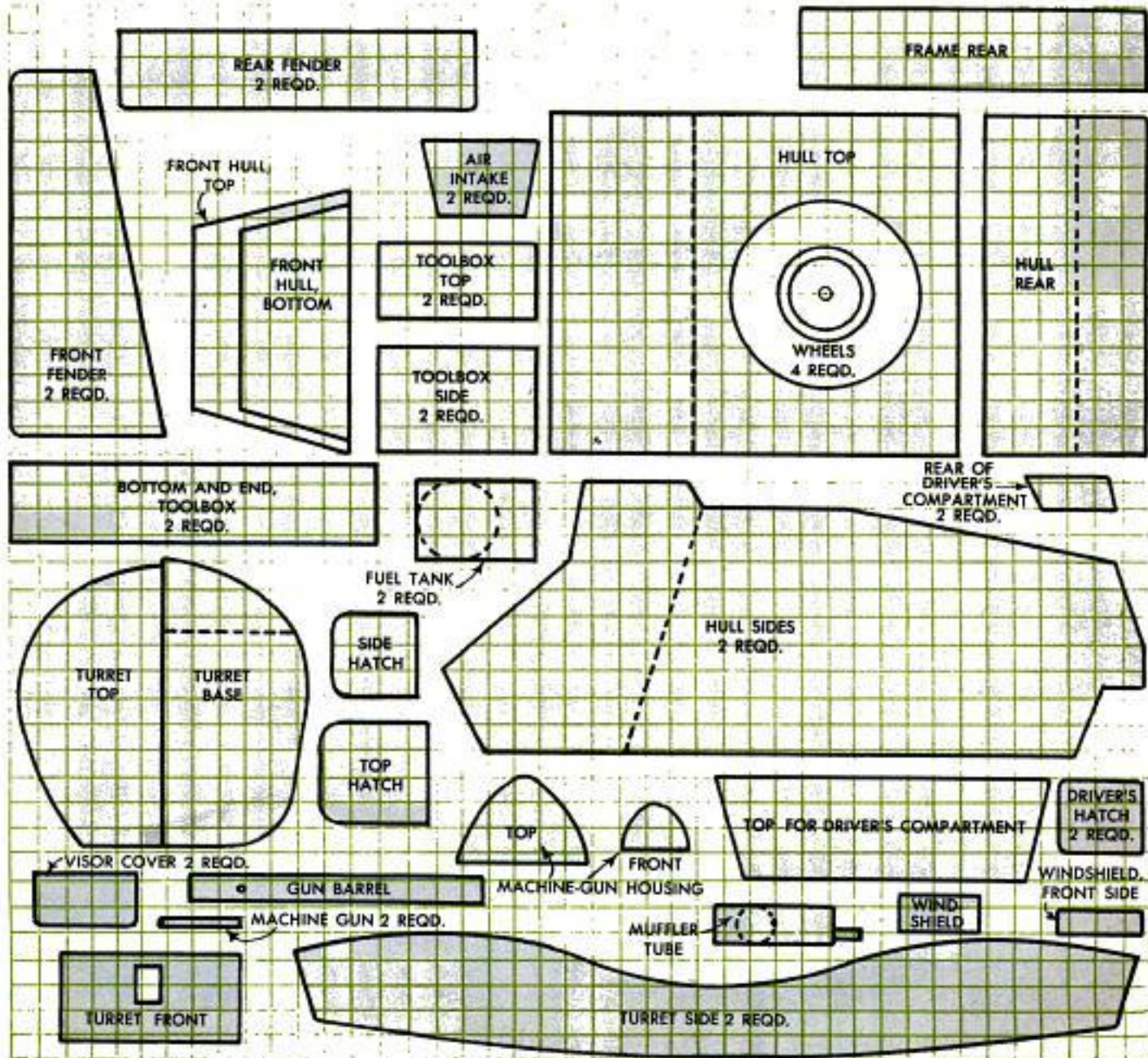
ARMORED CAR



UNDERSIDE REAR VIEW

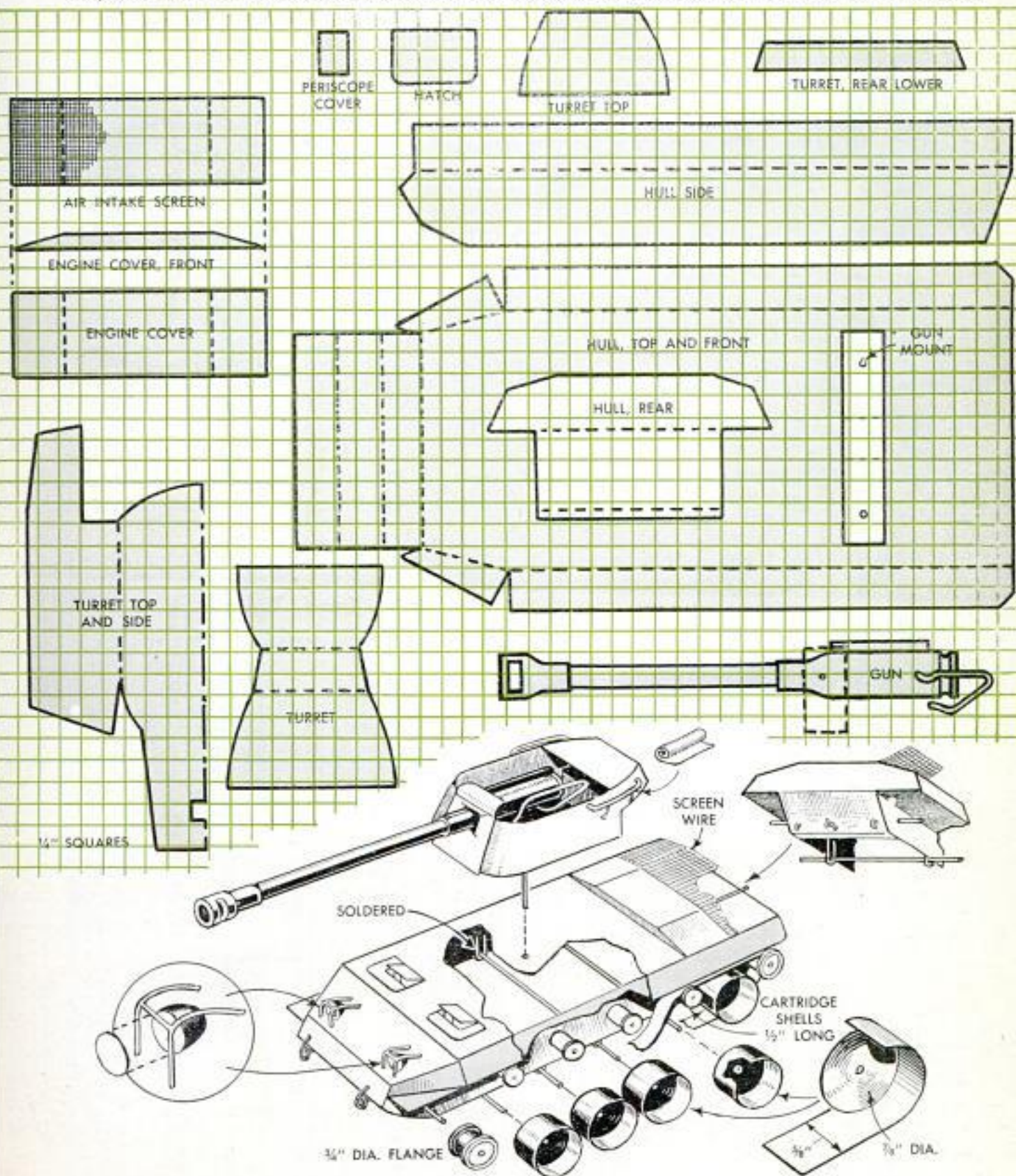
HUB FLANGE

$\frac{3}{4}$ " DOWEL,
1 $\frac{1}{2}$ " LONG





The three photos above show the detailing of the 76-mm. tank. Note the air-intake screen, the headlights and the pivoted gun turret. The idler wheels are made from .38-cal. cartridges, others from sheet metal or wood



Adjustable Brace on Cold Frame Fits Into Drilled Block



The hinged glass cover of a cold frame can be adjusted to the various openings required by weather changes by a simple adjustable brace and drilled block. The brace is a length of steel rod with an eye bent into one end. A wood screw is inserted through the eye and driven into the edge of the cold-frame cover just snugly enough to permit the brace to be moved easily. A wooden cleat screwed to the side of the cold frame has a number of holes drilled in it to receive the lower end of the brace. Adjustment is made by fitting the brace into the hole which holds the cover at the desired opening.

Croquet Wickets Protect Seedlings



A quick method of protecting a seedling from being trampled is to shield it with two or more croquet wickets. Simply force the wickets into the ground, to form a wire

shelter over the plant. Identification tags may be wired to the wickets.

Repairing Cracked Laundry Tub

A leaking cement laundry tub can be repaired by using a mixture of fine sand and cement to patch any cracks. Chisel out the crack to a depth of about $\frac{1}{2}$ in. and wide enough to provide a slight undercut. Use a mixture of sand, 2 parts, to cement, 1 part, and add just enough water to make

a stiff mortar. Pack the mixture firmly into the crack and smooth it flush with the surface of the tub. After the cement has begun to set, fill the laundry tub with water so the repaired place is submerged, and allow to cure for several days. *Caution:* Some older types of laundry tubs are made of soapstone, in appearance and texture very much like soft slate. This type of tub must be repaired with aquarium cement.—Art Fenn, Chicago.

Washing-Machine Agitator Used As Percolator in Feed Cooker

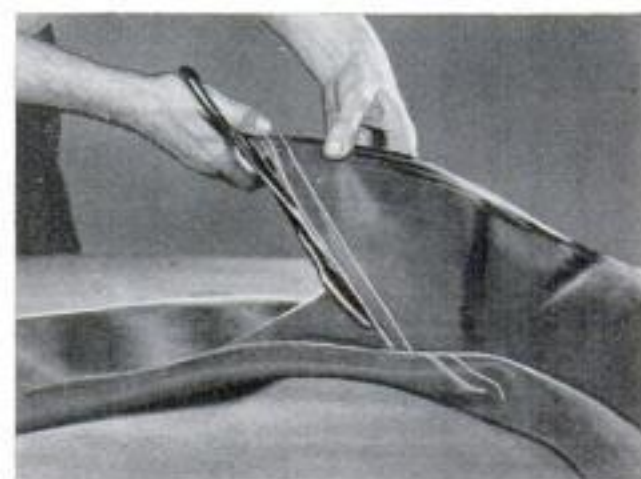
The task of stirring stock feed while it is being cooked can be almost eliminated by using the agitator from a discarded washing machine to provide a percolator. Place the agitator in the kettle on two or three metal blocks so there is space under it for the boiling mash

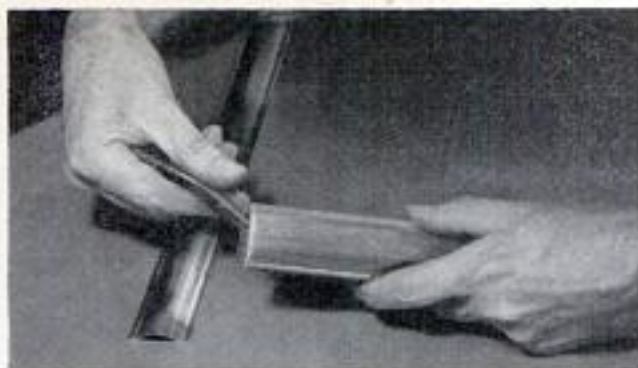


and water to circulate. Metal agitators from older-type washers should be used. Plastic agitators in newer-type washers may be warped by the heat of boiling water.

Extra-Long Rubber Bands Cut From Auto Inner Tube

When cutting rubber bands from an inner tube, it is possible to cut an endless band of much greater length than usually is supposed. The more oblique the angle is cut, the longer will be the band. The angle can be carried to the extent of starting the cut almost parallel with one edge and cutting around the tube a number of times until the opposite edge is reached.





Arched portion of weather stripping is pulled until it projects $\frac{1}{4}$ in. beyond base portion. Then end is folded over and flattened against adhesive back



To prevent the arched portion from shifting endwise, two or three punch marks are made in the two parts along the margin of metal and near the folded end



After end of the weather stripping has been folded back and cut to proper length, protective paper backing is carefully peeled from adhesive coating on metal

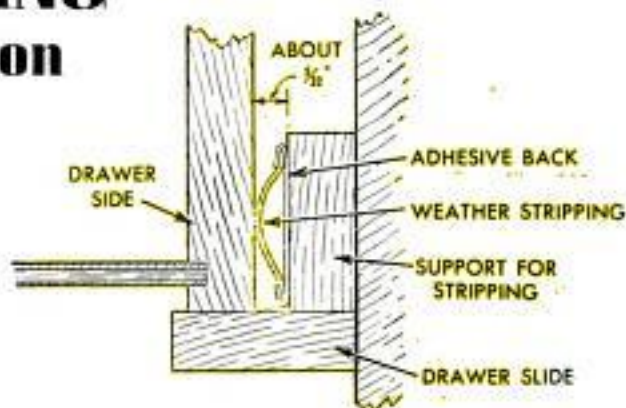


To install, merely press weather stripping firmly against wooden cleats added to sides of opening. Strips provide cushioning guides to sides of drawer

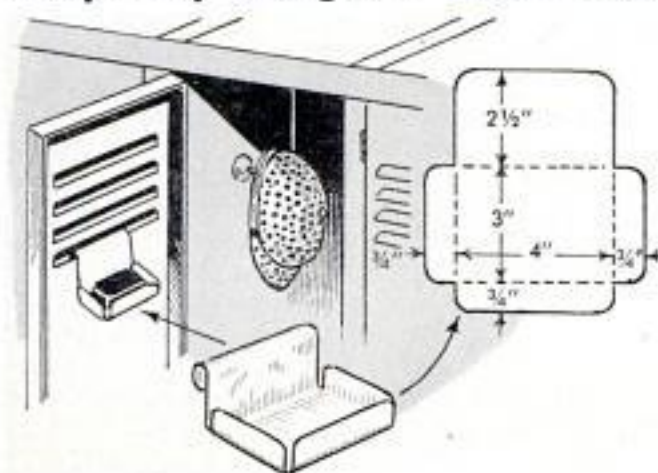
WEATHER STRIPPING Improves Drawer Action

Cabinet drawers having excessive side clearance which causes them to twist and bind can be made to operate smoothly by installing spring-bronze weather stripping along the sides of the drawer opening. Having an adhesive back for easy installation, the stripping is mounted in the manner shown in the detail so that its arched surface presses against the drawer sides. There should be a clearance of slightly more than $\frac{1}{8}$ in. on each side for the weather stripping.

By W. E. Burton



Soap Tray Hangs on Locker Door to Prevent Soiling of Clothes



This soap tray provides a way to keep wet bars of soap from soiling other articles in your locker. Using the dimensions in the sketch, lay out the shape of the tray on a piece of light sheet metal. After cutting it out, bend up the four sides. The top of the long side is bent over in the opposite direction to form a hook which is hung in the ventilating louver of the locker door. The sharp edges of the tray should be filed.
Norm Jacky, Fond du Lac, Wis.

☐ An empty thread spool slipped over a nail in the garage or workshop provides a hanger that will not tear work clothes.

WTM 56



Make Your Own PLASTIC BAGS AND COVERS

By M. G. Winterton

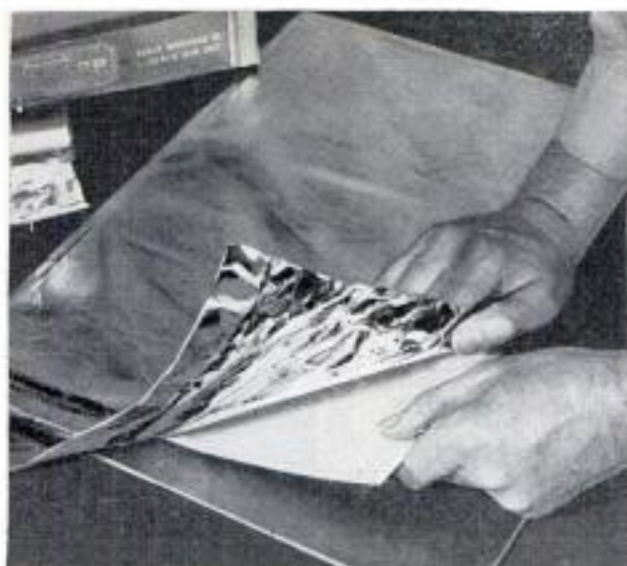
Large dustproof covers and bags like those shown above and below are made with heat-seaming method



DUST COVERS and bags that will protect valuable equipment, tools and appliances are made quickly from polyethylene plastic. Food and freezer bags are one of the most readily available and inexpensive sources of this material.

The bags or covers are made by "heat welding" two or more layers of plastic together with a household pressing iron. This is possible when the plastic is placed over an aluminum-foil reflective pad for welding. However, without the reflective pad, one side of the plastic would get too much heat while the other side would not get enough and lamination would be poor.

After the pattern for the desired bag or cover has been drawn on tracing paper, the sheets of plastic are placed on the aluminum-foil pad and the pattern positioned over them. Then the plastic outside the lines of the pattern is pressed with the iron and the waste is cut away, leaving a seam about $\frac{1}{8}$ in. wide. For items that must withstand rough usage, two or more thicknesses of plastic may be used for each panel. Bags may be fitted with waxed-thread drawstrings as in the photos. ★ ★ ★



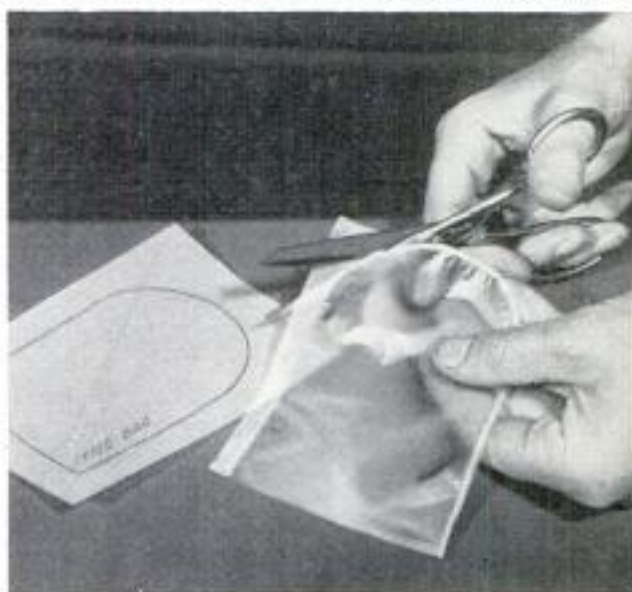
Heat-reflecting pad is made by placing two layers of asbestos paper over piece of hardboard and covering with aluminum foil turned over hardboard edges



Food and freezer bags, purchased in packages like those shown above, are best source for the polyethylene-type plastic required for heat-seaming method

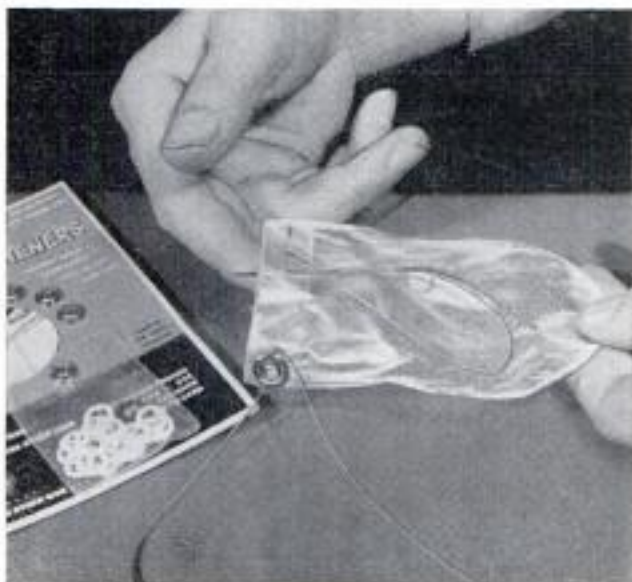


With tracing-paper pattern in position, plastic is heat-welded with iron. The iron is set for low heat

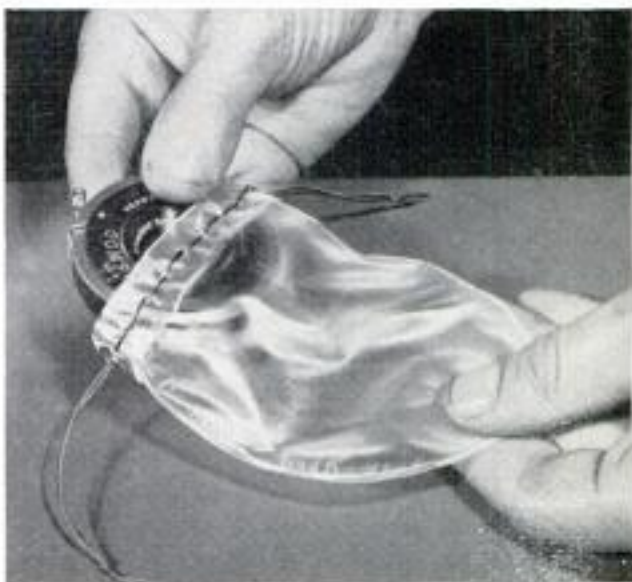


Most of heat-welded portion of plastic is cut away, leaving a 1/8-in. seam as strong as plastic itself

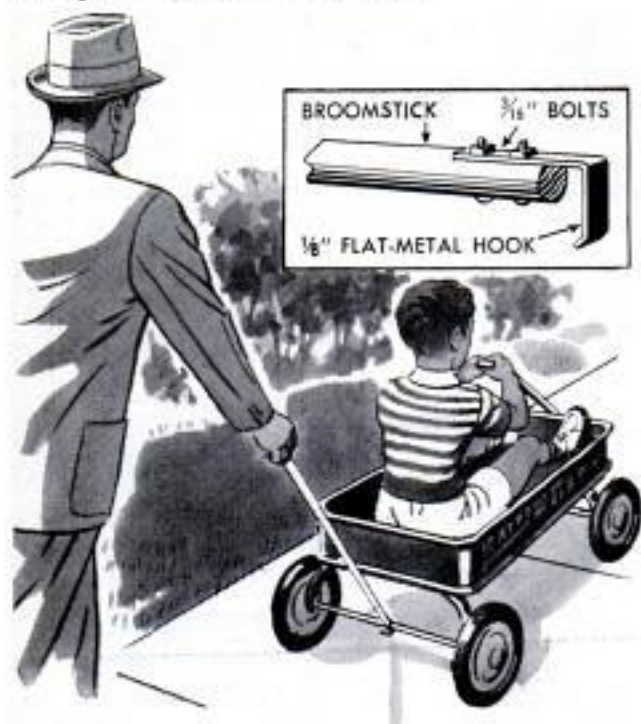
Top of bag is turned back twice and drawstrings are anchored with eyelets set on opposite sides of bag



Drawstrings are stitched through bag sides from both directions and then brought through opposite eyelets

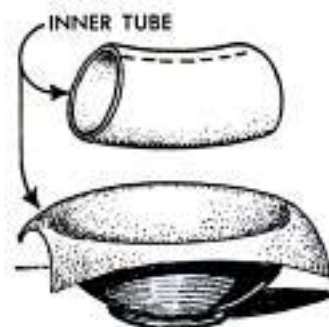


Push Handle for Coaster Wagon Keeps It Under Control



Instead of pulling your youngster in his wagon, use this push handle to let him have the fun of steering while you maintain control of his speed. The handle consists of a length of broomstick which has a flat-steel hook bolted to one end. The handle eliminates stooping, while the hook slipped over the back axle keeps the wagon under control when descending hills or going off curbs. A cross or shovel-type grip on the handle might be more comfortable if the handle is to be used frequently.

Removable Rubber Liner in Basin Provides "Self Cleaning" Pan



When mixing small amounts of plaster or concrete for patching and repairing around the house, one home craftsman uses a "self cleaning" container, which consists of a hand basin fitted with a sheet of rubber cut from an inner tube. When a job is finished, the rubber is lifted from the basin and shaken free of any dried and hardened particles.

Max Franklin, Hunter, Okla.

Faucet Washers Made Smaller

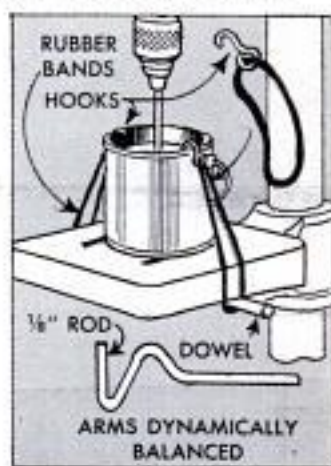
New faucet washers that are a little too large can be reduced in diameter by rotating them against a piece of fine abrasive

paper. A hand or electric drill is ideal for rotating the washer. Just force it over a drill that provides a snug fit in the screw hole. Be careful not to overdo it and make the washer too small.

James L. Creasy, Martinsburg, W. Va.

Pail Clamped With Hooks and Bands When Mixing Paint on Drill Press

Two wire hooks and two rubber bands provide a means of clamping a paint pail to a drill-press table when the press is used to mix paint. The hooks are fitted over the edge of the paint pail and the bands are looped over them and over the projecting ends of a dowel slipped



under the table. The stirring rod consists of a length of $\frac{3}{16}$ -in. metal rod bent to a modified Z-shape. Use the lowest drill-press speed and keep the stirring rod submerged to prevent throwing out paint.

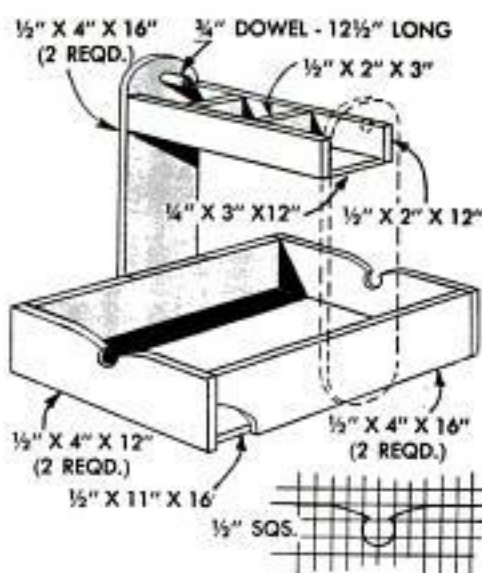
Whisk-Broom Guard Protects Bristles

A whisk broom that is frequently removed from the glove compartment of a car and just as often is jammed back into it will soon become ragged and useless unless the bristles are protected by a guard. The guard can be made by cutting a long strip of rubber from an inner tube and wrapping it snugly around the bristles. The ends of the strip are fastened with rubber cement so the guard keeps its shape. In use, the guard is slipped off the ends of the bristles and replaced by sliding down from the handle.



Combination Smoking Stand and Magazine Rack

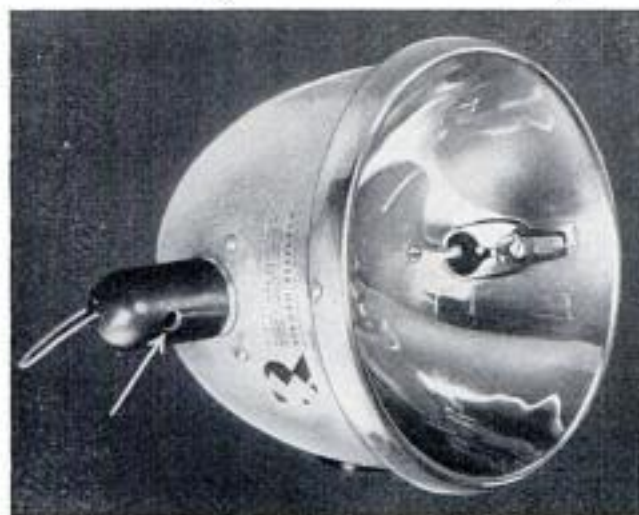
For the person who smokes while he reads, this combination ash-tray-and-magazine rack will fill a definite need. The rack easily is carried from one room to another, furnishing a handy supply of both reading and smoking materials. Either plastic or wood could be used in the construction and finished to match or contrast with the furniture. Hardboard also could be used in combination with wood and provide the added advantage of light weight. The smoking section of the rack could be designed to accommodate a purchased or handmade smoking set, consisting of an ash tray,



cigarette box and match or lighter holder. Or, if preferred, simply line one compartment with metal to provide an ash tray.

cigarette box and match or lighter holder. Or, if preferred, simply line one compartment with metal to provide an ash tray.

"Slave" Lights Controlled by Hole in Cover of Photocell Unit



The action of photo slave-flash units of the photocell type can be controlled so they will not flash when used in the presence of bright lights or near other flash guns if the photocell unit is covered with its protective cap in which a $\frac{1}{4}$ -in. hole has been drilled. To accurately locate the hole, re-

move the cap from the cell and measure from the top base of the flash unit to the tip of the forked anode in the photocell. Replace the cap and measure the same distance from the base and mark the location of the hole. (The measurements are necessary because not all photocell caps seat at the same distance above the flash unit, nor are all anodes the same distance above the base.) In use, the cap is fitted on the photocell with the $\frac{1}{4}$ -in. hole pointed toward the flash unit that will be used to trigger the light. The hole in the cap must be covered when the unit is not being used.

Kenneth E. Peney, St. Paul, Minn.

Hammer Handle Stores Tacks

For those occasional jobs around the house that require driving a few tacks, you will find it highly convenient to have an assortment of tacks in the handle. Bore a hole in the center of the end of the handle, not over 3 in. deep, and provide it with a snug-fitting cork.

The Know-How of Interior Painting . . .

makes the difference between success and failure, both as to final appearance and as to the lasting quality — and it takes just as long to do a poor job as a good one. So, why not find out how to avoid common paint failures in next month's story on interior painting, which includes data on sealers, one-coat flat paints and recommendations for applying popular deep-tone colors



PhotoKinks 58

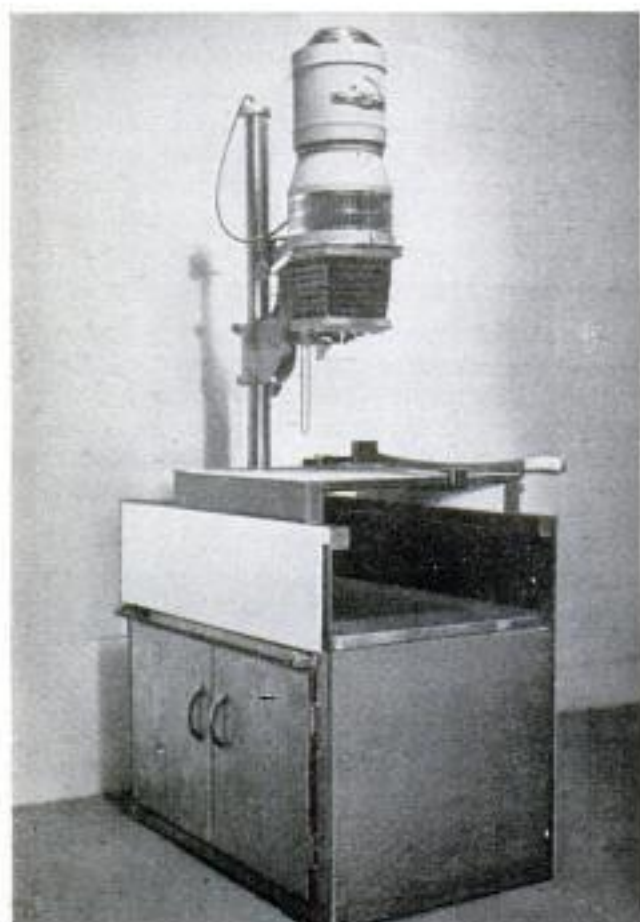


CABINET for your ENLARGER

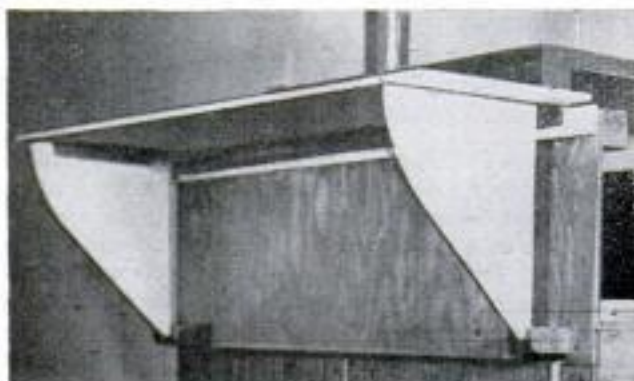
By Robert E. Dalton

TWO UNUSUAL features make this enlarger cabinet especially adaptable to use in basement or closet darkrooms where height and floor space are limited. Use of the cutting board, or trimmer, as a supplementary easel gives two easel heights with relation to the floor and also two projection distances in relation to the enlarger. The trimmer is hinged to the cabinet side-panel extensions and swings out of the way when not in use. Loose-pin hinges permit its removal when desirable. A hinged drop leaf, supported by hinged wings, is attached to the opposite panel extension as in the lower right-hand photos.

The cabinet, detailed on the opposite page, is made from $\frac{1}{4}$ -in. plywood and 2 x 2-in. stock for framing in the manner shown. In the detail, the plywood bottom has been omitted for the sake of clarity. This is



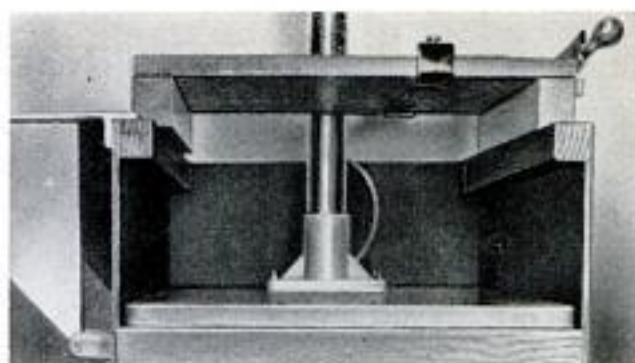
Photos above, left and below picture the convenience features of this enlarger stand which has been designed and built for use in limited space. Note use of trimmer as an auxiliary easel, also folding shelf



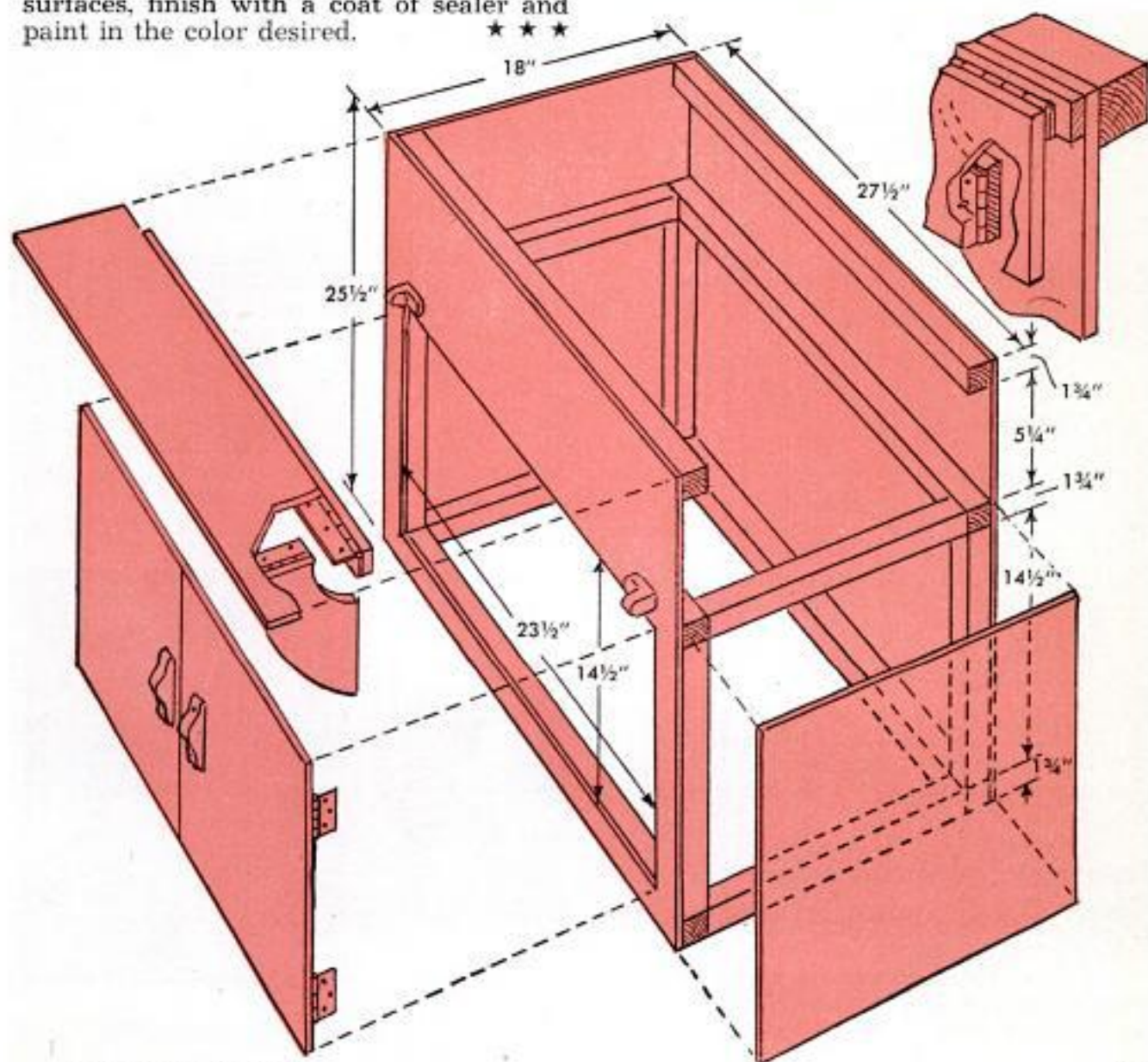
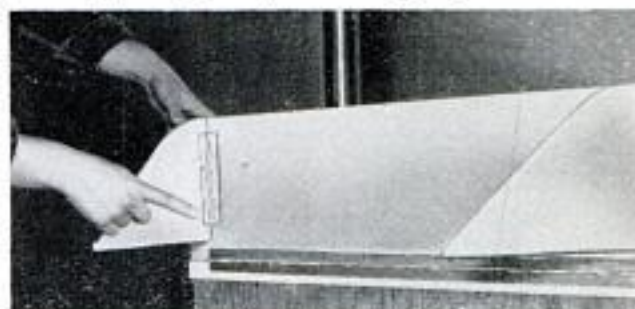
of $\frac{5}{8}$ -in. plywood which is of sufficient rigidity to support the weight of a printer and other items which may be stored in the lower compartment. The top of the cabinet, which is about $5\frac{1}{4}$ in. below the top of the extended side panels, also is of $\frac{5}{8}$ -in. plywood. For a heavier enlarger, use $\frac{3}{4}$ -in. plywood. Parts can be joined with nails, but the use of screws and glue will result in a much more durable and rigid cabinet. Doors are of $\frac{3}{8}$ -in. plywood and are hinged to fit flush in the opening to the compartment. Friction cabinet-door catches hold them in the closed position. Note that the folding leaf must be set out the thickness of the wings by means of a strip as in the upper right-hand detail. Note also that it swings on a continuous, or piano-type, hinge. This prevents the leaf from sagging at the center. The trimmer is hinged to the opposite panel of the cabinet and swings up and over so that it does not interfere when using the regular easel.

The dimensions given are those of the original cabinet. These can be altered proportionally if desired. Sand all exposed surfaces, finish with a coat of sealer and paint in the color desired.

★ ★ ★



Above, a front view showing how the enlarger easel fits into the upper open-end compartment of the cabinet. Below, the folding shelf, or leaf, swings on a piano-type hinge to prevent sagging at the center

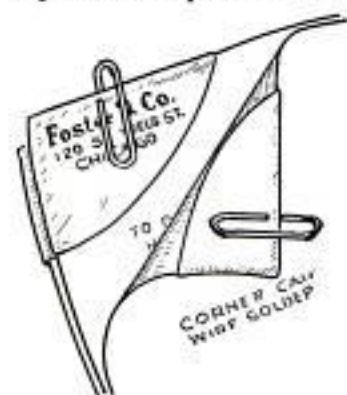


Recharging of Photoflash Unit Controlled With Electric Timer



One photographer who uses an electronic repeating-flash unit has found that recharging the unit is less troublesome if a timer is used to control the charging time. After a full day of use, the flash unit may require as much as eight hours of charging time. With the timer set to turn off the charger when the required charging has been completed, the danger of overcharging is eliminated.

Correspondence Easily Identified By Envelope Corners



To quickly identify papers and correspondence from various firms in a letter file, one office worker uses the corners of the envelopes carrying the return names and addresses of the firms. These are cut off and clipped

over the packets of papers from the corresponding firms. Thus, the name and address are immediately visible for easy location and quick reference.—G. E. Hendrickson, Argyle, Wis.

Treated Rope Around Tent Keeps Out Crawling Insects

Campers who sleep out in pitched tents can protect themselves to a certain extent from crawling insects by encircling the tent with a rope soaked in an insecticide

or insect repellent. The rope can be held in position by large staples driven over it into the ground. The area within the rope can be cleared of insects before the tent is pitched by spraying with DDT applied under a tarpaulin that has been spread on the ground.

White Tape Wrapped on Drill Bit Provides Temporary Depth Gauge

A quickly improvised depth gauge for a hand drill is a piece of white adhesive tape wrapped around the bit at the desired depth. When using the tape be careful not to drill too deeply because the tape will fray easily or be pushed up the drill bit.



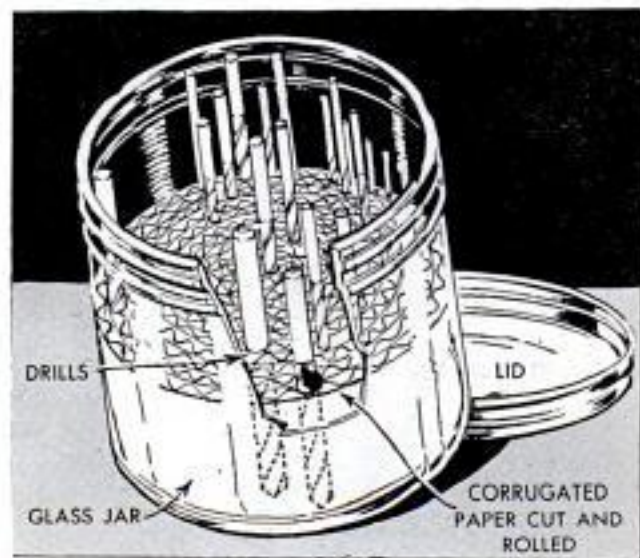
To Renew Circular-Saw Blade

One carpenter, not wanting to discard circular-saw blades damaged by nails in cutting old lumber, found that the blades could be renewed by setting the teeth in the opposite direction. After reversing the set, he filed the teeth to shape and resharpened them.—Robert Micals, Freehold, N. J.

Corrugated Cardboard in Jar Files Small Drill Bits

Often-used small drill bits can be filed for quick selection by rolling a strip of corrugated cardboard into a cylinder and placing it in a shallow, wide-mouthed glass jar. The bits will fit into the openings in the corrugations and the proper size can be seen at a glance. A small amount of oil poured over the cardboard will aid in preventing the bits from rusting.

E. V. Reyner, Townsend, Mont.



POPULAR MECHANICS

Variable-Intensity SAFELIGHT

By
Walter E. Frisbie, Jr.

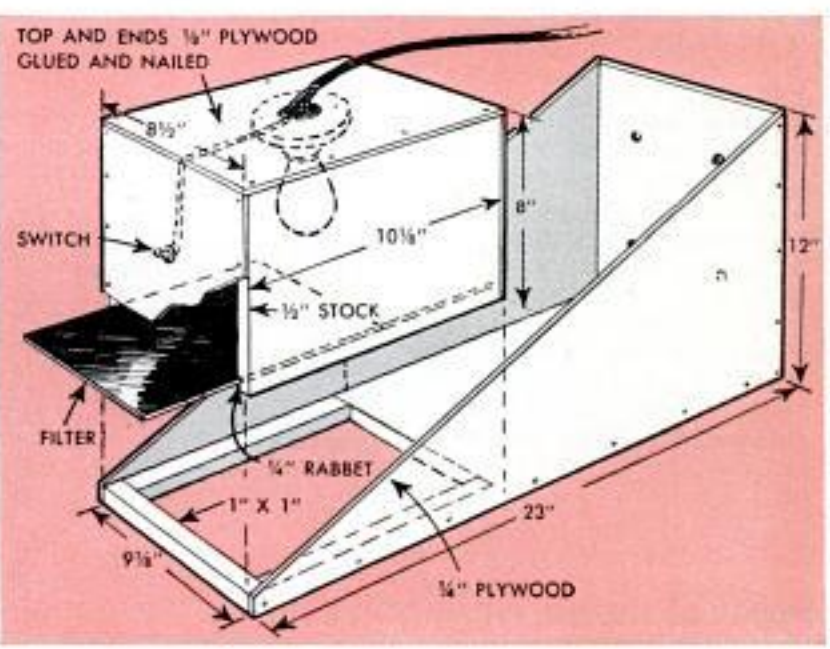
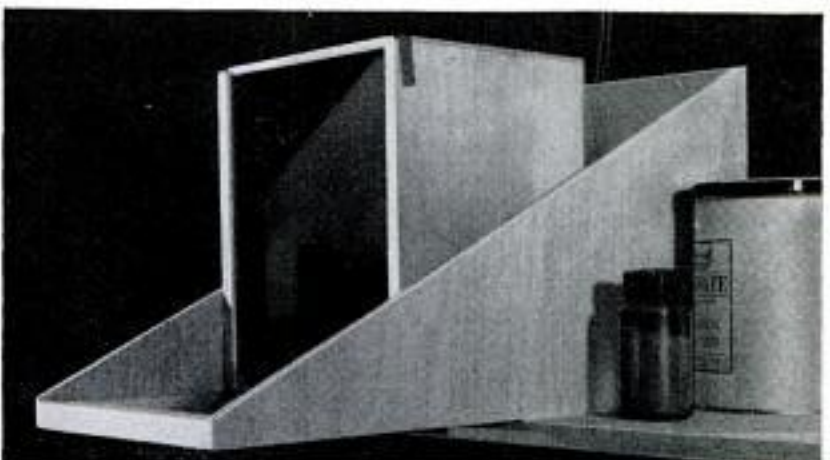
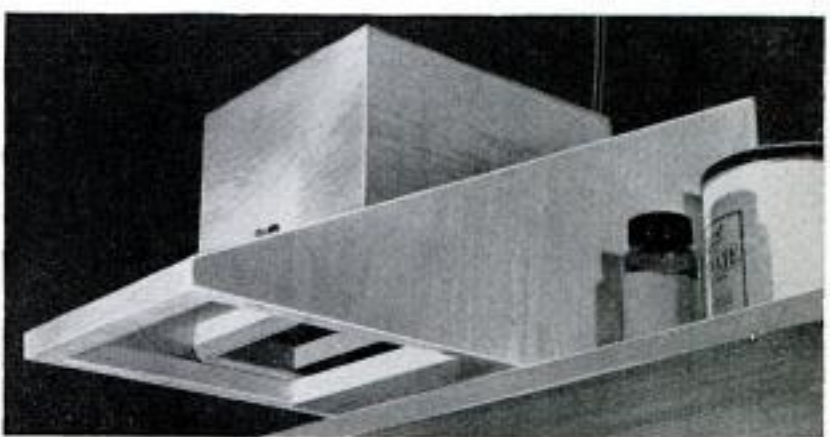
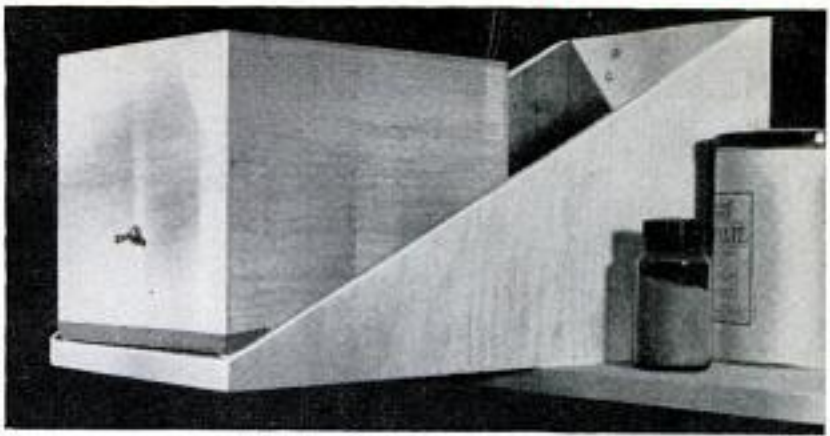
SAFE ILLUMINATION for processing all photo papers, from the slowest contact types to the ultrasensitive projection papers, is provided by this adjustable safelight which simply slides on rails in an open shelf to vary the exposed area of the filter and, thus, the amount of light.

As indicated in the detail, the light box has two sides which are 1/2-in.-thick stock, rabbeted to receive the 1/8-in.-thick filter. The ends and top of the box can be lighter material. The porcelain socket, fitted in the top of the box to hold a 40-watt bulb, is wired through a toggle switch on the front of the box. The toggle also provides a handle for pulling the box forward. The filter is an 8 x 10-in. Kodak Wratten, series OA safelight filter, obtainable at most photo-supply stores. A strip of red or black tape is used to insure a light-tight seal between the filter and box at the front and back.

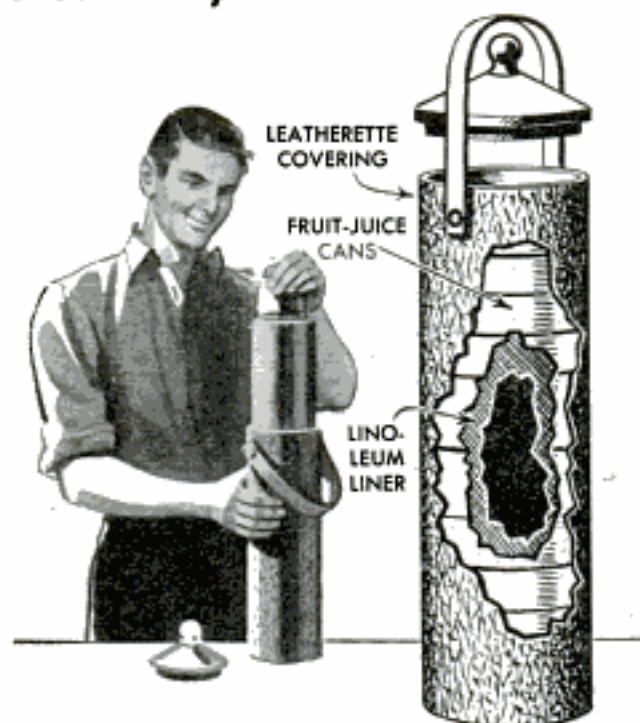
The shelf has two bracket sides cut from 1/4-in. plywood. The rear section of the shelf floor is 1-in. stock; the rails which run to the front are 1 x 1s, as is the cross brace.

The completed box-and-shelf assembly is light enough to be screwed to the wall, or supported on an existing shelf.

When the light box is pulled forward to expose the entire filter, maximum safe illumination for contact papers of the Azo type is provided. For more-sensitive papers requiring less light, the filter area is decreased by sliding the box back.



Protection for Vacuum Bottle Provided by Metal Carrier



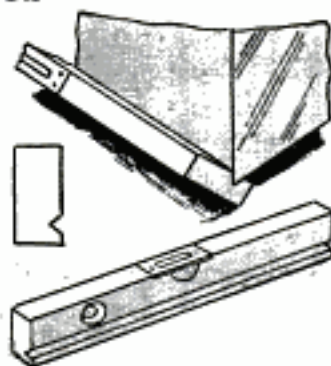
Protection against damage, plus extra insulation, is provided for a 1-qt. vacuum bottle by a carrier made from two empty fruit-juice cans. The top of one can is removed, as well as both ends of the other, and the cans are soldered together end to

end. The resulting cylinder then is lined with a scrap piece of linoleum and leatherette is cemented to the outside to provide a finished appearance. The lid of the carrier can be a wood turning, or a small saucepan lid might be used. The handle of the carrier is a leather strap riveted near the top.

Martin L. Seltzer, Des Moines, Iowa.

V-Grooved Level Permits Working From Bottom of Job

A V-groove cut in a wooden level permits it to be used for setting tanks, forms and structures where it is not possible or convenient to place the instrument in the normal position. The groove is sawed



the length of the level, near the bottom edge, and exactly parallel with the bottom. In use, the level is held so the V-groove fits firmly against the bottom edge of the job, as shown in the sketch.

Sea shells can be made into ornaments and ash trays if they are cleaned first and then given two coats of white shellac.

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Sofa Bed. No. 113

Sagless-type wire springs built-in. 2 patterns. \$1.00

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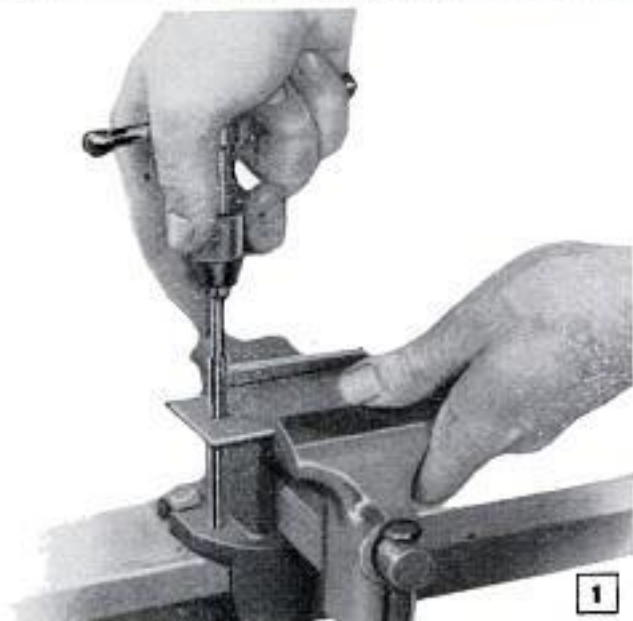
48 inches between arms. 2 patterns. \$1.00

All patterns are available from

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SHOP NOTES



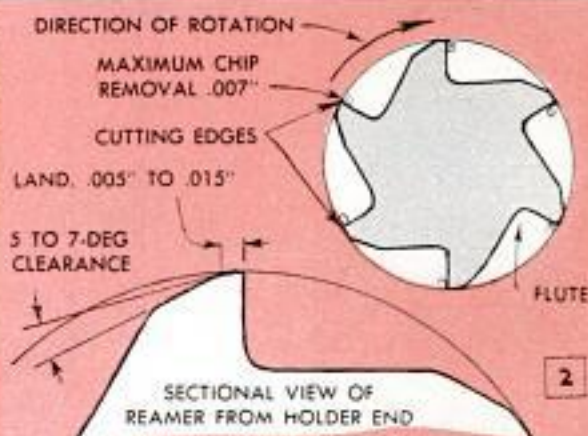
1

How to use HAND REAMERS, COUNTERBORES and COUNTERSINKS

HAND REAMERS are used to enlarge holes to finished diameters for fitting pins, spindles and other precision parts. For precision fits you cannot depend on using a twist drill only, since a hole thus made usually is from .004 to .006 in. larger per inch of drill diameter than the diameter of the drill. A drilled hole also may not be perfectly round, straight or smooth.

How reamers work: A reamer is a cylindrical or cone-shaped tool having longitudinal cutting edges separated by flutes, Figs. 1 and 2. How reamers remove metal from the sides of a hole is shown in Fig. 2. Cylindrical reamers have a uniform diameter so that the sides of a finished hole will be parallel. These are known as straight reamers. Cone-shaped reamers produce tapered holes.

The cutting edges and flutes of both straight and taper reamers may be either straight or helical, Fig. 3. Generally a helical-fluted reamer is preferred for high accuracy as it cuts with a shearing action and has less tendency to chatter than a straight reamer. It also is better to use in holes



2



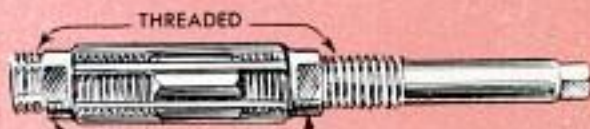
STRAIGHT, SOLID REAMER WITH STRAIGHT FLUTES



STRAIGHT, SOLID REAMER WITH HELICAL FLUTES



EXPANSION REAMER, HOLLOW



ADJUSTABLE REAMER, REMOVABLE BLADES



TAPER-PIN REAMER, SOLID



COMBINATION TAPER AND STRAIGHT

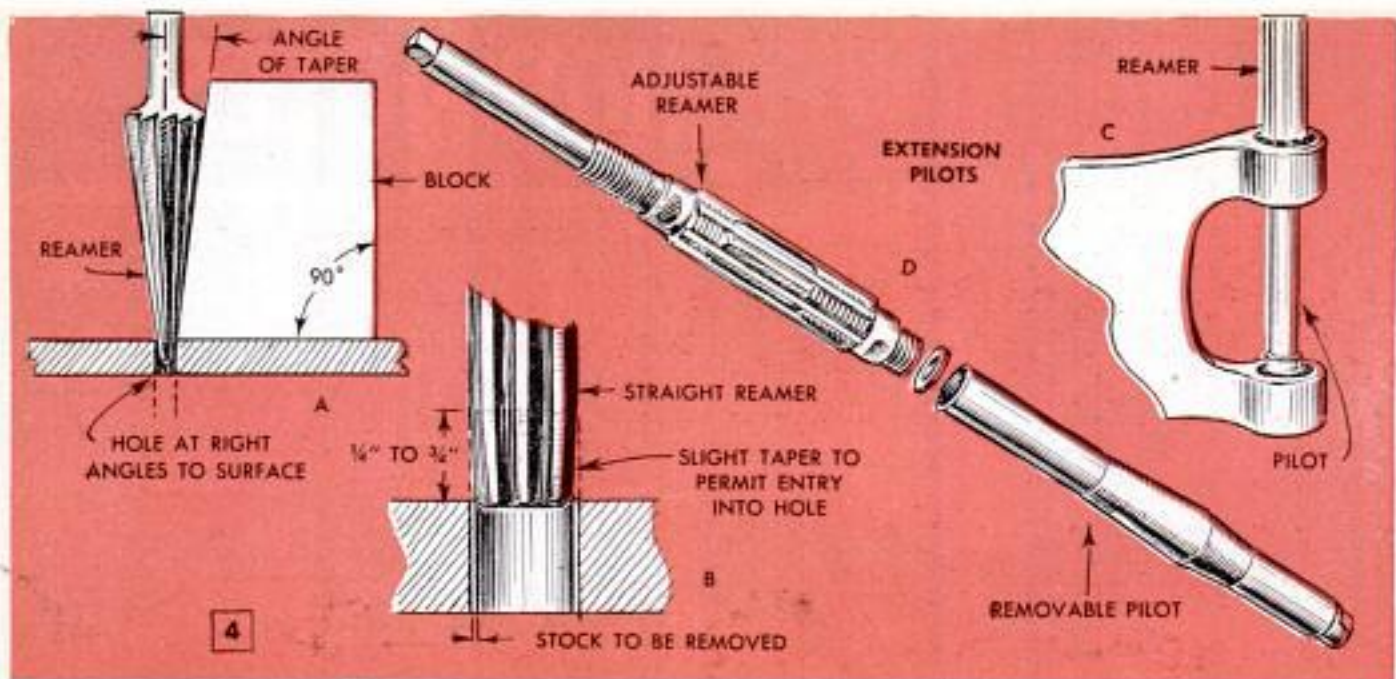


REPAIRMAN'S REAMER FITS CHUCK OF BRACE



PIPE-BURRING REAMER

3



having keyways or grooves. Reamers are hardened and the cutting edges are precision ground. Standard reamers are right-hand (clockwise rotation).

Hand reamers usually are made of carbon steel or high-speed steel and they range in diameter from $\frac{1}{8}$ to 2 in. Sizes increase by $\frac{1}{32}$ -in. steps up to the 1-in. dia., and by $\frac{1}{16}$ -in. steps from 1 to 2-in. dia. Each reamer overlaps the next smaller one in size. The shank end of reamers is ground square so it can be held with a tap holder. Some hand reamers, such as those used for removing internal burrs on pipes, have square tapered shanks, permitting them to be chucked in ordinary hand braces.

Straight reamers: The straight reamer, Fig. 3, is made from a solid piece of steel and cuts to a specified diameter. The expansion reamer has a hollow steel body which is slotted longitudinally so that a tapered screw plug that turns inside will expand the cutting diameter a few thousandths of an inch. The adjustable reamer has removable blades that fit in tapered grooves cut in the threaded body of the tool. The blades can be moved back and forth in the tapered grooves by means of adjusting nuts to vary the cutting diameter about $\frac{1}{32}$ in. The blades of an adjustable reamer must be held tightly between the adjusting nuts when in use as any looseness may cause blade breakage.

All straight reamers, except bottoming reamers, have a slight taper for a short distance from the starting end, as shown in detail B, Fig. 4. This permits the flutes to enter a hole easily. A bottoming reamer is used to finish a blind hole. As it has no taper, but only a slight bevel at the end of each flute, it must be handled carefully to avoid chipping cutting edges at the starting

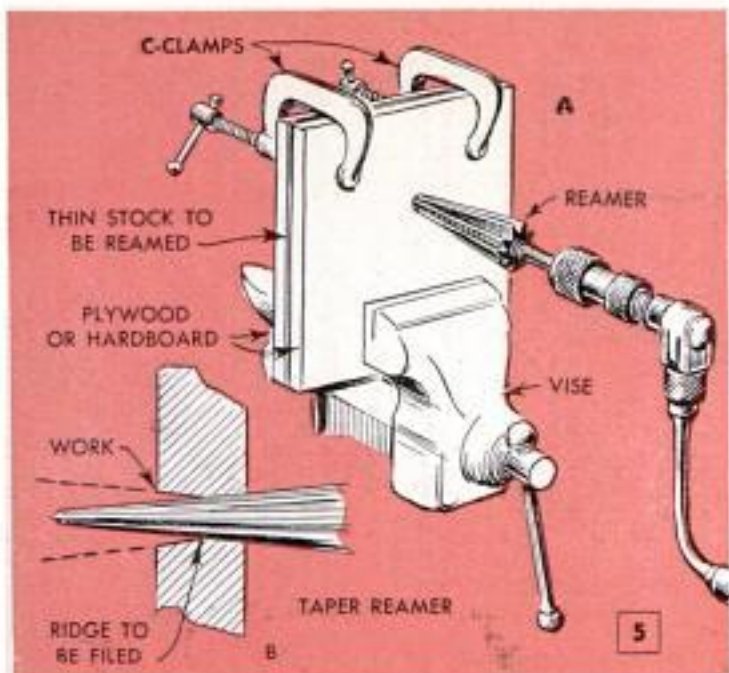
end. The reamer must be started straight.

Taper reamers: Taper reamers, Fig. 3, differ in their degree of taper. The Morse taper is approximately $\frac{5}{8}$ in. per ft., the Brown & Sharpe taper about $\frac{1}{2}$ in. per ft. Others, known as repairman's reamers, have as much as $1\frac{1}{8}$ in. taper per ft., while pipe-burring reamers have still more. Taper-pin reamers have a taper of $\frac{1}{4}$ in. per ft. Holes produced with them accommodate taper pins used for securing pulleys and gears to shafts. There also are combination reamers that are tapered about one third or one half the cutting length.

Precision fits by reaming: To obtain a precision fit, drill a hole slightly under-size, then finish it with a reamer of the diameter required. The hole should not be more than .007 in. smaller than the finish size, when reaming by hand. Removing a greater thickness than this places too much strain on the cutting edges. This is especially true of taper reamers where a hole should be the largest possible size to allow the reamer to finish it along its entire depth.

How to handle reamers: When possible, hand reaming should be done with the tool held in a vertical position as shown in Figs. 1 and 8. This makes it easier to start squarely with the surface of the work, and also allows the chips to clear more readily. The work should always be held rigidly, in a vise when possible. Although a reamer tends to follow the hole, it should be started squarely. When using a straight reamer, check the starting position with a square held in two positions at right angles to each other, as in Fig. 6. Check a taper reamer similarly with a square block having one side cut to match the taper.

Small reamers can be handled most conveniently when they are held in a chuck-

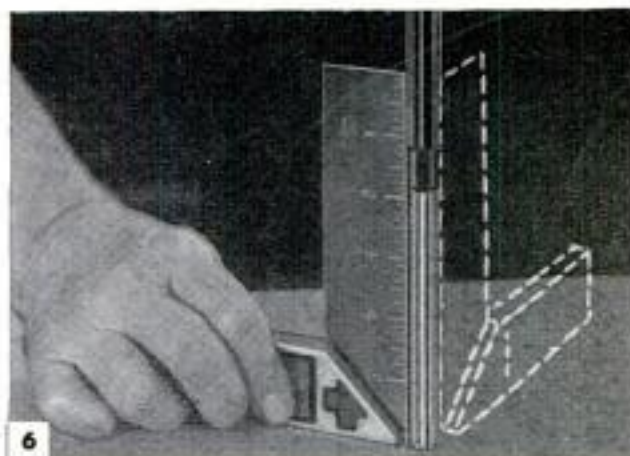


type tap holder, Fig. 7. Grasp the holder so that the palm of the hand is directly over the center of the handle as shown. This position will transmit pressure centrally to the tool. The balanced grip gives you a delicate feel when turning and minimizes the possibility of breaking the tool from side strain. A two-handle tap holder, Fig. 8, is best for longer reamers that require more turning leverage. When using a brace to turn a taper reamer as in Fig. 9, be sure that the tool is square with the face of the work. This can be checked by sighting downward and also sideways.

When reaming two holes in line with each other, as when reaming kingpin bushings, detail C, Fig. 4, alignment of a reamer is assured by using one fitted with an extension pilot, or guide. Detail D shows how an adjustable reamer can be fitted with interchangeable extension pilots.

To enlarge holes in thin stock, which is likely to bend when using a taper reamer in a brace, hold the work between two pieces of plywood or hardboard clamped together and mounted in a vise, detail A, Fig. 5. On heavier stock, where a precision fit is not needed, you can ream from both sides of the work as in detail B, Fig. 5. The ridge left at the center can be removed with a half-round file if necessary.

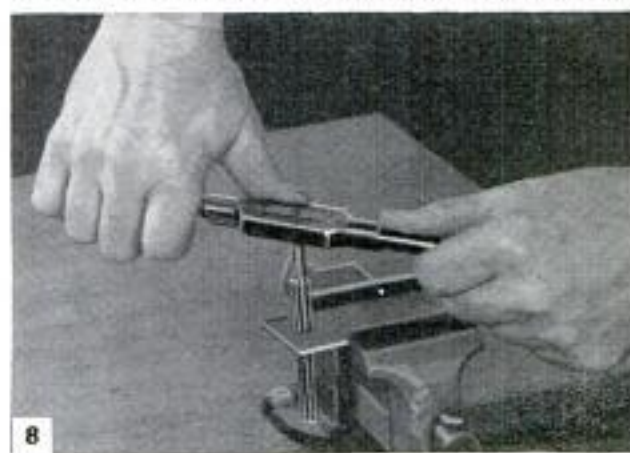
Turning pressure and feed: Since reamers are hardened they cannot be subjected to excessive lateral pressure as this may break them. Always turn a reamer slowly but quite firmly and at a uniform speed. Be especially careful when reaming cored holes in castings where scale may dull the cutting edges. Always turn a reamer in a clockwise direction, even when pulling it backward to disengage it. Turning it in the opposite direction will dull the cutting



Hand reamers are started accurately with a square

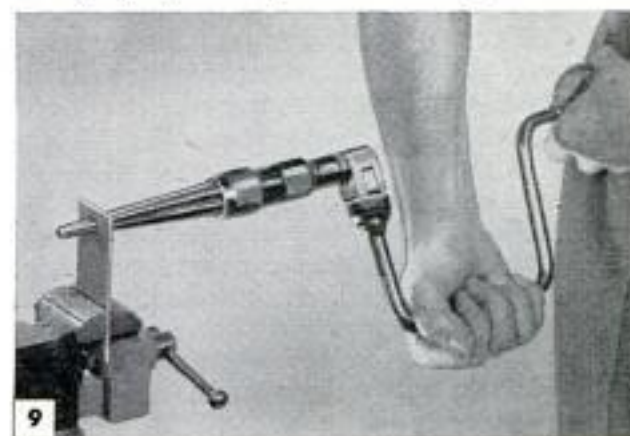


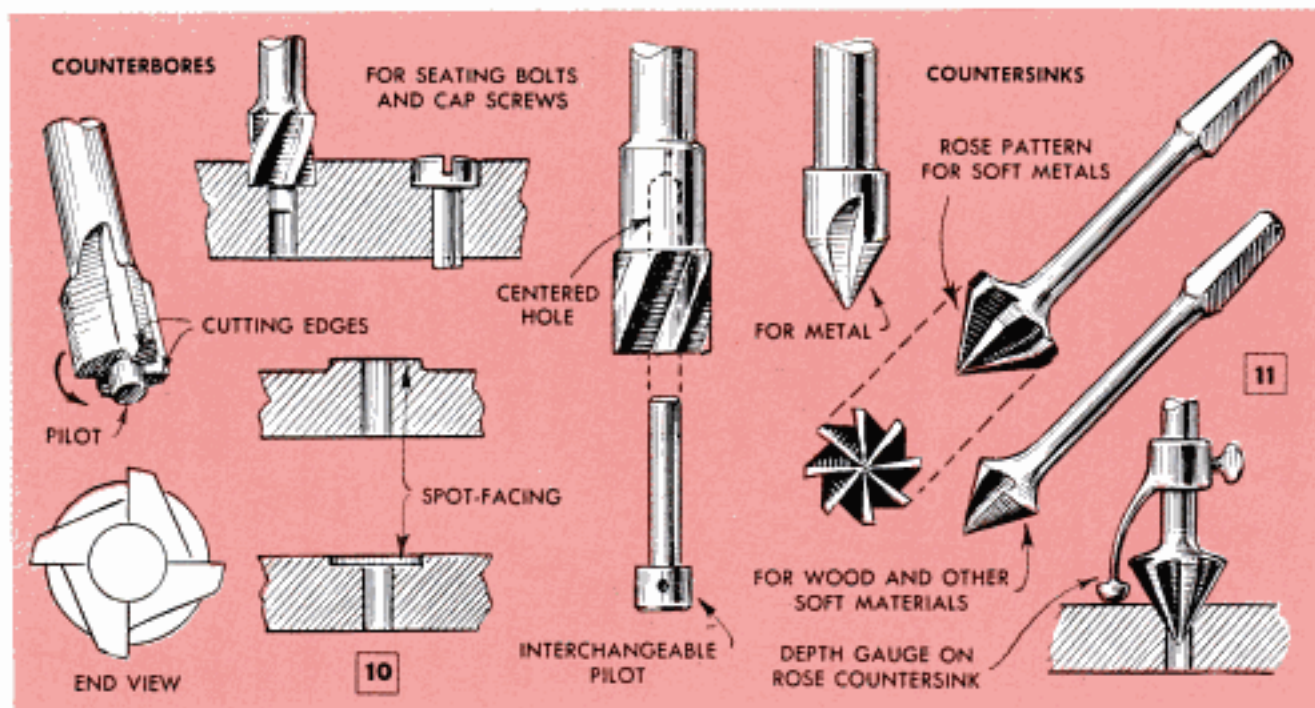
Grip chuck wrench in this manner for accurate work



Above, two-handed wrench is best for long reamers

Below, light pressure prevents breakage of reamer





edges. Downward pressure, or feed, on a reamer should be controlled carefully by feel so that the tool will have the required bite but will not bind in the hole.

Lubrication and chattering: When reaming steel or wrought iron, lubricate the cutting edges with cutting oil or light machine oil. Cast iron is reamed dry. When using a lubricant, remove the tool from the work frequently and brush chips out of the flutes. Clogged flutes may score the hole. Chattering, which produces a wavy surface, may result from reaming too fast, or from misalignment. It also can be caused when there are dull spots on the cutting edges. Some reamers have irregularly spaced cutting edges to counteract the tendency to chatter.

Reamer care: Handle and store reamers carefully. Don't permit them to lie on a bench or loosely in a toolbox or a drawer where the edges may become nicked from contact with other tools. To protect reamers against rust, where humidity is high, keep them in moistureproof plastic wrappings, in separate compartments of partitioned boxes or drawers. Resharpening reamers necessarily reduces their size. This is generally a factory operation and the average mechanic should not attempt it without the special equipment required.

Counterbores: Counterbores, Fig. 10, are similar to reamers. However, they differ in that they are end-cutting as well as side-cutting. Ordinarily they are used for seating heads of bolts and cap screws below the surface. Counterbores also are used for spot-facing, an operation that produces a surface seat for a bolt head or nut at right angles to the bolt axis, Fig. 10.

Counterbores are provided with a guide,

or pilot, which fits into the hole to be counterbored and keeps the tool in perfect alignment with the hole. Some counterbores are drilled centrally to take interchangeable pilots of various sizes, Fig. 10. The cutting edges of a counterbore are formed by flutes which may be either spiral or straight. The larger counterbores usually have four flutes. Small ones have only three. For iron and steel, use counterbores having 15-deg. spiral flutes, but for brass use those having straight flutes. Use a cutting lubricant on steel and wrought iron. Cast iron is worked dry. Counterboring can be done by hand but is accomplished better by using a drill press.

Countersinks: Like counterbores, countersinks, Fig. 11, are end-cutting tools but they have conical cutting heads and are used mostly for enlarging holes at an included angle of 82 deg. to take flatheaded screws. Countersinks may also be used to remove the burr from punched holes. Most countersinks are not provided with a pilot end. The shanks are either round for insertion in a hand drill, or have a square taper for use in a brace. The flutes may be either spiral or straight. Some countersinks are designed for metal only, others for wood only and others for both wood and metal. The cutting depth of a countersink can be controlled by using a depth gauge. Countersinks having a 60-deg. point are sometimes referred to as center reamers, although these usually are called center drills, particularly the type combining a reamer with a twist drill. They are used for forming center holes in the ends of work to be mounted between centers in a lathe. Center drills must be started with extreme care to prevent breakage. ★ ★ ★

Fruit Jar Holds Flashlight In Upright Position



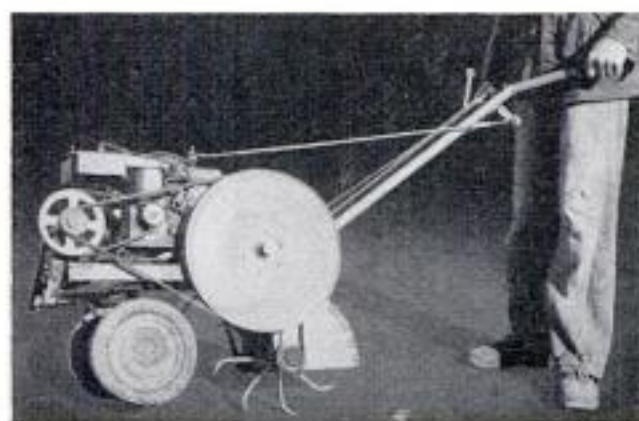
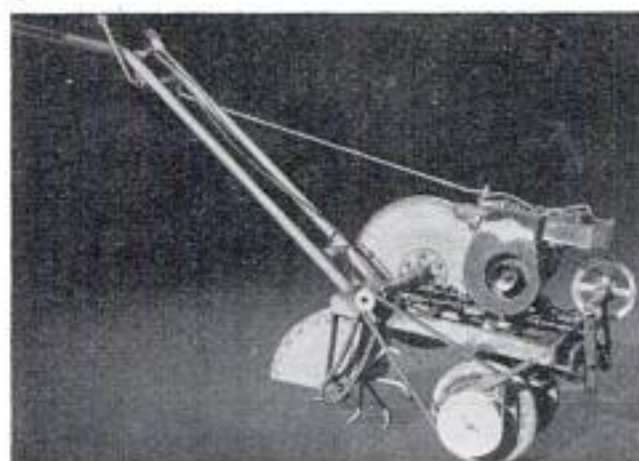
FRUIT JAR

A quart fruit jar can be used as a "light stand" when it is necessary to hold a flashlight in a vertical position for working under a car or other restricted location. A smaller jar also can be used if it is partially filled

with sand to weigh it down and prevent it from tipping over.

Homemade Farm-Garden Tiller

Power from the gasoline engine of this homemade garden tractor is transmitted to the driving wheels through a series of V-belts and pulleys, and the jackshaft provides a double reduction through sprockets and a roller chain to drive the tiller. The teeth of the tiller are tool steel and are arranged on the shaft in staggered rows so they cultivate the ground between 18-in. crop rows. The base of the gasoline engine is mounted on rods in the steel-angle frame. A clutch rod, actuated by a lever on the tractor handle, slides the engine backward or forward to tighten or release the drive belt.



FEBRUARY 1955



Hog-Weighing Scale Platform Rests on Ground

To facilitate weighing pigs in its swine-selection program, the University of Wisconsin designed and built the portable spring scale shown in the photograph. The platform of the scale rests on the ground until the animal walks onto it. The spring scale then is hooked into the chains which are bolted to the platform and the platform is lifted until it swings clear and the animal's weight is registered. The scale is hung from a 6-ft. lever which is supported by a chain hung from the steel-tubing arch. The arch fits over two vertical lengths of tubing that are welded to brackets. Each bracket has two legs which are riveted loosely so they fold together when the arch is removed and the scale is disassembled for transporting. A chain between each set of legs positions them and acts as a flexible brace to prevent their spreading too far.

Ed. Mercer, Madison, Wis.

Quick Way to Set Steady Rest

A quick method of accurately setting a lathe steady rest is to chuck a short length of material, of the same diameter as the work to be turned, in the headstock chuck. Slide the steady rest over the piece and move it as close to the chuck jaws as possible. With the lathe turning at low speed, adjust the steady rest. Next, remove the short piece and replace it with the work to be turned. Finally, slide the steady rest out to the desired position and lock it in place.—Alton H. Deibert, Munising, Mich.

211

SN 56

Off-Center TURNING

By Sam Brown



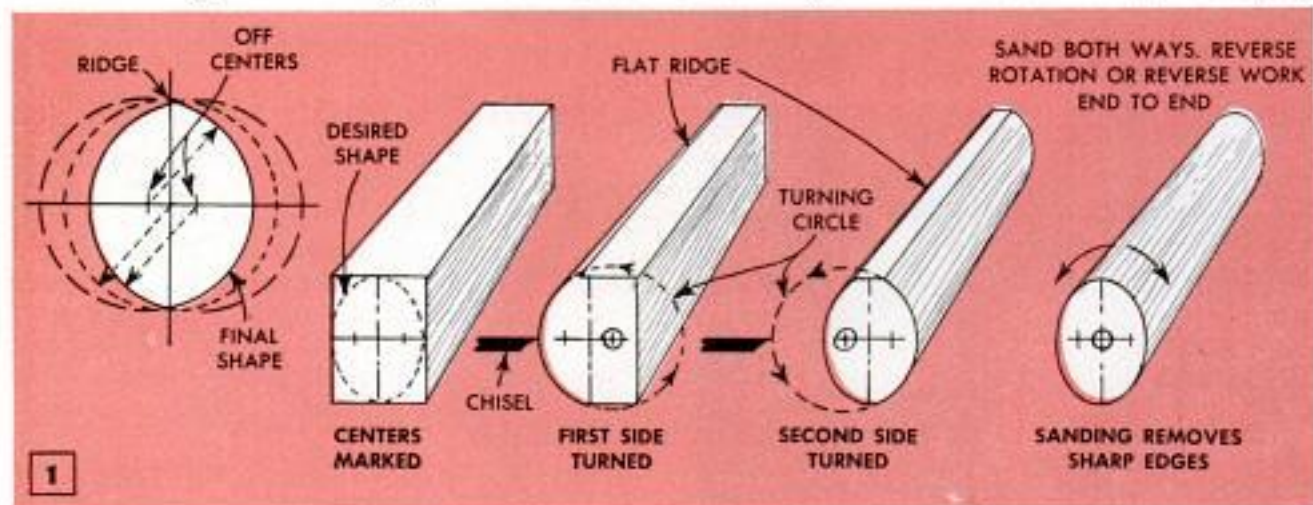
OFF-CENTER turning is a useful wood-lathe technique that makes it possible to turn tapers and ovals in a wide variety of shapes and sizes. The four splayed legs of the lamp table pictured above are examples of the practical application of spindle turning by the off-center method. The legs are of the club-foot, or spade-foot, type with a square top section and a swell, or barrel shape, at the center of the turned section. Some handwork is required to finish the spade foot, although the job is produced very nearly complete in the lathe as will be seen from the five stages of the work shown in Fig. 8. Turning procedures for

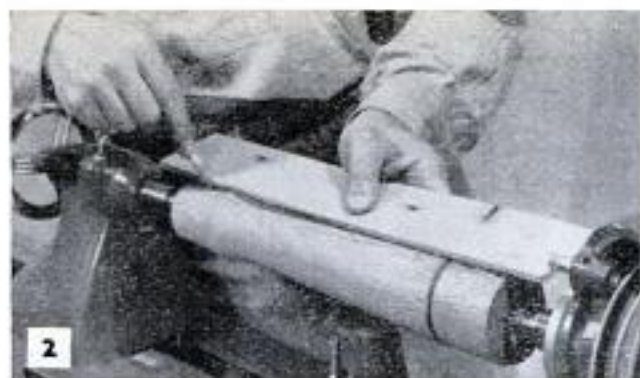
both taper and barrel shapes are pictured in Figs. 4 to 11 inclusive.

Oval turning: The oval spindle is the basic form of off-center turning. A hammer handle is a good example. To work a turning to finished size, make a simple layout as in the left-hand detail, Fig. 1. This will enable you to locate both the true centers and the off-centers on the ends of the stock. Before mounting between lathe centers, be sure that

the material is large enough to include the long diameter of the oval. When the work is to be offset at both ends and turned to the oval shape throughout the length, off-centering is done on the square.

With the centers laid out, mount the stock on the true centers and turn into round. Then mount on the first pair of off-centers ready for turning the first side. If the round is more than $1\frac{1}{4}$ in. in diameter, reduce the lathe speed to about 500 r.p.m., or less. Turn only with scraping tools such as the spearpoint and round-nosed chisels. The gouge and skew chisels, which are cutting tools, tend to run too deeply on the interrupted cut. After the work has been turned into round, some wood turners pencil a ridge line on the work as in Fig. 2.





After turning work into round, mark ridge line the full length of turning. Turn offset side to line



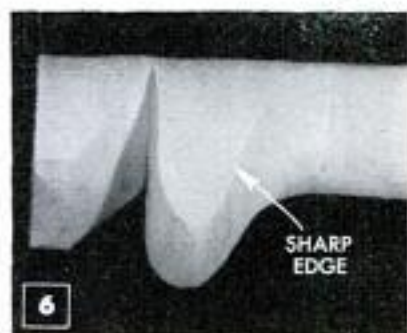
Locate the offset centers from the two flat sides of work. Here the offsets are made on the diagonal



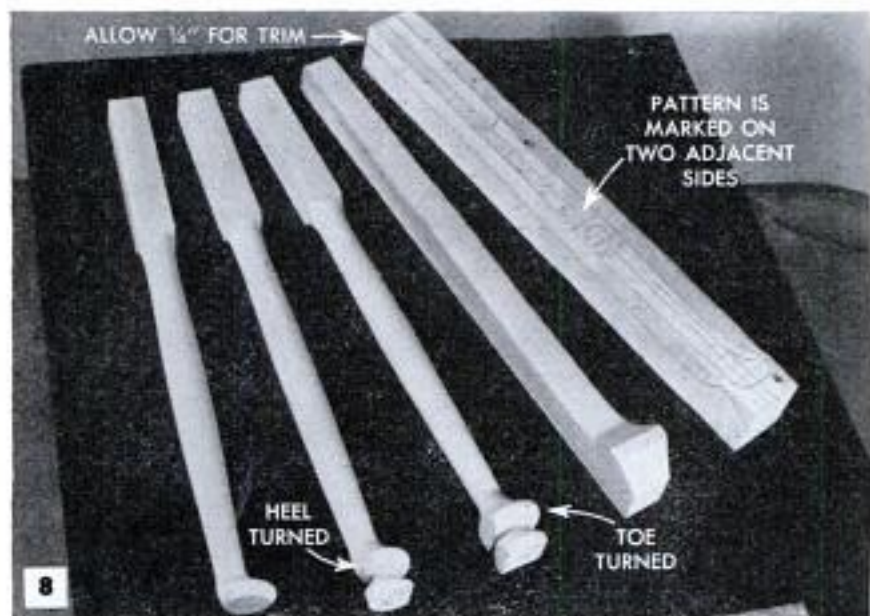
Body of turning and front of foot are turned down on true center



Toe is not a full circle and it must be measured from the flat side

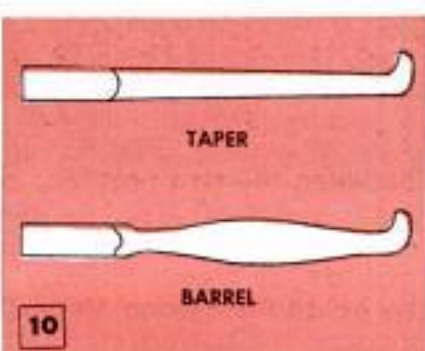


Work is off-centered at lower end only to turn heel of foot



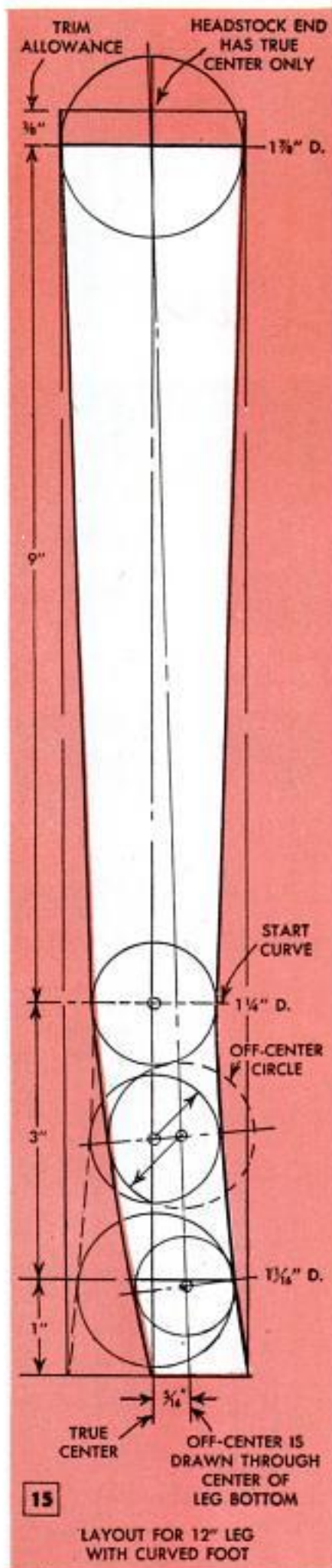
First step in turning the spade, or club, foot is to mark the pattern on two adjacent sides of the turning square. Then saw to rough shape

Careful sanding smooths the foot ready for finishing in color desired

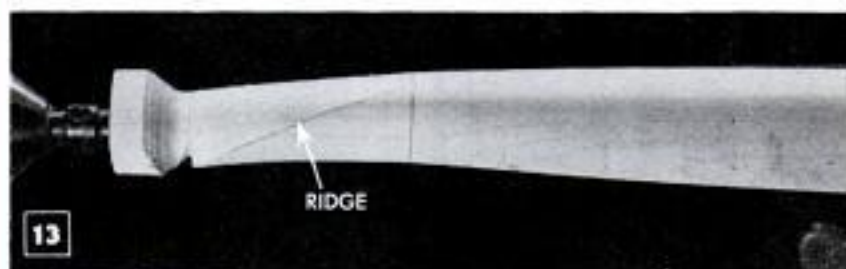


Light filing and sanding are necessary to remove sharp edges and shape foot to the required contour. Waste piece is sawed off





First step in making curved foot is turning into round on true center



Work is then off-centered at one end to turn heel of curved foot. Second step forms a sharp ridge at approximately point indicated



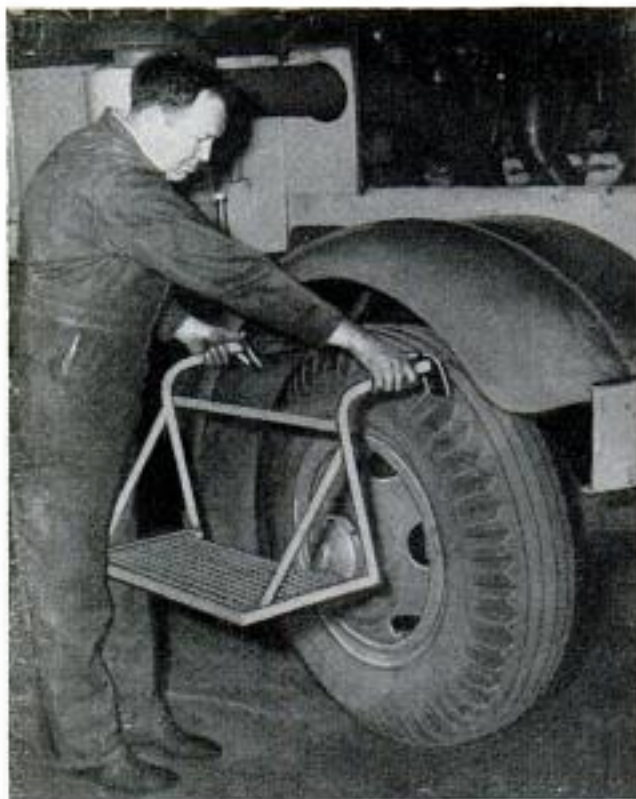
In the final step, ridges are removed by sanding and filing to contour

When off-centered, the stock forms a double image as it rotates, making it fairly easy to determine the correct contour by eye alone. After the first cut is finished to the ridge line, shift the stock to the second pair of off-centers and work the second cut to the ridge line. Then finish the sharp ridges by sanding the work while mounted on the true centers.

Usually it is better to work a long oval on rectangular, rather than square stock. This saves both material and time. Instead of running the ridge down to a sharp line, it is left as a narrow flat which is easily sanded out to a smooth curve. However, in smoothing the work while rotating in the lathe, the sandpaper tends to cut faster on the leading edge. This often makes it necessary to shift the work end-for-end to obtain a true contour.

Spade foot: The spade foot, or club foot, is turned by off-centering at the tailstock end only. If the top is to be a square section, as in the lamp table, Figs. 16, 17 and 18, off-centering must be done on the diagonal, Fig. 3. Just as in turning a plain oval shape, the desired contour is determined by making a layout of the arcs with a compass. Off-centering 1/2 in. is a good average for this type of work. When making splayed legs be sure to make an allowance for trimming at the top end, Figs. 8 and 17. Also in sanding, Fig. 9, it is helpful to recenter the work between the two previous centers.

Curved foot: This is very similar to the spade foot, except for the variation in the shape of the work. In making the layout the diameter at the bottom end should be held to the same dimension as the straight taper. The amount the bottom end is turned out determines the off-



Step Suspended From Front Wheel Aids Truck-Engine Work

Working on the engines of big trucks was made considerably easier in one garage by building platforms or steps that are suspended from hooks which fit over the tire on the front wheel. The steps are of angle-steel construction and so designed that even a short man can reach all the engine components on one side.

R. M. Ogden, San Anselmo, Calif.

Regular Timing Light Can Be Used On 12-Volt Ignition System

Ignition mechanics do not need to buy a special timing light for tuning cars with a 12-volt ignition system. A regular 6-volt light which receives current from the car battery can be used by hooking it across just one half of the 12-volt battery. The light then is fired by No. 1 plug, as usual, it not being affected by the voltage change.

Ed Packer, Chicago.

This Gate Tips Over to Open

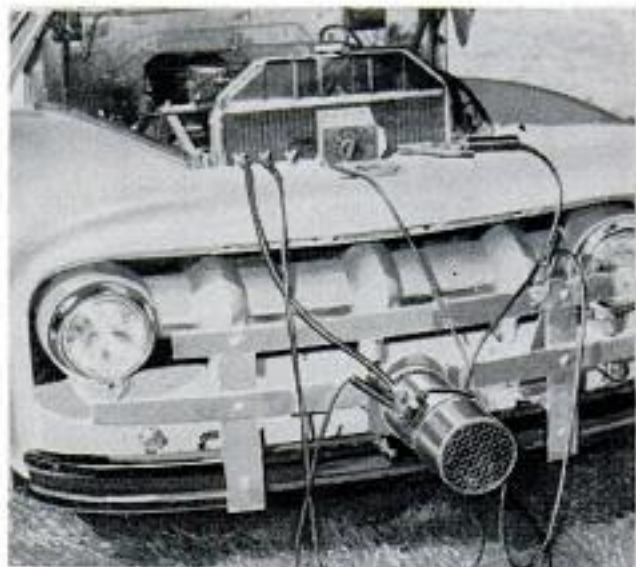


Requiring no swing space, hinges, hasps or latches, this farm gate is made from four strands of wire and two spreaders of a length equal to the height of the gateposts. First, the

spreaders are laid horizontally in front of each of the gateposts and the four strands of wire are stapled loosely to each spreader so that they are uniformly spaced. Then the ends of the strands are brought together and stapled to the second post on each side of the fence opening, as shown, the staples being driven into the posts at ground level. All four wires should be drawn to a uniform tension. To close the gate, simply tip it up to the vertical position and slip a wire loop over each spreader and gatepost.—B. M. Franklyn, Hunter, Okla.

Large Truck-Mounted Welder Provides Easy Portability

In order to have a large-capacity welder always close at hand, one farmer mounted a 200-amp. welder on his pickup truck so it was driven by the truck engine. Installations will vary with different makes of trucks. The installation illustrated shows the generator mounted on the front end of the truck to engage a power shaft driven by the engine. In other cases, the generator may be driven from a power take-off or may involve driving the generator from the fan belt. Also, it is possible to use a twin pulley on the fan shaft and drive it from this. The remainder of the welding unit is mounted under the hood on a frame bolted to the truck frame.



☛ If the edge of an aluminum sink smudges the clothing of anyone leaning against it, rub the aluminum with steel wool and apply two thin coats of shellac.

Fence Made From Implement Wheel Prevents Overturning Tub



A round tub used for watering farm animals can't be overturned easily if it is placed inside a guard made from a discarded implement wheel. The hub is cut from the wheel and the spokes bent outward at right angles to the rim, the spokes being heated, if necessary, to permit

bending. The spoke ends are forced into the ground and the tub is set inside the rim, as shown in the sketch. The diameter of wheel should be just slightly larger than that of the tub.

Altering Hand-Tightened Chuck To Take Pin Drills

Some hand-tightened chucks on hand drills and drill presses, which will not close tightly enough to hold pin drills, can be altered to do so by using a flat hex nut. The nut is dropped into the threaded hole in the chuck before it is screwed onto the drill spindle. The nut has the effect of lengthening the threaded portion of the spindle, which forces the chuck jaws together more tightly.

Gilbert C. Close, Hawthorne, Calif.

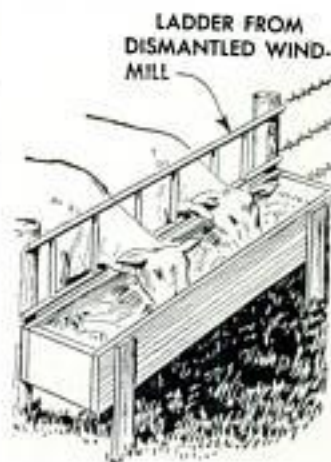


Early Seed Corn Dried in Crib By Hot-Air Furnace

To dry out his early harvested seed corn, one farmer installed this hot-air furnace in the driveway of his double cornercrib. Two overhead bins, each holding 250 bu. of corn, are piped for hot air from the furnace, and the corn is put into these when it comes from the field. Four days and nights of drying, with a temperature of 95 to 100 deg. thermostatically maintained, slowly reduce the moisture in the corn to 12½ per cent. When the corn is dried, it is shelled and elevated to storage bins.

Section of Windmill Ladder Used As Trough Stanchion

Ladder sections salvaged from a dismantled windmill can be utilized, without change, as stanchions, or dividers, on livestock-feeding troughs. As shown in the sketch, a ladder section can be nailed to the posts on either side of a fence-line calf-feeding trough. Hinged to one edge of a hog trough, the ladder section provides a divider that can be swung out of the way for cleaning the trough.



☛ If you find it difficult to make wallpaper adhere to plaster that has a chalky surface, apply a thin coat of shellac.

KEEPING YOUR WORKSHOP TOOLS SHARP

by E.R. Haan

The Equipment

1



POWER GRINDER



HAND GRINDER



GRINDING WHEELS
 ALUMINUM-OXIDE
 60 TO 80 GRIT
 SPEED
 3000 TO 5000
 SURFACE FEET
 PER MINUTE

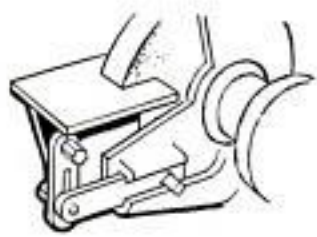
S.F.P.M. — WHEEL DIA. X 3.1416
 X R.P.M.



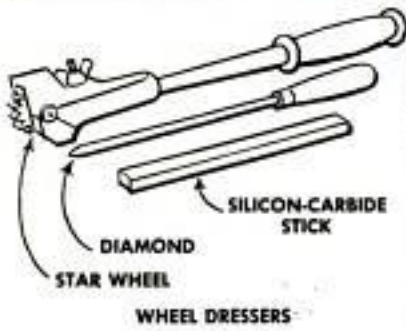
WEAR GOGGLES



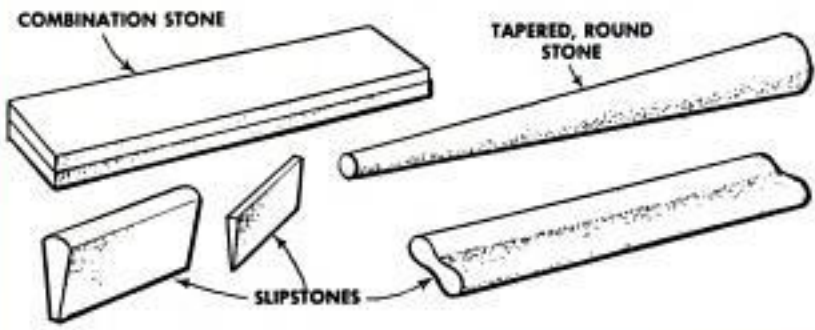
SAFETY-GLASS SHIELD



ADJUSTABLE TOOL REST



WHEEL DRESSERS



COMBINATION STONE

TAPERED, ROUND STONE

SLIPSTONES

A KEEN CUTTING EDGE is more than just one or two bevels ground along the length of a blade or across one end. It's also the result of simple know-how combined with the ability to perform several manual operations simultaneously. The sharpening of hand tools is easy after you learn the trick of maintaining uniform pressure, uniform length of stroke and a uniform position freehand. In accomplishing the desired result, whether you rough-grind on a power grinder, a hand grinder or the coarse side of a combination oilstone, the technique is much the same. You can finish the edge by fine-grinding on the fine side of the oilstone by hand, or on a honing wheel mounted on a power grinder. The end result will be the same, the only differ-

ence being that the power-driven unit will do the job in much less time.

Sharpening equipment: Fig. 1 shows the hand and power units most commonly used in sharpening hand tools in the workshop. You can do an acceptable job of sharpening common tools with only a combination oilstone. But you can produce a much keener edge by rough-grinding on a wheel of medium grade (grit), finish-grinding on a fine wheel and then slipstoning or stropping on a leather strop. Carvers and others accustomed to really sharp tools don't consider the edge practical to use unless it will pass at least two of the five sharpness tests shown in Fig. 2. One advantage of wheel-grinding is that the bevel is ground slightly concave (hollow ground) due to curvature

5 Sharpness Tests

2

SIGHTING
ACROSS
EDGE



SHAVING
TEST



FINGERNAIL
TEST

NAIL DRAGS WHEN
MOVED LIGHTLY
ALONG EDGE



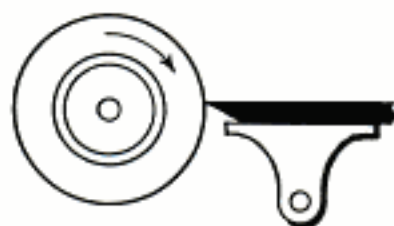
PAPER-CUTTING TEST



SHARP
EDGE
HAS NO
"FEATHER"

Grinding Procedure

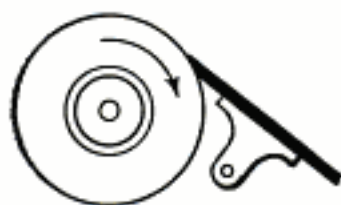
3



EDGE GROUND SQUARE
ACROSS TO REMOVE NICKS



CHECKING PLANE IRON
WITH TRY SQUARE



WHEEL ROTATES AGAINST
EDGE WHEN GRINDING BEVEL



TOOL MOVED BACK AND FORTH
ACROSS WHEEL FACE



DIPPING IN WATER
KEEPS EDGE COOL
WHILE GRINDING

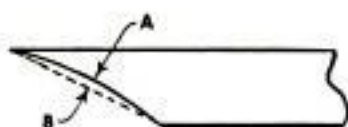
of the wheel. A disadvantage of wheel-grinding is a tendency of the wheel to draw the temper of fine-edged tools such as carver's chisels and gouges, pocketknives and socket and butt chisels with narrow blades. To prevent this possibility, use a wheel of medium grit, drive it at the correct speed and use a very light pressure while the tool is in contact with the wheel.

Grinding procedures: Note the grinding procedures in Figs. 3 and 4, and especially the positions of the tool when grinding on the face and side of the wheel. If the edge is nicked, square it on the face of the wheel as in Fig. 3. Check the squareness of the edge with a try square before and after grinding. This is especially important on plane irons and wide-bladed chisels. When

sharpening on a grinding wheel, dip carbon-steel tools in water frequently, Fig. 3. Tools of high-speed steel, such as twist drills, should be ground dry with very light pressure.

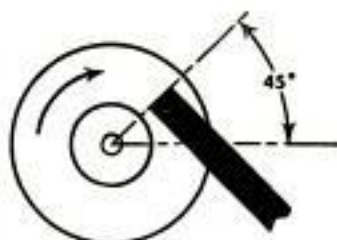
Grinding on either the side or face of the wheel forms a burr, or wire edge, Fig. 4. This is removed by honing or fine-grinding, Fig. 5. Some users of chisels often hone a second bevel as in one of the details in Fig. 5. This is an advantage in certain types of work where it is necessary to lift heavy chips.

Using oilstone and strop: Users of edge tools generally carry sharpening one step further to include stropping, Fig. 5. Some craftsmen prefer to make a strop by cementing a strip of top-grain leather to a

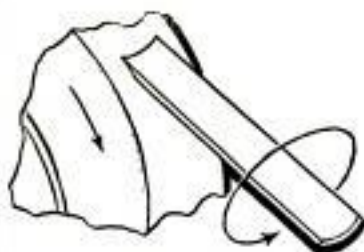


A—CONCAVE BEVEL GROUND ON FACE OF WHEEL

B—STRAIGHT BEVEL GROUND ON SIDE OF WHEEL



POSITION OF TOOL WHEN GRINDING ON SIDE



OUTSIDE BEVEL OF GOUGE GROUND ON FACE OF WHEEL



OUTSIDE BEVEL OF GOUGE GROUND ON SIDE OF WHEEL



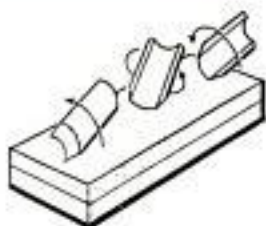
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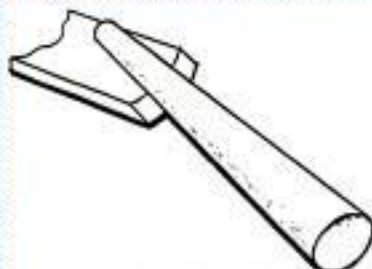
PLACE A FEW DROPS OF OIL ON THE OILSTONE BEFORE USING



TOOL IS PUSHED EDGE FIRST OVER STONE



OUTSIDE BEVEL ON GOUGE FORMED BY ROLLING SWEEP



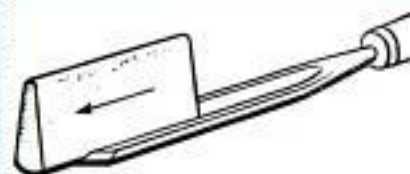
USE TAPERED STONE ON INSIDE BEVELS



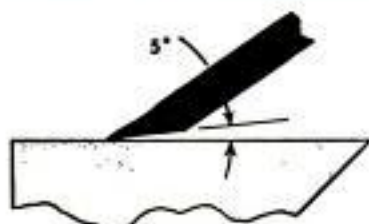
GRINDING FORMS BURR ON EDGE



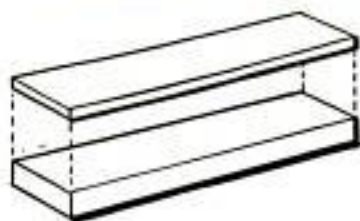
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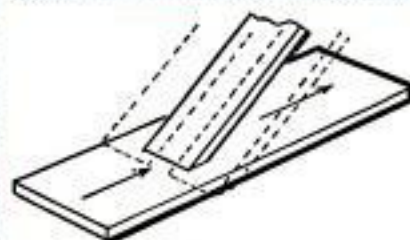
BURR ON GOUGE REMOVED WITH SLIPSTONE



HONE A SLIGHTLY SHORTER BEVEL



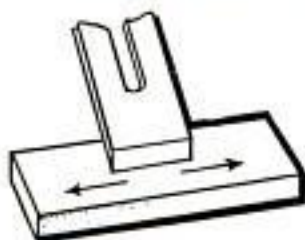
2" X 12" LEATHER STRIP GLUED TO WOODEN BLOCK



SHARP EDGE OVERHANGS STROP



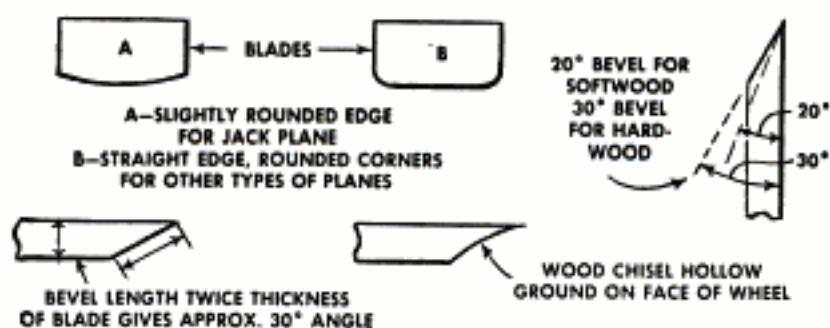
RAZOR STROP



FLAT SIDE OF TOOL MOVED OVER STONE

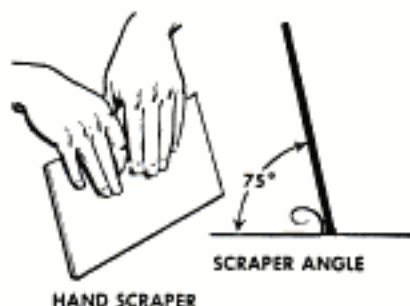
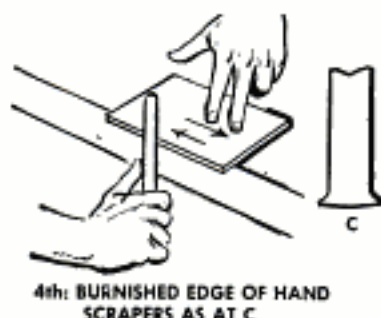
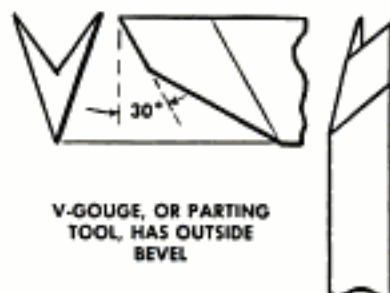
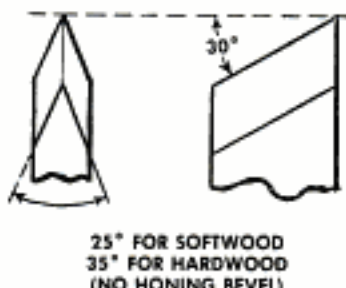
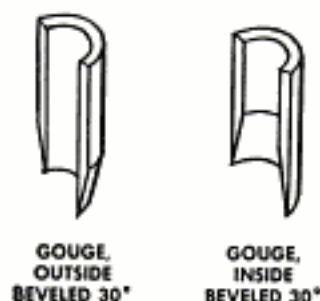


PLANE IRON AND CHISEL HOLDER ADJUSTABLE TO CORRECT BEVEL



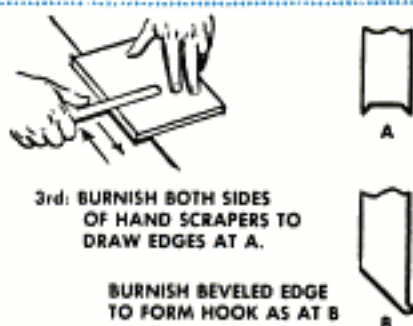
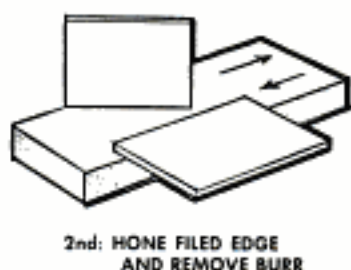
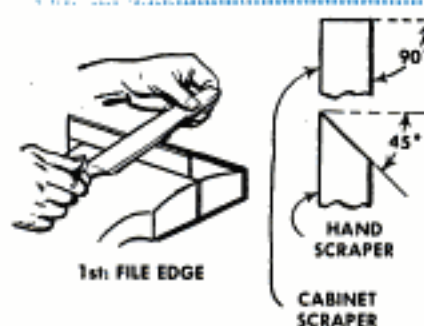
Chisel and Plane Blades

6



Hand and Cabinet Scrapers

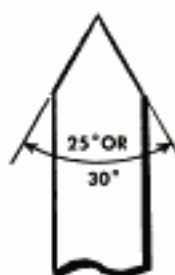
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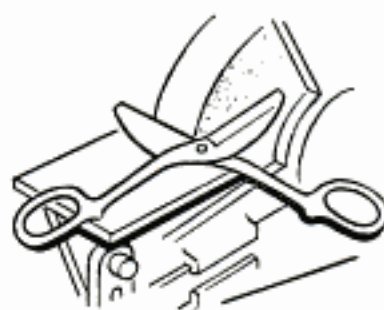
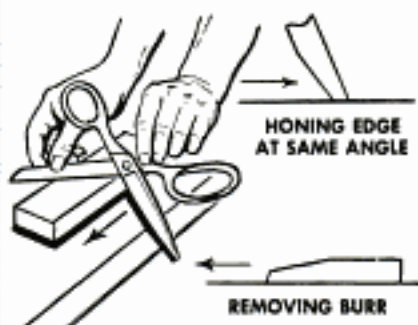
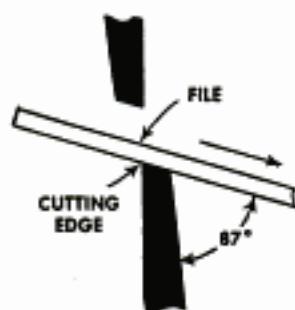
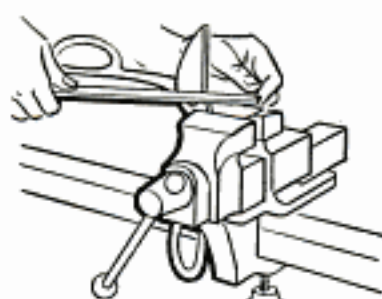
hardwood block. A piece of leather belting is excellent, but be sure that it is not contaminated with embedded grit, as this would make it entirely unsuited to the purpose. Carvers and whittlers often use a razor strop for finishing the edge of pocket-knife blades, Fig. 5. Some prefer to strop against the edge as indicated by the arrows, others make the stropping strokes in the opposite direction. It can be done either way, but the latter method is perhaps the most preferable. In any case the leather should be in good condition. Do not use old razor strops or leather that is cracked or roughened by long use for other purposes. A few drops of neat's-foot oil rubbed into the surface usually will condition it for use as a strop. Some craftsmen impregnate the leather with polishing rouge, but this is

hardly necessary unless it is desirable to speed up the removal of the invisible wire edge left by honing. In stropping tools sharpened with a single bevel, such as plane irons and chisels, it is common practice to stroke the bevel over the strop in one direction with the edge trailing. Some craftsmen say they get better results by alternating the strokes so that the edge overhangs the strop as indicated by the dotted lines in one of the details in Fig. 5. Others use a back-and-forth stroke but impart a rotary motion across the surface of the strop, the tool overhanging the edges of the strop alternately. There is no hard-and-fast rule but it is a common practice in stropping to stroke the tools with the edge trailing. It is not so much the type of stroke that is used, but rather is uniformity

CARVER'S CHISEL



8



of motion and pressure that produces a razor-keen edge for smooth work.

Chisels and plane irons: For rough work the edge of a plane iron should be rounded slightly as at A in the upper-left-hand detail, Fig. 6. For surfacing and jointing where accuracy is important, the iron should be ground straight across, detail B, with the corners only slightly rounded to prevent scoring the work. In both details, A and B, the contours have been somewhat exaggerated for purposes of clarity.

Cabinet scrapers: Although the scraper is a smoothing tool like the hand plane, the edge is formed by burnishing after rough filing or grinding is done. There are three cutting-edge shapes commonly used as in views A, B and C, Fig. 7. For average work on large surfaces, cabinetmakers generally prefer the hooked edge B as it cuts somewhat faster, although not as smoothly on softer woods as edges A and C. To form the edges A and C, the scraper is filed or ground square across and the cutting edges formed by burnishing as in the third and fourth steps. When using either of the hooked-edge scrapers, B and C, cabinetmakers generally prefer to pull the scraper across the surface at an angle of about 75 deg. However, on certain types of work better results will be obtained by pushing the scraper.

When used for paring, a hand chisel cuts in much the same manner as a plane iron. The exception is that the depth of cut of the plane iron is controlled mechanically while the depth the chisel cuts must be controlled manually. Gouges, skew chisels (used by turners and carvers) and the various types and sizes of V-gouges, or veiners, belong in this classification.

Shears, scissors and snips: The technique of sharpening tools which shear metals and fabrics differs somewhat from that for other common edged tools. This is due to the shear-cutting action necessary to sever the material and also to the comparatively heavy pressures to which the edges are subjected in ordinary use. When filing tinner's snips, it's a common practice to file with the edge and remove the burr by honing, Fig. 8. In grinding, the wheel runs against the edge, the blade being stroked across the face of the wheel under light pressure. This avoids any tendency to serrate which might result from application of heavy pressure and a slower stroke.

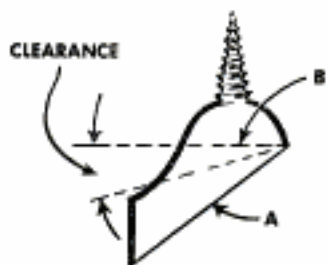
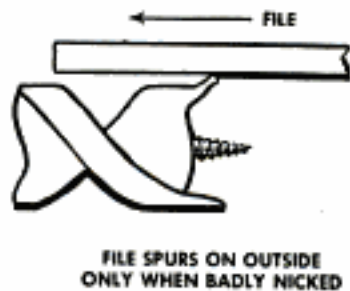
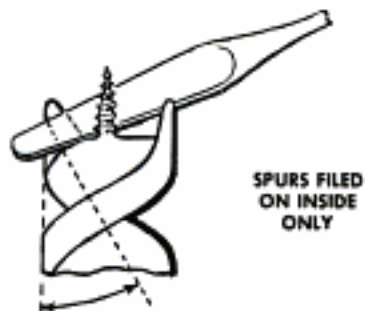
Auger bits: Sharpening dulled auger bits is quite simple to do if you use a file especially shaped for the purpose, Fig. 9. The spurs are always filed on the inside unless it is necessary to remove a nick. Then it is permissible to file on the outside of the spur as in one of the details in Fig. 9.

Twist drills: In grinding twist drills it's important to maintain the same angle across the leading edges and the correct clearance angle from the leading to the trailing edges. The former is 59 deg. for average work, with a clearance angle of 12 to 15 deg., Fig. 10. Although twist drills can be ground freehand on the side of the grinding wheel with a reasonable degree of accuracy, better results will be obtained from the use of a drill-grinding jig, Fig. 10.

Hand crosscut and rip saws: The eight steps in Fig. 11 show the procedure in jointing, setting and filing handsaws. Although the plunger-type setter is commonly used, some craftsmen prefer to set the teeth with a pin punch. This is done with a hardwood backing block. ★★★

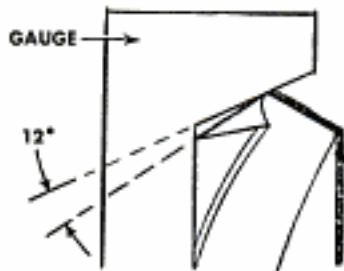
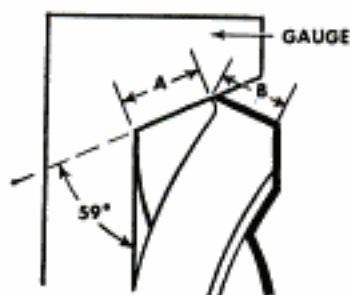
Auger Bits

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Twist Drills

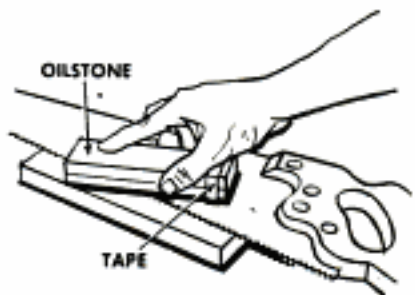
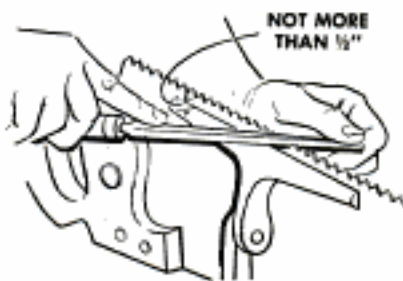
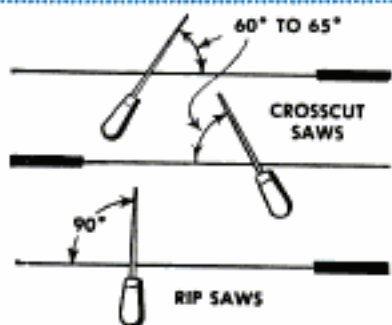
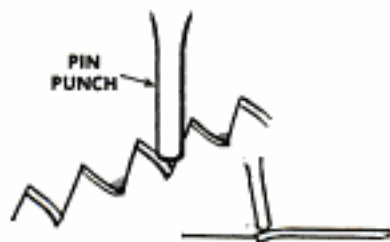
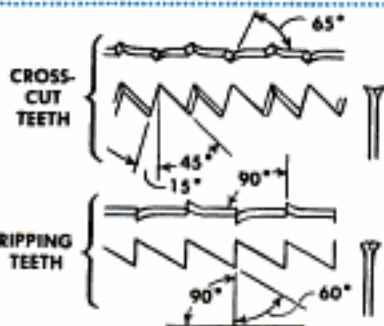
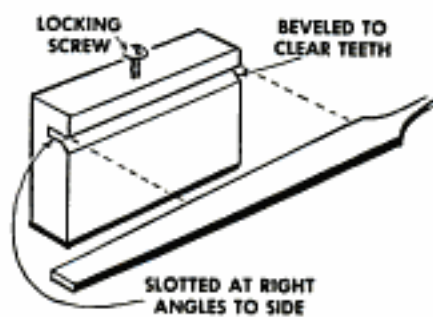
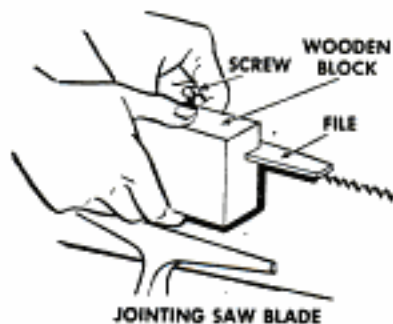
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DRILL-GRINDING JIG

Hand-Crosscut and Rip Saws

11



Belt From Tractor Generator Drives Mower-Sickle Sharpener



By installing a dual V-belt pulley and extra belt on the generator of his tractor, one farmer provides a means of driving a mower-sickle grinder bolted temporarily to the front axle. The fan belt drives the generator in the conventional manner, while the second belt on the generator drives the grinder.—L. H. Houck, Jefferson City, Mo.

Sticking Dresser Drawers Eased By Thumbtacks on Slides



Overloaded dresser drawers that are difficult to slide in and out can be made to work more easily by using ordinary thumbtacks in the drawer slides. Force the tacks into the slides a short distance back from the front edge of the dresser. Rubbing wax along the bottoms of the drawers where they contact the tacks will also help the drawers slide easily.

Howard E. Moody, Upper Jay, N. Y.

Cleaning of Gas-Line Filter Prevents Engine Troubles

A number of engine troubles of late-model cars, which are blamed on defective fuel pumps and clogged gas lines, actually are due to dirt and sediment collecting in a small filter located in the gas line between the carburetor and fuel pump. To avoid

trouble from this filter, clean it periodically by unscrewing the threaded fitting, removing the element and soaking it in gasoline. Compressed air can be used to blow out the dirt in an element that is badly clogged. It is advisable to buy a new unit if the old one cannot be cleaned. Under no circumstances should the filter be taken out of the line, since particles of dirt then may pass into the carburetor and cause trouble.

Stuart Foster, Columbus, Ohio.

Welded Stand for Bench Grinder Permits Easy Portability

When machinery is pulled into the barnyard for emergency repairs, it saves time and steps to have a bench grinder close to the job. The double-end grinder, shown in the photo, is bolted to a 12-in. length of 10-in. steel channel. The channel is welded to a length of 1½-in. steel pipe cut to a convenient work-surface height. On the original stand, the base was salvaged from a discarded sign. However, any circular shape, cut from plate or fabricated from flat bar, would furnish an equally good base. The circular shape allows the grinder and stand to be rolled to the job. An extra-long cord should be provided so the grinder can be used in any part of the yard.



Stemmed glassware need not be discarded when broken if part of the stem still remains, for this can be pressed into the soil of an indoor planter, making a small vase for cut flowers.

SHOPPING FOR TOOLS

1. SWIVELING MOTOR MOUNT provides for correct tension and release of V-belts when changing speeds on drill presses and other power equipment where the motor is mounted with the shaft in the vertical position. Fits nearly all small drill presses and takes motors up to $\frac{1}{2}$ hp. Consists of two cast-iron plates pivoted together so that they open and close in a manner similar to a hinge. A ratchet-type cam holds setting when belt has been adjusted to correct tension for job

Sutton Mfg. Co., Box 5742, Milwaukie 2, Ore.



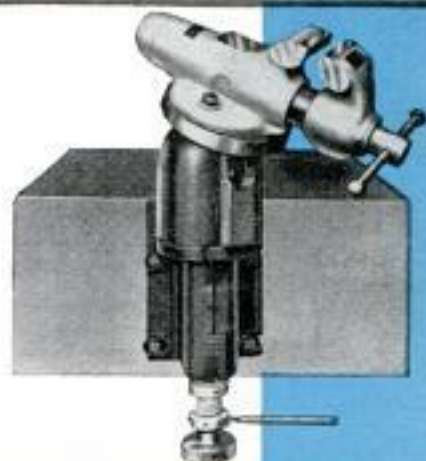
2. BLADE JIG holds narrow bandsaw blades in position for filing by hand or on a jigsaw fitted with a special chuck for holding three-cornered files. Jaws take either standard or skip-toothed blades from $\frac{3}{16}$ to $1\frac{1}{4}$ in. wide. As many as three teeth can be filed at a time by coiling blade and locating teeth in exact register before clamping in the jig. In this way the file stroke will sharpen three teeth simultaneously as in photo. Jig-filing results in accurate tooth spacing and preserves uniformity and correct tooth shape

Riverside Enterprises, 10 Riverside, Corning, N. Y.



3. POWER HEAD is actuated hydraulically so that work held in vise can be positioned for compound-angle work on drill presses, milling machines and shapers. Unit can be attached to wall, workbench or machine tables. Head swivels to any desired position, either vertically or horizontally and is held in any position by applying pressure hydraulically. Tension on head can be controlled from release to full holding capacity when it is necessary to move the work, adjust vise, or change position of unit vertically

Wilton Tool Mfg. Co., 925 Wrightwood, Chicago 14



4. "CORNER" SQUARE simplifies the job of determining, bisecting and transferring angles in cabinet-making, counter-top fitting and tile setting where speed and accuracy count. Unit is especially useful when fitting counter tops between walls in rooms slightly off-square at corners. Measurements can be taken and transferred to the materials to be cut with an accuracy and speed unequaled by other methods. Legs are 18 and 24 in. long. Links connect legs to slide on graduated bar from which reading is taken

Johnson Research & Products, P. O. Box 14, Flossmoor, Ill.



SHOPPING FOR TOOLS

(Continued from preceding page)



5

5. HAND NIBBLER cuts steel steel up to 18 gauge, aluminum and other soft metals to 16 gauge. Cuts in any direction, makes square corners on inside cuts, radius corners from the edge of the stock, cuts in and out from the edge, removing square, rectangular or curved section. Makes clean, sharp-edged cut and leaves straight edges without burrs

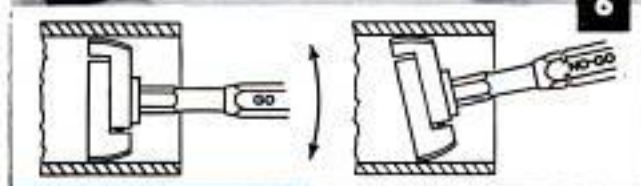
Adel Tool Co., 4013 N. Milwaukee Ave., Chicago 41



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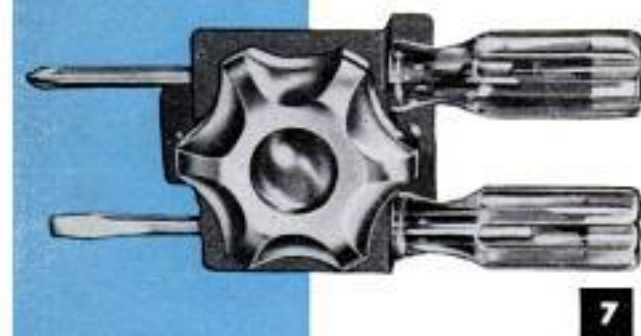
6. ADJUSTABLE BORE GAUGES are a major advance in fast, accurate bore-gauging at inspection bench or at machine. Double-ended, gauges are set go and no-go to the hole specification and are identified by green and red. No-go end also is notched for identification. Special design of gauges enables operator to detect defects as bellmouth, out-of-round and taper

M. C. Hutto Co., 6516 Detroit Ave., Cleveland 2, Ohio



7. RATCHET DRIVE for conventional-type screwdriver gives greater leverage and longer reach. Ratchet is fitted into a detachable palm-type handle similar to that on a brace. Driving lug of reversible ratchet fits socket in screwdriver handle. Available as a kit containing two drivers and ratchet drive, one driver for Phillips screws, one for standard slotted screws

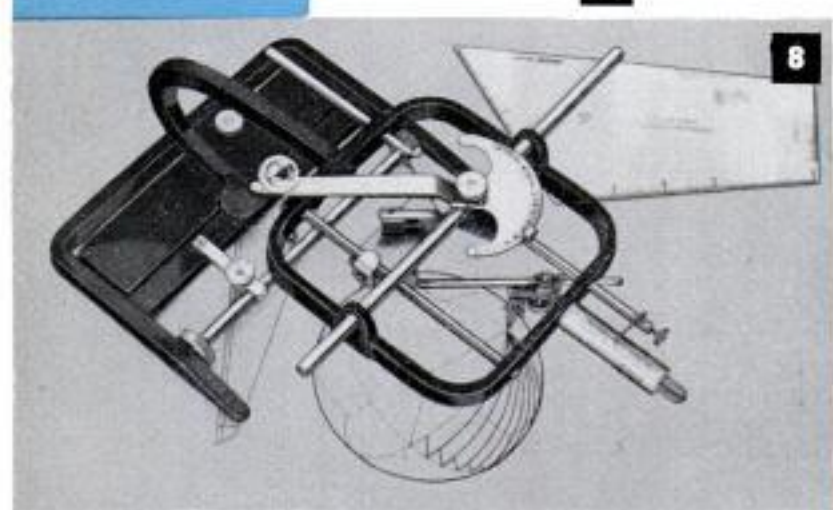
Kipton Industries, Kipton, Ohio



7

8. DRAWING MACHINE for draftsmen, engineers and technical illustrators makes accurate pictorial drawings which require ellipse forms drawn with mathematical precision. Two settings determine the minor and major diameters. Once set, related ellipses can be drawn repeatedly without variation in size. This feature is especially useful in making exploded views

Charles Bruning Co., 4700 Montrose, Chicago 41



8

9. NONMETALLIC TAPE RULE has bold markings protected by a special plastic coating compounded to resist abrasion, cracking, mildew and repeated soaking and drying. Maintains dimensional stability under adverse conditions. High safety factor is provided by nonmetallic construction when working near high-tension electrical circuits. Case is made of leather

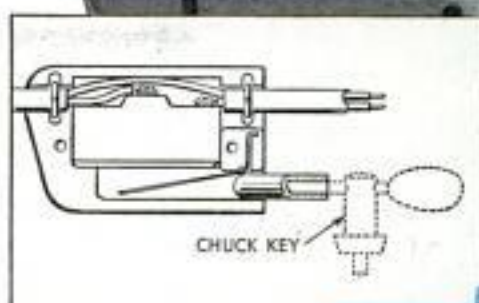
The Lufkin Rule Co., Saginaw, Mich.



9

10. SAFETY SWITCH for portable electric drills and drill presses utilizes drill-chuck key as a "circuit breaker." Motor cannot be started until key has been inserted in the switch as in detail. Only then will switch operate normally to start and stop motor. Eliminates the danger from chuck keys left lying on moving parts of the machine or in the chuck

Tricop Co. Inc., 308 W. Center, Akron 2, Ohio



11. SABER-SAW ATTACHMENT for circular saw fits underneath the saw table as in the lower photo. Unit tilts with the saw arbor, making it possible to cut curves at any angle within the limits of the tilting device. Crosscuts, rips and curve-cuts stock up to 2 1/4 in. thick. Also can be used for sanding and filing, either vertically or at an angle. Easily installed and removed

Delta Power Tool Div., Rockwell Mfg. Co., 430 N. Lexington, Pittsburgh 8, Pa.



12. SPIRALLY FLUTED TAP produces self-locking internal threads which largely eliminate the use of ordinary bolts, nuts, locknuts, cotter pins and locking rings in types of assemblies where bolts and pins are used as fasteners. Threads can be cut to extremely close tolerances, also various classes of fits, snug, tight and extra-tight. Threads take regular cap screws

Shearcut Tool Co., 7045 Darby, Reseda, Calif.



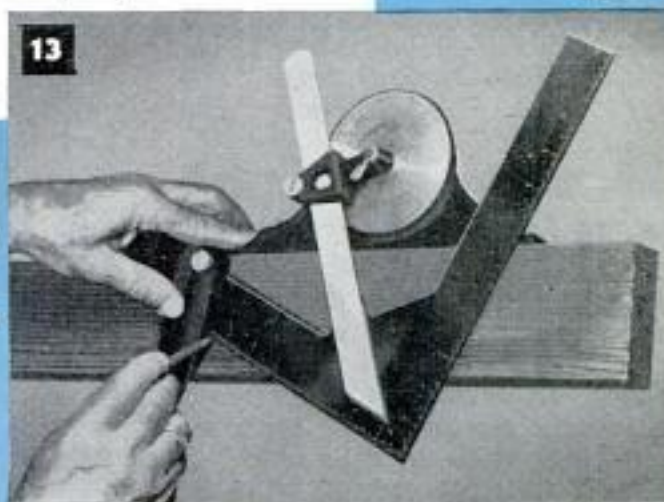
13. CARPENTER'S SQUARE automatically indexes to the correct angle for cutting rafters or other angular cuts used in framing. A simple turn of a dial gives the correct angle for 14 standard rafter cuts, including jack and cripple rafters. Can also be set for stair-riser cuts, sheathing cuts and octagon and polygon shapes. Easily adjusted to different widths

Unique Products, Inc., Box 2263, Reno, Nev.



14. SOLDERING GUN spotlights the work by means of a 10-watt bulb housed in barrel of gun and controlled by a separate switch. Gun is of the thermostatically controlled type which prevents overheating during idle periods while work is in progress. Comes in two sizes, one for light jobs such as radio and electrical work, the other for industrial jobs

S. J. Sutton, 228 E. Park, Wheaton, Ill.

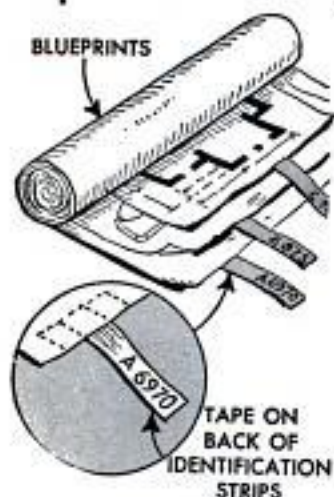




Children Cannot Reach Paint On Ceiling-High Shelves

In order to store paints, insecticides and other potentially dangerous material where it cannot be reached by children, one homeowner built shelves just under the ceiling of his garage. The shelves can be reached only by using a stepladder, which is stored on wall brackets too high for the children to reach.

Paper Tabs Identify Drawings



Paper tabs taped to one edge of blueprints or drawings of different sizes will prevent them from becoming misplaced when they are rolled together. Each tab is numbered or lettered to identify the particular drawing, then taped to the right-hand edge. When the drawings are

rolled together, keep the edges with the tabs fairly well aligned. Also, if possible, assemble the drawings so that one tab is not hidden behind another.

Leonard W. Mitchell, Carrsville, Ky.

Hole Enlarged in Sheet Metal Using Round File As Reamer

A round file, used as a reamer, will overcome the problem of drilling a large hole in sheet metal without tearing the metal. A hole first is drilled just large enough to admit the small end of a round file, then the file is chucked in a brace and turned counterclockwise with a light feed into the hole. Turning it counterclockwise prevents

the right-handed helix of the file teeth from binding in the hole. If the hole needs to be quite large, progressively larger sizes of files might be used.

Charles R. Haynes, Vestal, N. Y.

Seat-Protecting Cloth Held With Tire-Section "Clamp"

A narrow section cut from an auto-tire casing provides an excellent "clamp" for holding a mechanic's protective cloth in place on a car seat. Slipped over the top edge of the seat back, the clamp has sufficient tension to keep the cloth from being pulled down when the mechanic sits on the seat. Be sure that enough of the cloth hangs behind the seat back to protect against soiling by the clamp.



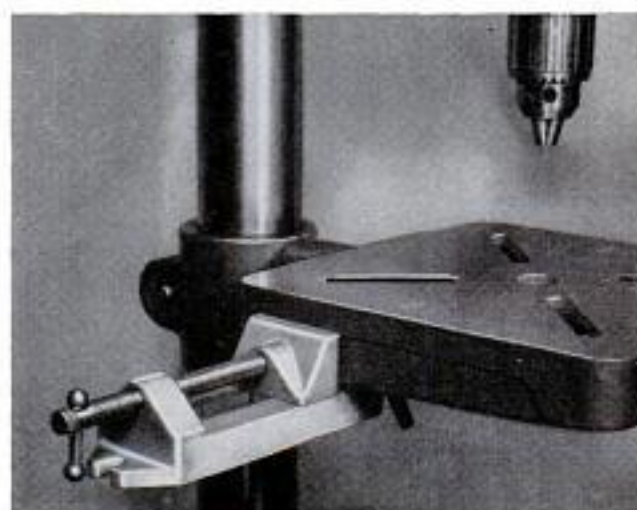
Stainless Steel Lubricated For Bending Operation

To prevent stainless-steel sheets from tearing while being bent in a sheet-metal brake, lubricate the area of the bend with tallow. The stainless steel tears because the sliding jaw of the brake digs into the surface instead of sliding.

Vise Clamped to Drill Press When Not Being Used

Clamped directly to the drill-press table by its own jaws, a drill-press vise will be instantly available, yet out of the way when not in use. Also, the removable jaws of the vise will not be misplaced since they are held in place by the clamping action.

H. Hanscom, Elmhurst, Ill.



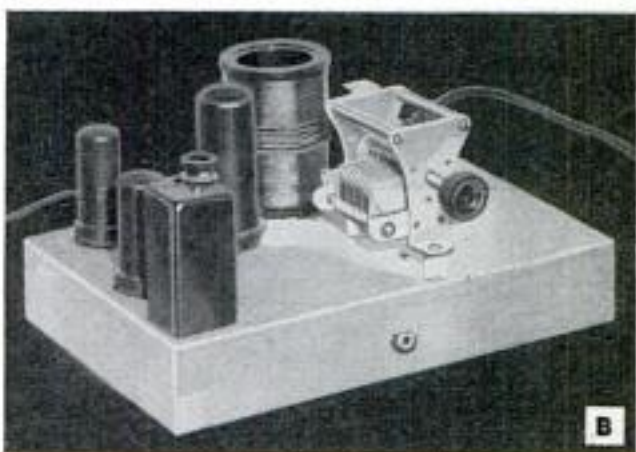
CAMPUS RADIO NETWORK

By Marvin Weisbord

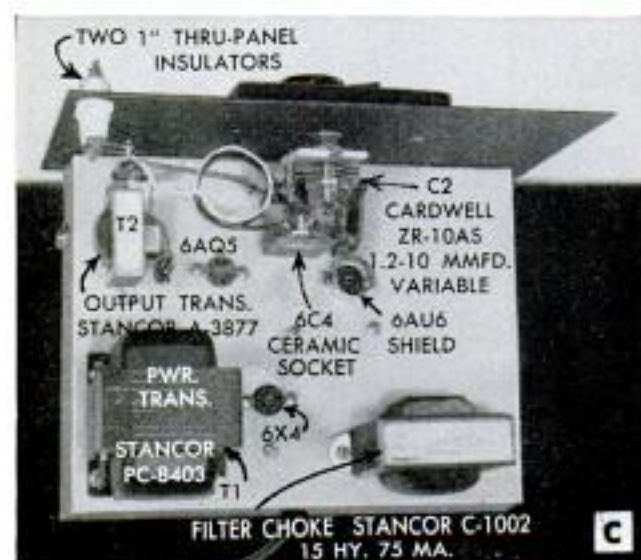
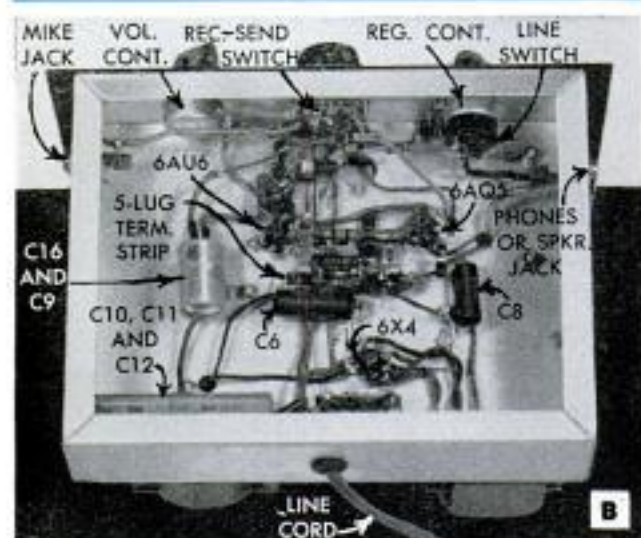
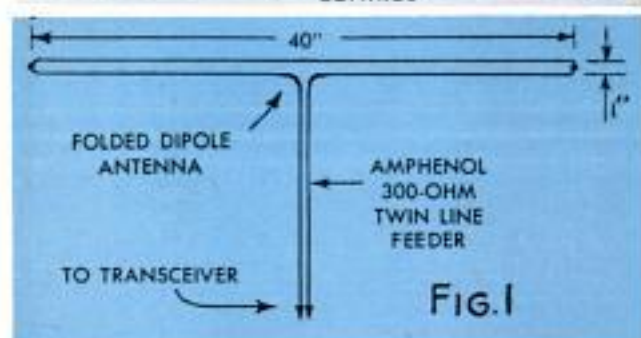
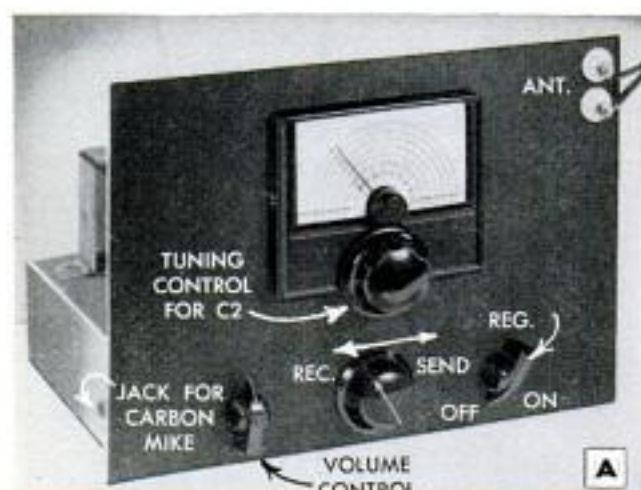
STUDENTS living in Hillcrest and Currier dormitories on the State University of Iowa campus in Iowa City have the unique pleasure of being able to tune in on their own tiny radio network each night, Monday through Friday.

Usually they get four or five hours of "easy to take" music for studying or just plain relaxing. The music is on records played by fellow students in the dormitories. A leased telephone wire connects station studio WVOC (which stands for Woman's Voice on Campus), photo A, and station HILC (Hillcrest, the men's dormitory, photo C). The wire enables the girls to listen to the boys' shows and vice versa. They alternate hours of air time.

Each station has its tiny transmitter, illustrated in photo B, and other necessary broadcasting equipment. The signals can be picked up on standard radio sets between 600 and 700 kilocycles within the area of their "closed circuit" operation which limits them to the dormitories. The equipment was built by a former student.



COMPACT TWO-METER RADIO



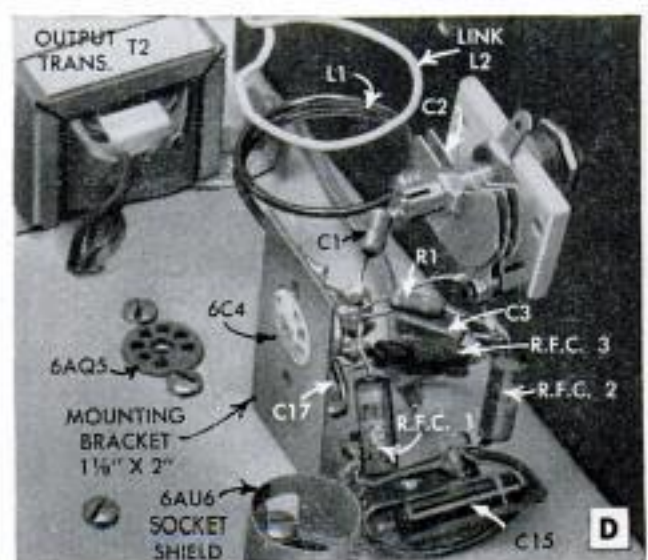
MANY RADIO AMATEURS now working at comparatively low frequencies hesitate to branch out into the 144-mc. band because of the high cost and complexity of VHF equipment. The two-meter transceiver described in this article permits the experimentally inclined amateur to investigate this uncrowded portion of the frequency spectrum at a relatively small cost. Any amateur radio operator, except one holding a novice-band license, can build and operate this compact combination transmitter and receiver.

This compact unit employs four tubes, including a rectifier, which are utilized for both transmission and reception. A built-in send-receive switch instantly converts the receiver into a transmitter, and again into a receiver, so that reception and transmission on the same frequency can be accomplished by merely flipping the switch.

The range is limited to local communication distance depending upon the height of the antenna and its location. No difficulty should be encountered for local contacts in areas free from hills and high buildings.

Crystal control is not required for operation at 144 mc., however it is necessary that the entire emission be kept within the limits of the band. A good folded-dipole antenna is important for maximum results and rotation is desirable if possible. A simple dipole may be made as shown in Fig. 1 and tacked to a lightweight wooden frame for rotation. This simple two-meter phone transceiver should provide many hours of entertainment and valuable experience in VHF operation.

A complete schematic circuit diagram is shown in Fig. 2 and the resistor chart appears at upper right. All unmarked, paper-type, fixed capacitors are 600-volt types. The electrolytic filter condensers C10, C11



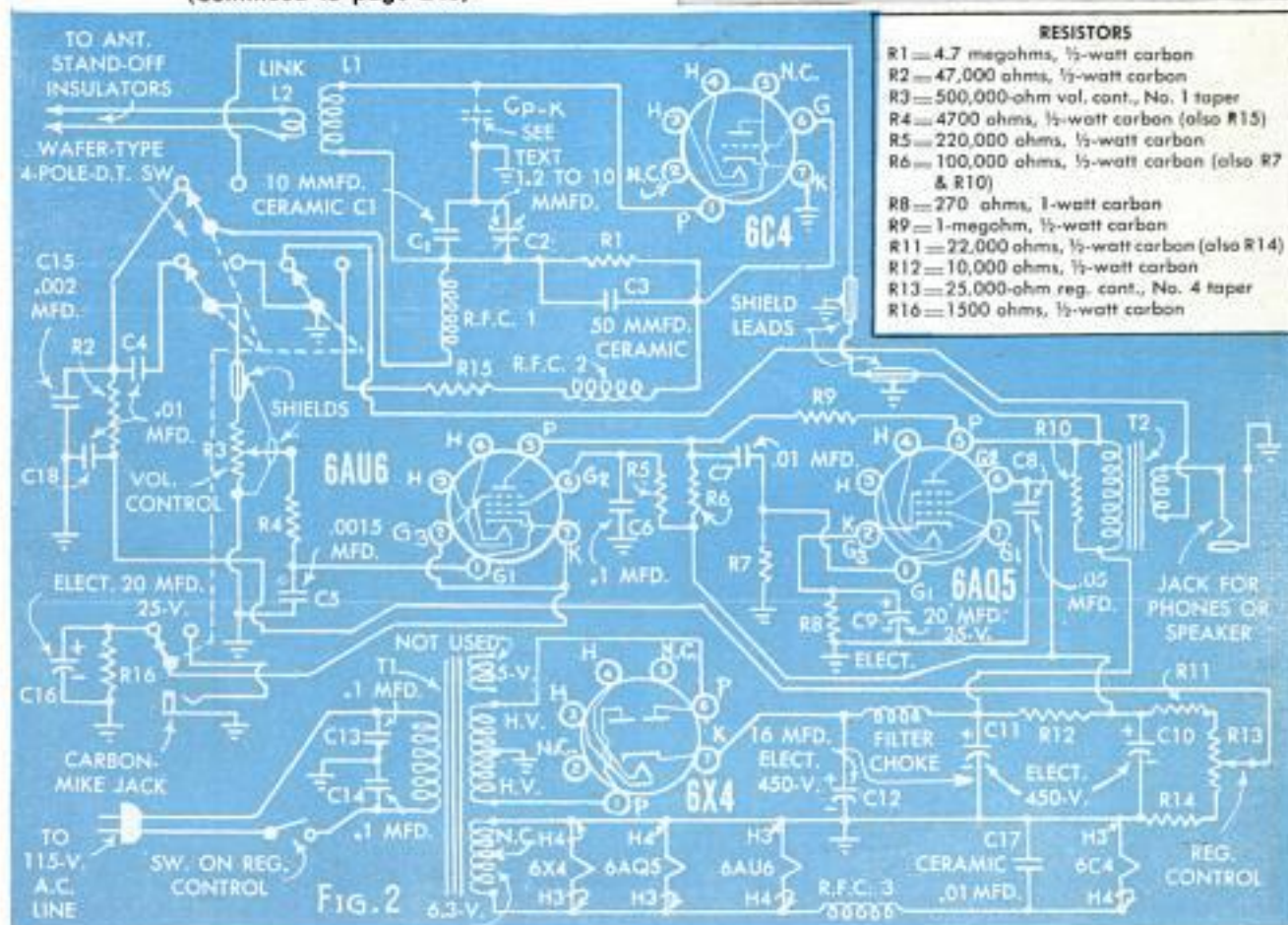
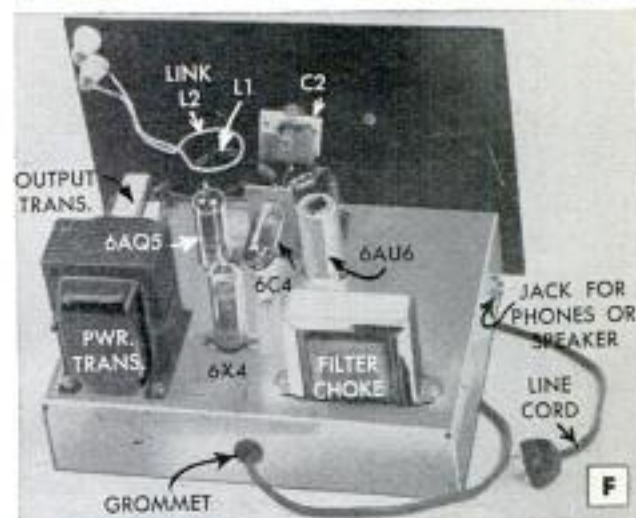
TRANSCIVER FOR AMATEURS

By Lothar Stern and
Frank Correia, W9SLX

and C12 are 16 mfd. each and are in a single triple-section unit as will be noted in the underside photo, B. All front-panel controls are shown in photo A. Photos B, C and D should be studied carefully for the layout details which are simple and not critical except for the parts shown in close-up photo D. In this close-up photo it will be noted that the 6C4 tube socket is mounted on a bracket in the center of the chassis so that all leads of components connecting the tube to tuning capacitor C2 can be made as short and direct as possible. It is highly important that these leads be kept short.

In the "receive" position, the 6C4 tube is employed in a super-regenerative detector circuit whose high gain and simplicity make it ideal for transceiver purposes. This is followed by an audio amplifier using a 6AU6 as a voltage amplifier and a 6AQ5 as a power amplifier. In the "transmit" position, the 6C4 is converted into the well-known Colpitts oscillator which is plate modulated by the output of the audio amplifier. A carbon microphone in the cathode of the 6AU6 provides sufficient output for proper modulation.

(Continued to page 246)



TV SERVICE HINTS

By H. F. Leeper

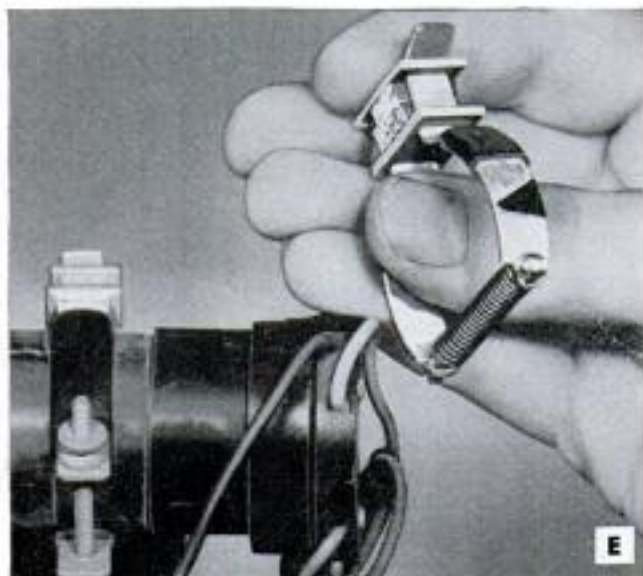
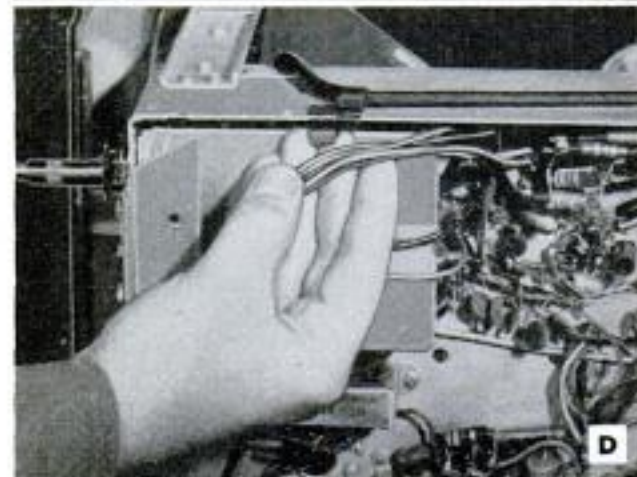
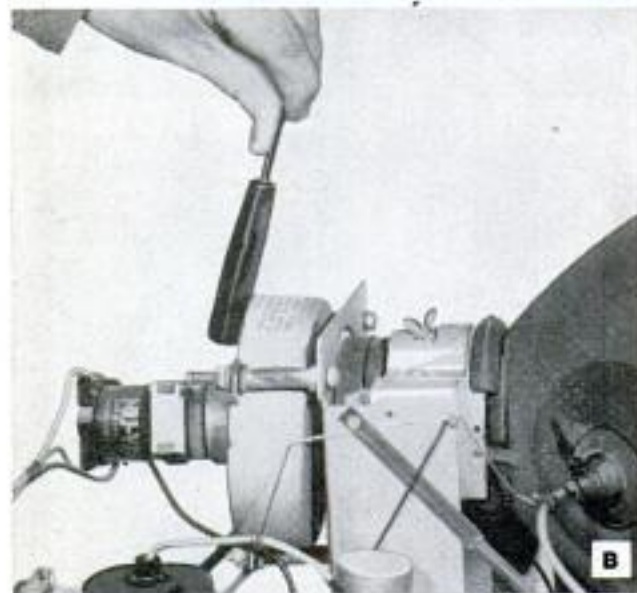
SERVICEMEN confronted with the necessity for removing tarnish and corrosion from TV-tuner turrets, or any other electrical contacts, will find a device called a "tuner-eraser" easy to use and it will not harm the contacts. It contains a chemically treated material formed as an eraser for convenient handling, as shown in photo A.

When unable to bring a TV receiver into proper focus, tapping the focus coil, as indicated in photo B, with the handle of a well-insulated screwdriver, or rubber mallet, may indicate defects. The coil could be loose and improperly placed or a broken wire could be the cause of the trouble. Such tapping is done with the receiver in operation, therefore care should be taken not to contact any part with the hand.

Picture flickering is sometimes caused by a loose high-voltage picture-tube cap. To check the cap, first disconnect the receiver power-line cord; then ground the cap terminal before attempting to make a tighter fit. A pair of long-nose pliers may then be used, as illustrated in photo C.

Many TV receivers use clamps on the underside of the chassis to hold various wires near ground potential as in photo D. It is a good idea to mark such wires before disturbing when necessary to replace a certain part. After replacement, make sure the same wires are placed in the original position to avoid necessity for realigning.

There are several types of ion-trap magnets for replacement on TV-picture tubes. Two types are shown in photo E. The one already on the tube is held in place with a thumbscrew; the other with a spring. These magnets are usually marked with an arrow for the side to be installed pointing towards the face of the picture tube.



You can do a 10'x12' Room

WITH IMPERIAL TRIMMED AND PASTED WALLPAPER

It's easy to hang these new Imperial Washable Wallpapers! Just open the package and the paper is *completely ready*. No muss or fuss . . . just fun. You simply cut a strip to the proper length, wet it and slide it into place . . . then watch how easy it is to match the pattern because of the special "slip" and precision trimming of Imperial Trimmed and Pasted Wallpaper.

Thrifty! As low as 94¢ a single roll! Imperial's selection of colors and patterns is as wide and pleasing as its price range. So see your Imperial Washable Wallpaper dealer without delay. He'll give you decoration hints and recommend a competent craftsman, if you prefer.

*Prices vary slightly in different localities.



Wet it . . . Just cut a strip to the desired length from a roll and dip it into Imperial's special water container furnished at your dealers. No pasting! No trimming!

Hang it . . . Lift the strip from the container to your wall. Slide paper into position with a sponge. Patterns match easily, for you have plenty of time to position paper.

Enjoy it . . . And you *will*—for a long, long time—because Imperial Wallpapers stay lovely and washable year after year. Their handsome decorator patterns bring extra charm to new walls and hide hideous cracks in old ones!

NOTHING WASTED WITH IMPERIAL TRIMMED AND PASTED WALLPAPER



Save your excess wallpaper and you can have an attractive wastebasket covered with Imperial's handsome Trimmed and Pasted Wallpaper! You can do it in a jiffy.



Wallpaper on a chest of drawers! This novel idea is catching on like wildfire. Imperial's Trimmed and Pasted Wallpaper sticks perfectly on properly prepared surfaces.



Closets are much more attractive wallpapered with Imperial Trimmed and Pasted. Ugly cracks and unsightly scuff marks disappear. Use a paper that brightens closets.



Here's an idea we'll bet you've never dreamed of! Yet—how smart and original. Cover the top of a coffee table with your excess Imperial Trimmed and Pasted Wallpaper.



Send 25¢ to Dept. F-1 for samples for the *one* style and *one* color scheme checked below, and picture story of "How To Hang." MY HOME IS MODERN..... RANCH..... COLONIAL..... PROVINCIAL..... 18th CENTURY..... THE COLOR SCHEME IS GRAY..... GREEN..... ROSE..... BLUE..... BEIGE.....

The pattern shown is Imperial's 71564.

Guaranteed for 3 years to clean according to instructions and not to fade or it will be replaced without charge. Imperial Washable Wallpaper is Color-Locked.

IMPERIAL PAPER AND COLOR CORPORATION, GLENS FALLS, N. Y.

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to a new world of quiet!

Something New . . . something wonderful has happened to outboard boating! **Gone** is the barrier of jangling sound that stood between you and complete enjoyment of the water!

Gone are the strident engine noises—the raucous “lows”—the shrill “highs”—throughout the full range of objectionable sound frequencies. We’ve tuned them out . . . or sealed them in . . . muffled them . . . canceled them! *At all speeds*—slow, medium, top! We’ve left you nothing to *hear* but the swish of the bow wave beneath the motor’s pleasant purr.

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Here is your future in boating fun . . . *Whispering Power*, smooth as sailing! It’s yours to enjoy in any size boat, small family runabout to cruiser. See your Evinrude dealer—look for his name under “Outboard Motors” in the yellow pages of your phone book. Choose from a complete range of Aquasonic models, 7½ to 25* horsepower. Time payments available. For free full-color catalog of the 1955 Evinrude line, write **EVINRUDE MOTORS**, 4546 N. 27th Street, Milwaukee 16, Wisconsin.

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Last word in fine outboard performance! Big Twin’s 25 thrilling horsepower, now velvet smooth and whisper quiet. *Plus* finger-touch starting . . . electric starting that you *know* is right . . . tested and proved in millions of miles **\$525** of owner service.

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*Power ratings are OBC certified brake HP at 4000 RPM tested in conformity with SAE test code. Prices f.o.b. factory, subject to change without notice.



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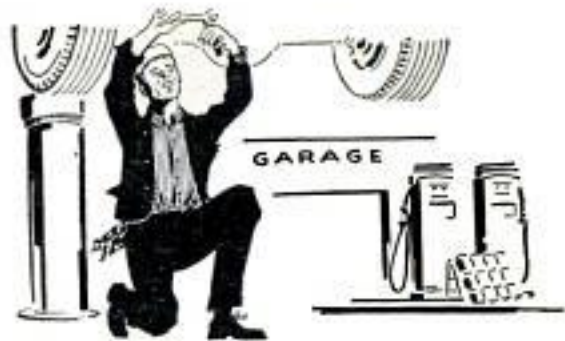
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A DIVISION OF OUTBOARD, MARINE & MANUFACTURING COMPANY
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You can make your own pictures right in the kitchen



No need for a special home darkroom

Modern photo developing and printing equipment is simple, easy-to-use, modest in price.

There's plenty of enjoyment in taking pictures but, if you're looking for a real thrill, try developing and printing them yourself.

It's fascinating to watch the scenes you've taken "come to life" . . . to see familiar sights suddenly reappear as if by magic. Added to this is the pleasure your family and friends will get from those extra prints you make for them.

Of course your photo dealer is always ready to have your film processed for you, but if you want to enjoy this fun

and fascination of doing it yourself, don't hesitate any longer.

With today's equipment there's a minimum of fuss and bother to home photo-making. Most of the steps can be done in room light and your set-up need not be elaborate.

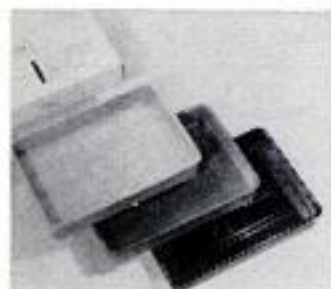
Above is an arrangement suitable for your kitchen. And, on the opposite page, the equipment shows how simple it all is—step by step.

Your local photo dealer has illustrated booklets to get you started on this rewarding family hobby. See him soon, won't you?

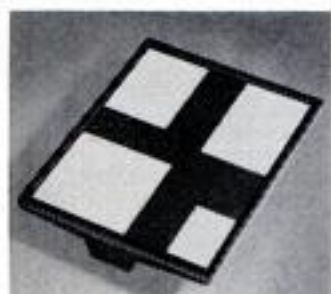
THIS INEXPENSIVE LINEUP LETS YOU START RIGHT NOW



Kodacraft Roll-Film Tank with aprons for easy developing of 620-120, 127 films. \$2.53.



Kodacraft Rocker Tray Set includes three 5" x 7" trays, with rocker for uniform developing. \$1.95.



Kodacraft Printing Frame with masks for 9 negative sizes. Accepts 4 1/4" x 5 1/2" paper. \$1.95.

You can develop that roll of film at home tonight . . .

The most convenient developing procedure is to use a small tank, such as Kodacraft Roll Film Tank. Handy Kodak Tri-Chem Pack contains developer, stop bath and fixer chemicals. You just mix with water. Put developer solution in tank. Step into any darkened closet to load the film in the tank. The rest of the operation is carried on in ordinary room light. Agitate film in developer, then in stop bath, and finally in the fixer. Remove film from tank, wash in sink, and dry overnight. Your photo dealer has detailed, easy-to-follow instructions. It's so simple even a child can learn in no time.

. . . print the pictures tomorrow (Kodak Velite Paper lets you do this in subdued room light.)

Simply place negative in Kodacraft Printing Frame; lay sheet of Velite Paper on negative; close printing frame; expose to ordinary lamp bulb for few seconds. Place exposed paper in tray of developer solution; in about a minute you'll have your picture appearing. Developed print is then placed in stop bath and next the fixer. Wash print and dry on blotter.



Kodak Tri-Chem Pack contains enough chemicals for processing two complete rolls of film. \$.25.



Kodak Velite Paper makes prints in lighted room. 25 sheets, 2 1/2" x 3 1/2" and larger. From \$.38.



Kodak Blotter Roll for efficient print drying. Capacity—60 average-size prints. \$2.88.

CONVENIENT PHOTO DEVELOPING AND PRINTING SETS AVAILABLE



Should you desire, your photo dealer can provide you with complete developing and printing equipment in handy kit form.

Kodacraft Advanced Photo-Lab (right) contains Kodacraft Metal Printer, Kodacraft Roll-Film Tank, Kodacraft Rocker Trays, Kodak Velite Paper, darkroom lamp, graduate, thermometer, film clips, stirring rod and instructions. \$14.95.

Kodacraft Photo-Lab Outfit (left) includes all items of Advanced Photo-Lab except offers Kodacraft Printing Frame (with mask set) instead of Metal Printer and is without lamp and stirring rod. \$9.75.



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Eastman Kodak Company, Rochester 4, N. Y.

FEBRUARY 1955

Kodak
TRADE-MARK

237

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Care and Feeding of Engines



BY
S. P. CORP

FROZEN DOOR LOCKS

When freezing makes a door lock inoperative, try heating the key with a match, then quickly insert key into lock. Heat of key will melt ice. *But be sure to remove key before it freezes in!* Another method is to force alcohol through keyhole.

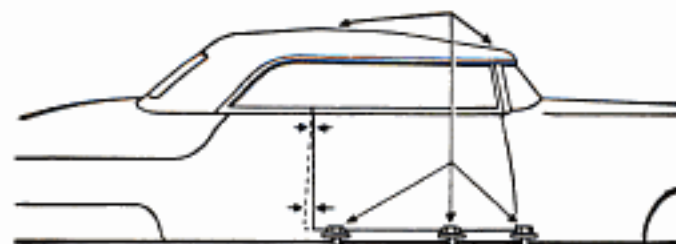
To prevent lock-freezing, mix 3 oz. of melted paraffin with 12oz. carbon tetrachloride and apply with an oil can, after first oiling with benzene or naphtha and working key in and out to clean lock. Apply carbon tet. mixture to door button and work up and down to insure penetration.



BENZENE

ALIGNING CONVERTIBLE DOORS

If a convertible top fails to lock correctly, check door alignment first, and inspect body bolts. Incorrect adjustment of body bolts can distort body on frame and cause trouble with doors and top. Start by loosening all body bolts and driving a short way to settle body on frame. Then tighten all bolts to 2 foot-pounds of



SHIM BODY BOLT HERE TO CORRECT THIS FIT

torque. If a door is tight at top and open at bottom, put a shim on body bolt at rear of door. If door is open at top and tight at bottom, shim bolts at front and rear of door, leaving bolt in center tight. Sometimes you will need to add shims on only one side of car. Use door alignment as a guide. If, however your doors are in alignment, correct alignment of top by adjusting the top linkage.

NEW BOOKLET ANSWERS CAR QUESTIONS



This new illustrated Sealed Power manual, "Care and Feeding of Engines," answers questions about everything from Air Cleaners to Windshield Wipers. Includes facts about Sealed Power KromeX Ring Sets and Motor Parts. Every car owner should have a copy. Get yours FREE by writing to Sealed Power, Dept. G-2, Muskegon, Michigan. A postal card with your name and address will do the trick.

Sealed Power

PISTON RINGS

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.



Stucco Defect

Q—My home has stucco exterior walls. It is about 30 years old and lately I have noticed that the stucco is loose in several places at the corners and along the foundation. Apparently it was applied over wood lath and has loosened. Can I repair these defects myself? What materials are used?

—W.K., Ill.

A—We would hesitate to recommend that you undertake this job yourself, unless you have had some experience in applying stucco, especially patches which require skill in application in order that the new surface will match the old. For this reason we would suggest that you consider employing a contractor experienced in the application of stucco. In general, procedures must be adapted to the requirements of each individual job, the first step being to remove the loose material without damaging stucco adjacent to that which is defective. Usually the material can be lifted off in small pieces and generally it will break easily at the point where it adheres to the lath. All material between the lath should be removed before applying the new coat. Some builders drive nails, such as galvanized roofing nails, into the sheathing to anchor the patch firmly. Others prefer to apply a wire mesh, cutting this to a close fit in the area to be patched and stapling it in place. The mixes used for patching vary somewhat, but a common one is one part portland cement to three parts aggregate, the latter varying in size according to the type of finish required to match the original.



Hanging Gutters

Q—The half-round gutters on my home are badly rusted and leaking at several points. What troubles me is how to attach the hangers. I want to use the strap-type hangers and I have been told they should not be nailed over the shingles, but placed underneath. How?

—W.B., Fla.

A—We assume you intend to install the same type of gutters, that is, the half-round type. Also, we agree with the information you have been given, that the hangers should be placed with the tabs under the shingles rather than on top. This can be

(Continued to page 240)

Texaco Tips On Car Care

How to keep from getting • stuck in ice and snow—→

To avoid getting stuck in ice and snow, keep a container filled with a mixture of sand and ordinary rock salt in your car trunk. Then, if your rear wheels begin to spin, sprinkle a handful of the mixture directly in front of each rear wheel. It is also good to let a little air out of the rear tires for more traction. Shift into second gear (or "Drive" with automatic transmissions) and give it only a moderate amount of gas—do not race the engine. Doing this, you should move out of any impeding snow or ice. For best mileage — both tires and gasoline — don't forget to reinflate your tires promptly.



← How to get the best all-'round performance from your engine

Rugged road tests—millions of miles of both low-temperature mountainous driving and hot desert high-speed runs in more than a hundred new cars—were conducted recently by an independent research organization. The purpose was to find the best motor oil for today's high-compression engines. Results: Test engines using Havoline (1) had greater gasoline and oil economy, (2) showed no appreciable wear, (3) and were much cleaner. Havoline will give you all-'round performance that no other motor oil can deliver . . . regardless of price. For more engine power, greater gasoline mileage and new-car liveliness that *lasts*, get Havoline today.

See your Texaco Dealer . . . the best friend your car has ever had.



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TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE or DONALD O'CONNOR, on TV Saturday nights. Metropolitan Opera radio broadcasts every Saturday afternoon. See newspaper for time and station.

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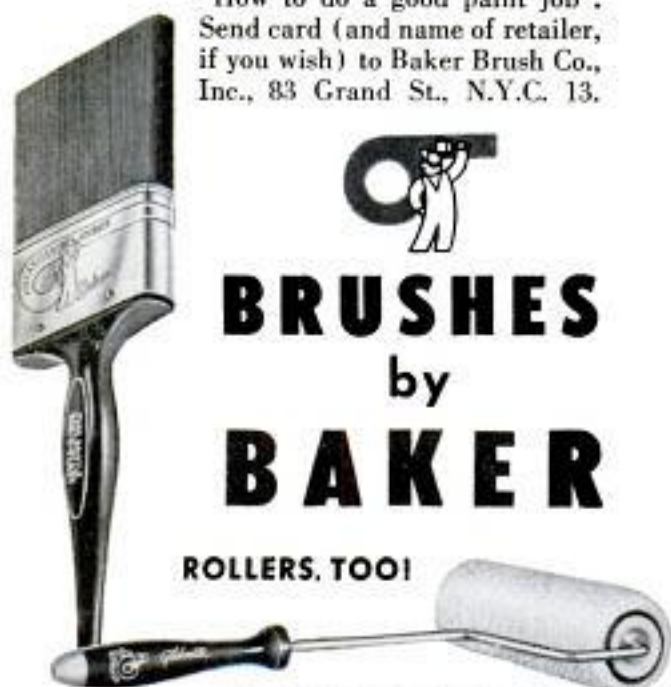
Use Baker Brushes and you'll paint faster; easier, *better!* Baker Brushes always pick up a full load of paint, so you dip less. Paint spreads more evenly, and with fewer strokes. To be sure of best results, ask for Brushes by Baker.

SEND FOR FREE BOOKLET "How to do a good paint job". Send card (and name of retailer, if you wish) to Baker Brush Co., Inc., 83 Grand St., N.Y.C. 13.



BRUSHES by BAKER

ROLLERS, TOO!



AMERICA'S FINEST PAINTING TOOLS

(Continued from page 238)

done quite easily by lifting the butts of the first course far enough to permit nailing the hanger tabs through the butts of the lower course into the roof boards. Care must be taken in this operation not to break the butts of the top course as they are lifted. As a rule it will not be necessary to withdraw the nails holding the shingles. If aluminum gutter hangers are used, fasten them with aluminum nails. If the hangers are of steel, then use galvanized nails. In some cases it may be necessary to cut off a portion of the hanger tabs in order to make it easier to force them under the shingles at the point where the latter are lifted.

Painting Overhead

*Q—*I always have trouble with paint dripping and running down the brush handle when painting overhead both inside on walls and ceilings and outside on siding. Painting cornices and ceilings is where I have the trouble. I have thought of attaching a kind of drip cup to the brush, but there seems to be no practical application of this kind. Isn't there some way this annoyance can be prevented?—U. M., Calif.



*A—*Simply mix the paint to a somewhat heavier consistency than that ordinarily used and add a small quantity of japan drier, about two tablespoonfuls to the quart of outside paint. For inside work you'll have less trouble with a paint roller, although it is possible to mix inside paints to a heavier consistency than that normally recommended and still produce good work without spattering or dripping from the brush. As you dip the brush, form the habit of slapping off the excess against the inside of the container. It also will help to clean the brush occasionally while in use, using a solvent such as lacquer thinner in order to loosen paint that gradually works down to the base of the bristles. Whip out the residue of the solvent after cleaning by striking the brush lightly over the edge of a board.

Tile Joints Open

*Q—*During the summer I laid a linoleum-tile floor in my bathroom. Just lately I've noticed that the joints have opened unevenly across the floor. Probably this has been going on for some weeks, but at this time the joints seem to have opened to 1/32 in. or more. What could be the cause, and the remedy, if any?—E.K., Mo.

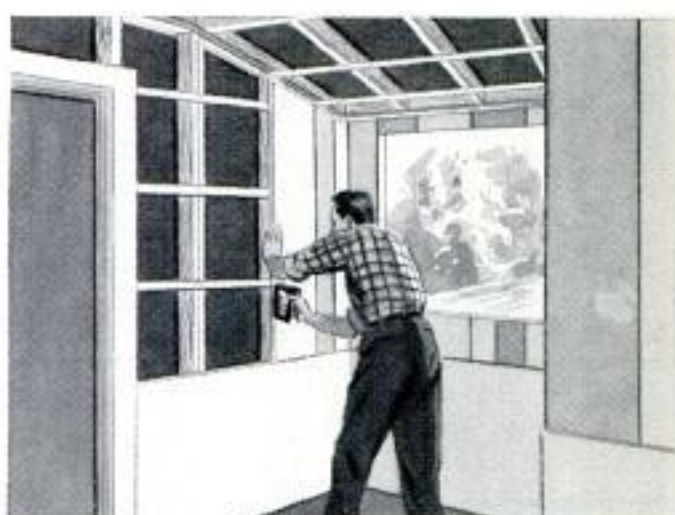
*A—*It is difficult to guess at long range just what is the cause. There is the possibility that if you laid the tile during exceptionally hot weather the opening of the joints is due to shrinkage of the individual tiles. However, this seems unlikely as trouble due to this cause is not at all common. We think it more probable that the cause is shrinkage of the subfloor, the underlayment, if any, or the floor joists. Perhaps all three have contributed to the condition, especially if the house is new. Also, undue shrinkage of the floor joists and the subfloor may have been brought about by some abnormal condition, such as drying out of the members after having been exposed to unusually high humidity in the basement, or concentrated dampness due to a leak in the plumbing. Another cause, less common but still a possibility, is failure to spread the cement uniformly at the time of application. A varying thickness of the cement film can cause slight movement of the tile when setting and possibly a gradual opening of the joints after a period of time. If, at the time of application, the subfloor was not carefully leveled by planing or scraping, then springing of the underlayment may be a cause of the tile joints opening as you describe. The only way to remedy this condition is to drill small holes from underneath through the subfloor and force calking compound in the space between the underlayment and the top of the subfloor. This usually proves an effective remedy.

Build that extra bedroom yourself . . . it's easy!

A few hours of your spare time can turn a dusty attic into that extra bedroom you've always wanted. It's an easy job . . . fun for the whole family. Simply finish the walls and ceiling with Armstrong Temlok® Interior Finish. You'll be surprised at how little it costs, and the finished room will add permanent value and comfort to your home.



- 1.** You build, decorate, and insulate in one simple application when you remodel with Temlok. Available in tile, plank, and board forms, Temlok is an inexpensive, easy-to-handle wood fiber material. It's factory finished for lasting beauty, adds fuel-saving insulation to the room.



- 2.** Walls are no problem with Armstrong Temlok Plank. The long planks go up fast over wood furring. The exclusive Lok-Bevel® joint makes stapling or nailing extra easy, assures neat, even joint lines. Attractively pre-finished in a random "Suntan Blend," Temlok Plank needs no further painting.



- 3.** The ceiling's done in no time with Armstrong Temlok Tile. The Lok-Bevel joint hides all nails or staples, helps you do a really professional-looking job. Temlok Tile comes factory painted in Snow White or Light Ivory. Temlok Tile also comes with noise-absorbing perforated surface.



- 4.** Some gay decorative touches and the room is done . . . ready for daughter, son, or overnight guest. It can double as a sewing or hobby room, too. You'll be so proud — and the family will be so pleased — you'll want to "Temlok" the basement next for that much-needed family workshop.

Ask your lumber or building materials dealer for full details on Armstrong Temlok. He'll be glad to show you samples and give you help with your remodeling plans. For your copy of the free booklet, "New Ways to Remodel Your Home," write Armstrong Cork Company, 3702 Watch Avenue, Lancaster, Pennsylvania.

* Trade-Mark

Armstrong TEMLOK

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I built this tool house faster,
better with my better-built
BLACK & DECKER SAW!



Really straight cuts were never easier, thanks to line-of-cut visibility!

The lift lever on the lower guard sure made pocket-cuts safe and easy!



To make rafter cuts, I sawed each one the long way first, then put all the rafters side by side, set my bevel angle and depth, and finished 14 with just one bevel cut!



**Black & Decker 6"
Heavy-Duty Saw**
\$64.50

Features built-in depth and bevel adjustments—specially designed, better-built B&D motor. Safe, thanks to telescoping guard.

Cuts 2 inches deep. See it at your dealer's. Extra! Get your Tool House Pattern and "Handy Tips" book! Mail coupon.

See "Tools-Electric" in phone directory for

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PORTABLE ELECTRIC TOOLS

The Black & Decker Mfg. Co., Dept. M025, Towson 4, Md.

Gentlemen: Please send me

Easi-Bild* Garden or Tool House pat. #51 (price: 50¢)

"Handy Tips" booklet (price: 25¢)

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Address _____

City _____ Zone _____ State _____

PT. M. REG. EASI-BILD PATTERN CO.

Diary of a New Car

(Continued from page 137)

(NOTE: Hammer forms are wooden shapes around which sheet metal is pounded to make the panels for hand-built prototypes.)

February 16, 1953

Sheet-metal shaping starts on Plymouth prototypes. Although complete design has not yet been approved, work continues on the major body panels. Wooden buck to support plastic mockup is being built in carpenter shop.

(NOTE: The plastic mockup will be the next step. It is an actual-size model that looks like a real car. It has glass windows, chromed moldings. It is an empty plastic shell supported on wooden blocks.)

March 23, 1953

Plymouth grille design is approved. Proving-ground tests are started so engineering can be sure the air flow is adequate for cooling under all conditions.

May 18, 1953

Revised Dodge and Plymouth clays are shown to top brass. This time they are enthusiastic. No changes suggested on the revisions.

(NOTE: Exner and King had been under terrific pressure up to this point because these revised front-end designs had to be right—time was running out. Revisions could be made at this point only under a costly, around-the-clock "crash" program.)

May 20, 1953

Plaster casts are made of the revised clays for forming plastic mockups. Layout men take templates of all body surfaces for final drawings to be used in production.

(NOTE: Styling has been finalized and now engineers have to convert the stylists' design into practical production procedures.)

May 26, 1953

Clays of instrument panels presented. Exner convinces Plymouth executives they should adopt dash-mounted shift lever on automatic-transmission models. Dashboards have to be restyled accordingly.

June 1, 1953

Proving-ground tests of the Plymouth V8 engine start. Engine is installed in a 1953 sedan.

June 15, 1953

Instrument-panel styling approved.

September 10, 1953

Plastic mockup shows up an unattractive

(Continued to page 244)

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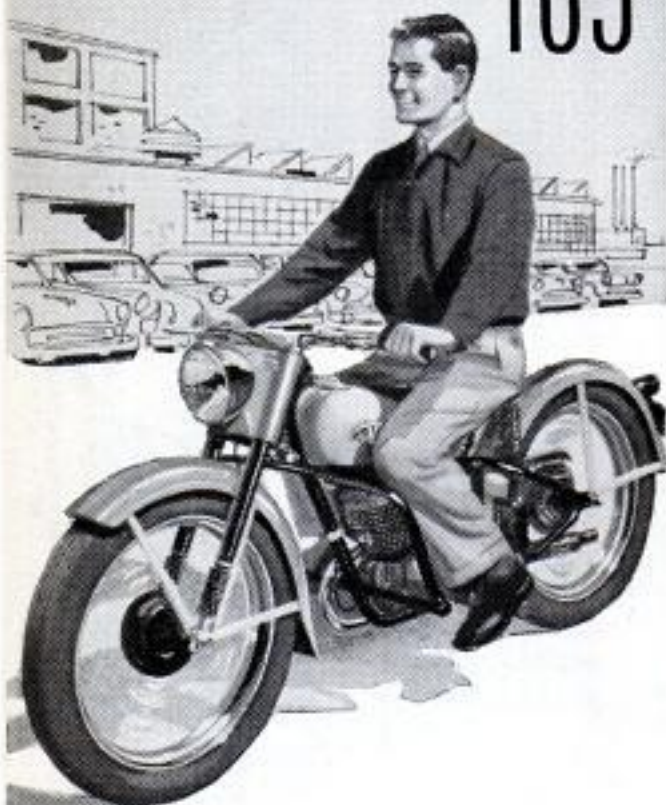


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"sag" in Plymouth rear fender, due to high light on metal crease or character line. The line is raised so it "reads right," as stylists say.

(NOTE: This mockup is the first model that accurately shows how the finished car will look. Normally, only comparatively minor changes can be made now. However, the "sagging" rear fender is considered a serious enough fault to change the die models. Trim details are worked over now because the model reflects light just like a real car. High lights can be studied. Major body surfaces cannot be changed because wooden models for dies have been under fabrication for some time.)

November 9, 1953

Suggested changes completed on plastic mockup. Plymouth's 1955 design is finished.

November 10, 1953

Full-scale surface master draft is started.

(NOTE: It is a highly technical drawing with three superimposed elevations. It is drawn on aluminum sheet so it won't change shape.)

November 27, 1953

All major parts of Plymouth prototype are completed. Assembly begins in experimental body shop.

January 15, 1954

Mahogany die models of major body panels are finished and sent to tool-and-die shops.

(NOTE: From this date on, diemaking is a continuous process as the wooden die models are completed.)

April 7, 1954

Assembly of first hand-built Plymouth V8 prototype is completed.

(NOTE: This four-door sedan, in contrast with production cars, has taken many months to build. It was painstakingly pounded out and assembled. Altogether six such Plymouth prototypes were made. These are the first models that operate—that prove out all the planning.)

April 19, 1954

Proving-ground tests begin on the first hand-built prototypes.

August 13, 1954

Assembly plants shut down for change-over to 1955 models.

September 27, 1954

First 1955 Plymouth comes off the production line.

November 17, 1954

The public sees the 1955 Plymouth for the first time—30 months after the initial meeting on May 15, 1952. ★ ★ ★

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Jacobs

CHUCKS

If it's a Jacobs it holds

Two-Meter Radio Transceiver

(Continued from page 231)

Construction is simplified by using a relatively large chassis base, and the circuit design permits the use of a metal front panel which virtually eliminates hand-capacity effect while tuning over the band. A Milen type 10039 midget dial provides sufficient bandspread to make tuning on this 144-mc. band easy. When mounting the dial make a template to locate the mounting holes accurately. The front panel is fastened to the chassis by the large hex nuts that mount the two controls and the send-receive switch. It is a good idea to include small angle brackets on each side to give added support between panel and chassis.

The power transformer T1 is a Stancor PC-8403 with a 117-volt, 60-cycle primary; the h.v. secondary is 500 volts @ 70 ma. d.c., center-tapped; 6.3 volts @ 2.5 amp., and 5 volts @ 2 amp. Note that the 5-volt secondary winding is not used in this unit. Also note that there is no connection to the 6.3-volt-winding center tap. The output transformer T2 is a Stancor A-3877 single-plate to voice-coil type; primary 5000 ohms @ 40 ma. d.c.; the secondary is 4 ohms. The filter choke is a Stancor C-1002, 15 hy. @ 75 ma. d.c., 400 ohms d.c. resistance. R.F.C. 1 and R.F.C. 2 are 3.3 mh. each. R.F.C. 3 consists of 11 turns of No. 24 enameled wire close-wound on any commercial-TV filament choke or similar form.

Proper adjustment of the transceiver, while not difficult, requires some test equipment which should be a part of every licensed radio amateur's station. Since only a single-tuned circuit is used, no tracking problems are encountered. The tank circuit consists of coil L1, capacitors C1 and C2, and the plate-to-cathode interelectrode capacity of the 6C4. L1 consists of two turns of No. 10 enameled wire, 1 $\frac{3}{8}$ in. in diameter, spaced the diameter of the wire. This coil and the capacitors provide a bandspread of exactly 4 mc. (from 144 to 148 mc.) as indicated by an accurately calibrated grid-dip test meter. If this type of meter is not available, an absorption-type wavemeter or a high-frequency signal generator can be used for making the proper adjustments. L2 is a single-turn coil of the same diameter made with No. 20 insulated hook-up wire.

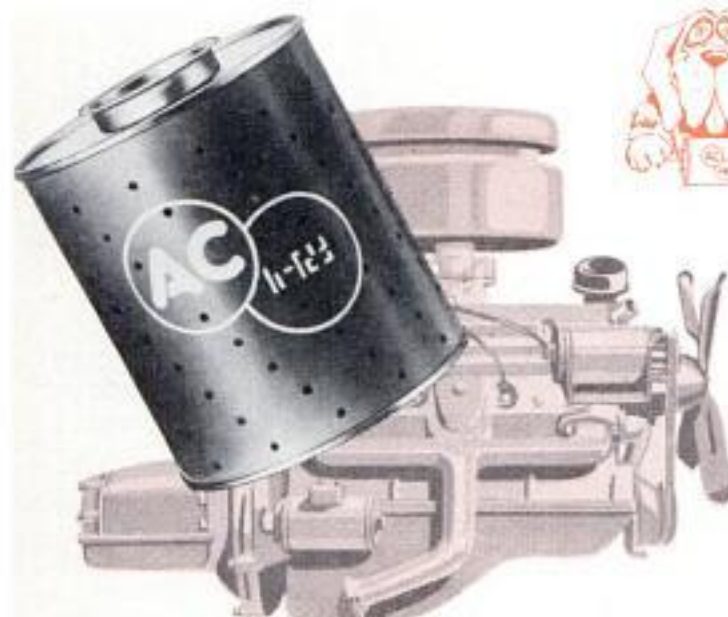
Since the interelectrode capacity of 6C4s varies, a careful check of the frequency spread must be made to mark the edges of the two-meter band, which should be clearly shown on the face of the dial.

Either earphones or speaker may be used. A hiss should be heard in the

(Continued to page 248)

AC OIL FILTERS

-rescue engines from themselves!



Long ago engineers realized that internal combustion engines produce something besides power. That something is a destructive combination of dust, dirt, grit, metal particles, carbon and acids that are picked up by the lubricating oil and recirculated. An oil change alone is not the solution. The oil itself needs the kind of protection AC Oil Filters give—filtering out the damaging grit—rescuing engines from themselves!

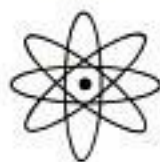
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For years AC engineers worked to secure *better* filtering than density-type cotton fibre packing could provide. They found it in *paper!* Not any ordinary paper, but a *special* material fabricated to such exacting porosity standards that it freely passes oil while stopping foreign matter as tiny as 1/100,000th of an inch. Then AC developed a special curing process making the filtering material impervious to water and crankcase acids. AC accordion-folds this material so that it gives ten times the filtering area.

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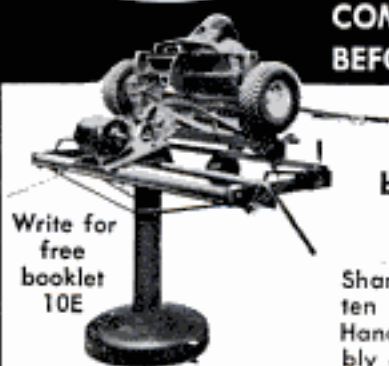
the original solid
center auger bit
•
screw drivers
screw driver bits

"receive" position as the regeneration control is advanced; this disappears as signals are tuned in. It should be possible, by varying the regeneration control, to retain the hiss as capacitor C2 is varied over its entire tuning range. If not, a slight reduction in the value of R2 is indicated. Conversely, if this hiss cannot be eliminated by turning the regeneration control to minimum, the value of R2 should be increased. Adding the small ceramic capacitor (C p-k), 3 to 5 mmfd., indicated by dotted lines, between plate and cathode of 6C4 will increase the bandspread. In this case, however, decrease the inductance of L1 in order to cover the desired band. In the "transmit" position the grid bias should not exceed 60 volts negative as measured with a vacuum-tube voltmeter, for any setting of the tuning capacitor. Negative voltages ranging from 25 to 50 volts are normal. Excessive voltage indicates too much drive which may damage the 6C4 tube.

Some practice is necessary for operating this transceiver; for best reception the degree of antenna coupling is quite critical. Too much coupling will prevent super-regeneration, and too little will seriously decrease the input signal strength. To adjust the coupling, it is suggested that the transceiver be switched to the "receive" position and the tuning capacitor C2 be fully closed. With an antenna connected, the coupling loop should be brought near the tank coil to the point where the detector can just be made to oscillate when the regeneration control is at maximum. As the tuning capacity is varied, this most-sensitive condition can be maintained by rotating the regeneration control counterclockwise. The degree of coupling need not be changed when switching to the "transmit" position. Detailed student material list R-430 is available from *Popular Mechanics'* Radio-TV and Electronics department upon receipt of ordinary letter postage.★★★

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Weighing just 1/100 as much as its bigger and older brother, a miniature gyrocompass has been adopted by the Navy for landing craft and other small vessels. The small gyrocompass was developed by the Sperry Gyroscope Co., Great Neck, N. Y. It permits small craft to obtain true-north readings at all times and not be dependent on the variations of the magnetic compass. A master gyrocompass for large vessels weighs 900 pounds and stands four feet high. The little brother weighs nine pounds and occupies less than 1/2 cubic foot of space.

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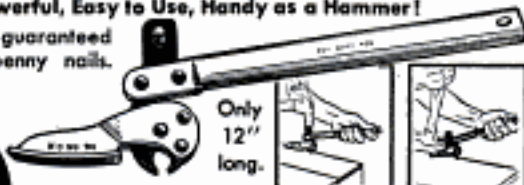
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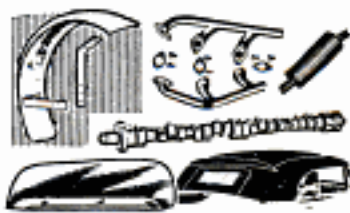
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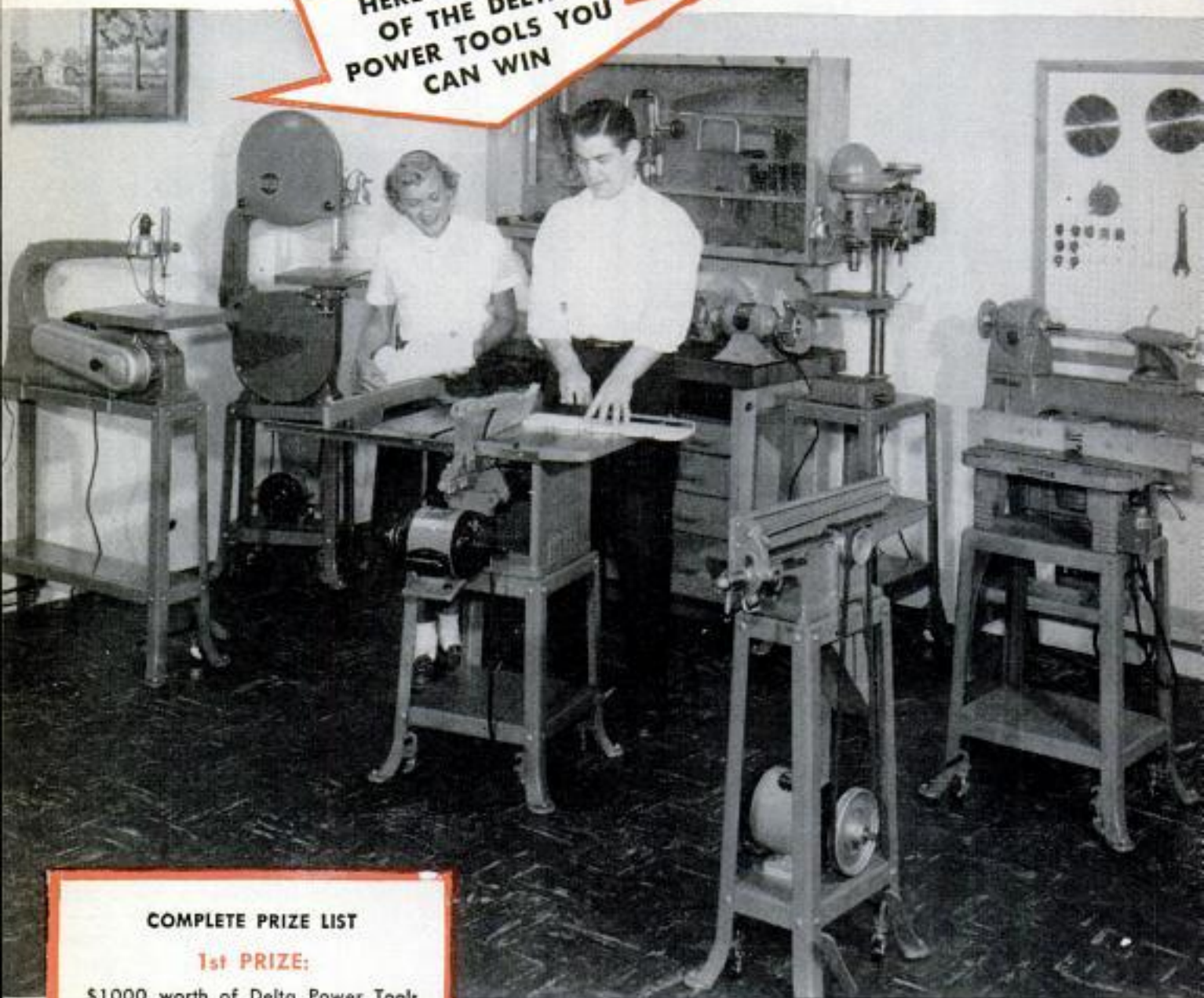
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\$500 worth of Delta Power Tools and accessories of your choice.

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in Delta Users' "Finest Home Workshop" Contest!

A Contest to Discover the Best Home Workshop
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Nothing to Buy

If you now own three or more Delta Power Tools, you are eligible to win up to \$1000 merely by sending us a picture of your shop, and telling, in your own words, *why* you like Delta tools. There's nothing to buy, no red tape. And the big prizes are all in the form of good-as-cash certificates which you can redeem at your Delta Dealer for Delta tools of *your* choice!

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Here's all you do to compete for the big first prize (\$1000 worth of Delta tools) and fourteen other valuable power tool prizes:

1. Get an official entry form, either from your Delta Dealer (listed under "TOOLS" or "MACHINERY" in the classified pages of your phone book), or by sending the coupon on this page.
2. In not more than 150 words, complete this statement: "I like Delta Power Tools because . . ." No fancy writing needed. Just tell us, in your own words, *why* you like your Delta Tools. Statements will be judged on sincerity and logic.
3. Take a picture of your workshop that shows the tool arrangement to best advantage. Use your own flash equipment, or borrow a friend's. Pictures will not be judged on professional photographic skill, but on practical arrangement for most efficient use of available space. If there are any special features of your shop of which you are proud, tell us about them in a note pasted on the back of your shop photo.
4. Mail entry form, statement, and photo to: Contest, Delta Power Tool Division, Rockwell Manufacturing Co., Pittsburgh 8, Pa.

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Remember, you don't have to have an expensive shop to win this contest. Entries will be judged not on the amount of money you've spent to build and equip your shop, but on the common sense you've shown in selecting and using your tools, and on your ingenuity in utilizing available shop space efficiently.

Here are the complete contest rules:

- Contestants must live in the United States or Canada, and own three or more individual Delta Power Tools, or a complete DeltaShop, Delta's one-motor combination of the four basic power tools—saw, jointer, drill press and sander.
- Employees of Rockwell Manufacturing Company or its advertising agency—or members of their families—are not eligible to compete.
- Entries must be on or accompanied by an official entry form. Elaborate or "dressed up" entries will be discarded.
- Contest closes July 15, 1955. Entries must be postmarked on or before that date.
- Winners will be notified by mail on or before November 1, 1955. Complete list of winners will be supplied on request.
- Decision of judges is final. In case of ties, duplicate awards will be made.
- All entries become the property of Rockwell Manufacturing Company, and none will be returned.
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Get Your Entry Blank NOW!

If you own three or more Delta Tools, you have as good a chance as anyone to win \$1000 worth of additional Delta Tools, or any one of the other fourteen valuable Delta power tool and accessory prizes. So get started now! Get your entry form from your Delta Dealer (listed under "TOOLS" or "MACHINERY" in the classified pages of your phone book), or send the coupon below.

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Name _____

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DELTA QUALITY POWER TOOLS
Another Product by **Rockwell**





After the Atom — Power From the Sun

(Continued from page 122)

fuel. And what better fuel is there than sunlight?

Dr. Maria Telkes, a leading authority in the field of solar-energy utilization, has evolved a sun stove which shows great promise of meeting this need. Doctor Telkes emphasizes that her stove is still in the development stage. Nevertheless, in tests in the New York area in October when there was a haze over the city, the stove prepared rice and cooked green vegetables which are the staples of India. Furthermore it roasted chicken, broiled steak and fish and baked bread. Even when the outdoor temperature was under 70 degrees Fahrenheit the sun stove developed a temperature of 300 degrees. The stove is so promising that the Ford Foundation is backing it with a grant of \$45,000 for research and development.

Unlike other solar furnaces, the sun stove uses flat mirrors instead of parabolic ones. For this reason it may eventually be produced for under \$5. The stove is simply a box with a glass window. Four flat-surface mirrors unfold outward as flaps around the window. The mirrors deflect sunlight into the stove, where the heat is trapped and stored by a chemical. The chemical retains the heat for more than an hour after sundown, making it possible to cook an evening meal at the time it is usually prepared. Food is slipped into the back of the stove on a tray. There's no upkeep problem, and even a child can learn to adjust the flaps for maximum heat. Though the solar stove is unimpressive in appearance, it could bring about an economic revolution in India.

The sun stove is a partial answer to the greatest puzzle facing the proponents of solar mirrors. This is the problem of heat storage. A second form of solar-energy utilization shows far greater promise than simply using a mirror to collect the sun's rays.

2. *Flat-plate collectors.* The principle here is the same as that used in a greenhouse. Prof. H. C. Hottel of the Massachusetts Institute of Technology Solar Energy Project looks on this as the most promising of all methods of solar-energy utilization.

Suppose you built a trough and painted the bottom of it black. Now cover the trough with a sheet of ordinary glass, which transmits short light rays but reflects long waves. Next you circulate a liquid or

(Continued to page 254)

Motorists prefer

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Surveys prove it . . . and in many cases the preference for FRAM Oil Filters more than equals the preference for the next two most popular brands combined!

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gas through the trough. Sunlight penetrates the glass and strikes the painted bottom. Here most of the heat is absorbed, and the little that is reflected bounces back as long waves. These can't penetrate back through the glass, so they bounce back to the bottom of the trough again. The heat builds up quickly inside the trough and the liquid or gas absorbs it. The heat is carried away in the liquid and used to heat a home or even to operate a steam engine.

Such flat-plate collectors, according to M.I.T. experiments, can be built for about \$2 per square foot. If this cost can eventually be cut in half by cutting the cost of the glass, large installations may well become economically feasible.

Flat-plate collectors have been used to heat several research homes across the country. One advantage is that the collector actually can form the house roof. The American Glass Company has developed glass shingles for this purpose. Enthusiasts in this field predict that many homes of the future will have glass roofs that trap the heat and carry it to storage areas within the home where it can be drawn off as needed. Even in the area of Boston, according to M.I.T. experiments, a flat-plate collector with an area half the floor area of the house can provide practically all the heat required. One authoritative report estimates there will be 13,000,000 solar-heated homes in this country by 1975.

Proponents of flat-plate collectors point out that they are a partial answer to the heat-storage problem because the heat is stored in chemicals or a gravel bed within the home.

But so far, nature herself is the biggest storehouse of solar energy, and man now is looking to nature as a guide for the capture of sunlight. If man could only improve on nature's own conversion system, would he not profit by an increased yield of energy?

3. *Photosynthesis.* Each year the green plants of the earth combine 160,000,000,000 tons of carbon and 25,000,000,000 tons of hydrogen. As an incidental result, 400,000,000,000 tons of oxygen are set free for the animal kingdom to breathe. Man still doesn't know how photosynthesis occurs, but he is making strides toward a speed-up of the process.

Dr. George R. Harrison, Dean of the M.I.T. School of Science, points out that an acre of corn land in the latitude of New York, which has an average 1000 horsepower of sunshine, is likely to produce annually a ton of food as corn kernels and a ton of fuel as stalks and cobs. If you burn the food in your body and burn the stalks

(Continued to page 256)

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and cobs as fuel, you get back less than one thousandth the original solar energy. Forests are similarly inefficient in storing energy. How, ask solar scientists, can we raise this efficiency?

One answer, they feel, lies in the depths of the ocean. Surprisingly, nine tenths of all photosynthesis occurs in the sea. Algae are unicellular plants which, under ideal conditions, can double their weight every 10 hours. This is a striking gain through photosynthesis.

One particular kind of algae—Chlorella—seems to deserve special study. The Arthur D. Little Company, on behalf of the Carnegie Institution, has carried on experiments in Chlorella culture. Chlorella is introduced into water inside a plastic tube. Pumps circulate the water to expose the algae to sunlight. The company estimates that through this system about 50 tons of algae could be produced per acre in one year. The biggest hitch is the cost of a plastic culture outfit, which runs about \$20,000 per acre.

The ideal form of solar-energy utilization, of course, is not the improvement of natural photosynthesis or the capture of the sun's heat, but some device that absorbs sunlight and gives off electricity in return. Such instruments are already in existence.

4. *Converting sunlight directly into electricity.* The ordinary photoelectric cell (as in a photographer's light meter) is a wonderful device that produces electricity directly from sunlight. So far it has produced only enough electricity to operate instruments and swing open supermarket doors. However, it may be possible that some day this system can be improved.

The biggest news in the field of solar-energy utilization is the development of "solar batteries" and "solar generators."

At the Wright Air Development Center, Donald C. Reynolds and Lt. Col. Gerard M. Leies have discovered the surprising ability of cadmium sulphide, a yellow powder commonly used as a pigment in paint, to convert light directly into electricity. The powder is processed into crystal form. The crystal in the present model is about the size of a sugar cube, but it can be thin as a razor blade and still work efficiently. Attached to opposite sides of the crystal are electrodes, one made of silver and the other of indium. A wire runs from the positive electrode to a motor or battery and back to the negative electrode to form the circuit. The solar generator is as simple as that.

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(Continued to page 258)

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crude model first built at Wright developed enough current to operate an electric clock. By increasing its size, making other improvements that seem possible, and then hooking a number of these generators in relays, scientists see no reason why they can't step up the voltages tremendously.

According to the Air Research and Development Command, the conversion powers of the generator are so great that a wafer-thin slab of crystal 4 by 14 feet, built into the roof of a house, would supply enough current to operate all the home's lights, stove, refrigerator and other appliances. Scientists aren't going overboard to the extent that they predict you'll soon be able to buy a roof panel that will eliminate your electric bill. But there's no doubt that they are excited over the discovery.

Bell Laboratories has developed a solar battery which is similar in theory to the solar generator, except that a crystal of silicon is used instead of cadmium sulphide.

So far the crystals have been made about razor-blade size. Extremely sensitive to light, they are linked together electrically and deliver power from the sun at 50 watts per square yard of surface. It's amazing to hold a battery not much larger than a cigarette pack, point it toward the sun and watch it spin a little electric motor. It's even more amazing to realize that this magic process consumes nothing in the battery, that there are no moving parts and that, theoretically, the solar battery will keep right on operating forever. The Bell battery, even at this point, is from 8 to 10 percent efficient and thus compares favorably with the steam or gas engine. Scientists calculate that about 60 acres of land covered with the crystals would produce 30,000 kilowatts of power.

The solar battery has a great deal of significance in the field of communications because telephone messages travel at low voltages. Bell engineers are already testing the battery as a power source for rural telephone lines. In such an installation the battery simply is fastened to a telephone pole. The electricity it generates flows into a storage battery on the same pole and this provides the current to carry the message.

These are the first gropings in what might be called a new science, a solar science. Workers in the field use understatement, but are enthusiastic about the future. They point out that nature has tied the knot of solar-energy utilization mighty tight, but so far they see no reason why it can't be untied. And because the life of man is bound up in this knot, they foresee gradually accelerating research until science at last is able to take advantage of Old Sol's bountiful gift of energy. ★★



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(Continued from page 93)

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Before any branch of the military puts equipment up for sale it first circularizes the other branches to learn whether the equipment can be used there. Lifeboats in the Army's possession, for instance, are first offered to the Navy, Marine Corps and Air Force and are put up for sale only if the other services can't use them.

Too, war-surplus materials are granted free to universities, schools, and hospitals that can use the equipment. Military academies, the Boy Scouts, the Civil Air Patrol and other agencies may get surplus materiel for which they have need. All the rest is sold by public auction.

A lot of war surplus was sold in the past by the sealed-bid method, then it was learned by trial last year that public auctions bring a greater return. Now the Department of Defense is contemplating a combination of the sealed-bid and the public-auction methods. Under this system a distant bidder who can't attend the auction would forward a sealed bid that stipulates the top price he would pay for an item in the catalogue.

The auction would be held in the regular way except that when bidding ends, the auctioneer would open any sealed bids and read them aloud. If a sealed bid happened to be higher than the bids made from the floor, the bidders who are present would then get a chance to top the price announced by the auctioneer.

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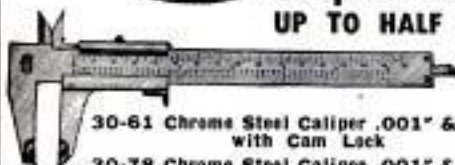
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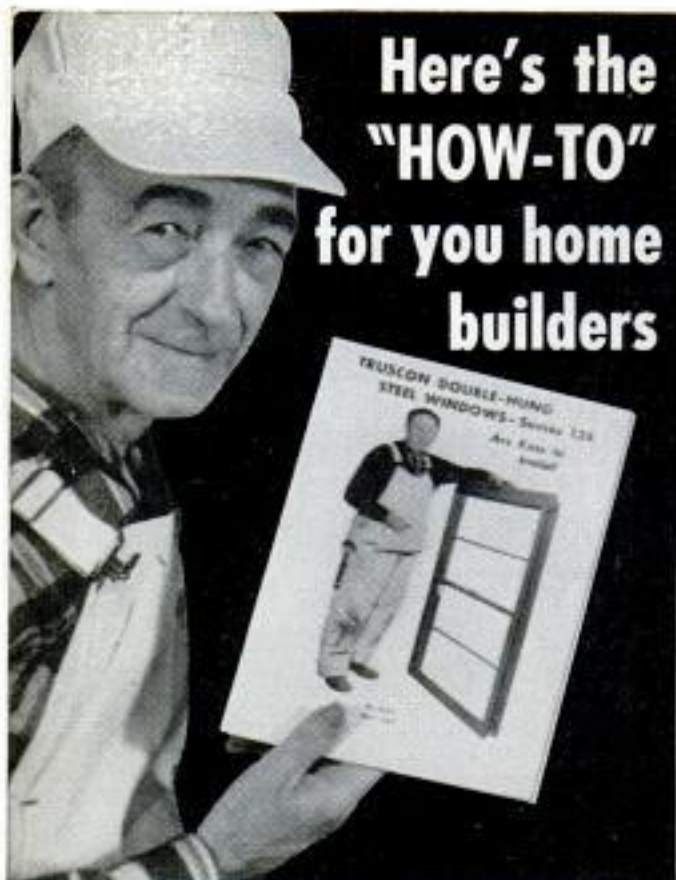
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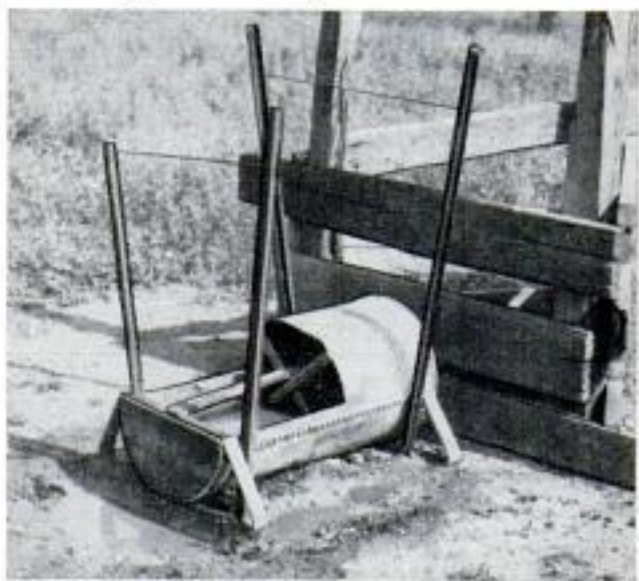
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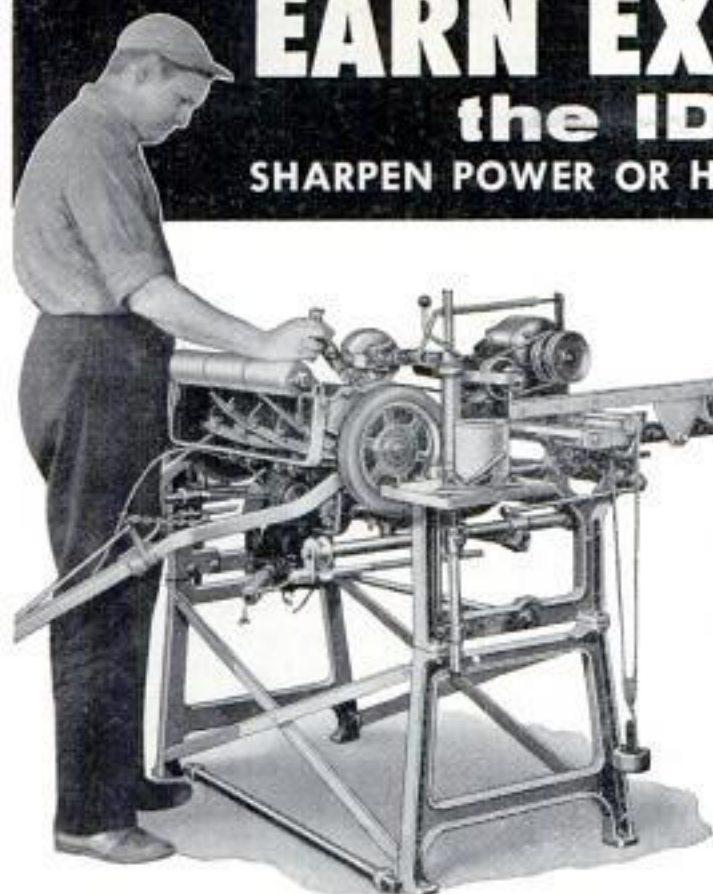


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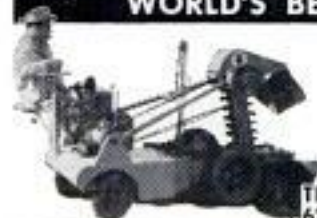
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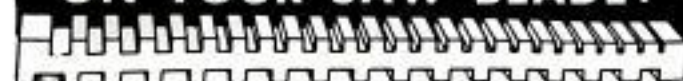
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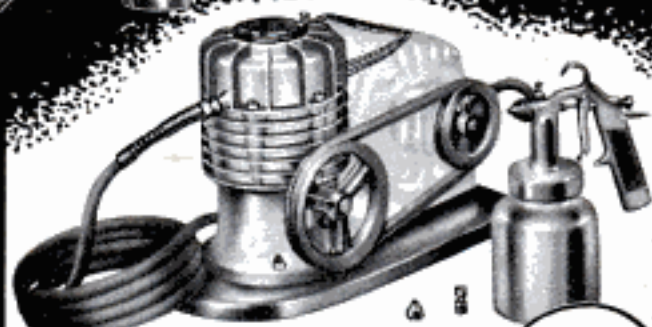
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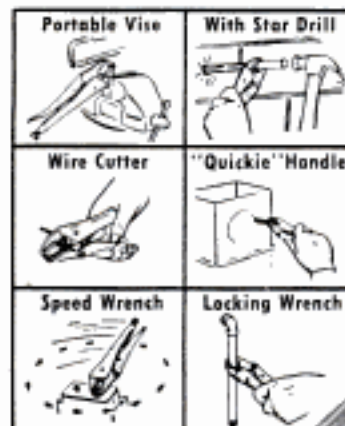
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CAP to the Rescue

(Continued from page 85)

When pilots—civilian or military, professional or amateur—fall out of the sky, CAP members take to their planes and to their radios, operating as a closely knit, well-organized search organization.

The Civil Air Patrol has been doing this sort of thing for 12 years. All volunteers, its members are continually expanding their scope of activity. Today, it stacks up as a key unit in Civil Defense for the evacuation of civilians, aerial reconnaissance and as a hub for communications in the event of an enemy attack.

Airplanes aren't the only means of transportation used. In Utah, CAP members take to horseback to perform ground search, while in the Florida Everglades they use swamp buggies and air boats. Nearly every CAP unit situated near a body of water has a boat for rescue purposes. In New Hampshire, an underwater rescue team made up of former Navy frogmen has been organized against the day when the wing might be faced with the problem of going beneath the surface of one of the state's many lakes and ponds to extricate victims of a plane or boat disaster.

CAP members work and fly without pay. They are charged an annual assessment for membership in the patrol and they buy their own uniforms—the USAF uniform with distinctive CAP insignia, as authorized by Congress.

More than three quarters of the 7000 light planes available for CAP use are owned by individual members who do receive reimbursement in the exact amount paid for fuel and oil burned on missions ordered by the Air Force. This, however, doesn't help defray the cost of insurance and wear on their private planes, nor does it pay the hospital and doctor bills of members injured in line of duty. It is significant that approximately 40 CAP members have lost their lives on missions since the inception of the Civil Air Patrol just six days before Pearl Harbor. More often than not, they must fly through weather that would ground even the birds.

A typical story is that of Capt. Bob Mason of the Alaska Wing. Tom West, an 84-year-old cannery employee, fractured a hip in Seldovia, an isolated wilderness community. Radio brought the message that the old man needed medical attention available only in Anchorage. CAP was asked to evacuate the patient by air.

Mason volunteered despite reports of high winds and minus-45-degree temperatures. It took three hours to start the

(Continued to page 266)

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FORMULA III

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engine of the L-5 ambulance plane because of the penetrating cold. He battled gusty winds and uncertain weather only to find the Seldovia air strip drifted with snow. He made a ticklish landing and his take-off with the injured passenger was one that will provide food for "hangar flying" for many a year to come.

Many of CAP's veteran pilots say you can usually expect a mission when the weather is the worst because in most cases old Mother Nature herself sets up the conditions that result in a call for "Help!"

For instance, a hurricane stranded Thomas Robertson of Mission, Tex., his 16-year-old son, and a friend, H. S. Watkins of Donna, in four feet of salt water on a strip of Gulf Coast beach. They'd been out surf casting.

Alerted by Mrs. Robertson when her husband failed to return on time, CAP planes were grounded for hours by hurricane winds. As soon as possible three planes piloted by members Harvey Ferguson, Slim Nagy and Maj. John Cooper, commanding officer of the McAllen Squadron, took off in the early morning hours. A few hours later Ferguson sighted the fishermen weakly waving a flag improvised from their shirts. They had been without food or water for more than 48 hours and had spent much of the time standing in waist-deep water.

Ferguson elected to try to set his L-5 liaison plane down on a soggy strip of beach much too short for anything but extreme-emergency landing. Scores of training hours paid off and he took one of the victims out on the first flight. A change in tide gave him more room for his second sortie and he evacuated the remaining storm victims.

Actually, weather disasters account for much of CAP's work such as a ticklish job done for a family named Redington. Timmy, his father, Joe, and his young mother were cold. There was little food left in their packs and the weather-beaten cabin in which they sought shelter from the icy Alaskan wind offered little protection from the biting cold. It seemed weeks since they had mushed out of sight of their own snug little cabin at Flat Horn Lake on the long, overland trek to Anchorage to spend Christmas with Timmy's grandparents. When the combination of unpredictable Arctic weather and a strange sickness among the sled dogs marooned the trio midway in their journey the future appeared black indeed.

At the first slackening of the wind, Joe braved the stinging cold to stamp out in the clean, white blanket of snow 20-foot letters spelling out "FOOD." To the little

(Continued to page 268)

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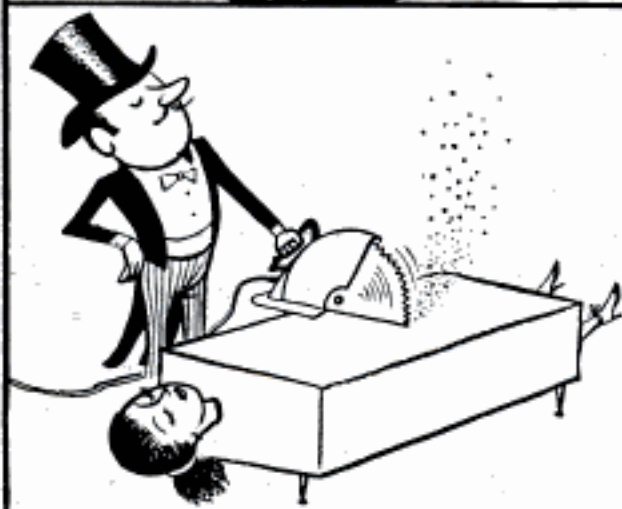
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family this represented their sole hope of survival.

In Anchorage, the worried grandparents sent out an anxious call for help. Air Rescue Service in Alaska turned the mission over to the Alaskan Wing of the Civil Air Patrol. Meanwhile drifting snow swept across the single-word message. Enough of it was visible, however, to attract the alert eyes of CAP members Warren Day and George Richie who swooped low over the area in their ski-equipped L-16 liaison plane and sized up the situation below. A quick radio message brought an ARS helicopter to the spot and in minutes the threat of triple tragedy had been erased by hot soup, warm blankets and friendly words.

Missions of this kind are a daily occurrence in the huge area of responsibility assigned to the Civil Air Patrol as part of its role as the civilian auxiliary of the United States Air Force.

Twelve-year-old David Smith, and another Reno, Nev., boy, Hart Tisdale, were rescued after they had been missing for more than 20 hours in the high Sierras west of Reno in temperatures which dropped below freezing during the long night.

The boys left home on their saddle horses without telling their families of their intention to cross Mount Rose to Lake Tahoe. When they failed to return by nightfall, their parents notified Washoe County Sheriff C. L. Young.

For many months Young had worked closely with the Nevada Wing, Civil Air Patrol, especially the Washoe Jeep Squadron—a ground-search and rescue unit built around the use of a fleet of radio-equipped Jeeps. Young promptly called the nearest unit of the Jeep Squadron.

The entire squadron was alerted immediately and within a half hour small groups of bright-yellow Jeeps were scouring the trails and roads into the Sierras which stretch up to 8500 feet west of Reno. Platoons of Jeeps systematically worked trail after trail in the freezing cold, maintaining contact with one another by radio.

Just before daylight one Jeep commander led his vehicles along the rough trail bordering Hunter Lake where they came upon the two boys huddled over a dying fire. Aside from exposure and hunger, the boys suffered no ill effects.

The rescue was the third problem faced by the Washoe Jeep Squadron within 14 days. The other missions included search for a missing plane and for two lost hunters.

A nation-wide network of fixed, mobile and airborne communications stations operating on special radio frequencies assigned to the Civil Air Patrol by the Air

(Continued to page 270)

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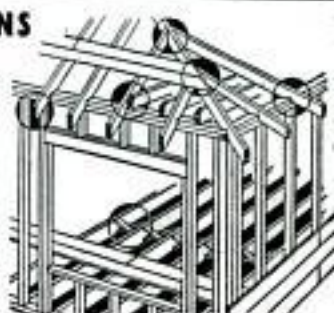
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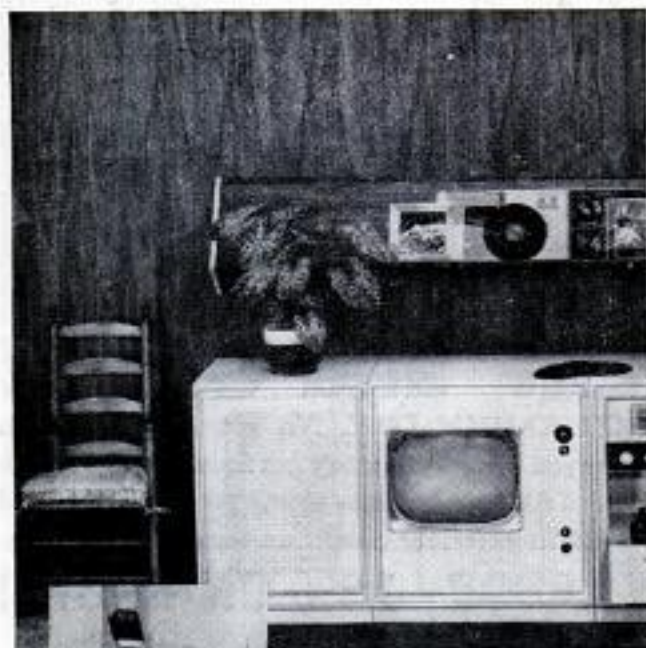
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YOU PUT UP WITHOUT NAILS!**



New pre-finished Weldwood paneling comes in figured walnut or light oak, 32" x 96" or 48" x 96", both 1/4" thick.



Brush Weldwood Contact Cement on studs and panel backs at points of contact. Let dry 1/2 hour and repeat. When dry, position panel; tap with hammer and wood block — job's done!

Here's real wood paneling that needs no staining or waxing—and you install it with a brush! New Weldwood panels come already *pre-finished* and waxed by expert wood craftsmen. You can put them up with new Weldwood Contact Cement—no nails, no hard-to-cover-up nail holes.

Panel a wall in your living room, dinette or den—Weldwood gives a lift and sparkle to the whole room. An 8' x 12' wall in pre-finished walnut costs about

\$78 — other unfinished decorative paneling from \$23 for 8' x 12' area. See your lumber dealer for pre-finished and regular Weldwood paneling and superior Douglas Fir Weldwood, or visit any of the 73 United States Plywood or U. S. - Mengel Plywoods showrooms in principal cities.

Ask your lumber dealer for



Weldwood®

Pre-finished Hardwood Paneling

UNITED STATES PLYWOOD CORPORATION

World's Largest Plywood Organization

55 West 44th Street, New York 36, New York

U. S. - Mengel Plywoods, Inc., Louisville, Kentucky

Force is CAP's greatest asset in its role of providing search and rescue and disaster relief to the general public.

When Brighton, N. Y., was rocked by a series of earth-shaking gas-main explosions and all means of communicating with the outside world were cut off, Civil Air Patrol communicators bridged the gap in less than an hour. Spotting mobile-radio rigs at critical spots throughout the city, they relayed specific requests for various types of assistance to a fixed station outside the danger area which was in contact with other CAP stations in near-by communities. The emergency net enabled rescuers to dispatch to each separate location the exact type of equipment and assistance needed.

CAP communicators provide emergency communications for fire fighters battling raging timber fires in scores of states. On-the-spot reports from the fire lines via CAP radio enable area supervisors to make better distribution of their forces while air-to-ground communications link the fire fighters to observation planes spotting new outbreaks and reporting progress of old fires.

There's no limit to the scope of CAP rescues and duties. Disaster—all kinds—is their business.

From the youngest of the 45,000 cadet members of the CAP (14½ to 18 years) to 91-year-old "Dad" Montee of Los Angeles, the oldest member of the Civil Air Patrol, these modern flying minutemen truly live up to their motto, *Semper Vigilans* — Always Vigilant.

When you need them you'll find their single-engine putt-putt planes Johnny-on-the-spot. ★ ★ ★

Human Body Replaced Every Year

Your body may seem to you to be much the same as it was a year ago, plus or minus a few pounds or inches, but it is 98 percent new, according to Dr. Paul C. Aebersold of the Isotopes Division of the Atomic Energy Commission. Use of radioactive isotopes in physiological study has shown that the various elements making up the body replace themselves at varying rates. "In a week or two, half the sodium atoms will be replaced with other atoms," Doctor Aebersold said. "The case is similar for hydrogen and phosphorus. Half the carbon atoms will be replaced in a month or two. And so the story goes for nearly all the elements. In a year, approximately 98 percent of the atoms in us will be replaced by other atoms that we take into our system in our air, food and drink."

30 Horsepower!



Meet the power leader
of the *Super-Quiet*
SCOTT-ATWATER line!

Here's your partner for glorious outboarding adventure—a motor with that vital *extra* power that means breathtaking speeds and flashing acceleration.

The Scott-Atwater 30 h.p. brings new luxury to outboarding with *Bail-a-matic* power bailing; smooth, quiet *Hush-Spring* Mount, *Aquamute* Exhaust, Intake Silencer; Push-Button Electric Starting (optional); Complete Shift with Safety-Zone Shiftlock; new Free-Flow V-Valves; Automobile-Type Dual Exhausts; Remote Control Connections; *Stowaway* Fuel Tank; Snap-off Hood.

See this new pacemaker among quality outboards at your dealer's now—his name is in your phone book classified section. Or send for free color booklet on the full line: 30, 16, 10, 7½, 5 and 3.6 h.p. Write Scott-Atwater Mfg. Co., Inc., Minneapolis 13, Minn., Dept. PM-25.

NOW
FIVE
BAIL-A-MATIC
MODELS!



SCOTT-ATWATER
30 H.P. \$459.50
WITH ELECTRIC
STARTER \$549.50
FOB Factory

Horsepower certified by OBC.
Price information subject to change.

FIVE *Super-Quiet* **SCOTT-ATWATER** MOTORS... AND THEY ALL BAIL YOUR BOAT!

"Handy" SANDY says:



You can always use a

**GOOD
SHORT-CUT**

... here are some
you'll prize!

Fixing bulges in linoleum calls for a really sharp knife and some good fresh linoleum paste. Slit the bulge, slip in a good supply of paste with a narrow-bladed knife, then put a heavy weight on the slit and leave it overnight.

Whether repairing linoleum or laying it, your knife **MUST** be sharp. I've seen plenty of people hurt because a dull tool slipped. Sharp tools are far safer to handle, because they'll do exactly what you want them to do. A No. 109 Combination Stone by CARBORUNDUM will keep them sharp and is basic to your tool collection... economical to buy—long lasting. Your hardware store or building supply dealer has a wide range of sizes for you to choose from.

You can't plane a plywood edge—so if a cabinet door binds, try a piece of Extra Coarse Flint Paper (wrapped around a 3"-square block of $\frac{3}{4}$ " wood to save your fingers). Works fine. Another good product by CARBORUNDUM. Matter of fact, CARBORUNDUM makes five outstanding Flint Papers: Extra Fine—Fine—Medium—Coarse—Extra Coarse. A few sheets of each on your workshop shelf will equip you for any refinishing job in the house.

Easy-as-pie way to store sanding discs: just "borrow" a pie tin from the kitchen. Cut it in half... tack the rim to a wall or the back of your bench, open end up. Return the unused half to the house, if you dare... on second thought, better make two storage "racks".

Or you can make a trade with your wife—the pie tin for a sheet of Fine Emery Cloth by CARBORUNDUM. Tell her a few stitches in it now and then with her sewing machine is the best way to keep the needle sharp and efficient... make sewing easier.

What home upkeep short-cuts have YOU discovered that other folks would like to know about? Send 'em to me on a postcard—a separate card for each idea—and I'll pay you \$5.00 right away for every one I can use in later columns. Even if I can't use 'em (on account of duplicates, and such) I'll send you a worthwhile little gift for your trouble.

Better send me a postcard anyhow, and ask for a fine new booklet, "HOW TO SAND," which the CARBORUNDUM folks have just printed. There's no charge. Just address your card to me...

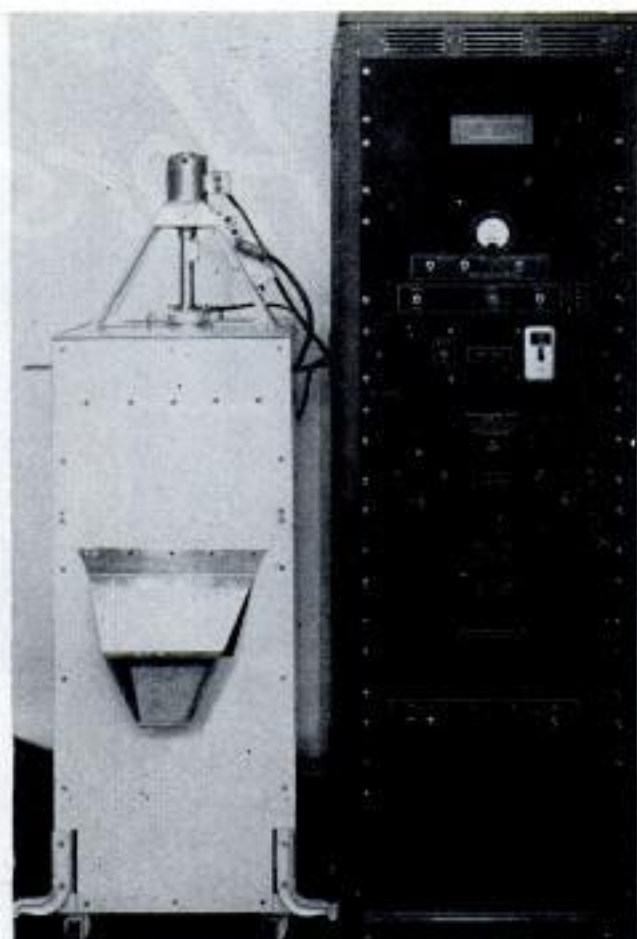


"Handy" SANDY
CARBORUNDUM

REGISTERED TRADE MARK

Niagara Falls, New York

90-24



Tosses Out 18,000 Coins an Hour

Ideal for slot-machine plungers, but reserved for U. S. Treasury use, is a newly devised machine that can weigh and sort 18,000 coins an hour. Designed and built by the Bureau of Standards, the machine balances new coins against a perfect coin of predetermined weight and tosses all good ones into one hopper and rejects into another. The sorter consists primarily of a whirling flywheel whose axis has a pendulum action. As coins are fed into the wheel through the hub, they slip into a slot where their weight counterbalances the perfect coin. If vibration is set up through imbalance of the pendulum, the coin causing the imbalance is rejected.

Jet Noise "Deafens" Tubes In Plane's Radio Equipment

When a jet pilot thinks the roar of his engine is deafening him so that he cannot hear his radio he may be partially wrong. The noise is "deafening" the tubes of his radio, not his own ears. Armour Research Foundation engineers maintain that exceptionally loud noise can cause failure or malfunction of small tubes and relays in radio and radar sets, and they point out that the sound level may approach a deafening 150 decibels 10 feet from the tail pipe of a jet engine.

easier with new
PARAGON Power Sprayer

One man with this compact 12-gal. Paragon can *effectively* spray insecticides, disinfectants, weed killers whitewash, water-type sprays, silicone-type waterproofing solutions. Latest type spray gun produces mist for wide coverage or stream 25 feet high. Pump delivers up to 1½ gals. a minute. Trouble free. Low priced. See your dealer or write us for literature on both hand and power sprayers.



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SMALL! POWERFUL!
ECONOMY TRACTOR

Unequaled value! Low price! America's finest tractor. Ruggedly built. Easy to operate. 790 lbs. Borg-Warner clutch, trans. and diff 140 to 1 reduction. 40% more drawbar pull than ordinary tractors 8-1/4 H.P. engine. 20 quick change implements. HOOD, FENDERS.

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TOP QUALITY

Built of the finest materials, Gerstner Chests are acknowledged top quality everywhere. Free catalog.

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CUT RADIO CHASSIS HOLES IN 1-1/2 MINUTES OR LESS

Quickly make accurate round, square, key, or "D" openings . . . in metal, bakelite or hard rubber . . . with GREENLEE Radio Chassis Punches. Simply turn with a wrench. Many sizes. Write for details. Greenlee Tool Co., 2102 Columbia Avenue, Rockford, Illinois.

PLANNING TO BUY OR BUILD A BOAT?

LOOK FOR THIS WELDWOOD® TAG

IT'S YOUR GUARANTEE that the plywood used in the boat won't delaminate, is the best made!

UNITED STATES PLYWOOD CORPORATION
World's Largest Plywood Organization
55 West 44th Street, New York 36, N. Y.

Build your own
FIREPLACE
INDOOR - OUTDOOR

FREE Booklet shows how



Booklet gives Complete instructions.

- Foundation
- Steel heat-circulating form
- Cold and warm air ducts
- Mantel or decorative front

Fireplace form set on foundation includes firebox, damper, down draft shelf and smoke dome.



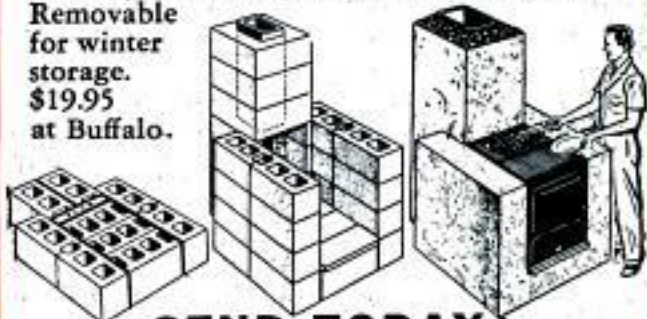
Brick, stone or cement block can be used around the form.



Save time, money and materials with **PRICE** steel fireplace forms.

Build this outdoor fireplace in **ONE DAY!**

• Use inexpensive concrete blocks with the Pyro-Grill steel form and complete the job in a day. Includes grill, grate, draft control. Removable for winter storage. \$19.95 at Buffalo.



SEND TODAY!

- Please send —
- Directions for building heat-circulating fireplace, free.
 - Book "100 Fireplace Ideas". Pocket size book, free.
 - Larger book, 8½ x 11, beautifully illustrated, 25c.
 - Build outdoor fireplace in 1 day. Also, 10 beautiful designs, free.

Name.....

Street.....

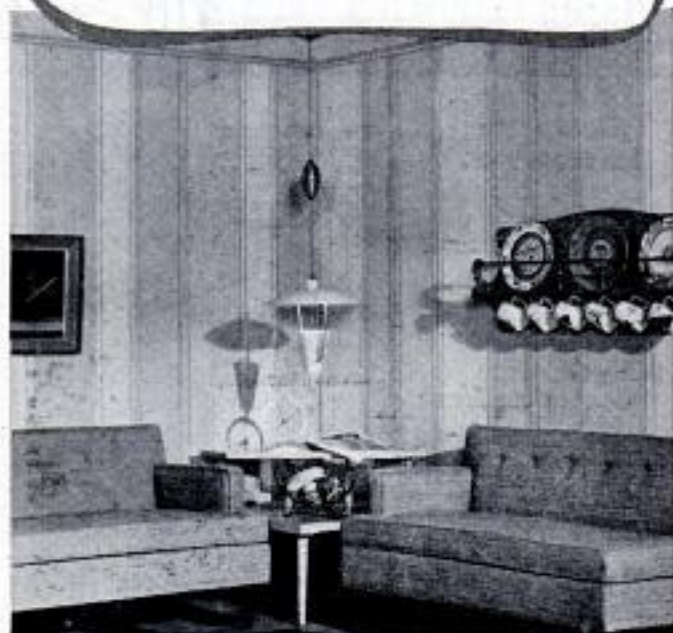
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Gold Bond Insulation Board



GOLD BOND Insulation Board, Plank and Tile decorate, insulate *and* sound condition all at the same time.

Whether adding a new room or remodeling an old one, give it smart good looks with these pre-finished planks and tiles in ivory or combinations of pastel colors. The tiles make a handsome ceiling and increase the rest and quiet of your room. Ready-cut and ready to install, there's no painting or decorating needed. Gold Bond Planks and Tiles are made from "live" southern pine fibres, keep furnace heat *in*, and summer heat *out*!

Send today for your copy of "Interiors by Gold Bond," the fascinating booklet that has helped thousands to new home beauty.

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BUFFALO 2, N. Y.



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NATIONAL GYPSUM COMPANY
Dept. PM-25, Buffalo 2, N. Y.

Enclosed is 10¢. Please send me my copy of
"Interiors by Gold Bond."

Name

Address

City Zone State



Aluminum Screens

You can make your own aluminum-framed window screens with a kit that includes all materials and step-by-step instructions. Aluminum frame sections, glass-fiber screening, corner locks, a handy miter box for cutting frame sections at an angle, and complete installation hardware are packed in the kit. A hammer, saw, screwdriver and sharp knife are the only tools needed to make screens of any dimensions.

Exhaust Pressure

Powers Road Sander

Blowing a fan-shaped coating of sand or grit under the rear wheels, an exhaust-powered sander provides traction on snow or ice-covered roads. The sand or grit is carried in a large hopper in the trunk. When a steering-column button is pushed, a valve near the end of the exhaust pipe is opened diverting some of the exhaust pressure into the sanding system. This pressure blows through the delivery tubing, forcing sand under the rear wheels. A whistling sound is made by the blowing action, informing the driver that he is using sand. The device can be installed on any car in an hour, the manufacturer says.

Scientists Bore Hole in Glacier

Seven scientists from the California Institute of Technology are planning to drill a deep hole in Saskatchewan Glacier in the Canadian Rockies. With a hot-pointed electric drill they will cut a hole 1500 feet deep from the surface to the bottom of the ice. A pipe then will be left in the hole. For years its deformation will be used to measure the flow of the river of ice.

Scared
to
Change
Fuses?



MINI-BREAKER®

The lifetime replacement for old-fashioned fuses

- Fits like a fuse in any standard fuse socket.
- Lifetime protection against electrical fire hazards.
- Protects against overload and short circuits.
- Just press the shockproof Mini-Breaker button to restore service.

NOW \$1.50—in 10, 15, 20, 30
amps. AC only, 125 volts. max.

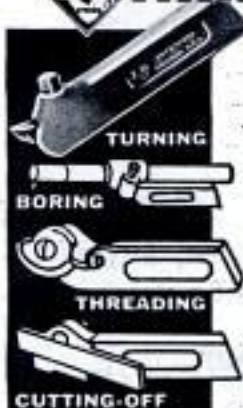
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MINI-BREAKER®

Ask for it at your favorite store or write
Mechanical Products, Inc., Jackson, Michigan

ARMSTRONG LATHE TOOLS



There is a correct ARMSTRONG TOOL HOLDER for every operation on Lathes, Planers, Slotters and Shapers. Shown at left are:

1. *Turning Tool*—for roughing, finishing and fillet work.
2. *Boring Tool*—for boring and internal threading.
3. *Threading Tool*—for thread cutting.
4. *Cutting-off Tool*—for lathe cutting-off work.

ARMSTRONG Lathe Tools are designed to give greater strength, maximum clearance and correct cutting angle. They are the most efficient and economical lathe tools you can buy. Write for Catalog

OVER 250 SIZES AND TYPES **ARMSTRONG BROS. TOOL CO.**
5268 W. ARMSTRONG AVE. • CHICAGO 30, ILL.



Today's Best Boating Buys!

Luxury 'Seafarer', exciting new molded plywoods, sturdy and economical. Newly designed, beautifully finished. See them at Chicago Boat Show. Outstanding aluminum boats.



WAGEMAKER CO., Dept. 60, Grand Rapids, Mich.

Use Gold Bond
TWINSULATION
America's New No. 1 Home
Insulation Value!



TWINSULATION gives you more for your insulation dollar! It provides *double* insulation action... the rock wool center *blocks* heat and the aluminum covering *reflects* heat from both sides. Blan-

kets add extra fire protection... the rock wool center is fireproof and the aluminum covering is flame resistant. The blankets are permanent... the rock wool fibres can't deteriorate.

AND NEW GOLD BOND TWINSULATION Blankets are rugged, easy to install. They give you greater savings on heating—and air conditioning—and add year 'round comfort, too! Send today for the new illustrated Gold Bond "Home Insulation" book below. Shows you how to install the right insulation yourself.

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BUFFALO 2, N. Y.



MAIL COUPON TODAY!

NATIONAL GYPSUM COMPANY
Dept. PM-25, Buffalo 2, N. Y.

I enclose 10¢ for "Home Insulation" booklet.

Name.....

Address.....

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

MORE SANDING AREA

than any sander in
its price class

25 square
inches



only **2 $\frac{1}{16}$ "** high...
fits under tight places

LOWEST SANDER DESIGN

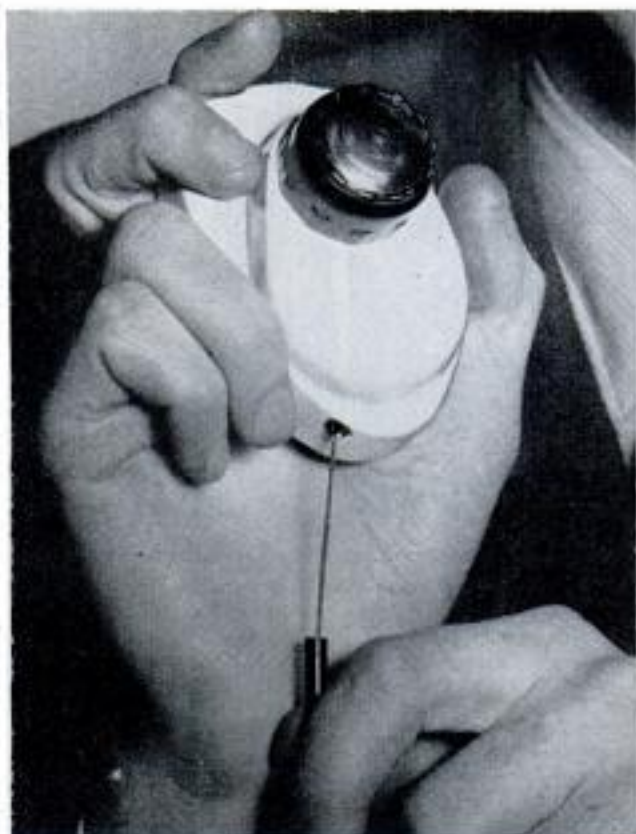
TERRIFIC POWER
with unequalled endurance
only **\$14⁹⁵** model 700

The Newest Power Sander and Polisher on the Market

As efficient as any rotating motor-driven sander, plus these quality features: straight-line action, no bucking, sands *with* the grain and goes all the way into corners; powerful 60 cycle reciprocating motor gives 14,400 strokes per minute; exclusive insulation gives smooth, quiet operation; push-button control; 8 foot cord.

Weller SANDERS
816 Packer Street
Easton, Pa.

AVAILABLE AT HARDWARE STORES

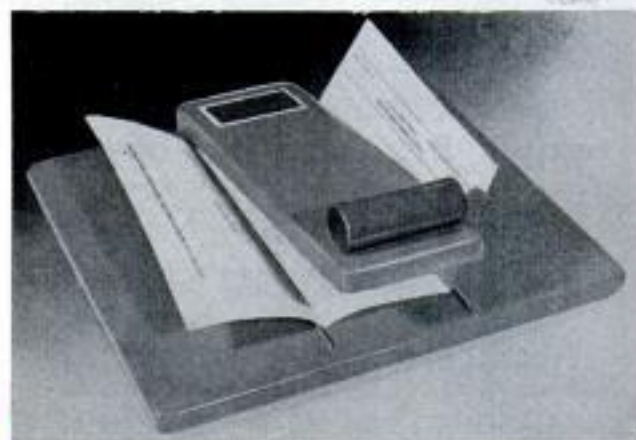


Nonelectric Shaver Is Operated by String

You don't need electricity for a mechanical razor developed in Germany. Instead, you pull a string that spins a tiny flywheel inside the razor. The flywheel spins for about a minute after one pull of the cord, giving the rotary cutter a faster speed than an electric model. The durable, low-cost razor has only three moving parts.

Letter Folder Creases Four Sheets at One Time

Up to 1000 letters per hour can be folded with the aid of a new manually operated office appliance. Four sheets can be inserted in the device at once. With one motion the operator sharply creases the paper to provide neat folds for easy insertion in the envelopes.



GREAT SURPLUS SALE OF HOME, FARM AND FACTORY EQUIPMENT

GROBAN FOUR-WAY OPEN CENTER HYDRAULIC CONTROL VALVE

ITEM #126—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. Finger grip handle. Ship. wt. 10 1/2 lbs.

AN OUTSTANDING BUY!
F.O.B. Chicago **21.50**

PESCO GEAR TYPE HYDRAULIC PUMP

Compact — Powerful — Reliable
ITEM #160—Especially designed for belt drive from fan belt, power take-off, drive pulley, electric motor or small gas engine. Equally suitable for direct coupling.

Pedestal type mounting with two bolt holes for 3/4" hold-down bolts. Standard 1/2" pipe thread inlet and outlet ports. Delivers 4.5 GPM at 1000 PSI at 2800 RPM with 4 HP. Hardened steel gears turn in dense oilite bronze bearings. Rotation—clockwise facing shaft. Guaranteed trouble-free service. Ship. wt. 6 lbs. F.O.B. Chicago **22.50**

DOUBLE ACTION HYDRAULIC CYLINDER

ITEM #310—3 1/2" bore, 11" stroke. Alloy steel cylinder wall. Micro-honed and all steel 1 1/8" diameter piston rod. 19 1/2" overall length closed. Clevis mounting at base and shaft. Will lift 9625 lbs. with 1000 PSI Pump Pressure. Uses 3/8" tubing fittings. (Fittings to pipe thread: two 3/8" MPT @ 35c.) A \$102.00

value. Shipping weight 11 lbs. FOB Chicago... **25.00**

PORTABLE ELECTRIC LIGHT PLANT

ITEM #334
Compact Electric Plant suited for small homes, cabins, campers, hunting and fishing camps, trailers and small electrical home appliances. Operating costs: About 5c per hour. Sturdily constructed for dependable service. Net weight only 88 lbs. Can be carried from place to place, or transported in trunk of car.

250-350 Watt—110 Volt—D.C. Model PE-77D. Powered by easy starting 1 Cylinder, 4 Cycle Briggs-Stratton Engine complete with muffler, starting rope and oil bath air cleaner, direct coupled to a 250-350 Watt Generator with twin plug-in outlets. Engine speed 2650 R.P.M. Shipping Wt. 110 lbs. Commercial List Price \$225.00

WAR SURPLUS PRICE
Special Value F.O.B. Chicago **75.00**
At Only... **OTHER SIZES IN STOCK**
FROM 350 W. TO 25,000 W.

ALL ITEMS BRAND NEW!

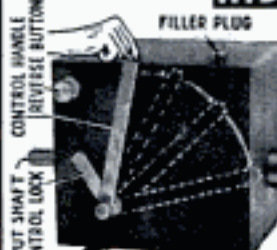
A. C. ELECTRIC GENERATOR

7 1/2 K.W. (7500 WATTS) single phase, 110/220 volt output. 3 wire system. 2 bearing construction. 5 groove 6" V belt pulley included. Self-excited. Foot mounted. Drive generator from tractor or stand by engine. Ample power for 6 room house. Dimensions: 34" x 11 1/2". Shipping Wt. 420 lbs. F.O.B. Chicago. **295.00**



GROBAN HYDRAULIC SPEED REDUCER

with FINGERTIP CONTROL
USE FOR: Reamer Drives • Midget Cars • Feed Mills • Canning Machines • Conveyors • Lathes • Milling Machines • Motor Boats • Cream Separators • Garden Tractors • Pumps.
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. Shafts 5/8" diam. Input rotation counter-clockwise facing shaft. Input speed 750 R.P.M. 7 1/2" x 7 1/2" x 11 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. **54.50**



Brand New! 5-TON BLACKHAWK HYDRAULIC LIFT KIT

Now Only 44.45 complete
The Complete Kit
For — • Dumping farm wagons • Adjusting depth of plows • Hydraulic press • Hydraulic jack • Snow plows.
KIT CONSISTS OF:
1—Brand new Blackhawk Model P-351—Hydraulic hand pump with built-in oil tank and release valve. Rated from 1200 P.S.I.—to 5400 P.S.I. 20" handle. Dim. 8"x6"x6" Item #82..... **22.50**
1—6 Ft. length double wire held rubber covered hydraulic hose—tested to 20,000 lbs. Item #2784..... **3.95**
1—Hydraulic cylinder. 2 1/2" bore, 7 1/2" stroke, 1 1/2" stainless steel shaft, will lift 10,000 lbs. using pump pressure. Standard clevis mounting. May also be used for double action service. Item #355A..... **17.00**
2-Qts. non-foaming hydraulic fluid..... **1.00**
All necessary hydraulic fittings. Total ship. wt.—40 lbs. **\$44.45**
COMPLETE KIT PRICE.....
ALL OF ABOVE INCLUDED F.O.B. Chicago



ITEM #91 300 AMP. D. C. GENERATORS

IDEAL FOR WELDING GENERATOR
Type B-1, rated 300 Amps.—30 Volts, Mfd. by Jack & Heintz. Government Acquisition Cost \$286.80. Ship. wt. 55 lbs. Dimensions: 16"x10"x7". Complete with instructions to connect as Welder. F.O.B. Chicago. **35.00**

HEAVY DUTY 12 VOLT D. C. GENERATORS

ITEM #99—For trucks, autos, marine equipment, construction machinery, 12 Volts—50 amps.—6 bolt mounting flange spline shaft—life time grease—sealed ball bearings. Mfd. by Leeco-Neville. Acq. cost \$165.00. **NOW ONLY... F.O.B. Chicago 16.50**



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ITEM #383—USE FOR:
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FEATURES • Needle Bearing Construction • 1 1/2" Pipe Thread Inlet, 1 1/4" Hose Outlet • Standard 3/4" Keyed Shaft • All Bronze Body & gears, Monel Shaft • Equipped with Drain Cocks, Grease Cup, Steel Internal Drive Gears for long, trouble free service.

CAPACITY: From 10 to 80 Gal. Per Min. At Speeds from 550 to 2400 Rev. Per Min. Using from 1/2 to 6 Horse Power. For Pressures to 60 lbs. Ship. wt. 58 lbs. U. S. Navy Cost \$168.00. F.O.B. Chicago **39.50** Two for Chicago **75.00**

D. C. ARC WELDER NEW MODEL 353

ITEM #65 For Stationary or Portable Use. **HEAVY DUTY RANGE TO 250 AMPS.**
Ideal for:
• Farm
• Garage
• Factory
• Workshop
Welds Anything From Auto Fenders To Tractor Frames



- Dial Type Rheostat Control
- Use 1/16" to 1/4" Rod
- Generator-type Welder
- Reactor Coil for Smooth Even Arc
- Use 7 1/2 H.P. Electric Motor or 10 H.P. Gasoline Engine
- Run at 2500 R.P.M.
- Available with Either Flat Belt or Double V Pulley
- Complete Operating Instructions

Shipping wt. 107 lbs. \$350.00 Value. Standard Model F.O.B. Chicago. **99.50**
Deluxe Model—with "Magic Terminal" for low amperage range welding. (Between 30-100 amps.) F.O.B. Chicago. **119.50**

BELT DRIVEN A. C. GENERATOR

ITEM #700—700 watts, 115 Volts, 60 cycles A.C. 3600 R.P.M. Compact, self-regulating generator with V Belt pulley and double outlet receptacle. Rotation counter-clockwise. May be driven by tractor or auxiliary gasoline engine. Requires 2 HP minimum. Ideal for powering electric tools, oil burner, refrigerator, lights, or other appliances requiring up to 700 watts of power. Dimensions: 10" long x 8" high x 6" wide. Shipping Wt. 27 lbs. F.O.B. Chicago. **59.50**



Floor Surfacing Contractors NEEDED!



- ★ BIG PAY
- ★ FULL or PART TIME
- ★ AGE No Barrier
- ★ Minimum Investment

Highly Respected Profession Offers You Unusual Opportunity to BE YOUR OWN BOSS

Thousands of men of all ages have found financial security and happiness in a phase of the building and remodeling industry that has become as necessary as the hammer and nails. The pay scale is high for those who are willing to work; many earn \$50 a day and more. No great physical stamina required—men from 18 to 80, even with physical handicaps, enjoy this pleasant year 'round indoor work where earnings are limited only by the amount of time you devote to it. The American Floor Surfacing Machine Co., a 50-year-old pioneer firm and leader in the industry, shows you how to quickly make good in this stable business. No schooling, no special talent or skills required. Only small investment in sander gets you started. Send coupon for "money-making booklet" entitled "Opportunities in Floor Surfacing"—enclose 25c in coin or stamps to cover handling.



AMERICAN

FLOOR MACHINES

SEND ↓

The American Floor Surfacing Machine Co.
535 So. St. Clair St.
Toledo 3, Ohio

Here is 25c in stamps or coin for booklet "Opportunities in Floor Surfacing", telling me how I can start my own floor sanding business.

Name.....

Street.....

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

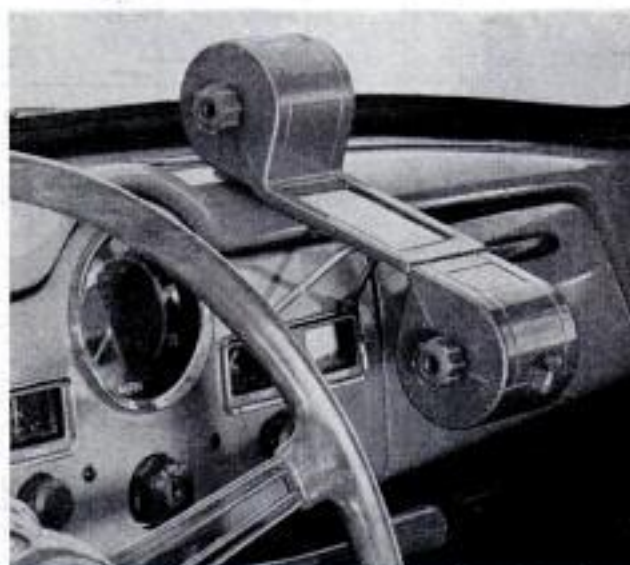


Visual Radiation Detector

Glasses that provide a visual reaction to deadly gamma rays have been developed in West Germany. The left lens of these glasses, or goggles, resembles a telescopic-camera mount, and contains a special screen that reacts to gamma rays, revealing contaminated areas. Use of the glasses for Civil Defense has been suggested.

"Logbook" for the Car

Motorists, traveling salesmen and deliverymen can record expenses and other facts on a "logbook" that attaches to the dashboard of a car or truck. A roll of ordinary adding-machine tape is inserted in one end, threaded through the log and fastened to a roller at the other end. As the user fills the exposed section of the paper with notations he turns a dial, storing the data on the roller and exposing more paper for further notes.



Buy EVANS for EXTRAS

in 6, 8, 10 and New 12 Foot
"WHITE-TAPES"



FROM
98¢

FREE WITH EVERY TAPE

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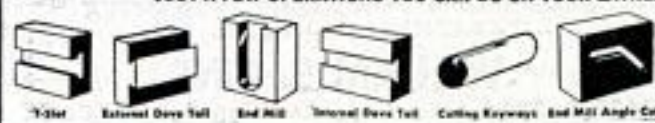
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Parade of 1955 Cars

(Continued from page 138)

and florist delivery trucks are now common to the family car. Two-tone combinations are almost the rule. Buyers who want something really flashy are forced to go to three-tone jobs (and many are available). Question: How will the taxicab companies paint their cabs so they will stand out among such color schemes?

These new colors, particularly the off-pinks, beiges and pastels, look most unappetizing under a coat of mud and slush. Washed and polished on the showroom floor, they are indeed appealing, especially to the women. But in the mud—oh, well, the car-washing business should boom.

There is another problem that arises from these exotic colors. Nobody minded when he saw another blue car that exactly matched his blue car, or another black car that matched his black car. But when a buyer picks out an ultraflashy two-tone job to be distinctive, it is bound to come as a jolt to see scores of them exactly like it around town. And that is certain to happen in a mass-production business.

Someone has asked: What's left for 1956? Well, here's one color trick that may even be out before the 1956 cars—colored tires to match the car paint. From the tread down to the white sidewalls the rubber will be colored in a selection of hues.

The Plymouth is more than 10 inches longer than last year. The Chevrolet is a fraction of an inch shorter, the Ford a fraction longer. But they all look much longer. The reason is a stylist's trick. These experts discovered that what makes a car look long is not the distance from bumper to bumper, but the length of the high-light line—that shiny horizontal line of sheet metal running from the headlights to the taillights. To make a car appear long, stylists extend the front fenders forward and the rear fenders backward until both are almost even with the bumper limits. This is the reason for the many hooded headlights and reverse-angle taillights in 1955.

Oldsmobile, with its so-called "vogue" styling of curved chrome moldings that outline two-tone color schemes, made a larger percentage gain in sales last year than any other car (see page 145). This year, perhaps as a result, almost all cars seem to be imitating that styling trick.

By the time you read this you may know that Studebaker made a midseason switch to wrap-around windshields. The new styling should be hitting the dealers' showrooms about now. The changeover was made during an inventory shutdown in the

(Continued to page 282)

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last weeks of December. Most of the engineering had been done about two years earlier when the decision to bring out a wrap-around was turned down. It is to be available only on the sedan models—the low-slung coupes won't have it. The buyer will have a choice—wrap-around or no-wrap on sedans.

Chevrolet will soon be selling the Corvette station wagon, the Nomad. It will be metal, not plastic like the original model. The Corvette will get a souped-up V8 engine to compete with the Thunderbird.

And so that closes another model year in this most hectic of all mass-production industries. It is an industry where the question "will it sell?" is as important as "will it run?" Is the merchandising approach being carried too far? Some critics seem to think so.

At a recent conference on design, two such critics verbally slugged the car designers. The art director for an international oil company said that as far as he was concerned, the car makers had "lost another customer" with their "longer, lower, wider" look. The editor of a cultural magazine said that the 1955 designs made cars look "like a tipped-over jukebox on wheels."

What do you say? That's the only thing Detroit wants to know—the sales figures will be the answer. ★★★



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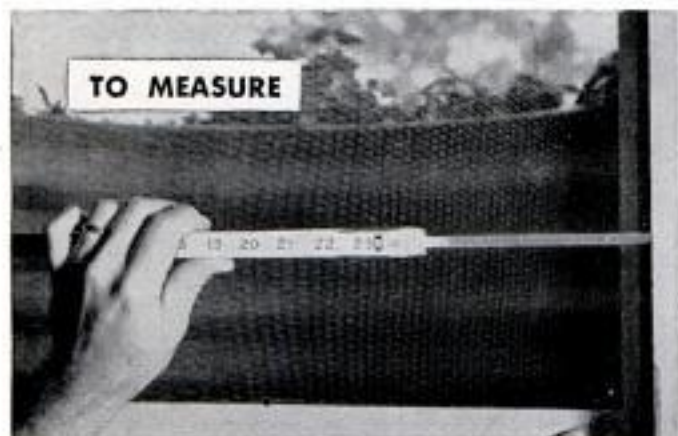
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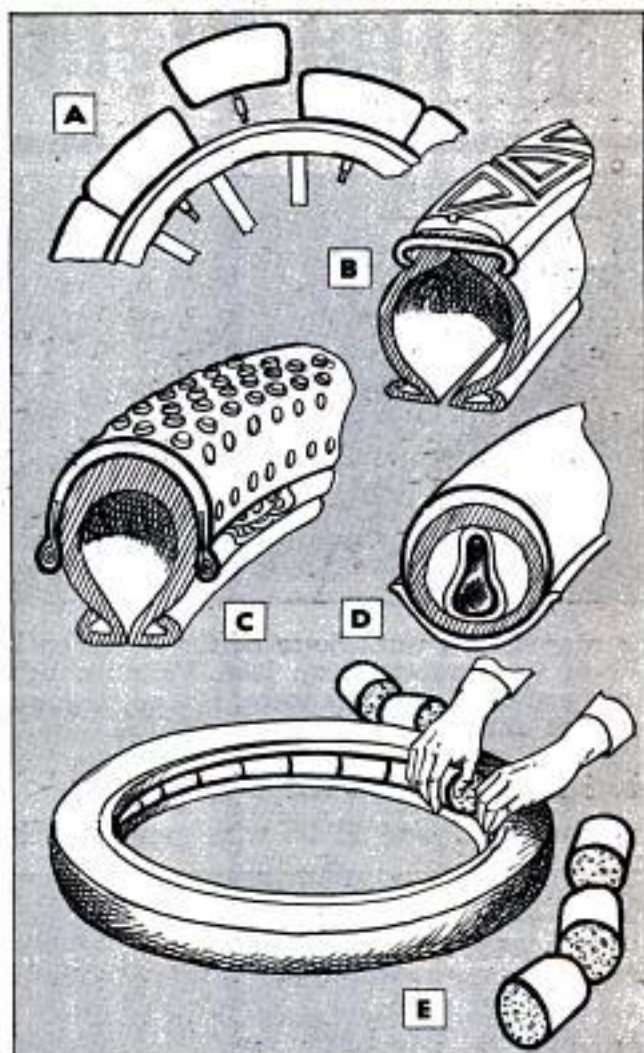


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They Also Ran

(Continued from page 167)



There were almost as many tire ideas as there were automobiles in the early days. Here are just a few: A. Segmented tire; B. steel-rimmed tire with rubber tread cemented to it; C. hobnailed tread that slips over any tire; D. punctureproof tires of almost solid rubber; and E. sponge-rubber fillers to replace tube

power ratios by sliding a friction-tired wheel across a revolving disk that was spun by the engine. As the friction wheel approached the center of the disk, the speed output was reduced and the power ratio increased tremendously. There was said to be "no hill the Cartcar couldn't climb." To increase speed, the driver moved the wheel toward the perimeter of the disk. The car then accelerated without jerking or gear changing. To reverse, the driver moved the wheel past dead center. Very simple, very practical, but an also-ran.

Probably no invention caused more comment than the Octoauto built in 1911 in Columbus, Ind. This strange vehicle had eight wheels, hence its name. There were two axles in front as well as two axles in the rear.

(Continued to page 286)

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The logic (if that's the word for it) behind the design was that since Pullman coaches with 12 wheels rode better than ordinary coaches with 8 wheels, automobiles with 8 wheels would ride better than those with 4 wheels. Complicated, isn't it?

Anyway, since each wheel carried only one eighth the load, a bump only felt one eighth as bad, said the manufacturer. Of course, there were eight small bumps instead of four large bumps! But that's another story.

It turned out that the eight-wheeled vehicle was not easy to steer, as you could have guessed. So the company solved this problem by bringing out the Sextoauto the following year. This model still had the dual axle and the four wheels in the rear, but it was reduced to a normal two wheels in front.

The Sextoauto was advertised as "The Octoauto's Sister." That proved it was scientific, the company thought. The advertisement stated that there was "not a single experiment embodied in the whole car . . . an old and accepted principle . . . bound to revolutionize automobile construction where comfort in riding is a consideration." Well, look around you. See any six-wheeled cars?

"Like a light canoe, skimming the surface, delicately responding to the slightest feathery motion of a noiseless paddle, the Owen Magnetic is under complete mastery of its owner's finger touch." Thus read an advertisement for an electric-powered car that carried its own generator. It had the smooth-power advantage of the electric, plus the convenience of the gasoline engine. The gasoline engine spun a generator which fed current to an electric motor attached to the drive shaft. It was called "the car of a thousand speeds" because it required no gearshifting. And it did operate as smoothly as any car before or since.

Not much different was a gasoline-electric truck which also had a generator hooked up to the gasoline engine. In this vehicle, the electricity powered four small electric motors, one inside each wheel hub. The design gave it a four-wheel drive and shift-free operation. It was also a four-wheel drive without steering problems, there being no front differential needed. The principle is the same as used in the diesel locomotives that pull today's trains.

A New Jersey motor company attacked the body problem in a revolutionary way with the "Gadabout" (\$450 completely equipped). The body was woven of reed, like a basket. This made it lightweight and strong. And it could be curved gracefully.

(Continued to page 288)

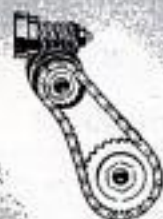
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SKIL

2 1/4" Belt Sander

Anybody can get professional finishes with this SKIL Belt Sander. It's so easy to handle—lightweight, compact, smooth-operating... in any position. Sands flush to vertical edges and corners. It will handle all your jobs, from rough to final finishing.

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Dependable, long-life combination worm and chain drive.



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Strong, lightweight die-cast aluminum motor housing.

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Made Only by SKIL Corporation
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Model 505



SEVENTY-FIVE YEARS OF PRECISION TOOLMAKING

From the invention of the combination square to a line of more than 3000 fine tools. From a room in a small machine shop to the largest manufacturing plant in the world devoted exclusively to the production of mechanic's hand measuring tools and precision instruments, dial indicators, hacksaws, band saws, band knives and precision ground die and flat stock. This is the contribution made to industry and to millions of skilled craftsmen by Laroy S. Starrett and the company which he founded.

On the occasion of our 75th Anniversary Year, the many Industrial Supply Distributors who make STARRETT products available to you join us in our pledge to maintain the STARRETT reputation for quality, precision and prompt, dependable service.

THE L. S. STARRETT COMPANY • ATHOL, MASS., U.S.A.



MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
HACKSAWS, BAND SAWS and BAND KNIVES

Another advantage claimed for the Gadabout was that it couldn't be scratched or dented. In fact, "slight bumps and bruises do not affect it in any way" reported a trade journal of the day.

As for cleaning it (which was the chief objection of such a body, wrote the automotive reporter), this was really very simple. It took but a minute to remove all the upholstery and floor boards. Then "if desired, a hose can be turned directly through the body, cleaning it thoroughly in a few minutes."

Engines were not always reliable in the early days so it was no wonder that inventors thought in terms of "spares." An inventor named Carter built a twin-engine car in 1908. When one engine went dead, the driver could always get home on the spare. Or, if more power was needed, both could be operated at the same time.

A similar approach was the convertible engine, of which several appeared. One, the Enger convertible 12, was what we would call a V12 today. There were two slanting banks of six cylinders each. By moving a lever, the driver cut off the ignition and lifted all valves on one bank so the engine ran on only six cylinders. This was the economy setting. When he approached a hard climb, he pulled back on the lever and all 12 cylinders roared into action.

And for those who just wanted to be different there was the Duck, built in 1913. It was the "newest, latest, best thing ever produced in the auto line." It was "new, exclusive, like no other, something you will want."

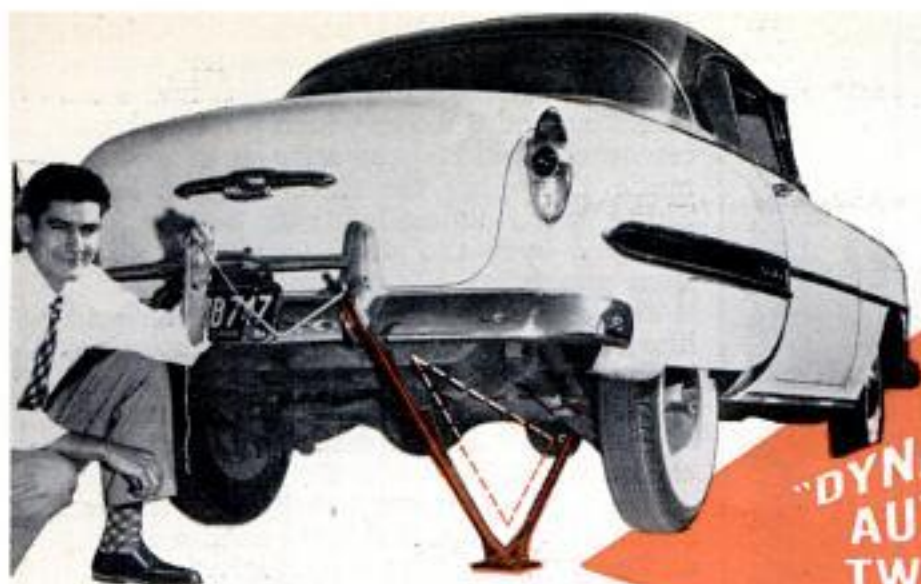
Well, it was different all right!

It was a touring car that was driven from the back seat. (This must have been for the original back-seat driver.) Of course, space in front of the driver could be used only for luggage (the ad said it was "a touring car of great luggage capacity"). It was only fair that nobody block his view of the road—he did have to see where he was driving. As you might expect, the Duck came and went with little more than a few quacks.

There were solutions to the tire problem, too. Tires of many separate segments made checking tire pressure an all-day operation. There were a dozen or more valve stems on each wheel. But for this trouble, you did have a tire that went flat in only one spot at a time. With it, you could still drive home when you did get a puncture—of course, it was to the accompaniment of a noticeable "ka zump" every time the flat segment came around.

There were sponge-rubber cylinders you

(Continued to page 290)



**NEW
"DYNAMIC TRIANGLE"
AUTO JACK LIFTS
TWO TONS WITH A
PIECE OF THREAD!**

BRILLIANT AMERICAN ENGINEER MAKES FIRST ADVANCE IN MANUAL LIFTING IN 2500 YEARS—since Archimedes' invention of the hydraulic screw. This fascinating and immensely practical invention is the talk of the automotive industry. This is the first automotive lift or jack to use the "dynamic triangle" principle instead of the straight line lift. It is now in production and can now be purchased by mail.

STUDY THIS DRAWING

When the handle is turned this **DOUBLE LIFT** jack **FIRST** lifts the car body **JUST** enough to clear the wheel. Then when the weight of the car body on the **REAR** leg of the triangle builds up, a part of this weight is transferred in the form of lifting energy to the **FORWARD** leg of the triangle—gently raising the wheel off the ground. The "V" on the forward leg engages the solid axle of all passenger cars and light trucks. First lifts bumper, then lifts wheel. Supports both bumper and wheel.



EVER WORRIED ABOUT THIS?

jacked up. This new invention will stay in place. **TRIANGULAR SUSPENSION MAKES CAR RESIST MOVEMENT.** When the Double Lift Jack is in use, the front or rear end of your car is actually resting on an inverted tripod (two jack legs and opposite wheel). With conventional jacks the car is resting on two points (jack itself and opposite wheel). With two point suspension, the car can roll off if the other wheels are not braked or blocked. With three point suspension it can't. Sounds tricky and it is, but just try it. Here's another way to put it. The principle is the same. You can walk away from a camera tripod and it'll stay there. Try walking away from a bipod.

The **DOUBLE LIFT "DYNAMIC TRIANGLE" JACK** is in production and in limited stock at the factory **NOW**. **GIVE IT THESE TESTS**—if you don't think it performs better than we say, ship it back and we will return your money.



FOLDS UP—FITS IN ANY TRUNK

DISTRIBUTORS - DEALERS — Double-Lift Jacks now in full production. Write for full sale details.



USE IT ON A TREACHEROUS SIDE HILL

USE IT ON A STEEP HILL



Here is a jack your wife or teen age daughter can use with ease when you're not there—and you don't have to worry about "jack" accidents. Send this coupon in with your check, cash or money order.

\$13⁹⁵ Postpaid in U.S. only

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Please ship me immediately _____ **DOUBLE LIFT** jack(s) @ \$13.95 each including shipping cost, on money back guarantee. (Or send \$5. balance C.O.D.)

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DO-IT-YOURSELF and
Save Over 50%
on Extruded Aluminum
COMBINATION WINDOWS
and DOORS



For a limited time you get regular \$9.95 Combination Window Kit for only \$8.95 f.o.b. factory—compare this quality, extruded aluminum window with any \$25 window. Due to elimination of assembly costs and mass production to meet increasing demand, and because you "do it yourself," you save as much as 50% on all U-Fab-It-Urself "Home Comfortizing Products."

KITS INCLUDE: All parts factory cut, drilled, mitered and hardware attached. The following Complete Line of U-Fab-It-Urself Kits engineered for easy assembly with household tools:

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- PICTURE WINDOWS
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Send for
FREE BOOK
 on Complete Line
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 Combination
 Windows
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"Satisfaction Guaranteed"

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Worthington, Ohio

Please rush details of **SPRING SPECIAL**—\$9.95 Kit for **ONLY \$8.95** f.o.b. plant. **PM-255**

Name

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

stuffed into the tire instead of a tube. These never went flat, at least not from a puncture. There were tires that had steel bands around them to which the tread was cemented. You had the softness of a pneumatic tire, plus the durability of steel. There were hobnailed slip covers that clamped over the tires to protect them from punctures.

There were tubeless tires. One was built like a garden hose with only a tiny airspace in the center. This was permanently sealed when the tire was made. It never went flat. It was almost solid rubber and must have ridden like it.

Finally, there were two inventions that should not be omitted from such a listing as this one. One was a spotlight that was installed by drilling a hole in the windshield. It was aimed like a pistol—in fact, its handle was shaped like a pistol grip. The light was a success for a while—sold half a million or so. Then it flopped. Another was a headlight dimmer that let you select any degree of brightness from full bright down to a faint glow for your headlights. It never did sell very well and soon was made illegal by state laws regulating headlights.

The man who manufactured and sold these two also-rans is the fellow who wrote this article. ★★★



Rubber Car Stopper

Your car stops at the right place in the garage when it hits a small cylinder attached to a rubber skirt. The weight of the wheel on the rubber skirt prevents the cylinder from rolling away, so there's no need to fasten it to the floor. A block for just one wheel is all that's needed. Reflecting disks help spot it at night.

new Thor SpeedWrench...

greatest 1/2" Square Drive Electric
IMPACT WRENCH
ever built—regardless of price!



\$89⁵⁰
complete

exclusive patented
**FINGER-TIP
REVERSE**



Now, you can set and remove nuts, drive and remove screws, drill in steel, wood, stone . . . tap drive and extract studs . . . no limit to its uses. This impact wrench does EVERYTHING!

One hand operation, one switch efficiency. MORE POWER... MORE RIGID CONSTRUCTION!

Easily triples capacity and dollar profits in your shop. Here's the low-priced power-packed impact wrench you've been waiting to buy.

Write for complete specifications on ALL Thor AUTOMOTIVE and SHOP SPEEDTOOLS!



***100 SpeedDrill**

A fistful of power. 1/4" cap. in steel... 1/2" in wood. HEAVY DUTY RADIAL & END THRUST BALL BEARING ON SPINDLE. \$25.00



***128 SpeedGrinder**

All-purpose 1/4 H.P. grinder for home, maintenance man, and garage. 6" x 1/4" face wheels. \$32.50



***1500 SpeedSander**

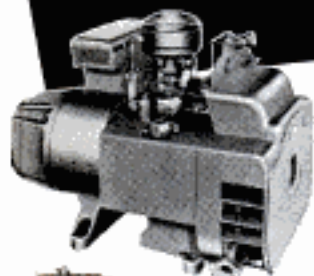
Heavy duty industrial orbital action sander. Larger platen. EXTRA power. 18 times faster than hand sanding... \$54.50



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a division of Thor Power Tool Company
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Emergency Power for homes, farms, business

Supply essential current when regular power source is interrupted. Prevents losses and hardships. 1 to 75KW. Gasoline-driven. (Model shown—10CW, 10,000 watts A.C.)



Portable Power for tools, lights

Carry them to any spot for labor-saving, plug-in electric power. Light weight, air-cooled. To 10KW. Gasoline-driven. (Model shown—07AH, 750 watts A.C.)



Electricity for cabins, resorts

Bring conveniences of electricity to any remote spot. Use regular 115-volt A.C. appliances and equipment. 400 to 75,000 watts. Gasoline-engine-driven.



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Enjoy electrical conveniences afloat. Install below decks. Compact, smooth-running, quiet. Water-cooled marine design. 400 to 3,000 watts. Gasoline-driven.

(Model shown—MKH, 400 to 1,000 watts)

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Decorative • Convenient • Economical

Now you can use the floor and wall space that swinging doors waste. Pella Wood Folding Doors fold compactly against the door jamb like an accordion. Ideal for closets, bedrooms, kitchen . . . and as folding partition between living and dining rooms. Anyone can install, quickly, easily. Completely packaged with hardware, fittings, installation instructions. Heights to 10', widths to 30'. Natural wood finishes and unfinished. Investigate today!

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ROLSCREEN COMPANY
Dept. G-81, Pella, Iowa

Please send complete literature on Pella Wood Folding Doors.

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CITY _____

ZONE _____ STATE _____

Are European Cars Better?

(Continued from page 163)

(because it is a two-stroke design it runs like a six-cylinder of four-stroke design) cruises all day at over 60 miles per hour and has a top speed of 74 miles per hour. It goes 30 miles on a gallon of gasoline.

Fuel injection is another significant development. The new Mercedes-Benz 300 SL now offers it. With fuel injection you squirt gasoline into each cylinder on the suction stroke instead of using a carburetor to mix the fuel and air outside the cylinder. This permits much closer control so there are no lean cylinders. You squeeze more work out of each drop of gasoline. The tricky problem of breathing restrictions is solved also and you get more power at the same time you get more economy. This six-cylinder engine of only 182.8 cubic inches puts out 240 horsepower and in top gear it has a range of 16 to 150 miles per hour.

Of course, the Mercedes-Benz 300 SL is expensive (\$7400), but so are some of our cars and with them you don't get fuel injection.

The V8 engine has just about killed off the in-line layout in the United States. In Europe, on the other hand, they are working hard to refine the short-stroke six and are finding low friction and high economy they never dreamed of.

Then there is the very effective diaphragm-type main bearing on the British Lagonda and Aston-Martin cars. This gives 360-degree support around the bearing.

One British car has an electric radiator fan with automatic controls that turn it on when water temperatures reach a certain level. On the highway, where you don't need a fan and it merely eats up horsepower uselessly, making plenty of noise to boot, the electric fan cuts out.

Mercedes-Benz carries cooling water around the oil sump, warming the oil when the car is cold and cooling it at high speeds. The Volkswagen has an oil radiator in its cooling system for the same reason.

But to the American car owner all this may be too technical to be exciting. After all, our cars do all right without fuel injection and torsion-bar springing (this latter is another feature of the Volkswagen and many European cars).

Let's look at some other points that are not so technical. How would you like it if you never had to bother having your car greased? With some European cars you don't.

The British Daimler has an automatic lubrication system that provides a supply of grease to chassis points every time the

(Continued to page 294)

Clean both sides INDOORS!



You can clean or paint both sides of a removable R.O.W window from *inside* the house—no need for ladders or sitting on sills.

See your local lumber dealer or write for free folders.

R.O.W. SALES CO.
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Please send me, without obligation, your free folders.

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WELD **BRAZE**
SOLDER **CUT**

4WAY
ONLY \$14.75
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WELDER
Complete with Twin Carbon Arc Torch and accessories... to handle all metal-craft work.

Acclaimed by thousands of Homeowners, Mechanics and Hobbyists as the welder of 1001 uses. Easily operated from properly wired 110 volt AC or DC line. The ideal gift with a life-long use... Order today on 10 day money back guarantee.

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12" Tiller fits and cultivates in 4" deep

We supply all parts except engine, already painted, plus full instructions. Twelve 4-in. teeth, 12" wide housing and shaft, sprockets, sheaves, chain, belt, wheels and handle. Only \$18.00 f.o.b. Richfield. Send check or money order today!

RED-E TRACTOR CO. RICHFIELD 17 WISCONSIN

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● Poor visibility when looking for road signs, landmarks, similar guides is one of the countless circumstances which make it easy to get lost... unless you drive by Hull Auto Compass. Keeps the way to your destination clear. Note that Hull universal vacuum cup mount with adhesive installs at eye level, away from magnetic interference of dash.

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America's Foremost money-making MECHANICS' TOOLS

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HALF-CLEAN ISN'T CLEAN ENOUGH



...in motor oil, too!

Half-clean oil wears an engine. Clean oil protects an engine. And Hastings Oil Filter Cartridges—when replaced as normally recommended—*keep oil clean from filter change to filter change!*

The reason for Hastings amazing performance is Densite—a new filtering material that absorbs dirt through its *entire* depth. And only Hastings has Densite!

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HASTINGS

OIL FILTER CARTRIDGES



OIL FILTER DIVISION • HASTINGS MANUFACTURING COMPANY
HASTINGS, MICHIGAN

Oil Filters, Piston Rings, Casite, Spark Plugs

engine warms up from cold. A tank near the exhaust pipe responds to engine heat, forcing grease into all chassis bearings. All you do is fill a reservoir every year or so.

Many European cars (like the Mercedes-Benz and the Czech Skoda) have had one-shot systems for years. In these the driver presses a lever in the passenger compartment and the car is greased. An accessory available in England is powered by a flexible cable hooked into the speedometer linkage. As you drive, various ports are opened automatically and grease is forced into chassis points in metered amounts pre-set by the manufacturer.

Europe has many other features in its cars that would excite the envy of an American driver: Self-emptying ash trays; ride control from the dashboard through adjustment either of shock absorbers or torsion-bar stiffness; side and rear-window defrosters; automatic transmissions that can be shifted by hand if you wish. The British Jensen features an all-plastic four-passenger-sedan body and cruises at 90 miles per hour with a 140-horsepower engine. Plastic panels are used in the Singer Hunter. Many cars use aluminum panels. The French Panhard is virtually all aluminum, even its body, chassis and engine.

But, American manufacturers say, the cost of such items is too great. Is it? Is cost a good argument against four-wheel independent suspension when the tiny French Renault has it?

Obviously, we should not copy any single European car complete. There is no argument about the quality of our American cars. The United States offers the buyer more car per dollar than any other country in the world. For brute straight-line performance, we can't be beat. Many of our stock cars will out-run all but the hottest European sports-racing cars.

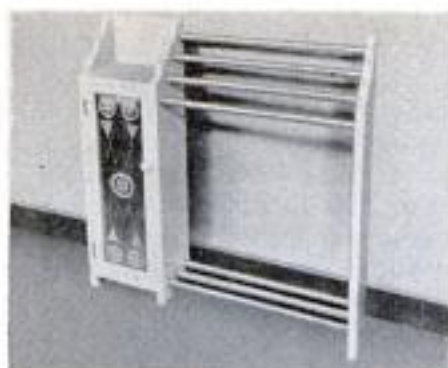
No cars in the world give an easier ride over long distances at 70 miles per hour on good roads.

Our cars are designed to provide dependable, foolproof operation. You don't have to be a mechanic to drive one. Our cars require little or no skill to start, to drive or to stop. No other country has cars that are so easy to operate and so free of annoying bugs.

But there are European features we could pick up and put in our designs without weakening any of our strong points.

Packard is making the first real step forward in suspension in an American car in many years with its torsion-bar suspension and its self-leveling feature. Lincoln and Mercury are offering a push-button-lubrication system as an optional extra

(Continued to page 296)



Bathroom Valet. Handiest addition your bathroom could have. Decorative storage cabinet door is made of hammered aluminum sheet. Requires wood, Do-It-Yourself Aluminum Tubing and sheet. Easi-Bild Pattern #29.



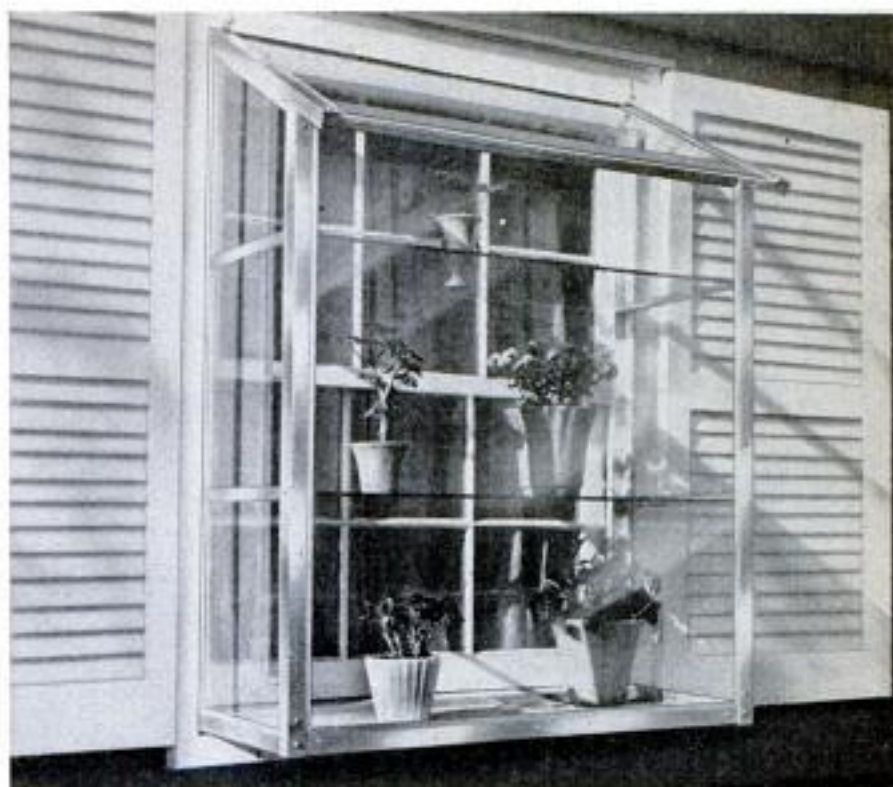
Serving Tray. Combines serving tray and stand in a useful and beautiful piece of furniture. Aluminum, Weldwood, Naugatop, Redwood and fasteners provide needed materials. Easi-Bild Pattern #52.



Weather vane. Pennsylvania Dutch design enhances the appearance of your house. Aluminum tubing, sheet, fasteners and wood are all you need. Easi-Bild Pattern #524.



Look for this rack containing Tubes • rods • bars • a wide variety of sheet designs • angles • fasteners • screen and storm sash sections • window hardware • Reynolds plastic film • trim strip.



Window Greenhouse. Have your own window conservatory—green things growing all year long. Can be made to fit any window. Requires glass, Do-It-Yourself Aluminum storm sash sections, angles and fasteners. Has three 14" glass shelves. Easi-Bild Pattern #566.

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 No. 524 Weather vane—35¢ No. 566 Window Greenhouse—50¢

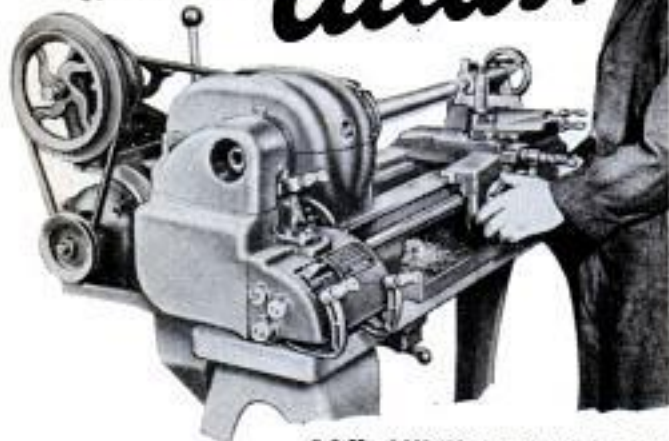
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 at lower cost
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10" QUICK-CHANGE LATHE

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CITY, STATE _____

this year. Nash and Hudson have had unitized construction, similar to that used in many European cars, for years. Chrysler puts disk brakes on its big Imperials.

You shouldn't get the idea that European cars are perfect. Anyone who has owned one knows that many minor details are poorly done (and it is in this department that our American cars excel). Light switches sometimes act up, heater and defroster motors are often noisy, door locks balk at times. But these minor points are not our concern here. In the big things, the major engineering, Europe's cars do offer a challenge our domestic products cannot ignore. ★ ★ ★



Insulating Spray

Mineral fibers and binders can now be sprayed onto walls and ceilings to form a lightweight insulating blanket 1/4 to 1 1/2 inches thick. The new surface slows heat transfer, deadens sound, fireproofs and solves condensation problems. The mineral fibers, in combination with a water mist, are applied with a spray gun after the walls are coated with an adhesive spray. A light tamping to attain correct density follows. If desired, the resulting surface can be painted or given a textured appearance with a finishing coat. The material can be applied to any clean, rigid surface such as metal, plaster, wood or concrete. It is said to be permanent and crackproof.

Ⓞ Lumps of ore up to eight inches long and weighing 10 pounds each are carried along by a high-pressure stream of water in a newly developed, abrasion-resisting rubber hose used in mining and refining.

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You can have an individual full-size screwdriver for every type of screw—including Phillips. All six screwdrivers are tempered, oil hardened, tool steel blades with flameproof, shockproof amber handles. They are heavily magnetized to pick up and hold screws. This is a \$4.85 value and each set carries an unconditional written guarantee. **ONLY \$1.00**

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WONDER DRILL SAW BIT



DRILLS OWN STARTING HOLE

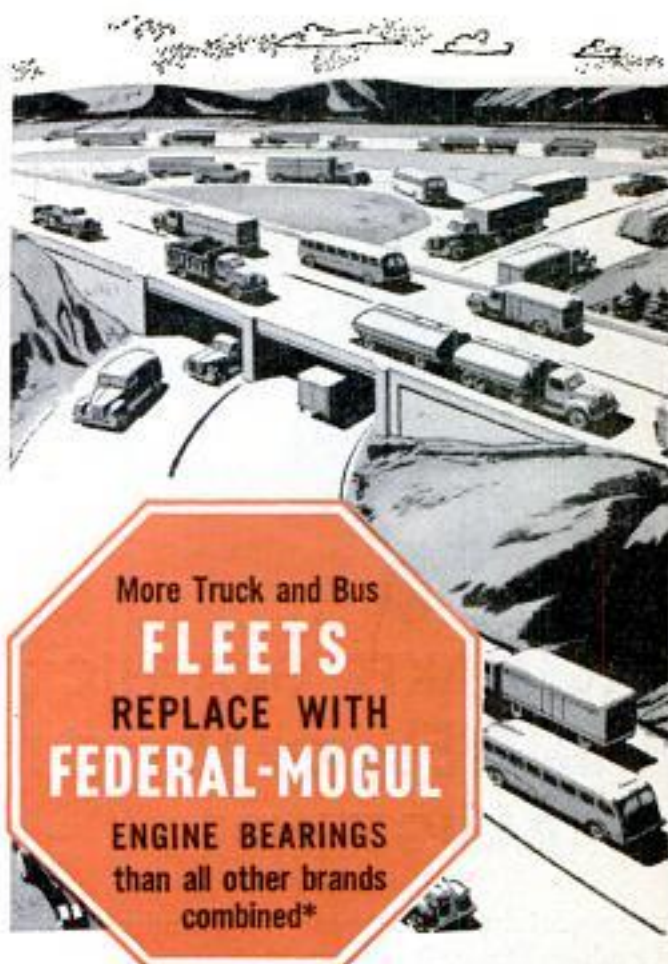
Combination bit for electric drills. Use as a drill, saw or reamer. Use for circles, ovals, squares, inside, hard-to-reach work. Works equally well in metal, pipe, wood, plastic, etc. Easy to use. Every carpenter, mechanic, electrician, plumber, hobbyist needs one. Made of abrasive resistant, hi-speed steel. Stands severe, continuous use without breaking. Resharpener free. Use with electric drill, slow drill press, lathe or milling machine. 1/2" diameter, 2" cutting section, total length 3 1/2". 3 types—wood, metal or all purpose. Set of 3, \$5.75. Details on request. Dealer inquiries invited. Money Back Guarantee. Shipped same day. Send check or money order to

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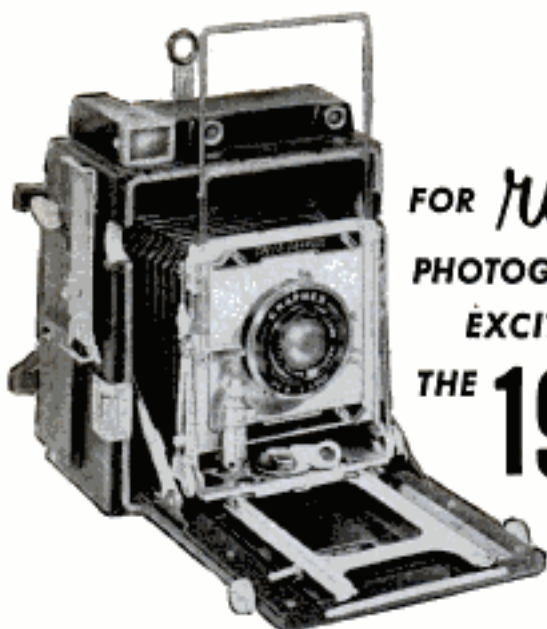
*The men who run America's great truck and bus fleets know how to recondition engines for best results. For example, a recent independent industry questionnaire, involving 83,360 trucks and buses, disclosed this fact: 66.7% of the vehicles surveyed get Federal-Mogul engine bearings as *first choice* for replacement. Do as the experts do! In reconditioning your car engine, install Federal-Mogul Oil-Control bearings. They restore full, clean power, pick-up and economy! They cost no more, yet have led the replacement field for 30 years . . . because of quality! Federal-Mogul Service, Division Federal-Mogul Corporation, Detroit 13, Michigan.

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What Does it Cost to Own a Car?

(Continued from page 153)

If you drive less than the average of 11,000 miles a year, these costs will be proportionately higher. If you drive more, they will be lower. The more you use the car, the more miles you get for your dollar.

Study the charts at the bottom of page 150 and you will see how much of the total bill is in fixed costs. By the sixth year, fixed costs have dropped to 53 cents out of each dollar, but at no point in the six-year study do they amount to less than half.

Figured by the mile, car costs are even more enlightening. In their first year, the low-price models averaged 10.4 cents a mile (and this does not include financing charges). Medium-price cars averaged 12.6 cents a mile and high-price cars, 16.0 cents a mile.

At no other point during the six-year study did the cost per mile of low-price cars equal that of the first year. This would seem to indicate that it is never cheaper to buy a new car than to have your old one repaired—at least not for the first six years. In the other two price classes, however, costs per mile did exceed the first year's during later years (see chart, bottom of page 151).

To compare the cars in the three price brackets, look over the chart on page 152. There is no great variation in how each dollar is spent. However, the total spent did vary considerably as mentioned previously (chart at bottom of page 152).

Owners in the survey who averaged under 5000 miles a year had the amazing cost of 26.4 cents per mile. In contrast, owners driving over 20,000 miles a year spent only 6.9 cents for each mile (see chart, top of page 153). But even for the 20,000-mile driver, the biggest single cost per mile was depreciation. It amounted to 2.9 cents per mile, while gasoline costs were only 1.9 cents per mile.

So if you decide to cut costs by leaving your car in the garage, you won't save much. You get more for your dollar by using your car more—even though it costs money to do it!

Here are some other interesting points brought out by the survey:

- Generally, the low-price cars cost less in repairs than high-price cars, even when five or six years old. You probably won't save anything by buying a high-price used car rather than a low-price model—the big cars seem to wear out as fast as the smaller ones and they cost more to repair when they do.

- Even when new, the high-price cars

(Continued to page 300)

SMALL INVESTMENT PUTS YOU IN GOOD PAYING BUSINESS OF YOUR OWN

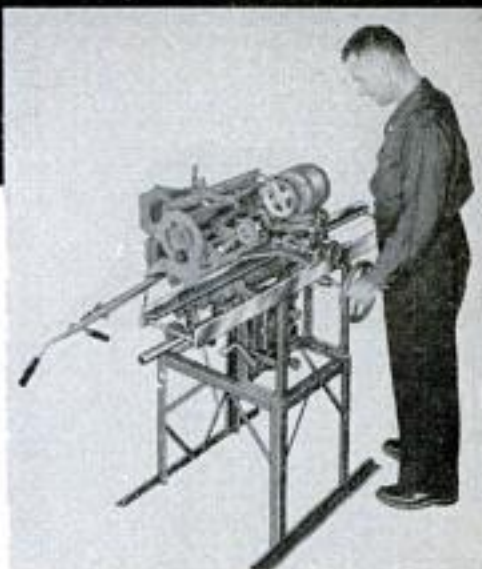
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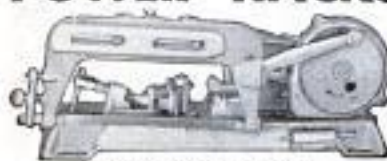
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cost more for repairs than the low and medium-price models. The average high-price-car owner spent \$81.16 for repairs during the first year. The medium-price-car owner spent only \$26.49; the low-price owner, a mere \$13.81. Of course, some of this spread may be due to the fact that high-price-car owners are more critical—and can afford to be. But even allowing for that factor, the figures seem to favor the cheaper cars.

• There doesn't seem to be any point in the annual-cost scale where it is "right" to trade. Apparently, the longer you own a car, the less it costs you per year—through the six-year period of our survey, at least. Repair costs did increase during the period, but not drastically. And the drop in annual depreciation more than offset the increase in repair bills.

• The make that gave the biggest bargain in costs, as reported by the owners, averaged 8.9 cents a mile. The most expensive make as far as costs are concerned averaged 21.3 cents a mile. So that's the spread you can figure your costs within if you drive between 5000 and 15,000 miles a year—from 8.9 cents to 21.3 cents a mile.

• Most owners are amazed to find out how much it does cost to own a car. Almost all stated that manufacturers should do something to reduce this cost.

They were asked to select the things they would be willing to give up in order to lower costs. These are what they would give up: Top speed (59 percent would get along with less if it would cut costs), annual style changes (56 percent would do without this), de luxe trim (52 percent), horsepower (48 percent), over-all size (35 percent), automatic transmission (33 percent), acceleration (19 percent) and interior space (a mere 7 percent would sacrifice roominess for lower costs).

• The most frequent single-cost complaint of the owners was insurance rates. Many of them asked why their rates keep going up when they, themselves, have never had an accident. Many suggest some sort of a refund of premiums to owners who drive all year without an accident.

Altogether the survey proved some interesting points about automobile costs. A careful study of the charts that illustrate this article will provide the reader with a clear picture of where a large chunk of his money goes each year. With more and more people buying new cars, with more families moving into the two-car category, with cars becoming larger and having more "extras," it is apparent that the public has decided that the cost is worth-while. It is up to each owner to decide for himself, of course.

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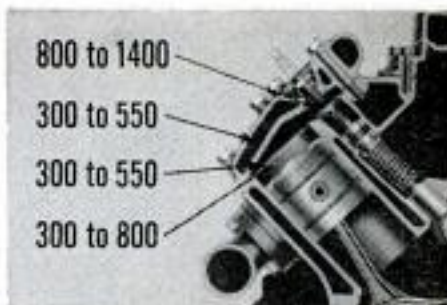
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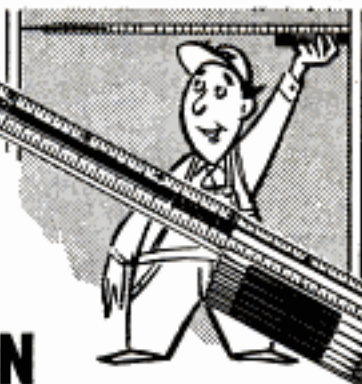
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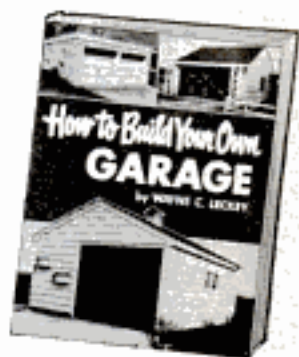
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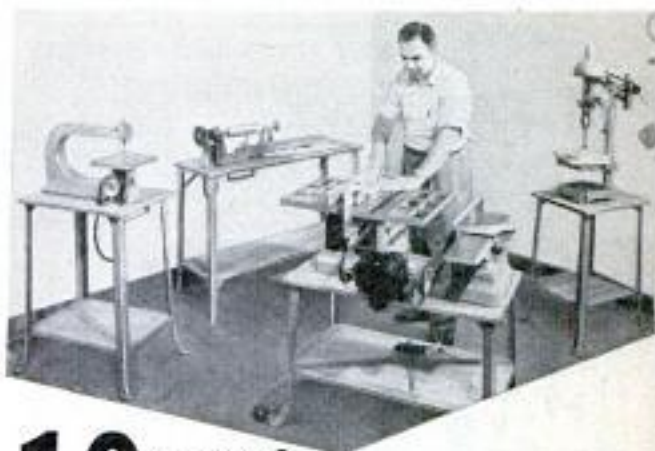
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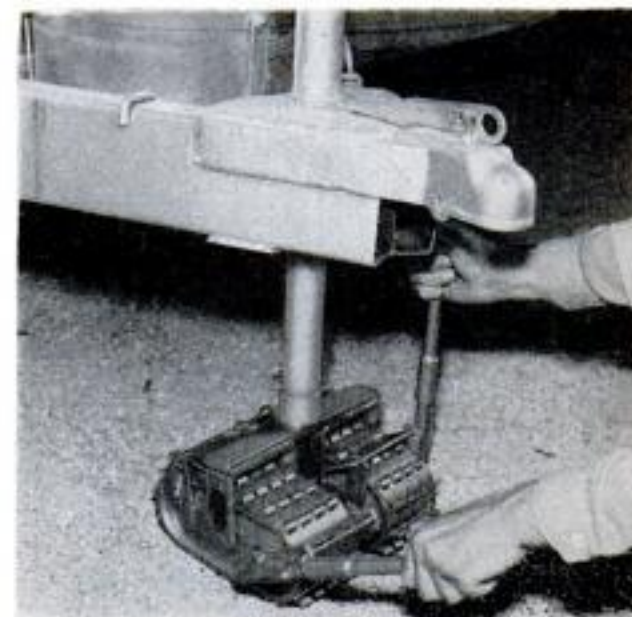
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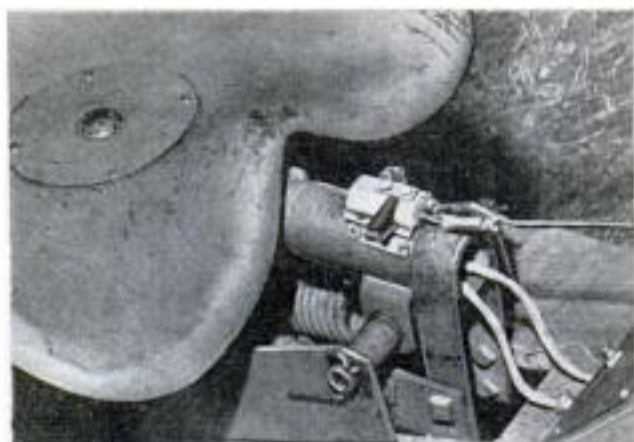
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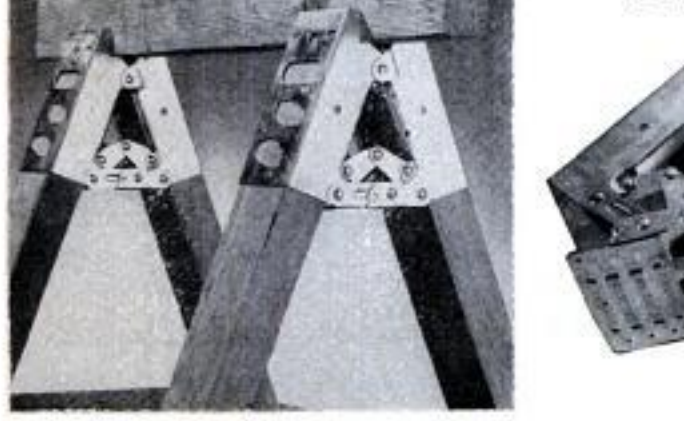
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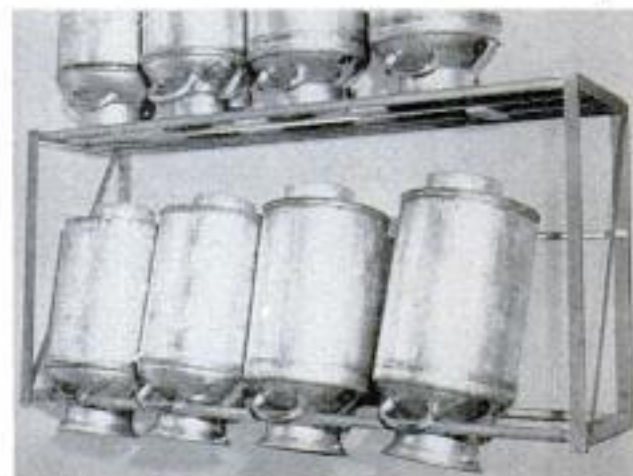
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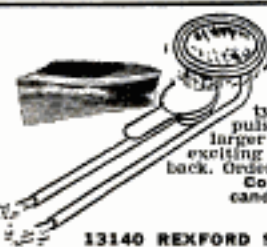
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 Plants, 10,000 w, 115/230 60-c. \$781
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 Plants, 7,500 w, 120-v, 60-c, 3 p. \$1091.50
 Generators AC and DC low as \$58.00

SPECIALS FROM PREVIOUS ADS

(See previous recent issues of this magazine for details.)
 Gar-Wood 12,000 lb. winch. \$169.50
 Selsyn Synchronous Motors (Gr.) \$12.97
 Portable Govt. Air Tank \$15.95
 Deluxe Army Tool Chest \$21.95
 Bomb Hot-1540 g. \$27.49
 Robot Control Cylinder \$23.89
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NEW U-238 geiger counter—world's smallest, most sensitive uranium locator. Ideal for prospecting even on hunting, fishing trips! (Full line of mineral and metal locators, too.)



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150 MILES PER GALLON!

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REMEMBER! — ONE COLD START CAN EQUAL 3 to 5 CAR-MILES. Starting your car on a cold morning can use as much gasoline as it takes to drive the average car owner to work. Here is a truly remarkable invention designed to stop this waste. Try it!

ELECTRONIC SPARK INTENSIFIER

Quickly fitted into the center hole of the distributor cap of any car, truck or tractor. Instructions included, never wears out. It pays for itself many times over in gas and battery savings. This amazing invention gives quicker starting, improves combustion, cuts wasteful misfiring. HERE'S HOW IT WORKS — Intensifier controls 25,000 volts or more for micro-seconds, "meters" built-up voltage charge at proper time for top efficiency. It also contains built-in point protector for plugs and ignition points. It also cuts down on car radio interference for reasons which have not been fully determined. Give it the A/C/D test, try it one of these cold mornings. If you can't feel the increase in power and starting pep, send it back for full refund. The Spark Intensifier is backed by our ironclad guarantee.



200 postpaid

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STOP BURNING OIL RESTORE COMPRESSION

Make a peppy youngster out of an old car with the recommended blue-seal TWO STEP treatment. HERE'S HOW you use our MOTOR RENEW KIT.

STEP NO. 2

Squeeze the self-depositing mineral compound into each piston (as directed). Fills in scores and worn areas of rings and walls, restoring compression and power. Pays for itself in a few days in reduced gas and oil usage.

Our guarantee also applies to MOTOR RENEW KIT. Return empty container for full refund if you are not satisfied with immediate results. \$6.95 postpaid complete. Sorry No C.O.D.'s

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Forms angles, locks pans, etc. New eccentric clamps. All steel construction. Size 15"-16 gauge steel.
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How good are the "miracle" oil filters?

by Fred Harris

"Is it possible that any Oil Filter—no matter how revolutionary in design—can actually make a car's engine last up to 150,000 miles before requiring an overhaul?"

"Is there really such a thing as an Oil Filter Cartridge that filters efficiently forever . . . that never needs replacement?"

If you're an average car owner and have seen the many recent ads on these new all-metal "miracle" filters, then you probably have asked yourself the above questions. You wonder, can anything be that good? Do Porous Bronze Filters really offer such remarkable advantages? If so, then which type should I buy?

Here Are The Facts

Make no mistake — Porous Bronze Oil Filters (every last one of them) *do* a remarkable job of filtration! Because of their porous (or sintered) bronze walls, they filter out incredibly small abrasives as well as acid-forming moisture, *without* soaking-out detergents. They make engines last thousands of miles longer . . . reduce repair costs. And save *even more* of your hard-earned cash because they *eliminate* costly cartridge replacements forever. Yes, *any* Porous Bronze Filter is going to save you a whale of a lot of money.

So maybe you'll agree you

ought to benefit from one of these "Miracle" Oil Filters. But, that puts you back right where you started. Which one should you get? Possibly I can help you make your decision.

Can It Be Transferred When You Trade-In Your Present Car?

There are more than 30 different type filter housings in the various-make cars. The cylindrical shaped bronze element fits all of them and can be transferred to your next car. What good is a "Lifetime" cartridge if it only fits your present car?

Does It Have a Double Acid Barrier?

All Bronze Filters strip out most acid-causing moisture. But is that enough? This same cylindrical shaped model has what is called a Free-Magnesium barrier which neutralizes remaining acids. This prevents acid-wear or "etching" of cylinder walls and bearings.

Does It Have Enough Filtering Area?

How About Wall Strength?

The cylindrical IMPROVED-LIFETIME brand averages 43% more area than other designs. This naturally provides greater filtering capacity and efficiency. According to an Independent Testing Laboratory, it is also 93% stronger. This is not just "talk"

. . . you can obtain a Notarized photo-copy FREE upon request.

Is It Easy to Install?

Does It Have a Critical Gasket Seal?

Because IMPROVED-LIFETIME is a complete, factory sealed unit (self-sealing on center-post) the right way is the *only* way to install it! Takes only 5 minutes. No gaskets to cause installation difficulties. An important point to consider.

Are Prices Honestly Stated?

You *can't* buy any "Full-Flow" Bronze Filter for \$6.95. If you drive any car with a "Full-Flow" oil system (as listed in the ad below), you have to pay more. IMPROVED-LIFETIME tells you, *before* you buy, exactly what cars use this system. This saves delay of reordering and possible unexpected "extra charges" later on. Read the ads *very carefully*, for your own protection!

Hope We've

"Helped Clear The Air"

Inasmuch as our Company was the originator of all "Lifetime" Bronze Oil Filters, we are vitally concerned with your knowing the facts. Read *all* the filter ads, then make up your own mind. After you've seen them all, we feel sure you will want to turn back to this page. Full details are given below on our 30-day trial offer. ★ ★

IMPROVED-LIFETIME

Trade-Mark

Not Just Claims... But Honest Facts:

1. First Cost = final cost. No more "Packs" to buy.
2. Transfer from one car to next; Fits them all.
3. Removes all grit; can't soak up detergents.
4. Complete with Acid Neutralizer added.
5. Greatest wall strength; most filtering area.
6. No "tricky" gasket seals. (Factory sealed.)
7. 5 minutes to install; Right way is only way.
8. Occasional kerosene rinse cleans like new.
9. Prices clearly stated for each make of car.
10. Originators of "Lifetime" Brand Oil Filters.
11. All models available for immediate delivery.
12. Double your money back guarantee.

Porous Bronze Oil Filter

ONLY \$2.00

With Order — Balance C.O.D.

HOW TO ORDER

"BY-PASS": For Most Cars.
"FULL-FLOW": For Buick V8;
Olds V8; Pontiac V8; '52-'55
Ford '6" & Linc; '54-'55
Ford V8 & Merc.; '46-'55
Chrysler.

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MILLIONS OF FUSED BRONZE SPHERES . . . filter out abrasive particles as small as 39 millionths of an inch!

MAIL THIS COUPON TODAY!

30 DAY FREE TRIAL! DOUBLE YOUR MONEY BACK GUARANTEE!
Try, Test IMPROVED-LIFETIME 30 days! If not 100% satisfied, return for full refund. This amazing filter is guaranteed for 10 years . . . far stronger than other designs or DOUBLE YOUR MONEY BACK!

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Now you can fill the booming demand with just 2 sizes for all cars & light trucks (Instead of 20 or 30). Write or wire today!



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5801 E. Beverly Blvd., Los Angeles 22, Calif.

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I enclose \$_____ in full payment. Ship prepaid.

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RUSH "Full-Flow" Filter Element at \$11.95

RUSH Complete Filter (Incl. Case) at \$12.95

I understand that if I am not completely satisfied I may return for full refund within 30 days.

CAR YEAR _____ MAKE _____ MODEL _____

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

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Original Gov. Cost

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DELIVERS up to 700 G.P.H.

For draining cellars, fish ponds, sumps, water circulators, etc. Powered by the famous G.E. 110 volt, 60 cycle motor. Has 1" standard pipe inlet, 3/4 inch I.D. hose outlet. A Gov't Surplus Bargain. Completely Reconditioned. Motor is rewound and checked for serviceability. Ready to run. Your satisfaction fully guaranteed. Order while stocks last.



HOIST 2875

WITHOUT MOUNT

Ideal for Garages, Machine Shops, Trucks, Boats, etc. Has a 2500 lb. lift capacity through a 24 to 1 gear ratio. A bronze worm gear drive. 18 ft. of high tensile, steel cable - 3/16" diameter. NEW!

WINCH HOIST - Same as above with a free-spool, pull-out clutch. **2975**

HOIST MOUNTING FRAME Specially designed for above winches. Allows easy universal mounting. Price of Frame Only **450**

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NEW LIFTS 1500 POUNDS Made for U.S. Navy Bureau of Ordnance as a Bomb Hoist. Has a 21 to 1 gear ratio, 40" tubular arm extension with a 3" pulley on the end. Drum has 12 ft. of 3/16", high tensile strength steel cable. The operating handle has a ratchet brake ideal for "swing about", truck or platform loading. **NOW 2250** A \$125.00 Surplus Value.

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A private phone or intercom system. Easy to operate. Ideal for use on farms, target range, mountains or forest or any place portable two-way communication is desired. Gives clear reception up to 15 miles. Uses two standard batteries. Set contains ringing generator, leather carrying case and one phone. Several of these phones may be used on one line. Reconditioned and checked out. Price per each phone - only **1495** Price for a system - two sets... **2950**

NEW HYDRAULIC CYLINDERS

Due to great customer demand we are now manufacturing a complete line of Hydraulic Cylinders. To fill all your requirements for size - bore - stroke and length. Most sizes in stock. All guaranteed to give up to 3000 PSI. Write for further info.

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Our Surplus stocks include over 100,000 Hydraulic Cylinders in 106 types & sizes. Adapt these wherever tremendous power is needed to push, pull, hoist, drive, etc. Also in stock - Hydraulic Pumps, Motors, Valves, Fittings, etc. See our catalog!

No. 29 Surplus SPECIAL. Gives 20,000 lbs. thrust using 1500 PSI line pressure as delivered from our hydraulic pumps. Will give up to 40,000 lbs. thrust with 3000 PSI pressure. Has 4" bore; 18" stroke; 30-1/2" long... **2995 USED 4395 NEW** also can be used on a low pressure air system.

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SAVE 50%

GENUINE SELECT
PHILIPPINE MAHOGANY
LUAN PLYWOOD

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This selected LUAN MAHOGANY meets rigid Gov't Specifications. It is WEATHER and WATER RESISTANT. You'll be amazed at the beauty of this fine wood. Its rich golden elegance will thrill you. Rotary cut for beauty and grain. Both sides sanded and ready to use. Bonded with finest resin adhesive. Face side unjointed. Ideal for paneling DENS, OFFICES, HOTELS, CABINETS, etc.

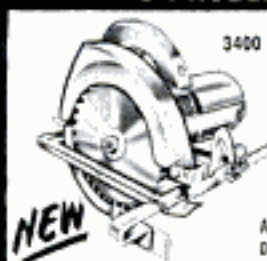
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18 sq. ft.
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4 ft. x 8 ft. x 1/4" 32 sq. ft.
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3400 RPM 1/2 HP POWER SAW

compares to saws selling up to \$250
Ideal for HOME or SHOP

1998

Complete with 5 1/2" Blade

CUTS THROUGH A 2 x 4 LIKE A KNIFE THROUGH BUTTER - RIPS - CROSSCUTS

A rugged, professional type, adjustable saw. Cut any angle, 0 to 45°. Has adjustable (0 to 8") rip fence. Safety-trigger switch on handle. Full 1/2 HP Universal AC DC, 110-120 Volt, 60 cycle motor. Weighs only 6 1/2 lbs. A sensational Value - We sold over 700 Saws in Los Angeles in one week

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Eliminates 12 Individual Items from your Pack or Tool Kit!
(A \$12.95 VALUE) **495**

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ORDER NOW While We Can Guarantee Delivery at this Special Low Price

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Has 12" steel head with Mattok on one side pick on the other. 1 1/2" hard-wood handle. Belt case. **129**

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Suitable for Artist, Architect, Draftsman, Student, etc. Has 9 separate pieces - one 7 1/2" divider, one each: 3/4" bow divider, bow pencil and bow pen with wheel adjustment and reversible needle point; one 4 1/2" ruling pen with extra handle; one capsule of leads. Complete in velvet lined, two flap case. **598**

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Originally used as standard navigational equipment on all Army Aircraft. A real War Surplus BARGAIN. Has a rotating verge range ring, calibrated in 1 degree increments from 0 to 360°. Two parallel grid wires for N-S alignment. Ideal for airplane, boat, etc. **1250**

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400 VALUE 189
DEPTH GAUGE
Depth Gauge & Protractor. Made of finest quality steel. Has double-face, 6" scale in 32's and 64's. Has thumb-screw lock on head. Increments and numbers are engraved. Made by Millers-Fells or Union.

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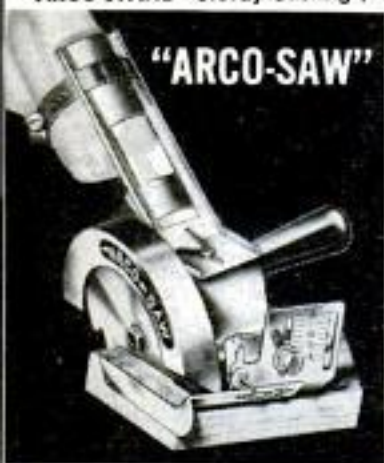
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These tools are used by mechanics, machinists, maintenance men, tool and gauge makers, and aircraft workers. Both with satin-finish light weight aluminum handle, knurled for easy holding. Made by leading industrial tool maker. Send stamps, money order or check. No C. O. D.'s please. Order today from:

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 Push Button Start 115-230 v. 60 cyc. A.C. A brute of a power plant with a rugged 14.6 hp. Wisconsin engine. Plenty of electricity for ranges, water heaters, freezers, pumps, machinery, etc. Affords both 110 and 220 volts. Ideal where heavy current is needed. Wt. 590 lbs. Easily worth \$895. With crank start. **Factory price \$585.50**
 Same plant, but with self-starter, Generator and control box only, best driven. Use your own engine or tractor. Wt. 240 lbs. (Item 163) **Factory price \$345.00**

Variable Speed Selector

Heavy duty, made by **B. F. GOODRICH** for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists—any operation requiring variable speed. Employs reliable "trouble free" planetary system. No hydraulic power losses. Infinite range, smooth operation, easy installation. 3 sizes: 1 1/2 hp. 30 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs.; Reg. list \$328, \$252 and \$332. Our price... **\$79.50, \$89.50 and \$114.50**

9 TON HYDRAULIC PRESS

A tremendously powerful hydraulic press, capable of exerting 18,000 lbs. pressure. Pays for itself many times over—straightening bent connecting rods, king pins, crankshafts, axles, link pins and bars—or pushing out frozen bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauge. Complete with both large and small anvils and jigs to straighten any kind of curve or bend. (Item 464) Wt. 110 lb. Actual list price \$365. Our special close-out price... **\$69.50**

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MASTER DC ARC WELDERS
 Now! a portable, rugged, industrial type welder with terrific performance, yet at a price hundreds of dollars less than you'd expect. Senior model made for years of trouble-free, continuous service. High capacity DC welding unit enables you to tackle any job with confidence—easily welds anything up to 2" plate using from 1/16" to 1/4" rods. Built-in stabilizer and cooling system makes easy to strike and hold. Dual control rheostat provides low heat soldering, brazing and welding from 30 to 300 amps. Complete with instructions, guarantee and triple V-belt or flat pulley. You can pay more, but you can't buy a better welder.
WELDER ONLY—DUAL CONTROL MODEL. Same as above, but drive with your tractor, jeep or gas engine of 14 HP or more. (Item 280) **\$119.50**
WELDER ONLY—STANDARD MODEL. Same as above but with single rheostat for heavy metal welding only. (Item 38.) **\$99.75**
COMPLETE POWER MASTER (Illustrated above) powered by a 14-hp. air cooled Wisconsin engine. Wt. 480 lbs. (Item 280) Complete with welder costing \$1200. **Factory Special... \$449.50**
WELDING KIT Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at... **\$10.50**

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600-700 WATTS PUSH BUTTON START
 115 v. 60 cyc. AC. Powered by a rugged 2 HP Briggs engine. No wiring necessary! Just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24.) Wt. 75 lbs. Easily fits in car trunk. Prepared if storm knocks out power lines. Reg. \$275 value... **\$143.50**
1000-1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine... **\$199.50**
LITTLE GIANT—350 WATT (Item 273) 115 v. DC 1 1/2 hp. Briggs engine. Perfect for lights, radios, chain saws and power tools. Wt. 65 lbs... **\$99.75**

PORTO-POWER 1500-1750 Watt Plant
 115/120 v. 60 cyc. AC. Push button start. Powered by a 4.5 HP Briggs engine. Combines compactness and easy portability with higher output for handling heavier starting loads. Ideal for operating all burners, sump pumps, freezers, television, lights, communication systems, etc. Perfect for contractor's power tools. (Item 20.) Wt. 146 lbs. **Factory Special Price \$279.50**

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 Dual Voltage 110/220 available for above plant for \$30.00 additional.
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 We make fully automatic controls to operate any of the above light plants. Write for details. **We make all sizes up to 25,000 Watts.**

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 Heavy duty and very flexible. Neoprene 14-2 cable. 20 year quality. Wt. 12 lbs. (Item 185) 100 ft. Complete with rubber plug and outlet. A terrific value at only **\$8.95**
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 Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. old implements and road machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—milk equipment, etc. Fully automatic—oil fired with new, built-in lifetime bronze water circulating pump. Draws water from faucet or bucket. Simple and safe—anyone can use it! built-in safety valve. Complete with 12 ft. of hi-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463. **\$329.50**
 Special factory price.

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 Same plant with electric self starter (Item 31a)... **\$359.50**
Generator only and control box... \$169.50
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3000-3500 WATT PLANT (Item 198) 110-220 v. 60 cyc. AC. Best Drive. Wis. engine Push Button Start. Wt. 370 lbs. **\$439.50**
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THERMOSTATS: BARN type (range 40°-60°). Wt. 2 lbs. **\$6.95.**

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 Completely self-priming! No foot valve required. Tremendous capacity—100 gal. per min. . . . Special impeller enables pump to handle muddy or sandy water. Simple to operate—simply start engine and watch the water go. Powered by a rugged, easy-starting 2 HP Briggs engine. Pre-lubricated sealed bearings for years of heavy-duty service. Big 1 1/2" model. Item 207. Wt. 70 lbs. **\$134.50**
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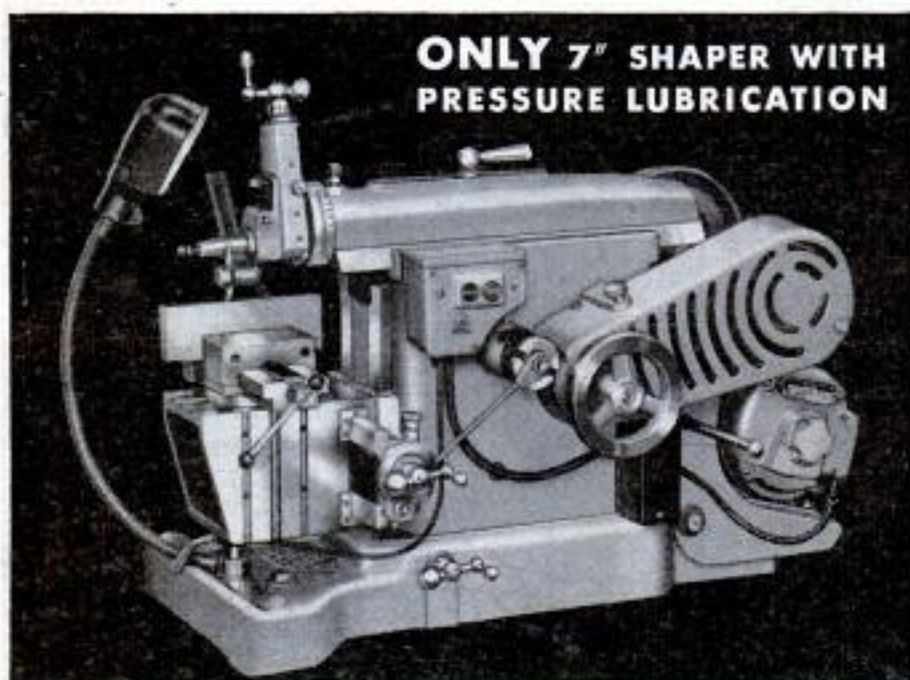
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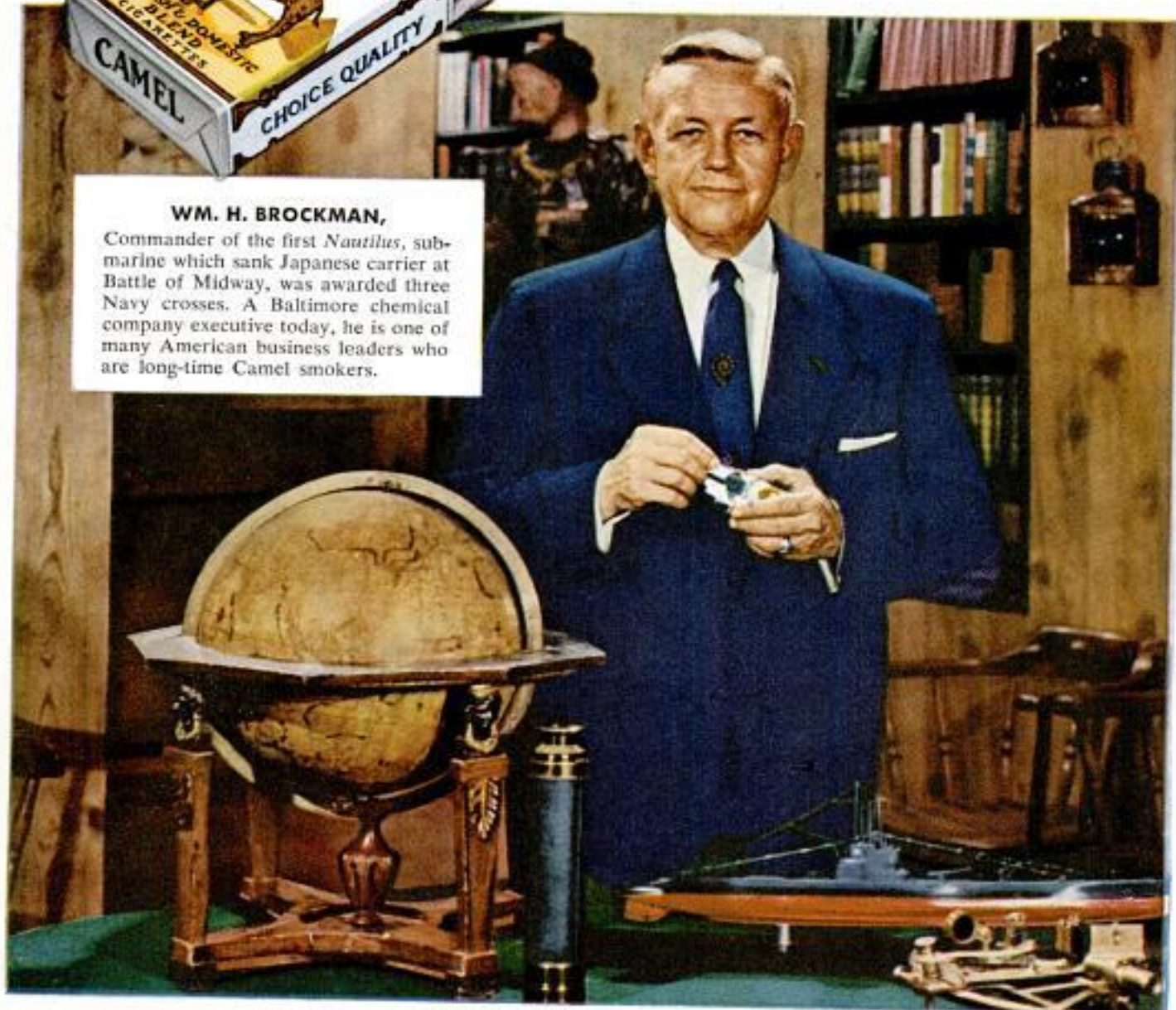


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R. J. Reynolds Tobacco Co., Winston-Salem, N. C.

Unanimously, long-time Camel smokers confirm this fact: no other cigarette is so agreeably mild, yet so rich in flavor!

The secret is in Camel's blend of costly tobaccos, never matched by *any* other brand.

**Make your own 30-day
Camel Mildness Test**

Smoke only Camels for 30 days. See for yourself why Camels' cool mildness and richer flavor agree with more people than any other cigarette!