

ANC



POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND

REG. U.S. PAT. OFF.



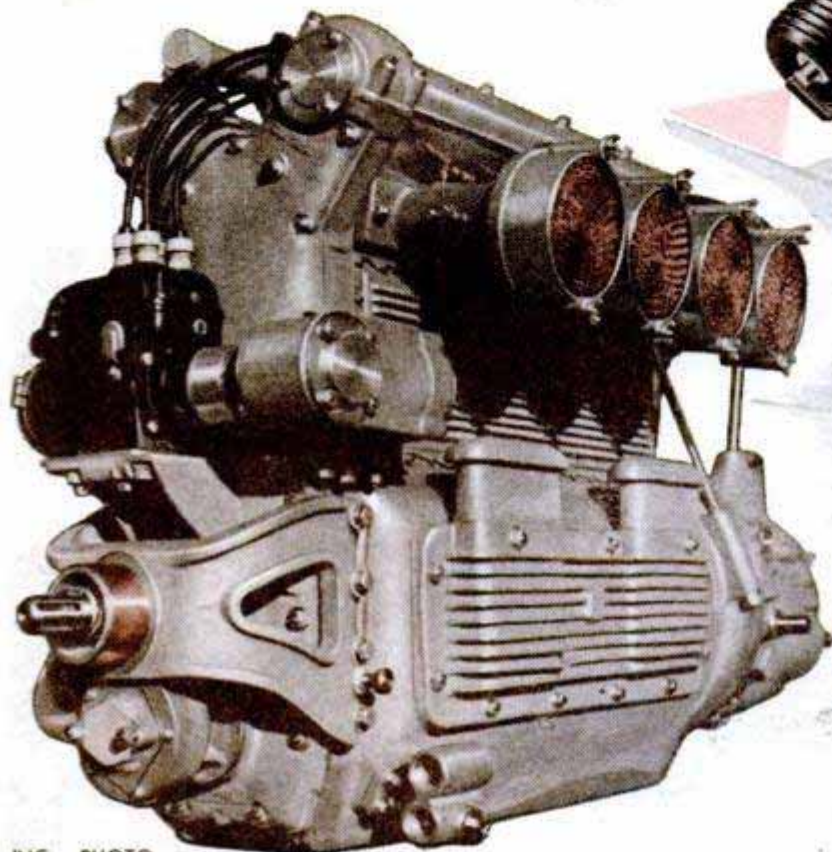
*Ski Wing—
page 155*

WANTED: 50,000 ENGINEERS—page 133

Build Glamour Into Your Basement Playroom—page 165

RACING'S TOP POWER PLANT!

THE 270 OFFENHAUSER



TREND, INC.—PHOTO

*"I build racing's top engine. Here's why I recommend
Champion spark plugs for your car." Louis Meyer*



Louis Meyer, three-time winner of the Indianapolis 500, three-time national AAA racing champion, today builds America's foremost racing engine—the Offenhauser, product of the Meyer-Drake Engineering Company. Its success in competition is without parallel in automobile racing.

Says Meyer, "We specify Champion Spark Plugs as standard equipment for the Offenhauser because we've never found any spark plug that can equal Champion in that extra notch of power and speed and extra dependability which you must have for

championship performance. Speaking from broad experience in this field, we know that all Champion Spark Plugs are built to *one, single* exacting standard—the best that top research, engineering and manufacturing can produce.

"Therefore, I say to every motorist, 'If you value the very best performance of which your car is capable, you'd better specify Champions for your car. In my book they're tops for every engine, and the record books prove it.'"

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

FOLLOW THE EXPERTS

Demand

CHAMPIONS

FOR YOUR CAR!

YOU CAN INSTALL IT YOURSELF

"World's Most Beautiful Flooring"



Beautiful in den or living room. Never slippery, cleans with a damp mop—and it never needs waxing.



Perfect for the kitchen. Not affected by water, will not rot or mildew, ideal for counter tops and wainscoting — and it never needs waxing.



Practical for children's rooms or play rooms. Resists scuffing —recovers quickly from denting—and it never needs waxing.

Send for free—"How To Install" booklet — Goodyear Flooring Dept., Akron 16, Ohio

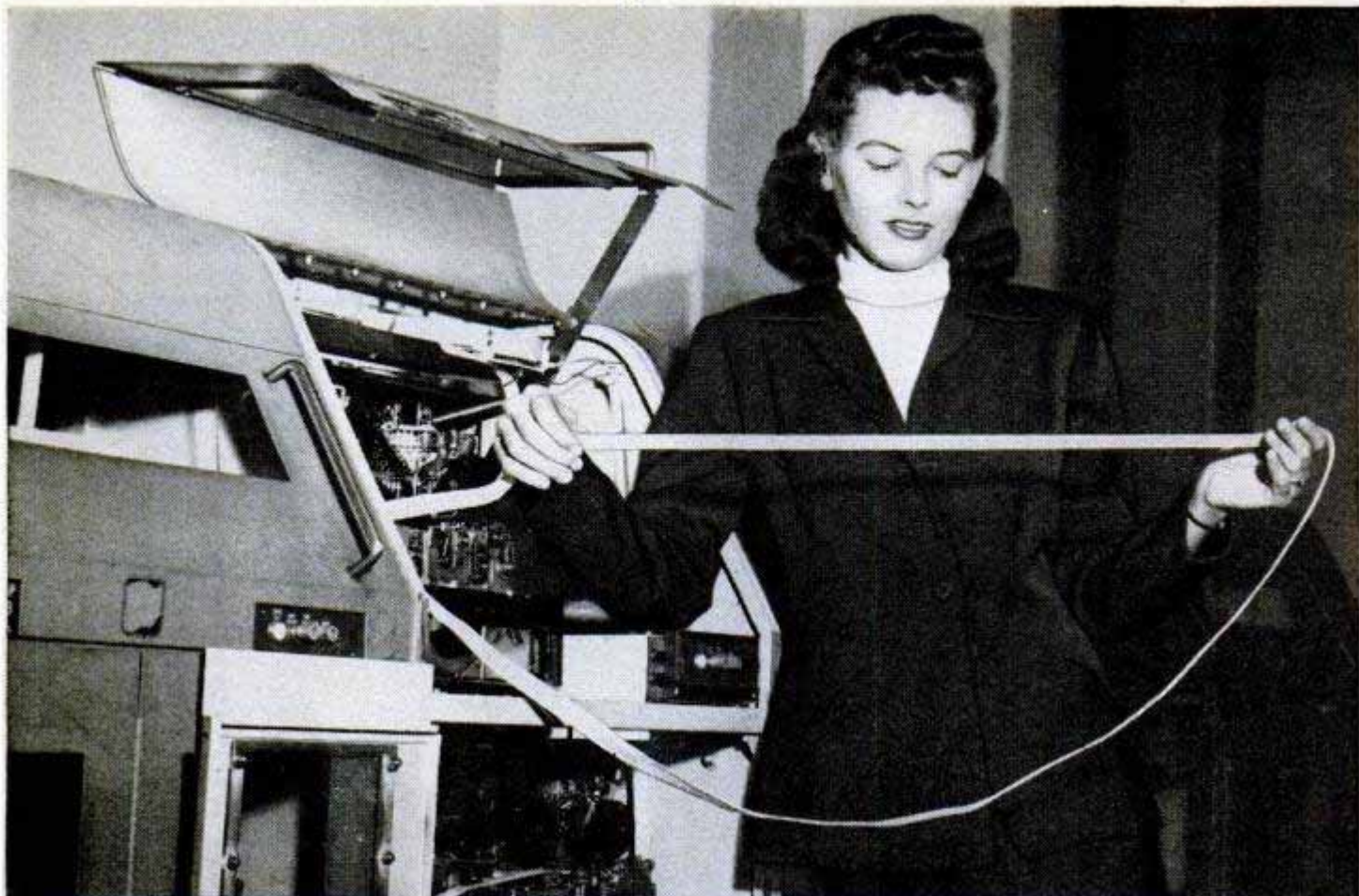
**PRE-POLISHED
VINYL-TILE
NEVER NEEDS WAXING**

Amateurs can install Vinyl-Tile and get a neat, professional-looking job. Handy kit is available, along with full illustrative instructions.

Pre-polished Vinyl-Tile is the All-Vinyl flooring decorators have proclaimed "The World's Most Beautiful Flooring." You can depend on it for years and years of long wear and lasting beauty.

Vinyl-Tile comes to you in 12 marbled colors and 12 solid colors — colors that add warmth and beauty to any room. Economical, too. Available at better flooring dealers and department stores everywhere.

Vinyl-Tile BY
GOODYEAR
Makers of Wingfoot Rubber Flooring



These signals find the way



SENDING

When you dial a telephone number, high-speed switching mechanisms select your party and connect you. Through a new development of Bell Telephone Laboratories, similar mechanisms do a similar job in private wire teletypewriter systems which America's businesses lease from the telephone company.

Company X, for example, operates an air transportation business with offices all over America. At one office, an operator wishes to send a message, let us say, to Kansas City. Ahead of the message, she types the code letters "KC". The letters become electric signals which guide the message to its destination.

Any or all stations in a network, or any combination of stations, can be selected. Switching centers may handle 50 or more messages a minute... some users send 30,000 messages a day. Delivery time is a few minutes.

Defense manufacturers, automobile makers, airlines and many other American businesses are benefiting by the speed and accuracy of the new equipment—another example of how techniques developed by the Laboratories for telephone use contribute to other Bell System services as well.



RECEIVING



BELL TELEPHONE LABORATORIES

Improving telephone service for America provides careers for creative men in scientific and technical fields.

Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

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



this month's cover

SAILING high, wide and handsome across our cover is a skier equipped with a new sail that permits effortless gliding above the ground. The sail-rigged skier can make leaps as long as 50 feet on slight inclines. You'll find more information on this high-flying subject on page 155 so we'd like to pay our compliments here to the artist, Robert Korta, the 32-year-old Chicagoan who painted the cover. Bob's apprenticeship in the field of commercial art consisted of running errands for a studio. Now he's become one of the most accomplished young artists in the field. Career girls in our own office went into raptures over the face of that skier on the cover. When asked who served as a model, Bob diffidently mumbled that he had no model—he used a mirror. Three of Bob's paintings recently were selected for exhibit at the Annual Exhibition of the Art Directors Club of Chicago—a high honor for a former errand boy

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Other items, and manufacturers of available products described, are listed on pages 12, 14 and 16

"OWN a Business" Coupon

DURACLEAN CO., 3-161 Duraclean Bldg., Deerfield, Illinois

Without obligation to me, send booklet and letter giving full details. Tell me how I may OWN a growing business of my own built upon satisfied customers.

Name _____

Address _____

City _____ State _____



Are You The Man?

If you are dependable, honest and willing to work to own a large-profit, lifetime business and become financially independent, we invite you to mail the above coupon for full details. We are now enlarging this 23-year-old, world-wide chain of **individually-owned** service businesses. We'll establish you in YOUR OWN business and help

finance you. You use successful methods of established Duraclean dealers. This is a nationally advertised, lifetime business. You can average \$5.00 hourly gross profit on service you render and \$3.00 on **EACH** of your servicemen at National Price Guide charges. **Easy to learn . . . quickly established.**

Revive, Clean and Protect Rugs and Upholstery!

The remarkable Duraclean Service (illustrated below) restores the natural fibre lubrication of wool and other animal fibers. Resiliency returns to the pile. It rises again. Brilliant colors revive. Results in many instances are almost unbelievable.

Duraclean Service banishes the need of cleaning upholstery, rugs and carpeting by harsh machine scrubbing and soaking. It eliminates harmful solvents and strong soaps.

The aerated foam, created by the **patented** electric Foamovator, cleans by **ABSORPTION**—not by scrubbing. Dirt, grease and many unsightly spots vanish like magic. Furnishings become clean, fresh, enlivened.

Forefall Damage by Moths & Carpet Beetles

The Duraproof Service (illustrated above) not only kills moths and carpet-beetles but is also **WARRANTED** to make fabrics **repellent** to both. The U. S. Government says, "**Moths are present in practically every household. . . . No section of the country seems free from such infestations.**" Damage to household goods and wearing apparel is greater from moths than from fire. This modern treatment **DEFINITELY PROTECTS** rugs, carpets, upholstery, furs, clothing, blankets, piano-felts, auto interiors, etc.

What Dealers Say

W. Lookiebill: "We've had 20 years of pleasant dealings. I'm 65 but am setting my sights for 20 more years."

G. Merriman: "This made me \$700 cleaning with only 13 working days."

P. Freidinger: "We had a big moth-proof business last year; one job alone was \$322.25."

Margaret Turner: "Took in \$106 and worked 15 or 18 hours."

R. Kimbrough: "Finished First White House of Confederacy and am to Duraclean the Governor's Mansion."

Q. Corbett (Canada): "Several hundred dollars in jobs lined up from canvassing."

H. Satterfield: Duracleaned chair for largest department store and got order for 60-75 chairs, couches & davenports."

E. Schenk: "The customers I had on **House and Garden** ads were very pleased. Their furnishings came out beautiful."

A. Ullman: "It is very encouraging that every demonstration has been a sale."

L. Johnson: "Each customer leads to 3 or 4 more."

No Shop Needed—EASY to Learn

No overhead expense. Service may be rendered in homes, offices, hotels, theaters, institutions, etc., by your servicemen. Auto dealers have upholstery revived in used cars. Some Duracleaners establish shops or an office—others operate from their homes.

Start Part or Full Time

No experience needed. We show you 27 ways to get customers. Almost every building houses a potential customer. A waiting market is in small and large towns alike. These year-round services are in constant need.

Nationally Advertised

Your services are advertised in magazines such as Life, McCall's, House & Garden, Ladies Home Journal, Better Homes & Gardens, etc. See the column ad in House Beautiful this month. These ads give your services national prestige.

Easy Terms!

A moderate payment establishes your own business—pay balance from profits. We furnish electric machines, folders, store-cards, introduction slips, sales book, demonstrators and enough materials to return your **TOTAL** investment. You can have your business operating in a **very few days.** Mail above coupon. No obligation.

Repeat & Voluntary Orders

Demonstrations win customers. Duracleaners find **REPEAT** and **VOLUNTARY** orders a main income. Customers, enthused at results, tell friends and neighbors. Your service is recommended nationally by America's foremost furniture and department stores.

Double Profits

You enjoy large profits on both materials and labor. To start, you may want to render service yourself. You have co-operation of a world-wide organization interested in YOUR success.

FREE Booklet

Our first letter and 16 page illustrated booklet will explain everything—these modern urgently needed services, the waiting market, how business grows, your large profits, easy terms and protected territory. Mail the coupon **TODAY.** No obligation.

OWN
a Growing
BUSINESS



Patented Machine converts to carrying case

World-wide Services

DURACLEAN CO., 3-161 Duraclean Bldg., Deerfield, Ill.

Mail Coupon TODAY—While Territory Is Open

HOW TO MAKE YOUR OWN

3 DIMENSION COLOR PICTURES



AT LESS THAN SNAPSHOT COST!

Three dimension photography is different because it affords an opportunity for depth planning. Subjects appear to "come to life" in stereo pictures.



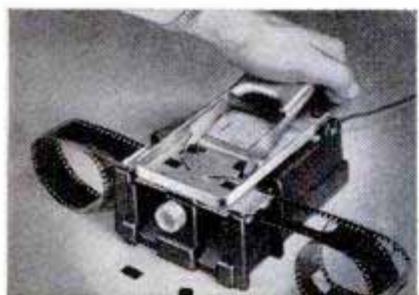
STEP NO. 1

All you need to know is sky condition and subject color. The patented View-Master Expo-Sure guide makes all other adjustments. No focusing necessary. Have film processed in the usual manner.



STEP NO. 2

Semi-automatic View-Master film cutter works quickly and easily. Film is registered perfectly to produce stereo pairs accurately die-cut to 1/1000 of an inch. You get 37 pairs on a 20-exposure film; 69 on a 36-exposure roll.



STEP NO. 3

Die-cut film slips into die-formed pockets. Photographically exposed marks on right and left pictures, which correspond with similar marks on film pockets, positively identify pictures and facilitate mounting.



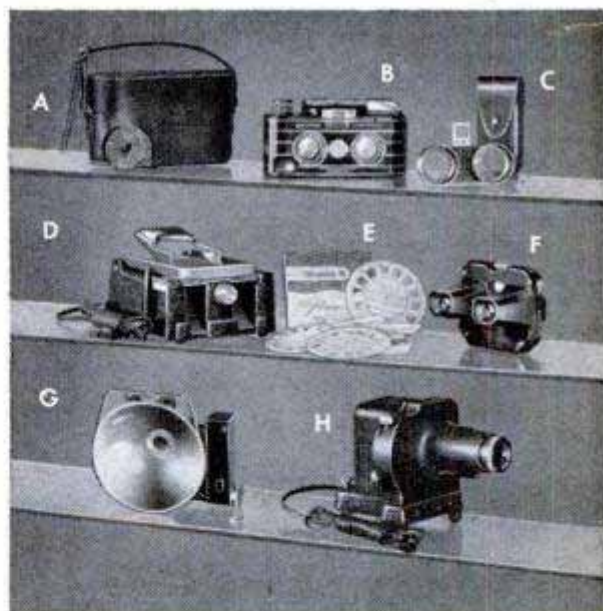
STEP NO. 4

The completed picture is viewed in three dimensions with a View-Master Stereoscope or in two dimensions with a View-Master Projector. An additional advantage is the huge View-Master library of scenic Reels with which to supplement your personal library.



Now, with the new View-Master Personal Stereo Camera, you can take brilliant, full color stereo pictures in thrilling "come to life" realism, for less than the cost of ordinary black and white snapshots. Persons with little or no photographic experience find it easy and fun to make breath-taking three dimension pictures of family scenes, children, friends, vacation travels. The illustrations show the simple steps of View-Master stereo picture-making. Adjust the camera and snap the picture. Have the color film processed. Use the View-Master film cutter to quickly and accurately die-cut stereo pairs. Then insert stereo pairs into blank Personal Reel for exciting viewing.

Integrated Units of the View-Master Stereo System



(A) Carrying Case (B) View-Master Personal Stereo Camera (C) Close-up attachment (D) Film Cutter (E) Personal Reels (F) View-Master Stereoscope (G) Flash attachment (H) View-Master S-1 Projector.

© Sawyer's Inc., Portland 7, Ore.

VIEW-MASTER

STEREOSCOPIC PRODUCTS ARE
AVAILABLE AT YOUR PHOTO DEALER

BE SAFE

add PYROIL to your winter oil

NOW!

● You need Pyroil more than ever when you change to winter oil. Low viscosity oil quickly drains off cylinder walls and piston rings, exposing them to excessive corrosion, caused by dampness and cold. Not so, if you use Pyroil. Pyroil causes oil—any oil—to adhere to all exposed motor surfaces. Perfect insulation against the ravages of winter driving!

Yes, you need winter oil for "easy starts"—but you need Pyroil for the extra protection, improved lubrication, reduced maintenance cost—and more comfortable driving.

Be sure your gas station attendant adds Pyroil and you will add trouble-free miles of winter driving to your car.

Pyroil for Aircraft Engines

Use Aircraft Pyroil B for lubricating oil, Aircraft Pyroil A for gasoline.

GIVEN! An attractive Pyroil metal savings bank—takes coins up to 50¢ pieces. **MOTORISTS**, it's yours for the asking—sent postage paid.

Manufactured and Guaranteed by Pyroil Company, 184 Pyroil Bldg., La Crosse, Wisconsin

Canadian Distributors: Central Purchasing Agencies, Ltd., Toronto, Ontario



PYROIL COMPANY
184 Pyroil Bldg., La Crosse, Wisconsin

I want my car to last and run properly. Please tell me more about Pyroil and how it can accomplish this for me.

Name _____

Address _____

City or Town _____ State _____



in this corner.....

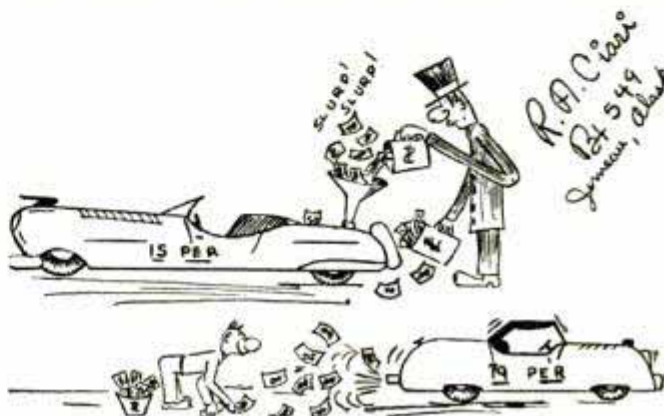
THE EDITORS



Letter to the Editor:

In regard to your article on the '52 Lincoln in this month's (Oct.) issue of your fine magazine, 'twas noted . . . a gentleman from St. Louis said "the difference between 15 m.p.g. and 19 m.p.g. amounts to only a few bucks by the end of the year." Now this may be true depending on what people consider a "few bucks."

Referring to my slide rule, comes out the figures of sumpin like a difference of about



65 bucks each year, depending on the amount of mileage at the end of the year. For instance, take an auto making 19 m.p.g.; it will burn up about 789 gallons in 15,000 miles while at 15 m.p.g. it will burn up about 1000. Figuring at 30 cents a gallon, it would be \$300 for the 15 m.p.g. and about \$235 for the 19 m.p.g., on the basis of both being driven 15,000 miles a year which, I believe, is pretty near average. Like I say, this may just be a few bucks to some, but to some of us peasants—well!!

R. A. Ciari,
Juneau, Alaska.

Letters to the Editor:

Just a line from an habitual reader of *Popular Mechanics*. A most enjoyable habit it is, too.

On page 164 of the October issue, the mysterious shotgun seems to be a "Hagen" tear-gas gun, or a copy of it. I wouldn't know how it got to Germany, but I sell 'em in Houston.

P. E. Preston,
Houston 22, Tex.

* * *

The gun in question is the type used by German farmers and foresters to kill wild pigs that destroy crops and gardens. They

(Continued to page 8)

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

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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.

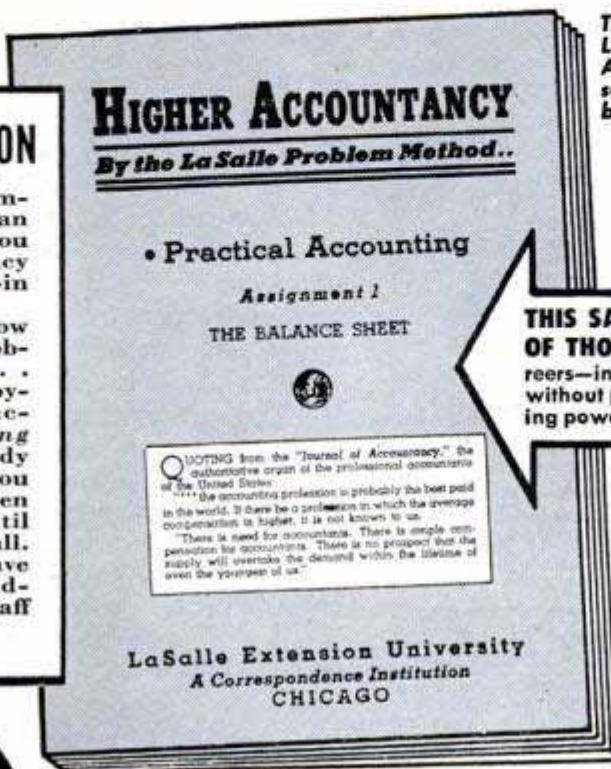
**Nearly 10%
of all C.P.A.'s
in the U.S. have
been trained by the
LaSalle Problem
Method**

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!

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LaSalle Extension University... A Correspondence Institution
Dept. 164 H, 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.....
Street Address.....
City, Zone & State.....
Present Position.....

This One

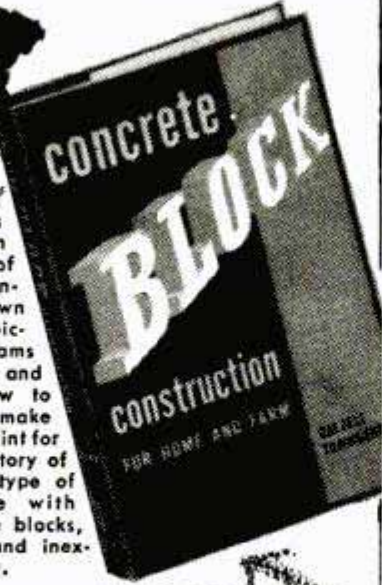


BYE8-RBT-OWJN

NOW YOU CAN BUILD IT WITH CONCRETE BLOCKS



This practical guide shows every step from how-to-plan to how-to-build with one of the most abundant and economical building materials known to man. Over a hundred pictures and cut-away diagrams show exactly what to do and what not to do. Tells how to plan, place corner block, make foundations easily, how to paint for special purposes. A picture story of everything in building any type of structure with concrete blocks, easily and inexpensively.



Here's how to apply mortar

Here's how little this book costs you . . . or if you don't keep it after 10 days trial, return it and you owe nothing. **\$2.75**

CARPENTRY FOR EVERYONE



A clear explanation of modern carpentry construction including framing, roof constructions, general carpentry work, exterior and interior finish of buildings, building forms and working drawings, and farm buildings. Covers everything you need to know about lumber, tools, joints and splices, floors, stairs, partitions, rafters, etc. Gives short cuts and tricks used by the master carpenter. Easy to understand. 504 pages, 580 illustrations. **\$2.50.** Use 10 day no-cost trial coupon below.

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How to Design and Install Plumbing—Hundreds of how-to-do-it pictures, full-sized blueprints for most every plumbing job. 349 illustrations, 422 pages. **\$3.95**

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Mail this coupon today—10 days trial at no cost to you
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 848 East 58th Street, Chicago 37, Illinois

Please rush me the following books I'm checking below to examine at home. If I'm not convinced these books will help me save thousands of dollars by doing my own building and planning, I may return the books and owe nothing.

Examine	<input type="checkbox"/>	CONCRETE BLOCK CONSTRUCTION FOR HOME AND FARM.....	\$2.75
at home	<input type="checkbox"/>	CARPENTRY.....	\$2.50
or no	<input type="checkbox"/>	BRICKLAYING...Skill and Practice...	\$3.00
cost.	<input type="checkbox"/>	HOW TO DESIGN AND INSTALL PLUMBING.....	\$3.95
	<input type="checkbox"/>	ELECTRIC WIRING—Residential and Farm.....	\$3.95
	<input type="checkbox"/>	How to Insulate Home & Farm Bldgs...	\$3.00
	<input type="checkbox"/>	Steel Square.....	\$2.25

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Ten day no-cost-trial. If I keep books, will remit by check or money order.
 Send C.O.D. Same return privilege—money refunded.
 I'm enclosing \$_____ now to save postage—same return privilege—money refunded.

(Continued from page 6)

are attached either to a tree or a stable support of sorts and are fired when the game trips a trigger wire.

M/Sgt. Fred E. Lepo, Jr.,
 85th Fighter-Interceptor Sqdn.,
 Scott Air Force Base, Ill.

Letter to the Editor:

Enclosed is a personal check for eight dollars for which I would like you to send a two years' subscription of *Popular Mechanics* to Mr. Antoine Jung, 78/a Grey Avenue, Vereeniging, South Africa.

Mr. Jung was a former subscriber of yours when he lived in Cyprus, but on occasions failed to get his issue. When this happened he'd ask me to buy it for him in Beirut, Lebanon, since I was flying over there often. Now that both he and I have left Cyprus I'd like to see that he gets the *Popular Mechanics* regularly. Mr. Jung has probably utilized your magazine to obtain ideas for more varied fields than any other reader. He is an accomplished musician, playing and repairing most every instrument; he is a well-qualified engine mechanic; a sculptor; a painter; a writer of fiction and technical books (in Hungarian); he molds and carves plastics (for which he designed and built his own tools—drills, lathe, saw, etc.). The man is as close to being a genius as I can imagine.

Mr. Jung is a middle-aged Hungarian who moved to Cyprus a few years before the war; was interned in West Africa during the war; returned to Cyprus; and recently immigrated to South Africa where he will again "start from scratch."

When he left, I asked if there was anything I could send him from the States—his only answer was "*Popular Mechanics*."

That, gentlemen, is a tribute.

W. G. Ghormley,
 Westover AFB, Mass.

This Bright-Green Chlorophyll World

We asked our Eastern Editor to bird-dog the chlorophyll business. Here is his report:
 Dear Boss:

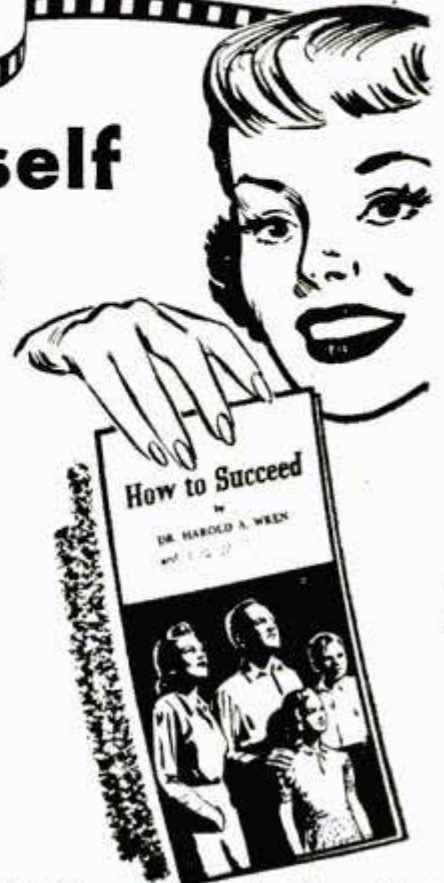
When you told me that dogs who eat chlorophyll-treated food are supposed to lose their doggy smell, I decided to investigate this new bonanza of green gold our chemists have struck. I want to report that, if the discoverers of this fabulous deodorizer have their way, we soon may be living in a world devoid of every unpleasant whiff.

Already, manufacturers are chlorophylling more than 100 products, to make people, animals and things smell like fresh air. One manufacturer recently marketed

(Continued to page 10)



Picture yourself going places



You've done it often. Call it day-dreaming if you like, but you've seen yourself in a bigger job — giving orders and making decisions — driving off in a smart new car — buying your family a fine home.

There's nothing wrong with dreams. But how about making them come true? *You can do it*, if you're willing to try!

Look around you. The men who are going places are the *trained* men. They've learned

special skills that bring them better jobs and higher pay. It's the men *without* training whose dreams never come true.

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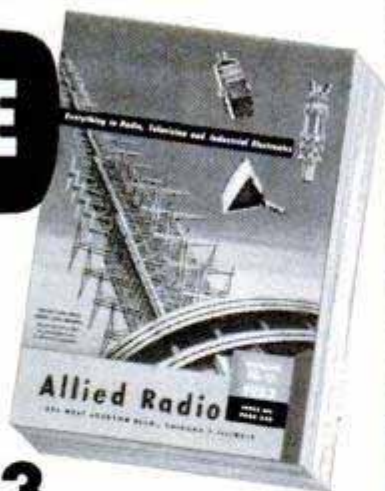
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(Continued from page 8)

chlorophyll-impregnated socks for men. There's a new shoe lining with green stuff in it. There's chlorophyll in a new brand of pipe tobacco, to keep your pipe fresh as an alfalfa leaf, the makers claim. There's a cigarette, too, that's supposed to exude odorless smoke that won't make the draperies smelly. They've chlorophylled mothballs so your winter clothes won't make your eyes water when you take the clothes out of storage in the fall. There's a chlorophyll bubble bath for the ladies. Shampoo, foot powder, talcum powder, soap, skin lotion, air purifiers, candles, cleansing cream—all come loaded with the green stuff that's supposed to chase odors. Just about everything for the bathroom from cologne to toilet tissue—and even the roller it goes on—is impregnated with the substance. And one adventurous company has just marketed chlorophylled baby diapers. Besides these there are droves of products everyone knows about—odor-chasing tablets, chewing gum, toothpaste, mouthwash and green stick deodorants.

This deluge of green extract from alfalfa leaves is just one more answer to the pessimists who claim everything has been invented and you can't make a million dollars anymore. Economists estimate that \$50,000,000 to \$120,000,000 worth of chlorophyll products will be sold this year.

Chlorophyll is the stuff that makes plants green. An Englishman named Priestley, who discovered oxygen, examined it in the 1800s, and learned that it played a part in photosynthesis—the process by which plants turn sunlight to their own use. No one paid much attention. Then, about 1930, Dr. Benjamin Gruskin at Temple University pulled chlorophyll apart in the lab and worked it over for 10 years. By removing cellulose and other products, he found the material could be produced in water-soluble form. In a paper published in 1940 he told how the amazing substance did something to burns, open sores and wounds, helped to heal them and, incidentally, robbed them of their odor. He used it in hundreds of cases ranging from trench mouth to brain abscesses with remarkable success—but the emphasis was on curing.

About this time, O'Neill Ryan, an advertising man looking for a new drug to market, heard of Gruskin's discovery, bought out his patent and started work on a healing ointment. Others were working on a chlorophyll preparation for treating anemia. Although it didn't work, the scientists were struck by the deodorizing effect produced on animals and people to whom the preparation was administered.

(Continued to page 30)

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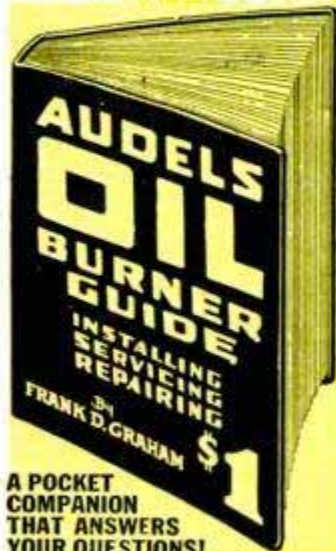
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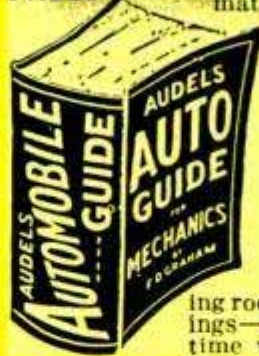
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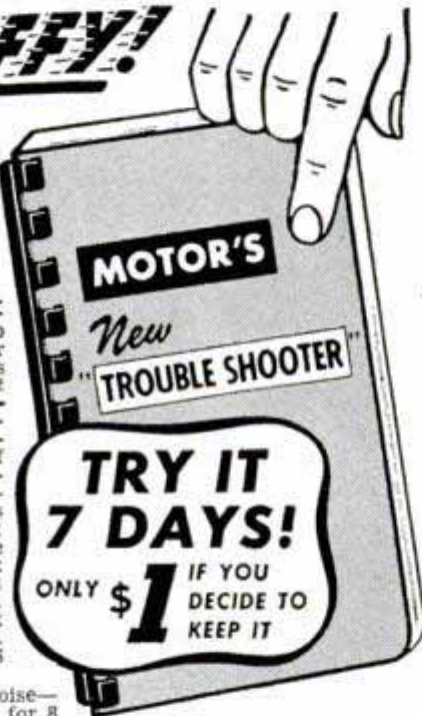
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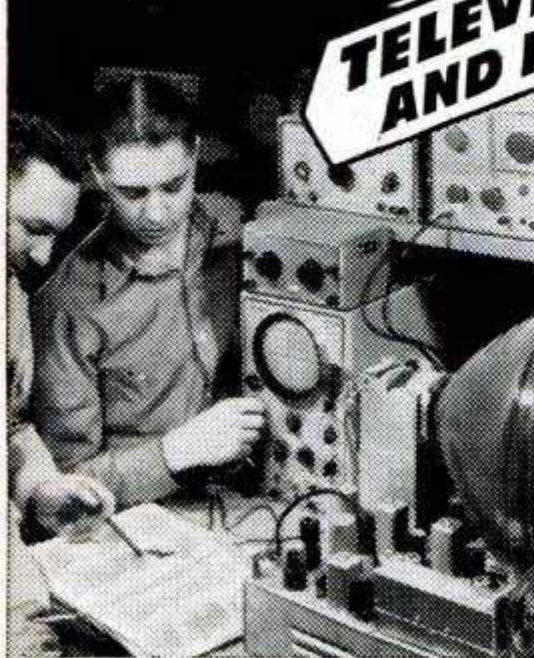
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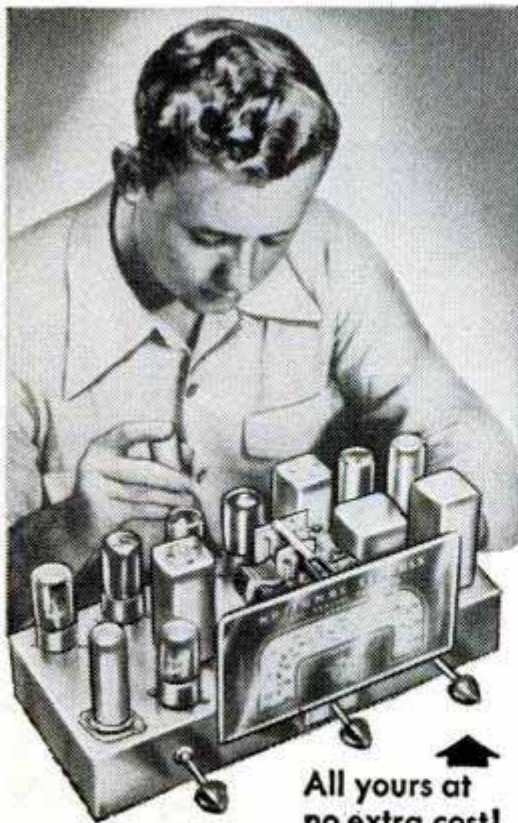


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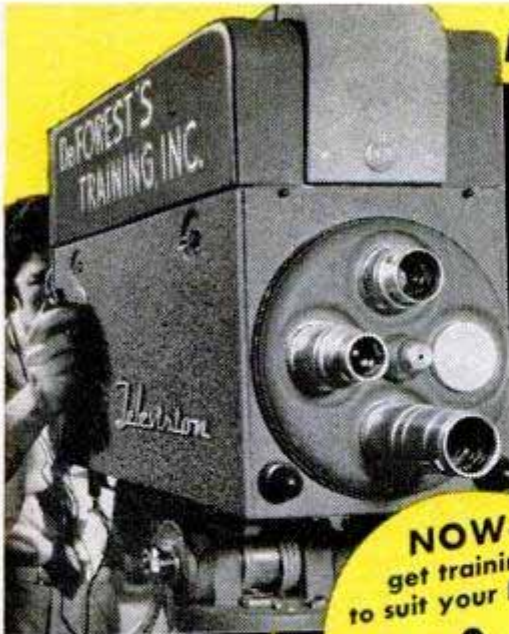
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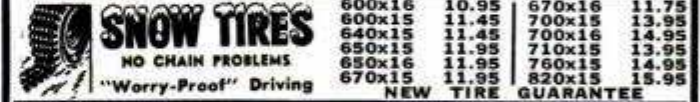
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111 NORTH CANAL ST., Dept. 10-S, Chicago 6, Ill.

I invite you to get all the facts—



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3 BIG
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BOOKS

I want you to have ALL the facts about my new 10-MONTH Radio-Television Training—without cost! Rush coupon for my three big Radio-Television books: "How to Make Money in Radio-Television" PLUS my new illustrated Television Bulletin PLUS an actual sample Sprayberry Lesson—ALL FREE. No obligation and no salesman will call. Mail coupon NOW!

MAIL COUPON TODAY—NO OBLIGATION—

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Please rush to me all information on your 10-MONTH Radio-Television Training Plan. I understand this does not obligate me and that no salesman will call upon me. Be sure to include 3 books FREE.

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(Continued from page 10)

Since chlorophyll is in all of nature's greenery, free for the chewing, you may wonder as I did, how come goats—who eat a steady green diet—can smell so awful. And camels are even worse. The men at Rystan explain it this way: "In nature, the substance does not have the properties that the derivatives do after impurities like waxes and cellulose are removed. Before it goes in your pills or toothpaste chlorophyll has been transformed by sodium or potassium hydroxide to water-soluble salts." This, it seems, is the big difference.

Another thing they point out is that chlorophyll is a contact deodorant, which means that it does the job by touching the thing it deodorizes. Some people think it gets in the blood stream and removes perspiration odors and the like there. "It has never been proved to have a systemic effect," the Rystan men point out. "We're not sure." They're more inclined to the theory that distinctive odors—like those in dogs—are removed by chlorophyll acting on food in the alimentary canal before it even gets to the blood stream.

"And don't be misled by a lot of impossible claims," they say. "Some products can't possibly do what they are claimed to do. First, if it's very cheap, beware. Chlorophyll costs \$90 a pound. And remember that it must touch something to deodorize it. It doesn't vaporize. Evaluate each product on its own and you won't go wrong."

No matter what you think, I can guarantee one thing: Chlorophyll is absolutely great for coloring things green. They gave me a sample of that toothpaste and my toothbrush has looked like something out of *Finian's Rainbow* ever since.

Dick Dempewolff.

Letter to the Editor:

If it is true that someone in good old England is really building the giant radioscope depicted on page 18 of your November issue, then who . . . is going to live to receive the echoes which will return to earth in about 1,500,000 years from now?

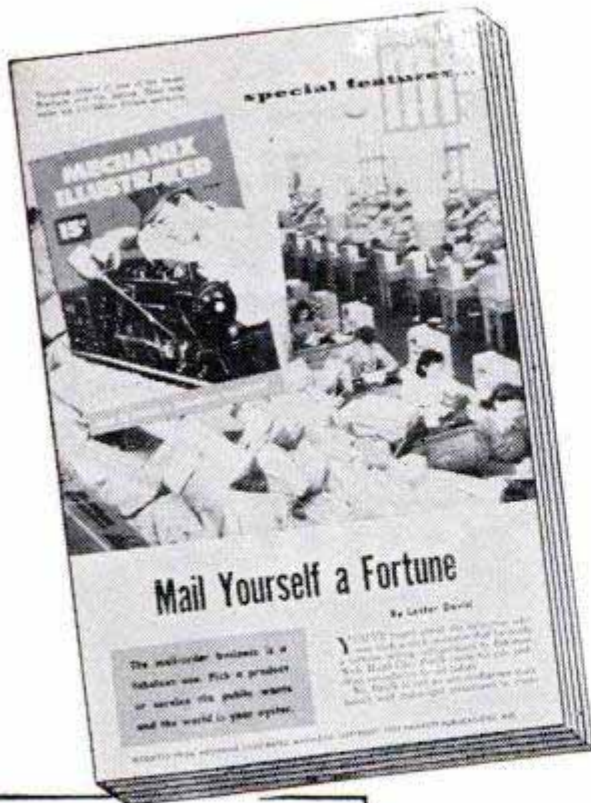
R. C. Olds,
 Westmont, Ill.

Sorry, we won't be around. We regret, also, a misleading report from the English project. The radar echo is not used to detect distant stars, but to track down meteors and other bodies closer to the earth. The radio-telescope is, however, intended to give the astronomers data on stars as far as 750,000 light-years away by picking up signals sent out by the stars themselves in the astronomical past, then measuring the angles and pin-pointing their origin.—The Editor

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Start on a SHOESTRING!

The real-life stories of success in Mail Order read like fairy tales. If I had not personally known these people their stories would be hard to believe. Yet they are not only true, but they represent just a few of the hundreds of "little operators" who have been swept into big money by Mail Order.

GAINES. I personally guided his start when he invented an automatic pants presser. He started with one little ad in one magazine. Four years later he retired — with enough real estate to keep him in cash income the rest of his life.

VAN MARK. I worked with him for six years. I met him when he was a wagon man for a tea and coffee house, knocking on doors. He went into Mail Order on nothing—made money from the start—ended up six years later with savings of \$50,000 and an income of \$5000.00 a year for life without further work.

DUGGAN. A few years ago he was a truck driver. Started fooling with Mail Order in a spare room in his spare time. Last year he said, "I don't know how much I'm worth—after you get the first million you quit keeping track."

MRS. NIXON. Started a small Mail Order business at home—just to keep occupied. It looked good and she came to me for advice. I showed her how to expand. In two years the business got so big her husband resigned his job to help manage it.

FOXMAN. Foxman worked as a hack writer at \$70 a week. He had idle time in the evenings—ran an ad offering something he didn't have—got so many orders he had to find a source of supply. He made \$18,000 the first year. He gives me credit for "showing the way."

JORGENSEN. Consulted me about a specialty product. On my advice he ran one ad to "test" its saleability. That ad brought sales of \$50,000. In his first year he did a business of nearly a half million dollars. His original investment was less than a thousand.

These things I have seen. These people I have helped to the realization of their dreams — these and hundreds of others. My own fortune was made in Mail Order. And now my secrets can be yours.

L. W.

Have you ever thought of running a profitable little sideline right from your home? Has it occurred to you that *you are just as capable as anyone else* of making money on a product or service that can be sold by mail? Have you ever looked into the Mail Order business as it's run (on tiny investments) by innumerable small operators?

Forget about Sears and Ward's! Read about the "little fellows" . . . clerks, teachers, vets, mechanics, salesmen and others . . . who are packing Mail Order items in bedrooms, spare rooms, attics, garages, cellars . . . dumping them in the Post Office . . . and quietly banking the fistful of Money Orders, cash and checks delivered to them daily by the mailman.

An annual business of almost a billion dollars is done by "little fellows" who advertise and sell just one item! The Department of Commerce of the United States says, "A number of the most successful obtain incomes as high as \$40,000 to \$50,000.00."

It's an incredible story . . . a story of a business that's wide-open for newcomers . . . with opportunities for income far-and-away greater than you can ordinarily hope to attain by holding down a job. And in Mail Order you can stay as small as you wish—run your deal as a \$50 or \$75 weekly sideline—or consider jacking it up into really big figures as a full time operation.

Glance at the examples at left. *These true stories are far from unusual.* Multiply them by the hundreds and you begin to get an idea of what can be done . . . what is being done . . . in the phenomenal Mail Order field.

Yet, if you were to jump blindly into Mail Order your chances would be slim. A peculiar brand of "know-how" is vital in this little-known, little-understood business. *This is fortunate for you.* If any Tom, Dick, or Harry would "click" in Mail Order, the field would have been overloaded years ago.

But now you have the opportunity to learn the authentic secrets of successful Mail Order operation. They are revealed for the first time, step by step, in an extraordinary new Survey . . . the L.W. Confidential Mail Order Letters.

This Survey is not a course—not a book—not a group of lessons. It is a simple guide that anyone can follow. It shows you how to pick the right product for Mail Order. It shows you exactly how to start a profitable business *fast*, with cash or Money Orders in the envelopes you receive. It shows how to buy your product out of the very money you get in the mail, so you don't have to tie up cash in large supplies of your product. It gives you actual examples of ads and letters, analyzed to show how and why they make money. It demonstrates the months to start, the time to expand, the best way to get prospects' names. It reveals from A to Z the confidential facts that have made fortunes for Mail Order operators who use them.

Mail the coupon today, or simply send your name and address on a postcard. No salesman will call. We will mail, postage prepaid, a Free copy of "How to Become a Mail Order Millionaire" and along with it will give you complete facts about the L.W. Mail Order Survey. Read the facts. Then decide whether you would like to spend spare time or full time in a profitable, fascinating Mail Order enterprise. If you think you would like to follow the footsteps of hundreds of others who are now making good money in this way, you can get your L.W. Survey and begin at once.

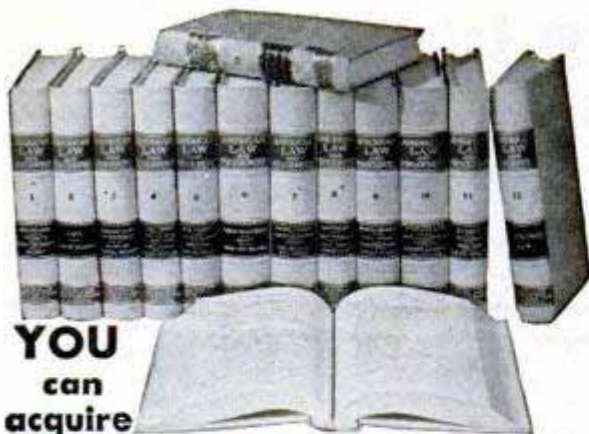
Please don't decide to write us "a little later." Send your name *now*, before you forget. This one little act might be the first step to a future of independence and wealth.

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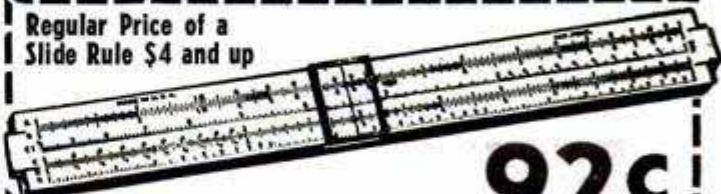
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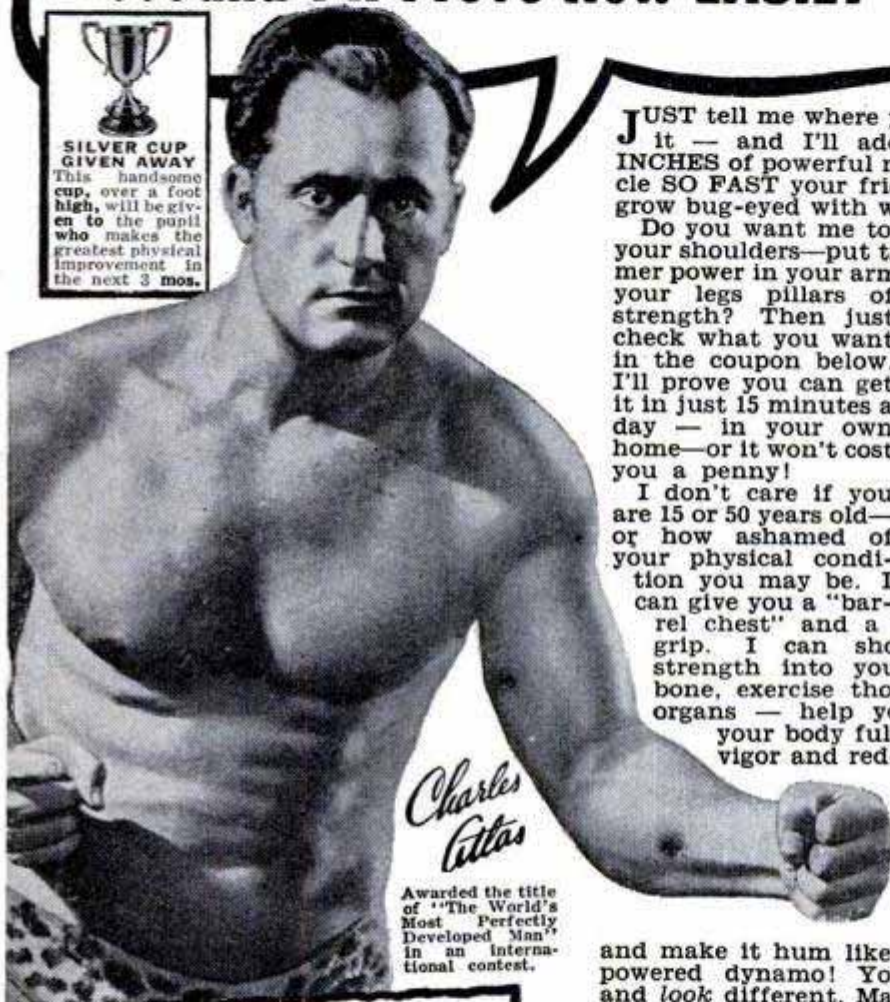
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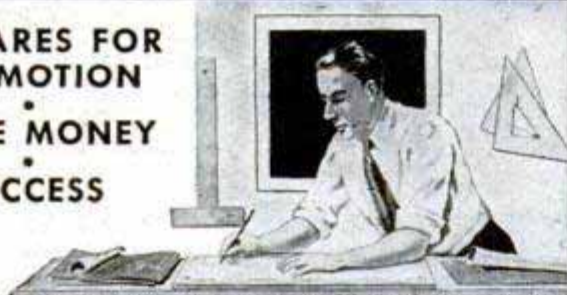
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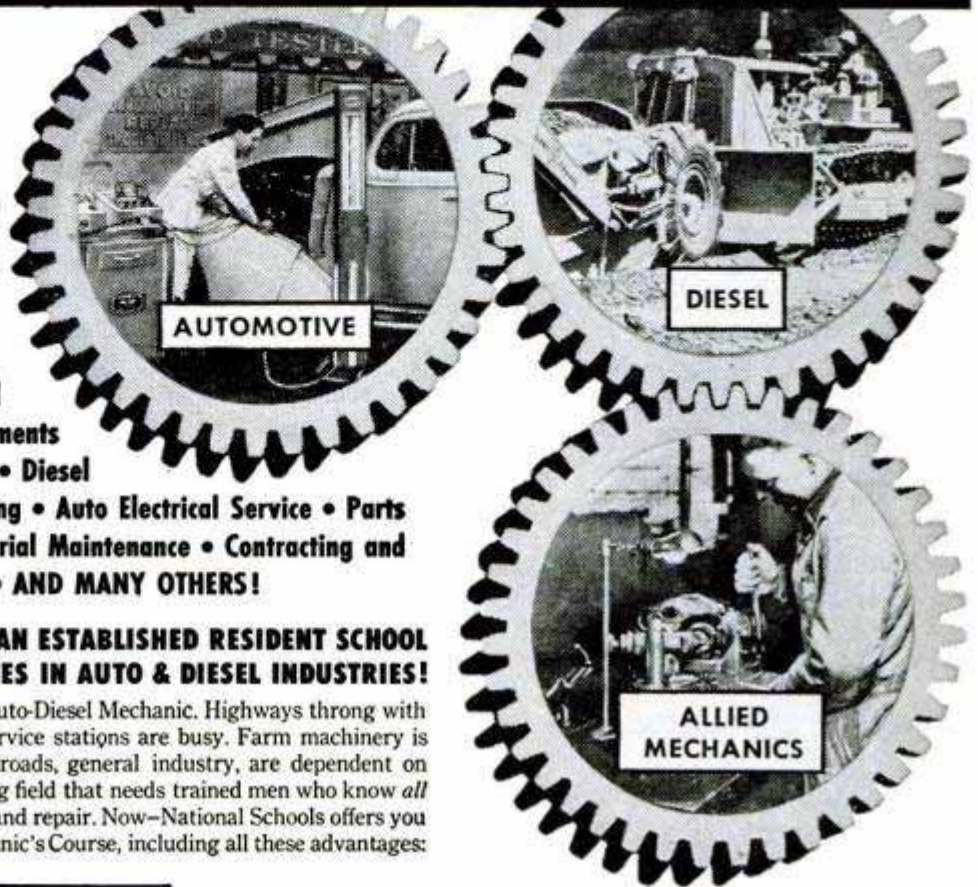
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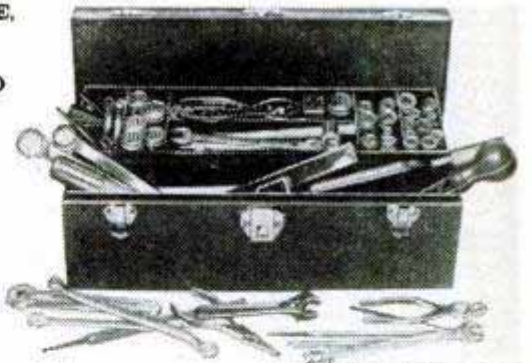
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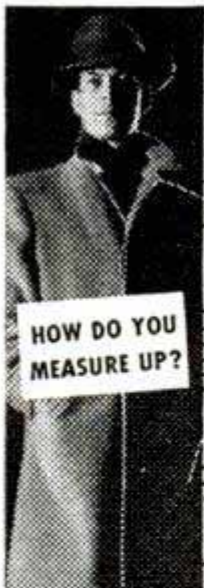


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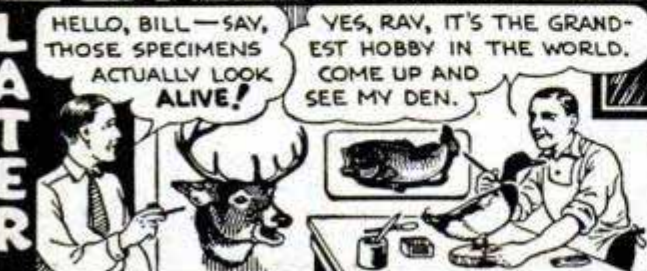
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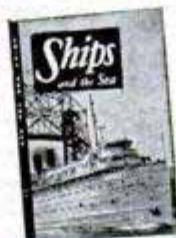
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I won't make any fancy promises of \$50.00 a day. And I'm not after any of your money. What I can do is show you a simple plan by which you can pick up enough extra money every week to help make up for the money you're losing in higher taxes and higher costs of living. And I supply your working outfit free—no charge and no deposit. Just your name is all I need. Read my proposition. It is honest and down to earth. And it won't cost you anything to try it.

TODAY almost everyone needs extra money. Increased taxes and increased living costs are making your dollar worth less and less, so you have to have more and more dollars just to keep even. There are lots of good ways to make extra money. I don't say my way is the best. I do say it's one of the easiest and most pleasant. It even leads to making new friends in sort of an endless chain. It doesn't call for house-to-house canvassing, either. Let me explain:

I am Sales Manager for a very big company. We make Stainless Steel Cooking Utensils. We do an enormous business with hotels, restaurants, hospitals, and institutions. We also make utensils for the Army, Navy, and Air Force.

As a result, we have very low manufacturing costs. We can sell a set of Stainless Steel Cookware for home use for about what it costs some companies to make it! In fact, for years we did sell to one Sales Organization who resold our cookware house to house under their own name. They got \$120.00 for the same set that our people sell for less than half of that.

You've probably heard of salesmen who give dinner parties in homes and then take orders from the ladies who attend. These salesmen have to get a high price because it costs money to give parties — he has to make his share — and his supervisor has to make his. The sales organization comes in for a share, and the manufacturer who sells to them has to make his. So there are about five profits added to the actual manufacturing cost.

About two years ago I got to figuring. There are five good reasons why Stainless Steel is the kind of cookware that should be in every home. 1. It washes as easy as a drinking glass. No scouring, scraping or scrubbing. 2. It doesn't rust or corrode—and it doesn't stain. 3. It doesn't affect the taste of food. 4. Buy it once and you're all through buying for life. You can't wear it out.

You see, Stainless Steel is not a coated or plated metal, like chromium plate on the bumper of your car. That chromium plate can chip or wear off and exposes the raw steel underneath. Then the steel rusts. But our kind of Stainless Steel is stainless all the way through. It can't chip, crack, peel, or wear off. You could use a set the rest of your lifetime and then give it to your children and it would still be good for their children. 5. Carlton Ware enables you to prepare food by the method called "waterless cooking" which keeps more of the natural minerals and vitamins in your food and makes the food taste better.

Well, I figured that if the price was low enough every family could afford Stainless Steel Carlton Ware. So I worked out this plan! We would sell a complete set of 19 pieces at a figure that would include our profit. Then you add your profit and re-sell this set to your friends and neighbors for less than half of the usual price charged on the "party plan." You actually save them more than half. They are glad to get such a bargain and they feel that you've done them a real favor. That's because the set they buy has in it only two profits, ours and yours. Both our profit and your profit is small and fair.

The plan becomes like an endless chain. When a woman gets her first piece of Carlton Ware she gets so thrilled with its better cooking and easy cleaning that she talks and talks. She can't wait to demonstrate it to her friends and tell them all about it. She's so proud of its silvery sheen and so happy about how easily it washes that she just "bubbles over." So just by letting your own friends in on a good thing, before you know it their friends call you up and ask if you can get the

same low prices for them. Then their friends call you and their friends' friends. It goes on and on!

To make an extra \$125.00 a month, you only have to deliver ten sets and that's easy. Mrs. Montell in Pennsylvania took orders for \$1400.00 worth in her first month. And Mrs. William Hanchow wrote, "Got my set Saturday—I already have 17 customers."

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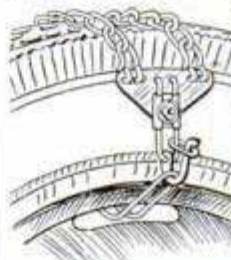
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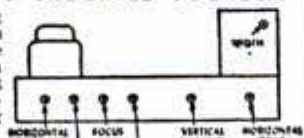
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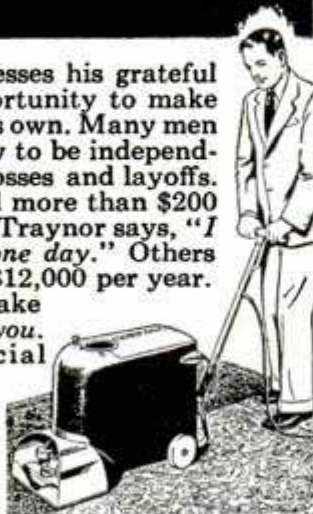
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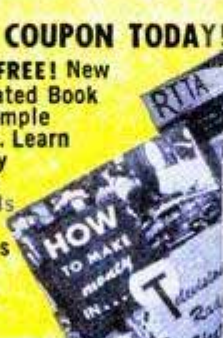
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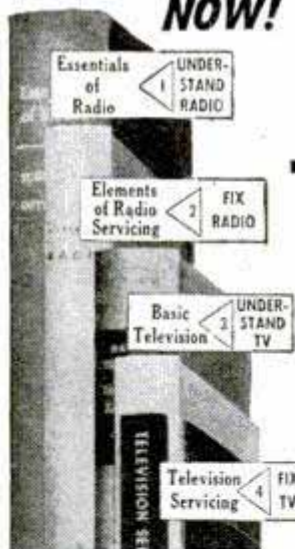
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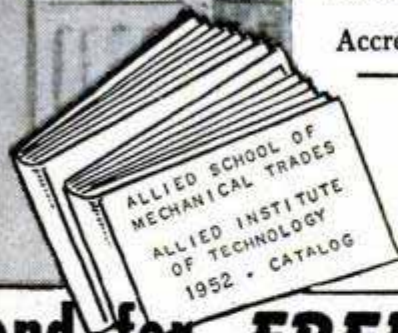
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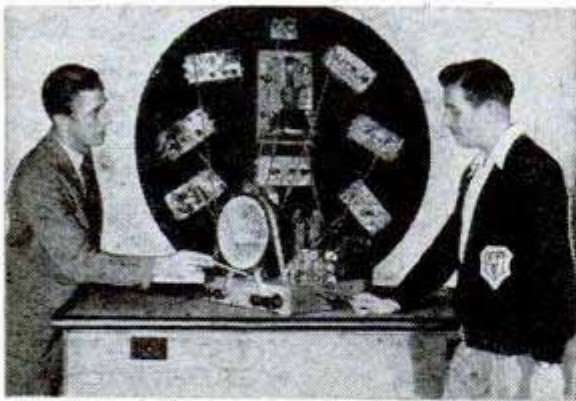
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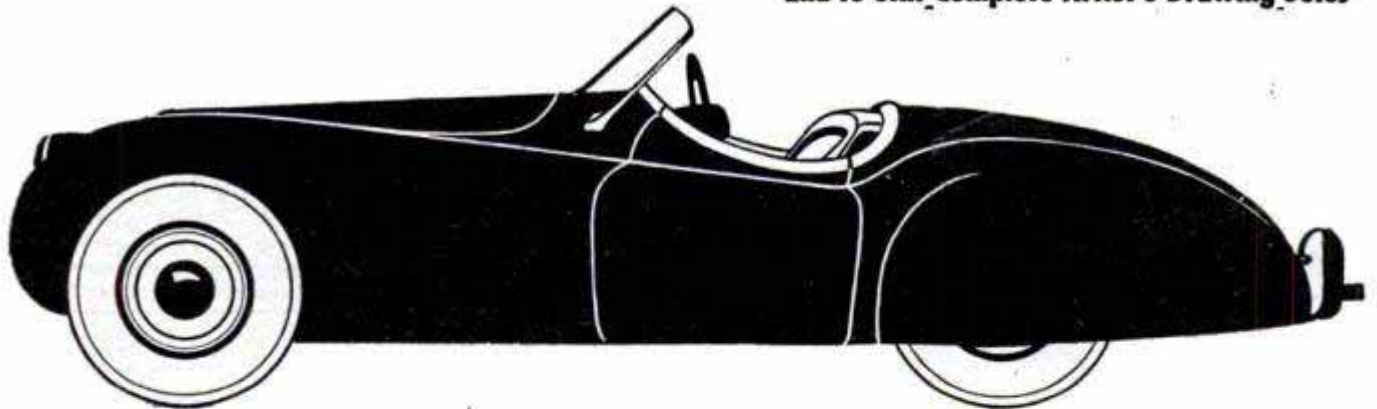
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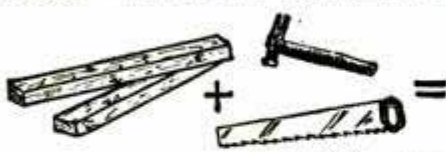
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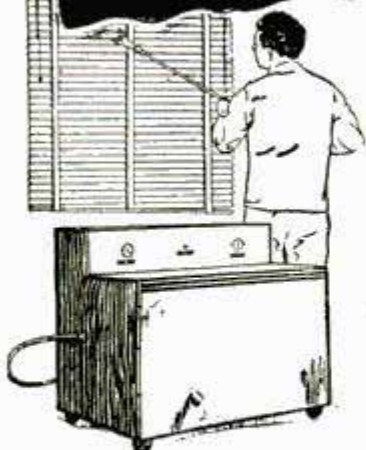
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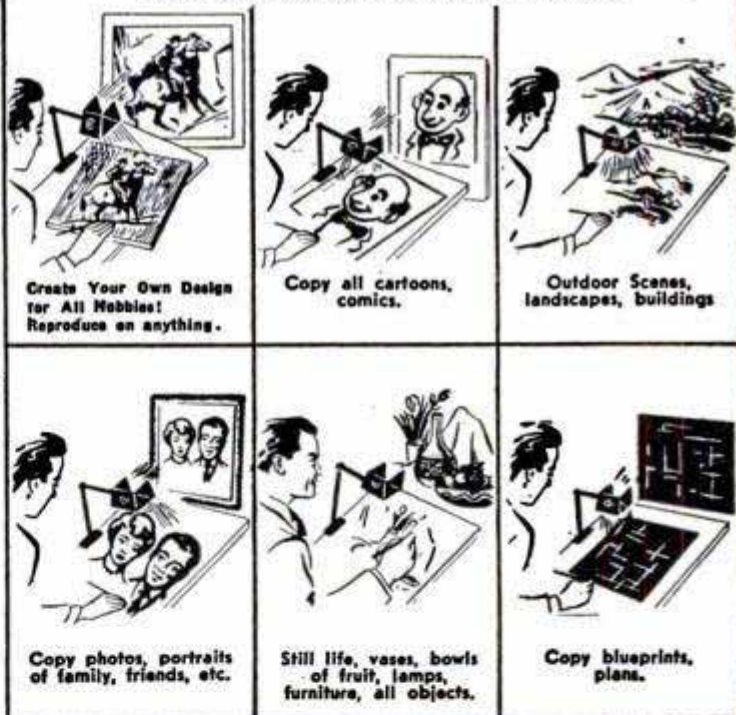
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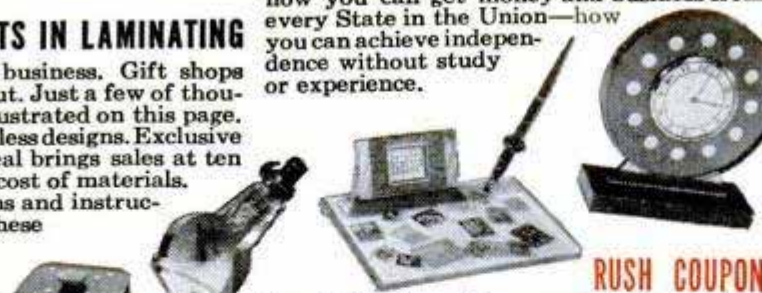
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1 CENT Each in quantity. Beautiful miniature toys. Terrific profits. Sell stores, mail order, homes. Send \$1.00 for 50 assorted samples. Money back guaran-tee. Morael Manufacturing Co., Box 115-M, Rockaway Park 94, New York.

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PRINTING, Salesbooks, envelopes. Free illustrated catalog. Erscow, Dept. PM, Bronx 72, New York.

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ABSOLUTELY Free, yours for the asking. Send postcard today requesting free sales kit showing complete new line, belt buckles with your name or personal initials, cap badges, 3000 different emblems also uniforms, caps, shirts, ties, wallets, etc. Write Hook-Fast Company, Box 480PM, Roanoke, Virginia.

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BE Your own boss! Free booklet "301 Unique, Successful Businesses" tells how. Start spare time, small capital, work home. Deumant Publications, 81-PM Deumant, Kenmore 23, N. Y.

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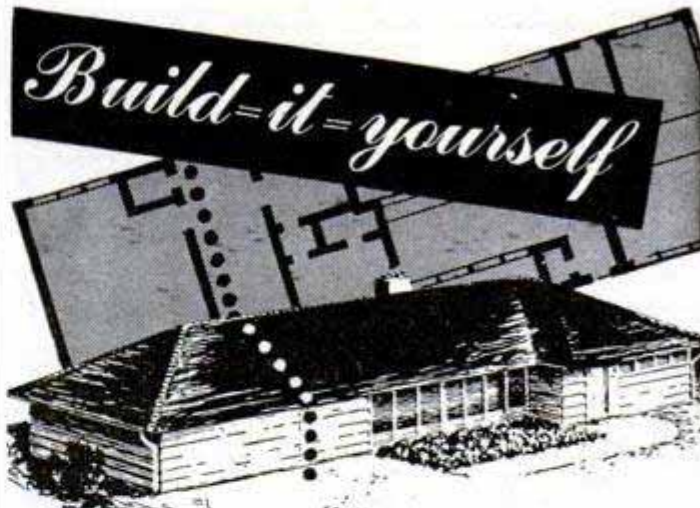
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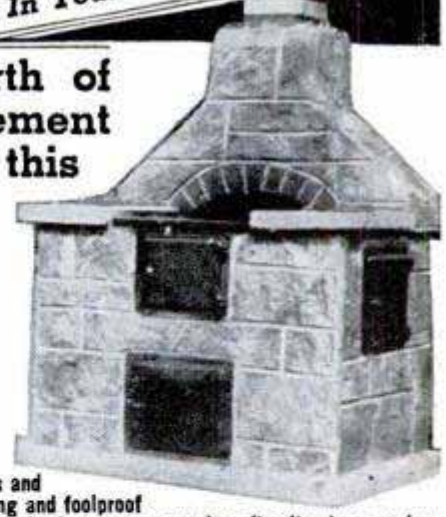
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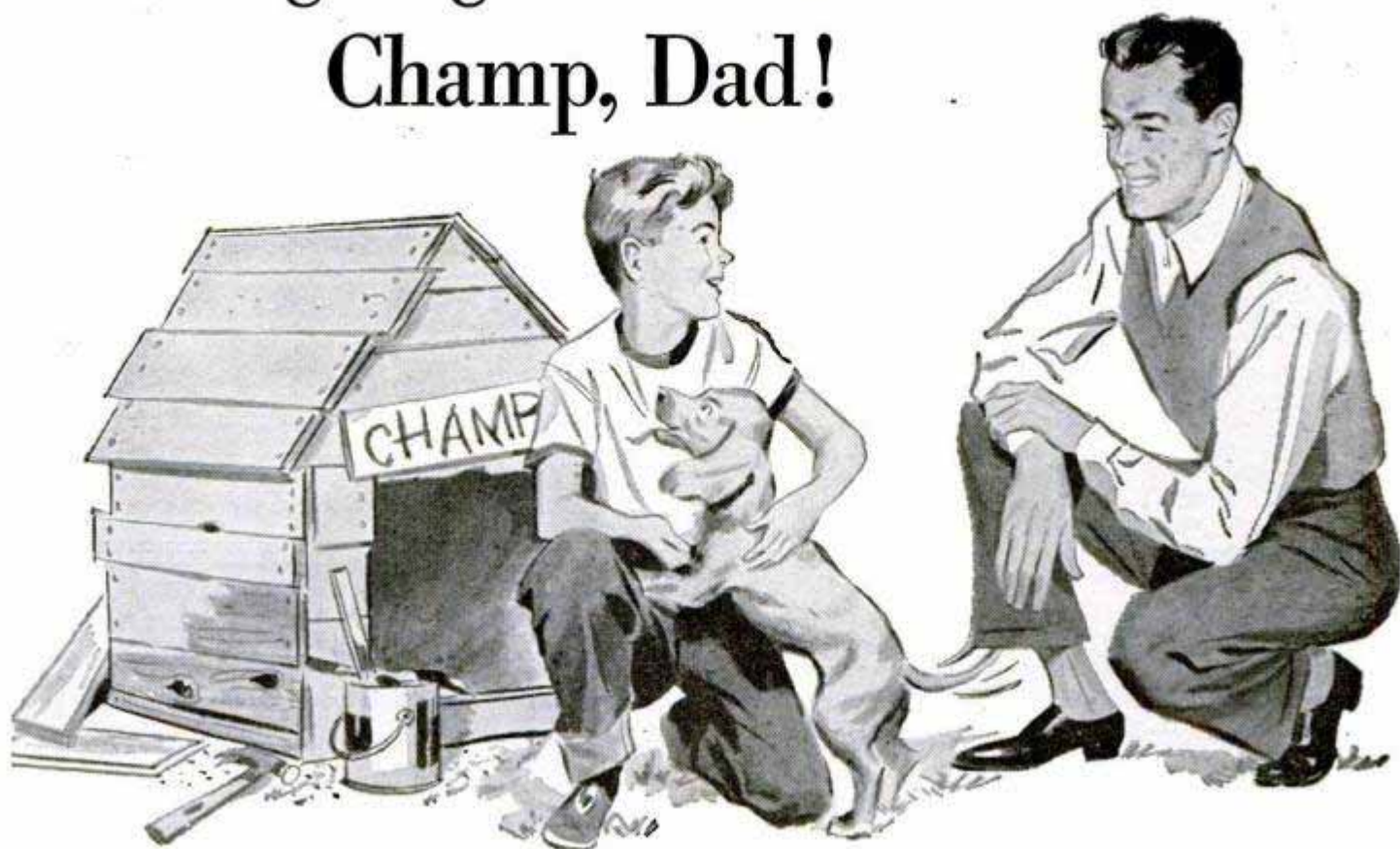
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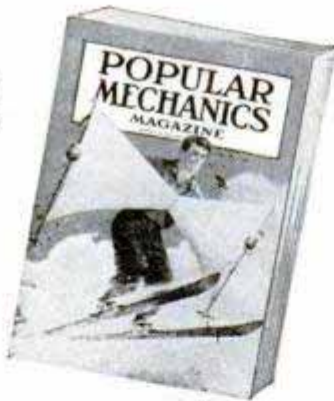
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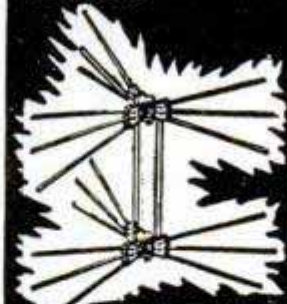
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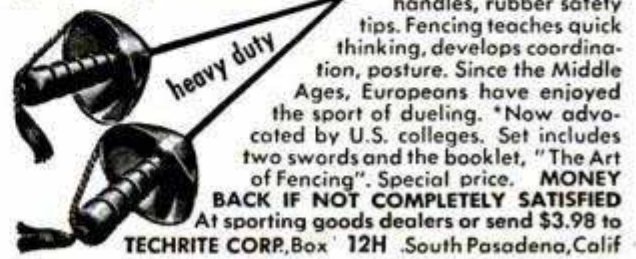
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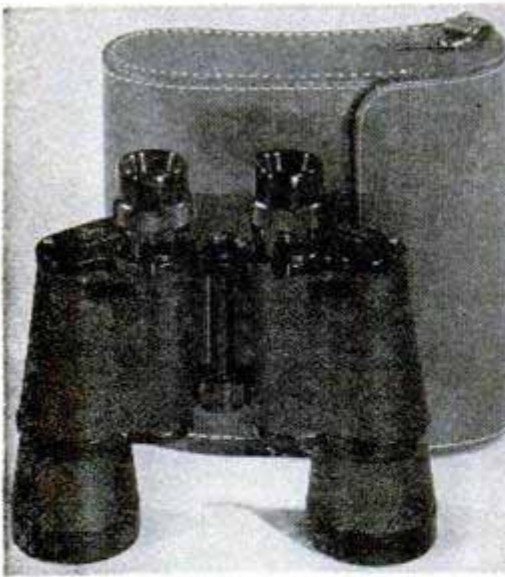
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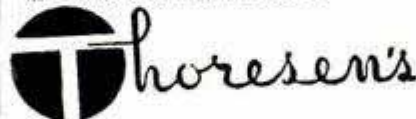
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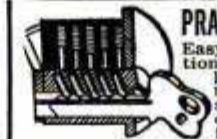
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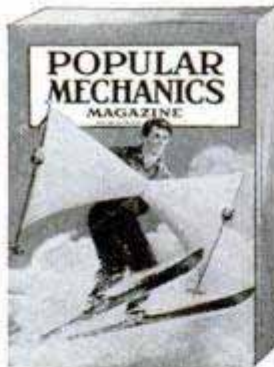
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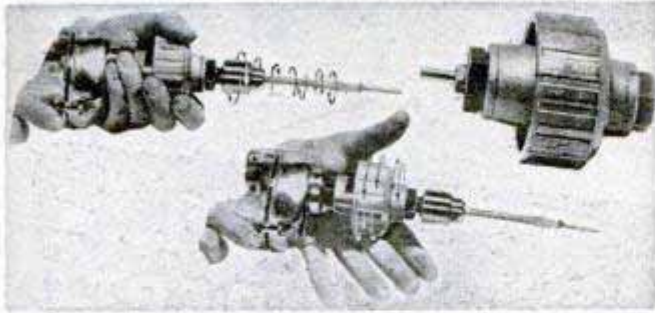
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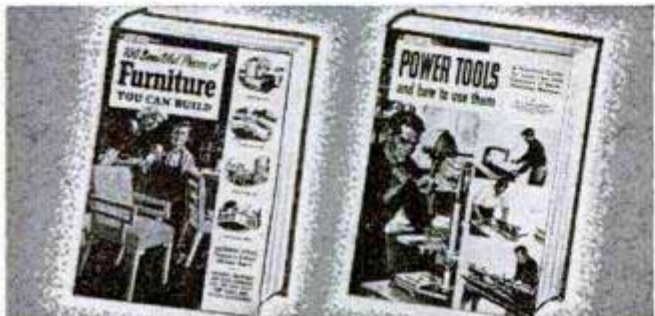




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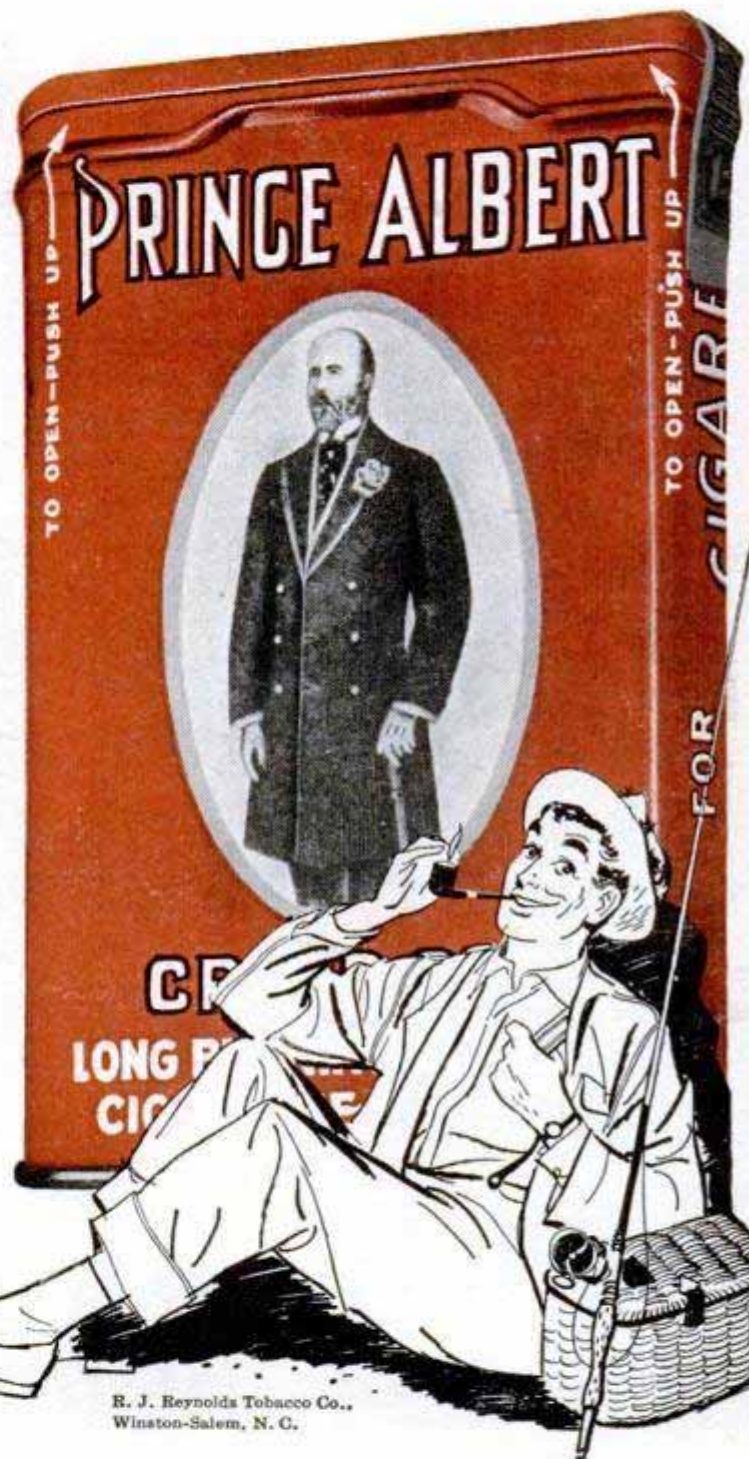
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Jets, the author points out, are rapidly overtaking speed of the gun projectile

HEADACHES OF A *JET* DESIGNER

By Edward H. Heinemann

(Chief Designer, El Segundo Division, Douglas Aircraft Company)
As told to Andrew Hamilton

EVER SINCE ORVILLE and Wilbur Wright dreamed up the first airplane a half century ago, aircraft speed has increased at the rate of 14 miles per hour per year. This is what makes aviation designing totally different—and compels jet designers to keep a big bottle of aspirin handy at all times.

When you're designing an automobile, a ship or a piece of furniture, a good bit of your work goes into "fashion design." You make it better than previous models, but a good many of the improvements come under the heading of styling. But when you're designing a military airplane, you start from scratch and redesign the whole works from nose to tail wheel on a functional basis.

That's why airplane designing is so complicated. It's why our newest planes were designed five years ago and those on the drawing boards now won't be in production

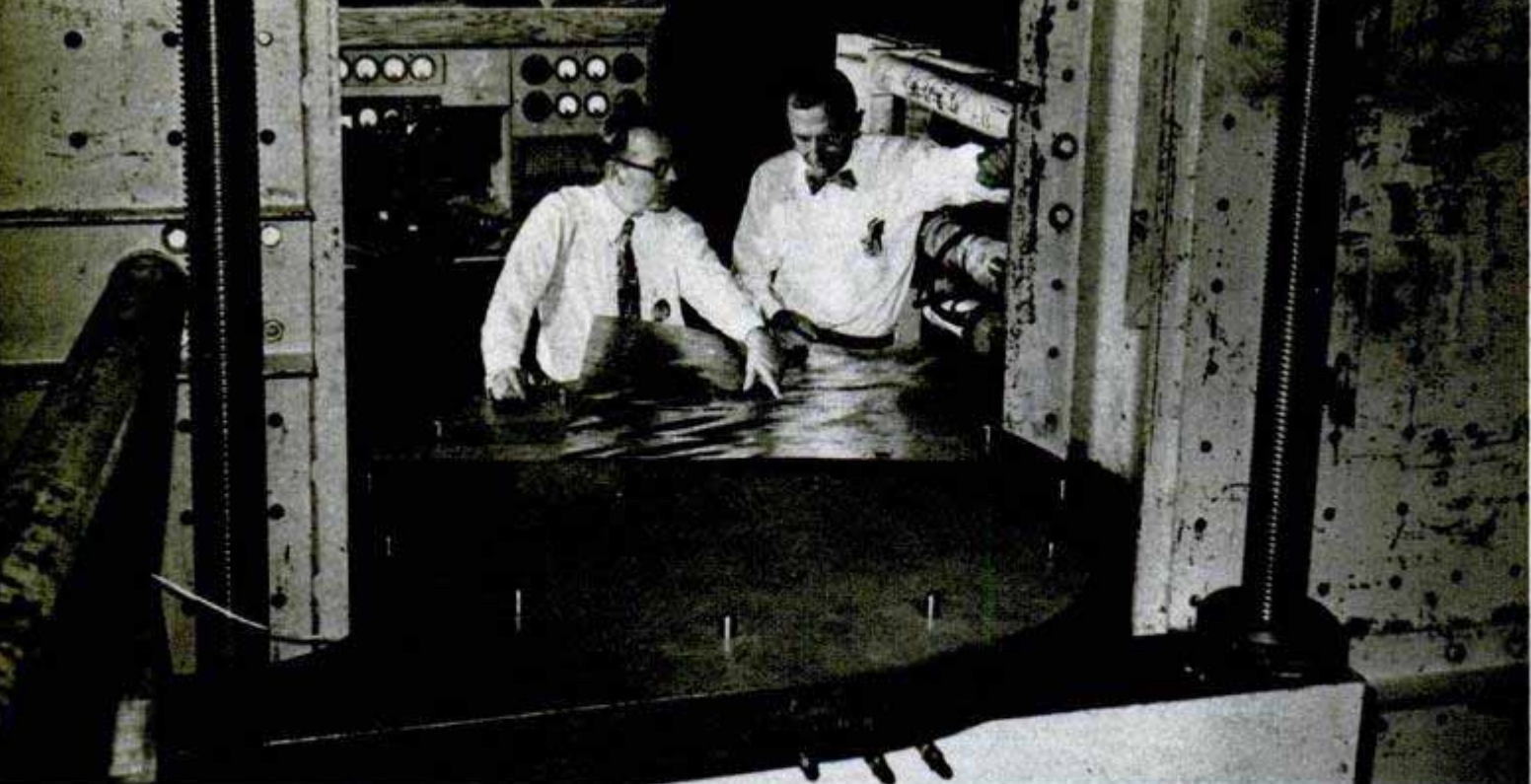
until 1958. It's why a modern plane requires 1,250,000 man-hours, 10,000 drawings and 25,000 new tools—ranging from \$5 patterns to \$20,000 main-wing jets.

When I started designing airplanes 25 years ago, a new experimental-model military aircraft cost \$20 a pound to build. Today such costs have zoomed to as much as \$1000 a pound. As a matter of fact, the electronic gadgets alone in some of today's planes cost as much as a whole airplane did in 1939.

Therein lie the headaches of modern jet-airplane designers: How to keep from adding weight, cost and complexity to tomorrow's fighting planes.

I often think of the problem as trying to roll a snowball downhill without its getting bigger by the time it reaches the bottom. The solution may be possible—but as yet no designer has been able to find it.

This is why the engineering staffs of most



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aircraft companies have grown until today aviation employs more professional engineers than any other industry. Twenty-five years ago, the average major aircraft-engineering department employed 15 to 20 engineers and draftsmen. Today the number ranges from 1000 to 3000. The ratio is about one engineer for every 10 other persons employed—or a total of between 350,000 and 450,000. Even so, a shortage of around 30,000 currently exists.

Just why should one industry require so many professional engineers?

As an industry, aviation is one of the most complex because of the many conflicting requirements of aircraft design. A designer, for example, is constantly plagued with the necessity of designing each part lighter—but at the same time stronger. He must build planes more reliable and able to accomplish more functions—but at the same time more simple.

Each new model must have greater high speed, but no greater low speed. It must function perfectly under all extremes, from 165 degrees Fahrenheit, when operating

from a desert base, to minus 65 degrees when flying in the stratosphere. It must carry a higher percentage of its weight in pay load—at the same time it must carry a higher percentage of its weight in fuel.

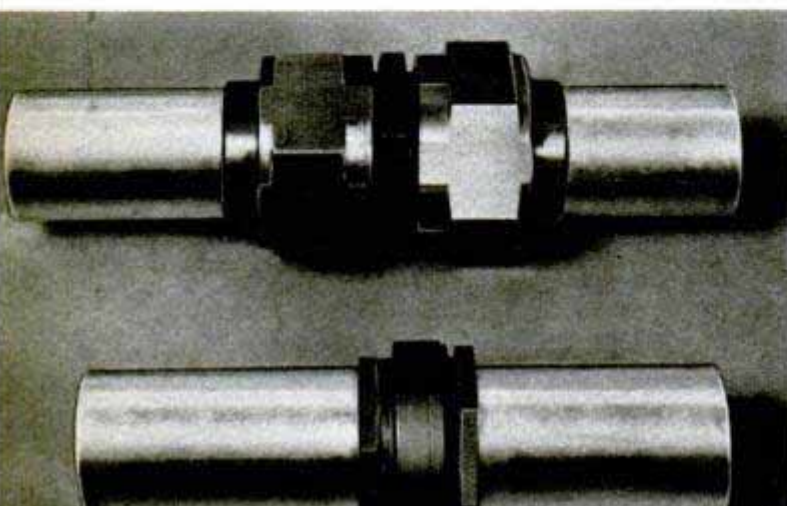
When the Wright brothers made their historic initial flight at Kittyhawk, Dec. 17, 1903, they reached an altitude of less than 20 feet, a speed of 20-odd miles per hour, and flew for a distance of approximately 100 feet. Today the Douglas Skyrocket has been clocked at 1238 miles per hour and recently reached an altitude of 79,494 feet, both world's records.

In response to constant pressure for superior planes, the aircraft engineer is confronted with a fundamental requirement for better performance. This can be broken down into two basic problems: (1) improved aerodynamics and (2) increased thrust or horsepower. These are the same two headaches that plagued the Wrights in their original design.

Recent aerodynamic developments—such as the swept wing, the delta wing and the thinner wing—have cut down “drag” in the

Designers are constantly hunting ways to cut down weight in new airplanes. Tube fitting at top was replaced by one below, weighing one sixth as much

Among the many planes author Heinemann has helped develop during 14 years as Douglas' chief designer are those displayed in model form below and at right



SKYROCKET

transsonic and supersonic speed ranges and will no doubt have a great influence on the trend of future developments. All, however, raise additional structural-design problems to be solved.

In addition to "drag," an entirely new factor has recently arisen in the transsonic and supersonic speed ranges. This is the problem of obtaining the necessary stability and control to make increased performance useful.

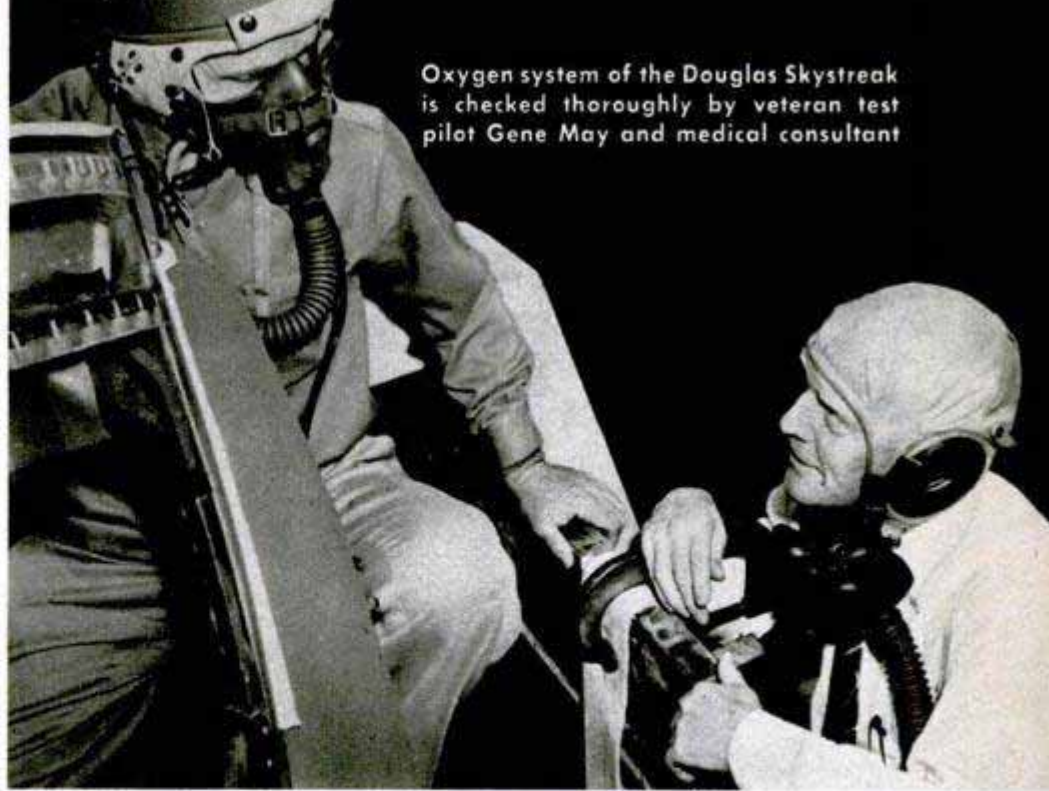
It took the first half century of aviation to perfect the means by which we take off, guide the plane in flight and land it. Now that we are operating in the supersonic range, we must perfect stability and control at supersonic speeds without sacrificing them at low speed.

In power plants, great gains have been made with turboprop and turbojet engines. For example, some jets today can deliver 8000 to 9000 pounds of static thrust. (The term "thrust" is used rather than "horsepower" in the jet business, a pound of thrust equals one horsepower at 375 miles per hour—at higher speeds more, at lower speeds less.) Such an engine weighs only about 4000 pounds and with afterburner develops as many horsepower as do three 3-unit diesel passenger locomotives. Compare this to the 12 horsepower of the Wright brothers' plane.

A fighter airplane of 20 years ago consumed, with maximum power at sea level, only 60 gallons of fuel hourly. The modern jet fighter without afterburner will burn approximately 1800 gallons per hour. With the afterburner turned on, it will use 7000 gallons of fuel per hour. At a Mach number of 1, or the speed of sound, this is equivalent to approximately 38,000 horsepower. This 7000-gallon-per-hour consumption explains why operation of the afterburner must be limited to a matter of a few minutes, as this much fuel is approximately five times as much as the average fighter carries.

The relatively new problem of aerodynamic heating may soon slow down the

Oxygen system of the Douglas Skystreak is checked thoroughly by veteran test pilot Gene May and medical consultant



progress of aviation, especially at low altitudes. This phenomenon causes the entire airplane, its equipment and occupants to become heated with speed, and has every indication of limiting speeds at sea level to 900 to 1000 miles per hour. At 35,000 feet, where standard air temperature is 65 degrees below zero (Fahrenheit), this limit can be expected to be approximately 1200 to 1300 miles per hour.

These limitations are based upon a 200-degree-Fahrenheit structural limit that applies to all lightweight airplane materials now in use. Titanium and stainless steels will permit operating at higher structural temperatures, but there is still the serious problem of cooling airplane occupants and equipment when operating at such temperatures.



DAUNTLESS



SKYRAIDER



SKY SHARK



SKYKNIGHT



SKYSTREAK



Engineers test pilot's means of leaving demountable nose of the Skyrocket in a simulated emergency escape

Miles of wire are needed for the complex electronic gadgets that are essential to modern fighter planes



The main increase in airplane costs is due to growth in size and complexity. For example, in the past 20 years the average fighter has grown from a gross weight of approximately 5000 pounds to the neighborhood of 30,000 pounds. Some fighters soon to go into production will run over 50,000 pounds. Twenty years ago the average bomber's gross weight was about 15,000 pounds; today it averages about 200,000 pounds.

Another way of expressing the recent trend in airplane costs is to consider that 20 years ago \$100,000,000 would purchase approximately 1000 fighters. Today it purchases only about 100. In the bomber category, 20 years ago \$100,000,000 purchased approximately 350 bombers. Today, approximately 20.

In the design of a current new model, if a 100-pound item of equipment is added and the performance and strength are maintained, the gross weight will increase—not by the 100 pounds—but by a factor of 10—or a total of 1000 pounds.

The reason for this is that as equipment weight is added, it is necessary to increase the wing area to maintain stalling speed, to increase horsepower to maintain high speed, to add material to the airframe to maintain strength and to add fuel to maintain combat radius.

To cool a 600-mile-per-hour interceptor cockpit and its electronic equipment at high speed and low altitude, the air-conditioning systems must handle five tons of air per hour. This however, won't even do the complete job. In addition, a refrigeration system is installed with a capacity equivalent to that required to freeze 176,000 one-inch ice cubes from 70-degree water in one day.

On the other hand, the system to heat the pilot and equipment in this airplane at high altitudes is capable of heating three 6-room average dwellings on a zero-degree-Fahrenheit day.

The aerodynamic forces on such an airplane are so great at high speed that the required power-control system is approximately 100 times greater than the normal pilot's effort. In other words, the control system requires approximately 22 horsepower or almost twice as much power as was used to propel the Wright brothers' first airplane.

In night-fighter planes the radar equipment alone weighs over 1100 pounds and contains approximately 400 vacuum tubes. This equipment alone is about 1½ times as heavy as the Wright brothers' airplane, including the engine and pilot. This radar equipment is extremely complicated, but without it the airplane could not operate under all conditions of weather and darkness effectively.

There is no question about it. American military airplanes are in general the most complete and best built in the world. Still, in many cases, they contain so much equipment that their performance and cost have been reduced to a point where their primary purpose and tactical usefulness have suffered.

Another way of expressing it might be to say that we are fighting a war with Cadillacs, whereas both World War II and the present Korean incident have shown that our enemies employ stripped down "hot rods."

Perhaps we are selling the pilot short. And it may well be that if we put our efforts into supplying aircraft with higher performance and less automatic or convenience features, the pilot-airplane team would be more effective.

We had something like this in mind when we set about to design the Douglas AD. The Navy wanted a plane whose maximum weight would be under 18,500 pounds. We scrimped and saved on weight—a few pounds here, a few more there. A bulletin went to all designers showing that for every 100 pounds of weight saved, take-off would be reduced by 8 feet, combat radius would be increased by 22 miles and rate of climb would be increased by 18 feet per minute.

We saved 270 pounds by simpli-

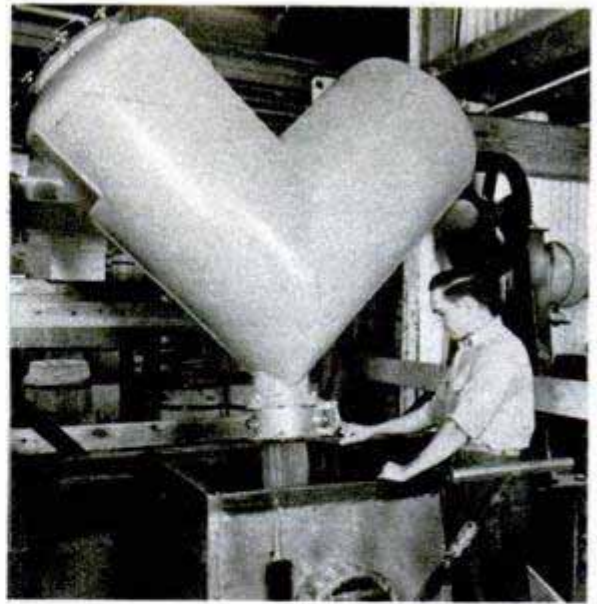
fying the fuel system. More than 200 pounds were shaved off by eliminating the bomb bay and hanging bombs, torpedoes and rockets outside. The use of fuselage dive brakes saved another 70 pounds. We even "lost" 100 pounds by using the old-fashioned tail wheel.

Result: A reduction of more than 1800 pounds in the weight of the airplane, which enables the AD to carry 8000 pounds of bombs, torpedoes and rockets and gives it the striking power of a heavy cruiser. Many authorities consider it the best possible

(Continued to page 248)

Heinemann and A. M. Mayo, right, chief of equipment design, inspect arrangements in a mockup. During vibration tests, plane below rests on inflated bags to simulate free flight





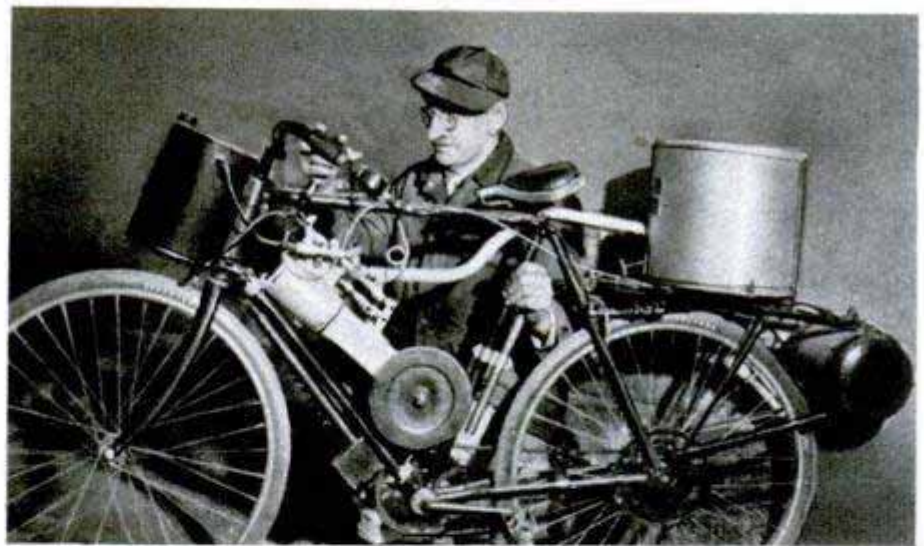
V-Type Blender Speeds Mixing of Dry Materials

Development of a V-type blender has speeded and improved the mixing of dry materials, such as are used in the manufacture of aspirin or other powder-base products. The blender, basically two metal or transparent-plastic cylinders joined at a right angle, is set in a U-shaped frame and revolves slowly on ball-bearing mounts. The mixing motion is supplemented by a

folding action as the blender alternately divides and combines the contents. A motor-driven bar studded with pins, placed across the interior of the blender at the axis of rotation, aids the mixing and can be used to disperse small amounts of liquid through dry material. Independently powered, it turns at speeds as high as 3200 r.p.m., compared with the 2 to 32 r.p.m. of the blender.

Old-Time Bicycle Built for Steam Is Still Operating

Powered by a steam engine, a 1910-model bicycle uncovered by a Waynesburg, Pa., mechanic, has potential speed in excess of 1952 speed limits. Finder Russell Gay duplicated missing parts and now has the machine puffing along as merrily as the day it was built. The two-horsepower engine has a bore of 2½ inches and a stroke of 3½ inches. It is mounted on the frame and receives steam from a flash-type steam boiler.



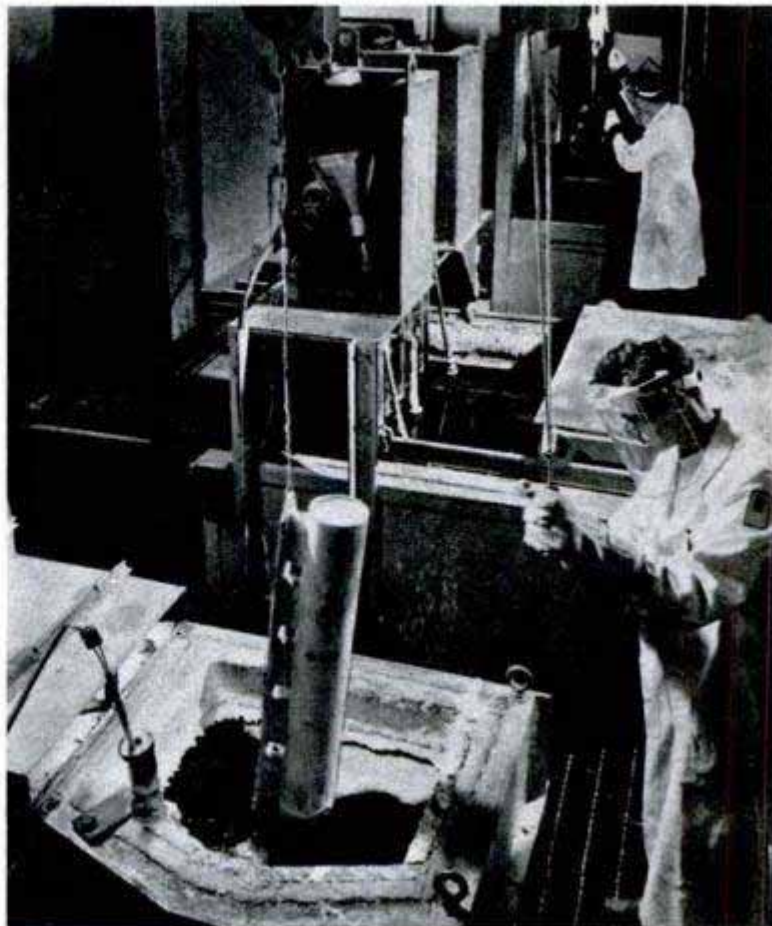
Thunderstorm Energy Equals 50 Atom Bombs

It would take at least 50 Hiroshima-type atomic bombs to equal the energy required to make one thunderstorm, says Dr. Roscoe R. Braham, University of Chicago meteorologist. In the average thunderstorm, 1 to 1½ quadrillion calories of heat are required to accumulate moisture from the atmosphere and carry it in an updraft inside the storm. The Hiroshima bomb generated 20 trillion calories, a puny figure by comparison. But even if 50 atomic bombs were ex-

ploded all at once, the effect on the atmosphere wouldn't be the same. The normal thunderstorm builds up over a period of several hours. Hot, moisture-laden air soars up, building towering thunderheads. Finally, the vapor forms into snow or ice crystals which start falling and accumulate moisture on the way down. Only 10 percent of the moisture a thunderstorm gathers in usually falls to the ground as rain, but that is more than formed by atomic bombs.

Steel or Iron Coated With Aluminum in Low-Cost Process

Steel or iron can be coated with aluminum in a simple and inexpensive process recently developed by General Motors researchers. Heated to a temperature of about 1300 degrees in a bath of preheating salt, the metal to be coated is placed in an aluminum bath for 30 to 60 seconds. It is redipped in the first bath and finished by air-blasting. "Aldip" metals are corrosion and rust-resistant, and they are heat-resistant when specially treated. They are expected to replace certain scarce heat-resistant materials now vital to the national defense.



More Eggs?

Aureomycin, the wonder drug, now shows promise of increasing egg production during the summer slack period. In one experiment, low-producing hens were given a feed supplement containing aureomycin. It apparently raised egg production from 26 to 57 percent over former levels.

Discover Natural Neptunium

Neptunium 237, originally obtained by cyclotron bombardment of uranium, has been isolated for the first time in its natural state in the Belgian Congo. Synthesized in 1942, the isotope is the long-lived parent of an important radioactive series valuable in radiation studies. It is the fourth such parent of a radioactive series to be found in nature and was discovered in microscopic quantities in pitchblende ore.

High-Speed Film Permits Movie-Making in the Dark

Moving pictures made in the dark are possible with a new infrared film possessing ultrahigh "red speed." For use in total darkness with invisible infrared rays or in extremely dim natural light, the film takes successful pictures in a room dimmed to $\frac{1}{70}$ of normal. Originally designed for industry, the film is now available to all owners of 16-mm. and 35-mm. movie cameras.

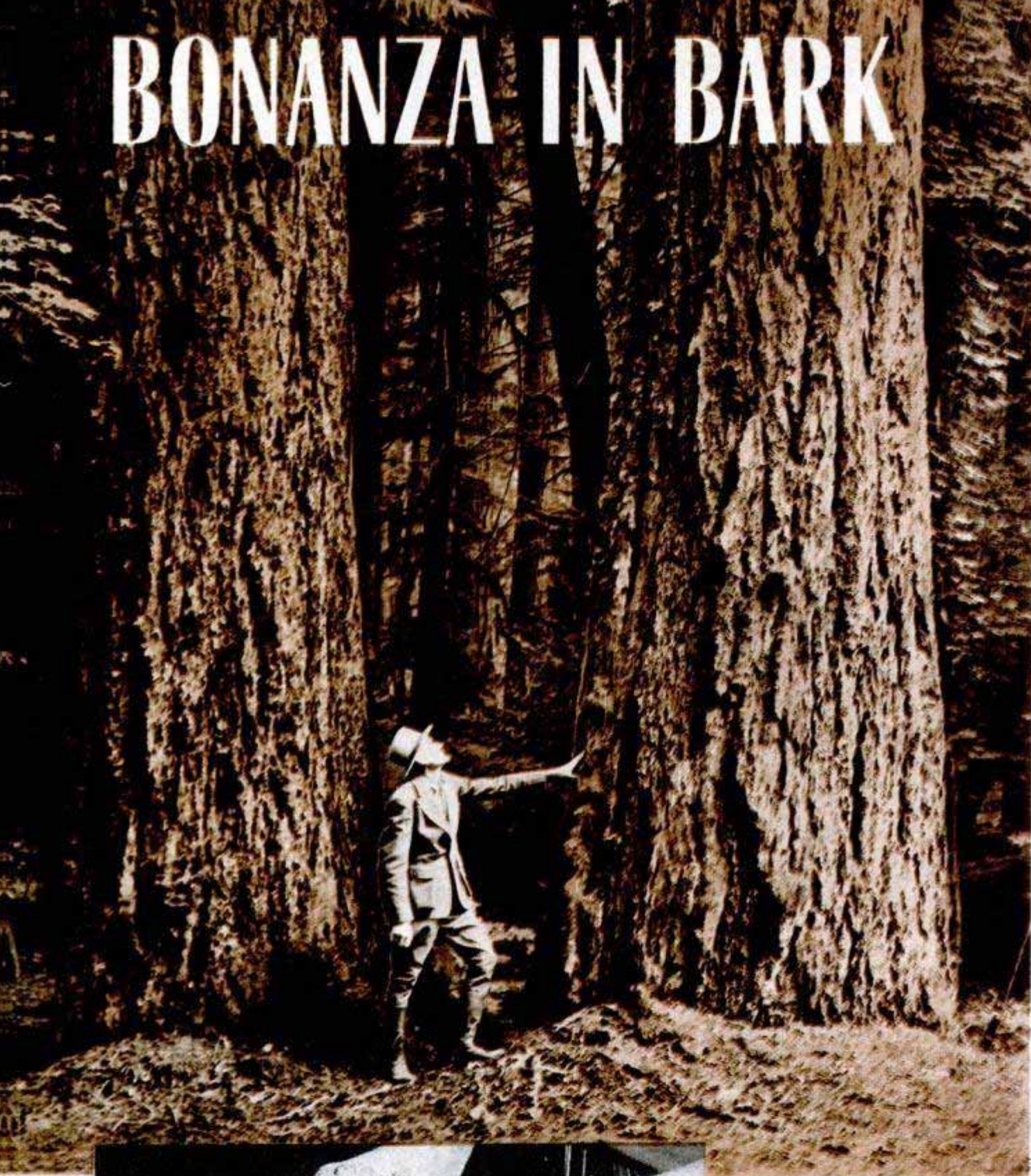
Convertible Brush is Adaptable to Three Widths



Three paint brushes of different sizes can be made out of a new convertible brush. The paint applicator consists of a screw-on handle, two brush heads and a socket for holding the two heads together. The complete assembly forms a four-inch wall brush. The handle also may be screwed into either of the two heads to make a 2½-inch varnish brush or a 1½-inch sash brush.

⌚ Clocked at 152.691 miles per hour in Belgian speed tests, an experimental gas-turbine British Rover automobile runs on kerosene or other fuels, has no clutch, gearbox, carburetor or ignition.

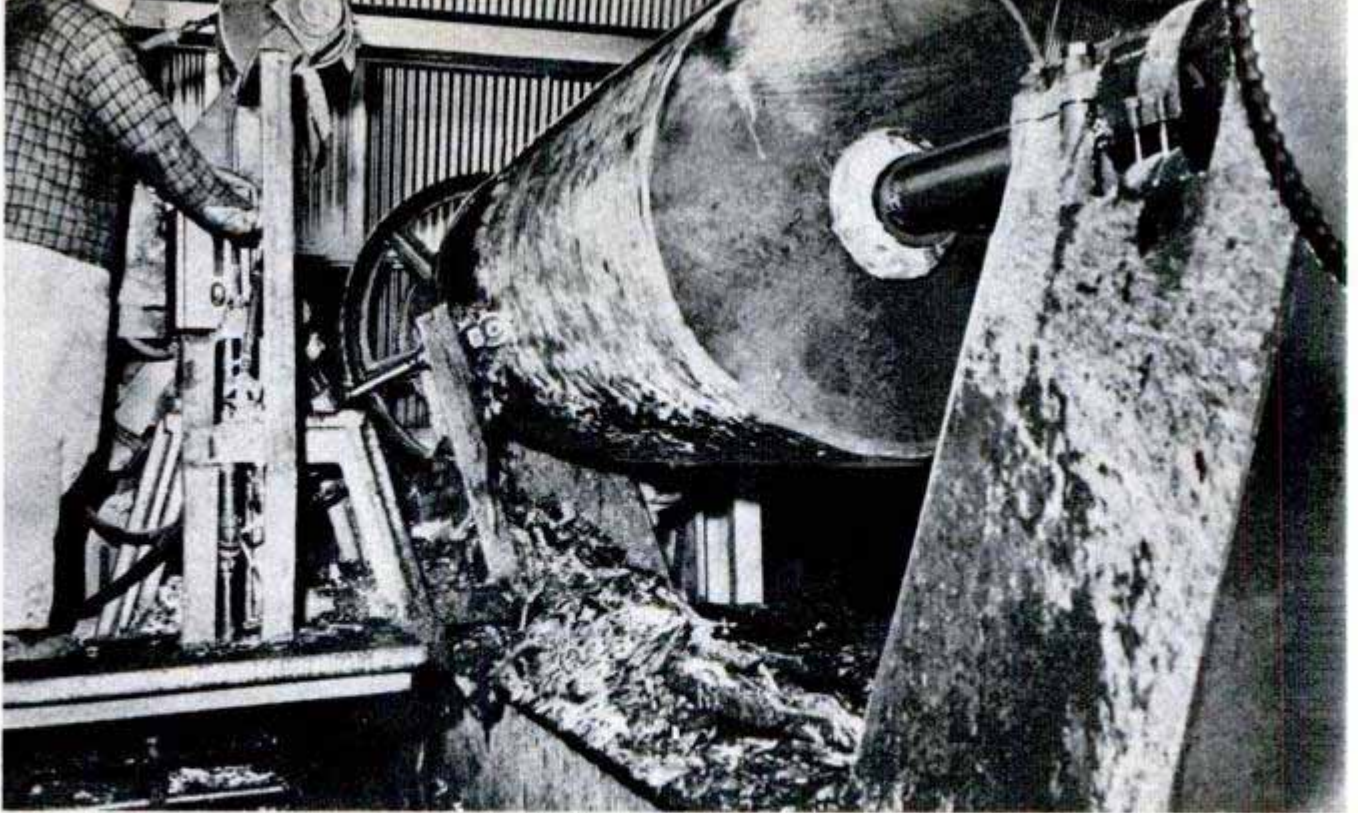
BONANZA IN BARK



Bark on old-growth Douglas firs like those above may be from six inches to two feet thick. There are plenty of these big veterans standing in Washington and Oregon

By
Robert H. Forbes

Bark in its fine-powder state. At Longview, Wash., after the grinding and screening processes, some is sold for plastic-molding compound and for use in cements and glues



As the log is rotated, a roller head is pressed against it with sufficient force to peel off the bark

CHANCES ARE that there is a liberal lacing of refined bark from Douglas fir trees in the shoes you're wearing. Soon, too, you may be polishing your floors with wax derived from the bark.

Uses for Douglas-fir bark, other than wrapping for trees, are now booming in the "big timber" country of Washington and Oregon. Well they might! The region's sawmills for some years have destroyed as waste almost 2,000,000 tons of this bark.

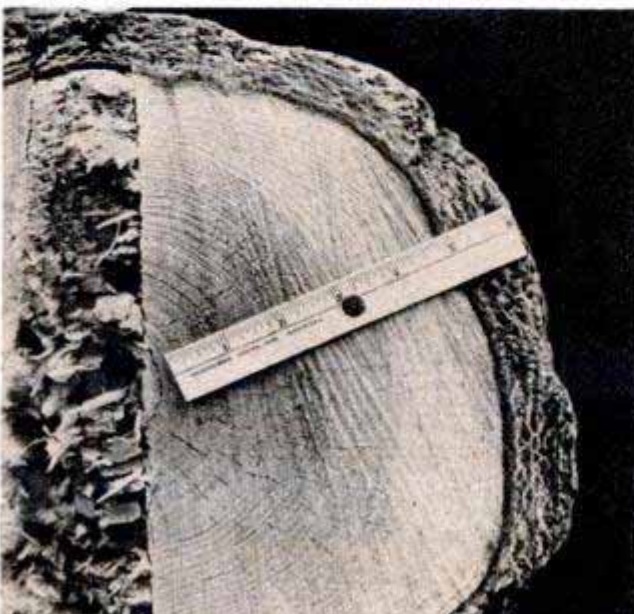
The hope of making dollars from their plentiful waste products has always interested lumbermen. The sawmill, wood-pulp mill and veneer plant of one company at Longview, Wash., alone pile up 200 tons daily of thick bark from fir logs, only part of which has been converted into market-

able products. Five mixtures of bark elements are now in regular production. Separated by grinding and screening, they contain various amounts of the three bark constituents—cork, needlelike fibers and a fine powder.

They are used for plastic-molding compound (your plastic ash tray may contain a good-sized portion of bark); as extender for plywood glues and in oxychloride and magnesite cements. They are also used in fertilizers and insecticides; in rubber; as a stabilizer in asphalt roof coatings; in hard-board (construction-board) manufacture, and explosives. Bark products also serve a unique purpose as a part of the "mud" and "completion fluid" that act as lubricants for oil-well bits as they bore into the earth.

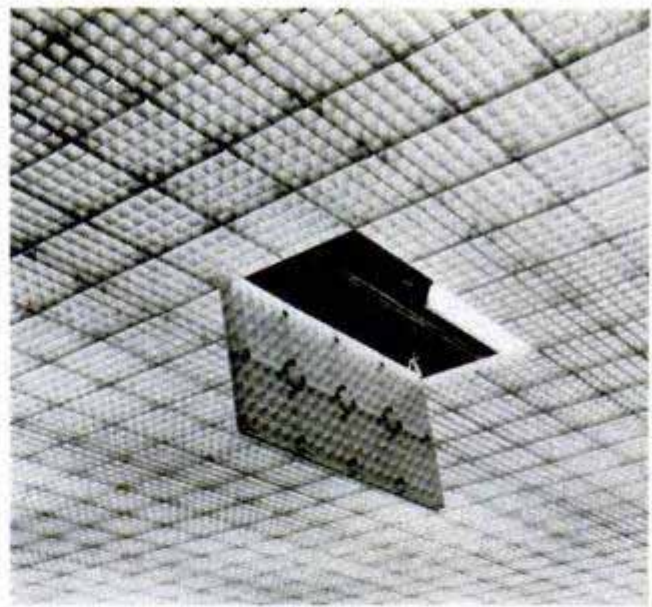
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Left, a six-inch ruler indicates percentage of bark on a small fir. Thick cork layers in chunks of Douglas-fir bark, right, are evident as light-colored bands. Needlelike fibers and fine bark powder are being poured





Clamping the plastic squares together is easily accomplished with a slight press on the small clips



Doors for servicing are quickly made. Special hanger hooks allow the sections to hang at right angles

Plastic Louvers Provide Sleek Illuminated Ceilings

Illuminated ceilings assembled from light-diffusing, fixture-hiding plastic louvers are now possible. Made of polystyrene plastic, the one-foot-square sections are clamped together side by side, hiding all light fixtures, plumbing, fire sprinklers and air ducts. The glareless, even light produced

is suited to theater lobbies, restaurants, stores and certain factories where goods are to be inspected or glass-covered gauges read. Hangers allow the units to swing out of the way for quick access to lighting or other fixtures. Removal for cleaning is also speedily accomplished.

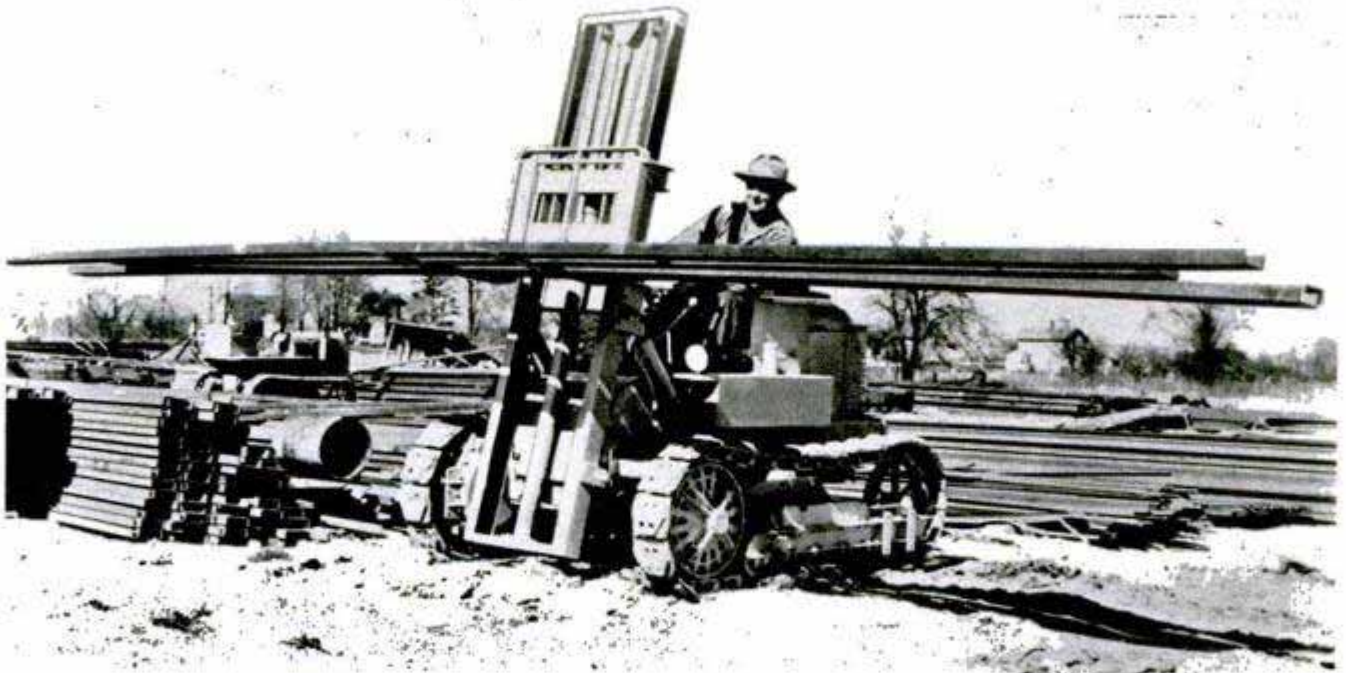
Electronic Guide Pilots Lawn Mower Through Tall Grass

Guided by an electronic "feeler" that ferrets out tall grass, a robot lawn mower does its job without human help. The machine is thrown into gear by raising the handle to an upright position. Once an initial swath is made in the lawn, the mower follows the uncut-grass line in decreasing circles until the last thin line is cut. The

electronic feeler, "brain" of the mower designed and built by Raymond P. Meyer of Omaha, is located just ahead of the front wheel. Only three inches long and two inches wide, it operates on two dry-cell batteries. The mower's one-horsepower engine weighs only 14 pounds and the complete unit totals 50 pounds.

Designer Meyer makes adjustments (left) and then relaxes as automatic attachment guides mower around lawn





Lift Truck on Crawler Tracks Operates Almost Anywhere

Thick mud, up to six inches deep, cannot stop a fork-lift truck mounted on crawler tracks. Maneuverable in terrain that would bog down other lift trucks, it is designed to handle heavy loads outdoors as well as

indoors. One model handles 2000 pounds with a maximum lift of 8½ feet; the other lifts 4000 pounds to a height of six feet. Attachments convert the machine into a bulldozer, angle dozer, loader or snowplow.

Photo-Retouching Machine Duplicates Skin Textures



Doubling photographic-retouching output, an electric machine renders more natural skin textures. The negative carrier, oscillating 3600 times a minute, converts strokes made by the retoucher's pencil into a diffused pattern resembling skin texture. If desired, an etching tool—available as an attachment—can be used in place of a pencil. The unit accommodates all negatives up to 8 by 10 inches, operates on standard current and has fluorescent lighting that will not cause the negative to buckle. Portable, it weighs only 25 pounds, measures 18 by 11 by 12 inches. The unit is available in three models for right-hand, left-hand or dual use.

Clamp-On Tow Chains Grip Bumpers Firmly

Automobile tow chains which clamp onto instead of encircling bumpers end the nuisance caused by obstructing ledges. At each end of an eight-foot chain are twin clamps joined by steel springs which hold them firmly to the bumpers. A self-equalizing section of chain on each end connects the clamps to the main chain. The chain weighs 5½ pounds.



☐ Clothes are protected by a ball-point pen which features a retractable point.



Ideal for operating in the wilderness, this Jeep was equipped by a wildlife photographer. Left, a crested lizard snapped in Arizona



DARKROOM in the DESERT

By E. P. Haddon

FOR A NUMBER of years I was content with my hobby of wildlife, travel and nature photography. Then the hobby developed into a profession that brought me a great deal of satisfaction as wildlife photographer for the State of Texas; later I became chief of the photo section of the United States Fish and Wildlife Service.

But always in the back of my mind was the desire to photograph our great Southwest entirely on my own. Recently I took the step.

With the knowledge of the ruggedness of this section of the country always before me, I decided that a Jeep with its four-wheel drive was a natural—aside from the fact that I was able to find a '49 model with insulated metal top (all in excellent condition) for \$500.

The Jeep's somewhat limited storage space did not stop me, but proved to be a

real test in planning. It was necessary to devise a means whereby I could carry food, water and equipment for extended stays away from any source of supply. My success with the Jeep should prove of interest to prospectors, hunters, fishermen, or anyone operating in wilderness or desert.

In order to organize my equipment, a box was made using $\frac{3}{4}$ -inch plywood joined with aluminum angles. This box exactly fitted the bed of the Jeep. Rear of the box, supported by a piano hinge, opens to form a sturdy table, which has proved to be almost indispensable. It is used for cooking and serving food, or as a desk when typing manuscripts and supports the backdrops I use when photographing small subjects.

This box, with its partitions, enables me to carry a large amount of equipment. Aside from its storage capacity, the box also acts as a divider, making it possible to utilize the

areas above each rear wheel. With such an arrangement, any item is available without having to disrupt the entire layout.

Two five-gallon Jeep cans fit the space over the right wheel. This takes care of water and gasoline for travel to remote areas. Over the left wheel rides a nine-foot-square umbrella tent, complete with sewed-in ground cloth, netting doors and windows, plus the stakes. It fits perfectly.

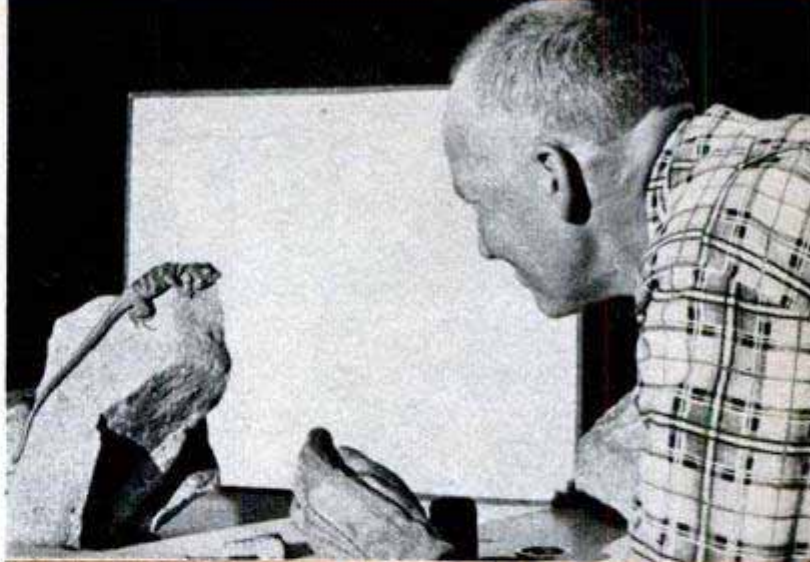
Four strong web straps with buckles were double-screwed topside of the box—two at the front and two at the rear. The front one holds a camp cot in place (could hold two), and at the rear, the collapsible tent poles are lashed down. Between them a bedroll is carried. The web straps are long enough to hold an extra bedroll. Inside the box is a shelf that holds a two-burner Coleman gasoline stove, cooking utensils and a large supply of canned goods.

In a government surplus store I found an oxygen maintenance chest, sturdily constructed of metal, fiber and plywood. With a few slight changes it gives me the equivalent, in smaller size, of the old-time Western chuck box. This chest stands 20 inches high, is hinged on the back side and has numerous Plexiglas drawers inside. Many food items are kept in this chest, along with a complete set of plastic dishes, silverware, paper napkins and other small items.

This little chest has proved a versatile piece. When meals are being prepared, it is opened and placed under the shelf, just back of the table space. This makes every item available. At night, if insects become bothersome, the chuck box becomes a typewriter stand inside my tent. Or, if an unexpected guest should arrive, it provides an extra seat.

Also at government surplus, I found three heavy canvas pads that are almost the exact dimensions of the box. One pad was used on the shelf and one on the bottom of the box inside to act as cushioning and to minimize noise. The other was fastened to the outside of the box, coming down far enough for the two Jeep cans to rest on, preventing the metal-to-metal clatter.

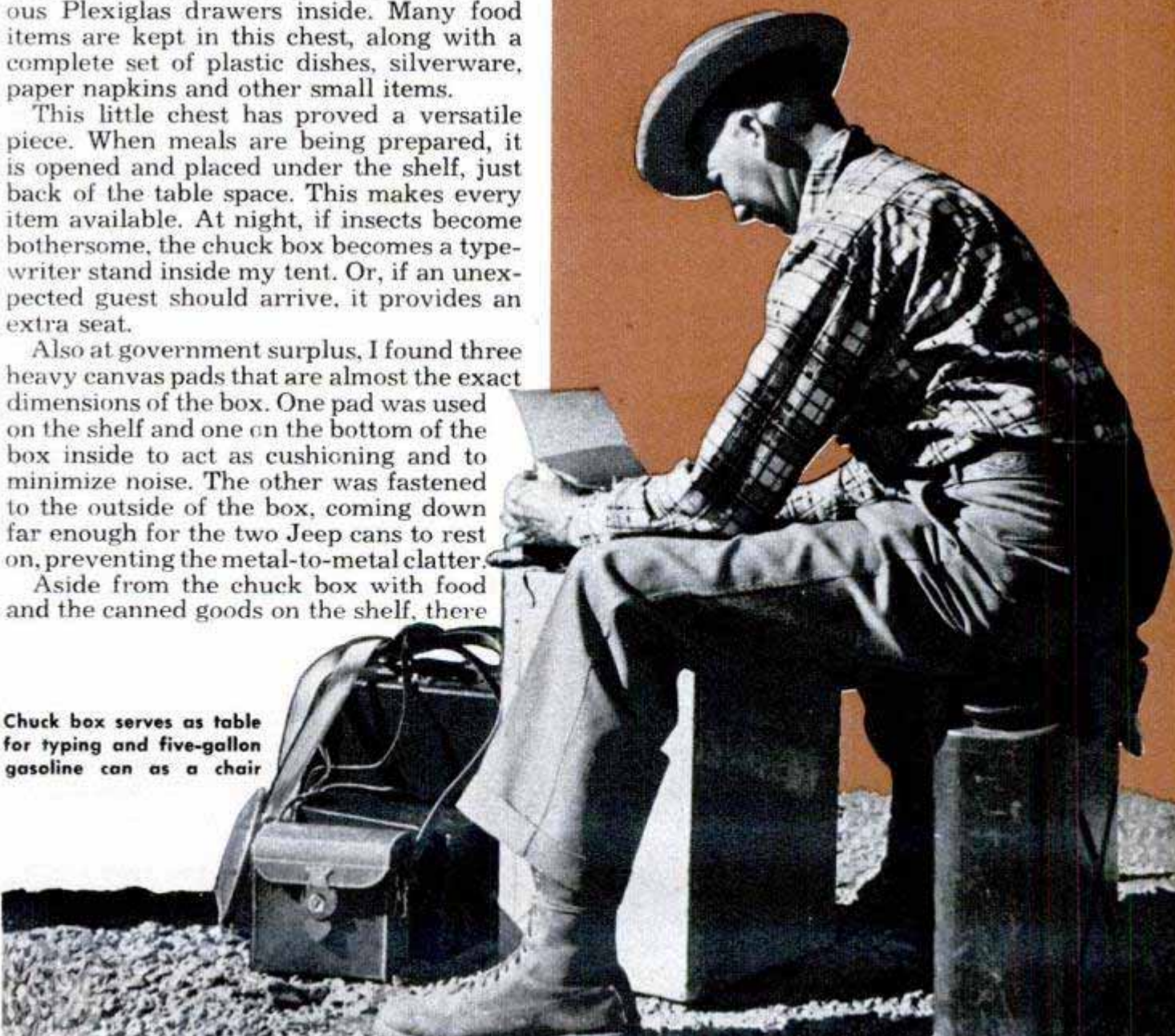
Aside from the chuck box with food and the canned goods on the shelf, there

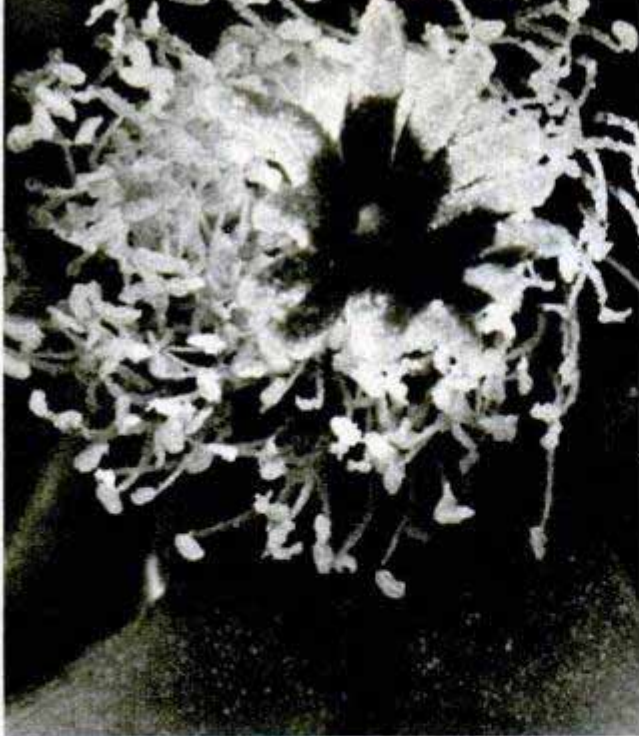


The author poses a collared lizard with the aid of background board he carries as prop for close-ups

A wildlife photographer adapted his Jeep as a rolling home and camera mount for the wilderness

Chuck box serves as table for typing and five-gallon gasoline can as a chair

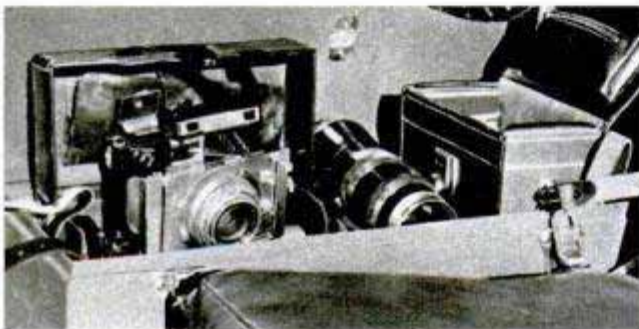




Enlarged shot of the heart of a cactus bloom was made by author "on location" with a 35-mm. camera



Author Haddon removed metal doors from his Jeep to photograph wild game that stands to look at the car



The Jeep camera case consists of a metal toolbox screwed to the floor and lined with sponge rubber on ends, sides and bottom. The case has a sturdy lock

Cooking is easy when the chuck box is opened and slid back under the shelf of big Jeep box. There is not only room for stove but a place to eat, too



is another box containing foodstuffs. Canned fruits and juices are particularly desirable in the desert areas.

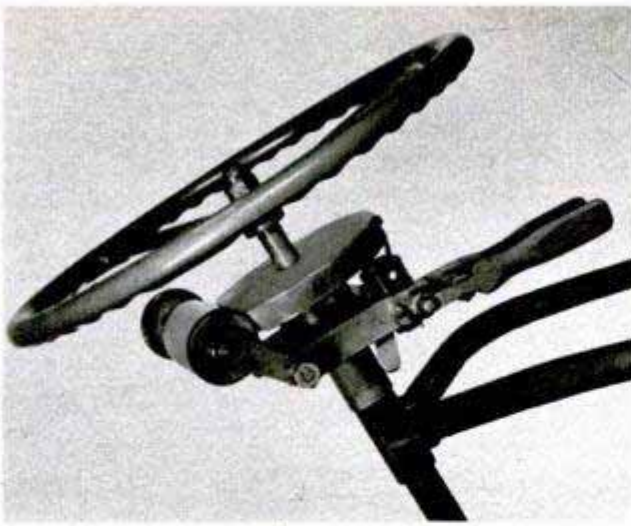
Stowed in one corner behind the chuck box are two cases which contain my portable darkroom, including a 35-mm. enlarger, stainless-steel trays, squeegee plates, dark-room lamps, developing tanks, chemicals and other necessary accessories.

A portable typewriter, stationery and a small ammunition box filled with field reference books find a place—along with a package containing a two-by-three-foot collapsible background to be used in photographing small objects. There is also room for a large two-suiter for my clothing.

Since driving over rough back country presents an extreme hazard to delicate photographic equipment, I placed it in a box, 20 by 9 by 10 inches, screwed to the floor with metal screws. This box is lined with sponge rubber, an inch thickness on the bottom and a quarter-inch on the sides. With additional cushioning of their specific cases, my cameras and lenses survived much rough travel without appreciable damage or loosening of screws. A Yale lock added to the box discourages any would-be prowlers.

The cab of the Jeep could be unbearably hot while working in the desert country, but removing the doors makes riding inside comfortably cool. Also, it helps give freedom of movement, for a camera can be handled easily without having to leave the driver's seat. Often, startled game will permit numerous snaps from a stopped vehicle, but will take off should the photographer step outside.

(Continued to page 252)



Left, close-up view of tractor pilot. Right, making "vernier adjustment" to lock the wheel securely

Automatic Pilot for Tractors Holds Steering Wheel in Position

Mounted on the steering-wheel shaft of a farm tractor, a locking device fixes the position of the wheel when the operator moves a small lever. Useful when the driver wishes to manipulate control levers, it also prevents constant "fighting" with the wheel during plowing or when working on rough ground. The device consists essentially of a matched worm gear and wheel, the latter

rigidly mounted on the steering-wheel shaft while the worm is hinge-mounted on the shaft tube or bracket. A light touch on the lever instantly meshes the two parts, locking the steering system in the desired direction. A small handwheel on the end of the worm shaft permits easy corrections or compensations in steering. The device is easily installed.

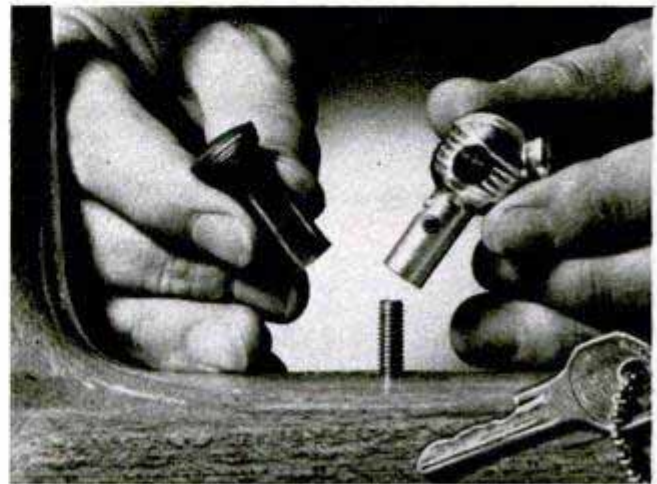
Book-Size Dictating Machine Is Portable and Lightweight

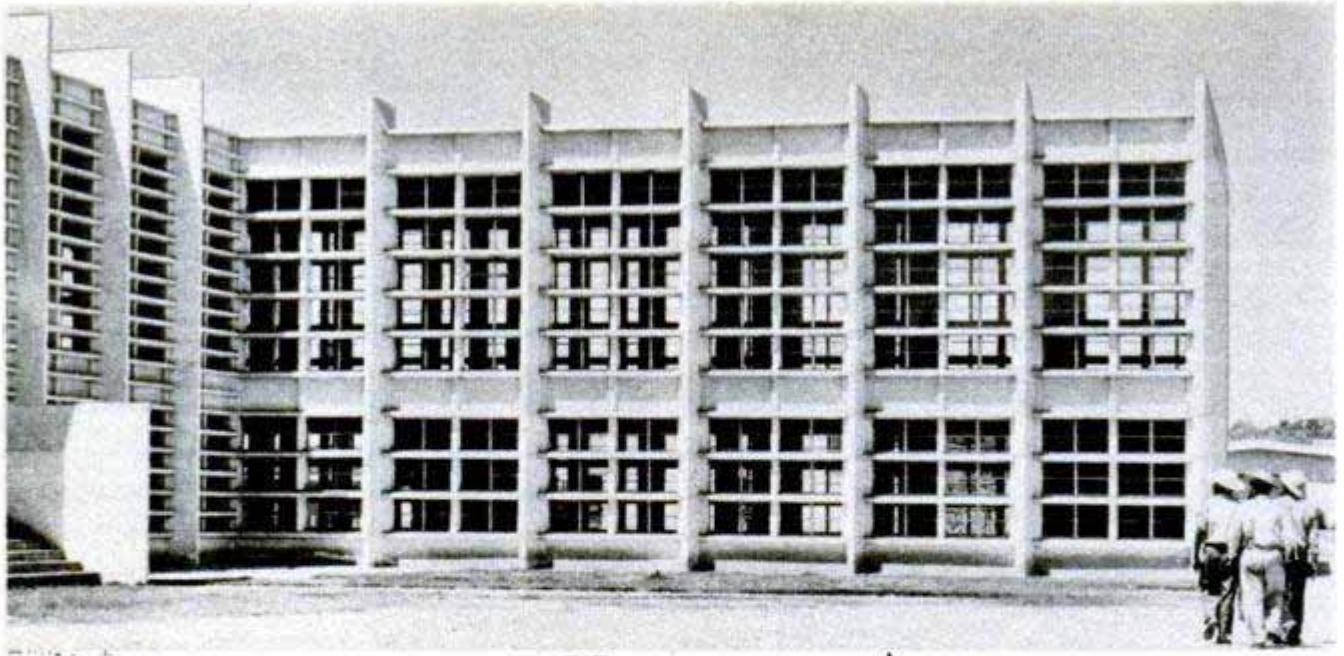


Shaped like a book, an 11-pound dictating machine is only 2½ inches thick and can be carried in a brief case. It records 30 minutes of dictation on a seven-inch reusable disk. One knob with four-way controls permits recording, complete playback, back-spacing to play back the last few words or any section of the complete recording. Lights indicate when the machine is turned on and ready to operate; an audible signal warns when the recording is near the end of the disk. The microphone serves as a loudspeaker for playbacks. A lock-switch holds the diamond stylus in place as well as anchoring other internal parts while the machine is carried.

Door-Locking Button Protects Children

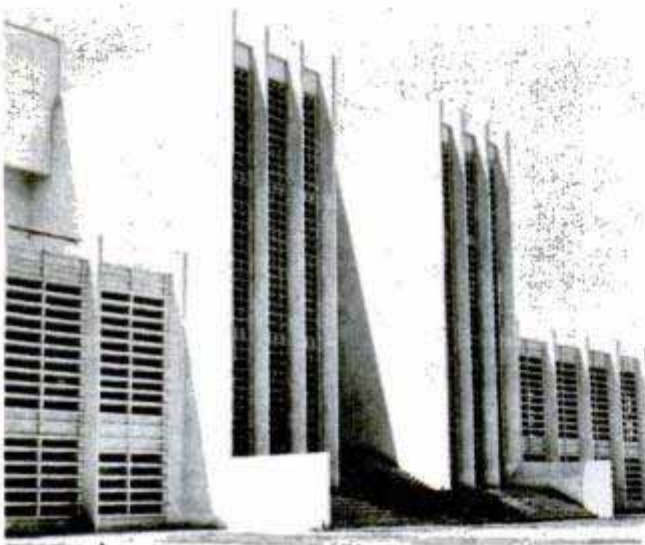
Rear doors of four-door sedans are made accident-proof by a small lock that replaces the conventional locking button in the window frame. Installation is simple: Merely unscrew the standard button and replace it with the new lock. For normal use, the lock acts in the conventional fashion. However, if you depress the safety button on the side of the lock, the door cannot be opened accidentally from the inside or outside by children. Positive in action, the device is unlocked with the car's ignition key.





Concrete and Glass University Building

Reinforced concrete and glass form the entire structure of a striking building on the campus of the University of Sonora in Mexico. It was designed by Mexican engineers and architects. Engineering principles resembling those developed in the aircraft industry make for lightweight rigidity. Economy, too, is a feature of the construction which uses the concrete slab as a structural member to cut down the amount of metal needed. A unique interlocking grid system permits the utilization of unusually thin concrete members.



Bumper Jack Operated By Handle on Top

You don't need to stoop down to operate a new automobile bumper jack; you simply turn a swivel handle on top. An adjusting lift hook supplied with the jack fits bumpers that have odd contours or deep skirts. Designed to prevent sudden drops or "handle whips," the screw-lifting action assures positive load control at all times. Easy and safe to operate, the jack has counteracting rollers which travel against the inner and outer surface of the U-channel supporting column and eliminate unnecessary frictional drag. The new jack is sturdy enough to support the heaviest passenger cars.

Sources of available products described in this issue are listed on page 12, 14 and 16. Sources of further information on other articles are listed in the WHERE-TO-FIND-IT LIST, which is available without charge to readers upon request to the Bureau of Information, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Illinois



Back from a world-girdling voyage, Danish scientists have brought home exciting evidence of

By Kai Norredam

ONE FINE JUNE DAY last summer, a beautiful white ship ran into the harbor of Copenhagen and was greeted by jubilant cries of welcome. From keel to deck the big vessel was loaded with weird things from all over the world. Upon its slender bow was painted the name *Galathea*. From a previous article, (March 1951) readers of *PM* will know this was the Danish deep-sea expedition which had come home after an adventurous voyage around the globe.

For two years the *Galathea* had been on the move. The expedition had passed over the deepest holes in the oceans, where the animal life had been completely unknown—nothing but one big question mark in our zoological knowledge.

What main results can be squeezed out of the voluminous reports from the *Galathea*? I put the question to the leader of the deep-sea expedition, Dr. Anton Fr. Bruun.

"The main purpose of the expedition was the exploration of depths greater than 18,000 feet," Doctor Bruun relates. "This was an almost-closed area to scientific research. The deep-sea scientist was in

Drawn up from a depth of several miles, fish net fastened to an iron frame is pulled aboard the *Galathea* with a load of queer luminous fish

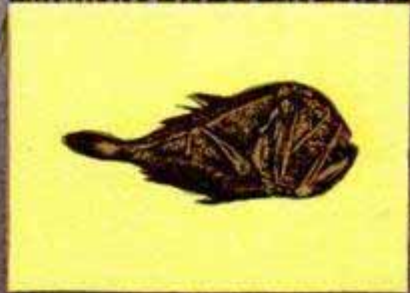
LIFE SIX MILES UNDER THE SEA





Professor ZoBell, American scientist on the Danish expedition, looks over his valuable collection of deep-sea bacteria which he keeps in vessels under 800 atmospheres of pressure and temperature of 36 to 38 deg. F.

Below, the Danish exploration ship *Galathea* at anchor off a tropic island. Inset at left is of a tiny sea monster with numerous legs like sticks. The other inset shows a weird fish that was brought up from the sea's depths



possession of very meager facts: A few sea cucumbers found 23,400 feet under the surface and some sponges from 22,800 feet. From more than 30,000 feet he had only a small sample of clay and one of water. Before the *Galathea* put to sea, nothing beyond this had been brought up from depths of more than 18,000 feet. Many biologists refused to believe in the existence of animal life beneath 24,000 feet. They claimed that life was impossible at this fantastic depth because of the tremendous pressure—about 800 atmospheres. Further, they pointed out that there could be no sun energy, basis of any form of life, at the greatest depths. The light of the sun penetrates at most to a depth of only 1200 feet. From here downward reigns an impenetrable darkness. The results of the *Galathea* expedition, however, prove these claims to be false.”

Although far from having mapped out in detail the fauna of the deep sea, the expedition has, nevertheless, revealed many of its secrets. Where before we had only vague hypotheses we are now in possession of facts, namely, many samples of various deep-sea animals.

Among the expedition discoveries is the finding that there are no “deserts” in the oceans as is the case on land. A Sahara of the sea will be searched for in vain. Everywhere there is life, even at depths that surpass the height of Mount Everest. Sea anemones, bivalves, sea cucumbers and other species have been found in these places. Rather primitive forms of life, but just consider how tough they must be to be able to live under the almost incomprehensible pressure of a thousand atmospheres—corresponding to the weight of a seven-mile water column.

Beneath 30,000 feet the *Galathea* scientists found only nine species of life, but as they came nearer the surface the conditions of life grow better in regard to pressure as well as food. Here they met various forms of life such as a crowd of weirdly formed, sometimes luminous, fish. The deepest catch of a fish was in the Java Trench at 23,400 feet beneath the surface.

The *Galathea* made deep-sea explorations at several places along the route, but trawling in the trench along the islands of the Philippines was anticipated with great



Here are some of the assorted eellike, shrimplike, fishlike creatures brought up from great depths at sea. Many are unknown to scientists

excitement. As Doctor Bruun tells about it:

“The Philippine Trench is next to the deepest hole in the earth. It is almost 35,000 feet deep, measuring 100 miles in length. It is from one to two miles broad, the sides being limited by rather steep slopes. We fished with a so-called sledge-trawl. This is a sack-shaped net, nine feet broad and fastened to an iron frame, to which are fixed two bottom dredges. The sledge-trawl is fastened to the long steel wire.”

The wire has a chapter of its own. The constructors had to consider that not only must the wire carry the sledge-trawl and the friction of the water, but also its own weight. Consequently the wire was tapered. The result was an 8-mile-long steel wire, one of its ends measuring 22 millimeters with a breaking strength of 33 tons, while the other end was only 9 millimeters in thickness and had a breaking strength of approximately 4½ tons.

“There were exciting hours when for the first time we were to scrape the bottom,” Doctor Bruun relates. “With a speed of only 2½ miles per hour, the sledge-trawl sinks downward into the unknown water until all eight miles of wire are out. We know the configuration of the area from previous investigations with an echo sounder. And then—forward goes our ship, navigated according to the echo sounder. The most difficult of all is to keep the trawl at the right depth. It must not



Eighteen-foot trawl is swung overboard far at sea; right, steel dredge brings up a chunk of the sea bottom

take too much of the bottom; but if, on the other hand, it floats just a few feet over the bottom, everything has been done in vain. So that you may understand, deep-sea fishing is just about as difficult as exploring the behavior of birds in a woods from a plane at a height of 30,000 feet—and in absolutely impenetrable darkness!

“But the catch of this trawl was sensational: Our net contained sea anemones, sea cucumbers, an amphipod and some bivalves, representing four main groups of animals.”

In all, the *Galathea* brought up 140 species from depths of more than 18,000 feet. The animals inevitably died when they came up to the surface because of the steep reduction of pressure and the great difference in temperature which exists between surface and bottom with the latter's mere 36 to 38 deg. Fahrenheit.

Among the most interesting happenings on board the *Galathea* were the bacteriological experiments of Professor ZoBell. Reports that ZoBell, aboard the *Galathea*, had brought up bacteria from a depth of

Professor ZoBell examines copper vessel dented by pressure at great depth; glass balls fit in containers





Prof. Grace Pickford of Harvard University visited aboard the *Galathea* to inspect deep-sea specimens

18,000 feet were sensational news to scientists all over the world. There was not the slightest suspicion as to the existence of these high-pressure bacteria. By means of a specially constructed, ingenious little high-pressure apparatus, Professor ZoBell put his bacteria under a pressure of 800 atmospheres at a temperature of 36 to 38 deg. Fahrenheit. The professor was overwhelmed with joy when he discovered that these microorganisms were actually living and breeding. This meant they were accessible for various experiments.

Professor ZoBell's bacteriological experiments will teach us under what conditions oil is produced, thereby helping the oil geologists find new sources. Professor ZoBell has taken his rare organisms home with him to the University of California.

"Those bacteria have given me plenty of work for the rest of my lifetime," he says.

As a proof of the enormous significance that various societies ascribe to his work, the professor has been granted \$83,000 for continued research. No doubt, the near future is going to hear a lot of grand news from ZoBell's laboratory at Scripps Institution of Oceanography in LaJolla.

Though deep-sea exploration was the main purpose of the *Galathea* expedition, many other subjects were studied, such as various zoological fields, ethnology and measurements of the magnetism of the earth.

Since ancient times man has been aware of the curious fact that the earth is loaded with magnetism. And just as long have the



Octopus and flying fish were caught near surface at night fishing by floodlight from side of ship

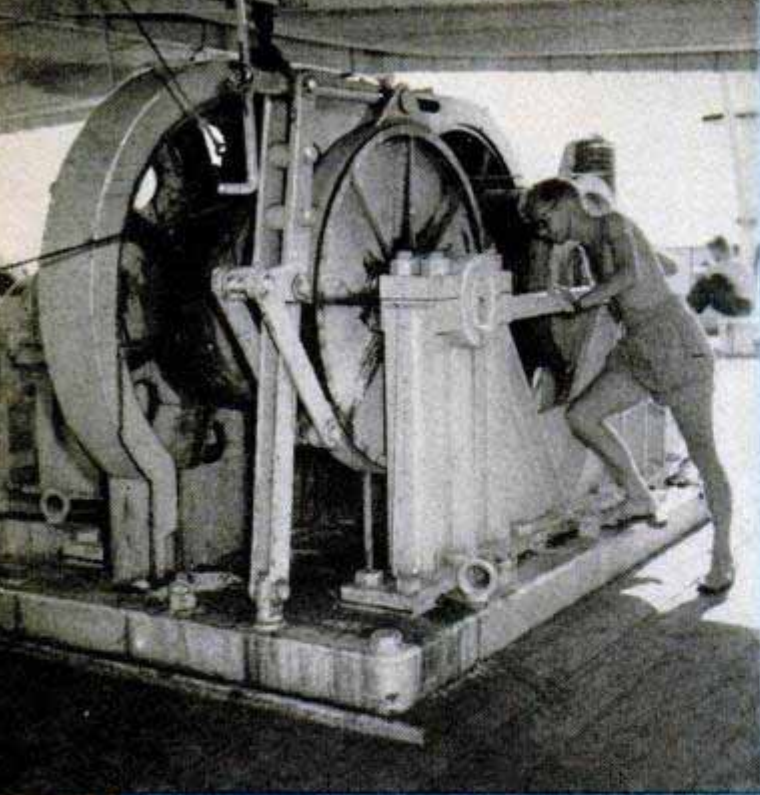
sources of this natural force been a puzzle to the wise men. Where did the mysterious force originate that makes the needle of the sailor's compass turn north, no matter where he is?

During the centuries, theories of various sorts have been put forward in order to solve this problem.

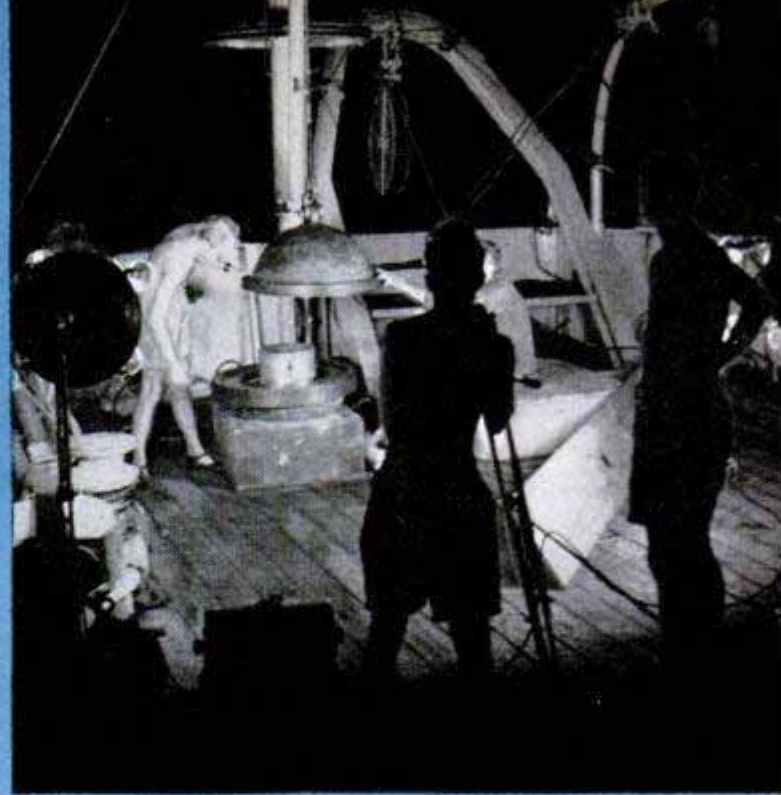
According to older theories the magnetism is due to certain qualities of the interior of our globe, which consists of floating iron and nickel. In 1948, however, the Nobel prize winner, Professor Blackett from the University of Manchester, advanced a new epoch-making theory. He said that all bodies with a mass—and so, of course, the earth—are surrounded by a magnetic field, *when they move*. In this way he explained the magnetic field of the earth as a result of its rotation around its own axis. If an old theory is correct, the strength of the magnetic field must increase toward the interior. If Blackett is right, it will decrease. So the job would be to find out whether the magnetism actually grows more or less intense towards the center of the earth.

This was an ideal job for the *Galathea*, partly because at sea greater depth may be reached than on the ground, partly because the injurious influence on the measurements from certain magnetic rocks would be insignificant in the ocean.

The measurements that were carried out on board the *Galathea* did not concern the exact direction of the magnetic field. This varies all over the world, being vertical at

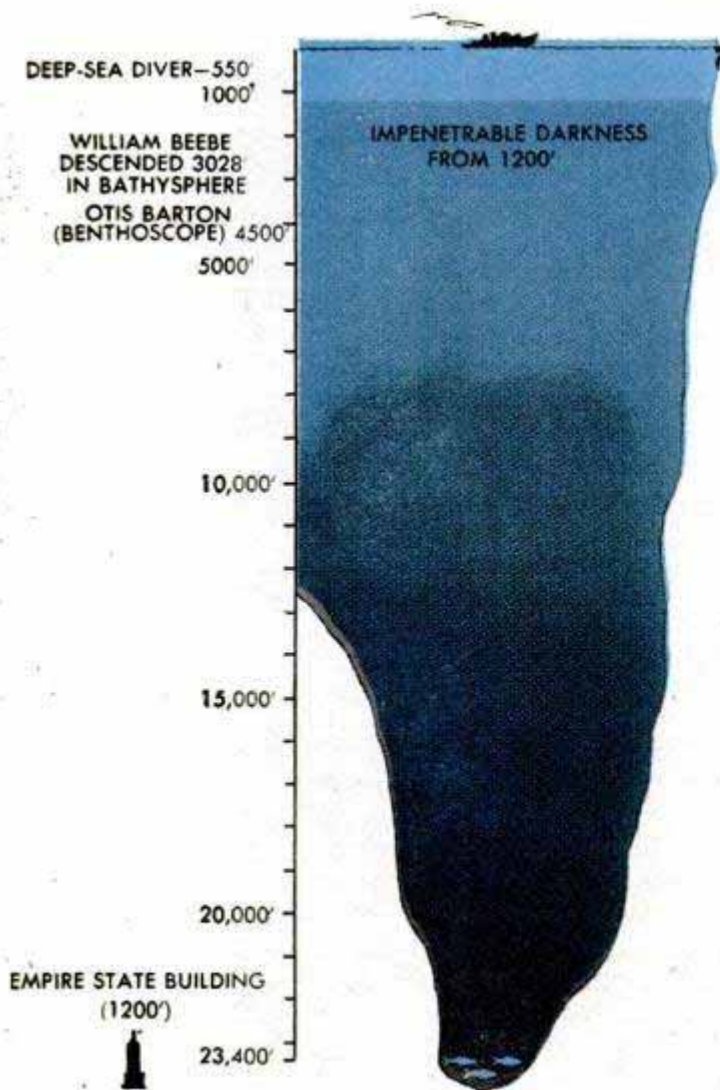


Giant winch holds eight miles of wire used for lowering sledge-trawl in deep Philippine Trench



Sphere for testing magnetism is readied for drop overboard. Test unit is in lower half of sphere

Below, sketch shows depth of ocean probed by expedition scientists in search of deep-sea fish. Forms of plant life and bacteria were found farther down



the poles and horizontal at the equator. Besides, the actual strength of the field is of minor importance. The point is whether it increases or decreases with depth.

In order that the delicate, immensely accurate apparatus might stand the enormous pressure of almost 1000 atmospheres, it had to be protected by hollow spheres. For this purpose two spheres were constructed, a single sphere weighing 2400 pounds and a double sphere weighing 3600 pounds. The walls are four inches thick, the inner diameter 20 inches. It proved very difficult to find an alloy that was completely nonmagnetic. After many vain attempts, a Danish firm finally succeeded in making a special bronze alloy—the so-called "Galathea bronze"—which suited the purpose well.

The *Galathea* scientists used two instruments for measuring the vertical and horizontal parts of the magnetic field. The apparatus for measuring the vertical force principally consists of a magnetic needle (as in a compass) turning around a horizontal axis with its center of gravity beneath the point of rotation. At the same time, the needle is influenced by an artificial magnetic field, the strength of which equals that of the earth at the surface but is opposite in direction. Consequently, at the surface of the ocean, the needle will be horizontal. When the instrument is sunk into the sea, the needle will turn one way if the field grows stronger (thus confirming the old theory) and turn in the other direction if the field decreases (thus delivering proof of Blackett's theory). A mirror,

fixed to the compass needle, reflects a ray of light to a strip of photosensitive paper, recording the needle's motion on the paper.

A third instrument used on the *Galathea* measured the horizontal component of the magnetic field and was intended for the double sphere. It worked on more modern principles. An electric coil rotates 1500 turns per minute around a vertical axis and thus induces a current, the strength of which depends on the strength of the horizontal component of the magnetic field. The current, being extremely weak, is amplified and registered. In the lower part of the double sphere is the coil, made of non-magnetic materials. In the upper sphere are the motor and the amplifier. They must be kept at a distance of at least six feet from the coil or else they would influence the magnetic field around the coil.

A lot of technical difficulties had to be conquered before successful measurements could be taken. Apparently for no reason at all, the bronze sphere rotated like a spinning top when lowered into the sea and actually succeeded in untwisting the steel wire about 20,000 to 30,000 turns during an immersion. So the men put up a jointing arrangement 30 feet above the sphere and equipped it with a rudder. Then, finally, it stopped rotating. The two halves of the

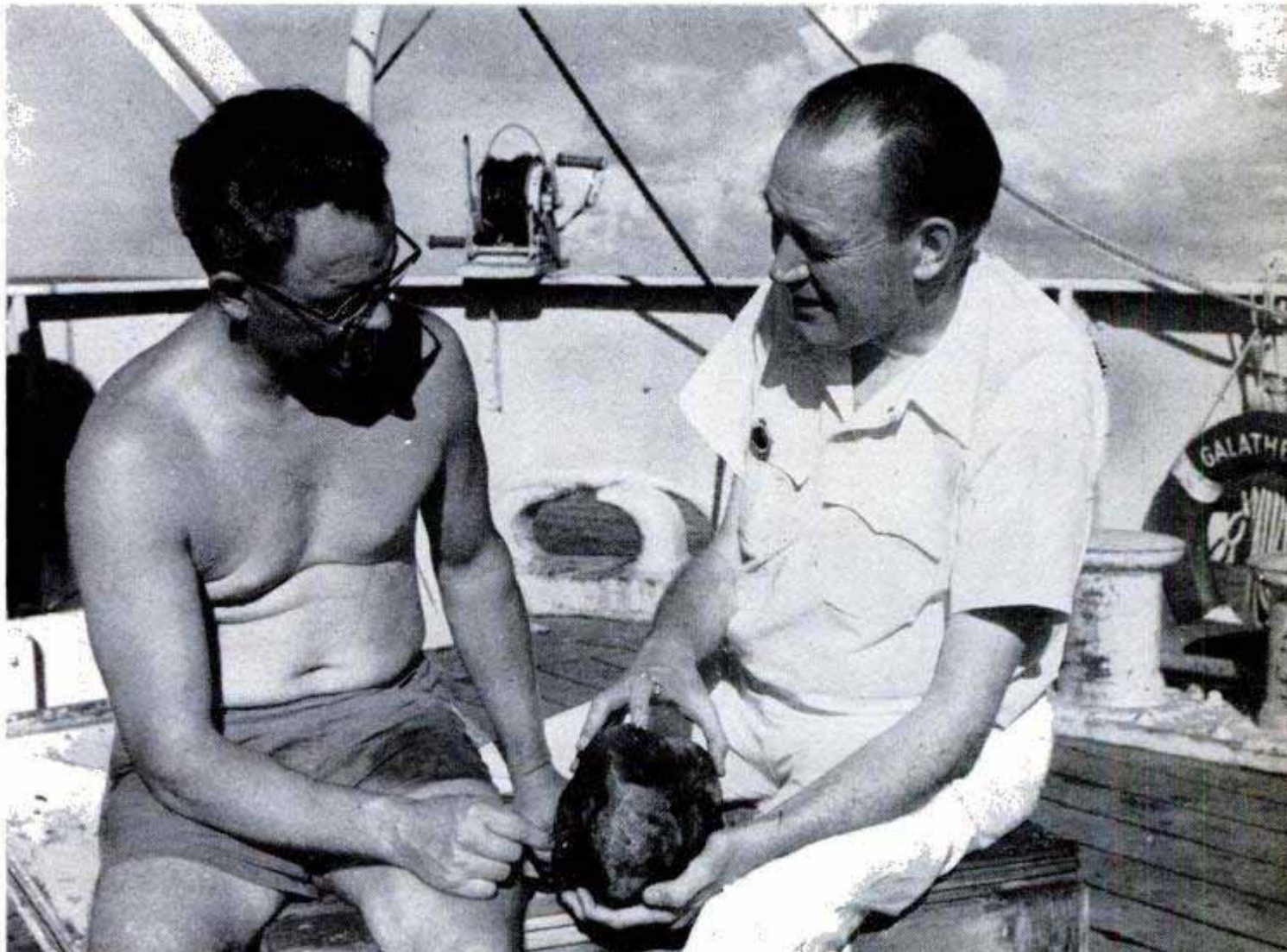
bronze sphere did not fit tightly enough, and water seeped in under the enormous pressure. Not until our arrival at Singapore could the jointing surfaces be ground sufficiently accurate to keep the water out.

In the meantime the *Galathea* had reached the Tonga Trench. The technical problems had been overcome and they were going to make the all-decisive immersion to the bottom—30,000 feet below. Then a catastrophe happened: The big winch broke. The experiments had to be delayed just as the end was in sight. Not until they arrived at Los Angeles could the winch be repaired. Measurements were carried out in the Panama Bay at a depth of 15,000 feet. These investigations show that the magnetic field increases toward the bottom—a refutation of Blakett's theory. Because of influences from magnetic rocks they did not, however, get the final scientific proof. It lies waiting for us about 30,000 feet beneath the surface, in the darkness of the Tonga Trench.

For the first time in history it had been proved that there is life at depths greater than 18,000 feet. This is of great scientific importance and is undoubtedly the most sensational finding of the expedition. The basis of all life however is the production

(Continued to page 240)

Dr. Anton Bruun, leader of *Galathea* expedition, right, examines sea anemone with American Professor ZoBell





Army-Ration Heater Is Smokeless

Canned Army rations are heated in the field by a new fuel unit that burns without visible flame or smoke. The flexible heater is wrapped around a can of field rations and ignited with a match. The invisible flame heats even frozen food to the proper temperature within a few minutes. Ration heaters now in use must be shielded from the wind and also tend to generate smoke that might disclose the soldier's location. The new heating unit was developed by the Quartermaster Corps.

Oil Fuel Drums Reclaimed by Speedy Navy Process

Battered fuel barrels bound for the scrap heap are made good as new by a speedy reconditioning process in use at a Navy depot. Leaky, rusty and dented drums are first straightened on their ends by a machine that takes the kinks out of the rims. Then a "dedenter" literally blows the dents out of the drum with high-pressure air. Diamond-shaped links in a chain scrape away rust on the inside of the barrel before

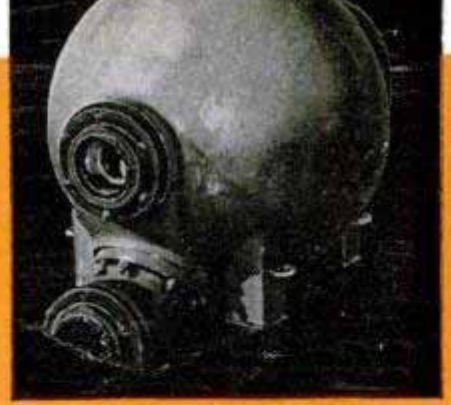
a solution of hot caustic soda goes to work on it. Wire brushes flying around the outside of the drum clean off scale and loose paint. Leaks are plugged, paint is sprayed on and an infrared drying oven winds up the process for a cost of only one tenth as much as a new drum. Over a month's time, the treatment saved the Navy almost \$90,000. The process allows the drums to be stored in the open for 18 months without attention.

Ancient Cedars Form Memorial for Logging Industry

As a memorial to the industry upon which the city of Vancouver, B. C., was founded, residents have erected a huge commemorative arch made of three ancient cedar trees. The cedars, cut within the city limits, are expected to form a symbol of the logging industry for hundreds of years.

Cedar is noted for its resistance to rot, and the trees are mounted on concrete bases. The huge log forming the top of the arch came from a tree 120 feet tall and 12 feet in diameter near its base and weighs 30 tons. It is estimated that the log is more than 1000 years old.





DEEP-SEA PHOTOGRAPHS



Allan Hancock Foundation photos

↑ Camera which took the photos was mounted in a 3000-pound steel ball with side opening for the lens and a lower one for the strobo-light

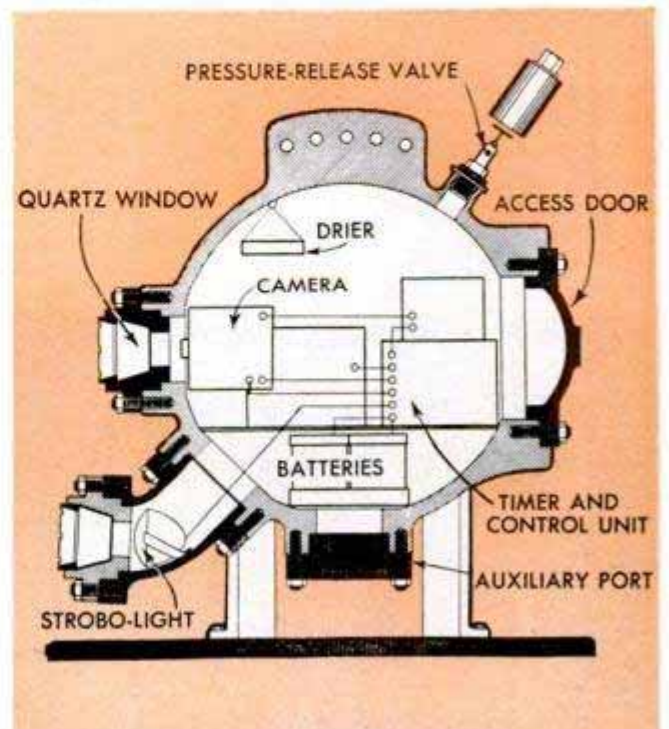
Above left, unknown kind of jelly-fish was photographed at a depth of 5620 feet. These strange, tentacled creatures live in total darkness

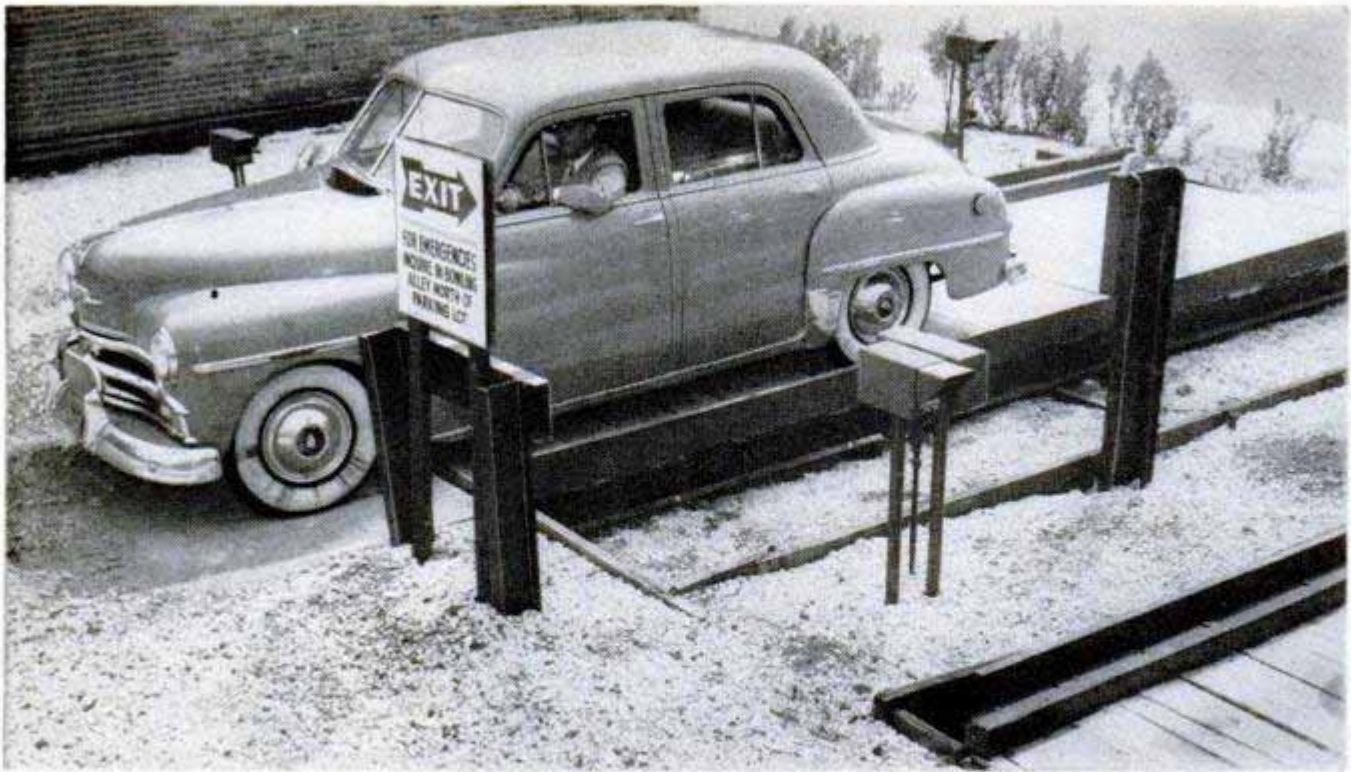
← Ocean bottom, 4356 feet below surface, reveals tentacles of unknown form of life, probably a wormlike creature with body buried in mud

IT HAS BEEN said that science knows more about the surface of the moon than of dark underwater areas that comprise more than 70 percent of the earth's surface. The Hancock Foundation of the University of Southern California has recently been peering into this vast unknown with the aid of a special underwater camera. The resulting photographs reveal organisms never seen by man. At some depths fish apparently carry their own lights like fireflies. Others probably swim with their enormous mouths open to collect as much organic debris as possible. Many are carnivorous, for large plant life and succulent algae do not exist below 600 feet. The camera was mounted in a 3000-pound steel sphere, with one opening for the lens and another for a strobo-light. A timer was preset to take one exposure every 30 seconds in hopes that the shutter would flash as sea life passed in front of the lens. This was an advance over the previous technique of lowering a camera for a single shot. The steel ball containing the photographic equipment, called a benthograph, was lost when it became hopelessly wedged in rocks 2100 feet below the surface of Santa Catalina Channel. However, it had already taken many photos including the two shown above. Photos of deep-sea basins, where the water circulates so slowly it becomes stagnant, show an abundance of worms, brittle-

stars and other creatures living in total darkness at 5000 feet. The photos prove that the ocean floor is bumpy from the burrowings of these animals. The scientists now are planning to build television into their next steel sphere to give them a camera-eye view of the ocean floor from the ship's deck.

Drawing shows equipment carried in the benthograph. The ball was lost in the rocks of a submarine canyon



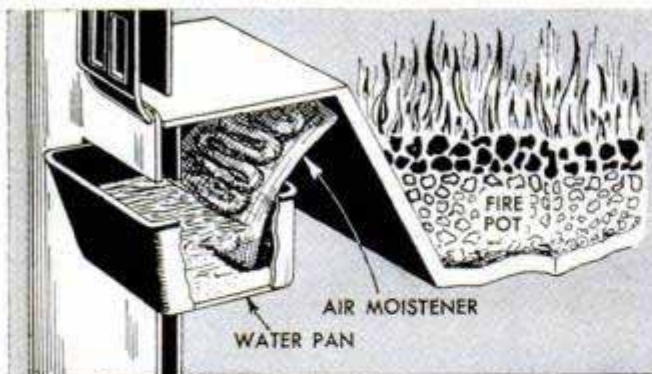


Parking Device Eliminates Need for Attendants

Guarding the entrance and exit of a parking lot, a completely automatic device collects parking fees, keeps a running count on the number of parked cars and prevents the entrance of more automobiles whenever the lot is full. An automobile coming into the lot rolls onto a flush platform, but is prevented from passing by a barrier in front of the car. The driver reaches out and deposits money in the coin box. This activates an electric motor that moves the

platform to the right of the barrier, allowing the car to enter and park. Signals from an electric eye cause the platform to move back to its original position, ready for the next automobile. The exit unit is identical with the entrance unit, a coin being necessary to activate the mechanism. A counting device set at the capacity of the lot flashes a "full" sign when that number is reached, stopping the operation of the entrance mechanism until a car leaves the lot.

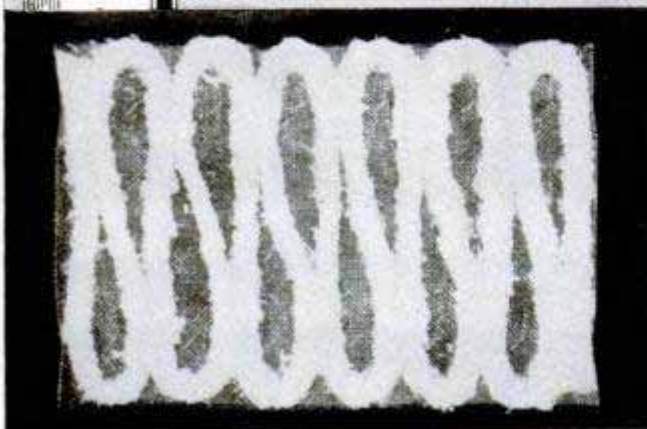
Humidifier Uses Asbestos Wick to Double Moistening Capacity



Made of asbestos wicking enclosed in bronze screen wire, a humidifier is attached to the water pan on warm-air furnaces with metal staples. It will not rust, rot or burn. This humidifier, or moistener, will increase the amount of water evaporated in the ordinary furnace pan two to three times, according to the manufacturer. The water-saturated wick, in an upright position at the back of the furnace pan, is fully exposed to the circulating air and heat from the fire pot.

Sandy Rubber Bounces At Low Temperatures

Developed for high-altitude airplane de-icing systems, a synthetic rubber, vulcanized and reinforced with fine sand, does not lose its bounce in extreme cold. Although most silicon-type rubbers snap when stretched more than twice their normal length, the new rubber will expand 600 percent without damage.



READ ABOUT ALL
THE '53 CARS

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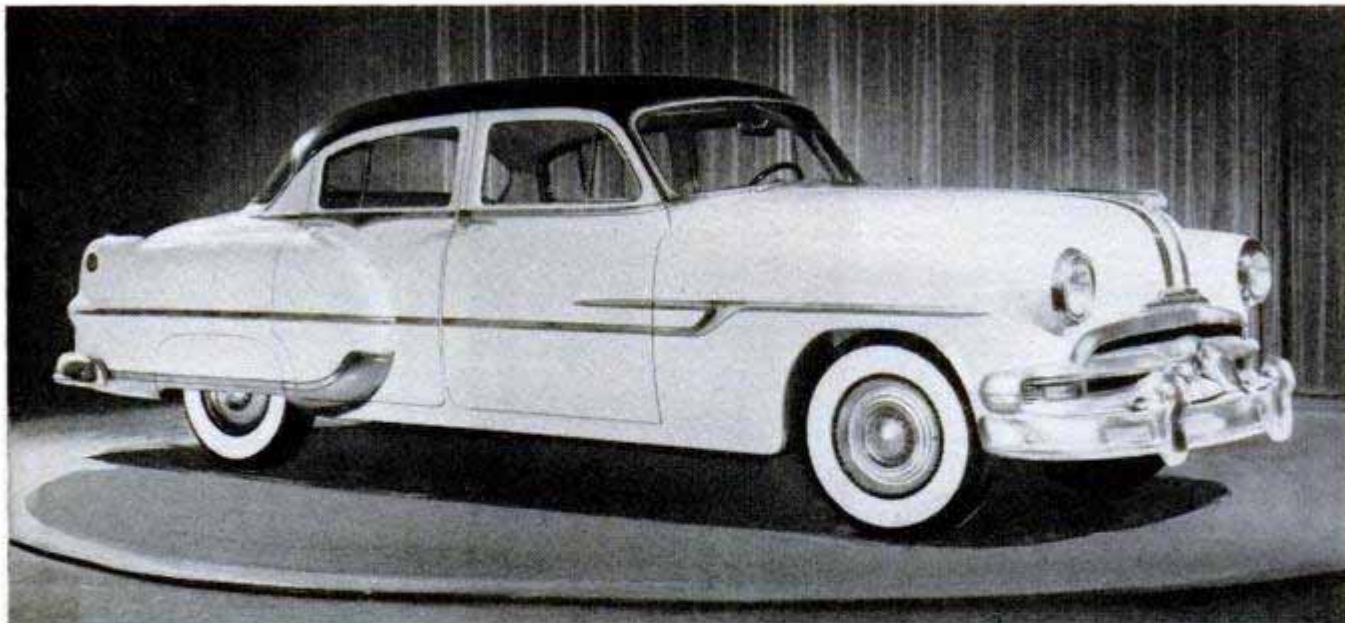
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on the newsstands January 27



Pontiac retains its personality despite complete restyling. Famed chrome striping is changed only slightly

'53 Pontiac Provides First View of General Motors' Styling; Ford, Mercury Get Face Lifting; Packard Revives Clipper

FIRST OF THE General Motors' line to appear, Pontiac presents an all-new body for 1953. Also making news are Mercury, Ford and Packard—all basically unchanged from 1952. Packard revives its Clipper line, dropped before World War II.

Pontiac's 1953 bodies are roomier and on a longer (122-inch) wheelbase. A redesigned front suspension system makes high-speed turning easier and reduces tire scrub. To make slow-speed steering easier, but slower, the over-all ratio was boosted from 22 to 1 to 25 to 1.

The Pontiac 6 has been upped to 118 horsepower (compression: 7.7 to 1) by duplex carburetion and a new intake manifold, new camshaft and smaller combustion

chamber. Other changes include one-piece wrap-around rear window, one-piece curved windshield, a rear-fender fin and ignition-key starting. The rear door on four-door models is squared off at the top for easier access and unhindered side vision. In sedans, knee room is about two inches greater in the rear seat. Extras include power steering and automatic headlight dimming.

Mercury in 1953 has only identification changes from 1952. A chrome strip from headlight to taillight along each side increases the apparent length of the body. Some power has been added by changes in the muffler and exhaust system, but horsepower rating is unchanged.

Ford improved riding qualities for 1953.

Front-end road shock has been reduced drastically by improved springing and larger compression bumpers. The company claims 80 percent reduction in front-end impact over a two-inch bump at 40 miles an hour. Styling changes include a cleaner front grille, larger taillights and lower rear bumper.

Packard's new combustion chambers boost horsepower to 180 in the big model, 160 in the Clipper De Luxe and 150 in the Clipper. Compression ratios are 7.7 to 1 in the 150, 8 to 1 in the others. The Clipper sells from \$2500 to \$2800, the big Packard from about \$3000 to \$6900 giving the company two price lines for the first time since before World War II. ★ ★ ★

In the four-door Pontiacs, the rear doors have been squared off on the top to provide easier access and better passenger vision



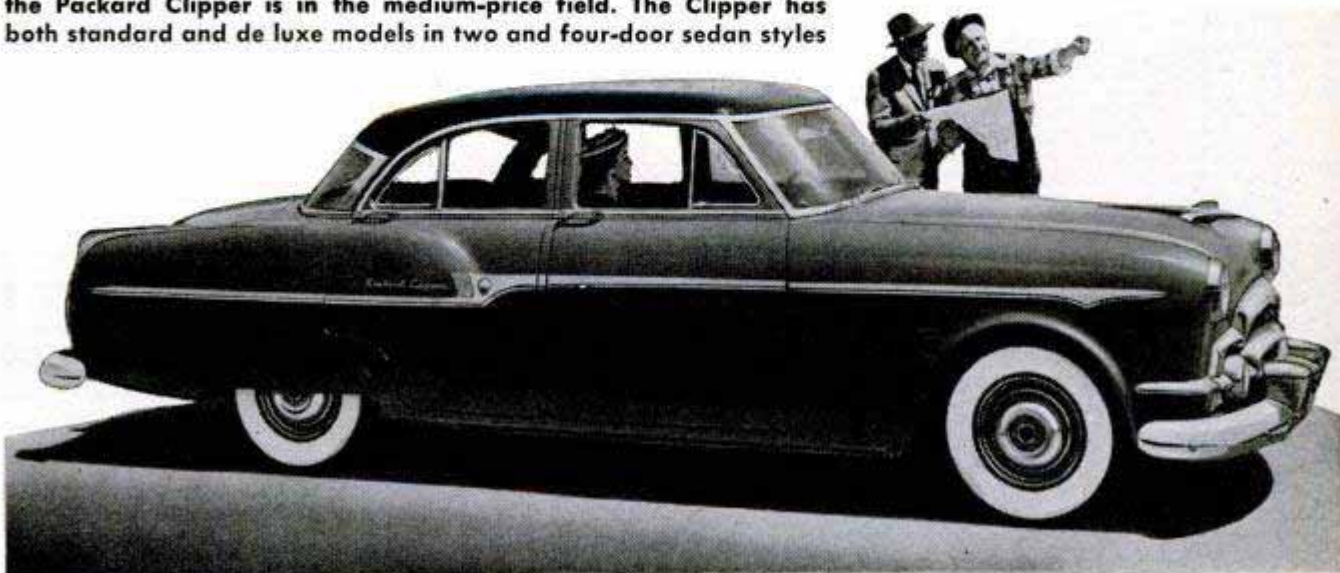


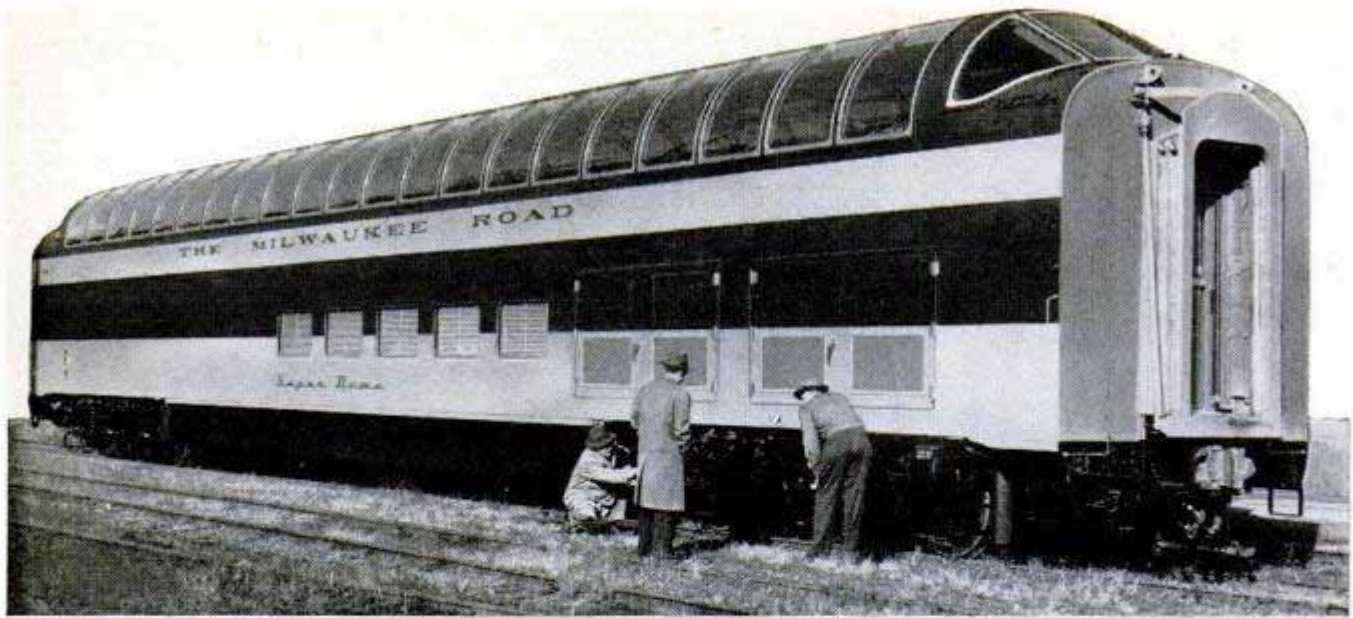
To make the 1953 Mercury appear wider and lower, designers have given the bumper grille a new treatment. The long chrome side molding also makes the car seem lower and protects it from parking-lot scratches

Most of the Ford changes are invisible, as engineers improved the ride for '53. However, you will notice the cleaner front grille and the chrome stripe on the rear fender. Taillights are larger



In production again for the first time since before World War II, the Packard Clipper is in the medium-price field. The Clipper has both standard and de luxe models in two and four-door sedan styles





Double-deck Super Dome cars provide an unobstructed view from the upper level and snacks in the dining-lounge section below



Center aisle stretches the full length of spacious dome car with stairways at either end. The curved-glass window sections are five feet high. Seats have lower backs than the ordinary coach seats for better forward visibility and are nonreclining type



Super Dome Rail Car Seats 68 Passengers

FULL-LENGTH observation cars, called Super Dome, provide seats for 68 passengers and a dining and lounge section on a lower level accommodating 28 persons. Ten of the new cars are making their bow on the *Hiawatha* trains of the Milwaukee Road operating between Chicago, Milwaukee, St. Paul, Minneapolis, Seattle and Tacoma. The 42 curved window sections on each car measure five feet high and more than three feet wide. Stairways at either end enable the passengers to walk the full length of the car through the dome section. Passageways on the lower level permit passengers to reach other cars without having to walk through the dining-lounge section. Each double-deck car is air conditioned with refrigeration equipment that could produce 20 tons of ice a day. Unique features of the heating and cooling system are two "solar disks" atop the dome to supplement the regular thermostatic controls. These disks lower the temperature setting depending on the sun's heat. The cars weigh 200,400 pounds each and were built by the Pullman-Standard Car Mfg. Co. at a cost of \$320,000 apiece. Six-wheel trucks, which weigh 65,550 pounds and were designed for high-speed train service, support the cars. The cars are 85 feet long and the dome top is 15½ feet above the rails.



Detroit Listening Post

By Siler Freeman

ANOTHER BIG DAY of the new-model season dawns this month. Chevrolet will present its 1953 models and its answer to competition will be awaited not only by its dealers, but by its arch-rivals, Ford and Plymouth.

Something of a disappointment to Chevrolet's prospects is the fact that its V8 engine has not reached the stage where it can be offered even optionally. Only new engine in the GM line will be in Buick.

However, Ford prospects suffered the same disappointment and so did Plymouth. So the low-priced class stays on the same footing engine-wise for the time being.

But each is rushing ahead with plans for new power plants. Ford's is about the farthest along. Next is Plymouth's and again Chevrolet will have a chance to examine its competition's best before it goes into production.

What happens this month will probably tell the story of whether the auto industry will have a return to old-time competition or just a mild renewal. After the holiday letdown, plants will start building up stocks for the spring selling. Controls of some sort are still present and few auto-industry officials can see real competition until they can gear production to the market.

Controls are due to expire April 30. The general opinion is that they will be allowed to do so. Then the prewar rivalry that characterized the industry's strides will be much in evidence.

The new models unveiled so far and those that will complete the 1953 lineup this month show what has been done in anticipation of returning competition.

In cases where something new hasn't been added, the old has been improved. This will be true of two cars that will show this month. Both Chevrolet and Buick have improved their automatic transmissions. Both are of the same type, torque converters. Both have faced the same criticism from their users—smooth operation but uneconomical in the lower ranges. How well they have done to offset this criticism will be seen in their 1953 versions of the Powerglide and Dynaflo.

Charles A. Chayne, head of GM's re-

search engineering, has hinted at greater developments in the automatic-transmission field just ahead. He went to England to make these disclosures before several scientific societies. The developments have been carried on in great secrecy. How soon the corporation will be ready to disclose them is a matter only for guesswork.

Enthusiastic though its proponents are, air conditioning for cars this year will be limited both by price and production. GM will have the only unit available from its Frigidaire division and it will go not only into its higher-priced lines, but also into the Buick Super.

Inspection of the new models will show little improvement in the quality of the chrome. Despite the relaxation on the use of a slight coating of nickel over the copper before application of chrome, the thinness of the brightwork is apparent. Wider use of stainless steel is the only answer.

But the industry is continuing its search for better materials. Its war on corrosion is said to be progressing with new chemical rustproof treatments paying dividends. One of the metals under consideration for future use in cars is titanium. This is highly rust-resistant but also very expensive.

The increasingly popular sports car will get off to a good start this spring. Just what is in prospect will be seen in the GM show this month at the Waldorf-Astoria in New York City. Each division has its own version of what a sports car should look like. What the rabid sports-car devotee will pay is another thing. Only Buick has brought the price down to where it could attract some business so far.

Studebaker promises to give the sports-car fan a lift with its new sports line, scheduled for release in a month or so.

Not only will competition be rampant this year in the lower-price class but the luxury lines will clash in no unimportant manner. Packard's new management is determined to win back its old customers from Cadillac. Chrysler is undaunted by the latter's postwar popularity and wants a good slice. And Lincoln is making its own bid which showed definite progress last year and will be continued this year.

AVERAGE MILEAGE
OF CARS POLLED: 7969

AVERAGE OWNER REPORTS-
CITY 26.9 M.P.G.
COUNTRY 31.8 M.P.G.

MOST OWNERS
AGREE WITH THESE

THREE BEST-LIKED
FEATURES, POLL SHOWS

MOST FREQUENT
COMPLAINT: LOW POWER

ONLY 28% BOUGHT MINX
AS A "SECOND CAR"

39% HAVE TAKEN
LONG TRIPS

Clymer demonstrates the narrow
Minx body—62 inches over-all

POPULAR MECHANICS OWNERS POLL

(Conducted by Floyd Clymer)

10 months. Speedometer mileage: 10845

- I have owned a Hillman Minx Premium gasoline
- I use regular gasoline . Average gasoline mileage in city: 26 m.p.g.; in country: 33.3 m.p.g.
- Average gasoline mileage in city: 26 m.p.g.; in country: 33.3 m.p.g.
- Oil consumption: One quart every 2000 miles. I change oil every 2500 miles.
- Roadability at high speeds: Excellent Good Unsatisfactory
- Maneuverability in traffic: Excellent Good Unsatisfactory
- Acceleration: Excellent Good Adequate Poor
- What is most satisfactory cruising speed of your Hillman? 55 m.p.h.
- What is the top speed of your Hillman? 85 m.p.h. Don't know
- My main reasons for buying a Hillman Minx: Economy of maintenance, low purchase price, maneuverability in city traffic, appeal of foreign car in both body & mechanical design (4 forward speeds, etc.)
- Rate these points:

Visibility, forward	Like <input checked="" type="checkbox"/>	Acceptable <input type="checkbox"/>	Dislike <input type="checkbox"/>
Visibility, rear	Like <input type="checkbox"/>	Acceptable <input checked="" type="checkbox"/>	Dislike <input type="checkbox"/>
Riding qualities:	Like <input type="checkbox"/>	Acceptable <input checked="" type="checkbox"/>	Dislike <input type="checkbox"/>
Horsepower:	Like <input type="checkbox"/>	Acceptable <input checked="" type="checkbox"/>	Dislike <input type="checkbox"/>
Trunk space:	Like <input checked="" type="checkbox"/>	Acceptable <input type="checkbox"/>	Dislike <input type="checkbox"/>
Body styling:	Like <input checked="" type="checkbox"/>	Acceptable <input type="checkbox"/>	Dislike <input type="checkbox"/>
Quick steering response:	Like <input checked="" type="checkbox"/>	Acceptable <input type="checkbox"/>	Dislike <input type="checkbox"/>
- Specifically, what are your complaints on the Hillman? fast-wearing brakes, hard on spark plugs, wheels which tend to come loose.
- Would you buy another Hillman Minx? Yes Possibly No
- Is your Hillman the "second car" in your family? Yes No
- What major repair work have you had done? Brake re-lining
- Do you find parts and repair service readily available? Yes No
- How is your dealer service? Excellent Good Average Poor
- Give an overall rating for the Hillman: Excellent Good Average Poor
- Have you made any long trips (over 1000 miles) in the Hillman? Yes No

OWNERS

Comment: Good performance.

20. What specific improvements do you want in your next car? Smoother riding, long-wearing brakes, larger drums, automatic conversion to open car, locking glove compartment, single front seat.

This questionnaire will be tabulated fairly and your name held in strict confidence. Write additional comments on reverse side. Thank you.

Mail promptly to:
FLOYD CLYMER
Popular Mechanics Owners Poll
1268 So. Alvarado St.
Los Angeles 6, Calif.

Your name: _____
Street: _____
City & State: San Francisco 22, Calif.
Occupation: Radio Writer-Producer





More American in appearance than most British cars, the Minx is one of the top sellers among foreign makes

REPORT on the HILLMAN MINX

By Floyd Clymer

FOLKS WHO DRIVE British cars love to talk about their automobiles. Most of them have a few thousand words to say, pro and con, about details which are often completely ignored in replies from owners of American cars.

Drivers of English cars seem more mechanically minded than the operators of Detroit products, commonly referred to as "inverted bathtubs" by the foreign-car devotees. A Hermosa Beach, Calif., research engineer expressed this opinion when he gave as his reason for buying a Hillman Minx: "I detest those chrome-plated monsters that give 10 miles per gallon."

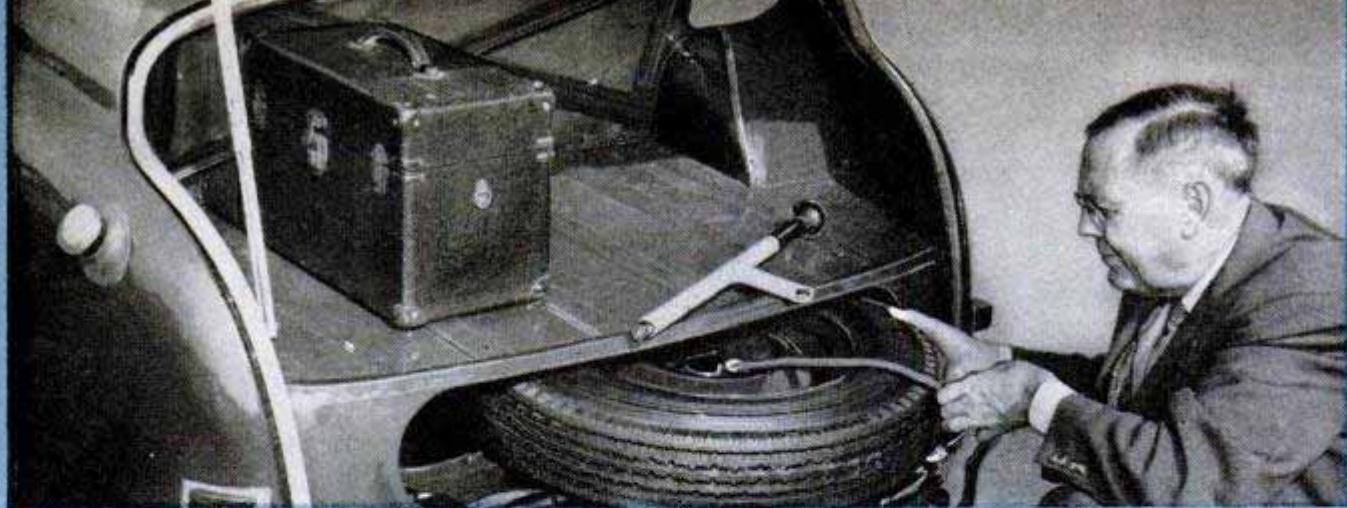
Not that owners of British cars aren't critical of their own vehicles. They can think of more things to crab about than the driver of a 1922 Saxon. One exuberant Hillman owner returned his questionnaire loaded with lavish praise for his car and wound up deploring in strong terms the absence of a cigarette lighter.

A building contractor-salesman in Amarillo, Tex., wrote: "After 13,000 miles in my Hillman, I feel qualified to add a few comments beyond the matters ticked off in your form. An owner who knows how to drive one of these low-torque, high-r.p.m. mills can get a world of satisfaction and, incidentally, a lot of fun out of a Minx. . . . If he's patient with this little car, he'll be amply rewarded in return. . . . One thing you should warn the prospective customers about is the fish-bowl aspect of driving a

The true test of a car begins when the owner takes the wheel. *Popular Mechanics* sent questionnaires to 1000 Hillman Minx owners. Here's what they have to say

Emergency-brake handle is convenient to use, but a few women wrote that they caught their skirts on it





Trunk space is small but well organized. Spare tire rides beneath the floor and is pulled out with a strap

Percentages From PM Owners Poll

Average length of Hillman ownership.....	8.5 months
Average speedometer mileage reported.....	7969
Owners using regular gasoline.....	56%
premium (high test) gasoline.....	44%
Average gasoline mileage in country.....	31.8 m.p.g.
in city.....	26.9 m.p.g.
Average mileage for adding one quart of oil.....	1183
Average mileage for change of oil.....	1516
Owners rating roadability excellent.....	61%
good.....	35%
unsatisfactory.....	4%
Maneuverability excellent.....	91%
good.....	Over 8%
unsatisfactory.....	Less than 1%
Acceleration excellent.....	17%
good.....	40%
adequate.....	37%
poor.....	6%
Average cruising speed.....	52 m.p.h.
Average top speed.....	73 m.p.h.

- Chief purchase reasons (in order of popularity):
1. Gasoline and maintenance economy expected
 2. Maneuverability (ease of parking specifically)
 3. Original purchase price
 4. Size and compact design
 5. Styling features
 6. Belief in quality of construction or preference for British manufacturing

- Most frequent complaints:
1. Inadequate power for climbing hills, passing, etc.
 2. Rattles, poor body fitting or assembly
 3. Inadequate acceleration in traffic and at cruising speeds due to low power or improper gear ratios
 4. Shock absorbers and other suspension parts requiring too frequent attention or replacement
 5. Inadequate rear vision in convertible models
 6. Poor paint or chromium trim
 7. Unreliable or unattentive dealers or poor service
 8. Difficult starting of engine when cold — excessive choking required
 9. Arrangement of gearshift positions

Heater control is within easy reach, but speedometer, seen at right, is too far from driver, Clymer says



Comments on specified features:

	Like	Acceptable	Dislike
Visibility, forward.....	97%	3%	0%
Quick steering response.....	88%	10%	2%
Body styling.....	83%	15%	2%
Riding qualities.....	72%	26%	2%
Trunk space.....	55%	39%	6%
Visibility, rear.....	45%	39%	16%
Horsepower.....	30%	59%	11%

Owners who will buy another Hillman Minx..... 68%
 might buy another Hillman..... 23%
 will not buy another Hillman..... 9%

Owners who bought Hillman as "second" car..... 28%

Major repair work done (noted mainly from owners having over 15,000 miles on their cars):

1. Piston rings replaced or valves ground
2. Brakes relined
3. Shock absorbers rebuilt or replaced
4. Carburetor or fuel pump reworked or replaced

Owners finding parts and service readily available..... 84%
 Owners rating dealer service excellent..... 41%
 good..... 24%
 average..... 19%
 poor..... 16%

Owners having made trips of over 1000 miles in Hillmans..... 39%

Improvements desired in next car (in order of preference):

1. More horsepower
2. Increased rear vision
3. U. S. gearshift position and more positive shifting linkage
4. Tighter body fitting, better workmanship
5. Larger or heavier car (longer wheelbase, more interior space, etc.)
6. Increased acceleration at low speeds and at cruising speeds. Gear ratio changes frequently suggested

OVER-ALL RATING OF HILLMAN MINX

Excellent.....	50%
Good.....	41%
Average.....	6%
Poor.....	3%

British drivers must have small feet! The clutch, brake and accelerator pedals are too close for safe driving



Minx, or any imported job for that matter. One soon learns to ignore the stares, but there's something else more startling. The car seems to bring out the beast in everyone on the streets. I find that even little old ladies in big Caddies will try to outrag me at lights. One gets used to such things. Or the service-station attendant who looks under the hood and says, a little contemptuously, 'Sure a small motor.' And then, 'Hey! Is that the battery?'"

This sentiment was echoed by a Tucson, Ariz., Air Force sergeant, who said: "Big cars, no matter what age, cannot allow a Hillman to be in front of them—it brings out the maniac in most other drivers."

A Chicago art director wrote: "It's a swell little car; I have no complaint whatever except I would like to see more of them on the road. Easy to handle in traffic, holds the road well, easy to park, economical to operate. . . . I would like to see a wider range of car colors."

Only a few owners replying in the survey found the Hillman was too much of a change from standard cars in respect to wheelbase. One of these was an Everett, Wash., salesman, who said: "I drove my Minx less than three months before I went over a 90-foot embankment and completely demolished it. I blame the accident solely to not being used to the short wheelbase. Other than that, the car was paying for itself by less gas consumption. I did not buy a second one."

The principal reason why 21 percent of the owners bought a Hillman was price and fuel economy. The survey showed that Minxes average 26.9 miles per gallon in city driving and 31.8 miles per gallon in the country. This compares favorably with the MG. But it was revealed that many Hillman owners want to have their cake and eat it too: A majority wished for more horsepower. This was suggested so fre-

Minx tested by Clymer had European turn indicators that swing upward. Some have the U.S.-style blinkers



quently as to lose all novelty. Several owners, including a Huntington, Ore., railway electrician, suggested that a change in the third-gear ratio should be made to provide more speed in that gear.

Here are some things people like about the Hillman:

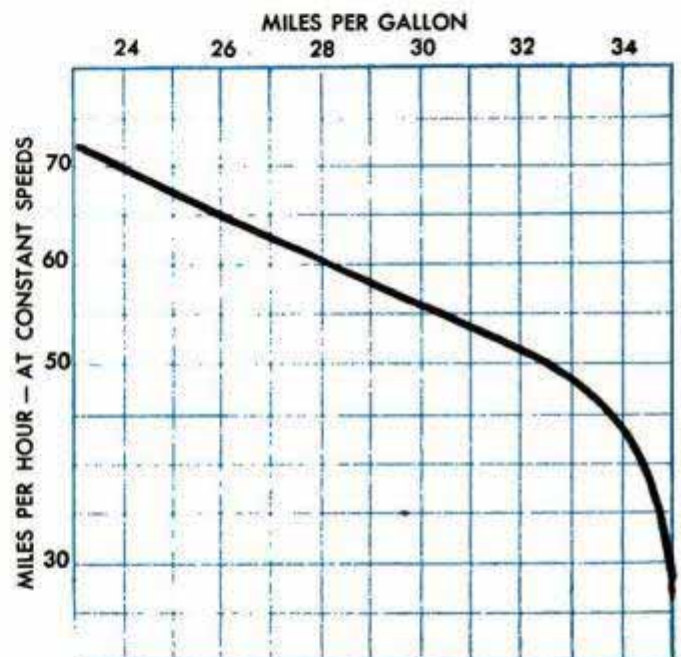
"Twelve-volt electrical system, leather upholstery, excellent heater and defroster system, electric windshield wipers, parcel shelf under dash."—Portland, Ore., auto-parts warehouseman.

"The four doors in the small body. . . . The car parks and turns much more easily than the ordinary one."—Inglewood, Calif., housewife.

(Continued to page 260)

ECONOMY TEST

HILLMAN MINX MARK V 4-DOOR SEDAN



Miles Per Gallon

At constant 30 m.p.h.	34.9 m.p.g.
At constant 50 m.p.h.	32.6 m.p.g.
At constant 60 m.p.h.	28.3 m.p.g.
At constant 70 m.p.h.	23.8 m.p.g.
Los Angeles to Riverside, Calif., and return	30.6 m.p.g.
San Pedro to San Fernando Valley (city limits of Los Angeles), 60 miles through average traffic	27.3 m.p.g.

ACCELERATION TEST

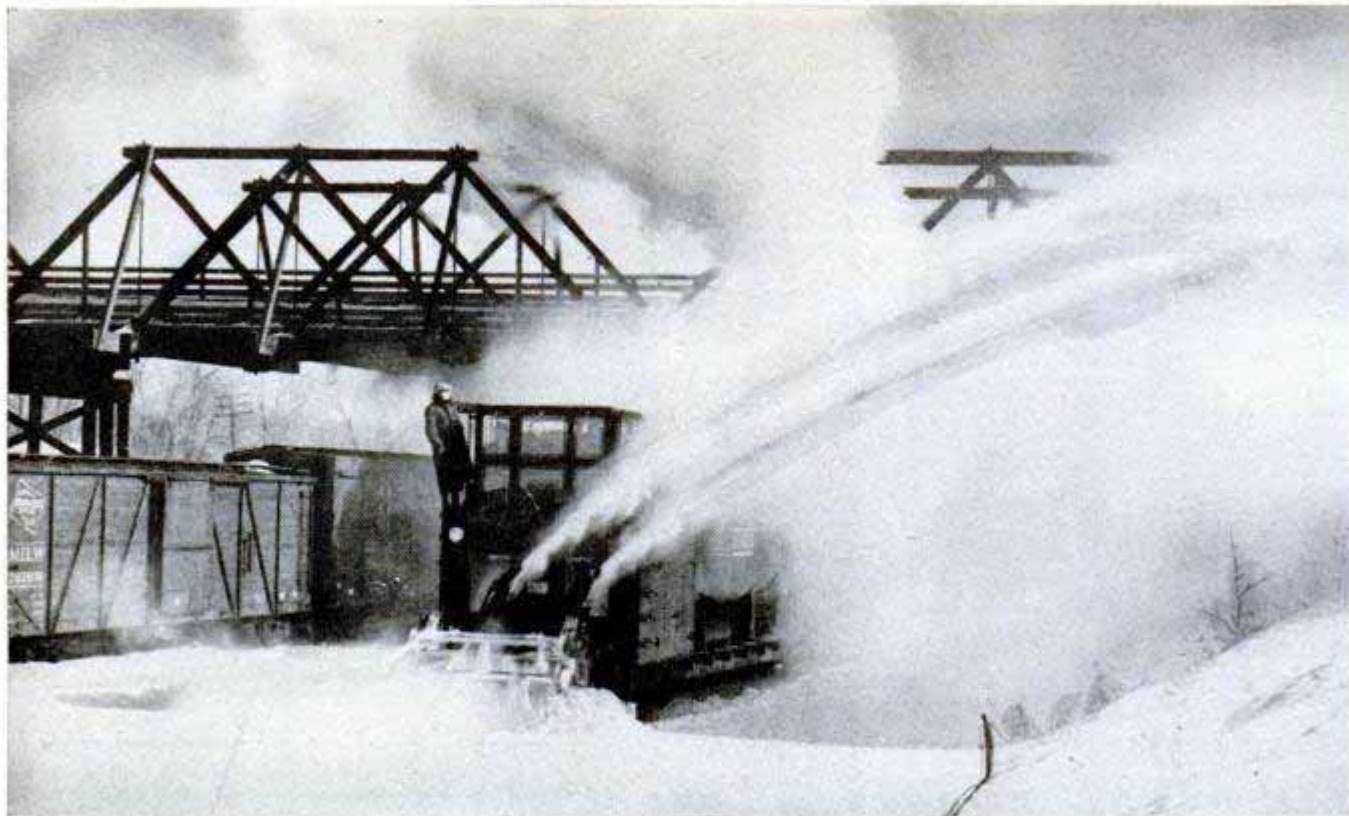
HILLMAN MINX 4-DOOR SEDAN

¼ mile from zero	33.3 seconds
½ mile from zero	53.4 seconds
0 to 30 m.p.h.	7.9 seconds
0 to 60 m.p.h.	31.8 seconds

Maximum speedometer readings

1st gear — 22 m.p.h. 3rd gear — 54 m.p.h.
2nd gear — 33 m.p.h. 4th gear — 78 m.p.h.

Actual top speed about 6% less (speedometer variation).



Railroad "Snow Eater" Plows and Melts

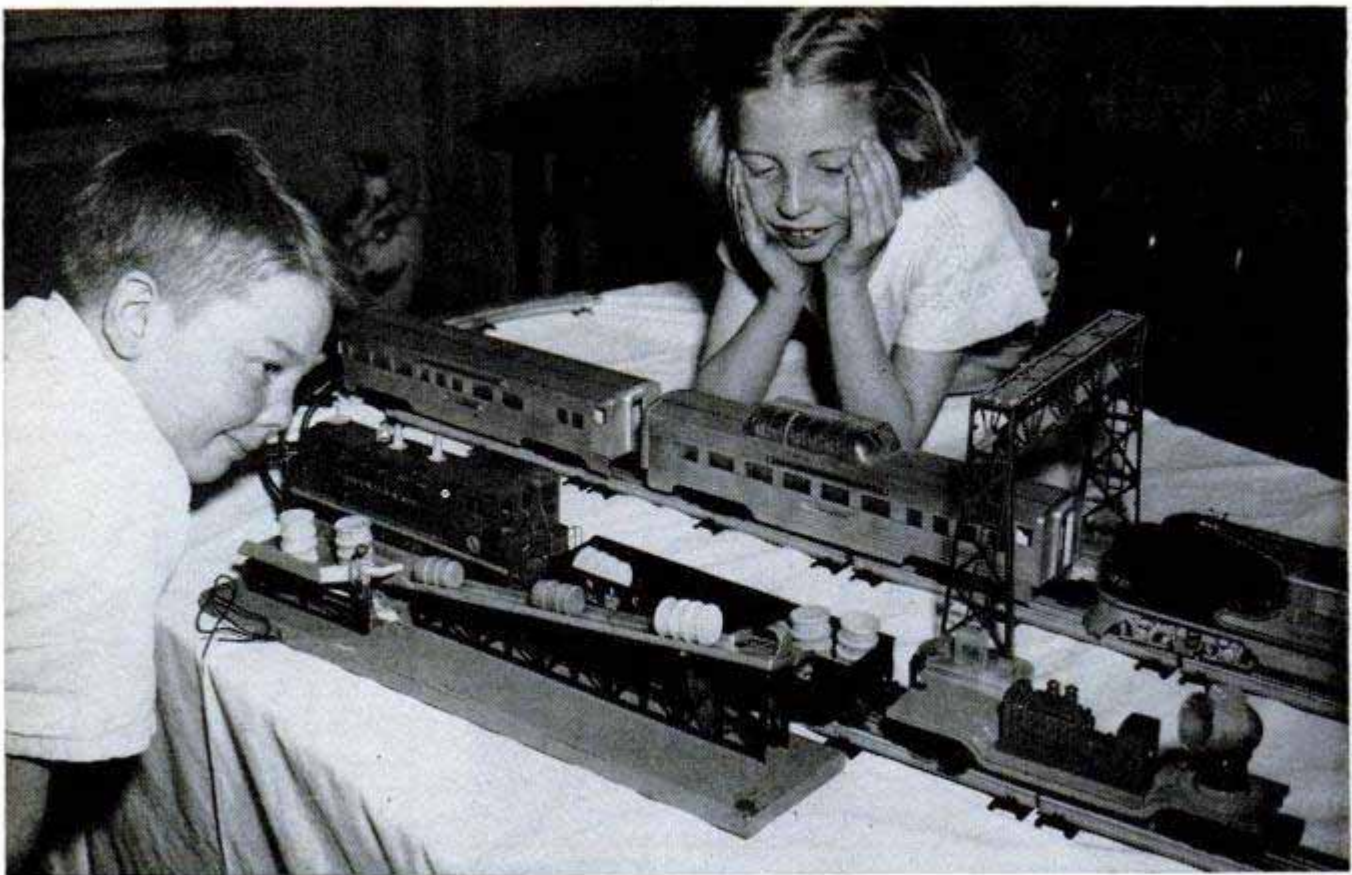
Gouging its way through drifts on a Northwest railway, a monster snow remover mounted on a 70-ton flatcar casts part of the snow aside and "eats" the rest. Tilted blades rotating in front of the plow blade break up the snow, which is thrown as far as 100 feet to the side by directional chutes or is carried back to a melting tank by conveyor. Fed into a 19,000-gallon chamber, it is melted by a steam-heated hot-water pressure spray and dropped later where it will not affect the rail operation. Both the crew and controls are housed in a high glass-sided cab which is located at the front of the machine.



Miniature French Auto

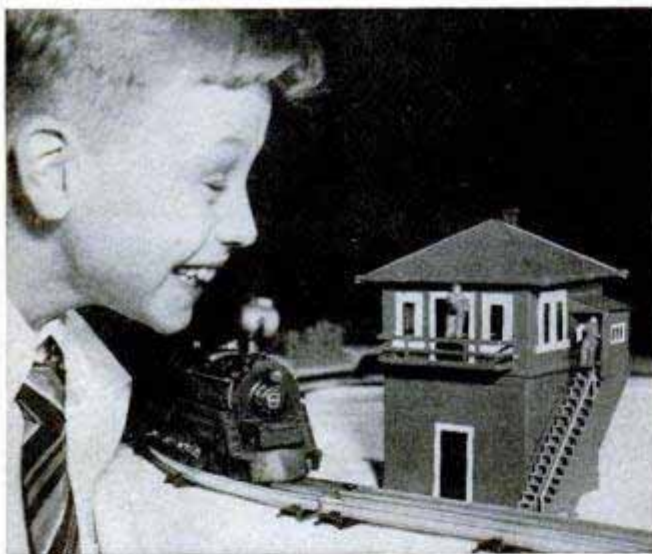
Appearing to be built around the driver, a French miniature car actually has room for one other passenger. The vest-pocket convertible is powered by a one-horsepower motor, has a top speed of 50 miles per hour and gets 35 miles to the gallon. It was displayed at a Paris auto show as one answer to the parking problem.

☐ Approximately 25,000,000 American automobiles are equipped with radios.



Miniature Railroaders Man Toy Switchyard

Miniature workmen man the switch tower and handle freight in a switchyard for model trains. As the train approaches, a switchman posted outside the tower room scurries inside to throw switches and alerts a watchman who descends a flight of stairs with a mail pouch, then climbs back upstairs once the train has passed. Barrels placed on a vibrating platform move within reach of a toy workman who topples each keg onto a conveyor which carries it up to a loading platform. From there it slides down a chute into a waiting railroad car.



Flexible Swinging Gate Adjusts to Any Grade Level

Any swinging gate works, it seems, except when it's on a slope or you're trying to coax a lot of small livestock through it. Now, however, a new swinging gate has slats that are joined to the uprights at all places by single steel pins. Nonrigid, the gate "relaxes" into position. An adjustable guy wire allows the gate to hang flush on any kind of slope. Easily raised at one end to permit small livestock to squeeze under it, it can be quickly dropped to maintain one-way traffic. When the gate is opened, it permits the clearance of frozen mud or other obstructions.



Of the 2558 new locomotives put into service in the United States in the last year, 2537 were diesel, 18 steam and 3 electric.



First hydro-ski tests were made by the NACA on this modified D-558 model and proved that the water skis were practical for high speed and could be retracted. Model is shown coming in for landing on its skis

Hydro-Skis on Seaplanes Speed Take-Off

SEAPLANES in the near future may take off and land on retractable hydro-skis with small beaching wheels inside the skis. This will eliminate the need for beaching gear or mooring buoys because the plane will be able to roll up a ramp without assistance. Extensive hydro-ski tests have been made by the National Advisory Committee for Aeronautics, the Navy Bureau of Aeronautics and the Air Force. The first tests were made on models of the Douglas D-558 research plane. These revealed that smooth landings could be made at high speed on rough water. It was also discovered that the skis were small enough to be retracted, thus removing the air drag of conventional seaplane design. Edo Corporation made the first tests on a full-scale plane by installing a single hydro-ski on a fixed strut under a JRF-5 seaplane. The gear was operated from ice, snow and water. The plane makes a speedy take-off from water. During landing on rough water the hydro-ski presents only a small area for impact. As the plane decelerates the hydro-ski takes more of the load until it submerges and the plane floats gently on the water. The next step was the introduction of wheels slightly below the ski's planing surface so an airplane could be landed in water and taxied onto a beach. Wheel tests were made on an SNJ.



SNJ used in tests is equipped with ski gear and wheels. Here the plane has taxied out of the water for take-off from beach



Above, JRF-5 hydro-ski test plane has single ski on a fixed strut below hull. This plane was tested for multibase operations and additional skis were added (below) for use on snow and ice. The ice tests were too rough on the airplane





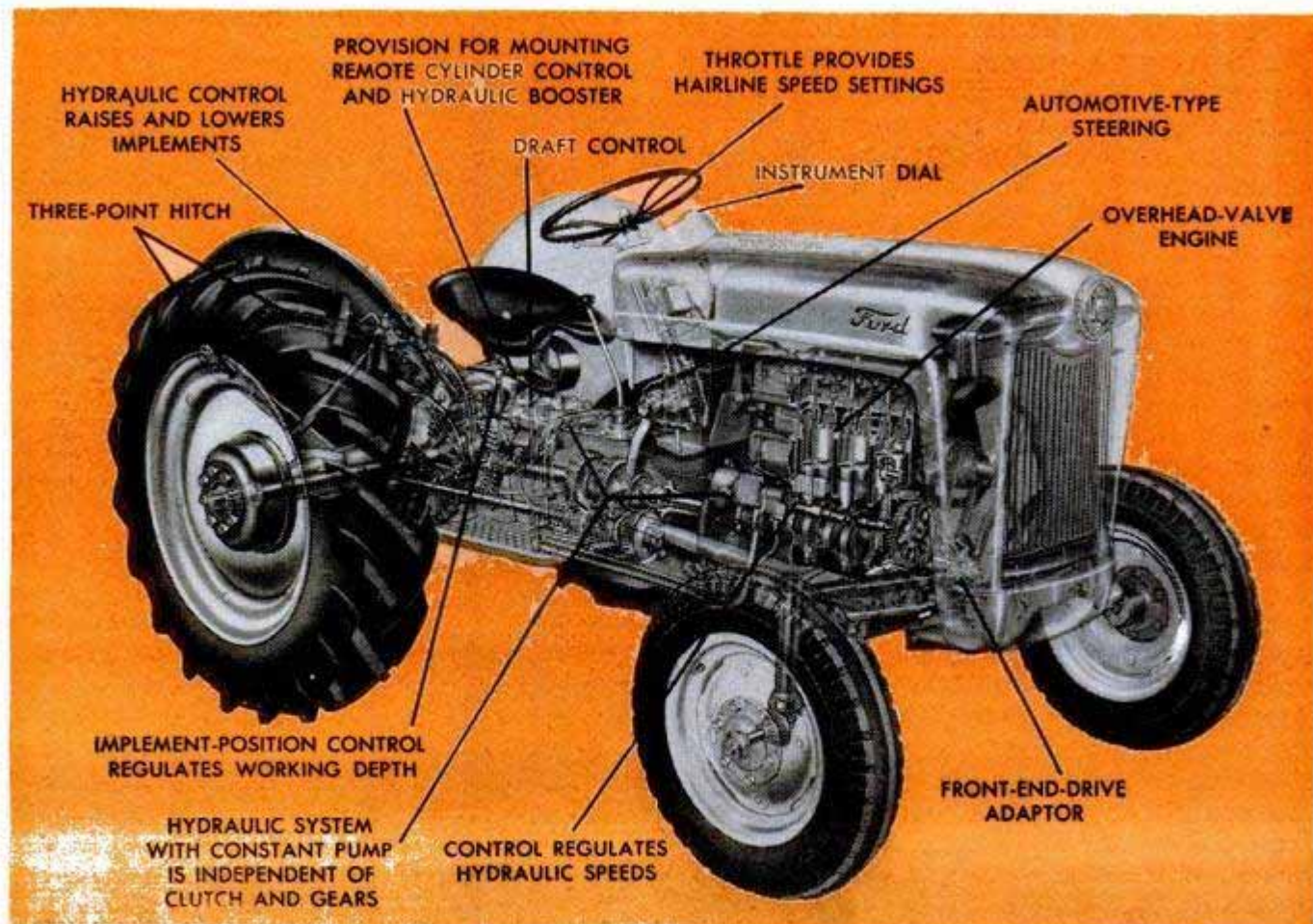
Streamlined tractor pulls the new hay baler, which will turn out three to eight bales per minute



Four-cylinder engine produces ample power to operate three-bottom plows in many types of soils. At end of the field or over grass strips the live-action hydraulic system will quickly lift the implements

Ford Tractor—'53 Model

GREATER POWER and a live-action hydraulic system are features of the '53 Ford tractor. It is larger, longer and heavier than its predecessors and the four-cylinder overhead-valve engine has been made more powerful by increasing the cylinder bore and shortening the piston stroke. Other features include a lever for implement-position control and constant-draft control, a throttle control for hairline speed adjustments, a selector which permits changes in the speed of the hydraulic system, and a live-power take-off attachment for continuous operation of implements whether the tractor is moving or standing still.





Official U. S. Navy photo

Light Beams Gauge Carrier Planes' Rate of Descent

Safe rates of descent for carrier-based aircraft are determined by a new shipboard instrument in a fraction of the time previously required. It sends out two beams of light which the approaching plane intersects and the instrument then records instantly the rate at which the plane is descending to the carrier deck. Prior to the installation and use of this instrument several days were necessary to compute the information acquired from photographic records.

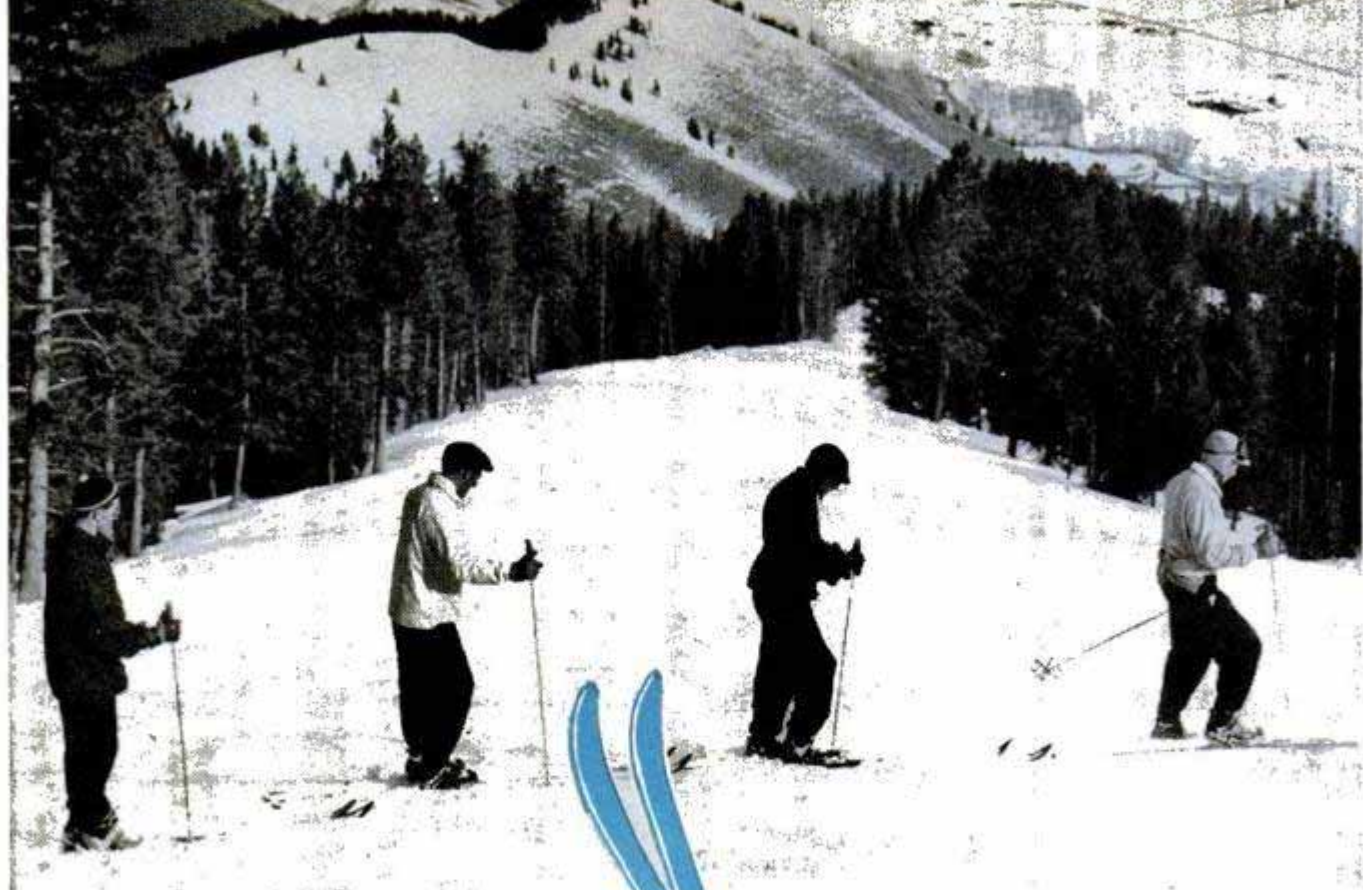
Hot is the word for that spot in California's Mojave Desert where geologist Dr. Thomas Clements measured the air temperature three feet off the ground at 150 degrees Fahrenheit.



Swiveling Outboard Motor for Low-Cost "Yachting" Enthusiasts

Responding to the fast-growing popularity of outboard cruising, Martin Motors is introducing a 20-horsepower Blue Streak model. The versatile, heavier-duty motor is expected to answer the needs of "yachting on a budget" fans as well as those of fishing and racing enthusiasts. The 2-cylinder, 67-pound power plant can be swiveled into the boat for propeller inspection or overnight docking in shallow or salt water. The manufacturer claims its automotive-type valves allow smoother, faster acceleration. It has a removable steering handle and plug-in attachment for remote control.





Sun Valley ski-patrol members pack trails high on 9250-foot Baldy Mountain after the season's first snow

HERE COMES the SKI PATROL!

By Norman Sklarewitz

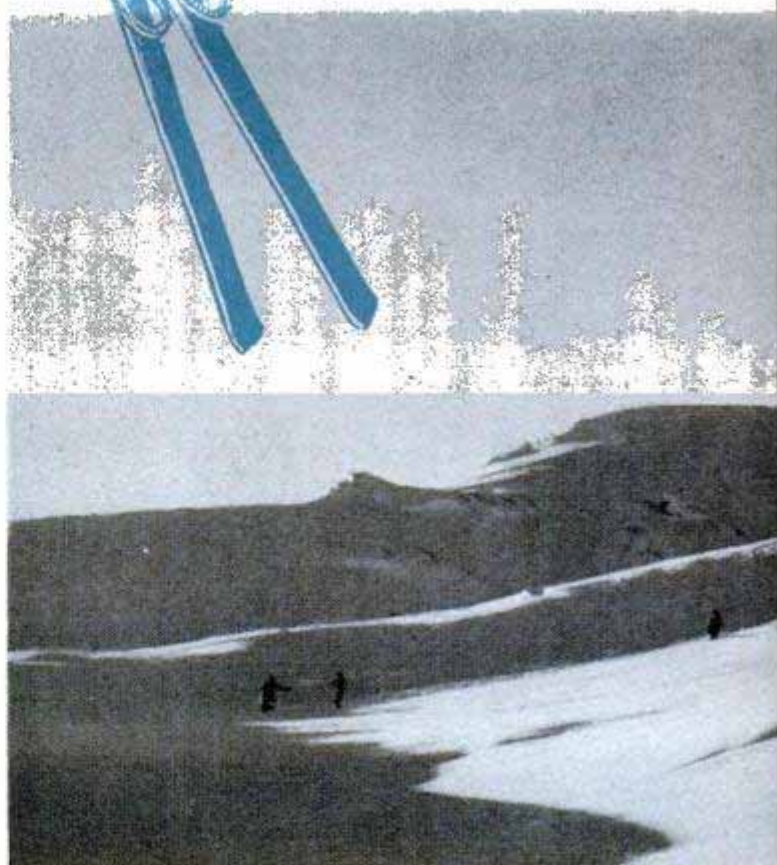
CAUGHT IN THE WHITE FURY of last winter's paralyzing blizzards, the crack streamliner, *City of San Francisco*, lay half-buried in the drifting snow high in the Sierra Nevada mountains.

Inside, passengers huddled together as the second day of their strange imprisonment dragged on. Slowly fear as well as the cold began to creep into the coaches and Pullmans. Then suddenly someone glanced out across the bleak stretches of the Donner Summit Pass and saw a strange but wonderful sight.

Moving down the slope, heads bent against the savage winds, came a file of skiers. Minutes later they reached the stranded train, slipped off their heavy packs—and contact between the outside world and the 196 men, women and children aboard was completed.

In the rush of evacuation activities that followed, only a few people had time to wonder how it was that these few rescuers were able to reach the train when the best available mechanical equipment had failed. But those who noticed a small blue and orange insignia worn by most of the men had the answer. It was the mark of the National Ski Patrol.

Qualified as expert skiers, the patrolmen are out early to prepare the snow trails and runs before the lodge's guests are ready for classes

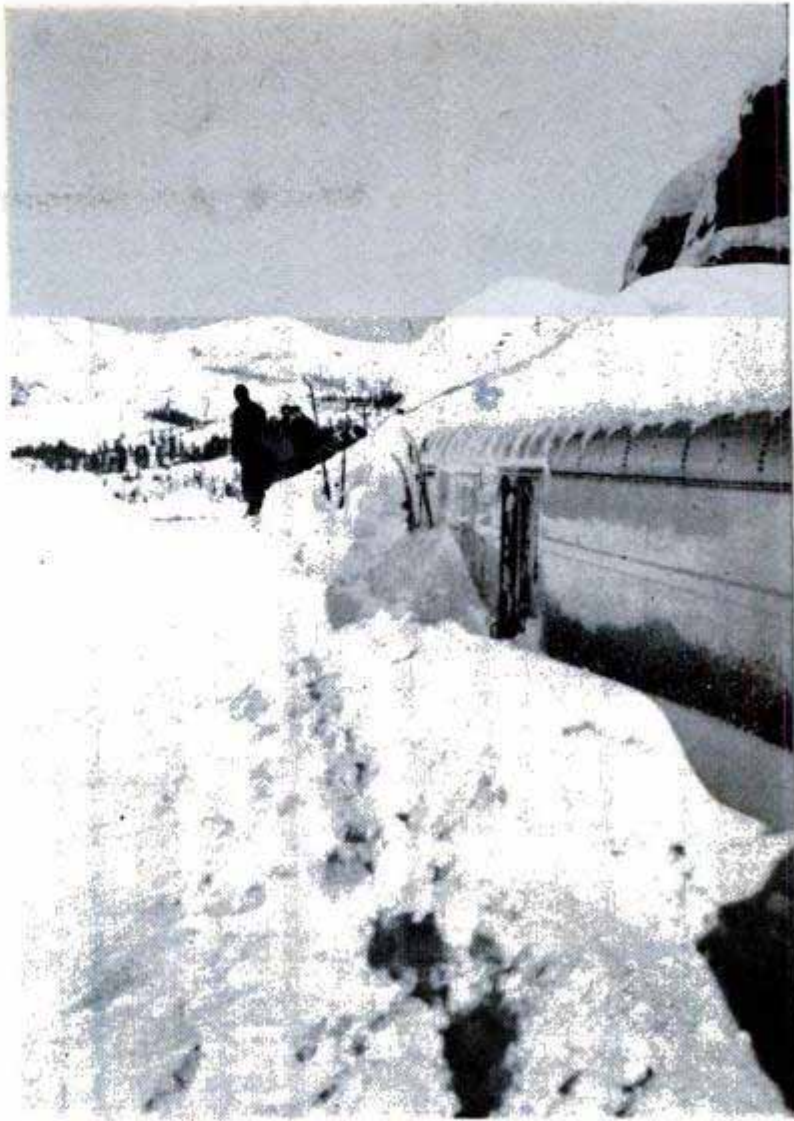


Across America's vast snow belt, the exploits of ski patrolmen would be almost legendary if they weren't so common. Here is an organization of only 4000 skiers who, in their brief history, have handled more than 36,000 accidents and saved 49 lives.

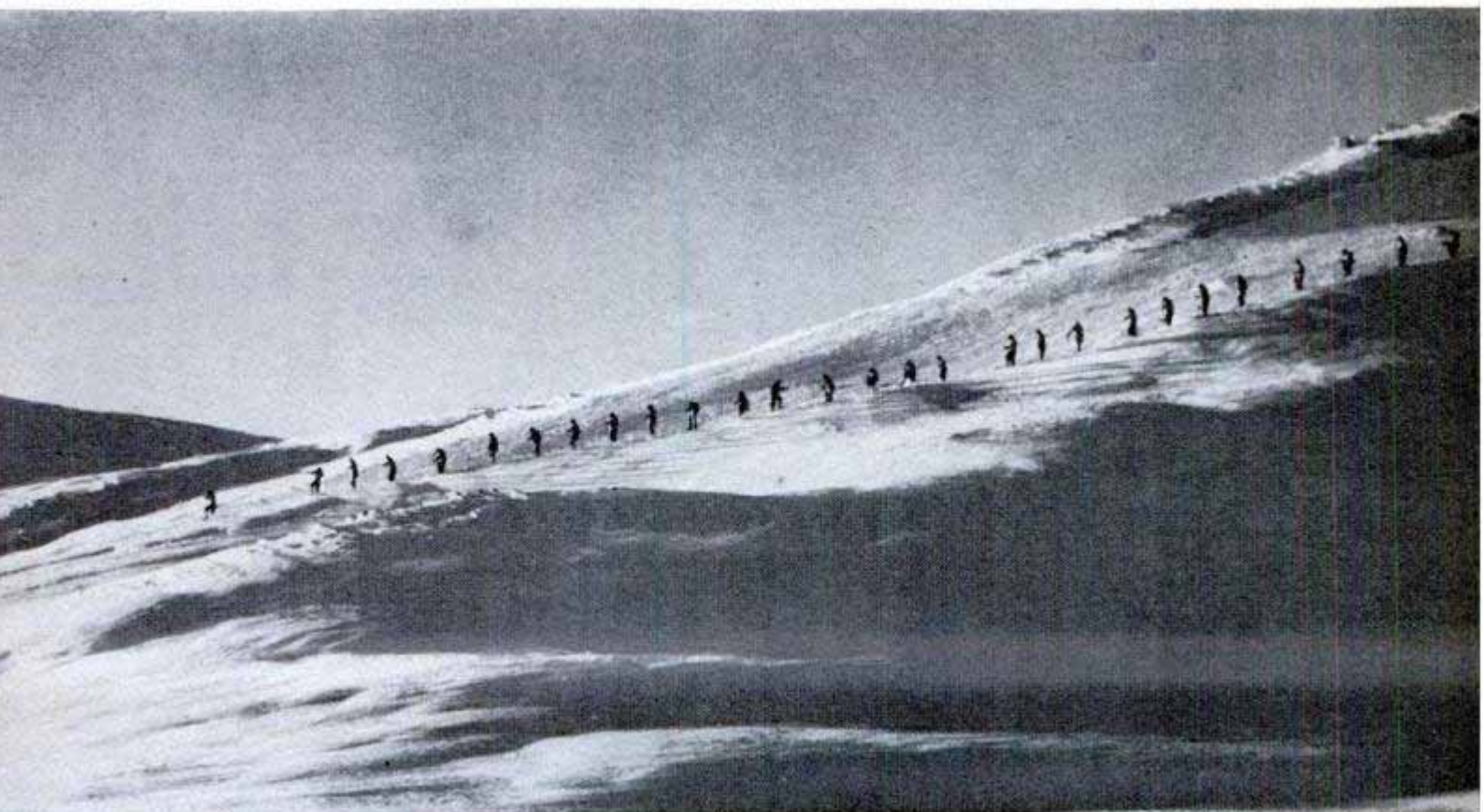
What's more, they've taken part in airplane-crash rescue missions in rugged wilderness areas of the Rockies . . . inched through blizzards in search of stranded motorists or lost hunters and carried out a constant program for winter-sports safety at hundreds of ski areas. And all this on an entirely voluntary basis!

This sounds like a lot of rugged adventure reserved only for a few hearty sportsmen. But, in reality, the Ski Patrol represents a cross section of American outdoor enthusiasts. And now the activities of the 500 local ski patrols are becoming increasingly important to the general public. During the past four years, skiing has attracted thousands of new fans. Week-end excursions by train, car and even airplane into snow areas are now common. Many new slopes and ski areas were opened last year alone.

While giving skiing a wonderful boost, all this activity has meant a greater need for safety supervision. As beginners and novices



Reaching 196 men, women and children stranded in the crack streamliner, *City of San Francisco*, by a blizzard, above, was one of the National Ski Patrol's most dramatic rescue missions





While a fur-coated patrol member stands by, a ranger gets a radio call for first aid for an injured skier

take to the slopes, adequate measures to protect them must be taken. This important responsibility has fallen on the shoulders of the Ski Patrol.

The National Ski Patrol System, Inc., as it is formally known, is certainly one of the most colorful groups of its kind in the nation. Its goal as stated officially is: "To

work towards greater safety and thus greater enjoyment in the sport of skiing." The headquarters is at Denver.

In order to carry out that objective successively, the group has branched out into a half dozen different fields. As a result, the NSPS is today an amazingly well-trained, well-equipped body of specialists. Civilian Defense agencies and the American Red Cross, in fact, now consider it one of their key units in disaster relief.

Depending upon the region in which a patrol operates, its members carry out rescue work under a variety of tough weather conditions and terrain. Out West, patrolmen (the term includes some 500 women) are expert mountaineers as well as skiers. They're trained in air-ground coordination and work closely with Civil Air Patrol and Air Force Rescue flights.

Farther east, patrols train for city emergencies when sudden winter storms block highways and cut power lines. In such cases, patrolmen are put at the disposal of local authorities. During a recent severe Midwestern winter, for example, transportation in a four-state area was crippled; all normal communications were out.

No sooner had the blizzard hit than ski patrols unlimbered their gear and reported to police stations, hospitals and state-police barracks. In Milwaukee, Wis., the situation was exceedingly critical. While the storm still raged, word came through that a farmer outside of town had fallen and broken

Moving a skiing-accident victim down the mountainside on a toboggan. All NSPS members have first-aid training



his arm. Roads were impassable but he needed help immediately. The Milwaukee Ski Club was ready for just such calls.

Joyce Pflieger pushed off to the lonely farmhouse and the injured man. She put his arm in a sling and stood by until a snow-plow brought a doctor.

About the same time, police radios got a desperate plea from another stranded community. There a man had suffered a heart attack. Fire-department rescue crews were giving him oxygen, but their supply was almost exhausted. Additional tanks were needed or the man would die.

Art Mariage, another Milwaukeean, got the report and swung into action. Two heavy tanks of oxygen were lashed to a toboggan and Art skied three miles cross-country pulling the load. The man's life was saved—and Art was later awarded the NSPS Purple Merit Star.

For all their heroic deeds and unselfish service to the sport, patrolmen work without pay or compensation of any kind. In fact, many sportsmen have expressed the opinion that the patrols carry far too much of a financial burden. When members ski, for example, they pay all their own expenses. Yet they are on call to the resort operator at any time.

Patrolmen even buy their own first-aid equipment and so have to ask that splints and bandages be returned after a patient has recovered!

Structure of the National Ski Patrol System is simple, but efficient. Edward F. Taylor at Denver is the national director. The country is then divided into seven regions—Eastern, Central, Northern Rocky Mountain, Southern Rocky Mountain, Intermountain, Far West and Pacific Northwest. Each is headed by a divisional chairman who directs the activities of the regions within his division.

Under the regional chairman come the sections and the various ski clubs which sponsor patrols. To be eligible for NSPS membership, each man or woman must first take and pass the

(Continued to page 254)



Ski patrolman Walter Kienzi clears the way beneath one of the chair lifts at Sun Valley. Patrolmen perform their heroic deeds and unselfish service without pay or compensation of any kind

Using skis as a brace on a steep mountainside, patrolmen bring an injured skier down safely and slowly. Interior of this versatile toboggan is a basket litter, which in many cases acts as a splint



Pocket Calendar Can Be Used for 307 Years

ON WHAT DAY of the week were you born? A new perpetual calendar will tell you—as it will tell you the day and date during any year from 1753 to 2059.

Claimed to be the fastest method yet devised for determining the day of the week in any year since the early part of the Gregorian calendar, the compact chart is the copyrighted brain child of Arthur A. Merrill, General Electric engineer in Schenectady, N. Y. It is simple to use and so uncluttered that all of the 3684 months represented on the calendar could be printed on the front and back of a wallet-size card and still be clearly legible.

The chart is divided into two sections. The first is a table that assigns a key letter to each of the 307 years that the calendar describes. The second section correlates these key letters with the 12 months of the

year to show how any month would be arranged in any year.

Here is how you find out on what day the Declaration of Independence was signed: The date was July 4, 1776. Starting with the left-hand table, go down the left column to the first three digits of the year, 177. Then go horizontally to the column under the fourth digit, 6, and you get the key letter H.

Now find July in the right-hand table. Move straight across the July line to the key letter H. Drop down the white channel below the column to the calendar that shows exactly how a July calendar page looked in 1776. You will discover that July 4, 1776, was Thursday.

In case you're interested: 1953 has three Friday the 13ths (Feb., Mar. and Nov.) and in the year 2000 you can plan a big holiday because Christmas falls on Monday.

- CALENDAR ... 1753 - 2059 -

To use:
 Go down column to first three digits of year, then across to column of fourth digit, and obtain Year Type Letter.
 Then find month, go straight across to Year Type Letter, then down to calendar.

175				A	B	C	K	F	G	A
176	I	D	E	F	N	B	C	D	L	G
177	A	B	J	E	F	G	H	C	D	E
178	M	A	B	C	K	F	G	A	I	D
179	E	F	N	B	C	D	L	G	A	B
180	C	D	E	F	N	B	C	D	L	G
181	A	B	J	E	F	G	H	C	D	E
182	M	A	B	C	K	F	G	A	I	D
183	E	F	N	B	C	D	L	G	A	B
184	J	E	F	G	H	C	D	E	M	A
185	B	C	K	F	G	A	I	D	E	F
186	N	B	C	D	L	G	A	B	J	E
187	F	G	H	C	D	E	M	A	B	C
188	K	F	G	A	I	D	E	F	N	B
189	C	D	L	G	A	B	J	E	F	G
190	A	B	C	D	L	G	A	B	J	E
191	F	G	H	C	D	E	M	A	B	C
192	K	F	G	A	I	D	E	F	N	B
193	C	D	L	G	A	B	J	E	F	G
194	H	C	D	E	M	A	B	C	K	F
195	G	A	I	D	E	F	N	B	C	D
196	L	G	A	B	J	E	F	G	H	C
197	D	E	M	A	B	C	K	F	G	A
198	I	D	E	F	N	B	C	D	L	G
199	A	B	J	E	F	G	H	C	D	E
200	M	A	B	C	K	F	G	A	I	D
201	E	F	N	B	C	D	L	G	A	B
202	J	E	F	G	H	C	D	E	M	A
203	B	C	K	F	G	A	I	D	E	F
204	N	B	C	D	L	G	A	B	J	E
205	F	G	H	C	D	E	M	A	B	C

JAN 31 d	E	L	G	N	D	K	A	H	C	J	B	I	F	M	31 d	JAN.
FEB. 28/29	B	L	D	K	A	H	E	L	G	N	F	M	C	J	28/29	FEB.
MAR 31 d	B	H	D	J	A	N	E	K	G	M	F	L	C	I	31 d	MAR.
APR 30 d	F	L	A	N	E	K	B	H	D	J	C	I	G	M	30 d	APR.
MAY 31 d	D	J	F	L	C	I	G	M	B	H	A	N	E	K	31 d	MAY
JUNE 30 d	A	N	C	I	G	M	D	J	F	L	E	K	B	H	30 d	JUNE
JULY 31 d	F	L	A	N	E	K	B	H	D	J	C	I	G	M	31 d	JULY
AUG 31 d	C	I	E	K	B	H	F	L	A	N	G	M	D	J	31 d	AUG
SEP 30 d	G	M	B	H	F	L	C	I	E	K	D	J	A	N	30 d	SEP.
OCT 31 d	E	K	G	M	D	J	A	N	C	I	B	H	F	L	31 d	OCT.
NOV 30 d	B	H	D	J	A	N	E	K	G	M	F	L	C	I	30 d	NOV.
DEC 31 d	G	M	B	H	F	L	C	I	E	K	D	J	A	N	31 d	DEC.

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S M Tu W Th F S

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12 13 14 15 16 17 18

19 20 21 22 23 24 25

26 27 28 29 30 31

S M Tu W Th F S

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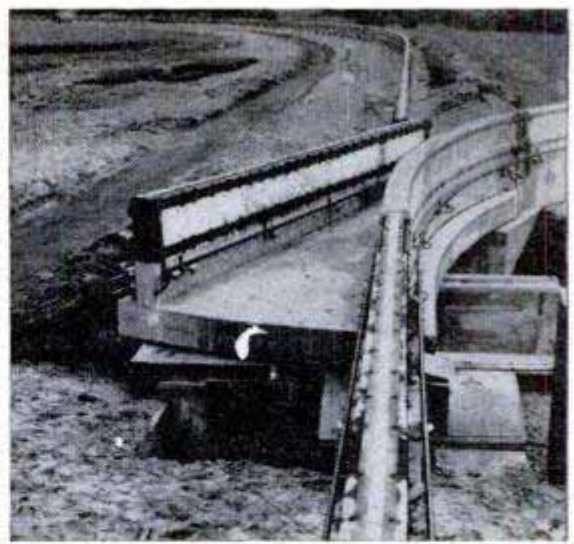
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Example
 July 4, 1776
 Year Type H
 Day of week Thursday

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 Arthur A. Merrill



Racing at high speed, test train takes a curve which would normally demand slowing to 18 miles per hour. Switch consists of huge concrete platform containing two sections of rail which is turned by electric motors

Germans Develop Fast Monorail Train for High-Speed Travel

Zooming along its one rail like a wingless airplane, an experimental train under test near Cologne, Germany, is the working model for a machine designed to travel at 200 miles per hour. Built of light metal and constructed like an airplane, the train is shaped like a caterpillar with a deep notch cut along its middle. It is into this notch that the single rail fits, the train reaching down around the rail and gripping it from the sides. The track consists of one reinforced-concrete girder elevated from the ground on pillars over six feet high. But the girder carries five metal rails: One main rail on the top and two flat metal bands along each side. The top rail carries the main drive wheels and bears the weight of the train. Sets of guiding wheels run on the side tracks at right an-

gles to the driving wheels, maintaining safety at high speeds. The model, 40 percent the size of the projected train, travels at 90 miles per hour even around sharp curves. The full-scale train will travel on a series of connected reinforced-concrete blocks supported by hollow concrete pylons spaced 50 feet apart. Diesel or even jet engines may replace the electric motors now used. Suitable for cross-country or commuting service, the train is designed to carry the same passenger load as a normal express train at the same speed with one seventh the power. Work has started on a train with a different carriage which could be adapted to conventional rail systems. Pylons would support a girder down the middle of a regular rail section, the revised train riding eight inches above the ties.

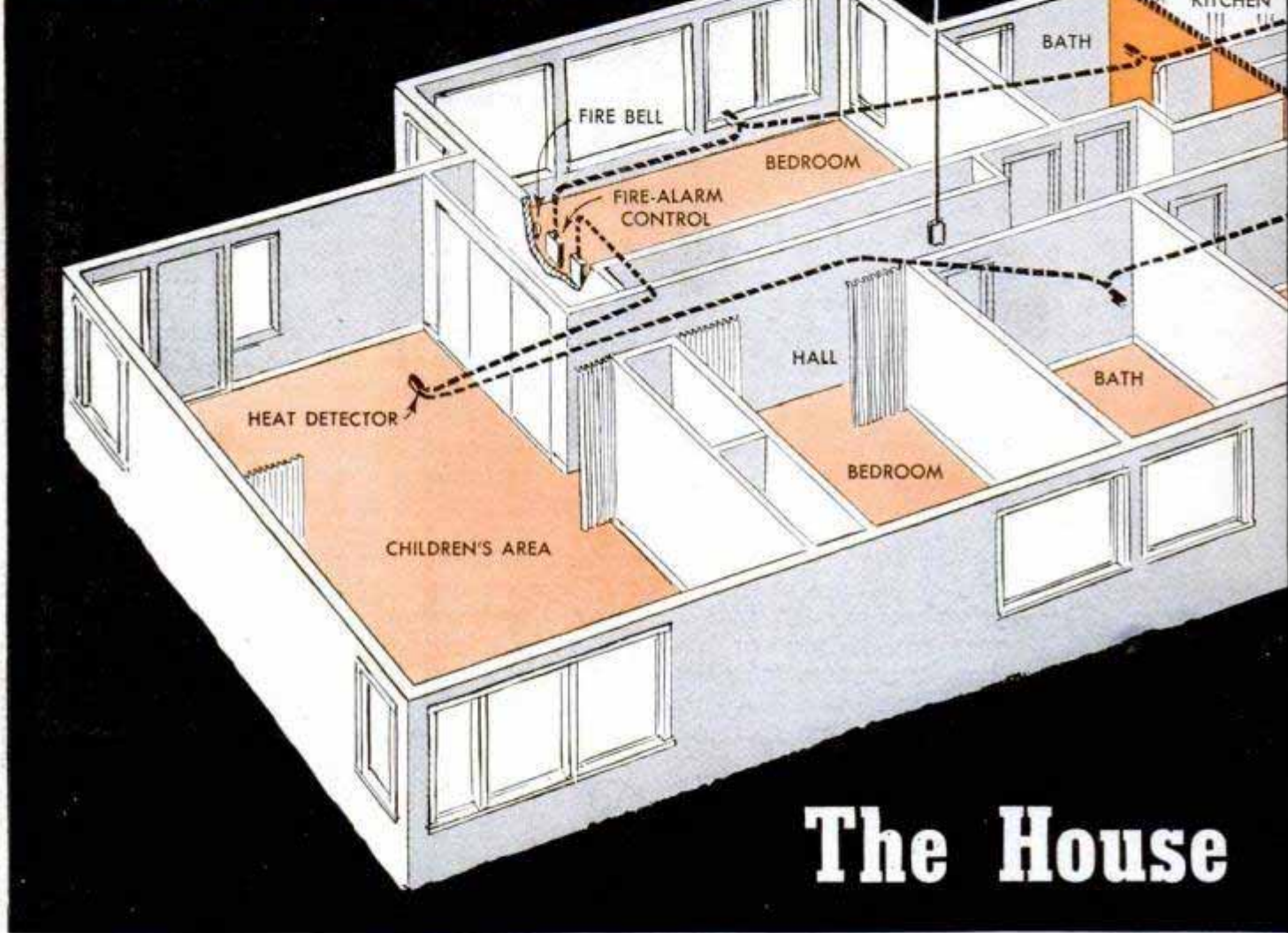
Plastic Rotating Tray Places Artists' Tools Within Reach

Art and hobbycraft tools are kept within easy reach by a rotating receptacle recently placed on the market. Adapted for use in shop, den or studio, it is made of light durable plastic, is 7 inches high and 10 inches in diameter.

Whistle Aids Anesthesia

"Blow the whistle," instead of "breathe deeply," is the command now given children receiving gas anesthesia at Mayo Clinic. A whistle that fits into the exhalation side of a gas-anesthetic machine climbs in pitch as the youngster works to expire air through the machine. After a demonstration of how the whistle works, children become interested and instead of struggling, fall asleep while blowing the whistle. When the patient loses consciousness, the whistle is silenced by a plastic cap.





The House

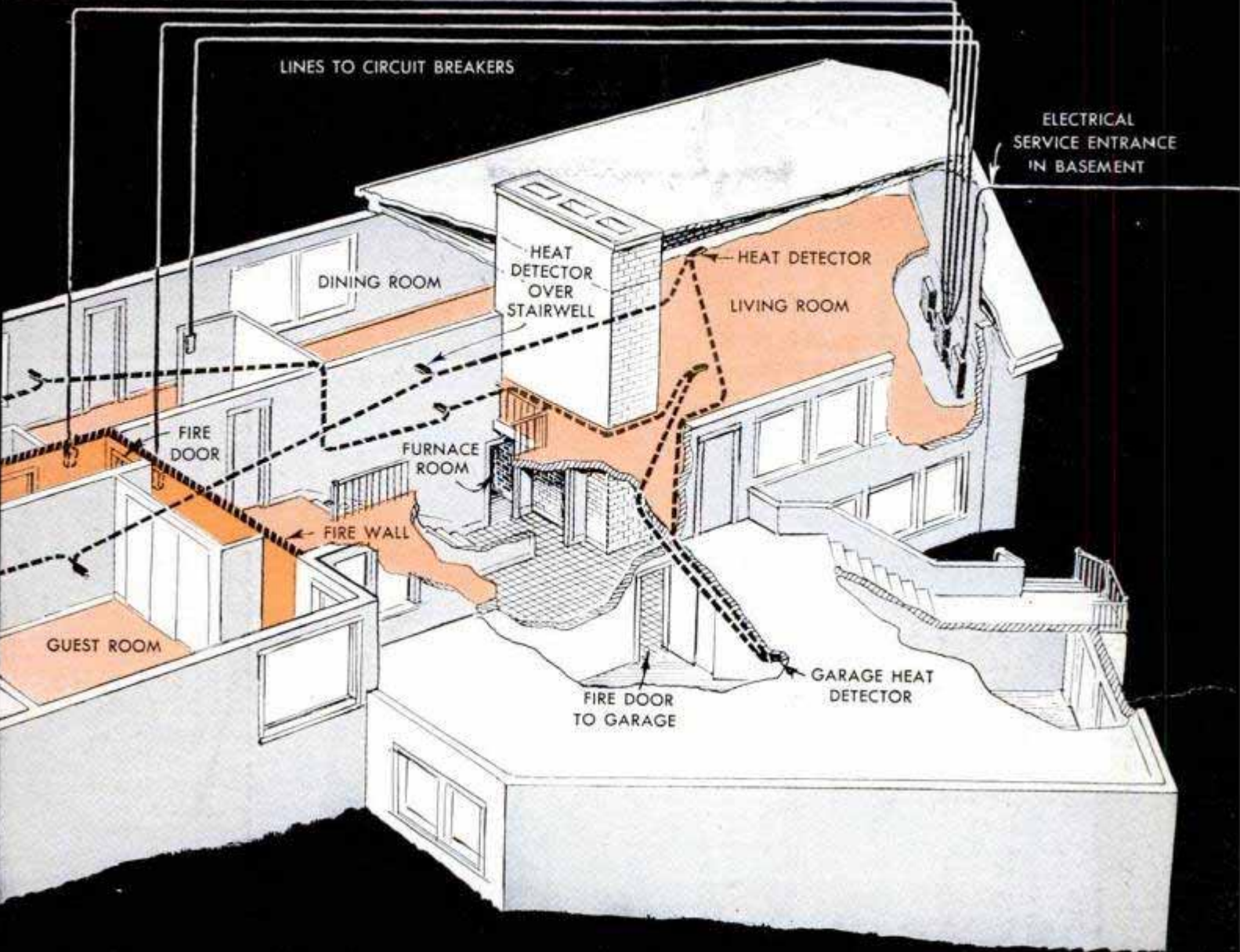
A fire-insurance executive planned and built this fireproof home of ordinary materials—wood and stucco

By Richard F. Dempewolff

NESTLED AGAINST a wooded bluff in suburban Larchmont, north of New York City, sits a new home. To passers-by, J. Wendell Sether's flat-roofed, multiwindowed, frame-and-stucco dwelling is just one more attractive addition to the many houses that are mushrooming across the nation. But under its solar eaves, and behind its huge picture windows and angular walls, lie a host of hidden surprises.

You can take a blowtorch, hold it up against an ordinary pine-studded plaster wall in that house for more than an hour, and end up with only a two-inch black spot

for your pains. You could build a bonfire on the cellar floor, let it rage for an hour, and stand a good chance of facing a repair bill for only a few broken windows. But it's doubtful a fire would start in Mr. Sether's house and burn that long. Before creeping flames got far, automatic sprinklers, spotted around the cellar ceiling would let go at 160° and give any blaze a thorough wetting down. About the same time that the sprinklers went off, a bell upstairs would clang loud enough to awaken the dead. If everything missed, the fire might gain some headway downstairs, but a few



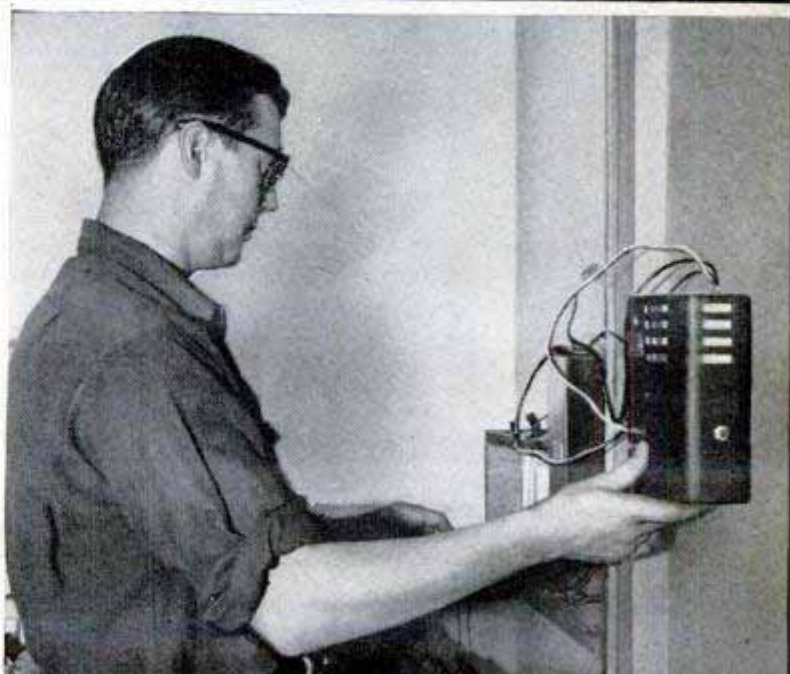
That Will Never **BURN** Down

House features fire doors and a bisecting fire wall

strategically placed fire doors would hold it back for one solid hour, preventing the flames from fighting their way into the stairwell. Suppose everyone was asleep and fire did manage to break all barriers and roar upstairs? It would bump into a fire wall capable of standing it off for another whole hour—and probably more.

Sether is a man with a job that would give most people the willies. Across his desk at the National Board of Fire Underwriters in New York pours a deluge of tragic reports. They are reports of dwelling

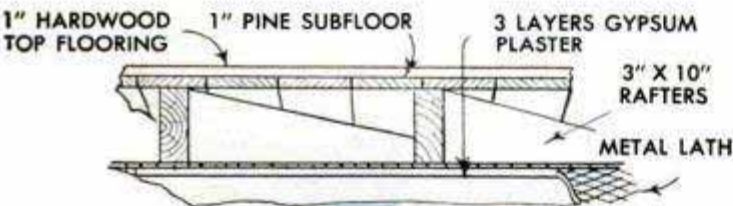
Sether adjusts bell on his bedroom wall that rings if fire starts anyplace in house, including garage



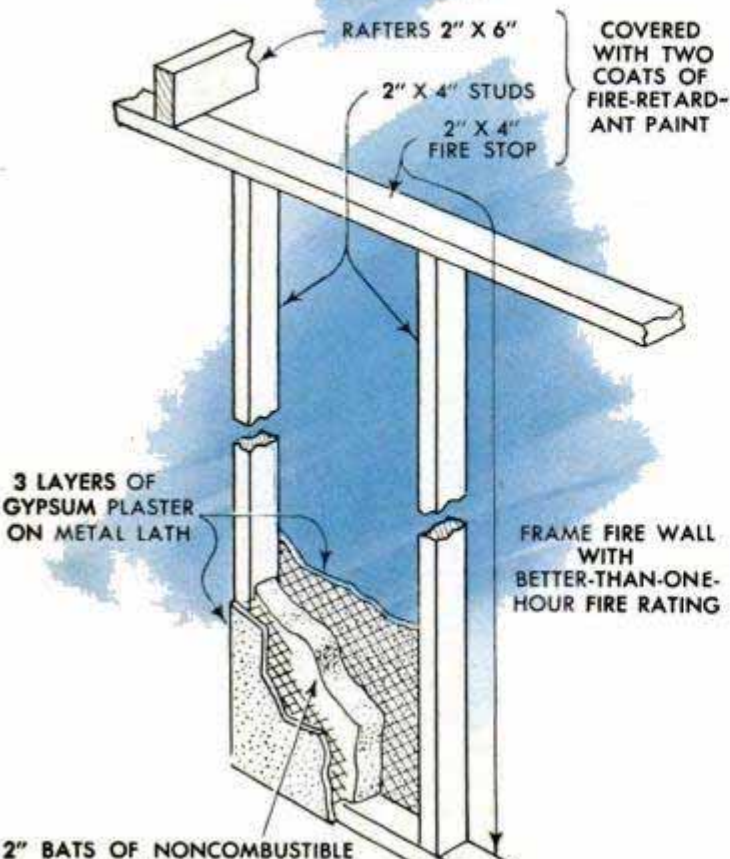


Sether sprays studs of fire wall with water-repellent chemical to protect the wood before painting them with fireproof paint which is water absorbent

Beams of basement ceiling are covered with metal lath and plaster. Both floor and the fire wall received high rating by Underwriters' Laboratories, Inc.



FLOOR BUILT FOR ONE-HOUR FIRE RATING



fires from all over the United States—vivid accounts of the roaring flames that damaged 293,776 homes last year and snuffed out 11,000 American lives. Since it is Sether's responsibility to study causes of fires in dwellings, and to help educate people in matters of firesafety, he decided to build a house that would be completely firesafe, but intensely practical—no blue-sky stunt. "Anyone," he says, "can build a house of steel framing and thick concrete that would be virtually fireproof. But how many folks will take the trouble to do it—even if they could afford it? Wood is more common. So is stucco. The trick was to make those materials as firesafe as possible."

Can it be done? The long, low home in Larchmont today is proof that it can. No special concessions were made in the architectural plans to assist in the fire-retardant features of the building. Designed for Sether by Edgar Tafel, it sits on the side of a bluff, and steps up in two levels. Garage and the playroom are downstairs. Living room, dining room, kitchen, two baths, master bedroom, guest room, a small extra bedroom, and a huge area that can be opened wide for play, or divided by movable partitions into two bedrooms for the children, form the main floor of the house.

"In most two-story homes," explains the owner, "a fire starting downstairs or in the cellar becomes disastrous in a matter of minutes. Open stairwells act just like chimneys, sucking heat and flames upward in a raging holocaust."

The grim efficiency of stairwell "flues" screams from the front pages every day, and Sether can pluck a hundred instances from his files in a few minutes—each one more grisly than the last. To prevent any such catastrophe in his home, Sether confined his stairs, from cellar to entry hall above, between two walls of concrete block covered with three coats of plaster. The stairwell is open at the top with a wrought-iron rail around the edge. But down below, the steps are completely bottled in. A blank wall faces the bottom step. Walls on either side of the landing have beautiful birch-finished flush doors opening out into the cellar areas. Another similar door, set in a concrete-block foundation wall, separates the garage from the cellar.

Though they look like plain wooden doors, these are actually fire doors—tested and awarded a one-hour fire rating by the Underwriters' Laboratories, Inc. A "one-hour rating" means this type of door has been put in the laboratories' furnace, one side held against a flame generating about 1700°, the other side facing the furnace door. At the end of an hour, the door was removed. A high-pressure water stream from a 2½-inch hose was then directed

at the charred door, and it stood the impact.

Though wood-surfaced, this type of door can stand off tremendous heat. It has a mineral core of incombustible hydrous calcium silicate, in a fiber binder. The edge, of solid birch, has been fireproofed under pressure. The frame is covered with $\frac{1}{16}$ -inch hardwood veneer, bonded to the core, with a decorative veneer on top of that.

"Any fire starting in the cellar or garage," Sether points out, "is going to have a tough time breaking through those barriers. As long as the doors are kept shut, the stairwell can never act like a chimney flue."

Downstairs, a few other precautions will discourage any fires. Sether admits that it isn't practical to put in special plumbing for sprinklers all over the house. But where water pipes run conveniently across the cellar ceiling it can be done cheaply. He has tapped pipes in the furnace room as well as other convenient spots (over his paint locker area, for instance) in the cellar ceiling. At the end of each outlet a little spout is fastened. Each spout has a nipple of fusible metal, and when the temperature reaches 160° the metal will melt and water will spray any fire beneath it.

Another vital factor in preventing fire from spreading through a multistoried frame house is the separation between the floors. Improperly constructed floors and walls can transmit heat and flames through a whole building in jigtime. It doesn't take long for temperature to soar up to 1000° above a confined fire.

What kind of flooring in a frame house would prevent a cellar fire from mushrooming? The floor of his firesafe house has a one-inch finish of red oak on a one-inch-pine subflooring. Ten-inch-deep air spaces between the beams provide an in-

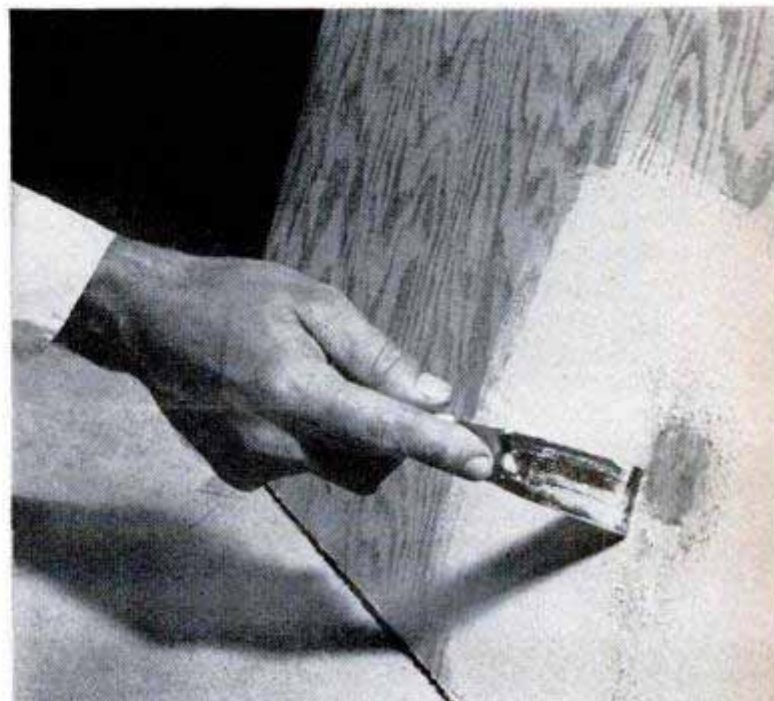
ulating barrier. So far, that's pretty standard. The difference is in the cellar ceiling. Instead of leaving beams exposed, as they are in most homes, Sether has covered the entire cellar ceiling with metal lath and three coats of gypsum plaster. This forms an incombustible seal that flames and hot gases can't penetrate for a long while. The furnace-room ceiling has three layers of cement plaster, which gives it a 1½-hour rating. "It's more expensive," he admits, "but it could spell the difference between a house standing intact or burning down."

Across the entire building, dividing the sleeping section from the living quarters is a remarkable fire wall of standard frame construction. The only opening in it is another of those wood fire doors with a one-hour rating. When the partition studs were in, Sether painted them with two coats of a commercial fire-retardant coating that looks like white paint. Hold a blowtorch against it, and the paint blisters up to form an insulation barrier between its surface and the wood. After half an hour of this, you can scrape off the charred substance, hit the same spot with the torch again and the undercoat will blister up and do the same job. Studs painted with this material will cook a long time before they catch fire.

To insure firesafety in the wall, Sether plastered the fire-retardant paint around rafters and cross members above the studs as well as on the floor members beneath it. Into the stud spacings went two-inch bats of incombustible insulation. Each side of the partition was sealed by metal lath and three layers of gypsum plaster. "The Underwriters gave this type of wall a one-hour rating," says Sether, "but they didn't try for the limits. It will undoubtedly hold for a lot longer than that."

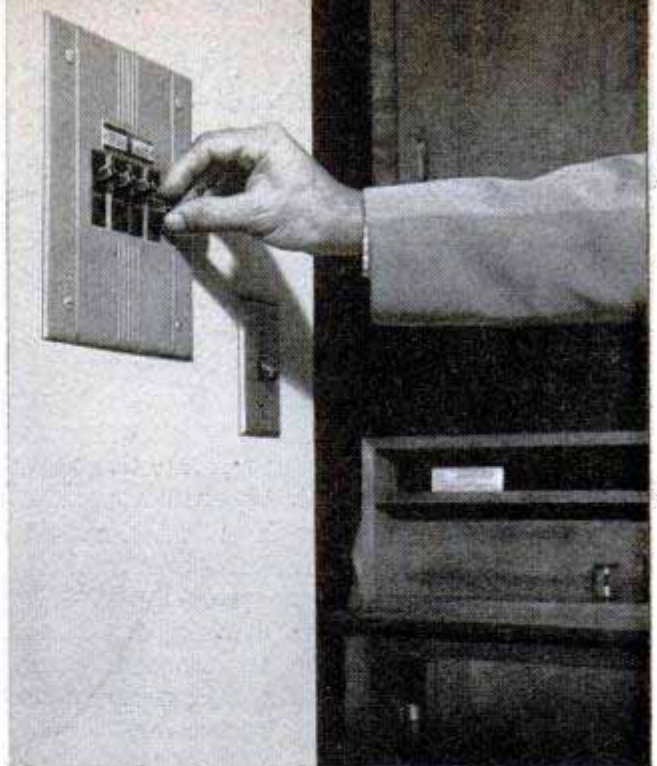
Blowtorch is applied to piece of laminated wood protected by fire-retardant paint used by Sether

After half-hour application of blowtorch, charred blisters are scraped off showing wood unscorched





Heat detector on ceiling has bar of fusible metal that melts at 160 degrees and sets off fire alarm



Circuit-breaker system eliminates need for a fuse box. Sether has five such switch panels in house

The only disadvantage to the paint is that it has moisture-absorbent qualities—a minor hazard. Sether solved it by spraying his studs and beams beforehand with a prepared chemical solution called Pentachlorophenol. This is a moisture repellent, and protects the internal timbers against any moisture the paint may attract.

There's another trick in this amazing house. If you look closely at the ceilings in every room, over the stairwell and in the garage, you can see little plastic and metal gadgets that look like miniature thermostats. In effect, that's just what they are. Down the center of each runs a bar of fusible metal. All are hooked together on a 24-volt system that works off the house current. A loud bell and a red light in the master bedroom are hooked into the circuit. When the circuit is intact, nothing happens. But if a fire should be burning anyplace in the house, the ceiling temperature in that room needs only get to 160° before the metal bar on the nearest detector melts. When it does, little springs on each end of the bar pull the stubs apart, breaking the circuit. Instantly, the red light in the bedroom glares, and the bell starts clanging away like mad. The efficient system is back-stopped by batteries to keep it functioning in case the house current fails.

A glance through the reports in Sether's files shows that thousands of dwelling fires each year are caused by defective electrical systems. "Faulty wiring," "pennies in the fuse box," "high-amp fuses" are frequent notations. No fuse box in this house will ever cause trouble. There is none.

Instead of feeding through one big box in the cellar, power lines come in to five

neat panels sunk in the walls of various rooms. Instead of fuses, the panels hold little circuit-breaker switches.

The draperies and upholstery materials in Sether's house are of spun glass fibers. Other decorative materials stress fire resistance. "Fabrics that can't be made of fire-resistant material," he says, "are easily treated at home. Four ounces of boric acid, plus nine ounces of borax in a gallon of water make a solution that can be used to spray, rinse or dip any fabric. Materials so treated can't support combustion."

What Sether has done is fine for anyone who's about to build a new house. But what if you already have a frame house? There are several things you can do.

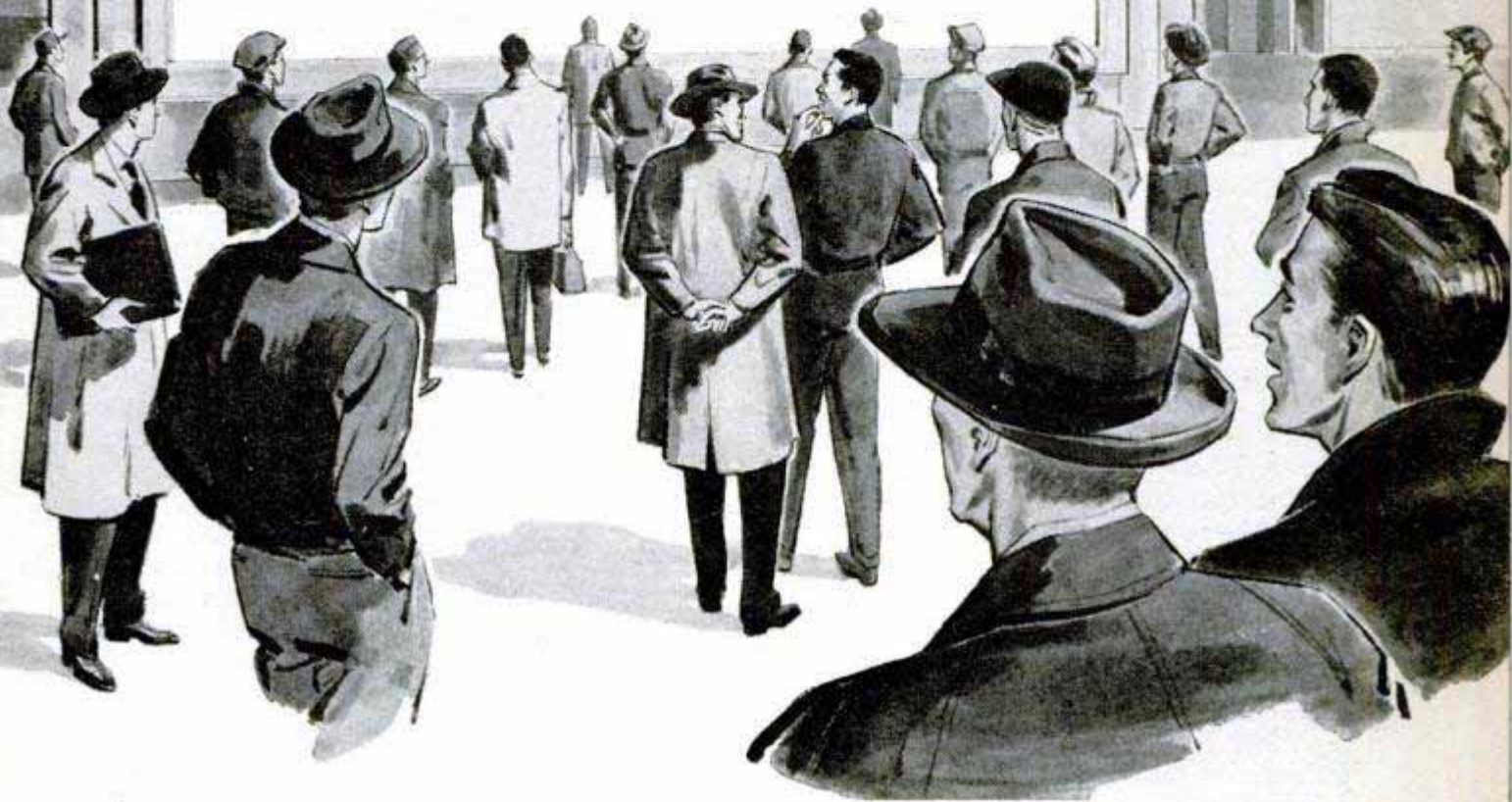
Stairs from cellar to first floor can be blocked by a flush-type fire door instead of the flimsy, wood-paneled affair with which most homes are equipped. Similar doors, costing \$30 to \$40, may prevent fire from coming into your sleeping quarters.

A gypsum ceiling covering the cellar beams will add a tremendous firesafety factor to any house. Judicious use of that fire-retardant paint can make a good "fire wall" out of a strategically located partition.

"And any man," Sether points out, "can rig the same fire-alarm system I have. If he wants to buy it, the entire outfit—including wires, batteries, detectors, bell and light—costs about \$50. A circuit-breaker system would run about \$30.

A home containing all these features, according to Sether, would be just about as firesafe as a frame house could be. Even if flames should start, you and your family would have plenty of time to gather your wits and get away unscathed. ★ ★ ★

WANTED: 50,000 ENGINEERS



Here's a profession that's exciting, constructive and well-paid, yet authorities see no end to the shortage of trained men. Readers of this magazine may have particular abilities needed in this profession. Sample aptitude tests with this article help indicate such abilities

By Carey H. Brown

Chairman, Engineering Manpower Commission

IF YOU'VE EVER dreamed of designing or building great bridges, huge monuments to civilization in the far corners of the world, electronic wonders or rockets to probe outer space, your chances of making those dreams come true were never better. Provided, of course, that you have the basic qualities it takes to make an engineer. And provided, too, you have the time for four to six years of essential college work before you can create and build your first dream.

Right now America is crying for engineers—50,000 of them. Worried men with slide rules have figured that, with the rapid advance of scientific development in every field, an additional 30,000 engineers will be needed every year in industry alone. We're not even close to meeting that figure. By 1954, only 17,000 engineering students will

graduate. There are many reasons for this sad state of affairs. Unlike our wartime allies, we drafted into military service thousands of engineering students, many of whom never returned to the field. The low birth rate of the 1930s is now aggravating the engineering-manpower shortage.

But the important fact is that any young person today who has an aptitude for engineering and is willing to work hard to develop it is virtually assured of a fascinating job, a sound future, prestige and a salary few fields can match.

How good is it? The engineering students who graduated last June could pretty well pick their jobs from a variety of offers with starting salaries of \$300 to \$375 a month. In 10 years the good ones will be making two or three times that much. Many



of today's student engineers will have branched into scores of specialty fields and spread to the four corners of the world—from the pipe lines of Saudi Arabia to new mining developments under the rim of the Arctic Circle.

Just what is engineering? It has been called the art that makes pure science useful. The engineer takes the formulas of the scientist and puts them to work for mankind. He is far from an impromptu builder who goes to work willy-nilly with sketchy plans and reliance on his handy ingenuity. Engineers analyze, design and then supervise the building of nearly anything you can name—railroads, radios, bridges, rockets, dams, power plants, radar and television devices, engines, machines, industrial plants, pipe and transmission lines and thousands of other things too numerous to mention. Their work carries them over deserts, mountains, seas and snowbound wastes.

Here's how it works. If you were a civil engineer hired to build a bridge across the Amazon River, you would first learn exactly the functions your customer wanted that bridge to perform. You'd plan in general how it could be done. You would visit the site with a crew of surveyors. You would determine all the forces, in their maximum degree, that would be brought to bear on the structure—like floods, earthquakes, wind and the loads it should be designed to carry.

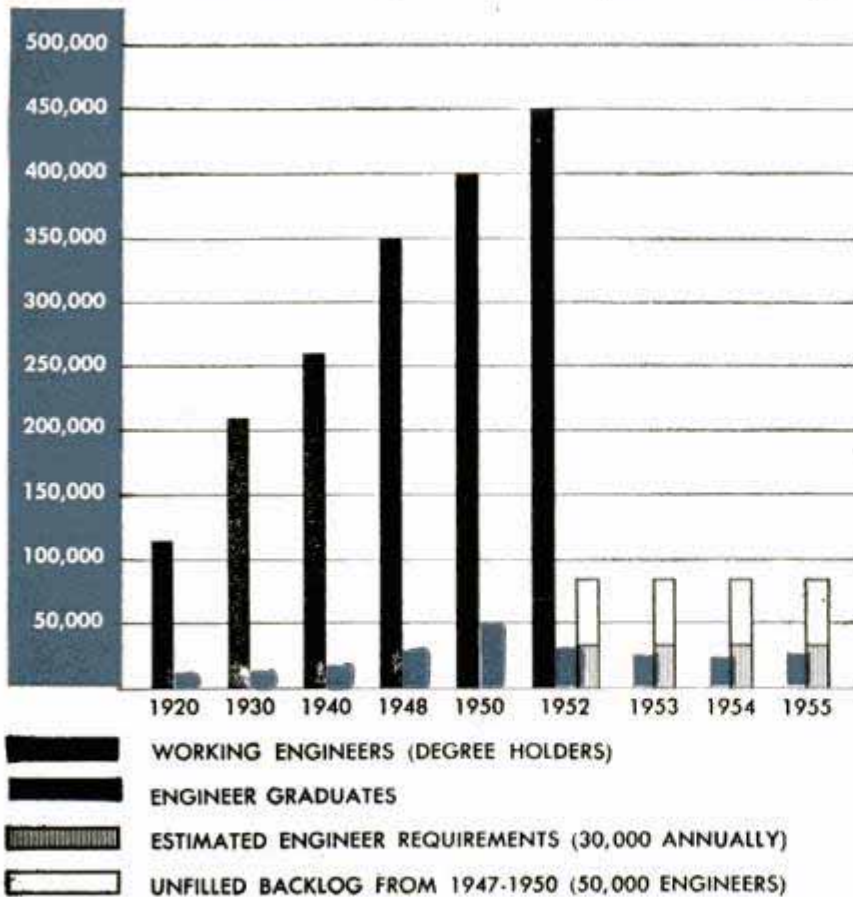
Several materials might do the job.

Should it be steel or masonry? For each you'd consider several possible arrangements. Should it be an arch bridge, suspension, truss or cantilever? After reconnaissance and selection of the site, followed by necessary investigations to acquire information on which to base the final design, you and your associates would spend weeks or months designing each separate part and making dozens of scale drawings. Then you'd draw up minute specifications and descriptions for the entire project as it would be in final form on the Amazon site. Nothing can be taken for granted. Every detail must be allowed for.

Finally, you might have to supervise the construction of your bridge, watch it grow through proper stages and satisfy yourself and your client that everything you put into it would do the job it was supposed to do.

From all this, you might gather that unless you were a big, tweedy, six-foot giant with a mathematical trap of a mind and a penchant for monstrous things and wide-open spaces, you couldn't be an engineer. This is not so. Engineering encompasses dozens of fields and myriad personalities. You can be fat, thin, tall, short, introvert or extrovert. And no matter what your particular bent, if you have an engineering-type mind, there's a niche you'll fit. You don't have to build a bridge or railroad; it may be a power plant, an oil refinery, a chemical plant, a steel mill or a mining project.

The profession breaks down into five big fields. There are electrical engineers who work in electronic devices, communications and electric-power generation, transmission and application. The mechanical engineer, alone or in cooperation with other engineers, designs and builds anything that can move or be moved—from monkey wrenches to steam engines. He produces airplanes, rockets, jet power plants, turbines. It is the civil engineer who turns his talent to the massive stationary monuments that decorate our modern landscapes—bridges, dams, superhighways, railroads, underwater tunnels, water systems and other structures. The chemical engineer takes what the chemist does in his laboratory and turns it to industrial use. He creates the plastic objects you use today, synthetic fibers and fabrics and a host of chemicals



used in industry. Mining and metallurgical engineers find ways to get minerals from the earth and combine them to produce useful products like stainless steel and many other alloys that make the things you use every day. Others who have adopted a specialty may call themselves industrial engineers, manufacturing engineers, aeronautical engineers, petroleum engineers or other designations indicating their particular line of activity.

Closely related to the engineer, and working hand in hand with him, are the designers, draftsmen, detailers and surveyors. The surveyor is the chap you see on the site of a big construction project, peering through his tripod-mounted transit. This with his level, plane table, tape and photographic equipment are his principal tools. He's an outdoor-type fellow, usually. He maps the site terrain, lays out the site for the engineer, locates boundaries, sees that structures are at proper elevation and grade, searches deeds and records. Though it helps, an engineering degree is not a "must" for him.

Engineering aides are highly respected men, essential to the successful execution of engineering projects, whose principal training in most cases has been on the job. Though sometimes applied to junior graduate engineers, this term usually signifies a man whose technical training or experience falls short of qualifying him as an engineer. Many of them have one to three years' training in a technical school plus a vocational-high-school diploma. They might be called the "top sergeants" of the profession and often command handsome salaries, but few go on to executive positions because most companies now prefer graduate engineers in those spots.

Another fellow who may or may not have a degree is the draftsman. This highly skilled craftsman makes finished drawings from designs the engineer has roughed out. Some specialize in cartography, or map making. In other specialties, such as machine design, the engineer and the draftsman work side by side or their activities may merge. Unless the engineer's idea or design is translated into proper drawings and specifications and thence into an adequate structure or piece of equipment it's of little practical value. This illustrates the importance of the engineering aide, the technician and the draftsman to the engineering profession.

All this is fine, but how can you tell if you have the qualifications to be an engineer? There are a number of specific things that help make a good engineer. Ask yourself these questions, posed by Dr. A. Pemberton Johnson, project director of the

Educational Testing Service. Try to answer them honestly.

1. Were your high-school-mathematics grades in the top third of your class?

2. Were your grades in physics, chemistry and other science courses in the top third of the class?

3. Were your high-school English grades in the top half of your class?

4. Did you have sound habits of work and study?

5. Does your curiosity about things run high? (Do you wonder why radio signals are weaker in daytime than at night? Why fluorescent bulbs are tube-shaped instead of bulbous like standard lamps? Why aluminum is soft? Why concrete highways are made of slabs instead of in a continuous strip?)

6. Are you interested in improving things? If so, have you ever done something about making an improvement?

7. Are you honest with yourself and other people?

If you can answer "yes" to all these questions, you have some of the faculties it takes. But there are many more. Though a four or five-year undergraduate course in a good engineering school will give a man his necessary degree, many engineers go on to graduate work and all must be prepared for continual study to keep up with the rapidly advancing developments in the fields of science. Many use night schools and correspondence courses.

The tests on these pages are samples of the type that help show your ability to acquire and retain knowledge in fields that should interest a potential engineer. Designed by Mr. Johnson O'Connor, director of the Human Engineering Laboratory, Inc., and the Johnson O'Connor Research Foundation, Inc., they are parts of tests now in actual use. They are helping to screen future engineers for large concerns. If you do well on the samples shown here, it does not necessarily mean you should plunge into engineering but indicates an interest in that direction, and you may want to investigate further.

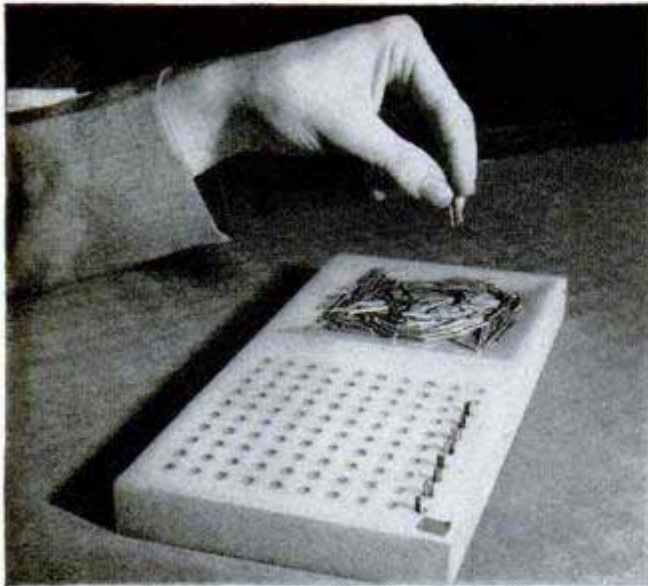
The best way to learn whether or not you have the basic engineering aptitudes is to take aptitude tests. These are designed to indicate your ability to visualize things in three dimensions; to determine the degree of your intellectual curiosity and creative imagination, and to determine your personality type. The answers are important for the prospective engineer to know. A quiet man with subjective personality and high creative ability does best in de-

(Continued to page 246)

The tests on these pages were designed and especially selected for *Popular Mechanics* by Johnson O'Connor, director of the Human Engineering Laboratory. Two types of test are used to probe a man's potential for engineering or any other profession: aptitude and knowledge. Today

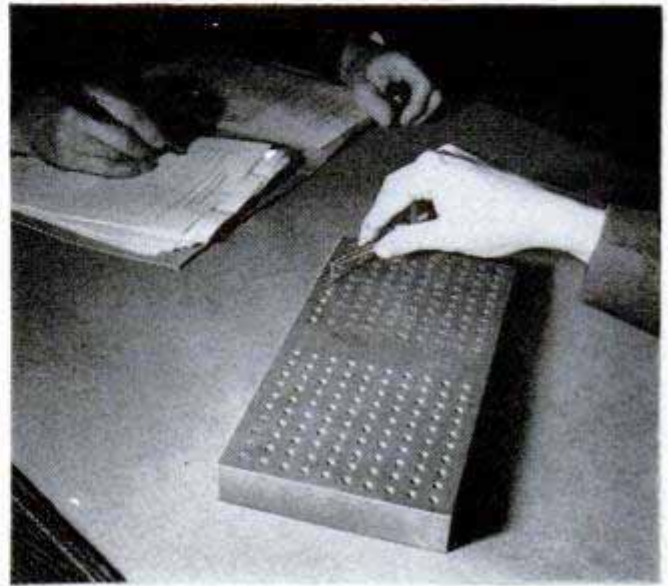
some 15 different aptitudes are known and measurable at the Human Engineering Laboratory. These two pages show the proficiencies especially important to the engineer. The following three pages contain sample knowledge tests which you can take as an experiment in this type of testing.

FINGER DEXTERITY



Finger dexterity represents a man's ability to carry out ideas with his hands. It is exhibited to a high degree by a mechanic, for example. This aptitude is particularly needed in engineering when coupled with good structural visualization. The photo shows how finger dexterity can be tested. The subject, seated at a table, is given the pegboard containing 100 holes. He is told to pick up three pins at a time and fit as many of them as possible in the plastic board in six minutes. The subject who fills 77 holes in the allotted time is judged fair in this aptitude. Over 83 holes filled is considered a high score and indicates finger dexterity to a high degree

TWEEZER DEXTERITY



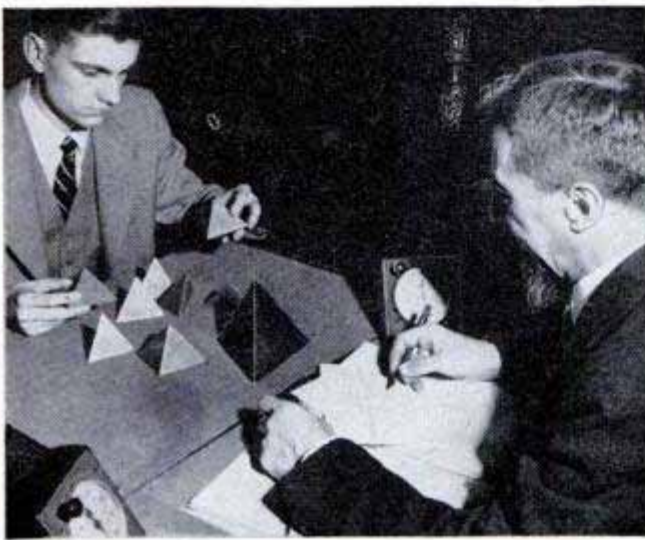
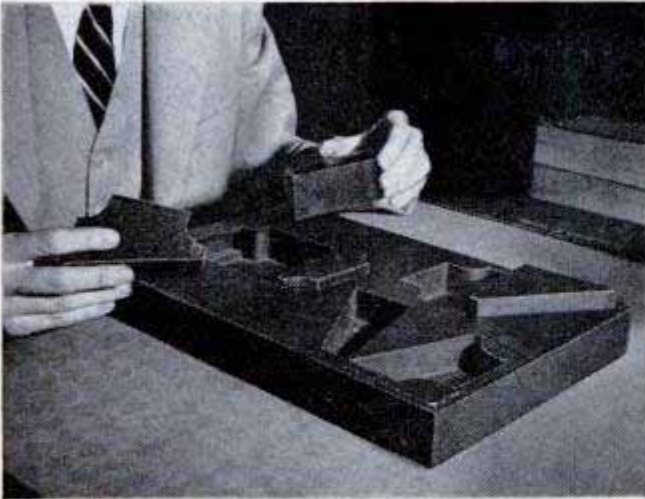
Tweezer dexterity is quite similar to finger dexterity, but has one basic difference in that the subject must manipulate some object in order to carry out his idea. It also is highly exhibited by the mechanic, who can perceive what is wrong with an automobile engine and then manipulate his tools with his hands to eliminate the trouble. In this test the potential engineer is given another pegboard and a pair of tweezers. He is told to pick up 100 pegs from one side of the board and drop them into holes in the other side. A highly dexterous person can move 100 pegs in 4.1 minutes to rate a good score in the test. This aptitude is valuable in miniature assembly work

INDUCTIVE REASONING



Inductive reasoning is the ability to see a fundamental law or relationship. The pure scientist rates extremely high in such ability. In each of these sample strips, three pictures are similar for a particular reason. In the top strip a child is common to three pictures; in the bottom strip it's a dog. To get the full benefit from this type of test the subject must determine the common factor in at least 60 strips of pictures at top speed. The strips grow more difficult—in the final strips the common factor is quite hard to find

STRUCTURAL VISUALIZATION



Structural visualization is the ability to see things in three dimensions. It has nothing to do with intelligence — persons of high intelligence sometimes have virtually no ability at structural visualization — but seems to be an inherited trait. This aptitude is usually tested with building blocks. In the upper-left photo the subject is fitting oddly shaped blocks into just as oddly shaped holes. If he has good structural visualization he'll do it in less than 2.8 minutes. Above, he is given blocks with black and yellow sides and told to build a big cube without any yellow showing. A good time for this test also is 2.8 minutes. At left his problem is to build a big pyramid by stacking up the little pyramids. If he does it in 8 minutes he has done well. Anything beyond 18 minutes is a very poor score. Student engineers who take the structural-visualization test shown here are permitted to try three times

NUMBER REASONING



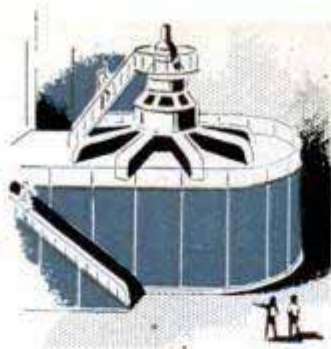
Testing for this aptitude is still experimental. The subject is given a board marked off with symbols representing mathematical problems. He also is given numbered tiles. When the test begins he must arrange the tiles as fast as possible on the board to set up the problems and answers. His score is judged on how fast he can set up the correct problems

Tests shown on these pages are the most vital to the engineer, but there are many other aptitudes that may be important to his work. Tests of knowledge may also yield much valuable information, as knowledge itself may indicate certain aptitudes. Tests on the following three pages are samples of those given potential engineering students. You won't get a high score unless you have a deep interest in the fields that are important to engineers. And you probably aren't interested in these fields unless you already have some of the necessary aptitudes. However, if you do well on these tests it does not necessarily mean you are a potential engineer. It does mean that if you are interested in the field of engineering it would be well worth your while to take an entire series of such tests. In taking these sample tests you may want to compare your scores and answers with those made by a representative group of engineering students. The answers to the following tests appear on page 246, together with the scores of these students. If you were a top professional engineer you'd miss only a very few of the questions in these tests. A good score indicates you may have valuable engineering aptitudes. It might pay you to investigate your aptitudes further. These knowledge tests were designed and are copyrighted by Human Engineering Laboratories, Inc.

MORE TESTS ON FOLLOWING PAGES ♦

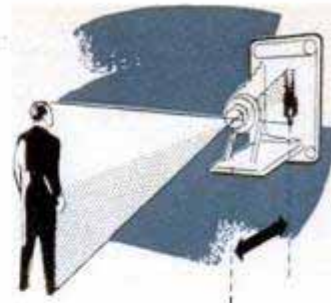
1. This machine, which creates power at Niagara Falls, is called:

- (eliminator) (antenna)
- (generator) (turbine)
- (spark-coil)



2. In this diagram, showing lines of light from a distant object to a camera film, the distance from the lens to the image being photographed is known as:

- (axis) (foot-candle)
- (penumbra) (incidence)
- (focal length)



3. This instrument compares the candle power of two light sources. It is called:

- (camera) (photometer)
- (electric eye)
- (electrophorus)
- (stereoscope)



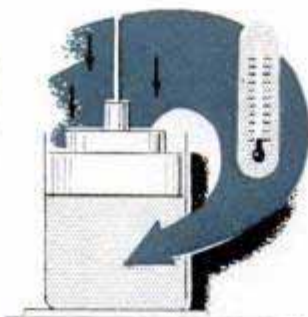
4. You'll find this device in most radios. It allows the flow of current in one direction only. Its name is:

- (switch) (audio)
- (rectifier) (fuse)
- (transmitter)



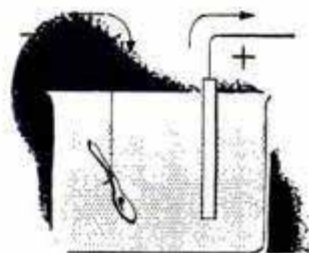
5. The temperature above which it is impossible to liquefy a gas, no matter how great the pressure, is called:

- (recalescence) (fusion)
- (critical) (boiling)
- (freezing)



6. The spoon in the beaker containing fluid is about to be electroplated. It is called the:

- (cathode) (ion)
- (electrolyte) (anode)
- (positive electrode)



7. The particle with the smallest known mass is the:

- (electron) (atom)
- (ion) (proton)
- (alpha particle)



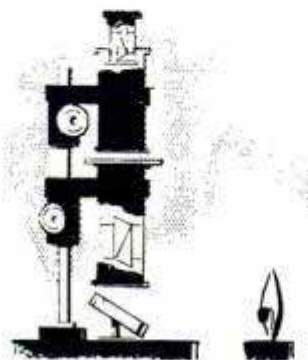
8. A famous pendulum is arranged to swing in the pattern indicated by the diagram, due to the earth's rotation. Such a pendulum is called:

- (compound) (simple)
- (ballistic) (Foucault)
- (Kator)



9. The instrument at right measures the sugar content of a solution. Its name is:

- (comparator)
- (polariscope)
- (spectroscope) (analyzer)
- (heliostat)

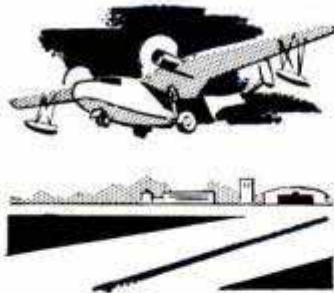


10. One ten-millionth of a millimeter is called:

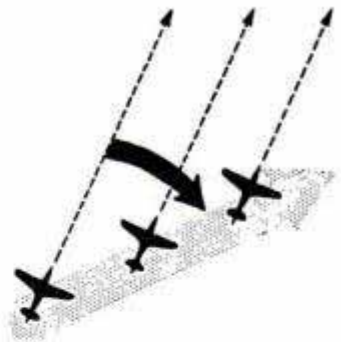
- (Angstrom unit) (micron)
- (micrometer) (megohm)
- (millimicron)



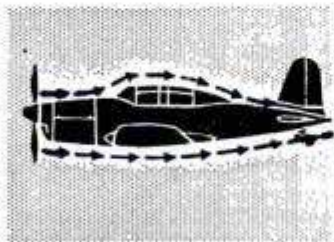
1. The airplane shown at right can land on water or land. This type aircraft is called a:
 (monoplane) (biplane)
 (amphibian) (seaplane)
 (flying boat)



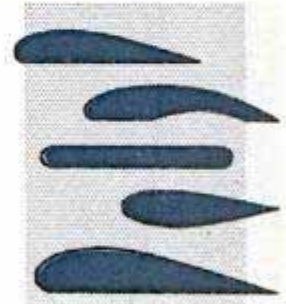
2. The angle indicated by the curved arrow is the one between the direction in which the plane is pointed and the direction in which it is moving. It is the:
 (angle of pitch)
 (trim angle) (drift angle)
 (flight-path angle)
 (wind-correction angle)



3. The current of air driven astern over the aircraft (shown by arrows at right) by the propeller is termed:
 (blade element)
 (downwash)
 (sweepback) (slipstream)
 (tail plane)



4. The diagrams right are cross sections of surfaces designed to obtain reaction from the air through which they move. Such a surface is called:
 (flap) (rib)
 (aileron) (airfoil)
 (strut)



5. The long steel tubes indicated by arrows at right form the framework of a plane's body and are called:
 (spacers) (flanges)
 (spars) (longerons)
 (gussets)



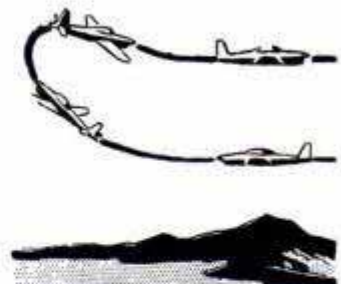
6. The group of parts forming the aircraft assembly at right is known as:
 (rudder) (empennage)
 (stabilizer) (fin)
 (elevator)



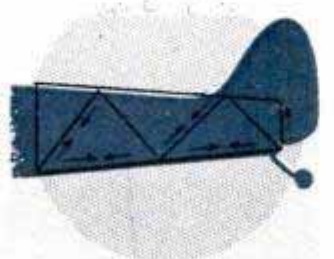
7. The instrument shown at right measures the force or speed of the wind. Its name is:
 (nephoscope)
 (anemometer)
 (psychrometer)
 (computer)
 (air-speed indicator)



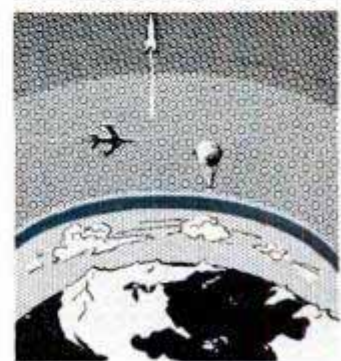
8. The climbing term diagrammed at right, in which the momentum of the craft is used to obtain a higher rate of climb, is called a:
 (chandelle) (wingover)
 (zoom) (Immelman)
 (pull-up)



9. The fore and aft compression members of the internal bracing system of the aircraft shown at right are called:
 (stringers) (spats)
 (tabs) (compression ribs)
 (drag struts)



10. The point in the atmosphere at which the fall of temperature with increasing height abruptly ceases is the:
 (ionosphere)
 (stratosphere)
 (tropopause)
 (troposphere)
 (pressure altitude)



CHECK ONE ANSWER IN EACH ROW THAT BEST ILLUSTRATES THE TERM



1. TOPOGRAPHY
PHYSICAL CHARACTERISTICS



HEAD



INDUSTRY



MINERALS



TYPESETTING



2. SMALL ESTUARY
INLET



LAKE



PROMONTORY



PENINSULA



ISLAND



3. MORaine
MARSH



FOREST



GLACIAL DEPOSIT



LOW GROUND



NARROW GORGE



4. FLUVIAL DEPOSIT
RIVER



VOLCANIC



DUST



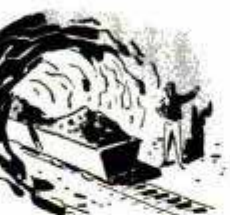
GLACIAL



CORAL



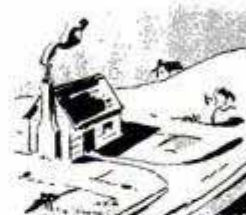
5. ALLUVIAL SOIL
ROCKY FORMATION



MINERAL



FERTILE



OVERWORKED



FLOOD DEPOSIT



6. NEOLITHIC AGE
PREFLOOD



PRIMITIVE MAN



GLACIAL



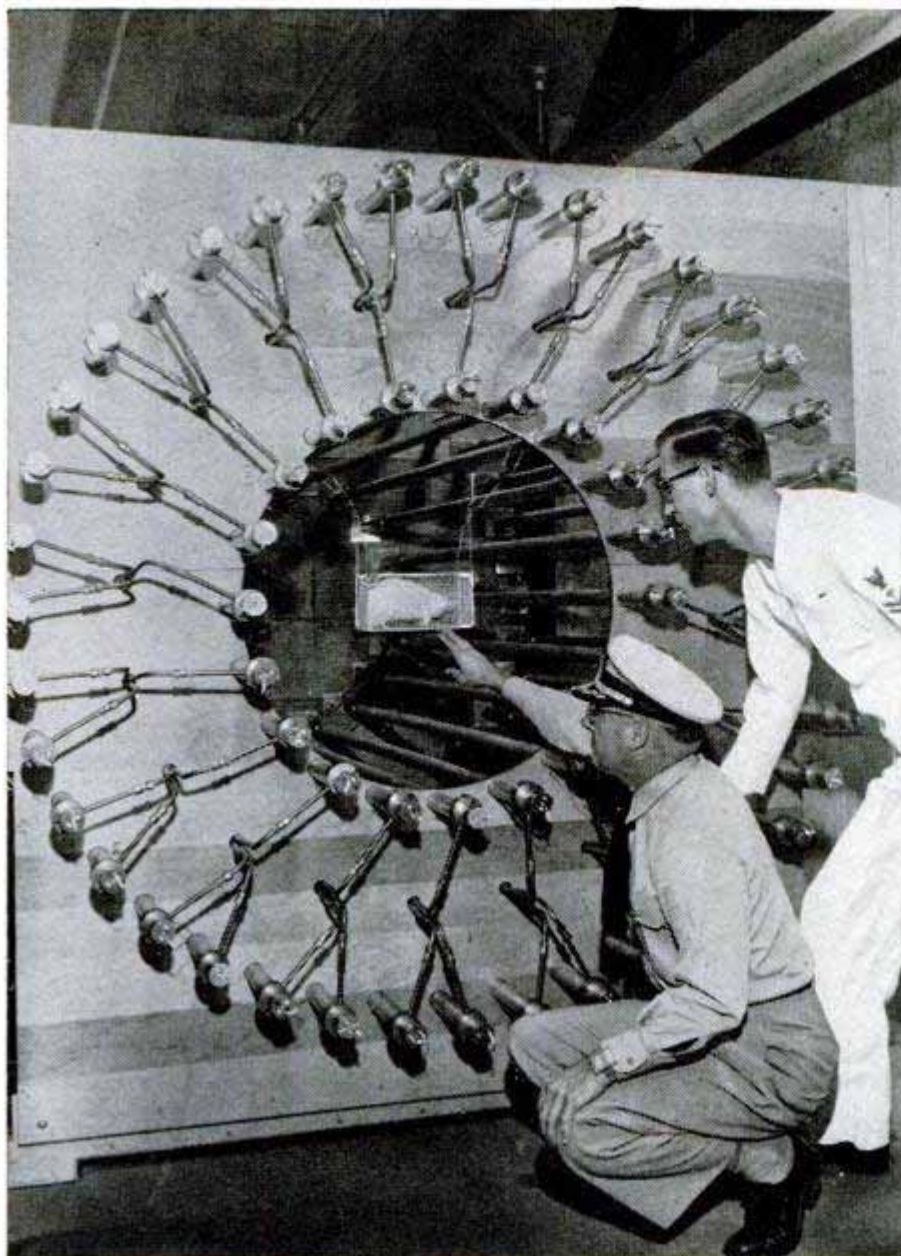
LATER STONE



CAVEMAN

Death-Ray Chamber Tests Atom Effects

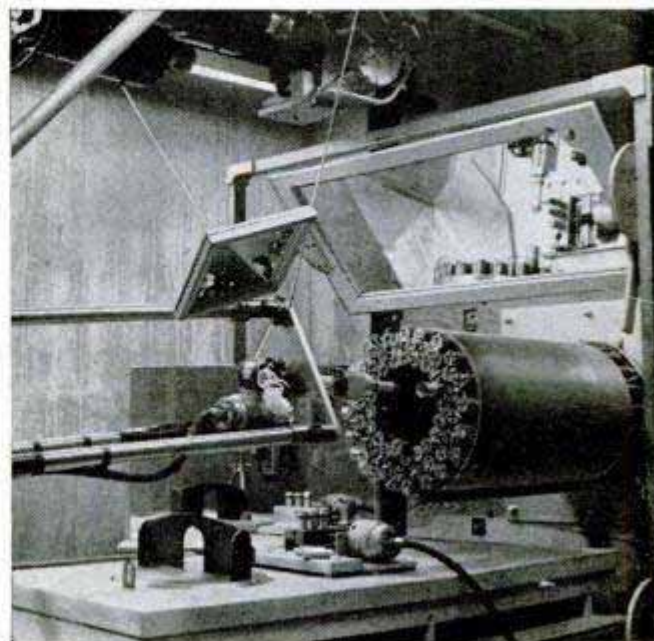
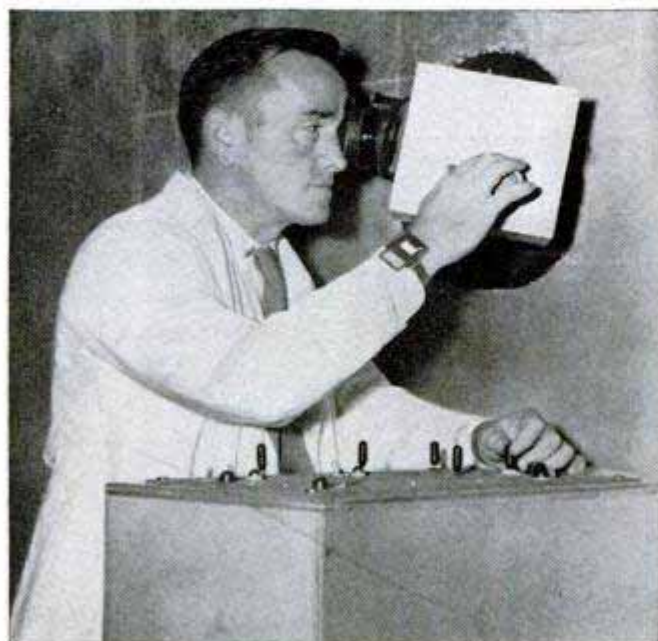
PACKED with the killing power of half the radium on earth, a radiation chamber for test animals is lined with tubes through which shuttle samples of radioactive cobalt. The animal, which may be a pigmy mouse or a fat pig, is suspended in a cage in the middle of a tube-lined cylinder. In an adjoining exposure room, a robot magnetic arm operated by remote control picks up "hot" capsules of cobalt one by one and shoves them into pneumatic tubes. Carried through the tubes which form the "death cylinder," the cobalt shuttles back and forth, soaking the animal with rays from all directions. With the machine, scientists at the Naval Medical Research Institute can simulate the effects of atom-bomb radiation on the human body. The experiments, they hope, will lead to better methods of treating radiation sickness and may point the way to a means of defending the body from the deadly rays.



Radiation chamber is a cylinder within a cylinder. "Hot" cobalt inside tubes permits even radiation not possible with present X rays or radium

Operator standing outside concrete-encased exposure rooms manipulates controls of robot magnetic arm to insert cartridges of cobalt in pneumatic tubes

Arrangement of mirrors enables operator to see what he's doing. There are 60 tubes in all; each has to be loaded separately. Rays in loading room can kill



WHAT'S NEW FOR

Your Home



1

1. BATHTUB CLEANER takes the hard work out of a frequent household chore. Foam-rubber pad, molded to fit corners and rounded surfaces, is fitted to sturdy aluminum handle bent at an efficient angle

2. ELECTRIC-BROILER unit handles a large steak, yet is smaller than the average teakettle. Any pan or skillet serves as a drip pan, when topped by the broiler rack which is covered by the heating unit

3. TABLE TRAY of plastic fits any rectangular table, brings food down to youngster's level. Two trays, clamped by knobs to opposite ends of card table, keep refreshments handy, yet out of the way

4. PASTRY BOARD faced with clothlike rubber material prevents dough from sticking or tearing, contributes to flakiness. Concentric circles on tray serve as cutting guides for various-sized crusts

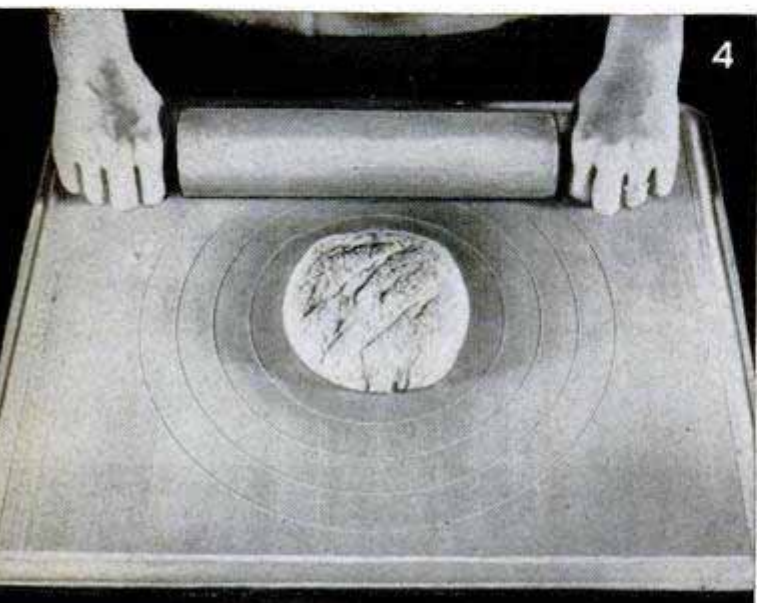
5. SIGN KIT allows anyone to make almost any kind of marker or sign with letters, numerals, boards and attachments supplied in knocked-down form. Kit is packed to order, includes everything but tools



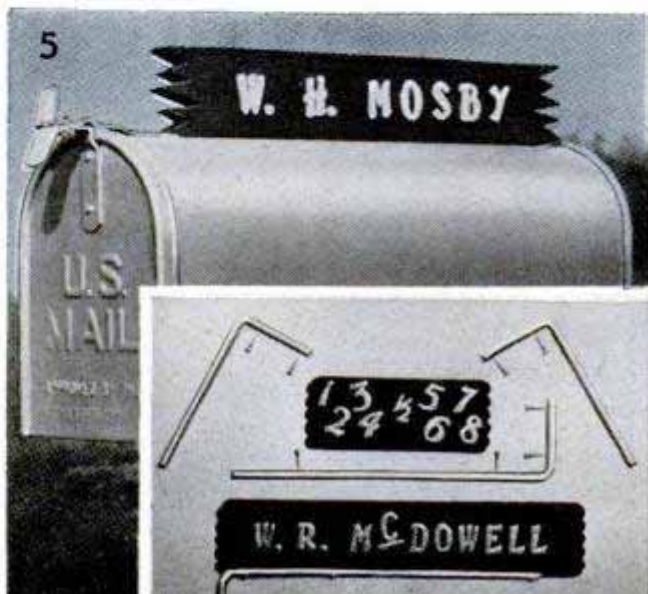
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3



4



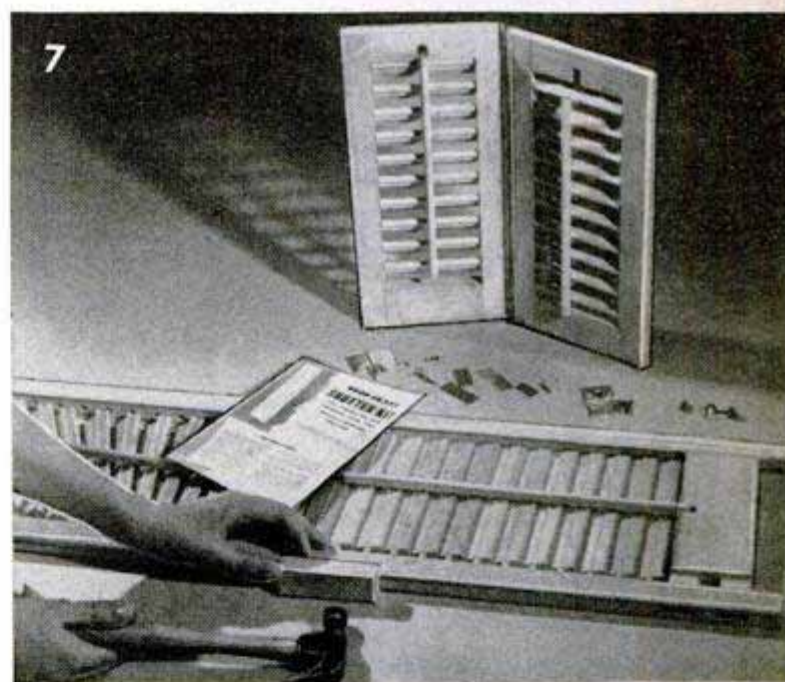
5



6. LUMINOUS PENDANT for pull cords is a miniature radium-lighted lantern that enables you to find lamp in complete darkness with a minimum of stumbling



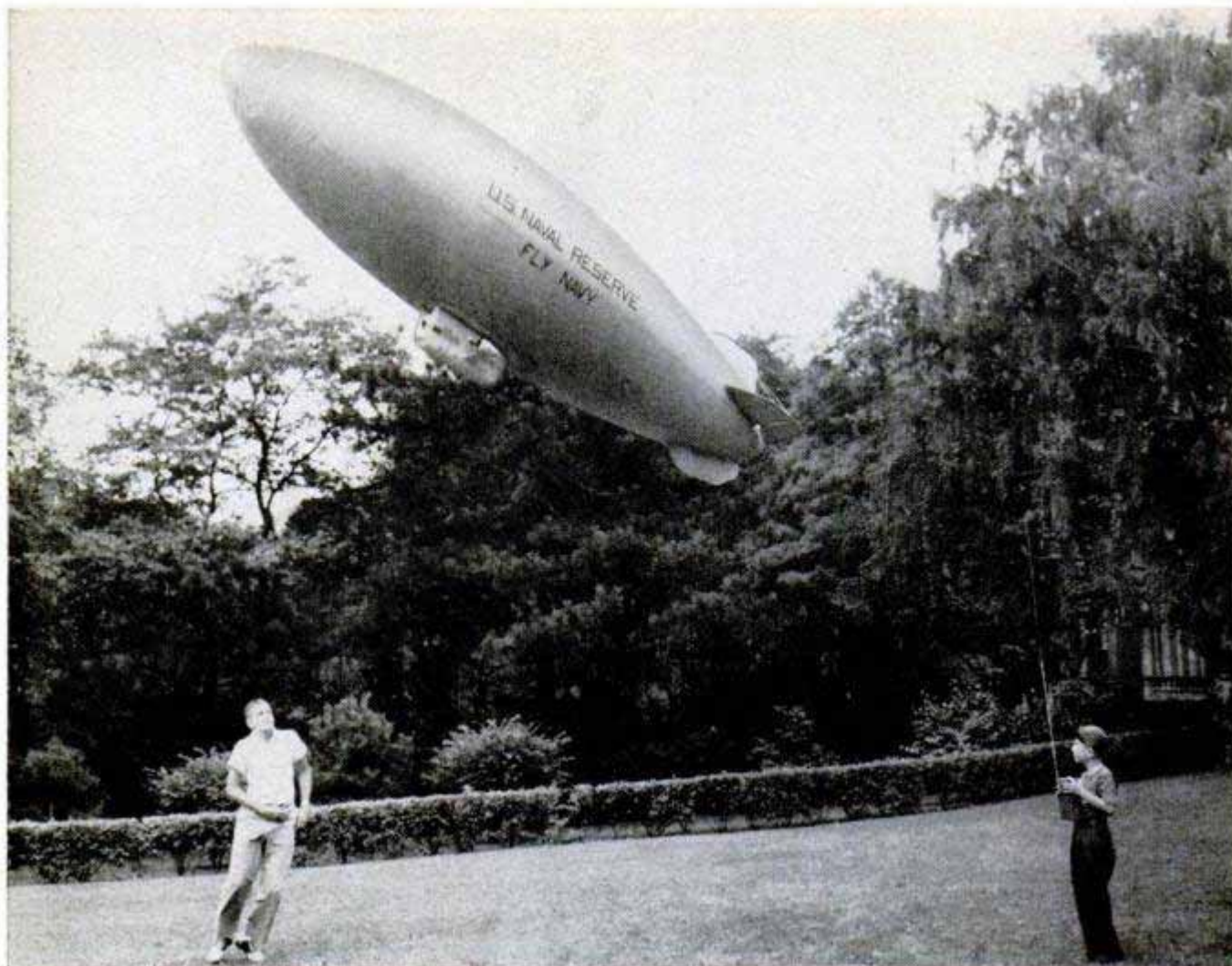
7. SHUTTER KIT halves cost of movable interior or exterior shutters by allowing you to do your own assembling, trimming, finishing and installation. Everything but costly handwork is done at factory



8. KNITTING SET allows speedy knitting with several kinds of yarn, eliminates tangling problem. Yarn is wound on spools fastened to the ends of clear plastic tubes, feeds up through tubes as needed

9. CLOTHESLINE REEL with tangle-free rope guide allows the stringing of up to 200 feet of taut line; keeps cord neat and clean when not in use. Light and durable, it is fitted with large, comfortable handles





Radio-Guided Model Blimp Used in Navy Recruiting Program

Operated by radio signals, a 17-foot model of a Navy blimp cruises along at 12 miles per hour and can be controlled up to a mile from the transmitter. The airship was built under the direction of Navy officers and is being flown in various parts of the country

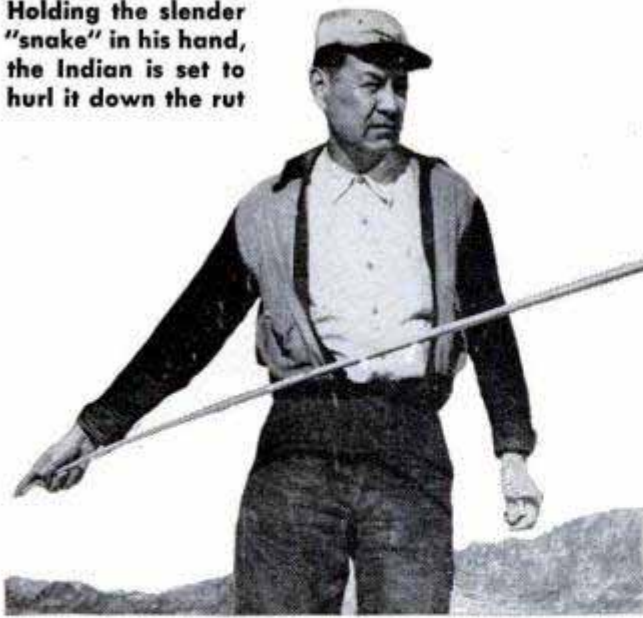
as part of the Navy recruiting program. A group of model-plane builders from Baltimore, Md., worked out the radio-control equipment, the fins and the two tiny gasoline engines which propel the small-size blimp.



Synthetic Asbestos Substitute

Possessing greater heat-resistant qualities than natural asbestos, a manmade ceramic fiber promises to ease the pinch on the critical imported material. The new fabric is made by melting aluminum and silica in an electric furnace and subjecting a stream of molten material to a blast of air. Result is a fluffy white cottonlike mass of fibers one fourth the thickness of fine silk and weighing two pounds per cubic foot. The fineness and random arrangement of the fibers make the material a superfilter for gases and liquids in chemical operations. Its resilience means that the product can be used for vibration damping and as a packing material for expansion joints. Specially processed aluminum-silicate fiber will be utilized for electrical insulation and as a replacement for asbestos in brake linings subjected to heavy loads.

Holding the slender "snake" in his hand, the Indian is set to hurl it down the rut



"Snakes" in the Snow

"HUN-YOU! Hun-you!"

That's the cry as braves of the Six Nations in Ontario, Can., hurl long wood "snakes" along a rut in the snow in a game that was old before the white man came to America.

The snake is a hickory wand made unbelievably smooth by patient labor. For a year, the wood is soaked in oil, then the head is weighted with lead and a finger groove is cut in the tail.

The track is made by dragging a sapling through the snow. Launched by a running heave, the snake slithers and slides effortlessly for nearly a mile before stopping.



Above, the hickory snakes must be flexible to follow the minor irregularities of the mile-long rut in the snow. Below, a short run is used to launch the snake





About 150,000,000 gallons of water a year are used in the Broken Hill zinc-lead mine



WATER LIFT FIGHTS AUSTRALIA DROUGHT

WHEN EIGHT YEARS of drought threatened Australia's great inland mining city of Broken Hill with disaster, the Iron Horse came to the rescue in the biggest rail water lift the world has known.

Across 40 miles of drought-stricken desert, fast express trains hauled a total of 250,000,000 gallons of water during six months of bone-dry weather. It took 1517 trains to haul the water and altogether they traveled 119,360 miles back and forth over the 40-mile stretch of trackage. The average speed of the trains was about 40 miles per hour.

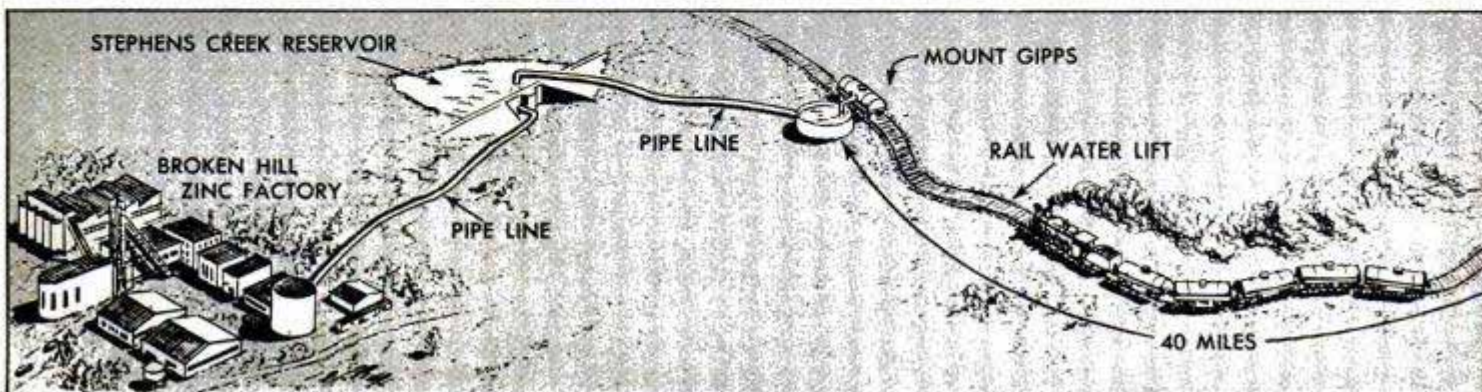
Broken Hill, a city of 36,000 about 700 miles west of Sydney, has the title of "Australia's Money Mine" because of its fabu-

By J. W. Morris

lous zinc-lead production — a production, incidentally, which requires large amounts of water. The city produces more than \$50,000,000 worth of ore annually, providing residents with a high standard of living and Australia with a valuable source of income. Since zinc-lead production began at Broken Hill in 1884, more than \$500,000,000 worth of ore has been taken from the vein. It was this fabulous wealth that put the full resources of the government-owned railroad behind the water lift to assure continuous production.

When it became apparent that Stephens Creek reservoir, the city's main water-storage facility, was running dry in the long drought, railway engineers shipped heavy earthmoving equipment to Mount Gipps,

Diagrammatic map shows the 40-mile stretch of rails over which 250,000,000 gallons of water were hauled



a previously unknown rail siding east of Broken Hill.

There, huge gravity tanks were built around a triangle of track. Within a week the work had been completed enough so that two trains could be handled simultaneously. Two days before the Stephens Creek reservoir failed, water trains were discharging water at Mount Gipps—a record of speedy construction and organization.

From the gravity tanks the water flowed 14 miles through a pipe line to the dusty, dry reservoir at Stephens Creek. From there it was carried by pipe to the city of Broken Hill.

The trains were filled at Horse Lake, another previously unknown railroad siding west of Menindee. Water from the River Darling was piped to Horse Lake to fill the special trains for their dash across the desert. These express trains operated on a round-the-clock basis with 14 trains of 10 cars each making a round trip a day. Only 72 men, including both train crews and administrative personnel, were used in the operation.

The water lift was discontinued when a new pipe line from Menindee to Broken Hill was completed. The incomplete section between Horse Lake and Mount Gipps had made necessary the railroad link. When this was finished, the water lift via rail was no longer operated.

All that remains today to attest to the unusual feat is a prolific growth of grass and shrubs around Horse Lake, the result of continuous wetting received as trains departed with dripping water tanks.

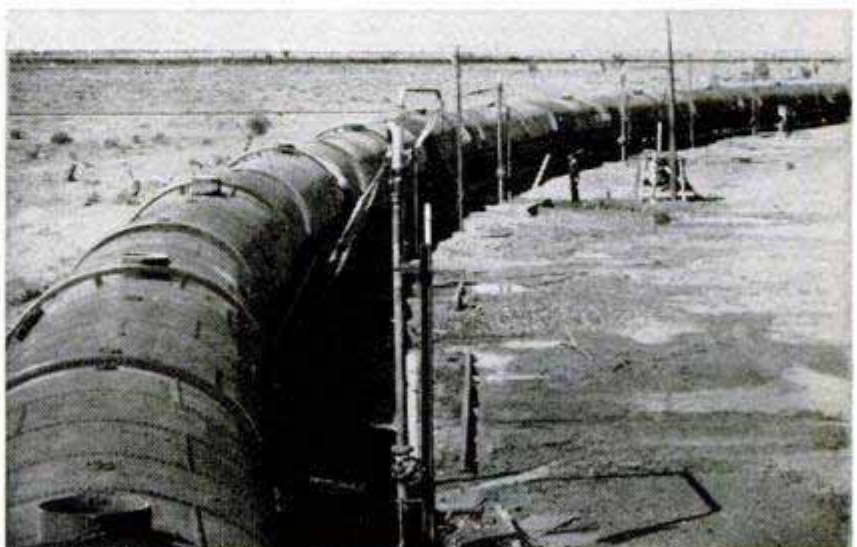
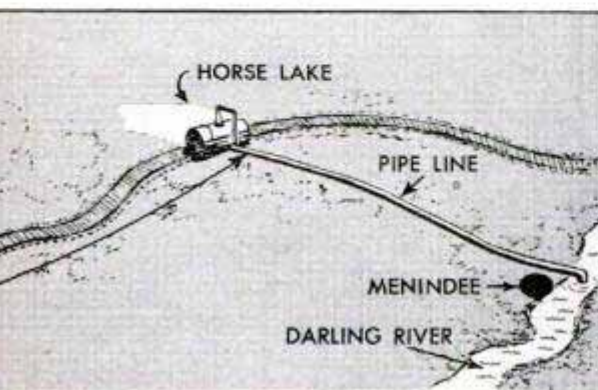


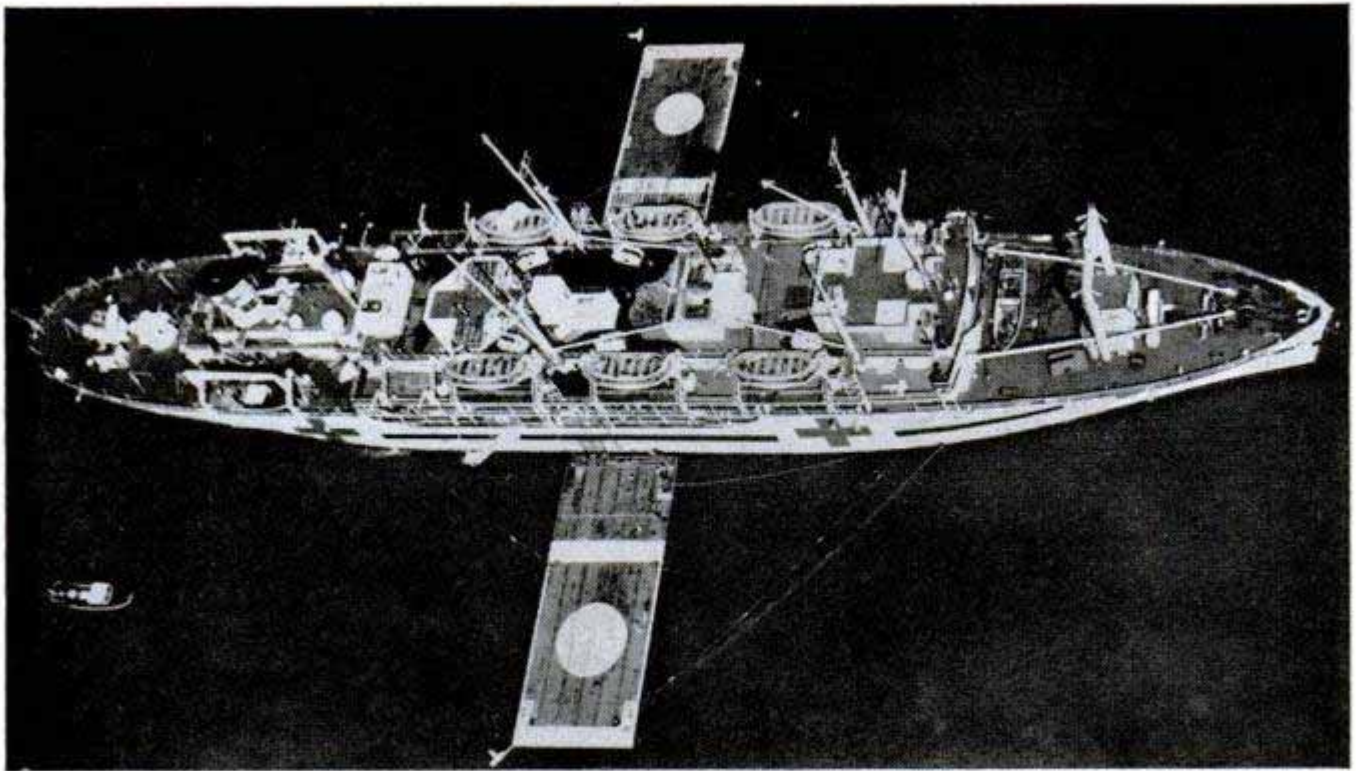
Broken Hill's main water reservoir at Stephens Creek looked as dry as the desert that surrounds it. Normally, 20 feet of water cover the sandy bed. Small hole in wall is the water-outlet valve



Water trains discharged into gravity tanks at Mount Gipps. From here the water flowed by gravity to Stephens Creek reservoir, 14 miles away. After leaving the reservoir, it filled the city water-supply mains

Filling the water tank cars at Horse Lake was carried out with no lost time. The daily quota of trains to be filled was 14 and the amount of water handled daily averaged about 1,500,000 gallons





Hospital Ship Has Helicopter Landing Platforms

Helicopters carrying Korean battle casualties can now fly direct from the front lines to the USS *Haven*, a Navy hospital

ship. They land on platforms specially constructed and moored to take helicopters and move men into hospital quarters.

Window Sheeting Removes Glare From Sun's Rays



Sunlight without glare results when custom-cut Vinylite-plastic sheeting is applied to window panes. Moistened, and pressed on with a squeegee, the material is easily peeled off again and is reusable. Tough and strongly resistant to tearing, abrasion, scuffing and chemical damage, the sheeting can be washed indiscriminately. Available in eight shades, from frosted translucent to blackout black, the glare-cutting plastic may find wide use in hospitals, homes, offices and factories.

Woven-Wire Carpet Gives Better Traction for Auto Tires

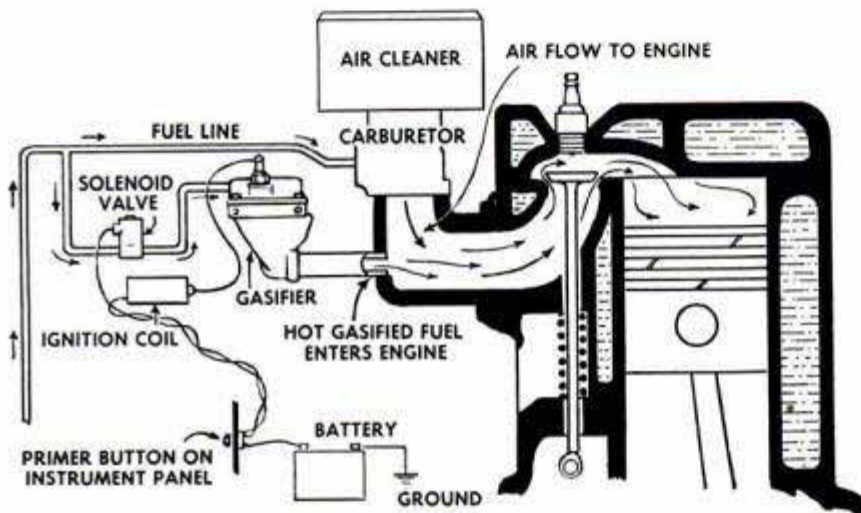
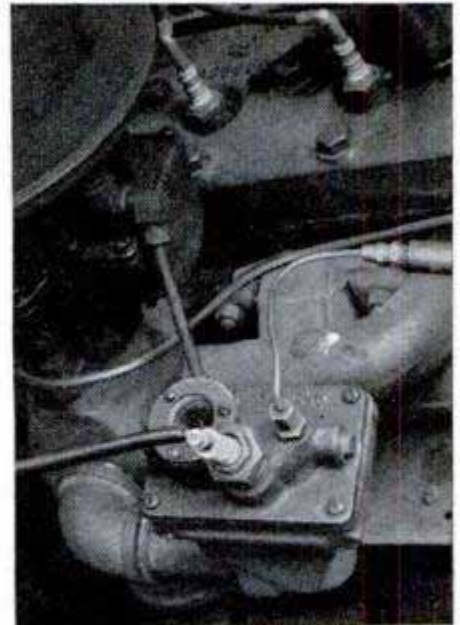
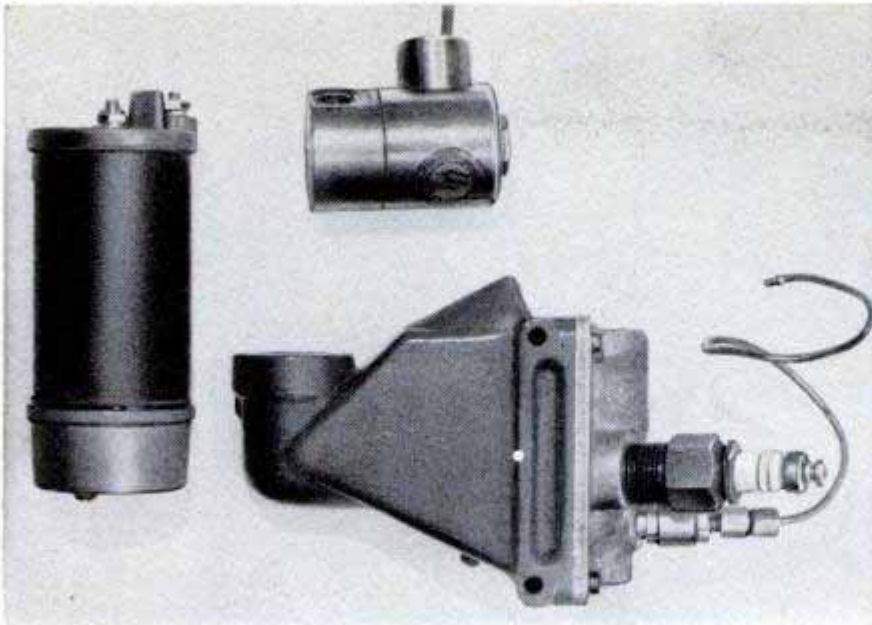
When automobile wheels spin on icy pavements, small woven-steel-wire mats placed under the rear wheels give needed traction. The thin edge of the carpet is wedged firmly under the tire, and the car is started slowly. The multilayered 27 by 5-inch mat digs into ice and snow, and provides a rough top surface for the tire treads.

Rocket-Fuel Chemical Produced by Electric Method

By shooting high-frequency electric current through ammonia gas, chemists at the University of Utah have produced hydrazine, a chemical source of rocket fuel and the tuberculosis drug, isoniazid. Formerly

produced by chemical means only, hydrazine had to be dehydrated by expensive and difficult methods. The new dry process may open the way to manufacture of hydrazine on a commercial scale.

Gasifier Aids Motor Starting Under Arctic Conditions



Three units (above, left) comprise the starting apparatus. At left is the ignition coil, above is the solenoid-electric valve, and at bottom right is the gasifier unit. Installation (above) in a regular car engine by sandwiching gasifier between manifold and carburetor or threading it directly into manifold below carburetor takes 15 to 45 minutes. Pressing of primer button (left) energizes system's solenoid valve and spark plug. Cold fuel is drawn from carburetor line, enters the gasifier. Part is burned; the rest, changed into hot vapor, enters intake manifold, mixes with carburetor air. Resulting rich, warm mixture enters combustion cylinder and is ignited

Enabling engines to start in less than 30 seconds at temperatures as low as -65 deg. Fahrenheit, a gasifier for piston engines may be used on Army vehicles operating in the Arctic. The device supplements the carburetor for starting only. It is essentially a fuel precombustion chamber with a conventional spark plug. A quantity of the fuel supplied is burned under controlled conditions to heat and vaporize the main portion. The resultant rich, warm gaseous

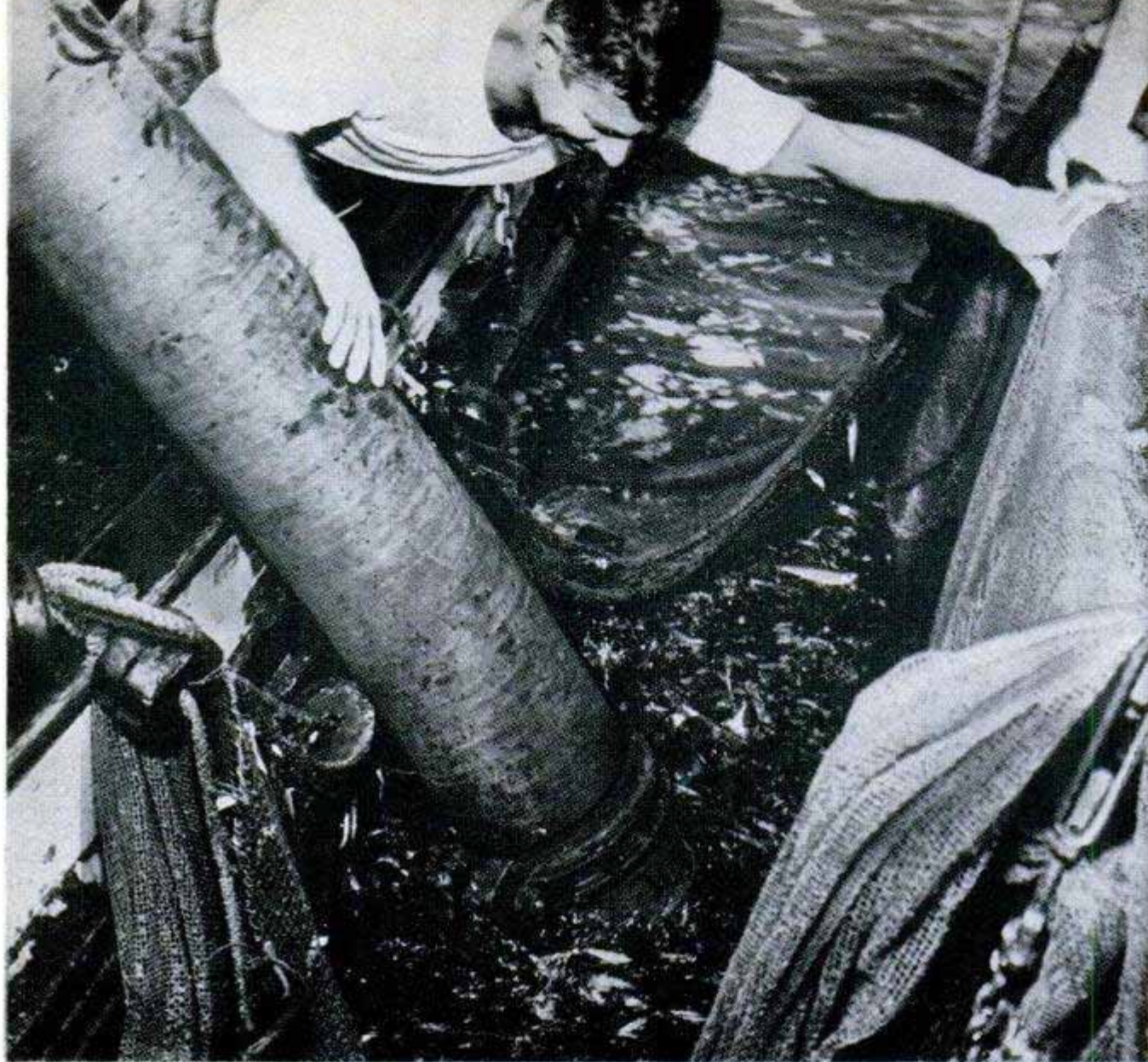
priming charge is drawn into the engine upon cranking to facilitate combustion independent of initial carburetor performance. After a few minutes of operation the gasifier enables the engine to operate satisfactorily in a normal manner. Simple to install, it needs no extra accessories for operation, such as an extra fuel tank, for it uses the same fuel as the engine. Adequate starting power is necessary for successful operation.

Cap Protects Rifle Sights Against Rain and Snow



Held tightly in place by a continuous band, a lens cap for rifle telescopic sights assures shooting accuracy even during a snow or rain storm. The lens cap can be detached quickly for a fast shot. A drip ring doubly seals the lens from all moisture.

☐ Forty-five percent of the cars on the road today have been driven more than 40,000 miles, according to the Automotive Manufacturers Association.



Anchovies are drawn up through the *El Redondo's* suction hose at a rate of 500 pounds of fish per minute

THE BOAT THAT INHALES FISH

By Shep Shepherd

EVER SINCE MAN has been keeping a record of his activities nets have been used for taking up schools of small ocean fish. Probably no other human enterprise has remained so long unchanged.

Along the southern California coast, from Pismo Beach to Ensenada, Mex., an industry has been growing steadily since sport fishing began in the Pacific in the early 1920s. Collecting live bait for sport fishermen is now an extensive business.

The small greenish-blue anchovy, four to six inches long, is the favorite bait fish, though sardines are sometimes used. The Pacific schools of anchovy and sardine have always been taken by net.

A school is located by watching either

the surface or the gulls. The presence of a flock of seagulls hovering over one spot is a sure sign of bait fish just under the surface. In their absence the boat cruises slowly about while a lookout scans the surface for signs of bait fish leaping from the water in an effort to escape game fish that are feeding on the school.

When a school has been spotted, the boat draws close, drops one end of a hundred-yard-long net over the stern and cruises in a circle. Several men on each end of the net then begin the laborious task of drawing in the net and transferring its contents to the bait tanks in the hold of the ship. It is here that the backbreaking work comes in. Large, long-handled dip nets are used.



Bringing the school in close to the boat is the only hard hand work that still remains in anchovy fishing

They hold as much as a man can lift. Slowly, a dip net at a time, the school is taken from the seine, passed from hand to hand until the last man dumps it into the hold.

All this is now changed. The long net is still used to trap the school, but there ends the old method. A second boat, the *El Redondo*, pulls in near the first with the net full of fish between. Over the side of the *El Redondo* goes a long, hard-rubber suction hose with a spreading mouth 18 inches wide. The ship's big marine engine starts a pump mechanism going that moves water

Once aboard, the fish ride a stream of water down the flume without so much as knocking off a scale

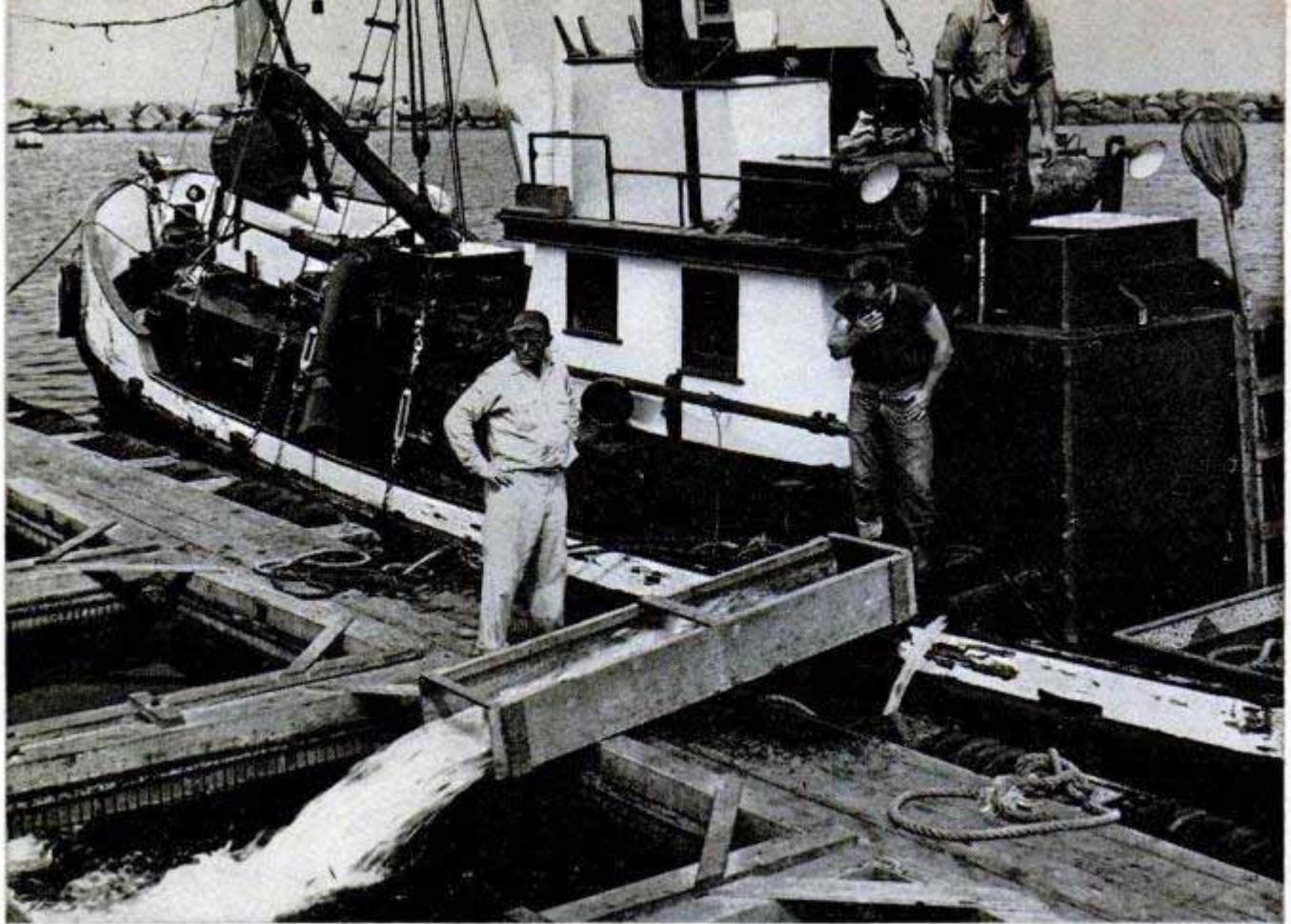
and bait fish aboard at a rate of 500 pounds of fish per minute.

Just before the fish hit the pump mechanism, where they would quickly be ground to bits, a rotary valve passes the fish out into a flume without so much as knocking off a scale. The fish ride a stream of water down the flume and into the holds.

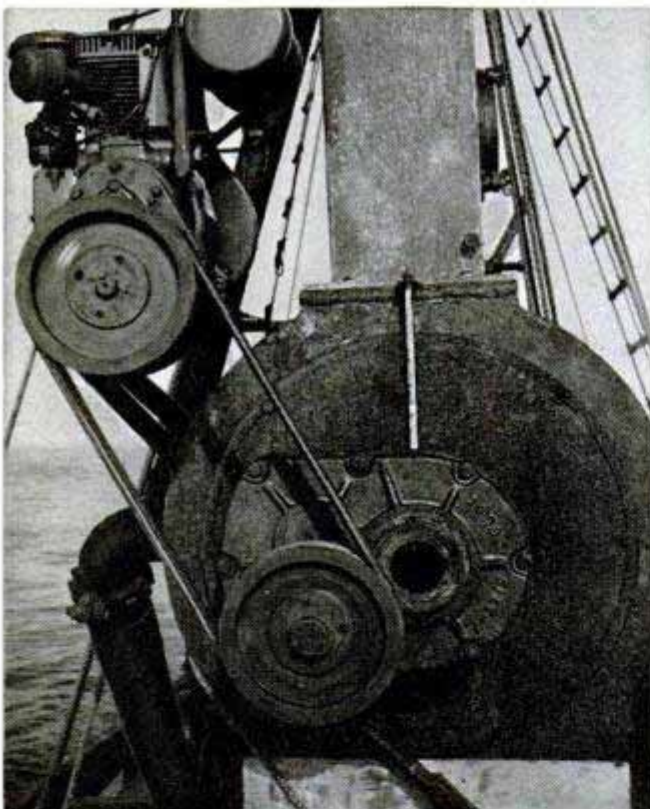
The *El Redondo* has a capacity of between 80,000 and 100,000 anchovies. I watched her stow away that number in less than 15 minutes; that job by hand would require three hours of backbreaking toil.

Use of the hard-rubber suction hose spares the bait-boat crew tedious, backbreaking effort with dip nets





After loading up to 100,000 anchovies, the *El Redondo*, above, heads home and the catch is flushed out into holding tanks. Rotary valve, left, detours fish out of suction system before anchovies hit pump mechanism



Once loaded the *El Redondo* cruises to holding tanks near port, where the sport-fishing boats call for the day's supply of live bait. Wooden flumes are fitted to outlets at the bottom of her holds. A lever opens the gates and the fish are flushed out into the holding tanks.

Loss of fish never exceeds two percent. Under the old system, in which the fish were not only lifted out of the water but crushed under the weight of their own fel-

lows in the dip nets, the loss ran as high as 20 or 25 percent.

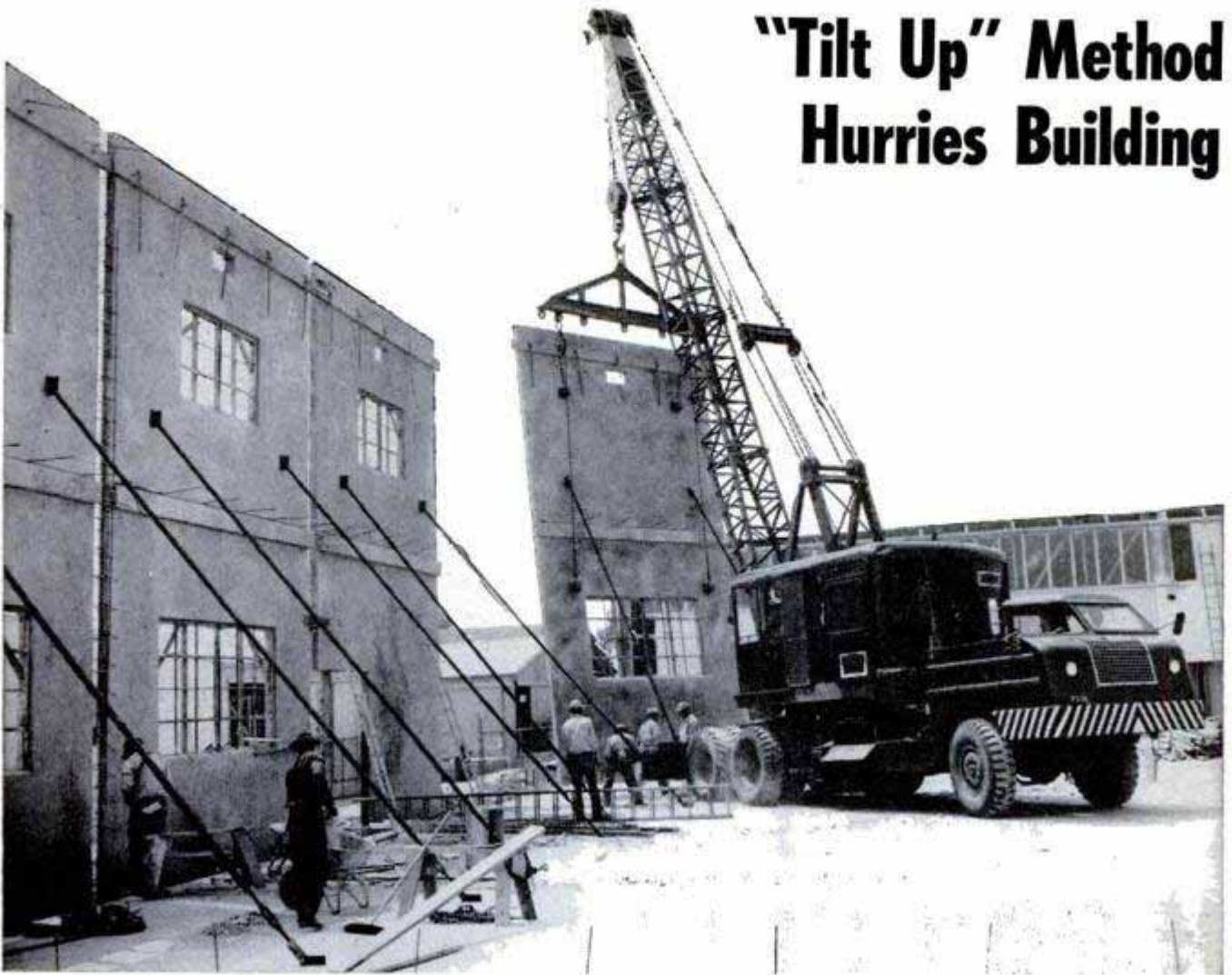
Old-timers have detected another difference. An anchovy has a greenish cast in the water. When lifted out of the water in dip nets from seine to ship and from ship to tanks they change to a bluish tone and lose some of their speed and agility. With the new system they are never out of the water and retain their original spirit and color.

This idea of a bait boat inhaling fish was the brain child of Howard Kimmerle of Long Beach, Calif. He took the design to the Meletron Corporation of Los Angeles, builders of marine equipment, who assigned engineer Emmett Lowery to "iron out the bugs."

Lowery is continuing experimental work with an eye on the sardine industry. Though big canneries have mechanical means of unloading catches from purse seiners, the small canneries do not. With the depletion of the Pacific sardine fishery the small canneries are finding it difficult to buy cargoes because the skippers and crews don't like the manual labor involved in unloading at a small cannery. They face shut-downs unless they can attract commercial fishing boats to their docks.

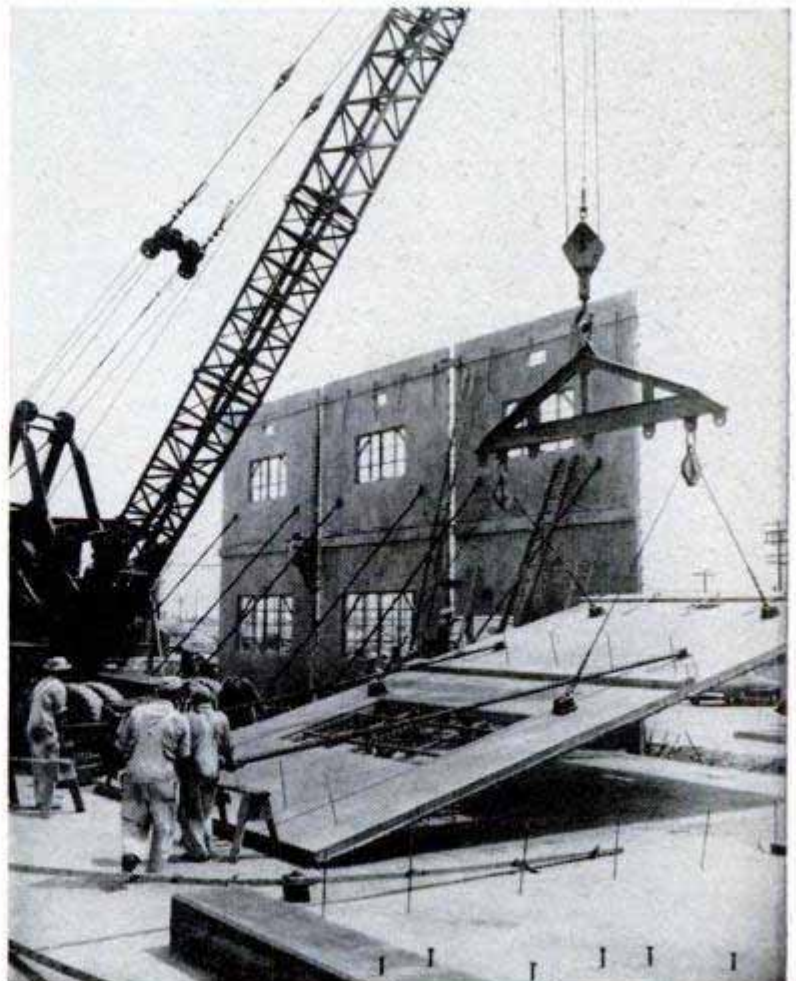
With a rig similar to the one on the *El Redondo* they can now compete with the big fellows on even terms. ★ ★ ★

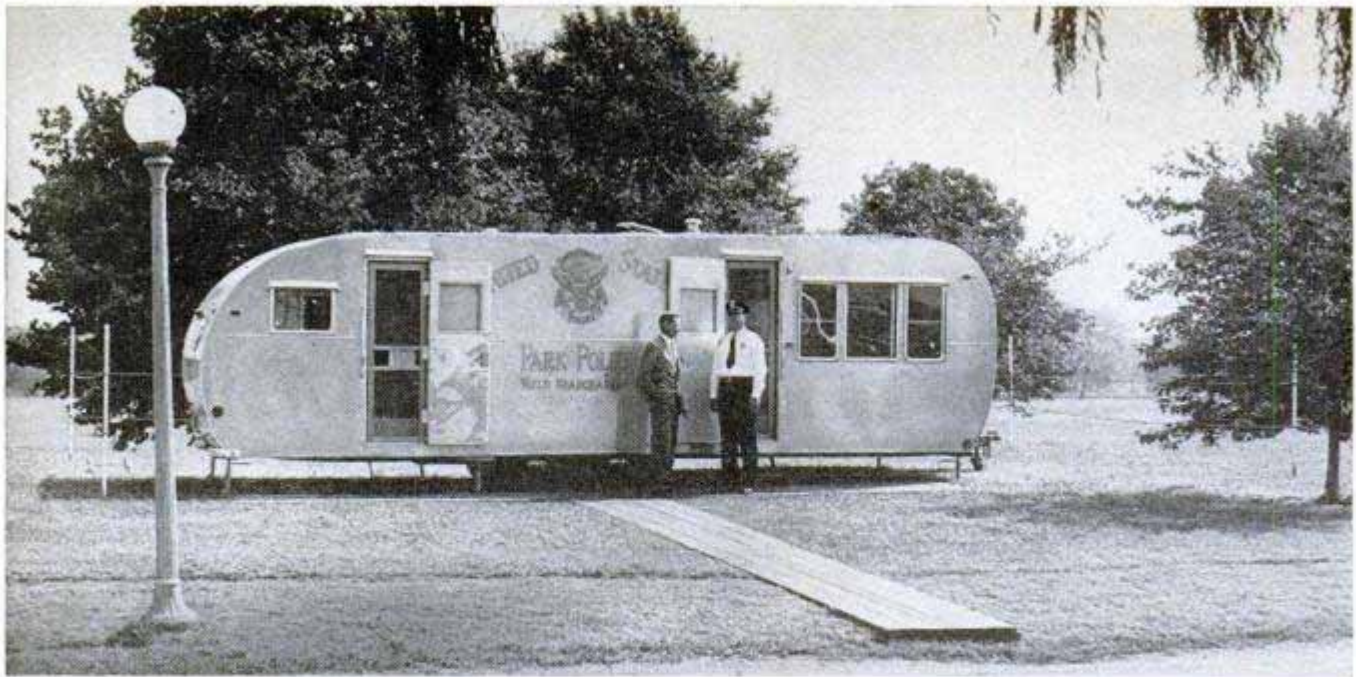
"Tilt Up" Method Hurries Building



Precast 22-ton concrete wall panels are raised into place by huge crane. Slabs settle into prepared slots

TWO MONTHS of work were cut from the construction time of a two-story factory recently built in Burbank, Calif., by means of "tilt up" techniques. Rapidly becoming a favorite method of constructing large, reinforced buildings, the method is fast and said to be inexpensive. Wall sections are poured in forms lying on the previously cured concrete floor, then raised and moved into place by a crane. Adjoining sections are tied together by means of reinforced-concrete columns. The method avoids all use of the costly wooden frames formerly required. In the Burbank operation, each precast wall slab measured 20 by 31 feet, was 6 inches thick and weighed 22 tons. A single crane placed 15 of the slabs in a day. Usually confined to single-story construction, the use of tilt-up techniques at Burbank marked one of the first times that the cost-cutting method was applied to two-story buildings. Approximately 45,000 feet of floor space are contained in the factory.





Washington's mobile police headquarters set up for action. Wheels in center allow easier maneuvering in transit

Rolling Hoosgow Serves Capital Police

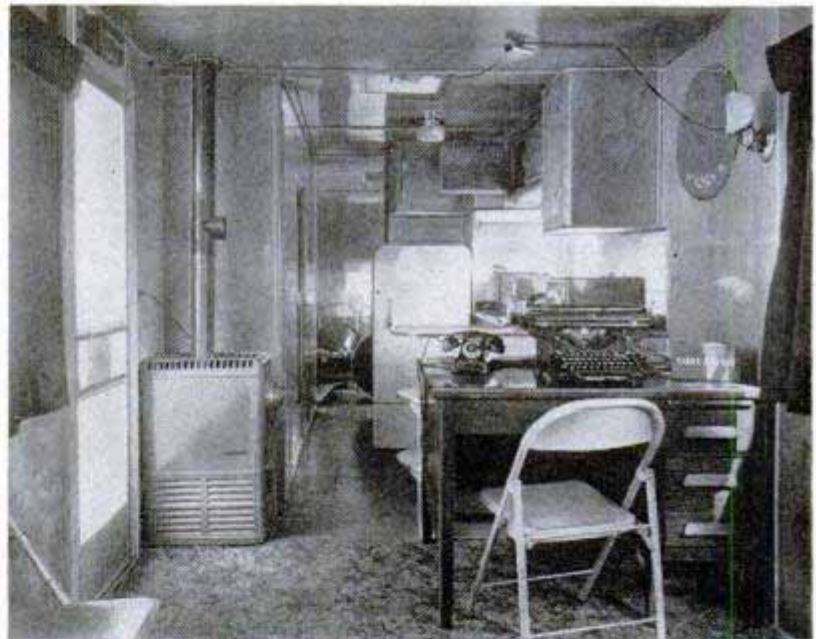
WASHINGTON, D. C., claims the world's only hoosgow on wheels. An elegant aluminum trailer 30 feet long, it is furnished with such home comforts as a shower bath, Venetian blinds, electric refrigerator, screens on the windows and rugs on the floor.

Much more than a rambling jailhouse, it serves as a mobile headquarters for the National Capital Park Police. In addition to acting as a temporary brig for questioning or detention until the patrol wagon arrives, it is a valuable field center when police are on duty at parades and special events.

Equipped with a two-way, 60-watt radio transmitter and receiver, public-address system, telephone, typewriter, floodlights and general supplies, it is an emergency field headquarters from which park police could direct their operations.

After an air raid or at the scene of a major accident, police must move into the area, establish security measures, take initial steps in the matter of first aid, rescue work, traffic control, and assume a host of other duties. An air tragedy in 1949 in which two planes crashed and 55 people were killed convinced park police that a mobile headquarters was a necessity.

The trailer was built to rigid specifications. It is of sturdy construction and has a strong steel framework, suitably welded. The body is insulated with glass fiber on all sides, top and bottom. Axles and wheels



Interior of trailer is designed for efficiency plus comfort and proves an efficient center for directing police activities

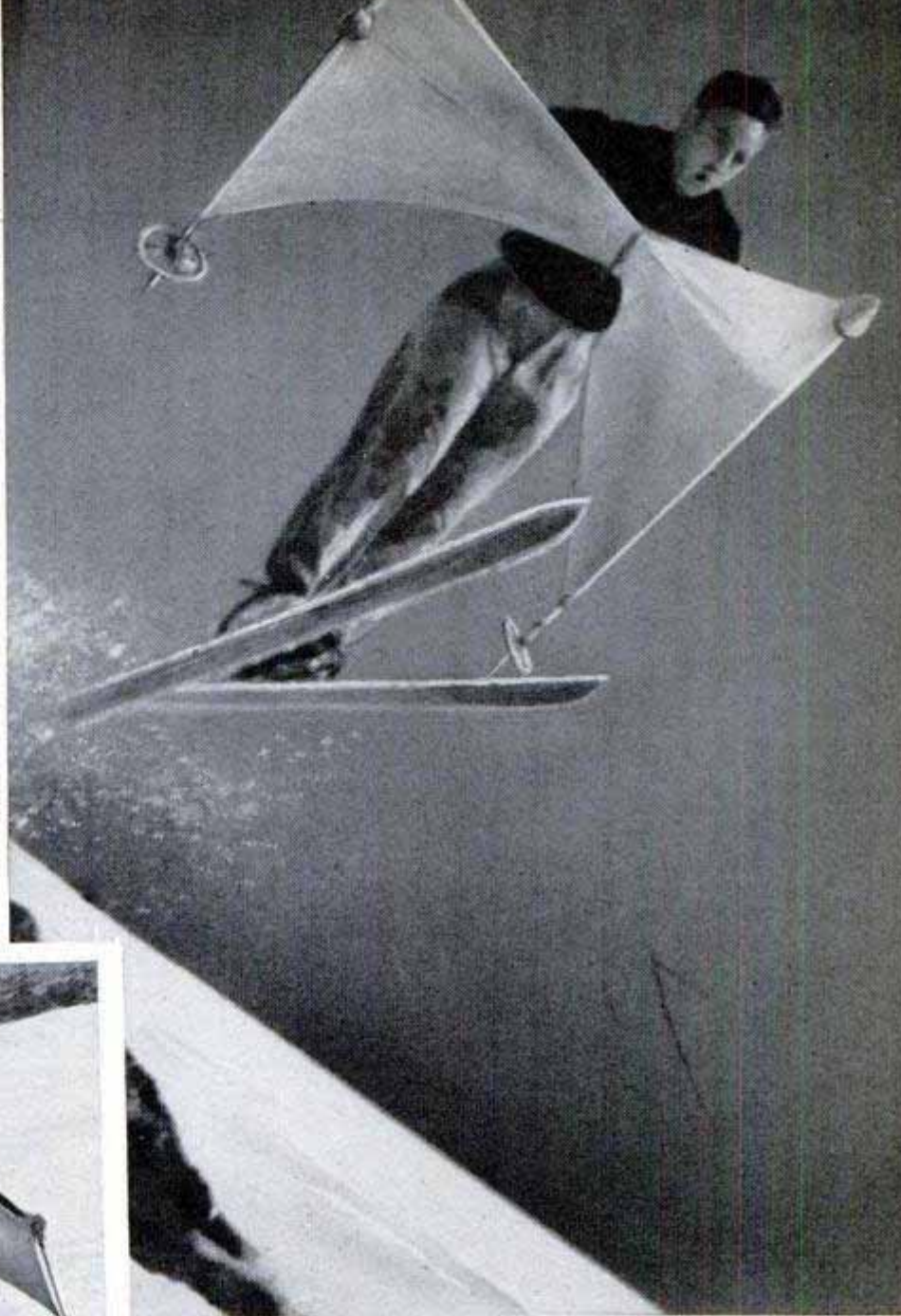
were designed for brake equipment on all four wheels; brakes are operated electrically from the towing car. A separate, Jeep-drawn unit houses a 7500-watt, gasoline-powered generator to supply electric current when city power is not available. Stocked with emergency supplies of all kinds, from rubberized sheets and woolen blankets to hip boots, a woodman's ax and a pack-type acetylene torch, the unit is regarded as indispensable by the city's forward-looking police department.

Chemically treated for strength and absorbency, a new paper cleans dirt from windshields without leaving streaks.

Graham (M) Info. Co.

Austrian's Ski-Sail Permits Long Leaps

Leaps as long as 50 feet can be made on slight inclines with a ski-sail developed in Austria. In addition to increasing the skier's speed, the inventor claims it gives users the feeling of lying on air while in a perfect jump attitude. Called the Glockner Sail, it makes possible effortless leaps across rocks, snow-free patches of ground and other mountainside obstacles, as well as helping beginners maintain better balance. The greater speed made possible by the sail also permits the user to make more downhill runs daily. The leaps are made by adjusting the canvas sail, which is fastened to ski poles, held by the skier, and to his chest. It enables the user to turn and maneuver more easily.



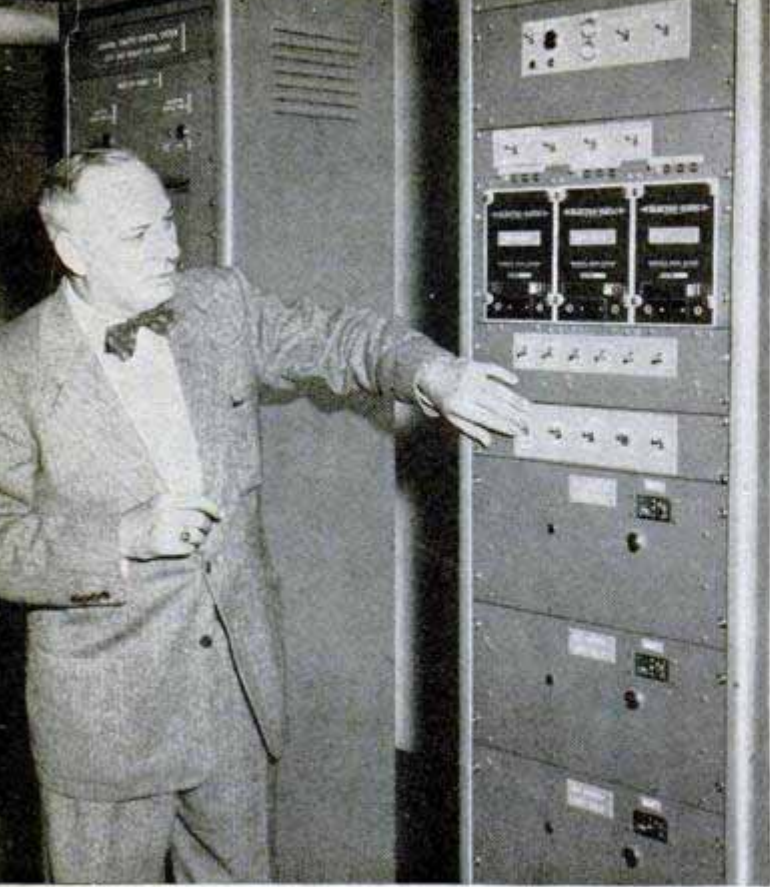
Leaning forward in good skiing form, a sportsman using a ski-sail "flies" effortlessly over a snow-slope obstacle

Faster downhill runs and turns are possible with the sail, which is attached to the skier's chest and poles

Chemical Technique Produces Metals From Low-Grade Ores

Through an entirely new process, metals are being refined with chemicals instead of by smelting or electrolysis. The technique shows promise of recovering metals from low-grade ores which can't be utilized economically at present. It also can produce virtually pure metals from scrap heaps. In the process, the ore is concentrated and then watered into a slurry. This flows into an autoclave—a tank where the metals are separated by heat, pressure and chemical agents. Different metals emerge as pure powders. The process requires a relatively moderate investment and authorities expect plants to be built right at the mines.





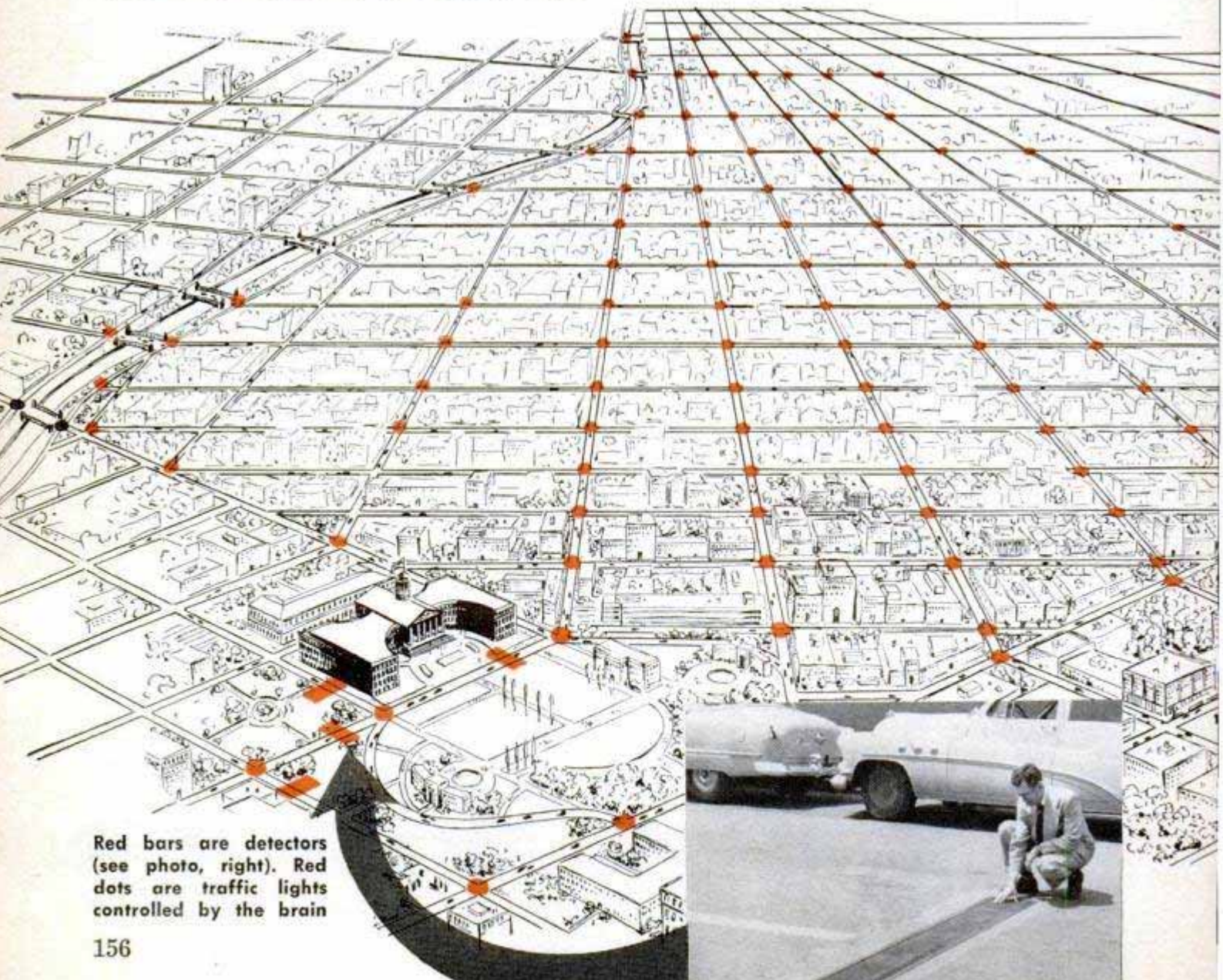
Henry A. Barnes, Denver traffic engineer, throws a switch on one section of his electronic "brain"

\$100,000 "BRAIN" KEEPS DENVER TRAFFIC ROLLING

DENVER HAS PUT its best brains to work on traffic problems and now has an electronic "brain" that promises to cut congestion to a minimum.

The mile-high city previously attracted national attention some years ago when it started a system that permits pedestrians to walk in any direction across intersections when the light says "walk."

Now, it has another solution—an electronic brain that detects and analyzes the traffic flow and relays its "conclusions" to traffic lights controlling 155 downtown intersections. Incidentally, it's a costly bit of "gray matter"—costing about \$100,000, plus another \$65,000 for installation. But



Red bars are detectors (see photo, right). Red dots are traffic lights controlled by the brain

that total is only a fraction of the net worth of the minutes wasted each day in traffic tie-ups across the city.

The brain does its analyzing by "studying" traffic as it rolls over four counters sunk in the streets around Denver's civic center. These counters or detectors notify the electronic brain inside the building how many cars are moving north, south, east and west. By projection, the brain translates this data into the precise signal-light cycling necessary to keep traffic from piling up anywhere in the 140-block area.

In theory, the lights are regulated to maintain an uninterrupted flow regardless of traffic conditions. The cycle can be reduced to as little as 40 seconds (for the red-yellow-green-walk cycle) when traffic is light. As more cars influence the brain, the cycle is lengthened until it takes 120 seconds for the cycle from green to green.

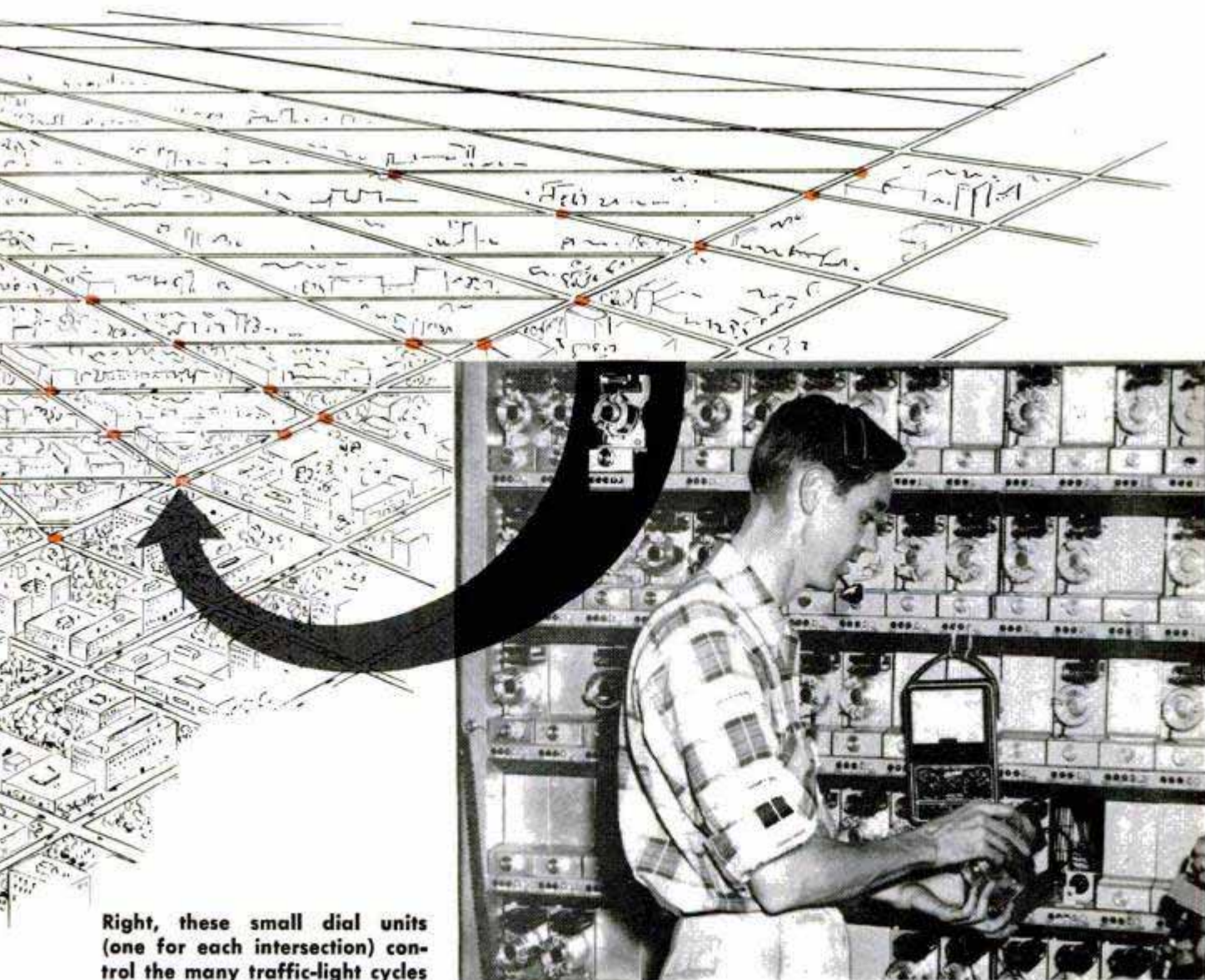
The brain takes traffic-flow samplings every six minutes and sets in the necessary changes immediately. If a sudden influx of traffic occurs in the downtown area, such as at the close of the work day, it takes no more than six minutes for the cycle corrections to be set in and operating over the

whole area where heaviest traffic is found.

The brain behind the brain is Henry A. Barnes, Denver traffic engineer, who feels that traffic congestion can't be treated with halfway measures. The electronic machine was conceived about five years ago by Barnes and his staff of eight electricians and electrical engineers. About five miles of wire are installed inside the control unit itself, while cables that connect the unit with the signal lights add up to about 1000 additional miles of wire.

When the brain (Barnes' staff members refer to it as "The Thing") has determined the direction and extent of traffic flow, it relays the instructions to each signal-control box. These electric instructions adjust the speed of tiny motors which govern the red-yellow-green-walk cycles of each light.

By the way, engineer Barnes, strangely enough, feels he is fighting a hopeless battle against congestion. The only solution to the problem, he says, is rapid and inexpensive mass transportation. Then, he claims, people will ride instead of drive to work—and, although he doesn't point this out, it would put his electronic "brain" out of work.



Right, these small dial units (one for each intersection) control the many traffic-light cycles



SOME PEOPLE collect dinosaur eggs as a hobby, others breed mink or raise fish-worms, but out in Cuyahoga Falls, Ohio, there's a man who since 1935 has been building a house for recreation. So far, it's more than 200 feet long, and you have to look twice to see it because one glance won't take it all in. Ezra Kauffman, now a

Hobby House 200 Feet Long

prosperous real-estate dealer, began the structure in the late depression when he didn't know where his next pound of nails was coming from. But he reasoned that no one ever finishes anything if he doesn't make a start. So he invested his last \$2.50 in



Solar Stove

Scientists of India have presented their prime minister with a solar cooking machine which they anticipate will be mass-produced in the near future. The cooker has a collapsible umbrella-shaped reflector which concentrates the rays of the sun on a pan containing the food to be cooked.



Vacuum Cast

All that's needed to apply a new medical cast to a patient is an air pump to create a vacuum. The cast can be used over and over again to immobilize patients undergoing X-ray and other types of treatment. It consists of a bag filled with tiny plastic granules. Because it is flexible, it can be pushed into exactly the right shape around the patient's torso.

☐ Crane operators in England get a close-up view of what is happening to the load by means of a television picture broadcast to a receiving set located in the control cab of the crane.



Under Construction Since '35

building tile and Depression Ranch was born. Over the years, working evenings and week ends, he added room after room until now the total is over 20. Kauffman estimates his expenses for materials and outside labor at less than \$8000. A main reason

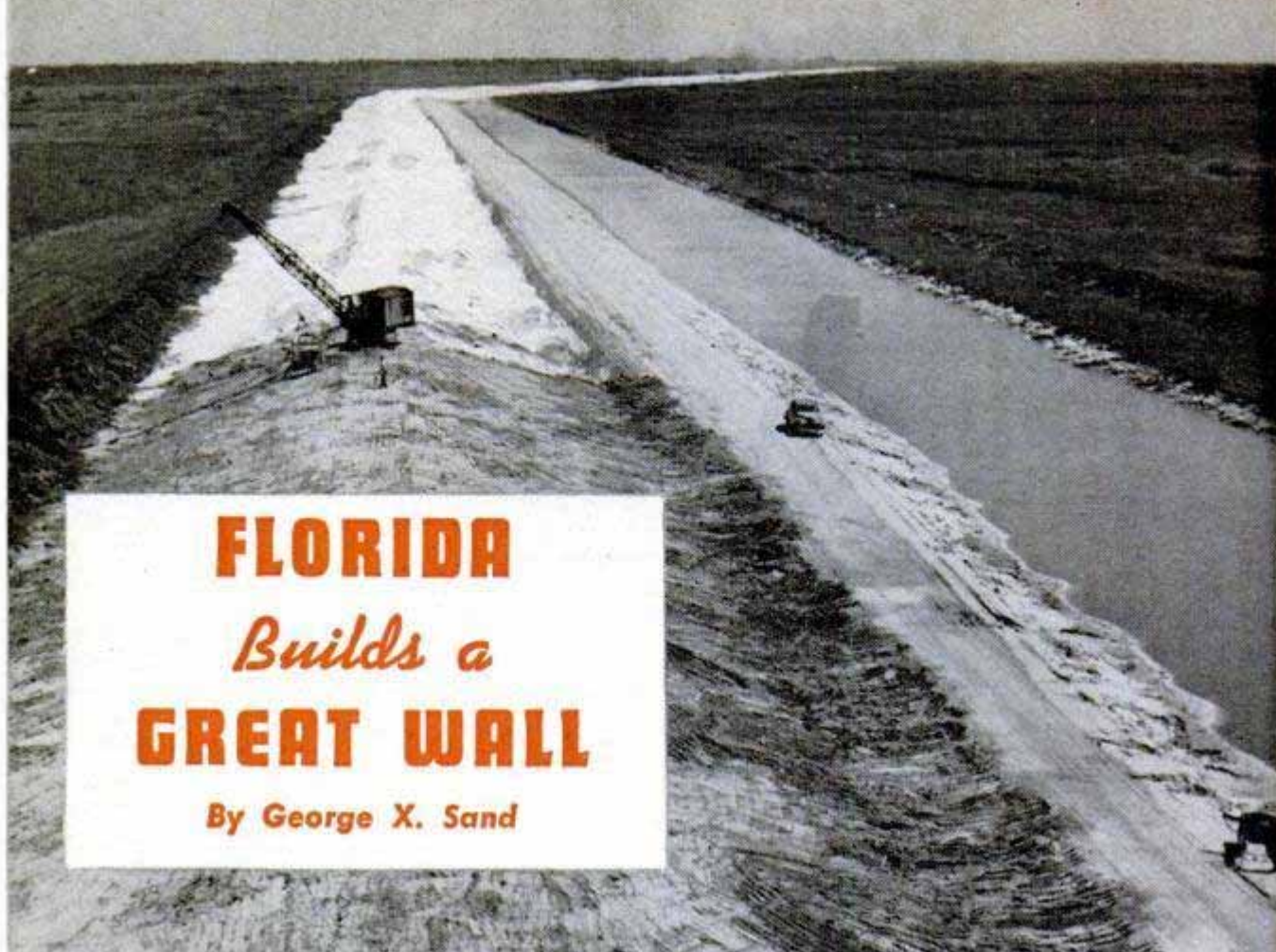
for his low costs has been his habit of buying with an eye to the future, picking up a bargain sink here, a supply of low-priced lumber there. Out of the stock pile came materials for such additions as the present greenhouse, shuffleboard court, shooting gallery, five kitchens and 16 fireplaces. Building, of course, continues.

Junior-Size Jaguar

Most six-year-old boys are proud of a pedal-pusher automobile so it's no wonder that Gary Tiscornia of St. Joseph, Mich., beams as he drives around in a small, motorized version of the Jaguar. The car weighs 1000 pounds, has a 71-inch wheelbase and is powered by a Cushman motor-scooter engine. It is geared down to a top speed of 10 miles per hour. Patterned after his father's full-size Jaguar, the car was custom-built by professional body men.

Over 2000 government-owned patents, available without charge to any manufacturer under non-exclusive, royalty-free licenses, are listed in a new pamphlet prepared and issued by the Government Patents Board, U. S. Department of Commerce.





FLORIDA *Builds a* GREAT WALL

By George X. Sand

Draglines "dress" the top of Florida's 110-mile levee of earth and rock before replacing topsoil for grass

DOWN IN WATER-MENACED Florida the federal government is helping to build a protective dike which will be thicker and mightier than the Great Wall of China. It is the largest earthmoving operation this country has undertaken since the construction of the Panama Canal.

Flying over this peninsula state, one sees plenty of water; the Atlantic Ocean on one

side and the Gulf of Mexico on the other. However, it is not salt water that poses the problem: The flood menace comes from within. It is a threat that lurks constantly in the placid depths of Lake Okeechobee, second-largest body of fresh water within this country. It hides in the state's 225 rivers and 30,000 named lakes and countless streams and canals. Experience has shown

Behind the Everglades Experiment Station a fire rages along a 30-mile front during a long winter dry spell



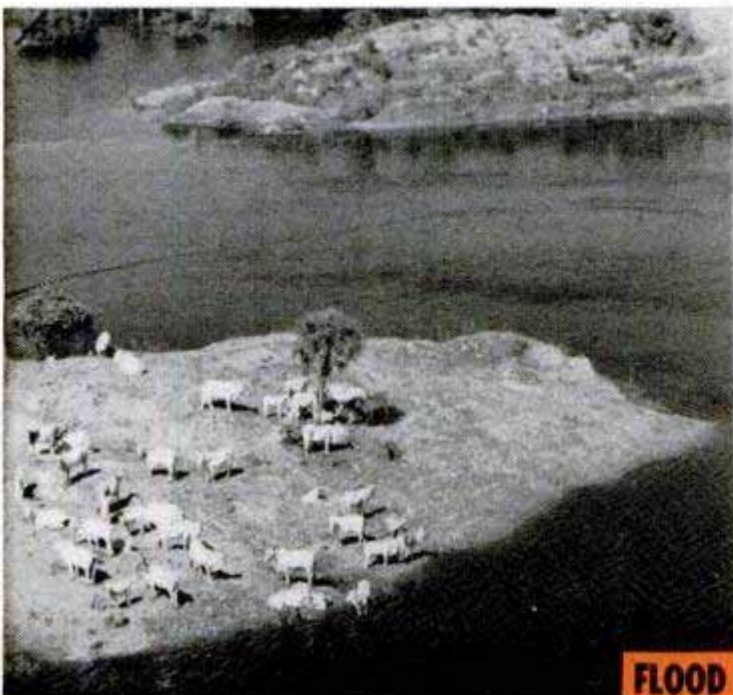
that during the wet season, the four-month period during which practically all of Florida's annual 60 inches of rainfall takes place, a single intense hurricane with its wind-borne waters can add to the already heavy downpour to overtax quickly the canals and streams. Under such conditions fresh water inundates a vast area of flat lands in mid-Florida. Such floodwaters flowing southward by gravity, as well as eastward to the coast through intercepting canals, usually inundate everything in their path—farm, ranch or resort city.

An intense hurricane occurred in 1926 and again in 1928, when 2300 persons were drowned after Lake Okeechobee overflowed. To prevent the recurrence of such a disaster the federal government in 1935 constructed high perimeter levees and control locks at strategic points about the huge inland sea.

While these great levees performed the work for which they had been intended, they were not enough. The remainder of Florida continued to suffer alternately from flood and drought. In 1947 crop losses alone amounted to more than \$35,000,000 from a single hurricane and over 2000 homes were flooded in Dade County, where Miami is located.

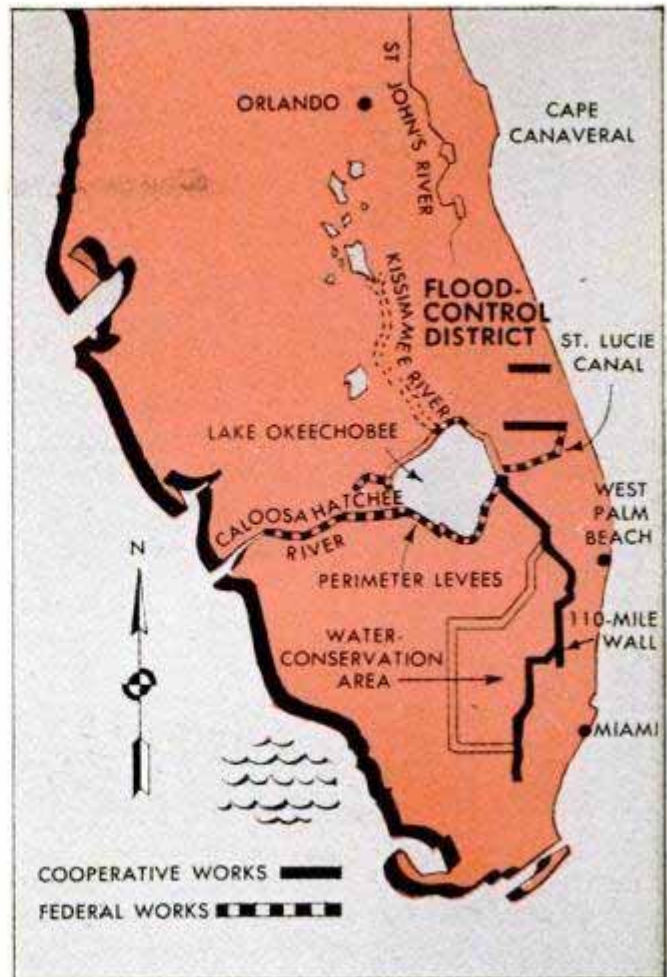
Following the 1947 floods, the Corps of Engineers recommended to Congress a comprehensive project for Florida which, in addition to flood control, provided for water conservation, increased land use and prevention of salt-water intrusion into well fields of the large vacation cities in the coastal areas. It also included plans for what promises to be one of the largest fish and wildlife sanctuaries in America. Con-

During a flood northwest of Lake Okeechobee, prize Brahma cattle seek refuge on hill in Hendry County



FLOOD

JANUARY 1953



Levee indicated on map will hold back floodwater during rainy season and store it up for irrigation

gress approved this recommendation in 1948 as a federal-state cooperative project. It was put into effect by the Florida legislature in 1949.

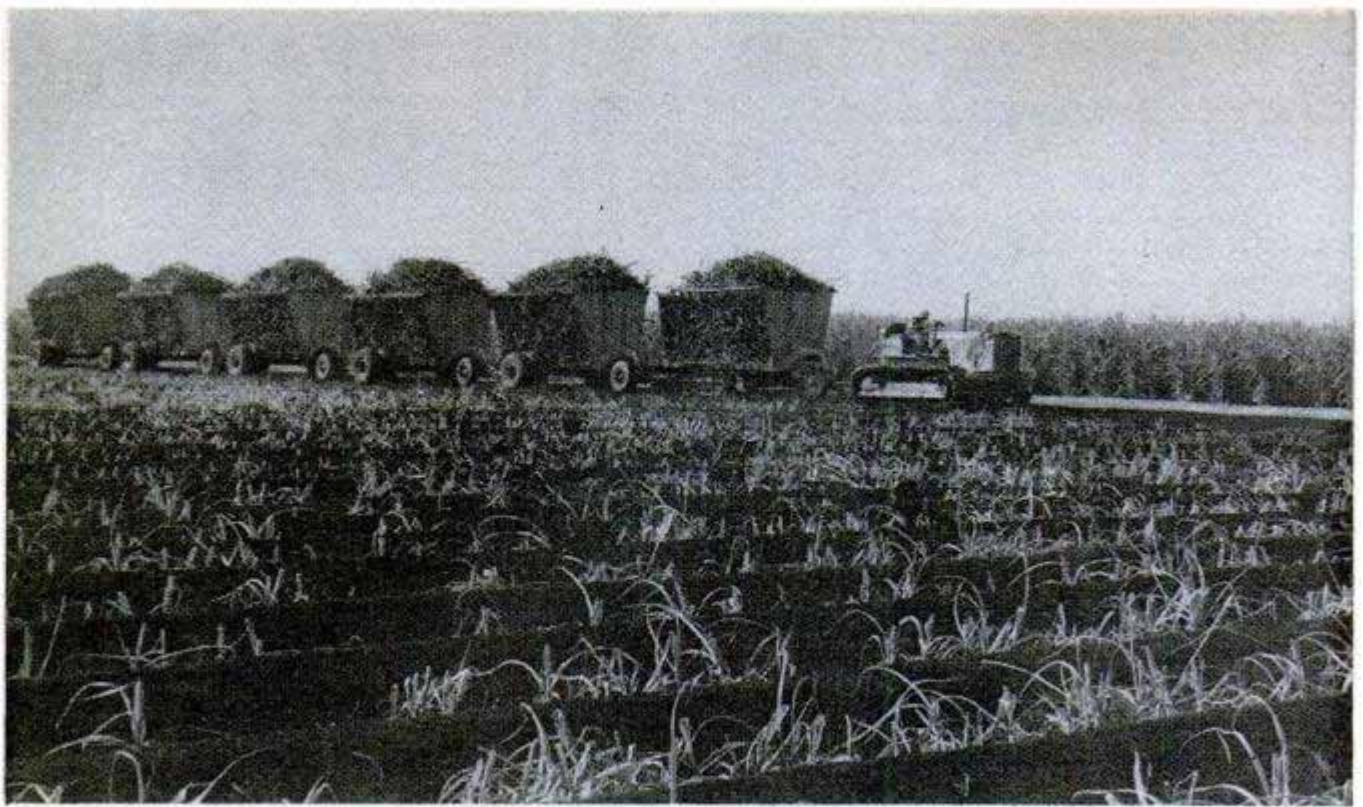
The basic scheme of the cooperative project is to make use of the natural storage reservoir provided by Lake Okeechobee, along

Measuring rod below shows how topsoil has blown away and subsided since 1916—top figure on the rod



DROUGHT

161



Three stages of sugar cane in Everglades—young cane in foreground, cut cane in carriers, ripe field beyond

with the Kissimmee River, which is its principal tributary, and the chain of smaller lakes that serves as headwaters for this river. Through construction of spillways at the improved outlets at each of the smaller lakes in the chain, water will be impounded for use during the dry season. During storm periods such storage of water in the upper Kissimmee valley will decrease flood heights along the lower river and hence lessen the peak flows into Lake Okeechobee. Similarly, the upper St. Johns basin with its associated lakes will be used to provide water storage during the rainy season and adequate water supply to adjacent agricultural and coastal city areas in dry spells.

Initial works, however, provide for flood protection for the lower east or "Gold Coast" cities and to this end men and machines are working night and day. Begun in January 1950, a 110-mile wall of earth and rock stands almost completed through the Everglades jungle region. Starting at Lake Okeechobee, it curves southeastward immediately behind the coastal area to a point just below Miami.

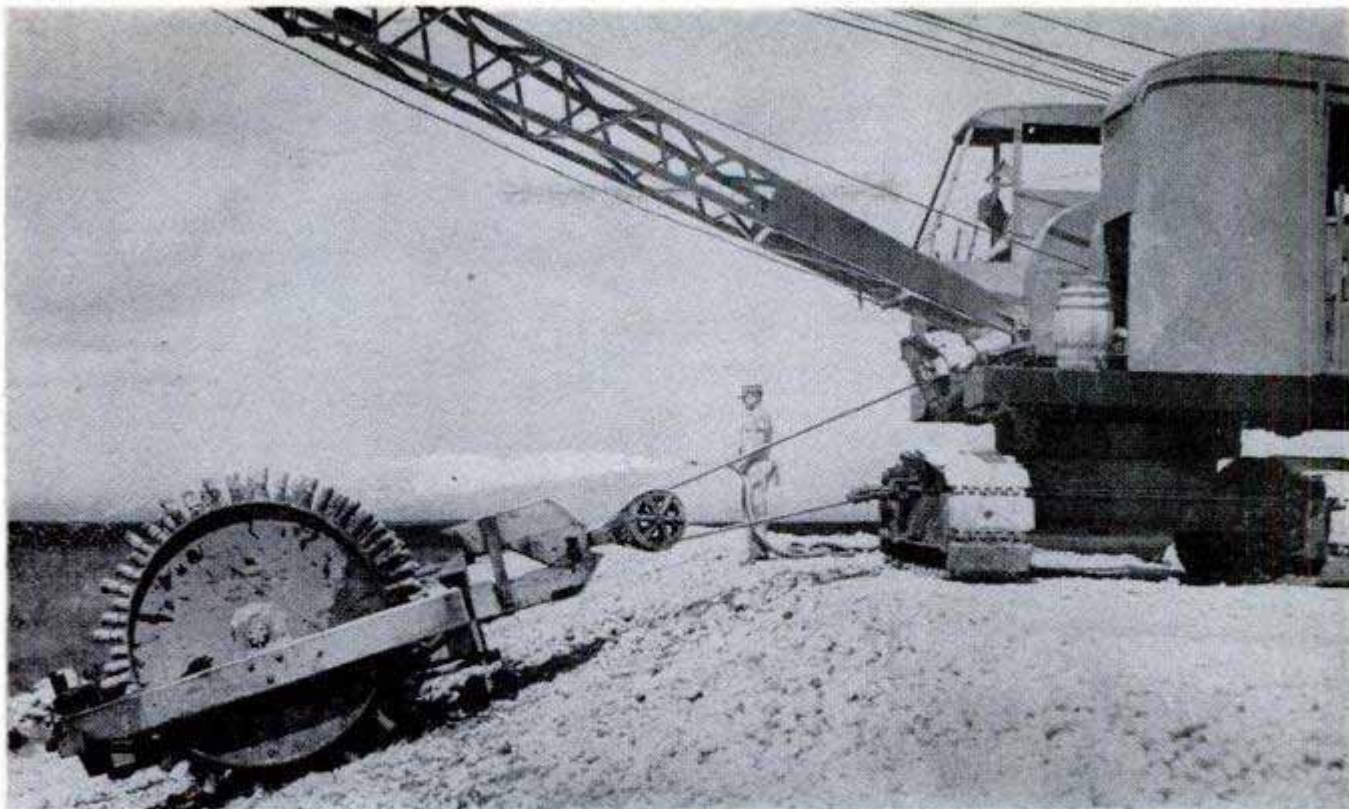
To build this great wall nearly 17,500,000 yards of soil are being excavated. Huge machines, like the 175-ton dragline with its 140-foot boom and 6-yard bucket, labor through the tropic swamp. To prevent such heavy machinery from settling into the muck the workmen must make up mats of five 40-foot lengths of 14 by 14-inch timbers bolted together. These mats are floated into position through the 10-foot-deep, 100-foot-wide borrow channel which the draglines leave in their wake as they construct the dike.

Normally the big draglines, each of which is capable of moving about 6000 cubic yards per day, work in pairs. First come the strippers, one working on the levee site, the other on what will be the channel. They strip off the vegetation, some of which will be used later as peat blanketing after the levee is dressed.

Next comes a pair of excavation draglines. Normally, two machines each dig one half the width of the channel to the desired depth, depositing the material on the levee site. Another pair of machines follows, one scooping up the piled dirt to shape the levee while the other spreads the original stripplings from the levee back to provide the soil for grass growth, thus saving the levee from erosion.

A representative levee is 10 feet high, 10 feet wide at the top and 86 to 96 feet at the base. A one-lane drive on its crown widens to 30 feet for a passing point every mile.

Watching the army of men battle against the problems of lengthening supply lines; the heat, insects and snakes; the big alligators that slide through the muddy sawgrass of the great swamp; listening to the roar of the dynamiters; the hiss of compressed air; the whir of skimming airboats carrying the engineers across the oozy bottom lands; the straining rumble of numerous tractors that had to be equipped with extended wooden support cleats before they could be used, one can't help sensing the irony behind this picture. For here man is busily attempting to restore the land to the condition in which he found it—before the water balance was upset through the



Sheep's-foot roller packs the earth firmly along sides and top of levee before the rich topsoil is replaced

use of poor or ill-advised drainage systems.

Early settlers of Florida found the rich Everglades mucklands covered by a thin sheet of water—the overflow from Lake Okeechobee. Crops planted in this rich layer of silt and organic decay, which was thousands of years in the making, would spring up almost overnight.

Drainage canals and ditches were feverishly dug. Men became rich from but a single lush harvest of oversized crops. But the jet-black earth, robbed of its normal high moisture content, began to dry up and blow away beneath the hot Florida sun. Huge muck fires developed which could not be controlled. Today, so severe has soil subsidence become, that a tall man can walk beneath some of the original Everglades homes that were built on piling foundations driven through the muck to rock. And, unless something is done, many of the soil scientists predict another 50 years will see the agricultural possibilities of this lush region exhausted.

The flood-control program has been engineered to safeguard against this possibility by maintaining favorable ground-water levels. Plans for Lake Okeechobee call for completing the levee encirclement originally begun for hurricane protection in 1935. Large pumping stations along the south shore will remove floodwaters from the agricultural lands during the storm season, storing them inside the big natural reservoir where they will be available during the dry season.

In addition, lying southeastward from the Lake Okeechobee agricultural area and

immediately westward from the great wall, there will be provided a second huge water-conservation area of some 1400 square miles—nearly double the size of the big lake itself.

This latter area will actually consist of three separate pools, divided by large levees housing big pumping stations, so that floodwaters may be absorbed and

(Continued to page 274)

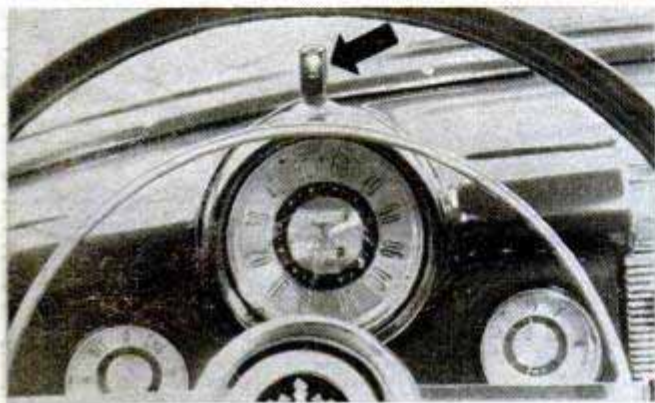
Kenaf, an excellent substitute for jute, thrives in the black Florida soil of the Everglades region



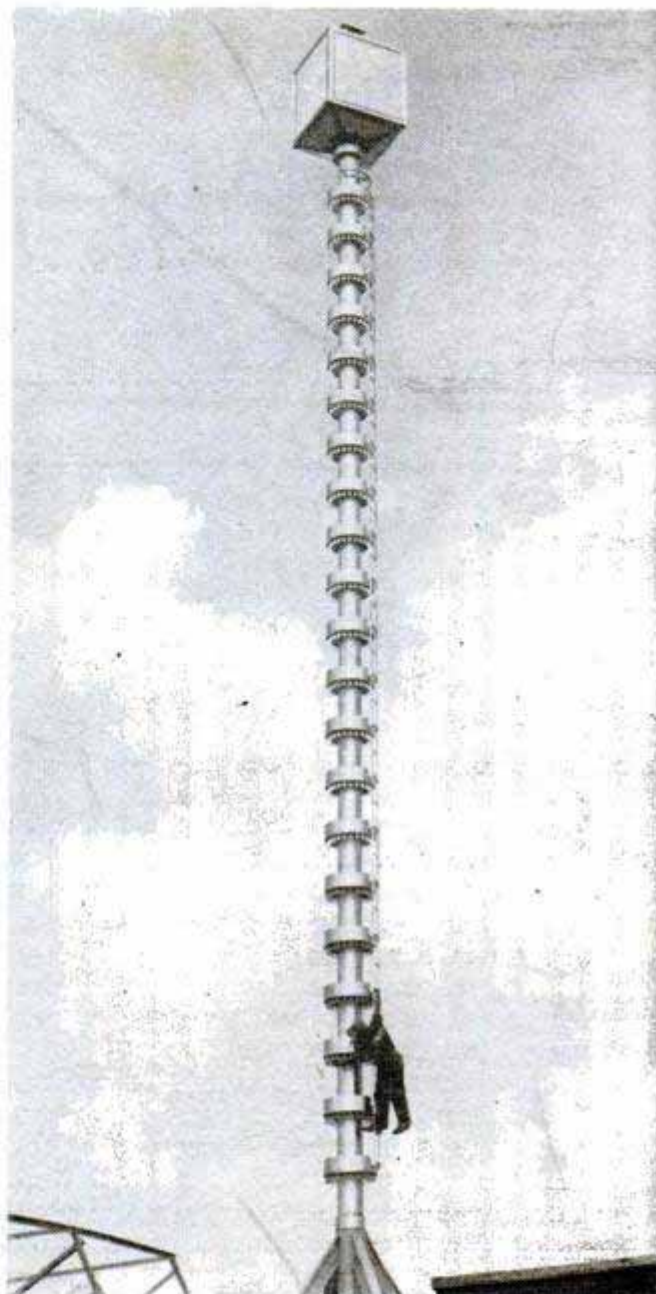
Kansas City Weather Beacon Provides Latest Forecasts

Visible for 15 miles, a weather beacon mounted atop a 10-story building in downtown Kansas City, Mo., relays late weather forecasts to residents and visitors. Changing lights on the 78-foot-high stainless-steel shaft are controlled by an operator in contact with the United States Weather Bureau. Green means fair; orange (steady), cloudy; orange (flashing), rain; white (flashing), snow. When the circular-band lights on the tower flash from bottom to top, warmer weather is coming. Steady rings mean "no change" and downwards indicates cooler temperatures. Forecasts are good for 24 hours.

Warning Light on Dash Signals Wasteful Driving



Operated by engine vacuum, a dash-mounted red light warns the driver when he is wasting gasoline by overacceleration. A small electric switch is attached to the intake manifold to control the indicator light. The lamp also informs the driver when he leaves the ignition turned on.



Rubber Valve Cap Shields Pipe-Line Workers From Chemical Leaks



Shaped like a bell, an acid-resisting Neoprene rubber cap which fits over pipe-line valves protects workers from leaks and sprays of dangerous chemicals. Installation can occur while the valve is in service. The valve wheel is removed, a hole for the valve stem is punched in the top of the "bell" and the shield is pulled down into place over the valve. The flexible lip at the bottom allows easy inspection of the valve or tightening of nuts. Made in three sizes, the shield is designed for valve sizes from three fourths to four inches.

If you do not find the information you need in the index on pages 12, 14 and 16, sources of further information are available without charge from *Popular Mechanics*. Write to the Bureau of Information, 200 East Ontario Street, Chicago 11, Illinois

the

POPULAR
MECHANICS

CRAFTSMAN

X 45



Olwen, her friend Marge Watling and I show how the built-in twin bench serves as conversation corner

Here's Glamour for **YOUR BASEMENT**

By James R. Ward

FREQUENT REQUESTS from two teenage daughters for a party room, plus questioning glances from their mother who hoped I would accept the challenge, led to this beautiful recreation room. Two family conferences gave us a start on planning, and also led to an agreement that building the room would be family project. This later proved to be a wise decision. It started a competitive interest in design and construction which kept the job going.

Judy, the 13-year-old, seemed to favor a miniature schoolyard complete with juke box in which all the "kids" could have Coke parties and hilarious times. Betty, the 18-year-old, being more grown-up, wanted a neat, modern room with radio, record player, television and plenty of dancing space. Olwen (Mrs. Ward) agreed with Betty, but also wanted a modern laundry and insisted emphatically that the room be easy to keep clean—an important factor to



Above, view toward south wall showing bench, bar and cabinet with the built-in radio and record player. Views below show approach to the stairway next to the laundry and built-in book shelves at the east wall



any mother. She also wanted plenty of storage space.

After consulting an architect and interior decorator, we decided on the room pictured on these pages. Reference to the color sketch on page 168 will give an idea of the plan as well as the appearance of the basement. The room is 25 x 25 ft. inside measurements. The wall at the lower left-hand corner is the north wall. This and the east and south walls are outside walls. In the west wall we incorporated closets. The closet at the southwest corner is a wardrobe type having sliding doors opening into the recreation room. This closet is mainly for use by guests. To the north of this closet is the doorway to the heating room and workshop. Two storage closets, separated by compartments for TV set and movie projector, complete the wall. Since the partition shuts off much of the heat coming from the boiler room it was necessary to provide an auxiliary heater for use during extremely cold weather. This was done by using a Coleman wall heater which you can see in the partition wall at the northwest corner.



Marge and Olwen enjoy a Canasta game while Judy serves from the folding buffet table on the south wall

When laying out a recreation room in your basement, any projections such as posts, pipes, etc., should be taken into consideration in the planning stage. Instead of trying to relocate them, it's better to build around them and use the free space of the resulting enclosures for storage, also incorporating the enclosures as part of the design. The electric and water meters and laundry tubs in our case are good examples. Instead of moving the tubs from the proposed recreation-room area we built the laundry room around them. In fact, the only change made in the original basement was to move three pipes. See lower photos on page 172. The gas, cold and hot-water pipes were moved over between the supporting timber and the heating pipes from the boiler and then enclosed.

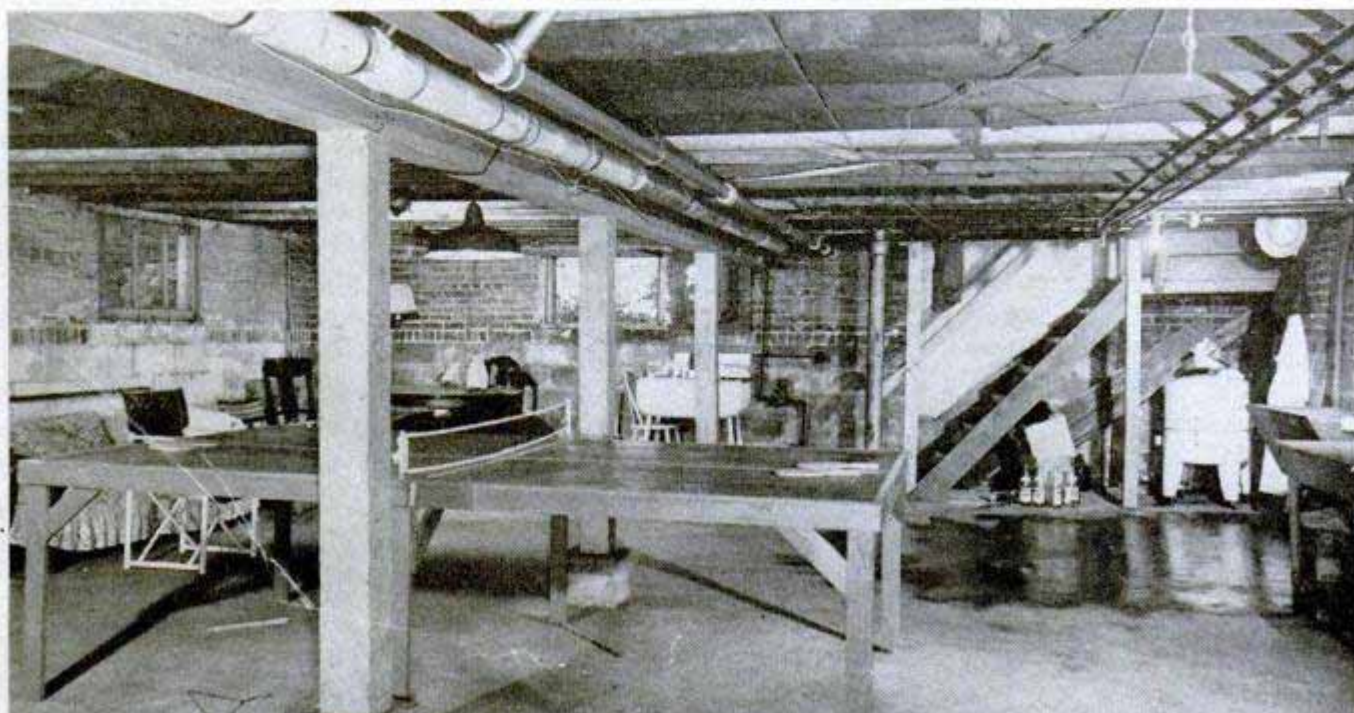
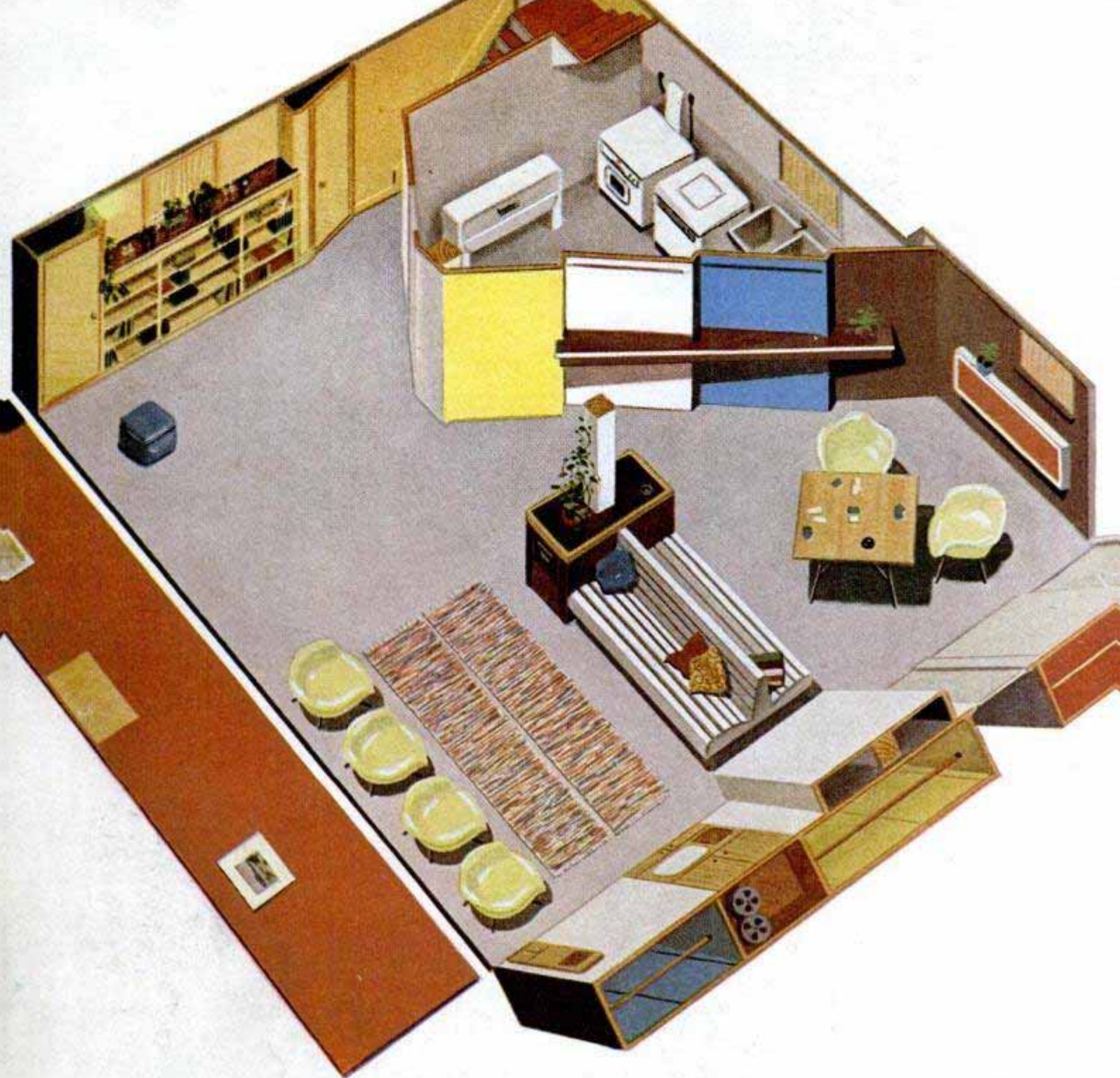
Before starting construction there are several things to keep in mind. First is the electrical wiring. If your home does not have enough circuits at present, now is the time to install them. Also, all the

wiring for the basement room must be done at this time, including the laundry, which will need a 220-volt circuit if you install an electric clothes drier.

Before you start framing, the walls should be cleaned and patched if necessary. It also is a good idea to waterproof them. There are several waterproofing compounds on the market. We used Coprox. This compound penetrates into the pores of the masonry walls and seals them thoroughly. In addition to this, insulate the cold-water pipes. This is necessary to prevent moisture condensing on them and dropping onto the ceiling, which may damage its appearance or cause it to deteriorate.

Matchstick-type bamboo curtains hide windows but let sunlight filter through into the room





Since wall construction will be determined by the type of covering used, it will be necessary to decide on the covering before you order lumber for the walls. We wanted a room that could be changed in appearance by merely changing the color scheme. After investigating various wall coverings, we decided on gypsum wall-board. This produces a wall as smooth as a plastered one and can be decorated easily with water or oil paints. It is available in large rigid sheets that are easy to apply and is highly resistant to fire.

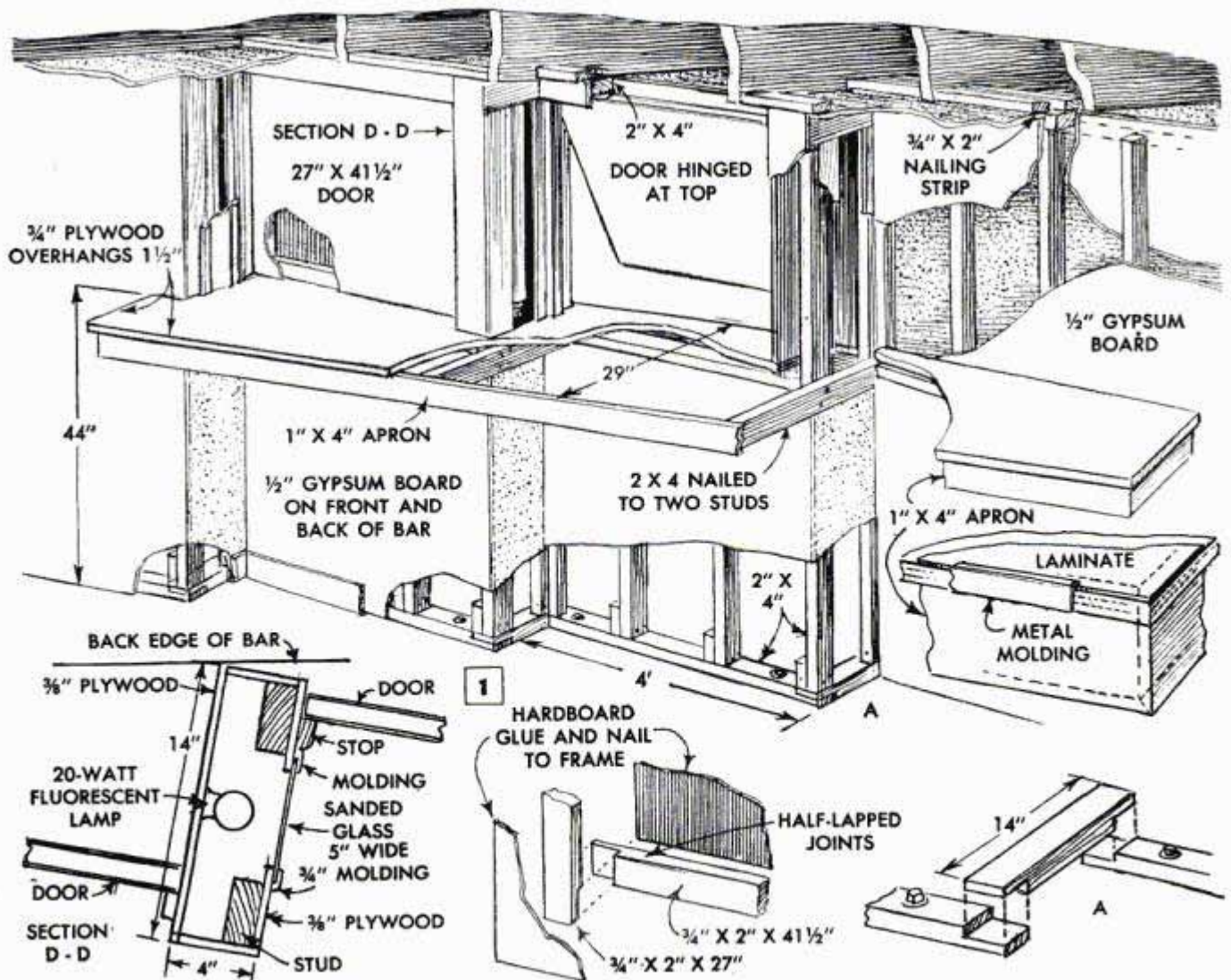
There are two ways of framing walls for the covering. One is to use furring strips and the other is to build a stud wall inside the masonry wall. We selected the latter method since our walls were concrete block up 4 ft. from the floor and brick the rest of the way. They also were uneven, which would have made it difficult to use furring strips. We used 2 x 3-in. studs and sills along the three outside walls, going to 2 x 4-in. stock for the partition walls. To build a wall of this type, anchor the sills to the concrete floor with lag screws and expansive sleeves, spacing the screws 6 to 7 ft. apart. Where the wall runs at right angles to the floor joists, nail headers to the under edges of the joists as nailing pieces

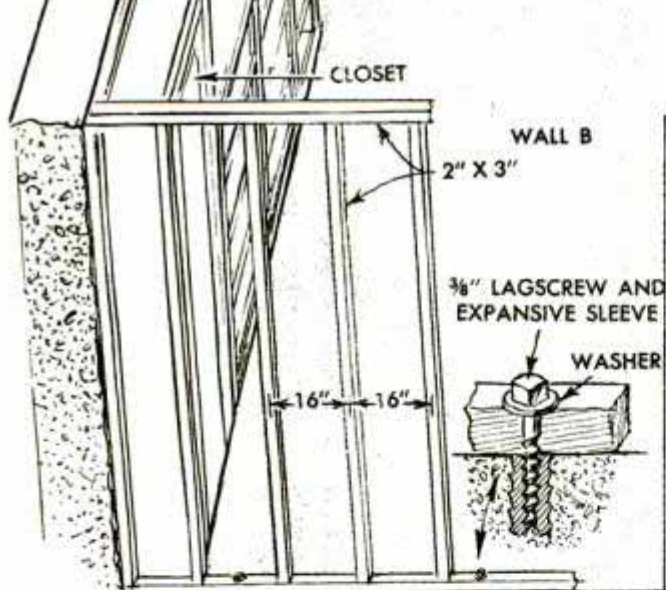
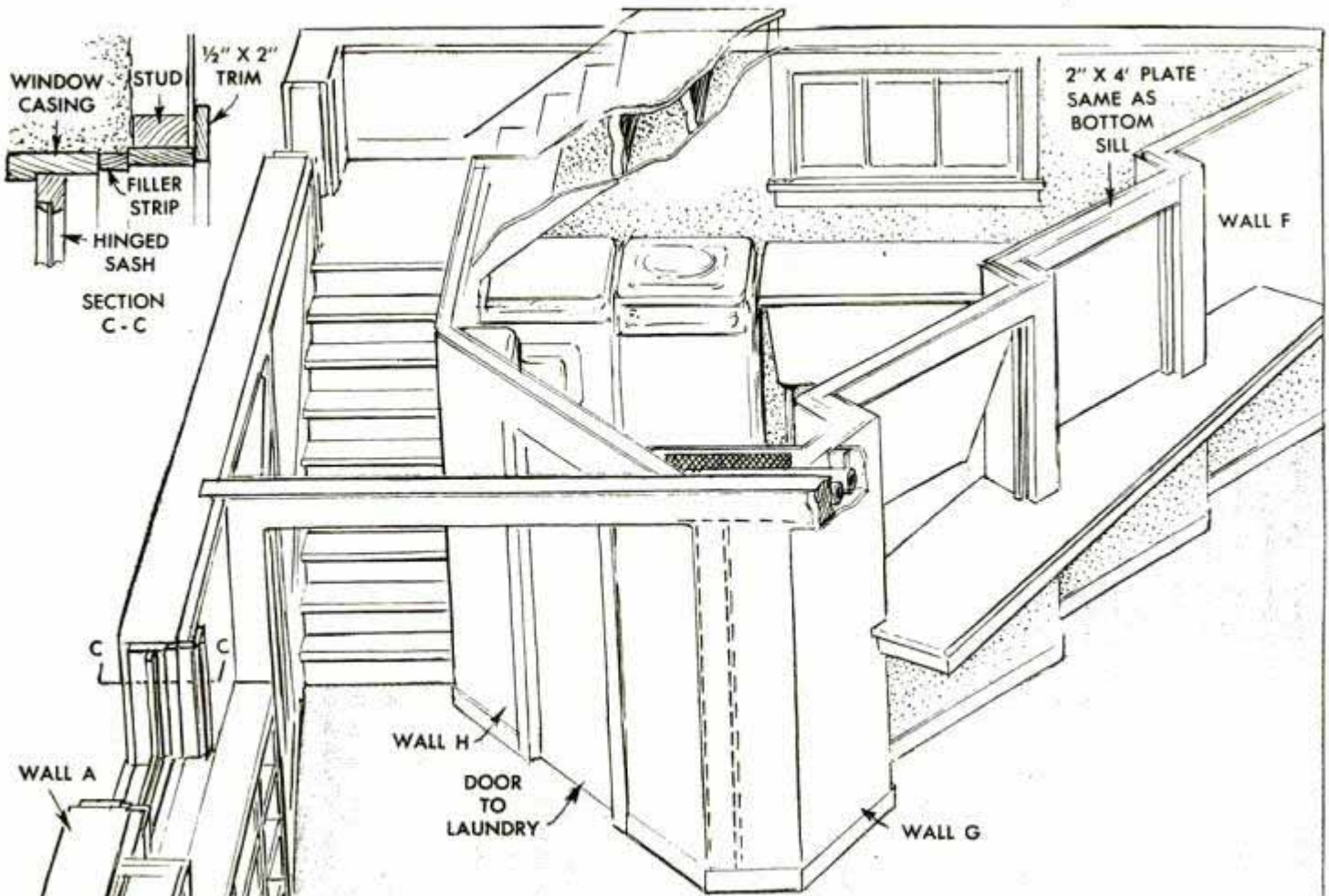
for the studs. In most cases, the studs should be set 16 in. on centers. However, if ½-in. gypsum board is used, you can space the studs 24 in. on centers.

Figs. 2, 3, 4 and 5 show how we framed the basement. No specific dimensions are given as these will be determined by your particular plan. Section C-C of Fig. 2 shows the window treatment. It will be necessary to bridge across, flush with the stud wall. To do this, we faced the studs adjacent to the windows and then filled in between the window casings and facings with filler strips, using window sills at the bottoms.

The two closets at the ends of the bookcase at the east wall were just a matter of running up studs for the wall covering. Fig. 3 shows the shelves that were built between the cabinets. We did this by first putting on the wall covering, which was gypsum grain board, then fitting the shelves over this, using cleats to support them in the center.

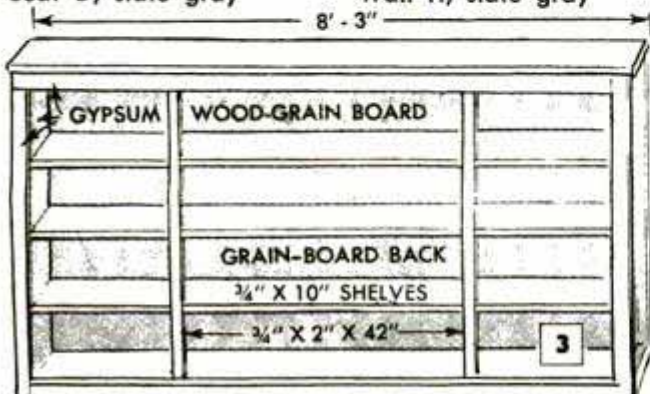
Like most people, we wanted a bar in the recreation room, but did not want it to be the dominating feature. The upper picture on page 166 shows how we built it into the laundry-partition wall. There are two small doors that can be raised when the bar is to be used for beverage purposes





COLOR SCHEME

- | | |
|---------------------|----------------------|
| Wall A, grain board | Wall E, cocoa brown |
| Wall B, slate gray | Wall F, cocoa brown |
| Wall C, slate gray | Wall G, lemon yellow |
| Seat D, slate gray | Wall H, slate gray |

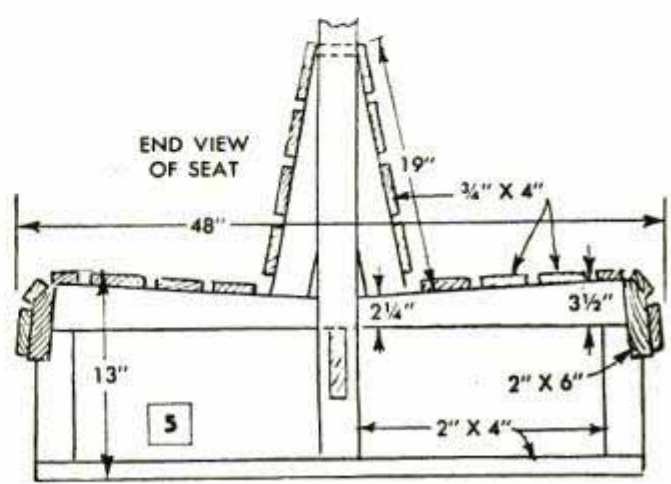
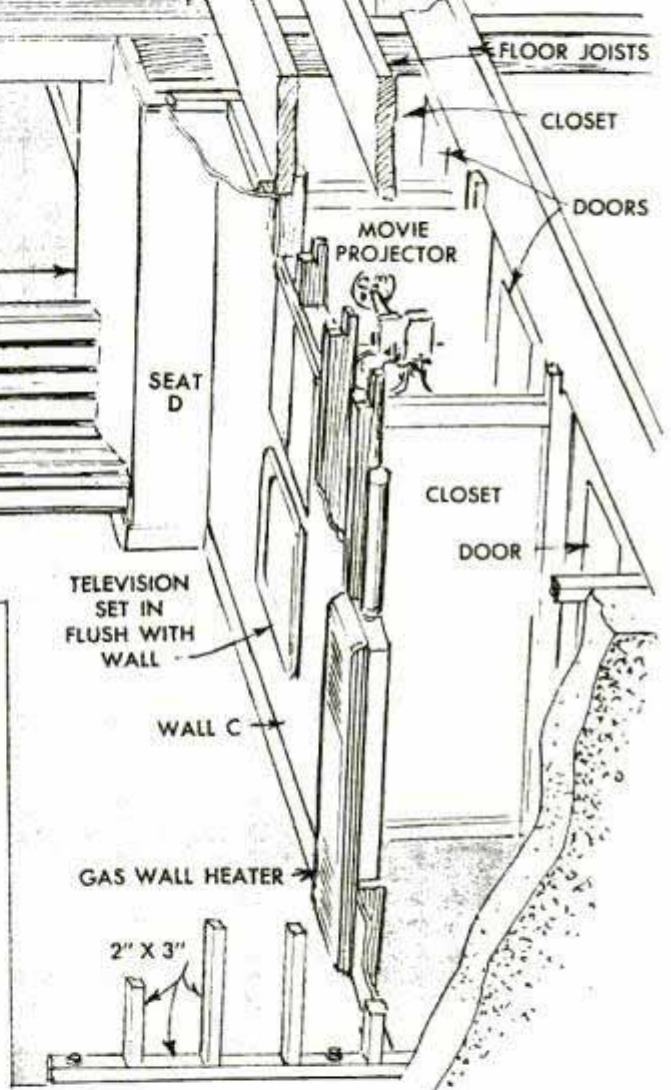
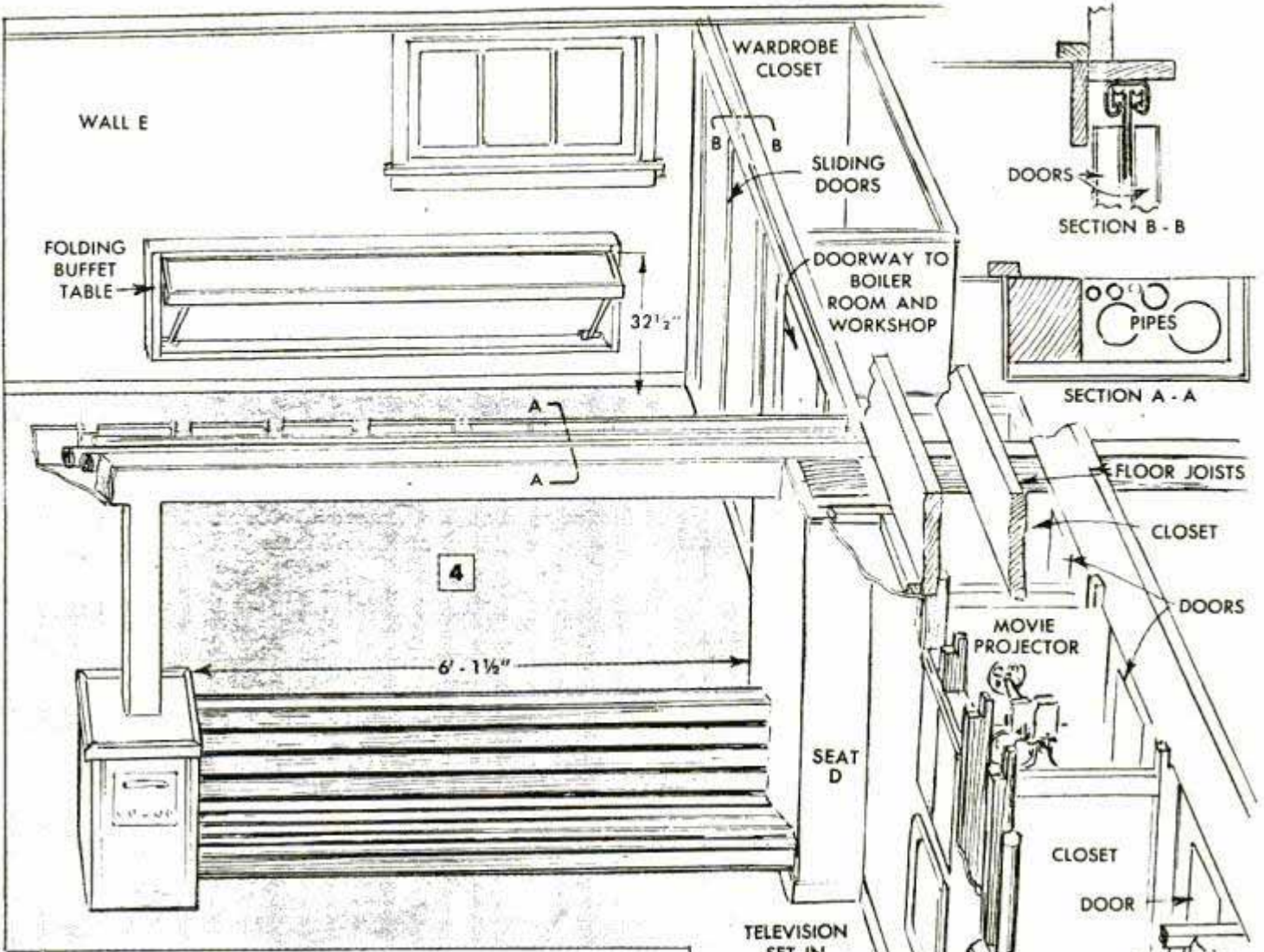


and closed when it is desired to use the bar top as a counter. Three vertical fluorescent lamps set into the wall directly above the bar top provide illumination. Fig. 1 shows the construction. The floor sill is built up, using half-lapped joints as shown at A. The ceiling plate at the top of the wall is a duplicate of the sill and is nailed to the under edges of the joists, after which the sill is bolted to the floor and the studs set in and toenailed in place.

Section D-D shows a down view of the three fluorescent lights. These are housed in boxlike compartments made of 3/8-in. plywood. The face side of each box is cut out to take sanded glass 5 in. wide. The glass is held in place by molding strips.

The upper parts of the bar at the ceiling also is faced with 3/8-in. plywood. The two small doors, which are hinged at the top to close the bar openings, are made by assembling a frame of 3/4 x 2-in. stock on each side of which is glued and nailed hardboard. This makes a very rugged door that will not warp. The upper left-hand photo on page 172 will give you an idea of the appearance of the bar at this stage of construction.

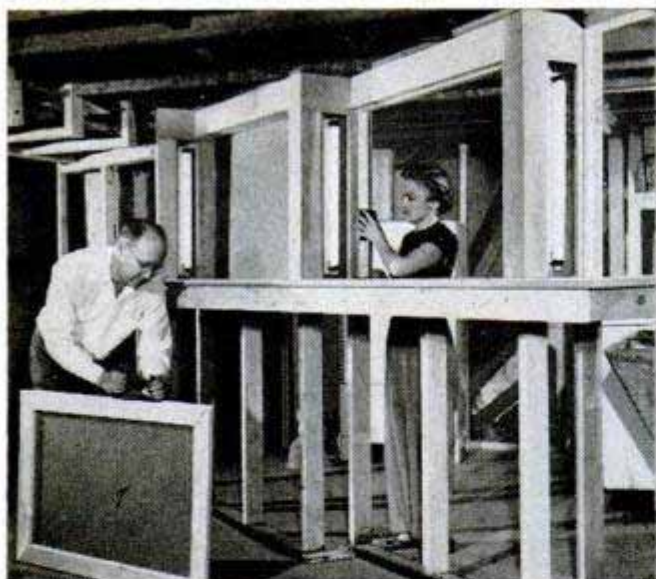
Fig. 5 shows an end view of the twin seat. Although at first glance this may



seem a little difficult to build it is quite easy to construct. The slats are $\frac{3}{4}$ x 4-in. clear pine and the supporting frame is made of 2 x 6s and 2 x 4s as indicated. It is supported entirely by the wall at one end and the cabinet around the post at the other end. Section A-A shows how the pipes—gas, hot and cold water and heating pipes—were assembled and then enclosed. Framing for the enclosure consisted of L-shaped members assembled from lengths of 2 x 4s and nailed to the center supporting beam and to the floor joists, the members being spaced the same as the joists. Two of these members can be seen in the upper-left corner of the upper-left photo on page 172. I also built a rectangular air duct around the heating pipes terminating it with outlets in the laundry and boiler rooms. The outlet in the laundry is covered with a grille and the one in the boiler room is fitted with a fan. Warm air from the boiler room is blown over the heating pipes into the laundry room to heat it. The fan operates only when laundry room is in use.

Section B-B shows how the sliding doors in the wardrobe closet were installed. These doors, as well as all others, were homemade and will be described next month.

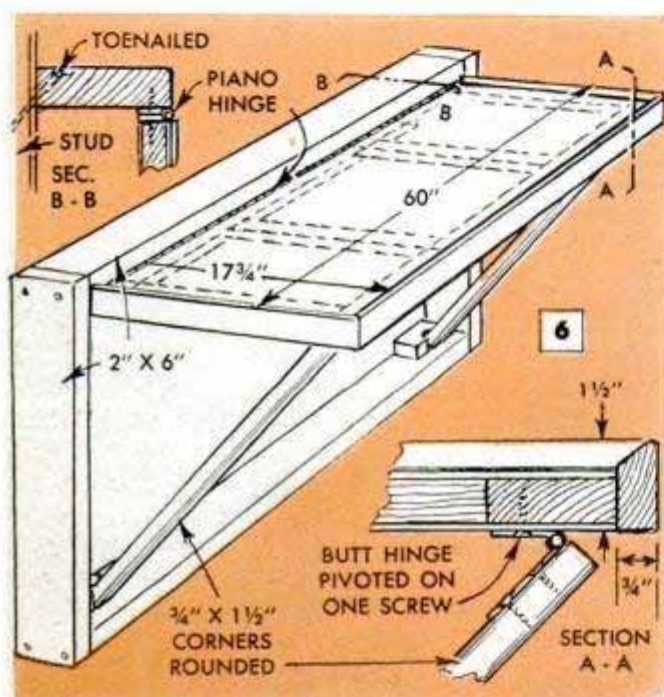
The folding buffet table pictured in Fig.



Olwen is busy with the sanding block while I fit the small doors before hinging them to ceiling plate



Continuing with the teamwork, Olwen fits a door latch while I install small wall studs in the shelf area

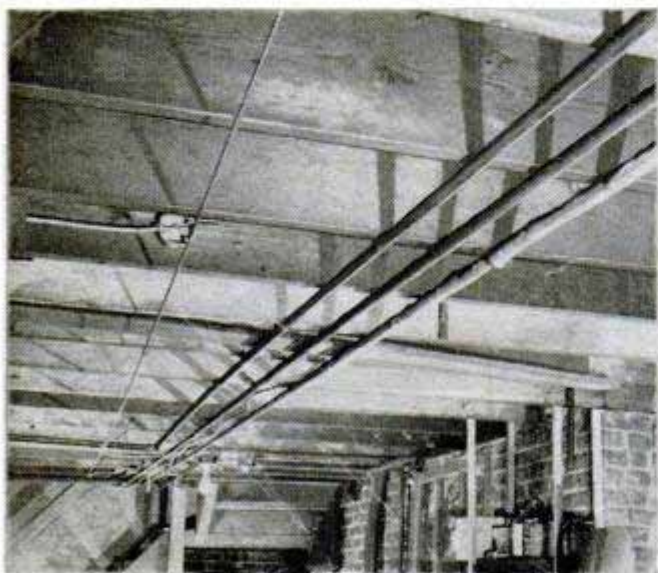


Construction details of folding buffet table that folds down against the wall when not in use for serving

6, consists of a frame made of 2 x 6s and toenailed to the wall studs after the wall covering is in place. The table top is assembled on a frame made of $\frac{3}{4}$ x 2-in. stock. The frame is covered on both sides with hardboard, after which the top surface is covered with laminate in a manner similar to the bar top. The table top is assembled into the large frame with a piano hinge. The molding around the edge of the top is made of oak. The supporting braces are hinged to the underside of the top, only one screw being used in the half of each hinge attached to the top, so that the braces can pivot and fold against the top when it is in the down position. After completing the wall framing, we framed the cabinet around the exposed supporting post. Next we built in the twin seat between the cabinet and wall in preparation for the wall and ceiling coverings which will be described next month.

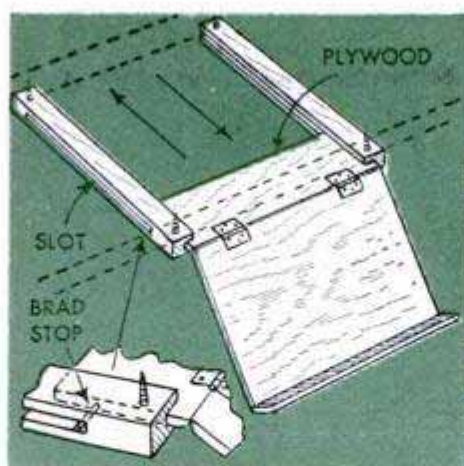
(To be continued)

Gas and hot and cold-water pipes were moved from the position shown below to space between center supporting timber and heating pipes in lower-right photo. Pipe assembly was then enclosed to hide it



Cookbook Shelf Slides Underneath Cabinet

This shelf will hold a cookbook directly above a kitchen work counter for easy reading and, when not in use, will slide out of the way underneath a wall cabinet. The shelf is a $\frac{3}{8}$ -in. piece of plywood, $11\frac{1}{2} \times 14$ in., sawed in two 4 in. from one end, after which one of the severed edges is beveled at a 25-deg. angle to permit the shelf to support the book at an angle. A narrow strip is nailed to the lower edge to form a ledge for the book. Following this, the shelf sections are hinged together, with the beveled edge underneath, and edges that will move in grooves sanded and waxed. Grooved slides of 1 x 1-in. stock,



having blind slots in which brad stops work to limit movement of the shelf, are screwed to the underside of the wall cabinet.

Method for Creating Vacuum in Can to Retard Thickening of Paint



By creating a vacuum inside a partly used can of paint, one craftsman is able to retard the thickening of stored paint. To do this, the lid is pressed down tightly and a tiny hole punched in the center. Then a piece of inner tube is coated at one end with rubber cement and placed so the flap or uncoated portion covers the hole, thus providing a one-way air valve. Following this, a force cup is placed over the valve and worked up and down. When the cup will no longer fill and a slight dimple appears in the rubber directly over the hole, the maximum vacuum obtainable by this means is indicated. When the paint is to be used again, the valve should be pried up and removed to release the vacuum before the can is opened.

Durable Varnish Finish for Wooden Counter Tops

Varnish applied to a wooden counter top or other surface that receives hard usage must penetrate deeply to provide adequate protection. For best results, sand the surface and then use spar varnish that has been cut 50 percent with alcohol. Apply

it liberally until the wood will absorb no more. After allowing the varnish to dry for 48 hours, remove the gloss with sandpaper and flow on a full-strength coat of spar varnish. When this dries, apply a second coat.—E. L. Burgess, North Platte, Neb.

Know Your Hammer

is the first of a series of articles in which the editors of *Popular Mechanics* will describe and tell how to use all the most popular hand tools. Use of the wrong type of hammer, or incorrect use of a hammer often results in bent nails, damaged work or injured fingers. A hammer that balances well in your hand, has a correctly ground face and is designed for the job will enable anyone to avoid these mistakes. Read this story next month and use your hammer correctly.

PLASTIC WEBBING BRINGS

Reupholstering becomes so simple with a new woven plastic webbing that anyone can put new life back into old furniture. The webbing also provides home-workshop fans with a new crafting material which has unlimited uses



'EM BACK TO LIFE

By Wayne C. Leckey

DOES YOUR ATTIC harbor a furniture derelict—a shabby upholstered chair, perhaps, that has been cast aside for want of a new seat? Look what you can do with a new material, called plastic webbing, to bring these forgotten pieces back to life. A common pull-up chair, for example, can be transformed into a smart modern piece and, what's more, it is such an easy job that anyone can qualify. "Reupholstering" with plastic webbing is simplified to the point of interlacing the strips, drawing them taut and tacking the ends securely to the chair frame. Available in 150-ft. rolls, 2 in. wide, the webbing may be purchased by the foot and can be had in many different colors at leading department, hardware or upholstery-supply stores. It is strong and sagless, moisture and fade-resistant and cleans like new with soap and water.

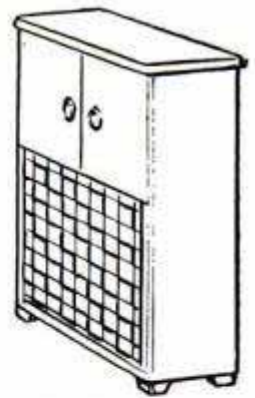
By means of special metal fasteners, it's a simple trick to apply plastic webbing to tubular furniture. Here, holes are drilled at intervals through the inner wall of the metal frame to take studs on the fasteners which are designed to snap in the holes and draw the webbing taut. The details given below and on the facing page show how the webbing is applied.

The use of plastic webbing is by no means limited to reupholstering chairs. The clever home craftsman can use it to add a smart basket-weave treatment to the face of cabinet doors and speaker grilles, to cover bed headboards, clothes hampers, valance boards and folding screens, as well as tops of coffee tables and benches. ★ ★ ★

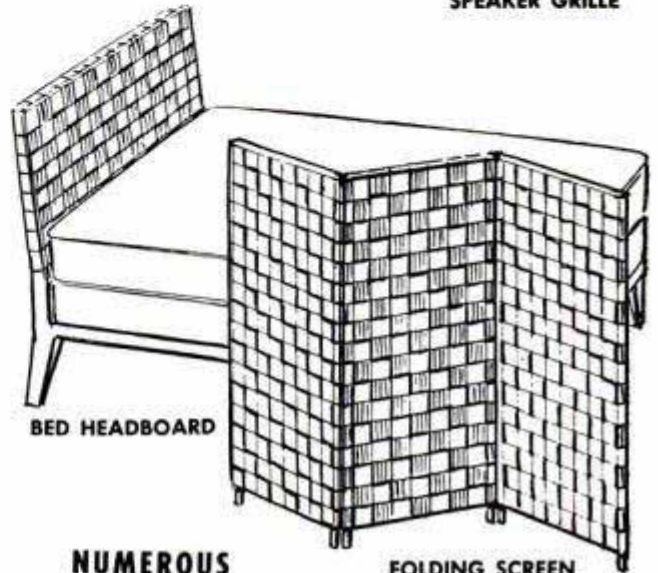
Information courtesy Martin Fabrics Corp.



COFFEE TABLE



SPEAKER GRILLE



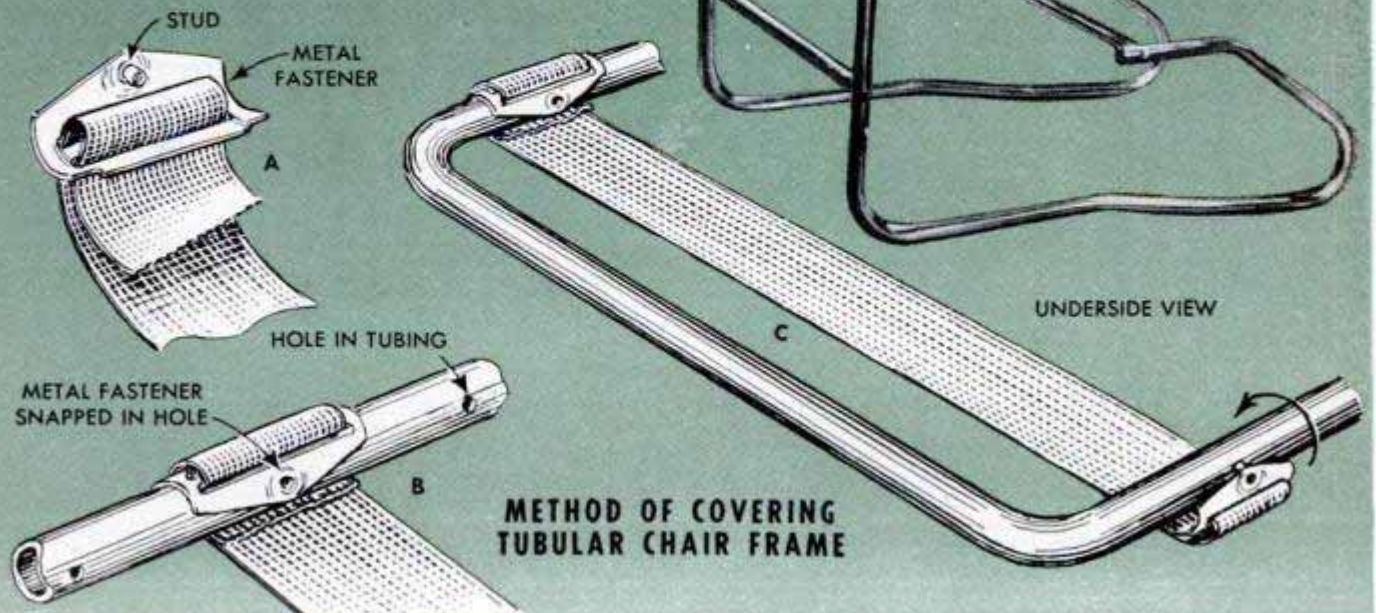
BED HEADBOARD

FOLDING SCREEN

NUMEROUS APPLICATIONS



UNDERSIDE VIEW



METHOD OF COVERING TUBULAR CHAIR FRAME

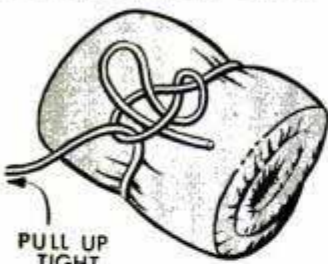
Ladder Secured to Slanting Roof Without Use of Nailed Brace



One homeowner avoided the use of nails in securing the base of a ladder placed on a slanting roof by anchoring it as shown inside another ladder laid flat on the roof and held in place with ropes. These were run from the supporting ladder to stout boards braced against the inside of windows near by. Another advantage of the arrangement is that the upright ladder can be moved along the supporting ladder as work progresses, thus eliminating the necessity of repeatedly securing the base each time the ladder is moved.

John L. Wilkin, Clifton, N. J.

Blanket-Roll Knot Is Slip-Proof



To tie a roll or bundle tightly, loop the cord as shown in the diagram and pull up tight. The knot will not slip back, and a half-hitch can be thrown over the projecting loop if desired. To untie, pull the loose end. A little practice will enable you to tie this knot quickly.

B. Franklin, Azusa, Calif.

Improved Mailing Labels

Mailing labels for packages and large envelopes can be made from wide gummed-paper tape. After cutting a piece of tape to the required length, wax paper is placed against the gummed side to prevent sticking and the tape is inserted in the type-

writer. When the completed label is removed from the machine, the wax paper is peeled from it with ease.

Robert Burgess, Grand Rapids, Mich.

Soles of Child's Shoes Taped For Play on Waxed Floors

Short pieces of adhesive tape applied to the soles of a child's shoes will help prevent injurious falls while walking or romping over freshly waxed floors. Cut the pieces slightly shorter in length than the width of the shoes and apply in the manner shown. The tape, which in no way will mar the floor, will remain effective for about a week, after which time it must be replaced.



Gene D. Legler, Houston, Tex.

Ax Handle Shock Absorber

If your ax handle becomes literally "chewed up" immediately behind the bit, nail a strip of rubber to the handle at this point. A strip cut from an old auto-tire casing is ideal for this purpose. As the handle is most likely to be damaged when

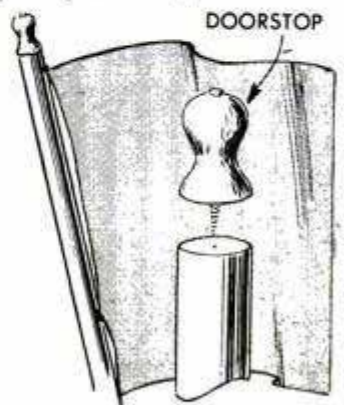


splitting stove wood and fence posts, this idea is especially desirable for that work.

Henry Josephs, Gardenville, Pa.

Wooden Doorstop Tips Flagstaff

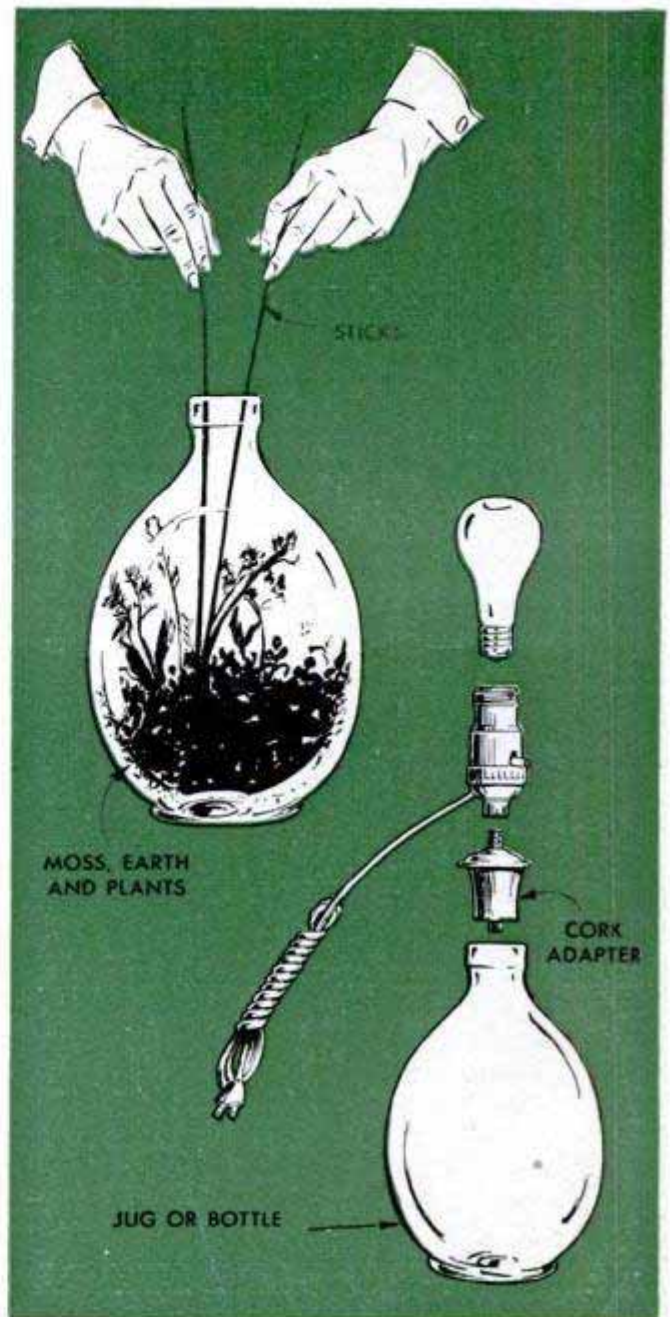
Homemade flag-staffs have a neat and finished appearance when a wooden doorstop is used as a crown tip. These come provided with a permanently attached screw by which they may be fixed to the end of the pole. A coat of bronze paint applied to the stop before it is screwed to the pole adds to the appearance of the finished job.



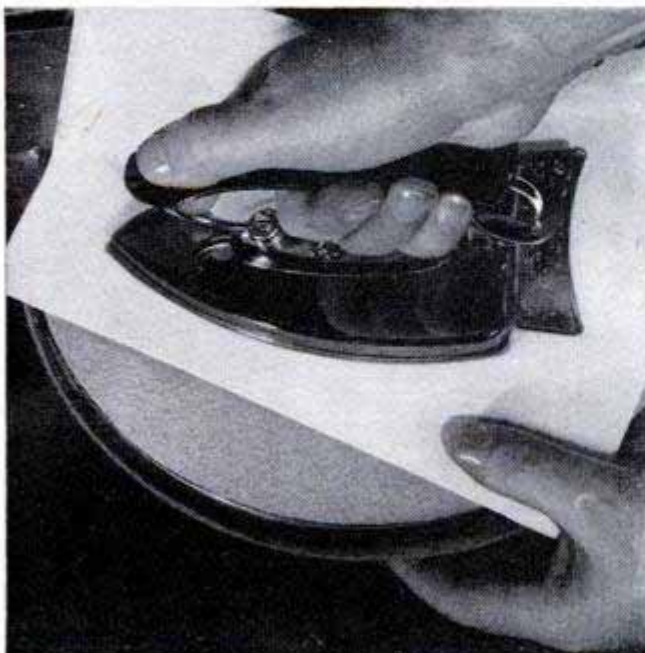


TERRARIUM LAMP

Plants growing in a lamp base are a decorative novelty that complements any type of home furnishings. Discarded jugs and bottles of clear glass, especially narrow-necked vases having value as antiques, can be made into attractive terrarium lamp bases by use of a special socket adapter available as a unit ready for installation. Adapter consists of a cork center-drilled for a short length of $\frac{1}{8}$ -in. pipe onto which a special lamp socket is screwed. Cork inserts are available in a wide range of sizes. Wild plants, such as wood violets and ferns, also certain slow-growing succulents, will take root and develop readily in a shallow bed of fine gravel, moss and rich soil mixed with leaf mold. Water the plants at regular intervals



Abrasive Mounted on Sanding Disk With Photographic Tissue



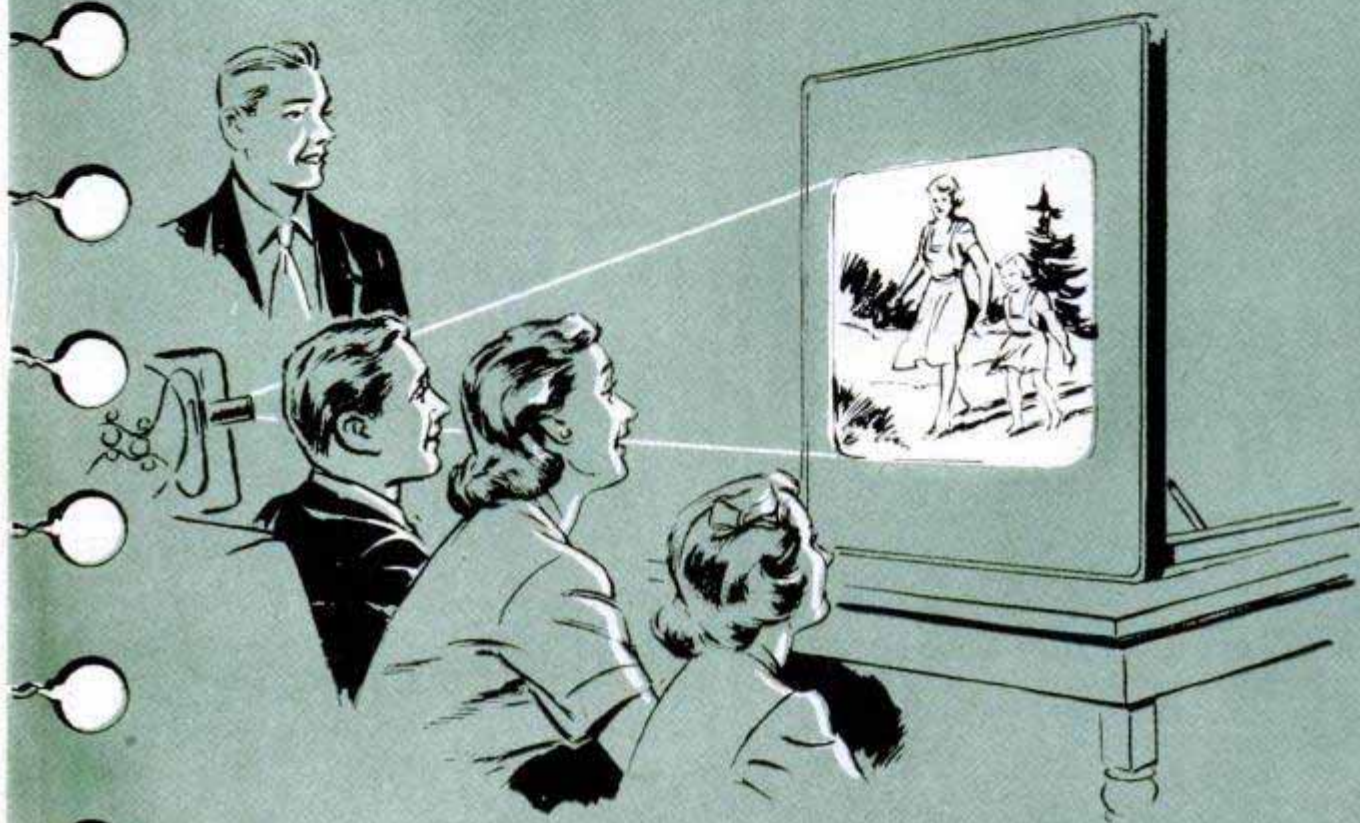
If an adhesive for attaching abrasive paper to a sander disk is not available, use a sheet of photographic mounting tissue as a substitute. Place the abrasive paper on the sanding disk with the tissue inserted between them and then press with a hot electric iron, using a piece of plain paper between the iron and the abrasive surface. The abrasive paper can be removed by heating with the iron to soften the tissue.

Coasters Improvised From Salt Box

The ends of round salt boxes, which usually are made water-resistant to prevent the absorption of moisture by the salt, provide durable, emergency coasters for glasses containing beverages. Cut off the ends so that a rim approximately $\frac{3}{8}$ in. wide remains. This may be deckled for a decorative effect.—Frank Shore, New York City.

Solving

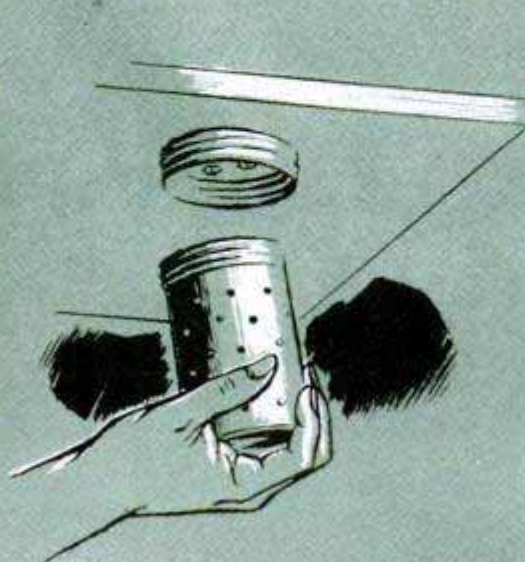
HOME PROBLEMS



CARD TABLE doubles as home-movie screen when two legs are extended to hold it on edge. If top is dark-colored, it may be covered with paper or white sheeting

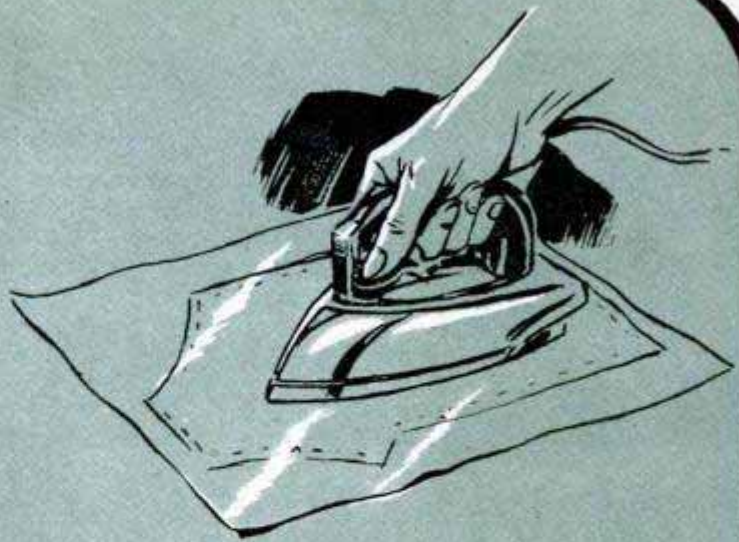
BAKING-POWDER CAN, perforated and fastened to underside of a closet shelf, provides container for mothballs. Lid of the can is screwed to the shelf

AN ORDINARY TEA STRAINER can be used to dampen ironing when clothes sprinkler has been mislaid. Just dip strainer in water and shake over clothes





WATERING POTTED PLANTS is done neatly and quickly by setting one or more ice cubes in each planter. Placed on top of the soil, the cubes will water the plants as the ice melts

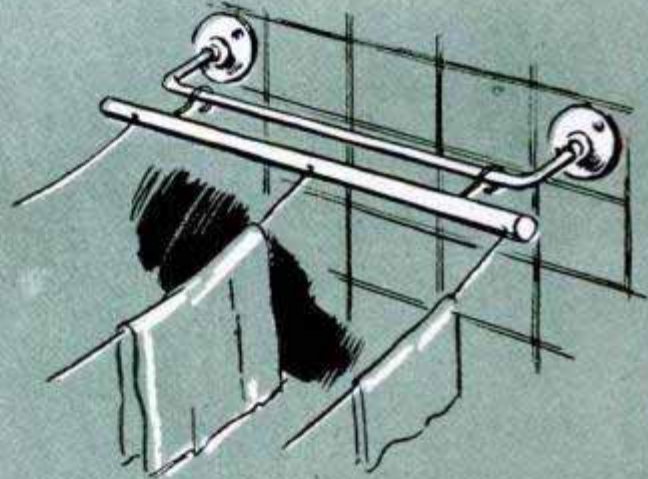


WHEN A DRESS PATTERN becomes so wrinkled that it is difficult to work with, place the pattern under wax paper and iron. This stiffens paper and smooths out wrinkles as well



SOFT INSULATION BOARD forms a handy backing when removing spots from garments. Placed under the fabric, the board absorbs the stain readily, eliminating much of the rubbing

IF BOTTLE CAP does not seal tightly because the cork or paper insert has been lost, wrap string around neck of bottle, as below. Cap will seat on string to make an effective seal



BATHROOM CLOTHESLINE is hung or removed in seconds by hooking it between two towel bars. Ends of the line are tied to a pair of drilled dowels which are fitted with screw hooks

NEXT TIME THE STAYS for your shirt collar are missing, don't waste time searching for them. Small hairpins inserted in the collar-stay pockets will hold collar wings in place





Piece of Chain in Clothesline Improves Airing of Garments

Sunning and airing of suits, coats and other clothing can be accomplished more quickly and efficiently if a length of chain is incorporated in the clothesline as shown. It then is a simple matter to space the hangers several links apart, thus assuring ample space between the garments for the passage of air.—Ed Packer, Chicago.

Wrapping Paper Cut to Length With Plywood Template



Finding that he needed to cut a number of sheets of heavy wrapping paper to exact size for a special job, one shipping clerk made a template that enabled him to do the trick quickly and without the necessity of measuring and cutting each sheet

individually. The template consists of two pieces of $\frac{1}{4}$ -in. plywood nailed together with a smaller piece sandwiched between them. The larger piece should be somewhat longer than the width of the paper and the combined width of the two pieces is made slightly less than the length of the paper sheet required. Then the paper is wrapped around the template to a dozen or more thicknesses and cut at one edge with a sharp knife as in the detail.

G. E. Hendrickson, Argyle, Wis.

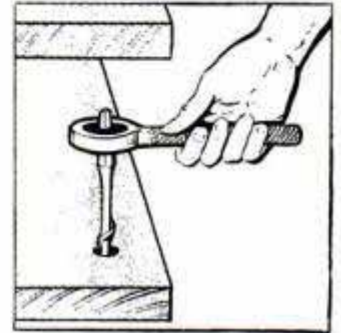
Shield Guards Hunter's Bootlaces

To prevent snagging and knotting of his bootlaces when walking through briars and weeds, one hunter uses rubber shields made from pieces of inner tube. These are cut to the shape shown in the drawing, of a size to fit snugly around his boot tops. Each shield is held in place by an arrow-point tongue, cut in one end, which is inserted through a slot in the other end.



Ratchet Wrench Turns Square Bit

When it is necessary to drill in a tight spot that will not permit the use of a brace, a regular mechanic's ratchet wrench can be used in place of the brace to turn square-shanked bits. To start the bit, apply downward pressure on the wrench until the threaded spur enters the wood and pulls the cutting edges of the bit into the work.

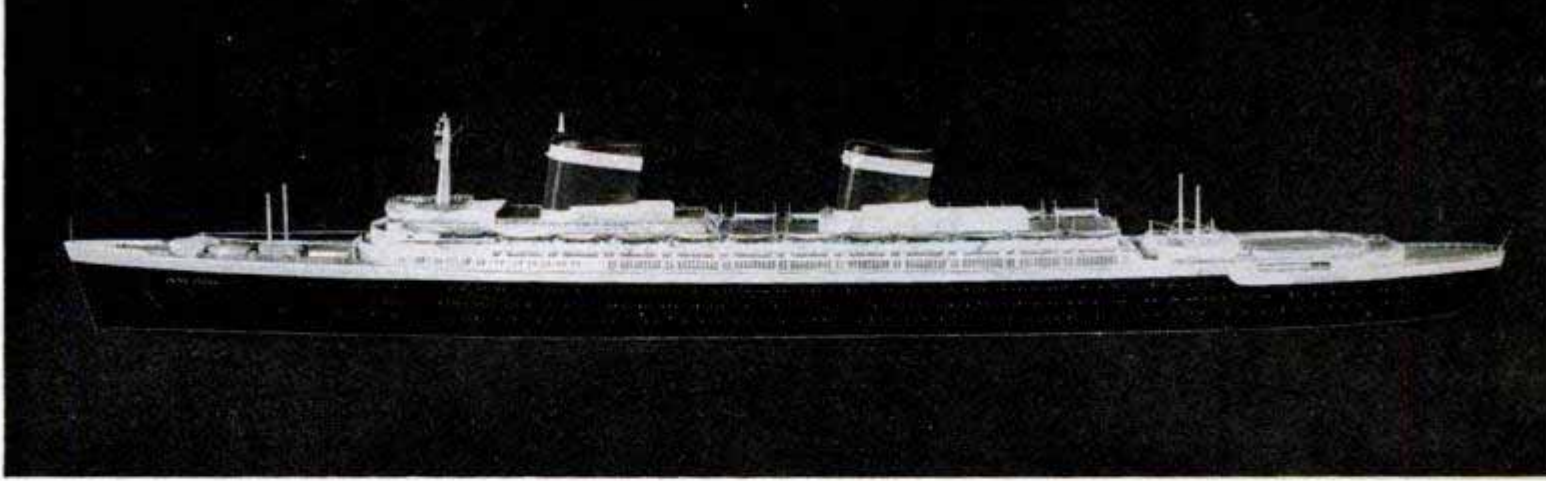


Caster Cups Hold Sewing Supplies

To provide handy containers for pins, needles, buttons and other sewing materials, keep a number of glass caster cups wherever sewing is done in the home. You'll also find them useful for holding dress patterns in place.

William Swallow, New York City.





36-in. Model of the

Part II

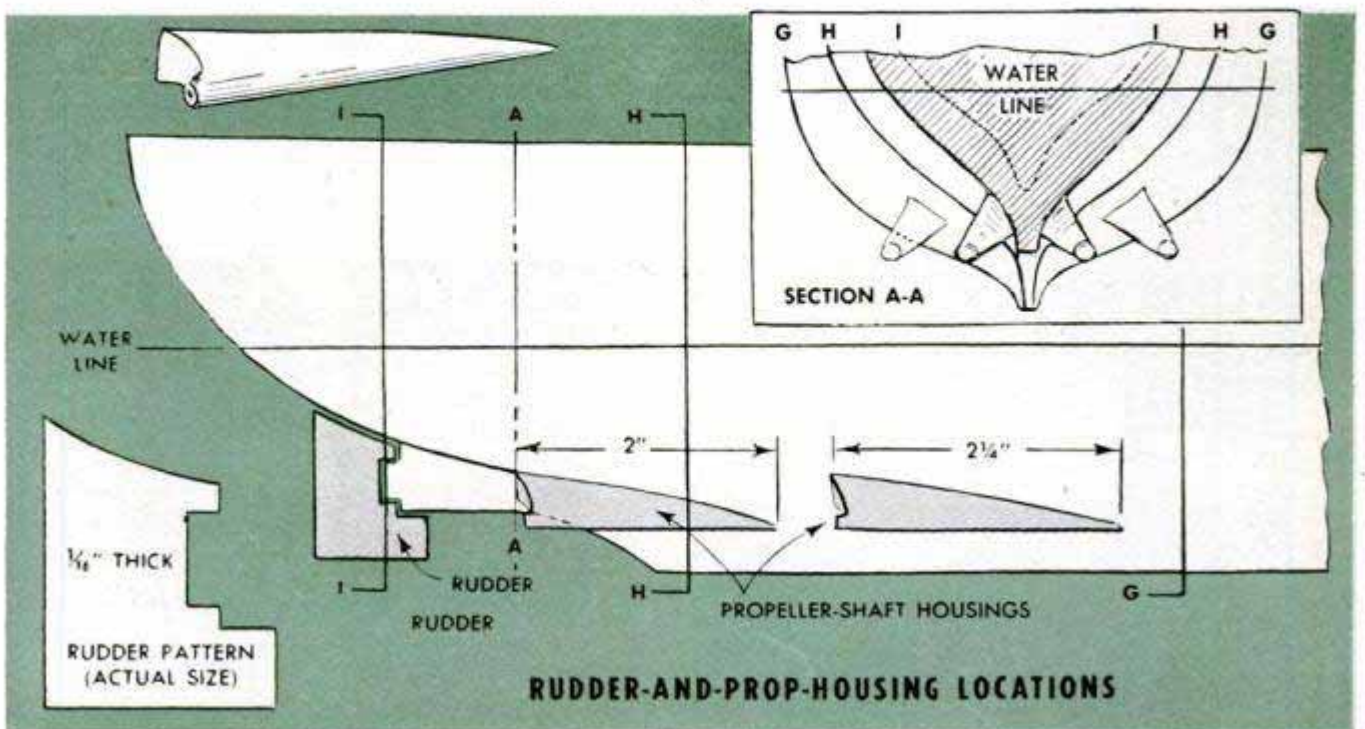
SS UNITED STATES

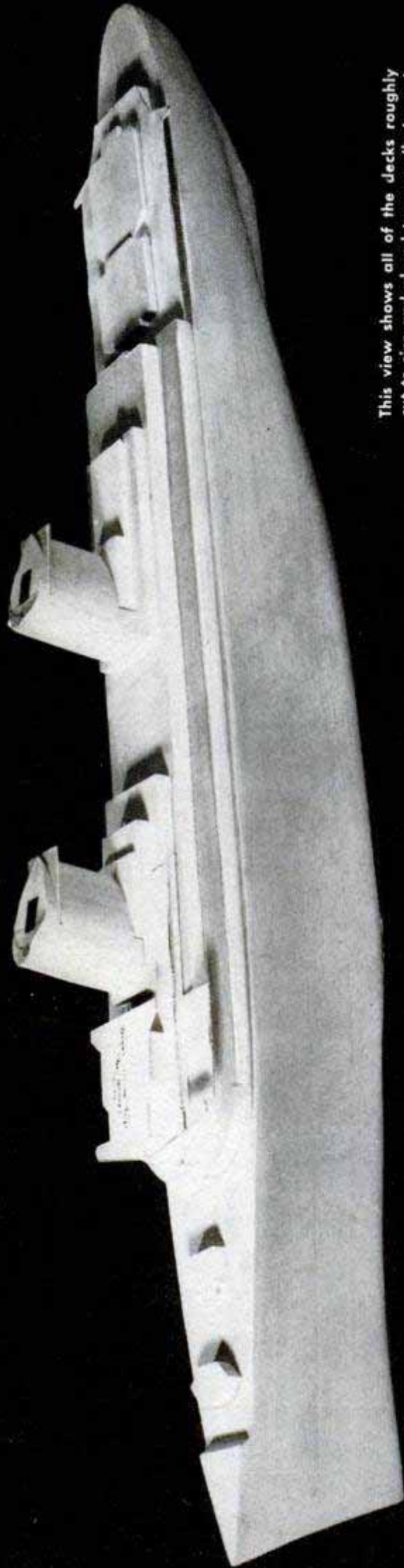
WITH THE MODEL of the SS *United States* completed to the point discussed in Part I, which took the modelmaker through the carving of the hull, we are ready to add the four propeller housings. The stern profile drawing, below, is presented one half actual size to assist you in plotting the location of each housing on your hull. Both fore and aft housings are made in pairs; each carved alike, except for being shaped left and right hand. Each housing, you will notice, resembles a tapered three-sided wedge which is individually shaped to fit the hull. A hub is formed on the aft end of each housing to take a standard four-bladed propeller, approximately $\frac{1}{2}$ in. in diameter. The cross-sectional size at the aft end of the housing measures approximately $\frac{3}{8} \times \frac{1}{2}$ in. After

the housings are shaped to your liking, they are glued to the sides of the hull, each being placed in relation to station lines H and G. To make the housings look like an integral part of the hull, fillets of wood putty are neatly formed along the joints and later sanded smooth. The pattern for the rudder is given full size, ready for tracing on a piece of stiff cardboard or hardwood. After it is cut and glued in place, the rudder is made to look like it actually pivots by scoring the joint slightly with the point of a knife.

With the hull set aside for the moment, we can turn our attention to laying out the various decks that make up the superstructure of the ship. Here you are referred back to Part I and the patterns which were given for the wooden and metal decks. You will recall that these patterns are half size and

The shaded area in the sectional drawing below represents the hull sliced through at section line A-A

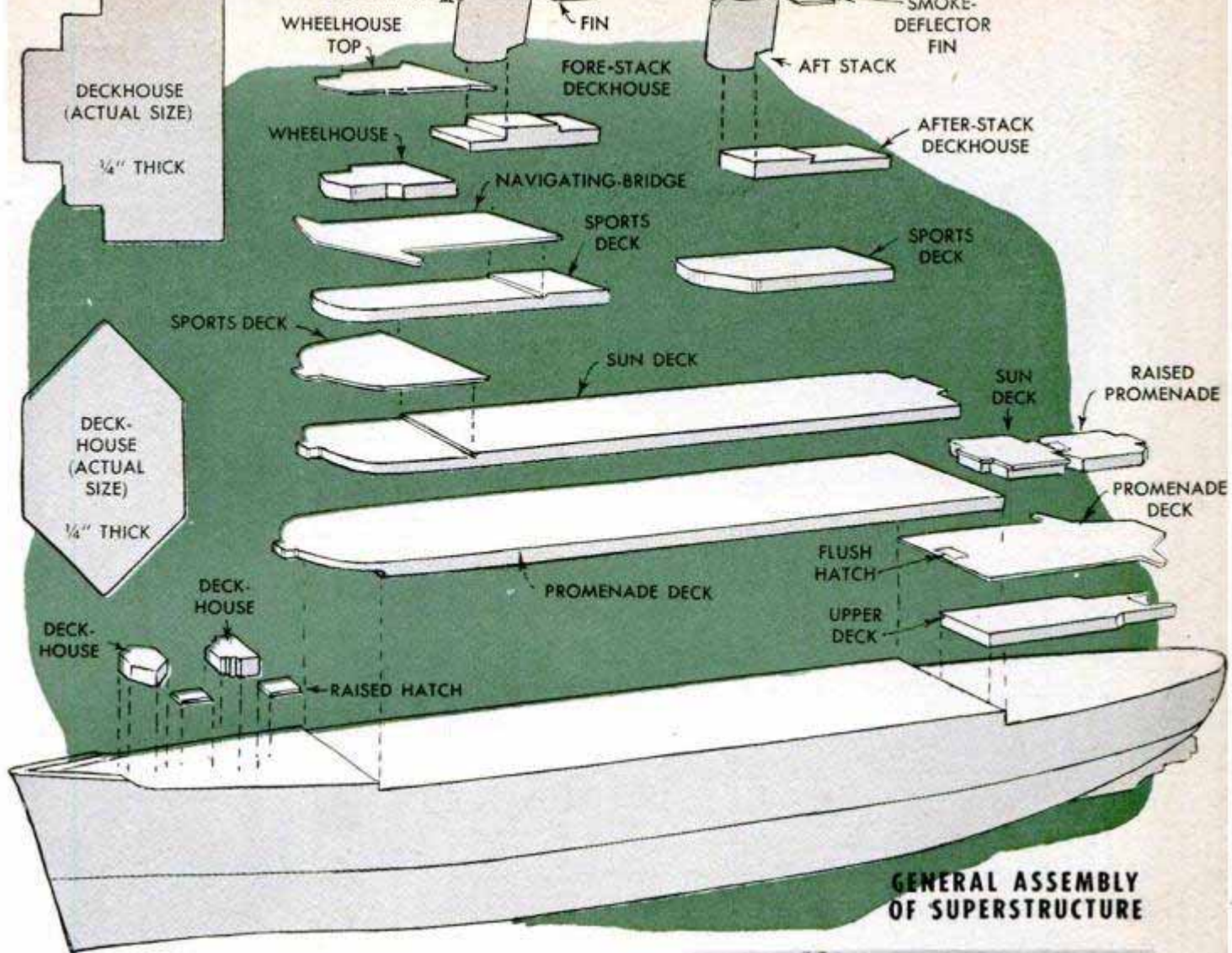




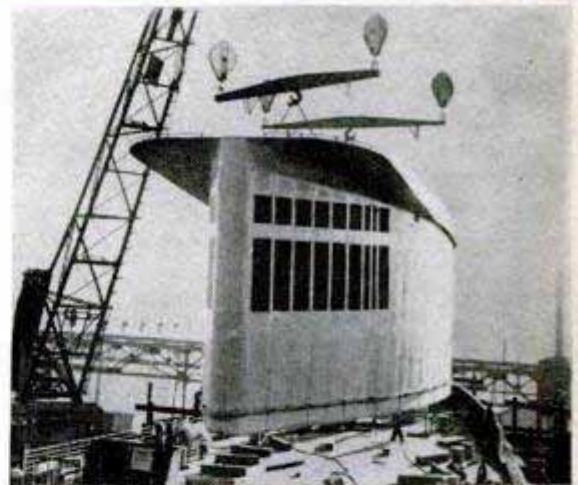
This view shows all of the decks roughly cut to size and placed temporarily in position on the hull. Later they will be finished individually before the final installation

are shown on $\frac{1}{2}$ -in. squares to permit you to enlarge them to full size. Actual-size patterns for these parts have been prepared for those not wishing to enlarge the magazine patterns. Not counting the stacks, some 18 separate pieces are required for the superstructure. The long promenade deck is cut from a piece of soft pine measuring $\frac{3}{8}$ in. thick. The fore end of this deck is undercut $\frac{1}{8}$ in. to set over the sheer step near station line C-C. The metal promenade deck, aft, is placed on top of the wooden upper deck which is butted against the sheer step between station lines G and F. If desired, the metal decks can be made of fiberboard, gluing rather than soldering the bulwarks to them. If metal is used, brass or any sheet metal will do as it is later painted. The long wooden sun deck tops the promenade deck. Note that the fore end of this deck is cut down to bring the metal sports deck flush with the surface. The sun deck and the raised promenade deck, which are placed on top of the metal promenade deck, are one piece. Notice that the sun deck is cut from $\frac{1}{2}$ -in.-thick cardboard or metal and overhangs the deck along each side. The fore sports deck, like the large sun deck, is cut down $\frac{1}{32}$ in. to permit the metal navigating bridge to set flush. The aft sports deck carries the aft-stack deckhouse, and both the aft and fore-stack deckhouses are cut from single blocks with steps cut where indicated to take the stacks themselves. Patterns for the two deckhouses located on the fore deck are given full size in the general assembly drawing on page 183. In addition to these, two raised hatches are required, one measuring $\frac{1}{8} \times \frac{3}{4} \times 1$ in. and the other $\frac{1}{8} \times \frac{9}{16} \times \frac{7}{8}$ in. Two flush hatches located aft on the plan view, Part I, are merely drawn on the deck surfaces. The pullapart assembly drawing of the decks will give a general idea of their relation but the plan view is used when permanently locating them on the hull. Later in the series of articles you will be told how each deck is finished individually, starting from the lower one, the promenade deck, and working on up.

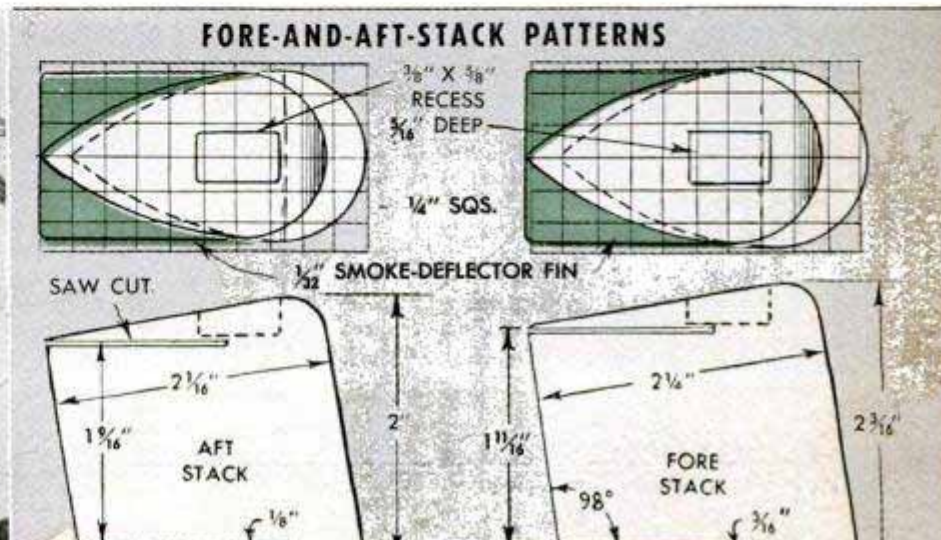
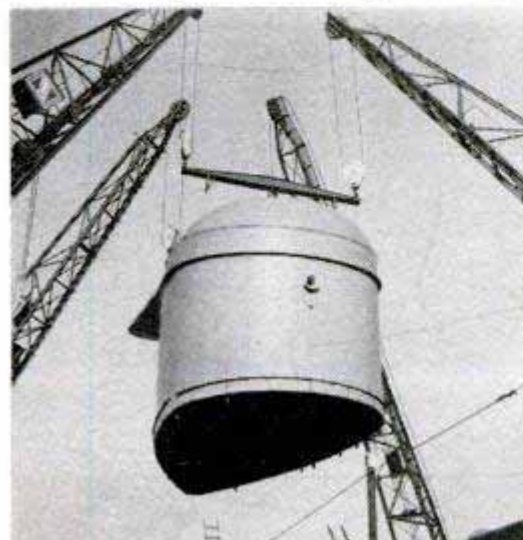
Both of the sleek, raked stacks are alike, except that the aft one is somewhat smaller. Patterns for their teardrop shapes are drawn full size from the squared drawing and traced on soft-pine blocks, top and bottom. A stepped cut in the bottom of each stack allows them to fit over the edges of the deckhouses. The tops of the stacks are rounded all around and a recess is cut in the top of each one. Smoke-deflector fins, designed to deflect exhaust from upper decks, are added to each stack at the top. These can be of thin cardboard inserted in sawcuts made with a hacksaw blade or merely cut out to fit the contour of the

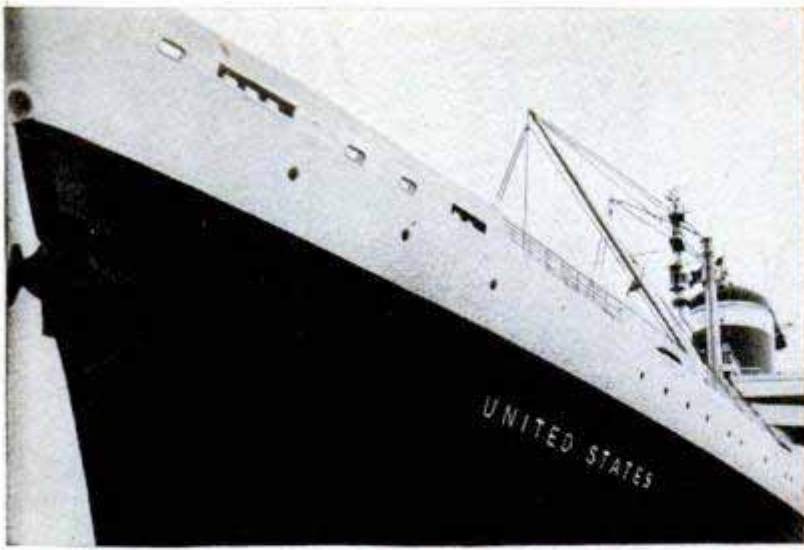


stacks and glued in position. Whistles, antenna brackets, tower and other stack fittings are added later. Of general interest in the construction of the actual SS *United States* is the fact that the stacks were riveted together with a total of 65,000 aluminum rivets. These were first tempered by heating, then stored in freezer chests and finally driven, ice-cold, a new departure in riveting. The mammoth twin stacks stand as high as a four-story house and spread the width of 10 parked automobiles. Traveling cranes hoisted them aloft in two sections and set them onto the hull while the ship was being built in dry dock. So much for

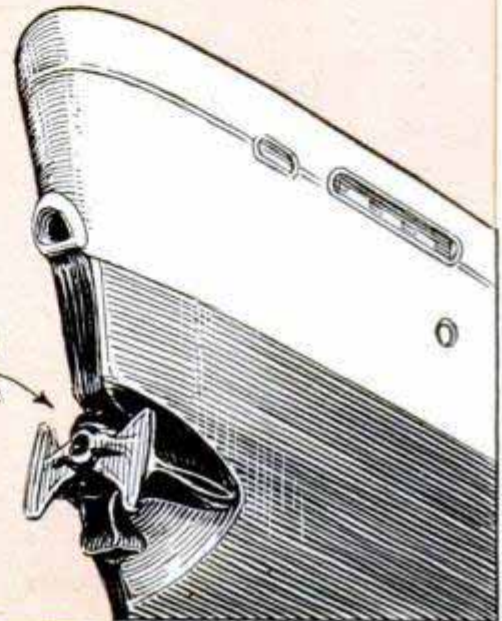
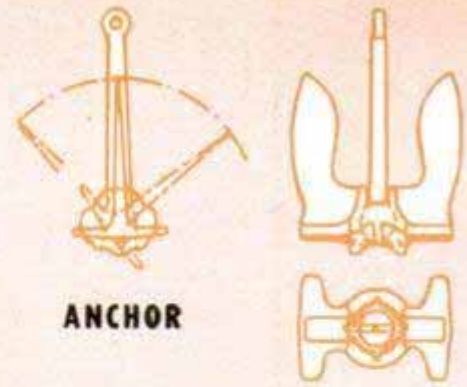
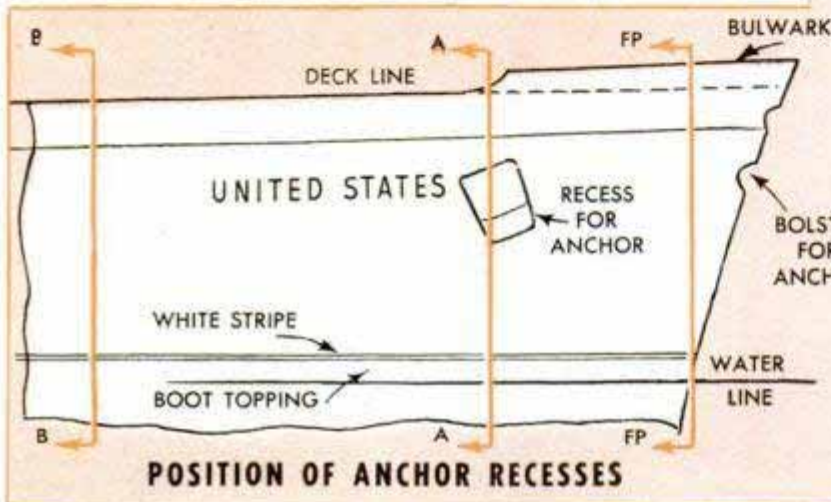


Prefabricated of aluminum, the stacks of the SS *United States* were set aboard by giant cranes as shown in these two photos. Towering 55 ft. high, the stacks are the largest and only all-aluminum ones in the world





Although dwarfed by the bow, the Inconel metal letters in the ship's name are 2½ ft. high and stretch 51 ft. long

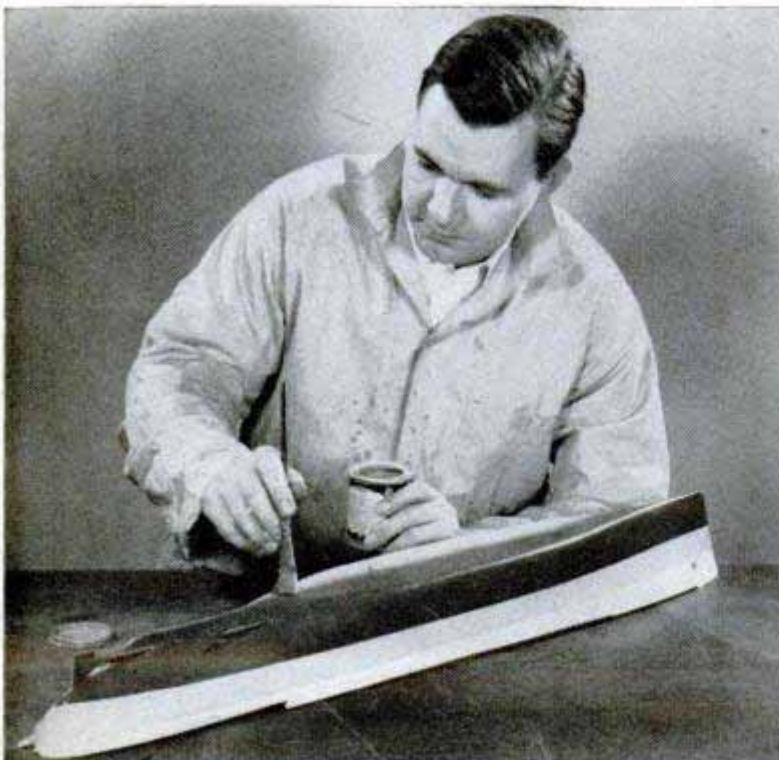


Using either brush or spray to apply the finish coats, the hull first is given four coats of sanding sealer, each one being left to dry for about an hour and then rubbed lightly with fine sandpaper. All nicks and other blemishes in the hull should be carefully filled with wood putty and sanded smooth

the superstructure for the present.

The SS *United States* is equipped with three anchors, one in the leading edge of the bow and one on each side of the hull at station line A-A. On the model, the side anchors are housed in shallow recesses chiseled in the hull. The size and location of the recesses are taken off the profile view, the measurements being doubled, of course, since the drawing is one half full size. The anchors can be purchased from model-supply houses, and in mounting them, holes are drilled in the hull for the shanks and the latter cemented in place. Bolster plates at the lower edges of the side-anchor recesses are cut to shape from thin cardboard and glued to the hull.

The hull now can be painted. If you are satisfied with the final sanding, give the hull four coats of sanding sealer to build up a smooth base for the paint. Let each coat dry and sand with 4/0 paper. As the water line establishes the line where the bottom paint ends,



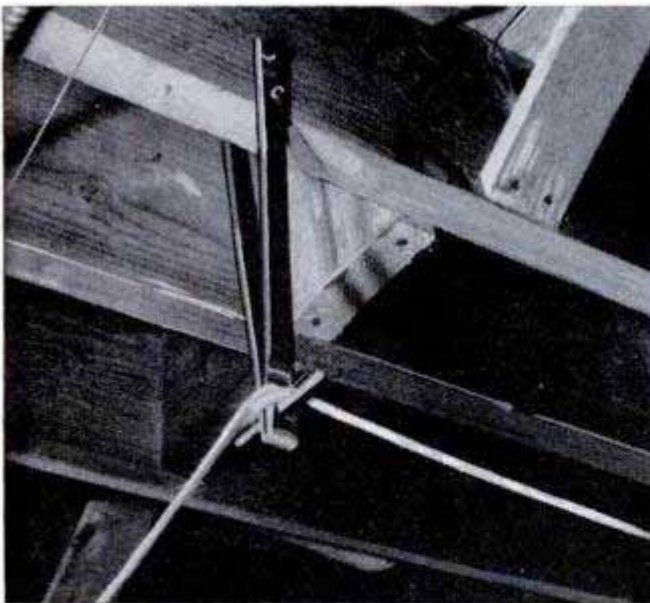
mask off the rest of the hull with tape and newspaper. If a spray gun is available, lay on several coats of red lacquer, rubbing each one lightly, when dry, with 4/0 waterproof paper. If the painting is done with a brush, use a quality four-hour enamel. Final painting of the hull above the water line is left until the portholes are installed. Placing some 775 portholes in both sides of the hull is a tedious job but they add tremendously to the detail of the model. In studying the outboard profile view in Part I, you'll note that the portholes are installed in four rows which run parallel with the sheer line. The spacing of the rows, as well as the portholes, is done best with a pair of dividers, doubling the spacing for each one as given on the half-size profile view, and then transferring it directly to the hull. The portholes are tiny eyelets about $\frac{1}{16}$ in. in diameter which can be purchased. A hole is drilled slightly undersize for each eyelet, after which it is tapped in place with a small pin punch. The spacing of the portholes is the same on both sides of the hull. The loading ports in the side of the hull are indicated with white lines scratched in the black paint.

(to be continued next month)



Adding the many portholes to both sides of the hull consists of drilling rows of undersize holes and pressing tiny eyelets into them. This is done before the hull is painted black above the water line.

Brackets on Basement Joists Aid Stretching of Clothesline



Hanging laundry in the basement will be less of a chore if brackets similar to the one illustrated are attached to joists to support a clothesline without sagging. The bracket is formed from a strip of flat steel, 24 in. long, which is bent double and drilled near the bend to take a $\frac{1}{16}$ -in. bolt. After the head has been removed from the bolt and a nut run all the way up on the threads, the bolt is inserted in the hole and a second nut run on and tightened to hold it in place. A tee or crossbar is thus provided, around which the clothesline may be looped, tied

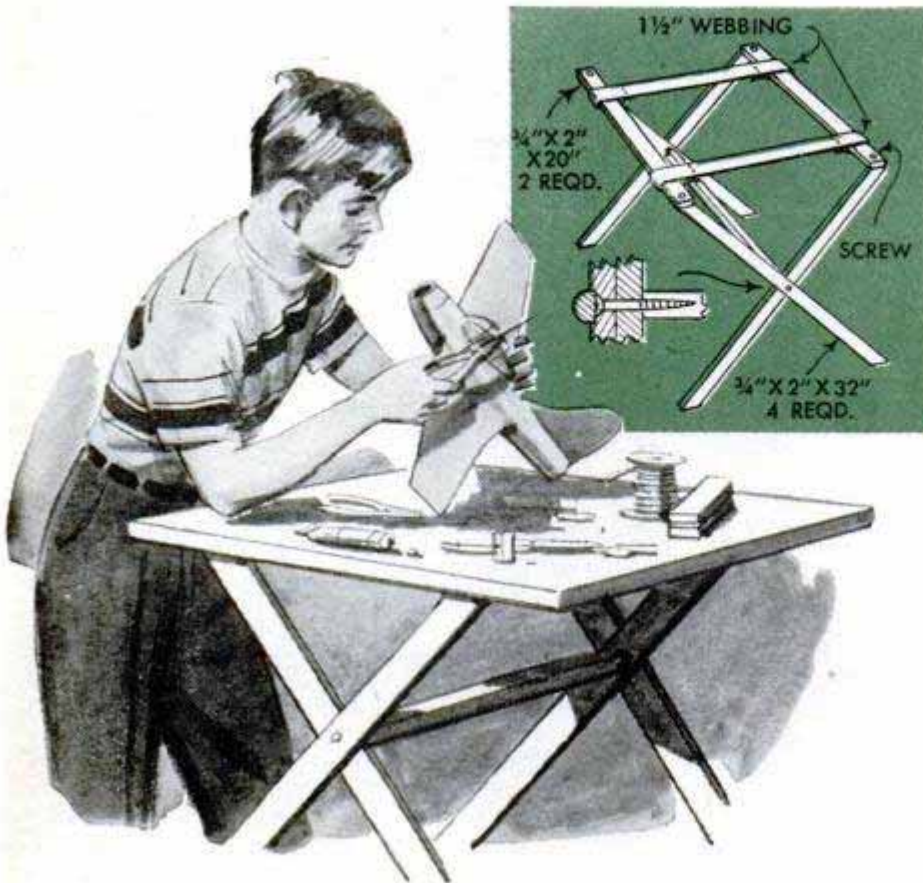
or cinched when stretching. Arms of the bracket then are drilled near the ends, spread apart and slipped over the joist where it is nailed in place.

Tire-Chain Life Prolonged By Waterproofing Straps

By waterproofing the web straps on strap-on tire chains, moisture and road chemicals will not rot them. A mixture of paraffin dissolved in gasoline or benzine can be brushed on the straps, or they can be dipped in the solution. Caution must be observed in using either of these solutions, as they are highly flammable.



Folding Table Transported or Stored Easily

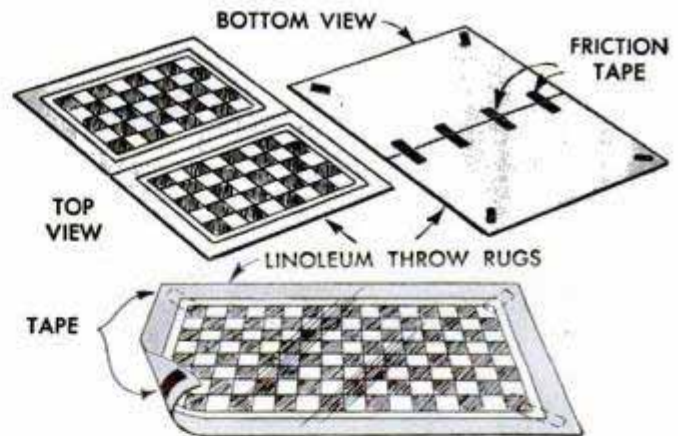


Here's a handy table which can be folded flat and stored easily in a closet. Consisting of a separate top that rests on a folding stand, the table not only will serve a variety of uses in the home but also may be carried along on outings. The top is plywood or hardboard, while the legs and cross-pieces are $\frac{3}{4}$ x 2-in. stock. A round piece, 1 in. in diameter, is used for a center brace. The legs are crossed and pivoted on screws driven in the center brace. The stand is braced in an open position by $1\frac{1}{2}$ -in. webbing which is passed around the crosspieces and stitched. Before the table is assembled, all pieces are sanded and finished with stain and shellac.

Linoleum Held Flat Against Floor by Friction Tape on Underside

To prevent the corners of a linoleum throw rug from turning up and cracking, apply strips of friction tape to the underside, extending at 45-deg. angles from each corner. The tape will not stick to the floor but is sufficiently tacky to prevent the rug from sliding about the floor. Pieces of tape also will come in handy for joining two of the rugs if desired. Simply invert two rugs and place them edge to edge. Then apply several strips of tape across the adjoining edges as indicated. This done, apply corner strips to the outer corners of each rug.

Mrs. T. F. Watts, Charlotte, N. C.



Tracing Wheel Perforates Plastic Lacing for Decorative Effect



Hobbyists who work with plastic lacing will find that a novel decorative effect can be obtained by running a tracing wheel over the lacing as indicated. Thumbtack the lacing to a flat surface and roll the wheel along the center of the strip. Then rub paint or crayon into the indentations and wipe off the excess. Several combinations of colors may be applied alternately, if desired, for varied effects.

☛ To prevent rusting and thereby extend the life of a garbage pail or can, paint it on the inside and apply a coat of wax.

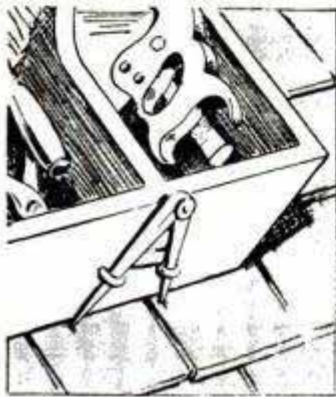
Container for Small Drills From Old Fountain Pen



Instead of throwing away an old fountain pen, use it as a container for small drills. After unscrewing the point and removing the ink sack, wash the pen thoroughly and dry before using. —Norm Jacky, Fond du Lac, Wis.

Dividers Hold Toolbox on Roof

Confronted with the problem of anchoring a toolbox on a steep wood-shingled roof, one carpenter used his dividers as shown to



hold the box in position. After two staples had been driven into the end of the box, the prongs of the dividers were passed through them and pressed down until the points of both became firmly engaged in the wooden roof.

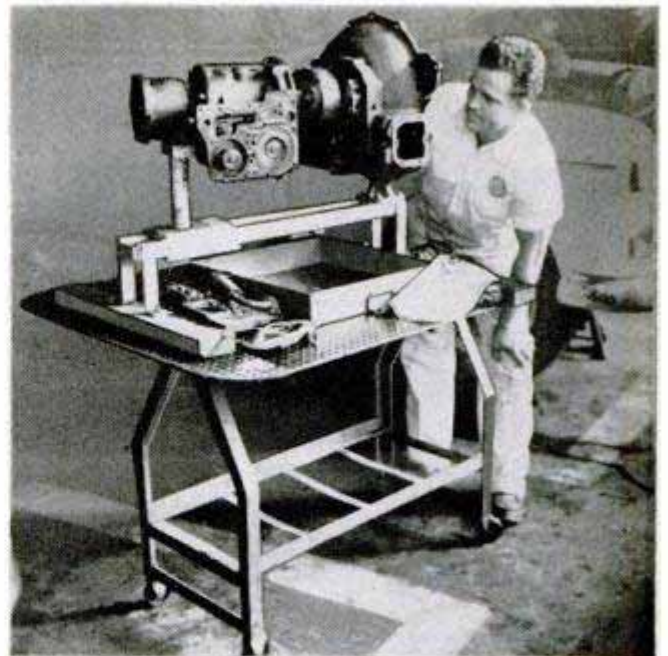
Rubber Strips Tighten Shelves Wedged Between Studs

Easily removed shelves for temporary use in a garage or tool shed are held securely between studs by placing a strip of inner tube at one end of each shelf before wedging it in place. Using 1 x 4 material, cut each shelf to fit a bit loosely between the studs.



Then place one end of each shelf against a rubber strip and drive down the other end with a mallet in the manner indicated. Finally, cut off the projecting end of each rubber strip flush with the joint.

White pine may be given an antique finish by staining it with strong tea diluted with water to the shade desired. When the stain has dried, cover it with two thin coats of shellac. Then wax and polish.



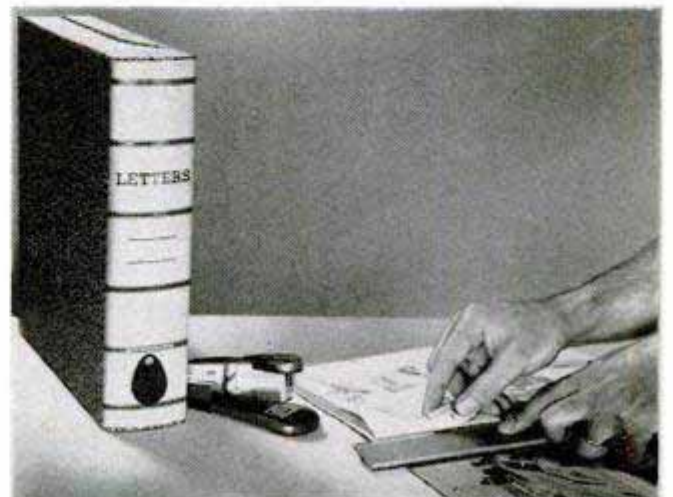
Portable Transmission Stand Reduces Overhaul Time

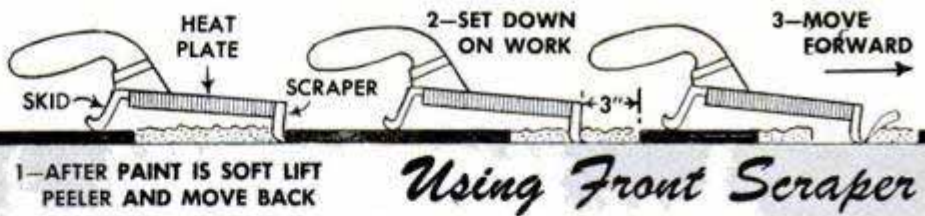
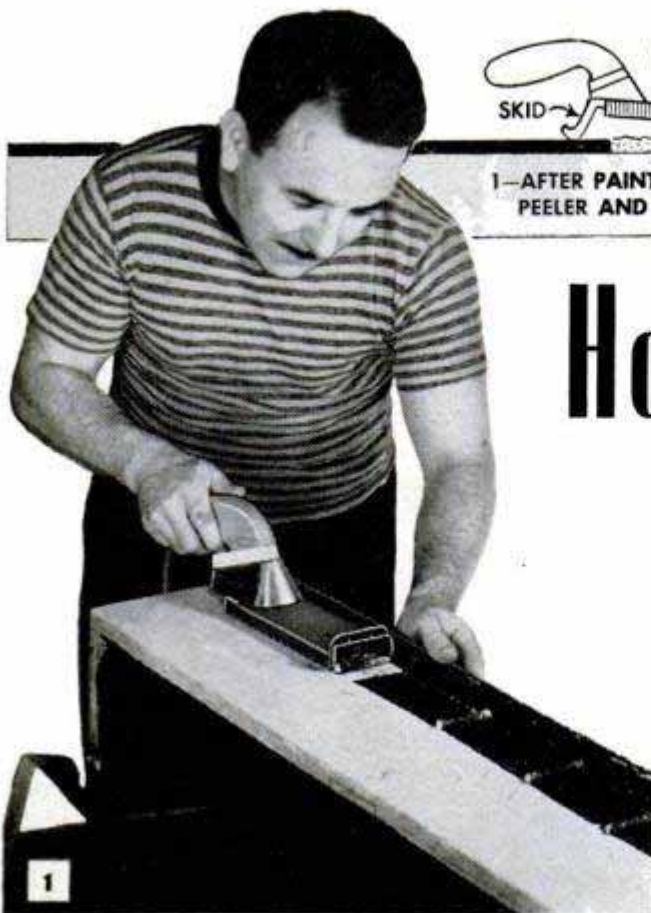
Instead of attaching an automatic-transmission overhaul rack to a workbench, one garage mechanic mounted it on a portable engine stand. This permits him to roll the repair equipment right to the car being serviced, thus saving considerable time and labor. The overhaul rack is bolted to a pair of 2 x 4s which, in turn, are clamped to the engine-stand table. In this way, the transmission rack may be removed quickly whenever the stand is needed for engine-repair work.

Clipped Magazine Articles Stored In Box-Type Letter File

Stapled together and filed alphabetically in a letter file of the type shown, magazine articles may be protected and kept readily available for future reference. The file, being of letter size, will accommodate pages from all but the largest magazines without the need for folding them.

Clyde L. Allison, Cadillac, Mich.





Using Front Scraper

How to UNPAINT!

By Sam Brown

SCRAPE, SAND, melt or burn it—you can take your pick from a wide variety of methods for removing paint finishes down to the bare wood. The efficiency of each method, however, depends primarily on the type and scope of the job to be done. For example, one method is ideal for flat, unobstructed surfaces but is practically useless on grooved or rounded surfaces such as moldings and baseboards. Naturally, the method selected should be one that is best suited to fill your particular needs. For this reason, if you lack previous experience, it is wise to do a small job first to learn which method you find the quickest and most satisfactory. The various methods to be considered are handscraping, hand sanding and power sanding as well as the use of a blowtorch, chemical paint removers and the recently developed electric paint peeler.

Electric paint peeler: Here is a tool that makes some unpainting jobs quite simple. This peeler will strip up to 20 coats of paint in one pass, cutting a ribbon 2 in. wide at the rate of 2 to 10 in. per minute. Exceptionally clean to work with but useful only on flat surfaces, the peeler consists of a simple heating element encased in a metal housing that is provided with a skid at one end for supporting it about $\frac{1}{8}$ in. above the paint. A scraper blade is provided at the other end for removing paint softened by the heating element. The unit may be used either with a front or rear scraper blade. The front scraper, shown in Fig. 1, is best for all-around work since it is controlled easily and permits working up to shoulders. Movement of the peeler with the scraper in front is illustrated at the top of the page, while Fig. 4 shows the proper

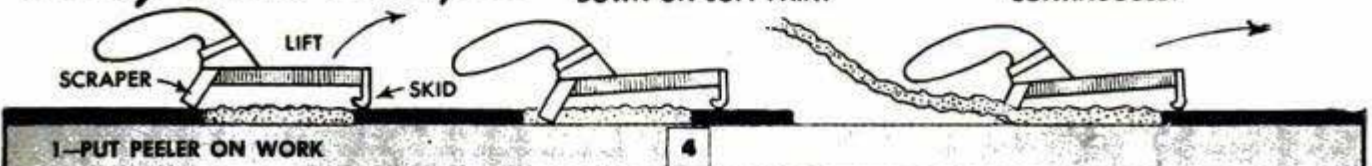
Electric paint peeler, above, shown with scraper mounted in front to permit working up to shoulders. Scouring of heating element with steel wool, center, removes paint accumulations. Rear scraper, bottom, is quicker and allows continuous forward scraping



Using Rear Scraper

2—MOVE FORWARD AND SET DOWN ON SOFT PAINT

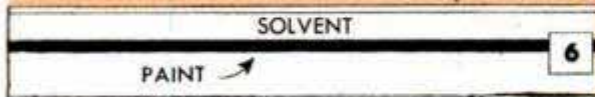
3—PUSH FORWARD CONTINUOUSLY





5

WAX FLOATS ON TOP

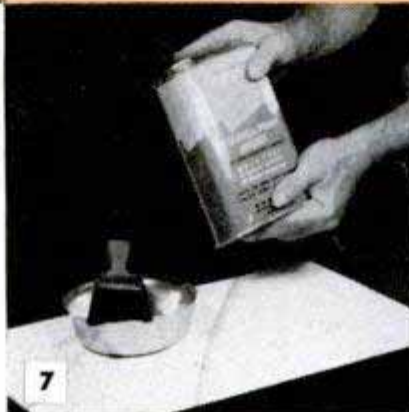


Chemical paint removers work well on almost any flat surface. Wax-base type is least expensive, but requires after-wash to remove wax residue. Paste type is best for vertical surfaces

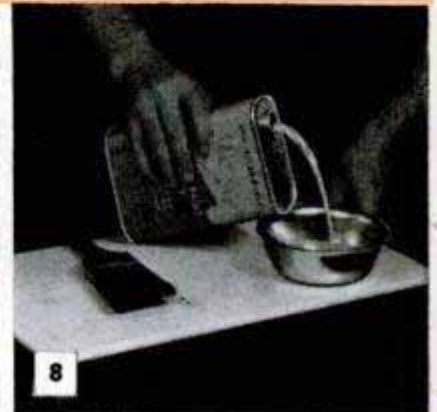
movement with the scraper in the rear. Although the rear scraper, Fig. 3, is faster and permits continuous forward scraping, it will not cut up to a shoulder.

Paint removed by the peeler is dry and hard after leaving the tool and may be brushed away like dry sawdust. After approximately 10 min. of actual use, the bottom of the heating element should be scoured with steel wool, Fig. 2, to remove any paint accumulations which may have dried on the metal surface.

Chemical paint removers: Liquid paint-and-varnish removers are solvent mixtures which, when brushed on the work, soften the old finish and permit its removal with a cloth or putty knife. The various kinds of removers, which are described in Fig. 5, are divided into two categories: Those having a wax base and those that are wax-free (no-wash). A remover containing wax is used because it seals in the solvent, Fig. 6, so it will not dry out before the paint is softened. However, some of the wax sooner or later reaches the exposed wood and, if left on, causes poor drying and eventual peeling of the new finish. For this reason, it is necessary to wash off the wax residue with alcohol or other suitable solvent. A no-wash remover contains no wax and requires no solvent wash.



7

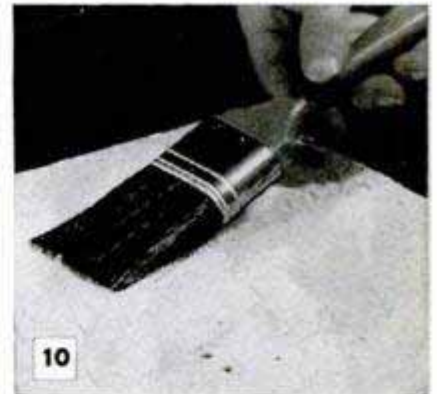


8

Left, always shake can before using, a "must" for wax-base removers. Right, use shallow container and pour only what you need

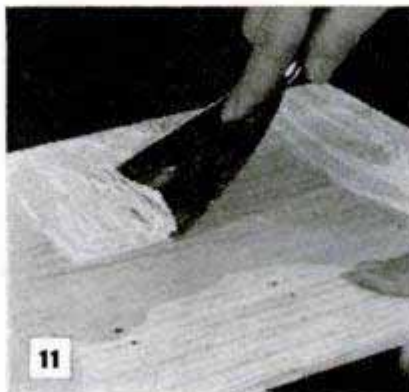


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10

Left, apply remover with flat side of brush, but do not brush out. Right, let work stand until soft, then apply second coat if needed



11



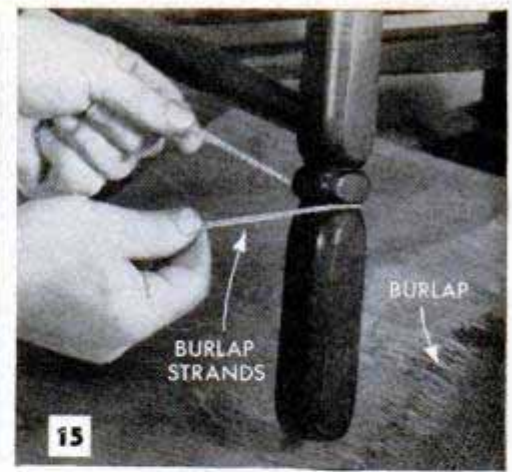
12

Left, remove softened paint with a dull putty knife. Right, use alcohol and rub with No. 2 steel wool in final cleanup operation



13

SAWDUST

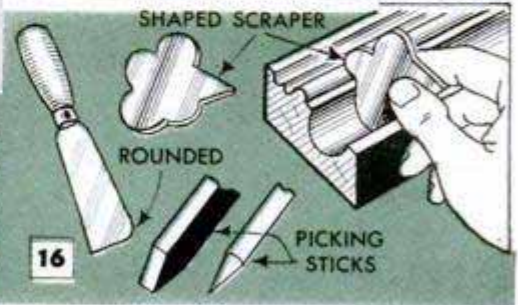


15



14

Above, using sawdust on final coat of remover. Above right, cleaning turnings with burlap strands. Left, burning of remover leaves powdered paint for easy scraping or sanding



16



17

STIFF BRISTLE (FIBER) BRUSH

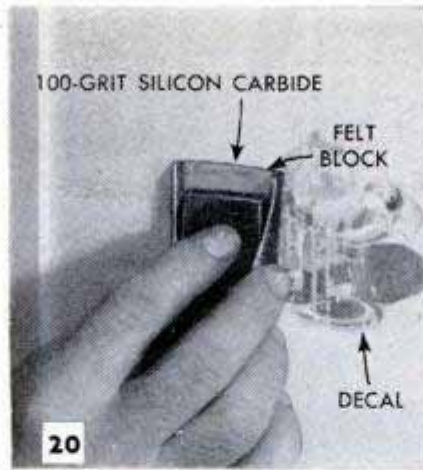
Above, using stiff brush on carved surfaces. Below, power sanding done with coarse belt minimizes loading tendency



18

Most liquid paint removers, unless otherwise specified, have a milklike consistency which is suitable for all level surfaces, but which will run when applied to vertical surfaces and drip when used overhead. The remedy for this is to use a heavy-bodied or paste type of remover. Figs. 7 to 12 show how paint remover is used for the average job. If no-wash remover is used, the final cleanup, Fig. 12, can be accomplished with a coat of the remover itself instead of alcohol. Most jobs require at least two coats of remover which either can be applied as separate coats or one on top of the other. Generally, if a paste remover is used, the proper technique is to keep piling on the remover until a test scraping shows that the paint has been softened down to the bare wood.

Some thick finishes require anywhere from 6 to 15 hrs. for softening, in which case the paste remover is best because it is made specifically for staying wet and active over long periods of time. The usual technique with the liquid-type remover, which must be removed and renewed frequently, is to apply a thick first coat, allow it to work for about 20 min. and then remove whatever paint has become soft. Used in the same manner, the second coat usually will cut through the average five or six-layer finish. Often, during second and third applications, the softened paint tends to become rather "gooey," a condition that can be remedied by sprinkling with sawdust, as in Fig. 13. This kink works best on the coat of remover that is expected to remove the last of the paint from the wood. Under this condition, the combined paint and sawdust mixture is scrubbed over the surface with a putty knife to dry-clean the wood. Another trick is to burn off the remover, Fig. 14, an operation that also works best on the final cleanup coat. However, this technique should be used outdoors only, and no more than a square foot of the surface burned at one time. The dry, powderlike film left by the burning yields readily to scraping or power sanding.



Left, applying 20-percent solution of muriatic acid to cut water-resin paint. Center, using 100-grit waterproof sandpaper to remove decals. Right, using electric peeler to remove paint on flat surfaces of door

A putty knife is the favored tool for removing softened paint. It is best to have two or three available—one with rounded corners to prevent gouging flat surfaces, one having square corners for working shoulders and another with corners rounded sufficiently for getting into moldings. The knife must always be kept clean for best results. On intricate surfaces such as carvings, the paint remover is applied with a stiff brush, as in Fig. 17, using short, jabbing strokes, after which it is removed in the same manner. Various picking sticks and contour scrapers, Fig. 16, can be made up as needed, while steel wool, burlap, moss, hair or wood wool often works better than a putty knife for the final cleanup. Fig. 15 shows the use of strands shredded from burlap for cleaning turnings.

Other methods: Various other methods that are used for removing paint in addition to those described, Fig. 22, include hand-scraping, hand sanding, power sanding and the use of a blowtorch. A dry, crisp finish is removed easily either by handscraping or power sanding. The one disadvantage of power sanding, Fig. 18, is that the friction created softens the paint and causes rapid glazing of the belt. This can be partially overcome by using a coarse sandpaper, employing a light, fast stroke and by not sanding any area twice in succession. The blowtorch is for professionals and should be used for house paint only. The torch is held in one hand while the other hand follows with a putty knife to remove the softened paint.

★ ★ ★

22 · UNPAINTING Job Specifications

AVERAGE WORK: For the average job use a chemical paint remover. Apply a heavy first coat to remove the bulk of the old finish. Then follow with a second coat of liquid remover and allow to dry overnight before refinishing. If a wax-base remover is used, a final cleanup with alcohol will be necessary to remove any traces of wax remaining on the work. As a further assurance of complete paint and wax removal, wash the surfaces with a mild caustic—a saturated solution of tri-sodium in warm water is recommended. Allow at least 36 hrs. for it to dry, sand with 3/0 paper and otherwise treat as new wood

DECALS: Decals may be removed easily with paint remover, but this also strips the finish underneath. To preserve the old surface, sand with 100-grit waterproof (silicon-carbide) sandpaper, Fig. 20, wrapping it around a felt or wooden block and using water for a lubricant

FINE FURNITURE: For best results, use paint remover for removing the finish from fine furniture, wiping off softened paint with burlap, wood wool or hair. It's wise to avoid the use of a scraper, putty knife or electric peeler in order to prevent possible damage to the wood

HOUSE PAINT: Use the electric paint peeler or a blow-torch for removing house paint. Paint removers are used sometimes, but in most cases are slow and expensive

WATER PAINT: Casein and resin-emulsion paints can be removed with a warm solution of household ammonia or muriatic acid, Fig. 19, using approximately 1 part chemical to 4 parts water applied with a stiff brush

WOOD FILLER: Wood filler, which normally will remain in wood, may be removed if necessary for a natural finish by applying a liquid paint remover and brushing well with a fine steel-wire brush. Sanding is also practical

WOOD FLOORS: Power sanding is the most common method for removing paint from wood floors. The job also can be done with a no-wash paint remover, working a 2 x 3-ft. strip at a time. Clean up with a commercial floor bleach and allow the floor to dry 24 hrs. before varnishing

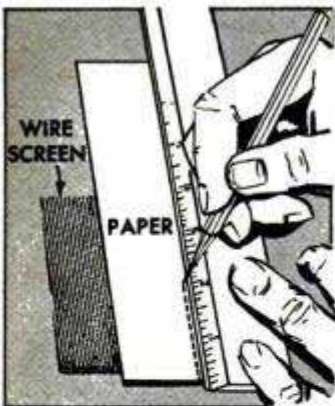
WOOD STAIN: Paint removers will not remove wood stain. Bleaching is effective sometimes. Stain removers are obtainable which are especially effective for red mahogany



Supply Kit for Lettering Artist Mounted on Tripod Near Work

When lettering names or signs on office doors and windows, one lettering artist uses a camera tripod to support a box containing supplies close at hand. A hole was drilled in the bottom of the box, which was a metal one of the kind used for fishing tackle, and a nut soldered over it to take the tripod bolt.

Wire Screen Perforates Paper



Sheets of paper can be perforated for tearing by ruling the sheets over a piece of screen wire. Slight pressure on a sharp pencil or stylus will score the sheets neatly. Use clean, unpainted screening for best results.

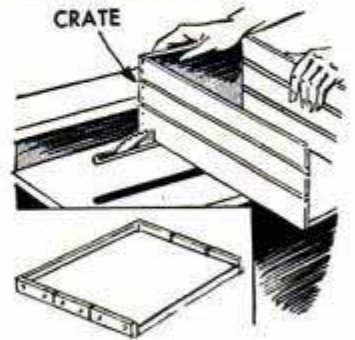
Repairing Damaged Linoleum

Small damaged areas in linoleum or asphalt-tile floors can be repaired quickly and permanently with the aid of a gasket punch. After cutting a circular piece containing the damaged portion with the punch, slip the blade of a putty knife under the edge of the piece and gently pry free. Then, again using the punch, cut an identical piece of matching design and grain if possible from any surplus tile or linoleum

on hand. If working with asphalt tile, warm the pieces with a blowtorch first to facilitate cutting. Next, scrape the old adhesive from the floor, apply fresh adhesive and install the patch. A gasket punch may be obtained at most refrigerator-supply houses.
P. Douglas Grewer, Alfred, N. Y.

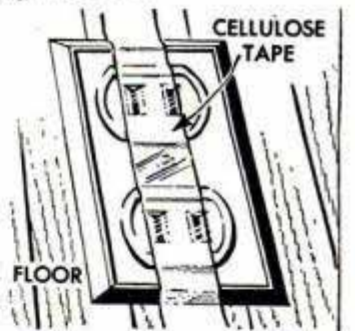
Fruit-Box Boards Salvaged Intact By Sawing Off Ends of Boxes

To salvage wood from fruit crates and boxes without having it split when the nails are removed, one craftsman cuts off the ends of the boxes on his bench saw as indicated. Ends of boards remaining on box ends may be pried loose, the nails pulled and the box ends sawed or split into the sizes desired.



Tape Protects Floor Outlet When Remodeling Room

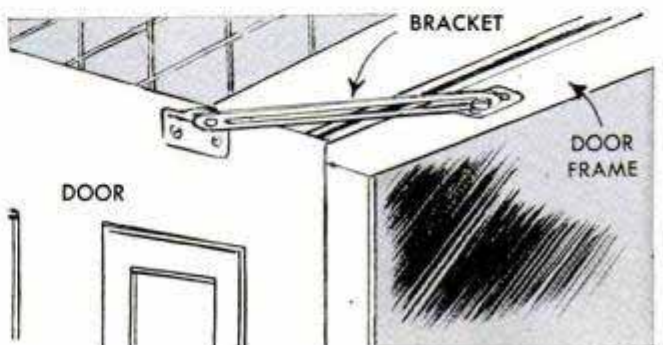
A strip of cellulose tape applied over the openings of an electric outlet in the floor of a room that is being remodeled will keep dust and bits of debris from getting into the plug. Leave the tape on until the work is finished and the dirt removed from the surrounding area.



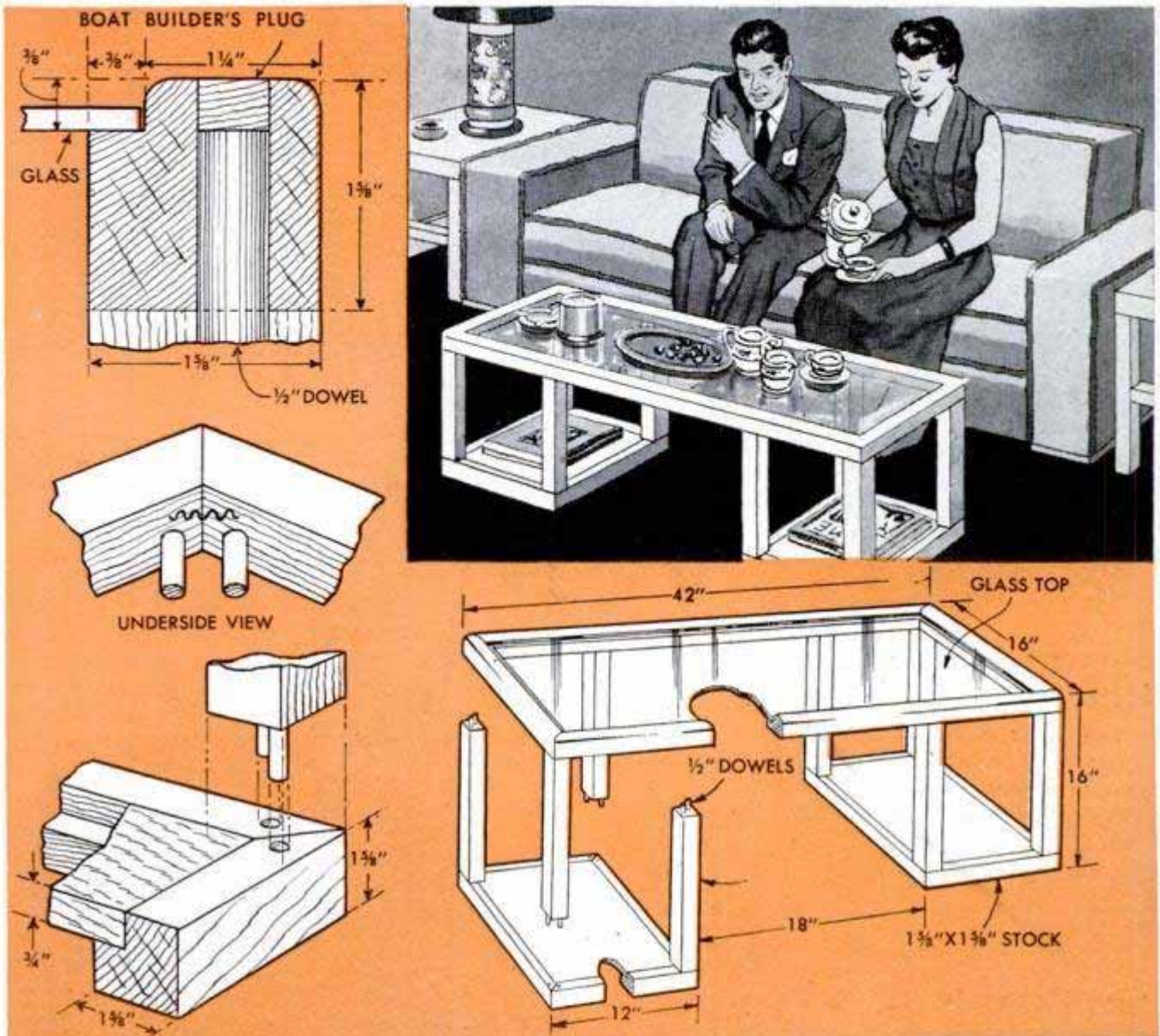
Joel Miles, Denver, Colo.

Bracket Serves as Doorstop

A slotted bracket of the type used to support the drop leaf of a writing desk will provide an ideal doorstop when mounted between the door frame and the top of the door. This arrangement has been found especially practical for doors having tile floors and baseboards.



Modern Coffee Table to Brighten Living Room



Featuring an attractive glass top that will never burn or stain, this handsome, open-design coffee table will fit into practically any room containing modern furnishings. The table is constructed almost entirely from $1\frac{5}{8} \times 1\frac{5}{8}$ -in. stock, while plywood is used for a shelf at each base of the unit. After members of the top frame have been mitered and joined together, the pieces are rabbeted along the inside top edge to take $\frac{1}{4}$ -in. plate glass as indicated. The operation is repeated with each of the base frames in order to accommodate the shelves. All joints are secured with dowels

and glue, while corrugated fasteners are driven into the underside of mitered corners for additional reinforcement. To attach the legs, two $\frac{1}{2}$ -in. holes are drilled through each corner of the top and base frames as well as the ends of each leg to receive dowels. After the dowels are inserted in holes in the top frame, boatbuilder's plugs are glued in place as shown, chiseled flush with the top side of the frame and sanded smooth. Then the entire unit is sanded thoroughly, given a coat of liquid sealer and, when dry, waxed or shellacked.
Hi Sibley, Nuevo, Calif.

Treatment for Violin Keys That Stick or Slip

Skilled instrument repairmen, in repairing sticking or slipping violin keys, first remove the keys and sandpaper them lightly to remove any gloss. Then they apply naphtha soap that is moist enough to smear like a heavy grease. Next the keys are returned to the proper holes and turned sev-

eral times. Remove keys again and apply a powdered chalk. Once again they are inserted and turned. The last time keys are taken out, most of the chalk and naphtha taken out, most of the chalk and naphtha should be repeated every few months.

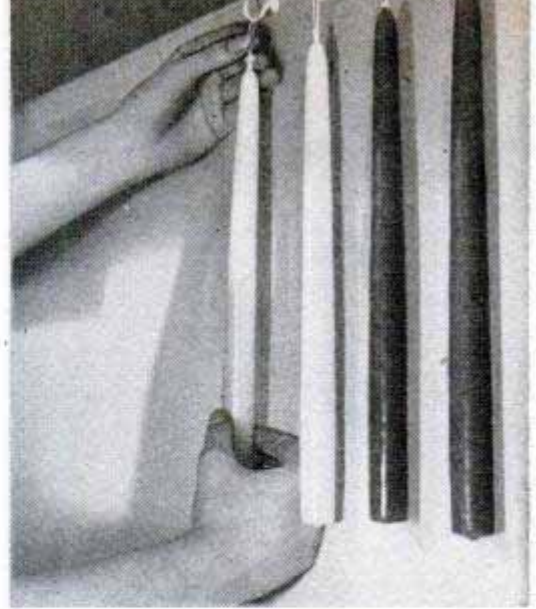
Jesse A. Leason, St. Paul, Minn.



Modern uses of candles still afford the old-time charm of candlelight on the dinner table, and also as console displays for special social gatherings and birthday-cake ceremonies for young and old. Candles are available in a wide range of sizes, colors, lengths and shapes for every party occasion

CANDLE HINTS

One of the practical uses for candles is the coating of a shellac brush with the melted wax to keep it soft during intermittent use. Light the candle and hold it horizontally over the brush, permitting the melted wax to drip onto the bristles. When you are ready to use the brush again, scrape off the wax



Long tapers stored loosely in a drawer are apt to become broken. It is better to hang them from hooks. Loops of thread tied to the wicks and slipped over the hooks will allow the tapers to hang straight and free. This prevents warping in warm weather



To assure that burning candles will stand upright in the holders, place two strips of adhesive tape crosswise on the lower end. Then press tightly into the holder until the free ends of the strips of tape are concealed

If candle is too large at base to fit holder, never pare it with a knife. Rather bring water to a rolling boil and dip the end of the candle intermittently until wax melts sufficiently for the end to fit holder tightly





Another way of fitting undersize candles to holders is to wrap a strip of corrugated cardboard around the base. This compresses when candle is forced into holder



Apply a thin coat of white shellac to candles to make them last longer. The shellac coating also helps to prevent excessive dripping of melted wax from the tip



Left, insect-repellent candles can be made by drilling holes 1 in. deep close to wick. Fill holes with citronella and coat with melted wax to prevent evaporation



Center, rub wax from a candle onto a Zipper to make it work easily. Right, melted wax from candles rubbed over the inside of breadboxes keeps them from rusting



Wax from used candles may be reclaimed by melting and pouring into a muffin tin. When hardened the wax disks are removed easily and stored for future use

Another trick that slows down the burning rate of tall candles is to make a conical-shaped hood of aluminum. This also prevents objectionable dripping



"Candles" on Cardboard Cake Formed With Dollar Bills



One father surprised his young daughter with a novel birthday "cake" made of cardboard and decorated with "candles" formed with dollar bills. The candles, each of which was topped with bright-colored paper cut in the shape of a flame, were mounted in holes made in the top of the cake to hold them in the shape desired. The cake itself, consisting of a single round piece and a long strip of cardboard, was assembled with cellulose tape and painted to represent a cake covered with frosting.

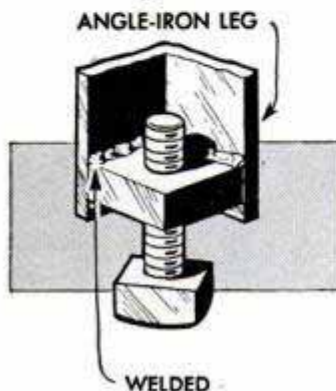
Wrapper Cut From Leftover Rolls Helps Identify Wallpaper Quickly



Before storing leftover rolls of wallpaper, wrap them in a piece of the paper before tying them together. With the design placed on the outside, the wrapper not only will identify the bundle but

also will help keep the rolls clean. Strips of cloth, used in place of cord to tie the bundle, will also help to prevent damage to the rolls.—H. Hanscom, Elmhurst, Ill.

Leveling Power-Tool Stands



Power-tool stands having angle-iron legs are easy to level if the bottom of one or two of the legs is fitted with a square nut and a cap screw. Adjacent faces of the nut are welded in the angle formed

by the leg. The cap screw is turned into the nut, the weight of the stand resting on the head of the screw. The stand is adjusted by turning the cap screws on the legs until the stand is level. Jam nuts turned on the cap screws before mounting the screws on the legs may be used to lock the screws after adjustment.

Carmen Carson, Calgary, Alta., Can.

Tape Prevents Suction Loss Through Vacuum-Cleaner Units

Several layers of cellulose tape wrapped around the metal ends of a vacuum-cleaner hose and extension pipes will help to prevent loss of suction when the attachments are worn or loose. An application of tape to the fittings of new vacuum cleaners will increase their cleaning efficiency, since most attachments fit the machine somewhat loosely.



Lance Werner, Cleveland, Ohio.

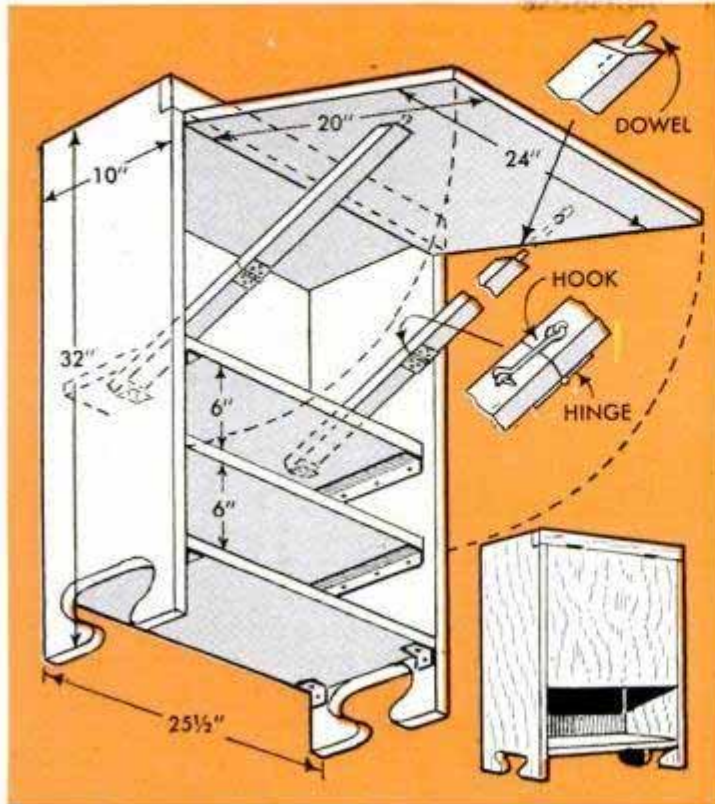
Steel Wool in Blowtorch Cup Prevents Spilling of Gas

When packed in the priming cup of a blowtorch in the manner illustrated, a wad of fine steel wool will help prevent the spilling of gasoline in case the torch is moved while being preheated. The arrangement also speeds up heating of the torch inasmuch as the flame, which tends to be steadied by the presence of the steel wool in the priming cup, will burn more evenly and its heat will be concentrated directly beneath the burner casting.



Attractive Writing Desk for Child's Room

By I. M. Fenn



This combination writing desk and bookcase, which will be a welcome addition to any child's room, features a drop leaf that folds down to cover all but the bottom shelf, presenting the clean lines of a modern console-type cabinet. The desk may be built to the dimensions indicated, or tailored to fit the requirements of a particular child or teen-ager. All shelves, as well as the top and sides of the desk, are made from $\frac{3}{4}$ -in. stock, while plywood is used for the drop leaf. Also cut from $\frac{3}{4}$ -in. stock or scrap suitable for the purpose, the two-part braces are hinged in the middle and where they are connected to the top shelf. Support for the

drop leaf is provided by drilling two holes in the underside to receive dowels which are fitted in the upper ends of the braces. If desired, additional holes may be drilled to change the angle of the drop leaf for drawing purposes. After all pieces have been sanded smooth, they are assembled with glue and nails. The bottom shelf is joined to sides of the desk with metal angle brackets, while the other shelves rest on short lengths of steel angle for easy adjustment or removal. When completely assembled, the desk is finished with stain, shellac or paint to match other furnishings in the room.

Roof Cement Secures Shingles Against Strong Winds



Composition shingles can be protected against windstorm damage most easily, I have found, by applying a small amount of asphalt roof cement under each shingle to secure it to the one below. A putty knife is used to raise each shingle and then for applying the cement about an inch back from the edge. Although requiring more time to apply than the canned liquid tar usually sold with roll roofing, the cement remains tacky over a longer period, adapting itself readily to any over-all movement of the shingles such as that due to strong winds or to a heavy snow load.

Clinton R. Hull, Costa Mesa, Calif.

CHIP CARVING



DECORATING your woodshop projects with chip-carved panels and moldings will give them a new-found warmth and a handcrafted appearance that otherwise is hard to achieve. Although the finished product may look like the work of a highly skilled craftsman, chip carving is actually a series of simple geometric cuts—triangles, squares, diamonds and arcs—arranged in an all-over pattern, as in examples shown on these pages. You'll be surprised at the skill attained with very little practice.

Accurate layout is essential to a professional-looking job, and this should be done directly on the work with a straightedge and a sharp pencil. The work may be carved with a pocketknife having a sheep's-foot blade or with a pair of knives, one of which has an angular sticking blade and the other a splitting blade as shown below. The sheep's-foot type of blade is used for making both the sticking and splitting cuts.



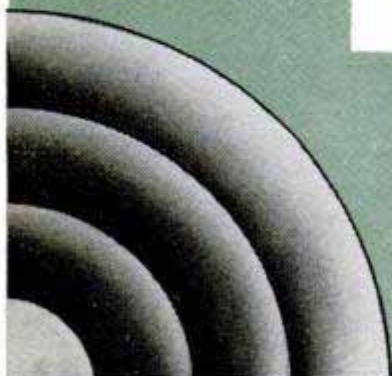
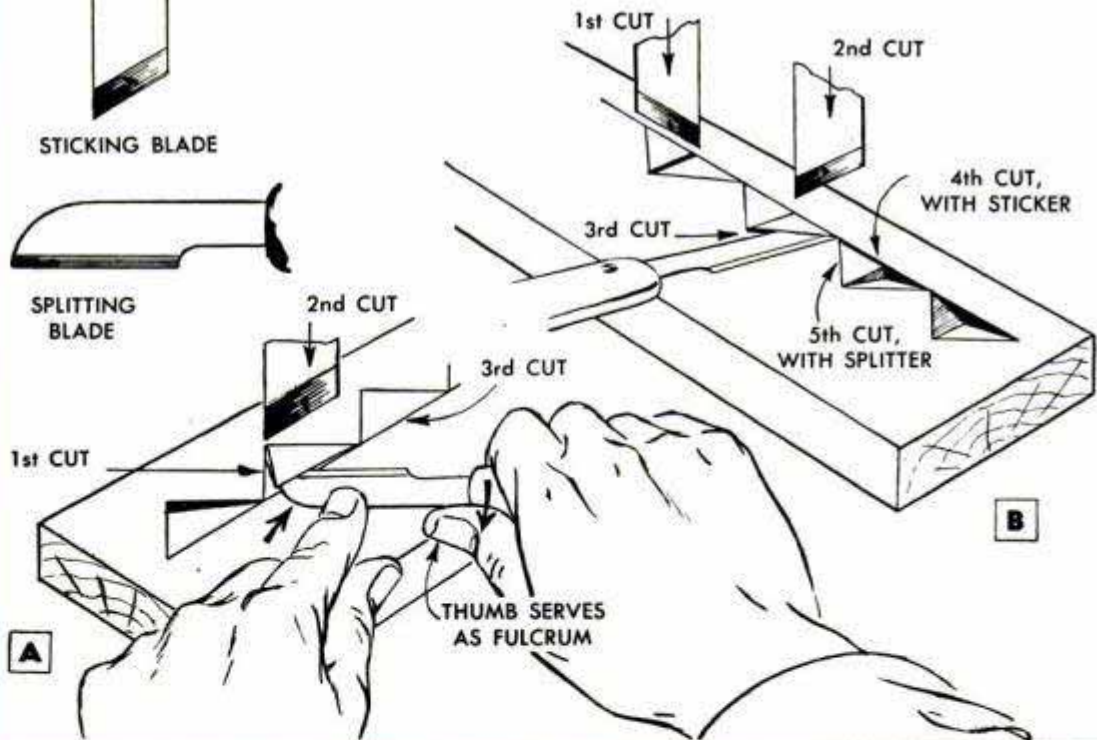
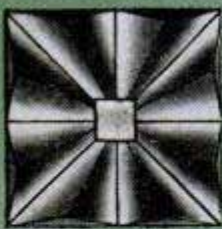
SHEEP'S-FOOT KNIFE



STICKING BLADE



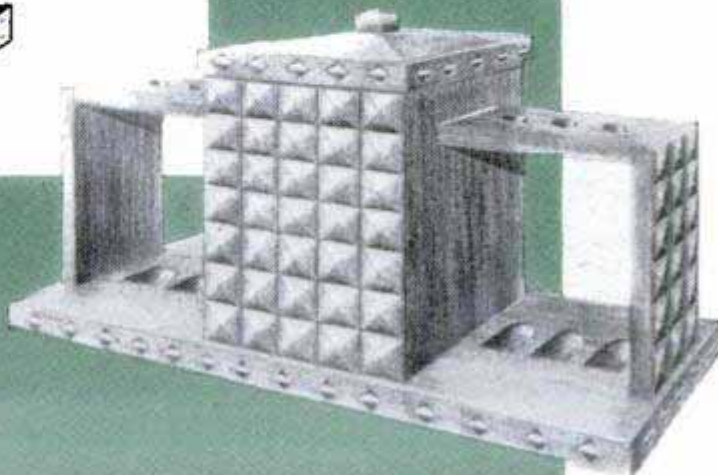
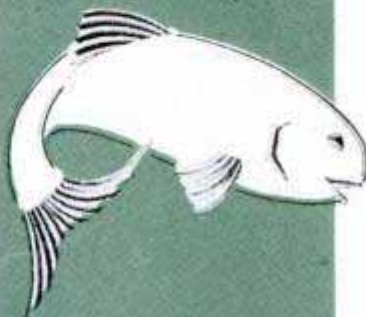
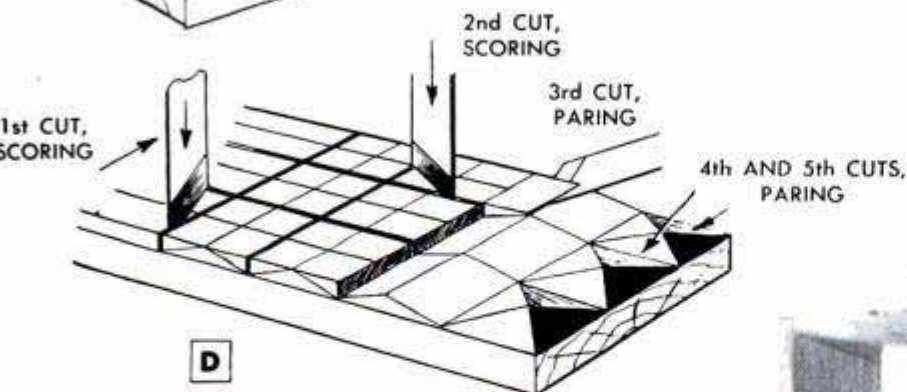
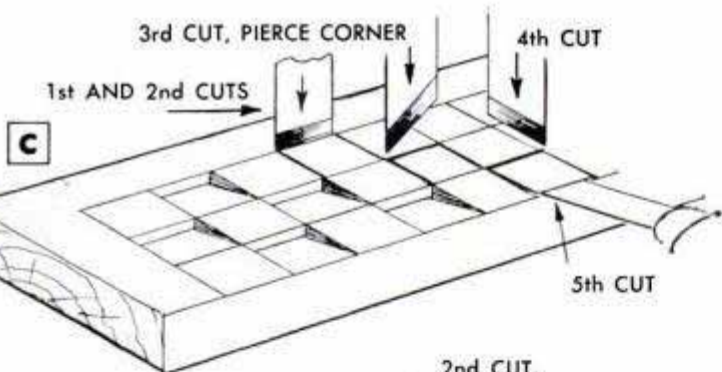
SPLITTING BLADE

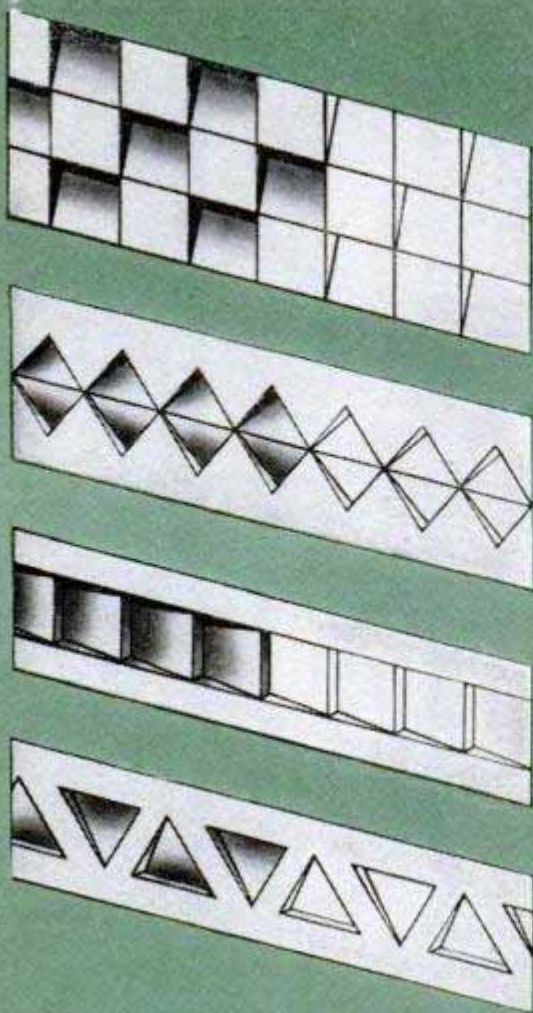


The pair of knives can be made from sections of hacksaw blades set in handles or fashioned from household paring knives of good-quality steel. The blades are ground to form a long bevel on both sides, the edge of the sticking blade being cut off at an angle before grinding. The blades should be honed to razor sharpness after grinding. It is necessary to keep them in this condition in order to produce satisfactory work. To renew the cutting edge, sharpen on an oilstone and hone the edge lightly on a hard slipstone. Then finish the edge by stroking across the palm of your hand or a piece of full-grain leather.

For the best chip-carving results, select a straight-grained wood that is free from knots, spongy spots and other defects. Basswood, poplar, mahogany, red gum and walnut are especially suitable.

Details A, B, C and D picture basic chip-carving cuts, the vertical cuts being made with the sticking blade and the stock removed with the splitting blade. Use both hands to hold and guide the knife. Note in detail A how the splitting knife is used to remove a triangular chip, the blade being pushed with the index finger while the thumb of the knife-holding hand serves as a



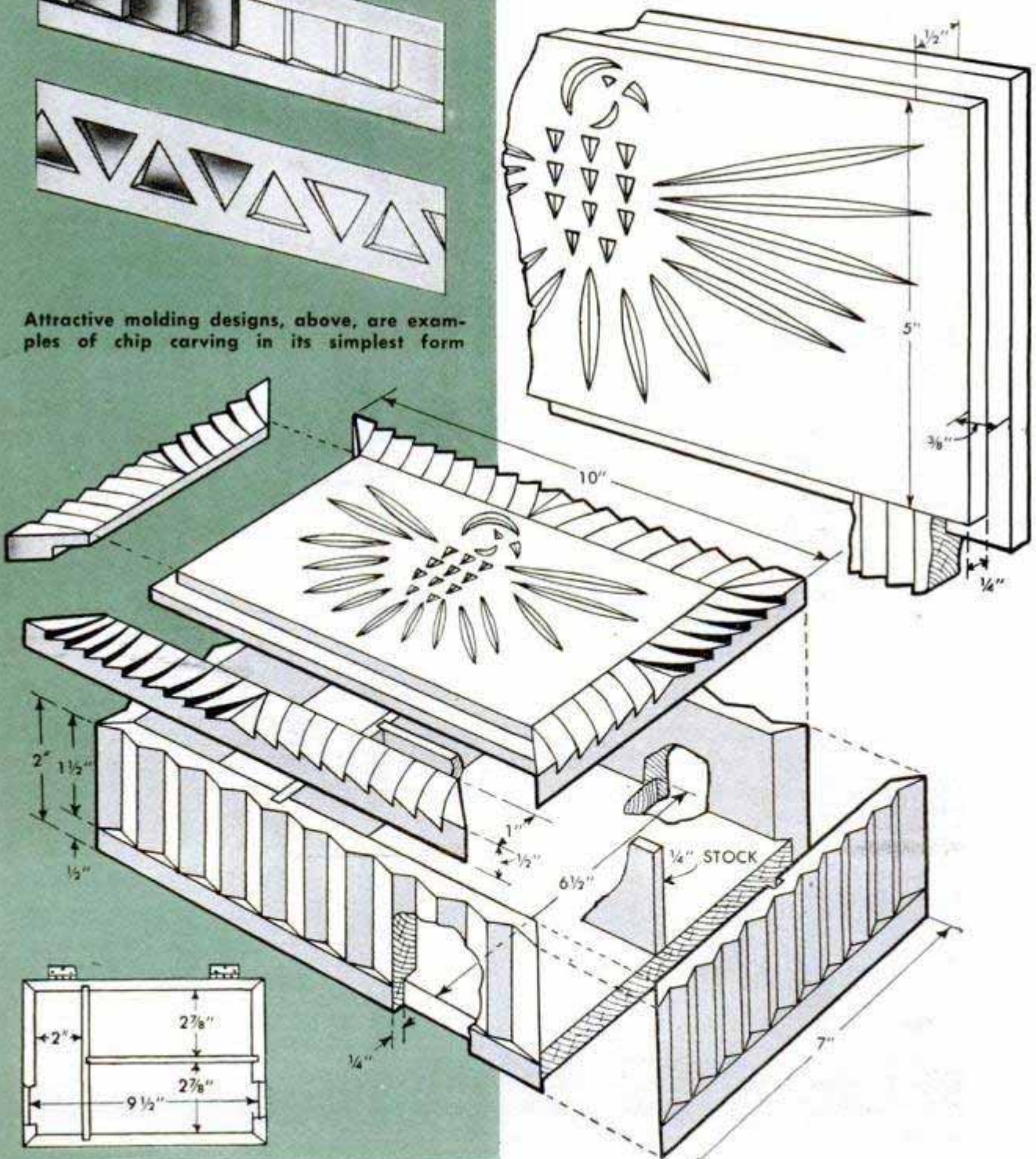


Attractive molding designs, above, are examples of chip carving in its simplest form

fulcrum. When making cuts as in details A and B, it is important to align the blade carefully with the opposite corner of the triangle in order to split the wood along the guide line. The paring cuts in details C and D may be made with either the splitting or sticking blade.

You can see from these illustrations that chip carving consists primarily of making two or three vertical cuts and then lifting out the chip. The sticking blade also is used to score the work for a series of cuts as in detail D. Try out the various patterns on scrap lumber to familiarize yourself with the different cuts before attempting to decorate a project. The designs shown on pages

Jewelry Box



198 and 199 are simply more extensive applications of the same techniques employed in the basic cuts.

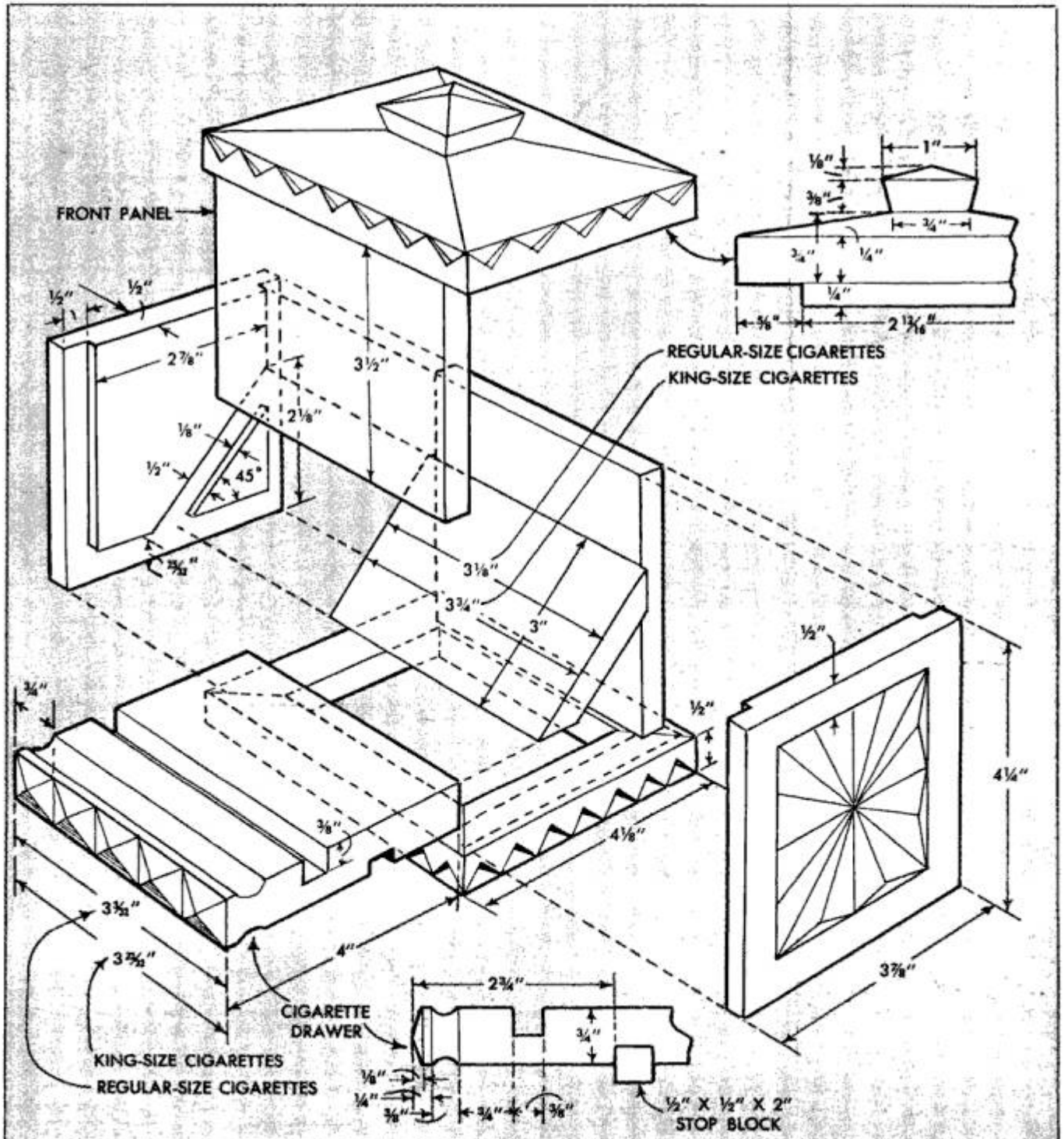
Before finishing the chip-carved piece, erase all pattern lines and sand the flat surfaces with fine sandpaper. The wood may be finished natural or stained to suit, applying two thin coats of clear shellac over the stain and sanding lightly between the coats. To protect the finish, coat the surface with a liquid wax. Apply the wax carefully with a brush so that it does not lump or cake in the carved depressions. Some craftsmen feel that shellac or varnish destroys the beauty of the carving and recommend that the work be finished merely with several

coats of furniture wax polished with a soft-bristle brush.

Jewelry box: Especially beautiful when made of $\frac{1}{2}$ -in. walnut or mahogany, this jewelry box utilizes the distinctiveness of chip carving to its fullest extent. The top consists of four outer sections mitered at the corners and fitted to the rabbeted center panel. The side members are carved as indicated and rabbeted along the lower edges. Corners of the side pieces also are mitered.

Cigarette dispenser: A real conversation piece, this novel cigarette dispenser is fairly ornate and yet achieves a modern appearance. The dispenser is designed so that the sliding cigarette drawer doubles as the bottom of the hopper. A $\frac{3}{8}$ -in. groove, just

Cigarette Dispenser

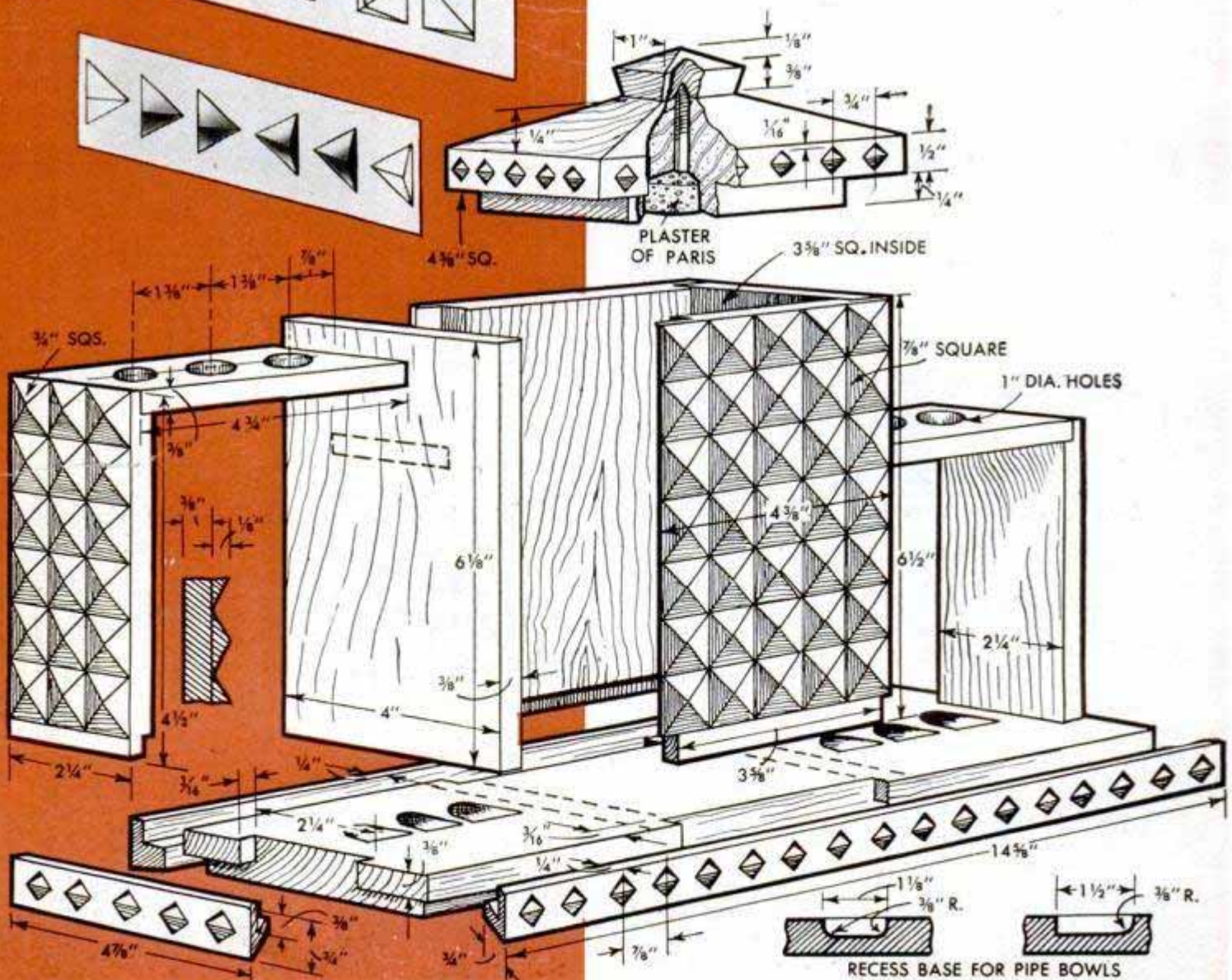


The raised and ornate borders, left, are produced with slight variations of basic chip-carving cuts

large enough to take a single cigarette, is cut in the upper face of the drawer, as detailed. A 2-in. stop block glued in a groove in the underside of the cigarette drawer engages the inner edge of the bottom frame to keep the drawer from being pulled out all the way. The front panel is glued to the rabbeted side panels and provides clearance at the bottom for the cigarette drawer.

Humidor-pipe rack: The chip carving on this combination humidor-pipe rack lends a touch of craftsmanship to an otherwise plain-looking project. The base is rabbeted for the edge molding and notched for the humidor front and back panels as well as the pipe-rack endpieces. Note that a 1½-in.-dia. hole is bored in the underside of the lid and filled with plaster of paris. Brads driven in the edges of the hole anchor the plaster in place. Keeping the plaster moist provides the necessary humidity inside the tobacco canister. ★ ★ ★

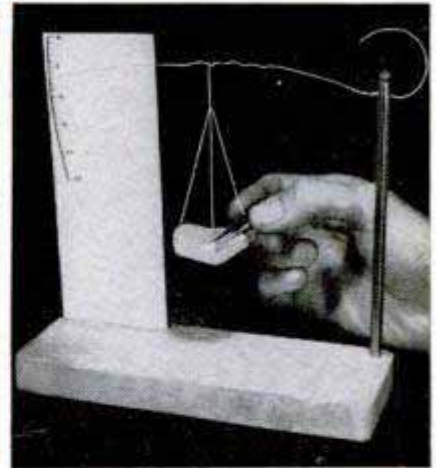
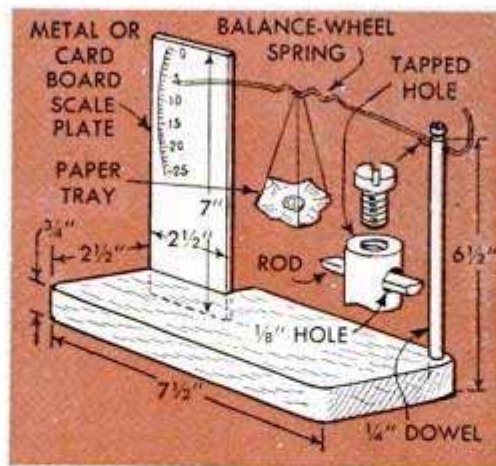
Humidor-Pipe Rack



RECESS BASE FOR PIPE BOWLS

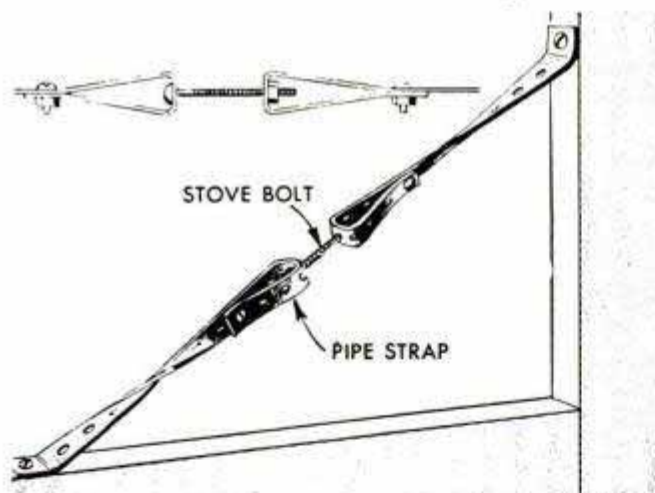
Alarm-Clock Spring Used in Scale for Chemicals

Useful to photographers, chemists and others who require accurate weighing of very small quantities, this sensitive scale is easily constructed from scrap materials. It is of the comparative type—that is, a known weight is placed on it and a reading taken. Then the material to be weighed is placed on the tray until it matches the reading. The sensitivity of the scale is shown by the fact that one grain will move the pointer from 1 to 2 in. when the arm is made from the balance-wheel spring of an alarm clock. For heavier work, larger springs may be used. The spring is crimped to allow the tray to be used in different positions. The tray is of lightweight



paper suspended by threads from the spring arm. A general curve is drawn on white cardboard or paper-faced metal, and this curve is calibrated as a scale. Divisions of any desired spacing may be used, but for accurate work they should be placed fairly close together.

Door Brace Made Easily From Pipe Strap



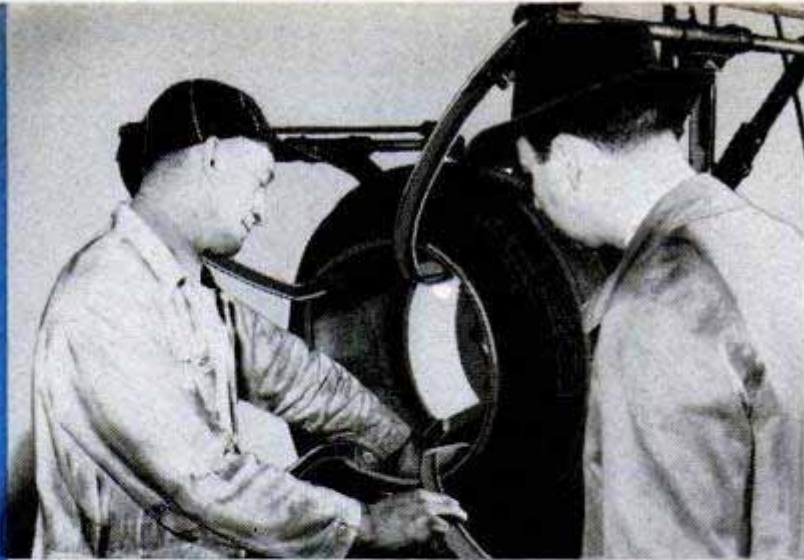
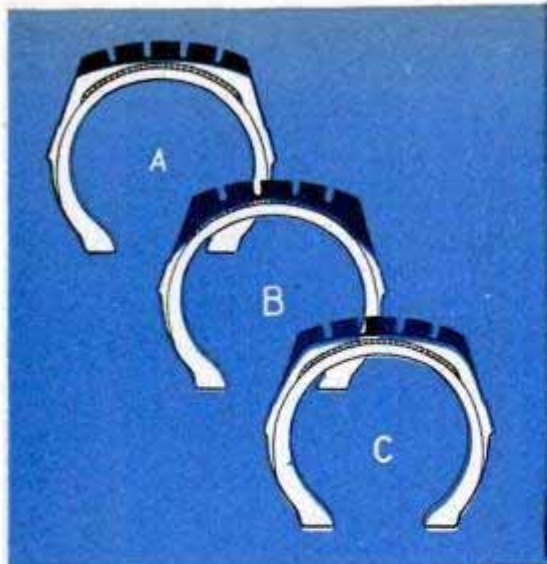
To eliminate sagging in a gate or large door, use a brace formed from pipe strap and several bolts. When cutting the pipe strap, be sure to allow enough extra length for forming "stirrups" at one end of each piece and for attaching the brace to the door or gate. Use pliers to bend the strap back on itself, allowing one of the jaws to square the end of the stirrup sufficiently to provide clearance for the bolt head or the nut, as the case may be. The ends are secured with 1/4-in. bolts. A 1/4-in. bolt, 1 1/2 in. long, is used for the adjusting bolt which, in use, is regulated with a screwdriver. Ends of the brace are screwed or bolted.

Graphite Mixed With Lighter Fluid For Out-of-the-Way Crevices

The problem of reaching inaccessible places for dry lubrication, which often proves difficult even with a pressure-type graphite gun, can be overcome by mixing the graphite with lighter fluid. This will allow the mixture to be flowed into hidden crevices where the liquid soon evaporates, leaving only a film of graphite. A clean fingernail-polish bottle will provide an ideal container for the mixture as well as furnish a handy applicator for the job. It's a good idea to shake the bottle before using the contents.—Ken Murray, Colon, Mich.

☞ To salvage putty that has become dry and hard, rub it through a screen and mix the resulting powder with linseed oil.





Above, the three types of new treads which may be put on a worn tire: Fig. A, the top-capped tire; Fig. B, showing tire fully recapped; Fig. C, retreaded tire

No retreading company will put on treads without thorough inspection. Here, spreader is used for inside inspection. Any casing break will reject tire

More Miles for Your Tires

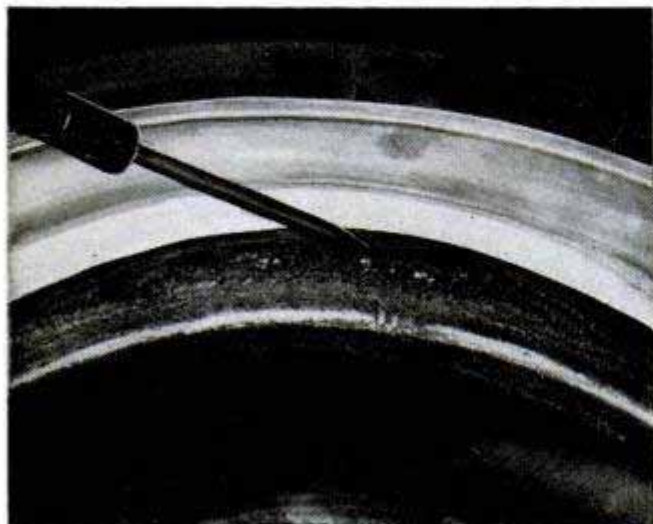
By C. E. Packer

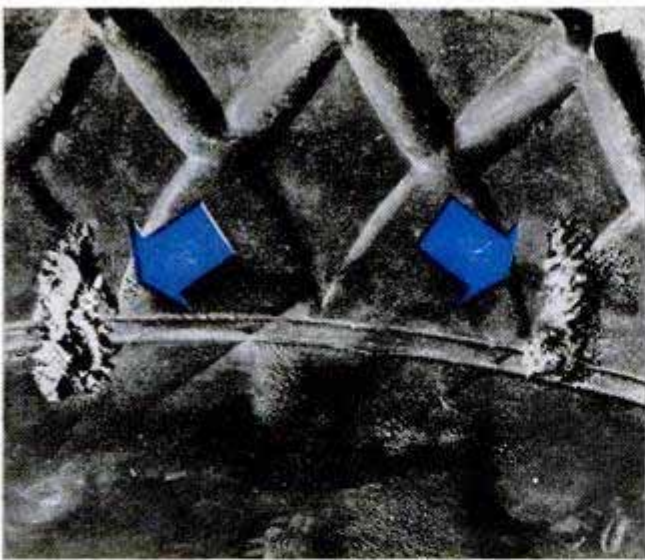
OF THE THREE big items of mileage expense—fuel, lubrication and tires—the latter is most often neglected by the economy-minded motorist as a means of reducing the cost per mile of driving. Actually, substantial savings can be had by taking care of tires during their normal life and by having them retreaded when they are worn smooth. They should be examined regularly for signs of undue wear, cracks, gouges and breaks, and any such damage should be repaired immediately. Special patches should be applied to small breaks and nail holes to prevent moisture from seeping into the cords, where it will cause interior rotting. Correct inflation has

much to do with the life of a tire. Low air pressure causes extreme flexing of the sidewalls, which will loosen the cords and cause separations between the cords and the outer rubber. A tire in this condition is beyond repair. It's a good habit to know what tires look like when properly inflated, and to check them by sight every time you buy gas. Screeching turns while driving and serious overloading of the car are responsible for bead separation, which also ruins a casing, and should be avoided. Finally, tires should be recapped as soon as the original tread is worn down. It is false economy to drive until the cords show through, for by then it may be too late to recap. But if recapped in time, a set of tires will give many more miles of safe service.

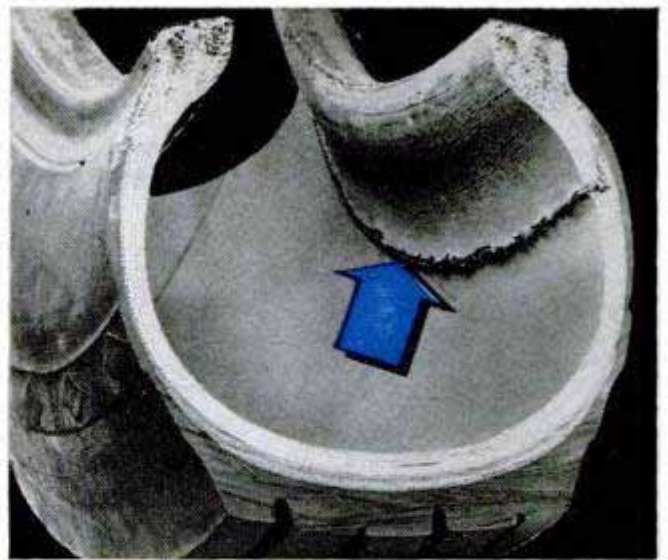
Pointer indicates bead separation which caused tire rejection. It may have been brought on by bad rims, poor mounting, overloading or hard driving on turns

Deep sidewall cracks, shown here, are result of old age and overexposure to weather and sun. This tire cannot be recapped because cracks extend into cords

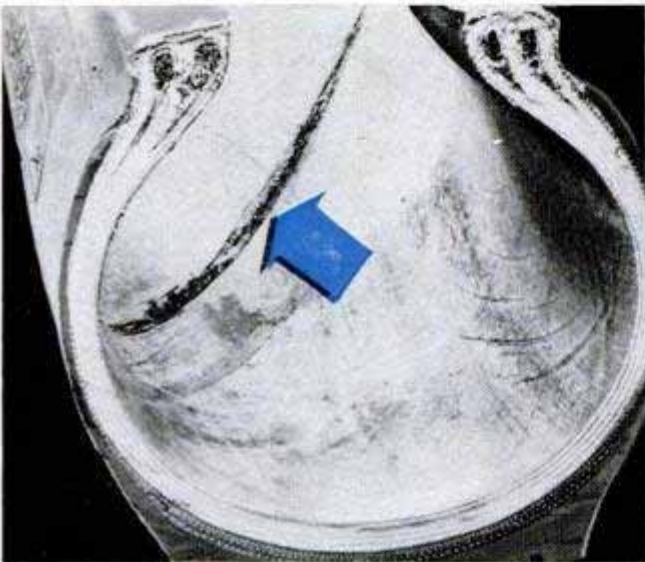




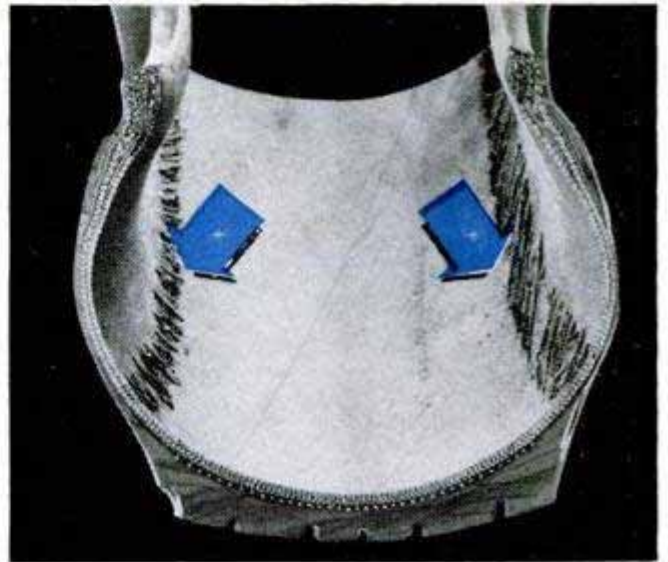
Gouges caused by tight snow chains or by striking curbs can be repaired with special patches. If they are not repaired, moisture will seep into the cords



Broken cords resulting from overloading have ended the life of this light-truck casing. Money made by overloading was lost in rapid tire deterioration



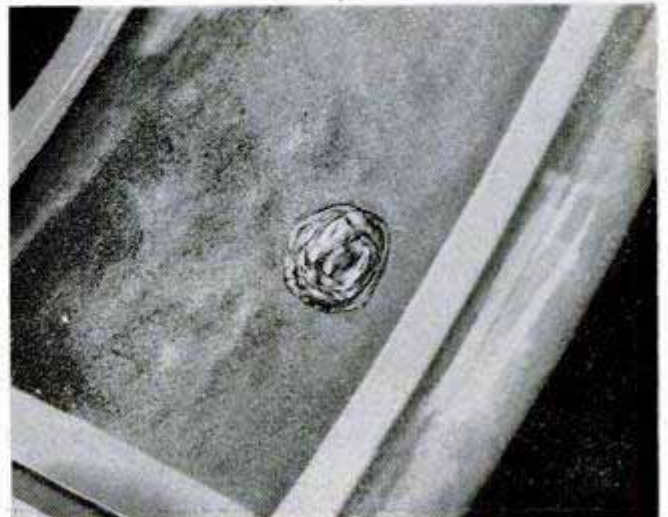
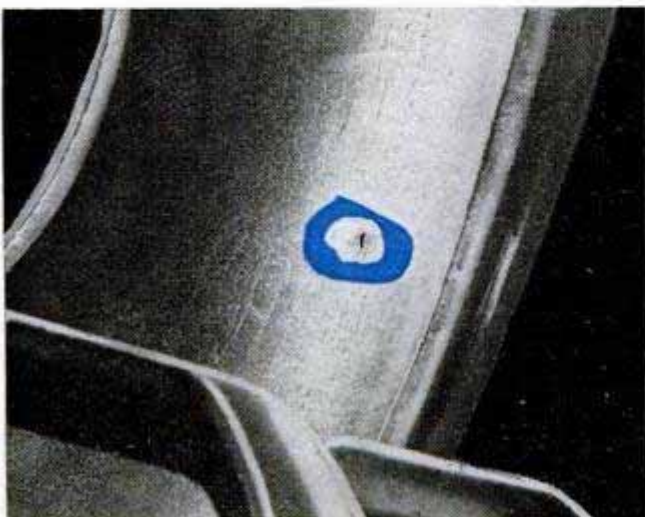
Damaged beyond repair by striking a bad hole in the street at too high a speed, this tire cannot be given a new tread. Slower, more cautious driving on rough streets can prevent casing breaks of this type



The owner of this tire forgot to check air pressure. The loosened cords in the sidewall are due to running for some distance with oversoft tires. Visual check of tires when buying gas will prevent this

A nail injury to tire casing is not serious and can be repaired. But if damage is neglected, it may lead to rotting of the cords by moisture or further tearing of the casing under adverse driving conditions

Nail hole pictured at left after being repaired with rubber carcass gum. Gum is also used to repair small gouges in exterior of casing, providing permanent repair. Special patches are used for larger cuts

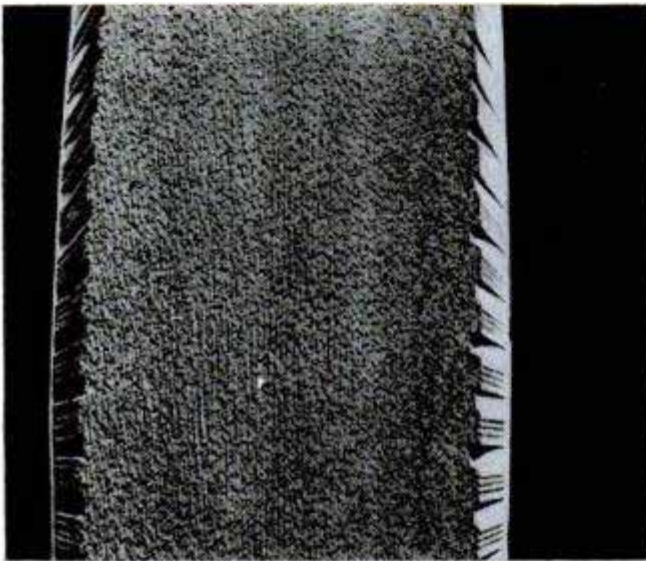




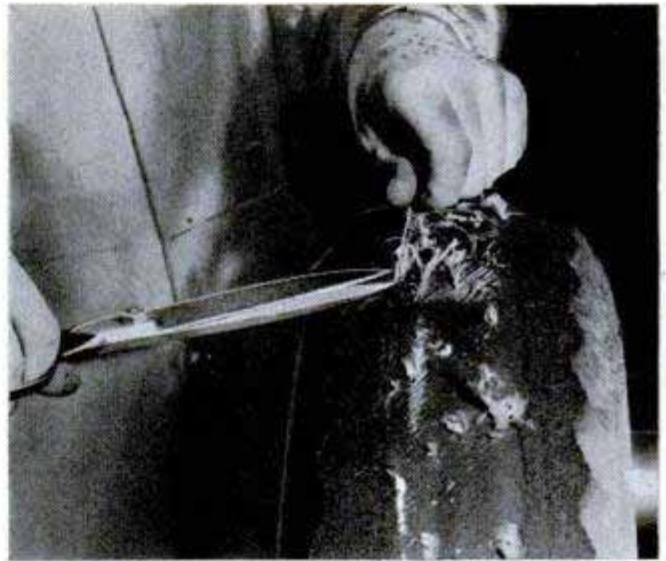
Prior to recapping, tire man removes all foreign matter from casing with a bradawl. Tacks and small nails which will eventually lead to punctures and slow leaks are frequently found embedded in casing



The outer surface of the casing is cleaned and roughened with a special rasp as the next step in the re-treading process. Careful preparation is essential for a job that will stand up satisfactorily in use



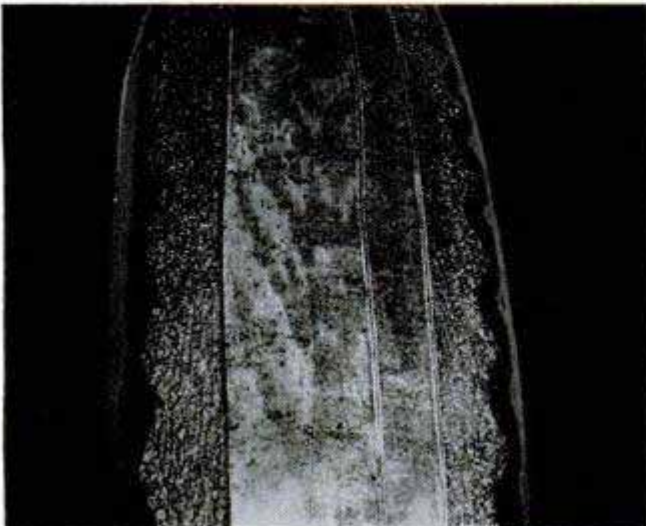
This photo shows the surface of a tire casing after it has been properly rasped and made ready for a coat of cement. With this job done correctly, the new tread will never tear away from the casing

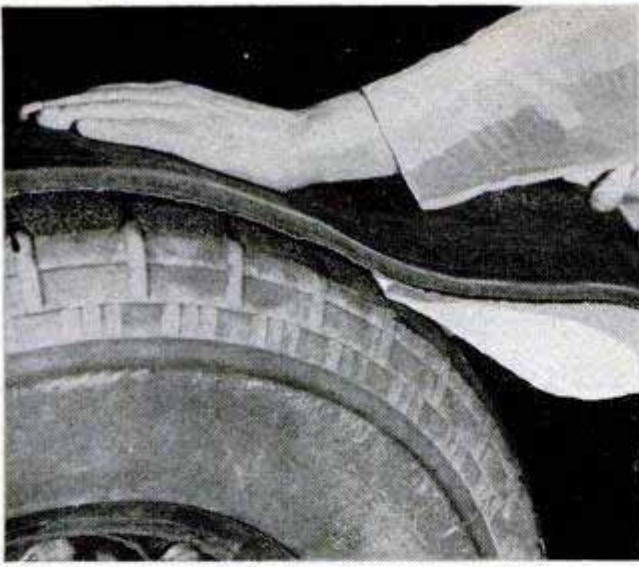


The owner of this tire drove it too far before deciding to recap. Some of the cords have been cut, but since they are only surface cords the tire may be saved. Deeper cutting would have ruined it

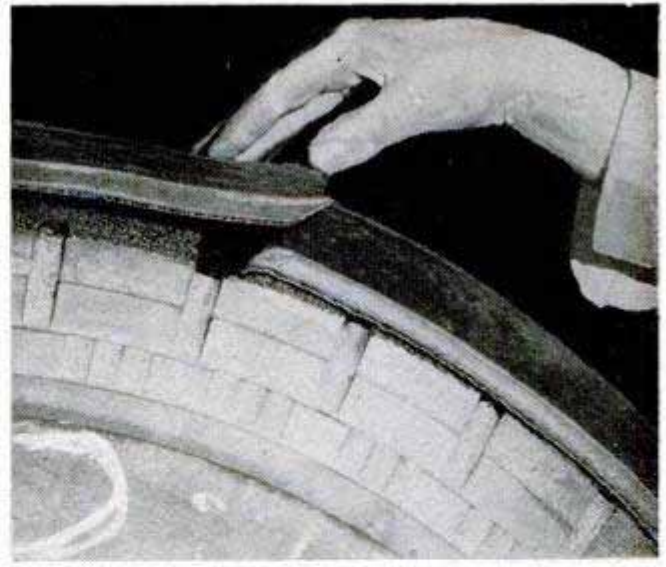
The rasped surface of the tire shown in the photo above is thoroughly coated with rubber cement, below, and strips of padding gum are applied to cover exposed cords. Successful recapping may now be done

The camelback or tread rubber is stitched down with a roller as it is applied to the prepared casing. Cement has been previously put on with a stippling action which works it down into roughened surface

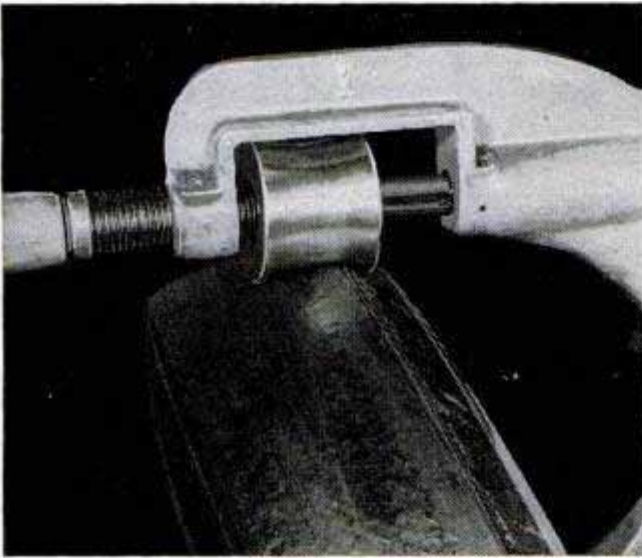




Camelback is carefully centered on casing since an off-center tread makes a lopsided, poor-wearing tire. Backing material is removed during application



Beveled camelback is crowded into contact with starting end. The tread is kept tight, but is not stretched as it is applied. Cement bonds the ends



After camelback ends are spliced together, a smooth roller is used, first along the center and then on the edges, to bond the entire camelback so that it is smoothly in place on the casing. Curing is next



Prior to putting the casing in the mold, a vulcanizing inner tube is inserted in it. Care must be taken to see that the tube and the mold are the correct size for the tire. Otherwise buckling may occur

With a matrix to give the desired pattern to the tread, casing is carefully centered in the mold and clamped. Heat of the mold softens camelback rubber, while pressure is applied to force it into the matrix design

Fleet operators have found that a tire with a good casing can be recapped several times, and that the recapped tires match the service and performance of new casings. Operational costs thus can be cut sharply



Vent Holes in Reflector Help Cool Floodlights



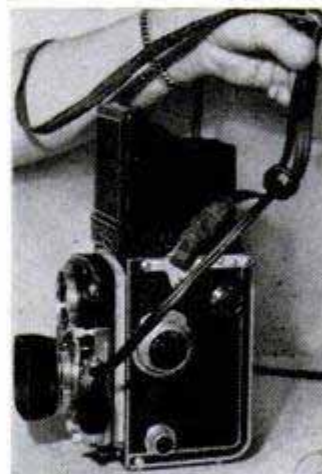
When using photoflood lights for an extended period, you can lengthen the life of the bulb and prevent damage to the socket by providing the reflector with several

small vents to permit the escape of heat. This may be done effectively by drilling $\frac{1}{4}$ -in. holes around the neck of the reflector as shown.—Henry Truchelut, Atlanta, Ga.

Positive Connection for Flash Gun

Photographers who shoot a great deal of action with a flash gun either attached or removed from the camera, often lose that important shot because the flash-gun cord has accidentally become disconnected. You can prevent this trouble by allowing enough cord to reach the solenoid and then by tying a knot with the cord itself to some stationary part of the camera. In this way, the strain will come on the knot and not on the solenoid connection. Flash-gun cords tend to break at the solenoid when considerable off-the-camera flash work is done.

Robert C. Florian, Chicago.



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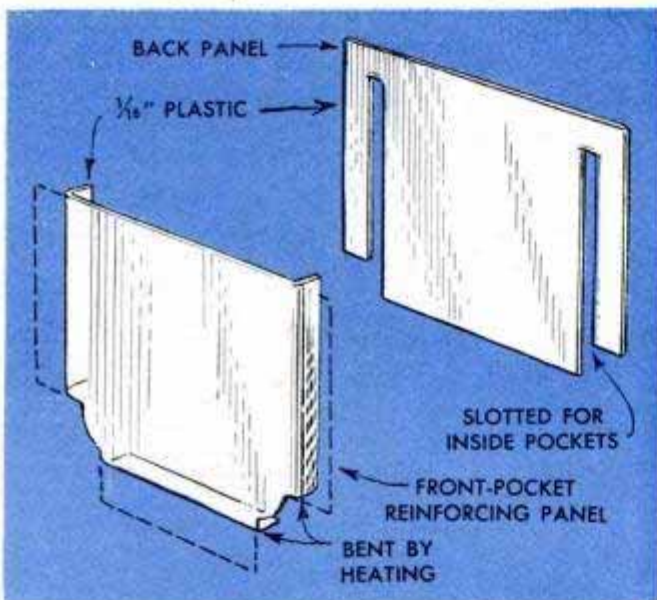
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Useful kinks for the CAMERA GADGET BAG

By M. G. Winterton

A PRACTICAL KINK for use with a camera gadget bag is to insert plastic panels inside the bag and outside pocket to protect photographic accessories and help maintain the bag's proper shape. Another idea, which eliminates opening the bag repeatedly, is to attach small zipper-type camera cases to the carrying-strap rings of the bag for filters, shades and other small accessories. Also, two straps sewed or riveted to the cover of the outside pocket will provide an ideal means for carrying a flash extension cord or a lightweight tripod. Leather wrist-watch straps are ideal for this purpose.



Above, panels are cut on jigsaw, after which front panel is heated in oven at 200 deg. F. for bending; below, camera cases attached to sides of gadget bag are handy for carrying frequently used accessories

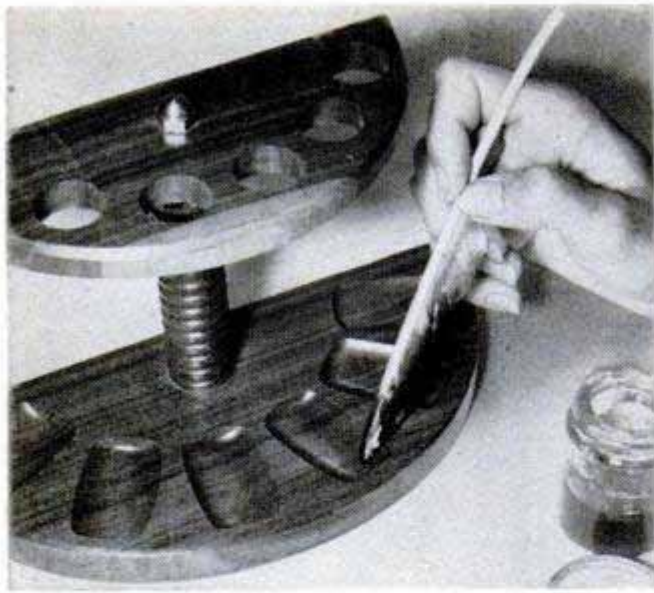


Plastic panel inserted in outside pocket protects flash bulbs and prevents bending of flash reflector. Panel is heated in oven for bending it to fit pocket



Above, prongs of back panel are fitted into pockets inside gadget bag; below, wrist-watch straps sewed or riveted to cover of outside pocket are ideal for securing an extension cord or lightweight tripod





Touch-Up Brush From Feather

Ideal for getting into small cracks and corners, a quill feather is an excellent substitute for a small paintbrush when painting or varnishing small objects or touching up scarred furniture. The feather, a dozen or more of which may be obtained from the wing of a duck, not only holds paint or varnish well but will spread it evenly, rarely causing bubbles to form as frequently occurs when applying varnish. Furthermore, the feather can be cleaned and used over again if desired.

Don Shiner, Nescopeck, Pa.

Leather Squares Prevent Rolling Of Punch on Smooth Surface



To prevent round center punches from rolling when placed on a smooth surface, I cut square pieces of leather, punched holes in the center of each and forced them over the ends of the punches as

shown. If a thin piece of leather is not available, the squares may be cut from the sole of an old shoe.

Arthur Trauffer, Council Bluffs, Iowa.

Seat-Cover Shock Eliminated

The unpleasant electric shock which comes from static electricity built up on the surface of plastic seat covers in automobiles can be eliminated by grounding the seat covers. A simple method of doing this is to place four thicknesses of aluminum foil, such as can be purchased in a grocery store, between the seat cover and

the car cushion. On each side of the seat a piece of flexible lamp cord is attached to the foil and to the seat springs to ground the foil.—Doyce Pool, Plainview, Tex.

Repairing Loose Furniture Casters

If a caster fitted in a wooden leg of a piece of furniture has worked loose and frequently drops out, build up the sides of the hole with wood putty to secure it firmly in place once again. After removing

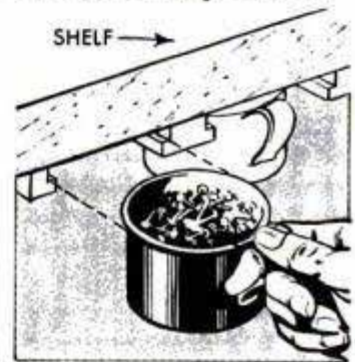


the caster, press a small quantity of the putty into the hole and clean away any excess. When the putty begins to set, grip the caster housing and twist the wheel a few times to free it for easy turning.

R. F. Donovan, Guttenberg, N. J.

Cup Stores Nails Under Shop Shelf

A common tin cup with a rolled lip can be used as a convenient drawer under a shop shelf in which to store nails, brads and other small parts. The lip slides in

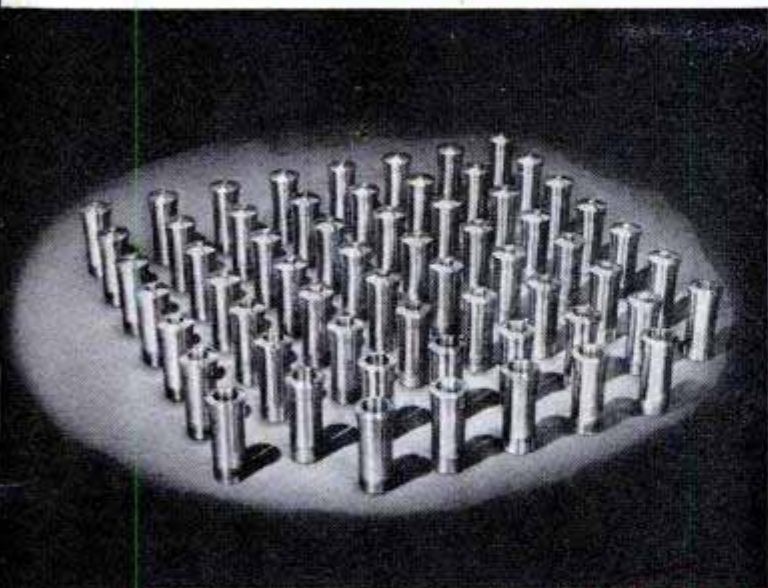


saw-slotted strips screwed to the underside of the shelf. The handle of the cup, facing out, is wide enough to be labeled to identify the contents of the cup.

Emergency "Stamp Pad" Provided By Typewriter Ribbon

If a stamp pad is not available, you may ink a rubber stamp for limited use on a typewriter ribbon. Simply place part of the ribbon on the roller as shown to provide a backing and then press the stamp against it several times.—John J. Rea, Urbana, Ill.





All photos courtesy South Bend Lathe Works

(SN 56)

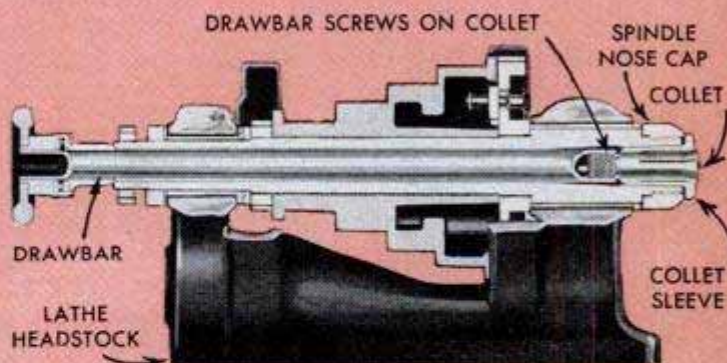
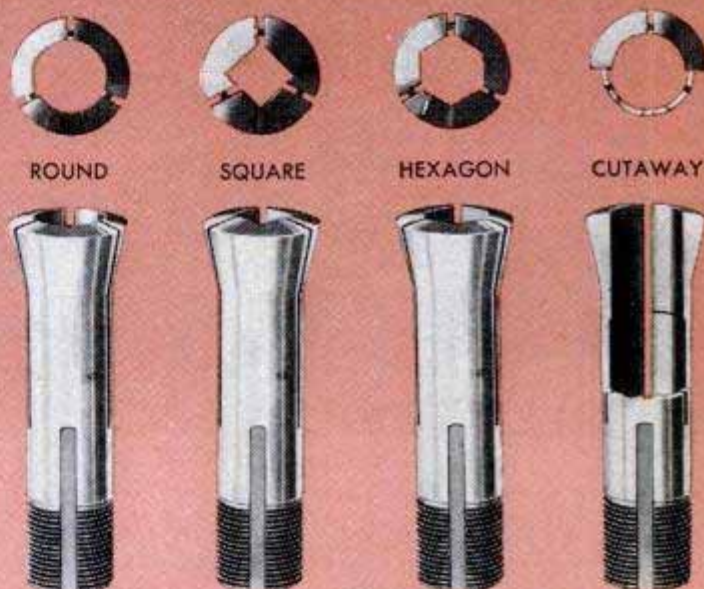
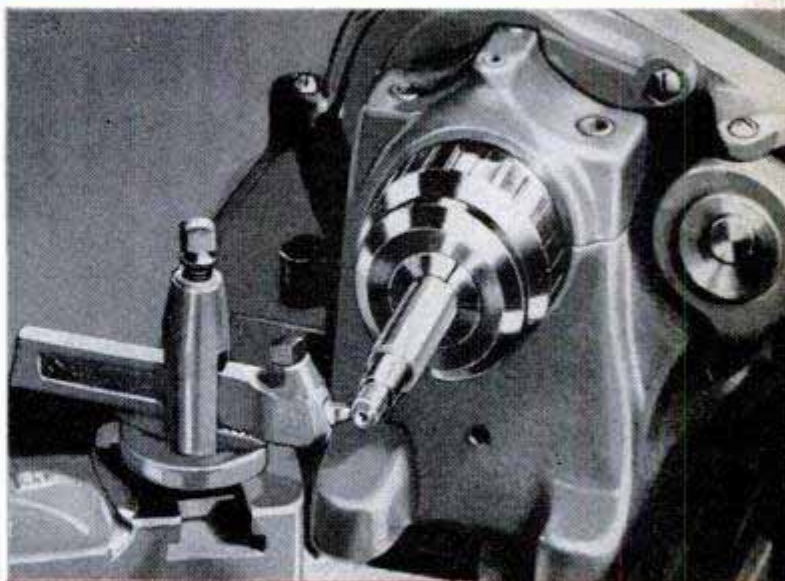
COLLETS

for precision chucking

By E. R. Haan

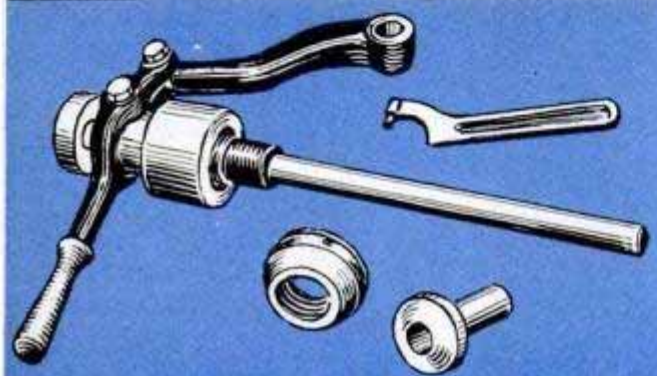
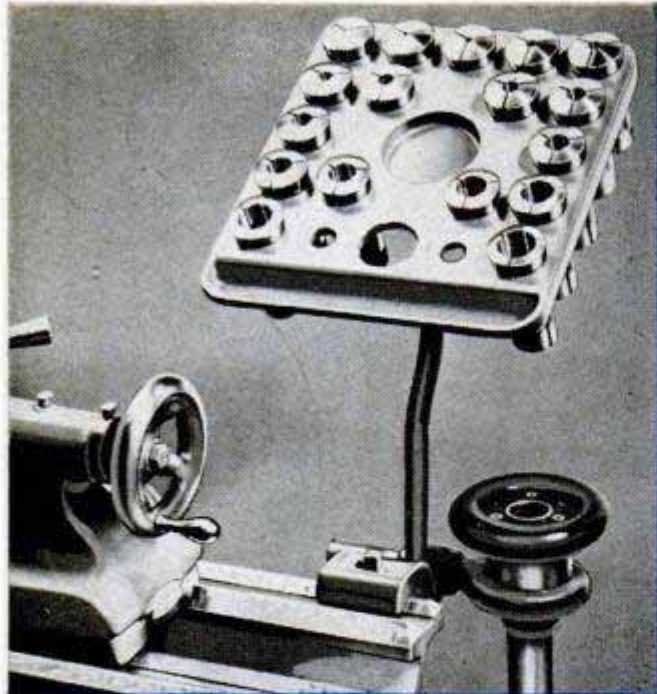
ON SMALL lathe work where extremely close tolerances are required, collet chucks are not only more accurate than most types of larger chucks, but also are great timesavers. Common collets come in sizes ranging from $\frac{1}{16}$ -in. to 1-in. capacity, rising by $\frac{1}{64}$ in. or equivalent. They are furnished in fractional-inch, decimal-inch and metric sizes and are designed to hold round, square and hexagon-shaped work.

Assembly of parts: To set up a collet chuck of the draw-in type, first screw the nose cap onto the threaded end of the headstock spindle. Then insert the closing sleeve which projects inside the headstock spindle and accommodates the collet. To loosen the sleeve, back off the nose cap until it bears against the sleeve flange. A drawbar fitted with a handwheel extends through the headstock spindle and its tapped inner end screws onto the threaded end of the collet. Contacting surfaces of these parts should be free from chips, dust and excess oil to assure maximum accuracy. Turning the drawbar handwheel tightens or loosens the collet, the tapered, slotted head of which grips the work when it is drawn into the closing sleeve. It is important to select the proper-size collet for a job. Never use one that has a designated size of more than .005 in. smaller or larger than the diameter of the work.

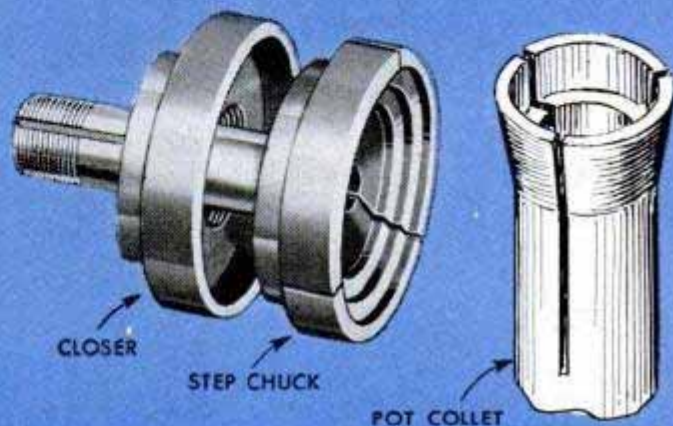


ASSEMBLY OF COLLET AND ACCESSORIES

Feeding stock for repeat operations: As the drawbar and collet are hollow, long stock can be fed through from outside the lathe headstock to the working position. The stock extending beyond the spindle always should be supported at the height of the spindle to prevent it from whipping. After the work has been machined and cut



HAND-LEVER, DRAW-IN COLLET CHUCK



These lathe accessories enable the operator to handle lathe jobs requiring toolroom precision. Always keep valuable collets in a holder or specially designed box to prevent damage. Never store in drawers

off, the collet is loosened, the stock advanced and the collet retightened for the repeat operation. Although collets usually are made of steel, precision-ground, then hardened and tempered, you also can buy brass collets which have many practical applications. They can be machined readily for holding tapered or irregularly shaped work and cost less than steel collets, making them ideal for odd sizes that are used only occasionally.

Precautions for accuracy: To assure accuracy of chucking in collets, the stock must be of uniform size, free from mars and other surface imperfections that may affect the diameter and also free of chips and dirt. The collet and drawbar should be kept clean and free from oil. Don't tighten collets more than necessary to prevent the work from slipping while it is being machined in the lathe.

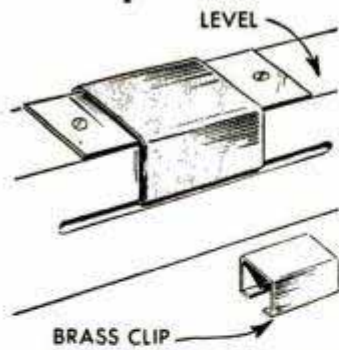
Collet storage: Where collets of various sizes are used daily, keep them at hand near the lathe on a rack of the type shown above. This can be obtained from the lathe manufacturer, or you can make one of hardwood. If collets are used only occasion-

ally, keep them protected from dirt and contact with other tools by storing them in a tight, strongly made hardwood box where the collets fit into marked wells for instant selection. Don't store collets in a drawer or box, or in contact with other tools, as scratches and mars destroy their accuracy.

Variations of collets: For increased production speed, you can make use of a hand-lever type of collet drawbar, Fig. 7, which permits opening and closing the collets without the need of stopping the lathe. A pot collet varies from a regular collet in that it is counterbored to form an inside shoulder that limits the depth to which short work can be inserted.

For holding disks, gear blanks and other narrow work, a step chuck and closer is a useful lathe accessory. It operates basically like a collet, the step chuck being slotted and forced shut when it is drawn into a tapered cup that acts in the same manner as the closing sleeve on a collet. Step chucks are made to order in various sizes in capacities from 2 to 6 in. They generally are supplied with a blank head which is machined by the user to suit the work.

Sliding Shield Protects Glass In Carpenter's Level



A good way to protect a glass in a carpenter's level against possible breakage when not in use is to fit a sliding shield over it. This can be shaped from a piece of thin brass.

The sides of the level should be grooved to provide a track for the shield. If spring brass is available, the shield should be made from this as it will better grip the sides of the level.

J. L. McClay, Pasadena, Calif.



Adjustable Stool for Mechanic From Jack and Brake Drum

To provide himself with an adjustable work stool for use while servicing car brakes, one mechanic welded a screw-type jack to a discarded brake drum and fitted the seat of a piano stool into the top of the jack. Adjustments in height are made easily by hand.—L. H. Houck, Jefferson City, Mo.

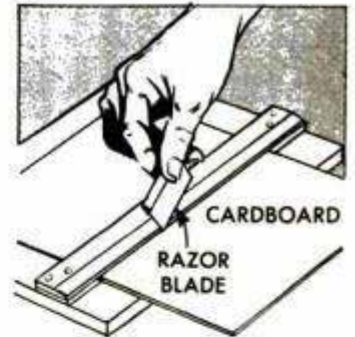
Farm-Machine Parts Assembled To Provide Small Concrete Mixer

Built from discarded farm-machine parts, an oil drum and steel angles and channels, this concrete mixer has several unusual features. The frame is constructed with one open end so that the unit can straddle a foundation form. Each fresh mix can be poured from the mixer directly into the form without a second handling of the material. Then the unit is moved to a new position over the form and the procedure repeated. The tilting frame which supports the drum and its driving mechanism is made by welding steel channels together to form the U-shape. A bevel gear and pinion taken from an elevator jack provide the reduction gear. This is driven through a salvaged chain and sprockets from a large flat-faced pulley mounted on a short shaft at one side of the frame. Use a small gasoline engine or electric motor to drive the unit.



Board Aids Cutting of Card Stock

One artist who had to make small price tags for various departments of a large store made this portable board to cut the cards as required. It consists of a hardwood board to which is attached a steel-edge ruler. Spacers are used at each end of the ruler to raise it above the board to permit insertion of the card stock. When mounted in this way the ruler provides a metal edge for guiding a razor to cut the stock.

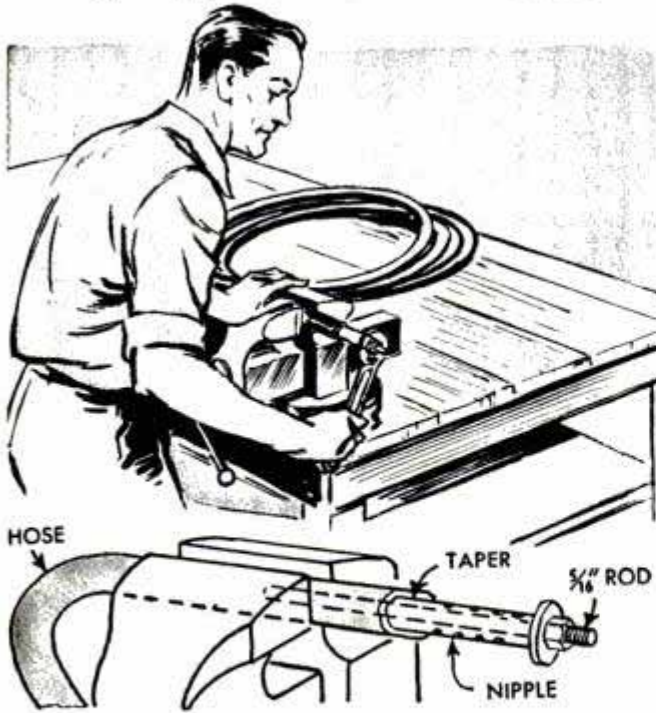


Improvised Plumber's Snake Fits Small Traps

A very flexible snake for cleaning small sink and lavatory traps can be made from the springs of two discarded window-shade rollers. Screw the ends of the springs together and solder them to make one 31-in. section. In one end of this section solder a piece of 1/4-in. rod to form a bit. When rotated in a hand drill, this snake can be worked well into the pipe.

T. K. Hastings, Los Angeles, Calif.

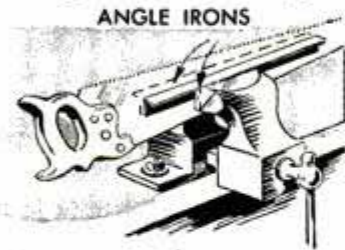
Fitting Nipples Into an Air Hose



Because of the tight fit required, the task of fitting nipples into the end of a compressed-air hose often can be difficult. A rig to ease this job can be made from a threaded rod 10 in. longer than the nipple, and a nut and washer. The rod is threaded for half its length and inserted in the nipple, which has been ground to a taper on its entering end. The hose is placed in a vise with a little more than the nipple's length projecting from the jaws. The rod and nipple assembly is inserted in the hose so that the tapered end of the nipple is started into the hose. The vise jaws are tightened on the rod and a small wrench used to tighten the nut. As the nut tightens, it forces the nipple into the hose. A small clamp around the joint finishes the job.

H. B. McDermid, Norwood, Ohio.

Angle Irons Lengthen Vise Jaws



If you use a common bench vise to hold handsaws for filing, you can eliminate much adjusting of the vise to move the saw back and forth

by lengthening the jaws. Two lengths of angle iron placed in the vise as shown will increase the length of the vise jaws for this purpose.

Easy Method of Cross Hatching

When an artist or draftsman finds it necessary to cross hatch, the job may be simplified by inscribing a dotted line on a transparent angle, 1/8 in. in from the longest

side. Draw the first hatch line as usual on the work, then slide the angle over and align the inscribed line with the first hatch line to draw the second hatch line.

Leonard Lundberg, Marquette, Mich.

Predrilled Nut Protects Threads When Drilling Hole in Bolt

One mechanic having a number of bolts to drill to take cotter keys used a guide made from a nut and clamped it in a vise to help speed up

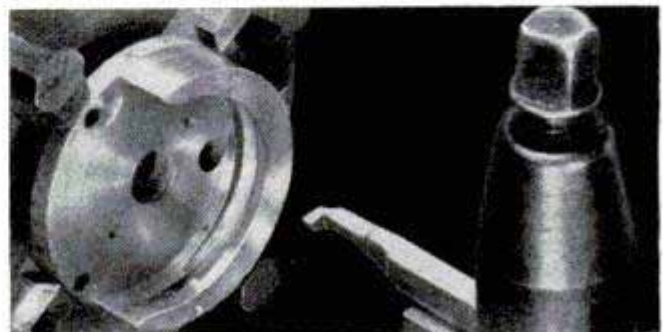
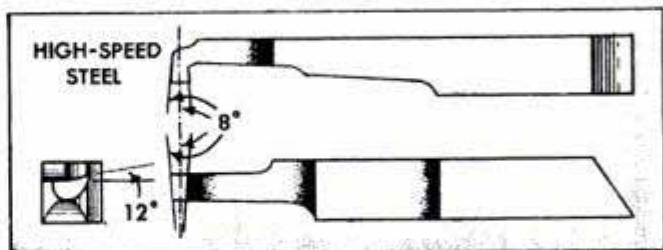


the work. The nut was drilled transversely, using a slightly larger drill than the one used for the holes in the bolts. In this way, the nut not only served as a drill guide, but also permitted the bolts to be held in the vise without damaging the threads.

Lathe Tool for Internal Slotting Is Used as Boring Bar

Originally designed to cut internal slots for grease seals, this lathe tool has since proven useful for other jobs, such as undercutting at the end of an internal thread or flush with the bottom of a blind hole. While the tool can be used frequently to do the work of a boring bar, it has two advantages over the latter, one being a lesser tendency to chatter, and the other its usefulness in starting a cut in a small hole. A 3/16-in. standard blank of high-speed steel was hand-ground to make the tool as detailed, the designated rake being intended only for cross-feeding. However, the tool can be made suitable for horizontal feeding, if desired, by grinding off the necessary rake angle.

Harry L. Truchelut, Atlanta, Ga.

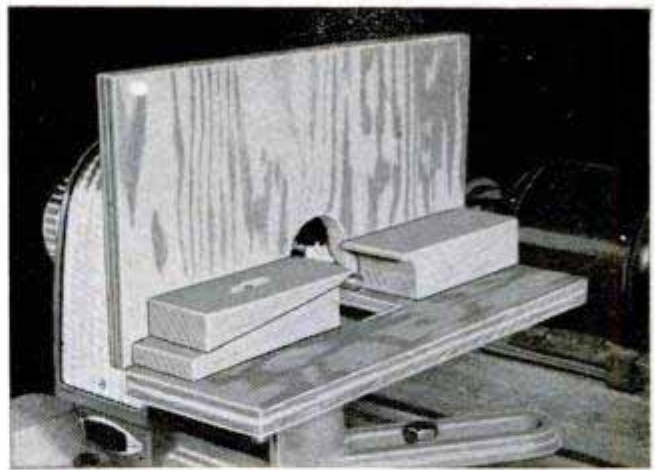


ADD A SHAPER

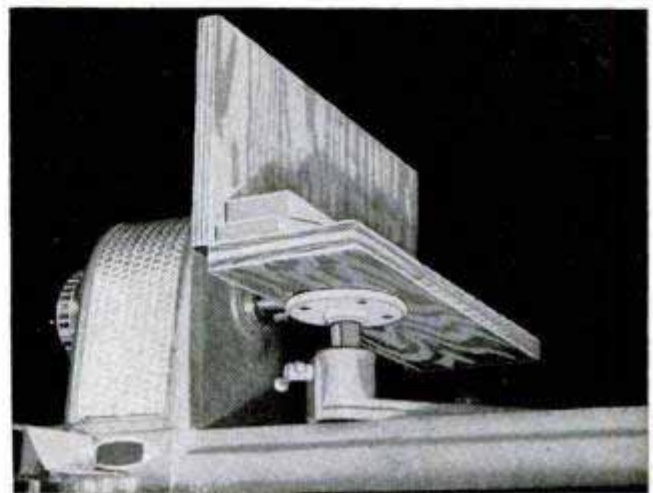
To Your Lathe

By R. Kielsmeier

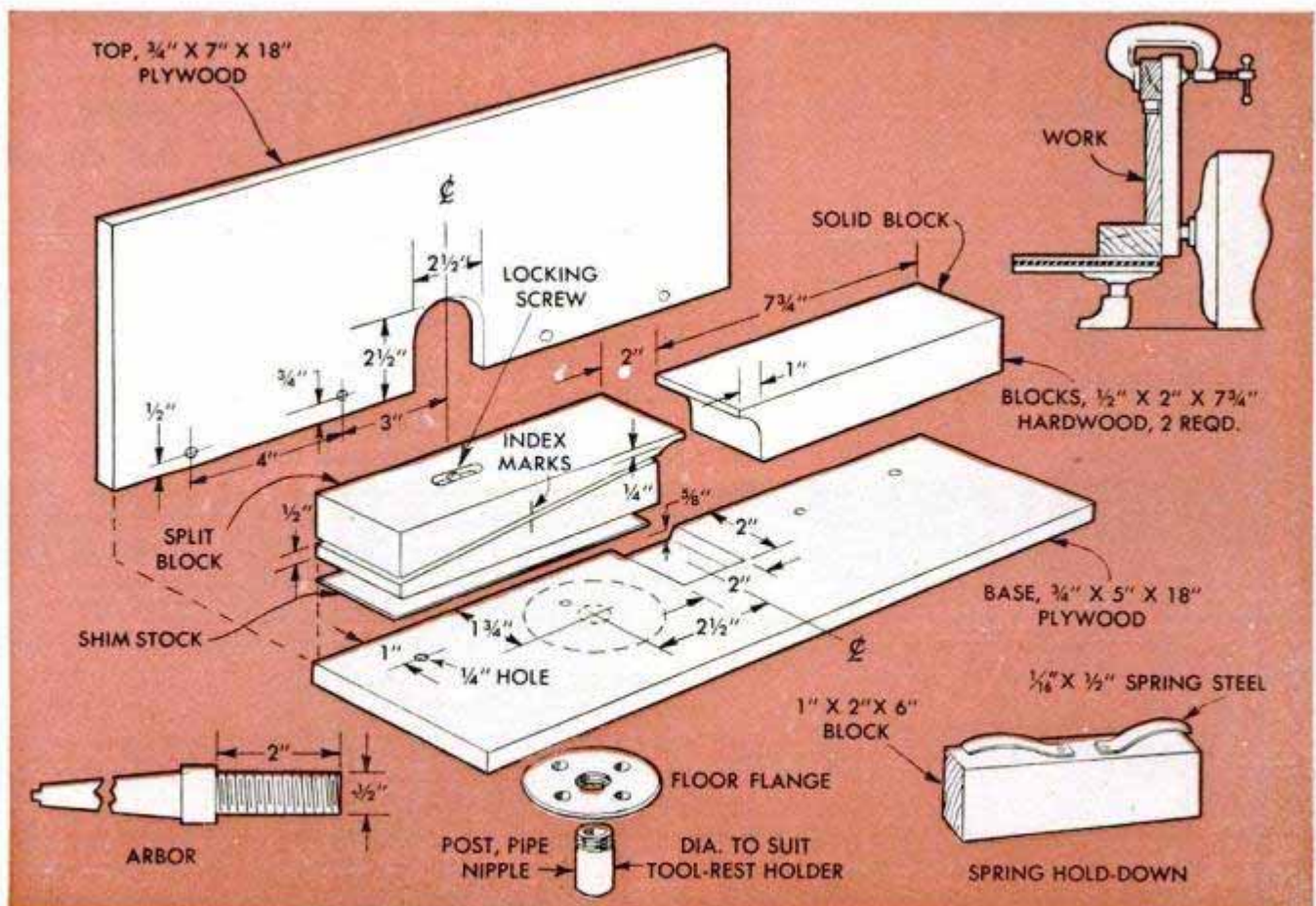
FOR A FEW cents, plus some scrap lumber, you can add a practical shaper attachment to your lathe and thus equip your shop for decorating table and chair legs, fluting, beading and making ornamental moldings. The only cash outlay needed to build the attachment is for the floor flange which holds the shaper in the tool-rest holder. The base and back are made of $\frac{3}{4}$ -in. plywood, while the blocks on which the work rests are $\frac{1}{2}$ x 2 x $7\frac{3}{4}$ -in. hardwood. One of these blocks is split diagonally so it can be adjusted to compensate for full-width cuts that are made with a straight-face shaper cutter. Index marks are scribed along the junction line of the two halves of this block. At the time this is done, the left and right-hand blocks must be in perfect level alignment. Once the assembly is mounted on the tool-rest holder, the base is checked for alignment with the arbor. If the alignment is not true, shims are inserted between the floor flange and the base. Several holding blocks are made, as indicated in the detail, and clamped against the backboard to hold the work in position while shaping.

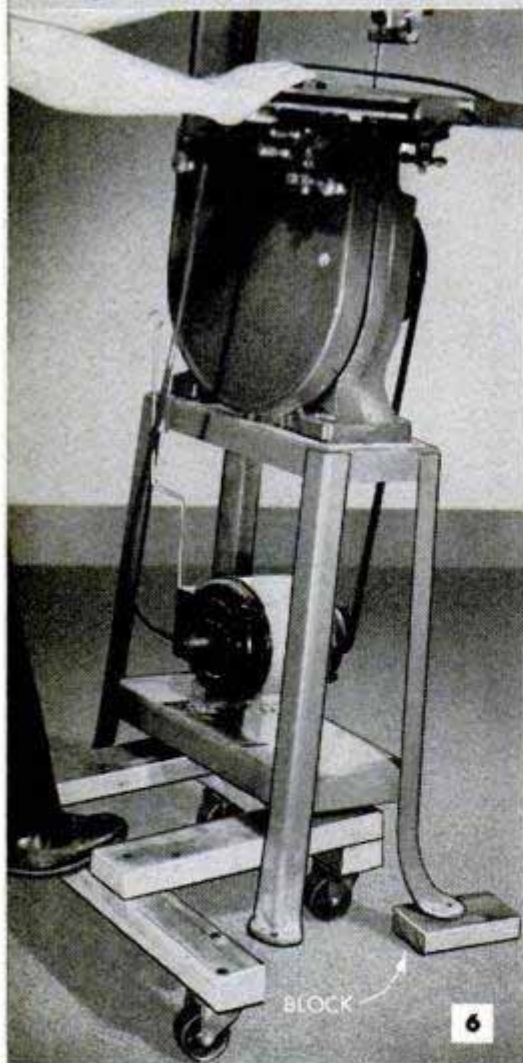
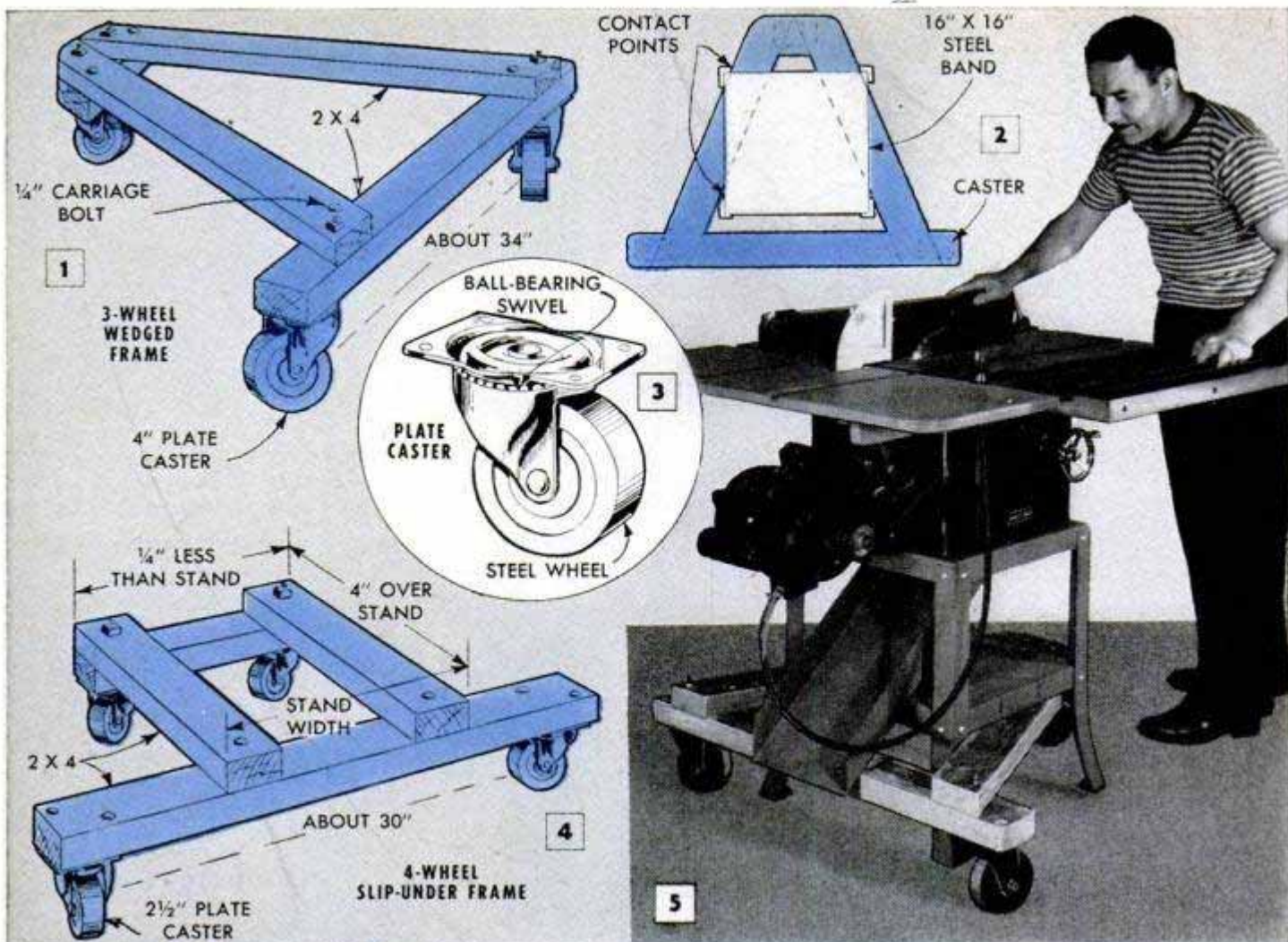


The completed shaper on the lathe and ready to go to work. Note that a shim is inserted under left block to compensate for saw cut when block is split



Diameter of floor flange and of pipe which threads into it depends on the size of the tool-rest holder

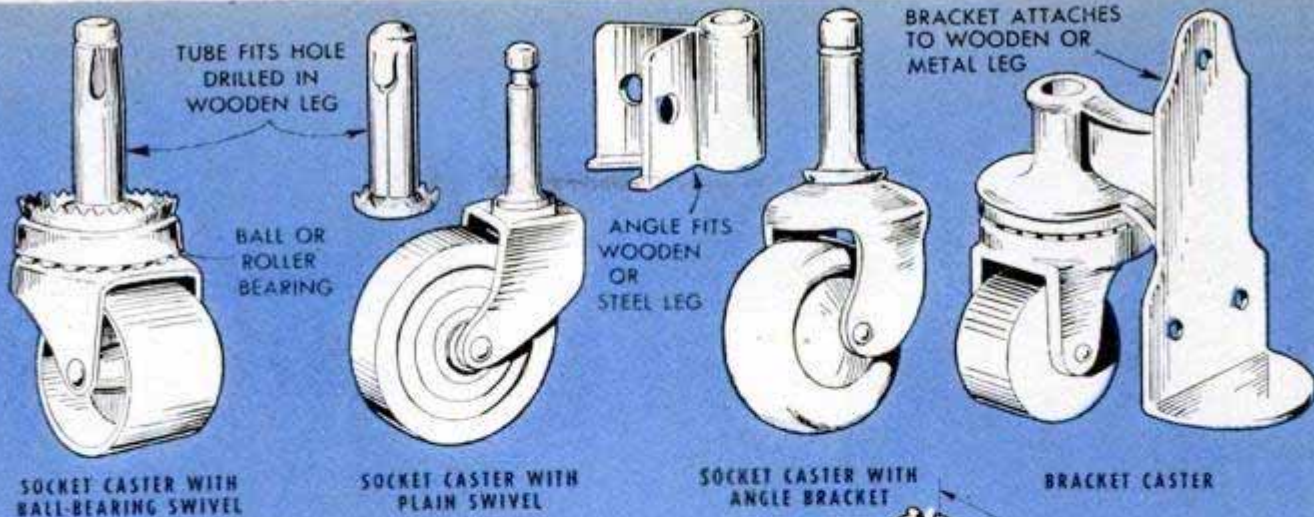




Wheels for your POWER TOOLS

By Sam Brown

FEW HOME SHOPS are big enough to provide ample work area for several power tools. When the space is limited, such machines as the bandsaw, shaper and circular saw must be moved to accommodate long stock. At best this is a difficult job and may result in damage to the machine and also the shop floor. A dolly fitted with three or four swiveling casters enables the operator to move the machine to the required position with a minimum of time and effort. Caster wheels of the types shown should be at least 2 in. in dia. and, better, 2½ or 3 in. If your shop floor is concrete and rough in spots, nothing less than 3 or 3½-in. wheels should be used in order to permit easy rolling, Fig. 9. The best wheel for a concrete floor is a steel wheel having a rubber or laminated-leather tire, such as is used in the installation shown in Fig. 5. Plain steel wheels are a good second choice although they are noisy on rough concrete. Plastic and composition wheels are satisfactory only if the floor is fairly smooth.



SOCKET CASTER WITH BALL-BEARING SWIVEL

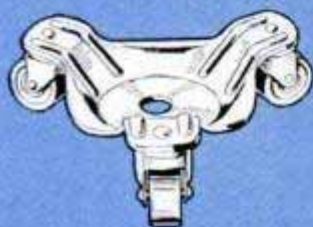
SOCKET CASTER WITH PLAIN SWIVEL

SOCKET CASTER WITH ANGLE BRACKET

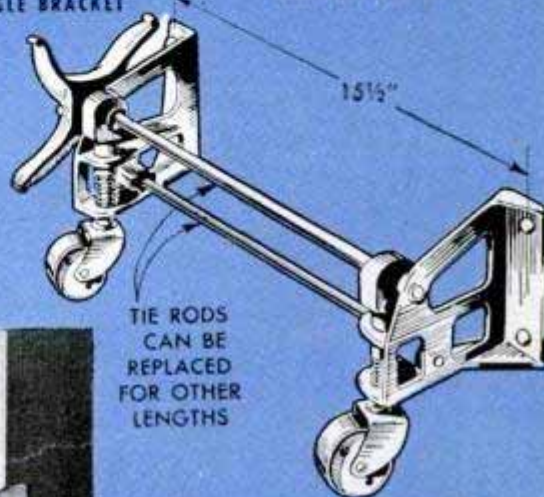
BRACKET CASTER

7

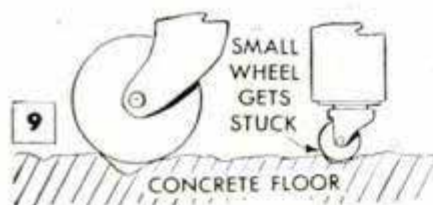
Casters for making power-tool dollies are available in a variety of styles and sizes. The average wheel size should be 3 in. for use on fairly smooth concrete floors. The retractable caster shown at the right is furnished as a unit having flat-faced brackets for bolting to any vertical surface



STOVE TRUCK CASTER



RETRACTABLE CASTER

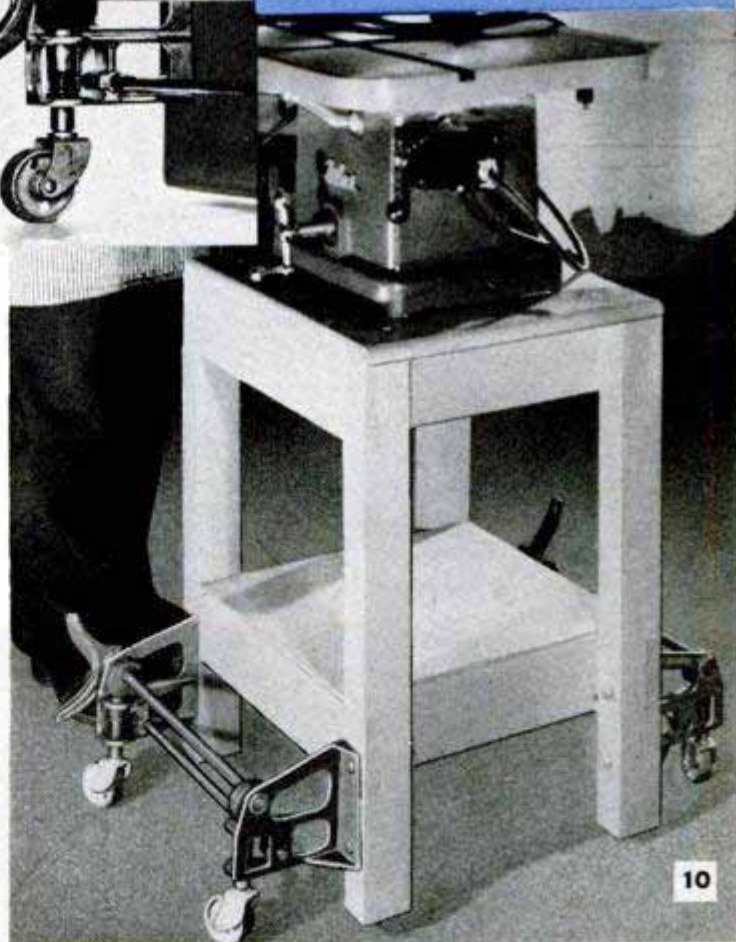


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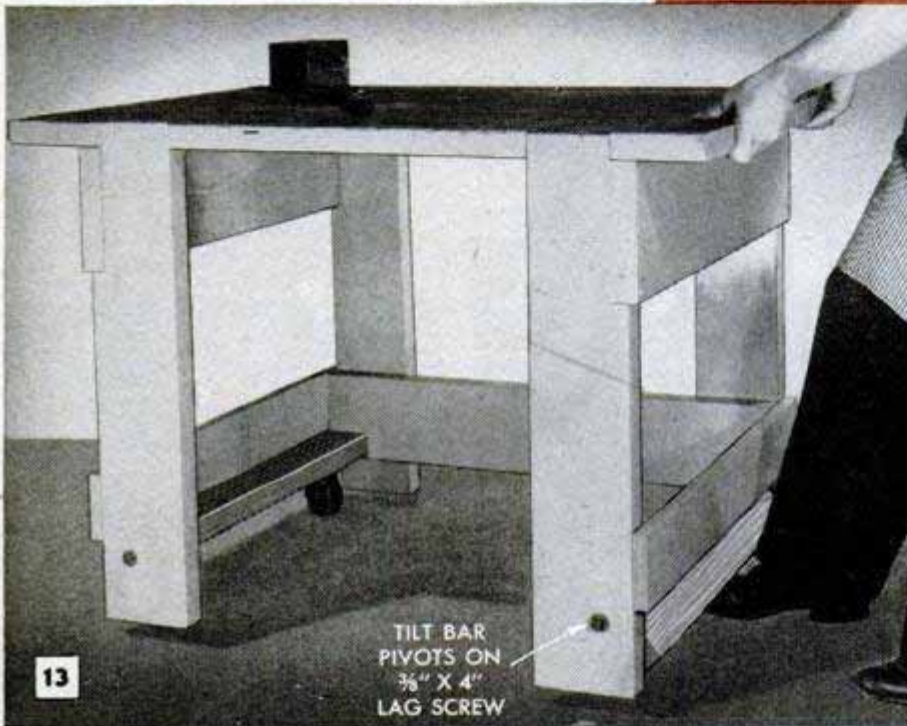
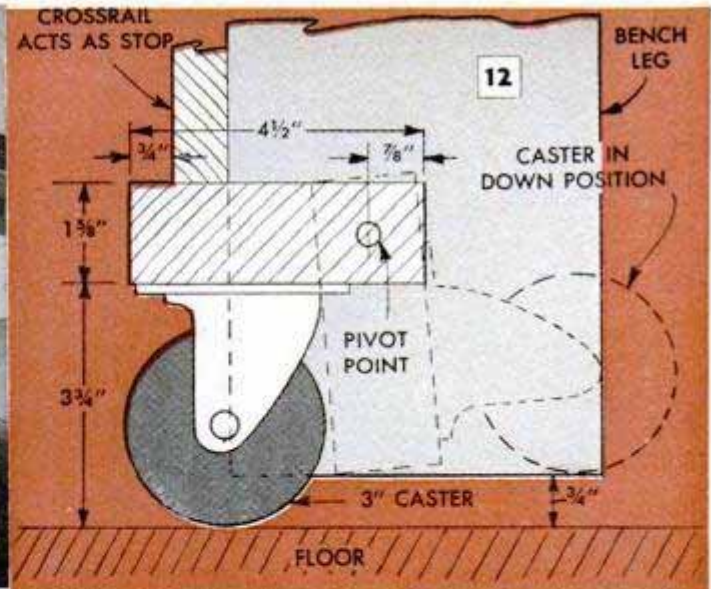
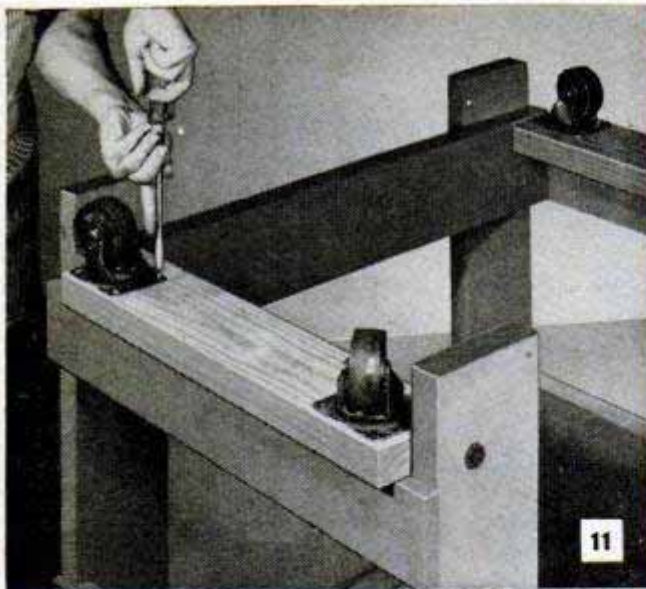
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Probably the most useful style of wheel for a power-tool dolly is the plate caster, Fig. 3. This is available with wheels from 2 to 6 in. in dia. When the tool is mounted on a steel floor stand, the usual installation is to make a wooden framework which will fit under the lower shelf of the stand. The casters are then bolted to the framework. A typical installation, shown in Fig. 5, is made from 2 x 4-in. stock wedged between the legs of the stand as in Fig. 2. It must be fitted in place for assembly and cannot be removed without disassembling one side. The 4-in. wheels, Fig. 1, raise the stand legs about 1 in. above the floor when used under the 2 x 4-in. framework on the stand pictured. Some dollies made in this manner may require blocking to raise the stand or half-lapping of the frame to lower the stand to get the desired lift of $\frac{3}{4}$ or 1 in. above the floor.



10

Although the retractable-caster units are best to use on a bench which permits attaching them inside the legs, they can be mounted on the outside of the legs as shown above



Simple retractable caster mounting can be made by pivoting a tilting bar between the legs of the machine stand. Casters are tilted to down position with foot

the casters inside the bench legs. However, an outside mounting, shown in Fig. 10, is quite satisfactory. This unit has an up-and-down movement of about $\frac{1}{2}$ in. and is operated by a treadle, Fig. 8. Socket casters, Fig. 7, are the easiest to fit when you want to fit wheels directly to the legs of a wooden stand. The angle-bracket caster is especially suitable for plain angle-steel stands. The bracket caster is a useful mounting for

A slip-under style of stand is shown in Figs. 4 and 6. This can be dimensioned to serve a number of tools. The unit is readily slipped under the machine after first blocking up the rear legs with blocks a little thicker than the distance the caster unit raises the legs above the floor, Fig. 6. It will be noted that in both of these units the machine rests on the wheels at all times. The legs do not touch the floor. This is a practical mounting when used on an average concrete floor as the machine will not roll under normal operating conditions. On a smooth floor, the two units shown operate satisfactorily with two wheels only, substituting plain raising blocks for the other caster or casters. In a two-wheel installation, the machine must be tilted wheelbarrow-wise to move.

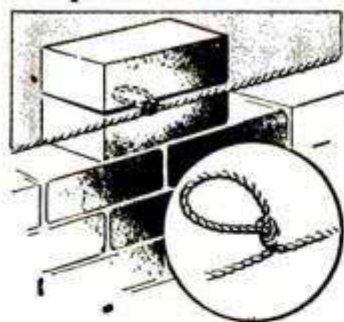
Retractable casters, Figs. 7, 8 and 10, make good installations for any light power tool. The best installation of this unit is on a long bench, since this permits fitting

attaching to existing legs without increasing the height of the installation. Normally, wooden or angle-steel legs can be sawed off to compensate for added lift of the casters.

For larger machine stands or a small wooden bench, the simple tilt-bar type of retractable mounting, Figs. 11, 12 and 13, is satisfactory. The unit shown uses four 3-in. plate casters fitted to the underside of a tilting bar pivoted on lag screws. To set the wheel position, the end of the bench is raised slightly, Fig. 13, and the tilt bar is moved in or out with the foot. Two casters only can be used if desired, making a wheelbarrow-type unit which is readily wheeled to any location. ★ ★ ★

☞ When painting your home early in the morning, work on the east side first, and then on the other sides. The sun will quickly evaporate any moisture left on the east wall long before the other walls are free of moisture.

Loop Anchors Chalk Line



To keep his chalk line from sagging or from vibrating in a high wind when stretched across a long span of wall, one bricklayer ties a loop in the center of the line. This loop, an inch or

more in diameter, is then anchored between two loose bricks as shown in the drawing.

Drill Rack Supports Round Work For Boring Lengthwise



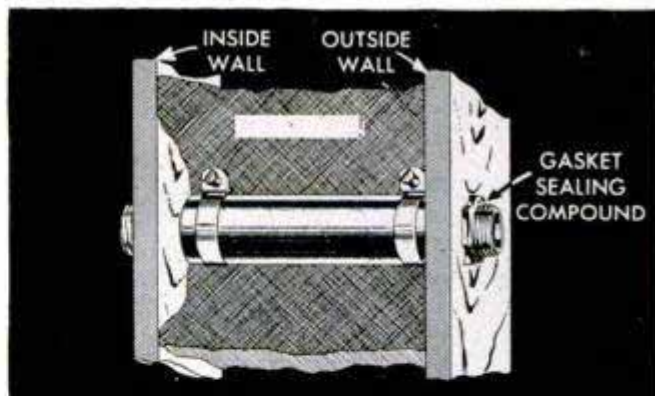
When drilling the end of wood, plastic or metal round stock, the problem of holding the stock firmly in a vertical position can be solved by inserting it in one of the holes in a

drill rack, using a hole that takes the work with a snug fit. With the rack on the drill press, the stock can be drilled, countersunk or tapped with reasonable accuracy.

Paul Fryar, Long Beach, Calif.

Wire Splices Soldered Quickly By Altering Tip of Iron

The soldering of wire splices can be accomplished more quickly if the tip of an electric soldering iron is altered slightly. First, remove the tip from the element housing by loosening the setscrew and then file or grind a deep groove near the blunt end similar to the one shown. After cleaning the tip of any solder or flux remaining from previous usage, insert the tip end in the housing and tighten the setscrew. Now heat the iron and lay the splice in the groove when ready to solder.



Sealed Refrigerator-Wall Duct

Condensation frequently forms on metallic pipe used as a duct for refrigeration tubing and electric wiring through the wall of a walk-in refrigerator. This moisture may rust the pipe or seep into the insulation, causing rotting and other damage. A duct made from a length of car-radiator hose and two pipe nipples will prevent this condensation. In making the installation, a pipe nipple with an inner locking nut is inserted outward through a hole in the outside wall. Calking compound is placed around the nipple on the outside and then a locking nut is tightened through the compound, making a leakproof joint. After the inner wall is erected, a locknut is screwed on the inside pipe nipple to hold the hose more firmly. With the tubing or wiring in place, ends of the duct are sealed with mastic and exposed parts are coated with aluminum paint.—Paul E. James and Chester P. Davis, Jr., Washington, D. C.

Preventing Clogged Spray Gun

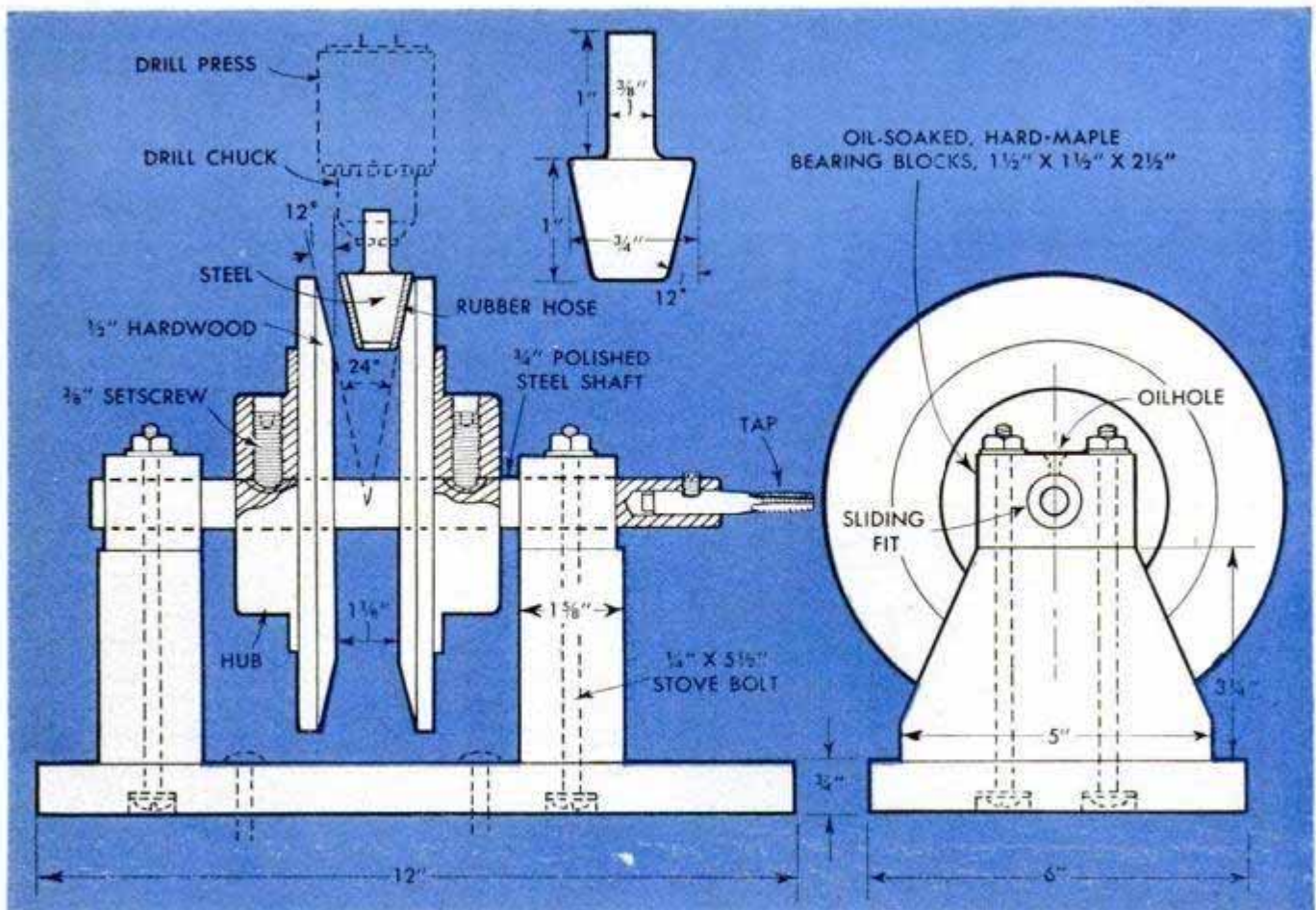
If you have had a spray gun become clogged between application of lacquer coats, here is an idea you will appreciate. One amateur painter, experiencing this difficulty with a spray gun having a screw-type canister, solved the problem by using two canisters. Lacquer is kept in one, while the other is filled with thinner. Whenever a short interval between applications is anticipated, the canister containing lacquer is removed and replaced with the one containing thinner, after which a little of the thinner is run through the gun. In this way lacquer inside the gun is prevented from drying. The operation, which can be accomplished in a minute or less, saves considerable time that otherwise might be spent in dismantling and cleaning a clogged gun.—Leo F. Bowler, Jr., San Bernardino, Calif.

DRILL-PRESS TAPPING JIG

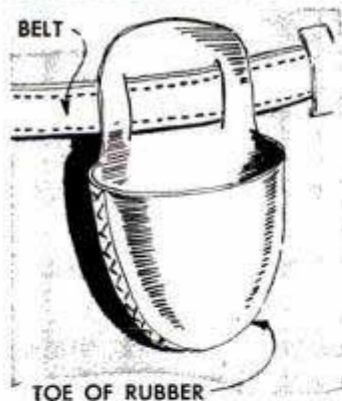
By Carl S. Bates



DESIGNED especially for the small production shop, this drill-press jig eliminates the bottleneck frequently caused by hand tapping a number of parts. By using the jig, the tap is automatically driven into the hole when the work is pressed against it, and then the tap is backed out by pulling the work away from it. This is accomplished by a pair of 7¼-in.-dia. hardwood disks mounted on a sliding shaft to reverse the direction of tap rotation when one or the other disk is held in contact with a rubber-covered driving spindle. The latter is tapered to match a bevel on the inside faces of the disks. Bearing blocks of hard maple are fastened to the base blocks with long stove bolts and the base is drilled to permit bolting to the drill-press table. Made to the dimensions given, the jig will handle taps up to ¼ in. If larger or coarse-thread taps are to be used, the diameter of the disks should be increased.



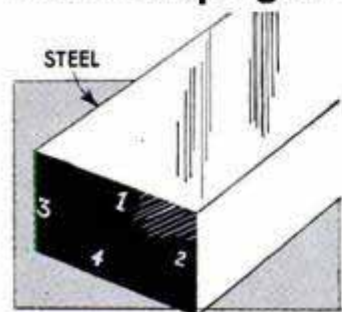
Tack Pocket From Old Rubber Toe



The toe piece cut from a discarded rubber can be utilized as a pocket to hold tacks for bill posting, carpet laying and other similar jobs. Slits in the tab end permit the pocket to be worn on the trouser belt, and the pocket remains

open for easy removal of the tacks. The fisherman who wades in a stream some distance from his bait can will also find this pocket handy for carrying live bait.

Mark Steel to Avoid Errors When Shaping or Planing



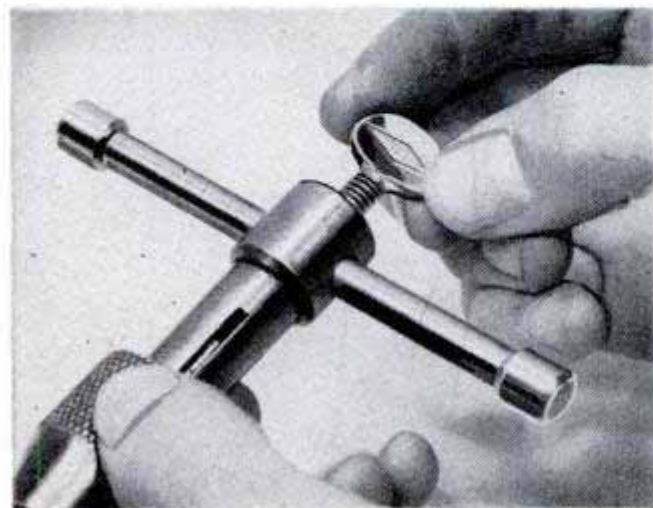
When shaping or planing steel bars, mistakes may be avoided if the faces being worked can be identified readily. This may be done by numbering them on one end of the bar being

worked, using layout ink or dye. This practice is particularly helpful to beginners in the shop or school machine-shop class, where grinding procedures specify that the direction be the same for each face.

R. M. Woodbury, Natick, Mass.

Thumbscrew on Tap Wrench Locks Handle in Position

The annoyance of having the handle on a tap wrench slip out of position may be eliminated by this simple locking arrangement. Simply drill and tap a hole in the end of the wrench to take a thumbscrew.

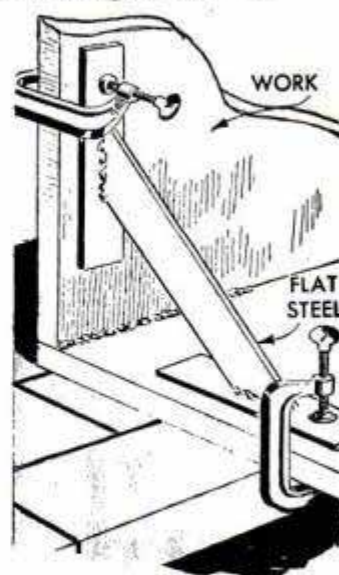


Pigeonhole Bolt Rack

This rack provides storage for 63 sizes of bolts, nuts and washers as well as screws and nails if desired. It was originally designed for use in a farm shop, but is equally useful in the home shop for storage of small parts that must be kept in order and readily available. It consists of a square frame of 1 x 4-in. stock, glued and screw-fastened at the corners. Shelves and dividers are cut from the same material. The back is of 1/4-in. plywood and the compartments are partially enclosed at the front by 3/8 x 1 3/8-in. strips of lattice stock nailed to the front edges of the shelves. Half-lap joints in the members are used to form the pigeonholes.

Jig Simplifies Right-Angle Welds

When welding work calls for a right angle, this jig allows the weld to be applied to the inside of the angle without breaking down the clamped setup, as is the usual procedure with ordinary welding jigs. Different sizes of the jig can be made to fit the work at hand. Care should be taken when using this jig to see



that the pieces to be welded together fit closely, with no air space between them.

L. E. Fannon, Huntington Park, Calif.

SHOPPING FOR TOOLS

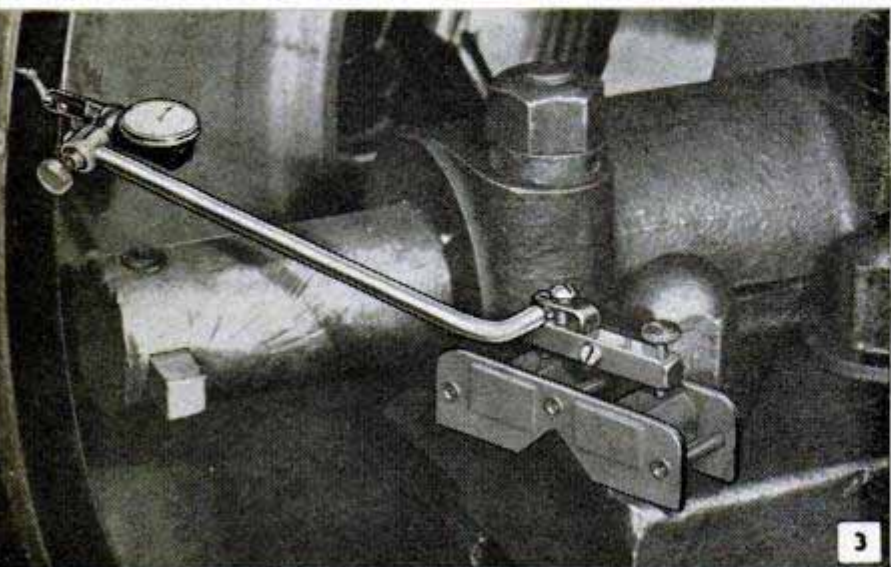
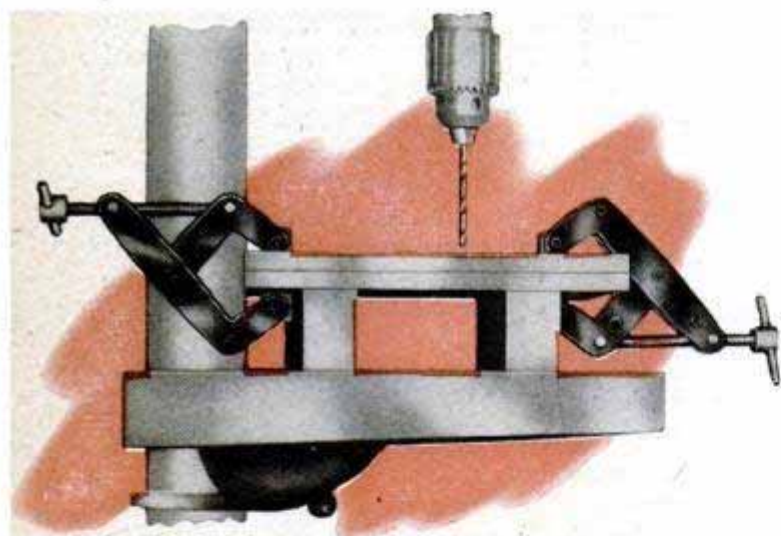


1. EASILY HANDLED LEVEL of lightweight magnesium offers a dimensionally stable, accurate tool for the homeowner and carpenter. The die-cast I-beam construction produces a rugged tool that will withstand considerable rough usage. The level features moisture and dust-free bubble vials which contain a new vial fluid developed to withstand greater temperature extremes

2. ADJUSTABLE CLAMP combines best features and strength of C-clamp and toolmaker's parallel clamp. Ball-bearing trunnion eliminates distorting, twisting action and absorbs vibration to insure a firm, steady grip throughout milling, routing and shaping operations. Screw remains in horizontal position so jaws can be quickly adjusted. Available in five sizes from 1½ to 12 in.

3. MAGNETIC HOLDER for dial indicators and inspection lights attaches to any iron or steel surface, magnet with 50-lb. pull providing a firm grip. Holder pictured features swivel arm and thumbscrew for minute adjustments. Also available for lathe-carriage use, equipped with an inspection light or with a swivel clamp for holding flashlight or extension lamp

4. WATER-COOLED DIAMOND DRILL for ½-in. chuck will cut through masonry, glass or porcelain at the rate of 1 in. every few seconds and produces a clean accurate hole. Valve-fitted water sleeve is connected directly to the water line. A 10-ft. length of hose is supplied with adapter which will connect to any supply from a ½-in. pipe thread to a ¾-in. faucet





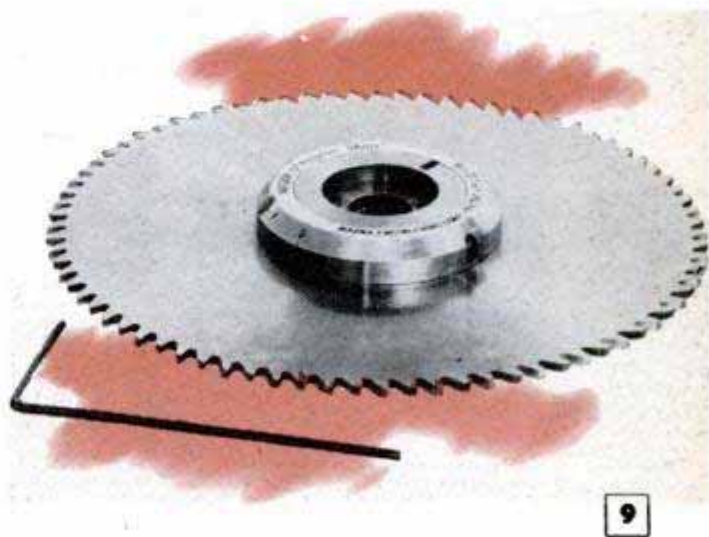
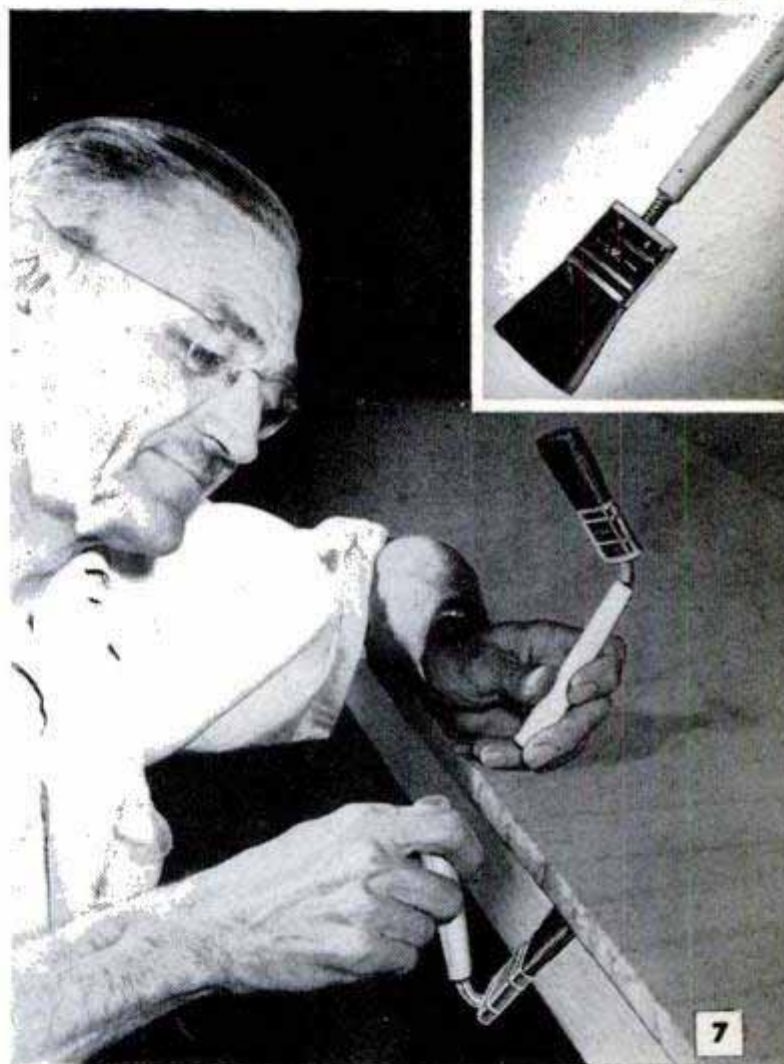
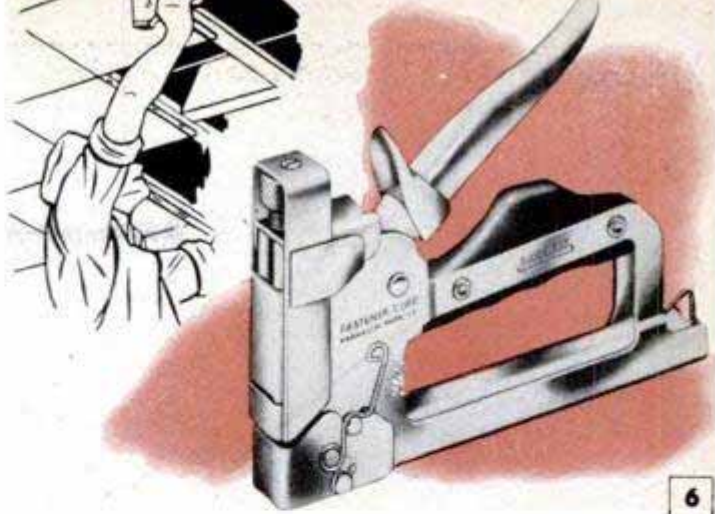
5. PORTABLE ELECTRIC SANDER features oversize bottom plate which extends beyond body to permit sanding in close quarters. Knob handle fastens to sides or front of housing and new holder simplifies changing sandpaper. Platen has orbit dia. of 3/16 in.

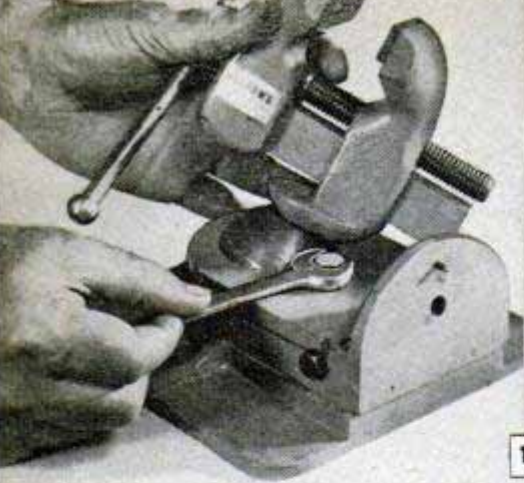
6. CEILING-TILE STAPLE GUN saves considerable time and labor when installing tongue-and-groove tile. Operator simply positions the gun tacker on tongue of the tile and then compresses the handle to drive a heavy 9/16-in. staple into furring strip

7. PAINTBRUSH HANDLE bends at almost any angle and remains in position until readjusted. Angle setting of handle permits thorough coverage of many hard-to-reach places that ordinarily are difficult to paint. Flexible cable joins wooden handle to brush ferrule

8. PRESET TIMING CONTROL on portable spot welder results in consistent and uniform welds on most common metals. Welder turns on when tips are closed to maximum pressure and stays on until time elapses. Draws average of 45 amp. on 220-volt, 60-cycle line

9. WOBBLE DADO SAW takes cuts up to 7/8 in. wide and 2 in. deep with a single adjustable blade. Pitch of 1/8-in.-thick blade is varied by loosening arbor nut and adjusting the hub gears with a socket-head wrench. Dado fits saws having 5/8 or 3/4-in. arbors



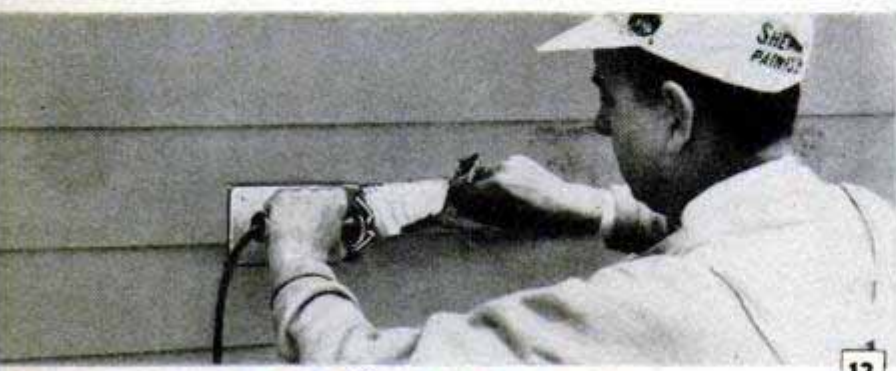


10



11

See letter in back of book



12



13

10. SWIVEL VISE holds work securely at any desired angle on drill press or milling machine. Vise is tilted by hand into position and held rigidly by a plate which clamps over the ball swivel. Machine bolt in base is loosened to relieve plate pressure for adjusting vise. Latter is supplied with a plate for drill-press and milling-machine use as well as a clamp for mounting on edge of a workbench. Vise is quickly changed from bench to machine work

11. HAND-TAPPING GUIDE automatically squares tap or reamer with hole to assure accuracy. As tool is held true at all times, guide eliminates the high percentage of tap and reamer breakage caused by twisting or bending out of alignment. Base of jig is ground square with guide sleeve and the tap holder works smoothly in the sleeve. Tools are inserted and removed easily as slotted guide base grips holder shank while handle is turned to loosen tap

12. ELECTRIC PAINT REMOVER operates quickly and economically through use of radiant heat. Designed for professional and home use, device consists of two skids under which a 1000-watt tubular heater is mounted. As remover is slid over surface, heat softens and blisters paint so it can be removed as rapidly as operator can scrape it off with a putty knife. Skids keep heat a safe distance from surface and reflectors keep the plastic handle cool

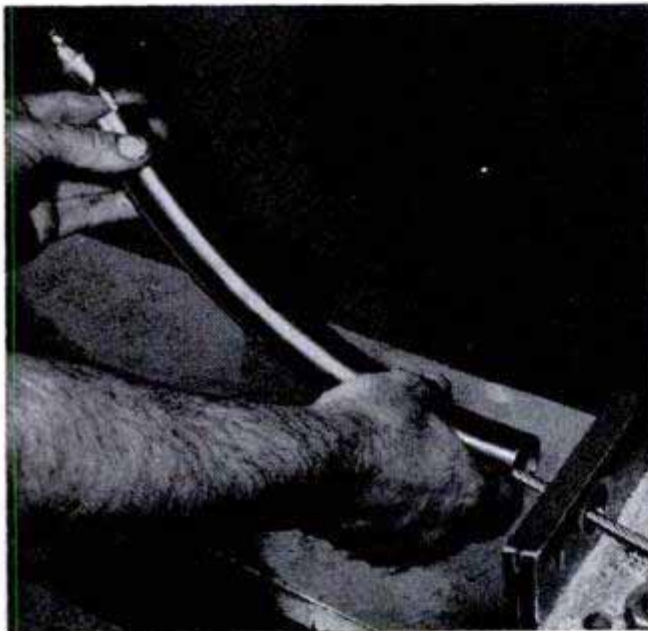
13. WOOD-BORING SET for 1/4-in. drill permits boring holes from 3/8 to 1-in. dia. to extreme depths; for instance, as much as a 27-ft. span of floor joists. Shank extensions, obtainable in 6 or 12-in. lengths, can be joined together without removing bit from work. A socket-head setscrew holds each extension in place. Front-rake design of the bits requires less horsepower, thrust and pressure than with ordinary bits and, at the same time, drills a smoother hole

Double-Swing Farm Gate Closed by Coil Spring

You won't have to set down a load you are carrying to open the yard gate if you hinge it to swing both ways and use a spring arrangement to keep it closed. This consists of a length of channel iron bent to the shape shown and welded to the top of the gate. To this is attached a coil spring, which is fastened to one of the fence posts close to the gate. Strength of the spring needed will be determined by the pressure required to close the gate. If small children are to use the gate frequently, the strength of the spring should not be so great that it presents a possibility of the gate flying back and injuring one of them as they pass through.



Steel Balls Drawn Through Tubing to True Diameter After Bending

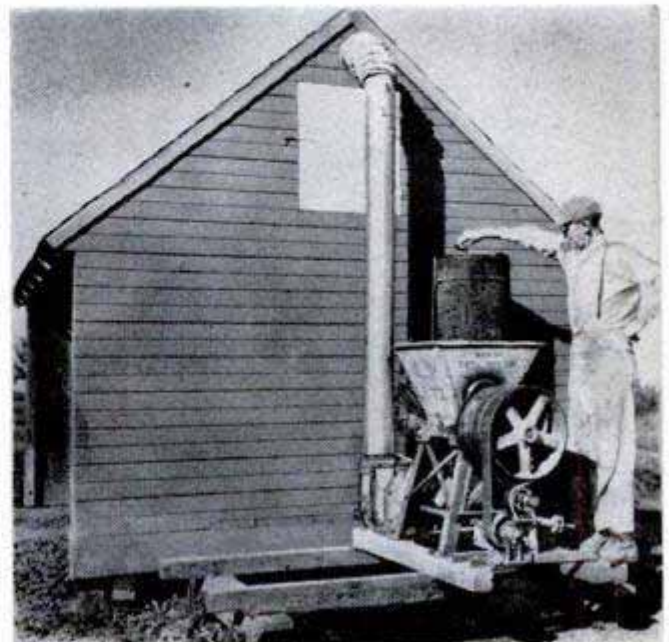


To restore tubing that has become distorted during a bending process to the exacting tolerances required by modern aircraft, one manufacturer developed a re-sizing operation in which steel balls are drawn through the tubing on a hydraulic cable-testing machine. From two to four egg-shaped balls in graduated sizes are used, each of which is drilled to take a short length of cable. After they have been coated with grease, the balls are connected to the machine by means of the cable and drawn through one at a time, starting with one of the smaller sizes and working up to one having the same diameter as the inside of the tubing. The operation, which is set up and performed by one person at the Texas Engineering & Manufacturing Company, Inc., has made possible tolerances as close as .001 in.

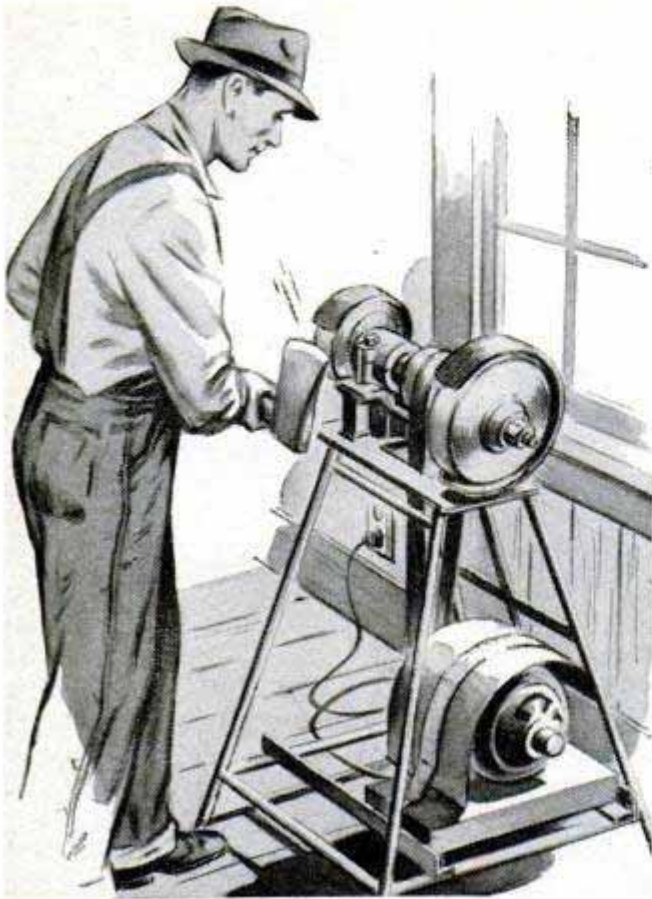
Grinder Mounted on Feeder Skids Saves Handling of Materials

By simply extending the skids of a cattle-size self-feeder, one farmer provided a sturdy mounting base for a burr-type grinder. In this way ground feed and supplements are blown directly into the feeder hopper, thus saving time-consuming handling of the materials. Note that an oil drum is mounted on the grinder frame just above the hopper. This serves as a container for supplements fed into the grinder by means of an improvised gate which covers a small opening cut in the bottom of the drum. By opening the gate to different positions the flow of supplements into the grinder can be closely controlled.

Electrician's tape wrapped around the handles of pliers for insulation will wear longer and the tool will be easier to handle if coated with household or model-airplane cement.—N. W. Byrne, Hamilton, Ont., Can.



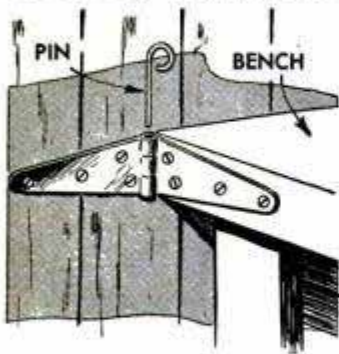
Rigid Stand for Power Grinder Made From Scrap Pipe



Lengths of scrap pipe, together with angle-iron braces for supporting an electric motor, were welded together to make this power-grinder stand for a farm shop. A piece of sheet metal was mounted over the motor as shown to protect it from abrasive particles. The grinder is connected to the current by means of a long cord, making it possible to move unit outdoors when necessary for work on large machinery.

A. M. Wettach, Mt. Pleasant, Iowa.

Loose-Pin Hinges Lock Workbench Securely Against Shop Wall



If your workbench has a tendency to be a little wobbly or for any other reason you would like to have it secured against a wall, yet have it so that it can be moved away easily, use loose-pin hinges as indicated.

Screw one leaf of each hinge to each end of the bench. Then screw the other leaves of the hinges to the wall and substitute pins bent from heavy wire or small rod stock for the pins that come with the hinges. The pins you make should have a loop

formed on the upper end to aid in withdrawing them easily. The best way to do the job is to screw the hinges to the bench and then move the bench into position and screw hinges to the wall. In this way you will be able to remove the pins and have the leaves in perfect alignment.

Leaky Fuel Tank Repaired While Still on Car

Small leaks in automobile fuel tanks can be repaired without removing the tank by using a 1/4-in. section of thin-wall conduit as a dam around the leak. Apply plastic auto-body solder to the outside surface of the conduit after it has been placed around the leak. When the solder is completely dry, plug the conduit section with a cork and cement the cork in place with more body solder.



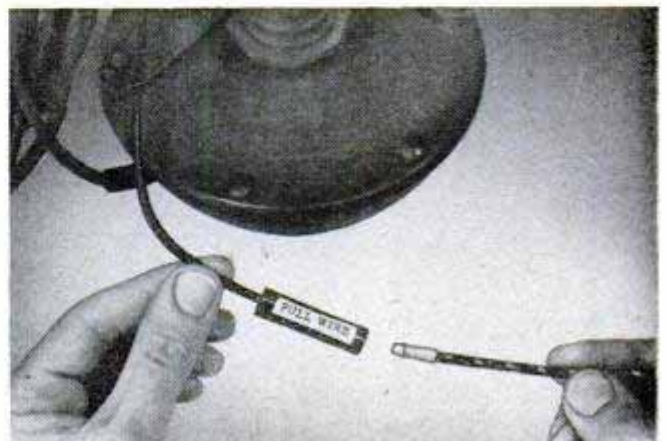
Sprinkler Heads in Spraying Booth Protected by Paper Bags

Automatic sprinkler heads in paint-spraying booths may become fouled by hardened lacquer and paint. This condition can be prevented by fitting small, fragile, paper bags over the heads. In the event of fire, the bags will burst quickly and not interfere with the normal operation of the sprinklers.—Howard Nichols, Canton, Mass.

Shorted Auto Horn Disconnected

Embarrassing moments spent frantically hunting a screwdriver or pliers when an automobile horn becomes shorted and sounds accidentally can be avoided by inserting a small snap-in wire connector in the switch wire immediately next to the horn. Paint it a bright red and label so that anyone opening the car hood can see it.

Roger Johnson, Lusby, Md.



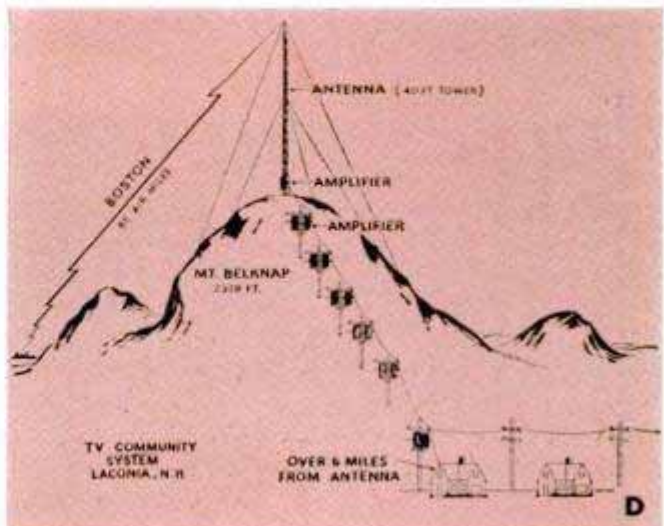
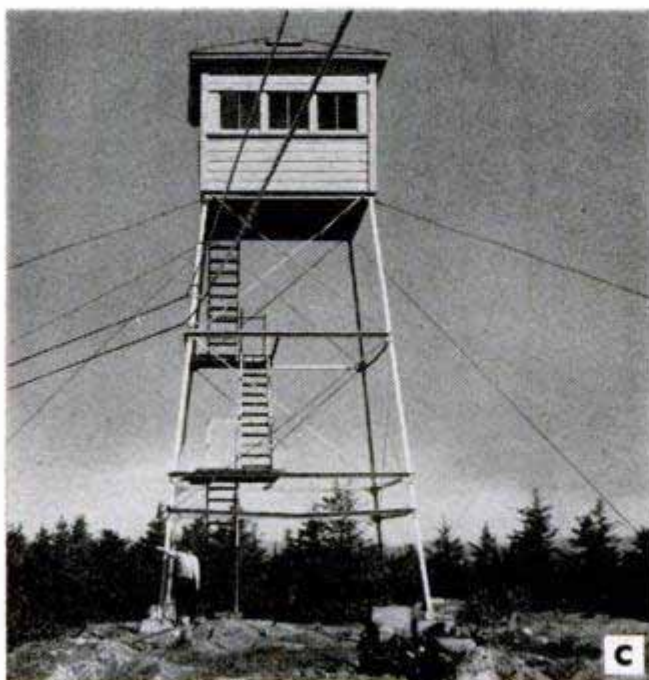
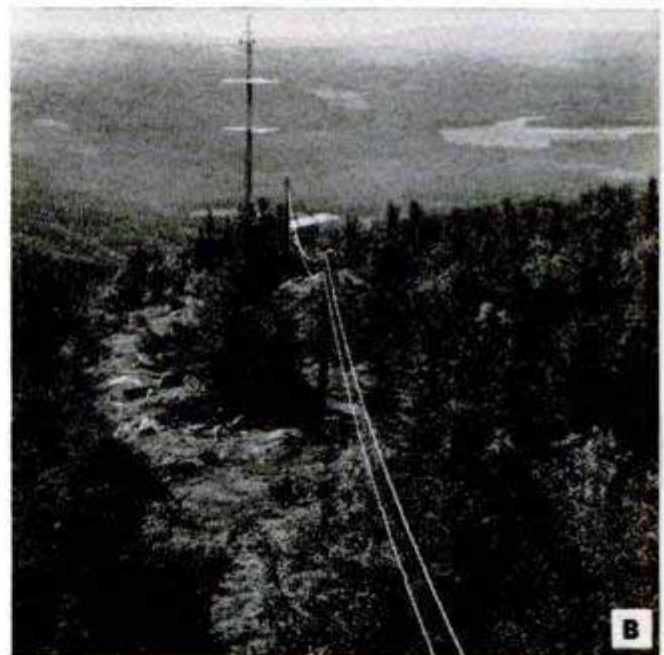
RADIO *Television* ELECTRONICS

COMMUNITY TV-ANTENNA SYSTEM

GOOD TV reception in Laconia, N. H., from Boston stations nearly 100 miles away presented what looked like insurmountable difficulties. These, however, have been overcome by RCA engineers with their Antenaplex system. It consists of a master TV-antenna tower on top of Mt. Belknap, the antenna being tuned to bring in the clearest possible signal from each of the stations. Diagram D shows the antenna tower, the amplifying system at the base, the series of line amplifiers down the mountain and through the town, and finally the booster amplifiers where the lines are tapped for the home customers.

Photo B shows the coaxial cable coming over and down the mountain to Laconia which dips like a saucer in the surrounding mountains. Up to this time TV reception there had been very poor; now the signals are clear, and all tall roof-top antennas have been eliminated. Photo A shows the system being tapped to bring the signal into a home in Laconia. The tower amplifier station appears in photo C.

The set owners' subscription price is fixed at \$169.00 for installation and there is a monthly charge of \$3.95. The old tall-mast antenna arrays formerly used in the neighborhood cost between \$75.00 and \$175.00.





HOW TO MAKE YOUR TV

By John B. Ledbetter

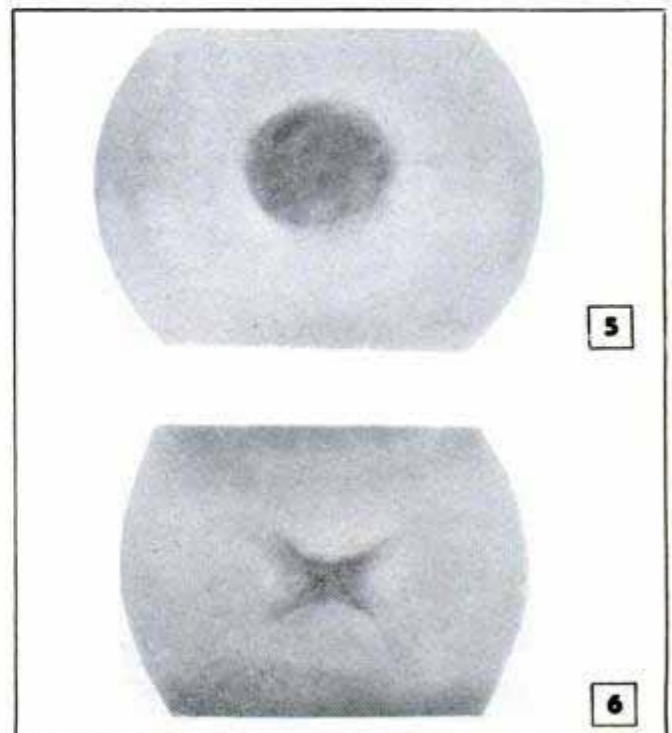
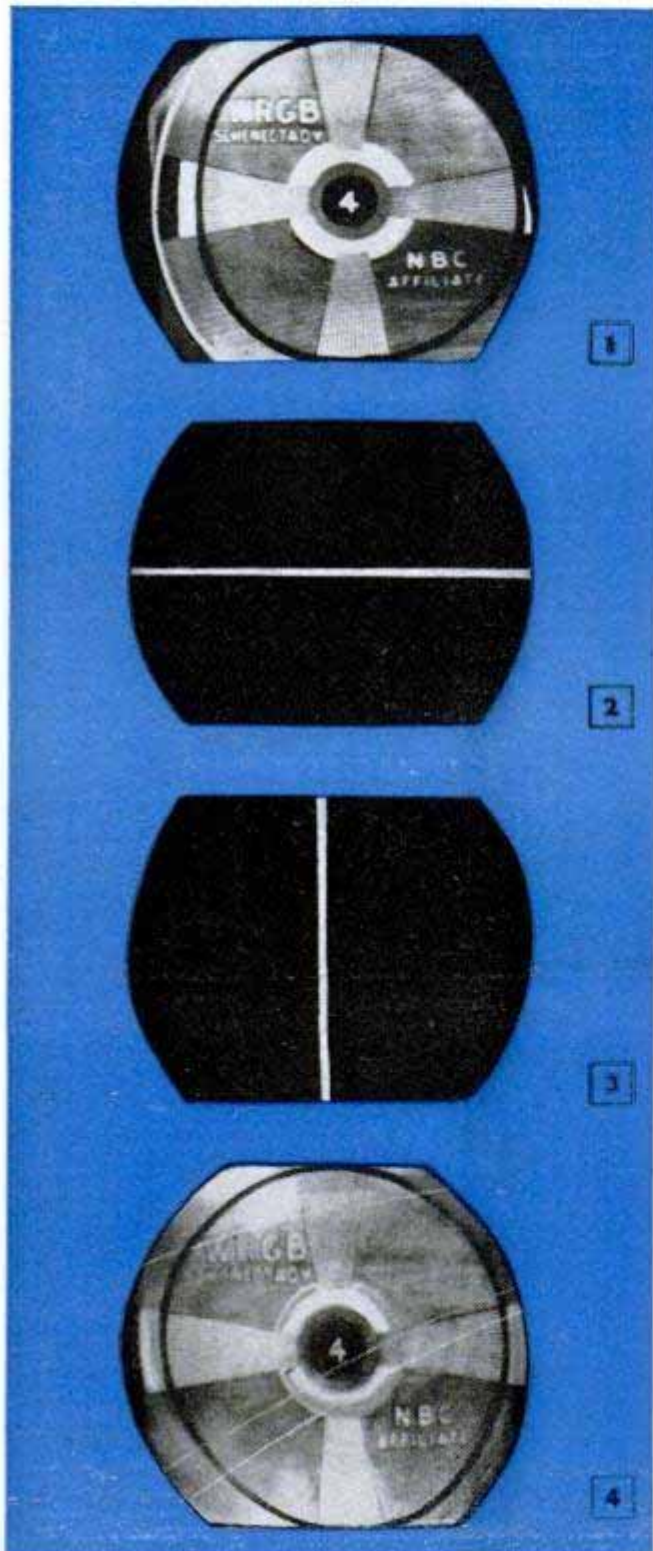


EVERY TV-set owner is interested in making his picture tube last as long as possible. While the following information cannot guarantee that the tube will last forever, it will help to stretch its normal life as far as possible. When adjusting or operating your TV set, never turn the brightness control full on for any length of time. With large tubes of the 20 to 30-in. variety, only a few seconds at full brilliance will cause permanent damage to the screen coating, especially if the ion-trap magnet is not adjusted perfectly.

If you are not familiar with television circuits do not attempt to make any adjustments inside your set. High voltages as well as dangerous low voltages are present when the set is connected to a power-line outlet. The set manufacturer provides a safety interlock for this reason so that the rear cover cannot be removed for simple tube replacements, or any other reason, without automatically disconnecting the set from the power line, see photo A. All necessary adjusting and tuning controls for the average inexperienced TV-set owner are external.

A poorly adjusted ion-trap magnet can cause dark corners or shadows on the screen as indicated in Fig. 1. Poor focus, low brightness, or a slight off-centering of the picture may stem from the same cause. Check with your serviceman if any of these troubles are present.

Do not leave your TV set turned on while you visit with neighbors. If you leave the

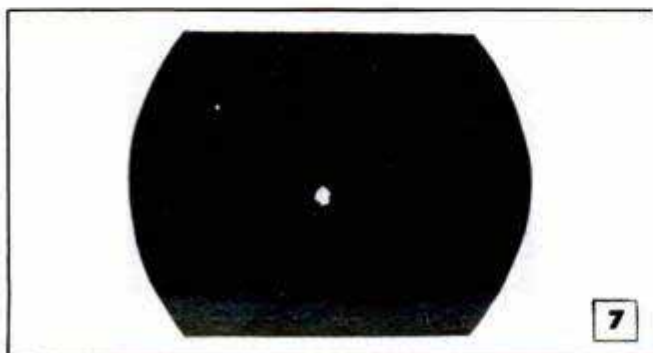
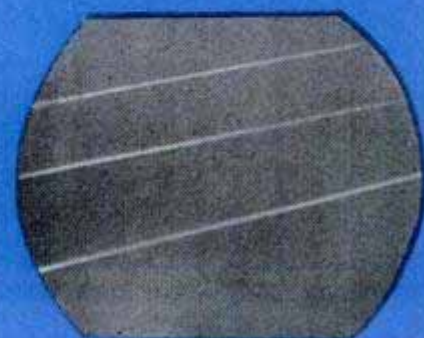


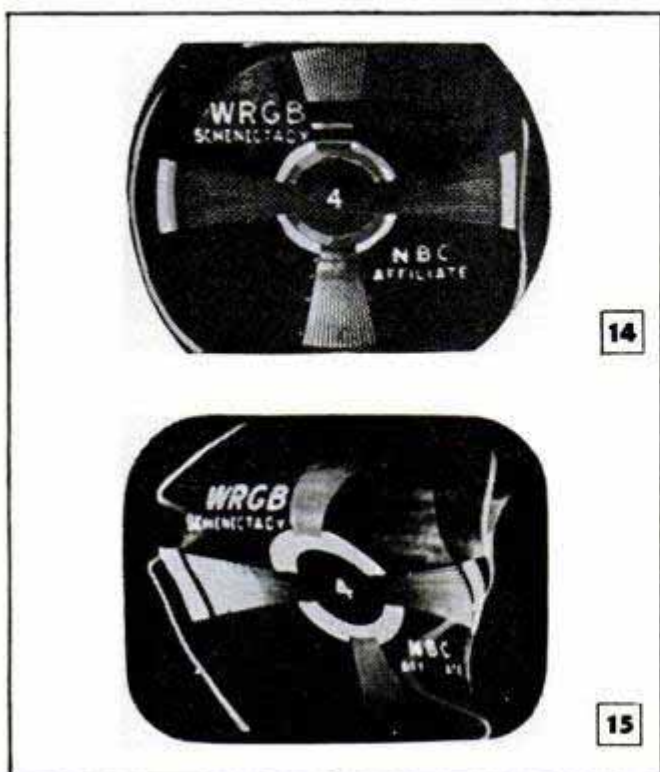
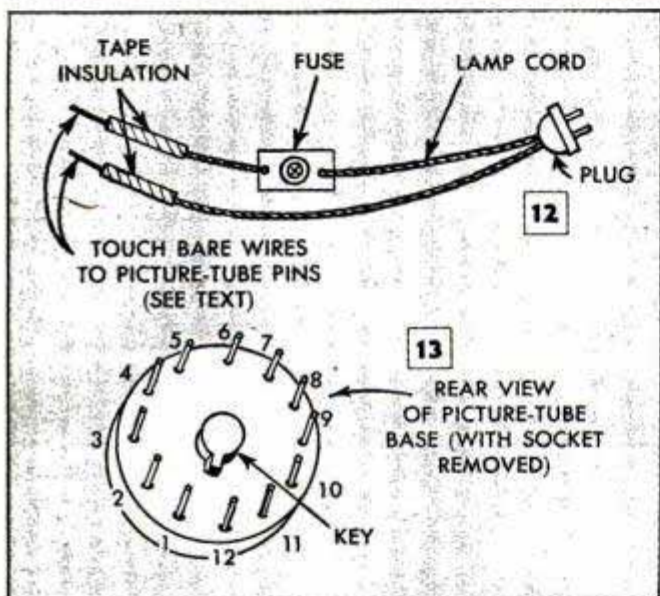
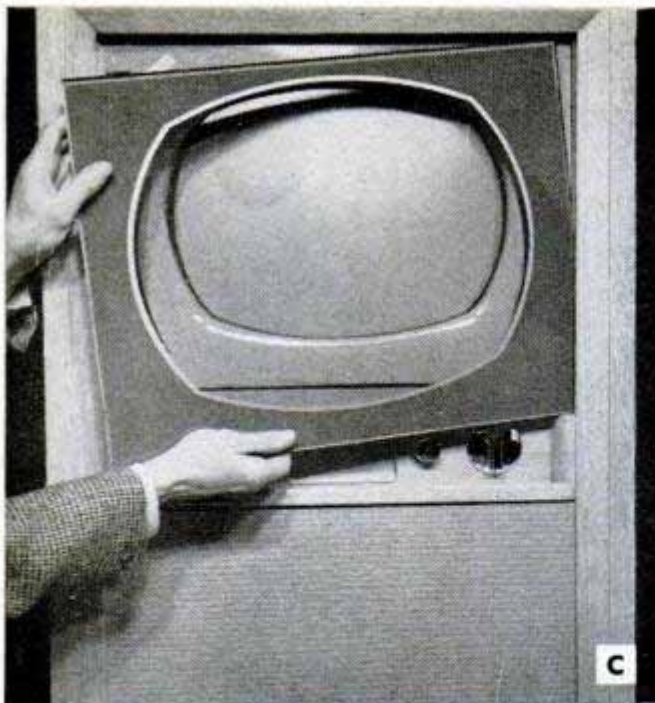
PICTURE TUBE LAST LONGER

room to answer the phone or doorbell, or if you listen to the sound only when busy in another room, turn the brightness control down. This will prevent burning a thin white line into the screen (Figs. 2 and 3) if one of the "sweep" tubes should fail. Some of the following picture-tube troubles will require checking by your serviceman, others you may be able to remedy for yourself. At any rate you will know where you stand if difficulties should arise.

Brightness in any picture tube will drop rather rapidly during the first 500 hours of use. Then it tapers off for the next 1000 to 1500 hours. If the drop is normal you do not notice it because it takes place so gradually that you automatically compensate by turning up the brightness control. Low brightness, Fig. 4, does not always mean that the picture tube has gone bad. More often than not, it is caused by some weak tube in the circuit, a defective filter condenser or resistor in the high-voltage section or simply by a heavy collection of dust and soot on the front of the picture tube and on the inside of the safety glass. This safety glass can be removed as illustrated in photo C, and special cleaning fluids are available from your TV dealer. The tubes to be checked are as follows: the high-voltage rectifier, horizontal oscillator, horizontal output and horizontal damper. (In most sets, these are numbered 1B3GT, 6BG-6G or 6CD6GT, 6SN7GT, 6V6G, 5V4G, 6W4G.) If these tubes are good, the serviceman should make the other checks previously mentioned. A bad resistor can make the picture "bloom" or change size and lose focus when the brightness control is turned up. A bad capacitor (condenser) may cause the picture to be dim or completely dark.

Ion spots, Figs. 5 and 6, are brown or amber in color and usually appear in or near the center of the screen. In this case there is nothing you can do except replace the picture tube, or put up with the trouble. If your set is within the warranty period, call your dealer or distributor as soon as you notice the discolored spot. Most distributors





make a satisfactory adjustment if the spot is caused by an internal defect. Some picture tubes will give off flashes of light for a short while after the set has been turned off. This is not important and will not harm the screen. If a tiny, brilliant spot (Fig. 7) should remain on the screen after the set has been turned off, it may eventually burn or discolor the screen. You can prevent this by turning the brightness control full on after the set is turned off. Always be sure to return the brightness control to normal before the set again is turned on.

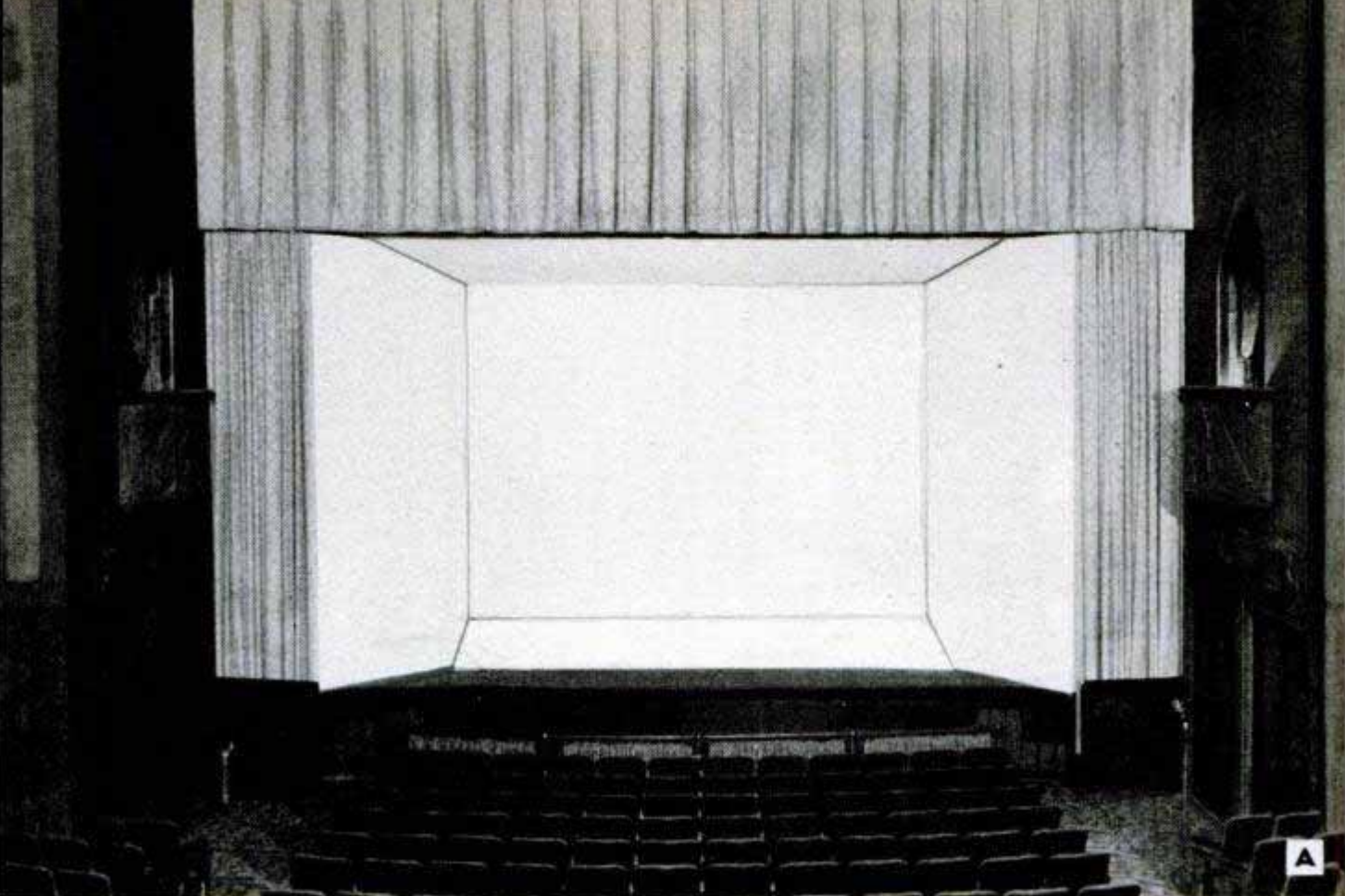
A shorted picture tube will make the picture resemble Figs. 4, 8, 9 and 10. Turning the brightness control full on will have no effect on the screen. In some TV-set models this effect can be due to a shorted capacitor across the brightness control. In other models, a shorted picture tube will leave the screen bright but with no picture, as in Fig. 11.

If the picture tube is still within the warranty period, contact your dealer immediately. If the warranty period has passed and you are reasonably sure that it is shorted, check with your serviceman.

The following test may be made by the experienced set owner, experimenter or student if he wishes to try it. It has cleared up many shorted tubes and, after all, if the warranty has run out, you have nothing to lose as the tube must be replaced if the short is not eliminated. The first step is to remove the power-line plug from the wall receptacle. Then take off the back cover of the set and remove the picture-tube socket. Its location is indicated by the arrow in photo B. The next step is illustrated in Figs. 12 and 13. Make up the test cord from an ordinary lamp cord as detailed in Fig. 12. The fuse in one of the leads should be of lower amperage than the house-line fuse and it is merely employed in case you accidentally short the two wires. Plug the lamp cord into a wall outlet after first making sure that the ends are not touching. Now locate pins 2, 11 and 12 on the picture-tube base, by checking their respective key positions as indicated in Fig. 13.

Note that the pins are numbered clockwise. Holding the lamp cord at the tape-insulated ends, place one lead on pin 11—then touch the other lead first to pin 2, then to pin 12 (do this several times if necessary). Just be sure that you do *not* connect the lamp-cord leads to pins 1 and 12 as this will burn out the tube. Many times this test has cleared the short and given the picture tube extra months or years of useful life.

When picture tubes become magnetized by a near-by speaker or other strong magnetic field, the typical effect is shown in Figs. 14 and 15. Metal-cone tubes can be demagnetized by your serviceman. ★ ★ ★

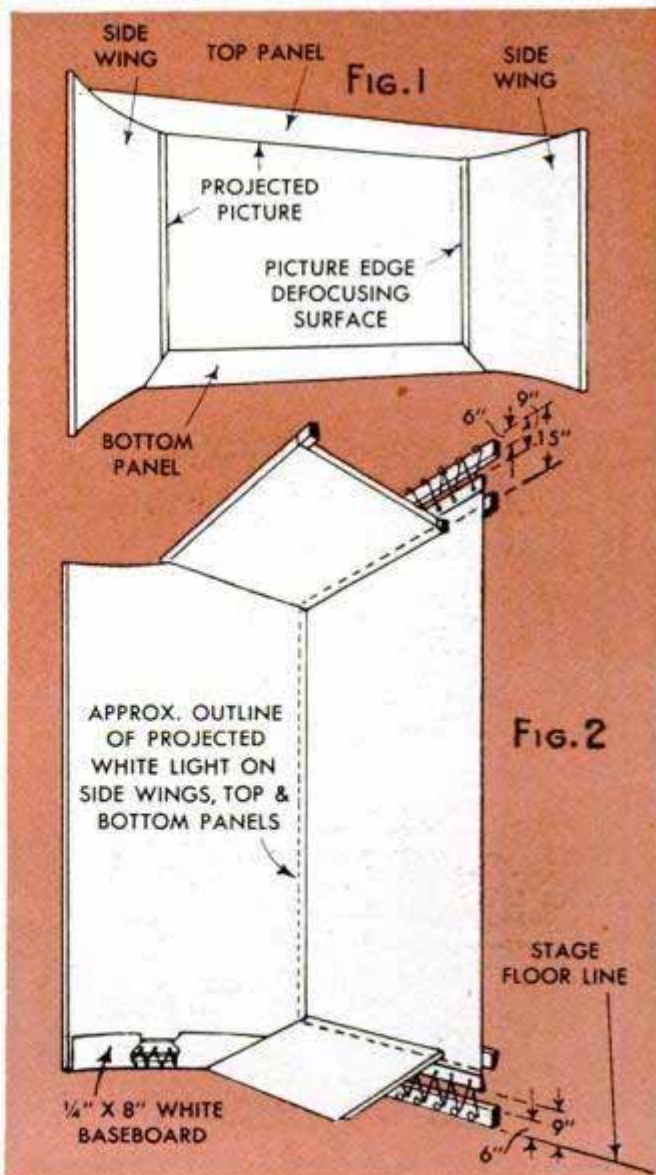


MOVIE SYNCHRO-SCREEN HEIGHTENS VISUAL IMPACT

PERHAPS one of the most important improvements in the pictorial presentation of motion pictures in 25 years is the new RCA wide-vision screen. This Synchro-Screen is a stage setting that utilizes a "surround" of screen-covered panels or wings at the sides, top and bottom. It is scientifically designed and assembled to produce an extension of the projected light, continuously synchronized in intensity and color with screen imagery. In other words, these panels pick up and reflect diffused light from the picture. When color pictures are shown, reflected hues appear on the wings and panel. This imparts to the viewer a new and dramatic sense of realism by making the action on the screen appear to occupy a larger portion of his field of vision.

Recently installed at the Palace Theater in Chicago, the first picture shown was the *Greatest Show On Earth*. When viewed by the audience, the optical impression was that of looking at a live scene. The picture appeared to be larger, less confined and more realistic as color is softer.

Photo A shows a theater installation; wing and panel details are given in Figs. 1 and 2. Reflection of light on the wings eliminates the sharply contrasting outline of the screen image and makes it appear to taper off in the outer portions.



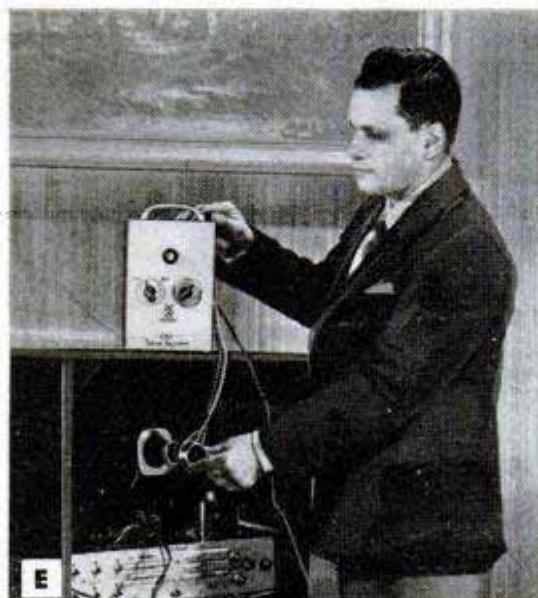
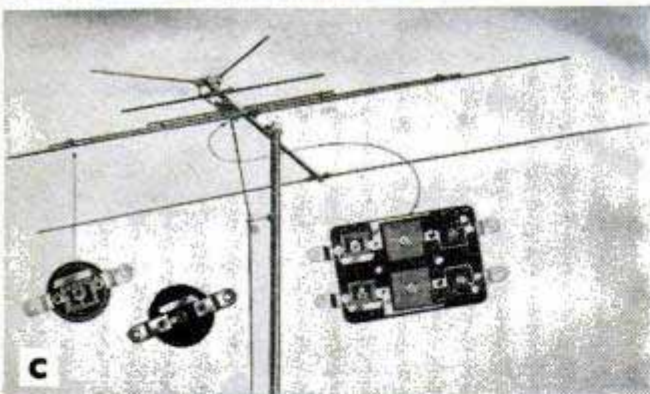
TELEVISION TODAY

INTEREST in the progress of television is international. Many countries will expand their TV stations and viewing audiences in 1953. A special hearing aid for deaf radio and TV listeners, shown in photo A, recently was demonstrated at the National Radio Show in London. Volume and switching are controlled by means of two knobs on the switch box connected either to the radio or to the TV set.

Here, in the United States, TV receivers are being built into the walls of new homes. One manufacturer of mantels includes a 17-in. TV sets of standard make in one of its mantel designs illustrated in photo B. The new UHF (ultra-high-frequency) TV stations will soon be on the air both in cities and in areas not now served by the standard VHF stations. These UHF signals require special antenna arrays for their reception. The one shown in photo C is claimed to cover all television channels, both standard VHF and the new UHF.

Many troublesome TV-interference problems will be solved in 1953. Manufacturers and servicemen are improving their products and techniques. Many set owners can help themselves and save time and money within reasonable limits. For example, if you are in an area where line voltage tends to increase up to 140 volts you can protect your set by plugging in a line-voltage ballast resistor between the TV set and the electric receptacle, as illustrated in photo D. Photo E shows a TV-picture-tube reactivator that is claimed to lengthen the useful life of worn and dim picture tubes that normally would be discarded.

The RCA tricolor picture tube, so important in the all-electronic color-TV system, appears in photo F. Basic improvements in these three-gun tubes have been made.





Using an electron tube developed by RCA, automotive engineers have perfected an instrument which automatically controls automobile headlights.

Out of the stars — a cure for headlight glare!

When RCA scientists developed an electron tube so sensitive that it could respond to flickering starlight, astronomers promptly put it to work in their studies of the Universe.

Called a *multiplier phototube*, RCA's invention now "takes to the road" in an instrument which will add to your safety in night driving. The multiplier phototube is now being used in an *automatic control for automobile headlights*.

Here's how it works. RCA's tube, in a new system, sits behind your windshield to "see" approaching headlights. A car comes, and instantly the multiplier phototube activates a

system which shifts your headlights to low beam—then returns them to high when the other car has passed. It's simple. It's completely automatic. And what's most important, it lets you keep your undivided attention where it belongs . . . *on driving your car*.

Development of the multiplier phototube is another example of how RCA research benefits you. RCA research assures you finer performance from any product or service of RCA and RCA Victor.

See the latest in radio, television and electronics at RCA Exhibition Hall, 36 West 49th Street, N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, New York 20, N. Y.



RADIO CORPORATION OF AMERICA

World leader in radio—first in television

Adventure in Color Pictures

The world of miniature
color photography is
exciting . . . rewarding.
Here you can pick a
"team of two" to help
you discover it.



THERE'S nothing more satisfying than "shooting it in color" on Kodachrome Film, then staging grand color shows. On these pages you see expert Kodak miniature cameras for taking color shots . . . projectors and viewers for showing big images of the beautiful color slides you get. Let your Kodak dealer help you select a camera-and-projector "team" to fit your budget. Ask,

too, about full-color prints and enlargements from your slides.

. . . .
Latest in home projection is the brilliant new Kodaslide Highlux III Projector, shown above. Its 300-watt lamp, combined with a specially designed optical system including Kodak Projection Ektanon Lens, 5-inch $f/3.5$, gives top brilliance plus unsurpassed color purity and over-all definition. Three-way slide cooling—by baffles, a fan, and heat-absorbing glass. \$56.50 (including carry case with built-in fan).



New economy 35mm. camera —
The new Kodak Retinette Camera is a miniature beauty. Slips into small coat pocket. Fine three-element $f/4.5$ lens assures sparkling color slides. Has automatic film stop, counter, double-exposure prevention. 8 speeds to $1/300$. . . and a delayed-action setting. Built-in flash "synch." Only \$59.50.



New model of famous Retina Camera—The new Kodak Retina IIa Camera with Schneider Retina-Xenon $f/2$ Lens and Synchro-Compur Shutter, 1 second to $1/500$, is designed for action work in color. Single window for range finder and view finder; rapid lever-action film wind; automatic film stop; double-exposure prevention. \$164.10.



Moderate-price range-finder "miniature"—The new Kodak Signet 35 Camera features Kodak's finest lens—Ektar $f/3.5$ —for extra color brilliance. Speeds to $1/300$. Built-in range finder, flash "synch." Exclusive ball-bearing action for ultra-smooth focusing; automatic exposure counter; film stop; double-exposure prevention. \$92.50.



Kodak Pony 828 Camera (left)—Inexpensive color camera with color-corrected Kodak Anaston $f/4.5$ Lens; Kodak Flash 200 Shutter. Takes 8-exposure black-and-white, Kodachrome, and Kodacolor Film. Only \$31.15.



Kodak Pony 135 Camera (right)—Makes superb color slides on Kodachrome Film. Has automatic film stop and exposure counter. Uses all Kodak 135 Films, 20 or 36 exposures. A good buy at \$35.75.



Kodaslide Table Viewer, Model A (left)—Projector, screen, and slide changer in a single unit. Projects brilliant images in lighted room. Takes 75 cardboard or 30 glass slides. Images appear as push-pull plunger positions slides. \$97.50.



Kodaslide Table Viewer, 4X (right)—This budget-priced viewer enlarges slides four times on its built-in screen. Showings are effortless. \$49.50.



Kodaslide Merit Projector (left)—Features improved slide-feeding mechanism on top of projector, eliminating danger of jarring instrument. Includes Kodak Projection Ektanon Lens, 5-inch $f/3.5$. \$26.10.



Kodaslide Projector, Master Model (right)—Fast lenses, 1000-watt lamp can deliver more light to screen than any other 2 x 2-inch slide projector. Choice of 4 lenses. From \$169.00.

New Kodaslide Highlux II Projector (right)—This highly capable 200-watt projector is a companion product to the Highlux III. Features include Kodak Projection Ektanon Lens, 5-inch $f/3.5$; heat-absorbing glass for slide protection; two Lumenized condensers for uniform light distribution over the picture area. If, later, you wish to convert to 300-watt screenings, you can do so very easily. Simply purchase the Kodaslide Highlux Blower Case for \$19.20 and insert a 300-watt lamp (extra). Price of the Highlux II, \$36.50.

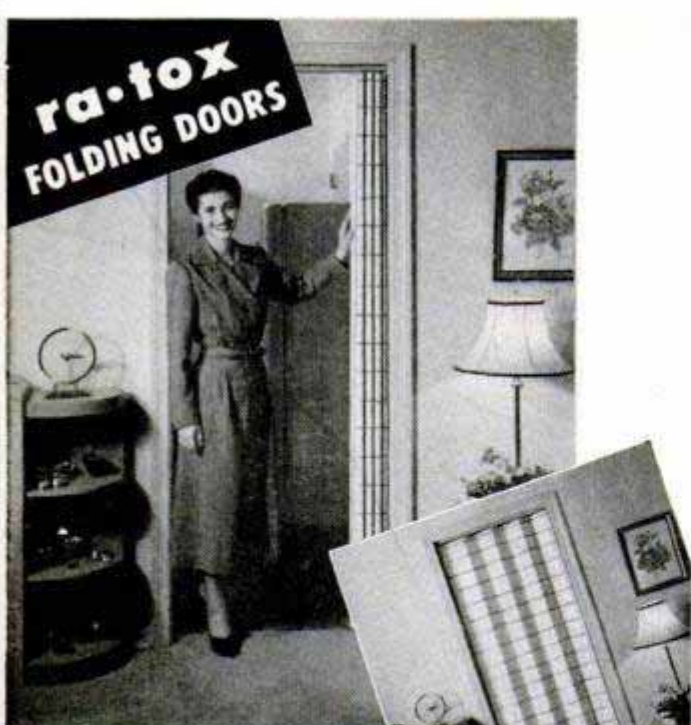


You can see this equipment, and many other interesting items, at your Kodak dealer's. Stop in any time and ask for a demonstration. His professional knowledge and experience will prove valuable in helping you make a selection that will best suit your needs.

Eastman Kodak Company, Rochester 4, N. Y.

Prices subject to change without notice and include Federal Tax where applicable.

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cost way*

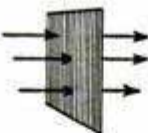
**TO ADD MORE ROOM AND
BEAUTY TO YOUR HOME**

DO IT YOURSELF, IN A FEW MINUTES

When rooms are small or you can't set furniture right, replace swinging doors with RA-TOX Folding Doors . . . Swinging doors take up space while Ra-Tox Doors hang from the top of the door frame and fold to the side. With this one change you also replace the plainness of hinged doors with folding doors that add beauty to your entire home. Ra-Tox Doors are made of woven wood slats, "natural stain" finish or choice of smart, new colors.

AIR FLOW: Narrow slat construction lets air circulate through door. Permits air-flow for proper heating and air conditioning. Ideal for clothes closet ventilation . . . ends dampness and musty odors.

Supplied complete with hanging hardware. You simply screw overhead track to top of door frame and anchor molding to door jamb. Takes only a few minutes.



Here is a typical clothes closet. Ra-Tox Door eliminates cost of door wall. Hang Ra-Tox door from ceiling to floor. Easier to build closet interior. Ra-Tox Folding Doors supplied in any door or room divider size.

Used everywhere by builders and home owners. Easy to install. Low cost. Beautiful. See your lumber yard or building supply dealer . . . or write for Ra-Tox Folding Door Bulletin No. 706.

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FOR WARDROBES

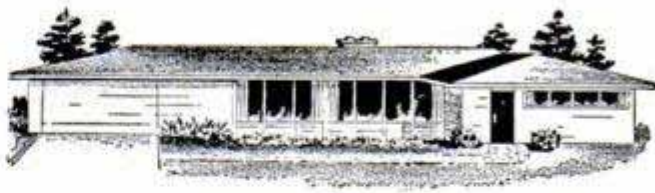


ROOM DIVIDERS



KITCHENETTE
CLOSURES

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.



Removing Decals

Q—How can I remove decal transfers from a painted wall? I have applied decals to the original paint job and now I want to remove them before painting the walls again. Also, is there any coating I can apply over the new paint so that the decals can be easily removed later on without damaging the paint on the wall?—G.T., W. Va.

A—You can remove decals from painted walls by applying a lacquer thinner, or reducer. However, unless care is used to apply the thinner only to the surface of the decal, the paint is likely to be damaged. Also, there may be an objectionable spot remaining when the decal is removed. A better way is to use the special felt pad supplied for removing decals without danger of damaging the paint film underneath. These are readily available at paint stores and come with full instructions for use. Although not recommended by the manufacturers of decals, you can make the transfers easier to remove simply by coating the spot where the decal is to be applied with paste wax. Apply only a thin film of wax and polish to a high luster before the decal is applied. Remove the decal by applying hot water.

Downspout Splashpads

Q—The downspouts on my new home empty directly onto the ground at the corners of the house as our local building code does not permit connecting them to a drain. How can I prevent water from the downspouts washing away the grade at the corners of the house? As it is, it will be impossible to seed the area.—C. H., Ill.



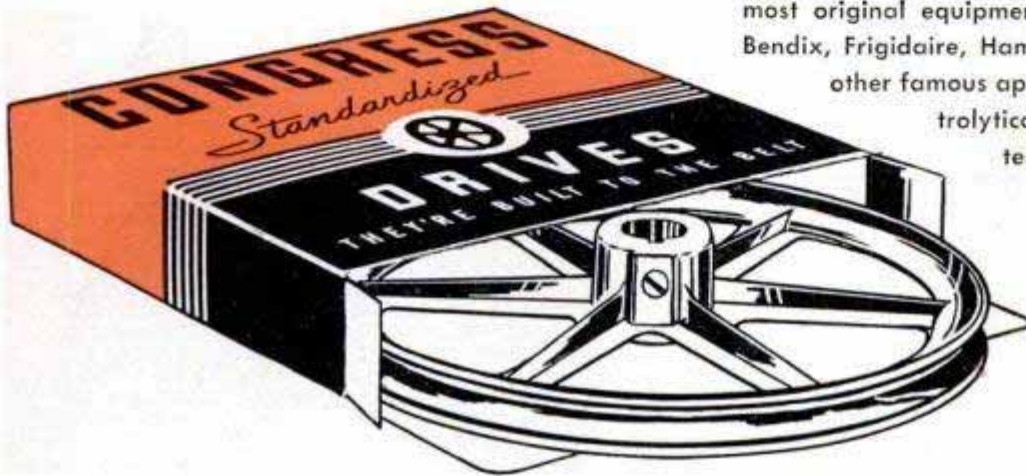
A—Anything that will spread the stream of water from the downspout will prevent washing of the soil. Some homeowners embed a large flat stone under the end of the spout elbow so that it slopes slightly away from the foundation wall. This will serve to break up and spread the stream when the quantity of water is not too great. A somewhat

(Continued to page 238)

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QUALITY COSTS YOU NO MORE!

Now you can get the finest quality pulleys from your local supplier. These are the Congress Pulleys used by most original equipment manufacturers — standard on Bendix, Frigidaire, Hamilton, General Electric and many other famous appliances. Congress Drives are electrolytically plated, diamond-bored and tested for trueness.



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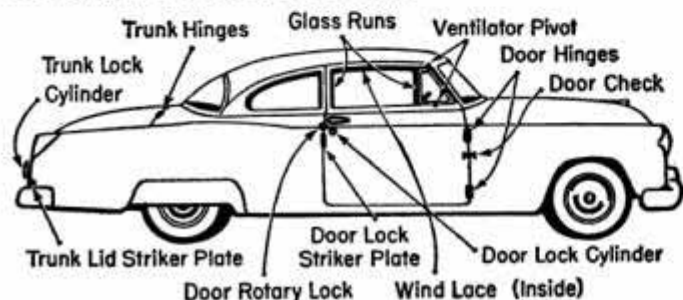


Care and Feeding of Engines

BY S. P. CORP

BODIES NEED LUBRICATION, TOO

Body lubrication is necessary if you want a quiet car, because body noises are caused by dry surfaces rubbing together. To do a good job, you will require a can of light engine oil, a stick of lubricant or a grease pencil, and a tube of powdered graphite, all obtainable at any gas station or car dealer.



QUICK GUIDE TO BODY LUBRICATION

1. Refer to the diagram and apply a thin coating of graphite to all glass-run channels, working glass up and down until graphite is worked in. Insert end of graphite tube into key opening of door locks, squeezing tube to force graphite into working parts; also the trunk lock.
2. Use grease pencil to apply a thin coating on door lock striker plate and trunk lid striker plate. Open doors and apply grease pencil to each weather cord, the cloth covered tube around each opening, wherever it contacts the door. Friction between weather cord and door often causes door squeaks.

OIL HINGES AND FRONT SEAT TRACKS

3. Apply light oil to all door and trunk hinges, door checks, door rotary lock, and pivots on door and window ventilators.
4. Front seats are usually on tracks. A few drops of oil here will make seat move with less effort and more quietly.
5. When windows are hard to operate, remove door or window trim pad and apply grease to window regulators, using your grease pencil.
6. Part of your body lubrication job should be a careful check to see that drain holes in the bottom of each door are open, so that rain running down the windows can find its way out. Clogged drain holes can cause doors to rust out from the inside.

By following these simple instructions, you can keep the body of your car as quiet as when it was new.



WRITE FOR FREE BOOKLET

This new booklet, "MORE POWER, Less Gas, Less Oil," tells many facts about car care, and about new Sealed Power KromeX Ring Sets, engineered to fight heat, friction, abrasion, and corrosion in late-model cars and trucks. A postal card to Sealed Power, Dept. G-1, Muskegon, Mich., will bring your free copy. It can save you real money.

(Continued from page 236)

better block, or pad, can be made by building a pear-shaped form from 3-in. strips of sheet metal in an excavation from 6 to 10 in. deep. Fill the excavation to the bottom of the form strip with gravel and tamp firmly. The metal form should be curved to the desired shape and held with wooden stakes, the top edge of the form being about 1 in. above the level of the grade. Then fill with concrete and trowel the surface to a concavity of about 1 in. leaving the lower edge flat. Size can vary but ordinarily the pad should be about 18 in. wide and at least 36 in. long, with a 1-in. slope.



Soil Conditioners

Q—I'm wondering whether I should use one of the new chemicals that are said to loosen hard, cloddy soils. My garden plot is a stiff clay soil which becomes as hard as stone if it is worked when a trifle wet. I'm told that it should be plowed and left rough in the fall—that freezing and thawing will loosen the soil. Is this

right, and what about the chemical?—O. B., Ohio.

A—Soil conditioners aid in curing the condition you describe, but before they can do their best work, the plot must be plowed and worked when it is reasonably dry. Then the conditioner should be scattered and worked into the soil by repeated disking and harrowing, or deep raking, if the plot is small. Usually heavy, compact soils that tend to puddle and then harden after rains can be put in a good, friable condition by the addition of organic matter in the form of a green cover crop plowed under, the addition of compost or natural manures and whatever commercial fertilizers are required to supply adequate plant food. Many garden plots which have been plowed for many years develop what is known to agronomists as a "plow sole," which is a hard layer of compacted soil just below furrow depth. This tends to prevent normal movement of moisture and causes rapid drying of the topsoil.

Repairing Stonework

Q—I want to fill small, narrow cracks in stonework. Both the joints and the stone are affected. Small pieces of mortar have fallen out of the joints and there are several cracks in the stones which make the wall unsightly. How should I repair the wall?—J. O., Ark.

A—Broken mortar should be chipped and brushed from the joints and these repointed with new mortar, using a mason's pointing trowel. Narrow cracks in the individual stones can be filled with a mixture of litharge and glycerin. This should be mixed to a heavy paste and applied to the cracks with a stiff-bristled brush. If the stones are a dark-gray or reddish-brown color, the mixture can be colored to match by adding a small quantity of lampblack or red lead to the mixture.

Condensation in Water Heater

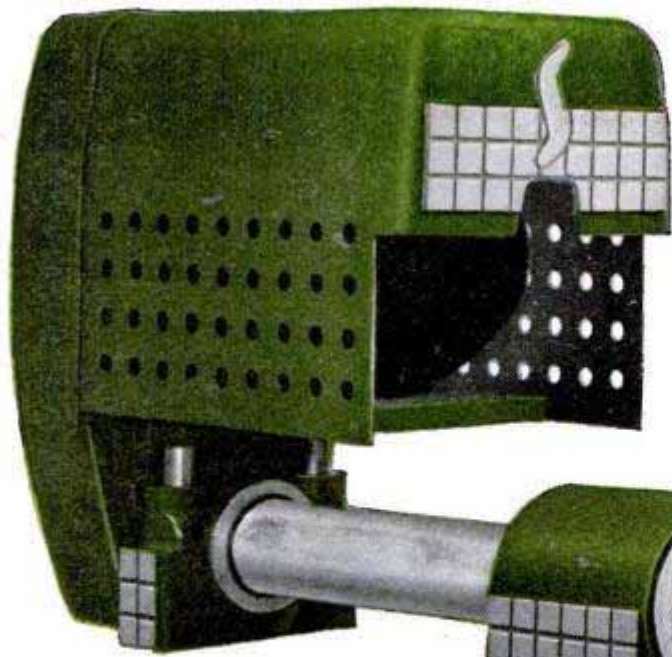
Q—I have a gas hot-water heater installed in the kitchen and vented to the chimney. When the heater is on, the pipe drips water. What is the cause, and how can I correct the trouble?—R. P., Calif.

A—One of the products of combustion is water vapor. This condenses on the surface of the vent pipe, which is cooler than the gases passing through it. Usually pitching the horizontal run of pipe at a greater angle will cure the trouble.

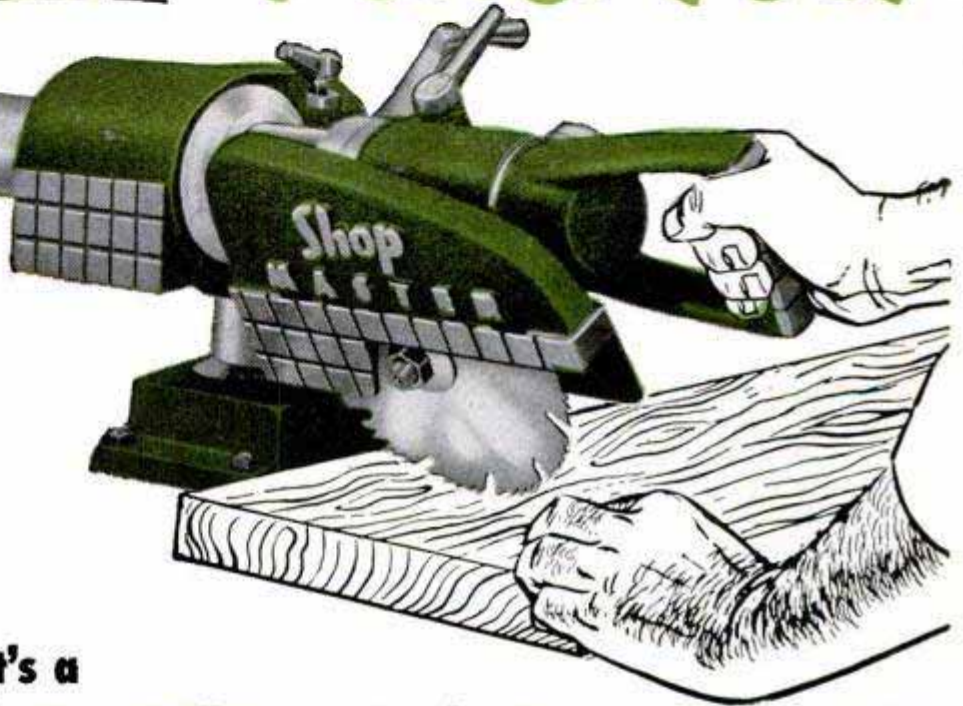
Correction

In our November 1952 issue the following appeared inadvertently: "Obtain a small quantity of muriatic-acid crystals" . . . This is incorrect. This acid is available only in solution; not in the crystal form.

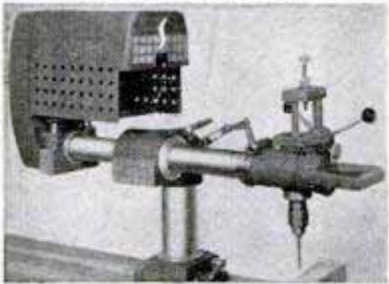
New ...SHOPMASTER
PRESENTS THE SENSATIONAL
Universal
INDIVIDUAL COMBINATION
Power Tool



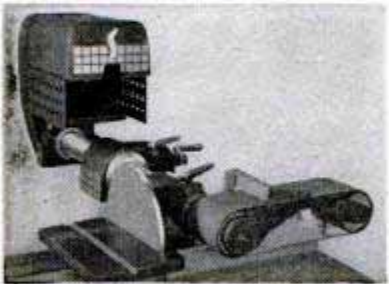
Patents Pending



As Ball Bearing Circle Saw
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As Ball Bearing Drill Press
 3" stroke, 18" throat. Drill, rout or mortise at any angle, in 36" circle.



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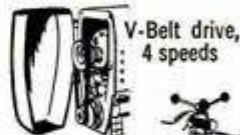
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(Continued from page 103)

of organic matter, carbohydrates, proteins, fats—in some form or other. And as animal life in many forms was found at greater depths than seven miles, there must be organic matter in these places. But where did it come from and in what quantities was it being produced? While animals break down organic matter to carbon dioxide and water, plants build up this material to carbon hydrates and other organic matters, which serve as food for fish, animals and human beings. It would, consequently, be of great importance to determine the production of organic matter in



Professor ZoBell used both feet and hands working to classify bacteria brought up from 30,000-foot depth

the sea. The *Galathea* people solved the problem. The production of organic matter in the sea has been investigated before, but the results have not been exact because the methods used—determination of the oxygen production of the plants—were by no means sensitive enough for the open sea. Therefore, it was imperative to develop a new method of greater sensitivity.

"The radioactive carbon isotopes, one of the first and biggest blessings of the atomic age, came to our rescue," says Dr. Steemann Nielsen, leader of this part of the expedition. In a few months he developed a method to determine the production of organic matter with the help of the carbon isotope C_{14} .

This new method was to give the most

(Continued to page 242)



—yours with these Wizards with Wood

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Produce those magical "woody" effects — on hard wood or soft, plywood or solid lumber with White Firzite. For light pastel tones, tint with Colors-in-Oil. (On fir plywood stain jobs, tame that wild grain with Clear Firzite.)

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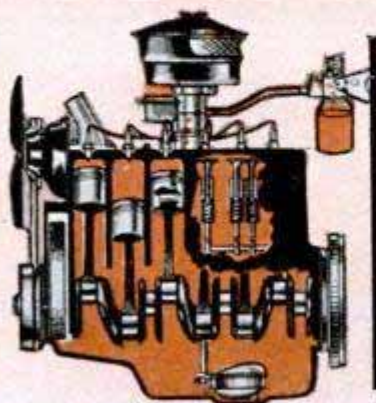


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astounding results. The radioactive element had to be purchased from the United States. It is expensive, but very little is necessary. A quarter of a gram was more than enough for the entire expedition.

If you put a drop of sea water under a microscope you will find it crowded with microorganisms, no bigger than $\frac{1}{100}$ millimeter. They are plankton algae, tiny green and golden plants of the craziest shapes. They produce the organic material, the amount of which the *Galathea* expedition was to determine. In principle this is done in the same way as other biological experiments with isotopes. The plankton cannot detect the difference between natural carbon dioxide and radioactive carbon dioxide, of which the isotope C^{14} is a part. Carbon dioxide containing isotopes is added to the plankton-filled water and with a Geiger counter you measure how radioactive the plankton algae have become. Then the amount of assimilated carbon can be calculated and also the organic matter that has been produced.

The average production of organic matter along *Galathea's* route across the Indian Ocean is 100 milligrams of carbon per square meter of surface. At the western coast of Africa the production is four to five times higher. This may not sound like



A few creatures brought up from the ocean bottom off South Africa—none could survive surface pressure

(Continued to page 244)

UNCLE WALTER

IT SMELLS GRAND



HAS IT GOT AROMA?
MAN, AND HOW!

IT PACKS RIGHT



AND IT PACKS SO NEAT
IT RATES A BOW

IT SMOKES SWEET



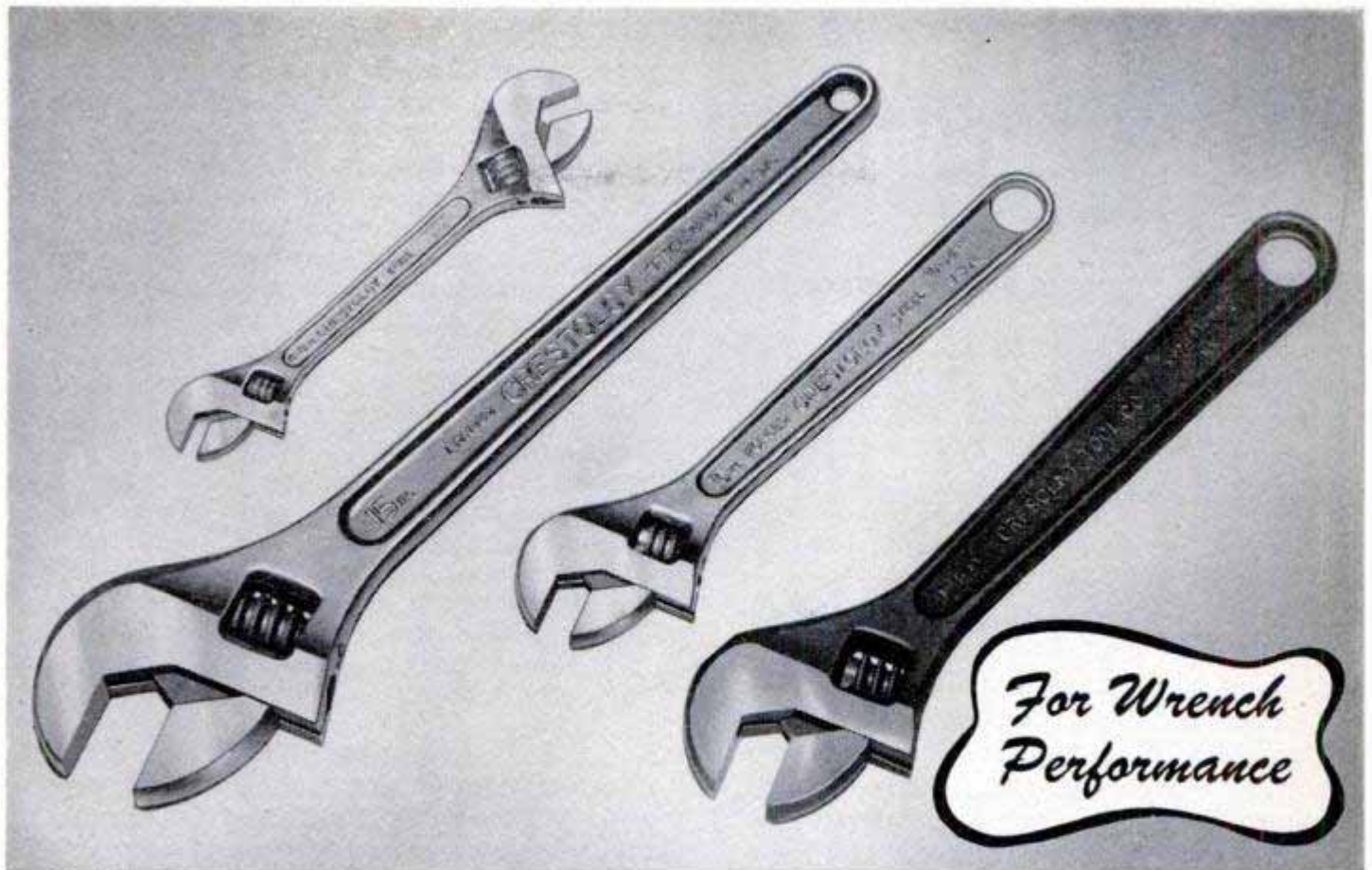
IT'S THE PIPE-BLEND CHAMP
YOU MUST ALLOW

IT CAN'T BITE!

A BLEND OF CHOICE KENTUCKY BURLEYS,
EXTRA-AGED TO GUARD AGAINST TONGUE
BITE. SIR WALTER RALEIGH STAYS LIT
TO THE LAST PUFF — NEVER LEAVES A
SOGGY HEEL



*It costs
no more
to get
the best!*



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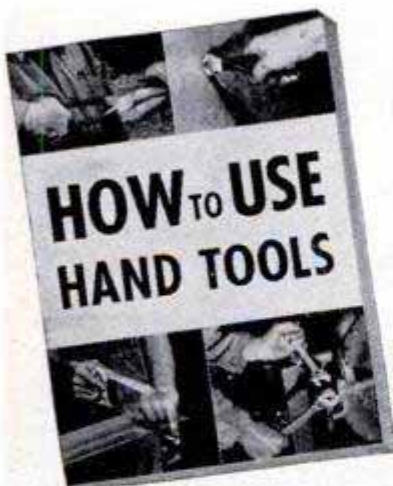
● Since more Crescent and Crestoloy Adjustable Wrenches are sold today than any other brand, an explanation of the differences in these two famous Crescent tools may be appropriate.

CRESTOLOY Wrenches are forged from a special alloy steel permitting thinner, trimmer design with greater strength and less weight than conventional types. They are available in Single End patterns, 4" to 24" size. Double-end in four models combining 4-6; 6-8; 8-10; 10-12 inch sizes.

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Symbol of Excellence*



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saves up to \$15 per room

This is the simplest, most economical known method of removing wallpaper. You just mix EASYOFF with warm water and brush, sponge or spray on. It penetrates the paper and dissolves the paste,

so all the old wallpaper can be peeled right off. Will not injure wall surface or woodwork.

If your paint or wallpaper dealer doesn't have EASYOFF, mail \$1.00 for 6-oz. bottle that makes 3 gallons of remover—enough to remove paper from one large or two small rooms. Money-back guarantee.

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much, but in the total amount of sea water 40,000,000,000 tons of carbon hydrate are produced every year and that is as much as is produced by all the trees and plants on land.

These investigations may be of great practical value. They tell where fishing can be done on a big scale without harming the population seriously. And one day, perhaps, our technical skill may be so developed that we use these vast supplies of food more directly than by eating the fish.

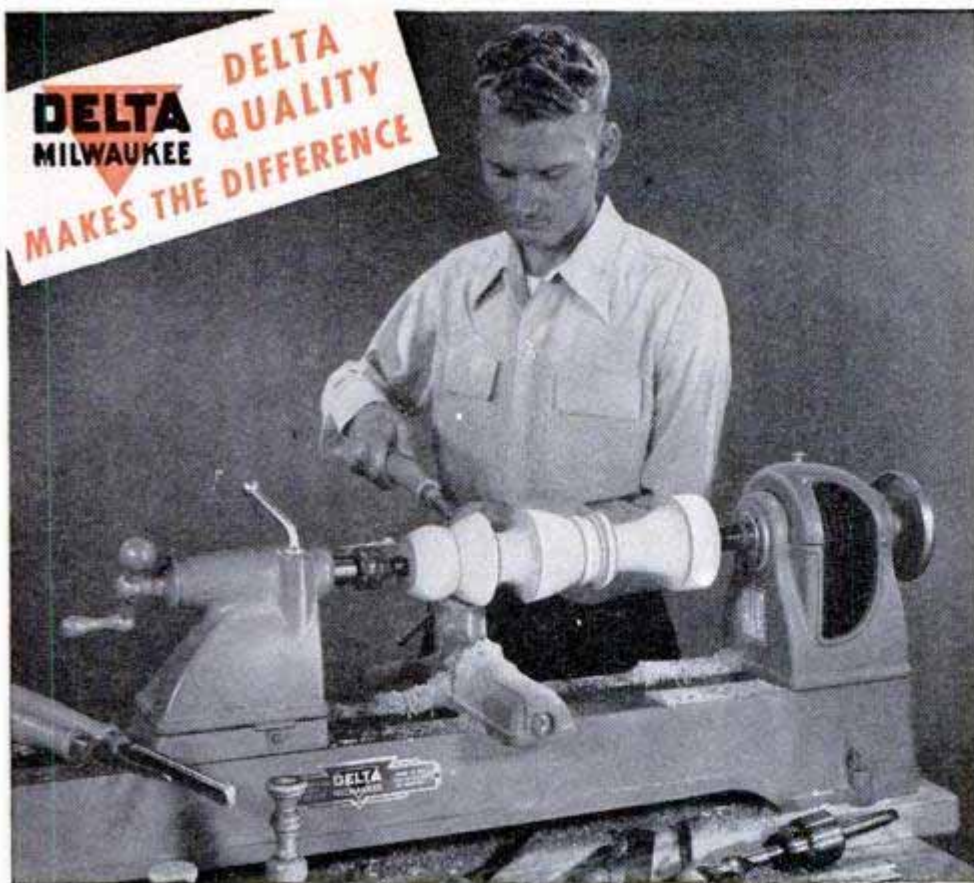
Ornithologists also were on board the ship and they brought home many rare birds from their expeditions. Among other places, they investigated the island of Mindanao in the Philippines, where in some mountainous areas no white man had ever been before. Here they successfully proved a theory advanced by Dr. Ernst Mayer regarding development of species. It is known that new species can be developed by mutations but, according to the theory, if the mutation shall form a new race, it must take place in an isolated area. If it does not, the new characters will swamp out by being mixed too much. In an isolated area the mixing is limited and there is a greater chance that the mutation will form a new race. Theoretically, you would expect to find new species on an isolated island like this one and the ornithologists did find many such. For instance, they found a little bird which was exactly like its relatives from other parts of the world except for a small yellow spot on the throat.

Dr. Birket Smith, ethnologist, studied the Igorots, a partly unknown people living in the center of the island of Luzon in the Philippines. A few years ago the Igorots were heartless headhunters. Today they live in isolation, but Doctor Smith's good luck got him contact with these people as well as the chance to live with them and study their life and religious ceremonies.

The *Galathea* has brought home some fine results from its trip around the earth. It has been successful in many ways. The trip cost Denmark about \$1,000,000—a lot of money for a small country. Now the scientists are trying to raise new capital so that they can start again on new expeditions, new scientific investigations and new adventures. ★ ★ ★

Time Switch for Car Headlights

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with a Fine
LATHE
Know the
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- graduated tail stock sleeve machined inside with a No. 2 Morse Taper and adjustable pointer for convenience in drilling work held in chuck
- handy lever locks tailstock to bed—ball lever at rear locks or unlocks tailstock sleeve in one easy movement
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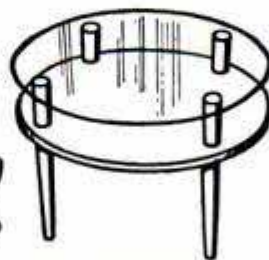
Graceful colonial table



Brilliant "zebra" bowl is simple



Turned wine set



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Guide for Amateur and Expert

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(Continued from page 135)

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In answer to a request from the government two years ago, the Engineers Joint Council, which is made up of five major engineering societies, formed the Engineering Manpower Commission located beside

(Continued to page 272)

ANSWERS TO PHYSICS TEST

Answer	Percentage of Engineering Students With Correct Answer
1. generator	100
2. focal length	96
3. photometer	80
4. rectifier	73
5. critical	57
6. cathode	49
7. electron	44
8. Foucault	39
9. polariscope	22
10. Angstrom unit	20

ANSWERS TO AVIATION TEST

Answer	Percentage of Engineering Students With Correct Answer
1. amphibian	95
2. drift angle	72
3. slipstream	67
4. airfoil	58
5. longerons	53
6. empennage	49
7. anemometer	46
8. chandelle	25
9. drag strut	20
10. tropopause	6

ANSWERS TO GEOLOGY TEST

Answer	Percentage of Engineering Students With Correct Answer
1. physical characteristics	81
2. inlet	75
3. glacial deposit	35
4. river	34
5. flood deposit	27
6. later stone	26

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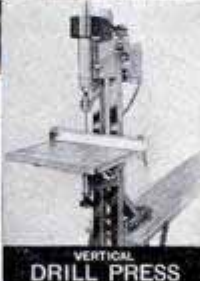
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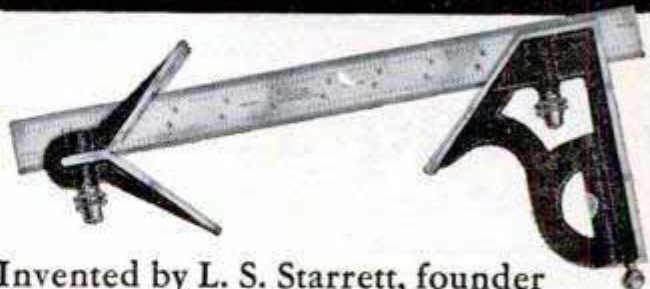
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Headaches of a Jet Designer

(Continued from page 85)

version of an attack plane yet to be built.

Complexity, therefore, is not a sign of perfection. Engineers are frequently lauded for the intricacy and complexity of their designs. This is a grave error. True perfection is a matter of solving problems by avoiding them and applying ingenuity to achieve simplification.

What it all boils down to is this: America will remain superior in air power if our designers not only can outguess the enemy but also our procurement agencies. A newspaperman, they say, needs a nose for news. An airplane designer must detect future trends and anticipate what the Navy and Air Force will require 5, 10 or even 15 years from today.

If we designers guess wrong, all 155,000,000 of us in the United States will be reaching for the aspirin bottle. ★ ★ ★



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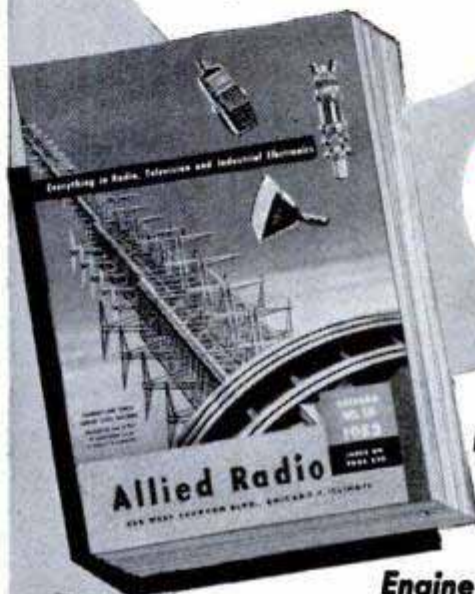
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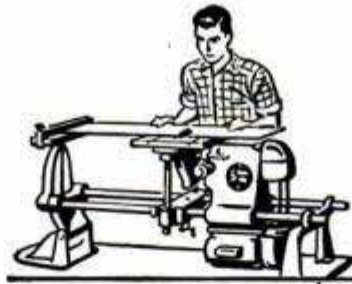
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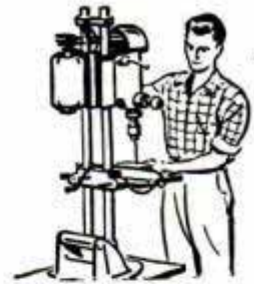
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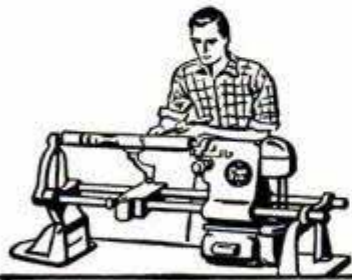
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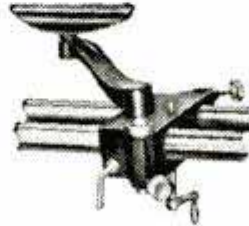
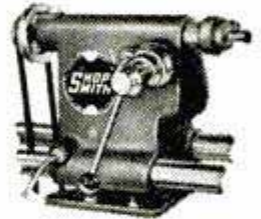
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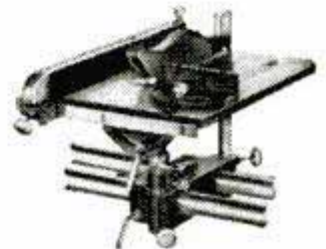
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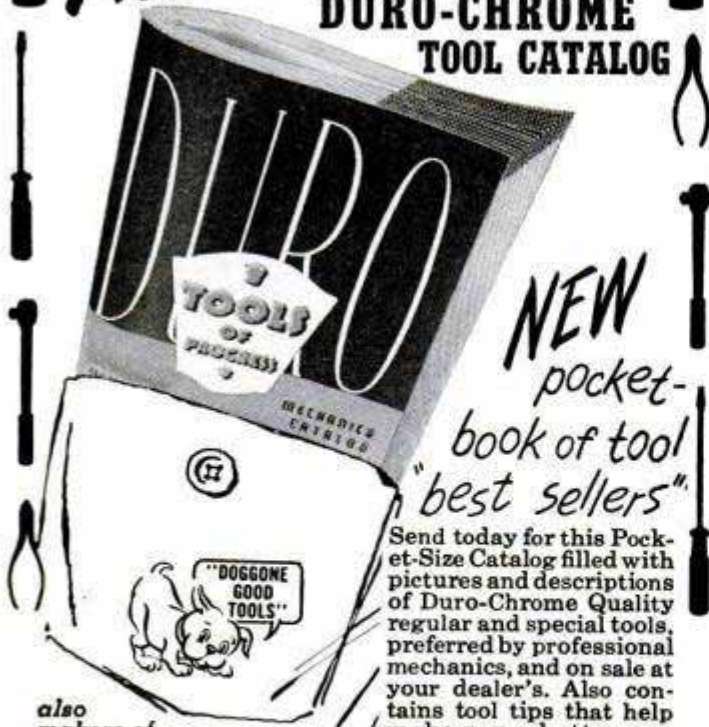
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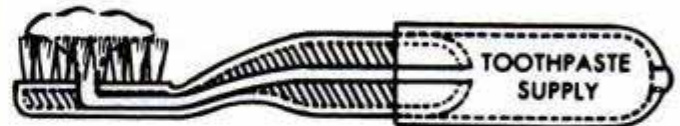
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(Continued from page 94)

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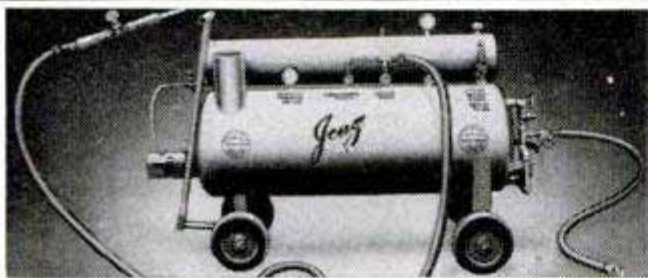
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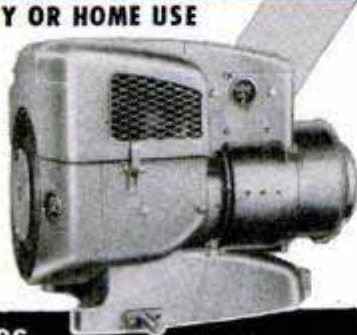
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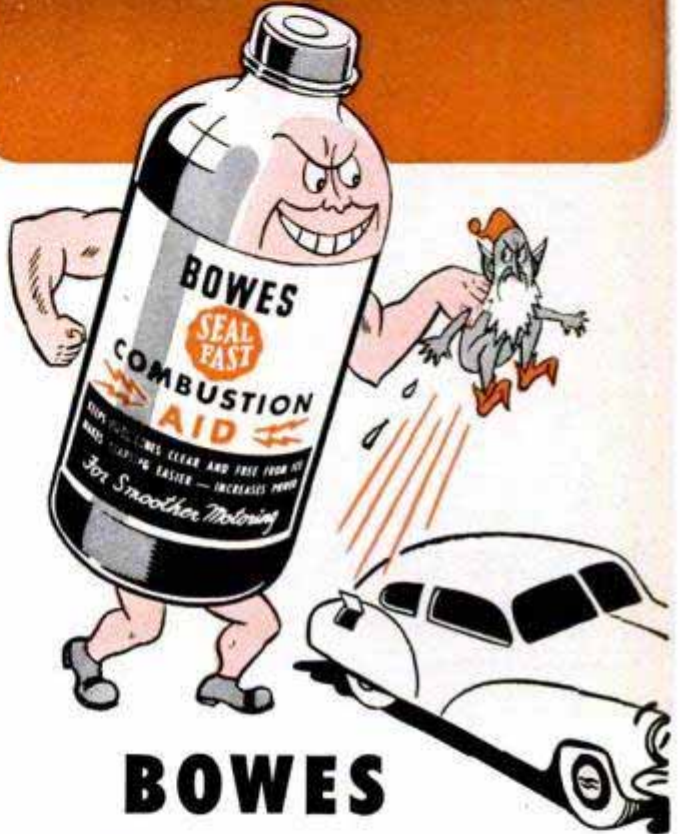


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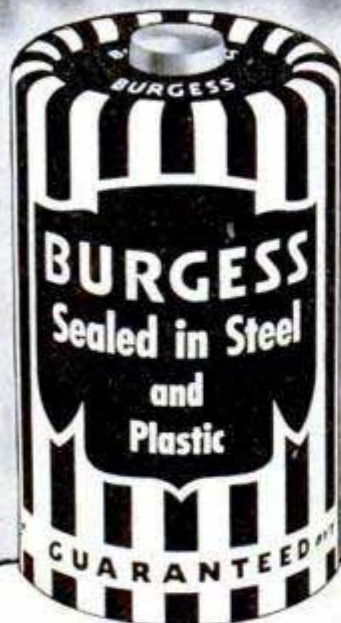
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Here Comes the Ski Patrol

(Continued from page 125)

American Red Cross standard 18-hour first-aid course. Then he takes the advanced 12-hour course which concentrates on winter-sports accidents.

Once these requirements are met, the candidate is given a skiing test supervised by an examining committee. Here he must demonstrate his ability as a skier and execute various downhill runs and methods of ascent.

He must, for example, make at least a 200-foot vertical ascent and descent under complete control carrying a 15-pound pack and demonstrate his ability to handle a rescue toboggan. These are specially rigged with control ropes, straps, blankets, first-aid kits and brakes to control the downhill speed.

Upon completion of these rigid requirements, the patrolman is certified by his divisional chairman and becomes eligible to wear the distinctive rust parka and blue-and-orange shoulder patch of the National Ski Patrol System.

As a patrolman, a member can be part of several different types of groups. In certain regions, skiers patrol only their own area. These are considered local patrols. Others who move about from area to area are termed metropolitan patrols and they serve wherever they happen to be.

Any patrolman who distinguishes himself by active participation in NSPS may eventually be recommended for promotion to the honorary rank of national patrolman. Last year only 88 men and 8 women achieved this position.

By tenure standards, the Ski Patrol is a relatively young group. It had its beginning in 1938 when the idea of a trained rescue unit was advanced by C. Minot Dole, a New York insurance broker.

The patrols were just becoming well-organized when the threat of war moved over the country. Almost immediately the manpower and resources of NSPS were offered to military and Civilian Defense agencies. Gen. George C. Marshall, then Army Chief of Staff, saw the value of the system and outlined a suggested program.

It called for patrolmen to experiment with various types of field shelters such as might be used by military ski units. Also, the Army suggested that the patrol could furnish guides to Army units training in remote areas. Lastly a program for anti-aircraft and antiparachute warning services was implemented.

Just before the Pearl Harbor attack, Dole, who was chairman of NSPS, made

(Continued to page 256)

LESTO Electric HAND SAW

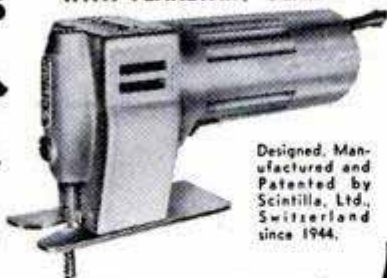
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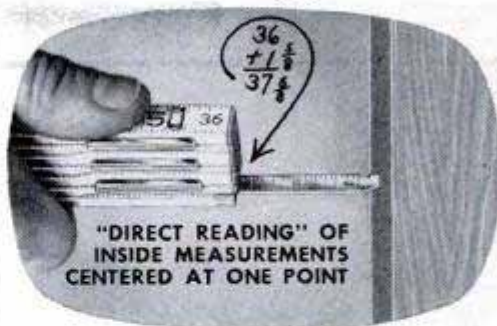
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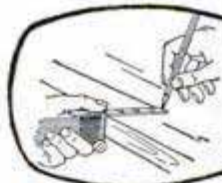
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Make no mistake, the new Stanley "100 Plus" Extension Rule is the handiest, most versatile folding rule you can buy.

Read it four ways — on inside measurements using slide, entire reading is centered at one point — no chance for errors; may also be used as an ordinary extension rule for inside measurements, and as a regular folding rule reading from either end.

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CHECK THESE "100 PLUS" RULE FEATURES:

- Easy to read Big Black Numbers on White Sticks.
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Car Make..... Year..... Cyl.....
Carburetor Make.....
Name.....
Address.....
City..... Zone..... State.....

arrangements through General Marshall for the patrol to process, check and clear applications for assignment to the mountain troops. As a result of the patrol's effort, the 87th Infantry Mountain Regiment, first in the United States Army's history, was established in November 1951.

More than 25,000 men were screened for duty with the outfit which became the 10th Mountain Division in 1942. The division served in the bitter campaigns of northern Italy and one of its members, Maj. George P. Hays, won the Medal of Honor.

During the war years, ski patrols in this country were also in action. In conjunction with the Second and Fourth United States Air Forces they initiated Air Force Winter Search and Rescue Units. In all, 52 missions were completed and eight known lives were saved. Ski Patrol members are still active as civilian instructors at the Mountain and Cold Weather Training Command Headquarters at Camp Carson, Colo.

Because there is much to be learned yet about ski safety, the NSPS has an extensive research program in effect. Through its medical chairman, Dr. Irvin E. Hendryson, reports on every accident attended are filed. These are then carefully checked and analyzed. Out of them have come recommendations on ski bindings, ski-tow safety devices and other vital aspects of sporting safety.

But still the most colorful and dramatic job of the Ski Patrol comes when the blue, early morning shadows cut across slopes of new-fallen snow. Then, high in the mountains of the West, in the tricky Midwestern hills or on the twisting trails of New England, the patrols move out.

In the first hours of daylight they reach the slope heights and begin to "break trail." Here they search for dangerous rocks uncovered by winds during the night and plant warning flags. Where avalanches threaten, they rope off the area or, in many cases, blast down the threatening cornice.

Medical caches high in the trails are checked and then the area is opened to the public. In more remote areas, telephone systems are available. Each time a patrolman passes one, he reports his position back to the lodge headquarters. As he skis for his own pleasure during the day, every patrolman is on the alert for accidents.

When one happens, help is rarely far away. In a matter of minutes, sometimes seconds, patrolmen bring up the rescue toboggan and begin to work against time. Shock sets in very quickly in cold climates so first aid must be given promptly. Then the descent, often down dangerous icy slopes, is made.

(Continued to page 270)

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CRAFTSMAN
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**10-inch Tilting Arbor
Bench Saw**

Saw Only

\$92.00*

cash
Less guard, motor,
extensions, bench
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Complete Outfit

\$183.65*

cash
With guard, motor,
extensions, bench
and Powr-Panl
\$18.50 Down

Only \$8.50 down puts this CRAFTSMAN Saw in your shop!

Here's a whole shop-full of tools in one compact budget-priced unit . . . designed for men who insist on professional quality work. **Massive, extra heavy duty construction!** Extraordinary accuracy. Improved model, with rigid saw base, strong motor support and new pivot arm for smoother operation. New tension device between motor mounting plate and support reduces transmission of vibration and jumping of motor.

Table never tilts . . . work always lies flat! Motor, blade and arbor tilt together as a unit, any angle up to 45 degrees; belt never twists. Blade raises and lowers to vary depth of cut from 0 to 3 3/8 inches.

Sealed precision ball bearings; lubricated for life! 27x20-in. cast semi-steel table.

13 3/8-in. working area in front of blade! Rip fence usable on either side of blade clear to table edge. Single control lever locks fence at BOTH ends. 10-inch combination rip and crosscut blade (3/8-in. bore) gives full 3 3/8-in. depth of cut. Blade, miter gauge, stop rods, rip fence, machine and motor pulleys and V-belt included.

Complete Outfit as shown: Saw; saw guard assembly, CRAFTSMAN 1-H.P. 3450 R.P.M. capacitor motor (110-120 volt 60-cycle AC); 2 table extensions, tool bench; remote-control Powr-Panl. See this superb saw at your Sears Retail Store today!

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Bonanza in Bark

(Continued from page 89)

The plentiful cork in some Douglas-fir bark is not of much use in conventional Mediterranean cork uses, but it is an important part of several of the above products. Douglas-fir cork also contains the most wax of any bark fraction, the Oregon Forest Products Laboratory found. This wax, extracted from the bark by leaching with benzene, is used with imported carnauba or candelilla wax as a polish and for water-proofing. It can also be employed in some uses of beeswax.

The Oregon laboratory recently announced the development of new processes for the low-cost recovery from bark of vegetable tannin for tanning leather, waxes and pharmacological chemicals. Tannin is extracted from bark merely by dunking it in hot water several times and then evaporating the water. Douglas-fir tannin would substantially reduce the United States' need to import 70 percent of the 150,000 tons used here yearly. Most of the latter is quebracho bark from Argentina.

Four companies already have applied for licenses from the laboratory to climb on the "waste bark" bandwagon.

Removal of bark from logs is a tough job, especially if it is left on the wood for a long time after cutting. One manufacturer has built machines to "squirt" bark from logs. Two nozzles of a hydraulic debarker force as much as 750 gallons of water per minute against logs, at pressures up to 1200 pounds per square inch. Pressure needed for good bark removal varies widely with season of year, species of tree, method of log storage and type of area in which the tree grew. Even at these high pressures, it is sometimes necessary to run a log through the water debarker a second time. Increase of pressure might destroy the wood.

Another type of debarker presses the log so hard with a roller head, like rollers used to put crinkles on the edge of pies, that the bark just gives up trying to protect the log and sloughs off. Some foresters are tampering with the idea of poisoning trees and then waiting a year for the bark to fall off before felling them. ★ ★ ★

Supersonic Propeller Planes

Speeds up to 1000 miles an hour are expected of airplanes using a new turboprop engine and special propellers recently developed by the Curtiss-Wright Corporation. Turboprop engines use jet power to turn the propellers and the new one is said to be the most powerful yet built. The propellers can harness 20,000 or more horsepower.

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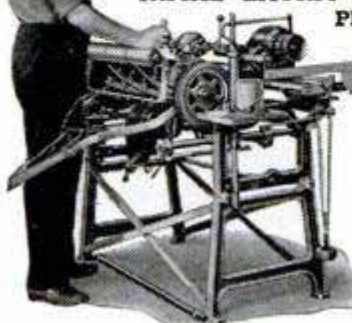
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 Strother Pattern Service, Dept. DD-8, Box 128, Belington, W. Va.

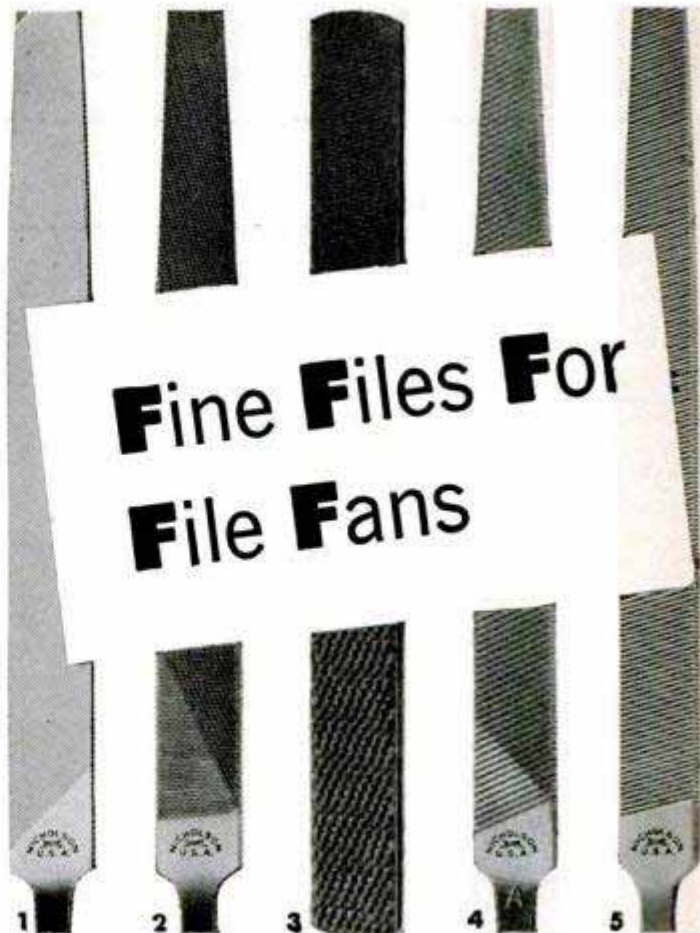
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Tire changing on a Minx is easy. The light car is easy to raise and the jack fits in a slipproof socket

Owners Report on the Hillman Minx

(Continued from page 115)

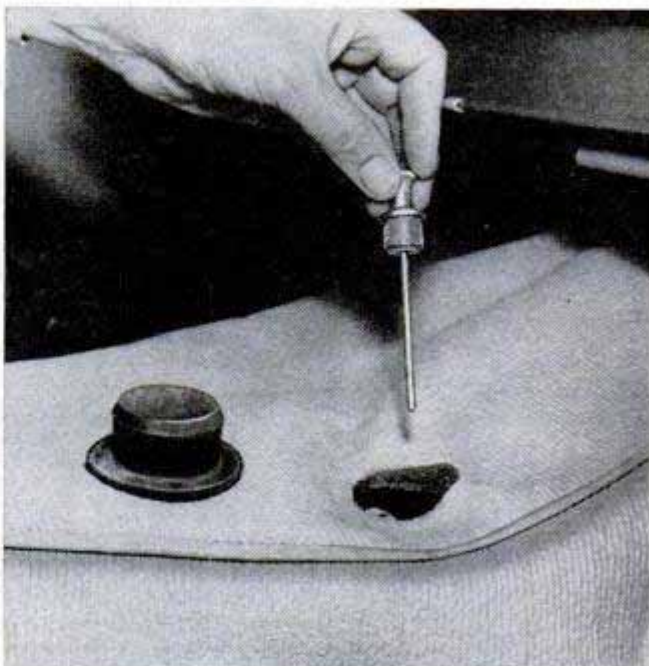
"Ease of handling, particularly for my wife; smart appearance for a small car and high quality of workmanship on interior." —Arcadia, Calif., hotel manager.

"My main reason for buying a Hillman: I wanted a sports car, my wife didn't. This is a compromise!" —North Hollywood, Calif., Air Force captain.

"I have no complaints on the Hillman.

(Continued to page 262)

Under the center hump of the front floor is a small dipstick for checking level of transmission lubricant



How To Clean Carburetors Right On The Engine



Here's the low-down on a new approach to an old problem: the why, when, and how of cleaning carburetors on the engine.



Disconnect and plug fuel line



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Complete carburetor cleaning no longer involves disassembly, soaking in solvent, re-assembly, and readjustment. On-the-engine carburetor cleaning does a complete job in less than 20 minutes; removes all dirt, muck, moisture, ... merely



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Didn't expect it to be a Rolls. It isn't. So what?" — San Mateo, Calif., advertising man.

"This car is a distinct pleasure to drive. I must continually check myself to keep from going too fast for the maximum cruising speed (60 to 65 miles per hour) of this wonderful engine." — Oregon City, Ore., paper-mill worker.

"I was tired of handling a large car and have no need or desire to hurry." — Seattle, Wash., retired executive.

"If this car had better rear springs and a better-made rear seat to give a better

1953 HILLMAN MINX (Mark V) SPECIFICATIONS

ENGINE

Type	4-cyl., L-head
Bore and stroke	2.56 in. x 3.74 in.
Piston displacement	77.20 cu. in.
Brake horsepower42 @ 4200 r.p.m.
Compression ratio	6.63 : 1
Transmission	4-speed synchromesh

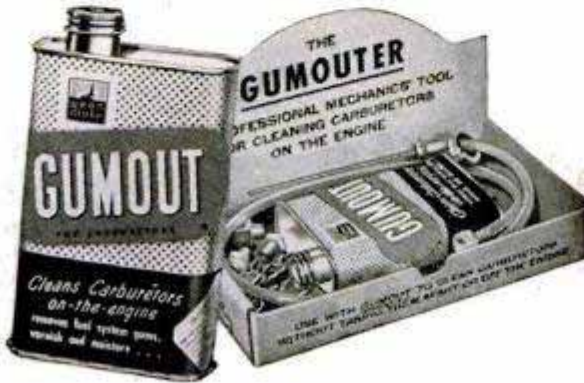
GENERAL

Steering wheel, lock to lock	2½ turns
Turning radius	16 ft. 6 in.
Brakes	Hydraulic with riveted linings
Tire size	5.50 x 15
Recommended tire pressure	28 lb. f-
Shipping weight	

placements—
to correct trouble cur-
by carburetor cleaning.
“clean the carburetor
considered the sensible
to curing a rough-run-
ne. When should this be
the man whose car is
the sweet song of a per-
nning engine cleans the
or (1) at the first sign of
trouble; (2) with every
(3) at least twice a year.

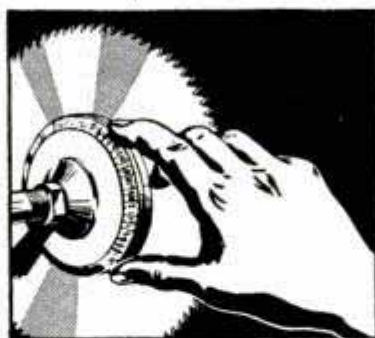
disconnect the fuel line; use an
inexpensive “applicator” to feed
the cleaner into the carburetor;
then reconnect the fuel line.

Pennsylvania Refining Com-
pany, 2687 Lisbon Road, Cleve-
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GUMOUT at \$1.50 a pint. The
applicator, which lasts indefinitely,
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has prepared a helpful *Carburetor
Handbook*, which is sent free on
request.



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Legroom, rear . .

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ride, it would
Antonio, Tex.

"I think if a
ican-made star
a car like a H
car every tim
ment officer.

As in every
cluded this q
are your com
random, here
responses:

"Battery loc
ice."—Alhamb

"Don't like
(Co

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Why does hot air rise?
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What is carbon dioxide?
How to write with invisible ink.

How to make . . .
Static electricity
Water boil with an ice cube
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How to carry sound in your finger tips
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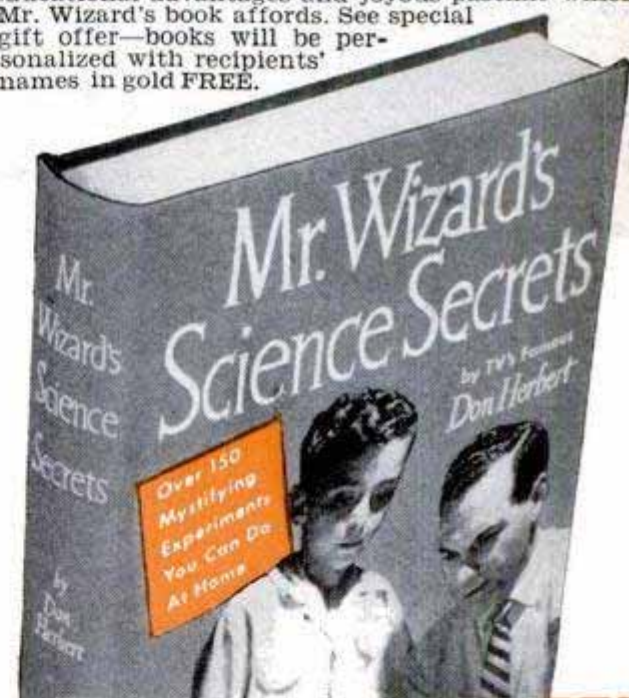
Mr. Wizard answers most of the questions children ask. They're all in his book. His answers and demonstrations are so fascinating that youngsters actually have fun learning the facts they should know and they never tire of learning. Parents and teachers will find the book a helpful treasure.

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(women catch skirts on it).” —Norwood, Ohio, housewife.

“The Hillman is wonderful for city traffic, but it is dangerous and hard to drive with poor steering.”—Milwaukee, Wis., insurance man.

“Inadequate hill-climbing ability.”—Portland, Ore., cabinetmaker. (This was mentioned frequently.)

“They would sell more Hillmans if a U.S.-type gearshift were used. As it is, the average driver is too confused when trying out a Hillman to really get the ‘feel’ of this fine car. I loaned mine to a friend who brought it back in 10 minutes. Too hard to find gears, he said.”—Los Angeles doctor.

“It shouldn’t be necessary to overhaul the car on an average of every 20,000 miles.” —Tacoma, Wash., maintenance worker.

“One bad feature about the ’52 Hillman is that the gas pedal is so close to the brake that when you apply the brake, acceleration is increased, causing confusion and possibly an accident.”—San Francisco registered nurse.

“Too small for a large family.”—Seattle, Wash., waterfront checker.

“Dust seeps into the car on country roads.”—Sherwood, Ore., housewife.

“The rear-view mirror should be higher. . . . The driver can’t see backward when three people are in the rear seat.”—Portland, Ore., housewife.

“Brakes do not hold up well; seats do not ‘breathe,’ causing lots of perspiration in hot weather.”—Baltimore, Md., musician.

“Car is geared too low for this flat country. First gear is hardly usable, second speed particularly too low.”—Ormond Beach, Fla., retired man.

“My only complaints are the uncooperative servicing facilities and the inadequate front bumpers, which are lower than on regular-size cars and the radiator grille gets dented if another car backs into it.”—New York City copy writer.

These were some typical suggestions for improvements:

“Why not a V4 or a V6 to increase the body capacity of a small car?”—Glendale, Ariz., machinist.

“Bigger trunk space if possible (although it is better than in most small European cars).”—New York press representative.

“Clutch and brake pedals should be farther apart. U.S.-style gearshift with fourth gear as an overdrive like Borg-Warner. Otherwise the car is excellent, a pleasure to drive and park. Economy is wonderful.”—Pasadena, Calif., contractor.

“Back seat should fold down so that

(Continued to page 266)



"WAS MY FACE RED"

... when I learned what a sucker I'd been for the oil change racket!

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That's what they all say when they learn the truth. Car owners like you, MILLIONS of them - all in the same boat and sinking hundreds of millions of dollars in UNNECESSARY OIL CHANGES every thousand miles or so. Well, you ask, "What's wrong with that? Doesn't everybody know you've got to change oil every 1000 miles because it gets dirty and full of sludge?" We ask, "Who told you THAT?" Shall we tell you?



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MAKE & YEAR OF MY CAR _____

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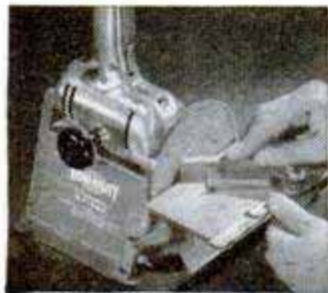
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trunk can be reached from inside of car, and so that larger objects can be carried.” —Cedar Rapids, Iowa, store buyer.

“Should have no chrome instead of a minimum.” —Chicago anthropologist.

“If you could put an Austin A-40 motor in a Hillman body, you would have just about the perfect small car.” —Pennsylvania factory manager.

The survey showed that 28 percent of the owners use the Hillman as a second car, mostly to drive to and from work. Of all owners replying, 56 percent use regular gas, 44 percent premium. Oil consumption averaged one quart every 1183 miles, with a change of oil every 1516 miles. Hillman doesn't pretend to be a fast car, yet the average top speed reported was 73 miles per hour.

The question of dealer service and availability of parts is sometimes controversial for foreign makes. Hillman owners reported dealer service as follows: Excellent, 41 percent; good, 24 percent; average, 19 percent, and poor, 16 percent. Parts and service were found to be readily available by 84 percent of the owners—quite a high percentage.

On the horsepower question, opinions of mechanically minded Hillman owners followed that expressed by a New York City supervisor: “If the Hillman used the same horsepower as its larger brother, the Humber Hawk — 53 horsepower, I believe — it would be an ideal car.”

A Freeport, N. Y., electronics engineer wrote: “I am surprised at the tire, brake and clutch mileage obtained. They are better than four times that which I had on three previous cars.”

But not every owner was so enthusiastic. A retired man living in Mt. Vernon, N. Y., said: “I would not recommend this car for anyone who cannot do some of his own repair work or who is not near a reliable dealer.” A San Francisco insurance solicitor wrote: “I would say that the Hillman Minx is a wonderful little car in spite of the British dealers who do everything to leave a bad taste in your mouth. In five months of ownership, the car was in the shop more than three months while their mechanics fiddled around with it.”

A Salem, Mass., Army engineer was one of several who remarked that the speedometer is too far over on the right side of the dash. A Boston, Mass., publisher rated his Minx “excellent” but asked for “less Americanization in styling. There is no reason to imitate American styling.”

Now for my test of the Hillman Minx: The car tested was the Mark V four-door sedan, which accounts for about 75 percent

(Continued to page 268)

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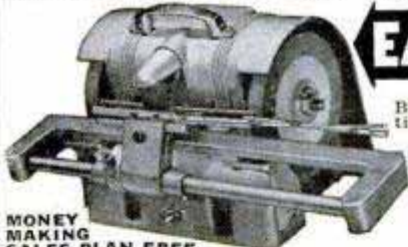
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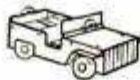
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of Hillman Minx sales in the United States, the other 25 percent being convertibles with a scattering of estate cars, which we would refer to as station wagons. I put the car through severe tests in the desert, mountains and over winding trails in southern California.

The performance of the car, considering the size of its 42-horsepower four-cylinder engine (77.20 cu. in., about the size of a large American motorcycle engine), is exceptionally good and economy is outstanding (see economy chart). For a four-cylinder engine it is extremely smooth and free of vibration.

By American standards the Minx is indeed a small car, having a 93-inch wheelbase (7 inches shorter than the Henry J or Nash Rambler) and having an unladen weight, less gas and water, of 2072 lbs. for the sedan and 2093 lbs. for the convertible. Considering the size of the car there is a surprising amount of room—although, of course, not as much seat width as in conventional American cars.

The car rides well and 2½ turns of the steering wheel from lock to lock make it quickly maneuverable in traffic and when parking. Because of the short wheelbase and the narrow tread (48⅝ inch front and 48½ inch rear) the car has a turning circle of 33 feet. The ground clearance of the Minx is 7 inches.

It cruises along easily at 50 to 60 miles per hour and has a top speed of 76 to 78 miles per hour by speedometer, which I found to be fast by about 6 percent.

The best performance of the Minx is secured by revving up the engine, as its power is developed by high engine speed. The four-speed transmission is therefore desirable because the different ratios are necessary for best performances under various road conditions. The over-all gear ratios are well selected as follows: High, 5.22:1, third, 7.78:1; second, 12.89:1; first, 18.60:1, and reverse, 24.85:1.

The car has little tendency to roll or sway on corners and the suspension is excellent, modern in every respect as coil springing is used in the front and leaf springs in the rear. After driving the car a few miles, there is no feeling of being in an ultrasmall automobile.

The car's interior is well finished, with leather upholstery, which the British seem to prefer. There is a wide range of adjustment for the driver's seat. The flexible-spoke steering wheel eliminates vibration and is very comfortable. The clutch and brake pedals are small and mounted too close together. Also, the foot throttle is too close to the brake pedal.

(Continued to page 276)

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5/16"	2 1/2"	.40	5/8"	4 1/2"	1.19
21/64"	3 1/2"	.40	1-1/8"	5 1/2"	1.19
11/32"	3 1/2"	.43	1-1/4"	5 1/2"	1.19
23/64"	3 1/2"	.48	1-1/2"	5 1/2"	1.19
3/8"	3 1/2"	.48	1-5/8"	5 1/2"	1.19
25/64"	3 1/2"	.53	1-3/4"	5 1/2"	1.19
13/32"	3 1/2"	.53	1-7/8"	5 1/2"	1.19
27/64"	3 1/2"	.55	1-7/8"	5 1/2"	1.19
7/16"	3 1/2"	.55	1-7/8"	5 1/2"	1.19
29/64"	3 1/2"	.63	1-9/16"	5 1/2"	1.19
15/32"	3 1/2"	.63	1-9/16"	5 1/2"	1.19
31/64"	3 1/2"	.65	1-11/16"	5 1/2"	1.19
11/16"	3 1/2"	.75	1-11/16"	5 1/2"	1.19
33/64"	4"	.82	1-13/16"	5 1/2"	1.19
17/32"	4"	.82	1-7/32"	8 1/2"	1.19
35/64"	4 1/4"	.90	1-15/64"	7 1/2"	1.19
9/16"	4 1/4"	.90	1-9/32"	7 1/2"	1.19
37/64"	4 1/4"	1.00	1-19/64"	5 1/2"	1.19
19/32"	4 1/4"	1.00	1-5/16"	5 1/2"	1.19
39/64"	4 1/4"	1.06	1-21/64"	5 1/2"	1.19
41/64"	4"	1.19	1-3/8"	5 1/2"	1.19
21/32"	6"	1.19	1-25/64"	7 1/2"	1.19
43/64"	4 1/2"	1.31	1-13/32"	8 1/2"	1.19
45/64"	4 1/2"	1.31	1-27/64"	8 1/2"	1.19
47/64"	4 1/2"	1.44	1-7/16"	6"	1.19
23/32"	5"	1.44	1-29/64"	6"	1.19
47/64"	5"	1.57	1-15/32"	8"	1.19
49/64"	4 1/4"	1.64	1-17/32"	7"	1.19
25/32"	4 3/4"	1.64	1-35/64"	8"	1.19
51/64"	5 1/2"	1.85	1-39/64"	7"	1.19
13/16"	4"	1.85	1-21/32"	7"	1.19
53/64"	4"	1.91	1-27/32"	7 1/2"	1.19
27/32"	5 1/2"	1.91	1-7/8"	9"	1.19
55/64"	5 1/2"	2.02	1-29/32"	6 1/2"	1.19
7/8"	4 3/4"	2.02	1-31/32"	10.00	1.19
57/64"	5 1/2"	2.12	2-1/2"	7 1/2"	1.19
29/32"	4 3/4"	2.20	2-7/16"	11"	1.19
15/16"	5 1/4"	2.20	2-15/32"	13"	1.19
61/64"	4 1/2"	2.42	2-1/2"	11"	1.19
31/32"	4 3/4"	1.50	4"	9"	1.19

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- TOOL C, Cut-off blade holder for 3/32"x 3/8" blade. Shank size 1/2"x1"x4 1/2". Can be changed to fit other size cut-off blades. PPD. only... **\$2.25**
- TOOL BIT SPECIAL: 12 H.S. 3/16" sq. x 2 1/2" new tool bits. PPD. **\$1.95**

NEW MOUNTED STONES

SET Mixture of 12 Mounted 27J ed Stones with 1/4" shanks. PPD... **\$2.95**



MOUNTED POINTS WITH 1/8" AND 3/32" SHANKS

Assortment of:
10 stones... **\$1.20**
25 stones... **\$2.75**
50 stones... **\$4.50**



NEW HIGH SPEED COMBINATION DRILL AND COUNTERSINKS

SET 8 selected sizes from A1 to F2 (3/8" drill x 1/8" body to 3/16" 2J drill x 7/16" body) 60° angle of countersink. New cost on these countersinks 75c to \$2.50 ea. Priced to you Ppd. at only... **\$3.98**



GENERATORS!

P1 GENERATOR 200-amp, 24-volt, continuous duty. Wt. 48 lbs. Special closeout price. F.O.B. Tulsa... **\$14.98**

E5A GENERATOR 50-amp, 12 volt continuous duty. Wt. 21 lbs. F.O.B. Tulsa. Only... **\$7.98**

These used, guaranteed serviceable aircraft quality generators are easily convertible for welders, power plants, boats, platers, etc.

H. P. MOTOR, 24-volt, 90-amp, double end ball-bearing shaft. Wt. 18 lbs. F.O.B. Tulsa, only... **\$7.00**



HYDRAULIC BARGAIN DEPT.

New Hydraulic Hose!!
2000-lb. Test

- Any length
- Std. Pipe Connections 1/4", 3/8", and 1/2" ID Available

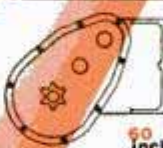
1/4" hose has 3/8" male pipe connections.
3/8" hose has 1/2" male pipe connections.
1/2" hose has 3/4" male pipe connections.

Length in feet	Price 1/4" ID	Price 3/8" ID	Price 1/2" ID
1	\$.75	\$1.50	\$1.65
2	1.00	2.25	2.40
3	1.20	2.75	2.95
4	1.45	2.95	3.10
5	1.70	3.40	3.60
6	1.95	3.60	3.75
7	2.30	3.75	3.95
8	2.30	3.75	3.95
9	2.30	3.75	3.95
10	2.30	3.75	3.95

11 to 50-ft. lengths available at 15c per ft. for 1/4" ID Hose—30c per ft. for 3/8" ID Hose—40c per ft. for 1/2" ID Hose. Above prices quoted complete with fittings. Finest construction double wire internal braid. 1/4" ID Hose will carry 3 GPM at 1000 PSI. Use for hydraulics, steam, air, etc. Large quantities available at greatly discounted prices.

60 TO 1 GEAR BOX

5/16" dia. input shaft, 1/2" dia. output shaft with removable sprocket. Wt. 6 lbs. PPD... **\$6.49**



60 TO 1 GEAR BOX TRAINING

Includes 8 gears and 7 ball-bearings. Wt. 10 lbs. Ppd. **\$6.00**



NEW VICKERS MF9, 6 H. P. Hydraulic Motor

Unit is compact, powerful. Displaces .507 cu. in. per revolution, 6 gal. per min. at 3000 RPM, 1500 PSI. Positive displacement. Angle type. Rated at 6 H. P. Rotates either direction. Unit can also be used as a pump. Here is the finest hydraulic motor available at a fraction of its new cost of over \$200. Our price only... **\$19.95**

NEW VICKERS HYDRAULIC MOTOR, Serial No. MF 107130 B.C. F 2, cu. in. displacement per rev., 378, 3600 R.P.M. 1000 P.S.I. Unit similar to above only with smaller displacement and H.P. Only... **\$16.50**

NEW SURPLUS PRESSURE GAUGES

2 1/2" Dial. Following pressures available: 30"—0—60", 0 to 600#, 0—30", Your choice... **\$1.30**

4 1/2" Dial. Std. quality gauges; std. pipe connections. Finest brands. Retailing at \$7.00 and up. Following pressures available: 0 to 15", 30"—0—100", 0 to 100#, 0 to 160#, 0 to 200#, 0 to 700#, 0 to 800#, 0 to 1000#, your choice, only... **\$4.00**

Gauges suitable for steam, air, oil, gas and water. Discounts on quantities.



AUTO TEST VACUUM GAUGE, 4 1/2" Dial, 30"—0. You can pay up to \$14.00 for this gauge. PPD, only... **\$3.25**

AIR TANK—REGULATOR—MASK

• A4 Tank, 5" x 8", 104 cu. in. vol. 500 PSI... **\$1.50**

• Demand Type Regulator complete with 500 PSI pressure gauge. Fits above tanks... **\$1.50**

• Mask complete with 14" of hose. Outlet valve. Fits above regulator... **\$1.60**

Above equipment suitable for air tanks, compressors, respirators, diving units, etc.



BARGAIN TOOL & SHOP MIXES—PPD.

- 30 GRINDING WHEELS 1/4" arbor, 4" diameter max... **\$3.29**
- 2—8" WIRE WHEELS coarse and fine, 1" thick, 5/8" bore. Pair only... **\$2.29**
- SURPRISE MIX: Over 50 pcs for your 1/4" elec. drill including rotary files, drills, bits, reamers, grinding wheels and arbors for our customers who like pleasant surprises. Your money back if you aren't satisfied... **\$2.98**
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Here is your chance to be your own boss, secure financial independence, build a future for yourself and your family in a profitable business in your own garage or basement. J. S. of Michigan writes, "I figure my profits (last season) at over \$1,000.00." Mr. C. H. R. of Ohio says, "This season I have taken in \$3,688.20." J. P. of Pennsylvania writes "I spent only 40c for a newspaper ad and have done nearly \$500.00 worth of business." Another owner writes, "I have had 4 mowers a day brought to me since last May . . . and do the grinding evenings at an average of \$2.50 each." Think of it! That's \$10.00 an evening in spare time. If you want to get ahead, make big money, be your own boss. Act Now. Write today for full details of our proved success plan.



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can the inside face and edge of the stationary blade, and all reel blades, be ground to proper clearance

ALL IN ONE SET-UP

WITHOUT REMOVING ANY BLADE FROM THE MOWER

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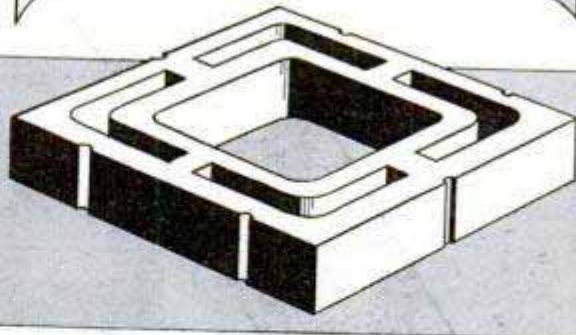
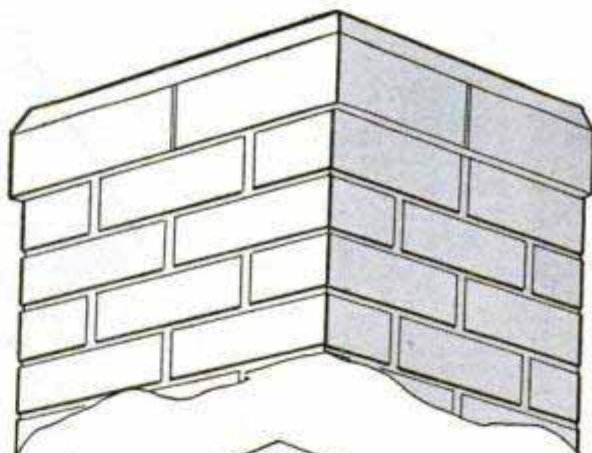
The patient is released to his companions for whatever further medical treatment or examination they wish to give and the patrolmen return to the slopes. By the end of the day when everyone else relaxes before the open fireplace, the patrolmen have one more important assignment—the "sweep" of the trails.

They are the last ones to ride the chair lift or tow rope to the trail tops. Then they move down, checking bad turns, following ski tracks that veer away from the main trail to be certain they returned. The run may be as long as two or three miles but the "sweep" is thorough; a skier's life may depend on being found in those few minutes.

Only when they finally assemble again at the lodge and the area is closed can the patrolmen settle back and join their friends in the companionship of this rugged sport. And though there has been strain and tension, even danger, in their day, few would trade places with the most carefree tourist.

For, in the lash of the wind and the sting of the swirling snows, they have found both the thrills and satisfaction that come to those who dedicate themselves to helping others.

★ ★ ★



Chimney Blocks With Flue Liners

Building up a chimney is an easy job for even the amateur workman when special square blocks are used for this purpose. Made of concrete, the blocks are scored to give the appearance of brick and are fabricated with built-in flue liner, which reduces both cost and time required to put up a chimney.

Tough hobby jobs

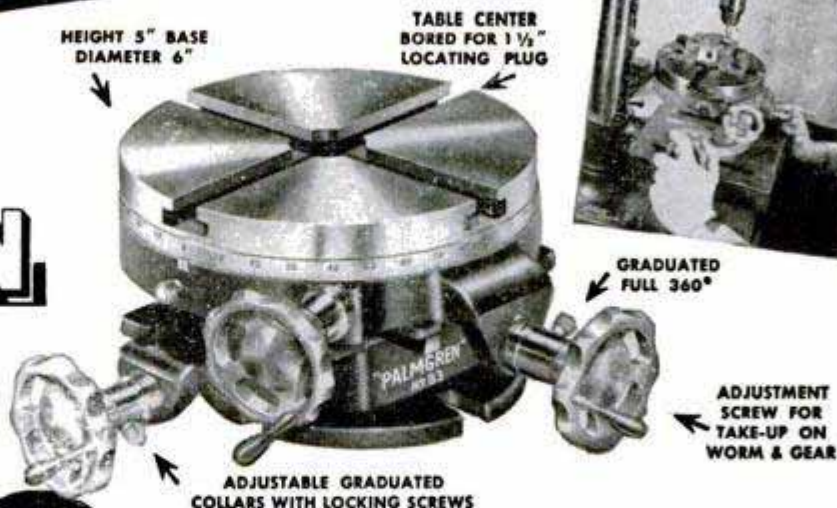
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ROTARY TABLE

NOW ONLY

\$54⁵⁰



**The Only Table Having ROTARY FEED
Combined With DUAL CROSS FEEDS!**

It's sensational—in price, in construction, in performance. Makes your drill press a vertical milling machine. You can rout, straight or curved-rabbit-drill-sand or mortise. Also hundreds of other jobs such as milling slots, grooves, keyways, squares, hexagons, curves, flats, dovetails, indexing and laying out work.

Designed for use on Drill Press or Milling Machine, it will handle large tough jobs or small model parts on all types of metal and woodworking projects.

Built by Specialists for LIFETIME SERVICE

Precision built. Permits close tolerances. Rotary feed is calibrated in degrees-cross feeds in thousandths. Cross slides and feeds are 2 1/8" each side of center—4 1/4" overall. Adjustable gibs on cross slides—40 to 1 worm and gear ratio in rotary feed. 4 Bolt slots—2 lock screws.



No.	Base Keyway	Table T-Slots	Base Dia.	Table Dia.	Ht.	Wt.	Price
83	5/8"	5/8"	8"	6 1/4"	5"	28 lbs.	\$54.50
82	As above without ROTARY FEED					26 1/2 lbs.	39.75

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A handy device with unlimited uses in finishing operations. Grips smallest pieces for buffing or grinding without damage and safeguards hands and fingers. No. 15—1 1/2" Jaws Wt. 7 oz. Only \$2.15

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Save \$89.50

on this **PORTER-CABLE** combination!

STARTS

as a **ROUTER**



Router Complete with base and motor—\$49.50

BECOMES

a **PLANE**



By adding Plane Attachment — \$25.00

THEN

a **SHAPER**



By adding Shaper Table — \$24.00



Interchangeable Motor powers 3 tools . . . saves cost of 2 motors!

All 3 Tools for only \$98.50

For expert woodworking, build your home workshop around this Porter-Cable Tool combination—production tools used by Builders—and save \$89.50!

As a ROUTER—you can tongue, groove, rabbet, dovetail, do scrollwork, cut contours and beaded edges on wood, composition or plastic.

As a PLANE—you can shave off wood at high speed—taking cuts from $\frac{1}{64}$ " to $\frac{3}{32}$ " deep—without a wave or ripple! Attachment for sharpening right on the job.

As a SHAPER—you can edge irregular pieces; joint strips accurately, even narrow and short pieces; make hundreds of fancy cuts for cabinets, furniture, trim, toys, picture framing, molding, etc.

Purchased separately, all tools complete with motors would cost you \$188.00. But, with *one* Interchangeable Motor mounted in the proper attachments, you get all 3 tools for only \$98.50—a saving of \$89.50!

See this great money-saving combination at your Porter-Cable dealer's. Or mail coupon today for full details.

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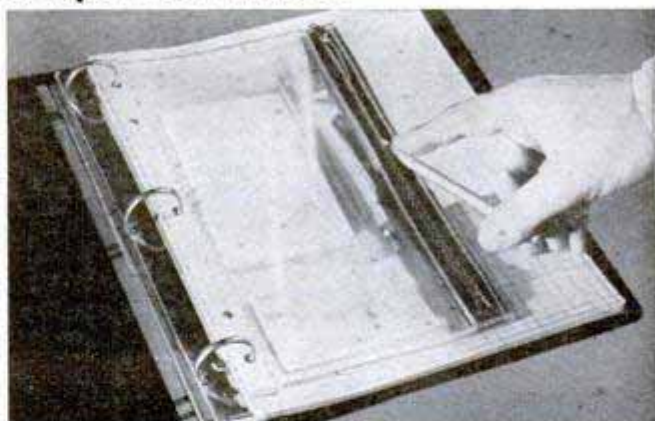
Manufacturers of SPEEDMATIC and GUILD Electric Tools
In Canada write: Strongridge, Ltd., London, Ont.

The Engineers' Club in New York City. The job of this commission is to work toward the alleviation of the engineering-manpower shortage. One way it is going about this is by interesting qualified young people in the engineering profession. Advice, encouragement and help to young people from all over is a part of the commission's function, and its New York office and its local delegates throughout the country follow through on hundreds of inquiries that come to their attention.

Our civilization today is permeated with engineering. A man with a recognized engineering degree can find his place almost anywhere, in scores of seemingly unrelated fields. Some engineers manage big businesses, like the presidents of many well-known companies. City managers and public-works directors in many cities are engineers. Government calls for more and more of them. Businessmen use engineers to survey and analyze markets or even to formulate plans for advertising and sales campaigns. Investment concerns turn to engineering advisors to evaluate the practical side of new manufacturing proposals. Industry is dependent upon the continued supply of qualified engineers.

Without proper preparation in high school—mainly in science and mathematics—entrance into an engineering college or a technical school is difficult. So if you think you want to be an engineer and set your sights on any one of these goals, start early and you'll get there if you have what it takes. ★ ★ ★

Plastic Pencil Case Snaps Into Binders



Pencils, erasers and drawing instruments are enclosed in a transparent-plastic pocket that fits into a loose-leaf binder. Holes punched in the sturdy inner edge fit standard two, three and five-ring binders. A slide fastener opens the outer edge of the five by ten-inch kit. Tear-resistant for long wear, the Vinylite-plastic case resists moisture, ink and scuffing.

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At Last! A PORTABLE Motor-Welder

9 TOOLS IN 1



Motor-Weld Model 1A
—recommended for hobby and home work. Comes as illustrated above, 110 volt, 60 cycle AC or DC. Four speeds and welds up to 3/8" steel. Uses up to 3/8" rod. (80 amps.) Ship. Wt. 40 lbs. F.O.B. Chicago, Ill. **\$54.75**

Battery charger attachment, \$5 extra.

HAS SELF-CONTAINED MOTOR GENERATOR JUST LIKE BIG PLANT UNITS

MOTOR WELD is the only known motor-generator type unit that has its Large Amperage Output, is self-contained, yet has light-weight "Pickup" Portability and sold at transformer price levels. Low cost, economical operation. No special wiring—just plug into any 110 volt AC or DC line (any cycle) and it's ready to use! Its portable POWER UNIT can be used to operate saws, grinders, etc. Other models (150-225 amp.—Cart Models, etc.) available.

Send for **FREE Literature**

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**90-Day Warranty
On All Machines**

Send remittance with order; will ship C.O.D. (\$15 deposit)

Porto-Weld Model 2A
—recommended for repair, maintenance, and installation work. Comes as illustrated above, 110-220 V.-AC or DC. 7 welding ranges and welds up to 3/8" steel. Uses up to 3/8" rod. (150 amps.) Ship. Wt. app. 80 lbs. **\$98.50** F.O.B. Chicago, Ill.

Battery charger attachment, \$5 extra.



- ✓ WELDS
- ✓ BRAZES
- ✓ GRINDS
- ✓ SANDS
- ✓ POLISHES
- ✓ BUFFS
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- ✓ CHARGES BATTERIES

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What d'ya mean
replacement
rings?



● Of course you know oil-pumping usually means worn-out piston rings—but maybe you don't realize all that ring *replacement* means.

As your engine gets older, the cylinders wear tapered and out-of-round. The engine runs hotter because of accumulations in the cooling system. It needs more oil on the cylinder walls. Yet this extra oil must be kept under full control—so you get generous lubrication without a bit of waste.

This calls for a special type of piston rings—*replacement rings*.

Hastings makes replacement rings exclusively . . . devotes all its research, on the highways and in the laboratory, to the particular replacement problems of each make and type of engine . . . for re-ring, re-bore and re-sleeve.

Hastings rings are nationally known for their ability to stop oil-pumping, check cylinder wear, restore engine performance.

At the first sign of oil-pumping or performance drop-off, go to your motor specialist. If rings are the trouble he will gladly install a Hastings Steel-Vent replacement set. Truly the best money you can spend on your car.

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These are the rings that are **TOUGH** but oh so **GENTLE!**

Tough on Oil-Pumping
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HASTINGS

**STEEL-VENT
PISTON RINGS**

Regular or Chrome-Faced

Motor Engineered

FOR CARS, TRUCKS,
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Florida Builds A Great Wall

(Continued from page 163)

distributed among the stations as occasion demands.

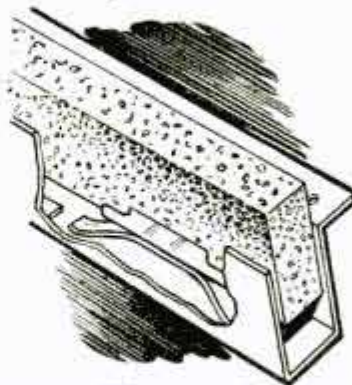
This 858,022-acre manmade water reservoir is ideally suited for fish and animal life. The first pool, having an area of 216 square miles, has been leased for 50 years to the United States Fish and Wildlife Service. The remaining two areas, 204 and 924 square miles respectively, will be administered by the Florida Game and Fresh Water Fish Commission.

Upon completion of the flood-control program, no longer should Florida's growing cattle industry (ranking thirteenth in the nation) be checked by flood and drought. No longer should emergencies arise such as that which confronted the lower-east-coast city of Fort Pierce in September 1951. Suffering from an acute water shortage, this city appealed to the Flood Control District for aid in recharging its well-field areas. Yet, before an emergency supply canal could be finished, Fort Pierce found itself under flood condition from abnormal rains!

Too, with provision made for adequate water control, there will be incentive for settlement of the vast ranges within the state that presently are regarded as wasteland. For example, in the Everglades agricultural area alone, there are 713,670 acres of land capable of long-term agricultural development. The presently developed area totals but 260,950 acres. This should inspire the planting of such extra crops as rice and such important fibers as ramie and kenaf.

The Florida project is an example of what intelligent state and federal cooperation can achieve in the salvation of great natural resources. ★ ★ ★

Spring-Action Weather Strip



Steel springs in a new design of weather strip push a pad of felt against doors and windows to give a positive seal against air leakage. The springs are mounted in an aluminum channel beneath the felt strip. The weather strip is installed with screws and cadmium-plated nails, using only a hammer and screwdriver.

☐ Clothing is the latest item to be shipped and stored in steel containers—or cans—by the Air Materiel Command.



5 features prove:
BOLENS
 garden tractors
*serve you better
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 all year 'round

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Spare yourself the toil and trouble of hundreds of jobs around the yard, farm or garden. Let a Bolens tractor do the work *faster and easier*.

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2 1/2 H.P.
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for countless jobs all year 'round

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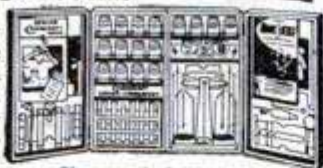
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Operates spray guns, rock drills, tampers, paving breakers, sandblasting... Uses only 1 gallon of gas an hour!



Save Money—build your own Smith Air Compressor! Famous the world over! Capacity 60 cu. ft.; pressure up to 100 lbs. per sq. inch. Just order the Smith Compressor Head and Accessories with complete instructions for assembling. All you need is a Ford Motor and shop facilities. Head equipped with high speed compressor valves; automatic unloading and idling.

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30 Models 8 TO 23 FEET

**21 FT. OUTBOARD AND
INBOARD CABIN CRUISERS**

Roomy cabin sleeps 2. Includes full size toilet room, galley, sink & ice chest.

New



**18 FT. OUTBOARD AND
INBOARD CABIN CRUISERS**

Fast Vee bottom hull, speeds up to 25 M.P.H. Accommodations for 2.

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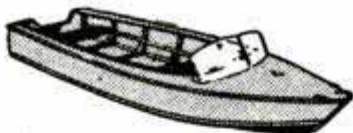


ROWBOATS OUTBOARDS INBOARDS

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KIT BOAT OWNERS

Protect your boat with Fiberglas. Makes new & used boats permanently water-tight. Lengthens lifetime, strengthens construction, increases value & safety. SEND 10¢ postage for interesting booklet with detailed instructions.



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703P WHITTIER ST
BRONX 59, N. Y. CITY

The Lockheed hydraulic two-leading-shoe brake system is ample for the weight of the car, although excessive pedal pressure is needed. The hand brake is located between the door and the seat.

There are two open package compartments on the dash. The speedometer is located to the right of center, actually nearer the eyes of the passenger than of the driver. I would prefer it directly in front of the steering wheel, as the driver's eyes must be shifted considerably from the normal driving position to see it. The choke is manual. The starter is the pull-out type and requires too much effort to operate. The directional-signal lever is at the top of the steering-wheel hub and, on the new models, U.S.-type blinkers are used instead of the side-operating signals common in Europe.

The one-piece windshield is slightly curved and vision is satisfactory. The rear window could be enlarged for better rear vision. One feature I like is the quick-acting window crank handle; about one turn of the crank raises or lowers the window (United States engineers should not overlook the value of faster-operating window cranks).

Mounted directly back of the engine on the fire wall is a 12-volt battery. Heretofore 12-volt batteries have been somewhat inconvenient because of lack of charging equipment in some service stations. However, the 12-volt system is now coming into use on American cars, as it is better than the 6-volt system when a lot of electrical accessories are added.

The doors open and close easily and the body is solid. The frame and chassis are solidly welded in unit construction, which is good engineering.

The gearshift is confusing. Low gear is down and forward. Second gear is down and back. Third gear is up and forward, and fourth gear is up and back. Reverse position is rather difficult to get into as the lever must be pushed far down and pulled backward. The new driver and occasional drivers of the Minx naturally are confused. For the American market, the adoption of a standard United States gearshift would be advisable—with some provision for fourth speed to be operated by pushing the lever down and pulling back such as is now used for reverse.

The spare tire is carried in a compartment below the rear luggage space. Hillman offers a unique jack arrangement with permanent four-corner sockets built into the main frame assembly. A rigid arm on the jack fits into the corner sockets. It is a convenient arrangement.

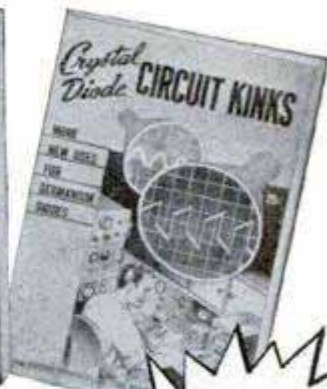
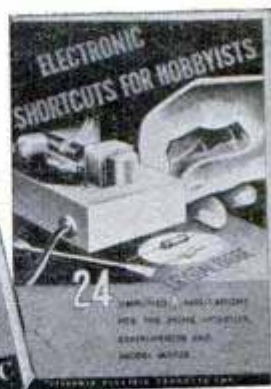
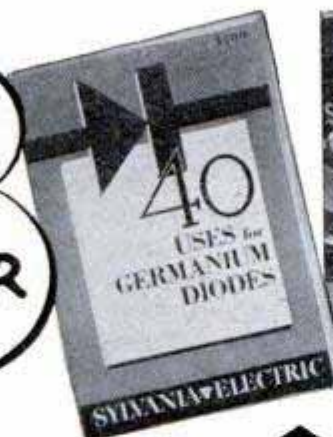
(Continued to page 278)

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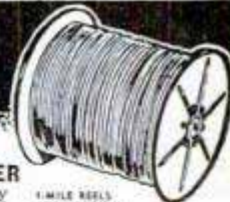
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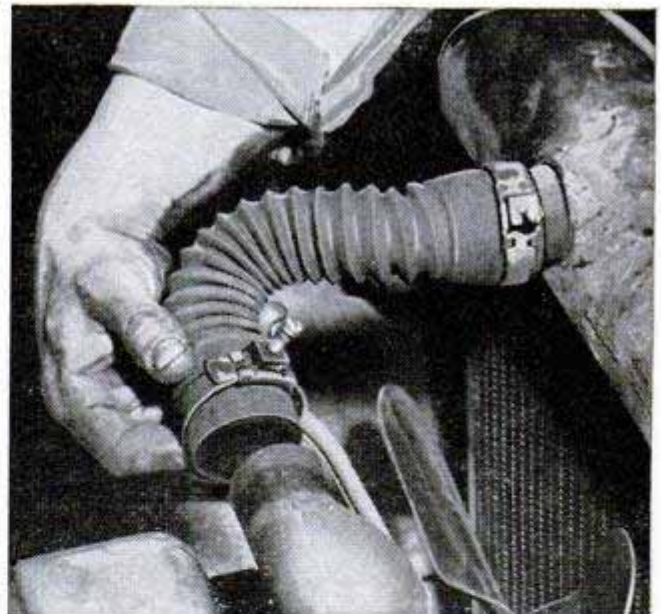


The rear trunk lid is held up by a rod which works automatically. The lid appears somewhat flimsy when opened because it is supported on one side only. There is an amazing amount of luggage space, considering the size of the car. In contrast with American manufacturers, Hillman furnishes a starting crank and a fairly complete set of tools.

The driver who wants top speed and tremendous acceleration is not going to find the Minx a car to his liking. The owner who desires dependable economical transportation with the many advantages of the small car will find the Minx a real value and well worth owning.

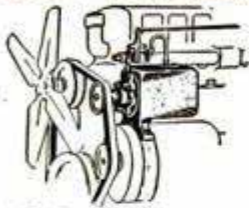
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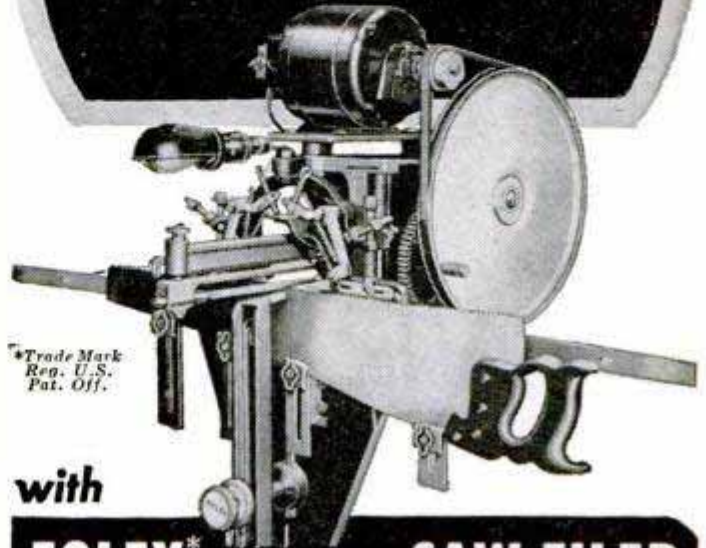
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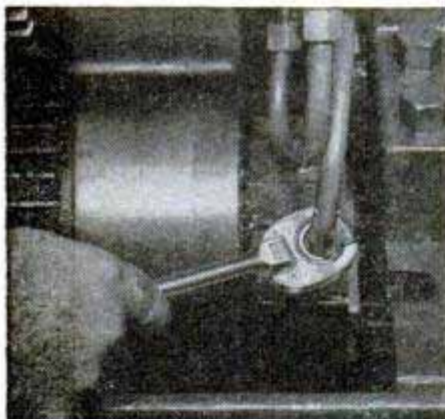
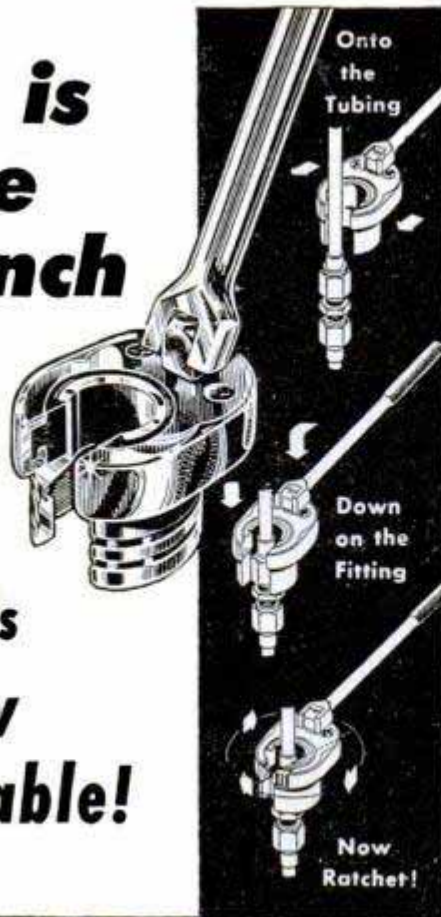


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Some Scientists Believe H-Bomb Harnessed for Power

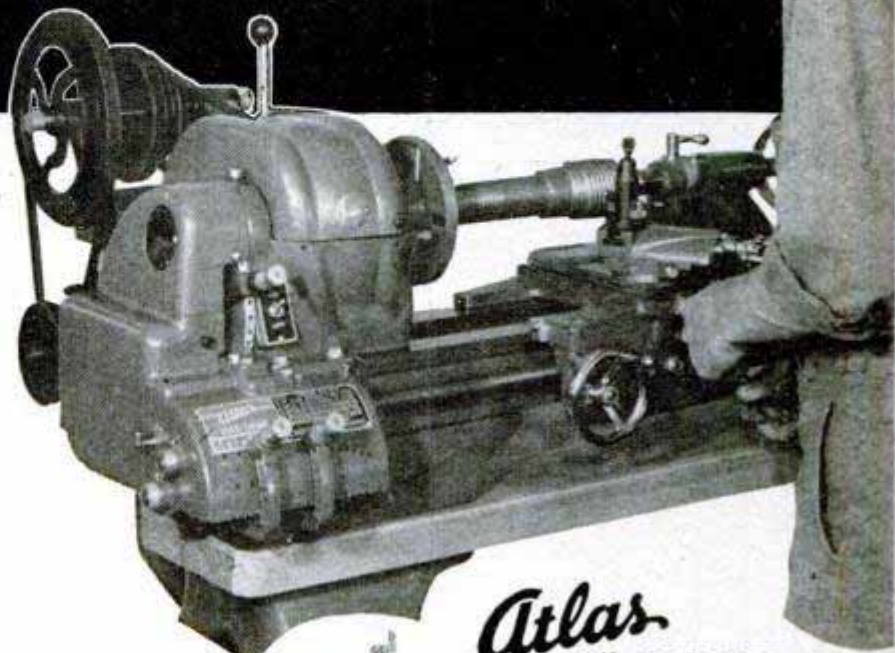
Can science harness the vast power of the H-bomb for industrial use? Some scientists believe the two big problems have been theoretically solved. A starting mechanism, producing extremely high temperatures, must be designed, and some form of control must be devised for the vast output of power that occurs when atoms of hydrogen are brought together to produce helium. The Italian government recently announced that Italian scientists already have succeeded in exploding hydrogen to make helium. Scientists of the Atomic Energy Commission are planning to test their theories in the laboratory. If they succeed they will have tapped a source of power far greater than the atomic reactors now being built, and will produce energy in almost the same manner as the sun.

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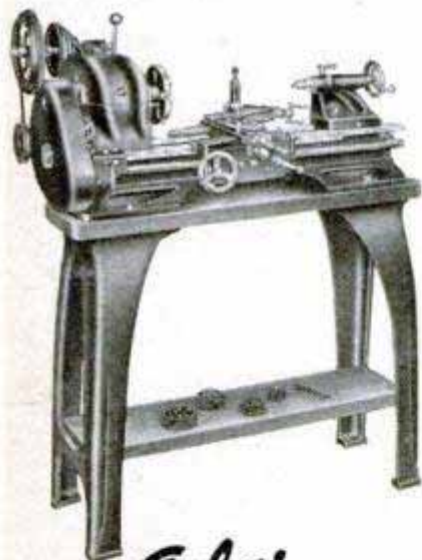
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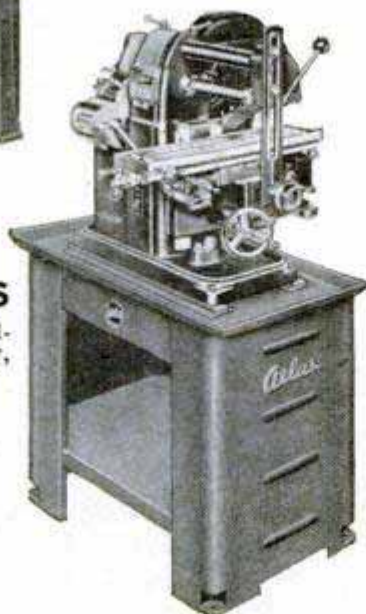
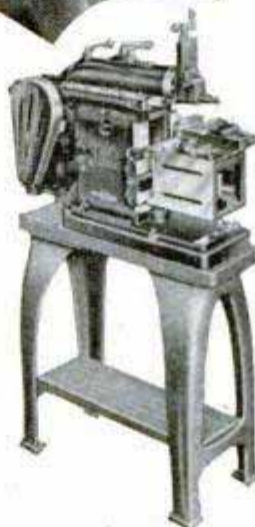


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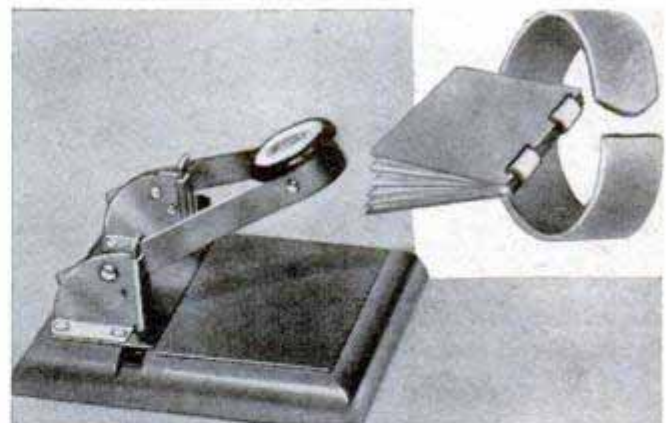


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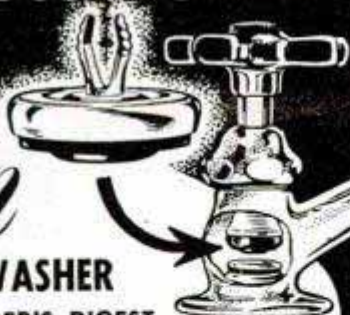
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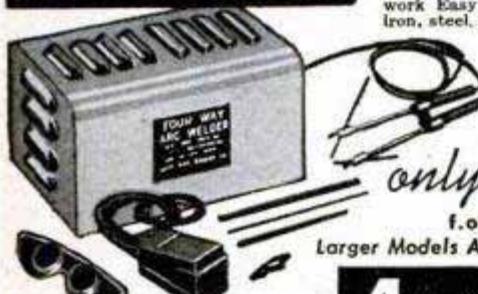
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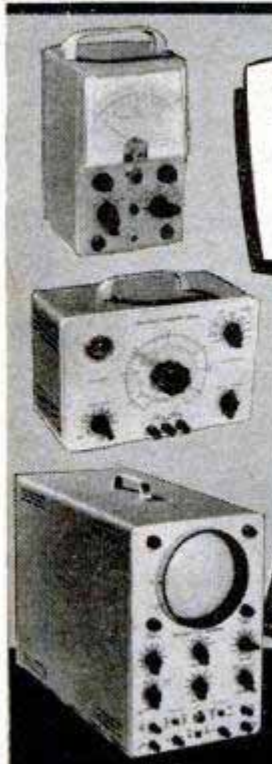
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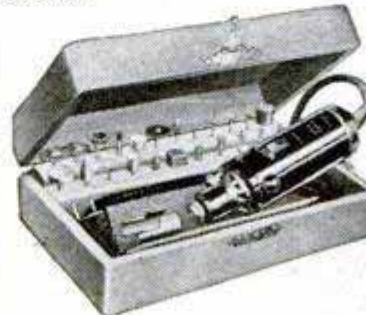


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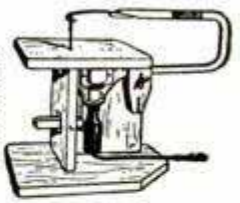


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Make your own jig saw. Complete plans and six project patterns included FREE.



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Here is a genuine craftsman's tool with dozens of household and workshop uses. It is perfect for all sorts of coping and jig saw work making window valances, knicknacks, hobby projects, etc. High-speed, reciprocating-type motor easily cuts asphalt and rubber tile, also masonite and formica—wood up to 3/4". Perfectly safe for children—so easy to handle that women love to use it. Has only two moving parts, never needs oiling. A high quality tool used by craftsmen, tile layers, and carpenters.

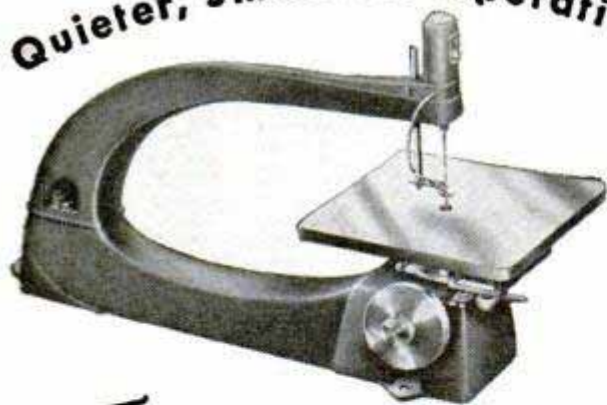


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DREMEL MFG. CO. DEPT. 113-A RACINE, WIS.

Quieter, Smoother Operation...



TOMLEE JIG SAW

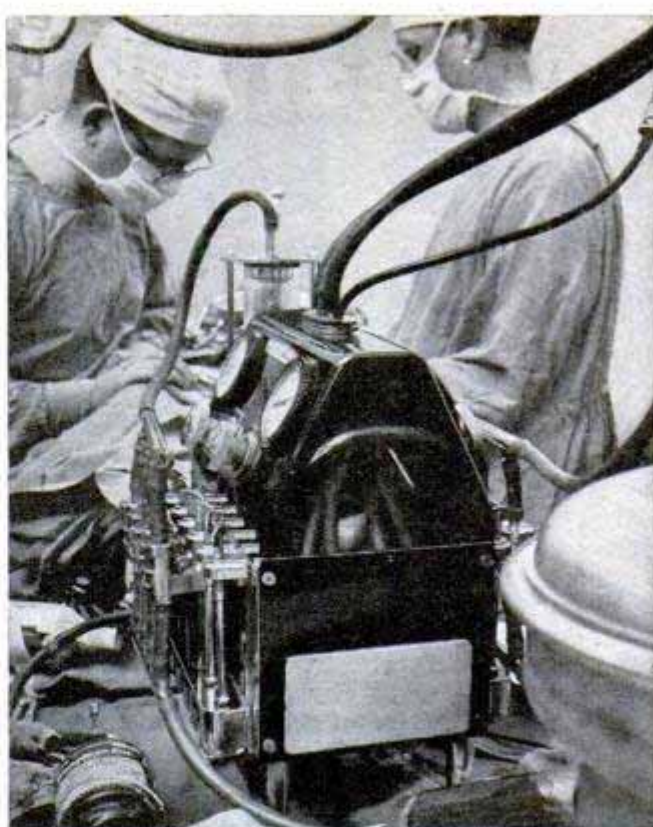
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Biggest user of finished steel in the 12 years prior to 1952 was the construction industry, which consumed 102,000,000 tons of the 737,000,000-ton total. The automotive industry was next, with 97,300,000 tons, 13.8 percent of the total. To warehouses supplying hundreds of thousands of small customers in different industries, however, went 115,000,000 tons, more than that used by any single industry.

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Genuine Swedish Charcoal Steel hardened and tempered for two-thirds of the length of the blade — that's the big difference between SHARK BRAND Paring Chisels and the ordinary kind. You'll do better, faster, more accurate work easier with these finest of all chisels. They really stay sharp and are honed with an extra wide bevel for the professional carpenter or home workshop enthusiast.

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Item #350 — Double acting pneumatic cylinder, 6" bore, 6" stroke, 1 1/2" shaft. Adjustable cushions at both ends. Flange mounting at shaft end. Overall length closed 18". Ideal for use in 125 PSI systems. Shipping weight 40 lbs. F.O.B. Chicago. **39.50**



LOGAN 4-Way, Foot Operated AIR VALVE Item #59, Model 6520—Ideal for operating air vices, presses, air machinery, and other double acting pneumatic devices. Heavy cast construction. Standard 3/2" pipe thread ports. Overall dimensions 8 1/2" x 5 3/4" x 7 1/2". Gov't acquisition cost \$42.00. Shipping weight 28 lbs. An outstanding buy. F.O.B. Chicago. **15.00**

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Large supply of new labor-saving, economical hydraulic equipment in many types and sizes. Use these positive, highly efficient smooth pressure hydraulics on presses, arbors, lifts, loaders, power control, positioning, brakes, plastic dies, auto frame alignment, etc.

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PUMP PRESSURE (PSI)	LIFT CAPACITY (LBS.)
500	3535
1000	7069
1500	10604
2000	14138



Item #29KJ — Gear Type Hydraulic Pump. Ideal in industrial applications and for

operating all hydraulically powered farm implements including loaders, stackers, swathers, plows, etc. Delivers 1000 PSI (may be set at lower PSI if desired). 12 GPM at 400 RPM. Maximum operating speed 800 RPM—rotation counter clockwise. Has built-in relief valve, permanent or torque bar mounting, 1" diameter shaft, 3/4" pipe tap inlet, 1/2" pipe tap outlet. Shipping weight, 22 lbs. F.O.B. Chicago. **45.50**

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Available for Immediate Delivery — Large Stock — Many Sizes from 350 Watts to 25 KVA



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Item #183 — 3000 to 4000 WATT GENERATOR SET — **FEATURES** — Power for your home or business. Simply connect to power panel or house circuit. • Constant voltage regardless of load. • Push button start or stop. • Easily made full automatic start or stop. **SPECIFICATIONS** — Sizes 19"x30"x48". Steel skids, weatherproof housing, requires no building. Wt. 725 lbs. • Hercules 4-cyl. 10 HP gasoline engine. Load governor, Oil filter, Quiet engine. • Hobart 115 volt, 60 cycle, muffer, 6-volt starter, generator. 3000 to 4000-watt generator. 2 or 3 phase power, 2 or 3 wire. • Panel contains oil gauge, voltmeter, ammeter, circuit breaker, voltage regulator, start button. Today's cost over \$1200.00. **SALE PRICE, 465.00**

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Item #2510, 2500 watts, 115 volts, 60 cycles, single phase, A.C. electric generating plant, powered by dependable 6.5 H.P. Wisconsin engine — Two pole ball bearing belt driven high efficiency generator with heavy duty windings for high torque motor starting loads. Rated 3000 watts for intermittent service. Light weight portable rugged unit, easily transported to job site. Consumes 3 quarts of gas per hour at rated load. Dimensions: 24"x20"x24", ship. wt. 220 lbs. Complete with fused outlet box and voltmeter. F.O.B. Chicago. **349.00**

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General Motors — Allison CENTRIFUGAL PUMP

200 GALLONS PER MINUTE

For Draining Basements
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 Converted for high volume commercial, home, and industrial use. Standard 2 1/2" pipe thread inlet, twin 1 1/4" pipe thread outlets. Ball bearing supported 3/4" shaft. Easy priming. Rotation, counter-clockwise facing shaft. Gov't. acq. cost \$145.00. Complete with full instructions. Ship. wt. 35 lbs. F.O.B. Chicago. **39.50**

Suction Lift	Head Pressure	Gal. Per Min.	H.P.	R.P.M.
10'	75'	260	6.0	3500
10'	65'	200	5.2	3500
10'	40'	140	3.5	3500
10'	30'	100	3.0	2500

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- every "Evans White-Tape" is unconditionally guaranteed.
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- underside is white, too. Mark with ordinary pencil, remove mark with flick of thumb.
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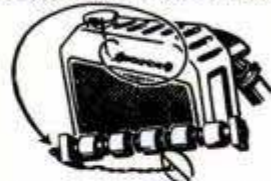
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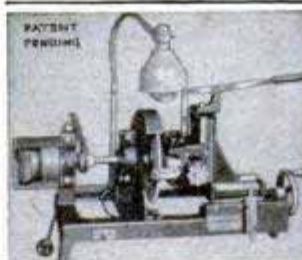
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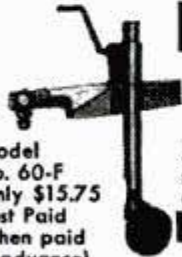


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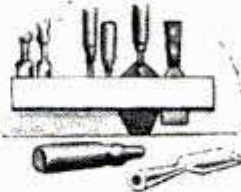
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JANUARY 1953

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WHEN HANDLES COME OFF, put 'em back on to stay with "Duco" Cement. It's a must in the tool room.



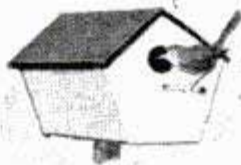
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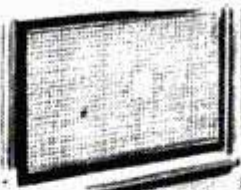
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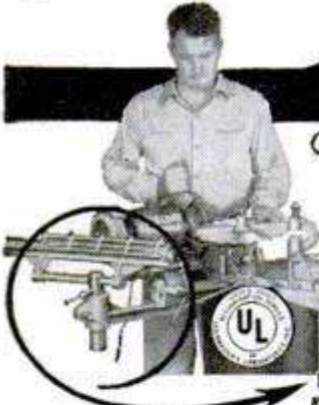
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New precision attachment for sharpening planer and jointer knives, plane irons, wood chisels and drill bits brings you up to \$4 an hour from the first day.

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1/2 HP	1750 or 3450 RPM	19.75	1 HP	1750 RPM	52.00
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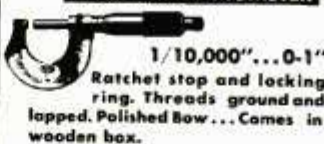
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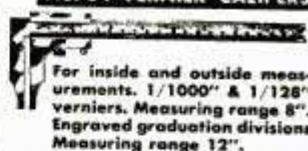
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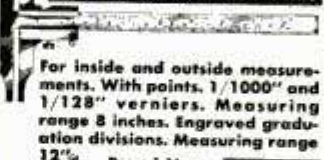
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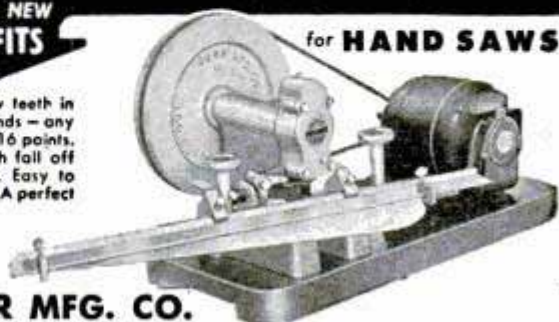
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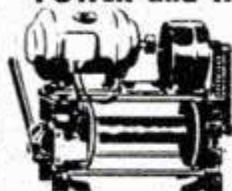
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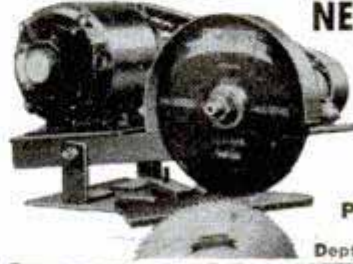
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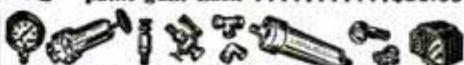
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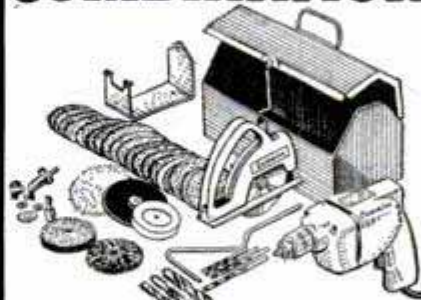
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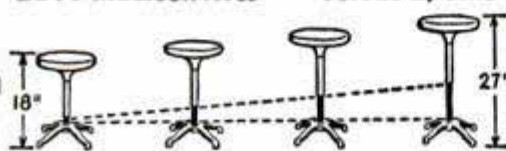
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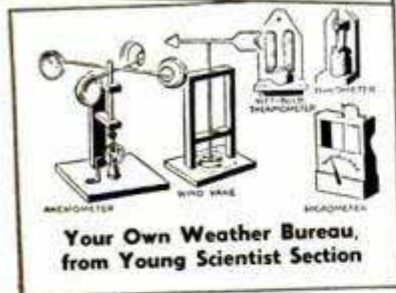
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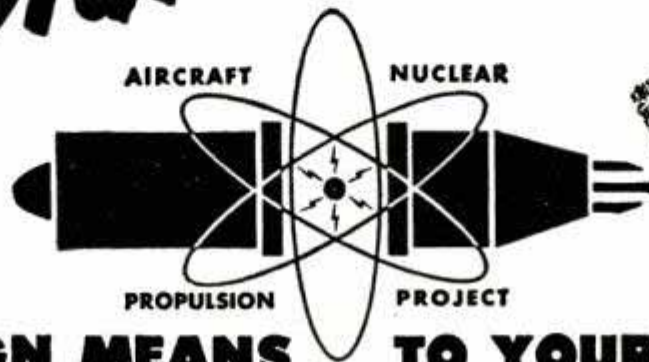
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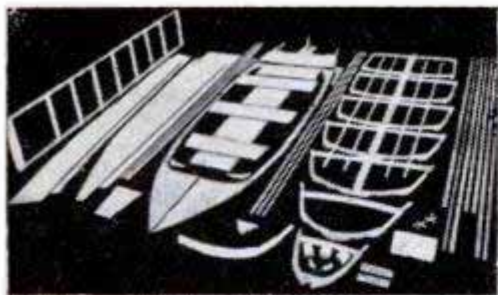
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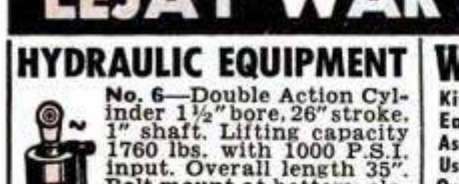
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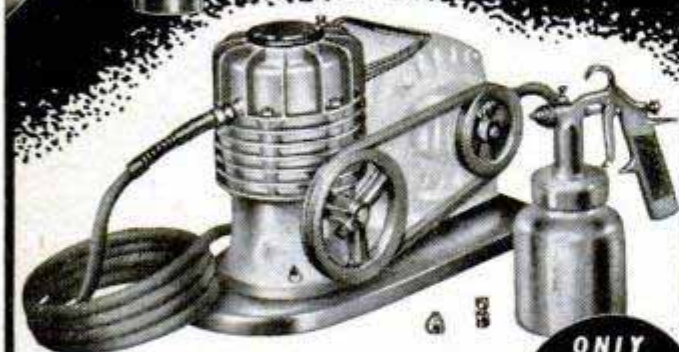
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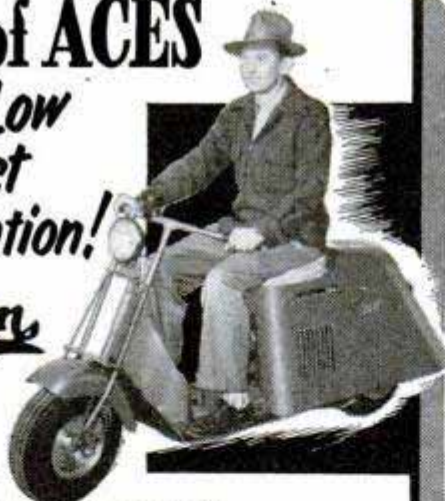
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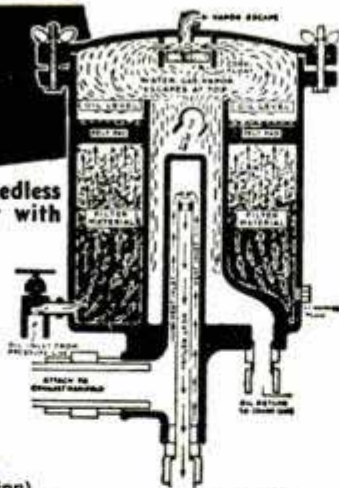
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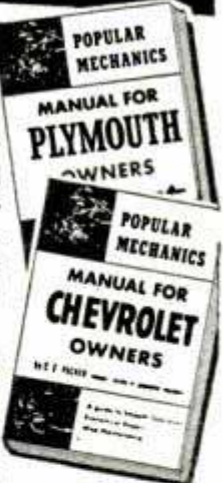
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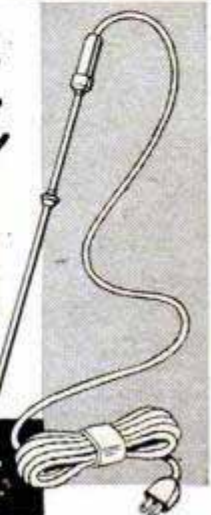
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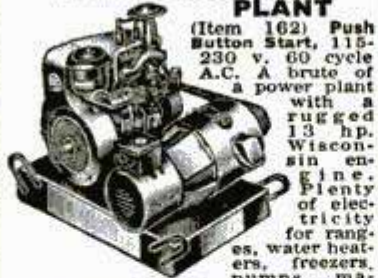
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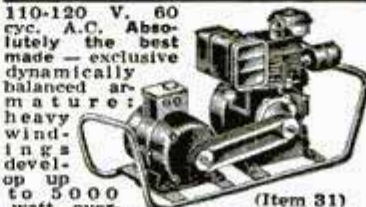
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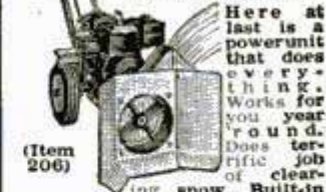
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Write for price of compressor only. A complete line of spray guns and air tanks available.

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Heavy duty, made by S. 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. Ideal for midcut autos. Employs reliable "trouble free" planetary system. No hydraulic power losses or creeping. Infinite range, smooth operation, easy installation (data included). 3 sizes: 1 1/2 hp. wt. 36 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs. Reg. list \$228, \$252 and \$332. Our prices... **\$79.50, \$89.50 and \$114.50.**

Factory Prices on Catalog Items

Send 10c for BIG 1953 catalog. Hundreds of bargains.

Prices f.o.b. Factory. 10 day Money back guarantee. Send check or Money Order
MASTER MECHANIC MFG. CO., DEPT. 79-B Burlington, Wis.

Schupack's AMAZING TOOL BARGAINS! ALL BRAND NEW MERCHANDISE

112 PIECE ASSORTMENT \$3.95
FOR ELECTRIC GRINDER
 \$10.00 VALUE — ONLY! **Post-paid**

Here's what you get! Mounted Stones on 1/2" mandrel, Drum Sander, Sanding Sleeves for sander, Rotary Cutters, Wire Scratch Brush, Bristle Brushes, Circular Saw, Buffing Wheel, Grinding Wheel, Rubber Polishing Wheel, Cut-off Wheels, Rubber Cylinder, Mandrels to fit above tool, Assorted Sanding Discs, Sharpening Stone, etc.

18 ROTARY CUTTERS \$5.85
 \$13.50 Value **Post-paid**

Illustrated 1/2" actual size

Assorted sizes cutter on 1/4" or 3/32" shank. Will fit all hand grinders. Ideal for cutting wood, metal, or plastic. Brand new.

12 MINIATURE CUTTERS \$1.00
FOR CUTTING WOOD, PLASTIC, OR METAL **Post-paid**

Actual size. Assorted shapes on 3/32" shank. For die makers, home workshop, etc.

7 HIGH SPEED TWIST DRILLS \$1.00
 15 DRILLS FOR ONLY \$2.00! Order Today! **Post-paid**

7 Popular Sizes—up to 1/4" Brand new. Ideal for home or shop use. Fits all standard chucks.

5 DRILLS FROM 1/4" to 1/2" DIAMETER—\$1.95

SURPRISE VALUE 100 Pieces \$1.00
FOR ELECTRIC GRINDERS **Post-paid**

Grinding Wheels, Cut-off Wheels, Sanding Discs, Mounted Stones, Sharpening and Honing Stones, Rotar Cutting Burs, Abrasive Cartridges, Mandrels, and many other items.

Free!

For a limited time only, and while supply lasts, we will give the items below absolutely FREE with every order for \$6.00 or more. Value of these FREE items is \$3.25.

- 3 Grinding Wheels 1 1/2" to 3 1/2"
- 1 Cut-Off Wheel 3" Dia.
- 2 Buffing Wheels 3" & 4" Dia.
- 2 Felt Pol. Cylinders

Every item in this ad, including the FREE items, is BRAND NEW FINEST QUALITY merchandise, sold with the Schupack guarantee of satisfaction. To get this FREE Offer clip this ad to order. All mdse. postpaid in U.S.A.

1953 Illustrated Catalog 10c

FLEXIBLE SHAFT — ONLY \$4.95 **Post-paid**

Fits all electric drills & hand power tools. 35 3/4" long. Oilite bearings. Core of specially wound, high carbon steel wire in flexible steel casing. Will accommodate tool shafts up to 1/4" dia. For lathes, electric drills, etc.

2 DRUM SANDERS \$1.50 **Post-paid**

With 12 Bands in Assorted Grits. 1 1/2" dia. x 1" long on 1/2" arbor with 12 Bands

ONE DRUM, 1" DIA. x 1" LONG ON 1/2" ARBOR WITH 6 EXTRA SLEEVES \$1.00 **Post-paid**

12 MOUNTED WHEELS \$2.95 **Post-paid**

and points on 1/2" Mandrel.

For grinding on plastic, wood soft and hard metal. Regular \$5.40 List. Val. 12 wheels on 1/2" Mandrel \$3.60

18 MOUNTED POINTS ON 3/32" MANDREL \$2.50

18 GRINDING WHEELS \$1.00 **Post-paid**

and rubber polishing wheels up to 1" dia. For grinding & polishing metals, plastic, wood. With one 3/32" mandrel.

10 CUT-OFF WHEELS 1 1/2" DIA. WITH 1/2" MANDREL \$1.00

20 ABRASIVE ROLLS, cloth, and 1/4" mandrel \$1.00 **Post-paid**

for grinding, sanding, deburring metal, plastic, wood or rubber. ONLY....

ADAPTER CHUCK \$1.50 **Post-paid**

With 2 interchangeable collets, opening from 3/32" to 9/16" on 1/2" mandrel. Price each only

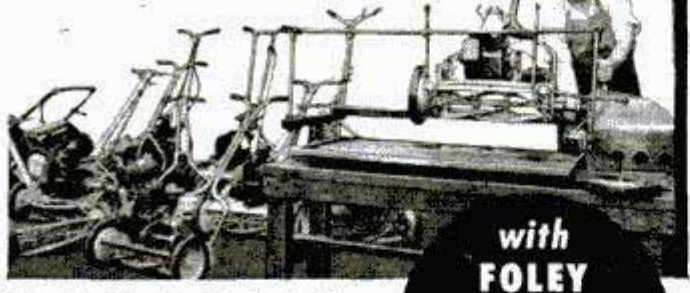
2 CIRCULAR SAWS \$1.50 **Post-paid**

ON 2 MANDRELS — ALL AT ONE LOW PRICE

1" diameter saws on 1/2" Mandrels. For cutting wood, plastic, or soft metals. Order at once! Send Check or Money Order.

SCHUPACK SUPPLY CO., 7331 COTTAGE GROVE AVE., DEPT. M-38 CHICAGO 19, ILL. SEND CHECKS OR M. O. NO COD'S PLEASE

Made \$2,600 LAST SEASON



99c Profit On Each Dollar

It costs less than 1c per mower for electricity and material. The Foley sharpens all blades and cutter bar together just like lawn mower manufacturers do it. Start in spare time in basement or garage. The Foley handles up to 3 or 4 mowers per hour—prices run \$1.50 to \$3.00 for hand mowers—\$5.00 to \$8.00 for power mowers.

FREE—VALUABLE ILLUSTRATED BOOK shows how to sharpen all leading makes of power mowers. Foley prices are low — easy payments available. **FREE PLAN** tells how to start. Send coupon today—no salesman will call.

with FOLEY LAWN MOWER SHARPENER

"Last year we sharpened and repaired about 1000 lawn mowers for a net profit of \$2600," says E. G. "In 1939 I bought a Foley Lawn Mower Sharpener," writes W.T.J., "the best investment I ever made. I have made a good living for my wife and self, and have put money in the bank besides."

SEND FOR FREE BOOK

FOLEY MFG. CO., 107-3 Foley Bldg. Minneapolis 18, Minn.

Send FREE BOOK and FREE PLAN on Foley Lawn Mower Sharpening business.

Name _____

Address _____

NO FROZEN PIPES

When You Use WRAP-ON ELECTRIC HEATING CABLE

Protects to 35° Below Zero

No more worry, expense or inconvenience from frozen pipes! Just wrap plastic coated cable around exposed or shallow underground pipes and plug into 115 volt outlet. Maintains low heat — like electric blanket. Uses only small current. Thermostat turns on only when needed. No radio or TV interference. Low prices — complete with connections. Satisfaction or money back.

G-Q Electric Seed Bed Heater. Seeds are up in 30 hours—root cuttings in 6 days. You cut germination time 2/3—transplant 2 weeks sooner. Uses house current. Thermostat control. Easy installation. Write for catalog and FREE folder on seed bed construction.

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 Tuxedo 5-5828

Free Catalog

NEW—Sensational! GEIGER COUNTER

"The SNOOPER"
LOW PRICE ONLY \$24.95
COMPLETE

Find a fortune in uranium with this new, super-sensitive Geiger Counter. Get one for atom bomb defense. So small it fits in the palm of the hand or in the hip pocket, and yet more sensitive than many large, expensive instruments. Weighs only 1 1/4 lbs. Uses flashlight battery. Low price includes earphone, radio active sample, instructions. Sold with ironclad moneyback guarantee.

ORDER YOURS TODAY—Send \$5.00 with order or payment in full to save C.O.D. Write for free catalog on larger, more elaborate Geiger Counters, metal locators and our Scintillator Counter.

Dealer Inquiries Invited **PRECISION RADIATION INSTRUMENTS**
 2235 PM So. La Brea, L.A. 16, Calif.

Why Pay List Prices? BUY WELLWORTH PRODUCTS ... SAVINGS UP TO 50%

PORTABLE SPRAY OUTFIT

1/3 H. P. HEAVY DUTY MOTOR



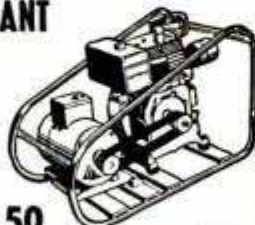
Paint Sprayer mounted on 7 1/2 x 25 inch tank, 1/3 H.P. 110 V. 60 cy. Heavy duty motor, 10 ft. cord and plug, V belt drive, Piston type Compressor with 2 Compression rings, 1 oil ring, 2 inch Bore, 1 3/4 inch stroke, displacement 2.86 C.F.M. at 60 lbs. pressure. Safety valve. External and internal atomizing gun, fan, round and angle spray nozzles; quart cup; maintains 35 to 40 lbs. working pressure. Oil and water extractor, 20 ft. heavy duty two-braid air hose with leakproof fittings. Complete with carrying handle. Wt. 75 lbs.
Special Price
Complete Outfit..... **\$67.50**
Spray Gun Sold Separately... **\$12.95**

Regular Price... **\$125**

2000-2500 WATT LIGHT PLANT

Heavy Duty Windings

110 v., 60 cy., A.C., takes starting overload up to 5000 watts. Floating Base for Automatic Belt Adjusting, 2-Groove Engine Pulleys, V-Belts, Bolts, etc. 5 H.P. Wisconsin or Briggs & Stratton Model 14 Engine. Voltmeter, 2 plug-in receptacles. Portable Tubular Steel Skid Type Carrier. Dim.: L 34 5/8" x W 17" x H 20". Wt. 180 lbs. List



\$299.50

Generator only, with voltmeter, 2 plug-in receptacles. Ship. Wt. 75 lbs..... **\$169.50**
500 WATT GENERATOR, Wt. 55 lbs..... **\$99.50**
5000 to 6000 W. GENERATOR, 110/220V. Wt. 225 lbs..... **\$325**
5 K.W. Signal Corps Light Plant, List price \$2200... **\$895**



"Wellworth" BLOWER BARGAIN

Quiet operating. Double wheel inlet, double width blower. For heating, ventilating, cooling, air washing, exhausting and forced draft. DIMENSIONS: 10" wheel; outlet 13 1/8" x 11 3/8"; inlet 8 3/4". Height 19". Width 18". Depth 16 1/2". C.F.M. 1/4" S.P. 1600; outlet vel. 1575. Wt. 45 lbs. **\$27.50**

With belt and variable speed pulleys, \$2.50 extra. Same Blower, complete, with 1/4 H. P. Motor **\$45.00**



RED SEAL CONTINENTAL GAS ENGINE

Red Seal, 2 HP with 6 to 1 reduction gear. Operates at 450 R.P.M. For lawn mowers, scooters, garden tractors, pumps, compressors, generators, etc. List Price **\$79.50**. Shipping wt. 54 lbs. **\$47.50**
SPECIAL PRICE..... **\$47.50**
Same engine, 3600 r.p.m., **\$47.50**
With 2 1/2 H.P. motor..... **\$62.50**

AUTOMATIC COMPRESSOR UNIT WITH 22 GALLON TANK

1/3 H.P. heavy duty capacitor motor. 110 volt A.C., 2" bore, 1 3/4" stroke, 60 cycle, 2x1 3/4 inch piston type compressor, splash feed lubrication. 14"x32" tank, automatic pressure switch, CFM 2.8 at 100 lb. pressure, or 150 lbs. pressure for intermittent duty. Check valve, safety valve, 20 ft. air hose with air chuck for inflating tires. V. belt drive. Mounted on 2 wheels, ball bearing, with 2"x8" semi-pneumatic tires. Portable with handle. Shipping wt. 150 lbs.



With 1/3 h.p. motor
Regular price \$175
\$98.50

With 1 1/2 h.p. gas engine
\$124.50

Regulator, gauge and filter included at no extra cost.

Larger size compressor units furnished with same tank and accessories described above:
with 2 1/2 x 2 Compressor, 1/2 h.p. motor, 3.24 c.f.m., wt. 175 lbs..... **\$136.50**
with 2 1/2 x 2 Duplex compressor, 1 h.p. motor, 7.35 c.f.m., wt. 200 lbs..... **\$225.00**

WELLWORTH AIR COMPRESSORS

Aluminum piston, stainless steel valves, 3 piston rings, bronze bearings, splash lubrication. Intake muffler, V-belt, cast iron fan cooling flywheel.



Model W800 COMPRESSOR 2" x 1 3/4". 2.8 c.f.m.
Operates with 1/4 HP or 1/2 HP motor up to 150 lbs. Weight 20 lbs. **\$20.50**
Special price.....

MODEL 200 COMPRESSOR
2 1/2" x 2". 2.55 to 4.80 c.f.m. up to 150 lb. pressure. Operates with 1 1/2-3/4 HP motor. **\$27.95**
Special Price.....
Shipping wt. 24 lbs.

MODEL W7 COMPRESSOR
2 cylinder 2 1/2"x2", 5.10 to 8.50 c.f.m. up to 150 lb. pressure. Operates with 3/4-1-1 1/2 HP motor. **\$54.50**
Special Price.....
Shipping wt. 45 lbs.



LELAND GENERATORS

2500 to 3000 watts, 110 v. 60 cy. single phase 1800 r.p.m., self excited. Fungus treated for long life. 1951 model. Brand new, in original factory crate. Ship. wt. 135 lbs. **\$195**
List **\$425**. SPECIAL PRICE.....

See our Catalog for Terrific Bargains in Light Plants and Generators.

PRICES F.O.B. CHICAGO. MONEY BACK GUARANTEE. SEND CHECK OR MONEY ORDER TODAY. PROMPT SHIPMENT. WRITE FOR FREE CATALOG.

GEAR HEAD MOTORS 110V., AC

Right angle gear head—1/30 h.p. 6 RPM **\$11.95**
Right angle gear head—1/20 h.p. 135 RPM **9.50**
Bottom type gear head—1/30 h.p. 1250 RPM **10.25**



WELLWORTH TRADING CO.

1832 S. Wabash Ave., Dept. D-153, Chicago 16, Ill.
Cable address "WELLTRADCO"



C1 COLORCRETE

Drab or dirty masonry—concrete, stucco, etc., becomes gleaming white. Or there's a range of sparkling colors—ivory, cream, pink, blue, green, and 25 more. Colorcrete is fused to masonry surfaces under pneumatic pressure. Stays put and stays beautiful. Highly water resistant. Used for more than a quarter century.

There's Profit-Appeal in Stucco Spraying

The business of applying Colorcrete is a community enterprise, with special appeal to men of limited capital. Equipment is compact, simple to operate, practically wear-proof. Work is easy, interesting and rich in profit potentials. Broad opportunities for development. We supply all equipment and full instructions.

No experience or special ability needed. Write or wire today for the Opportunity Book.

COLORCRETE INDUSTRIES, INC.
570 Ottawa Ave.
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FASTER THAN \$100 ENGINEER INSTRUMENTS!

Packed in husky carrying case 12 x 11 1/4 x 3 1/4"



UP TO 50 FEET OR MORE LEVELALL

Regular 50 Feet **\$8.95**

THE NEW, IMPROVED WATER LEVEL FOR SIMPLEST ONE-MAN OPERATION

Deluxe 75 Feet **\$12.95**
Heavy Case

FOOTINGS FOUNDATIONS GRADINGS

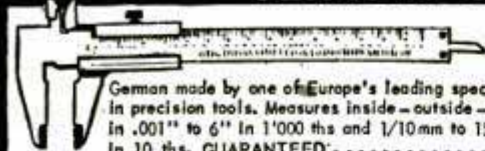
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 Send C.O.D. I will pay postman full purchase price plus delivery charge on arrival.
 Full purchase price is enclosed. Send postpaid. (Postage prepaid on orders in U.S.A. only.)

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INSIDE-OUTSIDE VERNIER CALIPER



German made by one of Europe's leading specialists in precision tools. Measures inside - outside - depth in .001" to 6" in 1/1000ths and 1/10mm to 150mm. In 10ths. GUARANTEED.....

9.75
NEW

STAND MAGNIFIER

Handy stand magnifier with universal adjustment. Over-all height: 6". Has a powerful, clear magnifying lens. **1.99**

MAGNETIC BASE INDICATOR HOLDER

Time saver for precision checking. Magnetic base fits curved or flat surface. Has 45-50 lb. pull. 6 1/2" stainless steel rod which is mounted in ball socket to permit universal settings. **3.50**

NOTE: We have complete line of instruments, depth gauges, inspection mirrors, etc. Write Today!

REPAIR KIT



An all-purpose kit! 6 useful tools - a fine steel trimming knife - pair of genuine WISS heavy duty scissors - a steel roller for cementing seams in fabric, wallpaper, etc. Two 12" half round files - a wire burnishing brush. Complete in cloth case. Ideal for wallpaper and linoleum. A 9.50 VALUE **3.29**

BENCH CLAMP

Carpenters, wood workers, cabinet makers - you need this one! Opens to 8" with 2-3/4" thumb screw. All steel, sturdy & dependable. Handy for clamping, glueing, assembling, etc. **1.59**

CLAMP-ON-ANYWHERE LAMP



One of the handiest lights you can own! Clamps on anywhere. Has a fully adjustable ball swivel which allows light to move freely. May be used with ordinary bulb, photoflood or photoflash lamps. Also used as reading lamp, work lamp, patio floor, etc. Socket assembly includes clamp, adjustable swivel, cord and plug. LAMP ALONE **1.39**

Spot Reflector (5" diameter) or Parabolic Flood Reflector (9" diameter) } **1.09 EACH**

PALLEY SUPPLY CO. SEE OPPOSITE PAGE

U.S. NAVY PHONE SET



Used by the Navy for flight deck and gunnery control. An ideal emergency communication system because they require no power supply. Perfect for office-to-shop, house-to-garage or barn, or any point-to-point within a 1/2 mile radius. These sets are fully Sound Powered. Each set includes 2 phones on chestplate, 2 headsets, button switches & approx. 35 ft. of cable. **10.95 PR.**

One phone and headset..... **5.95 EACH**

BELT KIT for TOOLS



For the Mechanic, Electrician, Machinist, Radio & TV technician, etc. Made of bark tanned, top grain cowhide and worn on the belt. Saves wear & tear on clothing. A convenient, handy place to carry all small tools. Re-inforced with rivets.

A - ELECTRICIAN'S, 7 POCKET KIT - Holds tape, pencil, tools, etc. **3.49**

B - EXTRA CAPACITY KIT - Main pocket is 1 1/2" box type, 2 extra pockets. **3.19**

C - METAL WORKERS KIT - Has 5 pockets & hammer holder. Roomy. **3.39**

D - GENERAL UTILITY KIT - Has just 1 large pocket for all uses. **1.79**

E - FLASHLIGHT HOLDER KIT - Handy holder for 2 cell lights. **1.09**

F - RADIO & TV INSTRUMENT KIT - 1 large & 2 small pockets. **2.79**

CUNO OIL FILTER



An aircraft type oil filter which can easily be adapted to autos, etc. Will keep oil clean without a cartridge replacement. Can be installed in minutes. Has two mounting braces. Lge size, 5/8" tube ports.

A real SURPLUS BARGAIN. **6.95**

HAND TOOLS KIT



WAR SURPLUS MIX. Four hand tools plus an Army Cinder Scoop for your fireplace. The tools alone are worth for more than our price but we throw in the Cinder Scoop FREE! Tools include a Hammer Punch, Chisel-Hammer, Stake Driver and 17" Stanley Screwdriver. All have crucible cast steel heads & hardwood handles. For heavy work around home, machine shop, garage, ranch, farm, etc. **2.89**

UTILITY BAG



Room to carry ammo, flashlight, compass, camera, maps, food, first aid kit, etc. Made of Heavy O.D. canvas. Has a wide, adjustable shoulder strap. Two rings on each side for tying on extra equipment. Inside has two large compartments. Cover straps down. Size: 12" x 7" x 4". **1.29**

PALLEY'S DEPT. PM-4, 2263 E. VERNON AVE., LOS ANGELES 58, CALIF.



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THE ORIGINAL AUTOMATIC GRIP SCREWDRIVERS



Gripper Recedes into Handle

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Build your own JET ENGINE!



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1. JET PROPELLED BICYCLE, Assemble your own. Photo and instructions, \$1.00.
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3. BOTH OF ABOVE in one order \$3.75. SEND NO MONEY. Order both at once \$3.75 C.O.D. in USA plus c.o.d. postage. Send check or Money Order and we pay postage. Get other information too. Rush Order.

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make your own Gems 29.50 F.O.B.



The Gem Maker comes complete with all necessary equipment, including a super-charged diamond blade for sawing, and all wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt, for only \$29.50, f.o.b., Burlington, Wisconsin. Write today for information and literature.

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START YOUR OWN BUSINESS With A Route of nut, candy or gum Vendors. No experience or training necessary. Earn at once, highest profits, easy operation. No age limits. Full or part time. For complete information how anyone can become financially independent send for CATALOGUE 100 to **RAKE**

609-P Spring Garden St., Philadelphia 23, Penna.

ONE-MAN SAWMILL LOW \$50.00 AS... 50.00 DOWN



Take BELSAW Portable Sawmill right to the trees - turn out valuable lumber for local yards - do "custom sawing" for neighbors. BELSAW lasts a lifetime. No crew needed. Power with old auto engine. Beginners get excellent results. Send postcard for FREE BOOK, "How To Make Lumber."

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FREE Garden Tractor CATALOG

3 outstanding models plus all attachments including sickle bar, plow, cultivator, and rotary saw. Designed for rough, hard service. Many exclusive features. Ideal for farm, club, estate, or small plot. Write for catalog.

Quick Mfg., Inc. 3257 E. Main St., Springfield, O.

Springfield GARDEN TRACTOR



100-200 300 POWER MICROSCOPE

Has a triple objective revolving turret. Extra fine micro adjustment. Adjustable plane sub-stage mirror. Body inclinable through 90° for microprojection. In dovetail hardwood wood case. **1395**

600 POWER MICROSCOPE

Has all the features needed for the finest work. Comes with 3 eyepieces (5x, 10x, 15x) Triple revolving turret has 4x, 10x, achromatic objective lenses. Gives power combinations from 20x to 600x. Also has a square 90° inclination stage. Two side plane & concave substage mirrors. Solid base, precision construction. A regular \$150 val. **OUR PRICE complete with special! 7495** **WOOD CASE.**



POCKET MICROSCOPE

A Palley Bargain! Has extremely sharp 50 power magnification. Compact, clips into pocket, 4 lens compound optical system. New examine insects, stamps, minerals, gems, etc. Comes ready to use. **349**



20 POWER TELESCOPE

Top quality import. Coated Lenses. Bright, clear image & wide field of view. **895**

EYE LOUPES

An indispensable aid in fine inspection work. Available in 2x, 2-3/4, 3-1/4, 4 and 5 power. **99c**

Surplus JEEP CANS

FOR RESERVE GAS SUPPLY. Holds 5 GAL. Has screw top and will take standard flexible nozzle. **139** **FLEXIBLE NOZZLE . . . 49c**

MARCHING COMPASS

Officer's type with prismatic hair-line guide for sighting distant objects and at the same time reading degree of setting. Accurate & dependable. Has a jewel mounted needle-luminous dial for night reading. **ONLY 395**



POCKET HAND WARMER

The perfect GIFT for servicemen, family or friends. Will maintain temperature of 100° from 16-24 hours by radiation. Uses pocket-warmer fluid, lighter fluid or white gas as fuel. Metal chrome finish with velvet pouch. For hunter, fisherman, skier, etc. **225**



LEATHER MITTENS

Sheepskin lined. Leather outer cover. Ideal for all types of winter work. Small - **269** Med. - Large. **PR.**



Air Corps Type LEATHER CAP

Special! For Hunter, Comber, Farmer. All leather with soft chamois lining. Has turn-down ear flaps, covered with warm sheepskin for added ear protection. Leather covered, long billed visor. Sizes: Small, Med., Large. **259**



SHEEPLINED BOOTS

A REAL BARGAIN! All NEW! 100% waterproof & designed to be worn with or without shoes. Lined throughout, including tongue, with soft fleece sheepskin. Water repellent leather uppers with waterproof rubber lowers. Heavy non-skid tread on soles. Full zipper closure. Height approximately 12". **SMALL, MED., LARGE 1395**



RICOH FLEX VI CAMERA MAKE YOUR OWN POWER UNIT



Acclaimed as "The Buy of the Year" by a nationally famous research publication. It's an ideal 'family' camera for indoor or outdoor use. Simple to load and operate. Comes with a genuine leather, ever-ready case. **38.50**

Compare These Features with those of Cameras Selling for Twice As Much...

- *All Metal Body, Leather Covered
- *ASA synchronized shutter.
- *Speeds 1/25, 1/50, 1/100 & 8.
- *Built-in focus magnifier.
- *Depth of field scale.
- *Comes with genuine leather Case.
- *Twin, Matched, Color Coated Lenses.
- *Shut coating, single lever shutter action.
- *Built-in Flash Synchronizer.
- *Precision Coupled Focusing.
- *Takes 8 & W or Full Color.
- *Uses No. 130 film. 12 exp.

10 DAY FREE TRIAL MONEY BACK GUARANTEE



Here's a unit PACKED WITH BRUTE FORCE! Does all those hard, heavy jobs that ordinary power tools cannot handle. Easily made from a vacuum cleaner type motor, a gear reduction drive and a few homemade parts. Can be used for turning large nuts & bolts, digging post holes, drilling large holes in wood or metal, driving power tools and machinery, lifting, pulling, pushing and any job where a slow speed with high torque is required. **YOU CAN'T STALL IT!** Lightweight and easy to handle. Has 1,000's of uses in the home, garage, shop, factory, etc. We supply assembly instruction with each complete unit. **ORDER YOURS TODAY!**

4 TAKE-OFF DRIVE UNIT



All four drives turn in unison from the common power input. Drive is adaptable to use with 9/32" flexible drive shafts and accessories. Has many uses where from one to four take-offs are desired. This item is worth at least twice our price. **375**

606 DELCO MOTOR



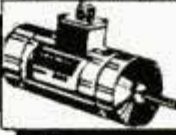
1/50 HP, 24V, DC, 1/6 amp. turns 3000 RPM. Has adj. overspeed contactor to stabilize and control speed - **495**

SURPLUS MOTOR



No. 500 - Used - 1/2 HP - 27v, DC-AC. This motor can be readily adapted to deliver up to 1/2 HP on 110 volts AC, by the simple method of rearranging armature brush-leads. Free diagram with each order. Supply is limited. **595**

SAMSELL MOTOR



27 volts, 16 amp. 1 1/2 HP, reversible, series wound motor, 3800 RPM, shaft 9/32" diam. 12" coline. 4-1/8" x 2-3/8". **NEW - ONLY 395**

RADIO MIX



A veritable "treasure chest" for "ham" operators and experimenters. Contains: Headset, Mike Buttons, Transformer, Wire, Insulators, Switches, Condensers, Rheostats, Terminals, Jump Cable, etc. Approx. 8 packed lbs. for **ONLY 249**

Signal Corps TELEGRAPH KEY



The new model J5A with ball type flame-proof, metal key. Perfectly balanced to permit positive contact with minimum effort. An ideal instrument for "ham" or professional use. A BUY at **NEW 189**

RADIO SPEAKERS



Ideal for small radios, intercom systems, test equipment, etc. **ALNICO - Permanent magnet type. 4" diam. 2 wire hook-up. NEW 249** **DYNAMIC SPEAKER - 10" with plug-in and transformer. 295** **PERMANENT MAGNET SPEAKER - 12" diameter, 2 wire hook-up. 425**

230 PAGE CATALOG

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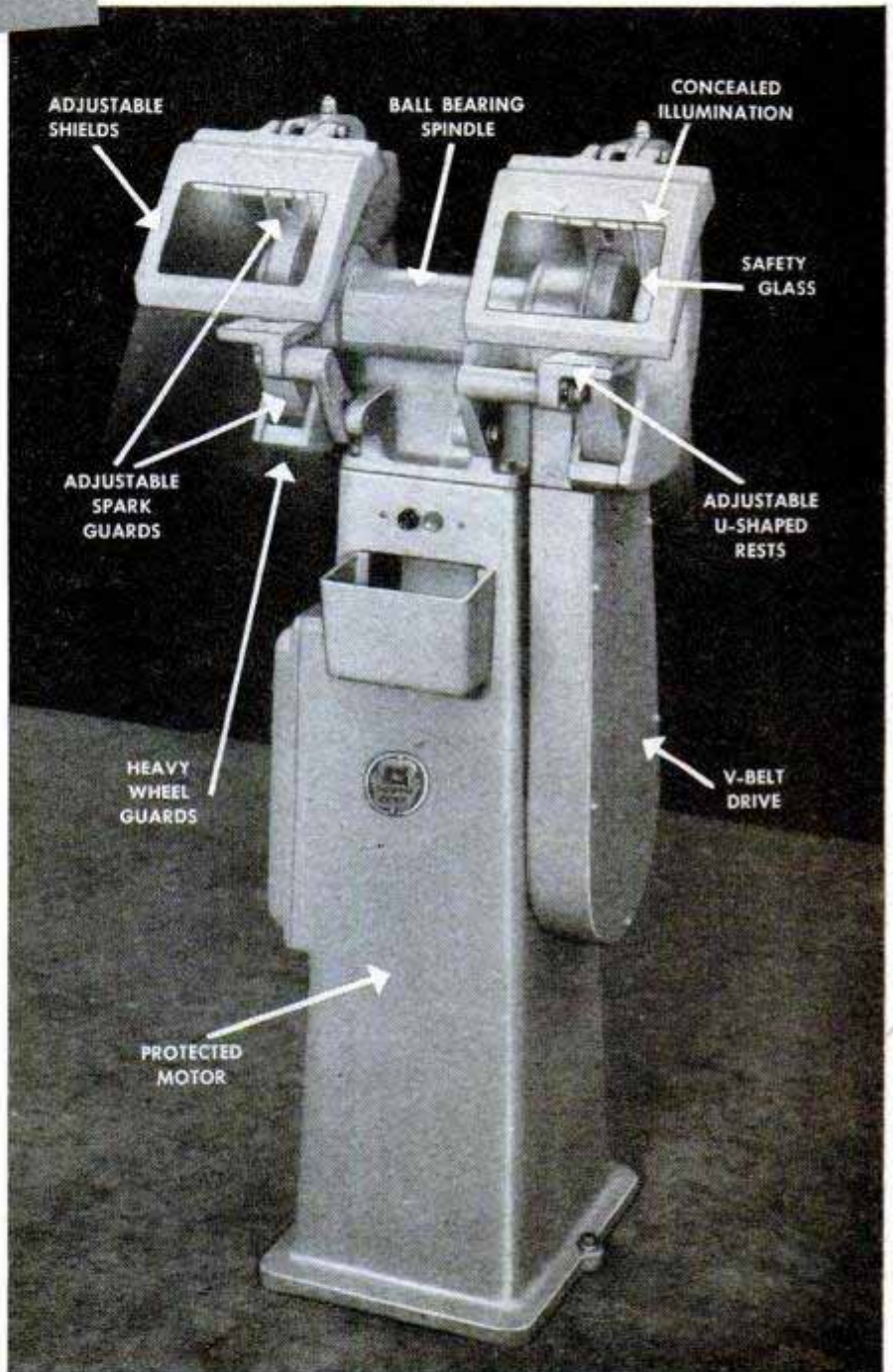
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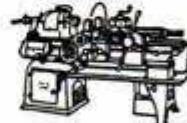
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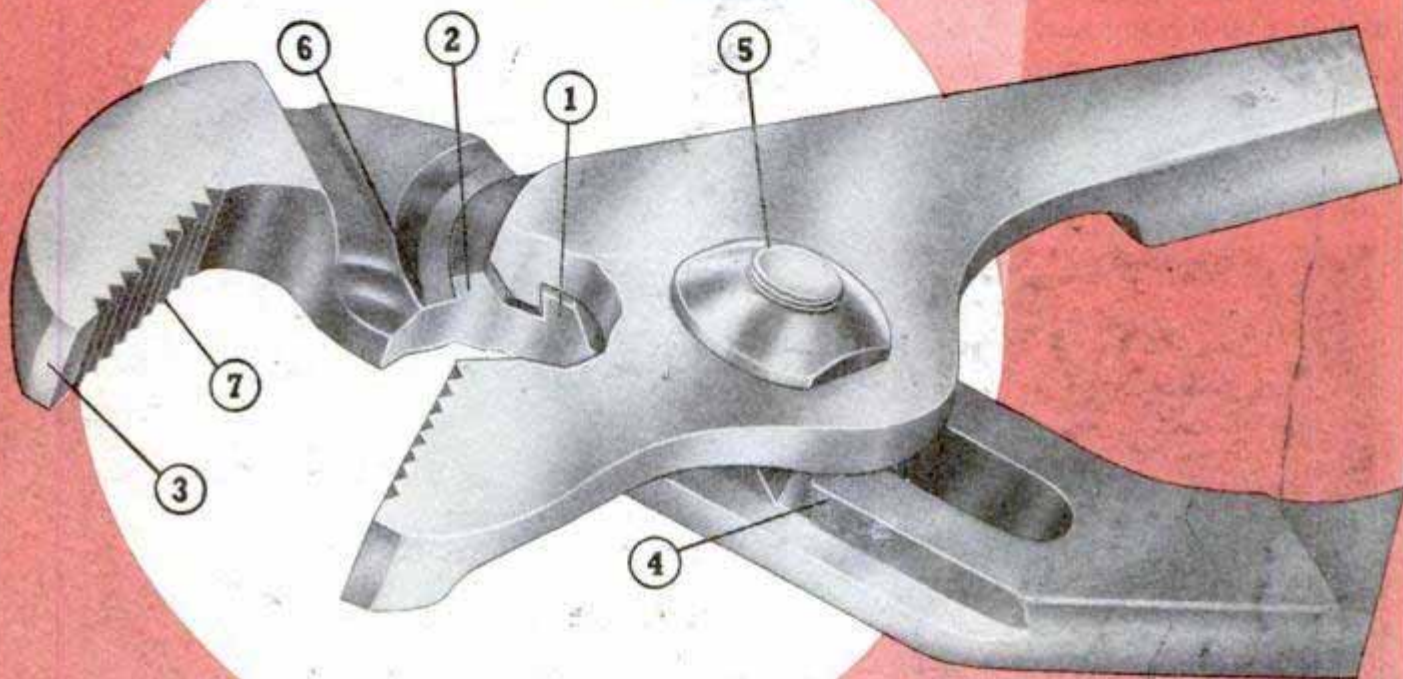
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