

NEW POWER FROM THE SUN

POPULAR MECHANICS

★

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG'D. TRADE MARK, GREAT BRITAIN, No. 410436

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SEE PAGE 558

WHOSE FAULT?



GOLDEN PLY BLOW-OUT PROTECTION FOUND ONLY IN SILVERTOWNS!

Reporter: "Pretty close shave, Miss. What happened?"

Driver: "We had a blow-out that shot us right off the road. Guess it serves me right. My garage man told me my tires weren't safe, but I just laughed at him." * * *

Don't let anyone tell you that all tires are safe. They're not. And the fact that thousands are killed or injured in blow-out accidents every year proves it. To really stand up under today's high speeds a tire must be specially constructed—it must give you protection where you need it most—*inside* the tire.

The new Goodrich Silvertown

is just that kind of a tire. It's the *only* tire in the world that's built with the Life-Saver Golden Ply, a layer of special rubber and full-floating cords scientifically treated to resist internal tire heat. By resisting this heat the amazing Golden Ply keeps rubber and fabric from separating—it keeps heat blisters from forming. And when you prevent the blister, you prevent the high-speed blow-out.

When Goodrich Silvertowns cost much less than other super-quality tires, can you afford to be without the protection and months of extra mileage they give? See your Goodrich dealer now.

HEAT CAUSES BLOW-OUTS.
PREVENT THOSE
BLOW-OUTS WITH THIS
HEAT-RESISTING
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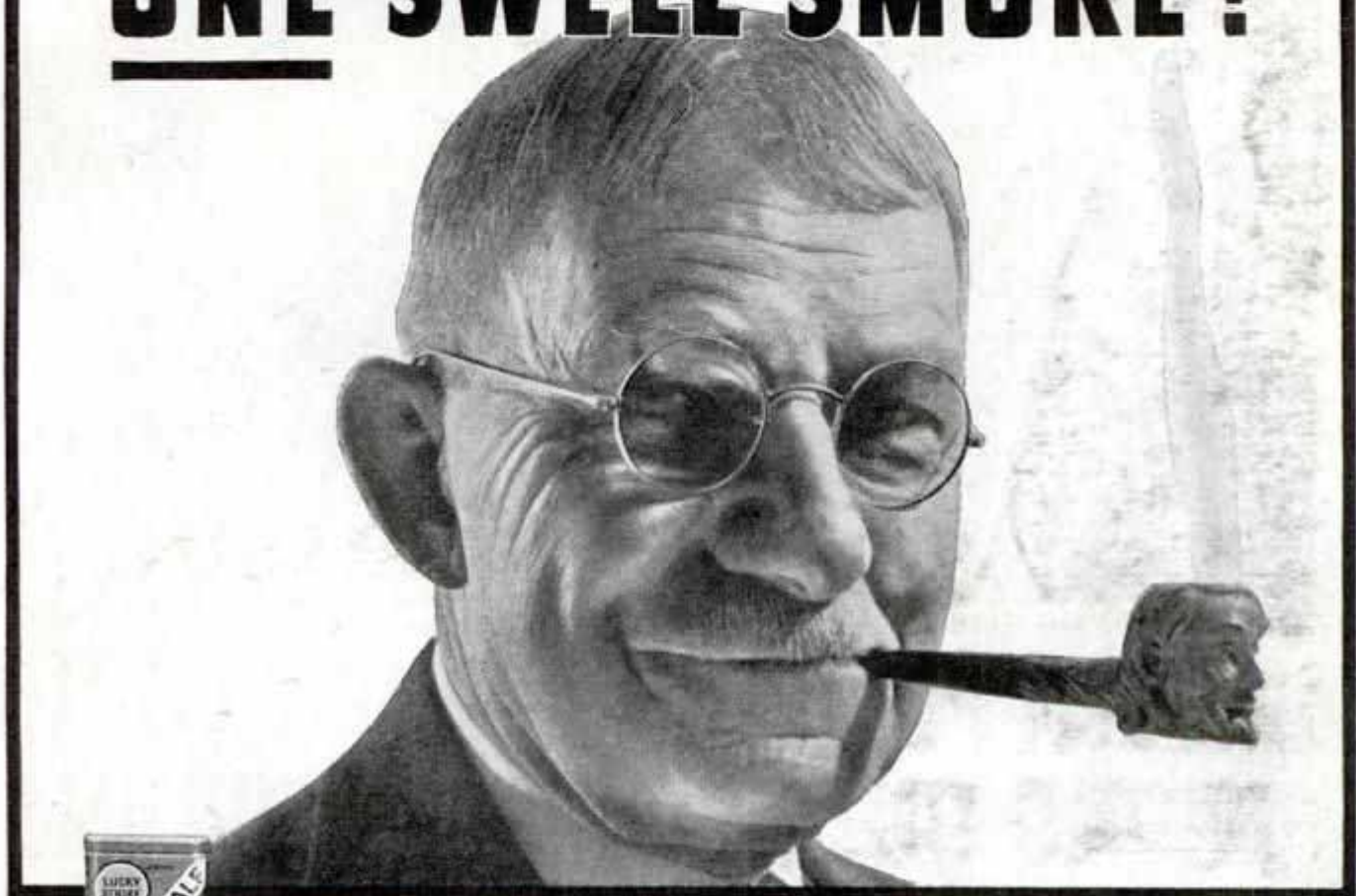


FREE! Join the Silvertown Safety League. Sign the Safe Driving Pledge and your Goodrich dealer will get for you absolutely free a tail-light emblem with red crystal reflector. No obligation to buy.



The new **Goodrich SAFETY Silvertown**
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No Bite!



No Bite!



Still no Bite!

Give your pipe a new deal with Half & Half. Cool as a call to show your cards. Sweet as holding four of a kind. Fragrant, full-bodied tobacco that won't bite the tongue—in a tin that won't bite the fingers. Made by our exclusive modern process including patent No. 1,770,920. Smells good. Makes your pipe welcome anywhere. Tastes good. Your password to pleasure!

Not a bit of bite in the tobacco or the Telescope Tin, which gets smaller and smaller as you use-up the tobacco. No bitten fingers as you reach for a load, even the last one.

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HALF AND HALF

The Safe Pipe-Tobacco

FOR PIPE OR CIGARETTE

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"Fine thing, the Telephone"

"HELPS TO KEEP PEOPLE CLOSE AND FRIENDLY"

"I put through a call for my son down East. Must be three hundred miles.

"Hold the line," the operator said. And next thing you knew, there he was. Sounded just like he was right here. It wasn't like that when I was a young fellow."

THIS COUNTRY has the best telephone service in the world. And it's still getting better—quicker, clearer, more useful to more people. Each year brings improve-

ments in equipment and operating efficiency. Operating errors on local calls—always a small percentage of the millions handled daily—have decreased 40% in the past six years.

Since 1929, the average time required for long distance connections has been reduced from 2.8 to 1.4 minutes and 92% of these calls are now handled while you remain at the telephone.

Time has proved the value of Bell System operation.

BELL TELEPHONE SYSTEM



Popular Mechanics Magazine

H. H. WINDSOR, Founder

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

October, 1936

Vol. 66, No. 4

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Why Gamble with Death?

SINCE 1922 automobile accidents have snuffed out the lives of more than twice as many persons as were killed in all the wars in which America ever participated. And if the present traffic accident rate continues, one out of every twenty persons in this country will be injured or killed in an automobile accident within five years. And that includes you! There's one thing you can do to help reduce this appalling slaughter, and that is to overhaul your own driving habits and eliminate the careless and "sloppy" practices which sooner or later result in accidents. Check up on your own driving by reading "Why Gamble with Death?" in the November issue.

Next Month

LIKE an arrow streamline trains shot across the country, captured public imagination and lured passengers back to the railroads. But there has been more to it than knocking off the square corners and putting pants on the engine. Power and weight were the big considerations. Read the concluding part of "The New Era of Railroading" next month and learn how the railroads found the answer. The article is illustrated with eight pages of Coloroto pictures.

Wanted—a Blizzard

NATURE cannot be relied on to produce a blizzard, a thunderstorm or a cloud bank when the movie director is ready to shoot such an effect, so Hollywood has its own corps of weather makers and its own machines for making everything from fog to sleet. Read how it's done next month.

Hunting Tips

IF YOU'RE going on a hunting trip this fall, you'll need more than a good gun and a good dog. You'll need proper clothing and such things as a knife, a waterproof matchbox and a host of other odds and ends which take up little space but add much to your comfort. Next month Bob Becker tells you what to take along and how to use it.

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This One



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MOTORISTS WISE

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**READ HOW SKINNY
GAWKY MEN GAIN
10 TO 25 POUNDS
THIS NEW QUICK WAY**

Thousands gaining normal husky pounds—in just a few weeks!

SKINNY, friendless men who never could gain an ounce can take new hope from the experience of thousands of others with this new scientific treatment that is sweeping the country. These others have gained 10 to 25 pounds of solid, naturally attractive flesh this new, easy way—in just a few weeks!

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No matter how skinny and run-down you may be, try these new Ironized Yeast tablets just a short time, and note the marvelous change. See if they don't build you up in just a few weeks, as they have thousands. If you are not delighted with the benefits of the very first package, your money back instantly.

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To start you building up your health right away, we make this absolutely FREE offer. Purchase a package of Ironized Yeast tablets at once, cut out the seal on the box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body." Remember, results with the very first package—or money refunded. At all druggists. Ironized Yeast Co., Inc., Dept. 5310, Atlanta, Ga.

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Promoted—when others were fired!

The Story of LaSalle Student Shaw



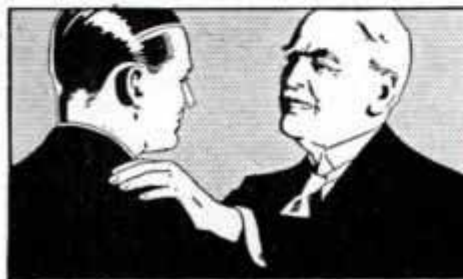
"Since the War I have been book-keeper at \$35 a week. Married, with one baby girl, I found it harder every month to make ends meet. I was desperate!



"Last winter my wife brought me a LaSalle ad on Higher Accounting—showing how I could study in spare time for the job ahead. I investigated, and enrolled January 23. Just in time! For—



"Suddenly, orders came through to cut the force. I watched seven men in my department get the bad news and leave. Then the office boy tapped me, said I was 'next.' My heart sank as I followed him to the Front Office.



"Smiling, the boss handed me a letter. It was from LaSalle to him, announcing my enrollment and my good work on the first lesson. 'We are keeping you,' he said, 'because we like your spirit.'



"Naturally, I had more work to do, with the smaller force, but my training made it easier. I learned quickly, and when the Department Manager left, the boss moved me up.



"I have since been promoted twice, and now carry the title of Chief Accountant—at a salary several times greater. The future looks bright. If it had not been for LaSalle, I would be looking for a job right now."

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You can win them, even today, if you can do the work. LaSalle experts will show you how, personally guide you step by step to success. Simply mark on the coupon the field you are interested in, and we will send you FREE, a valuable booklet about it, telling of opportunities open to you. No cost or obligation—and what you find out may put you on the road to success and financial independence.

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Mystifying the Man who Mystifies the Public

by Blackstone
World's Foremost Magician

MAGIC is bread and butter to me. I earn my living by mystifying the public with such famous illusions as the apparently disembodied and living head of a woman. Yes, I've amazed and baffled millions of theatre goers, but the tables were turned the other day at the Gillette factory in Boston. I was the one who was amazed during an inspection tour of this marvelous plant where Gillette Blades are made.

I stood wide-eyed with astonishment as I watched the operation of the automatically controlled furnaces in which Gillette steel is hardened. On each furnace is a magical black box. In this box is a steel strip of exactly correct hardness for perfect razor blades.

Then—as the steel in process passes through the furnace it must match this bellwether strip for hardness. If the slightest variation occurs—presto chango!—the temperature in the furnace is automatically raised or lowered to bring the steel to the exact required temper.

And I was amazed to discover that the edges of the Gillette Blade are so sharp that they are positively invisible. I was unable to see them even through the most powerful microscope.

Summing it all up—when the scientific wonders in this plant can mystify a professional magician—isn't it natural that the Gillette Blade shaves stubborn bristles with magical ease? I am convinced that every Gillette Blade shaves you in perfect comfort because every Gillette Blade is itself perfect. It's a mystery to me how any man could shave with any other blade.

With these important facts before you, why let anyone deprive you of shaving comfort by selling you a substitute! Ask for Gillette Blades and be sure to get them.

GILLETTE SAFETY RAZOR COMPANY, BOSTON, MASS.

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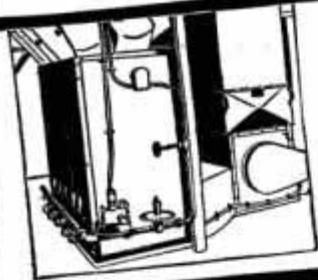
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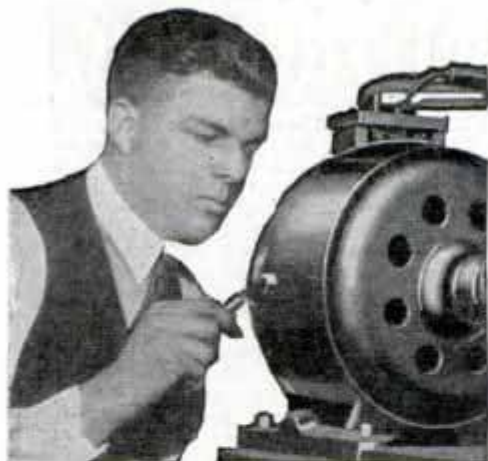
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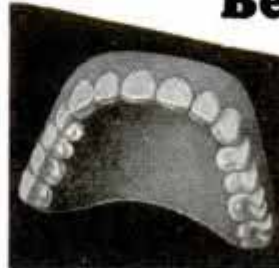
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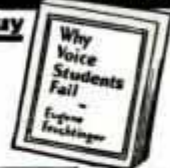
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STAMPS

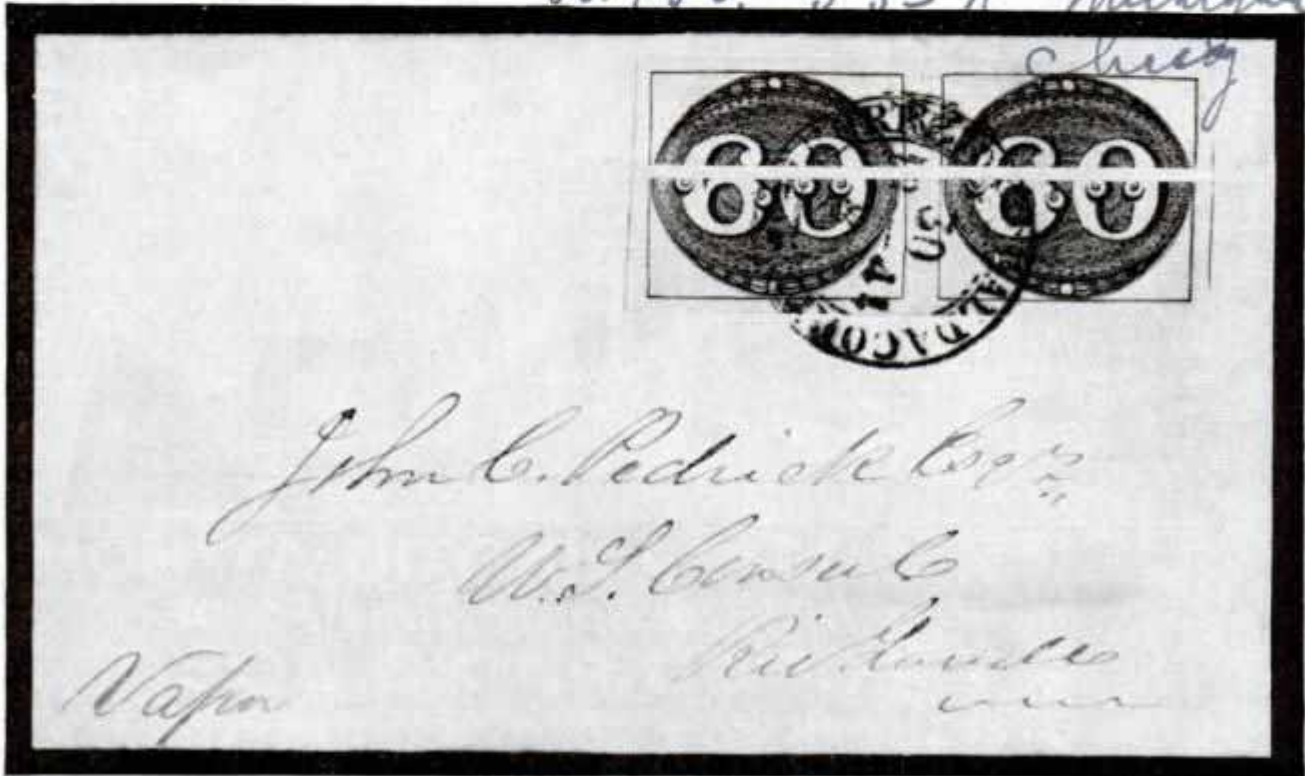


and Collecting

By Richard McP. Cabeen

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This cover, showing a pair of the rare sixty reis "bull's-eyes" issued by Brazil in 1843, is from the collection of Mr. S. Newbury, of Chicago

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(Continued to page 36A)

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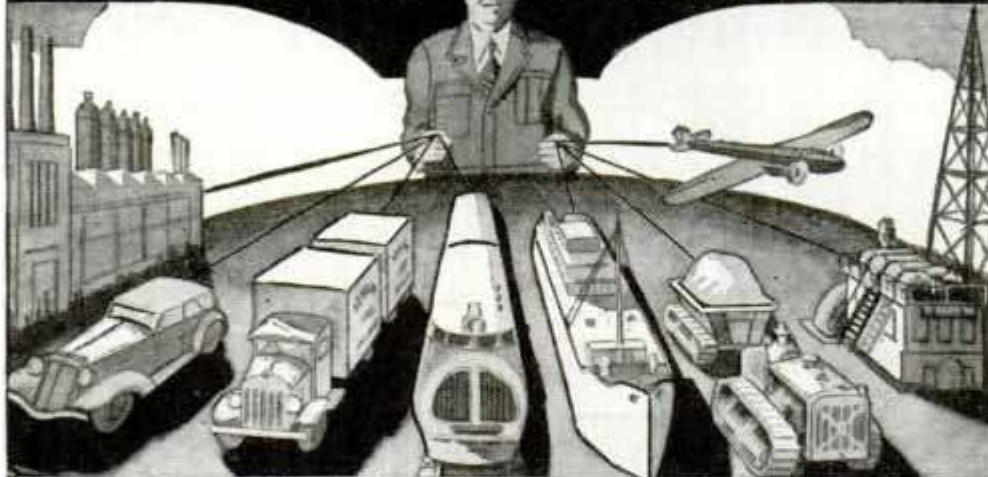
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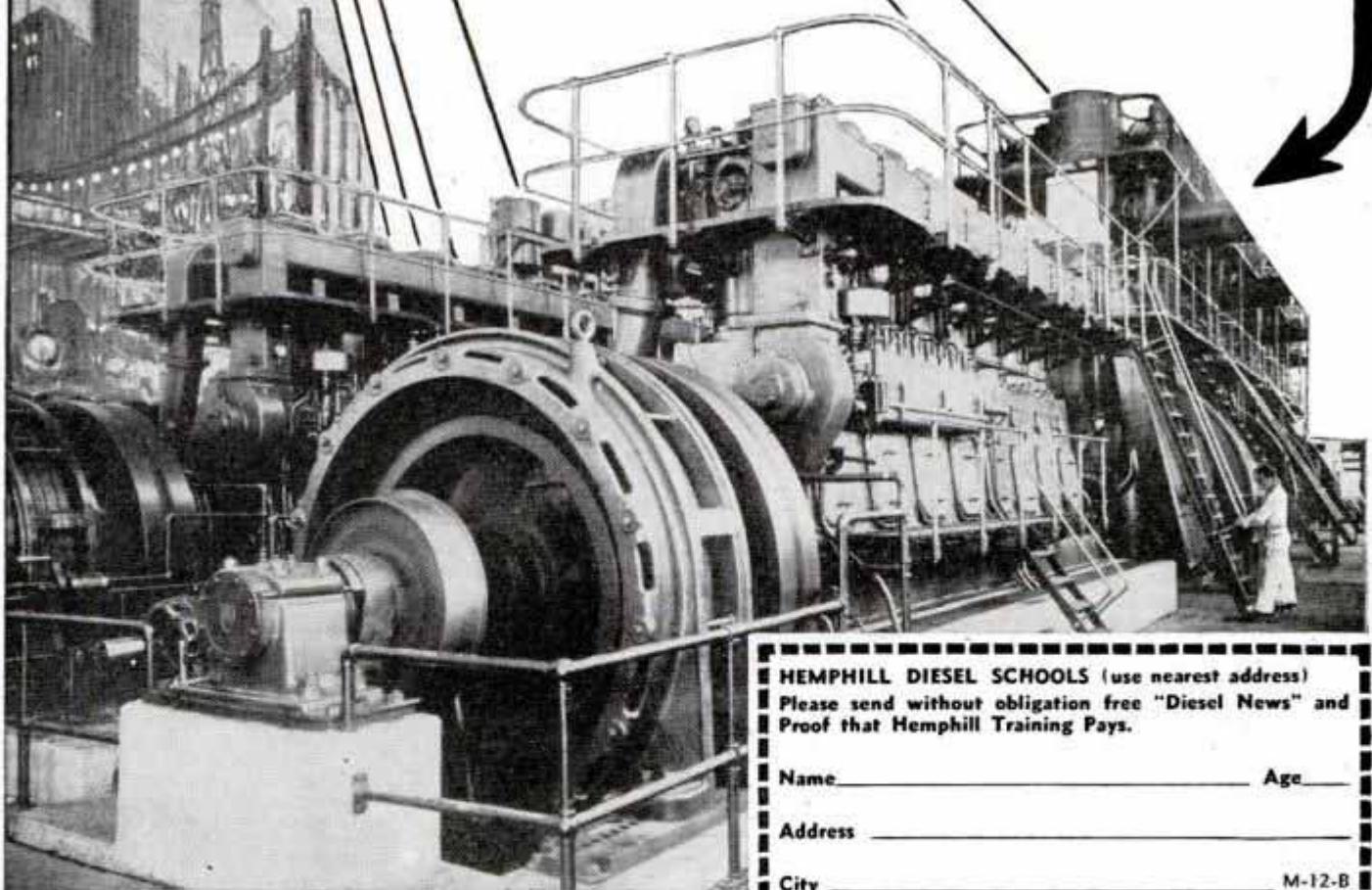
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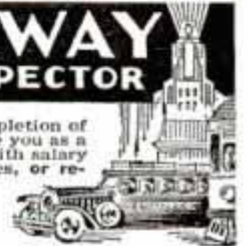
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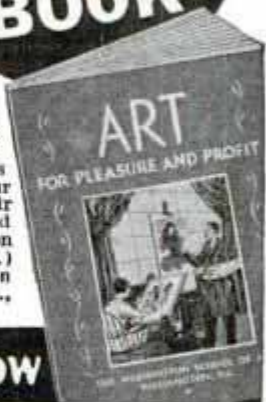
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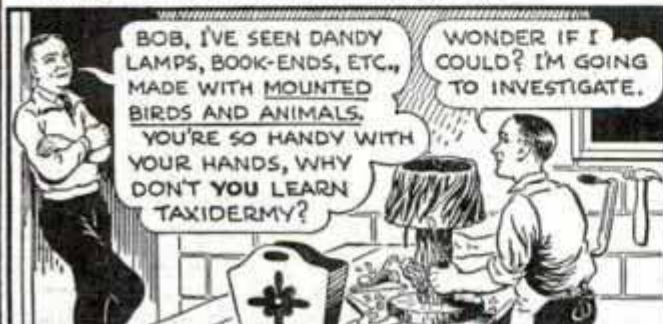
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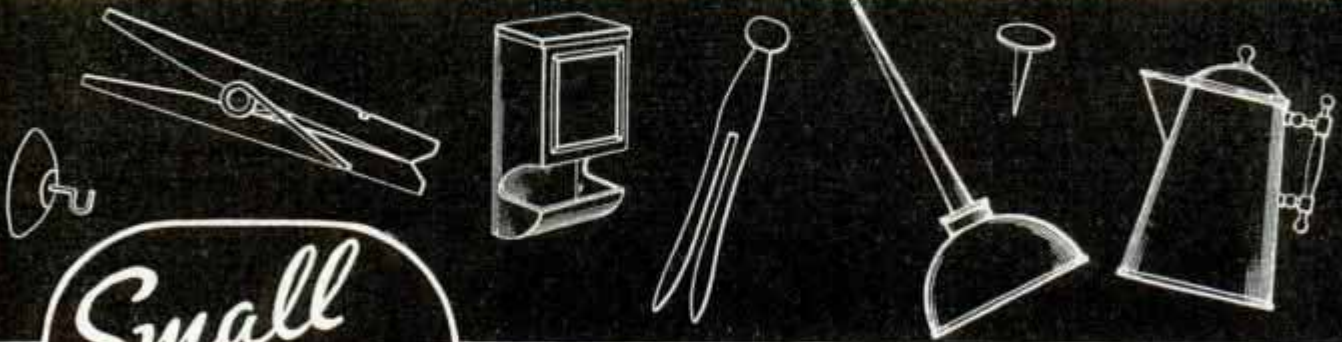
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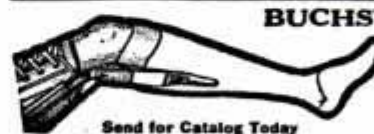


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may strain the heart or other vital organs! I at once put this system to work. I called it Dynamic Tension!

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look a mile wide. Put new pep into your thighs, get the calves of your legs bulging big, add weight if you need it. With a body like that you'll be so brimming-over with health *inside* that you'll feel on top of the world—free from constipation, poor digestion, bad breath, pimples, and similar weaknesses that are robbing you of the good things in life that can be yours. The ruddy glow of health will show on your face—you will be the outstanding fellow in your crowd.

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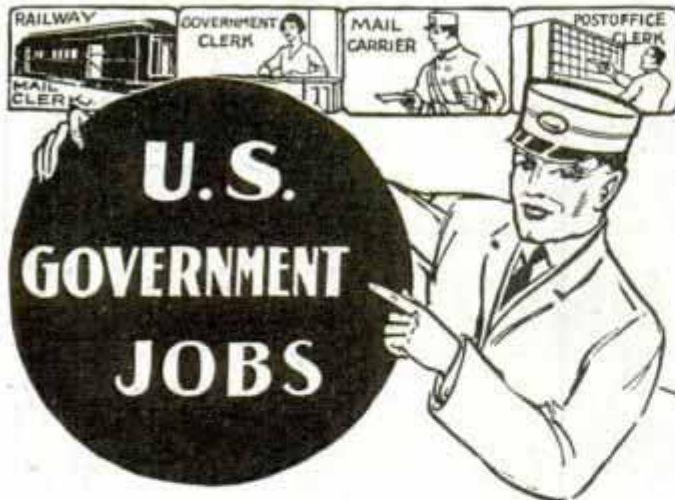
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STAMPS and COLLECTING

(Continued from page 14A)

various countries, or of their industries, or buildings, or animals, for each stamp subject has been selected with care, and in recent years with the obvious intention of advertising the country. From commemorative stamps the collector learns of the major events in the history of the nation. In fact, it is not possible to collect stamps without being inquisitive enough to learn something about them and the country which they represent. As collecting progresses the desire for a more intimate knowledge of the stamps themselves arises and it will be necessary to learn of paper varieties, of the three basic methods of printing, and of numerous other things which make one stamp issue differ from another. Thus the hobby takes its devotee out of his narrow line of activity and gives him an incentive for learning of other places and other things.

The Cover Collector

Collectors who go in for covers from out-of-the-way places may obtain one of the famous "Tin Can Island" covers if they will send a dime to Mr. W. G. Quensell, Niuafoo, Tonga Islands, via Suva, Fiji Islands. Mr. Quensell is practically alone on the island except for natives, and will appreciate letters from collectors.

The birth of the American navy will be the subject of a two-color cachet to be applied by Mr. S. Yates, 4504 16th avenue, Brooklyn, N. Y. Send three cents or a three-cent stamp or stamped envelope together with your name and address, or a ready-to-go cover. No forwarding fee required. Use commemoratives on outside wrapper. Closing date October 1.

Francis W. Bloch, director of the Westmont Cover Club, now located at 5439 Baywood st., Pittsburgh, Pa., announces the following presidential cachets: September 15, William H. Taft; September 24, Zachary Taylor; October 4, Rutherford B. Hayes; October 5, Chester A. Arthur; October 19, John Adams, and October 27, Theodore Roosevelt. Send stamped and addressed envelopes, unstuffed and un-

(Continued to page 62A)

HOW JIMMY BECAME THE MOST POPULAR BOY IN TOWN



Big Brother Dan: "You not going to the party, Jimmy?"
Jimmy: "Aw heck—I wasn't invited."



Dan: "When I was your age I was a dandy Harmonica player. They always wanted me at all the parties. Why don't you send for the new Hohner Instruction Book and get started?"



Dan: "Gee, Jimmy, this new Hohner Instruction Book's a lot better than the one I had. You'll be a better player than I was."

JIMMY'S brother Dan, who was in his sophomore year in college, had always been popular. Even as a youngster he was the leader of his crowd, invited to all kinds of parties. So when he came home on his vacation and found Jimmy always being passed up when party invitations were given out, he tried to find out why. Then he told Jimmy what thousands of boys and girls have found out—that a good harmonica player is always in demand for all kinds of parties and outings. And when players form Harmonica Bands, they are simply swamped with invitations to play everywhere, over the radio, at public receptions and big school events.

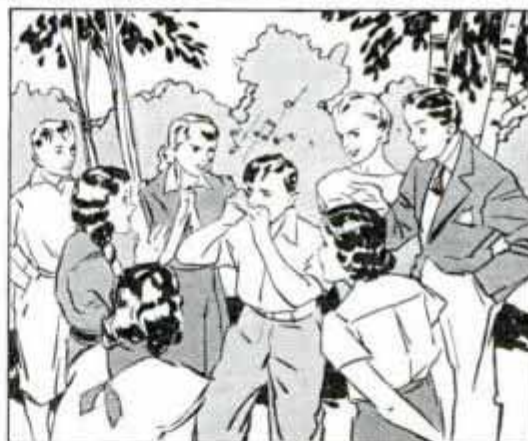
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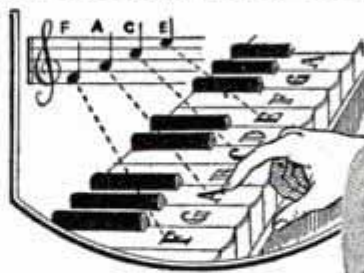
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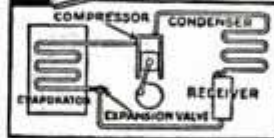
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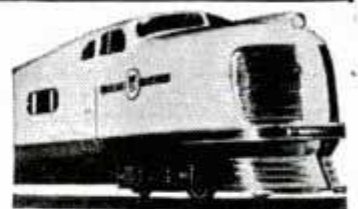
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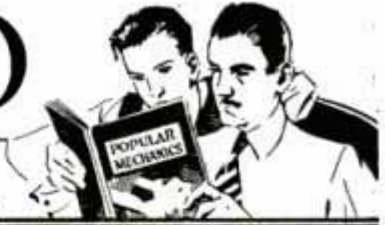
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HOW And where to obtain capital fully explained, particulars free. Star Service, Wanakona, Ohio.

BIG Mail 10c. Milton Boss, 2907M 34th St., Rock Island, Ill.

MAIL Business. Start small. Everything furnished. Free details. Metromails, P-10, Cincinnati.

SELL By mail. Books, novelties. Bargains! Big profits! Particulars free. B. Elfo, 525 S. Dearborn, Chicago.

I WANT To send you proof of the wonderful pulling power of Popular Mechanics Magazine's classified pages. What's your proposition? Write me today. F. W. Johnson, Manager Classified Advertising, 200 E. Ontario St., Chicago, Ill.

GET Lots of mail. Money making offers, etc. Your name in 10,000 directories, 35c. Roscoe, 4627 Glenshade, Cincinnati.

FREE Booklet describes 107 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

COMPLETE Chemical service, analysis, formulas, processes, trade secrets. Particulars free. W. L. Cummings, 228 Gordon Avenue, Syracuse, N. Y.

POPCORN, Crispette, caramelcrisp, potato chip, salted nut machines. Long Eakins, 1960 High St., Springfield, Ohio.

SUCCEED With your products. Formulas, processes, analysis. Catalogue free. B. Thaxly Co., Washington, D. C.

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 the big X-mas business. Write for interesting booklet mailed free. Plastex Industries, Dept. A, 1085 Washington Ave., New York.

MILLIONS Jobless! Get dollars in mail daily for satisfying employment information (got man 76 jobs). Keep money; we fill your orders free. Stamp brings details. Co-Operative Service, 77 Swan, Buffalo.

MECHANICS Hand soap. (Powder form) formula \$1.00. R. Barton, 2403 Brownsville Rd., Pittsburgh, Pa.

HAVE Your own profitable business-profession. Many opportunities everywhere. Write Enterprise Bureau, Syracuse, N. Y.

DOLLARS \$40,000—"Moore Made" It. Plan 10c. "MooreMade," Lapeer, Michigan.

VEGETABLE Concentrates, powders, tablets, vitamins making fortunes. Mail order, local. Samples 12c. Gardena Laboratories, Drawer 1310B, Hollywood, Calif.

50 Ways to make money 25c. Stevens, 1804 Natchez Trace, Nashville, Tennessee.

START A profitable paying business in your home. Write J. R. Thurman, 135-West 17th Street, Anderson, Indiana.

PROFITABLE Business, natural repeater. \$50 plus character required. Wemco, 622 E. 6 St., Jamestown, N. Y.

MONEY. Mail business. Free plan. Stamp Blackco, New Lexington, Ohio.

ABSOLUTELY Free—12 moneymaking formulas given to every new advertiser in "The Leader," 20 words 10c. W. E. Martin, Bassett, Va.

BIG Profits operating "route" penny peanut and gum vending machines. Start with \$100. Robbins Co., 1141P DeKalb Ave., Brooklyn, N. Y.

PROFITABLE Sparetime business at home, dependable income. Particulars for stamp. Colonial, 7867a - 79th Lane, Glendale, N. Y.

NEW Beauty, barber shop products! Sell by mail! Henkle Products, Norwich, Conn.

MRS. M. earned \$267, three weeks, raising mushrooms in cellar! Exceptional, but your cellar, shed perhaps suitable. We buy crops. Book free. United, 3848-A67 Lincoln Ave., Chicago.

OPERATE Chain world's finest money making vending machines. Sells four products—same time. Instant success! Small capital—profits immediately. No curiosity seekers. Penny King, 1233 Chouteau, St. Louis.

MAIL Order and local business. All office. No canvassing; no stock; no shipping. Part of national chain. All instructions given. Shoestring capital. Circular free. Harrigan, P.O. Box 97, Drexel Hill, Pa.

MONEY-MAKING Ideas, plans, formulas, information. Literature free. J. Kornegay, 1621 County St., Portsmouth, Va.

FREE! Complete plan of a real money maker. No obligation. Stamp appreciated. Box 1131-Univ. Sta., Des Moines, Iowa.

WE Teach you new business, then buy your product. Write Superior Specialties, Springfield, Illinois.

CORRESPOND For newspapers: Profitable, interesting, easily learned. Write Publishers' Service Bureau, 4258-F Drexel, Chicago, Ill.

COLD Winter ahead! Earn \$50 weekly income by Thanksgiving. Easily possible with limited capital in practical, sensible, mail order business. Send dime for "Key to Self-Earned Wealth." Midas, 10 West 26th, Minneapolis, Minnesota.

STORY Fortunes! Quick writing method \$1.00. Plot Service, 1138 S. Elgin, Tulsa, Oklahoma.

BARGAINS—Paint spray outfit, gasoline engine drive. Terms—trial. Holmick Paint Spray Exchange, M-1064, Troy, Ohio.

GUARANTEED O.K. mailorder business. Valuable booklet for stamp. Anthony Drungis, Jr., 267 Front St., Brooklyn, New York.

"A FORTUNE In Dimes"—Daring expose dime rackets. Tips, suggestions. 25c. Unusual literature free. Craftsmen, Lebanon, Tennessee.

OPERATE Your own business. No capital required. Good pay. No selling. Literature free. Tri-City Service, Box 151, Davenport, Iowa.

NOT Colossal, not stupendous, just ordinary sensible offers. My circulars convince you. George Walker, SPP School St., Brunswick, Maine.

OPERATE Your own sales business in used household equipment. My plan starts you without investment. Complete working plan \$1.00 postpaid. Geo. R. Mobley, Independence, Kansas.

FOREIGN Distributors for "Pinhole" fountain described in July Popular Mechanics. Locust Lawn Gardens, Crafton, Pittsburgh, Pa.

"SCHEMER Magazine." Alliance, Ohio, prints schemes, ideas, business starters, formulas—big winners; \$10,000 to \$50,000 reported. 38th year; \$1.00. Trial special: six months only 30c.

OPERATE Paying business. Little capital required. No manufacturing, canvassing. S. Morse, 1009 Oak, Elmira, N. Y.

START Little business anywhere. Everything furnished. No canvassing. Maywood, PM-923 Broadway, New York.

\$1.00 MONTHLY, maintains New York branch office. Co-Operative Mail Service, 126B Lexington Avenue.

CASH For spare time! Quarter brings folio surefire moneymaking plans. Jay, 8054-P Kenwood, Chicago.

MAKE Products yourself. Tested formulas—catalogue free. Grinstead Laboratory, Edwardsville, Illinois.

LEARN Marbleizing with our new formula. Flintlike hardness. Imitates marble over wood, concrete, anything. Free samples. See our new rubber composition samples. Stands all required tests. Cowell Institute, Grayling, Michigan.

MEDICINE Business for sale. Make offer. Leonard, Box 1852, Cleveland, Ohio.

FREE. Samples and instructions, painting political signs. Big money proposition. Clark, Ellwood City, Pa.

WANT Increasing income? Own business? Start small. Details, samples 25c. Sanis, 2277-P Third Avenue, New York.

WOULD A few honest dollars interest you? If so, consider this opportunity now. Quarter direct. Schaller, Pekin, Ill.

LIQUID Marble—Anyone can make! Colourful, glazed! Moulded, brushed, sprayed. Rubberlastic moulds. Composition flooring. Big money in these! Particulars free. Marbleizing Service, Edwardsville, Illinois.

PROFIT With new products. Make, sell, repeat. Analysis. Research. Guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, BD-1142 Sunnyside, Chicago.

MAKE Artificial marble, glazed tiles, uncanny. Tabletops, plaques, sanitary floors, yhetstones. Cement secrets. Inexpensive, fireproof. Brightly colored tile and liquid rubber samples 3c. John A. Payn, 945 Grande Vista Avenue, Los Angeles, Calif.

GOOD Looking signs. Easily painted with letter patterns. Write for catalog. John Bahn, C2120 Neva, Chicago.

BUSINESS Of your own with small investment. Details free. Anhel, 1044 Buckingham St., Toledo, Ohio.

WANT To earn \$5000 yearly? Nationally known motor oil business. Write Franklin, 1326 Beldale Street, Pittsburgh, Pa.

BOOKS Covering hundreds of subjects. Big catalog for 3c postage. Popular Mechanics Press, Room (C36), 200 E. Ontario St., Chicago.

MONEYMAKING OPPORTUNITIES

WISE Home worker and spare time money makers will send immediately for free details of new "Silent System" business. No canvassing. Harry Julius, Amarillo, Texas.

96 GUARANTEED Money making secrets—25c. Schumacher, 1502 Monticello, Chicago.

BIG Money exterminating pests. Benton, 183 Chestnut, Liberty, N. Y.

FREE Booklet describes 107 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

BIG Money at home plating auto parts, reflectors, mirrors, chandeliers, by late method. Experience unnecessary. Free particulars. Gunnmetal Co., Ave. N, Decatur, Ill.

WRITE For cash! Publishers offer \$75,000.00. A-C Institute, 4443-A Fullerton, Chicago.

SEE "Millions Jobless!" ad under Business Opportunities. Nothing like it!

\$50 A WEEK With a camera. Booklet describing 100 magazine markets 25c postpaid. Walnut Specialty, Everett, Mass.

LEARN Shoe dyeing, course \$1.25. Frank Lento, 36J12, Punxsutawney, Penna.

MORE dollars for you. Send 25c for 120 moneymaking ideas and other particulars. D-Co., Box 256, E. A. Sta., Akron, Ohio.

FREE Circular tells how to start your own business at home or in office. Randolph Specialty Co., 114-2nd St. S. E., Roanoke, Va.

BETTER Than any job—Make money as your own boss; men or women; "Self Help Bulletin" sent free. Smith-Dawe Co., Atmore, Ala.

1000 MONEYMAKING Ideas, book 50c; literature free. Harvey Teeple, Decatur, Ind.

THE Constitution. Distribute this much discussed document in your community. Particulars, sample 25c. (Returnable). Act today! Table, 528 Garfield Avenue, Chicago.

"HOME Factory." Start in business for yourself. Details. Elyte Supply, Linden, N. J.

BIG Profit, make homemade candles, anybody, anywhere. Recipes and proven selling methods \$1.00. The Candy Jar, Box 107, Corsicana, Texas.

BE A perfumer—at home, retail, or mail order. Hardly any capital. Free instructive booklet gives plans of operation. Call-Blossom Perfume Syndicate, Alhambra, Calif.

WEALTH Quickly and honestly made! Dime brings "Key to Business Opportunities." Valuable gift, also complete proposition. Cutler Publisher, Ephrata, Penna.

A PRACTICAL Idea for work at home. Clenco, Box 17, Verdun, Que., Canada.

MAKE Superior bath salts 5c pound. Sell 35c pound. Formula, only \$25.00. Fancy quart jar \$1.00. No agents wanted. No inquiries. Multichrome Co., Box 3014, Kansas City, Mo.

PROSPERITY For home workers, 52 page magazine. Sample, dime. Sizemore, 4917 N. Kostner, Chicago.

EMPLOY Yourself profitably at home. Free information. Innes, 21 NE. Fifth St., Minneapolis, Minn.

10c BRINGS Copy National Mail Order News, Box 1773-PM9, Roanoke, Virginia.

START Home mailorder business. Write, Dixie Mailers, King, North Carolina.

FORMULAS, PLANS, ETC.

GUARANTEED Formulas—New fast sellers. None better. Lowest prices. Catalog free. Kemico, 49, Park Ridge, Ill.

SOMETHING New! Razorless shaving preparation. Formula 50c (coln). Walter Janke, Three Rivers, Michigan.

FAST Sellers analyzed. Duplication guaranteed. Write. Associated Chemists, Indianapolis, Ind.

500 MONEYMAKING Formulas 20c. Interesting literature free. Ideal Book Shop, Park Ridge, Ill.

SUCCEED With your products. Formulas, processes, analyses. Catalogue free. B. Thaxly Co., Washington, D. C.

FORMULAS—Waterproofing of fabrics, seven formulas, \$1.00. Balco, 1150 Leonard, St. Louis, Mo.

500 MONEYMAKING Formulas 25c. Descriptive literature free. Harvey Teeple, Decatur, Indiana.

FAMOUS Dollar-dozen modern formulas: Autofloss, C'orox, Sol-o, Drano, Sav-an-upper, Sober-up, Mothpad, Plastowood, See-clear No-New Hotpad, No-flats. All \$1.00. Others, Conrad, B-186-A, Altoona, Penna.

FORMULAS—Latest money makers. Literature free. Belfort, 4042 N. Keeler, Chicago.

EXTRAORDINARY—Wealth using formulas. Large catalogue free. Brown's Formulary, 212 East Waters, Tampa, Florida.

TESTED Formulas—Newest, best, lowest prices. Catalogue free. Grinstead Laboratory, Edwardsville, Illinois.

GUARANTEED Formulas—Big list free. A Terrone, 22 Station S, Brooklyn, N. Y.

ICELESS Ice! Colder! Cleaner! Cheaper! Instructions, 25c. Duffy, Covington, Ky.

ANALYSIS. Research. Newest guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, BD-1142 Sunnyside, Chicago.

FREE Formulas. Inclose 3c to cover postage. Kruse Products, Green Bay, Wis.

3,000 FORMULAS, Facts, processes, trade secrets in Dr. Brown's Book of Formulas—380 pages. Price, postpaid \$1.00. Ogilvie Publishing Co., 57 Rose Street, Dept. 25, New York.

MAKE Your own goods. Booklet tells how. Ogg Laboratories, Tampa, Florida.

FREE Gift with 12 moneymaking formulas for 25c. Martex, Princeton, Minnesota.

ANY Formula \$1.50, three \$1.00. Cole Laboratories, Bryant Pond, Maine.

CHEMISTRY

USED Chemical laboratory—complete \$225 worth \$1000. Also minerals. Large library. Information. Adleman, 37-41 Bowne, Flushing, N. Y.

FREE Chemistry catalogs. Supplies at 5c! Equip complete laboratory. Send 10c for postage and handling. Kemkit Scientific Corp., 135P Johnson Street, Brooklyn, New York.

CHEMICALS, Laboratory apparatus and microscopes. Mail 10c for new large catalog. Stansl, 2340 Wabansia Ave., Chicago, U.S.A.

SUPPLIES For chemistry students. Catalogue 5c. Book catalogue free. Handbook for chemical experimenters, hundreds of instructive experiments, 50c. Reading Scientific Company, Reading, Penna.

SEND 25c For new illustrated chemical experiment book with over 300 formulas and tests. Also receive 32 page illustrated catalog of apparatus, microscopes, telescopes and chemicals free. GG. Winn, 124 West 23 St., New York.

RUBBER Latex. Dime brings literature twenty experiments. Price list. Special offer included. Eastern Latex Labs., Box 64, Norfolk Downs, Mass.

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

HELP WANTED

GO Into wholesale business without investment. Call on stores with biggest line self-selling counter displays: Aspirin, razor blades, handkerchiefs, breathlets, household cement, 79 different items. Up to 125% profit for you. Experience unnecessary. Write for catalog and plans. Procopax, Dent, 36-D, 1956 S. Troy, Chicago.

MANUFACTURE Polishpuffs. Amazing proposition 10c. Particulars free. Hickory-dell, Glenbeulah, Wisconsin.

MAN Wanted—Manufacturer established 46 years will finance responsible man with complete stock of guaranteed food, farm and household necessities—you pay when sold. Mighty attractive proposition. Good living right from start with steady increase for industrious man. Big value combination deals, premiums and fast-selling specials now in effect. Jacob Van Dyke of Michigan sold \$441.21; Maurice Vander Haar of Michigan sold \$376.15; and B. M. Anderson of Utah sold \$530.55 in one recent week. Pleasant outdoor work. Experience not necessary. No slack seasons or layoffs. Write today for "No-Investment" offer. McConnon and Company, Room 66KS, Winona, Minn.

ABLE Men to distribute advertising circulars and handle routes. Make up to \$42.50 first week. Brand new Ford sedans given producers as bonus. Details free. Albert Mills, 2906 Monmouth, Cincinnati, Ohio.

MRS. M. earned \$267, three weeks, raising mushrooms in cellar! Exceptional, but your cellar, shed perhaps suitable. We buy crops. Book free. United, 3848-A68 Lincoln Ave., Chicago.

BIG Profits raising canaries. Lucrative, pleasurable hobby. Feathered gold. Free particulars. Crimmins, 3741H, 60th Street, Woodside, New York.

AGENTS WANTED

MAN Wanted, by shoe manufacturer established 33 years, for sales work. Ready cash daily and extra bonuses to producers. No experience needed. Your own shoes at factory prices. Sales outfit sent free. Write Mason Shoe Manufacturing Co., Dept. A6, Chippewa Falls, Wis.

DEALERS—User agents cleaning up. Farm-city radios, power plants, accessories. Largest lowest priced line. Territory. Catalog. Free offer. Marco Company, 244 East 14th St., Kansas City, Mo.

NEW Cleaner—Amazes everybody. Cleans everything. Washes clothes snow-white quickly. Spots, stains removed like magic. Startling demonstrator. Free samples make fast sales. Quick repeater. Immense profit. Write quick for "free sample." Super-X Cleaner Co., 11, Berwyn, Illinois.

150% PROFIT In Motor-Tone. Amazing new, all weather gas lubrication process. 25% more mileage, operating economy! Free merchandise offer! Choice territories open. Box 1144, Fullers Motor-Tone Sales, Kalamazoo, Michigan.

"PROFITS Of \$34.60 single day."—Says B. J. Balmer, Tennessee. Startling discovery gives amazing results in autos, trucks, etc. Fleet owner reports savings 45% on oil—\$768 yearly on gas. Agents, distributors making 185% profit. Product sells itself. Big repeat business. Millions of prospects, exclusive territories going fast. Test product free of risk. Write today. K-W Corporation, 3252 Holmes St., Kansas City, Mo.

SELL Neon signs and window displays. Big demand. Large profits. Write McGinnis Signs, Rice Lake, Wis.

EXCELLENT Trouserpresser, stretcher, creaser, hanger \$1.00, \$7.00 doz. Perfect pants hanger stretcher 10c, 60c doz. Get circulars. Witness, 208 Van Buren St., Brooklyn, N. Y.

SEALS Punctures while driving: Instantly and permanently. Sells on its merits moment it's demonstrated. Sample 50c. Auto-Tire Puncture Sealer Laboratory, 4515 South Parkway, Chicago.

MAKE More money selling shirts, ties, underwear, dresses, hosiery, raincoats, jackets, pants, uniforms. Sales outfit free. Nimrod Company, Department 8, 4922-28 Lincoln Avenue, Chicago.

500% PROFIT Selling new "20-in-1" kitchen utensil. Retail 25c. Costs you \$1.00 a dozen. \$7.20 a gross. Sample 10c. New Method Co., PMM-46, Bradford, Pa.

CHRISTMAS Cards—50 beautiful folders, name imprinted, cost 65c, sell for \$1.00. Samples free. New England Art, North Abington, 206, Mass.

SELL North American oil burners. No experience needed. Write for free particulars. Wrenn Burner Service, Nashua, New Hampshire.

SPEEDY Glass brushes, sell on sight to bars, hotels, restaurants, fountains everywhere. Big profits. Fairchild Laboratories, 1136 Broadway, Brooklyn, New York.

WANTED—Men for good paying work with a large shoe company. Good pay every day. Free shoes as bonuses to "go-getters." No experience needed. Complete sales outfit sent free. Write Consolidated Shoe System, Dept. F1, Chippewa Falls, Wis.

UP To \$32 in a week. Sell great line of hosiery backed by definite replacement guarantee, covering holes, snags, runs. Write for samples quick. Wilknit Hosiery, Desk 37-K, Greenfield, Ohio.

SELL Changeable signs. Profitable. Write Koehler, 334 Goetz, St. Louis, Missouri.

300% PROFIT In new self-starting no-flint cigar lighter. Retail 50c. Sample 25c. Get details quick on wonder seller. New Method Co., Box PM-46, Bradford, Pa.

STRANGE Ironing cord. Saves electricity. Abolishes scorching and kinking. For telephones also. 150% profit. Sales guaranteed. Big free offer. Neverknot, Dept. 10A, 4525 Ravenswood, Chicago.

CHRISTMAS Cards! Absolutely finest assortment. Big profits. Write for samples. Robinson Cards, 201 Orange, Clinton, Mass.

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

AGENTS: Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50, make \$1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 40, East Orange, N. J.

NEW Cleaner! Washes clothes quickly. Cleans everything. Premium deals. Free sample. Bestco, 5007 Irving Park, Chicago.

GENUINE Gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

AGENTS—Opportunity to make money; book containing 107 successful business plans; home or office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

AGENTS Mosco corn and callous remover will build you a steady repeat business. Send today for pocket-size trial outfits. The Moss Company, 64 Searle Bldg., Rochester, N. Y.

MAKE And sell your own products. Employ agents yourself. We supply formulas and full instructions for making toilet preparations, perfume, flavoring extracts, soap, household specialties. Valuable booklet free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers, by late method; experience unnecessary. Simple plan of manufacturing at home starts you in big money making business. Free particulars and proofs. Gunmetal Co., Ave. H, Decatur, Ill.

COSTS 1c—Sells 25c. Make non-explosive cleaner from benzene crystals. 1c gallon. Sample 10c. Literature free. Western Reserve Laboratories, 6615 Denison Ave., Cleveland, Ohio.

AGENTS: Smash go prices! Santos coffee 12c lb. 100 sticks chewing gum 12c. Christmas cards, 21 in box, 14c. 150 other bargains. Premiums. Carnation Co., PO, St. Louis, Mo.

SUCCEED With your products. Formulas, processes, analyses. Catalogue free. B. Thaxly Co., Washington, D. C.

SEND For free wholesale list. Royal, Box 1134, Roanoke, Virginia.

BE Your own boss! Operate quality used-new clothing business from store home or auto. 200%-300% profit. Everything furnished. Portnoy, 566-G Roosevelt, Chicago.

NO Boss! Sure cash! Silvering mirrors, autoparts, reflectors, combination outfit. Write Sprinkle, Plater, 128, Marion, Ind.

WANTED—District purchasing agents. No experience or money required. Write Purchasing Manager, 174 N. Halsted, Chicago.

AGENTS! Dresses 33c, men's suits \$1.50-\$2.00, shirts 46c, ties 6½c, chiffon hose 42c. Amazing prices. Big profits. Catalogue free. Liquidation, AB-550 East 43rd, Chicago.

DO You want agents for your proposition? Your ad in this space will place your message before hundreds of men seeking fast-selling products. My folder "How to Secure Agents" is filled with proof. I'll gladly send you a copy free. F. W. Johnson, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

MAKE Big money selling typewriter ribbons, etc., direct from manufacturer to consumer. Write: Quality Ink, 720 So. Dearborn, Chicago.

AMAZING New invention. Holds shirt down—trousers up. Men buy wildly. Agents cleaning up big money. Absolutely no competition. Territory going fast. Similar product for women now ready for the market. Send \$1 for two sample sets. Shir-Tro-Grip Co., 321 W. 3rd St., Los Angeles, Calif.

100 PROFITABLE Mail order and local business plans. A. Pruitt, Elburn, Ill.

MAKE 212% Profit! Metallix—amazing new "metallic liquid" instantly, permanently repairs metal, wood, glass, leather, etc., without heat, acid or tools. Holds forever! Free sample. Write, Metallix, Dept. G-313, Cincinnati.

CLEAN UP \$5 daily during fall house-cleaning with "Glasshiner," magic window cleaning compound. Seneca Specialties, 24 Main, Geneva, New York.

GENUINE "Motorite" reconductions as it lubricates. Saves gas, oil, repairs. Approved. Guaranteed. Tremendous sales. Big profits! Hurry! Motorite, Torrington, Conn.

AGENTS! Make \$5 daily selling quality household necessities. Over 250 guaranteed positive repeat sellers. Atlas Products, 2129 S. Broadway, St. Louis, Mo.

\$2.00 HOURLY With new, scientific cream that mends all cloth easily, quickly, invisibly, without needle and thread. Stands laundering. Free sample. Sewnmore, G-744, Cincinnati, O.

SALESBOARD Men—New put and take jars. Details, samples free. Tom Thumb, Dept. PM, Nauvoo, Ill.

DISTRIBUTORS—Exclusive territory; non-competitive; low price sensation; a lifetime opportunity. Write Grezner, 5039-A St. Louis, St. Louis, Mo.

EASIEST 25c Seller. Has thousand uses. Simple demonstration gets the money. Sample 25c. Dozen \$1.50. Don't pass this up. Parmer, 645 West 66th St., Chicago.

GUARANTEED Double-edged blades 50c hundred up. If there's anything else you want, write us; we have it. Samples sent. Steven Snencer, 412 E. 51, Brooklyn, N. Y.

MAKE Money selling Diamonds, Watches and Jewelry on credit. Write for particulars. Loftis Jewelry Company, 34 No. State Street, Chicago, Illinois.

DISTRIBUTORS—Sell household dusters, protected territory. W. Miller, 1596 Parkview, Detroit, Mich.

TRANSPARENT Day and night signs. 8"x14"; 4c, retails 25c; over 1000 designs; sample free! Lowy, Department 648, 8 West Broadway, New York.

MEXICAN Feather pictures. Christmas novelty, 25c (stamps) bring \$1.00 worth sample, details. Mexican Art, Apartado 1593, Mexico City.

PROFITABLE Home business. Legitimate. No canvassing. Maywood Publishers, P-923 Broadway, New York.

BIG Profits eyeglass necessity. Cleans, polishes, prevents steaming. Sample ten cents. Shurberg Chemical, Hartford, Conn.

FREE Sample new photo novelties, 300% profit. Novel-Ad Company, 3327 North Ave., Chicago.

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

ARTISTIC Window sign letters. Lowest prices. Enormous profits. Stalbrite Co., 44 West 30th, New York. Established 1903.

\$1.00 MONTHLY Maintains New York branch office. Co-Operative Mail Service, 126G Lexington Avenue.

NEW Name plate slide in metal letters, (patented), deliver at time of sale. 100% profit. Naymon Plate Company, Lowell, Mass.

MOR-HEAT Water and steam boiler solution. Saves fuel. Quick sales. Repeat orders. Retails \$2.50. Sample \$1.25. Mor-Heat Chemical Co., 3733 Lisbon Ave., Milwaukee, Wis.

FREE—Genuine Duro, 26 piece silver sets. Amazing sensational plan gives away these fine sets and you make big money. Get details quickly. Lipault Corp., 1028 Arch St., Philadelphia, Pa.

ELECTRIC Or gasoline portable lamp kills insects automatically, indoor or outside. \$1.75 up. Literature free. Sauer Bros., East Oakland, California.

AGENTS Wanted to sell Lik-Nu paint cleaner to home owners. Good profits. Lik-Nu Co., 6730 S. Halsted, Chicago.

GOLD Reflecting letters for store windows. Large sizes penny each. Free samples. Modernistic Sign, B-3004 Lincoln Ave., Chicago.

PROFIT With new products. Make, sell, repeat. Analysis. Research. Guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, BD-1142 Sunnyside, Chicago.

ENGRAVED Name plates, numbers, signs, etc., easily sold, profits large. Brett Bros., Winthrop, Mass.

SELL Leather neckties. Look finer than silk. Big profits. Cleaned with damp cloth. All styles. Colorful designs. Always look new. Guaranteed profit plan. Send fifty cents for sample tie and complete sales outfit. Nu-Mode Ties, 1337 North Twelfth, Milwaukee, Wis.

SHOW Housewife—She buys. New spring device keeps electric iron cord from touching board. Big profits. Dept. 441, 1800 Winona, Chicago.

\$9.00 PROFIT Each sale, piano sell taught. Send \$1.00 sample copy, details. Stanley's, 616 Webster, San Francisco.

WANT A paying business of your own? I'll show you how. Write for full details and sales plan to Trout Products, Hickory, Ky.

BIG Money. Commissions daily. Free clothing. Sell quality raincoats, jackets, overcoats. New styles. Lowest prices. Sales kit free. Goodyear, 712-A Roosevelt, Chicago.

GOLD Reflecting letters for store windows. Easily applied. Large sizes, penny each, free samples! Atlas Sign Works, 7941 Halsted, Chicago.

NEW Beauty, barber shop products! Sell by mail! Henkle Manufacturing, Norwich, Conn.

MAGAZINES. Sell new and renewal subscriptions. All publications. Full or spare time. Highest commissions. Pay daily. Outfit free. Mission Circulation Company, Box 802, Santa Barbara, California.

DISTRIBUTORS To sell razor blades direct to users and stores. Exclusive territory granted real producers. Sample sales kit including blades 25c. LaSalle Blade Co., 1915 Vermont Ave., Toledo, Ohio.

WONDERFUL Opportunity to make up to \$240 a month, \$45 first week. Be a grocery route dealer. I send everything complete on trial; no money risk. Details free. Albert Mills, 2910 Monmouth, Cincinnati, Ohio.

BIG Commissions selling personal Christmas cards and stationery. New 21 folder \$1 assortment. 100% profit. Bonuses. Free samples. Wallace Brown, Inc., 225 Fifth Ave., Dept. 310, New York.

AMAZING Light discovery. Amplifiers reduce electric bills 25% to 50%. Needed by every store, factory, office. Huge profits for distributors—salesmen. Wonderful demonstrator. Nothing like it. Write today for convincing proof and no risk initial start offer. Apex Lamp Works, PM150 West 25th, New York.

SELL Neon tubes, 65c foot. Complete signs. Complete Neon plants \$395.00. Marcella's, 742 Strong, Schenectady, N. Y.

INITIALING Automobiles biggest money maker today. New type requiring no varnish to apply. Write for samples. International Monogram & Transfer Co., Box 6365, Philadelphia, Pa.

JUST Out—Drews steam pad, simple device for steaming the beard before shaving. Agents coining money. Hurry. Drew & Co., Dent. M. Puente, Calif.

SELL Novelty fun cards, novelties, etc. Samples 10c. National, Box 500M, Cincinnati.

WHOLESALE Catalog free. 500 best sellers. Paty Co., 1167 Broadway, Somerville, Massachusetts.

MEN—Women \$3 to \$6 daily. Selling 25c household necessity that repeats. Three to ten sold in every home. Free sample. Write Puro Company, 3107 Pine St., Dept. P-2046, St. Louis, Mo.

INSURANCE Claim adjuster, easily learned. Low cost. Write Modern, 1001 Nelson Avenue, New York City.

100% STEADY Profits selling cleansers, polishes, cosmetics. Sure repeats. Borlab, 426 Broome St., New York.

HIGH-GRADE SALESMEN

BRUSH Salesman—If you ever sold brushes write for our money making proposition. Donald Brush Co., Camden, New Jersey.

ATTRACTIVE Opportunity for experienced boiler compound or soot destroyer salesman with reliable company. Best commissions paid. Box 328, Saginaw, Michigan.

FAST Seller. 100% profit. No competition. 15c pkg. plus water, sugar, makes 5 glasses jelly, 5 minutes. Establish own business. Minute Foods, 257H Werdin, Los Angeles.

BRAND New grab-bag deal. Going big everywhere—big profits—swift sales—fast repeats. No restrictions. All dealers buy. Act! K&S, 4347-B Ravenswood, Chicago.

SELL Candidates! No competition. Finest most complete line of auto signs, stickers, and novelties. Union label. Free samples. Ad-Nov-Co, Newton, Iowa.

WANTED—County dealer: Man with car to demonstrate and service for large manufacturer. First class job. 247 Fyr-Fyter Company, Dayton, Ohio.

SELL Mimeograph advertising service to merchants in sparetime. Liberal commissions. Write Box 43, Siren, Wisconsin.

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NEW Specialty—Sells every business and professional man. Four \$15 sales daily pay \$280 weekly. Ferrell cleared over \$1,000.00 monthly. Write, F. E. Armstrong, President, Dept. PM, Mobile, Ala.

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SALESMEN—Auto accessory, brand new. Sell direct to car owner, also wholesale to automobile dealers, gas stations, garages. Big profits. Exclusive territory. Details free. Ace Sales Co., 3333 Madison, Chicago.

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5000 6x9 CIRCULARS. Postcards, letterheads, envelopes \$7.49. 1000 3½x6 folders \$4.49. 1000 envelope slips \$1.00; 5000, \$3.00. Samples. Goodprint, Harrisonburg, Va.

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SPECIAL—250 Size 6½ envelopes \$1.00 delivered. Morey, 87 Somerset St., Springfield, Mass.

1000 6½ ENVELOPES Printed \$2.50. Zone 4. Fry Printing Co., Rothville, Pa.

PRINT Your own. Bargains, presses, type. List 3c. Exchange D-14, 22 Orient, Meriden, Conn.

PRINTED Envelopes 24 lb., 6½, \$1.10 M. Any quantity. 10's, \$1.75. See samples. Maloney Sales, 724 Parsells, Rochester, N. Y.

500 ROND Letterheads, envelopes \$1.75. Print anything reasonable. Bradshaw, 3214-P Huron, Chicago.

1000 BUSINESS Cards, card case, \$1.50. Miller, Printer, Ambler, Pa.

\$1.85—1,000; ENVELOPES, Letterheads, statements, circulars. Midwest, Box 205, Northfield, Minnesota.

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ARTISTIC Two color gummed labels, 3/4x2 1/2, glossy red border, three line address blue. 250—25c; 1250—\$1.00. Ad-Man Press, 301-N. New Jersey, Indianapolis, Ind.

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PRINTING That satisfies. Complete samples. Jobey Press, 3932 Madison, Chicago.

GUMMED Labels: 1,000 printed 1x1 1/2, 20 words or less, 50c. JBS Company, Box 93, Holyoke, Mass.

LABEL Value headquarters. Specimens free. Labelers, 6618D Quimby, Cleveland, Ohio.

BETTER Business cards, 500 postpaid \$1.00. Artisan Press, Riverdale, Maryland.

SUPERB Printing at lower prices. Send copy for estimate. Buck, 2495 Telegraph, Berkeley, Calif.

ARE You seeking prestige? Then write, Hall's Printing, Dalton, Massachusetts.

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PRINTING Presses and printers needs. Lists 3c. Landts, Richland, Pa.

PRINTING Outfits—Presses, type, supplies, type novelties. Send 20c for card case samples. Catalog free. Model Press, York, Pa.

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TATTOOING Outfits, supplies. Illustrated list. "Waters," 965 Putnam, Detroit.

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GUARANTEED Factory rebuilt transits and levels for rent (with purchase option) or sale (cash or terms). Order now before prices advance. We will repair, trade in, or buy your old instruments. Ship prepaid for estimate and valuation. Write for List M-20 and complete information to Warren-Knight Co., 136 N. 12th St., Philadelphia, Pa.

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MISCELLANEOUS

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 W. T. Anderson,
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"REDUCED MY WAIST 8 INCHES"



Why Don't YOU Test the Weil Belt at Our Expense?
 You will appear many inches slimmer at once and in ten short days if your waist line is not actually 3 inches smaller. . . . it will cost you nothing!

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Name.....Age.....

Address.....

City.....State.....

Present Position.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

STAMPS and COLLECTING

(Continued from page 36A)



Left, recent Mother's Day stamp issued by Austria. Center, current French semipostal issue. Right, Bermuda pictorial with frame of sky blue and scene in black

sealed, and include one cent forwarding fee for each cover. Commemoratives on outer wrappers will be appreciated.

—o—

Official cachets of the Texas Centennial commission for September and October are as follows: September 7, San Angelo, pioneer celebration; September 14, Longview, Gregg County Centennial fair; October 3, West Columbia, commemorating the first congress of the republic of Texas; October 5, New Braunfels, Centennial celebration; October 14, Beaumont, South Texas State fair; October 16, Nacogdoches, historical pageant; October 21, Refugio, commemorating revolution battlefield; October 29, Waco, Brazos Valley Free fair. Collectors should prepare their covers, "ready to go," and send them under separate wrapper to the postmaster in the city named, with note requesting the cachet.

—o—

Sergio Perez Grau, editor of the Philatelic department of "Puerto Rico Illustrated" will sponsor a handsome printed cachet on October 7. Send only name and address and four cents in coin to Sr. Grau, c/o Puerto Rico Illustrated, Fortuna, P. R.

Recent Issues and Discoveries

Bermuda's recent issue of pictorial stamps was one of the last colonial sets showing the portrait of the late king upon

some values. The second, illustrated, pictures a racing yacht in full sail, in a strong breeze. In this example, a sea horse, the emblem of Bermuda, is shown in each of the upper corners. The frame of this stamp is sky blue, and the scene is in black.

—o—

The latest French semipostal issue is inscribed "For the children of the unemployed." This stamp was placed on sale as soon as the leftist party came into control of the government, and the current aid stamp, which was inscribed, "Aid for the intellectuals," was suppressed.

—o—

"One of the beautiful stamps of the year" is the description most frequently heard in connection with the mother's day stamp issued by Austria. The design is taken from a painting by Durer.

Stamp and Coin Notes

The original announcement of the two series of stamps to commemorate heroes of the army and the navy contemplated the release of the one-cent stamps about August 1. Recent reports state the first values cannot be issued until later. Rumors are current of stamps to honor Frederick Douglass and Mother Seton, both to go on sale before November 3. Should these be issued, the army and navy sets may be postponed.

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 Send me **MATHEMATICS FOR SELF-STUDY** in 5 volumes. Within 10 days I will either return the books or send you \$2.95 as first payment and \$2.00 per month for 3 months—total \$8.95 (5% discount for cash).

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No previous knowledge of mathematics is needed. No study is required. The specific information you want is easy to find, by looking it up in the index. The book takes up every trade and gives you practical methods, easily-worked formulas for solving every problem. Thousands of specific examples show you just how to make your calculations. If your work involves mathematics in any way this complete reference handbook is an indispensable part of your equipment. It is an amazing time saver for any one concerned with engineering, architecture, electricity, mechanics, construction, automobiles, machinery, printing, or any other industrial work; or with accounting, auditing, manufacturing, costs, taxes, or any other

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| Trigonometry | Carpentry and Building | Glazing | Print Shop |
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OL' JUDGE ROBBINS



TOBACCO BAIT

LET'S SEPARATE THIS MORNING - FISH IN DIFFERENT PARTS OF THE LAKE AND MEET HERE IN TIME TO COOK LUNCH

AND THE ONES WHO COME BACK WITHOUT FISH WILL HAVE TO DO THE COOKING!



NEARLY LUNCH TIME AND NO FISH. I'VE HAD MIGHTY POOR LUCK THIS WHOLE WEEK-END



NICE MESS O' BASS YOU'VE GOT THERE, STRANGER - I HAVEN'T EVEN HAD A STRIKE YET

WELL, YOU CAN'T HAVE EVERYTHING. I HAVEN'T A CRUMB OF TOBACCO WITH ME



I'LL SWAP MY EXTRA TIN OF PRINCE ALBERT FOR A COUPLE OF THOSE BEAUTIES

PRINCE ALBERT - MAN, OH, MAN - THAT'S WORTH THE WHOLE STRING O' FISH



I ALWAYS KNEW YOU WERE A GOOD FISHERMAN, DADDY, BUT -

I'M AFRAID YOU WEREN'T USING THE RIGHT BAIT

NONE OF THE REST OF US CAUGHT ANYTHING!



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YOU CAN'T GO WRONG WITH PRINCE ALBERT!



When a man gets around to smoking Prince Albert, he discovers the kind of tobacco joy that otherwise he might spend a lifetime looking for. There's good reason why Prince Albert is the world's largest-selling smoking tobacco. The pick of sunny tobaccos gives it deep-down satisfying tastiness. The special "crimp cut" insures cool smoking. And the "no-bite" process takes out all nip. Prince Albert is tops for roll-your-own cigarettes too.



THE BIG
2
OUNCE
RED TIN

CRIMP CUT
LONG BURNING PIPE AND
CIGARETTE TOBACCO

TRY PRINCE ALBERT AT OUR RISK

Smoke 20 fragrant pipefuls of Prince Albert. If you don't find it the mellowest, tastiest pipe tobacco you ever smoked, return the pocket tin with the rest of the tobacco in it to us at any time within a month from this date, and we will refund full purchase price, plus postage. (Signed)
R. J. Reynolds Tobacco Co., Winston-Salem, N. C.

PRINCE ALBERT THE NATIONAL JOY SMOKE!

50 pipefuls of fragrant tobacco in every 2-oz. tin of Prince Albert

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE AND CANADA

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 66

OCTOBER, 1936

No. 4

BEWARE *the* Spark Plug Racket

F1006

material from Champion Spark Plug Co. Toledo, O.



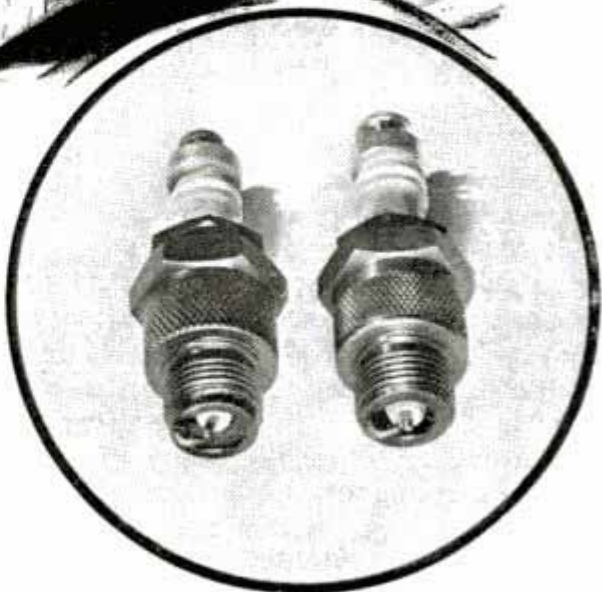
THE traffic light turned green and every car spurted ahead of the salesman in the tan coupe. The same thing had been happening for days, so the salesman, a stranger in town, pulled in to the first garage he saw.

"She's lost her youthful pep," he complained. "Sluggish at lights and everything passes me on the road."

"What you need," advised the garage man after an inspection, "is a set of new plugs."

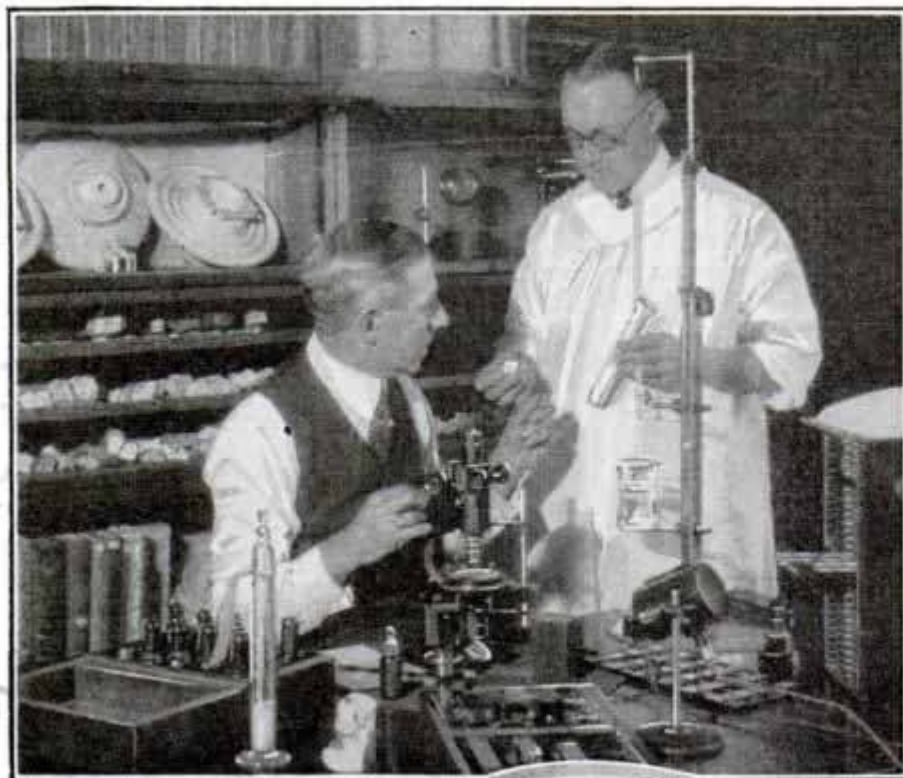
"O.K. Put 'em in while I make a call," ordered the salesman, glancing at a shelf filled with cartons bearing the name of a well known spark plug company.

The next week, back in his home town, the salesman's tan coupe was spitting and sputtering worse than ever. The exasperated



They look much alike, but plug at left is rebuilt and one on right is new

Raymond K. Robinson



off on the public at new plug prices by unscrupulous dealers.

Unless you happen to be one of those "cranky" owners who hangs around the garage while your car is being repaired and critically inspects every part that goes into it, you also are likely some day to be taken in by a spark plug racketeer. And even if you have sharp eyes, you still may be fooled unless you know what to look for and where to look for it.

The spark plug racket is an outgrowth of the depression and the demand for low-priced merchandise. The racketeer's "factory" is

some secluded garage or loft where there will not be too many prying eyes or too many questions asked. Reputable but unsuspecting garages and repair shops

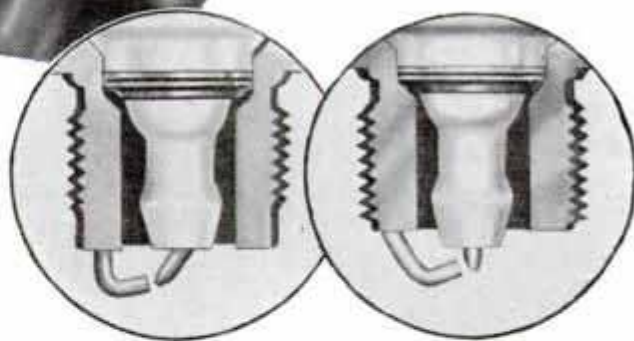
driver took it to his own service station.

"What you need," said the service man after an inspection, "is a set of new plugs."

"You're crazy," chortled the salesman. "Those plugs are new. Just put 'em in last week."

"These plugs are not new," retorted his service man. "They're old ones that have been rebuilt. Your car would have performed better if you hadn't changed at all."

The salesman was just one more innocent victim of the spark-plug racket. He paid for new plugs and assumed he was sold new plugs made by the manufacturer whose name appeared on the cartons on the shelf. But the plugs in his car came from a barrel under the counter. Perhaps if he had bothered to inspect them after they were installed, he might even have seen the name of the manufacturer on them. But they were not new plugs turned out by this factory. They were discarded and worn-out plugs which had been reconditioned so they would pass casual inspection and could thus be foisted



Top, examining cores with microscope in spark plug factory. Center, cores ready for firing. Bottom, note bent center electrode of rebuilt plug at left

are his source of supply and he pays men and boys two or three cents a plug to visit these places and collect worn-out and discarded plugs which the shops assume are to be sold as junk.

Instead he takes plugs apart, cleans the cores, sandblasts the bases, files off the

(Continued to page 144A)

Musical World Tries Out Odd Instruments



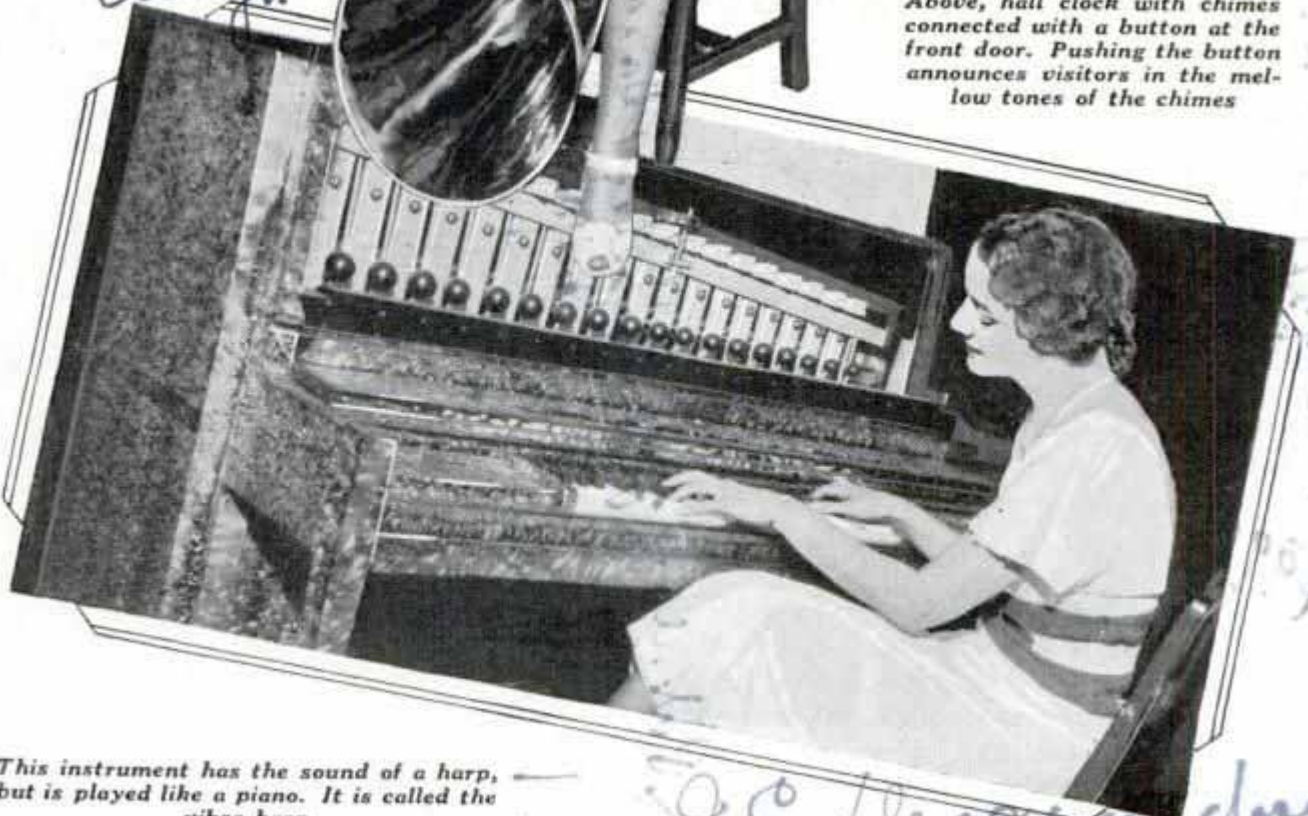
Aene.

Music comes in unusual packages, new instruments or combinations of old. Top, left, piano with reed back is designed for use in center of room. Center, playing the cello-horn, a combined string and brass instrument, before a recent convention

Chang.



Above, hall clock with chimes connected with a button at the front door. Pushing the button announces visitors in the mellow tones of the chimes



This instrument has the sound of a harp, but is played like a piano. It is called the vibra-harp

J. C. Deagon, Inc. W. B. Bertan

not in production

12/8/36

Flexible Glass Stage Settings Add Beauty to Movies



Bending a flexible glass palm leaf, part of a movie stage setting made of this glass

Glass almost as flexible as rubber is offering new stage effects in motion pictures and recently palm trees made of the glass were used as a setting for one scene of a Hollywood production. This particular kind of flexible glass was developed by Vienna scientists. It has a tensile strength of from 2,500 to 3,600 pounds and a force of 147,000 pounds is required to break it by bending. It also has been found that the glass can be permanently twisted by steaming. It possesses all the properties of ordinary glass, it is claimed, with the added advantage of flexibility. It is being tested as a material for automobile windows and windshields.

Antiblinding Photo Flash Prevents Eye Shock

Patents have been issued for an anti-blinding, nondazzling photo-flash lamp which eliminates eye shock incidental to the taking of pictures. The bulb of the lamp is coated with a lacquer colored with a blue dye which permits little glaring

yellow light to come through when the lamp flashes. Although this coating reduces the amount of light given off by the lamp, it is said that sufficient blue, violet and ultraviolet light rays pass through to produce a good negative. The inventor claims that a person may be photographed, with the new flash lamp, without knowing his picture has been taken.

F954

Bread Made with Wood Sugar Stays Fresh Longer

Bread which it is claimed remains fresh much longer than the ordinary yeast-leavened kind has been patented recently. The addition to the dough of a small amount of wood sugar, known as xylose and obtained from straw and other vegetable materials, wards off staleness, it is asserted. In other respects the dough mixture is the same as that used in making ordinary yeast-leavened bread.

F975

Auto Converted into Train Serves Mountain Line

Rapid and economical service over the Colorado Rocky mountains is provided by an auto-train. Made from a 1922 Pierce-Arrow automobile powered by a six-cylinder engine, the train runs six miles on one gallon of gas. Its maximum speed on the level is thirty miles per hour. The conversion was simple. Front and rear



Here is the auto-train ready for its 162-mile run through the Colorado Rockies

wheels of the automobile were removed and the chassis was set on a girder attached to the baggage car. The drive shaft was geared to the front group of four wheels. Power from the revolving axle is transmitted to the middle group of wheels by a sprocket chain. All three sets of wheels have brakes. The complete auto-

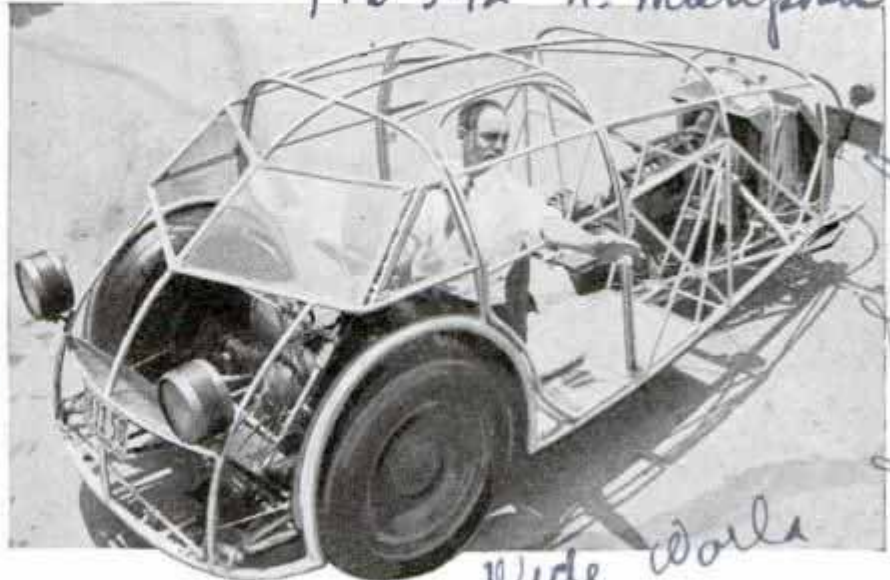
Cont. A. B. Herouman, 32-52 = 33rd St

Vertical handwritten notes on the left margin: "Los Angeles", "Hollywood", "Charles Carroll", "3/6 Architects", "Pat. 11 & 1040, 279", "Wire World", "Agent", "Kurlander", "J. H.", "July 27 1936".

train, which carries mail, light baggage and eight passengers, weighs 15,000 pounds. The train has a cowcatcher, a horn and a fuel capacity of twenty-seven gallons. Regular schedules are maintained between Durango and Ridgway in southwestern Colorado. The auto-train was devised when operation of a steam train on the 162-mile line became too expensive.

Latest "Tear Drop" Auto
Has Only Three Wheels

116 3 1/2 h. mariposa



Framework of tear-drop car as the three-wheeler neared completion. Note engine located at rear, near the single wheel

Wide wheels

Adjustable Top
of Art Table
Locks Itself

Easily adjusted to the desired angle with one hand, the top of a new art table remains in that position until unlocked by raising it to its full height. This movement automatically releases the elevating rod which holds the top in position and allows the top to lower to hori-



Self-locking adjustable table top is a convenience for the artist or the draftsman

zontal position. All working parts are sealed and there are no thumbscrews, bolts or ratchet devices. The top may be adjusted to any angle.

Constructed of welded aluminum, a three-wheel streamline automobile has been built by a Los Angeles mechanic. It has four seats on rollers which will shift forward or backward. The design calls for location of the radiator under the floor at the front and for reversal of the fan to draw in air for cooling the six-cylinder engine. A back tire may be changed by jacking up the car, unbolting the wheel and permitting it to drop down. The car has a front wheel drive.

Scouring Brush Is Refillable
with Steel Wool

Designed to be refilled, the latest scouring brush feeds steel wool as it wears. Additional steel wool is pushed forward by means of an adjustable plate.



The refills are packed in light cardboard tubes for easy installation in the empty handle. The brush is handy in the kitchen, the garage and on the farm.

Archaeologists in Austria recently dug up bronze razors more than 3,000 years old.

Keweenaw Mfg. Co.

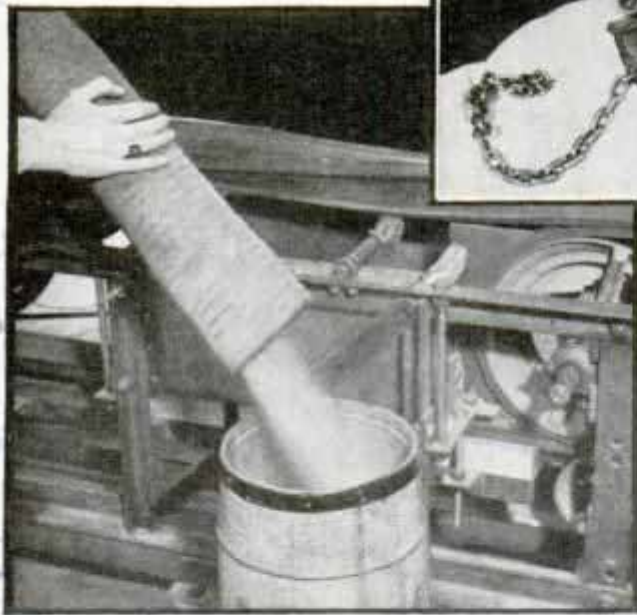
1614 Washington St.

James H. Chodas, 153 W. 1st St., Los Angeles, Calif.

Address Keweenaw Mfg. Co.
1614 MONROE STREET
EVANSTON, ILLINOIS

Copper and Brass
Research Assn. N.Y.C.

Rubber Pipe Line Is Endless "Bucket Chain"



Above, rubber pipe line in industrial plant. At left, how its two halves open, discharge their load, and seal themselves together again. Chain embedded in each side of pipe reinforces it

ing sharp corners, climbing vertically and traveling beneath floors or streets. Its use in the mine would eliminate dust. Foods and chemicals which must not be polluted or subjected to atmosphere can be carried in it. The two halves are joined by a tongue-and-groove lock so tight that liquids can be conveyed for thousands of feet without losing a drop. It can be shortened or lengthened by vulcanizing ends. The sectional compartments in the rubber line distribute the load evenly, so that heavy materials do not pile up excessive pressures when traveling vertically. Rubber carries the load without stretching, for the tension is borne by two steel chains embedded in the pipe, strengthening it without affecting flexibility. A four-inch line moving 500 feet per minute could carry 120 tons of material in an hour. In the industrial plant, the mine, the freight ter-

Endless conveyors of flexible rubber, moving pipe lines sectioned off into containers like a chain of buckets, carrying liquids or solids at high speed without loss en route, have just been placed on the market. The rubber pipe line—built in two longitudinal halves which seal themselves together, but can be pulled apart at any point to receive or discharge a load—automatically picks up its cargo, locks together in airtight, watertight tubing and “flows” to its destination like a belt, turn-

The Johns. ... 605 ... Newark, N.J.

W. 103rd St. Newark

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... 103rd St. Newark

minal, the rubber pipe conveyor can carry—wet or dry—such materials as plaster, soap, grain, sludge, wood pulp, sulphur, talc, coal, ashes, salt, chemicals, and various foods. Three products which are not readily conveyed in it are large sizes of rough-metal ores, coal and stone. It can be used to load ships or freight cars, and has certain advantages in ridding mines of water for it lifts water in its separate containers instead of pumping it out under pressure. Because rubber resists wear and the attacks of acids and weather, the flexible pipe line endures long exposure to hard work.

7994
**Photographs of Burned Bonds
 Expose Forged Signatures**

When the Brooklyn, N. Y., police attempted to bait a trap for three alleged bond forgers, they met with apparent failure when they found that the bonds and the signatures on them had been burned to ashes. However, the crime laboratory of the police department came to the rescue with microscopes and chemicals, then made 300 photographs of the charred scraps of paper. Finally a picture was obtained which, while not a photograph of a complete bond, was deemed important as evidence because the police claimed it showed the signatures which they allege were forged.



Photograph of partly burned bond made by Brooklyn police in forgery investigation

7944
**Bricks Hung on Metal Hooks
 Cut Modernizing Cost**



Thin bricks are properly aligned and supported by prongs on mesh nailed to old wall of house

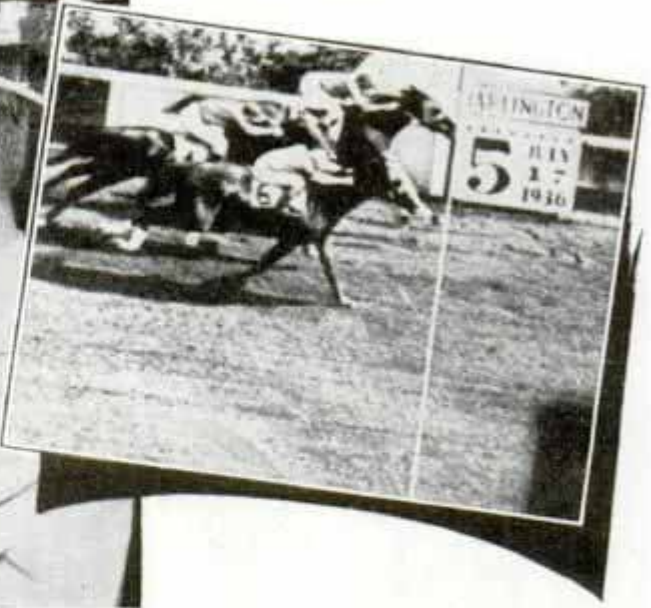
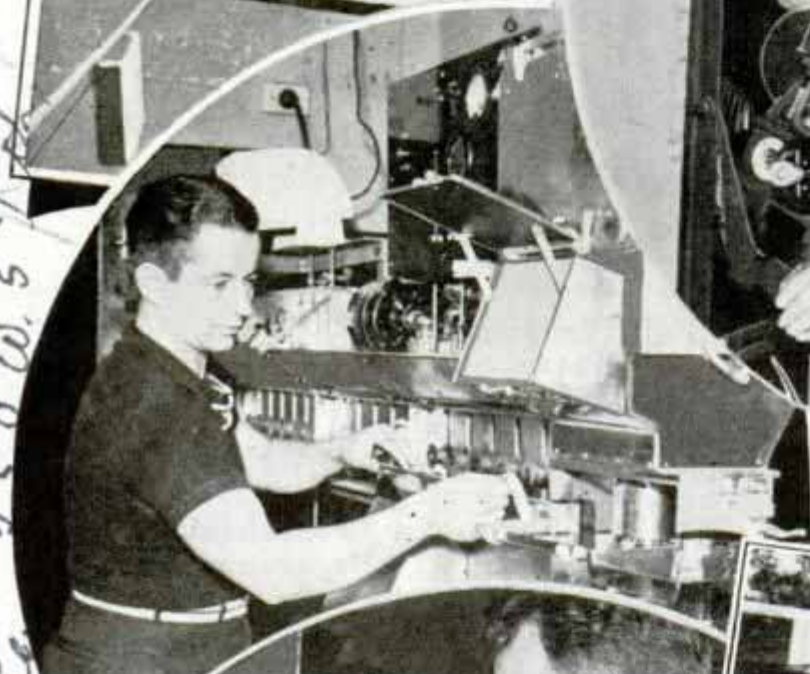
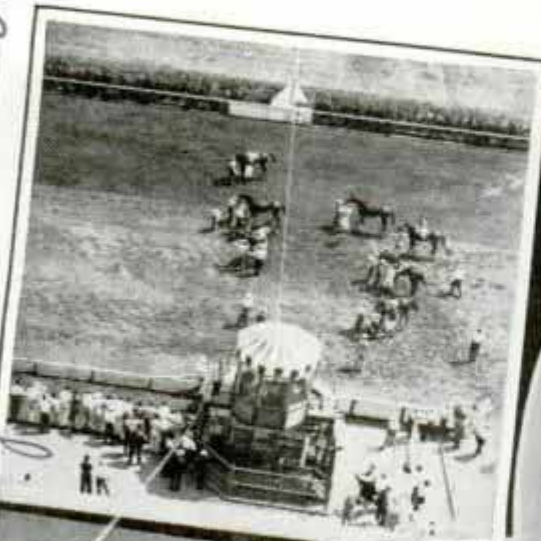
Intent on developing business by cutting the costs of home modernization, a Maywood, Ill., contractor has devised a method of "hanging" thin brick veneer on metal prongs that project from a reinforcing mesh panel. Old frame and stucco houses can be given new brick walls at a small outlay, since no additional foundation is required and the three-fourths inch brick veneer, made of the same materials and in the same colors as regular face brick, is easily applied over the old wall. On the back of the brick veneer slabs is a dovetail slot, centered so that the brick is reversible. Before hanging the bricks, a stiff, copper-bearing metal mesh "curtain" is securely anchored to the old wall. Projecting hooks or prongs on this patented mesh fit into the slot of the brick slabs, the mesh thus helping support the weight of the bricks. Mortar is applied to the slotted back before the brick is "hung." The cost of modernizing a frame house by this method is repaid in a short period of years by reduced maintenance costs. One large house which had a recurring paint bill of \$400 was brick-veneered by this contractor for \$1,100. The pattern of the hooks in the mesh assures perfect alinement of the bricks.

Sound travels 11,000 feet per second in ice—more than ten times the velocity of sound through air.

Wayne Dunscomb
 Engineer June 10 36

American Rubber June 1936
 Dept. 6
 129 St. 6th Ave
 New York City

'Eye in Sky' Camera Judges Close Horse Races



Harry I Day
 Electric Research
 250 W. 57th St.
 Chicago
 1965

cut.

When the finish is close at Arlington Park in Illinois, less than two minutes elapse before a photograph showing the winning horse is in the hands of the judges. A movie camera nearly 200 feet above the track is used to catch the horses as they race under the wire. Then the film is sent through the developer and an enlarger which magnifies the tiny motion-picture frame. From there it passes into the printing process and a second later the finished picture is sent sliding down to the judges' stand on a chutelike device. The judges frequently find it necessary to resort to the finish-line photo in determining the winner of close races

Harry I Day
 Electric Research
 250 W. 57th St.
 Chicago

#815 (Frank)

The NEW ERA of Railroading



FROM the Rockies to Chicago between twilight and dawn races the million-dollar "City of Denver," glittering ten-car streamliner hauled by this massive Diesel-electric power car.

PASSENGERS boarding the "Green Diamond," Chicago-St. Louis streamliner of the Illinois Central system, are greeted by a stewardess in green uniform who attends to every want of the traveler. The vestibule steps fold into the bullet-shaped side of the car. Below is the Diesel-electric locomotive of the "Abraham Lincoln," another Chicago-St. Louis speed train.



F813

PART I

A NEW era of railroading has captured America. Gone are the days of stuffy coaches with dingy red-plush seats, cinder-strewn window sills, aisles littered with aromatic orange peel, and exasperating waits on the siding for the limited, over an hour late, to clear.

Fast freights now rumble through at the speed of yesterday's passenger train, while America rides—and watches—the streamliner.

Across the prairies it streaks, a silver shaft, a bolt of gold or blue or canary, slicing the continent in half, bringing Chicago to the foot of the mountains, thrilling breathless "galleries" at every highway crossing. Townsfolk that had forgotten the railroads, country dwellers who had quit driving to town to meet the 8:10, park along the road to see the

streamliner flash past at eighty, ninety, a hundred miles an hour. By night the low, musical blast of an air horn, the vertical shaft of light piercing the sky warn of the speed train's approach, and suddenly it is gone, a streak of gay lighted windows alluring as the port-holes of an ocean liner.

Aboard the train a passenger, counting telegraph poles and checking his



INDIRECT lighting and wood-veneer paneled walls trimmed with aluminum lend a smart modern accent to the lounge car of the "City of Denver." One of the Burlington railroad's fleet of "Zephyrs" is shown below.





watch, asks the stewardess what speed they're making. The stewardess, dressed in a trim green uniform, picks up the telephone in the observation car and calls the head end. Telephones are located at strategic points through the streamliner. The message reaches a loudspeaker in the engine cab, and the engineer, with a look at the speedometer, lifts his speaker and calls back: "Eighty-seven miles an hour."

Minutes squeeze the miles in this new day of railroading. Two years ago the first of these modern trains rocketed across a startled continent. Today a fleet of more than twenty streamliners clicks off more than 115,000 miles each week, six million miles a year. Forty-four miles in forty-four minutes between



78/3

STEEL louvers afford privacy to occupants of berths on the Union Pacific's "City of Los Angeles," and a curtain protruding into the aisle allows more room for dressing. At the right is the ladies' "makeup room" aboard the Denver streamliner.

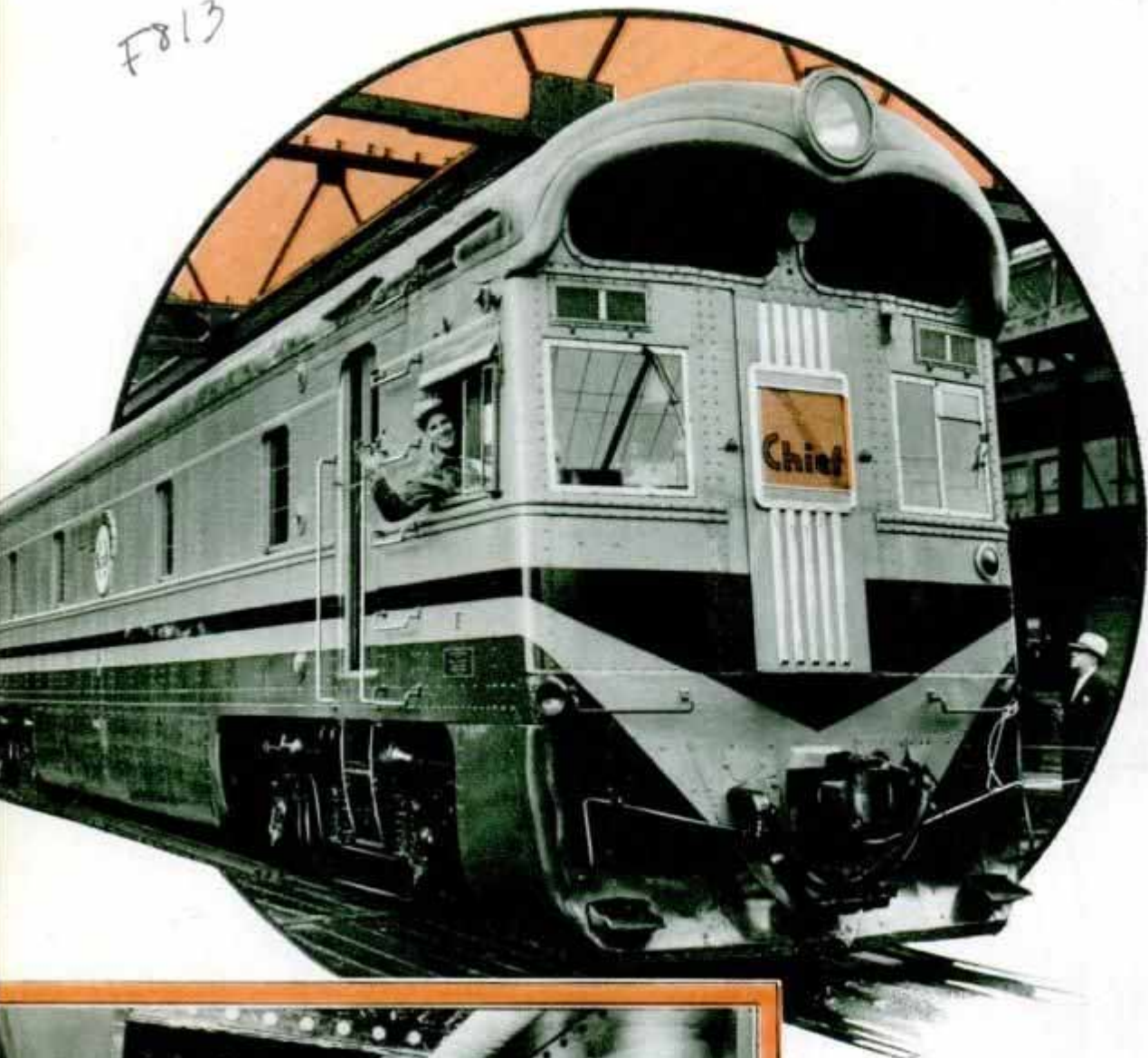


METAL grillwork and colored glass add decorative touches to the dining car of the "City of Denver," made more spacious by the side seating arrangement.

Boston and Providence, six round trips a day, races the "Comet" of the New York, New Haven & Hartford. Traveling salesmen who used to sleep two nights on the train now leave St. Louis after breakfast, enjoy a noonday lunch at a counter in a cool, clean car, reach Chicago in time for an afternoon's business, take the streamliner back home in time to sleep. Two hundred ninety-four miles, each way, in two hundred eighty-five minutes. Over three railway speed lanes between St. Paul-Minneapolis and Chicago, six trains run daily round trips at better than mile-a-minute paces. This was the proving ground where railroads found passengers multiply when drama

replaces drabness. Here the Burlington's twin "Zephyrs" packed in passengers so steadily that these streamliners were called on to make two trips a day. Eight hundred eighty-two miles of high-speed travel for each train every day in the week between 8 a.m. and 11 p.m., with just one hour's rest between trips in mid-afternoon. By the end of this year a \$5,000,000 fleet of eight Zephyrs will be plying the Burlington lines at a rate of probably 40,000 miles a week. The Union Pacific already has a fleet of six streamliners in service that cost \$5,000,000 or more. The Southern Pacific is building trains for a faster Los Angeles-San Francisco run. The

F813



MOST powerful Diesel-electric locomotive in America is the Santa Fe "Super-Chief." Left, a streamliner's power plant.

Canadian National Railways have just built Canada's first streamline engine, a steam locomotive of gigantic proportions to haul its crack trains into Montreal from the west. And so from Boston to Bangor, from Washington to New York, from Detroit to Toledo and Cleveland, and down the Mississippi Valley, the rails are singing the new song of speed.

But it is the west that shrinks most dramatically under the flying wheels of 1936. A year ago you crossed the Nebraska plains under a blazing sun, slept two nights on the best trains from Chicago to Denver. Tonight you step aboard a million-dollar twelve-car streamliner at sunset in Chicago, glide



GATHERING speed as it leaves Chicago, the old iron horse of the North Western's "400" races streamline rival trains to St. Paul-Minneapolis.

through the night with unbelievable speed and the smoothness of articulated cars, awake to see dawn on the Rockies. Sixteen hours from Chicago to Denver—nearly ten hours faster than a year ago.

San Francisco, Los Angeles, Portland are a day closer to Chicago on the fleet of streamliners now plying across the plains and mountains. They span the western two-thirds of the continent in the time it took the best steam trains out of Chicago to reach Butte, Mont., or southwestern Colorado. The most powerful Diesel-electric locomotive in the land, the blunt-nosed "Super-Chief" of the Santa Fe route, summons its 3,600 horsepower to haul standard heavy steel sleepers from Los Angeles to Chicago in less than forty hours. Or you can ride in million-dollar luxury at two cents a mile or less on the Union Pacific's "City of Los Angeles," "City of San Francisco" and "City of Portland," spanning the west in two nights and a day.

No Indian maharajah could command more comfort than the traveler aboard one of these streamliners. They are less like the conventional railway train of two years ago than itinerant palaces, colorful, festive, comfortable. Observation cars have become solariums, curving toward the finlike tail, with lounge chairs clustered in groups as intimately as a club. Wide windows afford broad vistas of the kaleidoscopic scene. Aluminum striping and paneling, wood-veneer walls, chromium-framed furniture contrast smartly with soft-hued upholstery. And you are in a climate apart from the world. Through desert heat and mountain chill, through blinding dust storm the streamliner's weather is man-made. The railroads spent \$16,000,000 to install air-conditioning equipment last year, just as a starter. Windows are twin panes of shatterproof glass separated by a gas chamber, sealing out dust and assuring a view unclouded by moisture.



IN THE pastel-hued "solarium" of the "Green Diamond" is this buffet section. Meals are also served in the coaches.



Steel louvers along the aisle of the sleeping car let the traveler seclude himself, day or night. Upper berths have been made as attractive as lowers, with windows that admit light and a view of the outdoors. Curtains protruding into the aisle make it easy to dress in upper or lower and steps to the upper berth instead of ladders, fold automatically when not in use and are removed during the day. In the club cars, lanes of reflected light enhance the pastel coloring of the room. In the sleepers, slim pencils of light illumine the aisles, and numbered bulbs glow above each section to guide you to your berth. Wall lamps over every seat shoot bright bullets of light over your shoulder while you read, and at a flick of a switch the lamp sheds a soft, blue night light. Rheostats dim the overhead lights in the coaches to a restful blue glow at night.

(Continued to page 132A)

7982.

"G-Men" Learn to Shoot from Speeding Car



club
While the car turns at high speed, the G-man fires with a machine gun at the man-size target shown at right. Accuracy is difficult, but the student is required to pass this test in police academy

It's not easy to send a bullet crashing through a man-size target from a speeding automobile, but that is the trick which G-men, agents of the federal bureau of investigation, must perform. The weapon is a machine gun and the G-man must be able to hit the "man" while the automobile is driven swiftly past or swept in a curve. The test is one of those established by the bureau for students attending the national police academy. Representatives from law-enforcement organizations of many states gather each year to learn more about scientific crime detection.

1977

Sunlight Acts on Greenness of Seeds in Test

That sunlight acts on certain seeds through chlorophyll, the green coloring matter of vegetation, has been established by Dr. Lewis H. Flint of the U. S. department of agriculture. The discovery opens a new approach to the study of light in relation to seed sprouting and growth, plant metabolism, distribution of plants and other problems of the science of life. Yellow, orange and some types of red light which promote growth are eagerly absorbed by the chlorophyll, Dr. Flint found. At the same time, violet blue light and nearly infrared light, both of which retard growth, were absorbed by the chlorophyll. Thus the green coloring matter, Dr. Flint says, becomes almost inevitably identified with the reactions of seed to different kinds of light.

Washington
pp

7983

Newspaper Office on Wheels Has Radio and Darkroom

Completely outfitted with two-way radio, photographic equipment and a darkroom, a newspaper office on wheels has been placed in operation at Detroit. Announcers or reporters have high-frequency



Wide World
This truck has two-way radio and other equipment for quick coverage of a big news story

radio packs with which they may carry on a two-way conversation with the mobile office or with the headquarters of the newspaper. Stories may be transmitted direct in this manner. The photographic unit enables the crew to take and develop news photos on the spot. Installation of the radio transmitter also may hold the possibility of sending photos by radio to the home office.

One-eighth of an inch is added to the radius of the earth every hundred years by the fall of cosmic dust.

Wayne University
Enclosure June 1936

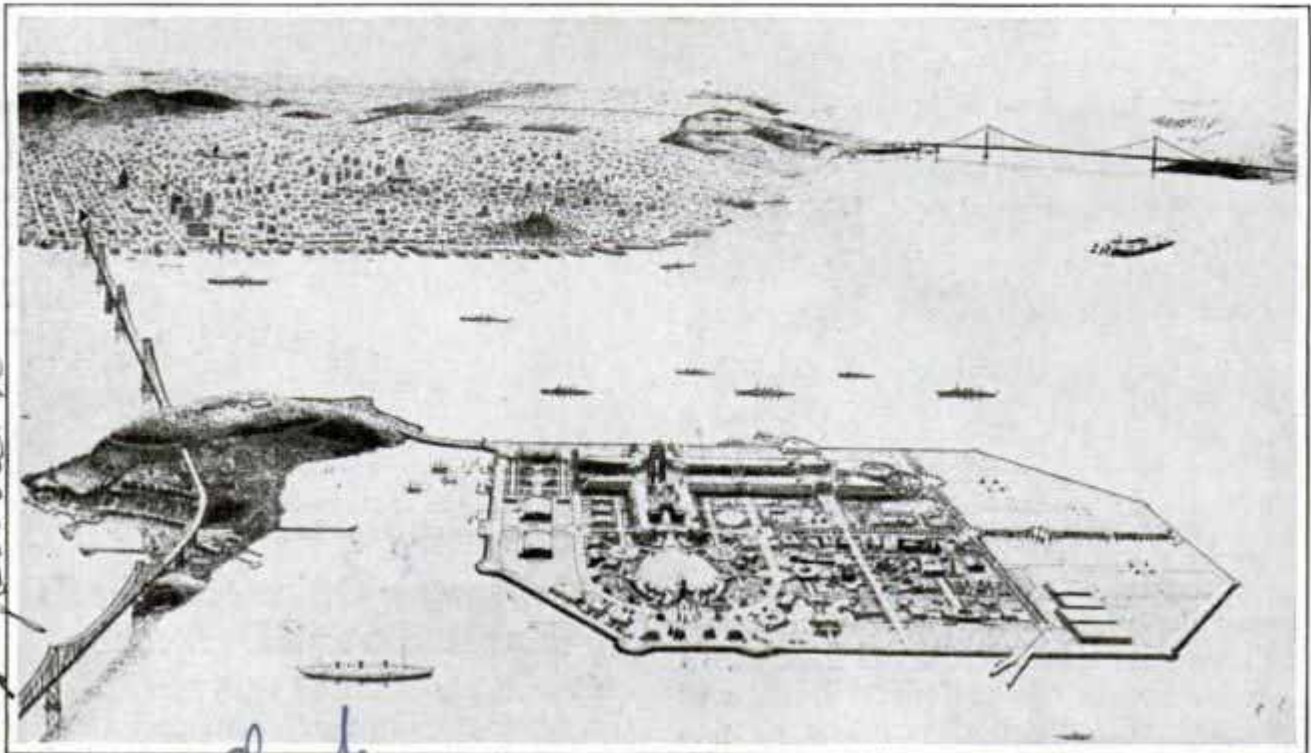
Science Service 7/20/36

F964.
498

2797

Design of Golden Gate Fair Wins Approval

Golden Gate International
Exposition



Here is the way the San Francisco exposition might appear from the air upon completion in 1939. This is the approved design. The bay bridge, ferries and planes will permit access to the ground

Approved by the management, the first architectural design of the 1939 Golden Gate fair at San Francisco, Calif., has been made public. At one side will be a six-lane highway leading from the San Francisco-Oakland bay bridge via the west side of Yerba Buena island. Near by is a semicircular three-story airport terminal building which will be used as the administration building. On the southern end of the site are two airport hangers which will

be used as exhibit palaces. The main exhibit buildings will run on two axes, at right angles, with a lagoon and a tower at the eastern end of the site. Foreign and state buildings will be grouped around the lagoon. Three ferry slips and a ferry terminal building on the western side of the site will handle boat-passenger traffic and another ferry slip on the eastern side will handle freight. Parking space will be provided on the northern end of the site.

Seventeen Miles on a Gallon Is Goal of 'Economy' Plane

Aero Engineering Corp
Los Angeles Calif



This trim craft, designed for economy, is expected to deliver high gasoline mileage without sacrificing important features of larger planes

Built to sell at a popular price and to fly at a low operating cost, a two-seater monoplane with many of the features of a big transport ship is undergoing flight tests in California. Engineers at California Institute of Technology aided in its design, and predicted the little plane would fly 150 miles an hour with its 125-horsepower motor, and would be able to

17 miles per gallon

Handwritten notes and scribbles at the bottom of the page.

cruise for 700 miles at 138 miles an hour at an average of seventeen miles to the gallon of fuel. It is "convertible," the cockpit having a removable cover. The ship is of the low-wing type, conforming to the best streamline design without a visible wire or strut. Twenty-five feet of split flaps behind the wing are used for wind-braking. Dual controls and automatic flying instruments are provided, and a two-way radio has been installed.

Pacific's 'Flying Library'

F933 Serves Readers on Islands



Loading books aboard Pan-American plane at Honolulu for readers on the isolated islands along the new Pacific air line

F951 Horse Protected by Gas Mask in Air Raid

For protection of horses during aerial gas attacks, a special gas mask resembling a feed bag has been devised and tested in Austria. The mask fits snugly on the horse's head and supplies the animal with purified air during the time the gas is floating near by.



Equipped with this gas mask, the horse is ready for the "enemy's" aerial gas attack

Supplying reading matter to the residents of Wake, Midway and other islands along the Pacific air line has been simplified by inauguration of a flying library service. When the Pan American clipper planes take off from Honolulu, packages of books are on board, each consigned to one of the islands. The Honolulu public library is in charge of the service. The books are kept in circulation by moving them from one island to another until the entire route has been covered.

F954 Automatic Stoker in Kit Form Is Assembled by Buyer

Available in kit form so that the buyer may assemble the parts at home, a low-priced automatic stoker will convert the coal-fired heating plant into a modern system. The parts may be purchased one at a time, if desired. Complete instructions for assembling and installing are furnished by the factory. The stoker also may be purchased in assembled form.

Sweden minted a thirty-one pound copper coin in 1659 worth about \$5.20.

Copier and Brass Research Assn.

Parts \$147.50 ready to install \$157.50
complete \$175.00

Tables of Agency Co. Manual

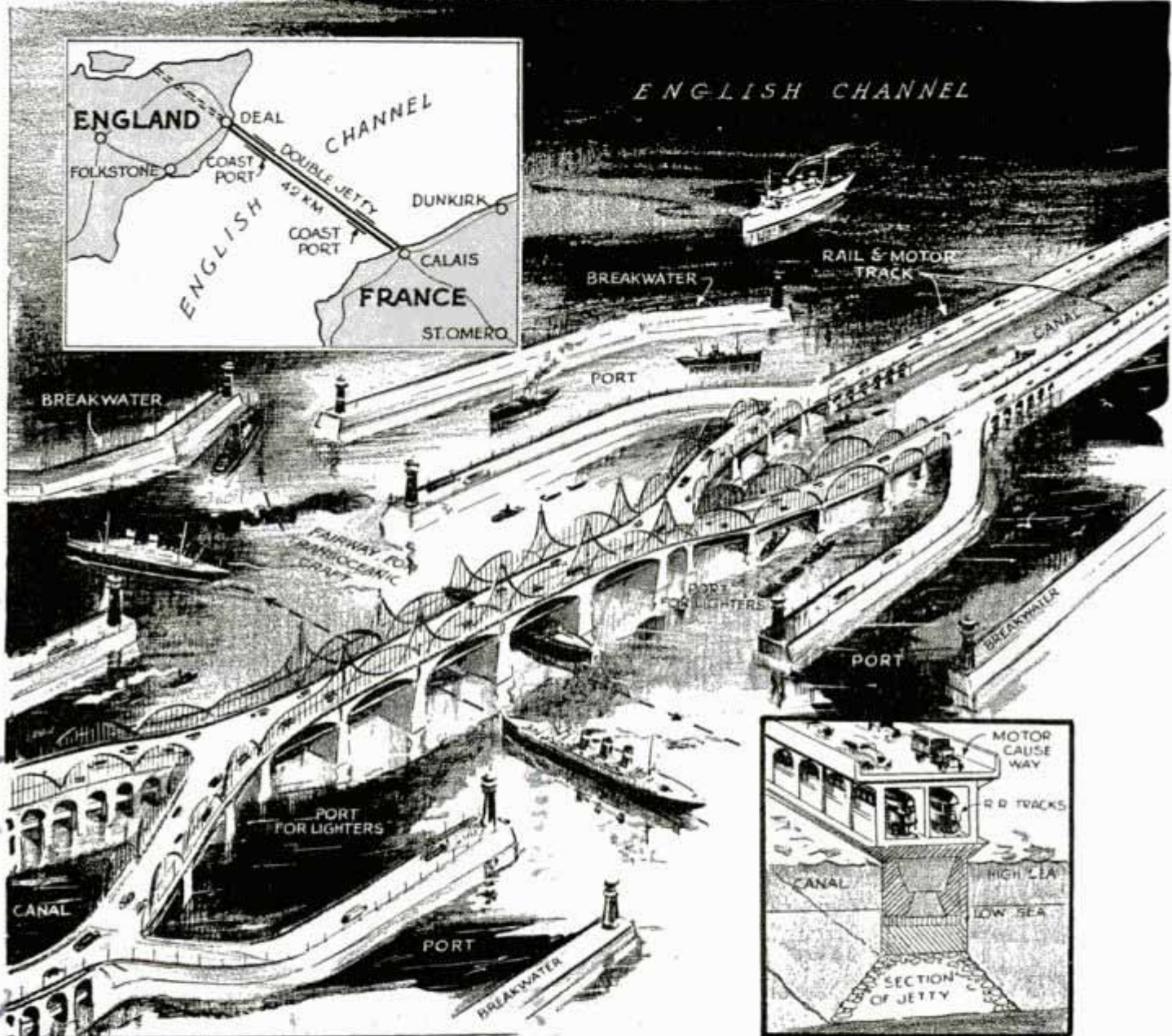
acme

11/18/38

W.C.

1812. Mr. Wm. Massman
 4 W. 103rd.
 New York

QUEER FACTS about



Solution of English Channel problem proposed by Swiss engineer. He would build two parallel jetties which would be linked up with shore at Deal and Calais by huge bridges

THIS is a bridge-building age. Five thousand bridges span the navigable waters of America, but America needs still more crossings to care for the ever-growing volume of traffic.

More than \$300,000,000 worth of bridges have recently or will soon be opened to traffic. Stretched end to end, the bridges and viaducts in the United States would reach across North America.

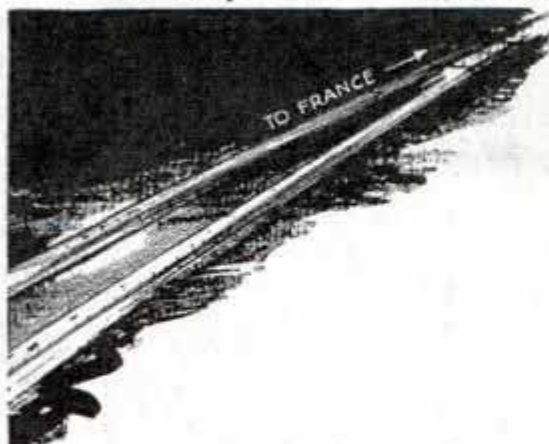
Bridges are forever growing higher, wider and roomier, and modern spans reveal the grace, beauty and strength that

goes with steel, the suspended roadways seeming to hang in space from the thinnest strands, like spider webs. American invention and enterprise have been largely responsible for the "big bridge" age. The foremost bridge designers and builders are the Yankees and at opposite gateways to the nation, San Francisco and New York, are new bridges unequalled elsewhere on earth.

In Europe the greatest bridge is the new \$8,000,000 Little Belt bridge, in Denmark, connecting the Island of Fuenen with Jut-

78/2

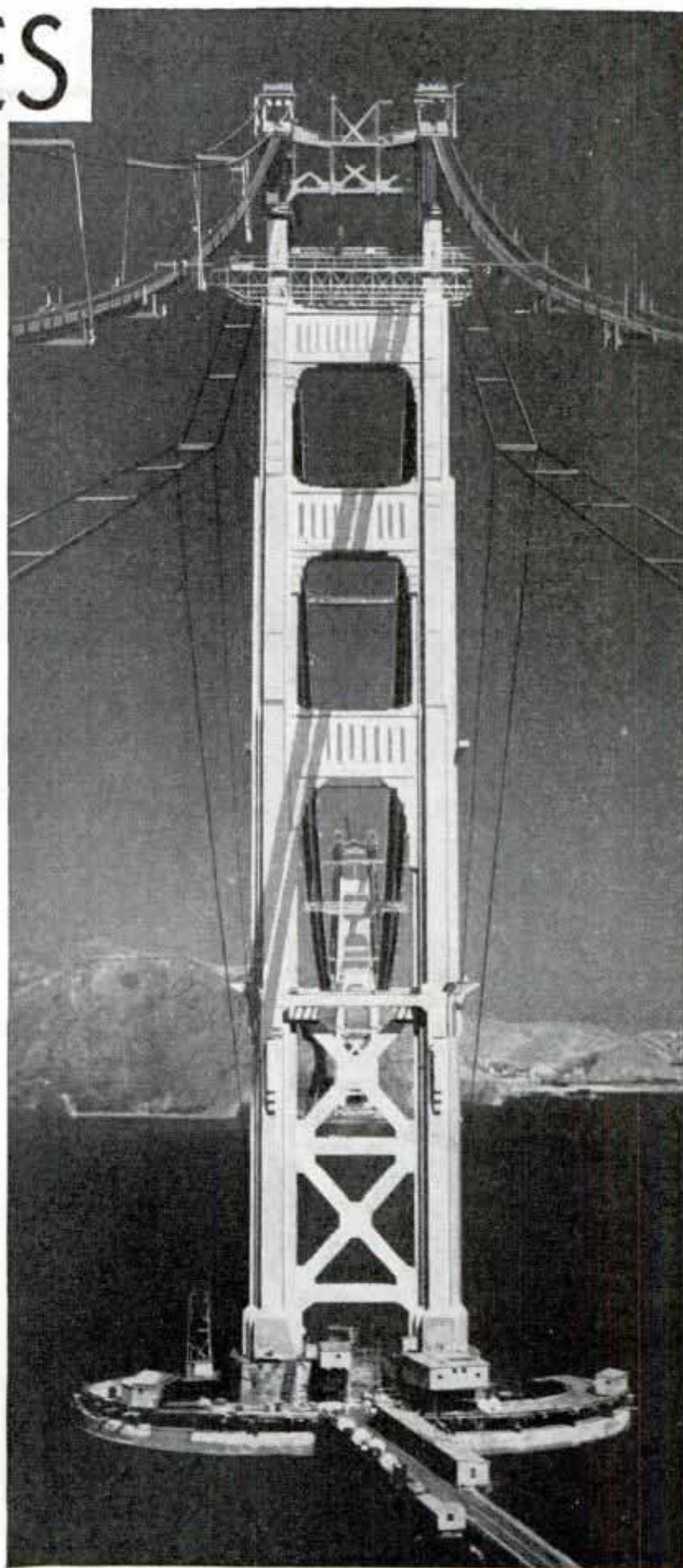
BRIDGES



land. This bridge is three-fourths of a mile long and rests on bedrock 121 feet below the water's surface. But the great spans in America surpass the continental bridges because the United States has denser traffic and wider rivers.

Every twenty-four hours, about 3,000,000 people cross the bridges of New York City alone. When famous London bridge was built, it was as much a street for shops as a means of crossing the River Thames and its capacity was measured in terms of horse carts and pedestrians. American bridge engineers think in terms of huge capacity. It is difficult to predict the volume of traffic in the next ten years, hence new bridges are either double-decked or have provision for future double-decking. If traffic increases at the present rate, many existing bridges will prove inadequate. With six mammoth bridges lying within ten miles of each other, the bridge facilities across the East river, New York, are still considered insufficient.

The more automobiles on our highways, the more bridges are required. The opening of a new bridge causes an important change



One of the huge towers of the San Francisco bridge. Through the deck level may be seen a twin tower, 4,200 feet distant



One of the few remaining covered wooden bridges. This one is more than fifty years old and is still in service near Rushville, Ind.

in the life of a city and the population spreads rapidly into the suburbs. Thus, thousands now living in the crowded areas of San Francisco proper are expected to change their residences when the new skyscraper bridges are opened.

Working with crude materials, the ancients were unable to erect spans greater than thirty or forty feet. Today we are building suspension spans up to 4,200 feet. The engineering feat of building the new San Francisco bridges may be compared with the Panama Canal. Looking at a series of skyscraper spans, costing about \$115,000,000, one wonders what the ancients would think of a double-deck, six-lane roadway hanging in free space without visible support for almost one mile. But bridges of greater length, height and capacity are still possible. Modern bridge building stops at few obstacles.

Arched structures of stone or brick go back to 4000 B. C., and their remnants are still found. For thousands of years, man found his best bridge material in stone,

but the work of keeping the ancient bridges in repair was quite costly. The same was the case with wooden bridges. Storms, winds, sunshine and flood destroyed their foundations and made them unsafe. In the middle of the nineteenth century the first metal bridges, made of cast iron, appeared. But they were impractical because cast iron lacks tensile strength. The development that revolutionized bridge building was the Bessemer process. This enabled engineers to design steel trusses, with high tensile strength.

John Roebling originated the use of wire cables for suspension bridges in America. His great undertaking, the beautiful Brooklyn bridge, was literally spun out of thin steel threads. That method also was followed in building the new Triboro, the George Washington and the San Francisco bridges. Metallurgy is expected to make possible even more spectacular developments in bridge building. This was indicated recently by the reconstruction work on the Smithfield bridge,



The George Washington bridge in New York City, erected at a cost of \$60,000,000, and a splendid example of the work of the modern bridge engineer

built in 1882 across the Monongahela river, at Pittsburgh. By redecking this bridge with aluminum girders, instead of steel, the engineers saved sixty-five per cent of the dead-load weight and added an estimated twenty-five years to the useful

service of the bridge. Formerly, vehicles were limited to thirteen tons on four wheels; today, twenty-ton trucks on four wheels can cross this bridge safely.

Dr. D. B. Steinman, one of the country's

(Continued to page 124A)

117 Liberty, New York

Figures Sculptured with Moist Newspapers

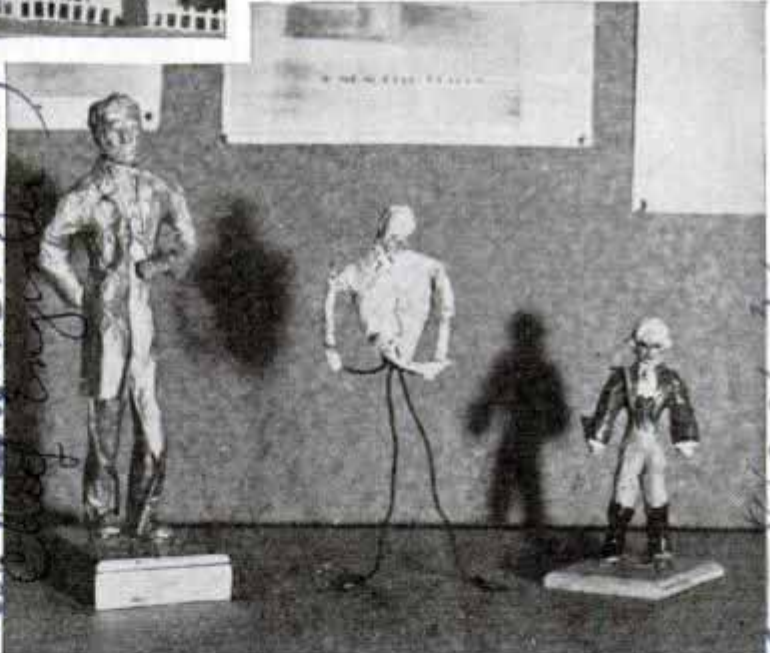


Newspaper sculpture is the latest art to attract those who like to fashion figures out of plastic materials. Wire frames are constructed and moist newspapers are molded over these frames to form human figures, houses, dolls, animals, puppets and caricatures. Flags and similar decorative objects also are created by employing hundreds of strips of colored paper and weaving the strips together to form designs.

Examples of paper sculpture made by molding moist newspapers over wire frames to form miniature figures. The flag is composed of hundreds of strips of colored paper

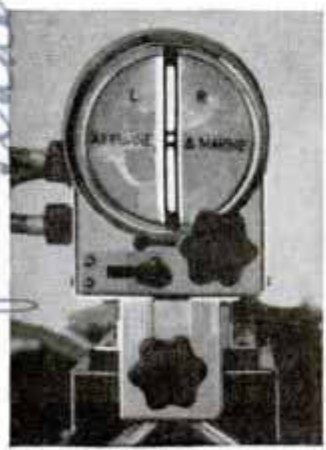
Cathode Ray Directs Airplane Pilot

Successful tests of a cathode-ray direction finder for airplanes have been conducted by the coast guard. When the plane approaches a broadcasting or radio range station being used for guidance, the cathode-ray pattern viewed on the "screen" on the instrument panel gradually opens out from a vertical line beam into an ellipse finally becoming an almost perfect circle as the ship arrives over the station. Should the plane miss the station the pattern may go completely off the circle, indicating the location of the transmitter. Total weight of the equipment is seventy-five pounds. Power to operate it is taken from the twelve-volt storage battery used for starting and lighting purposes. During tests, satisfactory performance over distances of 125 to 200 miles was reported with fifty-kilowatt stations.



"Super-Eye" Sought to Gauge Light and Color

Scientists are searching for an eye-surpassing instrument which will measure light and color with as much reliability and ease as a voltmeter and ammeter measure electricity. Dr. Herbert E. Ives of the Bell Telephone laboratories points out that such an instrument would be a definite improvement over the eye because eyes vary from person to person and because the eye is useless as an indicating instrument and can be employed only in comparative methods. Even the "electric eye" or photoelectric cell has definite



Handwritten notes on the left margin: "Airplane Direction Finder Corp", "Marine Direction Finder Corp", "Edward Teller", "1958", "1/20/56".

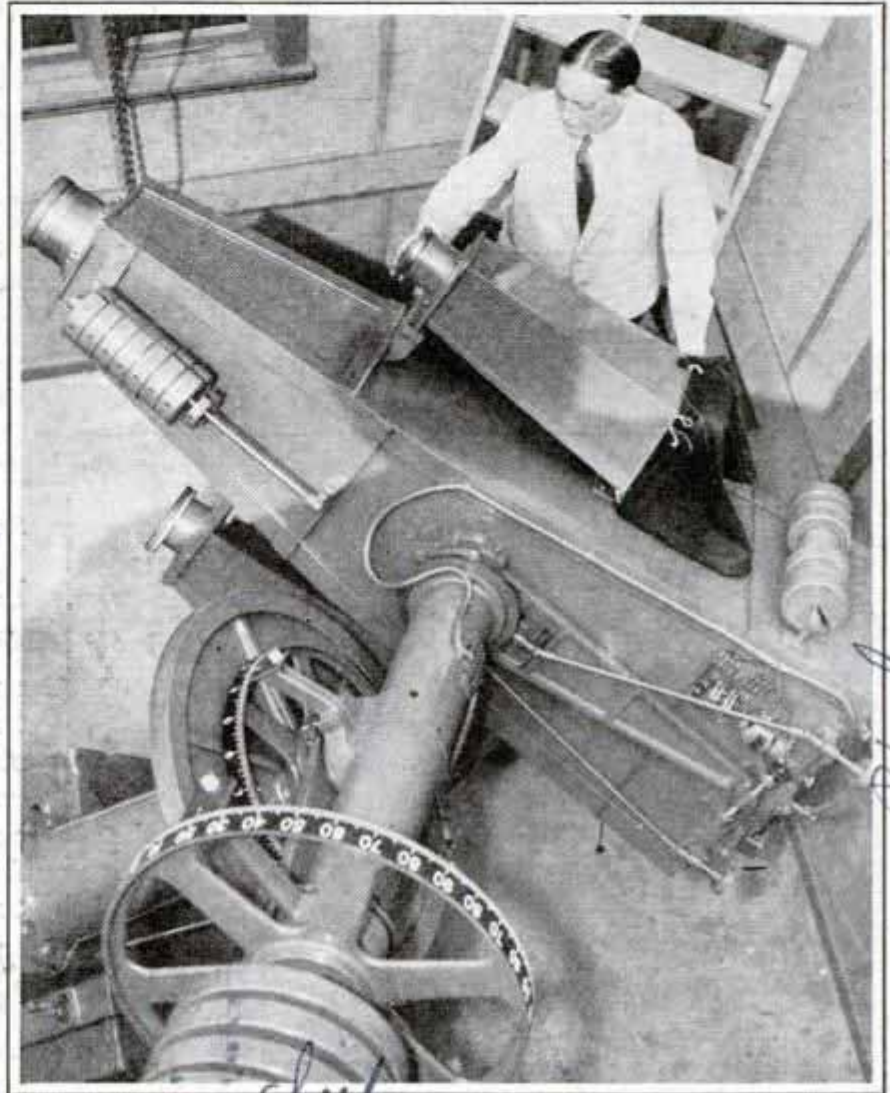
Handwritten address at the bottom: "463 West St. Newark".

7/20/36

T992

Two and a Half Ton Camera Will Chart the Night Sky

faults. One is that it is imperfect in ordinary light measurements, varying types being sensitive only to particular colors. By using several special cells, each sensitive to a certain part of the spectrum, Dr. Ives has obtained more accurate color measurement than any individual cell can record. This cell grouping has the advantage of eliminating errors due to scattered light of different wave lengths. But the problem is still unsolved.



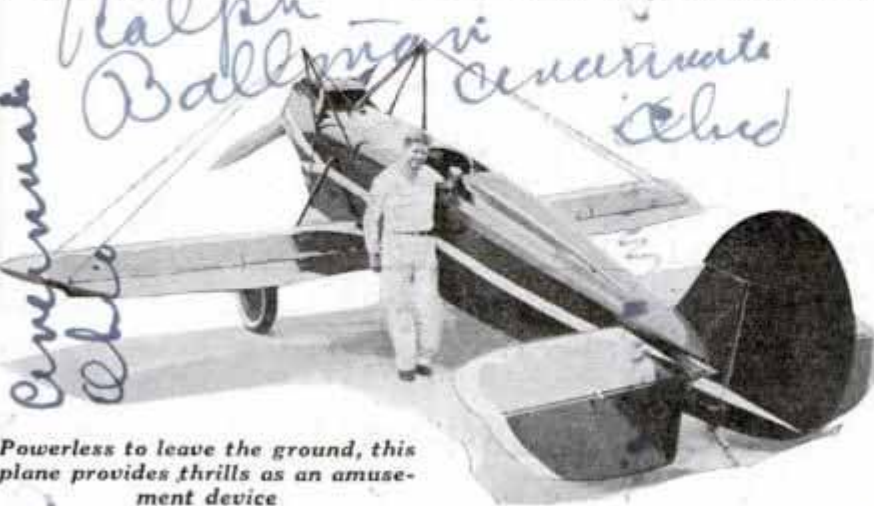
This combination of cameras in private observatory will be employed in charting the night sky by means of photographs

Mounted on an eighteen-ton base, a new two-and-one-half ton camera group has been set up in a private observatory for photographing the heavens. A photographic atlas of the universe within reach of the cameras will be compiled by Dr. Gustavus W. Cook, amateur astronomer. The big camera, which uses a plate twenty by twenty-four inches, will be trained first on the Milky Way.

High-powered rifles require steel-jacketed bullets because the terrific friction in the bore would melt lead.

Thrill-Ride Plane "Flies" Only on the Ground

Its original wings replaced with ornamental ones with no airfoil, a thrill-ride plane operates only on the ground. It has a top speed of eighteen miles an hour, produced by a small automobile engine which was substituted for the original motor. The builder plans smaller ones to be operated in amusement parks. The plane demonstrates how a ship reacts to its controls while on the ground.



Powerless to leave the ground, this plane provides thrills as an amusement device

Conk... Alan... Henry... Lumber... Aufward...
Carpenter...
Alto

Ralph...
Ball...
Cen...
Alred

Handwritten notes on the right margin, including "Wayne... Engineer...".

Wayne...
Engineer...
P.H.

your wrist or ankle, it does not interfere with swimming. It weighs three ounces. Swim out to the raft and you can have a dry smoke, and, for the ladies, it can hold powder puff and lipstick and there is a mirror inside its Bakelite cover. It is available in six colors.

7952
**Bird Family Photo
 Wins Amateur
 Contest**

When an alert amateur photographer snapped a picture of a mother robin feeding her young, he obtained an unusual photograph which won first prize in a wild-life contest conducted recently. The photo shows the baby birds holding their mouths wide to receive the "lunch" brought back to the nest by the mother bird. One of the tiny birds is being favored by the mother, the photo showing its mouth in the act of closing on the dainty morsel.



Lunch time for the bird family—as amateur photographer's prize-winning photo shows it

U. S. War on Counterfeiters Uncovers Plant in Suitcase



This suitcase, opened to show the complete counterfeiting plant which it contained, was seized in raid by federal agents

In a recent raid by federal agents engaged in a drive to stamp out counterfeiting, a complete plant for manufacturing bogus bills was found in a suitcase. Hundreds of bills turned out by this easily portable plant had been passed in the East before the raid. Bank clerks and post-office employes have been trained to detect bogus money, but by exercising a little care any one can soon learn the difference between good and bad bills. The old method of holding up a bill to the light and looking for the silk threads woven into the paper is still a good idea, because no counterfeiter has ever successfully produced a good imitation of the paper used by the government. Perhaps the best way to detect counterfeit currency is to study the picture on the face of the bill. A close examination of a five dollar bill, for instance, will show that the features of Lincoln are expressive and lifelike. The eyes are always clear and natural. On bogus bills the eyes are always blurred. This holds true, also, of the borders, which are marvelously engraved on genuine money. Fake coins usually can be detected by the ring when dropped upon a table. Not all counterfeit bills have a new appearance. The counterfeiters have a trick of soaking bills in coffee to give them the appearance of age.

#835. Mr. William...
Ila Puy, 1001-15th St. N.W.
Washington, D.C.

FEEDING ANIMALS



AN ODD job is that of catering at the National Zoo in Washington, D. C., a job which takes the time of some thirty employes and costs the taxpayer some \$50,000 a year. So well is the task performed that the claim is sometimes made that the bears at the zoo get better bread to eat than does the President in the White House a mile away. It is two parts flour and one part bran. A loaf of this bear bread weighs sixteen pounds and the big bruins require one and a half a day and the little ones half a loaf. Only the polar bear insists on fish or meat, preferably a hunk of brisket of horse with plenty of bone for exercising the teeth.

Half a dozen loaves of bear bread are given occasionally to the elephant as a special treat. The pachyderm, however, is dietetically simple in its tastes, being satisfied with eighty pounds of hay and a bucket of oats every day.

The coat of Queeny, the lady lion of the zoo on whom the sun has never shone, has



Top, the hippo gets his spring tonic. Bottom, the rhinoceros actually likes his spinach

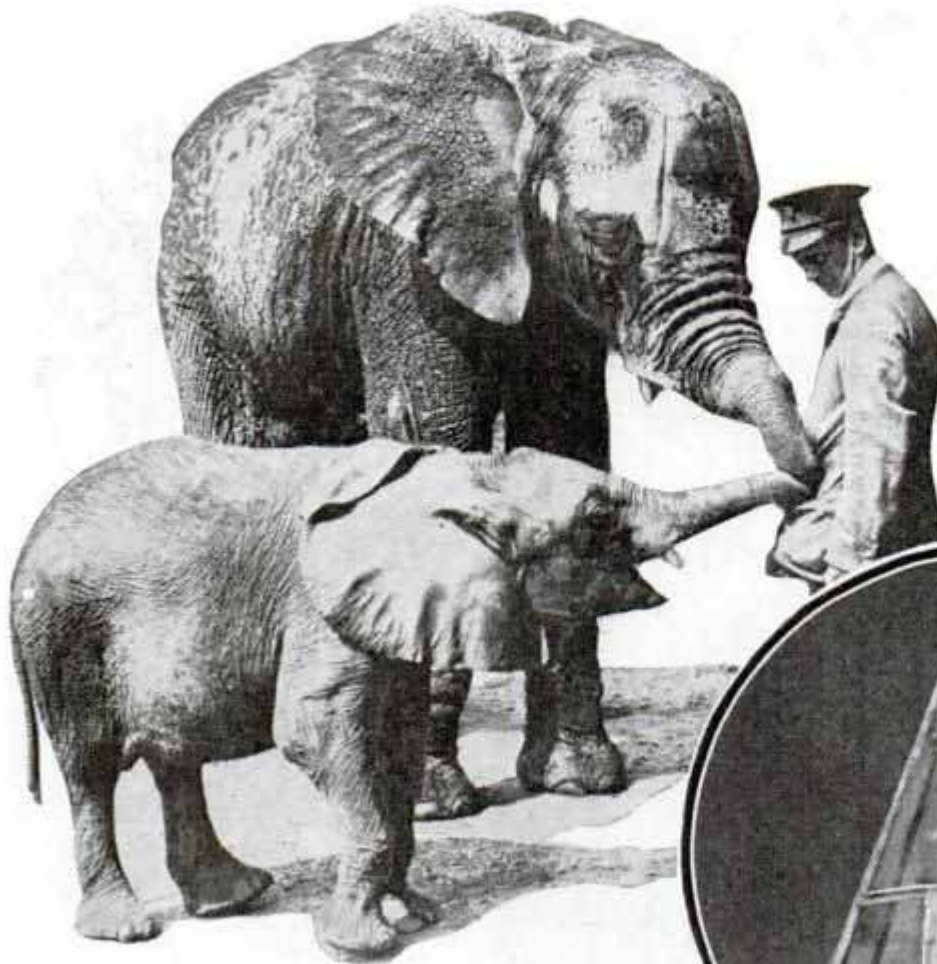
in the ZOO

a shimmering gloss because she gets her sunshine out of a bottle of cod-liver oil which she and hundreds of other cage dwellers get regularly. Shut it off for a few weeks and their coats become drab.

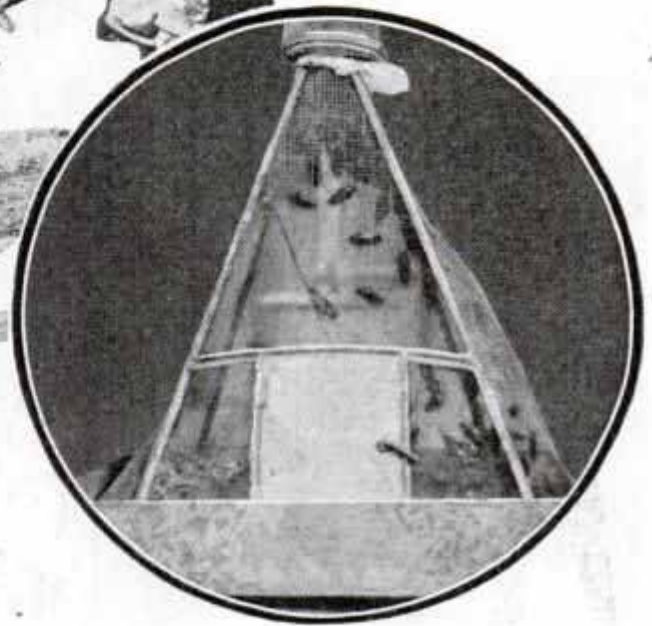
There are many fine beauty points at the zoo. The scarlet ibis, for example, must scintillate to keep people from looking at her spindling legs. When her feathers went dull attendants tried many experiments. Dried shrimp turned the trick. There was the case of the bird of paradise that would eat nothing in the bird-food pantry of the



Top, roly-poly koala bear and cub ready for the dinner bell. Bottom, left, every day's fish day for the penguins. Right, feeding a five-months old walrus a lump of whale blubber



dren. They are swept up every morning to delight the palates of certain fastidious lizards, birds, fishes, and the aardvark. Other breeding cases, abundantly supplied with wax, prove gratifying to small moths which become the piece de resistance of many discriminating birds and toads. A green,



zoo. She languished and faded until Dr. William M. Mann, the scientist who superintends the zoo, thought of desiccated ant eggs, a rare product. It can be bought, however, and was bought of an importer in New York, and turned out to be the very sort of caviar for which the bird of paradise was yearning.

Do you know that mockingbird food can be bought in a can? That's true, but the kitchen at the zoo makes its own, five or six hundred pounds of it a year. It is composed of ground zwieback, crissel (a dried meat mixture) and ant eggs.

Any housewife would be shocked by the cockroaches running all over the zoo pantry, but the cockroaches are the favorite food of many toads, lizards, snakes, turtles—all denizens of the reptile house. One of the interesting devices in the zoo kitchen is a specially designed trap for catching these insects.

An old chiffonier in the zoo becomes a mealy worm-breeding establishment. Its drawers are filled with layers of gunny sacks that are covered with bran. This becomes the perfect home for beetles of which mealy worms are the larvae chil-

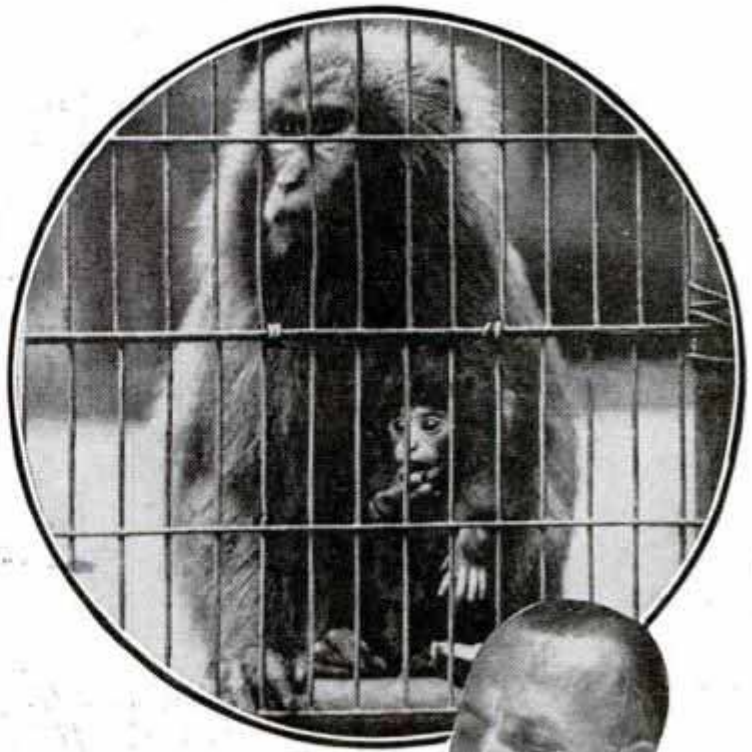
Left, a youngster learns a new trick from an old-timer at the zoo. The attendant's pockets are filled with tidbits—most likely, peanuts. Right, trap for catching cockroaches enables the zoo to provide many toads, lizards, snakes and turtles with their favorite food

poisonous frog from Panama and a horned toad from Arizona, with the knack of shooting blood from the corner of its eye, insist on red ants at mealtime. An over-ripe banana lures the red ants into the cages of these tiny reptiles.

There is an odd little snake from Australia that must have eggs and it swallows them whole. Sparrow eggs are the biggest it can eat. There is trouble, however, when the season for sparrow eggs is over. So plain chicken egg is stirred up, sucked into a syringe, and shot down the snake's neck. The cobra, from India, is an infrequent eater but bolts a squab every month or so. The gila monster of the southwest eats an occasional egg. Copperheads are fond of frogs.

Lions, tigers and leopards, are merely house cats grown large. What they want is good red meat, beef or horseflesh preferred, ten to twenty pounds a day for the big ones, five pounds for the leopards, two for the caracal. Pigeon day is quite an occasion. The cats eat but once a day. It has been found that they are healthier if they fast one day a week so they are not fed on Sunday. Then on Monday they get liver for a change.

The elephant seal is an expensive boarder since it consumes 100 pounds of fish a day while the sea lion requires but twenty. The prep-



Top, this monkey and her baby like almost any food that man eats. Center, four-months old buck deer is still a "bottle baby." Bottom, here we see a large lizard refusing a banana. This one eats nothing except seed-weeds from the Galapagos islands

paration of this food makes little trouble in the kitchen since it is served raw. But it must be carefully refrigerated and kept perfectly fresh.

A staple for the carnivorous animals is the meat ball, a sort of hamburger steak, made of cooked ground meat mixed with chopped-up vegetables. It is a sight to see

(Continued to page 136A)



7/27/36

Water Skiing Is the Latest in Sports World



Water skiing offers thrills—it skier in foreground isn't careful he will get a ducking

Great popularity among water-sports devotees in Germany has been won by floating skis on which the wearer may move along the surface of the water. Using the skis appears to be an art in itself, since the water variety is about as tricky as those worn on the snow. As the wearer grows more proficient, however, he discovers that unusual speed can be developed. For various water games the skis offer many new thrills.

Grass Juice Added to Milk Promotes Growth

Recent experiments have shown that grass juice will enhance the growth-promoting properties of milk. Juice squeezed out of lawn clippings was added to the daily milk ration of young rats, causing them to gain weight much more rapidly than rats fed plain milk. Liver and brain tissue also were found to promote growth when added to winter milk.

This finding, if it proves applicable to human nutrition, may point to the desirability of fortifying winter milk with materials containing the growth factor which it lacks. Such additions will not be necessary with summer milk because cows having access to pastures give a product potent in promoting growth.

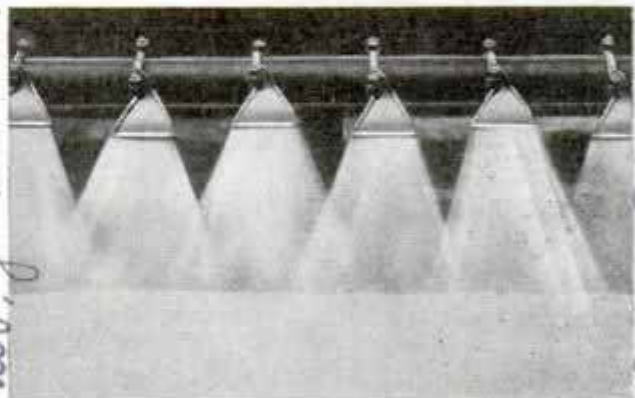
Rubber-Tired Roller Skate Has Soft-Riding Springs

Equipped with a spring for each pair of wheels, a German-designed roller skate with rubber tires is said to give a softer ride and to be easier to handle. The rollers are larger than on the conventional skate and improved ball bearings are claimed to increase the speed.



Spray System Easy to Make with Water-Pipe Nozzle

Attachable to any water pipe by drilling a small hole and tightening two nuts, a simple nozzle is available for making spraying systems, city and highway sprinklers and truck-farm irrigation systems. A deflector spreads the water into a wide spray. Several nozzles may be used on the same pipe. The unit has no shut-off valve, so the pipe valve serves all nozzles.



Here is how a water-pipe nozzle system appears in action. Note the separate nozzles

F992

Madison
Druid of Wisconsin

Aug. Schupmeyer, Esq. Volkmarsstein, Prussia

Am Chicago

Mrs. C. A. Elvehjem
209 1/2 Michigan

Link. Best Co
209 1/2 Michigan

Spin-Proof Plane Has Air Slots in the Wings

Successful tests were conducted recently of an airplane which the designer claims cannot go into a spin. The spin-proof feature is a slotted wing which permits some of the air to pass through. It is said this increases the lifting capacity of the wing, thus stopping any tendency of the craft to go into a spin. The plane can take off in 100 feet



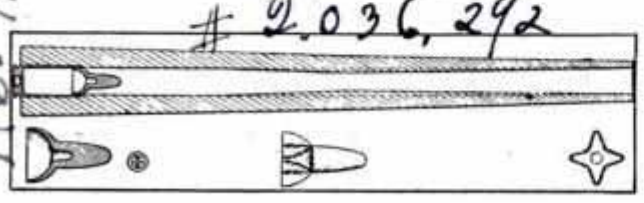
Plane with air slots in wings which permit some of air to pass through. The designer claims that this feature increases the lifting capacity of the wings and stops any tendency of the craft to go into a spin

and can rise 1,000 feet per minute. The designer of the plane said he obtained his idea for the wing slots by watching pigeons in flight.

Faster Rifle Bullet Is Shaped Like Nipple of Baby's Bottle

Similar in shape to the nipple of the baby's nursing bottle, a new rifle bullet has about four times the acceleration of a normal bullet. Stabilizing fins formed on the bullet during its passage down the

rifle barrel result in greater accuracy. The base of the bullet is cup-shaped and partly hollow, giving the exploding gases greater surface area on which to act. The bullet attains an estimated speed of 3,600 miles per hour. The government has been granted full use of the new projectile without payment of royalties.



Showing how fins are formed on base as bullet passes through barrel of rifle

Four manganese bronze propellers weighing thirty-five tons each, the largest ever cast in a single unit, drive the liner "Queen Mary."

W. E. McWhorter
 600 N. Military
 Lawrenceburg
 Tenn.

H. Parker
 420 Lexington
 Av. N.Y.C.

W. E. McWhorter
 Tennessee

600 N. Military
 Lawrenceburg
 Tenn.

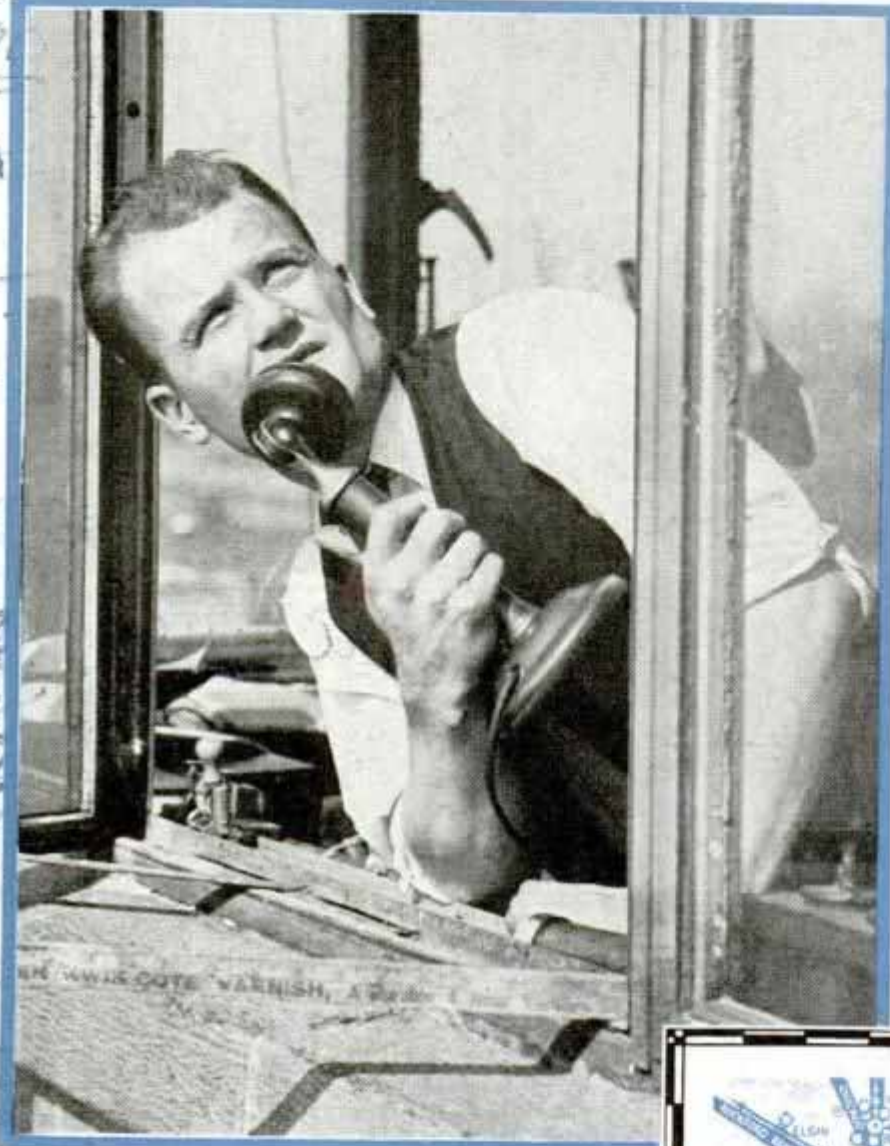
W. E. McWhorter
 600 N. Military
 Lawrenceburg
 Tenn.

420 Lexington
 Av. N.Y.C.

Capt. Wiley
 Research Assn
 Copper & Brass

Transcontinental and Western Air. Inc., Palmer House Lobby Chicago

TRAFFIC OFFICERS



His voice blares from one of several amplifiers in a tiny glass-enclosed tower atop the passenger station at the Chicago Municipal Airport. One of the two men in the control tower picks up a radiotelephone and makes instant reply.

"WGEH to Andrews, TWA 320, ten miles west at 4,000," comes the answer in Andrews' ear-phones. "Two private planes are flying at 3,000 south of port. United's Trip 10 is taking off and will take an eastern course at 6,000 feet. Wind southwest by west five. Kollsman barometer twenty-nine. Ceiling 2,500. Visibility three miles."

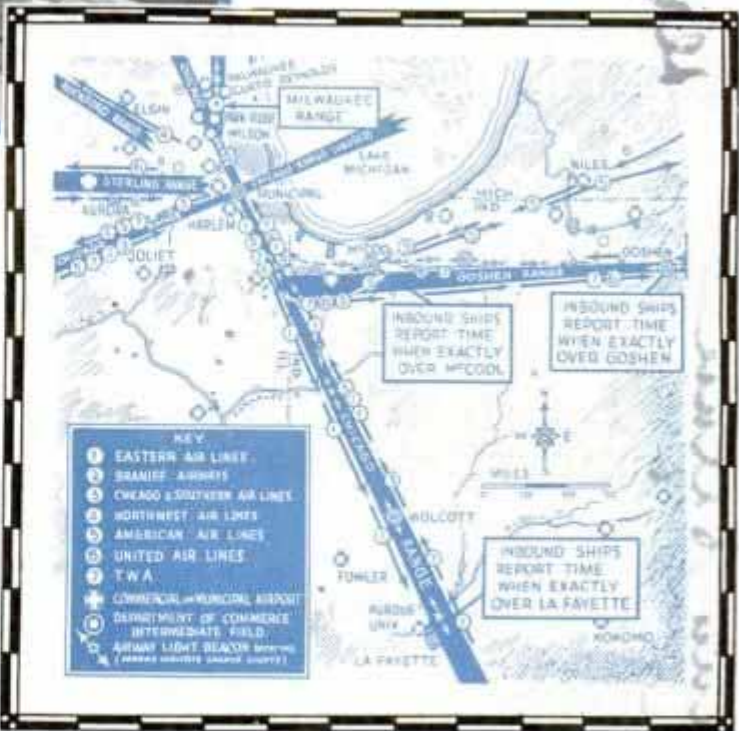
"Okay, WGEH," comes the voice of Pilot An-

By H. W. Magee

HIGH above a peaceful Illinois countryside, a TWA skyliner streaks eastward, its silver wings flashing in the morning sun. In the cabin a smiling stewardess moves down the aisle, arousing her fourteen dozing passengers. "Fasten your seat belts, please," she requests. "We land at Chicago in ten minutes."

Up front Capt. Harry N. Andrews and his mate prepare to encounter the heavy traffic of the world's busiest airport. The pilot glances at his instruments, then speaks into his radiophone.

"Andrews in TWA 320," he announces. "Ten miles west of airport at 4,000. Arrive 10:58. Go ahead."

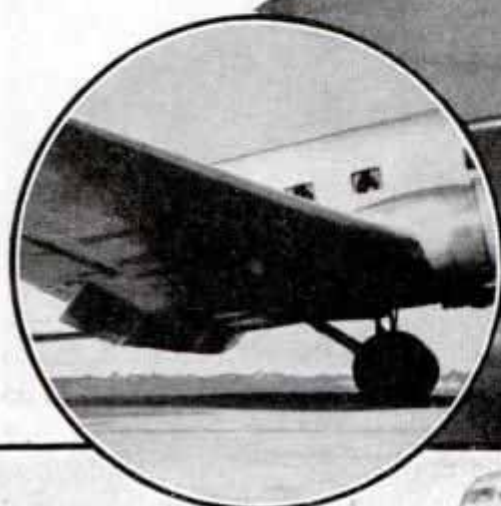
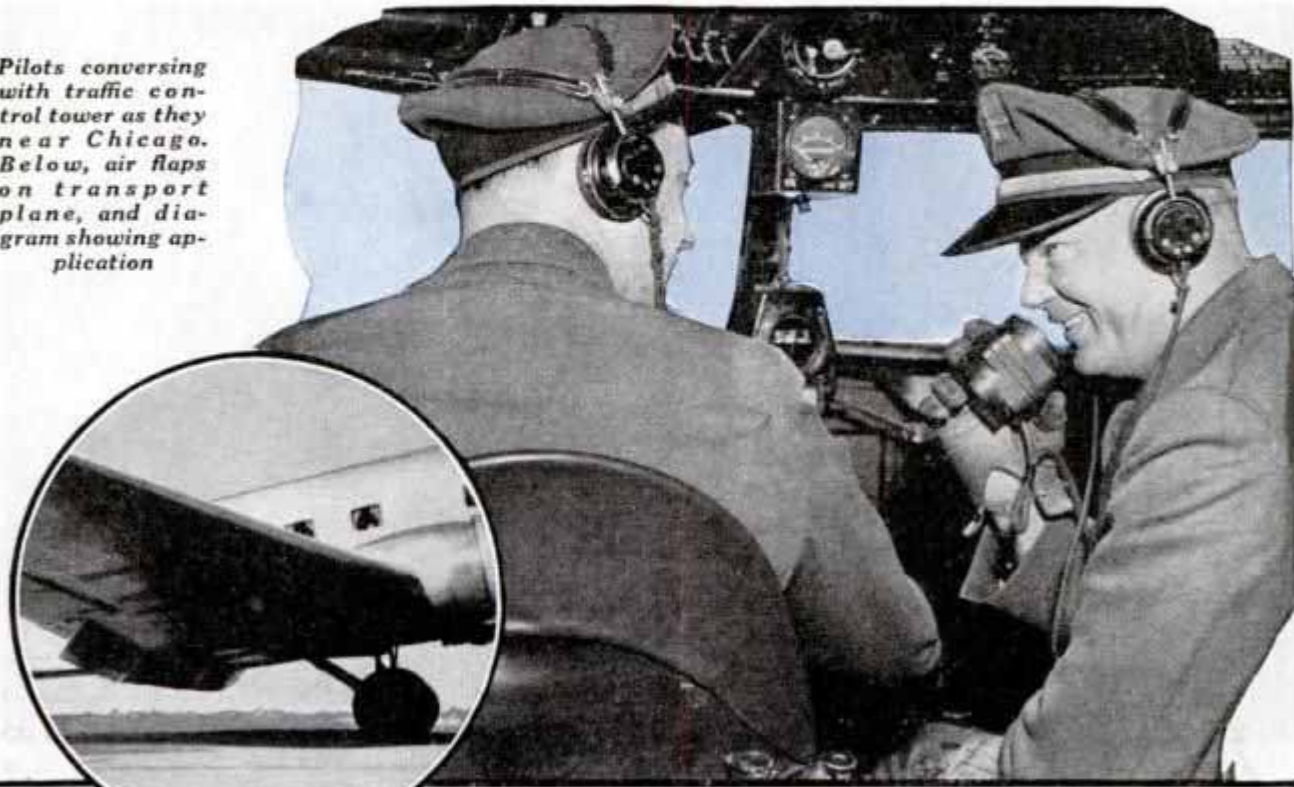


Talking by radio from tower to pilot about to land at Chicago airport, and map showing route followed by each line approaching airport

F 698

of the SKYWAYS

Pilots conversing with traffic control tower as they near Chicago. Below, air flaps on transport plane, and diagram showing application



draws, "wind southwest by west five."

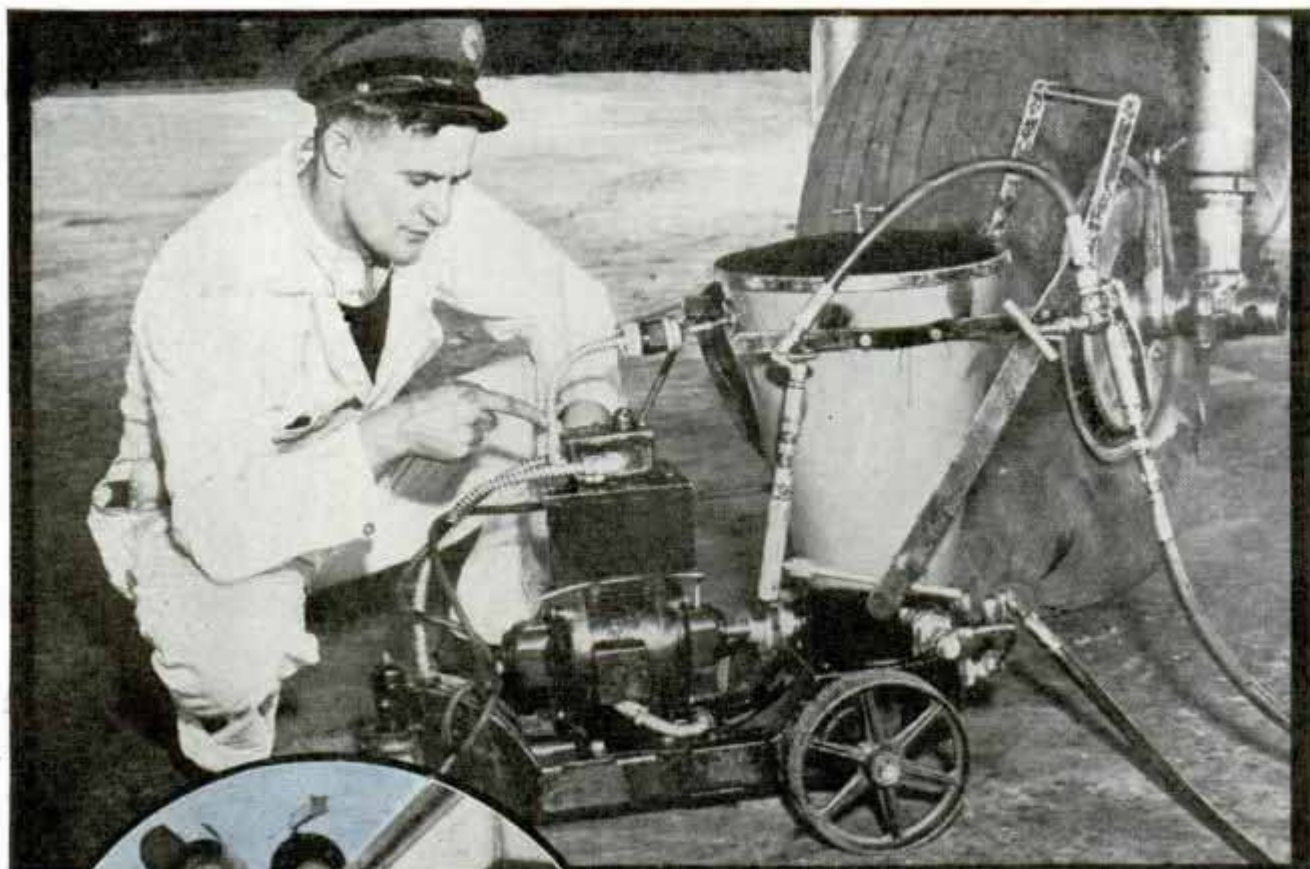
A few minutes later the pilot again hears the voice of the control man.

"WGEH to Andrews, TWA 320," comes the message. "I see you southwest of the field. There is nothing around that section to bother you. Those two private planes are now several miles south of here. Okay to land. Use the southwest runway, please."

The big air liner swoops low and as its wheels roll over the runway, Pilot Andrews again hears the voice of the control man.

"Okay, Andrews, to turn right," he is informed. "One of those private planes is preparing to land at your left. Taxi to Gate three."

Such is the procedure today in handling



Stop-and-go light on control tower, and electric oil heater developed by TWA mechanics

traffic at the country's most congested airports. A few years ago traffic was no problem. Except for a few federal "safety rules of the road," pilots were allowed to pursue almost any course they pleased in landing and taking off.

Then, around busy airports, the air began to be full of planes. Within the last five years the number of ships making scheduled trips over the airways has about doubled. And the amount of time these same ships spend in the air has quadrupled, due to new instruments which virtually make all-weather flying possible,

and to the development of ships and engines which require less time in the hands of maintenance crews.

At the Chicago Municipal Airport, for instance, arrivals and departures average more than 150 per day or about 60,000 per year. From three to seven air lines use some of the large airports and arrivals and departures in many cases occur at approximately the same time. Pilots began to worry about the possibilities of trouble in these congested airport areas.

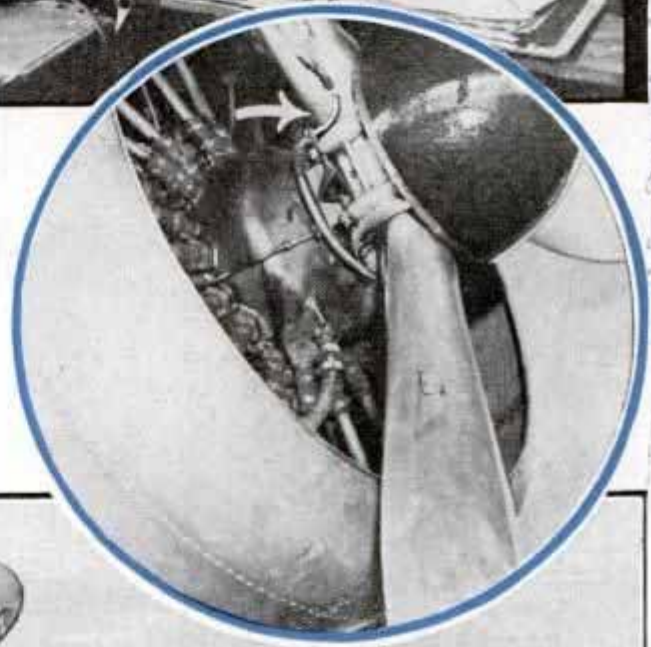
As a result, the federal bureau of air commerce and the commercial air line operators adopted a series of interline safety agreements, hard and fast regulations intended to prevent accidents or delays when a large number of ships are converging on the same airport simultaneously, particularly at night or under poor visibility conditions. Adoption of the agreements was followed by the appointment of a traffic coordinator for the bureau of air commerce who is directing the formulation of regulations similar to the unofficial agreements, which eventually are expected to become a part of the air commerce laws.

Because conditions were different for each airport, it was necessary to draw up

separate regulations for each of the busiest terminals. The most complicated of all was the Chicago safety agreement because seven lines center at the Chicago Municipal Airport.

The skyways traveled by commercial aircraft may be likened to broad highways traveled by automobiles, except that the skyways have a third dimension—that is, there are various levels at which ships may fly. Commercial ships follow routes marked by flashing light beacons on the ground and by radio range beacons emitting audible signals to keep pilots on course regardless of visibility of the light beacons.

Since the routes of all seven lines using the Chicago airport converge at that point, the vicinity of the airport is an area of heavy traffic for planes, just as several converging main highways would be an area of heavy traffic for automobiles. In



Keeping log of arrivals and departures in traffic control tower. Below, air-conditioner cooling cabin of sky liner and de-icing tubes on propeller hub

each case, regulation is necessary to prevent traffic snarls and possible accidents.

The "traffic officers" who regulate landings and take-offs from the Municipal airport in Chicago are housed in a little glass cubicle perched atop the passenger terminal. The control men issue their orders over WGEH, a fifteen-watt trans-

mitter with a maximum range of about 100 miles under ideal conditions, although most communications involve distances of only fifteen or twenty miles. A localizer radio beam enabling pilots to determine when they are over the field and guiding them down also is operated from the tower.

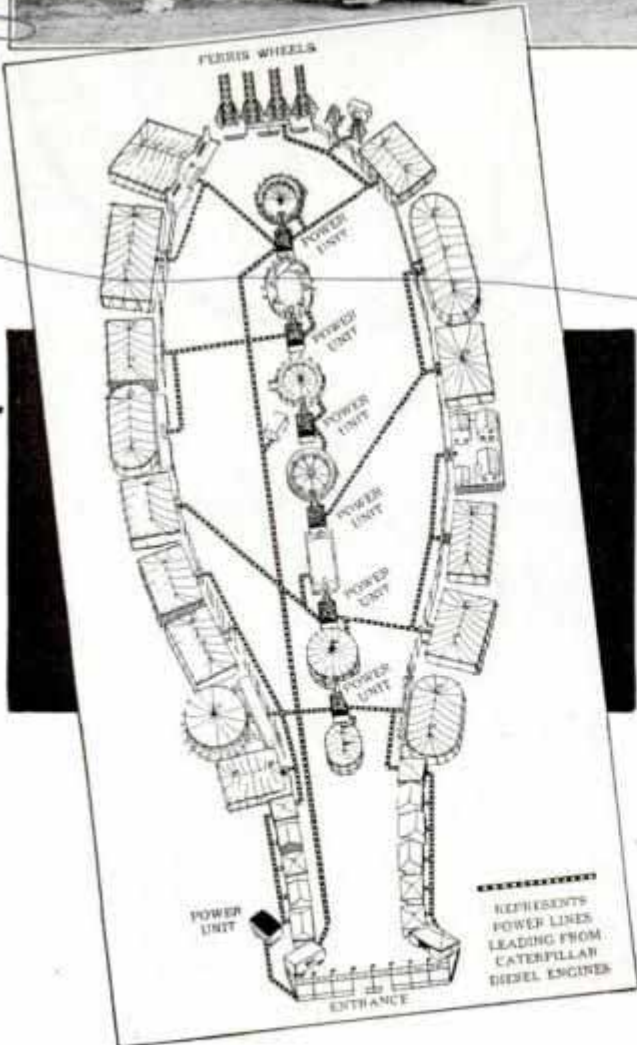
(Continued to page 114A)

7698
 Chicago Municipal Airport
 Chicago, Illinois

Diesels Supply Light and Power for Tent Show



Caterpillar Tractor Co
Peoria, Ill



Carnival lighted at night by Diesel units, some of the power wagons and diagram of layout

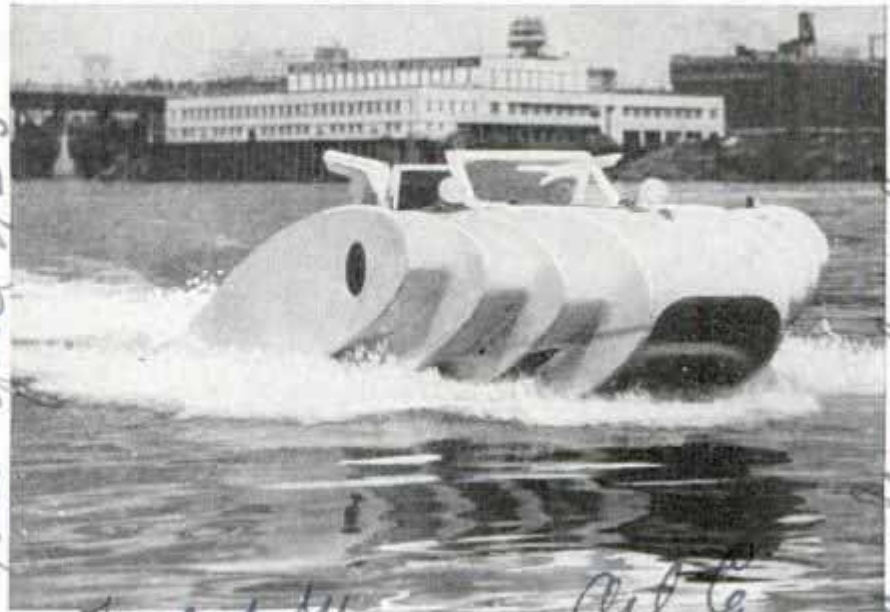
Light and power for a large traveling tent show which last year cost \$40,000 in purchased electric current, is being supplied this year by seven 125-horsepower Diesel engines for only a fraction of that sum. Each power unit consists of a Diesel engine connected direct to a sixty-kilowatt, alternating-current generator. Six of the units are 120-volt, single-phase generators and the seventh is of the 120-208 volt three-phase type. The Diesel units are installed in wagons which are bases for floodlight towers sixty-seven feet high. On each tower is mounted a ton of floodlights. The towers, of steel and aluminum framework, are collapsible and occupy little space when folded and stored. The power units and other rolling equipment are moved from lot to railroad siding by tractors of the endless-track type. Six of the power wagons are set down the middle of the midway, the seventh supplying power for the thousands of bulbs and strings of neon-tube sets at the entrance. The three-phase generator set powers a battery of floodlights, furnishes current

for the major rides, lights the ticket wagon and provides heat to maintain the even temperature necessary in the snake pens. The owners of the show estimate the power and light bill this year at \$5,000, about one-eighth of the cost last year.

Horse's Shipping Crate Has Feed Rack

To avoid loss of valued livestock because of heat and other hazards of slow transportation, horses are now crated and shipped on fast express cars. The wooden crate is small enough to prevent the horse injuring itself, and ample feed for long journeys can be provided in a rack attached to the side of the crate.

'Wings' on Streamline Boat Help to Increase Its Speed



Constructed with odd wing-like outriders or planes, this boat resembles an army tank afloat. The craft rides high as speed increases

Fashioned along the lines of an airplane wing, a new streamline boat has airtight compartments shaped like wings extending from each side. These "wings" serve to lift the boat out of the water as speed is increased. This results in the boat riding almost entirely on the surface. The streamline design is said to impart high efficiency to the craft, which is used by the city of Portland, Ore., as an ambulance boat on the Willamette river.



Note the feed rack attached to this crate in which horses are shipped by express

"Tape Measure" Cartridge Varies Distance of Shot

"Tape-measure" bullets packed with powder strips by which the bullet's distance can be controlled are the invention of an army man at Aberdeen, Md. Instead of the old method of removing the top of a cartridge and scooping out part of the powder, the new method is to leave a slot in the side of the cartridge, through which the end of the tape measure of powder protrudes. The powder is rolled in strips, marked off in yards showing how far the strip remaining in the cartridge will send the bullet. To shorten the firing distance, the gunner merely pulls out the powder strip to the desired mark and tears it off.

Cent. Townsend, Esq. Jefferson City, Mo. R. D. McLeod

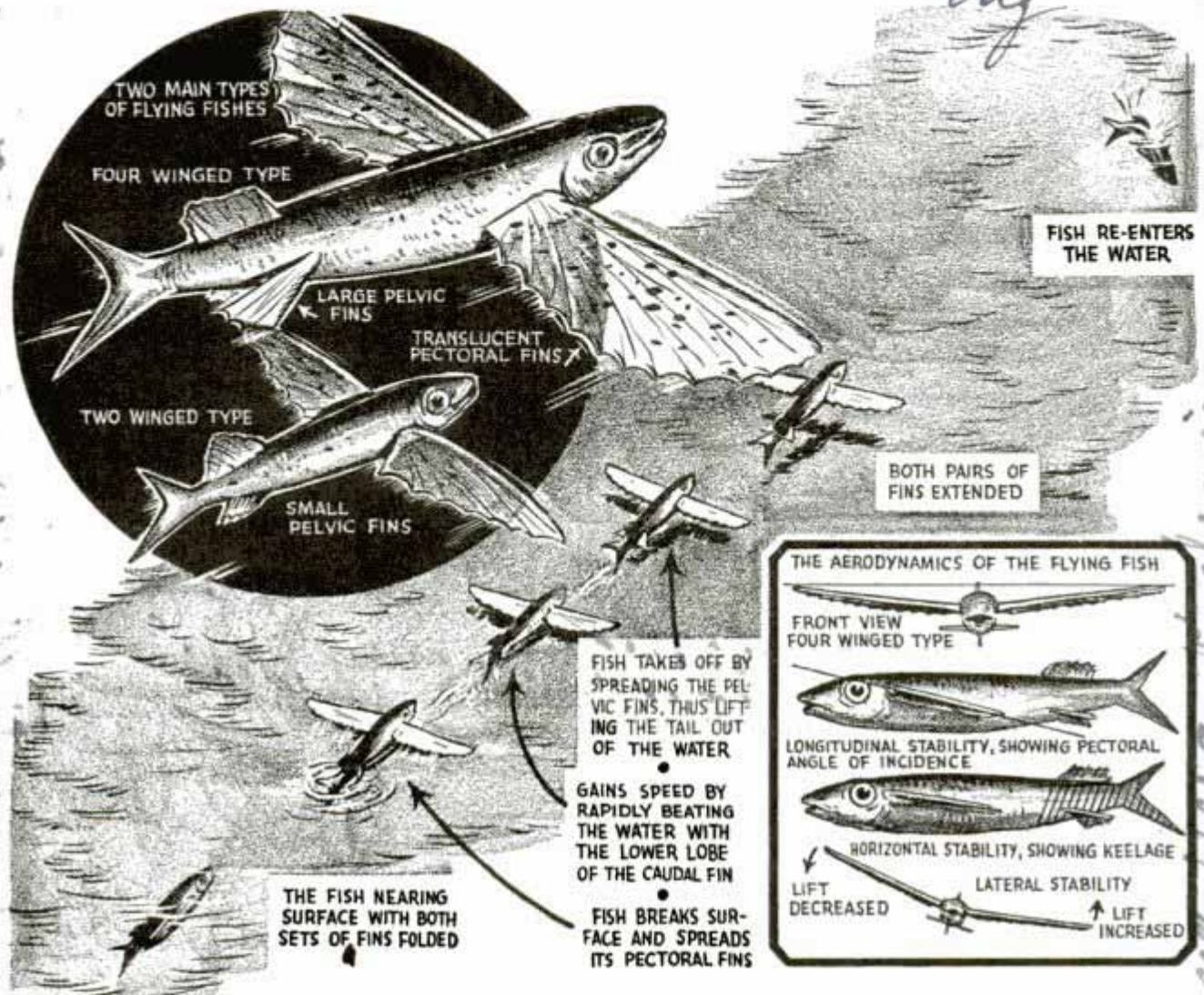
see April 1935

tested by Army. Vacuum Oil Co. reagent.

U. S. Stude, 867 Kelly St. Portland, Ore. dim. Gun Corps

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Flying Fish Glides in Air with Fins for Wings



Flying fish are nature's gliders, taking off from the water at a speed of fifty to sixty feet per second and soaring, rather than flying, on pectoral fins extended like the wings of a monoplane. The fins are not "flapped" like a bird's wings in flight, but are merely supporting planes. The fish accomplishes its terrific drive by a rapid sculling motion with the lower lobe of the caudal or tail fin, which vibrates doubly from fifty to seventy times per second. Carl L. Hubbs of the University of Michigan museum of zoology, who has studied the gliding fish, says it shoots to the surface of the sea with fins folded, and as it breaks the surface spreads its pectoral fins to lift the forward part of its body clear. The caudal fin is rapidly beating the water to gain speed, and finally the fish rises clear by spreading its pelvic fins, which lift the tail from the water. A half minute is a good glide, but sometimes the fish can

prolong its flight by dipping its tail in the water and spurting up again. While the fish can make quick turns in the air, it is a clumsy glider and sometimes collides with another fish or a ship. They have been seen to make involuntary half-loops when struck by up-currents of air.

I 955
2041 127

Vinegar Bath for Oysters Causes Them to Open

Oysters now can be made to open automatically by a method of anesthetizing them which was patented recently. First, the oysters are given a "shock" by shaking them, spinning them in a centrifuge or even shocking them electrically. Stupefied or "dizzy," the oysters are next placed in a solution which may be nothing more than water containing a small amount of acetic acid which is present in ordinary

Ann Arbor. Mich.

Palau Bernie

W. S. Bureau of Fisheries, Washington, D.C.

vinegar. Ether, chloroform, alcohol or salts of many kinds also can be used. The treatment causes the shells to open automatically for removal of the meat or for planting seed pearls. The treatment does not injure the meat, it is claimed. The oysters in which seed pearls are placed recover if returned to the water within a reasonable time.

Paint Softened by Chemical Washes Off

Paint removal has been simplified by a chemical which softens the paint so that it can be washed off with a high-pressure jet of water. The preparation is applied to the painted surface with a spray, or a brush may be used on small areas. The softening process takes from one to twenty-four hours, one application usually being sufficient.

Plane Needs Three Scales to Determine Its Weight

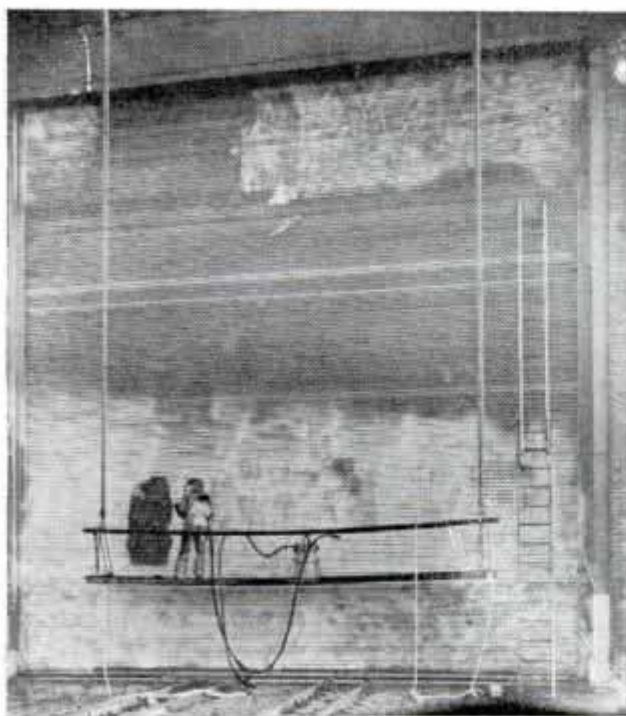
Here is the way a giant air liner steps on the scales. The two front wheels are resting on individual scales while the framework supporting the tail is on a third. This ship weighed six tons



*Styck Chicago
J. W.A. News Service*

cont.

When a giant TWA air liner is weighed, three scales are necessary, each one supporting and weighing part of the plane. Annual reweighing is required by the bureau of air commerce. One of the large ships tipped the scales at six tons. A remarkable thing is that this same ship is capable of lifting its own weight and an additional weight of six thousand pounds and flying at 200 miles per hour. The weighing process consists of placing the wheels on special scales and hoisting the tail off the floor approximately twenty-three feet in flying position, with the hoist standing on a third scale. The weight of the blocks and hoists is subtracted from the total readings to arrive at the actual weight of the plane.



Applying new type of paint remover

It is estimated that the nation's annual bill for rust is one billion dollars, equal to the yearly interest on the public debt.

*American Chemical
Prod. - C. Doubler Pa
Copper
Research Assn.*

F995 C.W. Thomas E. Stinson, Jr
10555 Holman Ave
Los Angeles, Calif

TRICKS of the RACE



Top, roaring into a turn. Bottom, giving drivers the checkered flag at end of race as two cars finish neck-and-neck

A HANDFUL of salt once won an automobile race. Smart drivers of midget cars fill their radiators with ocean water. In an economy race some drivers have their fuel measured out the night before and others pack Dry Ice around their gasoline cans. Some drivers tune their engines with barometers and humidity indicators. "Bird trouble" is one of the hazards of driving a race car.

These are some of the odd things about

racing. Drivers will try almost anything once in their efforts to get more speed and sometimes they hit upon queer ways of winning a race.

The handful of salt played its important part during a fast race on a hot day on an eastern track. All the cars were overheating and the drivers had to stop every few laps for radiator water. Finally one racer called for a pound of salt and dumped it into his radiator. That ended his cooling problem and he finished the race without stopping. Drivers of midget cars use ocean water for the same reason. The salt makes it a better coolant than plain water. But don't try it in your own

car. Salt corrodes water passages in the engine block and the racing drivers drain and flush their radiators every time they use it.

You get more for your money when you buy gasoline on a cold day. Fuel expands with heat, hence on a hot day a gallon of gasoline is really less than a full gallon. When some tracks limited fuel the drivers who knew this demanded their gasoline on the night before, when it was cool

F 795.

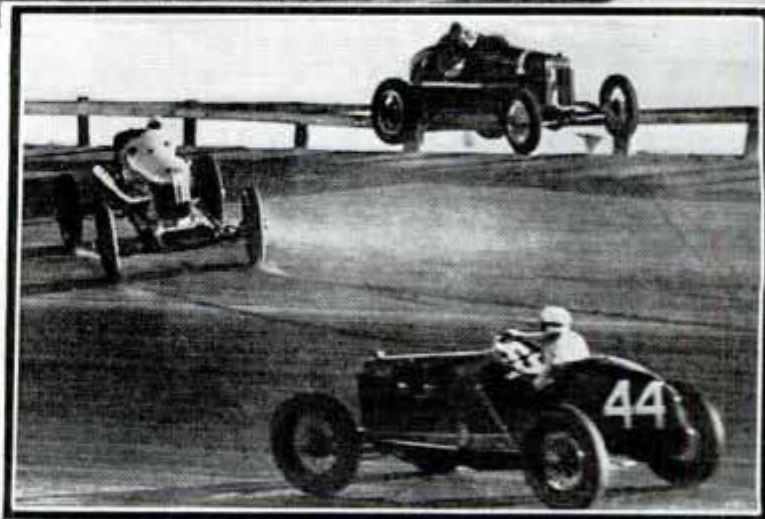
DRIVERS



The "speed groove" is a shallow groove cut into the track surface, usually made of concrete or asphalt, to provide extra grip for the tires. It is often used in wet conditions to prevent aquaplaning.

enough to get full measure. At Indianapolis fuel is metered out shortly before the race, and some drivers in the past packed Dry Ice around the cans so the gasoline would condense into the smallest possible space. That way they were apt to get a few more pints, possibly enough to win the race instead of stalling with a dry tank.

High-compression engines are even sensitive to atmospheric changes and smart drivers often tune their engines according to meteorological conditions. Wilbur



Top, explaining location of "speed groove" on track. Bottom, beginning of wreck. Note car with all four wheels off track



Throwing dirt on oil from wrecked car to prevent it from running down on the track and endangering the lives of other drivers left in the race. A wreck holds peril for every driver in the race

Shaw consults a barometer and humidity indicator when he wants to tune his motor for maximum power. Other drivers use the color of the exhaust smoke in checking the engine. If the smoke is white the fuel mixture is too rich, and if the exhaust smoke is black the oil pressure needs to be reduced. Bluish smoke shows the engine is running properly.

Nearly every veteran driver has collided with birds flying across the track. Ralph Hepburn once received a fractured skull that way but he managed to stay conscious long enough to stop his car. Crash helmets have removed some of the dangers of "bird trouble."

Every track has a "speed groove" which is the fastest although not the shortest path around the track. Drivers who hug the rail must drive slower than those who ride the groove higher on the track. It's called a groove because on dirt tracks it is usually well marked after a few laps.

Intake manifolds of racing engines are apt to freeze on hot days and the drivers pipe hot exhaust gases around the intakes to keep them warm. An unheated manifold may become covered with hoar frost, a condition that results from the cooling action of the vaporized gasoline that

rushes up the interior of the manifold pipe.

Lubricating their engines with gasoline is another of the "crazy" things that drivers do. In spite of upper cylinder oilers there are apt to be small rings at the tops of the cylinders that receive too little oil for frictionless performance. Drivers provide for this by using fuel mixtures slightly richer than would be necessary if they drove slower. The theory is that some of the unburned gasoline filters down past the tops of the pistons and lubricates the metal walls. The drivers know that the easiest way to burn up a motor is to run on too lean a fuel mixture.

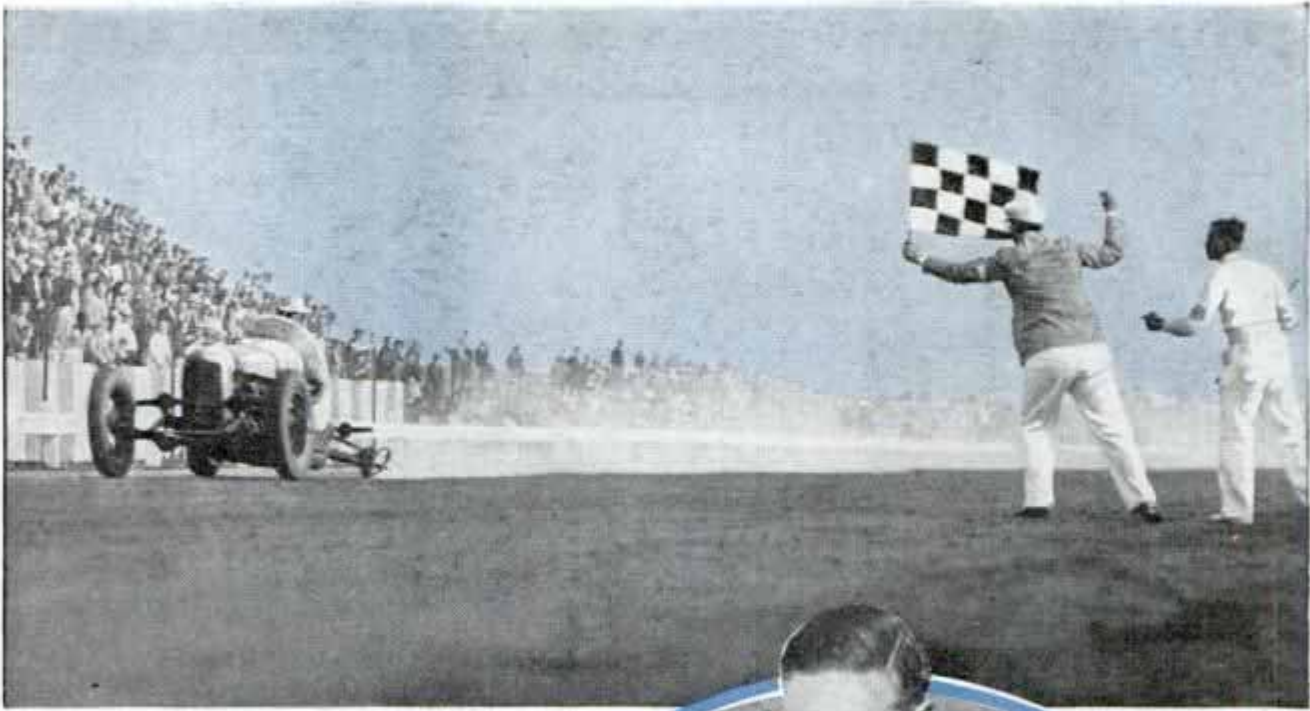
You don't need to "break in" a racing engine, because it is put together with wide clearances that would never be tolerated in ordinary use. The result is a noisier engine, but it permits driving 120 or 130 miles per hour the day the engine is installed.

Stock engines would literally fly to pieces if they were turned up to the speeds that some of the racing engines achieve. A few midget racing motors have been "wound up" to 9,500 revolutions per minute without harm. This is possible because each moving part is balanced to a thousandths of an ounce and because all

Bob Blair Muncie
 Newport Los Angeles Calif

5077
 5795

F795



parts of the engine are heat treated.

In your own car you are lucky to get twenty miles to the gallon if you drive around forty-five miles per hour. Speed up and you pay for it by using more fuel. At 100 miles per hour your car might go only ten or eleven miles per gallon of fuel. Yet racing cars go faster than that on much less gasoline. In the 500-mile Indianapolis race this year, Louis Meyer averaged 109 miles per hour and drove about sixteen miles per gallon of gasoline. Semi-streamlining

(Continued to page 126A)



Top, car finishing race on the axle, having lost wheel two laps back. Circle, heating oil so car will be at peak efficiency. Bottom, start of wreck in which driver and mechanic were killed

(Continued to page 126A)

Auto Is Made Convertible into Ambulance

*Arntgen Chevrolet Co. Chicago
810 N. Clark*



Top, cutaway showing patient on stretcher in police car. Bottom, left and center, views of stretcher in car. Right, stretcher folded in trunk

For converting the passenger automobile into an ambulance in emergencies, special equipment is available. The change does not affect the outward appearance of the car or the interior when in normal use. Thus, the car becomes a combination vehicle, serving either purpose. The equipment is installed in the trunk. In an emergency the stretcher is unfolded and rolled on steel tubing rails into a position across the front and back seats and locked. Or, the stretcher may be removed from the car for picking up the patient and then returned to the truck to be rolled into position. Auxiliary stretchers, splints and other equipment may be obtained. In this manner any police car may be turned into a first-aid ambulance and any country doctor may have the means of moving his patient to a hospital with a minimum of discomfort. The change from passenger car to ambulance requires less than two minutes.

Ice Skate with a Double Blade Reduces Ankle Strain

Designed for safety, the latest ice skate has a double blade which reduces ankle strain and which eliminates many of the hazards for the beginner. A concealed equalizing spring returns the skate to the proper position at the conclusion of each stroke. The skater's shoe can incline freely to either side, but



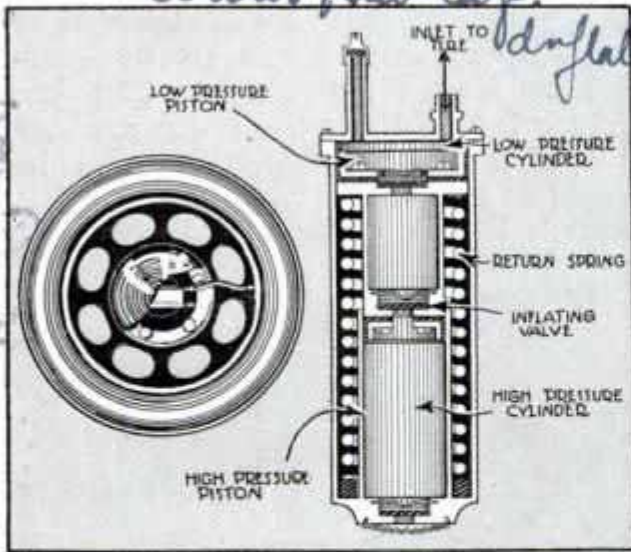
*Dr. Arthur Kautz
Safety Case*

*Double Blade Ice Skate
#1, 496.925
5205*

cannot rub on the ice. Skidding is practically eliminated by the double blade, yet the skater may execute intricate figures with all the ease of any one using conventional single-blade skates. Ankle braces and straps are unnecessary and the shoe may be laced loosely, giving more comfort.

Hub Pump Keeps Tire Inflated as Car Runs

Automatic inflation of tires when the air drops below a fixed pressure is accomplished by a two-cylinder hub cap pump now on the market. If normal tire pressure is twenty-five pounds, the pump can be set to start inflating the tire whenever it drops to twenty-three pounds. Power is derived from irregularities in the road surface. When air pressure drops to the fixed minimum, resistance of a spring in the inflator is over-



Drawings show two views of two-cylinder pump which keeps tire inflated while running.

come and the high-pressure inflator piston starts working, pumping air through a tube to the tire valve. Original inflation is through a separate valve.

*Altherm Products
One Broadway Hill*

Chemicals "Fingerprinted" to Help Identify Substances



Apparatus used in taking "fingerprints" of unknown chemical substances for comparison with "prints" of compounds already identified

Identification of unknown substances through a method of "fingerprinting" chemicals is made possible by the use of X-ray diffraction patterns. The method permits accurate analysis of particles no larger than the point of a pin, but it is not applicable to liquids or to other non-crystalline substances. The molecules of any given compound are known to be arranged in a definite geometrical structure, which is characteristic of this compound only. Equally characteristic of the compound is the photographic pattern which results from the interaction of X-rays with this definite geometrical structure. Thus, the photographic pattern can be viewed as the "fingerprint" of the chemical compound. The method permits identification, even though the unknown is a mixture of substances of similar chemical nature.

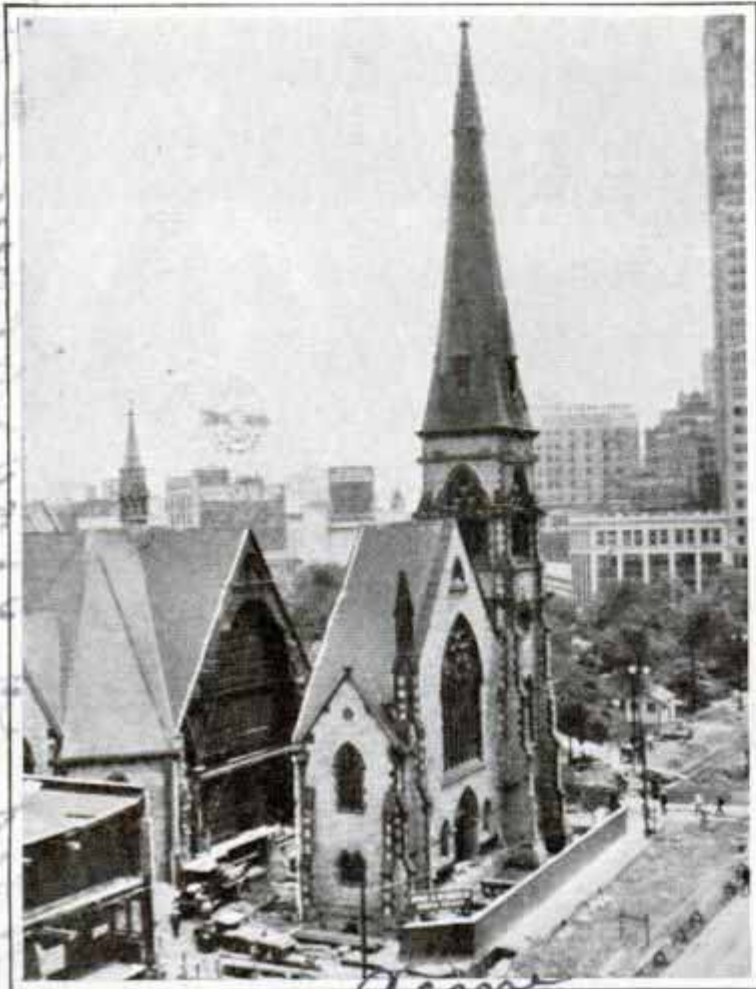
QST!—Correction—QST!

The following W1 calls were listed as W7's by error in the article "Minute Men of the Air" which appeared in our September issue: W1MY; W1JPE; W1XT and W1NF.

*Used by slow chemical compound
midland, Mich*

Haydy Brown Corp
3925 W. 7th St
Detroit, Mich

Tall Church Spire Is Moved to Permit Widening of Street



Showing spire and twenty-six-foot segment of church separated from main auditorium in unusual building operation

Widening a street in downtown Detroit meant a major surgical operation for the Central Methodist church. A twenty-six foot segment was cut from the church, and the entire front of the edifice, including its 183-foot steeple, had to be moved back from the street and rejoined to the main body of the church now shrunken in size. The spire weighs 3,500,000 pounds.

Auto Governor Is Adjustable to Speed Desired

F904

Making it unnecessary for fleet operators to use several governors for different speeds, the latest type of automotive engine governor can be adjusted and locked at the speed desired. The universal type is designed to reduce the cost of installations on fleets of trucks, buses or automob-

biles. It is available in three models, with sealed adjustment, lock adjustment type and key control adjustment located on the dash. Setting the speed from the dash makes possible the application of the governor to the passenger car since the owner is thus permitted to impose on younger members of his family a top speed at which the vehicle may be operated.

'Electric Eye' Tunes Piano to Accurate Pitch

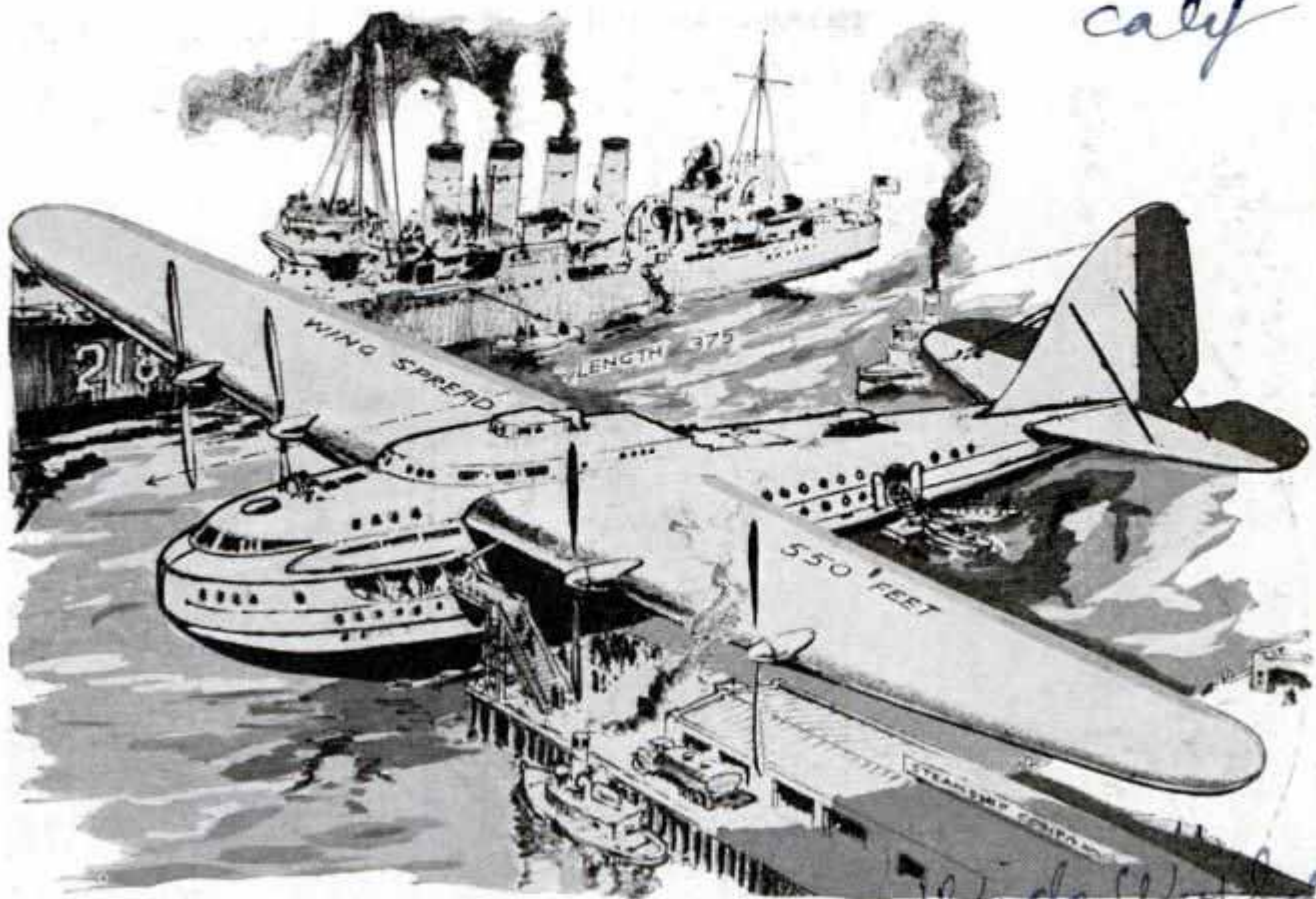
Housed in two portable cases, an "electric eye" machine for tuning pianos has been found to give more precision in setting strings than when the work was done by ear. A more accurate pitch can be obtained and the piano stays tuned longer, makers of the instrument claim. The dial of the machine is set to the tonal pitch and quality desired. Sound of the piano strings is translated into light by the photocell. This light shows the vibration of the strings and corrections are made in accordance with the finding. The strings are adjusted by hand, as usual. By focusing the electric eye on single strings, the operator or tuner can detect sympathetic vibrations inaudible to the ear. Another feature is that operation of the machine and adjustment of the strings can be taught in a few weeks, whereas it takes years to become expert at tuning by ear.



Tuning piano with the "electric eye." Adjustments are made as machine indicates pitch

Wade
Baermen

Ocean Air Liner Big as Destroyer Predicted



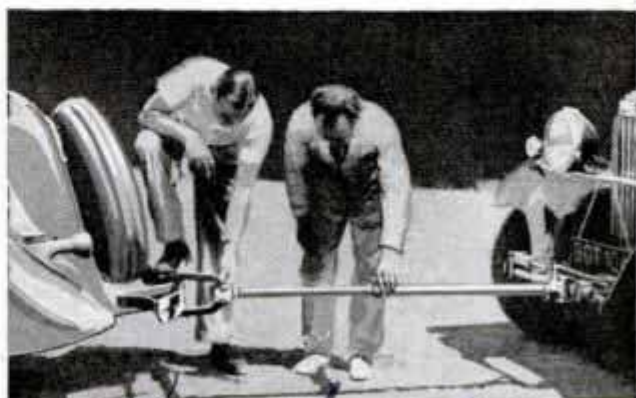
Here is the designer's idea of how the giant transatlantic air liner of the future will appear. Note the great wing spreading over the dock. Destroyer in the background helps to illustrate the plane's size

Capable of carrying 500 passengers, the flying boat of the future will be as large as a destroyer, according to *Schuler* Kleinhans, designer for one of the leading aircraft companies. More than 375 feet long, with a wing spread of 550 feet, the 1,500-ton air liner would be powered by a 200,000-horsepower engine system which would propel the craft at 300 miles per hour at an altitude of 12,000 feet. Such a plane could cross from New York to Liv-

erpool in eleven hours. It would be multi-decked, deep hulled. A crew of 100 would be required, according to the designer, who has prepared a sketch of the flying boat. This sketch pictures the liner hawsered to a steamship dock, with a destroyer of about the same length in the background to give some idea of the size of the flying boat. Powered by four engines, possibly of the Diesel type, the craft would cost about \$20,000,000.

Police Car's 'Claw' Grabs Bumper of Fugitive Automobile

Equipped with an odd claw arm which can be operated from the driving compartment, police cars may reach out and grab the spare wheel or bumper of a fugitive automobile in a chase. The claw may be moved in any direction desired. Attached to the front of the police car, it extends almost six feet. The claw is the invention of Sir Malcolm Campbell, driver of the famous "Bluebird" racing cars which hold the world's land speed record.



Key Stone

3. Aircraft Co. Santa Monica Calif

Wider World

1915

UP *and* DOWN



All photos © Wide World

Above, type of mail rocket which underwent tests in Belgium. Right, explosion of test rocket at night. Below, bathysphere used by Dr. William Beebe for under water exploration.

underground explorer. Thus, a new motor, as long as a bean pole, stands on its head at the bottom of a deep hole and "kicks" oil to the surface. With such devices, it is possible to extend commercial operations into the earth at greater depths than heretofore. This single invention, the "bean-pole motor," promises to increase the nation's oil reserves by millions of barrels. In the opposite direction, high altitude, a meteorological balloon loaded with instruments recently reached the highest





level ever recorded for a man-made instrument. It soared to an altitude of 138,451 feet, approximately twenty-six miles, almost twice as high as the maximum altitude yet reached by man.

Without oxygen a man can climb to an altitude of about 18,000 feet. It is a comparatively short time since men began to explore beyond three miles up. In fact, it is less than ten years since Capt. Hawthorne C. Gray of the army air corps, blazed a trail into the stratosphere. And only in the last five years has the altitude record for human

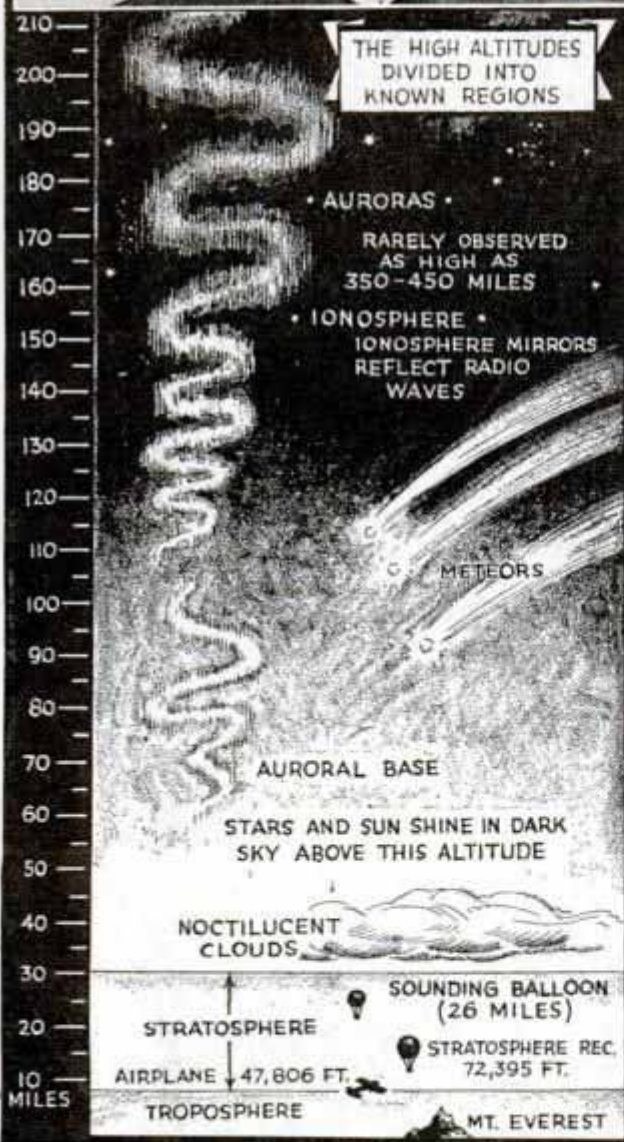
flight jumped from 42,000 to 72,395 feet, a gain of about 30,000 feet. The limit of high-altitude exploration recently has risen an average of about one mile per year. If this rate of gain continues for another century, man will have reached an altitude of about 115 miles.

The stratosphere ends at an altitude of thirty miles, and thereafter one enters the ionosphere, as unknown today as the stratosphere was twenty years ago. There is a possibility that free balloons will soon reach the upper limit of the stratosphere, and thus will commence a new epoch in the story of aerial exploration.

The present airplane altitude record, 47,806 feet, was established recently by a Russian aviator. The previous record, 47,352 feet, had been made by Renato Donati, the Italian ace. The new record, however, is still short of the stratosphere balloon record by almost five miles.

The stratosphere balloon may have an effective range up to 100,000 feet. Beyond that, we must depend upon free hydrogen balloons and rockets. Rockets hold forth the greatest possibilities for exploring the ionosphere for they are the only known self-propelling devices that can travel in very rare air without loss of efficiency.

No man-made device has ever crossed into the vast region of the ionosphere. But the promise of rockets is very bright. An American rocket has already attained a



Attaching aluminum soles to suit intended for flyer penetrating the stratosphere, and diagram showing the location of the several known high-altitude regions

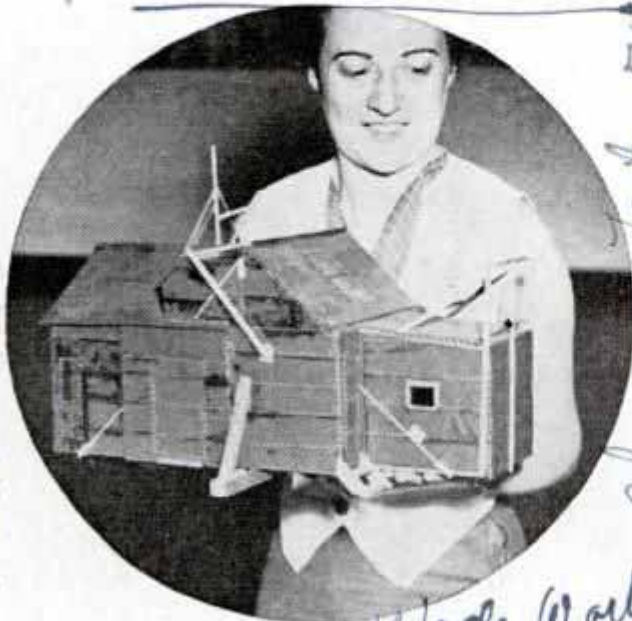
velocity of 700 miles an hour and rocket motors have shown remarkable efficiency. Metallurgists, aircraft designers, chemists, and physicists are working together on the problems of super-altitude rocket flight, and such attempts probably will be made in the next few years.

The ionosphere was first discovered by that long-range tool, the spectroscope. Its boundaries are not exact, but its presence is shown by the presence of ozone and by its ability to reflect sounds of heavy explosions, as well as by the behavior of meteors. At a height of about fifty miles, there are said to be "clouds" which some believe are collections of minute dust particles. But not many can explain how dust managed to collect at this altitude. At forty-five miles there are signs of twilight, indicating the presence of some air, for twilight cannot occur in a vacuum of space.

(Continued to page 121A)

Model of First Film Studio in Edison Exhibit

Among articles in an exhibit arranged to show history-making points in the career of Thomas A. Edison is a model of the first motion-picture studio in the world. The original was built at the Edison plant in Orange, N. J., at a cost of \$637.37. The model is a part of the Edison exhibit at the New York Museum of Science and Industry in Rockefeller Center.



Here is the first motion-picture studio, in miniature. It appears in Edison exhibit

Tint Mosquitoes with Spray to Trace Their Migration



Spraying marshes with dye to trace the migration of mosquitoes from their breeding grounds

Swamplands west of Chicago, favorite breeding grounds of the mosquito, were sprayed with red, green, purple and yellow dyes this year to "tag" 50,000,000 mosquitoes and learn how far they fly. Would a mosquito travel more than a mile to bite a man? Officials think not, but to prove it they sprayed four marshes four different colors and then, as the tinted mosquitoes started out on their man hunt, set about to trace their migrations.

Whirling Color Filter for Lens Helps Film Blue Eyes

Blue eyes have ceased to be a dilemma for the movie cameraman. Until recently, light-colored eyes have not filmed well and many actors have been kept from screen success by this failure to register. Blue eyes would appear a pale, dishwater grey in the picture. But now the movie technicians have developed a tiny motor that whirls colored ray-filters past the lens when it is focused on a blue-eyed player, and the eyes gain depth and color.

1994

7806

7885

Chicago Trib. 7/10/36

Wide World

Perfect by Karl... m 25 m

Vertical handwritten notes on the right margin: "mosquito abatement", "Les Plaines", "Wide World", "Chicago Trib. 7/10/36", "Perfect by Karl", "m 25 m".

1975

GROWING PEARLS *at* HOME

EVER since the first aborigine cracked open the first shellfish with a stone and found embedded in its flesh a bright, lustrous ball which he prized as an ornament, man has been trying to speed up or improve on nature's method of producing pearls.

And as is usually the case when man keeps everlastingly at a problem, he has finally found the solution and today possesses the knowledge necessary to harness the mollusk to the business of producing the queen of gems "by hand." Working at the Scripps Institution of Oceanography at La Jolla, Calif., La Place Bostwick who has spent years in patient research and experiment, has succeeded in growing perfect pearls in colors in California's beautiful abalones. Some of the gems are delicate shades of green, others are in blue tints, some are blue-black and in a few flamelike flashes of red appear.

Previously Mr. Bostwick has produced ball and egg-shaped fresh water pearls in white and in colors, some of them ten grains in weight, ball and egg-shaped conch pearls and "attached" pearls up to forty grains in weight, but his experiments with abalones may point the way to a brand new industry, particularly along the Pacific coast where "pearl farming" in the future may develop into a commercial enterprise comparable to that in Japan where small white sphere pearls have been grown for years in margarita shells, or "pearl oysters."

It is well for pearl lovers that man has solved the problem of producing the gems



Sorting man-produced pearls. Below, Nordica collection of colored pearls. Drop pearl is an abalone weighing 175 grains



because no new pearl fisheries of consequence have been found in the last fifty years and the known sources have been so depleted that large, fine pearls today are about as scarce as Stradivarius violins.

Nature, it seemed, even in prehistoric times never produced enough pearls to satisfy the demand for them. More than a peck of large gems were found in one of the earthworks of the early Mound Builders and yet there is evidence that even these prehistoric people tried to grow pearls despite the fact that lakes and rivers at that time must have been paved with shells offering a seemingly inexhaustible supply. Fine pearls have been taken from many of the ancient Egyptian tombs and the earliest literature speaks of them.

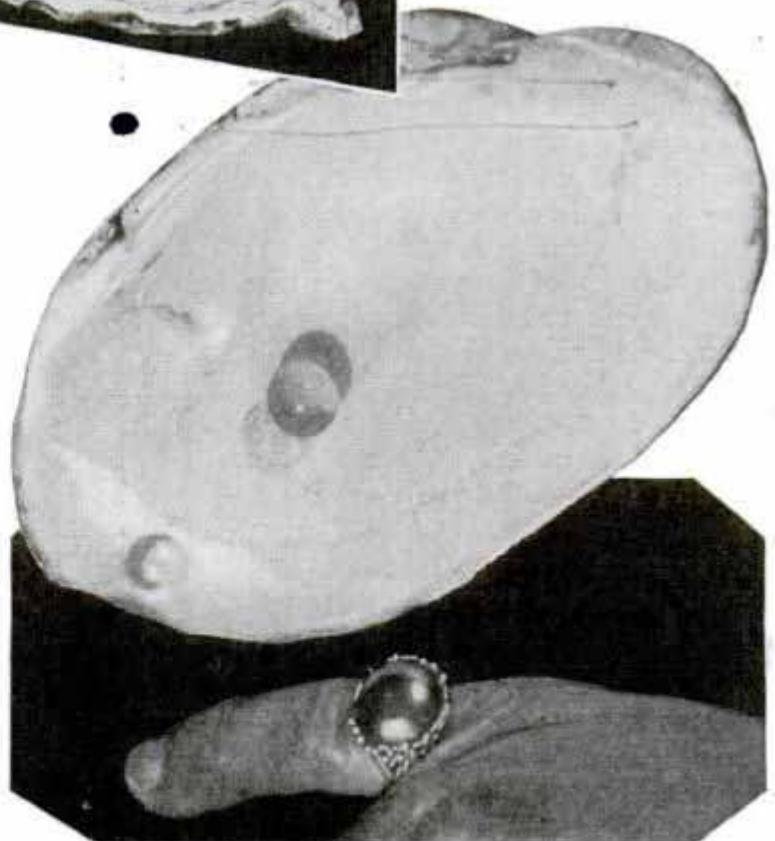
When white men came to America they bartered with the Indians for pearls for a long time before they realized that the Indians were getting them out of near-by lakes and streams. While many pearl hunters searched these waters for fine specimens, it was not until the advent of the mother-of-pearl button business that it was realized that a fortune in

pearls lay hidden in our inland waters. Button factories were established and "shelling camps" dotted the shores of streams throughout the Mississippi drainage system.

Upon opening the shells, pearls were found, varying in size and shape according to the species in which they grew and the localities where they were found. There were innumerable rough barques, or pearls of ir-

regular shape, thousands of small ones and others of large size and excellent quality. Gems valued at millions of dollars often were found in one "shelling season," some worth from \$1,000 to \$3,000 each and a few large ones of exquisite

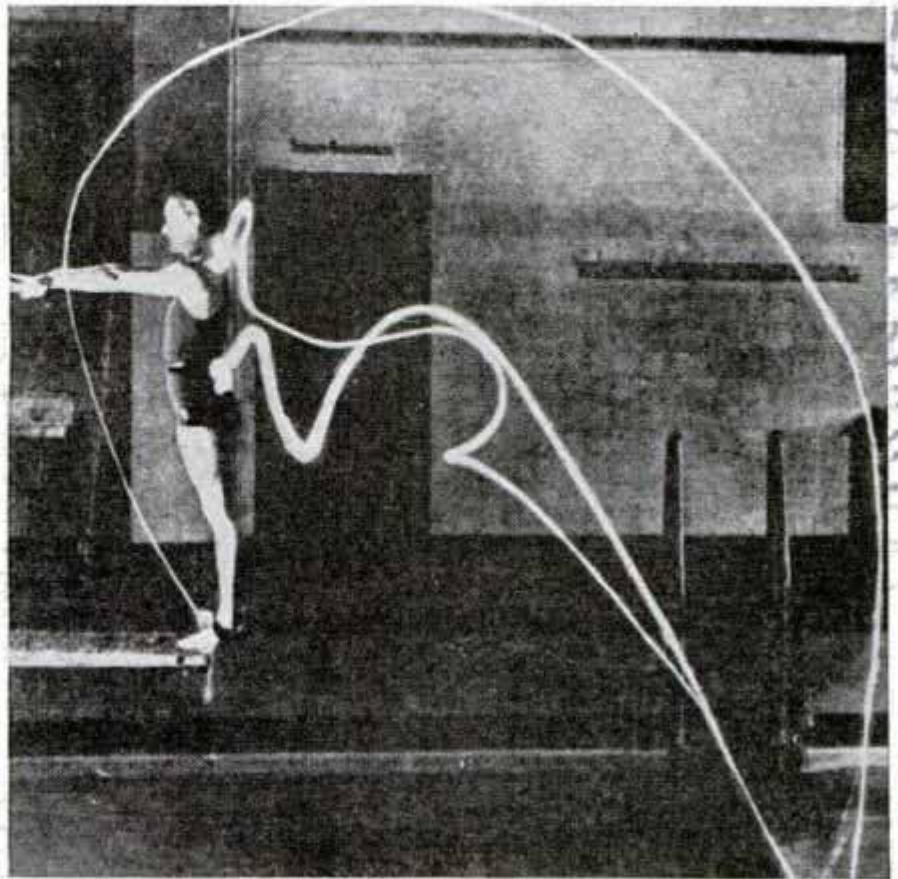
(Continued to page 128A)



Top, operating on abalone. Center, attached conch pearls. Bottom, attached fresh water pearl on shell, pink gem conch pearl in shell and abalone pearl on finger

Flashlights Trace Dive on Photographic Plate

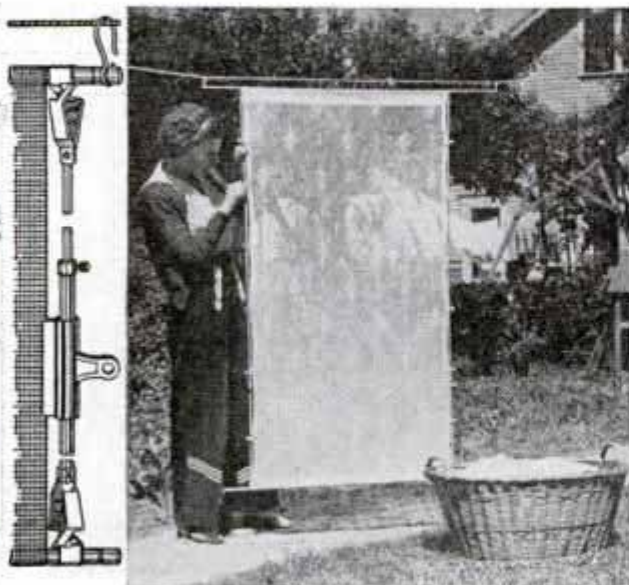
Charting the twists and turns of a swimmer's body in diving is now being done on photographic film by means of lights attached to the diver. Germany's Olympic diving team was trained in this manner, practicing before the camera and then studying their movements as shown by the lines in the picture. A flashlight is attached at the ankle, neck and waist, and the plate is exposed during the dive.



White lines mark travel of flashlights attached to feet, waist and shoulders of diver during demonstration for the camera

Curtains Are Saved by Pinless Stretcher

To save curtains from the uneven edges and occasional tearing caused by pinholes, a curtain stretcher which requires no pins has been developed. After washing the curtain, a light rod is inserted through its upper hem and a heavier rod through the lower hem. Then attachments and clips are adjusted at each side, stretching the curtain smoothly and uniformly.



This pinless stretcher prevents damage to the finest curtain after washing

Pilot Light in Wall Switch Is Guide at Night

Equipped with a small pilot light, the latest wall switch is easy to find at night. The light emits a faint glow which is directed downward so that it does not interfere with sleep, yet is sufficient illumination to dimly outline furniture and other objects. The pilot light turns on when the bright lights are turned off and it uses hardly enough current to register on the meter.



Our Bureau of Information will answer questions regarding articles in this magazine, if accompanied by return postage.

*To lock my Co. clps.
K...*

*Stability & novelty & mayette
Cassan Antoinette...*

Flash Camera for Closeups Aims from Two Inches Away

F945



Two views of flashlight camera in action for closeup and (circle at top, left) the human eye as it appears in closeup photo. The camera is useful for taking clinical pictures and other special work

for photomicrography, clinical pictures for doctors and dentists, floral and biological views and other special closeup pictures.

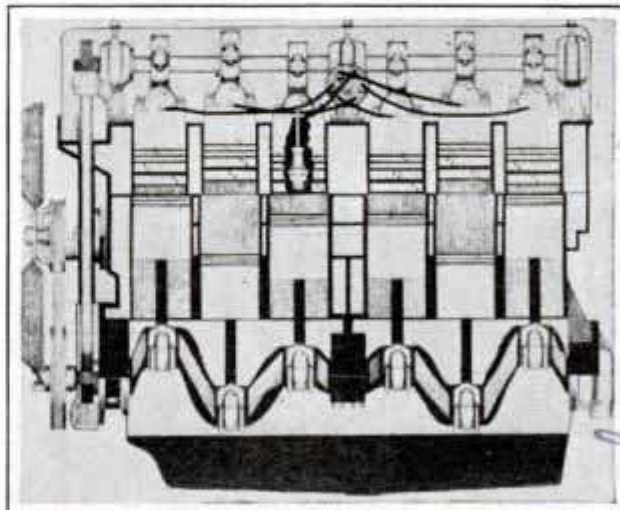
F930

Valveless Head Is Offered for Auto Engine

Offered as a means of converting automobile and truck motors into valveless engines, an unusual motor head is being marketed under the claim that it effects fuel savings of thirty to fifty per cent and increases power and speed. The conversion is simple, the regular head with all valves and valve mechanism being removed, leaving the block free except for the crankshaft and the pistons. Valve openings are then closed permanently by a solid gasket. Installed in the new head is a series of pistons operated by a cam shaft which is gear-driven by a vertical shaft connected to the crankshaft. The cams operate the upper pistons at a certain given stroke. Each upper piston comes to a stop at the time of firing and acts as a head in its cylinder until the

"Firing" at an object only two inches away, a flashlight camera developed for closeup work snaps a picture remarkable for clarity of detail. It is mounted directly in front of a flashlight or floodlight bulb whose light is multiplied by mirrors set in an octagonal housing, literally bombarding the subject with light from every angle. It is adjustable for distance from two to twenty inches, with a fixed shutter speed of one-fiftieth second and a lens aperture adjustable from f-6.3 to f-45. Ordinarily the aperture is stopped down to f-45. The shutter operates like a bulb, pressure of the shutter rod exposing the film and setting off the flash, release of the rod stopping exposure. Flat plates or films three and a quarter by four and a quarter inches are used. The light bulb can be set off by batteries mounted in the back of the reflector or by plugging a cord into the house circuit. The camera, easy to operate with or without tripod, is useful

ated by a cam shaft which is gear-driven by a vertical shaft connected to the crankshaft. The cams operate the upper pistons at a certain given stroke. Each upper piston comes to a stop at the time of firing and acts as a head in its cylinder until the



Drawing shows valveless engine head in place. Note second set of pistons in the head

Burtin mfg. Co. Chicago, Ill. 605 7
 F945
 F930
 John W. Jenkens
 Jenkens Motor Co., 2451 Ethel St. Chicago, Ill.

power stroke is spent. Then it resumes its movement. The explosive mixture and the exhaust are handled through ports on opposite sides of the head. At the time of firing both ports are closed by piston rings. The upper pistons make one stroke while the lower pistons make two. The makers claim that the valveless motor eliminates spring and valve repairs and grinding, results in reduced construction costs when used on new motors and produces greater engine efficiency.

⁷⁹³⁵
**Passengers Watch Speed Dial
 in Rear of Streamline Train**



Here's a new diversion for passengers on streamliners. The dial, located in the last car, shows the speed of the new fast train

⁷⁹³⁴
**Tricycle Rickshaw
 Takes Three
 for a Ride**

Malayan rickshaw boys still furnish the motive power for their vehicles, but now they can ride, too. A new rickshaw that resembles an old-fashioned buggy mounted on a tricycle has been introduced at Penang,



This bike-rickshaw is something new. One advantage is that the operator rides, too

Straits Settlements, by a municipal commissioner, who plans a fleet of fifty rickshaws for hire. Two passengers can ride behind the pedaling rickshaw boy.

The entire world production of radium up to today weighs less than a golf ball.

Speed has an added thrill for passengers on the "Flying Yankee," streamline train of the Boston and Maine railroad. They can sit in the solarium of the rear car and watch the speedometer, installed to tell them exactly how fast this speed train is traveling. The dial reads up to 120 miles an hour. It is illuminated at night, and there is also a clock in its face.

⁷⁸⁸⁷
**Brush Eraser Cleans Paper
 of Ink and Typing Print**

Consisting of a mineral fiber brush in a molded plastic holder, the latest eraser removes ink and typewriter print from paper, and India ink from tracing cloth. It fits the hand conveniently, being about the size of a small fountain pen. The top section of the holder turns to propel the brush through the tip. In this manner the brush can be fed through as needed until used. Refills are available.



*Clamer
 Lin Eon Thon
 Municipal Commissioner*

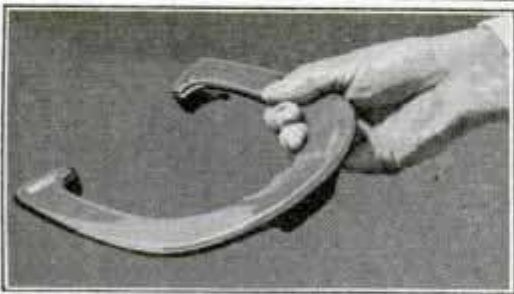
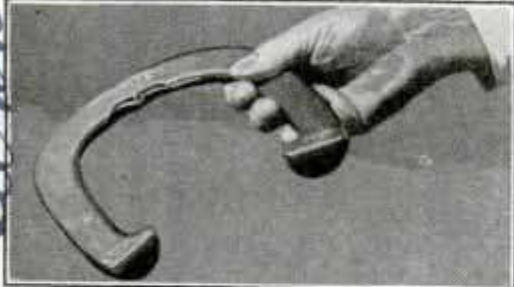
*Allen D. Child
 73, Kansas City, Mo
 W. J. ...
 ...*

*Wayne. D. ...
 Engineer
 June 1936*

*The Eraser Co.
 1208 Washington*

7661 Mrs. James M. ...
 20 W. Dartmouth Road,
 Knoxville City, Mo

Reference: Ted Allen, 206 4 S. Levee, 23
 Illinois, Chicago



HORSESHOE

By Ted Allen

HORSESHOE pitching, like ping-pong, light-harness racing, bicycling and a few other pastimes of a by-gone era, is regaining its place after languishing in the doldrums several years.

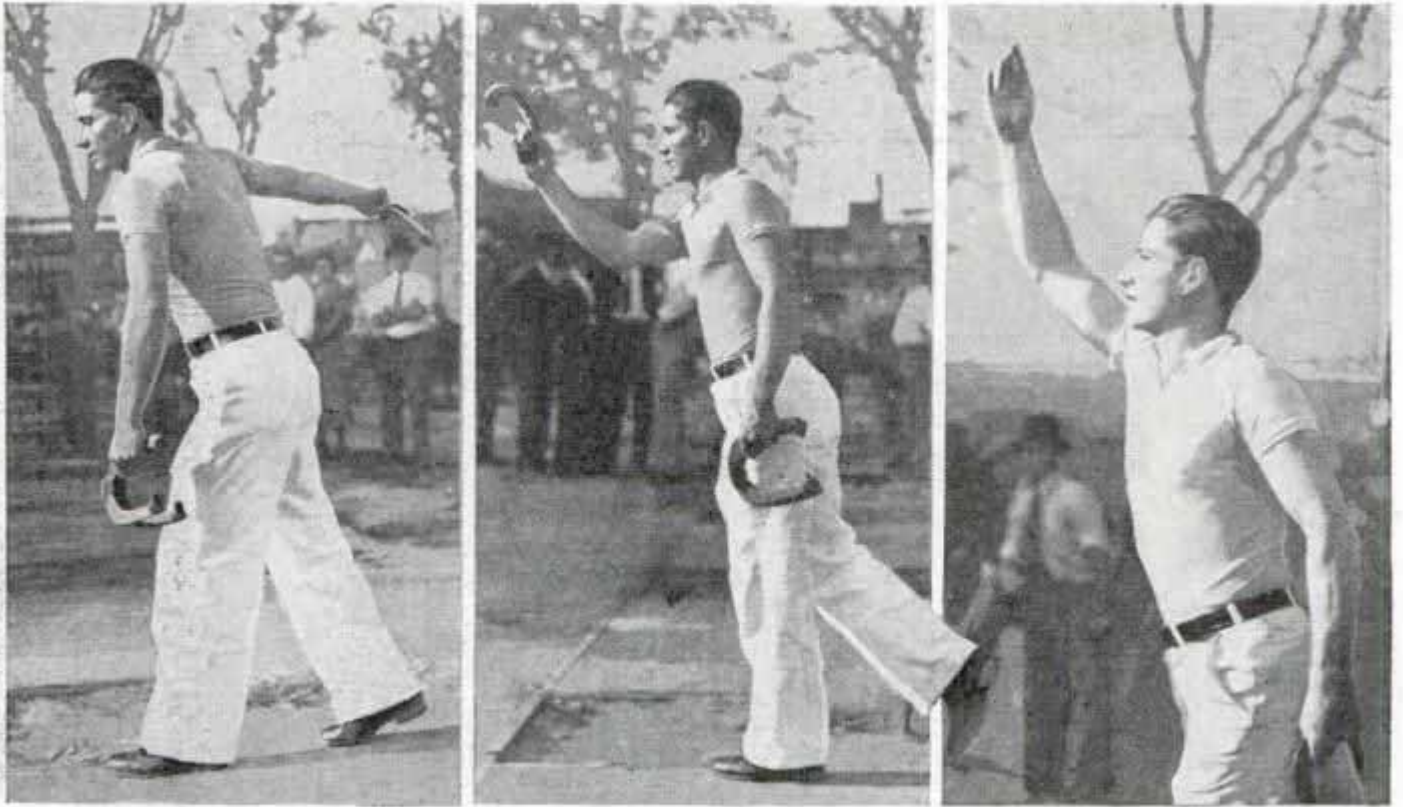
With an enthusiastic following of approximately four million persons, horseshoe pitching may be considered a recreation of the first magnitude. And it appears to be growing in popularity in every section of the country. A number of leading universities have introduced the sport into their physical education departments. Harvard and the University of Southern California were the ringleaders in this movement and many other colleges and public schools are following suit.

Horseshoe pitching is almost the perfect game because it has many of the advantages of the more popular forms of sport without their drawbacks. To young and old, it offers amusement, competitive thrills and exercise of both mind and body, though not too strenuous in either case. It can be played indoors or out, and in such a way that the experienced player can match his skill against an inexperienced one.

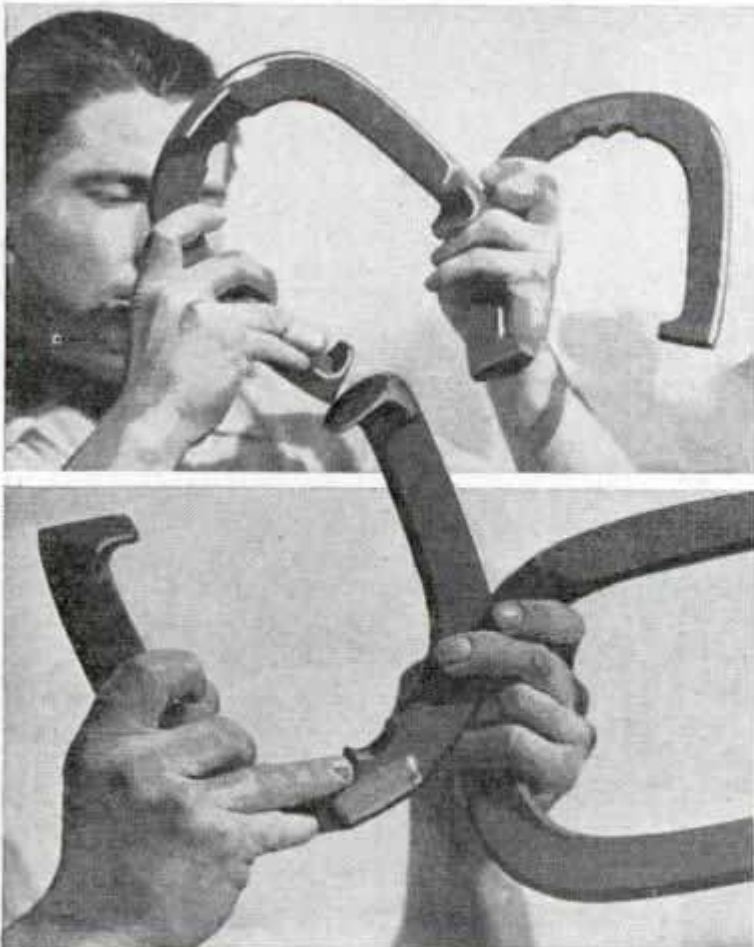
But like the old gray mare, horseshoe pitching "ain't what she used to be." It has grown scientific and a little high-brow. In fact, the term

Top, left, perfect form. Strip on this and facing page, proper stance, backswing, starting throw, release and the follow-through. Note position of feet in each photo. Center, left, and bottom, learning how to hold the shoe

Reference: Ted Allen, 206 4 S. Levee, 23 Illinois, Chicago



PITCHING *Comes Back*



Note position of fingers as one expert player demonstrates two of the grips found effective in championship contests

horseshoe has been preserved merely for sentimental reasons. By no stretch of the imagination could anyone picture a horse shod in the game's present-day implements. They are approximately seven inches wide, seven and one-half inches long and weigh about two and one-half pounds. There are a few other requirements concerning the distance between calks and their size that would preclude them as suitable equine footwear.

Although historical minded folk will tell you that horseshoe pitching goes back to the army camps of the old Greeks and Romans, its present popularity is traceable to an Akron, O., fireman, George May, who started pitching for ringers instead of points.

Before May's time, players tossed shoes in the general direction of the peg and hoped for a ringer. It was May's theory that by adjusting the fingers on different parts of the shoe so as to reg-



ulate its revolutions in flight that the number of ringers could be increased. This is known as the open shoe. It must be admitted, however, that many other players had worked along this same line, but the Akron fireman was the first to obtain results. With this experience, May entered the national championships to walk away with the crown after winning twenty-four straight games and pitching 430 ringers.

His findings became common knowledge and the leading players grew more and more proficient at throwing ringers. In the old days, an average flipper considered himself fortunate to toss two ringers a game, while now a player must throw sixty to sixty-five per cent ringers to be classed as a first flight competitor. In championship competition seventy to seventy-five per cent of the shots are ringers.

At the national tournament last year at Moline, Ill., I was fortunate enough to make seventy-five and five-tenths per cent ringers in twenty-three consecutive games, while C. C. Davis, former titleholder, was close on my heels in this phase of competition with a score of seventy-three and six-tenths per cent.



Top, general view of horseshoe-pitching tournament on Long Island. Bottom, form of an expert player just before the shoe is released

Horseshoe pitching is the same as any other sport in that a thorough training in fundamentals supplemented by plenty of practice spells success.

After deciding on the type of shoe you can handle and control the best, the beginner should learn to pitch the open shoe. Among the most successful grips are the one and one-quarter and the one and three-quarters turn. With the one and one-quarter turn, the shoe turns one and one-quarter times from the point from where it is released until it reaches the peg. With this style, the shoe's opening should be to the player's left while with the one and three-quarters grip, it should

(Continued to page 140A)

1968.

San Francisco Water Tube Is Big as Subway

Water for thirsty San Franciscans will travel through the huge Crystal Lake tunnel on which work now is proceeding near San Mateo. This great water conveyor—minus the water—might easily be mistaken for a subway or the Holland tube in New York, so great is the diameter of the bore.

I986

Strange Mineral for Insulation Is Like Cork

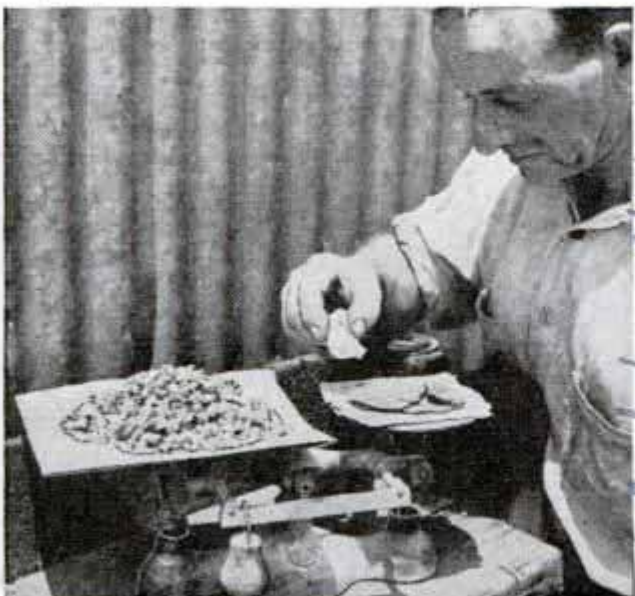
Vermiculite, a strange mineral which floats on water after treatment, is the latest insulating material for electric refrigerators and hot-water heaters. In the raw state it resembles mica and is obtained principally from a mountain in Montana. Exposure to low heats causes it to expand twenty-seven times its original volume, take on a golden color and assume the lightness and toughness of cork. It also is fire resistant.



This photo gives you an idea of the size of the big water tunnel which will serve San Francisco. It is being rushed to completion

Phonograph Records of Glass Are Easy to Make at Home

Phonograph records on glass disks can be made at home by a process developed by Ivan Eremeeff, sound engineer, who first covers the glass with a coat of paint composed of automobile filler, beeswax and lacquer. The recording is made while this composition is still semidry, a steel needle marking the sound track in the paint and cutting down to the glass. Since the paint has an exceedingly fine grain, the track is sharp with no ragged edges. After the recording, the paint is permitted to harden and forms a permanent record. If a master record is desired from which other records may be pressed in wax, the glass record is taken to a photoengraver who can make a plate in which the sound track will be raised. Such a method was used in pressing music records into sheets of chocolate candy, which could be played once or twice before they were devoured.



Weighing the mineral after it has been treated. It becomes light like a cork

2084 Danann M. Phila

1 1/2 lbs Bros. Chemical Co. 2159 Bay St
 Chestnut and 16th

1969.

Bobsled Roller Coaster Is Latest in Thrill Rides



Here we see the latest thing in amusement park devices—a bobsled roller coaster starting around a thrilling turn

Offering something new for the thrill seeker, a bobsled roller coaster is in operation at a Berlin amusement park. The car in which the riders are seated resembles a bobsled. The coaster speeds around a track somewhat similar to a bobsled run, containing straightaways and death-defying horseshoe turns.

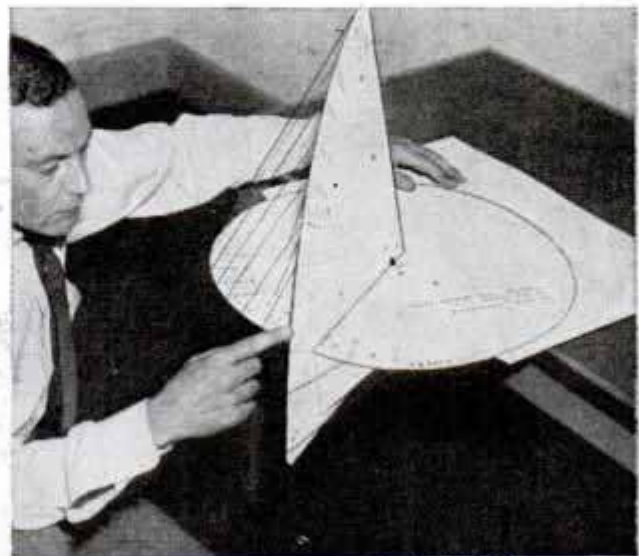
Ultraviolet Rays Hold Hope of Conquering Influenza

After recovering flu virus from the air, scientists have found that it may be destroyed by bringing it in contact with ultraviolet rays. Thus there opens up a vast field of preventive medicine, whereby the air in hospitals, theaters, schools and

auditoriums may be freed from dangerous germs. Influenza spreads easily because the virus floats in the air for at least thirty minutes after a person suffering from the disease sneezes.

Peltier Comet's Path Is Shown by Model

Built to show the orbits of the Peltier comet and the earth, a novel model has strings to indicate the relative distance between the two as they approached each other recently, and then drew apart. On August 4, 1936, the comet was at its closest point to the earth, sixteen million miles away. After that date it passed rapidly from view. Each of the distance strings represented the gap between the comet and the earth on certain dates. At forty miles an hour, it would take more than forty-five years to drive sixteen million miles.



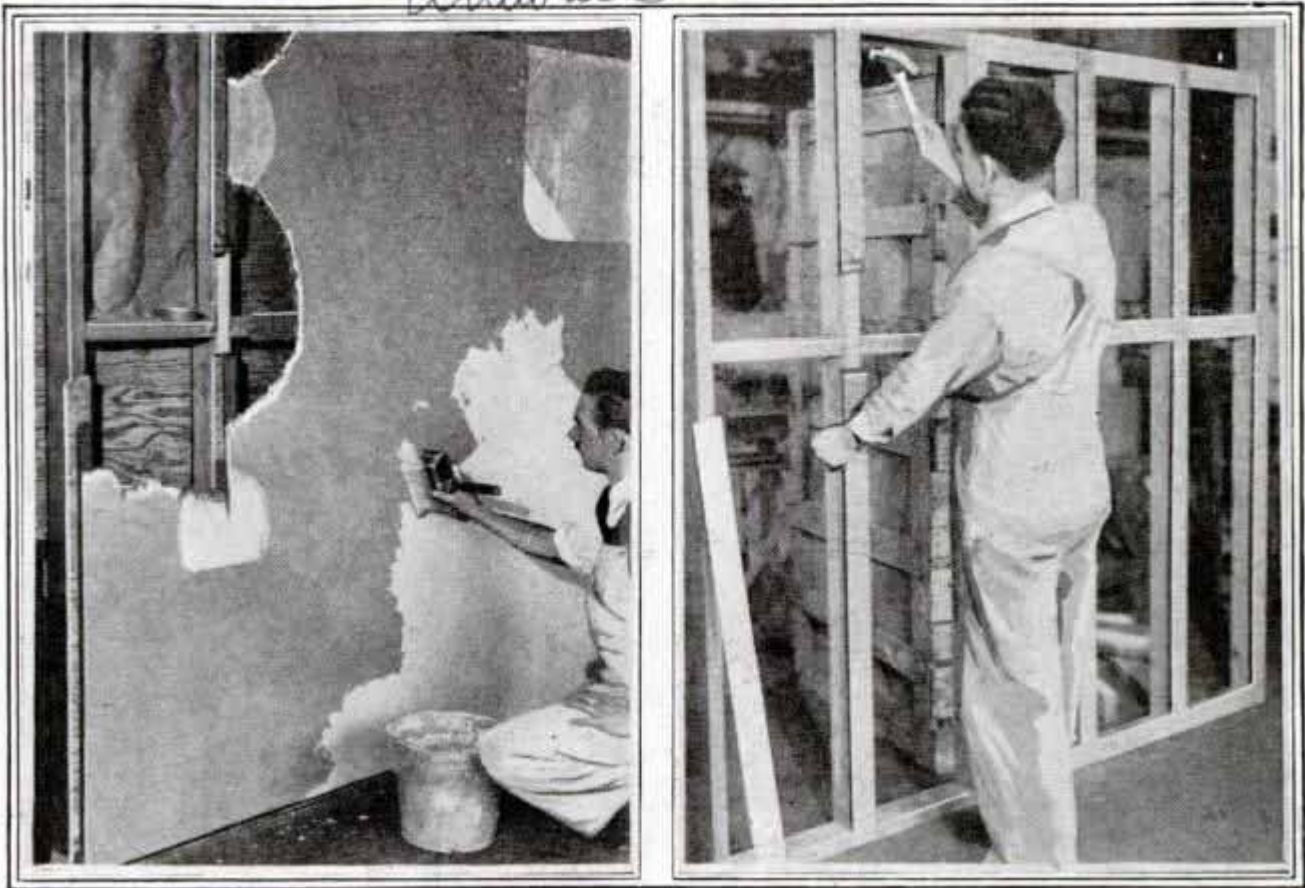
Pointing to string indicating nearest point that comet approached the earth

No further information

1979

Chicago Tribune
7/22/36

Glued Wall System Replaces Lath and Plaster



Left, cutaway section of wall shows its construction and the ease with which it may be decorated to resemble plastering. Right, nailing on the strips to which the plywood or wallboard is glued

Making lathing and plastering unnecessary, a new glued wall system employs glue instead of nails in the vital part of the joint construction. In addition the wall is strong and crackless. The system calls for the nailing of patented strips of fir plywood to studdings, rafters and headings. Then comes the gluing of panels of plywood or wallboard to these strips and edge gluing of the panels to each other to form a solid one-piece wall. Because of the self-bonding nature of the glue no excessive pressure is necessary to get a tight fit. Shrinkage and expansion of the wood are not transmitted to the surface of the wall. The wall can be decorated to look like regular plaster walls, but the glued panels will not shift and cause cracking.

Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information is kept on file and will be furnished by our Bureau of Information upon request, accompanied by stamped, self-addressed envelope.

Heavy-Duty Portable Drill Exerts High Pressure

When it is difficult to take the job to the stationary drill, a portable heavy-duty drill can be taken to the job. A hand drill designed for quick use anywhere, a precision tool capable of extreme accuracy with heavy pressure, is now available. It fits in and around all types of machinery, holding itself in position by its own pressure. Backbone of this drill is a sturdy steel bar on which both drill head and shoe pivot. Feed control is semi-automatic, the feed clutch engaging and disengaging from the crank by fingertip pressure. A ratchet handle makes it possible to work in close quarters.

\$16.25

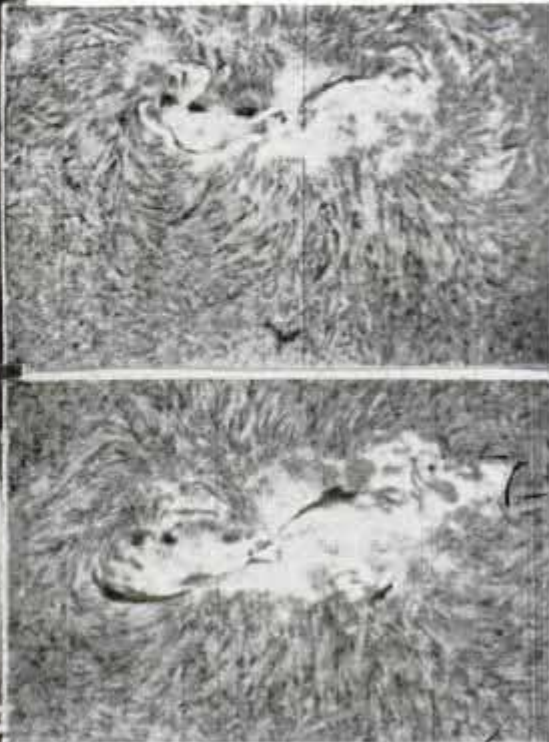


Liste Corp
 Planned & made

Handwritten notes on the right margin, including the number '7' and some illegible text.



Left, melting a metal sheet with the aid of concentrated heat from a solar furnace

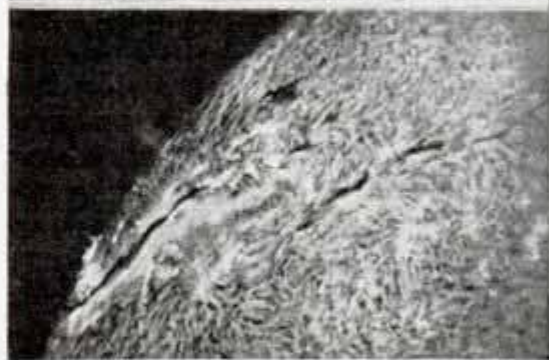
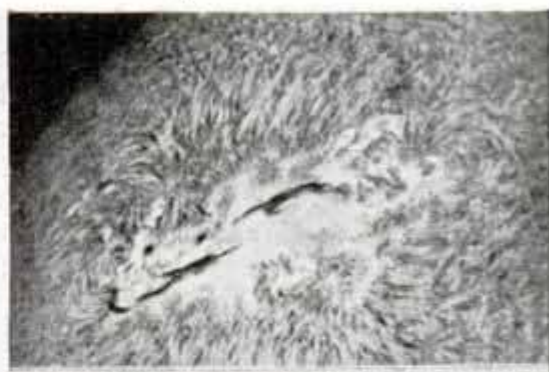


New POWER from

WILL man ever be able to transmit power by radio? Until lately science has had to reply emphatically that "on the basis of present knowledge" this was an impractical dream. Now it seems that eventually the sun may supply a different answer.

The reason is that during the last few months astronomers have learned more about an unexplained radiation that the sun broadcasts, and it may be that additional research will open up an entirely new field of knowledge. Mysterious radio interruptions are pointing the way.

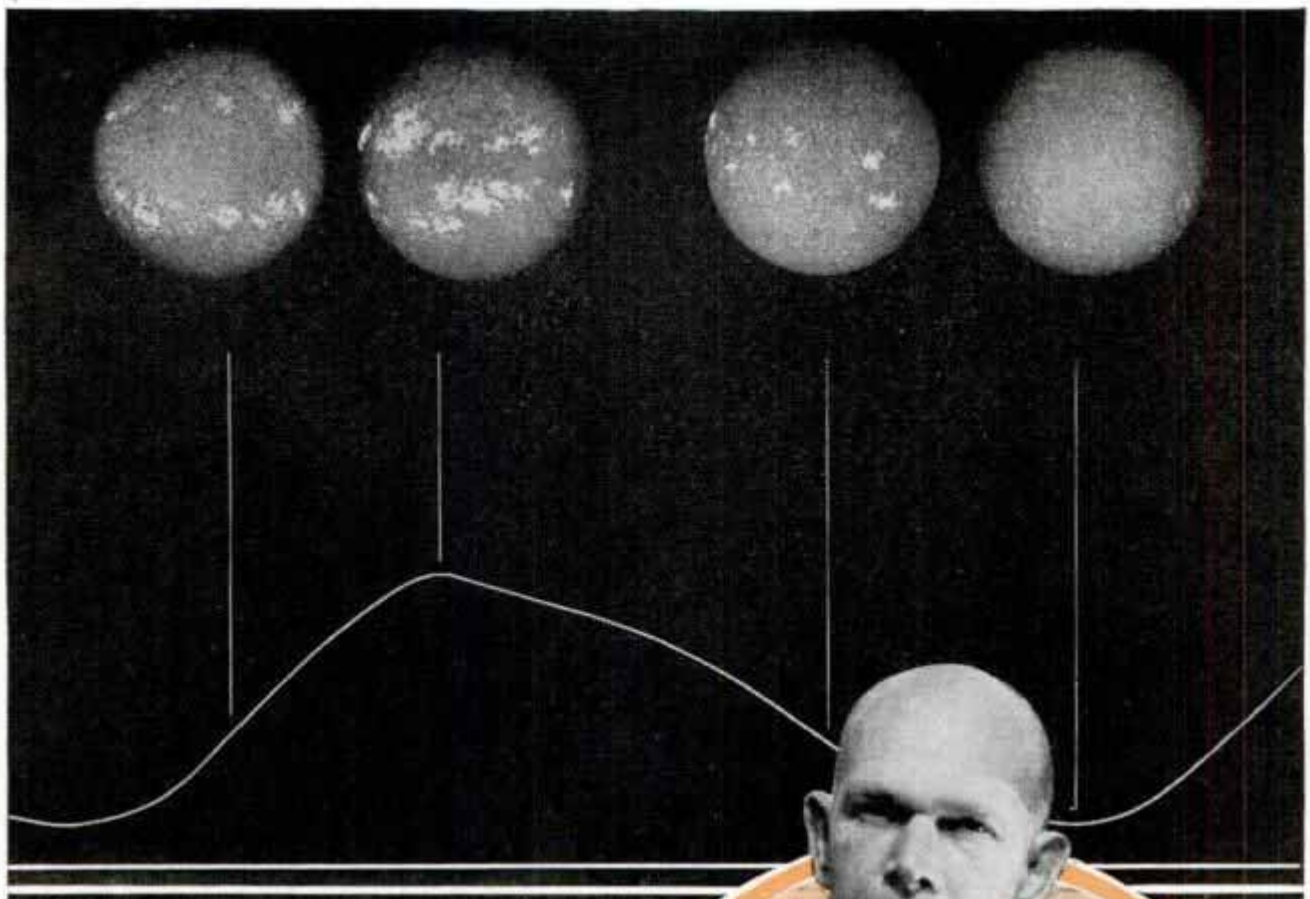
The sun has been blamed for years for the peculiar "magnetic storms" that sometimes disrupt electrical communication systems. In a general way these disturbances are traced to sunspot activity. Not very much is known yet about the spots that appear on the sun, the belief being that they are regions on the surface that have a temperature 2,000 degrees less than their surroundings. Occasionally tremendous flaming clouds of hydrogen gas appear in the neighborhood of the spots. When these eruptions occur, electromagnetic disturbances are apt to happen on earth, but no theory that explains the connection has been generally accepted. Some radio experts think radio reception fades and improves in cycles lasting



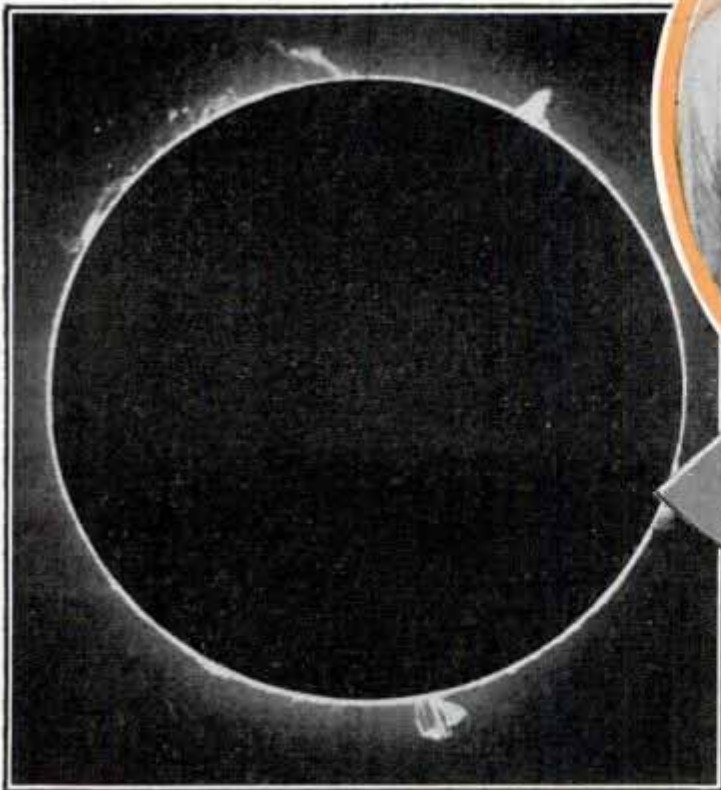
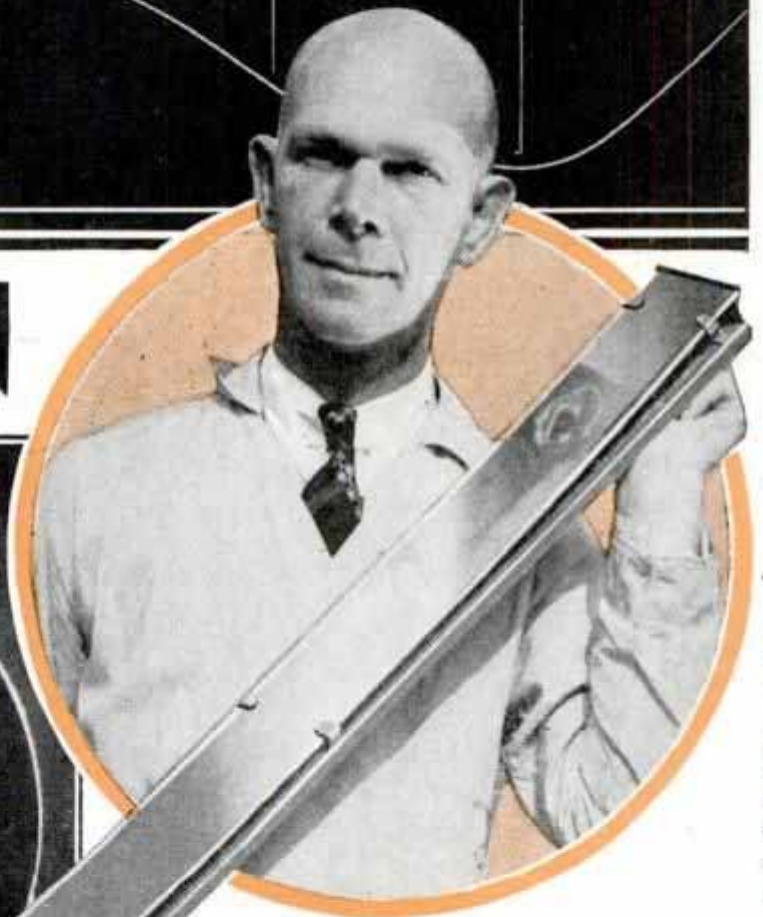
Appearance of sunspot on successive days as the rotation of the sun carries it farther and farther to one side of the turning planet until it disappears from view

F 783
 Cmd. Thomas & Lemmon of Los Angeles
 1055 Palmdale Ave. Los Angeles

7 7833 2



the SUN

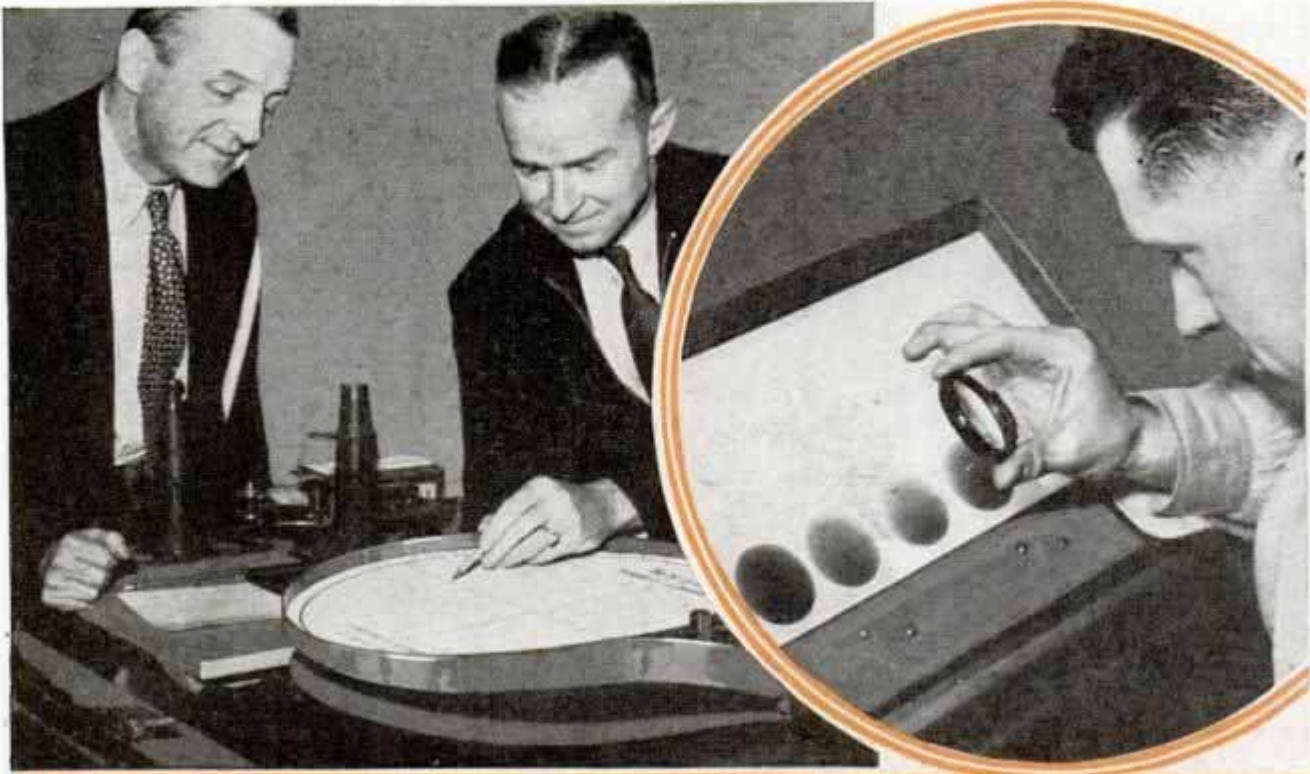


Top, curve of sunspot cycle and spectroheliograms showing appearance of sun at different phases of cycle. Below, curved glass for solar heating and gas rising from sun's surface

a number of years, paralleling periods of sunspot activity.

Today a new connection between the sun and the earth is being studied. During the last year radio men have been surprised to find that at extremely high frequencies reception sometimes dies out completely even though reception at other wave lengths, including the broadcast bands, is not interrupted. Except for faint signals from near-by stations, short-wave

Handwritten notes on the right margin: "Sun spot cycle 11 years" and "Sun spot cycle 11 years".



reception disappears as completely as if a fuse had blown. This happens at from seventy-five meters down past twenty meters, and depending on the wave length, lasts from fifteen minutes to four or five hours over the illuminated half of the globe.

With some exceptions the fade-out occurs about every fifty-four days. This period, being approximately twice the period of the sun's rotation, suggests that something is happening every other time the sun turns around, although no one can yet say why.

Last spring scientists estimated a fade-out was due April 8, and astronomers decided to learn all they could about the phenomenon if it should recur. In California, Dr. Robert S. Richardson, one of the "sun men" of the Mt. Wilson observatory of the Carnegie Institution of Washington, D. C., prepared a spectroheliograph to photograph solar eruptions



Top, studying sunspots on paper disk suspended in light path of solar telescope, and examining sunspots on glass negatives made with aid of telescope. Below, mirror disks of horizontal telescope used to study sun

by their hydrogen light and arranged other instruments for the test. When the work was over he had new evidence of some mysterious transfer of energy between the sun and the earth.

At 8:46 that morning the Mt. Wilson

(Continued to page 118A)

813 Sante Barbara
 Pasadena
 Calif

Caterpillar Swarm on Rails Stops Fast Trains



Always traveling in a straight line, caterpillars climb over fence post at left rather than detour around it. Right, crew attempts to clear track of caterpillar swarm that greases rails and stalls train

Caterpillars swarming six inches deep on the rails have halted transcontinental express trains in Ontario this year and denuded more than 8,000 square miles of farm lands and forests. One sixty-mile-an-hour train was stopped for forty minutes by the pests, and, unable to get traction on the heavily coated tracks, had to be broken into sections before it could be moved. Another train waited two hours while the track was cleared with live steam, and extra locomotives were sent in regularly to infested areas. Finally locomotives were all equipped with steam jets in front of the driving wheels, the live steam sweeping the caterpillars from the rails. The unusually heavy infestation this year was blamed upon lack of early frosts which ordinarily kill the insects, and an abundance of their favorite food, poplar and birch trees, which have grown up on burnt forest areas. Airplanes were sent up to spray forest and city areas with insect poison, shade trees in towns were protected with cotton wrappings and

sprays, and farmers trapped the caterpillars in trenches and burned them with gasoline and coal oil. Still, clover and hay fields were swept bare, cattle could not find grazing and forests were stripped of foliage along a 175-mile front. Chickens had their fill of caterpillar diet and quit eating them. School was dismissed near Sudbury because the caterpillars swarmed on walls and floors. Even fishermen complained, because caterpillars swept out on the lakes gave the fish plenty to eat and they would not rise for a fly.

F918.

Number of Airports Increases to Twenty-Four Hundred

Airports and landing fields in the United States totaled 2,402 on July 1, 1936, compared with 2,343 counted by the bureau of air commerce a year previous. Of the total, 701 were lighted for night use. The army maintained sixty-two airdromes, the navy twenty-six; there were 746 mu-

Cont. James Montague, 517 Harbour
 Comm. 10/10/36

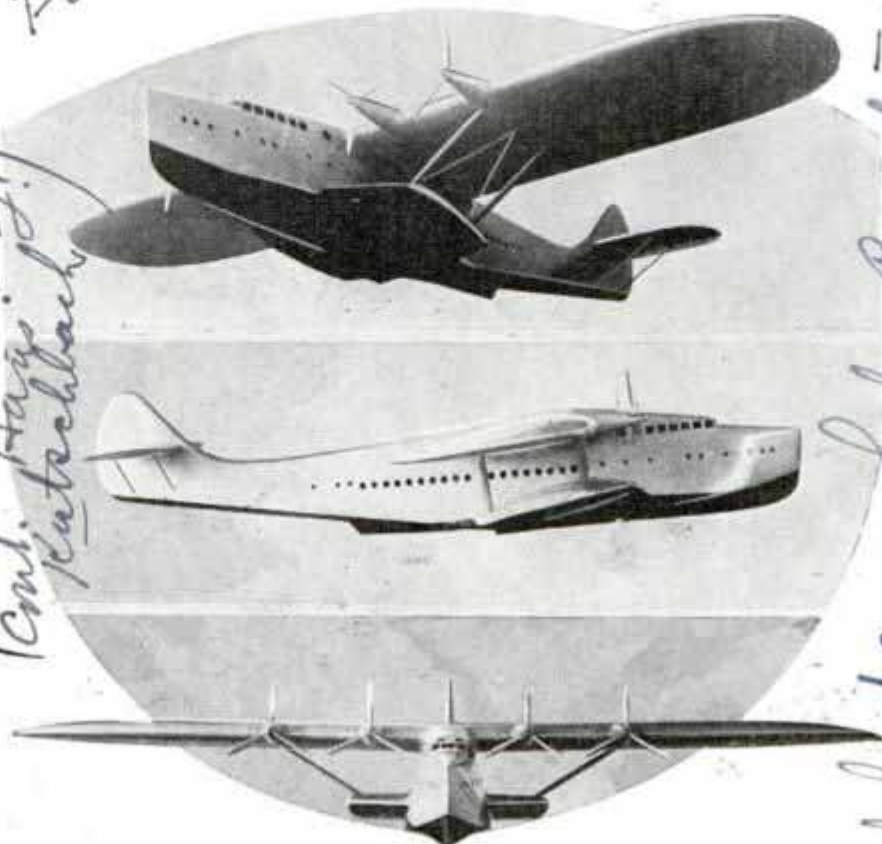
June 2, 1936

Caterpillar Swarm on Rails Stops Fast Trains

nicipal, 498 commercial airports, 291 department of commerce intermediate landing fields and several hundred auxiliary, private and government airports. Seven states which had 100 or more aviation fields were California, 192; Texas 135; Pennsylvania 118; Michigan 114; Florida 112; Ohio 103 and New York 100.

Eight Motors of Air Liner Drive Its Four Propellers

7880



Three views of huge Diesel-powered flying boat being built in Germany for transoceanic passenger service. Engines are recessed in wings

Underwater Photo Shows Secret of Swimmer

How a star swimmer performs under water has been photographed by a camera inclosed in a special device beneath the surface. The swimmer, Shozo Makino, long-race, free-style champion of Japan, was caught by the camera as he drove through the water after diving.

7888

(Comb. by J. F. Kutschbach)

Waseda University Japan.



Unusual photograph of a swimmer in motion under water. Note twisting arm action

Destined for transoceanic service, a giant flying boat with eight motors geared to its four propellers is being built in Germany. With 8,000 horsepower available, and a wide cruising range, the plane will be capable of non-stop flight between Frankfurt-on-Main and New York City. The ship is being built at the Dornier Works and will be even larger than the famous "Do-X," which had twelve engines. Dornier engineers found it was more efficient to install four three-bladed propellers and gear two 1,000-horsepower motors to each. The engines are recessed into the wings, which have a span of 160 feet. Diesel engines are used in the new "Do-20" instead of gasoline motors which drove the "Do-X." The ship will have a cruising speed of about 160 miles an hour and top speed of about 180.

[America's 1,864,643 miles of copper telegraph lines would provide eight wires from the earth to the moon if they could be strung across space.

Copper + Brass Research Assn.

7880
Lake Constance Germany
I'm a Dornier flying boat

7-15-2. Mrs. C. Schumacher
727 Park Ave
Newport City

They KEEP THINGS



IN EVERY catastrophe, whether national or local, an "army of generals" goes into action to aid the victims, to help restore order and to keep things moving. They are the maintenance men of the telephone, electric power and gas companies and are called the army of generals because when they rush to battle an emergency, they are generally on their own, each skilled man commanding himself and such volunteers as enlist their services.

When a tornado sweeps through a town leaving death and destruction in its wake, when a flood inundates a wide area, when a devastating fire breaks out in a city or when a blizzard drops a smothering white blanket down upon the countryside, the maintenance men go into action. No mat-

Top, this freak accident made work for maintenance men. Below, repairman splicing a damaged telephone cable after flood

Copied from...

MOVING

ter what damage the elements have done, no matter what physical obstacles must be overcome, telephone lines must be repaired immediately. Electric power must be restored and gas leaks must be stopped and broken pipes shut off.

In a national emergency the maintenance man is one of the first to aid the Red Cross, the National Guard and other forces summoned to fight the disaster. In a local disaster, such as a



fire, an explosion or a cave-in, the maintenance man appears on the scene as quickly as does the fire or the police department. In most cities the fire alarm registers in the office of the gas company simultaneously with the alarm in the fire houses.

"Twenty-four hours a day, every day in the year, the emergency crews function regardless of weather" states E. E. Hill, supervisor of the New York Edison and United emergency crews. When service fails, it is the men of the emergency crews who restore it. The many situations they meet call for exceptional skill, courage and initiative, and these men are carefully chosen for the work.

"Personal hazard is often entailed in the clearing of burn-outs



Clearing flood debris from telephone poles so switchboard, center, can function. Bottom, repairing railway trestle which was undermined by flood waters



Guest arriving at Hartford, Conn., hotel in boat, and soldier operating short-wave radio during flood

the injured and applying artificial respiration are part of the regular duties of the emergency crew.

"A few years ago, the shoring of a subway under construction caved in, precipitating several people into the excavation. The emergency crew rescued the victims, one member risking his life to crawl under shaky timbers to release a pinioned woman. When an explosion and fire occurred in one of New York's largest apartment hotels, emergency men assisted in removing the dead and injured and went into the sub-basement, when fire and possible explosions endangered every one, to install temporary lighting to help in the work of rescue and fire fighting."

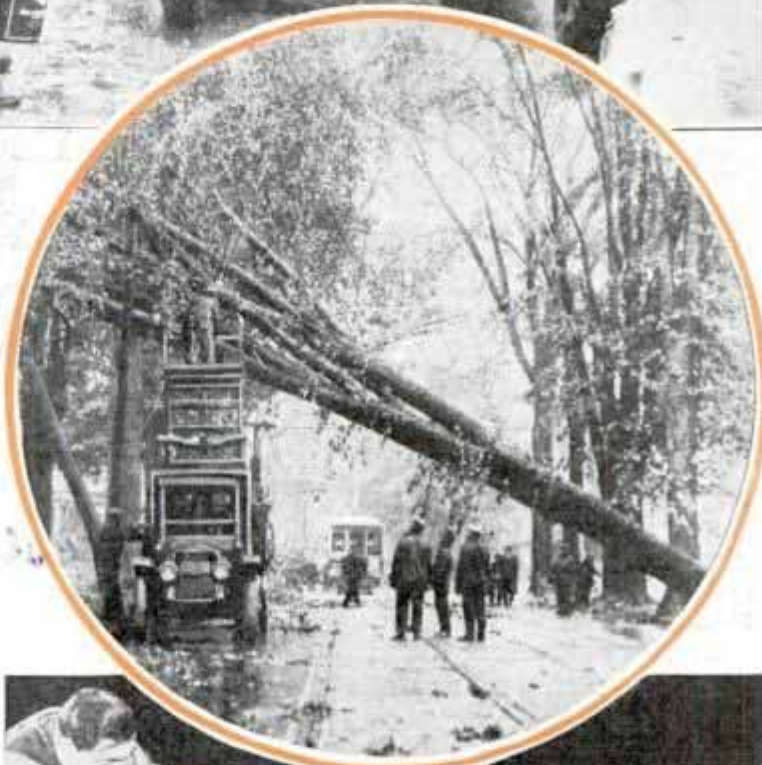
One of the greatest tests ever faced by the army of generals occurred during the floods this year. From Maine to the valley of the Ohio, the maintenance men were called upon to repair the damages wrought by the flood so "things might be kept moving." Some idea of the immensity of operations may be gained from the emergency supplies sent to the flooded area by the Bell Telephone System alone.

More than 50,000,000 conductor feet of rubber-covered wire; 24,000 telephones; 750,000 pounds of copper line wire; 200,000 pounds of pole line hardware; twenty-three sections of central office

and our men have been highly praised for bravery. Yet their work is not confined to routine clearing of electrical trouble. Indeed some of their most notable jobs have been at fires, floods and cave-ins where men trained and equipped for emergencies were needed. Nor is the individual citizen in distress overlooked. Stopping water leaks, giving first-aid to

switchboard and scores of private branch exchange boards in addition to telephone poles, cable conduit and rubber boots were shipped to put the telephone lines back in working order. The maintenance men repairing the long-distance lines which kept the rescue officials in the flood area in touch with the rest of the country worked night and day at the risk of their lives. The

7752



average number of "patch orders" calling for replacement of long-distance lines by providing substitutes, in normal times averages ten a day in the long-distance traffic control bureau in New York. In the six days during which the flood conditions were at their height, more than 1,000 such orders were put through.

Working in boats and wading through water, chopping lines free of trees and debris lodged against them by the crest of the flood, climbing icy poles and erecting new ones where necessary, the linemen in this period succeeded in restoring ninety-six per cent of the long-distance circuits which would normally have been in service.

"Doubtless no one will ever be able to estimate the number of lives and the extent of property saved, due to speedy warnings of the impending flood" states J. F. Kilpatrick, president of the New York Telephone company. "Numerous press reports have told how linemen risked their lives to restore the circuits broken by the mad waters, how telephone operators stayed at their switchboards day and night in many instances



Fire truck pumping drinking water after flood. Center, street in Syracuse, N. Y., after a windstorm. Below, maintenance men repairing generator

(Continued to page 116A)

Syracuse, N. Y., after a windstorm
 2/1/1935

repaired by the
 116A

Cement Model of State Capitol Has over 900 Windows



Cement model of ten-million-dollar state house at Lincoln, built in a Nebraskan's landscaped garden

There are more than 900 windows made of mirror glass in a cement model of Nebraska's \$10,000,000 state capitol building, built as a hobby by a Nebraskan. It stands in his beautifully landscaped garden. The figure of the sower on top of the skyscraper model is gilded, and the decorations over the entrance doors are hand-painted reproductions of figures and symbols of pioneer days.

*E. P. Faustman
Built by Aurada, Neb.*

The auxiliary unit, which was developed recently, also may be used independently. The unit consists of a cylinder, which has a compression spring and a trigger and which is housed beneath the regular unit by slightly altering the shape of the tail cone. An electrical switching mechanism when loaded with the antenna cartridge and released by a special control, shoots out the cartridge and closes the electric switch to put the auxiliary antenna into immediate use. When the control is released, the compression spring forces out into space a paper cylinder upon which is wrapped thirty-five feet of antenna wire. The wire unravels and discards the paper cylinder, then trails from the plane. A special loading tool is used to reload the cylinder with a new antenna cartridge.

7892

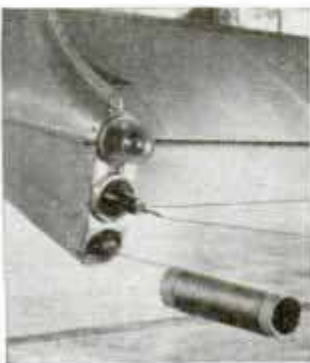
How Earth Looks from Moon Is Shown by Globe

Prepared under the guidance of an astronomer, a globe at the Franklin Institute in Philadelphia shows how the earth would look to some one on the moon. The continents are accurately outlined in the misty colors which the moon-man would see. Basis for the research which resulted in the painting of the globe was the earth's



This globe shows how the earth would appear if the observer were on the moon

F900 Pilot Shoots Second Antenna to Boost Radio Signals



When radio reception or transmission is poor, the pilot of a TWA air liner may shoot into space an auxiliary antenna for simultaneous use with the regular antenna.

Painted by Howard Russell Butler

*Stewart D. Stewart
Astronomical Dept.
under direction of Prof. [unclear]*

light, or "earth shine," on the new moon. The small crescent shows the color of the moon, in its light from the sun, but there is also the earth shine, the light which has been reflected from earth to the moon and back. This light gives the scientist a clue as to how the earth appears from the moon. Thus, with this globe, man may go into the universe and look at the earth.

1829

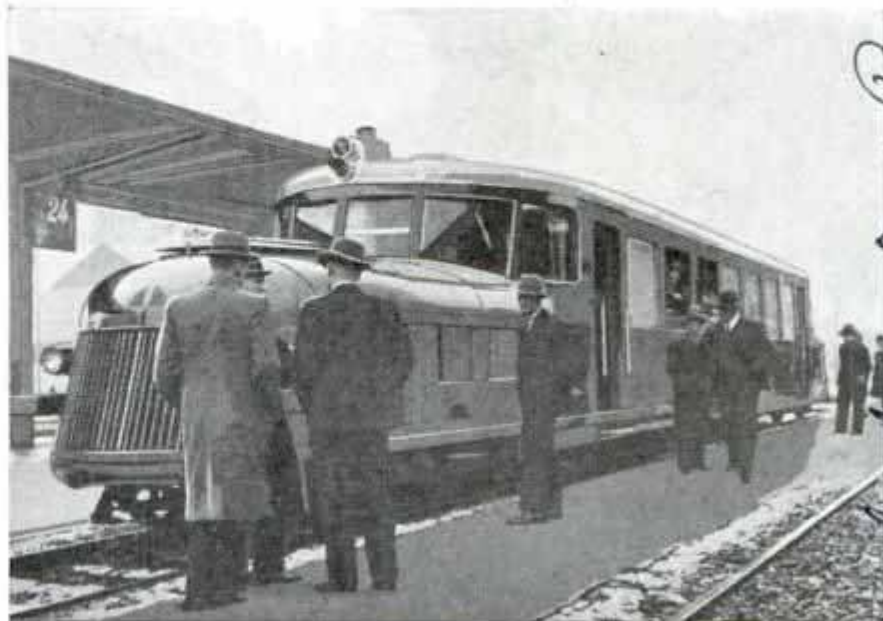
Dog Rides in Pram on Top of Car

Dogs enjoy motoring as much as the family does, and it's hard to leave the pup at home when starting on a tour. All packed for a trip, one family found the car too crowded to take the dog along, but there was plenty of room on the roof. So they roped the baby's perambulator on top, put a blanket around the dog and let him ride in this special seat. The pup seemed to enjoy his perch.



Scribner Syndicate
509-6th Ave NYC
Maybe there isn't room inside, but this pup will not be left behind. He has a special observation seat in a pram on top

Streamline Diesel Railcar 1905 Hauls Swiss Passengers



© Max Kettel

Travelers in the Swiss Alps ride on this Diesel-motored railcar which resembles a huge streamline bus

Built for passenger service on the Swiss Federal Railways, a new railcar of striking lines somewhat resembles a giant bus. Its Diesel-electric power unit is mounted low in front of the cab. The broad windows afford the car's occupants an excellent view of the Alpine country.

927 Sensitive Scale Can Weigh Atom to Four Octillionths of a Gram

So precise that it can detect a difference in weight of 4,000,000,000,000,000,000,000,000ths (four octillionths) of a gram, a scale capable of weighing atoms has been developed at the University of Chicago by Prof. Arthur J. Dempster of the physics department. It is a "mass spectrograph" of a new type, used in analyzing solid substances. With the material to be analyzed as an electrode, Dr. Dempster produces a hot spark. Atoms from this spark are drawn through an electrical field and a magnetic field and on to a photographic plate. The instrument already has helped Dr. Dempster discover hitherto unknown isotopes, variant forms of elements.

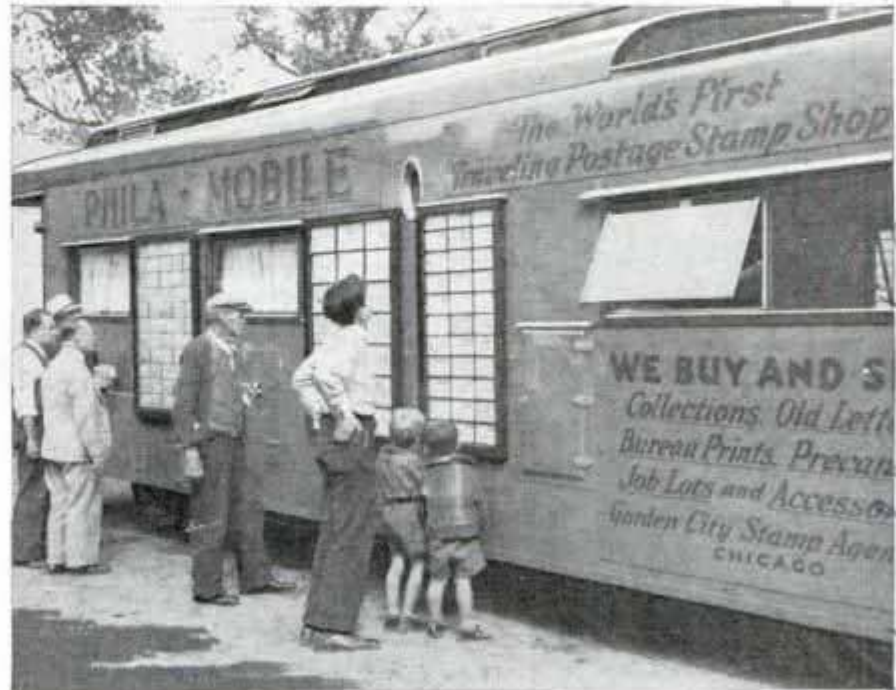
Official information Bureau of Switzerland
7/10/36
Chicago Tribune

of sheet iron. Over the one-room structure they install a shed with a wood roof. In the space between the wood roof and the sheet-iron roof is a water pipe with holes cut at intervals. When the water is turned on, it streams from the holes and cascades over the roof and down the sheet-iron sides. Inside an electric fan circulates the air. Temperatures are twenty to thirty-five degrees cooler than those outside.

7929
**Flower Mosaics
 Mark Ancient
 Festival**

Composed of millions of flowers and buds, beautiful mosaics cover the streets during the feast of Corpus Christi in Genzano, Italy. One of the unusual exhibits during the recent celebration of this ancient festival was a bust of King Victor Emmanuel made up of thousands of flowers of all colors. The mosaics are arranged on streets along which the religious procession passes.

**Postage Stamp Shop in Bus
 Sells to Collectors on Tour**



This traveling stamp trading post gets wide attention from philatelists. Thousands of stamps are exhibited in its showcases.

Stamp collectors stop and look when the "Phila-Mobile" comes to town. It is at once a traveling showcase and salesroom for a postage-stamp agency, its name being a contraction of "philatelist's automobile." Touring the country, this stamp shop enlists interest among collectors and buys

or sells stamps, taking orders to be filled from the home office. The car is divided into two rooms, with an observation platform at the rear, and is completely outfitted for all-year touring. There are twin beds, a clothes closet, gas stove for heating and kitchen with a gas range, ice box, running water and storage space for a month's provisions. There is room enough to entertain twelve persons.



Outlined in thousands of flowers, this mosaic represents bust of King Victor Emmanuel. It was one feature of ancient festival

☐The copper roof of Hildesheim cathedral in Germany, put on in 1320, is still serviceable.

*Chicago Tribune
 7/1 3/32
 City Stamp Agency
 1018 N. Dearborn St. Chicago*

*Copper and Brass
 Research Assoc.*

Lister Leaves Small Dams in Furrows to Hold Water



Top, special lister throwing up dams in furrows. Bottom, after a rain the dams hold water and prevent washing of the topsoil

To prevent valuable soil from washing away and to help hold water on the field, a new farm machine has been tested successfully in Kansas. It is a basin lister which serves the double purpose of preparing the ground for crops and of leaving dams in the furrows. A U-shaped piece of metal that fits into the furrow is dragged along collecting dirt for about ten feet, then a nub on the lister wheel catches the bar to which the shovel is attached and causes it to lift, depositing the pile of dirt at intervals in the furrow. Those dirt piles act as dams when it rains, holding the water in the furrow and resulting in unusual penetration of moisture into the ground. Tests at the Fort Hays experiment station showed that the water soaked twenty inches into the ground when the basin lister was used. Where the ordinary lister was used the soil was moist only twelve

inches. Land not worked was soaked ten inches. The dams thrown up by the lister also keep the topsoil from washing off the field during heavy rains.

Adjustable Heater Rids Windshield of Frost

Designed to keep the windshield clear of frost in cold weather, a special mounting for an automobile heater has been tested successfully. The mounting permits pulling the heater from under the instrument panel and swinging it into various positions so that the warm air may be directed against the windshield. Thus the heater may serve its usual purpose and also that of defrosting fan or blower. When not in use, the heater may be pushed back under the instrument panel. The mounting does not interfere in any way with normal

flow of hot water from the automobile cooling system through the heater.



Heater swung up to windshield, ready to eliminate frost. It adjusts to several positions

Developed at Fort Hays experiment station, Kansas

Journalism Dept. Kansas State College Manhattan Kan.

A. W. Brandt 8704 Jackson Park

Dr. W. A. ...

F891

Chrysler Corp 341
Massachusetts Ave
Detroit, Mich

Sliding Roof Converts Taxicab into Open Car

Taxicabs with a sliding door in the roof are being introduced in this country. Patrons can enjoy sunshine and fresh air, and a view of the skyscrapers as if in a sight-seeing car, by sliding open the roof above the rear seat. This feature, in addition to rear and side windows which open wide, converts the sedan into an open car. A special safety feature is a signal on the dashboard which warns the driver if a door is open.



Two views of latest model taxicab with sliding roof that makes it an open car

Three Chances in a Million Lightning Will Kill You.

Your chances of being struck dead by lightning in the next year are just three in a million, unless you live in one of the southern or western states where bolts do their deadliest work. Insurance statisticians found only three persons in every million in the United States were killed by lightning in the last ten years. In the band of states from Montana to Arizona and across the "old south" death rates are as high as six per million, while Pacific coast and eastern states ranked as least hazardous. Death by lightning is a rarity in large cities where the steel skeletons of skyscrapers act as lightning conductors and dissipate the electricity from the sky. Tall buildings are often struck without being damaged.

Cows are sometimes so annoyed by the humming of near-by high-tension wires that they cease to give milk.

Substitute for Black Walnut Sought by Gunsmiths

Scarcity of black walnut, regarded as superior to all hardwoods for making gunstocks, has started a search for a substitute. The Forest Products Laboratory, operated by the government in Wisconsin, is experimenting with low-grade lumber. Before being used in gunstocks, the wood must be given a twenty-year period of air-drying. The world war caused a shortage in black walnut, which accounted for the price obtained for two partially decayed trees in the Arkansas national forest, \$20 per 1,000 feet on the stump.

cont Kenneth P. 49 Pl. Wayne
Elvis. Engineer

Operated by Sunbeam Radio 1975

Operated by Sunbeam Radio 1975

7/6/36

O'Brien & Evans
7/21/30

Pearl Oysters Packed in Cans Thrill "Treasure Hunters"

\$2.00 can



Here's a new thrill—hunting for pearls in oysters which are shipped in cans from Japan to this country

Many of the thrills of the diver searching for pearl oysters on the sea bottom are offered purchasers of cans packed with pearl oysters and shipped to the United States from Japan. Upon opening the can, the "treasure hunter" pours off the sea water, lifts the oyster from the native sea weed and searches for the pearl embedded in the oyster's flesh. The pearls are of varying size, so the result may be a large gem of great beauty. Prior to canning, the oysters have been taken from the ocean, a small mother-of-pearl bead placed in the shells and the oysters returned to the sea to permit formation of the pearl around the bead. A few years later the oysters are again brought to the surface and canned.

Light Colors Cause Plants to Seek or Shun Others

Different colors of light cause seedling tips of plants to seek or shun each other, Dr. Enoch Karrer of the Smithsonian Institution has found. Dr. Karrer grew oat

seedlings and exposed them to the rainbow band of light obtained by splitting the white light of an electric arc. Blue light caused seedlings to bend toward the light and toward each other. Red illuminated seedling tips bent away from each other. Plants receiving orange light became greener than their neighbors and roots grew longest in the extreme blue rays.

Blind Doctor and Guide Ride Twin Bicycles

Blindness does not keep Dr. A. O. Wilson of Lincoln, Neb., from enjoying his bicycle ride every day. When he wants a bit of exercise or is called to visit a patient he teams up with some friend who has a bicycle. Dr. Wilson used to pedal a bicycle with a sidecar in which a companion rode to direct him through traffic. Now his companion has to do his own pedaling. The doctor's bicycle has a frame-brace permanently attached, with an arrangement at the other end so that any friend can "hook on" for a joint ride. Steel bars form a cross from the rear sprocket of one bicycle to the seat base of the other, a bar connects the front of each frame and a steel "bumper" links the front sprockets.



When this blind doctor goes bicycling he hooks his "bike" to that of a friend who acts as guide

Clifford...
580 x 5...
Washing ton, Ill.
2/10/30

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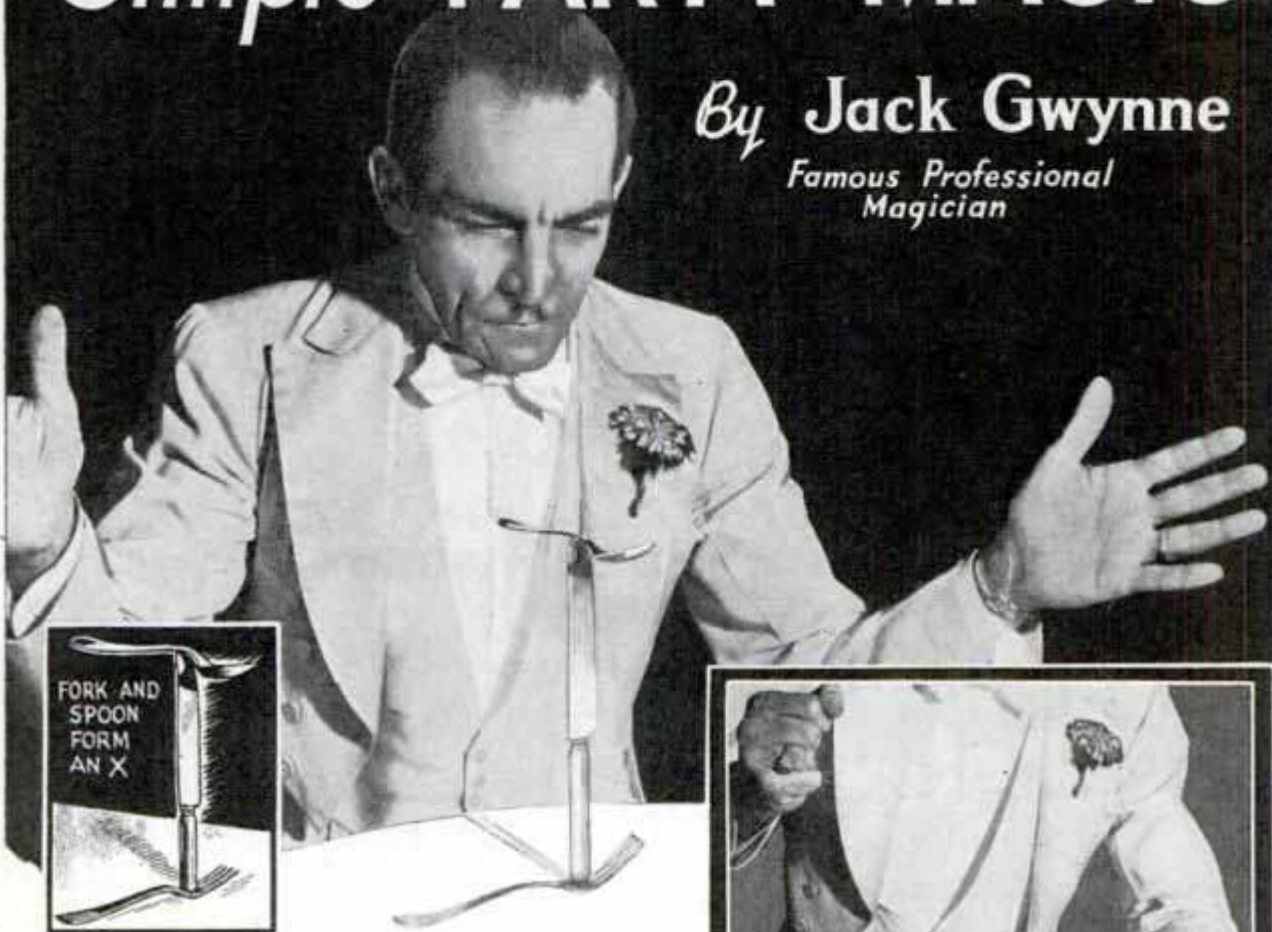
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1944

311 Conroy St.
Bradford, Pa.

"Simple PARTY MAGIC"

By Jack Gwynne
Famous Professional
Magician



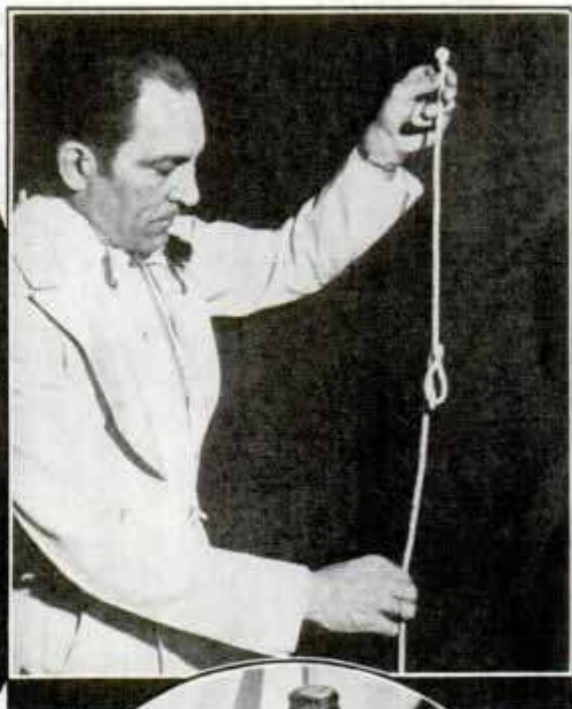
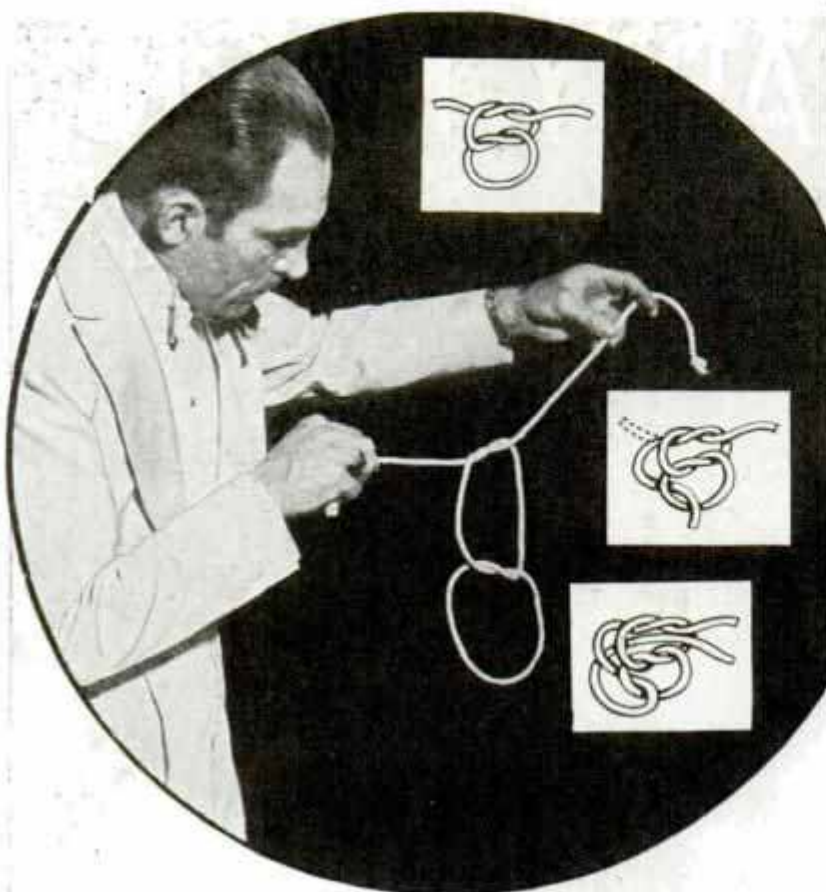
SIMPLE magic performed with everyday objects commands a ready audience everywhere and the person who is willing to spend an hour or two in serious practice can soon learn a whole repertoire of tricks that will enable him to contribute to the gaiety of social gatherings.

Before attempting any magic in public, however, the amateur entertainer should rehearse his routines with great care. A half-mastered stunt is productive only of ridicule. It is axiomatic that people like to be fooled, so the amateur who explains his methods after he has shown a trick destroys whatever pleasure his performance has brought to the crowd. The average person loses interest in a trick as soon as he learns its secret.

Playing with the silver and glassware may be a breach of table etiquette, but if you are willing to try it, an amusing balance feat can be performed with an ordinary knife, fork and spoon as shown in the illustration. Any person with fairly steady nerves and an equal amount of



Flipping spoon into glass with fork and balancing a knife, fork and spoon, two table tricks which are easy to master



Details of rope trick, above, and right, making dime dance on bottle. Below, card trick worked by noting difference in width of margins



patience can master this stunt in ten minutes. To balance the knife handle between the fork prongs, hold the knife near the top of the blade. The spoon is then placed on top of the blade at an angle with the fork.

Another table stunt good for a laugh is to make a spoon jump into a glass. As shown in the illustration, the handle of the spoon is placed against the glass, the upper part of the fork touching the bowl of the spoon. By striking the end of the fork with the fist, the spoon can be flipped into the glass. After a few trials, the amount of force with which the fork should be struck can be determined accurately.

The dancing dime is another sure-fire stunt. A freshly emptied beverage bottle and a dime are the only "props" required. By grasping the bottle with both hands as illustrated, the dime can be made to bob up and down on the mouth of the bottle. To begin this trick, the magician places the coin on the bottle and then tips the latter a little to moisten the dime. When the entertainer presses his two hands against the glass, the dime will start moving up and down. A clever bit of patter enhances the value of this trick.

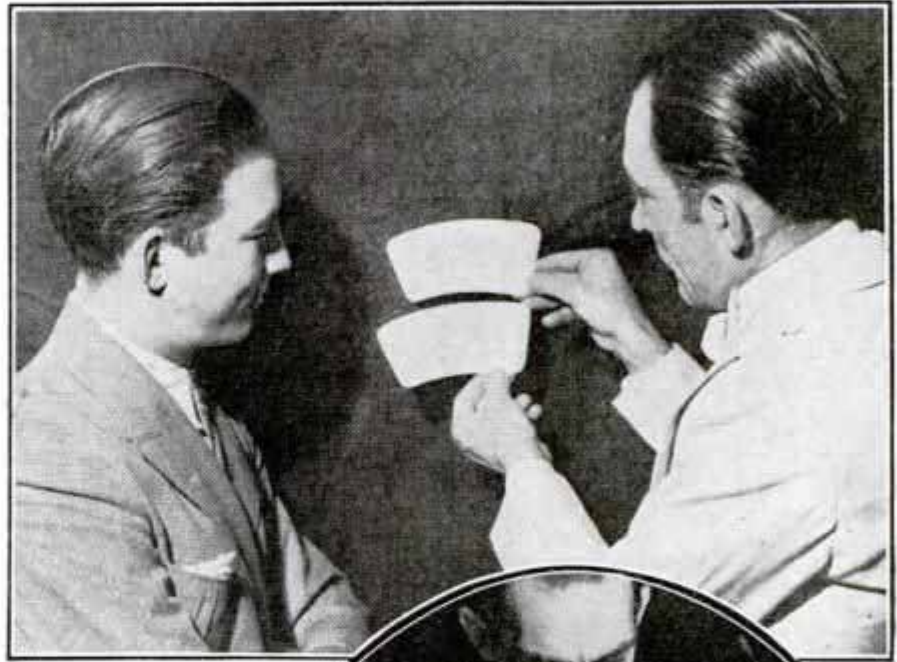
With a little preparation, a partly filled water glass also can be balanced as shown in another illustration. The secret of this one is in "planting" a large kitchen match under the tablecloth. The match is



2744

laid flat on the table and by placing a few other wrinkles in the cloth, it will not be discovered. When the glass is tilted against this match, the balance is obtained.

A simple but mystifying trick also can be done with a cube of sugar, a lead pencil and a glass of water. The magician asks someone to write his initial on the cube, which is then dropped into the water glass by the magician. As the cube dissolves, the person holds his hands over the glass with palms up, repeating certain mysterious words, after the magician, and upon turning his hands over, he discovers the initial has reappeared on his own hand. While the volunteer is writing his initial on the cube, the performer idly wets the ball of his thumb. When he takes the cube in his fingers to drop into the glass, he presses the ball of his thumb against the initial and the lead is transferred. Casually he takes the assistant's hand to hold it over the glass, and in so



Top, the two pieces of cardboard are the same size. Center, match under tablecloth helps balance tumbler. Bottom, details of the trick in which an initial is transferred

doing stamps the initial on the back of the hand with his thumb. The moment this trick is concluded, the performer should swing into another one.

Simple rope and card tricks can be employed to supplement the above when the party moves into the parlor. One of the

best of the rope tricks is shown in accompanying illustrations and diagrams. It is called the rope with the dissolving knots and at the outset a regular square knot is tied. Then the left end of the rope is brought through the loop toward the per-

(Continued to page 33A)

25/10/20
Cassidy
33A

25/10/20
Cassidy
33A

566
T 856

Bird Tamer Trains Family to Take Food from His Lips



Wild World
Charles Edward Jones of Vancouver, B. C., with a few of the hundreds of wild birds he has tamed and trained

At the command "Ring the bell!" a wax wing robin will perch on the shoulder of Charles Edward Jones, tug playfully at his ear and then sidle around to take a tidbit from his mouth. The robin is a favorite among his pets, which number about 400 different species of birds. So tame is the family of this bird trainer at Vancouver, B. C., that even strangers are welcome and the birds fearlessly perch on dog or man.

Leather Made from Fish Skin by Inexpensive Process

Manufacture of leather from ordinary fish skins by a simple process which is commercially practical is reported in Germany. Use of fish skins for production of bookbinding leather is not new, but large scale conversion has been impossible heretofore, due to the cost. The price of the leather is near that of good quality split

leather, but it is claimed that this might be reduced if the leather were produced on a large scale. Fish skins require tanning by special materials because they are very sensitive to acids. Tests show that the fish-skin leather has a stretching capacity superior to that of sheep and calf parchment. It has withstood 50,000 foldings without breaking.

1879

Small Electric Generator Supplies Light for Cabin

Weighing only forty pounds, a portable electric generating plant supplies enough current to light six 25-watt lamps, sufficient for a small house, summer cottage or camp. Its four-cycle gasoline engine is air-cooled and runs sixteen hours on a gallon of fuel. There is a rope and pulley type starter for emergencies, but a manually operated switch allows the generator to crank itself, using current from an automobile type battery of six or twelve volts, the same voltage as the plant. The generator keeps the battery properly charged.



Air-cooled gasoline motor generates electricity to light a small house. It weighs forty pounds

Dept. of Commerce
Press memo 6/24/36

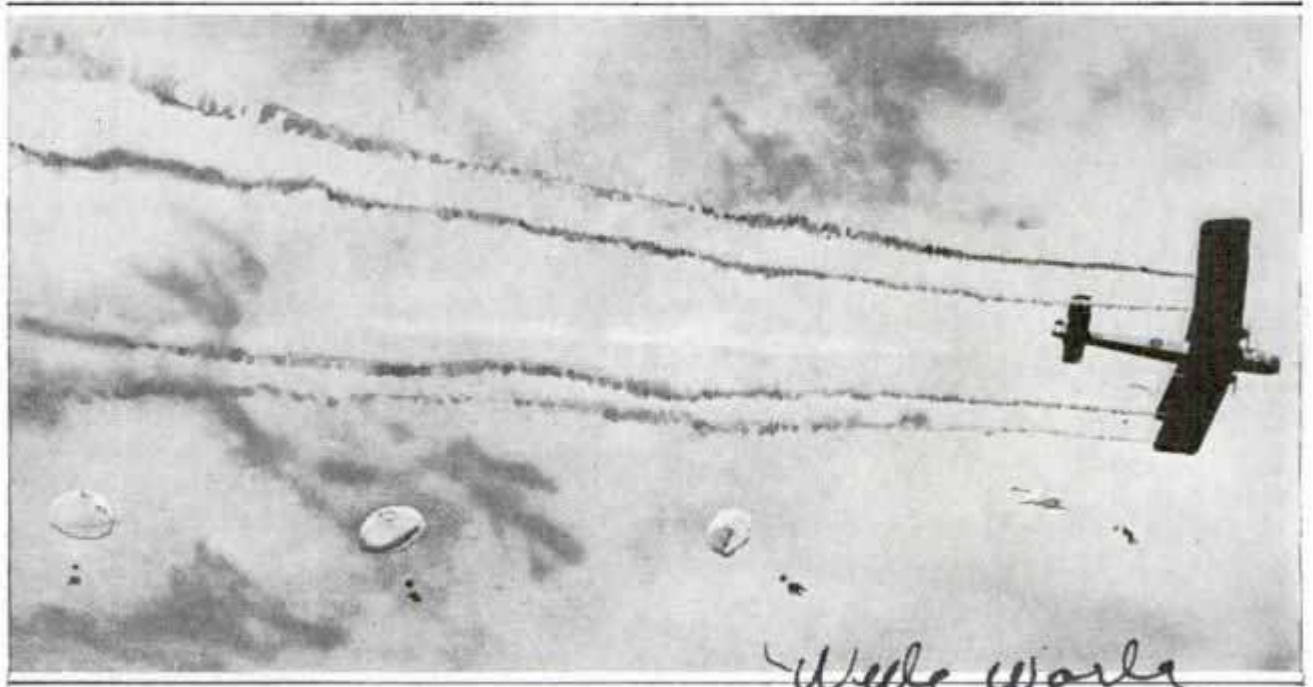
T 876

av. Rochester, N.Y.

Reported by Consul
W. W. Heligantner

Heligantner
Comp. 39 Fuel

Dummies Drop from Plane 'Hit' in War Play



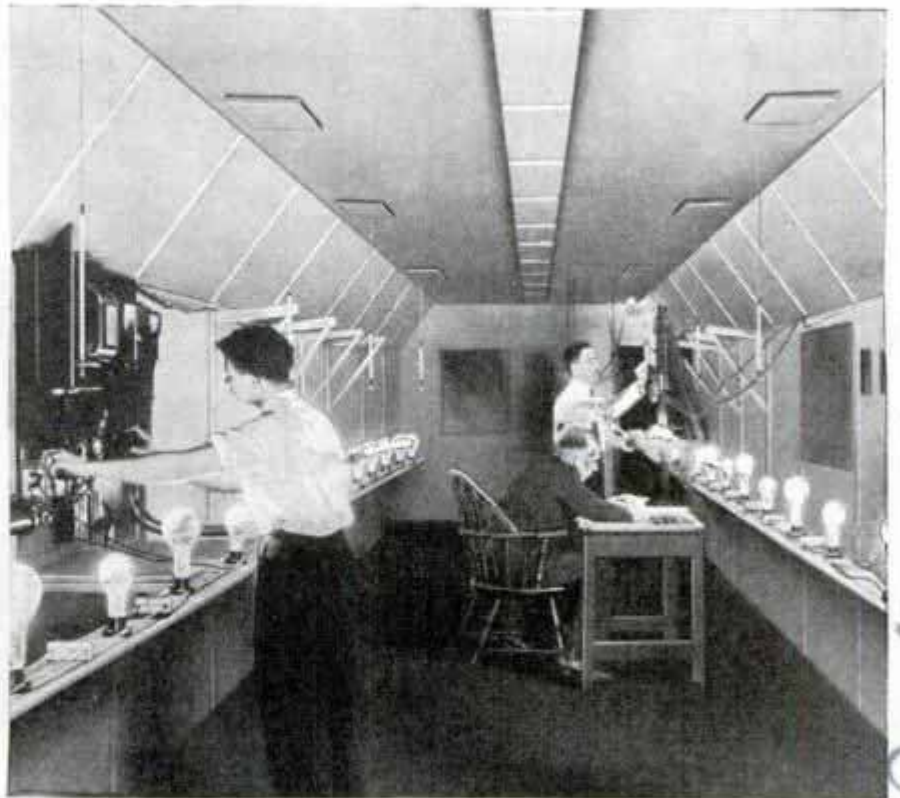
Dangerous winds were blowing during the Royal Air Force war show at Hendon, England, so dummies substituted for flyers in parachute jumps from bomber supposed to have been hit by anti-aircraft guns

To add a striking bit of realism to the sham war in the air, dummies were cast off with parachutes after a bombing plane had been "hit" in a British Royal Air Force

demonstration at Hendon, England. Smoke streams trailing from the exhausts as the big biplane roared across the sky were the signal that the guns had scored a hit.

Laboratory Like a Car Plans Railway Air-Conditioning

In order to reproduce as exactly as possible the conditions of a railway car, a full sized replica of the car interior was built as a laboratory to study railroad air-conditioning. Constructed in sections, it can be altered in dimensions or shape to represent any type of car, for conditions of draft and temperature differ in diners, sleeping cars and coaches. On one side are instruments to show temperature and humidity, on the other are temperature controls. Parallel rows of electric-light bulbs represent "body heat," giving off heat equivalent to that radiated by passengers.



Laboratory built like railway car to study air-conditioning. Each light bulb represents body heat given off by a passenger

7862
Barlow, main
W. J. Hurler Co. 16
Windsor Park

T 7 4 3

Mr. Frederick W. ...
115 Walbridge Road
Hartford, Conn

Fight Deadly CORROSION

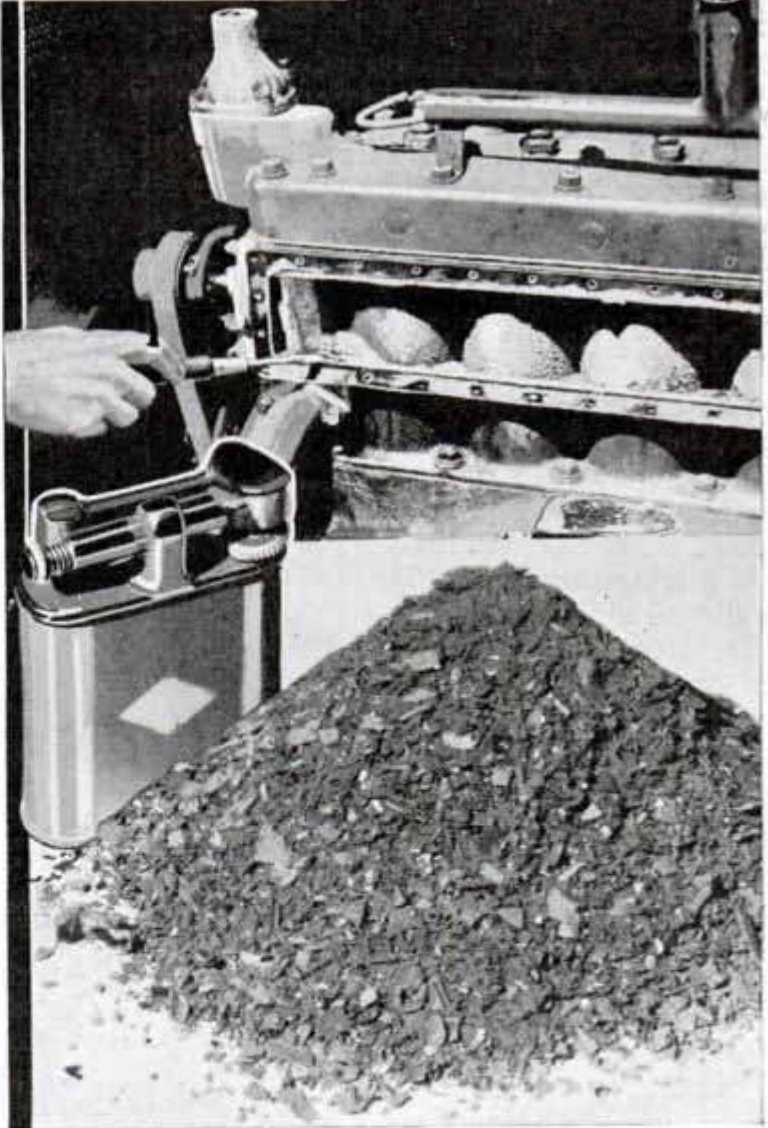


Anti-rust, which means anti-corrosion, solutions are on the market, inexpensive and easy to use. Called rust "inhibitors" by the automotive engineer, these anti-corrosion solutions usually are of the type which lubricates the cooling system. A little hard to believe, because the motorist knows oil and water will not

AS YOU drive along that last stretch of your vacation trip, you wonder why the car seems so sluggish, why the engine is so much hotter than when you took a similar trip two years ago. Of course, the car was new then, but there is no apparent reason for the motor to overheat now. Serviced regularly and driven carefully, the car should be in perfect condition.

But you have forgotten something—corrosion. While the car performed well and looked all right, one of the automobile engine's worst enemies was at work, eating away at all parts of the cooling system and gradually destroying the power plant. So now, with passages too clogged to permit free circulation of water, the cooling system cannot do an efficient job and the motor overheats.

This has happened to thousands of motorists, particularly in those days when too little attention was paid to the cooling system. And even today, many drivers fail to give that part of the power plant the proper care, in spite of the fact that all facilities for preventing corrosion are available at any good service station.



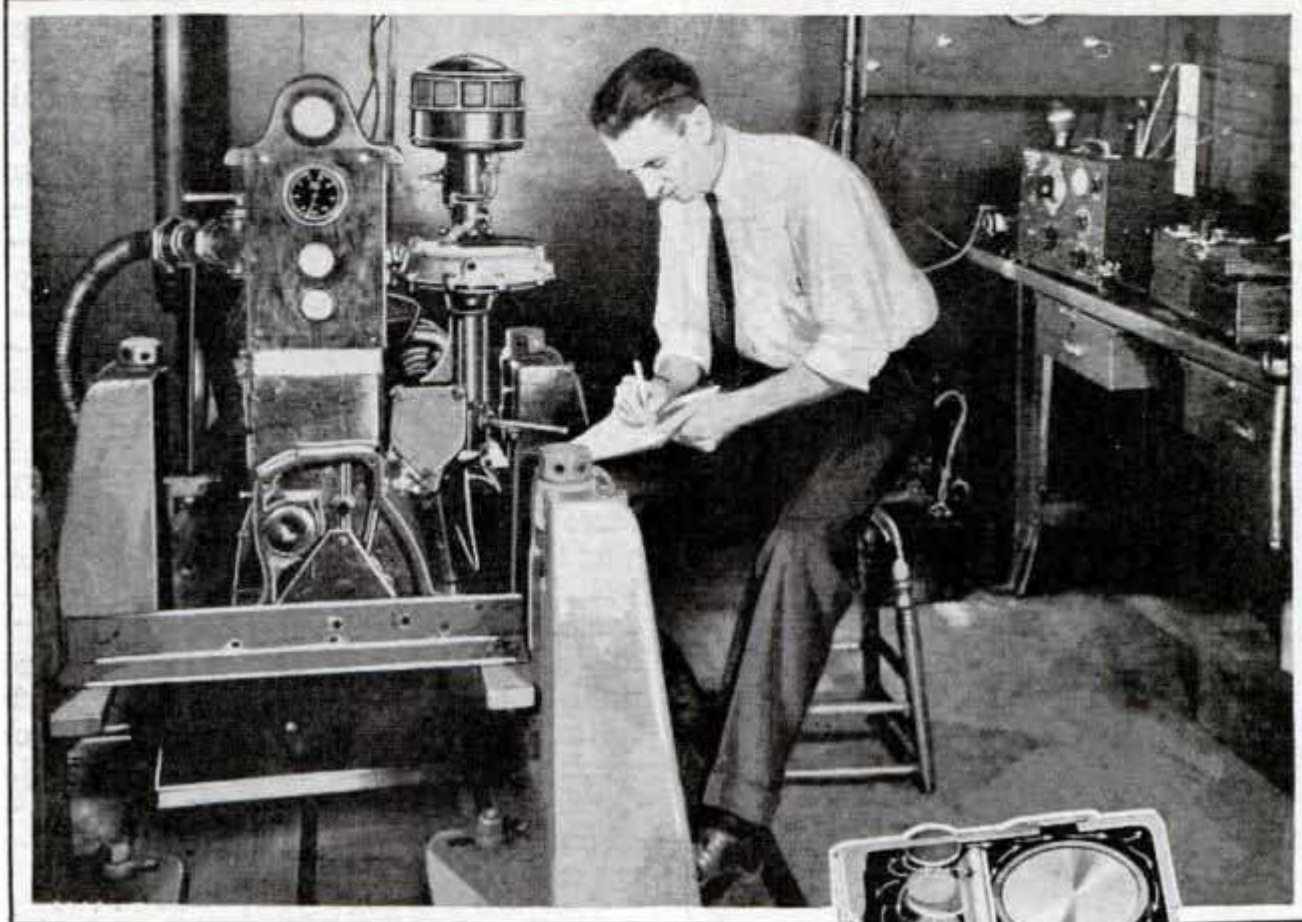
Top, steaming is evidence of clogged cooling system. Center, cleaning corrosion from around cylinders. Bottom, pile of rusted metal particles scraped from water passages

National Carbon Co.
19 E 41 st New York

Everyday Prestone

2743

to Save YOUR MOTOR



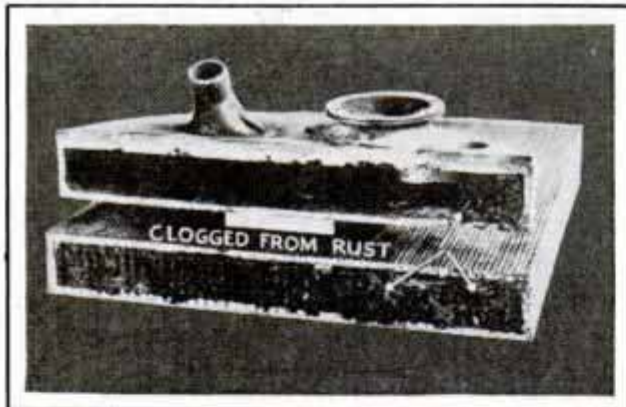
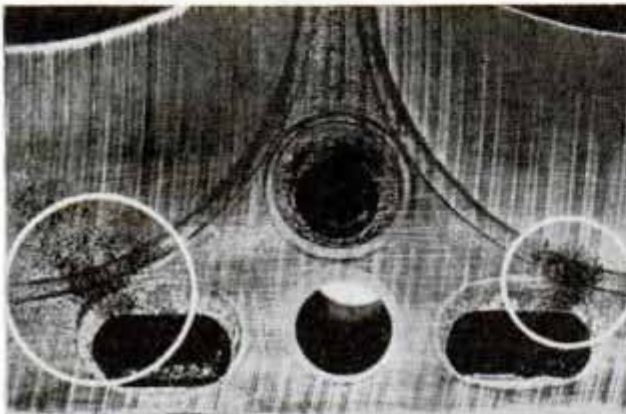
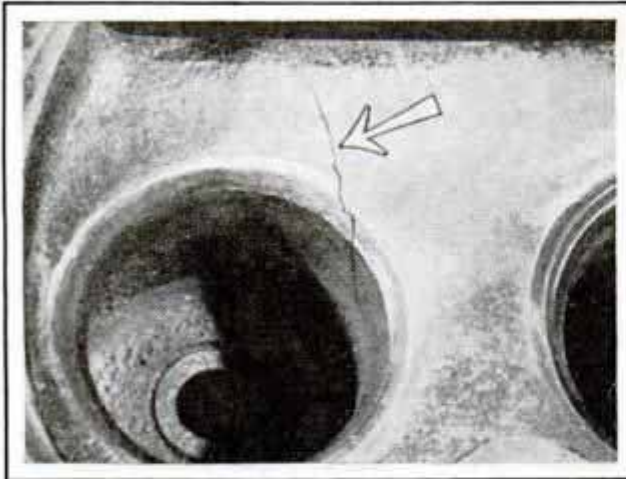
mix, but this lubricant is an oil which will dissolve in water instead of floating around at the top of the radiator or collecting on the inside of the block, engine head, hose connections, thermostat and radiator core. As the solution spreads through the engine, it coats with a thin oil film all metallic parts, thus hindering the process of oxidation.

Rust is the result of oxidation, which is the deadly effect of oxygen on iron and steel. The more oxygen in the water, the more rapid is the process of rusting or corrosion. Air entering the motor through the overflow pipe or a leaking water pump carries more oxygen into the water in the cooling system and the corrosive action continues. Rust forms faster while the car is being driven than while standing idle, first because more air is taken into the cooling system when the engine is running, and second, because rusting, like all chemical action, increases with heat. And as a general rule the faster a car is driven, the more rust is produced.

Use of the inhibitor or anti-rust solution checks corrosion, however, particularly if it is used when the car is new. So effective is the process that sometimes a very rusty system in an old car can be cleared up merely by adding more than the usual amount of



Top, testing engine. Bottom, engine with valve seats sprayed by water must have clean cooling system



Top to bottom: Cracked block caused by overheating due to corrosion; corrosion spots; clogged radiator core, and sediment from cooling system

inhibitor. This, however, is not recommended. The cooling system of a car already in service should be flushed out before inhibitor and fresh water are added. Engines with cast-iron heads can be flushed with sal-soda solutions, but those with aluminum heads need a special cleanser. Whether the system should be reverse flushed will depend upon how badly corroded it is. In many cases accumulations of rust and sediment in the water jackets must be removed manually by first taking off the side plates of the engine block.

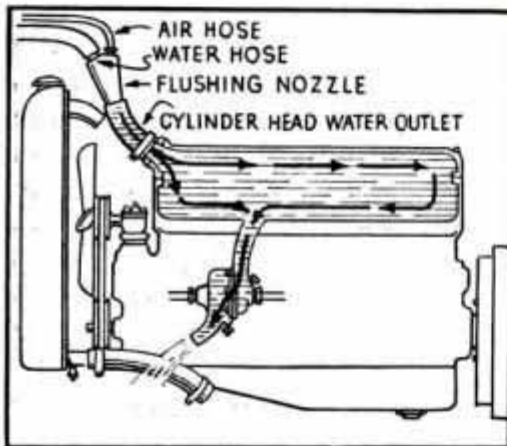
The wise motorist will appreciate that by using rust inhibitors from the time he takes delivery of his car he will be spared the long list of cooling troubles that befall those less provident. Corrosion, by clogging the radiator core and lining the water jackets so that heat is less efficiently conducted away from the cylinders, gradually raises the engine's operating temperature until trouble develops. This may extend to the metal of the engine itself so as to crack the block or at least warp the head. Overheating troubles can be so complicated and far-reaching that irreparable damage may follow an overdose of corrosion.

Twenty years ago many chauffeurs added a little sewing-machine oil to the contents of the cooling system and firmly believed this kept the water clear. They realized that the oil did not mix well with the water, but by using it sparingly and flushing out the system frequently they managed fairly well. They were also careful not to use so much oil as to put too heavy an insulation against heat on the inside of the cooling system.

Today the job is simplified, not only because the special solvent oil mixes so freely with the water but also because enough of it can be used at one filling to keep the water clear throughout the entire season. A pint of this oil is enough to protect the cooling system of the largest car. So effective is solvent oil that the small cans of rust inhibitor or rust preventive sold on the market contain a percentage of water. Just as in the case of adding anti-freeze, it is better to add rust inhibitor when the cooling system is half filled rather than to start pouring it into a system that is already nearly filled. This will prevent the possibility of thinning out

the mixture by losing some of it out the overflow pipe immediately. Because of expansion when the engine heats up, this overflowing is certain to take place where the owner fills up the radiator while the engine is cold.

Failure to keep the spark timing properly adjusted, allowing the fan belt to get loose, neglect of the simple matters that combine to keep an engine functioning at par will help to bring on overheating trouble, but in majority of cases overheating can be forestalled by checking corrosion in the cooling system. Allow rust to form, and the core of the radiator soon clogs with flakes of



Several views of method and equipment used in pressure cleaning of auto cooling system. Air pressure is necessary to remove heavier sediment. The radiator core may be tested by removing the cap and watching water level as engine is raced. If water rises and spills over, the core is clogged

metal. This collection of sediment slows down the flow of water through the core, thus starting a vicious circle of trouble.

It is a good plan to test the cooling system frequently by looking into the radiator through the filler pipe while the car is standing still with the engine running fast. If water surges forward and spills over the top of the radiator there is every reason to suspect that the core is partly clogged. Before reaching this conclusion, however, be sure to look at the lower water hose connection. If it collapses as the engine is accelerated there would be good reason for the radiator to overflow. However, if the old hosing does not seem too flexible, and if a new piece of hose also collapses, then the radiator core itself is not clear enough.

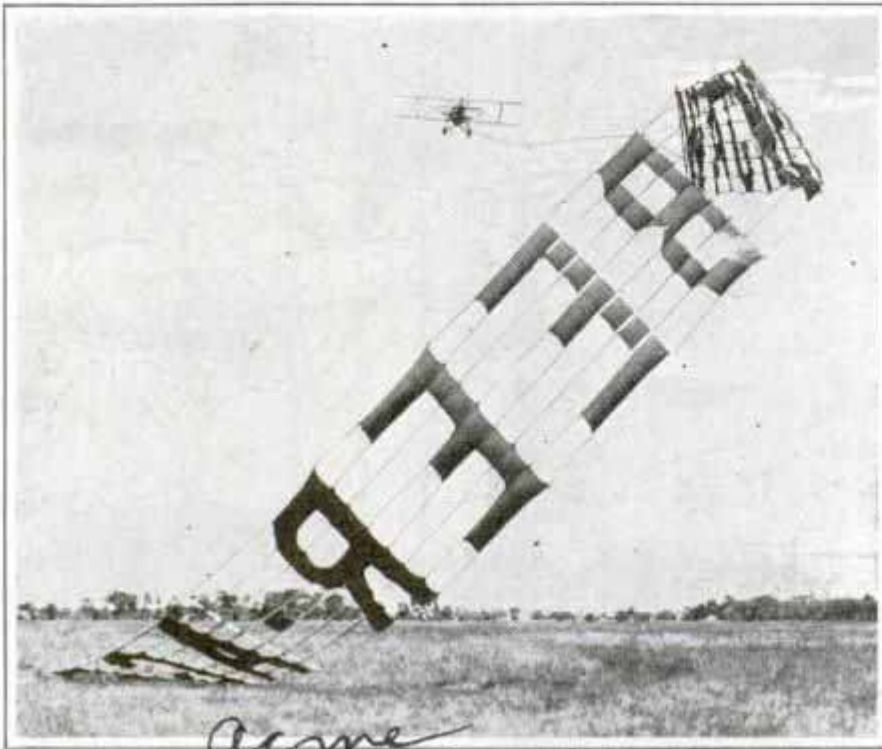
Over a period of a few years any engine can create a surprising quantity of rust. Most of this remains in the block where

it tends to insulate heat and prevent its normal escape to the air through the metal. If only a small portion of this passes through to the radiator core it will be sufficient to clog the fine passages through which the water must pass at a rapid rate. If the car is an old one, and the owner plans to make a fresh start, he should not consider the work complete if he merely has the radiator reverse flushed or the core replaced. Cleaning out the system must include cleaning out the block and the head.

A cleansing job requires pressure, chemicals, heat, quantities of water and—in some cases—manual scraping out of those places which can be reached with suitable tools.

A car that has not enjoyed the benefits of rust prevention becomes as troublesome as one which has never had the right grade of oil or not enough oil.

Plane Whips Sign into Air at End of a 300-Foot Rope



With 450 feet of towrope and advertising sign dragging behind him, the pilot must get off the ground in a hurry

Now you know how the pilot got off the ground with that huge sign trailing behind him. The advertising slogan itself is 150 feet long, its letters seven feet high, and to take off safely there must be at least 300 feet of rope between the plane and the first letter. The sign is laid on the ground in front of the plane, and as the ship sweeps across the field for a quick takeoff the sign is whipped into the air. At the end of the day's work the pilot merely cuts the sign loose over the airport.

Safety Goggles Shut off Grinder Until Operator Dons Them



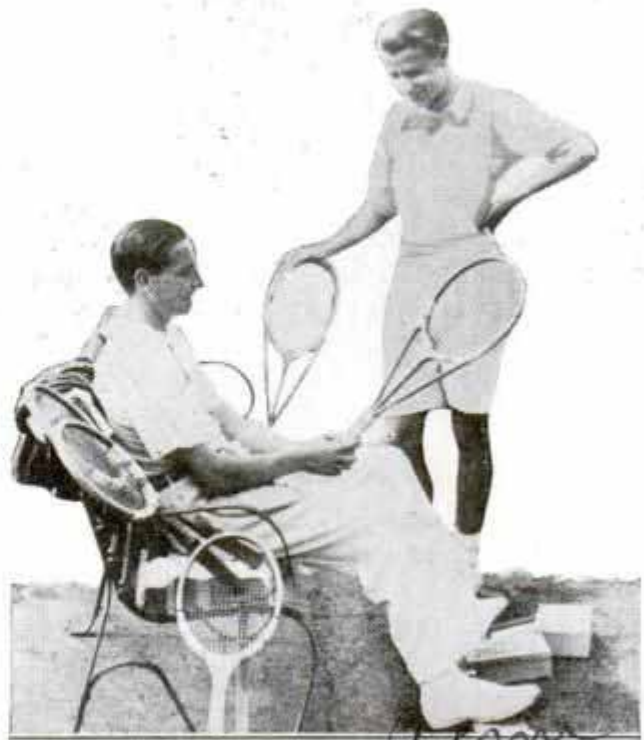
To enforce a safety rule requiring machinists to wear goggles while at work, a Freeport, Ill., manufacturer devised a novel switch. When the goggles are not in use, they rest on

a tray balanced above the plunger of a sensitive electric switch connected to the motor of the grinding machine. As long as the goggles are on the tray, their weight is sufficient to depress the plunger and cut off the grinder motor. The operator can not go to work until he picks up his goggles, allowing the circuit to be completed and starting the motor.

Streamline Racket Used on Courts at Wimbledon

In a recent tennis tournament at Wimbledon, England, streamline rackets were subjected to a severe test in championship play. Instead of a solid handle and throat attached to the head, the

racket has a three-pronged throat, the upper end of each prong being attached to the head. All parts are streamlined to permit easy handling.



On the sidelines at Wimbledon two players examine the latest type of racket

C. F. Burgess Laboratories

F 8 7 4. *Journal of the American Institute of Architects* 6/20/36 P. 1127

Indian Memorial a Masterpiece in White Onyx



Towering above the floor of the new city hall at St. Paul, Minnesota, this thirty-six-foot statue is a masterpiece in white onyx. It consists of a base portraying a group of Indians gathered around a campfire and smoking their peace pipes. Rising high above them and as if taking shape in the smoke from their pipes is the giant figure of an Indian god, holding a peace pipe in one hand and extending the other in friendly gesture. The memorial is the work of Carl Milles, Swedish sculptor

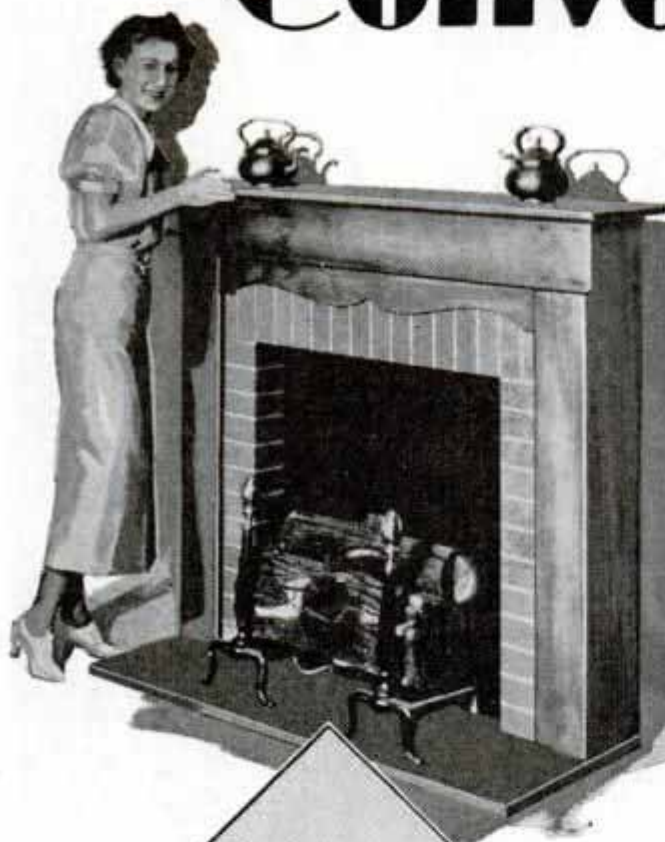


New

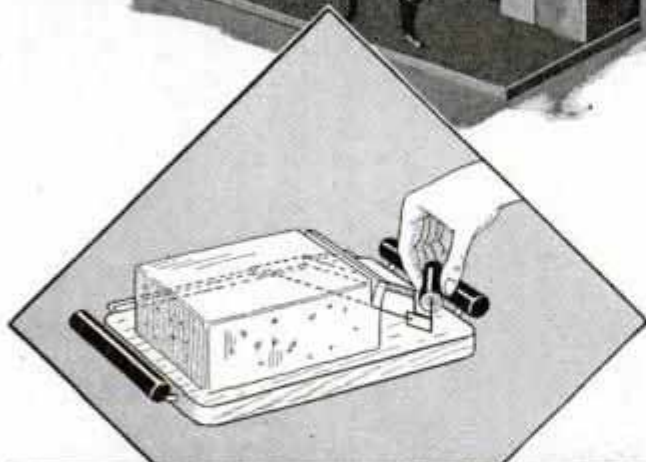
*Chromium-plated skillet
which requires no scouring
since it is unaffected by
heat, grease or food acids*

Conveniences

for you

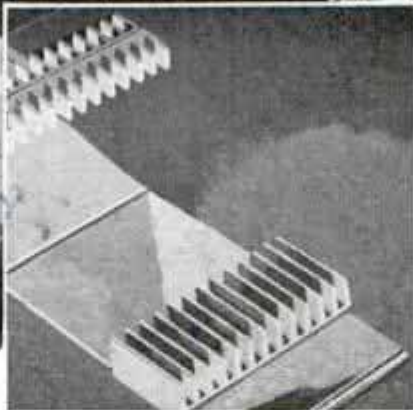
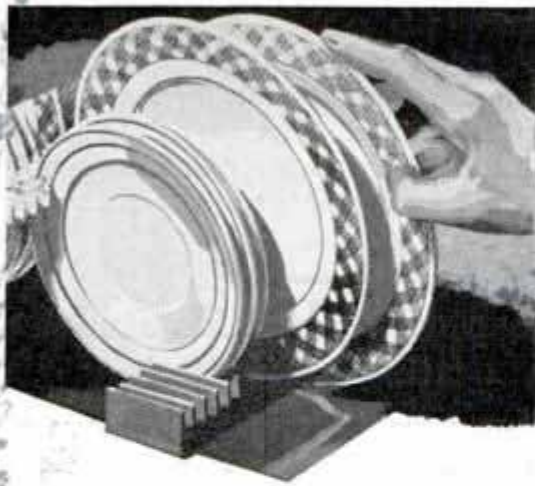


Portable fireplace for decorative purposes. It can be shifted about the room when the furniture is rearranged, or even moved from one room to another whenever a complete change in the decorative scheme of the home is desired



Handy cheese cutter and server, above. The cutting wire slides along rod at rear. Right, automatic gas-burning water heater which also serves as a utility table





Rubber racks for your china prevent nicks. Instead of stacking plates together, you can stow them away separately in adjustable racks that save space

HOME

Lift the top of this end table, at right, swing it around and it becomes a reading desk to support your book. Likewise it is convertible into a music stand, sewing table and catchall. The pivoting desk top can be adjusted to any position



In circle at left, cake holder places one layer upon another in perfect alignment without breaking the layers. This is an especially handy kitchen tool when the cake is warm and light

Whirling yarn holder for knitting or crocheting, above at left, feeds direct to needle, preventing snarls

Two-Story "Atom Smasher" to Aid Scientists



Giant "lightning" generator under construction. Its "bolts" will be fired at atoms

Capable of developing 800,000 volts of electricity, a huge "atom smashing" machine is being constructed at the University of Chicago to help scientists study atomic structures. The apparatus stands two stories high. It is designed to shoot giant man-made bolts of electricity at the nucleus or heart of an atom in attempts to disintegrate the atom. This breaking down of the atom would enable scientists to obtain knowledge which might make possible transmutation of metals, perhaps the changing of lead into gold through a rearrangement of atoms. This, however, is regarded only as a possibility and is not the immediate purpose of the machine.

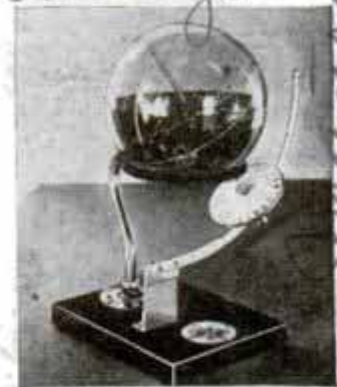
Exhaust Gas Compresses Air for High-Flying Planes

Designed for use in high altitudes, such as the stratosphere level, an exhaust-driven supercharger compresses air for the carburetor of the airplane, resulting in more efficient operation. The supercharger is a small ferris wheel propelled by jets

of exhaust gas from the plane's motor. It attains a speed of 40,000 revolutions per minute under the impact of the gases striking tiny vanes. At this velocity the wheel is a centrifugal pump which compresses the thin air of the stratosphere to sea-level density.

Star Map on Globe Aids Student in Locating Constellations

Amateur astronomers can now have a "planetarium" of their own. An English railroad man who is an enthusiastic astronomer has invented a globe on which the constellations and principal stars are mapped. It can be adjusted for any latitude in the northern hemisphere, tilting the globe by sliding a screw clamp which holds a glass rod to a quadrant arm. This arm is graduated in degrees. The rod represents the axis of the celestial sphere and points to the Pole star. The globe, six and one-half inches in diameter, is partly filled with a colored liquid to represent the horizon, and the earth is imagined to be at the center. To find the constellations, the globe is placed with the brass quadrant pointing south along the meridian of the place of observation, its axis pointing north. A magnetic compass is set in the base to aid accurate observations. A tiny red hemisphere representing the sun, its flat side a vacuum suction cup, is fixed on the surface of the globe along its ecliptic, marked by a dotted line, the location depending upon the date; then the globe is rotated to put the sun exactly on the meridian, its position at noon. The clock pointer is then set at noon, the quadrant adjusted to the right latitude, and by rotating the globe and turning the clock to the desired time of day the positions of stars and constellations can be readily seen. An unbroken line around the globe, graduated to show degrees or time, marks the celestial equator. A silvered vacuum cup represents the moon.



Change return 6/30/36
Prof. Samuel Allison

at Wright field
F861
Astriglobe
made by W. W. Weston N.Y.



Radio

7 35 96

ONE to TEN-METER Receiver

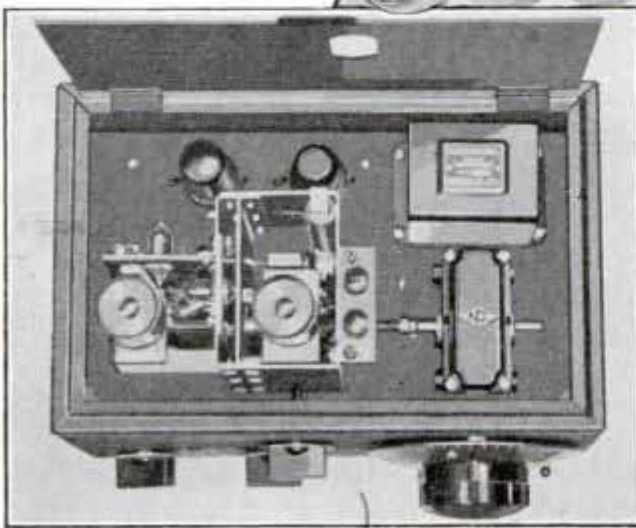
NAMED for its unusual tuning range of from one to ten meters, this receiver provides excellent performance in a difficult field. The enormous frequency range covered by the wave lengths between one and ten meters was, until a year or so ago, practically unused. The value of this territory is rapidly increasing, however, as shown by the activity of amateurs, two-way police radio, facsimile transmission and experimental television.

Experimenters have been seriously handicapped by lack of a suitable ultra-high-frequency receiver that must be extremely sensitive and at the same time simple and easy to operate. The set illustrated has been designed by short-wave engineers to meet this need with due regard



for the special characteristics of present-day transmitters.

It employs two miniature acorn-type tubes and two metal tubes, of the varieties shown in Fig. 1, in an improved super-regenerative circuit. A separate power unit supplies six volts for the tube heaters and 180 volts to the plate and screen circuits. If desired, the heaters may be supplied from a 6-volt storage battery and the B-circuits from B-batteries, thus making the receiver adaptable for mobile use. The coils, which are used in pairs, are shown with the covers removed in Fig. 2. These plug into the r.f. and detector coil sockets as required to cover the desired portion of the 1 to 10-meter range. An interior view of the receiver, given in the lower photo, shows the tuning unit and acorn tubes mounted in sockets built into shields between the condenser sections. This is the real heart of the set, which is tuned with a micrometer dial that makes ten revolutions to cover any one coil range. All controls are shown in the upper photo; the switch at the lower right-hand corner breaks the positive B lead for temporarily rendering the receiver inoperative during periods of transmission or when changing coils.



*National Company
61 Sherman St. Malden*

ALL-PURPOSE

By M. N. Beitman

YOU can assemble this portable hearing-aid amplifier with simple tools in a few interesting hours of work. It will reproduce voice and music clearly and with surprising power even when the lapel-type microphone is used some distance away from the source of sound.

The hard-of-hearing will find it a valuable means for reproducing

and amplifying radio programs to suit their needs without advancing the volume of the radio receiver to a point where it would be objectionably loud for those with normal hearing. In addition to its hearing-aid applications, it may be effectively used as a detectaphone in the manner illustrated in the sketch on the opposite page. When employed for this purpose, the microphone cord can be any length up to 25 feet. The "mike" is a small flat disk variety that may be concealed easily in an adjoining room. As a noise analyzer, it is useful to the auto mechanic and has many other applications that will suggest themselves to the builder and experimenter.

Easily portable, the amplifying unit is self-contained together with the batteries in a neat metal case. Standard high-resistance headphones or a single unit headphone may be used. The phone and "mike" cords are arranged to plug into insulated jacks conveniently located on the front panel. More than one pair of head-



For the Deaf



FIG. 3-c

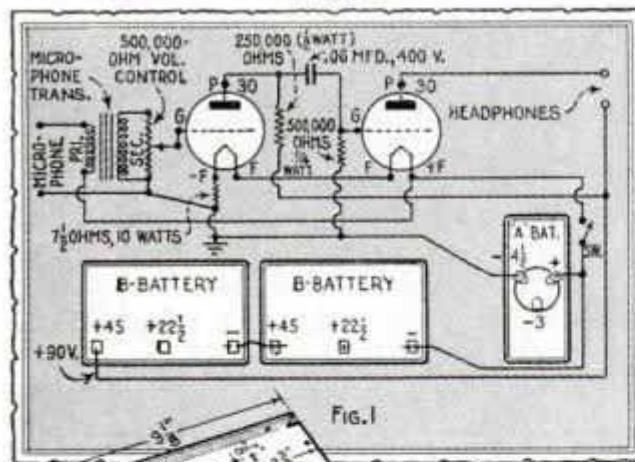


Fig. 1

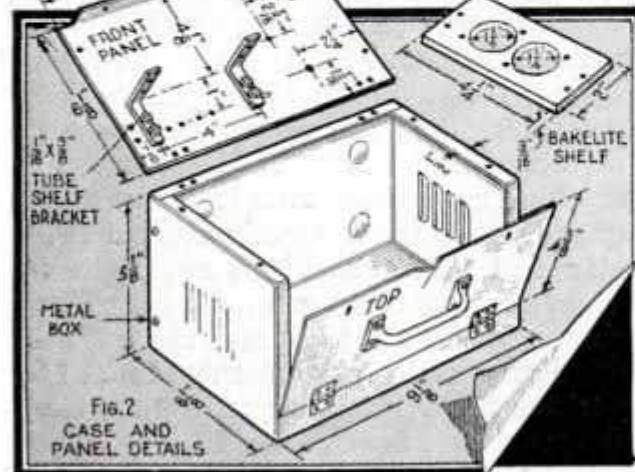


Fig. 2
CASE AND
PANEL DETAILS

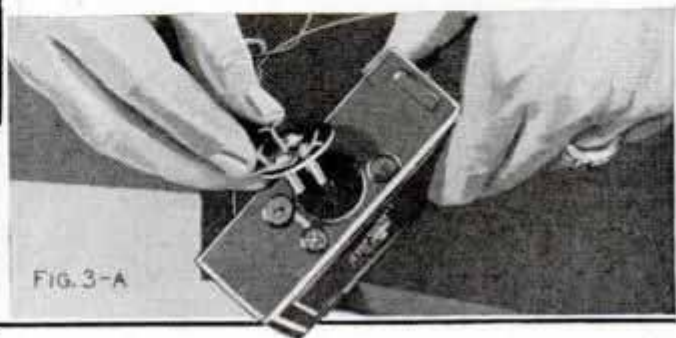


FIG. 3-A

Hearing-Aid AMPLIFIER



As a Detectaphone

phones may be operated from the amplifier, or if desirable in certain cases, a bone conduction unit may be employed.

The circuit is a simple two-stage resistance-coupled variety using type-30 tubes that operate on two volts, as shown in the schematic diagram Fig. 1. It will be noted that the filament voltage is reduced to the required value by means of a $7\frac{1}{2}$ -ohm resistor in series with the $4\frac{1}{2}$ -volt negative side of the A-battery, which is at common ground on the metal case. Proper grid bias for the tubes is obtained automatically because of the method by which the filaments are interconnected.

All case and panel details are given in Fig. 2 including the di-



FIG. 3-D

mensions of the Bakelite shelf on which the tube sockets are supported by means of angle brackets. This case, complete in every detail, is available for those who do not wish to make their own. The metal front

(Continued to page 122A)

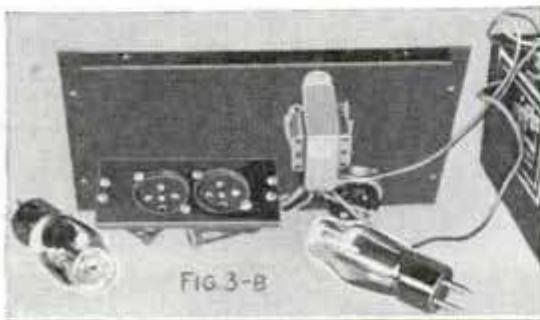
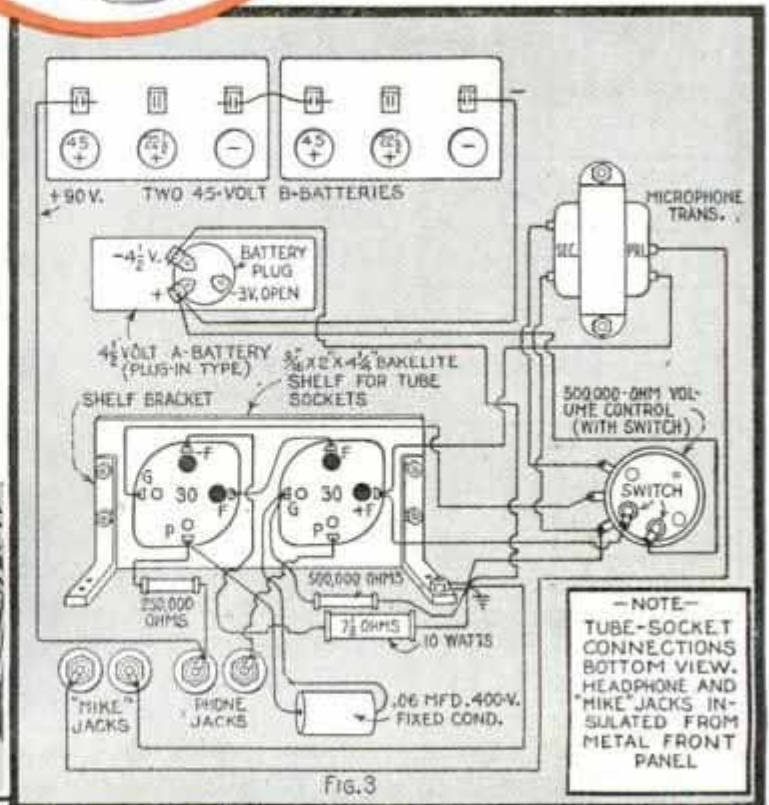
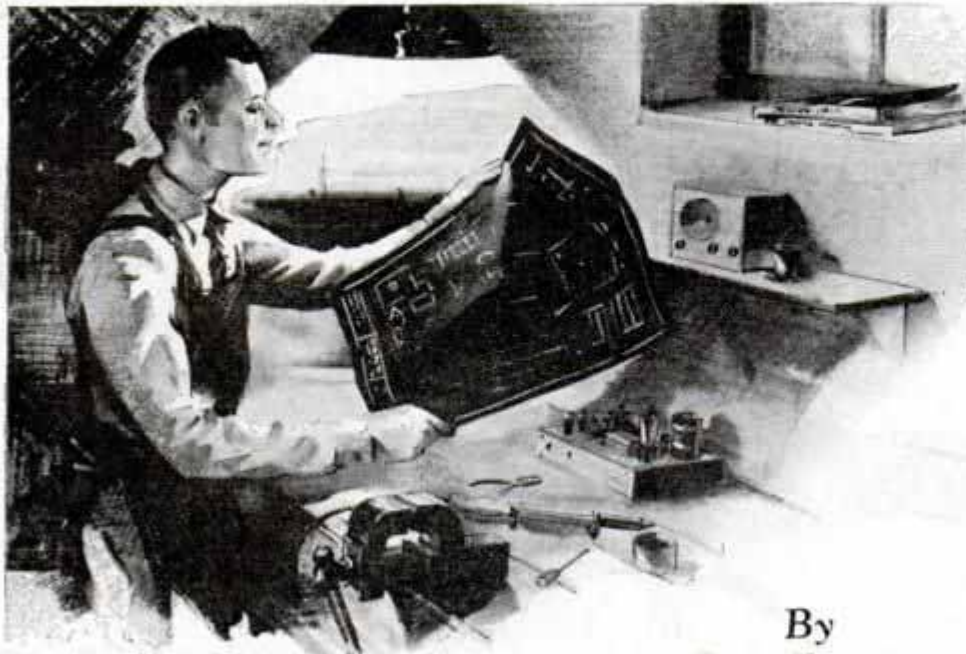


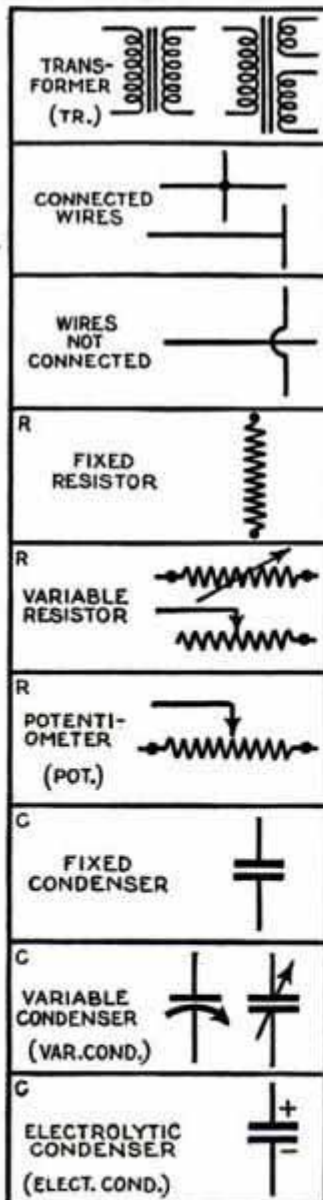
FIG. 3-B



How to Read Schematic Circuit Diagrams



By
F. L. Brittin



BEGINNERS should be familiar with the symbols used to represent the various radio parts as they appear in what are known as "schematic" circuit diagrams. These conventional graphic symbols, although not fully standardized, have become quite well known through popular use. They are employed as a common universal language to indicate radio parts in their proper relation in circuit diagrams. In fact, the average radio experimenter, glancing casually through a foreign radio magazine, merely needs to look at the schematic diagrams to get a pretty clear idea of the instrument described, although he may not be able to read a word of the text.

Some of the most commonly used symbols and abbreviations appear on this page. When more than one symbol is ordinarily used to indicate the same part, both are given. Most of the radio construction articles that appear in Popular Mechanics Magazine show both the schematic and a carefully prepared simplified or "picture" diagram of the parts and wiring. The simplified diagram enables the builder to see just how the mechanical arrangement of the various parts, and the actual wiring, appear on the top and underside of the

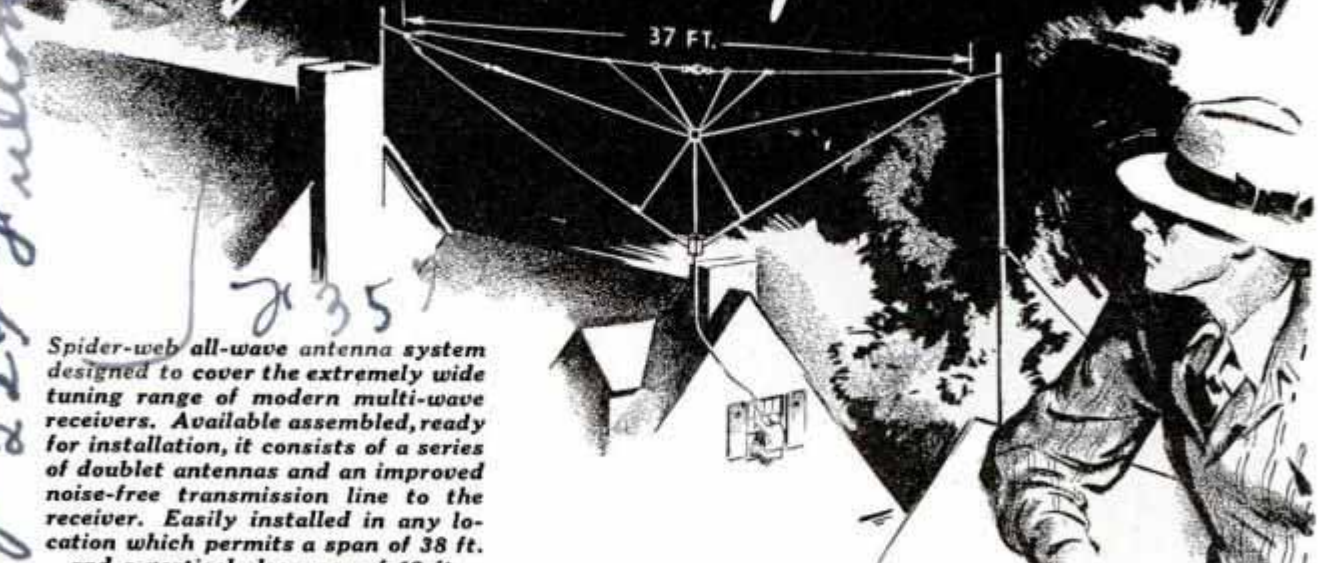
(Continued to page 134A)



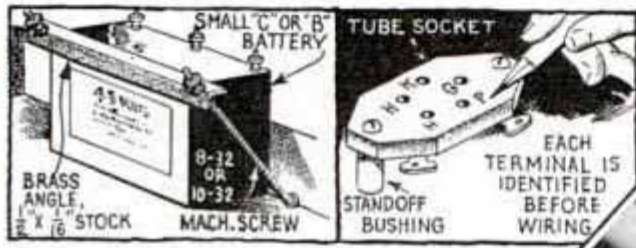
Camden, N.J.

Hints for RADIO Experimenters

Arthur W. Lynch, Co. 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100



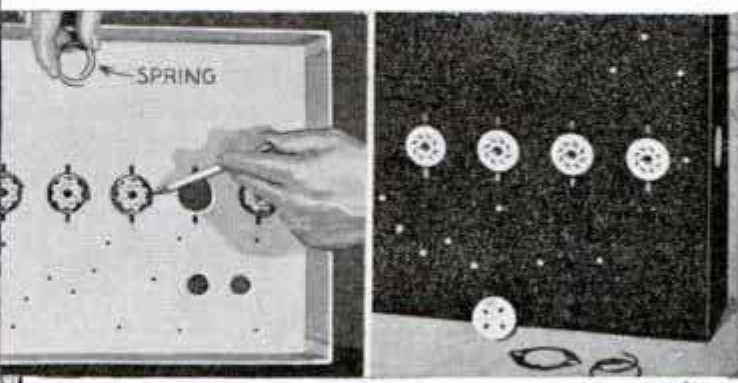
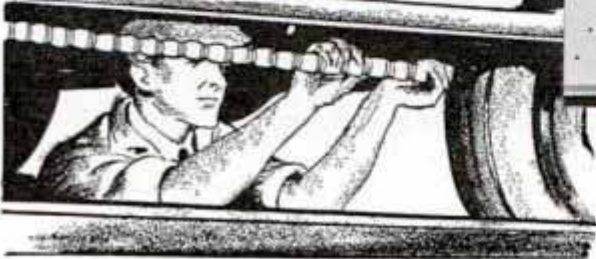
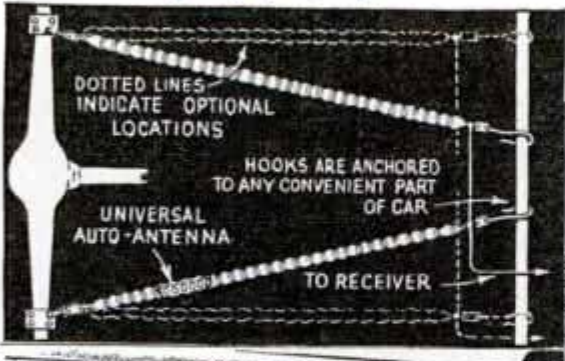
Spider-web all-wave antenna system designed to cover the extremely wide tuning range of modern multi-wave receivers. Available assembled, ready for installation, it consists of a series of doublet antennas and an improved noise-free transmission line to the receiver. Easily installed in any location which permits a span of 38 ft. and a vertical clearance of 12 ft.



Above, brass angle and machine screws used to hold small battery in portable set; Right, errors in wiring porcelain sockets may be avoided if terminals are plainly indicated with "china" marking crayon; Below, easily installed coil-spring under-car antenna, encased in dust and grease-proof covering



Above, chassis die for punching socket holes in metal bases; Right, tube socket mounted on small hinge provides variable coupling with plug-in coils



Flush-mounting ceramic tube sockets designed to mount directly into metal chassis, are held firmly by means of heavy spring-wire retainer rings; photos show top and underside views of base with sockets in position

American Chicago City Chicago



TYPE with COMFORT.. *in your easy chair*

FOR the typist who likes to work comfortably at home, this portable typewriter cabinet has a top which can be swung across the arms of an easy chair. The typewriter is bolted to the underside of the top, bringing it to correct typing position when the stand is opened for use. When not in use, the typewriter is lowered into a dust-free compartment, entirely out of sight, and the cabinet becomes a chair-side lamp table. Swinging doors in the sides of the lower compartment provide easy ac-



The top of this lamp table is swung over across the arms of a comfortable chair, bringing the typewriter into a convenient position



cess to paper and other writing material, which may be kept on shelves, while the center portion may serve as a wastebasket. There is also shelf space on the outside of the cabinet, at either end, for books, magazines or knickknacks.

As you will notice from the drawings, the top swings on a rod projecting into both sides of the cabinet at one corner. This makes it possible to swing the top across the arms of chairs varying in height. However, as a perfectly horizontal position

between the upper and lower compartments. In assembling the parts, 1 by 1-in. cleats are used at the corners and 1½-in. round-head wood screws are driven through the cleats into the sides and ends, leaving all visible surfaces on the outside smooth and free from screw heads. Note that the bottom, which fits up into a recess formed by the sides and ends, is screwed on from the outside to the cleats inside that support it. However, it is not screwed in place until all the assembly work in the lower compartment has been completed. The method of pivoting the top is completely shown in one of the drawings, the end of the top being beveled so that when fitted to the crosspiece, there is just enough space for the pivot rod. Holes bored half-way through the sides will retain the pivot rod in position, in which case the rod must be installed when the sides are assembled. Or, if you desire the rod to be removable, bore the holes entirely through the sides and use a setscrew to hold the rod

Weighted Clothesline Stays Taut

If you occasionally put up a clothesline on your porch, in the basement, or even



in the kitchen, here is a good way to keep it taut. Attach one end to a screw eye, pass the other end through a screw hook and tie an iron or similar weight to it. You can pull down the line to hang clothes and, when released, the iron will pull it up tightly.

Miniature Japanese Garden Is Built on Top of Bird Bath

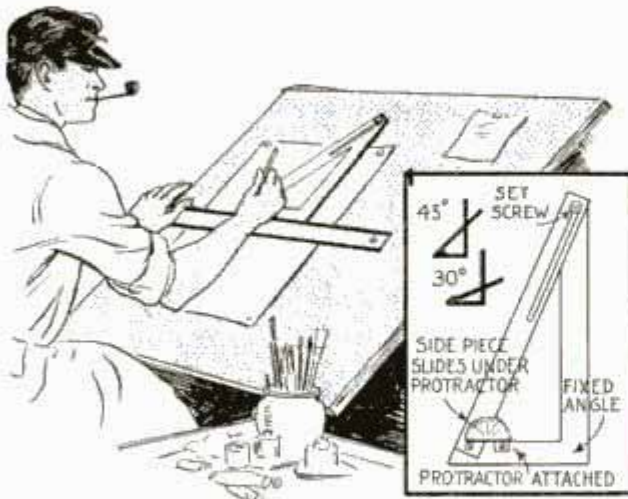


This garden ornament offers unlimited variations in design, and will give you much pleasure in experimenting with different kinds of plants

With a top resembling a miniature Japanese garden from which real flowers and vines grow, this attractive garden bird bath is easily made in a short time by anyone. Lay a plywood panel across a couple of sawhorses and start the job. First trowel out the base with a mixture of equal parts of sand and cement to a depth of 1½ in. A piece of ½-in. mesh wire should be pressed into the mixture for reinforcing. Then work in your rocks, bridges, etc. Be sure that the rocks around the edge of the base are cemented tightly as they serve as the rim of the water basin. Crevices and pockets formed by the rocks are filled with rich soil for plants. A standard of rocks laid up with cement is ideal to support the bath. Painting the bridges and other architectural features in vivid colors enhances the effect. What to plant in the garden, of course, is governed by your particular taste.

—Frank E. Brown, Pasadena, Calif.

Protractor Triangle Aids Artist When Lettering Work



This protractor triangle is quickly adjusted to letter work at any angle

Made from a regular triangle or from pieces of wood, this protractor triangle is especially handy for artists as it is quickly adjusted to any angle for lettering. The top angle is joined over a long slot with a set screw, while a semi-circular piece of tin with the angles marked is attached to the lower left-hand angle. The apex of this protractor must be the apex of the inside angle. The left side is movable and pivots on a rivet or bolt attached to the horizontal bottom piece. Thus the left side of the triangle may be moved, while the protractor designates the angle. The set screw locks the parts at the desired angle.

Finding Leaks in Flush-Box Float



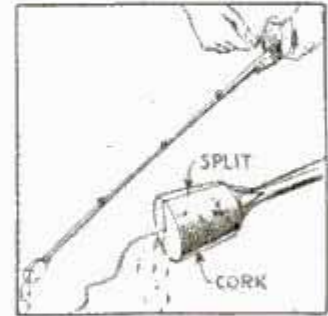
When ball floats in bathroom flush boxes develop small leaks that are almost impossible to find, yet quickly let in enough water to make the float ineffective, you can find and cure the trouble as follows:

Drill a small hole in the float close to the stem, as the metal is thicker at this point due to reinforcing the ball. Then insert a tiny tube, or even a soda straw and blow into the float. This will drive out moisture inside and show up the small holes. If air

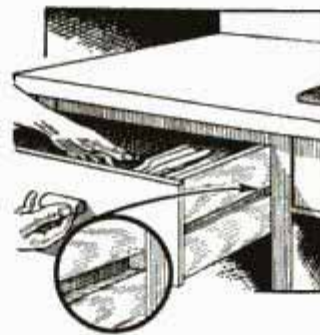
escapes past the tube, you can seal it with a little chewing gum. After soldering the leaks and the hole drilled for the tube, the float is ready for use.

Split Cork Serves as Wringer for Drying Fishline

By slicing a large cork half-way through one side with a sharp knife or razor blade, one angler provided himself with a practical little wringer to aid in drying his fishlines. In use, the line is drawn through the slot which squeezes out the water.



Enlarging Drawer in Sink



Finding the cutlery drawer in our cabinet sink much too small for the purpose, I replaced it with a deeper one, which was done by removing the strip between the drawer and the door below. This, of course, made it necessary to change the slides to the type that fitted in grooves cut in the sides of the drawer as shown.

—W. A. MacArthur, Long Beach, Calif.

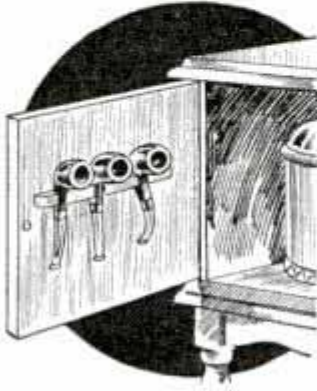
Corroded Pipe Couplings Loosened by Heat



If you are making alterations on some of the plumbing lines and find that the pipe couplings are corroded so tightly that they cannot be loosened with a wrench, try expanding them with the flame of a large candle as

shown. A blowtorch is faster, of course, but if you haven't one at hand, a candle will often do the trick provided the pipe isn't too large.

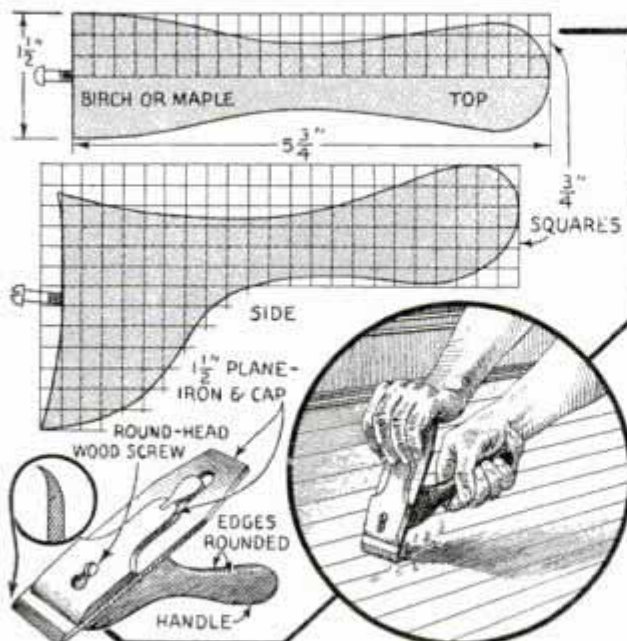
Pipes on Smoking-Cabinet Door Are Always at Hand



If you haven't a place on your smoking cabinet to keep your pipes, get a toothbrush holder and screw it inside the door of the cabinet. Be sure to get a large-size holder that will take the stems of all your pipes.

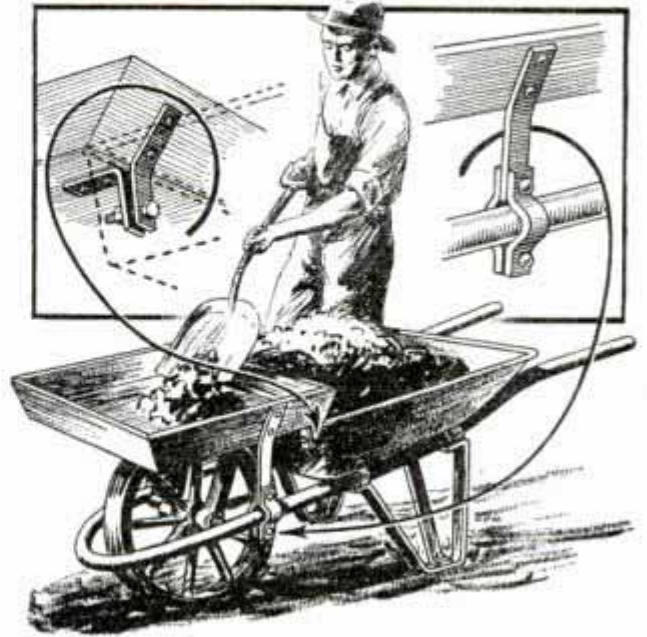
Wood Scraper from Plane Parts

Here is a handy cabinet or floor scraper that is easily made and one on which you can put plenty of pressure for heavy scraping jobs. It consists of a plane iron and cap attached to a maple handle shaped as shown in the squared details. As plane irons are too soft for floor scrapers, they must be heated to a cherry red and chilled in water to harden them. The cutting edge is then turned as shown in the small circular detail in the lower left-hand corner.



The handle is the only thing you have to make on this scraper; other parts are already assembled

Wheelbarrow Has Extra Space for Hauling Large Loads

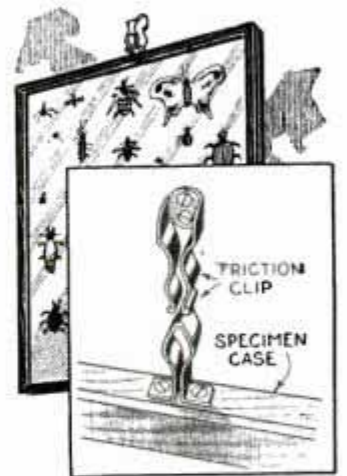


Wood tray mounted on wheelbarrow provides extra space for hauling large loads

Unusually large loads can be hauled with very little additional weight on the handles, if your wheelbarrow has an extra box mounted above the wheel as shown. The box is attached to the front end of the regular hopper with flat-iron brackets, while two long arms of the same metal support it rigidly above the wheel.

Specimen Displays on Wall Are Quickly Detached

Having a number of butterfly and beetle specimen cases hanging on the walls of my den which were frequently taken down for inspection, I was troubled with the hangers until I tried friction catches of the type shown. These were purchased at a ten-cent store. They will sustain a fairly heavy weight, thus making them handy for hanging pictures, framed charts, etc., that are taken down often.



—K. F. Keith, St. Petersburg, Fla.

Jig-Saw Blower Operated by Foot Gives Strong Air Stream

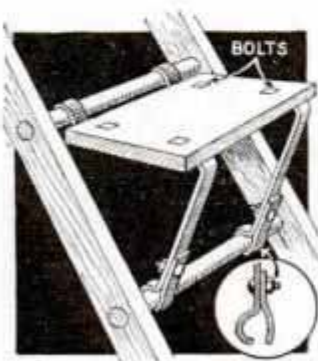


An occasional tap on the bellows with your toe will keep the work free of sawdust

This bellows was used on a homemade jig saw which was not equipped with a regular blower. As the operator stands or sits at the saw, an occasional light tap with the toe will produce plenty of air. Consisting of a 7-in. length of inner tube, two wood disks $5\frac{1}{4}$ in. in diameter, a few rubber bands and a length of $\frac{1}{4}$ -in. rubber tubing, the blower can be made in an hour. One disk is slipped into the upper end of the inner tube and rubber bands are stretched around it. The other disk is provided with a flat rubber valve, and a hole for one end of the rubber tubing. An old coil spring from a bed is placed between the two disks as shown.

—Dale R. Van Horn, Lincoln, Nebr.

Ladder Platform Eases Strain on Your Feet

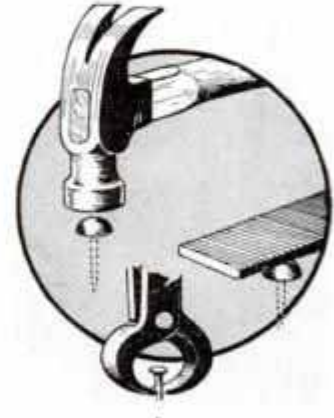


If your work requires standing on a ladder for long periods, use a small platform like the one shown which is less tiresome on the feet than a ladder rung. It is adjusted in

height easily and consists of a hardwood tread and two heavy pieces of flat iron bent to the shape shown to hook over the ladder rungs.

Removing Upholstery Tacks

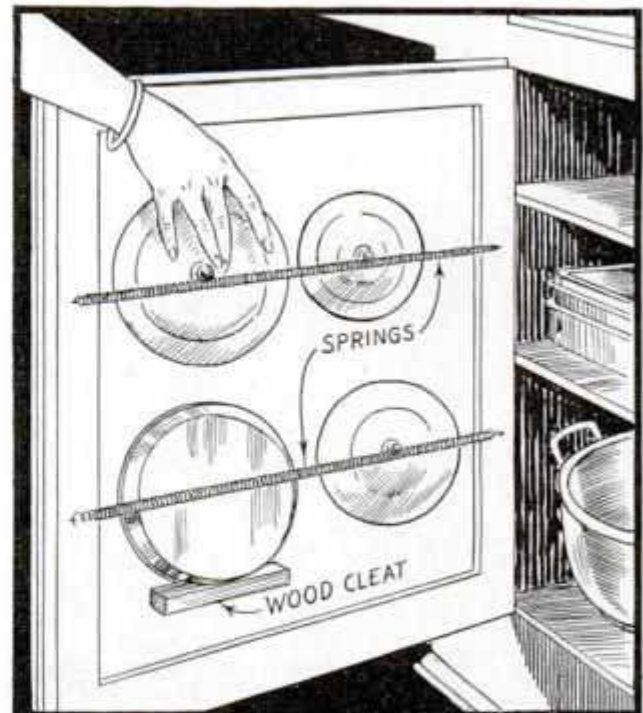
You can easily remove tacks with cup-shaped heads, commonly used in upholstery work, without marring the surrounding surface, as follows: First drive the tack further by tapping it with a hammer to indent the head.



Then file across the head, which will loosen and remove it, leaving the tack with just sufficient head to be withdrawn.

Lids Held on Cabinet Door

A good way to utilize the waste space behind your cabinet doors is to tack screen-door springs across the inside as shown to hold pot lids. If a grooved wood cleat is glued to the door a few inches below each spring, you can also store pie tins and similar utensils in this way.

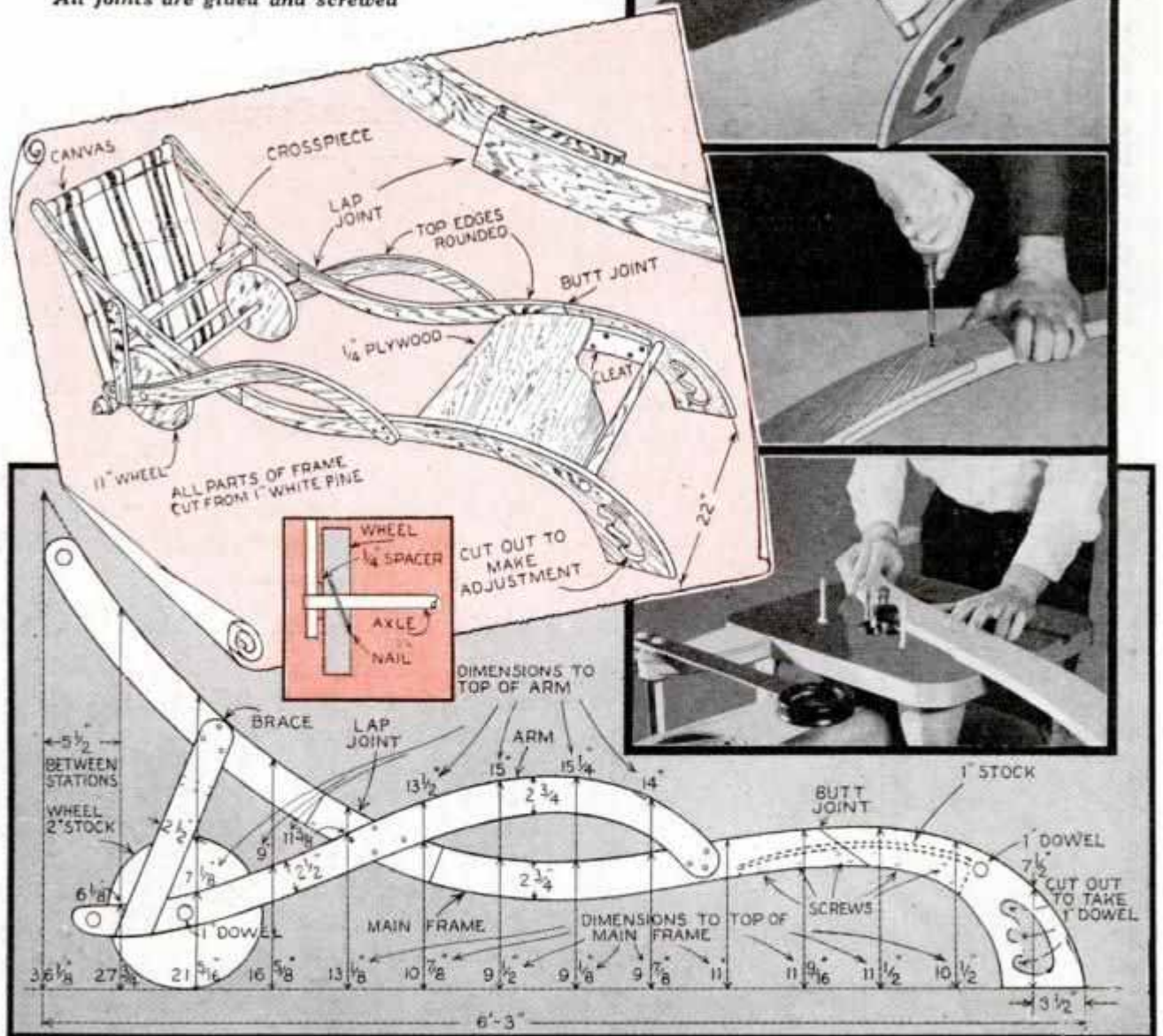
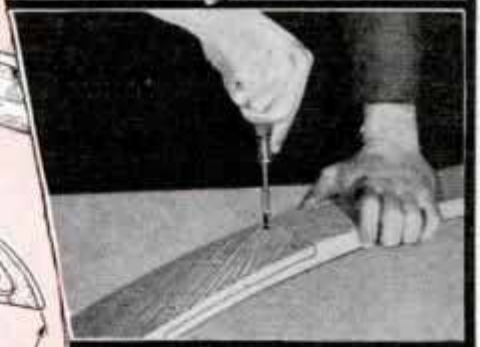
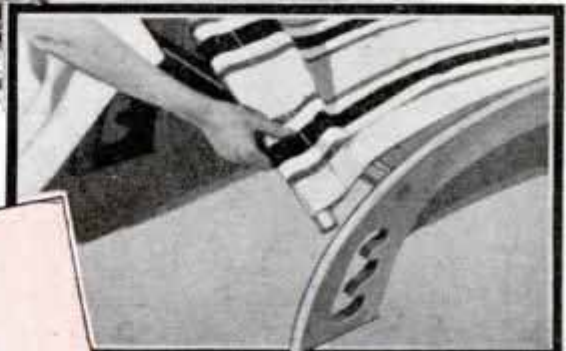


Pot lids stored behind a cabinet door utilize waste space and are always easy to reach

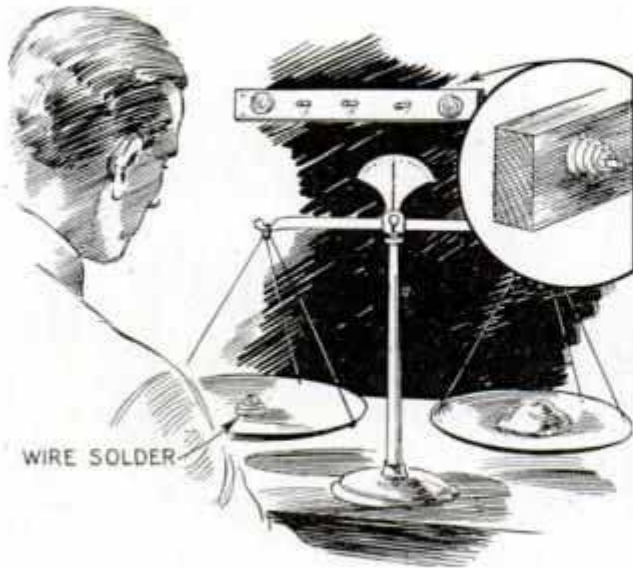
A HAMMOCK on Wheels



As it is fitted with two wooden wheels at one end, you can push the hammock anywhere in wheelbarrow fashion. Cutouts at the foot end of the frame serve the purpose of handles for wheeling besides providing a means of adjusting the tension on the canvas. Uniformly molded edges, done by means of a shaper, give the job a neat, finished appearance. The two main side rails are each made up of three separate pieces, the upper and center ones being half-lapped, while the center and lower ones are merely butt-joined on a cleat, which carries a plywood panel. All joints are glued and screwed.



Special Weights for Small Scales Made from Wire Solder



Exact weights in wire solder for various chemicals save time in duplicating formulas

When the same quantities of chemicals or other commodities are to be weighed out repeatedly, it is often convenient to have a suitable single balance weight for each. These may be provided by cutting lengths of solid wire solder and carefully trimming them down to the exact weight required. The lengths may be coiled so that they will be convenient for handling and then marked to designate the formula in which they are used.

Novel Photo Wall Bracket

Here is an unusual method of displaying a large photograph on a wall bracket which will serve to support a clock, pot of flowers or some ornament in the home. Dimensions given can be varied to suit the photo, which is glued to the surface

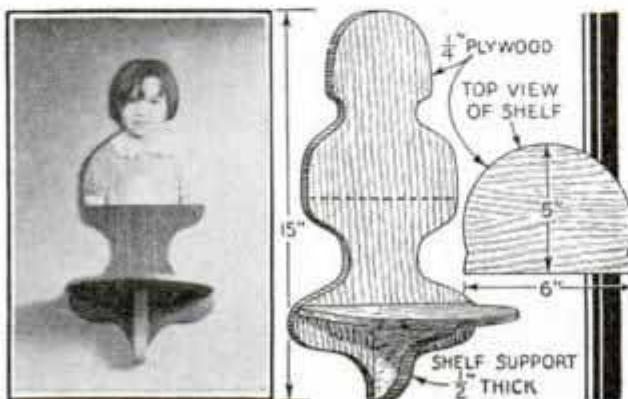
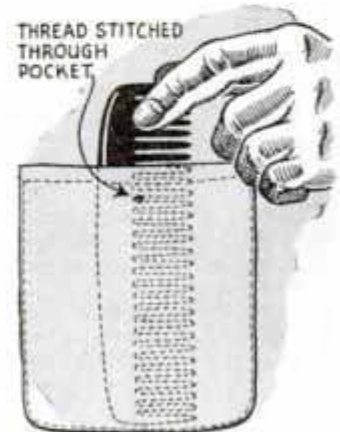


Photo mounted on a wall bracket to support ornaments gives it a personal touch

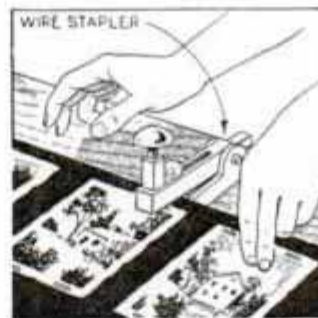
of a piece of plywood and, when dry, is cut as shown with a fine scroll saw. The exposed parts of the wood are sanded smooth. A shelf and support are required. The ones shown will take care of the average ornament, but can be modified to suit individual requirements.

Comb Slipped over Thread Stays in Pocket

To hold a comb securely in your pocket, stitch a thread through the pocket at the point indicated. Thrust the comb into the pocket and then pull it to one side so that the thread will slip between the teeth.



Snapshots Stapled in Album



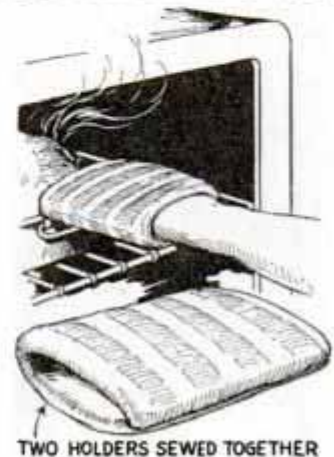
I find an office stapler handy for mounting snapshots in an album. A number of them can be mounted neatly in a short time, and there is no possibility of them loosening

and falling out, which sometimes happens when paste or art corners are used.

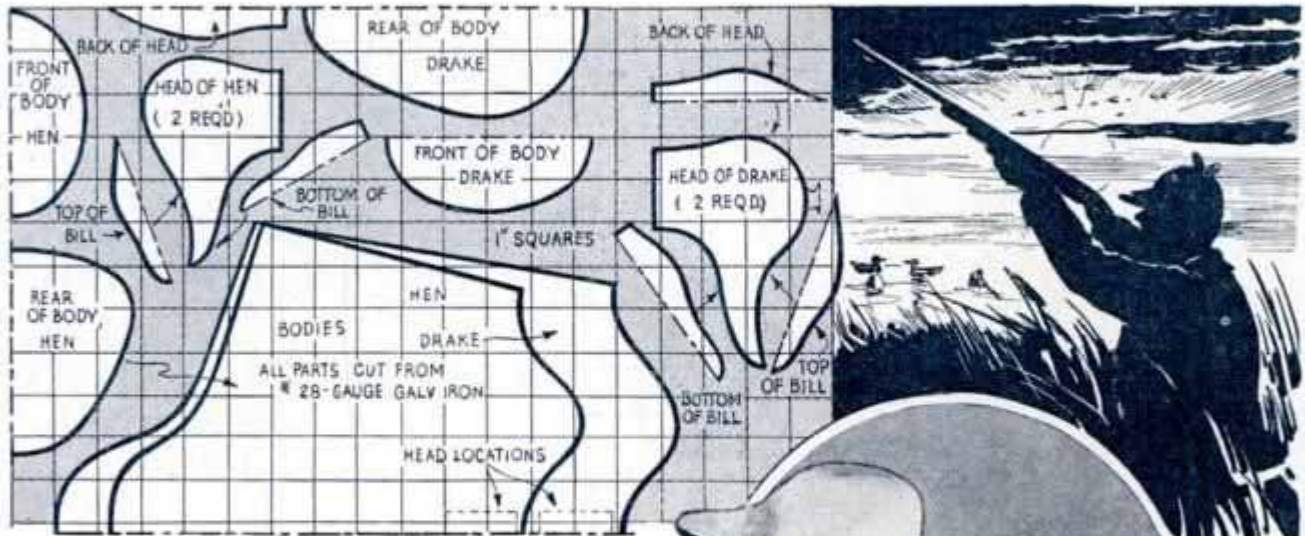
—J. Howard Cooper, Brooklyn, N. Y.

Hot-Pad Mitten to Reach in Oven

When reaching into a hot oven to remove or adjust pans, there is little danger of burning your hand if you use this mitten. It is made by sewing a couple of ordinary hot pads together along three sides, as illustrated.



Lifelike Duck Decoys of Metal Are Lasting



Realistic in appearance, these duck decoys are made of sheet metal and will not split or get waterlogged. They are easily constructed and will last indefinitely if given proper care. The patterns given in the squared detail are for one half of each member represented. Therefore, when the full-sized patterns are outlined on the sheet metal, they must be made double as indicated in the lower right-hand detail. When cutting out the parts, allow $\frac{1}{4}$ in. of metal along the edges to be soldered for a lap joint. The body parts that are to be rounded are easily formed over a piece of large pipe. After the decoy has been soldered carefully together to make it water tight, solder a wire ring to the bottom to attach a weight, which keeps the decoy from tipping. If galvanized sheet metal is used, paint the finished decoys with vinegar before applying the white-lead priming coat. The vinegar will roughen the surface of the metal so that the paint will adhere firmly. Finish the job by painting the decoys to resemble the wild ducks as nearly as possible. Use only flat paint to avoid reflection of light.

—Ralph T. Moore, Elyria, Ohio.

Covering for Model Airplanes

Made right in your own home, this model-airplane covering is nothing more than a thin sheet of cellulose nitrate, which is obtained by dissolving celluloid in amylacetate. Preparation of the material in sheet form is simple. Just take a pan

of water as large as the sheet desired and pour a few drops of the cellulose-nitrate solution on the water. The film spreads like oil and the evaporation of the solvent leaves a thin film of celluloid on the surface of the water. The problem of lifting the film without breaking it is solved by pinching the edges around a wire frame and sliding it off the surface of the water to avoid tearing. As soon as the sheets are dry, they are cut from the frames and applied to the model. If the water is cold and the liquid hot, very thin films can be prepared. Exposure to sunlight will deteriorate the films slowly.

—Chas. King, Chicago.

☐ Waterproof casein glue kneaded to the consistency of dough with wood flour can be shaped easily into small parts for making models.

Drawing-Board Surface Repaired with Cork Inlay



Drawing boards that are marred near the edges from thumbtacks are renewed with cork inlay

When a drawing board becomes badly marred around the edges by thumbtack marks, it can be repaired with strips of sheet cork. A wide rabbet is routed around the edges of the board to take the cork, which is glued in place. When the glue has dried, the edges of the board and cork inlay are sanded smooth.

—L. H. Georger, Buffalo, N. Y.

Pocket Check Protector at Hand When Needed

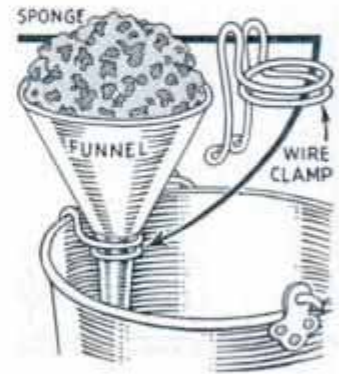
If you carry a check book, why not make this simple check protector and carry it in your pencil pocket? The protector is simply a short piece of small wire cable or rope, preferably the latter as it is made up of wires much finer than those in the cable. Insert this in the cap of a large rifle shell, the cap of an old fountain pen or the barrel of an old automatic pencil. The latter two usually have a pencil clip attached. Let the end of the wire extend a fraction of an inch from the container, and



be sure it is cut off squarely so that the tiny wires will make a good impression over the writing on the check.

Wet Sponge Drains in Funnel When Washing Walls

When washing walls, woodwork, etc., and the sponge is laid down while wiping off the work, a large funnel clamped on the water bucket as shown will hold the sponge and allow dirty water to drain into the pail. A wire clamp is easily made to hold the funnel on the inside of the bucket.



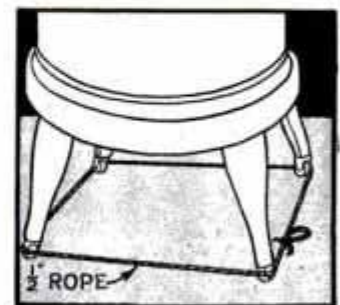
Drawer Knobs Are Kept Tight by Lead Washers

If the drawer knobs on your furniture loosen, remove the screws and slip a small lead washer under the head. Lead grommets used to seal a hole water-tight in sheet metal are ideal for the purpose and can be purchased for a few cents. Drive the screw heads tightly against them. The lead conforms to irregularities of the drawer front and will hold the screw firmly in place.



Creepy Washer Has Rope Brake

The tendency of an electric washing machine to creep when it is in operation can be stopped by tying a length of $\frac{1}{2}$ -in. rope around the four casters as shown. Or, still better, insert a small coil extension spring in the rope and you can raise it up on the legs where the spring will hold it when you want to move the machine.



PICTURES
in
RARE WOODS

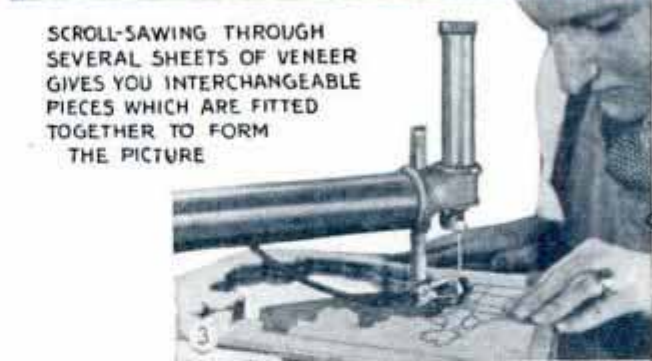
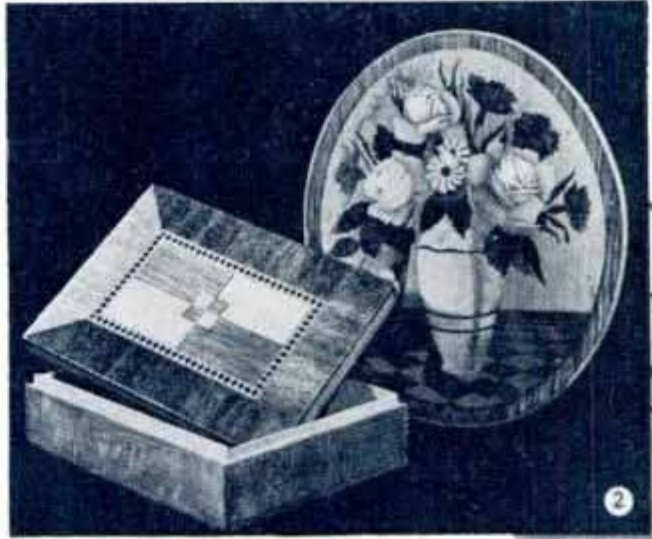


A workshop hobby that makes your scroll saw pay!

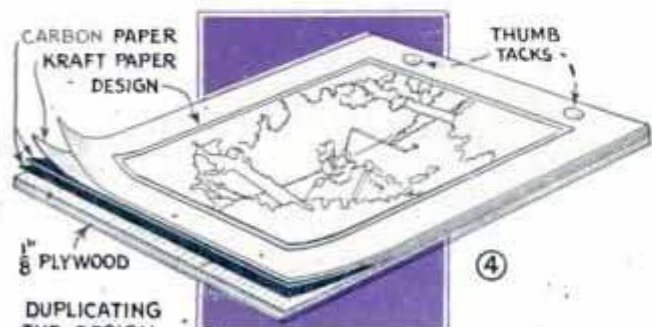
By Floyd Mix

EMBRACING all of the natural beauty found in colorful rare woods, inlay pictures offer some unusual possibilities for bringing out the touch of individuality so much desired in the modern home. The principle involved in making these pictures is a simple one—different kinds of veneer are stacked up like the layers of a cake, and with the design on top, are sawed simultaneously, as in Fig. 3. The selected pieces are then assembled in jigsaw puzzle style. Material generally used is 1/8-in. stock, which may be purchased by the square foot or in kit form.

To get right into the construction of these wood pictures, let's take the one shown in Figs. 1 and 6. The others, illustrated in Figs. 2 and 9, are made in a sim-



SCROLL-SAWING THROUGH SEVERAL SHEETS OF VENEER GIVES YOU INTERCHANGEABLE PIECES WHICH ARE FITTED TOGETHER TO FORM THE PICTURE



DUPLICATING THE DESIGN ON THE TOP BACKING PIECE AND ALSO IN REVERSE ON PAPER TO FACILITATE ASSEMBLY AS IN FIG. 5

ilar manner. First, trace the design on a sheet of tough paper which has been marked off in 1/2-in. squares. Then, transfer it to a piece of 1/8-in. plywood 11 by 14 in. in size, which serves as the top backing sheet when assembling the veneer pad for sawing, and a sheet of kraft paper, as shown in Fig. 4. Use two sheets of carbon back to back, arranged so that the

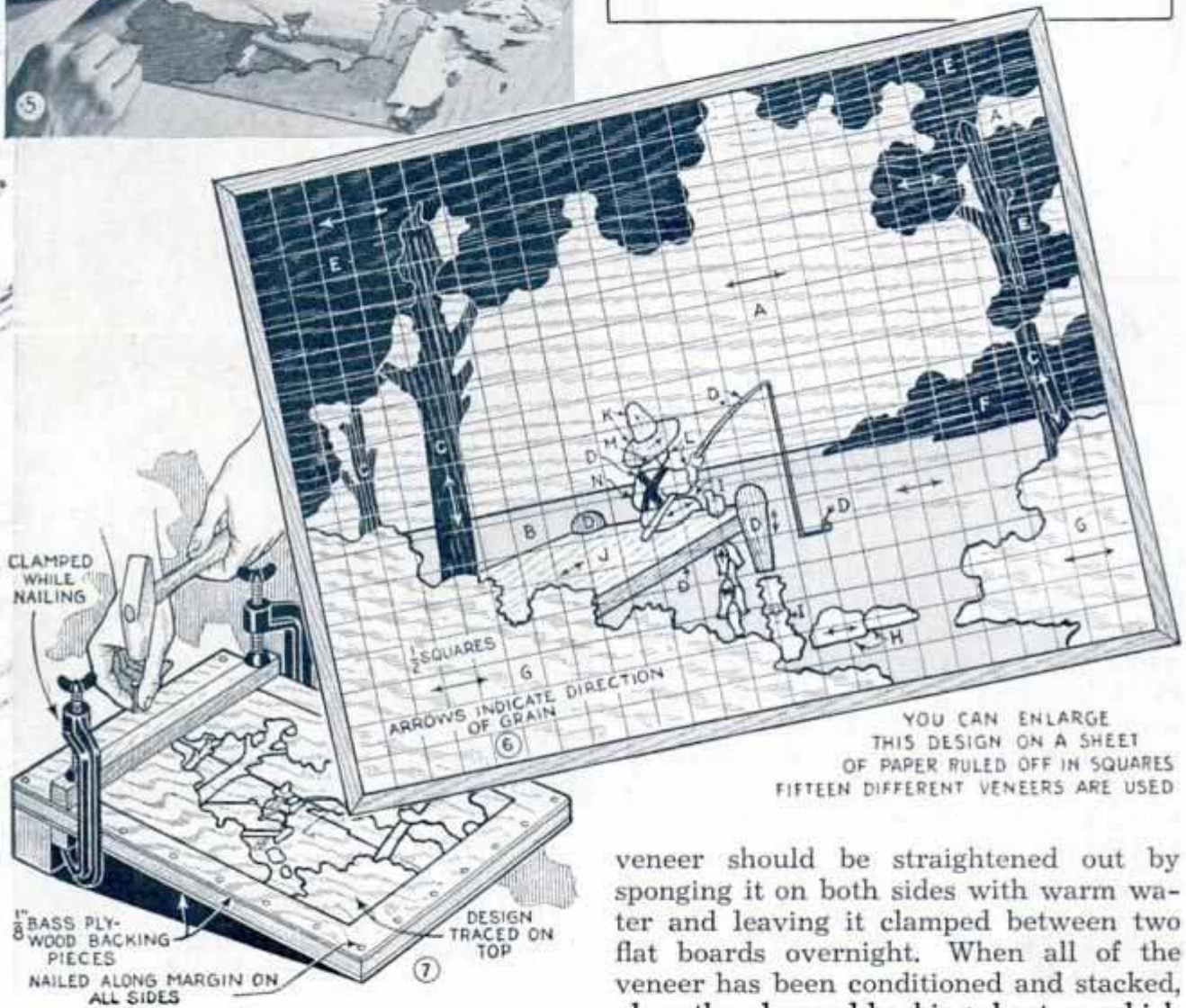
*Jewell's Blade for Scroll Saw
Acherbach - Steffani & Co*



KEY TO VENEERS USED

- | | | | |
|---|---------------------|---|------------------|
| A | Prima vera | I | Plain walnut |
| B | Green-dyed ash | J | Maple |
| C | Brazil rosewood | K | Brazil satinwood |
| D | East India rosewood | L | Pearwood |
| E | Walnut burl | M | White holly |
| F | Thuja burl | N | Blue dyed wood |
| G | Lacewood | O | Vernilion |
| H | Oak burl | | |

All pieces should be 11 by 14 in. unless patch method is used

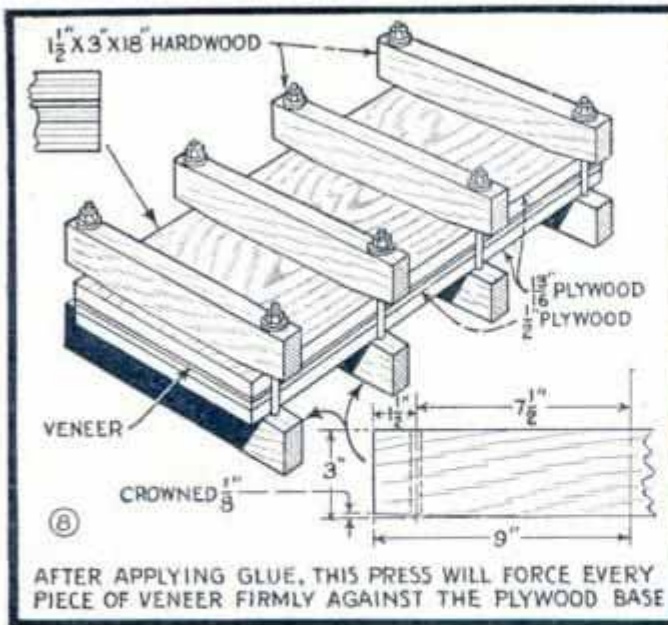


YOU CAN ENLARGE THIS DESIGN ON A SHEET OF PAPER RULED OFF IN SQUARES FIFTEEN DIFFERENT VENEERS ARE USED

design on the paper will be reversed for use in assembling the pieces. The sheets of veneer corresponding in size to the plywood backing are next assembled, placing veneer from which the small pieces are to be removed for the face, suspenders, etc., on top of the pad. Additional protection against breakage of the small pieces can be obtained by gluing thin, tough paper on one side of the veneer. An alternate method of building up the layers is to patch pieces of expensive veneer such as rosewood, satinwood, etc., into sheets of inferior quality, as in Fig. 10. Warped

veneer should be straightened out by sponging it on both sides with warm water and leaving it clamped between two flat boards overnight. When all of the veneer has been conditioned and stacked, place the plywood backing sheet on which you traced the design on top of the stack, and a similar sheet of plywood on the bottom, clamp the edges and nail along the margin of the pad, as indicated in Fig. 7.

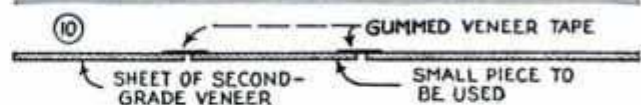
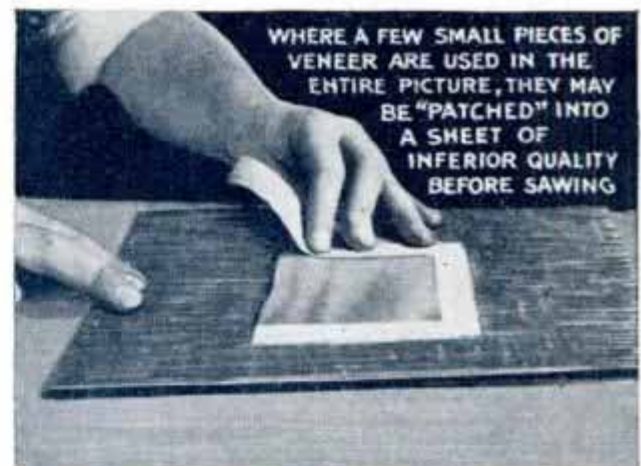
The next step is to drill holes through the pad just large enough to take the saw blades. These should be drilled where two lines come together at a sharp angle, to prevent irregularities in the saw cuts. Before sawing, it will be necessary to slow down your scroll saw to approximately 550 or 600 strokes per minute. Tilting the table is unnecessary, as the space left by the blade, which should not be over .008



in. in thickness and .028 in. in width, will be filled when gluing. Saw the small "isolated" pieces first, pick out the ones that are to be used in the picture and assemble them temporarily with rubber cement on the reversed design on the kraft paper, as in Fig. 5. To simplify cutting, use a heavy blade for the "fishline" and fill the space with plastic after the final glue job.

When all of the pieces have been cut and assembled, you are ready to glue the veneer onto a piece of $\frac{3}{8}$ -in. plywood which serves as a backing for the completed picture. For this purpose either stainless white glue or art inlay glue is satisfactory. The latter enables you to make pictures without the use of clamps. In using stainless white glue, mix the powder with cold water to the consistency of a thick paste, let it set a few minutes, then apply liberally to the surface of the plywood and the exposed side of the inlay. Sponge the opposite side of the plywood and also the paper side of the inlay to prevent excessive warping. Place three or four thicknesses of newspaper and a layer of cardboard on top of the veneer to prevent glue from sticking to the cauls, and to equalize slight irregularities in pressure. For the clamping job, you can use a press as shown in Fig. 8. Leave the inlay in the press for at least 24 hrs., then remove it, and strip off the kraft paper.

One of the simplest, yet most effective ways to frame an inlay picture is by using inlay banding and veneer. The picture is squared up, corners of the veneer and banding mitered to fit and temporarily



fastened with veneer tape, after which glue is applied and the assembly again clamped. When dry, the tape is removed, the entire surface sanded lightly, and shellacked. Irregularities in the saw cuts can be closed with plastic or a mixture of sawdust and glue. Applying the shellac first helps to prevent the plastic from getting into the pores of the wood and discoloring it. Next, the edges of the plywood are beveled and stained. A couple more coats of shellac, rubbed down carefully between coats, and a final coat of wax will make a satisfactory finish.

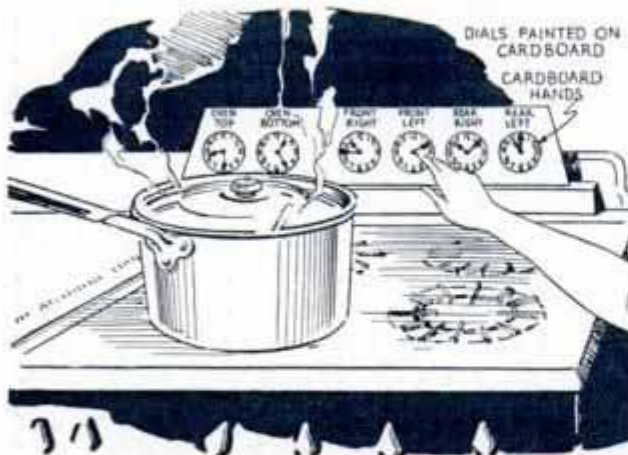
Wheeled Scoop Has Many Uses Around the Home



This scoop is handy for moving dirt, ashes, or objects that are too heavy to carry

Attached to a hand truck, this scoop will come in handy many times for wheeling coal, removing ashes, clearing away trash or for distributing soil in making lawns and flower beds. Any metal worker can form the scoop from heavy sheet metal, or you can cut it out of an old oil drum and bolt it to a hand truck as shown.

Cooking "Clocks" on the Stove



When you put the food on the stove just set the dial to indicate time for removal

Have you ever forgotten how long certain foods had been cooking when several of them were on the stove at the same

time? If so, a set of clock dials, one for each burner, painted on a strip of cardboard or metal and attached to the back of the stove will help avoid this trouble. Each dial is provided with two pivoted hands just like a clock. When the food is put on the stove, the hands are set to indicate the time it is to be removed.

Auger Bit Used in Tight Places with Doorknob "Brace"

When it is necessary to bore a hole in a tight place where a bit brace cannot be handled, try using a doorknob to drive the auger into the wood. The doorknob will slip over the squared end of most auger-bit shanks, providing a firm hand grip to apply torque. If your hand has a tendency to slip on the smooth surface of the knob, stick two or three strips of tape to it.

—P. A. Starck, Sioux City, Ia.



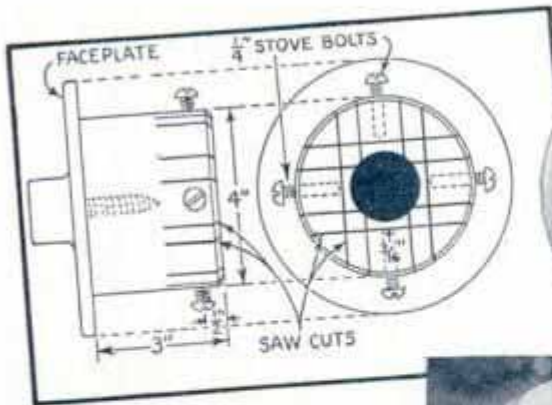
Does Your Dog Chase Cars?

The habit of a dog to chase cars not only endangers the animal, but may result in a serious accident if a motorist swerves the car or becomes confused in trying to avoid hitting the dog. Such a habit can often be stopped by a small rubber ball attached to one of the dog's front legs as shown. The ball is not likely to hurt the dog, will not keep it from getting plenty of exercise, yet will hinder it from running fast.



☞ Corks to be used for stopping bottles of glue or cement should be dipped first in hot paraffin to prevent sticking.

Wood Chuck Grips Work Without Marring It



Made from a cylindrical hardwood block, this chuck holds small turned work without marring it while finishing the ends. The block is bored halfway through the center, and saw cuts are made to form a set of inner and outer jaws. Stove bolts fit tapped holes in the outer jaws and bear against the inner ones, squeezing the latter against the work.



Part of Roll Film Removed from Camera for Developing

Have you ever taken a few pictures on a roll film and wished that they could be developed without waiting until the rest of the film was exposed? To do this, turn the film ready for the next exposure. Then open the camera in a darkroom un-

der a ruby light. Pull out the film a trifle and cut it in two, close to the exposed section, but do not cut the paper. Remove the exposed strip, tape the end of the unexposed film to the paper and reassemble the camera.



Just cut off exposed film and cement end of unexposed film to paper backing

High Pressure in Blowtorch Is Dangerous

In our August, 1936 issue, page 292, a short article was published on making a repair on a blowtorch by soldering a tire valve to the pump so that an auto pump can be used. As long as a pressure not exceeding 30 to 35 lbs. is maintained in the tank the idea does not involve serious hazard. But the danger lies in the fact that by using an auto pump—or perhaps even compressed air from a service station—a much greater pressure may be applied inadvertently. Such excessive pressure, especially in an old torch, makes it definitely hazardous to use and serious accidents may result. Therefore, although the repair was used by a reader, we suggest that the old pump on the torch be repaired, and if this is impossible, to purchase a new torch.—Editor.



There's Money in HAND-

SEEING and feeling these lifelike flowers will give you little clue that they are artificial. Appropriately perfumed, the deception is almost perfect. The material is inexpensive so that anyone can establish a profitable "at home" business, making corsages, bouquets and plants.

Orchids: An artificial orchid corsage is just as attractive as a real one and durable enough to be worn many times. To make one, cut out patterns for the two types of petals and the throat, following the pat-

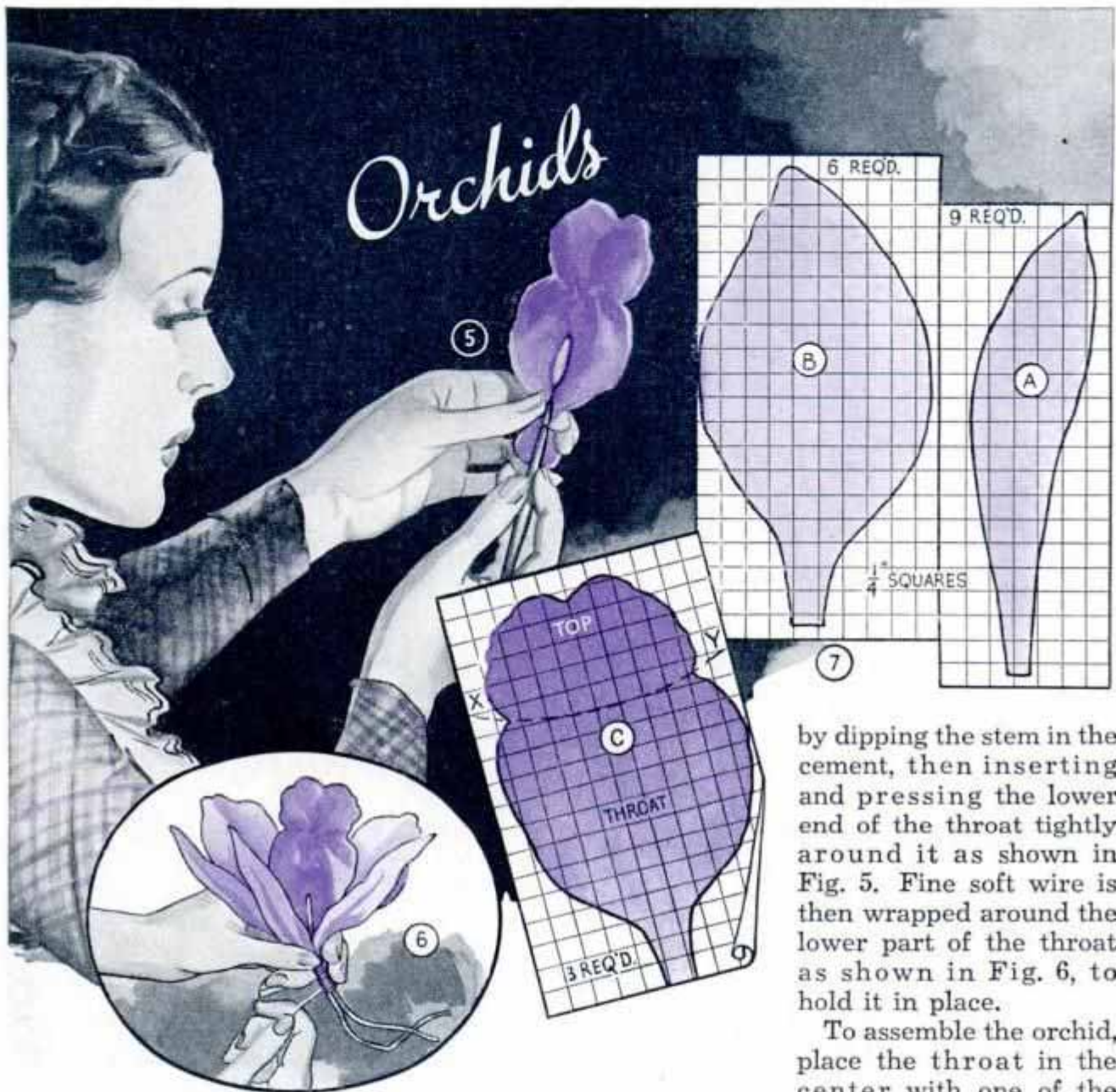
terns in Fig. 7. Light cardboard is used for the patterns, these being placed diagonally across a pile of three of the fiber orchid sheets, after which you cut the latter as in Fig. 1. The petals are cut from plain orchid fiber, but the throat requires a blended material. Three sets should be cut from pattern A, two from pattern B, and one from pattern C. See Fig. 7. When cutting the throat pieces, be sure that the "top" of the pattern covers the darkest part of the material. Each petal is made



MADE FLOWERS ..

up of three layers of the material supported by a short length of wire. Pile three layers together, hold with the left hand, as in Fig. 2, and apply a $\frac{1}{8}$ -in. line of cement (water glass) all around the edge of the two top layers and press firmly together. Then turn the pile over and glue one edge of the loose piece on in a similar manner. Before gluing the other edge, dip a 4-in. length of No. 32 white cotton-covered wire in the cement and insert between the middle and top layer at about the center, as in Fig. 3. This wire should extend about two thirds the length of the leaf. The remaining edge is then cemented into place to complete the petal. Each petal should be shaped before the cement is thoroughly dry to avoid breaking along the cemented edge. A special perfumed cement is on the market, but equally good results may be had by using ordinary sodium silicate (water glass) which can be obtained at any drug store for only a few cents, and adding



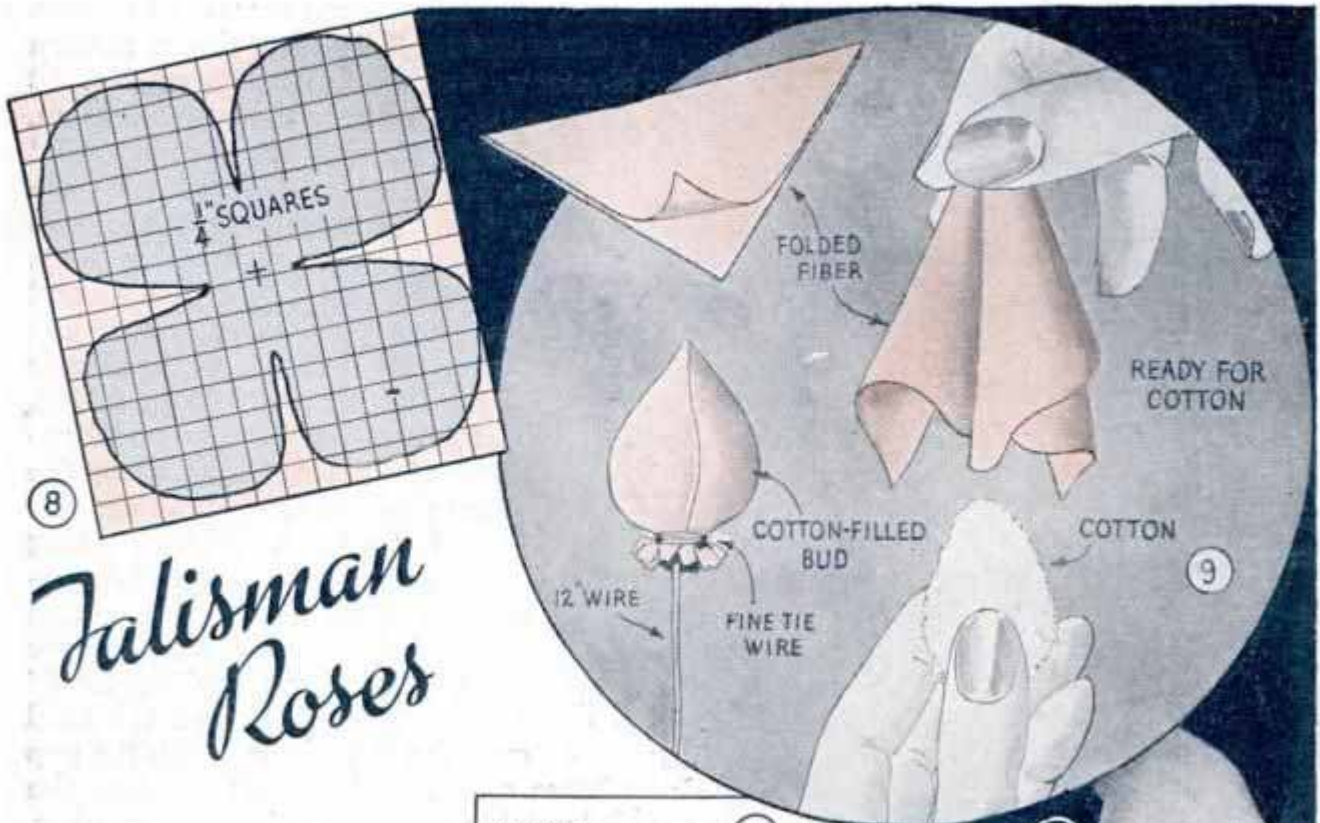


to it a small amount of suitable perfume.

The throat of the orchid is formed by cementing the edges of the lower half of the three layers together, then reversing and cementing the bottom and middle layers together at the top. Between the top and middle layer a piece of wire is inserted in the position shown by X-Y in Fig. 7. Brush cement lightly over the wire and press the top layer gently in place. While the cement is still damp, push the fiber along the wire as shown in Fig. 4, to give it a gathered appearance. Allow a few minutes for the cement to set, then carefully pull the wire out. Do not continue work on this piece until thoroughly dry, then cement the remaining top edge. The pep at the bottom of the throat is secured

by dipping the stem in the cement, then inserting and pressing the lower end of the throat tightly around it as shown in Fig. 5. Fine soft wire is then wrapped around the lower part of the throat as shown in Fig. 6, to hold it in place.

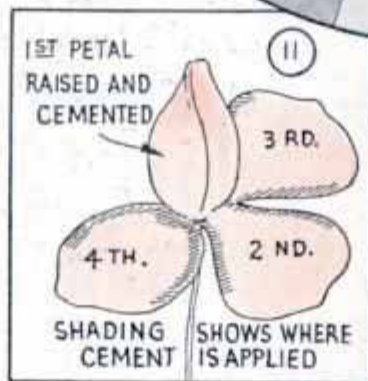
To assemble the orchid, place the throat in the center with one of the larger petals (Fig. 7, B) on each side of it. The petals should be placed so that the double thickness of the material covering the wire is at the top. The three smaller petals are spaced across the back. The petals and throat and a 6-in. length of No. 22 green cotton-covered wire are all bound together with fine tie wire and thrust into green tubing to form the stem. Combine nine sprays of lilies of the valley with one spray of fern and fasten on a 5-in. piece of No. 22 wire as before. A green rubberized tape, which adheres by pressing together with the fingers, is used to finish the stems at the top above the green tubing. To arrange the corsage, place the fern and lilies to the back of the orchid, tie all together lightly with fine tie wire and tape. A bow of silver metal-



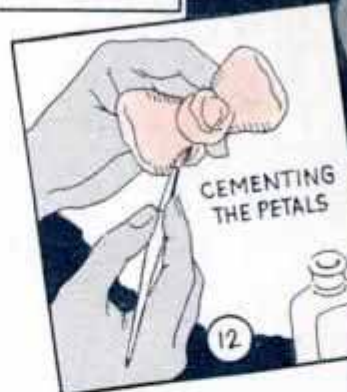
Talisman Roses

lic ribbon finishes the piece.

Talisman Roses: Talisman roses, with their delicate shading of pink and yellow, are made individually. Get the proper colored fiber, leaves and stemming. First cut out a pattern as in Fig. 8, for the petals. Cut four pieces of the fiber at one time, as two double petals are required for each rose. Cement the pieces together by brushing the adhesive along the edges as previously described. The cone-shaped center portion is made next. Fold a square of the fiber into a triangle and wrap over a piece of cotton, making a cone about $\frac{3}{4}$ in. in diameter and 1 in. long as shown in Fig. 9. A 12-in. length of No. 22 green cotton-covered wire is twisted tightly around the bottom of the cone, forming the stem. To make the bud more secure, wrap tightly with tie wire and clip away the ends of the fiber. Before assembling the petals, the edges are curled by rolling over a steel knitting needle or piece of wire as in Fig. 10. After curling, cement is applied around the base of the cone and along the inner edges of the petals as shown in Fig. 11. The wire is thrust through the slit in the center of the petals and pressed up firmly again to the bottom

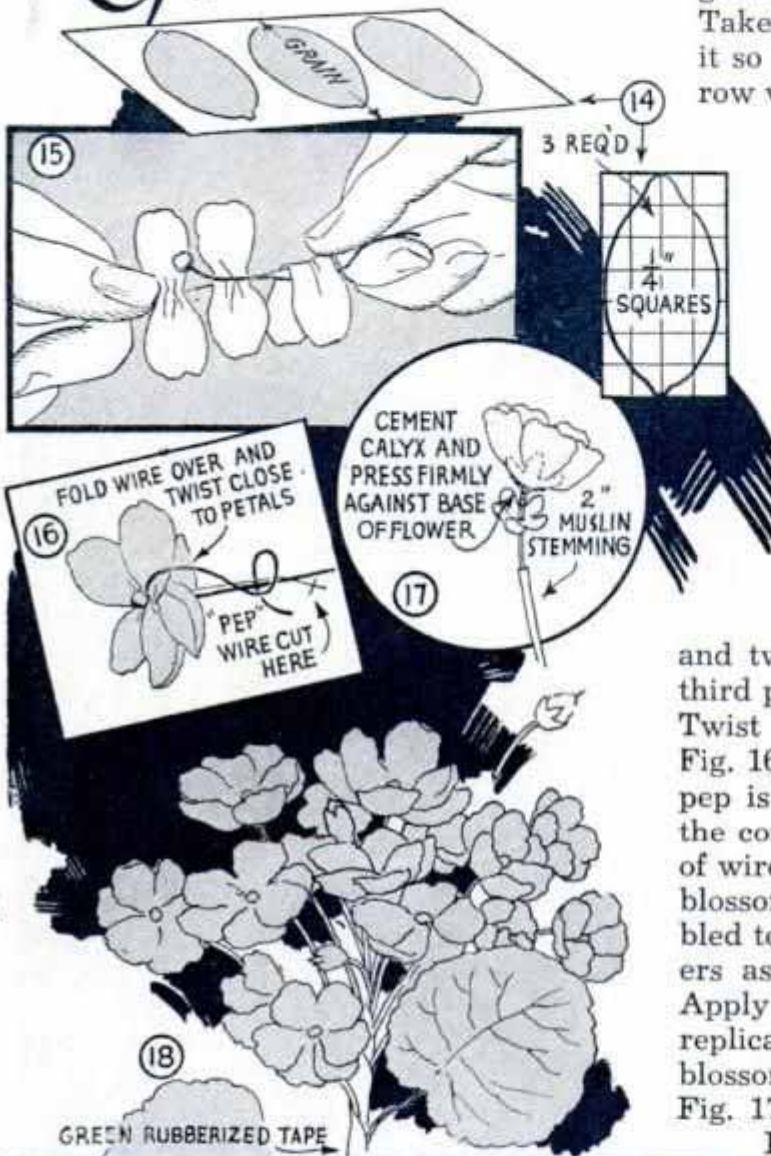


10
CURLING EDGES OF PETALS



of the cone. The edges of the first petal are wrapped snugly around the cone and cemented in place, then the opposite petal is cemented likewise, following with the other two as shown in Fig. 12. Add the second set of petals in a like manner. The flower is finished by cementing a rose spider to the bottom of the petals, Fig. 13. The stems are covered with 12-in. lengths

Geraniums



holes are punched and leaves are inserted.

Geraniums: To make the geranium blossoms, cut 4-in. lengths of No. 28 green cotton-covered wire for stems. Take a single piece of the fiber and fold it so that the grain runs across the narrow width. Six pieces, or enough for two

flowers, are cut like the pattern above, Fig. 14. Fold in half and place one piece over a wire between the thumb and forefinger of the left hand as shown in Fig. 15. Push with the thumb and forefinger of the right hand along the wire to gather the piece near one end of the wire. While holding the petals thus formed, in this position, put on a second piece and do the same. Now lay a pep over the top with the "yellow head" under the thumb and the cord over the forefinger. With the pep

and two petals held in this position, the third petal is applied in a similar manner. Twist the wire close to the petals, as in Fig. 16, being careful that the cord of the pep is twisted in, then cut off the end of the cord with scissors. About 2½ to 3 in. of wire will be left to form the stem of the blossom. The blossoms should be assembled to appear as much like the real flowers as possible by spreading the petals. Apply cement to a calyx, which is a paper replica of the green formation under the blossom, and slip over the wire stem, as in Fig. 17, pressing it close to the blossom.

Four or five buds should be prepared with a calyx also. The stems of all the blossoms and buds should be thrust into 2-in. lengths of light muslin stemming, then tied to the end of a 9-in. length of No. 16 wire. About thirty blossoms and four buds are used to make a cluster. Cover the large stem by wrapping it with green rubberized tape as in Fig. 18. The buds, which should be arranged around the base of the blossom, will look more real if they are bent downward slightly. About 2 in. below the cluster, place a small leaf against the stem, wrapping with tape. Add five

of thorn rubber stemming. A little cement should be put in the top of the stemming to hold it in place close to the spider. At random distances along the stemming,

or six more leaves at intervals of 1 in. around the stem with the small ones nearest the top. Two complete clusters are required for the plant, one of which should

be somewhat shorter than the other to give a natural appearance. To secure the cluster in a flowerpot, mix a small quantity of plaster of paris and fill pot two-thirds full, then insert the stem into the plaster and arrange as desired, before the plaster sets. The top of the plaster may be covered with artificial moss, or soil may be used.

Besides the wood-fiber flowers of the kind described in this article, conventionally decorative flowers that have a lustrous, glassy appearance, although not realistic, are very attractive and can be formed by a simple dipping process shown in Fig. 19. Thin wire is first bent to the shape of the petals and leaves, twisting both ends together to form the stem. The wire "forms" are then dipped under the surface of a tacky lacquer of the right color and slowly brought out of the liquid edgewise, after which the stem is thrust into a bar of soap to hold the petal or leaf vertically, allowing drainage of surplus lacquer toward the stem.

Label Moistener Saves Time

Fastened to the rim of a pie pan with a small C-clamp, an old paintbrush can be used as a label moistener on many odd jobs. The pan should be about half full of



Try this the next time you have a bunch of envelopes to seal or labels to stick on packages

water and slight pressure in pulling the stickers across the brush causes the bristles to dip in just enough to provide sufficient moisture.

—A. H. Waychoff, Tempe, Ariz.

Pressing Cloth Held in Frame Can't Wrinkle



Home pressing jobs are done in a jiffy when the cloth is held in this frame

You not only save time on home-pressing jobs with this frame, but you can do a neat job as the pressing cloth is kept taut so that it can't wrinkle. Make two identical frames of light, thin wood, place them together and drill three small holes along each side for bolts. Fit these with wing nuts and clamp the edges of the cloth between the frames. The cloth is dampened by sprinkling water over it, and can be removed easily for washing.

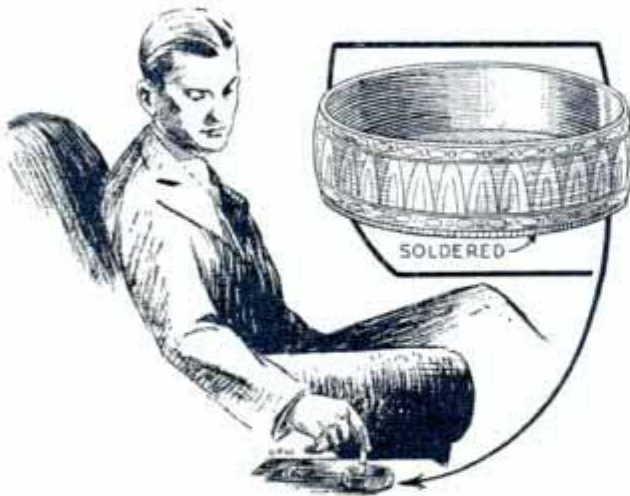
Quick Repair for Small Leak in Hot-Water Tank

If you find a small hole in your hot-water tank, it can be repaired with a brass wood screw in half an hour. Get a screw slightly larger than the hole, cut off the head and slot the end for a screwdriver. Then clean the metal



around the hole, drive in the screw, file flush and flow solder over it. Such a repair will withstand the pressure inside the tank because the screw bites into the metal and helps relieve strain on the solder.

Engraved Ash Tray at Small Cost by Utilizing Old Bracelet

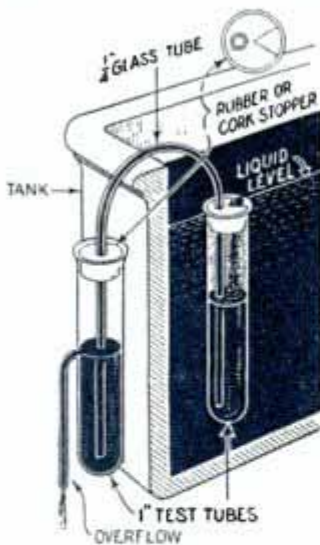


Solder a polished metal disk to an old bracelet and you will have an unusual ash tray

If some member of the family has a wide metal bracelet that has been discarded, it can be converted readily into a novel ash tray by soldering a sheet-metal disk to one edge. A piece of felt glued to the bottom of the tray will protect polished surfaces of tables and other furniture.

Siphon Keeps Liquid in Tank at Constant Level

Needing some means of keeping a liquid in a tank at a constant level, the tank being so constructed that holes could not be made in the bottom or sides, I made the device shown,



tubing, the outside tube being provided with an overflow as shown. The inside tube is fitted with a notched stopper to allow liquid to flow into it, while the outside one is tightly corked. The principle is a siphon, which works as follows: The

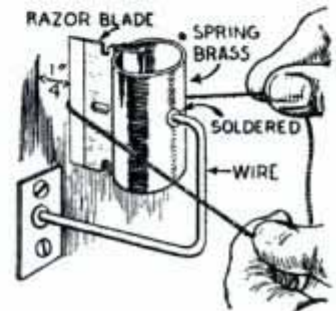
liquid flows into the test tube through the notched stopper and raises the level, the difference in pressure causing the liquid to flow through the glass tube into the outside test tube where it drains out through the overflow. As some liquid always remains in the test tubes, the siphon never gets air, thus it starts functioning whenever the level of the liquid in the inside tube rises.

—E. F. Nussdorfer, Mt. Vernon, Ohio.

You Won't Injure Your Fingers on This String Cutter

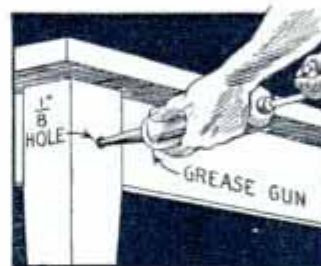
Utilizing an old safety-razor blade, this string cutter is very sharp, yet as the cutting edge is only

$\frac{1}{4}$ in. from the wall, there is little possibility of anyone accidentally cutting their fingers on it. The blade is held in a tube-shaped piece of spring brass, which is soldered



to a wire bracket. If spring brass is not at hand, you can use a piece of thin-wall tubing and slot one side with a fine metal-cutting scroll-saw blade. When the razor blade becomes dulled with use, just replace it with another one.

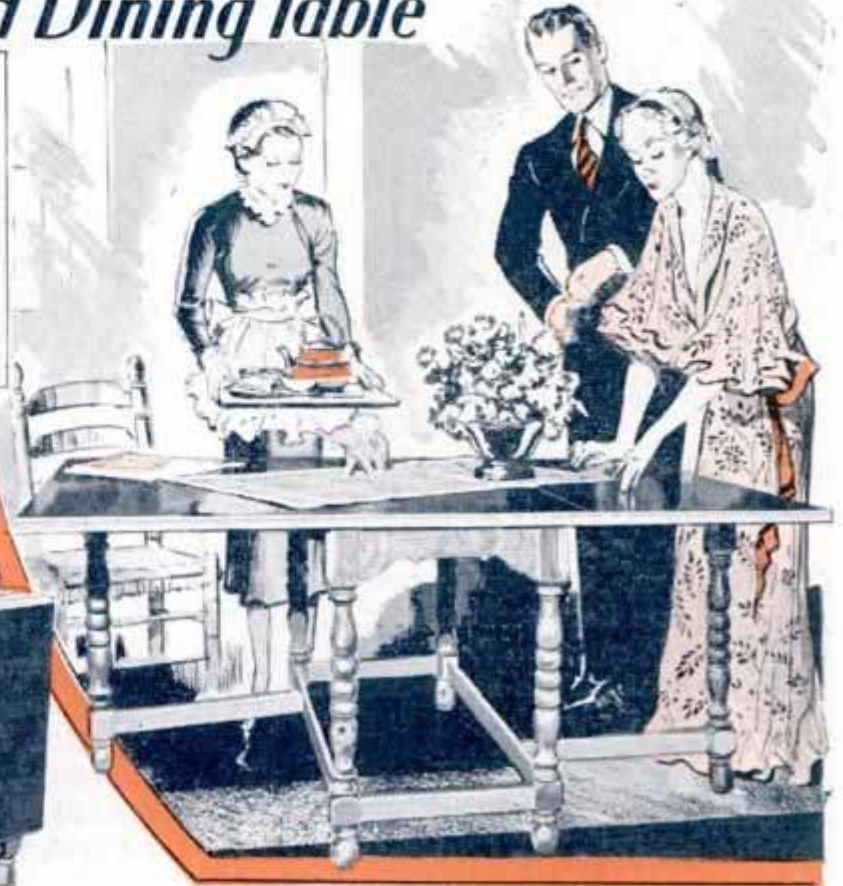
Furniture Given Glue Injections to Tighten Loose Joints



If you have some old furniture that has become rickety and would like to use it on a porch or in the basement, here is a method of regluing it without taking

the loose members apart. Just get a grease gun and fit it with a tapered nozzle. Then drill a small hole through the loose member to the joint and force in some glue with the gun. After putting in the glue, fill the hole with a small wood plug, and set the furniture aside until the glue has dried thoroughly.

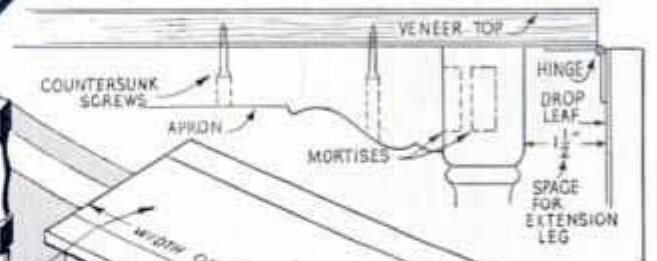
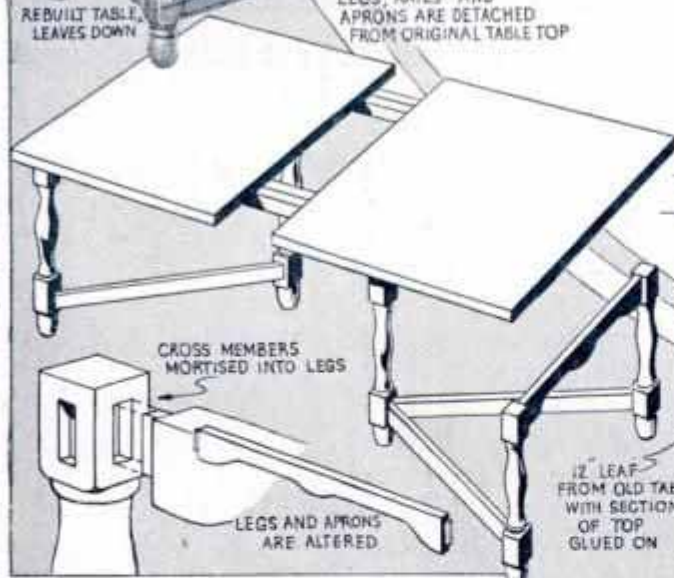
Space-Saving DROP LEAF made from Old Dining Table



REBUILT TABLE,
LEAVES DOWN

LEGS, RAILS AND
APRONS ARE DETACHED
FROM ORIGINAL TABLE TOP

Here's the way to build that gate-leg table you've always wanted—and at the same time save yourself a lot of tedious work. An old dining table with six turned legs will furnish practically all the material ready made. Because of large flat surfaces the rebuilt table is easy to finish



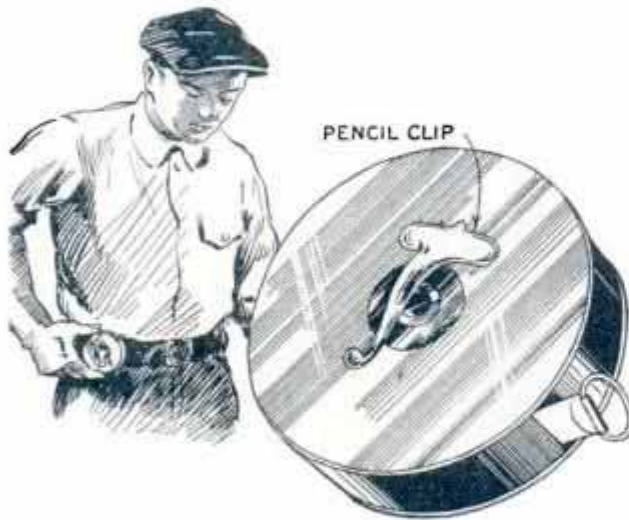
12" LEAF FROM OLD TABLE WITH SECTIONS OF TOP GLUED ON

The first step is to get the old table apart without damage. Then you build the new top from the old, the parts being doweled and glued. Rails are mortised to the center legs to form supports for the drop leaves. From here on the details above show you what's to be done in building up the center section



MORTISE ON HINGED LEGS. LEG IS CUT AWAY ON ONE SIDE

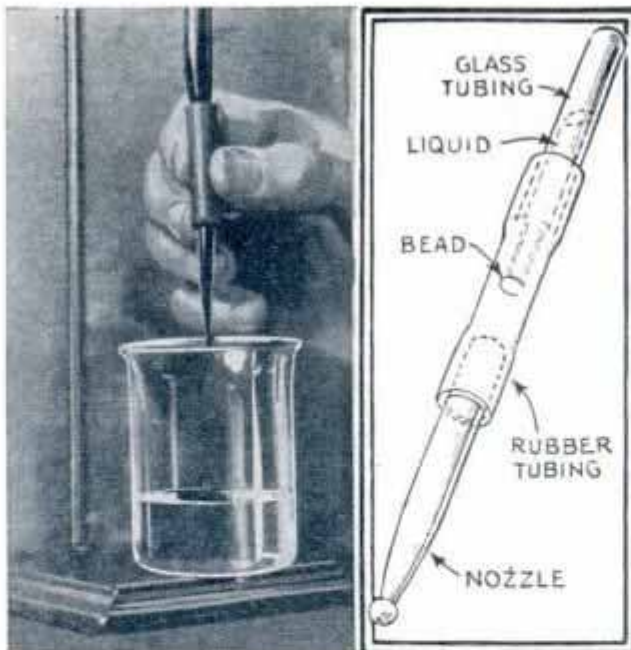
Tapeline Case Has Pencil Clip to Hook on Worker's Belt



Carried on your belt, this tape reel is always at hand for instant use

Workmen who carry a tapeline ready for instant use, will find it convenient if a pencil clip is flattened and soldered onto the back of the case. This allows the reel to be snapped on the belt where it will be handy for use.

Simple Glass-Bead Stopcock for Home Chemists



Pinching the rubber tubing allows the liquid to flow past the bead into the nozzle

The home chemist will find this simple stopcock useful in titration, where one solution is added to another drop by drop. A short piece of rubber tubing to join a

glass nozzle to a larger glass tube, and a solid glass bead, made by fusing a 1/4-in. length of glass rod in a burner flame, make up the device. To add a solution, squeeze the rubber around the bead with the fingers so that the liquid can flow. To stop the flow, remove the fingers.

—P. Ralph Dowden, Bronx, N. Y.

Sanitary Sleeves on Toothbrushes

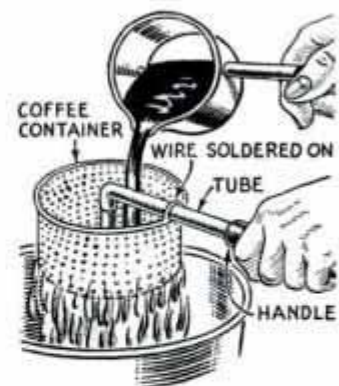
When toothbrushes are kept in a holder outside of a cabinet, it's a good idea to keep them in transparent Cellophane sleeves. These are easily made by folding strips of the material and sewing or gluing them along one edge as shown. It's easy

to identify the brushes, and it takes only a second to remove or slip them inside the sleeves, which fit right into the holder.



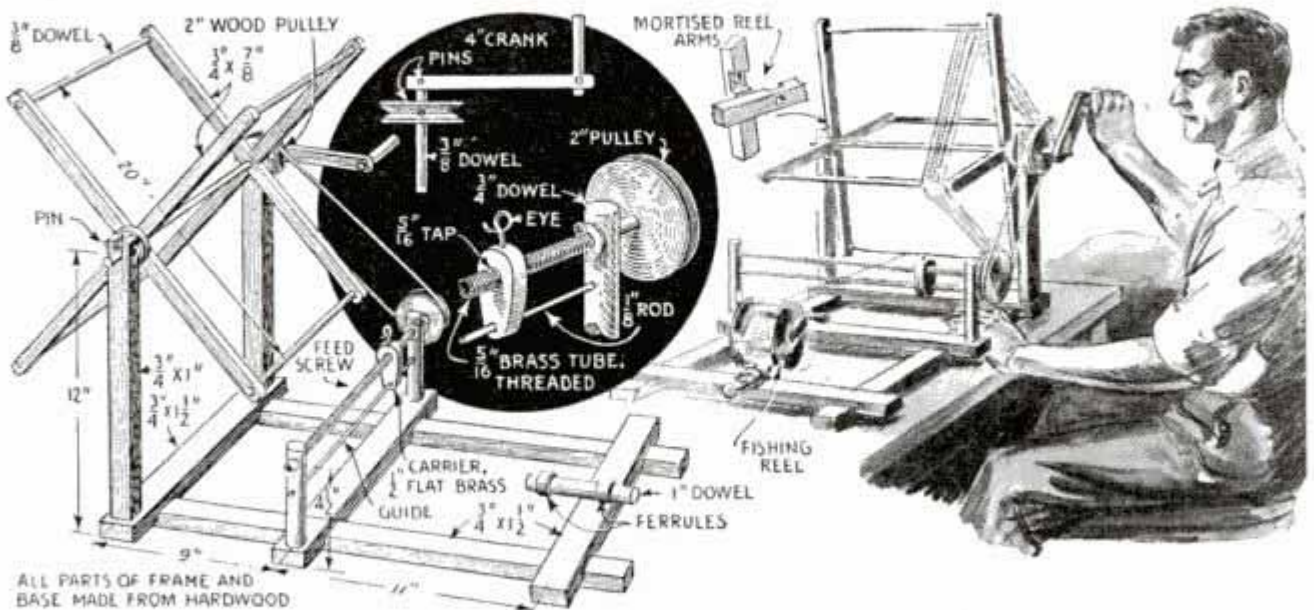
This Strainer Stands Hard Use

For a strainer that not only strains out very fine particles, but one that is also substantial, take the perforated coffee container from an old percolator and attach a handle to it as shown. A piece of metal tubing or rod soldered to the tube in the center of the container and to the rim with a wire eye is a good handle. If a wood grip is desired, a piece of round stock can be bored at one end and slipped over the tubing.



☞ To keep colored clothes from getting a gray appearance when washed, add vinegar, 1 tablespoonful, to the next-to-last rinse water.

Speedy Drying Reel Winds Fishline Evenly



This drying reel not only winds the fishline evenly but does it quickly, approximately 4 ft. being wound at each revolution of the crank. It is constructed entirely of hardwood with the exception of a feed screw, which draws the guide along as it winds. Note that the cross members of the base are mortised into the sills, which prevents the frame from twist-

ing. Also, the arms of the reel are mortised into each other. Pulleys are turned from white pine, the crank and handle being fastened with a pin. For the feed screw, use a $\frac{5}{16}$ -in. brass rod and thread it. Each thread should be approximately the thickness of the fishline. However, by the use of different size pulleys, any thread can be made to feed the line as desired.

Coal-Bin Door Hinged in Sections Opens from the Bottom

Here is an unusual door that permits fuel to be removed from the bottom or top of a filled coal bin. As shown in the drawing, a number of boards are cut to fit the door opening. These are hinged individu-

ally to the casing and the free ends held with a hasp and staple. If you desire to open the hinged sections as one unit, after the bin has been partly emptied, screw eyes may be driven into the sections in a vertical line and a rod run through them.



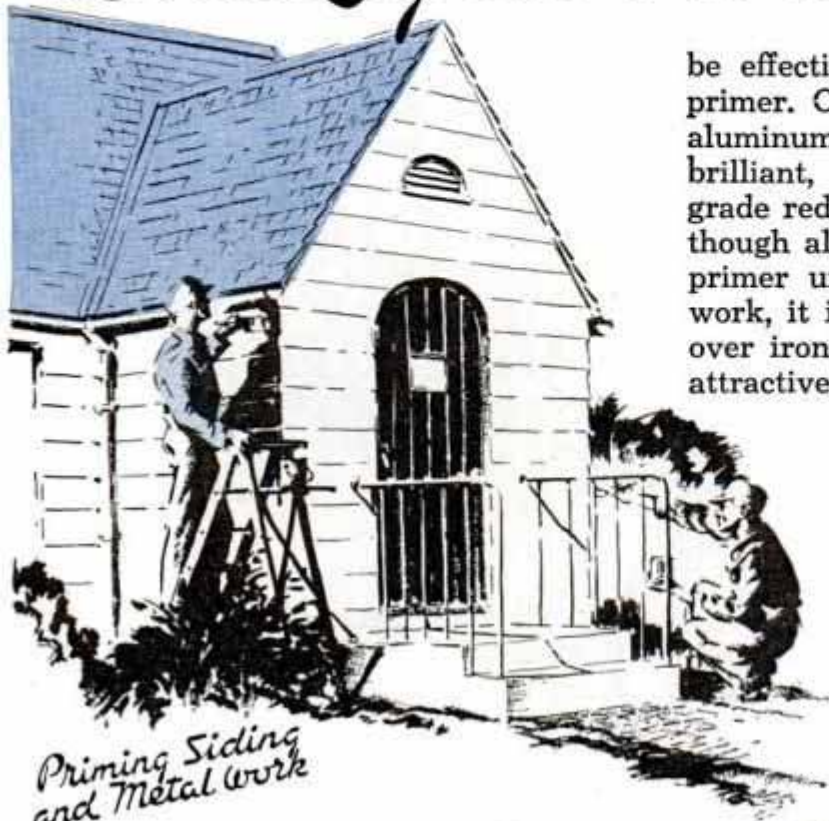
This coal-bin door opens in sections to remove fuel from any level desired

Black Finish for Plaster Casts

Amateur sculptors who wish to produce a variation in the finish of plaster-of-paris objects, may give them the matte-like appearance of black basalt and similar stones by brushing on two or three coats of a solution of colloidal graphite in water. The casts to be treated should be finished off without undue sanding and they should be thoroughly dry. With a little experimenting, one can regulate the black tone produced by altering the dilution of colloidal graphite, and by polishing the highlight areas with a soft cloth.

—E. A. Bodine, Port Huron, Mich.

What you can do with



*Priming Siding
and Metal work*

be effectively sealed with an aluminum primer. On metal exposed to the elements, aluminum paint is generally used as a brilliant, silvery finish coat over a high-grade red-lead or iron-oxide primer. Although aluminum paint can be used as a primer under enamel on exterior metal work, it is generally used as a final coat over iron primers simply because of the attractive finish it produces. Indoors, on plumbing, water tanks, gas plates and furnaces it is used as a one-coat finish, for which it is most effective. It's also just the thing for priming newly plastered walls. Here the paint can be stippled on the bare wall with a sponge to produce an attractive temporary job and at the same time serve as a primer for any finish applied later on.

SEVERAL unusual properties of aluminum paint make it especially adapted to household use, indoors and out. Practical tests show that aluminum paint prolongs the life of paints applied over it. It forms a seal against moisture and has remarkable durability and covering power, due to the "leafing" action of the individual metal flakes which comprise the pigment. These flakes are flat, and are treated with an acid that causes them to float to the surface of the vehicle, where they overlap like leaves or shingles on a roof. Due to this leafing action, one coat of aluminum paint, properly applied, will hide any color, even black.

It is especially effective over woods that do not hold paint well, such as yellow pine. The formation of a "toothed" surface bonds the succeeding coats of regular oil paint or enamel and prevents scaling and peeling. Woods containing natural dyes that "bleed" through ordinary oil-paint films can



*Interior walls
and woodwork*

Aluminum paint is what might be called "self-leveling," which means that it spreads without brush marks, due to the leafing action. Because of this, proper proportions of powder to fluid and mixing are very important. The pigment is obtainable



ALUMINUM PAINT

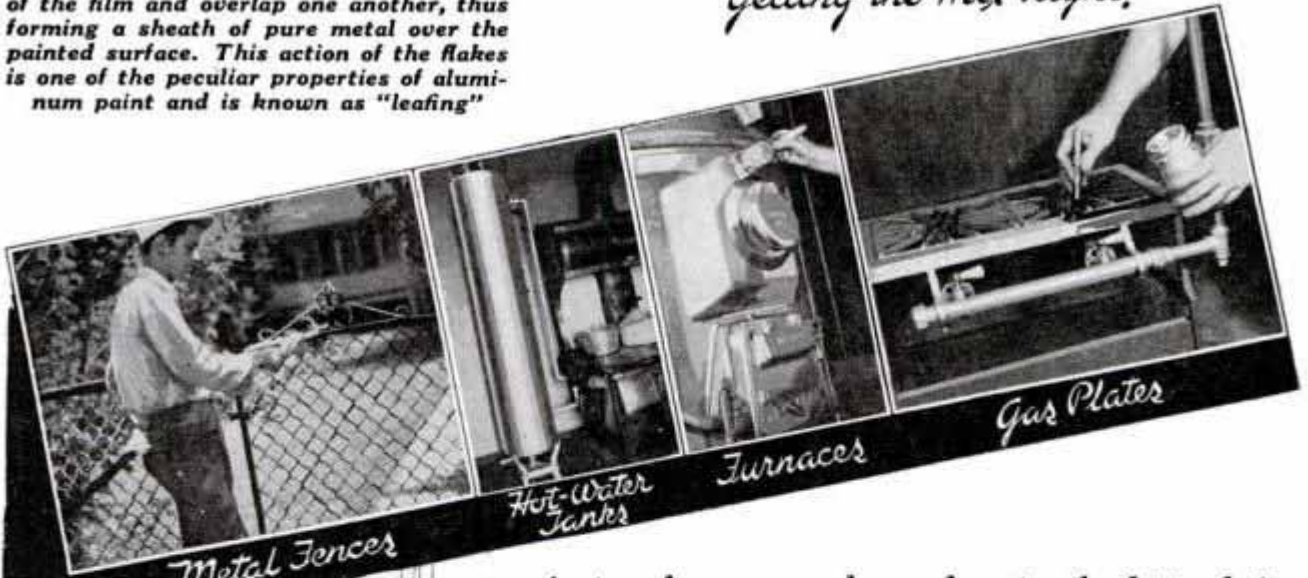


By
R. H. Wampler



Getting the Mix Right!

Tiny, metallic flakes of aluminum paint are coated with an acid which causes them to float in the liquid vehicle. As the paint is spread these particles rise to the top of the film and overlap one another, thus forming a sheath of pure metal over the painted surface. This action of the flakes is one of the peculiar properties of aluminum paint and is known as "leafing"



Metal Fences

Hot-Water Tanks

Furnaces

Gas Plates



Basement walls and plumbing

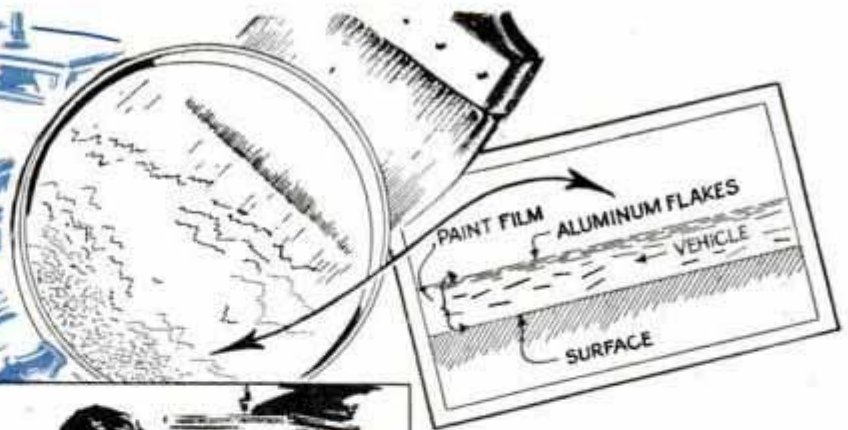
in two forms—powder and paste, the latter being easier to handle. The powder or paste should be weighed and mixed in the proportion of from 1½ to 2 lbs. of powder or paste to 1 gal. of liquid. The pigment in either form is placed in a suitable container and the liquid vehicle gradually added to it, with continuous stirring. Many manufacturers pack aluminum paint in two-compartment cans—one containing the powder and the other the liquid. In this case the manufacturer's directions should be followed carefully in both mixing and applying the paint.



Jobs Dressing for Cabin Cruisers

For priming coats on exterior work the powder or paste is mixed with what is known as a "very long oil" varnish and for finishing coats a "long oil" varnish vehicle. These terms are used to denote the proportions of oil to gum in the varnish. Spar varnishes and bronzing liquids are also satisfactory vehicles, the former for certain kinds of outside work and the latter only for interior work where decoration is the main purpose. Boiled linseed oil thinned with turpentine to the proper consistency, may also be used as the vehicle when painting exterior work.

Only sufficient paint for the work in hand should be mixed at a time for if it stands it loses its ability to leaf due to absorption of the acid film with which each aluminum flake is coated. The vehicle also reacts with the metal, causing it to darken to a dull gray color. However, if you have a small amount of paint left over from one job, you can seal the container and then later add this to a fresh batch of paint without



On Machines



Covering Varnish Stains



Dark Cupboards Lightened

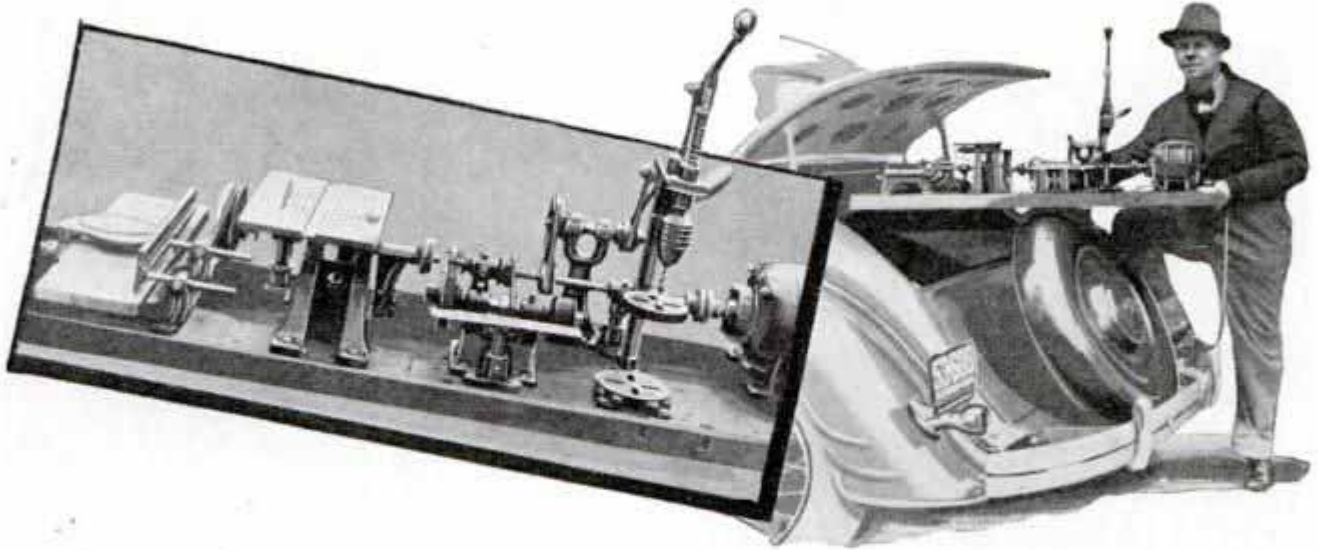
darkening the latter appreciably. When using aluminum paint, it must be stirred constantly in order that the proper proportion of vehicle to pigment will be applied to the work.

Aluminum paint is brushed on just like any other paint. It can also be handled in a spray gun, if properly thinned so that it will atomize readily. When brushing by hand it is necessary to avoid brushing back to paint that has partially set, as the fresh film will ride up over the first coat, resulting in a lap that is likely to show when the paint dries. It's best to cover only a small area at a time.



To Reflect Light and Heat from Trailers

Portable Home Workshop Is Carried in Car

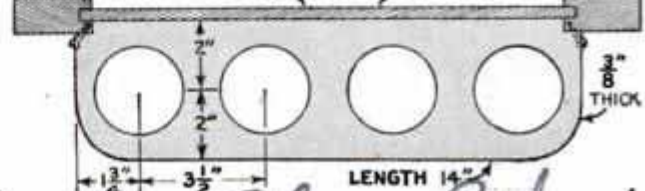


One home-workshop enthusiast who spends many week ends at his lakeside cottage has a number of small power tools mounted compactly on a panel so that he can take them back and forth in the car. This idea is also handy if you live in a small apartment where space is not available for a permanent shop. The tools can be used on a porch, in the basement or garage and stored when not in use. The exact arrangement will depend on your tools. In this case, a grinder and drill

press are run from a small shaft, one end of which is connected directly to a motor with a universal joint. The other end of the shaft is provided with a coupling that can be quickly attached to the mandrel of a circular saw, and can be disconnected when using the grinder or drill press. A pulley on the saw mandrel drives a jointer, the face of the pulley being fitted with a sanding disk. When using the latter, the fence is removed from the jointer, which then serves as a work rest for the sander.

Shelves on Cabinet Door Provide More Space for Glassware

If you need a little extra room in the kitchen cabinet, shelves that are fitted onto the doors will hold many glass tumblers. As the shelf sizes will vary with each job, a little ingenuity on the part of the craftsman will be required to work out something suitable. In some cases it is advisable to use metal brackets to support the shelves, while in others the method indicated will be satisfactory.



Anti-Dimming Paste for Windshields

Applied to the glass with a rag and rubbed until a polish is produced, the following mixture is useful for preventing sweat and frost on the inside of windshields: diethylene glycol, 1 1/2 oz., and precipitated chalk, 1 oz. Mix the ingredients thoroughly. More or less chalk may be added to give any desired consistency. The product may be packed in jars or collapsible tubes.

*Carbide • Carbon Chemy Co's
30 E 42nd. New York*

*Suggested by Deuggers & Co 159
W. Kemble, Chicago*

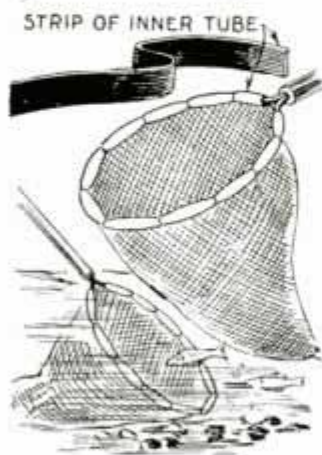
Short Dowels Cut on Circular Saw with Aid of Jig



With this jig, you can cut any number of dowels quickly without feathering the edges.

On a job requiring a large number of short dowels, a jig of the kind shown was clamped to the miter gauge of the circular saw. A block 2 in. square, was bored lengthwise through the center to take the dowel stock. After raising the table so that the saw just cuts through the hole in the block, the dowel stock is fed in at the left-hand end of the block, passed over the saw and the dowel pushed out at the right-hand end. A finger of the right hand over the hole in the block serves as a stop to keep the dowel stock from being pushed through too far. With this method there is no feathering of the severed edges of the dowel.

Dip Net Is Rubber Shielded Against Wear



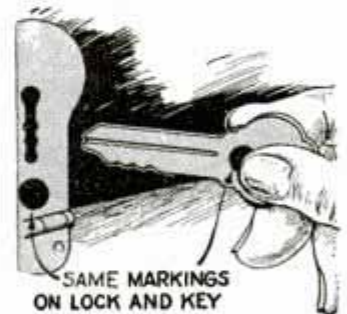
band of rubber from an oversize inner tube and stretch it around the hoop as

Dip nets used for catching minnows in shallow streams must often be forced against rough stones or gravel, with the result that the net fabric is soon worn out along the outer margin of the steel hoop. To prevent this, cut a wide

shown. If tied with stout fishline at intervals around the hoop, the rubber will protect the net and increase its period of usefulness many times.

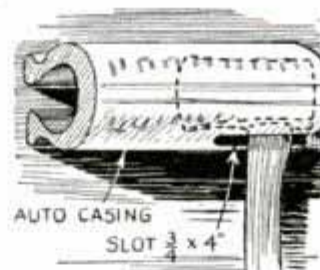
Keys and Locks Marked to Save Time

When a bunch of keys are kept on one ring around the house, put duplicate marks on both the keys and the locks they fit. Then, when you want to unlock an unused drawer,



cabinet or trunk, a glance at the marking will enable you to pick out the right key quickly. The markings can be painted, scratched or filed on the locks and keys.

Ax Hung in Rubber Holder Sheaths Blade

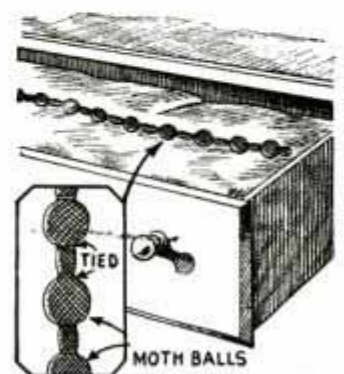


A good holder for your ax that will protect the blade can be made in a jiffy from a piece of old auto tire 8 or 10 in. long. Cut a slot

near one bead of the tire to take the handle as shown, and nail it to a wall, driving the nails through the beads. This holder is also handy for hatchets and similar tools.

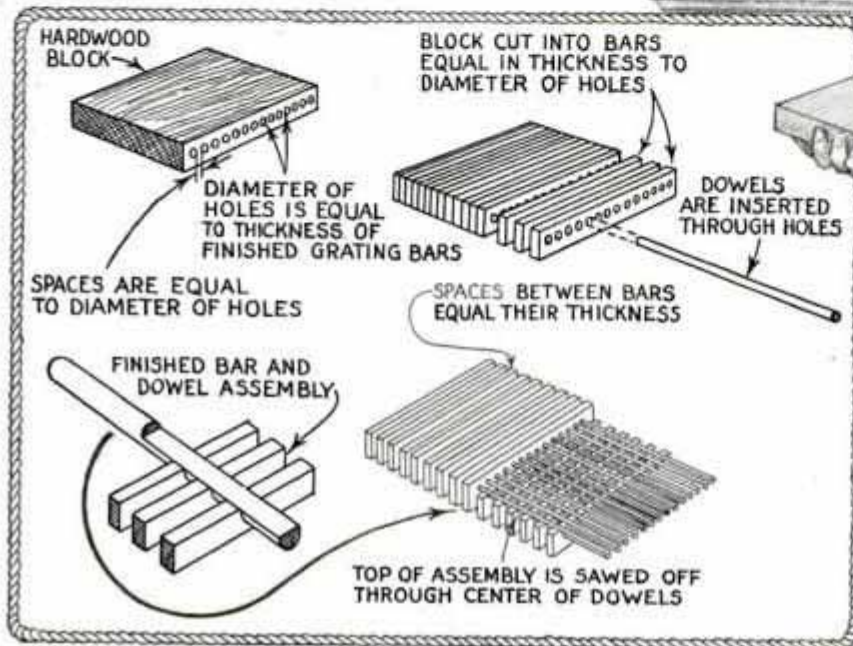
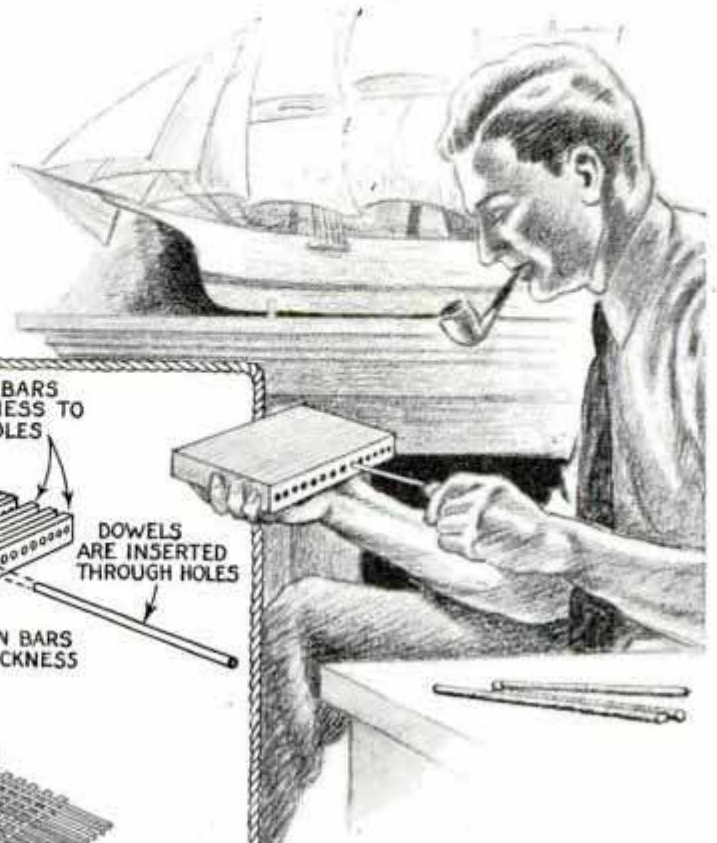
Moth Balls Kept in Mesh Tubes Are Easy to Handle

Instead of putting moth balls in a drawer or trunk loosely with clothing, make up a few sleeves or tubes from mesh cloth, such as cheesecloth, slip the balls inside and tie the cloth between each one.



Tiny Gratings on Ship Models Simple to Build

Here's a real short cut for model builders—a simplified method of making the tiny gratings required for many ship models. You start with a hardwood block, drilling a series of equally spaced holes horizontally through the center of the block, the distance between the holes being equal to the diameter of the latter. Then the block



When you want a ship-model grating try this method of making it from a block of hardwood and a few small dowels

is ripped into strips of a thickness equal to the diameter of the holes. Next, the strips are stacked and hardwood dowels are inserted into the holes as shown, the spaces between the bars being equal to their thickness. Then the whole assembly is immersed in thin glue and after drying, it is sawed and sanded so that the top surface exposes bars and openings of uniform size.—Harold T. Bodkin, Chicago.

Dough to Clean Wallpaper

Here is a good wallpaper cleaner that you can make in your home. Mix whiting, 1½ lbs., wheat flour, 5 lbs., common salt, 3 oz., soda ash, 5 oz., powdered pumice stone, 4 oz., oxalic acid, ½ oz., and ammonium chloride, 4 oz. The powders are mixed dry and, before use, enough water is added to make a stiff dough. When the mixing with water is partly completed, kerosene, ½ oz., is added and worked in. A ball of the cleaner is rubbed over the wallpaper in long even strokes.

Sandpaper Fastened on Wire Smooths Scrollwork

To sand odd-shaped cutouts, wrap a sheet of sandpaper around a piece of heavy wire, and tie the ends with stout string or light wire. The wire may be bent to any angle, thus permitting access to small openings and hard-to-reach corners.



Strainer in Wheelbarrow Bottom for Washing Vegetables



When you wheel in fruits and vegetables for storage, open the strainer and wash them with a hose

If a sink strainer is installed in the bottom of a wheelbarrow that is used to bring in your fruits and vegetables for winter storage, you can wash them right in it with a hose, the strainer allowing the water to run through the bottom. The strainer should be of the double type so that it can be closed when using the wheelbarrow to move other materials.

Salt and Pepper Shaker Covers from Rubber Bottle Caps



come in a number of different sizes and can be obtained in almost any drug store.

To prevent the contents of salt and pepper shakers from being scattered over your lunch while on a hiking or camping trip, you can slip small, rubber bottle caps over them as shown. These caps

Removing Soot from Chimney

A mixture consisting of sal ammoniac, 10 lbs., and sulphur, 3½ lbs., thrown onto

a fire in a furnace or stove will burn out soot in the chimney. Too large a quantity of this compound should not be used at one time, and all drafts should be closed. It is a good idea to watch the roof closely to see that burning particles of carbon do not start a fire.

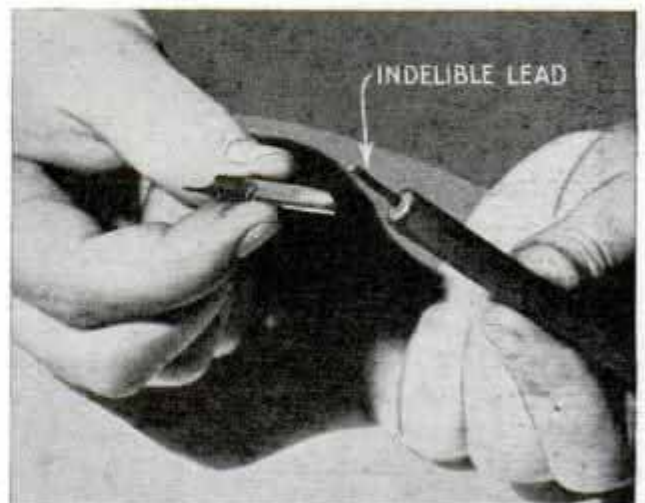
Beads Kept in "Multiple Dish" for Stringing

When decorating purses, necklaces and other work with designs worked up in different colored beads, an ordinary egg-crate separator of the type shown is handy for keeping them assorted as to color and size. The rough texture of the cardboard, from which the separators are made, helps to keep the beads from sliding around when picking them up.



Inkless Pen Uses Indelible Lead

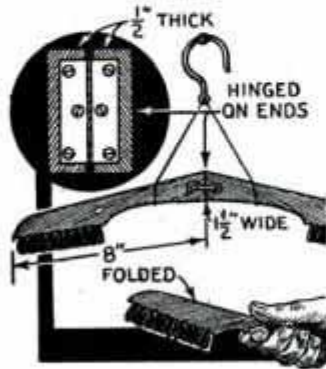
Absence of a bottle of ink in the home need not cause you worry if this pen is kept at hand. It produces its own ink from a piece of indelible lead which projects from a small hole drilled in the end of an ordinary penholder. The lead should be in close contact with the underside of the pen point. In use, dip the pen in water, which will dissolve some of the lead.



This ordinary pen produces its own ink by dipping the point in clear water

Folding Coat Hanger and Brush

Taking little space when folded, this combination coat hanger and brush fits into any traveling bag. It is made by cutting a long-handle brush in half lengthwise, sawing right through the bristles. If the brush is more than 1½ or 2 in. in



width, it is best to saw off a couple of strips ½ or 1 in. in width, instead of ripping the brush in the center, to avoid having the hanger too large. The strips are hinged in the center and are equipped with

a small hook and screw eye to hold them open. Stout cord forms a connection from the hanger to a wire hook on which it is suspended.—H. R. Wallin, Brooklyn, N. Y.

Reflectors on Dog's Collar Visible to Motorists

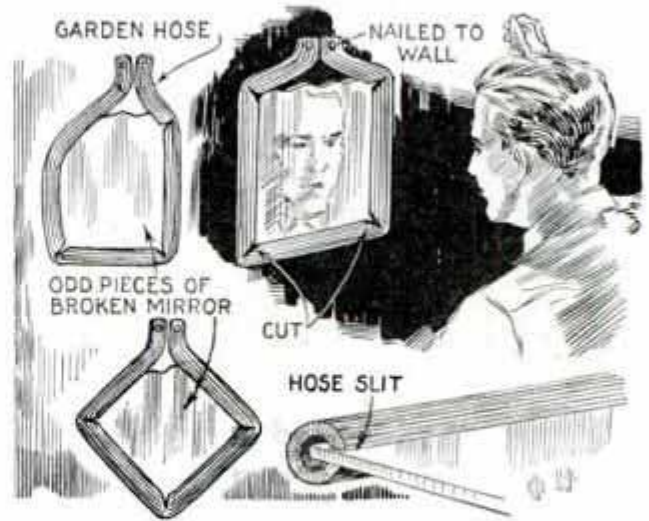


Reflector buttons attached to your pet's collar may keep it from being struck by a car

To lessen the chances of your dog getting hit by auto when crossing the streets after dark, attach several button reflectors to its collar or harness. A beam from the headlights makes a reflection which causes most drivers to slow up, giving a dog plenty of time to get out of the way. Reflectors such as used on road signs, bicycles, etc., are suitable for the purpose.

Small pieces of transparent Scotch adhesive tape will join the ends of torn amateur movie film until there is time to make a regular cement patch.

Scrap Pieces of Mirror Hung with Garden Hose

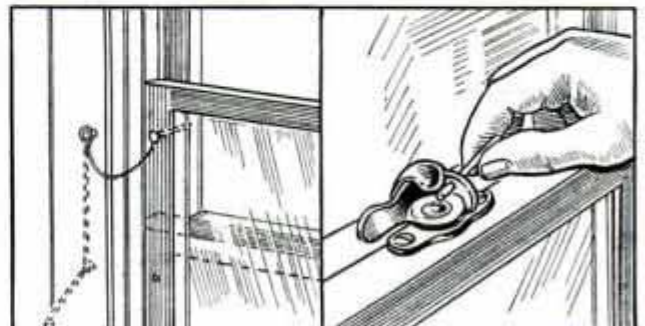


Scrap pieces of mirror are hung easily when framed with lengths of garden hose

A scrap piece of mirror often comes in handy in the basement, garage, shop or porch, but it is usually a difficult job to hang. This is done easily by using a piece of hose or tubing for the frame. The hose is slit along one side to take the glass, triangular pieces being cut out of the hose wherever a bend is made to avoid bulging at this point.

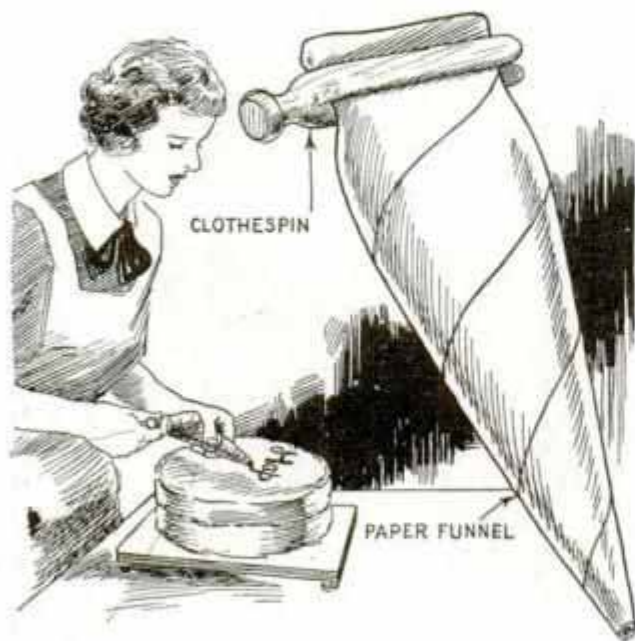
Burglarproofing Windows

Here are two ways of locking windows that will try the patience of prowlers. One consists of drilling a small hole through the sash lock and slipping in a nail to prevent it from turning. The other consists in raising the lower sash to the desired height and drilling a hole through it into the upper sash from the inside to take a heavy nail or steel pin. Two or three holes can be drilled at different heights, for the purpose of adjustment, if desired.



Simple precautions like these will discourage prowlers from entering the windows of your home

Clothespin Grips Pastry Tube to Aid in Squeezing



Instead of squeezing a pastry tube by hand when decorating a cake, slip a clothespin over the large end and roll it as shown. This will give perfect control of the mixture, and at the same time avoid escape of any contents past the fingers. Every drop of the mixture will be squeezed out of the tube.

An Effective Rug Cleaner

Here is a good rug-cleaning preparation that you can make yourself. Mix together diglycol oleate, 3 pts., butyl cellosolve, 5 fl. oz., ethylene dichloride, 12 fl. oz., denatured alcohol, 1 pt., and oleic acid, 12 fl. oz. In a separate container, add ammonia (strong 28%), 12 fl. oz., to water, 3¼ pts., and pour it into the first solution. The preparation should be stirred thoroughly for several minutes.

Why Not Start a Home Workshop?



Cabinet Workbench—898

DRILL PRESS—895: Pipe fittings. ½-in. chuck and ball-bearing spindle. 28 in. high—25c.

BELT SANDER—579: Heavy-duty type. Angle-iron framework and a 5 by 46-in. belt—25c.

VERTICAL SPINDLE SANDER—560: Fine for curved surfaces. Table 10 by 17 in.—25c.

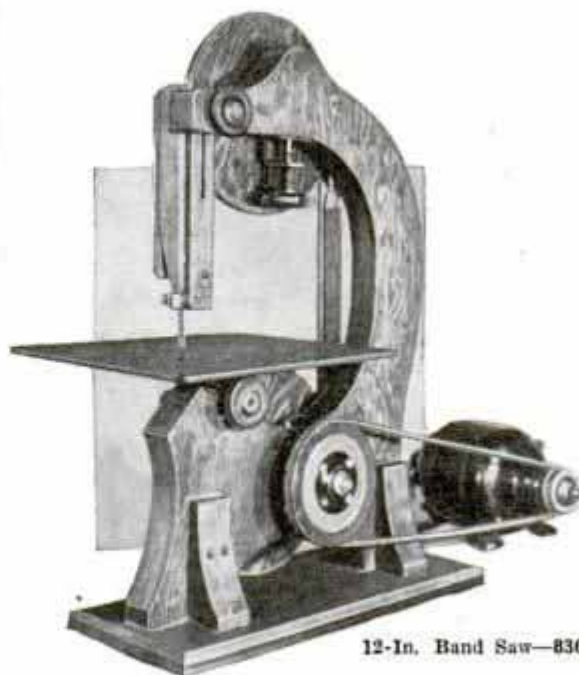
All six blueprints listed above will be sent to you prepaid upon receipt of \$1.00, or separately for 25c each. Also send 12 cents for our booklet "What to Make" which lists hundreds of other blueprints for practical craftsmen. These include plans for home improvement, furniture, novelties, toys, boats, models, outdoor sports, and many other miscellaneous subjects.

A few homemade machines will enable you to get into this interesting field. Whether you want a shop for pleasure or profit, our plans will give you all of the information you need.

CABINET BENCH—898: Nearly 8 ft. long, 27 in. wide, 35 in. high. 20 drawers—25c.

22-IN. SCROLL SAW—771: Pipe fittings and hardwood. Has sewing-machine drive—25c.

12-IN. BAND SAW—836: Smooth running and sturdy. Cuts 2-in. stock easily—25c.



12-In. Band Saw—836

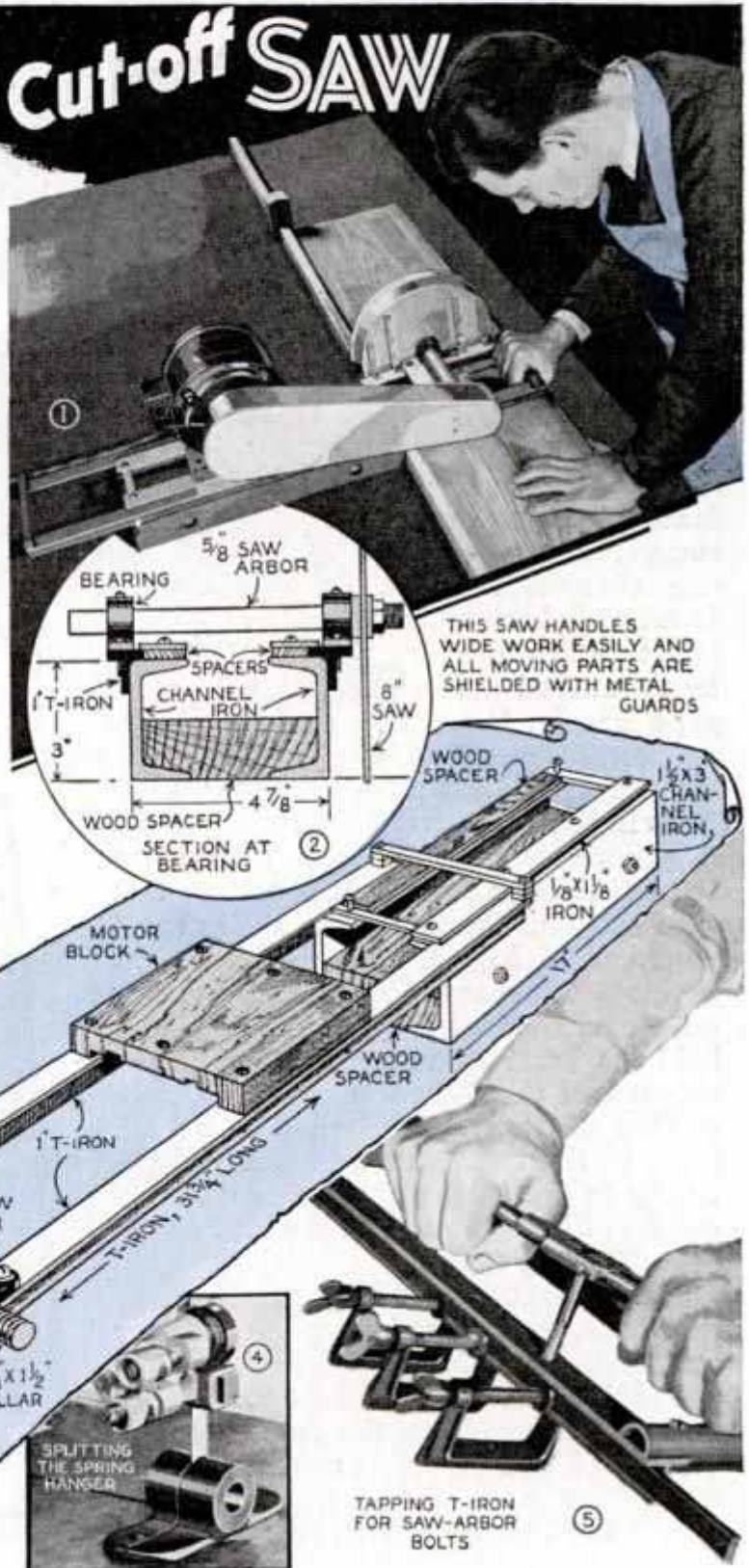
Blueprint Department, Popular Mechanics Magazine, 200 E. Ontario St., Chicago



SHOP NOTES

A SLIDING cut-off SAW

SIMPLE and compact, this sliding cut-off saw operates without the overhead rigging common to power saws of this type. It will crosscut boards 14 in. wide by 2 in. thick as in Fig. 1. The whole thing consists of a base of channel iron and a sliding T-iron carriage, the latter forming a support for the saw arbor and the motor. As shown in Figs. 2 and 3, the channel-iron base pieces are held together at the bottom by means of a wood spacing block and two through bolts. Metal crosspieces at both ends on the top side of the channel maintain exact width. Wood spacers and strips of iron are bolted to the top flange of each channel to form a hold-down for the sliding carriage.





The carriage consists of two lengths of T-iron, spaced to form a snug, sliding fit on the channel-iron base and held rigidly to this width by means of the pipe handle, the rear cross tie, and the motor block. Bearings for the

saw arbor are made by cutting the flange off a Chevrolet front spring hanger and then splitting the hanger into two equal parts, as in Fig. 4. The original brass bushings are reamed out to take the saw arbor. As shown in Fig. 2, the studs that hold the bearings extend partly into the sidewall of the T-iron. Consequently, in drilling and tapping the stud holes, a scrap piece of flat iron should be clamped securely to the side of the T-iron as indicated in Fig. 5, to prevent the drill or tap from "leading off."

The saw-arbor collar is reamed a trifle undersize, then heated over a gas burner until red, after which it is forced over the end of the shaft and immediately quenched in water. Threads on the saw arbor are right hand. An important mechanical feature of the saw concerns the fit between the sliding T-iron carriage and the channel-iron base. The sharp outer corners of

the channel irons should be ground off, as shown in Fig. 6, so that the T-irons can ride in positive contact. Riding surfaces should be polished to minimize friction. Fig. 7 shows the saw in a closed position, a bolt through one of the T-irons striking against the channel base to form a positive stop. Blade and shaft guards are made from $\frac{1}{32}$ -in. sheet iron or brass. The blade and belt guards are hammered to shape over a wood form, as shown in Fig. 8. Both the blade and belt guard should be well braced with suitable metal strips. Fig. 9 offers a good view of the blade guard and shows the insertion of one of the oilers, which should be fitted in both bearings.

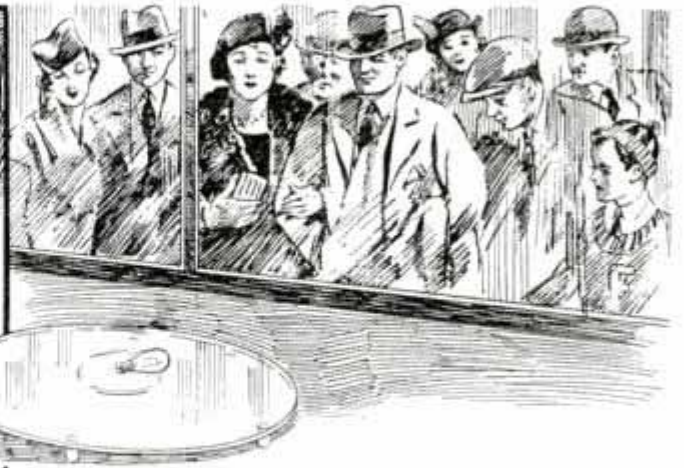
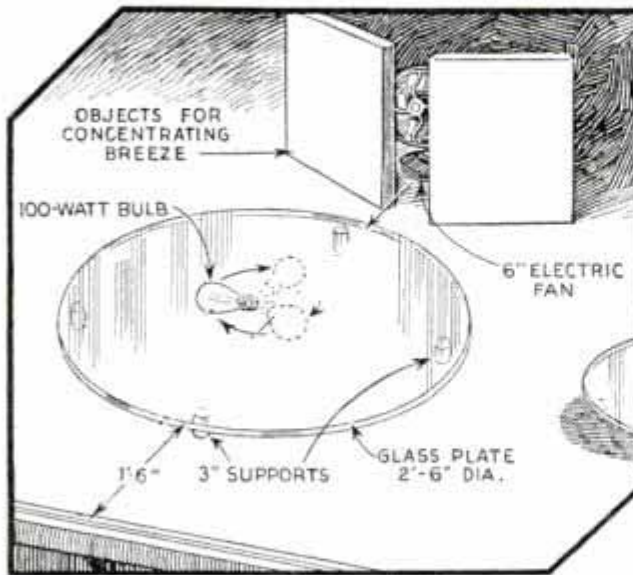
An 8-in. cut-off saw is used for this unit. The motor can be either $\frac{1}{4}$ or $\frac{1}{3}$ hp., depending upon the

nature of your work. The pulleys are 2 and 4 in. in diameter to give a blade speed of approximately 3,400 revolutions per minute.

A narrow slot is cut in the table top below the blade so that sawdust can pass through.



Rotating Bulb in Window Baffles Shoppers



If you conceal the fan thoroughly and leave no loose scenery to move in the breeze, this display will be a real "sticker"

An electric bulb, rotating on a piece of clear glass without any apparent means of motive power, is very mystifying and makes an unusual window display. The secret is a current of air from a small electric fan hidden behind objects of background scenery. By careful arrangement of some props, the air can be directed in

a narrow stream, which passes across the glass at an angle to just catch the end of the bulb. It may take a little experimenting to get the air stream adjusted, but once this is accomplished, the bulb will rotate continually and remain exactly in the center of the glass. Be sure that the glass is supported in a perfectly level position.

Clogged Ink Pad on Mimeograph Temporarily Repaired

When the cloth ink pad on the cylinder of a mimeograph machine becomes clogged to such extent that the ink will not pass through it evenly, the trouble may be re-

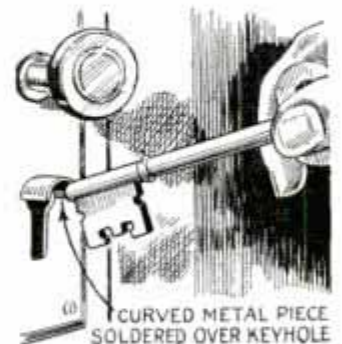
lieved temporarily by removing the stencil and lifting one end of the pad away from the cylinder. This shifts the cotton fiber of the pad, makes it more porous and allows the ink to penetrate freely. This is only an emergency measure and a new pad should be obtained as soon as possible.



Lifting one end of the ink pad shifts the cloth fibers to make the pad porous

Guide Helps Locate Keyhole

Soldered to a door lock plate just above the keyhole as shown, a small, curved piece of metal will serve as a guide when unlocking the door at night. Before doing the soldering job,



however, be sure to remove all paint from the spot on the lock plate where the metal is to be attached and clean it with emery cloth so that the solder will adhere.

Large Ledger Fitted with Handles Is Easily Carried

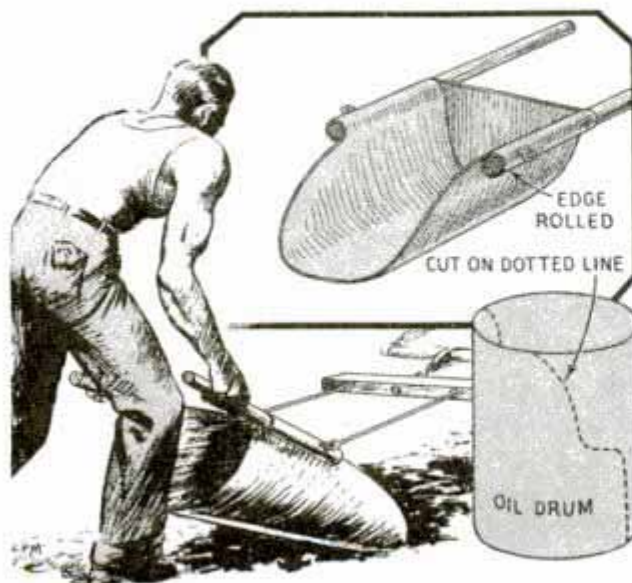


With a couple of handles attached to a large, bulky ledger, you can carry it easily

In offices where heavy ledgers must be carried about, a couple of handles attached as shown will provide grips so that they can be moved easily. The handles, either leather or metal, can be fastened to a wide strip of canvas, which is cemented to one side of the ledger.

Handy Scraper for Use on Farm Made from Oil Drum

Work on drainage ditches and other occasional excavating jobs on the farm may be handled readily with a dump scraper improvised from an oil drum as shown. The drum is cut in half as indicated by

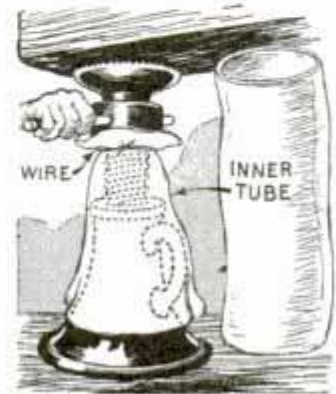


This handy dump scraper will handle most light excavating jobs on your farm

the dotted lines, after which part of the top edge on each side is rolled to form sleeves for the handles, the latter being held in place with bolts. Large eyebolts near the front ends take iron rods, which are attached to a doubletree.

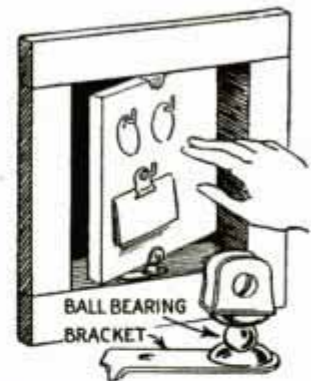
Inner-Tube "Skirt" on Jack Keeps Threads Clean

A western house mover found that inner-tube coverings to keep sand, dirt, etc., from getting into the threads of jack screws, greatly reduced wear. The rubber is wired to the jack so that it hangs down over the body, and turns with the screw. Keeping the threads clean also improves lubrication.



Bearings for "Turn Board"

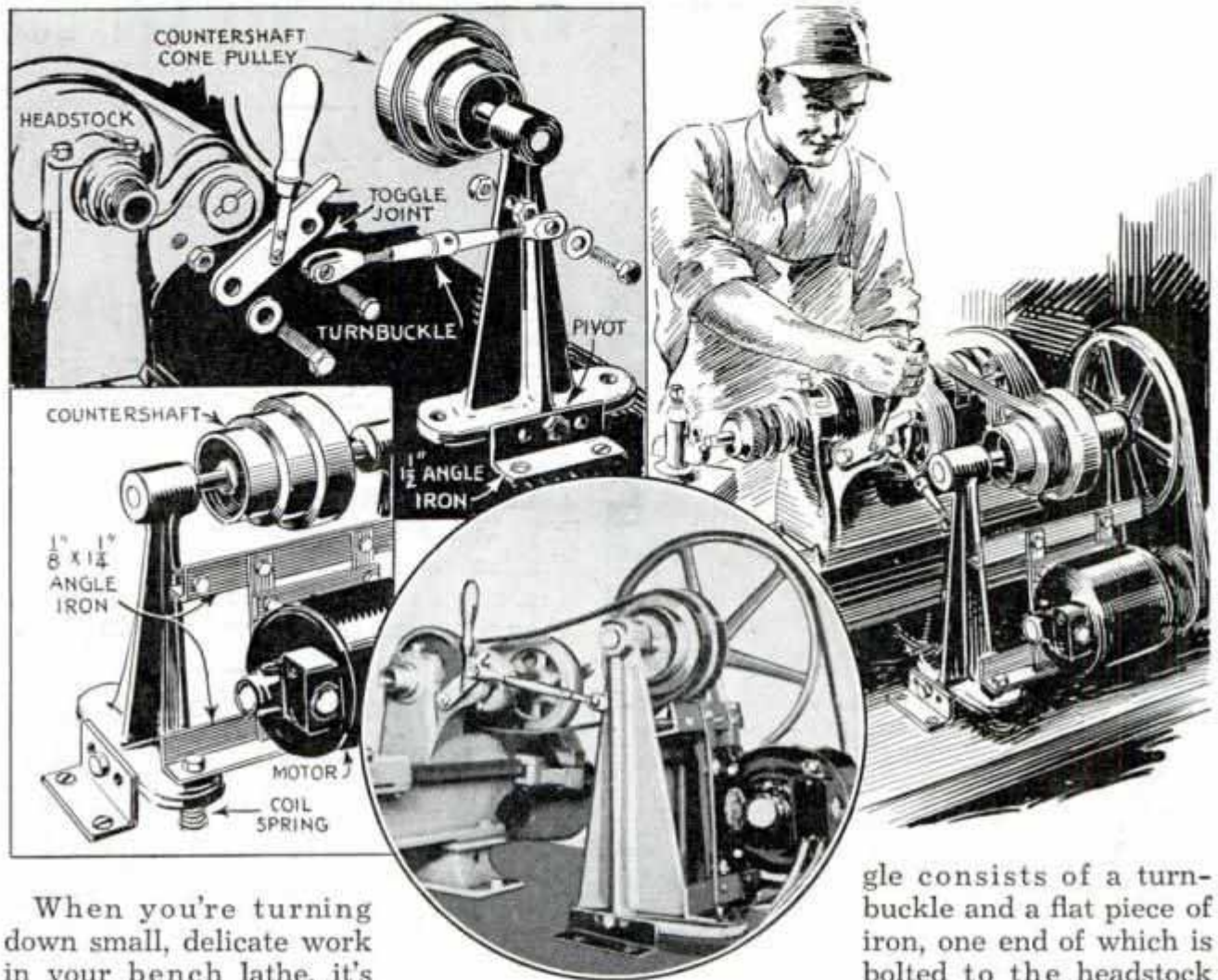
In assembling a turn board for passing messages, mail, etc., through a wall, bearings on which the board pivots can be made from window-shade brackets, and steel balls. Brackets intended for inside window casings are preferable, although outside brackets can be used by straightening the metal at the corner bend.



Solution to Clean Paintbrushes

Dirty paintbrushes that have been left in the following solution overnight and then washed in warm water will be perfectly clean. To make the solution, mix kerosene, 1 gal., and oleic acid, $\frac{1}{2}$ gal. In a separate container, mix ammonia (28%), 1 pt., and denatured alcohol, 1 pt. Stir this mixture into the kerosene-oleic acid solution, continuing the stirring until the product is smooth.

Bench Lathe Is Controlled by Hand Clutch

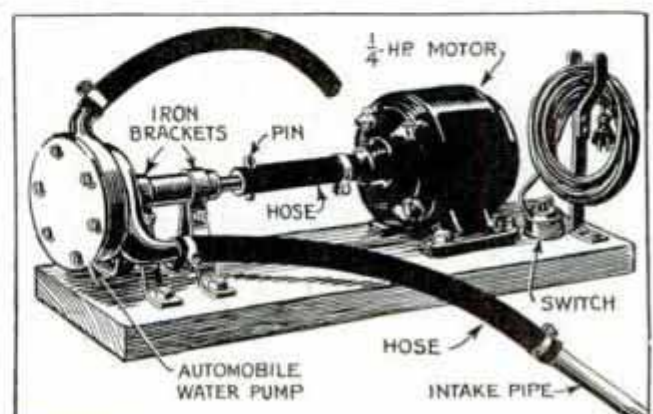


When you're turning down small, delicate work in your bench lathe, it's handy to be able to stop and start the spindle without stopping the motor. This can be done by mounting the motor on the countershaft and then pivoting the whole thing so that it will swing in toward the lathe. To shift the countershaft, you rig a toggle arrangement, one end being bolted to the countershaft and the other to the lathe headstock. The tog-

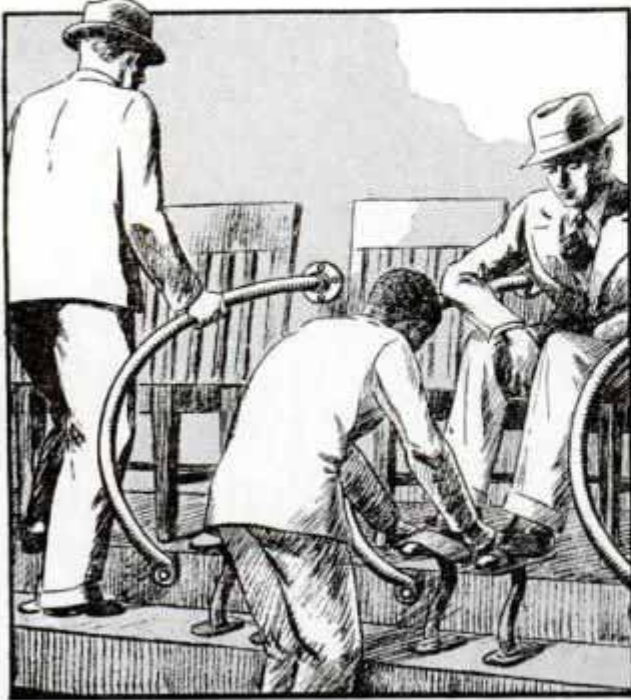
gle consists of a turnbuckle and a flat piece of iron, one end of which is bolted to the headstock and the other to the turnbuckle yoke as shown. When you pull back on the hand lever, the drive belt slackens and the lathe spindle stops. Pushing the lever forward until the toggle joint locks, tightens the belt and gradually starts the spindle to rotating. Shortening or lengthening the turnbuckle provides adjustment for belt tension.

Motor-Driven Auto Pump Does Chores Around the Home

If you need a pump for light work where the lift is not great, such as for draining your basement, emptying pools, tanks, etc., a centrifugal water pump from an old car, connected to a 1/4-hp. motor, will do the trick. It is mounted on a heavy wooden base with flat-iron brackets as shown and is connected to the motor with a short piece of garden hose. Although the unit can be mounted anywhere above the water level, a pump of this type works most efficiently on a short intake.



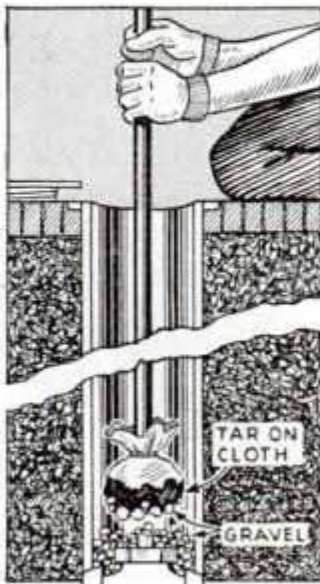
Shoe-Shining Parlor Improved by Pipe Railings



Railings between chairs in shoe-shining parlor aid customers in getting into seats

To assist his customers in reaching the seats, one bootblack mounted curved pieces of pipe between the chairs. The pipes, which also serve to divide the chairs into individual stalls, were attached to the wall with floor flanges, the lower ends being flattened and drilled to take lag screws or bolts for attachment to the platform under the chairs.

Gravel over Water-Main Valve Removed with Tared Cloth

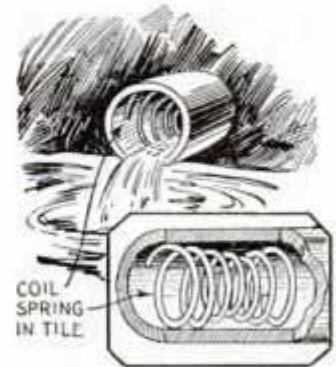


Workmen called out to repair a broken water main last winter, found that children had removed the cap from the shut-off pipe and dropped in gravel, which prevented the valve from being closed. As it was impractical to dig out the valve on account of the frozen ground, one workman wired a

small pad of cloth to a pole and painted the cloth with a thick coat of tar. When this was inserted into the shut-off pipe the pieces of gravel adhered to it and were lifted out quite readily.

Rodents Kept Out of Drain Tile

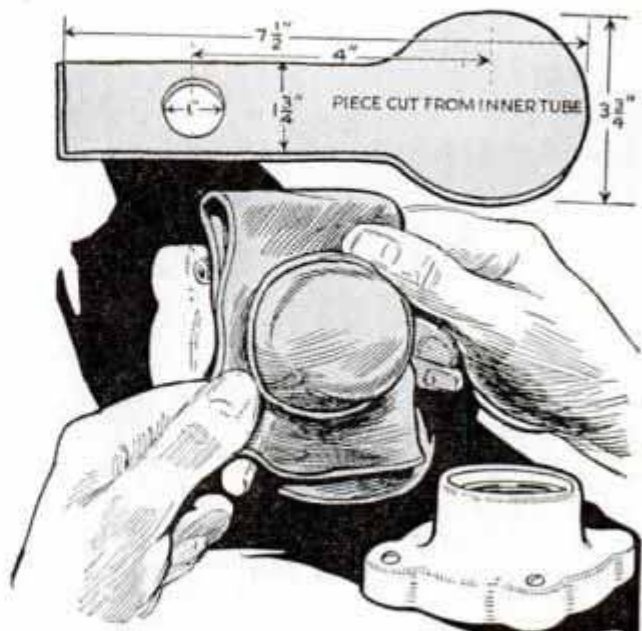
Where tile is used to drain certain low sections of farm land, a coil from a seat cushion or bedspring inserted in the outlet end will keep small animals from entering. If the spring fits loosely in the



tile, stretch one or more of the coils until they provide a snug fit and stay in place.

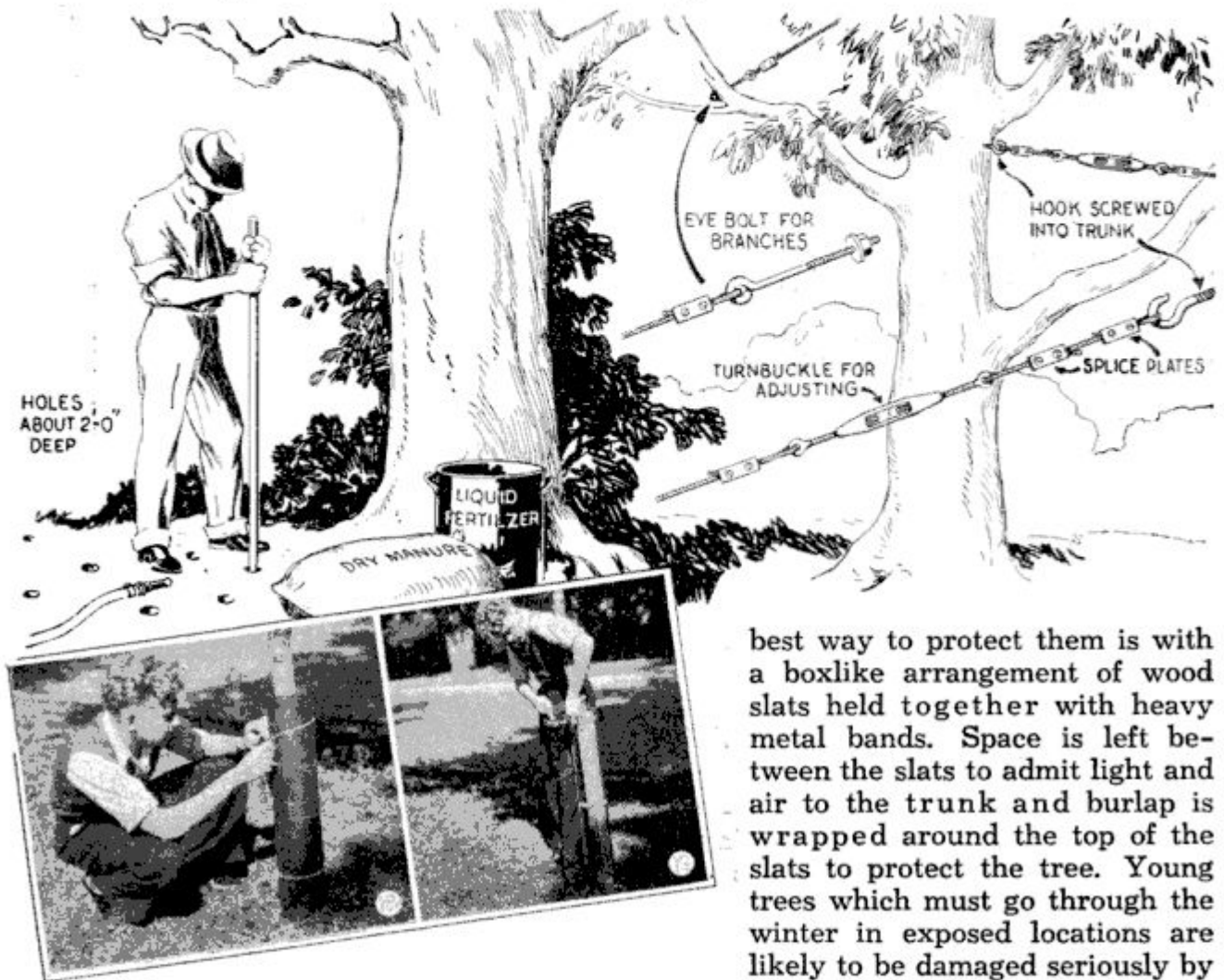
Exposed Lamp Sockets Protected with Inner-Tube Rubber

Banjo-shaped pieces cut from an old inner tube to the approximate size indicated are just the thing to keep snow, dirt, etc., from getting into receptacles when electric lamps have been removed for the season. Cover the opening with the widest portion of the rubber, then lap the other end back and stretch the hole over the shoulder of the porcelain.



Exposed outlet receptacles should be covered to prevent corrosion of the metal parts

"Feeding" and Protecting Your Shade Trees



best way to protect them is with a boxlike arrangement of wood slats held together with heavy metal bands. Space is left between the slats to admit light and air to the trunk and burlap is wrapped around the top of the slats to protect the tree. Young trees which must go through the winter in exposed locations are likely to be damaged seriously by frost. To prevent this the trunks

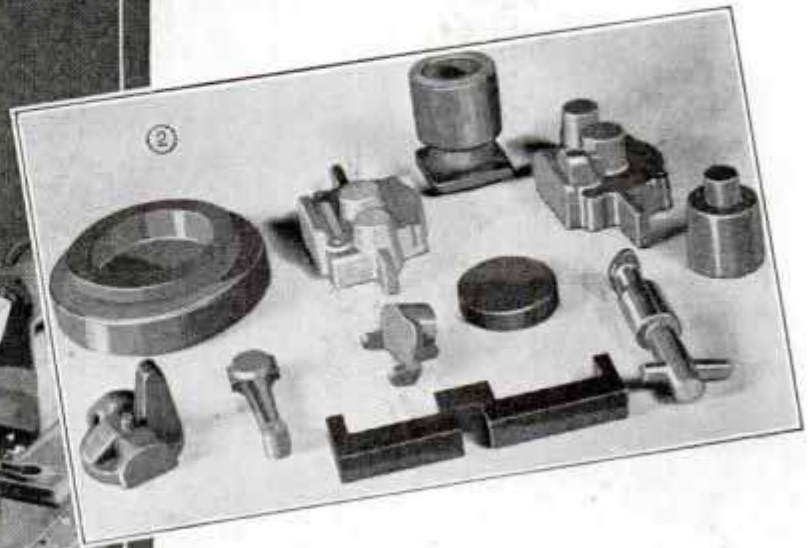
are wrapped with several layers of burlap and the wrapping is encased in heavy tar paper. This should be fastened with wire. It's a good idea to paint a coat of tar over the top end of the wrapping to prevent water running down the trunk into the burlap where it might freeze and damage the bark. Small trees in orchards must always be protected in this way against rabbits and other small animals which gnaw away the protective bark and cause serious injury. Spreading limbs of shade trees and heavily laden branches of large fruit trees can be braced to the trunk, using cables attached to screweyes and eye bolts and fitted with turnbuckles for adjustment. The cables should not be wrapped around the trunk; this will choke the growth and eventually kill the tree.

Large trees along parkways are more or less starved by walks and pavement, which shut off air and moisture from the roots. Trees in this location are likely to have a sparse and withered-appearing foliage. Such trees will be benefited greatly by loosening the soil about the trunks so that more moisture and air can penetrate to the roots. Then you can "feed" the roots by punching a series of holes with a crowbar over a circular space 8 or 10 ft. about the trunk. The holes are filled several times with water, then packed with dry or decayed manure. This is followed in a few days with liquid fertilizer, after which the holes are sealed with a good top soil. Where a large tree is located close to the street pavement it may be necessary to feed it in this fashion once or twice each season in order to keep it in a healthy condition. Young trees on a parkway are always in danger of injury from children, lawnmowers and passersby. The

are wrapped with several layers of burlap and the wrapping is encased in heavy tar paper. This should be fastened with wire. It's a good idea to paint a coat of tar over the top end of the wrapping to prevent water running down the trunk into the burlap where it might freeze and damage the bark. Small trees in orchards must always be protected in this way against rabbits and other small animals which gnaw away the protective bark and cause serious injury. Spreading limbs of shade trees and heavily laden branches of large fruit trees can be braced to the trunk, using cables attached to screweyes and eye bolts and fitted with turnbuckles for adjustment. The cables should not be wrapped around the trunk; this will choke the growth and eventually kill the tree.

☐ A few drops of household ammonia added to the water in which fountain pens are cleaned will help remove corroded ink.

MIDGET



By E. C. Wittick

Part I—Making the Patterns

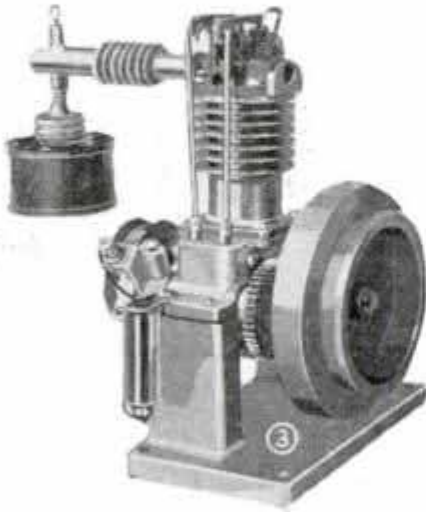
SPECIALY designed for construction in the home workshop, this tiny engine, which will develop about $\frac{1}{8}$ hp. at maximum speed, is really built "from the ground up." Being of the four-cycle type the engine is very easy to start, as in Fig. 4, and runs smoothly at high speeds. As a project in machine work, its construction would not be considered difficult, and it offers you not only excellent practice on your lathe but a try at pattern making as well. Now the patterns for the engine parts are not of the type that would be made by a manufacturer aiming to conserve metal, but they are designed for ease of construction and a liberal allowance of metal on the castings for finishing. The main thing to remember about pattern making is that certain projecting parts of the pattern must have "draft," that is, they must be tapered slightly so that the molder can draw the pattern from the sand mold easily. Also, certain patterns, the cylinder for example, must be made in two parts, or "parted," as it is termed. This is also done to facilitate the work of the foundry. Dimensions given for all the patterns allow for the normal shrinkage of the metal, so you don't have to lay out the work with a shrinkage rule.

Work begins with the cylinder pattern—a very simple wood-lathe job as you will see from Figs. 1 and 5. Notice especially the upper-right and the lower-left details in Fig. 5, showing beveled edges on the two parts of the pattern stock. These bevels can be run on the jointer and each of the two pieces faced on one side to form a perfect flat joint. Registering holes for short dowel pins are bored in the halves and the dowels are fitted and glued into only one of the two parts. Then the two pieces are screwed together and turned down to the dimensions indicated, after which the ends are sawed off and the whole thing smoothed up. The projection at each end is a core print and should be finished with black shellac, which is made by adding lamp black to orange shellac. The molder will insert the proper core when he makes up the mold.

Now the connecting rod, Fig. 6. The pattern is made of mahogany. One good way to make this pattern is to use a base piece of $\frac{1}{8}$ -in. stock and then fit turned disks to form bosses for the wrist-pin and big-end bearings. Notice especially the location of the parting line and how the webbed center section is formed. The right-angle corners in the webbed section

Refering. to 8, 26
air cooled.

GAS ENGINE

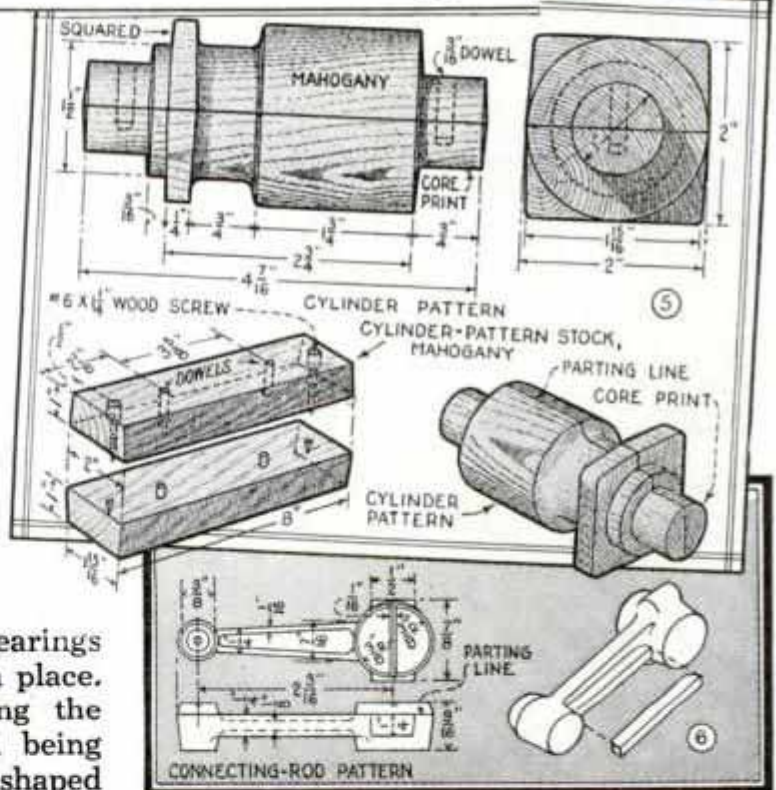


turned from castings

must be rounded with wax fillets. This can be done by softening a piece of beeswax and then pressing this into the corners, rounding it neatly with your finger. Bolt lugs are glued on and carved to shape with a knife.

The piston pattern, Fig. 13, is merely another wood-lathe job, but the piston core box shown in Fig. 8 is a trifle more intricate. Here the blocks are doweled as shown and fastened together with heavy wire staples, then the whole is mounted on the faceplate and counterbored as in the sectional view. Bosses for the wrist-pin bearings are turned separately and glued in place.

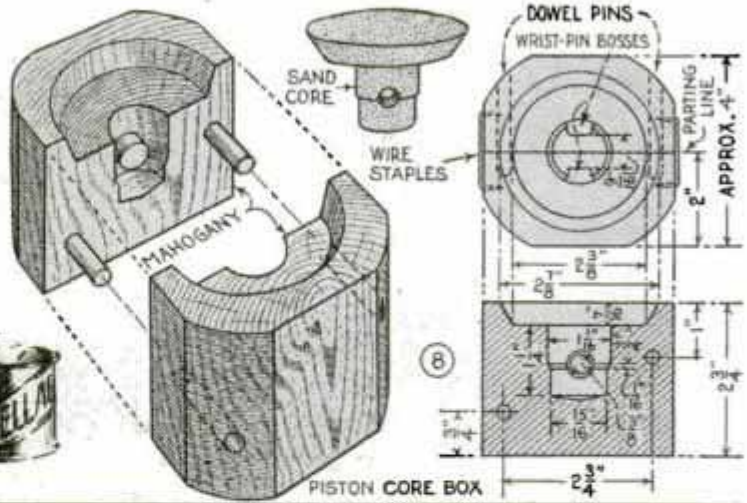
There are two ways of making the crankcase patterns, one method being shown in Fig. 9. First, the cup-shaped pieces for the main body and bearings are turned out and then the other projecting parts are turned separately and fastened on with glue or metallic cement, the latter being very good for this purpose. The pieces that form supports can be cut from a strip about 1 ft. long, planed to exact size. The flat pieces that form the cylinder seat when the castings are bolted together can be made the same way. Lugs for bolts,



which hold the two halves together, may be made as a split turning by gluing two strips together with a piece of paper between. Then turn down to cylindrical form, split the turning apart, and after cutting to length, glue the pieces to the pattern. Now another way of making the same thing, shown in Fig. 10. This is done by sawing the main body of the pattern

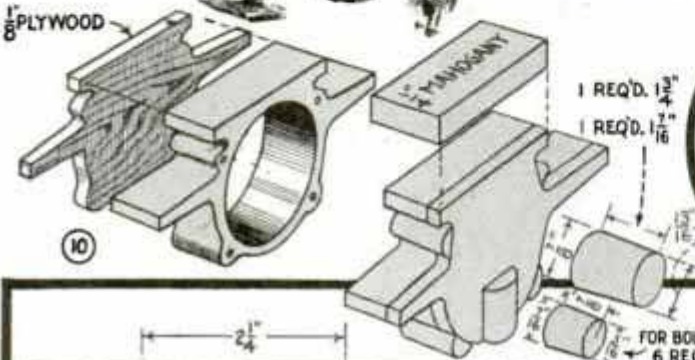


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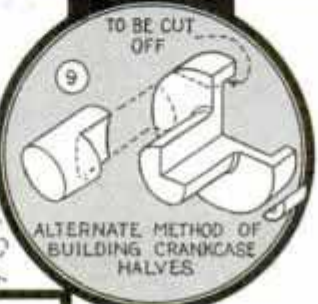


8

PISTON CORE BOX



10



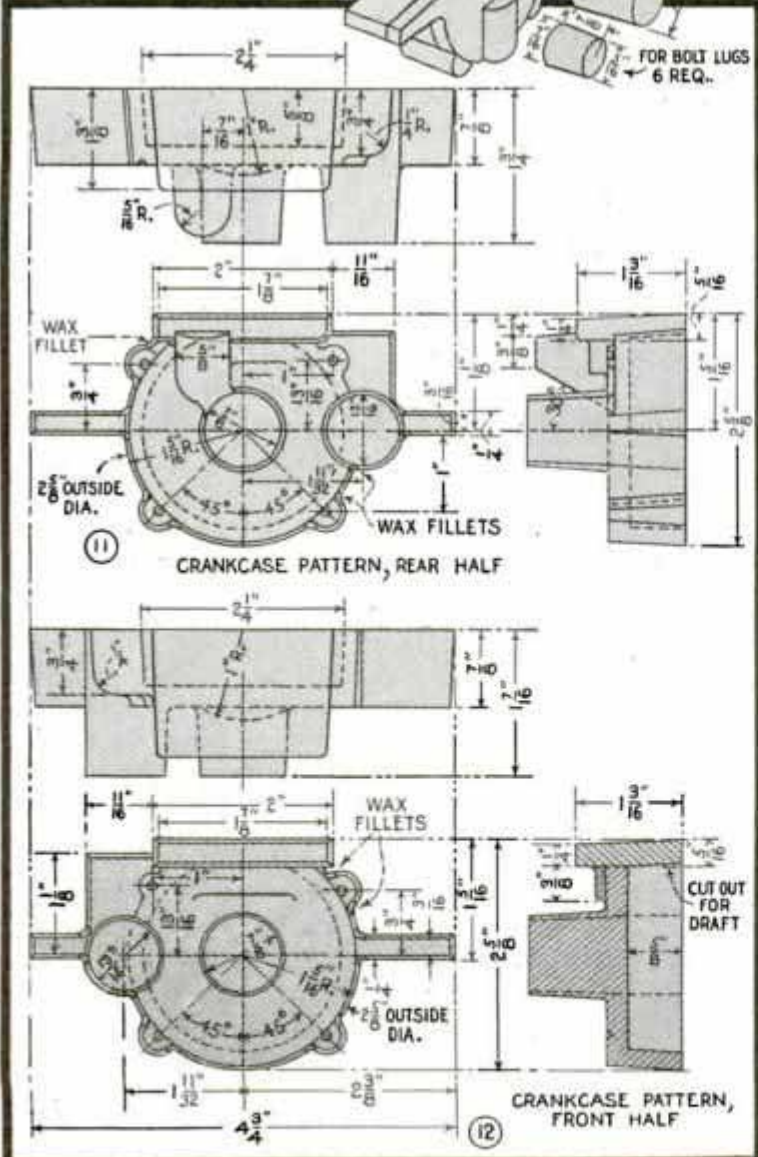
9
ALTERNATE METHOD OF BUILDING CRANKCASE HALVES

from 3/4-in. stock, the outer contour including the supports and bolt lugs. You can use a scroll saw, setting the blade at a slight angle to cut the draft inside

and out. Then a piece of 1/8-in. plywood is cemented to one side and cut to the same contour. Some smoothing up will be necessary. Figs. 11 and 12 give the details and dimensions of both halves.

In Fig. 14, the flywheel pattern is another comparatively simple lathe job, the carburetor pattern is very similar to that made for the cylinder, but the cylinder head and timer yoke involve some gluing and handwork. Taking the cylinder head first, you turn a disk to form the main body, then glue on small parts forming flanges, valve-stem guides, rocker-arm support and spark-plug seat. The timer-yoke pattern is made in the same way. The body is turned to size in the wood lathe and the projecting parts glued on. However, notice particularly that the draft on this pattern runs each way from the main flat surface.

Now a few important details applying to all the patterns for this job. It is essential that each pattern be finished smooth all over, otherwise the molder will have trouble getting it out of the sand. This means careful sanding,

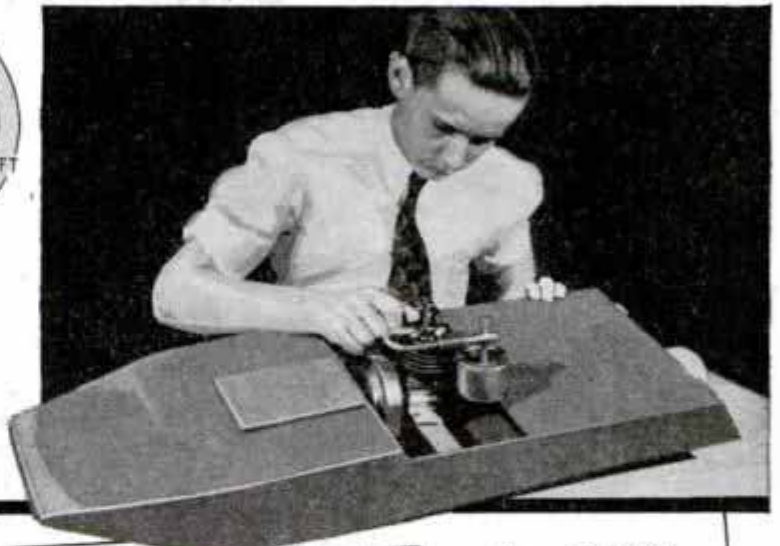
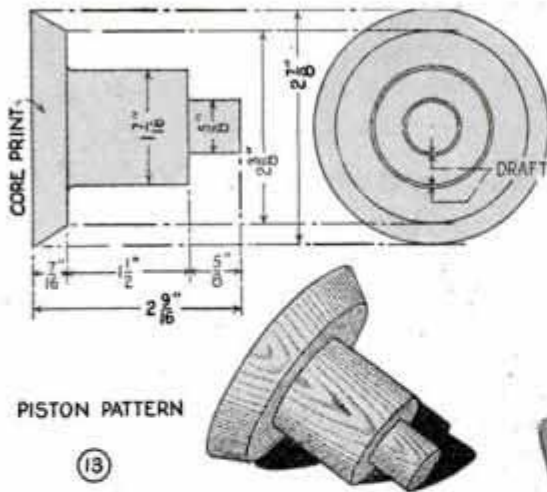


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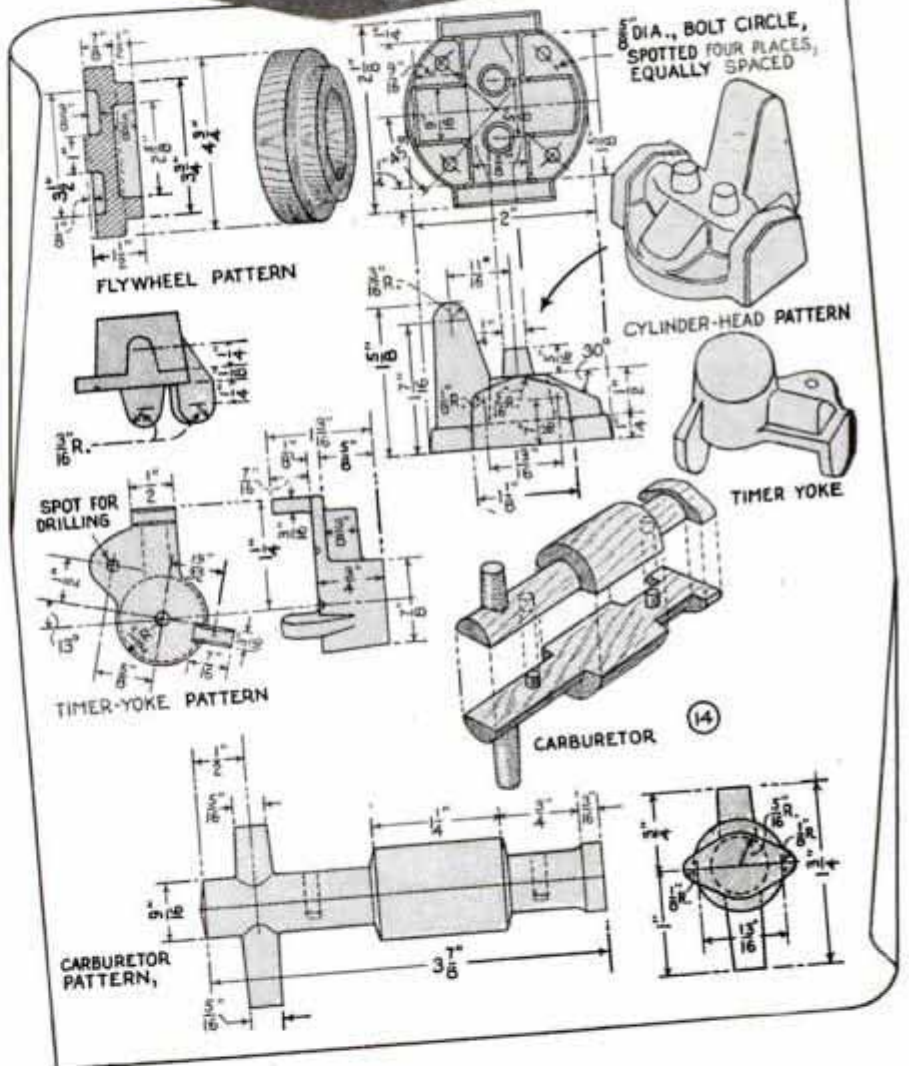
CRANKCASE PATTERN, REAR HALF

12

CRANKCASE PATTERN, FRONT HALF



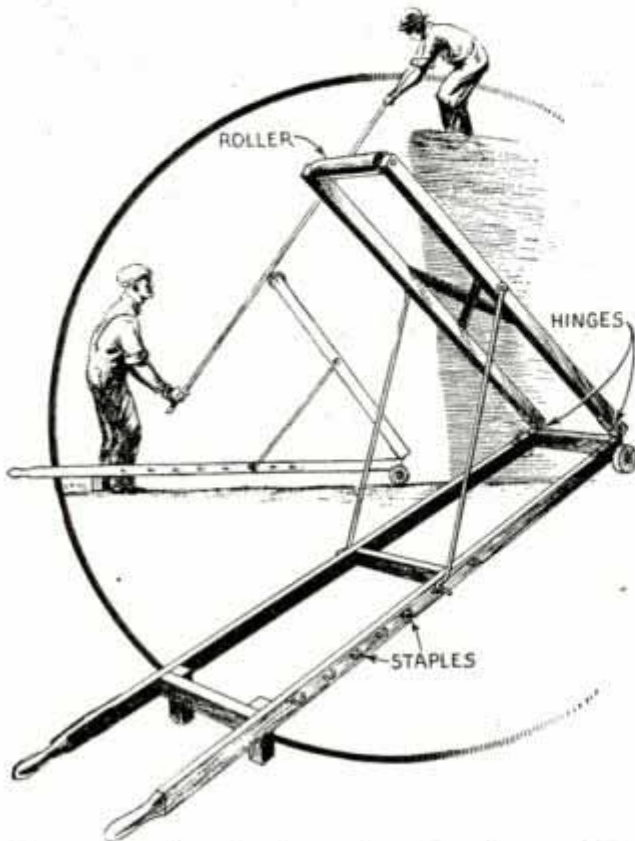
wax fillets in all corners where two parts join, and two coats of orange shellac applied as in Fig. 7. Don't forget that the core prints on the cylinder and piston patterns must be coated with black shellac. Where gluing is specified you can use either waterproof casein glue or metallic cement. Where dowels are used in the parted patterns remember that they serve only as locating or guide pins. They are glued into only one of the halves and the projecting ends are tapered slightly so that the halves will come apart easily. You will see from the drawings that wherever possible, holes to be drilled are spotted on the pattern. This is done with a short-beveled prick punch. The castings will then come back to you with the holes spotted all ready for drilling. The complete set of castings, and the steel crankshaft blank, are shown in Fig. 2. The finished engine is shown in Fig. 3. When you take the patterns to the foundry, specify soft, grey iron for the cylinder, cylinder head and flywheel; bronze for the connecting rod, timer yoke, and carburetor. The crankcase is cast in aluminum. Mahogany or selected white pine is the best wood to use for small pat-



terns of this type. To make good patterns you must have good wood, of a grade suitable for pattern making. This is especially true of pine. Though the latter wood can be used, selected mahogany is always to be recommended for small patterns because of its durability, resistance to both shrinkage and expansion after working, and the ease with which it may be finished.

(To be continued)

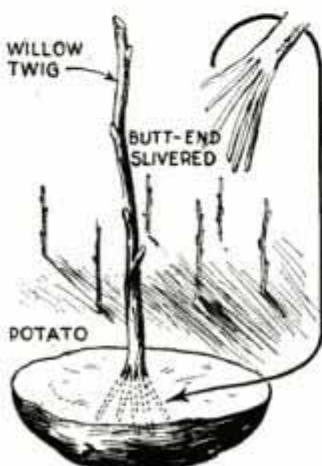
Lumber Lifted Single-Handed to Top of High Stack



One man easily raises long, heavy boards to a helper on top of a lumber pile with this adjustable jack

When lumber is stacked in high piles in a lumber yard, this portable jack saves labor in lifting heavy boards. It is nothing more than a two-wheel truck with a frame supporting a roller. In use, the boards to be piled are placed, one at a time, on the roller, pushed down at one end and shoved forward and upward to within reach of the man on the pile.

Willow Twigs Planted in Potato Grow Rapidly

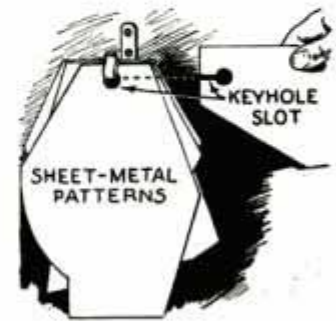


If you are planning to set out a number of willow twigs some place on your farm to stop erosion, sliver the butt end of each one and insert it into a half of a raw potato before setting it in the ground, and practically every

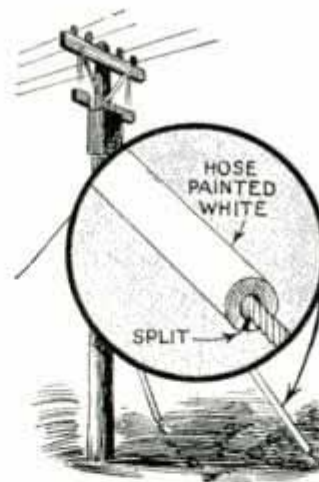
one of the twigs will grow. The potatoes furnish the necessary plant food and moisture until the twig gets a healthy start.

Metal Pattern with Keyhole Slot Quickly Removed from Hook

To avoid the usual necessity of removing a number of metal patterns from the hook to get the one desired, a tin-smith cuts keyhole slots in them so that any one may be removed without disturbing the others. The hook on which the patterns are hung is made from flat iron so that by merely lifting the desired pattern to a horizontal position, it may be withdrawn easily.



Guy Wires in White Hose Are Easy to See



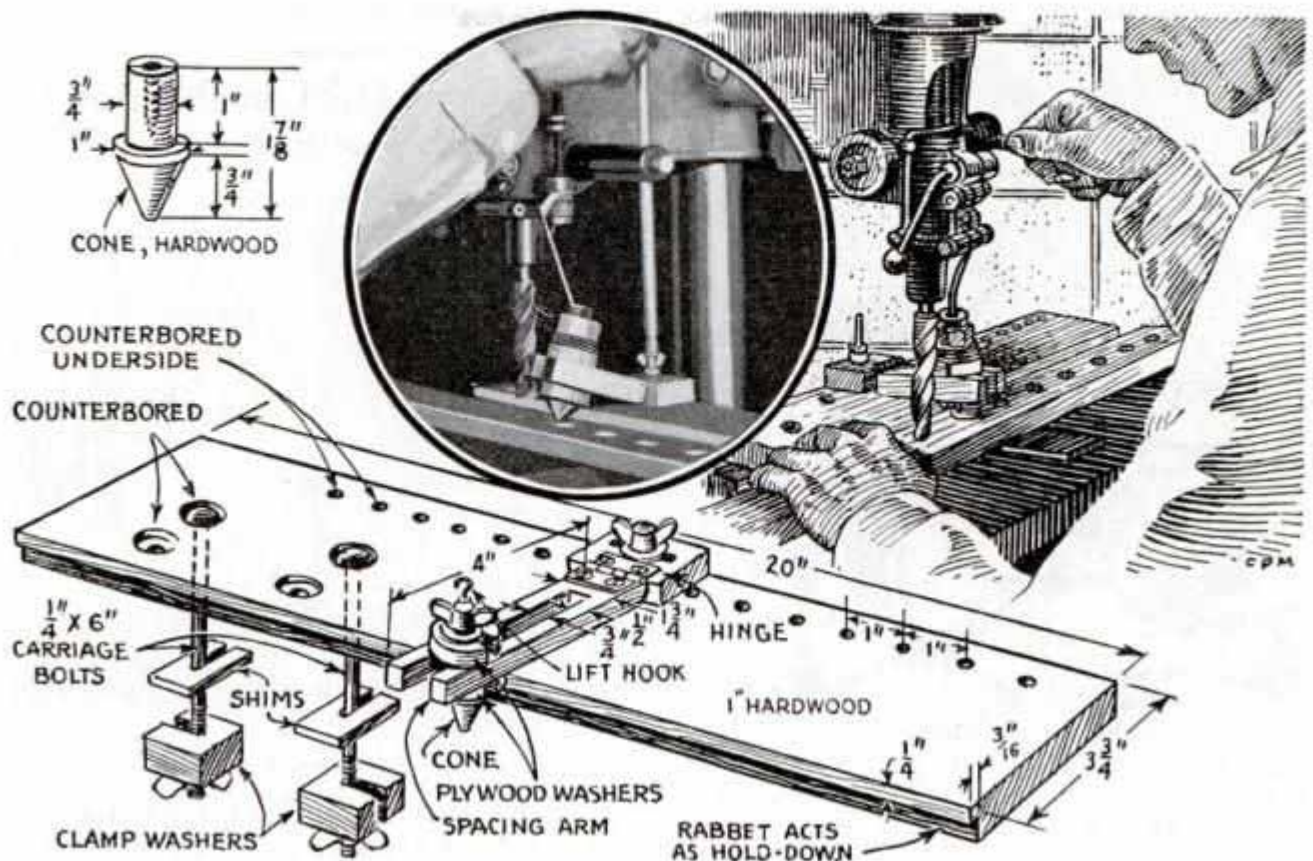
At a packing plant where guy wires on poles were often driven into at night by trucks and delivery wagons because the wires were not plainly visible, they were sheathed in lengths of rubber hose, which were painted white.

Fingerless Glove Aids Sign Writer

To avoid soiling the surface of cards and signs, and to allow your hand to glide more freely in manipulating the brush, cut the fingers from a soft, cotton glove and wear this, as shown. It will be found especially useful in warm weather.



Drill-Press Boring Jig Spaces Holes Accurately



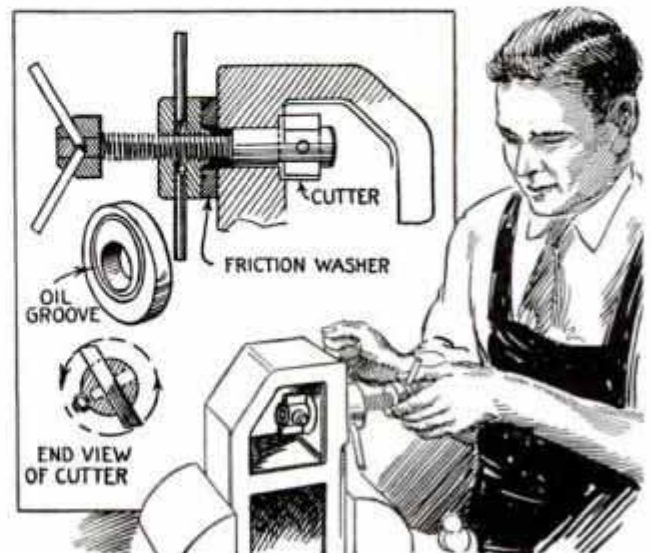
This simple jig will take care of the problem of spacing any number of holes equally. Dimensions given in the details are arbitrary as you can make considerable change in size of parts without affecting the operation. As you will see, the whole thing bolts to the drill-press table, removable hardwood shims and wing nuts permitting quick adjustment of the jig with relation to the table. In operation,

you drill the first hole in the position desired then move the work the required distance to the right. The cone is adjusted to drop into this hole when the bit is the proper distance from the center. Thereafter this spacing is duplicated for any number of holes. A cord tied to the drill-press spindle lifts the conical guide clear of the work each time the bit is raised.

—Edwin M. Love, San Gabriel, Calif.

Hand-Operated Facing Tool Will Get into Difficult Places

Made of materials picked up around the shop, this back-facing cutter will get into places inaccessible to any common tool used for this purpose. It consists of a threaded arbor, to one end of which the cutter is attached with a threaded taper pin. A steel disk, or feeder nut, tapped to fit the arbor and fitted with two 1/8-in. steel pins, bears against a bronze friction washer as in the sectional view. This gives a delicate feed. A threaded collar is turned onto the end of the arbor and pinned as shown, the pins acting as handles. Turning this collar rotates the arbor and light pressure on the feeder nut draws the cutter into the work.



Cabbage Head Cut and Loaded in One Operation



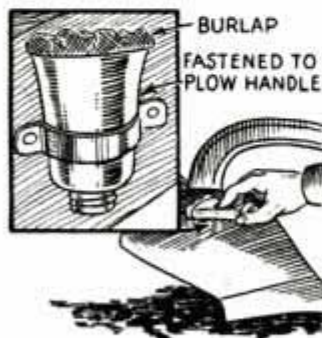
You can cut a load of cabbages quickly with this converted long-handle shovel

Here is a tool that saves labor when harvesting cabbages as you can cut off a head and scoop it into a wheelbarrow or wagon with one sweep of the arms. The tool is merely a long-handle shovel with a wide V-notch cut in the center of the front edge of the blade, the edges of the notch being sharpened with a file.

—James Vick, Mannboro, Va.

This Improvised Plowshare Oiler Is Always at Hand

To prevent possible neglect in the oiling of plowshares, cultivator shovels and other implements,



one farmer keeps a simple oiling device on the plow handle. The bottom was removed from a screw-top can, of pint size, and several folds of burlap were placed in the opening before the sides of the can were driven together.

When the can was filled with oil through

the screw top, and the cap replaced, the burlap provided a wick by which the fluid could be applied quickly.

Sign Copy Held on Window with Vacuum Cup

To hold copy securely in position for reference while lettering special sales bulletins on store windows, one artist avoids possible errors by using a music clamp as a copy holder. This is bolted to a vacuum cup, which permits it to be attached to the window in the most convenient position.

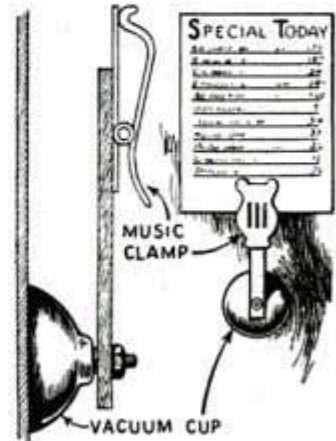
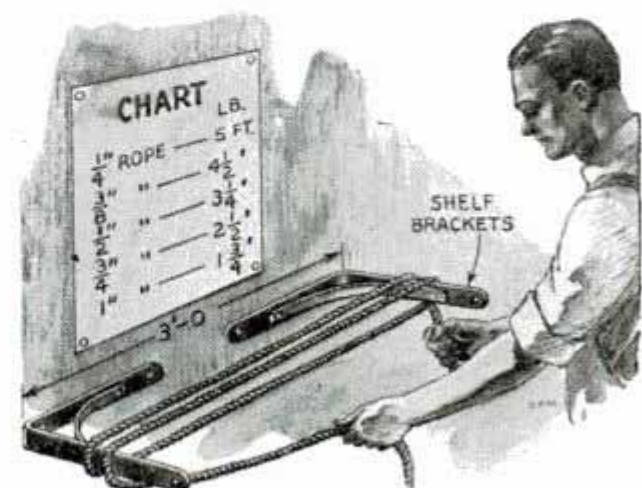


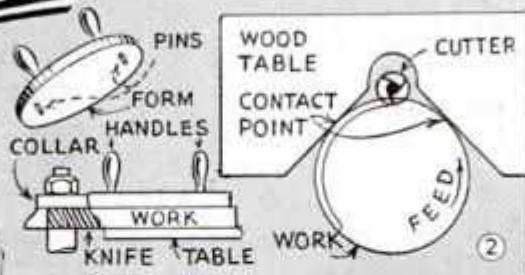
Chart Permits Cost Estimate of Rope Needed

As a means of quickly estimating the cost of a given length of rope, which is usually sold by weight, one dealer made a chart showing the number of feet in each pound of rope of different sizes. This was done by simply dividing the total length in feet of a new coil of rope by its weight in pounds. As a further convenience, a pair of shelf brackets were attached to the wall 3 ft. apart so that the rope could be wound back and forth around them to quickly measure the length of rope.

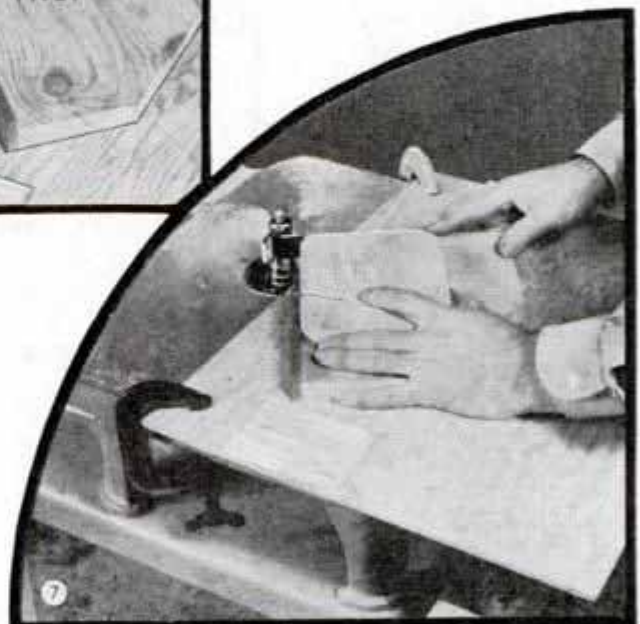
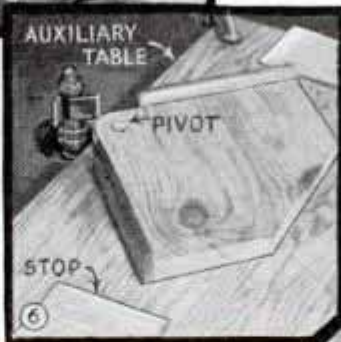


With this chart, you can give a customer the cost of any length of rope before cutting

JIGS



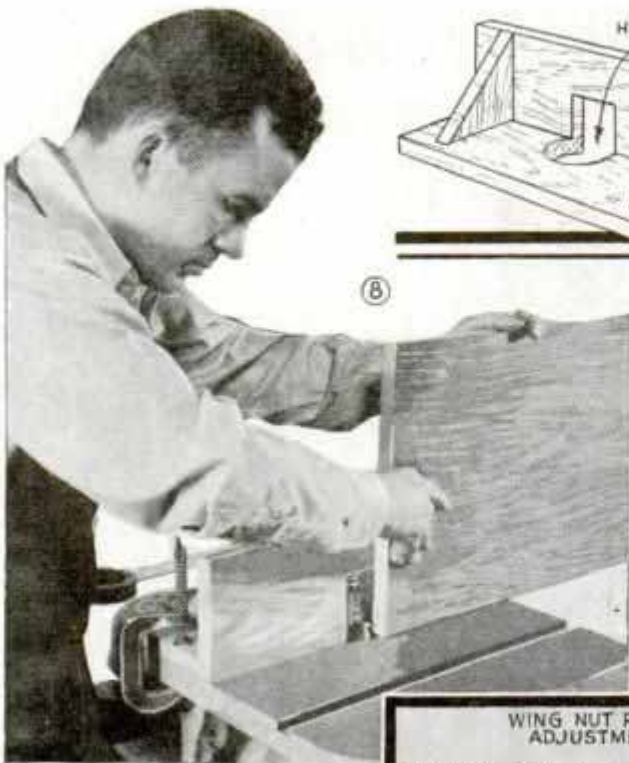
for the SHAPER



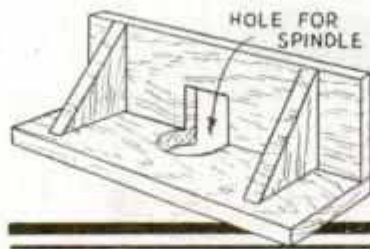
SPEED and uniformity in producing work on the shaper depend largely on the jigs and fixtures you use. For the most part, these are quite simple to make. A typical set-up for handling round work is shown in Figs. 1 and 2. The jig consists of an auxiliary wood table which is clamped to the shaper table. The wood table has a V-shaped opening, which forms an exact right angle about the shaper spindle. Circular work of almost any size can be worked in this jig, the edge of the work contacting the sides of the V-shaped opening. Continuing the same idea, Fig. 3 shows a jig for shaping round work against collars. The advantage of the form is that the original blank need not be cut to a smooth surface. The form

should be perfectly round and smooth. It is fitted with two handles on the top side, and two or three short, sharp pins projecting on the underside to engage the rough-sawed blanks. The work is shaped in the usual manner with the form riding a collar of suitable size.

In Figs. 4 and 5 is shown a useful jig for tenoning the ends of square stock. It consists of a fairly

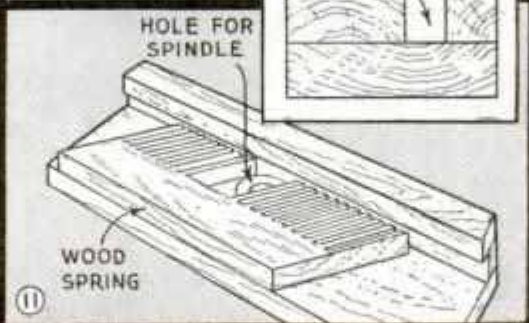
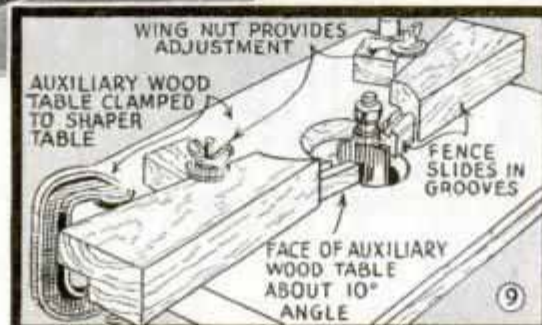


Simple, practical jigs and fixtures like these give speed, uniformity and an element of safety to shaper work. Most of them can be made in a few minutes from scraps of hardwood and attached to the shaper table with C-clamps or small bolts. One features a holder for small round disks, another, Figs. 4 and 5, provides a means of cutting round tenons on square stock



⑧

heavy square of wood, which is nailed to another piece to clear the shaper spindle. The working portion of the jig is fitted with a round plug, and a square hole is cut through the plug to take the work. A piece of plywood on the underside of the block prevents the plug from falling through, but has a round opening of a size to permit the passage of the square stock. The rest of the jig consists of a wooden collar which fits over the shaper spindle and limits the depth of cut, as can be seen in Fig. 6. The stock to be tenoned is simply pushed down through the square hole in the plug until it contacts the disk, after which the stock is revolved in the same direction as the knives, to complete the tenon.



⑫

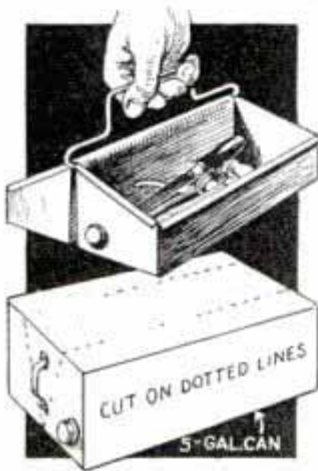
Fig. 7 pictures a useful jig for rounding corners. It consists of a wood block pivoted to a square of plywood, which is clamped to the shaper table. Work to be rounded is placed on the revolving block and fed into the cutter head. Small wood blocks are nailed to the plywood table to limit the start and stop of the cut.

Auxiliary fences on the shaper are useful for a wide variety of jobs. One of the simplest is the high fence shown in Fig. 8. Some shapers are not fitted with adjustable fences, and in this case you will find the unit shown in Fig. 9 quite practical for any type of work demanding fence adjustments. As can be seen in the

sketch, the main table is grooved to fit corresponding lugs on the two fence pieces, adjustments being made by sliding either the front or rear fence to the position required, and clamping by means of the simple washer-and-wingnut arrangement. The face of the main table should

be cut at an angle of about 10° each way from the center, and the fence pieces cut on a corresponding angle to bring the face of the fence back to a straight line. Fig. 10 shows a jig for making strip moldings, the construction being shown in Fig. 11. The height of the opening should be the same as the width of the stock, and the wood spring should be set a little closer than the thickness of the stock so that it will grip the work properly to prevent backlash. The circular fence shown in Fig. 12 is useful for a wide variety of curved work, the fence portion being cut to the same radius as the work.

Toolbox from Oil Can

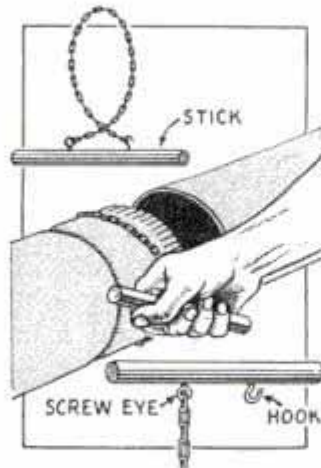


For carrying tools from place to place about the shop or farm, a 5-gal. oil can may be used quite satisfactorily. Cut the can along the dotted lines indicated in the lower detail and bend the two halves over, after which a length of wire is hooked under the

ends of the bent portion to serve as a handle.—G. E. Hendrickson, Argyle, Wis.

Joining Stovepipe Easily

One tinsmith gets around the difficulty of joining lengths of stovepipe by using this chain-twist tool with which he squeezes the crimped end of one pipe so that it will slip into the end of the next length. The tool is simply a hardwood stick to which one end of a length of small chain is fastened. This can be slipped around the pipe and fastened to a screw hook near the other end of the stick.



Small-Parts Trays Made of Cloth Hung Up Like Bags



When small parts of each repair job are kept on a cloth square the bench is quickly cleared

Electricians, clock repairmen and others who work on small mechanisms, often have one job on the bench when another one of more importance comes in, necessitating much tedious work in gathering up the parts and storing them where they will not be lost. To simplify matters in such cases, one mechanic places the small parts on square pieces of cloth having small brass rings stitched onto the corners. By gathering the four corners and hooking the rings over a convenient hook on the wall, the work space is cleared, and all parts kept safely at hand. A ticket on each hook indicates the contents of the bag.

Two-Color Pencil for Checking

When checking work where both a colored and a regular lead pencil are needed, just remove the eraser from the pencil and insert a short crayon in the ferrule. Then you can make the check marks in color without laying down one pencil to pick up another one, thus saving time and assuring an accurate check, as your attention is not distracted from the work.



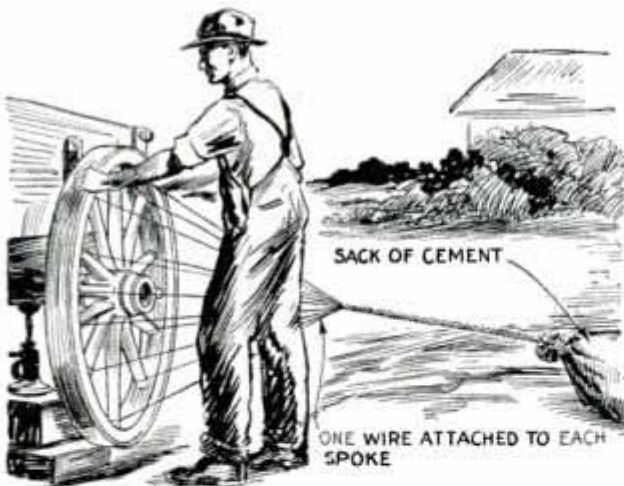
Cashier's Counter Has Trough to Catch Rolling Coins



This trough will save stooping and hunting for coins on the floor

To prevent coins from dropping on the floor, one cashier put a sheet-metal trough on the edge of the counter as shown. A trough an inch wide will catch the average coin and, if it is finished to match the surroundings, it will not be noticeable.

Wire Cables Twisted Uniformly by Wagon Wheel



It's no trick to twist a length of wire cable needed around the farm

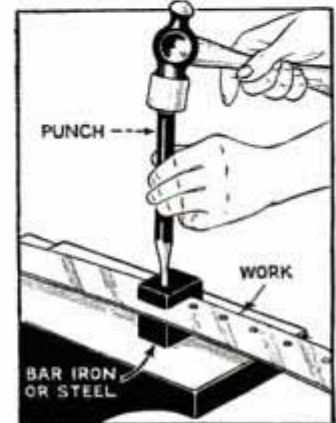
Wire cables for anchoring fence posts, high silos and other structures on the farm may be made by the following method: Cut as many lengths of wire as you wish strands in the cable, and attach one end of each wire to one of the spokes of a wagon wheel. Attach the other ends of the wires to any heavy, but movable ob-

ject, such as a bag of cement or sand. Then jack up the wheel and turn it slowly. This will twist the wires into a firm cable, due to the tension produced by the weight at the opposite end, which is pulled toward the wheel.

Hand Punch for Sheet Metal

For the mechanic or other worker who has only an occasional need for a punch

to perforate sheet metal, here's a simple one. Just take a short piece of bar iron or steel, drill it through the center lengthwise, and then slot it about two thirds the way through from one side as shown. As the size of the tool



depends on the particular work at hand, it is a good idea to make up several of them to meet various requirements—or one block having several holes. The tool is set on a solid surface or it may be clamped in a vise, after which the work is inserted into the slot and a punch driven through the hole.

Perfect Circles Cut on Stencils with Can Lids

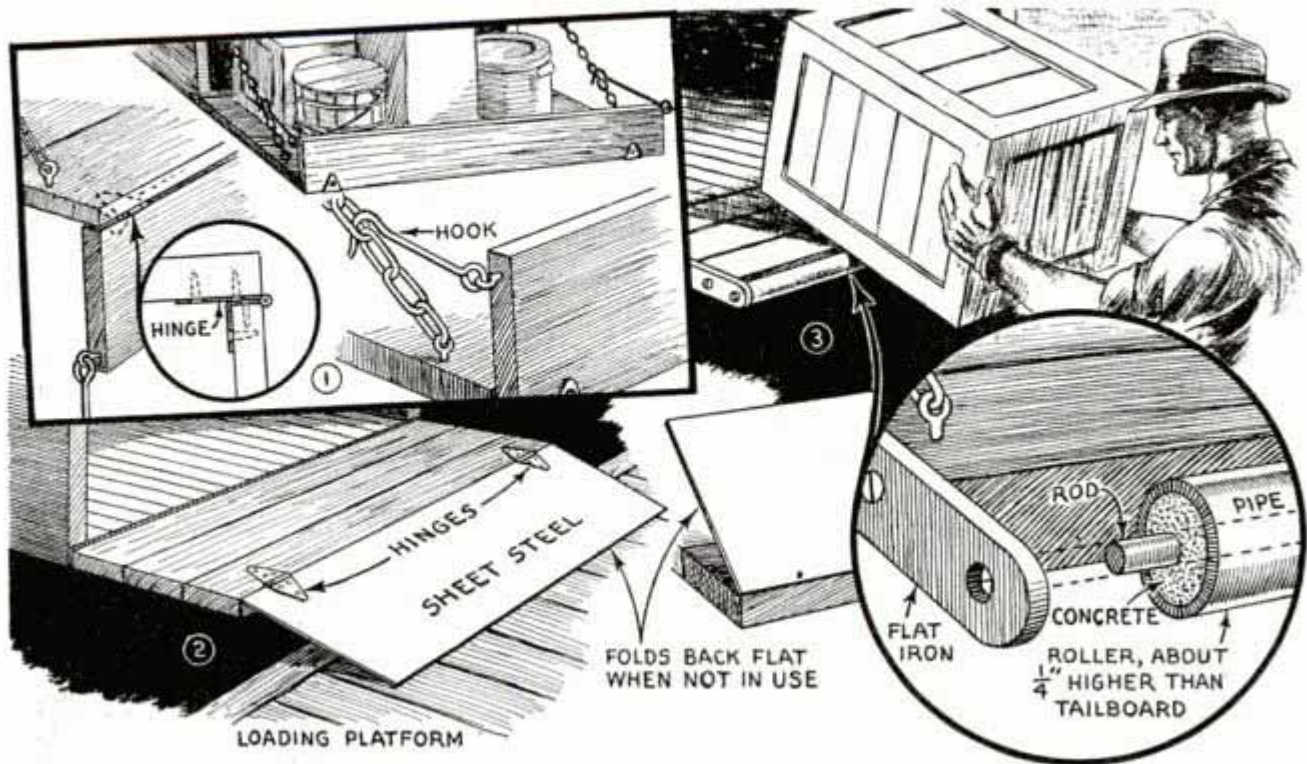
In making stencils for duplicating commercial work, circles of various sizes are frequently used

for the prominent display of special items and prices. As it is impractical to make the circles with a compass, one operator collected a number of tin-can lids of various sizes and used them for the purpose.



The lid is placed on the stencil in the desired position, pressed down firmly and given a quarter turn, which cuts the circle perfectly.

Three Ideas to Ease the Truck Driver's Task



Applied to a truck tailboard, any one of the ideas above, depending on your particular type of work, will save labor. In Fig. 1, a light plank hinged to the tailboard serves as a ledge to keep boxes, cans, etc., from slipping off when the board is lowered to a horizontal position to make more room. As shown in Fig. 2, a piece of heavy sheet steel hinged to the tailboard serves as a bridge between the latter and the

loading platform, and is especially convenient when rolling barrels and other round containers into the truck. Also, it is useful when using a hand truck for loading heavy objects. For expressmen and other drivers who often have to lift heavy boxes and trunks from the curb or street into a truck single-handed, a roller on the outer edge of the tailboard, as in Fig. 3, will make it easy to shove them inside.

Undercutting Mica on Commutator with Hack-Saw Blade

When a tool for undercutting mica between the segments of a motor or generator is not at hand, the job can be done easily with a hack-saw blade and a slotted sheet-metal sleeve. The sleeve should fit snugly over the commutator as it serves to guide the blade and avoid scratching the copper segments. In use, the slot in the sleeve is adjusted so that it is directly above each mica strip as the latter is cut.

—Rev. J. A. Harper, Pinckneyville, Ill.

☞ One half of a magnet from a model-T Ford magneto makes a dandy tool for handling valve-spring keys and similar small parts that are often accidentally dropped into hard-to-reach places when working on a car motor.



Sleeve with slot in side shields commutator segments when undercutting the mica strips

Cylinder Heads Lifted Easily with These Hand Grips



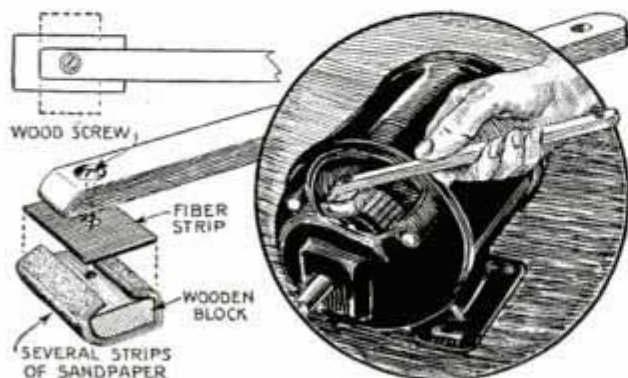
These hand grips screw into the spark-plug holes so both ends of the cylinder head are lifted evenly

Lifting a cylinder head single-handed is simplified with a couple of hand grips, which are screwed into the spark-plug holes. Take a couple of old spark plugs, remove the porcelain insulators and fit the plug shells with hand grips bent from small iron rods. The grips can be fastened into the shells by forming eyes on the rods and drilling holes through the shells for pins, or they can be brazed or welded in place.

—John H. Dodge, Sr., Shamrock, R. I.

Commutators Sanded with Block Attached to Handle

Here is a sander for smoothing motor and generator commutators that permits doing the job without endangering the

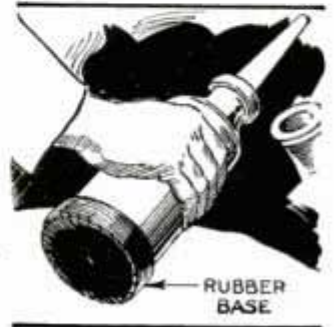


With this block, commutators can be cleaned without any danger of injuring the fingers

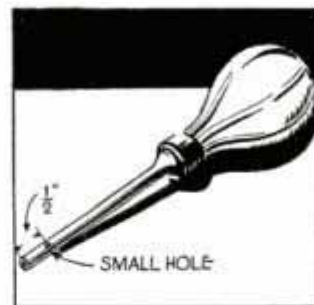
fingers in the moving parts. It is simply a small sanding block shaped as shown and screwed to a wood handle with several strips of sandpaper attached, a fiber strip being used between the block and handle to hold the ends of the sandpaper. As a single screw attaches the handle, it can be turned to any angle to reach the commutator so that the beveled edge of the block faces opposite the direction of rotation.

Rubber Bottoms on Oil Bottles Protect Car Fenders

It's a good idea to cushion the bottoms and sides of your filling-station oil bottles with rubber as shown. Then, if you accidentally strike the bottle against the car when in a hurry, the finish will not be marred, which is very annoying to many motorists. Rubber bases for the bottles can be purchased, or you can make them from old inner tubes.



Automatic Battery Filler



Uniform filling of storage-battery cells with distilled water is possible with any bulb type of filler if a bleed-hole is drilled through one side of the nozzle tip as shown. The hole

does not interfere with the filling, but when the surplus water is being removed, the sucking action automatically stops when the level of the water in the cells reaches the hole and allows air to enter.

Dirty Air Cleaner Chokes Motor

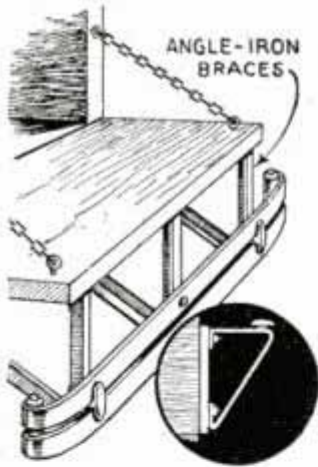
As all air that mixes with the fuel in your motor must pass through the air cleaner, the importance of keeping this unit clean cannot be overemphasized. A dirty cleaner not only results in low gas

mileage, but it is often the cause of a motor missing at high speed because it allows insufficient air to enter the carburetor. Most air cleaners have instructions for cleaning printed on them. If not, the information is given in your instruction book, which comes with the car.

Unburned Fuel in Manifold Causes Gassy Motor

Sometimes offensive fumes leaking into a car, after it has been driven many thousands of miles, are not monoxide gas, but are produced by a rich, poorly burning fuel mixture resulting from carbon in the intake manifold and poor carburetion. It is claimed that adjusting the carburetor carefully and sandblasting the inside surface of the manifold or replacing it with a new one usually ends the trouble.

Tailboard Bumper Protects Cars in Rear of Truck

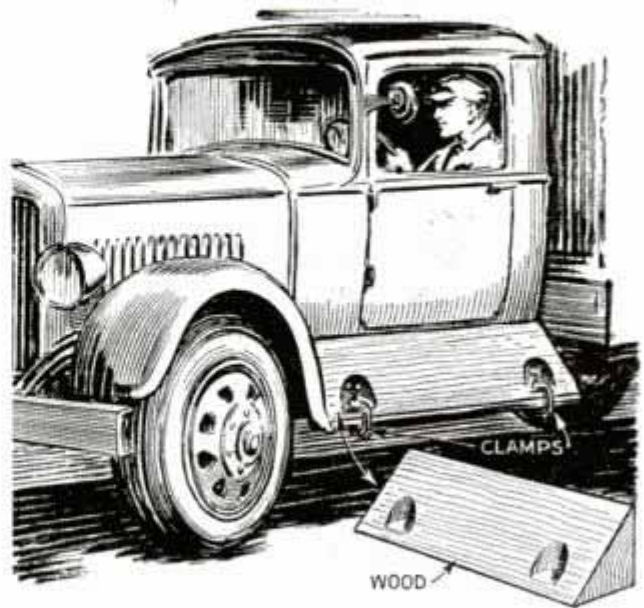


To keep motorists in the rear from accidentally bumping into the truck, when he was driving with the tailboard down and had to stop suddenly, one driver put a bumper on it like the one shown in the illustration.

Wanted—More Auto Kinks!

Simple things that will add to the convenience of driving and touring—easily made repairs for minor troubles and disorders of cars—precautions that will avoid troubles—these are some of the many things motorists would like to know about. Possibly you have devised something for your car or garage that will be helpful to thousands of others. Just describe the idea briefly but completely, illustrate it with a sketch or photo and let's have a look. Perhaps it fits in with our needs and if so, a check will be sent promptly. Avoid old practices, ideas that are of use only occasionally or those that involve too much trouble and expense. Ideas accepted must be found workable by actual practice and must be outstanding. Address Technical Editor.

Truck Driver Foils Road Bandits with Sloped Running Board



Hold-up man trying to jump on running board of truck slips off sloping block

After being held up at a lonely cross road, one truck driver clamped a large wood block with a sharply sloped top surface on the running board so that it would be difficult for anyone to jump on the truck. C-clamps in recesses in the block hold the block on the running board.

Hydraulic Brakes Refilled Single-Handed

Services of a helper or special equipment, when bleeding hydraulic brakes that have a supply tank with the master cylinder, are unnecessary if the tank is filled as shown. Take an oil bottle and stop the air hole in the spout, which should be of a size to slip well into the tank filler hole. Fill the bottle with brake fluid. When the cylinder fills up sufficiently to cover the end of the spout, the fluid will cease flowing because the air cannot get into the bottle. Thus, as the oil is pumped into the lines by the brake pedal, the bottle will automatically keep the master cylinder full.



Pan for Cleaning Small Parts Swings under Workbench



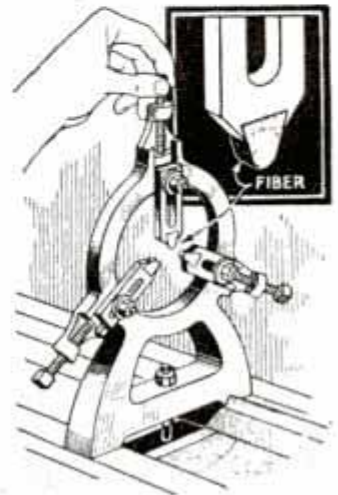
This small-parts pan swings out of the way, yet is always at hand

To keep his small-parts cleaning pan out of the way when not in use, yet have it immediately available, one mechanic swings it under the workbench on a pivoted arm. The latter is a piece of heavy

flat iron bent to the shape indicated and riveted to the pan, the bend being made to provide a spring effect to help prevent sagging. A long bolt pivots the assembly to the bench. It's best to use a pan with a handle on the front side so that it can be swung outward easily.

Steady Rest for Fine Work

Does the steady rest on your lathe mar finely polished surfaces? If so, the trouble can be prevented by cutting dovetail slots in the ends of the steady-rest jaws and inserting pieces of fiber. A little all-purpose cement on the fiber pieces will keep them in place.



☐ When laying a new floor over an old one, be sure to allow $\frac{1}{2}$ in. space on all sides for expansion of the wood, covering the space with molding.

The Next Issue

PECK-O'-FUN FOR THE HALLOWEEN PARTY

Collapsible chairs, "X-ray" helmets, confetti blizzards, hand-shaking ghosts and finger-printing machines that shock, telescopes that give the star gazer a "black" eye, as well as a variety of costumes that resemble ghosts, frogs, turtles, etc., all assembled inexpensively right in your home workshop.

SCALE MODEL OF FUTURE RAIL SPEEDSTER

Carved from a single wood block, this model propeller-driven railplane, with its sleek, rakish lines adds a thrill to an already interesting hobby.

ELECTROPLATING BY FRICTION

Inexpensive process by which anyone can plate silver, copper or nickel on car bumpers, radiator shells and many other articles around the home or shop.

WHY CAN'T I HIT 'EM?

If this question bothers you, check up on the fit of your shotgun. This article tells how to "tailor" the gun and what to look for when buying a new one.

Blaze

AUTUMN TRAILS

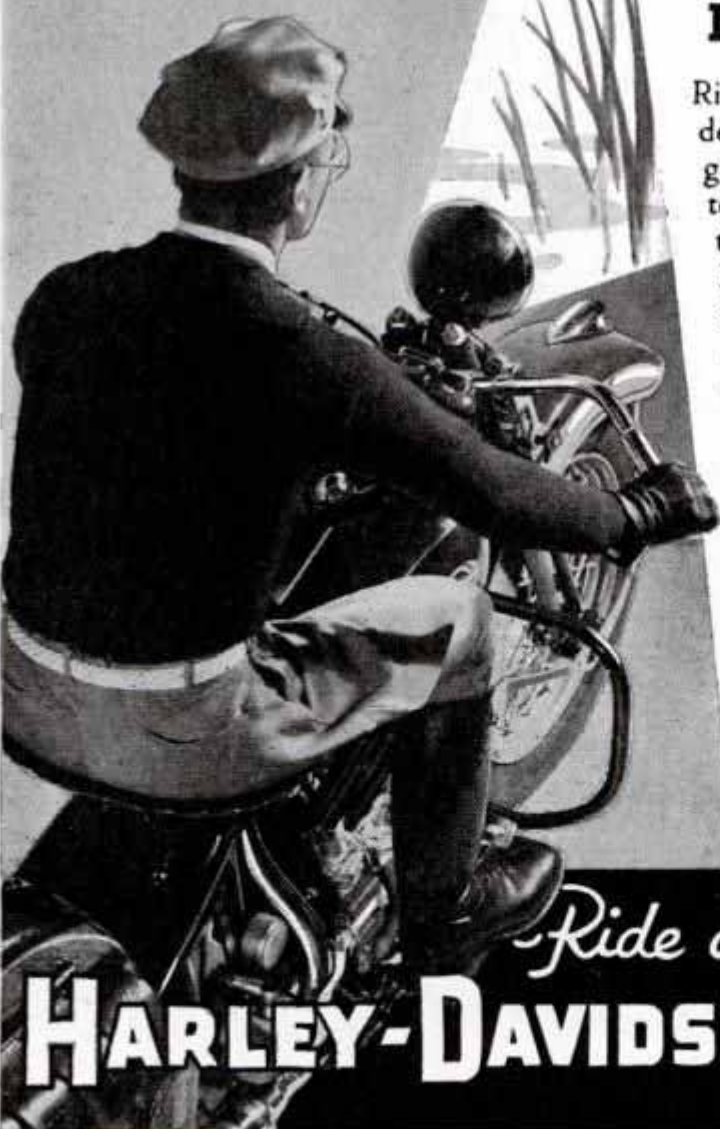
with a

HARLEY-DAVIDSON

Ride the trails to good hunting spots—"where deer and antelope roam"—where ducks and geese settle between flights—or where Nature tempts you most. Wherever it is, you can get there quickest and cheapest in the saddle of a Harley-Davidson. Thrill to its fast getaway, surging power, zooming speed, flashing style—and other advantages of streamline design and latest motor improvements! . . . No use talking—you must RIDE a 1936 Harley-Davidson to know what thrills will be yours when you own one. See your nearest Harley-Davidson dealer for a *free ride*—ask about his Easy-Pay Plans—and send in the coupon.

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Interested in motorcycling. Send illustrated literature.
Postage stamp is enclosed to cover mailing cost.

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Address _____

My age is 16-19 years, 20-30 years, 31 years and up, under 16 years. Check your age group.

Traffic Officers of the Skyways

(Continued from page 517)

In the tower also are more than a dozen radio receivers, each with its own loud-speaker. Over these receivers the control men hear the reports of the pilots made to their own lines while the ships are still many miles from the airport.

In the case of Pilot Andrews, for instance, the control tower was not "taken by surprise" when Andrews made his first call. The towermen knew Andrews had cleared Kansas City for Chicago, and under the safety regulations, Andrews reported to the TWA station in Chicago when 100 miles from the terminal, giving his position, altitude and estimated time of arrival. So the control towermen were anticipating the radio report from Andrews.

Red and green "stop and go" lights atop the glass tower are used by the control men as visible signals in addition to the audible instructions transmitted by radio. The lights also are used to signal ships without radio equipment. The red light "locks" the field to enable a plane to land, and no other ship can go out on the runways as long as the red light is on. Planes with radio receivers but no transmitters get their instructions by radio from the control tower and indicate they understand by dipping their wings or by some other signal requested by the towerman.

The control tower governs the take-off of planes as well as the landing. A pilot, before taking off, must inform the control tower of his destination, the altitude he expects to fly, the estimated time of arrival and any other pertinent information about the trip. This is also a rule at other control towers and the information is relayed between points. Thus WGEH is informed in advance of every departure and anticipates every arrival.

With such an arrangement it is easy, for example, to control accurately the landing of two ships from the west and one from the east even if they are due at the same time. Perhaps favorable winds indicate it is best for the ship from the east to land first. The pilot would then be so advised. At the same time the other ships would be told by their own company radio stations of their relative positions to each other, and each would be assigned a definite altitude to hold. Then each plane

would be brought in separately after the one from the east was down.

This close cooperation between the control tower and the radio stations and operations departments of the various air lines is made possible by an interphone system linking all together. If the control tower wishes to talk with TWA offices, the man in charge simply calls, "Control tower to TWA." This is audible to all stations through a loud-speaker, but when the TWA phone is picked up, the loud-speaker is disconnected, thus affording private conversation.

Included in the safety agreements is a provision that commercial planes be equipped with Kollsman altimeters adjusted to correspond to readings of the nearest ground station Kollsman barometer which is maintained at the sea-level altitude of the ground station. Eastbound planes on the radio range course are required to fly at even 1,000-foot levels—2,000 feet, 4,000 feet and so on, while westbound planes fly at odd 1,000-foot levels—such as 3,000 feet, and 5,000 feet. Pilots crossing an airway must proceed at the 500-foot levels to be out of the way of planes using that airway, and must cross at an angle of forty-five degrees or more in order to make the crossing as quickly as possible. Of course all ships are required to "keep to the right" of the radio beam along which they are proceeding.

The take-off directions are quite similar to the landing instructions from the control tower. Pilot Andrews, for example, was scheduled to take off for the east ten minutes after his landing at Chicago from the west. After calling the tower and reporting his trip, he was given his clearance by the ground dispatcher. The control tower then advised him to proceed to a certain runway, called his attention to other ships in the air or taking off, and finally gave him the "go ahead" to proceed down the runway. Once in the air, he was further advised by the control tower of other ships flying near by and of any he might encounter on his course. A final "Okay, WGEH" from pilot Andrews indicated that he had cleared the airport district and was switching to the radio station of his own line.

Snapshots this size



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When writing to advertisers please mention *Popular Mechanics*

They Keep Things Moving

(Continued from page 555)

while the waters swirled perilously near.

"A less spectacular but equally important aspect of the service provided by modern communication facilities was in preventing the disaster from being as great as it might have been had there been no facilities of this kind. No such efficient means for warning was possible during the Johnstown flood of 1889 when more than 2,000 lives were lost in one city—more than ten times the toll suffered during this year's flood which covered a much wider territory.

"At Binghamton the waters swept away cable under the Washington street bridge, cutting off the south side section of the city. But almost before the cables went, telephone plant men braving the dangerous waters strung up temporary circuits.

"An outstanding instance of heroic endeavor to keep the voiceways in order was in repairing the important Binghamton-Endicott cable which broke at a point across the Susquehanna river about midnight. Risking his life, a repairman mounted a cable cart attached to the line which was barely above the raging waters, gradually pulled himself out 2,000 feet to the point where the break had occurred in midstream and repaired the line."

Not all telephone linemen climb poles or descend through manholes to underground vaults to keep communication in order, however. There are many important telephone cables laid beneath rivers and hence "seagoing" linemen are necessary. They face extra hazards because they generally work at night when there is least interruption from water traffic. One of the veterans who keep things moving beneath the rivers is Capt. Edward H. Zimmerman who commands the "Lidiv," a cable boat used in laying, maintaining and repairing telephone cable in the waters about New York City. The "telephone navy" has had its share of exciting experiences, one of the most trying of which took place one cold winter's night.

"We got word the telephone cable beneath the Hudson river between Tarrytown and Nyack, an important toll link between New York and upstate points, had failed," says Capt. Zimmerman. "A tugboat, pushed out of the channel by floe

ice, had run aground and fouled the cable. Our orders were to proceed to Tarrytown and restore service. Ordinarily the trip takes the boat about three and one-half hours. That night it took twelve. The upper part of New York bay was full of drifting ice, but we had no real trouble until we got past the Washington bridge. Then shore ice eight or ten inches thick reached out from both sides while the ebb tide was packing half-mile wide floes into the channel, jamming them tight now and then until they tore off another floe from the shore ice.

"We plowed in, following an open lead close to the Yonkers shore, but soon the pack closed in on us, grinding against the iron sheathed sides of the 'Lidiv' and we lost our headway. Keeping our eyes open for gaps in the floes, we made our way gradually to where the broken cable lay. Before we got our grapnel down to bring up the cable, we had to break ice, but finally we had her aboard, lashed tight bow and stern with heavy chains. We began our tests and then started splicing. Thirty-six hours later we finished the job, and we were never sure while we had that cable on board whether we were going to stay upright or not."

Science, personified by electrical and research engineers is ever on the alert to lessen the work of the maintenance man and in some cases has succeeded in replacing the human element. A few months ago when "the thing that couldn't happen" did, and New York was plunged into darkness, there was scarcely a flicker of the lights at the switchboards or in the current which propels the automatic switching apparatus and the telephone bells in homes and offices. Automatic relay switches in the central offices immediately solved the problem without the aid of a human hand, turning on the reserve power sources at every telephone office, so there was no interruption in service.

Preparations for emergencies even include such minor details as having the feed wires enter the telephone buildings from different streets, so if one source is cut off, another will function. It is the maintenance man, however, who keeps things moving when disaster strikes.

WISH I KNEW WHY THEY ALL TURN ME DOWN



A PIMPLY SKIN CAN SPOIL ANY BOY'S CHANCES FOR A JOB

GEE, I HATE TO TELL UNCLE JACK I DIDN'T GET THIS JOB! DON'T SEE WHERE I SAID ANYTHING WRONG, EITHER. WISH I WASN'T SUCH A WASHOUT!



WANT A LIFT, GEORGE? SAY- WHAT'S WRONG? YOU LOOK AS IF YOU'D LOST YOUR LAST FRIEND ON EARTH!

WELL - I'VE LOST ANOTHER CHANCE FOR A JOB - GUESS THAT'S ENOUGH TO MAKE A FELLOW FEEL LOW



FEELING LOW WON'T GET YOU A JOB- AND LISTEN, GEORGE, I'VE A HUNCH THOSE PIMPLES DON'T HELP, EITHER. WHY NOT TRY FLEISCHMANN'S YEAST? IT FIXED UP BOB- AND HE LOOKED EVEN WORSE THAN YOU DO!

THANKS FOR THE COMPLIMENT!

WONDER IF SHE'S RIGHT?



LATER

WELL THEN, ADAMS- WE'LL EXPECT YOU TO START IN TOMORROW

THANK YOU SIR - I'LL BE HERE ALL RIGHT

PEG WAS RIGHT ABOUT THE OLD PIMPLES - SURE GLAD I ATE THAT FLEISCHMANN'S YEAST!



SAY, PEG - HERE'S REAL NEWS! I GOT THE JOB. SURE THING! WHAT? OH, QUIT THE KIDDING - NO, I'M NOT VICE-PRESIDENT YET, BUT I'VE GOT SWELL PROSPECTS!

PUBLIC PHONE



Don't let Adolescent Pimples keep YOU from getting a start

PIMPLES are apt to occur after the start of adolescence—from about 13 to 25, or longer. At this time important glands develop. The entire system is disturbed. The skin gets over-sensitive. Waste poisons in the blood irritate this sen-

sitive skin, pimples appear. Fleischmann's Yeast helps correct pimples. It clears the skin irritants out of the blood. Then—pimples go! Eat 3 cakes a day, a cake about ½ hour before meals—plain, or in a little water, until your skin clears.



—clears the skin
by clearing skin irritants out of the blood

New Power from the Sun

(Continued from page 548)

magnetometer registered an abrupt change in the direction and intensity of the earth's magnetic field. A magnetometer records magnetic fluctuations something like a seismograph charts the vibrations of an earthquake. Unlike the effect of an ordinary magnetic storm, however, there were no violent fluctuations of magnetic energy. At exactly the same minute, Dr. Richardson's photographs showed a large spot near the center of the sun suddenly erupted. A cloud of flaming hydrogen gas large enough to engulf the earth shot above the surface. Observatories in South America reported a similar phenomenon.

Checking up later, Dr. J. H. Dellinger, chief of the radio section of the bureau of standards, found that also at the same minute, short-wave radio receivers no longer picked up signals that had been coming in strongly a moment before. The effect was as if every short-wave transmitter in use had suddenly shut down.

"The indications are that this type of radio interruption is due to radiant energy emitted at the time of the sunspot eruption," says Dr. Richardson. "It seems to be a definite case in which a solar eruption is identified with an electromagnetic disturbance on earth, and shows that the energy that produced the radio fade-out traveled with the velocity of light.

"Instead of solving any problems, this example of energy transference only supplies new questions for which answers must be found. It does seem quite possible, however, that by additional study of the sun we will learn a great deal more than we now know about energy transmission and how to put it to practical use. It is impossible to be more specific because no one can say where the research will lead us, or whether results are five years or 500 years away."

Man has been trying to harness the sun for scores of years and some investigators think solar heat as a source of power may eventually enter the market in competition with coal and petroleum. It is estimated that solar energy falling on a square yard of surface at sea level on a clear day is equal to about one horsepower, although high losses in converting the heat are always encountered. One solar boiler that

raised 210 pounds of steam per square inch and operated a pump of 1,400-gallons-per-minute capacity was built early in the century. Sunshine has been used to run stoves, water heaters, smelting furnaces and small motors. Several attempts have been made to set up huge power plants in desert regions to collect the sun's heat and convert it into steam, although no such scheme has been commercially successful.

Dr. C. G. Abbot, Smithsonian Institution head, who has experimented with solar power for twenty years, used a solar heater in California that stored boiling water overnight and that operated a fireless stove in which all ordinary cooking could be done. His heat-gathering device consisted of a glass-covered trough, the curved glass top of which focused sun's rays on a pipe through which a heavy oil circulated to the stove and water heating coils. Electrically operated gears turned the trough so it always remained pointed at the sun while that body was above the horizon.

Dr. Abbot's latest heat collector, far more efficient, consists of a large stainless steel curved mirror that reflects eighty per cent of the sun's rays to a small focus. At the focus the concentrated rays pass through the walls of several concentric glass tubes and heat a special black heat-absorbing fluid pumped through the innermost tube. Air spaces between the outer tubes are exhausted of air like a vacuum bottle so none of the heat will radiate away. The conducting fluid is raised to a temperature of several hundred degrees by the sunlight. The hot liquid, in turn, may be used to convert water into steam. A one-half horsepower steam-raising model is now under construction.

Many types of solar water heaters are used in sunny climates. In its simplest form a water heater consists of water pipes laid along the roof of a house to absorb heat from the sun. They may be connected to an insulated storage tank where the water may be held at a high temperature for as long as twelve hours. The roof pipes are usually painted black and laid against a black tar-paper background to increase efficiency.

(Continued to page 120A)

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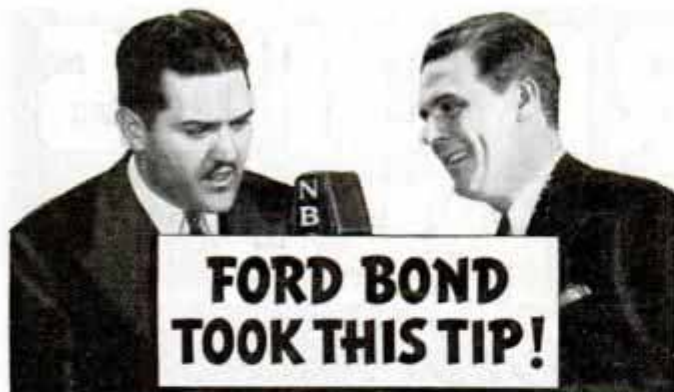
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(Continued from page 118A)

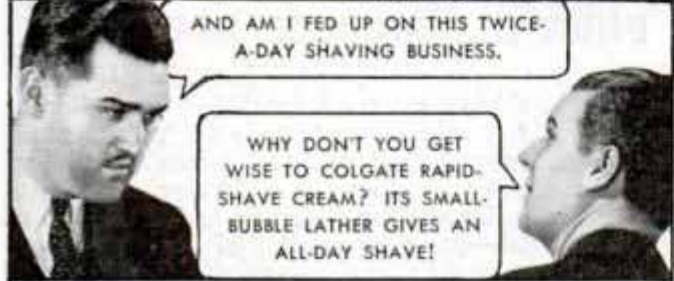


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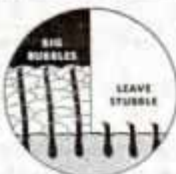
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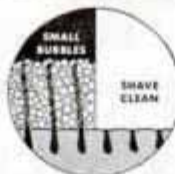


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One development of the solar heater is a "sun-cooled" refrigerator for which a patent has been issued. The action of the heat is to boil off liquid ammonia, the ammonia in turn removing heat from hydrogen gas that circulates in a freezing coil. Even on partly cloudy days there is enough heat to operate the refrigerator.

Meanwhile, astronomers are learning more about the sun itself. That body is "burning up," or losing weight at the rate of 4,000,000 tons a minute, but the bulk of the sun is so huge that its loss since the earth was born is only a minute fraction. The sun is gaseous and rotates fastest at its equator. Spectra of sunshine show many materials not found on earth but these cannot be duplicated here because the high temperatures and pressures of the sun cannot be reproduced. Recent developments in photography have more than doubled the number of lines in the spectrum available for observation, and astronomers are studying "invisible sunshine" in the infrared band.

Most important of all, possibly, is the investigation of magnetism on the sun. Even the sunspots are magnetic and seem to have north and south poles like magnetized steel bars. Whenever spots occur in pairs they have opposite magnetic polarities. The north pole of one spot is reversed in its neighbor. Spots above the solar equator have opposite magnetic polarities as compared to spots below the equator, and the whole system of polarities reverses with each sunspot cycle. That means that the magnetic cycle of the sun is about twice its sunspot period, or about twenty-three years. New spots at the beginning of each sunspot cycle appear in fairly high latitudes and as the cycle progresses the spots occur nearer the sun's equator.

At present, facts like these have little practical value. Astronomers gathering the facts have not been able to arrange them into a sensible pattern that explains some of the peculiar things about sunspots. When they do accomplish this, they hope, they will have a new law of nature that can be put to work.

Our Bureau of Information will answer questions regarding articles in this magazine, if accompanied by return postage.

Exploring Up and Down

(Continued from page 533)

Far above the so-called "dust clouds," lie the regions of auroras. These may possibly extend to an altitude of 350 or 400 miles. The aurora borealis commonly observed in polar regions has its base at about sixty miles altitude. The brilliant colorings, extending for hundreds of miles above the earth's surface, imply that the atmosphere clings to the earth with great tenacity.


Radio experiments indicate that the ionosphere is the region of reflecting "mirrors." Radio waves—a form of invisible light—are reflected from the high-altitude mirrors. There is reason to suspect the presence of mirrors at various levels.

Diving into the sea has not extended the third dimension of discovery very far. The present record, 3,028 feet, made by William Beebe, is still less than a mile but this is extraordinary when we recall that less than ten years ago man had not descended beyond 400 feet. Submarines can probably reach 500 feet below sea level, but the ideal submersible for deep-sea work is the bathysphere, built to withstand the tremendous water pressures. It is not unlikely that men will at some future date descend to the greatest ocean depth, more than five miles.


A new method of reaching hidden secrets on the ocean floor, and of describing dramatic events which took place in the distant past, was recently announced by Dr. Charles Piggott, of Carnegie Institution. Dr. Piggott has invented what may be described as a "hollow punch," which is thrust into the ocean by an explosion of powder and which, when it is hauled back, brings up a rock core of the ocean bed. He has brought up cores eight feet in length from a depth of 7,200 feet.

On land, there are also new methods of exploring and mapping conditions below the surface. Employing electrical currents, prospectors can map the underlying rock structures accurately to a depth of almost one mile. The electric currents reveal the nature and composition of the underlying rock with such faithfulness that it is possible for a geologist to prepare a detailed map, showing the position of the beds, their thickness, and their relation to each other.

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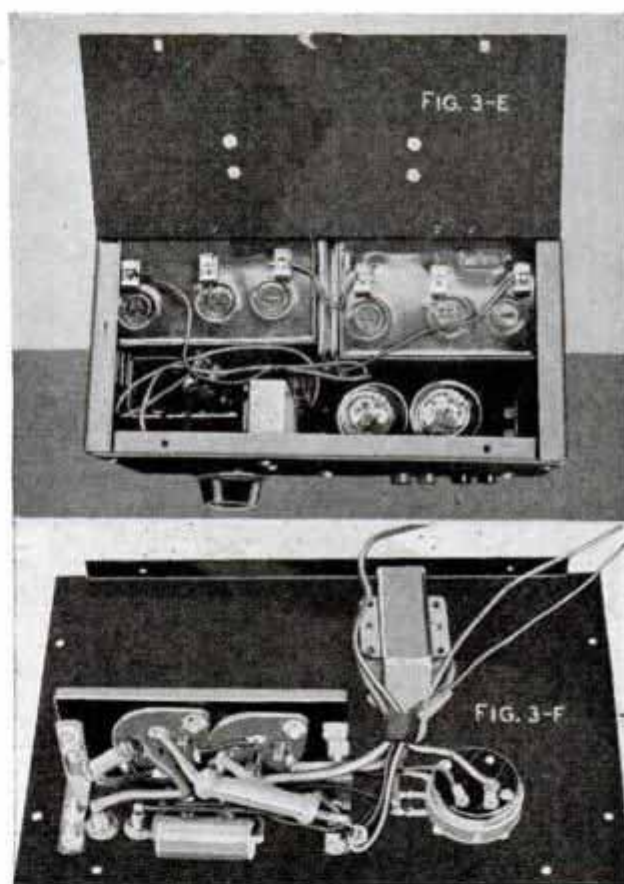


Portable Hearing-Aid Amplifier

(Continued from page 579)

panel is fastened to the box by means of self-threading screws, and the hinged top is provided with a handle for carrying.

A simplified wiring diagram is given in Fig. 3; this shows the various parts spread out so that the wiring may be traced easily. All connections are made with standard hook-up wire, covered with push-back insulation, with the exception of the various resistors and fixed condenser which are supported directly by their own wire leads. An original material list of all parts used in this hearing-aid amplifier is available from Popular Mechanics radio de-



partment, without charge. The blueprint number is R-229.

As all parts are assembled on the front panel, there is plenty of room for the two portable-type B-batteries and the 4½-volt A-battery, which is provided with a handy connecting plug as shown in Fig. 3-A. Figs. 3-B, C, D, E and F are photos showing various stages of the assembly. Care should be taken to prevent the headphone case terminals from coming in contact with the metal box. The "on" and "off" switch and volume control are combined.

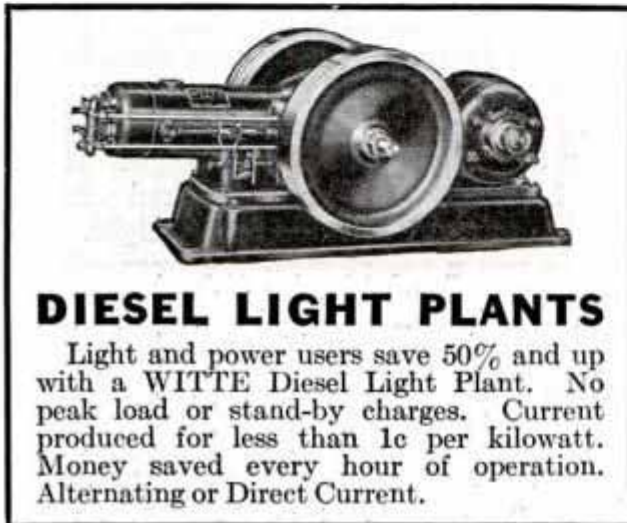
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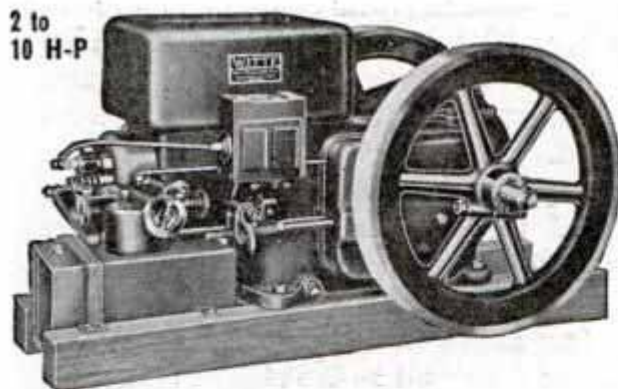


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Queer Facts about Bridges

(Continued from page 503)

foremost bridge authorities, recently extended the mathematical theory for the design of suspension bridges.

"The old method," he said, "satisfied safety alone, but not economy. There was a substantial waste of metal in the stiffening trusses. The new method of calculating saves from twenty to sixty-five per cent of the metal in these same trusses."

Bridge building, like shipbuilding, awaits a super metal. With present materials, says Othmar Ammann, engineer consultant on the San Francisco bridges, it would be possible to build a suspension span 10,000 feet long, or a little less than two miles. As the length of the span increases, so does the amount of metal that has to be used in the support of its own weight. The limit of a bridge's length is reached when it is able to carry only its own weight. If you can use a metal with the properties of steel, but with only half its weight, it would make possible the spanning of wider waterways.

Building a bridge is one of the most delicate undertakings of engineers. One factor which must always be considered before construction is the change in a bridge's dimensions with changes in weather. The exact length of a bridge bears a direct relation to the temperature. It is longer in summer heat than in winter cold.

In high heat and under full load, the span of the George Washington bridge sags eight feet below normal. In cold weather and under no load, the span rises four feet above normal.

The cost as well as the size of bridges is mounting steadily. The Brooklyn bridge, considered the wonder of the nineteenth century, cost \$25,000,000. The George Washington bridge, completed in 1931, cost \$60,000,000. The new San Francisco bridges will total \$115,000,000. The eight and one-half mile bridge and tunnel link between Oakland and San Francisco, to be completed in 1937, will cost \$80,000,000, probably a world record.

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T 195
Tricks of the Race Drivers

(Continued from page 525)

and special fuels are two of the reasons why race cars go so fast on so little.

The most thoroughly streamlined car at Indianapolis this year was driven by Wilbur Shaw, who had "tailored" the car to fit his body. Shaw cut a scale model of himself out of celluloid and then built a miniature padded cockpit with the driver's seat fitted to the dimensions of the model. He did the same with the mechanic's side. The result was a small streamlined body that fitted around the driver and mechanic like a glove, offering minimum wind resistance.

Many drivers prefer the braking action of a semi-streamlined design. They complain that if the streamlining is too complete the car tends to float along and that they must ease up on the accelerator long before entering a turn.

Instead of a conventional opening in front for the radiator grill, Shaw closed the front of his car and used a small wind scoop to pick up air to cool the engine. The air exhausted out of the car behind the engine through an overlapping slot designed to function like an N. A. C. A. airplane engine cowling. The efficiency of his design was demonstrated when he used not much more than a gallon and a half of fuel to drive twenty-five miles at better than 116 miles per hour.

Most drivers have pet superstitions about the track. One of them thinks that he will have bad luck if someone in his pit eats peanuts during a race, while another eats a dish of chow mein before warming up his car. He does it every time because one of the first races he ever won was driven right after eating some. Another driver withdraws from the field if he happens to drive close to an ambulance on the way to the track, and many race drivers think that some cars are luckier than others. Green is an unpopular color for race cars and many drivers dislike to have an even number as a racing symbol. Odd numbers are more popular, although "11" is not often used because it might be confused with "7" in broadcast announcements. Most of the drivers would never think of painting "13" on their cars, and yet one racer who has never had a bad accident insists on using that number!

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Growing Pearls at Home

(Continued from page 536)

beauty bringing from \$20,000 to \$50,000. A fortune always glimmered like a mirage just ahead of the "sheller" and whole communities wild with "pearl fever" deserted business and flocked to rivers with rakes and drags. Thus was this country's great natural pearl crop harvested.

Man has tried to aid and abet nature in producing pearls for hundreds, and perhaps thousands of years. The Mound Builders tried to grow pearls and failed. The Chinese also tried it many years ago but it was not until 1913 that the Japanese scientist, K. Mikimoto, succeeded in producing small attached pearls and later little white sphere pearls. He used diminutive balls of mother-of-pearl as a nucleus and grew pearls of excellent quality and shape in margarita shells or pearl oysters. Backed by the Japanese government, the industry of growing these pearls assumed large proportions and ran into millions of dollars per year.

One great difference between "wild" or accidental pearls and purposely grown ones is that the former may have as a nucleus, or starter, some foreign material, but the latter can be of pearl substance throughout. The more common ones of the pearl oyster are usually silver white but fresh water gems run the gamut of every color and shade, even the metal hues. Since the various species of life in which pearls grow vary in anatomical structure, it is natural for pearls to vary in form. Also the composition of both shell and pearl is to some extent controlled by environment. Usually the color of the shell dominates the coloring of the pearl, but this is not always true.

Some kinds of mollusks, especially pearl oysters, are attacked by parasites, resulting in thousands of "seed pearls." The majority are so located that abortion is certain and few attain the desired size. When a mollusk is unable to abort a foreign substance which has drifted into its shell, irritation is set up and a protective secretion quickly covers it. This thickens and hardens, eventually becoming a semi-transparent layer of pearl material. If it is touching the shell, a connection is formed, resulting in an "attached" pearl, but if in the flesh, without contact with the shell,

it may develop into a round or ball pearl. However, this is unlikely for a wild pearl seldom happens to be in the right place for proper growth, and muscular or organic pressure upon the soft secretion of a growing pearl will shape it like turning it in a lathe, the resulting form often being of less value than a sphere pearl which must, while growing, remain stationary in its pearl sac and not be interfered with by movements. That is one reason why there are not more well-formed accidentals, because as a pearl becomes larger there is an ever increasing danger that the pearl sac will burst, allowing it to escape.

When growth starts, the covering is very thin, but it increases in thickness as the pearl grows, each succeeding layer adding to the size. Chemically, pearl structure is like that of the inner lining of the shell, each being composed of organic matter and carbonate of lime. Beauty and luster are determined by the shape, structural arrangement and quality of the material. The pearly nacre usually is deposited in irregular, fingerlike layers of delicate thinness which cross and overlap each other like frost on a windowpane. The laminae form angles with the surface and waves of light are reflected from different depths, minute prisms splitting the rays into their colored constituents, resulting in chromatic or iridescent effects.

In addition to using real pearl material as a nucleus, thus insuring a solid pearl, the pearl grower places this material in the anatomy of the mollusk in such a position that danger of abortion is virtually eliminated. It sounds simple, but finding out how to do it required years of time, unlimited patience and thousands of carefully checked experiments.

Mr. Bostwick began his experiments in pearl growing in Iowa and built a laboratory on the shores of the Iowa river. A cement floor was divided into runs eight inches deep, a centrifugal pump supplying a constant two-inch flow of fresh river water. On the bottom of each run he placed sand, mud or rocks mixed with soil, whatever the different kinds of mussels required. Since the mollusks must have the proper amount of oxygen or they

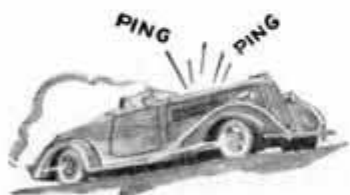
(Continued to page 130A)

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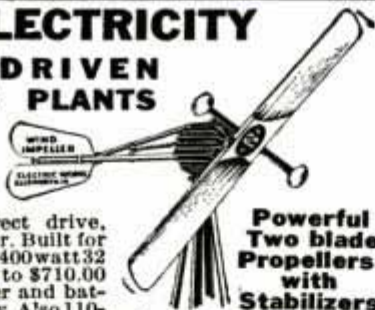


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Mr. B

(Continued from page 128A)

will die, he aerated the water by using small fountains and dump tanks. A cement operating table over which flowed three inches of water completed the laboratory.

Here were grown the first fresh water sphere pearls ever produced by man—aided, of course, by the mollusks. They were white and in colors and some weighed ten grains. The nucleus was a little round pearl or a mother-of-pearl ball, so the result was 100 per cent pearl with no grain of sand, flake of shell or piece of mud in the middle. Here he also grew attached pearls—those touching the shells—weighing forty grains and in white and colors. The latter, of course are worth less money, but in colors they are suited particularly to the making of art jewelry. Growing pearls is not difficult, says Mr. Bostwick, and can be engaged in by anyone who masters the operating technique.

"As each species of mollusk has a different anatomical structure," he explains, "each presents a new operating problem. To a person scientifically inclined, the pleasure lies in solving these problems. When growing attached pearls, the nucleus must be placed in just the right spot, in contact with the shell, behind the mantle. When correctly located, under proper conditions the result will be a perfect attached pearl. When sphere pearls are grown, it is necessary to perform an exceedingly delicate surgical operation, using fine tools made especially for the purpose. When the anatomical location for insertion of the nucleus is chosen correctly, and the operation is performed at just the right time, the pearl will mature nicely and the result will be a perfect sphere."

After his success in growing pearls in fresh water shells and the great pink conch, Mr. Bostwick was invited to California to conduct experiments with abalones, and his discovery that large and fine specimens in color can be grown in them may make it possible in the future for man to grow pearls to order, filling a commission for a gem of any size or color.

But that's something for someone else to worry about. As for Mr. Bostwick, he's fascinated just now by a species of large silvery snail. It may or may not be able to grow a pearl. But Mr. Bostwick intends to find out.

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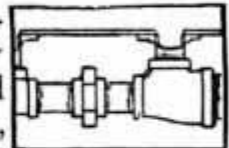
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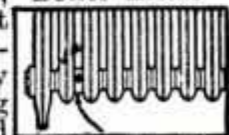


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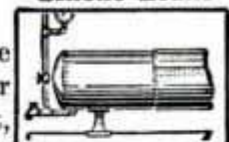


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TRANSPARENT • WATERPROOF



The New Era of Railroading

(Continued from Coloroto section)

The genius of modern architects, designers, interior decorators has made the women's room a "makeup room" worthy of a fashionable home, and the bedrooms—no longer red plush, nor flecked with soot and cinders—are alternately green, rust-brown or blue, with sliding doors that open to make a spacious double room for the family. You may telephone from the club car to the dining-car steward for a dinner reservation, and listen as you wait to a sweet-toned radio set behind decorative metal grilles in the wall.

You may have a midday snack at a lunch counter where prices compare favorably with the corner drug store back home, or have the stewardess set your supper on the tray that unfolds conveniently from the seat ahead. The most unique car on the "City of Denver," streamliner of the Chicago and North Western and Union Pacific lines, is its "frontier" tavern room, a replica of an old-time western inn with unfinished log beams across its ceiling and bare pine board walls decorated with prize-fight pictures of frontier days, old newspapers and bills of traveling theatrical troupes.

Speed has not taken the place of safety in this new era. While the transcontinental streamliner weighs only half as much as its conventional predecessor, its cars are built of a sturdy aluminum alloy and the locomotive is of Cor-Ten steel. From his post high above the engine room and well back from the grilled steel nose of the "City of San Francisco," the engineer's view is unobstructed and he can see the track less than fifty feet ahead. Air brakes clap double brake shoes simultaneously on wheels throughout the train, and, if one brake line fails, the engineer can whip out the brake grip and slip it instantly into an emergency line. In a test, this streamliner was brought to a halt from eighty-seven miles an hour in 2,800 feet. Like modern steam locomotives, the Diesel-electric has a "dead-man control" which will stop the train if the engineer is disabled.

As you ride these streamliners you experience the thrill of the pioneer, for you are watching the birth of a new era. But is the streamliner just a "trial horse" of the railroads, to be forgotten in a decade?

(To be concluded next month)

"Simple Party Magic"

(Continued from page 565)

former and on around to the front, and back through the upper loop toward the performer. By gently pulling the two ends of the rope the knots will all disappear.

Most card tricks presuppose dexterity on the part of the performer, but here are two that can be mastered instantly. The first one is a pseudo mind-reading act. A number of face cards are placed on a table. The magician leaves the room and someone inverts one or two of the cards. Upon his return, the performer can tell which of the cards have been moved. The secret lies in the fact that the white border on most face cards is larger on one side than the other. Thus by lining up the cards with the large borders all on one side, it is an easy matter to tell the cards that have been turned upside down.

The other one is more of an oddity than a trick. The deck first should be sorted so the kings are on the bottom, then the queens, and so on through the deck until the four aces are on top. The performer then spells out each card, removing one card for each letter, and on the final one, turning the card face upward. In starting, for example, the performer takes one card off the deck for "A," then another one for "C," and turns up the third one, which is "E." Naturally, this one is an ace, but this is true in spelling out every card in the deck, concluding with the king.

For an optical illusion, fashion two pieces of cardboard as shown in the remaining illustration. They are identical in size, but when one is held above the other, the top one appears to be much smaller than the lower one. In presenting this trick, go through the motions of "stretching" the bottom one before comparing the two.

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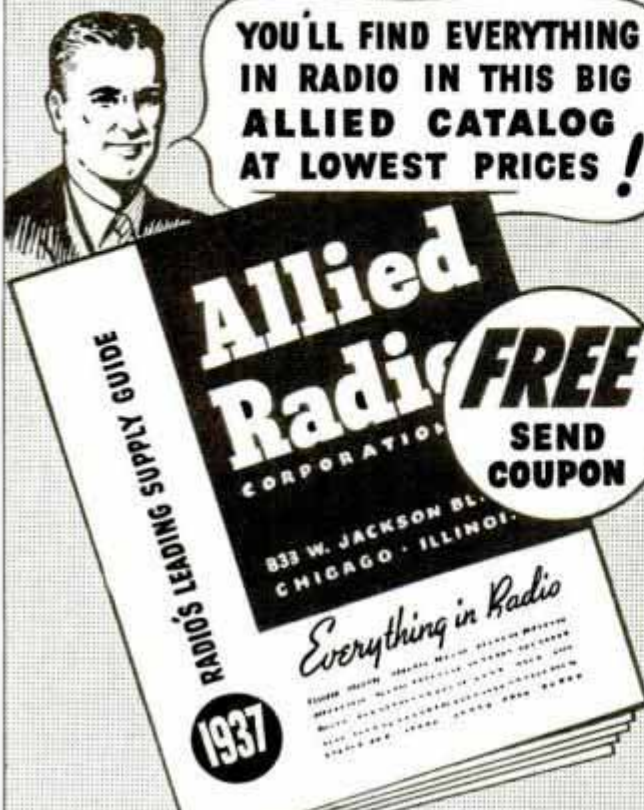
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Reading Schematic Diagrams

(Continued from page 580)

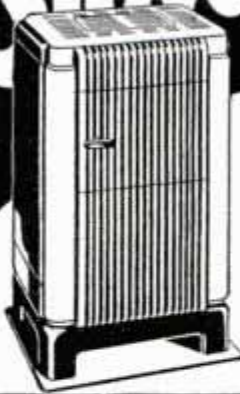
completed chassis. When wiring the circuit, following the simplified wiring diagram, the builder should always check his work with the schematic diagram. In this way errors are not only avoided but at the same time the beginner will quickly learn to identify the symbol used to indicate the part that has been sketched in on the simplified or picture diagram.

Many beginners ask the meaning of the letters R, C and L that appear with a sequence of numbers near the various resistor, condenser and coil symbols in radio diagrams. The letters and numbers merely refer to the values of these parts as given in the material list. For example, R₁ may indicate a 1,000-ohm resistor, which may be either of the fixed or variable variety. If several resistors of this same value, and type, are used in the circuit, they all will be indicated as R₁. Then, resistors of other values and types will be indicated as R₂, R₃, R₄, etc., in sequence as they appear in the schematic diagram and the original material list. This also applies to C and L.

It will be noted that the symbol which is used for an electrolytic condenser is marked for polarity. This is highly important as it must be connected in the circuit with the positive and negative terminals just as shown in the diagram. The polarity is plainly marked on the condenser, by the manufacturer. Some electrolytic condenser units are of the double or triple-section variety having several flexible colored leads that not only indicate polarity but also the value of each section. The black lead is usually negative and common to the other sections. Electrolytic condensers are available in both metal cans and cardboard containers. In schematic diagrams the various condenser-unit sections may be indicated at widely separated points in the circuit; however, the polarity and value of each are shown.

Tube symbols commonly show bottom views of socket connections as well as the internal elements of the tubes. Tube characteristic charts, including standard symbols for all tubes, can be obtained from the various tube manufacturers upon application. Another article in this series of helpful hints for beginners, will appear in an early issue.

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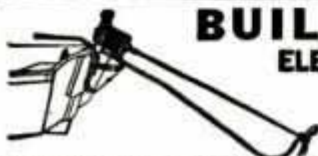
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Feeding Animals in the Zoo

(Continued from page 511)

the great East Indian hornbill snap one of these meat balls which the keeper has thrown into the air.

On the other hand, the hay and grain eaters are not greatly different from Dobbin and Bossy. An elephant will put away his sixty to 100 pounds of hay together with a half bushel of bran, although eating the latter is an acquired knack. When the elephant was first brought to the zoo



It's "teatime" for this two-year old lion, but don't let the teacup fool you. This youngster is old enough to want good, red meat—ten to twenty pounds of it a day

the bran looked like dust to him and he used it for throwing on his back to keep the flies away.

Many odd problems of feeding develop at the zoo. The cheetah, for example, is a rare and beautiful cat and, while other members of the family get along on one meal a day, it is favored with milk and eggs for breakfast and pigeon or chicken for supper. Hyenas are predisposed to goiter and their diet must be watched very carefully. The king cobra wolfs a pigeon now and then but goes long periods with nothing at all.

In the wild state the giraffe has a practical monopoly in browsing among the treetops, the leaves of the mimosa being its favorite food. In captivity, however, it takes to hay on the ground.

When Norwegian reindeer first came to the zoo shipments of moss were brought regularly from Maine and mixed with their hay and grain, but they were tapered

(Continued to page 138A)

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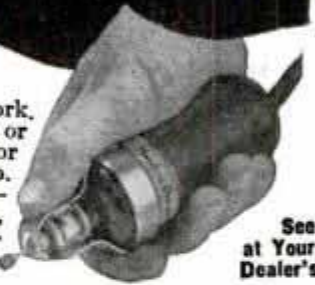


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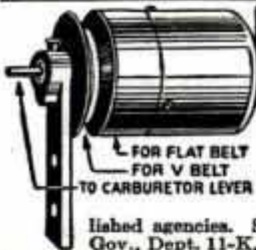


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(Continued from page 136A)

off and now get along without it. The gnu is a spunky fellow and young ones, when first captured in Africa, refused to eat. Finally they were tempted with oatmeal, were delighted with it and ate it all the way to Washington.

The apteryx is a rare, flightless bird from Australia. It is very shy, hiding by day and coming out only at night. It has a long beak at the end of which are sensitive scent glands. It used to grovel for worms with this in the wild state. At the zoo it could be induced to eat only by burying strips of meat about its cage which it would smell out by night and devour. Owls also like their meat arranged for them in advance, hung out where they can get it when they come out in the dusk. Most birds, however, are grain eaters and relish rice and sunflower seed. The lorries, of Malay, are quite fastidious and it becomes necessary to soak bread in milk, fruit juice and honey, for their gratification.

The animals have their equivalents of ptomaine poisoning, acute indigestion and what not. The cassowaries, for example, have certain trouble in dietary matters. Salted peanuts do not seem to set very well on their stomachs. One died after receiving too liberal portions of peanuts at the hands of visitors. An otter also died from eating peanuts, and eight noisy magpies, ordinarily hardy birds, went the same way.

A giant condor from the crags of the Andes died suddenly and an autopsy showed that it had a ball of lead foil in its stomach, evidently tossed idly into its cage by a visitor.

Even deadlier than peanuts at the zoo in Washington are laurel leaves. A handful thrown into the angora goat enclosure one day resulted in the death of six of those animals reputed to thrive on tin cans. Many of the monkeys are leaf eaters and so, one day, when some laurel leaves were passed into the Diana monkey, the only one of its kind in America, it ate them and died in convulsions.

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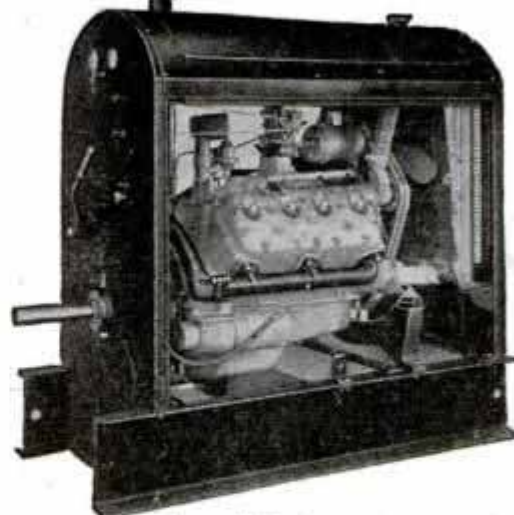
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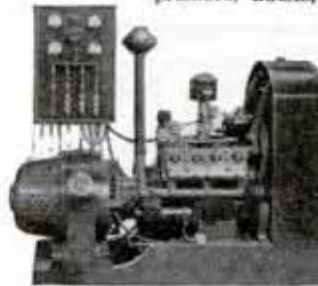
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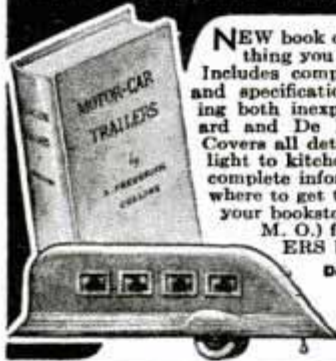

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Horseshoe Pitching Comes Back

(Continued from page 542)

be to his right. Then, too, for the latter, it is advisable to hold close to the toe so that the shoe can be balanced better and result in a good swing. The grip should be at all times firm, comfortable and natural.

The one and three-quarters turn calls for more wrist action than the other grip to make the shoe open. Some players swing the shoe edgewise along the side of the leg to enhance the wrist action at the point of release. It is not necessary to do this on the one and one-quarter turn. It does have a tendency, however, of helping the shoe make a dead landing. The easier you can make a shoe land, the less chance of a ringer bouncing off.

Proper stance and delivery also are important. If you are a right-handed tosser, stand about eighteen inches on the left side of the peg. The right foot should be even with the peg and the left five or six inches back. It is imperative the right-handed player learn to step forward with the left foot as this is what supplies rhythm to the action.

The shoe should be held out in front of the face to get the proper alinement of the opposite peg with the arm swinging in a direct line to the stake. Another reason for this is that the backward swing is more easily accomplished because the weight of the shoe gives impetus to the swing.

When delivering the shoe, step a trifle longer than you normally do unless, of course, you are accustomed to taking long strides. The idea is to take a natural, easy step that will furnish enough propelling power for the flip.

With the body balanced and the swing directly toward the opposite stake, the player should endeavor to make each pitch alike. A naturally easy swing is best, whether it be long or short, the former being more beneficial if it can be mastered. The backward swing should extend back as high as the head, or higher, if possible. Both the backward and forward swings should be nearly alike without any push to the delivery.

As in golf, a horseshoe pitcher must follow-through on his swing if he ever hopes to rise above mediocrity. The follow-through in this case supplies the

(Continued to page 142A)

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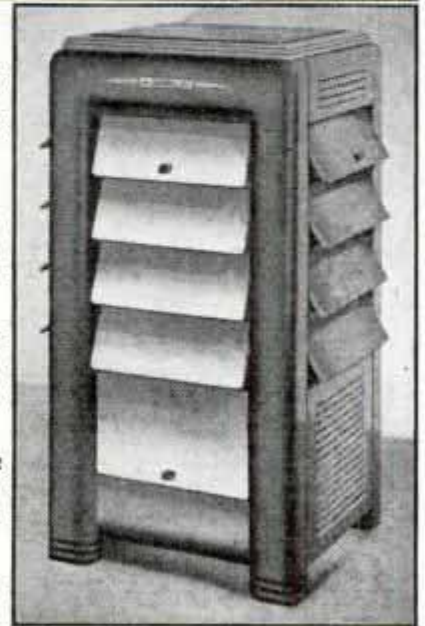
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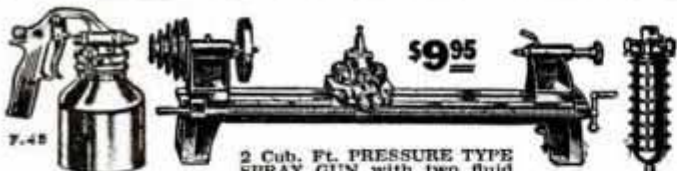


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(Continued from page 140A)

proper elevation to the pitch. And when this part of the swing is neglected, the sport becomes work instead of play.

From the beginning, the beginner should try to keep the shoe at a height of eight to ten feet at the peak of its flight. When kept at this elevation, the shoes will be easier thrown and it will be evident to the player what he should do to cushion their landings to keep them from bounding off the peg. Some championship players stretch a wire across the center of the practice court at the desired height to school themselves in this fundamental.

Lost ringers often decide a match so the correct method of landing a shoe is of great significance. As was pointed out in the previous paragraph, elevation has some bearing on the landing of the shoe, as has the "wobble" in flight. The wobble prevents the shoe from zipping toward the peg and then bouncing off.

The horseshoe game has as many hazards as golf. If an opponent's shoe stands up in front of the peg, ready to be knocked on for a ringer, the expert must throw a high drop shoe that will come down between the peg and the shoe. If the shoe is his own, he must try and knock it on, while pitching for a straight ringer with the second shoe. Another hazard is a shoe resting near the peg with the calks up and the toe near the peg. There is the danger or the good fortune of the next shoe hitting the toe calk of the other shoe and flopping it on. Throwing skillfully to drag another shoe on or off is also quite common. When a shoe is leaning in front of and against the peg, the next shoe is apt to find difficulty in staying on the peg unless it can be rung higher or beneath the leaning shoe.

Thoughtful practice transforms the dub into a polished performer. Merely tossing shoes back and forth harms rather than helps a player's game once he has mastered fundamentals. A player must strive to pitch his best at all times whether he is alone or in competition. It's a good idea to match flips with players who are better than you because this is bound to raise your ringer percentage in time. Practice on a good court and do not throw over a few hundred shoes a day or every other day. More practice than this will result in staleness or loss of shoe control.

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Beware the Spark Plug Racket

(Continued from page 482)

tips of the electrodes and bends the wires in an effort to restore the proper spark gap, then reassembles the plugs, paints the shells with black paint, packs them in cartons which often resemble the packages of reputable manufacturers and marks the product "rebuilt" in very inconspicuous letters. He offers these rebuilt plugs to dealers at about half the regular price and unscrupulous dealers sell them as new plugs.

These reclaimed plugs are not new any more than a secondhand tire is new. The wear and tear on a tire, however, are quite evident, even to the most inexperienced driver, while the reconditioned spark plug looks very much like a new one to inexperienced eyes. Yet a set of these reconditioned plugs may do irreparable damage to a motor and, as a general rule, the car owner would be much better off if he had left his old plugs in his engine if they would operate at all.

There are several reasons why worn-out spark plugs cannot be rebuilt successfully to perform satisfactorily. In the first place, the sandblasting operation necessary in cleaning a plug so it will look new destroys the shape of the insulator and this, in turn, impairs the efficiency of the plug because there is a very definite relationship between insulator shape and performance. Also, each type or shape of insulating core is especially designed to operate in a certain type of engine and the metallic shell for this plug is designed to function properly with that particular type of core, and with no other. The rebuilder picks parts at random in reassembling, giving no thought to the fitness of cores and shells to function together. The result is a nondescript plug with astonishing gas leakage.

"Out of all the reclaimed plugs we have tested," says Otto C. Rohde, chief engineer of the Champion Spark Plug company, "almost every one has shown a leakage of fifty cubic centimeters per minute or more. When you consider that a gas leak of five cubic centimeters per minute will increase the tip temperature of the spark plug core from thirty to fifty degrees, you can imagine the tremendous overheating with a fifty-cubic-centimeter

leak. Is it any wonder such plugs break up because of excessive heat? Add to that the fact that this excessive heat in the plug causes preignition which increases the temperature of the entire combustion chamber tremendously, and you can readily picture how much damage to pistons and valves may result."

Another major weakness of the rebuilt plug is that it is impossible to set the gap properly. In a new plug, the gap is sawed by precision machinery and set to a thousandth of an inch. Its shape and width are carefully engineered to deliver a spark as hot as possible at this point. When the plug is rebuilt, the only recourse of the racketeer is to clip the electrode tips to make a fresh metallic surface, then force the wires together, usually by bending the center electrode. Since the wires have been clipped short, this results in improperly gapped plugs.

Let's consider for a moment the terrific punishment that a properly built plug must take. If a 100-horsepower engine develops its peak power at 3,500 revolutions per minute, a plug in this engine must not only create the spark for 1,750 explosions each minute, but it must also resist the force of these explosions. It gets pretty hot in the combustion chamber too, and the plug must withstand the heat. The average chamber temperature may be between 1,450 and 1,500 degrees Fahrenheit. And then there's the matter of pressure. In an engine with a compression of five to one, the gas is exploded when it is in a space one-fifth as large as when it entered the cylinder. The plug must withstand that too.

The loss of power through spark plugs is negligible, but hot gases escaping along the electrode may decrease the plug's efficiency and cause it to operate at a temperature for which it was not designed. Thus a "cool" plug may become a "hot" plug and operate at a temperature that neither the engine nor the plug designer intended.

Modern spark plugs of improved design are necessary for today's high-compression motors and it is hopeless to expect a worn-out plug designed five or six years ago to do the work of a modern plug, even if it could be rebuilt to function efficiently. If such plugs operate at all, the tremen-

(Continued to page 146A)

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Beware the Spark Plug Racket

(Continued from page 145A)

dous temperatures developed in modern engines cannot fail to result in preignition and lead to a host of other motor and ignition troubles which are likely to cost the user more than if he bought brand new plugs every week in the year.

Protecting yourself from the spark plug racket is comparatively simple, once you understand what to look for. In the first place, the person who rebuilds plugs and sells them as such violates no law although his product may be even more worthless than the old plugs you are about to discard. The motorist who buys used plugs and knows he is buying used plugs has no one but himself to blame for results.

Wise motorists, however, do not knowingly put reclaimed plugs in their cars. But unscrupulous dealers have no hesitancy in buying reconditioned plugs as such, then palming them off on car owners as brand new plugs and doubling their profit. So the first thing to do in insuring yourself and your car against reclaimed plugs is to buy only from a reputable dealer. If there is no dealer in whom you have implicit confidence, buy plugs bearing the name of a reputable manufacturer and be sure they are packed in the manufacturer's original wrapper and package. You'll need sharp eyes here, and you'll need to know the manufacturer's label, because the racketeer often tries to imitate the package, but he cannot legally duplicate it and he usually protects himself by printing "rebuilt" or some similar term in small type somewhere on the carton.

Then, after buying new plugs, be sure that the plugs you have purchased are the ones that go in your car. The salesman saw some cartons of plugs and assumed they were to be used in his car. The cartons may have contained new plugs but the ones he got did not come out of them.

If you're in doubt whether the plugs you are purchasing are new or rebuilt, examine the bases carefully—the ends which screw into the motor. You should be suspicious if the end of the center electrode bears evidence of filing, or if it is bent to bring it close enough to the side electrode. This is often necessary due to

(Continued to page 148A)

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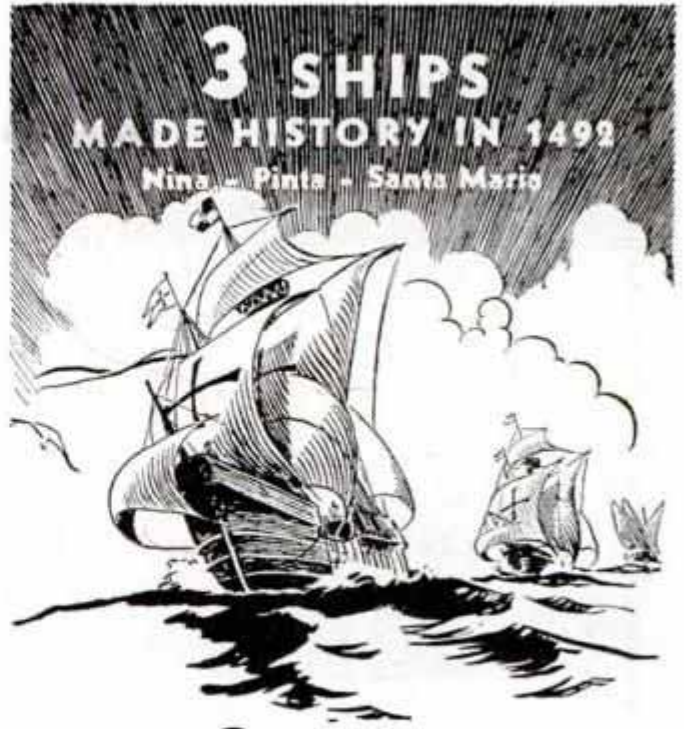


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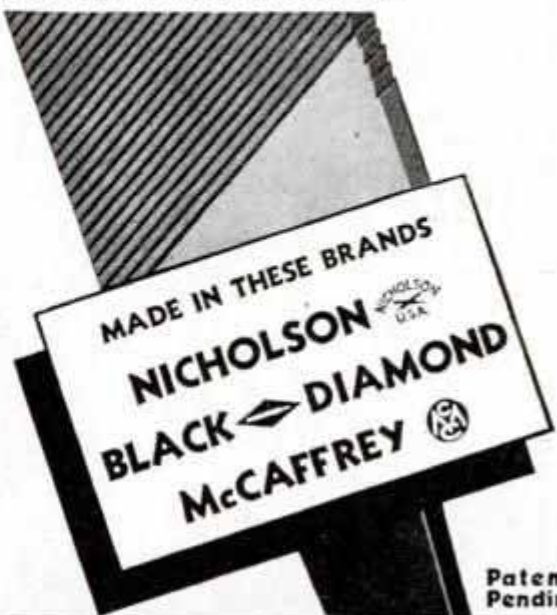
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Beware the Spark Plug Racket

(Continued from page 146A)

clipping the ends of the wires. Also, sand-blasting usually leaves telltale marks at the base of the insulator which are easy to detect.

Finally, a new plug has a natural, dull rust-resistant finish which it is impossible to duplicate with black paint. A coating of paint over a plug is virtually a sure sign that it is a rebuilt plug. If you do get stung, you'll find the paint gone after one day's driving and a set of brown second-hand plugs nestling where you thought the black, shiny new ones were.

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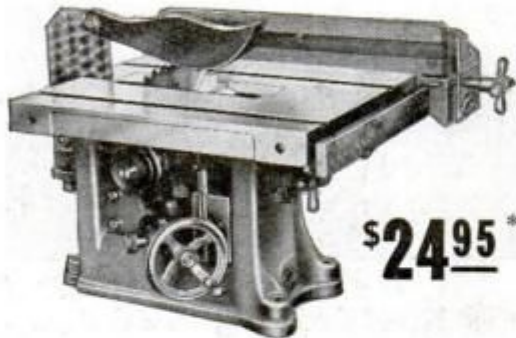
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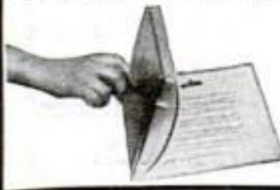
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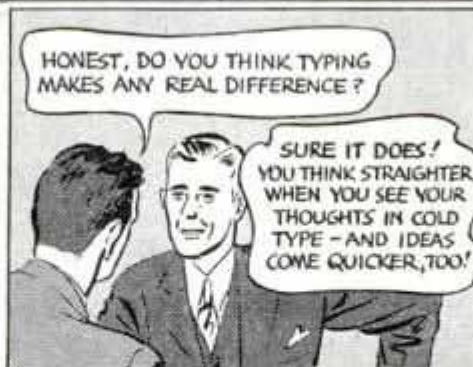
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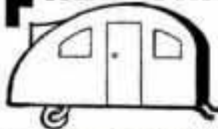
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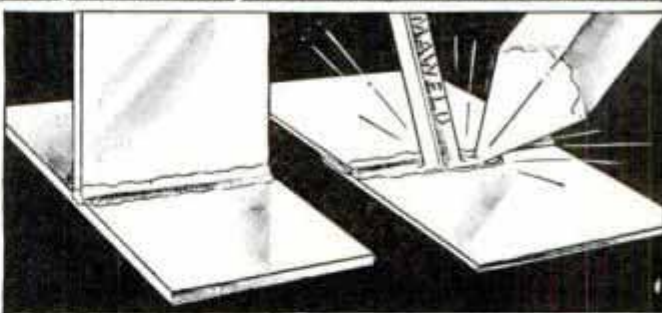
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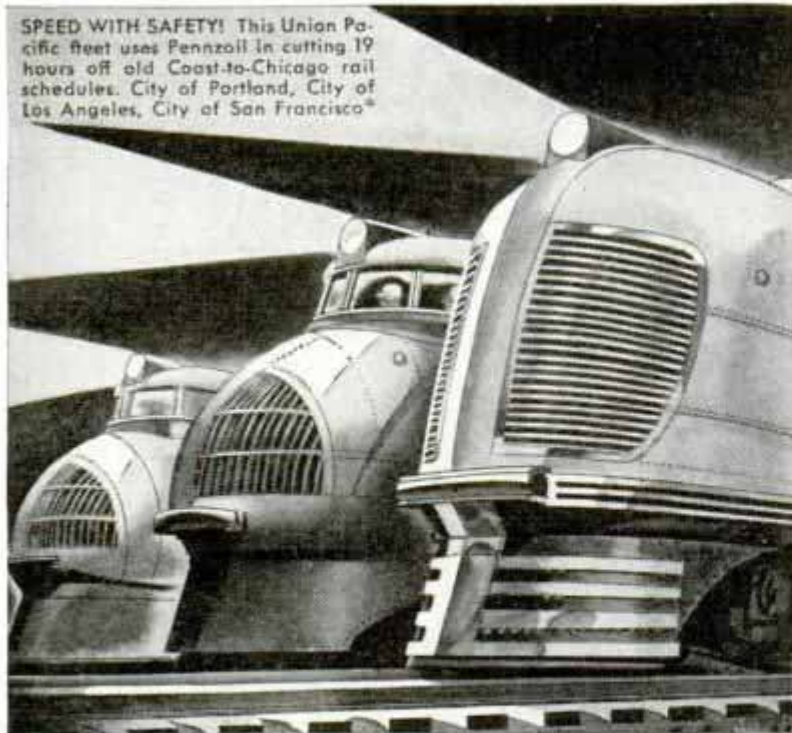
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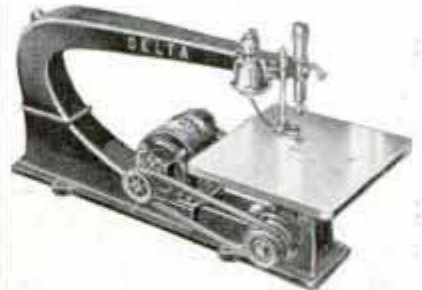
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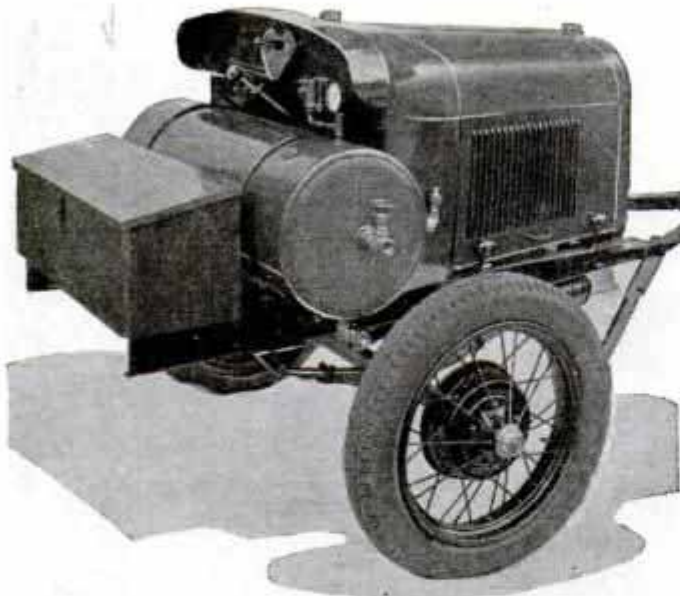
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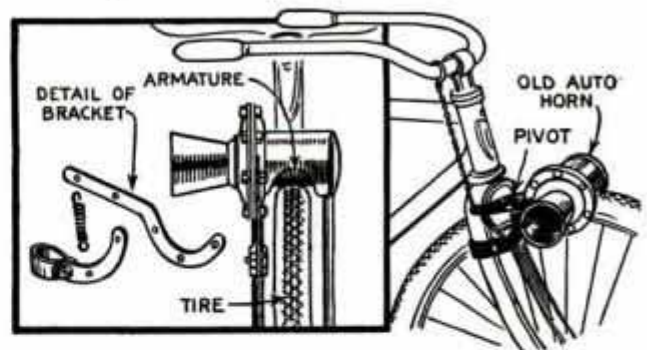
SAFETY OIL-IGNITION CONTROL

This low cost device prevents burning out expensive motor bearings and saves many other costly repair bills due to lack of oil. It shuts off your motor before your oil gets down to the danger point. This Safety Oil-Ignition Control also prevents running down your battery too. When your motor stops with your switch on, it automatically turns it off. Only \$5.00 and easily installed. Get one now before you have a big repair bill.

SAFETY OIL-IGNITION CONTROL

503 13th Avenue New Brighton, Pa.

Bicycle Horn Clears the Road



The horn-motor armature on contacting the front tire, is driven at high speed

Here is a bicycle horn that can be heard many hundred feet ahead, and it costs practically nothing. Just get an old auto horn of the motor-driven type from the junk yard and cut out a half-moon shaped section from one side of the motor housing as shown, so that the armature will be exposed. Then bolt it to a bracket of the type indicated and clamp it to the bicycle fork with the exposed part of the armature directly above the tire. When you pull up on the free end of the bracket arm, the armature will contact the tire and be driven at high speed in a manner similar to that of a regular bicycle siren.

Opening a Sealed Envelope



It's easy to open a sealed letter by alternately pulling on the flap and envelope

Instead of steaming a sealed envelope to open it, I find that less damage is done to the paper by opening it as follows: Lay it, flap side down, on a smooth surface and work it gently away from the flap as shown. Then turn it over and pull on the flap, repeating this operation alternately until the flap is loosened. You will have to use a little mucilage to reseal the letter.

—Andrew Vena, New York, N. Y.

VACU-MATIC SCORES AGAIN!

BOB McKENZIE

TRANSCONTINENTAL AUTOMOBILE CHAMPION
COAST TO COAST

WESTERN UNION
TIMED

NEW YORK

LOS ANGELES

LOS ANGELES

NEW YORK

CANADA

LOS ANGELES

NEW YORK

WASHINGTON, D.C.

MEXICO CITY

LOS ANGELES

PHOENIX

MURKIN LAKE

LOS ANGELES

ALPHA, WIS.

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Vacu-matic Carburetor Co.
7617 W. State St.
Wauwatosa, Wisconsin

Dear Sirs:

Having just completed a new speed record between Los Angeles and Chicago, driving a 1936 Chevrolet equipped with a Vacu-matic carburetor control, I thought you might be interested in knowing some of the facts and the important part Vacu-matic played in the success of the run.

The distance covered was 2322 miles in thirty nine hours and forty-two minutes, officially timed by Western Union, which gave me an average speed of 59.7 M.P.H. based on elapsed time and with the Vacu-matic averaged 18 1/2 miles per gallon on gas-line.

Before leaving Los Angeles, we made several test runs both with and without the Vacu-matic, and the tests proved that Vacu-matic increased my gas mileage 3 1/2 miles per gallon at the driving speed of 80 M.P.H. and also very noticeable increase in both acceleration and power.

After this experience with Vacu-matic, you can depend that on my future speed runs across country that I will be depending on Vacu-matic to give me the same added performance it has proven on this last record breaking drive.

Yours very truly,

Bob McKenzie



Sets New
Coast-to-Chicago
Record

New Supercharge
Principle
SAVES GAS

MORE POWER - MORE SPEED
FASTER PICK-UP - - NEW LIFE

ESTABLISHING new mileage records on cars in all sections of the country, the Vacu-matic again scores in a new speed record established by Bob McKenzie transcontinental automobile champion. Los Angeles to Chicago—2,322 miles in 39 hours and 42 minutes—driving 75 and 80 to maintain a speed average of 59.7 miles per hour!

Here is speed—a gruelling grind—where quick acceleration, greater top speed — and less stops for gasoline mean those precious moments saved that make new speed records possible. The same Vacu-matic that helped Bob McKenzie establish this speed record and gave him such fine gas savings is now available for all car owners. It is positively automatic—simple to install—inexpensive—and pays for itself many times over in gas savings

Automatic - - Nothing Like It!

Vacu-matic is *entirely different!* It operates on the supercharge principle by automatically adding a charge of extra oxygen, drawn free from the outer air, into the heart of the gas mixture. It is entirely AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. It is so simple it will amaze you—so practical it will save you many dollars on gas costs.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and fused into one unit, correctly adjusted and sealed at the factory. Nothing to regulate. Easily attached in ten minutes.

Agents and Salesmen

VACU-MATIC offers a splendid opportunity for unusual sales and profits. Valuable territories now being assigned. Check and mail coupon.

The VACU-MATIC Co. Wauwatosa, Wis.

Guaranteed Gas Savings

VACU-MATIC must prove itself on every car. It is guaranteed to give worthwhile gas savings, quicker pick-up and more power, or it costs you nothing. "On my V-8 Ford it works miracles", says Ralph Fields. James Seeley—"On an International Truck on a round trip to Cleveland, 385 miles, it saved 19 gallons of gas." A. V. Grove—"On the Buick it showed 5 miles more per gallon." F. S. Peck—"I average 22 miles per gal. on my Plymouth, an increase of 7 miles, for a saving of \$15.00 a month, or \$180.00 a year." Wm. Lyons—"Averaged 25 miles on a gal. with a Model A Ford at 40 miles per hour."

Free Details

You owe it to yourself to know all about this remarkable discovery. Mail the coupon below. Start saving gas with VACU-MATIC and enjoy a new driving thrill! There's no obligation—so get the facts now! Write today!

FREE OFFER COUPON

THE VACU-MATIC COMPANY

7617-241 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

Name

Address

City State.....

Check here if interested in selling proposition.

Write-
FOR THESE BOOKS



\$75⁰⁰

LESS MOTOR DRIVE

Easy Payments

IF DESIRED

9" x 3' SOUTH BEND WORKSHOP LATHE



A BACK GEARED SCREW CUTTING LATHE

Weight
320
lbs.

No. 415-YA 9 1/2" swing by 3' bed Workshop Bench Lathe with Horizontal Motor Drive, 3/4 H.P. Reversing Motor, Switch and belt tension countershaft as shown **\$103²⁵**

A PRECISION LATHE

The New 9-inch Workshop Lathe is a Precision Lathe with Twin Gear reverse to leadcrew, Ball Thrust Bearing on Spindle, longitudinal screw feed to carriage, precision lead screw for cutting screw threads, and scores of other important features. Recommended for the finest work in the plant, shop and tool room. Used by all important industries. Use coupon or write for complete details, free postpaid.

South Bend Lathe Works

909 E. Madison St. South Bend, Ind.

5 OTHER SIZES
9"-11"-13"-15"-16" SWING

in all bed lengths

\$87 to \$1200



No. 192-C 16" x 6' Quick Change Gear Underneath Belt Motor Driven Lathe complete with 3-phase motor, reversing switch complete as shown, weight 2300 pounds... **\$775**

South Bend Lathe Works,
909 E. Madison St., South Bend, Ind.

Please send the following:

- No. 1 10c No. 2 10c No. 3 10c
- No. 4 10c No. 5 10c No. 6 10c
- No. 7 10c No. 8 10c No. 9 10c
- No. 10 10c No. 11 10c
- No. 12 25c
- Workshop Catalog No. 15 Free
- General Catalog No. 95 Free

Name _____

Address _____

City _____ State _____

SOUTH BEND *Precision* **LATHES**

Safe at the Plate....



.... a casualty
ten feet beyond



His Head Cut Open
Harold Genesen Rushed
to Camp Hospital Where
Lights Fail



WE HAVE A "twilight league" at our summer camp. One time, when I was on second base and a teammate made a hit, I dashed for home, thinking of nothing but how badly we needed another run.

I crossed the plate breathless and ran smack into a bat a fellow was swinging carelessly. It laid open a deep wound along my eyebrow, so they took me to the doctor's cabin. It was getting dusk and the camp electric plant was out of order, so the doctor told the boys to bring flashlights. We all had them, of course, but only one boy had one bright enough for the doctor to use. It was an Eveready Boy Scout. And the fellow who owned it said it was brighter because he had real, fresh Eveready Batteries in it and not just any old

kind. That accident showed me that just having a flashlight isn't enough . . . you've got to have good fresh Eveready Batteries in it . . . if you are going to live up to the Scout motto: "Be Prepared."

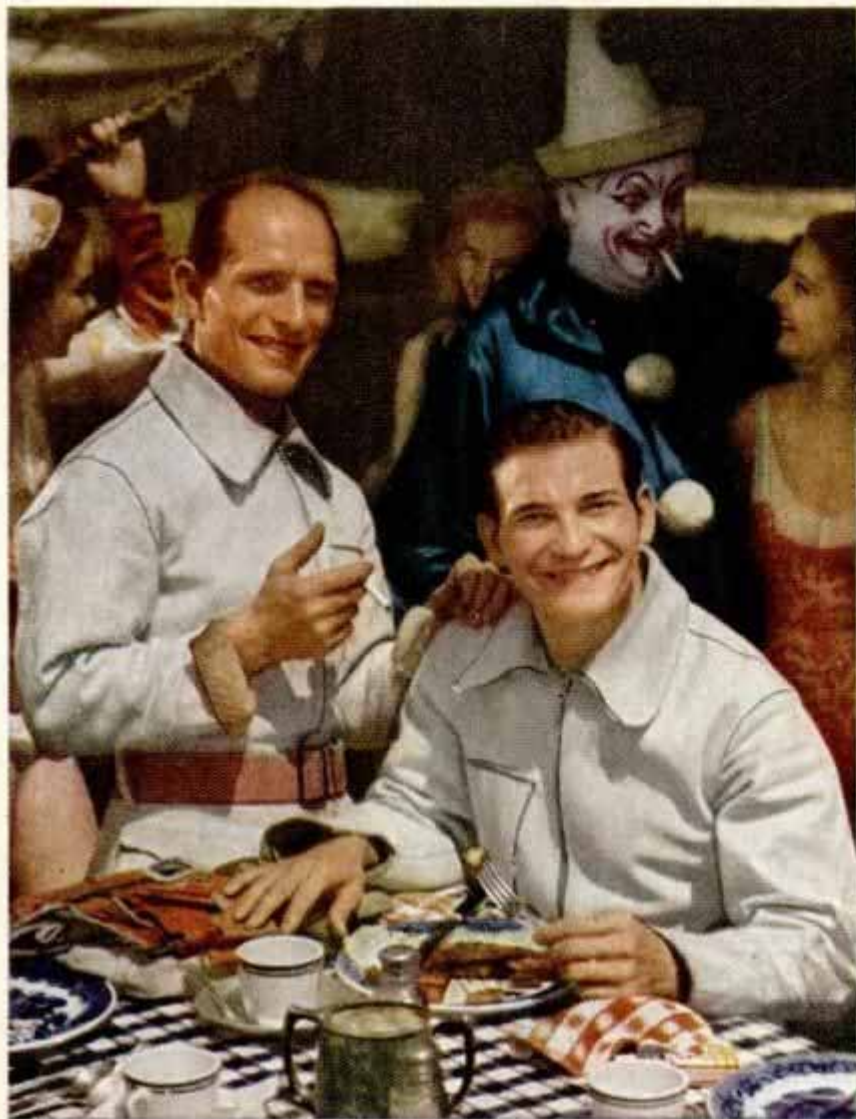


**EVEREADY
BATTERIES**

←
**ARE FRESH
BATTERIES**

NATIONAL CARBON CO.,
INC., 30 East 42nd Street,
New York, New York





HUMAN COMETS: Hugo and Mario Zacchini disappear deep into the maw of a monster cannon. *A flah!—a crash!*—and these human bullets hurtle across the arena. As a test of digestion, this stands by itself. "We smoke Camels," says Hugo. "Camels keep digestion working smoothly."



"NEWS COMES FIRST," says Miss Helen Nolan, reporter, "eating, second. So I turn to Camels. Food tastes better and digests easier when I smoke Camels."



FIRST in the Albany-New York Outboard Marathon! Clayton Bishop says: "Camels are a swell aid to digestion—make my food taste better and digest easier."

**PEOPLE CAN MEET TERRIFIC STRAIN—YET ENJOY GOOD DIGESTION.
SMOKERS SPEAK FROM EXPERIENCE WHEN THEY SAY—**

"For Digestion's Sake — Smoke Camels!"

*Costlier
Tobacco!*

Camels are made from finer, **MORE EXPENSIVE TOBACCOS**—Turkish and Domestic—than any other popular brand.



© 1936
R. J.
Reynolds
Tob. Co.

MODERN life bombards us all with a thousand and one shocks and nervous irritations. The strain tells on digestion... slows down the flow of digestive fluids.

And it is to the comforting cheer and refreshment of Camels that one naturally turns to put more enjoyment into eating. As you enjoy your Camels at mealtime, the flow of digestive fluids speeds up... alkalinity is increased. You feel at rights with the world!

Camels set you right! And they don't get on your nerves or tire your taste.