

DECEMBER

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POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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\$10,000
IN PRIZES

PAGES 34-35 AND 891



SEE PAGE 930

REACH FOR YOUR TELEPHONE AND

TAKE COMMAND



You need only pick up your telephone to control millions of dollars' worth of property . . . a thousand yards or a thousand miles of wire . . . five thousand or five million dollars' worth of equipment . . . a few or many of the Bell System's hundreds of thousands of trained workers.

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AGENTS Cleaning Huge Profits



67,000 BEAM CANDLE POWER
ONE FIFTH OF MILE OF LIGHT
NO GLARE

SPEEDLIGHT BEAM

LOWER BEAM

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NOT A PAINTED BULB

But a real scientifically constructed road light with a concentrated 67,000 candle power beam of light on the road for over a thousand feet and no glare. Cuts through fog and darkness like a knife. There is no light like it in the world. It is not a spot, it embodies an absolutely new

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"For 16 Weeks



I enjoyed every broadcast from

VK3ME

MELBOURNE, AUSTRALIA

This is not a "freak" record. Hundreds of other Scott All-Wave Receivers—all summer long—have brought their owners tons of clear, perfect music and song from the other side of the world.

EVERY now and then, the story of some phenomenal instance of extremely long distance radio reception breaks into the press. DX fans usually find little interest in such stories because they know the performance which they relate is invariably due to "freak" conditions.

But DX fans KNOW, when my receiver brings in every broadcast from VK3ME for 16 consecutive weeks, that full credit must go to the receiver that did the work. And when they learn that hundreds of other receivers exactly like mine, and located in all parts of the world, are piling up equally sensational records, they are well satisfied that the Scott All-Wave is not only the most powerful, most sensitive receiver possible to obtain, but the one receiver that fulfills their lifelong hopes.

Undeniable Proof

Away last spring I made up my mind to eclipse all standards of radio reception—distance—power—selectivity and tone. I believed the Scott All-Wave would do it, so I set out to make a day-to-day log of VK3ME, Melbourne, 9560 miles away from my receiver. I tuned in every broadcast, on the loud speaker, and to prove to the entire world that I heard every VK3ME program with full volume, and with perfect tone and clarity, I made a disc recording of every broadcast! Half of these records I sent to VK3ME. The others are at my laboratory and will be played for anybody who asks to hear them.

Not a Special Set

The Scott All-Wave Receiver that you may buy will in no way differ from the one I used in my 16-week test. It will be identical to the hundreds of other Scott All-Wave Receivers that tune in voice from England, France, Germany, Italy, Japan, Indo-China, and South America every day in the



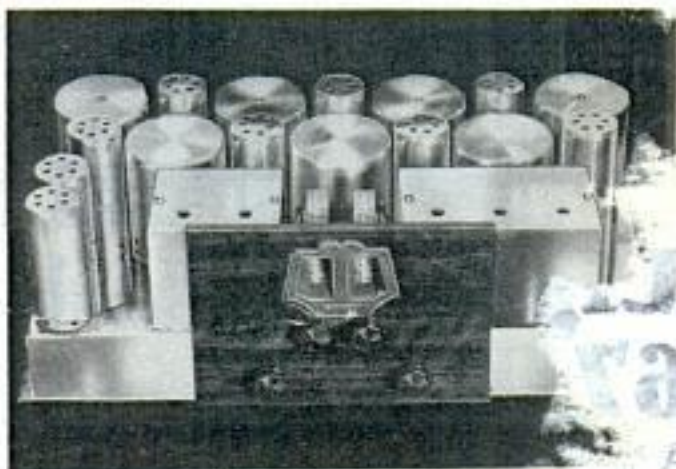
This cablegram verifies the first 10 weeks' reception. To date there has not been time for my log of the last 6 weeks to reach Melbourne.

E. H. SCOTT RADIO LABORATORIES, Inc.
(Formerly Scott Transformer Co.)

4450 Ravenswood Ave., Dept. P-12, Chicago, Illinois

The SCOTT ALL-WAVE

15-550 METER SUPERHETERODYNE



The Scott All-Wave Chromium Plated Chromium

week—summer and winter. The set that I to you will actually be tested on reception G5SW, Chelmsford, England, or 12RO, Rome before shipping!

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CLIP-----

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Popular Mechanics Magazine

200 E. Ontario Street, Chicago, U. S. A.

H. H. WINDSOR, Founder

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London: Messageries Hachette,
3 La Belle Sauvage, Ludgate Hill, E. C. 4

Paris: Hachette & Cie.,
111 Rue Reaumur

Melbourne: Gordon & Gotch
509-513 Little Collins St.

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Entered as Second Class Matter Sept. 15, 1908, at the Post Office at Chicago, Illinois, under Act of March 2d, 1879.

Entered as Second Class Matter at the Post Office Department, Canada.

Published monthly by POPULAR MECHANICS CO.

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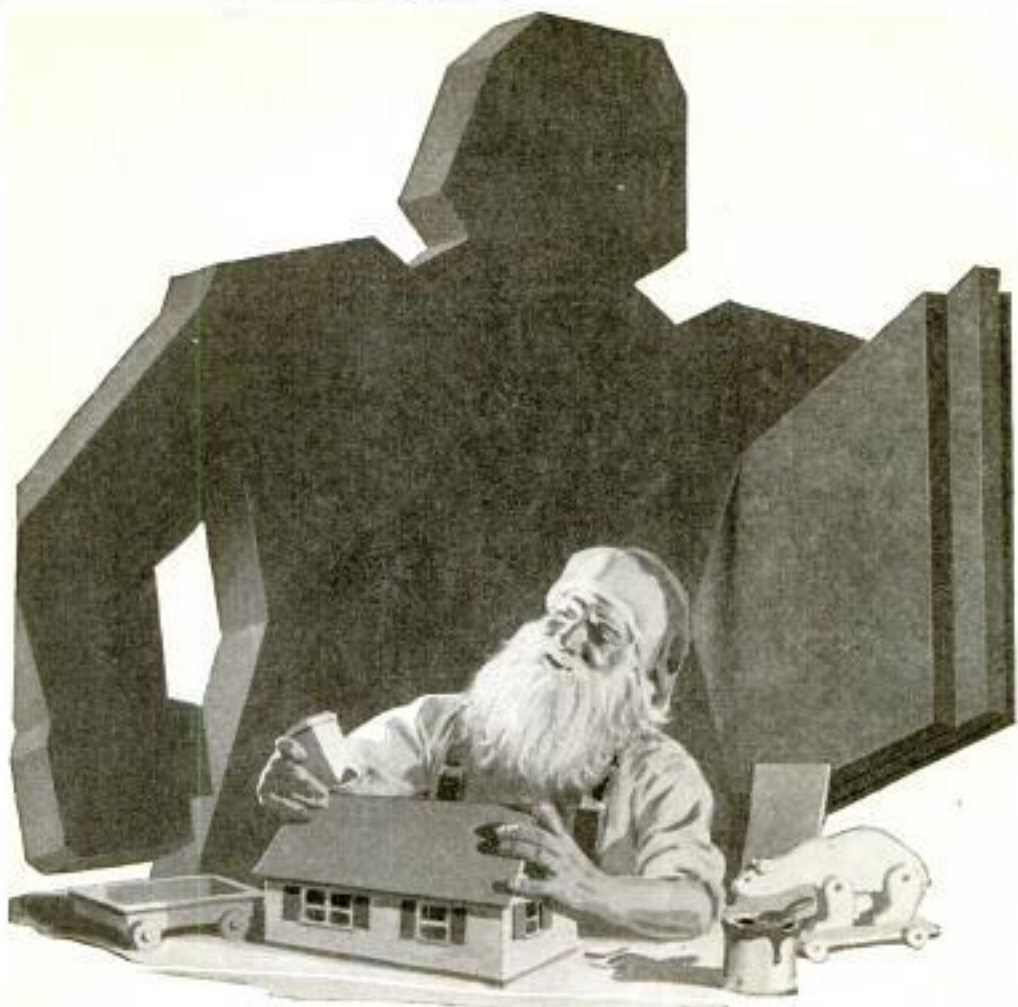
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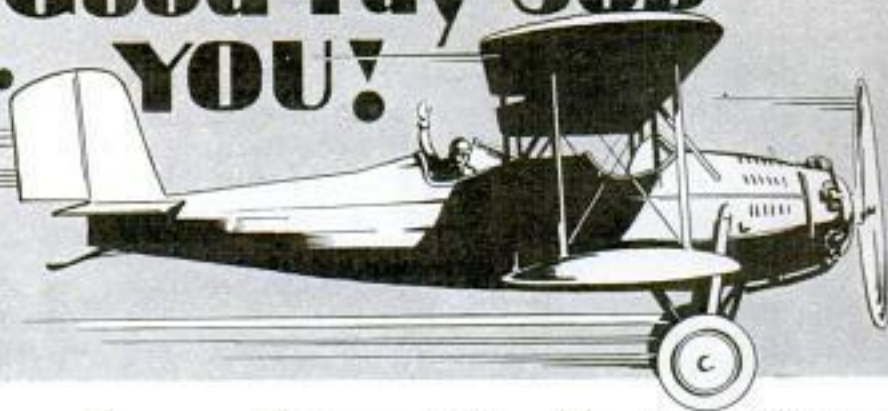


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Lincoln's \$250,000 Mechanics' School (right). A view at the \$100,000, modern Airport (below).



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lies in a man himself"

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Here is Edwin McTeer (address on request) and some of his work. The crude pen drawing was made before he had any training and the striking story illustration (worth \$100) was made after he took the Federal Home Study Course.

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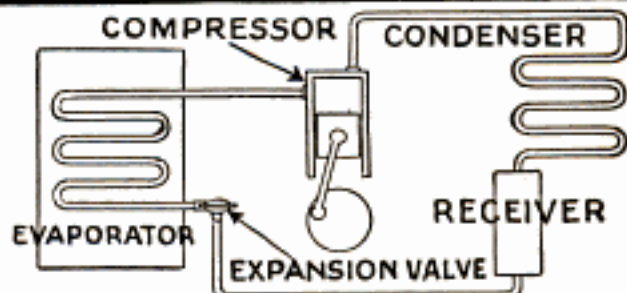
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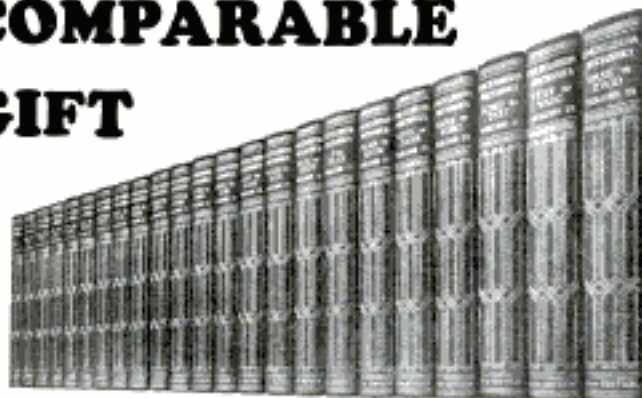
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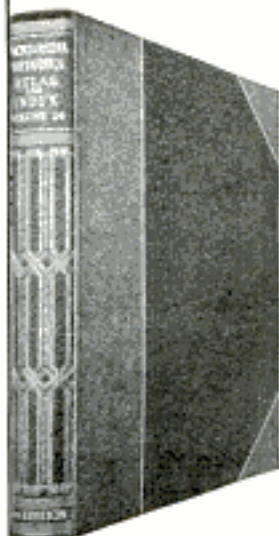
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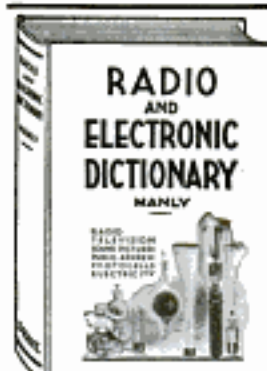
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State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared H. H. Windsor, Jr., who, having been duly sworn according to law, depose and say that he is the editor and business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit: First, That the name and address of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 305 East Ontario St., Chicago, Ill., Editor, H. H. Windsor, Jr., 305 East Ontario St., Chicago, Ill., Managing Editor, J. K. Weber, 305 East Ontario St., Chicago, Ill., Business Manager, H. H. Windsor, Jr., 305 East Ontario St., Chicago, Ill. Second, That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Popular Mechanics Company, 305 East Ontario St., Chicago, Ill. L. B. Windsor, 305 East Ontario St., Chicago, Ill.; H. H. Windsor, Jr., 305 East Ontario St., Chicago, Ill. Third, That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None. Fourth, That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. H. H. WINDSOR, Jr., Editor and Publisher. Sworn to and subscribed before me this 29th day of September, 1931. GRAHAM, Notary Public. (My commission expires June 18, 1932.)

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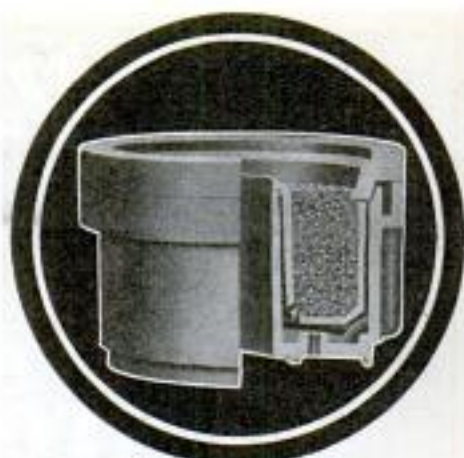
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MAGIC Catalog 20c. Lynn, 105 Beach, Dept. 3, Jersey City, N. J.

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MELOMITE Crystal radio, \$1.00. Melomite, Fairmount Station, Kansas City, Mo.

BUILD Your own radio-phonograph. Catalog mailed for 10c. "American," 3602 Wesley, Berwyn, Ill.

GUARANTEED "Pocket Radio," \$2.00. Catalogue, 10c. Nell Tasker, Shamokin, Pennsylvania.

TIME Counts in applying for patents. See pages 132 and 133. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

EXPORTS AND IMPORTS

THE Uebersee Post, German importing and exporting monthly English journal offers numerous bargains in latest goods. Thousands seeking American outlet. A wonderful opportunity for obtaining any distributing agency. Subscription 1 year \$3.15. Sample copy 6c. Fred Hettick, Sec'y., Mail Order Dealers Ass'n., Bismarck, North Dakota.

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SUPER-SPEED Panchromatic 16mm. negative, including processing, 100 ft., \$6.50; panchromatic negative including developing and printing, 16mm., \$5.95; 35mm., \$6.95. Movie cameras, projectors, films, etc., bought-exchanged-sold. Lists free. Zehrbach, P. O. Box 2089T, Atlanta, Georgia.

16mm—35mm NEW. Used equipment. (1932) films. Stamp brings booklet "Better Movies." 16mm products. Lynwood, California.

WHY Pay express charges extra? Our films postpaid. Buy from Chicago Film Dealer 6801 South Carpenter, Chicago.

SAVE Money. Movie camera \$25, projector \$25, stereopticon \$25, 100 foot 16M Eastman negative \$1.50, 35M negative 2c foot, kodak \$5.00, typewriter \$10, cameras and films bought and exchanged. C. F. Ray, 820 - 8th Ave., New York.

500 FEET 90c, odd reels \$1.25, plus postage. Lists. Hoffman Film Service, 57 Broad, Albany, N. Y.

TAKE Your own movies with Pathex cameras, special offer \$9.85 complete; electric projector \$6.49, film \$1.49, beaded screen \$1.95. Mogull Bros., 1844 Boston Road, New York City.

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FILMS 60c 100-Ft. list. Edgar Film Supply, Woodville, Mass.

MOVIE Cameras and projectors. For homes, schools, churches, business organizations. Literature free. D. F. Elder Company, Dept. C, Chelsea, Massachusetts.

TALKIE And movie producers are clamoring for new short story ideas, plots, etc. Perhaps you can write one that we can shape and sell for you. One writer (V.M.) received \$3,000. New York best market. Write now for free booklet, without obligation—How To Write For the Talkies! Daniel O'Malley Company Inc., Suite P, 1776 Broadway, New York.

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GET Our big lists 16mm., 35mm. films. Eastin Films, Galesburg, Illinois.

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

COMEDIES, Westerns \$2.50. Power's projector \$75.00. Marshall Films, Rome, Georgia.

TIME Counts in applying for patents. See pages 132 and 133. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

TRADE AND TECHNICAL SCHOOLS

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LEARN Blue print reading. State your trade. Carroll Ramsey, Drexel Building, Philadelphia.

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AMAZING Profits in the mail order business. Send no money, particulars free. Very little capital required. Size of city you live in has no bearing on your success in this business. Thousands now making big profits. Mutual Thrift Club, 547 Plymouth Bldg., Minneapolis, Minn.

START Your own business. Make big profits weekly. My "Business Secrets" fully explain 10 guaranteed successful plans. Complete, \$1.00, postpaid. Particulars free. A. Norden, 402 Cherry St., Phila., Pa.

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TIME Counts in applying for patents See pages 132 and 133. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

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FREE "Booklet of money making opportunities," new ideas, original plans, money making secrets and other valuable information. None require peddling or outfits. Elite Co., 81 Elizabeth St., New York.

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NEW. Big-profit proposition. **Cheraris,** Shelton So. Bldg., Buffalo, N. Y.

AGENTS—100% Profit selling "Quik-Stikon" long wear non-skid shoe soles. Sample pair fifty cents. **Specialty Supply,** Box 638-G, Chicago.

SELL Calif dehorning pencils to farmers. 1169 Grinnell, Peoria, Illinois.

GENUINE Gold Leaf Letters anyone can put on store windows. Guaranteed to never tarnish. Large profits. Enormous demand. Free samples. Write today. **Metallic Letter Co.,** 438-D North Clark, Chicago.

NEW Changeable sign sells to stores for \$1.50, agents profit 400%. Particulars free. **National Sign System,** St. Louis, Mo.

AUTO Mitten dusters. Season's biggest selling hit. Over 200% profit. Free sample offer. **National Fibre Broom Co.,** St. Louis, Mo.

MIRROBS Resilvered at home. Costs near 5 cents per square foot, you charge 75 cents. Profitable business plating auto-parts, reflectors, tableware, stores, refinishing metalware, etc. Outfits furnished; details free. Write **Sprinkle, Plaster,** 123, Marion, Ind.

MEN And women, earn five to ten dollars daily. Full or part time. Lowest prices for guaranteed hosiery, lingerie, neckwear. Send for catalogue and full information. **Monarch Hosiery Co.,** 424 Market Street, Philadelphia, Pa.

POLMET Polishing Cloth removes tarnish from all metals without the use of liquid, paste or powder. Our agents say it sells like "hot cakes." Retail \$25; sample free. **Gale & Co., Inc.,** 15 Edinboro St., Boston, Mass.

PHOTO Medallion men and women, the largest line of photo novelties in the world. Lowest prices, quickest service. Send for catalog showing over 200 money makers. **Gibson Photo Jewelry Co., Inc.,** 833-837 Gravesend Ave., Brooklyn, N. Y.

DAILY Necessity in homes, factories, garages. Quick seller. Fine repeater. Big profits. Exclusive territory. Sample free. **Lawdale Products Co.,** 3209 W. 22nd St., Chicago.

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

NO Dull times selling food! People must eat. Federal distributors make big money; up to \$3,000 yearly or more. No capital or experience needed; unsold goods may be returned. We furnish free sample case, license and free samples for customers—sure repeat orders. Exclusive territory. Ask now. **Federal Pure Food Co.,** A2307 Archer, Chicago.

400% PROFIT Selling signs used everywhere. Largest selection, wonderful repeat business; \$1.00 worth samples, 25c; 50 signs, \$3.00, 100 signs, \$5.00. **P. Franklin Co.,** 3322 Third Ave., N. Y.

DOLLARS in "Fixit" service, depression killer. Particulars. **Hougate's "Fixit" Service,** 1205 N. Elmolino, Pasadena, Calif.

WOULD You like to make \$10 to \$15 a day selling our line of toilet preparations? We want agents in every town; men, women, students; whole or part time. Write for free sample outfit offer. **Hindo Perfume Co.,** 515 E. 47th St., Chicago, Ill.

A BILLION Ideas. This is the title of our remarkable catalog of books along practical lines. Arranged alphabetically by subjects for easy reference. If you have not received it, send for a copy. You will find hundreds of subjects you cannot usually locate in book stores or public libraries. Sent free upon request. **Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.**

MAN In each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. **Gun Metal Co.,** Ave. H, Decatur, Ill.

MAKE. Sell your own products. Formula catalog free. **Clover Laboratories, (P.M.) Park Ridge, Ill.**

BIG Proposition; no canvassing. **Asco,** Box 1081, Washington, D. C.

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 samples. **American Monogram Co.,** Dept. 40, East Orange, N. J.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name and address, 25c. Stamping outfits, Emblem checks, check-fobs, name plates. **Hart Mfg. Co.,** Desk 2, 303 Degraw St., Brooklyn, N. Y.

REPLATE Brass worn-off automobile parts, reflectors, bath room fixtures, worn spoons, forks, etc., with pure silver. Looks like new. Use U-Kan-Plate Polish. Positively no mercury; \$1.00 half pints. Postpaid. Satisfaction guaranteed. Agents wanted. **Dept. A, U-Kan-Plate Co.,** Philadelphia.

BIG Money selling shirts, ties, underwear, socks, raincoats, lumberjacks, sweaters, leathersuits, overalls, pants, playsuits. Outfit free. **Nimrod Co.,** Dept. 8, 4922-28 Lincoln Ave., Chicago.

SELL Goodyear raincoats, \$2.95 up. Goodyear Rainwear, 18 West 22nd, New York.

SOMETHING The housewives want. A signed guarantee to save money and time in cooking. No competition. 400% profit. No license required. **Station C, Box 25E, San Diego, Calif.**

THAXLY Formulas produce perfect products. All lines. Catalog free. **B. Thaxly Co.,** Washington, D. C.

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

NEW Line Counter Displays, Aspirin, Flints, Chewing Laxative, Breath Gum, No-tartar, Silktone, etc. Steady Repeats. Over 100% Profit. **Superba Co.,** W3, Baltimore, Md.

THIS Advertisement may make you thousands of dollars, if you write immediately for my "Eye-Opening" literature describing guaranteed formulas; valuable trade processes, moneymaking information how to easily make the world's best-selling specialties. All lines. Investment small. Profits immense! Start in your home, room or office. Make the good money you're entitled to. **Dr. Liscombe Miller, Chemist,** Tampa, Fla.

CHICAGO Exporter valued \$3 stone at \$300. The diamond's only guaranteed rival. Greatest spare time, side-line article ever known! Amazing profits. \$5 pocket sample case free. Write quick. **Mexican Gem Company,** Dept. 1M, Monterey, Calif.

WE Start you without a dollar. Soaps, extracts, perfumes, toilet goods. Experience unnecessary. **Carnation Co.,** 641, St. Louis, Mo.

FLAVORING Extracts—Bottle yourself! Labels furnished. 600% profits! Whirlwind money-makers! Repeaters! Free offer. **Thomas Manufacturing Company,** Indianapolis, Ind.

CALIFORNIA Perfumed beads, selling like hot cakes. Agents coin money. Catalog free. **Mission Factory, P. 2028W** Pico, Los Angeles, Calif.

SELL Stores 5c carded breathlets, etc. **Lorrac Products,** Albany, N. Y.

SELL Men's neckwear—wonderful proposition. **Astor-M. 39 East 28th, N. Y.**

BEST Books for \$1. All formerly sold for \$2.50 to \$5 each. Select from the following list of guaranteed bargains. All brand new books: **Woodcraft** by Seton, **Book of Letter Writing** by Crouther, **Etiquette** by Eichler, **Creative Chemistry** by Shosson, **Revolt in the Desert** by Lawrence, **Trader Horn, White Shadows in South Seas** by O'Brien, **Count Luckner (The Sea Devil)** and **Outline of History** by Wells. Delivered at your door C. O. D. Simply pay postman \$1 each and postage. **Popular Mechanics Press, Room 802, 200 E. Ontario St., Chicago.**

MANUFACTURE Chipped glass house numbers. **Beveridge,** 140-22 Locust, Jamaica, N. Y.

SUCCEED With your own products. Make-sell them yourself. Formulas, processes, trade-secrets. Expert analytical service. Catalog free. **B. Thaxly Co.,** Washington, D. C.

HIGH-GRADE SALESMEN WANTED

MAKE Big money now—selling, demonstrating, new Stewart-Warner Changeable Write-it-Yourself Electric Sign, the fastest selling, biggest-valued, most unique electric sign on the market. Print, write, draw anything on it, any color, as you do on a slate. Fairly biases forth; with neon effect! Every locality packed with prospects. Full line. Prices reasonable. Big discounts. For producers, a chance for immediate advancement on a product built by Stewart-Warner, famous for quality the world over. An unbeatable opportunity for distributors, crew managers, specialty salesmen. Write to Stewart-Warner Corp., Dept. C, 1826 Diversey Parkway, Chicago.

DON'T Be a job hunter—Start your own city business on our capital; no hard times, no lay-offs, always your own boss; hundreds average \$5,000 annual sales year after year; we supply stocks, equipment on credit; some 225 home necessities, selling experience unnecessary; wonderful opportunity to own pleasant, dignified, profitable business backed by \$17,000,000 world-wide industry; for complete information write **Rawleigh Co.,** Dept. L-U-PPM, Freeport, Ill.

MEN To cover small town and rural districts with nationally known line of motor oils, paints and rosin, sold on easy credit terms to farmers, property and auto owners, merchants, factories, etc. You carry no stock. We ship from nearby warehouse and collect. Commissions paid weekly. Bonuses monthly. State territory wanted. Write **Central Petroleum Co.,** 703 Century Bldg., Cleveland, Ohio.

SALESMEN—Four \$15.00 sales to stores net you \$48.00 daily. **Sayers Systems, Est. 1895, 2801-123 Sheffield Avenue, Chicago, Illinois.**

SALESMEN-DISTRIBUTORS. New auto tire patch; guaranteed 10,000 miles. Repairs blowouts permanently. Sells garages, gas stations, tire shops. Salesmen's profit 100%. Up to 300% to dealers. Easy seller. Exclusive territory. Economy Rubber, 608 Burkhardt, Darton, Ohio.

NEW Cigarette roller. Real proposition to hustlers. **E-W Specialty Co.,** Postoria, Ohio.

DISTRIBUTORS, Salesmen—Newly patented automobile accessory, burglar proof. Fast seller. Inexpensive, highly profitable. **Automatic Gas-Lok, 21 E. VanBuren, Chicago.**

BRAND New—Sure fire trade-stimulator. Every retailer buys. \$50-\$200 weekly in advance. Well rated company. Free pocket outfit. **Salesmanager, 4th floor, 308-N Michigan, Chicago.**

BIG Profit putting our gold sign letters on store windows, without experience. Samples. Consolidated, 69-V West VanBuren, Chicago.

FREE Booklet describes 67 plans for making \$20-\$100 weekly in home or office business of your own. **Elite Co., 84 Elizabeth St., New York.**

FASTEST Selling automatic free wheeling, lowest price, most profit, quickly installed, any automobile distributors. Wanted quick action. Secure territory. **Automatic, 310 North Erway, Dallas, Texas.**

SALESMEN Wanted to call on fish dealers. **Snow & Parker, Inc., 41 Fish Pier, Boston, Mass.**

TAKING Orders for shoes, direct from factory to wearer pays big money. Free outfit. **Mason Shoe Mfg. Co., Dept. M-85, Chippewa Falls, Wis.**

PATENTED Envelope sealer. Seals 3,000 hourly! Retail \$4.50 only. Offices buy on sight! Tremendous demand. Free trial. **Sealer, 8031 Spring Lane, Boston.**

SCREW-HOLDING Screw drivers! Not magnetic. Remove, hold, insert screws inaccessible places! Factories, garages, electricians, carpenters, mechanics, radio owners, buy on sight! Free trial! **Millen, 5015 Winthrop Bldg., Boston.**

SALESMEN—To sell well known desk stapling machine for an old established firm; indispensable to large and small businesses; age and previous experience unimportant. The man who will work hard and follow instructions will make plenty of money; strictly commission; no drawing account. **Hoge Mfg. Co., 21 East 21st St., New York.**

EVERY User of the mails needs an envelope sealer. The Kendall seals fifty a minute. Retail \$2.50. Big profit. Good territories. **Kendall, Dept. T, East Jaffrey, N. H.**

DISTRIBUTORS, Organizers and agents exclusive territory for Soderite the new fluid solder that needs neither heat nor acid. **See November Popular Mechanics, page 143.** Write **Fluid Solder Products Company, 1440 S. Wabash, Chicago.**

GRAPE Bricks. Grape concentrates—Port, sherry, champagne, claret, etc., in solid brick form. One brick makes one gallon juice; legality established twice in Federal courts. Government financing industry. Every home, drug and grocery store, church, hospital, a prospect. State and county rights available. Apply V. S. Co., Dept. 8-219, 395 - 9th St., San Francisco, Calif.

\$25 DAILY Possible selling merchants printing, novelties, specialty items at half price. Quick delivery. Union label. 40% commissions advanced. Experience unnecessary. Elaborate outfit free. Northwestern, 625-DE, Jackson, Chicago.

NEW, Different, improved, business stationery line. Biggest commissions—bonuses. Quickest delivery. Free copyrighted cuts. Experience unnecessary. Attractive outfit free. David Lionel Press, 312 So. Hamilton, Dept. 568, Chicago.

PUNCHBOARD Salesmen—Most gigantic line ever featured. Vending machines—all kinds. Make as high as \$28.00 on single order. Repeat commissions. Beautiful colored catalog free. Lion Mfg., Dept. 16, 308 W. Erie, Chicago.

WANTED—County salesman with car. To demonstrate for large Ohio manufacturer. First class job. Fyr-Fyster Co., 2210 Fyr-Fyster Building, Dayton, Ohio.

\$18 To \$25 Daily; biggest selling line of men's suits. Meets present day conditions. Amazing values at \$11.95, \$14.50, \$16.95, \$18.95. Also raincoats, slickers, topcoats and boys' suits. Biggest commission paid in advance. Liberal bonus. Free outfit. State age and selling experience. "Jim" Foster, Inc., Dept. 212, 2250 South Spaulding Ave., Chicago.

\$136.00 COMMISSION From \$6.95 sale! You can make 3 sales daily. Our salesmen do it. Free kit. Sales Stimulators, Dept. 9H, 4311 Ravenswood, Chicago.

SALESMEN—At last! New feature sells punchboards everywhere. Dealers wild with joy—prosperity back again. Profits enormous. Samples free. Puritan Co., 1407 Jackson Blvd., Chicago.

NEW Legal punchboard plan! We furnish everything! No investment for you or your customer! Nothing to sell or carry! 50% profit! Unsatisfactory merchandise returnable! Full repeat commissions. AJ Novelty Company, 161 Washington, Chicago.

FOR big income, sell garages, gas stations, machinery, R. R. men, amazing safety non-slip shoes. Exp. unnecessary. Sample free. Atlas Shoes, 78, Waltham, Mass.

MEN To sell batteries with complete line of supplies to garages. Lowest prices. Mickman Battery Co., St. Paul, Minn.

\$15.00 DAILY Selling Union Label business and blotter cards, 1000 for \$1.50 including card case. Free cut service. 33% commission advanced. Outfit free. National, 108-28 No. Jefferson, Chicago.

SELL Nothing—\$170 weekly. \$500,000 punchboard firm announces new No Investment plan. Season starting. K&S, 4326 Ravenswood, Chicago.

APLENTY New—Different—Fast selling 5c—10c merchandise on attractive counter cards. 100% comm. for you and dealers. Advertised over WLW 3 nights weekly. No investment. Catalog free. (Estab. 1921.) World's Products, 175 Central, Spencer, Ind.

BURGLAR Proof window lock permits ventilation with safety. Salesmen and distributors write. Sample 25c. Surelock Homes Co., Charles Bldg., Denver, Colo.

COLOR Lighted Christmas novelties are best sellers. Write Unger, 571P Harrison, Chicago.

MAKE Up to \$18 daily introducing men's, women's, children's finest hosiery. Guaranteed 6 months or replaced. Amazingly low prices. 126 styles, colors. Auto and hosiery given producers. Write quick! Wilkmit Hosiery Co., C3712 Midway, Greenfield, Ohio.

BIG Money steady. High grade coveralls, shopcoats, pants, shirts. Advertising on back. Fast sellers. Great demand. Prospects everywhere. Free outfit. Strong Mfg. Company, 911 West Jackson, Chicago.

BIG Money selling shirts, ties, underwear, Sox, raincoats, lumberjacks, sweaters, leathercoats, overalls, pants, playsuits. Outfit free. Nimrod Co., Dept. 65, 4923-28 Lincoln Ave., Chicago.

NEW Polish for silver, pewter, brass, etc. Big profit, easy sales. Modern Polish Co., Trenton, N. J.

SALESMEN—Become independent. Own your business; experience unnecessary, selling our \$10,000 accidental death; \$50 accident; \$25 sick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady income from renewals. \$250,000 deposited insurance department. Universal Policy, Dept. A, 716 Lefcourt Bldg., Newark, N. J.

WONDERFUL Opportunity. Twenty dollars per day can be earned. Experience unnecessary. Home protection at cost. Ages one to eighty. \$250 to \$1000 at death. Not insurance. You make \$5 for each member secured. Childless of Virginia, sent in 54 one day. National Aid Society, Myers building, Springfield, Illinois.

PENNY Golfer, new fascinating coin-controlled game. Legal. Exciting. Merchants everywhere buy. Solendid commission. Specialty Mfg., 617 Division, Chicago.

SELL Egg Cartons! Dandy repeat side line. Everyone who sells eggs needs cartons—grocers, poultry farms, dairies. Send for information and samples. Pick up these extra commissions. Self-Locking Carton Company, 575 E. Illinois Street, Chicago, Ill.

GREAT Sideline for any salesman! Pocket outfit free. New cash customer Building Campaigns for merchants. D&H Premium Co., Dept. 538, 116 So. Wells, Chicago.

NEW Specialty—Sells every business and professional man. Four \$15 sales daily pay \$280 weekly. Paper cleared \$4920 in three months. Write, P. E. Armstrong, President, Dept. PM, Mobile, Ala.

NEW, Largest color catalogue, punchboards, vending machines, produces quicker orders, big commissions. Free outfit. Lincoln Sales, 116 So. Wells, Chicago. Dept. D. Established 20 years.

HELP WANTED

A RICH Opportunity—men-women! The offer of a lifetime! We put you in a business of your own which once started, becomes self-sustaining, requiring an investment of less than two dollars. Our plan pays you up to \$25.00 and more cash profits everyday with no selling. Grasp this bonafide opportunity to enjoy complete financial independence, be your own boss. Quick action necessary. Wire or write at once. The Plaque Studios, Inc., 56 E. Randolph, Dept. 25, Chicago, Ill.

\$10 TO \$35 Weekly mailing circulars, no canvassing. Samples, instructions. 25c. Poonorris, 2305 Gratz, Philadelphia.

IF You want to get your groceries and household supplies at wholesale, and a wonderful chance to make \$15 cash profit a day besides, send me your name immediately. No experience necessary. Albert Mills, 9293 Monmouth, Cincinnati, O.

WORLD'S First one handed egg beater, Gold-mine for agents. No high pressure selling. Spectacular demonstration gets orders like magic. Every woman wants one. Low price. Big profits. Write quick for territory, and free offer of sample. Quik-Whip Co., 500 N. Dearborn, Dept. WC-512, Chicago.

EARN Up to \$25 weekly or more growing mushrooms in your cellar or shed. Illustrated booklet free. American Mushroom Industries, Dept. 507, Toronto, Ont.

MAIL Order house wants ambitious young men each county to mail circulars, appoint agents, fill orders. Experience unnecessary. Part or full time. Good pay. International Laboratories, 192 N. State, Chicago.

GO Into business—Make big money. We start you furnishing everything. Experience unnecessary. Federal Pure Food Co., X2307 Archer, Chicago.

EDUCATIONAL AND INSTRUCTION

SOUND Motion picture operators wanted. Learn to operate. Free practical training when course is completed. Easy terms. 50% of tuition payable when employed. 103 North Rowan Ave., Dept. A, Los Angeles, California.

BECOME A landscape architect. Uncrowded profession; wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Est. 1916. Write for details. American Landscape School, 7 Plymouth Bldg., Des Moines, Ia.

LEARN Automobiles, electricity, fenders, bodies, welding. Stevinson's, 2008A Main, Kansas City, Mo.

LEARN Rapid figuring from "Higher Arithmetic." Write for information. Fredrick A. Smith, 4745 Virginia Ave., Chicago.

IMPROVE Your handwriting. Gaskell's penmanship course gives 20 separate lessons and complete book of instructions, only \$1.00. Ogilvie Publishing Co., Dept. 29, 51 Ross St., New York.

WANT A Government job? Steady. \$105-\$250 month. Men-women, 18-50. Paid vacation. Short hours. Common education usually sufficient. Experience usually unnecessary. 25 coached free. Full particulars and list positions free. Write today sure. Franklin Institute, Dept. K3, Rochester, N. Y.

FINGER Print and secret service particulars free. Write, American Institute, 2190 Broadway, N. Y.

LEARN Photo-engraving at home by experience. Equipment furnished. Earn while learning. Aurora Photo-Engraving School, Aurora, Mo.

DOUBLE Entry bookkeeping 60 hours with 8 keys guaranteed. (Diplomas.) International Bookkeeping Inst., 8 Springfield, Mo.

BECOME A foreman. Increase your wages. Send 50c stamps to H. J. Montgomery, outstanding authority on foremanship training, for valuable booklet. 40 North Wells St., Chicago, Ill.

LEARN To repair and rewind electric motors. Send for free information. Randle Bros. Armature Shop, 520 4th St., Waukegan, Ill.

PHOTOPLAY Talking picture and magazine stories wanted for revision, development and copyright. Sell on commission. Established 1917. Booklet free. Universal Scenario Company, 406 Meyer Bldg., Western and Sierra Vista, Hollywood, Calif.

WANTED, Men-Women, 18-50, qualify for steady Government jobs. Salary range, \$105-\$250 month. No Government experience required. Paid vacations. Common education. Thousands appointed yearly. Write Ozment Institute, 101, St. Louis, Mo., immediately.

U. S. GOVERNMENT Wants men, \$1,700-\$1,900 and up at start. Railway mail clerk examination coming. Let our expert (former government examiner) prepare you for this and also rural carrier, post office, customs, internal revenue, and other branches. Write today for free booklet. Dept. 8, Patterson School, Rochester, N. Y.

DON'T Prepare for any civil service examination without seeing our catalog. Free. Columbia Correspondence College, Washington, D. C.

SHORT STORIES

LEARN To write news. Expert newspaper men will give you complete course of training by mail. Send for free writing test. Newswriter Associates, 7407A S. Harvard Blvd., Los Angeles, Calif.

SHORT Stories revised, typewritten and marketed. Details free. Harsh Service, Box P-1013, Harrisburg, Penna.

TYPEWRITERS AND SUPPLIES

TYPEWRITERS—All makes, \$5 to \$32. Guaranteed. Catalog free. Typewriter Works, Ada, Okla.

ADDING MACHINES

NEW \$4.75 Automatic Adding Machine. Fully guaranteed. Bassett, 1458-C, Hollywood Avenue, Chicago.

PRINTING, MULTIGRAPHING AND MIMEOGRAPHING

200 BOND Letterheads 20-lb. (8 1/2 x 11), envelopes, cards, statements, \$1.00 each, postpaid. Samples. Roland Company, Wareham, Massachusetts.

PERSONAL Stationery—100 sheets, 50 envelopes with name and address \$1.00. Foreign postage extra. Sidney Studio, Sidney, Ohio.

500 TWO-COLOR Letterheads \$2.50. Classy printing, prompt service. Mailpress, Cincinnati.

15 PERSONAL Christmas cards \$1.00. Applebaum-P, 1258 Brook, New York.

COMMERCIAL Printing, Hammermill bond, 1000, \$2.75. Bell Press, Winton, Penna.

TWO-COLOR Envelopes printing at one-color prices. Samples. Rapid Service, Edwardsville, Ill.

COMMERCIAL Printing, Bargains. Quality. 3103 E. 18th, Kansas City, Missouri.

200 BOND Letterheads, 100 envelopes \$1.00, also mimeographing. Blueprint Company, 1607 East 146 St., Cleveland, Ohio.

5,000 ATTRACTIVE Folders, 1,000 words, \$11.50; 6x9 circulars, \$7.50. \$1.00 cash, balance c.o.d. Samples. Goodprint, Harrisonburg, Va.

QUALITY Printing for less—500 letterheads—envelopes \$3.75, thousand circulars \$2.00 prepaid. New-depression pricelist. Pound samples, dime. Big plant. Webb-Print-Press, Gettysburg, Penna.

1000 BUSINESS Cards \$1.75; letterheads, envelopes, statements \$3.25, postpaid. Samples, Dept. PM2, 2311 Lidstone, Houston, Texas.

AGENTS. Three-color business cards, \$2.95 thousand. Crescent, 1715 1/2 Wood, Dallas, Texas.

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

200 LETTERHEADS And 100 envelopes, \$1.00; 200 letterheads, 8 1/2 x 11, 150 envelopes, \$2.00; 250 cards, \$1.00. Hoosier Print Shop, Portland, Ind.

500 LETTERHEADS, 500 Envelopes \$2.95. Ware, Box 357, Ft. Madison, Ia.

WE Print stationery, booklets, catalogs, circulars. Samples. Commercial Press, Batavia, Ohio.

LETTERHEADS, Envelopes, 500, \$1.10; 1,000, \$2.00; \$5,000, \$8.00, plus postage. Samples. Corle & Kimballs, Newport, N. Y.

250 BOND Letterheads, envelopes, billheads, cards, \$1.35 each. Economic Press, Leonia, N. J.

PRINTING OUTFITS AND SUPPLIES

PRINT Your own circulars, envelopes, with home made press costing less than \$1.00. Illustrated instructions 10c. Carl Edouist, Odessa, Minn.

BUILD An 8x10 printing press for \$1.00. Complete instruction only 50 cents. K. Wise, 100 E. Broadway, Red Lion, Pa.

COMPLETE Printing outfits, presses, type, ink, paper, supplies. Write for free catalog. Kelsey Co., B-11, Meriden, Conn.

PRINTING Outfits—Presses, type supplies, type novelties. Send stamp for catalog. Model Press, York, Penna.

PREUSED Printing presses and supplies. Lists 2c stamp. Popular Bargains, Richland, Pa.

GUMMED LABELS

COLORED Stickers pay! Economical, too. Samples. Harvey Wolf, 6618 F Quimby, Cleveland, Ohio.

1,000 PRINTED; Name, business, address 50c. JBS Company, Box 93, Holyoke, Mass.

DUPLICATORS AND DEVICES

"EXCELLOGRAPH" Rotary stencil duplicator \$39.00. "Two-Faced" film duplicator \$8.00. Booklet free. Pittsburgh Typewriter Supply, Dept. 601, Pittsburgh, Pa.

RUBBER STAMPS

NAME, Address, 2 lines 25c; 3 lines 35c. Stamp Works, Auburn, Nebr.

FOR SMOKERS

CUT Your cigarette cost—Send for factory fresh Green Rivers at \$1.25 per carton, 200 cigarettes, postpaid. Smoke 5 packs. If you don't enjoy milder more tasty natural flavored smoke—return 5 packs and get \$1.25 back. Green River Tobacco Co., Box 980, Owensboro, Kentucky.

HOME Cigarette machine! Illustrated circular, \$3.75 postpaid. Automatic Cigarette Machine Wks., 1055 Sheridan, Chicago.

RAZORS AND BLADES

YOUR Gillette. Probak blades resharpened, 1c each. Pettef Wetterquist, Rockford, Ill.

TWENTY New "Gillette-style" guaranteed blades, \$1.00. Nell Tasker, Shamokin, Pa.

ELECTRIC Safety razors \$5.00. Simplex typewriters \$2.50, printing presses \$10.50, catalog 5c. Cash paid gold, jewelry, names artificial eye users. Demco, 114 Ford St., Providence, R. I.

SPECIAL. Any small razor blade honed keen 1c each. Satisfaction guaranteed. Perola, 4630 North Ashland, Chicago.

FOR THE HOME

BURGLAR Alarm—fool proof. Electric alarm goes off, even if the wires are cut! Always on the job! Easy to install. Send 50c for drawing, etc. Wm. Oesterle, Jr., Milway, New Jersey.

KEEP Your walls clean. Beautiful radiator shields, priced to sell. Write for folder. Leader Metal Prod. Co., D-4, St. Louis, Mo.

FIELD GLASSES

\$12.50 GOVERNMENT Binoculars, six power with leather case, worth \$35.00. Wonderful for hunting. Big selection guns, rifles, musical instruments, field glasses, telescopes. Buy, sell and exchange. Send new free list. Well's Curiosity Shop, 20 South Second Street, Philadelphia, Pa.

PRECIOUS STONES

(DIAMONDS Rival) genuine Zircons, deep blue, pale blue, golden brown, and blue white. Sample blue white \$3. Goetz Gem Co., Gallon, Ohio.

ANTIQUES, WAR RELICS AND INDIAN GOODS

ANTIQUES, Firearms, medals, swords, daggers, relics. Catalogue free. Nagy, 8P South 18th, Philadelphia.

INDIAN Maid bracelets post paid \$1.00 with pamphlet explaining symbols, made of 999 fine silver hand work. The Wigwam, Colo Springs, Colo.

INDIAN Relics, coins, curios, beadwork. Catalog free. Vernon Lemley, Northbranch, Kan.

SEND 5c For fine new list Indian relics, antique firearms. F. E. Ellis, Webster Groves, Missouri.

MUSIC AND MUSICAL INSTRUMENTS

FORTUNES Being made from songs through talking pictures, radio, phonograph, music publishers. "Hit" writers revise, arrange, compose music to your lyrics. We submit to studios and other markets. Free reading. Send for booklet. Universal Song Service, 625 Meyer Bldg., Hollywood, Calif.

SONGWRITERS—Read "song requirements of talking pictures, radio and records" an explanatory instructive book sent free to aspiring writers of words for songs. We compose, arrange music and secure copyrights. Write today. P.C. Newcomer, Associates, 1674 Broadway, New York.

WRITING A song 25c. Connor, 24 East, Chicago Falls, Mass.

DUO-Flex reeds for clarinets and saxophones eliminate your reed troubles. Write for circular, Duo-Flex Reeds, 1204 1st Ave., Evansville, Ind.

COMPOSERS—Verse or music. Brilliant opportunity. Write VanBuren, 2559 McClurg Bldg., Chicago.

SONGWRITERS—"Real" proposition. Hibbeler, D1, 2104 Keystone, Chicago.

SONGWRITERS, Professional plan. Edward Madden, 113 Michaels, Syracuse, N. Y.

SONGWRITERS—Free booklet "How To Turn Your Songs Into Gold." Stan Tucker, 370 Wadsworth Ave., New York.

SYSTEM Complete \$1.00. Address "Music Shortland," Pismo Beach, California.

SONG Posts, write Sequoia Songwriters Service, Sherman Branch, Los Angeles, Calif.

POEMS Wanted. Work guaranteed. We publish. Great Eastern Song Bureau, Dept. 27, Thomaston, Me.

SONG Writers. Send for our "Publishing Agreement." McKinley Music Printers, 1501 E. 55th St., Chicago.

WRITE Songs. Big money and reputation. Write for information. J. Gordon Pub. Co., 201 N. Hoyne Ave., Chicago.

"MUSIC Composed" to words. Bauer Bros. (formerly of Sousa's Band), Oshkosh, Wis.

SEND Song poems, 50-50 plan. Indiana Song Bureau. (Brookside), Salem, Ind.

PATENT ATTORNEYS

PATENTS. Reasonable rates. Write, The Ramsay Company, World Patent Attorneys, 273 Bank St., Ottawa, Canada.

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This client has left it to me to find the right article and I am telling as near as I can what he wants so that anyone who reads this and who thinks he has it may tell me so.

I am an officer of a well known business firm in New York doing business with many large manufacturers of many different types of products, all of which for the present I must ask you to believe for I simply cannot, in fairness to myself or to you, sign my address and risk having numerous unappointed callers waiting in line, so I will use the Box No. of our Advertising Agency.

If you have this new patented product, or think you have, write me about it telling frankly what it is and the patent situation. . . . I can't steal it or in any way harm you, and besides I wouldn't if I could. Don't write me evasive letters for appointment without telling me your product, or any kind of evasive letter, for first I must know clearly what we are to consider. And the man with the right product will not hesitate to be specific for he will realize that in due course I want to see it (and him) as much as he wants to sell it.

There will be no advance fees asked, so don't worry your head over that or over anything else except having "the thing to fill the bill." We will try to do the rest for you.

Now, if we understand each other well enough to really get started, please feel free to do what I have suggested and write me (I will get it unopened).

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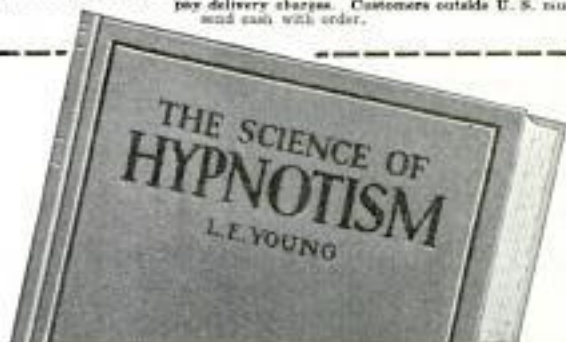
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The coming field of many great opportunities is covered by my course.



IF YOU are earning a penny less than \$50 a week, send for my book of information on the opportunities in Radio. It is free. Clip the coupon NOW. Why be satisfied with \$25, \$30 or \$40 a week for longer than the short time it takes to get ready for Radio?

Radio's growth opening hundreds of \$50, \$75, \$100 a week jobs every year

In about ten years Radio has grown from a \$2,000,000 to a \$1,000,000,000 industry. Over 800,000 jobs have been created. Hundreds more are being opened every year by its continued growth. Men and young men with the right training—the kind of training I give you—are stepping into Radio at two and three times their former salaries. J. A. Vaughn, 3107 S. Grand Boulevard, St. Louis, Mo., writes: "Before I entered Radio I was making \$35 a week. Last week I earned \$110 selling and servicing sets. I owe my success to N. R. I."

You have many jobs to choose from

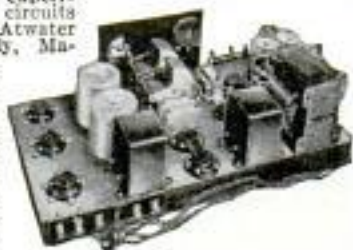
Broadcasting stations use engineers, operators, station managers and pay \$1,200 to \$5,000 a year. Manufacturers continually need testers, inspectors, foremen, engineers, service men, buyers, for jobs paying up to \$7,500 a year. Shipping companies use hundreds of Radio operators, give them world-wide travel with board and lodging free and a good salary besides. Dealers and jobbers employ service men, salesmen, buyers, managers, and pay \$30 to \$100 a week. There are many other opportunities too.

So many opportunities many N. R. I. men make \$200 to \$1000 while learning

The day you enroll with me I'll show you how to do 28 jobs, common in most every neighborhood.

I Give You 8 Outfits of Radio Parts for Practical Home Experiments

You can build over 100 circuits with these outfits. You build and experiment with the circuits used in Crosley, Atwater Kent, Eveready, Majestic, Zenith and other popular sets. You learn how these sets work, why they work, how to make them work. This makes learning at home easy, fascinating, practical.



for spare time money. Throughout your course I send you information on servicing popular makes of sets; I give you the plans and ideas that are making \$200 to \$1,000 for hundreds of N. R. I. students in their spare time while studying. My course is famous as the one that pays for itself. G. W. Page, 1331 Pine St., McKenzie, Tenn., writes: "I picked up \$955 in my spare time while taking your course."

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Now this miracle has come! Imagine a device that hangs on the wall and juices fruit with just the

turn of a crank! Even a child can operate it. New type reamer quickly gets all the juice. Specially-designed perforated strainer strains seeds, pulp and pith. No spilling, no fuss. And so easy to clean! Just turn crank and rinse—that's all! Can't rust. Guaranteed 5 years. Yet priced amazingly low. No wonder agents report up to \$8 and \$12 an hour! Rush coupon at once for full details of this and three other Speedo inventions needed and wanted in 20,000,000 homes! Write quick! Central States Mfg. Co., Dept. W-5135, 4500 Mary Ave., St. Louis, Mo.

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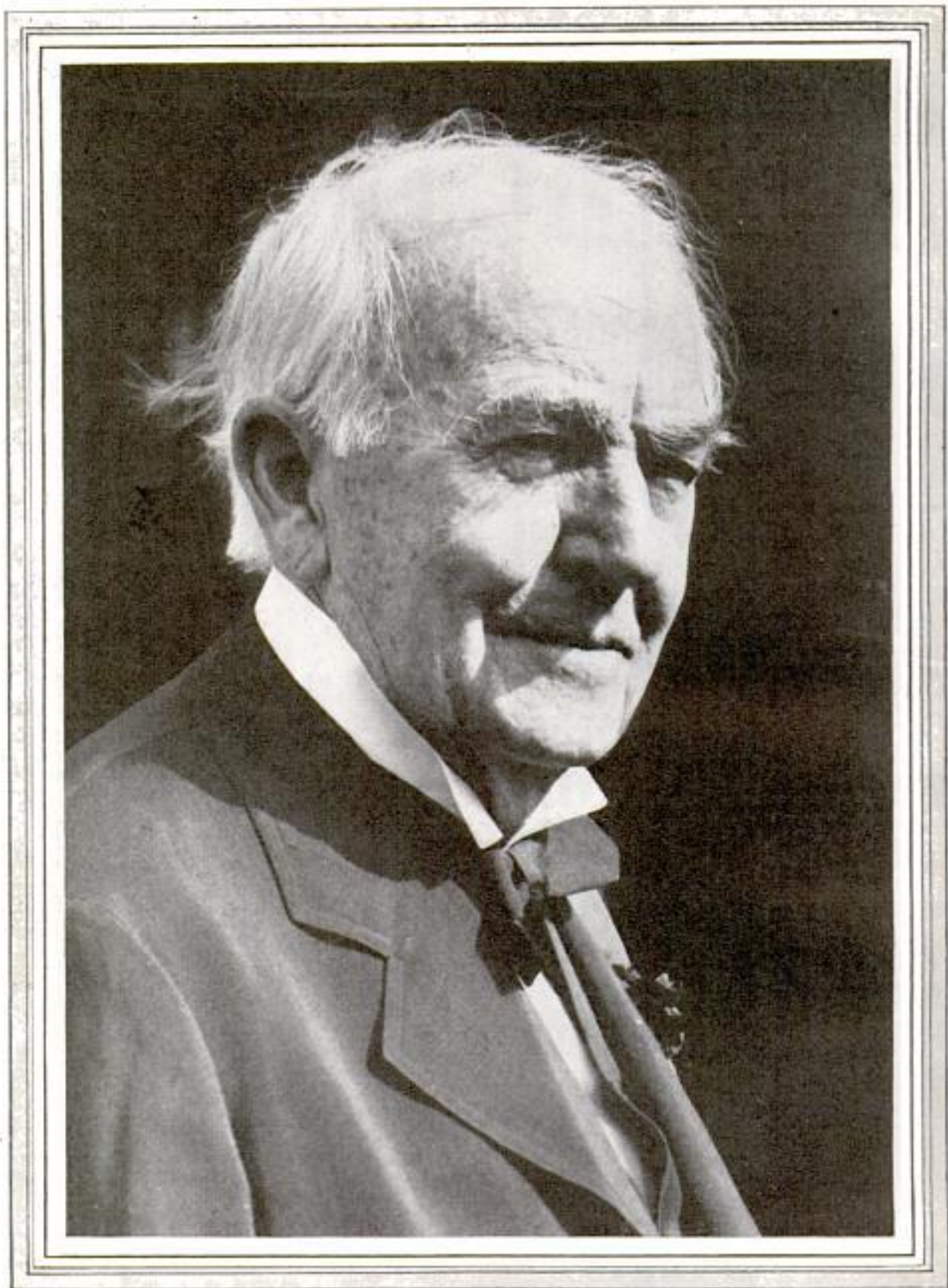
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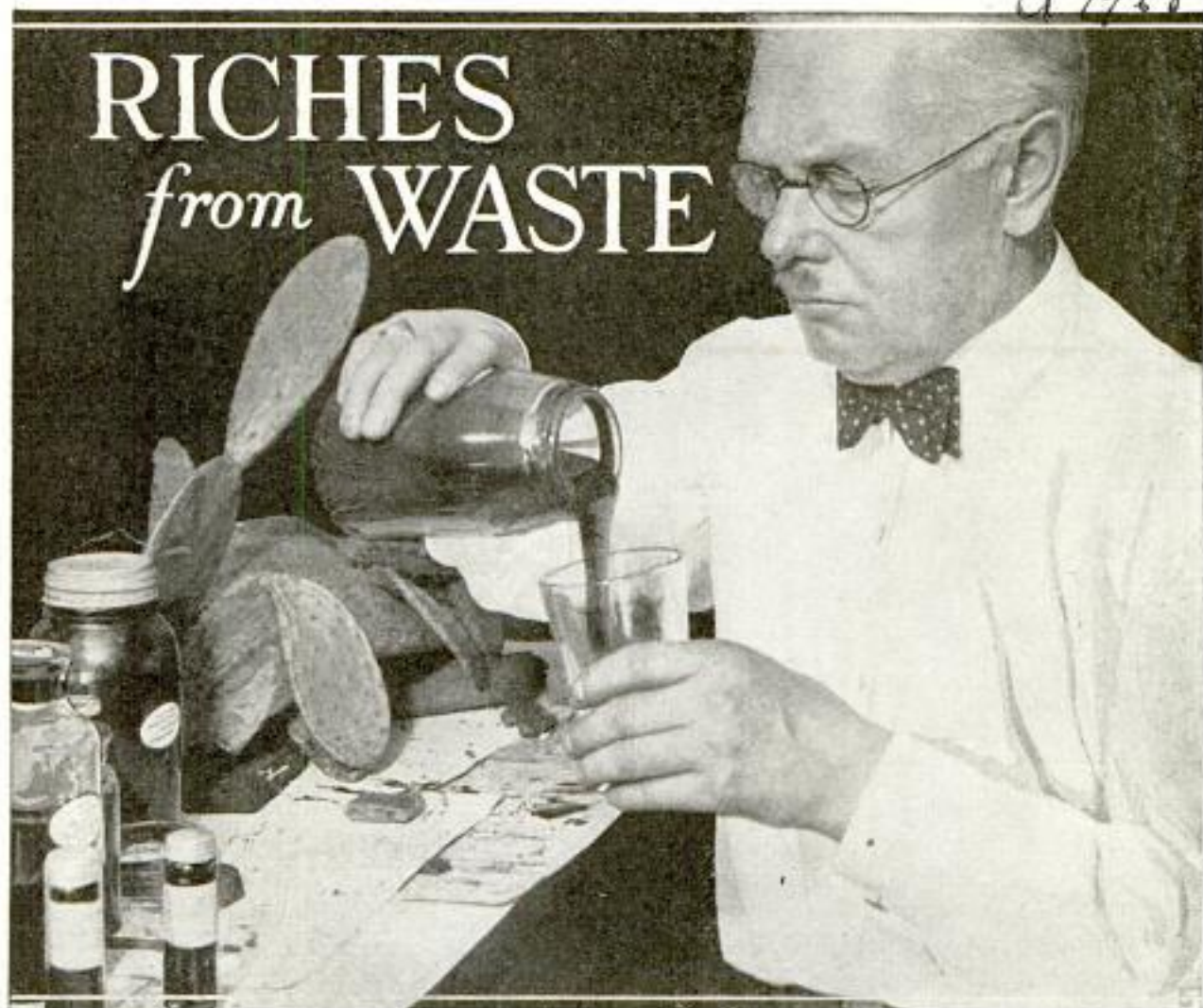
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 56

DECEMBER, 1931

No. 6

1968



RICHES *from* WASTE

The Gummy Juices of the Cactus Plant Have Been Turned into Rubber by the Los Angeles Experimenter Shown Above; the Liquid Is Cactus Sap after Cooking

THERE are many valuable things made today from material that once was thrown away as waste. Go first to the copper refineries and see what change science has made in this field. A few years ago, all copper smelters released great quantities of sulphur dioxide. This killed all the grass for miles around the plant, making for trouble with the cattle men of the west. Finally, the refineries installed equipment to use the gas to make sulphuric acid.

In time sulphuric acid became so plentiful that the price dropped and its manufacture became unprofitable. So, the

chemical engineers had to find a new and better use for the sulphur dioxide. They hit upon a plan to ship in phosphate rock and with the sulphuric acid made acid phosphates, which are essential in agricultural fertilizers. By this process, the same fumes which had formerly destroyed crops were employed to make them grow more abundantly.

About a hundred years ago, people in Pennsylvania, Ohio, Kentucky, Tennessee and West Virginia used to dig brine wells from which they made salt. Much annoyance was caused by the appearance of oil in some of these wells.

*see mag. 1930. 75-57
jan 1939. 67*
Capt. Harry K. Hobart, 71, Albemarle⁸³¹ Ave
Hempstead, L. I. New York

*Dr. John C. Wickham
cannot locate*

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9 1908
882



coins like the present-day nickel, and people who were fooled into buying a gold brick often found that under the thin coating of gold they had a solid brick of "worthless" platinum.

Then it was discovered that platinum would resist corrosion by many substances which attack other metals, and so is suitable as a container for corrosives. Since then it has steadily risen in value until now it is far more precious than gold.

Chemists working on a process to make sulphuric acid from the gas that troubled the copper refiners, knew that the first step was to add oxygen from the air, but the sulphur dioxide and the oxygen from the air refused to unite. Finally a chemist tried bringing the two substances together in contact with a platinum screen, and the combination took

In those days, people had plenty of use for salt, but there was little use for oil. It was used in a small way in medicines and was a not very satisfactory illuminant. Today salt water and oil still occur together, but it is the oil wells that are spoiled by the salt water,

Early refiners met another annoying problem. In making kerosene, they extracted a rather explosive substance for which there was practically no market. They even had trouble in throwing it away. They poured it on the ground and frequently into rivers. Many fires of sudden and unknown origin were caused by this. Laws were passed forbidding dumping of the liquid, and the refiners were at their wits end to get rid of it. Today it is this fluid for which refineries are mainly operated. It is gasoline!

Just as dramatic as the stories of copper fumes and gasoline is that of platinum. At one time it was so cheap that the Russian government used it for small



First Step in Turning Corncobs into Furfural, Above, and Seaweed for Making Bread

place immediately. In like manner platinum screens force ammonia to take oxygen out of the air in making nitric acid.

91971

In these chemical processes the platinum itself is not altered.

The creamery is the field of another big chemical triumph. The old nursery lines can be truthfully paraphrased: "Where are you going, my pretty maid?"

"I'm going to milk the cow, sir, not only of milk, but of unbreakable cups and saucers to serve it in, eyeglass rims, beads, fountain pens, massage cream, glue and waterproofing paints."

This may seem like a fairytale, but all these articles are made from milk, and not the milk we drink either, but from the skim milk that dairies used to throw away.

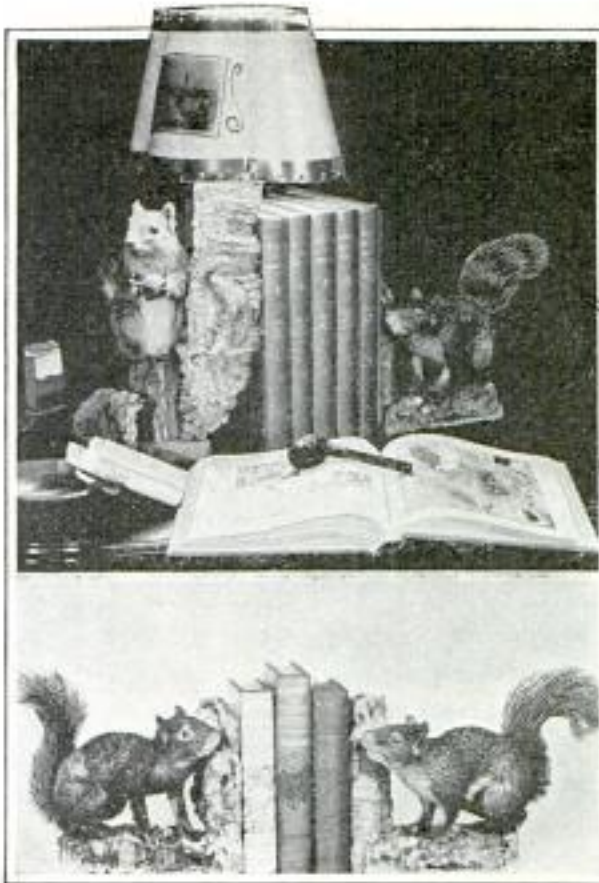
91966

ELECTRIC STOVE FOR WIENERS COOKS AUTOMATICALLY

Operated as simply as a toaster, an electric frankfurter cooker is being offered to simplify the making of this form of sandwiches. The cooker can be operated on the kitchen or dining-room table from any wall socket. It consists of a colored base on which is a tray with individual compartments for the sausages. Water is placed in each compartment and becomes part of the electric circuit when the current is turned on.



Electric Frankfurter Cooker with Individual Compartments in Which Water Is Placed



Examples of Book Ends and Table Lamps Made by Mounting Small Animals on Wooden Bases

SMALL ANIMALS ARE MOUNTED TO MAKE BOOK ENDS

Persons who have taken up taxidermy as a hobby recently have been devoting their skill to the making of useful and artistic home decorations by mounting the commonest of small birds and animals, such as squirrels, rabbits, frogs and pigeons. Squirrels, for instance, are being mounted on the natural bark from trees to form attractive book ends, and these and other small animals come from the taxidermist as the bases for electric lights or ash trays. Other mountings are made to form gun racks, tie racks and thermometer holders.

2049

GLACIERS TELL THE WEATHER

That glaciers foretell the weather as well as regulate drouth and flood, was the recent statement of a Norwegian scientist. He cited the result of great advances in Norwegian glaciers between 1720 and 1740, which period terminated with three years of famine because the summers were cold and wet so that the cereals did not ripen.

W. Wernerskiold
in paper before
Asn. Advancement of Science
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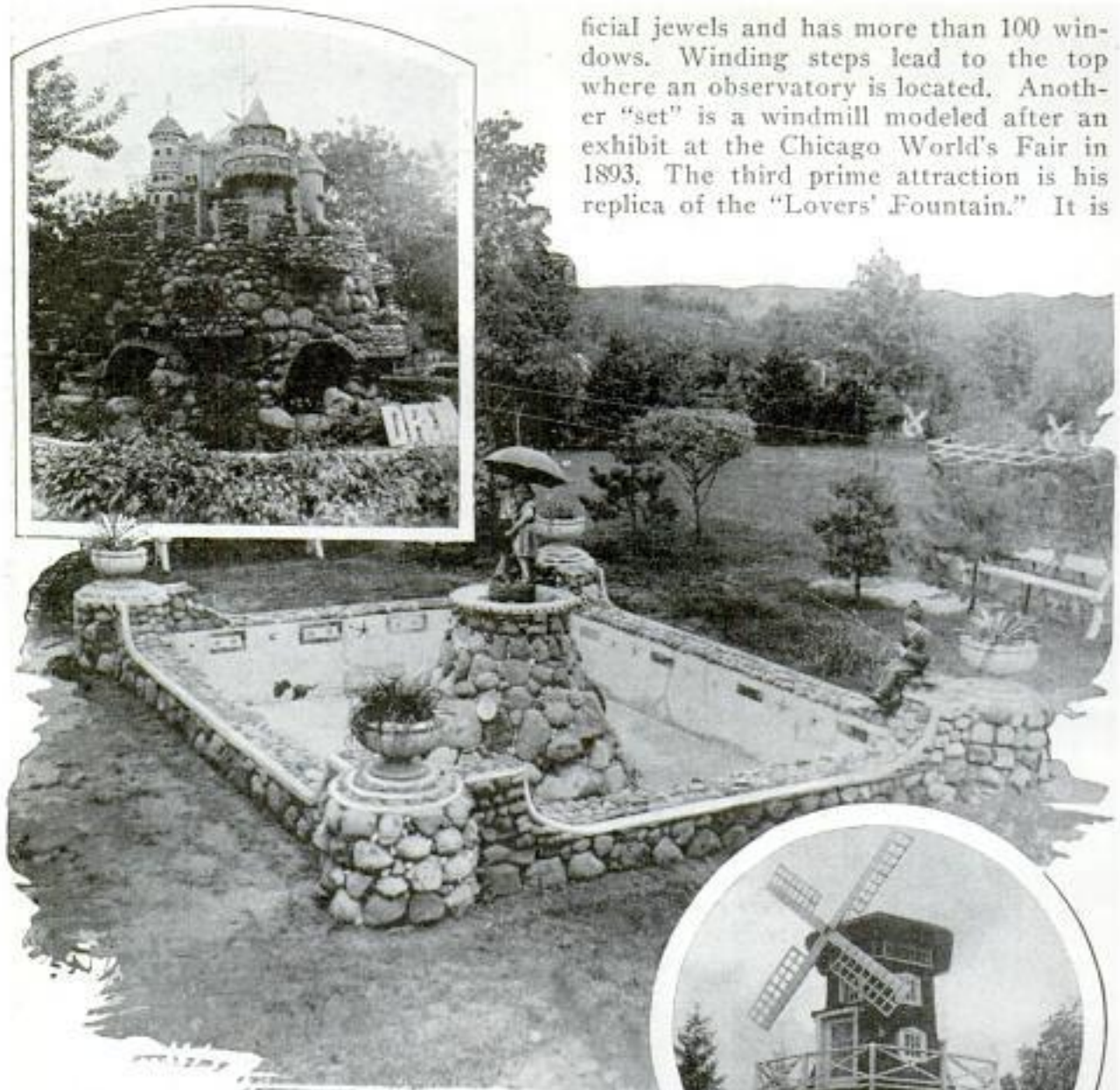
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a 1908

Miniature Castle Built in Huge Rock Garden



ficial jewels and has more than 100 windows. Winding steps lead to the top where an observatory is located. Another "set" is a windmill modeled after an exhibit at the Chicago World's Fair in 1893. The third prime attraction is his replica of the "Lovers' Fountain." It is



Famous "Lovers' Fountain" Reproduced in a Rock Garden; Miniature Castle Is Seen Above, and, at the Right, a Windmill That Really Runs

Fifteen years ago, a retired industrialist of Fox River Grove, Ill., purchased four acres of wooded land. Working in secret since that time, he has constructed a gigantic rock garden, including three magnificent replicas of attractions in other lands. One of these is a miniature castle, modeled to scale after one built abroad between 500 and 600 years ago. The miniature is entirely hand-carved, has a tile roof and is decorated with hanging baskets of flowers cut in the rock. It has four floors, each with different-colored art-glass lights. It is studded with arti-

seventy-five feet long and thirty wide with two human figures in the center.

a 1996
ALUMINUM-WIRE BRUSHES

Brushes which are claimed to stand long service in the application of acids have been placed on the market. Made of aluminum wire, these swabs will resist, for a long time, the effects of acids used by sheet-metal workers.

*Cleveland Acid Swab Co
2003 Marlow Ave
Cleveland Ohio*

*John Legah Dr.
open to public*

Developed by U. S. Bureau of Standard
 Washington, D. C.
**EYE-AND-EAR SIGNAL FOR PILOT
 TO MAKE FLYING SAFER**

at Radio. Electrical
 1952 World's Fair
 POPULAR MECHANICS 885
 Madsen Square Garden
 N.Y.

A2
 78 S. Kearney, So. W. Wintermole

Combining eye and ear signals for pilots, a radio transmitter now being tested is expected to make flying safer. The transmitter sends impulses which vibrate two small reeds in an indicator installed in the plane. When the plane is on the course, the reeds vibrate at the same rate and show two narrow white bands. Off the course, the reeds vibrate unequally, the rate increasing on the side to which the plane is veering and creating a wider white band there, while the width of the band on the other side decreases. At the same time, another transmitter, operated on the same frequency, may send directions, weather reports or other information by voice. The plane's one receiver catches both signals, but a small filter separates the voice from the reed impulses and sends the voice to the pilot's headphones.

10/3/51
 Stevens News Letter



Small Piano Which Also Contains a Radio; Either Instrument Can Be Played Independently

**RADIO AND PIANO COMBINED
 IN ONE CABINET**

One of the latest musical instruments is a small piano which contains a radio with a control panel beside the music rack. With this combination, the musician finds it an easy matter to turn on the radio receiver and play some accompaniment to the program on the piano, although either instrument can be used independently.

Mohawk Corp.
 All. America
 North Tonawanda, N.Y.

**DRILL TABLE AND VISE IN ONE
 FOR ODD-SHAPED WORK**

To enable the operator to make secure set-ups quickly, a combination drill table and vise is being offered to replace the customary table on a drill press. It is actually a split table, with vise jaws faced with steel, and eliminates the use of clamps, angle irons, parallels, V-blocks and other equipment to prepare odd-



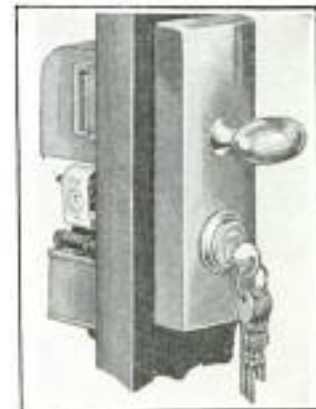
shaped work for drilling. The jaws hold the work securely and rigidly, preventing much drill breakage and eliminating scrap and waste caused by imperfect work. For regular drill presses, the shank is accurately

turned to size, but for electric and speed drills and radials, special mounting arms are available. Four different sizes are obtainable.

608 S. Dearborn
 Chicago

**LOCK TELLS TIME OF OPENING
 AND KEY THAT DID IT**

A recording lock that not only tells the time it was opened but the key that did it, has been placed on the market. It can be used in connection with any standard make of door fitting. It prints on a tiny paper roll, like that in a cash register, what time the door was locked and each time it was opened. It has facilities for as many as six keys, each making its own forgery-proof imprint on the roll.



1927

Names and addresses of manufacturers of articles described in this magazine will be promptly furnished, free, by our Bureau of Information.

Modern Machine Tool Co., 601 S. Water St., Jackson, Mich.

The Recording Lock Co., 536 Spring St., Columbus, Ohio

a 1932
886

Cont. Elm Blasseman, 55 W. 86th
New York

Microphone Like Bomb Makes Better Talkies



"Shooting" Scene with Bomb "Mike"; Two Types of Microphone Contrasted at Left



that no matter how perfect the interior mechanism, a certain amount of distortion crept in. The "gas pipe" type worked perfectly only when the sound came directly into it from the front. Working back to an old principle of physics that a spherical body obstructs the passage of a sound wave less than any other form, engineers found that a spherical microphone housing gave better results from a distortion standpoint than any previously tested. The new instrument, it is said, can transmit almost every sound wave audible to the human ear. The new "mike" weighs less and has one-third fewer working parts than formerly used.

Microphones that are round and black and look like bombs have been adopted at a California talkie studio, after many experiments. Engineers heretofore have concentrated largely on sound pick-up in the microphone rather than on the housing of the instrument, and it was found

RUINS SHOW STONE-AGE RACE LIVED IN PHILISTINE CITY

Excavations on the site of Gaza, the Philistine stronghold whose gates were carried away by Samson, recently uncovered evidence of human occupation

a 2027
Bureau Service 9/29/31
Copyrighted material

metro. Soldwyn Mayer

Hollywood, Motion
Picture Equipment Co. Ltd.
6416 Selma Ave Los Angeles Calif

running back to the latter half of the stone age. The latest period of occupation was that of the Hyksos, wild horsemen who buried their horses with their warriors. Horse skeletons were found alongside human remains. Beneath the Hyksos stratum, evidences of the older Canaanite culture were discovered. This race had city planning, public baths and well built religious shrines. Earlier still were signs of another invasion from the north, that had destroyed the titanic fortifications of the copper-age civilization, which fades back into the later stone age.



Crashes of Student Planes Are Eliminated by Suspending the Training Ship from a 1,000-Foot Cable

PLANE FLIES ON TROLLEY WIRE TO TRAIN STUDENTS

Safety under real flying conditions has been attained by suspending a training plane from a 1,000-foot cable, strung between masts at a height of fifty feet. The plane, equipped with a four-cylinder motor, thus can fly 1,000 feet with the student protected at all times from crashing.

"TIRED" GLASS IS REJUVENATED BY HEAT TREATMENT

When special glass used to pass ultra-violet rays becomes opaque or too "tired" to let these health rays through, heat treatment will pep it up. Tests at the bureau of standards show that if the glass is subjected to five hundred degrees Centigrade for a few hours, it will be rejuvenated to ultraviolet transparency. Chemical changes involving oxidation of the iron content in the glass are usually held responsible for its gradually becoming opaque to the health rays. It seems that the glass absorbs light when in use. Under the heat treatment, the glass gives off its pent-up light in a glow which lasts until the discoloration has disappeared and it is ready to serve again.

ADJUSTABLE GOLF-CLUB GRIPS TO CURE TROUBLES

Adjustable thumb grips for your golf clubs promise a cure for many ills of the game. They can be "whipped" on the shaft at the correct points to prevent hooking, slicing and slipping in rainy weather. The individual grips are made of aluminum and two of them provide the correct position for both thumbs. The fingers of each hand then fall naturally into position. The grips are especially useful in golf schools.



Golf-Club Grips That Can Be Fitted to Any Hand and Correct the Golfer's Control

where the correct grip is one of the most difficult points to teach.

Over 300,000 motion-picture projecting machines of the sixteen-millimeter class are in use in the United States.

W. O. Butler,
 400 W. Madison
 Chicago

A. Q. Tool and R. Stair,
 Washington, D. C.

351 W. 4th St. New York City

Developed by Public Air
 Service Corp.
 351 W. 4th St., New York City

1943

Saf. Plane

come

1804, 316 9/5/31

Detector

same service

a 1953

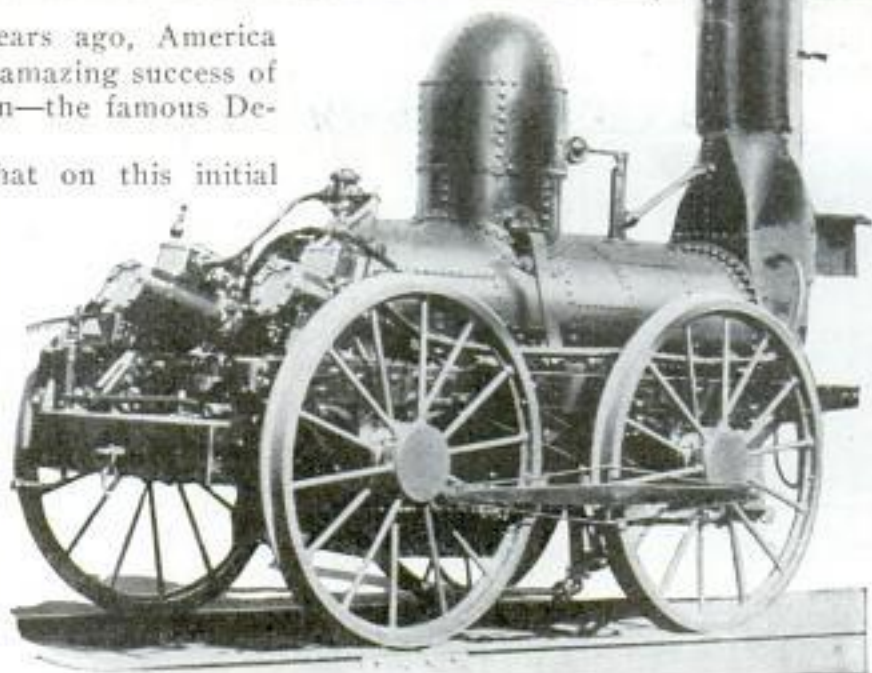
MASTER MODEL



JUST a hundred years ago, America was agog with the amazing success of its first passenger train—the famous DeWitt Clinton.

Tradition relates that on this initial trip of the Mohawk and Hudson railroad, the original unit of the New York Central lines, the passengers' clothes caught fire from the "chimney" of the locomotive, and that the cars jolted so much fence rails were placed between them as bumpers.

A replica of the old train, with many of the original parts, is now to be seen in the Grand Central station in New York City, and beside it is



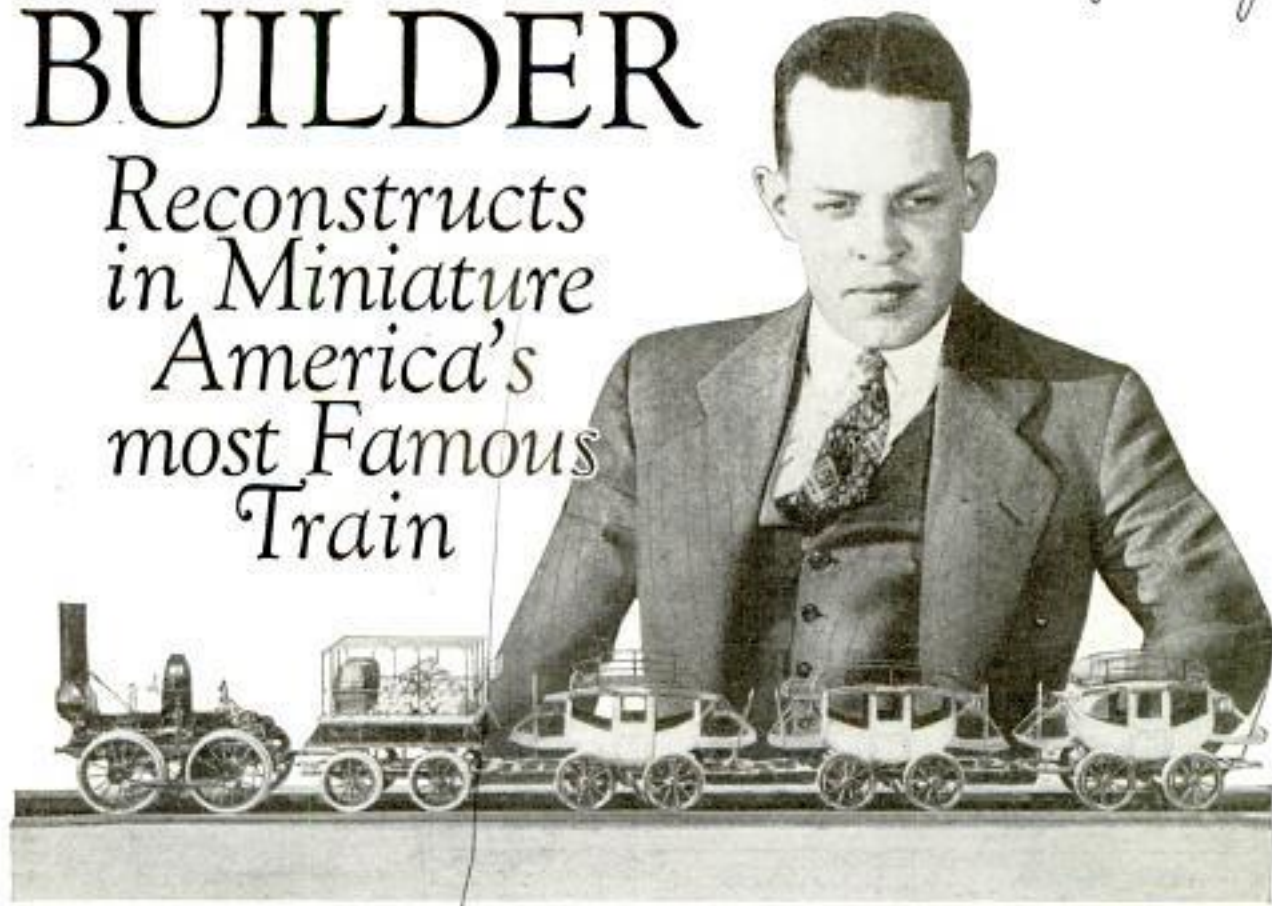
"Centuries" Passing Each Other at Buffalo, and, Below, the Old DeWitt Clinton Engine in Replica at Grand Central Station

an exact scale model—the delight and wonder of every craftsman who views it.

R. H. Claudius, 919. 80 M M
Brooklyn, N.Y.

BUILDER

Reconstructs
in Miniature
America's
most Famous
Train



Reginald H. Claudius with His Model of the DeWitt Clinton Train, Built to Exact Scale and Exhibited by the New York Central Side by Side with the Full-Size Replica

This is the work of R. H. Claudius, who began model making as a pastime, but who, through it, has achieved both fame and advancement in his profession.

During the war, Mr. Claudius served on a torpedo-boat destroyer. Afterward he went to the New York Central lines as a fireman's helper in the electric-locomotive service. "My duties consisted in getting the engines ready for the road, seeing that fuses, switches, third-rail shoes, controller and lights were ready for service," he says. "Then the idea struck me to start building a model of one of the locomotives on which I worked. I wanted to see just what a locomotive would look like if it had had a good bath and shrunk up to the size of a toy.

"My workshop was the kitchen, my workbench was the washtubs, my tools consisted of a few twist drills and hand-drill stock, some small files, both coarse and fine, a hacksaw, a jewelers' saw, gas pliers, cutting pliers, small bench vise and tin snips. In addition to the above, small machine screws were purchased and necessary material was stocked."

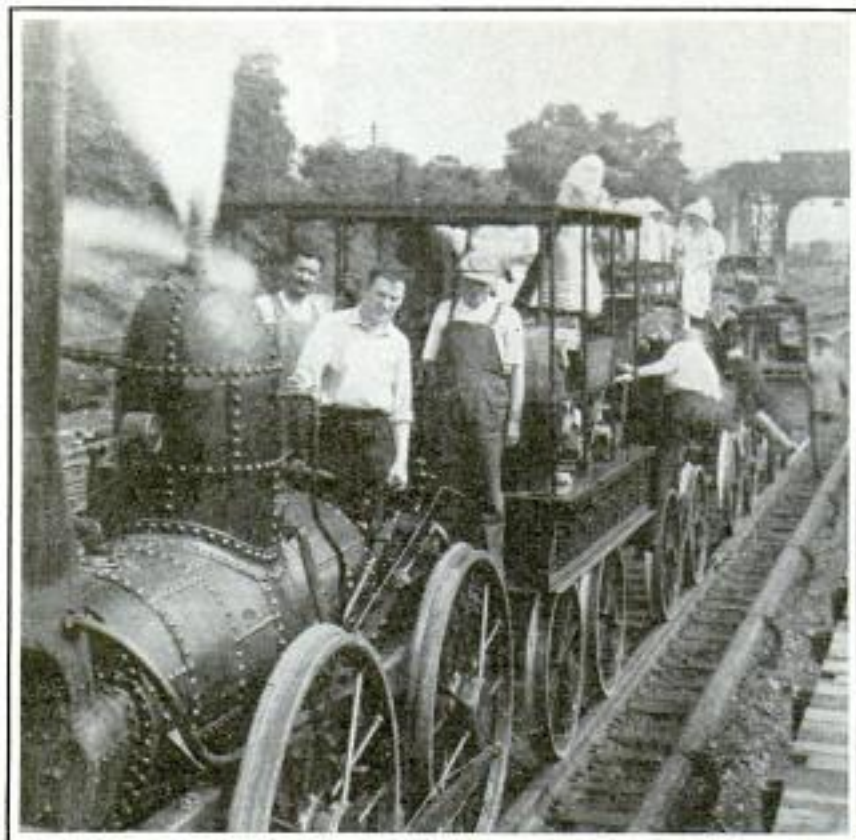
"After ten months' work, the locomotive was finished, packed carefully in a box and sent to the master mechanic, who became interested not only in the model, but in the way it was built, and that none of the time consumed in constructing it had interfered with my regular work. The model was then sent to the electrical engineer and was placed on exhibition. I was then transferred to the electrical engineering department.

"Shortly after, I was assigned to build an exact replica of the famous Twentieth Century Limited, including the new Hudson-type locomotive and tender, three standard Pullman sleepers, club car and one observation lounge car.

"I fell heir to this job on account of past performances, and started immediately to improve my shop, having moved from an apartment to a private house with a good-sized cellar which was readily converted into a workshop. The machines installed were:

"One electric drillpress (bench size), one foot punch press, one sheet-metal hand shear, one small lathe, with scroll

ca 1953
890



Thomas Meighan, Movie Actor, at the Throttle of the DeWitt Clinton Replica during the Centennial Pageant

constructed on the same scale of one-half inch to the foot. Exact details of how to build this DeWitt Clinton engine, tender and three stage-coaches will be given in following issues of Popular Mechanics Magazine.

"Model building is one of the most fascinating and profitable pastimes, I know. Its principal requirement is patience."

While the DeWitt Clinton was not the first locomotive to turn a wheel in America, that honor belonging to the Strombridge Lion, it exercised a greater influence in the development of the railway than any other of the pioneer locomotives, and its niche in the Hall of Fame is

second only to that of Stephenson's "Rocket." The weight of the DeWitt Clinton was 6,758 pounds. It had two cylinders, one in each side of the engine at the rear end of the boiler, of five and one-half-inch diameter and sixteen-inch stroke. It was rated at about ten horsepower. Experiments with this locomotive developed some troubles. The steam-supply pipe lead-

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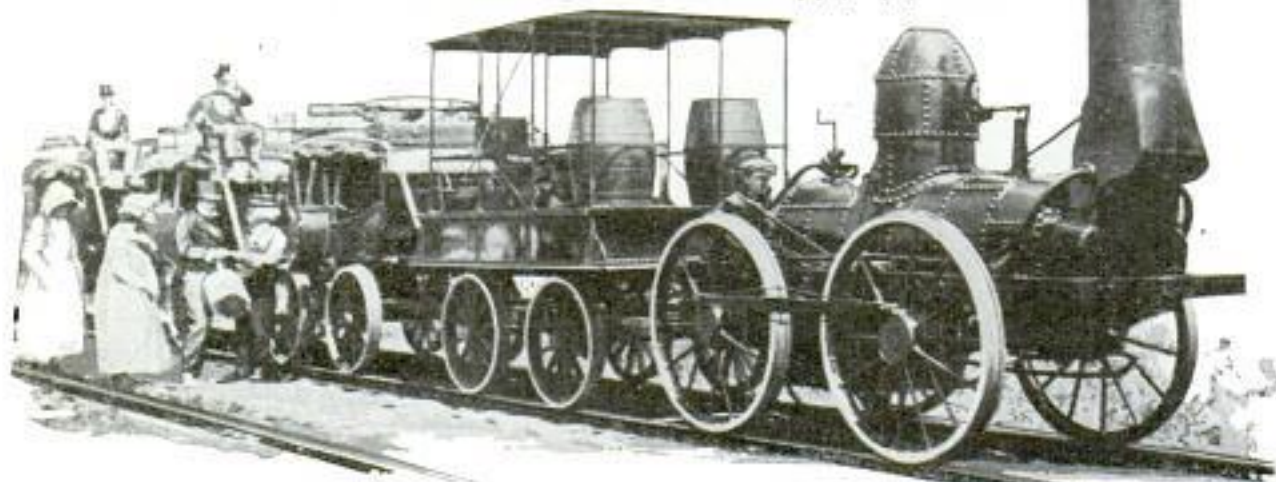


Photo of the DeWitt Clinton Train Taken during the Pageant Which Celebrated the One-Hundredth Anniversary of the Chartering of the Mohawk and Hudson Railroad

ing to the cylinders probably terminated in the upper part of the boiler, for the surging of water in the boiler was so great it passed over into the cylinders.

The draft was bad, and the chimney, as the smokestack was then called, was too large. An effort was made to use anthracite, but it was found to pack and required a blast. An artificial blast was given and then the heat seemed too great in one place and too scant in others and melted the grates. Resort was then had to wood, and that was the fuel used on the first trip.

What it did not have in the way of the very simplest appliances which were soon found to be indispensable on locomotives, is somewhat remarkable. There was no headlight, no bell, no whistle, no spark arrester in the stack, no cab. The engi-

neer stood on a small platform at the rear of the boiler without protection from the sun or weather, nor was there any covering or protection for any of the levers or machinery. The fuel had to be passed by the fireman into the furnace over this small platform on which the engineer stood, having no seat so far as can be learned, and how the two could do their work in the narrow space is something of a mystery.

It is said its average speed, drawing three loaded cars of about eight tons' weight, was fifteen miles an hour, but that it frequently did thirty miles an hour with the same load. It was used only between Western avenue in Albany and the head of the inclined plane at Schenectady, a distance of about seventeen miles.

Build This Model and Win a Prize

IN following issues of this magazine you will find a series of articles by R. H. Claudius telling exactly how to build a scale model of the famous DeWitt Clinton train. To encourage model builders, Popular Mechanics will offer the following prizes:

First Prize, \$1,000 in cash, and a week's visit to New York via the New York Central's Twentieth Century Limited.

Second Prize, \$500 in cash, and a week's visit to New York.

Third Prize, \$250 in cash, and a week's visit to New York.

In addition, there will be five prizes of \$50 each, and ten of \$25 each for the next best models. In the event of a tie for any prize offered, a prize identical in all respects with that tied for will be awarded to each tying contestant.

The contest is open to all residents of the United States and Canada, and, instead of the trip to New York, a similar trip to Chicago may be substituted at the option of the first three winners should they reside in the east.

The judges of the contest will be Mr. Claudius, H. H. Windsor, Jr., editor and publisher, and officials of the New York Central Railroad. The date for closing the contest will be announced in the final article.

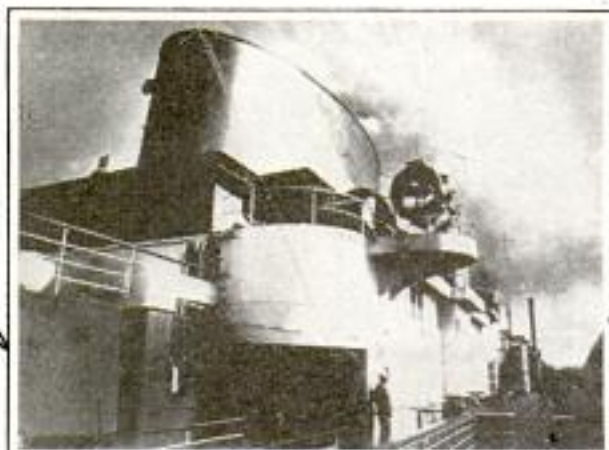
All contestants will be required to submit photographs of their models, and, in case of necessity, the model itself may be requested for inspection by the judges. All models will be returned.

In the latter case, shipping charges will be paid by Popular Mechanics Magazine.

Watch for the Next Issue of Popular Mechanics

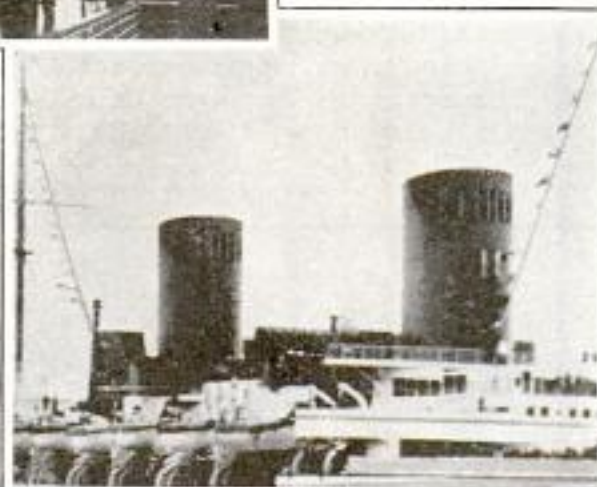
Berley Beach, in London, Eng

Ocean Liners Fitted with Smoke Deflectors



Smoke and gases, always annoying to passengers on ocean liners and coast-wise vessels, are being diverted from the passenger decks and thrown high into the air by deflectors. The discomfort caused by coal and oil smoke and gases falling almost directly onto passenger decks has long been a problem for transatlantic ship lines.

Several methods of diverting the smoke have been tried, but none seems to have been as successful as that used on the liner "Bremen," which is operated between New York and German ports. At first the "Bremen" had short smokestacks, apparently cut off to permit the liner to pass under bridges. These short funnels caused the smoke to pour down on passengers, resulting in constant complaints. The steamship company elevated the "Bremen's" stacks and then pierced each of them near the rim. Baffleplates then were installed behind the slits in each stack, so that smoke and gases were thrown high into the air, rather than down on passenger decks, as the liner steamed against high winds at sea, and this method of smoke elimination is being tested by other ship lines. Another big ocean liner, soon to be placed in serv-

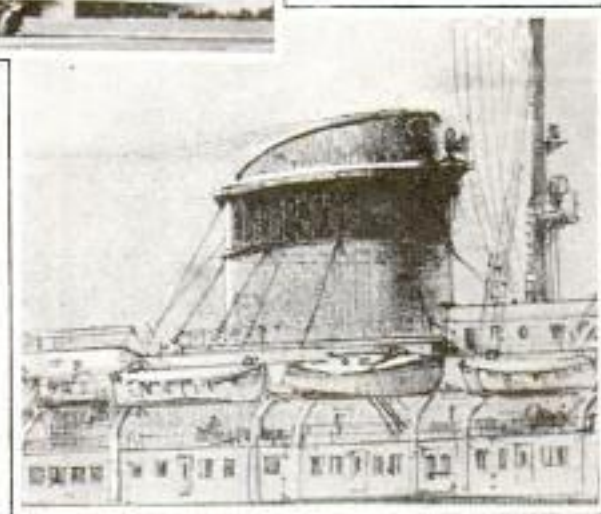


Courtesy Norddeutscher Lloyd
Top, the "Bremen" Before Its Stacks Were Elevated; Center, the Liner's Raised Funnels, Pierced for Baffleplates; Right, French Ship "Champlain"

ice between Havre, France, and New York, via Plymouth, England, is equipped with similar devices. This ship, the "Champlain," has a short funnel with deflectors built in near the rim.

NEW FORM OF LIVER EXTRACT CURES SECONDARY ANEMIA

Secondary anemia, a common human affliction, has been cured in dogs by use of a new form of liver extract. This form of anemia is usually accompanied by great physical or mental lassitude. The extract developed in the tests on dogs is palatable, unlike other forms which usually cause the stomach to rebel at tak-



ing the large quantities of liver necessary. Secondary anemia is more common, and the patient's recovery is slower than in pernicious anemia.

Chicago Trib. 10/5/31

THIRTY-DEGREE V-TYPE MOTOR HAS LESS VIBRATION

Cylinders set at a thirty-degree angle and firing in staggered order produce less vibration in a motor developed especially for use on fire-truck equipment. The

Bremen, Germany

Developed by Dr. C. H. Whipple, Head of Medical Research, H. J. Wilkins & Co., Boston.

American La France
and Foamite Corp

a 1903

POPULAR MECHANICS
963 Erie St, Amherst, N.Y.

893

McCormick Harvesting

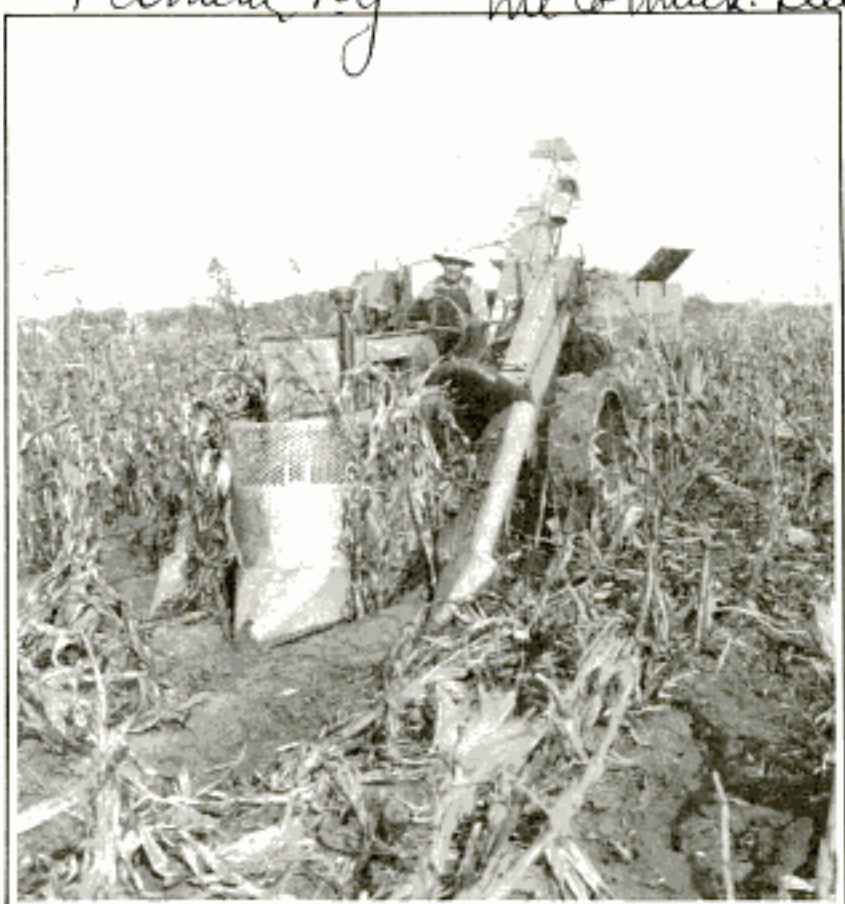
Chicago - 3830 S. Michigan

motor has twelve cylinders, with the theoretical smoothness of twenty-four. It was built for double duty, as a propulsion unit and also for driving fire pumps. Horsepower at 2,800 revolutions per minute is 245, giving a speed of sixty miles an hour. For pumping purposes, the engine will deliver 1,500 gallons a minute through attached hose.

a 1980

MACHINE SHOP ON AUTO PAYS COST OF TOURING

Installation of a number of machines on his automobile enables a Denver man to combine pleasures of touring with the necessity of going after business. He closed a completely equipped saw-filing and tool-grinding shop, mounted a few of the smaller machines on his coupe and began an extensive tour. A fair profit was earned over and above all touring expense. Four electric motors and a number of other tools were mounted on sturdily constructed platforms, the framework for which was fastened to the car.



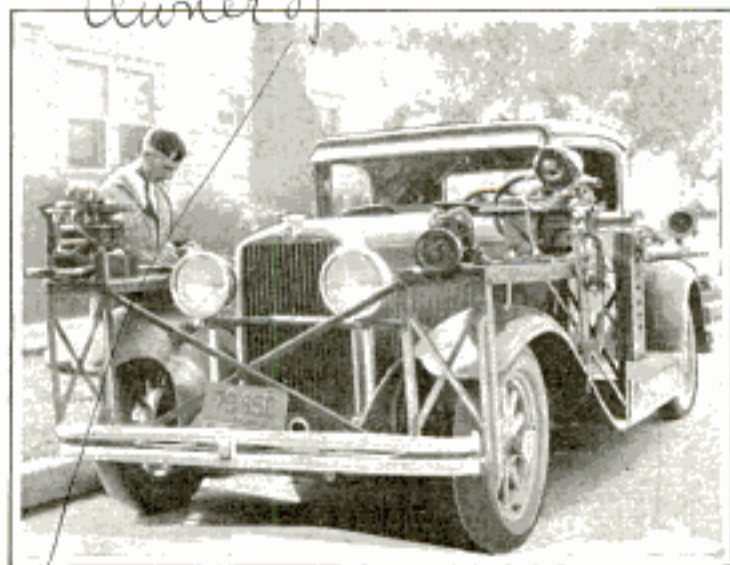
Corn Picker and Husker That Harvests Any Two Rows in the Field at One Time; Two Men Do the Work of Sixteen

PICKER AND HUSKER FOR CORN DOES WORK OF SIXTEEN

Two men with the aid of a new corn-picking and husking machine, can harvest sixteen to eighteen acres of corn in a ten-hour day, the work of sixteen men of average skill. The harvester picks and husks two rows at a time and can enter the field at any point and travel down the rows without disturbing adjacent ones. One man operates both picker and tractor, while the other handles the unloading of the wagon.

International Harvester Co.
606 S. Michigan Ave Chicago

Owner of



Complete Grinding and Sharpening Shop Fitted on an Auto That Pays Its Owner's Touring Expenses

Keen Edge Shop
2357 S. Cherokee Denver, Colo.

STEAM ROLLER RIPS UP PAVED ROADS a 2043

Iron claws have been fitted to a steam roller for ripping up asphalt roads which need to be repaired. The claws dig one to five inches deep, tearing up the hard paving material as it goes, and saving the cost of a large crew of laborers.

maker
Columbian

91944



Wes Work

High-Speed Hydroglider, a Motorboat with an Air Propeller Mounted at the Rear; the Craft Travels Better Than Forty Miles an Hour and Can Be Used in Very Shallow Water

AIR PROPELLER ON MOTORBOAT GIVES HIGH SPEED

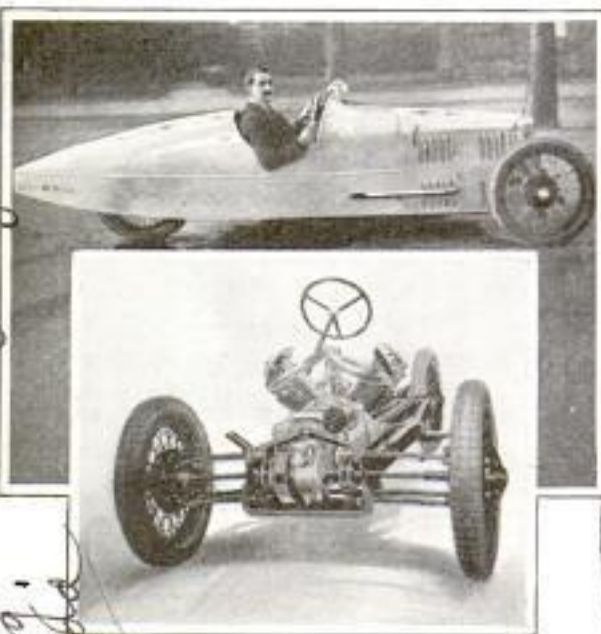
One of the latest developments in high-speed water craft is an air-propelled motorboat, or hydroglider, produced in England. It has accommodations for eleven persons and makes between forty and

fifty miles an hour. An air-cooled rotary engine of 140 horsepower is installed in a streamlined housing at the rear, and drives the four-bladed air screw directly as in airplane practice. The use of the air screw enables the boat to run in shallow water where a craft fitted with a submerged propeller could not be operated.

THREE-WHEELED RACING CARS GIVE AMATEURS A THRILL

Three-wheeled amateur racing cars of extremely light weight and fitted with

aluminum bodies, recently achieved a speed greater than eighty-six miles per hour in France. From the front both have the appearance of the normal automobile except for size. One model was fitted with an air-cooled two-cylinder engine and front drive. The other was water-cooled and was powered by a four-cylinder engine equipped with a standard form of transmission.



Three-Wheeled Race Cars; the One Below Is Driven by the Front Wheels Instead of Rear

REDUCTION OF IRON CORROSION AUGHT IN SOIL STUDY

Reduction of corrosion losses in iron and steel is the object of soil studies by the bureau of standards. Use of less corrodible material and the coating of steel with a material less susceptible to soil action are two ways in which the bureau is fighting corrosion. Several varieties of copper, lead and brass have been found to resist soil action. A lead coating and galvanizing appear to have added life to pipe and to have retarded corrosion materially in many soils.

a204

*Journal of Research
Washington, D.C. Sept
issue*

*Cont. Henry Hech, Civil
Engineer, 47, Zwenfeller Str
Stalbeq.
Chinele
Larmant*

*England -
British Small
Arms Soc. Birmingham*

Baltimore, Md a 1973

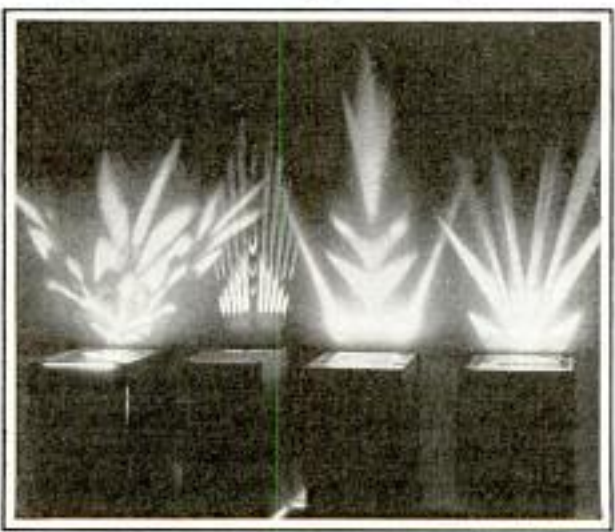
Science Service 10/3/51

VARIATIONS IN MAN AND BEAST HELD BASIS OF PROGRESS ^{a 20 34}

Variations in all living things form the basis of evolutionary progress. This is the conclusion of Dr. Adolph Schultz, of Johns Hopkins medical school, who explains that no two individuals, no matter how much they may be alike, are absolutely alike in all respects. Without variations there would be nothing to select from, and without selection, there would be no progress or at least no lasting change in, or evolution of, our physical makeup, explains Doctor Schultz. Even twins are not identical. Absolute symmetry does not exist in nature, and control of selective factors is what the scientist seeks to gain in his attempt to produce a better race.

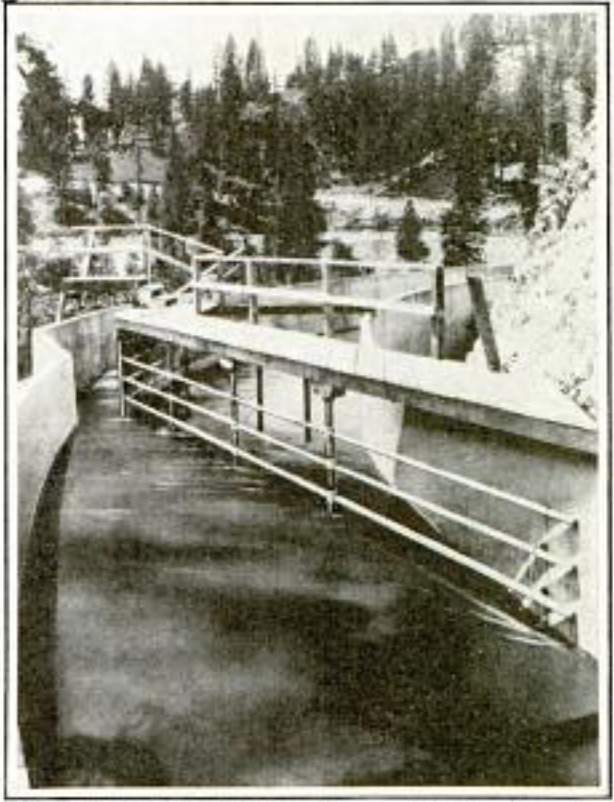
LIGHT PAINTS WALL DESIGNS WITH CUT-OUT PATTERNS ^{a 1963}

Light, projected through cut-out patterns, is being used to produce decorative wall designs. The source of lighting is placed within an inclosed area, painted black to avoid reflections, on which the pattern is placed. The light then throws the design on wall or ceiling. Any design of simple pattern can be cut from thin wood or wallboard. Designs in color may be projected by placing colored gelatin over the patterns. Mirrors can be mounted beside the lamps, thus throwing the cut-out image in several positions. Dimmers may be used to make parts of the design fade and reappear.



Cut-Out Patterns, Placed over Electric Lights, Produce Unusual Wall or Ceiling Decorations

Com. C. Randolph Yeager, % Natl Lamp Works, Nela Park, Cleveland, Ohio.



Iron Bars across Flumes Force Animals from the Water and onto a Ramp

DEER ESCAPE BUILT IN FLUME SAFEGUARDS ANIMALS

Deer escapes have been built into water-power flumes in the west to save deer, bear and other animals which get into water either deliberately or accidentally. There are two places at which an animal in the steep-sided flume has no choice but to get out. There the conduit widens from fourteen to nineteen feet and a ramp is constructed at one side. Iron bars across the flume not only prevent the animal from going farther in the water, but steer him onto the ramp and then he has only a few feet to dry land. In both instances the deer escapes lead to actual paths made by deer.

Com. Mrs Mary Isleson 280 Chronicle Bldg - San Francisco Calif

ICE FORMED OVER HOLE IN SHIP TO PREVENT ITS SINKING ^{a 20 35}

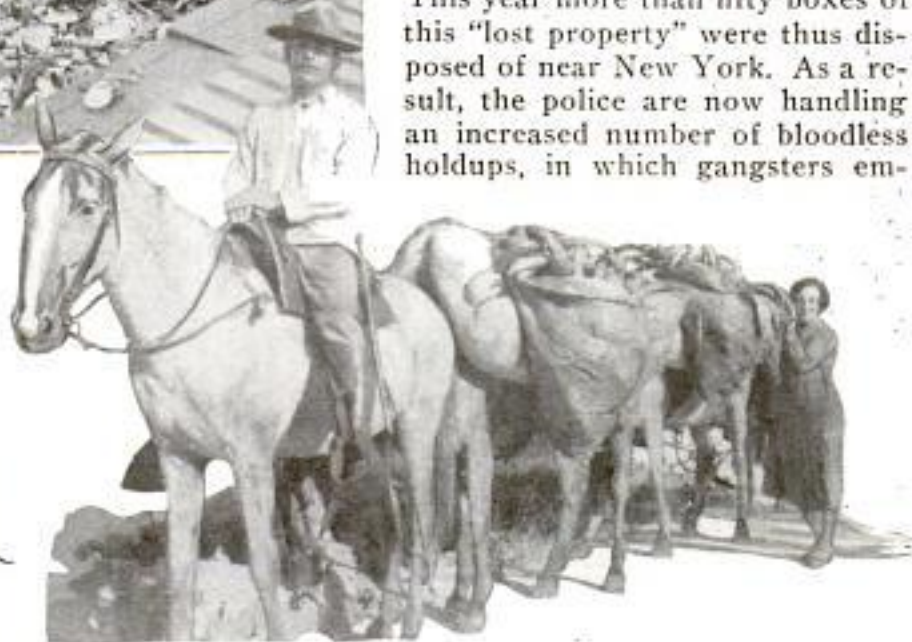
Forming ice over a hole in the bottom of a ship by refrigerating apparatus is the process recently developed to prevent the sinking of a damaged vessel. The refrigerating equipment is placed over the hole, preventing water from entering, and the machine, working under pressure with ammonia, forms ice which closes the hole.

Davis Company ny James 10/21/31

War on Organized Gun Running for Killers



Above, Dumping Confiscated Weapons in New York Harbor; Right, Pack Train Such as Is Used to Smuggle Guns into Country



fully concealed by removing numbers, etc., may be worth even as much as \$50 to \$100 to a slayer. These pistols, shipped legitimately to Mexico from Spain are smuggled into New York by fruit boats or slipped over the border by peons in bags of produce. One gunning ring located in New York brings firearms to that metropolis in such manner. Once a pistol or revolver has been seized from a gunman, it is destroyed. Bombs, "pineapples," are destroyed immediately, while small firearms, knives, sword canes and blackjacks are collected by the lost-property clerk of the police department, trucked to a scow and taken out to sea to be dumped. This year more than fifty boxes of this "lost property" were thus disposed of near New York. As a result, the police are now handling an increased number of bloodless holdups, in which gangsters em-

During the past year, gangster slayers have discovered to their amazement that ballistic experts have developed an uncanny knack in tracing bullets back to the pistols that fired them, thereby incriminating their owners. Consequently they now go far afield for the weapons they use in killings, and gun running has become an important business of the underworld—an "industry" that extends as far away as Spain and utilizes even Mexican peons. Last year, of the 3,000 pistols seized and destroyed by the police of New York City alone, a very high percentage were of Spanish manufacture or importation. Instead of the adventurous days of gun running into Mexico for revolutionists, guns are now being run out of Mexico for the gunmen of large cities. A "well rubbed" pistol, one whose identity has been care-

ployed toy pistols, relying on the fear inspired by the sight of a firearm.

SIGNAL RISES ABOVE RADIATOR IF HUMIDIFIER RUNS DRY

Humidifiers for radiators have been fitted with a flag which rises above the top of the radiator when the water level drops too low to keep sufficient moisture in the heated air of home or office. The signal attached to a float rises on an arm as the water level lowers until finally it protrudes above the top of the radiator.

Del. Laundale 9048
Q 2012
Chas. W. M. Haroldich
1821 S. Karlov Ave
Chicago

N.Y. Herald Tribune A 2016 Made by Ray Loper, 1425 North Ave
10/14/31
POPULAR MECHANICS 897
a 210 2 Waukegan, Ill

**U. S. ISSUES TWELVE STAMPS
 IN WASHINGTON'S HONOR**

Stamps in twelve denominations are being printed by the United States post office in honor of the 200th birthday of the nation's first president, George Washington. The face of Washington, as modeled by famous artists, appears on each of the twelve stamps. The new issues and their colors are: one-half cent, dark brown; one cent, green; one and one-half cent, light brown; two cent, red; three cent, purple; four cent, warm brown; five cent, blue; six cent, orange; seven cent, black; eight cent, olive green; nine cent, pink, and ten cent, orange.

**AUTO WITH AIR-POWER MOTOR
 COSTS LITTLE TO RUN** *a 208 3*

Compressed air has been harnessed to operate an automobile successfully at no cost for fuel. The car has a tank for its air, which is carried to the transmission by a small engine resembling a radial airplane motor. There is no cooling system, no carburetor, no ignition system—nothing except the small air motor controlled by the air throttle. There is no noise except a slight hiss from the exhaust. As the air goes through the engine, most of it is recaptured and recompressed.

Clara Gray & Meyers, Los Angeles



still experimenting

Waukegan, Ill

Filling Up the Air Tank of Compressed-Air Auto; Note the Small Radial Engine

Air Power Corp. Ltd., Los Angeles, Calif



Golf Is Played through the Door of This Model of a Florida Hotel on a Miniature Course

**HOTEL MODEL IS GOLF HAZARD
 ON INDOOR COURSE**

Modeled after a large hotel in a Florida resort city, an eight foot building, six feet wide, with glass windows, roof garden, awnings and other features of a modern hotel, now is serving as a golf hazard on an Illinois indoor course. The hotel model is constructed of vincer and plaster and has electric lights.

mami Isolf Waukegan, Ill

**DRIED AND GROUND WIGGLERS
 MAKE GOOD FISH FOOD** *a 209 9*

Mosquito larvæ, or "wigglers," after being dried in the sun and ground to the consistency of sand, make an excellent food for aquarium fish. A Californian has turned a stagnant pond into a source of income by seining the wigglers at the rate of 100 pounds daily, drying and grinding them and selling them as fish food. The mosquito larvæ in the dried form retain all the original food elements of living larvæ, nothing having been removed except water, which is quickly restored when the food is placed in the aquarium. Fish fed on the dried larvæ grow as fast and retain the same degree of health as those fed on living wigglers. The food brings more than one dollar per pound.

Antonio Patria, 501 W. Colorado Way, San Gabriel, Calif

a 1697 Cmt. H. T. Wilkins Esq
Colombiere, 29, Beau Road,
Besley Heath, nr
Dundee

DOG HEROES of



Courtesy Julien Peres
Life-Saving Patrol of St. Bern-
nard Dogs and Monks



her two-story building, the home of brave dog sol-
diers and black-robed monks who save lost and
perishing travelers coming through what is well
called the "Valley of Death."

One bleak night, when blinding snow flurries
drove before a howling Alpine storm, there came
a ring on the telephone connecting the Great
Saint Bernard hospice with a station at the bot-



Swiss Airman Who Crashed in the Alps, Saved by the Famous Dogs, and,
at the Left, Above, "Barry," Savior of Many Lives

By H. T. WILKINS

EIGHT thousand feet
above the sea, at the
very top of a terrible
mountain pass, where
cold, bleak winter is king
from the first week of
September till the fol-
lowing July, is a big som-

a 1697

the "Valley of Death"

tom of the pass on the Swiss side.

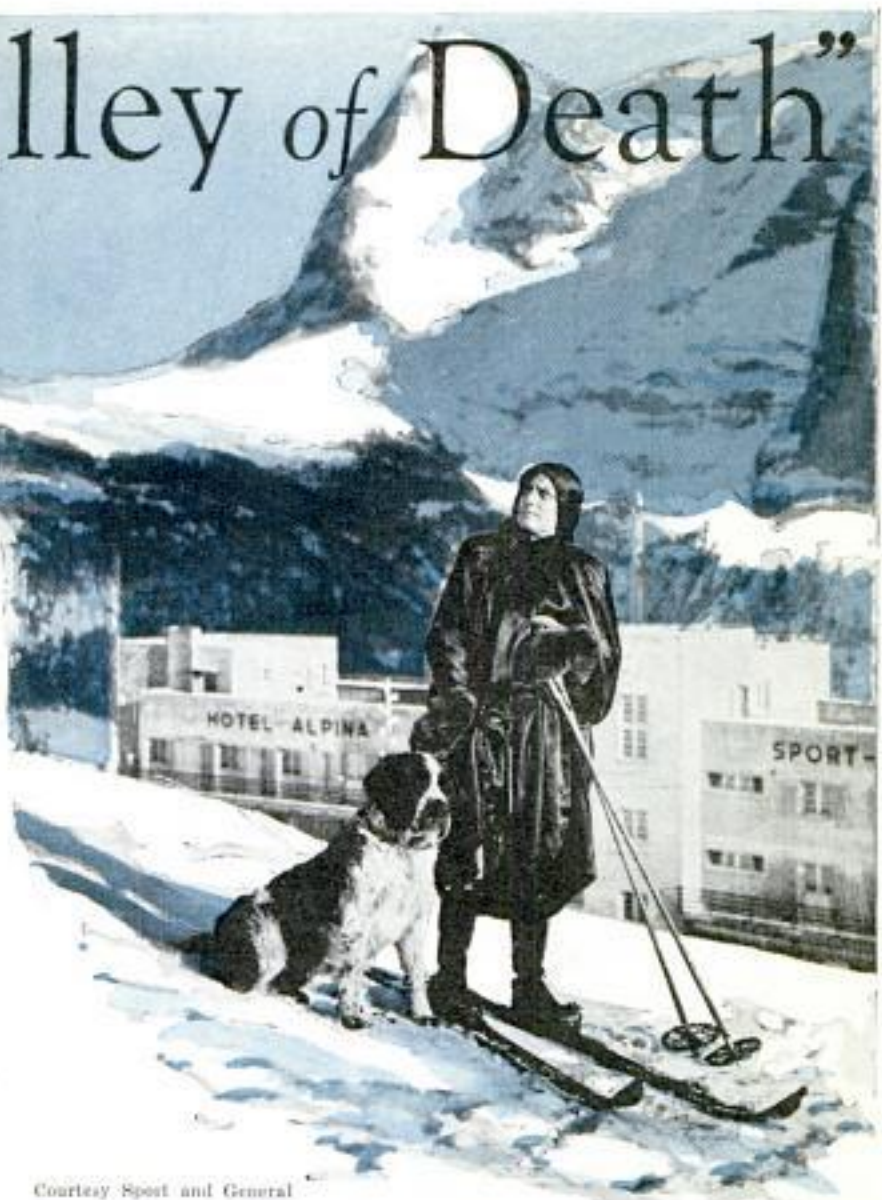
"Italian refugees passed by here two minutes ago. A woman was guiding them when they crossed the frontier. They say she fell into a hidden crevasse. They tried to find her, but had to give up, because they were being pursued by Italian carabinieri."

"Very well," answered the brother, "we will go out with the dogs and look for her."

There came a baying of big dogs, and soon helmeted figures, picturesquely clad in great fur coats and black woolen gaiters, followed the lead of the St. Bernard dogs. Before them stretched steep slopes covered with great snowdrifts and masses of ice.

Sudden fogs make this trackless region extremely dangerous, even to experienced mountaineers. Even the monks—picked men—do not trust to their local knowledge. They let the dogs lead the way, knowing that their intelligence and splendid powers of scent are the best guides on these icy eaves of the roof of Europe, where the snow is often fifty feet deep.

Suddenly, up a slope close to where the tip of the rocky crags peep above the snow, one of the dogs bays and starts frantically to scratch the snow. The assistants, with shovels and alpenstocks, ski



Courtesy Sport and General

Monks on Skis, with the Aid of the Dogs, Patrol the Mountain Passes. Frozen for Nine Months Out of the Twelve

over, and below the white mantle lies some lost person, perhaps the body of the woman they seek.

Strapped to a rude bier, the corpse is carried to the hospice, where it is placed in a solitary stone hut—the morgue of the monastery. For many miles around there is not a stick of wood or a pound of earth to make coffin or grave. The morgue is a natural refrigerator in which bodies are preserved for many years, until perhaps they are identified. Many are never traced.

Ages ago, this famous hospice was built to aid famishing and storm-bound pilgrims, journeying over the terrible peaks and passes from Germany to Rome. By the rule of the order, no one is charged for food and shelter. One hun-

dred beds and accommodation for 300 travelers are available. Its celebrated dogs can track a man by his footsteps, though it may be three days since he passed, and the tracks have been wiped

through the top-floor windows of the hospice, they did not omit to send out the dogs.

If the dog finds a man fallen down a precipice, he runs back or barks to announce



Courtesy Societe Graphique

Family of Potential Life-Savers Getting a Meal; Preparing to Brave the Blizzard, at Left

Courtesy Jules Dorzaz

out by more snow. Their pedigree goes back 500 years.

When a sudden blizzard comes down the pass, the monks know approximately what point of the gorge the travelers have reached, and send the dogs ahead to find them.

Standing thirty inches high at the shoulder and weighing about 150 pounds when full-grown, the St. Bernard can carry a heavily built man a long distance. Each dog, with a big wooden flask of wine strapped under his collar, is trained to go out alone as a scout. Even when the monks, as this year, were snowed in for eight months and could leave only

the discovery. Then the rescue party goes out. In stormy weather, no visitor is allowed to leave the hospice, unless one of the dogs accompanies him down the trackless white way to the valley.

The methods of training the dogs are interesting. In the brief summer, the monks take the young dogs down into the valleys where there is snow the sun cannot melt. One man lies down and buries himself in the snow. A dog is sent to look for him. The animal is taught to bark when he finds the man, and to wake him from the deadly snow sleep, by licking him till he stands up. Then the St. Bernard runs on in front, to show him the way to the hospice.

There is more than one kennel at the hospice dating from the days when an avalanche overwhelmed all the dogs except three, from which a new race had to be bred. High prices have been offered for the finest dogs, but the monks are adamant in refusing to sell. It is a fact that the light reflected from the snow has so seriously damaged the eyesight of the St. Bernard dogs, that some scientists predict the breed may become extinct.

One famous St. Bernard named "Barry," who saved the lives of forty men,

was scouting one wild day, when news came that a young Swiss soldier had been lost two days before. The big dog picked up the scent, forty-eight hours old, and finally paused before a high bank of ice. Here he dug until he uncovered the waxen face of the dying soldier. The dog licked him as he had been trained to do, when the dying man started up, and mistaking the big St. Bernard for a wolf, stabbed him to the heart with a bayonet. Near the monastery, there is a monument to "Barry," which reads:

"He saved the lives of forty persons. He was killed by the forty-first."

A descendant, also named "Barry," has saved three lives, while around the fires of the monastery kitchen, are seen basking old dogs who have each saved twenty lives.

92045

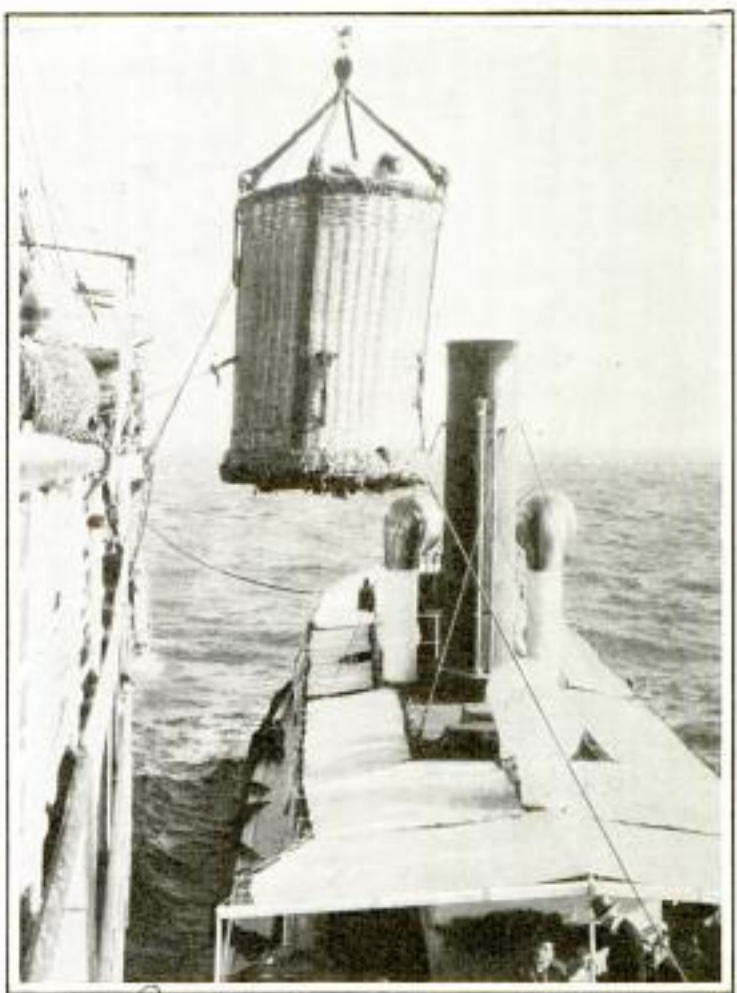
LIGHT ON RADIO MAP MARKS STATION

Tiny electric lights on a radio cabinet map are turned on as the dial is turned, marking the location of the broadcasting station to which the radio is tuned. When the operator turns the dial to a position coinciding with the wavelength of a particular station, the tiny lamp at that station's position on the map lights up. Seventy stations are so marked for the convenience of those who tune in a station broadcasting in an unknown language.

McGregor



Courtesy Maj. E. N. Whittingham. When a Station Is Tuned in, a Light Flashes on the Map, Showing Location of Broadcaster



© Photopress. How Passengers Are Taken off Liners and Put Aboard Shore-Going Boats at One South African Port

BASKET LIFTS THE PASSENGERS FROM LINER TO TENDER

Passengers who wish to land at East London, Africa, where liners have to anchor in the open harbor, are lifted from the ship to a shore-going tender in a huge basket suspended from a derrick. The basket method of transferring passengers was adopted as the safest in all kinds of weather.

HIDDEN SUN FOUND BY SEXTANT IN CLOUDIEST WEATHER

Clouds and fog cannot hide the sun from an all-weather sextant recently invented. The instrument enables the navigator to determine the altitude of the sun above the horizon, regardless of weather conditions, by detecting the infra-red radiation of the sun. An amplifier connected to the sextant proper by two small, flexible rubber-covered cables is used to detect the sun's heat rays.

Dr. Paul H. Maguire, 1 Huntington, 2d. New York

Cond. Williams

*Arden Electrical Supplies Ltd
35, Davies St, London W.1, England.*

*Chas. W. Frates & Underwood / Corn Llam, valley of
San Francisco
902
a 2037* POPULAR MECHANICS *Evitts Creek, Bedford
County, Pa.*

**MUSIC FOR ALL INSTRUMENTS
WRITTEN BY ELECTRICITY**

Pat # 6,847,282



Sup. Air Tone
© International News Photo
Music Writer, Which Produces Harmony Parts for
Orchestra, Recording from Composer's Piano

Harmony parts for each instrument in an orchestra are produced by an electrical music writer which makes it possible to compose music and record it by simply playing over the composition on the piano. The invention also produces sheet music of the melody of the selection.

**LIVE-RUBBER ENGINE SUPPORTS
FOR SMALL AUTOMOBILES**

Motor vibration in Ford cars can be virtually eliminated by the use of absorbers in the form of live-rubber suspension supports for the motor. This engine mounting insulates the body of the car from vibration by means of three-point suspension. Two of the units are placed under the front motor-support bracket, effectively cradling it



on blocks of rubber an inch thick. The third unit fits over the universal housing, with its rubber cushions resting on the frame crossmember. In this way, the motor is supported at both

ends, eliminating rumble and deceleration noises, as well as much clutch chatter and gearshift and emergency vibration. The equipment also makes possible more positive brake action and smoother stopping and starting.

**DAM TO BE WEIGHED AS TEST
OF CONCRETE MIXTURES**

All ingredients of materials used in construction of a 726-foot dam in Pennsylvania will be weighed automatically in engineering tests of concrete mixtures. A special scale, which will do the weighing, controls the flow of materials, automatically cutting off the flow when the correct amount of each ingredient has entered the concrete hopper. The actual value of moisture contents of concrete aggregates thus will be definitely determined.

**MOVABLE MAGNIFIER FITS RIM
OF SPECTACLE FRAME**

For persons who require frequent aid of a reading glass, a small magnifying lens is being made mounted in a frame which attaches to the rim of a pair of spectacles. The magnifier can be pulled down in front of the spectacles, or pushed up out of the way quickly. For those not wearing glasses, but having occasion to use the magnifying lens, it can be mounted on frames without spectacles. It can be obtained for either the right or left eye and for a focus of from two to five inches.



**SAFETY MATCH CAN BE STRUCK
TWO THOUSAND TIMES**

Two thousand lights from a single match is possible with an English invention, which calls for one chemical for striking the match and another for putting out the flame. There is no danger of part of the match head breaking off and burning the person striking it. Considerable saving in match wood may result.

*Leate & Underwood street address
Park Hotel, Rock'd Springs, Wyo.*

*Chicago 574 Shaven
a 1994*

*Corogone Co, Hanna
Bldg. Cleveland, Ohio*

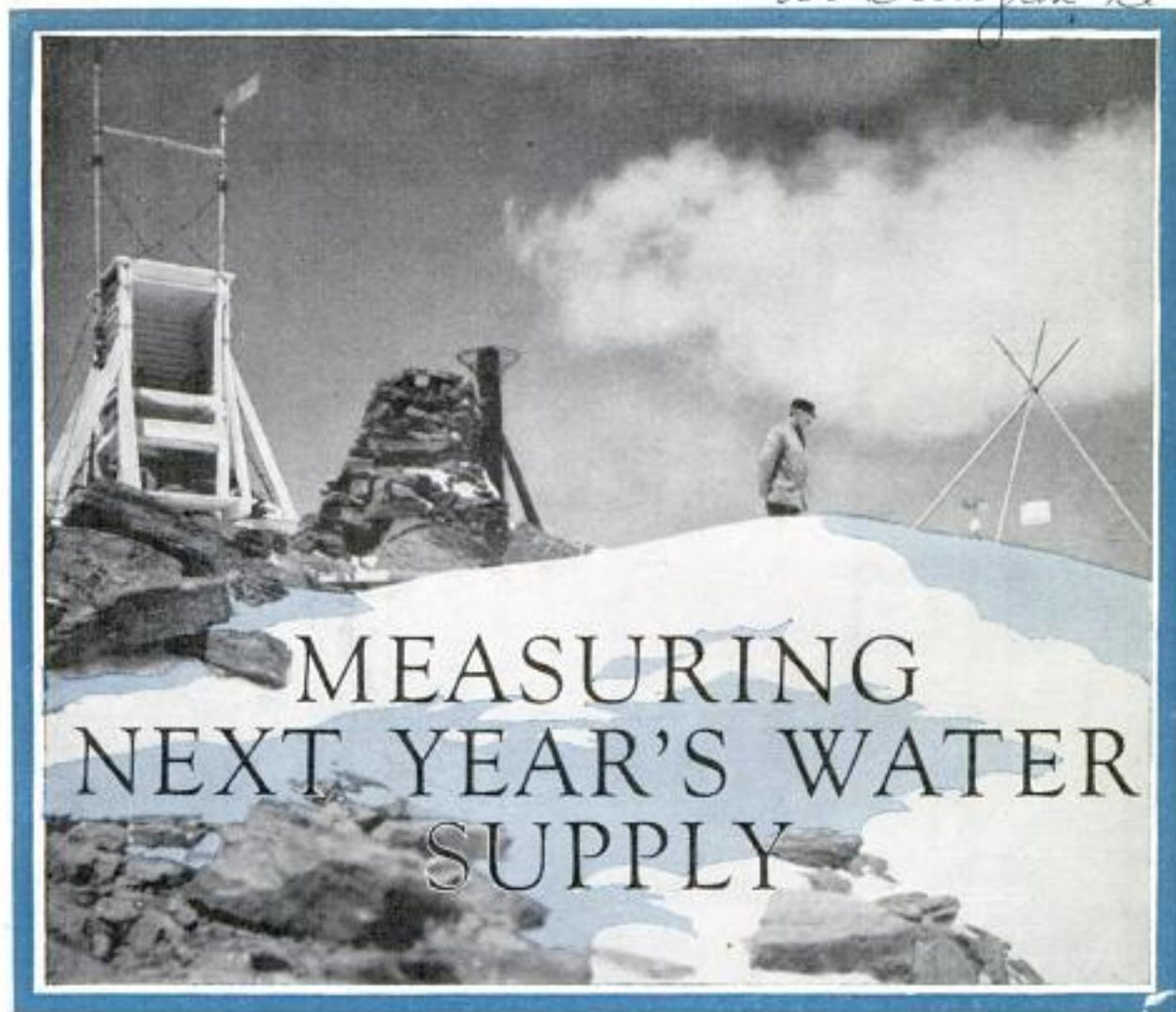
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114 W. Mifflin St. Wm. S. Casper, Wyo.

Am. Chem. Co. 1931-579

*Dr. W. M. Ferdinand
Renger Chemical
Vernon, Austria*

Q 1611 Cont. *Althas Vincent Welles*
1331 Lo St. N.W. Suite 608
Washington D.C.



Measuring the Evaporation of Snow on the Cornice at the Summit of Mt. Rose; at the Left Is Seen the Shelter for Certain of the Measuring Instruments

WHAT of next year's water supply? Will it be adequate for crops, for city consumption, for wells? This has been in very recent times a matter of prime importance.

Some forecasts on this subject have been little better than guesses. Now a new era has arrived with the introduction of "snow surveys." The largest share of our water supply comes from the snow. But just how much water does snow contain? Prof. J. E. Church, Jr., has been interested in finding out, and recently has developed a method of ascertaining the value of snow in accurately estimating future water supplies.

The methods of the snow surveyor are entirely different from the old plan of sizing up the mountain snowfields. The procedure now consists in determining the water content of the snow cover, along suitably selected "snow courses" in each river basin, by cutting and weighing sam-

ples of snow at intervals along each course, these measurements being made at the same points every year. The results of the survey are compared with normal, based on the records of previous seasons, and an indication of the run-off from the melting snows is thus obtained.

The technique now employed in California is more or less typical. Preliminary surveys begin in midwinter, but the main survey, which includes all courses, is made in April when most of the winter's snow has fallen but the spring melting has hardly begun.

Snow courses vary in length from 500 to 5,000 feet and are located with a view of obtaining measurements representative of the whole basin. The site chosen must be one where the snow lies uniformly and which is relatively free from steep slopes and surface irregularities of all kinds. A course may be straight or it may be turned at various angles to avoid obstruc-



tion. Within a few years after the work is begun, all courses are definitely located and marked.

Measurements are made at exact intervals of twenty-five feet on short courses and fifty or 100 feet on long, the positions being determined by the tape measure. The surveyors travel over the basin singly or in pairs, the trips over the snowfields from course to course being made on snowshoes or skis. Their work is dangerous and always strenuous. Shelters and places of refuge are now being provided, stocked with blankets and provisions. These are located ten or twelve miles apart.

The measuring outfit consists of a snow sampler and a spring balance scale. The sampler is a light, jointed steel tube having a serrated cutting edge to facilitate driving it through the snow. The tube is made in five-foot sections, which can be coupled together to form a sampler long enough to reach the bottom of the deepest snowdrifts. Narrow slots cut in the walls of the tube provide windows through which the column of snow within may be observed and through which a tool for cleaning out the snow may be inserted.

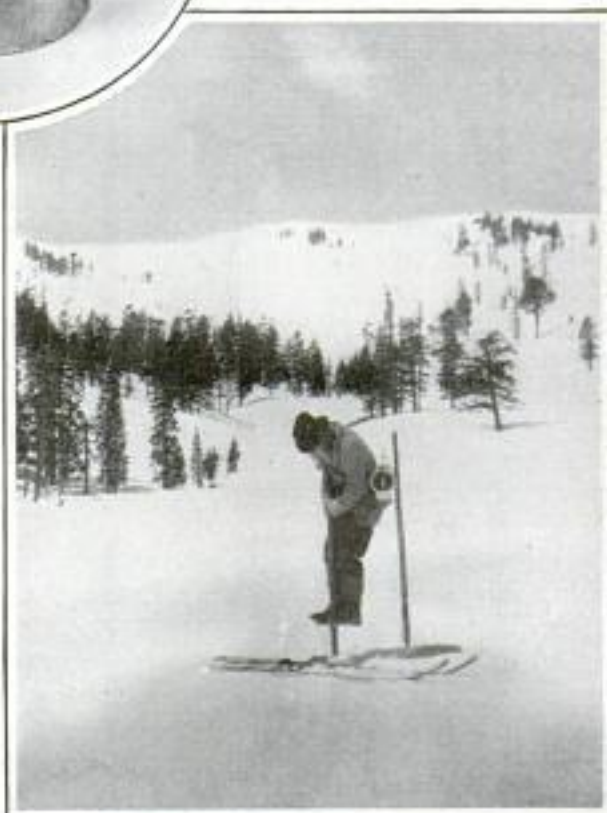
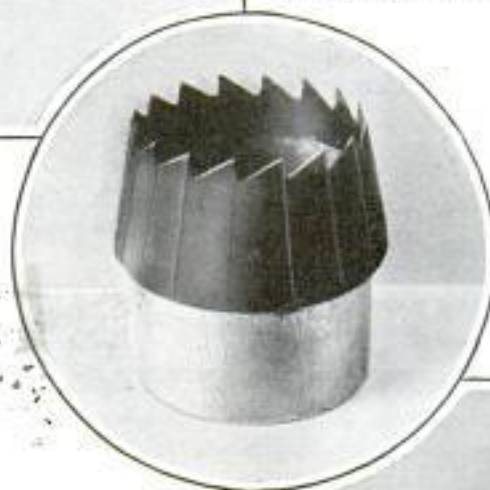
The outside of the tube is graduated in inches.

In taking a sample, the tube is driven vertically down through the snow with a steady thrust and without twisting except when ice crusts are encountered. The surveyor can tell when the ground is reached by the feel. After bottom has been reached the depth of snow is read and recorded. The tube is then twisted to break the snow core from the ground and is withdrawn by pulling vertically upward with a steady motion.

A complete core of snow is brought up inside the tube and this must next be weighed to determine its water content.

After completing the surveys, which take several days, the average water content of the snow lying along each course is computed from the individual readings,

and the data for all the courses are then combined to obtain a figure for the entire basin. The figure can be expressed as a percentage of the corresponding figure for a year of normal water content, and the prediction of run-off assumes



Sampling the Snow; Snow-Cutter Head, and Driving Sampler Deep

that the latter will vary from the normal in a similar ratio.

The results of the main survey provide the basis for a forecast of the total seasonal run-off, covering the period from April to July or August. With the help of supplementary surveys made at certain key points once a month, both before and after April first, together with information concerning the rainfall, temperature and state of the ground, the experts in charge of this work can predict with considerable accuracy, in addition to the total run-off, the details of its distribution through the season.

In the semi-arid west, where the storage and regulated distribution of water play a part in some of the leading industries, the value of the advance information obtained through snow surveys is obvious. Such information enables the irrigation districts to estimate the acreage that can be irrigated and the rate at which water can be furnished from reservoirs without risk of shortage; it guides the farmers of irrigated lands in selecting crops and planning the season's work; it indicates to the hydroelectric companies whether their plants can be operated to full capacity, and it has also a number of other important applications, including the prediction of floods. This method of surveying is now being used by all the western states.

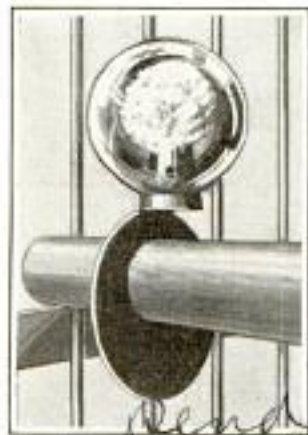
LOG OF WOOD MAKES CLOTHES ENOUGH TO DRESS ONE

Girl with Log of Wood Approximately the Size Needed to Make Silk for Her Clothes



From Philadelphia Institute School.

MITE TRAP FOR CANARY'S CAGE KEEPS BIRD HEALTHY 1918



trapped and destroyed. The trap can be left in the cage indefinitely and will keep the songster free of mites for life. The only care required is an occasional cleaning of the glass ball.

Ch. Morley
Patchogue, NY

With production and consumption of rayon increasing rapidly throughout the United States, the question has arisen as to just how much wood a woman carries when fully dressed. Calculations by textile experts show that the average-sized woman requires a log approximately the size of the one shown in the accompanying photograph to make her clothing. It is estimated that about one-third of the undergarments sold to men and women are made of rayon. Rayon is a synthetic textile prepared by several different methods from wood pulp or cotton linters. The wood or cotton is formed into a viscous fluid and then forced through minute openings in the form of filaments which are hardened into threads which are spun, dyed and woven into fabric.

Rayon Institute of America
225 W 34th
New York

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The MAN who Made

EDISON, known in his lifetime as a prophet of invention, who did more than any living man to make the world a better place to live in, has been raised by death to a place among the immortals.

"I consider Thomas Alva Edison the greatest single benefactor of the human race since the dawn of history," declares Dr. Lee DeForest, inventor of the grid vacuum tube, foundation of modern radio.

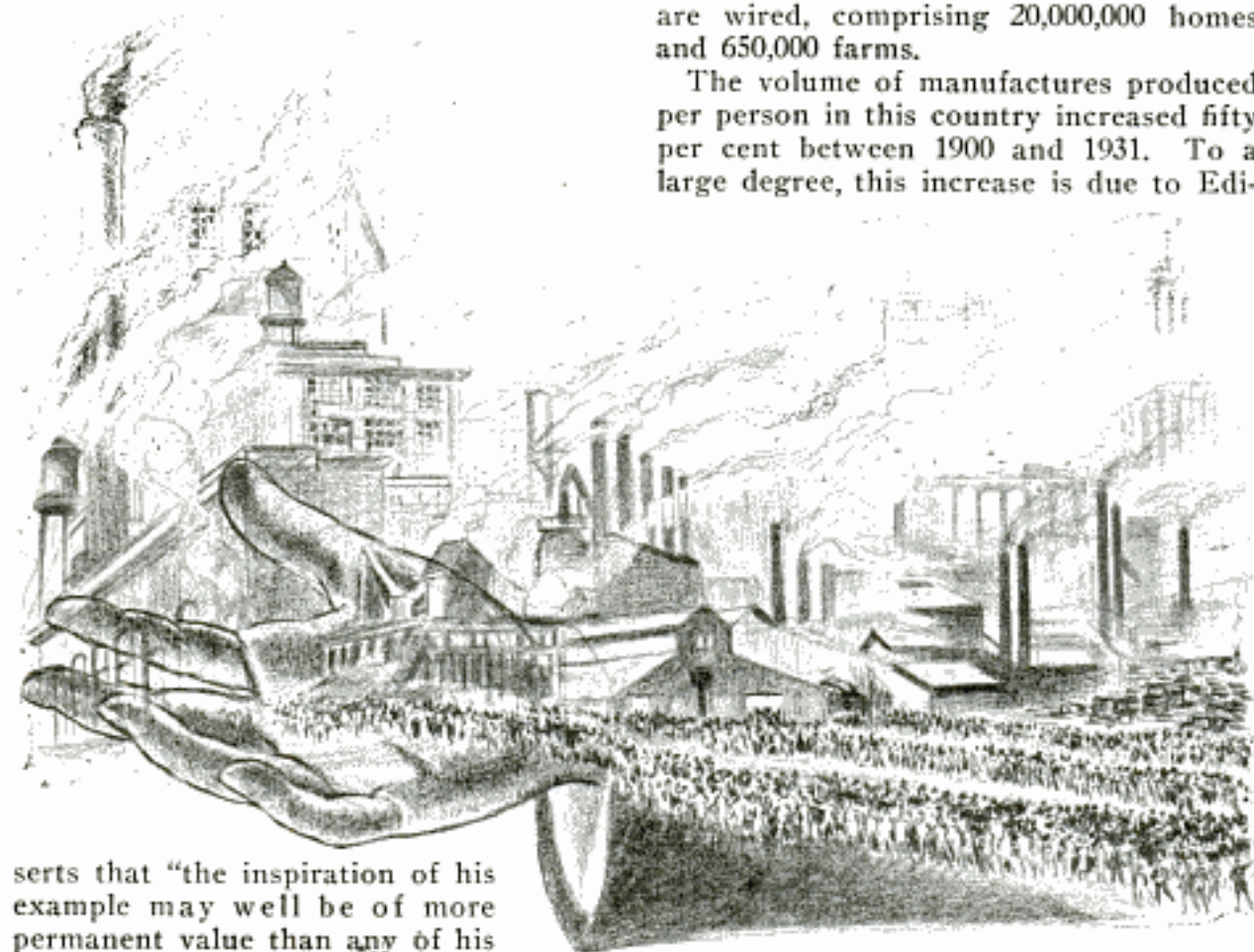
Although Edison's genius has created billions of wealth and given employment to millions of men, Dr. Harrison E. Howe as-

serts, of the Smithsonian Institution.

At the dawn of the electrical age, a little over fifty years ago, Edison appeared like a heaven-sent pioneer. In 1882, he created the electrical lighting system, which has not experienced an essential change since that time, thus laying the foundation for the electric-light and power industry.

In 1930, the electric-light and power industries added 550,000 customers and \$850,000,000 to their investment, giving employment to increased thousands. Today, seventy per cent of American homes are wired, comprising 20,000,000 homes and 650,000 farms.

The volume of manufactures produced per person in this country increased fifty per cent between 1900 and 1931. To a large degree, this increase is due to Edi-



serts that "the inspiration of his example may well be of more permanent value than any of his multitude of inventions."

"Edison's life is an inspiration to all young men who have their own way to make in the world," declares Dr. G. K. Burgess, director of the bureau of standards. "His genius for leadership, his energy, and his tenacity of purpose, have contributed more to the progress of the world than those of any other person of his generation," adds Dr. Alexander

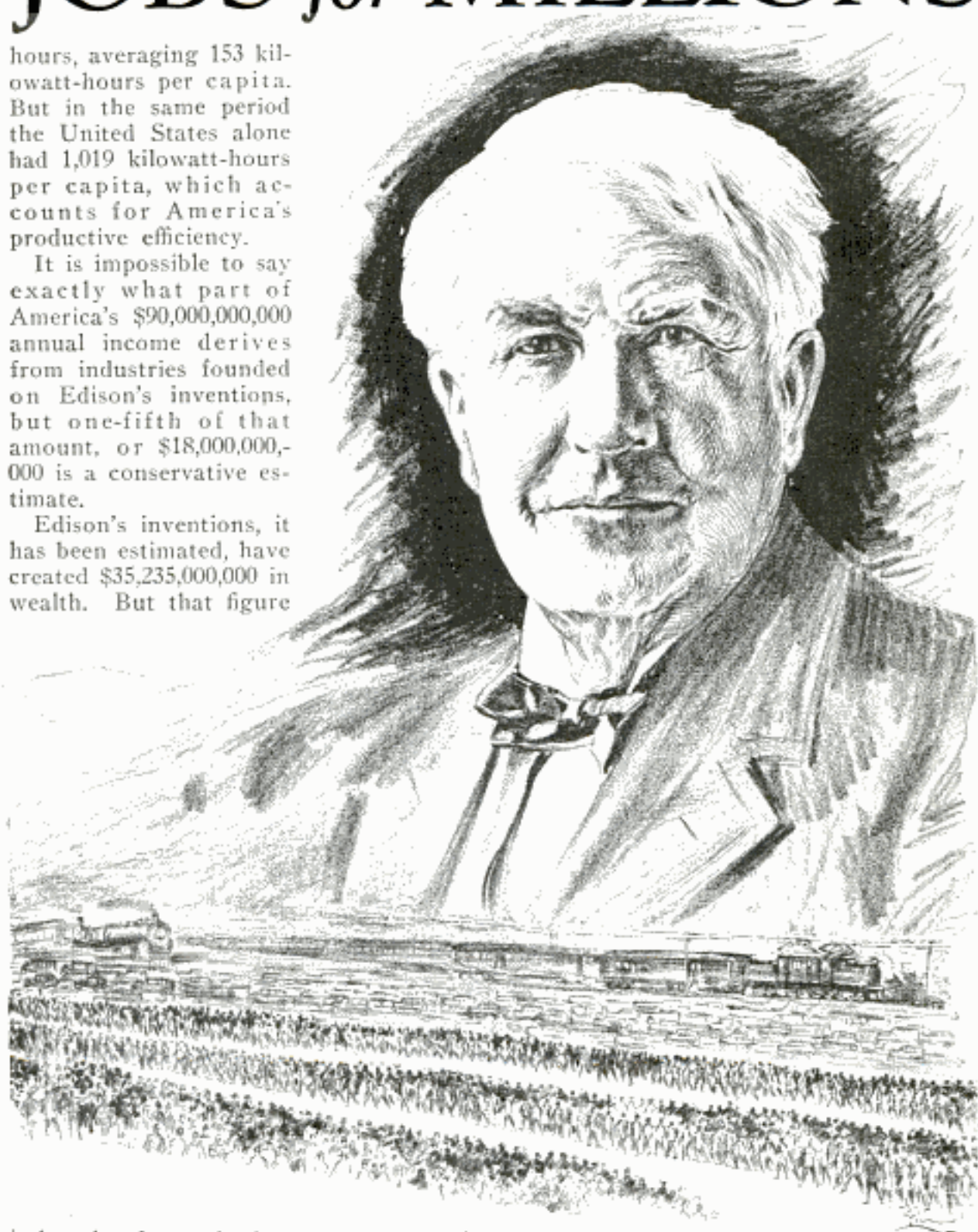
son's electrical inventions, and they account also for America's supremacy in the markets of the world. Although we maintain the highest wages and standards of living, American-made products sell faster in open competition than those of any other country. And the reason may be found in these vital statistics: The annual current output of the world one year ago was 300,000,000,000 kilowatt-

JOBS *for* MILLIONS

hours, averaging 153 kilowatt-hours per capita. But in the same period the United States alone had 1,019 kilowatt-hours per capita, which accounts for America's productive efficiency.

It is impossible to say exactly what part of America's \$90,000,000,000 annual income derives from industries founded on Edison's inventions, but one-fifth of that amount, or \$18,000,000,000 is a conservative estimate.

Edison's inventions, it has been estimated, have created \$35,235,000,000 in wealth. But that figure



is based only on the investment, or capital, of certain industries in America. It is impossible to calculate how many millions of jobs and hundreds of billions of dollars this one man created out of his own brain. The moving-picture industry over the world involves no less than 500,000 people

and the investment probably runs up to \$5,000,000,000. The world carries on 35,000,000,000 telephone conversations annually through a system which involves an investment of another \$2,000,000,000. The electric railways of the world are stead-

son was asked how he felt, he said, "Like a two-shift man always feels—well! My philosophy of life is work. Bringing out the secrets of nature and applying them for the happiness of man. Looking on the bright side of everything."

Only the human tributes of his fellow men can best express mankind's debt and its appreciation of Edison.

Walter P. Chrysler says: "Service to humanity is the ideal of modern civilization—Edison is greater than any material thing he has ever put together, and the example of his life has a higher



ily displacing all other forms of rail transport. Their value approximates \$15,000,000,000. The phonograph has suffered by the advent of radio; nevertheless, the world has invested \$200,000,000 in that industry. The manufacture of dynamos and motors involves another \$3,000,000,000; the cement industry, \$1,000,000,000, and telegraphs, \$2,000,000,000.

The epic of frozen music and speech began with Edison and his invention of the phonograph. He was experimenting with a telegraphic repeater when he heard a musical note. A strange idea sprang into his head, and before he could forget, he wrote, "there's no doubt that I shall be able to store up and reproduce automatically at any future time the human voice perfectly."

Toward the end of his days, when Edi-



Above, One of Edison's Early Inventions, a Megaphone for Long-Distance Speaking and Hearing; Below, His Method of Killing Cockroaches

value than any of his achievements."

Owen D. Young: "Edison is the personification of the industry. A vision of a great service to be performed; a faith that it could be done. Unremitting toil, unexampled ingenuity; persistency and patience, finally crowned with accomplishment. Work, work, work!"

"FROZEN LIGHT" MAKES SCREEN GLOW AFTER THAWING

Experiments that may lead to discovery of means of storing energy by freezing recently showed that the light-giving properties of certain substances can be preserved by this means. There are substances which glow brightly when exposed to the invisible rays of the cathode tube. These are used to coat screens upon which the rays will then show their presence. Almost as soon as the rays cease, however, these screens lose their glow. One of the screens was made to glow brightly and was then treated with liquid air. The screen lost its glow and was packed away. When, later, it was brought out, the glow returned as brightly as ever.

SCOOTER MADE LIKE A CHARIOT WILL NOT TIP OVER

Low-slung and well balanced, a combination scooter, wagon and chariot, which will not overturn, has been placed on the market. The toy has the appearance of a small chariot and is propelled like a scooter, with one foot resting on the footboard while the other provides the motive power. By slipping out the removable dash, the wagon has capacity for two passengers. Oversize balloon tires, roller-bearing wheels and extra-heavy casting for the handle shaft are other features. Sharp turns can be taken at good speed without tipping over.

Built Low and Well Balanced, This Scooter Wagon Carries Two Passengers without Danger of Tipping Over



The National Mfg Co
Lincoln, Neb



Warm Air, Drawn from Above, Is Fanned over Fruit Trees to Guard against Frost

ARTIFICIAL WIND IN ORCHARDS PROTECTS AGAINST FROST

Artificial winds, created by large electric fans built on towers, are protecting California orchards from frost. The fans are set on a carriage which rotates about the top of the tower, making one revolution every six minutes and insuring uniform distribution of air over the trees. The principle of this equipment is based on the fact that air in the San Joaquin valley, where the tower fans have been tested, is several degrees warmer above the trees than at the ground. So, at twenty to thirty-five feet, the fans actually raise the temperature of the orchard by pulling warm air from above and sending it down on and into the trees. One fan, say the makers, will protect ten acres of trees against frost, at a fraction of the cost of setting and maintaining smudge pots. Another advantage over the latter is the absence of dirt, that often settled upon the trees from the smudging process.

Used by Warren South.

citrus groves
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Calif

Metach from A. S. Morrow, Jr., Pa
Hughesville, Pa

a 1939 Only Wing Plane

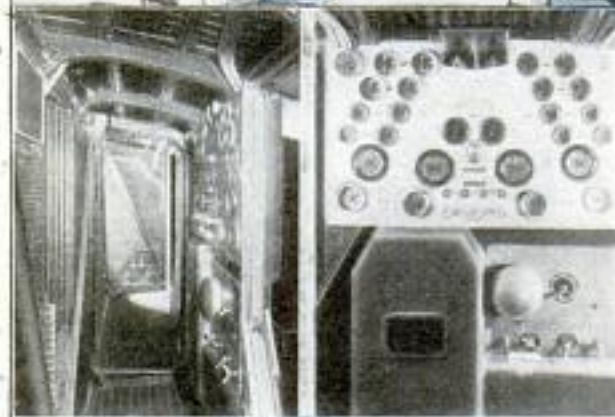
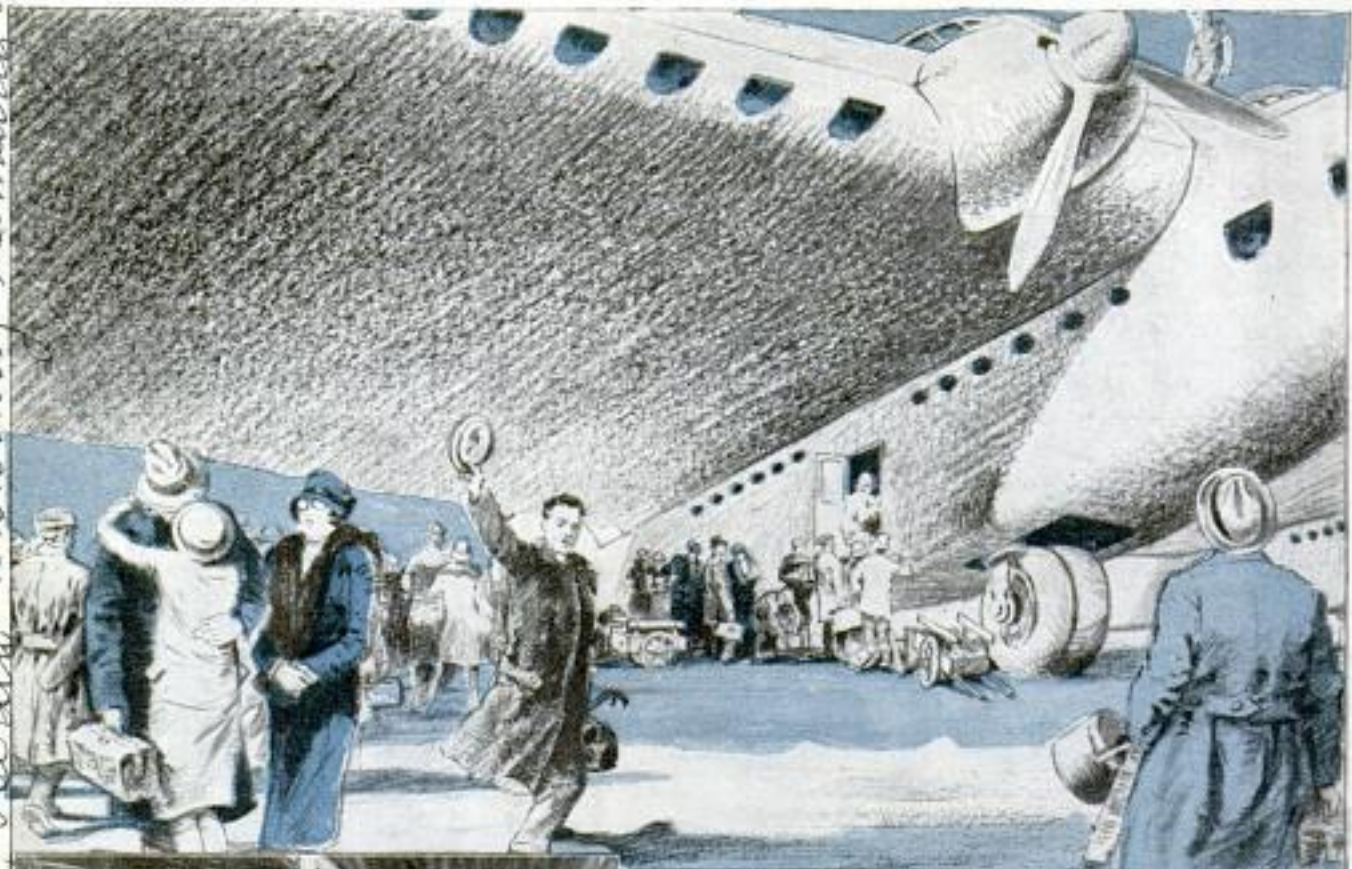
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POPULAR MECHANICS

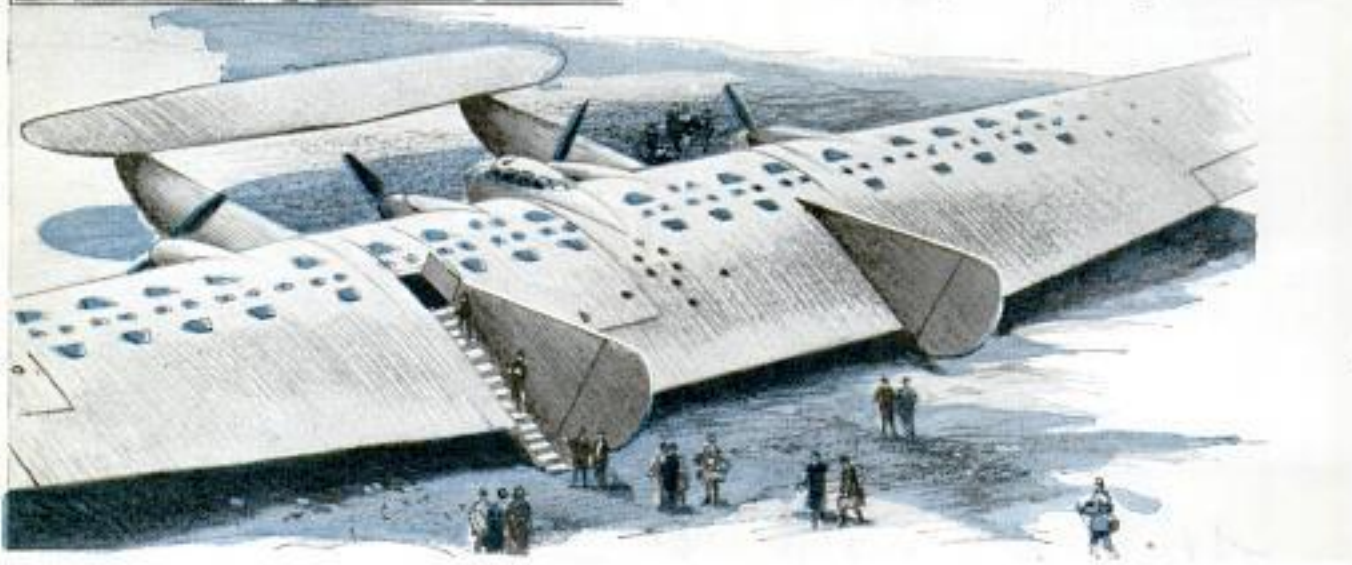
Junkers plant at Dessau Germany

Passengers to Be Carried in Wing of Giant

Emb. Hans F. Kutschbach, Schwary, Hofberg, & Bierlin, Lambury, Cambridge



THE giant "J-1000," called the "Super-Duck" because of its appearance, is to be built shortly in Germany. The big ship really is a "flying wing," inside which the passengers will be housed. Above is the artist's conception of the start of an ocean flight. At the left is seen the passageway inside the wings of the mammoth "G-38," built much like the "Super-Duck," and below, how passengers will



"Duck" Being Built for Flight Over Atlantic



enter. As can be seen above, the stabilizer of the air giant is to be placed forward of the wing instead of behind it. The undercarriage is expected to be constructed so it can be drawn inside the ship while in flight. Details of the "G-38" undercarriage can be seen at the right. The interior arrangements for passengers of the "J-1000" are shown below.

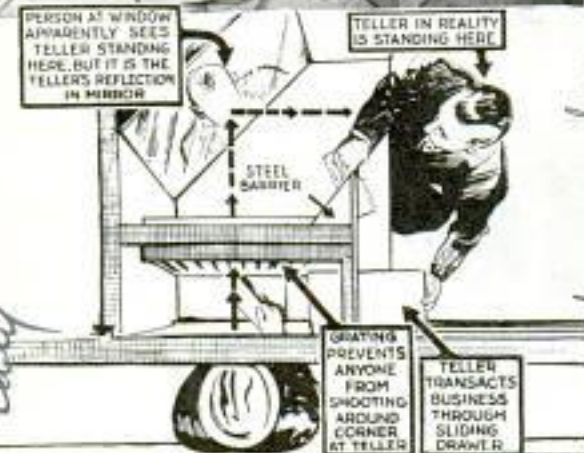


Dr. W. David Es

Used by Mr Edwin R. Jaynes and Mr H. W. Weighart at Bell Telephone Lab.

a 1983 912

Earl Long Beach, Calif.
MIRROR SET IN TELLER'S CAGE FOILS BANK ROBBERS



Bank Teller's Cage Fitted with Mirror to Foil Robbers; Diagram Shows How It Works

To foil bank robbers, a teller's cage in which a mirror is set at an angle has been devised, the teller being out of sight and out of reach of the customer appearing at the window. When a bandit approaches the cage, he sees only the reflection of the teller in the mirror. Actually the bank official is standing to one side of the window within easy reach of a gun that is placed in a turret so it is trained on a position in front of the wicket where the bandit stands. Two sets of wide bars prevent a robber from reaching through the window and shooting around the corner at the teller.

POISON SPRAY GUARDS PLANTS FROM INSECTS AND FUNGI

Performing double duty in plant protection, a poison spray, made by improvement of pine-tar oil distilled from "fat" stumps and old logs, has been discovered. The spray not only kills insects, but also checks the growth of fungi. Hitherto, this forest waste product had been known

studied by Dr. E. A. DeLong, Consulting entomologist, San Francisco, Calif.

to possess insecticidal value, but could not be applied to plants because its acids poisoned the foliage and often killed the plant. New processes now eliminate the acids, making the oil harmless to plants.

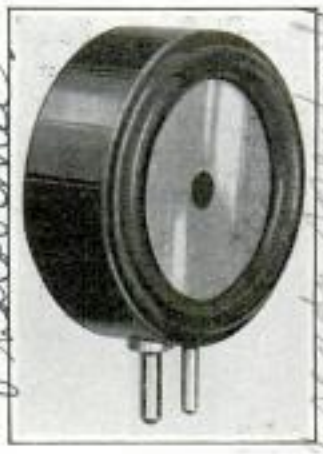
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AIR LEFT IN "PERFECT" VACUUM MEASURED BY MOLECULES

Millions of molecules of air are left in the best vacuum known to man after the most powerful pumps have taken out all the air possible. The amount of air left in such a vacuum has been measured by an instrument, which shows that there are 500 million molecules in every cubic inch of the vacuum. This seems a lot, but it is, in fact, only one three-trillionth of the original amount of air. Measurement of the best vacuum is important in the manufacture of photo-electric and other vacuum cells, in which the emission of electrons from a metal surface is hindered by the presence of the least gas.

Science Service 10/7/31

a 1193
SIMPLE TYPE OF ELECTRIC EYE MEETS AMATEUR'S NEED

Photo-electric-cell equipment has been brought within the reach of amateur experimenters by a simplified form of electric eye just placed on the market. This cell, called the "photronic" cell, is low in cost and does not require the usually expensive auxiliary equipment. So far as the makers know, the life of the cell is practically unlimited, and a continuous flow of current does not harm it. The cell contains no liquid and does not require vacuum or gas, so there is nothing to get out of order as it is not subject to physical or chemical change. Its output is constant and its response to light variations is instantaneous. The cell employs a highly light-sensitive disk which transforms light energy directly into electrical energy without the use of auxiliary voltage.



order as it is not subject to physical or chemical change. Its output is constant and its response to light variations is instantaneous. The cell employs a highly light-sensitive disk which transforms light energy directly into electrical energy without the use of auxiliary voltage.

Weston Electrical Instrument Corp. 619 Tremont Street, Newark, N.J.

*Dr. E. A. DeLong, Mill Valley, California
Montgomery and Bush Sts.
San Francisco, Calif.*

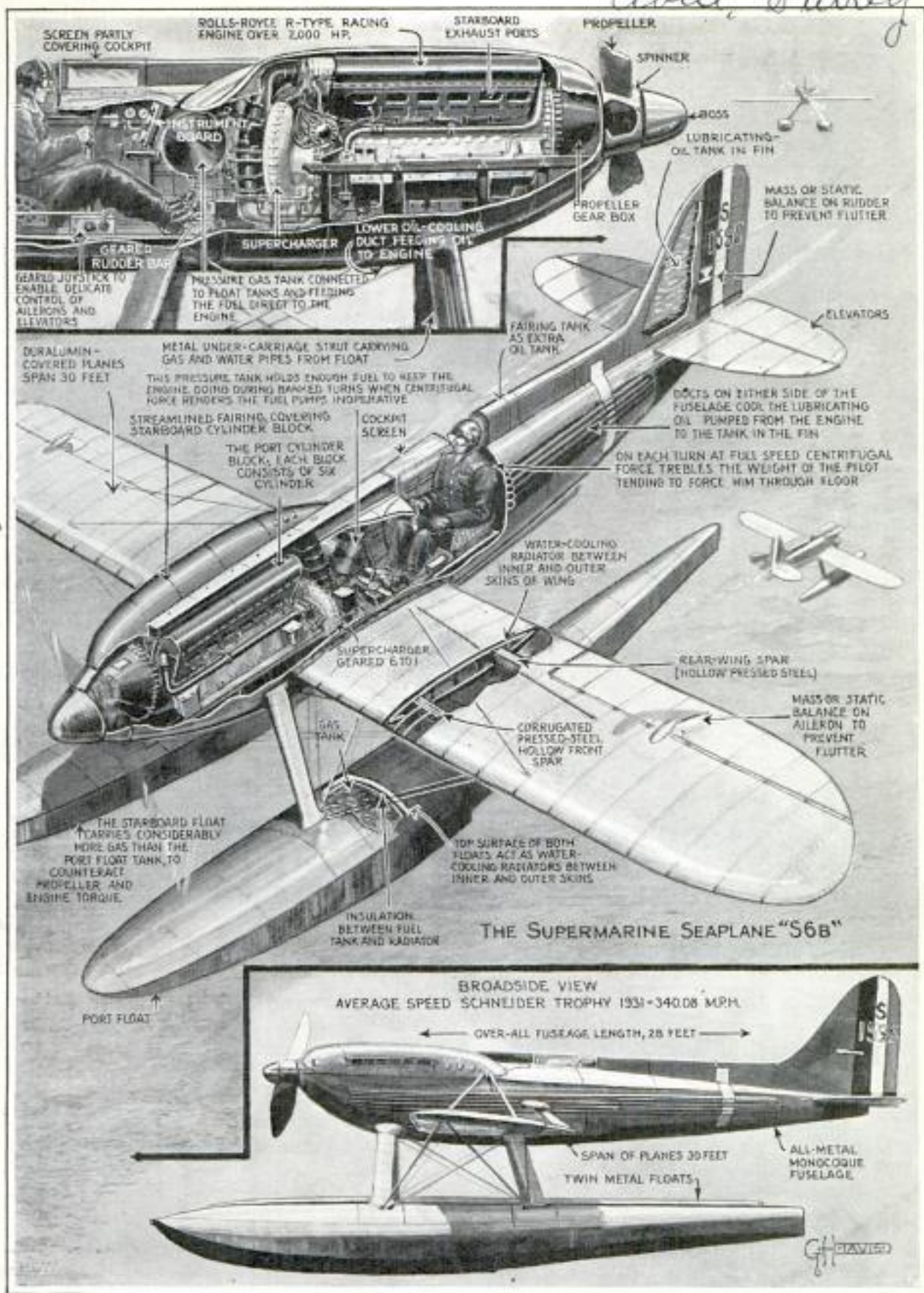
a 2019

3 W. Jackson

Photronic

Not of body...

a 2068 Capt. L. S. H. Davis, Esq.
 "Limners" Hillside Road,
 Ewell, Surrey Eng

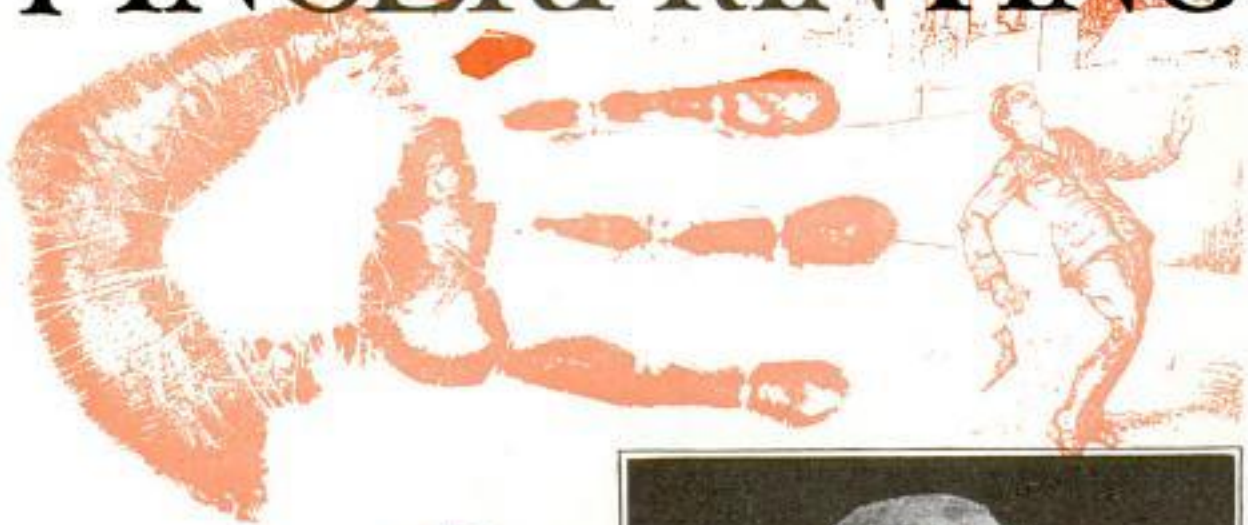


After Assuring England Permanent Possession of the Schneider Cup by His Speed of 379 Miles per Hour, Flight Lieut. G. H. Stainforth, a Few Days Later, Set a New World's Air Record, 408.8 Miles an Hour, Almost Seven Miles a Minute; the Plane Was Equipped with a Special Engine Burning a Mixture of Gasoline and Alcohol and Having But a Few Hours' Life at This Terrific Speed

a 1627

Capt. John F. Coggeswell,
16 Edgemoor Road
Belmont Mass.

FINGERPRINTING

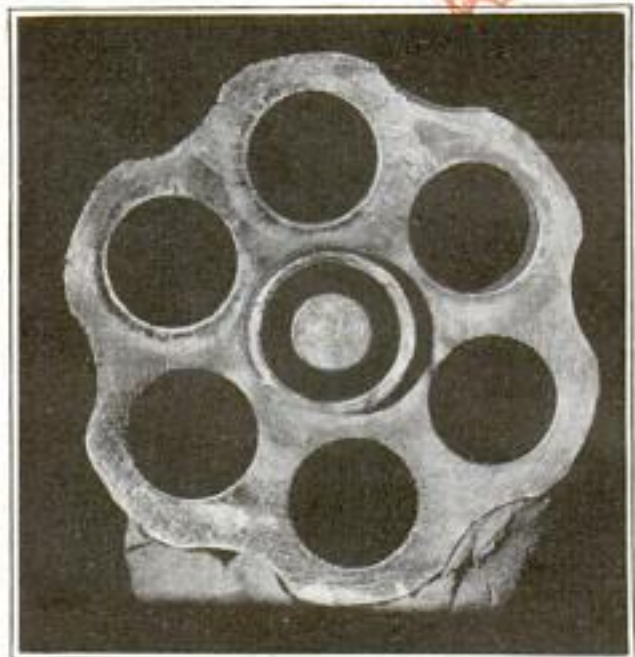


IF there be a single weak link in the chain of facts, presenting technical evidence to a criminal-court jury is always hazardous to the state's case. All points must dovetail to a nicety, and all of them must be unassailable and easily understood. The slightest doubt cast upon a single bit of the technical testimony is more than likely to sweep the whole presentation aside in favor of less reliable but more clearly comprehensible evidence.

A roadside-stand operator had been shot to death during a robbery. Capt. Charles J. VanAmburgh, firearms expert of the Massachusetts department of public safety, on the stand for the state, had built up a beautiful case. The technical evidence laid out a clear trail of guilt connecting the mortal bullet, the revolver that had fired it and the man accused of the crime.

"Then, Captain VanAmburgh, you can state positively that this bullet, marked 'Exhibit 1,' was fired from this revolver, marked 'Exhibit 2'?" was the prosecutor's last question before turning the witness over to the defense for cross-examination.

"I can," answered the expert and then braced himself for what he knew would be a skilled and crafty cross-examination,



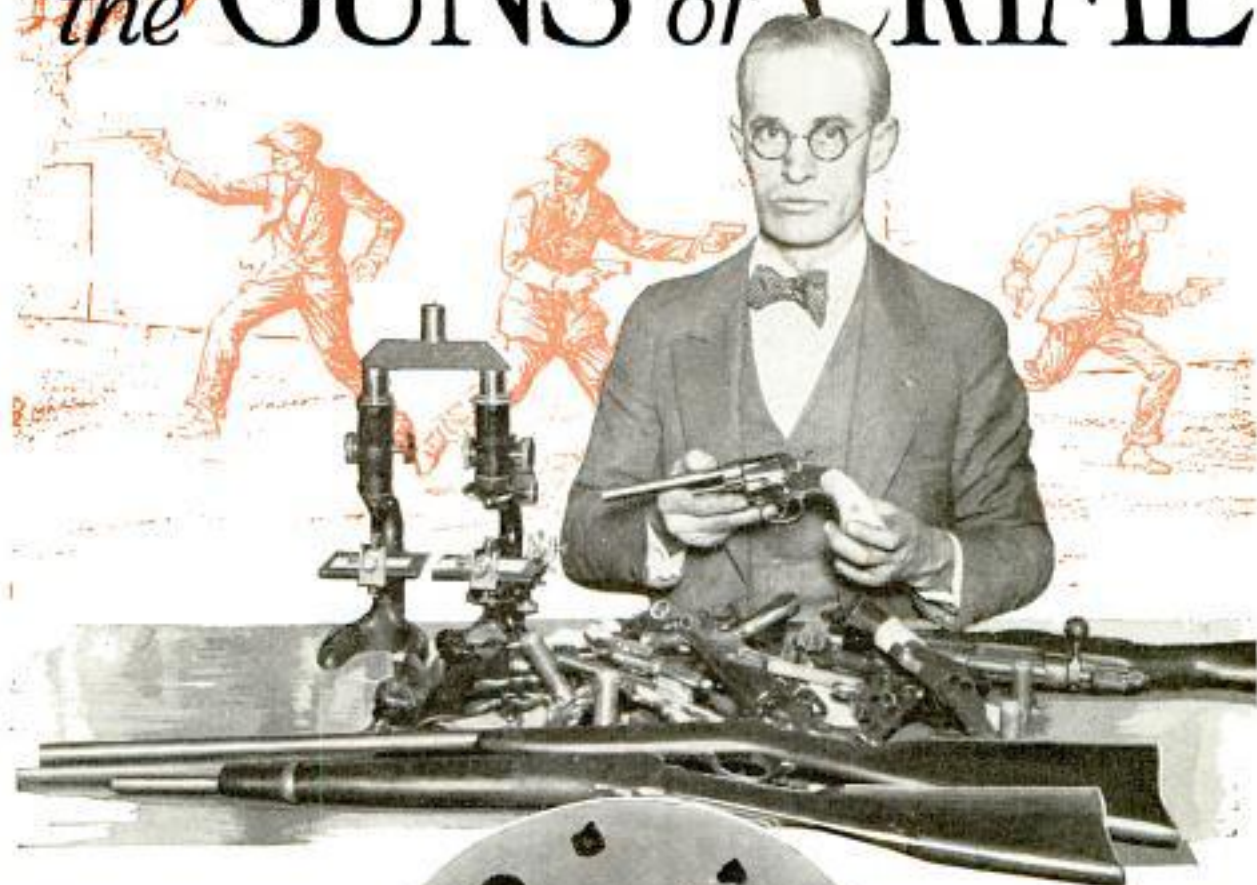
Powder Smudges Can Be Seen around Two Chambers of This Revolver Used by a Killer

for another noted ballistics expert sat with the defense attorney, ready to supply the latter with questions tending to cast doubt upon VanAmburgh's testimony.

"You have testified that careful measurement of the marks of the barrel rifling on the mortal bullet shows that it was fired from a revolver with a rifling twist of one turn in 16.24 inches," stated the defense attorney and the witness agreed.

"Then how can you state that it was fired from this revolver, alleged by the state to be the one that figured in the crime? According to the description sent out by its maker, this model is always rifled to a twist of one turn in exactly

the GUNS of CRIME

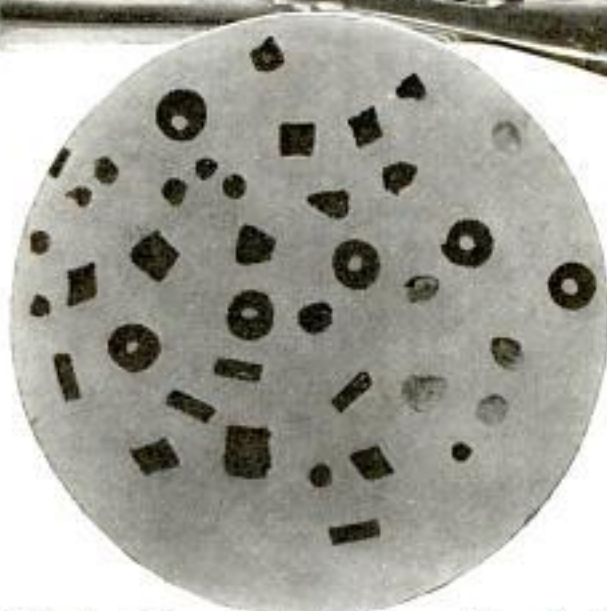


sixteen inches, not 16.24 inches. Certainly, then your own testimony shows that this revolver could not have fired the bullet in evidence."

A few months ago this would have been a poser for any firearms expert, for there is no denying that the gun is supposed to have an exact pitch of one in sixteen.

But experts know it is beyond the range of human and machine precision to manufacture two revolver barrels exactly the same, to a hair's breadth, in every detail.

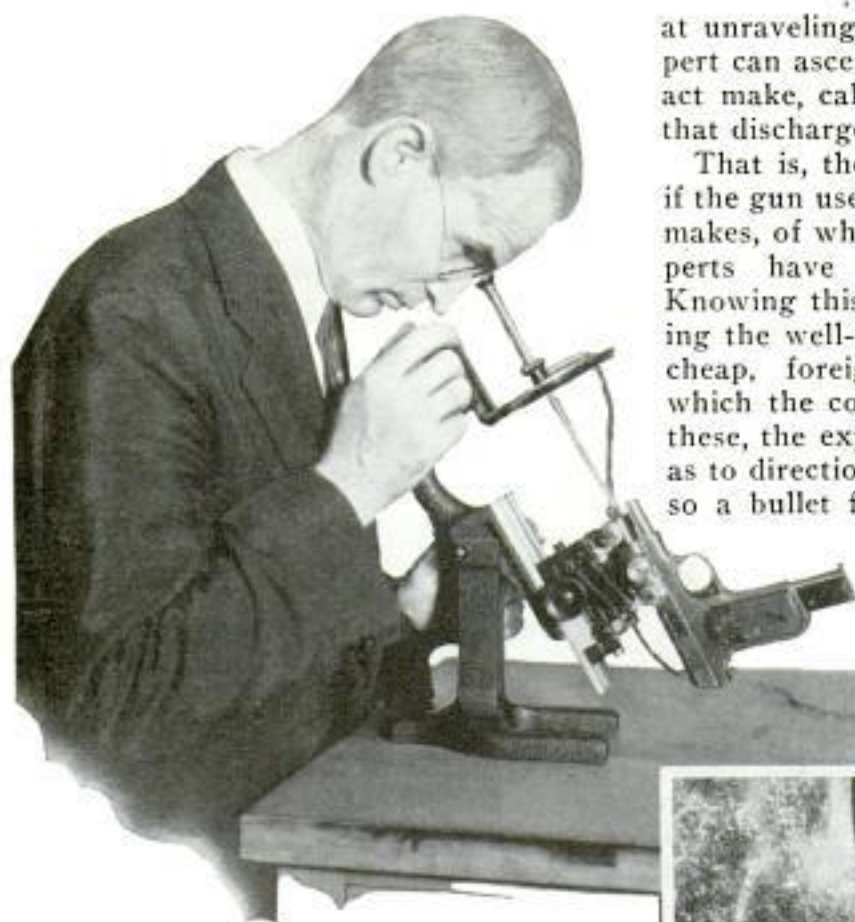
For a long time there had been no accurate method of exactly measuring the rifling pitch of any particular gun. By sawing the barrel in two lengthwise, measuring the lands and grooves with



Collection of Guns Sent in by Citizens; Below, Each Brand of Powder Has a Different Grain

micrometer exactness and then working out an involved mathematical process, the expert could arrive at the approximate pitch, but that was all. Furthermore, no gun placed in evidence could be mutilated in this manner.

However, in this case Captain Van-Amburgh brought into court an apparatus that he had labored for several years to perfect and had only received from the makers a few days before. The ballistics authority has named this new device the microprotractor. It is, firearms experts agree, the last connecting link necessary to make their testimony air-tight and unassailable. It makes positive the relation between any discharged bullet and the gun barrel from which it



was fired. A tiny electric light, at the end of a rod, illuminates the interior of the barrel. With his eye to a magnifying lens, the expert sets the marks on a sliding micrometer-eyepiece scale to coincide with the edges of the rifling land—the raised section of the twist. The scale points are moved along the land edges for a certain distance. The movement actuates a circular scale, from which the exact rate of rifling pitch can be read directly.

A demonstration before the jury, in the case under discussion, convinced them that the mortal bullet had been fired from the revolver seized from the defendant and clinched the case for the state. Hitherto, the experts have had to rely upon the proof furnished by test bullets fired from the suspected gun, but now the relation between gun barrel and mortal projectile is direct.

However, the inventor does not deem the preparation of evidence the most important service that the new instrument will render in the fight against crime. In any murder by gunfire, there is one piece of evidence, the fatal bullet, that must be left behind. That bullet always furnishes the investigating detectives with a start

at unraveling the case; the ballistics expert can ascertain in a few hours the exact make, caliber and model of the gun that discharged the projectile.

That is, the information can be given, if the gun used was one of the recognized makes, of which, in tabular form, the experts have full detailed information. Knowing this, organized crime is forsaking the well-known makes and taking to cheap, foreign-made hand arms with which the country is being flooded. Of these, the experts have little information as to direction, depth and pitch of rifling, so a bullet from one of them is nearly worthless as a clue. One of VanAmburgh's first pieces of work with his new instrument will be the furnishing of this information to other ballis-



Measuring Ridges in Gun Barrel. Above, and a Slayer's Fingerprint

tics experts throughout the country. Already he has collected samples of all the imported firearms. He will make careful measurements of all details of the barrel interiors of these weapons and prepare tables for distribution, a distinct service in the battle against gangster crime.

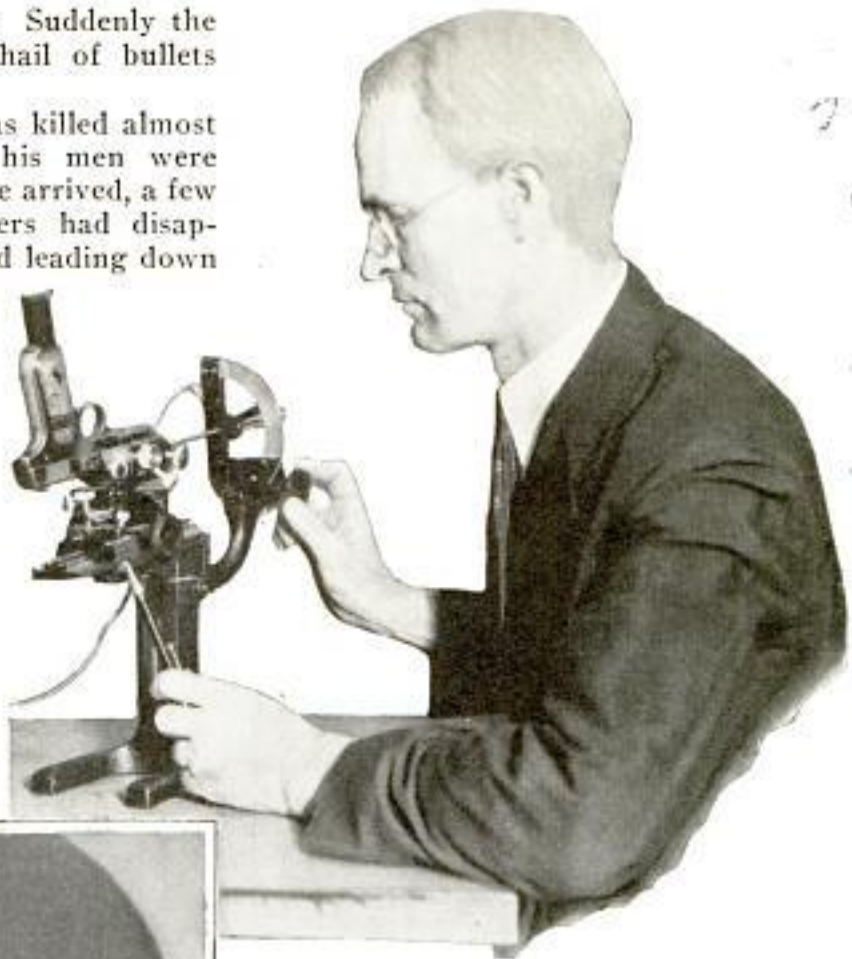
In one gangster murder, mortal bullet, gun and slayer were linked together so quickly and effectively that it left the expert fairly gasping. The members of the gang were gathered about a gambling ta-

a 1627

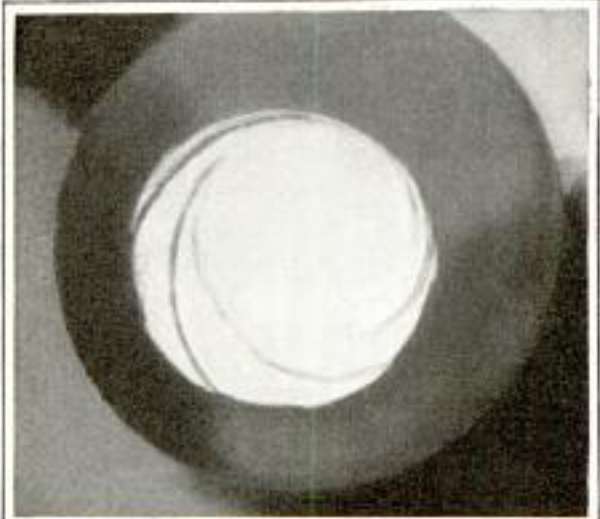
ble in their headquarters. Suddenly the door burst open and a hail of bullets raked the room.

The racketeer leader was killed almost instantly, and three of his men were wounded. When the police arrived, a few minutes later, the invaders had disappeared, but a trail of blood leading down the stairs indicated that one had been wounded. A half hour later, a man suffering from a bullet wound was left at the emergency entrance of a near-by hospital.

That was the condition of affairs when VanAm-burgh was summoned to the scene. The medical examiner removed the fatal bullet from the dead gang leader. Under the stairway was found



Handwritten notes on the right margin, including the number '2' and some illegible text.



Microprotractor Expert Measuring Gun Barrel, Top, and View of Inside of Rifle Barrel

an automatic pistol, evidently cast aside by the fleeing killers. By the time the automatic and the mortal projectile had arrived at his laboratory, the clothing of the wounded man in the hospital had reached him.

The inside of one coat pocket was blown out and charred on the inside; evidently the wearer had fired a shot from a gun without removing it from his pocket, a conclusion verified by the finding of a discharged automatic pistol shell in the lining.

The microprotractor and comparison

with test bullets showed conclusively that the mortal bullet had been fired from the automatic found under the stairs. Then marks on test cartridges were found to match exactly those on the shell found in the wounded gangster's pocket. The chain of evidence leading from the fatal bullet to the discarded pistol and thence to the man in the hospital was complete within four hours after the killing.

91919

GROOVER HAS ELECTRIC MOTOR WITH SAFETY SWITCH

Designed especially for weatherstrip work, an electrically operated grooving tool now on the market, has an adjustable handle, a safety switch and perfect balance. The switch operates automatically, releasing when grip is relaxed. High-speed cutting by electricity results in better work, the grooves being clean.



Infra 404

*Speedway Inf. Co 1834 S
52nd Ave
Acero. d. l.*

1997
918

Carl L. A. Lyman, Box 983
Buffalo, NY
POPULAR MECHANICS

This Miniature Railway Pays Boys a Profit

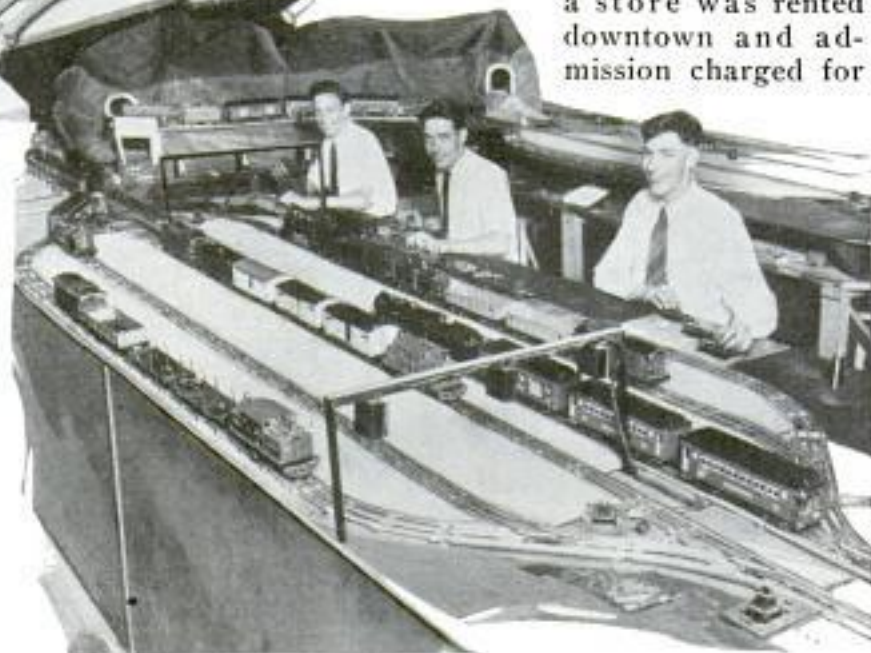
Don, Jack and Ed Moulton
don located on West Street
part of main line Buffalo
November 12/23/31

name of store
unknown



Above, Novices among the Patrons Are Given But One Division to Operate; Right, It Takes Skill and Training to Operate Parts of the "Main Line"

In some spots the tracks run six wide. There are thirty-six switches, nine locomotives and six signal towers. The main line is controlled through electric block signals, while semaphores guard the traffic on the branches and sidetracks. The brothers have more than a thousand dollars' worth of equipment. The venture started in an attic and proved so attractive to neighboring boys that a store was rented downtown and admission charged for



Three youthful brothers in an eastern city are operating two miniature railway systems in a downtown store that pay them a real profit. The trains are of all types, including passenger, freight, locals, limiteds and "transcontinental." It takes more than thirty operators to run the systems at one time. Altogether there is 700 feet of track in the two systems, and they run through tunnels, over bridges, climb mountains and make hairpin turns.

anyone who wished to operate a section of the system. A profit was made the first day, and the number of patrons has increased every week since the start.

SWITCH "THINKS" FOR ITSELF AND SHIFTS WITH SEASON

An industrial alarm clock, recently developed by a General Electric engineer, seems almost to think for itself and adjusts its movements to fit the season of the year. If the dial is set to turn street lights, for instance, off at 5:30 in the morning on the shortest day of the year, the increasing amount of daylight on

each succeeding day does not fool the mechanism. It simply adjusts itself each night to turn the lights on slightly later each evening and off a little earlier the next morning. When the maximum amount of daylight is reached on the longest day, in June, the switch reverses itself to cope with the diminishing periods of daylight. It is even designed to take care of varying twilight conditions in different parts of the world.

Christian Science
number 10/2/31 2050

W & Porter
Schenectady N.Y.

Science Service to a 2001 April date
 10/5/31
 POPULAR MECHANICS Bank
 2055
 Fox Reservoir del
 919

X-RAY PICTURES OF THE SINUS USED FOR IDENTIFICATION

X-ray pictures of the nasal sinuses, those tiny cavities in the skull which have caused discomfort and pain to many persons, provide a positive means of identification. No two sinuses are alike, Dr. Thomas A. Poole, of Washington, says, after close examination of 2,000 photographs of sinuses, collected over a period of eight years. Neither age nor treatment makes any difference in the sinus, so that an X-ray picture taken at any time in a person's life will be a lasting means of identification. Police and insurance companies are studying Doctor Poole's findings in the hope of adding the sinus photographs to fingerprint records for identification purposes.

2056

LANDING GEAR OF PLANE LEADS IN STRUCTURAL FAILURES

Failures of landing gear cause the most accidents generally attributed to structural weakness in aircraft. All accidents, and their causes, for the last six months of 1930 were compiled by the department of commerce. In the structural-failure class, landing gear is held responsible for 77.2 per cent of all accidents, and the wings next, with 9.1 per cent. Heavy loads imposed on the gear by frequent rough landings probably caused most of the accidents, the report points out, stressing the need for landing-gear improvements.

Air Commerce Bulletin
 10/1/31
 91999

RUBBER PIPE POCKET IN BOOTS FOR ANGLERS AND HUNTERS

Hipboots intended for fishermen and hunters are being provided by one manufacturer with a rubber tobacco pocket that is waterproof and always within easy reach of the wearer. The pocket is fitted with a flap and is large enough to hold pipe, cigars, matches and a supply of tobacco.



Goodyear Rubber Co.
 116 Chambers
 New York



Patrons Must Be Identified at the Grilled Window Before They May Enter This Bank

'SPEAKEASY' BANK OPENS DOOR ONLY TO KNOWN PATRONS

Patrons of a bank in Illinois must identify themselves before the cashier unlocks the doors by pressing an electric button. Two robberies brought a decision by the directors to keep the bank doors locked until known patrons presented themselves. Strangers must present themselves for the cashier's scrutiny at a barred window before the door is opened.

SHEET ZINC MADE FOR BENDING HELPS METAL WORKERS

Sheet zinc, prepared so that it bends freely in metal-working processes, is now on the market. Previously, this metal could not be put through a press nor did it have sufficient free bending to allow it to be worked to any great advantage. The new type of zinc can be bent, seamed and formed both with the grain and across the grain, without fear of cracking. Its surface is very smooth, making this material valuable in metal working.

Chicago
 205 W. Wacker
 New Jersey Zinc Co.
 160 Front St.
 New York

severe

a 200 3

rec April 1930 578
Feb. 1928 267



Your idea

Here's an Opportunity for Everyone to Help Supply Simple Time, Labor and Money-Saving Things for Which the Entire World is Waiting

What's

ELECTRICITY - Increase in use of electricity in homes, hotels, schools, etc. - demand for more efficient and economical methods of generating and distributing power.
AVIATION - Increase in air travel - demand for more efficient and economical methods of transportation.
RADIO - Increase in use of radio in homes, hotels, schools, etc. - demand for more efficient and economical methods of generating and distributing power.
CHEMISTRY - Increase in use of chemicals in industry, agriculture, etc. - demand for more efficient and economical methods of producing and distributing chemicals.
HEATING - Increase in use of heating in homes, hotels, schools, etc. - demand for more efficient and economical methods of generating and distributing heat.

Wanted

TELEVISION - Increase in use of television in homes, hotels, schools, etc. - demand for more efficient and economical methods of generating and distributing power.
MECHANICS - Increase in use of mechanics in industry, agriculture, etc. - demand for more efficient and economical methods of producing and distributing mechanical parts and equipment.
HOME APPLIANCES - Increase in use of home appliances in homes, hotels, schools, etc. - demand for more efficient and economical methods of producing and distributing home appliances.
LABORATORY - Increase in use of laboratories in industry, agriculture, etc. - demand for more efficient and economical methods of producing and distributing laboratory equipment and supplies.
AUTOMOBILE - Increase in use of automobiles in industry, agriculture, etc. - demand for more efficient and economical methods of producing and distributing automobiles and parts.

"WHAT the world needs is something new because wealth depends not on capital—we have too much gold—or labor, but on ideas," recently declared one of America's greatest engineers.

"A new prosperity is ahead of us. New fortunes will be made, new leaders will find the way to the top. The rewards are greater than ever before in history, but they will not be for those who merely wait for something to happen. The rewards will go to the man who has ideas and who puts them into use."

History of the past gives us the key to the future. Take a look backward. Just a hundred years ago, America was cheering its first passenger train. Its average speed was fifteen miles an hour. In the same year Michael Faraday discovered the principle of electromagnetic induction without which the present development of the electric industry would have been impossible—no electric lights, no telephone or telegraph and no radio.

Within the memory of men, automobiles have supplanted bicycles, rayon is competing with silk, the aluminum industry was born in the experiments of a youth in college, radio has girdled the

Inv. Sir Wilfrid Stokes
(wartime technical mortar time)



Cooking Steak Right on Table So Easy with Apparatus Shown Above

List of 995 needed inventions
 price 1 shilling. post 2 pence. a 2003



may be worth a Fortune

globe, airplanes have become commonplace, new motors have been developed, lacquers made from explosives have revolutionized the paint industry and American talkies are seen around the world.

Each development has created new wealth and opportunities for everybody, particularly for simple ideas. One man puts a bit of rope about a paper bag for shoppers and reaps a fortune. Another prints a face on a thin bit of rubber and immediately sells it to a great corporation for advertising purposes. The first automobiles had a rubber bulb for a horn. An inventor came along with a better horn and made millions. There is no end to opportunity, no limit to the wealth which may actually be created by ideas. The entire world is crying for new ways of doing simple things.

Engineers agree that the chances for inventors to convert original ideas into dollars were never better than they are today. An inventor, for example, who can devise a really safe and effective automatic railroad coupling to lessen the yearly toll of life and limb, will make a fortune if, before the end of this year, he submits a winning idea to the International Labor Office at Geneva, Switzerland, or to the International Railroad Union. It is estimated that, in Europe alone, about two billion dollars will have to be spent in re-equipping rolling stock with effective automatic couplings. Every year, the Institute of Patentees in London files details of 40,000 new inventions. Even some apparently unlikely inventions, of which the patents were filed in 1930-1931, are today returning royalties to inventors whose chances of success seemed far from rose-colored.

Edwards Storm King



Courtesy: Internat'l Pat. Exposition
 Model of "Barrel" Type Airship That Operates on Compressed Air; It Has Three Motors and Cylinders Are Made of Rubber

"It is never safe to say that a particular invention will never make money for the inventor," said Capt. G. Drury Coleman, secretary of the institute. "I once said that the man who invented the glass ball in mineral-water bottles made \$15,000,000. He angrily wrote to

Richardson Mar. Chas. Edwards
 B. H. Edison, Managing Director

Edwards Storm King
 Edwards Storm King
 Edwards Storm King

requiring in
 French and
 German

International Bureau of
 Patents, 24, rue des Saussaies,
 Paris, 16, France

39, Victoria St. 921
 London, England

Chicago
 One by the inventor 2003
 B. E. Blakely
 107 S. B. St.
 March 13, 1917

out of print. list of wanted inventions
 appear in monthly publications
 POPULAR MECHANICS
 "The inventor" published by Institute
 are permanently fixed hatpins. House-
 wives now have available a geyser kettle
 which produces immediate and contin-
 uous supplies of hot water; there is a spoon
 which cannot fall into a boiling saucepan,
 owing to a catch at the top of the handle.
 Do you know that the man who invented
 the movable top of collar studs has drawn
 royalties of \$20,000 a year from this in-
 vention, and has been receiving that mon-
 ey for a long time? Often, even appar-
 ently strange and ridiculous ideas in me-
 chanical devices find a good market."



another
 wife and
 Kalkberg
 Fleebusch
 Brooklyn, N.Y.

me that he had not made nearly so much money. Still the invention brought him a fortune. At one of our exhibitions for inventors, there was a device for forcing toothpaste out of a tube by means of a handle, and, frankly, I thought people would always prefer to squeeze a tube. But, one day, a firm which makes polish, rang me up to say: 'We are having great difficulty in making our polish exude freely, can you suggest something?' Here was the chance for the handle inventor. A device that was not attractive as a toothpaste novelty was sold to meet a practical need.

"Out of the 40,000 new inventions recently filed, it is surprising how people who would not usually be supposed to possess mechanical inventive abilities have developed profitable ideas. If the fashion of long hair comes in again, there



nothing

© Special Press

A feature of the Institute of Patentees is the "Wanted Book." A few years back, Sir William Bull presented the Wanted Book to the institute. His idea was that it should form an exchange between manufacturers and inventors, and in it was entered every conceivable type of invention proposed by inventors or inquired for by manufacturers and business men. A difficulty which has had to be overcome was that many of the things suggested proved in practice to be too costly to produce, so the slogan of the inventor must be, "Try to



Courtesy H. C. Johnson
 Girl Inventor with "Non-Skid" Soap, at Top; Center, Midget Phonograph That Plays Full-Size Disks, Yet Can Be Folded into a Vanity Case; at Seat Adjustable for Width, Below

Johnson Club Co. 132 Northfield Road, Long Norton
 Birmingham, Eng
 1/10

Chas. H. C. Johnson
 "Screen House" Doctors
 Park, Harrow, England

keep the cost down to rock bottom." In the Wanted Book, at the moment, a firm offers a prize for "a metal container to hold loose face powder. The container should be quite slim and convenient to handle, and easily slipped into a woman's vanity bag. The device must also have a fairly large surface area. The utility of the new box will be enhanced if it is made to hold a specially designed refill, thus binding the buyer to use a particular type of powder." Here are some other popular requests sent, in the last few weeks, by manufacturers and recorded in the Wanted file room of the Institute of Patentees:

Wanted a collapsible table for wringing machines, making a complete table and needing only one movement for conversion; cardboard boxes collapsing when not in use; method of making stainless iron from chilled iron, which will withstand heavy loads; needle or hook automatically operated for the purpose of reknitting runs or ladders in knitted fabrics, or silk hosiery (the



nothing



nothing

© London Daily Mail

Model of Safety Lock for Mine-Shaft Elevators, Top; Bottle with Lop-Sided Neck to Prevent Gurgling or Spilling, Center; and Phonograph That Plays from Film.

firm asking for this hook knows that there are already patented needles or hooks on the market, but wants a patented device of its own); lipstick

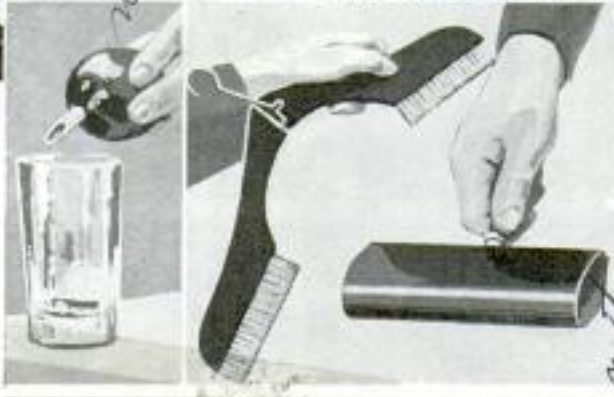
case, used with one hand only; method of burning kerosene without use of wick; a simple automatic trailer brake applied when trailers overrun power unit; improved wax-composition cork stopper for bottles (the stopper must be bright in color and strong enough to be driven into bottles without fracturing); automatic floor-polisher machine, needing no power and having no wheels to clog; a device to quicken production of dentures not made of gold or vulcanite; an idea for a firm making flat and other forms of tubing, which wants a novel and profitable line for its goods; a means of keeping ground coffee as fresh as when it comes from the grinding machine (either by packing or treating the coffee); a fireproof gasoline tank; boot and shoe fasteners on eyelet



Courtesy Mme. Faucon Johnson

Paris, France

*J. L. Andrews
9200 3
37 Cranford Road,
Cranford Ind. Cleburne,
England*



Courtesy London Daily Mail
Scissors with Spring That Takes Up Wear; Baby Carriage Driven by Engine; Lemon Squeezer That Leaves the Pips; Combined Cigarette Hanger and Brush, and Crumb Sweeper

as long as the ordinary disk; a surveyor has a new dishwasher; a woman, a new parachute; a physician, a new tool for cleaning fish; and the inventor of the deadly wartime trench mortar turned his hand, just before his death, to the production of a novel

system but incorporating well-known strip fastening; machine converting battens and deals into thin boards without waste of lumber; smokeless electrical lighters; anti-freezing solution for autos; a sink strainer which does not leave refuse on the base of the sink; a cheap clip-on apron, needing no tying strings, and which can be sold at a low price; a cheap electric heater; a road surface safer for motoring and horse traffic; electric-cable cover which will not burn; sewing machine whose shuttle does not run out and stop the machine; a simple device to prevent the corners of rugs curling upward; a floor stain sinking one-eighth of an inch into deal boards.

The records of the Institute of Patentees reveal strange contrasts between the trade or profession of the inventor and his or her creation. An accountant recently invented a new way of preserving eggs; a plowman invented a new type of rotary engine; a naval lieutenant produced a new parlor game; a woman devised a mechanical scarecrow for corn fields and orchards; an author invented a new phonograph disk playing ten times

electric table cooker, in the form of a frying pan cooking by radiant heat, which is placed over the plate off which the food is to be eaten. Another recent invention is a bottle which does not gurgle, froth or overflow when liquid is poured into a glass.

But the most extraordinary story of a recent invention is told of a man of twenty-four years who is working in a secret laboratory on a heath a few miles outside London. After three or four years of experiments, he has invented a chemical "dope" which, when applied to a helmet or suit, enables the wearer to walk in perfect safety in the face of intense heat or a raging fire. Emissaries of foreign governments are alleged to have tried to steal his invention. Foreign war departments are said to be interested in this invention since it can be applied to making airplanes fireproof.

*E. M. Vail, 6150 Estate Drive
Oakland Calif. in charge of work*

at Salinas Calif **POPULAR MECHANICS** *1958 Hendley Eversole,* **925** *newman's*

MEAL MADE OF CULL LETTUCE USED TO FEED STOCK *a 20 44*

Cull lettuce, a packing-shed waste which accumulates by the ton and has been a costly problem to packers for years, is being transformed into an alfalfa meal which is good for feeding live stock. The waste lettuce is run through a chopper and crusher, a large percentage of the water is squeezed out and the resulting product is treated with heated air. It resembles alfalfa meal both in appearance and food value. The reduction plant, making disposal of the cull lettuce easy, plans a flume system of transportation for floating the lettuce from the packing sheds to a settling pond, thus eliminating the use of trucks. Shippers now deliver the lettuce free, because the hauling distance is shorter.

a 1962

TOYS WITH VACUUM HANDS CLING TO GLASS

Gay-colored toy figures with vacuum-cup feet and hands are among the newest amusement devices for children. They also can be used for ornamenting automobile windshields and windows, holding merchandise in windows or showcases, and for attaching signs to the glass of shop windows. The toys consist of a wooden body, a head mounted on rubber



60¢

Several of the figures can be arranged in a group, the feet and hands adhering to each other.

RIM JACK IS SO EASY TO USE CHILD CAN OPERATE IT *a 1958*

Operated while standing in an upright position and without soiling the hands or clothing, a rim jack for automobiles is be-

*Atto Ketelsen
Kenmore Blvd at 18th St. W.
Minn. Ohio*



pat. app.

Rim Jack for Auto That Can Be Operated from a Standing Position without Soiling Hands

ing made to replace the old axle type. The jack is placed at an angle against the wheel rim and raised with a crank. With the car lifted, the tire can be slipped over the jack and a rim support shoved under the wheel to hold it while changes or repairs are being made. The jack folds into small space so it can be carried under a seat, and a child can operate it.

APPLE BARREL WITHOUT BULGE OCCUPIES LESS SPACE *a 1959*

Less storage space is required for a straight-sided apple or potato barrel which has the same capacity as the old-style container with bulging sides. The barrel, just placed on the market, is constructed of three-ply hardwood veneer and weighs less than the stave barrel. Its makers also claim that it is more moisture-proof.



*The Northern Plywood
Co. Houlton
Maine*

Copyrighted material

Fish and Animal Doctors Cure Ailing Pets



Above, Parrot in an Animal Hospital Ready for a Cleansing Spray Bath as Part of Course of Treatment



Hospitals for Animals, Birds and Fish Have Been Established in Many Parts of the World, and Specialists in Animal Injuries and Diseases Now Are Attached to Most Zoos; Above, Two Doctors Are Shown Treating a Dog for Concussion of the Brain, and, at the Left, a Goldfish Is Undergoing an Operation in a Fish Hospital at Toronto

Animals, like Man, Find Their Principal Enemies in Germs and an Ailing Lion or Tiger in a Zoo Undergoes a Thorough Physical Examination Before Its Trouble Is Diagnosed by the Animal Doctor; at Right, a Young Leopard Is Being X-Rayed to Determine the Cause of the Beast's Sudden Illness



U.S.A.

a2015
928

Rossia Educational Chart
73 POPULAR MECHANICS
New York

University
of Buffalo
Buffalo NY
Prof. Frank P. Hartman
and Herbert Beck



Information about Any of the Forty-Eight States is Shown on Chart Which Operates Mechanically

MECHANICAL CHART OF NATION GIVES GEOGRAPHICAL FACTS

Geographical information about any of the forty-eight states in the United States may be obtained by operation of a revolving chart with a keyboard at the outer edge of the disk. Turning the keyboard to a certain state will cause the chart to show, in cut-out spaces, the largest city, the capital city, the state's rank in population, the area, principal industries, dates of settlement and entry into the union, and other facts.

BENCH VISE MADE ADJUSTABLE TO HEIGHT OF WORK



Adjustable to the exact height of the operator's work, a bench vise which saves time has been placed on the market. Not only is the vise adjustable up or down, but it turns on a swivel, making many operations easier.

NERVES TREATED WITH CORTIN GET TEMPORARY RELIEF

Temporary relief from nerve diseases has been obtained by using cortin, life saving extract of the cortex of the adrenal glands, in test cases. In some cases insomnia was replaced by restful sleep, depression by a sense of well-being, fatigue was reduced and aches and pains diminished or disappeared. But cortin is in no sense a cure for such conditions, the experimenting doctors warn, the tests showing that only temporary relief follows treatment with the extract, which has prolonged life in patients suffering from once fatal Addison's disease

ONE-WAY RADIATOR AIR VALVE SAVES FUEL IN HEATING

Allowing air to pass out of a radiator, but preventing any from entering, a vacuum cap that fits any ordinary steam-radiator air valve gives the valve a vacuum action, enabling the radiator to furnish more heat on less fuel. Radiators are hot only when full of steam and the one-way valve cap assures a steam supply because, as that in the radiator condenses, more is drawn from the boiler to fill the partial vacuum. In this manner, radiators are kept hot for hours without forcing the fire to raise the pressure.



TRACTOR WITH RADIO CONTROL PLOWS BIG FIELD

Entirely controlled by radio, a tractor recently passed a successful test while plowing a thirty-acre field. The tractor carried three fourteen-inch plows with a keyboard operated from an automobile thirty feet behind. The tractor was started with one key, the clutch adjusted with another, the machine guided with a third and the engine's speed by a fourth.

a2080
reported to Springfield
neuro-psychiatric
Chicago
Chicago
Chicago

a2008

11/20/20

Wm A Barrett & Co,
126 S. Clinton, Chicago

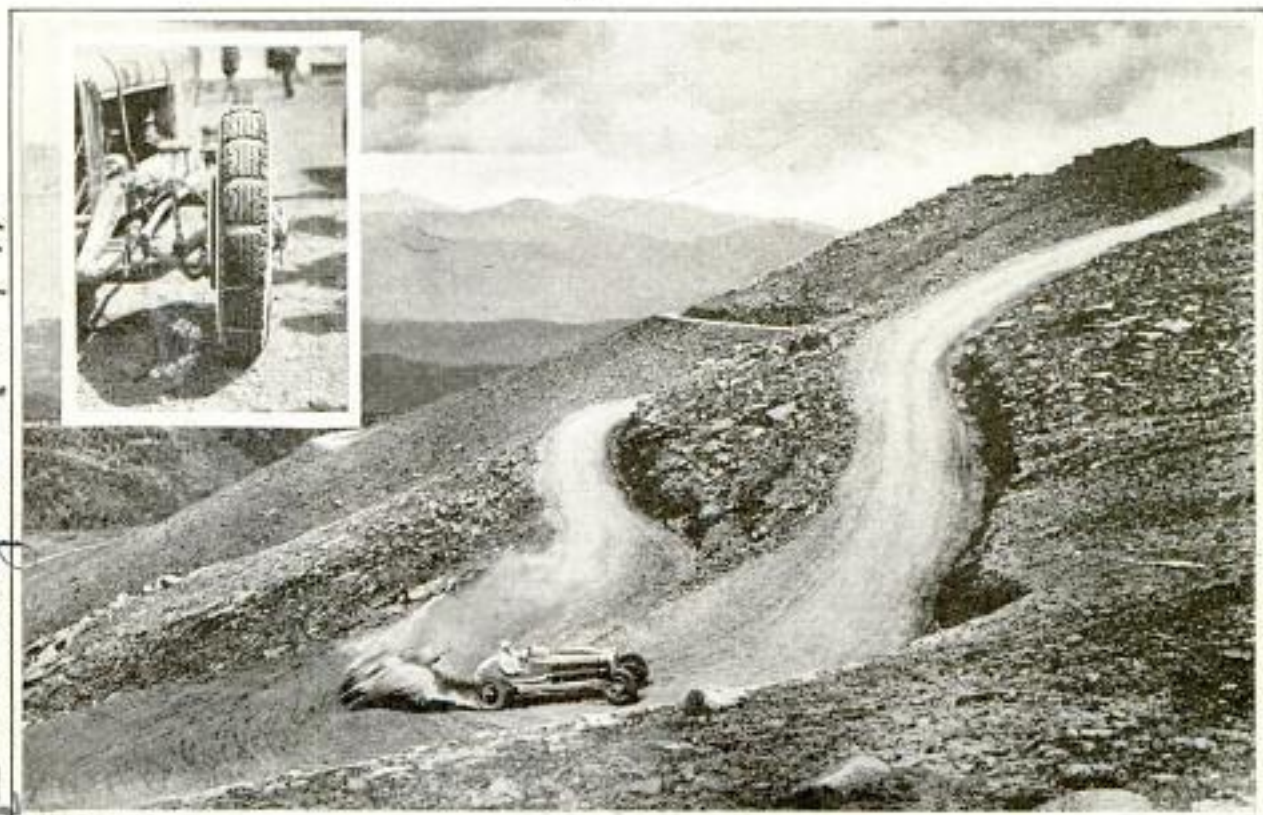
demonstrated by
J. J. Lynch, Miles City
Mont., at
at Noblesville.

and

a 1911. Cont. John Stewart MacClary
725 W. 14th St
Omaha, Neb 929

POPULAR MECHANICS

Grooved Tires Help Win Pikes Peak Race



Taking a Hairpin Turn at High Speed in a Race to the Summit of Pikes Peak; Inset Shows Grooved Auto Tire Used by One of Racers to Minimize Slipping in Loose Gravel

With the present perfection of cars and the skill of their drivers, the outcome of an automobile race often turns on some trifle—the result of keen observation or lightning-quick decision. This was true in the last Pikes Peak race to the “top-o’-the-world.” The winner was C. A. “Chuck” Myers, who drove a Hunt Special (Studebaker “President Eight”). His time was seventeen minutes, ten and three-tenths seconds. Slightly more than fifteen seconds slower was the time of Glen Shultz, who drove a car powered by

a DV thirty-two-valve Stutz motor. The road surface of disintegrated granite affords poor traction—especially on sharp curves taken at high speed. The winning car, and that which placed second, used tires whose heavy treads had been remodeled. The winner had deep grooves cut across the treads, while Shultz’ tires, too, were specially grooved, but on them the grooves followed the circumference. The effect was very much the same as obtained by putting cleats on tractor wheels. Slippage was thus minimized.

a 2005

see April 1933
508

MERCURY-METAL VAPOR LAMP CONNECTS TO ANY SOCKET

Mercury and metal vapors have been successfully mixed to produce a light of any color in an electric lamp which can be connected directly to any socket. The lamp combines the advantages of the mercury-vapor arc and the neon tube. It can be made in the form of the usual long tube or a very short tube curved back on itself to produce a U-shaped bulb which

can be screwed into any household socket, something not possible before. A light very similar to daylight is produced by mixing vapors of mercury, zinc and sodium at high pressures, while other mixtures will result in lights of various colors. This lamp glows almost immediately after the current is switched on, and after about one minute, the light intensity increases to a maximum. It is about three times as efficient as the best filament electric lamp of equal candlepower

Veran... H. Korina... 11-14

and Dr. Hans Jopanner
Berlin No. 4. Chaussee 117.
Germany

181 E. 142nd St
New York City

in connection with H. W. Hoovering & Co. Germany
and Dr. Edmund Hoovering & Co. Germany

EARTHQUAKES



© Fairchild Aerial Survey, Inc.

gineering at Stanford University, California.

These men produce quakes and control them. With skillfully designed apparatus, they determine in advance the kind of shock they will have, fix its character, intensity and duration. To these known conditions of destruction they oppose the resistance of accurately constructed models of buildings. They then as-



© Planet News, Ltd.

REDUCTION of loss of life in earthquake disasters to great cities, such as the destruction of San Francisco in 1906 and of Tokio in 1923, is sought in experiments with man-made shocks and models on a huge "shaking table" in the school of en-

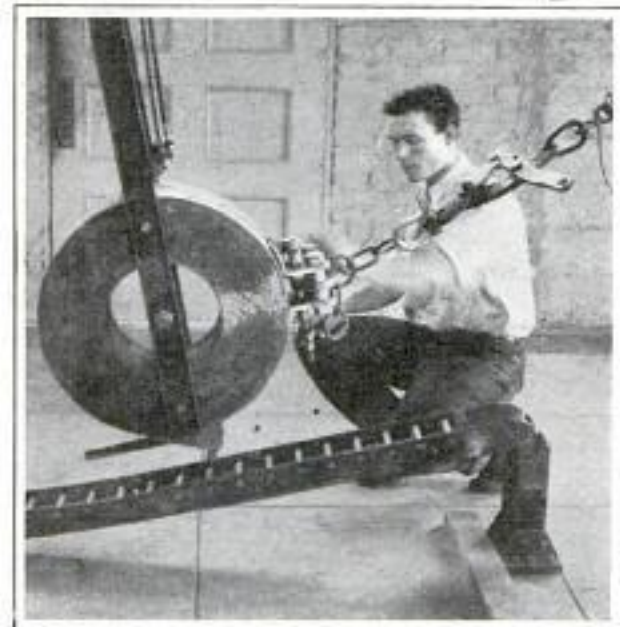
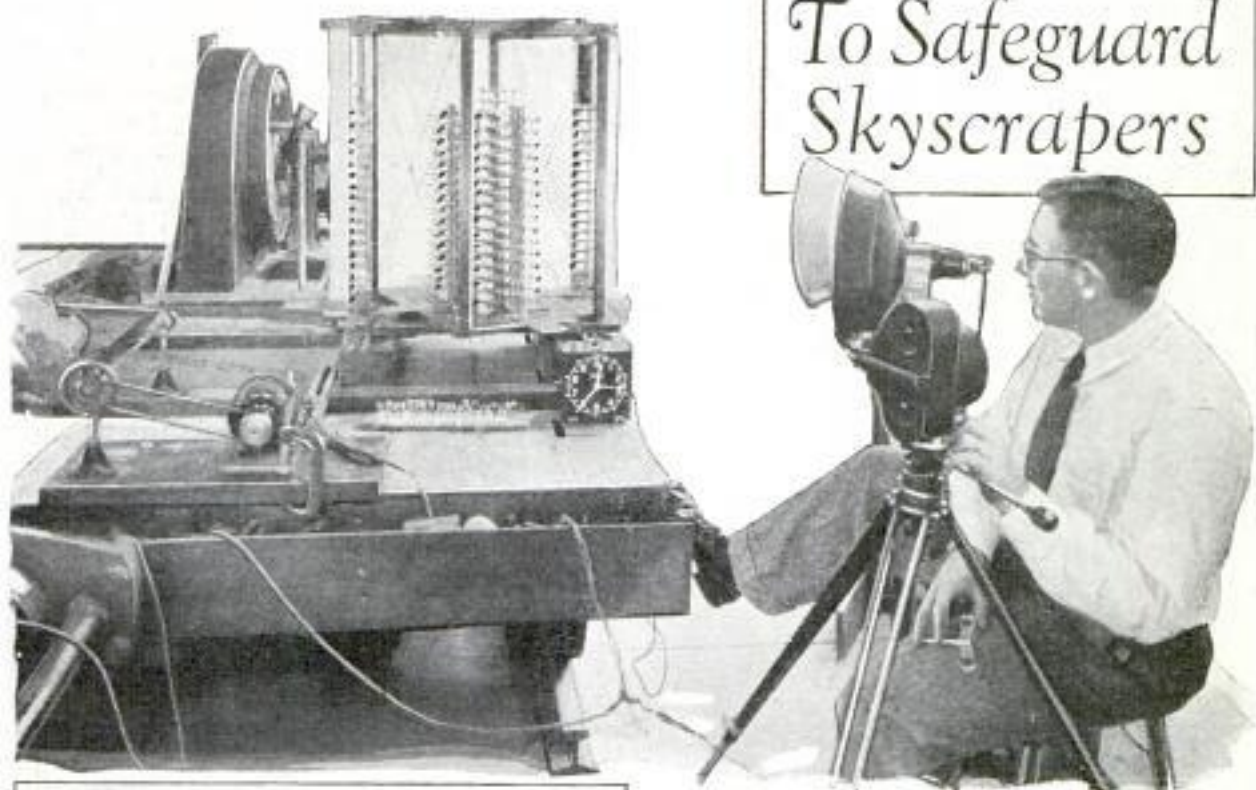


Lower Manhattan Island, Top; Toppling Chimneys with Man-Made Quakes, at Left, and the Earthquake Machine

certain exactly how and why the structure failed. And thus knowing the conditions of destruction, they proceed to

Made to Order

To Safeguard
Skyscrapers



Photos © Planet News, Ltd.
Making Movies of Model Building in Earthquake Machine; Eleven-Hundred-Pound Pendulum Hammer

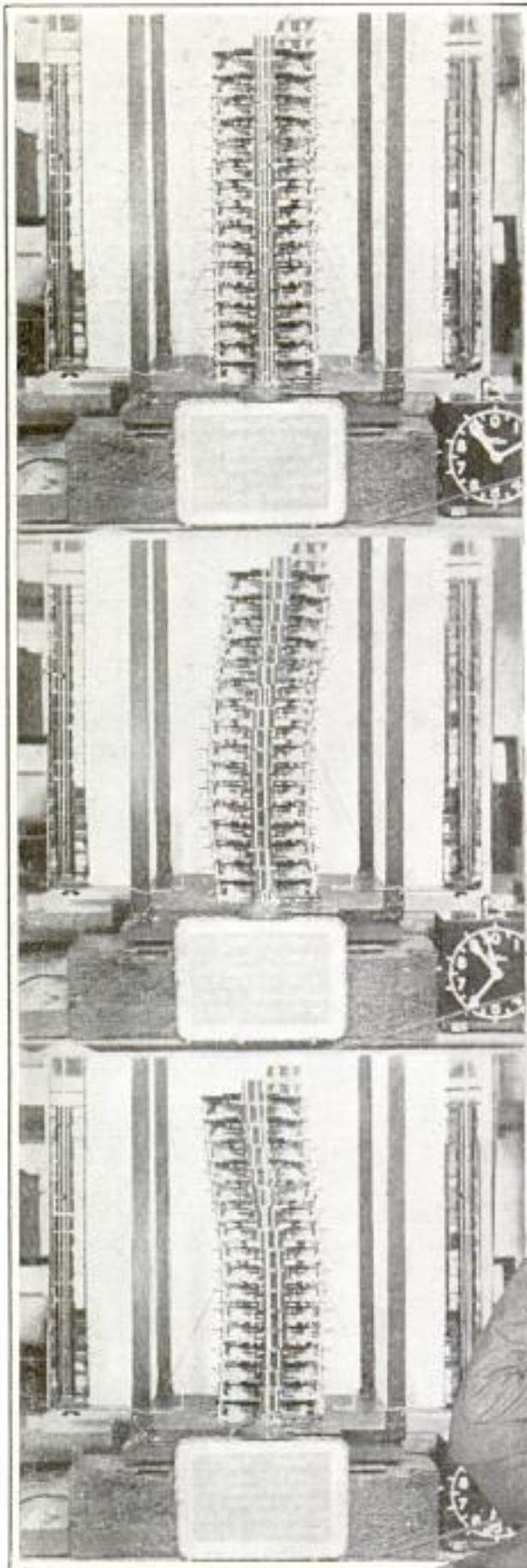
work out the principles of safe construction.

Already they have taken the first few steps in their efforts to learn best methods of building quake-proof structures, humble homes or tall towers, and how best to build on loose ground and how on

rock. Their experiments indicate that diagonal sheathing in a wall is apt to be more resisting than horizontal or vertical sheathing. They have found that nails are easily shaken loose. They have learned that apparently weight, and not surface exposure to the wind, determines the susceptibility of an engineering structure to earthquakes.

Prof. Lydik S. Jacobsen, of the department of mechanical engineering, is the scientist conducting this research. For one of his experiments upon the shaking table, a 6,000-pound platform mounted on four car wheels, he places a mathematically exact model of a building. An 1,100-pound pendulum, seventeen feet long, is raised to a certain height and—whang—it crashes down into a bumper spring fastened to the vibrating platform. Before the pendulum can recoil for a second blow, it is caught. The pendulum has struck a blow the force of an earthquake, and observers are able to determine the exact effect which a comparable quake would have had on the life-size structure.

For another experiment Professor Ja-



cobsen prepared an unbalanced flywheel so that, when it rotated and caused the table to shake, the vibration would be a simple harmonic motion which could be varied to suit the needs of the experiments.

Since the vertical motions a building experiences during an earthquake are negligible compared with the horizontal, steel balls were placed between the floors to support the vertical load, and highly accurate springs were used to check the horizontal movement.

This model was placed on the shaking table and exhaustive experiments were made with it. The table was struck with the pendulum. The table was shaken by movements of various cams so constructed that they would reproduce the vibrations of many actual and many theoretical quakes. One of these cams reproduces the east-west component of the Tokio earthquake in 1923.

Professor Jacobsen used a small motion-picture camera to photograph the action of the delicate model as it moved when the three-ton steel platform was made to tremble.

To get an idea of the dynamic effect of water against the face of a dam during an earthquake, experiments were carried on by filling large wooden tanks with water and then observing them going through tests on the shaking table.

Experiments with various types of soil having different water contents, to learn how best to build on certain kinds of ground, have not progressed far enough to justify general conclusions, excepting that the old guess that buildings are safer on firm foundation than on loose ground has been questioned considerably. Evidence tending to show that

Moving Pictures Showing, Top to Bottom, How Model Sixteen-Story Building Is Distorted in Vibrator, and, at Right, the Cams That Reproduce Famous Temblors of History

Photos © Planet News, Ltd.

a 1946

this is not always true being revealed.

Prof. Emeritus Baile Willis, who was the originator of this research and widely acclaimed in scientific circles as "dean of the science of seismology in America," said:

"These experiments with artificial earthquakes constitute a most important advance. Professor Nito, of Japan, showed us how to build rigid buildings to withstand earthquakes. These experiments will tell us when to build either rigid or flexible structures to resist earthquakes and by the most advanced methods of design. The study is to safeguard mankind against an ancient danger which is due largely to his ignorance of the nature of earthquakes and the practice of safe conditions."

*309 Babara
Cyril Lamb
Palmer
Munk*



Team of Concrete Oxen Hitched to an Old Covered Wagon to Lend an Air of Realism to a Collection of Early American Antiques

CONCRETE OX TEAM ADDS LIFE TO ANTIQUE EXHIBIT

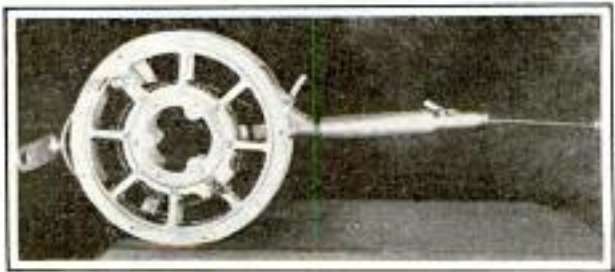
To add realism to an exhibit of early American antiques, a private collector in Michigan has constructed a life-size team of oxen of concrete, modeled on wooden frames. The team is hitched to an old-time covered wagon which is a part of the collection. The neck yoke is a genuine antique also, and the animals are painted in a manner to make them most realistic at a distance. The horns are from real oxen, the ears are made of parts of rubber tires and the tails are of hemp rope. The team and wagon stand beside a log cabin containing a collection of household utensils and tools used a century ago.

Henry de Pue near Ypsilanti Mich

CLOGGED-UP DRAINS CLEARED BY FLEXIBLE ROD

By winding the flexible rod, with which clogged drain pipes are cleared, on a reel, one plumber has solved one of the industry's problems. The wheel of the reel, which is fifteen inches in diameter, is used as a crank, and the rod is fed into

a 1938



Flexible Reel for Cleaning Drain Pipes Mounted on Wheel Which Serves as a Crank

the pipe a little at a time, and a length of pipe may be inserted between the reel and the plumbing connection, allowing the reel to be operated in a standing position away from cramped and crowded places. The reel is light, weighing but eighteen pounds while carrying a fifty-foot rod, and may be strapped about the operator's waist to leave both hands free.

*Harley L. Young
1412 N. Main St
Mayton Ohio*

INDICATOR SHOWS BOAT SPEED ON UNIFORM DIAL

Adaptation of a uniform dial to a speed indicator for boats has been accomplished in an instrument just placed on the market. The dial reads in miles per hour. From the indicator, which may be placed anywhere desired on the boat, a small rubber tube is run to the stern fitting. From there, a small tube, with a small mouth or hole opening forward, extends into the water. When the boat is under way, the pressure of the water at this mouth corresponds to the boat's speed, and is transmitted up the tubing, moving the hand on the indicators.

\$5.00

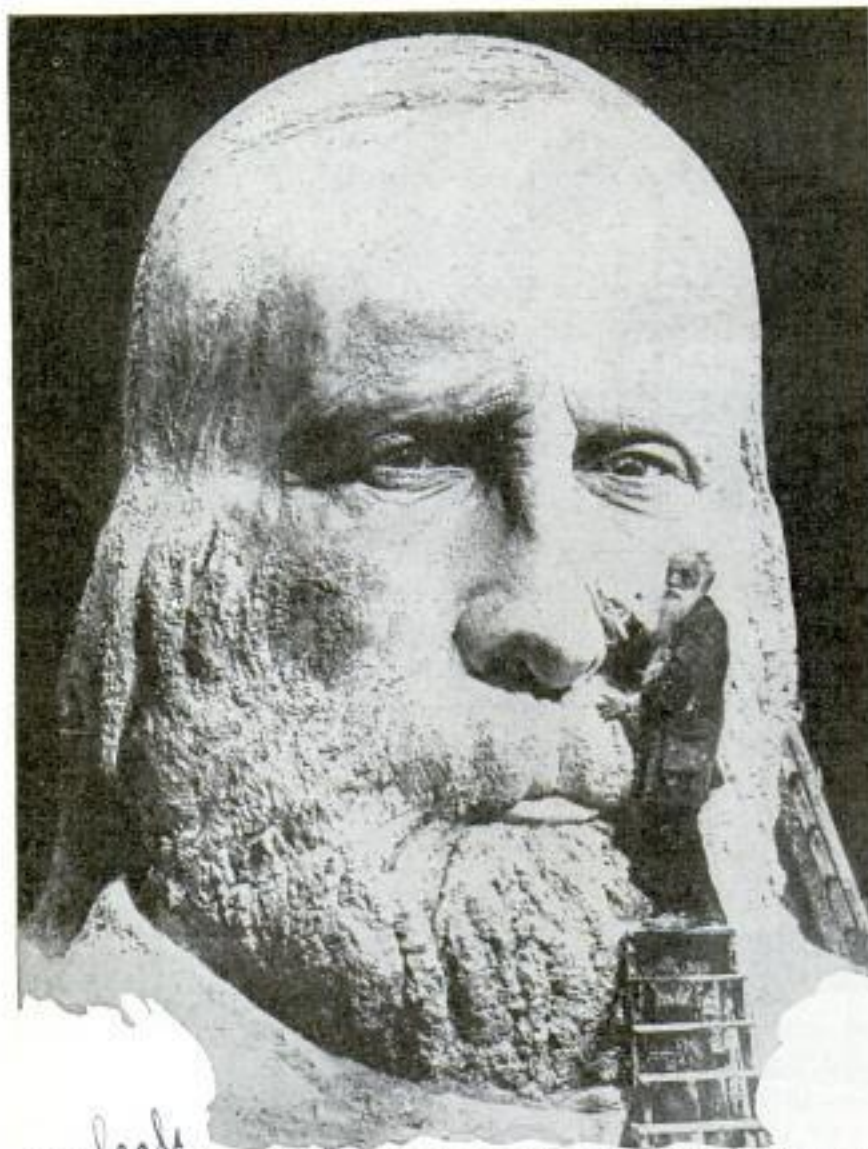
a 2011

no. 500

Kolman

*Constant Service Works
4982 N. Kolman Ave.
Jefferson Sta Chicago*

a1851
934



Sculptor at Work on the Huge Head of an Enormous Statue of Garibaldi, Famous Italian Patriot, Which Is Being Erected in Rome

MAN'S HEAD LARGER AS A HOUSE IS CARVED IN STONE

In memory of Giuseppe Garibaldi, famous Italian patriot who died in 1882, a huge statue of the liberator and unifier of his country is being erected in Rome. The immense proportions of the stone likeness of the Italian were made apparent when a picture of the head was taken with the sculptor at work on it. This shows the head alone to be as large as an ordinary house, and the rest of the figure is in the same heroic proportions.

MAGNETISM IS KILLED BY HEAT UPSETTING ARMY OF ATOMS

Iron atoms are like well-drilled soldiers, obeying their commanding officer—magnetic field—until their ranks are invaded by

atoms of other elements. This is what happens, says Trygve D. Yensen, of the Westinghouse Electric and Manufacturing company when iron, nickel, cobalt and their alloys are heated to certain temperatures. Heat destroys magnetism by upsetting the army of atoms until their fighting strength is reduced to zero. Mr. Yensen, inventor of a supermagnetic alloy, hipernik, points out that by alloying iron with various percentages of nickel, the temperature at which magnetism is lost can be regulated. Thus, hipernik, an alloy of equal amounts of iron, which loses magnetism at 760 degrees Centigrade, and nickel, non-magnetic at 375 degrees, will hold its magnetism to 500 degrees. By alloying iron or nickel with cobalt, which resists heat even more, the magnetic force continues to 1,140 degrees. Electric switches, made of an alloy in ac-

curate proportions, may be opened automatically when the temperature of a magnetic material reaches a certain point and closed when the temperature drops below that same point.

"ELECTRIC EYE" SORTS BOXES ON CONVEYOR BELT

Color-operated conveyor systems recently have come into use, which shunt packages of different colors to different locations. The system depends on an electric eye, picking out packages of one color and operating a mechanism which separates these particular packages from others. The system can be used to discharge boxes according to their colors at various floors that are served by a vertical elevator.

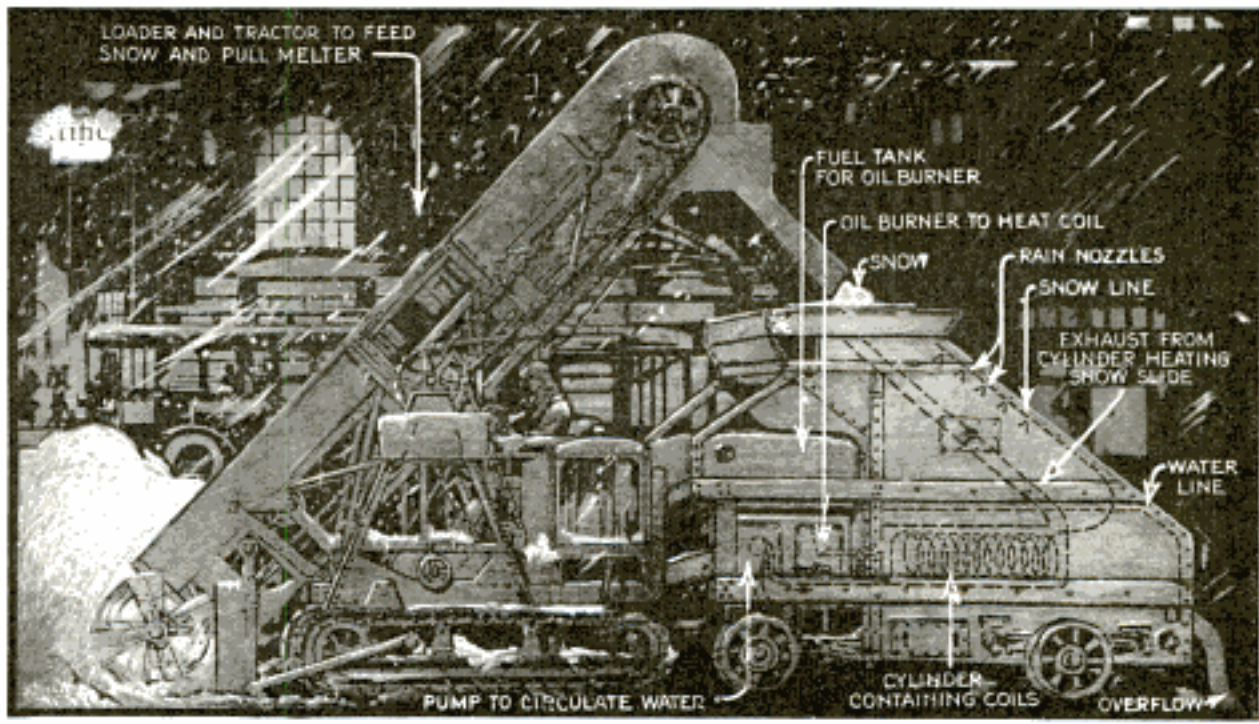
The Logan Co. 1115 Franklin
Louisville Ky

michele La Spina

a189

a1876

Rain Machine Melts Snow to Clean Streets

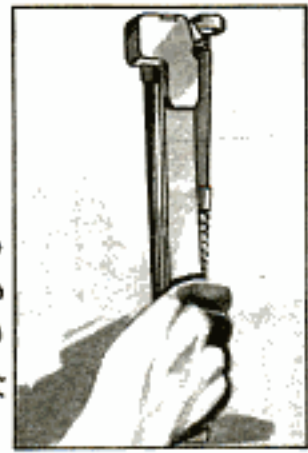


Rain Machine Pulled by a Snow Loader That Will Clean a Half Mile of City Street Forty Feet Wide in an Hour; Photo Shows Method of Operation

Rain has been found to be the most efficient remover of snow, so an artificial rain maker has been devised, which, pulled behind a loader snowplow, will clean a half mile of forty-foot street in an hour. The machine consists essentially of a large tank of water, circulated through tubes which are heated by oil flame. Snow is fed from the loader onto a slide where the heated water falls upon it. The melted snow then falls as water back into the tank where an overflow pipe carries off the excess to the gutter. Clogging of the chute is prevented by the passage of exhaust gases from the heater under the snow slide.

water from the condenser is circulated through a tubular device which raises the building's air supply to a temperature of eighty degrees Fahrenheit. Towers on the roof force a draft which gives the water in the two containers temperatures from which the refrigeration system can operate.

HAMMER FEEDS ITSELF TACKS FOR FAST AND SAFE WORK



Holding tacks or staples in your mouth or hand is eliminated by a self-feeding hammer now on the market. The magazine automatically feeds up tack or staple and a single blow drives it home. The operator can tack as fast as he can swing his arm. Light roofing, upholstering and floor covering are some of the jobs on which a hammer of this type saves time and labor.

COOLING AND HEATING SYSTEM COMBINED IN ONE UNIT

One California office building is heated in winter by the same refrigeration system that provides cool air in summer. As in an ordinary cooling plant, the refrigerant is vaporized by absorbing heat from a container of water, which it cools. When it condenses, it heats up the water of a second container. Air is passed over the cooled water to make the building comfortable in summer, but in winter the

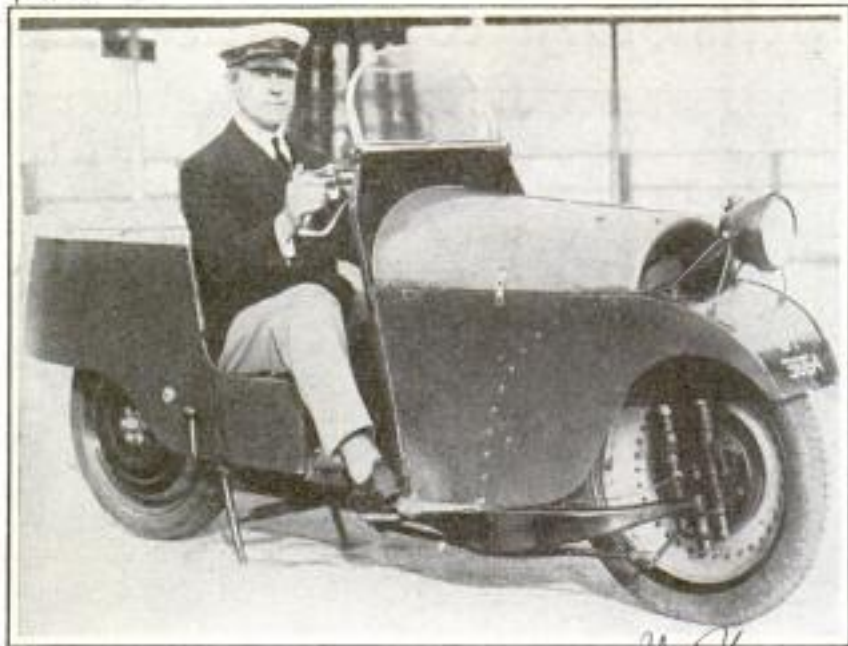
Not in Commercial production until fall of 1932

Chicago 542 S Dearborn

Scano Serno Builders
 9/26/30

Wostitch Sales Co
 East Greenwich
 R.I.

a1923



Motorcycle Transformed into Small Auto by Mounting Special Body on It; Note Brace to Keep Vehicle Upright When It Stops

ONE-MAN CAR BODY IS BUILT ON A MOTORCYCLE

Shaped like a baby car, a body of his own design has been built on a motorcycle by Sir A. V. Roe, British aircraft designer, for driving to and from work. Even a windshield is provided for the vehicle, which looks far more comfortable than the usual motorcycle. A small brace, operated by a lever, is let down to keep the car from falling when its driver stops.

WAY TO BLOCK RADIO STATIC IN CODE RECEIVER FOUND

Static, the problem of radio engineers for years, appears to have been vanquished in code and radio printing-machine work at least, through the system evolved by a young Canadian engineer. Its possibilities from the broadcast standpoint have not as yet been fully developed, but give great promise. Essentially, the system consists in the transmission of a carrier wave, on which are superimposed two other frequencies, such, for instance, as one of 3,000 cycles and one of 5,200. These result in a common note, or heterodyne, made when the telegraph key is depressed. When the signal is received at the other end, the detector output is divided and sent through two filters, one passing 3,000 cycles and the other 5,200 only. At the filter output is

a tube arrangement that will pass on only such impulses that are perfectly matched in both sides of the filter. If static tries to come through, it will be stronger on one side or the other and so will never get by, and the reception will be free from static disturbances.

a1926

FLOWER GROWTH IS SHOWN BY X-RAY

Details of flower growth and construction, including the appearance of buds, petals, leaves and stems, are brought out clearly by X-ray pictures of the blooming plants. Curiously, the charm of a flower is not lost by submitting it to the X-ray; on the contrary, the radiograph appears to enhance the delicacy of anatomy and beauty of form and line. Such pictures are difficult to make because it requires only a minute quantity of X-ray energy to penetrate the petals, the amount being about one-hundredth of that needed to X-ray the human skull.



X-Ray Picture of a Calla Lily Which Shows Details of the Flower's Growth and Anatomy

Plyde England

Chudson Denver Monitor 9/26/31

and H. Englebrecht by name

Alfred Starr
 Institute of Radio Engineers
 33 W. 39th St. N.Y.C.
 Made by Arthur W. Fuchs
 Eastman Kodak Co.
 Rochester, N.Y.

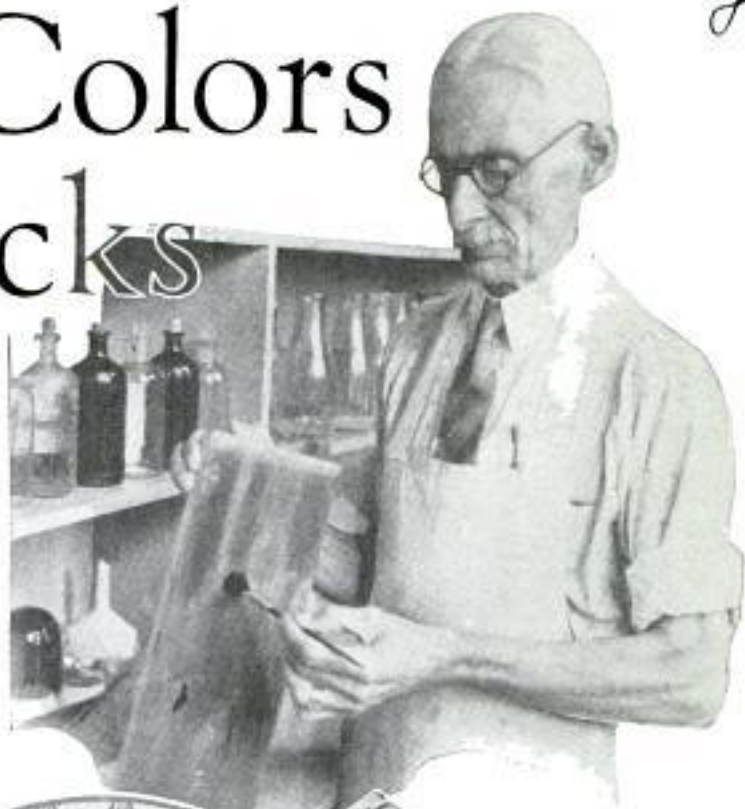
11887

*George E. Anker and David
C. Warner, Mendocino, Calif.*

Metal Colors from Rocks

FROM the ore dumps of southern California mines cast-off rocks are being converted without smelting into paint. Lead, bismuth, iron, zinc and other minerals form the basis of the liquid metal into which the rocks are converted. From this metal, paint in three forms—paste, solid and liquid—is being produced by two men who have been working quietly on the secret process for almost forty years.

They have succeeded in reducing low-grade complex ores into liquid metals and gases without the costly smelting process. No heat, other than brief contact with steam, enters into the process. As a result, they produce 276 colors for painting iron, steel,



ing with heat and cold, so do not chip off the glass.

Hard and heavy rocks are reduced to a liquid, light in both color and weight. The liquid, in fact, may be said to be a neutral color; yet, when it is combined with a gas, it is converted into one of the 276 colors.

"Here," said one of the developers of the process, pointing

to a stack of rocks, "are complex ores. We find in them the fundamentals of all colors. These ores, brought from the dump of a mine, are crushed, then run through a catalyzer which separates the precious from the base metals. It is the latter we use for color, after having processed them to a complex liquid."

He took down from the shelf a milk bottle partly filled with a waterlike fluid. Some of this he poured into a test tube. From another bottle came more liquid, this also waterlike and of the same consistency. The second, he explained, was a gas solution obtained during the process.



Painting with Metal, at Top, Ukulele "Antiqued" with Metal Paint, Center, and Light Globes Coated with "Rock" Finishes

wood, floor coverings, glass and other surfaces.

Electric-light globes around the stage of a Los Angeles theater are tinted with several colors of these paints, which have the property of expanding and contract-

Ankerite Products Co.

*1709 Standard Ave
Mendocino, Calif.*

9/18/87
938

As he poured the liquids together, there settled to the bottom a beautiful chrome-

Machine That Grinds Pure Metals to Powder, Below, and Examining Complex Ore Before It Is Being Liquefied



yellow precipitate, which, he said, was pure metal color, composed of bismuth, lead, iron, zinc and other elements.

In the laboratory the ores first are broken up with a hammer. They then are crushed into coarse powder, and finally

pulverized as fine as flour. This is poured into a large digesting kettle, called a "catalyzer," together with a chemical which dissolves the minerals.

At last steam is turned into the kettle at a pressure of 125 pounds. While a rotary bar mixes the chemical and minerals, the steam aids in liberating gases which are pumped out. The residue is a solution of liquid metals. Here the binder has been removed, leaving pure, colorless metals. The only heat used in this process is the steam, and metals are removed from the original complex ore without smelting.

Exactly how the chemical reacts on the pulverized minerals is the secret. To produce any of the 276 colors the same colorless liquid metal is combined in different ways with the gases. "That the colors will 'grow' sounds unbelievable, yet here is the proof, a small jar containing a pure brown metallic color," said the demonstrator. "Two years ago we put two ounces of this material in the jar, and

a 1866

Dr Edith Kleimferer

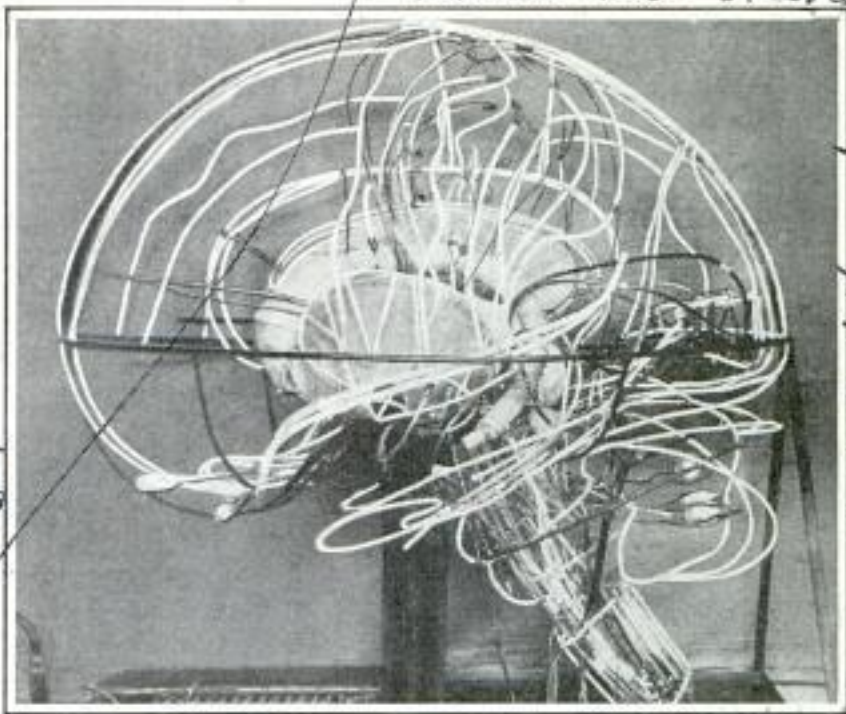
Dr. Robert Exner

today it weighs seven-
teen ounces and is con-
tinuing its growth. There
has been practically no
chemical change in it.
Its bulk and weight have
increased and its strength
has increased in propor-
tion to the weight. We
feed it nothing to attain
this growth, yet were we
to feed it gases taken
from it, we could force
its growth materially."

a 1866

**MODEL OF BRAIN
MADE OF NEON
TUBES**

Two Vienna physicians
have made an illuminat-
ed model of the human
brain and central-nerve
system out of 100 pieces of neon tube.
The glass construction enables the show-
ing of both interior and exterior parts,
and in lecturing, the particular section



Illuminated Glass Model of the Human Brain and Central-Nerve System,
Which Was Made Out of About 1,000 Pieces of Neon Tube

under discussion can be illuminated while
the rest of the model remains dark, thus
making it a simple matter to trace the
functions of each area of the brain.

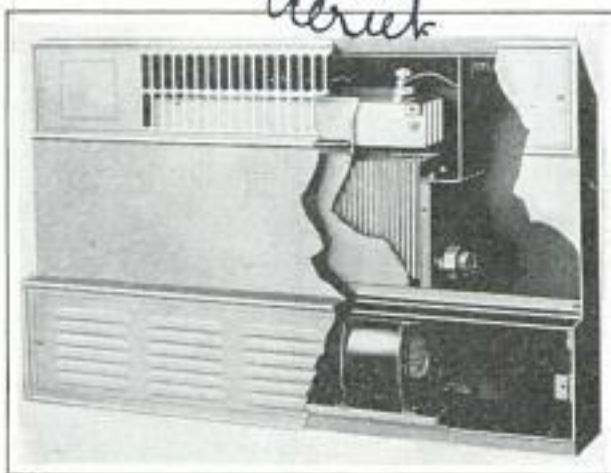
Model demonstrated at 5th Int
International Neurological Congress

**STEAM RADIATOR IS COMBINED
WITH ELECTRIC HEATER**

a 1975

Two types of heating elements, a steam
radiator and an electric heater, are com-
bined in one cabinet now being offered in
two forms, one model fitting into the wall
and the other representing the free-
standing variety to replace cast-iron radi-
ators. The electric and steam heaters
can be operated together or separately as

Aeriet



Steam Radiator and Electric Heater in One Unit; a
Motor-Driven Fan Is Included

desired, and motor fans in the cabinet can
be used independently of either heating
element to provide cool-air circulation in
summer. An air-washing and humidify-
ing attachment also is obtainable. The
combination radiator is intended for use
in bath or living rooms where it is desir-
able to take the chill off in the fall or
spring before the regular heating plant is
in operation, or it can be used as an aux-
iliary to the heating plant when the latter
fails to furnish sufficient warmth. It is
claimed the cost of operation of the elec-
trical unit is lower than for the ordinary
type of radiant electrical heater.

a 2048

LONG LIFE OF JEWEL BEARINGS

Friction between the pivot and a jewel
bearing has been measured to find why
such bearings have long life. One of the
discoveries is that rust is formed during
rotation and is chiefly responsible for in-
creased friction. Lubrication was found
to prolong the life of the bearing al-
though apparently it did not diminish the
friction.

N Y Times
10/4/31

Air-Way Electric Appliance
Corp. 2101 Auburn Ave
Toledo, Ohio

British National
Physical Laboratory
Copyrighted material

Waco Tool Works Science Service
 940 5216 W. Kensington
 POPULAR MECHANICS
 a 1990 Chicago

from eight to 140-foot candles. Normal daylight is not sufficient. About 3,000 mercury-vapor lamps and 25,000 incandescent lamps have to be used. And then the finished product is placed in brightly lighted display rooms.

91972
**GOLD SEPARATOR
 REQUIRES NO
 WATER**

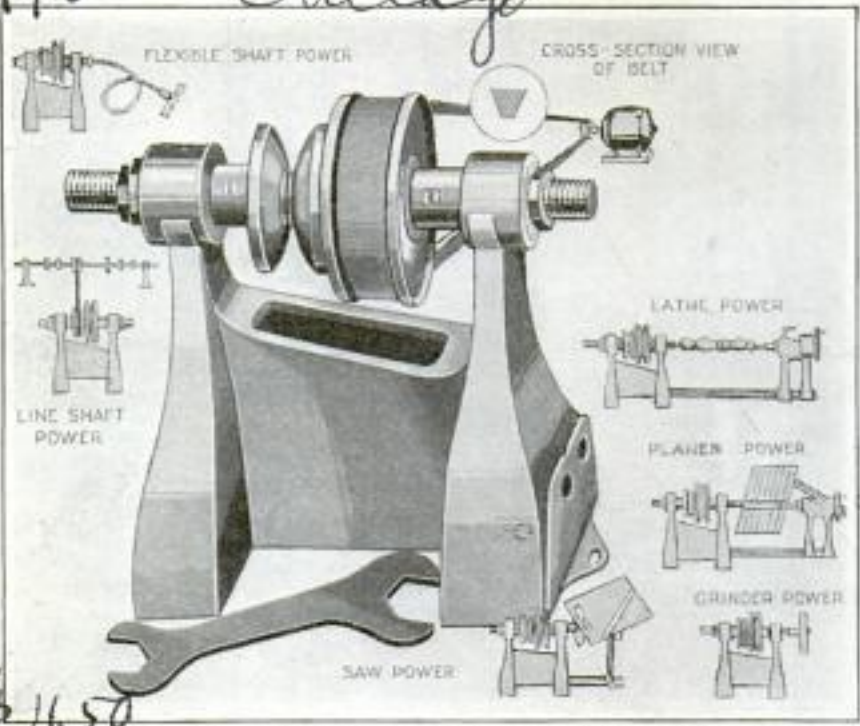
Intended for use particularly in desert regions where little water is available, a small gold-washing machine with a capacity of about one cubic yard of material an hour can be operated

under certain conditions without any water. It consists of a screening and washing drum mounted above a concentrating pan which separates the gold and other heavier materials and places them in a pocket at the rear of the pan. The machine, which can be taken down easily and transported anywhere, requires little water to operate at any time, and tests have shown that it will run at almost maximum efficiency without any water at all if the material is very dry. The machine is operated by a gasoline engine.

new Way Concentrator



Portable Gold-Washing Machine That Can Be Operated without Water if Material is Dry



"Universal" Headstock That Provides Power for Almost Any Purpose in the Shop; It Has Been Named the "Thousand and One"

**THOUSAND AND ONE PURPOSES
 ACHIEVED BY SHOP TOOL**

Equipped for driving with a non-slip V-belt, a new headstock for the craftsman's shop has been introduced under the model name "1001," descriptive of its many applications. It can be used in connection with any kind of motive power from one-fourth horsepower up, and is built with double heads with both ends of the shaft threaded. Standard thread-fittings and parts enable any variety of combinations. Openings in the base casting allow for the insertion of steel rods for attaching rigid lathe beds, or the mounting of a saw or planer table, and like implements. Among its manifold purposes are the provision of power for flexible shafts, lineshafts, lathes, planers, grinders, saws and polishers.

**AUTO UNDER BRIGHTEST LIGHTS
 FROM START TO FINISH**

So brilliant must be the electric lamps under which automobile makers work that the motor car is fast becoming a creation of light. All the way from the foundry to the finished car, light of particular intensity and character plays a vital part in its production. In one large automobile factory, light intensities vary

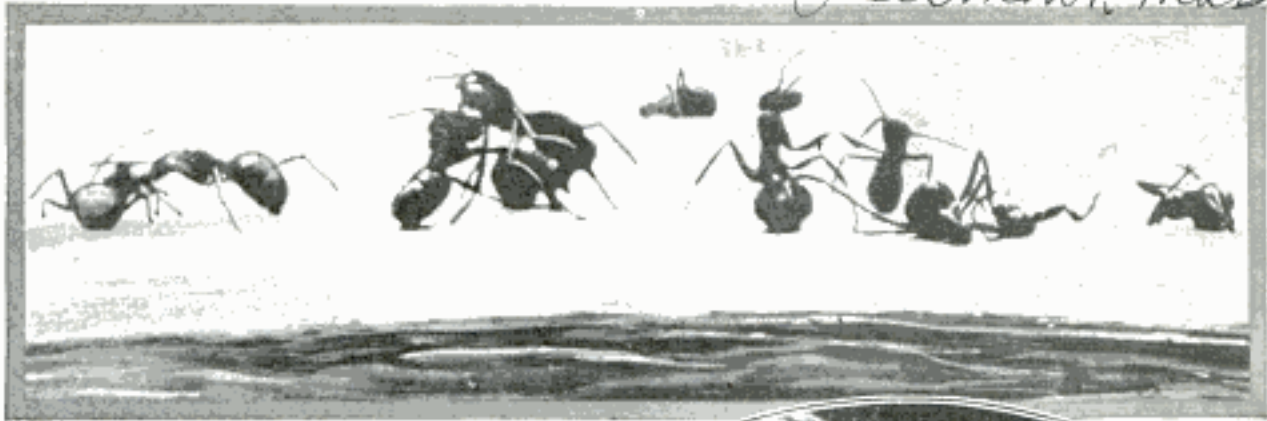
Report in Electrical World
 10th Ave and 36th St
 New York

Dr. O. A. Kennerly
 214 Martin St.
 Plymouth Falls, Ariz.

Q209

41178

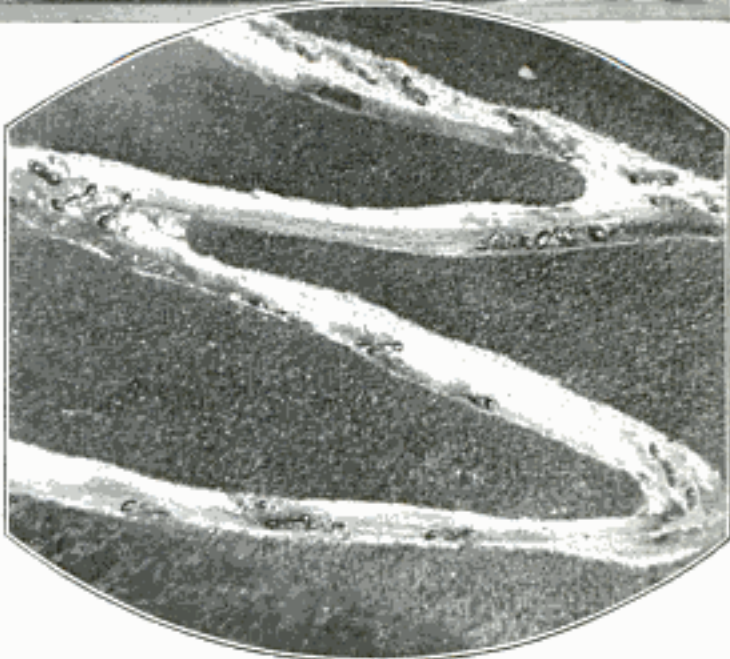
Com. John J. Cogswell,
16, Edgemoor Road
Belmont, Mass



ANTS

almost human
in their

Actions



ANTS raise crops for their own consumption. They have their harvest times, when they fill their storehouses and protect it against the elements. They have their own herds of food-giving "cattle" and tend and protect them with assiduous care.

Ants go into battle, marching with the regularity of disciplined troops, with scouts and guides in the van and flanking parties out at the sides. Some of them return from forays loaded with fresh supplies of food; others come back, bearing as spoils of war the young of their enemy, which are reared as slaves or auxiliary workers in the nests of their masters.

Investigators believe that ants have means of imparting information to one another—a marvelously efficient means of communication. Ants build veritable cities, often with a population of a hundred thousand or more, and carry on their community affairs with a complex

Ants Battling, Top; Left to Right, Casualty Carried off Field, Death Grips, and Two against One with Officer Directing; Building a Road, at Bottom

colony organization, co-operating in the building of the habitation, care of the young, and of one another, defense against enemies, sanitation and "policing."

These and many other amazing facts concerning the insects that outnumber all other terrestrial animals, are vouched for by Prof. William Morton Wheeler of Harvard, who is regarded as America's foremost authority on the subject.

Doctor Wheeler styles ants as the "humans of the insect world." All species are hunters of ability; many are pastoral and others agricultural. Some even show indications of carrying on a well-planned industrial life.

Ants, according to Doctor Wheeler, possess a fair brand of intelligence. While they are not able to begin with a premise and reason things through to a logical conclusion, they do have a keen memory and are able to adapt their experiences

Cambridge, Mass. 941



to meet utterly new situations with success.

Probably in no one of their activities do ants show their ability to carry out well-planned operations, in mass, more impressively than in the slave-gathering forays of the so-called Amazon and sanguinary species. The location of nests offering plunder is learned by scouts, who scour the vicinity and report to the home nest. Then the army moves out and surrounds the nest of the victims with all the precision of a human army investing an enemy city.

No human babies get better care than do the offspring of the ants when they are in helpless state as larvæ. These are incapable of any great movement; they require food but cannot get it for themselves.

One evening Doctor Wheeler placed a small insect in a nest of ants. One of the ants immediately snapped at it, disabled and left it. Another ant picked it up and carried it into the chamber reserved for the young. A third assisted in tearing

the victim to pieces. Then the workers proceeded to carry it to one larva, which they allowed to feed upon it for a few minutes, and later they gave a second its ration and fed others in turn.

"In the dry districts of western Texas," said Doctor Wheeler, "I have seen ants bring their young to the surface in the cool of the evening and carry them to and fro, just as human nurse maids wheel babies in their perambulators in city parks."

Harvester ants are most efficient husbandmen. Late in the afternoon, long files of workers may be followed for a distance of sixty or ninety feet from the nest before the ants disperse among the scant vegetation in search of seeds. They eagerly seize upon all the mature seeds they find and carry them to the nest, where they carefully remove the husks and store the edible kernels in the granaries. The chaff and seed pods are then carried out and dumped in a refuse heap.

Once harvested, the stored crop is well taken care of. One species actually bites off the germ from each seed, so that it cannot sprout. If the seeds become wet, all the seeds are carried out

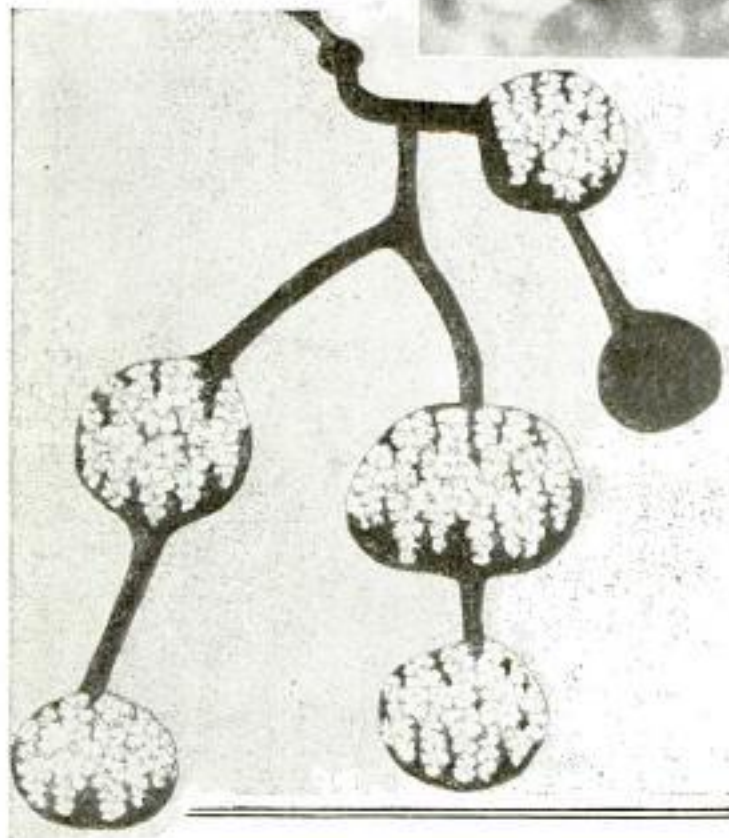


Ant Gardens in Trees, Top; Soldier-Worker, Center, and Honey Ant Feeding Workers

91178

and laid in the sun to dry, the first clear day, and are then returned to the storage chamber.

Harvester ants do not plant and grow their own crops, but in South America there is one tribe, the Attii, that does. The main article of diet is a very small fungus. The Attii excavate nests with a series of chambers, each the size of a man's head. Into these chambers they carry small pieces of plant leaves



Microscopic-Camera Photo of Ant, Top, and Fungus-Growing Ant Chambers, Each About the Size of a Man's Head

upon which the fungus spores grow and multiply rapidly. In some of the older nests, the chambers are found to be three-fourths filled with the fungus mass, upon which the ants and larvæ feed.

Many ant tribes maintain large herds. Their cattle are the aphids, commonly called plant lice, that perch upon the stalks and roots and suck the juices of plants.

Many ants construct, often at some distance from their nests, little closed pa-

vilions or sheds of earth, carton or silk, as a protection for their cattle and for themselves. The young cattle are put out to pasture, as it were, during fair weather, but in bad weather or on cold nights, they are taken back into the burrows.

In the ant community, the work is divided most intelligently among the workers. A certain number tend and feed the larvæ, others look after the feeding of the queen, some harvest the food seeds and care for them in the storerooms, others attend the herd, while the larger and more formidable members of the colony are told off as soldiers and guards.

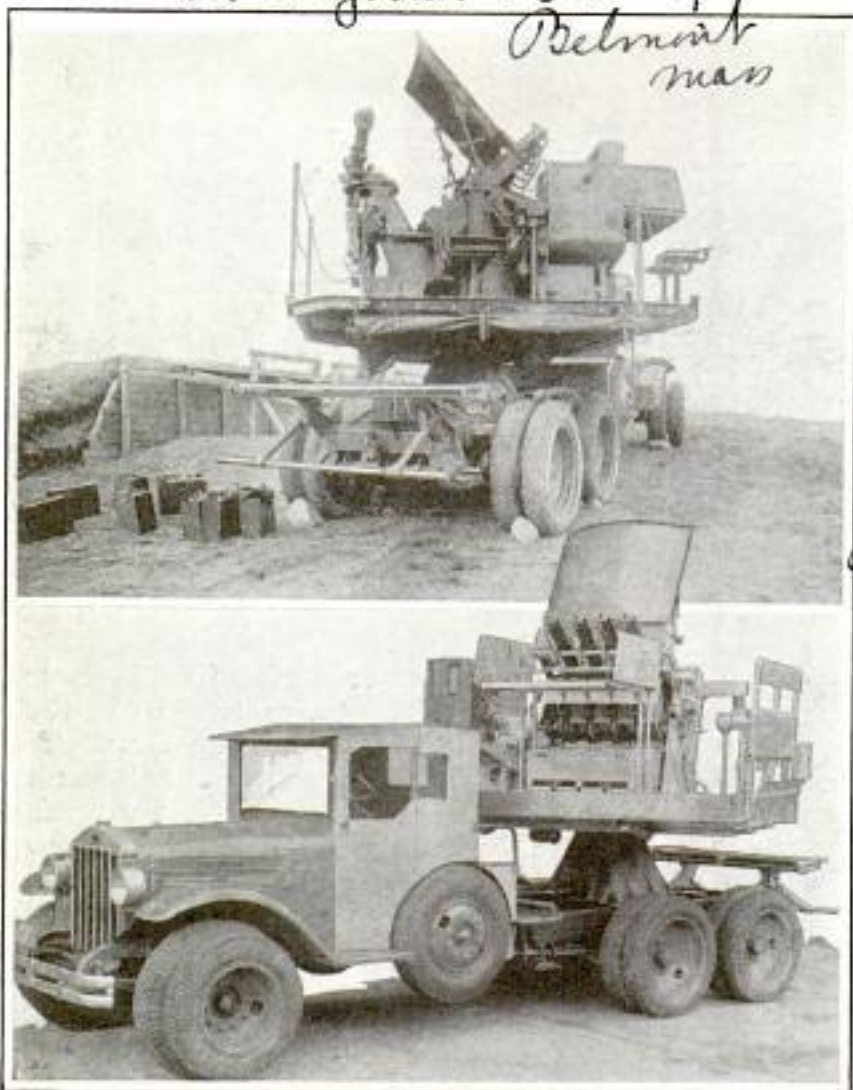
The soldiers guard the nest. One species lives in the interiors of the galls of oak trees. The entrance is made exactly the size of the heads of the soldiers. Day and night, they take turns in closing the opening with their heads, and on signals from a worker let it in or out by withdrawing from the entrance.

Some ants, notably those of the bulldog tribe, are fierce defenders of their nests. At the first alarm, they jump out of the side door of their mound and fasten upon the first living thing they encounter. The unwary intruder, who does not know of the side door, generally succumbs to a rear attack of the ants.

a 1947
944

Capt. John L. Coggeswell,

POPULAR MECHANICS
16. Edgemoor Road
Belmont
Mass



Army's "Shotgun" for Bringing Down Enemy Planes Has Four Machine Guns Mounted Together on a Truck; 2,400 Bullets Are Fired per Minute

sixty miles an hour on good roads. A companion piece is the new chassis-mounted, semi-automatic three-inch anti-aircraft gun, which discharges twenty-five high explosive shells per minute with a range of over 5,000 yards. This gun will bring down a plane within 100 yards of the explosion.

WEST INDIES TO BE
2024 "WEIGHED"

By "weighing" the West Indies with apparatus which determines the difference in gravity at different points on the earth's surface, an international expedition hopes to obtain more information on the origin of the islands. A United States submarine will be used by the expedition in determining the relative stability of the islands, the manner in which they have been formed and in seeking to throw more light on the origin of the major inequalities of the earth's surface. Five thousand miles of submarine profiles will be measured and thirty to forty gravity-at-sea stations will be established to help weigh the islands, as well as to sound the deepest parts of surrounding water.

UNCLE SAM'S LATEST WEAPONS
FOR WAR IN THE AIR

Four machine guns, capable of firing 2,400 half-inch bullets per minute, have been mounted as a unit on fast trucks to guard the United States army from low-flying enemy airplanes. Firing is arranged so that the bullets, instead of traversing parallel paths, lay a pattern similar to that of a charge from a shotgun. In tests on a flying target at 1,000 yards, the gunners put over ten per cent of their bullets into a section corresponding to the vital parts of a plane. Automatic height and range finders make for extreme accuracy. When the finders are ranged upon and follow the plane's flight, they automatically give the guns the correct "lead" on the moving target, just as an experienced hunter leads a flying bird with his aim. The assembly is capable of

PIPE CLIMBS TWO-MILE WALL
2027 WITH CANYON WATER

Construction of a pipeline, which will climb two miles up the wall of Grand Canyon to carry water to a settlement on the rim, will be completed soon. Erection of an 8,000-foot transportation cable between the settlement and a point far below the canyon rim marked the start of operations. This cableway is built in four sections, with transfer points, to avoid too great a strain in carrying heavy loads, such as the steel pipe and the big pumps.

Prof Richard M. Field
Dept. of Geology, Princeton
University, Princeton, N.J.
any Republic of Phoenix, Ariz
of James 9/28/01

**CAT'S EYES SEE FORTY TIMES
 BETTER THAN HUMAN'S**

That a cat can see forty times better in the dark than a human has been established by a German biologist at the university of Koenigsberg. It has long been known that a cat can see better, but just how much better had not previously been computed. The reflecting tissue that lines the rear of a cat's retina, and the results of which can be seen when a cat's eyes shine in the dark, really acts as a light amplifier, it has been found. The human eye has no such lining. The "reflector" sends the rays falling on it back to the front of the retina where the nerve rods and cones are located, thus augmenting the light stimulus coming from the outside through the eye's lens. The color of the reflector varies in different animal species, but regardless of its color it will reflect light waves of the same length as those received.

Hy Jones 9/16/31

91834

**WINDMILL MADE OF OLD IRON
 IS GARDEN DECORATION**

Old iron is the material with which an Englishman has landscaped his flower garden. One of the artistic effects is a windmill, the base of which is formed by an old potato-washing machine, while the upper part is built of odds and ends of metal picked from a heap of scraps.



Decorative Windmill Made of Old Scrap Iron for a Garden; the Base Is an Abandoned Potato-Washing Machine

*H. Scott Baker
 Potter St. Essex, England*

Long-Range Tear-Gas Gun, Like a Sawed-Off Shotgun, Which Shoots a Gas Shell 180 Yards



**TEAR-GAS GUN FIRES SHELL
 FIVE HUNDRED FEET**

One officer, armed with a long-range tear-gas gun and shell, recently developed, can disperse a crowd at a distance of more than 500 feet, for the weapon fires its ten-inch tear-gas projectile 180 yards. The weapon resembles a sawed-off shotgun, about thirty inches long, and throws the shell over a high trajectory, so the user can fire from behind a wall.

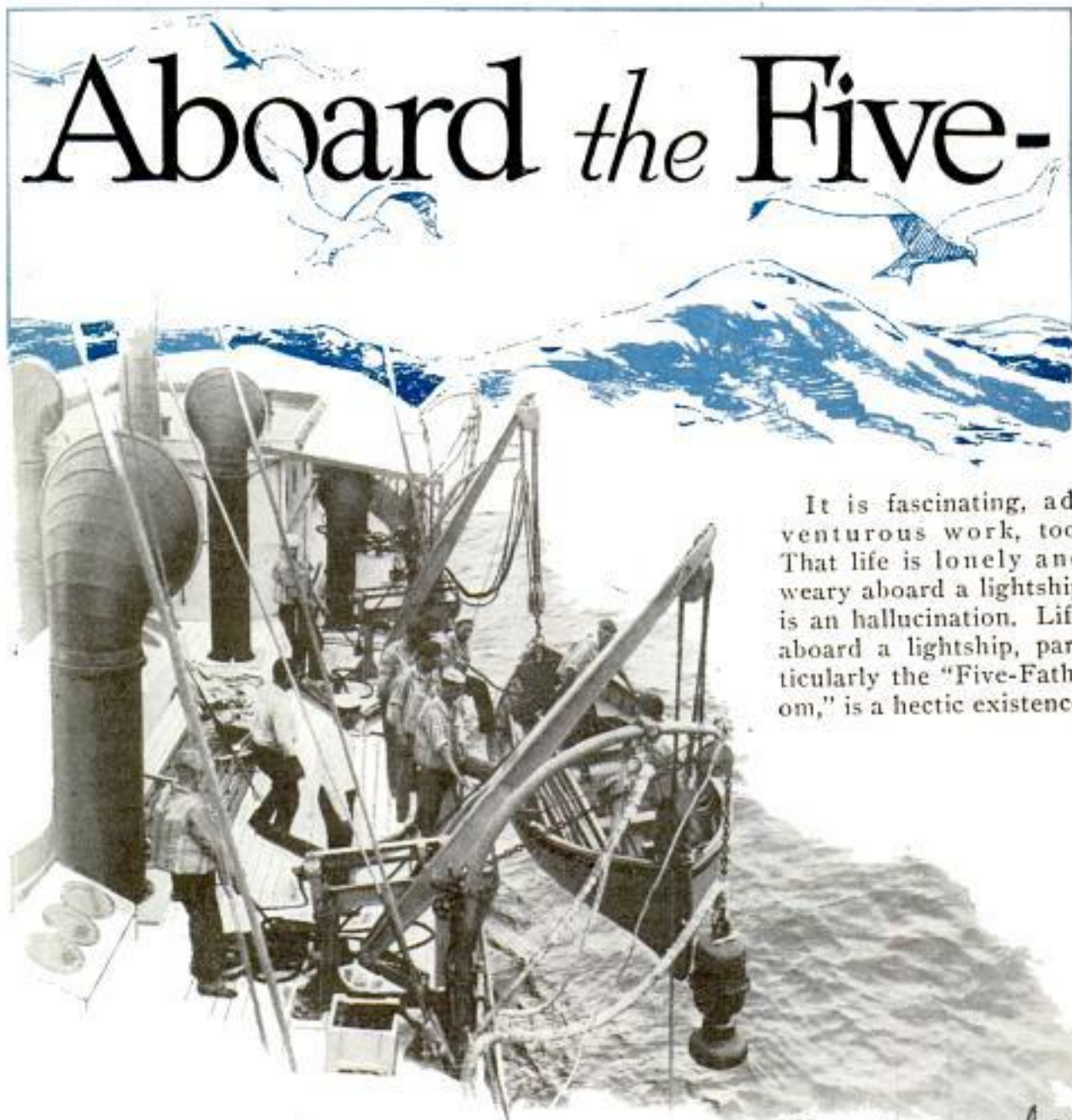
*Capt. A. F. Spring
 no further information*

**RADIO AND ELECTRICITY SPEED
 HARDENING OF STEEL**

Hardening of small metal parts, such as those used in typewriters and sewing machines, can be speeded up by the use of high-frequency radio currents, ultraviolet light and the electric spark. Research metallurgists have found the steel can be given this desired case-hardening by nitriding, involving the heating of the metal while it is placed in a nitrogen atmosphere. After many hours of heating in contact with nitrogen gas, the steel is cooled and its surface becomes hardened. By subjecting the metal to ultraviolet light or to electrostatic fields caused by the electric spark or high-frequency radio currents, nitriding has been speeded up and case-hardening has been accomplished in a short time. While the latter method is not commercially practicable at present, further experiments may make it so.

91917
*before American Society for
 Steel Heat Treating
 7016 Euclid Cleveland, Ohio*

*John J. Egan, metal.
 burgh Long Island
 City, N.Y.*



Crew of the "Five-Fathom" Lightship Holds a Fire Drill at Station off New Jersey Coast

MORE happens during a twenty-four-hour watch on the "Five-Fathom" lightship anchored thirty miles out in the Atlantic ocean, than in many a high-powered factory, running full blast, back on terra firma. There is work—plenty of it—every moment.

Let a member of the "Five-Fathom" crew slow up in his tasks, and he throws a hitch in the great sea mistress that vigilantly, indefatigably guards the vessels plying the busy Atlantic seaboard. The tiniest cog out of place is enough to halt the routine of the day. This eagle-eyed mistress never sleeps.

It is fascinating, adventurous work, too. That life is lonely and weary aboard a lightship is an hallucination. Life aboard a lightship, particularly the "Five-Fathom," is a hectic existence

Wide World

with hardly time allowed for breathing spells. Real romance often pops up out of the sea. But this work of watchdog of vessels is not easy. It is dangerous. Helping a ship in distress, rolling constantly in treacherous waters, lying in the path of many steamers through fog and storm—is all in the line of her duty.

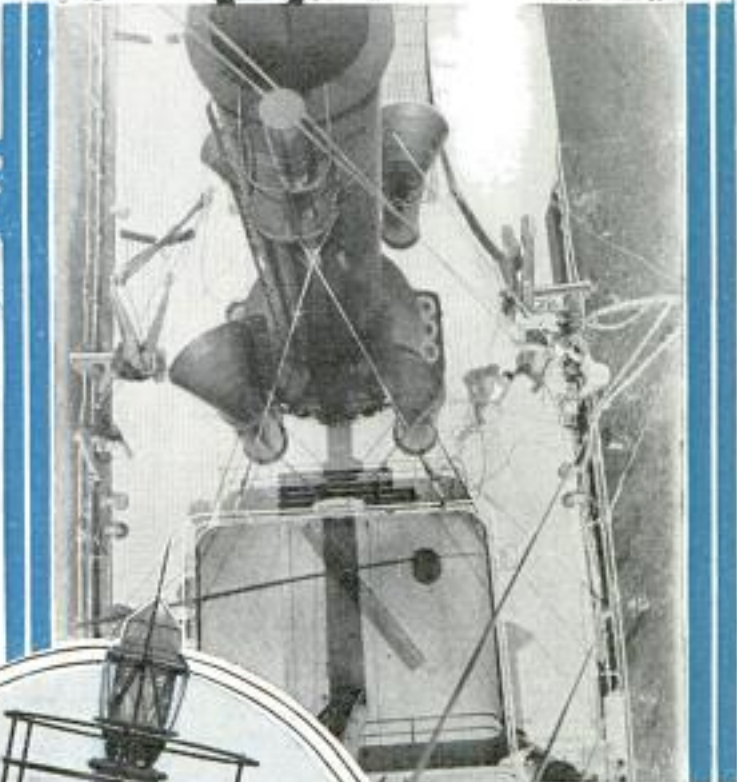
Thirty miles east of Cape May, N. J., proudly floats the "Five-Fathom," the largest and one of the most up-to-date lightships in America and, perhaps, the entire world. She stands as a model for the fifty-two other lightships that keep vigil on the coasts of the United States.

Fathom Lightship



She is a bustling scientific workshop; she is absolutely the height of nautical mechanics. Few palatial steamers surpass her in comforts and conveniences. And rare are the vessels better equipped to subdue an angry sea or conquer a vicious storm.

The region of the "Five-Fathom" has been marked by comparatively few disasters within recent years. But when a calamity does occur, it more



"Air" View from the Foremast; Close-Up of One of the Lights, and Pilothouse

than makes up for the intermittent periods of peace and quiet. There is excitement galore aboard the lightship then. There are tense dramatic moments. No battle on land, no matter how tumultuous with explosions of bombs and rat-

tat-tats of machine guns, compares with the conflict on the sea of the elements against man's ingenuity, combined with the peaceful sciences. Here's a typical picture:

The lightship is lolling in the water like a self-satisfied old duck; her heart of machinery purrs away delightfully. In the background the sun is setting in all its glory. It is a truly beautiful scene. Suddenly the radio operator darts out of his cabin and shouts, "Quiet men!" No more is necessary.



The men know what that means—something is wrong aboard a ship close at hand. The crew rush to the door of the operator's cabin. They go no further. The radio cabin, with all its mysterious instruments is a sacred place. The men huddle about the door as closely as they can. All eyes are strained on the operator who wipes off his earphones.

"Captain, there's a ship sinking outside Atlantic City. Machinery broken down or something."

"How far away?"

"Forty-five miles."

"Relay the message to base nine of the coast guard and then communicate with vessels in the vicinity of the sinking ship."

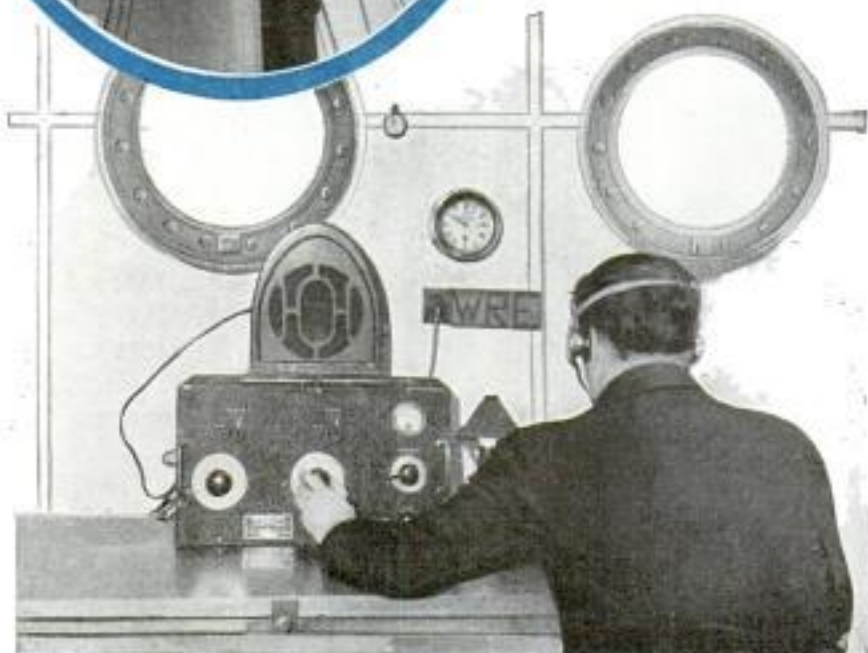
No sooner said than done. Ten minutes later, the radio operator again wipes off his earphones. "O. K., Captain! Coast

guard cutter has just reached the ship in distress."

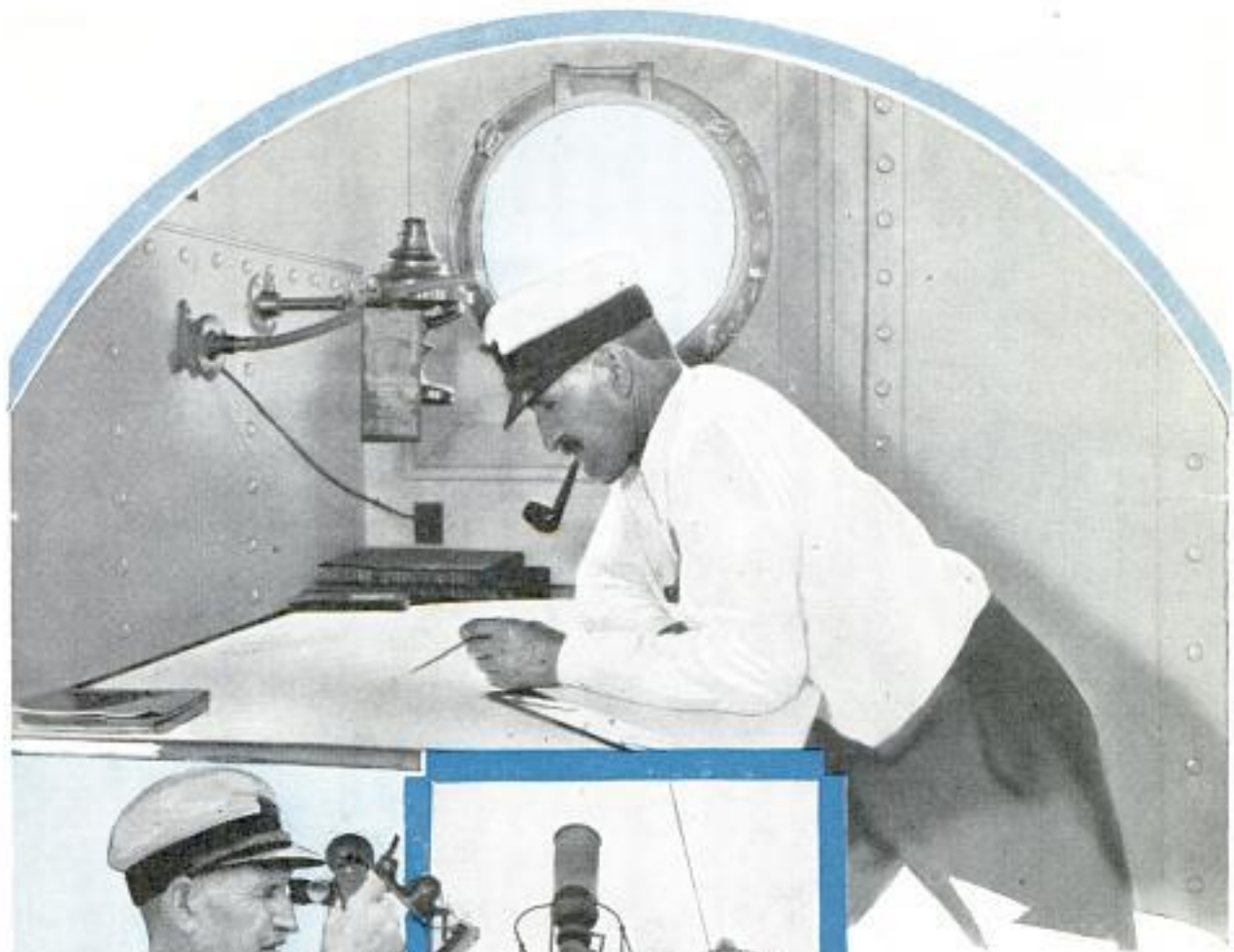
When evening envelops the "Five-Fathom," she is lit up by electricity as gayly as a Christmas tree. She dazzles the water. Atop her thirty-five-foot beam glow two huge electric beacons. Passing liners seem to wink their approval of the guardianship.

All the while, night and day, the most important work of the "Five-Fathom" goes on. Silently, without human operation, the radio beacon has been aiding scores of vessels up and down the Atlantic.

There is a staccato tick-tock now and then, but it is a humming noise pleasing to the ears. The crew may eat, drink, sleep, seek entertainment or go ashore on leave, but, no, not the radio beacon. Nothing but a little oiling for this super-sentinel of the sea. Seldom is praise bestowed upon it though it saves thousands of lives, let alone thousands of dollars, every year. The "Five-Fath-



Submarine Bell Being Lowered over Side; a Light Mast Seen from the Deck, and the Radio Operator at Work



Captain Johansen at Work on the Charts; Fog Horn, a Foot in Diameter, at Left

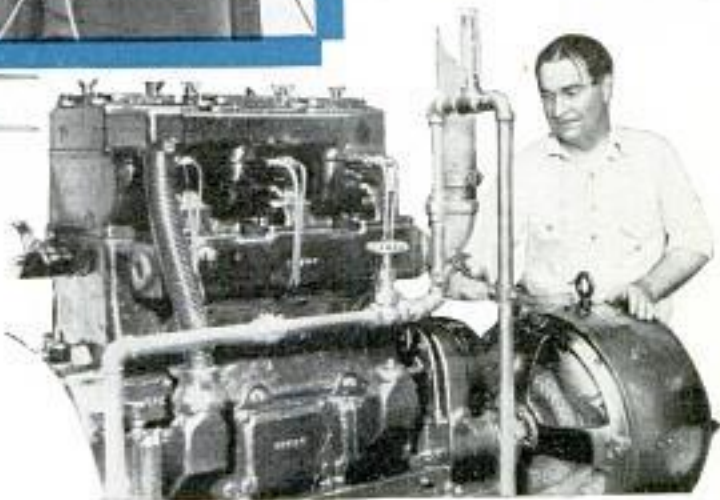


United States. It was one of the first in the world and is available up to several hundred miles at sea, far beyond the usefulness of any other aids to navigation.

Any number of vessels properly equipped with

Master Alfred Johansen on the Bridge, Checking Position, and Right, Electric Generating Plants for Lights and Radio

om" radio beacon is one of the most powerful and most useful of the eighteen radio beacons on lightships on the coasts of the



con aboard the "Five-Fathom." It functions on much the same principle as do light and sound signals; that is, it is placed at an important point of navigation, which is shown on the charts. It periodically sends out signals with a distinguishing characteristic. It transmits for a period of fifteen minutes out of every hour. The signals are sounded for a minute and are followed by a silent interval of two minutes to allow for the staggering of other radio beacons. The frequency of adjacent radio beacon stations is staggered in order to avoid interference when they are operating simultaneously. The actual transmission is effected by a simple automatic keying device.

Prior to the development of the radio beacon the navigator ascertained his position at sea by astronomical observations, but as this was impossible in foggy or cloudy weather, he was called upon much of the time to sail his vessel by dead reckoning that often proved disastrous. No accurate allowance could be made for the drifts from ocean currents and the skip-

a radio compass, or direction finder, may take bearings simultaneously on the "Five-Fathom" radio beacon. The beacon, working in conjunction with radio compasses on board passing ships, takes bearings and cross-bearings on other ships in order to avoid collision in fog and storm; it also takes bearings on any vessels in distress, so that they may be correctly located and quickly approached. There is absolute accuracy because of the charted location of the "Five-Fathom" with respect to the land.

Many a sea disaster and consequent loss of life and property has been averted or minimized through the bea-



How Anchor Chain Is Brought through Bow; Foremast Light Bulb, and the Lightship at Anchor over the Bank

*By Truman & Fuller
Schenesbady
NY*

POPULAR MECHANICS

*Spencer Heater
Co.
Williamsport
Pa. 951*

per's first task with the clearing of the skies was to take his bearings and learn his whereabouts.

Today, as long as he is within range of the radio beacon, he need not be in doubt. Weather conditions have no effect upon either the operation or the accuracy of the radio beacon. The element of chance has been virtually eliminated.

STEAM WEAKENS STEEL

Steel subjected to sprays of steam weakens perceptibly, the American Society for steel treating was told at a recent meeting. If the steam is wet or contains an excess of oxygen, it causes an even greater loss in the steel's resistance to breakage, the society was informed. Even nickel and chrome-iron alloys, which withstood ordinary steam, give way before this combination. In the case of some specimens, when liquid water and oxygen both were present in the steam, the steel lost up to half its resistance.

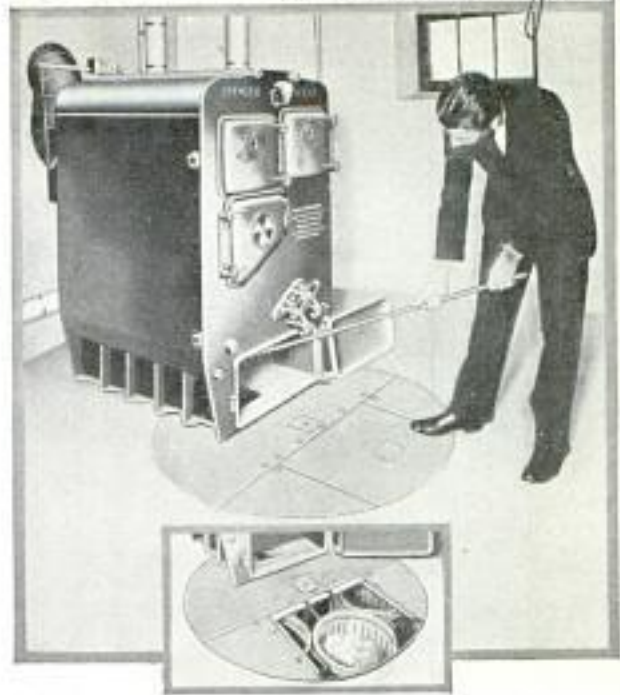
ELECTRIC JIGSAW DOES MANY TYPES OF WORK

Fast and clean cutting of wood, fiber, bakelite, aluminum and many other materials, is possible with an electrically operated jigsaw now on the market. It is practical for cutting wood two inches thick. Motor power is applied directly to the blade through a connecting rod eccentrically mounted on a crank disk which supplies 1,725 one-fourth-inch strokes per minute. Blades are interchangeable and may be obtained for any type of work. One of these is a double blade for inside cut and scrollwork.



Speedy, Clean Cutting Is Easy with This Jigsaw, Mounted on and Operated by Electric Motor

*Beebe Bros. 3211-23
First Ave South
Seattle Wash*



Ashes Are Raked into a Can beneath the Furnace Floor, Eliminating Shoveling and Dust

ASH CANS UNDER FURNACE PIT KEEP CELLAR CLEAN

Ashes disappear through a hole in the furnace-pit floor when a receiver system now on the market is used, eliminating all shoveling, dirt and dust. The ash receivers are located on a steel drum below the cellar floor, the drum revolving so that an empty can may be locked in position under the hole in the pit. When this can is full, a crank turns the steel drum to move another empty receiver into place, with the operator never touching the cans. When they are all full, the ash man lifts a steel plate, removes the filled cans, disposes of the ashes and puts the empty receivers back into place.

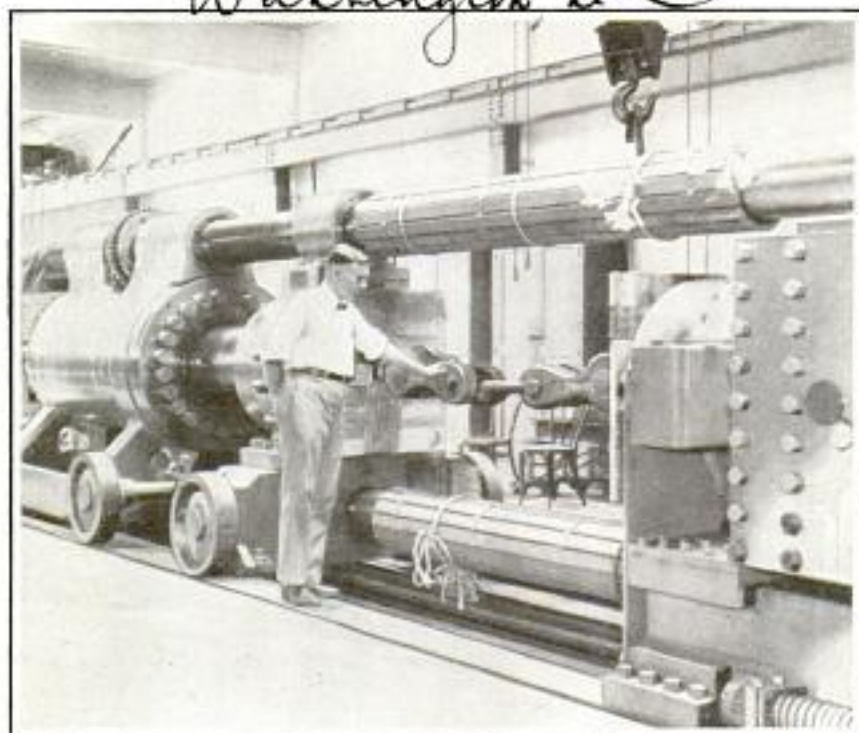
ZIGZAG CURB SOLVES PROBLEM OF OBLIQUE PARKING

One Philadelphia department store has solved the problem of providing parking space for customers' cars by constructing a serrated curb on one side of the building. This saw-tooth curbing with its triangular projections compels each car to park at the proper angle and in the proper space, and also makes certain that the parked autos are parallel. In addition, passengers step out of their cars directly onto the sidewalk instead of into the street as in ordinary oblique parking.

*Strawbridge & Clothier
Store*

a1864
952

W. H. A. Stapp
Bureau of Standards
POPULAR MECHANICS
Washington D C



Huge Links of Steel, Used in Ship Anchor Chains, Are Torn Apart in Tester Which Applies Force of 2,300,000 Pounds

ANCHOR CHAINS PULLED APART TO TEST STRENGTH

Heavy steel chains, such as are used for ships' anchors, are pulled apart in a huge testing machine at the bureau of standards. This machine, with a pulling power of 2,300,000 pounds, tears apart the strong alloy-steel links, which are heat-treated to withstand heavy loads.

CHRISTMAS TREES AS SIDE LINE INCREASE FARM PROFITS

Growing of Christmas trees as a crop affords a profitable side line for farmers in parts of the United States. A market for the trees exists in every town and city, according to the department of agriculture, which points out the superiority of a shapely home-grown tree over one shipped in from a distance. The problem of utilizing idle farm land can be solved in part by growing Christmas trees, since, on many farms, there are fields exhausted by years of cropping,

land which is eroding or washing, odd corners of tillable land not handily situated for cultivating in regular crops, or excess pasture land. Production of the trees is less difficult than the growing of many garden and truck crops. Considerable care is required in starting the plantation, but once established, little time need be given to make it a success.

a1830

A SPECIAL TRUCK GATHERS COAL FOR STUDY

Coal samples for laboratory study are obtained from mines throughout the country by a bureau of mines

truck specially equipped for this work. The samples are analyzed to determine the special characteristics and values of coal from different fields. The sampling truck contains a flat body on which is mounted a small crusher operated by a gasoline engine. To insure each sample being representative, half a ton of coal taken from the tippie is crushed and mixed and from the mixture a five-pound sample is placed in a marked bag for later examination. From the crusher the coal passes through a "riffle" which divides it into two equal parts, the first step in obtaining the sample. About 1,000 samples are analyzed each year by the bureau.

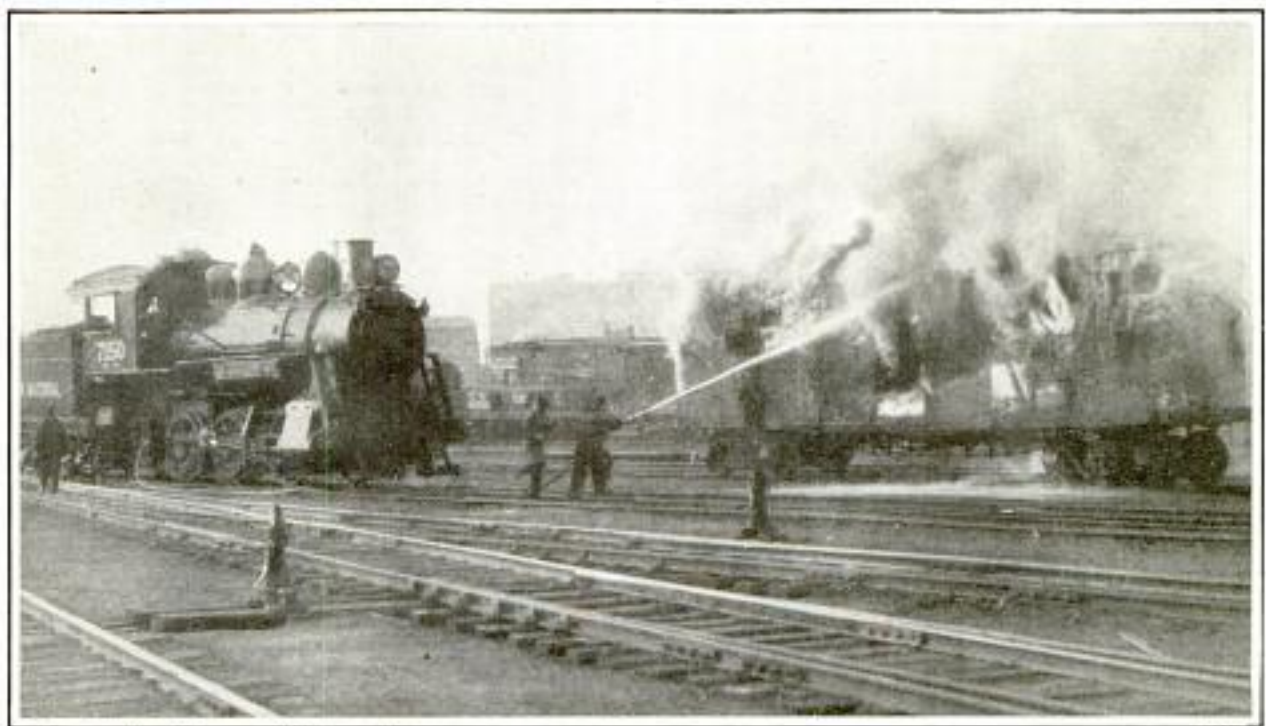
a1874



Coal from Mine Is Being Poured into Crusher on the Truck; a Five-Pound Sample Taken from Each Mine Is Tested

Farmer Bulletin
1664. Sept of
Agriculture

Rail Fire Fighters Guard Property and Lives



Locomotive "Pumper" Helps Fight Railroad Fires Not Easily Reached by Organized Firemen; Two Members of Crew Are Shown Here Fighting Flames in a Freight Car in the Yards

Special water-pressure units, installed in a fleet of railroad locomotives, are helping one railway to fight fires in its yards, in towns along the line and in forests near its tracks. These portable units are especially useful in extinguishing flames which cannot be reached by organized fire companies. Water can be delivered from each locomotive at the rate of 4,600 gallons per hour at a distance of 115 feet. The equipment works under far less steam power than did old apparatus, with which there was danger of the crew being scalded if hose burst.

OPPORTUNITY SEEN FOR TOWNS IN AVIATION'S GROWTH

Aviation is a new and golden opportunity for small communities of today, according to Col. Halsey Dunwoody, vice president of the American Airways system. "We have seen the effect of our 700,000-mile system of hard-surfaced roads on the personal and business life of the small cities of yesterday," Colonel Dunwoody says. "Just as the whole economic system was changed, so the airplane will bring further and even more remarkable changes. The human mind is the most

wonderful thing in the world. Next in importance is communication, which enables one mind to share its product with another. Then comes transportation, which enables the movement from place to place of material things, and man with his powers of observation and expression. History of humanity shows that with increased freedom and speed of interchange of ideas, there has come an elevation and broadening of standards of living and more complete understanding among peoples. The airplane will eliminate what may still remain of the isolation of small communities. Suburbs of the future will be from fifty to 100 miles from the present centers of the modern cities. Men will live where they want to live and work where they want to work. The airplane is rapidly removing the 't' from the word 'there'."

WALL "PAPERS" OF GLASS

Wall "papers" made of glass are woven at a factory in a German village famous for its ancient glass industry. The glass paper or fabric is produced in various colors and patterns and is fade-proof and washable.

*Lausche (German mfr.)
 Ellis Steiner Veters (Ohio)
 New York.*

*Lambert Field.
 St Louis, Mo*

*US Agent Reichelt
 John C. Inc
 Suite 801, World*

Robert J. ...

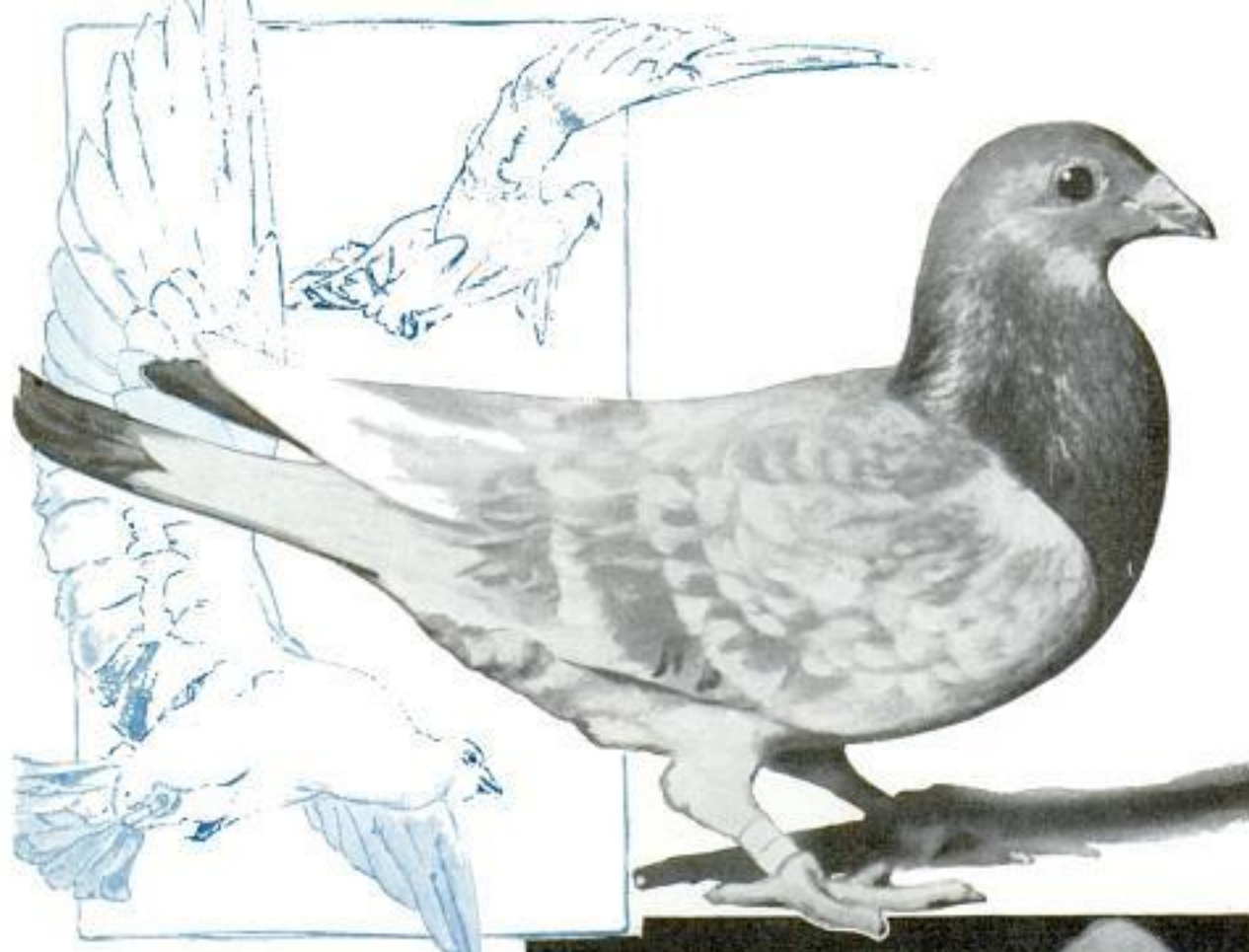
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1948

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Cont. Sec. W. Gray Sparkell, n y

UNCLE SAM'S



By **GEORGE W. GRAY**

A NEW race of pigeons is in the making at Fort Monmouth, N. J., where the signal corps has its lofts for breeding and training war messengers for the army—a race of swift night-flyers.

Ordinarily a homing pigeon will not venture on the wing after dark. In sunlight it will fly for hours at a stretch, without pause for food or drink or rest. But as soon as the sun goes down, it comes down too and selects a tree-top roost for the night. With the first peep of dawn it is away again, ready to fly another twelve or fourteen hours if necessary to reach home.

If pigeons would fly at night, their value as messengers would be increased manifold. Not only would night-flyers take less time on long journeys but there



"Lele," the Army's Speediest Night-Flyer, Above, and a Nest of "Squeakers" Three Days Old

would be less risk of their being caught by hawks and other enemies, and of being shot by hunters.

Especially in time of emergency would night-flyers be priceless. Of the five pigeons that were released by the Lost Battalion in the Argonne, only one reached headquarters; the others were killed by

FLY-BY-NIGHTS



S.
tl.
C.
Mr.
N



"Mocker" and "Spike," Army Carrier Pigeons, Both Heroes of the World War

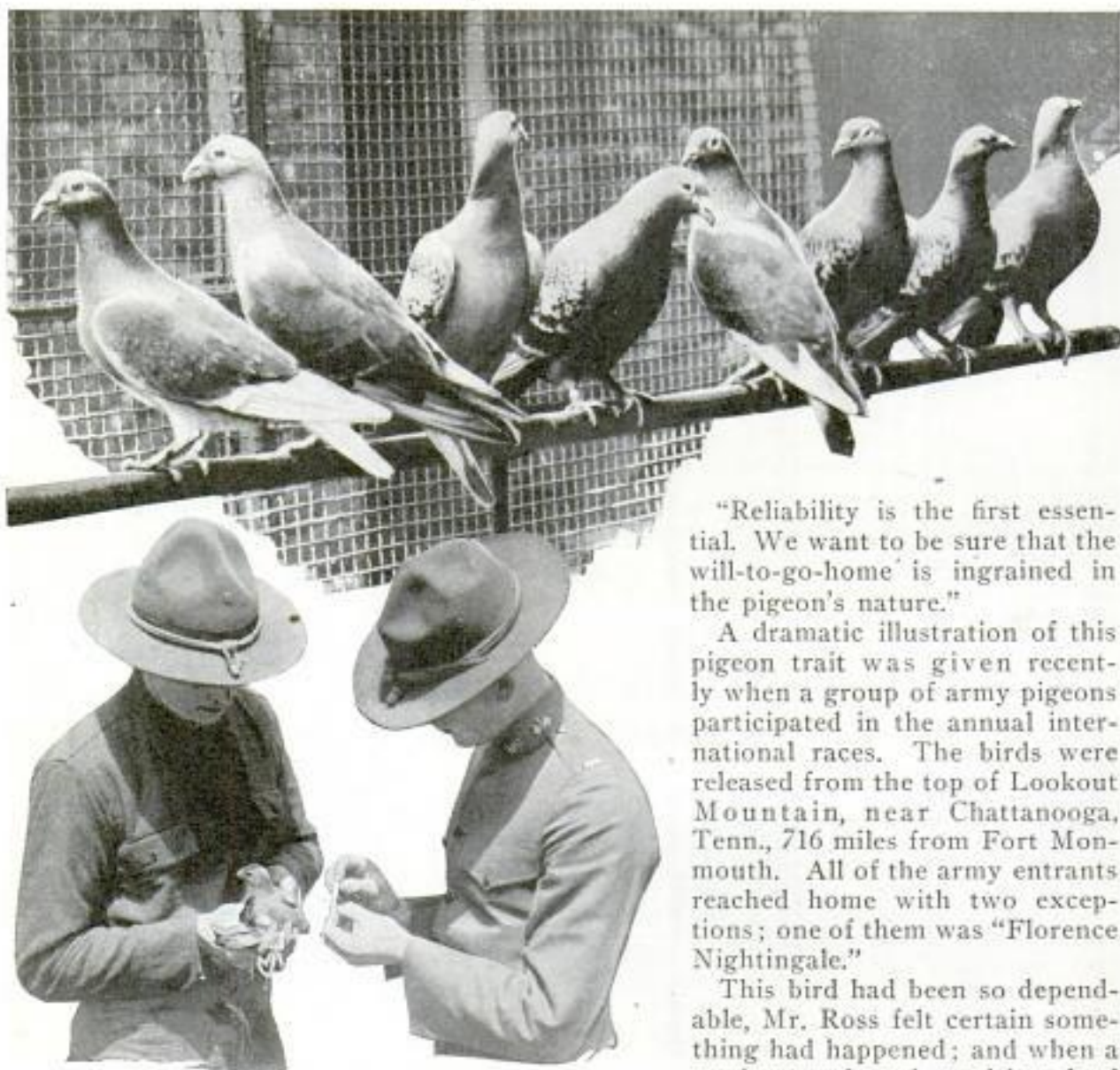
enemy bullets. One day an official report came from Hawaii to the army pigeon headquarters that electrified the fanciers. It told of four young pigeons that showed a strange fondness for darkness. When released in the late afternoon they flew home the same evening, arriving in the dark.

Thomas Ross, chief pigeon expert for the army, checked back, and found the parents of the four birds at Fort Monmouth. He selected other youngsters of the same strain, and chose also birds of outside strains that had shown a strong sense of direction.

When the eggs hatched, he picked the twelve likeliest "squeakers" as candidates for his night-flying squad. He separated them from the hundreds of others and

settled them in a special loft. "All day long the birds were kept inside their loft," said Ross. "A little reflected sunlight was all they ever saw. After sundown, I'd let them out for exercise, and they'd flutter around and try their wings. Every week I'd make this daily exercise period a little later in the twilight, until finally they were working wholly in the dark.

"Then, one evening, I took them out, carried them 100 yards away and released them. My helper stayed in the loft and rattled the food can, and the hungry birds hurried home for supper. The distance was gradually increased until today they are flying seven miles in the dark. They do not do so well in moonlight. A night-flyer wants an honest-to-goodness night to bring out his best powers."



Group of British Pigeons in the King's Loft, and Below, Preparing Message Capsule

The fastest time made by the Fort Monmouth night-flyers is seven miles in ten minutes. Mr. Ross expects to raise this speed to a mile a minute. One of the Hawaiian night-flyers has flown eighteen miles at a speed of 1,659 yards a minute, or 101 yards short of the present goal. This speed is not up to the velocities that have been attained by day flyers. An American pigeon has flown 300 miles at the rate of 2,100 yards a minute, which is better than seventy-one miles an hour.

"But speed is not the main essential," said Mr. Ross. "Speed depends on so many outside factors—on the weather, direction of the wind, fogginess. A pigeon won't fly in a fog, and for some unknown reason an east wind slows it down.

"Reliability is the first essential. We want to be sure that the will-to-go-home is ingrained in the pigeon's nature."

A dramatic illustration of this pigeon trait was given recently when a group of army pigeons participated in the annual international races. The birds were released from the top of Lookout Mountain, near Chattanooga, Tenn., 716 miles from Fort Monmouth. All of the army entrants reached home with two exceptions; one of them was "Florence Nightingale."

This bird had been so dependable, Mr. Ross felt certain something had happened; and when a week passed and nothing had been heard or seen of the bird, he gave her up as lost.

One noon, twenty-four days after the race, "Florence Nightingale" was found hopping along the ground in front of her loft. Her right wing dragged helplessly. The bone had been shattered by a bullet. Some hunter, seeing a flying bird, had shot her.

Another promising hen pigeon, "Molly Pitcher," was among the missing.

Twenty-five days later a message came from Camp Dix. An officer there had seen a pigeon drop out of the sky and flutter to the ground. He found it was wounded, and its leg tag identified it as one of the Fort Monmouth stock. Mr. Ross recognized at once his missing "Molly Pitcher." She too had been the victim of a shotgun.

91879. Chase Corporation
1500 Walnut
Phila 937

"But in spite of pain and hunger, she had kept on the homeward way," said Mr. Ross, proudly. "Camp Dix is between Chattanooga and Fort Monmouth, and when she reached it, she must have been near exhaustion. She saw below her an army camp, a place that was not Fort Monmouth but akin to it. So she landed and allowed herself to be caught. I count her one of the smartest birds in the army."

It is this kind of reliability plus intelligence that Mr. Ross hopes to develop in the new race of night-flyers. He wants the birds to be so dependable that, if ever again there is a Lost Battalion, it can release a pigeon under cover of night and feel confident that it will fly immediately to headquarters.

91833

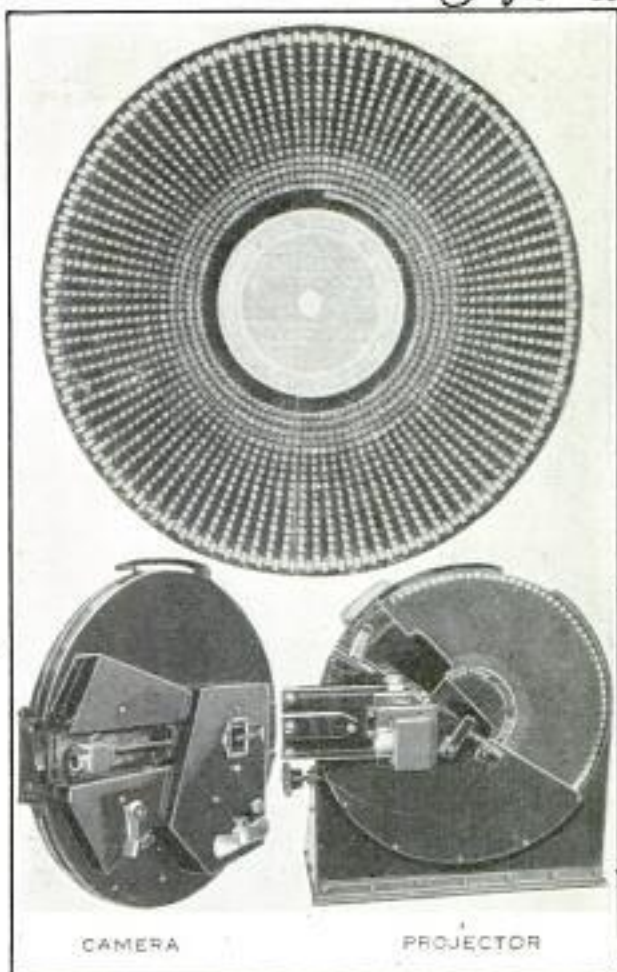
BROOMSTICK AND AUTO HORN MAKE MUSIC INSTRUMENT

Out of a hollow broomstick and an old auto horn, a German youth has constructed a one-string musical instrument that combines the tone and characteristics of both string and brass instruments. Incorporated in the horn and broomstick to produce the necessary volume, is a membrane from a phonograph. The odd combination is played with a bow, and the fingering is the same as for any other type of string instrument. The tone is rich and pure, and the volume is sufficient for concert work.



One-String Musical Instrument Made Out of a Hollow Broomstick and an Old Auto Horn

Ernst Häggberg
Berlin, in Vienna Austria.



Two Thousand Images Photographed on a Single Disk Instead of on Movie Ribbon Film

MOVIE PHOTOGRAPHED ON DISK INSTEAD OF RIBBON FILM

Motion pictures are recorded on a disk instead of on ribbon film with a new camera especially devised for the purpose. The image registers on the disk in spiral sequence. Two thousand images can be photographed on a single disk, being equivalent to fifty feet of sixteen millimeter ribbon film. Distortion that ordinarily would result from the spiral arrangement has been compensated in the camera's design, and the focus automatically changes as the lens moves outward along its track to project the image on the film. Advantages claimed are that the disk is cheaper and easier to develop than ribbon film, that it requires no winding, or rewinding in projection, that there is no chance of running the film backward and no mending ever is necessary.

Our Bureau of Information will answer all questions regarding articles appearing in this magazine.

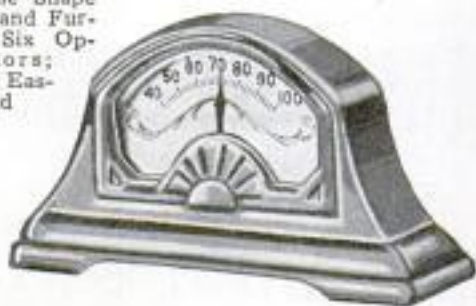
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Phila

MAKING HOME TASKS

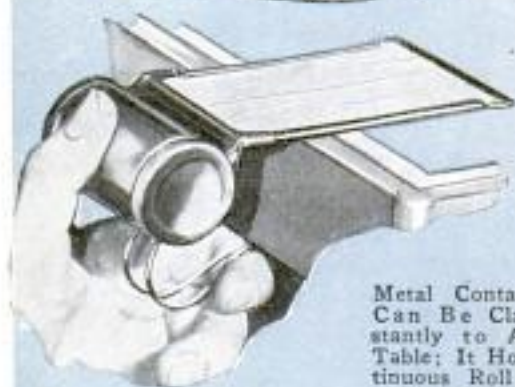


Easily Handled High-Suction Cleaner That Can Be Operated in Corners and under Furniture

Desk Thermometer Made in the Shape of a Clock and Furnished in Six Optional Colors; It Is Very Easily Read



This Rubber Soap Dish Attaches by Vacuum Feet to Any Surface; Top View Shows the Underside; Note Special Drain Fitting for Water That Might Otherwise Collect in the Dish with the Soap



Metal Container That Can Be Clamped Instantly to Any Card Table; It Holds a Continuous Roll of Paper Marked Off for Bridge Scoring

Metal-Frame Holder for Half-Gallon Bottle Makes It a Pitcher; It Is Locked Securely by a Catch



Vacuum-Cup Clothes Washer That Attaches to the Sink and Has an Additional Unit That Dries the Clothes in a Vacuum After They Have Been Washed; the Whole Machine Is Easily Portable

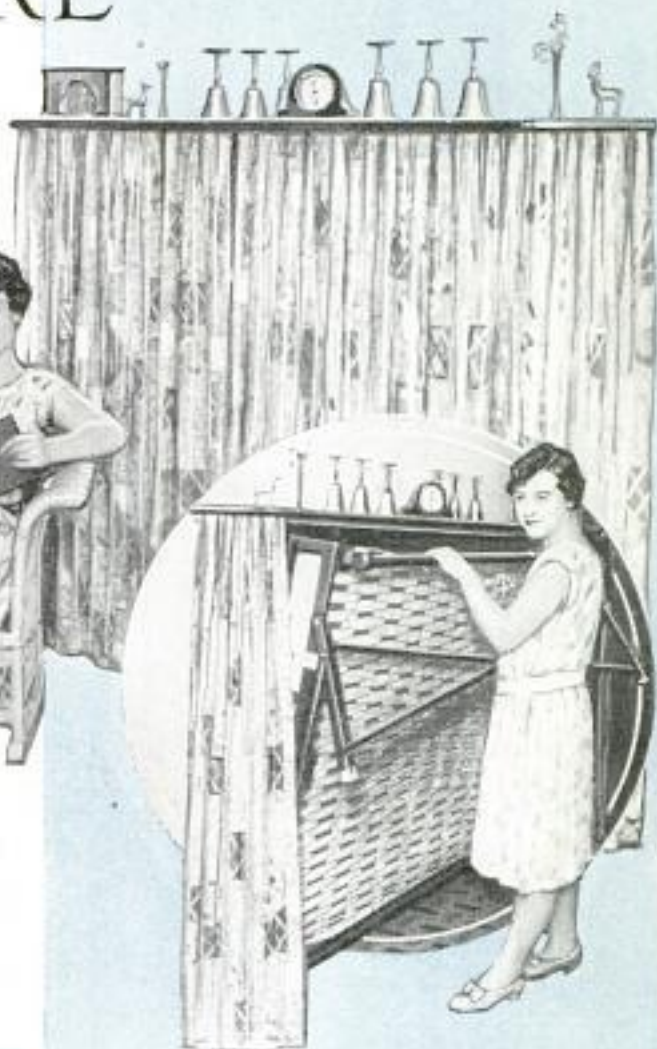
A PLEASURE



Non-Rusting Fruit-Juice Extractor That Fits over Glass Pitcher and Combines Speed with Removal of All the Juice



Electric Hotplate Furnished in Many Color Combinations to Match Your Breakfast Nook



Compact Wall Bed That Folds When Not in Use; It Is Fitted with a Mantel Shelf with Draperies and, When Unfolded, Opens to a Full-Size Bed



Heater That Burns Solidified Alcohol Provides Sufficient Heat for One Room and Is Particularly Useful with Baby in Home



This Automatic Food and Drink Mixer Operates on Water; It Will Fasten to Any Faucet by Means of a Chain; the Tube Can Be of Any Length and Power Is Provided for the Mixing of Liquids of High Viscosity

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 no information
 960
 as to firm making this

Clipping from Houston,
 Texas paper



The Pick-Proof Lock Demonstrated by Its Inventor; Combination and Key Both Are Necessary

KEY-AND-CODE COMBINATION LOCK IS PICK-PROOF

Studying with experts in lock picking, and learning all the underworld's secrets in the "art," a Californian has invented a pick-proof lock. The lock is a double one, consisting of a knurled knob around the keyhole. The knob must be turned to a code before the key will open the lock.

BLOTTER MADE OUT OF STONE RENEWED BY HEATING

A manufactured stone which blots any ink on any paper, has recently been introduced, cut in a curve like a desk blotter. It weighs just enough to be useful as a paper weight also. It is said the stone blotter absorbs ink instantly, leaves no lint and will not offset. The stone can be renewed by heating it to a red color for a few minutes over a stove burner.

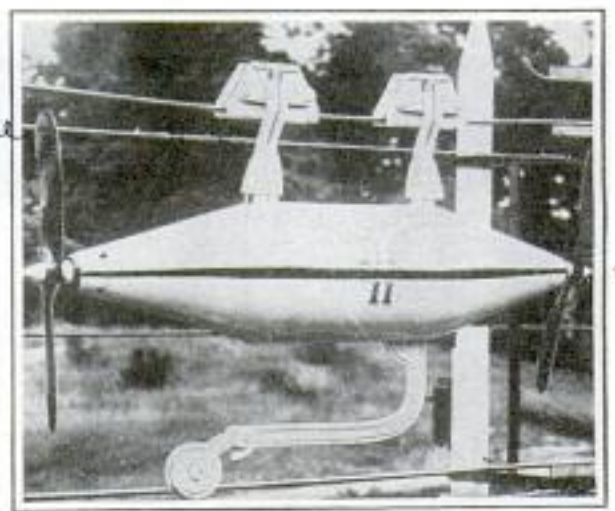
AUTO DASH DIAL CHANGES TO HELP MOTORISTS

High speeds and traffic congestion have caused motorists to disregard the instruments located on the dash because they cannot permit their eyes to rove from the road. This has caused one British automo-

tive engineer to suggest radical changes in the location of the instruments to bring them more nearly into the range of driving vision. By actual tests, he determined that it takes from one and one-half to three and one-half seconds for drivers to take their eyes from the road, focus them on the dash and refocus on the road, the average being about two seconds. At forty miles an hour a car in that interval would travel 116 feet, and at sixty miles an hour the driver would ride "blind" for 176 feet. It is suggested, therefore, that some of the important instruments requiring frequent inspection be moved from the dash to the radiator cap, or to a point near the center of the hood. This, of course, would reverse the present trend of design, which is to keep the cowl and hood as clear as possible. It is believed, however, that the speedometer and motor-heat indicator might well be grouped in an ornamental standard on the radiator where they would be almost in the direct line of driving vision.

AERIAL TORPEDO CARRIES MAIL ON OVERHEAD CABLE

Intended for transporting mail, an aerial torpedo, running on an overhead cable,



Aerial Torpedo Running on an Overhead Cable Which Is Proposed for Transporting Mail

is the invention of a Berlin engineer. With propellers fore and aft, it is hung from a cable and below is a guide like a trolley wheel attached to a second cable. The inventor claims that with such a system established, a letter could be sent across Germany in forty minutes.

Harold Marks, San Quentin Penitentiary, Calif

American Association of Manufacturers
 97 W. 47th St. New York

Letter rec'd 11/3/21
 Cml. J. B. Bruce, 1521 Murriger St. Houston, Texas

American Blotting Stone

Herr Richard Pfautz

Reported to American Society
of Refrigerating MECHANICS
Engineers
39 W 99 St New York
9/18/31

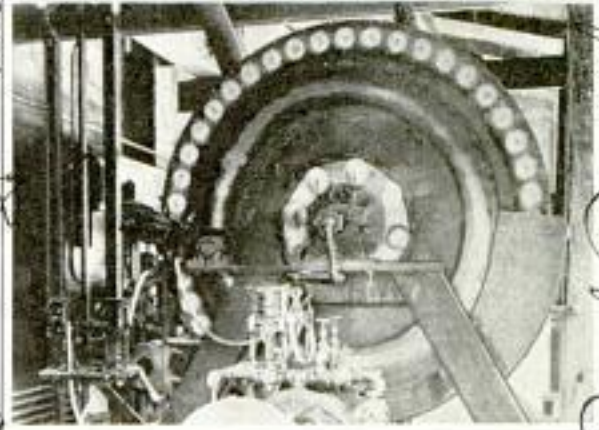
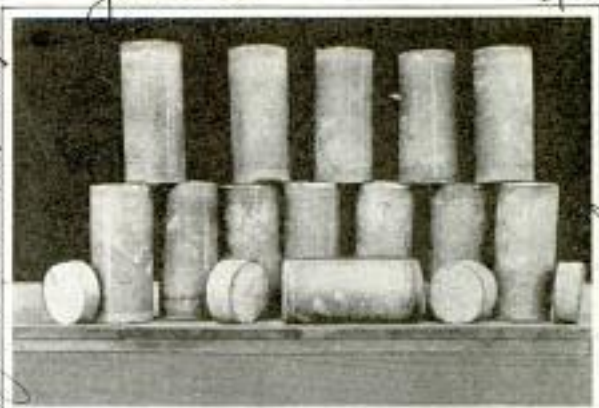
961
9/18/49
Chief
Engineer, Pottlach Forest, in the vicinity
of Idaho

Scene same 9/12/31

**ALUMINUM AS HEAT INSULATOR
COVERS STEAM PIPES**

Aluminum foil, crumpled irregularly and assembled in layers, is being used as an effective heat insulation. The metal sheets are as thin as paper and the limited area of contact transfers little heat. The foil has the additional advantage of not storing the heat and of being untarnished by air. Aluminum has been used for both brine and steam pipes on German cruisers and for hot-water pipes in homes and factories both here and abroad. One French vessel has been fitted with four tons of the metal sheets where under old methods, 380 tons of cork and magnesia would have been required.

by Max Bracton



Hydraulic Press That Turns Sawdust into Bricks Like Those Shown Above, for Fuel

**DOUGHNUT AUTO TIRES OFFER
EASIER RIDING**

Doughnut tires, the super-balloon types taking from ten to twenty pounds of air pressure, are being extended to trucks and pleasure cars after being used with success on airplanes and on airport and golf-course tractors. Advantages claimed for these tires include greater riding comfort, twice as much surface on the road, with consequent greater traction and less tendency to skid, and added mileage. General adoption probably will involve redesigning of wheel and axle assemblies and the improvement of steering mechanisms. Hydraulic steering has been used on trucks fitted with doughnut tires.

Wood Brackets, the
Johnson, Idaho

**SAWDUST TURNED INTO FUEL
IS CLEANER THAN COAL**

Bricks made from sawdust without any binder have been introduced by a western firm for use as fuel. The sawdust is compressed in a wheel seven feet high, having forty-four holes the size of the bricks near its circumference. Each five-pound brick is said to have the thermal efficiency of three and three-fourths pounds of coal, and the fuel is much cleaner to handle.



Small Car Equipped with Doughnut Tires Similar to Those Used on Airplanes

**RADIUM TESTS STEEL IN SHIPS
OF UNITED STATES NAVY**

Defects in steel and other metals used in ships of the United States navy are being revealed through the use of radium. The research department of the navy recently purchased \$30,000 worth of radium for testing ship metals after the discovery of serious defects in several new cruisers. Radium produces a ray known as "gamma," capable of piercing the heaviest armor plate. Otherwise invisible cracks and defects are recorded on a photographic plate.

Goodyear Tires & Rubber Co
Akron, Ohio

Herald by amiel
9/14/31
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New Type of Plane Being Tested on a Self-Propelled Rail Car; the Car Travels at High Speed and the Plane Imitates Real Flight

PLANE MOUNTED ON A RAIL CAR IMITATES FLIGHT

Two French inventors have made an airplane, known as a "clynogyre," which embodies some of the principles of the autogyro and is intended to land in a small area at great speed. A specially constructed loose propeller aids the craft in landing in restricted space. In testing the craft, it was mounted on a frame set on a flat railway car. This car made eighty miles an hour, permitting the plane to duplicate the actions of flight.

WHAT MAKES STARS EXPLODE?

Absorption of light from the star by the atmosphere surrounding it causes the star periodically to explode and blow its atmosphere away, Dr. Dean B. McLaughlin, of the University of Michigan, reported at a recent meeting of the American Astronomical society. The light absorbed is believed to be of ultraviolet character. The phenomenon was discovered by Doctor McLaughlin in connection with his research into star spectra, those that explode being peculiar in that their spectral lines were bright instead of dark. He also found that, after the star's atmosphere had been

blown away by the force of the explosion, it began to settle again, once more became clothed with its atmosphere, and ready for another blast.

RUBBER COATING KEEPS PLANTS IN SHIPPING

Coating trees, plants and shrubs with a rubber solution will cause them to maintain their life as long as nine months between plantings, the B. F. Goodrich Rubber Company has discovered. Roots of plants to be shipped or transplanted are dipped to prevent loss of moisture and to

hold the shape and color of the original foliage. Trees are sprayed with the solution. After replanting, the expansion of the plant or tree, when it resumes growth causes the rubber to crack, curl and fall off, the shrub then "being on its own" in the normal manner.

RIFLE WITH COUNTERBALANCE GIVES GREATER ACCURACY

One expert marksman has fashioned a counterbalance for a target rifle by means of which the gun can be held more steadily than would otherwise be possible, thus providing greater accuracy. The balance was made from an automobile radius rod and is attached to the barrel, extending under the gun to the rear of the stock.



Counterbalance for a Target Rifle to Improve Marksman's Aim; It is Made from an Automobile Radius Rod

Adiere and Bessemer
Paris France

Arin arbor
Mich

N.Y. Times
9/9/31

Richard Steiff
Jackson, Mich

918 88
7/27/31
Mon lot
Chick
alone

Acme

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MENTAL MAGIC

FEATS of divination have long been among the most pleasing phases of magic. While the effect in every case is based upon pure trickery, the clever performer can often, through a subtle use of pseudo-science, mold the spectator's mind into such a receptive mood that the effect becomes something more than a mere trick.

However, forgetting the scientific ballyhoo, how's this? The performer exhibits an ordinary alarm clock. He requests a spectator to set the minute hand at any number. The performer then takes the clock and, without looking at the face, announces the selected number.

It's really too easy. You prepare the time-piece beforehand by set-



ting the long hand at 12 and then making a vertical arrow mark across the stem which sets the clock. This arrow, cut in with a knife, should be scribed as lightly as possible consistent with visibility. You must remember, however, that, being on the reverse side, the arrow will point to the right for left-hand numbers and to the left for right-hand ones.

If you take a lump of sugar and make a pencil mark on it, the impression of the mark can be transferred to your finger tip by pressing the tablet with the moist forefinger. How about having a spectator mark some tablets with numbers. These are placed, marked side down, on a table. The spectator selects one, notes the number and hands it to you,

How the Performer Tells the Number on the Clock's Face, and How Numbers on Sugar Reveal Themselves

A1261



number down. You drop the sugar into a glass of water, let it dissolve, and then announce the number. Of course, the imprint of the number, reversed, would have come off on your finger which should be previously moistened.

Here's another effective feat which actually works itself. The performer exhibits three small cards, each inclosed in a small envelope. One card is red, another black, and the third blue. A spectator shuffles the cards and places them in the envelopes. Nevertheless, the performer calls out the color of the card in each container.

Simplicity again! Of the three cards, the red one fits the envelope closely, the blue one is one-thirty-second of an inch narrower than the envelope all along, and the black is cut on a slight bevel to fit perfectly at one end and taper about one-thirty-second inch at the other. These slight variations are quite unperceivable to the eye, yet can be easily "spotted" by squeezing the envelope between the fingers and thumb. This is done casually as the hand travels to the forehead for a lit-

tle "color radiation." Here's an excellent stunt with cards.

The performer takes a deck of playing cards and hands them out for shuffling. They are then put inside a hat and covered with a napkin. The hat may be thoroughly shaken. Despite all this the performer reaches inside the hat and removes ten or twelve cards, one at a time, announcing the name of each before it is withdrawn.

Ten or a dozen cards are memorized in order and held together with a paper clip. These cards are secreted up the sleeve. When the performer reaches under the napkin and into the hat to remove a card, he is actually busy taking the cards from his sleeve. After that, it is a simple matter to run through the memorized packet and name them.

The next little conceit has to do with a typewriter, and while it involves some preparation, it is quite mystifying when well performed. Like this: The wizard casually jots down a se-



Telling the Color of Cards in Envelopes, Above, and the Mystifying Trick of Naming the Deck

ries of four-letter words on a slip of paper. This list is handed to a spectator with the request to select any word and write that on the typewriter. He does so. He removes the paper. The performer inserts a second sheet. His hands hover the keys as he strives to locate the "sympathetic" physical attraction and then—there it is—he is writing the selected word on the second sheet.

A piece of chalk accounts for the mystery. Notice that the list of words contains no two which start with the same letter, nor do any of these initials appear in any other word.

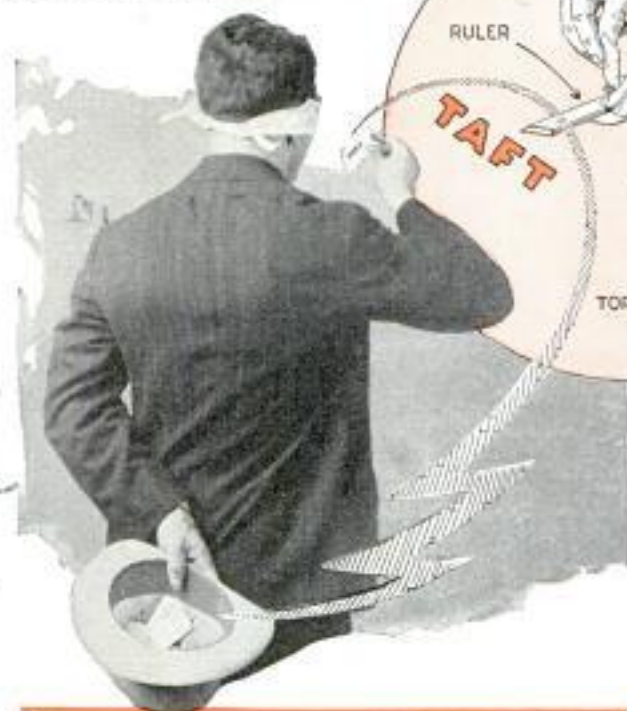
If you limit the list to the first five, you have the initial letters d, b, s, g and l. The typewriter keys representing these five letters are gently touched up with chalk. The doctoring is scarcely visible and is never noticed. If the word "deep" is selected, the spectator's typing of this



will cause the chalk mark to disappear from the D-key. You let your eyes roam over the keys and detect the letters not chalked.

One of the most popular effects is the "dead person" test. In this, the performer distributes a number of paper slips among the audience, requesting each person but one to write the name of a living person on his slip. The odd spectator is requested to write the name of a dead person. The slips are dropped into a hat. The performer may be blindfolded, yet he picks out the "dead person" slip, the others, as he puts it, "feeling much warmer" in contrast.

If you tear paper using a yardstick or ruler, the torn edge is rough. That accounts for the whole mystery. You use a



The Ghost Typewriter Tells What Word Was Written on It, and the "Dead Man" Trick

long slip of paper with four smooth edges. Tearing off from this, the first slip will have three smooth and one rough edge, while the others, barring the last slip which is not used, will have two rough edges. The person receiving the smooth-edged slip is requested to write the dead person's name; the others write the names of living people. The smooth-edged slip is easily detected by touch.

**FISHING AND HUNTING VEST
CONTAINS WIRE CREEL**

For the use of both hunters and fishermen, a combination jacket is now being



Jacket for Hunters and Fishermen; the Compartment at the Back Contains a Wire Creel

offered that contains a built-in creel as well as a pocket for game or equipment. The garment is sleeveless and the creel, in the form of a large wire basket, rests in a pocket at the back. This pocket is waterproof and the creel and its compartment can both be washed.

**STEAM PLANT FOR AIRPLANES
NEARS A TRIAL FLIGHT**

In an effort to develop an airplane power plant more dependable and economical than the gasoline or Diesel engine, a Cleveland manufacturer is building an experimental steam-driven plane. Work has been in progress more than a year and leading metallurgists have co-operated in

producing parts of sufficient strength combined with the necessary lightness and many new alloys have been adopted. The power plant is of the turbine type, having a closed water and steam circuit, forced feed and a condenser. Its backers claim the plane will have an emergency radius of more than fifty miles as a result of reserve power in the steam plant, so that emergency landing hazards will be at the minimum. Bunker fuel oil is to be used, while fewer parts and lower operation and maintenance charges will produce marked economies, it is expected. Since the turbine is practically vibrationless and produces no electrical disturbances, radio interference will not be present. The motor is to produce 2,350 horsepower, and heat from the steam can be utilized to make the cabins comfortable.

**COPIES MADE ON TYPEWRITER
WITHOUT CARBON PAPER**

From one to four copies and the original can be typed simultaneously on a typewriter without the use of carbon paper by attaching a frame containing ribbon strips to the carriage of the machine. There are two of these ribbon strips secured to a double-armed plate. If only one or two copies are wanted, a guarded ribbon which duplicates on only one side is used. If more than two copies are required, double-sided ribbon strips are employed, each ribbon making one copy on the front of one sheet and the second on the reverse side of another. If four copies are wanted, two must be made on thin paper as the typing is read through the paper, while the two others may be made on paper of any thickness. Two levers operate the ribbons, bringing them between the sheets in proper position for writing after the paper is inserted in the roller. The ribbons are less expensive than carbon paper and involve less work.



*a 185
Victor I. Hendrikson
377 Clark St
St Paul, Minn*

Creel Jacket

not on 5.10. 10/21/35

a 1876

Great Lakes Aircraft Corp. 16800 St. Clair Ave Cleveland Ohio

The Copy. Graph Corp. Chrysler Bldg New York

*# 1,781, 300
11/11/31*

Curt Everett Spring 9-19-16 Coventry Saloon
 1929 N. Capital Washington, Lee
 EAR MECHANICS bald car. 967

**ROMANCE OF MAHOGANY
 IN TARIFF RULING**

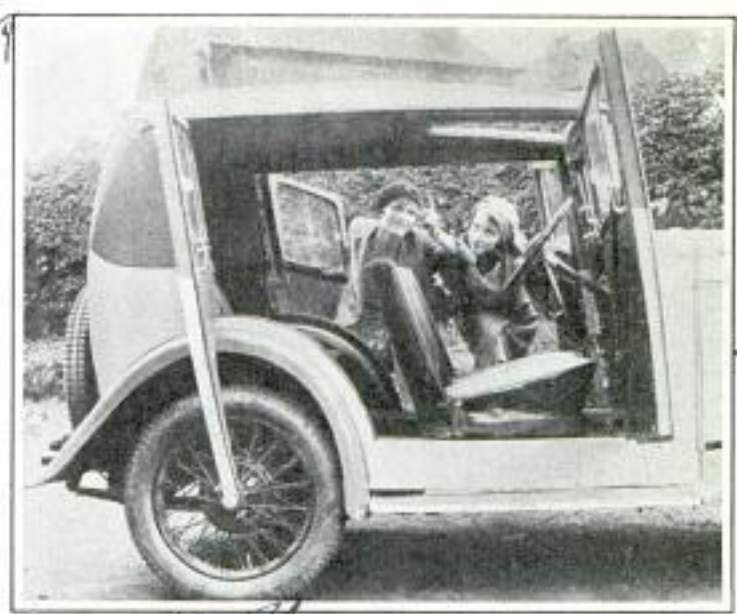
Hidden behind a recent federal trade-commission ruling, dismissing proceedings designed to prevent labeling a wood produced in the Philippines as "mahogany," is a romantic history of the wood dating from its discovery in the sixteenth century. Meanwhile forestry authorities announce that the Philippine supply of the rare timber promises to be inexhaustible. Grown on American territory, produced by modern methods and machinery and imported without duty, it is used here for the manufacture of fine furniture and boats. The history of mahogany dates back to 1521, when Spanish and other explorers employed the wood for making canoes and for ship-repair work. Sir Walter Raleigh remarked on "its great beauty, hardness and durability," when on one of his voyages to the West Indies it was necessary for him to make repairs to his ship. From 1850 to 1905, most of the mahogany used in furniture in American households came from San Domingo, Cuba, Central America and Africa, and then also from the Philippines.

**AUTO IS BUILT TO BRING BACK
 WORLD'S SPEED TITLE**

Streamlined to a high degree and powered with two 1,500-horsepower engines will be the racing automobile which Harlan Fengler, American driver, is building in an attempt to recapture for the United States the world's straightaway speed record now held by Great Britain. His model is constructed to a scale of one to eight.



Model Shows Streamlining of Racing Automobile Which Is Being Built for an Attempt to Break World's Speed Record



Automobile with Doors Which Lock Together, Eliminating the Center Posts; Note Sliding Panel in Roof

**CAR DOORS OPERATE TOGETHER
 TO PREVENT ACCIDENTS**

One of the body models of a small English automobile is unusual in that it contains no center posts to which the four doors may be fastened. Instead, the two doors on each side lock together, making it impossible for a rear door to swing open without the knowledge of the driver as the front door opens at the same time. The car also has a sliding roof, virtually converting it into an open model for good weather. The rear doors are cut out to clear the wheels and fenders.

**PLOW FIGHTS FOREST FLAMES
 BY CUTTING TRENCHES**

Fighting forest fires in Oklahoma has been made easier by the use of a plow which cuts wide furrows from which backfires may be started. The plow, which is a combination of a tractor and "middle-buster" plow, does a day's work of ten men in two hours, clearing a four-foot space two miles long in that time. The tractor motor provides sufficient power to enable the plow to travel any ground an army tank could negotiate.

shown at motor show at Olympia London, England

Wed World

9/19/31
 U.S. Navy

Oklahoma
 Flood Service
 Copyrighted material

BIRD



It is every man's opportunity, and some practical suggestions follow on how to save lives and get a lot of fun.

The good Samaritan must first recognize two groups of winter birds. The first is made up of the happy-go-lucky, friendly fellows who will come cheerily around the home, sit on the porch, and play in the back yard. These include the chickadee, nuthatch, bluejay, downy woodpecker, cardinal and others. In the second group are the quail, pheasants,

THE assurance that a well-fed bird rarely, if ever, dies of cold, makes thousands of sportsmen, home owners, farmers and boys and girls turn each year to the important sport of winter feeding to provide meals, life, and warmth for game and song birds which do not migrate to warmer climes.

Providing food for birds—either around one's home, or on a farm—is much more than a sport. It is a conservation measure that helps the farmer and the sportsmen and assures the future of game and song-bird life.

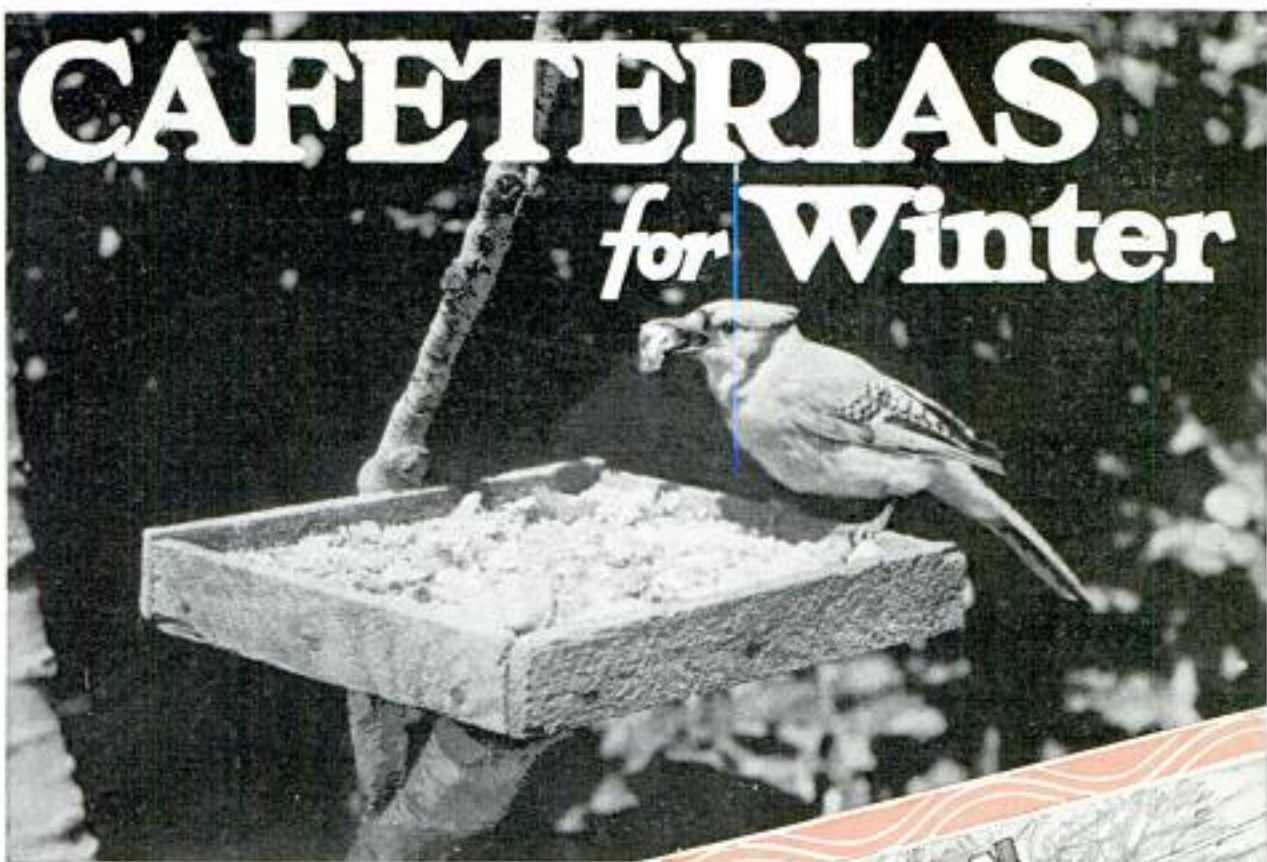
The feathered residents become tamer in winter because they are hard pressed for food. It is a simple matter and not expensive to feed the winter birds. No elaborate or costly equipment is necessary. No large sum of money is required.



The Chickadee Above Became Very Friendly around a Feeding Station; an Elaborate Food Station for the Yard, at Left



Woodpecker at a Suet Hopper. Getting a Free Meal



CAFETERIAS for Winter

Hungarian partridges, occasional doves, and other birds that spend their winters on farmlands outside of village, town and city. These are wilder and must be helped in their natural haunts.

The spectacular stunts, such as scattering loose grain from an airship, are generally ineffective. The grains sink rapidly into the snow and are soon out of sight and reach. Feeding must be maintained over long periods to be effective.

The staples in the winter food kitchens should include seeds, bread crumbs, nuts, and some fat, like suet.

The time to begin your outdoor cafeteria is not late in the fall but the very first day in November. Begin early and continue the feeding until March. Regularity of supply is very important.

Here is an inexpensive way to make a suet container. Take a common wire soap shaker, fill it with suet and suspend it from a line in a tree. The crow and the pestiferous sparrow, which do not like to feed from a swinging object, will leave it alone.

With a few boards, hammer, nails and a saw, you can build a simple food shelf near a window so that you may watch your feathered boarders. A slanting roof



Bluejay at an Extremely Simple Winter Station. Made from a Couple of Boards and Four Pieces of Lath; Suet-Feeding "Shakers" Can Be Hung on a Line with Snaps or Clothespins

a 1693 970

POPULAR MECHANICS



is recommended. The shelf may be fourteen by twenty inches, or larger, and should have a lath tacked around the edges to keep the food from blowing away. Leave drainage holes in the bottom and at each end and cover them with screening. Nail a stick, fifteen inches high, to the floor and attach a small wire hopper full of suet. On the other side, drive a few nails, leaving part of each exposed so that you may hang apples, meat bones, bread, and similar foods, from the points.

It is quite easy to forget the birds which do not come near the house.

There are the bobwhites, the pheasants, meadow larks, doves, and others, that stay in the fields and thickets.

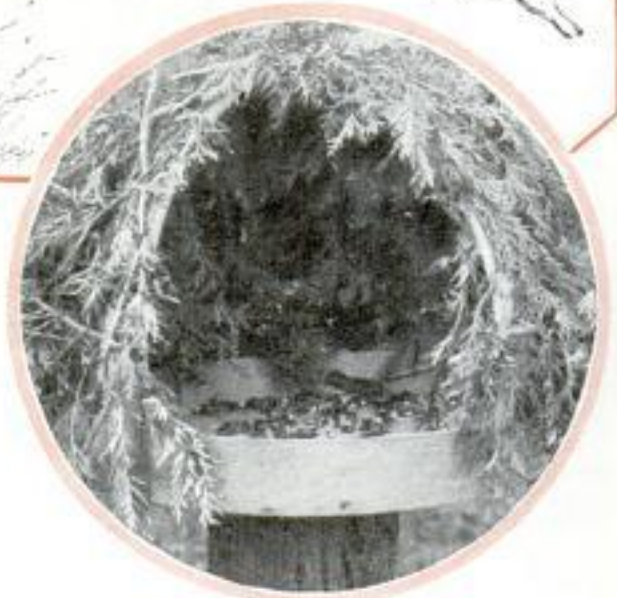
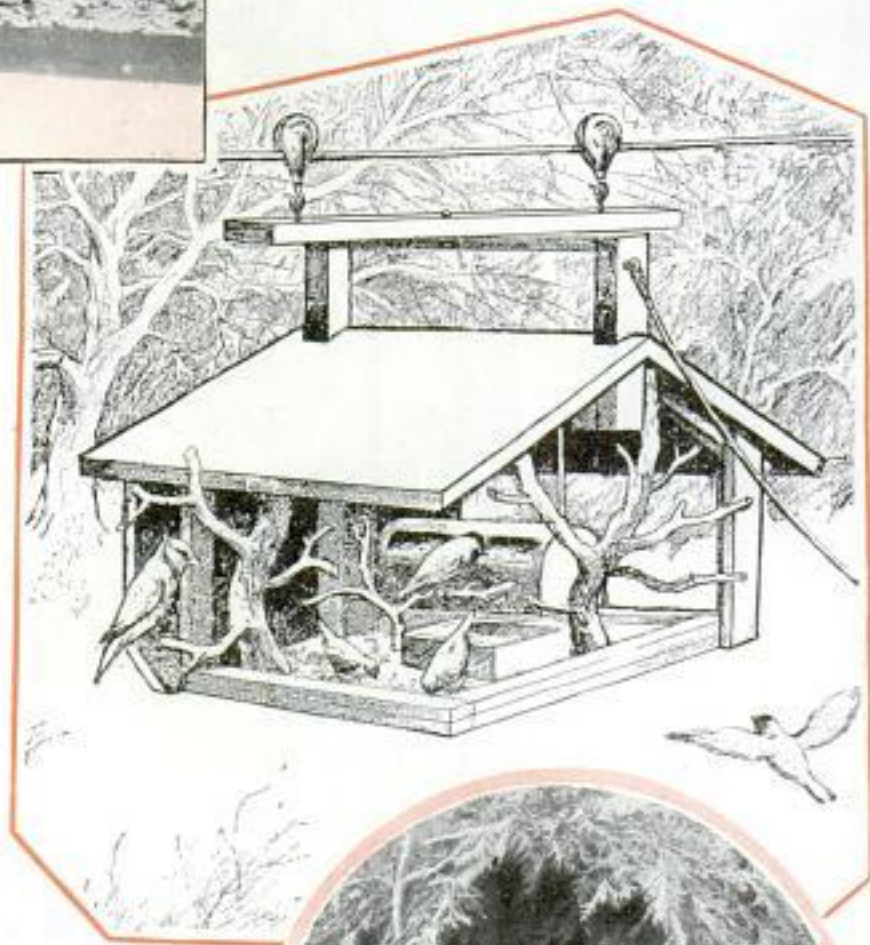
A severe winter, especially if sleet storms occur, makes it unusually difficult for game birds to sustain life. Here is the way to set outdoor cafeterias for them.

If you are going to feed cracked corn, buckwheat, barley or chaff, clear away the snow before scattering it, and make a windbreak to keep the snow from covering the food. Open-pit feeding is to be recommended for Hungarian partridges and field birds, such as the snow buntings, longspurs, and most upland game birds who will go some distance from their cover.

It is not so effective for quail. In this case, it is much better if you locate the coveys, if you can, and distribute the

grain near by. For quail, shelter feeding is particularly recommended.

The shelters should be large enough and placed with the needs and habits of the birds in mind. Arrange the brush or stalks in the form of a tepee and face it away from the biting winds. Leave open-



Suet Should Always Be Placed inside Wire Netting, at Top; Trolley-Car Food Station, Center, and a Station Made from Cheese-Box Cover

ings so as not to make a trap of it. Leads of grain may start at some distance from the shelter and run directly to it. Having once found it, the birds will remember the food station.

Cont. Amos Dodds,
Mornreed,
Santa Paula, Calif.

91893

STEAM HEATING OF ORCHARDS TO SAVE FUEL 1964

Steam heat, delivered by overhead irrigation, may banish smudge pots from California citrus orchards if winter trials prove successful. The new system, with slight alterations to provide revolving steam outlets, will be fed from a central power plant. The outlets, placed under the trees, not only will send steam-heated air through the foliage, but will supply a constant, warm draft through the orchard as well. Considerable saving in fuel and in labor charges incidental to tending the smudge pots is expected, while the air will remain free of soot that is given off by the pots.

91985

U. S. POPULATION CENTER STILL MOVES WEST

Steady movement west of the center of population of the United States is recorded by latest census figures, showing that the shift in the last ten years has been 22.3 miles west, and 7.6 miles south. This places the center of population in Stockton township, Greene county, Indiana, near the town of Linton. Since 1790, various influences have affected the nation's population. Cattle, wheat, oil, real-estate booms, resorts, motion pictures, minerals, cotton, fruit and national defense—all these have had a hand in "jiggling" the census gauge. In 140 years, the advances of population bulk have totaled 589 miles, mostly westward and a trifle southward, according to a bulletin from the National Geographic society, which points out that the rate of movement has been approximately three miles per year, following principally along the thirty-ninth parallel of latitude.

Geographic News Bulletin 2094.
9/25/31

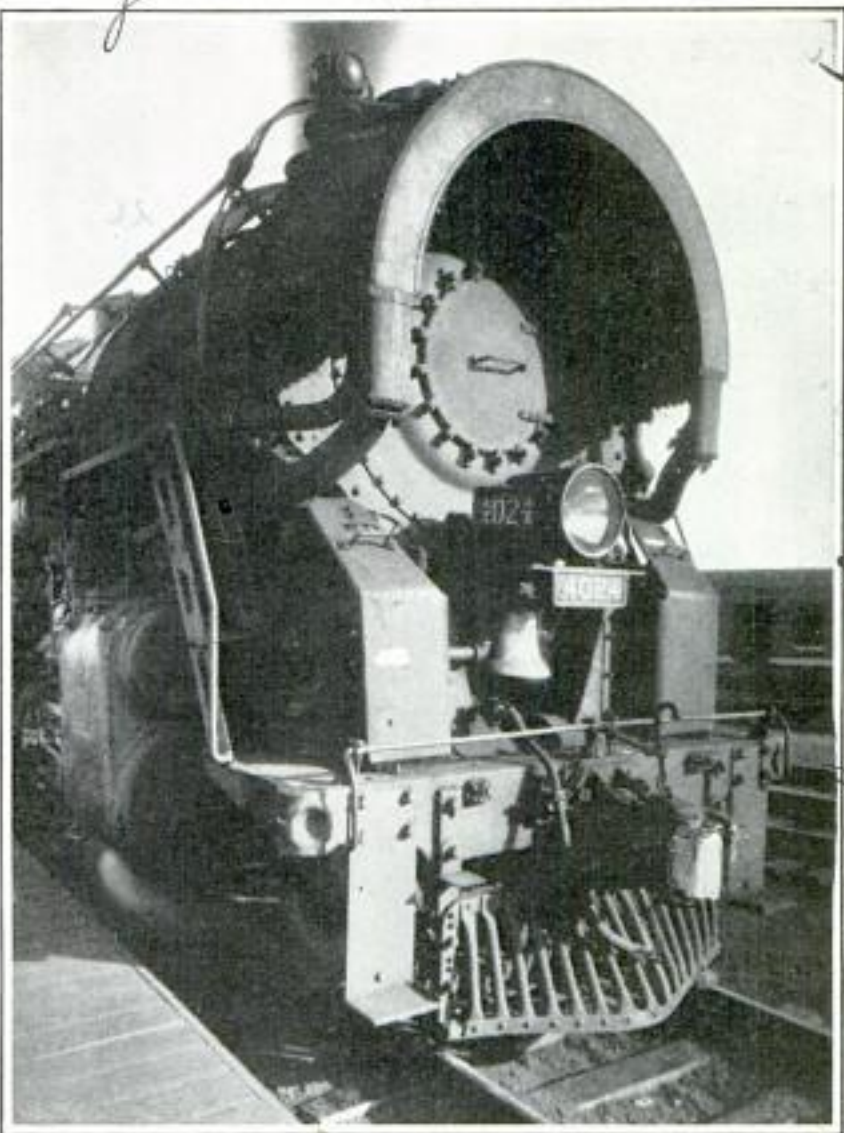


Photo Ewing Galloway
Freight Locomotive That Wears a Bonnet Which, in Reality, Is a Water Heater; Note the Position of the Bell and Headlight

LOCOMOTIVE WEARS A BONNET TO HEAT ITS WATER

Several innovations in engine design are incorporated in freight locomotives recently purchased by one eastern railroad for use in hauling heavy loads over the mountains. A front view of such an engine shows a projection like a hood or bonnet extending out over the boiler. This is a feed-water heater which was moved to the front because of changes in the position of the main throttle valve. In a recess above the pilot, the bell and headlight also are found, instead of in their usual place on top of the boiler. Engines of this type weigh more than 300 tons, are 100 feet long and develop 3,400 horsepower. They carry 18,000 gallons of water and twenty-four tons of coal.

Linna Locomotive Works
Linna, Ohio.
used by Dowd's main RR

Riverside Orchard Co

972 Edgerton POPULAR MECHANICS

FRUIT BAGGER HOLDS THE SACK FOR EASIER HANDLING

\$ 25.00

Apples and Other Fruit or Vegetables Are Easily Sacked with This Machine Which Holds the Bag to Be Filled



Easier handling of apples, potatoes, or any fruit and vegetable that can be sacked, is made possible by a bagging stand which holds the sack while the fruit is being emptied from another container. This equipment is padded to prevent bruising, and the sack may be raised or lowered to settle the fruit. Paper bags, holding one-half or a full bushel and fitting into the buyer's auto without injuring upholstery, are used instead of the old-style basket.

CLICKER ENDS ANIMALS' FEAR OF CAMERA NOISES

Wild animals' fear of the camera's click has been dispelled by an invention which has only one use—that of getting jungle life accustomed to the noises attendant on filming of the wary beasts. This invention, placed in the film party's blind, clicks away hour after hour while the camera operator watches. As the animals grow accustomed to the sound, they soon lose their fear and venture within range, there to be filmed in their native haunts. Formerly, when the camera started clicking, the animals would turn tail and flee,

no information as to makes or models

Bureau of Soils, Dept of Agriculture, Washington, D.C.

even after the operator had waited patiently for days, or perhaps weeks, for the right moment.

SAFETY WINDOWS PREVENT DUST EXPLOSIONS

Safety windows, hinged to "give," may be the means of preventing in the future many explosions in grain elevators, flour-mills, and like places, from dust. It has been discovered that almost invariably there are three distinct blasts in such disasters, the first being slight, but sufficient to shake down more dust, causing a second heavier explosion, and finally a third that may shake or destroy the entire building. Windows so installed that pressure from the inside will cause them to swing outward, will confine the first blast to the room in which it occurs by providing a "safety valve," it is argued.

IRON ROADWAYS RESIST WEAR OF HEAVY TRAFFIC

Iron-plated roads are being constructed in London to cope with the increasing heavy traffic on streets near the docks and on arterial thoroughfares. The iron roads are constructed of triangular cast-iron slabs, each stamped with truncated pyramids. They are laid on a concrete



London Street Surfaced with Slabs of Cast Iron to Resist the Wear of Heavy Traffic

Cmd. H. J. Walker

Detach Apple Bagger
pat pend.

Collins 9/12/31

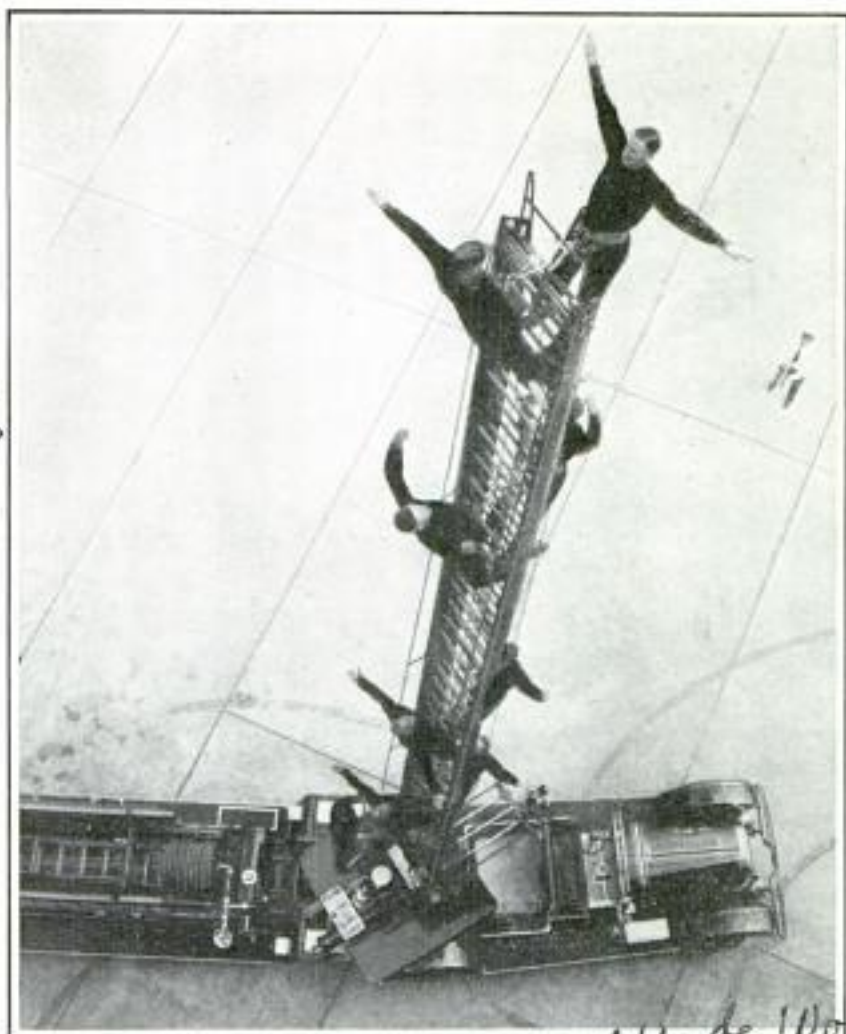
Gen Manager Iron Roads, Marble Hall, London, England
Copyrighted material
Vauxhall
London E.C. 2, U.K.

foundation and are spaced half an inch apart, the apertures being filled with a tarry substance to allow for expansion and contraction. White traffic lines, consisting of detachable plates, can be incorporated in these streets, some of which carry traffic amounting to 80,000 tons a day.

91896
**FLYING DEATHS
 REDUCED BY
 HALF**

In more than 20,000,000 miles of scheduled air-transport flying during the first six months of 1931, there were only five accidents involving fatalities, and in these only three passengers were killed. As compared with the corresponding period of 1930, when passenger-miles flown per passenger fatality were 2,375,664, the passenger-miles per fatality in 1931 were 5,277,989, due both to an increase in miles flown and a decrease in passenger deaths. Miles flown in scheduled operations in the first half of 1930 were 16,902,728 and, in the same period of 1931, the figure was 20,304,430, while passenger fatalities decreased from twenty-two in 1930 to nine in 1931. The total number of accidents of all kinds increased in the 1931 period, and although the number of miles flown was greater this year, there was a decrease in the number of miles flown per accident. In the first half of 1930, there were forty-four accidents, making the number of miles flown per accident 384,152, while this year there were sixty-one accidents, or one for each 332,860 miles. Causes of accidents during the first half of 1931 rated as follows: material, 40.08 per cent; miscellaneous, including weather, darkness, airport or terrain, 32.31 per cent; personnel errors, 25.15 per cent, and undetermined and doubtful, 2.46 per cent.

*Dept. of Commerce.
 Aeronautics Branch*



Recruit Firemen Exercising on an Aerial Ladder to Accustom Themselves to Clinging to the Lofty Perch without Using Their Hands

**CLIMBING LADDERS IS TRAINING
 FOR FIRE FIGHTERS**

Recruit firemen at the Detroit training school go through an intensive course during which they must become proficient in climbing ladders, jumping into nets and effecting rescues from tall buildings. One of the stunts consists in doing calisthenics at the top of an eighty-five-foot aerial ladder. In such exercises, the recruits hold to the ladder with only their feet and legs, leaving the hands free and thus becoming accustomed to the lofty perch and experts in clinging to it without the aid of the hands.

Popular Mechanics Magazine does not publish the name of the maker or seller of any device described in its pages, but this information is kept on file and will be furnished free upon application to our Bureau of Information.

Undersea Acrobats the World Never Views

Diver exercising during the Decompression Period when



Regulating air-valve

Rising on the shot-rope by adding buoyancy to the suit.



Shot-rope from surface to sea-bottom

Method of hanging on the shot-rope




Hanging on the shot-rope by the right leg & exercising body & arms



Prone Position for proceeding against a very Strong Current

Working forward against a 2 1/2 knots Current in a Series of "Shoulder Charges"





Resisting a Medium Current

How the Diver rises on the Shot-Rope.



Shot-Rope → Surface

→ Depth 10 feet

→ Depth 20 feet

→ Depth 30 feet

Series of halts made by diver during decompression period.


→ Depth 40 feet

→ Depth 50 feet

→ Depth 60 feet

→ Depth 70 feet

Regulating air-valve to increase buoyancy



Preparing to push off from the bottom at the commencement of the jump.

A' High under the



The diver rising.

Courtesy The Illustrated

Gymnastic Exercises Divers Must Go Through on Their Way to the Surface, to Decompress Themselves, Are Shown across the Pages; Many of Their Activities Are Never Considered by the Public

and "Slow Motion" Jumps on Ocean's Floor

ascending to accelerate Expulsion of Nitrogen from his body.



Regulating air valve & swinging body forward whilst hanging on by the left hand.



Backward swing exercising body & legs.



Hanging on by left leg & exercising.

Using an Oxy Acetylene Cutting Torch under Water.



Naked flames.

The appearance of a Diver when subjected to great Water Pressure.



Upper portion of suit partly inflated to relieve pressure on ribs.

Lower portion of suit pressed tight against body by the water pressure.

Mud rising in clouds.

Diver emerging from tunnel bored by Water Jet under Wreck.



Water jet pipe.

Diver's telephone lines & air pipe.

Nozzle.

Wrecked Submarine.

Diver.

Sea Bed.

Tunnel under wreck.

Jump Sea.



Gliding over the top of the rocky obstacle.



Gently landing at the conclusion of the jump.

The Diver's "High Jump" diagrammatically illustrated.



G. HAYES 1921.

London News

8/22/31 P. 286-7

The Undersea "Slow Motion" Broad Jump Sometimes Is Necessary to Get over Rocks and Other Obstacles; Tunneling under Wrecks Is One of the Divers' Most Hazardous Undertakings

London Express

Mr. Elsie McDonald

8/19/36

976
a1797

WIRE ROLLS TO STOP BANDITS
FLEEING IN AUTOS



How Coils of Loose Wire Are Employed to Stop Fleeing Auto Bandits

Developed primarily for army use, Great Britain has found an effective road barrier for stopping fleeing auto bandits in nothing more substantial than a roll of light wire. The wire coils, about four feet in diameter, weighing less than fifty pounds and stretching about sixty feet, were found to block roads so swiftly that armored cars and trucks were stopped dead in their tracks. The roll of wire is known as a "fence concertina" and is stretched across the road at a point where it is desired to stop a car. The secret of its efficiency lies in its ability to tangle. When a car runs through it, the coil stretches and then breaks, the loose strands twisting about the wheels, winding into the steering gear, working into brake drums and around axles and usually finishing the job by completely jamming the engine.

NEW DRUGS FROM KEROSENE
REWARD RESEARCH WORK

Hitherto unknown substances, believed to contain valuable medical properties, have been found in crude kerosene. These products, different from anything ever obtained from a natural source, are classified as hydro-aromatic bases, in which are

Mr. J. R. Barley Prof.
Organic Chemistry, Univ. of
Texas, Austin, Texas

included such well-known plant drugs as quinine, morphine, cocaine and strychnine. Heretofore, the plant kingdom alone has furnished this type of substances, known as alkaloids. The breaking down of complex molecules in the refining process of crude oil results in the alkaloid products. They differ from plant alkaloids in that they contain no atoms of oxygen. No one can foretell how far this, and other slight differences, may go toward producing important effects upon disease. An advantage of the petroleum alkaloids is that they can be distilled and thus highly purified. Tests of the substances were made at the cancer-research institute of the Pennsylvania university.

Philadelphia
GYPSUM AS A FERTILIZER

Gypsum from Nova Scotia is used in large quantities as a fertilizer and moisture retainer in the peanut-growing districts of Virginia. Large deposits of this mineral are found not only in Nova Scotia but in several other Canadian provinces. In addition to its use in growing peanuts, gypsum is employed, when calcined, for making dental and hard wall plasters.

Canadian Government
Bureau of Statistics
ROAD MAP SHOWS DISTANCES
93 ON SLIDING CHART

Distances from any designated point to any other point are shown automatically on a road map which consists of an envelope, on the face of which the map appears, and a sliding chart fitting inside the envelope. Beside each town designated on the map is an opening through which figures on the chart show. To reveal the distance from one city to all others, the chart is moved until the name of the starting point appears in a slot



at the right of the map. The figures in the openings then show the distances to each of the towns on the map.

A. McLay & Co. Ltd.
Cardiff, England.

Chicago, Ill. 9/14/37

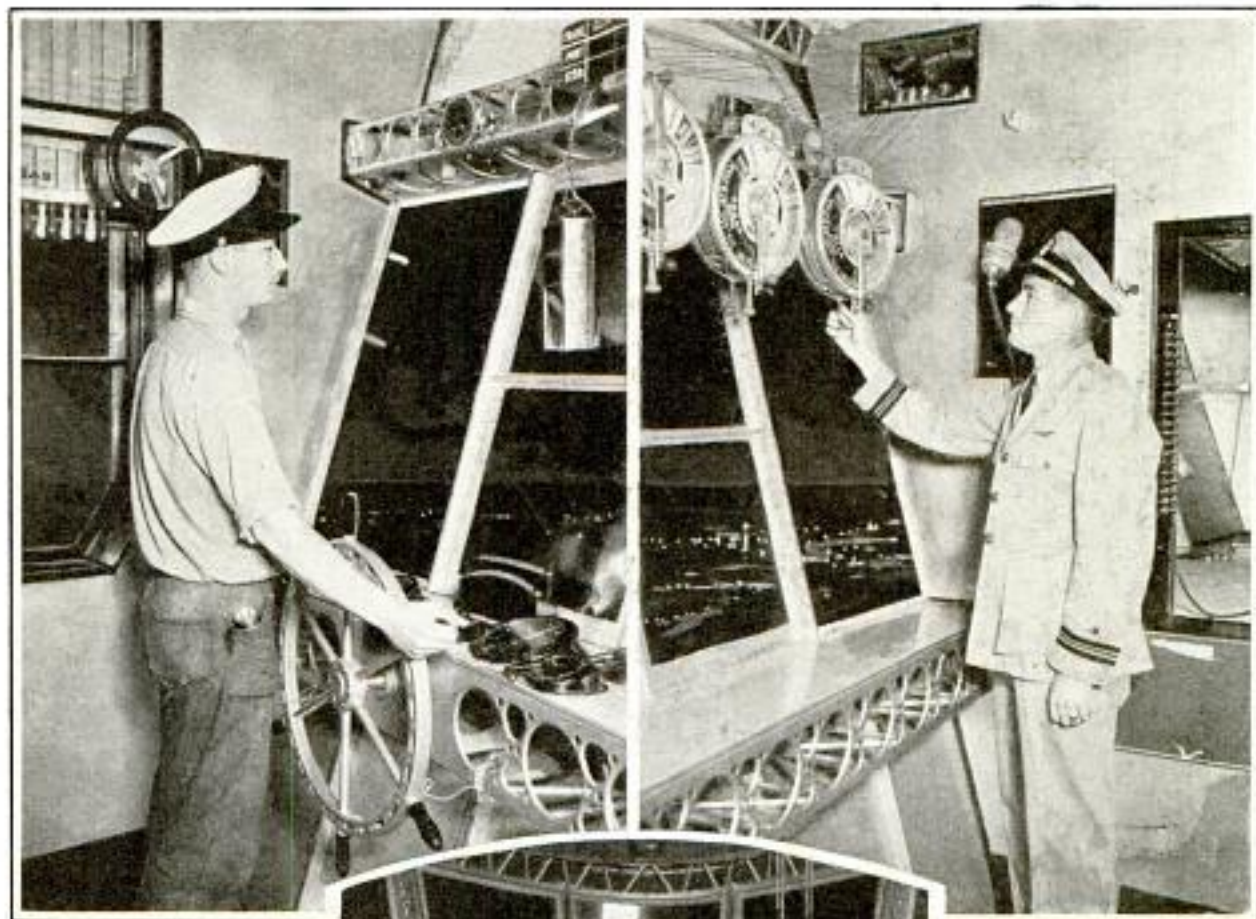
a1812

a1793

No. 12 agent known

Montana

Navy's Air Giant Handles Easily as a Yacht



When the "Akron" recently cruised over north-eastern Ohio on her maiden trip of three hours and forty-seven minutes with 113 passengers aboard, she handled "like a yacht," according to officers. The pictures on this page show the three principal control compartments of the giant ship. In the upper left is seen the elevator controls which cause the vessel to point upward downward by moving the giant horizontal elevators more than 600 feet



The "Eyes" of the Dirigible "Akron"

away, at her stern. These controls, of course, are exclusive of those regulated by ballast or gas. In the upper right photo Lieut. Comm. Bertram G. Rogers of the navy, engineer officer of the "Akron," is operating the engine telegraph levers through which orders from the control car are transmitted instantly to the eight engine rooms. At the bottom is the steersman who governs the ship's course. This wheel moves the vertical fins and guides the ship to the right or left.

a 1894
978

John Edwin Dagg,
Box 458,
Alhambra Calif

Suggest J. D. Farman & Co.
209 S. Dearborn, Chicago



Fireman in Asbestos Suit and Helmet Walking through Flames as He Sprays Carbon-Dioxide Gas on Blaze

FIREMAN IN SUIT OF ASBESTOS WALKS THROUGH FLAMES

Firemen of Los Angeles have been provided with suits of asbestos in which they penetrate into the heart of a blaze without injury. Those wearing the fireproof suits attack the flames with carbon-dioxide extinguishers, spraying this gas directly into the blaze and thus smothering the flames at their source. The asbestos suits cover the entire body from head to foot, the top comprising a hood in which there is an aperture through which the wearer can see.

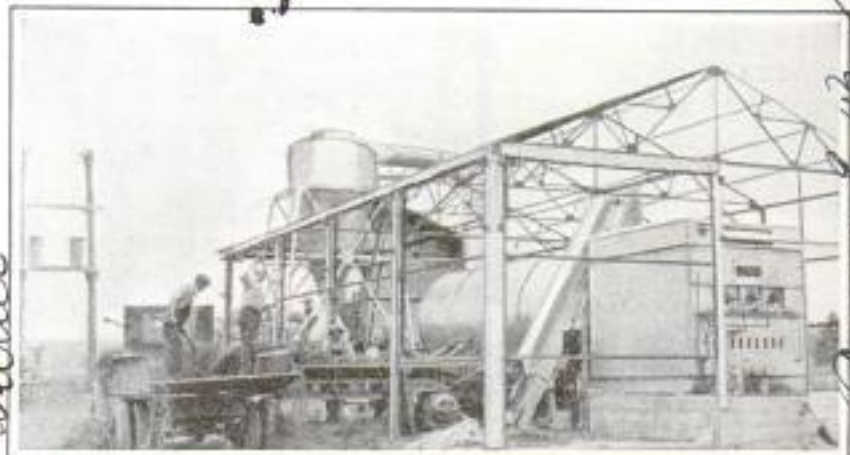
SNAILS TEST WATER

Just as canary birds can detect the presence of poisonous gases in mines snails are being used by mineral prospectors in the southwest for testing the

safety of water supplies obtainable from isolated water holes. Such sources of supply seldom are contaminated with disease-producing bacteria, but frequently contain poisonous minerals. Snails are very sensitive to contaminated water and die very quickly in it. Prospectors now carry a few snails in a bottle of water and when doubtful of a water hole, they take a sample and drop a snail into it. If the snail survives for half an hour, it is almost certain that the water is safe for drinking.

HAY DRIED ELECTRICALLY LATEST ON FARM

Green hay is chopped and dried, independent of the weather, by electrical equipment being used on farms in the United States. The hay is mowed in the usual way, then carried to an electric-motored chopper, which cuts the hay into one-eighth-inch lengths, and electrically conveyed to the hopper on top of the drier. The short green hay is fed into the drier, mixed with hot gases and the moisture driven off at temperatures of 1,000 to 1,500 Fahrenheit. A large exhaust fan pushes the mixture through three cylinders and finally blows the hay into a separator. Here the dried hay is collected and placed in the mow or storage bins. Retention of valuable food properties is among the advantages of the drying equipment, all of which is operated by electric motors.



Rain or Shine, This Electric Drier Makes Hay, Doing in a Few Minutes What Takes the Sun Days

Arnold Dryer Co. Milwaukee
on Ashgrove Farms, Wis.
3000 W. Montana

near Sausalito, Calif
Dunes - 803 Ashton

Andrew

a 1916

Copyrighted material

91765 Cont. John W. Harrington
220 W. 42nd New York

World's Tallest Hotel

Built on Stilts over Railway

BUILT over a railroad yard and yet free from noise, jar, smoke, soot and dust, stands the new Waldorf-Astoria.

While it was being erected, express trains moved over its site. Since its opening, they glide among the steel stilts between the tracks which hold its strange



foundation. Here is a hotel providing comforts and luxury for thousands, and yet without cellar, coal bunkers, furnaces, boilers or electric plant. It was made possible by stunts of engineering ingenuity; its operation defies tradition.

The old Waldorf-Astoria was sold in 1928 to make room for the Empire State building. At that time, the owners served notice that the hyphenated title was protected by trade-mark. Finally a new organization was formed and the land on Park avenue acquired on which now looms this \$38,000,000 hotel.

Site of New Waldorf-Astoria Hotel with Skeleton Outline of Building Imposed

First came the removal of the buildings which occupied the site. More than 1,000 men were set to work in the underground realm stretching from Forty-third to Fiftieth streets, to reroute enormous pipes and conduits, and 400 electricians shifted twenty miles of cable. All of the work had to be done without discommoding the traveling public. No expense was spared in the placing of the giant legs which decided whether or not the hotel would be habitable. If the columns were

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980



An Unusual View up Park Avenue, Showing the Waldorf-Astoria Hotel as It Now Stands Completed above the Railroad Tracks

not properly set, the rumble of the trains would be communicated to them and to the remotest parts of the structure. Hence each support rests on an anti-vibration mat. This device consists of a layer of sheet lead one-eighth of an inch thick; three-eighths of an inch of compressed asbestos; a layer of galvanized iron about the thickness of a postal card, and another one-eighth-inch plate of lead. All its materials vibrate a little as the trains go by, but at differing rates. The varied vibrations neutralize each other. Around the foot of each column is a cleared space which prevents any pulsation from the sides.

The hotel has 2,150 rooms. It has a plant whereby its climate is made to order—cool, warm, dry or moist. Beneath the structure is a spur of track to which express cars of supplies may be shunted. Private parlor cars may be switched there also, so that their owners may go directly to rooms in the hotel.

The roof garden is another of the mechanical marvels of the place. Its floor is the first setback, eighteen stories high. Two hundred feet long, it is covered with an ornately designed lattice, through the open work of which you may gaze at the blue vault of the star-studded sky on summer nights. If rain should suddenly come, a steel and glass skylight, apparently moved by magic and coming from nowhere, slides noiselessly over the garden.

Although it burns neither coal nor oil and gets its heat from outside, the Waldorf-Astoria can warm up a cold room in two or three minutes. Its radiators, as the public will call them always, probably, are not radiators at all. They are convection heaters made of copper pipes to which are at-

tached fluelike appendages of the same metal. These get hot within a few seconds after the valve is turned; draw the air in at their bottoms, and send it heated out of their tops. They are hidden behind pierced screens under the window sills.

The elevator service consists of thirty-one units, capable of being run at high speed. It includes also a huge cab in which automobiles and motorboats can be taken to the grand ballroom for exhibition purposes.

As a structure, the new Waldorf-Astoria is 625 feet high, and contains 20,487,000 cubic feet. It has only 2,150 rooms, which is less than the number found in several leading American hotels, such as the Stevens (2,986) and the Palmer (2,243) of Chicago, but they are considerably larger than the average.

Forty-seven stories tall, the hotel uses twenty-eight of the stories for transient patrons, the upper apartments being reserved for permanent residents.



© Photopress Ltd.

Auto Equipped with Adjustable Roller to Take Up Road Shocks in Touring Wilds of Central Asia; When Rough Roads Are Encountered, the Roller Is Lowered and Absorbs Vibration

ADJUSTABLE ROLLER FOR AUTO ABSORBS ROAD SHOCK

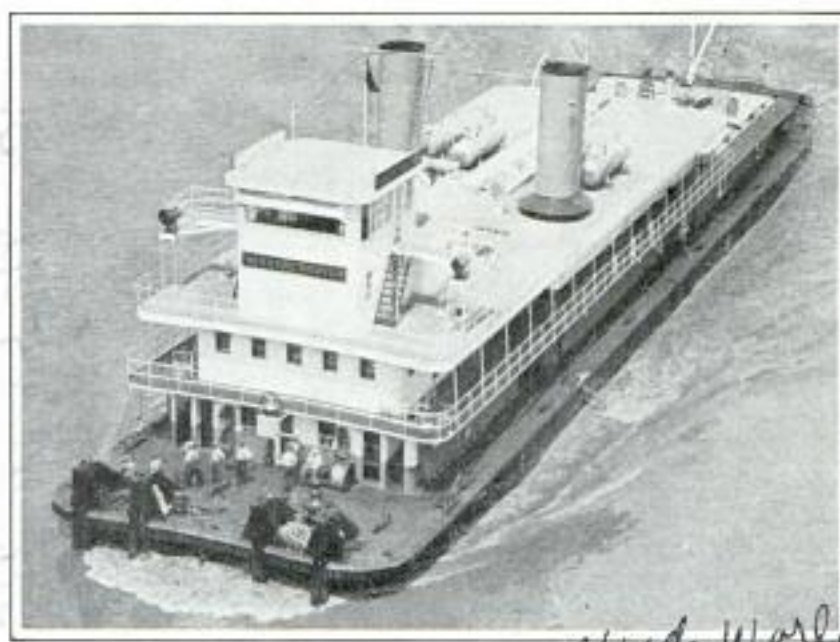
Automobiles composing an expedition touring the wilds of central Asia to make sound-picture films have been equipped with huge rollers to aid in negotiating the rough and dangerous roads that often are little more than paths. Each car has

one of the adjustable rollers installed in front of the bumper. When the going is rough, these rollers are lowered and absorb much of the shock in sudden steep drops, preventing the jolting and vibration from being transmitted to the mechanism. On good roads, the roller is raised above the road level where it is entirely out of the way.

Q1836
DIESEL ENGINES FOR TOWBOAT ADD TO POWER AND SPEED

Capable of maintaining a speed of twenty miles an hour, the "Herbert Hoover,"

the world's largest Diesel-powered towboat, recently was placed in service on the Mississippi river. The craft is 225 feet long, has three decks and cost half a million dollars. Power is supplied by two oil-burning 1,000-horsepower engines and the boat carries a crew of thirty-three. It will be used for service between St. Louis and New Orleans.



Towboat Powered with Diesel Engines of 1,000 Horsepower Each That Makes Twenty Miles an Hour

SPRINGS OF RUBBER FOR AUTO Q1956

A new type of automobile, now being built in England, will be almost entirely rubber-sprung, it is announced. Specially prepared rubber of high elasticity and endurance will be employed to dispense with metal springs. Trials of the car are expected within a few weeks.

Dept. of Commerce
Reported by Consul W. St. John Newcastle-on-Tyne, England

*maker of umbrella
unknown*



Patrons Are Protected from Sun and Wind at Outdoor Tables by These Revolving Umbrellas with Side Curtains

UMBRELLA WITH SIDE CURTAIN REVOLVES OVER TABLE

Umbrellas with side curtains revolve over outside tables at a Los Angeles cafe, to protect diners from sun and wind. The staff of the umbrella is set in concrete and turns on roller bearings. The side curtain is wide enough to cover forty per cent of the circle, and as the sun or wind moves during the day, the curtained umbrella is revolved to provide adequate protection. The device converts each outside table into a semi-private booth. Its use on lawns, beaches or other outside places has been recommended by the makers.

FREEZING KEEPS RIVETS SOFT FOR MAKING AIRPLANES

Freezing to keep duralumin rivets soft until time for them to be driven in airplane assembly is a discovery by engineers of a western company. It has been found that if duralumin rivets are allowed to stand more than a few minutes after

heat-treating and quenching, they become too hard to drive satisfactorily. These engineers have found, however, that if the rivets are placed in freezing temperatures immediately after being quenched, this hardening process is delayed for as long as two weeks. "Dry-ice" containers holding the rivets are placed in a master storage box and from there distributed to smaller boxes in the various assembly departments requiring them.

91898

MOTOR OIL IS REFINED WHILE ENGINE RUNS

Cleaning and refining of motor oil while the automobile is in operation is made possible by an improved filter which removes dirt, carbon, iron, copper and other abrasive matter. The filter actually refines the oil, its inventor asserts, through use of a secret compound which becomes active at a temperature of 210 degrees, generated by the motor. The refining process does not destroy the viscosity of the oil, but

improves it by removing gasoline and acid dilutions, according to the inventor. Oil treated by this improved filter will op-

Refine-O-Filter



"Filter" Being Installed in Filter Which Cleans and Refines Oil as Auto Runs

*Chas. O. F. Tibbets
Los Angeles, Calif*

1916 W. 85th St.

Jan. O'Shaunter d m w.

*Boeing Airplane Co.
Georgetown, D. C.
Seattle Wash*

erate satisfactorily in a motor for 10,000 miles, at which point both the oil and the secret "filler" must be changed.

ELECTRIC EYE AIDS ORCHARDISTS ROUT PESTS

1945

Oriental peach and codling moths, foes of the peach and apple crops, may be routed with the assistance of the photo-electric eye if experiments carried on by the New Jersey agricultural college prove successful. These moths cause much damage by laying their eggs on the trees in question, but they will not lay when the temperature is below 60 degrees or in the daylight. To defeat the moths, it was decided to floodlight some experimental orchards and have the light turned on and off by General Electric photo-electric relays. These devices are set to operate when the light increases or decreases beyond certain predetermined limits. When darkness approaches, the eyes note the change and cause the floodlights to be turned on; when daylight returns, the never-sleeping eyes turn the floodlights off again. The moths, finding a state of continual daylight are expected to be discouraged from their egg-laying in that particular orchard. As it is unnecessary to use the floodlights when the temperature drops below sixty degrees, a thermostat will be used to cut them out entirely under such conditions. The moths then will be discouraged by the low temperature, as they will not lay their eggs below that temperature even though it is dark. It is planned to try colored lights in conjunction with the other arrangements.

New Brunswick N.J.



Examples of Documents as They Appear on Keyed Receiver, Left, and on Any Other Set at the Right; Inventor at Top

SECRET PAPERS SENT BY RADIO THAT DECOMPOSES THEM

Documents that must be kept in utmost secrecy, including plans, maps or illustrations, can be sent by radio with absolute safety by means of a unique telephoto machine recently developed abroad. The sending machine decomposes the photo or document and the receiving machine, which is keyed to the sender, recomposes it into its original form. Any other machine, although it can receive the same image, finds it merely a jumble of dots and splashes, which defy every attempt at interpretation.

A. M. M. Belin
France

Copyrighted material

9 1821

Cont. Ilon Ilassamian, 55 W. 86th
New York

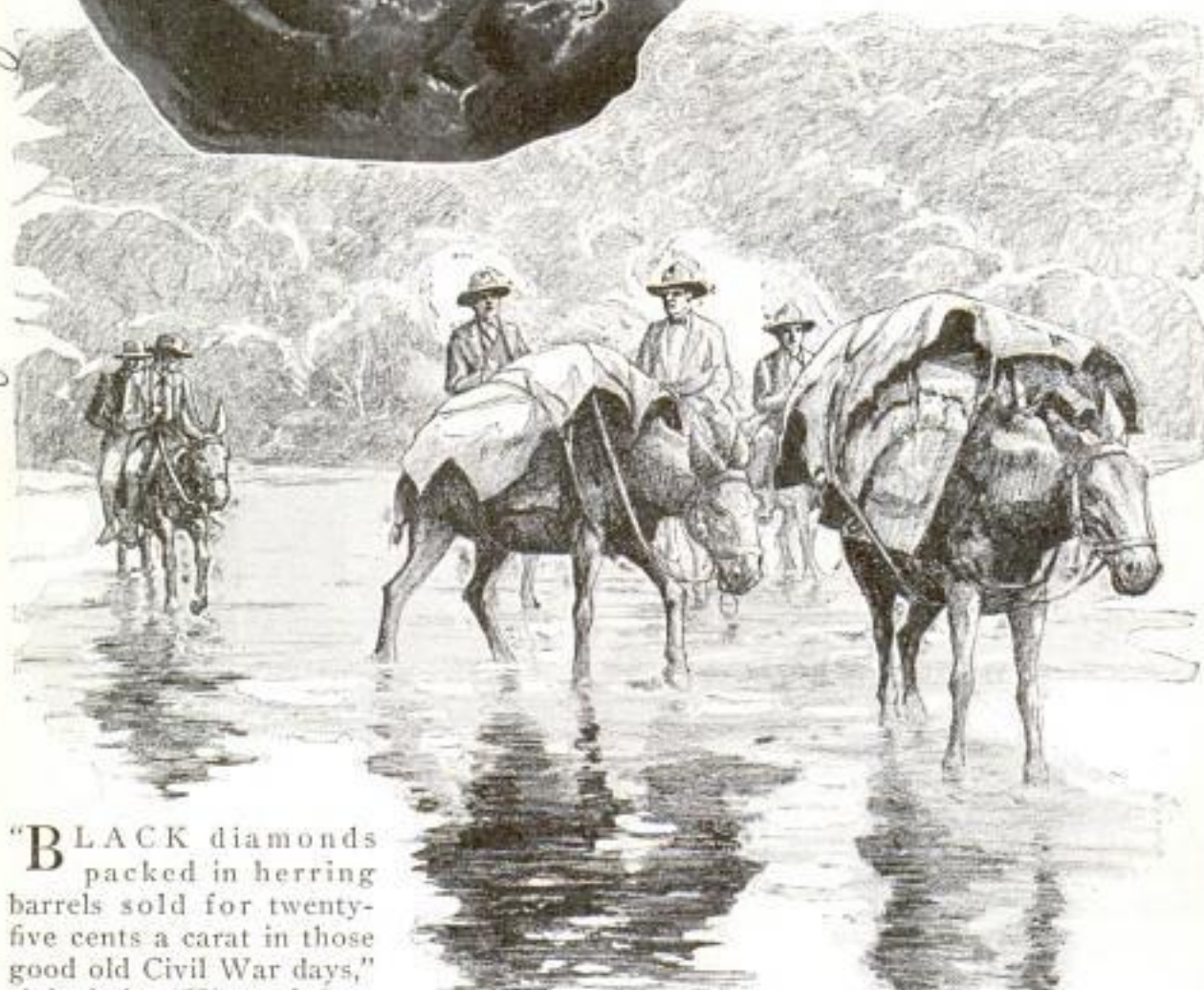
The KING

dent of the Bahia corporation, operators of a huge black-diamond mine concession in the state of Bahia, Brazil.

What's the difference between black and white diamonds? Black diamonds are worth more in cold cash, but they need no protection. You can't pawn them. An unidentified person can't sell them be-



Arthur Bandler, president of the Bahia Corp



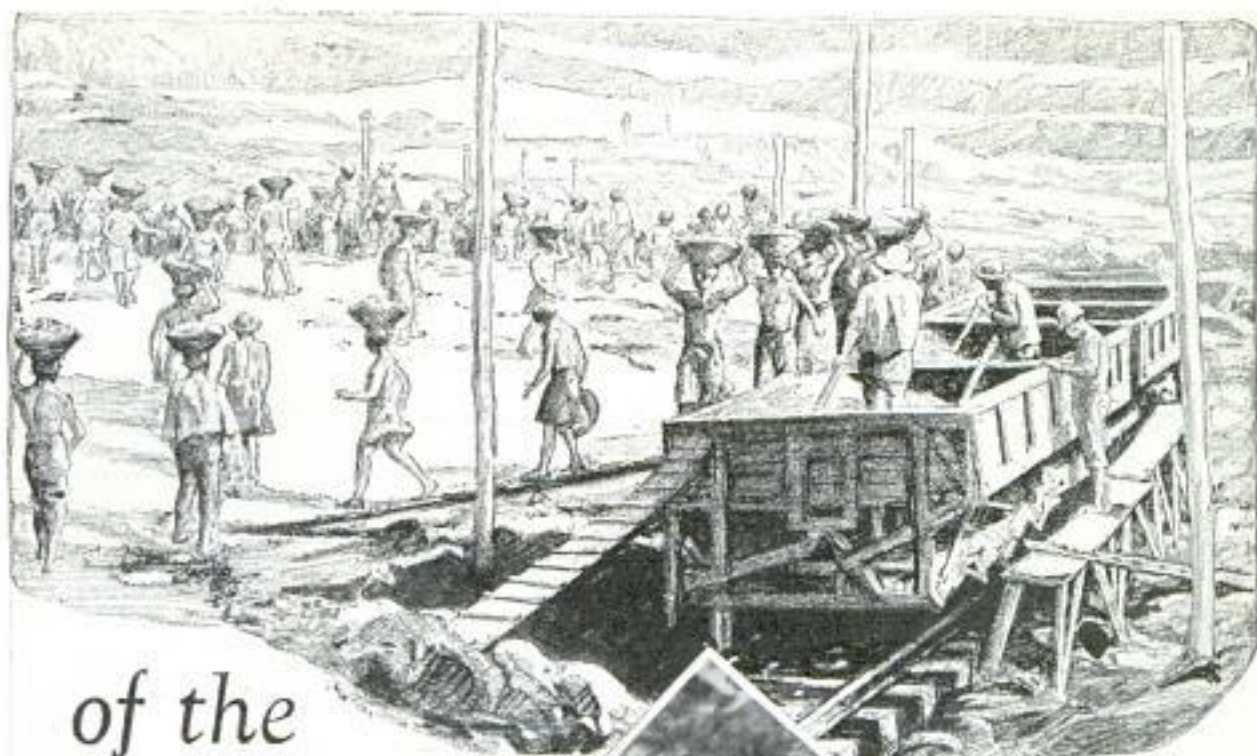
"BLACK diamonds packed in herring barrels sold for twenty-five cents a carat in those good old Civil War days," sighed the "King of Carbon" as he let his hand play with \$100,000 worth of pebbles. "You wouldn't believe it," he went on, "but for a long time, a Dutchman used one 2,000-carat diamond, worth \$250,000, as a counterweight on a door!"

The romance of black diamonds hangs on such stories. There may have been half a million, or a million dollars' worth of black diamonds in the room with Arthur Bandler, the king of carbon, presi-

dent of the Bahia corporation, operators of a huge black-diamond mine concession in the state of Bahia, Brazil. cause every dealer in black diamonds is well known. And you can't give them to your sweetheart, because she would believe you were presenting her with a nugget of charcoal.

"They're tough," said the king. If in doubt, try to cut a black diamond with any other substance. It can't be done. The blacks are slightly harder than white

Largest Black Diamond Ever Found, Weighing About 3,078 Carats; Photo Is Three-Quarters Actual Size; Carrying Supplies to Diamond Camps



of the BLACK DIAMONDS

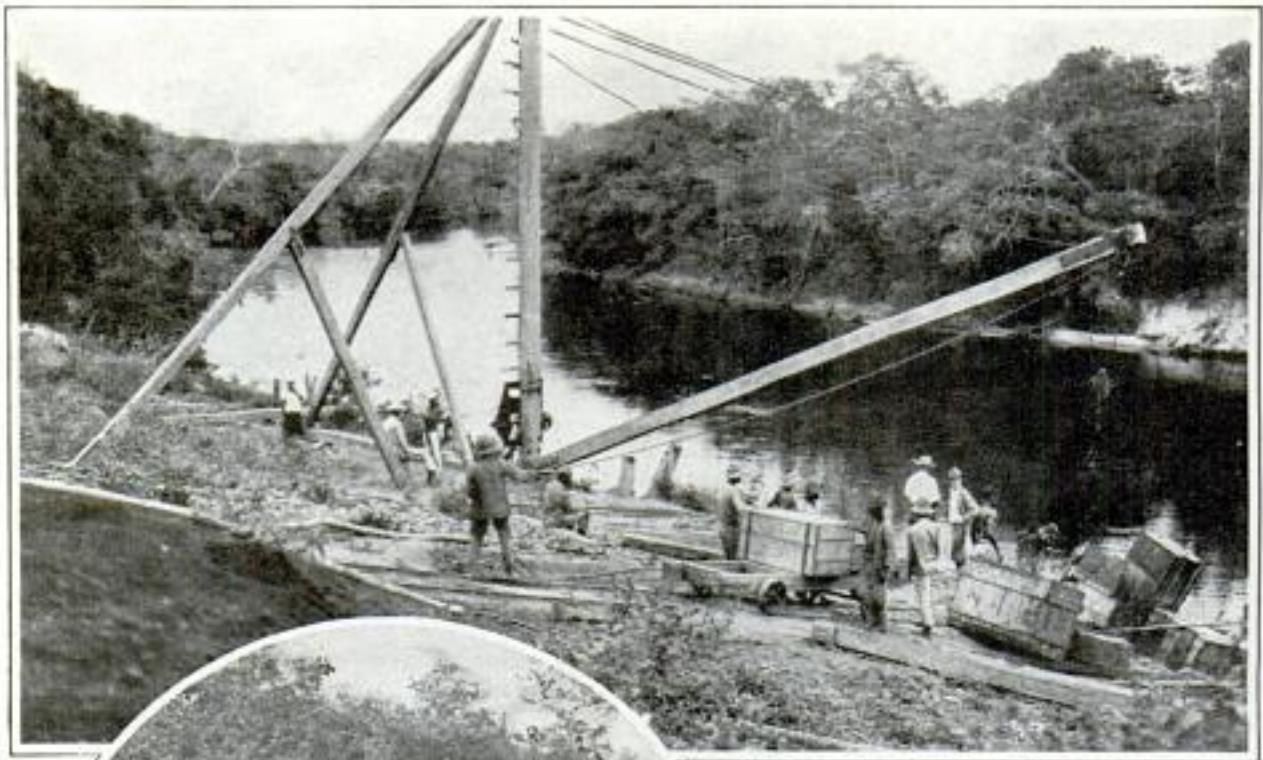
diamonds. White diamonds command money for their beauty, but there is no substance uglier than a black diamond. Other minerals may be beautiful, but none has more utility.

Tough is the word. A black diamond will scratch the hardest chromium steel or the next toughest mineral, corundum. And bite? Black diamonds have bitten through 6,000 feet of slate, limestone, granite and quartzite. Black diamonds have bored into millions of tons of iron ore on the Mesabi range. Black diamonds are exploring the foundations of Chicago for a rapid-transit subway. North of New York City, diamond drills are searching for water-tunnel sites. The king of carbon has sold the government enough black diamonds to drill 300,000 feet of rock at Hoover dam. In the Ural mountains of Russia, prospectors are diamond-drilling for copper lodes. Nevada prospectors are drill-



Natives Carry the Diamond-Bearing Dirt on Their Heads; Diamond Washers at Work

91821
986



Unloading Freight Hauled 250 Miles through the Jungle; at the Left, the Rail Section of the Journey

ing for gold. Wherever industry needs the very hardest cutting tool, the king of carbon sells his wares.

He made a trip to Bahia in 1924, his pockets bulging with money. The industrial diamond market in the United States was at a standstill. Diamonds could not be purchased through the regular channels. A group of European traders had pooled their resources in order to cut off the American supply. Bandler disguised his mission under an assumed name. He had to see what could be done about it. And he dropped into Bahia like a meteor.

The king of carbon sought out independent traders and placed his bids high.

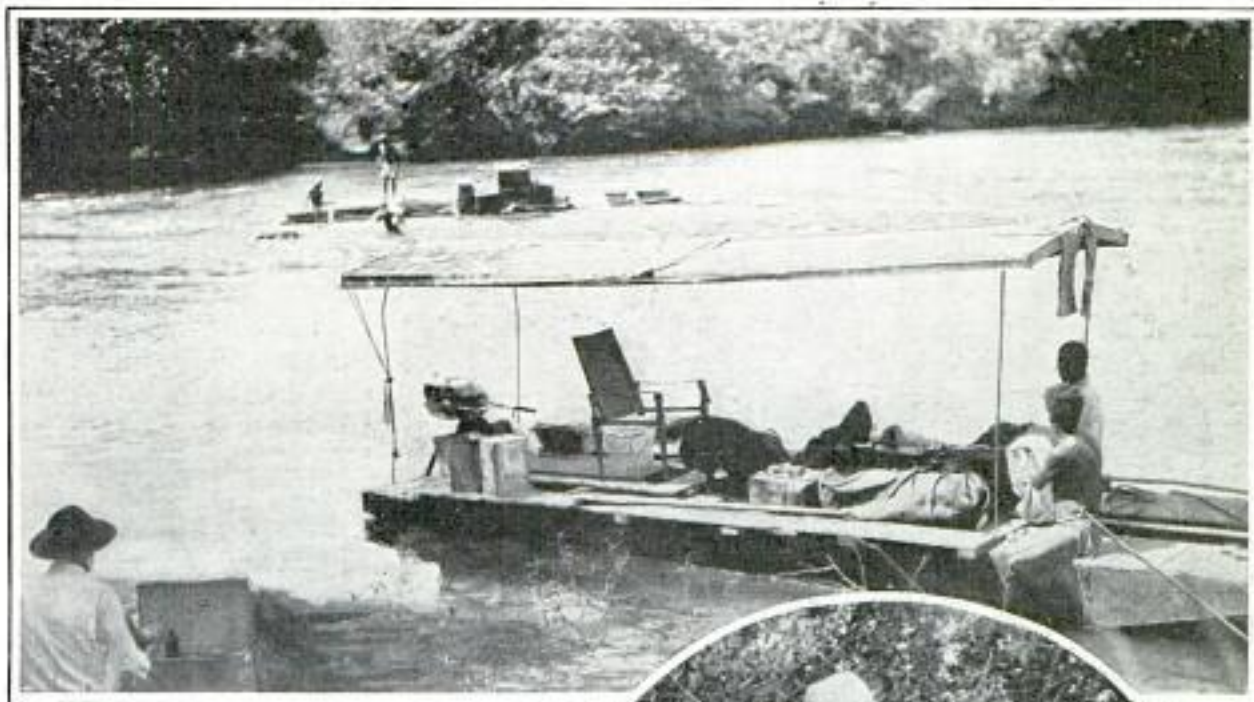
At that time the highest price paid for black diamonds was \$60 to \$70 a carat. The combined traders raised their bids. Bandler jumped his, and before very long, buyers were paying \$150 per carat. The king broke the backbone of the combine, and since then, the trade has been free to all.

The terrors held out to prospectors in the black-diamond country were many. "Be careful," said a French hotel keeper to Bandler as he prepared to penetrate the jungle, "I once had visions of becoming the king of carbon, and now I am only the king of soup."

The dread of yellow fever, snakes and savage Indians did not deter Bandler, however. He was astonished to find that the natives were working their mines in the most primitive way, and that none of them had made an investment of even \$5,000.

He secured the first and only mining privilege ever granted in the Bahia district, a thirty-year government concession. He bought Mocombo, a 40,000-acre farm, for \$60,000 and later another tract of 70,000 acres, which gave him the right to both sides of the river.

91821



First Outboard Engine in the Jungles, and, Right, an Expert Diamond Worker with His Pan

One of his first efforts was to rid the district of yellow fever. In this he was assisted by experts from the Rockefeller foundation, who drained the swamps and distributed mosquito-eating fish. The scourge which had attacked ninety-eight per cent of the population, was reduced to two per cent.

The king of carbon's mining operations have involved an outlay of \$700,000 for equipment. One thousand tons of freight had to be hauled to the concession.

At Bahia, the machinery was loaded on sailing barges and taken fifty miles up the river; then 160 miles by rail, and the last lap of forty miles by river. Bandler's mines now employ 1,400 natives.

Never, according to Bandler, has any diamond trader been molested or robbed of his possessions. When a native hands over some carbons to a prospective buyer, he never asks for a receipt. The buyer may keep the stones three or four days in order to inspect them. A buyer rides his mule into the jungle with \$100,000 in cash on his person, and returns to the city with \$100,000 worth of carbon. There is no record of an ambush. The natives respect property rights.

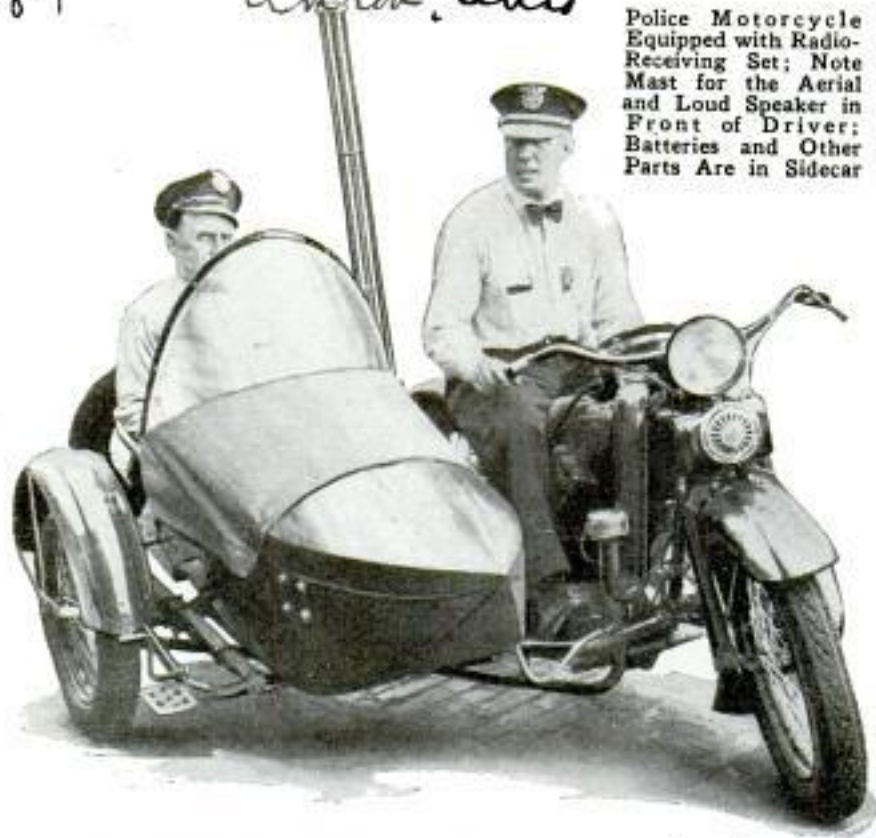


The size of industrial carbons ranges from one-sixteenth carat up to several hundred carats. Large stones are rare. A 3,078-carat carbon was broken up for the diamond drills used to develop the Mesabi range. The king of carbon has, in the past five years, purchased and broken stones ranging from 100 to 458 carats. The Brazilian diamond deposits were opened long before the African mines. The black variety is found in no other country than Brazil, which also produces some white diamonds. The Braganza, 1,680 carats, said to be the largest ever discovered, came from Brazil between 1741 and 1797; the Star of the South, weighing 254 carats, in 1853.

Emb. Walter & Burton
988 1032 POPULAR MECHANICS
Akron, Ohio

9129

Police Motorcycle
Equipped with Radio-
Receiving Set; Note
Mast for the Aerial
and Loud Speaker in
Front of Driver;
Batteries and Other
Parts Are in Sidecar



fourth with 3,715. These figures are for both active and reserve forces. But in civil aviation, the United States leads the world powers. It has 49,254 miles of airways, as compared with the British empire's 22,297, Germany's 20,272, France's 19,750 and Russia's 19,002. There are 1,258 airports in the United States, as compared with 507 in the British empire, 256 in Russia and 176 in France. The United States, with 10,235 civil planes in operation, also is first in that classification, the British empire coming second with 2,070, France third with 1,320 and Italy with 750. And this nation

has 16,709 civilian flyers, more than all the other powers combined.

MOTORCYCLE WITH RADIO SET SPURS WAR ON CRIME

As an auxiliary to the police automobile fitted with a short-wave receiving set, a radio-equipped motorcycle is now being built for police use. The motorcycle is faster and more economical to operate than a car, and with radio connections to a central sending station, its usefulness in thwarting crime is further increased. The receiving set is carried in a sidecar, along with batteries. A short mast, mounted on the car, carries the aerial, and an air-column speaker is fastened to the frame of the machine, the horn opening being in front of the driver. Even at high speeds the radio has been found to function satisfactorily.

FRANCE FIRST IN WAR PLANES; U. S. LEADS CIVIL FLYING

France now leads the world in air armament with 4,683 fighting planes, according to a recent estimate. The British empire is second, with 2,065, Italy third with 1,834, and the United States fourth with 1,809. France also is first in number of pilots trained for war, with 7,952, the United States second with 4,668, the British empire third with 3,858 and Italy

LION-PROOF HUTS FOR VISITORS TO SOUTH AFRICAN PARK

Lion-proof huts are provided in South Africa's Kruger National Park for the protection of tourists. These huts have cement floors, mud or cement walls and thatch roofs, with an open space between roof and walls for ventilation. The newer huts have windows, but some visitors object to these because of lions. In "Hints for Our Visitors," a pamphlet distributed by the park officials, the tourist is advised not to become alarmed if lions stop and stare at his automobile. Just slow down, advises the pamphlet, and the lion will move out of the way. But the visitor is warned against getting within 100 yards of a lioness with cubs, and advised to stop his car until the mother has taken her cubs safely away.

PLANES CARRY STARVING BIRDS IN MIGRATION OVER ALPS

Airplanes were used recently in Austria to supplant nature in sending birds on their annual flight to warmer climes for the winter. Thousands of swallows

Akron, Ohio Journal Defeat

91970

91999

Science Source 9/24/10

Comparative Air Armaments of the World, compiled by Carl Boyer & Associates

arriving from the north descended in the streets of Vienna and on farms and buildings, so exhausted that it was almost certain they would either freeze or starve on the long journey over the Alps. A society for the protection of animals and birds chartered several airplanes, and bird-lovers collected the migrants and brought them to Vienna, where they were loaded into wooden cases, carried over the mountains in the planes and liberated in Italy.

1867

COAL SOLD IN FANCY BASKETS TO JAVANESE CONSUMERS

Coal, wrapped in fancy baskets, is hawked to consumers in Java, where one never telephones his order to the coal dealer. Most of the residents prefer to buy one day's supply at a time from the coal salesman, who carries about one shovelful in each of his baskets.



Two of Java's Coal Salesmen Are Shown with Their Fancy Baskets, Containing One Shovelful



Watering the Garden Is Easy with This "Rain Gun" Connected to a Well or Stream

"RAIN GUN" WATERS FLOWERS FROM POND OR STREAM

Watering the flowers during a drouth is made easy by a "rain gun" which produces a spray with the aid of an electric generator and a connection to a near-by pond or stream. It takes but a few seconds to pump the water from the pond through the nozzle and produce enough rain for a large garden.

ELECTRICITY FROM AIR MOTOR

Generation of electricity in commercial quantities by trapping enough wind and air currents to turn a rotor generator will be attempted in a New Jersey test plant. A four-mile wind will turn the rotors fast enough to produce electricity, the engineers say, while in dead calms, rotors mounted on giant trucks will be pushed around a circular track at sufficient speed to set the rotors spinning.

Public Service Corp of New Jersey, in cooperation with 4 utility companies

Patent rights sold to Madagas Rotor
Patent rights sold to Madagas Rotor
Patent rights sold to Madagas Rotor

Shimura & Schuchert
Berlin Germany
No 4 S agent known

1997

See Jan. 1902
0.00.

Berlin Germany

a 1947 Logan U. Olanis, 55 W. 42nd St. New York

POPULAR MECHANICS

Explorers of Universe Find the Earth a Speck

LIGHT—186,324 MILES PER SECOND

SPIRAL NEBULAE HAVE BEEN COMPUTED AT 12,500 MILES PER SECOND

SUN—200 MILES PER SECOND

EARTH—18 MILES PER SECOND

THE SUN'S LOSS IN RADIATION PER MINUTE—IN TONS—IS 480 TIMES THE FALL OF WATER AT NIAGARA—SAME SPACE OF TIME.

WITH ONLY 6 GRAINS OF DUST IN ITS ENTIRE INTERIOR, THE EMPIRE STATE BUILDING WOULD STILL BE MORE CROWDED THAN SPACE IS WITH STARS

SOME STARS RADIATE—PER SQ. INCH!

50,000 HP

SUN RADIATES PER SQ. INCH: 50 HP.

THE STAR MIRA COULD HOLD 30,000,000 SUNS OR 39,000,000,000 EARTHS

Some of the Vastness of Space May Be Grasped from the Illustrations Above; the Earth's Speed of Eighteen Miles a Second Is Slow Compared with Light

and Its Terrific Velocity Just a Snail's Pace

A GIANT LARGE ENOUGH TO HOLD THE GREAT DIPPER WOULD BE ABOUT 398,867,328,000 MILES IN HEIGHT!

LIGHT WOULD BE NEARLY 7 YEARS PASSING FROM A TO B

TO THE NEAREST FIXED STAR:

IT WOULD TAKE THE FASTEST PLANE 8 MILLIONS OF YEARS

A ROCKET MOVING AT 7 MILES A SECOND WOULD REQUIRE MORE THAN 16,265 YEARS

KNOWN HISTORY PROBABLY LESS THAN 90 MINUTES

WITH EACH TICK REPRESENTING THE PASSAGE OF ONE YEAR, A CLOCK MUST STILL RUN FOR MORE THAN 4 YEARS BEFORE LIGHT FROM SOME DISTANT STARS COULD REACH US

1492

1931

SOME STARS MAY SEE US AS OF 18,400 YEARS AGO!

WHILE MAN WAS YOUNG, 18,400 YEARS AGO, LIGHT FROM SOME STARS STARTED FOR THE EARTH

AIRPLANE — 528 FEET PER SECOND

RACING CAR — 352 FEET PER SECOND

MOTORBOAT — OVER 161 FEET PER SECOND

A STUDY IN SPEED

A DROP OF WATER PROPORTIONATE TO THE SIZE OF THE GREAT DIPPER COULD ENCLOSE 25 SOLAR SYSTEMS

The Nearest Star May Be Seeing What Took Place on the Earth More than Four Years Ago; Our Whole Solar System Is But a Minute Part of the Universe about It

4/19/29 992

1950

Great Western

Crown Iron works Co. 1229 Tyler, N.C.,
Munshapoli, Minn.



Exercising Wheel on a Fox Farm, in Which the Animals Get Miles of Running without Leaving Their Cages

EXERCISING WHEEL FOR FOXES KEEPS THEM HEALTHY

Owners of fox farms where these active animals are raised for their pelts, always face the necessity of providing exercise to keep the captives healthy. Plenty of running in a restricted area is furnished by an exercising wheel for them. This wheel is about five feet high and is surrounded by a wire cage. It stands vertically and about its rim is a track in which the animals are placed. Their movements cause the wheel to revolve, thus enabling a fox to get miles of running without leaving the cage.

BLIND SHORT-WAVE OPERATORS 195 TALK AROUND WORLD

More than a dozen blind operators are licensed to conduct experimental communications in the short-wave range in the United States. Radio is used by these amateurs in conversations with "hams" not only in this country, but the world over. Usually they have only improvised sets. William D. Terrell, of the department of commerce, obtained the census of sightless operators through co-operation of district radio supervisors.

Director of Radio.

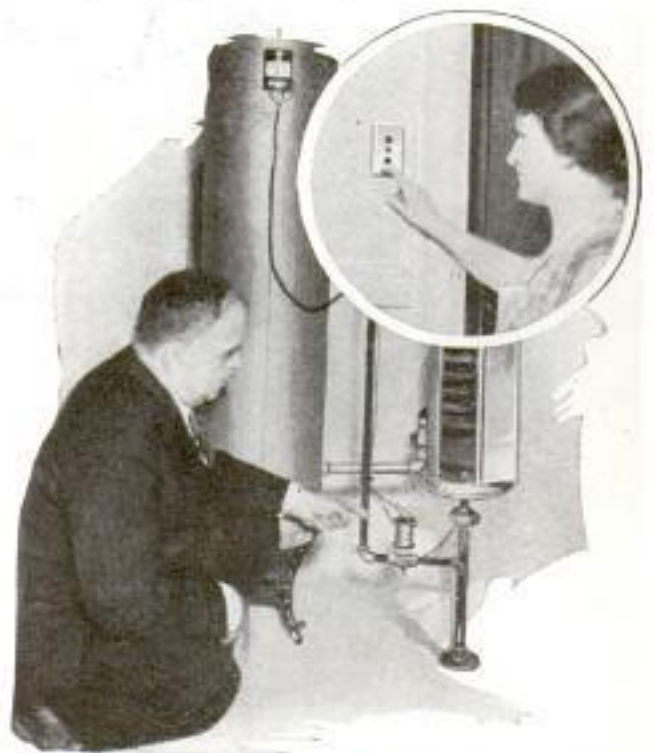
WHITEWASH AIDS EASY RIDING ON RAILWAY

Whitewash dropped on sections of a famous British railway aids maintenance crews in spotting bends and rough spots which otherwise might escape their notice. A whitewash car makes regular inspection tours over the line, and an electrical apparatus causes a quart of the fluid to splash on the track at every point where the car sways too far. Repair crews follow the car and fix the track at these points.

1906

PUSH BUTTON CONTROLS WATER HEATER

By means of electric push buttons in the kitchen or bathroom, the gas heater connected to the water tank in the basement of a home can now be controlled automatically. The attachment is electrically operated and easily installed. At the press of a button, the gas is turned on and, when the water reaches a predetermined temperature, it is shut off automatically, or this can be done at any time by pushing another button.

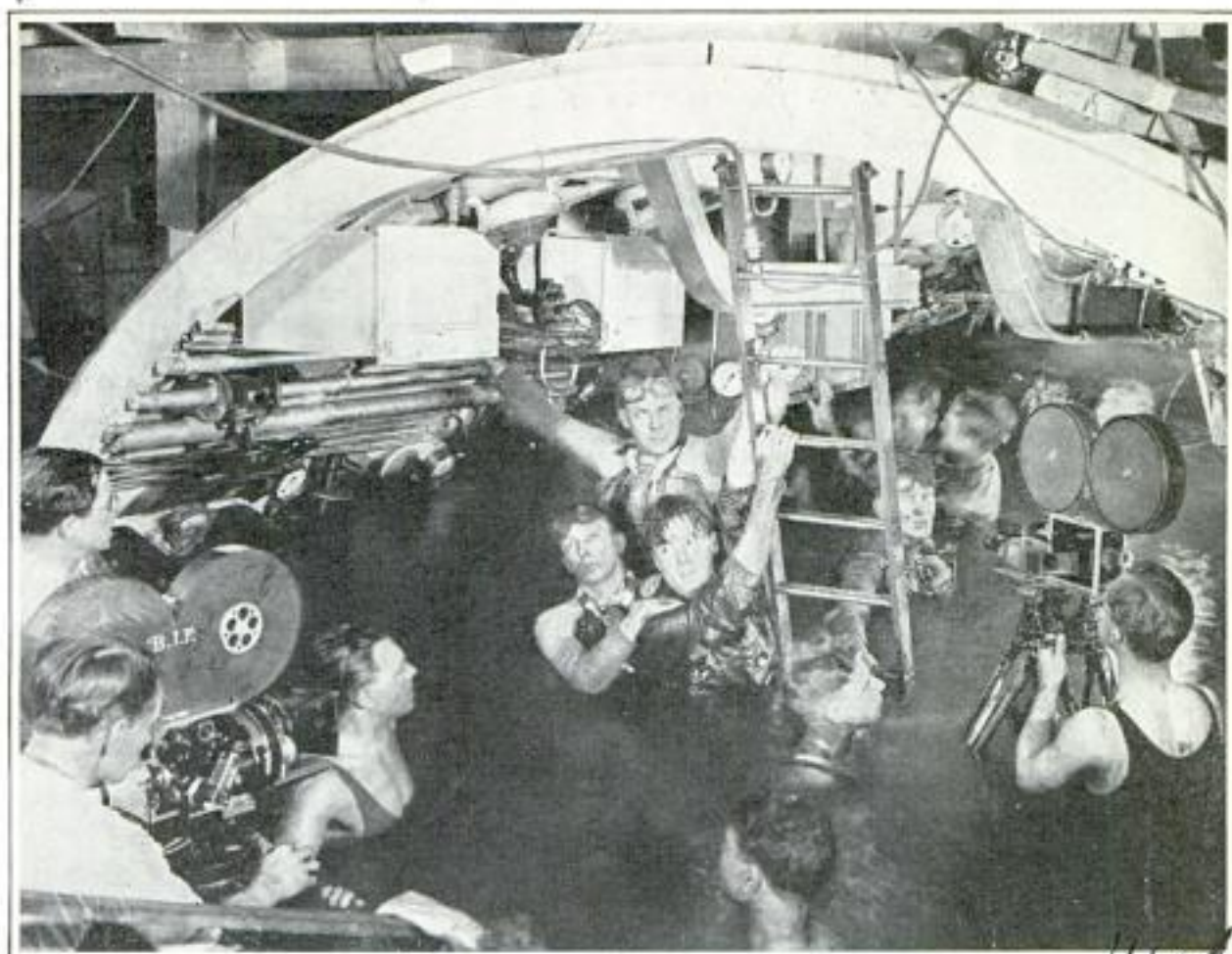


Gas Heater in the Basement That Is Controlled by a Push Button in Kitchen or Bathroom

Isas. Isard Co. Inc.
375 Main St.
Rochester, N.Y.

U.S. Daily 9/22/31

9/21/31



Everybody Got Wet during the Filming of This Submarine Movie in England Recently; Note the Cameras Standing in the Water and the Bathing Suits Worn by the Operators

Wed Work

at Ectree, Bedfordshire.

CAMERAS OPERATED IN WATER FOR SUBMARINE FILM

During the filming of a submarine picture in England recently, not only the actors but the cameras and operators as well were forced to take to the water to obtain some of the shots representing the interior of a flooded submarine. The cameras were set on tripods placed in the water and the photographers wore bathing suits while shooting the scene.

01827

AMERICAN CHEMISTS PREPARE TO GET OIL FROM COAL

Although American crude oil is now so low in price as to cause acute distress in several oil fields, the supply is not inexhaustible and chemists are looking to the day when we shall have to make gasoline and lubricating oil out of coal, as they are already doing in Germany and other European countries. At the meeting of the American Chemical society here a

series of experiments on soft coals from both eastern and western United States fields were described by Prof. H. K. Benson and his associates at the University of Washington. The process consists in subjecting coal to pressures from 2,200 to 4,200 pounds per square inch, at temperatures from 200 to 450 degrees centigrade in the presence of water vapor. The oily mixtures obtained by this procedure compared favorably with the product of European coal treated in the same way. We commonly think of even soft coal as pretty hard stuff. Yet coal is a jelly—a colloid, to use the strictly scientific term. Evidence to this effect was adduced by Dr. Reinhardt Thiessen, of the bureau of mines. Using a new ultra-power lens, he has seen the "micellæ," or ultimate visible particles that go to make up coal, and has found them similar in size and shape to the micellæ of plants, which, of course, were the raw material of coal ages ago. The colloid nature of coal has long been suspected, but not verified until now.

Prof. H. K. Benson, University of Washington, Seattle Wash.

*Science Service Wire
9/3/34*

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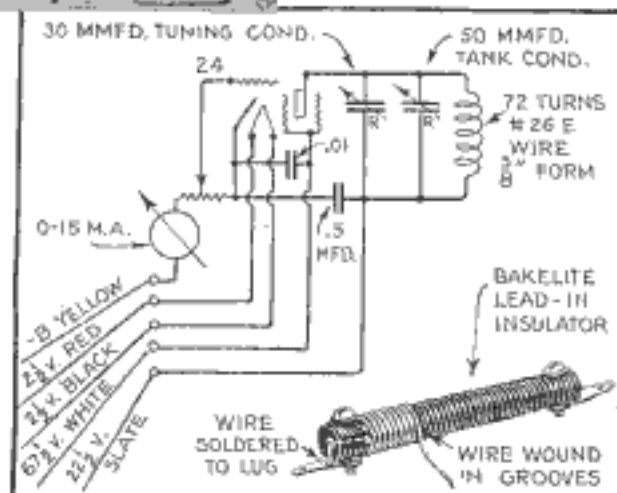
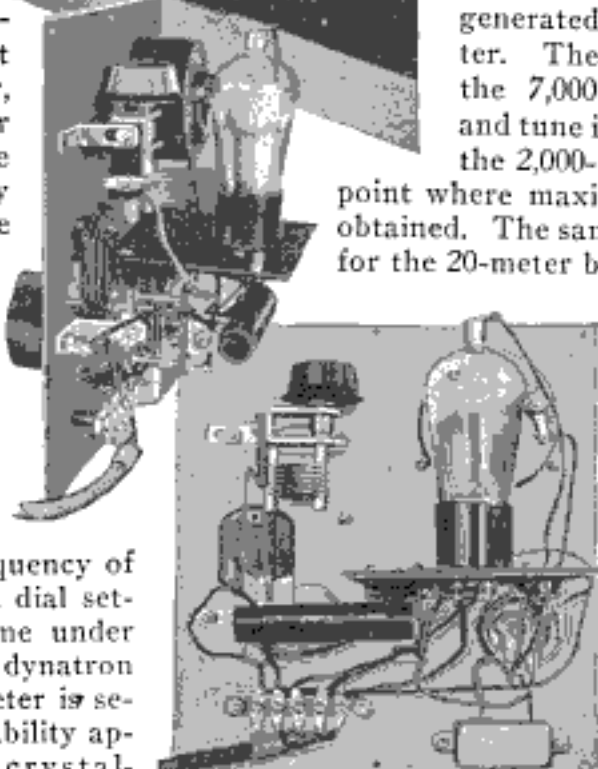
Meter Helps Amateurs Check S-W Bands

Calibrating the Dynatron Frequency Meter from Standard Frequency Transmissions That Are Broadcast Weekly by Reliable Authorized Stations



UNLIKE the monitor, which is just a miniature receiver, the frequency meter is an oscillator whose signal is picked up by the receiver in the same manner as the monitor signal is picked up when adjusting the transmitter to a certain point in the band. The oscillator used in a frequency meter must be quite stable in order that the frequency of oscillation at a given dial setting may be the same under all conditions. This dynatron type of frequency meter is selected because its stability approaches that of a crystal-controlled oscillator when correctly built. The single coil is permanently installed to cover the 80-meter band, as the dynatron is very rich in harmonics and the 20 and 40-meter bands operate on the harmonics of the tuned circuit. The oscillator circuit of the dynatron frequency meter will not change in calibration except by loss of voltage in the batteries and aging of the tube. To check and correct this shift is a simple matter, as the milliammeter is connected to show the current taken by the tube, and this value is easily maintained when the fre-

quency meter is calibrated and while it is in use. Calibration is obtained by listening in on the weekly standard frequency transmissions. A 2½-volt filament transformer is used or with slight changes a 222 or 232 dry-cell tube may be substituted. A power supply separate from the receiver's is advised. The coil may be wound on a grooved bakelite insulator, as shown, but any good form of the same diameter can be used. To prepare the frequency meter for transmission calibration, first set the short-wave receiver on the 3,500-kc. band and tune in the signal generated by the frequency meter. Then tune the receiver to the 7,000-kc. or 40-meter band and tune in the harmonic. Adjust the 2,000-ohm potentiometer to a point where maximum signal strength is obtained. The same procedure is followed for the 20-meter band. The idea is to find a point on the potentiometer where it operates best on all bands. The standard frequency signals may then be tuned in and the meter signal beat against the receiver until zero beat occurs. Then it is at the exact frequency of the standard signal transmitter.



Transmitting-Tube Operation

When placing a transmitter in operation after periods of idleness, some tubes may be found inoperative. This does not necessarily mean that the tubes are defective, the condition often being caused by gas given off by the metals in the tubes during the idleness. If the tubes have not been in use for some time, a half-hour period of filament heating is advised. In addition, reduced plate voltage should be applied when the station is placed in operation and gradually increased to normal.

Loud Speaker from Headphones

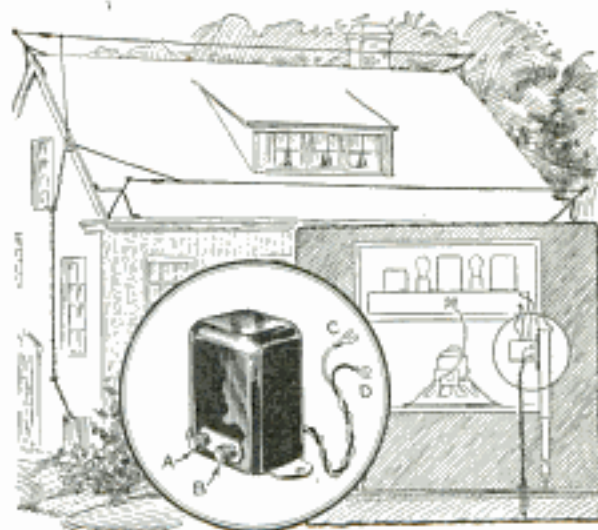
An experimental loud speaker for small sets may be made at a cost of about 50 cents or less. The sound chamber is made of sheet metal in the form of a cylinder, the dimensions of which are indicated. A hole is cut in the center to take the end of a large tin funnel, with the end cut off



so as to leave about 1/2 in. of the spout, which is slit back to form four tabs. These are peened over on the underside of the metal sheet and soldered. The cylinder is then formed over a wooden dowel, of the proper diameter, and the edges are brought together and either soldered or riveted to make a sound-tight compartment. Felt washers are placed over the ends of the cylinder and the headphones may then be clamped in position.—W. A. Paltridge, Hollywood, Calif.

Several Receivers on Single Antenna

When there are two or more receivers in the same dwelling this antenna-coupling unit, recently introduced, saves much trouble and expense by enabling multiple reception from one antenna. Connected into any single radio receiver, the coupler is claimed to eliminate interference and permits long lead-ins without loss of sig-

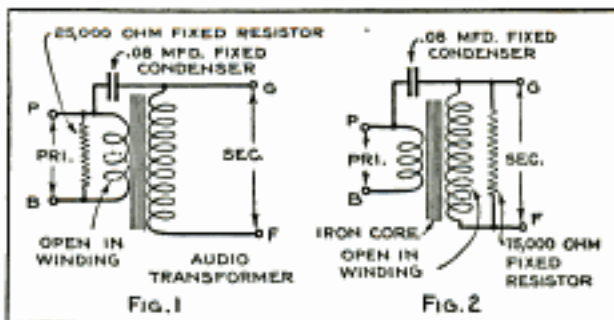


Antenna Installation with Long Lead-In through Basement; Insert, Coupler and Method of Mounting

nal strength, sensitivity or selectivity. A unit is installed in the speaker compartment of each set, as shown in the sketch at lower right. Where two or more sets are used, an additional, or master, coupler is used in the lead-in wire or wires, one being required for every ten receivers.

Audio Transformers Quickly Repaired

When the receiver goes dead and a continuity check, made with a lamp or meter in series with a battery, shows an open primary or secondary winding, the first thought is a new transformer. Suitable replacement transformers are not always available, but a satisfactory repair may be made quickly with the fixed resistors and condensers inserted in the circuit as shown. In Fig. 1 the open primary is shunted with a 25,000-ohm resistor. The same idea applies to the open secondary in Fig. 2, but the resistor value should be 75,000 ohms.

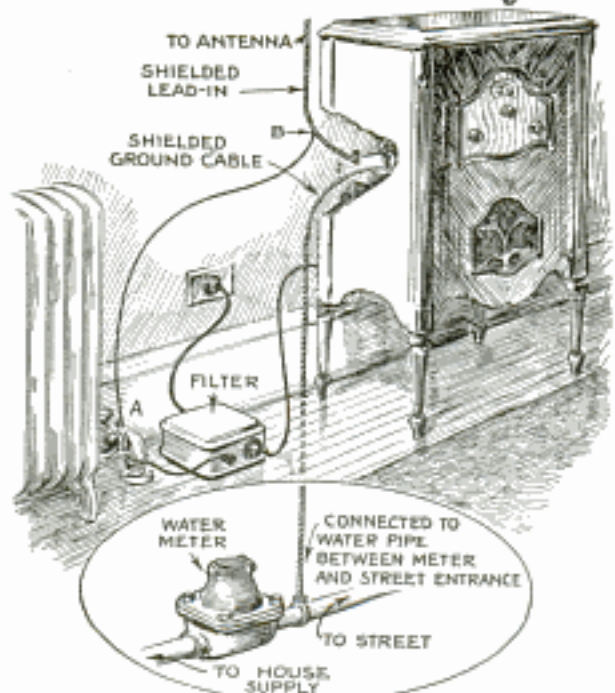


Temporary Repairs for Open Windings in Audio Transformers

Brass plates from old condensers can be cut up to make other radio parts.

Chicago 35 & Wacker

General Motor Radio Corp. Dayton, Ohio



Completely Shielded Installation, Showing Connections to the Filter

Filter Stops Power-Line Interference

A well designed filter at the power input to the receiver will remove interference carried on the power line. It also prevents coupling to ground. In many cases where bad local interference is encountered, it is also a good idea to use a shielded lead-in wire. The metal sheath is grounded to a radiator at A and B, as is also the filter, but in no case should the filter and receiver be grounded at the same point. For the receiver ground to the water pipe a shielded lead also is used.

Adjusting Screen-Grid Receivers

Some screen-grid sets have noticeably poorer tone when the volume control is near the minimum position, but, unless the volume is cut down, powerful locals are too loud for comfort. In such cases, lifting the cap from the top of the first tube lessens the coupling between the antenna circuit and the next r.f. stage. The volume control may then be turned up to normal position with much better tone quality. This may be done without tools and does not injure the set. For distant stations the cap is replaced.

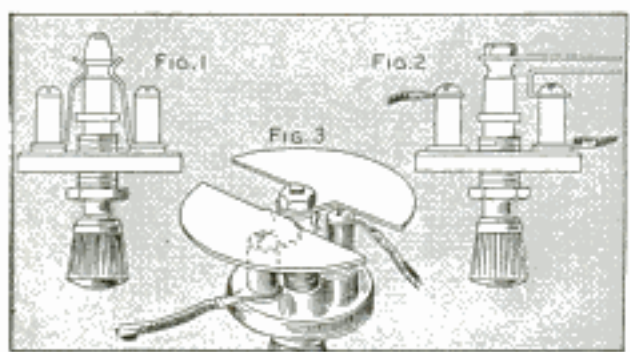
For further information on any radio construction article write to the radio department; this service is free.

Neat Service Pays

When preparing to service small apparatus, it is a good plan to spread a large sheet of clean white paper on the workbench. The instrument to be repaired is placed in the center of the paper so that the small parts may be arranged in an orderly manner on it as they are removed. If there are many such parts, a cardboard box to hold them will also be found handy. More time than the actual work takes, otherwise may have to be spent looking for parts.

Trimmer Condensers Can Be Made from Battery Switches

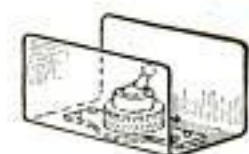
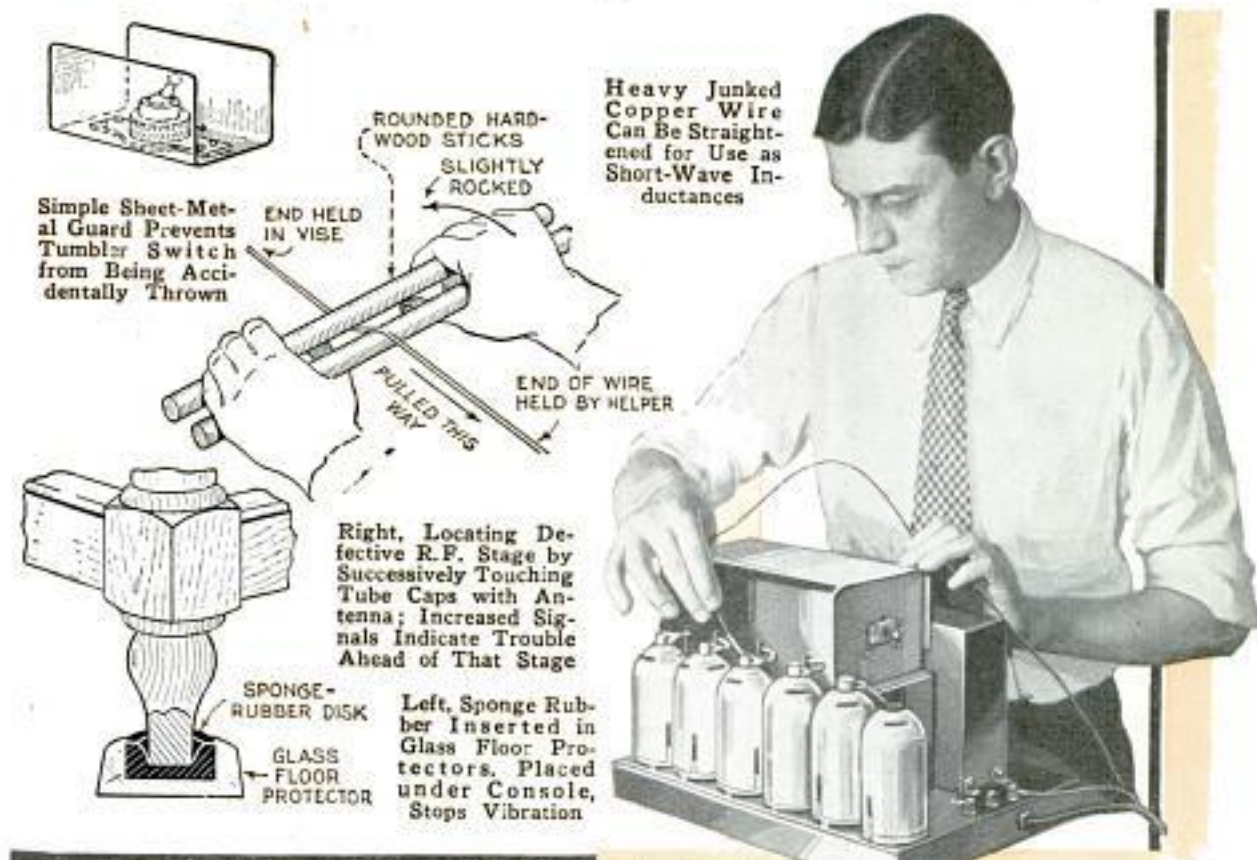
Old battery switches of the push-pull type, Fig. 1, may be easily altered to make serviceable trimmers or midget condensers. The insulating button at the tip of the plug is removed, and the end of the shaft is drilled and threaded to take a 6-32 machine screw and nut, as shown in Fig. 2. The condenser plates may be cut from old parts or from thin brass or aluminum sheet. The movable plate is clamped tightly under the end nut. It may be necessary to rearrange the insulating washers under the side posts, and the spring under the post that holds the stationary plate should be removed. This post should be completely insulated from the base and a soldering lug is used as shown. To avoid hand capacity, the rotor shaft should be grounded in the usual manner. The spring bearing against this



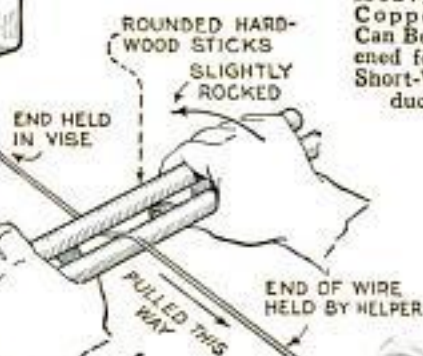
Details for Altering Battery Switch to Serve as a Trimmer Condenser

shaft provides the rotor connection to the post at the left. The top view, Fig. 3, shows the shape of the plates and the method of mounting the stationary plate. —Parker Snapp, Eugene, Oreg.

Easy Ways of Solving Your Radio Problems



Simple Sheet-Metal Guard Prevents Tumbler Switch from Being Accidentally Thrown



Heavy Junked Copper Wire Can Be Straightened for Use as Short-Wave Inductances



SPONGE-RUBBER DISK
GLASS FLOOR PROTECTOR

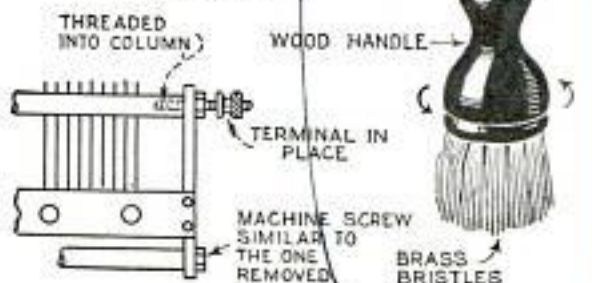
Right, Locating Defective R.F. Stage by Successively Touching Tube Caps with Antenna; Increased Signals Indicate Trouble Ahead of That Stage

Left, Sponge Rubber Inserted in Glass Floor Protectors. Placed under Console, Stops Vibration



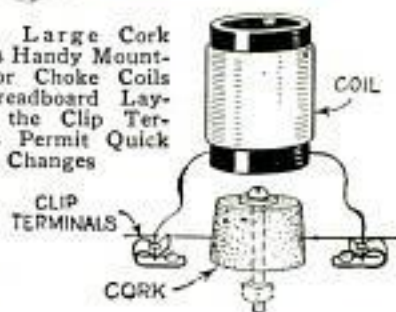
Filters for Removing Radio Noises Caused by Various Types of Electrically Operated Apparatus, Are Now Available and May Be Easily Installed

Right, Ten-Cent Wire Brush, Mounted for Hand Drill, to Put Burled Finish on Metal Panels; Below, Auxiliary Binding Post on Variable Condensers Handy for Quick Connections



CHUCK
THREADED BOLT
WOOD HANDLE
BRASS BRISTLES

Right, Large Cork Makes Handy Mounting for Choke Coils on Breadboard Layouts; the Clip Terminals Permit Quick Changes



CLIP TERMINALS

CORK

Metal Pan or Disk Connected to Antenna Post May Be Covered with Scarf to Make Indoor Antenna; Set Volume Reduced When Phone Is Removed for Use



Typed Labels, Glued to Panel, Indicate Tester Connections

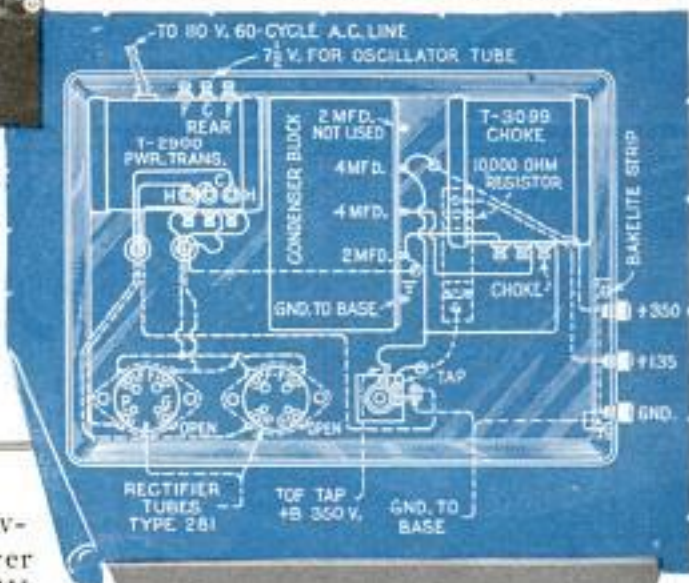
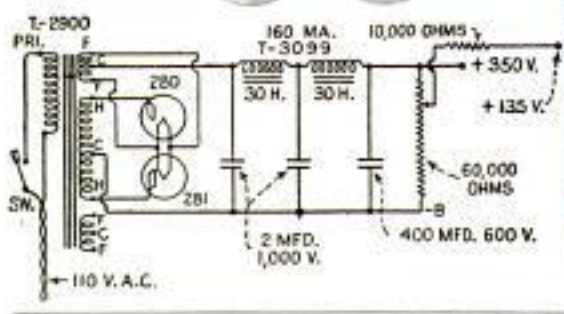
Jobe Leutschmann Co.
Canton, Mass

Power Supply for Crystal-Controlled Oscillator



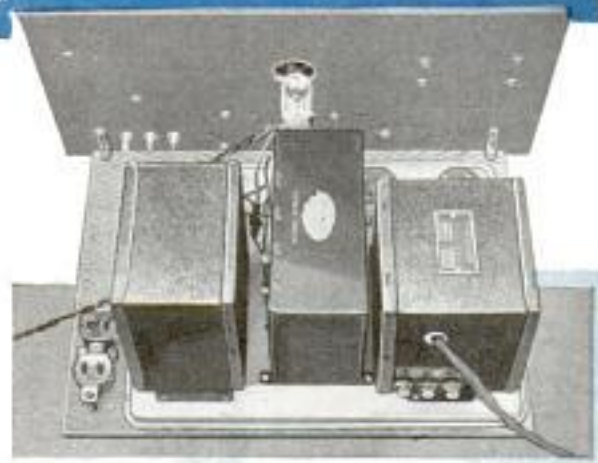
tube. The voltage divider should be a 100-watt tapped type. The additional 10,000-ohm unit, in series with the 135-volt lead, may be omitted if desired. A B-eliminator voltmeter should be used to check the output voltages carefully while under load, to be sure they are the specified values.

The assembly is quite simple: The unit is screwed to the baseboard as shown: the front panel is $\frac{1}{4}$ by 9 by $17\frac{3}{8}$ in. and carries the filament and plate-supply switches, microphone input jacks, pilot



A SEPARATE and well filtered power supply is installed on the lower shelf of the 50-watt phone and CW-transmitter, for the crystal-controlled oscillator described in the September, 1931, issue. This power unit is assembled on an aluminum baking pan, the bottom of which measures $8\frac{1}{2}$ by 12 in. Three binding posts are mounted on a bakelite strip screwed inside the base at one end.

The power transformer supplies 350 volts for the plate of the oscillator tube and 135 volts for the plate of the type-227 tube in the speech amplifier located in the top panel. It also furnishes the necessary filament voltage for the rectifier tubes, and an additional 7.5-volt filament winding is available for the oscillator



light and also the optional keying relays.

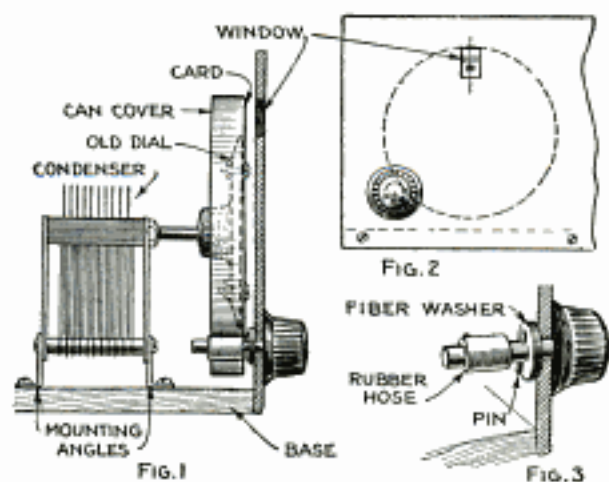
(To Be Continued)

A.C. Tubes on D.C. Supply

It has been found that the a.c. radio tubes are very satisfactory for use in automobile receivers owing to their rugged construction. The 227 and 224-tubes are provided with filaments that draw 1.75 amp. at 2.5 volts. This is the average for a.c. supply, but, when d.c. is used, a resistor of suitable value, in series with the heater, should be provided, so that the current drawn will be slightly less than 1.75 amp. As these tubes have 2.5-volt heaters, two of them may be connected in series so they will total 5 volts from the 6-volt car battery. In this case only a small resistance drop will be required to give the proper operating condition.

Vernier Dial from Can Cover

A cover from a tin coffee can, an old flat-type dial and a few odds and ends from the junk box will make a serviceable vernier dial, as shown in Fig. 1. The tuning control is mounted in a single 1/4-in. hole drilled in the panel. A hole for the condenser shaft is drilled through the knob of the dial so that the latter may be held to the shaft by the usual setscrew. The can cover is then fastened to the dial with two short machine screws as indicated. A circular card is fastened to the can cover at front where it may be seen through a hole cut in the panel. The usual dial markings are filled in or the various station call letters printed on the card. The window may be fitted with a celluloid cover and illuminated from the



back if preferred. The front panel arrangement is shown in Fig. 2 and the driveshaft for the control knob in Fig. 3.

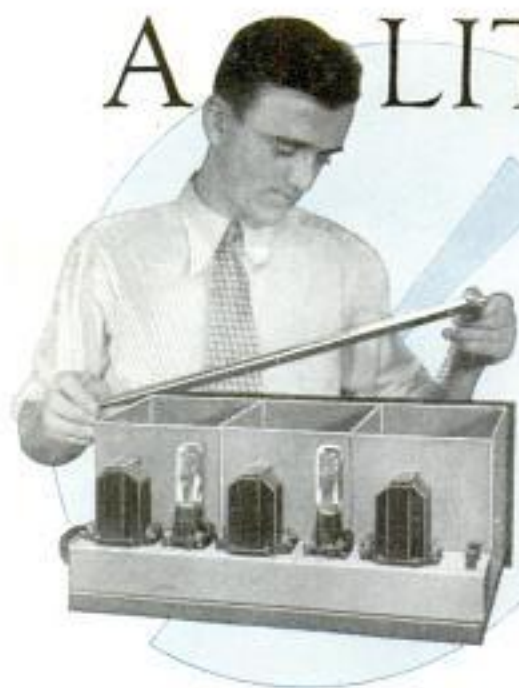


Antenna Installation with Shielded Lead-In for Eliminating Interference

Shielded Lead-In Reduces Interference

There are many ways in which the radio owner can help himself in overcoming interference or "man-made static." This is caused by interruption in the flow of electric current and also by the discharge of voltage accumulation on conductors. Whenever such conditions exist, a discharge occurs, and the resulting high-frequency voltage causes a current to flow along the conductors in which the effect takes place. This interference may be carried directly to receivers or radiated from the conductor and enter the receiver through the antenna or ground connection. A simple method of overcoming much of this interference is to provide a special lead-in wire consisting of a stranded No. 14 conductor, rubber insulated and having a metal braid outside the insulation. When this is used, a high antenna, about three times the length of the lead-in, should be erected and the lead-in carried in one piece from the antenna to the receiver, as shown. The metal sheath should be stripped 2 in. from each end and the sheath connected to a ground. Whenever possible, this ground should be independent of that used for the power and telephone wiring. All grounds should be made to clean metal.

A LITTLE GIANT

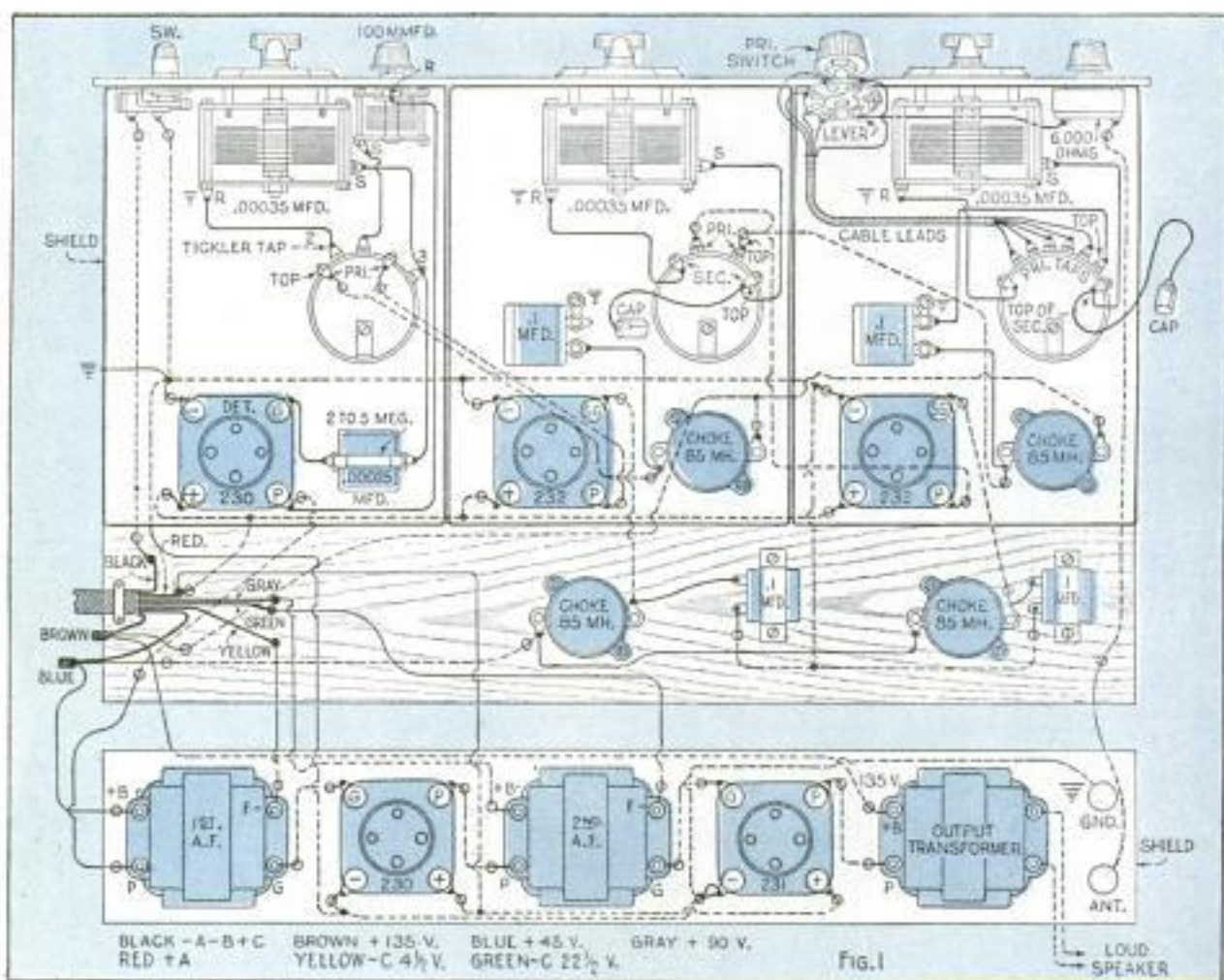


FOUR No. 6 dry cells connected in series-parallel will operate this receiver for about 700 hours. Additional features are low cost, DX-sensitivity, good selectivity and excellent tone quality. These, combined with simplicity and the possi-

bility of using many old parts, make the Little Giant receiver especially attractive to the experimenter. B-batteries or a B-eliminator may be used as desired. The circuit is flexible and subject to a number of variations that make it ideal for the farm home and camp or wherever power lines are not available.

To duplicate the fine results that have been obtained with this hookup, the coils should be wound on bakelite tubing, $4\frac{1}{2}$ in. long and 2 in. in diameter. However, there is no reason why these results could not be obtained with regular commercial coils, provided they are of the screen-grid type and match the condensers employed. The tapped-type antenna coil is optional, but will be found quite useful in congested districts where a greater degree of selectivity is required.

The volume-control unit is connected in the antenna circuit and will enable the



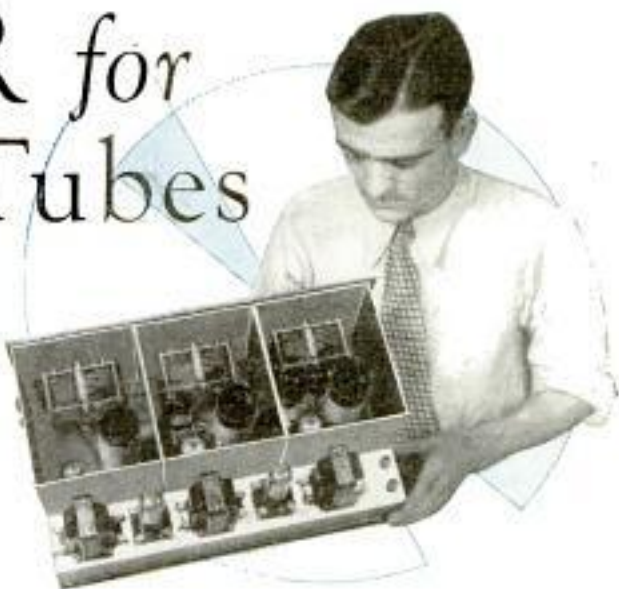
RECEIVER *for* Two-Volt Tubes

By HENRY S. LARABY

operator to reduce the volume on strong locals to prevent the blanketing effect of such stations from interfering with DX-reception. Shielding is optional, but when properly done improves this as well as any receiver. If the builder does not care to make up the shields as shown, aluminum box shields of similar size may be purchased. If so, it may be necessary to rearrange the layout within the shields. If the receiver is to be used at some distance from powerful broadcasting stations, all shielding may be omitted. If no shielding is employed, it will be necessary to have a 24-in. baseboard instead of 17 $\frac{1}{4}$ -in., so that the coils may be mounted farther apart and at right angles to each other, to lessen the risk of coupling. In both cases, the coils are mounted above the baseboard by means of 1-in. angle brackets.

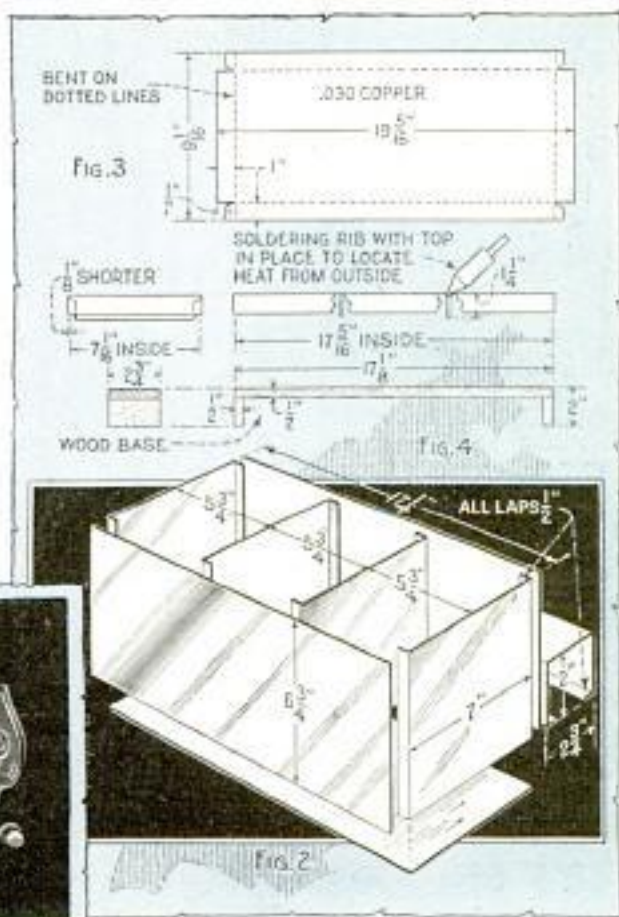
The simplified wiring diagram, Fig. 1, shows the completely shielded layout with the audio stages, mounted on the rear shield, removed to reveal the wiring and parts assembly below. This rear shield and platform, Fig. 4, was used to make a more compact assembly rather than for any shielding effect obtained. If the platform is not used, it will be necessary to add 2 $\frac{3}{4}$ in. to the depth of the baseboard. The bakelite front panel is $\frac{1}{8}$ by 8 by 18 in.

The baseboard is made from $\frac{1}{2}$ -in. stock, and narrow strips of the same material are used at the rear and sides to elevate the base slightly in order that as



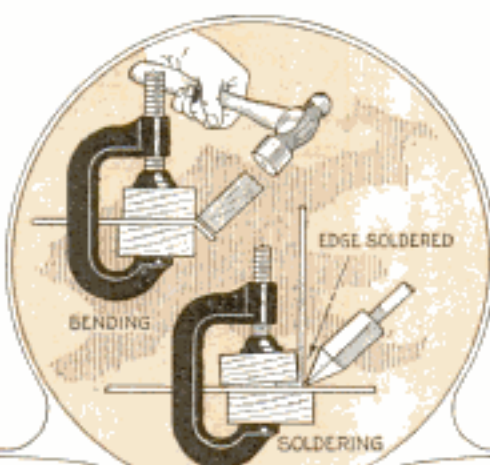
much of the wiring as possible may be run below.

It will be noted that all shielding and the rotors of the .00035-mfd. variable condensers are common with A-negative and ground. The rotors of these condensers, and other points indicated, must be grounded whether shielding is used or not. The 100-mmf. midget-type condenser for controlling regeneration must be in-

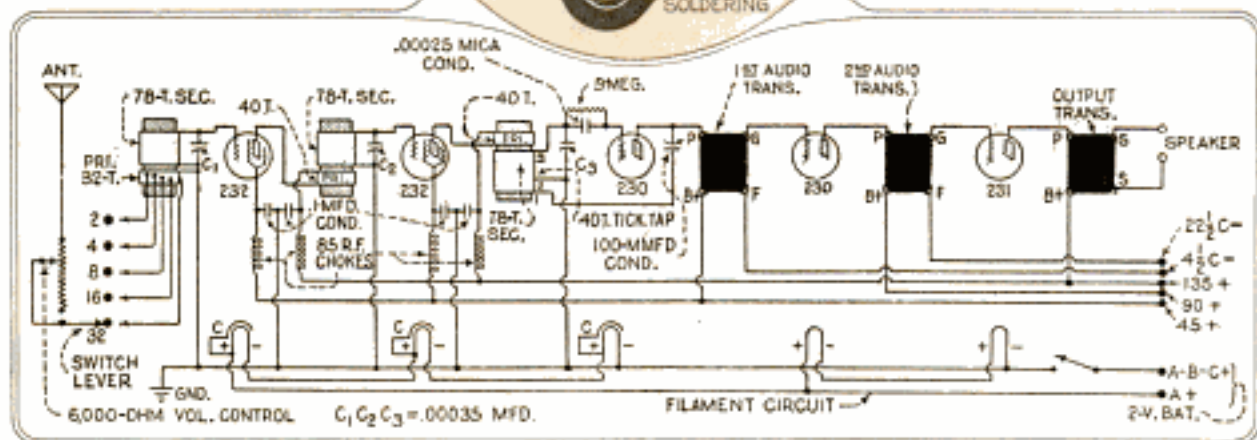


sulated from the metal shielding by means of suitable washers or by making a cut-out in the shield at the rear of the front panel. The primary inductance switch and the A-battery switch must also be insulated from the shielding in the same manner.

The shielding details



nections. This cable is clamped to the base-board at left rear, as shown in Fig. 1, the circuit connections being made to these leads where they are soldered and carefully taped. Enlarged blueprints and list of parts, which are all standard, are available.



given in Figs. 2 and 3 are quite simple, but the construction may be varied to suit the builder, provided the over-all dimensions are held to the specifications given. For example, the top and bottom covers may be made identical. The laps on the covers may be $\frac{1}{2}$ in. instead of 1 in., as shown in Fig. 3, with square cut-outs at the corners for simple butted and soldered joints instead of the more complicated corners, although the method shown is stronger. If a flat-bottom piece is used, as shown in Fig. 2, the endpieces are lapped over at the bottom edge and are screwed to the baseplate and board. This type of construction is handy, as much of the assembly and wiring may be done directly on the baseplate of the shield before the sides are assembled. This method of assembly should also be followed for the front shield and panel, as it will be difficult to assemble and wire the instruments on the front panel after the shielding partitions are soldered in place. A simple way of bending the shields and soldering the joints is shown on this page, the C-clamps being inexpensive and very handy for the experimenter.

Five feet of seven-strand color-coded cable is used for the various battery con-

nections. The tubes are all of the 2-volt type and draw very little current. When the dry cells are used as an A-battery, it is necessary to connect a 25 or 30-ohm rheostat in series with the negative lead to the set, to reduce the output to 2 volts. The negative-B and positive-C connections are made to negative-A directly at the batteries. The antenna is connected to the insulated binding post mounted on the metal shield covering the shelf at the rear. The ground post is mounted directly on the shield. Any good magnetic speaker will give excellent results.

To tune the receiver, turn on the filament switch and place the volume control in the full-on position. Rotate all three dials in step until a station is tuned in. Adjust the primary-inductance switch and regeneration-control condenser to the point where the station comes in with the desired volume and clarity. It will be found that, by leaving the volume control full on for DX-reception, the set may be controlled to advantage by means of the regeneration control alone.

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; material lists free.



AMATEUR MECHANICS

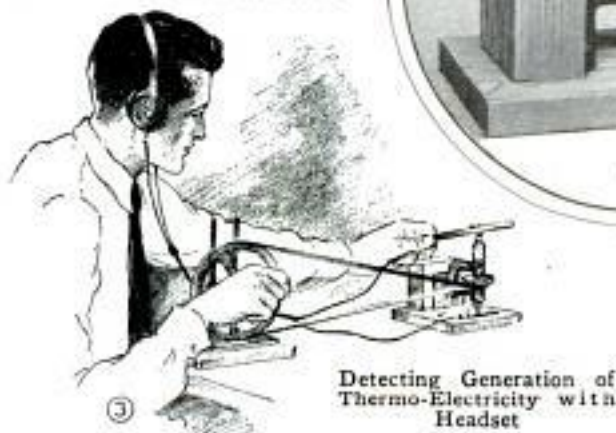
Centrifugal Toys that Amuse

By Raymond B. Wailes

BY USING the driving head or headstock from a home-workshop lathe, which can be had at almost any 25-cent to \$1 store, interesting experiments can be conducted to demonstrate the basic principles of physics involved in many industrial machines and other devices.

Among the simplest of experiments by using such a headstock, and also a handwheel or small motor for driving it, is the one shown in Fig. 1, illustrating how friction generates heat. Take a small brass tube

enough heat will be produced to cause the liquid to boil, and generate sufficient



Detecting Generation of Thermo-Electricity with Headset

with one end soldered shut and hold it in a chuck on the headstock, which should be mounted on a wooden frame as indicated in Fig. 2, so that the tube will be held vertically. Fill the tube with water or alcohol, and cork the top. Clamp both the headstock base and the handwheel to the table, connecting the two by a suitable belt. By holding a band of emery cloth, canvas, or even two strips of wood, tightly against the tube while rotating it,



②



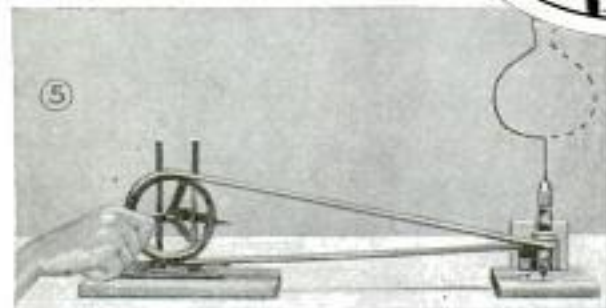
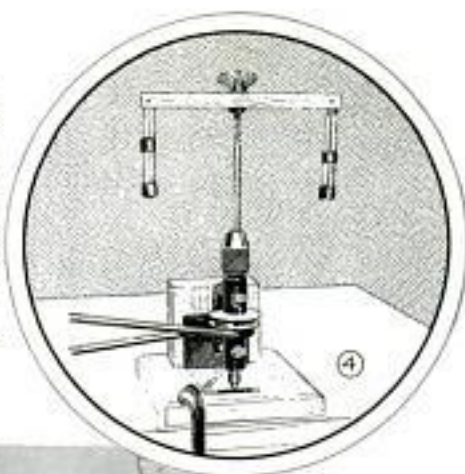
①

steam to cause the cork to blow out with a loud "plop."

Friction produces heat and heat produces electricity, which is then called "thermo-electricity." To demonstrate this transformation of energy, hold a machine screw tightly in the chuck, a wingnut and a locknut being

driven up against the head so that the nut will not rotate. A spring clip is then screwed to the base directly under the center of the headstock, so that the two are in contact. Now connect one cord of a radio headset to the clip and the other to a copper strip, which is held against the wingnut while it is rotated rapidly, as shown in Fig. 3. The copper strip is struck every half revolution of the shaft by the wingnut, causing it to become hot and generate a pulsating direct current evidenced by a clicking sound in the headset.

Figure 4 shows a simple centrifuge, the principle of which is employed in cream separators. Get a strip of wood, about 10 in. long, and drill a hole through it at



the center so that it can be attached to a long bolt or screw held in the chuck. At the ends of the strip, two small cages holding test tubes are pivoted, spacing them equally from the center. The cages should be of equal weight, to obtain a perfect balance, and they must be free to swing outward. Muddy water in the tubes will become clear after turning the device several minutes. Centrifugal force acts on particles of greater weight more readily than on lighter ones, and therefore the dirt particles are thrown to the bottom.

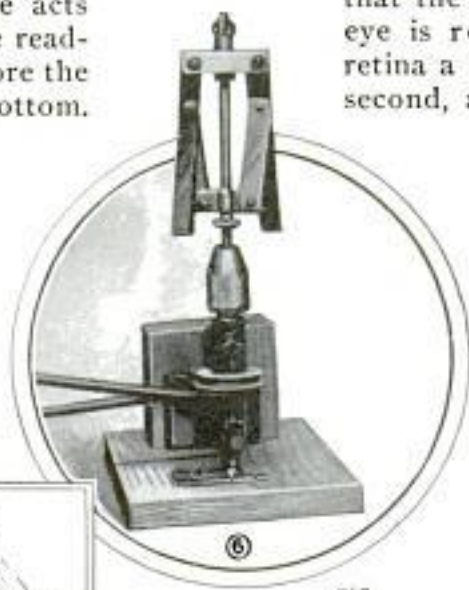
The principle of the steam governor may be illustrated by using the device shown in Figs. 6 and 7. This device is somewhat like the centrifuge, but in addition to the two swinging members, which are pivoted to the ends of a short horizontal bar, a sleeve is slipped over the rod that holds the bar, and two links connect the sleeve to the hinged arms, all joints being pivoted. In operation the sleeve creeps up as the arms rise toward a horizontal position. In the real governor, the sleeve is connected to a lever that controls some part of a machine, and in a steam engine, it regu-

lates the supply of steam delivered to the steam chest by opening or closing a valve. As the speed of the engine increases, the arms swing outward, raising the sleeve and partly closing the steam-inlet valve. When the engine speed slackens, the opposite action takes place. Other experiments with centrifugal force will readily suggest

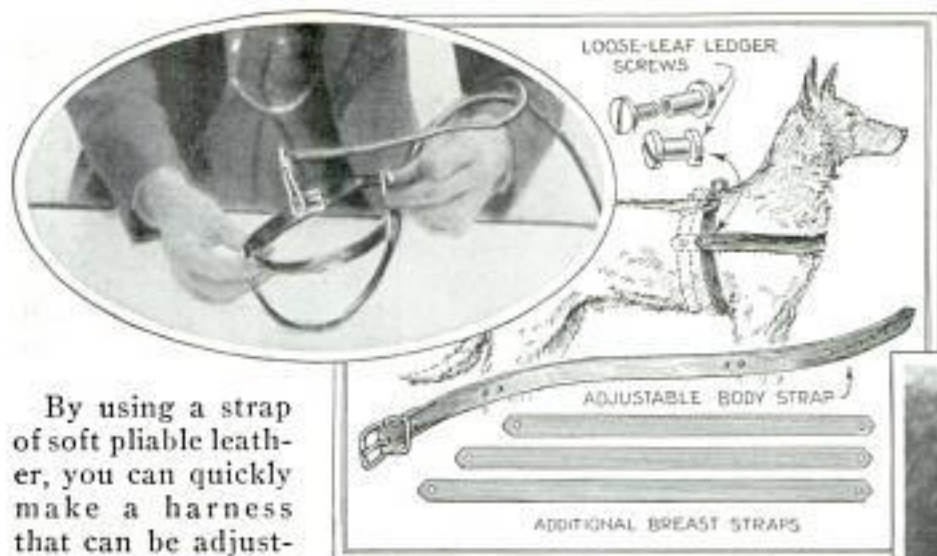
themselves. Colored disks of various sizes and shapes can be made to blend into each other when fitted to the rotating shaft. Spheres made from flexible flat strips will flatten at their poles when rotated, explaining the depression of the earth's poles by its rotation. Cardboard disks toothed along the periphery can be made to produce musical notes when a stiff card is held against the teeth.

Persistency of vision can be quickly demonstrated by bending a piece of stiff wire to form one-half of a vase, as in Fig. 5, allowing one end of the wire to project at the bottom for attachment in the chuck. Turning the wire gives the illusion of an entire vase, due to the fact that the image seen by the eye is retained upon the retina a slight fraction of a second, a principle which

has its most common and popular application in the presentation of moving pictures.



Adjustable Harness Fits the Growing Puppy



Made from Soft Leather Straps, This Puppy Harness Has a Wide Range of Adjustment

By using a strap of soft pliable leather, you can quickly make a harness that can be adjusted to fit a growing puppy over a period of several months. Starting at the buckle end of the strap, measure off the distance around the pup's body, just behind the forelegs, and punch several holes at $\frac{1}{2}$ -in. intervals for adjustment of the buckle. This piece is used for the body strap, and the nameplate or license tag may be riveted to it if desired. The breastpiece is then made from the remaining portion of the strap and fastened to the body strap by means of loose-leaf ledger posts, inserted through holes in the two straps as indicated, punching an extra hole in one side of the body strap to allow for vertical adjustment of the breastpiece. It is necessary that the ends of the latter be fastened at

points high enough on each side of the body strap so it will fit over and be supported by the animal's shoulders. To

provide an adjustment for the breast strap, let the ends extend beyond and to the rear of the body strap, and punch two or three holes at $\frac{1}{4}$ -in. intervals in each end, or a separate strap can be made for each adjustment. When the harness is properly assembled, the buckle will be at the top and will serve as a leash ring.



Power for Small Paper Glider

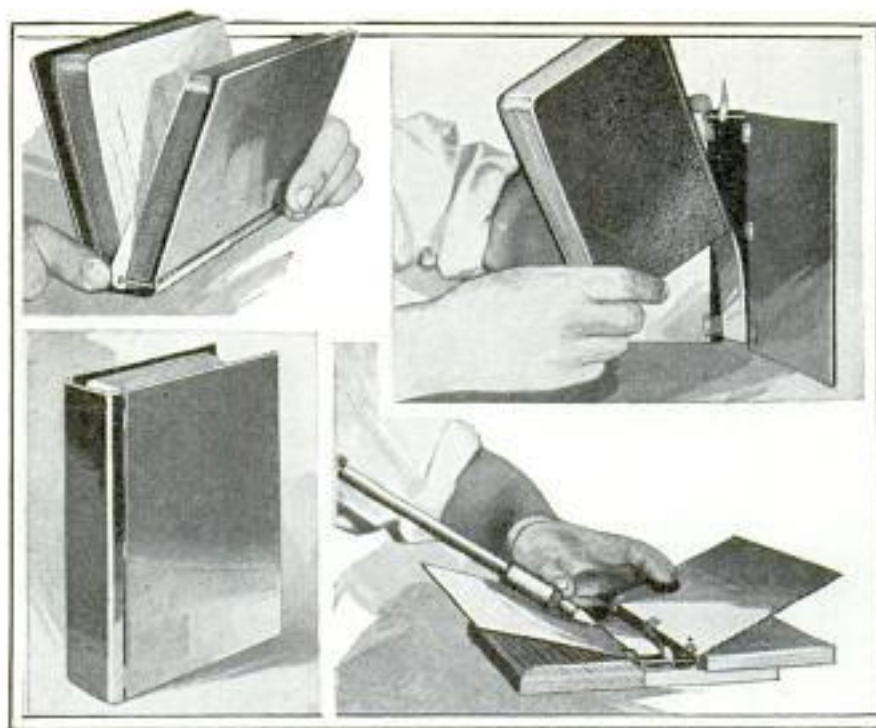
The boy who likes to make paper gliders can transform them into small planes by adding a rubber-band motor and a propeller. A paper clip is straightened out and an eye bent at one end and a hook at the other. A pin serves as an axle for the propeller. It is inserted through the eye in



the clip and the end bent to form a hook. The clip is then slipped over the glider as indicated, and a rubber band fastened to the bent end of the pin and over the hook on the end of the clip. A small bead between the propeller and the eye of the clip greatly reduces friction.—J. V. Hazard, Washington, D. C.

Pushing Curtain Rod through Hem

Gummed-paper tape placed over the ends of curtain rods helps slipping them through the hems of the curtain, and prevents tearing the fabric. A thimble slipped over the end of the round metal rod will serve the same purpose.



Your Favorite Books Will Be Protected with These Metal Covers Which Have a Mirrorlike Finish and Can Be Etched or Engraved

Metal Covers for Your Books

You can easily provide your favorite books with beautiful covers made from nickel-zinc. The sides of the cover are cut $\frac{1}{4}$ in. larger than the book and attached to the back with small hinges. A strip of stiff spring steel is soldered at one end inside of the back to hold the book as shown, while a length of shim brass, fastened to a nail soldered across one end of the back, provides a book mark as shown in the upper left-hand detail. If desired, designs or the title of the book can be etched or engraved on the covers.

Height of Electrolyte in Batteries Tested by Glass Tube

Guesswork can be eliminated, and perhaps a battery saved, if you use a glass tube for testing the height of the electrolyte in storage batteries.



Insert the tube into the battery until it touches the plates. Then place your finger over the top of the tube to make it air-tight, and withdraw it, holding it above

the filler opening. The exact height of the electrolyte above the plates will be shown by the amount in the glass.

—A. H. Waychoff, Phoenix, Ariz.

How to Make Pipe Coverings

Water pipes in an unheated cellar or garage can be kept from freezing by the application of homemade insulation consisting of tar-paper wrapping around the pipe, a layer of felt over the paper, and a cover of canvas. The entire assembly is fastened together with paste or wire ties, after

which it can be given a coat of waterproof paint. Another method is to wrap the pipe with layers of old cloth, then newspapers and lastly with burlap. This cover should be 4 to 5 in. thick.

Ash Catcher Fits Cigaret Holder

Bent to conform to the shape of a cigarette and fastened to a holder, a piece of thin sheet aluminum will provide a catcher to prevent ashes from falling on rugs and furniture. Two small projections are left on one end of the aluminum, with which it is clamped to the holder as shown.—Anthony E. Zipprich, New York City.

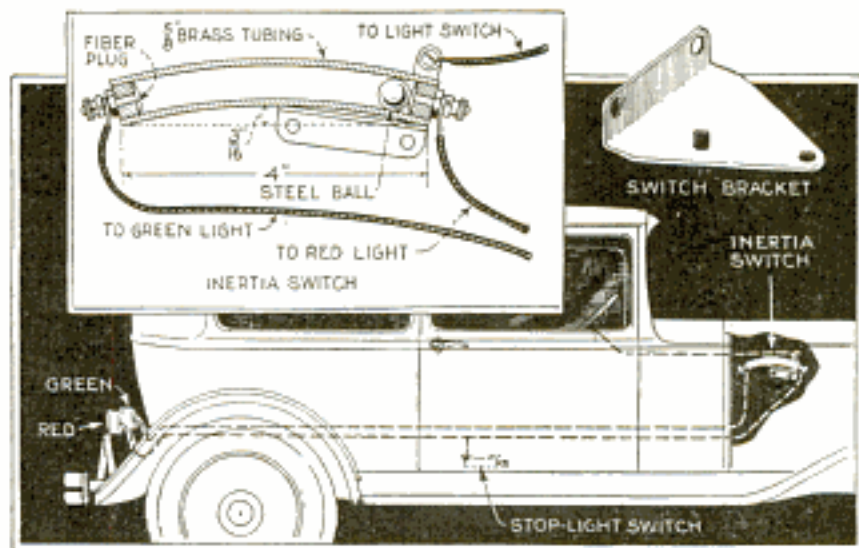


Waste Locates Cause of Puncture

When it seems almost impossible to find the object that caused a tire puncture, try this method: Take a handful of waste and brush it back and forth inside of the casing. If there is anything sticking through on the inside, some of the threads in the waste will be caught on it.—Grant H. Ogden, Denver, Colo.

Stop and Go Lights for Auto Are Automatic

Wide variation in the visibility of tail lights makes it difficult for a driver to judge the exact distance to a car ahead of him, which increases the hazard of night driving. A one-color stop light does not indicate whether a car is standing still or moving, and for this reason a two-color stop-light combination, which works automatically by means of an inertia switch, offers additional safety, the green light indicating movement and the red one that the car is at a standstill. The inertia switch consists of a length of brass tubing slightly bowed. Fiber plugs are fitted to the ends, and a steel ball is held inside, which makes contact with the wall of the tube and with machine screws projecting through the fiber plugs. A bracket is provided for holding the switch under the hood, in the position indicated, and wires are run from the screws on the switch to the lights, the front screw being connected with the stop light and the rear one to the green light, on a single-wire system. The bracket must be mounted on a piece



Curved Brass Tube, with Steel Ball and Contacts at the Ends, Forms Automatic Switch to Operate Stop-and-Go Lights on Auto

of fiber or bakelite so that it will not be grounded, and it is connected to the light switch, to obtain current. The stop-light switch, operated by the foot brake, is connected as indicated, instead of running a separate and parallel lead to the light. In operation, the momentum of a moving car throws the ball against the rear contact, causing the green light to function. When brakes are applied, the ball is thrown forward against the front contact, lighting the stop light. When the light switch is turned off, the lights will not function; only the stop light, when the brake pedal is depressed.

Repair for Broken Window Glass

Brass shim stock, or other thin sheet metal, of a thickness that will slip through the crack in a broken pane, will hold the glass in place. The strip must be about $1\frac{1}{2}$ in. wide and as long as needed.

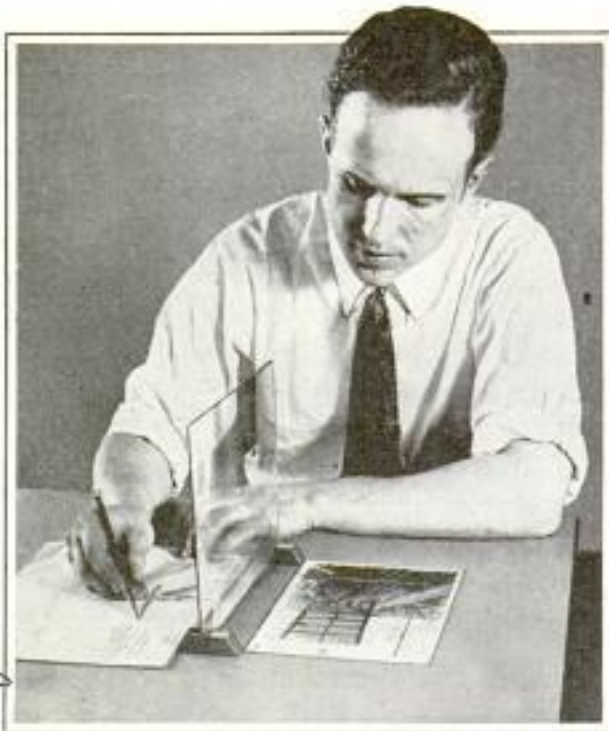
Notch both sides, forming triangular tabs as shown in the detail, the narrow strip in the center being equal to the thickness of



the glass. Insert the strip and bend the prongs up and down alternately. This makes a sturdy and neat repair.

"Teeter-Totter" Candles for Parties

A large tallow candle, pivoted at the center on a needle, will slowly dip in "teeter-totter" fashion when lighted at both ends. The needle may be hung on stiff wires, or supported on two blocks with grooved tops. Several smaller candles may be fastened to the larger candle, and when the entire assembly is lighted and in motion, the cluster provides a fascinating centerpiece for the table. It makes a hit at any party.—Bert Russell, Harrison, Idaho.



Pane of Glass Supported in Vertical Position Provides Means for Copying Drawings and Pictures

Copying Pictures by Reflection

Supported vertically by two wooden blocks, a pane of glass can be used for making copies of pictures and drawings. The work is placed to the left of the glass, and a sheet of plain white paper is laid to the right. By looking through the glass from the left side, as shown, an exact reflection of the work will be seen on the plain paper where it can be traced with a pencil or pen. Of course, the position of the worker's head in respect to the glass should not be changed while the copying is being done, or the drawing will be distorted.

Suction Cup Holds Window Cards



Here is a clip that will hold your display cards at any place on the window. It consists of a rubber suction cup, such as is used to hold ash trays to windshields, and a large paper

clip bolted to it as shown in the photo. The cup is stuck to the window and the card held by the clip.

Tire Tube Mends Pipe

Water pipes cracked by freezing or for any other reason, can be quickly repaired by using an old inner tube. It is cut into a strip that is long enough to wrap around the pipe three or four times, and is stretched while being wrapped. It is bound with wire or tape. This emergency repair usually will stop the leak and last until warm weather when the pipe can be replaced.—Millard Loe, Blanchardville, Wisconsin.

Safety Shield over Gas-Stove Cocks

A shield over the cocks of the gas stove is useful in preventing children from turning the gas on or off. It consists of a piece of sheet metal, bent to fit as indicated and hinged at one end to the stove. Notches are cut in one edge to fit over the cock handles, and should be just large enough to allow adjustment for a high or low flame, but not so large as to allow them to be turned off or on without raising the shield.—Robert J. Bailie, Long Island City, New York.



Flashlight Bulb Tests Windings of Generator

Open circuits in the winding of a generator can be detected with a flashlight bulb. Connect the bulb to the generator and then turn the latter at a fairly high speed. If the bulb burns steadily, the wiring is all right, but if it burns with a flicker, the trouble is in the commutator or in the wiring.

☛ An efficient and ornamental chain for hanging pictures and maps can be made by joining a sufficient number of ordinary wire clips.

(copies) Mayer Inj. Corp. 14 26 W. Randolph St. Chicago
 New Jersey
 Mechanical Lubricated Corp.
 30 Church St. New York

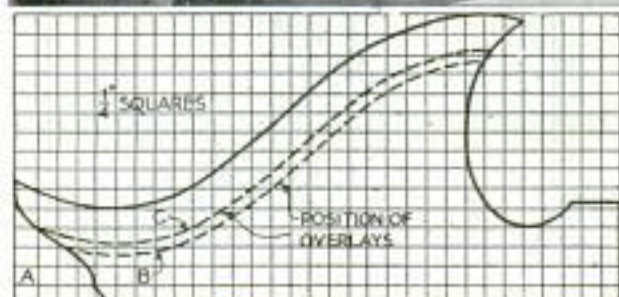


FIG. 2

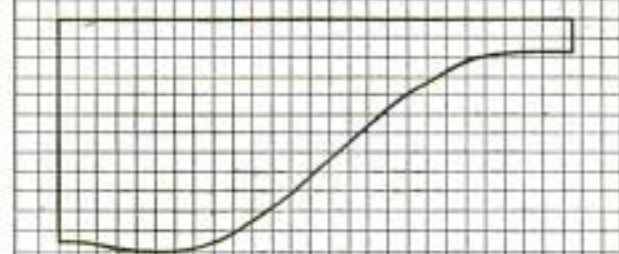


FIG. 3

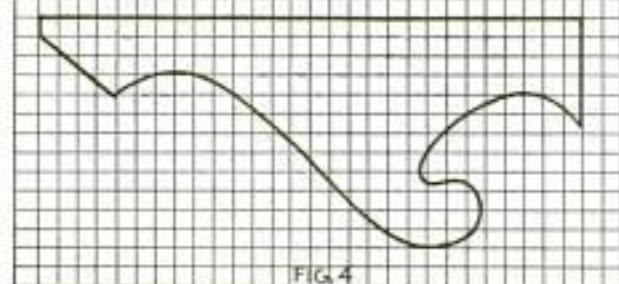


FIG. 4

glued onto the frame at each corner, in about the position shown in the figure. After they are dry, glue is applied to the joints and worked into the end grain. The splines, too, are glued and then slipped into place on all the corners, and the frame assembled. C-clamps or hand screws, applied to the ears, are used to draw the joints up tight and the frame true. Do not attempt to trim off the splines where they extend beyond the frame until the glue has set. The ears can easily be split off with a sharp chisel, after which the places where they were attached may be smoothed down. The $\frac{1}{4}$ by $\frac{1}{4}$ -in. grooves for the top and bottom scrolls should be cut on the circular saw either by making several kerfs or by using a dado head. These grooves are shown in the side view of Fig. 1.

The heading is of the broken-arch type, and as the home-workshop equipment usually does not include a shaper, the writer suggests a method by which a curved molding can be made by using a band, jig or scrollsaw and building up the molding. It consists of three pieces, as shown in Fig. 7. The back piece is cut to a size of 4 by $15\frac{1}{2}$ in., and the pattern shown in Fig. 2 marked on its surface. Two pieces, the shape of which is given in Fig. 3, are next cut, the edges carefully smoothed and the pieces glued into place as shown by the dotted lines in Fig. 2. Two more pieces are made to conform to the dotted line C of Fig. 2, and the curved edges of these pieces are cut to a quarter-round with a medium grade of sandpaper. Care must be taken to keep the same contour as line B, as it is obvious that the spacing must be equal the full length of

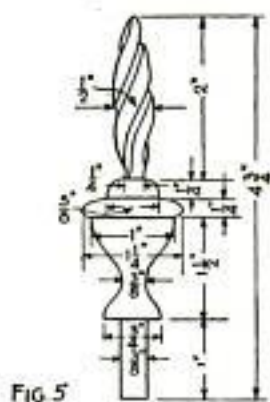


FIG. 5

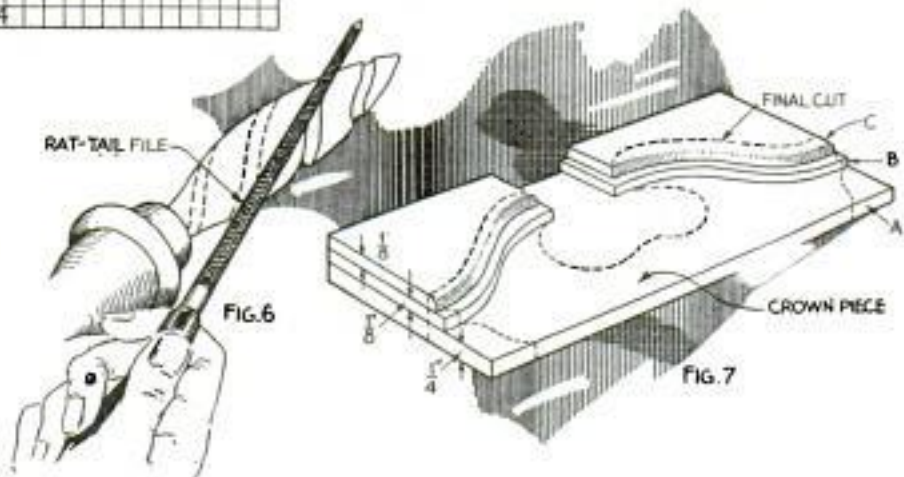


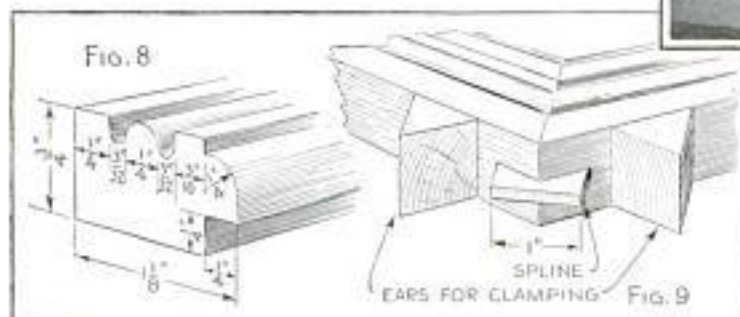
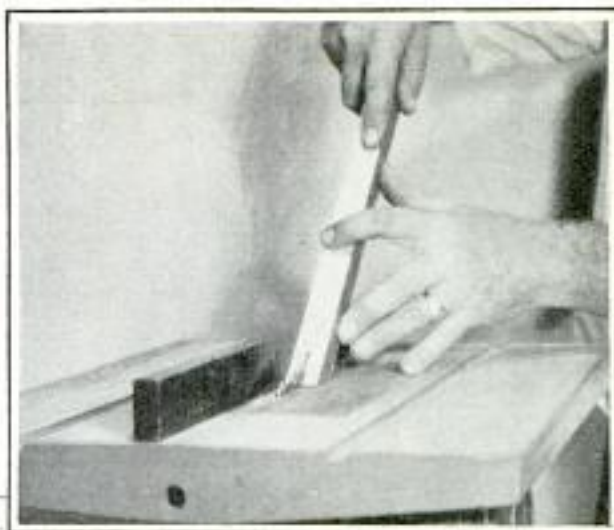
FIG. 6

FIG. 7

Without a Molding Cutter You Can Build Up Realistic Imitation Molding from Pieces Cut on a Bandsaw

the curves. Glue these pieces into place and allow to dry. The final cut is made along the dotted line shown in Fig. 7. The bottom scroll is made without molding or other form of ornamentation, so requires no special explanation. A pattern for this piece is shown in Fig. 4. The thickness of the stock also is $\frac{1}{4}$ in. and plywood is preferable for it as well as for piece A, Fig. 7.

After the heading and bottom scroll have been glued into their grooves all that remains to be made are the block,



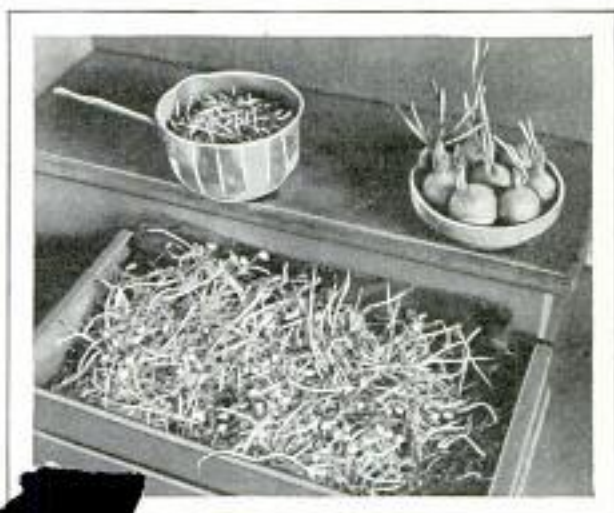
cap and flame-and-urn ornament or finial, which gives the final touch of beauty to the mirror. The block is simply a $\frac{3}{4}$ -in. plinth in which a notch has been sawed, allowing it to slip over the heading. The top of this block is covered by a little $\frac{1}{8}$ -in. cap with slightly rounded edges. A $\frac{3}{8}$ -in. hole is drilled through this piece and into the block to a depth of 1 in. to receive the dowel on the end of the finial. The dimensions for these pieces are given in Figs. 1 and 5. The finial is turned out on a lathe. Care must be taken to make very light cuts with sharp tools because of the slenderness of the piece. The smaller diameters should be made last for the same reason. The spiral cuts on the flame part of the ornament should be marked out with a pencil, then cut with a small rat-tail file, as shown in Fig. 6, unless you are proficient in the use of carving tools.

Apply one coat of a solution consisting of bichromate of potash, 1 part, and water, 3 parts. When dry, lightly sand with No. 00 sandpaper and follow with a coat of mahogany water stain, a coat of paste-wood filler and two or three coats of white shellac. Sand between coats and rub the final coat with powdered pumice-stone and paraffin oil. After the finishing is completed, gild the bead next to the mirror with old-gold bronzing liquid. You

must be sure to gild the rabbet in which the mirror rests also, as the reflection of this surface shows in the mirror quite plainly.

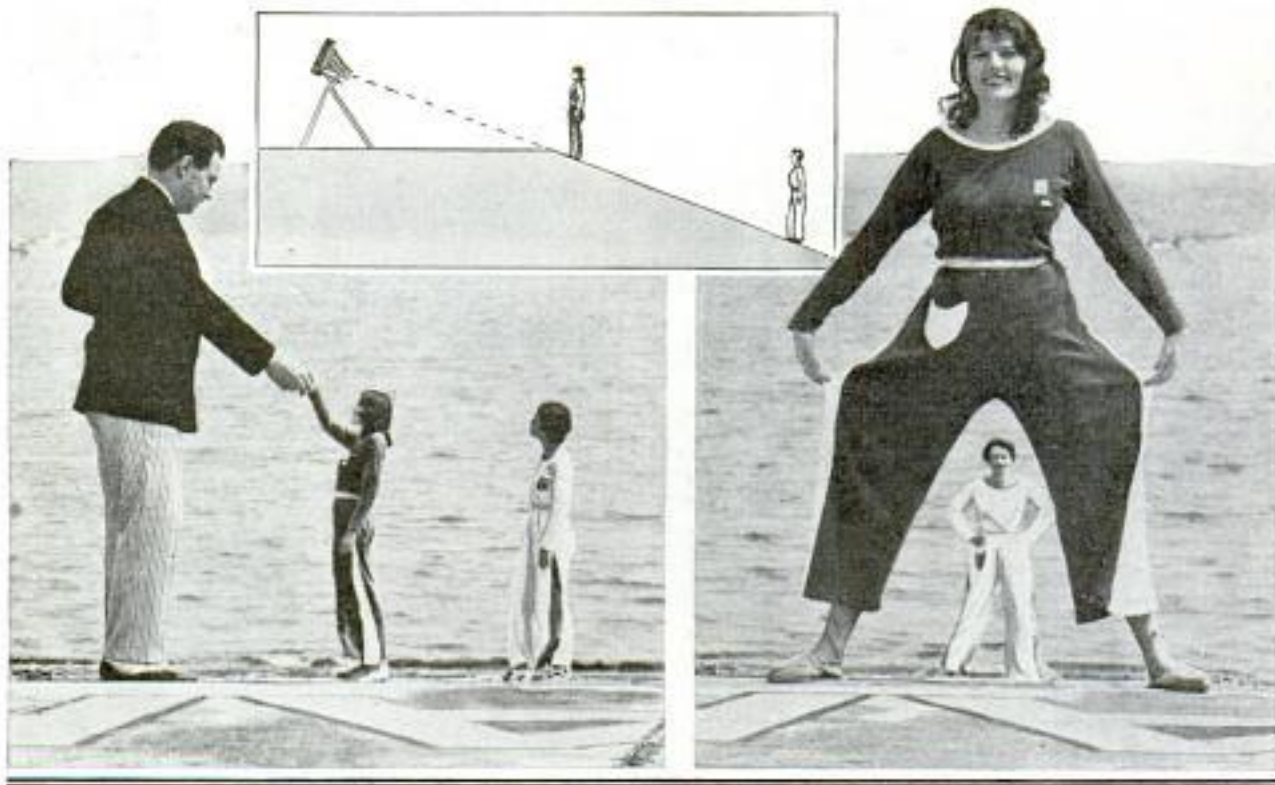
Vegetables Sprouted in Cellar

If you have a well-lighted and warm cellar, or some extra space in the kitchen, you can grow vegetables during the winter. A few pans and one or two small wooden trays to sprout all kinds of beans, peas, corn and smaller grains are needed. For beans, spread a thin layer in a tray, moisten and add a little sand to hold the roots in place. When the sprouts have formed about four leaves, cut them off just above the roots, or remove the whole plant. Onions are sprouted similarly, but are slower, each bulb growing three or four shoots, which will be tender when they reach the size of a lead pencil.



In the Basement, Fresh Vegetables Can Be Had During Winter Months.

Trick Photos Resemble Double Exposures



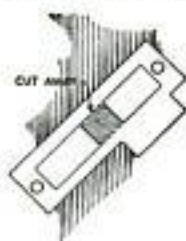
Snapshots That Resemble Double Exposures Can Be Made with Any Camera, Stopped Down to Obtain a Sharp Focus of Objects Placed at Various Distances from the Lenses

By taking advantage of the natural topography, trick photos that resemble double exposures can be taken with an ordinary camera. Those illustrated were taken on an incline—a seaplane ramp in fact. The camera was mounted on a tripod and set at an angle parallel to the slope. The camera lens was stopped down to F.16 or less in order to get a sharp focus, and the exposure was timed accordingly. The subject to be taken big was placed about 20 ft. from the lens while the one to be taken small was placed farther down. The illusion of shaking hands was obtained by looking into the finder of the camera and making sure that the hand of the close-up subject was in front of the hand of the more distant one. This part of the stunt must be carefully done so that the secret will not be given away. While pictures may be made of such a variety of subjects as a giant stepping into a tiny airplane or boat on such a ramp, the ordinary city street or country road provides adequate facilities for equally ordinary pictures. For example, you can cure a picture of your bull pup-

you, with the dog as big as an elephant and yourself Lilliputian in size. Houses at the foot of a hill and other objects often lend themselves to absurd and humorous pictures such as a snap of yourself putting your foot down on an entire village. No trick lenses, exposures or retouching are necessary, the only requirements being a tripod and a camera that will stop down to F.16 or F.32, or farther.

How to Adjust the Lock Strike of a Sagging Door

Doors that have sagged so that the latch will not enter the slots in the lock strike can be cured by merely sawing out the metal that separates the two slots, and also chiseling out the wood between the slots in the door casing. This will provide enough space and the door will have to sag considerably before the latch catches again. In case the lower part of the latch catches, the slot of the strike can be filed a little deeper.



Copper Strips Add to Efficiency of Car Heaters

Strips of sheet copper bent to form deep corrugations and clamped to the top of the exhaust manifold will greatly increase the efficiency of car heaters of the inexpensive type. Due to the great heat conductivity of copper, much additional heat is transferred to the air that passes through the heater. The strips encircle the manifold between its branches, and the ends are drawn together with small stove bolts.

Improved Heater for Poultry Water Fountain

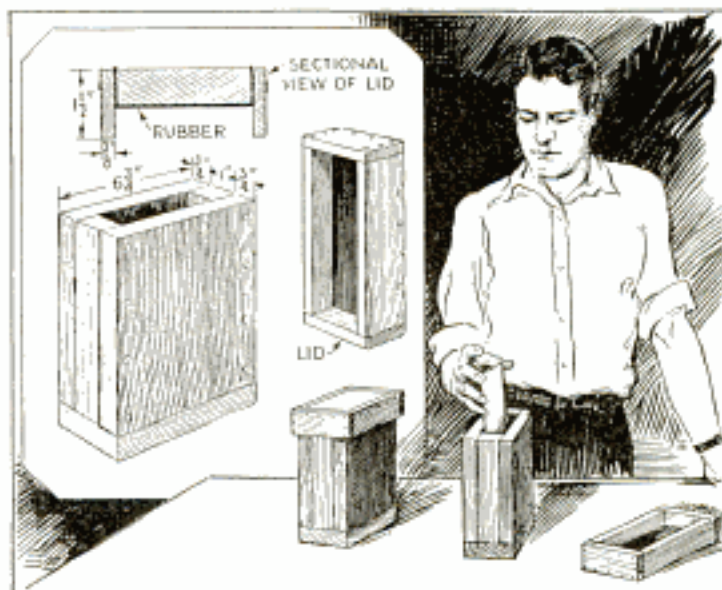
To provide a poultry water fountain, which would not freeze and could not be littered, a Wisconsin farmer soldered a portable fountain on top of an old 10-gal. milk can. An opening was cut in the side



of the can to permit the insertion of a lighted lantern which kept the water warm. A tin slide closed the opening, and a layer of concrete in the bottom of the can kept it from tipping over. A discarded auto tire rim, with four legs bolted to it to hold it within an inch of the drinking pan, was slipped over the can for the chickens to perch on while drinking.—Russell Bookhout, Madison, Wis.

Chamois-Skin Lining Protects Watch Pocket

An octagon-shaped watch will soon wear a hole in a pocket, especially if the watch is heavy. To prevent this, a piece of chamois skin or durable cloth, which will not scratch the watch, is sewed inside the pocket. Besides saving the lining, this method will also keep your watch case polished.



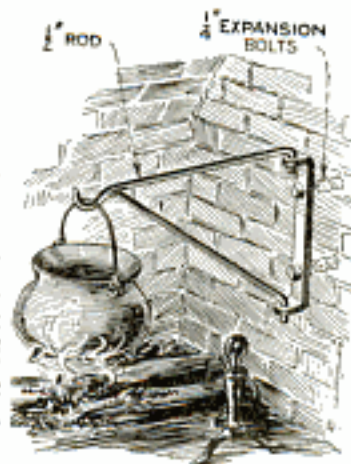
Made of Wood and Holding a Few Films, These Midget Tanks Will Save Much of Your Developing Fluid

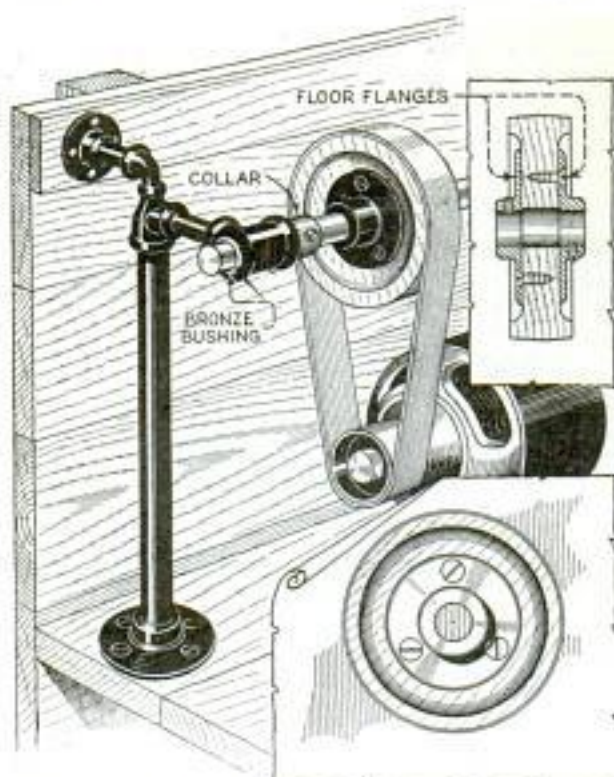
"Midget" Tanks Will Save Developer

Much developing fluid can be saved by the home photographer who uses cut films and has only a few to develop at one time, by providing himself with a number of midget tanks. Constructed of wood, they should be 1 in. wide and of suitable length and depth to fit the size of films used. The inside is waterproofed with melted paraffin which is poured out before it hardens. Lids for the tanks are also made of wood and lined with rubber cut from an old inner tube.

A Crane for Your Fireplace

A crane that will add to the attractiveness of a fireplace, besides being useful for holding a kettle, can be quickly made of $\frac{1}{2}$ -in. iron rod and a piece of bar iron. Weld two lengths of the rod together and form the ends into a hook as shown. Then round off the free ends of the rod, bending them to fit into holes drilled in the ends of the piece of bar iron, which is also bent, and fasten the outfit to the rear of the fireplace with $\frac{1}{4}$ -in. expansion bolts.





Self-Aligning Shaft Bearings, Supports and Pulleys Made from Pipe and Fittings

How to Make Your Own Pulleys and Lineshaft Bearings

If you have a small lathe, you can easily make your own pulleys and bearings. They may be turned out of maple or birch, are recessed on each side as shown, and have a hole drilled in the center, slightly larger than the shaft on which they are to be used. Two cast-iron floor flanges, of suitable size, are faced in the lathe to fit the sides. The inside of the flange hub is reamed out to just slip on the shaft, and is then drilled and tapped for setscrews, with which it is fastened to the shaft. The three pieces are mounted on the shaft or mandrel, and the flanges screwed to the pulley with flat-head wood screws, staggering them on opposite sides. A coat of shellac applied before assembling the pulley, will prevent shrinking. It is also a good plan to take the finishing cut on the face of the pulley and crown it at the same time. For high-speed work, it may be necessary to balance the pulley by screwing flat-head screws into the sides. Self-aligning bearings and supports for a lineshaft can be made from pipe and fittings, which will provide an exceptionally rigid assembly and sufficient range of adjustment for any reasonable belt stretch. Run the threads back on the

pipe farther than is usually done, to allow a horizontal and vertical movement of about $\frac{1}{2}$ in. for adjustment purposes. The bearing itself is a standard pipe tee, reamed to the proper size for a thin bronze bushing, which is held in place by a short headless setscrew at each end of the tee. File a flat spot on the bushing so it will not be necessary to tighten the setscrews enough to distort the bushing. After assembling, drill and tap a hole for a grease cup through the tee and the bushing. In assembling, the top of the "L" should be left loose, or the bearing could not aline itself.—Paul C. Wright, Columbus, Ohio.

Lime Deposit in Teakettle Removed by Freezing

Lime deposits on the inside of a teakettle can be removed by setting the kettle, empty, outside during freezing weather, or by placing it in an electric refrigerator and allowing it to freeze. This will cause the deposit to crumble almost to the consistency of fine sand which can readily be removed.

Ruled Holder for Exposing Prints

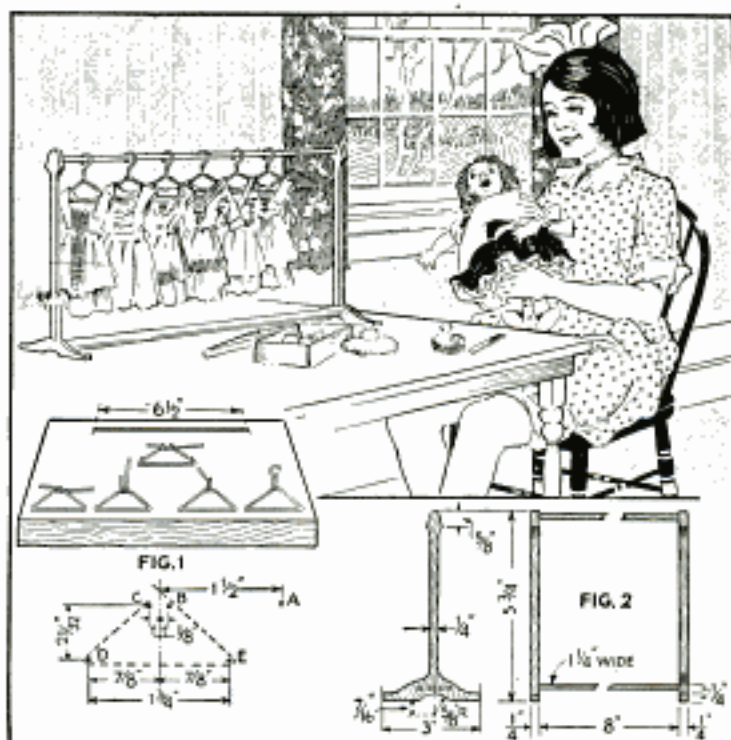
To aid in determining the correct distance for a light when exposing photo prints a graduated holder is handy. The light and switch are fastened to one end of a board, about 5 in. wide and 24 in. long. Starting at the base of the light socket, lines are ruled across the board at 1-in. intervals and numbered. The correct exposure time for each distance is then readily obtained by making test-strip exposures and marking the time in each section.



Ruled Board Fitted with Lamp Aids in Getting Photographic Prints Correctly Exposed

A Rack and Hangers for Doll Clothes

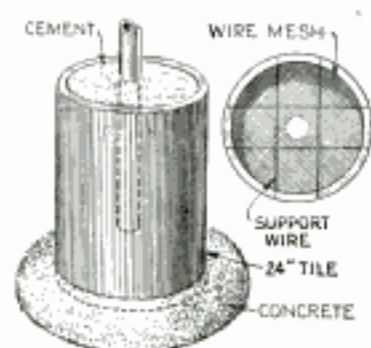
This rack and hangers for dolls' clothes will make a pleasing gift for small children. The rack is made from wood taken from a cigar box. The two endpieces are cut to the shape and size shown, and have an 8-in. length of $\frac{1}{4}$ -in. dowel rod glued between them at the top, and a piece of the plywood, $1\frac{1}{4}$ in. wide and 8 in. long, similarly fastened between them at the bottom. The hangers are of wire and can be made as follows: Lay out five points on a board and drive small nails in the board as shown. Then cut them off about $\frac{1}{2}$ in. above the board. Cut a busbar into $6\frac{1}{2}$ -in. lengths and place one end of a length against the two nails and with a pair of pliers bend it around the nails. Then take the wire off the form and bend the ends up at the center, twisting them together until the short one gives out and



Small Children Will Have Many Amusing Hours with This Rack and Hangers for the Clothes of Their Dolls

the long one sticks out to one side, thus making the neck of the hanger.—L. M. Curtis, Jr., Tulsa, Okla.

Filter for Shallow Well or Cistern



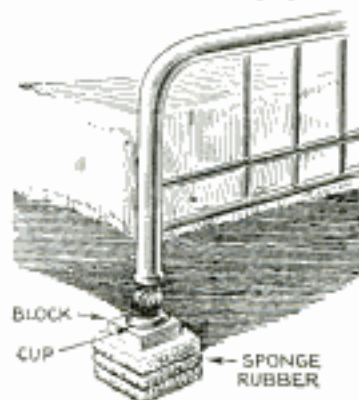
Owners of cisterns or shallow wells can have clean water by using the illustrated filter. First clean out the well, then make a concrete base directly under

the pump pipe, 15 in. in diameter and 2 in. thick, and set a 10 by 24-in. soft drain tile upright in it. After the concrete has set, drill a number of holes for No. 9 wire, about 2 in. from the top of the tile. Insert the wire in the holes and cut a piece of coarse-mesh wire screen to fit inside the tile. This is to support a concrete top over the tile. Then cut a hole in the wire to fit the pump pipe, and place the pipe in position. Pour cement over the wire and around the pipe, making it tight to prevent leakage of water around the top. The water will filter through the

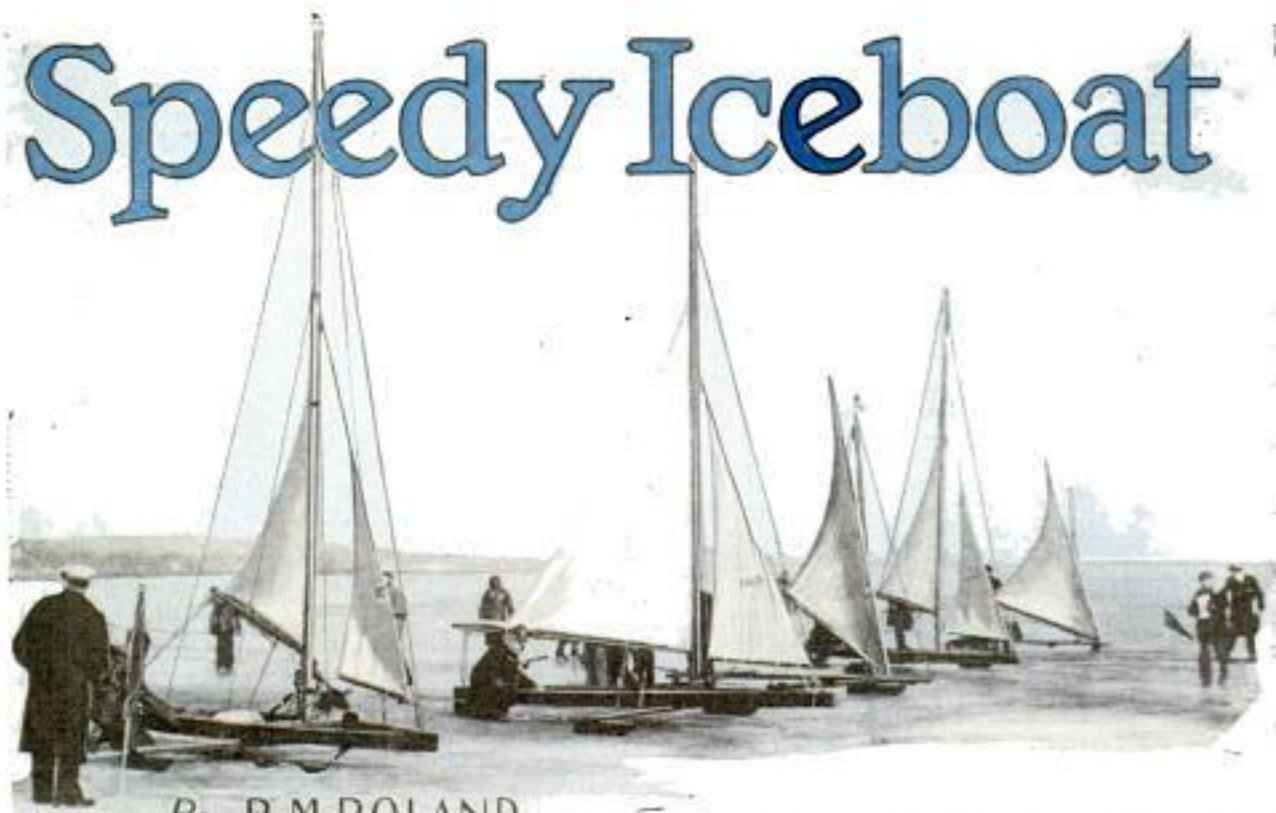
tile fast enough to meet any ordinary demands on the well and has been found highly successful in actual use.—James A. Meece, Tuscola, Ill.

Sponge Rubber Prevents Vibration of Bed from Heavy Traffic

Those living along streets carrying heavy traffic can eliminate vibration of the bed by placing sponge-rubber cushions under each leg. Cut the rubber into 4-in. squares and place three or four pieces on one another. A wooden block of the same size is laid on the top piece, and a caster cup is set on the block to prevent the caster from rolling off, although it is advisable to remove the caster and set the bed posts in the cups.



Speedy Iceboat



By R.M.ROLAND

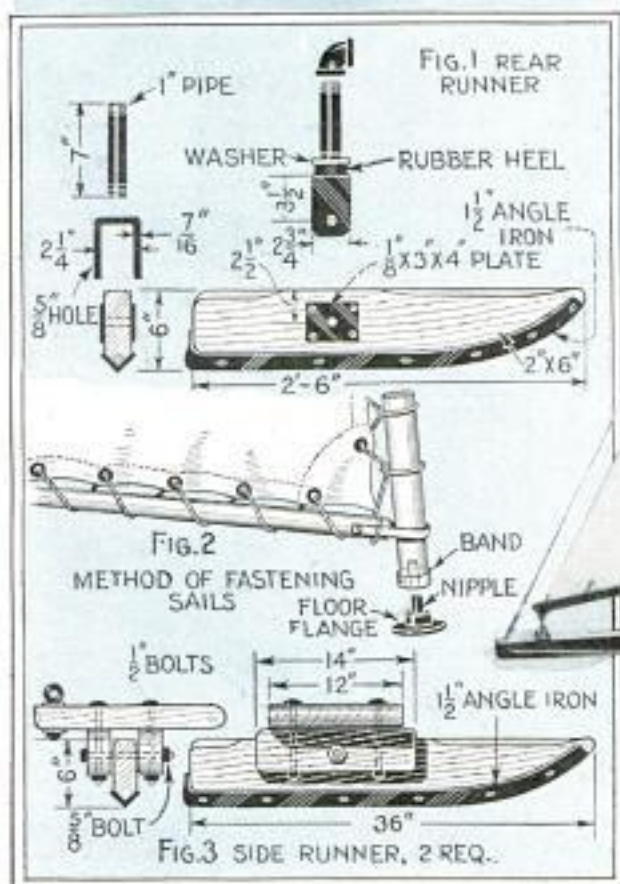
CAPABLE of carrying four persons, and often more, this 18-ft. iceboat is especially adapted for small lakes, and can be towed along the road with your car.

The frame consists of a center beam and crosspiece. Get a clear piece of pine, 4 by 4 in. by 17 ft. in size, and another piece 2 by 12 in. by 12 ft. The latter is attached 8 ft. from one end of the center beam, U-bolts being used for this purpose, as shown in Fig. 6. The bolts can be made from 11 $\frac{3}{4}$ -in. lengths of $\frac{5}{8}$ -in. iron rod, threaded at each end. Pieces of $\frac{1}{4}$ by 2 by 14-in. flat iron, drilled to slip over the ends of the bolts, are then placed on the underside and nuts driven on the bolts, lock washers adding security. As a base for the mast, screw a 1 $\frac{1}{2}$ -in. pipe nipple to the center beam just ahead of the crosspiece, and fit a 2-in. nipple in the flange. At the rear end of the center beam, a 1 $\frac{3}{8}$ -in. hole is drilled for the 1-in. rudder post, while $\frac{3}{8}$ -in. flat-iron plates, about 3 by 4 in. in size, are screwed above and below the hole as indicated, to take the wear of the post. The plates are securely attached by using large flat-head wood screws, the heads being counter-

sunk flush. Details of the rudder are shown in Fig. 1. It consists of a piece of oak, 2 by 6 by 30 in. in size, cut to the shape shown, and the lower edge is beveled to fit the runner, made of 1 $\frac{1}{2}$ -in. angle iron, which is screwed on with flat-head countersunk screws. The holes drilled in opposite sides of the runners should be staggered, as they would weaken the piece considerably if drilled in line. Two 3 by 4 by $\frac{1}{8}$ -in. plates are screwed to both sides, centering about 12 in. from the rear end, and a $\frac{5}{8}$ -in. hole is drilled through the assembly as shown in Fig. 1. A $\frac{7}{16}$ -in. U-piece straddles the runner at this point, its sides being drilled to match, and a hole is bored in the top to take the end of a 7-in. pipe nipple, which is welded on. Then a rubber washer, or "heel," and a metal washer are slipped over the pipe. The rudder post is pushed up through the center beam after which an elbow is driven on the nipple. A hole should be drilled through both elbow and nipple to take a pin which prevents the elbow from turning. Then the tiller is run into the elbow as shown in Fig. 7.

Oak is also used for the other runners, a detail of which is given in Fig. 3. These are 3 ft. long and are similarly fitted with angle iron which may be flattened at the upper end. Two 2 by 4-in. blocks are bolted to each runner through a hole 1 $\frac{1}{8}$ in.

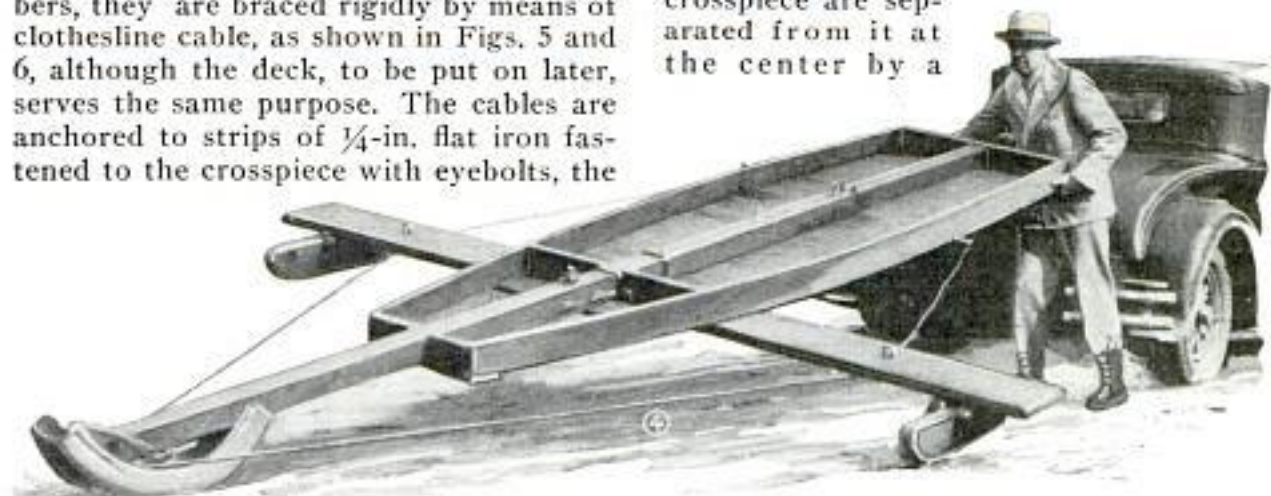
Seats Four

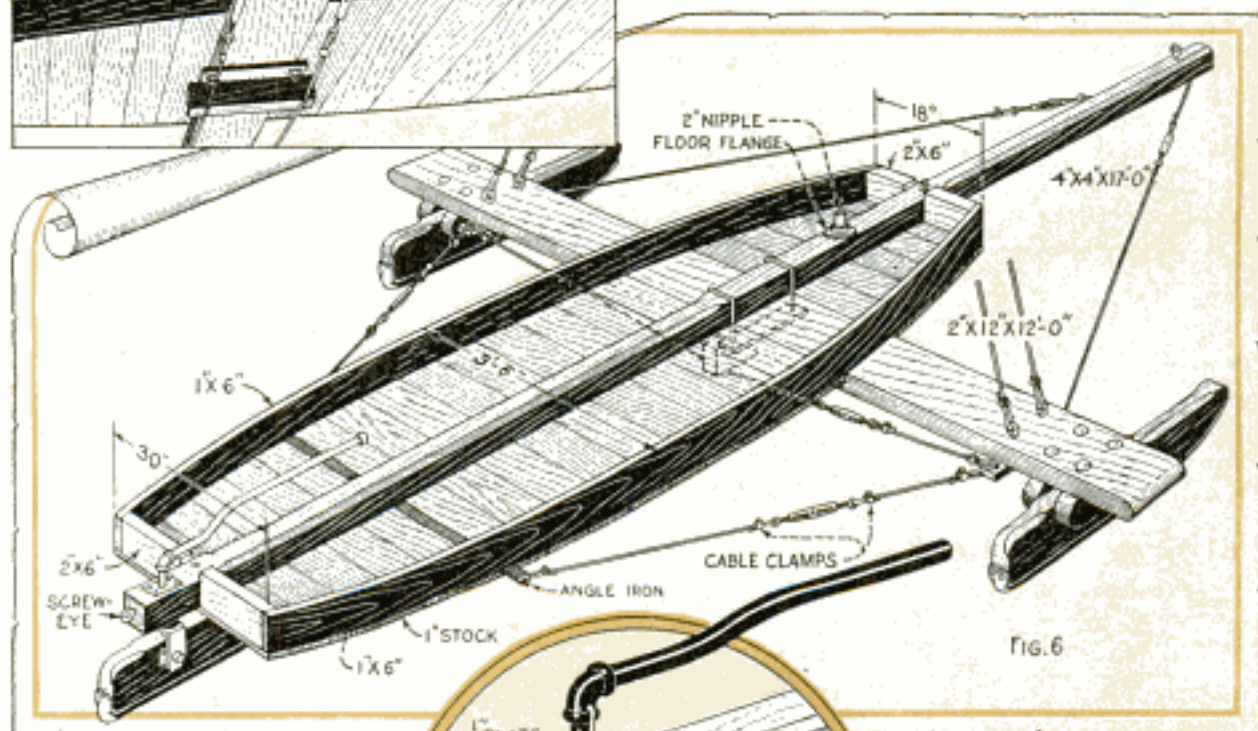
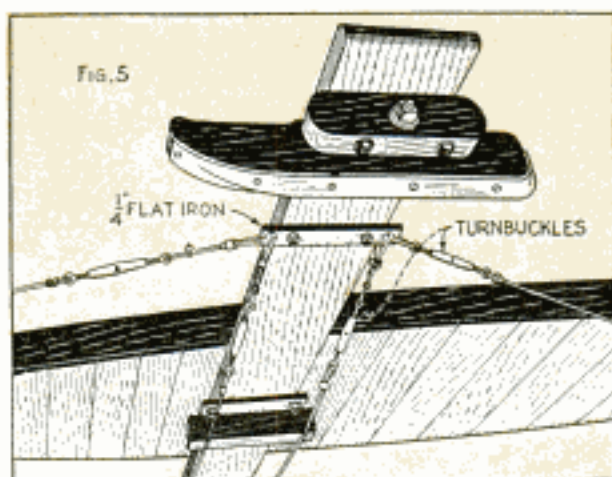


Although This Photo Shows a One-Man Boat, the Deck May Be Enlarged

from the top and 14 in. from the rear end, and these pieces in turn are bolted to the crosspiece. Care must be taken to get the side runners parallel to each other, and the edges of all runners must be kept sharp, which can be done by touching them up with a file at regular intervals. To prevent weaving of the frame members, they are braced rigidly by means of clothesline cable, as shown in Figs. 5 and 6, although the deck, to be put on later, serves the same purpose. The cables are anchored to strips of $\frac{1}{4}$ -in. flat iron fastened to the crosspiece with eyebolts, the

eyes holding the lower ends of the mast stays. Eyebolts are run through the center beam to enable attachment of the diagonal cables. The ends of the cables are run through holes drilled in the anchor strips or through the eyebolts, doubled and then held in place securely by means of cable clamps. Turnbuckles on each cable allow adjustment for tension. The two parallel cables directly under the crosspiece are separated from it at the center by a



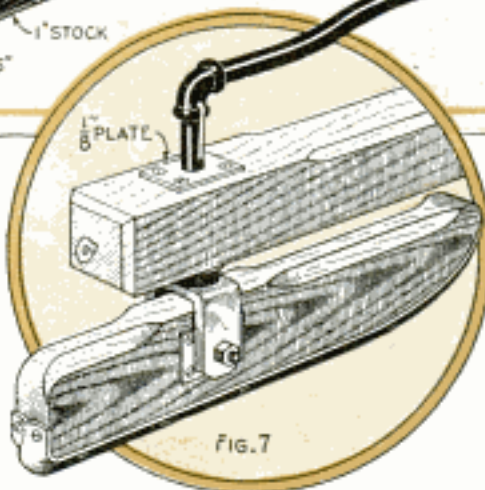


block, an arrangement which greatly strengthens the crosspiece against vertical strain.

The deck is now put on. It consists of 2 by 6-in. pieces at the front and rear ends, while 1 by 6-in. stock is used for the sides and bottom, which is screwed on last.

The mast should be 14 ft. high and 3 $\frac{5}{8}$ in. in diameter at the center. The lower end is drilled to fit on the nipple, the hole being slightly oversize to allow a little play, and a ring or piece of strap iron is tightly drawn up around the lower end of the mast to reinforce it. The main sail is 12 $\frac{1}{2}$ ft. high at the peak of the gaff and 12 ft. wide at the boom. The jib sail is 5 $\frac{1}{2}$ ft. wide at the boom and 7 ft. high. The sails may be made of 8-oz. duck sewed three times at each seam, on an ordinary sewing machine. When com-

pleted, the sails can be taken to an awning shop and eyelets put in, or you can do this yourself. The sail is held onto the mast by means of rings and is fastened to the boom as shown in Figs. 2 and 9. A U-shaped piece of flat iron is bolted to the boom and slips over the mast, a lag-screw in the mast keeping it from being pulled up too far. Other details of rig-



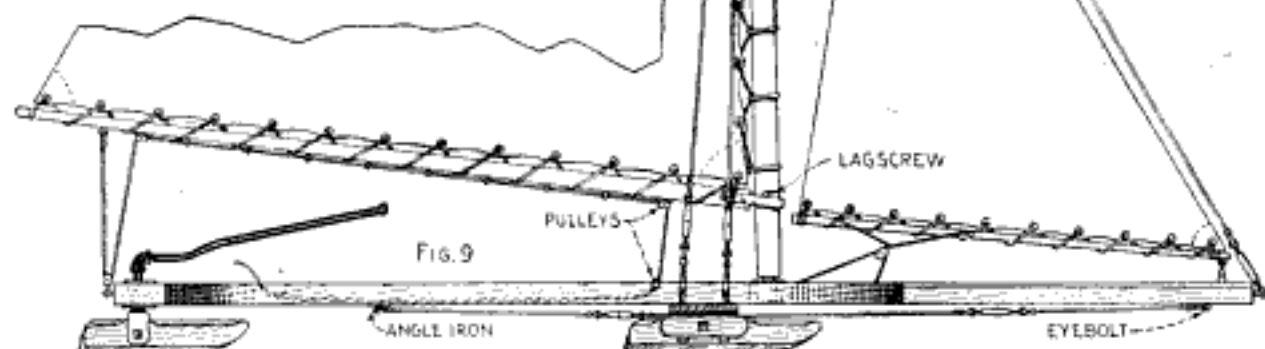
ging are also shown in Fig. 9. When the boat is being towed, it should be arranged as in Fig. 4, with the rudder removed and a piece of old tire slipped over the dragging end of the center piece.

The mast should be well planed and sandpapered smooth, after which a couple of coats of spar varnish should be applied to protect the wood from the weather. The shrouds, or lateral guys, which lead in pairs to the masthead, should be of clothesline cable and also provided with turnbuckles to permit drawing them taut.

A word about the sails. The starch or size in new canvas, will, after being dampened, cause spots of mildew. In order to prevent such discoloration, it is a good idea to mildew-proof the sails in a pickling bath. This removes the size and sub-

stitutes another substance not affected by the weather. Get a $\frac{1}{4}$ -lb. of sugar of lead and the same quantity of powdered alum, dissolving these in a large pan of water. Let the sails soak overnight in this solution and then without wringing hang them in the shade to dry. To wash and slightly bleach out dirty sails, use $1\frac{1}{2}$ lb. of chlorinated lime to $2\frac{1}{2}$ gal. of water. As this removes the residue of previous pickling, it is necessary to repeat the pickling bath before using.

If your boat has been made of new lumber its attractiveness can be greatly increased by giving the wood a couple of coats of spar varnish. The lumber may have to be bleached out, as you will likely soil it when working on it. To do this,



mix up some crystals of oxalic acid, using a tablespoonful to 1 qt. of hot water and stirring well to dissolve the crystals. After this solution has been applied to the wood, it should be neutralized with vinegar before proceeding with the finish. The raised grain can be sanded down and the wood filled, which should be allowed

to dry for 24 hours, before applying the first coat of varnish. Varnishing should not be done during cold weather as it will not spread evenly. For this reason it is best to varnish the parts separately indoors where the temperature is at least sixty-five degrees, and assemble them later when dry.

How to Make Glow Pictures

Glow pictures can easily be made as follows: Dissolve in 2 fluid oz. of hot water, saltpeter, 2 oz., pulverized gum arabic, 1 oz. When cooled, this solution will have the consistency of jelly, but is readily liquefied by placing the container in a pan of warm water. With a pencil, draw a picture on a sheet of thin white paper, being careful that all lines connect and that they are not too close together.

Then, using an ordinary pen, trace over the drawing with the solution, allowing the finishing line to come to the edge of the paper so that it can be ignited. To do this, scratch a match, immediately blow it out, and apply the glowing end to the line at the edge of the paper, which will ignite the glow solution and start a smoldering fire that will not cease until the design has burned out.—E. Perry, Oakland, Calif.

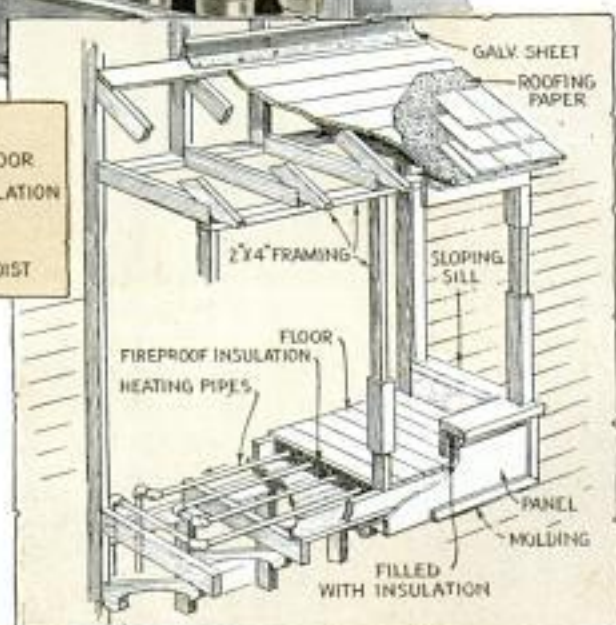
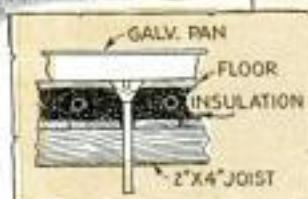
Conservatory in the Dining-Room Window

DESPITE the approach of zero weather you can hold captive a delightful bit of summer by installing this conservatory in your dining-room window and filling it with favorite blooms. It can be built at a nominal cost in any double-window opening on the south side of the house, with very little patching up on

the purpose of preventing too much heat on the underside of the flowerpots and of eliminating wasteful radiation. Thus the soil will be kept at about the same temperature as natural soil in summertime. Continue with the framing and make the roof conform to that of your house, whether shingle, slate or tile. The side-window sash are set in permanently, but the two in front are made to swing out. Also make allowance for storm sash during extremely cold weather, and for screens for use



Built at Nominal Cost, a Window Conservatory Keeps Flowers in Bloom and Fragrance during the Winter; in Spring They May Be Transplanted to the Garden



the inside. If there already is a bay, it can be adapted to a conservatory by fitting a heater in a double floor as shown in the drawing. Complete dimensions are not given because these depend on each individual case, but, to simplify the work, it is best to design the heating installation to fit between four or more studs, which are usually spaced 16 in. apart on centers. The drawings illustrate one built between five studs, and 30 in. deep.

First set the floor joists and braces underneath, and lay the subfloor of matched lumber. Next fit in the heating pipes, assuming you have hot-water or steam heat, with the valve set in a panel in the side of the wall near one corner. Block up the pipes so that there will be a slight drop toward the return, especially in the case of steam, and cover them with commercial insulation. This serves the dou-

during the fly season. If you wish, the plants can be transferred to the garden in the spring, the pan lifted out and a cushion substituted, making an inviting window seat.

For a galvanized pan it is best to leave a job of this size to the tinsmith. Have him make it with a rim about $1\frac{1}{2}$ in. high, or more, depending on the individual requirements, with a drain near one corner. This is to be set in a funnel fitted in the

floor. Raise the opposite end of the pan slightly to prevent the accumulation of stagnant water after sprinkling, which can be done by shimming with slats of diminishing thicknesses, placed crosswise at 6-in. intervals under the pan.—Hi Sibley, Pasadena, Calif.

Imitation Metal Cover Painted on Auto Tire

Protection and beauty for the spare tire, as secured with a metal cover, can be imitated with paints that also serve as a preservative for the rubber. The side walls should be given a coat of black top dressing, and the tread coated with a good quality aluminum paint. As the aluminum reflects heat and light, the tire will actually be kept cooler than it would be without the paint.

Rubber-Tipped Gloves Help the Postman

Rubber tips sewed on the thumb and forefinger of a glove, as shown, will be helpful to those who must sort letters or papers outdoors, during cold weather.



The rubber provides friction so that it is not necessary to take off the glove when engaged in this work.

Dropping Sash Weights Open Stuck Windows

Windows that stick can usually be opened by pulling down and suddenly releasing the sash cords. The dropping weights will give the window a sudden jerk, thus loosening it. Do not pull the cords too far, as too vigorous a jerk might break them.

Two or three tablespoonfuls of condensed milk poured through the valve stem of your bicycle tires will serve the same purpose as a never-leak solution.

Picture Frames from Film Packs



Old Film Packs, When Properly Decorated, Make Beautiful Picture Frames

You can easily make a number of beautiful picture frames if you have a film-pack camera. Take apart the metal frame of an empty film pack, properly trim and put the picture in it and reassemble the frame. If desired, a glass can be placed in front of the picture. The frame can be set in a horizontal position by bending a length of wire to form a bracket and bolting it to the frame. Then enamel or lacquer the frame any color to suit your fancy, and the frame is ready for use.

Thumbtack on Cork Forms Pen "Primer"

It is often necessary to press down on the point of a steel pen to start the ink flow. By driving a thumbtack into the cork of the ink bottle as shown, a smooth metal surface is always handy to serve as a pen "primer" and the tack is in the bottle when it is set aside.





Efficient Homemade Snow Sweeper Made from a Discarded Rotary Brush and a Two-Cylinder Engine

This Homemade Snow Sweeper Is Motor-Driven

Tired of removing snow with a shovel, an eastern man devised the motor-driven sweeper shown here. The chassis was made from the frame of a baby carriage. Two lawnmower wheels were fitted at the rear and two cart wheels at the front. The rotary brush was one discarded by the city street-cleaning department, and was driven by a small two-cylinder motor to which it was connected with a bicycle chain and sprocket gear. An automobile muffler to reduce noise and a few other refinements were added.—Jacob Deschin, Hartford, Conn.

Rack Holds Your Ties Separate



Sawed from 1-in. stock, this tie rack can be made in any size and design to give an artistic effect. It consists of two pieces, fitted together at right angles. The back is drilled at the top for a nail with which it is fastened to the wall, while the other piece is drilled to receive short pieces of dowel rod.—George Haas, Chicago.

Camera Tricks for the Home Movie Maker

Many exciting and novel home movies can be made by using a few simple tricks with the camera, such as reverse action. For example, take a picture of some one diving from a springboard in the usual way. Then have them repeat the dive and photograph it with the camera upside down. After the film has been developed, cut out and reverse the latter section end for end and cement it back in place. When the picture is projected, the diver will dive into the water and then jump from the water back to the springboard. Another good trick is to take a reverse picture from the rear of a rapidly moving train. Treat the film in the same way, and it will have the appearance of being filmed from the front of the locomotive. Set the camera, and, while it is running, have some one drive a car over it, making sure, of course, the car will clear it by a good margin. This film will have the appearance of a car being driven right into the audience.

Locks for Water Valves

Here are two effective methods of locking water valves. Small ones can be locked by using ordinary extension locks. If the valve is too large to be locked in this manner, a length of rod can be bent to a U-shape with eyes at the ends and used in connection with a padlock, as shown in the illustration.



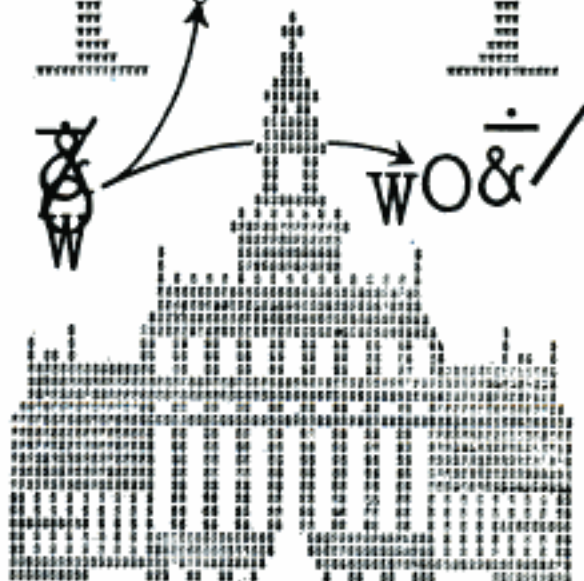
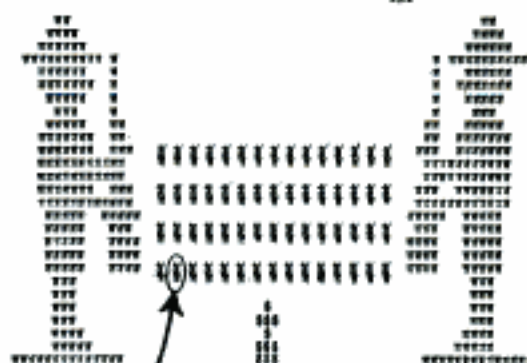
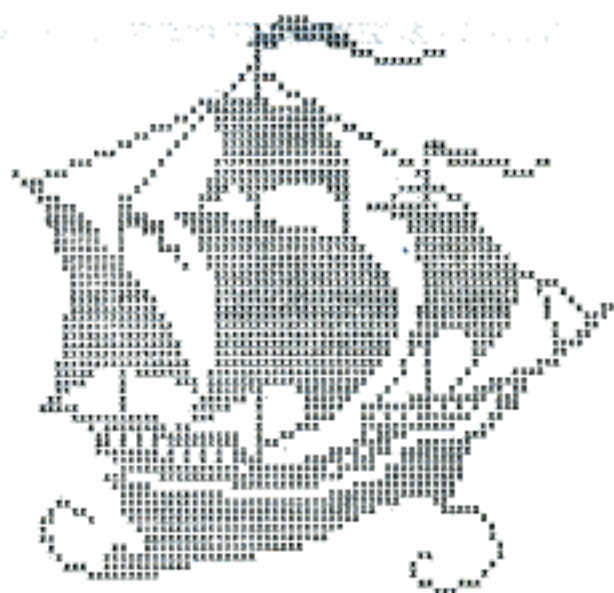
How to Ground Washing Machine to Avoid Shocks

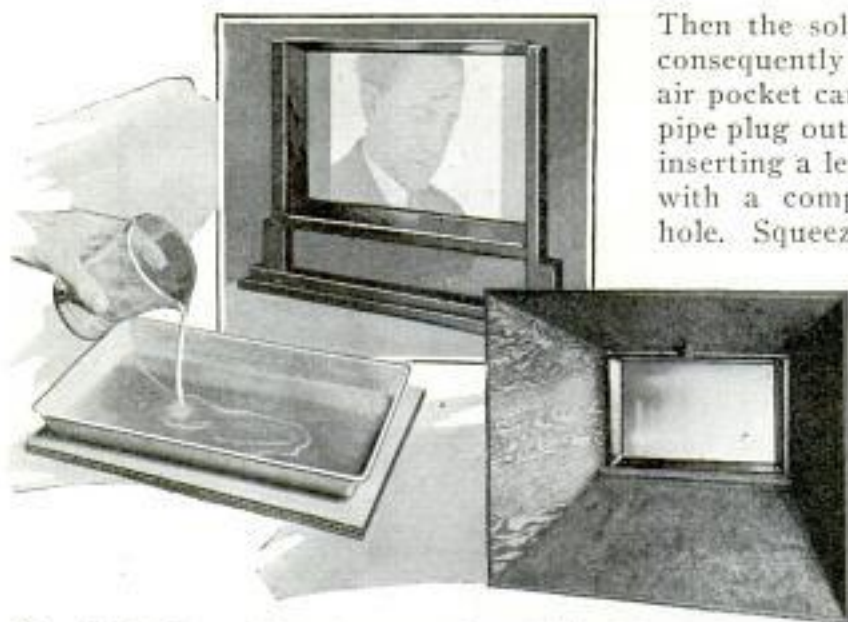
Motors on some electric-washing machines are grounded to the metal frame, which may cause unpleasant and dangerous shocks, especially on wet basement floors. This can easily be avoided by attaching a length of flexible copper wire under a bolt head on the machine and grounding it to a cold-water pipe.

TYPEWRITING ART

By Floyd Mix

TYPEWRITING art is not only an interesting pastime, but students in business schools will find that a silhouette and border will add materially to the attractiveness of their "budget" covers. Another practical application of this idea is the making of cross-stitch designs for embroidered work. First draw a light pencil outline of the project you have in mind and then select some letter or character that tends to form a solid mass when closely spaced by rolling the platen slightly off the regular line. Starting at the top of the rough pencil design, fill in the space as neatly as possible. The attractiveness of the design can be increased by using various characters and a two-color ribbon; also by leaving suitable blank spaces, these being an important factor in the larger designs. It is sometimes necessary to use two or more characters as in the small soldiers. Note the reproductions of Independence Hall and the DeWitt Clinton train.





Home-Movie Screen Made from Aluminum Baking Pan Reflects Small Images Suitable for Six or Eight Spectators

Home-Movie Screen from Aluminum Baking Pan

Thoroughly cleaned on the inside, an aluminum baking pan, about 9 by 12 in. in size, will make an efficient screen for home movies where a small image is satisfactory. Fill the pan to a depth of $\frac{1}{2}$ in. with a strong lye solution, allowing it to stand for 30 minutes. Then empty, rinse, and scrub off the resulting dark deposit with a wet cloth. This will leave a finely matted surface that is very efficient for a screen. The sides of the pan should be painted black on the inside. For use in a darkened room, the pan may be supported on a small wood frame resting on a suitable base or fastened to the wall. By placing a pyramid-shaped hood, made of $\frac{1}{4}$ -in. veneer or wallboard, about the pan and painting it black on the inside, brilliant images can be obtained in an illuminated room. The small opening should be of the same internal size as the outside of the pan rim. If the larger opening is 8 in. greater than the small opening for a hood measuring about 10 in. deep, the proportions will be about right.

Cure for Air-Clogged Auto Heater

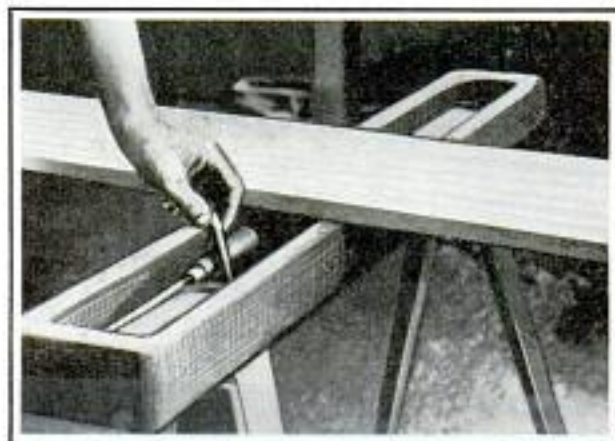
Auto heaters of the hot-water type frequently become air-clogged particularly if anti-freeze solution is allowed to drop too low and the radiator has to be refilled.

Then the solution will not circulate and consequently little heat is produced. The air pocket can be destroyed by taking the pipe plug out of the top of the heater and inserting a length of small copper tubing, with a compression coupling, into the hole. Squeeze the open end of the tubing together, leaving just enough space to allow the air to escape. Then place the end of the tubing in the drain provided for the cowl ventilator, or if there is no such drain, run it through the dash to the motor side and down to the pan, making sure that the point where it goes through the dash is several

inches higher than the top of the heater, or the solution may siphon out. This method is particularly effective on cars not equipped with a circulating pump, although it will better the results on any car. Another way of improving these heaters is to tap the top water manifold for a $\frac{3}{8}$ -in. nipple near the front cylinder. The hose running to the top connection on the heater is then attached to this nipple instead of to the adapter. The hole in it is rather small and more solution will circulate through the heater via the nipple.

Carpenters' Sawhorse Has Box for Holding Tools

Sawhorses can be made more useful by providing them with a tool box. Built of



The Top Cross Member of This Horse Is a Box for Holding Tools

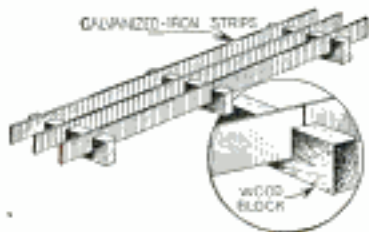
1-in. stock, the box, which is 3 by 6 by 36 in. in size, forms the top member of the horse. The legs are made of the same material, fastened to the bottom of the box and braced in the usual way. If furniture or other finished work is to be handled on the horse, it is a good idea to cover the box with old carpet or canvas to prevent marring the work.

Parting Metal by Drilling

When material is to be parted by drilling a series of holes through it, time can often be saved by drilling one hole through the edge of the work. It will be necessary to hold the work at right angles to the drill-press table, which can be done by means of angle plates, so that a drill, almost as wide as the thickness of the work, can be run through.

Toy Track Made of Sheet Metal

When you need more track for your toy train, a good substitute can be made from strips of No. 24 gauge sheet metal and wooden blocks, $\frac{1}{2}$ by $\frac{3}{4}$ by $2\frac{1}{2}$ in. in size. Three sawcuts, spaced the correct distance apart and $\frac{3}{8}$ in. deep, are made in each tie and the sheet-metal track, which is cut in 30-in. strips, $\frac{5}{8}$ in. wide, is then tapped down into the sawcuts. Use a hacksaw in making the cuts as they will then be just wide enough to make a snug fit for the strips. The joints at the ends of the tracks should not occur on the same tie, and the ties should be spaced about 5 in. apart. A 40-ft. length of such track was made for \$1.



Cleaning Commutator with Ink Eraser

To clean commutators without scratching the metal, fill a small, shallow container with carbon tetrachloride and dip a soft ink eraser into it, then rub the commutator firmly with the moistened end of the eraser and polish it with a cloth also dampened in the liquid. The eraser should be dipped into the liquid from time to time as it begins to dry.

Stilts Aid in Washing Walls

Strapped to the feet, these stilts will prove to be time and labor savers in cleaning walls and ceilings. The stilts are made of $\frac{3}{4}$ -in. stock, $7\frac{3}{4}$ in. wide and from 15 to 20 in. high, depending on the height of the work. A spread of 12 to 15 in. should be allowed for the feet to assure a safe balance. A discarded pair of shoes can be nailed on the tops instead of the straps if desired. Rubber snubbers may be placed on the bottom of the legs to prevent marring the floor.



Brake Lever Used to Tighten Clothesline

An emergency-brake lever from an old model-T Ford, or a lever from a discarded machine, makes a good clothesline tightener. The lever and ratchet are fastened to the post as shown. The clothesline is run over a pulley mounted on top of the post and is fastened to the lever at the point indicated. In use, the lever is raised to slacken the line, and the clothesline hung up, then pulled down to tighten the line.



Dirty candles can be cleaned with a cloth wet with alcohol.

THE BEAUTY of



NOTHING can so quickly and artistically change drab, unsightly walls into panels of sparkling beauty as wallpaper. Note the difference as shown in Figs. 1 and 8.

Getting started is simply a matter of preparing the old walls for their new covering. Often this means only pulling away loose bits of paper. If the old paper is spotted or stained at any place, a hot iron applied over a piece of blotting paper, as shown in Fig. 3, will usually remove the discoloration. Damp spots can be effectively prevented from coming through by covering the wet area with sheet tinfoil, although a coat or two of shellac will serve the same purpose. All cracks in the plaster must, of course, be filled up before the new paper can be put on. In doing this with plaster of paris or patching plaster, be sure to undercut the opening, as shown in Fig. 4, so that the filling material can take a good hold.

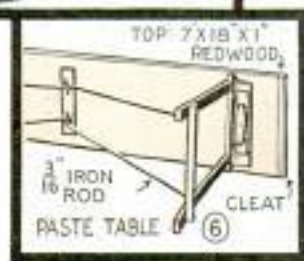
It's easy enough to build the paste ta-



and how

ble shown in Figs. 5 and 6, and cheap enough to purchase the two necessary brushes—a paste brush, and a smoothing brush, as pictured in Fig. 10. You will also need a sharp razor blade or a base trimmer to cut the paper, a bucket for the paste, a pair of large scissors, a pencil and a yardstick. Good paste can be purchased ready to mix with cold water.

Put the ceiling on first. Before starting the hanging, however, snap with chalkline or rule a line $17\frac{1}{2}$ in. out from the wall as a guide for the first strip, as shown in Fig. 11. Since the average paper is 18 in. wide, this will leave a slight margin to turn down on the sidewalls. The necessary length for the ceiling paper is then determined, allowing about 1 in. at either end to turn down on the sidewalls, and six or seven strips are cut to this size and placed, blank side up, on the paste table. In pasting the paper, start at one end and cover about two-thirds of the strip, keeping the edge of the paper nearest you flush



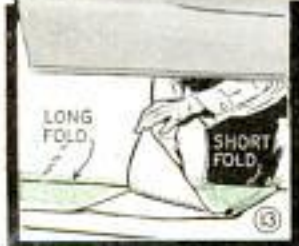
WALLPAPER



to apply it

with the edge of the table. The pasted portion of the paper is then folded, as shown in Fig. 12, after which the rest of the strip is pasted and folded in like manner, as shown in Fig. 13. The first fold is the longer of the two and is known as the long fold. The second and final fold is known as the short fold. The long fold is always the top of the paper and should be opened first when applied to the wall or ceiling.

The actual hanging is next. Fig. 2 shows the start of the operation. The long fold has been opened out, which is done immediately after mounting the scaffold, and the paper is held in position with a small roll of paper, carried in the left hand. Notice that the corner of the paper is turned back over the right hand, while the palm of the hand is flat against the ceiling. This corner is set to the line, while the left hand, with the roll of paper, is drawn tight and likewise set on the line. If the paper is set true on the line both at the right and left hand, you will find



no difficulty in sweeping it straight and true across the room. Now, push your right hand over and back toward the corner to temporarily fasten the paper, then get out the smoothing brush and sweep the strip through the center and on both sides. Continue brushing, keeping your eye on the line, until you reach the short fold; then put the brush in your pocket, and, with the right hand, open the paper by pulling down on the far corner, as in

Fig. 7. Finish brushing the paper to the end of the strip. Care, patience and ordinary common sense are all that is necessary. By the time you have put on three or four strips, always lapping each one over the one before, you will either have acquired the necessary technique or will be calling for assistance. There's no halfway mark.

When working on the walls the paper is pasted and folded as before, the long fold being the top of the paper. After folding, the strip is slipped over the right



arm and carried up the ladder. Fig. 14 shows how the strip is held preparatory to opening the long fold.

Notice that the thumb and first finger of either hand grips the corners of the paper, while the other fingers prevent it from unfolding. When you are properly stationed on the ladder, the last three fingers of either hand are removed and the long fold gently slides open. The paper is then set to a line or to the edge of the previous strip and smoothed on with the brush. The match is usually quite easy, being marked in most cases by arrows along the selvage of the roll. Fig. 16 shows the brushing-on immediately after the short fold has been opened, the



right hand holding the end of the strip while the brush is swept through the center of the paper. Each strip should be thoroughly brushed into the angle formed by the baseboard and the wall, and then cut off with a trimming knife, razor blade or circular base trimmer, as shown in Fig. 15.



Hanging walls presents a number of little problems. On no account should a full strip of paper be used to turn a corner. Rather, the paper should be cut so as to lap about $\frac{1}{4}$ in. on the adjoining wall; then the rest of the strip can be brushed on, as in Fig. 17, with no danger of the paper wrinkling. Fig. 18 pictures the usual manner of papering around

windows and similar openings, the paper being carried over and under the opening without any mismatch. The strip saved from the left-hand edge of the window will fit in perfectly on the right-hand edge regardless of the size of the window or the dimensions of the piece cut out.

You will, of course, have to remove all lighting fixtures in order to fit the paper properly. Then tear the paper, as shown in Fig. 19, brushing it back to rematch the strip perfectly. On light-tinted papers, where a tear might be visible, the patching can sometimes be eliminated by





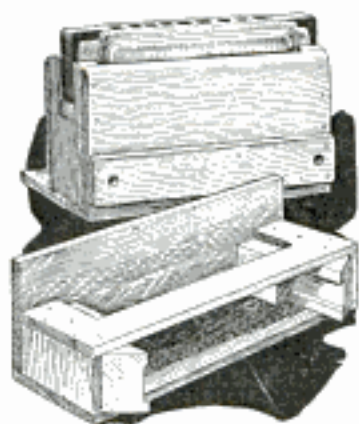
A Crib That Baby Can Propel Around Will Exercise and Aid in Teaching It to Walk

Rolling Crib Teaches Baby to Walk

Two rolling pins, fastened to a supporting frame and used as casters, will make an excellent crib that will exercise and teach a baby to walk. A strip of canvas, suspended from the front and back of the frame, serves as a seat. The top should be well padded to prevent injury should the baby fall on it. Rubber strips would also prevent marring furniture.

Sounding Board Improves Tone and Volume of Harmonica

Constructed by a person who was slightly deaf, this sounding board for a harmonica increased the volume of sound and improved the tone of the instrument.



The board was made from wood taken from a cigar box and its construction is clearly shown in the drawing. The braces on either end of the box were carefully cut, making a flange to prevent the harmonica from sliding all the way in, so that an air space would be provided to increase the volume of the

board was made from wood taken from a cigar box and its construction is clearly shown in the drawing. The braces on either end of the box were carefully cut, making a flange

sound. The holes on the side, near the bottom, are for a wire brace which holds the instrument in place.

Electroplating Lead Oxide on Iron to Protect It from Rust

By the use of a special solution, a thin, impermeable layer of lead oxide can be electrically deposited upon iron or steel objects to prevent rusting. The plating bath is composed of lead nitrate, 10 parts, and ammonium or sodium nitrate, 5 parts, dissolved in 100 parts of water. The object is first cleaned by dipping it in a boiling solution of lye, and then immersed in a 5-per-cent solution of sulphuric acid and water, in which it is allowed to remain for a time. It is then hung in the bath, a lead plate serving as the anode, a 2-volt current of 1 amp. per square foot of surface being used. Under these conditions the plating is completed in about 10 minutes. A larger current will shorten the time somewhat, but the coating will not adhere so well.

Sure-Hold Garage-Door Fastener

Trouble experienced in holding garage doors open, can be overcome with this fastener. It is a 3-ft. length of $\frac{3}{8}$ -in. iron rod with a right angle bent at one end for a handle. It is fastened to the



door with screweyes in which it slides, one of the screws being opened and driven in a position to hold the rod up while closing the doors. A hole is drilled in the concrete directly under the rod at the point the door is to be held, and the rod is dropped into it as shown.—C. Purcell Scott, Los Angeles, Calif.

☞ The odor of gasoline or benzine that remains on clothing after cleaning can be removed by sponging with water to which 6 or 8 drops of sassafras are added.

centering the strip at the opening and working on either side. This method is frequently used to avoid a tear in the ceiling paper around the central light fixture. In working around archways, the sidewall paper is cut in small segments to lap over the edge of the opening, then the adjoining sidewall strips are brushed on from the bottom up, cutting the paper at the necessary point to cover the half portion of the arch edge on that side, as shown in Fig. 20.

Mirror for Checking Engine Timing

When it becomes necessary to check the timing of an engine, there is generally so much dirt on the flywheel that it is rather difficult to see the markings, even with a flashlight. By placing the car in the sunlight and using a mirror to throw the light onto the flywheel housing the markings can easily be read.

Method of Cutting Show Cards to Prevent Waste

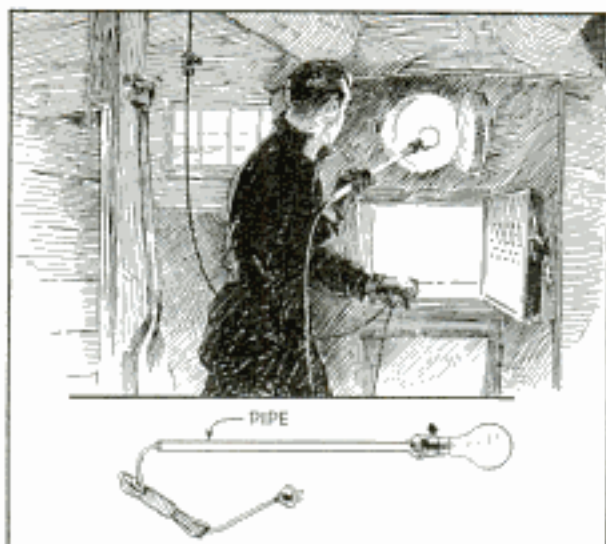


Full-size sheets of Bristol board can be cut for store signs so there will be no waste. The sheet first is cut in half and then into smaller sizes as shown. By following this method, considerable waste is avoided and cards of almost any suitable size are provided.

Tape Prevents Fingers Adhering to Cold Door Hook

When cold door hooks are gripped with damp fingers, the skin often adheres to the metal. To avoid this, wrap a piece of adhesive tape around the shank of the hook and press it into a hard cigar-shaped mass. If the tape remains a bit sticky, rub it with ashes or sand. A piece of cloth wrapped around the hook serves the same purpose.

Extension Light Aids in Cleaning Inside of Furnace



Electric Lamp Mounted on End of Pipe Provides Extension Light for Cleaning Furnace

Mounted on a $2\frac{1}{2}$ -in. length of $\frac{1}{4}$ -in. pipe, an extension lamp can be used to light the inside of a furnace while cleaning it. One end of the pipe is threaded to fit the tapped cap of a lamp socket, and a suitable length of lampcord is run through the pipe.

Heater Element Helps to Start Motor

To start your car during cold weather, if it is kept in an unheated garage, screw a heater element in the socket of an extension cord and drop it inside of a small tin can which is placed directly under the carburetor. In 3 or 4 min. the carburetor and intake manifold will be heated sufficiently to insure vaporization of the gasoline.—Vernon Harrison, Chicago.

Sign Inflated by Electric Fan

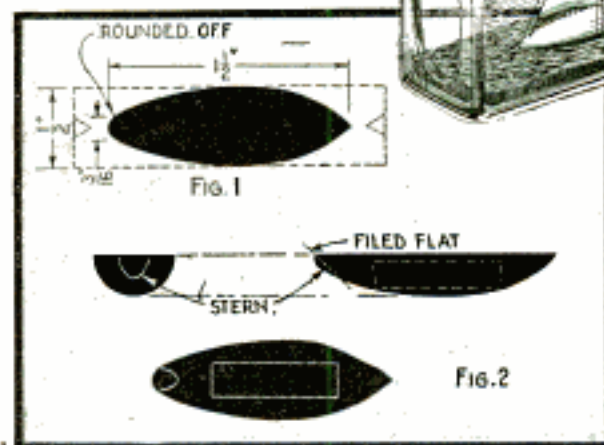
Mounted on an electric fan, a sign painted on a piece of cloth, sewed together at two sides to form a cylinder, will attract attention. The air blast from the fan keeps the cloth inflated. When attached to an oscillating fan, it can be seen from several angles.



Simplified SHIP-IN-A-BOTTLE

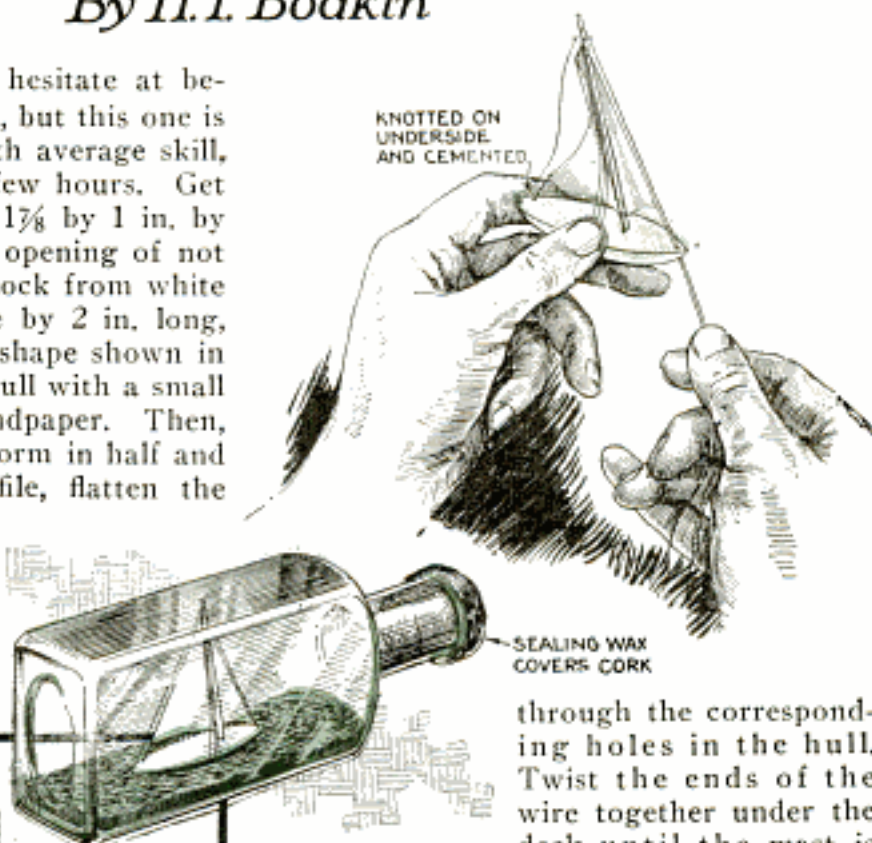
By H.T. Bodkin

MANY home workers hesitate at beginning a bottle-ship, but this one is greatly simplified and, with average skill, can be constructed in a few hours. Get a flat-sided bottle, about $1\frac{1}{8}$ by 1 in. by $3\frac{1}{8}$ in. deep, and a neck opening of not less than $\frac{3}{4}$ in. Cut a block from white pine, about $\frac{1}{2}$ in. square by 2 in. long, and turn it down to the shape shown in Fig. 1, or rough out the hull with a small plane and finish with sandpaper. Then, with a fine saw, cut the form in half and with a medium coarse file, flatten the larger end at an angle to form the sternboard, as in Fig. 2. On the curved bottom, mark off a rectangle and cut out the wood up to $\frac{1}{16}$ in. from



the deck. To receive the rigging lines and the wire hinge that holds the mast to the deck, drill eight No. 60 holes in the approximate positions indicated in Fig. 3, five vertically and three horizontally. The latter should be $\frac{1}{2}$ in. aft of the mast and $\frac{1}{2}$ in. apart. A fine needle, heated red-hot and quickly pressed through the hull will serve as a bit.

The mast is a round, hardwood toothpick, $1\frac{1}{8}$ in. long, as shown in Fig. 5. Cut and scrape the mast to the taper shown and drill six small holes, Nos. 3 and 6 being at right angles to the rest. The mast is fastened to the hull by passing a fine wire through hole No. 6, and bending the wire on each side of the mast to go down



through the corresponding holes in the hull. Twist the ends of the wire together under the deck until the mast is drawn down on the deck but not too tight, allowing it to swing freely fore-and-aft. At this point, it is best to paint the ship.

Any fine brown or khaki-colored thread, say No. 60, is satisfactory for rigging. Cut a 2-ft. length, rub it with beeswax and then quickly pass it over a low flame to melt the wax into the thread. Thread a fine needle and, starting with the first of the three horizontal holes in the hull, pass the thread through as indicated in Fig. 4. Knot the loose end of the thread so that it will not pull through the hole. Hold the mast vertically while the thread is run through hole No. 3, and draw the thread taut. Drop a touch of ambroid in the holes where the loose ends of the thread emerge from the hull and, with the mast perfectly vertical both fore-and-aft and athwart, glue the threads where they pass through the mast. The back and forestays are then threaded. Tie the thread tightly with a square knot at the stern. Then, holding the mast upright, stretch the thread from the stern diagonally up through mast hole No. 1,

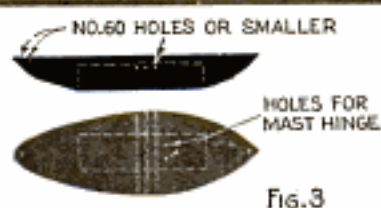


FIG. 3

pass it around the mast two or three turns and, with the thread taut, tie it with a half-hitch to the mast. The thread should be knotted so that the loose end comes squarely from the front and center of the mast. Cement the thread as before, and when dry, run it through the hole in the bow. Do not cement this forward hole. The end of the thread, after it is passed through the bow hole, should be left long so that it can be used later to pull the mast upright when the ship is inside the bottle.

The sails are made of tough gray tissue paper. Fit them in their proper positions, trimming them along the edges until they are of the correct size. Now, cut five pieces of waxed thread 6 in. long and a sixth piece 12 to 15 in. Tie a tight single knot in the end of each piece. With a toothpick, ambroid the knots and coat the three points of each sail likewise on both sides of the paper. When the cement is dry, pierce a corner of a sail and pass the thread through, until the knot lies flat on the paper, not too close to the edge. With the knot pulled snugly against the sail, drop a touch of cement over the thread and paper, and hold the knot in place until the cement hardens. The long piece of thread goes through the forward lower point of the

foresail, and the short pieces through the remaining corners of both sails. Attach the mainsail first. Thread the needle with the "line" attached to the lower forward corner of the mainsail and pass it through hole No. 4. Leave the thread loose in the hole until the other threads are in place. Next, pass the top thread through hole No. 2. Then pass the last, or rear-corner, thread through the hole in the aft side of the deck. Now leave the mainsail and attach the threads fastened to the edge of

the foresail that goes next to the mast. One thread goes through hole No. 5, one through hole No. 4 and the long thread at the forward lower point of the foresail through the hole in the bow. Pull both sails against the mast with the threads and tie a single knot on one side of the mast with the loose ends

which are then brought around and another knot tied on the opposite side of the mast. After that the knots are cemented in place, leaving the ends long, as they can be cut off later. Now, hold the mast upright and have another person tie the third thread of the mainsail securely to the after deck. Cement this knot also. The long thread attached to the foresail is not cemented, as it serves to pull the sail taut after the ship has been placed in the bottle. Cut off all loose ends of the threads close to the knots, but

do not cut the long piece from the foresail that passes through the bow hole for the reason just mentioned. Fold the mast backward and fit the ship inside the neck of the bottle to make sure that it will pass through easily. Cover the bottom of the bottle with ordinary putty, as it lies on its narrow side, to a depth of about $\frac{1}{4}$ in. This putty is first kneaded until it is plastic and free from lumps. Then, mix a small amount of japan automobile paint to a greenish-blue color, using turpentine to thin it. Do not thin too much, as this will make the putty "messy" when the

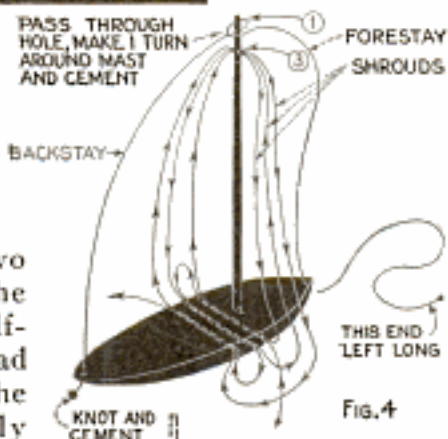


FIG. 4

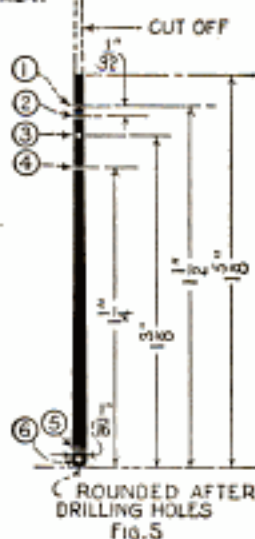


FIG. 5

color is added to it. Knead a little of the paint into the putty and keep adding to it until a suitable effect is obtained. Flatten a small wooden stick to a paddle at one end to pass into the bottle without touching the side of the neck. Use this to put the putty into the bottle, a little amount at each time. Avoid touching the glass sides and neck. Spread the putty evenly over the bottom with a stiff-wire hook and then let it stand for a few hours. Now insert the ship, stern first. Use a similar wire hook to guide the ship into position and press it tightly into the putty so that the latter fills the "well" cut in the hull bottom. The two long threads at the ship's bow must extend outside the bottle neck. Allow the putty to harden for two or three days, then pull the mast upright and the slack out of the two threads with the hook, so that all the rigging is taut. Grip the two threads against the outside of the bottle, remove the hook, and cement the threads where they emerge from the hole in the ship's bow. When dry, sharpen the inside edge of the wire hook and saw off the threads close under the bow hole. Discard the waste pieces and touch the thread ends in the hole with white lacquer to match the hull.

The waves in your sea can be made with the hook. Catch it in the surface of the putty and pull it slightly toward you to make ridges in the putty. Dip the same hook in white lacquer or paint and touch the tips of the waves to imitate whitecaps. Cork and apply sealing wax as shown.

Cloth Lining for Wash Basket



To keep the clothes from being soiled, a removable muslin lining for your wash basket will be found useful. The lining is made up of two pieces that are cut and sewed together

to fit inside the basket, the whole lining being held in position by cutting holes in it to fit over the basket handles.



Making It Easier to Carry a Heavy Ladder by Providing a Comfortable Shoulder Pad

Shoulder Pad for Carrying Ladder

Fitted with a soft shoulder pad at the point where it balances, a ladder can be carried with ease and comfort. This saves time in locating the point where the ladder balances. The pad is made of curled hair or folded burlap with a canvas cover tacked to it and to the ladder, or part of an auto tire casing may do.

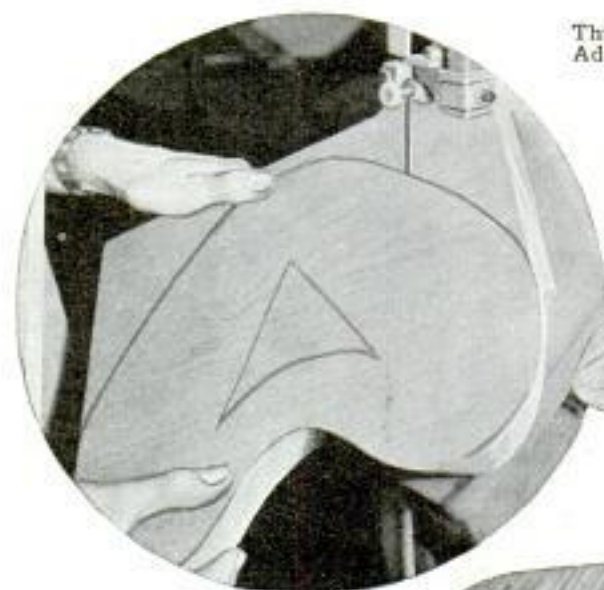
Heated Spark Plugs Aid in Starting Gasoline Engine

Starting cold engines or concrete mixers, etc., is sometimes a rather exasperating task, especially if the engine is not in the best of condition. Remove the spark plugs and heat them, being careful not to break the porcelain. After they have been heated, replace them as quickly as possible and crank the engine. The heat from the plugs aids in vaporizing the gas mixture in the cylinder, causing it to ignite more easily.—A. W. Dreyer, St. Louis, Missouri.

Steel Wool Cleans Windows in Cold Weather

During cold weather it is often rather difficult to clean windows, because the water freezes on them. By using a good-sized wad of steel wool and rubbing it over the window, spots can be removed quickly, and the wool will not scratch the glass in any way.—B. L. Gilbert, Chicago.

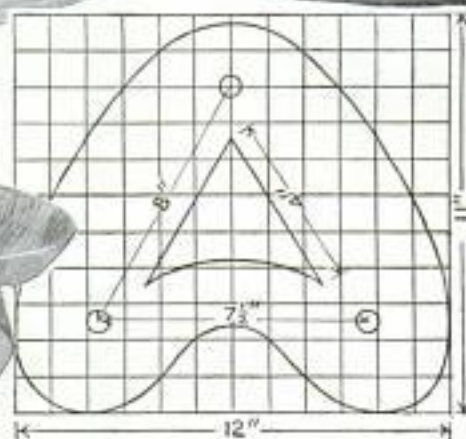
Eskimo Stool Quickly Cut on Your Bandsaw



Three-Legged Eskimo Stool Adds Touch of Pleasing Variety to the Home



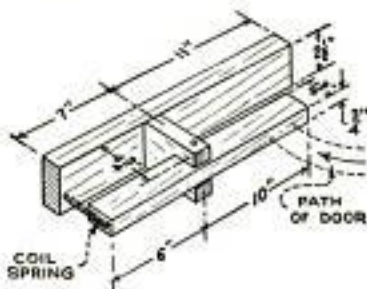
Probably you would find it inconvenient to import one of these simple, rugged but useful Eskimo stools, but you can readily make a duplicate in your shop at little cost. It is a three-legged, heart-shaped affair with a hole in the center so that it can be picked up easily. The model shown was patterned after a genuine Eskimo stool in the Cleveland Museum of Natural History, one that had enabled its original owners to fish through ice without getting frozen feet. Cut the stool top from well-seasoned wood, preferably hardwood, about 2 in. thick, using a tilting-table bandsaw if one is available, as indicated in the upper left-hand photo. Then chisel out the central opening. Also round the lower



edges with a chisel and spokeshave, but leave the upper edges fairly sharp. Dimensions for the top are given in the drawing, while the legs, shaped by turning or whittling, are each about $4\frac{1}{2}$ in. long and tapered from 1 to $\frac{1}{2}$ in. in diameter. They are inserted in 1-in. holes bored at an angle in the underside of the top. This angle should be such that the bottom of the legs will project slightly beyond the edges of the stool when viewed from above. The legs are beveled to fit squarely on the floor.

Spring Check for Storm Door Prevents Broken Glass

Breaking of the glass in a storm door by slamming against the house, can be prevented with the illustrated stop. The notched block, which serves as a fulcrum, is screwed to the base. A wooden arm,



pivoted to the block, has a coil spring at one end, which checks the force of the door when it closes.

Red-Striped Cardboard Increases Visibility of Water Gauge

Clear water in a clean gauge makes it difficult to determine the exact height at a glance. To remedy this trouble, a piece of white cardboard, $4\frac{1}{2}$ in. wide, should be cut slightly longer than the glass, and red diagonal lines, $\frac{1}{4}$ in. wide, and $\frac{1}{4}$ in.

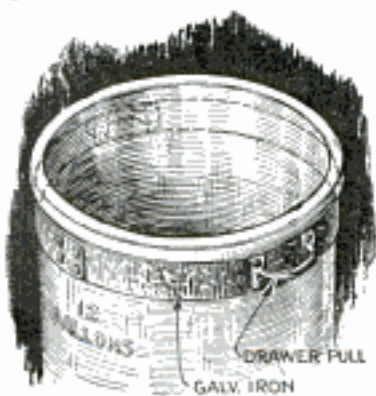
apart, painted across the entire surface. Fasten the ends of the card on the back of the gauge glass so that it is slightly curved behind the glass, and is equally divided as to its width by the glass.—Robert McNicol, Albany, N. Y.

Getting Truck Out of Mud without Strain on Rear Springs

Should you get your truck stalled in a muddy place, chain the rear wheels up tight to the body sills before jacking up the rear part. This brings the entire rear axle closer to the load and reduces the strain on the springs. Often, when stalled, the rear wheels grind down to the hubs and by applying force enough to pull the truck out, the rear springs or bracing is likely to be wrenched. If the rear part of the chassis is jacked up and properly blocked, heavy boards can be placed in front of the rear wheels and the truck moved along to firm footing.—Evington Lemaster, Maryville, Mo.

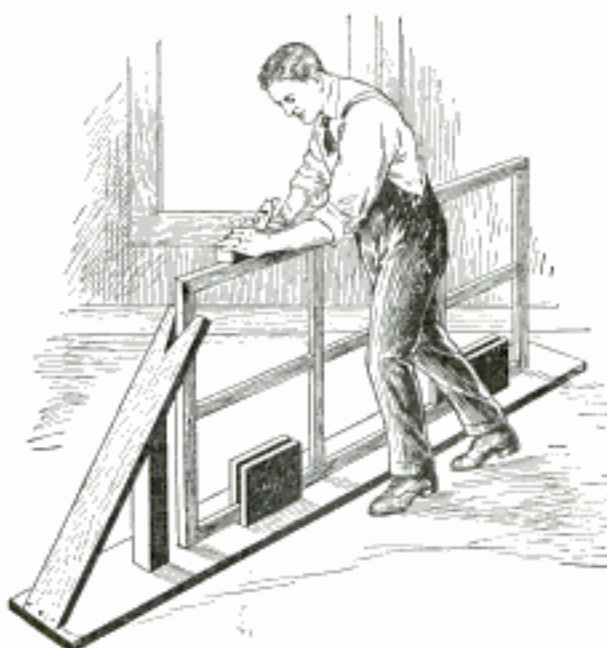
Handles on Large Earthenware Crocks

Much effort can be saved in lifting large earthenware crocks if they are fitted with handles. To do this, rivet two door pulls to a sheet-metal band of sufficient size to just slip over the crock from the bottom. The flange around the top of the crock will prevent the band from coming off when lifting.



Lamp Improvised from Blowtorch

For temporary use, a light of great intensity can be improvised from an ordinary blowtorch. Tie a gas mantle over the mouth of the torch nozzle, and light it in the usual way. As a blowtorch has considerable more pressure behind it than a gas lamp, care should be taken not to turn it on too far as this might burst the mantle.—Dr. F. J. Svoboda, Cozad, Nebr.



Special Holder of Simple Construction Eliminates Awkwardness When Planing Window Frames

Wooden Holder Simplifies Planing of Window Frames

This holder is made of 1-in. stock and consists of a base to which two cleats are nailed for holding the bottom of the window frame. The end of the frame is held by a notched piece nailed to the front of the base at an angle and supported by a brace.—J. T. Watkins, Astoria, N. Y.

Fence Posts from Old Auto Frames

Imbedded in concrete, the side members of old auto frames make sturdy posts for fences around industrial plants, schools, etc. The ends of the frames, which are usually bent to accommodate the front spring, provide the desired overhang and should be placed with the bend toward the outside of the fence, to be more effective in keeping out trespassers.—R. F. Starzl, Le Mars, Iowa.



☞ Before letting the baby use new shoes, sandpaper the soles and it will be saved many falls.

Window-Seat Wood Box Operated by Windlass



By utilizing a window seat in a living room for a wood box, fuel can be hoisted from the basement with a dumb-waiter. First make a box from 1-in. material, with the ends extending a few inches above the sides. Then cut a hole in the floor underneath the window seat large enough for the box to go through. Also cut a similar hole

in the top of the seat, fitting it with a hinged lid. Bolt a length of 2 by 4-in. stock to the basement floor, directly under and about the center of the hole in the floor, and drill two holes in it for two lengths of iron pipe to serve as rails on which the box slides up and down. Insert a length of pipe through the holes drilled in the ends of the box near the top, and fit a pipe tee, large enough to slide over the pipes, on each end. Drive a screw-eye into each end of the box near the bottom, also to slide on the pipe, to prevent the box from swinging. Then set one end of the pipes in the holes in the 2 by 4-in. piece and fasten the other ends to the underside of the seat with a length of 2 by 4-in. stock in a similar manner. Next fasten two pulleys underneath the top of the seat and run a rope over them, one end being tied to the pipe inside the box and the other to a windlass fastened to the basement wall. In use, the box is filled with wood in the basement and hoisted up in the window seat where it is concealed, being held by hooking a small rope, fastened to the basement wall, over

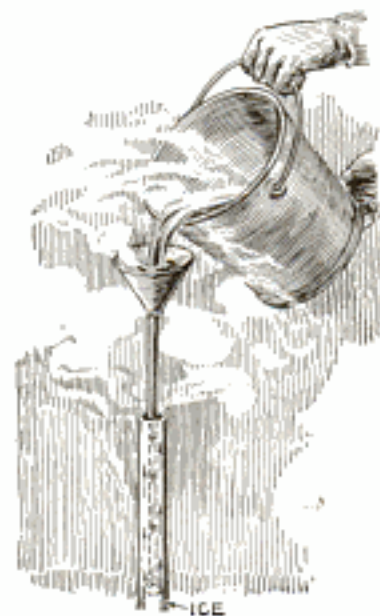
the windlass handle, as is also shown in the drawing.—R. B. Black, Los Angeles, California.

Temperature Indicated by Paint

For certain kinds of heat treatment for steel, a reliable temperature paint that gives a visible warning by changing color can be made as follows: Dissolve gum arabic, 10 gr., to each ounce of water, then add mercury iodide, 1 part, and silver iodide, 1 part. At ordinary temperatures this is a yellow compound, but when heated it gradually turns to a brilliant red. The last stage occurs at about 115°. If copper iodide is substituted for the silver iodide, the paint will blacken at about 190°, but will again turn to its normal color when cooled. A practical use for the paint is covering for heating containers. With an accurate thermometer and ordinary paints of graduated colors, a chart can be made that gives the temperature of the container when it reaches different shades of color.

Thawing Out Water Pipes

Thawing out an overflow pipe of the watering trough was simplified by an Indiana farmer with the aid of a funnel and a length of smaller pipe. The frozen pipe was of 1-in. size, so that a piece of ¼-in. pipe could be shoved down to the ice. A funnel was slipped into the upper end of this pipe to receive the hot water. By this method the hot water runs down on the ice while the cooled water rises between the pipes.



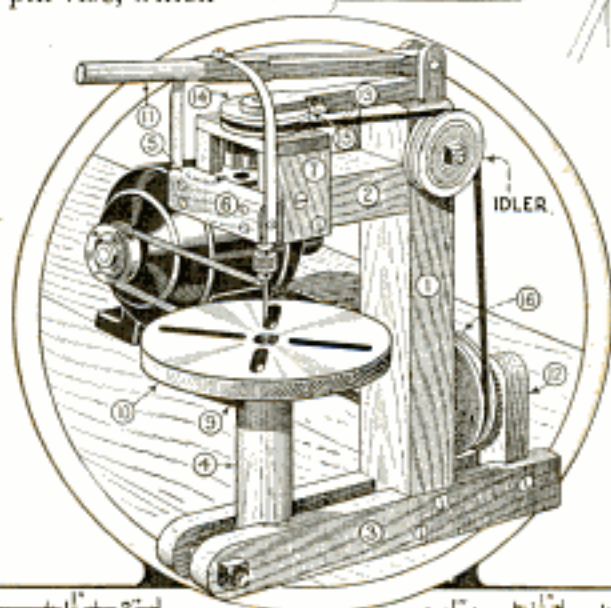
☛ Dust and lint can be removed from the mechanism of a typewriter with a tire pump.



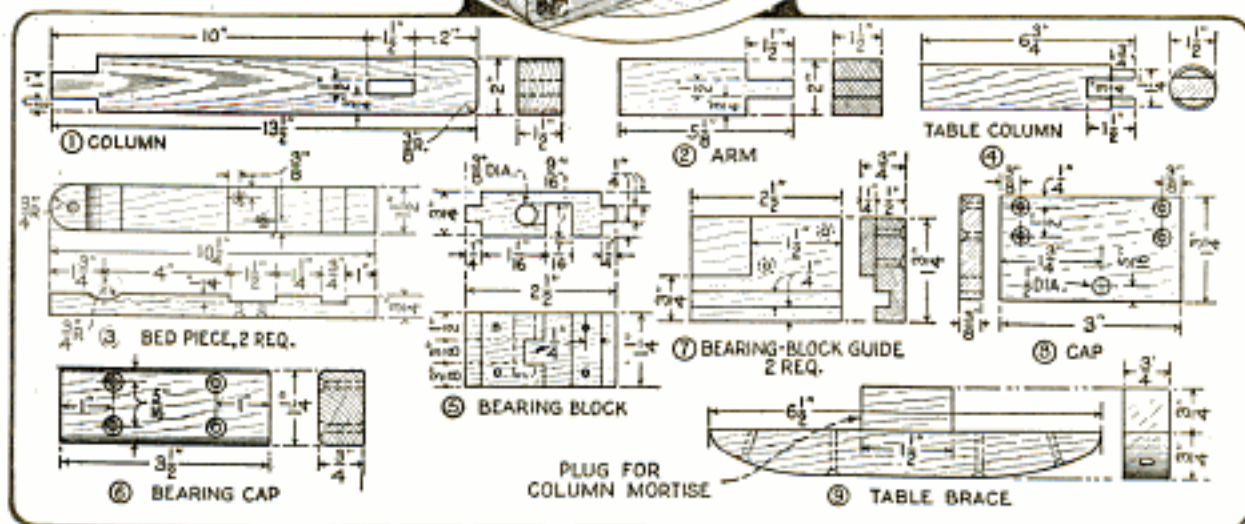
Sensitive DRILLPRESS for Small Work

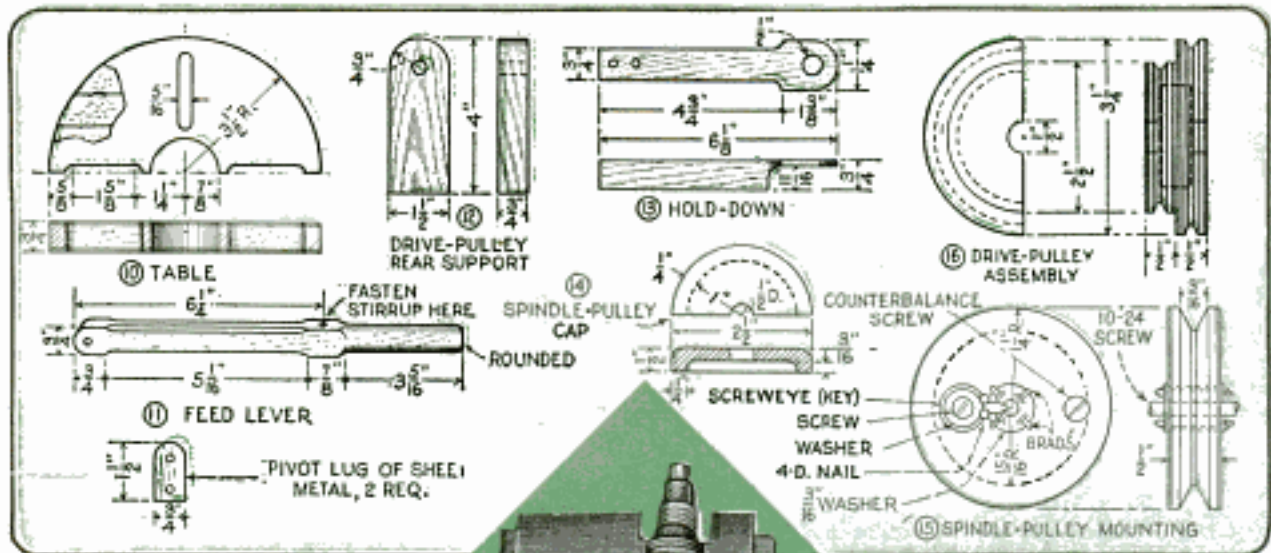
By Edwin M. Love

ASSEMBLED from a pin vise, roller-skate wheels and scraps of hardwood, this sensitive drillpress is a handy addition to the small shop and is especially useful in model making. The heart of the press is a pin vise, which forms the chuck for holding small drills or fine needles. In its usual form, the body is hollow and knurled the greater part of its length before expanding for the chuck, and as a bearing surface is required here, it is necessary to turn off the knurling. Chuck it in a lathe and stroke it with



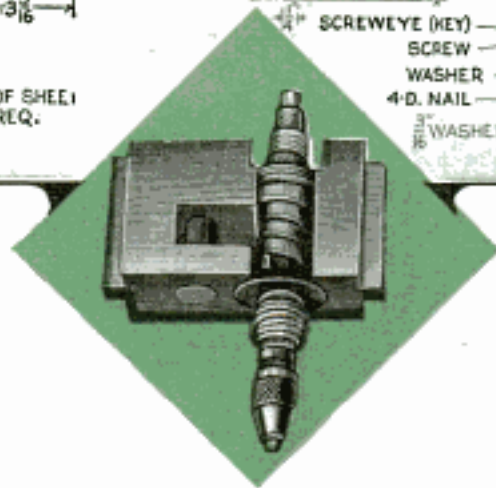
a flat file as it turns at high speed, finishing with fine emery cloth and oil. The bearing block is tongued on the ends to slide between grooved guides, and has a crosswise groove for the bearing. Drill a $\frac{3}{8}$ -in. hole beside it, connect-





ed to it with a chiseled channel, so that a piece of waste can be tamped in for an oil wick. Now expand a $\frac{1}{4}$ -in. machine washer to slip over the top of the vise. This is done by driving a punch into the hole, afterward hammering the washer flat again. This forms the lift-thrust washer. Expand three thin washers for the pressure thrust, two of them fitting freely and the third binding on the upper knurling. Flatten the expanded washer after being put in place, and it will hold. Next cast the bearing. Hammer flat a length of wire solder. Wrap it around the vise bearing and lay the vise in the block, wedging it at such depth that it will center in the thickness of the block. Hold it with twine. Flow solder around it with a hot copper, pry out, block in place with the solder at the bottom, and complete the bearing. Be sure, however, to twist the bearing loose after each half is cast. Melt out a section to connect with the oil hole.

The frame of the press is of hardwood, the arm being mortised into the column and the latter into the base strips. Glue these parts, but leave the drive-pulley-assembly rear bearing unglued, so as to permit removal. The two guide blocks are notched for mounting on the arm, and grooved for ways to fit the bearing-block tenons. Thicknesses of paper under these guides will provide for necessary clearance. Place the screw holes in

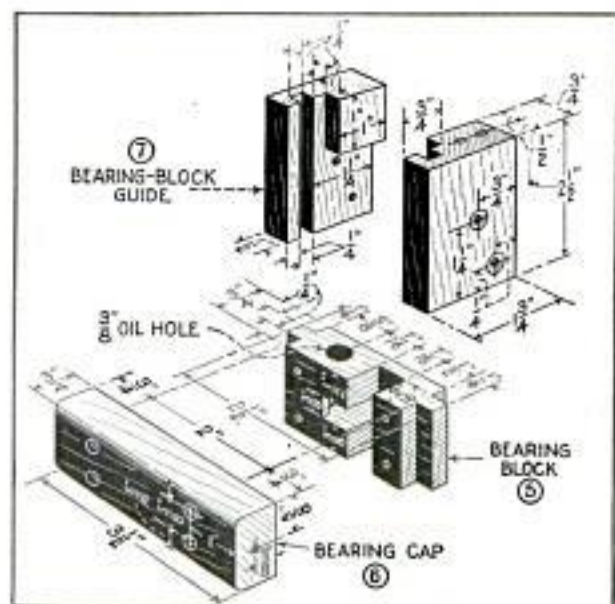


the bearing cap to center on the solid sections of the bearing block, and bore the latter so that the screws will not split it. Brace the guide tops with a $\frac{3}{8}$ -in. cap screwed in the thick parts, and pierced with a $\frac{1}{2}$ -in. hole

to admit the spindle. As the spindle, being driven by its pulley, must be free to slide up and down while the pulley remains at a constant level, a sliding key is needed, and a long keyway to mate with it. This is done by extending the pin vise with a machine screw, about $\frac{3}{16}$ in. in diameter, driven in the hollow end. A No. 10 screw, $2\frac{1}{2}$ in. long, is about right. As the threads are rolled, they are larger than the smooth part of the screw, and the thread diameter varies a little. It is possible, by trying a number of screws, to find one that can be securely twisted into the vise by means of pliers. Holding the screw in a vise, cut a $\frac{1}{16}$ -in. deep slot lengthwise with a hacksaw, for a keyway. From $\frac{1}{2}$ -in. hardwood, preferably five-ply, turn four pulleys, $2\frac{1}{2}$ in. in diameter. A three-cornered file, ground to a point at the tip, is excellent for shaping the grooves. For the idlers, bore holes just large enough to admit roller-skate wheels which are forced in by tapping lightly. Also turn a pulley, $\frac{3}{4}$ in. in diameter, recessing this and one of the smaller wheels to receive a roller-skate wheel, the two, when assembled, inclosing the wheel. Notice that the centers must be bored large enough to clear the stationary part of

the wheel center. Screw the assembly together and mount with a $\frac{1}{4}$ -in. lagscrew through the center, and some washers at each end. The spindle pulley is drilled $\frac{3}{16}$ in. at the center. Attach above and below it washers, held with four bent-over brads. Remove the keyway screw from the spindle, slip it through the pulley, and again screw it into the spindle. Cut the threaded end from a $\frac{3}{8}$ -in. screw-eye, and file on the stub a tenon to fit the keyway. Screw the eye flat on the upper side of the pulley, the key meshing with the groove, and drive a short piece of four-penny nail each side of the stub, to prevent swiveling of the eye. In boring the hole for the idlers, align the groove where the belt will run with the driven and driving pulleys. The idler at the left is parallel to the arm, while the right one inclines toward the driven pulley. Therefore, incline the bolt hole backward $\frac{1}{8}$ in. when entering from the left, so that, when the end carrying the right idler is bent forward, the groove will not be drawn out of line with the large pulley. Glue split wooden washers of proper thickness between the column and the idlers.

Turn a cap for the spindle pulley, relieving it on the underside to fit over the washer and screws of the pulley, and brad in place. Mount the hold-down on the top of the column, centering the hole on that in the pulley cap, screw on the lugs, and pivot the feed handle.



Isometric Drawing Showing Relative Positions of the Bearing Block, Cap and Guides



Improved Electric-Driven Forge for the Farm or Workshop Is Made from Scrap Parts

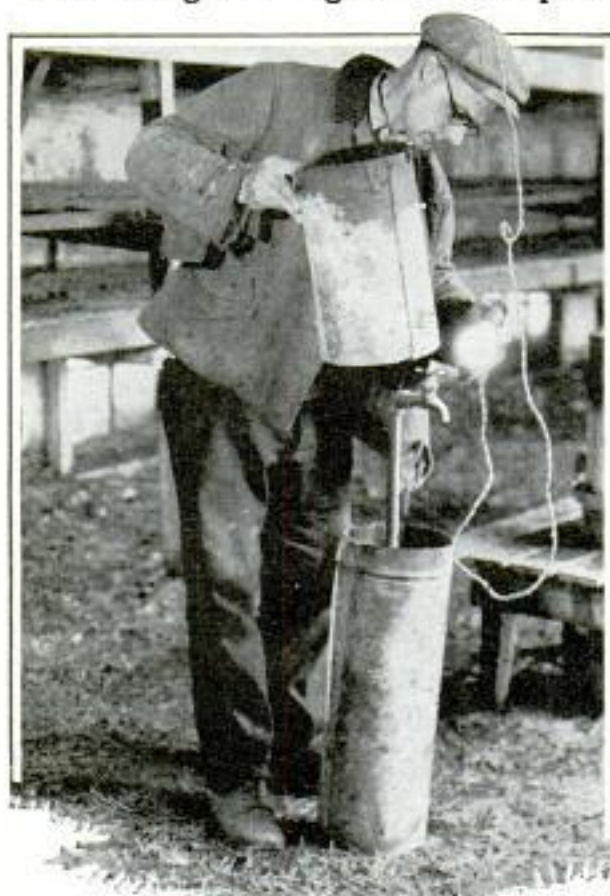
Vacuum Cleaner Provides Blower for Workshop Forge

Anyone, who has a discarded vacuum cleaner, can make this forge. A support is made from one-half of an auto axle housing mounted on a harrow disk. The blower consists of a motor and fan taken from the vacuum cleaner and is attached to the base of the forge by means of a tube inserted into holes cut in the support and the fan housing of the sweeper, as shown. Draft control is provided by blocking the ends of the suction nozzle and fitting a metal door over the hole between the blocks. The fire bowl is a sheet-metal disk fastened to the top of the support and is perforated with a number of small holes. A tire rim is fastened to the disk to prevent the fire from falling out. The entire fire bowl is lined with clay.

Starting a Tractor in Cold Weather

Hard starting of a tractor during cold weather can be overcome by cranking it with a car. Attach a pulley to the rear wheel of the car and run a belt over it to the belt pulley on the tractor. Release the control on the tractor so that the pulley will turn freely. Then speed up the car and engage the pulley control on the tractor. This will enable the car to turn the tractor motor until it starts.

Preventing Freezing of Water Pipes



Water Pipes inside Poultry House Prevented from Freezing by Stovepipe and Electric Lamp

A poultryman near Lafayette, Ind., uses a simple method to prevent the water pipes in his poultry house from freezing. Lengths of old stovepipe are set over the water lead and a 25-watt electric lamp is hung inside of them. The heat from the lighted lamp suffices to prevent freezing in the coldest weather and running water will be available at all times.

Corrosion Causes Ignition Trouble

Hard starting of an auto motor is frequently due to slightly loosened electrical connections which have become corroded, although the motor may run well after it is started. When the ignition switch is turned on, the current must break down this corrosion and create a path for itself. Until the current is able to do this, and build up to its full strength, poor ignition, or no spark at all, may be found. The current flow may be noted by observing the pointer of the ammeter while the engine is being cranked. It should swing over to between

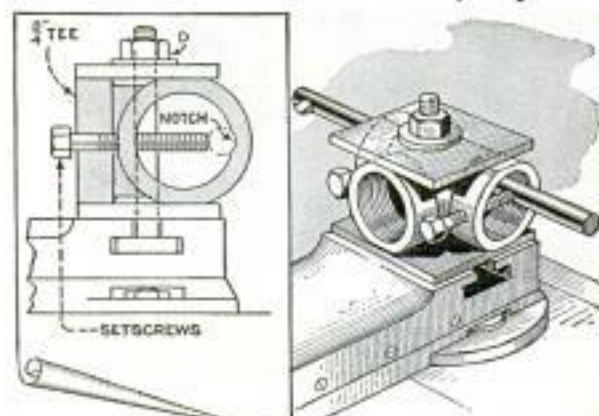
4 and 6 amp. at regular intervals. If it does not do this regularly, a corroded terminal somewhere in the ignition circuit may be suspected, perhaps at the timer points. If cleaning the points does not remedy the trouble, all the ignition wires should be shaken in turn, while observing the ammeter. Any irregular movement of the ammeter should be checked by inspecting the terminal of the wire which seems to cause the irregularity. After the terminal has been cleaned and tightened, recheck the wires in order to be sure the fault has been corrected.

Cure for Saw-Filing Squeaks

Shrill squeaks when filing saws, can be reduced by the use of sheet lead. Cut two strips the length of the saw clamp and about 1 in. wider than the face of the clamp. Place them in the clamp, one at a time, and bend over the projecting strip so that they will hang in the clamp. Then place the saw between them and tighten the clamp. These silencers absorb the vibration which causes the squeaks.—W. W. Wheatly, Fresno, Calif.

Lathe Boring Tool Improvised from Pipe Tee

In the absence of a boring tool, a good substitute can quickly be made from a pipe tee. Two holes are drilled and tapped for setscrews which hold the tool in a notch filed in the inside of the tee. It is faced flat on top and bottom and drilled in the center for a bolt to hold the tee, the head of the bolt being ground square to fit in the toolpost slot. A piece of flat metal, of the proper thickness to aline the tool with the headstock center, is placed



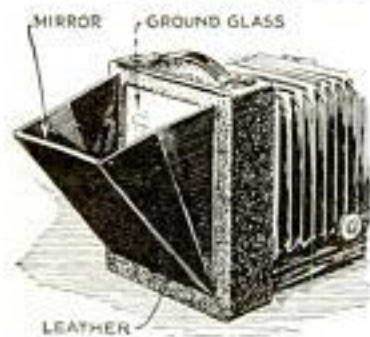
This Boring-Tool Holder Is Assembled from a Pipe Tee, Bolt and Two Flat Iron Plates

between the tee and the lathe compound rest, while a similar piece is placed on top to provide a smooth surface for adjusting the tee, both pieces being drilled to receive the bolt as indicated.

Beach-Sand Molds for Metal

Beach sand thoroughly mixed with flour and water, makes good molds for casting metal. Just enough water should be added to moisten the ingredients. After packing the sand around the pattern, it is baked in an oven until thoroughly dry and hard. A mixture of oil and graphite on the pattern, and dry graphite between the halves of the mold, will insure separation and the easy removal of the pattern. Vent holes should be made in the mold. The flour is burned out of the sand which is in contact with the metal.

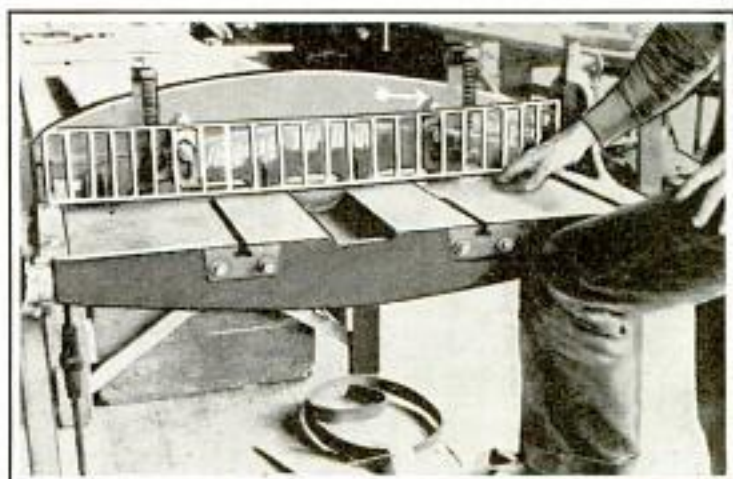
Mirror Adds Reflecting Feature to Ordinary View Camera



Inexpensive and easily constructed, the illustrated mirror arrangement will add the reflecting feature to a regular view camera. Cut a piece of thin

mirror to the size of the camera ground glass and cement it to the back of a piece of imitation leather, cutting the latter large enough so that the excess leather at the sides will form a folding pocket when attached as shown. A space of $\frac{1}{2}$ in. should be allowed at the bottom to serve as a hinge. Used in this manner, the mirror unfolds quickly, the leather at the sides keeping out excess light. The mirror shows the reflected image full size and right side up.

☐ To find the diameter of a circle, multiply the circumference by .3183 instead of dividing it by 3.1416, multiplication being easier than division to most people.



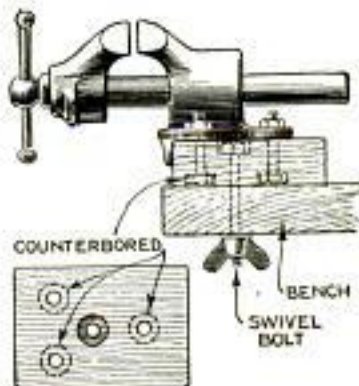
Injury to Operator's Hands with Square Shear Prevented by Guard Bolted to Work Hold-Down

Guard Prevents Cutting Fingers on Shear

Bolted to the holder for the work, this guard for a square shear will protect the operator against injuring his fingers on the cutting blade. It consists of two lengths of $\frac{3}{16}$ -in. iron rod, having 6-in. pieces of the same material welded cross-wise between them at 2-in. intervals. Two short rods are bent into loops and tightened under the nuts on the bolts of the hold-down. This keeps the guard about 3 in. from the cutting edge of the blade and allows it to touch the table when the cut is being made.

Swivel Joint Increases Usefulness of Stationary Vise

Fitted with a swivel, the usefulness of a stationary vise can be increased greatly. The vise is bolted to a hardwood block, countersinking the bolt heads flush with the underside of the block so they will clear the bench when the vise is turned. The block is then pivoted to the bench top with



a bolt and wingnut, the head being similarly countersunk to clear the bottom of the vise. This arrangement will allow the vise to be turned and used at any angle.

Old Ice Tanks Used for Scaffolding



Scaffolding Supported by Discarded Ice Tanks Is Quickly Torn Down without Damage to Material

A building contractor in Topeka, Kans., uses old ice tanks in the erection of scaffolding for building construction. Their advantages over wooden supports are quicker erection with less labor, more strength and rigidity, elimination of cross bracing and platform lumber, as well as easier storage and transportation. In addition, they enable openings to be made quickly by leaving out or withdrawing connection lumber as shown. They are also adaptable for either interior or exterior work in any unit length desired and have been used successfully up to three-story heights.

Center Punching at Equal Intervals



When you have work that requires a number of perforated holes, here is a spacing punch that will speed up the work. The tool consists of two lengths of bar iron pivoted together at one end while holes are drilled in the oth-

er ends to hold center punches which are kept in position by setscrews as indicated. Another length of bar iron is slotted at both ends and fitted over bolts in holes drilled a few inches back of the punches, to serve as an adjustable spacer, a washer of suitable thickness being used between this bar and the lower arms to keep them in alinement.

Preventing Cracks When Flanging Metal

Before attempting to flange a piece of sheared sheet metal, it is a good idea to remove the burr from the edges. This can readily be done by using a file, or in cases of poor shearing, a cold chisel. Absence of the burr prevents the metal from slipping off the line in the vise or flanging machine. It also prevents cracking at the edges, if the burr side of the metal is to form the outer corner or heel of the finished flange. Some metals crack even though the ragged edges have been removed. To overcome this, slightly chamfer the heel side of the metal with a round file before bending.

Neat Sign Fasteners from Gummed Paper and Pins

By bending a pin as shown in the detail and using a three-cornered piece of gummed paper, a neat hanger for window signs can be made. Hold the pin against the window and paste the paper over it. Then hang the sign on the bent pin.



Tooling for Duralumin

In turning duralumin, set the cutting edge of box and similar tools a little above the center, instead of at the center, as with brass. Also give about 5° front clearance for best results. Forming tools that pass under or down beside the work, which makes them act as scraping tools, work better with a little shearing action to the cut. A 10° shear and a similar front clearance give a good clean job.

Abrasive belts - Minnesota
Mining & Mfg. Co.
79 of Fiorello St
St. Paul
Minn

Using ABRASIVES in the Small Shop

By W. Clyde Lammey

GRINDING and polishing in the home shop need not be limited to the use of emery and buffing wheels in the ordinary manner, for readily available materials offer possibilities of making many additional appliances of value in this branch of work.

For grinding a true face on small flat work, the lap board shown in Fig. 1 is useful. The surface of the base must be true and of sufficient width to allow two strips of emery cloth, one very fine and one of medium grit, to be clamped tightly over the base as shown.

Another useful accessory on a buffing spindle is the emery-covered grinding wheel shown in Fig. 2, consisting of a turned and slotted hub. Strips of emery cloth are cut to the width of the hub and about $3\frac{1}{2}$ in. in length, and are inserted in the four slots. The strips are held in place at one end by small screws, one in each slot, with the

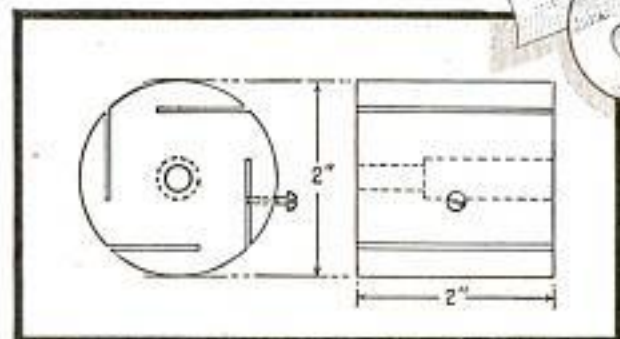
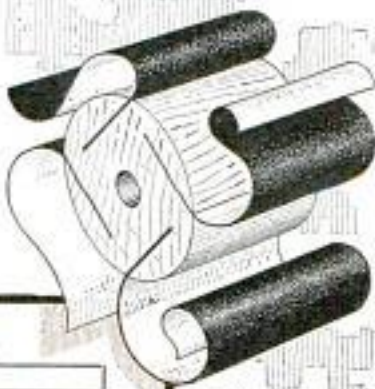
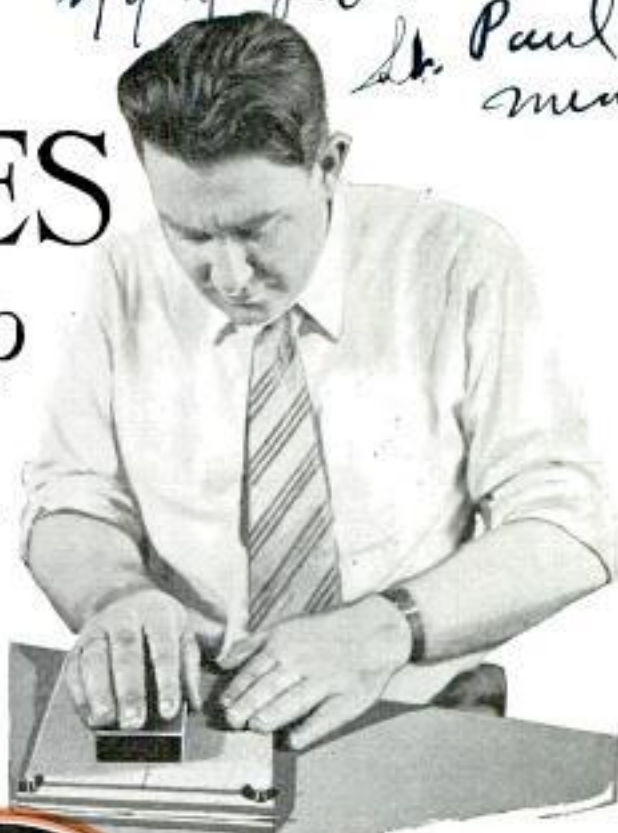


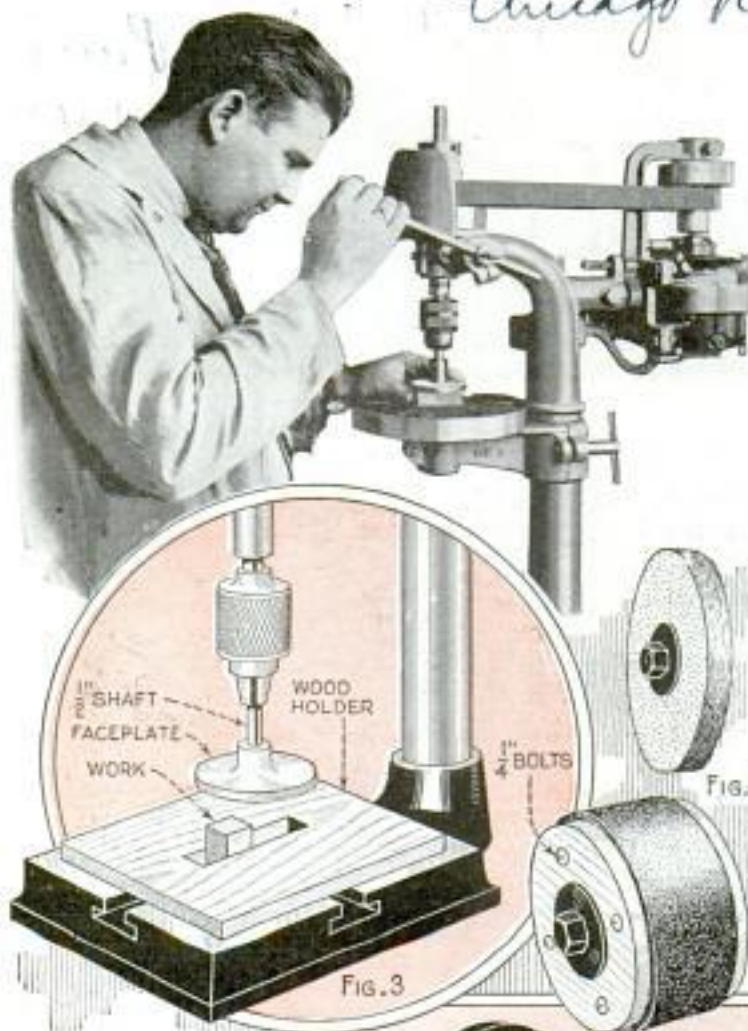
Fig. 2

head sunk in a counterbored hole. The hub must be counterbored so that it turns up on the tapered buffing spindle and the slots may be accurately cut on a bandsaw. In use, the flying strips strike and cut on all parts of the surface, being especially effective on irregular work. The speed of the buffing spindle should not exceed 1,800 r.p.m.

Two additional types of flexible abrasive wheels that are mounted on a spindle are shown in Fig. 4, the first being simply a disk of emery cloth backed by a disk of $\frac{1}{2}$ -in. felt of equal diameter. The cloth is not glued to the felt, as the latter acts merely as a backing

to prevent tearing and to better hold the abrasive up to the work. The second wheel is made up of two disks, cut from $\frac{1}{2}$ -in. felt and held between two wooden disks, the diameter of each being 1 in. less

Chicago. 1500 Madison Ave.



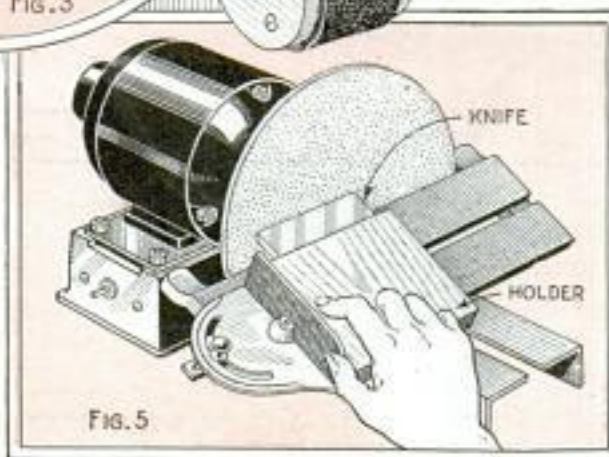
than that of the felt. The parts are held together with $\frac{1}{4}$ -in. bolts. The felt surface of the wheel is impregnated with polishing rouge. Care should be taken to cut the disks true and to center the spindle hole, as otherwise they will vibrate when running at high speeds.

Another method of grinding a true, flat surface on small parts is shown in Fig. 3, using a lathe faceplate for the grinding disk, a 2-in. length of steel shafting, $\frac{1}{2}$ in. in diameter, being inserted in the faceplate and tightened in the drill chuck. The faceplate is coated with a special adhesive such as is used for attaching garnet paper to sanding disks, to hold an emery-cloth disk. The work is held in a slotted block of hardwood, and only the

portion between the center and the rim of the faceplate is allowed to do the grinding to get a true surface. Fig. 5 shows a practical method of grinding planer knives, use being made of a sanding disk to which is glued a disk of fine emery cloth. The work is held in a slotted wooden holder in the position shown on the sanding table, guided by the miter gauge. Only half the disk is used in grinding, and the work should not be allowed to pass the center of the disk.

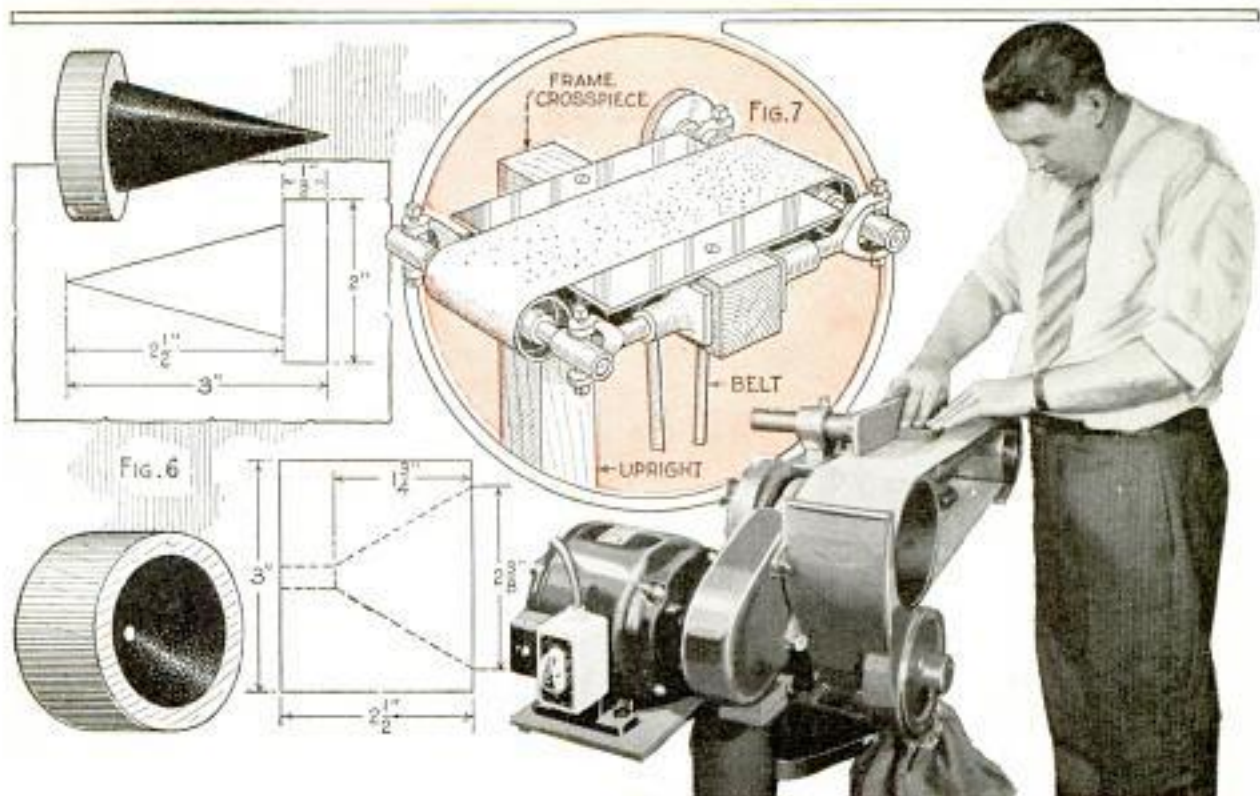
Two grinding appliances for sharpening gouges with either inside or outside bevels, are shown in Fig. 6, the first being simply a hardwood cone turned to approximately the dimensions given. The conical surface is coated uniformly with thin glue, and after this has set slightly, the surface is sprinkled with medium emery powder. When the surface is dry, the process is repeated, three applications giving the

best grinding surface. In use, the inside beveled gouge is inverted, and the edge placed on the revolving cone in such a position that the curve of the edge coincides with that of the cone. To make the second grinder, turn a disk from hardwood to



the approximate size indicated. Then turn out a conical recess. Coat this with thin glue and sprinkle with medium emery powder three times, allowing the glue to dry between applications. To use, place the outside beveled gouge, concave side up, so that the edge coincides with the curve of the abrasive surface.

When using a grinder, it is always best to wear goggles to protect the eyes, and no valuable machine or tool should be near the grinder, as particles of grit may get into the bearings. A power-driven



lap grinder of the type shown in Fig. 7 is especially useful to the model maker, as it effectively supplants the use of a file in truing small parts. The assembly of the grinder consists of four small shaft hangers, bolted to a crosspiece of hardwood in the manner shown, the size of the crosspiece depending on that of the hanger bases. The hangers may be of a size fitting $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{3}{4}$ -in. shafting, according to the capacity and size of the machine desired. The pulleys may be made of wood turned to about 3 in. in diameter, depending on the width of the hanger base. The face of the pulley should be $\frac{1}{2}$ in. wider than the width of the abrasive belt. The pulleys are keyed centrally on the shaft, which is held in place in the bearings by collars. The table may be made from $\frac{3}{8}$ -in. steel plate, the plate being screwed to the crosspiece with the ends projecting the same distance. The machine may be mounted on the bench or, if desired, may be made into a self-contained motor-driven unit by bolting the crosspiece to a single square column, the lower end of the latter supported on a square base to prevent tipping. The motor may be bolted on a shelf, attached to the column about 6 in. above the base, the motor pulley alining with the pulley on the grinder shaft. Abrasive belts of

varying widths and lengths as well as grit sizes for metal or wood can be obtained already spliced. The belt may be tightened to the proper tension and alined on the pulleys by adjustment of the hangers, and may be easily removed and replaced by another belt of finer or coarser grit by simply slacking the hanger-column set-screws. If necessary, a wide channel may be cut across the lower face of the crosspiece to allow belt clearance. Drill and tap the bearings for grease cups and use a rubber V-belt on V-pulleys for the drive.

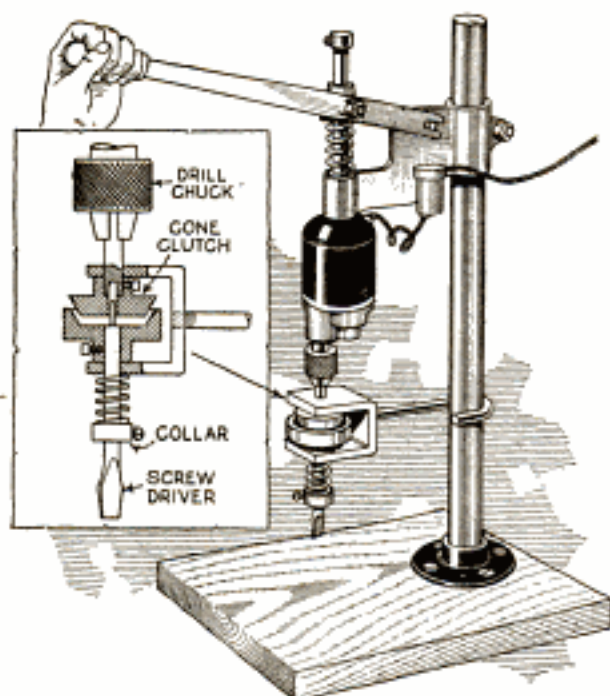
How to Grind Drills to Prevent Burrs



Drills ground as shown in the illustration will not cause burrs on the underside of the work when the drill breaks through. The angle at which the drills are to be ground depends on the quality of the material to be drilled. It is a good idea to use bushings to guide the drill when starting it.

☛ Sponging with gasoline or some similar fluid will clean soiled tracings.

Screwdriver Driven by Drillpress



Screws Are Quickly Driven with This Cone-Clutch Assembly Attached to a Drillpress

Driven by means of a cone-clutch assembly attached to almost any type of drillpress, this tool will speed up work where a great number of screws are to be driven. No dimensions are given, as these depend on the type of press used. A U-shaped piece of steel is drilled and tapped at the bottom for an iron rod, bent into a hook at one end to fit around the metal support of the press, to prevent the assembly from turning. Holes are drilled in line with each other through the sides of the U-shaped piece. A steel shaft is passed through the upper hole and chucked in the press and the lower end is fitted in the top member of the clutch. The screwdriver blade is inserted through the lower hole, and the collar part of the clutch fastened to it as shown in the detail. The lower part of the clutch is held against the U-shaped piece by means of a compression spring slipped over the screwdriver blade and kept in place with an adjustable collar, which allows the tension on the screwdriver to be varied. When the screw is driven home, the clutch will slip.

Refinishing Peroxide Spots on Furniture

Hydrogen-peroxide spots on furniture can be removed as follows: First apply oil stain on the spots to match the surface.

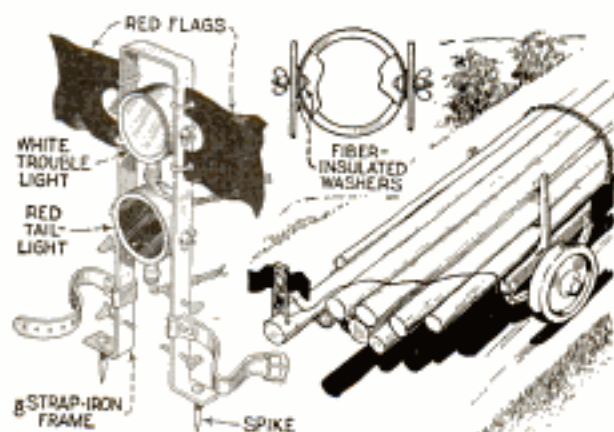
Then use a small camel's-hair brush to varnish the spots, building them up slightly higher than the surrounding surface by applying successive coats at 24-hour intervals. Then rub down level with finish first with powdered pumicestone and water and next with powdered rottenstone and oil on a felt-covered wood block.

Treatment for Frozen Combs on Poultry

As a remedy for frozen combs on fowl, first thaw out the affected parts by rubbing vaseline into them with the fingers. Keep the birds in a cool place away from heat, and continue rubbing the combs twice a day with the following mixture: vaseline, five tablespoonfuls, glycerine, two and turpentine, one tablespoonful.

Portable Tail Light and Flag for Overhanging Loads

Truck drivers will find the illustrated tail light and warning flags handy to attach to long overhanging loads. It consists of a U-shaped piece of $\frac{1}{8}$ -in. flat iron of suitable size, on which the lights and flags are mounted as shown. If desired, the flags may be cut from light sheet metal and clamped to the frame with wire. The lower end of the frame is fitted with thumbscrews and leather straps for fastening the assembly to the rear of the load, while the ends of the frame are bent at right angles and drilled for nails, if used on loads of logs, etc. A length of extension cord is run from either lamp to the regular tail light of the truck, where it is attached to the lamp socket by means of a plug.



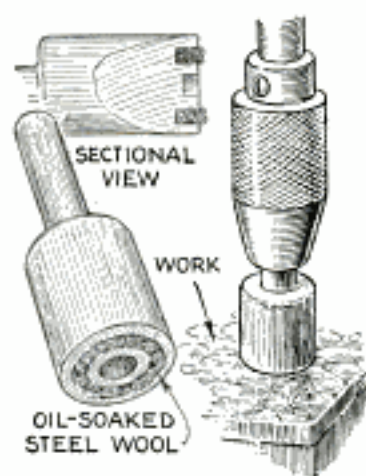
This Extension Tail Light and Red Flag Is Attached to Any Kind of a Load Projecting beyond Rear

Keeping Water Drip from Valve-Rod Packing Nut Out of Crankcase

Water drips from the valve-rod packing nut on small vertical steam engines, can be kept out of the crankcase by using a large-size steel grease-cup cap. Drill a hole in the center of its top to fit over the valve rod, and braze a length of copper tubing in a $\frac{1}{4}$ -in. hole drilled in the side of the cap near the top edge, to serve as a drain pipe for the drippings which are caught in the cap. It is then an easy matter to place this assembly over the valve rod, open end up, between the packing nut and slide bar.—R. C. Norton, Hamilton, Ont., Can.

This Tool Puts a Decorative Finish on Aluminum

The finish on aluminum can be restored after machine operations, such as drilling and milling, by using a length of hardwood in a drillpress. A shank is turned on one end of a broomstick to fit the chuck, while the other end is faced off



and recessed, $\frac{1}{8}$ in. wide and $\frac{1}{4}$ in. deep, as shown. The recess is packed with fine steel wool, which is allowed to project a little. In use, the aluminum is coated with a film of oil and the tool rotated on the surface. Bring

it in contact with the work for a moment, then raise it, and repeat the operation in a manner similar to drilling a number of holes. The fineness of the finish depends upon the number of times this process is repeated.—W. B. Decker, Delaware, O.

How to Improve Cheap Printing Ink

Cheap grades of printing ink can be improved so they will give better results in the following way: Put two or three drops of water glass on the ink disk of the press, which will soon be spread uniformly by the rollers.



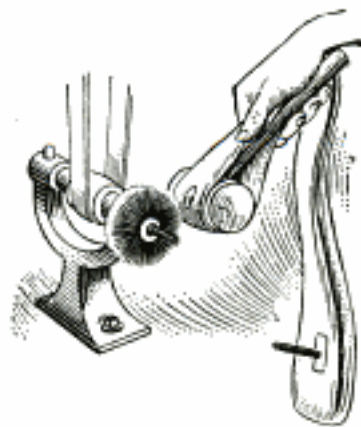
Lever Latch on Wire Gate Cannot Be Opened by Stock and Is Easily Operated

Latch for Wire Farm Gates

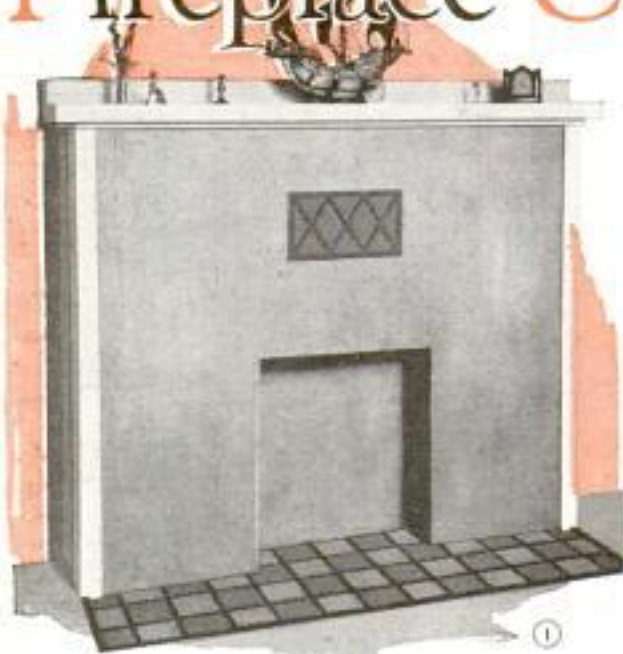
Pivoted to a horizontal bar nailed between two posts, a lever, to which a suitable loop of heavy wire is fastened, will provide a good latch for a wire gate. Place the loop over the small post and tighten the gate by pulling the lever back until the gate is tight. The lever is then held by means of a small chain fastened to the post or bar as shown in the drawing, and fitted with a snap to engage with a screw eye driven into the end of the lever.—Cap E. Miller, Fargo, N. D.

Wooden Mallet Holds Inner Tube for Buffing

Buffing damaged spots on an inner tube before patching can be neatly done by using a mallet. The tube is stretched over the mallet head and held against the wheel as indicated, which eliminates the danger of the tube being caught and wrapped around the wheel, or injuring the operator.—G. E. Hendrickson, Argyle, Wis.



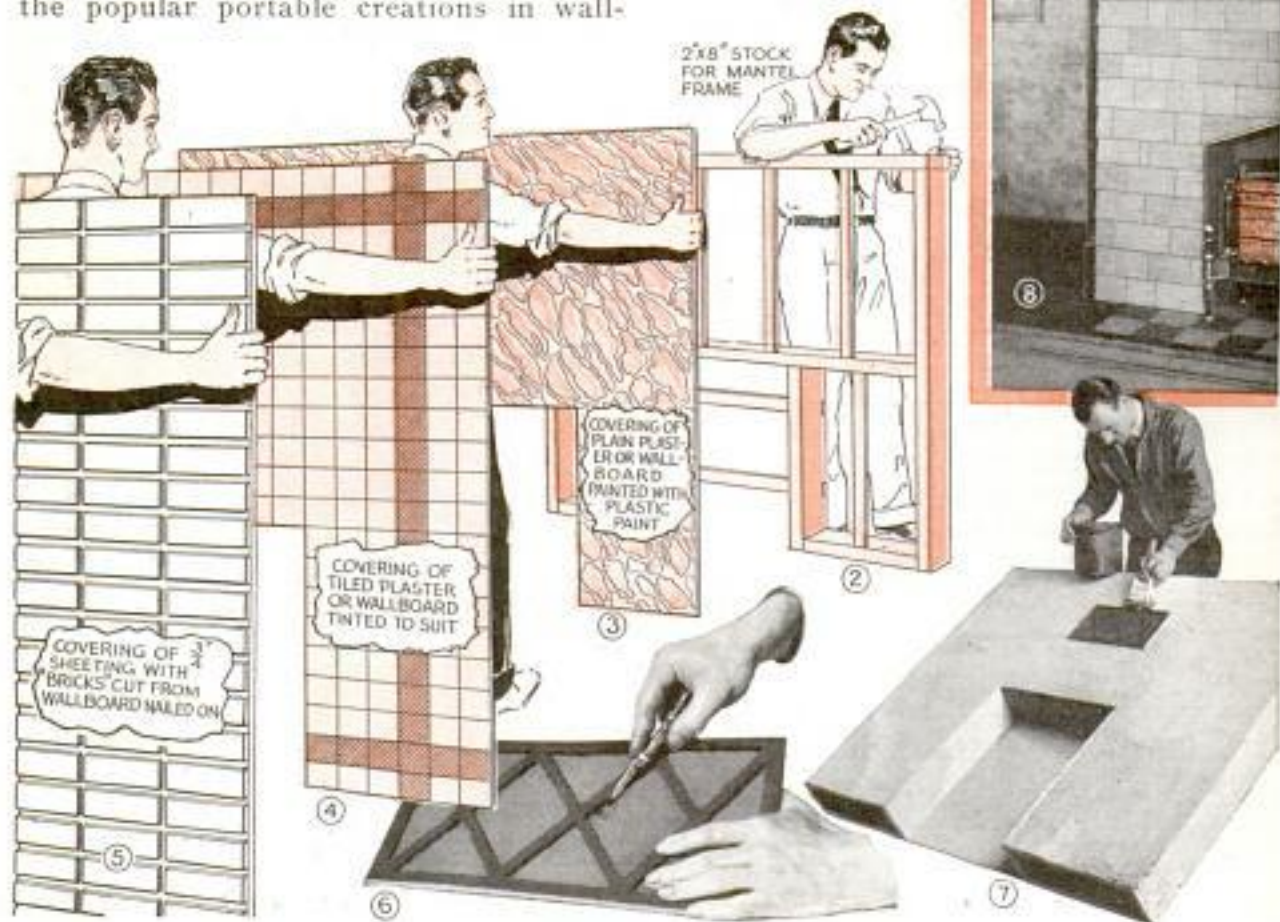
Fireplace Construction



THERE are many projects in fireplace construction that are absurdly simple; even the traditional wood-and-tile and the age-old brick mantel become easy after a little study.

Perhaps the simplest type of mantel is the popular portable creations in wall-

board, imitation brickwork, sand and shingled effects. These are especially suited for bedroom use or as a second mantel in any part of the home. The typical example shown in Fig. 1 was made from plasterboard over a wooden framework. Plastic paint was then applied to give a stucco effect. The hearth is a piece of inlaid linoleum. Woodwork in white and the opening, lined with green asbestos shingles, complete the picture. The whole story of these portable mantels should be apparent from Figs. 2 to 9, inclusive. You will notice that a wooden framework of 2 by 8-in. stock is used, and over this is nailed the face covering of wallboard, shingles, linoleum, etc. Easily made ornaments can be produced by incising heavy linoleum, as shown in Fig. 6. Fig. 7 shows a popular size of fireplace being treated



for the Small Home

Plasterboard, Tile, Concrete or Brick Go in the Make-Up of These Imitation Fireplaces



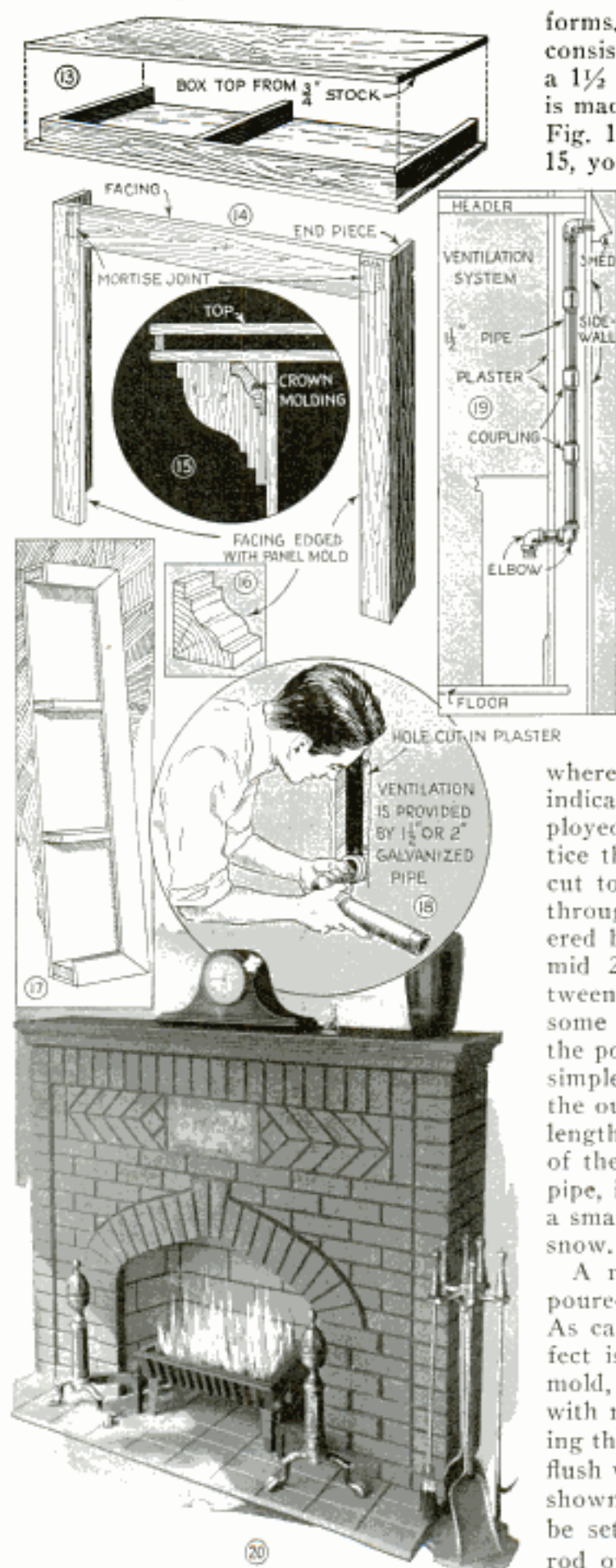
with plastic paint, while Figs. 8 and 9 give an attractive example of the shingled mantel. On this job 5-in. courses were used, the final layers being cut off flush with the top of the

framework. The size of a fireplace depends on the room. Where there are no restrictions in the way of doors and windows, and the wall space is conveniently located, the standard size—6 ft. long by 4 ft. high, with a 24 by 24-in. opening—seems the most popular. Naturally, this can be altered to suit the room, to fit between two windows, or to conform to any other arrangement of previous construction.

For a more pretentious fireplace, the attractive wood-framed mantel shown at the top of this page furnishes a good project which is easily within the capa-

bilities of the average home craftsman. As before, a rough framework of 2 by 8-in. stock is required as a backing. The 4-in. tile from which the mantel is to be made are pasted, face down, to a sheet of paper within a wooden framework of suitable dimensions, using spacers of light wood in order to get uniform lines. After the squares have been pasted in place, the spacers are removed and the form filled with a good mortar mix. Two side slabs and one top section are poured in this manner, then the sections are backed against the framework and held in place with the woodwork, which completes the mantel. Figs. 10, 11 and 12 give you the idea. Any dimensions may be followed. The hearth looks attractive and gives good service in linoleum or rubber tile. Also, the opening lined with asbestos shingles looks every bit as neat as the more difficult-to-fit bricks or tiles generally used for this purpose.

The framing for the wood-and-tile mantel may take any number of different



forms. As can be seen in Fig. 13, the top consists of two boards held together with a 1½ or 2-in. edging. The frame proper is made up from five boards, as shown in Fig. 14. In the cross-section view, Fig. 15, you can see how simple brackets and crown molding are used to give a costly appearance to the finished job. If the mantel is constructed without the brackets, the lower board of the box top can be fitted from narrower stock, which is quite an item when working with expensive cabinet woods, as shown in Fig. 17.

In using a gas log or heater in the fireplace, it will be found that large rooms will usually carry away any fumes that may arise. Many stoves are fitted with water compartments and are self-ventilating. To be on the safe side, however, a suitable flue of 1½ or 2-in. galvanized pipe should be provided. This should be led into the regular chimney opening wherever possible, but

where this is not practical, the method indicated in Figs. 18 and 19 may be employed to good advantage. You will notice that this calls for a 4 or 5 by 24-in. cut to be made in the plaster. Working through this slot, which will be later covered by the mantel, you can easily pyramid 24-in. lengths of pipe upward between the inside and outside walls until some projection is reached. Sounding the point which you have reached, it is a simple matter to drill a 2¼-in. hole from the outside so that you can insert a 4-in. length of pipe to catch the elbow on top of the main stem. The outer end of the pipe, in this case, would be covered with a small shed in order to keep out rain or snow.

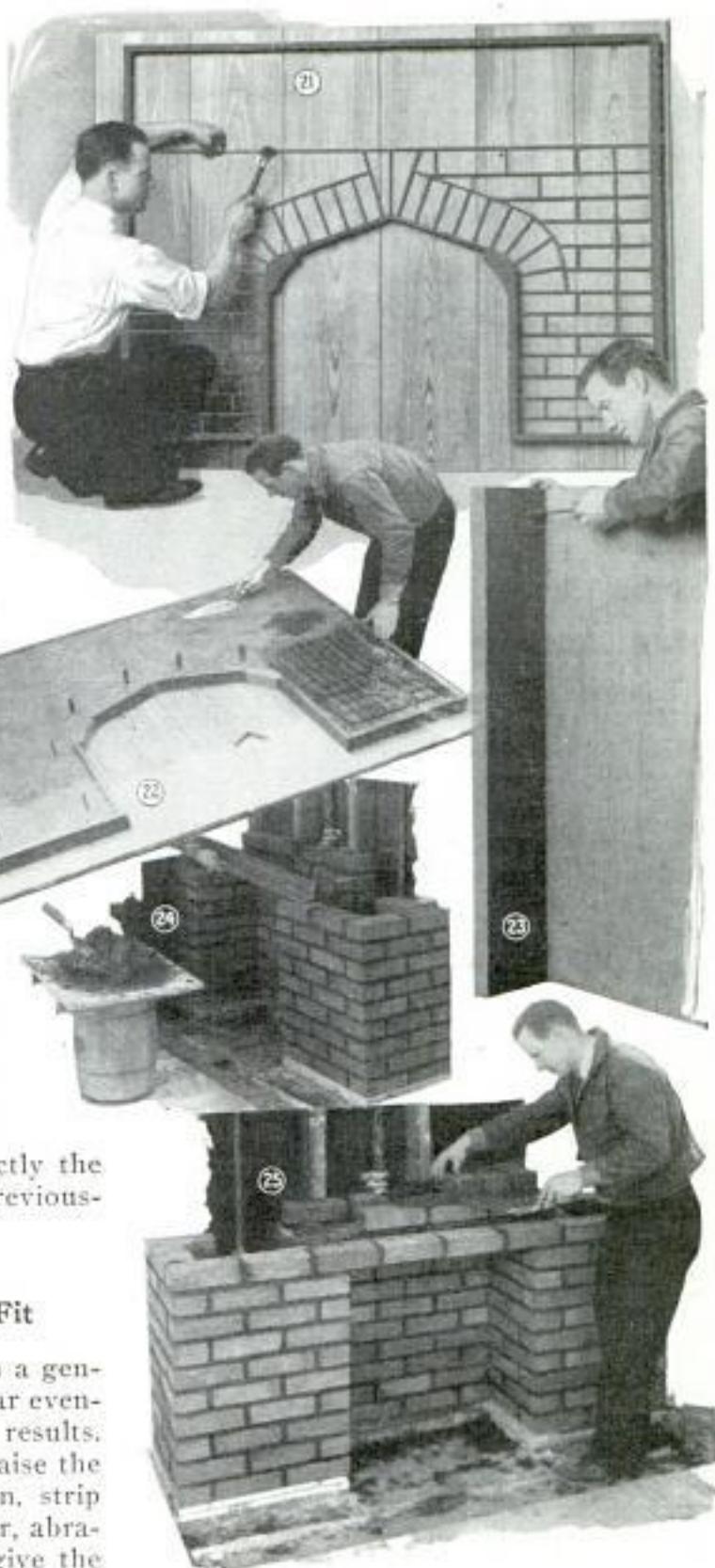
A new departure in fireplaces is the poured concrete unit shown in Fig. 20. As can be seen in Fig. 21, the whole effect is procured by means of a wooden mold, the brick markings being laid out with narrow strips of wood. After making the pattern, the mold is simply poured flush with concrete to a depth of 2 in., as shown in Fig. 22. Wire reinforcing should be set in about mid-depth, and a ½-in. rod or two of metal will add materially

to the strength of the slab. End sections and fire-opening sections are poured in the same manner, and the whole thing is then assembled by means of 3-in. angles, set in the concrete while pouring. By using different mixes of colored concrete, many novel effects can be produced. The mortar lines of actual brickwork are best duplicated by brushing the seams with black or dark-gray paint. Whatever the design is, the forms must be thoroughly soaked with oil before pouring, as the concrete will not part from the mold perfectly if poured directly on the bare wood.

Even the built-up brick mantel is not so difficult if undertaken with good materials and some care in the initial lining-up. The problem of bridging the fire opening is solved by the length of 3½-in. angle iron, as shown in Fig. 24. This forms a recess into which the next course of bricks is fitted. Putting on the top is simply a matter of bridging the opening with lengths of pipe or iron and laying the brick in place, as shown in Fig. 25. The wooden top to fit these concrete and brick mantels would, of course, be exactly the same as for the simpler mantels previously described.

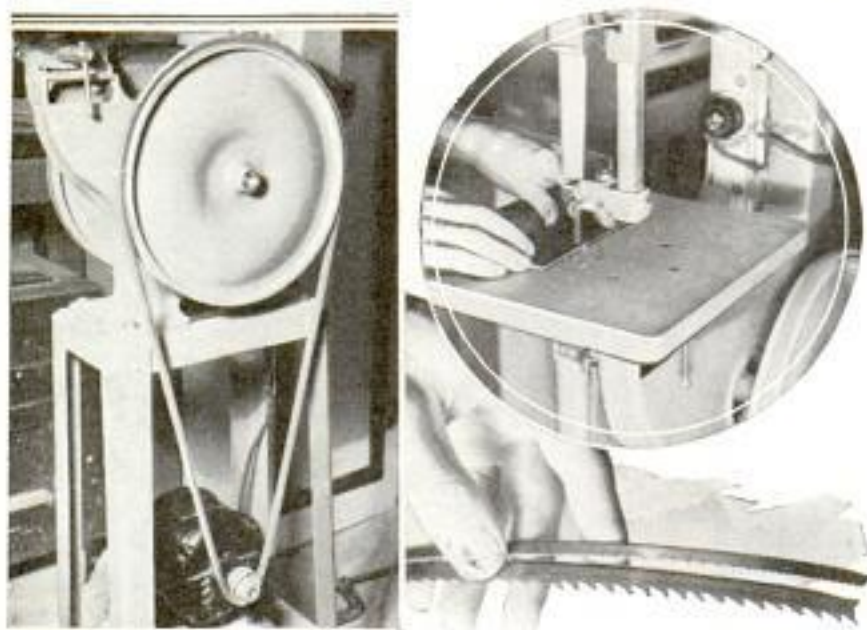
Generator Brushes Easy to Fit

When installing new brushes in a generator, it is necessary that they bear evenly on the commutator for best results. Put the brush in the holder and raise the remaining brushes. Place a 10-in. strip of emery cloth on the commutator, abrasive side toward the brush, and give the armature one complete turn, back and forth, until the brush is cut down to conform to the surface of the commutator. Some generators are easily dismantled for this purpose, and the work is easier when the brush holders can be removed. A fine valve-grinding compound can be ap-



plied to the commutator, the holder replaced and the armature twisted back and forth until all brushes are fitted. A stiff brush and gasoline, or water in the case of a water-mixed compound, should be used to remove all traces of the abrasive.

Cutting Sheet Metal on the Home Bandsaw



By Adding a Metal-Cutting Blade to Your Bandsaw Equipment, the Range of Work Will Include Metal Cutting, Often Necessary in the Small Shop

With a metal-cutting blade and an over-size pulley wheel on your bandsaw, you can double the usefulness of the machine. That kind of blade has fine teeth that are set and tempered like those of a hacksaw blade, and is run at a comparatively slow speed, so that a change in the pulley ratio

is necessary. Obtain an extra wheel, like those on which the blade runs, and fasten it to the lower wheel shaft instead of the regular pulley. It may also be advisable to replace the motor pulley with a smaller one, and a longer belt will be necessary. Although the face of the large wheel is flat or slightly rounded, you will find that a V-belt, a flat or even round belt will ride in the center when everything is properly aligned. The saw illustrated had a pulley ratio of about 2 to 1, giving the saw wheels a speed of 875 r.p.m. By changing both motor and saw-wheel pulleys, the ratio was reduced to less than one third of the former speed. Besides sawing sheet and other forms of metal with ease, a metal-cutting blade may be used to work lumber containing nails, without fear of ruining it.

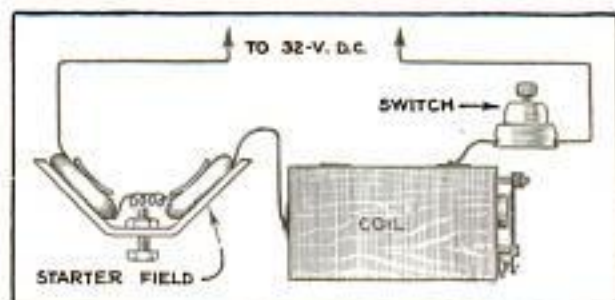
Chain Increases Strength of Truss

When a truss is needed for heavy work, take a length of old chain, stretch it around the timber that is to form the truss and tighten by means of wedges started at the center and driven toward each end. Thus tightened the chain will strengthen the truss. The wedges can be held in position with lagscrews.

This Armature Growler Works on a 32-Volt Circuit

Working on a 32-volt circuit, this armature tester will be of interest to shop mechanics where such current only is available. The starter shell of an old "4-90" Chevrolet is sawed in two so that the two poles serve as the tester fields. Two coils of No. 26 d.c.c. wire are wound around these poles, using all the available space which gives the right number of turns approximately. This assembly may

then be mounted on a small box and an old Ford spark coil placed inside, letting the vibrator points project so new points can be put on when needed. The primary winding of the coil is connected in the circuit of the armature-tester windings so that the vibration of the coil points will cause an interrupted current to flow



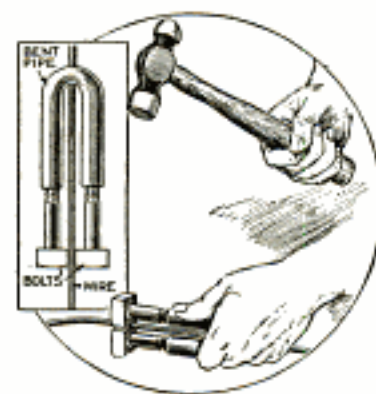
Inexpensive Armature Growler for Testing Armature Windings Will Work on a 32-Volt Circuit

through the field windings. This sets up a fluctuation of the magnetic lines of force that flow through the armature placed between the fields for testing, and

induces a current in the windings of an armature that is in good condition. If the armature is grounded, a spark can be obtained by shorting between the shaft of the armature to the commutator. A defective coil in the armature can be detected by the amount of current generated between the segments of the commutator. A switch to control the current is placed in a convenient place on the outside of the box.

Tool for Flattening Wire

Made from a length of tubing and two square-head bolts, this tool is useful for flattening wire before drilling holes through it. The bolts are driven into the ends of the tubing, which is bent to a U-shape so the heads will be about $\frac{1}{8}$ in. apart as shown. A small hole is drilled through the tubing at the bottom of the "U," and the wire to be flattened is run



through the hole and between the bolt heads. By placing the tool on an anvil and striking one of the bolt heads with a hammer, the wire will be flattened.

Paper Tubes Protect Cutting Edges of Reamers and Drills

To prevent the cutting edges of small tools, such as reamers and drills, from nicking against other tools put them into tubes rolled from strips of heavy paper. Glue the edges of the paper together and coat the outside with shellac. These covers can be removed quickly when the tools are needed, and are easily replaced after they are worn out.

Corrugated Roofing Removed without Damage

To remove corrugated sheet-iron roofing quickly and without damage is a rather difficult job with the use of hammer and crowbar only, but is made comparatively easy by means of the tool shown. Take



a 14-in. length of $\frac{3}{16}$ -in. flat iron, about 2 in. wide, and heat one end so that it can be bent to form a loop that will fit the corrugations. Using this as a rest for the hammer or crowbar, nails can be removed without damage to the roofing. Nail holes should be filled with roofing tar.—Luther Strosnider, Onaga, Kans.

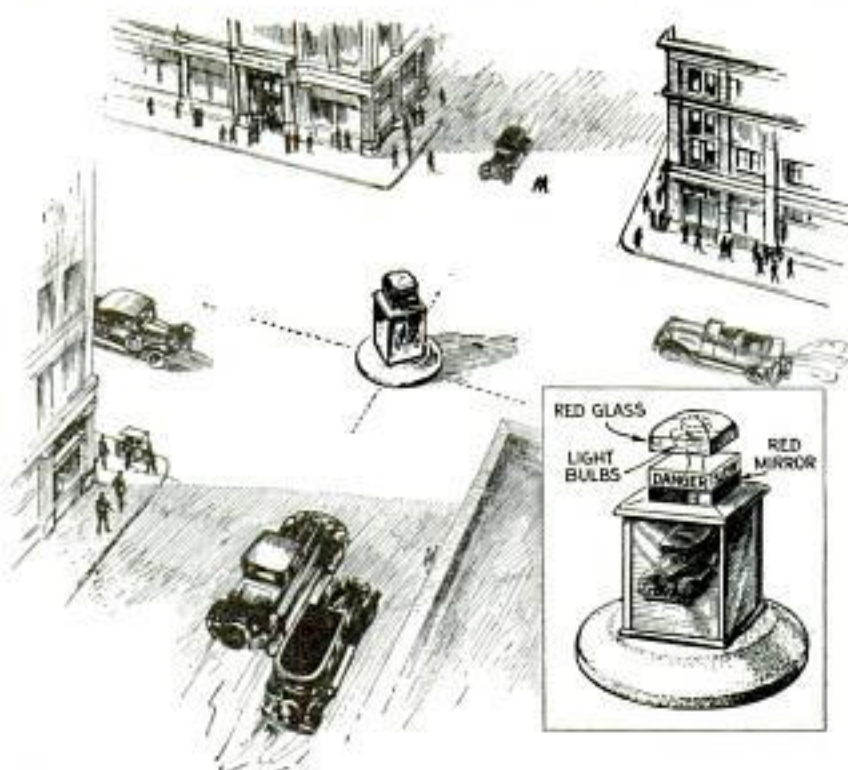
Damage to Axle Shaft Prevented by Reversing Nut

If a wheel puller is not available, when removing the rear wheels from a car, it is customary to drive on the end of the axle shaft with a heavy hammer. If the shaft is unprotected, this will result in expanding its end and ruining the threads. The shaft is best protected by removing the nut and replacing it reversed, flush with the end of the shaft, so that the castellations will be toward the wheel hub. A piece of babbitt metal or brass is held over the end of the shaft when pounding on it.

Flexible tubing can be made by pushing tin cans, whose ends are removed, into an inner tube, leaving the cans an inch or so apart.

For Your Workshop

AN attractive 16 by 23-in. table giving both the decimal and metric equivalents of the fractional parts of an inch, for use in the home workshop as well as the drafting room, machine shop, garage, etc., will be sent to anyone upon receipt of 10 cents to cover mailing costs. Address Book Dept., Popular Mechanics Magazine, 200 E. Ontario St., Chicago.



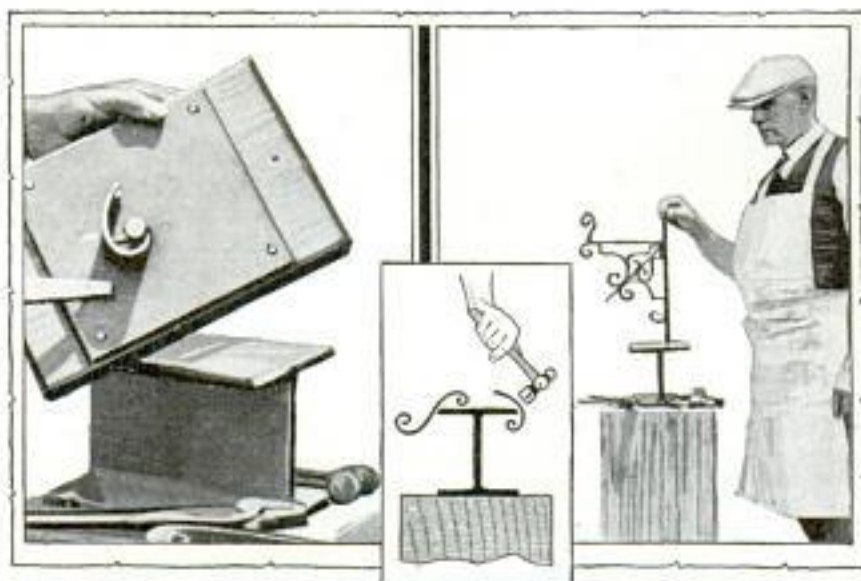
Mirrors Mounted on Safety Signal in Center of Street Intersections Reflect Image of Approaching Cars to Drivers at "Blind" Corners

Mirrors on Safety Signal Reduce Accidents at "Blind" Corners

Consisting of four mirrors, set at 45° angles as shown, this safety signal will aid in preventing accidents at "blind" corners. The image or headlight of an approaching car is reflected by the mirrors and is visible to drivers coming from either the right or left intersecting street. —Geo. A. Alexander, Watertown, Mass.

Jig for Forming Iron Scrolls

The varied possibilities of bent-iron articles will justify your building this jig for forming the scrolls. Get a piece of ¼-in. steel plate, 7½ by 8 in. in size, and cut a ⅝ by ⅝-in. slot in the center. Then screw it to a 1⅞ by 8 by 12-in. hardwood base, the edges of which should be beveled. The scroll is made of bar iron, 6½ in. long, heated and bent to shape, then attached to the steel plate and block with a ⅜-in. machine bolt and a ¼-in. pin, which is riv-



Easily Constructed, This Jig Will Greatly Simplify the Forming of Scrolls in Ornamental-Iron Work

eted to the outer end of the scroll. The base should be countersunk so that the nut and washer will be flush with the bottom. When using the jig in a vise, a 1 by 2 by 10-in. block is bolted to the base, but on an anvil, the jig simply can be clamped. It is preferable, however, to make use of the vise or to fasten the jig on a bench, reserving the anvil for other operations. The jig is for medium-sized scrolls, adaptable for almost any design. Larger or smaller scrolls can be made by following the same plan, and using the same plate. If a fan-shaped end is desired, the stock should

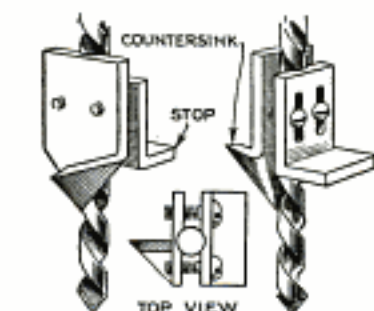
first be heated for 1 or 2 in. from the end and hammered with the peen end. A slight arc should be made on the hammered end so it will conform to the inner curve of the jig when inserted into it. When thus started, the stock is reheated for at least 4 in. of its length, inserted into the jig and held for bending by a clamp bar in the slot. The bar is 12 in. long and ¾ in. wide, and is tapered at one end to ¼ in. With this jig scrolls can be made very rapidly, subsequent curves or angles being made over an anvil.

Chain Holder for Small Tools

A short length of straight-link chain, that is worn so that it will not stand any strain, can be utilized as a tool holder. Stretch it between two points on the back of the workbench. Half of the links will be in a horizontal position and can be used for holding tools such as chisels and screwdrivers, while the other links, being in a vertical position, will provide places for tools that can be hooked into them.

Adjustable Countersink Clamps to Drill Bit

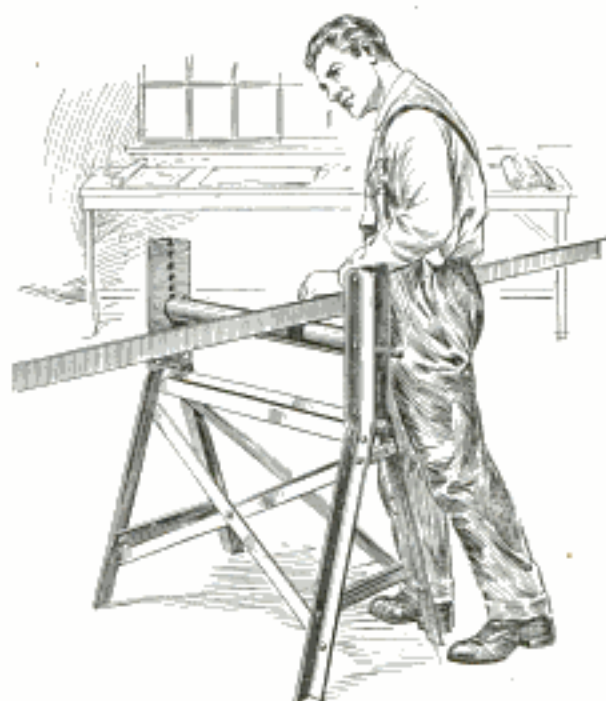
By clamping a stop and countersink attachment to a drill bit, holes can be drilled and countersunk in one operation. Two pieces of steel are used, one for the countersink and the other for a stop. The countersink is bent to the shape shown in the left-hand detail, after which the bent edge is sharpened to a bevel. It is then drilled and tapped for two small screws and slightly grooved on the back to fit the



bit. The stop is bent at right angles and slotted to correspond with the holes in the countersink. These slots allow it to be adjusted for depth of countersink. A groove is then cut in the back of the stop similar to that on the countersink. The assembly is clamped to the bit by inserting screws through the slots in the stop to engage with tapped holes in the countersink.

Metal Horse Equipped with Roller Supports Long Work

Here is a handy steel horse for general purposes in the shop. The legs are made of 4-ft. sections of 2 by 2-in. angle iron, bent 16 in. from the top as shown. The vertical portions of the legs are joined together by riveting a section of 1/2-in. metal plate to them, and a number of 3/8-in. holes are drilled through this piece to ac-



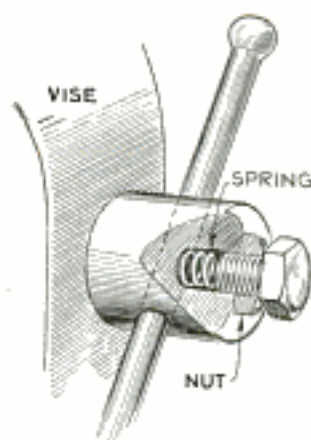
Metal Horse, Fitted with an Adjustable Roller, Is Useful for Supporting Long Work

commodate a 3/4-in. iron rod. A roller, made of 2-in. pipe, 30 in. long, with steel disks welded on each end, is slipped over the rod, holes being drilled in the center of the disks for this purpose. Two cross-pieces of 1 1/2 by 1 1/2-in. angle iron are riveted to the legs to hold material when the roller is not desired. Other braces are bolted to the legs, for the purpose of providing additional rigidity. Adjustment for height can be obtained by raising or lowering the roller.

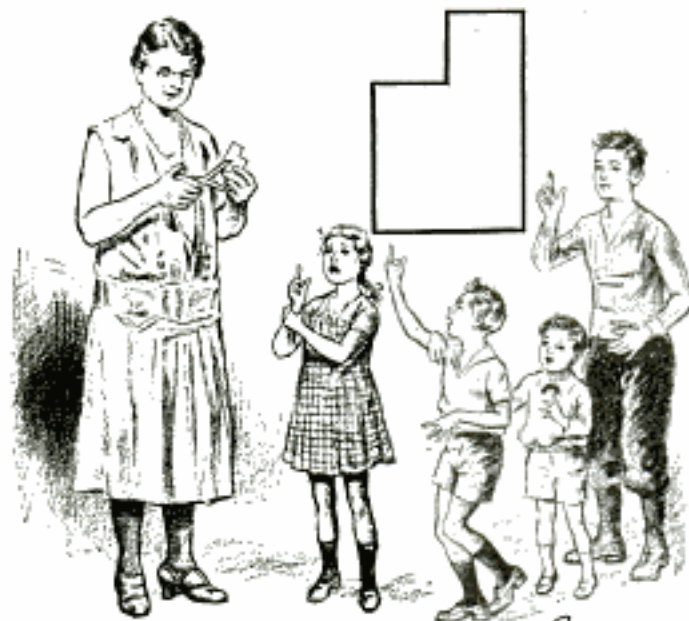
Compression Spring Holds Vise Handle in Position

Inserted in a 1/2-in. hole drilled in the end of a vise screw, a compression spring can be used to hold the handle as shown. Drill the hole through the screw head to meet the hole for the handle as indicated, and insert the spring.

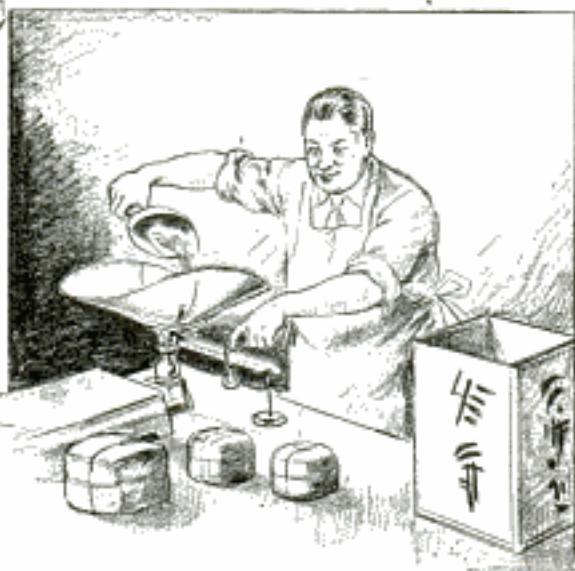
Weld a 1/2-in. nut over the hole and drive a 1/2-in. bolt through it to compress the spring against the hand lever of the vise.—George Madsen, Chicago.



Can You Solve *these* Puzzles?



Let us imagine that the figure is produced by the laying down of four separate wires of uniform length, all bent into the same shape, and not crossing. What will be the common shape of those four interlocking wires?



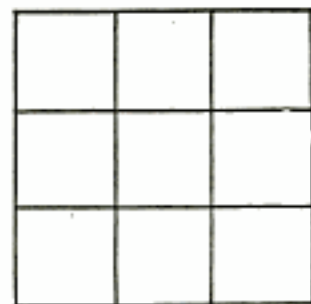
Halsey N. Brooklyn 53 N.Y.
By SAM LLOYD

EACH of four children burned a finger on the Fourth of July, and Mother Jones had in her medicine cabinet only a small piece of courtplaster, corresponding in shape to the design shown.

Now, if the children had been five, rather than four, in number, it would have been no problem to divide the plaster. However, Mrs. Jones seized her scissors and snipped the remnant into four pieces of uniform shape and size.

Who can mark off that figure into four parts of similar shape and size?

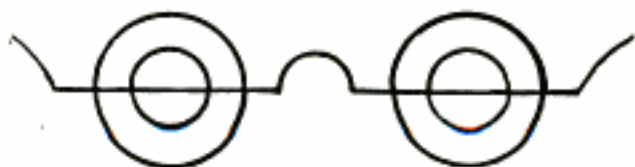
INSPECTION of a square containing nine cells, reveals that at eight points of intersection the number of branches is odd.



The rule for such puzzles is to divide the total number of odd nodes (points of intersection) by two, to determine the number of continuous lines necessary to construct the figure. So, this design will require a minimum of four separate continuous lines, if the retracing or crossing of a line is prohibited.

WHILE tidying up stock, Groceryman Miller encountered a natural puzzle in a fifty-pound tea chest. There was an even number of pounds left in it, and this quantity Miller wrapped up in five lots, the quantities being whole numbers of pounds. "It struck me as a coincidence," relates Miller, "that the total number of pounds in the five packages was evenly divisible by five numbers only, which correspond to the five lots." Who can tell what those five quantities were?

"**O**LD Specs" is a simpler specimen of the second puzzle, and its solution will be good preparatory exercise for the greater task of analyzing the nine-cell design. Copy the design without taking pencil from paper, and never retracing or crossing the line.



Answers to the above puzzles will be given in the next issue

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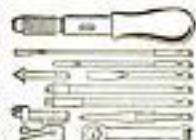
The finest tool to give mechanic or amateur is a "Yankee" Ratchet Bit Brace No. 2100. Lucky man, who gets it! Price (10-inch), \$8.20.



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Where could a boy find a better partner than his own father, or one better adapted to teach him to be a keen athlete and a good sportsman?

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With a Daisy Pump Gun handy, the "old-man" can prove to the youngster that mature judgment and steady self-control count for success both in business life and in sport. And the youngster can give his dad some real stiff competition when it comes to keen sighting and quick trigger action. If you haven't tried it, get in on this fascinating sport without delay.

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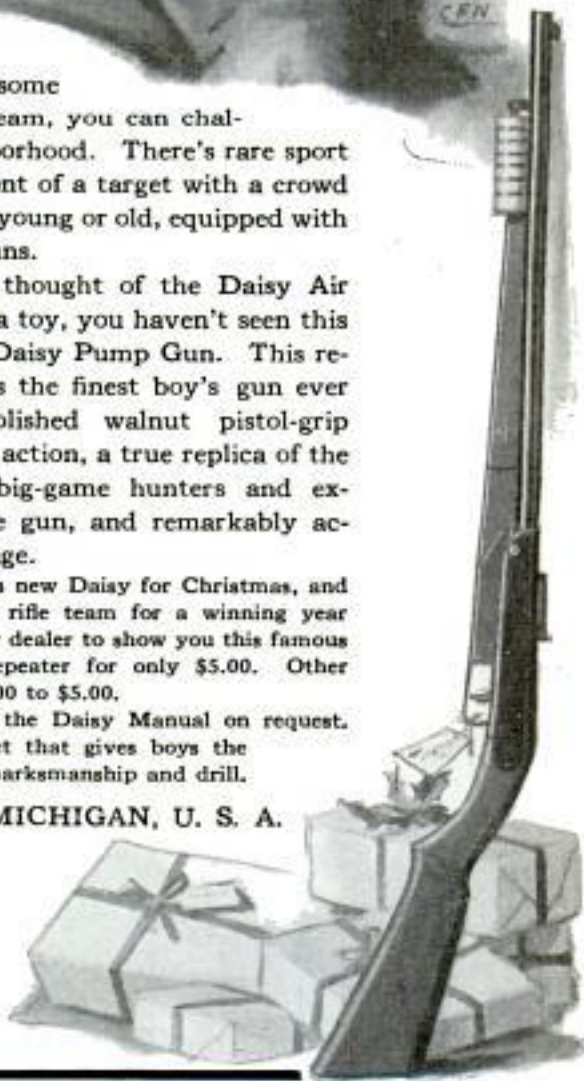
Get the boy this new Daisy for Christmas, and start off the new rifle team for a winning year in 1932. Ask your dealer to show you this famous rifle, a 50-shot repeater for only \$5.00. Other Daisy models, \$1.00 to \$5.00.

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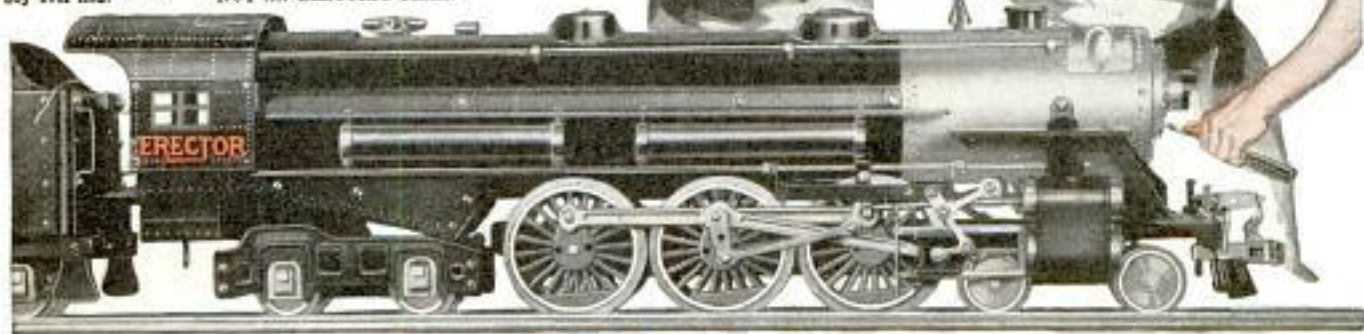


Millions of boys know Mr. A. C. Gilbert, champion athlete and champion maker of things boys like. He has devoted his life to the work of making Erector what it is today, the most exciting sport any boy ever had.

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4-foot reproduction of the New York Central's crack flyer, the locomotive of the 20th Century Limited. Built entirely with Erector. And you can build hundreds of other realistic models, too.

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Be the wonder of your neighborhood

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the most exciting sport any boy ever dreamed of.

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There is something about Erector that will fascinate your Dad.

Send for the Erector catalog (see coupon). Show it to your dad. Take him to the nearest toy store. Let him see the sport and scientific thrills that only Erector can give. Christmas will soon be here. Tell your dad Erector is what you want. He'll be pleased, and he'll probably sit on the floor with you Christmas morning and help you build your first Erector model.

95 cents and up

Even though I've improved Erector this year, I've also reduced Erector prices so that more boys can share the thrills of building engineering models. Of course, the bigger the set, the higher the price. But there is an Erector set for almost any price your Dad wants to pay. I wish you a merry Christmas and hundreds of happy days next year with

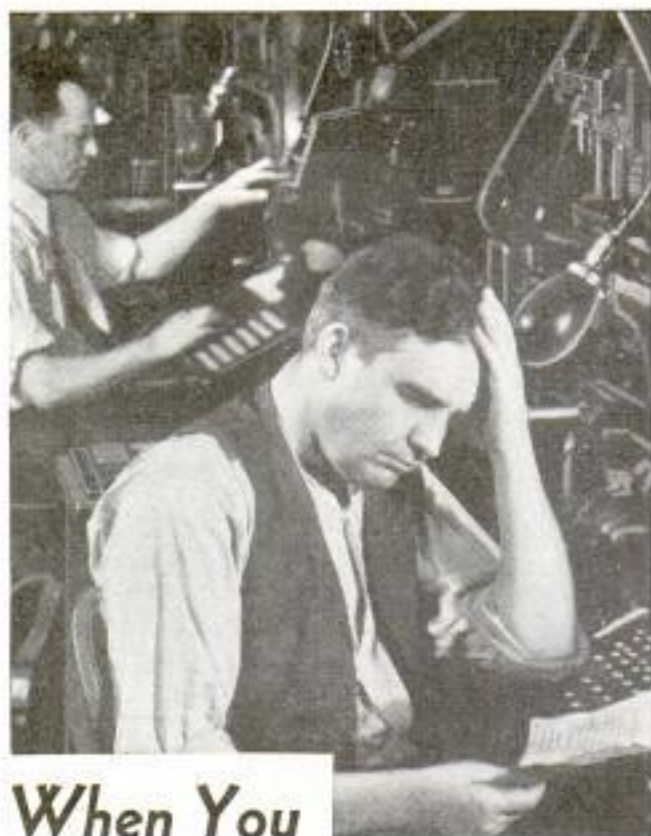
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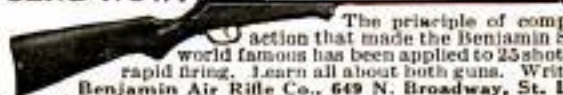
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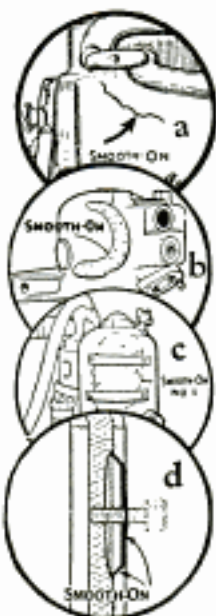
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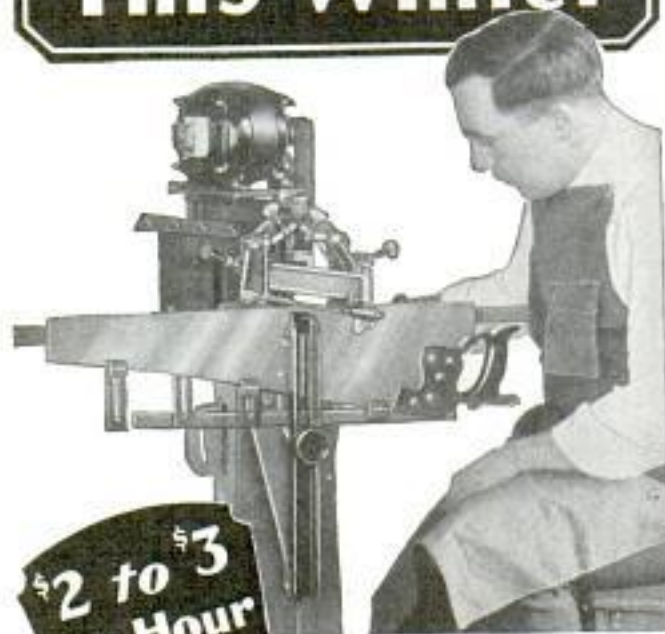
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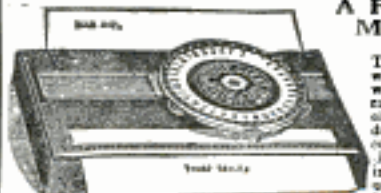


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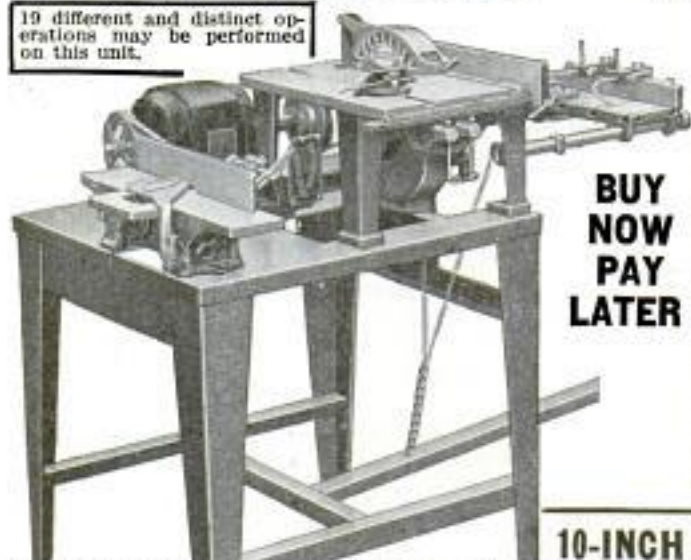
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19 different and distinct operations may be performed on this unit.



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Here is an ideal woodworking unit for any man's shop. It is a real BOICE-CRANE achievement. Consists of a solid steel stand—26" x 29"—on which is mounted a 15" x 17½" Saw, a Mortising attachment and a 4" ball bearing Jointer. The saw has a tilting arbor which raises, lowers and tilts. The table is solidly bolted to the legs, and remains flat and level at all times. The mortising attachment may be permanent, as it in no way interferes with the free operation of the other units. Has full ½" square chisel capacity. Powerful leverage makes toughest mortising jobs easy. Choice of ½ or ¾ h.p. motor. The low price of this fully equipped stand will amaze you. Write for catalog.

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Another Boice-Crane value in accurate, swift, powerful, wood-working machinery. Long, polished table; steel head; two-way tilting fence. Also 4 in. and 6 in. ball bearing jointers.



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No better lathe built for the price; 11" x 42", only \$29. Can be equipped with metal working compound slide rest, 7" x 30" Lathe for only \$12.



10-INCH Jig Saw

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Heavy, heavy duty machine. Table tilts. Also a 20" Jig Saw.

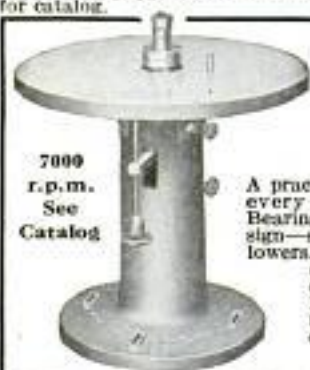


NEW SAW \$32.50



Also with 20 in. x 27 in. table

Notice how saw tilts while table remains rigid and level. Arbor also raises and lowers. Full length rip guide. Polished 15 in. by 17½ in. top. Graduated scales for ripping, mitering and beveling.



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A practical machine in every respect. Ball Bearing. Correct design—spindle raises and lowers. Cuts mouldings on straight or curved pieces. Dove tails, routs, mitres, dados, etc.

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Extra large 60-page catalog with big 8½ x 11" pages filled solid with pictures, descriptions and interesting information. Sent anywhere on receipt of 10c coin or stamps (which only pays part of mailing cost). Don't buy before you investigate the new Boice-Crane Line.

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tractor during spare time and have it ready for use when needed!



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To meet present conditions, we have greatly reduced prices on SHAW Tractor Equipment. Get your SHAW Equipment now and build tractor during spare time—or buy it complete.

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For Model "T" and "A" Fords, Chevrolets and other make cars.

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Front view of SHAW-Tractorized Model "A" Ford. Shows New HIGH ARCH, allowing for clearance of tall corn, cultivating 1 to 2 rows at one time. Regular cultivator beams may be used.

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Low Cost—You can have a SHAW Tractor at surprisingly low cost—on Easy Payments. SHAW Tractor Equipment costs very little—at New Reduced Factory-to-You Price. If you haven't an old car, you can pick up an old Model "T" Ford or Chevrolet for \$5 to \$25; or a Model "A" Ford chassis, which has had the body wrecked, very cheaply. Many Model "A" Fords are now being wrecked into SHAW Tractors. SHAW Equipment, bought now for a Model "T" Ford, can later be installed on a Model "A." Many attach SHAW Equipment to other makes of cars.

Anyone Can Attach SHAW Equipment quickly and easily, using only monkey wrench and screw driver. You don't have to be a mechanic. We furnish all parts, easy-to-follow directions. Can be attached to full-length or sawed-off chassis.

Make Tractor Now—Remember Reduced Price is subject to change any day. So make your tractor now. SAVE MONEY! Mail Coupon for full information—TODAY!

SHAW MFG. COMPANY
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SHAW DU-ALL Tree and Garden Sprayer
Kills insects that injure trees, shrubs and garden produce. Reaches tops of tall trees. Fine for orchards and potatoes. Rids lawn and cattle of ticks and lice. Has 84-gal. barrel. Two 15-ft. discharge hoses with 3-ft. pipe extensions and nozzles. (Capacity for 8 nozzles.) Pressure gauge. Mounted on regular SHAW DU-ALL Garden Tractor—see below. Coupon brings details, Reduced Price, 10-day Trial Offer, Easy Payment Plan.

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Great time, labor, money-saver—for farms, truck gardens, nurseries, poultry ranches, estates, etc. Plows, harrows, weeds, cultivates, harvests, mows; runs saws, washing machines, pumps, etc. 5 gears, 1 to 6 horsepower. Costs 2 to 4¢ per hour to run. Brakes and direction engine. Has gear shift: 3 speeds forward, and reverse. Coupon brings details, Reduced Price, Easy Payment Plan 10 day trial offer.



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SHAW-Tractorized Ford plowing.

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Coupon below brings FREE Book, containing full information, new Reduced Price and Easy Payment Plan on 1932 HIGH ARCH Model, and FREE SHAW DU-ALL Garden Tractor Catalog. Mail Coupon TODAY!

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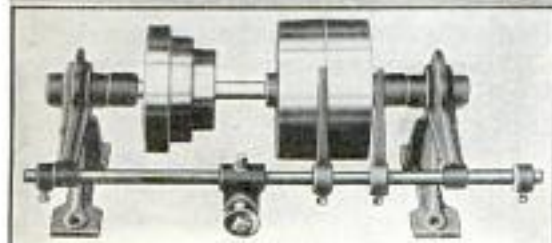
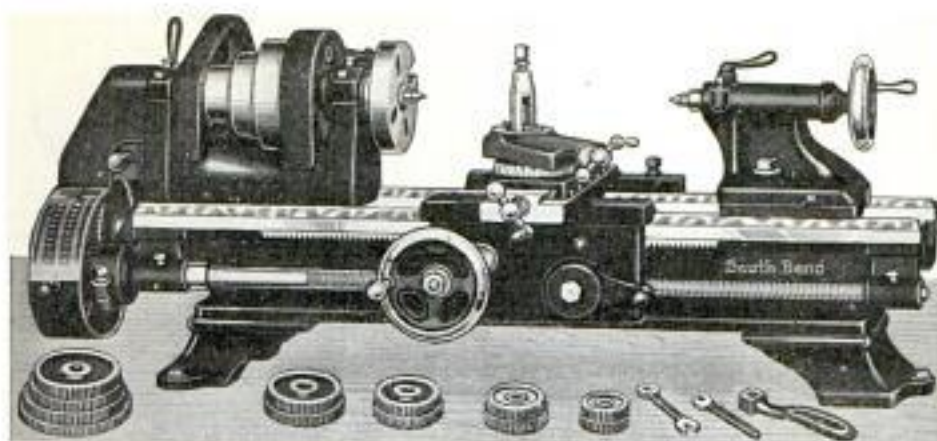
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8" x 24" Junior Back Geared Screw Cutting Precision Bench Lathe with Tight and Loose Pulley Countershaft and Equipment, \$20.00 down, \$7.00 per month. **\$100** Net Weight 175 lbs. t.o.b. factory

Announcing The New South Bend Junior

8"

BACK GEARED
SCREW CUTTING
PRECISION LATHE

\$100 AND UP

Prices of 8" Lathes with Tight and Loose Pulley Countershaft

	Between Centers	Net Weight	Plain Rest	Compound Rest
8" x 24"	6"	175	\$100.00	\$115.00
8" x 30"	12"	190	105.00	120.00
8" x 36"	18"	205	110.00	125.00
8" x 42"	24"	220	115.00	130.00

EASY PAYMENT TERMS as low as \$20 down and \$7 per month for 12 months will place this new precision lathe in any shop in the United States. Write for further details.



8" x 24" Junior Back Geared Screw Cutting Precision Bench Lathe with Simplex Countershaft instead of Tight and Loose Pulley Countershaft with Plain Rest. \$100.00

Prices of 8" Lathes with Individual Motor Drive

	Between Centers	Net Weight	Plain Rest	Compound Rest
8" x 24"	6"	175	\$116.50	\$131.50
8" x 30"	12"	190	121.50	136.50
8" x 36"	18"	205	126.50	141.50
8" x 42"	24"	220	131.50	146.50

In the tabulation below we itemize motor and complete motor drive equipment so that you can purchase only the parts that are needed. This applies to any 8" bench lathe with various bed lengths.

Itemized Prices for Motor Drive Arrangement
 1/2 H.P., 1750 R.P.M., Single Phase, A. C.

Motor	\$12.00
Motor Pulley	1.25
Enclosed Type Knife Switch	1.50
Belting, Motor to Countershaft and Countershaft to Lathe	1.75
Total	\$16.50

The New 8" Back Geared Screw Cutting Precision Bench Lathe illustrated above is announced on the Silver Anniversary of the South Bend Lathe Works, having specialized for 25 years in building lathes exclusively. All the quality, precision, accuracy and up-to-date mechanical features which characterize the complete line of South Bend Lathes are incorporated in this new remarkable lathe.

Recommended and manufactured for auto service, electrical work, tool room work, manufacturing, home work shop, laboratory use and for all classes of fine precision jobs—can be used in the tool room the same as in the small shop as it has the accuracy and precision for gauges, small tools, dies, etc.

Features include back geared headstock— $\frac{3}{4}$ " hole in spindle—set-over tailstock— $\frac{3}{4}$ " diameter lead-screw—power feed to carriage—plain rest for holding tool—cuts screw threads 4 to 40 per inch—takes 1" belt—six spindle speeds—weighs 175 pounds net.

A full line of attachments are available at similar low attractive prices for this lathe including draw-in collet chuck attachment with collets, milling attachment, taper attachment, grinding attachment, thread dial, chucks, tools, accessories, etc., all for precision work.

Write for new Circular No. 8

describing and illustrating in detail all the features of this new up-to-date bench lathe. Sent free, post-paid, to any address. Fill out and mail coupon below.

SOUTH BEND LATHE WORKS

642 East Madison Street, South Bend, Indiana, U. S. A.

Gentlemen: Please send circular No. 8, illustrating and describing the New South Bend Junior 8" lathe.

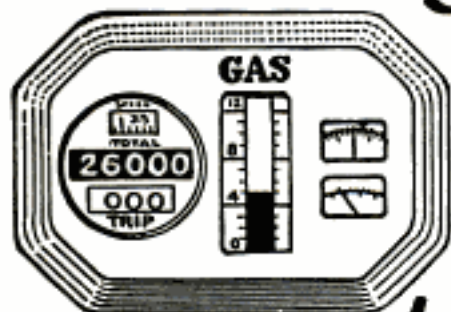
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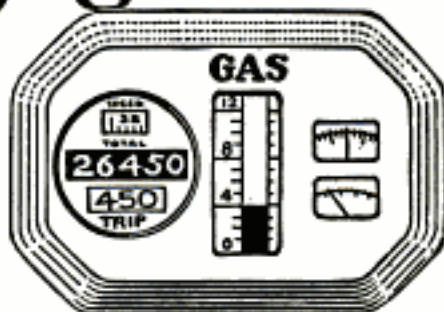
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450 MILES in a gallon of gas



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How to increase gasoline mileage has been a problem that Automotive Engineers have been trying for years to solve. Recently a world famous engineer made the statement that the energy produced by burning a gallon of gasoline would run an auto a distance of 450 miles. Other well known authorities go on record as saying that eventually it may be possible to get over four times as much out of gasoline as in the past.

Amazing Whirlwind Device Saving Millions of Gallons of Gas for Auto Owners

The Whirlwind Carbureting device embodies scientific features which conserves part of the gasoline that formerly went to waste.

Letters coming into the office tell of record mileages resulting in amazing gas savings. Low gasoline mileage is reported on practically every make of car. Greater power and smoother running motors are also noticed by users. The cost of the Whirlwind is so little that, basing its gas saving features even on the most modest reports, it would pay for itself almost immediately and then save many, many dollars for its owner by reducing gasoline consumption.

Car owners all over the world are saving money every day with the Whirlwind, besides having better operating motors. Think what this means on your own car. Figure up your savings—enough for a radio—a bank account—added pleasures. Why let the Oil Companies profit by your waste? Find out about this amazing little device that will pay for itself every few weeks in gas saving alone.

FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck or tractor. It's actually less work than changing your oil or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you will save.

SALESMEN and DISTRIBUTORS WANTED To Make Up To \$100.00 a Week and More

Whirlwind men are making big profits supplying this fast-selling device that car owners cannot afford to be without. Good territory is still open. Free sample offer to workers. Full particulars sent on request. Just check the coupon.

WHIRLWIND MANUFACTURING CO.
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GUARANTEE

No matter what kind of a car you have—no matter how big a gas eater it is—the Whirlwind will save you money. We absolutely guarantee that the Whirlwind will more than save its cost in gasoline alone within thirty days, or the trial will cost you nothing. We invite you to test it at our risk and expense. You are to be the sole judge.

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Dept. 776-A, Station C, Milwaukee, Wis.

Gentlemen: You may send me full particulars of your Whirlwind Carbureting device and tell me how I can get one free. This does not obligate me in any way whatever.

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Since its introduction, this never-before-equalled protector of motors has repeatedly amazed every user who has put it to the severest tests. Frats never before accomplished have been accomplished with PYROIL. Records of speed and endurance never before attained have been attained with PYROIL.

SOLVES EVERY FRICTION PROBLEM

PYROIL is positive protection against metal-to-metal wear and friction in motors. It is the proven solution to this greatest of all motor problems—a solution for which the entire automobile industry has waited for years!

WHAT PYROIL DOES

PYROIL, simply added to oil and gas, establishes and perpetually renews an all metal bearing surface with which it comes in contact an impermeable, friction-defying, self-lubricating surface which is impervious to any degree of motor heat, is cold or to the wearing efforts of raw gasoline. This wear-resisting lubricating film—which penetrates the pores of the metal so that it does a better job—in addition to the countless other values of good oil supplies for the first time, fuel-less, flawless, lubrication for automobiles, airplanes, motor boats and all internal combustion motors!

PYROIL POSITIVELY

Minimizes wear—reduces noise—cuts repair bills—free valves—wears rings—keeps hard carbon. Greatly

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You can establish yourself as an exclusive PYROIL Distributor or Representative. Clip the coupon below—fill it—send it. It will bring you the whole amazing story—proof of PYROIL's astounding efficiency, also full complete details of this amazing opportunity for you. ACT AT ONCE!

Beware of Imitations

Genuine PYROIL is manufactured under a highly approved, patent-protected process and cannot be copied. It positively cannot burn the finest motor mechanism. It is 100% guaranteed!

WINTER PYROIL

Pyroil "W," for winter use, establishes Pyroil self-lubricating surfaces throughout entire transmission, differential and outside gear systems as well as the motor itself. Provides 100% protection when oil is sluggish and slow in circulation. Easy starting in coldest weather. Buy demand NOW for PYROIL "W"!

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Mr. W. V. Kidder, Pres.,
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Genuine PYROIL comes in gallons, quarts and pints. Also 15, 20 and 25-gal. steel drums. Simply add 2 oz. of "B" to each quart of crankcase oil; 1 oz. "A" to every 2 gals. gasoline.

PYROIL HEADLINES!

What World Notables Say About PYROIL. Russell Boardman, who used Pyroil on his world record-breaking flight from New York to Turkey, immediately called back:

"Pyroil experiment satisfactory. Believe gas and oil consumption thereby reduced."

(Signed) (Boardman) Tommy Estlick, famous title-holding motor boat racer who depends on Pyroil in every race, says:

"Was leading Free-for-all race at Oona [City, N. Y., Sept. 15, 1931, when motor got swamped with salt water, freezing motor—wished like hitting stone wall. Paused in water Pyroil and raced it. When finally 'took motor apart' found piston stuck until nearly pulled from the walls, yet Pyroil lubricated!"

(On Sept. 14, 1931, Estlick, using Pyroil established new World record of 55,237 miles per hour (Class "E") at Middletown, Conn., and also won Eastern Division Championship (Class "C"). Also recently established three world's records at Muskegon, Mich.; won Midwest Championship in both Class "V" and "R" at Peoria, Ill.; won Philadelphia Yacht Club Trophy at Philadelphia.

Major Manfred A. Pakas, Pelham, N. Y., noted Aviation expert, Analyst, Editor and Radio Broadcaster, says:

"After exhaustive tests using your product, I positively do recommend PYROIL as being the last word in proper lubrication!"

Dr. Arthur D. Little, Cambridge, Mass., awarded Perkins Medal as this year's "most distinguished American Chemist," says:

"There is nothing present which we should suspect would be injurious to a motor."

A. B. Martin, treasurer, Independent Coal Co., Burlington, Iowa, says:

"—we notice a saving (using Pyroil) on our run units (trucks) of approximately \$1.74 per day."

AND HERE ARE FURTHER RECENT TESTS OF PYROIL! PACIFIC GUANO & FERTILIZER CO., Analytical and Consulting Chemists, Honolulu, Hawaii. This test secured by Libby, McNeil and Libby of untreated and Pyroilized oil used in their trucks:

Pyroilized oil used twice as long as plain oil, shows only a trace of sediment and is in better shape—can sustain 20% sediment in plain oil, used as comparison!

UNIVERSITY OF UTAH TEST:

1000-hour load testing oil with Pyroil, shows decrease of friction 25.7%, as compared to oil without Pyroil, tested in comparison!

Truly—Pyroil makes the "Impossible" POSSIBLE!

W. V. Kidder, President

THE PYROIL COMPANY

5121 Pyroil Building La Crosse, Wisconsin

Start to Play Very First Day

This Year Give Yourself
Lifelong Fun
Profit and
Popularity



PARENTS!

What greater gift can you confer on your children this year than lifelong fun and entertainment?

Love of music means love of home, an appreciation of the finer things in life. Here is a chance to give your boy or girl that love without the tedious practice that most instruments require. The Xylorimba is easy to play. No teacher is needed. Practice is actually a joy.

Remember, the Xylorimba is the guaranteed product of a company established nearly half a century ago—a company that stands back of every promise it makes.

↑ **T**HINK of the best Christmas gift you have ever received. Multiply the pleasure it gave you by ten, and still you have only an idea of the joy you can give yourself this Christmas if you act at once.

Start to Play the Very First Day!

Haven't you, like millions of others, envied the fellows who "bring down the house" with snappy xylophone or xylorimba numbers? Haven't you longed to create your own music, to be looked up to wherever you go, to be able to make real money in spare time? If you have, this ad spells O-p-p-o-r-t-u-n-i-t-y. The xylorimba—wonderful for home, in demand at dances and gatherings—is nevertheless *the easiest of all instruments to play*. In fact, on the very day you get yours you play simple melodies, even if you can't read a note of music right now. In a few weeks you astonish your friends and family. *All your life* you have the joy that comes to those who can entertain.

Plays 20 Minutes; Gets \$20!

Ralph Smith, Chicago, played twenty minutes at wedding; his "pay" was \$20. Harry Brewer, New York, has made thousands of friends thru his xylophone selections on the radio.

L. E. Hallman, Reading, Pa., writes: "Made \$300 in 5 weeks—spare time."

And now J. C. Deagan, Inc., (world's largest manufacturer of xylophonic instruments) has made it so easy to own a xylorimba that nothing stands in your way. Sizes and styles to fit every age and pocketbook. A five-day free trial that eliminates risk. Free, easy lessons that make teacher unnecessary—and, best of all, such easy payments that they are hardly noticed.

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Everyone wants to be popular. Everyone wants to make extra money. Everyone wants to be *center of attraction* at gatherings. But these advantages don't come by themselves. Opportunities must be seized. This is *your* opportunity—will you pass it up without investigation? The accompanying coupon will bring our big FREE book to your door. It tells all about the Deagan line, the free trial, the easy payments. Remember, no cost or obligation! Simply fill in and mail the coupon—but do it before it slips your mind. Today is as good a day as any. Do it NOW!

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TINY INVENTION NOW TURNS HEADLIGHTS INTO SEARCHLIGHTS -INSTANTLY!

At last! An invention that makes any headlight give at least twice the road illumination! Shoots an entirely new kind of "infused" light that banishes glare! So new and uncanny that it amazes everyone. Now offered for introductory test to all who mail the 10-DAY TRIAL COUPON promptly!



PERFECT-O-LITE astonishes expert and layman alike! Science at last has conquered the grief of night driving!

DOUBLES ROADLIGHT.. BUT ENDS DIMMING!

IT is a well-known fact that motor car manufacturers have solved every big problem **except one**. As soon as the sun goes down at night, the highways of America break forth into a constant rushing stream of "dimming and damping." Speed is cut down one-third to one-half. Every Monday morning finds the highways littered with broken glass, wrecks, cars in the ditch, overturned, shattered against telephone posts. Every man who ever groped dizzily down the highway in traffic at night knows the horrible sensation of being half-blinded by cars on his left, unable to see the ditch on his right, his own lights seeming dim and shadowy and practically worthless. Now, in a twinkling, this curse of night driving is lifted completely and **inexpensively** from the shoulders of the entire motoring world!

Fits Any Headlight

This new lighting discovery is called Perfect-O-Lite. It is a little invention that replaces the ordinary "bulbs" in your automobile headlights. No extra wiring or installation. Millions of motorists have invested from \$10 to \$25 or more in so-called "Spot" Lights and "Driving" Lights which at best

are only makeshifts. This new lighting method costs only a tiny fraction as much, yet actually **DOES** double road illumination. Banishes need for Glare Shields. Cuts through the other fellow's light, yet absolutely cannot glare in his eyes. Makes ruts, animals, children, detour signs, etc., visible at least three times as far. Now night driving at 40 to 60 miles an hour is safe and easy.

Make Your Own Test Free

The secret of the amazing things this new light does is in the kind of "beam" or "ray" that it throws. Instead of ordinary light, this new invention pours a solid beam of double-reflected or "infused" light down the entire roadway. Shows up ditches at the side, as well as distant objects, absolutely clear. Space here limits further discussion of the facts about this discovery. Under an introductory offer you are now invited to be the judge without risking one penny. The coupon brings full details of the invention, offer of a set on FREE TEST and facts about agents' money-making opportunities. Mail it **TO-DAY!**

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