

THE WEST POINT OF THE AIR

# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG'D. TRADE MARK, GREAT BRITAIN, NO. 40426

**JULY**  
**25 CENTS**  
30c IN CANADA



SEE PAGE 17



# MARFAK gives true fluid-film lubrication!



*Texaco Marfak liquefies under pressure, supplying correct fluid-film lubrication. The undisturbed Marfak retains its cohesiveness and seals this fluid film in the bearings.*

"KNEE ACTION" front suspensions demand special attention. There are many more pressure-bearings to lubricate. There is nothing like Marfak for the safer lubrication and longer life of these points.



Pressures on the king pin and steering connections are tremendous. Save these bearings with Marfak. They *float* on Marfak—which means easier steering and new driving comfort in the certainty that everything is safe. It's a film of protection that can't be broken.

Marfak resists water. It provides an effective seal against dust and dirt and gives ex-

traordinarily effective lubrication. It lasts three times as long as ordinary greases.

It will pay you to drive to a Texaco Certified Station for Marfak lubrication. You'll appreciate its value in the lubrication savings and your pleasure in the smoother, quieter action of your car.

THE TEXAS COMPANY • Texaco Petroleum Products

The Texas Company is the only Company that makes Marfak

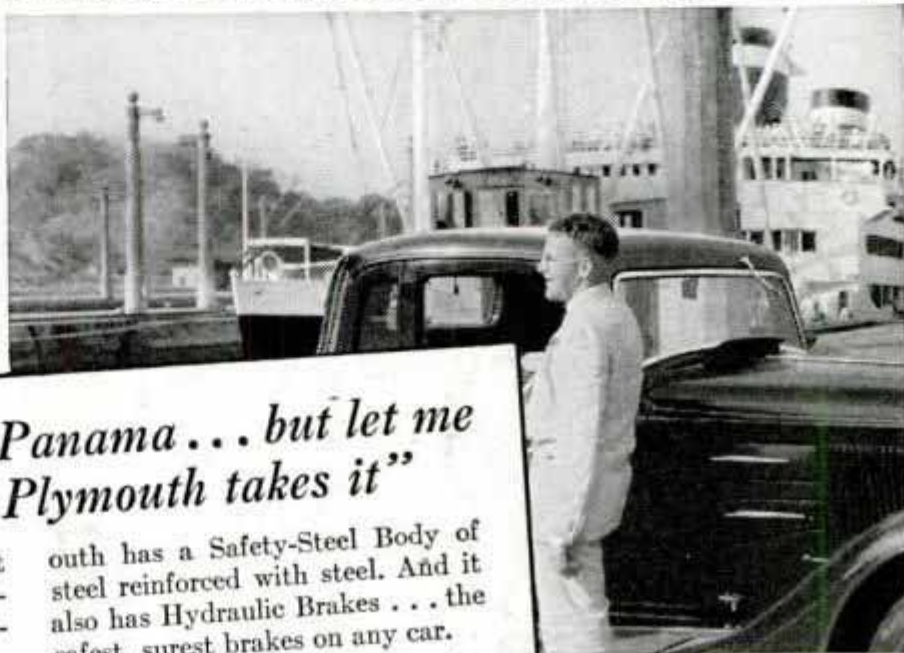
COPYRIGHT, 1934, THE TEXAS COMPANY  **TEXACO *Certified* LUBRICATION**



# "Building a Canal—or Buying a Car—*Good Engineering Counts*"

★

A CERTIFIED INTERVIEW WITH CONSTRUCTION ENGINEER FRANK VIOLETTE ★



*"We punish cars in Panama . . . but let me tell you how my Plymouth takes it"*

FRANK VIOLETTE talks little about his supervising millions of dollars' worth of Panama's construction. But ask him about cars . . .

"In the Canal Zone, our everyday driving soon proves how well a car can take punishment. I've found that of all the low-priced cars, Plymouth stands up best," he says.

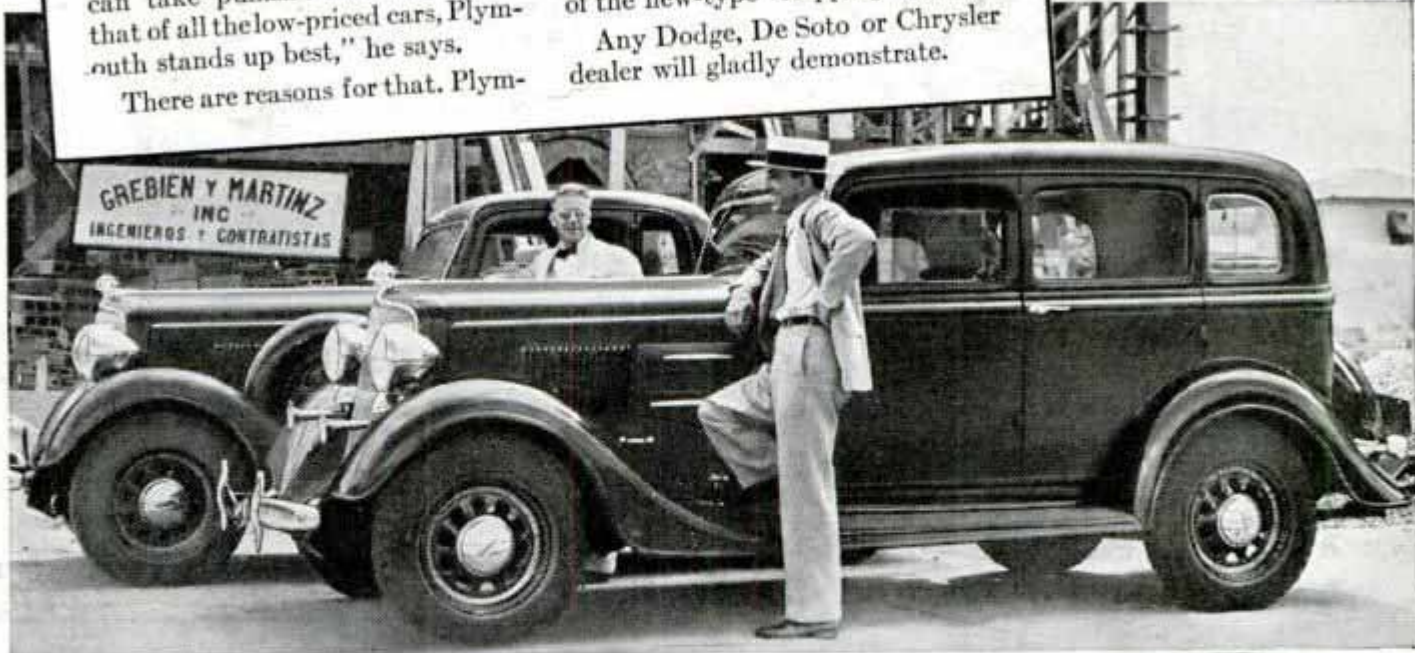
There are reasons for that. Plym-

outh has a Safety-Steel Body of steel reinforced with steel. And it also has Hydraulic Brakes . . . the safest, surest brakes on any car.

Then, for *comfort*, it has Floating Power engine mountings and Individual Wheel Springing—strongest of the new-type "stepping" springs.

Any Dodge, De Soto or Chrysler dealer will gladly demonstrate.

1. "The Canal is built of steel. And so is the car I picked. It's a Plymouth with a Safety-Steel Body."



2. Mr. Violette and Mr. Martinz, President of his company, each with his De Luxe Plymouth. Plymouth prices begin

at \$530 at the factory. Time payments to fit your budget on the Official Chrysler Motors Commercial Credit Plan.

## PLYMOUTH \$530

AND UP  
AT THE FACTORY  
DETROIT

IT'S THE  
BEST ENGINEERED  
LOW-PRICED CAR



Don't worry... I won't  
bring him again



## "The man who doesn't keep clean shaven is *never welcome*"

SAYS ALICE-LEONE MOATS, FAMOUS AUTHOR OF "NO NICE GIRL SWEARS"



Alice-Leone Moats

Of course he isn't welcome. Who *could* make a good impression with a growth of stubble on his face! Most men know this is true—yet far too many are careless about shaving.

If there is any doubt that shaving is essential in keeping the respect of others listen to the words of Alice-Leone Moats. Famous authority on modern manners, Miss Moats brought etiquette up to date in her sensational best-seller, "No Nice Girl Swears." She knows the woman's viewpoint—has helped thousands to get along with others—win new friends and keep old ones.

Says Miss Moats: "No woman cares to entertain or be seen with a man who neglects shaving. He may

Hear Gene and Glenn on the air every night except Sat. and Sun. W.E.A.F. and coast-to-coast hook-up: 6:15 E.S.T., or 9:15 C.S.T.

think he is getting away with it—but the truth is, a careless shave only too clearly implies that the offender thinks so little of his hostess that he cannot be bothered about his appearance. In fact, failure to shave *carefully* is an affront that women simply will not overlook."

Why take a chance on stubble when shaving is so quick and easy with today's Gillette "Blue Blade"! At the new low prices you can afford to change blades frequently and make every shave a perfect shave. Just try this and see. You will agree that the comfort and satisfaction you get can not be measured in pennies.

If you haven't a Gillette razor ask your dealer for the "Red and Black" special or see coupon below. Remember—the Gillette Razor with its flexible blade is adjustable to the special requirements of your beard. Without this essential feature no razor can be entirely satisfactory.

# Gillette

## BLUE BLADES

Now 5 FOR 25¢-10 FOR 49¢

Gold-Plated Gillette Razor and 5 Gillette "Blue Blades" 49c

• Heavily gold-plated with new-style "husky" handle. Comes in handsome red and black case with 5 Gillette "Blue Blades." If your dealer cannot supply you, send coupon and 49 cents to—

THE GILLETTE  
SAFETY RAZOR CO.  
Boston, Mass.

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City .....

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PME-4



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# Popular Mechanics Magazine

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

July, 1934

Vol. 62, No. 1

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## Cracking Davy Jones' Locker

EVER since man learned to sail boats, there have been shipwrecks. Thousands upon thousands of ships lie at the bottom of the sea. These sunken vessels contain more gold alone than is held in all of the world's treasuries. In addition, Davy Jones' locker holds other hundreds of millions of dollars represented by the imperishable part of the cargoes of these wrecked vessels. Captain Simon Lake, the world's great authority on salvaging sunken treasure, tells in the August issue how science is preparing to reclaim much of these riches and how this undertaking may provide future industries greater than any to be found on land today.

## Next Month

IF you want to fly, Uncle Sam offers to teach you, feed you, clothe you, provide comfortable living quarters, give you your wings, make you a second lieutenant when you graduate—and pay you \$75 a month while you learn. In the August issue you will find sixteen more pages in color showing how the Army trains its pilots at Randolph Field, the "West Point of the Air," and a story explaining how a war flyer is turned out.

## Rolling Down to Rio

WHEN the superhighway connecting North and South America is completed, you will be able to drive from your door to the great capitals of Argentine, Brazil and Peru with as much ease as you now travel between the capitals of our states. Read in the August issue about this "main street of the Americas" where each day brings a new climate.

## The Lottery Racket

DO you believe in taking a chance? Lotteries, "numbers" games and other gambling rackets mulct millions from the American public annually. The odds are always against you, even if the game is honest. If it is crooked, you lose even when you win. An article in the next issue shows you why you can't beat these rackets.



# Every Car Should Be SIMONIZED

If you want your car to stay beautiful, the sooner you Simoniz it, the better! New or old, every car needs Simoniz to protect the finish from weather and dirt. Only Simoniz can stop these destructive elements from dulling and destroying your car's beauty! It makes the finish last longer and keeps colors from fading.

Millions of motorists say there's nothing else like Simoniz and Simoniz Kleener. So, always insist on them for your car . . . avoid substitutes!



## EASIER—QUICKER SAFER

Make your car sparkle like new with the wonderful Simoniz Kleener. Restores lustre with a few easy strokes. Nothing could be faster, safer or easier! Then apply Simoniz. It protects and keeps the finish beautiful for years.

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# NEW CAR? PLANNING TO USE "LIGHT" OIL?

Anxious to start off your new car just right? Wondering particularly about oil... because of these new-type pistons, rings, and bearings... and because the makers of today's new cars recommend "light" oils?

Take the car makers' advice, of course. But also take the advice of experienced motorists, and use a *good* light oil. For the lighter the oil you use, the *better it has to be*...to stand up. Here is what M. H. Battenhouse, of Cleveland, writes:

*"My 1931 De Soto turned over 30,000 miles today, operating as efficiently as when new. The motor has never been opened. Quaker State S.A.E. 20 was used for the first 25,000 miles. At that time, I stepped up to S.A.E. 30. I make my living with my car, selling automotive parts; and no one could sell me anything but Quaker State."*

Why can't ordinary oils assure your car safe protection from first mile to last? Because, in every gallon there is one quart, more or less, of thin, watery material. This burns up quickly, fails to lubricate.

But with Quaker State, your motor gets full-strength lubrication...every driving moment. All thin, non-lubricating material is removed at the refinery. You get "an extra quart of lubrication in every gallon."

Look for the green-and-white Quaker State sign. Most places will service your car from refinery-sealed cans or from double-sealed drums. Quaker State Oil Refining Company, Oil City, Pa.

## QUAKER STATE

**MOTOR OILS and Superfine Greases**

*"First choice of Experience"*

Retail Price . . . 34¢ plus 1¢ Federal Tax: 35¢ per q

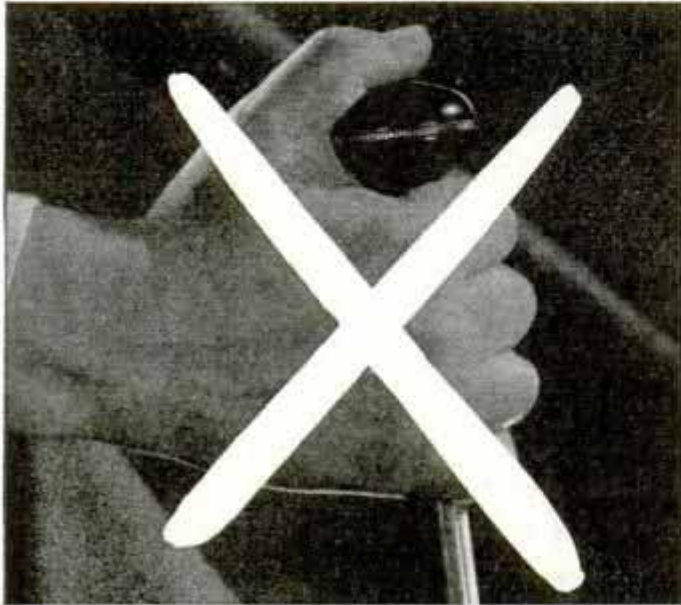
This One



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# GEARSHIFTING ABOLISHED by REO NOT MERELY MADE EASIER



● Many an automobile advertisement these days talks of "easier gearshifting."

This point would hardly be stressed if it were not acknowledged that gearshifting by-hand is at best a bothersome task from which the motorist is entitled to relief.

The *ultimate* in relief, of course, would be to make it unnecessary to shift gears at all—*take the gear-shift lever out of the car.*

That is precisely what Reo has done!


Gearshifting-by-hand is not merely made *easier* in the new Reo. It is **ABOLISHED!**

The REO SELF-SHIFTER—most important engineering advance since the self-starter—does *automatically* what drivers of other cars are still required to do *manually!*

Imagine how much SAFER Reo drivers are, with both hands free for steering—and with no danger of stalling in dangerous places on account of some slight mistake in shifting!

Thousands of owners have declared they could never again be induced to go back to hand-shifting. Nor would you—once you experienced the really astonishing advantages of the REO SELF-SHIFTER.

Standard Reo passenger car prices are now as low as \$795 at factory, plus tax.

 WRITE today for copy of our interesting booklet, PROOF, containing enthusiastic comments of Reo owners. Also detailed explanation of Self-Shifter operation.

See and drive the new Reo Flying Cloud for 1934—a brilliant triumph in aerodynamic streamlining and long life construction. Amazingly low prices.

**REO** MOTOR CAR CO.  
LANSING, MICH.

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# Accountancy Home-Study

## made interesting and practical thru problem method

**Y**OU know as well as we do that Accountancy fits many men for positions that pay three and five and ten thousand dollars a year—gives many other men unusual opportunity to start a profitable growing business of their own.

You probably realize also that—because of the new state and federal legislation—the accounting profession faces now and for the next few years the greatest opportunity it has ever had.

The only question is—just how practical is it for *you* to train yourself adequately in Accountancy through home study?

And the answer lies in the LaSalle Problem Method.

For this modern plan of training not only makes Accountancy study at home thoroughly practical but makes it interesting as well.

And here's how:

### You Learn by Doing

Suppose it were your privilege every day to sit in conference with the auditor of your company or the head of a successful accounting firm. Suppose every day he were to lay before you in systematic order the various problems he is compelled to solve, and were to explain to you the principles by which he solves them. Suppose that one by one you were to work those problems out—returning to him every day for counsel and assistance—

Granted that privilege, surely your advancement would be faster by far than that of the man who is compelled to pick up his knowledge by study of theory alone.

Under the LaSalle Problem Method you pursue, to all intents and purposes, that identical plan. You advance by solving problems.

Only—instead of having at your command the counsel of a single individual—one accountant—you have back of you the organized experience of the largest

business training institution in the world, the authoritative findings of scores of able accounting specialists, the actual procedure of the most successful accountants.

Thus—instead of fumbling and blundering—you are coached in the solving of the very problems you must face in the higher accounting positions or in an accounting practice of your own. Step by step, you work them out for yourself—until, at the end of your training, you have the kind of ability and experience for which business is willing and glad to pay real money—just as it was glad to pay these men.\*

### Five Men Who Tested and Proved It for You

For instance, there was the man who started Accountancy training with us in 1916. After a short period of study, he took a position as bookkeeper for a year, and then became accountant for a leading automobile manufacturer—with two bookkeepers under him. Today he is auditor of one of the foremost banks in his state and his salary is 325 percent larger than when he started training.

He writes, "My training is the best investment I've ever made, showing a cash value running into five figures."

And the young clerk, earning \$75 a month eleven years ago and now getting many times that as general auditor for an outstanding, nation-wide organization. Within six months after he began our training, he was earning \$125 a

month and within four years, he was earning \$250.

Do you wonder that he writes, "While LaSalle ads once seemed like fairy tales to me, now I know from personal experience that they are true."

Or let us tell you about two men—one a stenographer and the other a retail clerk—neither of whom knew more than the simplest elements of bookkeeping. One is now the comptroller and the other the assistant comptroller of a large company.

"LaSalle training in Higher Accountancy," write both, "was the important factor in our rapid climb."

And if you are thinking about the C. P. A. degree and a public accounting business of your own, read about the pharmacist who was earning \$30 a week eleven years ago when a LaSalle registrar secured his enrollment for Accountancy training. Eight months later he left the drug store to take a bookkeeping job at \$20 a week—less money but larger opportunity. Three years later he passed the C.P.A. examination and a year later yet he was earning \$5,000 a year. Now he has his own highly successful public accounting firm for which he says, "My LaSalle training has been largely responsible."

### One-Tenth of All C. P. A.'s Are LaSalle Trained

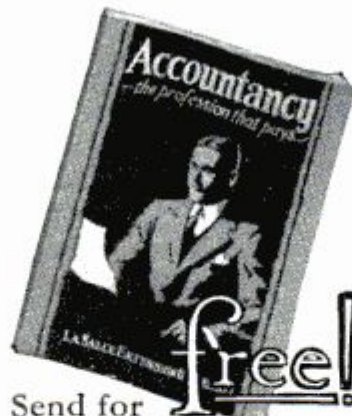
If you want still more proof, remember that 1,200 C. P. A.'s—approximately one-tenth of all those in the United States who have ever passed the difficult examination for this coveted degree—are LaSalle trained.

And knowing these facts, ask yourself if there can be any further question about the practicability of this training for you—ask rather if the real question is not about the size of your own ambition and the quality of your determination.

For Accountancy is no magic wand for the lazy or the fearful or the quitter—it offers success only to the alert adult who has the courage to face the facts and the will to carry on till the job is done.

If you are that individual, the coupon below, filled out and mailed, will bring you free the information that can open up to you the future of which you have dreamed—ability and income and success.

Is it not worth getting that information?



Send for  
This Book

\*Names and addresses given on request.

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Please send me, free of all cost or obligation, your 64-page, illustrated book, "Accountancy, the Profession That Pays," telling about the profession of accountancy and your training for success in that field.

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... that's all I need to **PROVE I**  
can make **YOU** a **NEW MAN!**

BY CHARLES ATLAS

*Holder of the Title: "The World's Most Perfectly Developed Man"—Won in open competition in the only National and International Contests held during the past 15 years.*

**O**NE week! That's all I need to PROVE I can make you a new man of vitality and power. I was once a 97-lb. weakling, with a sickly, flabby body. How I became "The World's Most Perfectly Developed Man" is told in my book, "Everlasting Health and Strength," which I will send you absolutely free.

Now I offer you a 7 days' trial of my famous method, **Dynamic Tension**, to PROVE that I can and will put firm layers of muscle where YOU need them most, tone up your whole system, and banish constipation, poor digestion, bad breath, pimples, joy-killing ailments.

I've got no use for tricky weights or pulleys that may strain your heart or other vital organs. I don't dose or doctor you. My **Dynamic Tension** is the natural tested method. It builds powerful muscle, gets rid of surplus fat, gives you vitality, strength, pep that win the admiration and respect of every man and woman.

**FREE BOOK!** Send for your free copy of my book, illustrated with many actual photos. Learn how I changed from a weak, no-muscle "runt" to the physique you see here. Gamble a stamp to mail my coupon—to learn how YOU can now win life's biggest prize—a handsome, healthy, husky body. Address **CHARLES ATLAS**, Dept. 8-G, 133 E. 23rd St., New York City.



**CHARLES ATLAS, Dept. 8-G**  
133 East 23rd Street, New York City

I want the proof that your system of **Dynamic Tension** will make a New Man of me—give me a healthy, husky body, and big muscle development. Send me your free book, "Everlasting Health and Strength."

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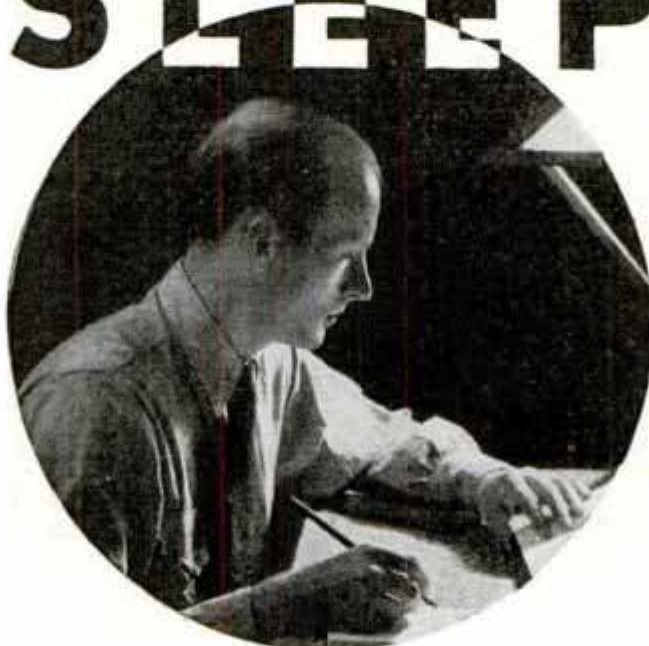
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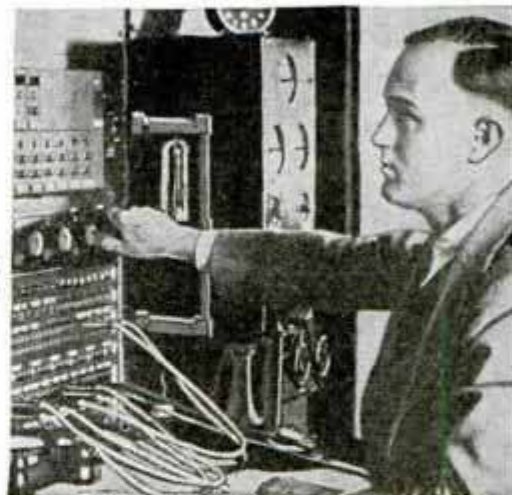
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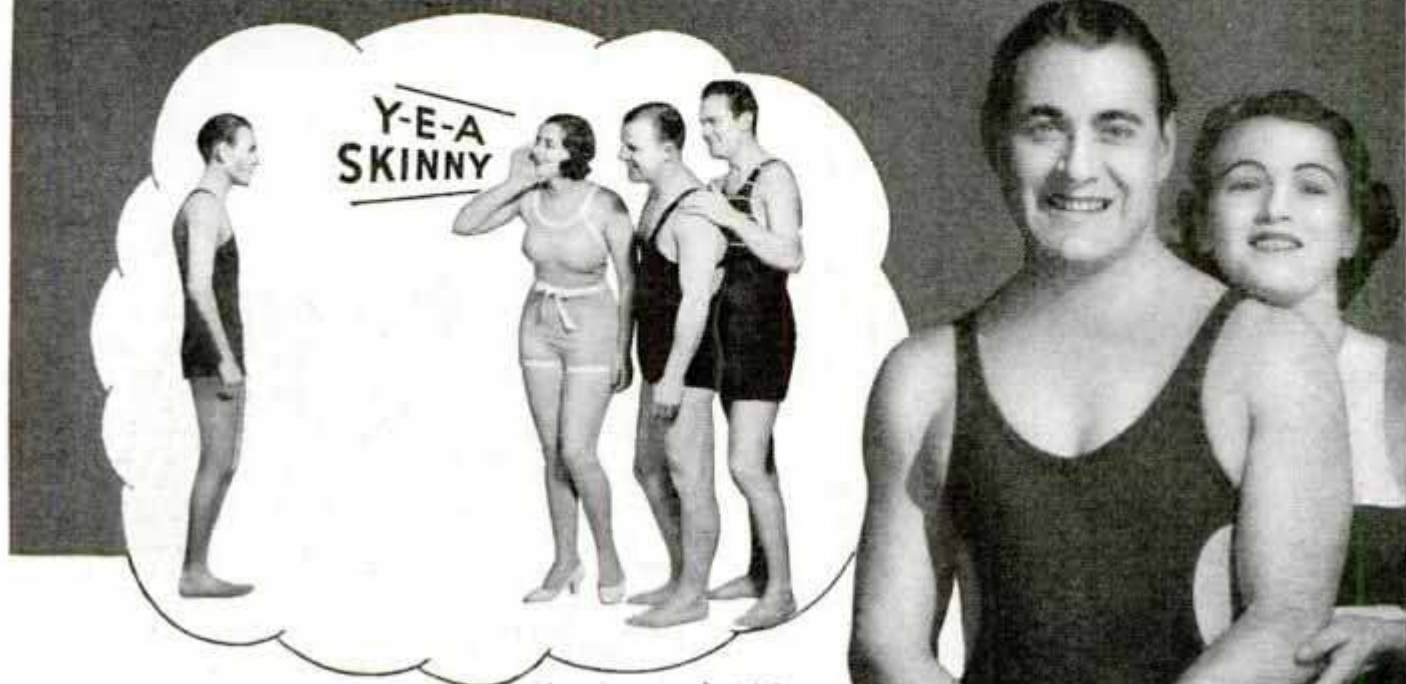
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50 DIFFERENT Stamps cataloging over \$1.00 only 10c to approval applicants. 20,000 different stamps of prices ranging from 1/4c up. All stamps guaranteed genuine and fine selection of U. S. revenues at 1c and up. Address F. G. Stein, Dept. 123, 7360 N. Seeley Ave., Chicago.

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STAMPS Sent on approval. 50% discount. Fred Herzberg, 197 Grantley Ave., Elmhurst, Illinois.

FREE!!! United States scarce \$2.00 stamp. Postage 3c. Superior Stampco, Palms, Los Angeles, Calif.

**MAGNIFIER**, Stock book, stamp album, hinges, watermark detector, perforation gauge, millimetre scale, packet scarce stamps. Price 5c with approvals. Atlas Stamp House, Culver City, Calif.

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**BYRD** Commemorative and 34 different U. S. including early issues, high values, commemoratives, airmail, envelopes, special delivery, postage due and revenues cataloging over 85c. All for 7c to approval applicants. Illustrated pricelist free. Curhan Stamp Co., Dept. P, Gloucester, Mass.

ILLUSTRATED U. S. list, price 50c, large complete U. S. price list free. Stanley Gibbons, 38P Park Row, N. Y.

FREE Dollar packet to one cent approval applicants. Harlan, 5307 S. Marshfield Ave., Chicago, Illinois.

#### RARE COINS

FREE!—Foreign coin, banknote, and large illustrated coin catalogue.—1c postage. Souvenir California gold quarter size 26c; 1/2 size 53c; both 65c! Round or octagon, set of each \$1.30! Approvals with each order. Tatham Coinco, West Springfield, Mass.

CALIFORNIA Gold quarter size 27c; 1/2 size, 53c; 3c piece and catalogue, 10c. Norman Shultz, Salt Lake, Utah.

UNITED States white cent and bargain selling price list 10c. Arcy, Box 483, Muskogee, Okla.

OLD Money wanted. Will pay fifty dollars for nickel of 1913 with Liberty head (no buffalo). We pay cash premiums for all rare coins. Send 4c for large coin folder. May mean much profit to you. Numismatic Co., Dept. H, Ft. Worth, Texas.

FREE—Coin, banknote, list—6c postage. Texas Numismatic Company, Box 2553, Dallas, Texas.

UP To \$15.00 each for certain Indian head pennies. Send dime for list of these wanted. Coin-Shop, "D," Springfield, Mo.

MILLIONAIRE! Genuine Reichsbanknote—25c coin. Michael, 4168 Maryland, St. Louis.

HIGHEST Prices paid for Indian head pennies. Send dime for list of those wanted. Coin Shoppe, Box 407-P, Ottawa, Ills.

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UNITED States. Large cent, two-cent bronze, three-cent nickel and bargain list, 25c. Thirteen dates large cents, \$1.00. George P. Coffin, Augusta, Maine.

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**HAVE** You a camera? Send ten cents for recent number of our big magazine, showing how to make better pictures and earn money. American Photography, 116 Camera House, Boston, 17, Mass.

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**ROLL** Films developed 5c; prints 2 1/2c each. Newton, Parkridge, Ill.

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**PHOTO** Outfits 4 for dime strips. Wabash Photo Supply, Terre Haute, Ind.

**FILMS** Developed, 8 Newton prints, including new roll of films under 118, 50c. Newton, Parkridge, Ill.

**MAKE** Money in photography. Learn quickly at home. Spare or full time. New plan. Nothing like it. Experience unnecessary. American School of Photography, Dept. 3435, 3601 Michigan Avenue, Chicago.

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**COLORED** Enlargement with each film developed, printed 25c. LaCrosse Film Company, LaCrosse, Wis.

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**INCOME** From your camera instead of expense. Low cost home course teaches you to make photographs for magazines, newspapers, advertisers. Tremendous demand. Earn good money wherever you live. Free book. Universal Photographers, Dept. 104, 10 West 33rd St., New York.

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**NEW** 16mm Bargains. B&H 70-A camera \$55.00, projector \$68.50. Comedies \$2.50, 100 ft. camera film \$2.50, 100 ft. including processing, 400 ft. reels 38c. Humidors \$4.45. Cement \$2.0. Victor No. 5 camera \$85.00. Kodascope K \$95.00. 8-9 1/2mm equipment, films. Trades accepted. Soundfilm, silent, soundisc library. Free membership. Catalogue. Mogull Bros., 1944-J Boston Road, New York City.

**DEVELOP** And print your own movies, instructions \$1.00. Milo, 620 Myrtle Ave., Brooklyn, N. Y.

**BARGAINS**. Used theatre projectors, parts soundheads, turntables, amplifiers, horns. Catalog mailed. S.O.S. Corp., 1600 Broadway, New York.

**16MM FILMS**—Rental, sale, exchange. Dime brings catalogue, two "end" titles. Eastin Films, Dept. 19, Galesburg, Ill.

**MOVIE** Equipment exchanged-bought-sold. Films exchanged 25c up, (some loaned free). Art samples 25c. Send 3c for lists. Peerless, Box Y-14, Southgate, Calif.

**FREE** 16mm, 8mm Bargain lists. Films 35c up. Art sample 25c. Home Movies, Box 32, Easton, Penna.

**ROAD** Show film. Machines. Supplies. National Equipment Co., Duluth, Minn.

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**SEND** 10c For sample copy. Personal Movies Magazine, Canton, Ohio.

**BASS** Offers for a limited time brand new 100 ft. Stewart-Warner 16mm Cine camera, complete with case, F:3.5 lens, worth \$50.00, at \$18.50 each. Hundreds of other bargains in Bass Bargaingram No. 212 mailed on request. Write to Value Headquarters. Bass Camera Company, 179 W. Madison St., Chicago, Ill.

**35-MM FILMS**, Projectors. Stamp for lists. Box No. 6, Rosedale, Kans.

**BARGAIN** Lists 3c. Hoffman Film Service, 57 Broad, Albany, N. Y.

**WORLD'S** Greatest "Passion Play" 16 MM. (new) 5 reels. Rent or purchase. Write Hemenway Film Co., 37 Church Street, Boston, Mass.

**LEARN** Motion picture theatre business. Catalog. Theatre Institute, Elmira, N. Y.

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**PLASTEX** Industries offers industrious men an opportunity to start a business of their own, manufacturing art goods, novelties, souvenirs, etc., in Plastex and marble imitation. 5c material makes \$1 articles. Rubber moulds furnished for speed production. Small investment brings big returns. You are just in time for big 1934 business now starting. Write for interesting booklet mailed free. Plastex Industries, Dept. A, 1085 Washington Ave., New York.

**MAIL** Order drug store. Let us supply your drug store wants. Information given; stamp appreciated. Mequon Drug Store, Thiensville, Wis.

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**LIQUID** Marble—Anyone can make! Colorful, glazed! Molded, brushed, sprayed. Rubberastic molds. Composition flooring. Big money making these! Particulars free. Marbleizing Service, Edwardsville, Ill.

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**EARN** \$5.00 Daily raising mushrooms in cellar, shed, attic. We buy crops. Guaranteed materials furnished. Odorless method. Book free. United, 3950-CG Lincoln Avenue, Chicago.

**MAKE** Money at home! Hundreds of plans. Magazine, 32 pages, three months 10c. Home Industries, Irvington, Nebr.

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**INDEPENDENT**. Traveling business carried by automobile. Our portable electric machines re-level butchers' chopping blocks. Easy to operate. Big earnings. Heath Company, 210 Lafayette Street, New York.

**DO** You want substantial business of your own? Manufacture show cards and price tickets to order. Patented machine. Unlimited field. Regular repeat business. Enormous profits. Particulars free. Clark Kline, P. O. Box 3643, Washington, D. C.

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**MAKE** Products yourself. Tested formulas—catalog free. Grinstead Laboratory, Edwardsville, Ill.

**CASH** Income daily resilvering mirrors at home. Replating autoparts, tableware, etc. Outfit furnished. Write Sprinkle, Plater, 127, Marion, Ind.

**PATENT** Your idea. Other men have read and profited by our free book, "Patent Protection." Fully explains many interesting points to inventors and illustrates important mechanical principles. With book we also send free "Evidence of Invention" form. Prompt service, reasonable fees, deferred payments, thirty-five years experience. Avoid risk of delay. Write immediately to: Victor J. Evans & Co., Registered Patent Attorneys, 650-H Victor Building, Washington, D. C.

**MAILING** Secretaries wanted. Experience unnecessary. Contract—details, 3c postage. Nazel Enterprises, 1329 Olive, Indianapolis, Indiana.

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**MAKE** Money in spare time retiring children's vehicle wheels; wagon, buggy, velocipede, scooter, etc. No machine required. Low price outfit with instructions, and supplies to start. Colmen Supply Co., Box 43, Fort Wayne, Ind.

**CASH** For spare or full time. No canvassing. Curtiss, Bergman, Ark.

**FREE** Circulars. Make big money, in a mail order business of your own, at home. Write now. Mail Order Institute, 901 Avenue T, Brooklyn, N. Y.

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**BARGAINS**—Paint spray outfit, gasoline engine drive. Terms—trial. Helmick Paint Spray Exchange, M743, Troy, Ohio.

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**BIG** Money cleaning upholstery in homes. We furnish everything. Degen Products, 6249-P St. Lawrence, Chicago.

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**MAKE** Artificial marble, glazed tiles, no polishing, uncanny. Tabletops, bookends, floors, whetstones. Inexpensive, hard, enamels wood. Rubber moulds for exquisite novelties. Secret cement processes. Colorful samples free. (So. Calif. business reserved.) John A. Payn, 945 Grande Vista Avenue, Los Angeles, Calif.

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**TESTED** Formulas—Newest, guaranteed! Catalog free. Grinstead Laboratory, Edwardsville, Ill.

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**INTERESTED** In formulas? Send for amazing New Deal offer. H. Newman, Box 58, Chicago.

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**FREE**—Formula literature. Manufacture products yourself. Thomson, 7309 Pingree, Chicago.

**ANYTHING** Analyzed. Practical formulas. Free list. Associated Chemists, Indianapolis, Indiana.

**FORMULAS**, Business plans. Literature free. Belfort, 4942 No. Keeler, Chicago.

**SUCCEED** With your products. Formulas, Processes, Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

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**20** FORMULAS, 20c. Latest, best—why pay more? International Agency, Cincinnati.

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**FIREWORKS** Easily made. Simplified instructions 50c. Eureka, Box 475, Marion, Indiana.

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**FREE** Chemical catalogue. Enclose 3c postage. Spanner, 212 Forsyth, New York City.

**SEND** Your chemical problems to Lowell Bunting, Consultant Chemist, 20 Elm Park, Royal Oak, Mich.

**CHEMICALS**, Laboratory glassware and apparatus. Catalog CP. Biological Supply Co., 1176 Mt. Hope Ave., Rochester, N. Y.

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"**WEATHERPRUF**"—Sensational new automobile finish. Unsurpassed furniture polish. Easily applied; lasts longer. Big money for demonstrating agents. Weatherpruf Company, 3856-P North Western Avenue, Chicago, Ill.

**MAKE** Money. Collect \$5, keep \$4. Two quick selling dollar per month "hard times" life policies. Write the Fidelity Mutual Benefit Association, Rockford, Ill.

**500% PROFIT!** Gold and colored sign letters for windows, offices, trucks, signs. Monograms. Easily applied. Neonite, Akron, Ohio.

**WHY** Worry about a job. \$1 will start you in a business of your own. Mr. Bullock made over \$300 his first month. Send for free literature today. Dept. A, 1101 Flatiron Bldg., New York, N. Y.

**CASH** Income daily resilvering mirrors at home. Replating autoparts, tableware, etc., outfit furnished. Write Sprinkle, Plater, 128, Marion, Ind.

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**ROUTE** Man wanted for your county. Steady income up to \$50 weekly servicing hotels, taverns, restaurants. Have business of your own, weekly cash customers. No merchandise to sell, all equipment furnished. Small investment required. Premier Co., Dept. 102, 166 W. Jackson, Chicago.

**CLEAN-UP** With wash well soap powder. Free selling plan. L. C. Cherry Company, Cincinnati, Ohio.

**AGENTS**—New, sensational. Women buyers amazed, delighted. \$5 day easy. Write Hawkeye, Grundy Center, Iowa.

**HERE** It is! All colors! Adjustable! Durable! Ventilating! Twenty-inch spinning shade for automobile windows. Sample and home sales plan, postpaid \$1. Rotary Sun Shade, Highland Park, Mich.

**1000** BEST Sellers, blades 65c hundred, tooth tabs 59c dozen, needle books 25c dozen, 8 bar box soap 13 1/2c. Free wholesale catalogue. Paty Company 5P Elston, Somerville, Mass.

**AMERICA'S** Greatest food bargains! Miraculous premium deals! Values that beat chain stores! Want free proof? Mail a postcard today. Kennedy Products, Inc., Kokomo, Ind.

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**AGENTS**—Distributors. Amazing sellers. Washes, cleans everything. Housewives need them, excellent profits, repeaters. Sample. Manhattan Co., 333 W. Manhattan Blvd., Toledo, Ohio.

**CASH** Paid for butterflies, insects. See Sinclair Display Advertisement on page 15A.

**\$6 HOURLY** With amazing invention. Refinishes old, shabby autos like new for low cost. No rubbing, polishing, waxing, or painting. Lasts 8 to 12 months. Wipes on with cloth. Free sample. Karnu, Dept. Y-108, Cincinnati, Ohio.

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**ALL** Rubber fruit jar wrenches selling like wild-fire, cost 5c, sell for 15c. Free sample. National Fibre Broom Co., St. Louis, Mo.

**SALES** Kit free. Write for our free offer and catalog of household deals, cosmetics, extracts, etc. Make big money selling your friends and neighbors. Clyde Collins Chemical Co., Dept. PM-6, Memphis, Tenn.

**HOUSEHOLD** Item. New. Spectacular demonstration. Costs fifteen, sells thirty-five cents. Grout Mfg. Co., San Bruno, California.

**MARRIED** Man with spare time to distribute free samples coffee, flavoring, food products and make customers. Must devote at least two hours daily and be satisfied with up to \$3 in an hour. Permanent. Blair, Dept. DFS 13, Lynchburg, Va.

**YOU** Have spare time but need money. Then write Hetzel, 802 Garden, Hartford, Connecticut.

**OPERATE** Home mail order business, selling our products. Everything furnished. Superior Specialties, Springfield, Ill.

**NEW** Rotary can opener. Wonderful demonstrator. Only one moving part. Agents profits 100%. Send 25c for sample. Convince yourself. Money promptly refunded. Roto Shear Co., 6992-P Newburg Ave., Chicago, Ill.

**\$3 TO \$5** Daily: Fast selling 25c household necessity. 2 to 6 sold in every home. Over 200% profit. Big season just starting. Write for free sample and sensational offer. Sterling Laboratories, 4441 Cook Ave., Dept. 6-B, St. Louis, Mo.

**MEXICAN** Hand made feather pictures. Send 25c (stamps) for \$1.00 worth sample and details. Mexican Art, Apartado 1593, Mexico City.

**MOTH** Tabs, two ounce, \$3.00 hundred. Toilet bowl deodorizers, \$5.00 hundred. Insect powder, four ounce can, \$7.00 hundred. Aroma Chemical Co., St. Louis, Mo.

**BRAND** New invention. Sanitary automatic server for household. Sells on sight. Field for millions. Thank yourself for seeing this "ad" and write immediately. Durand, Huntington, N. Y.



**100% PROFIT** in the mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 50c. Sample and sales plan 25c. New Method Company, Desk PM-19, New Method Bldg., Bradford, Pa.

**REMARKABLE** New scientific device reduces electric bills 25%-70%, increases light. Absolute necessity every store. Tremendous success. Sun-Lite Company, 1150 Broadway, New York.

**AGENTS:** Smash go prices! Santos coffee 12c lb. 4-oz. vanilla 8 1/2c. \$1.00 size tonic 14c. 60c size shampoo 8 1/2c. 100 sticks chewing gum 12c. Christmas cards, 21 in box, 14c. 150 other bargains. Experience unnecessary. Write Carnation Co., P.O., St. Louis, Missouri.

**YOU!** Can make money manufacturing and selling our products, cleaners, mechanics soaps, all automobile specialties, newest polishes, get formulas and processes for latest products on market from an expert. Information free. Murphy, Chemist, 1024 Douglas, Los Angeles.

**MAKE** Products yourself—Tested formulas. Catalog free. Grinstead Laboratory, Edwardsville, Ill.

**300% PROFIT** Selling mystery gas lighter. Retail 25c. Costs you \$1.00 per dozen. Sample 10c. Square Deal Co., Desk PM-19, Bradford, Pa.

**LAMP** Insect killer. Automatic, safe, sure, sanitary. Save crops or clear house of pests. \$1.75 up. Direct to you. Literature free. Agents wanted. Sauer Bros., East Oakland, California.

**NEW!** Self cleaning broom and mop. Erases dirt. Wonderful demonstration. Sold thousands last month. Send \$1.00 for sample outfit. Money refunded if returned. Very profitable for men or women. M. & M. Co., Springfield, Mass.

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**300% PROFIT** Selling new "20-in-1" kitchen utensil. Retail 25c. Costs you \$1.00 a dozen. Sample 10c. New Method Co., PM-19, Bradford, Pa.

**NEW** Transparent day and night signs, 8"x14", cost 4c, retail 25c. Sample free. Clean up! Lowy, 8 West Broadway, New York.

**MEN** With cars needed immediately to fill vacancies local grocery routes. Wonderful chance to make \$7.50 a day. Steady, year round earnings for ambitious men. Write Albert Mills, Route Mgr., 4548 Monmouth, Cincinnati, O.

**AGENTS**—Engraved name plates, number plates, signs, etc., easily sold, profits large. Brett Bros., Winthrop, Mass.

**BRAND** New! Practical telephone at top price. Talks for thousands of feet. Perfect for homes, offices, garages, etc. Sells the year round. Investigate. Utilifone Co., 2101 Insurance Exchange, Kansas City, Mo.

**STRANGE** Ironing cord. Prevents scorching. Saves electricity. Abolishes kinks, snarls. Approved by Good Housekeeping. For telephones also. 140% profit. Samples furnished. Neverknot, Dept. 7-A, 4503 Ravenswood, Chicago.

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**BE** Independent. Own your business; experience unnecessary, selling \$10,000 accidental death, \$50 accident; \$25 sick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady renewal income. \$250,000 deposited insurance department. Universal Policy, 716-A Lefcourt Bldg., Newark, N. J.

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**300% PROFIT**, Buy direct from manufacturer, moth exterminators, deodorants, insecticides, specialties, polishing cloths approved by Good Housekeeping, pure food flavors. Free samples. Shif Mfg. D. Co., Union City, N. J.

**SELL** Made to measure raincoats. Outfit free. Goodyear Rainwear, 18 West 22nd, New York.

**FLAVORING** Extracts—Bottle yourself! Labels, 600% profitmaking repeaters! Free offer! Thomas Manufacturing, Indianapolis, Indiana.

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**FREE** Literature describing many business plans. Belfort, 4042 No. Keeler, Chicago.

**BEAUTIFUL** Gold window sign letters. Penny each, any size! 2500% profit. Easily applied. Samples, complete working equipment free! Atlas Sign Works, 7941 Halsted, Chicago.

**SELLS** Like hot cakes. Big profits. New laundry soapflakes. Perfumes clothes lastingly when washing. Territory given. Sunset Laboratories, Lynbrook, N. Y.

**SUCCEED** With your products. Formulas. Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

**300% PROFIT**, Buy direct from manufacturer. Moth exterminators, deodorants, insecticides, specialties, polishing cloths approved by Good Housekeeping, pure food flavors. Free samples. Shif Mfg. D. Co., Union City, N. J.

**BIG** Money applying gold initials on automobiles. Easiest thing today. No experience needed. Free samples. "Ralco," 1084 Washington, Boston, Mass.

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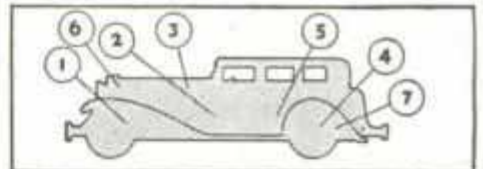
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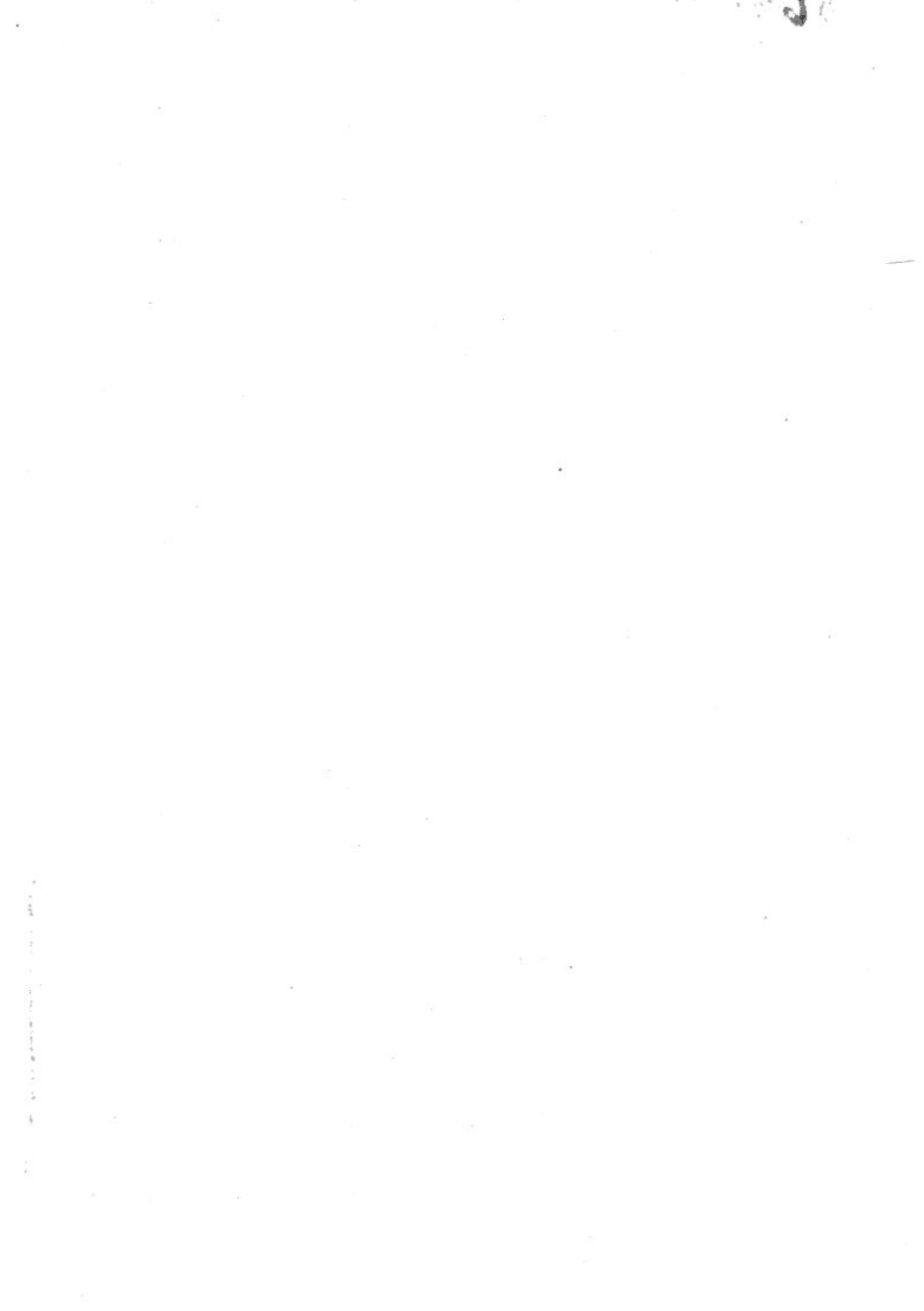


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Vol. 62

JULY, 1934

No. 1

## Secrets *of a* RACING YACHT

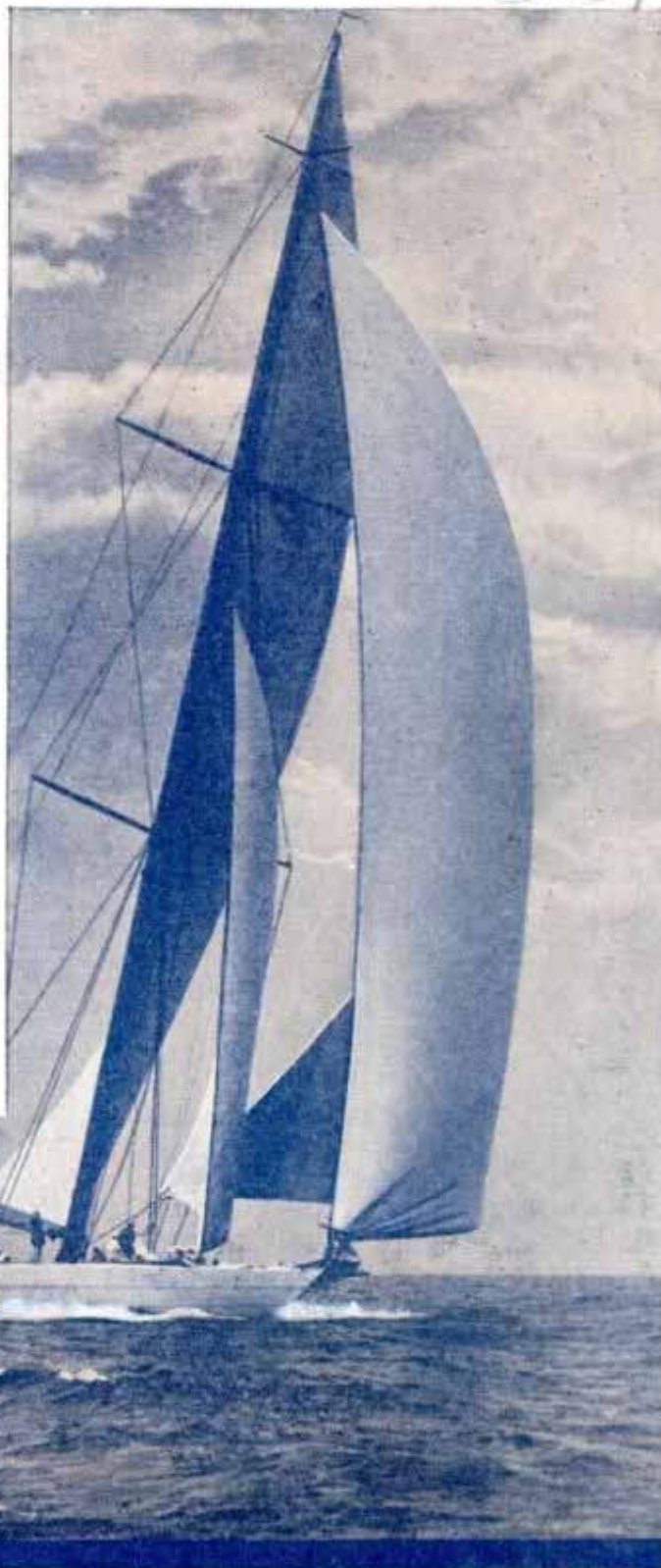
By W. STARLING BURGESS

*Designer and Navigator of America's Cup  
Defender, as told to Don Glassman*

RACES may be won by a hairbreadth or by a second, but it takes years to design and build a yacht fit to enter a cup contest.

The great international cup race, beginning September 15, is for a trophy that has been held in the United States for fifty-three consecutive years. The British have been thorough in the preparation of their 1934 challenger and promise a race with many a thrill.

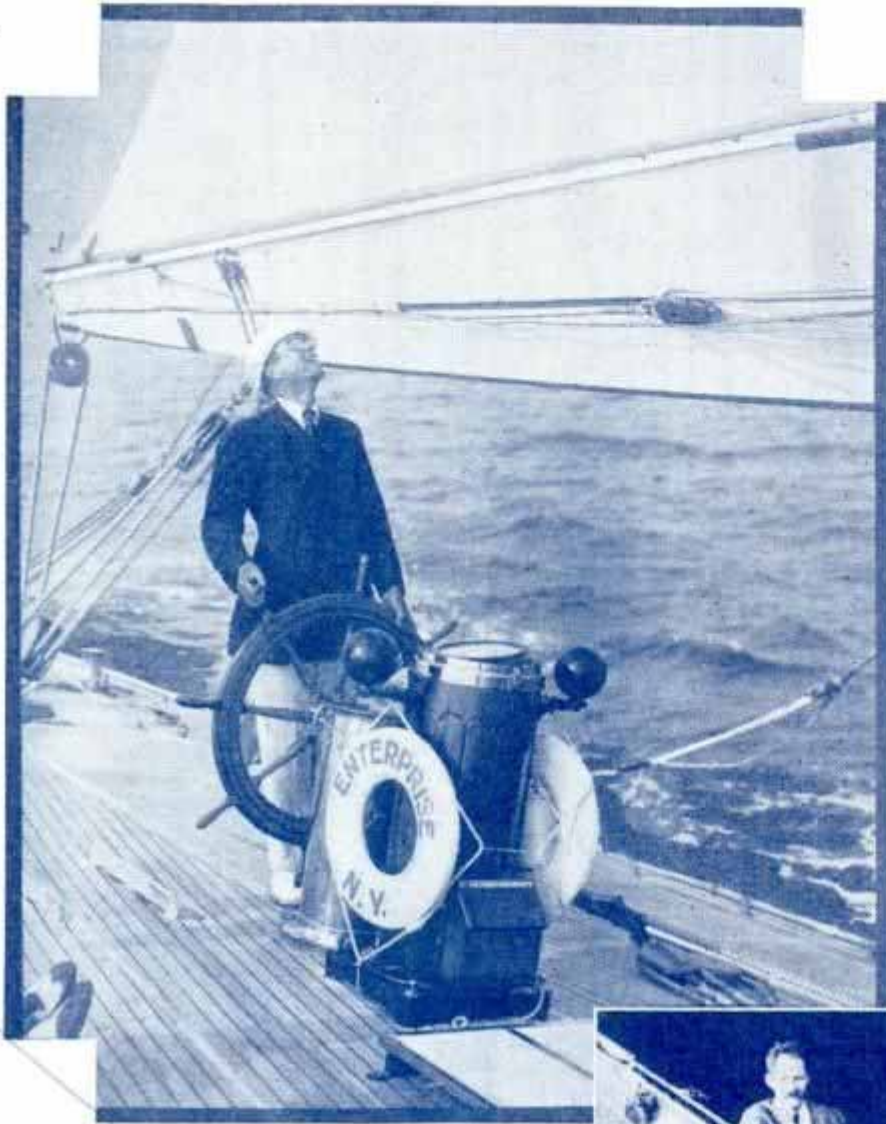
My first cup yacht was the "Enter-



Bearing All Earmarks of a Thoroughbred, the "Enterprise" Speeds Along on Trial Run; This Yacht Successfully Defended the Cup against Sir Thomas Lipton's Entry in 1930

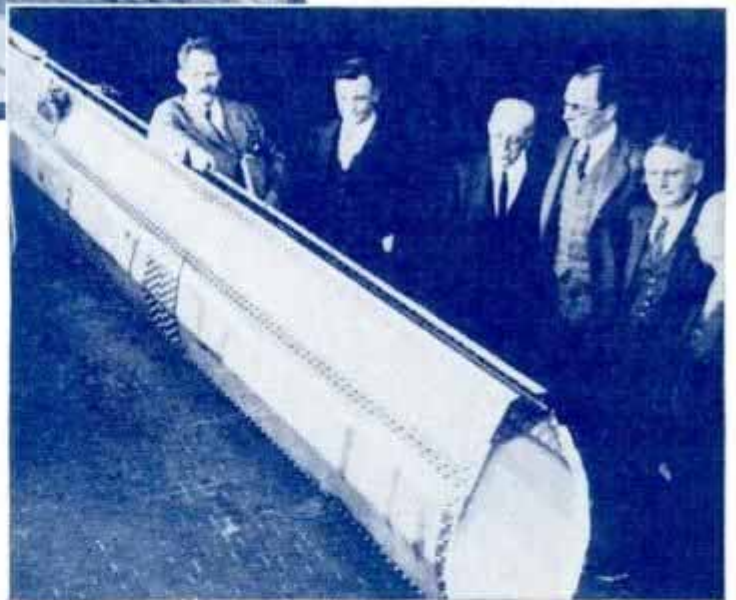
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as 24 ST. The properties of this alloy, duralumin, make it as strong as mild steel while weighing only one-third as much. Since the "Rainbow's" 165-foot mast is entirely streamlined, its construction was intrusted to the Glenn L. Martin Aircraft Co., of Baltimore. The center of gravity is required to be at least forty-two per cent of its length from the foot of the spar. When hoisted at this point, it hung balanced with nothing to spare on either side.

The second great factor in cup yacht design is to achieve a vessel which moves through water with the least resistance, and at the same time has sufficient stability to carry sail. This means that the craft must be stream-



Top, Harold S. Vanderbilt, Skipper of "Enterprise";  
Bottom, Inspecting "Rainbow's" Mast

prise," which won the race against Sir Thomas Lipton's entry in 1930. My present design, the "Rainbow," will compete against T. O. N. Sopworth's "Endeavor," a super-challenger. The "Endeavor's" owner will stand at the helm.

Two factors are borne in mind when designing a cup yacht:

First, the limitation of the racing rules under which the boat is built. These limitations give the "Rainbow" a waterline length of eighty-two feet and a displacement of 137.8 long tons. Her sail area is limited to 7,555 square feet. Both yachts must conform to Lloyd's rule of shipping, which specifies the weight of the frame and the "skin" of the ship as well as that of the major members constituting the hull.

Both yachts have metal masts this year; the "Endeavor's" is of steel, while the "Rainbow's" is of a high-grade alloy known

lined carefully above and below the waterline. Here is the procedure followed in designing the "Rainbow": I calculated the shape of the hull by the use of mathematical formulas. From sketches, we constructed a 500-pound model of the "Rainbow," large enough to carry a man. After ballasting, we placed the model in a tow

3643  
 Paul D. Scarborough, England  
 Paul D. Scarborough, Bristol, Eng.





*Hull of T. O. N. Sopwith's Challenger for America's Cup Is Shown under Construction; Christened "Endeavor," the Yacht Is Expected to Give "Rainbow" a Close Race*

tank, above which is an electric traveling crane and two sets of delicate instruments, one to measure the speed of the tow and the other to measure the resistance necessary to tow the model.

Back and forth, the model was towed. Slight changes were made. These studies were so delicate and decisive, that the "Rainbow's" final hull form was influenced even by the temperature of the water.

Under the racing rules, all cup yachts must have the same sail areas, but the size of the hull and its weight, which is a function of the size, may vary. Plainly, a large hull is faster in a heavy wind, while a small hull is faster in a light wind. To determine the proper hull, we studied U. S. weather records over a period of thirty years, paying especial attention to the days on which the races will be run.

Having decided on the final design, the lines were enlarged and drawn in chalk on the "mold loft floor." Then these lines were cut into the floor with a knife. Full-sized

patterns were made of the various members. Before the frames were assembled, the ballast, a single mass of lead weighing eighty tons was cast in a form of molder's sand. After cooling, it was taken from the mold, planed smooth and "jacked" to position on the cradle from which the "Rainbow" was launched. The next operation was laying the bronze keel plates on top of the lead, and the erection of the frame on which forms the "Rainbow's" skeleton.

Next in importance to the hull was the design of the rig. For this we turned to the science of aeronautics. Every effort was made to keep the rig light, yet very strong. "Rainbow's" sails are made of the very best Nile grown long-fiber cotton.

"Rainbow's" crew consists of thirty-one men. The afterguard consists of Harold Vanderbilt, captain and helmsman; an English observer; John Parkinson, assistant helmsman; C. Sherman Hoyt, in charge of setting the sails, and myself as navigator and "mast nurse."



Chicago Steel Co  
222 N. Bank Street

scale m.  
Cherese and J. J. J.  
St. Louis, Mo.

# Plastic Weatherstrip Comes in Handy Tube



or squeezed into cracks to seal out wind, water and dirt. The cement, which adheres to iron, steel, wood, glass, stone or concrete, forms a tough skin on the surface, but remains soft underneath, expanding and contracting with the surface on which it is applied. It never hardens or cracks. The cement may be used to seal cracks around window and door frames, to set glass in greenhouses and skylights, to mend cracks in brick, rock, concrete and stucco surfaces, to fill joints in silos and boats, to mend broken

Top, Right, Handy Tube for Applying a Plastic Weatherstrip Cement; Other Sketches Show Ease of Applying the Cement with Tube

Plastic calking cement, resembling glaziers' putty, may be applied easily by means of the tube in which it comes, ready to use. The nozzle of the tube is designed so that the cement may be spread evenly

slate, tile or glass and to waterproof basement walls. Found efficient as a means of weatherstripping the home, it may be applied with the handy tube, a knife or an ordinary calking gun.

Skinner Bros. Co  
580 N. W. 1st St.  
478

# Babbitting of Grinding Wheels Replaces Wooden Plugs

Babbitting of grinding wheels is replacing the wood plug or bushing as a means of preparing the wheel centers for the mandrel. In places where large numbers of grinding wheels are used and stocked, the wheels may be babbitted with a machine known as a babbitting chuck, which produces a center as true as a die. The chuck is provided with a set of pattern mandrels of all the necessary sizes. The wheel is clamped in the machine, the mandrel of the right size is centered in the opening and the babbitt metal is poured around it. The method makes it possible to stock only grinding wheels with a three-fourths inch hole, which may be babbitted to any size desired.



Drawing Shows How Grinding Wheels May Be Babbitted in Preparation for Mandrel

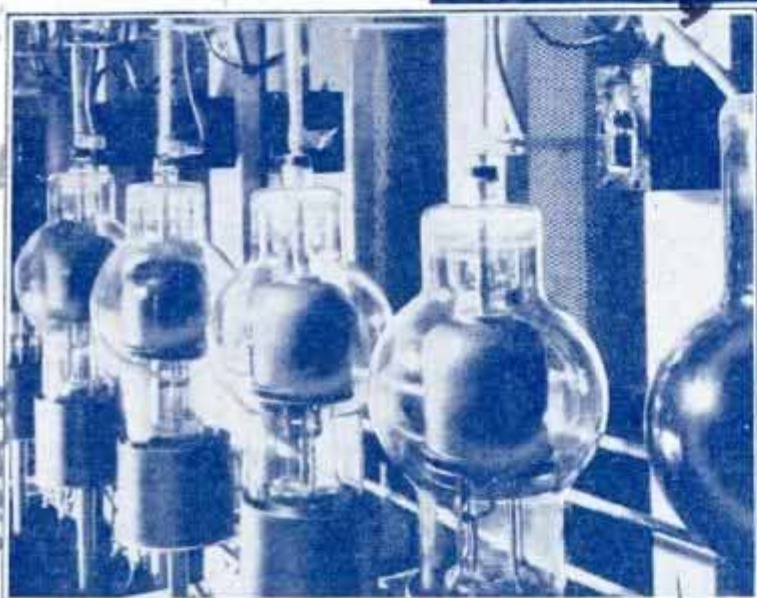
Commercial use for the common fly has been found; legs and wings of flies, if mixed with the pulp of superfine paper, give the finished product a peculiar and handsome pattern difficult to duplicate in any other way.

paper mandrel  
for babbitting



# Super-Power Radio Station Overcomes Static

Radio station WLW at Cincinnati, Ohio, now boasts that it is the most powerful broadcasting plant in the world. A huge 500,000-watt transmitter, ten times as powerful as the one previously used, has been installed, extending the station's area coverage twenty-five times and enabling it to give reliable service inside a circle with a diameter of 5,000 miles. Its tremendous power is ex-



Mercury Vapor Rectifier Tubes of 500,000-Watt Cincinnati Transmitter and the Operator's Control Console

pected to eliminate fading and to "override" static, atmospheric noises and other interference.

## STONE SOAKED IN KEROSENE USED IN KINDLING FIRE

Stone "kindling" is now being used to start fires. It is in the form of a synthetic stone which, when soaked in kerosene, burns for ten minutes. It can be used repeatedly as it does not break down in the heat and absorbs the fuel, thus permitting it to burn gradually when lighted. The Egyptians used a stone soaked in lard for the same purpose and when coal oil was first employed as fuel, a deposit of a peculiar granite was found which was used

in the same manner. It was called the Cape Cod lighter and was soaked in coal oil, but the deposit of Cape Cod stone was soon exhausted.

Designed to replace dry cells and primary cells, a long-life storage battery has been produced. The two-volt type is the same size as the No. 6 dry cell ordinarily used for operating doorbells. A feature of the new battery is low rate of self-discharge, only fifteen per cent of its capacity in a year's time. Ordinary storage batteries consume their own energy, discharging in about ninety days. For rural homes, unwired for electricity, the new storage cell will run a radio three hours a day for twelve months on a single charge.

In average service, the batteries are expected to have a life of five to ten years, depending on their care.



Phil  
Robert J. Martin  
6558 Holman

D523

Pure  
Duncan

Willard Storage

D-468  
Willard Storage Battery  
Cleveland, Ohio



To be used by...  
Priestley, English Explorer.  
D 585 and Peter Fleming

no reply...  
m...  
Wade Wall



Resembling Sawed-Off Shotgun, This Device Fires Gas Shell to Subdue Wild Animals

**GAS GUN TO CAPTURE ANIMALS IN DEPTHS OF JUNGLE**

Animals will be captured alive in the depths of the jungle by means of a new gas gun recently produced for the explorer. It resembles a sawed-off shotgun, but fires a gas shell. The fumes overcome the animal sufficiently long to permit the explorer to rope or chain its legs.

**TRAP HAS SCENTED CANDLES TO ATTRACT BEETLES**

Baited with special flower-scented candles, a new trap is available for combating the Japanese beetle. The trap consists of a glass bottle with a specially designed cover supporting a funnel, in which is mounted a candle holder and an opalescent glass chimney. Over the whole is a conical top for protection against wind and rain. The scent and the light of the candles serve as a double lure for the beetles. As the insects fly against the



the candles serve as a double lure for the beetles. As the insects fly against the

glass covering of the candle, large numbers drop through the funnel into the bottle, which is partially filled with a mixture of water and turpentine, and in which they are killed. The trap may be set on the ground or hung up.

D 581

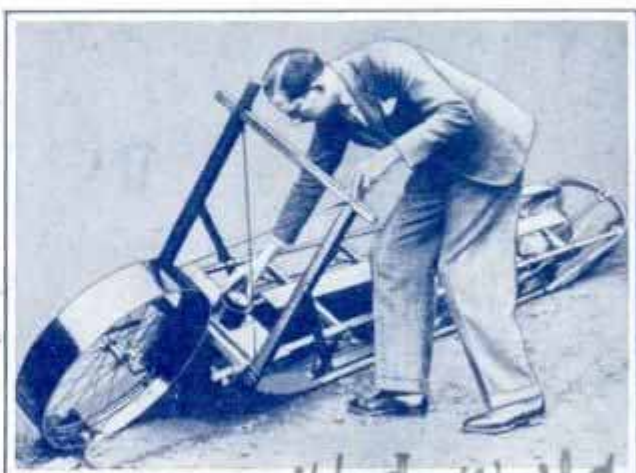
**NON-SPILL SPOUT FOR OILCAN HAS PLUNGER CONTROL**

Leakage when the can is tipped over is prevented by a plunger control in a new spout for oilcans. A spring fastened on a lever mechanism holds a heavy piece of wire tightly in the spout. Since the lever rests against the inside bottom of the can, pressure must be applied on the flexible base before the plunger permits oil to flow.



**MILEAGE INDICATOR ON SLED USED BY EXPLORERS**

Members of the British Arctic expedition to Greenland, who will explore the largest stretch of unknown territory in the Arctic, will use a combination of the primitive and the modern in their travels. The explorers expect to make the longest sledging journey ever attempted by a self-supporting party, and will use Arctic sleds for this purpose. However, the sleds are



The Wheel on This Arctic Sled Measures the Miles and the Man Is Pointing to a Compass

equipped with modern travel aids, including a compass and a wheel which indicates the mileage covered.

Leut. Martin Lindsay

Babell 230 Fifth Ave

Summit Hotel  
Room 65  
Summit Hotel



# Dressing Easier in the Latest Pullman Berths

Increased privacy and comfort feature a sleeping car designed by the Pullman Car and Manufacturing company for use in a new streamlined train. The semi-tubular shape of the train made it necessary to rearrange the standard Pullman section, resulting in a number of improvements. One of these is the transforming of the section into a room by means of metal ventilated partitions and sliding doors. This substitution for curtains gives absolute privacy by day or night. A collapsible washbowl and an illuminated mirror in each berth facilitate the making of the toilet. The lower berth has a rigid top rod on which hangs a curtain, forming a recess in which the passenger may undress while sitting on the berth. Wooden fenders prevent passersby from stepping on the toes. A folding stairway enables the occupant to reach the upper berth without calling the porter. This



berth is equipped with a semi-circular rod and curtain to facilitate dressing and undressing. The steps fold against the panel when the occupant retires and pulls down a roller curtain. Lower and upper berths may be locked. Each panel contains louvers

that admit free circulation of air. Since the new sleeping car is air-conditioned, ventilation is assured.

*Essex film D 418*  
**LIGHT BEAM REPLACES NEEDLE IN SOUND-FILM PHONOGRAPH**

Phonograph production may be revolutionized by a "talking-ribbon" machine which employs a light beam instead of a needle to reproduce sound. The ribbon is a narrow strip of unbreakable film on which sound tracks have been imprinted by a vibrating diamond cutter. When the film is passed in front of the light beam, sound is reproduced without a pick-up. The film may be played back immediately.

**Top, Occupant of Upper Berth Preparing to Retire; Center, Lower Berth; Bottom, Daytime Section**

*Williams*  
*Blue Bellows*  
*Widie No 8*  
*Paris*  
*and J. Frenchman*



# The Triumph

Cummins Engine Co  
Columbus, Ind

D 586



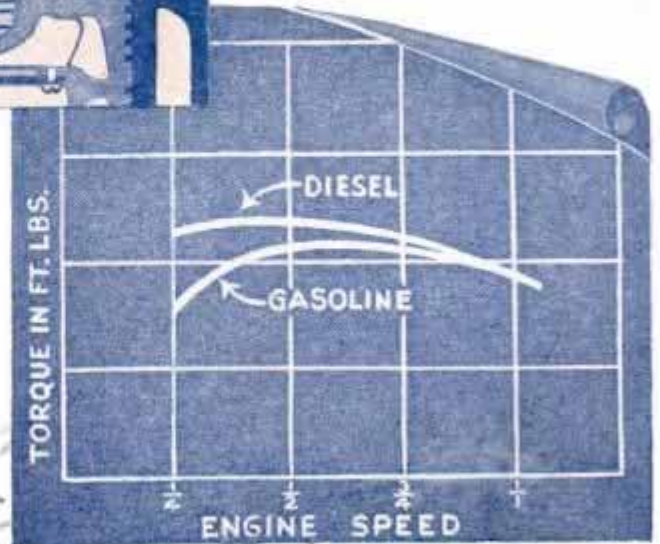
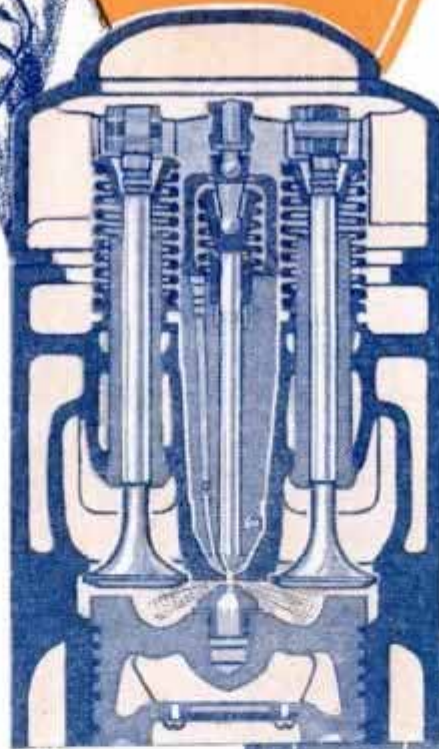
\$1.38 for fuel. In 1931 a 17,000-pound truck with a Cummins motor established a new coast-to-coast speed record for trucks by covering the 3,214 miles between New York and Los Angeles in ninety-seven hours and twenty minutes running time. The average speed was more than thirty-three miles per hour and the fuel bill was \$11.22 or one-tenth of a cent per ton mile of pay load.

The same truck was returned to Indianapolis and driven over the speedway for fourteen days and nights without stopping the engine. It traveled 14,600 miles on the track, 13,535 miles without stopping the truck and 10,005 miles of the distance without refueling. The average speed was over forty-three miles per hour and fuel cost averaged less than one-half cent per mile. A year later a ten and one-half ton bus,

WITH motor ships rapidly displacing steam, and streamlined oil-electric trains competing with the locomotive, Diesels are now challenging the gasoline engine for supremacy on the highways.

In 1931 the first Diesel-powered car appeared in the Indianapolis race and covered the 500 miles without a stop on thirty-one gallons of fuel at an average speed of more than eighty-six miles per hour. The fuel oil and one quart of lubricating oil consumed by that car cost just \$1.78!

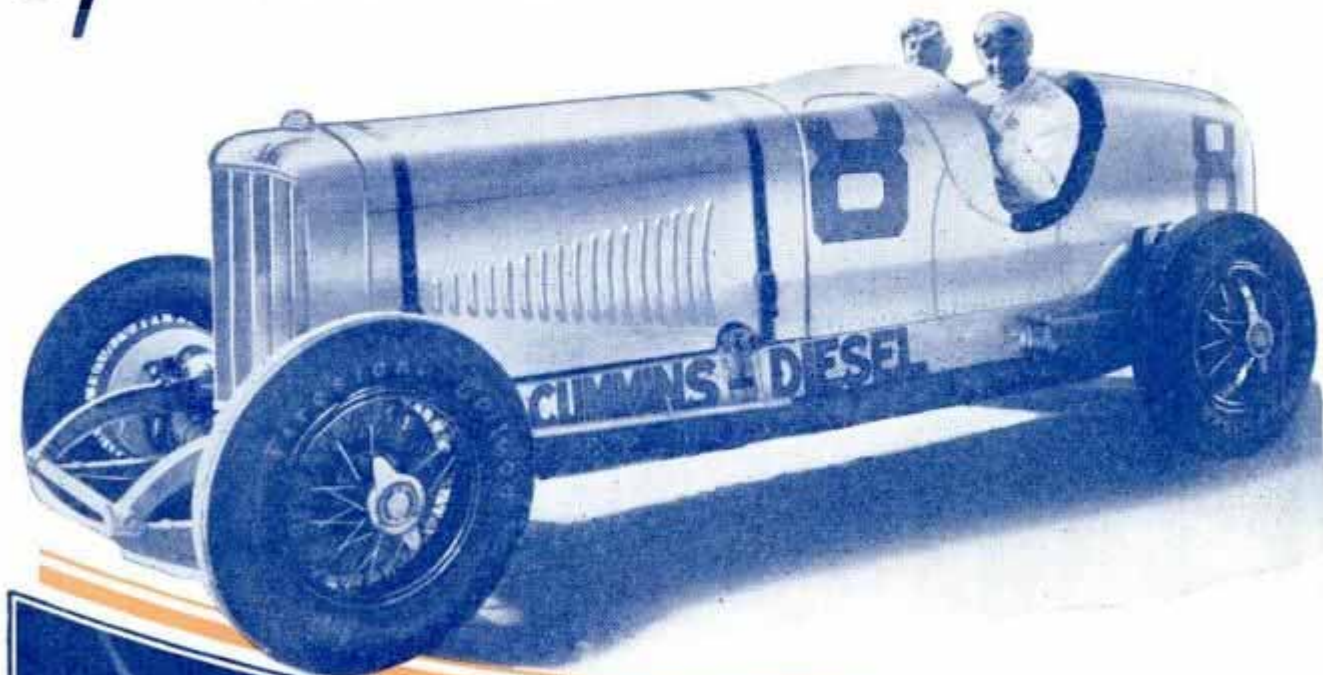
This racer was designed and built by C. L. Cummins, a pioneer in the development of light oil-burners, and other Cummins Diesels have piled up an impressive list of performance records on the road in the last five years. In 1930 a seven-passenger sedan equipped with such an engine made a 792-mile run from Indianapolis to New York. That trip cost the driver



Diagrams Showing Firing of Gasoline Engine, Section of Diesel Cylinder Head and Torque Curves



# of the DIESEL



*The 1931 Cummins Diesel Racer and the 1934 Two-Cycle Engine on the Test Block*

was equipped with a two-cycle motor. For years the Diesel has been recognized as an economical power source, but until it began to establish speed records it had not been considered seriously as anything but a heavy engine for comparatively slow work.

"There is no reason for this," says Mr. Cummins. "The power plant of our race car, for instance, is orthodox in every respect

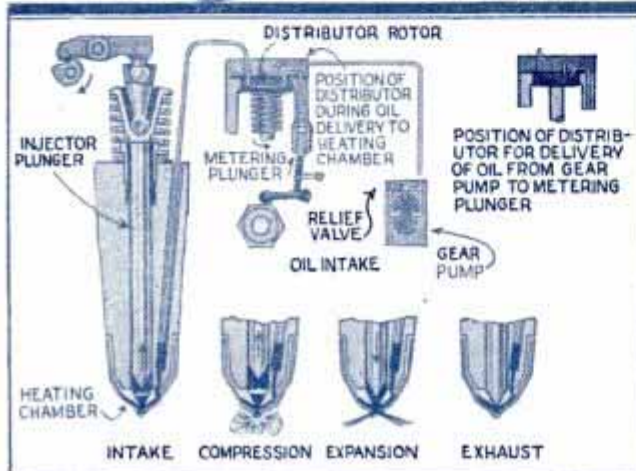
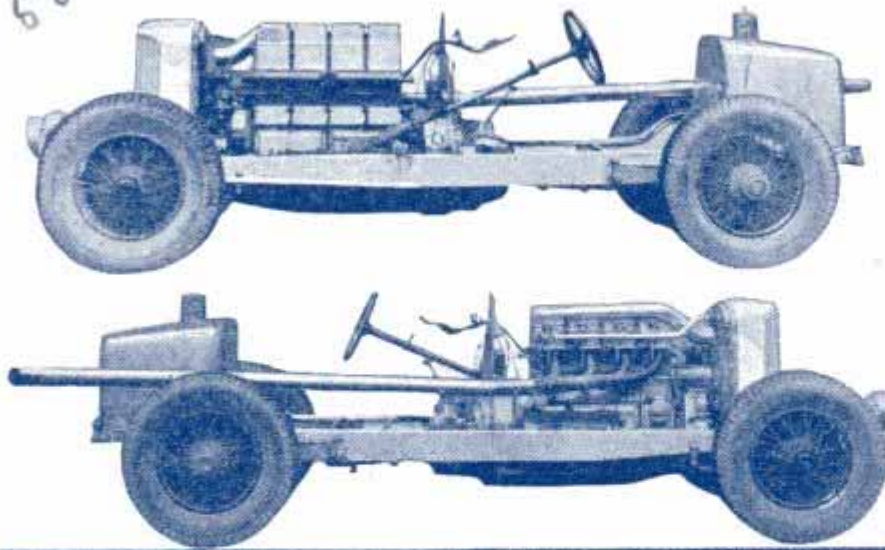


powered by a six-cylinder Diesel engine, was driven from New York to Los Angeles in seventy-eight hours and ten minutes running time at an average speed of more than forty-one miles per hour. The 365 gallons of fuel cost \$21.90, the average fuel cost per mile being  $\frac{68}{100}$  cent.

As a result of the success of the Diesel car in the 1931 motor classic, Mr. Cummins entered two such cars in this year's Indianapolis race. They were identical in design, except that one carried a four-cylinder, four-cycle engine and the other

except that there are no spark plugs, ignition system or carburetor. The engine weighs about the same as a gasoline engine of equal horsepower and capacity. Pistons, connecting rods, crankshafts, cams, valves and all of the standard parts are like those used in a high-grade gasoline motor. A Diesel crankshaft, valve or rocker arm can operate just as fast as those in a gasoline engine. It is entirely a matter of burning fuel rapidly and completely. That is the problem we have solved in making a high-speed Diesel."





Opposite Sides of 1931 Diesel Racer and Diagram of Metering and Injection of Fuel in 1934 Car

This year's race entries were not only faster but smaller, shorter, lighter and better streamlined than the 1931 car. Both 1934 cars used superchargers and the engines weighed about 1,000 pounds, compared with 1,600 pounds for the 1931 motor. The old car, loaded for the track and with driver and mechanic aboard, weighed 4,300 pounds. The new ones weighed 750 pounds less. The four-cycle motor had a four and seven-eighths inch bore and stroke with a piston displacement of 364 cubic inches. The two-cycle was the same size, most of the parts being interchangeable. The engines turned up 2,500 revolutions per minute, developing about 135 horsepower. On each car a Roots type supercharger was connected directly on the front end of the crankshaft, air being carried from the blower into the intake manifold which had no throttle or other means of control, the engine always taking a full charge of air.

Outward appearances of the two engines were almost identical except that the four-

cycle had an intake and an exhaust manifold, with one intake and one exhaust valve for each cylinder. In the two-cycle motor, the intake valve was converted to an exhaust valve, giving two exhaust valves instead of one. The two-cycle engine developed a little more power but burned a little more fuel. Like most race cars, the Diesels were started with the aid of a portable battery and electric starter. In the Cummins engine a single plunger pump meters the charge of fuel required, according to load and speed, and this goes to a distributing valve mechanism which delivers it to the proper valve at the proper time, thus actually distributing fuel oil instead of electricity.

In the gasoline engine the heat is applied to the fuel in the form of a spark, but in the Diesel the process is reversed and the fuel is applied to the heat. Air is drawn into the cylinder in a maximum charge and compressed to 500 pounds, the friction of compression raising the temperature to about 1,000 degrees. The fuel oil, also under pressure which heats and partly vaporizes it, is injected into the combustion chamber through nozzles which break it up into finely atomized and gasified particles. Thus the hot, gaseous fuel is applied to the incandescent air to cause combustion.

The secret of smooth performance necessary for an automobile power plant is to be found in the metering apparatus and the injector. The fuel charge measuring mechanism is entirely separate from the injector and does not operate at high pressure as does the injector. In some large Diesels, a single pump unit is sometimes used for each cylinder and all the plungers are tied together by some means of control. This is much like trying to use six carburetors for a six-cylinder gasoline engine, and trying to keep all of them in adjustment.

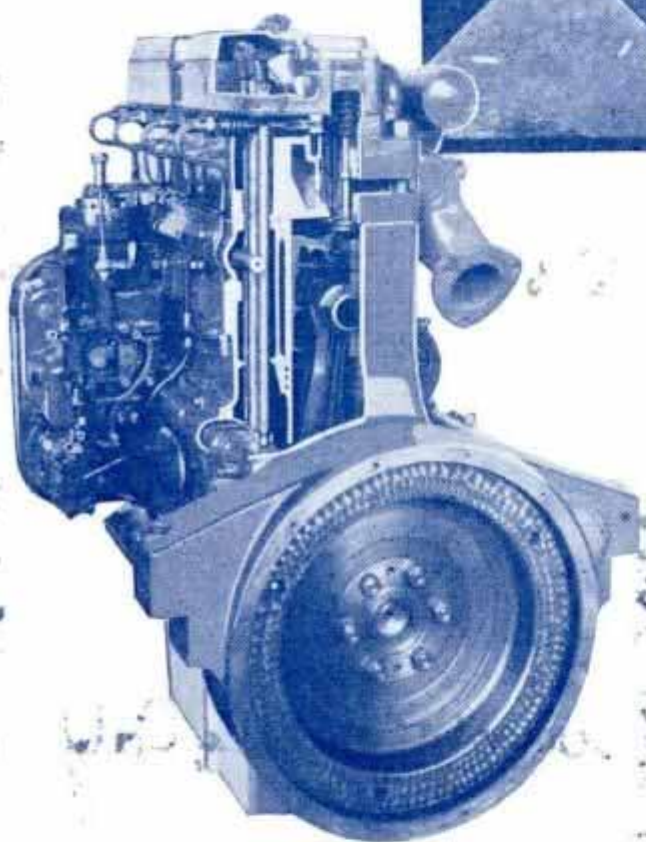
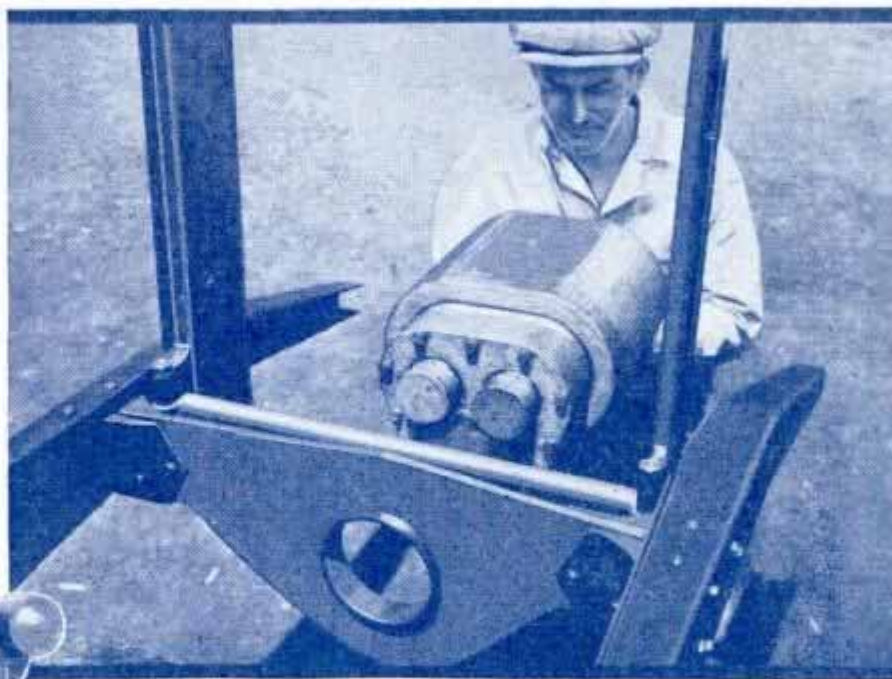
In the Cummins engine the fuel is metered by the use of a single plunger, the stroke of which is controlled by a foot throttle and the use of a distributor. Thus



D586

every cylinder gets exactly the same charge of fuel, regardless of the adjustment of the plunger or wear of the mechanism. This keeps the engine balanced and insures a smooth, even flow of power instead of the knocking and detonation often associated with heavy-duty oil burners.

In the gasoline engine,



*Wood Model of Supercharger for 1934 Diesel Racer, and Cutaway Section of Engine*

compression pressures rarely are carried above 100 pounds because the heat of compression causes pre-ignition. However, at the time of explosion, such pressures are raised to 350 or 500 pounds and sometimes higher. In the Cummins Diesel, compression starts at 500 pounds, but because of the gradual injection of the fuel charge, the rise is not as great proportionately. In a well designed and properly adjusted engine, the rise may be only 100 to 200 pounds.

Fuel consumption in the gasoline engine is extremely high at partial load, reaching the point of minimum consumption at

about three-fourths to seven-eighths of full load. As the speed of the car increases, less fuel per horsepower hour is consumed, but this is offset to a considerable extent by the increased air resistance encountered at the higher speed. In the Diesel the fuel consumption is comparatively equal per horsepower hour from no load to full load, thus offering the highest mileage per gallon at low speed. Due to wind resistance this naturally decreases gradually as speed increases. For a 3,000-pound car, this fuel consumption decreases from forty miles to a gallon of oil at fifty miles per hour to twenty miles to the gallon at seventy miles.

So far as acceleration is concerned, a study of torque curves reveals that the Diesel is a better performer than the gasoline engine. In the latter the torque curves are very low at lower loads and speeds. In the Diesel, the reverse is true. Here the highest torque is developed just before the stalling point. As the Diesel slows down, the torque increases, maintaining a higher gear ratio.

Will you ever be able to drive a passenger car with a Diesel engine, delivering forty miles or so of smooth power from a gallon of fuel oil costing about five cents? There is no good reason why such a car cannot be built, according to Mr. Cummins, if a demand for it develops. If you ever do own such a car, you will have a miniature gasoline plant, for it converts fuel oil into a kind of gasoline by applying heat and pressure.



**FAST PACKAGE STRAPPING UNIT HAS ADJUSTABLE MOUNT**



*Packaging Is Speeded Up by This Strapping Tool with Mount Adjustable to the Package*

Speeding up operations in factory or store, a new package strapping unit consists of a tool-mount package guide and package stop, together with a strapping tool. The mount is adjustable for various size packages and holds the strapping tool in position for work. The equipment can be installed in existing conveyor systems or can be furnished attached to a roller conveyor.

**STEEL BALL IN CATCH PULLEY GRIPS CORD OR ROPE**



the cord clear of the ball, it passes through the pulley freely, but when the cord is dropped, the steel ball is drawn in under

Developed for fastening ropes and cords, a new catch pulley consists of a wheel mounted in a frame constructed so that it imprisons a steel ball. In operation, a cord passes between the wheel and the ball. By holding

the wheel, locking the cord. There are no rough surfaces to mar the rope or cord. A companion pulley for locking two cords at the same time also is on the market.

**LOCK FOR EMERGENCY BRAKE**

Extra trouble for car thieves is occasioned by equipping your car with a lock for the emergency brake. This lock is for the type of brake lever fitted with a button to be depressed when the lever is moved. The lock fits over the neck of the button and when the emergency brake is set and the lock is attached, the lever cannot be moved without removing the lock.



**HARPOON GUN FOR FISHERMEN FIRED BY COMPRESSED AIR**

Compressed air fires the harpoon from a new lightweight gun designed for the fisherman. Mounted on the gunwale of a boat, the gun is accurate for more than one-tenth of a mile. It consists of a harpoon barrel, high and low pressure pumps, air gauge and an air reservoir. The gun has a pistol grip and trigger, military-type sights and a rest to hold a rod and reel



*Harpoon Gun, Shown Mounted on Small Stool, May Be Attached to Side of the Boat*

until after the harpoon is fired. It is intended for use in catching big game fish which refuse to strike at bait.

There are moths in the American tropics measuring almost a foot in wingspread.

*Science Letter. 1/13/34*

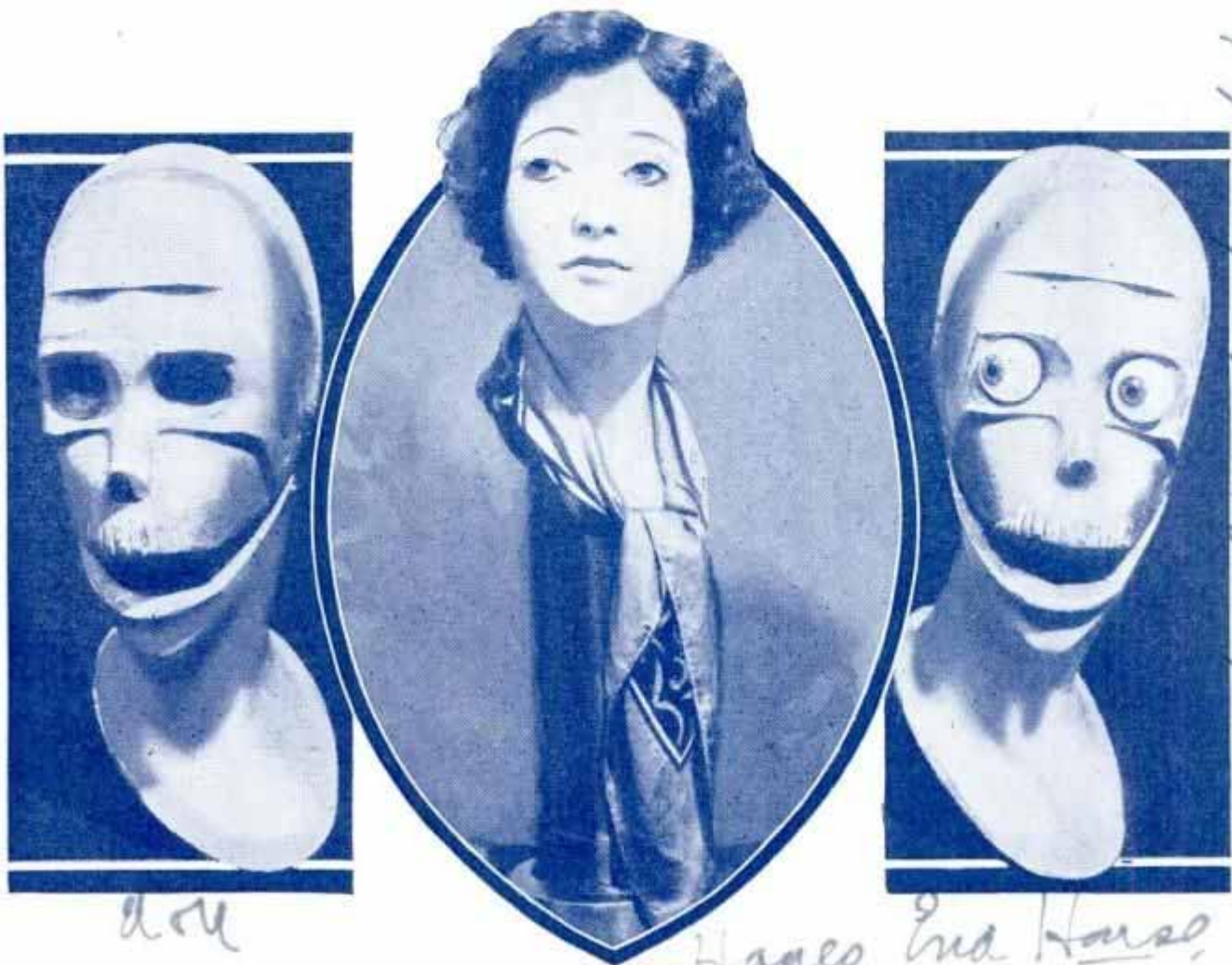
*Acme Steel Co*  
*2840 Archer Ave*  
*Chicago*  
*D602*  
*124 Hammel Ave*  
*Webster Groves Mo*  
*A. E. Jannopoulos*  
*D473*

*Jeneth Heater Co*  
*1603 S Michigan*  
*Chicago*  
*D599*  
*D569*  
*Santa Monica, Calif*  
*1309 Piedmont*  
*Santa Monica*  
*C. R. Klier*  
*1309 Piedmont*  
*Calif*



D499

# Lifelike Dummy's Face Changes Expression



Address from English who who  
Letter returned

Center, Model Head That Can Be Made to Look Smiling, Coy, Demure or Scornful; Left, Same Model Before Eyes and Outer Covering Are Installed; Right, Model Head with Movable Eyes in Place

Almost human in its changes of expression, the face of the latest show figure can be made to smile, register astonishment, show its dimples and roll its eyes. A small electric motor drives the mechanism for changing the expression. The figure is the work of Courtenay Pollock, London sculptor. Before the outer covering, or "skin," is applied to the face, it is grotesque, resembling the human skull. Then the skin is fastened on, the motor set for a smile or some other expression and the dummy's face resembles that of a beautiful woman.

of 200,000 pounds per square inch. The locking bar or bolt, made of chrome molybdenum drop forging steel, has heavy threads or teeth over which the lock is advanced by turning the key until secure. Adapters are available for unusual uses of the lock. One model of the lock is equipped

with a cartridge which explodes when an attempt is made to open it without a key. The same lock may be connected to a burglar-alarm system by means of an adapter. Automobile doors may be made doubly secure by using the device as an auxiliary lock installed outside of the car.

## PORTABLE LOCK IS ATTACHED WITHOUT USING TOOLS

D457

Designed to make secure almost anything from a small bottle to a large door, a portable lock about the size of a twenty-five cent piece may be attached without the use of tools. It has a tensile strength



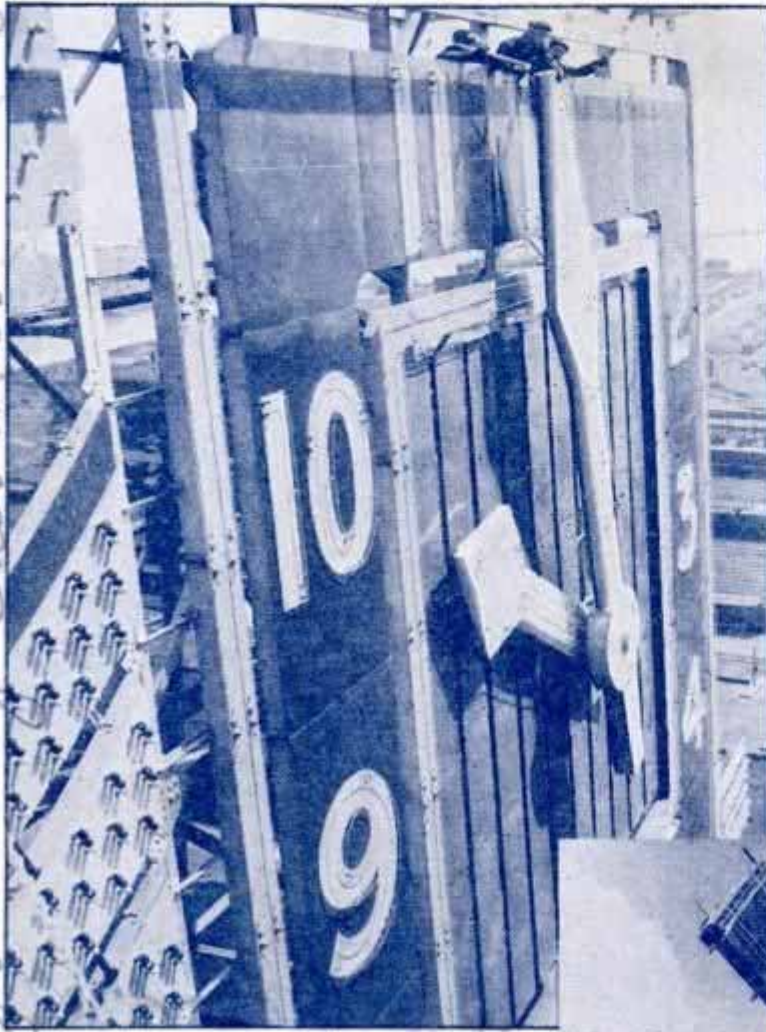
about \$2.00

Joseph Menchen, 6500 Maryland

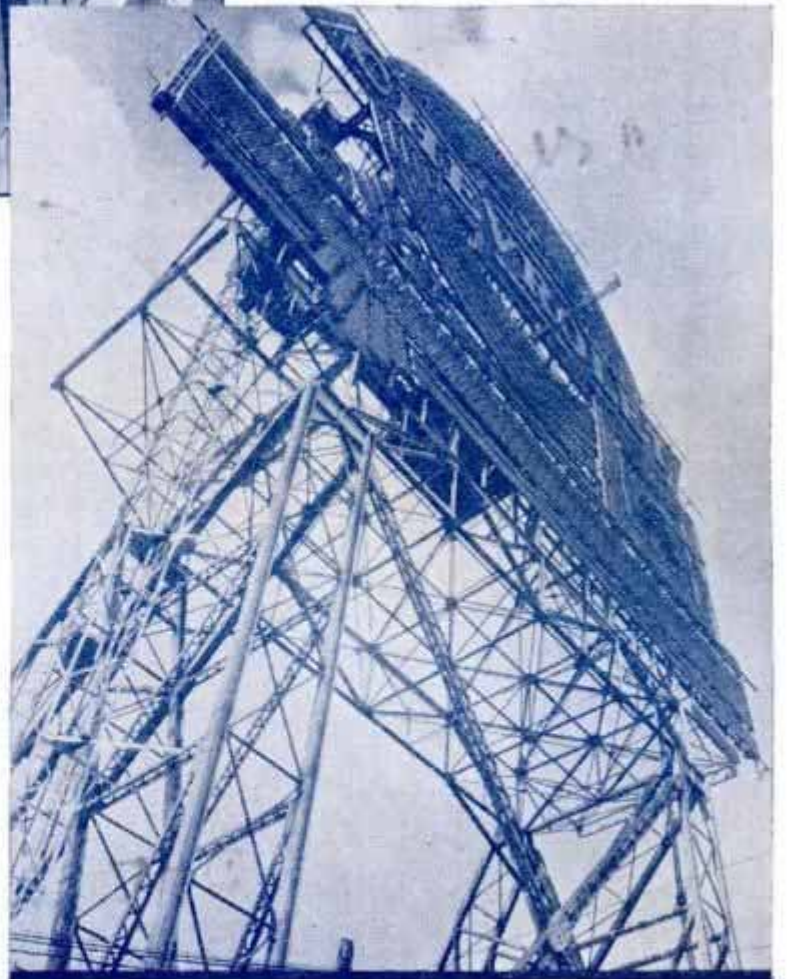


D 648

# Giant Electrical Sign Has Its Own Elevator



the world is mounted on the face of the display. Forty-six feet square, the clock has a minute hand twenty-seven feet long and weighing 1,000 pounds. The cross-section of the hands is streamlined to lessen wind resistance. A penthouse behind the sign contains electrical motors, flasher, motograph control, time switch and remote controls. The flasher operates the movement of light on the circle and those parts of the sign flashing on and off. A photoelectric cell switches the sign on and off as darkness comes and goes. The elevator runs from the ground to the middle of the display frame. Having a load of about 445 kilowatts, the sign consumes between \$50 and \$60 worth of electricity in six hours.



Visible for six miles on land and ten miles on Lake Michigan, a giant electrical sign in Chicago has its own elevator by which maintenance men reach the operating mechanism far above the ground. The sign is 275 feet high and 153 feet wide, illuminated by 17,240 lamps and 1,100 feet of neon tubing. Wiring required more than twenty-one miles of insulated cable. The structure, which consists of the display frame and supporting steel girders, contains 330 tons of fabricated steel, with 15,000 square feet of porcelain enameled steel on the face in eleven colors. A strip below the circle inclosing the name of the advertiser carries a message in moving electrical lettering thirteen and one-half feet high. The circle is 100 feet in diameter. One of the largest electrical clocks in

Top, Closeup of Giant Clock on Face of Display; Bottom, Looking Upward at 275-Foot Sign; Note Elevator Shaft at Left of the Structure

Built by Federal Electric Co. 87 W. S. State Street Chicago Chevrolet



ADMINISTRATION

D 1973



*The* WEST POINT  
*of the* AIR





D 575

FIRST days of training. This student is about to make his first flight and is being instructed about his parachute and phone arrangements. Below, the instructor, in front, giving last minute orders before the take-off. Once in the air, the instructor converses with his student, seated in the rear, by telephone.



*Cont Lieut. Corley Mc Harment Ballsbough  
Fairfax Hotel Fairfax Va*

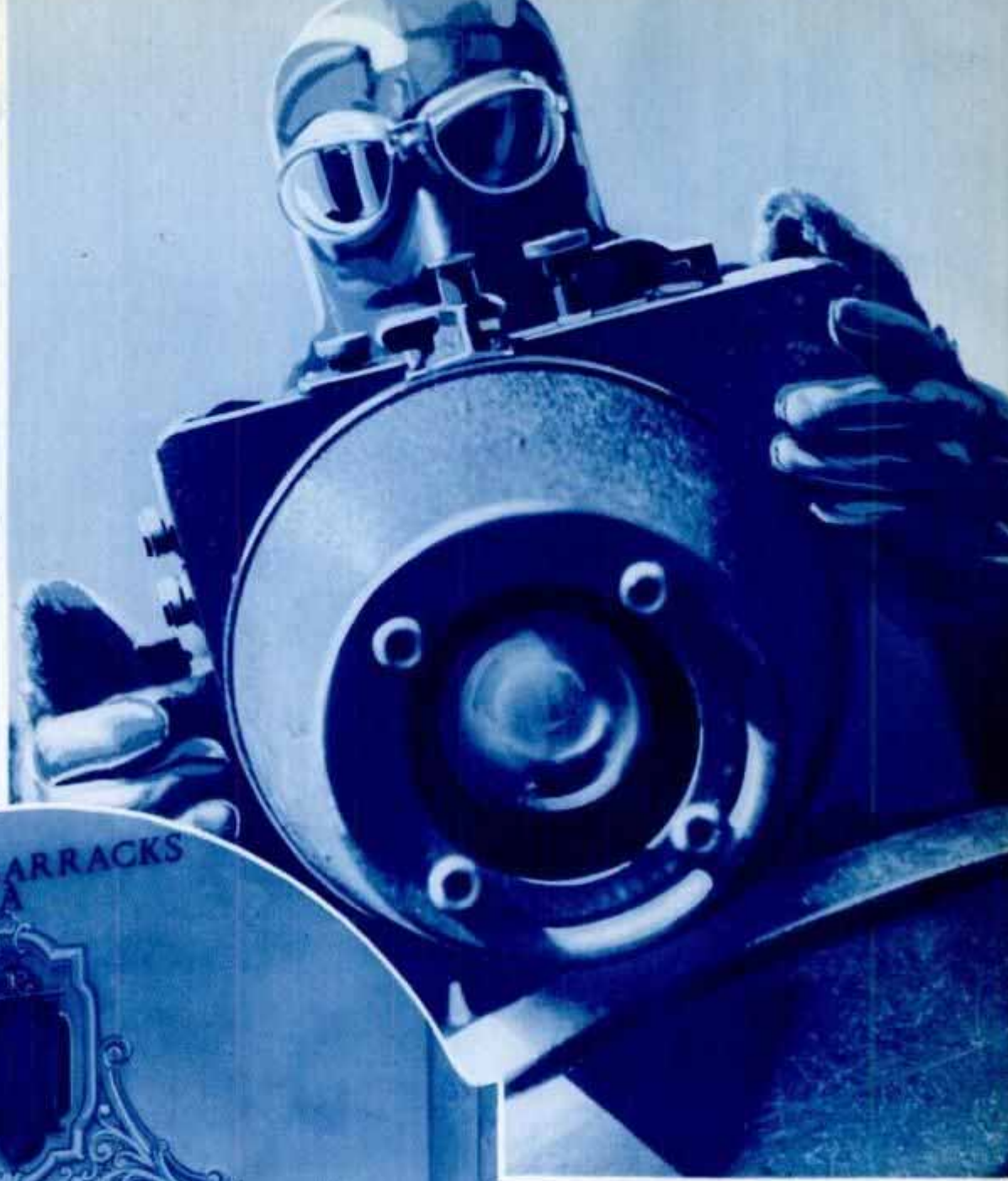
**F**LYERS who win their wings at Randolph Field, Texas, the "West Point of the air" differ as greatly from the old-time, war-trained aviators as the ancient Jennys differ from the modern bombers. Two incidents which occurred while the Army was carrying the mail will serve to illustrate this difference.

An old-time Army pilot was scheduled to make a night flight above a mountainous area. There was a storm over the mountains, but fairly good weather was reported at the destination. However, the forecast indicated it would get bad there a little later. The chances of getting through before the weather closed in at the other end were not quite fifty-fifty, especially with the storm in between. The old pilot pored over the weather maps, checked on wind direction and velocity and investigated the weather history of the situation. Then, without asking permission to cancel the flight, he announced



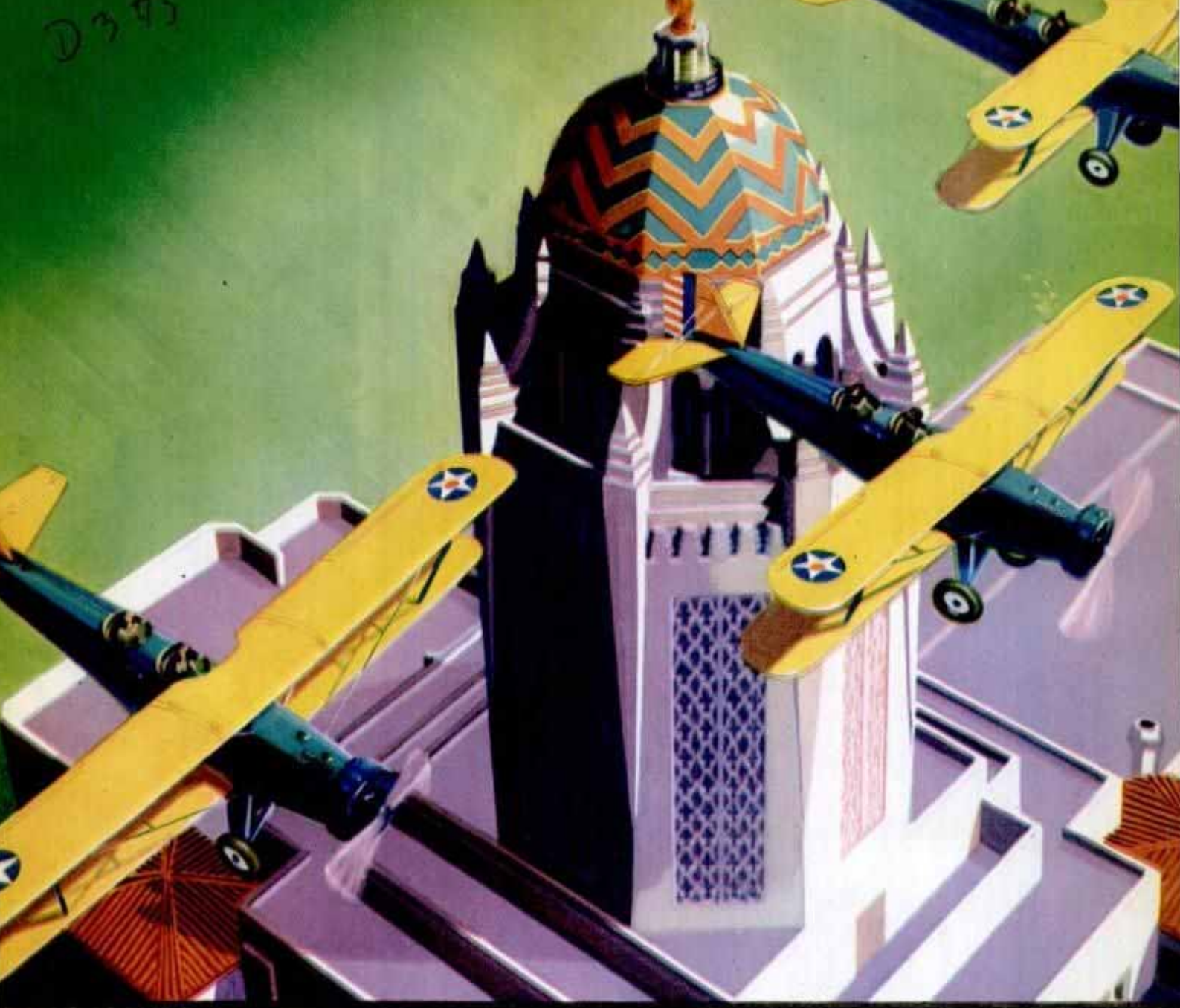
0377

CADET BARRACKS



**HIGH** altitude photography. The cameraman is wearing an electrically heated flying suit, made necessary by his exposed position while taking pictures at altitudes of 15,000 feet or more. Left, the beautiful cadet barracks at Randolph Field where students meet to tell of their experiences after a busy day of instruction or ground work.





TRAINING ships flying over Administration building in close formation.

his decision.

"I've been flying for sixteen years," he said. "I'd kind of like to fly sixteen more. I think I'll go home."

The control officer, also an old-timer, smiled as he cancelled the trip. About the same time a youthful pilot—a recent product of the Army's academy of the air—landed one stormy night with his mail at a division headquarters, climbed wearily from the cockpit and stumbled through the snow to the operations office.

"How soon do I take off again?" he inquired.

"Don't you want to look over the



11TH BOMB. SQDN.

weather reports?" asked his control officer.

"Not unless you say so sir," came the reply. "I'm supposed to go on—"

"But man, the report says zero," exclaimed his superior. "Dew point and temperature right for ice on wings. Light rain beyond. Of course, you might go above and get out of the ice zone. What do you say?"

"Just as you think, sir," came the dogged reply. "I'm supposed to go through."

Close questioning revealed the pilot had had no experience in getting out of ice areas, his compass was off several



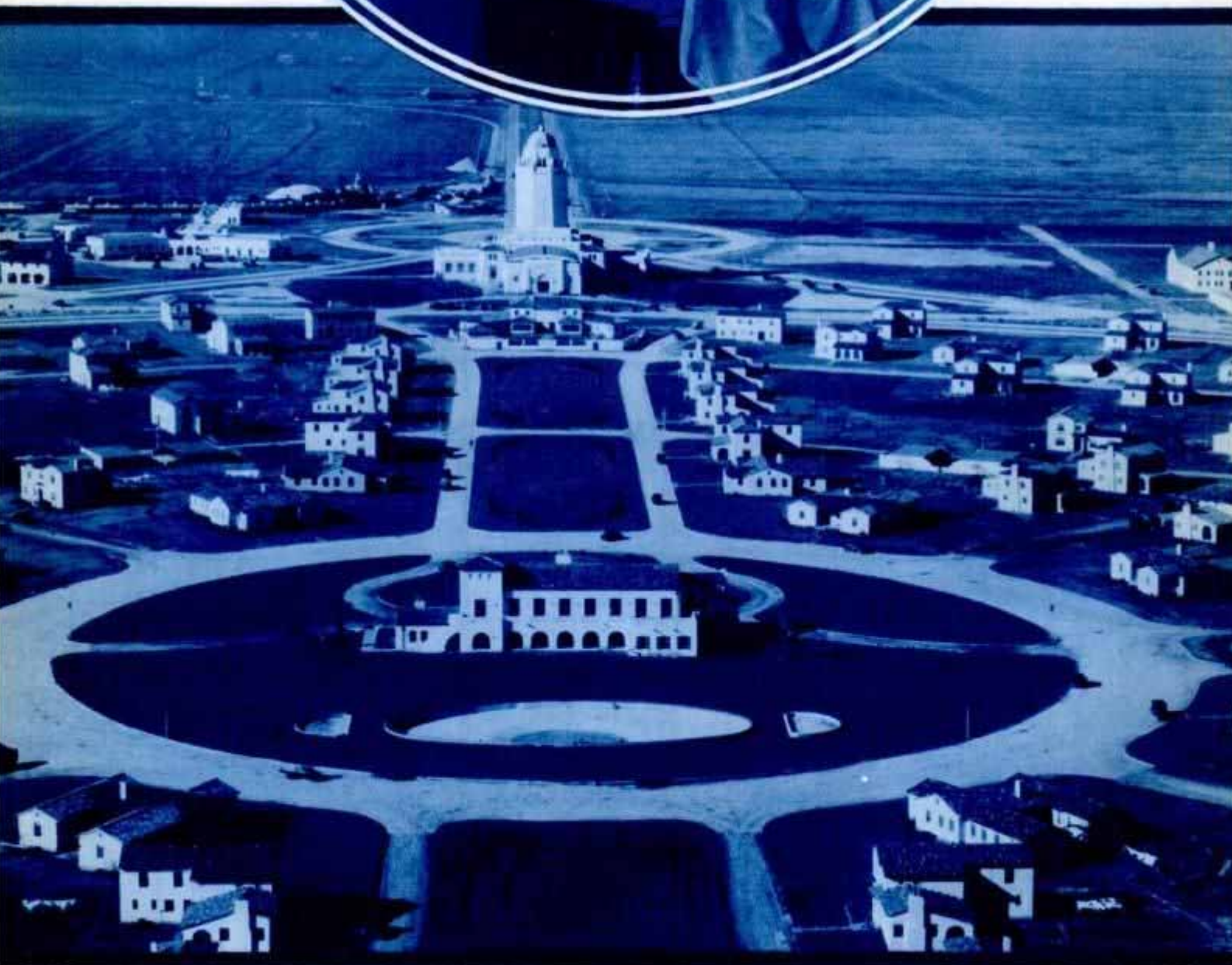


**STUDENTS** entertaining visitors at Post Exchange. This is where the students buy their supplies and meet relatives and friends visiting the flying school, hence it is one of the popular points of assembly when the students are off duty.

D 375

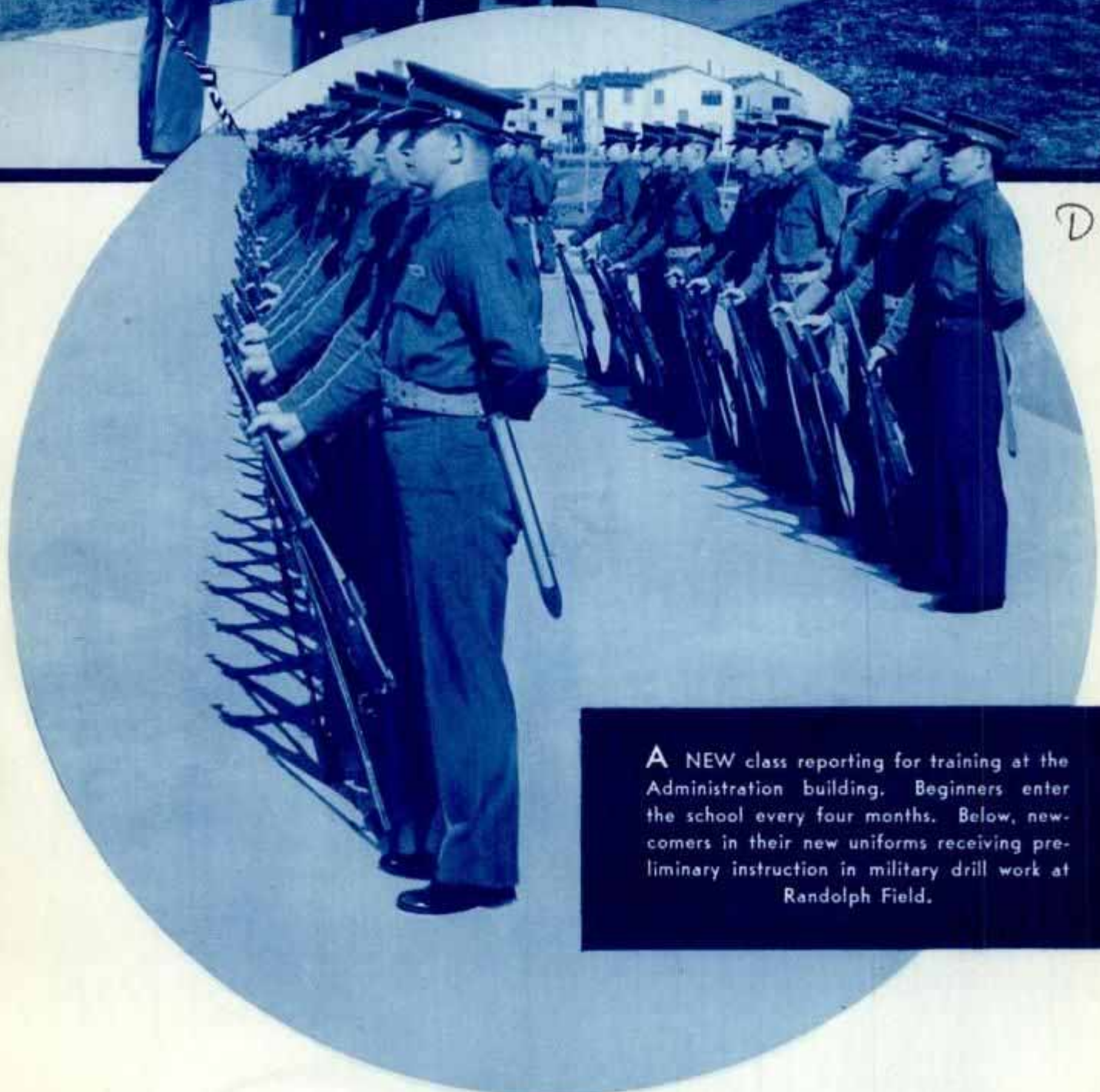


Q275



**STUDENT** taking test to determine his field of vision, and an air view of Randolph Field, looking north. The Officers' Club is in the





D375

A NEW class reporting for training at the Administration building. Beginners enter the school every four months. Below, newcomers in their new uniforms receiving preliminary instruction in military drill work at Randolph Field.





**STUDENTS** receiving photographic instruction at Kelly Field. This type of training has become more and more important in recent years, particularly for the observation groups.

points and his radio was dead. But the youngster had orders to go through, and he expected to keep going.

"You better check in," his control officer told him. "We'll put the mail on a train."

"But I'm supposed to—" began the flyer.

"Never mind. You're through for tonight. Turn in."

"Yes, sir. Thank you, sir. Good night, sir."

That's the difference between the young eagles and the old-timers. The old-timer was a rugged individualist. He was trained to fly alone and fight alone, to rely on his own judgment and his own

resources. When he thought he was right and his superior officer was wrong, he argued about it—even if the superior officer happened to be a general.

Not so the young flyers being turned out at Randolph Field. These youngsters, termed the "shock troops of the air," live for a year under the strictest kind of Army discipline. They learn to obey without question or hesitation the least command of a superior. And they are not lone eagles or individualists. From the very first day they are taught to fly and to fight in "packs." Team work, which is another name for formation flying, is the creed. They do not attack like an eagle. They descend on a





**BOMBERS** flying over Yosemite Falls. The new breed of war bird is not a rugged individualist, but is trained for teamwork and formation flying. Below, some of the squadron insignia.



26TH BOMB SQDN



32ND BOMB SQDN



34TH BOMB SQDN



36TH BOMB SQDN



38TH BOMB SQDN






D375



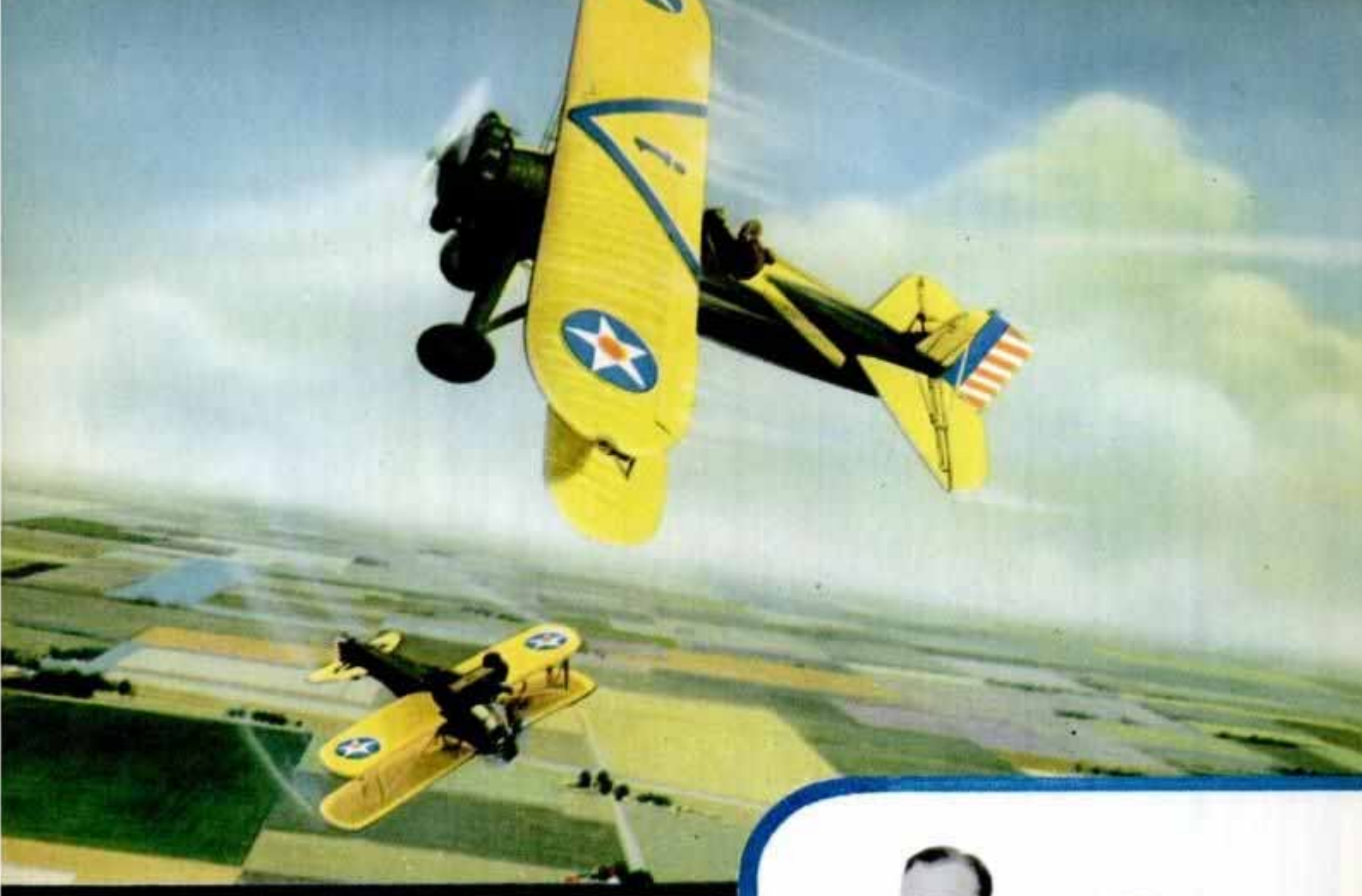
**FOLLOW** - the - leader, an example of close formation flying. Right, students learning how to mount and manipulate the aerial camera on an observation plane. This camera can take oblique views of strategic positions, and the record it makes is an invaluable aid to military strategists in time of war.





SILK umbrellas hung up for drying in the parachute room at Randolph Field. This is a regular procedure in the meticulous care given this part of the army aviator's flying equipment.





D395

**DOG** fighting. The object is to get on the other fellow's tail, thereby gaining the most advantageous position. Right, the wobblemeter test for fatigue.

quarry like a swarm of hornets. It's the group, the squadron, the team spirit that counts today.

The flying school is both unique and exclusive—unique because the cadets receive pay for attending and exclusive because it is hard to get in. The students come from every state and from every profession, a rich boy and a poor man's son may enter side by side.

If you are between twenty and twenty-seven years old, unmarried, of good character, of sound physique, enjoy good health and have completed two years or more of study at a recognized college or university, or can pass an examination covering such work, you can apply for training as a flyer at Uncle Sam's expense.



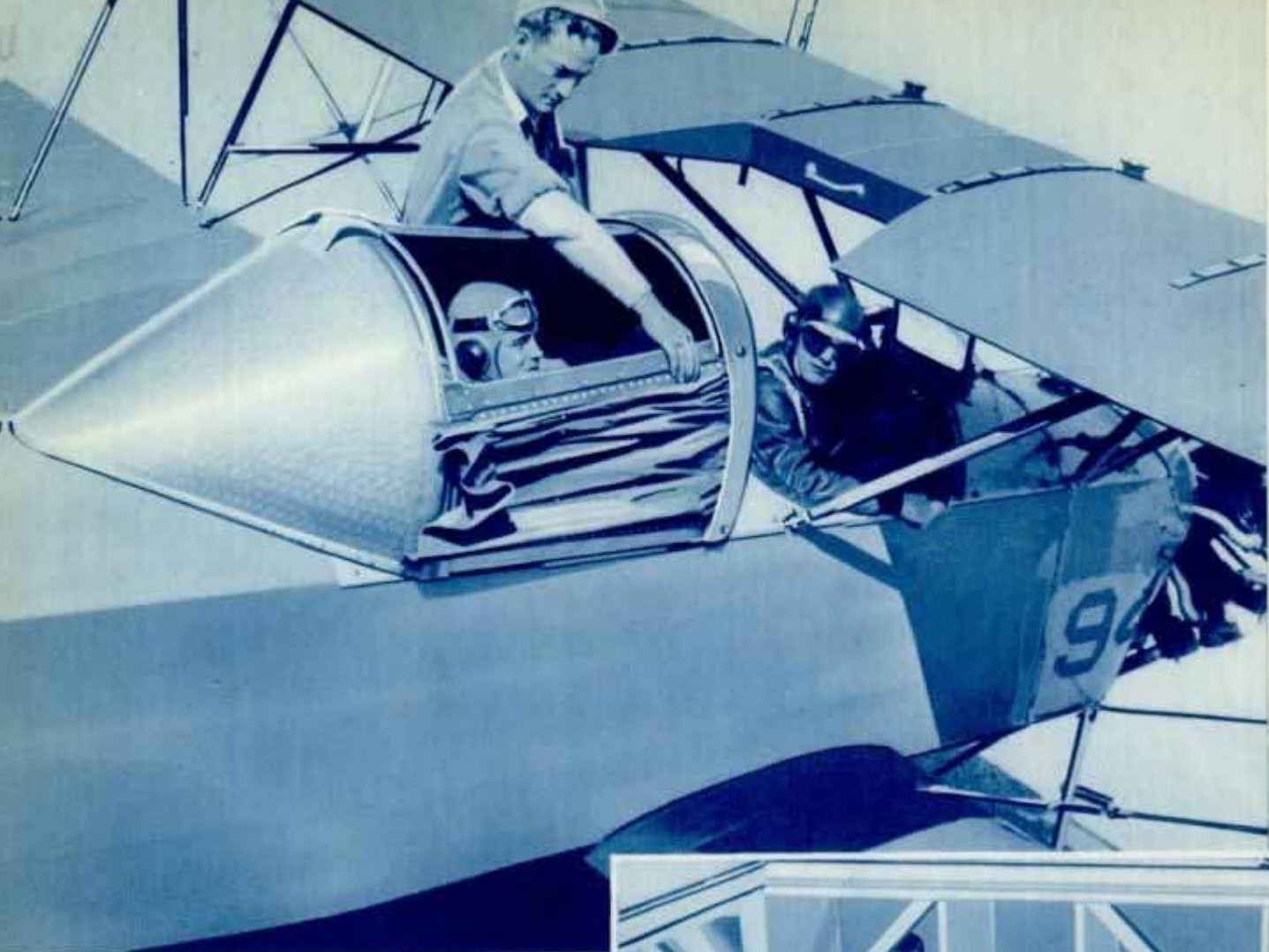




**A** GROUP of "Dodoes"—new students—being given a glimpse of what is in store for them in a few minutes. These boys are about to make their first flight, and are watching the advanced students flying in formation.







D375

**STUDENT** in hooded cockpit, ready for blind flying instruction. Right, a miniature battle field. The men on the upper stage are practicing bombing. Small lights appear on the field after each attempt, indicating the accuracy of the shot.

The course lasts a year, the first eight months being spent in the primary flying school at Randolph Field, and the last four months in the advanced flying school at Kelly Field, San Antonio. New classes begin training March 1, July 1 and October 15, and about 150 cadets enter the school each four months.

The physical standard for flying training is higher than that for enlistment in the regular army, and special attention is given to vision, hearing, and tests of equilibrium and nervous or mental  
*(Continued on Page 116A)*







VARIOUS activities in the photographic dark room. Here students in the observation group receive instruction in oblique photography, mosaic map work and movie camera work, all essential in making military pictures from the air.



D 378



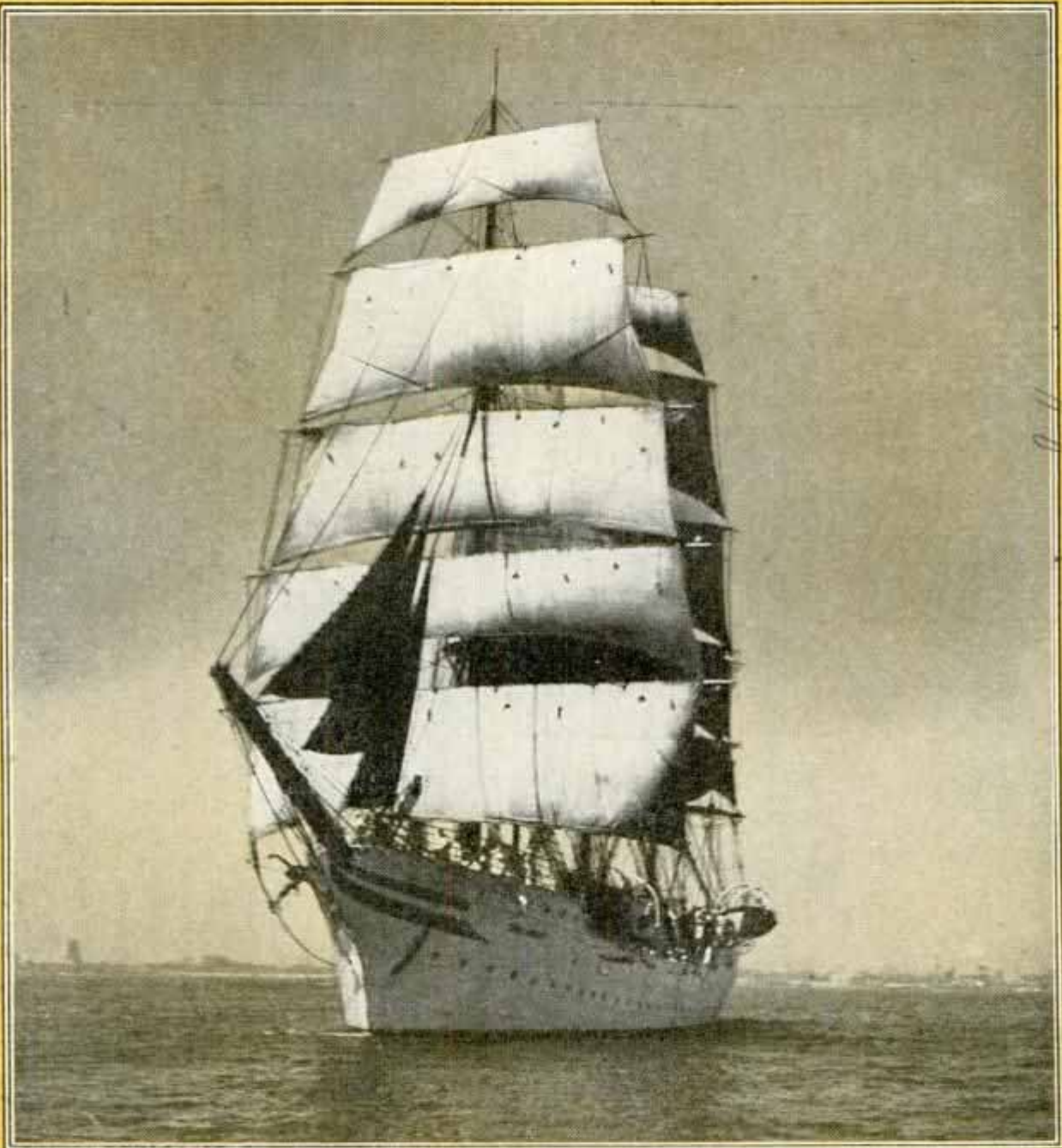
A VIEW of Randolph Field, showing the Administration building and the bachelor officers' barracks. Below, some of the squadron insignia.





U.S. Navy Capt. W. Sheridan, Little Neck, L.I. New York

# The CHALLENGE of SAILS



Capt. W. Sheridan, Little Neck, L.I. New York

Norwegian Training Ship, "Sorlandet," on Lake Michigan; It Is of Steel Construction, One of Four Used by That Nation's Naval Reserve

**F**AR-SIGHTED shipping men predict the return of the sailing ship as they watch the continued increase in oil prices force cargo-carrying vessels back to the use of coal. This situation, they say, can result only in higher prices for coal and, eventually, in the comeback of sails.

The major factor in favor of the sailing ship is that it is able to carry cargoes at lower freight charges than the steamer

and still earn money. There is no expense for fuel, labor cost is lower and interest, depreciation and upkeep are less. The sailing ship of the same cargo capacity as a steamer costs much less to build because it does not need expensive engines which frequently cost more than the hull.

Of course the sailing ship is much slower than the cargo steamer so that its use is only in transportation of commodities







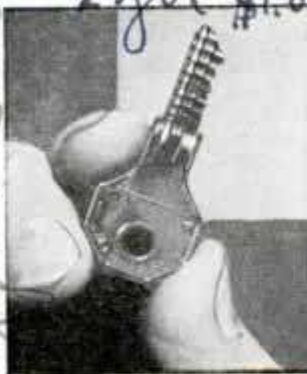
2711 N. 13th, Milwaukee Wis.

edge gained from aviation and racing-yacht experiments, much greater speed may be attained with sail craft. It is probable that the new sail craft will be a combination of the old pure square-rigged craft with the more modern schooner. The square-rigged craft is more seaworthy than the schooner, running before the wind in heavy weather while the schooner is the best when beating up against a head wind. Sailing vessels on long voyages pick the routes that give them the maximum of fair, following winds so that square sail is advisable. But head winds can not be avoided so that the ship should have the fore and aft canvas of the schooner. It is the problem of the constructor of the new craft to harmonize the square and fore and aft sails so as to obtain maximum efficiency. Another great need for sailing ships is that they form the best school in which to prepare young men for a life at sea, even in steam.

D 574

**LIGHTWEIGHT KEYS IN COLORS ARE HANDY FOR AUTOIST**

Aluminum alloys, tough and lightweight, are being used in producing keys that are strong, yet weigh one-third as much as nickel, silver and other metal keys. A new electroplating process applicable to these lightweight keys makes it possible to introduce colors to the key chain. For instance, the ignition key may be colored red to make its selection easy. Reds, blues, greens and yellows are available in attractive, lasting finishes.



2 for \$1.00

introduce colors to the key chain. For instance, the ignition key may be colored red to make its selection easy. Reds, blues, greens and yellows are available in attractive, lasting finishes.

D 590

**GLASS THIN AS A SOAP BUBBLE PASSES ULTRAVIOLET**

Glass as thin as a soap-bubble film, or about two ten-thousandths of an inch, has been developed with the increased use of ultraviolet rays in the treatment of disease. Best ultraviolet results are obtained with quartz bulbs but these are very expensive. Glass bulbs of ordinary thickness are of little use but experiments have shown that the very thin glass permits a



Ultraviolet Ray Treatment Being Given with Bulb Containing Glass "Window" Thin as Soap Bubble

large percentage of the rays to pass. Obviously an entire bulb made of the thin glass would collapse just as a soap bubble does. The Westinghouse Electric and Manufacturing company overcame this difficulty by making a glass bulb of ordinary thickness and setting into it a tiny "window" of the thin glass which is held directly over the part being treated.

**SPECIAL TOWING DOLLY USED FOR KNEE-ACTION CARS**

D 527

Service stations have had trouble in towing some models of cars with independent front-wheel suspension and a special towing dolly has been built for moving cars with this feature. Instead of jacking up the cars in the usual manner, the dolly is slipped under the front of such a car and the frame rests on the dolly, chains anchoring the car to the towing aid.



Acme

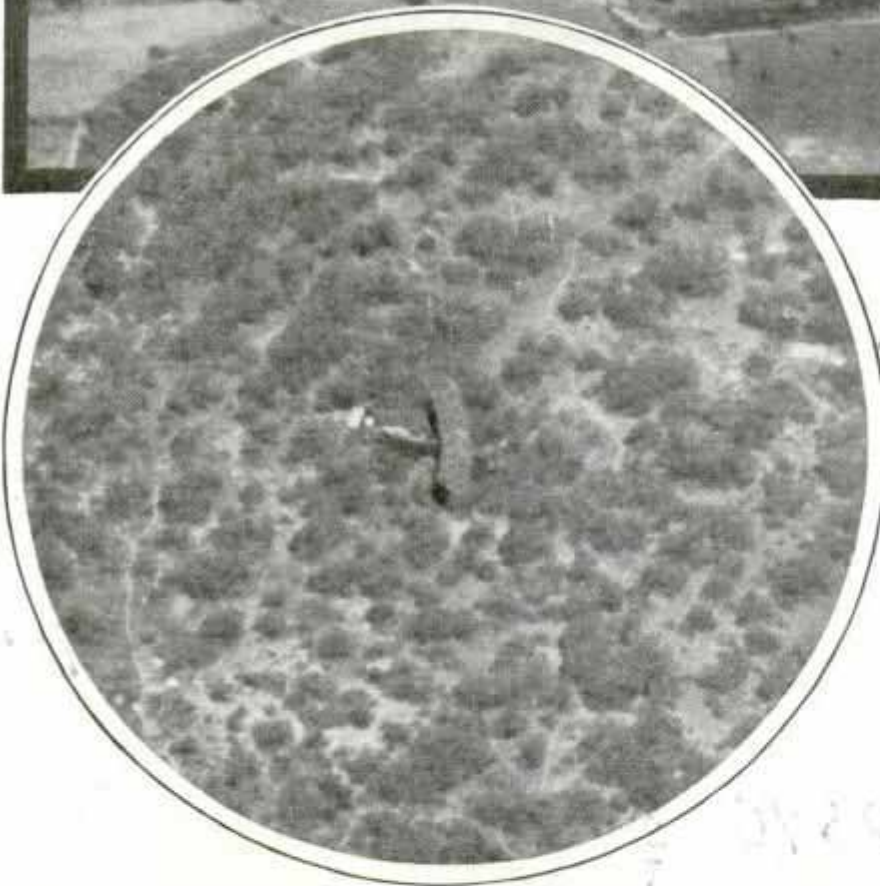
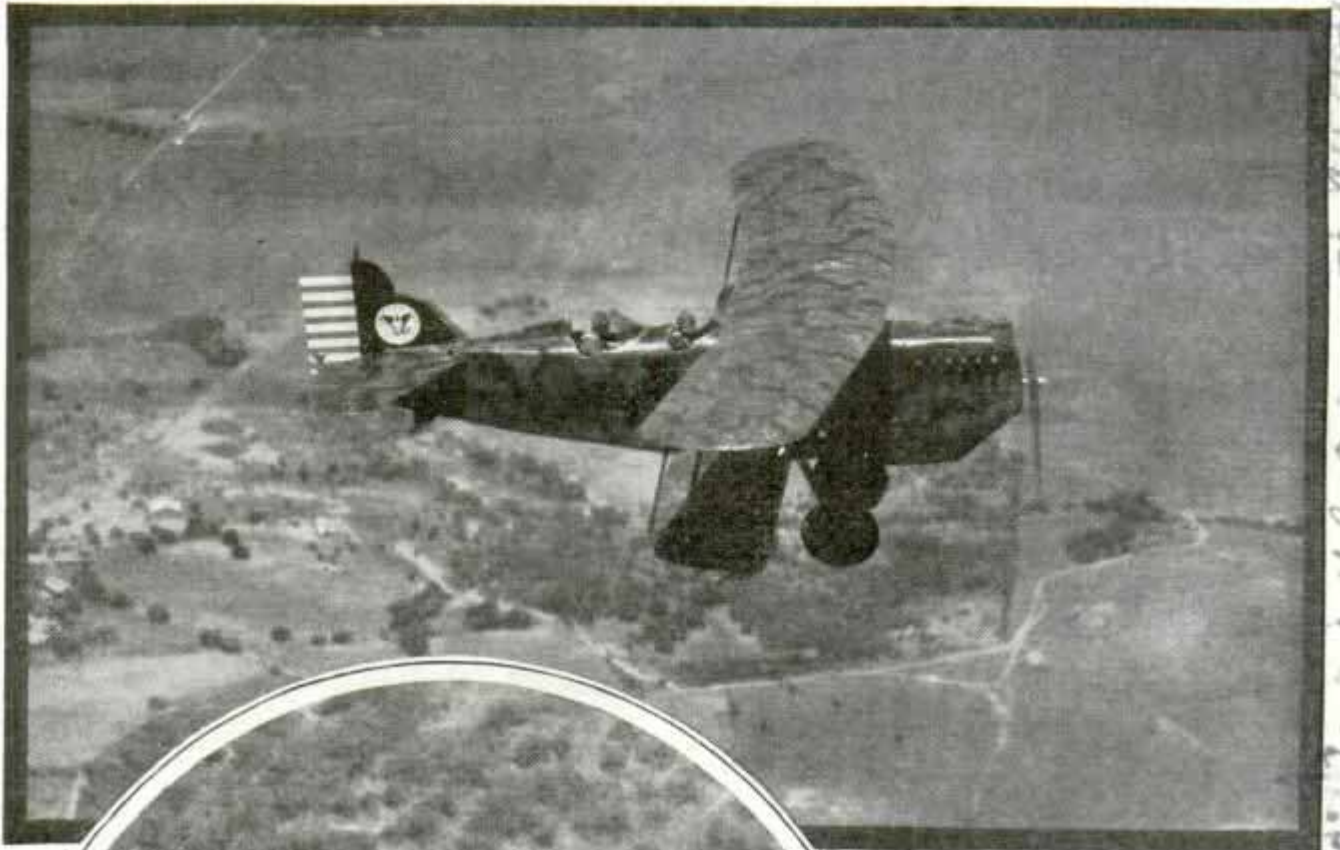
Wheaver Mfg. Co. Ill.

Bugby & Stratton Corp

East Pittsburgh, Pa.



# Camouflage Tricks Tested on Army Planes



Courtesy U. S. Army Air Corps

Top, Camouflaged Plane in Practice Flight; Circle, Plane at Center of Photo Is Painted to Resemble Shrubby on Ground

Effectiveness of various forms of camouflage is tested on planes used by the United States Army Air Corps on practice flights. Camouflage artists in the service are busily engaged in devising new ways for hiding an airplane from the enemy, developing paints and methods of painting military craft so that the color will blend with that of the shrubbery on the ground. Colors common to each season are close-

ly copied, so that a plane may be made practically invisible against the green background of spring and then repainted in the brown hues of fall. At Randolph Field, Tex., pilots have been operating an army plane camouflaged to resemble the mesquite and sagebrush of that particular section. "Enemy" observers find it hard to distinguish the outlines of this plane, so closely does the design resemble the small bushes of the Texas plain.

D 402

## AUTOMATIC AIR CONDITIONER BURNS COAL "STICKS"

Designed for year-round operation, the latest air-conditioning plant for the home burns coal "sticks" wrapped in paper. The efficiency is rated at better than ninety

American Pottery Mfg. Co. Middleton, Ohio



Bldg. Cincinnati

D 509.

per cent, representing a considerable saving in fuel. Each coal stick weighs about twenty pounds and is twenty inches high and six inches in diameter. Six sticks will operate the plant one day in unusually cold weather, that number being placed in the magazine in the morning. As one stick is consumed, the magazine revolves automatically to bring another stick over the fire. The plant has forced draft to increase combustion efficiency, a Venturi tube to conduct gases, smoke and soot through a second stage of combustion, and a heat exchanger for extracting the maximum heat before the fumes and a small amount of gas escape into the smoke pipe. A blower draws the heated air into the house, where a thermostat regulates the temperature. A furnacestat operates a blower to prevent overheating. A small jet of heated

Conditioned air



Loading Magazine of Home Heating Plant with Paper-Wrapped Coal "Sticks"

water sprays into the hot-air flow to provide proper humidity. In the summer, the same equipment cools and de-humidifies the air. The air conditioner may be operated on gas. Safeguards are provided in case of failure of electricity or gas or coal.



Giant Bulb Designed for Stratosphere Flight; Base Contains Valves for Capturing Samples of the Upper Air

### LAMP BULBS TO SAMPLE AIR ON STRATOSPHERE FLIGHT

Special lamp bulbs of the ten-kilowatt size have been designed by General Electric engineers for Capt. Albert W. Stevens, U. S. Army aerial photographer, to carry in his stratosphere balloon as air-sample containers. The bulbs resulted from Capt. Stevens' request for some means of bringing to earth samples of air taken at various elevations for chemical analysis. The lamp bulbs have valves for the intake and exhaustion of the stratosphere air. Tubes leading to the outside of the balloon's gondola serve the intake valve.

D 530

### ALL-ELECTRIC TIME SWITCH

Operation of electrical appliances may be regulated by means of an automatic time switch that plugs into the circuit. The motor-driven device may be adjusted for any period from a minimum of fifteen seconds to a maximum of one hour by turning a pointer. The case is sealed. One application for the timer is in connection with the electric range. Cooking can be started, completed and stopped without attention, once the switch has been set.



Nela Park Cleveland Ohio  
 Schenck of  
 National Geographic Society  
 Jones & Lohley  
 Chas. W. Randall  
 June 11

Jones & Lohley



D587



*Reproduction of an Engraving by Paul Gustave Dore Depicting King Solomon Receiving the Queen of Sheba; These Ancients Possessed Gold in Almost Unbelievable Amounts; We Are Told, for Instance, That the Queen Brought Gifts on Her Visit to King Solomon, Including 120 Talents of Gold, Estimated to Have Had a Value of \$5,500,000 at the Prices Prevailing Today for the Metal*



D 58

1065 - 11th St  
Boulder, Colo

# Strange FACTS about GOLD

By P. G. WORCESTER

*Professor of Geology  
University of Colorado*

THE desire for gold is one of the oldest and strongest motivating forces of mankind. From time immemorial, it has developed man's ingenuity in devising new and easier ways of obtaining it and the search for it has been the most important single factor in the settlement of vast new empires.

Men have frozen in the Yukon, roasted in Death Valley, starved in the Rockies and fought the jungles of South Africa, all for gold. And the gold fever still burns in our blood today as fiercely as it ever did.

Gold is precious because gold is rare—yet it is everywhere. Every continent except Antarctica is known to have workable deposits of gold and some has been mined in virtually every country. Even the oceans contain tons of it. On the basis of one grain of gold per ton of sea water, the gold in the oceans, at the present price of \$35 per ounce, is worth thirty-five quadrillion dollars!

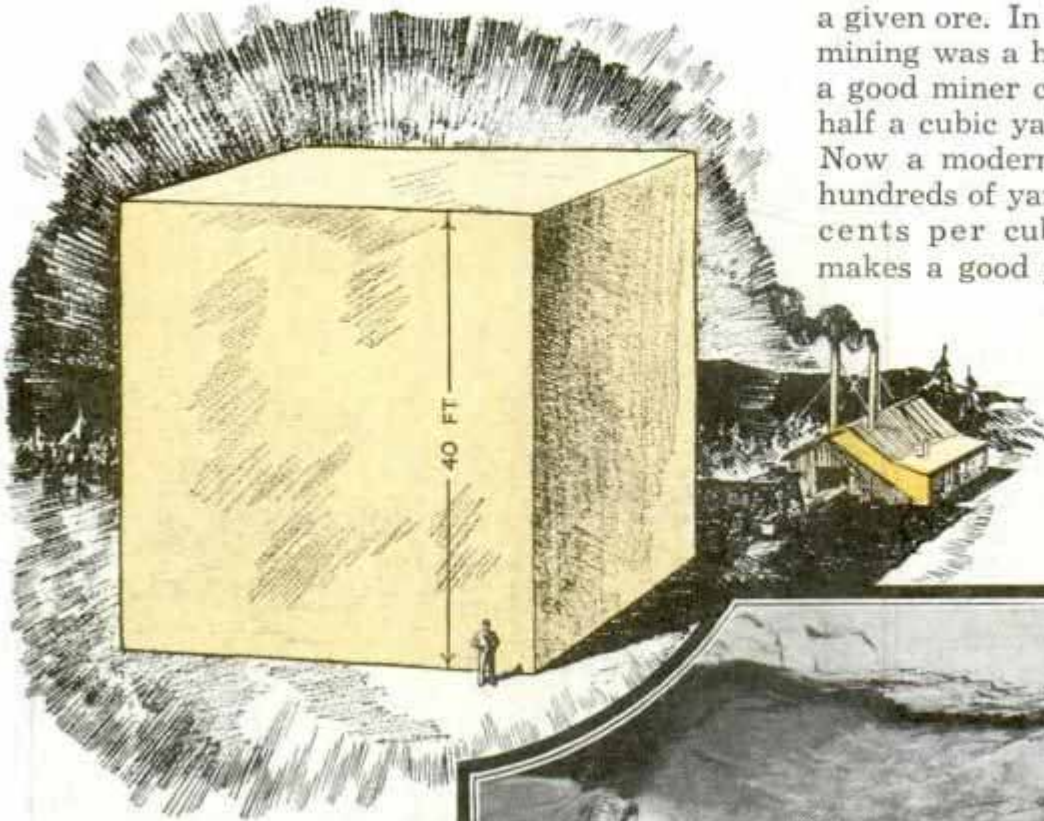
In spite of man's ingenuity, and despite all the progress science has made, methods of mining, milling and smelting gold today differ only in details from those of 2,000 years ago. And the gold produced in those ancient days was almost incred-



Courtesy of the Colorado Assn.

**Gold Is Being Mined Today at Great Depths; Here Hard-Rock Miners Are Being Lowered Down an Inclined Shaft in an Open Cage**





a given ore. In the old days placer mining was a hand operation and a good miner could handle about half a cubic yard of dirt per day. Now a modern dredge handles hundreds of yards at a cost of five cents per cubic yard and thus makes a good profit with dirt on which the miner was lucky to make twenty-five cents a day by hand methods. Formerly rock was broken with

ibly great. King Solomon traded twenty cities to Hiram, king of Tyre, for cedar and fir timbers and 120 talents of gold. A talent is supposed to have weighed 110 to 114 pounds. If that is correct, Solomon received \$5,500,000 worth of gold at present prices in this one deal. The Queen of Sheba visited Solomon

and brought along gifts—including 120 talents of gold worth \$5,500,000 today.

From 1492 to 1932 the total gold production of the world was 1,107,265,403 fine ounces worth \$22,889,209,313 at the old price of \$20.67 an ounce. Expressed in another way, if all the gold produced since Columbus discovered America were gathered together, it would make only a forty-foot cube! And fifty-six per cent of the gold produced since 1492 has been mined since 1900, the average annual production being a little less than 20,000,000 ounces.

This is the result of modern methods and machinery. Most of the modern methods of mining, concentrating and refining gold have been developed within the past seventy-five years, and improvements in crushing and flotation processes have made it possible to recover more of the gold in



*All the Gold Mined Since Columbus Discovered America Would Make Only a Forty-Foot Cube; Below, Hard-Rock Gold Miners at Work*

stone hammers or heated with fire and cooled quickly with water to shatter it. Now modern air drills drive a ten-foot hole in a few minutes and dynamite does the shattering.

Today an electric hoist raises six tons of ore in a skip at the rate of 1,200 feet a minute, and the rock is run through a jaw crusher and then ground in roll or ball mills driven by electric power. The slime passing out a mill today does not contain more than five or ten per cent of the original values. The rest is saved. Formerly many complex ores could not be treated at all, and some of the valuable metals were lost from others which were treated. Today, through flotation, roasting, smelting, chlorination and cyanidation, almost any ore can be treated successfully and the gold recovered. There has been no



D587

*Pacific Piling Co. Wilmington*

new major gold discovery since early in the present century. Of course there have been discoveries of ore bodies in known fields, and there will continue to be, but important new regions have not been found.

One result of this is that gold now is being sought at great depths instead of near the surface. The famous Morro Velljo mine in Brazil, which has been paying dividends for almost 100 years, is now more than 8,000 feet deep. Similar depths also have been reached in mines in South Africa and India.

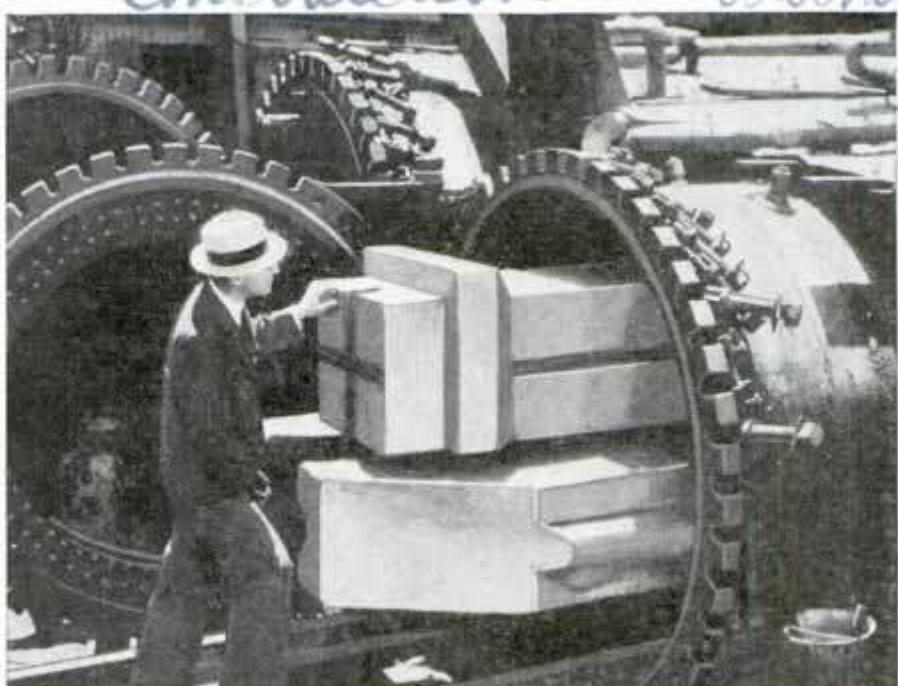
What becomes of all the gold mined? Of the \$22,000,000,000 worth of gold mined since 1492, a little more than half is represented by coin or bullion in the money stocks of the world. In 1931 the world mined gold worth \$459,000,000 and \$61,000,000 went into industrial arts. Of this amount the United States contributed \$29,000,000 but only \$6,000,000 was in newly mined gold, the rest being old gold previously used. If the same percentages apply to the rest of the world, it is apparent that less than one-seventh of the value of the gold mined in 1931 went into industry, and only about one-fifth of that was new gold. What happened to the rest? No one knows exactly, but apparently much of it has been hoarded.

How long will our gold supply last at the present rate of mining—about 20,000,000 ounces a year? Gold production in

(Continued to page 124A)

**ASPHALT SEAL FOR CONCRETE SAVES PILING FROM SEA**

By impregnating and coating concrete with molten asphalt, engineers have devised a way to protect harbor structures from deteriorating effects of ocean water and spray. Water is used in the mixing of concrete and when that water evaporates, the concrete becomes porous, literally opening the door for the salt water to work its way inward. This moisture in-



Concrete Piles as They Are Moved into Chamber for Treatment with Asphalt; the Process Produces a Seal That Resists Sea Water

duces rust in the imbedded steel which reinforces the concrete piles used for underpinning marine buildings, piers and the like. The asphalt seal gives the piles an estimated life of seventy-five years.

**BRIDGE MEN WEAR HELMETS AND GAS MASKS**

Steel workers building the \$35,000,000 bridge which will span the Golden Gate of California are outfitted much like World War soldiers. They wear special gas masks to protect them from lead fumes while working inside the huge metal spans and steel helmets to guard them from injury from falling rivets.



Bridge Builder Wearing Gas Mask to Protect Him from Lead Fumes, and Helmet with Lamp

*Wilmington, Calif.*

D469

D591

*plut.*

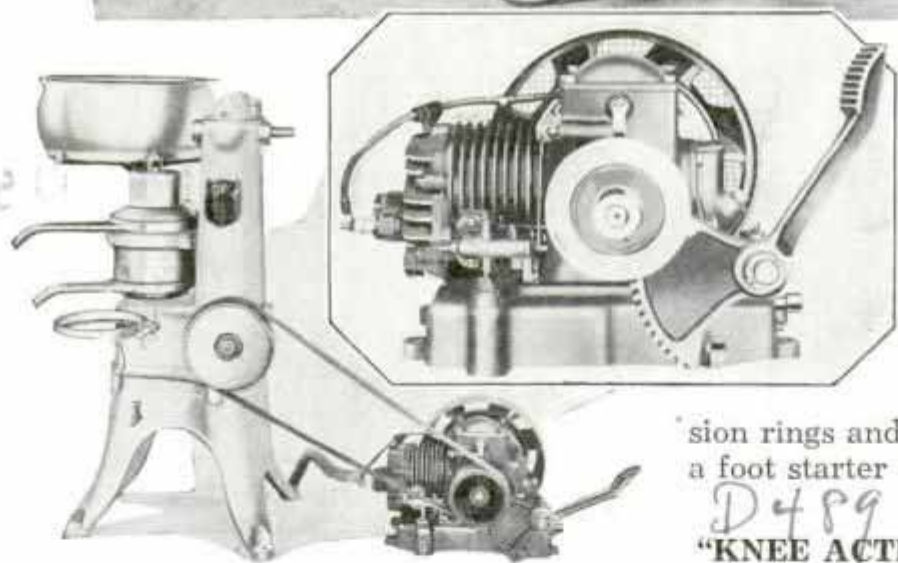
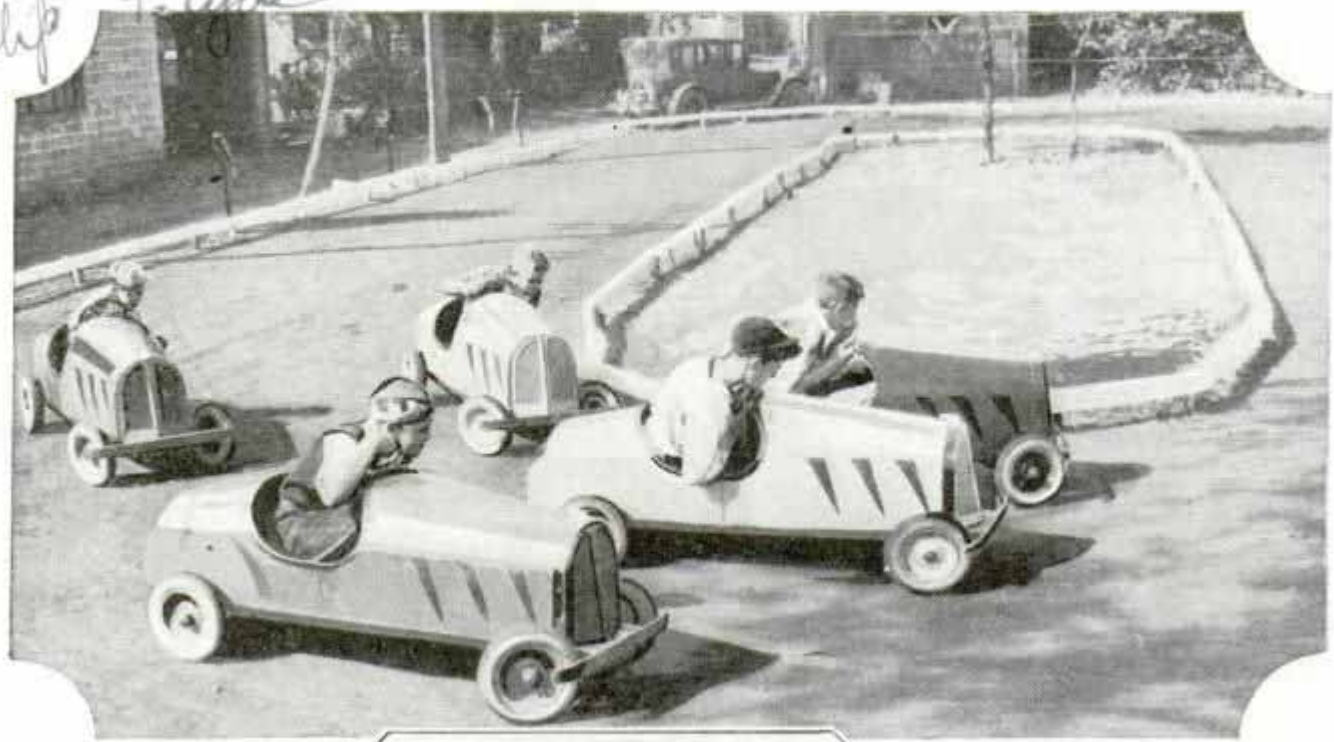
*Pacific Piling*



D428

# Small Gasoline Engine Has Variety of Uses

2/4 hp 4 cycle



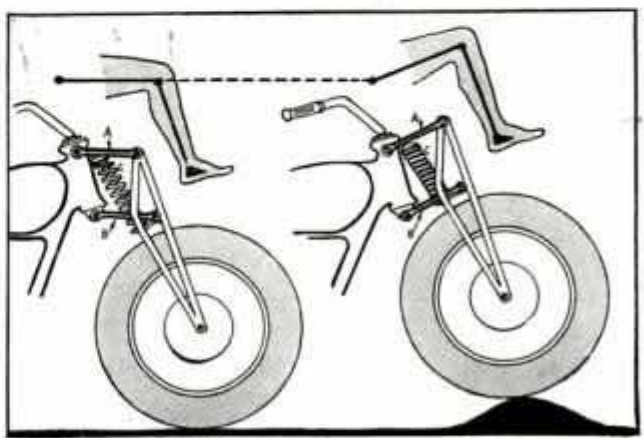
Baby Autos Powered by Four-Cycle Gasoline Engine Shown; It Can also Operate a Cream Separator or Washing Machine

Adaptable to a variety of uses, a small four-cycle gasoline engine turns up three-quarters horsepower and does almost as much work on a farm as a hired man. It can operate washing machines, cream separators, milking machines, pump water, run a grindstone, operate a small generator or paint sprayer and run a small air compressor. It is also being used very successfully as the power plant in miniature racing cars, and has opened a new business in the form of small race tracks where the little cars are for hire. Fuel consumption of the single-cylinder engine is very low, the tank having a capacity of three pints which will run the motor under continuous load for three hours or

more. Oil capacity is one-half pint. The engine is air cooled and has a cylinder base of two and one-half inches and a stroke of two inches. The piston has two compression rings and one oil-control ring. It has a foot starter and weighs sixty pounds.

D489  
**"KNEE ACTION" FOR MOTORCYCLE INCREASES SAFETY**

Greater safety is claimed for a motorcycle equipped with a front wheel suspen-



Latest Motorcycle Wheel Mounting

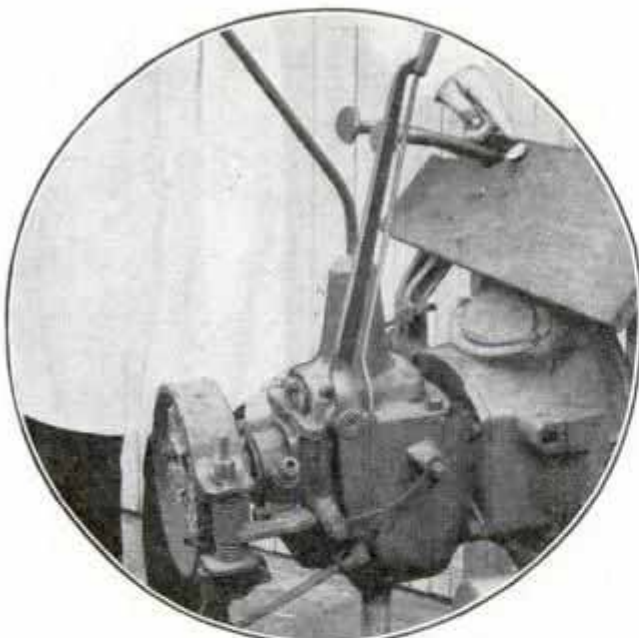
Chidiane Motorcycle Co  
Chicago, Ill.



tion similar to the "knee action" devices in the automobile industry. The entire wheel, including the short axle, brake assembly and steering mechanism, is suspended on two parallel links, with a single coil spring taking up road shocks. A "ride adjuster," controlled by a small wheel within easy reach of the rider's hands, permits adjustment of shock absorber to road conditions. A steering damper makes it possible for the rider to reduce the tendency of the motorcycle to wobble over rough roads at high speed.

**POSITIVE AUTO BRAKE WORKS WHEN OTHERS FAIL**

Actuated by a button directly beneath the foot brake pedal, an automatic emergency brake for the auto operates when both the ordinary foot brake and emergency brake fail. If the foot brake is pressed all the way down because the brake lining does not take hold or because of broken brake rods, the pedal touches the emergency button and an independent mechanism is actuated. Two methods of operating this mechanism have been dem-



Button beneath the Foot Pedal Operates Independent Brake When Car's Own Brakes Fail

onstrated. In one the button cuts in a selenium cell which applies power to the emergency brake rod. In another, a vacuum mechanism is used. The positive brake allows the driver to keep both hands on the steering wheel in an emergency, without fumbling for the emergency lever.



Flexible Control for Oil Drain Plug Shown Attached to Convenient Place under Hood

**PUSH-PULL OIL DRAINAGE PLUG IS HANDY FOR MOTORIST**

Eliminating the necessity of crawling under the car, a "remote control" oil drain plug has a control button located in a convenient place under the hood. When the motorist desires to drain the crankcase, he pulls the button, releasing the oil. The plug is closed by releasing the spring clamp. Installation is simple, the new plug replacing the old drain plug.

**BUTTER MADE FASTER IN CHURN RUN BY WASHING MACHINE**

Designed to fit all makes of gyrator washing machines, an efficient churn produces butter in a few minutes. It has a divided dash which agitates the milk harder and faster than many other types of dashes. A deep, tight-fitting cone-shaped lid prevents the milk from splashing out. The churn has extra width to permit easy cleaning. It is made of dairy tin with a heavy plating to resist rust.



*Mrs. R. E. Madyen*

*1716 1/2 Colorado Blvd. Los Angeles, Calif. 434 N. Western Ave. Chicago Ill. 2366 Lane columns*



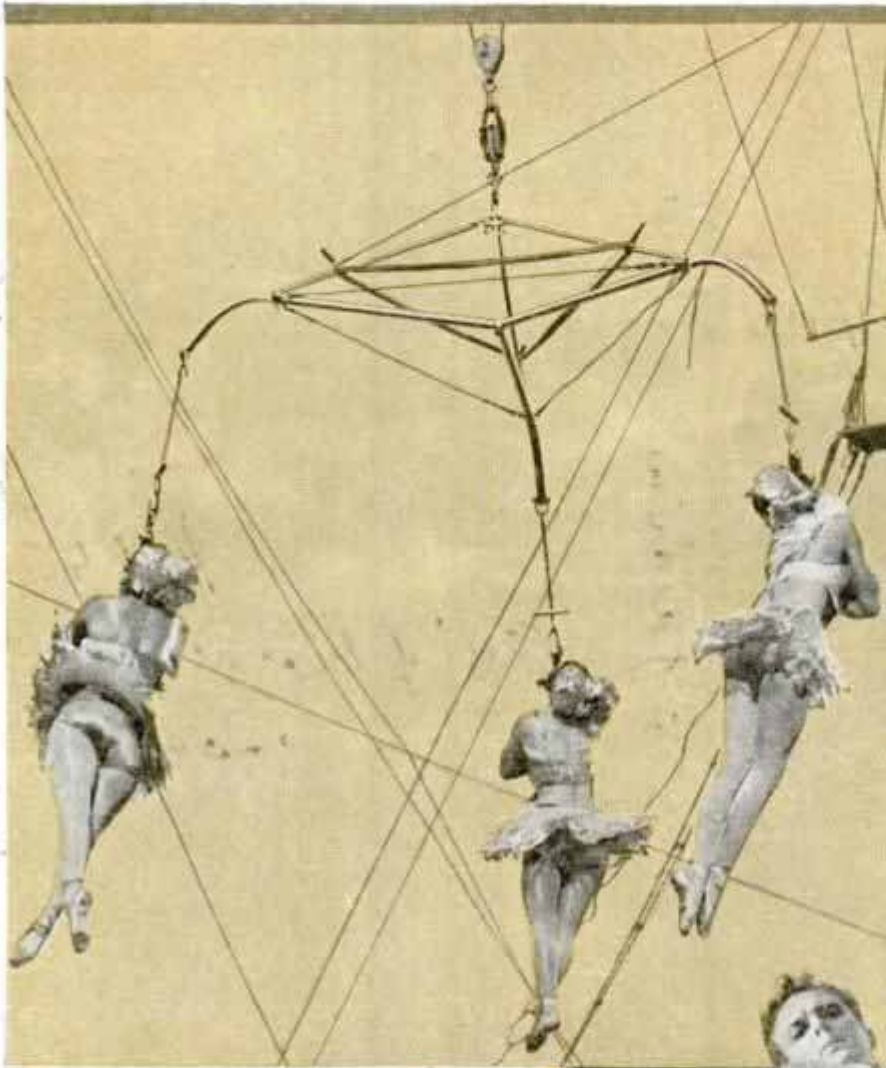
D495

Mr. A. Marton Smith

Box 160

Isañosville Texas

# CIRCUS DAREDEVILS



to his own failure. This confidence in his own ability is the outgrowth of long periods of exacting practice. During rehearsals, the hazards of the dare-devil stunts are eliminated by the use of mechanics. Only after a performer demonstrates his ability to accomplish a feat ten times out of ten, is the safety device laid aside.

His is an art that depends upon form, accuracy and perfect timing which are acquired only by years of preparation. A double somersault from

**T**HE circus artist who performs death-defying feats in the arena does not believe in taking chances. One seldom hears of a tragedy under the big tops. In fact, there have been but half a dozen performers killed in this country in the past five years and at least three of these fatalities were attributable directly to faulty rigging.

The circus artist fears the steel rigging hooks may crystallize and break at a crucial moment; he fears that a block and tackle may slip and send him hurtling from his trapeze; he fears the net beneath him may give way under his weight, but he never has a thought of an accident due



Top, "Human Butterfly" Act; Bottom, Alfredo Codona, Who Has Mastered Triple Somersault



# *in the* MAKING

a teeter board to the shoulders of a fellow acrobat may require but three seconds to perform, yet it may have been the result of three years of practice. During rehearsals, the performer might often have been disabled but for the mechanic, which is nothing more than a heavy leather belt to which are attached ropes, suspended from the ceiling of the gymnasium or from a wooden or steel frame if outdoor rehearsals are the order. The instructor presides over the mechanic and saves the performer from a fall by taking up the slack in the ropes and suspending him in mid-air with the aid of the belt about his waist.

The safety device is applied to many types of circus acts. In its sim-



*Top, Artist Trains for Backward Somersault on the Tight Wire; Bottom, Boy Performer Wearing Safety Belt as He Attempts Somersault from Shoulders of One Acrobat to Those of Another*



plest form it is used to practice ground tumbling, shoulder-to-shoulder and teeter-board acrobatics, horizontal bars, the tight wire and certain aerial acts. It is in-

dispensable to the bareback rider who aspires to do somersaults on a galloping horse. For this purpose, the stationary framework is replaced by one which pivots about a post set in the center of the ring, and follows the horse in its circular pacing.

In aerial acts where a performer leaps from one perch to another as in the case of flying return and aerial bar acts, a safety net is stretched beneath the rigging. But the safety net belies its name, for one who is not schooled in the art of falling into a net may suffer serious injuries upon striking it. And there is always danger of being thrown out of the net on the rebound. The loop-the-loop trapeze brings thrills to the spectators, but it is made simple for the young woman who conducts its gyrations. As the trapeze whirls over and over, the performer is held secure by steel plates on the soles of her shoes fitting into slots in





*Left, Girl Aerialist Tries a Stunt While Wearing Safety Belt; Right, Painful Training Necessary for the "Human Butterfly" Performer*



his partner, does one of the most dangerous acts in the circus. In practice, ropes swung from upright posts are attached to the top of the perch pole to prevent it from becoming overbalanced if the performer makes a misstep.

Perhaps the most important protection

the bar on which she stands and her wrists are held fast in webbing loops. When she has become accustomed to the aerial evolutions and has acquired the strength to control the trapeze, the safety devices are discarded.

The human butterflies, or the women who hang by their teeth in the top of the tent, are well "grounded" in their work before they take to the air. Training for this act is perhaps the most painful in the gamut of circus thrills. For weeks, the artists are required to hang by their teeth, swing pendulum fashion only a few inches from the ground, strengthening the muscles in the back of their necks which bear their weight, and accustoming their jaws to the strain.

The man who stands on his head on top of a forty or fifty foot bamboo perch pole balanced on the shoulder or forehead of

against injury is the performer's training to take the falls. The embryo aerialist finds it just as necessary to learn to fall into a safety net correctly as it is to leap from one trapeze bar to another. The novice in the acrobatic field is never allowed to experiment with advanced tumbling until he has demonstrated his ability to control his somersaults.

Many sensational feats have been successfully accomplished but have never been seen in the circus. A double somersault has been seen on the bounding rope but never on the tight wire. The one artist in the world who does a forward somersault on the wire, has on occasions accomplished a double somersault. But being able to accomplish it one time in ten tries after six years of practice, does not warrant the feat being made a part of his exhibition routine.

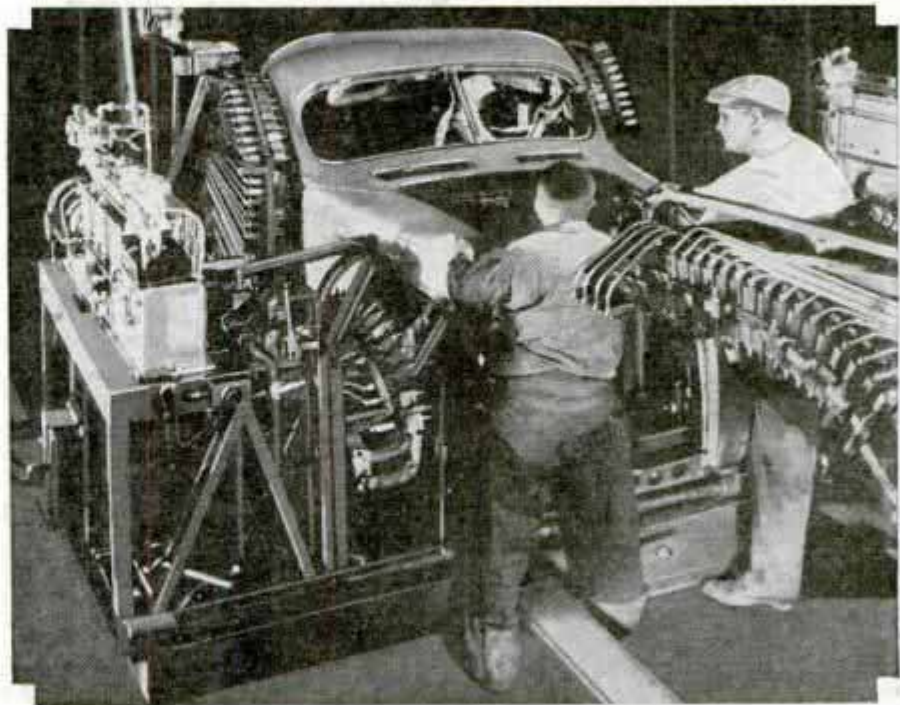


D 326

Corp 341 Massachusetts Ave Detroit Mich

# Automatic Welder Sews Steel Auto Bodies

Sewing a seam of metal, a "hydromatic" welding machine is used to join parts of all-steel automobile bodies, just as a sewing machine sews two pieces of cloth. Completely automatic, the welder speeds up spot welding, insures uniformity of quality and eliminates the chance of human error. The metal to be welded is clamped securely in place and the machine, which moves on a track, is brought over the work. The pressure of a lever brings the welding points into contact with the metal and holds them there until a perfect weld is made. In constructing Chrysler airflow bodies, the front-end assembly and the rear-end assembly are



*Automobile Body Is Shown in Welding Machine That Speeds Up Operations and Improves Quality of the Work*

brought together and placed in a fixture to be welded electrically to each other and to the frame, forming a complete assembly.

D 452

# Singing Gong Sounds Its Voice When Rim Is Rubbed



*Ancient Gong, Once in a Buddhist Temple, Which Sounds When Rim Is Rubbed with Padded Striker*

In the famous bell collection at the Mission Inn, Riverside, Calif., is a gong shaped like a huge bowl which sounds without being struck or tolled. The gong, almost five feet high, including its base, and nearly 1,300 years old, is sounded when a leather-padded striker is pressed firmly against the rim by the operator and held there as he walks around it many times. The principle involved is similar to that which causes sound to be produced by rubbing a finger around the top of a drinking glass. The vibration produced by the rubbing of the gong increases as the action is continued until it reaches a tremendous volume. This gong, dating from 646 A.D., was presented to a Buddhist temple by the founder of Japanese Buddhism. Curiously, not all who try can make the gong sing, and this has led to the story that it favors some persons. When struck lightly on the rim, a melodious tone is produced which continues for several minutes. Even a light tap with the hand starts sound waves of wonderful tone quality.

Cont. Alley Fr. Hutchings of Mission



D. 458  
48

# Officers Find Opium Hidden in Oil Drums



Above, Oil Drum Which Concealed Opium; Below, Method of Hiding Narcotics in Oil Shipment

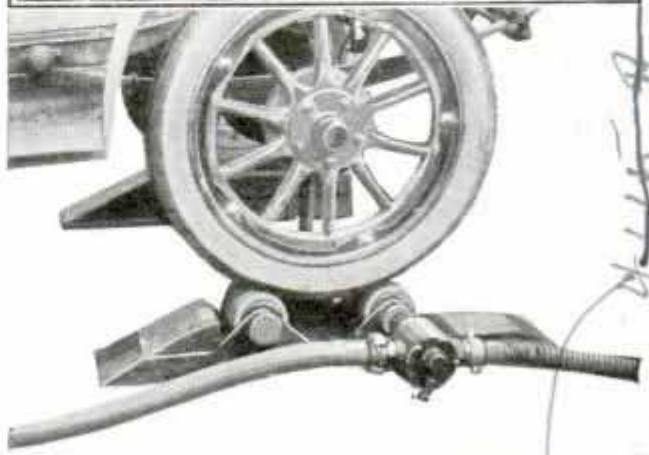
Federal agents recently exposed an ingenious smuggling scheme at San Francisco when they seized a large quantity of contraband opium concealed in an oil shipment. Inside several steel drums containing oil, smaller drums had been built and the opium was neatly packed between the sides. The smaller drum, shorter than the outer one, was sealed with a sloping union or "lip" between the two, after the manner of a funnel, this slope permitting the oil of the inner drum to rise above the lip to the side of the outer drum, thus hiding from view the secret compartment. Customs agents literally stumbled onto the scheme when one of them accidentally kicked a barrel. He noticed that it gave forth a hollow sound whereas barrels containing only oil gave off a solid sound.

Another clever method of smuggling was revealed in the Hawaiian islands. Through portholes of liners from the Orient were tossed small quantities of opium buried in salt encased in burlap bags. The salt dissolved, the bags floated and small flags attached to the opium tins informed "collectors" of their location.

D 486

## AUTO WHEEL RUNS FIRE PUMP FOR TWO HOSE LINES

Water is supplied to two hose lines from a portable fire pump operated by the rear wheel of an automobile. A block is provided to raise the other rear wheel to the same height. At a speed of fifteen to eighteen miles per hour in high gear, the pump operates efficiently. It can be adjusted quickly by one man. The pump is self-priming. One model produces a hose-line pressure of 100 pounds to throw water 100 feet high. Smaller models are available for crop irrigation, tree spraying, etc.



Top, Two Hose Lines in Operation; Bottom, Small Fire Pump Driven by Auto Wheel

Com. John L. Country 3/10/7  
19th St. N.W. Washington D.C.

4415 - 28th St. - Chicago  
2814 W. Miller St.

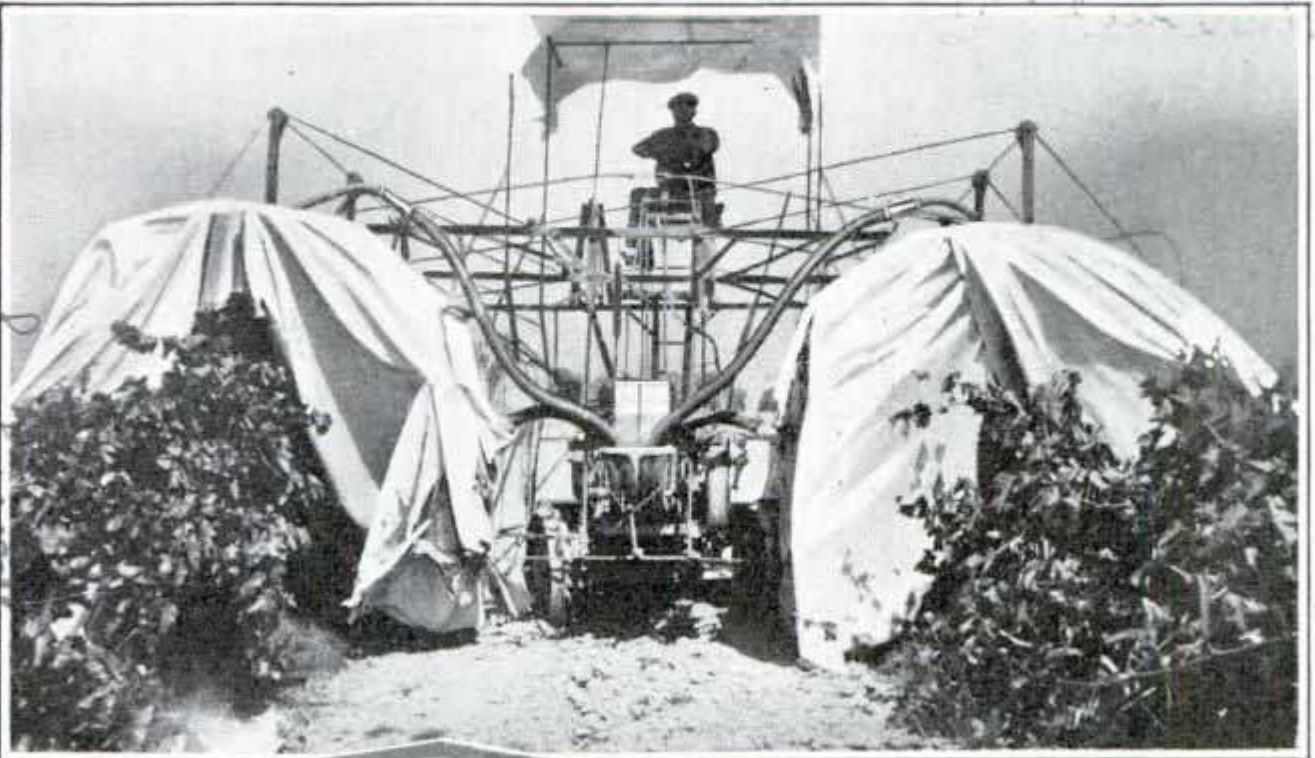
Chas. A. + Es. W.  
P.O. Box 11



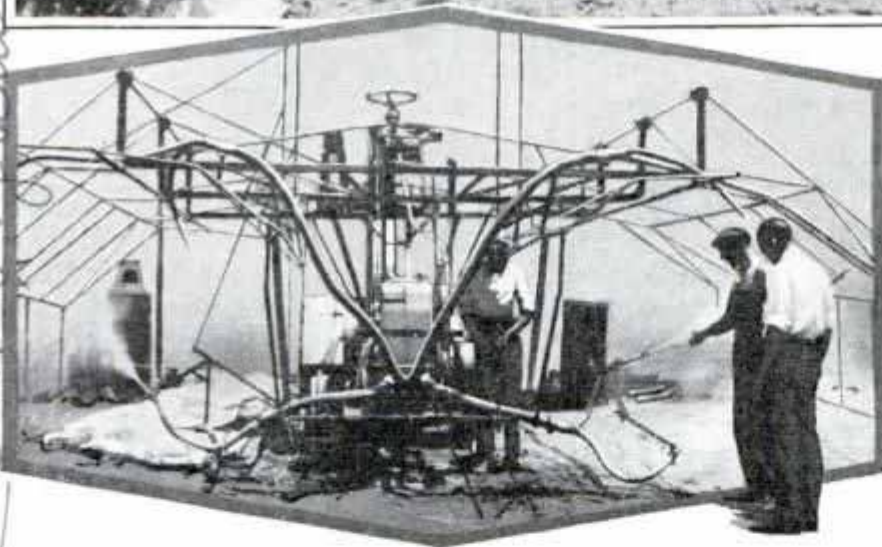
# Big Poison Blower Kills Insects under Tents

Emk. Roy Bainter, Div. of Agricultural Engineering

D 503 Chas. Wiley, N. Weaver  
El Centro, Calif.



Top, Giant Poison-Blowing Machine with Its Tents Suspended over Grape Vines; Bottom, Framework of the Latest Machine in Insect War



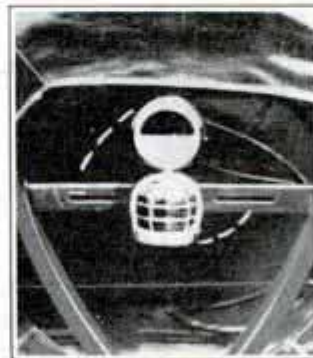
the blower so that the gas, which is heavier than air, will not reach him.

D 532

## STOP LIGHT SWINGS WHEN BRAKES ARE APPLIED

Added safety in night driving is offered by a combination stop and tail light for the automobile which swings when the brakes are applied. It consists of two lights, an

Grape growers in California are combating the leaf hopper with cyanide gas directed against the vines by an unusual machine. Special frames, one on each side of the machine, support tents which cover the vines as the cyanide blower moves between the rows. A lightweight tractor supports the tent frames. The cyanide is introduced under each tent in a blast of air from a blower driven by the tractor pulley. The natural moisture in the air combines immediately with the cyanide to form a gas that is deadly poison to the hoppers. The tents hold the gas in close proximity to the vines for several seconds as the machine moves down the row. The operator of the machine, is seated above



is vacuum operated, it makes no demand on the battery.

upper one which is stationary, and a lower one which swings as a red signal when the brake pedal is depressed. The motion of the swinging light attracts more attention than a stationary signal and, since it

- El Centro, Calif.  
1512 W. S. St.

Box 571, Harris

Crandall Mfg Co  
1512 W S St



Chas. A. & E. W. P. Pentzger

D 328 4115 Riverside Ave

# Gas Engine Carried on Back Motorizes Hands



HAND CHAIN SAW



HEDGE CLIPPER



ROTARY PLANING

BORING TOOL

Small Gas Engine Carried on the Back Like a Knapsack Has Attachments for Doing Various Kinds of Cutting and Sawing

or bench. It has attachments for working the coil, pumping water and spraying, mowing lawns, sweeping, trimming trees, clipping hedges and carpenter work. An asbestos shield protects the back from heat, the exhaust is blown away from the operator and vibration is absorbed by springs between the engine and the frame.

## D 565 GLASS CLEANER USED WITHOUT WATER

Automobile windshields and windows, mirrors and other glass may be cleaned without water with a liquid applied by means of a special can in which the cleaning fluid is sold. The can has an adjustable jet-

type nozzle through which the fluid is forced by squeezing the side of the can, covering the glass with a fine spray. Wiping the glass with a cloth completes the process, removing dust and dirt quickly.

706 Clark Ave. St. Louis Mo



Waterless Glass Cleaning Fluid Is Applied by Means of Special Can Shown at Right; It Is Handy for the Motorist

Max Chemical Products

rec. Feb. 1931. 223  
May 1932. 290

Max Chemical Products

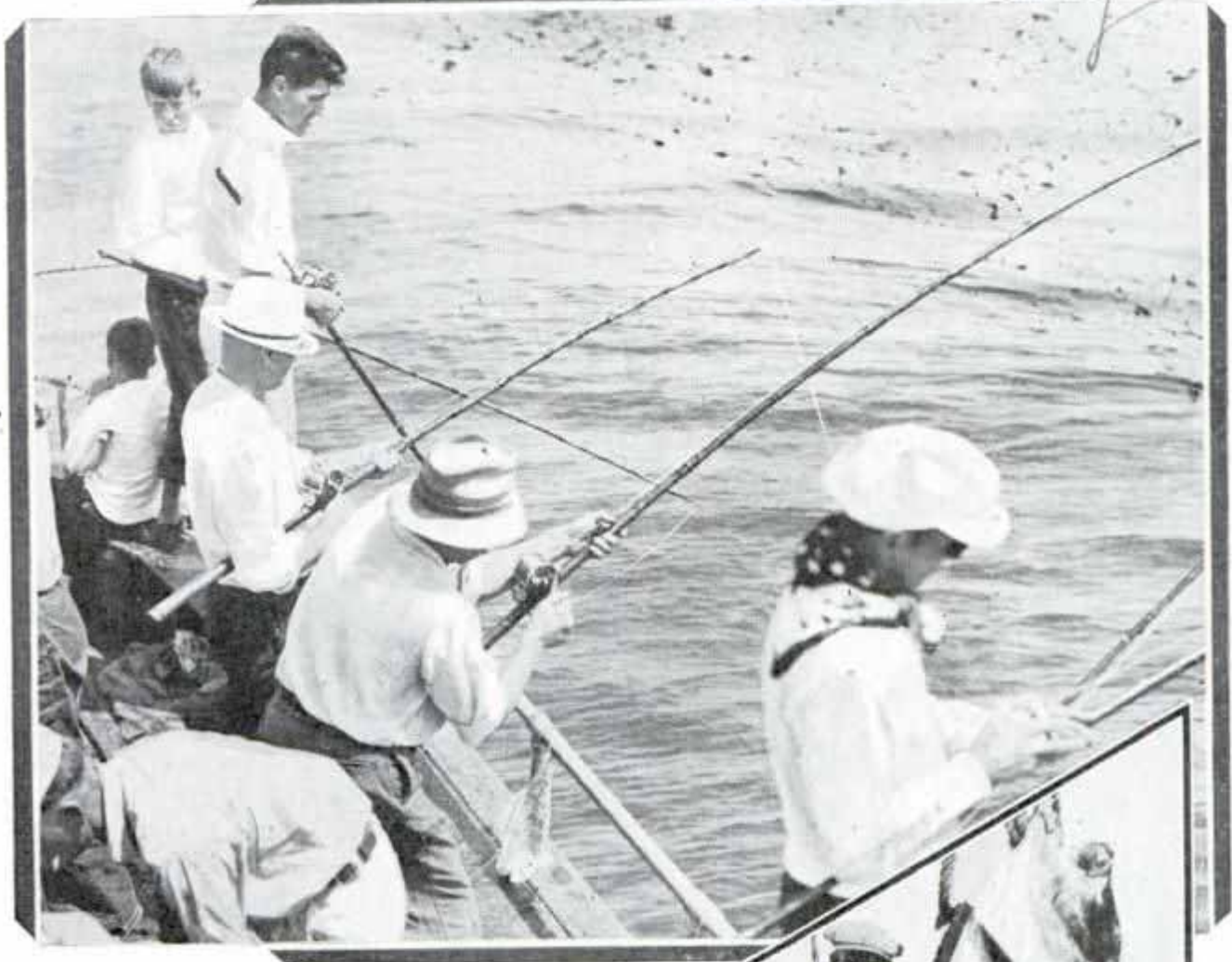
St. Louis Mo



D 521

Bohannan - McCay & Co  
3626 W. Washington  
Blod. Los Angeles  
Calif

# From BAMBOO to FISH



ANY sort of makeshift "fishin' pole" may be all right for the angler seeking catfish in some lazy creek, but a scientifically constructed rod is needed by the deep-sea fisherman. Veteran sportsmen deliberately hunt monsters weighing as much as 1,000 pounds.

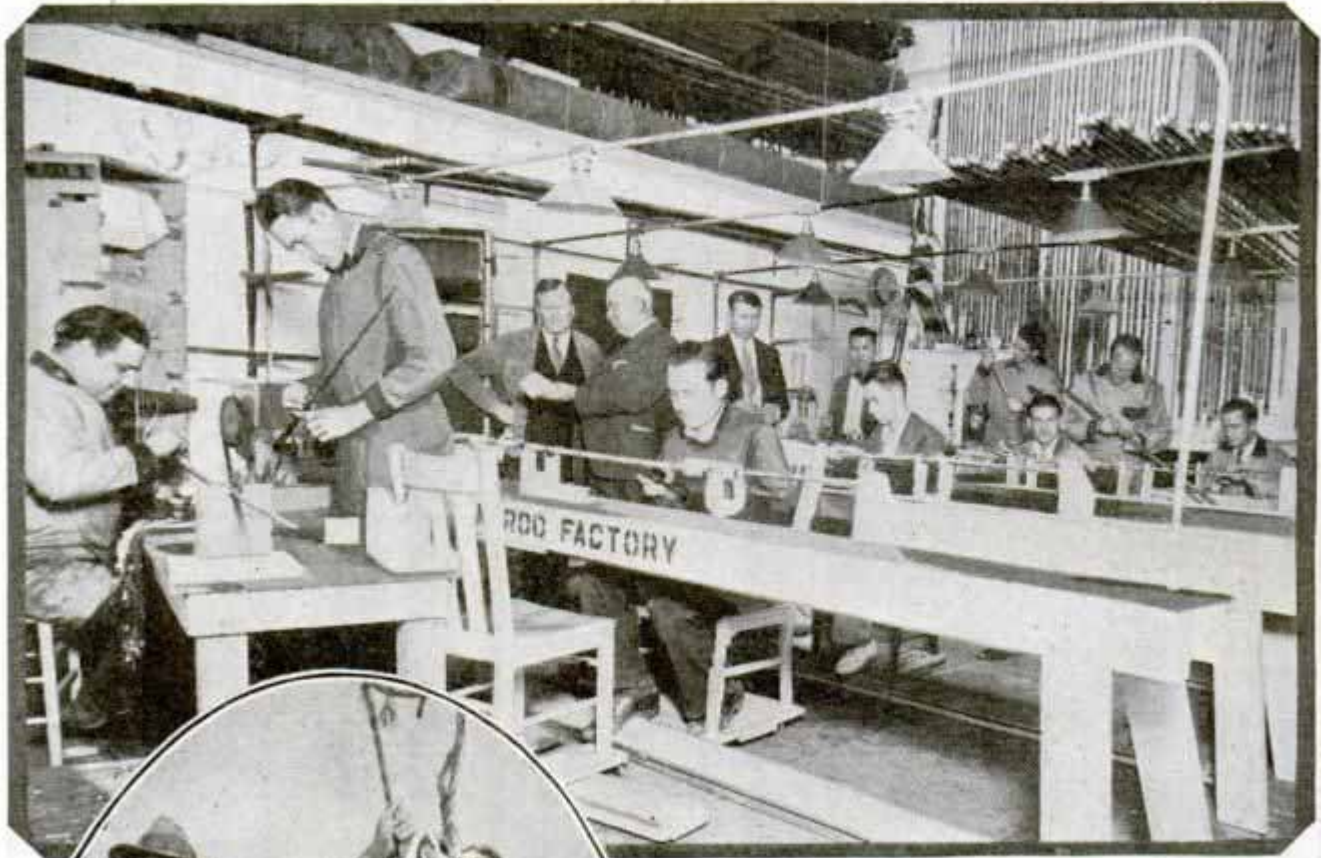
When F. L. Bohanan, an ardent fisherman, decided to try manufacturing fishing rods, he vowed to make them as nearly perfect as possible. A visit to the factory reveals the patience and care which must be put into the making of a rod. The first requisite is that the raw material must be sound, tough poles. Two special kinds of bamboo, selected Calcutta poles from India, and Tonkin super-canes from the hills of China, are imported. Every pole is carefully inspected for possible wormholes or cracks.

After the pole has been cut to proper



Top, Fisherman, Second from Right, Hooks One; Note Arch in Rod; Bottom, 482-Pound Fish Caught from Barge Off Santa Monica, Calif.





*Top, Corner of Rod Factory, Showing Wrapping Lathes; Finished Rods Appear in Background; Bottom, One Big Bass That Didn't Get Away*

length, the ridges around the joints are filed down to make the pole nearly smooth. Next the pole is tempered as though it were steel. Each joint is straightened over a flame, and then cooled in water. The pole is also given a slight arch. This allows the angler to get full benefit from the spring in the finished rod.

The important wrapping operations which follow are done on special wrapping lathes. The worker moves along the length of the pole deftly manipulating twelve linen threads at once. The strongest rods are those wrapped with a spiral design. Others are wrapped at the joints only and are very flexible.

After a first coat of varnish has been applied to the plain wrapped pole, the fittings are put on. They consist of a reel seat (a short metal saddle), guides and a tip. The more expensive poles are often fitted with costly metals.

A rod designed for the heaviest fish has a guide at every joint. Such a heavy-duty rod is probably eight feet in length. Average rods are about ten feet long.

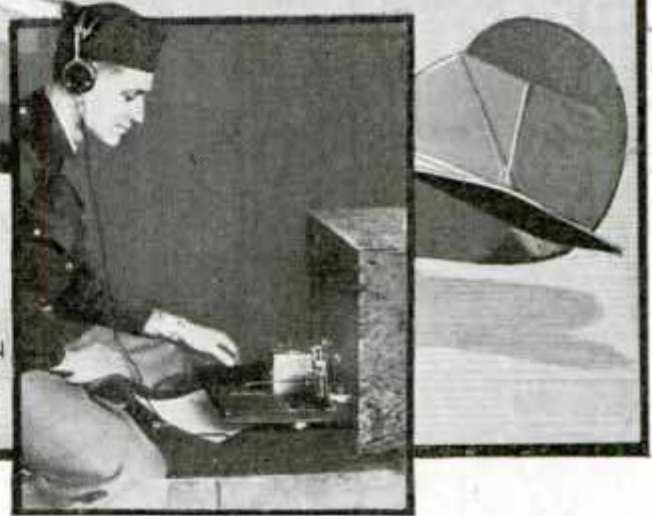
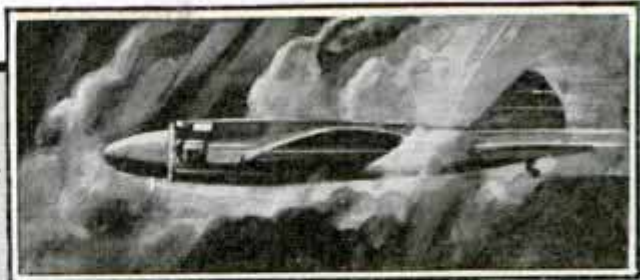
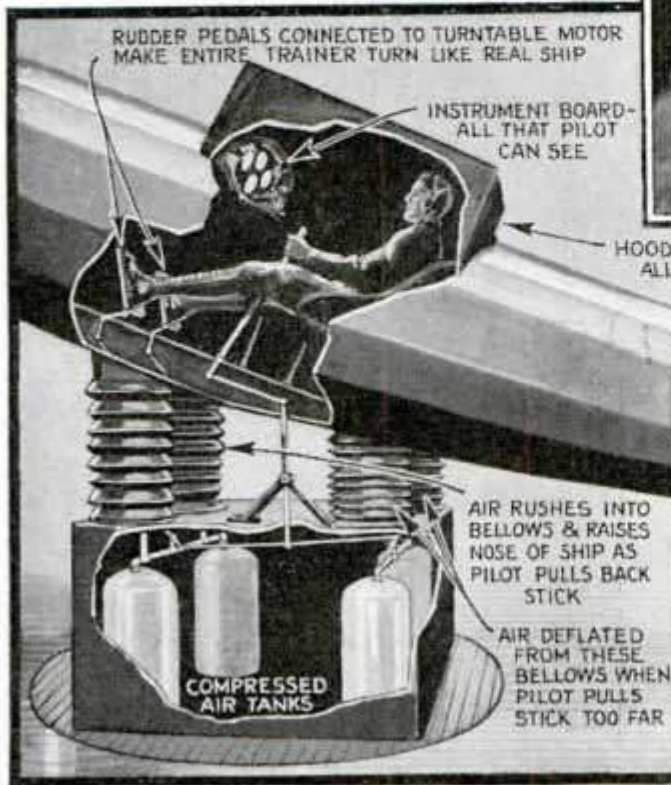
"One reason the short, thick rods are used for the heaviest fish," Mr. Bohanan reveals, "is that with them you can use less line. You can land big fish with long flexible rods, but you must have enough line to let them go a long way before you try to bring them in."

The pole is officially spoken of as a rod only when the ultimate touch has been added. This step is the fitting of a small rubber cap on the butt end. Then the rod is considered a trusty weapon for the most finicky of sea-going nimrods.



# Blind Flying Taught Safely in Dummy Plane

*D 509... installed by Casey Jones at Newark Airport.*



Sketch Shows How Bellows and Compressed-Air Tanks Are Used to Facilitate Movement of Dummy Plane; Bottom, Right, Instructor Flashes Orders by Radio to Student in Training Ship

Danger is eliminated from instruction in blind flying by a dummy airplane in which the student sits in darkness, piloting his ship with only the aid of instruments, yet never leaving the ground. The training plane is mounted on a revolving platform containing an electrically operated turntable. Rudder pedals used by the student are connected to the turntable motor so that normal turns may be made. The trainer is supported by four air bellows to which air is supplied from compressed-air tanks. As the student operates the control "stick," the bellows are inflated or deflated, causing the plane to perform the motions of dipping, climbing, or diving a short distance. These motions are registered by the instruments. A hood that fits over the cockpit places the student in darkness, as though he were flying at night or in fog. Equipped with a radio receiving set and headphones, the pilot receives radio beacon signals. While he listens to the signals, the student attempts to keep his plane "on the course" and level by manipulating the controls according to

the blind flying instruments in the cockpit. An instructor watches the plane's movements, then explains the student's errors.

*D 439*

## AERATOR FOR MINNOW BUCKET

Anglers can keep minnows alive and active while fishing by using a simple aerator and injecting air into the water at intervals. It consists of a tube with a rubber bulb at one end and a stopper at the other.



The tube is perforated near the end containing the stopper and the bulb has a valve which closes when squeezed but opens when released. Squeezing the bulb injects air into the water containing the

bait. The valve which opens to admit air when pressure is released prevents the bulb from filling with water.

*Dr. George L. King*

*White Bear Ave. St. Paul, Minn.*

*Carl Theodore C. Hodgdon, Willbraham, Mass.*



R.D. Githour Westinghouse Lamp Co.  
150 Broadway New York City

R.D. Githour, Westinghouse Lamp Co.  
150 Broadway  
New York

D 462



Top, Inserting "Black Light" Bulb in Insect Trap;  
Bottom, Ready to Lure Beetles

### BLACK LIGHT LURES BEETLES TO DEATH IN TRAP

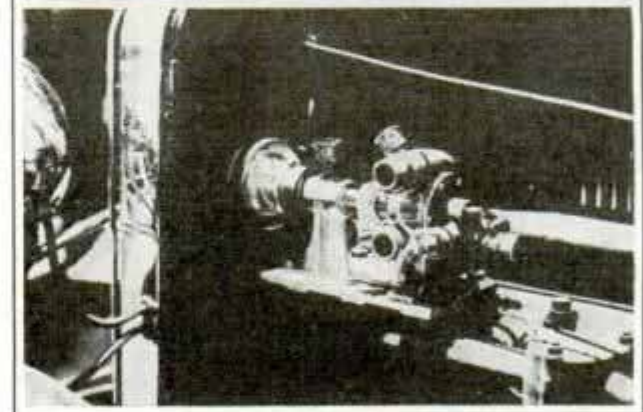
Black light is used as bait in an effective trap developed by Westinghouse illumination engineers for combating the Asiatic garden beetle. The adult beetle hides below the moist soil of cultivated areas in daytime. After dark, it emerges and feeds on flowers, foliage and vegetable tops. Experiments in trapping the pest followed the lines of using light as bait, with success marking tests with a funnel-shaped trap over which was hung a 500-watt Mazda lamp. Even better results were obtained by using a 500-watt daylight Mazda. Later, it was found that the insect responded to light wave lengths of green-blue-violet lines and possibly to long wave

lengths of ultraviolet. Continued experiments finally resulted in placing a G-1, black-bulb ultraviolet lamp over the trap. As soon as this lamp was turned on, the kerosene film in the "death chamber" of the trap became self-luminous, producing a bluish-white light of very low intensity directed upward by a lower reflector. In thirty minutes, 174 dead beetles were collected from the kerosene film, indicating that the visual organ of the pest is tuned to receive ultraviolet wave lengths which the human eye cannot see.

D 538

### FIRE PUMP ON AUTO ENGINE HAS CONTROL ON DASH

Controlled from the dash, a small rotary pump for attachment to the automobile engine is available for fighting small fires. It delivers from five to fifteen gallons per minute when working against heads of forty to eighty pounds per square inch. It is driven off the fan belt. While its capacity is small, it is handy for the fire warden and ranger, farmer and rancher. Weighing only seventy pounds, the pump



Top, Fighting Grass Fire with Auto Engine-Driven Pump; Bottom, Method of Mounting

can draw water from a barrel or small tank on a truck or it can lift water from a stream near by.

Panama Pump Co.

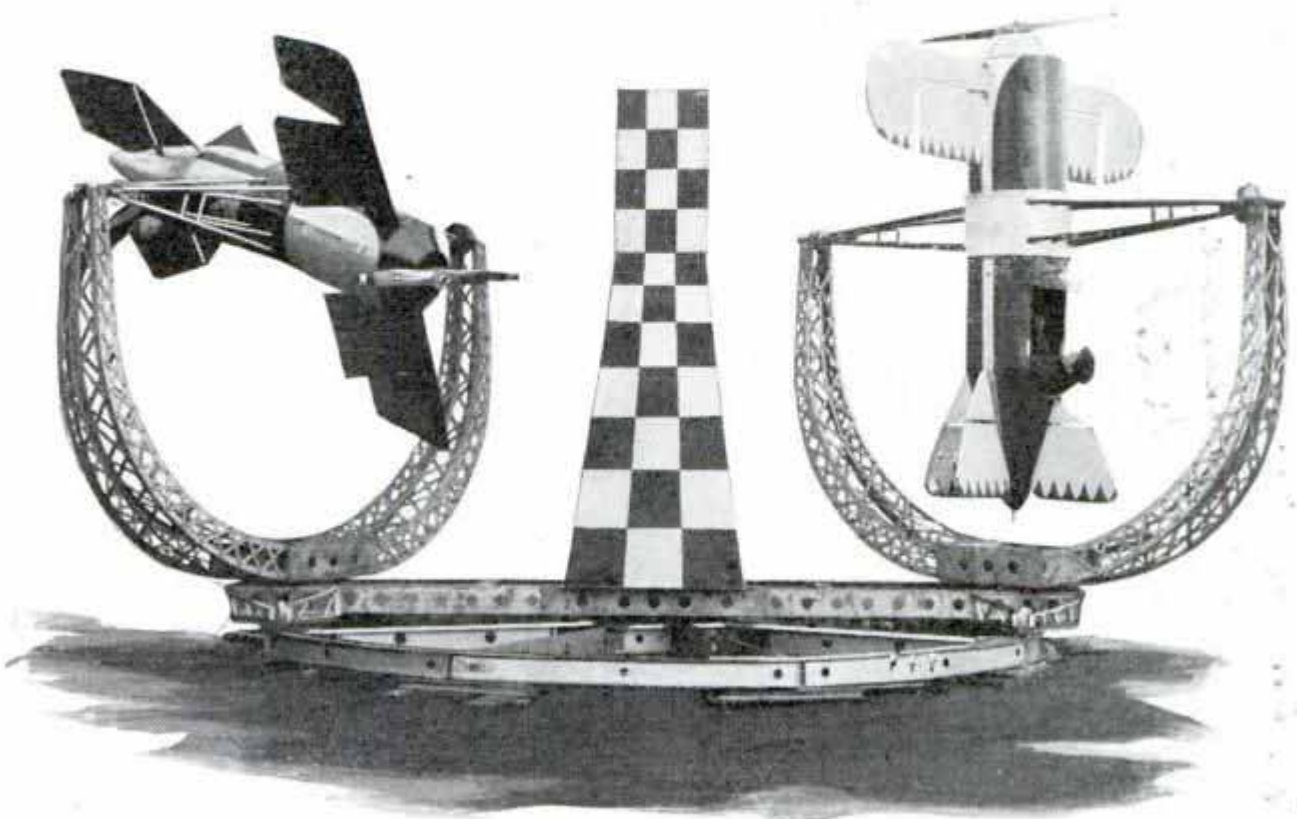
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D 250 C. W. Chas. Welford,

344 W. 56th Place, Chicago

# Training Planes in Frames Move in Circles



Two Training Planes, for Use in Instructing Student Pilots or as an Amusement Device, Are Shown Mounted in Steel Frames; Almost Any Maneuver May Be Executed in Safety

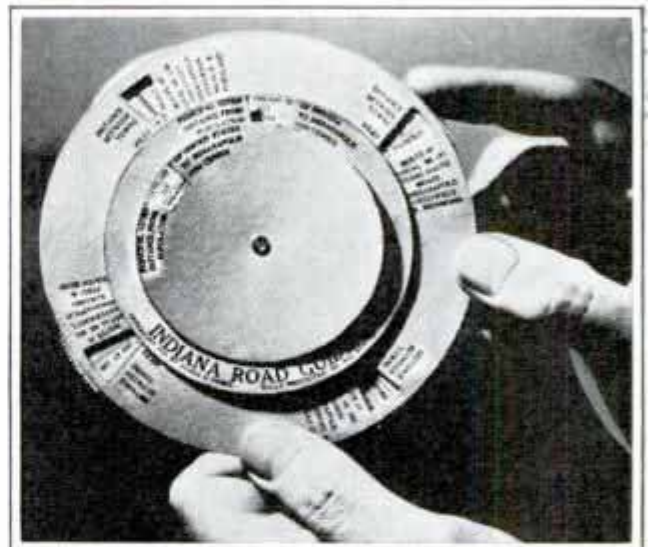
Powered by five-horsepower electric motors, two dummy airplanes mounted in U-shaped metal frames are equipped with standard controls for use as training ships. The planes will perform almost any maneuver of a real ship except the take-off and landing. The U-frame supporting each plane rides a circular track, in the center of which is a pylon to break the air wash from the propellers. The arrangement gives each ship a forward motion, as well as the ability to loop, barrel-roll and spin, yet with complete safety. The operator seated in each cockpit is equipped with safety belt and shoulder straps. Brakes hold the planes steady for loading and unloading. The motors operate on standard electrical current.

When these small disks are turned, towns and mileages appear in small windows in the face. Superimposed on the large disk are two smaller ones, one showing distances between principal cities in the state and the state capital when it is revolved,

D 556

## ROAD GUIDE IN FORM OF DISK TAKES PLACE OF MAP

Instead of maps, some motorists now are using road guides in the form of disks. Each disk covers the principal roads in one state. Around the rim of the disk are the routes with smaller disks containing the names of the towns along each route.



This Disk Is a Road Guide; Mileages between Towns Appear in the Slots When It Is Rotated

and the other showing distances between principal cities in the country and the state capital.

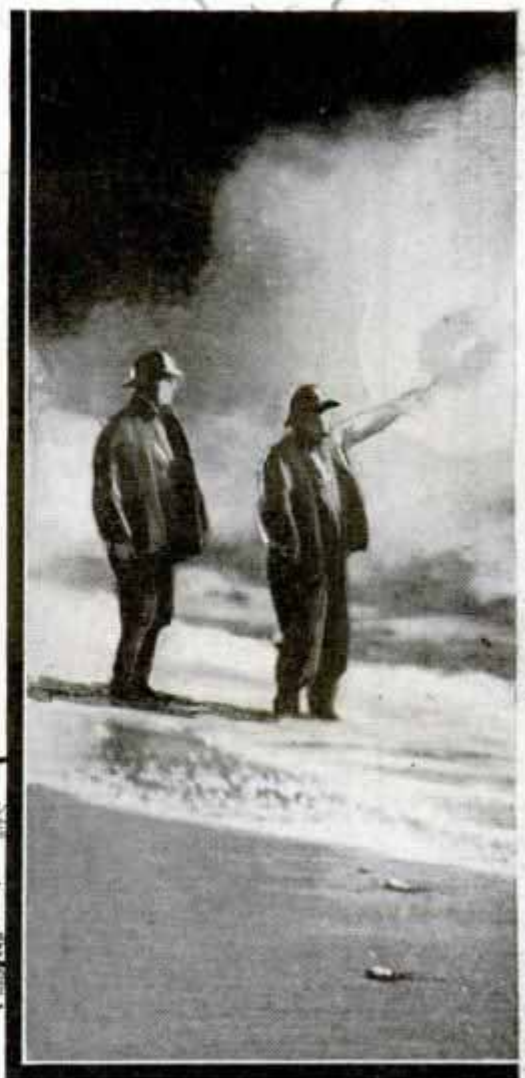
Mr. James Berk. Box no 924  
2627 N. Dearborn St.



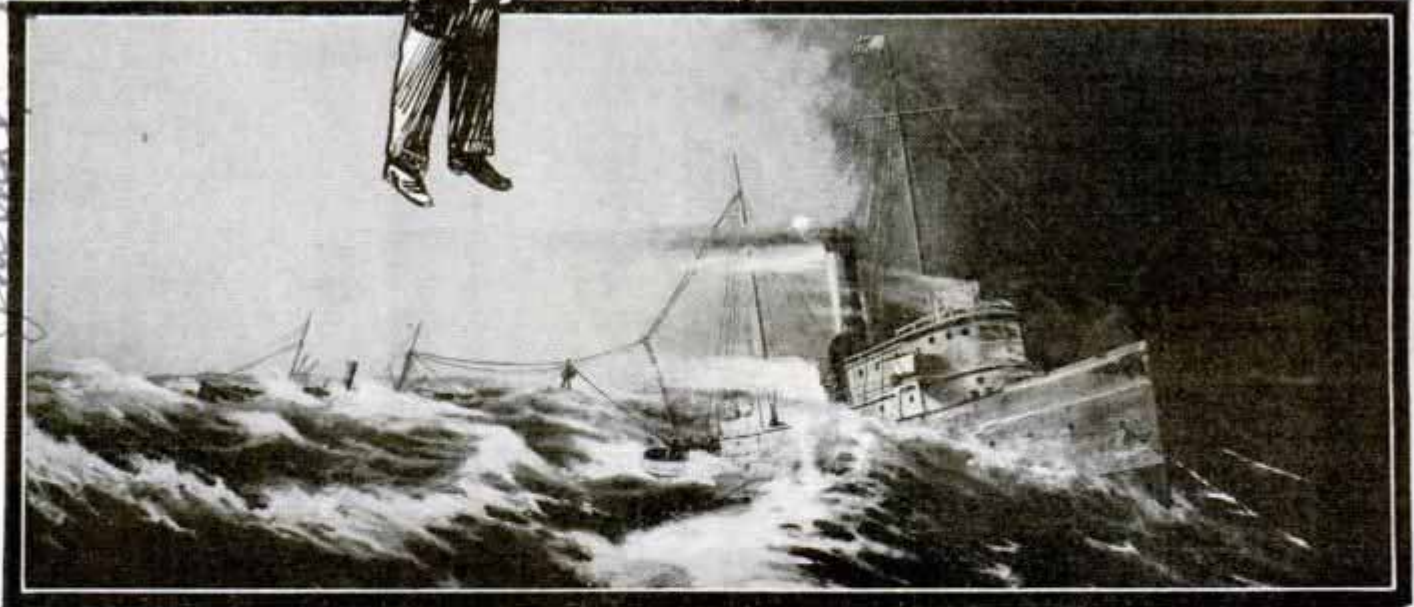
D 543

Emb. Robert W. Gordon % The Infantry  
Journal  
115.17  
Washington  
D.C.

# The COAST GUARD to the RESCUE



*Breeches Buoy Rescue and, Below, Coast-Guard Cutter Effecting a Rescue at Sea by Means of Breeches Buoy, from a Painting*



By **BOB GORDON**

**F**EBRUARY 7, 1934, was not a pleasant day. A blinding blizzard rode a northerly gale and the thermometer dropped toward zero. Coast-Guard ships along the Atlantic seaboard stood by off shore, for dirty weather means heavy work for guardsmen. In mid-afternoon came the

expected "SOS." The schooner, "Purnell T. White," laden with lumber, was in distress off Cape Hatteras. The Coast-Guard cutter, "Mendota," went to her assistance, reaching the scene about midnight. Part of the schooner's deck load had been washed away, some of her sails were gone, she was leaking, pumps were out of order.

But her captain didn't want to abandon





*Above, Coast Guardsmen Illuminating Scene of Wreck with Flares; Below, Coast Guards Carrying Explosives to Blow Up a Wreck*

ship—he wanted a tow. The cutter shot a line to the schooner, a hawser was run between the two boats, and the “Mendota” started for Chesapeake bay with her tow. But the gale increased in fury and both ships were sheathed in ice by the morning

of February ninth. The third night the schooner signaled it could hold on no longer.

The weather made attempts at rescue with a boat impossible and the crew of the schooner could not go forward over the ice-coated deck to cut the towline. A weight was attached to the “Mendota’s” end of the hawser to sink it, and the cutter let go. She then approached to within thirty feet of the schooner and passed a heavy line and three-inch hawser with life raft attached to the disabled vessel. In this way two sailors were hauled aboard the cutter. Two more men were so weak from exposure that they could not hold to the life lines and were swept away.

The same sea parted the line connecting the ships and the schooner heeled over on her side, the four remaining members of the crew clinging to the upper rail. The “Mendota” steamed forward, pushed her bow against the hulk and life lines were thrown to the survivors. Two more men were hauled aboard



① 543



*Above, Steamer Stranded on Rocks Off California Coast; Coast Guards Rescued the Crew; Below, Guardsmen Launching a Surfboat*

the "Mendota," then the mate lost his footing and was swept away. The captain apparently lashed a line to himself and jumped into the sea, but when the line was hauled aboard, he had disappeared. The rescued men were in need of hospital treatment and the "Mendota" made for port. Two days later the cutter, "Pontchartrain," found the wreck and towed it in.

Such adventures are all in the day's work for the Coast Guard. There is scarcely a storm off our coasts in which some cutter or patrol boat is not enacting a similar story. During each of the past five years, the Coast Guard has saved an average of 5,040 lives while nearly \$45,000,000 worth of shipping has yearly been assisted into port and restored to its owners.

In addition to the boats patrolling the seas, the Coast Guard maintains 240 shore

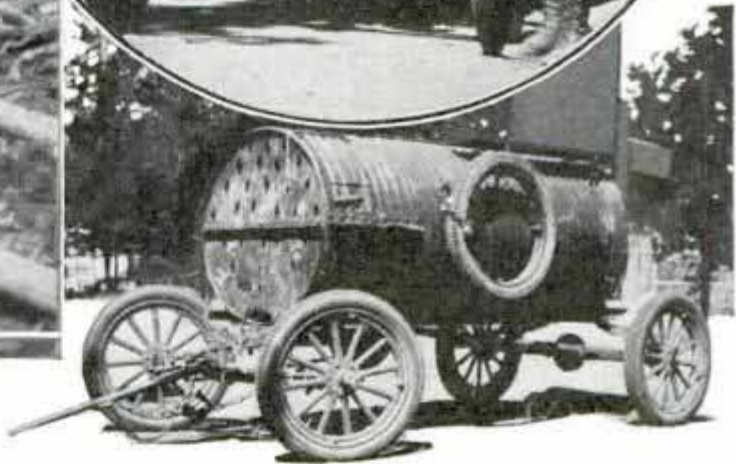
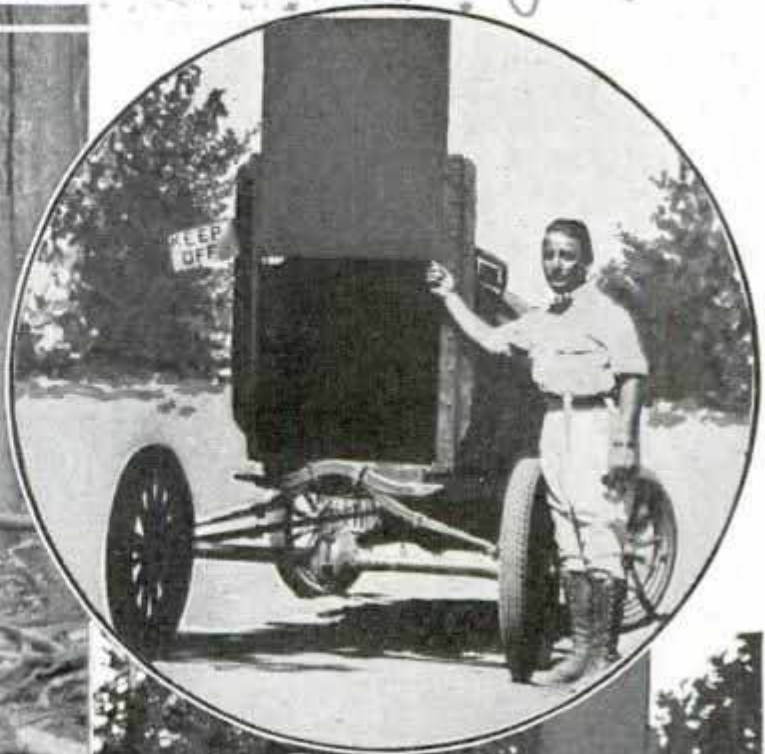
patrol stations, each manned by from eight to ten surfmen. These stations are located at the entrances to harbors and on points along the shore where wrecks most frequently occur. At each of these stations a lookout to sea is constantly maintained, while surfmen patrol the beach for miles on each side.

Each shore patrol station is equipped with a power boat and "pulling boat," line-throwing guns, breeches buoy, a "life car," and other life-saving equipment. The boats are self-baling, having a false deck above the water line, and slots through which any water shipped may drain out. Air tanks between this deck and the hull make them practically unsinkable. Surfmen carry red Coston signals when patrolling the beach, which they light to warn a ship that

(Continued to page 120A)



# Iron Trap Mounted on Wheels Exiles Bears

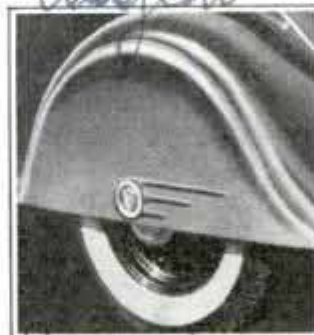


Left, Bears in National Park; Right, Two Views of Bear Cage on Wheels

Because some visitors have been bitten and clawed when they ignored warnings against feeding the brown and black bears in Yellowstone and Yosemite national parks, a scientific means of handling the unruly bears has been devised. It consists of a galvanized iron trap, cylindrical in shape, mounted on an automobile chassis equipped with rubber-tired wheels. A trapdoor is arranged so that a bear closes it automatically when he climbs inside the trap to consume a piece of bacon. When a bear annoys tourists, one of the park rangers attaches the "bear car" to his automobile and tows it to the scene of the depredations. After baiting the trap with a large slab of bacon, the ranger drives his auto into a place of concealment. Soon the bear appears, attracted by the smell of bacon, and climbs into the trap, the trapdoor clanging shut. Driving from his hiding place, the ranger hooks the "bear car"

behind his auto and tows it to a remote section of the park where the bear is released unharmed.

## STREAMLINE FENDER GUARDS ARE EASY TO ATTACH



Quickly installed without tools, fender guards that cover the upper part of the rear wheel increase the streamline appearance of the 1933 or 1934 Ford. Both guards may be attached to the fenders in less than one minute. Brackets lock the guards in place, making them rattle-proof. The guards conform aerodynamically to the lines of the car.

*8.00 pair*  
*Dear Wood Industries*  
*7924*  
*Dear Wood Industries*

*Dear Wood Industries*  
*7924*  
*Dear Wood Industries*



# Rubber "Gun" Shoots Graphite as Lubricant



Upper Right, Rubber "Gun" for Applying Graphite; Sketches Show How It May Be Used in the Home or Automobile Repair Shop

for directing the lubricant to the spot desired. When the rubber "barrel" is squeezed, the gun deposits the graphite in measured amounts through positively controlled air pressure. The volume is largely controlled by the position of the nozzle in relation to a dial on top of the gun. The nozzle may be turned to a complete shut-off position, making the gun practical for carrying in tool kits. A plug fitted to the bottom of the device, and easily snapped in and out, carries a disk of chamois for use as a burnisher. The head of the gun unscrews for refilling with the powder. The graphite provides oilless, greaseless, temperature-proof, combustion-proof,

Lubrication of the auto engine and other parts with graphite powder is made possible by a rubber "gun" fitted with a nozzle

dripless, odorless lubrication on metal, wood, rubber, leather, paper, fiber, composition, varnish or painted surfaces.

# Small Fire Truck Protects Village or Industrial Plant

For protecting a small area, such as a village or industrial plant, a tiny fire truck is being produced in England. This motor-driven apparatus has a supply of chemicals and a hose through which it can pump water and has been found useful in extinguishing fires before they gain much headway, since it is intended to be located within a short distance of the area it is protecting and thus is on the job, ready for any emergency, almost as soon as an alarm is received.



Compact Motor-Driven Fire Truck Carries Both Chemicals and Hose

*Handwritten notes:*  
No. 11 Sagant, 1/2 gallon.  
D 3, 8 8

*Handwritten notes:*  
Solomon Shire  
R. A. Lister & Co. Thundersley, Essex, England.

*Handwritten notes:*  
R. A. Lister & Co. England.



# With the . . . SHORT TRACK RACERS



By T. A. HODGDON

*Wilbraham  
Mass*

**M**MOTORCYCLE short-track racing is not like any other form of motor racing, for in this game, the drivers must be athletes as well as skilled racing drivers. If a rider is to be a consistent winner he must have a special racing motorcycle of light weight and short wheelbase, and must be a master in the art of guiding his speeding machine into long controlled skids, holding his position by fighting ability and sheer strength.

This controlled skidding is called "broadsiding," because the men who ride their motor bikes fastest in one of these short-track races are really, at times, broadside of the track. By using all his knowledge of broadsiding, a rider is able to travel around a fifth-of-a-mile track at about forty-five miles per hour—yet without this spectacular sliding of his bike, this same rider could not make a speed of over thirty-five miles per hour. In other words, the skill of the rider counts more



*"Broadsiding" around a Turn, and a Night Race on  
One of California's Short Tracks*

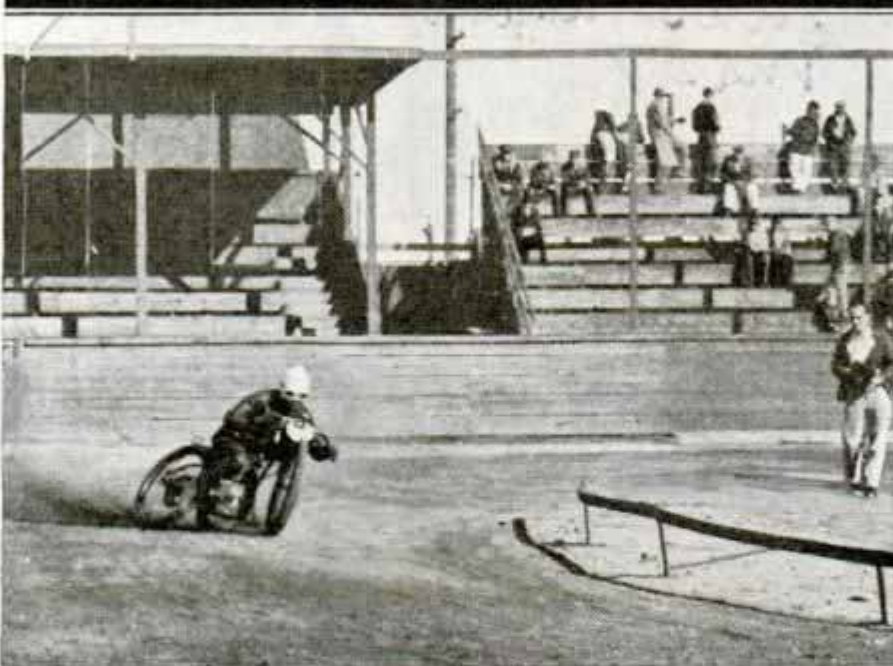
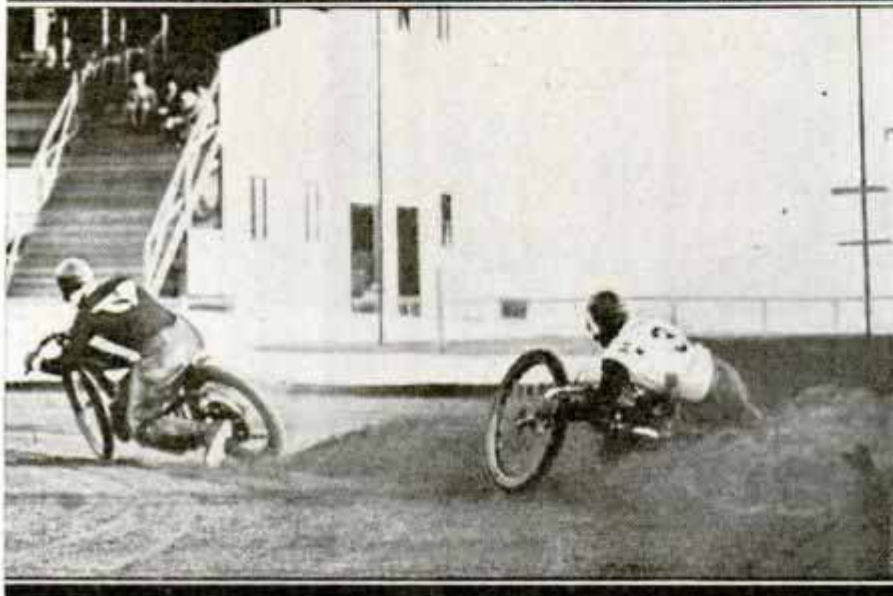
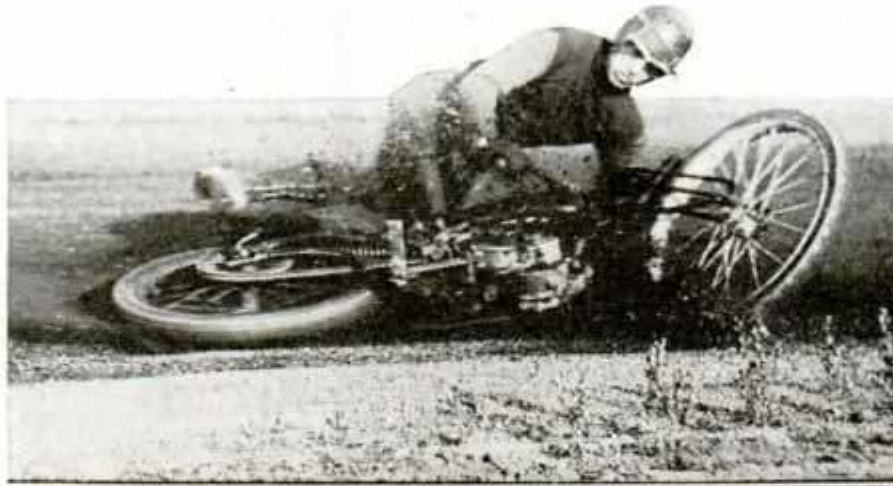
than the power of his motor in the turns.

A veteran short-track racer who earned over \$5,000 in one year at this game, recently told how he learned it without getting into serious trouble.

"First of all," he said, "wear the right clothes. Get leather breeches, leather jacket, a crash helmet, goggles of the unbreakable kind, and good strong leather gloves.

"Next, be sure your motorcycle is fitted





*Short-Track Racers in Action; Spills, Skids and Speed  
All Add to the Excitement*

with a low footrest and a padded knee iron so that you can brace yourself and be a part of the machine. This equipment belongs on the right side of the machine;

whip sideways of the track and the rider gets a violent toss. Keeping the throttle on in a broadside is the surest way to go down gently while learning."

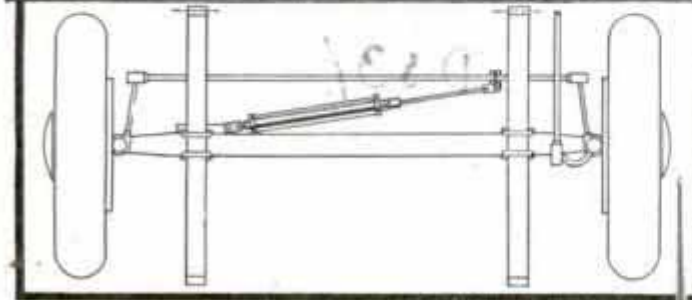
when you are riding you won't have to use your left foot on the machine at all, but will be leaning or 'laying over' so far that you will unconsciously drag or dab at the track with the left foot to help you control your skids.

"Now as to really starting to learn the game in earnest—start your practicing some day when the track is deserted, going into the turns at about thirty miles per hour, and when you are about half-way around give the engine full throttle. You will find that the rear end then skids outward because the power is spinning the rear wheel very fast. Correct the skid by steering—but keep the throttle on.

"The first few times you try it you will probably turn completely around and you and your machine will find what it feels like to scrape along in the dirt. But when you feel yourself going down—don't shut off the throttle. Let the rear wheel keep up its spinning—let it dig right in as you skid around too far. Then when the bike, and you with it, come to a stop you will not be thrown, but will merely slide along a few feet. The mistake a lot of beginners make is that of quickly shutting off the throttle when they find themselves broadsiding around too far. This sudden shutting off of the power makes the motorcycle



Robot Holds Car on Road If Tire Blows Out



Top, Left, and Bottom, Right, Blowing Out Tires at High Speed; Bottom, Left, Sketch of Stabilizer; Top, Right, Stabilizer on Racing Car



Preventing the automobile from swerving or turning over after a tire blows out, an hydraulic stabilizer is available for making the steering gear safer. The device takes charge of the steering gear in an emergency, holding the car on a straight course. In tests on a dirt track, a racing driver handled his car with one hand at 100 miles per hour while his passenger blew out a front tire with a shotgun. The stabilizer, which is mounted between the front axle and the steering tie rod, consists of a specially designed piston operating in a fluid-filled cylinder. Under normal conditions, the fluid moves back and forth freely through holes in the piston, but upon receiving a sudden shock, the piston holes close, preventing the liquid from flowing and holding the car on a straight course by hydraulic action.

*Chicago Freston don't handle.*

rates in the center for filling, one section holding red, and the other black ink. The well is polished brass, and colored circles around the openings identify the hue of the ink. Access to either color is gained by turning the identifying circle up and resting the well on the opposite opening.

**SPILL-PROOF INKWELL HOLDS TWO COLORS IN BALL**

Two colors of ink can be held in one ball-shaped inkwell which will not spill its contents when knocked over. It sepa-



Ball-Shaped Inkwell Which Holds Two Colors and Can Be Turned End for End without Spilling

*Sold by Carson Pirie Scott & Co*

*Max Wayne Hydraulic Steering Stabilizer*

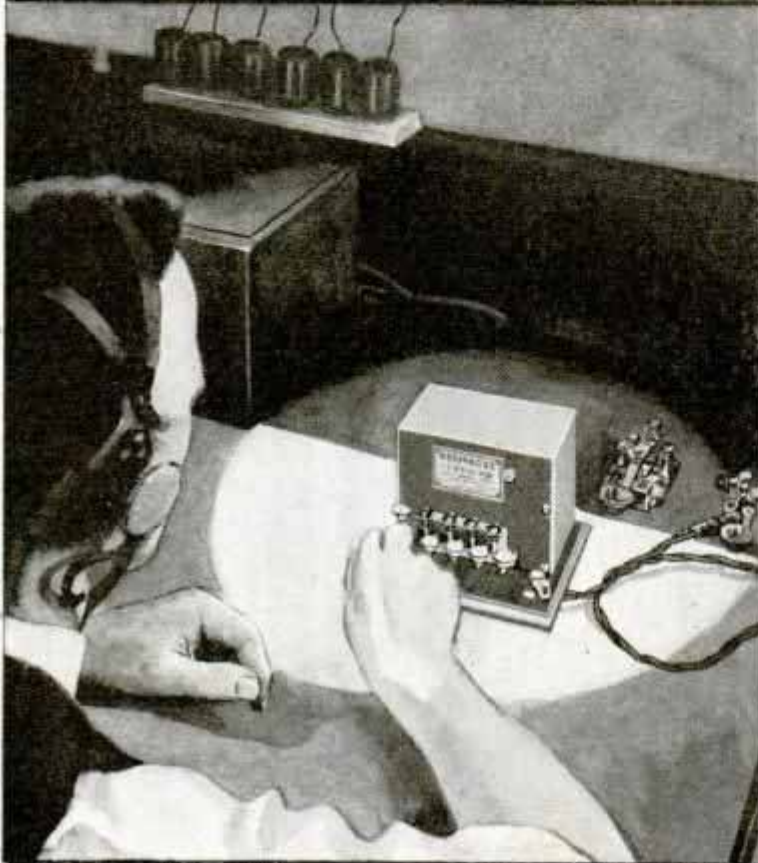
*Los Angeles Calif \$12.00 to \$22.50*

*41.25*

*D 539*

*made by Charles F. Steele, 830 Sherman*





Center, Typewriterlike Instrument That Speeds Up Code Transmission; Small Sketches Show Some of Its Uses

### MULTIPLE-KEY CODE SENDER SPEEDS UP TELEGRAPHY

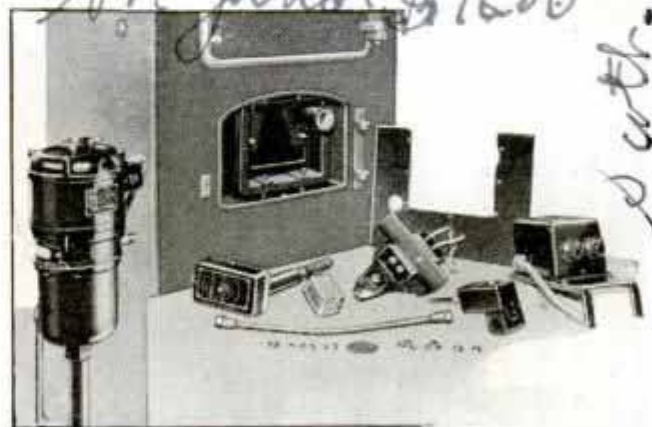
Messages may be transmitted in continental or Morse telegraph codes at a faster rate with half the labor by means of a multiple-key instrument resembling a small typewriter. There are ten keys, five white and five black. The white keys send one, two, three, four and five dots respectively, when depressed, while four of the black keys send one, two, three and four dashes, respectively. The fifth black key is a standard telegraph key which may be used at the option of the operator, in connection with any of the other nine. The keys

may be depressed in rotation to form any character in the code. The instrument operates with wire or wireless equipment. Operation is semi-automatic. Sending speed may be adjusted. Formed automatically and mechanically, each dot and each dash is perfect in length and spacing, clear and sharp in transmission. With a little practice, the operator can develop a "touch system" similar to that used by typists.

### BURNER USING CHEAP OIL CUTS HEATING COST

Heating costs for the home may be reduced by use of a burner designed to operate on cheap fuel oils, as low as twelve to sixteen gravity, without screens or filters. The burner will even use auto crankcase drainings run through a cloth filter after being permitted to settle. The area of the spray nozzle orifice is 110 times the area of a pressure atomizing burner of the same capacity. Surprisingly high combustion efficiency is obtained, even without an air blower. Another feature of the burner is that it can burn very small quantities of fuel, even down to one quart of oil an hour, if desired. Extremely simple in construction, the unit requires little servicing. No screens are used, and the large nozzle orifice per-

mits foreign matter to pass through. There are no valves or adjustable parts.



Economical Burner for Use in Home Heating Plant

*D. B. McShurtack Co. Keen State Sled. Linder Area. Impney's. Munn. Linder and Linder's. C. B. Keen State Sled. Linder Area. Impney's. Munn. Linder and Linder's.*

*S. C. H. Newcomb. 1970 Pine. Newcomb. 1600.*

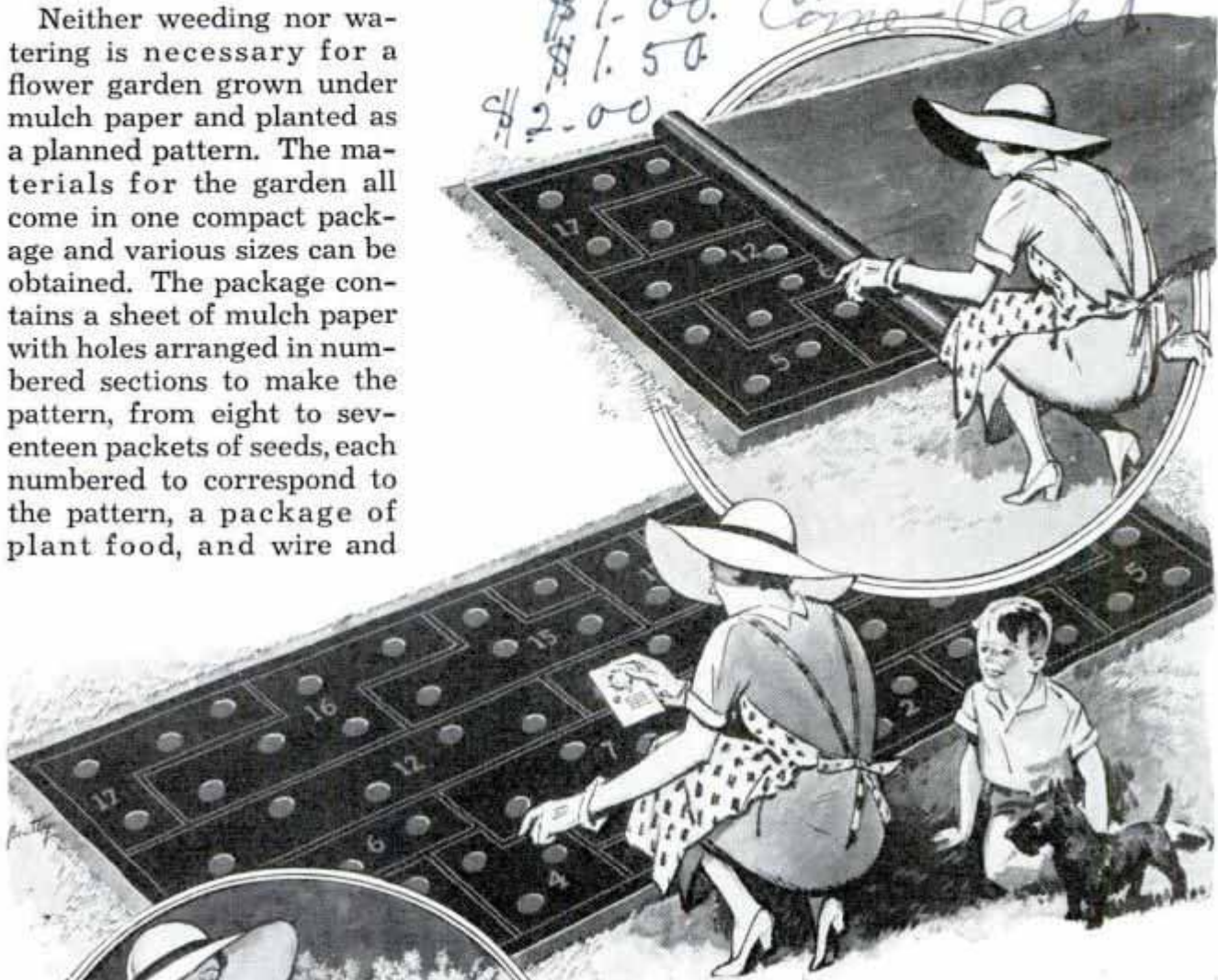


International Paper Co.  
 220 E 42nd  
 New York City  
 POPULAR MECHANICS 65

mulch paper sheet.  
**Mulch-Paper Flower Garden Needs No Care**

Neither weeding nor watering is necessary for a flower garden grown under mulch paper and planted as a planned pattern. The materials for the garden all come in one compact package and various sizes can be obtained. The package contains a sheet of mulch paper with holes arranged in numbered sections to make the pattern, from eight to seventeen packets of seeds, each numbered to correspond to the pattern, a package of plant food, and wire and

\$1.00  
 \$1.50  
 \$2.00



*Mulch Garden Paper Pattern with Holes Arranged in Numbered Sections to Receive Flower Seed from Packets with Corresponding Numbers*

and the pattern planned for color harmony, and the pattern is laid out for variation in the height of plants, small ones being in front and the taller ones in the rear.

**WEATHER DATA FOR AUTOISTS  
 SUPPLIED BY RADIO**

D/31

Automobile radio receiving sets capable of receiving weather reports from department of commerce aeronautical radio stations have been suggested as a means for supplying motorists with an advance knowledge of conditions ahead on long trips. Drivers can receive such information if their sets are capable of picking up frequencies between 200 and 400 kilocycles. During a cross-country trip, such advance weather information would be of value to the motorist.

staples for anchoring the paper. After preparing the soil and fertilizing it with the plant food, the mulch paper is laid and anchored. The seed is then planted according to the numbers on pattern and packets. The paper raises the temperature of the soil, conserves moisture and eliminates weeding. The flowers were selected

Washington D.C.



D506 Cmt. Walter & Burton  
1082 Florida Ave  
Abermillie

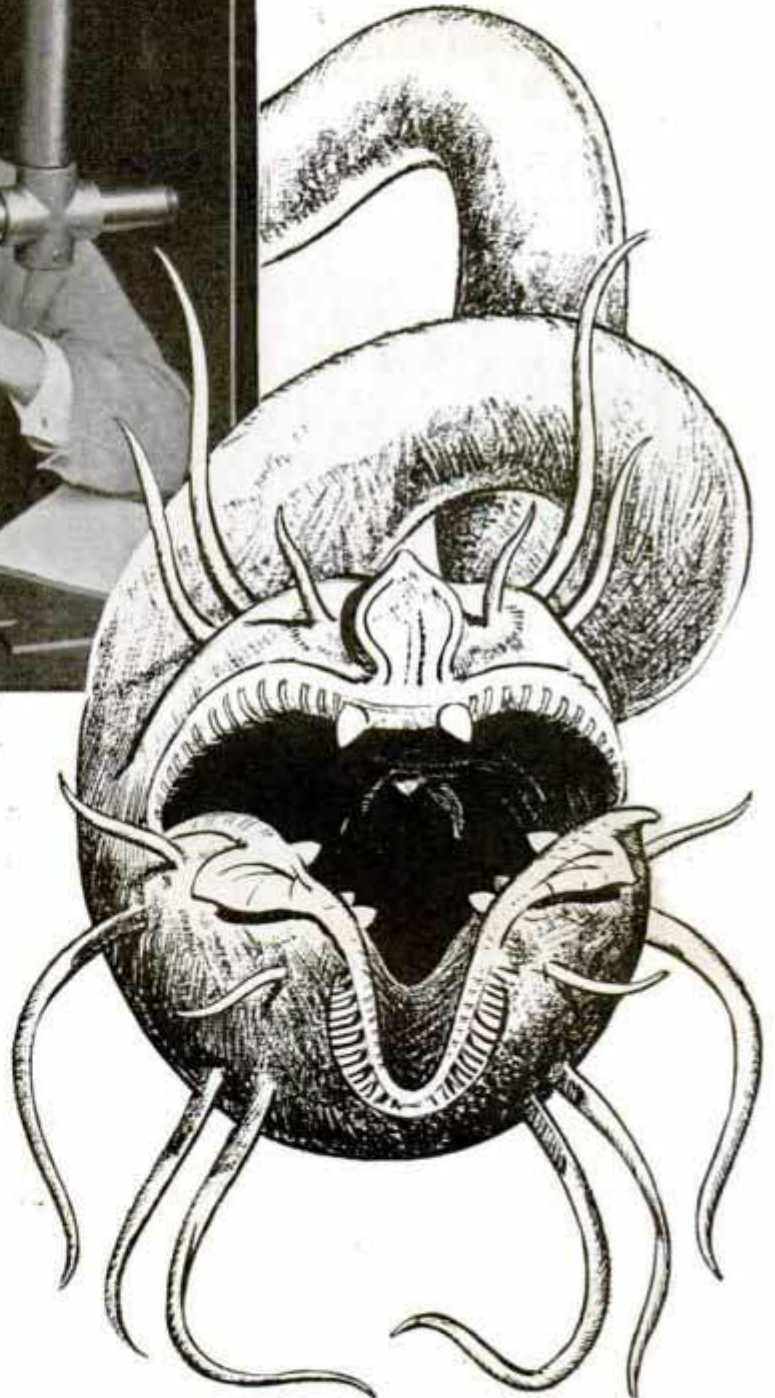
# MONSTERS of the



processes have not been found entirely satisfactory, the recording of fine details of nemas is done by drawing. It may require months for a highly trained scientist or technician to complete a drawing of a nema.

**P**UTTING a worm a fraction of an inch long on the tip of the 555-foot Washington monument may seem like a nightmare idea, but it is a perfectly sane stunt performed every day in one of Uncle Sam's most unusual laboratories. This laboratory is dedicated to the myriads of nematodes or nemas, eel-like creatures that swarm over the earth, being found abundantly in the soil and natural water. Because many of the nemas attack plants, animals and humans, they are being studied constantly by government scientists.

In these tiny specks of life are found almost as many and as specialized organs as you have in your body. Nemas generally are, without particular preparation, excellent microscopic objects because they are transparent. Because photographic



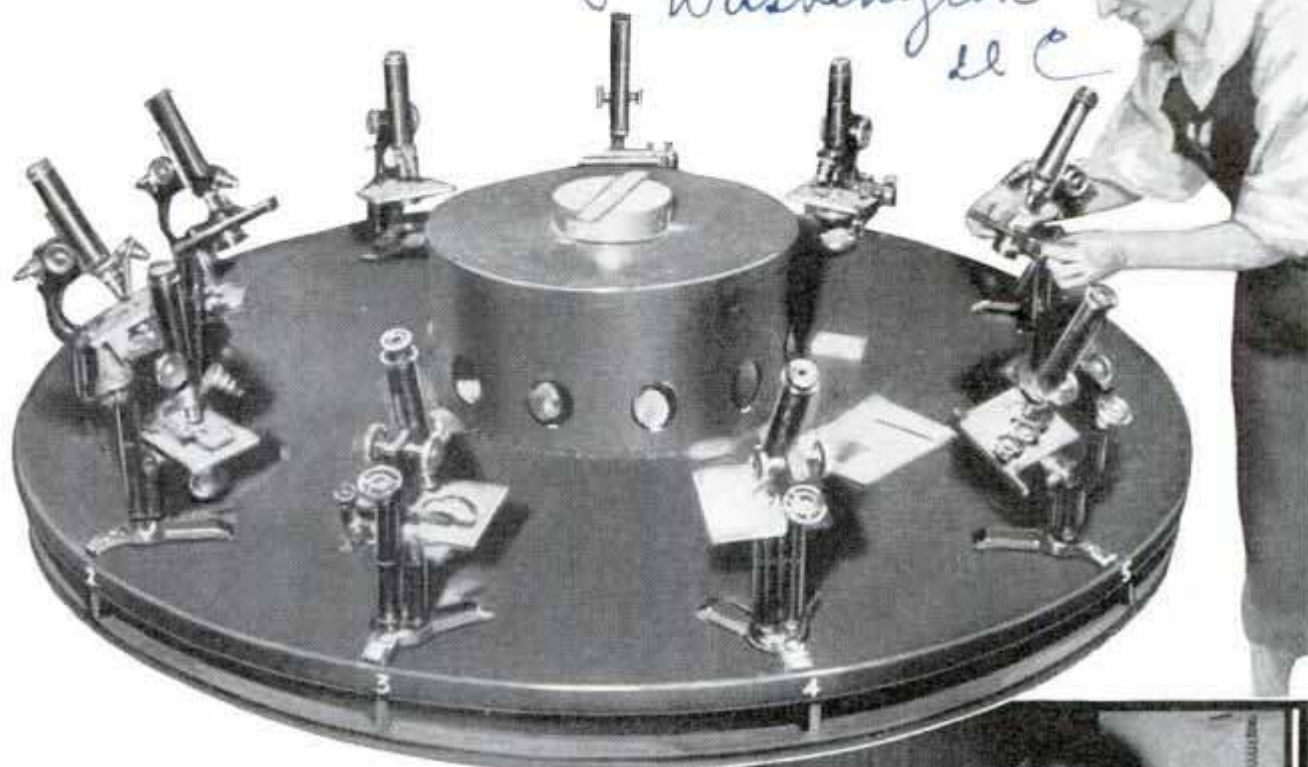
*Drawing of Tiny Nematode Monster as It Appears under Microscope; Above, Microscopist Studying Nematodes with Aid of Plaster Cast Headrest*



Dr. H. S. Steiner, D 305  
Dept. of Nematology,

# INVISIBLE WORLD

Bureau of Plant Industry  
Dept. of Agriculture,  
Washington  
D.C.



A camera lucida arrangement is used for making the drawings. The microscope itself rests on a metal pillar extending down to the concrete of the building. The camera lucida arrangement consists of an eyepiece prism and a very large reflecting prism mounted at one side, on an adjustable arm. By looking into the microscope through the eyepiece prism, the operator sees the image of the specimen projected against the drawing paper, which is tacked to the table beneath the large prism. An adjustable headrest holds the eye steady and lessens fatigue. For each investigator a personal headrest is made from a plaster cast of his forehead.

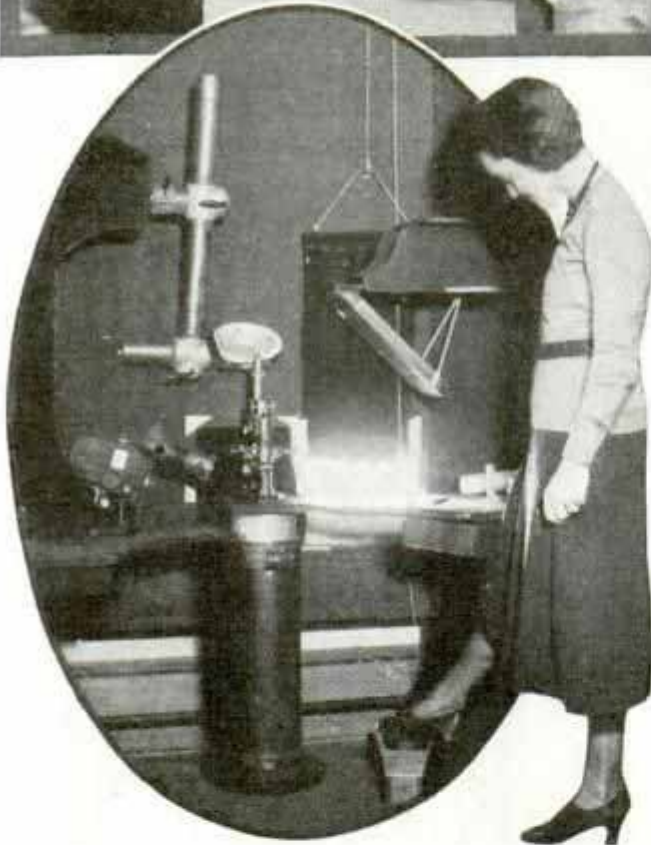
A sheet-metal holder, with turned-over edges and a hole in the center, supports two cover glasses between which the nema is mounted. Tiny separators made from strands of spun glass or the tips of camel's-hair brush bristles hold the glasses apart.

By using, instead of the regular glass microscope slide, a second cover glass, better rendering of microscopic detail is ob-



*Microscope Round Table for Rapid Study of Specimens; Below, Complete Drawing of Nematode Consists of Sectional Drawings Fastened Together*





*Top, Nematode Expert at Work; Below, Foot-Operated Reel to Manipulate Panel Which Controls Illumination on Drawing Paper*

tained. The microscopes for which these thin slides are intended have two objectives that are used simultaneously. It is necessary to focus both objectives accurately, and that is where the Washington monument enters the picture. The lower condenser must be focused at infinity, or on a distant object. To do this the operator places a slide, containing a micro-

scopic worm, on the stage and focuses on it with a low-power objective. Then he adjusts the lower objective by bringing into sharp focus a distant object. Because it is convenient, the monument is used to focus the microscope. When the tiny nema is sharply defined against a clear image of the monument tip, the operator knows that everything is favorable for switching to a higher power.

Science, in spite of its highly trained workers, knows little about nematodes. If you lift a spade full of soil there is a possibility it will contain kinds of nemas no one ever saw before. Some 120 species have been found in the human body. One kind is found only in the felt mats on which German beer drinkers set their mugs!

Vinegar eels and the hairworms some people believe to be horse hairs come to life, are among the common nematodes you may have seen. Nemas in general are very long and slender worms with highly developed organs. One thing that makes nematodes a fascinating study is the great variety of forms. No dragon manufactured by Oriental imagination could look more ferocious than some of the nemas.

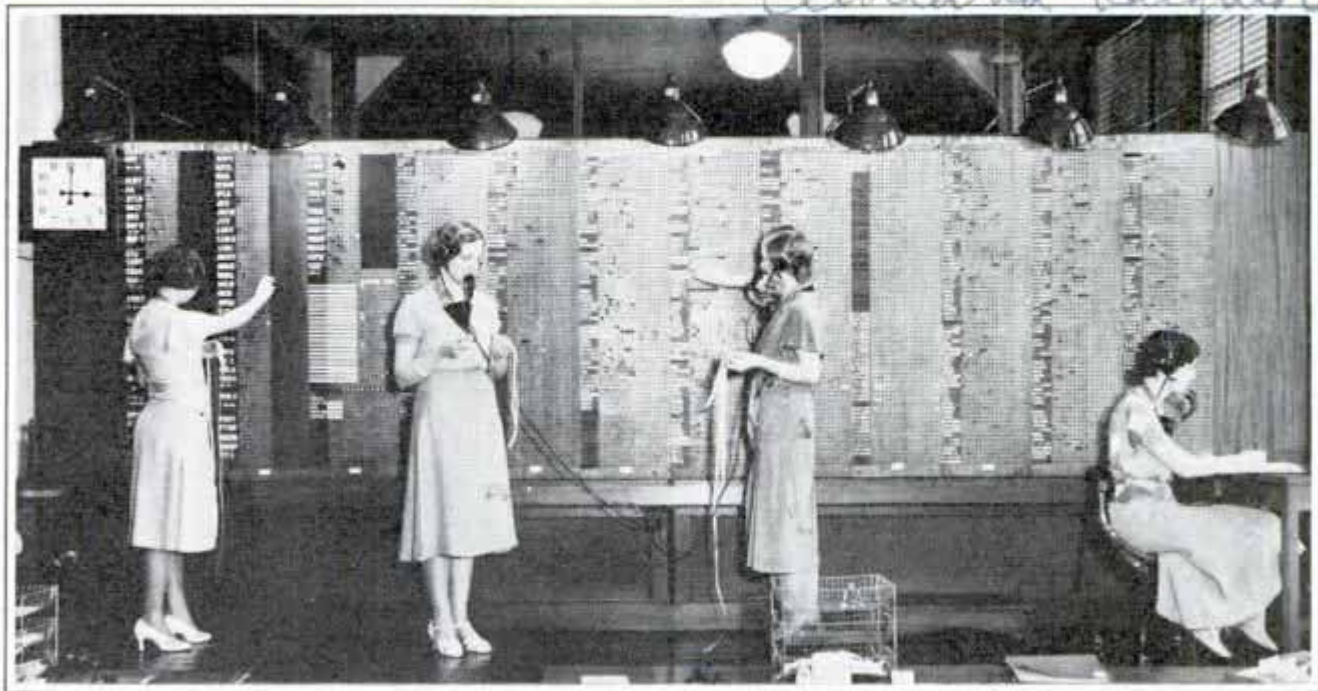
The injurious nematodes work their destruction in a variety of places and manners. If the doctor tells you that you have

(Continued to page 120A)



# Detouring Voices on Phone to Defeat Storms

*D 356. Conn. James & Cottland  
3997 Rosemond road  
Cleveland Heights, O.*



*One of Three Traffic-Control Boards through Which Telephone Calls Can Be Detoured by Roundabout Routes, Thus Maintaining Service When Storms Snap Wires*

If you had placed a telephone call from San Francisco to Seattle during a storm on the Pacific coast a few months ago, you would have talked half way across the continent and back before your voice reached Seattle, for your conversation would have gone by way of Salt Lake City, Chicago, Minneapolis and Helena. The voice highways have detours for emergency use just as do auto highways, and some unusual routes become necessary when sleet and ice snap cables or a bridge burns and melts a main trunk line. To keep the wires open to all parts of the country every minute of the day, three traffic-control bureaus have been established. These are located in New York, Chicago and Cleveland. When a cable breaks or a line is down, the news is flashed to these bureaus by teletypewriters and arrangements are made to detour calls around the break on other cables still in service, thus maintaining service to points beyond the trouble. So completely does the cable network cover the country that a call from Cleveland to New York could be made by way of the Pacific coast if necessary. The status of each cable is checked in each district on a large board resembling the quotation board in a stock exchange and a glance at the board reveals the condition of all cables in the ter-

ritory. This enables telephone service to be maintained today in the face of obstacles which a few years ago would have caused a breakdown.

*D 557*

## CAR VENTILATION IN RAIN AVOIDS ALL DRAFTS

All-weather draftless ventilators which can be attached to any car are now available. The ventilator consists of a metal frame which is attached to the top of the window and which conforms to the window's shape. When the window is lowered



*Ventilator for Top of Car Window Which Maintains Air Circulation but Keeps Out the Rain*

about an inch, the ventilator permits air to enter but a protecting lip keeps out drafts and rain.

*Precision Metal*

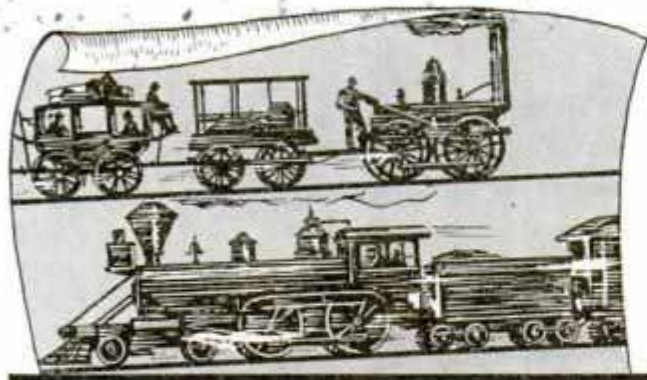
*are Chicago*



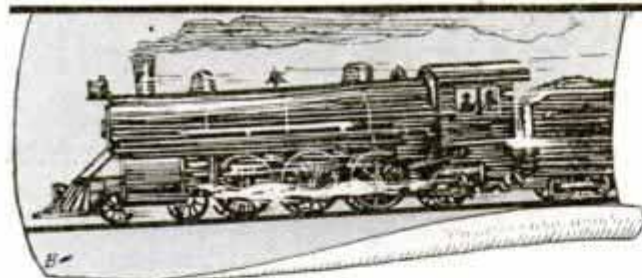
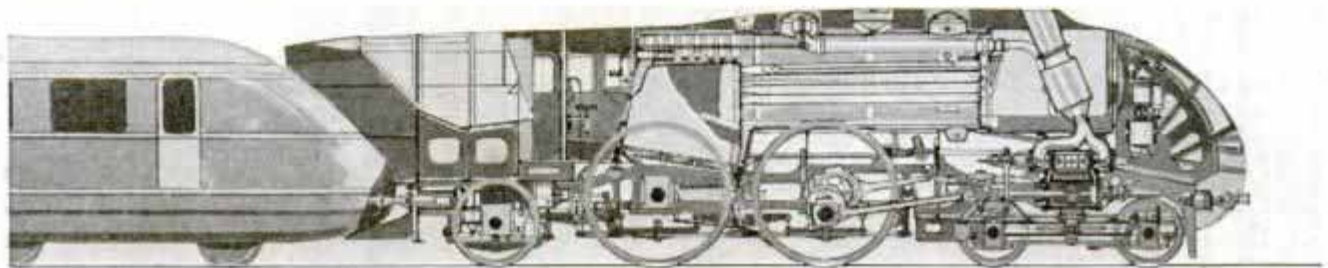
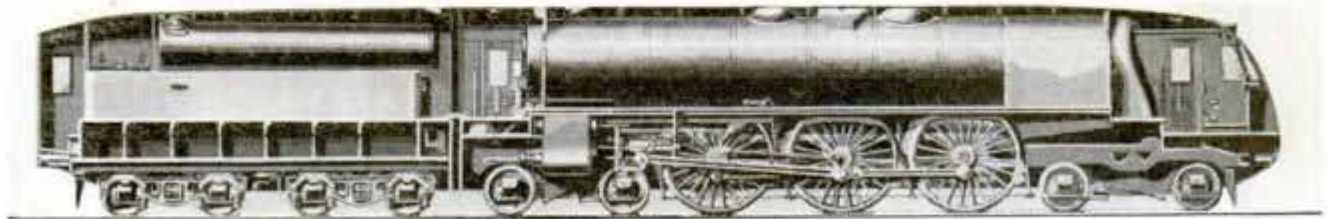
DD

Carl Hans J. Kytachbach  
Berlin-Lankwitz  
Bismarckstr. 28, Germany

# Streamlines to Increase Speed of Locomotives



Streamlined covers for locomotives are being employed in Germany to increase train speed. The covers or hoods are designed with flowing lines to reduce wind resistance, thus permitting faster operation without increasing the power. Speeds of 100 to 125 miles per hour are expected. One design places the engineer's cab at the front, resulting in improved vision.



Top and Bottom, Three Steps in Evolution of the Steam Locomotive; Center, Two Streamlined Locomotives, Upper View Showing Driver's Cab Located at Front; Lower View Shows Method of Articulation

Another provides for a cover which will fit in with covers on the coaches so that the entire train becomes a streamlined unit.

## Valve Seats "Frozen" in Motor at Hundred Below Zero

Steel-alloy valve seats are "frozen" into iron cylinder blocks at 100 degrees below zero, Fahrenheit, in the automobile factory of the Dodge Brothers corporation. The frost-shrunken valve-seat rings emerge from a refrigerating compartment through chute openings that are ice-covered, due to the condensation of moisture around the super-chilled outlets. After insertion in the engine block, the inserts regain normal temperature, expanding to form a tight fit. Previous to the adoption of this method, heavy hammer blows were necessary to insert the rings, often resulting in distortion of cylinder blocks. Dry-Ice is used to create the low temperature.



Note Frost around Valve Ring Outlets

79.00 Ino. Campbell  
Are Detroit, Mich  
D510



228-7466  
Developed by Howard Ault Co. and Francis Co. for the Pontiac

### TWO-COLOR PHOTO PRINTS

Dual-tone photographs may be produced by a system calling for the use of only one toning solution. Several colors may be obtained on ordinary white photo paper. The solution has no effect on the whites, but affects the partly or fully reduced silvers, according to the amount of reduction that has taken place during the developing and printing of the pictures. No treatment is necessary other than immersing the picture in the chemicals.

### MIRROR SHOWS "KNEE ACTION" TO PASSENGER IN AUTO

How "knee action" wheels on 1934 General Motors cars operate under actual running conditions is demonstrated to passengers in an automobile equipped with a mirror mounted near the right front wheel. The mirror reflects every movement of the suspension system to the pas-



Movements of Wheel Mounting Are Reflected to Passenger's Eye by Mirror above Wheel

senger's eye as the car speeds along the road. Removal of the front fenders results in a clearer view of the operation.

### BICYCLE FRAME ON PONTOONS LATEST WATER CRAFT

Mounted on three pontoons so that it balances well, a bicycle frame is converted into the latest water craft. Its speed is be-

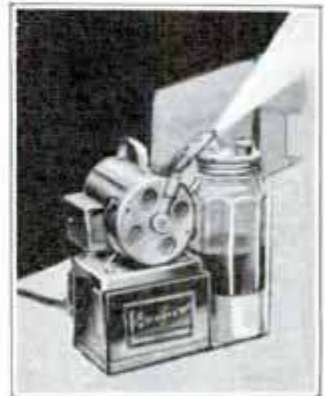


Odd Water Cycle Is Capable of Six to Ten Miles per Hour; It Rides on Pontoons

tween six and ten miles per hour. Pedals are used in propelling the water cycle which is steered by handle bars connected to a small rudder under the front pontoon. Trips of twenty-five miles have been made on Lake Pontchartrain, La., by members of the family of E. C. L. Herwig, the inventor.

### AUTOMATIC ELECTRIC SPRAYER KEEPS FLIES AWAY

Fighting flies is made easy if you use an automatic sprayer which requires no attention except for an occasional oiling of the motor and replenishing of the insecticide. It holds one quart of liquid insect killer and emits a fine, cloudlike spray which permeates every crack and crevice of a restaurant or dining room.



Handwritten notes on the right side of the page, including 'Herwig, 5921' and other illegible scribbles.



# ROBOT



Control Box Which Governs the Operation of the Manless Warship Several Miles Distant; the Petty Officer Receives Radio Reports as Each Mechanism on Robot Ship Goes into Action

By HAROLD J. FITZGERALD

*306 Panoramie Way Berkeley Calif*

OUT through the Golden Gate steamed a lean grey destroyer, different in no respect to the casual eye from any of the sea greyhounds frequently to be seen traversing that waterway. But on that entire craft there was no human being. Its engines turned, speeded up, slowed down, without the touch of a hand. As deserted as any derelict, it nevertheless performed its every function as though manned by a full crew.

Half a mile behind it was another destroyer, fully manned. On its bridge was a metal box about the size of a portable radio. Standing beside this, his hand on a small keyboard, was Lieut. Com. Boyd R. Alexander, commandant of the navy's mobile target division No. 1, and inventor of

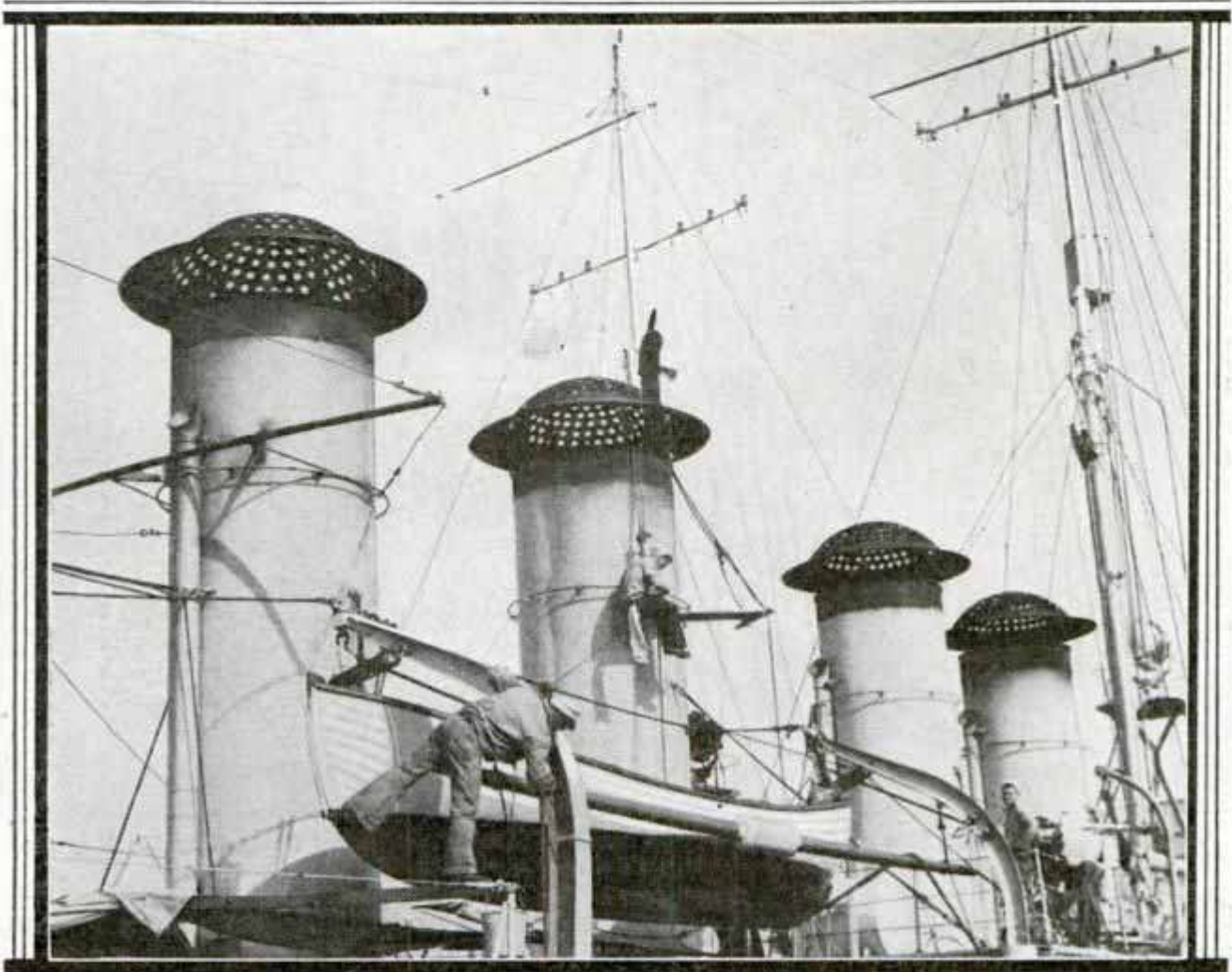
the world's first robot fighting ship. From time to time Commander Alexander's fingers depressed a series of the white keys—there are only nine of them altogether—in such combinations as a typist might use in writing a couple of short words. Each time the ship ahead changed its course or its speed, or both. Once it tooted twice at a fishing boat.

The principal use of the robot type of ship in peace time is a mobile target for bombing planes. The robot boat, "Boggs," for instance, is taken out to sea and sent out far ahead of the control ship. Bombing planes fly over it and try to drop non-explosive missiles aboard it, while the "Boggs," controlled from afar, makes the same maneuvers to escape being hit that an enemy ship would make in war time. But it is as offensive and defensive un-



# WARSHIPS ~

D209



*On Board the "Boggs" When She Was Being Prepared for Robot Service; Note Elaborate Radio-Receiving Apparatus and Caps over Funnels to Prevent Bombs from Dropping Inside*

of the navy's active forces that the most important and startling possibilities of the robots are to be realized.

Out in those blue wastes where there is still some privacy in a crowded world, the robots have been tested in mimic naval engagements of many different varieties. The experiments have revealed some of the almost incredible things that may be expected of the robots in time of war—some of them only, for there is little doubt that many others, perhaps even more startling, remain unguessed at. The robots have been maneuvered against actual fleets; their guns have been fired upon moving targets. An enemy fleet is sighted steaming toward our coast. Out goes a robot ship with a control ship behind it, and on the deck of the latter a hydroplane. Long before the control ship has come

within sight of the enemy it heaves to, and the plane goes forward scouting.

It sends back a radio message giving the position of the fleet, and the robot is sent forward, far out of sight. The airplane reports its position, together with that of the enemy. Now the robot is reported within firing distance, and a new set of positions is given, from which the gunnery officers on the control ship calculate the exact range and deflection for the robot's forward guns. A combination of keys is touched, and far over the horizon the robot guns swing uncannily into position. Another key, and a shell screams into the enemy's midst.

As everyone knows, a radio system can be rendered totally ineffective by the simple device of getting on its wave length and filling the channel with irrelevancies.





*Air View of the Robot Ship at Sea Showing the Deserted Decks; the Vessel Controlling the Ship by Radio Is Far in the Rear but the Robot Responds to Every Command*

But first you must catch your rabbit. What are the wave lengths in the present case? So far no instrument has been devised that will detect a radio signal without patient tuning unless it is already set for it. And to tune onto a short wave is not a matter of locating a broad band, as with the low frequencies, but a hair line.

This could be done in time, of course, if the signals were being repeated continuously on that same hair line. But in less than a second the four or five signals necessary to set any part of the robot's mechanism in operation zip through the air and are gone. It is in a small part of that second that the enemy must tune onto the fine ether channel occupied by any one of them. That instant gone, it is too late until the next signal—when again opportunity will be so small that it would rattle around in the breadth of a watch tick.

But suppose that by a chance too remote for practical consideration the enemy succeeded in identifying those frequencies, there would still be the task of setting up

and maintaining precisely similar ones. Granting again the virtually inconceivable, that before suffering irreparable damage from the robot's guns the enemy could identify and reproduce those sparse and elusive signals, they would find they had had their labor in vain. For the control ship would simply shift onto an alternative set of frequencies.

Another way in which the robot can be used to great effect in war time is as a mobile mine to guard our harbors. The present mine system has one defect—it cannot work till the enemy gets close enough to bombard the port and its defenses without risking the mines at all. But a robot ship loaded with nitro-glycerine is another matter. Long before the enemy can get within effective bombarding range he finds the mines leaping at him out of the long blue swells, and unless he is foolish enough to try to fight them off, pursuing him far out to sea.

There is only one answer to robots, and that is robots. Regardless of the fact that



an enemy would probably never get a chance to copy one of ours—for it would be blown up as he stepped on board of it—ships based on the same principle will, of necessity, be devised by other nations. It may be a long time before they will hit upon a mechanism that will operate as effectively, but they will assuredly develop some type of ship subject to remote control. And then robot fleets will meet and fight it out in the open sea.

What kind of battles these will be, no one can now speculate. They will be battles in which no lives can be lost, and which the only conscious participants will watch through spy-glasses. The possibilities of maneuvering when neither leader need hesitate, for humanity's sake, to sacrifice a "piece," and when the pieces can be played upon as deftly as the stops of a flute, cannot yet be realized. One thing is probable, however—the robots would make naval warfare more humane.

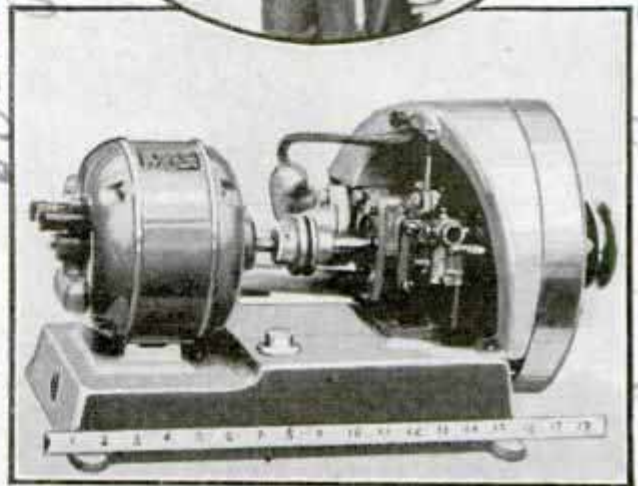
**GAS MASKS TO GUARD HORSES AND DOGS IN WAR**

Horses and dogs will be protected from gas attacks in the next war by masks that fit over the mouth and nose. Equipment



Wax Figures Are Used in Showing How Animals May Be Protected by Gas Masks

of this type was exhibited recently at a special air defense show in Prague, Czechoslovakia.



Top, Demonstrating the Ease of Carrying the Small Motor Generator Shown at Bottom

**PORTABLE MOTOR-GENERATOR SUPPLIES HOUSE CURRENT**

Sixty-cycle, 110-120-volt current for lighting or power is generated by a motor-generator weighing only sixty pounds. The entire plant can be carried on the owner's back, if occasion should arise for its removal. The gasoline motor, which is one cylinder, air-cooled and easy to start, and the generator are bolted and coupled on a rigid aluminum base. Speed of the engine is governed. Ignition is shielded for short and long wave radio work. Gasoline is supplied to the engine from a tank in the base. The generator is self-excited, with its voltage regulated automatically to eliminate the possibility of burning out electric lamps, motors or radios. The plant will operate ten fifty-watt lamps or supply filtered alternating current for any standard short-wave or broadcast receiver, radiophone or telegraph transmitter up to 350 watts input.

D 450

60-cycle 110-120 volt

195.00 fth

Sealite

W 200 mfg Co. 520. Second Ave

Sealite, 60 watt

Paul

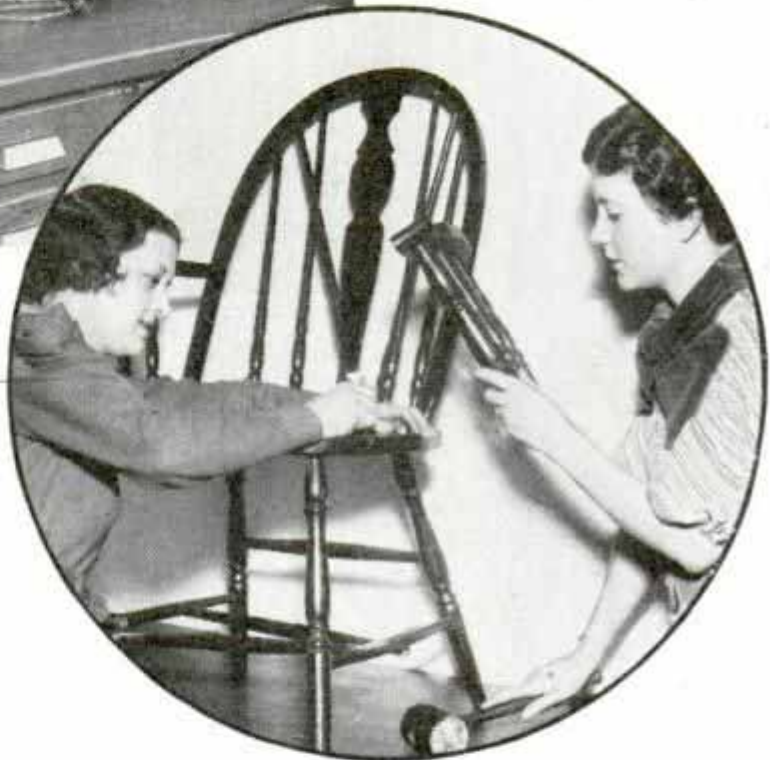


# Girls Taught Mechanics of Running a Home



High-School Girls Repairing Household Electric Appliances and Mending a Chair

High-school girls of Wichita, Kans., are being offered courses in home mechanics. The students learn to repair household appliances and do many tasks about the home requiring a knowledge of mechanics and of simple tools and their use. Girls in the electrical-appliance class are taught how to make simple wiring connections, repair faulty light-bulb sockets and defective switches, and how to care for vacuum cleaners, mechanical refrigerators and other electrical appliances used by the modern housewife. They likewise learn to distinguish between inferior and first-class merchandise, how to estimate water, gas and electric bills, how to illuminate the home, and how to operate a furnace. The wood-working unit gives instruction on the use of woodworking tools.



air chamber with ten or twelve strokes of the pumping rod. After four or five shots are fired, the force decreases gradually, due to a reduction in the air pressure, as each shot consumes some of the force. The safety is used when pumping, loading, dissembling the gun and after shooting is complet-

ed. The rifle is used for hunting birds and small animals and for target practice.

D491

### CLUTCH PEDAL STARTS ENGINE WHEN PUSHED TO FLOOR

When the clutch pedal of the 1934 Reo is depressed to the floor, it causes the



starter motor to turn the engine at the normal starting rate. The combination of starter and clutch is said to make winter starting easier, since it forces the driver to disengage the clutch be-

D443

### SAFETY ON AIR RIFLE

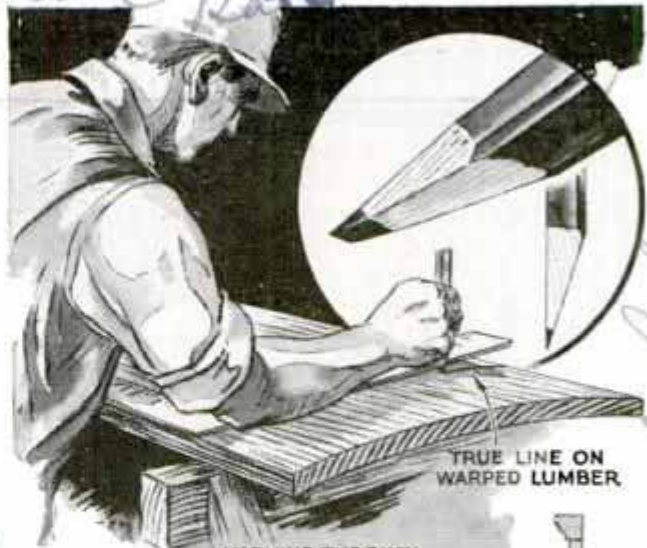
Automatic loading by means of the bolt, hair trigger and a safety device are features of the latest repeating air rifle. The magazine holds twenty-five steel shot, one of which is placed in firing position each time the bolt is operated. The gun is prepared for firing by compressing air into an

Benjamin Air Rifle Co

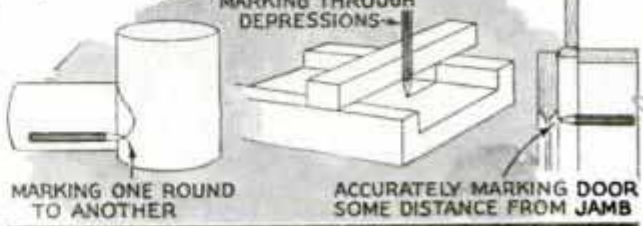


John Bali, 47 45 Melville Ave East Chicago, Ind. D 5 66 S.W. Knuth, Knuth Bros 77

fore the starter goes into operation. With the clutch disengaged, the drag of thick oil in the cold engine is reduced, relieving strain on the starting mechanism and the battery. The clutch pedal is said to be so soft in action that the added resistance of the starter button spring affords ample protection against accidental closing of the starter circuit during normal operation of the clutch in changing gears. The clutch is used little, however, because the Reo is equipped with a self-shifting transmission.



TRUE LINE ON WARPED LUMBER



MARKING ONE ROUND TO ANOTHER

ACCURATELY MARKING DOOR SOME DISTANCE FROM JAMB

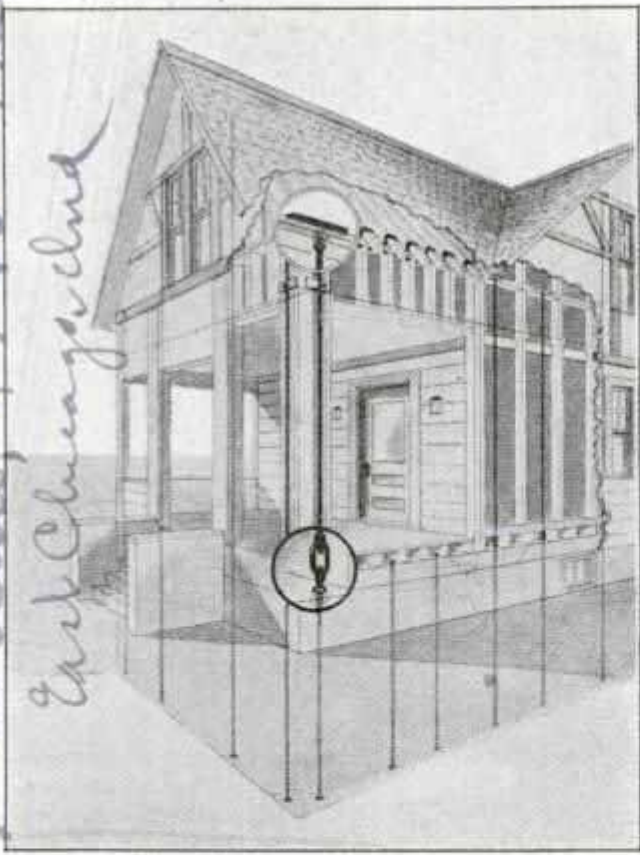
Some Ways in Which New Flat-Side Pencil (Inset) May Be Used by the Craftsman

Land of Lakes, Wis

**IRON ANCHORS BRACE HOUSE TO RESIST STORMS**

D493

Old or new houses may be braced against storms by installation of iron anchors developed recently by a building contractor. A wind velocity of eighty miles per hour usually will rip a frame house from its foundation if not properly braced. In comparison, a building made rigid by use of



Drawing Shows How Iron Braces Anchor a Building to Withstand High-Velocity Winds

the iron anchors is said to be capable of resisting a wind velocity of more than 200 miles per hour.

Less than two pounds of radium are available for use in the world today.

**SQUARE PENCIL IS A HELP IN ACCURATE RULING**

Serving the purposes of an ordinary pencil, in addition to those of pencils used by mechanics and draftsmen, an odd-shaped pencil is available for accurate ruling. The lead is set into the pencil on one side in a manner that makes it easy to follow a drawing guide. It is made of wood, with a hard lead.

**RUBBER BUMPER ON DOOR KNOB PROTECTS THE WALL**

D538

Doorstops are eliminated by a rubber bumper which fits over the door knob and protects the wall or other construction the door might strike against. It is also claimed that because it is made of soft rubber it prevents the breaking of the glass in doors with glass panels, a common accident when such a door slams against the ordinary kind of doorstop.



Wes

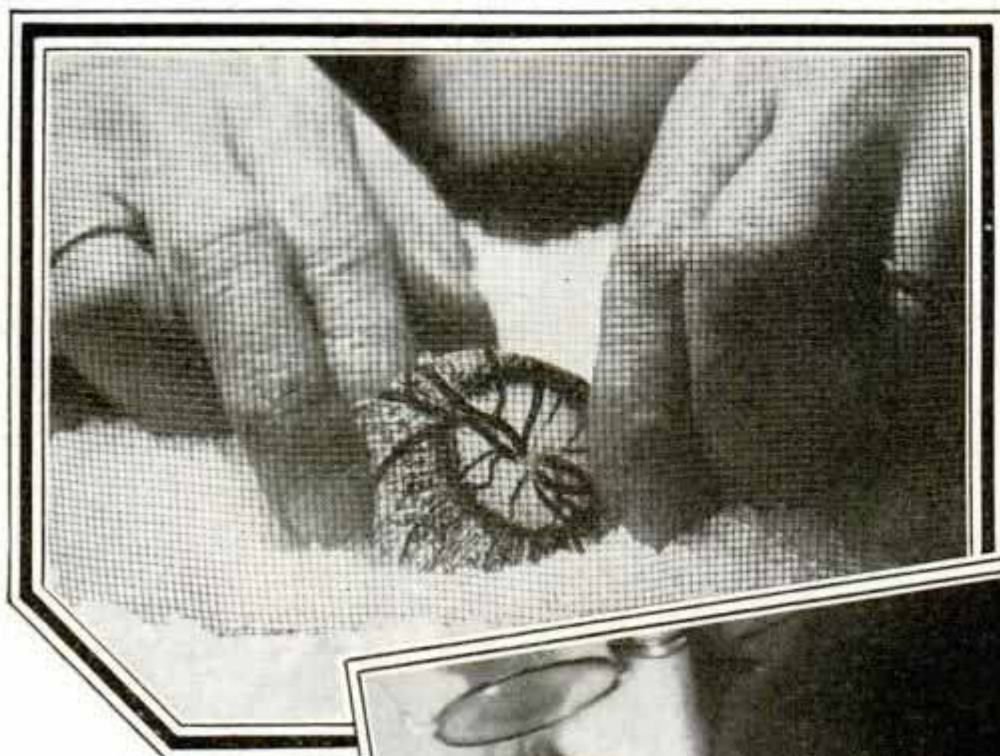
Scena Letter 3/3/34

The Hornby Co. Detroit, Mich.

John Bali, 47 45 Melville Ave East Chicago, Ind.

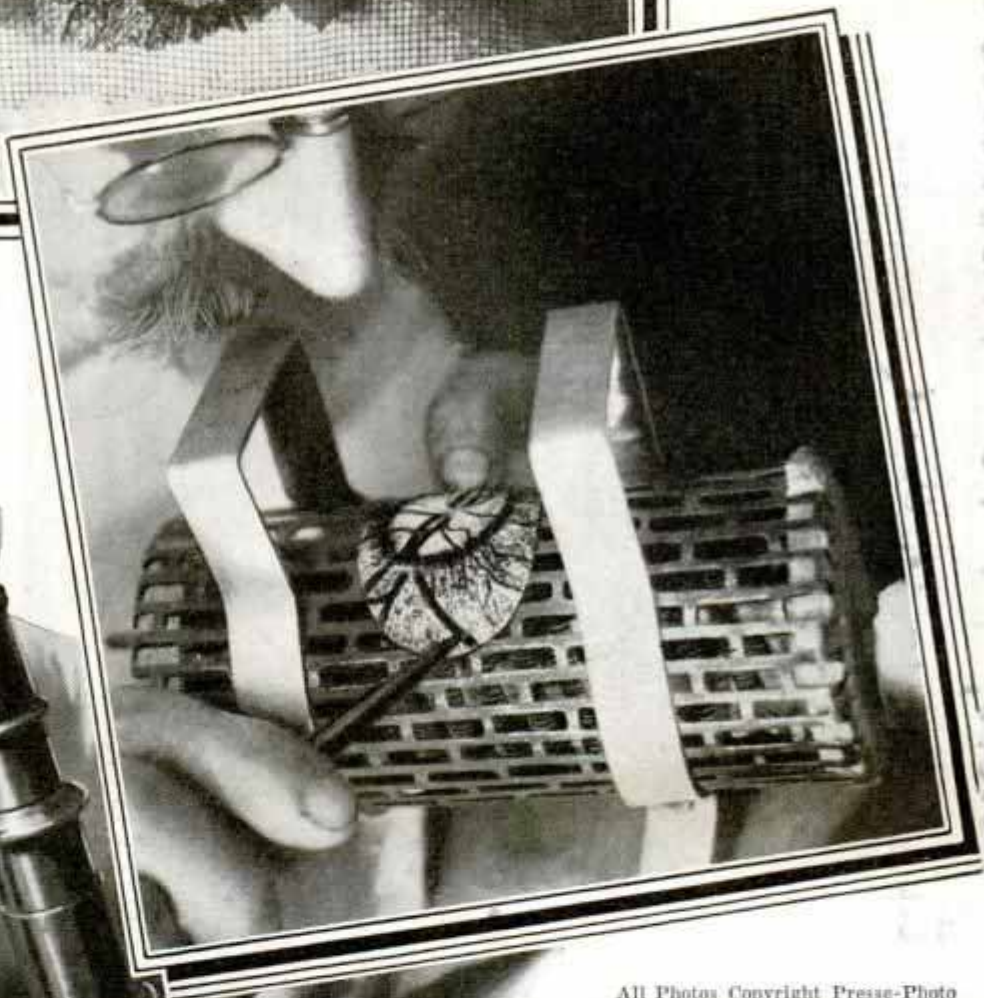


# "Eye Photography" Tested for War on Crime



*Another Weapon against Crime May Be Developed as Result of a German Photo-Chemist's Secret Experiments with a Method for Reproducing Photographically the Images on Retina of the Eye; Left, Photo of Retina Is Subjected to Chemical Process to Make Image Visible*

*Right, Treating Photo of Retina on "Radiostatograph" to Make Visible the Last Visual Impression; This Process Reproduces Details of Image in a Few Seconds*



*All Photos Copyright Presse-Photo Left, Photo-Chemist Studies Photograph of Retina of Murder Victim's Eye in Attempt to Solve Puzzling Case; Close Examination of the Photo under a Microscope Is Necessary to Bring Out Every Detail of Last Impression Caught by the Retina and Retained by the Optic Nerve*

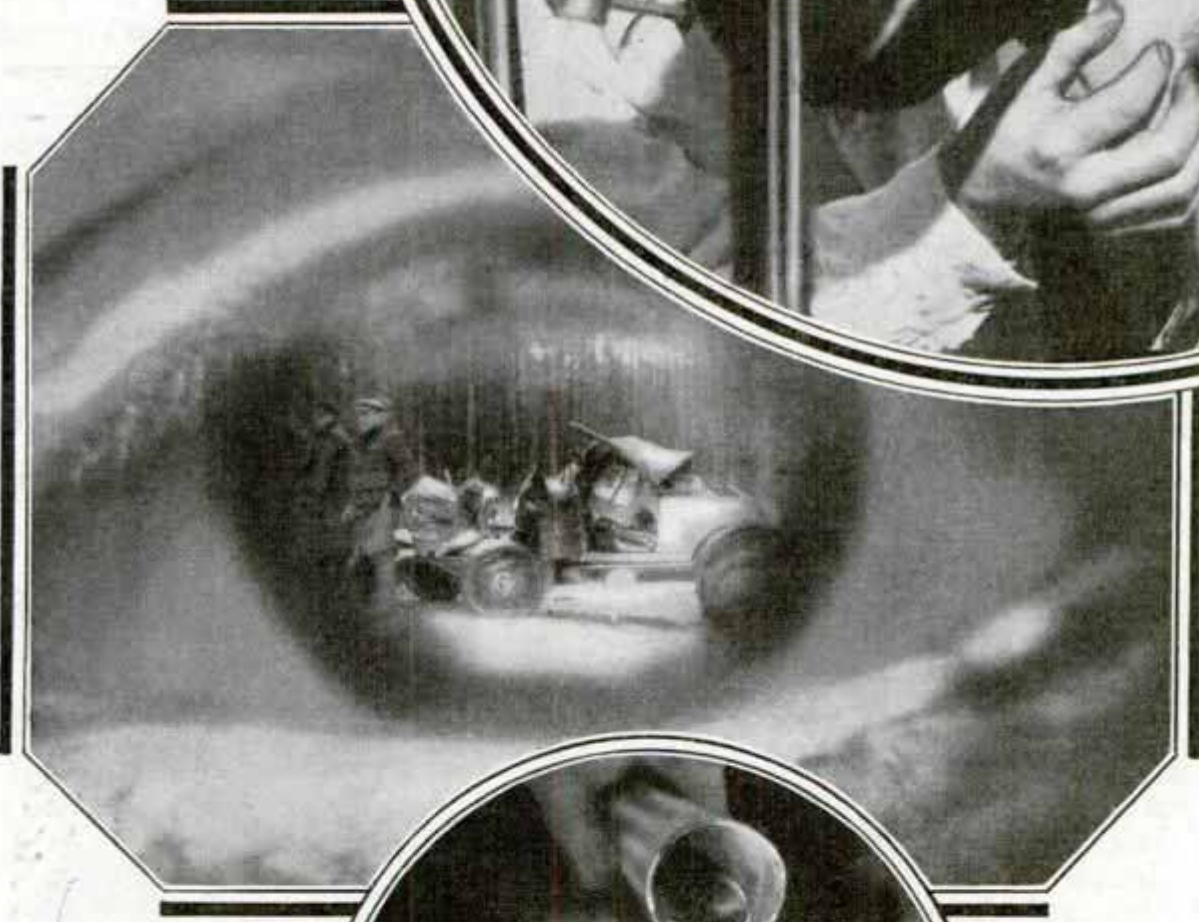
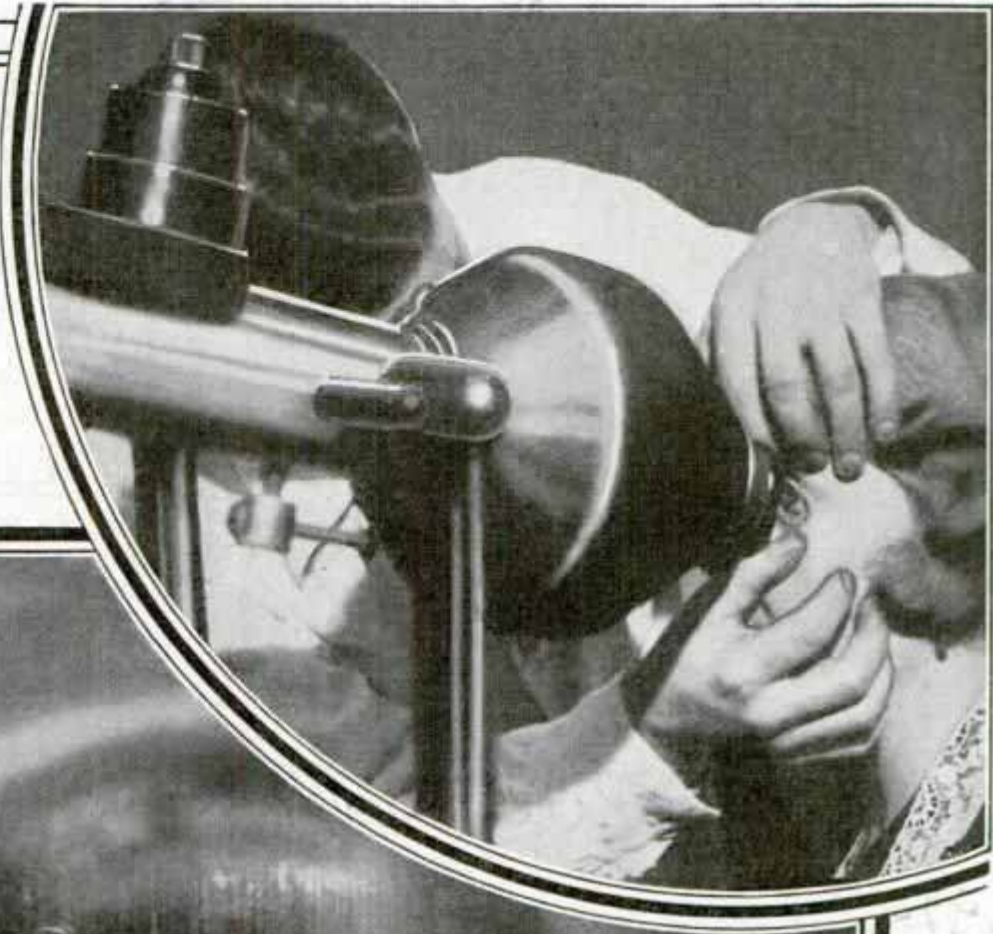
*Islok Photo...*



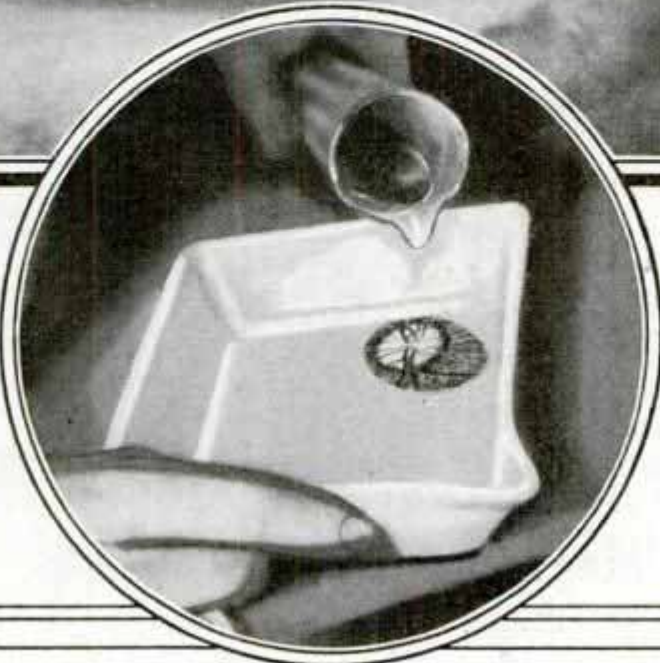
see also *Wendell*  
*Photography*  
POPULAR MECHANICS  
*April 1934 558*  
D 522<sup>79</sup>

# Camera Reveals Invisible Images on Retina

*Right, How the "Retinograph" Is Used in Photographing the Eye; It Is Known That the Retina Acts as a Reflector, the Visual Purple Receiving an Inverted Image Which Excites the Ends of the Optic Nerve; the Retina Might Be Compared to the Photographic Plate of a Camera*



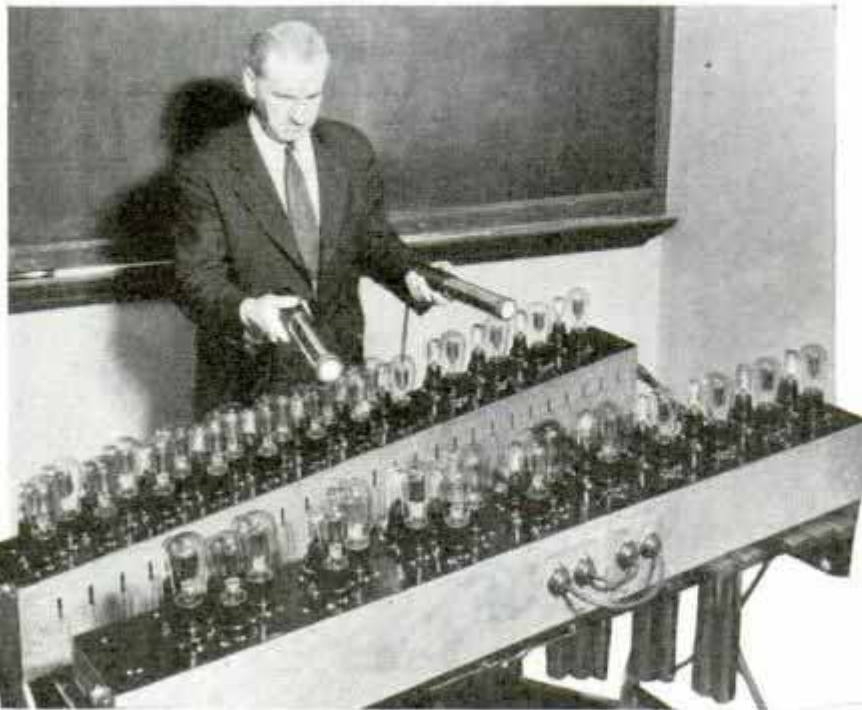
*Right, One Step in Developing Photo of Retina; This Work May Make It Possible for Police to Solve Many Crimes by Photographing the Eye of the Victim and Revealing Important Details Recorded on the Retina*



*Center, Reproduction of Image Caught by Retina of Woman Killed in Auto Accident, Proving That She Lived a Few Seconds After Wreck; Note Clarity; This Photo Helped Police Working on the Case*



# Light Beam Surpasses Four Human Musicians



Flashlights Are Used in Playing This Marimba, Which Is Equipped with Grid-Glow Tubes and Other Recent Developments in Science

light is the latest trick from the scientist's bag of electrical marvels. Two beams of light replace the musician's hands in producing passages too difficult for four marimba players performing in the normal way. The instrument is a standard marimbalite-type of xylophone which is played by means of two or more flashlights, one or more in each hand of the operator. Dr. Phillips Thomas of the Westinghouse Electric and Manufacturing company has been presenting the light-beam marimba in a demonstration of the advances in

Playing a marimba by photo-electric and grid-glow tubes actuated by beams of world research, with emphasis on the use of photo-electric and grid-glow tubes.

# Handy Food Mill for the Kitchen Is Operated by Hand

Handy for mashing or ricing vegetables, canning fruits and preparing foods for infants and sick persons, a hand-cranked food mill is being offered for kitchen use. The utensil is easy to operate. After the device is placed in a slightly larger kettle or bowl, the food is put into the mill. Turning the crank causes a curved beater to force the food through the finely perforated bottom.

through sixteen coils. Heavy insulation in both sections gives increased efficiency.



Showing Two of the Many Uses to Which This Simple Food Mill May Be Put; Note the Ease of Operation in Turning Handle

## HOT-WATER HEATER BURNS OIL

Economical operation is claimed for a new oil-burning hot-water heater. The water enters copper coils in the lower section for preheating, then passes through to the upper section, flowing

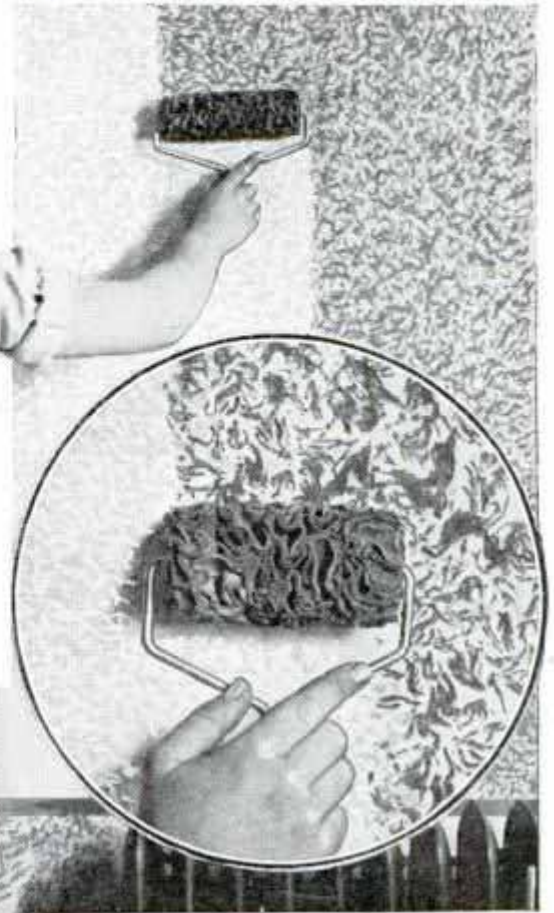
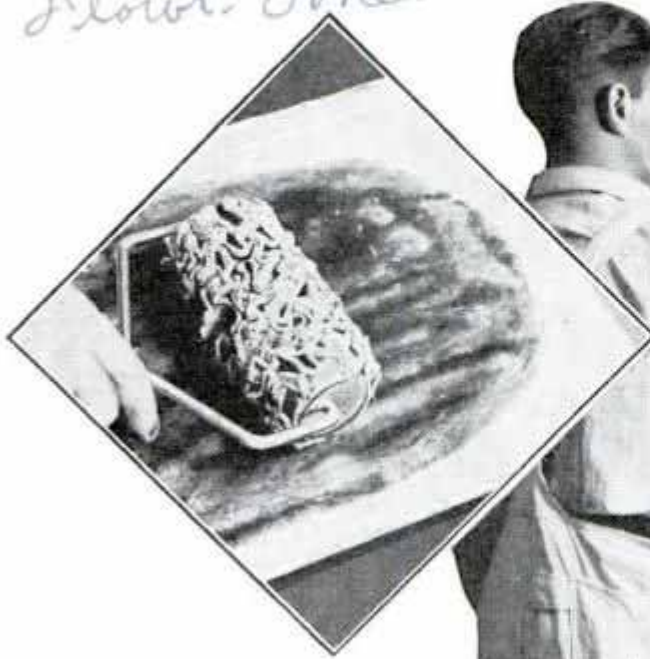
*1:1 Main St. N. E. & Gunneboles Turn*

*Foley Mfg. Co. Inc. 143 1/2 Foley Bldg.*

*Carlson Bros. Food & Machine Co. Inc.*



*D 45*  
*Huntington, N.Y.*  
**Wall Paint Roller Applies Two-Tone Finish**  
*Two-Tone*



*Left, Rolling the Leather Cylinder in Paint; Center, Applying Paint to Walls; Right, Close-Up of the Roller as Attractive Design Is Applied*

Decoration of interior walls in two colors, or more, may be accomplished by using a paint roller. A solid coat of body paint is applied in the usual way and allowed to set or dry. Then the paint to be used for decorative purposes is prepared. The roller, after being dipped in gasoline, benzine or turpentine before using, is worked in the paint on a flat tray and applied to the wall. Many attractive effects may be produced by proper manipulation of the roller. If desired, a third color may be applied. Satisfactory results are claimed for the roller, which is made of leather. Given the proper attention after using, the roller will not clog with paint.

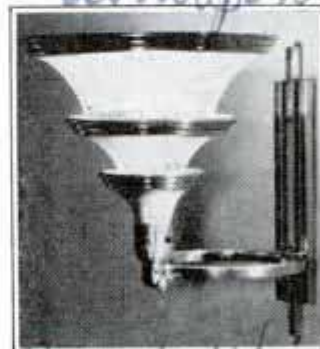
*D 137*  
**SCALES ARE FISH FINGERPRINTS**

Canadian government fishery scientists have found that scales identify fish just as fingerprints identify humans. This fact was discovered by tagging salmon and freeing them. With the tag, record samples of scales from that particular fish were filed away. A reward was offered for return of the tag if the fish should be caught, but it was specified that samples of the scales must accompany the tag. A comparison of the scales tells the experts whether the tag is authentic. The scales also tell the

fish's history, when it migrated to the open sea and when it returned to spawn in the stream where it was born.

**PORTABLE LAMP PINS ON WALL TO LIGHT BRIDGE TABLE** *D 359*

Glareless light for the bridge table is provided by an indirect illumination, portable unit that is attached to the wall by means of push pins. The cord drops down the wall to a base plug. Weighing only one and one-half pounds, the electrical unit can be moved from one wall to another as easily as a small picture. A G-30 indirect Mazda lamp is used in the bracket. The shade of the lamp gives the effect of translucent glass trimmed with metal when lighted, but it is made of aluminum. Tilting the shade alters the lighting effect.



*Can. James Montague, 608*

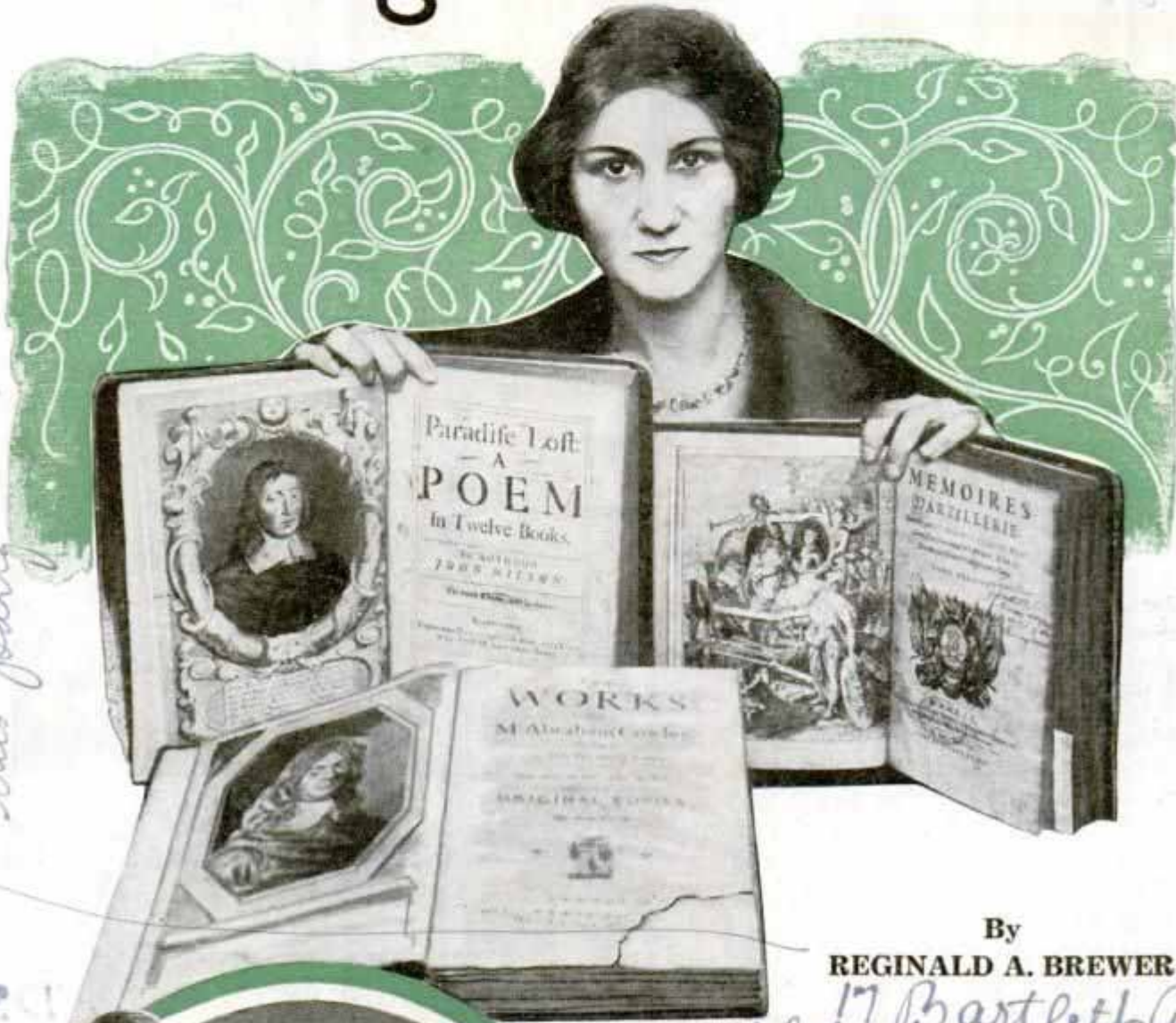
*about \$6.00*  
*Pat. U.S.*  
*Brailley Corp.*  
*Pure Land, Ohio*



D470

# Hunting TREASURES

*Inquiries can be referred to this party*



By  
**REGINALD A. BREWER**

*17 Bartlett Ave  
Detroit Mich*



**F**EW of us can set forth to try to penetrate the secrets of long lost pirate plunder. But, treasure there is for all of us, waiting for discovery near our own homes. Others have found it and many are earning a living from it with always the chance of a lucky "strike."

Few people realize that literally hundreds of well known American books have, through the years, become valuable—some very valuable. None of these volumes is much over a century old. They are to be found in many a bookcase, in attics, in second-hand stores and at auctions of household effects. They are just as likely to be encountered on the farm and in rural communities as in the metropol-

*Above, Some of Rare Volumes in Collection of the University of Pennsylvania; Below, Old Martin Luther Bible Printed in 1729*



# in RARE BOOKS



*Above, Giant Bible Weighing More Than 1,000 Pounds; the Letters Were Printed by a Hand-Stamping Machine; Right, Tiny Bible with Pages about Half the Size of a Two-Cent Stamp*



itan centers. In fact, those living in the smaller towns are likely to find their opportunities even better than the city book hunter. The farmer or the resident in small towns is not as prone to discard his possessions of the past as the city dweller.

Now, why are these books valuable? What does one have to know to seek them out? What are they worth? How can they be converted into cash?

Certain books are valuable because they are rare and important. Technically they are known as "first editions." In 1850 there was published in Boston a book called the

"Scarlet Letter," by Nathaniel Hawthorne. Just how many copies the publishers printed of the first edition is unknown, but probably not more than five hundred. Today, one of these first copies is considered worth \$750 by book collectors.

To go in search of book rarities requires a thorough familiarity with the important books published in this country, the dates of the first editions and, in some instances, special information necessary to identify the preferred copies. For example, in the case of the "Scarlet Letter," one must know that the copies worth \$750 must not





only be dated 1850 on the title page but must also contain a typographical error on page twenty-one in the twentieth line. In the valuable copies you will find the word "reduplicate" which should have read "repu-diate."

All this information is available. Public libraries have certain works on the subject and reasonable study will soon equip anyone to know what to look for. Certainly, the possible rewards are well worth the effort.

Let's consider these rewards. The gem of American book rarities is a little book published in Boston in 1827 and written by that master author, Edgar Allan Poe. It bears the title, "Tamerlane and Other Poems written by a Bostonian." So rare is this slight volume that a copy in good condition would be easily worth \$10,000. So far, less than ten copies have come to light but one never knows when some



© Harris & Ewing  
Top, Gutenberg Press and \$500,000 Gutenberg Bible; Right, Venetian Edition of Aristotle, Called "the Most Beautiful Book"; in Circle, Original Gutenberg Bible; Left, Book Written in 1534 Describing Columbus' Voyage

lucky individual will unearth another.

Then there is "Fanshawe: A Tale," by Nathaniel Hawthorne, published in 1828, which is valued at \$5,000 a copy.

Another very valuable book is "Prose Romances. Number 1," written by Poe in 1843 and worth better than \$2,000 if in good condition. Not all rare books rise to such

(Continued to page 122A)



Latest Flying "Pullman" Has Twelve Berths



Top, Section of Air "Pullman" with Berths Closed for Day Travel; Bottom, Berths Ready for Use by the Night Traveler

Completely equipped for night travel, the first of a fleet of six sleeping planes has been delivered to American Airways for use between cities in the southwest. The air "pullman" has six compartments, each of which has sleeping facilities for two passengers. Each berth is equipped

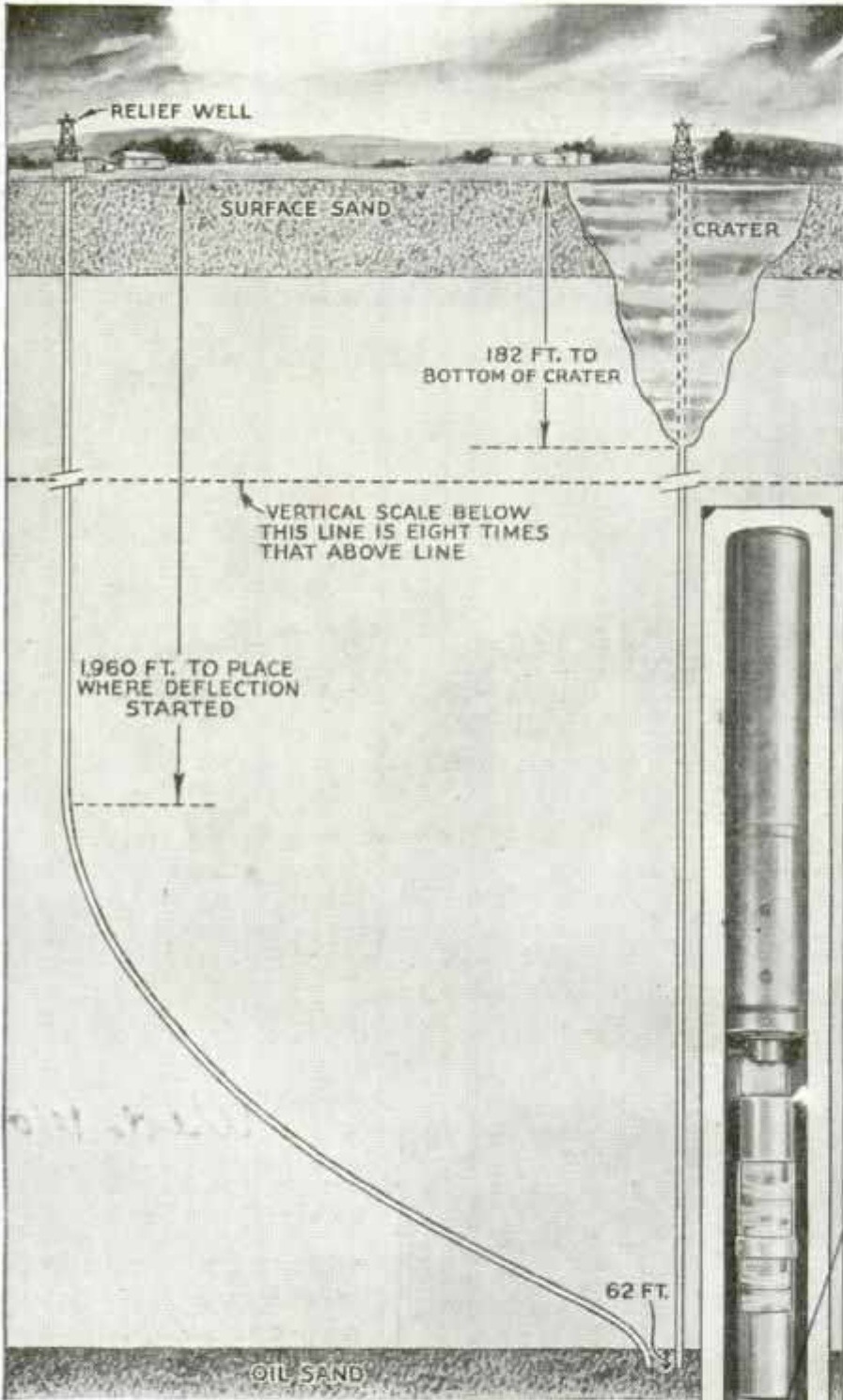
with reading lights, individually controlled warm and cool air, luggage shelf, clothing net, coat hanger and service call button. Berths can be converted quickly into comfortable seats for daylight operation. Cruising speed is 160 miles per hour, fast enough to fly from Dallas, Tex., to the west coast in ten hours. Built by the Curtiss-Wright Airplane company, the plane is designated as a convertible Condor.

☐ Coffee is a native plant of Abyssinia.

Science Letter 1/13/34.



# Wild Oil Well Tamed by Scientific Trick



Left, Diagram of Relief-Well Drilling; Inset, Instrument Used to Aid Drillers; Right, View of Cratered Well, with Relief Well in Background



direction. The relief well was drilled straight down for 1,960 feet. Then a new knuckle-joint deflecting device, a combination bit, reamer and deflecting tool, was used to drill twenty feet of hole. The instrument used to show where the well was going is one that is run into the well on the end of a wire line. At a certain number of minutes after it is started down the hole, it takes a picture of a compass and of the intersection of two cross wires which show the number of degrees the hole is inclining from the vertical. This photograph forms a permanent record. When the well reached a depth

When an oil well in Texas cratered and let the derrick fall into the hole, releasing oil and gas over an area 168 feet in diameter, engineers finally brought it under control by pumping water through another well to the bottom of the wild well. The well through which the water was pumped was sunk by means of a special tool to start the relief well on its course, and new type underground survey instruments to keep the well going in the right

of 4,800 feet its lower end was near that of the wild well and drilling from that point was kept nearly vertical. Its entire depth when completed was 5,135 feet. As soon

*at course of field*

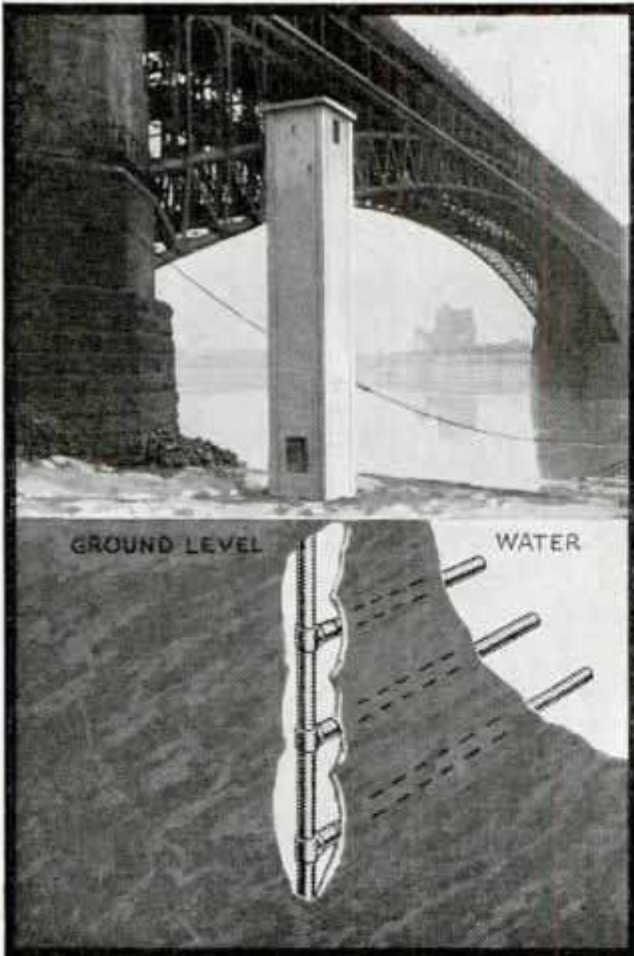
*John H.*



*Cont. W. O. News*  
*Commercial St.*  
*St. Louis, Mo.*  
 as the relief well was finished, the wild well was "killed" by pumping water down the relief well. About half of this water came up the wild well, cutting off the oil and gas and making it possible to repair the well at the surface. A sheet-iron shield between the two wells, and fire-fighting equipment protected workers in the event of fire reaching the gas and oil.

*D467*  
**REMOTE-CONTROL RIVER GAUGE  
 WARNS AGAINST FLOOD**

Daily inspection trips of weather bureau employes to obtain water-level readings on the Mississippi river have been eliminated at St. Louis, Mo., by installation of a remote-control gauge. Every movement of the water, up or down one-tenth of an inch, is recorded electrically on instruments in the weather bureau office far from the river. The gauge takes the readings, which are transmitted to the record-



*Gauge in This Tower Records Water Level in Weather Bureau Station Some Distance Away*

ing instruments by electrical current. Housed in a water-tight concrete building, the equipment is safe from flood.



*One of the Tubular Lamps with a Metal Cap on Each End; Several Produce Line of Light*

**END-TO-END TUBULAR LAMPS  
 FORM LINE-OF-LIGHT**

Tubular electric lamps, constructed to fit end to end, have been produced to make possible a nearly continuous line of light with a minimum amount of dark area. Instead of the conventional base, the new lamp has at each end a special metal contact cap. It employs a single stretched coil filament drawn out into a continuous line from one end-contact cap to the other.

*D455*  
**POCKET PENCIL SCALE SHOWS  
 WEIGHT OF LETTERS**

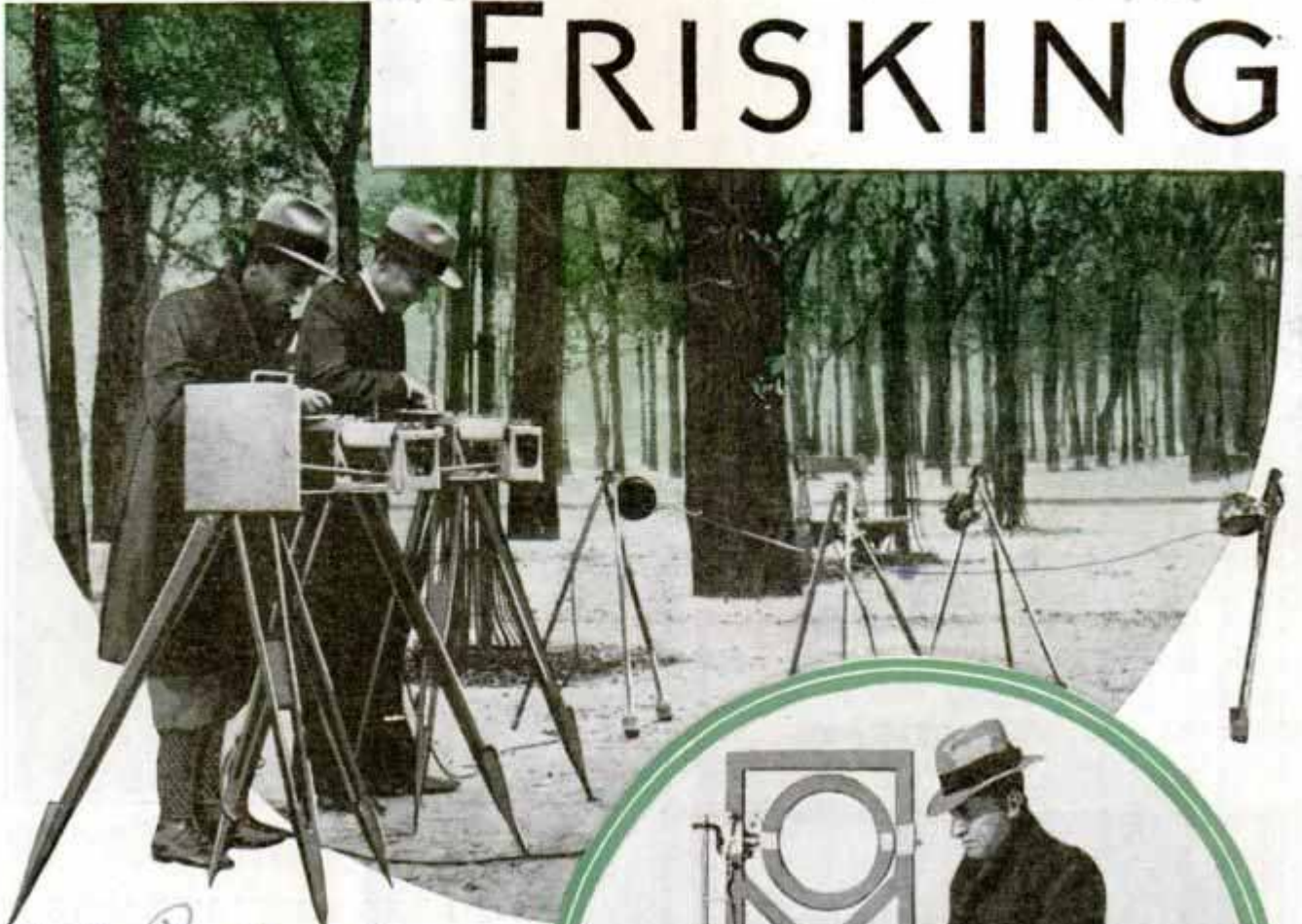
Using the standard lead refills, a metal pocket pencil also contains a small scale to show the weight of letters in ounces, making it easy to find the postage required. Letters are slipped into a clip at one end of the pencil and suspended, the weight being indicated on a telescoping scale.



*P. Sparuth Co.*



# FRISKING



468 Riverside  
Avenue  
New York City

By CHARLES F. CARTER

WITH touch too delicate to disturb the lightest sleeper, geophysical prospectors on every continent are frisking Mother Earth for such valuables—diamonds, gold, silver, nickel, copper, iron, oil, lead, zinc—as she may have concealed on her person.

In their search this scattered army of prospectors uses pendulums, torsion balances, seismographs and much other apparatus strange to the layman with which they make on the surface measurements based on physical properties of different substances by means of which they locate concealed mineral deposits of all kinds and map their extent and their depth with success which almost stretches credulity beyond its elastic limit.

Applied geophysics is a heritage of the World War. It appears that the principles upon which geophysical prospecting is based were developed and used to locate



Two Observers Simultaneously Registering Electrical Currents at Right Angles; Below, Magnetic Gradiometer Used in Geophysical Exploration

enemy submarines lying motionless on the bottom of the sea. Steel vessels have magnetic properties, which in sea water cause them to behave like batteries. They also reflect sound waves directed toward them. On these principles various devices were evolved and used successfully in coping with the submarine peril.



D 444

# MOTHER EARTH



After the war there was time to observe the close analogy between submarines under water and ore bodies under ground. Detection of either depends on the difference between properties of the body and of the surrounding medium. On this principle ore bodies can be located at any depth from which it is possible to recover them. By contrast the science of geology, in its search for mineral deposits, is restricted to exposed parts of the earth's surface. Only by costly drilling can geology verify its conclusions drawn from surface indications.

First geophysical methods to be employed were based on magnetic attraction. Almost all



*Above, Geophysical Exploration for Oil in French Equatorial Africa; Below, Searching for Oil by the Inductive Method*



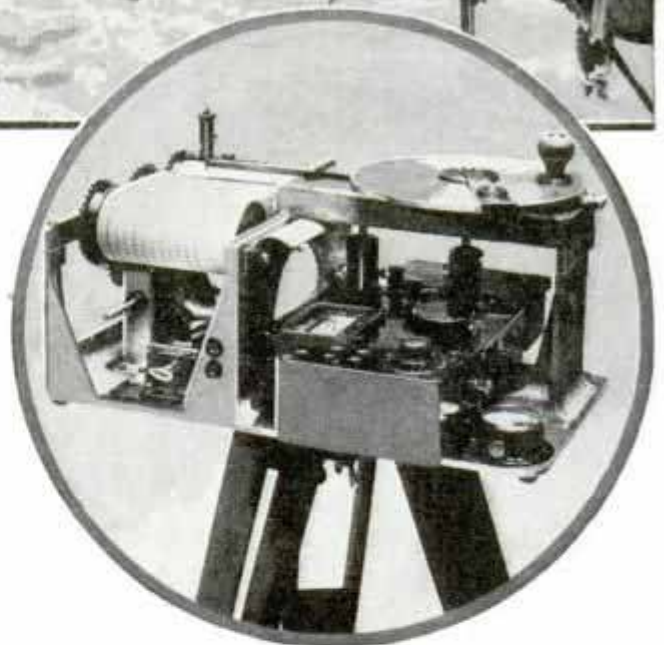


num weight at one end and a similar weight suspended from the other end. A mass of greater or less density than surrounding material at one side or the other of the beam produces a different pull on the two weights, turning the beam a minute amount. This

substances have some magnetic effect. This method has been used in locating iron ore in Sweden, in the Lake Superior iron district and in Canada where copper and nickel ores often are associated with magnetic pyrrhotite. A sort of compass the needle of which swings vertically instead of horizontally, indicating changes of as little as one part in six thousand in the earth's magnetic field, is the essential feature of a magnetic survey.

Magnetic exploration helped in the development of the immensely important Gulf Coast oil fields in Louisiana and Texas, in delimiting Lake Superior iron ore deposits, in locating a certain type of gold-bearing vein in Brazil, in revealing the extension of the gold reef in the Rand, and in working out the geology of the coal basin in the Province of Seville, in Spain, after numerous expensive drillings had failed to provide the needed information.

Advantage also is taken of the fact that a man standing on a certain kind of rock weighs more than when standing on a certain other kind in developing the gravitational method. Small though the difference between the pull of gravity over dense rocks and the weaker pull over less dense formations may be it is detected and measured by the torsion balance. This consists of a light horizontal beam suspended at its balancing point by a fine wire. The beam is balanced by a small gold or plati-



*Top, Geophysical Survey Party in Equatorial Africa; Center, Using Magnetic Gradiometer; Below, Potentiometer with Registering Apparatus Used in Geophysical Exploration*

twists the torsion wire, the degree being recorded photographically by a spot of light reflected from a tiny mirror mounted on the wire. The gravity method has achieved its greatest success in the search for petroleum in Europe and in the Gulf

(Continued to page 116A)



Chas. W. Jacoby

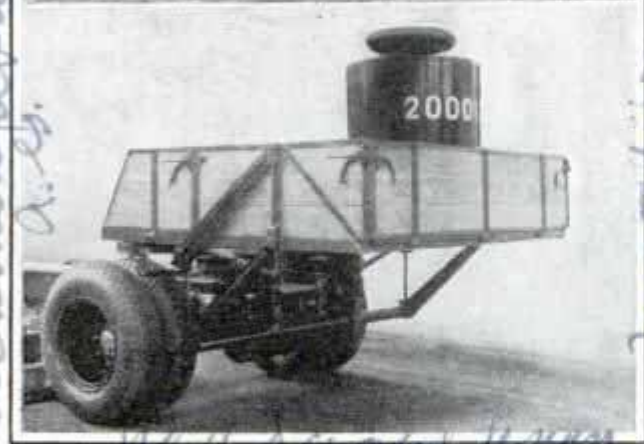
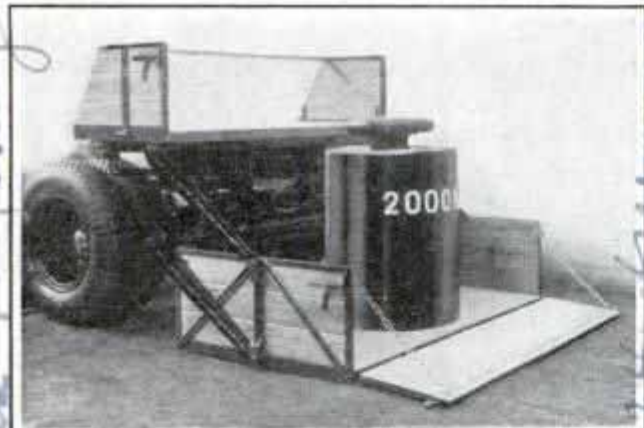
**MOVIES ARE MADE LIFELIKE BY PAINTING SCREEN**

2819 Frankford Ave. Philadelphia D409

Motion pictures are made more lifelike by painting the screen with a mineral solution that apparently imparts "roundness" or "third-dimension" properties. The method depends upon the power of certain minerals to act as minute "transformers" of light rays, stepping them down from the invisible to the visible part of the spectrum. Each mineral is painted on the screen and permitted to dry until seven coatings have been applied. Motion pictures projected upon the treated screen have "life" and warm depth.

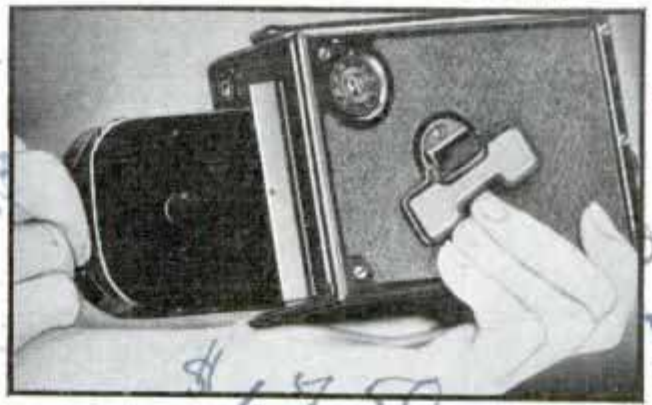
**HYDRAULIC LIFT FOR TRUCKS LOADS AND UNLOADS**

Loading or unloading heavy articles on or off trucks is made easy with the aid of a hydraulic lift now being produced in Germany. It is attached to the rear of the truck and swings up or down on parallel arms operated by two horizontal hydraulic



Hydraulic Lift Which Raises Load from Ground or Lowers It from Floor of Truck

rams. The lift thus raises a load from the ground to the floor of the truck, or lowers it from the truck to the ground.



Top, New Lightweight Movie Camera; Bottom, Magazine for Loading Camera in Daylight

**MOVIE CAMERA HAS MAGAZINE FOR DAYLIGHT LOADING**

Instantaneous loading is possible with a lightweight motion-picture camera designed for magazine loading. The operation is simple, a fifty-foot film magazine being inserted in the camera and the door closed to prepare the camera for work. The unfinished film can be interchanged with the film of another type at any time, even in daylight, with the loss of only one frame. Thus, the user may turn at will from monochrome to Kodacolor, or from one type of monochrome film to another. The camera weighs slightly more than two pounds. There are two view finders, one a spy-glass finder and the other a waist-level finder of the reflecting type. Two speeds, sixteen or twenty-four, are provided for, as are single-frame exposures. Sixteen millimeter film is used.

Richard  
Machmentfabrik  
A. G.  
Munster  
Germany

1809  
Dachmant  
Chicago  
Bell & Howell Co.

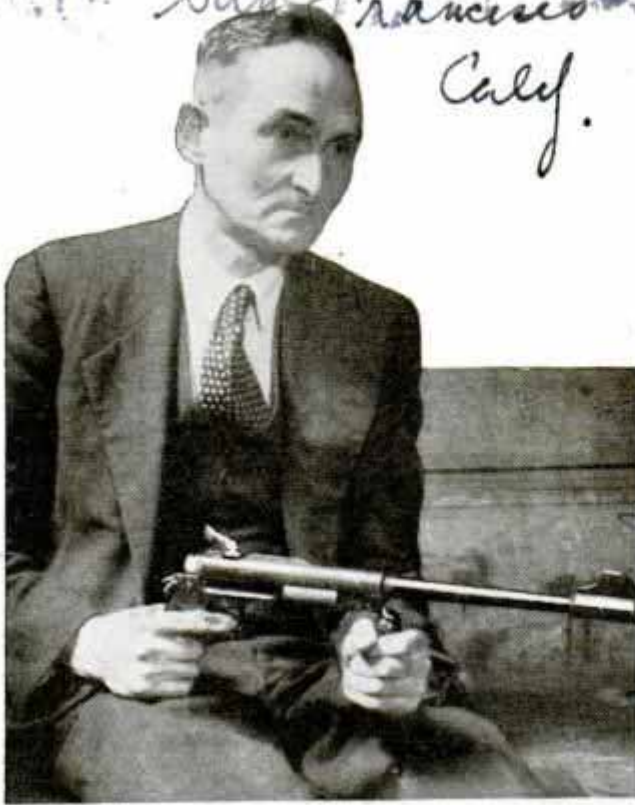
Bell & Howell Co.



D 496.

C. M. Clyde Harrell

San Francisco Calif.



Small-Size Machine Gun That Has Little Recoil, Though Capable of 700 Shots per Minute

MACHINE GUN OF AIR-RIFLE SIZE USES SPECIAL BULLET

Little heavier than a child's air rifle, a new machine gun is capable of firing 700 shots a minute with almost no recoil and without overheating. The gun weighs only three and one-half pounds. The bullets, of revolutionary design, receive only an initial impetus from the firing pin, generating their own energy in flight and releasing whatever energy they have left on contact with any obstacle. The bullets are joined together with aluminum wire, fed from an endless chain.

SIGN MOUNTED ON AUTO HOOD IS HELD BY WIRE FRAME

By mounting a detachable wire frame on the hood of a pleasure car, the automobile can be transformed into an advertising medium for business purposes. A cardboard sign nine by eighteen inches and painted on both sides is held in the frame and the sign can be changed as often as desired. The frame is held tight

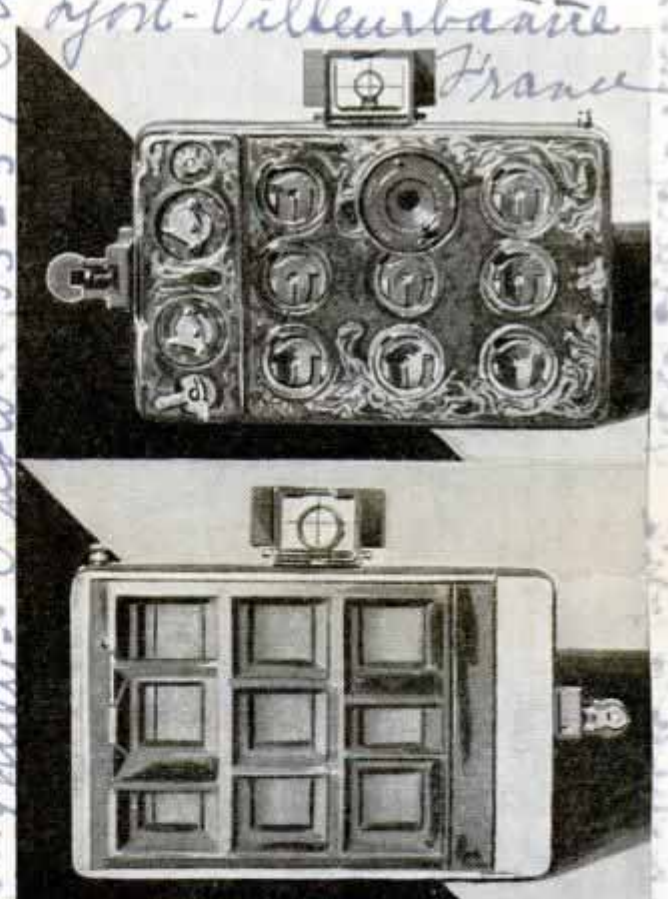


against the hood by spring tension. Brackets in the rear slip under the hood and rubber feet in front rest on top of it without marring the finish. It can be attached or removed in less than a minute.

D 503

CAMERA TAKES NINE PICTURES ON SINGLE PLATE

Nine pictures on one plate or film measuring three and one-half inches by four and three-fourths inches can be made with a French camera. Nine openings in the face of the camera are protected by shields until a lens is inserted. A quarter turn locks the lens in place and opens the aperture, ready for the exposure of that particular section of the plate or film. The shutter operates over all nine openings at one time, so that any area under an opened aperture is exposed. Automatically timed exposures, ranging from ninety seconds to



Top, Face of Camera with Nine Lens Sockets; Bottom, Nine Sections for Exposing Plate

one five-hundredth of a second, are possible. Another adjustment permits a delayed exposure of ninety to ten seconds, so the operator can set the camera and take his place in the group to be photographed.

Caminal locale

D 413

Eastman Co. Rochester N.Y.

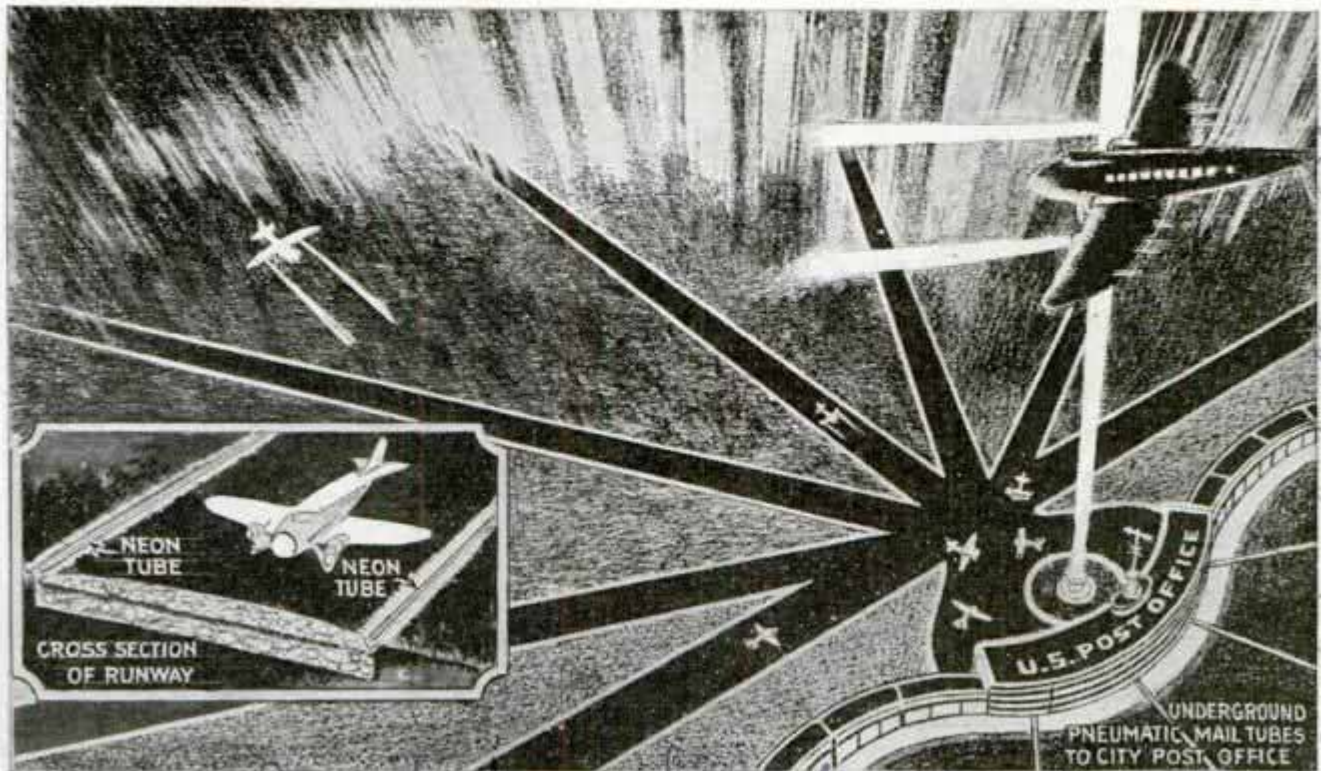
Photo 55-57

1908-1910

No 11 Saginaw



# Non-Glare Airport Lighting Aids Night Pilots



© Hamilton Wright

Sketch of Lighting System for Airports, Showing How Runways Would Be Outlined in Pencils of Neon Illumination, Increasing Visibility; Inset, Method of Installation of Tubing Alongside Runways

Designed to eliminate glare, a new system of airport lighting has been developed by Capt. C. H. Biddlecomb, Clarence Chamberlin and Everett Sutcliffe, experts in various phases of aviation. The system, which is called "glow-worm," enables aviators flying over the airport to visualize the arrangement of buildings, obstacles and land areas instantaneously without having to face the glare of beacons and searchlights. The glow-worm airport would have the exact outlines of runways, buildings and obstructions described in thin pencil lines of glowing light, such as that given by neon tubing. The cost of installing neon on a large scale is estimated as considerably less than the cost of flood-lighting systems generally used for night operations. The nearest approach to glow-worm lighting is the General Electric company's runway marker system which distributes submerged incandescent lamps along the runways, a sort of indirect lighting system. In a study of the visibility of various color combinations, the experts found that the ideal combination is yellow and black. Accordingly, their system calls for black roadways outlined by yellow pencils of light. The illumina-

tion is visible to the aviator at all angles, yet forms no obstruction. The top of the light trough is flush with the road level.

## TOP FOR MOTORCYCLE SIDECAR FOLDS WHEN NOT IN USE

American motorcycles used by a Japanese electric-power company are equipped with tops and curtains for the sidecars like those used on sport roadsters in this country. When not in use the top folds down back of the car into a neat canvas boot and the curtains, with celluloid windows, are folded and stored back of the seat.



Motorcycle Sidecar Equipped with Top and Curtains Which Fold Out of Way When Not in Use

Capt. Theodore A.

30 Rockefeller Plaza, New York

*newspaper syndicate features*

*D 450*

*Tokyo Japan*



# Beam Gun "Shoots Down" Pilots at Night



SHOWING EFFECT GREEN LIGHT GUN HAS ON STUDENT PILOT WHILE IN THE AIR

OFFICER IN OPERATION CONTROL TOWER AIMING 50-CANDLEPOWER LIGHT GUN TO BRING DOWN STUDENT FLYER

OPERATION CONTROL TOWER

*Light Signals Are Used to Direct Students in Night Flying at Randolph Field, Tex., U. S. Army Air Corps School; Left, Center, Officer Aiming Beam "Gun" at Novice's Plane*



D 507

# Colored Lights Flash Orders to Air Students



THIS DIRECT AND EFFECTIVE LIGHT CLEARLY SIGNALS STUDENT PILOT TO LAND

THE LIGHT BARS AND CIRCLE ON HANGARS ARE SIGNALS TO TELL FLYERS WHAT TO DO - WHEN GREEN CIRCLE LIGHT IS FLASHED IT MEANS THAT STUDENTS SHOULD REMAIN AT ALTITUDE OF 2000 FT. SO THAT CROSS COUNTRY FLYERS IN LOWER ALTITUDE ARE SAFE

WHEN BARS ARE FLASHED RED STUDENT SHOULD LAND

ONE BAR IS FOR STUDENT IN ZONE ONE TWO BARS ARE FOR STUDENT IN ZONE TWO ETC.

WHEN RED CIRCLE APPEARS THIS MEANS SOME DANGER SUCH AS A CRASH ON THE FIELD WHICH MUST BE CLEARED



CONTROL ROOM - WHICH OPERATES ALL THE LIGHT SIGNALS FOR NIGHT FLYING

of the material to be used.

Operated from Control Room Shown at Bottom, Right, Lights in Form of Bars and Circles Direct Student Flyers at Night; When Lights in Circle on Building "E" Flash Red, They Warn of Accident

Cont.



# One-Passenger "Trolley" Used on Mountain



Showing How Individual Rail Cars Operate; Note One Worker Awaiting His Turn to Start for Home at Foot of Mountain After Day in Quarry

*merioneth*  
 Workers in the slate quarries in Wales return to their homes after a day's work in the mountains on one-man "trolley" cars. These single-passenger vehicles used on the mountain railway consist of nothing more than an axle with a seat at one end above a small wheel and a roller at the opposite end. The wheel is placed astride one rail and the roller revolves on the second rail. Much time is saved on the downhill trip by using the little cars with horizontal trolleys.

# Flying over the Alleghenies with the Aid of a Fruit Jar

*D 3 19*  
*Army aviator*  
*Middleton, Pa.*  
 Aviators are famous for their inventive genius. Stories are plentiful about barnstorming aviators who used to land in hayfields and repair their cracked struts and fuselages with hay wire. Ingenuity of the same type was shown by Lieut. Paul E. Shanahan when he was ordered to fly across the Allegheny mountains with the ceiling and visibility registering close to "zero-zero." The small training plane he was to deliver had no blind flying instruments in it. He could not get any turn and bank indicator or pitch gauge from stock, and there were orders against installing such instruments on training planes anyway. The stretch he had to cross is called the "aviators' graveyard," and he decided he needed an instrument to show whether the plane was flying level. So he tried a fruit jar, filling it half full of water and tying it on the

cockpit cowling. Then he took the plane up for a trial hop. If the water climbed up on the right side of the jar it would indicate that the plane was banking to the right and vice versa. But in the test flight,

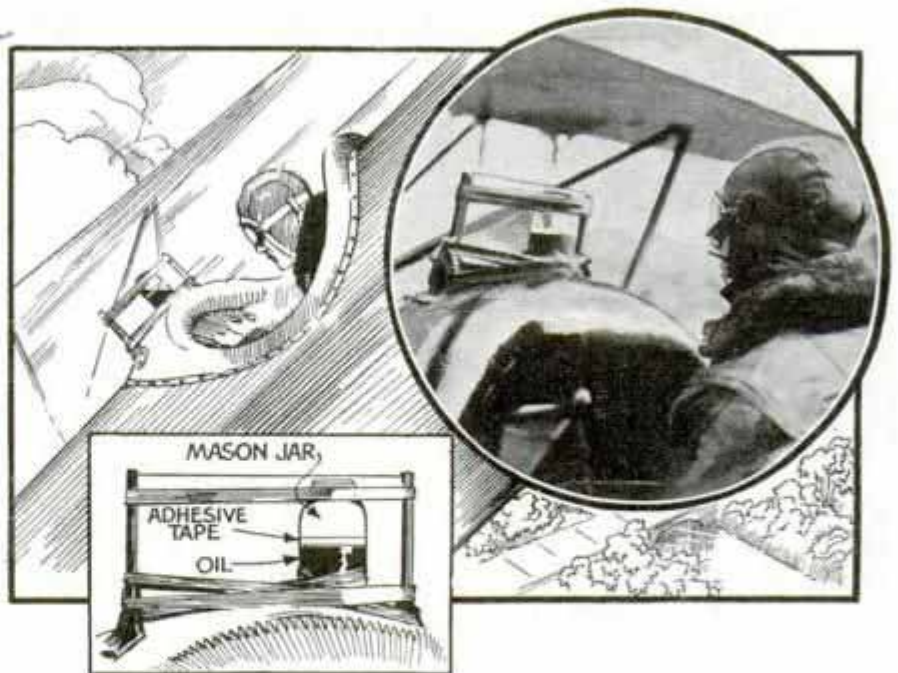


Photo and Drawings Show How Fruit Jar Half-Filled with Oil Served Aviator as an Instrument to Tell Whether Plane Was Flying Level

the water splashed up in the jar every time the plane hit a bump. This was not so good. He needed a liquid which would

the water splashed up in the jar every time the plane hit a bump. This was not so good. He needed a liquid which would

*Comd. Lieut. Corley Mc Harment.*



not splash and splatter so easily. The answer to this problem was oil. Filling the fruit jar half full of medium motor oil and taping the half-way mark outside the glass, Lieut. Shannahan took a chance. He flew the plane out over the mountains and soon ran into zero-zero as he expected, but he pushed the nose of the little plane right into the thick of it and his homemade combination "turn and bank" and "pitch gauge" brought him safely through to his destination.

**GUN TO COMBAT WAR TANKS  
SHOOTS THROUGH STEEL**

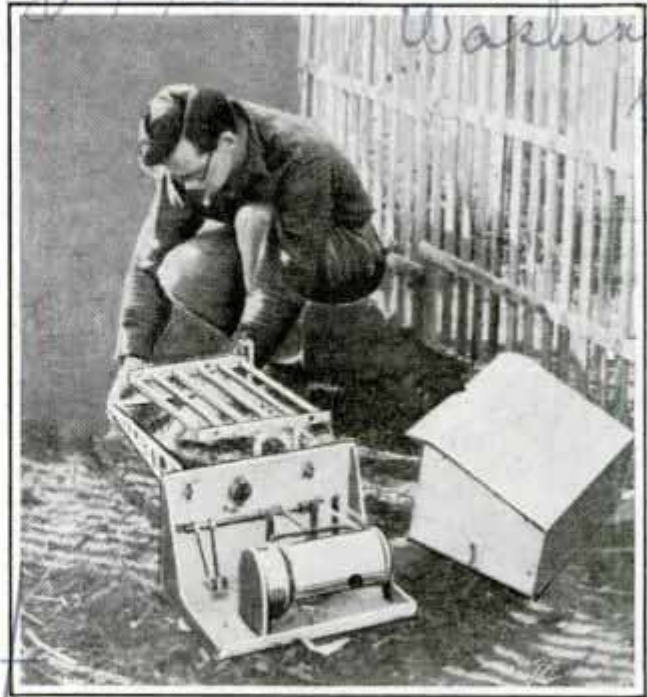
Defense against war tanks is improved by means of a twenty-millimeter rapid-fire gun tested by the Infantry Board at Fort Benning, Ga. Specifications of the weapon were kept secret by the United States army. In tests, cardboard silhouette targets were placed in the crew compartments of a tank and two shots were fired



Top, Outlines with Black Spots Showing Hits Made by Shell Fired into Tank

at 400 yards. The high-explosive bullets pierced the steel armor and detonated inside the tank, riddling the targets.

Among the volcanic rocks in Hawaii national park are some which float on water, some which can be heated and held in the hand without injury, and others which look like human hair or wool fiber.



Forest Ranger Removes Records from Machine That Records Essential Weather Data

**WEATHER ROBOT IN FORESTS  
AIDS FIRE PREVENTION**

Wind velocity and moisture content of the ground cover of the forest are recorded automatically by an instrument developed by the U. S. Forest Service as an aid to fire prevention. A tracing pencil on a revolving roll registers the wind velocity, as determined by a four-cup anemometer, and the duff and wood moisture, helping foresters to determine the fire hazard. In addition, the instrument keeps records complete while members of the service battle flames in another part of the forest.

**BATTERY WATER-LEVEL GAUGE  
MOUNTS ON DASH**

Guesswork about whether your battery needs water is eliminated by a water-level gauge that mounts on the automobile instrument panel. It is electrically operated from the battery, but pulls only one-twenty-fifth of an ampere. The gauge is installed easily, its terminal being placed in the cap of the middle cell of the battery.



Capt. Robert W. Leonard, 1115-17 A St., N.W. Washington, D.C.

A. S. Smith, Arlington Hall, Washington D.C.

D441  
 D475  
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 Science Letter  
 Fred W. Clamphit  
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# NEW CONVENIENCES



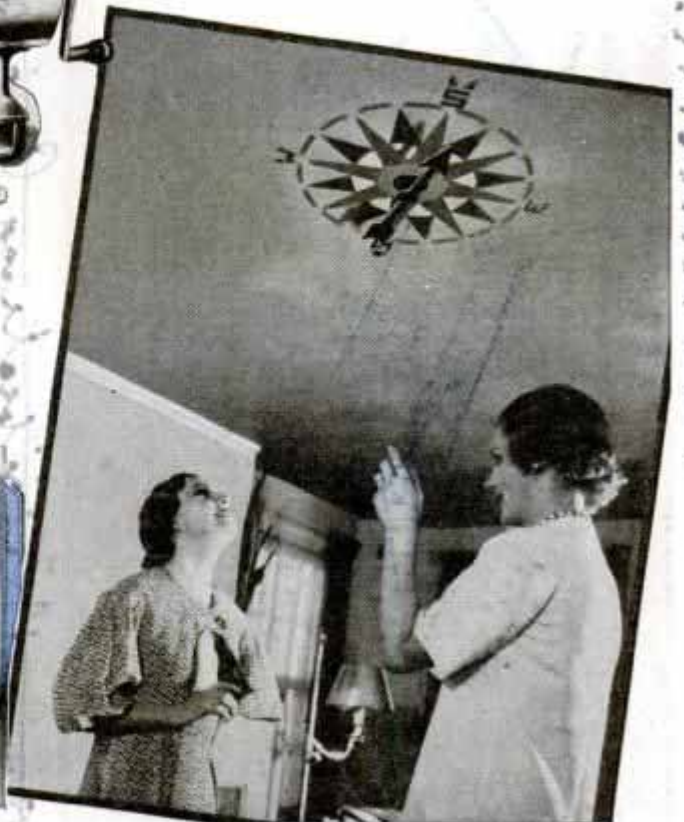
*Left, Handy Serving Tray Built into Door of Electric Refrigerator; Below, Automatic Knife Sharpener Operated by a Small Flashlight Battery*



*Left, Hand-Operated Kitchen Appliance Which Prepares Vegetables and Fruits for Soups, Salads, Side Dishes and Desserts; the Attachments Include a Fine Shredder, Dicing Disk, Slicing Disk, Stripper Knife and Coarse Shredder and Chopper; It also Crushes Ice*



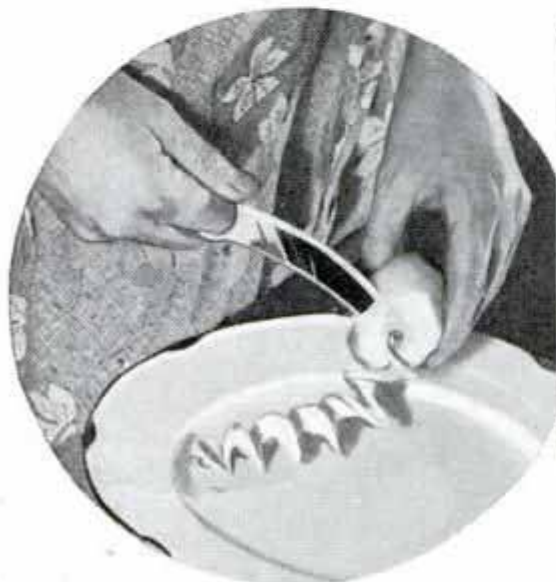
*Below, Self-Feeding Floor Waxer; the Wax Is Contained in the Hollow Handle and Is Expelled Just Back of the Mop; It Can Also Be Used for Oils, Sealers and for Scrubbing; Right, Wind-Direction Indicator in Ceiling Actuated by a Weather Vane Located on the Roof*





# for your HOME

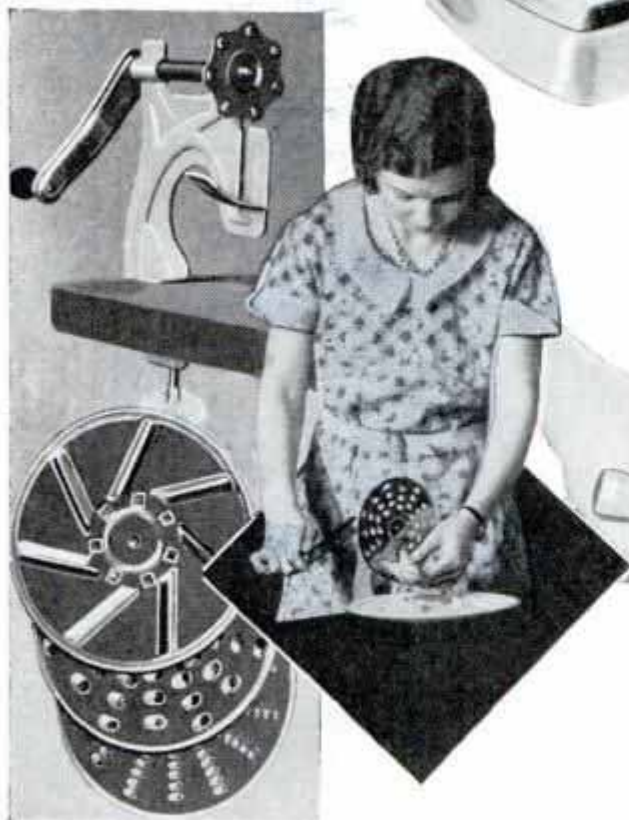
*Below, Simple Cutter Which Makes Coiled Potato Chips; It Consists of a Blade Fitted with a Threaded Screw and a Hole for the Finger*



*Below, Vegetable and Fruit Cutter with Three Disks for Fine Shredding, Coarse Shredding or Grating and Also a Slicer*



*Above, Combination Cedar Chest and Dressing Table; in Making a Table, the Front Folds Down and a Mirror is Removed from the Under Side of the Cover and Placed on the Top; Left, Bathroom Scale with Airplane-Type Dial for Easy Reading; Below, Three Measuring Spoons in One; the Ridged Bowl Enables the User to Measure One or Two Teaspoonfuls or a Tablespoonful, and a Rim around the Edge Prevents Spilling*









*Trimmer 1528 Armitage*  
*W. H. C. Chicago*

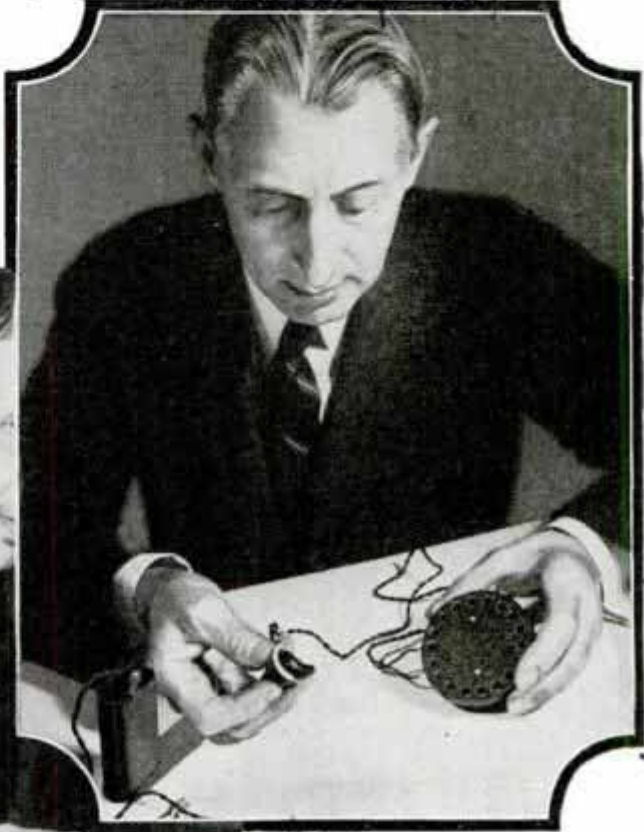


# POCKET HEARING AID

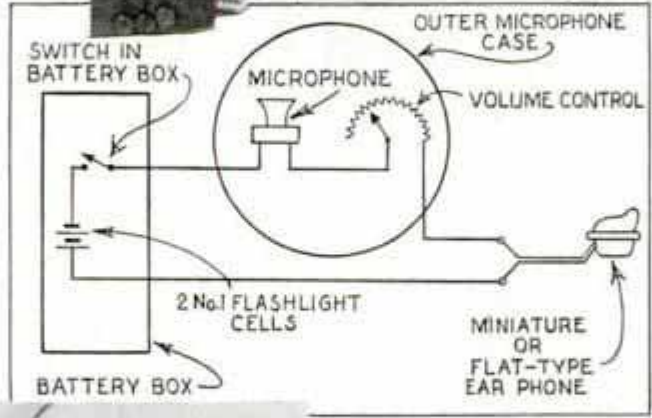
*D4540. Excellophone*

**E**ASILY assembled from a kit of parts, this pocket-type hearing aid for the deaf employs two small inexpensive flashlight cells for its operation. The microphone proper is inclosed in a metal outer case, which aids in amplifying the sound, and a small variable resistor is used to regulate the volume to suit the requirements of the individual. This case is provided with a clip for the coat pocket, and the entire assembly is designed so that it may be carried and operated with very little discomfort.

The miniature ear phone, shown in the photos, does away with the usual head-band. However, best results are obtained with the ordinary flat-type phone.



*\$32.50*



small metal box, shown in the lower photo, is used to house the No. 1 flashlight cells which may be obtained from any hardware or ten-cent store. This battery box is carried in the vest pocket and a miniature switch enables the user to disconnect the batteries when

the device is not required. Lightweight silk-covered wire is employed to connect the units and these leads terminate in plugs of different sizes that fit into midget jacks in the microphone case. The wiring diagram shows the hook-up clearly.



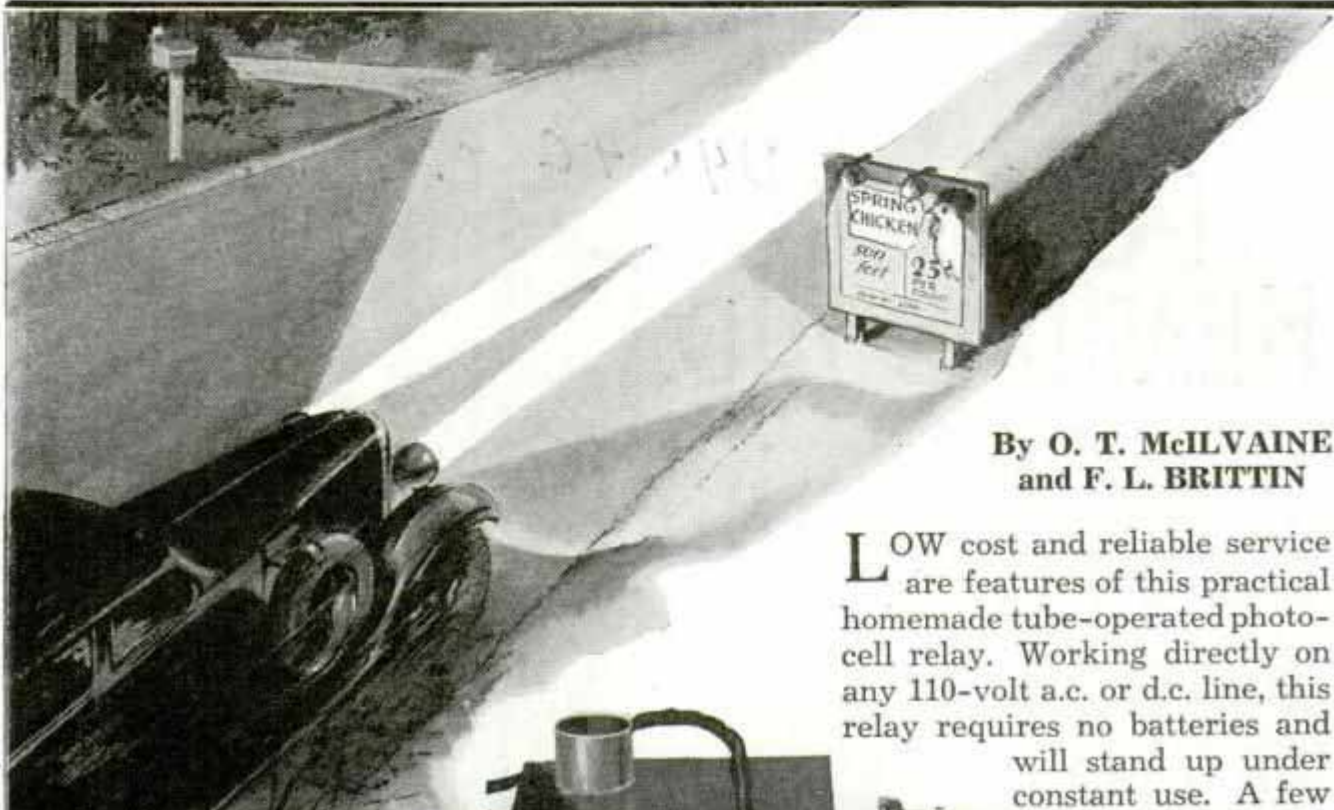
*Letter from doctor says several people found it of not help.*



Refer enquiries on this to J Britten.

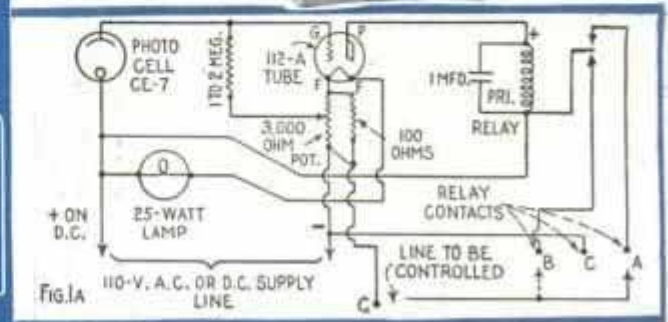
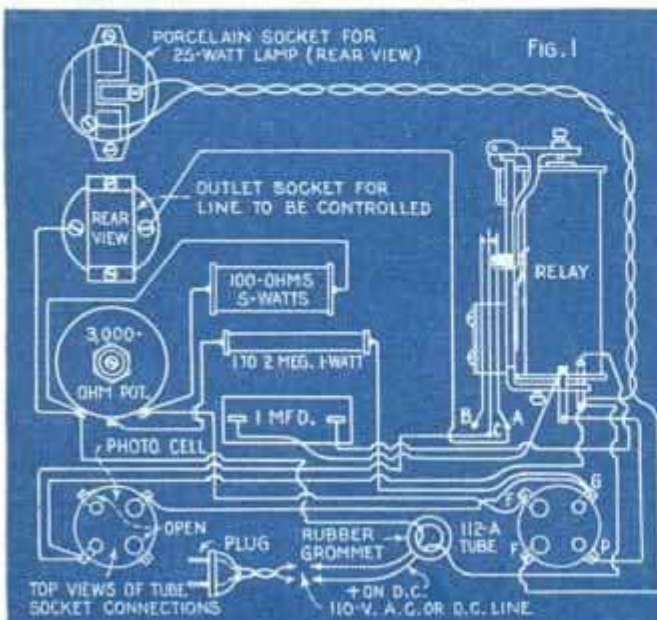
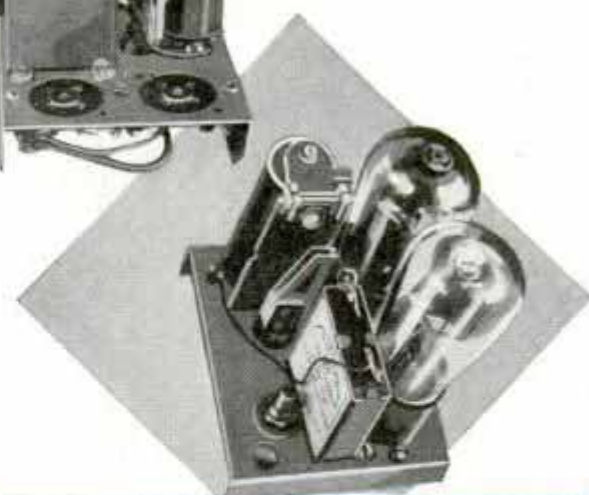
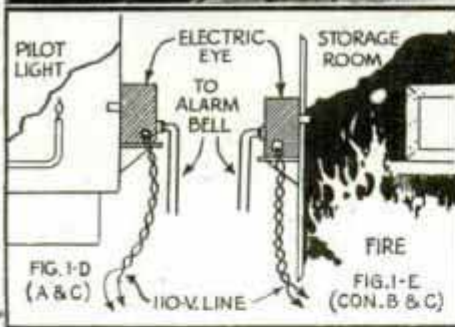
D.P.R-199

# SIMPLE TUBE RELAY



By O. T. McILVAINE  
and F. L. BRITTIN

**L**OW cost and reliable service are features of this practical homemade tube-operated photo-cell relay. Working directly on any 110-volt a.c. or d.c. line, this relay requires no batteries and will stand up under constant use. A few of the many simple applications possible are illustrated in the sketches; these are





# for ELECTRIC EYE



*Operates on  
A.C. or D.C.*

merely ideas that may be worked out in further detail by the builder to suit his particular needs.

A beam of light directed across the service driveway of a gas station is interrupted by the customer's car and the electric eye promptly rings for an attendant. Another application, as a pilot-light monitor, is shown in Fig. 1-D, both of which require relay connections A and C. When connected in this manner the light source holds the alarm bell circuit open and immediately closes it when the light is lowered or interrupted. A and C operation may also be used for door openers, burglar

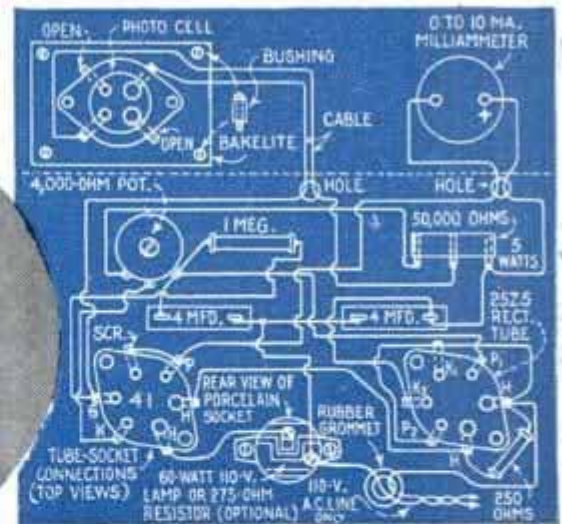
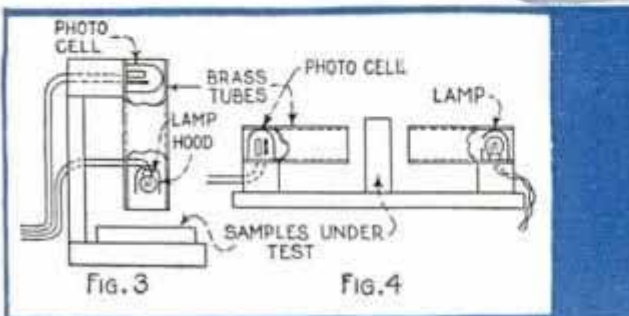


Fig. 2, Simplified Wiring Diagram for a Meter-Type Unit; Left, Photo-Electric Cell



alarms and, with daylight as a light source, for turning on lights in schools, factories, yards or porches as darkness approaches. For burglar-alarm protection, a filter placed over the light-source lamp will absorb visible light, permitting only infra-

(Continued to page 114A)





*Inset, Single-Pole Circuit Breaker; Left, Mounted, Showing Ease of Operation*

**Circuit Breaker Replaces Fuses**

This small circuit breaker will save the radio amateur many trips to the basement fuse box. It makes use of the same principle that protects the giant electric lines of power companies. When used instead of fuses, for the protection of radio apparatus, service can be quickly and safely restored by simply flipping the breaker handle that is just like an ordinary wall switch in the home. It may be mounted at any convenient point near the work bench or radio transmitter.

**Sound System over House Wiring**

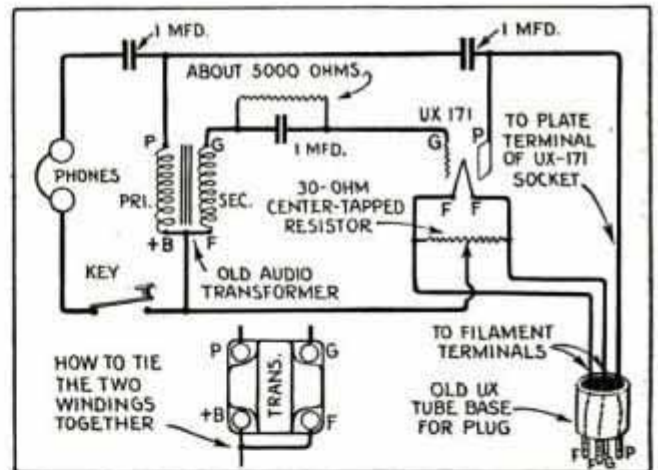


A socket-type microphone unit may now be plugged into the lighting socket for transmitting music or speech to one or more amplifier-speakers connected to the lighting circuit anywhere in the same building. The audio amplifier and speaker of a radio

receiver can be used as the outlet for this unit. Clear, noiseless transmission is claimed for any private or public-address need. The desk model shown consists of an audio-frequency modulated r.f. amplifier and microphone housed in a neat metal case.

**Code Set for Beginners**

The power to operate this beginners' code practice set is obtained directly from the last audio stage in the radio receiver. All parts can be found in the average experimenter's junk box. The tube socket and transformer may be mounted on a small board and fahnestock clips can be used for the key, phone and cable terminals. The type 171-A tube is indicated, as many of these are still in use. However, if another variety of output tube is employed in your set it can be substituted in the arrangement. This may involve a slight change in the value of the grid condenser and gridleak. With the apparatus shown, a pleasing tone of about 500 cycles is obtained. The 30-ohm center-tapped resistor is connected directly across the filament terminals of the socket. The center lead is taken to the connected transformer windings and also to the key. The output tube



*Hook-Up for Beginners' Code Practice Set That Plugs into the Radio Receiver*

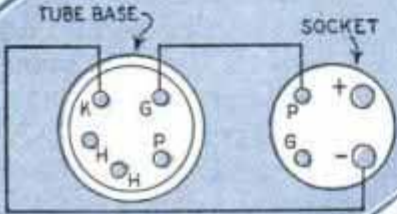
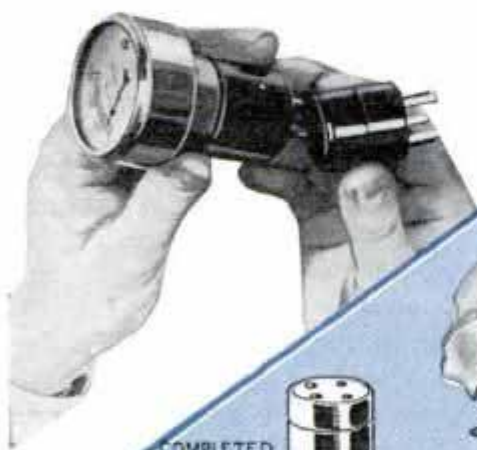
is removed from the receiver and plugged into the code set. The cable plug is made from an old tube base, or a similar plug can be purchased for a few cents. About 3 or 4 ft. of 3-conductor cable is required. These leads are connected as shown and soldered in the plug prongs indicated; this plug is inserted in the output tube socket of the receiver and the code set is ready for use when the receiver is turned on.—  
Ross J. Plaisted, Brecksville, Ohio.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge on receipt of postage.

*D4517  
Miles Reproducer Co. Inc.  
244 W. 23rd, New York*



# HINTS *for* RADIO EXPERIMENTERS



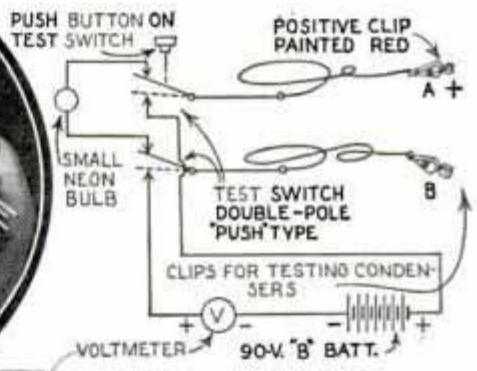
Above, Easily Made Adapter for Using a 4-Prong, Socket-Type, Plate Voltmeter to Test Screen-Grid Voltage in Modern Receivers; Connecting Leads Shown in the Diagram Hold the Adapter Together



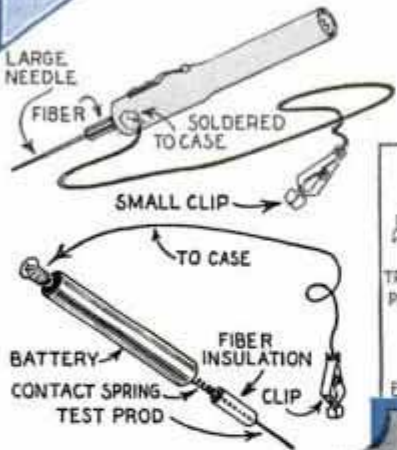
Above, Drilled Metal Bases Now Available in Various Tube and Coil Arrangements; Below, Tester for Electrolytic or Ordinary Fixed Condensers, Shows Short, Open or Leakage



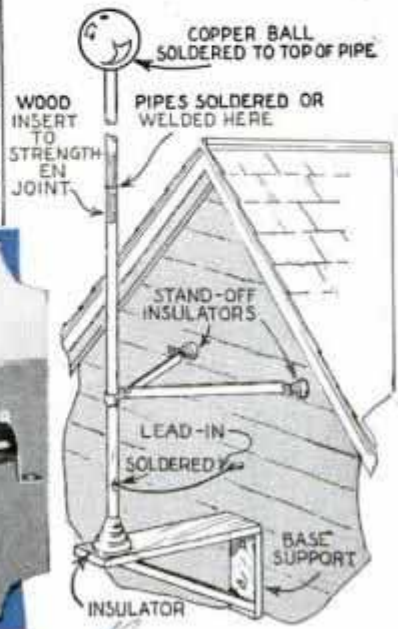
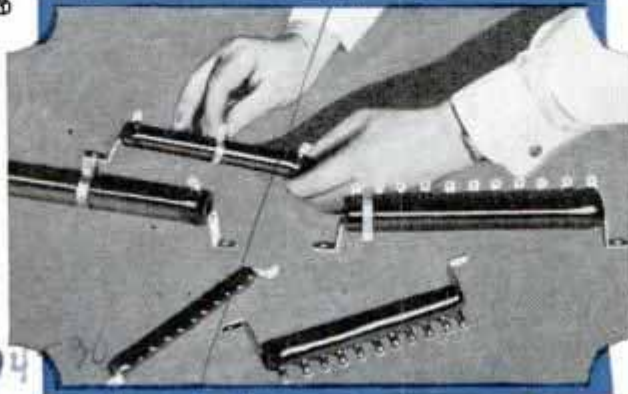
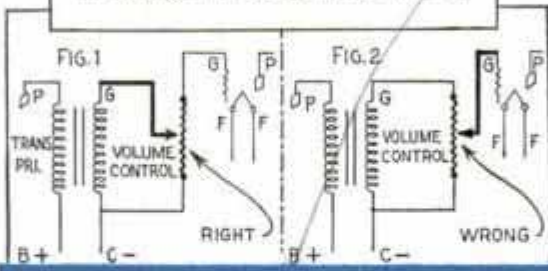
Above, Four-Circuit Double-Pole Double-Throw Jack Switch; Below, Fig. 1, Correct Method of Connecting Volume Control, Prevents Possible Loss of C-Bias



Below, Inexpensive Self-Supporting Antenna Made from Metal Drain Pipe and Copper Ball; Some Receivers Require Shielded Lead-In



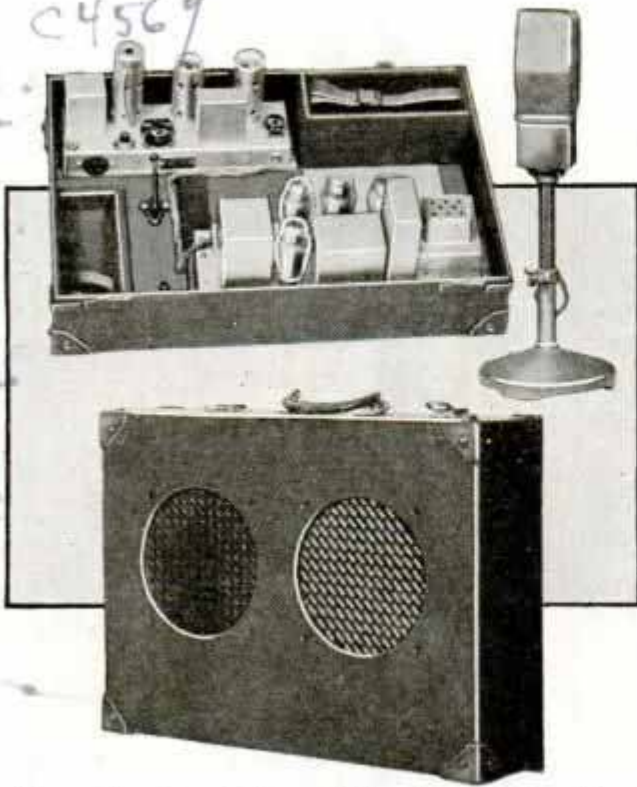
Above, Fountain-Pen Type Flashlight Makes Handy Continuity Test Set; Push-Button Is Removed and Replaced with a Fiber Bushing in Which a Large Needle, with a Small Spring Soldered to the Top, Is Firmly Fastened; Fiber Insulates Contact Spring from Case; Right, Heavy-Duty Semi-Variable Resistors



Ohmite

Harry Blanes Co  
1412 S. Wells Chicago



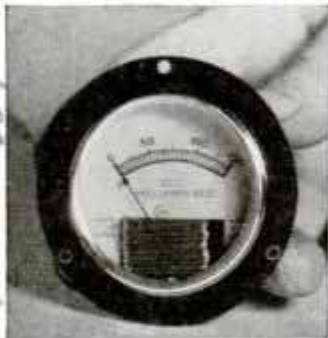


Above, Amplifier Unit and Microphone; Below, Loud Speakers with Metal Grilles to Protect Cones

**Portable Public-Address System**

This portable amplifier is designed for use in auditoriums as a public-address system. It is also well suited for paging or making announcements in schools, hotels, railroad stations or wherever sound is to be picked up at its source and amplified. It employs a ribbon-type microphone and a high-gain amplifier with a 20-watt output. Two electro-dynamic loud speakers are mounted in the front half of the carrying case.

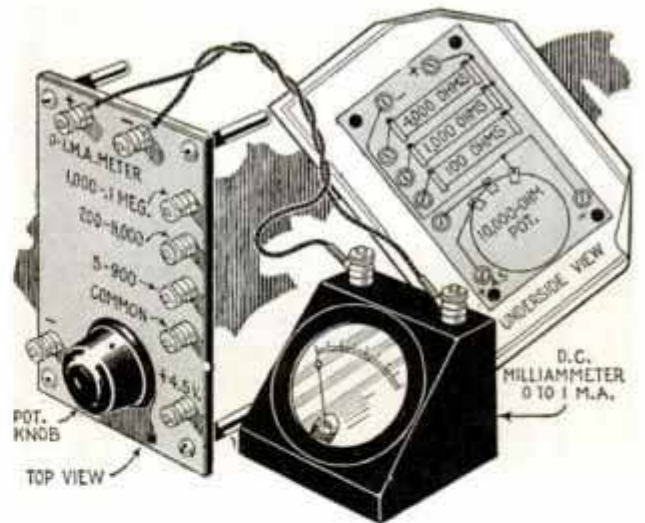
**Inexpensive Meter for Experimenters**



It is no longer necessary to omit voltmeters or milliammeters, where specified, because of high cost. This small inexpensive panel-mounting type meter is available in practically all of the commonly used ranges and is sufficiently accurate for most experimental and amateur purposes. It is a magnetic-vane variety and has a wide flange giving the meter an over-all diameter of  $2\frac{1}{16}$  in. Three mounting holes are provided.

**Low-Reading Ohmmeter Attachment**

The radio service man and the experimenter often require some means for measuring resistance values. Many of these resistors are of comparatively low value and this attachment may be used with any 0 to 1 M.A. meter for obtaining accurate readings. The meter is always available for other purposes as it is only connected to the ohmmeter panel when required. The panel is made from scrap bakelite and may be mounted on extension bushings in a small case or on the workbench, as desired. The various resistors, potentiometer and binding posts are mounted on the panel as shown in the sketch. All resistors must be accurate as to the values given or the results will not be correct. When completed the milliammeter is connected to the terminals indicated and a  $4\frac{1}{2}$ -volt C-battery is wired to the lower posts. The common terminal is connected to the post of the resistance range desired and the potentiometer is adjusted so that the meter reads exactly full scale. The connector lead is then removed from the posts, the unknown resistance



substituted and the reading noted on the meter. One-tenth of a volt is required for the 5 to 900-ohm range; 1 volt with the 200 to 9,000-ohm range and 4 volts for the high range. When the meter is adjusted for full scale reading with these ranges, the voltage is automatically regulated as given. The unknown resistance value is found by dividing the voltage by the current reading noted on the meter. Always deduct the value of the fixed resistor in the ohmmeter panel from the result.—S. H. Burns, Schenectady, N. Y.

Readrite Meter Works  
325 W. Huron St. Chicago  
4512





# It's easy to REPAIR A CANOE

**R**ESTORING a canoe to usefulness is a comparatively simple task that can be undertaken by anyone. A rip in the canvas can be patched by inserting a piece of canvas in the tear, after forcing a liberal amount of marine or other waterproof glue into the opening, so that the patch will adhere to both the planking and the canvas. A putty knife is then used to smooth over the patch, as shown in Fig. 1.

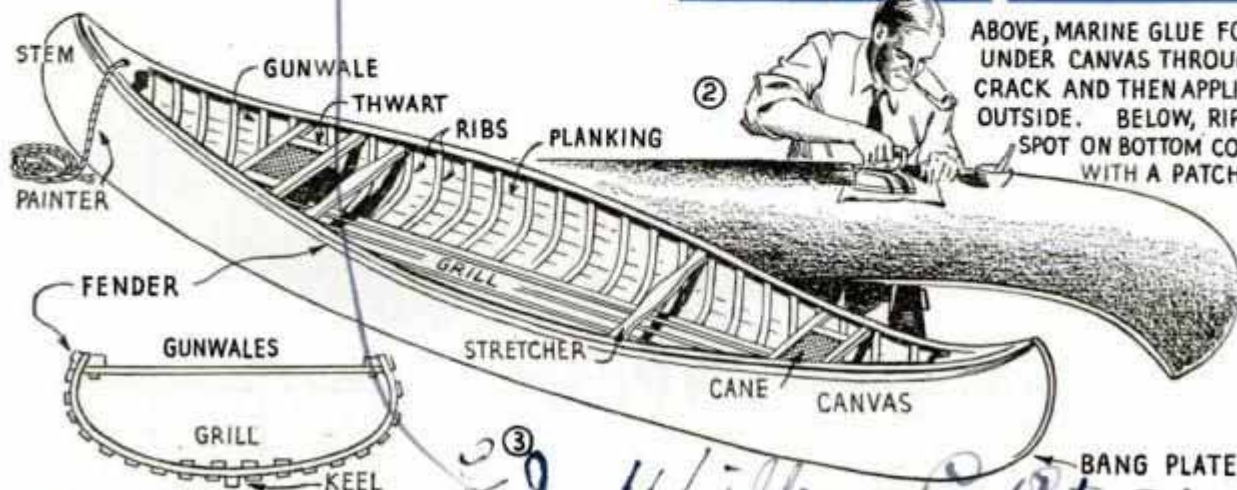


Courtesy Armstrong Roberts

1. If the canvas has been rubbed through on the bottom, by dragging the canoe over sharp stones, the surrounding canvas has probably been weakened so that it is advisable to put the patch on the outside, as shown in Fig. 2. After smearing the can-



ABOVE, MARINE GLUE FORCED UNDER CANVAS THROUGH CRACK AND THEN APPLIED ON OUTSIDE. BELOW, RIPPED SPOT ON BOTTOM COVERED WITH A PATCH

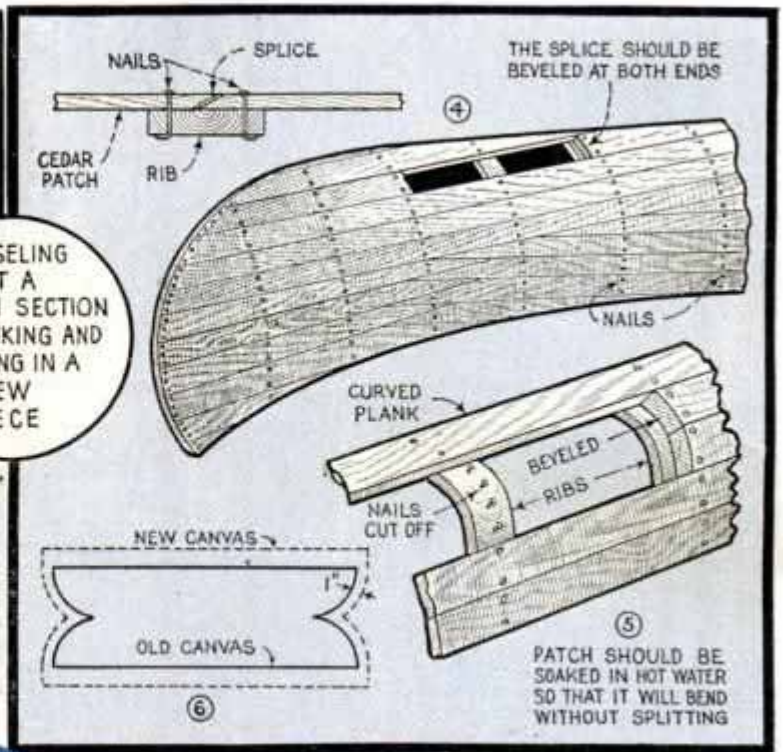


also canvas  
 J. Willis G. 97  
 Kainer  
 Bang Plate  
 107



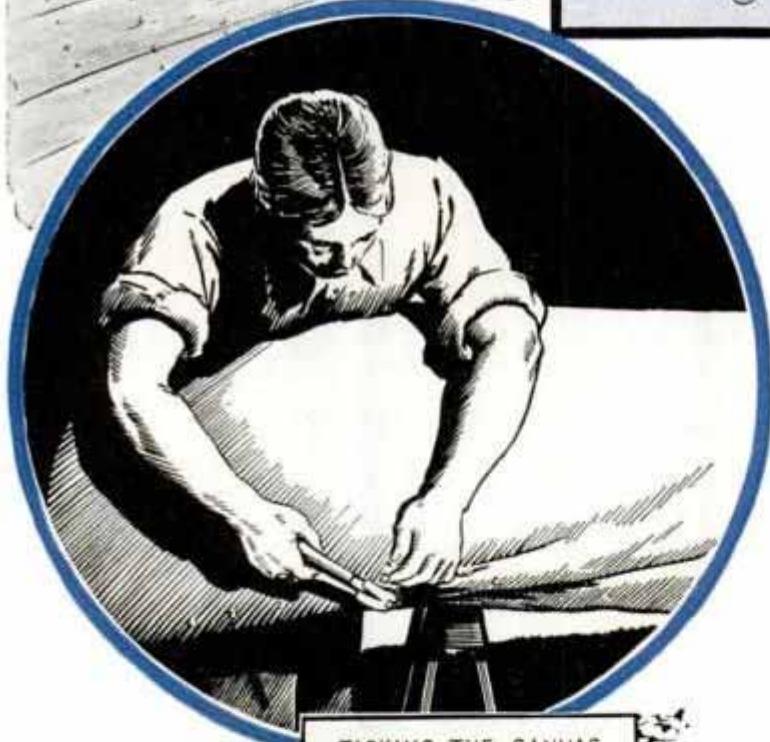


CHISELING OUT A BROKEN SECTION OF PLANKING AND SPLICING IN A NEW PIECE



THE SPLICE SHOULD BE BEVELED AT BOTH ENDS

PATCH SHOULD BE SOAKED IN HOT WATER SO THAT IT WILL BEND WITHOUT SPLITTING



TACKLING THE CANVAS TEMPORARILY ALONG STEMS AND GUNWALES

plate and keel, which are named in Fig. 3. Remove the old canvas carefully, so that it will serve as a pattern for the new canvas. The broken part of the planking is cut out with a chisel, as in Fig. 4. Make the splices between the planking and the patch come over a rib. Where the planking is bent, as in Fig. 5, it will be necessary to soak the patch in hot water until it will take the bend without splitting. The patch is then nailed to the ribs with copper nails, the points of which are clinched. For re-canvassing a canoe, marine glue is generally used and is applied hot. However, casein waterproof glue is also satisfactory for the beginner, and it is easier to work

vas and the patch liberally with marine cement, a warm flatiron is used to smooth it out and to force the cement well into the material. When dry, the area around the patch should be painted. Re-canvassing of the entire canoe is usually necessary if there is a hole of any size through the planking. In this case, remove the fenders around the gunwales, the bang

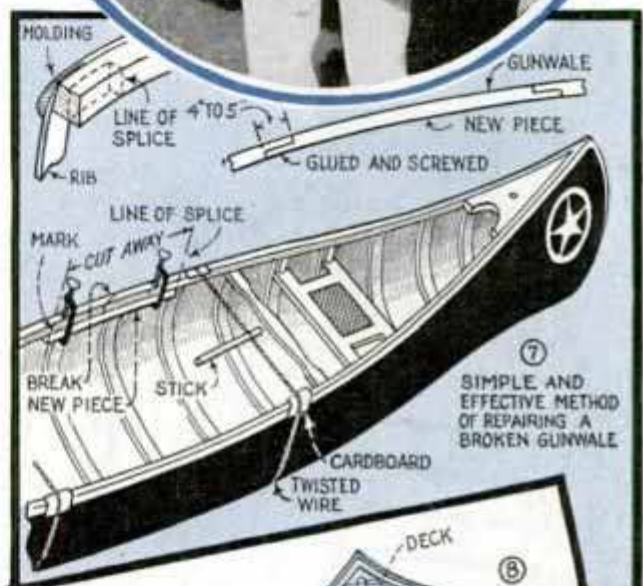


1ST COAT, SHELLAC; 2ND, LEAD AND OIL; 3RD AND 4TH, PAINT; 5TH AND 6TH, SPAR VARNISH

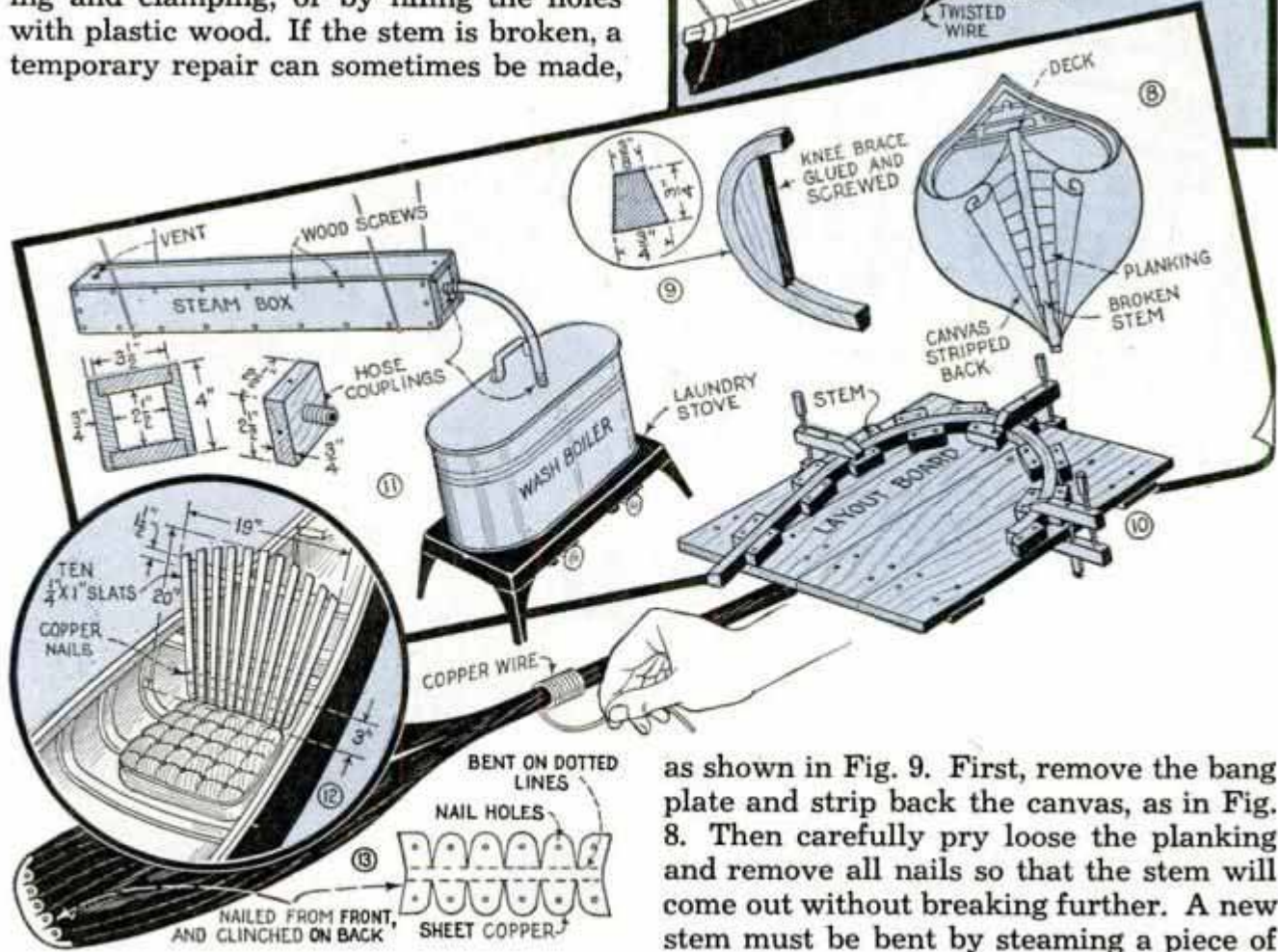


as one does not have to worry about its setting before the canvas is properly stretched. Lay the old canvas on the new piece and cut it out, as in Fig. 6, making the new piece 1 in. larger all around. Soak the piece in water and then run it through a wringer. The glue should be mixed in the proportion of 1¼ parts of casein glue to 1 part of water. With this mixture, one pound of glue will cover about 30 sq. ft. of surface. Apply the glue liberally to the entire canoe, using a stiff brush. To prevent the glue from starting to set, if the day is warm, cover it with the wet canvas as you go along. Starting at the center, lightly tack the canvas along the line of the keel, working toward each end. Rub and stretch the canvas as you go, tacking it temporarily along the stern and gunwales, so that you can go back and work out any wrinkles that may appear. Then drive the tacks home, but do not trim the canvas until the glue has dried. A recanvased canoe should be given one coat of shellac, one coat of lead and oil, two of paint with color, and two of spar varnish.

A canoe with a split stem that will not hold tacks, can be repaired either by gluing and clamping, or by filling the holes with plastic wood. If the stem is broken, a temporary repair can sometimes be made,

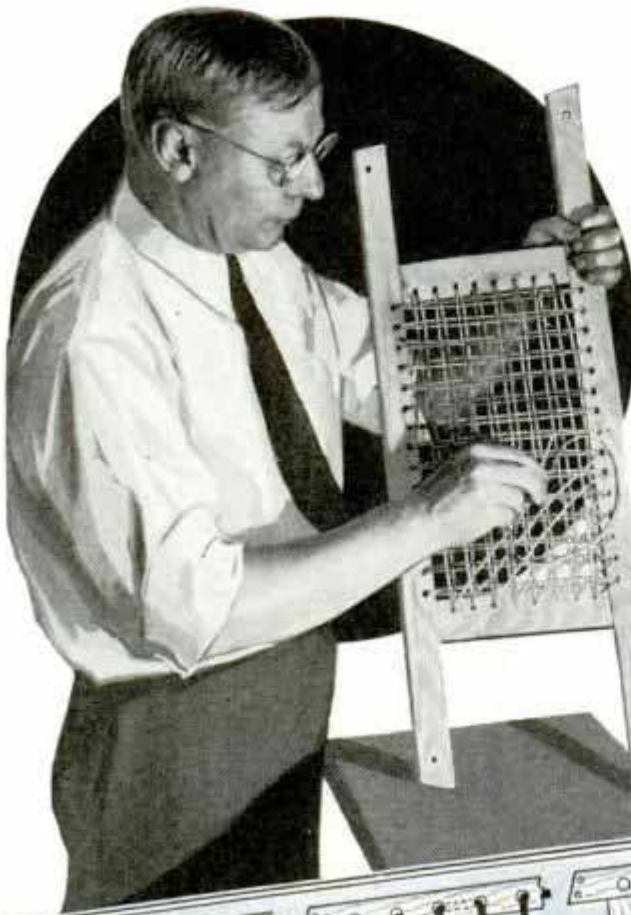


7 SIMPLE AND EFFECTIVE METHOD OF REPAIRING A BROKEN GUNWALE



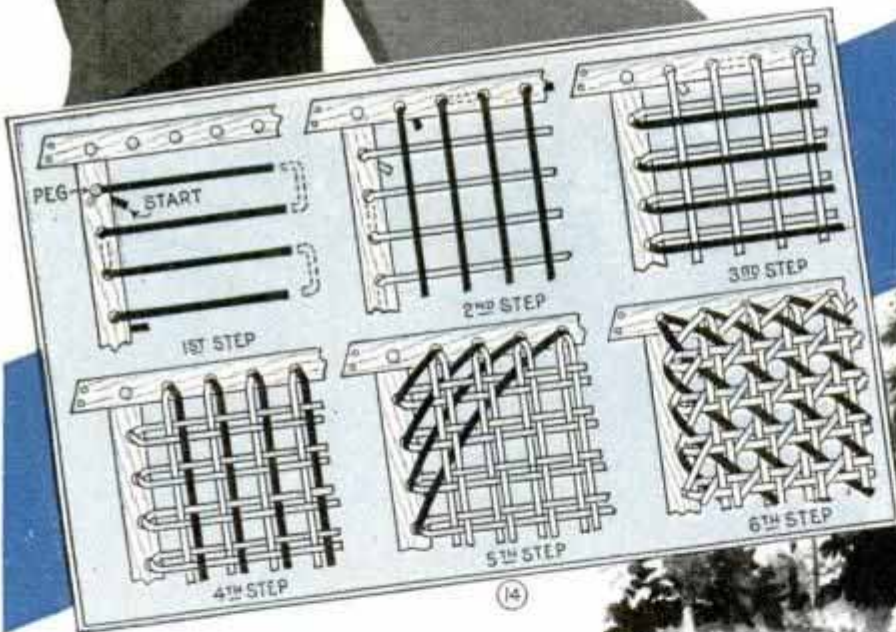
as shown in Fig. 9. First, remove the bang plate and strip back the canvas, as in Fig. 8. Then carefully pry loose the planking and remove all nails so that the stem will come out without breaking further. A new stem must be bent by steaming a piece of





A broken gunwale can be repaired by the method shown in Fig. 7. The canoe is first drawn into shape with bar clamps or twisted wire, and the new piece is clamped under the gunwale at the brace. The lines for the splices can now be marked on both the old and new pieces. To weave a new seat with cane, as shown in Fig. 14, soak the cane in water and simply follow the steps indicated. The black lines show the last step in weaving while the light lines show weaving that has already been finished in previous steps. A wood plug is used to hold the cane at the start until other strands hold it in place. A bit of bacon rind rubbed on the end of the cane will be of help in weaving the final steps. Paddles fractured at the shaft can be repaired by the method shown in Fig. 13. Repairing a split blade is often accomplished with a copper tip, cut as shown,

so that it can be bent around the curved end. If a passenger is to be carried in the canoe, a "lazy back" will be found comfortable. Fig. 12 gives full dimensions for making this handy accessory.

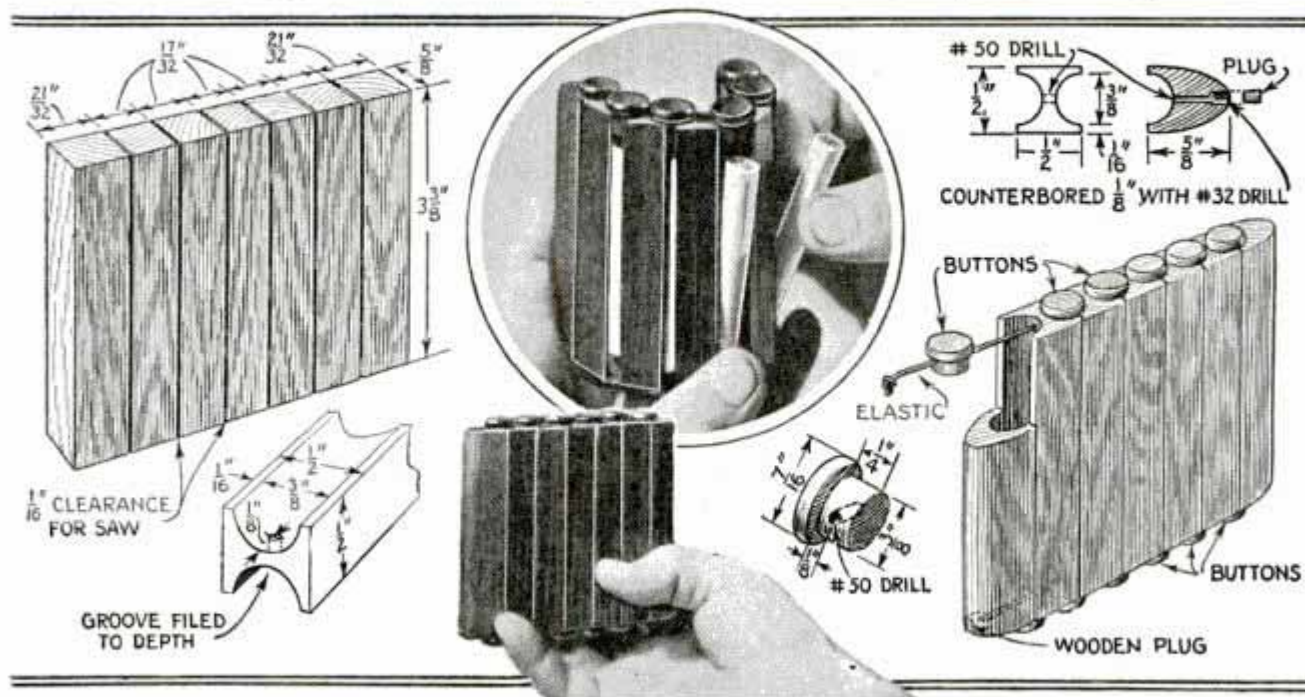


ash. For this purpose, a steam box, as shown in Fig. 11, should be constructed. The piece should be steamed five or six hours, or until it is very pliable. Fig. 10 shows the bending form on which the new stem is shaped. The pattern is somewhat greater in curvature than the old stem, to compensate for the amount the piece will straighten after it is released from the form. It should be left on the form overnight. The shaping up, with a plane or draw knife, is done after the stem has been bent.





# Novel Cigarette Case Is an Easily Made Item



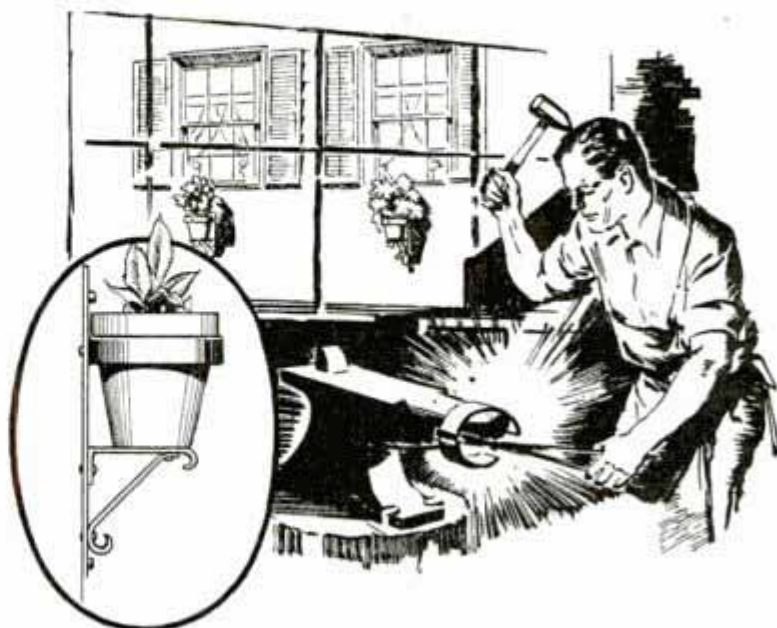
An unusual cigarette case that is opened by bending it in your hand, can be made from waste pieces of hardwood. The case consists of seven pieces, held together with round elastic strung through holes at the top and bottom. The pieces can be cut from a single block, and each one is grooved on two edges, with the exception

of the end pieces, so that when they are assembled the butting grooves form holes for the cigarettes. The end pieces are grooved on the inside edges only, the outer edges being rounded as shown. The holes formed by the grooves are plugged at the ends with wooden buttons, which are also threaded on the elastic.

## Ornamental Flat-Iron Wall Brackets Hold Potted Plants

Decorative wall brackets to support potted plants are easily made of flat iron, which can be forged cold over an anvil, and then riveted together as shown. An iron band to hold the top of the pot prevents it from tipping. The appearance of the front of a home can be improved by using these neat brackets to hang potted flowers under the windows. Pleasing effects can also be had inside the home by using them to support flowers and vines in bare corners and on the sides of arches between rooms. If you have a small conservatory in which plants are kept during winter months, the use of these brackets will permit the pots to be neatly hung on walls and specially constructed standards. Having the plants arranged in this

way makes it possible to get more in a room without crowding them together, and also makes it easier to care for them.



*Pleasing Effects Produced by Supporting Potted Flowers and Vines on Walls of the Home with These Flat-Iron Brackets*





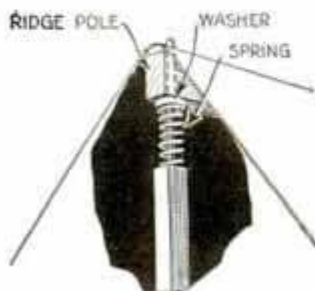
*Utilizing Skate Rollers as Wheels, This Scooter Has a Steering Column of Pipe*

### A Simple Homemade Scooter

Instead of the usual box type of homemade scooter, which utilizes skate rollers as wheels, this one has a steering column of standard  $\frac{1}{2}$  or  $\frac{3}{4}$ -in. pipe and fittings. The pipe handle is bolted to the base by using a floor flange and is topped with a tee into which nipples are screwed for hand grips. The bolts that hold the pipe in place also hold the front rollers.—Raymond B. Wailes, Bethesda, Md.

### Springs Keep Tent Roof Taut

To keep his tent roof taut automatically, one camper substituted long rods for the ones in the ends of the support poles so



that he could slip coil compression springs over them for the ridge pole to rest on. In this way, when the tent was staked down, the springs pro-

vided a tension against the roof. This eliminated loosening the guy ropes to keep the stakes from being pulled up when the canvas shrunk from getting wet.—A. H. Waychoff, Phoenix, Ariz.

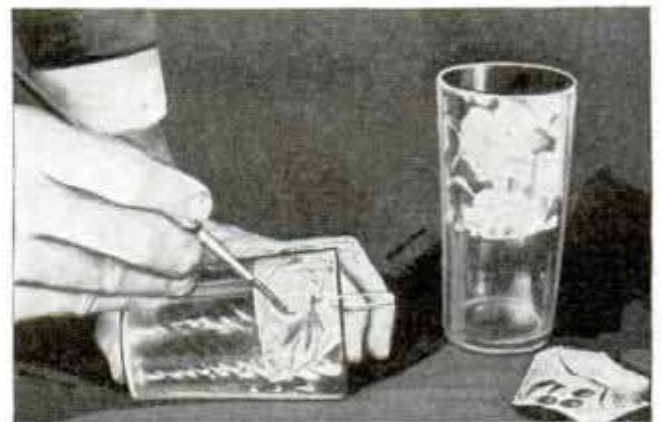
### Guard Prevents Calcimine Running Down Brush Handle

To prevent calcimine from running down a brush handle and causing annoyance, when working on a ceiling, you can use this sheet-metal guard. It consists of two pieces bent to the shape shown and then riveted together at the ends. When slipped over the bristles and tacked to the brush ferrule, the guard will catch all the surplus calcimine.—A. Wurz, Jr., Rockyford, Alta., Can.



### Easy Method of Hand Painting Glass Tumblers

You can decorate glass tumblers with painted designs that have the appearance of professional work. First draw the design to be painted on paper and color it. Then, holding the paper inside of the tumbler by means of paper clips, copy the design on the outside of the glass with



*Design Held Inside of Glass Tumbler and Copied on Outside with Paint*

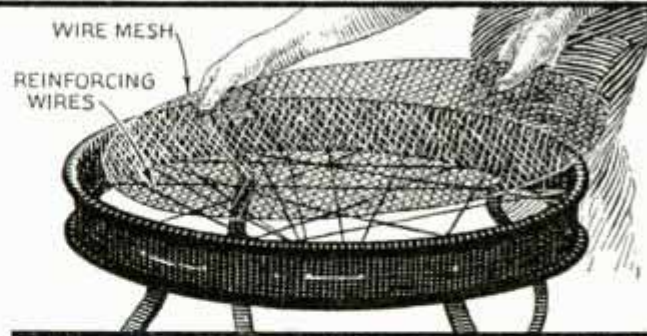
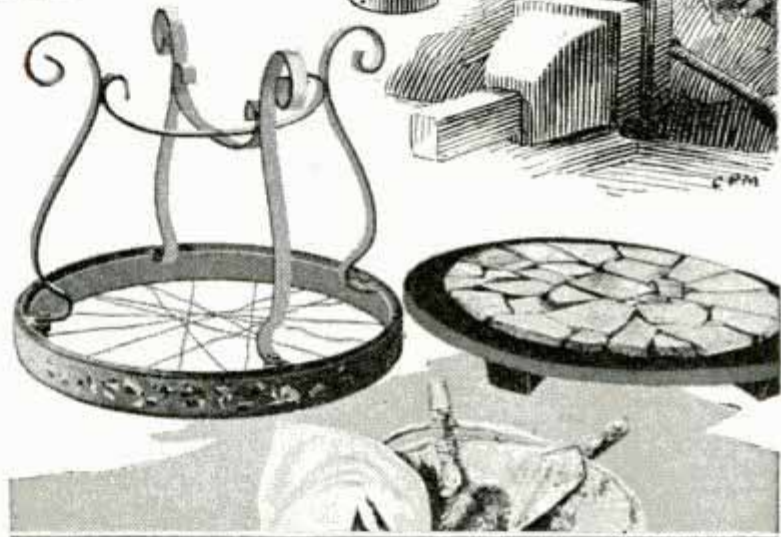
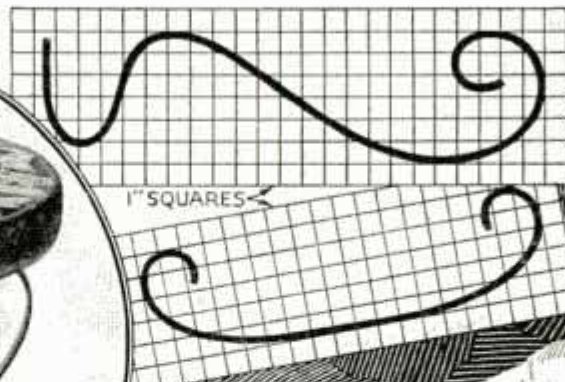
paint of corresponding colors. This method eliminates the work of sketching and assures an exact duplication of the design on each tumbler.



# Table Has a Cement Top Inlaid with Tile

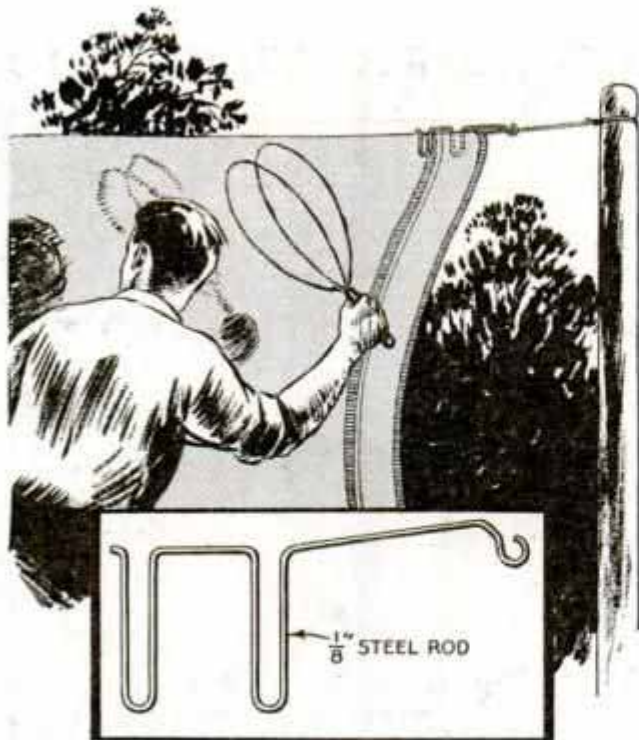


Here is a beautiful cement-top table that is made from an old auto-tire rim, and has the top and side surfaces inlaid with bits of colored tile. The legs are made of flat iron, bent cold, and are braced at the bottom with two iron scrolls, welded or riveted to the legs. The upper ends of the legs are bolted to the rim-bolt flanges and small holes are drilled through the rim at 6-in. intervals, 1 in. below the top edge through which fairly heavy wire is woven from side to side across the center space, as shown, and then covered with wire mesh to reinforce the cement that backs the tile of the top. The outer clincher edge of the rim is also inlaid with tile, and has a strip of wire mesh pulled tightly around it inside of the clincher edges to anchor the cement in which the tile is laid. The table is now ready for pouring the cement. To do this, place a large piece of tar paper on a smooth surface and scribe a circle on the paper equal to the inside diameter of the rim. Then, with the broken bits of tile that have been soaked in water, form the design you desire to appear on the table top inside of the circle. Now turn the table upside down over the tile and fill the rim with mortar, which consists of cement, 1 part, and washed plaster sand, 3 parts. As the cement is poured, tamp it carefully



to fill all the crevices around the tile. If you desire more color in the table top, dry oxide color may be added to cement when mixing it. After pouring the cement, let the table set in a shady place for about 12 hours, and then keep it covered with a damp cloth for a few days. This is done so that the cement will dry slowly. Acid stains can be used to color the cement after it dries instead of adding dry oxide colors to the mixture.





*Clips Made from Heavy Wire for Holding Rugs on Clothesline Securely*

### Clips Hold Rug on Clothesline

Bent to the shape shown, a piece of small steel rod or heavy wire provides a good clip for holding rugs on a clothesline while beating them. The two legs of the clip straddle the rug, and the hook at the end of the arm is looped over the clothesline. A clip is placed at each edge where the rug is folded over the line.—G. E. Hendrickson, Argyle, Wis.

### Powder Shaker Made from Old Flashlight Case



Frequently a shaker is needed around the home workbench to apply powdered substances. If none is available, one can be made from an old flashlight case. Remove the battery and substitute a perforated tin disk for the lens. To fill it, unscrew the bottom.

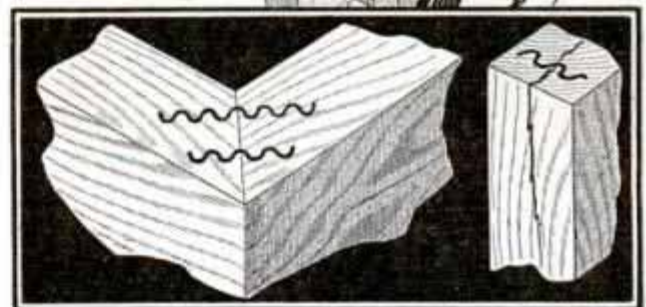
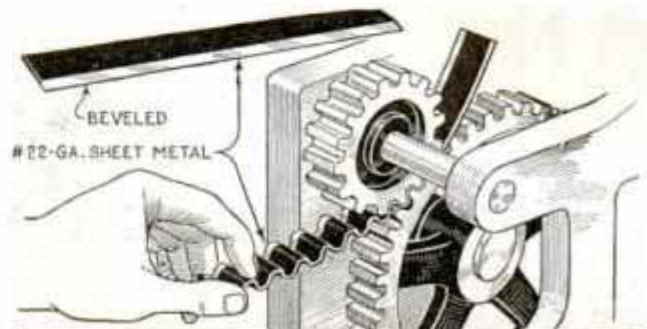
### Solution for Killing Dandelions

Experts at a midwestern university have successfully destroyed dandelions by brushing each plant with a solution consisting of iron sulphate, 1½ lbs., and water, 1 gal. While this method requires individ-

ual attention for the plants, it does not take much time to rid the average lawn of dandelions if a brush with a long handle is used. A brush made by wedging 15 to 20 fine, stiff wires into a hole drilled in the end of a broomstick is handy.

### Homemade Corrugated Fasteners from Sheet Iron

Corrugated fasteners can be made by running strips of No. 22-ga. sheet iron between a couple of gears that mesh loosely. Almost every home has a machine on



*Corrugated Fasteners Made by Running Beveled Strips of Sheet Iron between Two Gears*

which there are gears that will serve for this purpose. Before crimping the metal strips, bevel one edge so that the finished fasteners can be driven easily.

### Rubber Bath Sponge Utilizes Soap Chips



Small pieces of soap can be economically used by inserting them inside a rubber sponge as shown. Cut a small slot in the sponge and widen it in the center. When the pieces of soap are inserted into the slot, they will be melted by water and absorbed by the sponge.



# Making Money at the BEACH



**I**N a favorable location the rental of beach equipment has money-making possibilities. One of the most popular items is a midget boat which no child can resist. It is designed for rowing, sail or paddle wheels. The paddle wheels clamp to the gunwales and can be operated individually, so that the user can maneuver without a rudder simply by turning one faster than the other. The boat is strongly built though light in weight, and is only



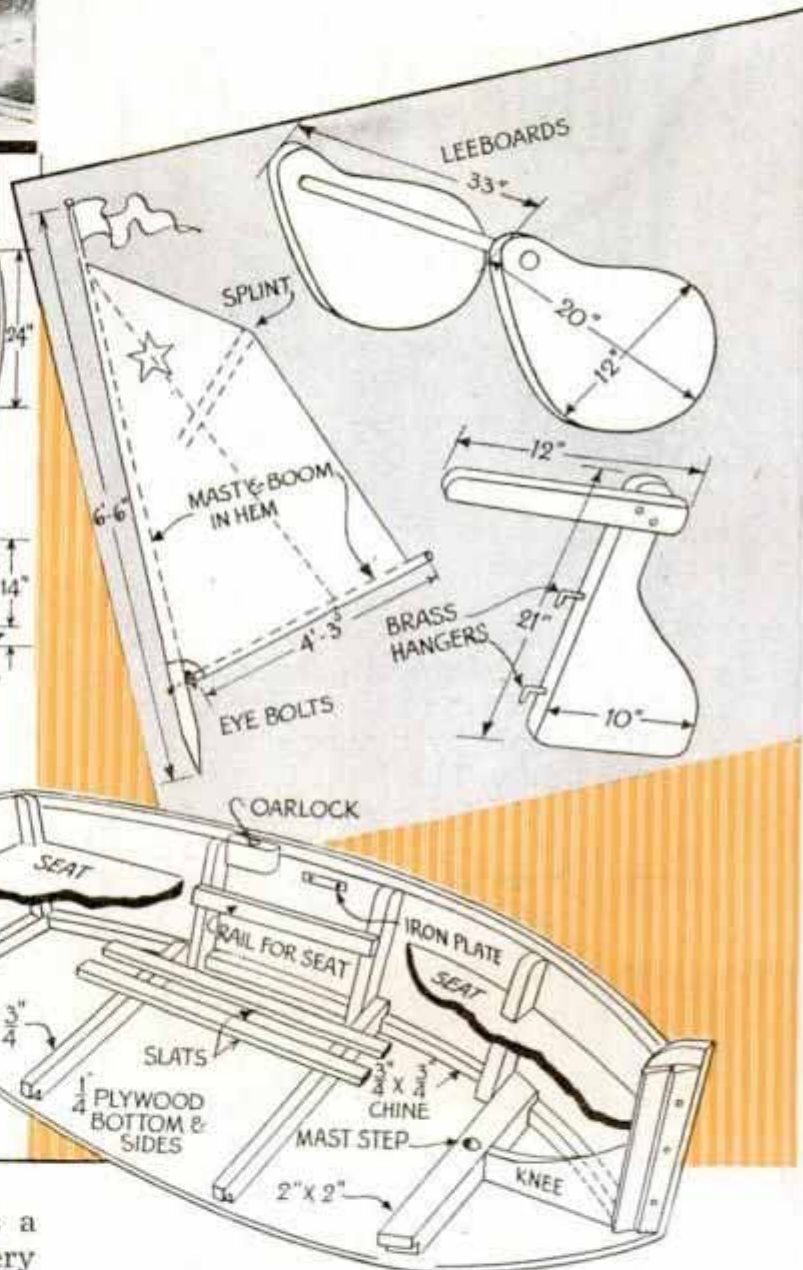
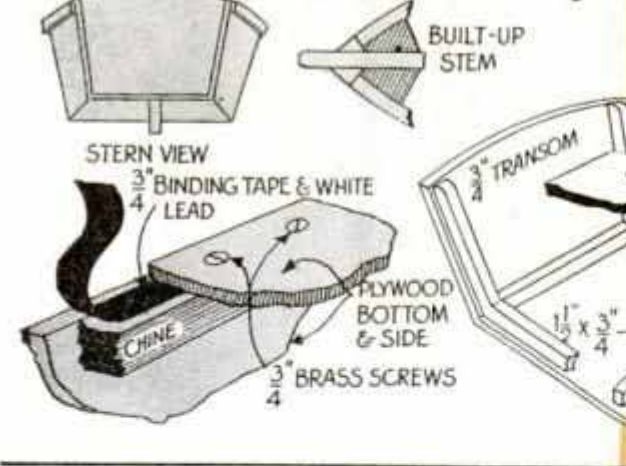
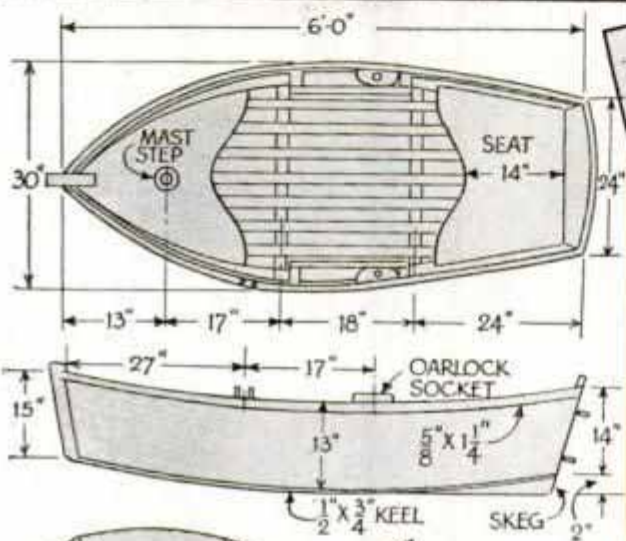
6 ft. long. The sides and bottom are of plywood, which makes it necessary to calk only along the chine, stem and transom. To calk, a strip of binding tape soaked in white lead is laid over the joint between the chine and the side board, and the bottom screwed down over it with brass screws. Use waterproof plywood if available. Smooth the edges well and apply several coats of paint. Also give at least two coats of paint to the inside surface of the ply-





ger of capsizing in a sudden squall. This equipment is not expected to make the finer points of yachting possible, but it will teach the child some of the rudiments of sailing. Note that the mast and boom slip into wide hems in the sail, and no stays are required, the mast being tapered at the bottom to fit the mast step.

Surf boards are always in demand and can be made especially attractive if they are painted in bright colors. A light wood,

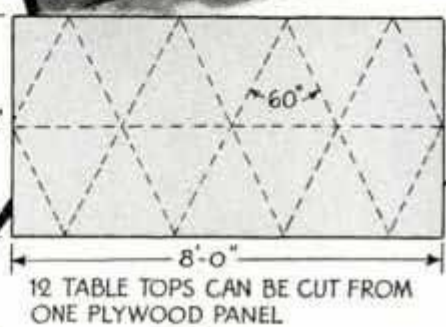
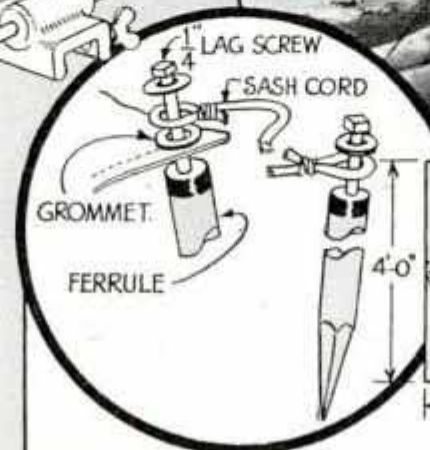
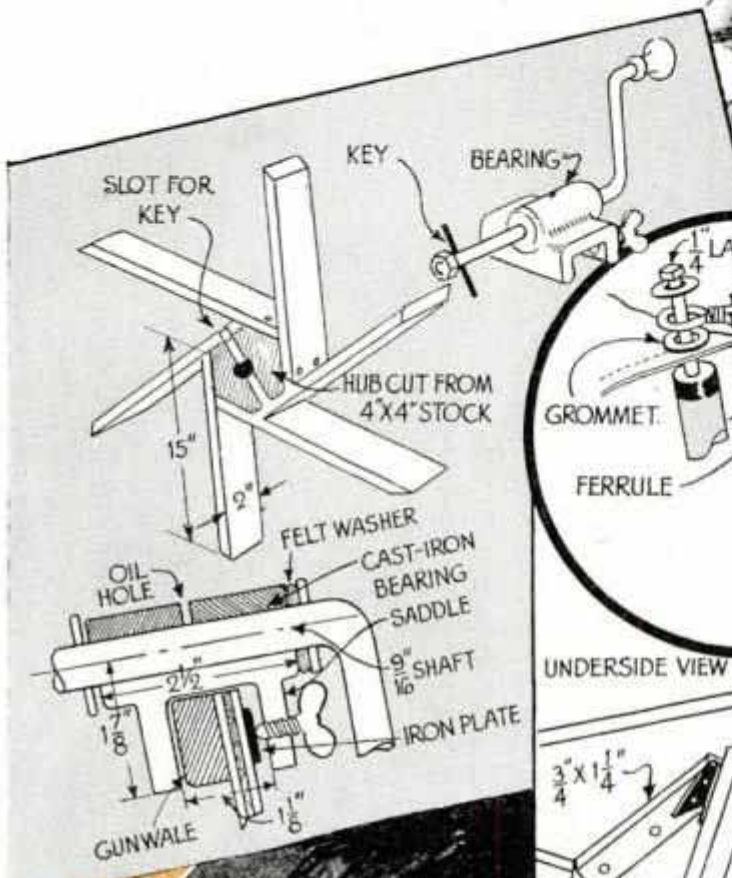


wood before assembling. The stem is a built-up job, and must be calked very carefully, particularly where the bottom joins it. The paddle wheel is mounted on a crankshaft carried in a cast-iron saddle bearing, which clamps over the gunwale. Note that the wing screw clamps against an iron plate on the inside of the gunwale. Sailing equipment includes mast and sail, twin leeboards and rudder. The sail has only a small area so there will be no dan-

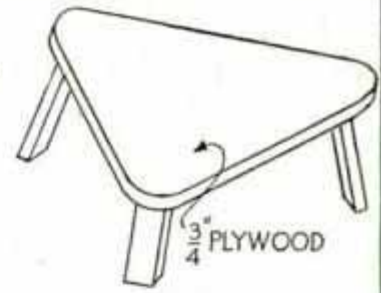
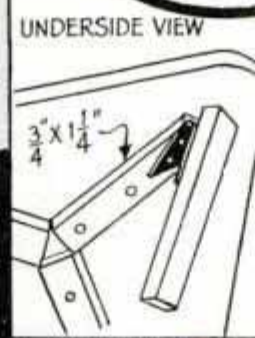
such as pine or redwood, will not split, if two cleats are mortised flush on the underside. Finish with oil stain and a brightly colored design, with spar varnish over all. The size given is suitable for children who do not weigh over 90 lbs. Larger surf boards along the same lines can be made for adults.



A small, low table is a great convenience for liquids, food and for playing cards. The three legs fold flat so that the table requires small storage space. There is also a demand for a beach shelter to accommodate a larger party



12 TABLE TOPS CAN BE CUT FROM ONE PLYWOOD PANEL



than a single umbrella. It can be made practical for this purpose by having poles, stakes and guy ropes non-detachable. The corners of the canvas should be reinforced with gussets where grommets are put in, and there should be ferrules on poles and stakes. Sharpened with a long taper, the latter can be pushed into the sand with a twisting motion by hand. An interesting water toy for the little tots consists simply

of two boatlike floats with dummy funnels and deck houses connected with cross bars. The child grasps one of these and kicks himself along in the water. A suggestion for a rental booth is also shown. The roof is canvas over an umbrella-shaped frame, and a fence in the rear with a low shelf displays the surf boards, tables, etc., to good advantage without their being "borrowed" easily. As in all such enterprises, a deposit is required of each patron to cover cost of replacement if the article is damaged or not returned.

### Determining the Age of Bass

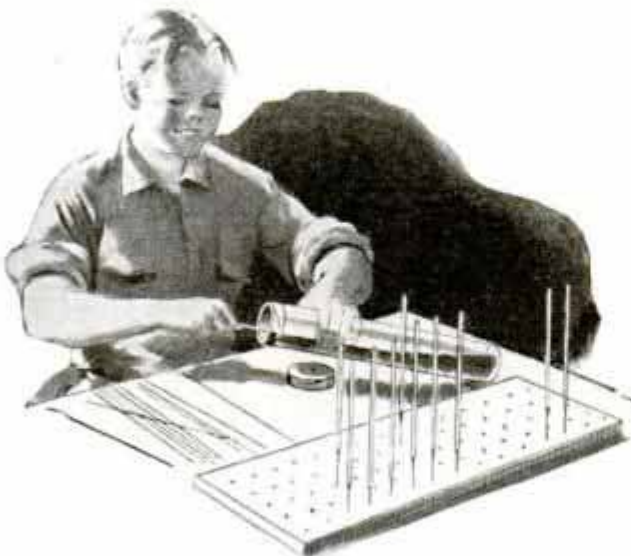
The age of a bass can be closely determined by removing a large scale from the fish's back and counting the growth rings with the aid of a reading glass. Each ring represents one year's growth.



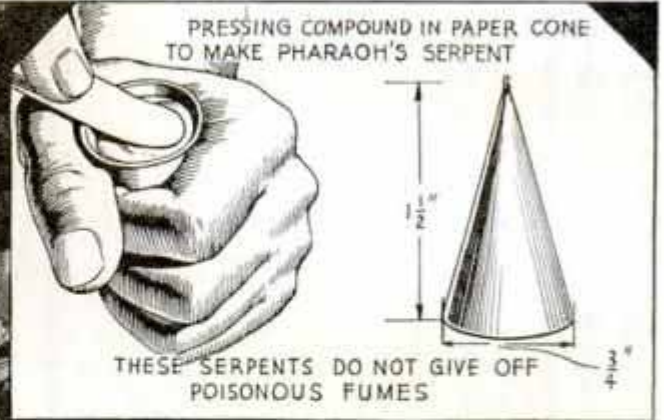
# How to Make Safe Fireworks for Children



Sparklers and Pharaoh's serpents are simple fireworks with which children can safely celebrate the fourth of July. The sparklers are made by coating 12-in. lengths of No. 18 iron wire with a compound consisting of powdered sulphur, 1 oz., potassium nitrate, 5 oz., powdered charcoal, 1½ oz., iron filings, 2 oz. and aluminum powder, ¼ oz., mixed in shellac to a thick creamy consistency. Dip the wires in the mixture and then insert the



*Safe Fireworks Sparklers for Children Made by Coating Wires with Chemical Mixture*



bare ends in holes drilled into a board as shown, until the mixture dries. Repeat this process until each wire is covered with a thick coat. The Pharaoh's serpents are comparatively simple to make and do not give off any poisonous fumes. To make them you will need a stiff paper cone about 1½ in. high and ¾ in. in diameter at the base. This is formed by wrapping "touch" paper on a wooden form turned or whittled to a cone shape. Paste or mucilage is applied to one side of the paper before wrapping so that all the layers will adhere together firmly. Now, in a mortar, grind together potassium dichromate, 4 oz., potassium nitrate, 2 oz., and ordinary sugar, 6 oz., or any other quantity of these ingredients in the proportions just given. Shellac, thinned with an equal volume of alcohol to make a thick putty-like paste, is pressed into the paper molds as shown. When the cones are dry they are removed from the molds and can be ignited with a match. If the cones are to be kept for some time before using, they should be protected from the light.

## Spring Clothespin Drives Small Screw Eye into Hardwood

Holding small screw eyes while turning them into a hardwood picture frame or molding is generally a difficult task. However, a spring clothespin with the tapered ends cut off, will grip the screw eye firmly, allowing it to be driven in without slipping.





### Turning Kink for Soft Wood

When soft wood is turned in a lathe, the tailstock center has a tendency to enlarge the hole in the end of the stock, which causes it to chatter before the turning has been completed. A simple remedy for this trouble is to locate the center hole in the stock with a center punch and then drive a small hollow brass rivet into it. This provides a temporary bearing for the tailstock center, which can be cut away from the finished turning.

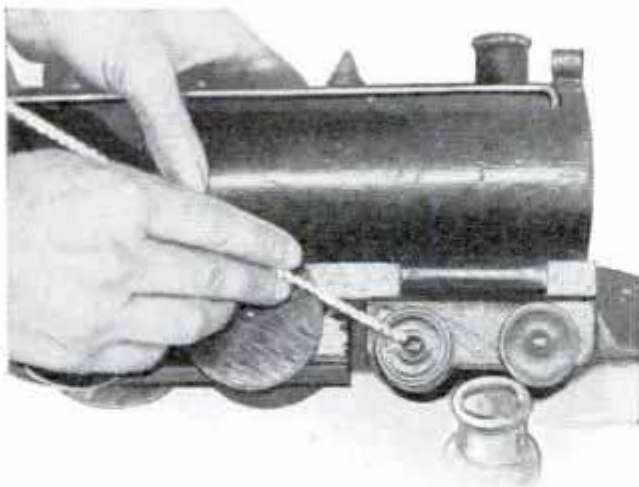
### Gummed Paper Helps Mend Broken Chinaware



When cementing broken chinaware, a strip of gummed paper will be found handy to hold the pieces together until the adhesive sets. After it has dried, the tape can be soaked off with hot water.—Ray J. Marran, Kansas City, Mo.

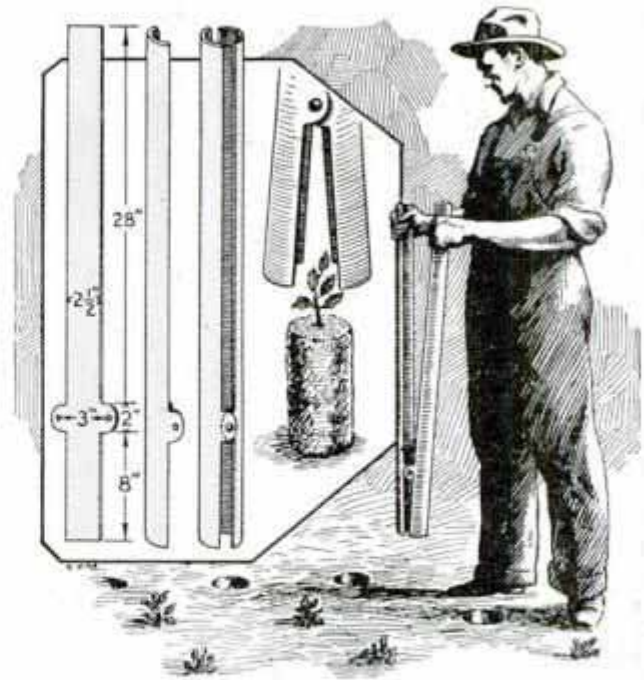
### Lubricant for Wood-Wheel Toys

A good lubricant for wood wheels on toys can be had by dissolving a piece of paraffin about the size of a pea in gasoline, 1 oz. The lubricant is easily applied with a pipe cleaner. As the gasoline evapo-



*Paraffin Dissolved in Gasoline Makes Clean Lubricant for Wood-Wheel Toys*

rates, the wax, which has penetrated the wood with the gasoline, lubricates without the objectionable smeary film that is usually left by machine oil.



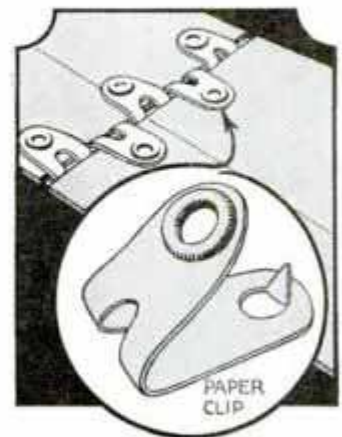
*Small Plants and Shrubs Are Easily Transplanted with This Tool without Damaging the Roots*

### Transplanting Tool Made of Sheet Metal

Young plants and shrubs can be quickly transplanted in the garden with this tool without any danger of injuring the roots. It is made from two lengths of sheet iron, which are curved over a large pipe or pole and are pivoted together near the lower ends, two small projections, or ears, being left for this purpose when cutting the metal. It is a good idea to cut away part of the upper ends of the tool and fit it with wooden handles to protect the hands.

### Small Belts Spliced with Paper Clips and Wire

Model builders and others who have occasion to use light flat belts for running small tools or driving models will find paper clips of the type shown in the detail handy in splicing the belts. As can be seen in the drawing, the clips are fastened to each end of the belt and a piece of wire is used as a pin to hold them together.—L. Gordon Loos, Bambalapitiya, Ceylon.

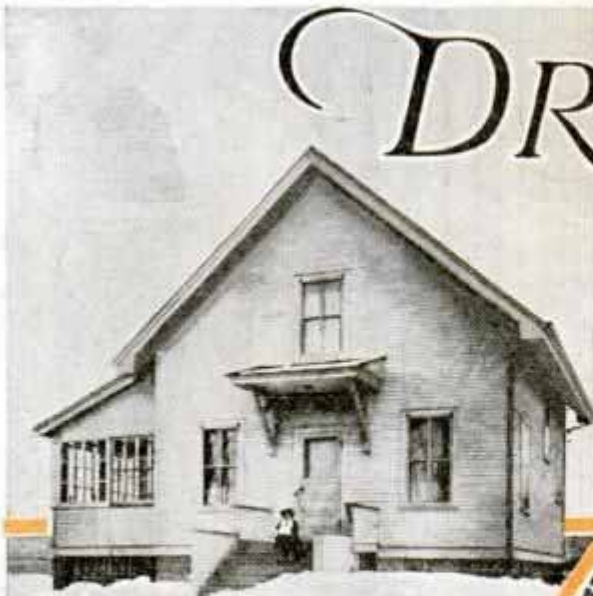




# DRESSING UP

By R. O. BUCK

Lane Technical High School  
Chicago



BEFORE and AFTER



IT'S surprising what you can do with an old house to transform it into an up-to-date structure, by making a few comparatively simple changes which need not be expensive if you are able to do the carpentry yourself. Just notice the change made in the house, shown before and after, in the photographs above. Originally the hood above the doorway was too high, so that a "tacked on" effect was produced, there were too few windows and the whole structure was plain and unattractive. Yet it had possibilities. The second photo shows how a few changes completely transformed this house and made it a great deal more attractive. The addition of the entrance and vestibule furnishes a center of interest, and the double window and shutters above help to balance the front elevation. On the side, the wall line is broken by an arbor, which serves to balance the sun room on the other side. Dormers not only add to the appearance of the roof but assure plenty of light and air in the second-floor rooms. Frame houses, having walls covered with siding or shingles, are easiest to remodel, and stucco or brick veneer is not difficult.

Solid brick or cement block houses are more difficult, of course, and require some masonry experience. Another change to modernize a home, is shown on the right-hand page. This simple little cottage, of a type popular a few years ago, with massive brick piers and heavy porch columns entirely out of proportion for so small a building, was made attractive for less than fifty dollars worth of new material and a few days' labor.

Removing a window and replacing it with a larger one, or even a double or mullion frame, is usually quite a simple matter. After deciding on the size of the new window, you should locate the position of the studs which come within the area to be cut away. This is accomplished by tapping with a hammer on the inside wall. Also make sure that no obstructions,



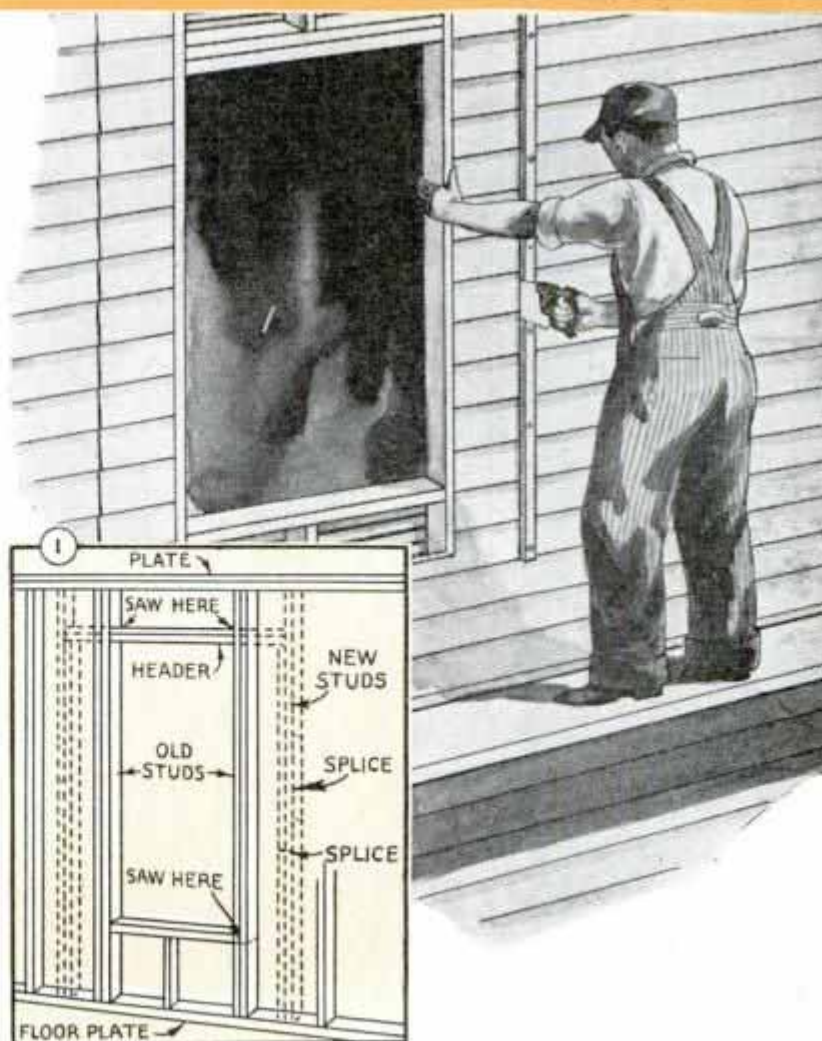
# YOUR HOME

*How many out-of-date homes can be improved in appearance and value by a few changes that are simple and inexpensive, such as new entrances, modern windows and dormers*

THIS CHANGE WAS MADE FOR LESS THAN FIFTY DOLLARS



such as heat flues or soil pipes, will be encountered. After deciding on the location, the siding is cut back, as shown in Fig. 1, to a line where the outside of the new casing is to be, and removed, exposing the sheathing. Next mark out on the sheathing the size the frame opening is to be, and saw out the sheathing, starting the cut with a key-hole saw. Care must be taken not to damage the plaster by striking the lath with the saw. Also use a plumb line to lay out the opening. Before cutting the plaster or removing the old studs, set in the new ones by inserting the pieces through the openings just made. Fig. 1 shows the relation between the new and old studs. The outside ones reach from plate to plate as shown, while the ones nearest the window are just long enough to reach the underside of the header. All of the new studs are spliced, as it would be impossible to get full-length pieces into the wall otherwise, without removing most of the sheathing. After both the sheathing and plaster-covered lath are nailed to the new studs, the excess plaster and lath, which is now well supported, can be cut away. With the new studs in, the





# Suggestions for

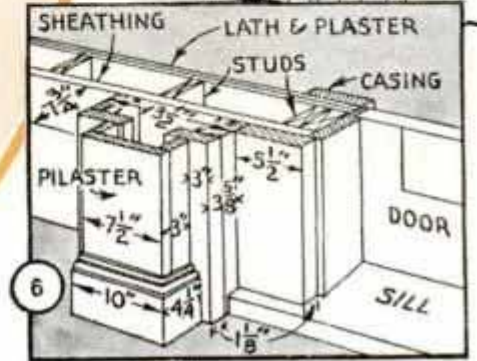
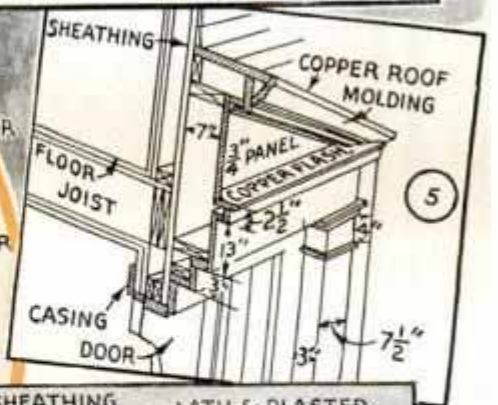
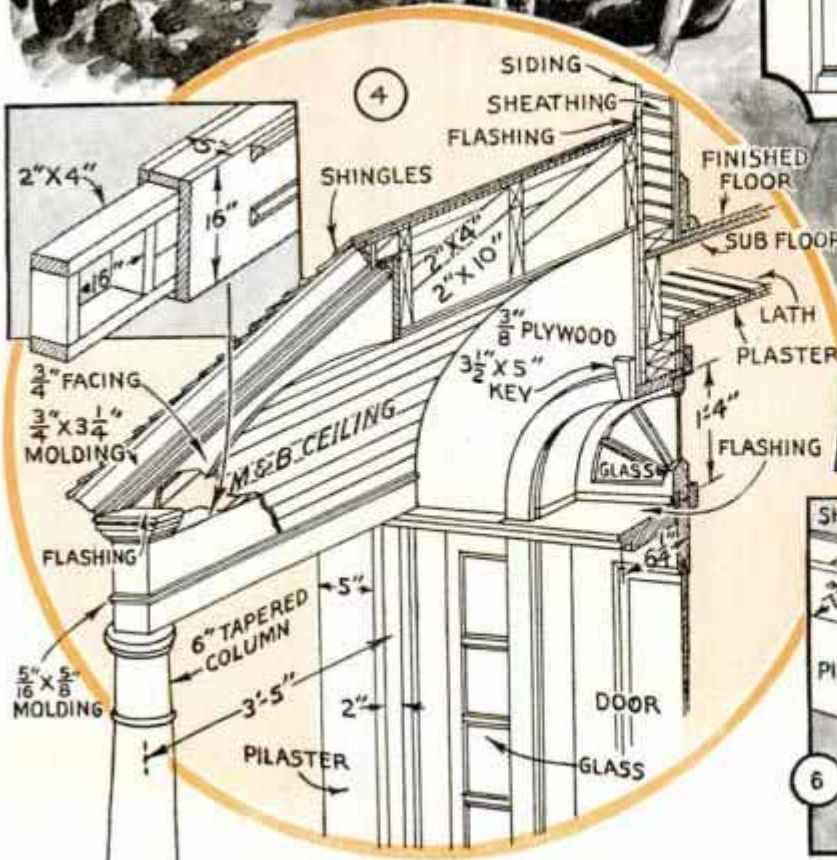
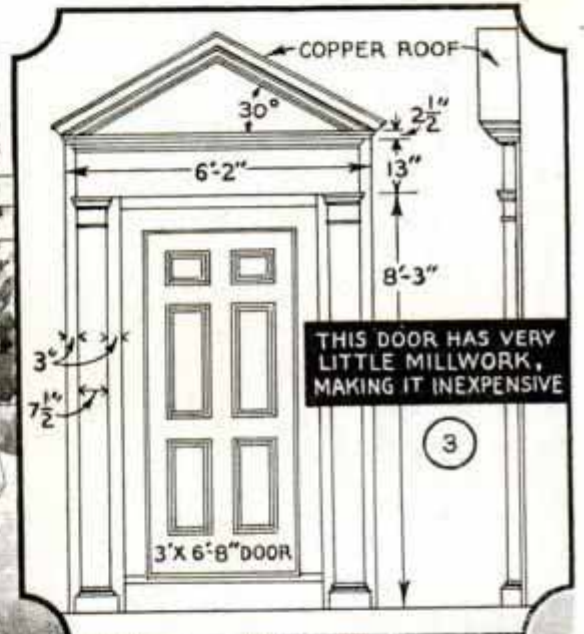
THIS ENTRANCE IS SUITABLE FOR ALMOST ANY TYPE OF HOME AS IT REQUIRES NO CHANGES OF OTHER LINES ~ ~ ~



old ones can be removed, and the headers and window frame installed.

By carefully following this method, windows can be changed without damaging the plaster or even making re-decorating necessary.

Entrances are of many sorts but the Colonial types illustrated in Figs. 2 and 3 are the most popular, and lend themselves to a remodeling job most readily, as they do not require a change of roof line or other expensive alterations. The





## new doorways

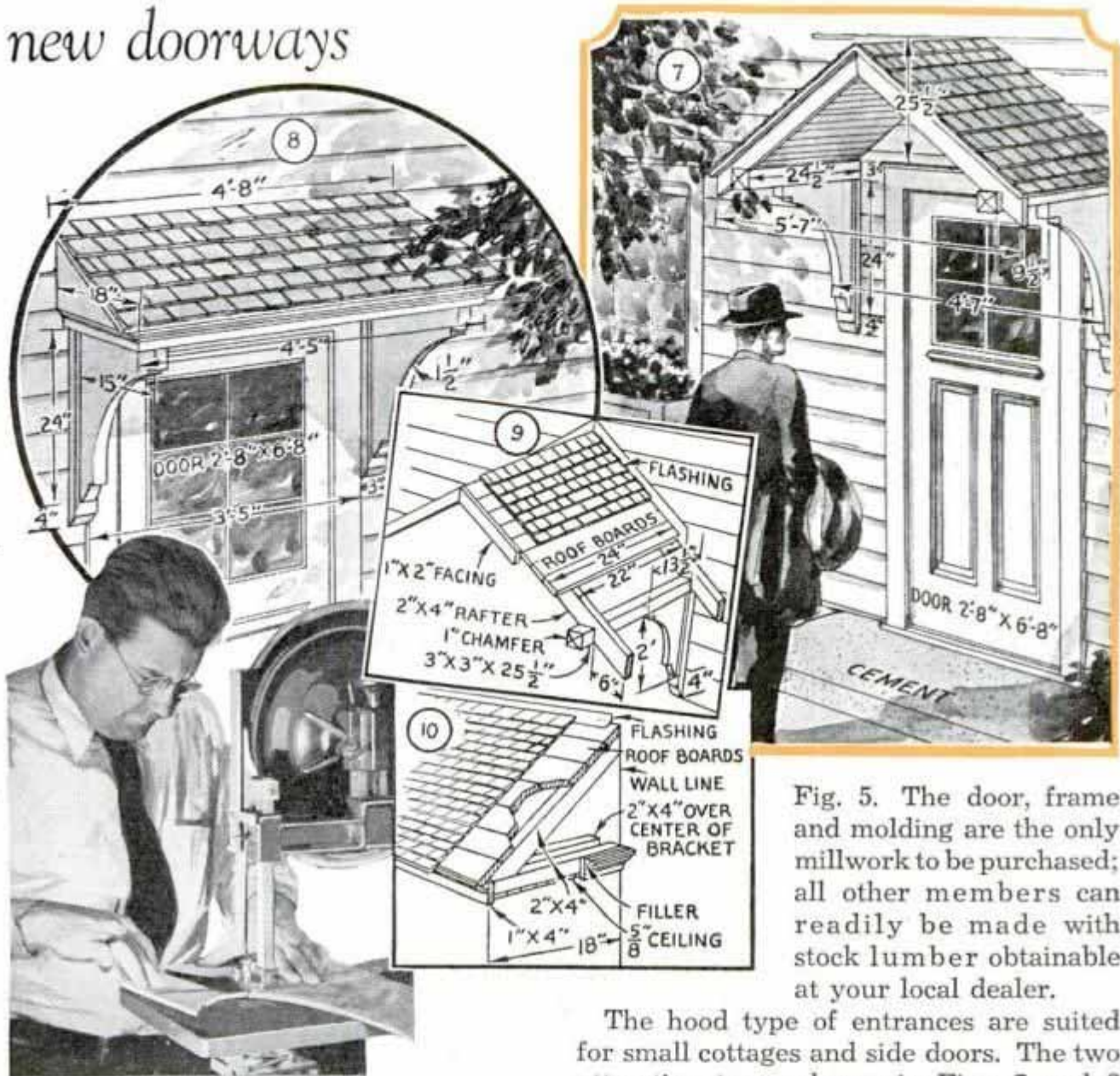


Fig. 5. The door, frame and molding are the only millwork to be purchased; all other members can readily be made with stock lumber obtainable at your local dealer.

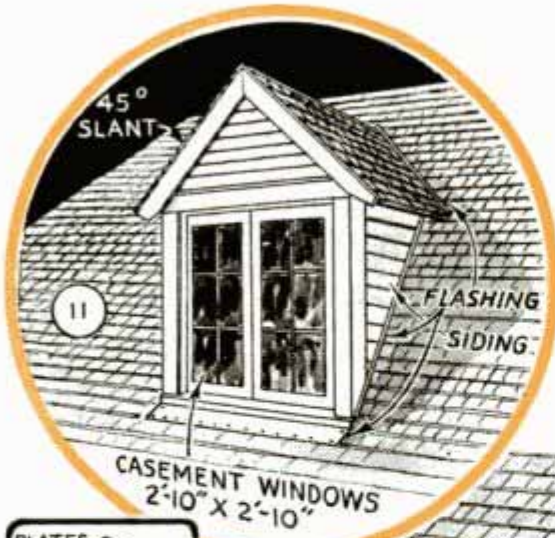
entrance shown in Fig. 2 is similar to the one used on the house in the photo. While the entire entrance, as a unit, can be purchased, considerable expense can be saved by building it yourself, using stock columns, side light and transom, but doing the framing, roofing, etc., yourself. Fig. 4 is a detail drawing of the upper portion or hood, and shows clearly how the ceiling, entablature, etc., are framed. The entrance shown in Fig. 3 is of a somewhat similar type to the one in Fig. 2, but is much simpler and less expensive to build. The whole entrance structure is furred away from the wall, a distance of  $7\frac{3}{4}$  in., or more if desired, as shown in Fig. 6, to give an appearance of depth. Square pilasters, nailed against this structure, are used to support the pediment. The framing and construction of the latter are shown in

The hood type of entrances are suited for small cottages and side doors. The two attractive types shown in Figs. 7 and 8 differ only in the arrangement of the roof. The brackets offer an opportunity for a bit of original design although the ones illustrated are a stock pattern. The framing details for the ridge-roofed hood are given in Fig. 9. The brackets support timber plates, upon which the roof is framed, so they must be securely anchored to the wall, over a stud preferably. The shed-roof type requires only the usual two-by-four framing, as shown in Fig. 10.

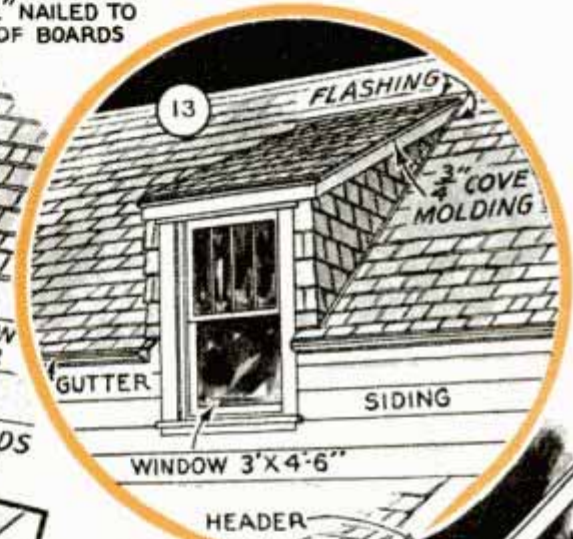
Dormers should be designed to suit the roof on which they are to be built as there are certain variable factors to be considered, such as the slope and type of roof, the distance of the plate above the floor line, and, of course, the architectural style of the house. The five typical dormers shown in Figs. 11, 13, 15, 16 and 17, give you an opportunity to choose the type best



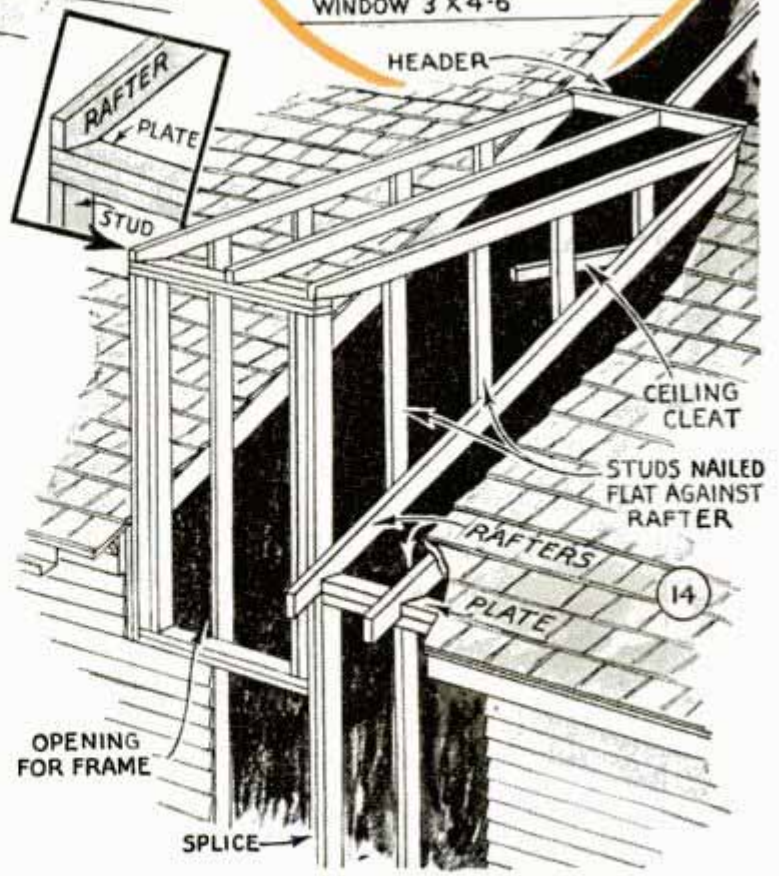
# Five types of dormers



for the dormer is shown in Fig. 18. The shingles are removed over the area and a few inches back from the line for the opening, and the roof boards are either cut away along a rafter, or a short rafter is set in at this point. The rafters that are cut away are fastened with a header. Figs. 19 and 20 show a plan and elevation, giving the location of the floor and the partition in relation to the opening. Fig. 25 shows the front and side views of the dormer in Fig. 16, and Fig. 26 shows in a similar way, the dormer pictured in Fig. 13.



suited to your house. The window sizes are merely suggestive but give some indication of the usual size. The two dormer framing methods in common use are shown in Figs. 12 and 14. In the former, a regular plate arrangement is used on which the rafters are set. The studs are nailed against the sides of the roof rafters and are run to the floor, unless the dormer runs into the side wall of the building as in Figs. 13 and 15. The second framing method, shown in Fig. 14, eliminates the plates on the sides, as the slope of the roof is so slight as to make these pieces unnecessary. In order to give the maximum room, the studs are often set flat, as indicated. The procedure for cutting the opening

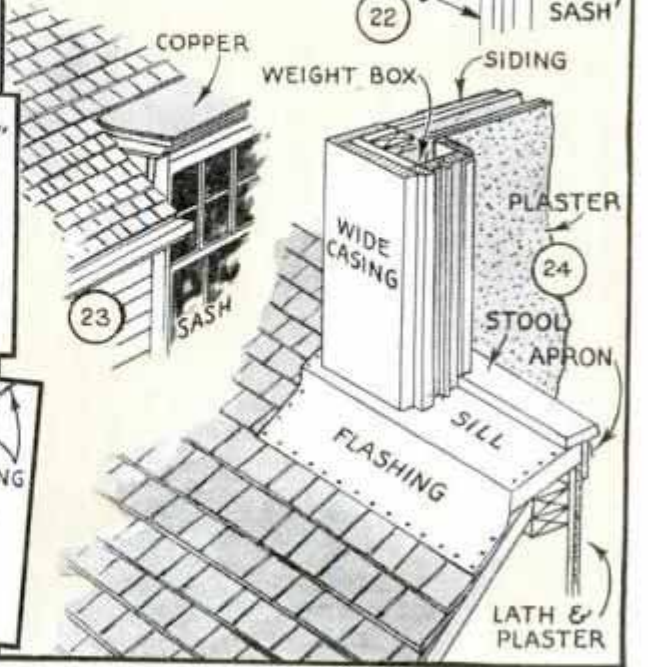
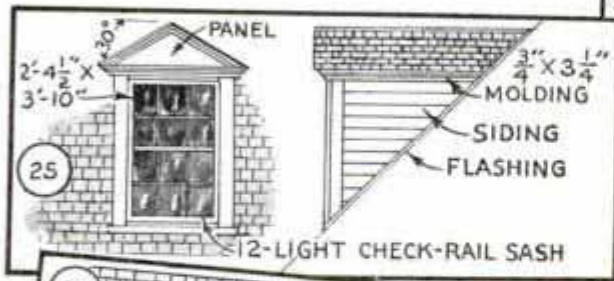
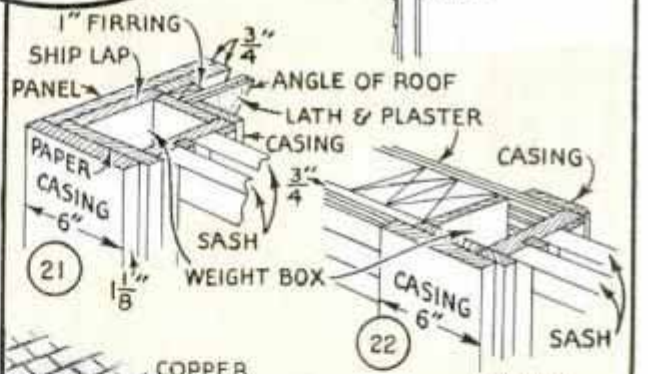
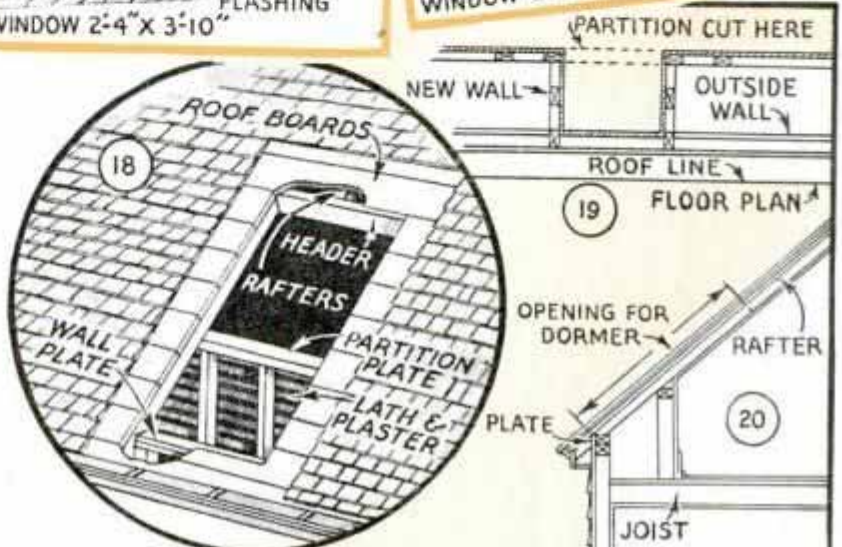




in general use

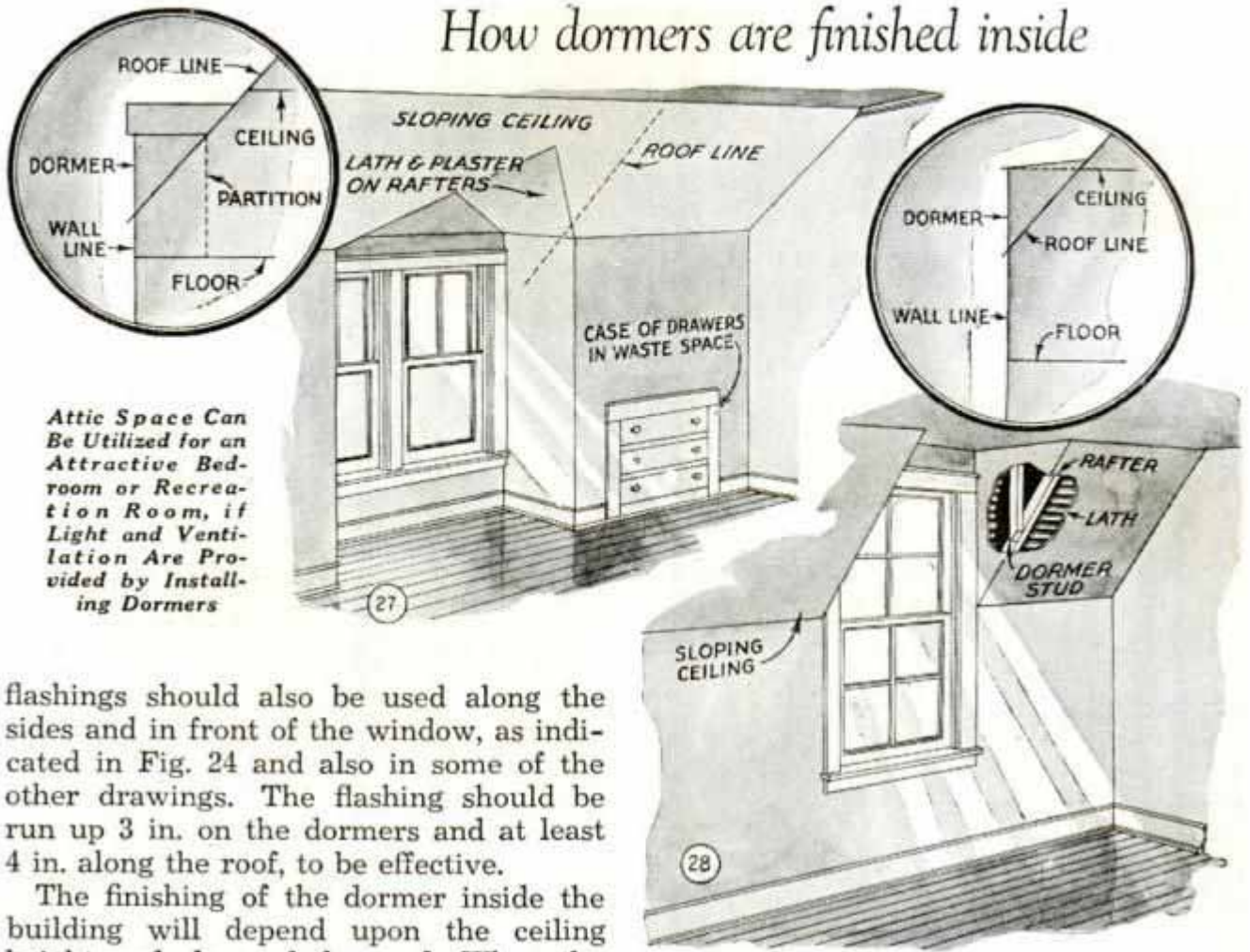


These typical examples are used to further clarify the general scheme. The wall dormer shown in Fig. 15 is unusual and requires special detailing. Fig. 21 shows how the corners are framed above the roof line. Below the roof, the framing is like that for any ordinary window, as shown in Fig. 22. The roof on this dormer is so short that the piece of metal, preferably copper, used as flashing, is simply extended to cover the roof, as shown in Fig. 23. When the dormer is entirely in the roof, the sill is framed as in Fig. 24. The sill is either placed on the top of the wall plate or, if the dormer is higher on the roof, on the partition plate. Metal valleys are necessary along the roofs of all dormers at the line where they join the main roof. Metal





## How dormers are finished inside



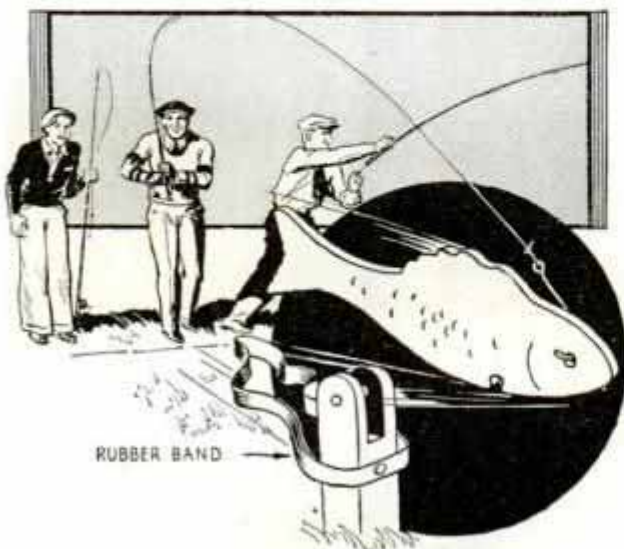
*Attic Space Can Be Utilized for an Attractive Bedroom or Recreation Room, if Light and Ventilation Are Provided by Installing Dormers*

flashings should also be used along the sides and in front of the window, as indicated in Fig. 24 and also in some of the other drawings. The flashing should be run up 3 in. on the dormers and at least 4 in. along the roof, to be effective.

The finishing of the dormer inside the building will depend upon the ceiling height and slope of the roof. When the juncture of the roof and wall is fairly high the arrangement shown in Fig. 28 works out nicely. In buildings with little side wall above the second floor the dormer opening is set out to form an alcove and a partition is run up on each side to meet the partition of the room. This arrange-

ment is shown in Fig. 27. The waste space formed by the partition can often be utilized for storage space, either by means of a door or a case of drawers, as suggested in the figure. The dormer ceiling may either be arched up to the shape of the rafters, rounded or cut off square.

## Novel Fish Game That Will Test Your Skill at Angling

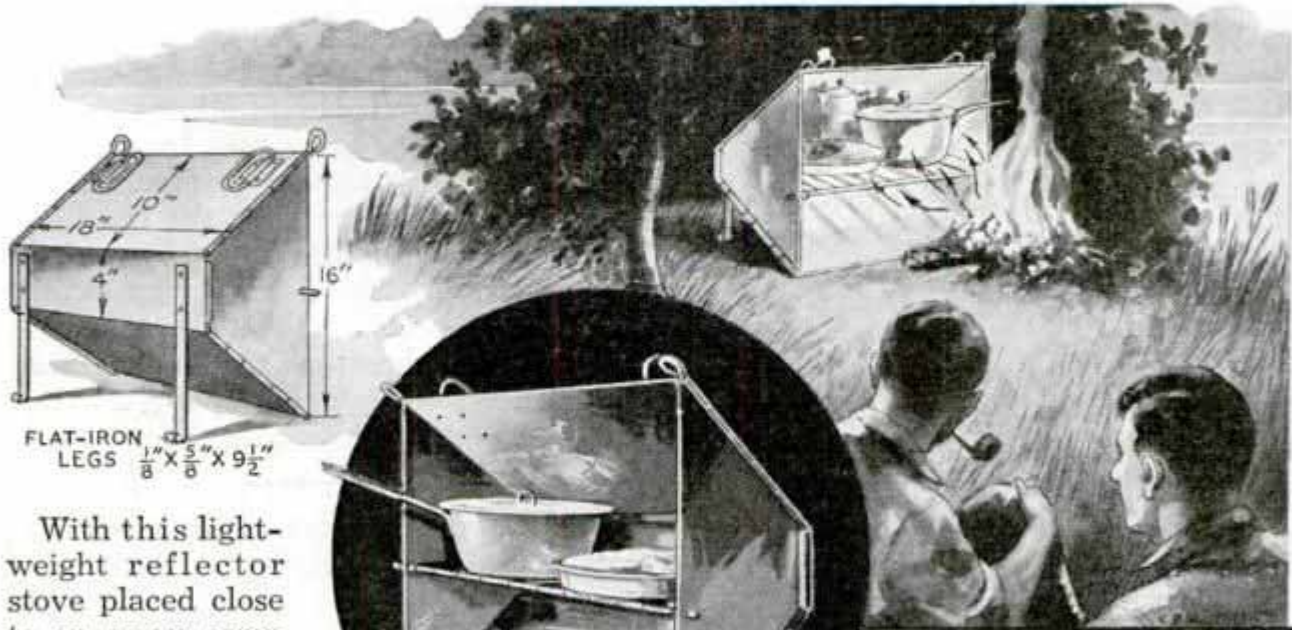


*This Fish Will Test Your Angling Skill*

Dry-land fishing is real sport with this jumping-fish game, which is played on a lawn. The fish are made of plywood and are notched on the undersides to fit over wooden pins in forked supports. A hole is drilled through the head of each fish at the location of the eye to provide a means of hooking it. When hooked, a slight jerk on the line releases the fish, which is then driven forward by a heavy rubber band slipped over the support and the fish's tail. To play the game, stand at some predetermined spot, and, holding the hook over the fish's head, try to get it into the eye. You will be surprised at the skill required to keep the fish on the hook.



# Folding Campers' Stove Cooks by Reflection

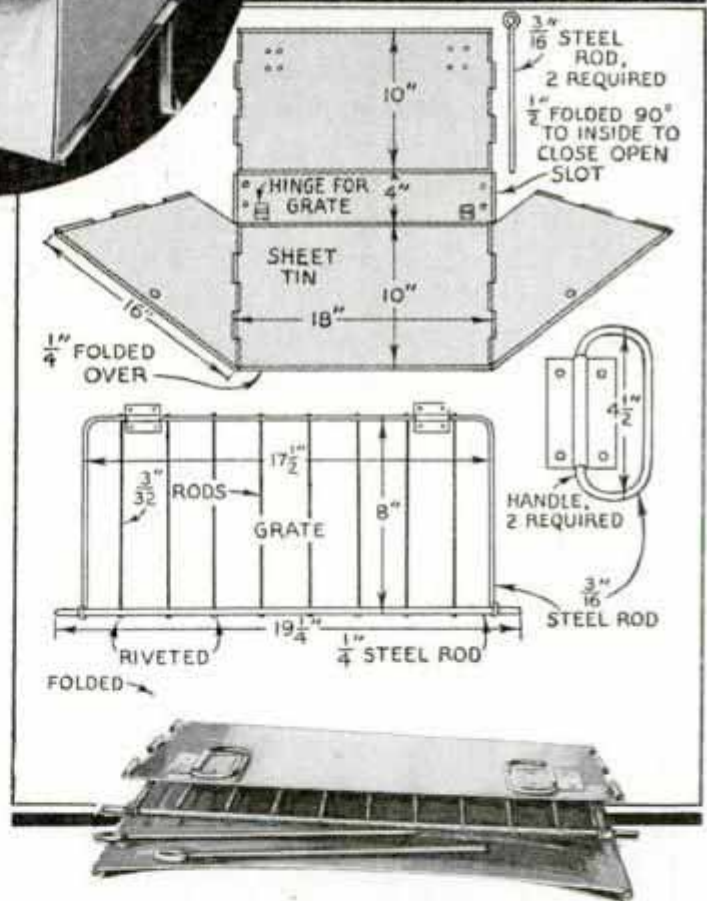


With this light-weight reflector stove placed close to an open camp fire, you can cook a meal in a short time. It has several advantages over a gasoline stove or an open grate fire as it cooks and bakes evenly, is clean, and the cooking utensils do not become blackened with smoke. When folded flat, the stove is easily carried, and if stored, it takes little space. It is made from five pieces of highly polished sheet tin and small steel rods. In cutting the tin, small projections are left on the edges of each piece as indicated, and are folded over to take the rods to form hinged joints. All the pieces are hinged together permanently except where the top and sides join. The rods in these joints are removable to permit the stove to be folded. To hold it in position for cooking, two flat-iron legs are riveted to the back. A grate to hold cooking utensils is hinged to the back and is supported in front by inserting the steel rod into the holes in the sides. Riveting a couple of handles to the top of the stove completes the job.

## Overheated Spark Plugs Stop Outboard Motor

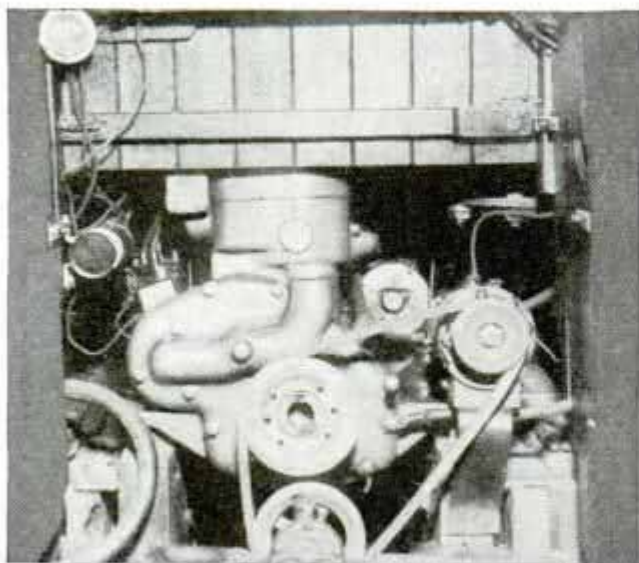
Overheated spark plugs were found to be the cause of a peculiar performance of an outboard motor, which ran perfectly

for the first minute of wide-open throttle operation and then decreased its speed and stopped suddenly as it backfired through the carburetor-air intake. The plug points retained heat long enough after firing the compressed gas in the cylinders to fire the incoming charges before the valve ports were closed. Cooler running types of spark plugs was found to be the only permanent remedy for this trouble.





### Auxiliary Lighting Plant for Small Cruisers from Auto Generator



*Old Auto Generator Belted to Boat Motor Supplies Lighting Current for Small Cruiser*

Owners of small cruisers who have difficulty in keeping their storage batteries charged, when they are used for lighting the boat and starting the motor, will find that a small auxiliary plant driven by the motor will solve their problem. This plant consists of an old 6-volt auto generator, a 100 ampere-hour storage battery, an electrical cutout, ammeter and a V-pulley, all of which can be obtained at small cost from a dealer in second-hand auto parts, although it is best to get a new battery.

The pulley is keyed to the end of the motor shaft to take a V-belt, which drives the generator. The ammeter is mounted on the boat instrument board and the cutout is, of course, mounted on the generator housing. The method of installing the plant will depend on your motor. In the case illustrated, the generator is mounted on the side of the motor near the front. A small bilge pump is also driven by the belt that runs the generator. If a similar installation is made, the long belt should be replaced with a short one to the generator on extended runs to save wear on the pump.—Frank McIntyre, Chicago.

### Short Handle Increases Usefulness of Garden Rake

By removing the handle from an old garden rake and substituting a file handle, you will have a tool that will be found convenient around the home for jobs that must be done



in a kneeling position, such as raking around bushes and flower beds. This short-handle rake is also handy for raking up chips and corn cobs.—Frank W. Bentley, Jr., Missouri Valley, Ia.

## 380 Blueprints for Home Craftsmen



### Boat Building

"Roamer," 16-ft. outboard cruiser, 765 to 770 (6 prints). "Hi-Ho," 14-ft. outboard or inboard runabout, 840 to 845 (6 prints). "Pop's," Class-A outboard racer, 813 and 814 (2 prints). 15-ft. Rowboat, flat bottom, 644.

### Model Making

"Sovereign of the Seas," 828 to 835 (8 prints). Boeing Transport Plane, 865 to 870 (6 prints). "Zip," 50-in. Model Yacht, 880 to 883 (4 prints).

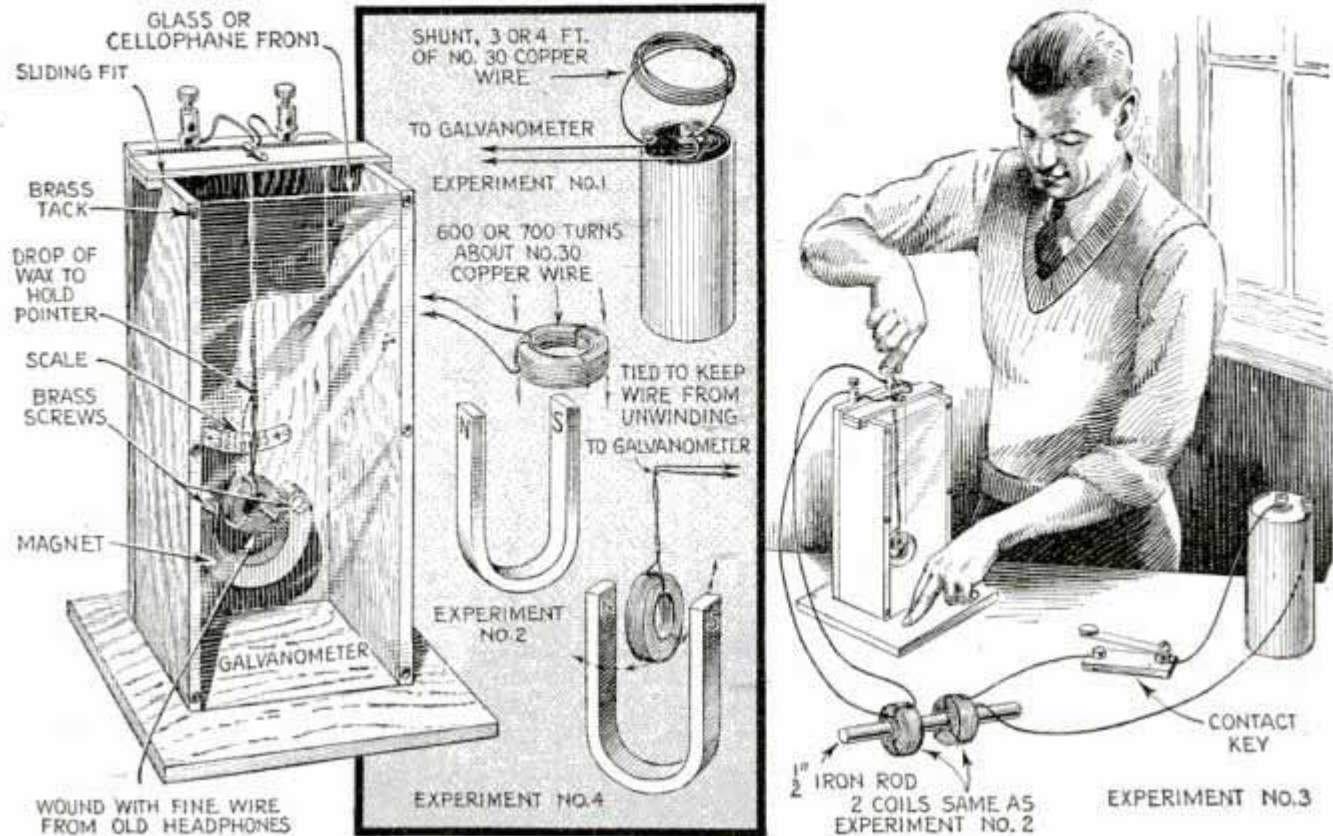
### Woodworking

Bird Huts and Bird Hotels, 884 to 886 (3 prints). Ornamental Wood Fences, 640. Corner Cupboard, 839. Revolving Book Stand, 500.

List of blueprints for 3c postage. Prints sell for 25c each or six prints (not projects) for \$1.00. Address Blueprint Department.



# Experiments with Homemade Galvanometer



This galvanometer can be used to perform many interesting experiments. The magnets are removed from an old pair of headphones, and are screwed to the back of the box, spacing them  $\frac{1}{2}$  in. apart. A coil, wound with wire from the headphones, is suspended from a sliding board on top of the box to hang between the magnet poles with a clearance of about  $\frac{1}{8}$  in. on each side. The suspension wire is a continuation of the coil leads, which are fastened to a couple of binding posts on top of the box. A short wire attached to these leads with a drop of wax serves as a pointer on a scale screwed to the back of the box. A piece of glass or Cellophane over the open front of the box completes the instrument. For the first experiment, wind coils from 4-ft. lengths of No. 20, 22, 24, 26, 28, and 30 copper wire and alternately connect each one across the posts of a dry cell, which has been connected to the binding posts on the galvanometer. These coils act as shunts, and each one will pass a different amount of current as indicated by the varied deflections of the pointer on the scale. The second experiment shows the amount of current induced in a coil of wire that is suddenly plunged

over a pole of a horseshoe magnet. For this experiment you will need two coils consisting of 600 or 700 turns of No. 30 copper wire. The coil leads, of course, are connected to the galvanometer binding posts. In the third experiment, two coils, similar to the one used in the second experiment, are slipped over an iron rod. One coil is connected to the galvanometer and the other is connected to a dry cell, and a contact key is attached in one of the leads as shown. This experiment demonstrates the principle of a transformer and shows the amount of current induced in one coil by current from the dry cell flowing through the other one. The fourth experiment demonstrates the principle of a dynamo or generator, and is a coil connected to the binding posts and rotated between the poles of a horseshoe magnet.

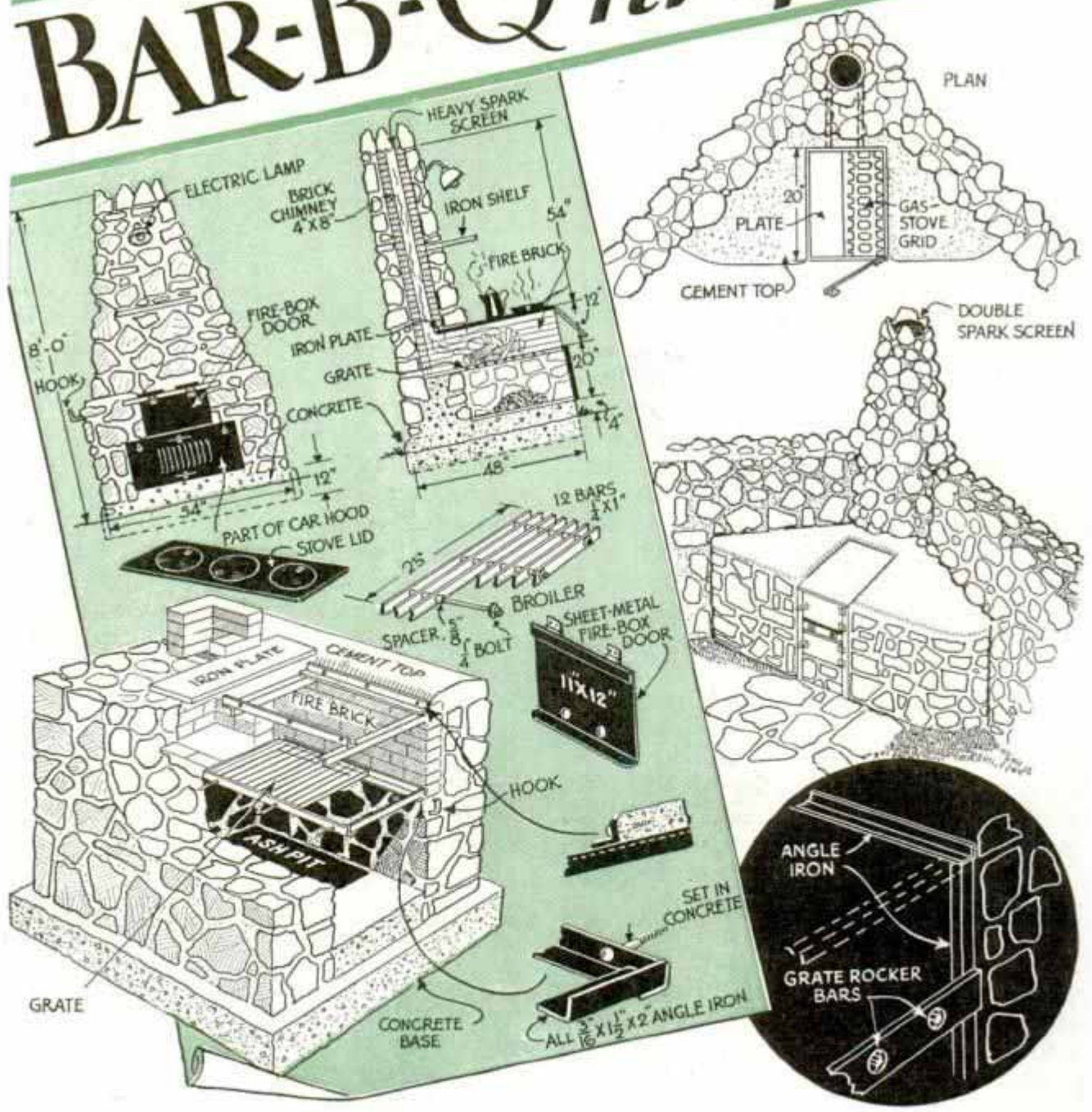
## Garden-Hose Gaskets Made of Cork

Good gaskets for use between the connections of a garden hose are easily made from the cork disks found in bottle caps. The center of the cork is cut out, leaving a ring, which makes a gasket just the right size for the average hose.





# BAR-B-Q fireplaces





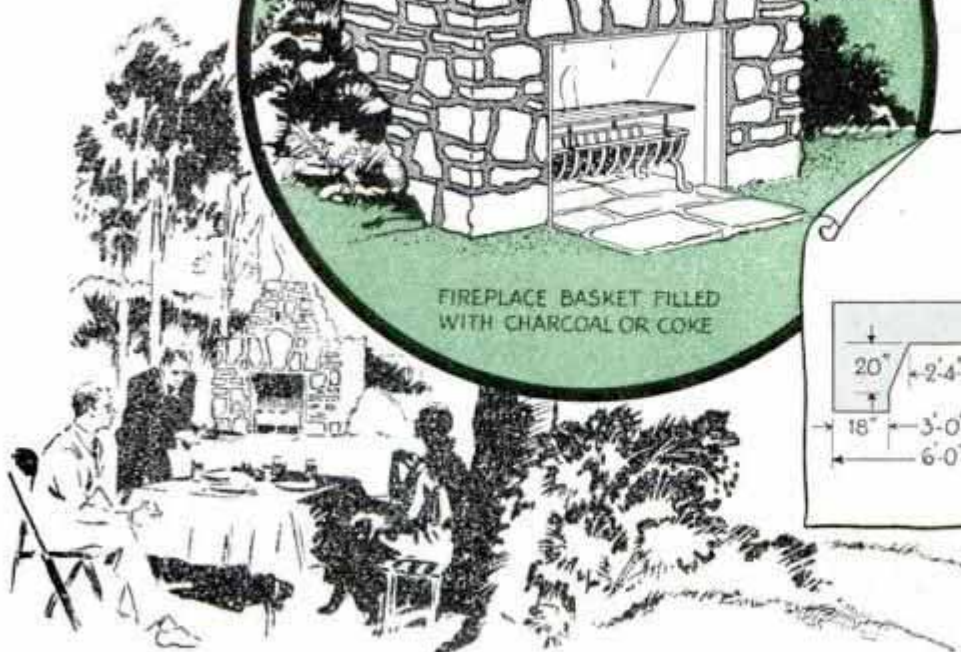
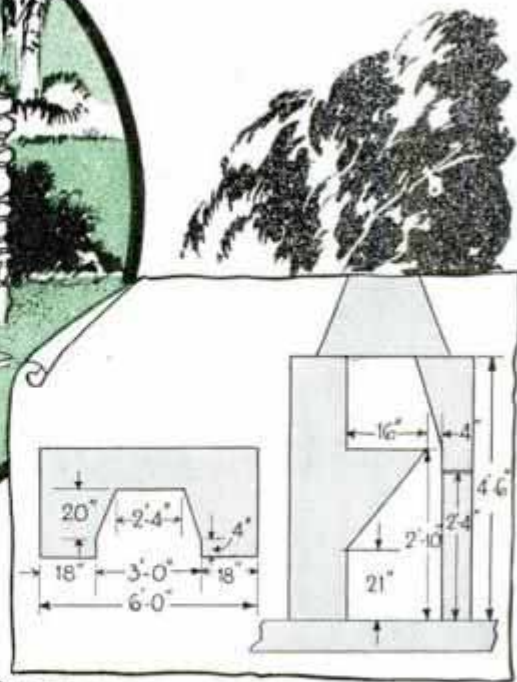
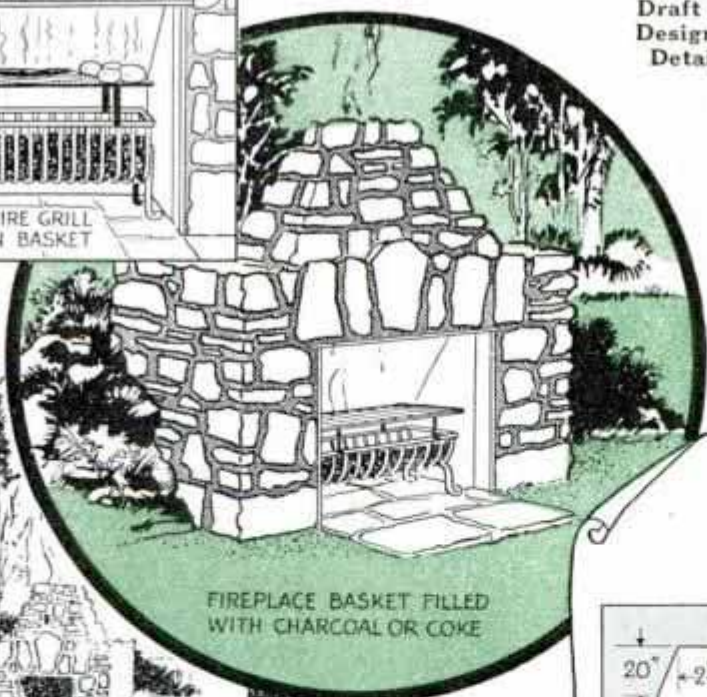


# for the GARDEN...

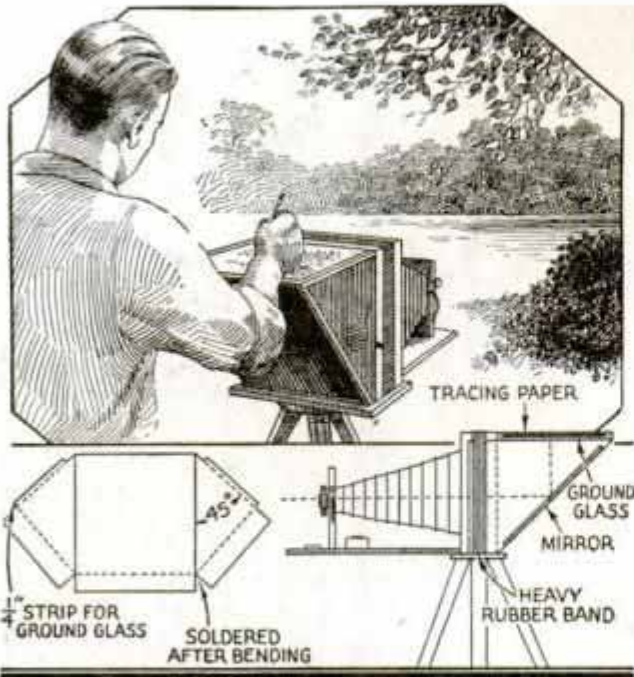
Garden Fireplaces, for Preparing Meals Outdoors During Hot Weather, Are Both Practical and Ornamental, Being Built to Match Other Items of a Rock-Garden Setup; Usually a 6-In. Concrete Floor Is Laid First, after Which Stones of the Hearth Are Set in Place; the Mortar Used Should Consist of Cement and "Torpedo" Sand, Mixed in Equal Amounts; for Fuel You Will Find Charcoal or Coke Convenient



Arrangement of the Flue Is Very Important to Insure a Constant Draft and No "Down Drafts"; the Design Shown in the Lower-Right Detail Eliminates Such Trouble





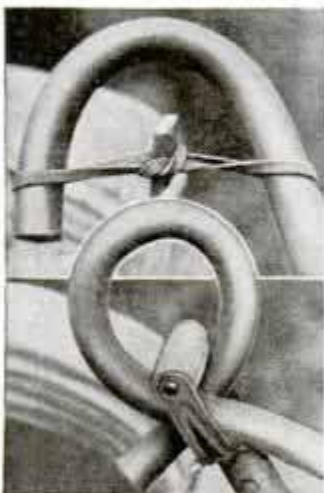


*Homemade Attachment Permits Landscapes to Be Sketched with Aid of Camera*

### Camera Used to Sketch Landscapes

By fitting this attachment on the back of a camera that has a ground glass, anyone can trace landscapes accurately. It is made from a piece of sheet metal cut to the shape shown, and has a mirror set in the back to reflect the image from the lens against the ground glass, the latter having been removed from the camera and placed in the top of the attachment. After focusing the camera sharply, paper is placed on the glass and the image is traced. —W. C. Wilhite, Hornsby, Ill.

### Two Methods of Holding Garden Hose to Fill Tubs

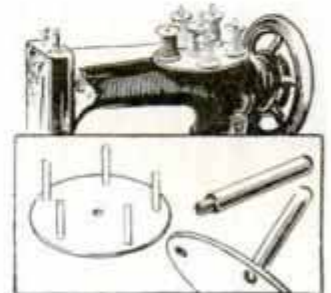


Here are two practical methods of attaching a garden hose to the rim of a tub or tank while filling it with water. In the upper photo, two fruit-jar rubbers are looped around a stick and the end of the hose is bent through the rubbers so that when the stick rests against the inside of the tube, the hose is held firmly. The lower photo shows

the end of the hose looped through the handle of a spade, which leans against the tub.—Frank W. Bentley, Jr., Missouri Valley, Ia.

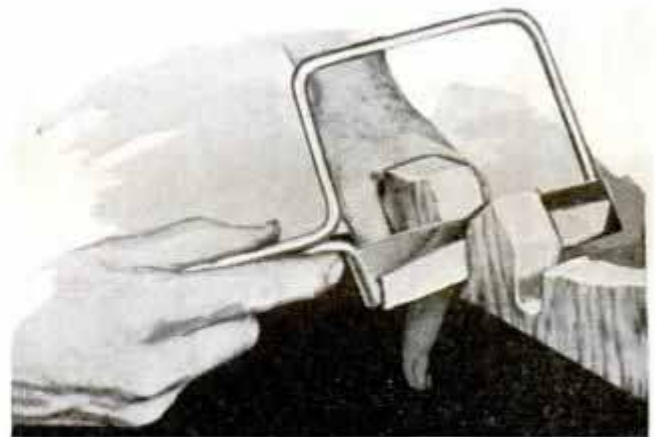
### Multiple Spool Holder Improves Sewing Machine

When different kinds of thread are used intermittently on a sewing machine, much time can be saved in changing spools by using this spool holder. It consists of a 3-in. sheet-metal disk, which has four equally spaced spindles soldered into holes drilled near the edge. A hole in the center of the disk permits it to be slipped over the regular holder on the machine. When a change of thread is made, the holder is turned until the proper spool is in line with the threading eye of the machine.



### Scroll Saw Serves as Sanding Tool

Intricate scrollwork can be sanded easily with the aid of a hand scroll saw and a wide rubber band stretched over the saw blade as shown. A narrow strip of sandpaper is folded over the lower edge of the



*Small Scroll Saw Holds Strip of Sandpaper for Sanding Intricate Scrollwork*

band. Only one hand is needed for the sanding, the other one being used to hold the work.

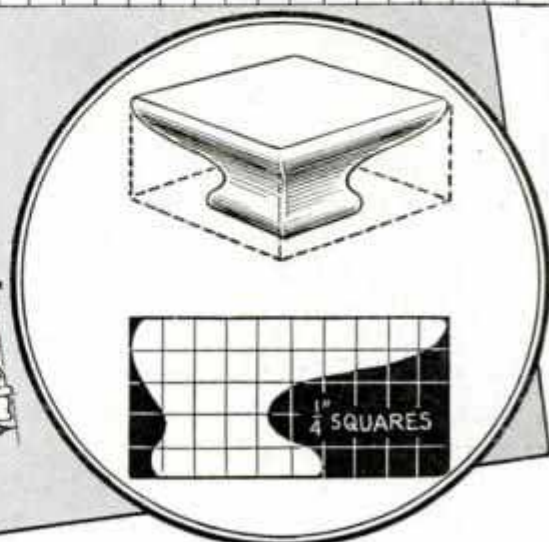
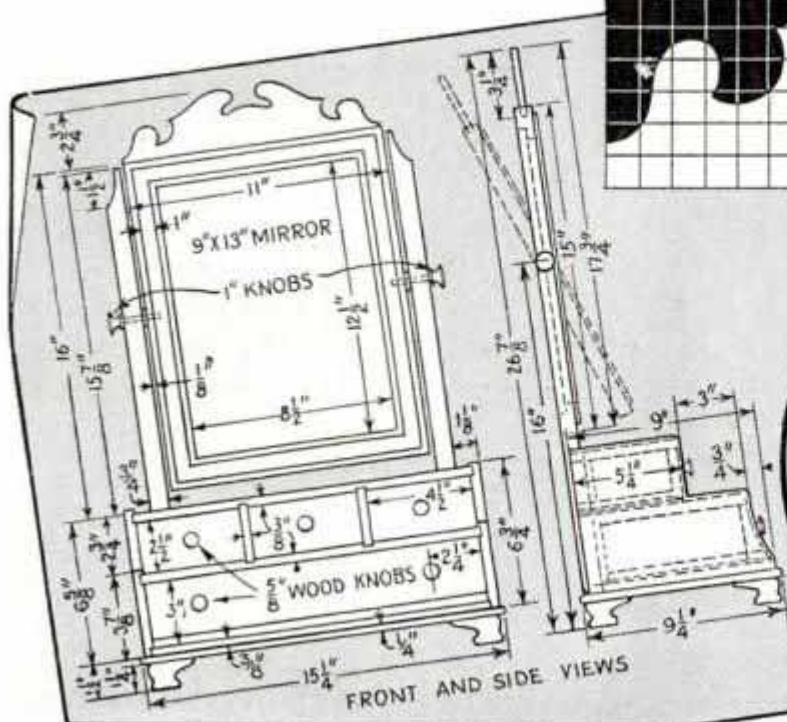
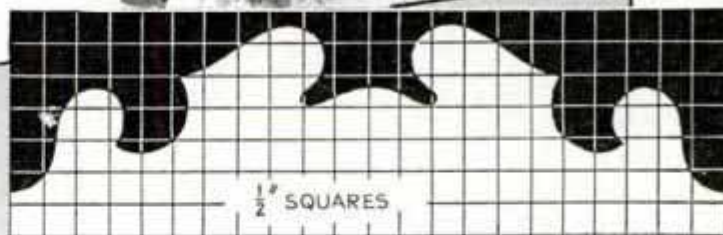
☞ The corner of an envelope may be used as a small funnel if the tip of the corner is cut off.



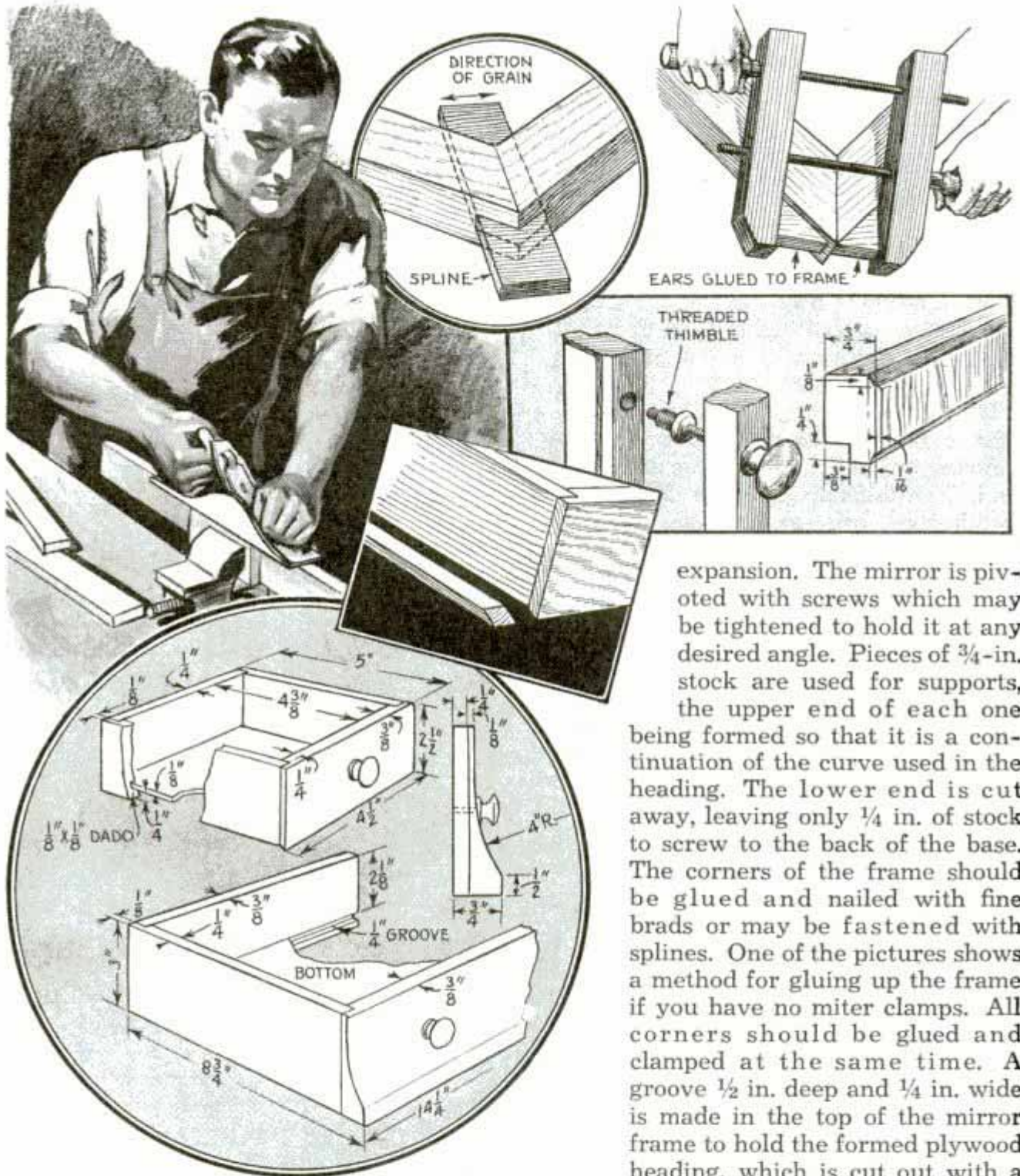
# A Queen Anne Style VANITY MIRROR

FOR use on either a dressing table or on top of a highboy or chest of drawers, this vanity mirror is easily constructed with hand tools, although a circular saw, jointer and band saw will prove convenient.

The end pieces of the base are made first, a housed butt joint being used between the horizontal pieces and the end. Partitions dividing the three little drawers are set into dadoes cut into the top and middle pieces. These cuts are made  $\frac{1}{8}$  in. deep with a back saw and chisel, and should fit the pieces snugly. When finished, a  $\frac{3}{16}$  by  $\frac{1}{4}$ -in. rabbet is made on the rear edges of the side, top and bottom pieces to take a  $\frac{1}{4}$ -in. backing. The base is fastened together with glue and small brads. A cardboard pattern should be made for the bracket feet. After the blocks have been cut, the pattern is transferred, and the feet are cut out with a band or coping saw. Screws are used to fasten the legs in place. In making the three little draw-







ers, a groove is cut in all pieces to house the bottom and allow for expansion instead of having the bottom extend under the back piece, as is the usual practice with larger drawers. The front of the lower drawer is cut from  $\frac{3}{4}$ -in. stock to the curvature shown. This may be done with a plane and a gouge followed by rough sandpaper wrapped on a piece of wood of approximately the same curvature. Do not fit the drawers too tight; about  $\frac{1}{16}$  in. should be allowed each way for finish and

expansion. The mirror is pivoted with screws which may be tightened to hold it at any desired angle. Pieces of  $\frac{3}{4}$ -in. stock are used for supports, the upper end of each one being formed so that it is a continuation of the curve used in the heading. The lower end is cut away, leaving only  $\frac{1}{4}$  in. of stock to screw to the back of the base. The corners of the frame should be glued and nailed with fine brads or may be fastened with splines. One of the pictures shows a method for gluing up the frame if you have no miter clamps. All corners should be glued and clamped at the same time. A groove  $\frac{1}{2}$  in. deep and  $\frac{1}{4}$  in. wide is made in the top of the mirror frame to hold the formed plywood heading, which is cut out with a scroll saw, after transferring the design to the wood from a paper pattern, shown in one of the drawings.

### Brightening Nickel and Aluminum

To brighten metal fixtures of polished nickel or aluminum, rub them with a cloth dipped in a solution consisting of alcohol, 1 oz., and sulphuric acid, 2 drops. After cleaning the metal, it should be rinsed with clear water to remove all traces of the acid.

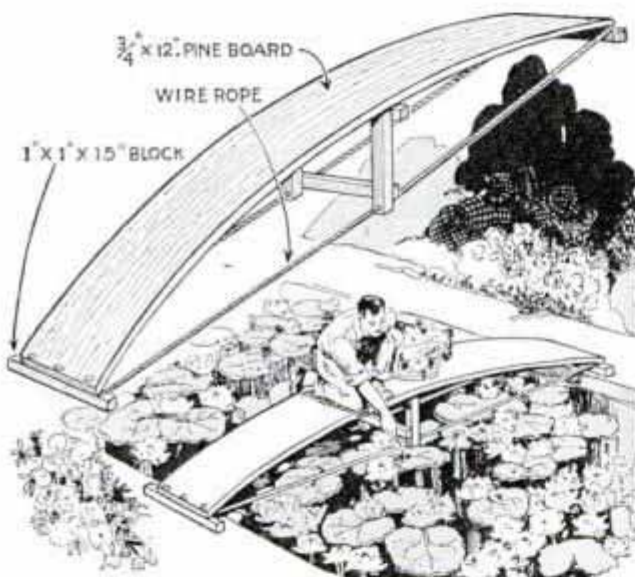


### Printing Removed from Flour Sacks

Many uses for empty flour and sugar sacks can be found around the home if the printing can be removed from them without too much difficulty. This can be done by rubbing lard into the printed design or lettering, and rolling the treated sack into a compact roll. After a few days, unroll the sack and boil it in soft water until the printing disappears.—G. E. Hendrickson, Argyle, Wis.

### Lightweight Bridge Helps in Tending Large Lily Pools

If your lily pool is so wide that the plants in the center cannot be reached, this bridge will enable you to get at them with ease. It consists of a long board held in an arched position by means of wire rope and a brace in the center. This construction

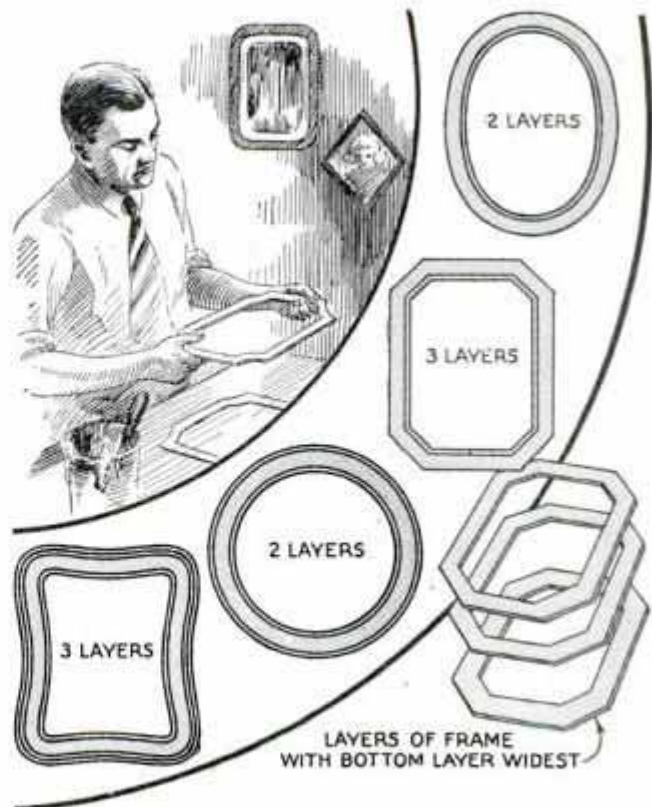


With This Bridge You Can Reach Plants in Center of Large Lily Pools

makes the bridge strong enough to support a heavy person, yet light so that it can be handled easily.

### Picture Frames Made of Composition Board with Simple Tools

Picture frames having mitered corners are difficult to make without proper tools, but anyone who has a sharp jackknife and a hand scroll saw can make some of composition board that will compare favorably with those made of solid stock. First, the design of the frame is laid out on the board and is cut out. Then the frame is glued



Odd-Shaped Picture Frames Made by Gluing up Layers of Composition Board

up in layers, using two or more as desired. A rabbet in the back of the frame, to take the picture and glass front, is made by cutting a little more stock out of the center of the lower layer than the upper ones. Molding effects can be made by cutting each layer a little smaller in size than the one directly below it. This is shown in the lower left-hand detail of the drawing. After sanding and shellacking, the frame is ready for decorating.

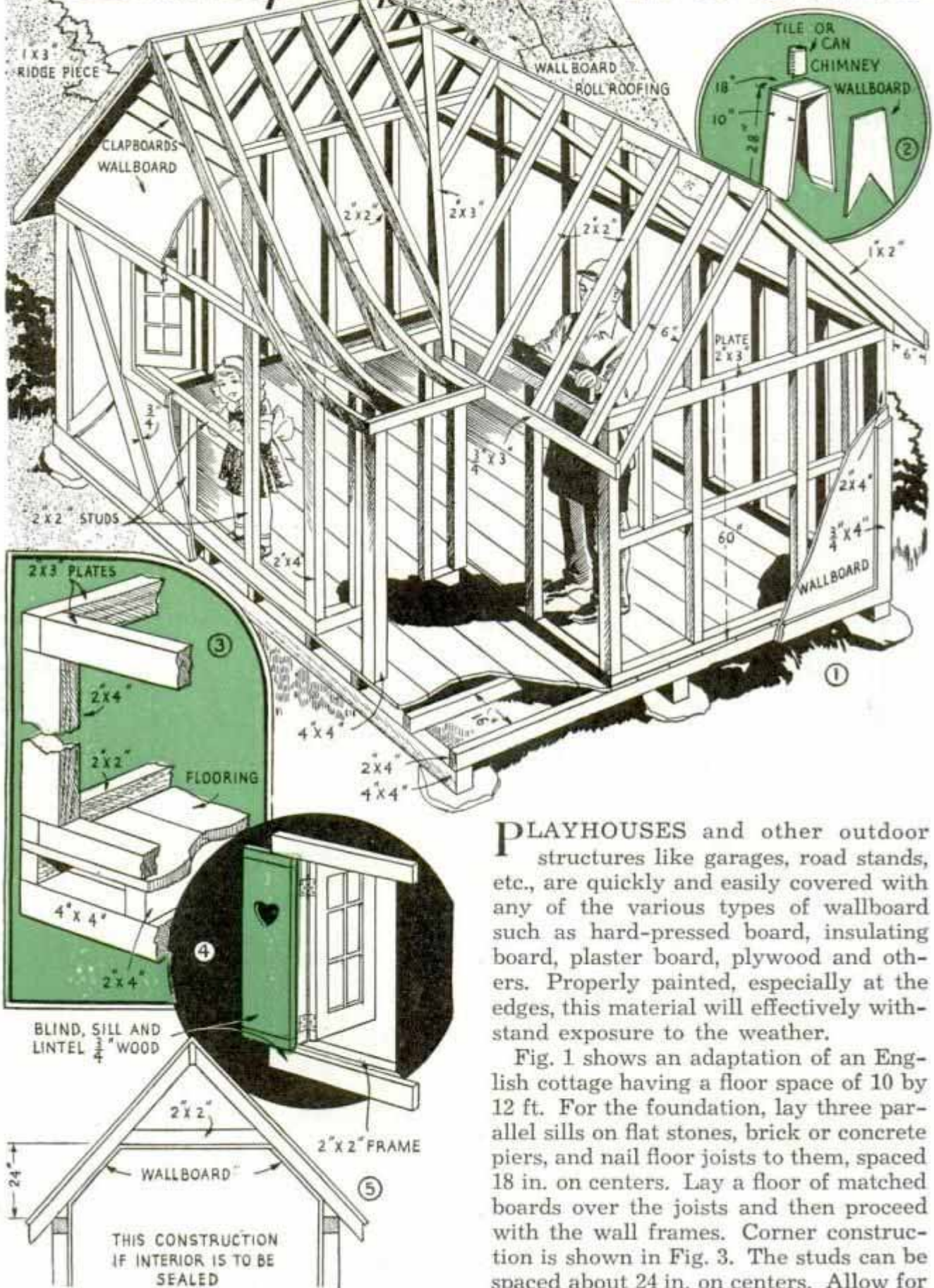
### Prongs on Plug of Electric Cord Protected with Cork



To prevent the prongs of a plug on an electric cord from being accidentally bent or broken off when not in use, slit opposite sides of a cork and force it over the prongs as shown. When the plug is in use, the cork can be fastened to the cord by means of a small rubber band.—Frank W. Bentley, Jr., Missouri Valley, Iowa.



# Weatherproof PLAYHOUSES



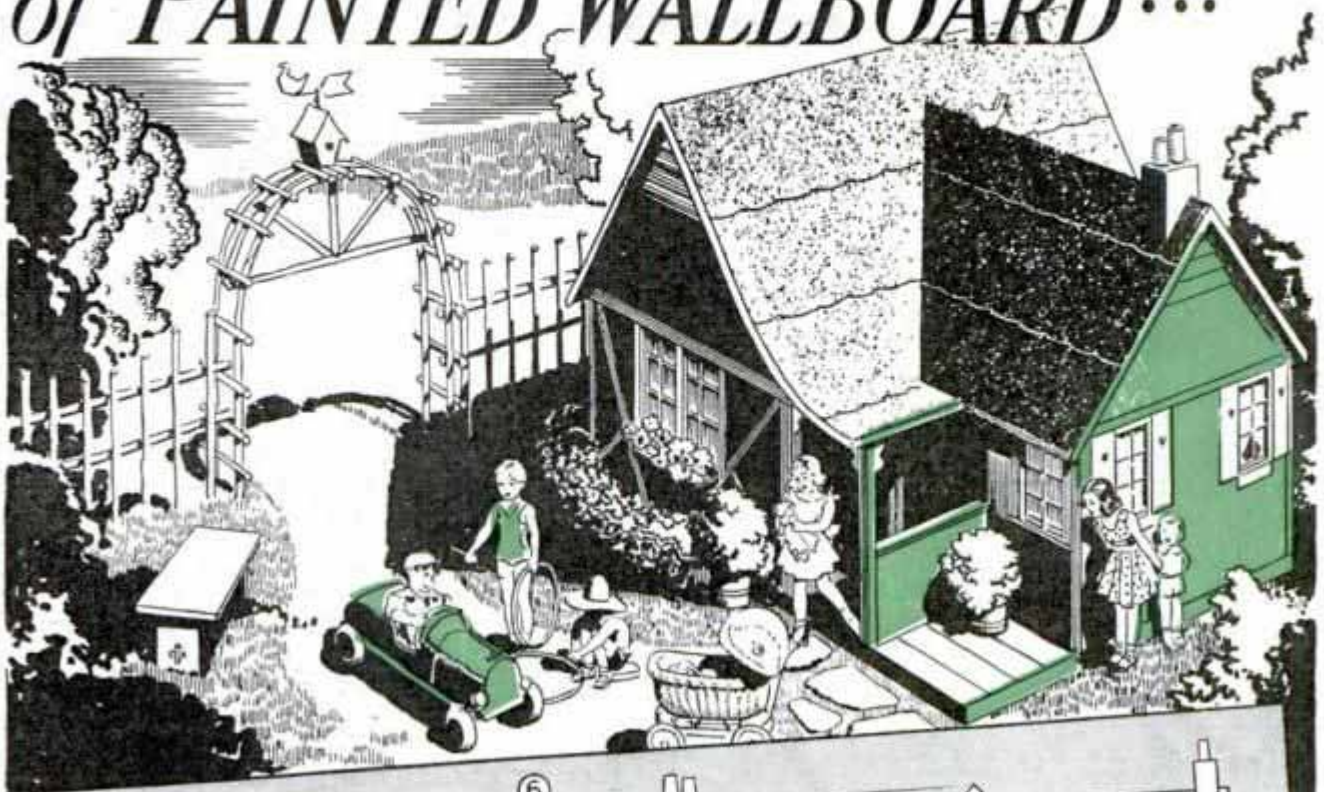
**P**LAYHOUSES and other outdoor structures like garages, road stands, etc., are quickly and easily covered with any of the various types of wallboard such as hard-pressed board, insulating board, plaster board, plywood and others. Properly painted, especially at the edges, this material will effectively withstand exposure to the weather.

Fig. 1 shows an adaptation of an English cottage having a floor space of 10 by 12 ft. For the foundation, lay three parallel sills on flat stones, brick or concrete piers, and nail floor joists to them, spaced 18 in. on centers. Lay a floor of matched boards over the joists and then proceed with the wall frames. Corner construction is shown in Fig. 3. The studs can be spaced about 24 in. on centers. Allow for door and window openings of sizes given



B p 925

# of PAINTED WALLBOARD...

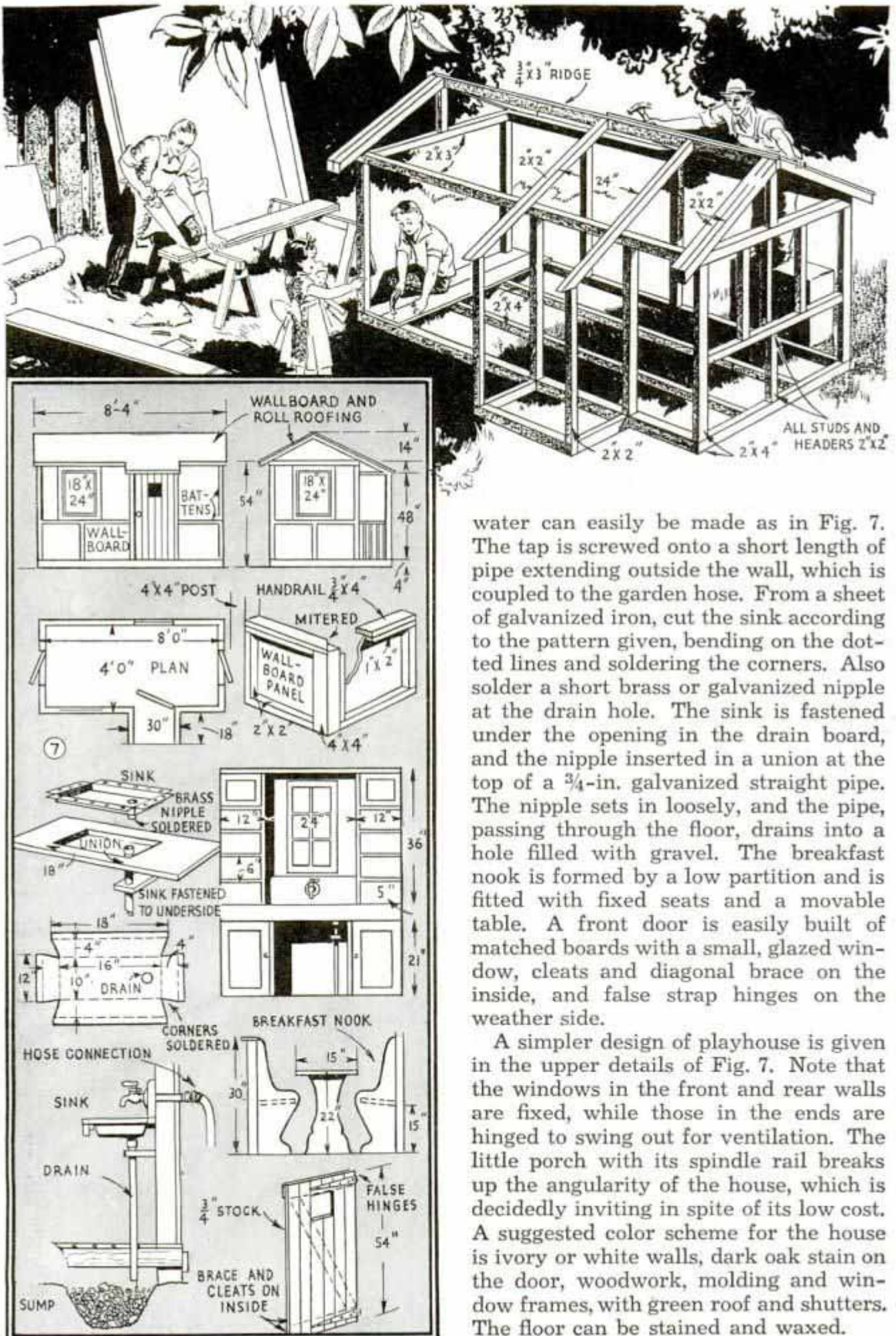


in the elevation drawings, Fig. 6. The distance from the floor to the top of the plate, or horizontal piece across the tops of the studs, is 5 ft., and the peak of the main roof is 5 ft. above the plate. The smaller roof is 4 ft. above the plate. Spacing of the rafters depends on the kind of wallboard used for sheathing. Light wallboard will require rafters fairly close together, while a heavy, stiff wallboard will allow greater spacing. Curved strips are nailed to the rafters and cornice over the tiny porch. After the framework has been completed, install the wallboard roof sheathing and cover with roll roofing, the laps being cemented with roofing tar in the usual way. Timber work is applied over the wallboard on the front of the house. Casement windows, Fig. 4, are easy to in-

stall, the studs and headers forming the window frame. The tapering chimney, Fig. 2, is built up of wood and wallboard, and is nailed to the peak over the completed roofing. Of course, sealing the inside and trimming with battens will greatly improve the appearance of the interior. In this case, cross pieces should join the rafters horizontally about 2 ft. above the eaves as shown in Fig. 5. It is important that the wallboard be painted on the outside to prevent it from absorbing moisture, and it is a good plan to give the inside one coat also, if the house is to be exposed to continued wet weather. In any case, paint the walls before applying the timber work and molding so that they will not become daubed in the course of painting.

A kitchen sink with a drain and running



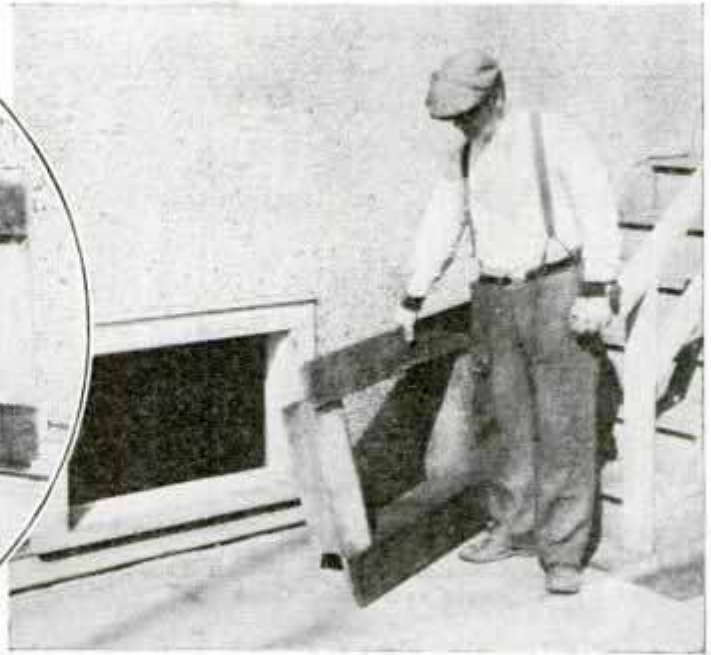


water can easily be made as in Fig. 7. The tap is screwed onto a short length of pipe extending outside the wall, which is coupled to the garden hose. From a sheet of galvanized iron, cut the sink according to the pattern given, bending on the dotted lines and soldering the corners. Also solder a short brass or galvanized nipple at the drain hole. The sink is fastened under the opening in the drain board, and the nipple inserted in a union at the top of a  $\frac{3}{4}$ -in. galvanized straight pipe. The nipple sets in loosely, and the pipe, passing through the floor, drains into a hole filled with gravel. The breakfast nook is formed by a low partition and is fitted with fixed seats and a movable table. A front door is easily built of matched boards with a small, glazed window, cleats and diagonal brace on the inside, and false strap hinges on the weather side.

A simpler design of playhouse is given in the upper details of Fig. 7. Note that the windows in the front and rear walls are fixed, while those in the ends are hinged to swing out for ventilation. The little porch with its spindle rail breaks up the angularity of the house, which is decidedly inviting in spite of its low cost. A suggested color scheme for the house is ivory or white walls, dark oak stain on the door, woodwork, molding and window frames, with green roof and shutters. The floor can be stained and waxed.



## Wood Frame Protects Coal-Window Casing



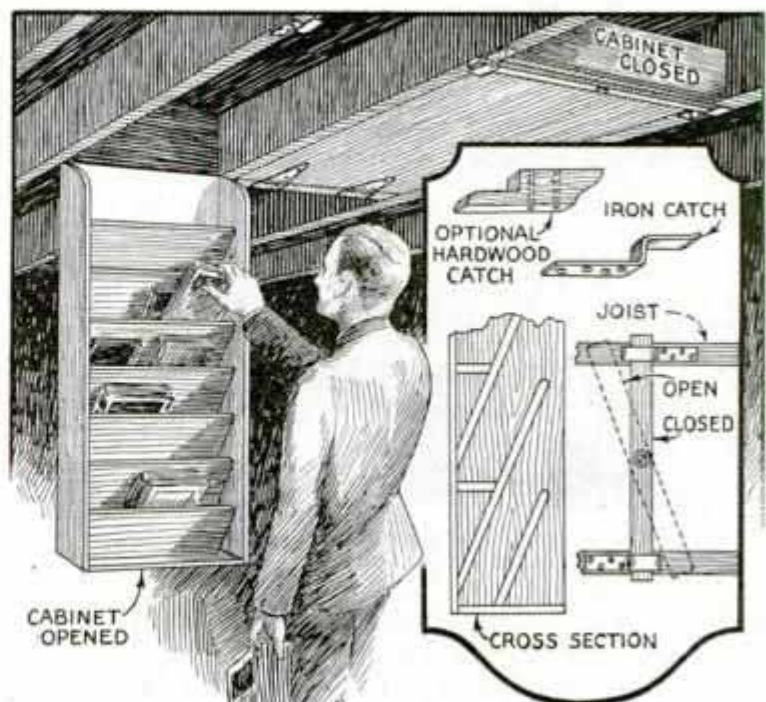
To prevent his basement window from being marred by having coal strike the casing and blacken it, one home owner made a wood frame which he slipped over the casing when filling the coal bin. Short pieces nailed to the end members at right

angles, slip inside of the window opening and hold the frame in place while shoveling in the coal. After the bin has been filled, the frame is removed from the window and is set aside until needed again.—F. H. Moore, Elmhurst, Ill.

## Storage Cabinet in the Basement Folds between the Joist

Hinged to a spreader between the floor joist in a basement, this cabinet folds up against the floor and provides a handy storage space. No dimensions are given as the size of the cabinet can be made to suit. It is open at the hinged end and has shelves set at an angle as indicated. To hold the cabinet in the folded position, an arm is pivoted to the center of the bottom at the front end to engage catches screwed to the joist. The catches may be made of wood or flat iron.

used with good results on rubber gloves that have lost part of their elasticity.



*Cabinet between Floor Joist Provides Extra Storage Space*

### Softening Typewriter Platens

Typewriter platens can be renewed with a mixture consisting of equal parts of glycerine and ammonia, which is rubbed in with a cloth. Allow the typewriter to remain in a warm room for a day before wiping off the excess solution. This method can also be





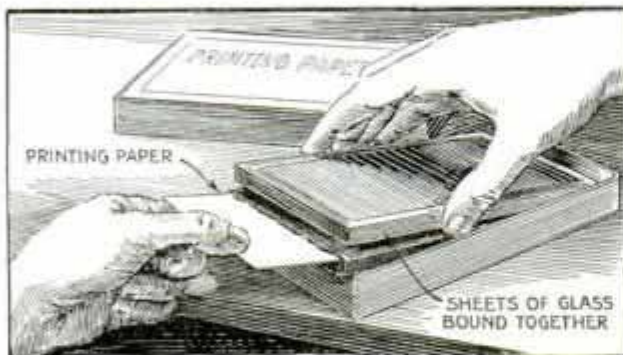
*Homemade Refrigerator Pan in Which to Freeze Desserts in Serving Cups*

### Refrigerator Pan for Freezing Dessert in Serving Cups

Substituted for one of the regular ice-cube pans in your refrigerator, this homemade pan enables you to freeze custards and other desserts in paper serving cups, thus eliminating the necessity of transferring them to other containers. The pan is made from two strips of sheet metal and heavy wire, which are soldered together as shown. The average pan will accommodate eight cups.

### Keeping Photo Print Paper Flat

To prevent sensitized printing paper from curling after half of the box has been



*Sheets of Glass Bound Together and Used as Weight to Keep Print Paper from Curling*

used, bind together four or five sheets of glass of the same size as the paper, and place them on top of it, inside the box. In opening new packages of paper, do not remove the black paper wrapping; just slit

it at one end sufficiently to remove the sheets one by one, and the contents will be better preserved. If you add a little glycerine to the final wash water, say about 5 per cent, prints will not curl after they have dried.

### Plate Scraper Aids in Applying Priming Coats of Paint

On many refinishing jobs about the home, it is necessary to apply a priming coat to the wood with more pressure than can be exerted with a paint brush. A



*Rubber Plate Scraper for Applying Cleaning Solutions to Surfaces Before Painting Them*

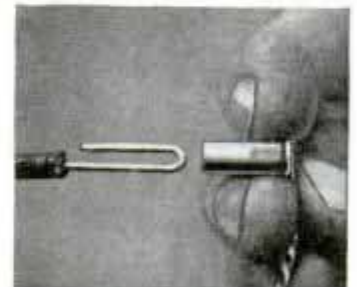
good tool for this purpose is a rubber-blade plate scraper, which can be obtained at a dime store. The scraper is also handy for applying acid or lye solutions to clean the surfaces before painting.

### Low-Voltage Electrical Connectors Made from Rifle Cartridges

Where low-voltage currents are handled, in experimenting with temporary electrical hook-

ups, slip-on connectors can be made from No. 22-ga. rifle cartridges. Clean out the cartridge and solder the end of one wire to the bottom. Then

bend the end of the other wire to a U-shape so that it will slip inside of the cartridge. Be sure the cartridge is thoroughly cleaned inside.





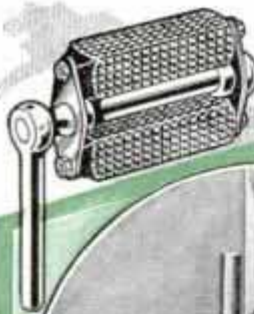


# A Portable BELT SANDER

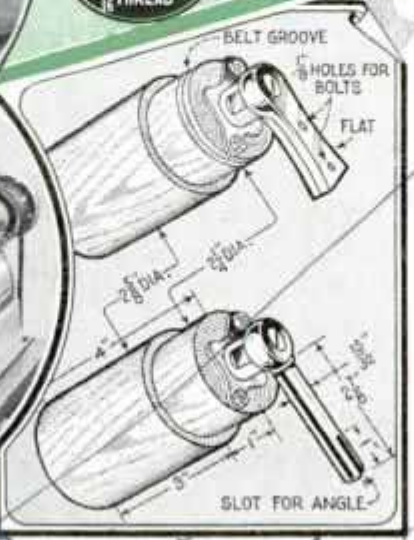
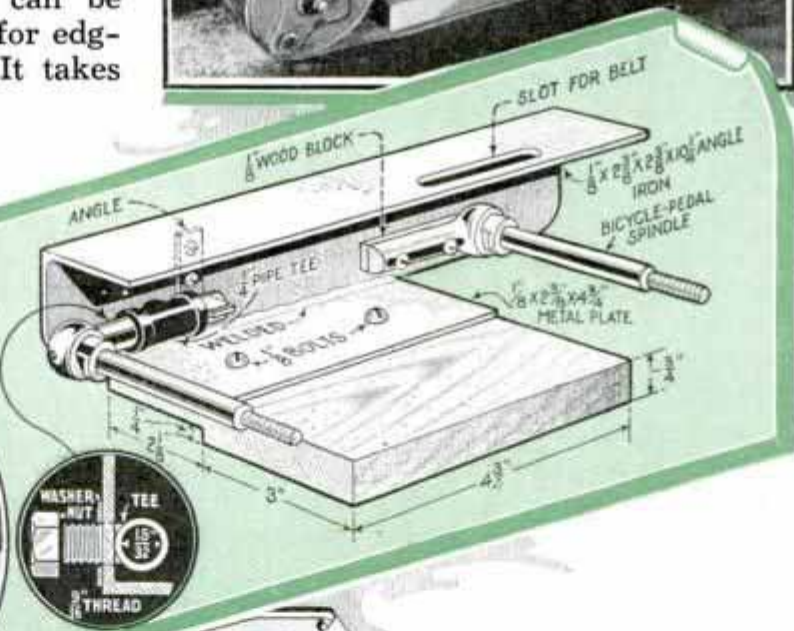
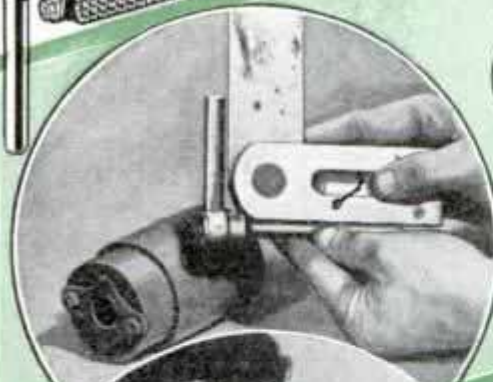
**S**IMPLE and inexpensive to build, the power sander described here finds hundreds of uses around the shop, especially in surfacing large areas such as boat planking, interior floors, and the larger furniture projects. The sander can be readily fitted with a bench stand for edging and jointing straight stock. It takes



Illustration by Charles  
 Export - 182 Beane St. New York  
 Western Ore  
 Minnesota  
 Co. 15 for S.



BICYCLE PEDALS MAKE THE TWO PULLEYS



the standard 3 by 24-in. sanding belt, and a large variety of grits for wood or metal cutting can be obtained.

The framework is made from a length of 2 3/8-in. angle iron to which is welded a shorter metal plate of the same width to make a U-shaped frame. A length of channel iron or a casting to the same general dimensions could



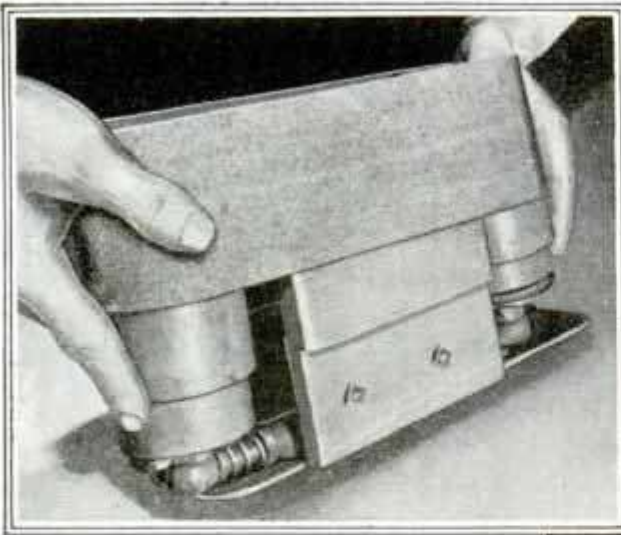
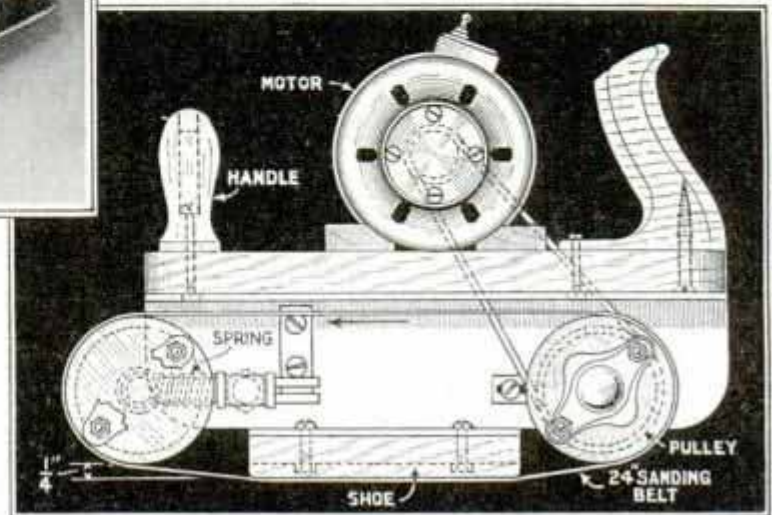


Photo Above Shows How the Front Pulley-Tensioner Spring Is Compressed with the Hands to Permit the Belt to Be Slipped into Position; the Detail at the Right Shows the General Construction

also be used. The frame carries the two pulleys and their respective supporting arms. These are made from bicycle pedals and cranks in a manner which should be fairly apparent from the pictures. Each pulley is made from hardwood and to the same dimensions, with the exception that the rear pulley has a groove at one end to take the  $\frac{3}{16}$ -in. sewing-machine belt.

Considerable machining is necessary on the two pulley arms. These can be made from the original pedal cranks or made up from suitable stock. In any case it is important that the pulley spindle and the supporting arm be perfectly square, and a constant check should be kept to see that everything lines up right. The sander, when finished, has a spring tensioner to take up belt slackness, but it has no alignment device—hence the importance of getting the spindles squarely mounted to start with. The rear pulley spindle is fixed solid; the forward spindle arm is housed in a  $\frac{1}{4}$ -in. pipe tee which can be readily reamed out to the required size. A close fit is essential. The shoulder on the short arm of the pipe tee is machined off and then threaded so that it can be held in place with a suitable nut, as shown in the inset. A good fit is necessary between the slotted end of the crank and the supporting angle iron. A wooden shoe is fitted to the underside of the framework. This supplies the actual sanding surface, and, for average work, should be slightly curved.



A straight shoe is useful for rough work with coarse belts. Curved shoes can be used for working on concave surfaces. All shoes should be hardwood and carefully polished to minimize friction.

Power is an important item. The object sought for is a light motor with sufficient strength to make the thing go. Some of the

larger vacuum-sweeper motors work well, using a 1 to  $2\frac{1}{4}$  reduction with a belt drive. The motor should develop sufficient power so that the sander will "walk away" in the familiar tractor fashion. The motor must have right hand or clockwise rotation as viewed from the pulley end. Sweeper motors of high speed should be avoided since they cannot be geared low enough to supply the power required.

In operation, the belt sander is held much like a plane, with the notable exception that the cutting stroke is always made as the sander is pulled toward you. Some workers use a sweeping, circular motion, but the beginner will do best to stick to straight strokes. A certain amount of practice is necessary for the successful operation of any belt sander—don't work on a finished product until you learn a thing or two from practice on scrap stock.

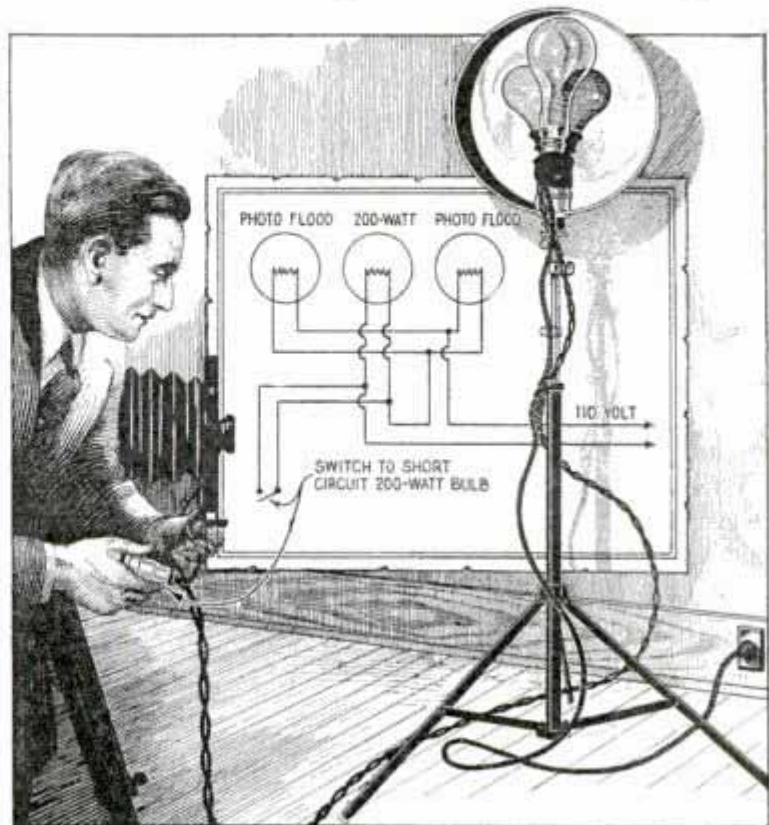
The bearings should be kept well lubricated, and, if you are using a high-speed motor, the sander should not be kept in continuous operation for longer than half-hour periods.

☞ To keep hogs from rooting under a gate and getting out of the field, bolt some old crosscut-saw blades to the bottom board so that the teeth extend a little below the lower edge of the gate.



# Making Your Photoflood Lamps Last Longer

Saving in the cost of replacing photoflood lamps can be effected by using a 200-watt bulb in the same circuit and lighting the lamps only when making exposures. While focusing, the bulb will provide sufficient illumination. A handy arrangement that permits the photographer to turn the bulb on and off is shown in the drawing. The bulb is connected in series with the photoflood lamps and in parallel with a switch, which is attached to one end of an extension cord 7 or 8 ft. long, the other end of the cord being connected into the circuit as indicated. While focusing, the 200-watt bulb burns brightly and the photoflood lamps only glow. When ready to make the exposure, the switch is turned off which short circuits the 200-watt bulb so that the photoflood lamps light to full brilliancy.—B. Caldwell, Jamaica Plain, Mass.



*Photoflood Lamps Saved by Using Large Electric Bulb in Same Circuit to Focus the Camera*

# Injecting Water Near Roots Protects Trees from Drouth

After trying several methods of surface watering to protect trees and shrubs from drouth, experts at the Missouri Botanical Gardens found that water was most effective if injected into the soil around the

roots. To do this, a jig was rigged up from pipe and fittings and fastened to the end of the hose. The jig consists of a cock to control the water supply, two short nipples, a pipe cap, tee and a 48-in. length of  $\frac{1}{4}$ -in.



*Water Injected around Roots of Trees and Shrubs with "Needle" Protects Them from Drouth*

pipe assembled as shown. In use the end of the pipe is pushed into the ground and the water is gradually turned on until its force loosens the soil, after which the pipe is slowly pushed into the ground. The angle at which the pipe is inserted is determined by the depth of the roots of the tree or shrub being watered. The injections are made at 3-ft. intervals around the tree directly beneath the outer edge of the foliage. Under ordinary water pressures, 3 mins. are required for each one.

☞ If felt house slippers that have become soiled are washed in a washing machine and then dried on shoe trees, they will be almost as good as new.





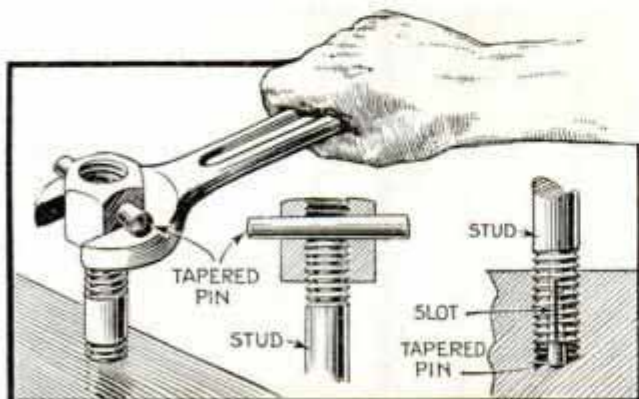
*Circular Enclosure of Old Posts Is Filled with Rocks to Provide Sturdy Corner Fence Post*

### Fence Corner Posts from Rocks and Waste Material

Sturdy corner posts for fencing can be made from a few old posts, one or two old wagon-wheel tires and some rocks. The posts are driven into the ground to form a circular enclosure, around which a wagon tire is slipped to hold the posts in line. Additional strength is obtained by wrapping barbed wire around the assembly.—Eugene Kibbe, Springfield, Mo.

### Improved Driver for Studs

Occasionally it is necessary to drive studs without the proper tools. A temporary driver can be made by drilling and



*Nut Made from Hexagon Stock and Drilled Transversely for Taper Pin Used to Drive Studs*

tapping a short length of hexagon stock, as shown, to screw on the ends of the studs. The driver is also drilled transversely near one end to take a taper pin. A wrench is used to tighten the stud and the driver is loosened by driving out the pin. To prevent loosening of the studs, one end is drilled to a depth equal to the length of the thread and is slotted half this distance with a hack saw. A taper pin is tapped tightly into the hole drilled in the stud. When it is turned into the tapped hole, the end of the pin strikes the bottom of the hole and expands the halves of the threaded section.

### Auxiliary Container for Spray Gun Saves Paint on Small Jobs

When lacquering or enameling small jobs with a spray gun, considerable time and paint can be saved by using a small auxiliary container inside the regular one as shown. The small container can be made from a test tube.



Mark off the correct length, file a groove around the tube and snap it off. The rough edge of the glass can be smoothed by softening it over the flame of a bunsen burner.—Kenneth Murray, Sturgis, Mich.

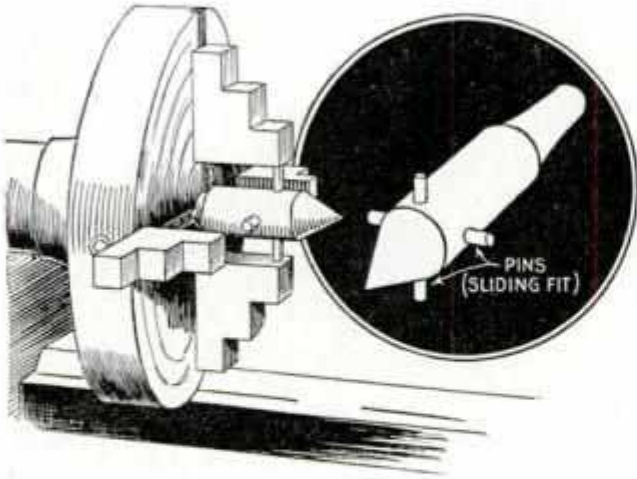
### Work Slotted with Two Saws

Recently I had several slots to make in some work, but did not have suitable tools for the job. As an experiment, I clamped two hand saws together and used them in connection with a miter box as shown. This method was found highly satisfactory and the work was done in half the time that is usually required when using only one saw.—C. R. Thompson, South Gate, Calif.

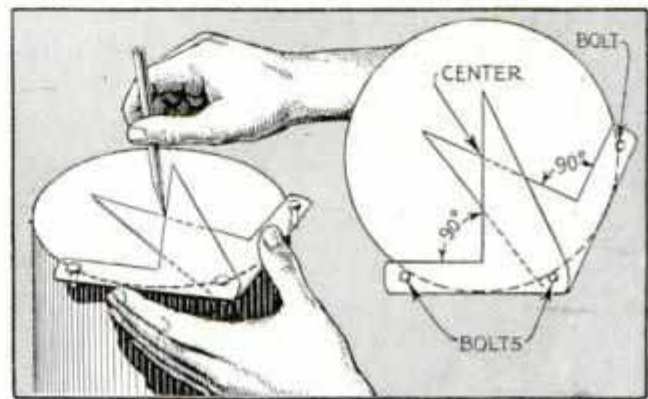
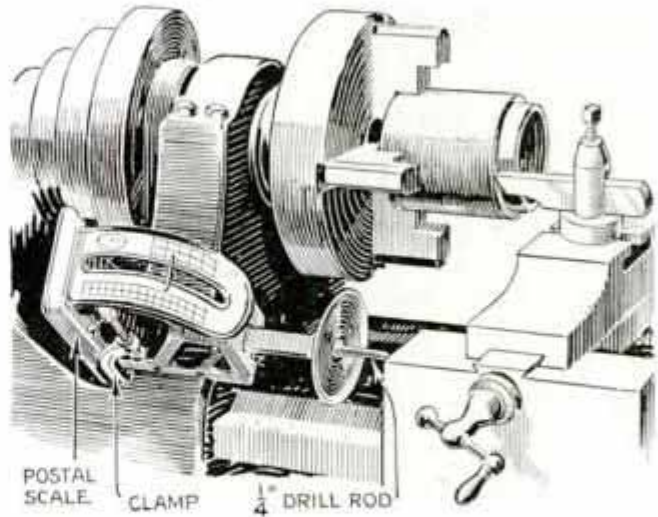




## Three Simple Kinks to Help Lathe Operators



Instead of removing a heavy chuck to put a faceplate on his lathe for turning work between centers, one operator made a center to be used in a four-jaw independent chuck as shown in the upper left detail. The center is tapered to fit the headstock and projects beyond the chuck jaws. Two holes drilled through the center at right angles near the pointed end, hold pins of equal length. In use, the jaws are brought against the ends of the pins. A postal scale clamped to a lathe, as shown in the upper right-hand drawing, will serve better for a carriage stop than a C-clamp attached to the ways, as is often done. A short piece of drill rod is soldered to the scale top to contact the carriage. The shaft centering device in the lower detail consists of two pieces of sheet metal cut to the shape shown and pivoted together at the bottom. Small bolts or rivets



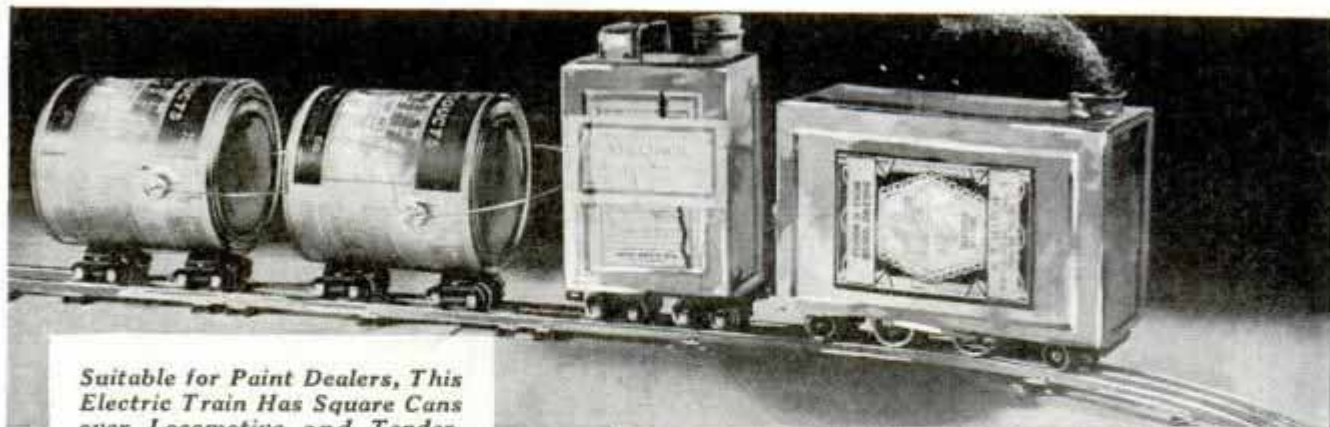
at the extreme ends of the pieces serve as stops. The device can be made almost any size desired, the only requirement being that care be taken to see that the right-angle cuts on each half of the tool are exactly  $90^\circ$  and that the two edges intersect on each piece exactly half way between the center and the stops.

## Attachment on Merchants' Scoop an Aid in Filling Bags

Feed merchants and grocers will find this scoop attachment handy for filling small bags. It is made from a piece of sheet metal, which is bent to a cone shape, and has the top side open. When cutting the metal, two projections or ears are left on the sides by means of which the attachment is pivoted to the open end of the scoop as shown. In use, the attachment is folded back while filling the scoop and is then dropped over the open end to pour the contents into a bag. When filling large bags, the attachment is folded over the top as shown in the detail. For this reason, the pivot rivets should be fairly tight to hold it in place.

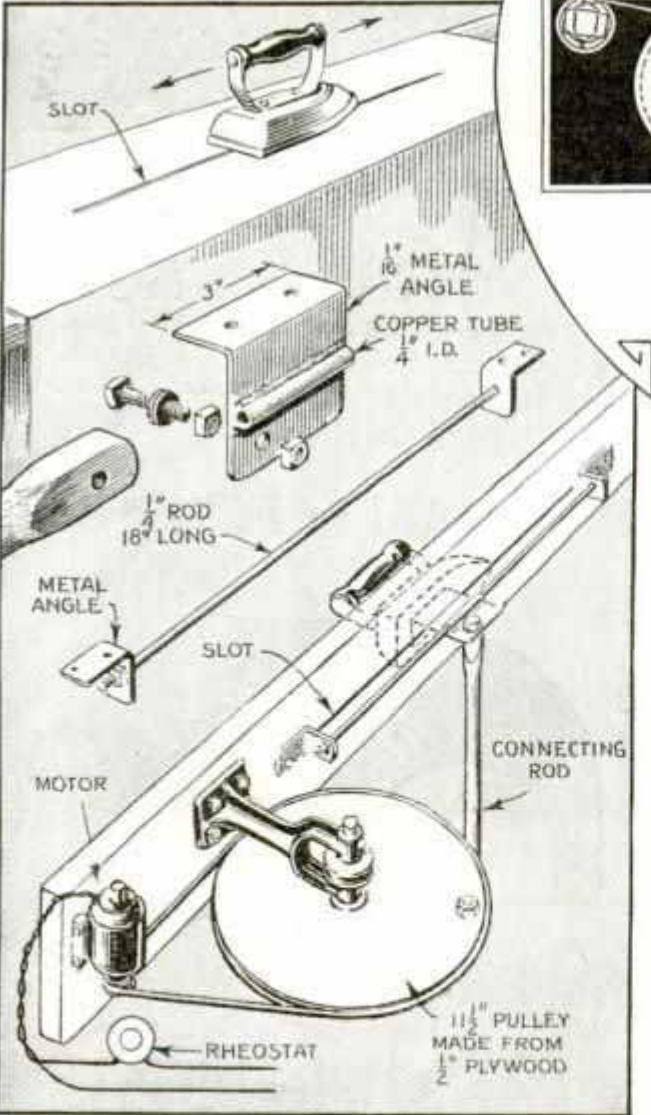
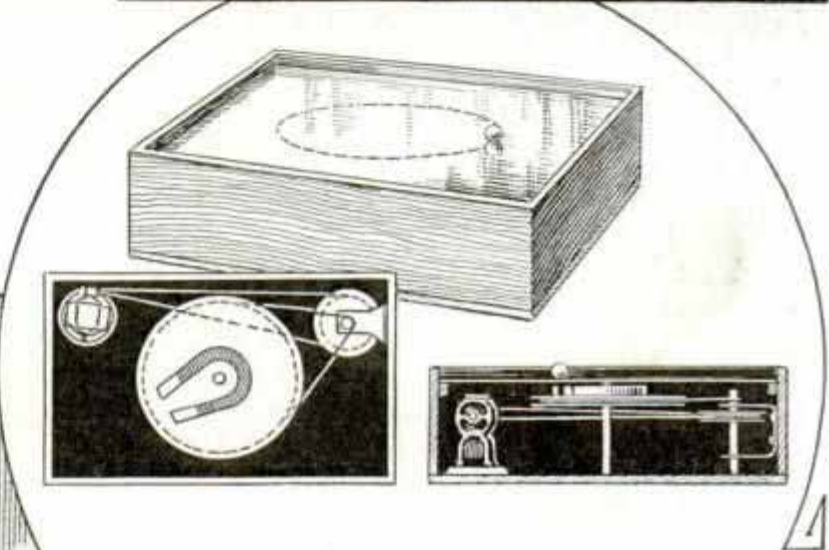
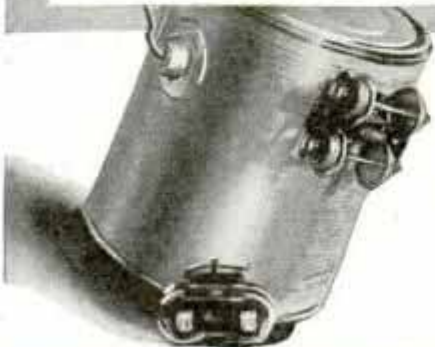






*Suitable for Paint Dealers, This Electric Train Has Square Cans over Locomotive and Tender, and Round Cans for Cars; Steel Wool Represents Smoke*

# WINDOW

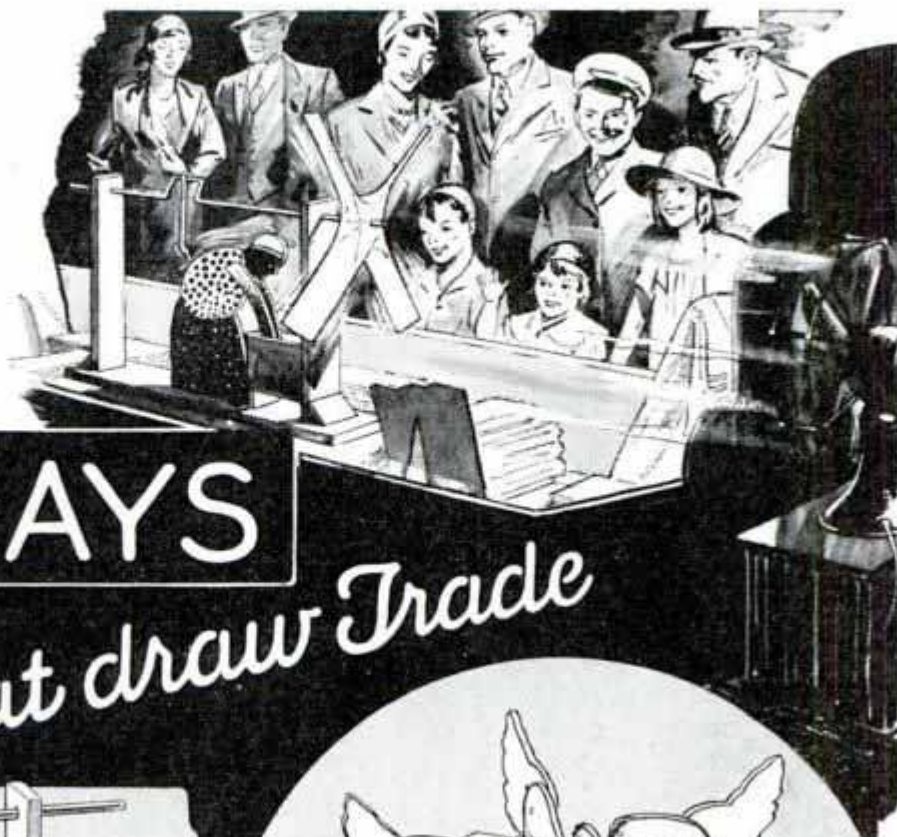


OPERATED by concealed motors and drafts from electric fans, these mechanical displays will help attract people to your show windows. A strong magnet mounted on a revolving disk causes a steel ball to roll in a circle on the surface of a thin mirror, set directly over it, as shown above. An electric iron can be moved to and fro on an improvised ironing board as shown on the left. Camphor is the motive power to make a small wheel keep turning in a water-filled dish. The wheel consists of five corks and four  $\frac{1}{8}$ -in. dowels, arranged as shown below, a small piece of camphor being fastened to each outside cork with sealing wax. Examples of elec-





Variety in Simple, Animated Displays Is Practically Unlimited; Some Interesting Examples on These Pages Suggest What Can Be Done to Attract Attention



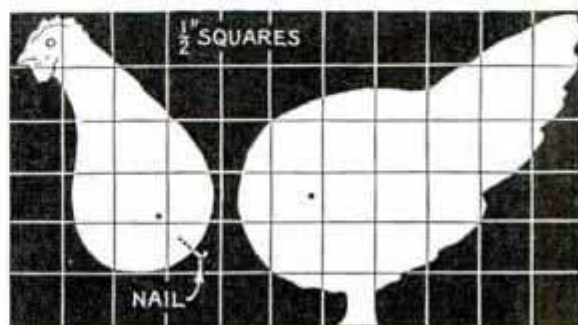
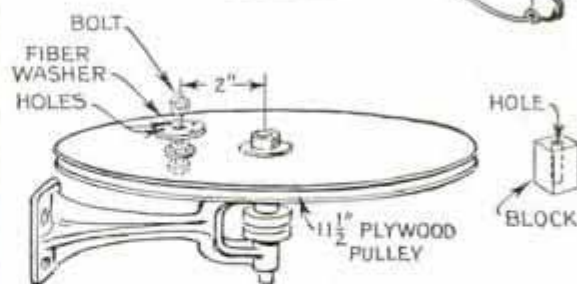
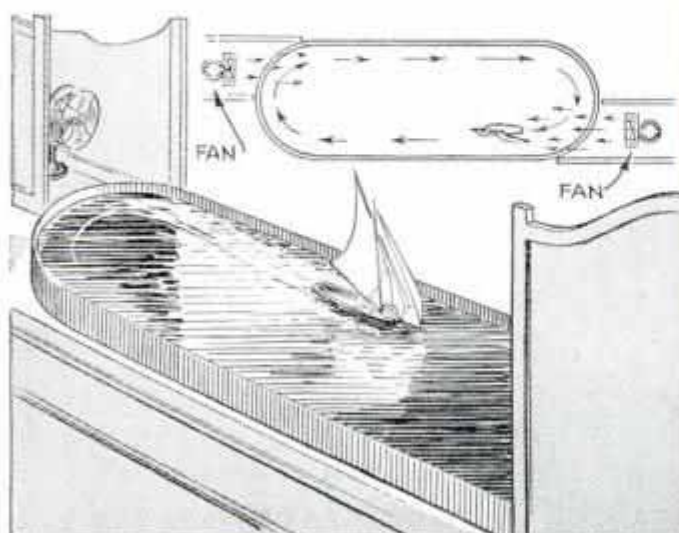
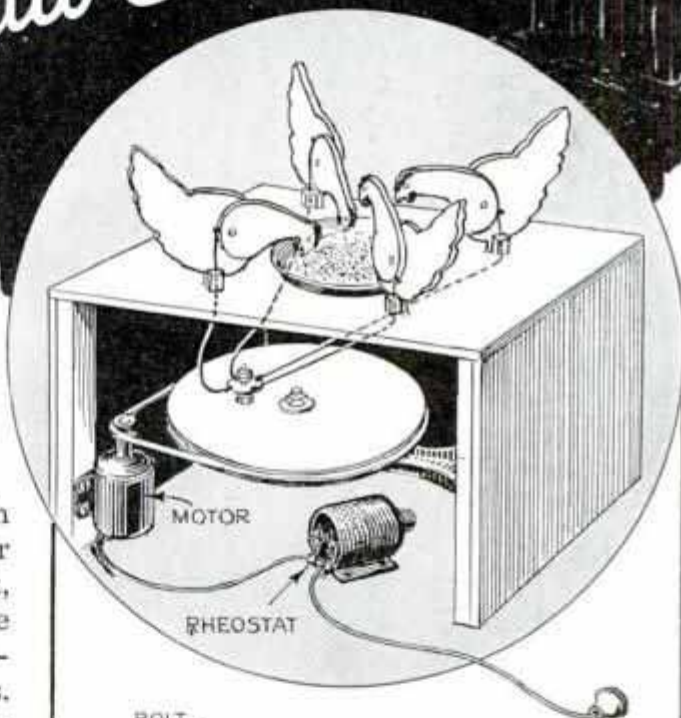
# DISPLAYS

by Floyd M. Mix

that draw Trade



tric-fan propelled displays are the wash woman and the sailing boat. In the former the draft turns the propeller and shaft, which in turn causes movement of the wash woman. The feeding chickens display is especially suitable for feed stores. As the pulley revolves, the heads bob up and down in a lifelike manner.





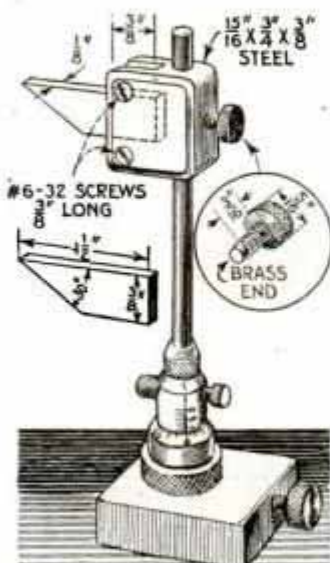
### Ground Cork Provides Non-Slip Step on Airplane Wing



Ground Cork Applied to Step Area of Airplane Wing Prevents Slipping

To prevent accidents caused by passengers slipping off the step area on an airplane wing, ground cork was sprinkled over the step, which had first been made tacky by coating it with shellac. After this had dried, a second coat of shellac was applied to serve as a binder.—James Hennessey, Alameda, Calif.

### Simple Attachment for Micrometer Height Gauge



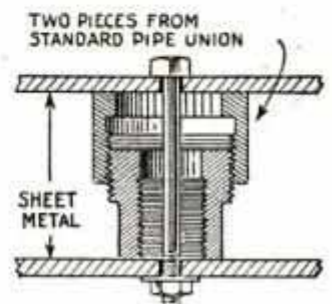
the micrometer rod and is slotted to take the blade, which is held by two machine

Utilizing an inside micrometer, this tool is a good substitute for a vernier height gauge, and will be found handy in small shops where the cost of vernier gauges usually prohibits their use. The blade and holder of the tool are made of cold-rolled steel. The holder is drilled to slip snugly over

screws to permit adjustment. To protect the micrometer rod against marring, the adjustment screw, shown in the circular detail, has a brass end. Great care should be taken in machining the blade and holder, as the accuracy of the tool depends entirely on them.—G. McMillan, Verdum, Quebec, Can.

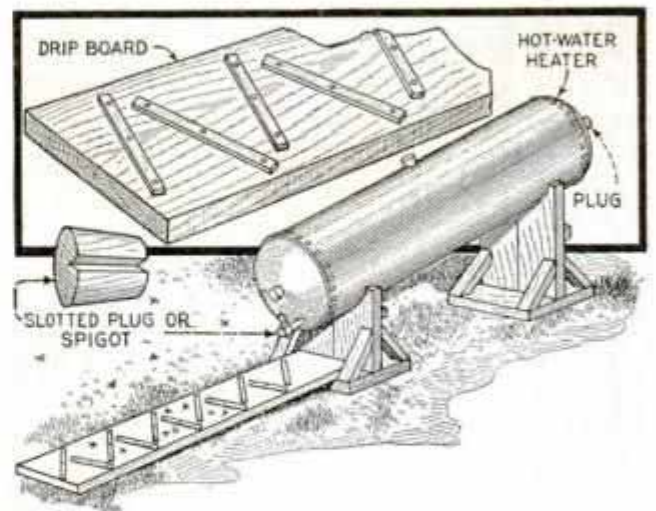
### Pipe Couplings Used as Spacers for Shelves

When installing sheet-metal shelves, some adjustable spacers were needed, but none were at hand. As an emergency means, two pieces of a standard pipe coupling, the nut and one end, were found satisfactory. A clamp bolt was run through the shelves and each spacer as shown. Almost any length of spacer can be had by screwing a nipple into the end of the coupling.



### Watering Device for Bees

To assure a supply of fresh water for his bees, one apiarist rigged up the watering device shown. It consists of an old hot-water tank supported in a slanting position, and a board with cleats to distribute

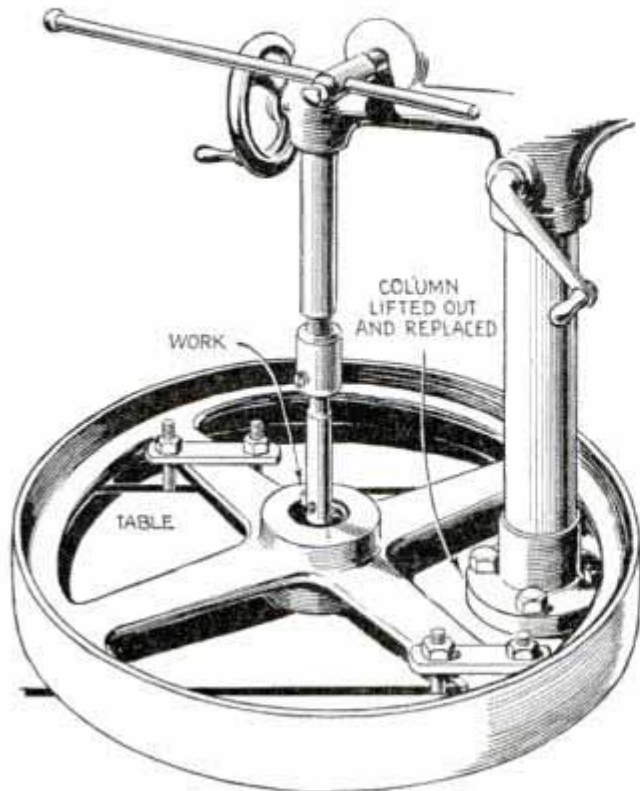


Water Slowly Dripping from Tank onto Cleated Board Provides Drinking Place for Bees

the water. The holes at both ends of the tank are plugged and a spigot or a slotted plug is fitted at the lower end and is adjusted to drop water slowly on the board.

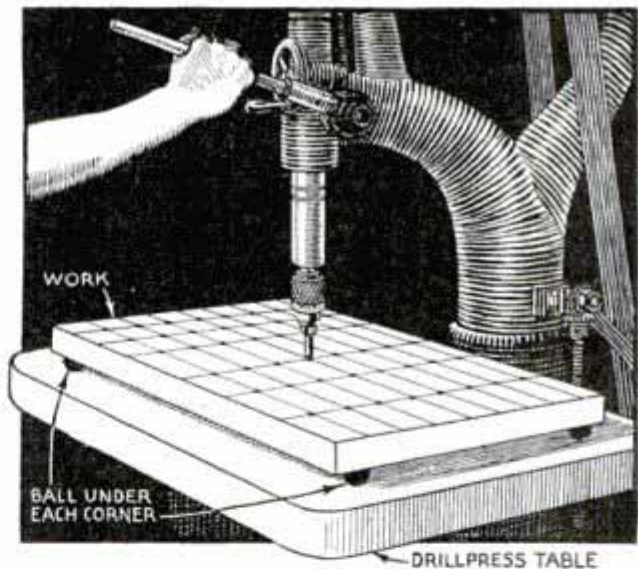
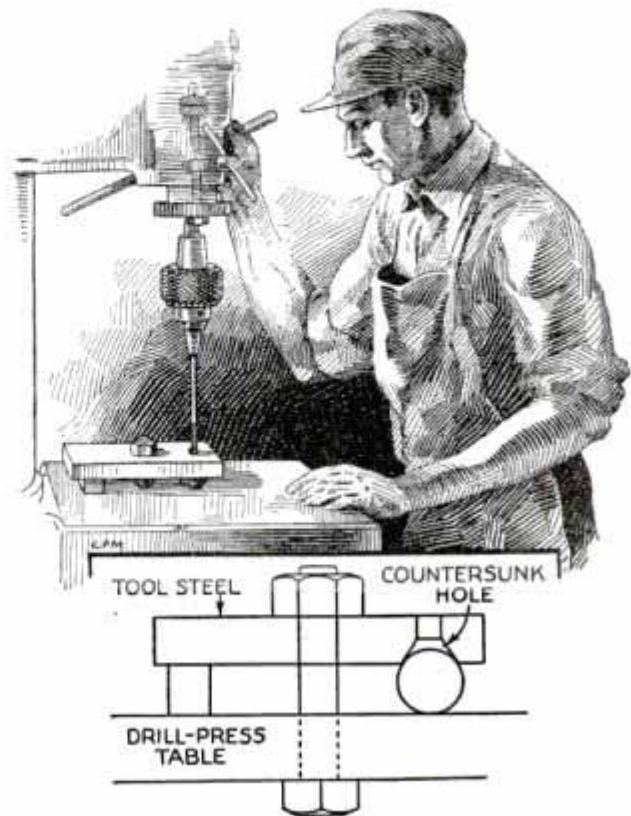


# Ideas to Help Solve Your Drill-Press Problems



On a job of reaming the shaft hole of a pulley that was too large to be mounted in the small lathe at hand, the work was done on a drill press. Although the clearance on the drill-press table was insufficient to center the spindle over the shaft hole, this difficulty was overcome by removing the column of the drill press, and then replacing it so that the pulley could be set in the position shown above. After clamping the pulley down on the drill-press table, reaming, in this case, was done with a boring tool. Center-drilling steel balls is quickly done on a jig attached to the drill-press table, as shown in the upper right-hand detail. The ball is held firmly between the table and a countersunk hole in the jig, which also guides the drill. Center-drilling on a flat surface is accurately done by following the method shown in the lower detail. The work is mounted on steel balls, which reduce friction between the work and the table so that the point of the drill will move the work as it engages the center-punch hole, thus automatically centering the drill so the hole will be drilled accurately.

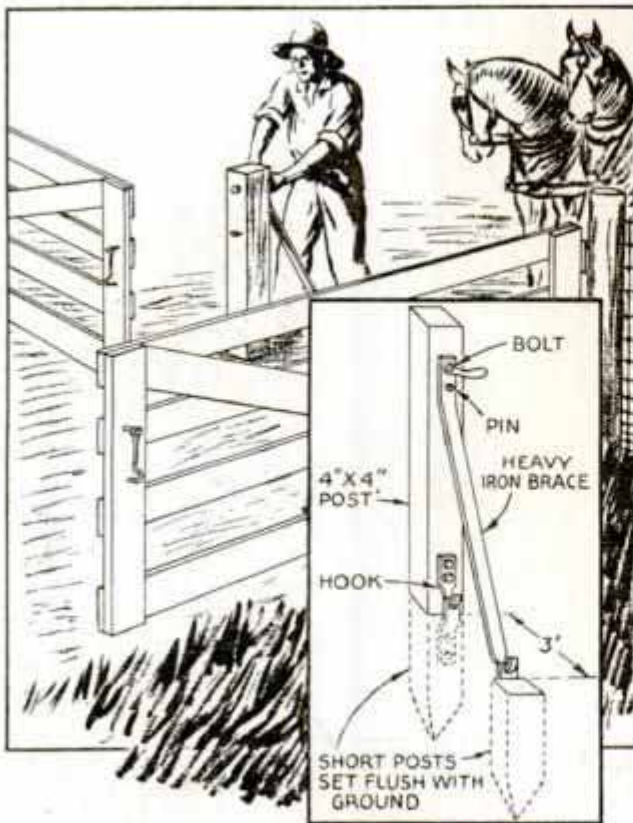
☐ New Dutch ovens for kitchen use should be primed with boiling olive oil as a precaution against rust.



## Coiling Pipe with Oxyacetylene Torch

A good job of coiling pipe may be done by means of an oxyacetylene torch. Drive the form around which the pipe is to be bent into the ground. Then fasten one end of the work to be coiled to the form, or have a helper hold it, and play the torch flame against the pipe progressively as a second helper walks around the form coiling the pipe. Hold the torch just close enough to the work to heat it a dull cherry red right at the point of bend.—John Hyler, Peoria, Ill.





Center Post for Double Farm Gate Is Easily Removed to Accommodate Wide Machines

### Removable Center Post on Double Farm Gates

Double gates are the most desirable on farms to allow wide machines to pass through fences, but are seldom used because of the inconvenience of removing the center post. Here is one that is easily removed. If soaked in creosote, it will last indefinitely. Stub posts supporting the center post are set flush with the ground so low-slung machines can pass over them.

### Oil Reservoir Lubricates Drills

To assure that plenty of oil is provided for a small drill, slip a rubber cigar holder over it as shown. This serves as an oil reservoir, which allows just the right amount to reach the point of the drill. If the oil flows too fast, one of the flutes on the drill can be plugged with cotton where it passes through the rubber. The holder



may also be slipped over the chuck of a small automatic drill to keep it from marring the work when the drill breaks through it. Rubber tips that are worn on the finger for sorting papers are also handy for this purpose.

### Eye Guard for a Metal-Cutting Saw

This guard will help to protect the eyes when cutting metal on a circular saw. It consists of a small block of wood drilled to take two dowels at right angles, one being fitted into a hole drilled in the saw

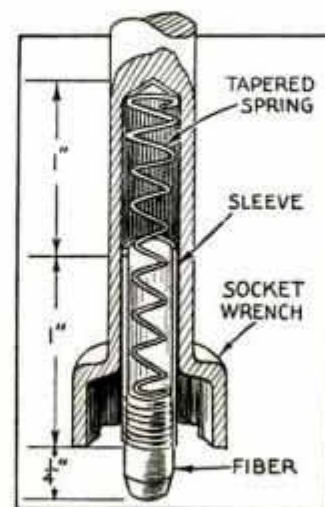


Celluloid Guard to Protect Eyes When Cutting Metal on Circular Saw

table, and the other slotted at the outer end to take a sheet of heavy celluloid.—Kenneth Murray, Sturgis, Mich.

### Socket Wrench to Start Nuts on Bolts

Here is a wrench for starting nuts on bolts that cannot be reached with the hands. A hole is drilled into the end of a socket wrench as shown, to take a tapered compression spring. The other end of the spring carries a fiber plug and a short metal sleeve, which slides freely in the hole and serves as a guide to keep the free end of the spring from bending when in use. The nut is forced over



the end of the plug which holds it to start it on the bolt.—Chas. F. Knapp, Johnson City, N. Y.



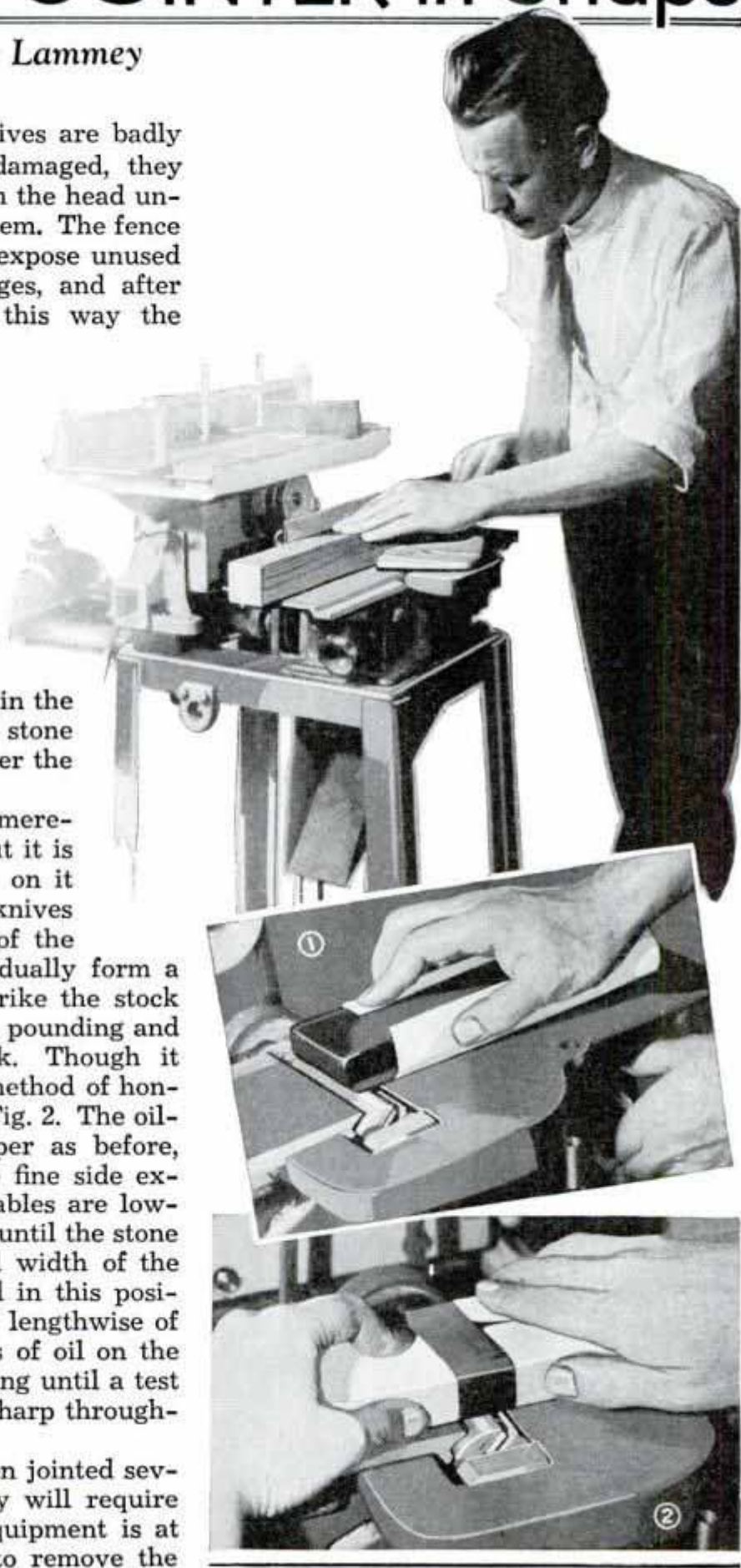
# Keep Your JOINTER in Shape

By W. Clyde Lammey

UNLESS your jointer knives are badly nicked or otherwise damaged, they should not be removed from the head until it is necessary to grind them. The fence may be shifted slightly to expose unused portions of the cutting edges, and after wearing down evenly in this way the knives may be honed with an oilstone as in Fig. 1. This is done by setting the front and rear tables exactly in line with the cutting circle of the knives by means of a straightedge. The fence is removed and the oilstone is wrapped with heavy paper, leaving only a portion of the end on the fine side exposed. Held in the position shown in Fig. 1, the stone is rubbed back and forth over the rotating knives.

This method will serve for merely touching up the edges but it is not good practice to rely on it as a means of keeping the knives sharp, as continued use of the stone in this way will gradually form a second bevel which will strike the stock being surfaced. This causes pounding and results in inaccurate work. Though it takes more time, the best method of honing the knives is shown in Fig. 2. The oilstone is wrapped with paper as before, leaving about  $\frac{3}{4}$  in. of the fine side exposed at the center. The tables are lowered and the head revolved until the stone bears on the knife the full width of the bevel. The head is wedged in this position and the stroke is made lengthwise of the knife. Use a few drops of oil on the stone and continue the honing until a test shows the edge uniformly sharp throughout its length.

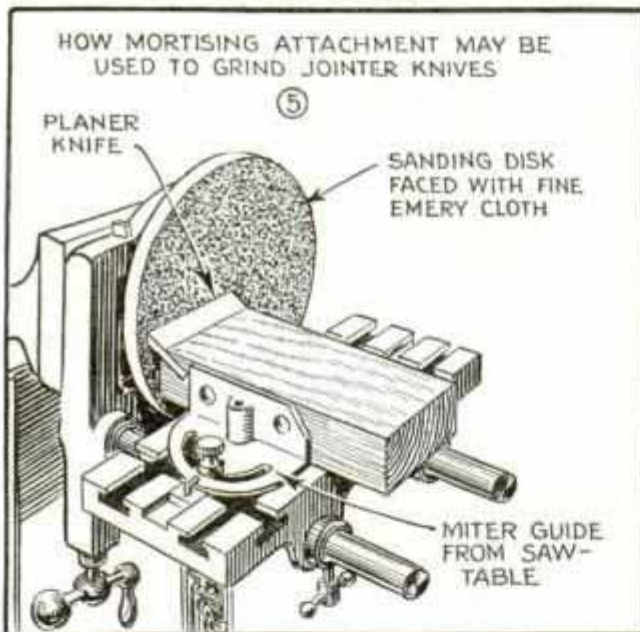
After the knives have been jointed several times in this way they will require grinding. Unless special equipment is at hand it will be necessary to remove the





GRINDING  
PLANER  
KNIVES ON  
DRILLPRESSSLOTTED HARDWOOD  
BLOCK, ANGLE OF SLOT  
SAME AS KNIFE BEVELSANDING DISK  
FACED WITH FINE  
EMERY CLOTH

PLANER KNIFE

HOW MORTISING ATTACHMENT MAY BE  
USED TO GRIND JOINTER KNIVESPLANER  
KNIFESANDING DISK  
FACED WITH FINE  
EMERY CLOTHMITER GUIDE  
FROM SAW-  
TABLE

knives from the head. Either the drill-press or the circular-saw mortising attachment can be used for grinding, as shown in Figs. 4 and 5. A sheet of fine emery cloth is glued to the face of a sanding disk and the latter is attached to the spindle of the machine by whatever means is provided. It is important that the disk runs true. The knife is held in a hardwood block slotted to hold the knife in such a position that the knife bevel rests flat against the surface of the disk. The block must be held steady and the pressure should be light. Always grind against the edge.

After grinding, the knives are re-assembled in the head and the setscrews are

tightened against the wedges just sufficiently to hold the knives in place. They are then set permanently with a hardwood straightedge as in Fig. 3, setting them true with the straightedge first at one end and then the other. The setting on each knife is re-checked to make sure that the setscrews are uniformly tight against the retaining wedges. After this is done, the rear table is re-set, using the straightedge as in Fig. 3. The latter is held firmly on the rear table, the head is turned by pulling on the drive belt, and the table is lowered until the knives just catch the straightedge as the head is revolved slowly. Each knife should catch the lower surface of the straightedge and move it forward between  $\frac{1}{2}$  and  $\frac{3}{4}$  in. One side of the head is tested in this way, after which the fence is moved across the table and the other side is tested, on all three knives. Accurate setting of the rear machine table is important as the machine will not plane a true surface on the work unless the rear table is properly set.

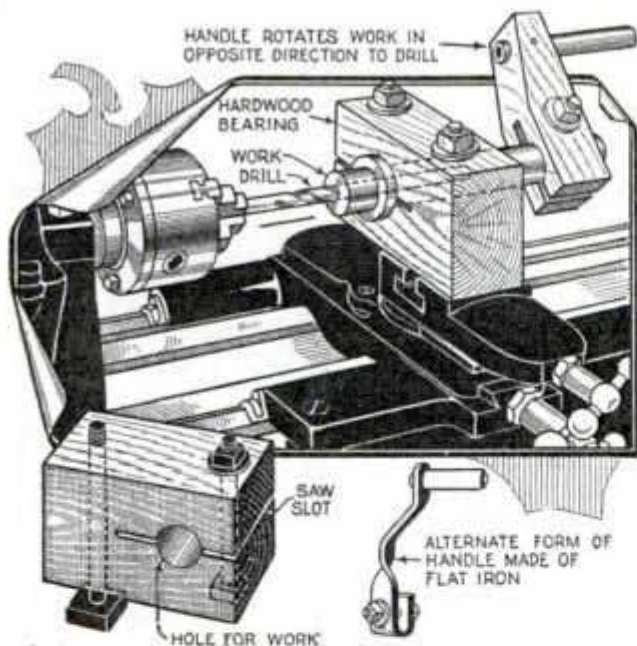
### Salt in Poultry Feed

Although salt is not considered of great importance in the diet of poultry flocks, experienced poultrymen claim that its use in dry or wet mashes stimulates the appetite of laying hens and helps to increase the egg yield.



### Drilling Long Parallel Holes in Lathes

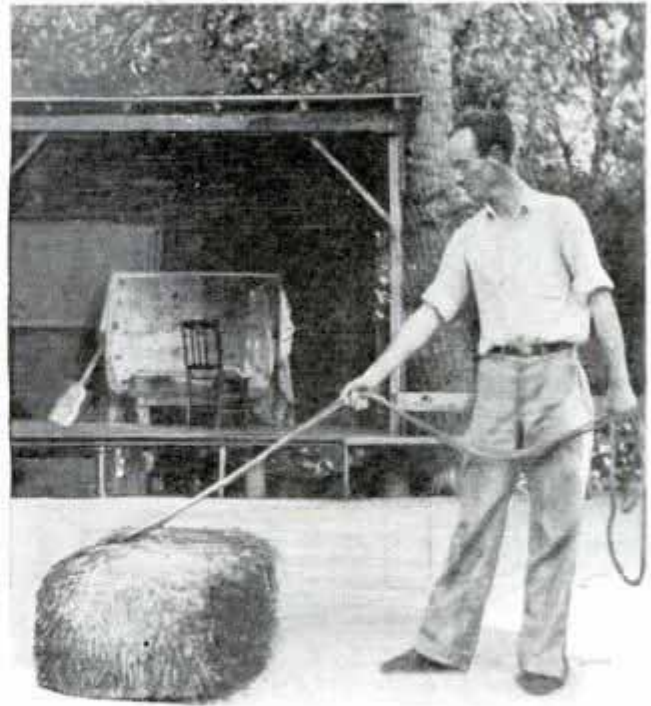
Drilling parallel holes lengthwise in a long shaft or rod is easily done by using a jig or fixture that permits the work to be turned in a direction opposite to that of the drill. A hardwood block is drilled to take the work and is slotted from the end through the hole as shown. A second hole is then drilled through the block at right angles to the slot to take a clamp bolt, which provides a means of adjusting the bearing. The latter is bolted to the tool-post saddle and alined parallel with the lathe centers. A collar fitted with a set screw is fastened to the work to take the end thrust of drilling. A simple crank is made from a block of wood, a bolt and a short length of pipe, the throw of the crank allowing clearance over the lathe bed. Center the drill in either a three or four-jaw chuck and countersink the end of the work so that the drill will start true. Run the spindle at its highest speed, use the longitudinal carriage speed to bring the



**Holes Drilled Accurately through Center of Round Stock with This Set-Up**

drill into the work, and turn the crank slowly in a direction opposite to the rotation of the drill.

ⓘ When a mechanic is working on the motor bearings and another is busy on the clutch or transmission, the starter should be disconnected from the battery as someone might accidentally push the switch which might result in serious injury.



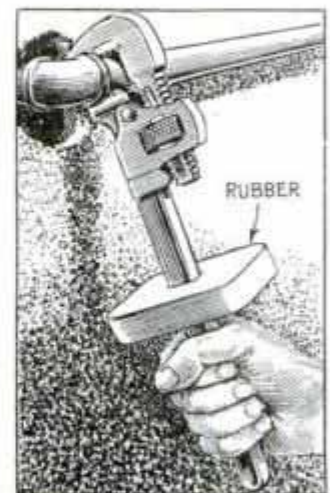
**Dragging Bale of Hay over Dance Floor Covered with Corn Meal Smooths Surface Quickly**

### Surfacing Outdoor Dance Floors

I have found that one of the best methods for surfacing an outdoor dance floor that has become roughened from exposure to the weather, is to cover it with corn meal and then work this into the pores of the wood by dragging a bale of hay across the floor. If the bale is weighted, the floor will become smooth in a surprisingly short time, and can then be put in good condition with the usual wax preparation.—J. Clark, Hillsboro, N. Mex.

### Rubber Guard on Tool Handle

When working in restricted places, a wrench or tool sometimes slips and injures the hand. A guard to protect the hands can be had by cutting a hole in a square of solid rubber and slipping it over the handle of the tool as shown in the drawing. The hole



in the guard should be small enough to provide a force fit on the handle.—G. A. Luers, Washington, D. C.





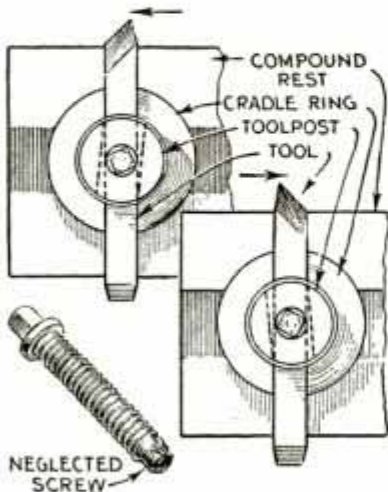
*Feed-Pail Holder Made by Cutting Hole in Inverted End Section of Salt Barrel*

**Pail Holder Prevents Waste of Feed**

In feeding a calf from a pail, the mash or milk is often spilled unless the attendant holds the container. As this takes time, one farmer used the holder shown, which is an inverted end section of a salt barrel with a hole sawed in the head large enough to receive the feed pail.

**Method of Holding Lathe Tools against Work**

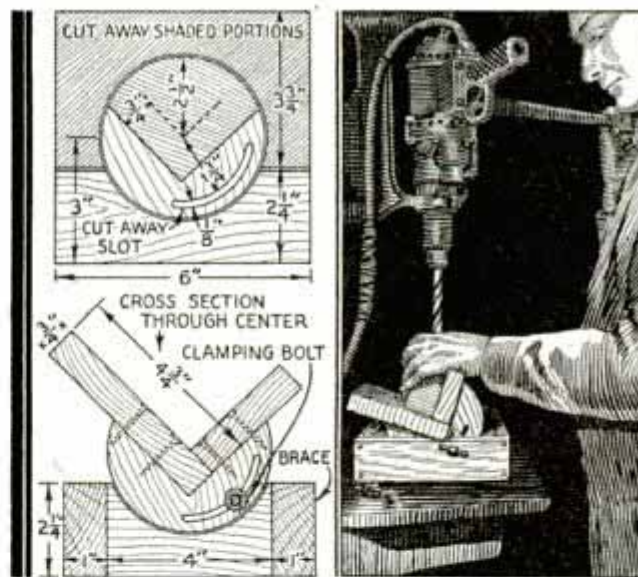
If the lathe tool tends to swing or draw away from the work when taking heavy cuts on stock mounted between centers, first remove the tool-post screw and re-grind the lower end square across. Clean away any accumulation of chips and grease on the rocker and under the cradle ring. Place a thin paper washer under the cradle ring to offset the tendency to slip, due to the metal-to-metal contact. When re-assembling, be sure to take up



the slack in the tool-post slot by swinging the holder so that opposite sides wear against the edges of the slot. A cut taken in the direction of the arrows shown tends to cause the tool to swing in the direction indicated by the dotted lines. To prevent this, swing the tool post in the opposite direction and lock it securely. This brings the edges of the slot to bear against the holder. The tool-post screw should be oiled to prevent undue wear on the threads. Keeping the lathe tool ground to the proper form will do much to prevent a recurrence of the trouble.

**Tilting Table on Drill Press Has Many Uses**

This tilting table for a drill press is easily made and will be found handy in the shop. It holds work to be drilled perfectly steady and at any angle from zero to 90°, and is a time saver in drilling transverse holes in round stock. The table is made from one piece of hardwood to the dimensions given in the drawing. The trunnions



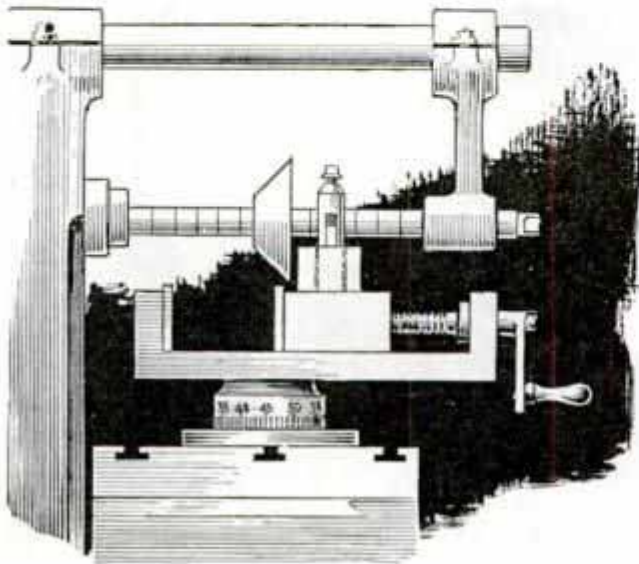
*With This Tilting Table on a Drill Press, Work Is Easily Drilled at an Angle*

must be cut so that when the table is in place, its inner corner is at the center of the circle. Attention to this detail will eliminate any tendency of the table to turn when drilling pressure is applied. It is clamped in any desired position by a bolt and thumb nut at each end. To protect the finished table from moisture, give it two coats of orange shellac and thoroughly wax the working surfaces.



### Work Turned in Milling Machine

In a small shop, I had a conical collar to turn, and as the only lathe available did not have a compound rest, the job was done on a milling machine. The work was placed on the milling-machine arbor as shown, and a tool post was held in the movable jaw of the swivel vise, which was

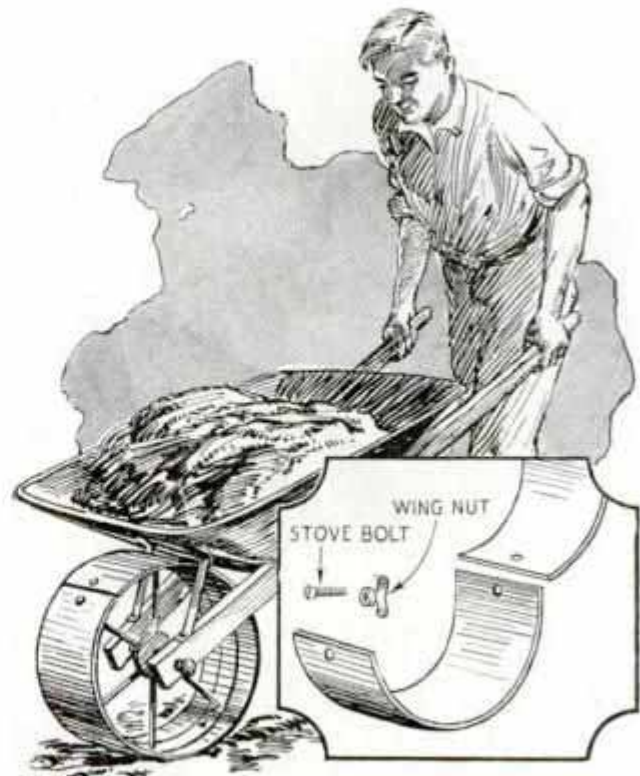


*Conical Work Turned in Milling Machine by Using Lathe Tool Post and Cutting Tool*

set at a 45° angle. After starting the machine, the cutting tool was fed into the work by means of the movable jaw of the vise.—Charles Kugler, Philadelphia, Pa.

### "Beads" Improve Chemists' Glass Test Tubes

Beakers, test tubes and other glassware used in a chemical laboratory can be made less fragile by forming a bead around the rim or mouth of each piece. The bead is formed by revolving the mouth of the tube over the flame of a bunsen burner. Heat only the edge, and keep it in motion continually, taking care that the closed end is lower than the open end to prevent condensed moisture from running into the heated portion. If this happens, the glass is likely to break. Allow the heated glass to cool slowly.



*Detachable Rim Prevents Wheelbarrow from Sinking into Soft Ground*

### Wide Rim Improves Wheelbarrow

Contractors will find that their men can accomplish more in a day's time, when pushing loaded wheelbarrows on jobs where the ground is soft, if the wheels are fitted with wide detachable rims. These can be made of heavy sheet iron, and each one should consist of two sections fastened to the wheels with bolts and wing nuts so that they can be quickly removed when not in use.

### Steel Insert Adapts Large Socket Wrench to Small Nuts

When a socket is broken or lost from a wrench set, one of the larger sockets can be adapted to take its place by using a steel insert, made from sheet steel. The insert is shaped by bending it around a nut of the same size as the one to be tightened or loosened.—J. F. Goodman, Stockbridge, Mich.



Ants can be kept out of beehives by setting the legs of each hive in cans filled with crankcase oil.



# SIMPLE CURES



Unless There Is a Clearance of at Least  $\frac{1}{8}$  In. Provided between the Edge of the Hood and the Radiator Shell, the Hood Will Rub against the Shell and Cause an Annoying Squeak or Rattle; Right, to Provide Sufficient Clearance Loosen the Nuts on the Radiator Brace Rods, Move the Shell Forward and Tighten the Nuts to Hold the Adjustment; Then, If Possible, Move the Radiator Out at the Bottom to Make the Clearance Uniform at the Top and Bottom

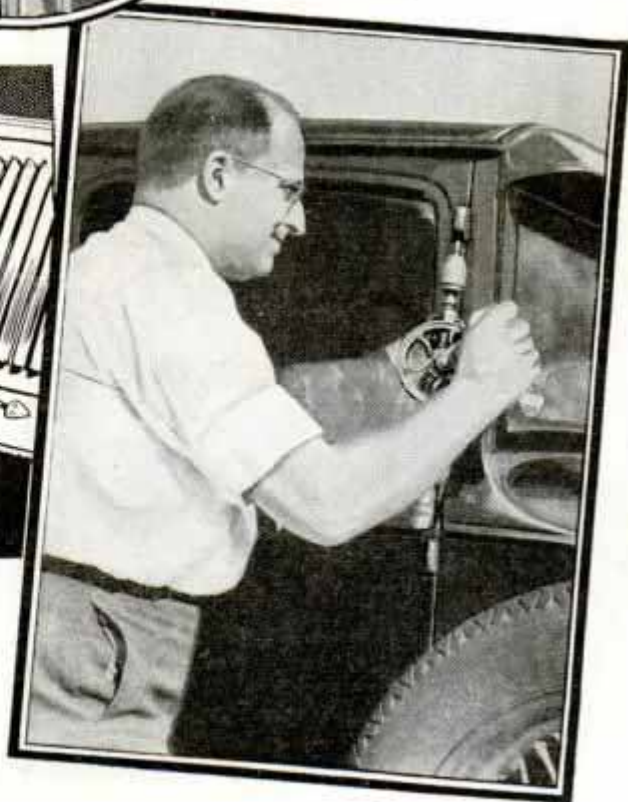


Hard, Worn Hood Lacings Should Be Cleaned Thoroughly with Gasoline, Given Two Coats of Shellac, and Then Covered with Felt Weather-Stripping, as Shown in the Left Detail

Hood noises are the most common

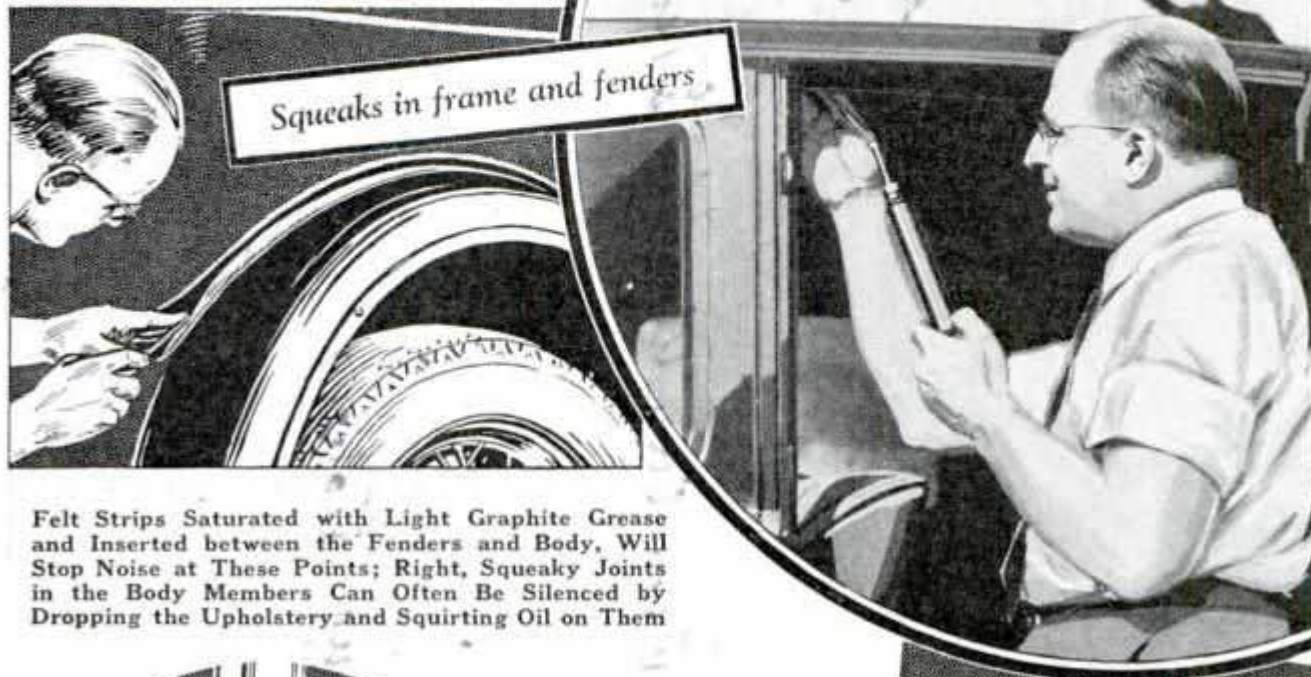


Small Pieces of Sponge Rubber Cemented to the Hood Where the Hold-Downs Rub against It, Will Eliminate Rattles at This Point; Right, Worn Hinge Pins Sometimes Cause Door Rattles, Which Can Be Eliminated by Reaming the Holes in the Hinges and Installing Oversize Pins; Also Tighten the Screws That Hold the Hinges





# for CAR RATTLES



Squeaks in frame and fenders

Felt Strips Saturated with Light Graphite Grease and Inserted between the Fenders and Body, Will Stop Noise at These Points; Right, Squeaky Joints in the Body Members Can Often Be Silenced by Dropping the Upholstery and Squirting Oil on Them



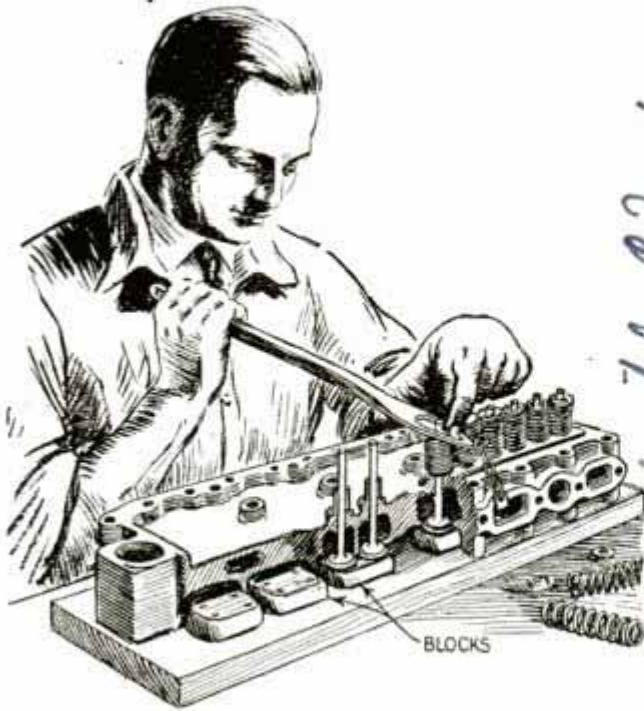
What to do when doors and windows rattle

Rattles in Doors Are Sometimes Caused by Worn Latches, Which Should Be Filed Smooth and the Catch Moved Forward to Engage the Latch Securely; If There Is No Adjustment on the Catch, It Should Be Removed, the Holes in the Frame Plugged and the Catch Replaced; in Cases Where the Catches Are Attached with Machine Screws, File the Holes in the Catch Oblong So That It Can Be Moved Forward Slightly



Door Bumpers Shimmed with Cardboard to Take Up Wear; the Bumper Is Removed and a Piece of Cardboard Is Inserted behind It; However, It Is Better to Install New Bumpers as the Rubber in the Old Ones Hardens with Age and Loses Its Resiliency; Left, Stopping Window Rattles with Strips of Cardboard Glued behind the Felt Guides to Take Up Excess Play





Wood Blocks Nailed to Board Support Overhead Valves to Remove the Springs

**Holding Overhead Valves to Remove Springs**

Nailed to a board, a row of wood blocks provides a handy device for holding overhead valves against their seats while depressing the springs to remove the retaining keys. The head, of course, is removed from the motor and is placed over the board as shown. Any suitable tool can be used to compress the springs. The one in this case is a piece of steel with a hole near one end to take the key and the valve stem, a short chain and hook being used to fasten it to an intake or exhaust port. By pulling down on the free end, the tool compresses the spring.

**Lead Shot Helps to Inflate Auto Tires**



Sometimes a tire cannot be inflated because the valve has been screwed so far into the stem that the air-hose connection will not depress it. In this case, a BB shot dropped into the end of the valve stem will do the trick. It is necessary to remove the shot before replacing the valve-stem cap.

**Scratches Removed from Windshield with Felt and Rouge**

The cleaner a windshield is kept the less chance there is of it becoming scratched from the action of the wiper blade. About the only time that a wiper will scratch the glass is when it first goes into action and picks up the abrasive dirt that is present, carrying it across the glass. The more the glass becomes roughened, the greater is the future chance for abrasive bits to find their way between the glass and the wiper. Shallow scratches may be removed by rubbing the glass with a piece of hard felt that has been moistened with water and then dipped in rouge, either red or black rouge being suitable for the job. Rub the rouge-coated felt back and forth across the scratches until they have disappeared.—John E. Hyler, Peoria, Ill.



**Lubricating a Windshield Wiper**

Many failures of the vacuum-type windshield wiper are due to lack of lubrication. This results in the leather disks inside of the wiper cylinder drying out so that they do not seal the piston. The disks may be lubricated easily by removing the rubber hose which leads to the



Windshield Wiper Lubricated by Working Blade While Oil Is Squirted into Intake Pipe

intake manifold and inserting the spout of an oil can into the air pipe of the wiper, oil being drawn into the wiper cylinder by operating the blade with the hand.

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 Any place

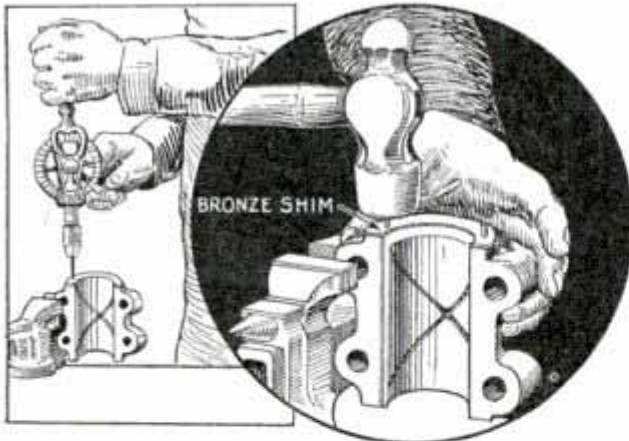


### Air Pockets Removed from Chambers of Shock Absorbers

Failure of shock absorbers is sometimes caused by air that has been trapped in the oil chambers. To remove it, take out the filler plug and squirt the proper oil into the chamber with an oil can while the car body is rocked up and down. As most shock absorbers of this type have several oil chambers, it is necessary to watch for the appearance of bubbles, which show that the air is being worked out. When no more bubbles come, it may be safely assumed that the air has escaped after which the filler plug is replaced.

### Taking Up Excessive End Play in Auto Crankshaft

Excessive end play in an auto crankshaft can be taken up by sweating a curved bronze shim to one end of the main bearing that takes the end thrust of the shaft. The cap is removed and the end showing the greatest amount of wear is filed smooth so that the shim can be sweated to it. For additional safety, the shim should be pinned to the bearing with brass pins. This is done by drilling a number of



*Bronze Shim Sweated to Main-Bearing Cap Takes Up End Play in Crankshaft*

holes, slightly smaller than the pins used, directly through the metal into the face of the bearing cap. The pins are driven tightly in place and are cut off flush with the surface of the shim. When completed, the cap should slide freely into place with not more than .001 in. clearance. Care must also be taken to remove any excess metal from the repaired end of the bearing so that it fits the fillet on the shaft perfectly.—A. H. Vance, Harshaw, Wis.



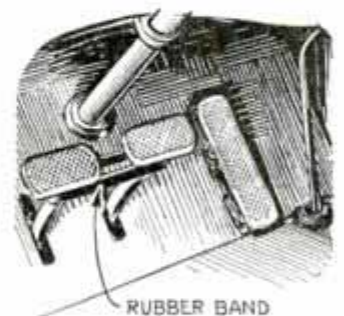
*Small Gasoline Torch Lighted by Hot Spark from Ignition System of Car*

### Gasoline Torch Lighted with Car Ignition System

If you are on a camping trip and run out of matches or your supply gets wet, the ignition system of your car can be used to light a torch. First wrap a small cloth around one end of a stick and saturate it with gasoline. Then remove the high-tension lead from the distributor head and hold it  $\frac{1}{4}$  or  $\frac{1}{2}$  in. from the motor block with the torch between them. At the same time have someone turn on the ignition switch and "step" on the starter. The hot spark, jumping from the end of the lead through the cloth to the motor, will ignite the gasoline. Be careful not to get gasoline on the motor and start a fire.

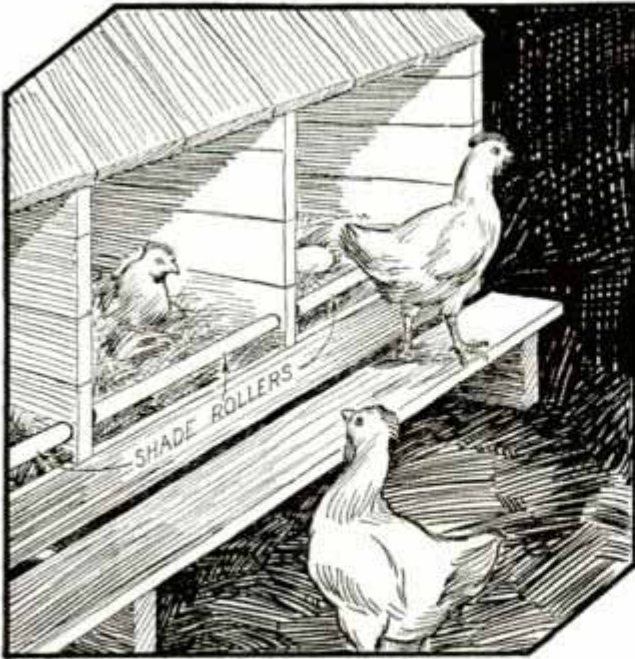
### Rubber Band Silences Rattling Brake Pedals

Wear in the shafts of auto brake and clutch pedals sometimes causes them to rattle from vibration of the car. This annoyance can usually be eliminated by stretching a heavy rubber band across the pedals as shown.



The band will not interfere with their movement in any way.—A. S. Wurz, Rockyford, Alta., Can.





*Free-Turning Rollers on Edge of Nests Prevent Hens from Roosting on Them*

### **Rollers Keep Hens from Roosting on Edges of Nests**

To prevent chickens from roosting on the edges of the nests, one poultryman cut off window-shade rollers and installed them as shown. The rollers do not prevent the hens from entering or leaving the nests, but it is impossible for them to maintain a perch on the rollers.

### **Protecting Plants from Cutworms**

Tomato, cabbage and other tender young plants can be protected from the ravages of cutworms by wrapping a double thickness of newspaper around their stems when they are transplanted. The collar should encase the stem of the plant to about 1½ in. below the surface of the ground and 1 in. above.

## **The Next Issue**

### ***THE SECRETS OF MAKING MARIONETTES***

You have probably enjoyed the Marionette Carnival at the Century of Progress Exposition at Chicago. Anyone can easily learn to make these realistic string-operated midgets perform, which provides fascinating entertainment either in the home circle or on school programs. Every detail of constructing marionettes skillfully will be thoroughly explained by Mr. Rufus Rose, designer of the Carnival marionettes, in a series of interesting articles.

### **REPAIRING ELECTRIC HEATING APPLIANCES**

Why buy a new electric iron or toaster just because the element of your old one has burned out? It's easy to fix it at small cost. This article tells how to figure the size and length of the Nichrome wire needed. Also, it gives design data on rheostats to control speed of motors, etc.

### **IDEAS FROM THE GARDEN ARCHITECT**

Do you want a 5-ft. Dutch windmill for the garden? Or, will a small Japanese tea room, where meals can be enjoyed outdoors, be of greater interest? These and other unusual ideas are pictured on these interesting pages.

### **LOCATING AUTO MOTOR KNOCKS**

Those elusive motor knocks can be traced down to their source by following a number of time-tested methods that have been used by an old automobile mechanic. Knowing what's wrong may save you many an expensive repair bill.

### **COOL AIR IN YOUR HOME**

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## SIMPLE TUBE RELAY FOR ELECTRIC EYE

(Continued from page 103)

red rays to pass. These are invisible in the dark although the cell will continue to see them and, when the beam is interrupted, will sound the alarm. The opposite result is obtained when B and C relay connections are employed. These applications are illustrated in Fig. 1-E for fire alarms, and also in the sketch above. Here the tube-operated relay and electric eye are housed in a weatherproof box and installed in a roadside sign. When the eye sees the light of an approaching car the sign is floodlighted until the car has passed, or in the case of a highway sign, a warning bell can be rung.

The construction details are given in simplified form in Fig. 1 and the schematic diagram Fig. 1-A. In Fig. 1 all parts are shown in their relative positions above and below the metal base. This base is made from a piece of sheet metal 5 in. wide and 7 in. long; it is bent over 1½ in. at the ends as shown in the photos. Holes are cut for the wafer-type sockets, relay contacts and the potentiometer. This variable resistor should be insulated from the metal base. A type 112-A receiving tube is used to work the relay which is placed in the plate circuit. Whenever the tube passes current the relay is operated by the plate current. The filament of the tube is in series with the fixed and variable resistors together with a 25-watt 110-volt lamp, these being connected directly across the 110-volt a.c. or d.c. supply line. The photo-cell socket is connected at the terminals indicated and the eye unit is now ready for the sheet-metal container. This box, open at the end, should fit snugly over the base, where it is held with short machine screws through the sides and base. The box is 7 in. high and provided with a cover. The outlet socket, for the line to be controlled, and the socket for the 25-watt lamp are mounted in the side of this metal container. A hole is cut for the eye outlet and a short metal tube, 1½ in. in diameter, is soldered in the position shown. The type CE-7 photo-cell used, looks very much like an ordinary radio tube and costs \$3.00. The relay closes at 2½ mils. and is a type R-5014-A-5, approximately 3,000 ohms, handling 1 amp. 110-volts on the contacts.

(Continued to page 118A)



# This 1934 Kodak shows how greatly cameras have improved

## The New Kodak Six-20 with *f.6.3* lens

**E**XPECT a lot more of a Kodak now—witness this new 1934 Kodak Six-20:

Press a button—the camera springs open. Sight through the eye-level finder . . . and follow the action easily . . . stop it with a shutter that splits a second into 1/100. Your keen Kodak Anastigmat *f.6.3* lens frees you from many light handicaps.

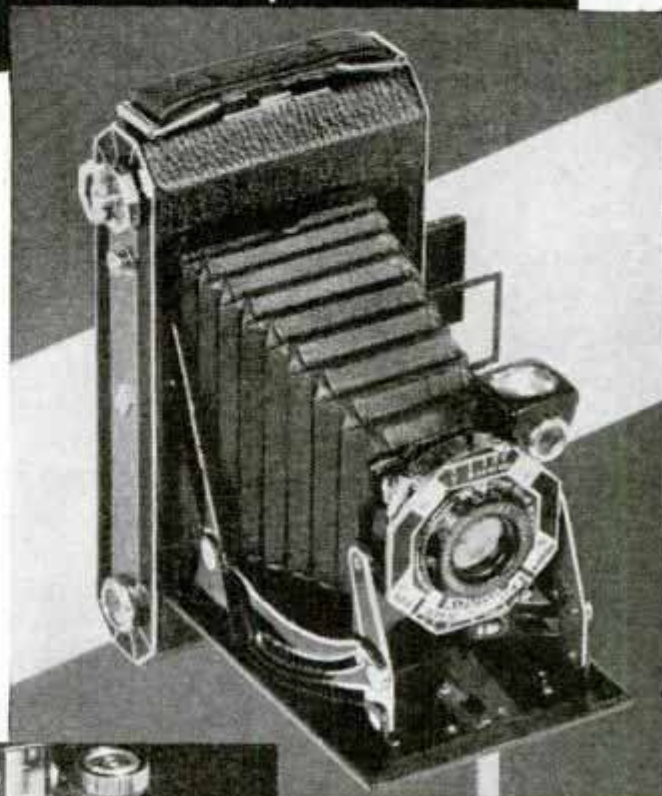
Richly appointed, trimmed in metal and enamel, the Six-20 Kodak has style . . . sturdiness. For 2¼ x 3¼ inch pictures, Kodak Six-20 with *f.6.3* lens costs \$17.50. Kodak Six-16 with *f.6.3* lens, for 2½ x 4¼ inch pictures, \$20. With the ultra-fast Kodak Anastigmat *f.4.5* lens, Six-20 costs \$37.50; Six-16, \$40.

### SNAPSHOTS AT NIGHT

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### PUPILLE—*f.2*

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### VOLLENDIA—*f.4.5*

. . . an inexpensive miniature camera. Takes 16 pictures on a roll of "vest pocket" film. Three-speed Pronto shutter—*f.4.5* lens—built-in self timer. Price, \$22.50.



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## FRISKING MOTHER EARTH

(Continued from page 90)

Coast region of Louisiana and Texas. Yet another method of geophysical prospecting was suggested by the study of earthquakes with the sensitive seismograph. In order to utilize the seismograph in locating mineral deposits the geophysicist creates homemade earthquakes as required, and studies the resulting shocks. He simply drills a hole in the earth, drops in from a pound to 150 pounds of dynamite and sets it off, producing a fair imitation of an earthquake.

Sound travels through the air 1,100 feet per second; but the shock of explosion travels through various strata in the earth at different speeds up to 16,000 feet per second. The waves in passing from a layer of one speed of transmission to another of a different speed are refracted as light is refracted in passing from one medium to another. As a rule deeper layers have higher transmission speeds so that the wave paths are refracted eventually back to the surface, enabling the geophysicist to deduce a considerable amount of information about underlying strata. By using several seismographs in the field and studying their records in the light of his knowledge of geology the prospector is able to construct a picture, with all essential details, of the interior of the area to which he has been assigned. Artificial earthquake shocks often penetrate the earth for several miles. One French experimenter recorded a depth of thirty miles.

Electrical methods of underground exploration, of which there are numerous variations, can be adapted to either large or small scale operation. Electric current may be passed through the earth by metal stakes driven into the ground or a current may be induced in the earth from insulated wires laid on or suspended near the surface. Sometimes two parallel wires, each a mile long, are laid a mile apart. Distribution of the current will depend on conductivities of surface and subsurface formations. The Boliden gold mines in Sweden were located by the electrical method, as were forty other mines in the same area. Although Swedish prospectors have been looking over this region for hundreds of years nothing was known of the Boliden deposits for they were covered by a glacial moraine.

## THE WEST POINT OF THE AIR

(Continued from Roto Section)

stability. As a result the flying school student body is one of the finest groups of young men to be found in any school in the world—both physically and mentally.

Once accepted and enrolled, you find yourself being given a liberal education—and receiving a salary while learning. The cadets are paid \$75 a month, furnished with excellent quarters, all clothing and a mess comparing favorably with any training table. But the mere fact that you are in does not mean you will stay in—another feature which tends to make the school exclusive.

In spite of the careful selection of students, it is found that only about fifty per cent are suitable for pilots. With their previous mental training, few students have trouble with the ground school courses, but it is difficult to predict how any man will react in the air until he actually enters this strange environment.

Perhaps he is unable to move the rudder with his feet and the stick with his hand and gain the proper coordination to execute smooth maneuvers. Possibly he has a slow mental reaction. May be he cannot think clearly while flying. But in order that the student may have all the "breaks" even after his instructor has given him up as hopeless, he is given a series of rides with the flight commander. If he shows promise, he is given another instructor, but otherwise he is sent to the stage commander in charge of his training division and this officer must also decide on the student's possibilities. In this way it takes the unanimous opinion of three experienced pilots to recommend a student to the faculty board for elimination. Most eliminations occur very early in the course, before or at the solo period.

But suppose you are able to make the grade, and stick it out until you win your wings. What will you know when you graduate? You will know how to fly an airplane, of course, but you will also know a lot more. You will have a working knowledge of airplane mechanics, meteorology, radio, aerial photography and a host of other subjects.

(Editor's Note—This is the first of two articles on "The West Point of the Air." In the August issue you will find sixteen more pages in color and a detailed explanation of the training given these Army flying students.)



# Gem alone works with a *Barber Stroke*



This actual photo proves how Gem reproduces the stroke and slant of the Barber's Razor.

## *Barber Stroke*

Gem doesn't scuff the skin with short, choppy, *stubble-twisting* strokes. It *slides* through the toughest whiskers with the velvet action of the barber's razor, because it *also* uses wedge-edge, *rigid* blades in a straight, *full contact* holder.

Gem's design *compels* correct shaving. Its slanted, bevelled top meets the bristles at *root-level* and right angles and removes the beard in swift, tugless, *face-length* glides. Like the barber's stretching fingers, Gem tightens all folds and wrinkles, reaches the hairs that *wrongly-shaped* razors *miss* and leaves clefts and nostril contours clean as a whistle.

Dual Alignment (patented feature) sets the blade so accurately and *unbudgingly* that Gem can *safely* use such *sharp* blades that a *once-over* will keep the blackest jowl socially fit for twenty-four hours.

We build Gem Blades of super-tough, 50% *thicker* surgical steel, and strop 'em 4840 separate times for *long* use on *strong* beards. They remain keen so *indefinitely* that economy scowls at the money wasted on softer, thinner, *shorter-lived* substitutes.

Gem Micromatic Razors are fool-proofed, and guaranteed *forever*. One piece with no take-down parts. Adjusted with a twirl — cleaned in a jiffy. Handsomely boxed sets sold everywhere at \$1. Or a regular dollar holder with two blades to any "Doubting Thomas" who'll *spend* a quarter and *send* this coupon.

Gem Safety Razor Corp., ©G.S.R.C.1964  
Dept. PM 23, Brooklyn, N. Y.



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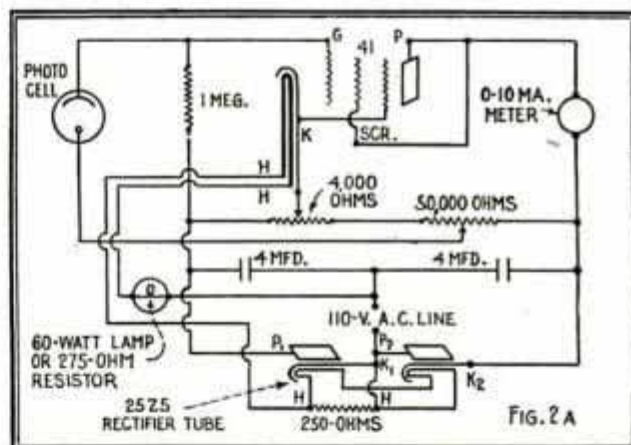
**CONOCO TRAVEL BUREAU**

## SIMPLE TUBE RELAY FOR ELECTRIC EYE

(Continued from page 114A)

Those who wish to operate the relay from a 32-volt lighting plant should use a 110-ohm ¼-amp. potentiometer in series with the 32-volt filament supply. It will also be necessary to use a 90-volt block of B-batteries for the plate voltage. A complete list of materials and further data on 32-volt operation are available upon application without charge.

Figs. 2 and 2-A show a little more expensive hook-up; however, owing to greater sensitivity this meter-type unit has many applications not possible with the first. These uses include matching colors, as illustrated in Fig. 3. Fig. 4 shows an arrangement for candling eggs and measuring the opacity of paper. This unit is for 110-volts a.c. only; it employs a type-41 tube and a rectifier. The base layout is similar to that of the other unit except for



the photo-cell tube which is inserted in an external hooded socket and connected with an extension cord. The milliammeter is inserted in the plate circuit of the type-41 tube instead of the relay. This meter is also connected to extension leads. The 60-watt lamp may be connected externally and employed both as a line resistor and a light source. An enlarged blueprint of the wiring diagrams for both units is available if desired; those who wish it should specify blueprint R-199. In Figs. 3 and 4 the exact amount of light falling upon the photo cell is accurately indicated by the milliammeter.

Ⓢ When changing tubes or tightening screws in a radio receiver, always do so with the power off.



# South Bend Back Geared Screw Cutting Lathes

for the  
 Manufacturing Plant  
 Tool Room  
 Machine Shop  
 Automotive Repair Shop  
 General Repair Shop  
 Home Workshop

**\$75**

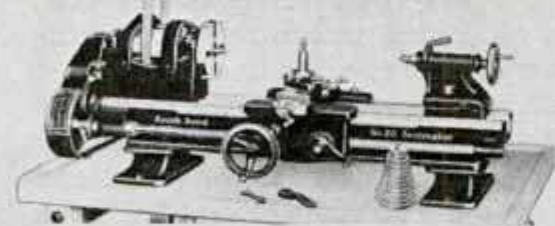
less motor drive

Wt. 300 lbs.



9" x 3" "Workshop" Lathe complete with Horizontal Motor Drive Equipment, 1/4 H.P. reversing motor and reversing switch, as shown - - - **\$93<sup>00</sup>**

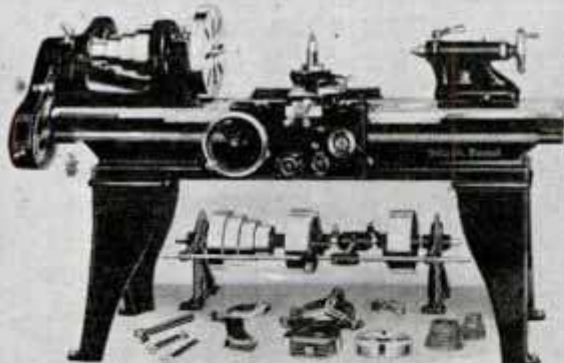
The new 9 1/8" swing by 3' bed "WORKSHOP" Lathe is a Back-Geared, Screw Cutting Semi-Precision Metal Working Lathe taking 18" between centers. Can also be used for working wood, compositions, etc. Cuts all screw threads 4 to 40 per inch. Has automatic longitudinal feed; graduated compound rest; 3/4" hollow headstock spindle. Operates from lamp socket for 2 cents per hour. Other bed lengths 3 1/2' and 4'. Terms as low as \$21.00 down, \$7.00 per month.



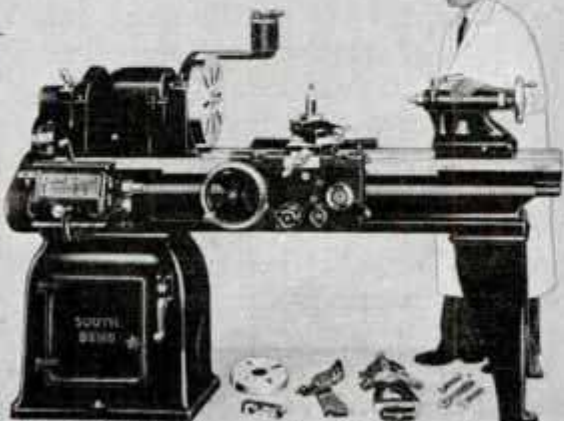
9" x 3" "Toolmaker" Precision Bench Lathe, Countershaft Drive, wt. 325 lbs. **\$140**



9" x 3" Quick Change Gear Precision Bench Lathe, as shown, wt. 430 lbs. **\$265**



16" x 6" Standard Change Gear Precision Lathe, Countershaft Drive **\$480**



16" x 6" Quick Change Gear Precision Lathe, Underneath Belt Motor Drive **\$752**

## 96 Sizes and Types of Lathes

South Bend Back-Geared Screw Cutting Lathes are built in 96 sizes and types from 9" to 18" swing, with individual motor drive and with countershaft drive, price range \$75 to \$1500. South Bend Precision Lathes are used by U. S. Government, General Motors, Kelvinator, R. C. A.-Victor, Curtis-Wright and hundreds of other leading industries in the U. S. and 96 countries throughout the world. Four popular sizes of lathes are illustrated and priced in the panel at left, other popular selling sizes are listed in the tabulation below:

Size	Weight Crated	Countershaft Drive	Motor Drive
9"x3' Toolmaker Bench Lathe.....	340 lbs.	\$140.00	\$158.00
9"x3' Junior Bench Lathe.....	416 lbs.	170.00	188.00
9"x3' Standard Change Bench Lathe.....	461 lbs.	225.00	244.00
9"x3' Quick Change Bench Lathe.....	471 lbs.	265.00	284.00
11"x4' Quick Change Lathe.....	920 lbs.	340.00	433.00
13"x5' Quick Change Lathe.....	1460 lbs.	402.00	535.00
18"x8' Quick Change Lathe.....	3140 lbs.	705.00	895.00

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Showing all sizes and types of South Bend Back-Geared, Screw Cutting Lathes, 9" to 18" swing. Catalog also shows Tool Room Lathes, special large swing lathes and Brake Drum Lathes. 72 pages. Sent free, post paid, on request.



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| <input type="checkbox"/> 9" Junior Lathe...\$170    | <input type="checkbox"/> 16" Lathes \$480 to \$1020 |
| <input type="checkbox"/> 9" Standard Change...\$225 | <input type="checkbox"/> 18" Lathes \$585 to \$1324 |
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My work is.....  
 Name.....  
 Address.....  
 City..... State.....



## THE COAST GUARD TO THE RESCUE

(Continued from page 58)

is moving too close to shore, or to notify one in distress that help will be sent.

If a ship is wrecked along the coast the surfmen launch their boat through the breakers if possible, and either pick off the crew or guide their boats through the surf. Often, however, the sea is too wild for a small boat. It then becomes necessary to use the life-line and breeches buoy.

Surfmen dislike to talk of their own adventures, but tell with pride of what they consider the epic of beach patrol work:

The British tanker "Mirlo" was torpedoed off the North Carolina coast in August, 1918. The lookout at Coast-Guard Station 179 reported seeing a great mass of water shoot into the air about 4:30 that morning. Immediately after several violent explosions were heard, and flames shot up from the ship.

The crew launched their power surfboat. As they neared the wreck the sea was covered with burning oil and gasoline. They met one of the ship's boats containing the captain and six men; it was learned that two other boats had been launched but one had capsized, and it was feared that all of the other men had been lost in the flames. Keeper John A. Midgett directed the captain where to go, then headed for the burning wreckage. Between two great masses of flame, about 100 yards apart, a capsized lifeboat could be seen with six men clinging to it.

Midgett steered his boat through the masses of flaming wreckage and oil and lifted the six men overboard. Ten others had originally clung to the overturned boat, but in attempting to escape from the deluge of blazing oil and flame-crested waves bearing down upon them they had been forced to submerge. Efforts to protect themselves from both fire and water told upon their strength, and one by one they had loosened their hold.

After further search through the wave-tossed flames Midgett found another boat containing twenty men, some terribly burned, and three others who had miraculously kept afloat by swimming. Midgett picked up the swimmers, took the boat in tow, then picked up the captain's boat, and through a tumult of breaking waves kicked up by the gale, succeeded in landing the thirty-six survivors safely.

## MONSTERS OF INVISIBLE WORLD

(Continued from page 68)

hookworms, he means your intestine is infested with a certain type of nema. The dreaded Guinea worm of the tropics is a nematode. If raw or partly cooked, trichina-infested pork is eaten, trichinosis, a serious and often fatal disease, may result, the nematodes burrowing in the muscles of the victim. It has been suggested that nemas may be involved in the transfer of cancer. In animals and man, a result of nema attack may be fever, pains, anemia, laziness, abscesses, punctured blood vessels or even paralysis and insanity.

The damage nemas do to crops of the United States runs into millions of dollars a year. A nematode disease of wheat and rye has caused much loss in certain states. The beet-sugar industry often suffers considerable losses through a nematode attacking beets, dwarfing them and reducing their sugar content. Rotation of sugar-beet crops with some unaffected crop is the most practical control method.

Nemas attack strawberry plants, narcissus bulbs and scores of other plants. In fact, a list of nearly 900 plants that are victims of one single species of nemas has been prepared. The root-knot nema, found mostly in the south, is the culprit in this case. It burrows into roots of plants and causes abnormal cell growth that produces swellings or knots. Among the methods for ridding plants of this and some other nema pests is treatment of roots and bulbs with hot water.

Some nemas, by eating more injurious members of their own kind, are beneficial. Citrus tree roots are attacked by a certain nema. There is a second nema that, living in the orchards with this species, feeds upon it, and therefore renders a valuable service to the orange grower. Some nemas devour the eggs of grasshoppers and other injurious insects. Others destroy the larvæ and mature insects. Still others transmit the germs of insect diseases. Perhaps, some day, science will be able to rid the earth or at least part of it of mosquitoes, gnats, earwigs, May beetles, ants, wasps, gipsy moths, cutworms and undesirable nemas, by finding a way to establish a natural balance between these pests and their nemic parasites. Work being done by Uncle Sam's nematologists is speeding the arrival of this day.



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## HUNTING TREASURES IN RARE BOOKS

(Continued from page 84)

heights to be sure. There is the first edition of that famous story of the sea, "Moby Dick," by Herman Melville, published in 1851. This is a \$500 book. "Little Women," by Louisa May Alcott, a two-volume book dated 1868-69, is rated at \$400. The first edition of Harriet Beecher Stowe's "Uncle Tom's Cabin," as first issued in 1852, is quoted at \$300.

Moreover, not all valuable books are old. For instance, "Stories Without Women," by Donn Byrne, which made its appearance in 1915, is a \$100 book. The first published work of the contemporary American dramatist, Eugene O'Neill, which came forth under the title of "Thirst," in 1914, is a \$50 volume as far as collectors are concerned. And, to cite a very recent example, Hervey Allen's "Anthony Adverse," published only last year, has risen from its published price to \$15 a copy for the genuine first edition!

Converting rare books into cash is the final step. Three avenues are open to the book hunter. The private collector is more or less difficult to find and even though you find him he may not be interested in the particular book you have to offer, or may not be in a position to buy it at the moment.

The second source is the book auction. In both New York and Chicago, during the winter months, there are held public rare book auctions. To these, anyone can send valuable books for sale. Two charges are made for this service. One is for listing the book and a description of it in the catalog of the sale. The other is a commission on the price the book brings. Selling at auction involves somewhat of a gamble. The price you get depends on how badly the book is wanted at the moment and who is bidding.

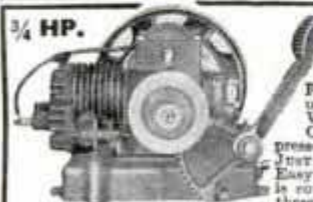
Finally, there is the dealer in rare books. Obviously, he will pay only a portion of the book's retail value for he must be assured a profit. But this is fair because the dealer must find a collector to buy the book for his library. As a means of making extra money, a profitable use of spare time, book hunting holds not only the possibility of profit but the thrill of the search with little more investment than knowledge and time.



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## STRANGE FACTS ABOUT GOLD

(Continued from page 41)

ounces of fine gold has been decreasing steadily since 1915, and except for temporary fluctuations, probably will continue to decrease. A committee of geologists a few years ago made a painstaking effort to determine the gold resources of the world.

The report said that nine major and six minor gold-producing countries of the world had in 1930 estimated reserves of 341,000,000 ounces of gold, just about half the amount produced by the whole world since 1900. However, many countries producing considerable amounts of gold were not included in the report. Adding the estimated reserves of twenty-six such countries, based on the production of each for the previous ten years, the combined estimate totals 406,616,490 ounces in reserve for forty-one countries, or about 160,000,000 ounces less than was produced from 1900 to 1932 inclusive.

This amount represents all the known gold left in the ground. In 1931 and 1932 the annual world production averaged 22,604,589 ounces. If this rate is maintained, the world's gold resources would be exhausted by about 1950.

This is unlikely to happen, however, because comparatively little scientific prospecting has been done and many undiscovered gold deposits may be found by improved prospecting methods. Also more improvements will be made in the extraction of gold from complex ores.

Finally, much gold eventually will be mined from deep in the earth. Many problems must be solved, however, before deep mining becomes a general practice. For instance, a cubic foot of granite weighs about 166 pounds. This means that at a depth of one mile the rock pressure in granite would be 875,000 pounds per square foot. Temperatures also increase about one degree Fahrenheit for every eighty feet of descent. Thus at a depth of a mile, the temperature problem is sure to be difficult.

Possibly by the time all the gold has been removed from the bowels of the earth, and we have found all on the surface, we shall be ready to extract it in quantities from the sea water and thus have a virtually inexhaustible supply. For the lure of gold will remain, whether we extract it from the earth or the ocean.



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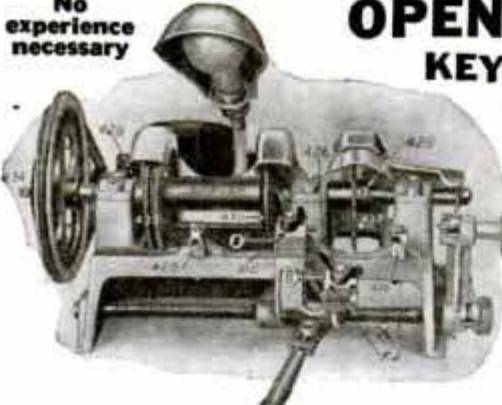

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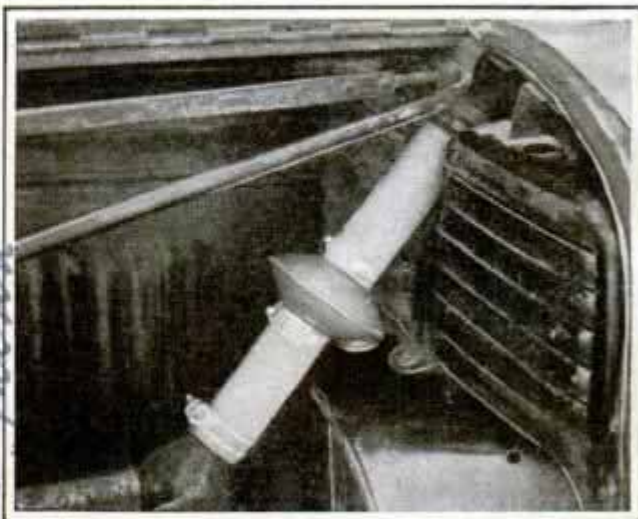
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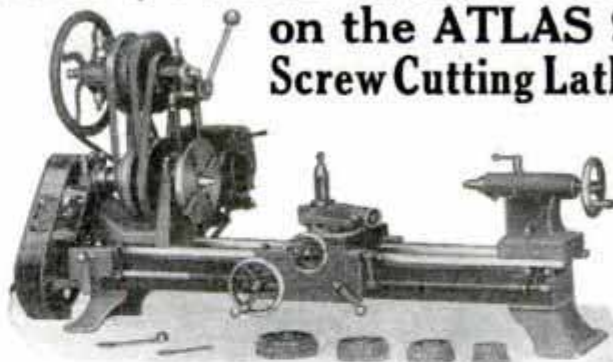
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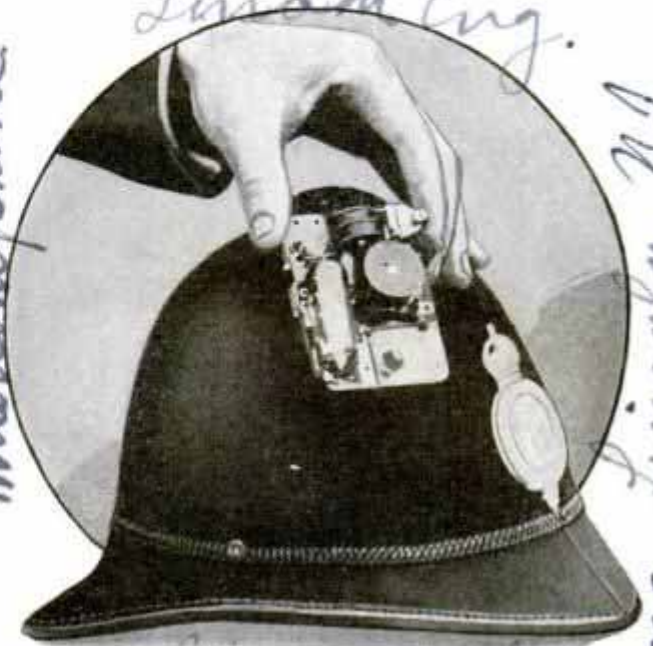
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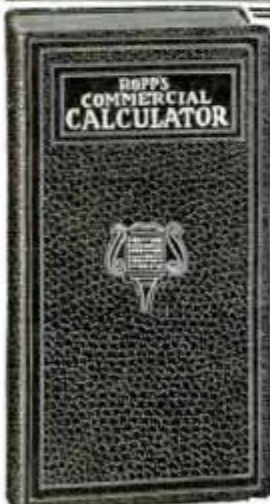
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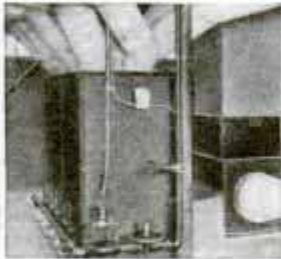
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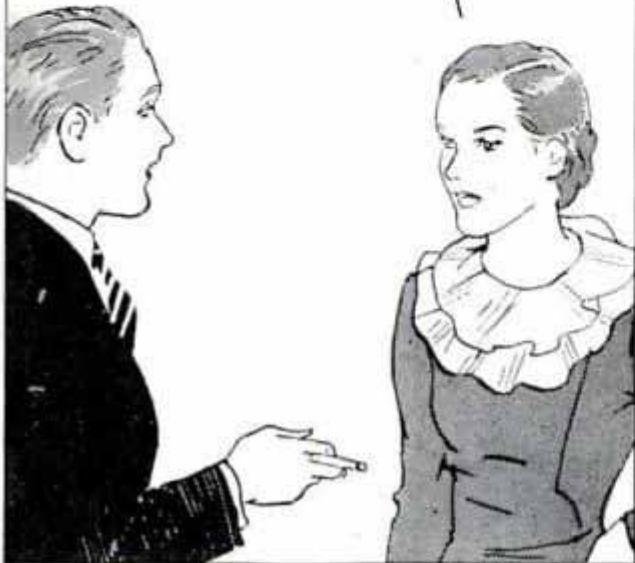
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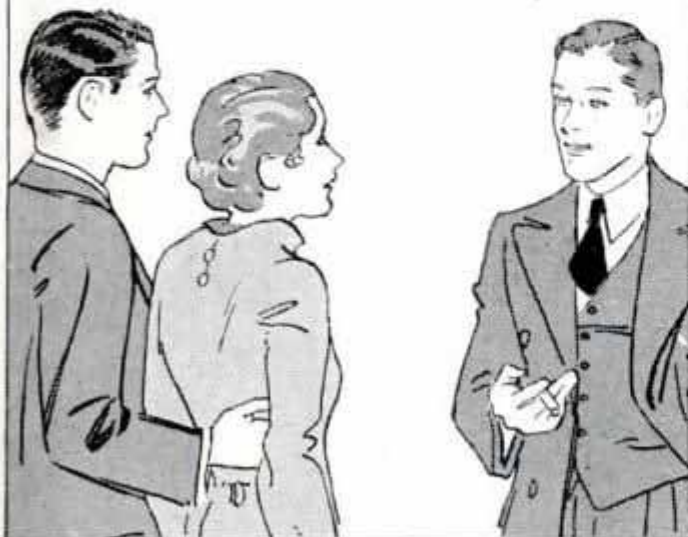
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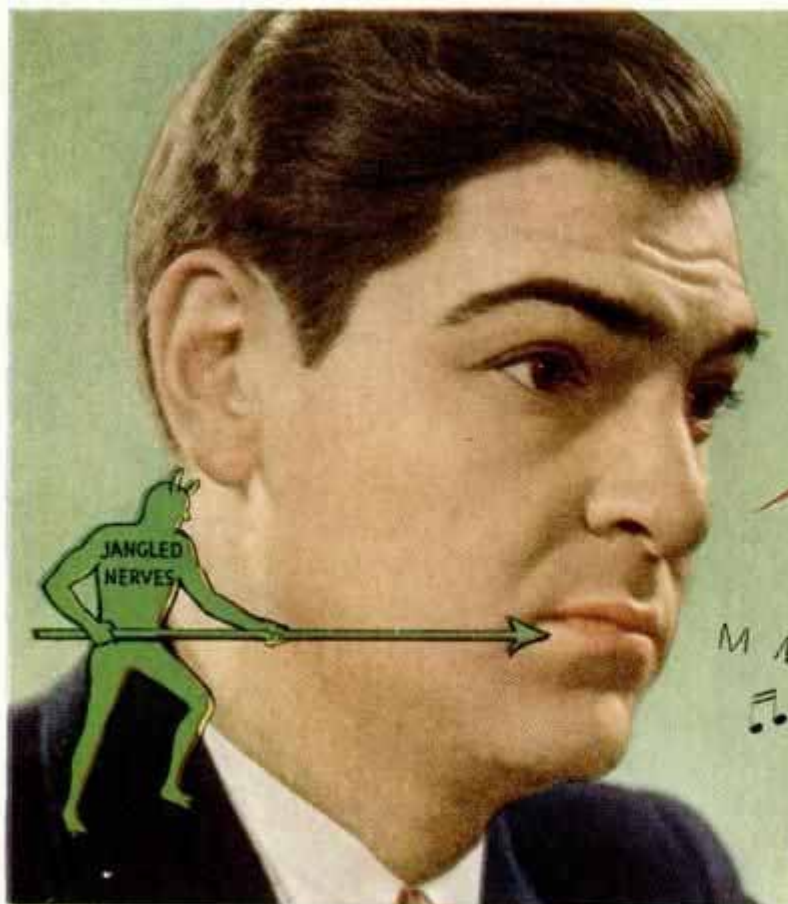
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