

April

M. H. McQuire

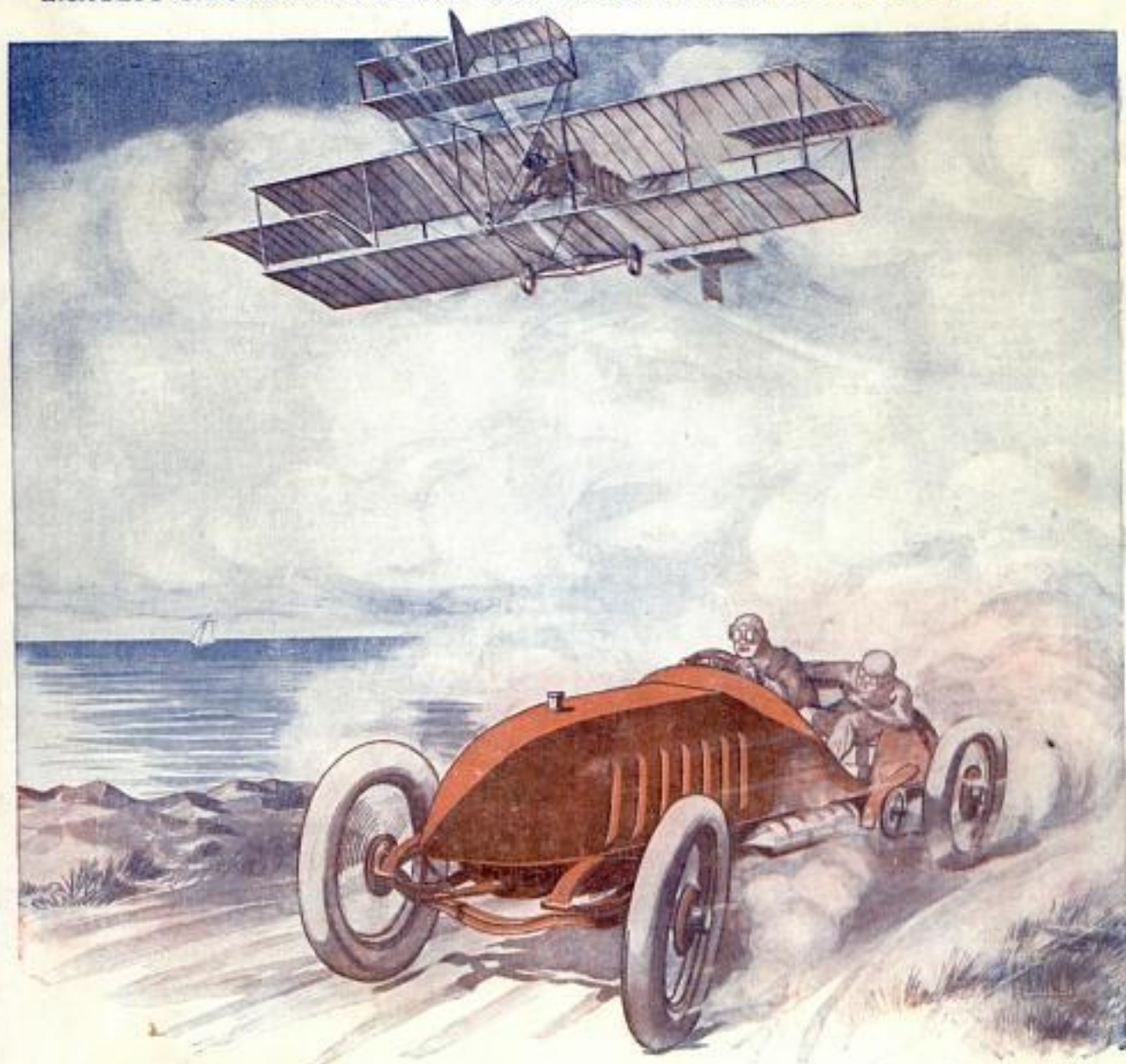
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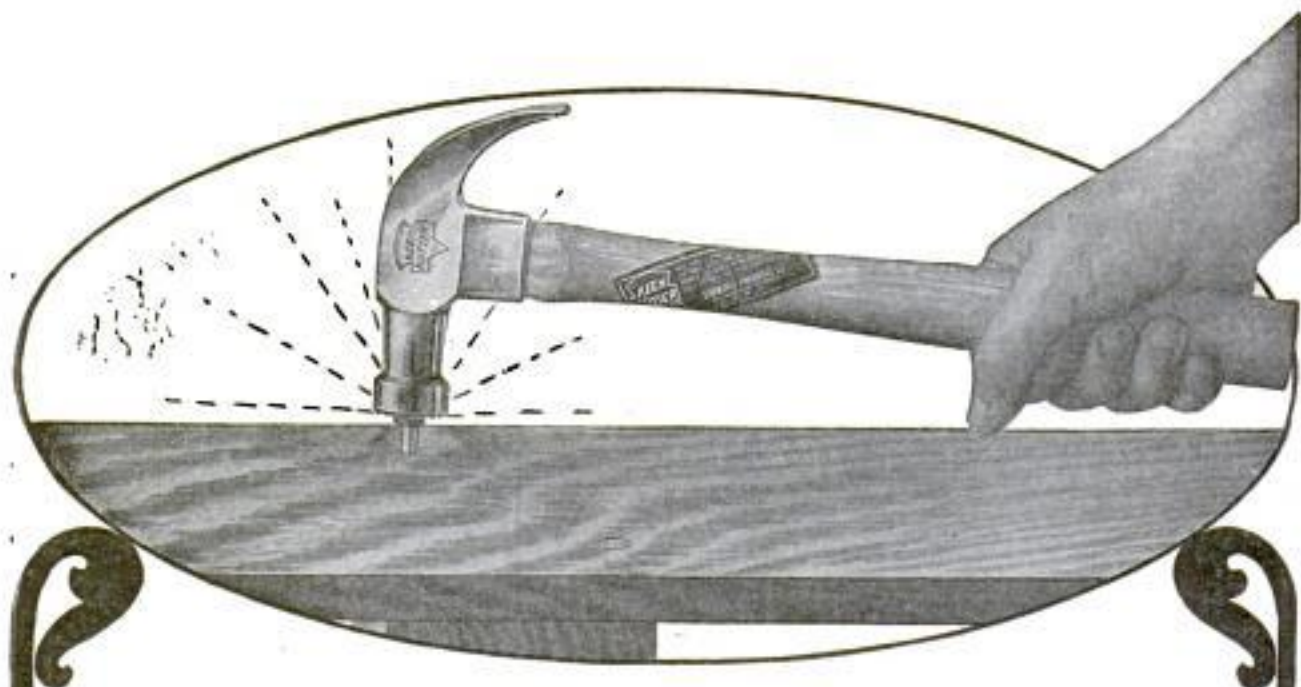
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Entered as Second Class Matter Sept. 15, 1903, at the Postoffice at Chicago, Illinois, under Act of March 3rd, 1879.
Published monthly by POPULAR MECHANICS CO.

The attention of prospective advertisers is called to the policy of this magazine in accordance with which the publisher waives all claim for payment of any advertisement appearing in any issue where the number of copies actually printed and circulated is less than the number printed on the front cover page.

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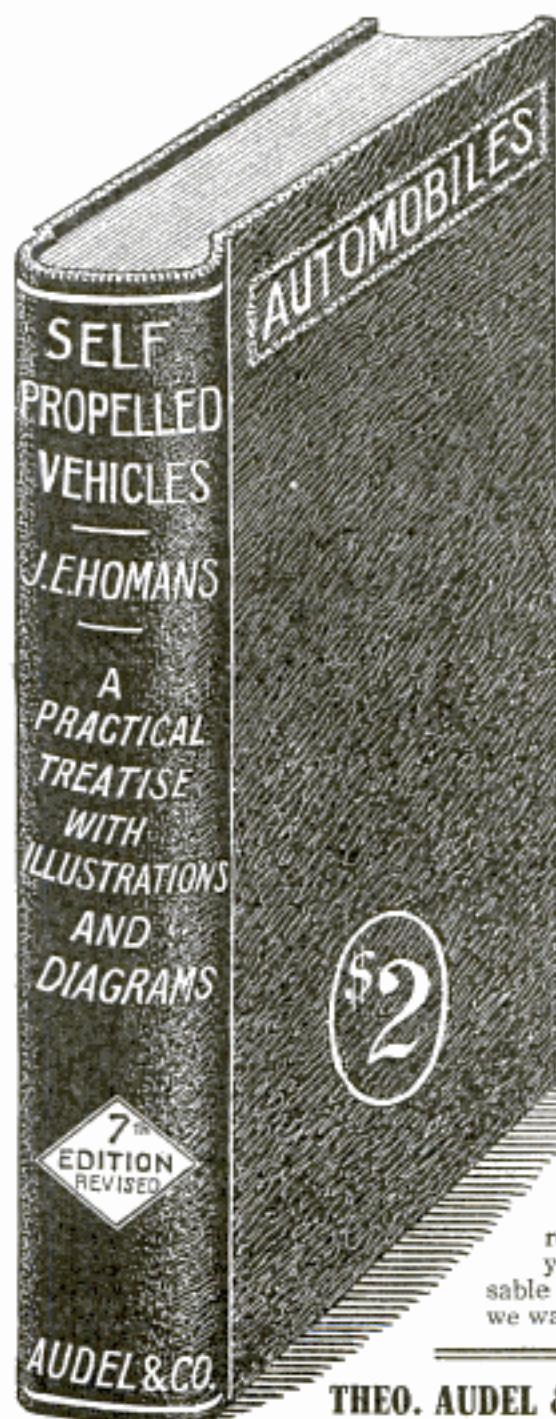
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\$200 to \$600 MONTHLY easily made fitting eyeglasses. Short, easy mail course. Diploma. Special reduced tuition fee. Big demand for opticians. Best and easiest money-making business. Quick sales. Tremendous profits. We assist you to start. Write today for free "Booklet 4." Tells how. National Optical College, St. Louis, Mo.

NAVIGATION

NAUTICAL SCHOOL—Lake and Ocean Navigation Marine Engineering. Make a specialty of preparing young men for original or raise in papers. Special yachting course. Students taught by correspondence. Chicago Nautical School—founded by Lieut. W. J. Wilson, U. S. N.—Masonic Temple, Chicago. Send for circular.

TRADE SCHOOLS

AUTOMOBILE SCHOOL—Learn the automobile business, repairing and driving, in which you can earn good wages and have healthful and pleasant work. We give a thorough and practical course in road work and repairing. For full particulars address Academy of Automobile Engineering, 1420 Michigan Ave., Dept. "A," Chicago, Ill.

LEARN PLUMBING, EARN \$5.00 A DAY. We qualify you in four to six months by actual experience on new buildings, which feature of instruction cannot be obtained in other schools in the country. Tools furnished free. Tuition reduced. For particulars address Master Plumbers Trade School, 3637 Finney Ave., St. Louis, Mo.

BUSINESS OPPORTUNITIES

WE OFFER TO ACTIVE ENTERPRISING MEN with small capital a splendid chance to build up a handsomely paying business. This is no fake peddling or canvassing scheme. Address Imperial Machinery Company, Dept. A6, Buffalo, N. Y., or Brantford, Can.

WELL EQUIPPED MACHINE SHOP, automatic lathes will manufacture specialties, lowest prices. A. W. France, Tacony, Pa.

A PROFITABLE BUSINESS. Make incandescent gas mantles. Cost two to three cents a piece. Complete formula \$1.40. Incandescent, 528 Huron Ave., Port Huron, Mich.

PATENTED RIGHT RECENTLY, useful new invention, good patent for sale, write quick. James A. Wilson, Bertram, Texas.

ASK ME how you can start a profitable mail order business at home evenings. Heacock, 750 Lockport, N. Y.

LARGEST HOG RANCH ON EARTH—You can secure an absolutely free deed to part of this ranch, also share equally in its enormous profits. This is within every ones reach. Salesmen wanted on whom we can depend to honestly represent us. (Not misrepresent.) Only hustlers wanted, who are willing to work hard and make good pay. Union Hog Ranch, First Nat. Bank Bldg., Houston, Texas.

START A PERMANENT BUSINESS OF YOUR OWN. We, as manufacturers, start you and furnish everything. No canvassing. Three simple successful Mail Order Plans to keep our factories busy. We coach you and show you how to get business. You pay us in three months and make big profits. Spare time to start. Write today for positive proof. Pease Mfg. Company, 1617 Pease Bldg., Buffalo, N. Y.

START A MAIL ORDER BUSINESS of your own. Be your own boss. I made \$25,000 in two years with small capital to start. My booklet "Money Making Opportunities in the Mail Order Business" sent free. Address McKean, Dept. 290, No. 2233 Eighth Ave., New York.

TWO HUNDRED WAYS to increase your income only 10 cents, postpaid. Send for this valuable collection of "Money Making Secrets" today; start a spare time business of your own and make more money. Satisfaction guaranteed or dime refunded. Bc. Frankson Co., Baltimore, Md.

MECHANICS CAN START PROFITABLE SIDELINE manufacturing and selling Automobile Specialties. Four practical formulas. 50 cts. M. H. Day, Zionsville, Ind.

\$\$\$ IN THE MAIL ORDER BUSINESS: Modern Advertising tells you how to start without capital and make from \$50 to \$300 a month. Trial subscription, 10c; no free copies—too valuable. Modern Advertising, 239 C. O., Grand Rapids, Mich.

MAKE MONEY in Advertising or Mail Order Business. Send name and address and twenty-five cents and we will mail you three issues of the Advertiser's Magazine. Each issue contains articles on Mail Order Business, Ad Writing, Business Correspondence, Selling Plans, Office Systems, Business Short-Cuts, Follow-up Literature, etc. Write today, as this is a very special offer. Address Advertising Magazine, 747 Commerce Bldg., Kansas City, Mo.

FREE—"PATENT SENSE AND PATENT NON-SENSE." Broad and narrow claims compared. Obed Billman, Cleveland, Ohio.

FIVE DOLLARS will buy our Complete \$25.00 Course in Real Estate and Brokerage for a limited time. Satisfaction guaranteed or money refunded. Booklet free. Finks Realty & Mining Co., Ft. Smith, Ark.

DANDY HOME BUSINESS, selling names, formulas and other valuable information by mail. Some make \$100 to \$1,000 monthly. Instructive booklet for stamp. Information System, Box X4, Marietta, Ohio.

LADY SEWERS make neckties; utilize your spare time; stamped envelope brings full particulars. Agents Supply Co., Dept. B, Los Angeles, Cal.

ENERGETIC MEN, LEARN PAPERHANGING and Decorating. We teach by Correspondence and Illustrations. Pay after graduating. We start you in business or guarantee position. Booklet free. Norwalk School of Decorating, South Norwalk, Conn.

MAKE MIRRORS AT HOME. Same formula as used in a large mirror factory. Small cost nearly all profits. Complete instructions forty cents, coin or money order. P. J. Harkness, East Lynn, Ill.

23 ORIGINAL PLANS for starting profitable local or mail order business on small capital. 25c coin. R. E. Clark, Duluth, Minn.

GINSENG AT CUT PRICES, for want of room. Send stamp. Epworth City Ginseng Garden, Ludington, Mich.

SEE WHAT I SAY under "Typewriters." Atchison.

"LIVE HUSTLERS" MAKING \$3 TO \$5 AN HOUR with our new amusement device; legitimate. Monarch Mfg. Co., Bonne Terre, Mo.

\$300 DAILY MAIL-ORDER BUSINESS, Established 1874. Easily conducted by anyone, anywhere. Part cash, balance from business. Trial given. Book Publisher, 6947 N. Clark, Chicago.

LEARN ALL ABOUT MAIL ORDER BUSINESS before investing in "outfits." The "MAIL ORDER ENCYCLOPAEDIA" contains complete, rapid home study, also Directory of 1500 manufacturers, etc. Has helped others, will help you. Write for free particulars and valuable information about Mail Order Business. MAIL ORDER LIBRARY, 569 FIFTH AVE., N. Y.

"MAKE RICE CRISPI"—New confection; sells like wildfire; enormous profits; machines \$10 to \$20; literature free; samples 10c. Shaw Mfg. Co., 900 Laguna St., San Francisco.

ASK ME how you can start a profitable mail order business at home evenings. Heacock, 750 Lockport, N. Y.

MONEY—30 ways to earn money in your own home; my new book "Silent Helper" tells how; this book was printed to sell for \$1.00. I will send it this month by mail prepaid for only 10 cents (silver or stamps). The Chemist, 214 Kasota Bldg., Minneapolis, Minn.

AGENTS—\$300 every month selling our wonderful 7-piece Kitchen Set. Send for sworn statement of \$12 daily profit. Outfit free. Thomas Mfg. Co., 262 Third St., Dayton, Ohio.

3,000 GUMMED LABELS \$1.00 postpaid. Any size to 1x2, two colors. M. Terrace Manufacturing Company, Pittsburg, Pa.

CAN START YOU a good home business by mail. 30 p. catalogue free. Parli P. Book Co., Buffalo.

FREE FOR THREE MONTHS. The Economic Geologist and plenty of opportunities to make money in mining. Do you want to manage a district for a gentleman's business associated with the best class of people? If so, send for information. The Economic Geologist, 7 Pine St., New York.

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THE SOUTH. Opportunities, Real Estate, Investment Securities, and Loans in the Southern States and Mexico. Southern States Development Co. Geo. B. Edwards, Pres., Tribune Bldg., 154 Nassau St., New York, N. Y. References.

LIVE MEN: If you are making less than \$25 weekly, send your address quick. If you have a horse and buggy or bicycle you can use, all the better. We teach you. You can start right where you live. You owe it to yourself to investigate this opportunity and let us prove that we can better your condition. The Thomas Company, 923 Third St., Dayton, Ohio.

AGENTS make \$103.50 per month selling wonderful self-sharpening scissors and cutlery. V. C. Gellmer sold 22 pairs in 3 hours, made \$13; you can do it. We show how. Free outfit. Thomas Mfg. Co., 342 Third St., Dayton, Ohio.

START legitimate mail-order mercantile business of your own; possibilities unlimited; cash orders, good profits; conducted by anyone. We print your catalogs, supply everything; sell you merchandise at wholesale; show you how, on small investment. Write for free booklet and sample catalog. Central Supply Co., Kansas City, Mo.

INCORPORATE FREE; pay expenses; we take stock for service. Listed Securities Co., Elmira, N. Y.

AGENTS WANTED

\$90 MONTHLY AND EXPENSES to men and women to advertise, leave samples and collect names. Write at once. Silverton Co., J. 3, Chicago.

BIGGEST MAIL ORDER AND AGENTS specialty—Utensil Mender, positively will repair any leak in tinware, copper or graniteware—so simple a child can apply—20 cents gets complete outfit and terms. Johns Co., 123 E. Erie St., Chicago.

LADY OR GENTLEMEN AGENTS—To sell rich looking Jap. silk rugs, at \$1 each. W. E. Liscord, 80, Berwick, Me.; sold 99 in 4 days, his profit \$45. You can do as well. Write for sample offer and unique selling plan. Exclusive territory given. Edward B. Condon, Rug Specialist, Stonington, Maine.

MECHANIC FAMILIES should use Mabhey Button Fasteners. For all kinds buttons on all clothing. Dime per dozen, postpaid. Agents wanted. H. A. Mabhey, Lima, Ohio.

AGENTS—WE MANUFACTURE GLASS PAPER. Plain glass windows made to look like real stain glass; something new; easily applied; big money maker; two sample sheets of paper, with catalogue in colors and discount sheet, for 10c. S. H. Parrish & Co., 216 S. Clark St., Chicago.

AGENTS—Portraits 35c, frames 15c, sheet pictures 1c, stereoscopes 25c, views 1c, 30 days' credit. Samples and catalogue free. Consolidated Portrait, Dept. 1193, 230 W. Adams St., Chicago.

AGENTS—Best proposition yet—Automatic Button Bachelor Button selling at sight to consumers and stores—Big profits to hustlers. Send 10 cents and two cent stamp for sample dozen. T. R. Barber, 4428 Evans Ave., Chicago.

AGENTS—SOMETHING NEW: a winner; folding sleeve iron board; set in on the ground floor; make \$10.00 daily; sample sent prepaid for 50 cents. Dexter Supply Co., 334 Dearborn St., Chicago.

BOYS, WOMEN, MEN earn large salary working for us during spare time. Write at once as this ad will not appear again. Joe Serres, 121-84, La Crosse, Wis.

AGENTS—Biggest proposition yet. Send 10c for 25c sample. Novelty Manufacturing Co., New Durham, N. J.

ALADDIN KEROSENE MANTLE LAMPS sell as fast as you can demonstrate them. Needed in every home. Generate gas from kerosene (coal oil) give like more brilliant than city gas, gasoline or electricity. Our Sunbeam Burners fit other lamps. You are losing dollars every minute you hesitate. Write nearest office. Mantle Lamp Co., Desk 176, Chicago, Portland, Ore., Waterbury, Conn., Winnipeg, Montreal, Can.

\$1,500.00 A YEAR FOR LOCAL REPRESENTATIVES. Last year 577 agents made over \$1,500.00 each, selling our wonderful everlasting Cooking Utensils. An excellent proposition for high-class agents. Write to-night. American Aluminum Mfg. Co., Dept. 101, Lemont, Ill.

SEND 10 CTS. FOR SAMPLE Klean-Em Plate and Kettle Scraper. It's a winner. L. C. Food Co., Los Angeles, Cal.

AGENTS make big money selling our new gold letters for office windows, store fronts and glass signs. Any one can put them on. Write today for free sample and full particulars. Metallic Sign Letter Co., 405 N. Clark St., Chicago.

WANTED—Experienced steam appliance salesmen for labor and fuel saving boiler attachment. Thousands in use. Many testimonials. Price \$50.00. Sold on 30 days' trial. Exclusive territory and \$15.00 on each to desirable men. 42 in use in one plant. Box 295, Detroit, Mich.

COLLECT NAMES, addresses and other valuable information. Fascinating home business. Steady income. Instructive booklet for stamp. Information System, Box R. Marietta, Ohio.

A GREAT INVENTION—Success Envelope and stamp moistener; something new; can be carried in pocket; sells to everybody; sample 25c; Cassessers make big money. Success Moistener Co., Harrisburg, Pa.

MEN AND WOMEN take advantage of the heavy demand Nalrene advertising is creating; introduce Nalrene. The great nail shine. Small look form. Nothing like it. World beater for profits. Free sample. Agent's prices. Margo Chemical Company, Los Angeles, Cal.

AGENTS—SOMETHING NEW: a winner; Hand Rope Making Machine make own rope from binding twine any size and length in three minutes' time at two-thirds less than factory made rope and twice as strong and pliable; every farmer and stockman or any one that uses rope will buy one. We want one agent in every county in the United States and Canada. Territory going fast, get in on ground floor. This is the only machine of this kind made so there is no competition. Machine weighs only three pounds. Send postal order for \$1.50 for sample machine. We also sell country rights. E. O. Berg Manufacturing Co., Madison, Minn.

WANTED—WIDE-AWAKE SALES AGENTS everywhere to sell New Sicilian Portrait. Nothing similar ever produced. Quick sales, big profits. Drop your dead line and start Spring with live seller. Sales-Compelling samples furnished. Illinois Art Company, 6314 Wentworth Ave., Chicago.

EVERY HOUSEWIFE WANTS our new, practical and fast-selling specialties; samples and catalogue free. Household Specialties, Dept. A, Box 612, Portland, Maine.

AGENTS—PHOTOS ENLARGED ON CHINA PLATES. Fast sellers, sample free. Clement, Warrington Block, Oak Park, Ill.

OUR AGENTS MAKE \$25 TO \$100 PER WEEK EASILY, one of the greatest labor saving devices ever invented. Thousands of stems saved between stove and ironing board; is unnecessary to heat a whole stove to keep a few irons hot. The Doran Self Heating Iron does it all. Will do complete ironing for less than 1c. One tried always used. Send for Agency proposition at once. Doran Sales Co., 1274 Washington Blvd., Chicago.

SALESMEN—\$300 per cent profit. Our Bank Check Protector sells to every office and business house. Does work of \$25 machine. Sample 25c. Circulars free. National Office Supply Co., Dept. F, Toledo, O.

AGENTS—Why work for others? Sell something you can manufacture yourself. 1500 per cent profit, formula and best selling plan 10c. Conway Laboratory, Vineland, N. J.

POCKET ADDING MACHINE—Lightning seller. Agents write us. Cincinnati Specialty Manufacturing Co., Cincinnati, Ohio.

MAKE YOUR OWN FIRELESS COOKER; instructions 25c; particulars free. C. H. Fint, Bonne Terre, Mo.

AGENTS—New patented article everybody needs; sells for 50c; pays 100 per cent profit; pocket sample; big seller. Write for particulars. Bullard Mfg. Co., 98 Webster Bldg., Boston, Mass.

SALESMEN—Our Bank Check Protector sells to every office and business house. Does work of \$25 machine. Sample 25c. Circulars free. Terry Mfg. Co., 132 Colton Bldg., Toledo, Ohio.

SPARKLENE—Prevents eye glasses steaming. Make money by selling Sparklene. Formula and sample for 50c. Harry Fox, 408 Stinson Bldg., Los Angeles, Cal.

WOULD YOU LIKE to wear a beautiful suit made to your exact measure, tailored in latest Chicago style, if the price were less than you pay for ordinary ready-made store clothes? Write at once for free samples and full particulars. We ship on approval, express prepaid, absolutely guarantee perfect fit and satisfaction. Agents wanted—Any bright man can make \$25.00 a week in his spare time taking orders for our fine custom tailoring. Our samples, new up-to-date styles and low prices surprise everybody. Orders come easy. We give exclusive territory. You can build up a fine business for yourself on our capital. We furnish agents samples and outfit free and explain everything. You can't fail. No money or experience required. If interested ask for agents' outfit and we'll make you a special inside price on a suit for yourself as a sample; or else please show this ad to someone who would appreciate it, for it is a wonderful opportunity. Address Banner Tailoring Co., Dept. 360, Chicago, Ill.

DOLLARBACK STEWART, San Jose, Cal.—3 USEFULTES 3c.

GOLD AND SILVER Sign Letters; attractive, durable, inexpensive; sample free. Johnson Mfg. Co., Quincy, Ill.

I WANT HIGH CLASS SALESMEN to act as state and district managers to introduce my new invention—more useful than typewriters, more profitable than cash registers. J. W. Bolte, 8 E. Michigan St., Chicago, Ill.

WE HAVE MONEY FOR YOU—You can make \$50 to \$300 at your home, during your spare time, each month, when we get you started right. You have nothing to sell, and need no capital. No experience necessary. We furnish everything. Total expense to you \$5.00 a year. We want men and women members everywhere to secure information for us. You can be our information reporter in your locality if you write quick. Send stamp for particulars. Manufacturers Sales-Information Association, 661 Holiday Building, Indianapolis, Indiana.

AGENTS: 100% PROFIT. Monkey-wrench, plumbers' pliers, with 13 other tools combined. Most wonderful combination of tools ever made. Lightning seller. Sample free for examination. Forshoe Co., B. 1335, Darton, Ohio.

WANTED, AGENTS, MACHINISTS ATTENTION! Increase salary, new revised Saunders Hand Book Practical Mechanics. Best ever ready reference. Thousands in use. Postpaid \$1.00 cloth; \$1.25, \$1.50 leather flap. Big profits. E. H. Saunders, 216 Purchase St., Boston, Mass.

23 FOR DIRT cleans everything. Everybody needs it. Send 10c for can. Agents wanted everywhere. Corliss Chemical Co., 401 S. 12th St., St. Louis, Mo.

PORTRAIT AGENTS WANTED—Guaranteed Crayons, size 10x 20, 40c. Frames at your own price. 30 days' credit, samples free. We are not in the picture and frame trust. We own a large frame factory and sell at one-half the price portrait companies can. Our business established 25 years. We can give you steady employment. Our big wholesale art catalog with confidential prices and instructions mailed free to agents. Williams Picture & Frame Co., 2548 Taylor St., Chicago.

WANT FEW MORE GENERAL AGENTS for our Dash Board Line Holder. \$200 to \$400 monthly profit. Agents getting rich with this patent. Sample postpaid 30c silver. Wholesale Supply Co., D15, Valdosta, Ga.

AGENTS—Every wife wants our O. K. Laundry Iron. Holds heat 5 times as long as others. Sells on sight. Exclusive territory. Write for particulars, \$2.00 Premium Offer and price list of 40 useful articles. Fair Mfg. Co., O. K. & Racine, Wis.

AGENTS make 500 Per Cent Profit selling Our Novelty Signs. Any one can put up our New Gold and Silver Sign Letters, and make \$5.00 per day. Enormous demand. Catalogue and particulars free. M. O. Sign Co., 4741 State St., Chicago.

WONDERFUL INVENTION—Canchester Kerosene Incandescent Lamp. Burns with or without mantle, 6 times brighter than electricity, gas, acetylene, or gasoline, at 1/10 cost. Burner fits any lamp, saves 75% oil. No trimming wicks. \$10 daily. Beware of imitations. Handsome outfit furnished. Canchester Light Co., 26 State St., Dept. P. M., Chicago.

"PERPETUAL" WICK. For lamps and oil stoves; better light, less oil; no trimming, smell, smoke or broken chimneys. Fine chance for agents. 3 samples mailed 10c; assorted doz., 25c. Dent, A., Vitrum Works, Warren, R. I.

THE NEW "SWIFTLIT" LAMPS light instantly with 1/4 match; like city gas; no alcohol used; radically different from any other; portable or systems, 100 to 1,000 candle power at will; burners cheap for old lamps; Agents making money; great novelty; wholesale price for introduction. Planet Mfg. Co., Dept. 4, St. Louis. (Established 1868.)

\$5,000.00 IN PRIZES to Davis agents; not only unusually large profits for selling our High Grade Soaps and Toilet Specialties, but continued service rewarded by a share of our profits in premiums. That makes Davis agents "go some." \$15.00 to \$25.00 weekly easily made. \$100.00 by hustlers. Illus. catalogue and profit-sharing plan free. Davis Soap Co., 80 Union Park Court, Chicago.

POPULAR MECHANICS wishes to secure an agent in every town and city in this country to sell our 6 volume set of Shop Notes. These books sell readily among machinists, shoopmen, farmers, carpenters, blacksmiths and all who use tools. The commission to agents is very liberal. If interested write Mr. of Book Dept., Popular Mechanics Co., 225 Washington St., Chicago.

BE YOUR OWN BOSS: Start Mail-Order Business at home; devote whole or spare time. We tell you how; very good profits. Everything furnished. No catalog outfit proposition. For "Starter" and free particulars address, P. M. Krueger Co., 135 Washington St., Chicago, Ill.

MEDALLIONS SELL AT SIGHT. 300 per cent to 500 per cent profit. Make up your own goods and be independent. "It's easy." Catalog free. Fred Besag Co., 1295 W. Randolph St., Chicago.

AGENTS—\$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 402 Third St., Dayton, Ohio.

AGENTS—\$75 monthly. Combination Rolling Pin. Nine articles combined. Lightning seller. Sample free. Forshoe Mfg. Co., Box 248, Darton, O.

EXCEPTIONAL OPPORTUNITY for energetic collectors with grit and selling power. Article absolutely new and guaranteed. Tremendous seller. Everybody buys if shown. 60c to \$2 profit each sale. Virgin field awaits hustlers everywhere. Write today. Sanfax Co., 2309 Wabash Ave., Chicago.

FOREIGN AGENTS

MANUFACTURERS' AGENT—Established importer and general agent desires to represent American and Canadian Manufacturers of articles and goods suitable for sale in South Africa. I have branches at Johannesburg and Kimberly. Address Jesse C. Chevers, 55 Loop St., Cape Town, So. Africa.

MALE HELP WANTED

\$3,000 TO \$10,000 YEARLY IN REAL ESTATE BUSINESS: no capital required; if you are honest and ambitious, we will teach you the business by mail, appoint you special representative of leading real estate company, list with you salable properties, cooperate with and assist you to a permanent success; a thorough commercial law course free, this month, to each representative. 62-page book, free. The Cross Co., Dept. 3734, Chicago.

TOOL MAKERS, FIRST CLASS for jig work. Must be competent machinists and bench workers able to assemble motorcycle engines. Steady work. State previous experience, employment and wages. Address Machinist, P. O. Box 1592, Philadelphia, Pa.

LEARN TO BE DETECTIVE, earn money in your town. Write today. Waller, Monon Bldg., Chicago.

WANTED—Specialty Salesman of ability to command \$5,000 per year and expenses, selling Coal and Fruit Lands in small tracts. Monthly payments. Liberal proposition to right man. W. P. Records, 213 Bellance Bldg., Kansas City, Mo.

GENTLEMEN AND LADIES to learn to dance, waltz and two-step; simple, easy, complete, instructions by mail for \$1.00. Prof. Goodfellow, Factory St., Springfield, Ohio.

SALESMEN WANTED—\$50 per week easily made selling our wrenches. "Something New." Handy Wrench Co., Lock Box 3, Wood River, Neb.

LIVE MAN IN EACH COMMUNITY to own and operate a business in his home. Profits are \$200 each week. Money comes in every day and all yours. Brand new business. No canvassing. No capital. Particulars free. Frank C. Voorhes, Desk C. R., Omaha, Neb.

MEN WANTED—To prepare for Railway Mail, Internal Revenue, Customs and Postoffice Examinations. \$50.00 to \$125.00 monthly. Short hours; Common education sufficient. Political influence unnecessary. Preparation free. Write immediately for schedule of Spring Examinations. Franklin Institute, Dep't R, 23 Rochester, N. Y.

YOUNG MEN WANTED—To prepare for Railway Mail, Customs and Postoffice Examinations. \$50.00 to \$125.00 monthly. Preparation free. Write immediately for Spring Examination schedule. Franklin Institute, Dep't R 23, Rochester, N. Y.

MEN WANTED—For Railway Mail, Customs and Postoffice examinations. \$600 to \$1500. Preparation free. Write for schedule of Spring examinations. Franklin Institute, Dep't R 23, Rochester, N. Y.

WANTED—RAILWAY MAIL CLERKS. Average salary \$1100.00. Postoffice examinations everywhere coming. Write for schedule. Franklin Institute, Dep't R 23, Rochester, N. Y.

MEN WANTED—To prepare for next Railway Mail, Internal Revenue, Customs and Postoffice examinations. \$50.00 to \$125.00 monthly. Annual vacation; short hours; steady work. Common education sufficient. Over 15,000 appointments this year. Political influence unnecessary. Write immediately for schedule of spring examinations. Candidates prepared free. Franklin Institute, Dep't R 23, Rochester, N. Y.

RAILWAY MAIL CLERKS WANTED—Average salary \$1100.00. Write immediately. Franklin Institute, Dep't R 23, Rochester, N. Y.

WANTED, RAILWAY MAIL CLERKS—Average salary \$1100.00. Preparation free. Postoffice examinations soon. Franklin Institute, Dep't R 23, Rochester, N. Y.

MEN WANTED—To prepare for Railway Mail, Internal Revenue, Customs and Postoffice examinations. \$50.00 to \$125.00 monthly. Annual vacations. Short hours. Steady work. Common education sufficient. Country and city residents equally eligible. Political influence unnecessary. Over 15,000 appointments this year. Write immediately for schedule showing places and dates of Spring examinations. Preparation free. Franklin Institute, Dep't R 23, Rochester, N. Y.

WANT A BETTER PLACE? Government salaries are high, steady and sure; work is pleasant and promotion easy. Liberal vacations. No pull needed. Hundreds of vacancies every week, in all parts of U. S. Our paper tells you just how you can get one of these fine positions. Only ten cents for six months' trial. Money back on request. Send dime or stamps today to Desk 29, Civil Service Record, Washington, D. C.

WANTED—1,000 CHAUFFEURS and Repair Men. Our demand for automobile engineers exceeds the supply; calls for men of intelligence and mechanical bent, capable of commanding \$100 to \$150 monthly upon graduation. Resident courses \$15 to \$25. Home correspondence courses completed by practical road and shop work at any of our branches or affiliated schools, highly successful. Look This Up. Auto Schools of America, 1681 Michigan Ave., Chicago.

I WANT TO START YOU in business; work in spare time, will pay you from \$100 to \$500 per month. \$10 capital. No canvassing. Increase from profits. A new idea, never fails. Free particulars. F. E. Abbott, Desk 81, Omaha, Neb.

WANTED

WANTED—Scrap or odd size sheet of 18, 20, 22 black sheet steel. Redlinger & Angle Mfg. Co., Freeport, Ill.

WANTED—Southern, or State, Agency, meritorious patented article. Box 296, Selma, Ala.

WANTED—A MOTORCYCLE, an engine, or supplies. A. Wolke, Louisville, Ky.

WANTED—Architectural Cyclopeda. Bengtsen, Harvey, Ill.

DATA SHEETS WANTED—The editor of Popular Mechanics will pay for original data sheets of an acceptable character similar to those published in Popular Mechanics' Shop Notes Quarterly. Address Editor, Popular Mechanics.

WANTED TO BUY Water Cooled Stationary Gasoline Engine, from 1 to 10 h. p. from manufacturers of same willing to furnish under our own name, in carload lots, or large quantities, for cash. Manufacturers state full particulars to Water Works, Box 773, New York.

FOR SALE

FOR SALE—Sheet steel blanks, three pass, not rusty. Twenty, twenty-four and twenty-six gauges. Four to ten inches wide, twenty to thirty inches long. Sell random sizes or cut to exact size. George M. Clark & Co., Harvey, Ill.

TOBACCO FOR SALE—Write for samples to I. G. Wosta, Portland, Tenn.

FOR SALE—One 3 hp. and one 5 hp. brand new, air cooled, stationary gasoline engines. Also No. 5 Remington typewriter. All bargains. R. A. Frear, Ithaca, N. Y.

LEFT FROM HOLIDAYS—24 100-115 V Transformers giving from 2 to 24 V. For operating motors, miniature lamps, chemical rectifier for charging storage batteries, etc. While they last \$10; sold for \$20. M. & M. Electric & Machine Co., Station 34, Baltimore, Md.

FOR SALE—Complete heating and ventilating course I. C. S., 252 L. J. Beuret, Auburn, Ind.

ROLLER SKATES—18 pair, like new, half price. Ed. Bland, Hickory, N. C.

FOR SALE—Stereopticon and outfit; 5x7 Pico camera; 5x8 Printing Press; ¼ hp. direct current motor. E. W. Dunham, 434 Quincy St., Topeka, Kans.

GOOD 5x8 Hand Printing Outfit. Walter L. Rose, Lafayette, R. I.

INTERNATIONAL RY. CORR. INSTITUTE fireman's course. H. Bullock, Appleton, Wis.

75 WATT ROTARY CONVERTER. Brand new. A bargain. Box 2, So. Chicago, Ill.

FOR SALE—Profitable sheet metal shop. Sickness. Frank J. Winters, Fremont, Ohio.

MILL PROPERTY FOR SALE. 50 bbl. Wheat Mill and 50 bbl. Buckwheat with 24 inch attrition Mill on feed, and good Coal business connected with Mill. Doing good business. Must sell to close estate. W. W. Cline, Skimmers Eddy, Pa.

FOR SALE—I. C. S. Machine Shop course. Cost \$63; will take \$49. A. B. Cotton, Wamego, Kans.

8 HP. MARINE Engine \$35, also 3 hp. engine \$20, both like new; also 6½ ft. Laminated Wood Aeroplane propeller \$10. V. G. Gustafson, Joliet, Ill.

SEE WHAT I SAY under "Typewriters." Atchison.

FOR SALE—Repair shop in city of about 3,000. Account sickness. Theo. Heun, Eldora, Iowa.

MOTORCYCLES \$25 Up. Engines \$10 up. Get our prices and save money. A. F. Wolke, Louisville, Ky.

NEW PATENT FISH HOOK—2 for 25c. Ed. Trube, 2415 Market, Galveston, Texas.

FOR SALE CHEAP—One 32 cal. Marlin Repeater, one 50 cal. Winchester Repeater, two Remington 41 cal. double barrel derringers. A. V. Reayburn, Jr., 2549 Front St., San Diego, Cal.

GREAT ASTHMA REMEDY—FORMULA. 60c. Wm. Baxter, 1083 Oakdale Ave., Grand Rapids, Mich.

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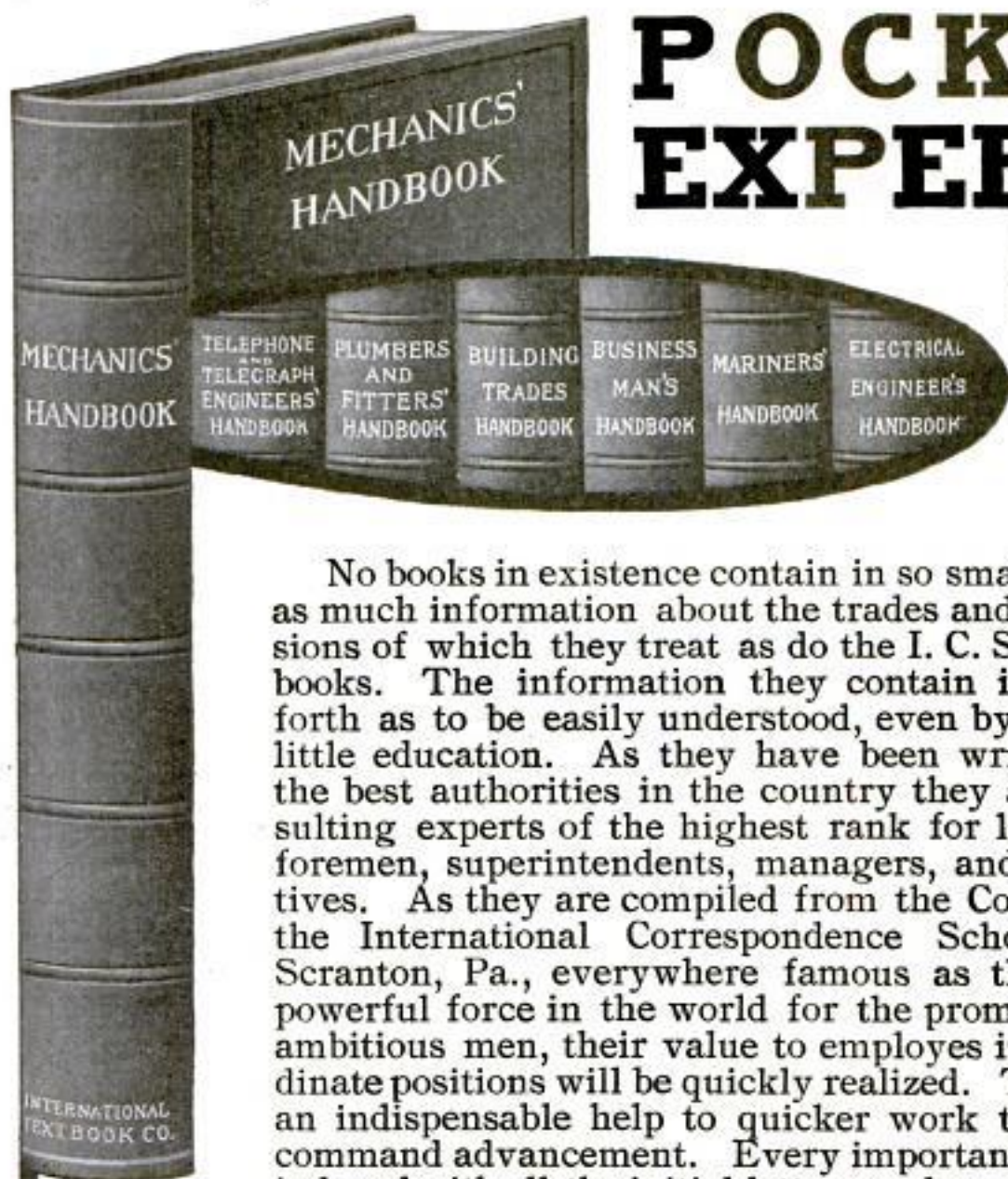
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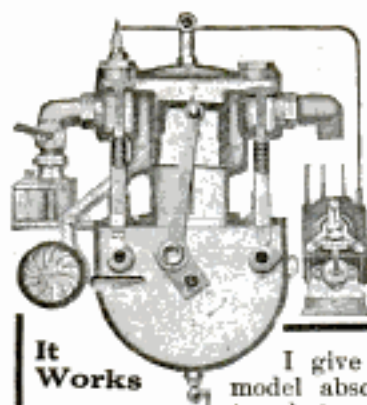
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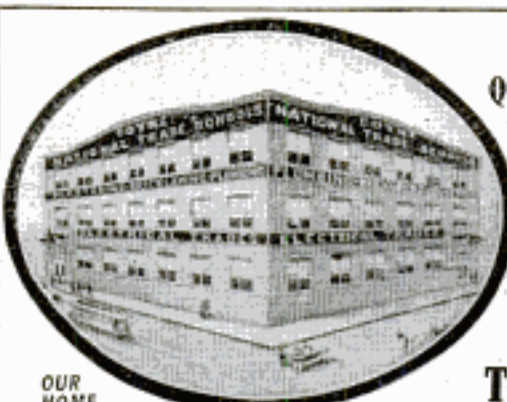
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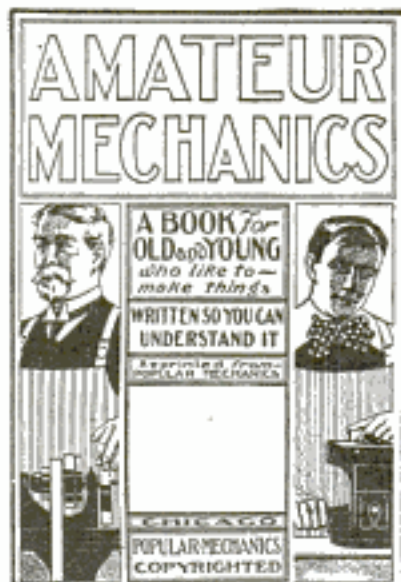
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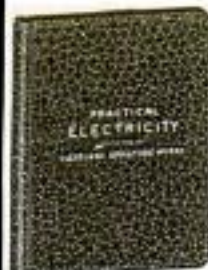
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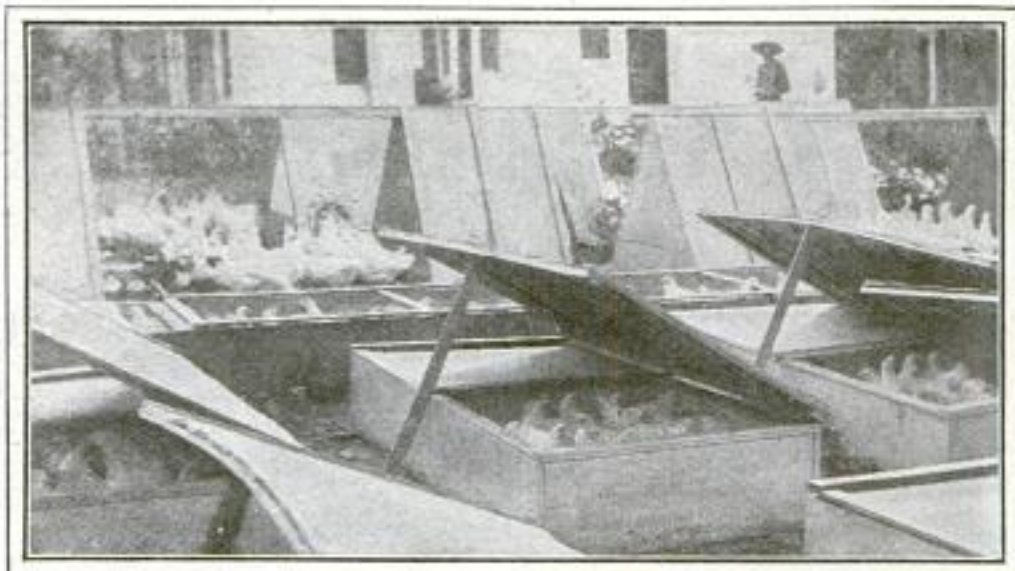
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and in many respects just the reverse, accomplishing things in poultry work that have always been considered impossible, and getting unheard-of results that are hard to believe without seeing.

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from selecting the breeders to marketing the product. It tells how to get eggs that will hatch, how to hatch nearly every egg, and how to raise nearly all the chicks hatched. It gives complete plans in detail how to make everything necessary to run the business and at less than half the cost required to handle the poultry business in any other manner.

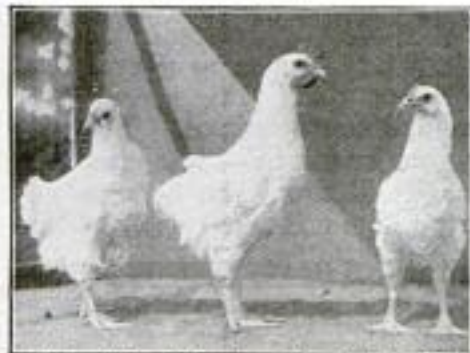
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are raised in a space of less than a square foot to the broiler, almost without loss, and the broilers are of the very best quality, bringing here three cents per pound above the highest market price.

Our Six Months Old Pullets are Laying at the Rate of 24 Eggs Each Per Month

in a space of two square feet for each bird. No greens, cut bone of any description is fed, and the food used is inexpensive as compared with food others are using.

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No lamp required. No danger of chilling, overheating or burning up the chickens as with brooders using lamps or any kind of fire. They also keep all the lice off the chickens automatically or kill any that may be on them when placed in the brooder. Our book gives full plans and the right to take and use them. One can easily be made in an hour at a cost of 25 to 50 CENTS.

Testimonials

Elmira, N. Y., October 30, 1909.

Mr. E. R. Philo, Elmira, N. Y.

Dear Sir:—No doubt you will be interested to learn of our success in keeping poultry by the Philo System. Our first year's work is now nearly completed. It has given us an income of over \$500.00 from six pedigreed hens and one cockerel. Had we understood the work as well as we now do after a year's experience, we could easily have made \$1,000.00 from the six hens. In addition to the profits from the sale of pedigree chicks, we have cleared over \$200.00 running our hatchery plant, consisting of 56 Cycle Hatchers. We are pleased with the results, and expect to do better the coming year.

With best wishes, we are, very truly yours, (Mrs.) C. P. Goodrich.

Valley Falls, N. Y., Sept. 10, 1909.

My Dear Mr. Philo:—I want to tell you how pleased I am with my use of the Philo System during the past year. The fowls laid exceptionally well in the New Economy coop, much better in proportion than those in my old style house. The fireless brooder has solved the problem for me of raising extra early chicks. I am going into your methods more extensively this coming year.

Wishing you success, I am,

Sincerely yours, (Rev.) E. B. Temple.

South Britain, Conn., April 14, 1909.

Mr. E. R. Philo, Elmira, N. Y.

Dear Sir:—I have followed your system as close as I could; the result is a complete success. If there can be any improvement on nature, your brooder is it. The first experience I had with your system was last December. I hatched 17 chicks under two hens, put them as soon as hatched in one of your brooders out of doors, and at the age of three months I sold them at 35 cents a pound. They then averaged 2½ lbs. each, and the man I sold them to said they were the finest he ever saw, and he wants all I can spare this season.

Yours truly, A. E. Nelson.

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Written So You Can Understand It

APRIL

No. 4

BUFFET TENDER FOR AUTOMOBILES

A tender that can be drawn behind an automobile and in which a full dinner for a large party can be prepared, has been built by G. L. Reeves, of Columbus, Ind.

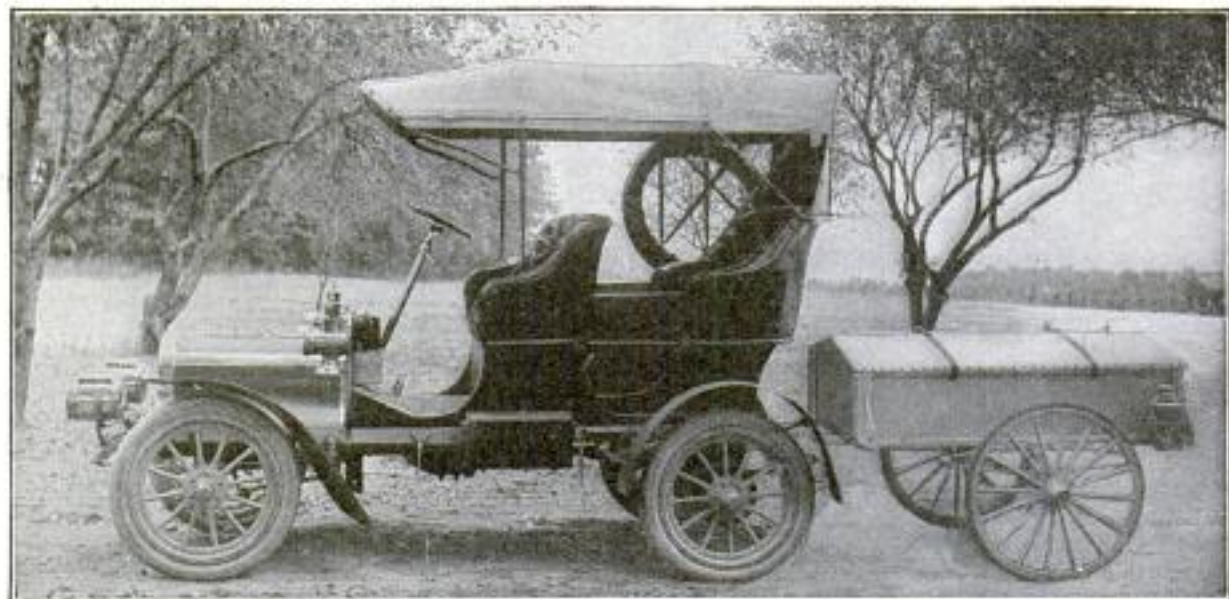
The tender is mounted on two 32-in. wheels and two full elliptic springs. The body is 5 ft. long, 3 ft. 1 in. wide and 1 ft. deep. Fixed across the rear end is the 3-burner gasoline stove. A



A Roadside Dinner Served from the Buffet Tender

Everything that a modern kitchen can boast, even to a gasoline stove and a refrigerator, is included. It has been used by the builder many times in serving roadside dinners for his guests on automobile excursions.

one-gallon gasoline tank is connected with it by an adjustable feeder and folds down when the tender is closed. In front of the tank is a receptacle 11 in. square, in which is fitted a complete cooking outfit, each article nest-



The Tender Attached to Auto

ing and telescoping into the other, and consisting of two frying pans, four boiling vessels, coffee pot, 20 serving plates, three saucepans and eight soup tins.

To the left of the cooking outfit is a 3-bin vegetable cellar with tray lid for large cooking spoons, cake turner, carving forms, etc.

To the right is a galvanized iron-lined refrigerator, 21 by 10 by 11 in., containing six one-pint glass sealers, ice receptacle and large meat tray.

Immediately forward of the refrigerator and extending to the end of the bed is a 7-gal. water cooler. To the left of the water cooler is a 13-drawer cabinet intended for all grocery and cooking staples, knives, forks, spoons, and table linen.

The illustration showing the kitchen open indicates that the two covered lids when opened out form two spacious serving tables. These lids are covered on the inside with padded oil-cloth and on the outside with rainproof ducking. The meeting edge of one cover is provided with a patent leather flap and is held in place in transit by two large straps which buckle securely, and make the tender rain and dust proof. A small brass hasp and lock is also furnished. A neat little folding dining table is strapped to the inside of one of these lids.

An extra broiler and cooker for emergency, a pocket axe, and a camp lantern strapped to an outside bracket complete the outfit.

A rigid pair of folding legs is provided to support the end of the body when disconnected from the auto.

The tender is painted French gray with black stripe finish and is attached to the steel frame of the car by a neat steel coupling. The wheels have rubber tires and the parts are so nested that the tender moves even at 20 to 25 miles an hour without noise.

The tender weighs 475 lb. and the extra draft on the automobile is scarcely perceptible. The cost of the tender complete was about \$125.

STRIKE GOLD WHILE EVADING BOAT INSPECTORS

One of the most curious instances on record of lucky gold finds was the result of a successful attempt of two prospectors to escape detention by boat inspectors. Their boat, a 45-ft., flat-bottomed, sidewheel steamer of such crude workmanship and design that it would not pass inspection, was steaming slowly along the Yukon river in Alaska, when warning was received that the inspectors were coming. Therefore, the craft was run into the Intoke river, and thence into a

smaller stream. While waiting for the inspectors to leave the territory the two men prospected to pass the time, and in a day or so struck a pay streak of coarse, shotty gold. The find was a bonanza, and claims were staked out for themselves and friends.

Before the past winter settled in, more than 2,000 prospectors were on the scene and several thousand more are now on the way there from Fairbanks, which is 700 miles distant.

THE OWNERSHIP OF THE AIR

Under the long established laws of practically every civilized country the proprietor of land owns all the air above it. This is now providing a topic for considerable discussion in aerial circles. Until the advent of the airship such ownership was not considered of much importance, but the fact that the aviator who flies over another's land is technically liable for trespass has made many aerial enthusiasts demand a solution of the problem.

At a meeting of the Aero Club of America in New York, Littleton Fox announced his belief that the most effective solution would be by the exercise of the right of eminent domain. "The state should condemn the air as a highway," said Littleton, "and take title to it, subject to the right of the land owner to build as high as he likes, or make other private use of the air above his land. Payment to each owner of whatever he should be able to prove to be the value of the air above his land should be provided. A cent apiece would seem to be ample compensation in most cases."

UPHOLSTERY GOODS AS MATERIAL FOR GOWNS

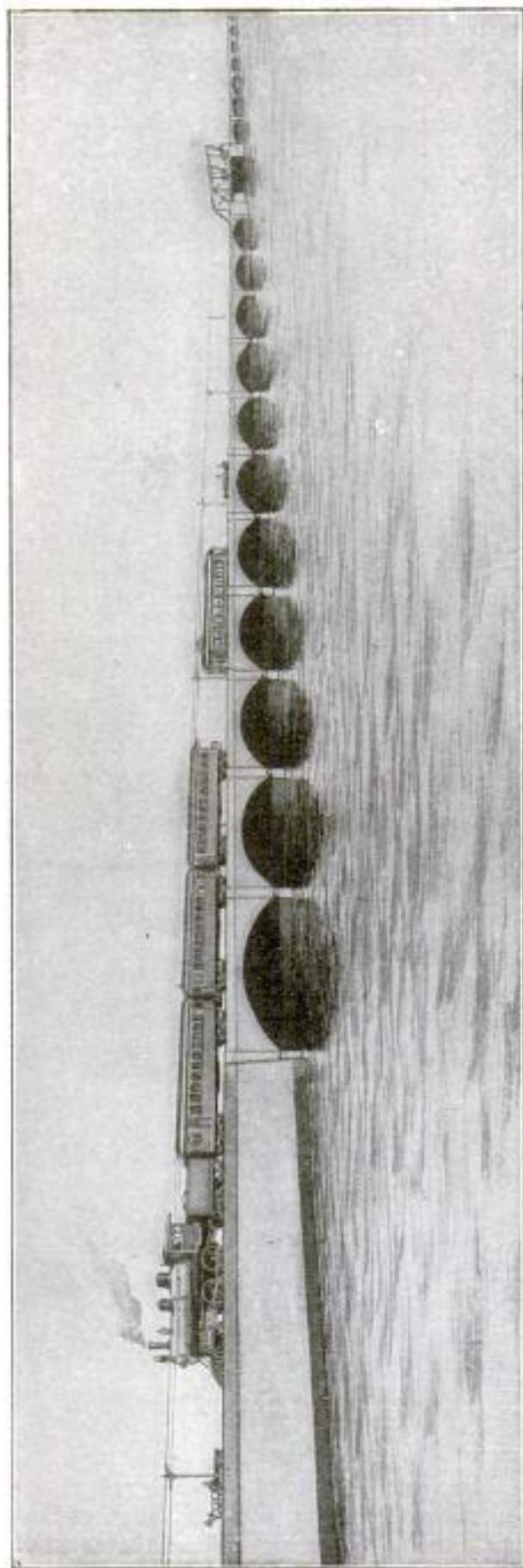
The modistes are now getting some of the material which they use in making fine gowns and cloaks from the upholstery trade. One New York importer has been doing quite an extensive business in this line, and it is predicted that next winter, even more than



Courtesy the Upholsterer
Material Had Narrow Escape from Being a
Chair Back

the past season, will show material meant for chair seats and backs used for gowns that will arouse envy in the fashion parade.

Pronounced dead by several physicians, a Chicagoan was saved from burial alive by a perfunctory final test made with an electric needle.



GALVESTON'S THIRD GREAT UNDERTAKING

If any section or city of this country can lay claim to a little of the spirit of Holland, that country which has continually struggled for hundreds of years to keep itself above water, and whose motto is "We Struggle and Emerge," it is Galveston. Following the storm of 1900, this wonderful city of Texas, with its 40,000 population, arose from the discouragement of a human loss of 6,000 souls and a property loss of \$20,000,000 and commenced to build a sea wall, costing \$1,200,000. This was completed in 1904, then came the second great project, the raising of the grade of the city several feet to insure greater safety, at a cost of \$2,000,000. And now that this is completed, the third great project has come: a concrete causeway is being built over the two miles of Galveston bay which intervene between the mainland of Texas and the city of Galveston.

This great connecting link, which was commenced in Sept., '09, and is expected to reach completion in December of this year, will consist of a protected roadway, a concrete arch bridge, and a lift drawbridge, and will cost about \$1,500,000. The protected roadway, or dirt portion of the causeway, is to be at either end; the concrete arch bridge, 2,358 ft. in length, is to span the middle, and the lift drawbridge is to be in the center of the arch bridge.

The causeway will furnish permanent and adequate means of egress and ingress for people and for the commerce passing through Galveston. Since the great storm a trestle bridge, crude and transitional in appearance, has served for all trains entering and leaving the city, and the record for 1908 showed that a total of 145,912 loaded cars of freight passed over it. The export freight alone passing over it during the 12 months ending Sept. 1, '09, amounted to \$189,449,577. Thus can be realized the importance to the commerce of the Southwest of such a structure as the causeway is to become.

The protected roadway will be 119 ft. wide at the top, and is being constructed by pumping sand filling, dredged from the bay, into spaces confined by sheet piling and concrete slabs. The concrete sides of the roadway will amply provide against erosion. The concrete arch portion is to be 66 ft. wide at the top, and is to consist of 28 arches or spans, each span having its foundation beneath the bottom of the bay upon piling driven 30 ft. into the ground. The foundation piers are being laid by means of cofferdams. The drawbridge is to be 100 ft. in length.

The available surface of the causeway is to be divided between three steam railroads, an electric interurban road, and the county of Galveston. The steam roads get 50 ft. of space over the protected roadway portion, 29 ft. over the arch-bridge portion, and 27 ft. over the drawbridge. The electric road will have 29 ft. over the protected roadway, 15 ft. over the arch bridge, and 18 ft. over the drawbridge, the latter to be used jointly and equally with the county of Galveston. Galveston county will have 40 ft. over the protected roadway, 22 ft. over the arch bridge, and the joint use of the 18 ft. above mentioned over the drawbridge. This is to provide a good roadway between the city and the mainland for the passage of all kinds of vehicles. The roads on the mainland leading to the causeway are to receive an expenditure of \$500,000 in improvements, bonds having recently been voted for this purpose.

TATTOOING DEAF AND DUMB CHILDREN FOR IDENTIFICATION

A novel means of identification has been adopted by one of the large institutions for deaf mute children of New York. The children sometimes wander away or become lost while traveling, and as many of them can not read and write, it is often a difficult thing to return them to the institution. By tattooing the name and address on

the skin it is an easy matter for the deaf mutes to be identified. The tattooing is done in ink that is not indelible,



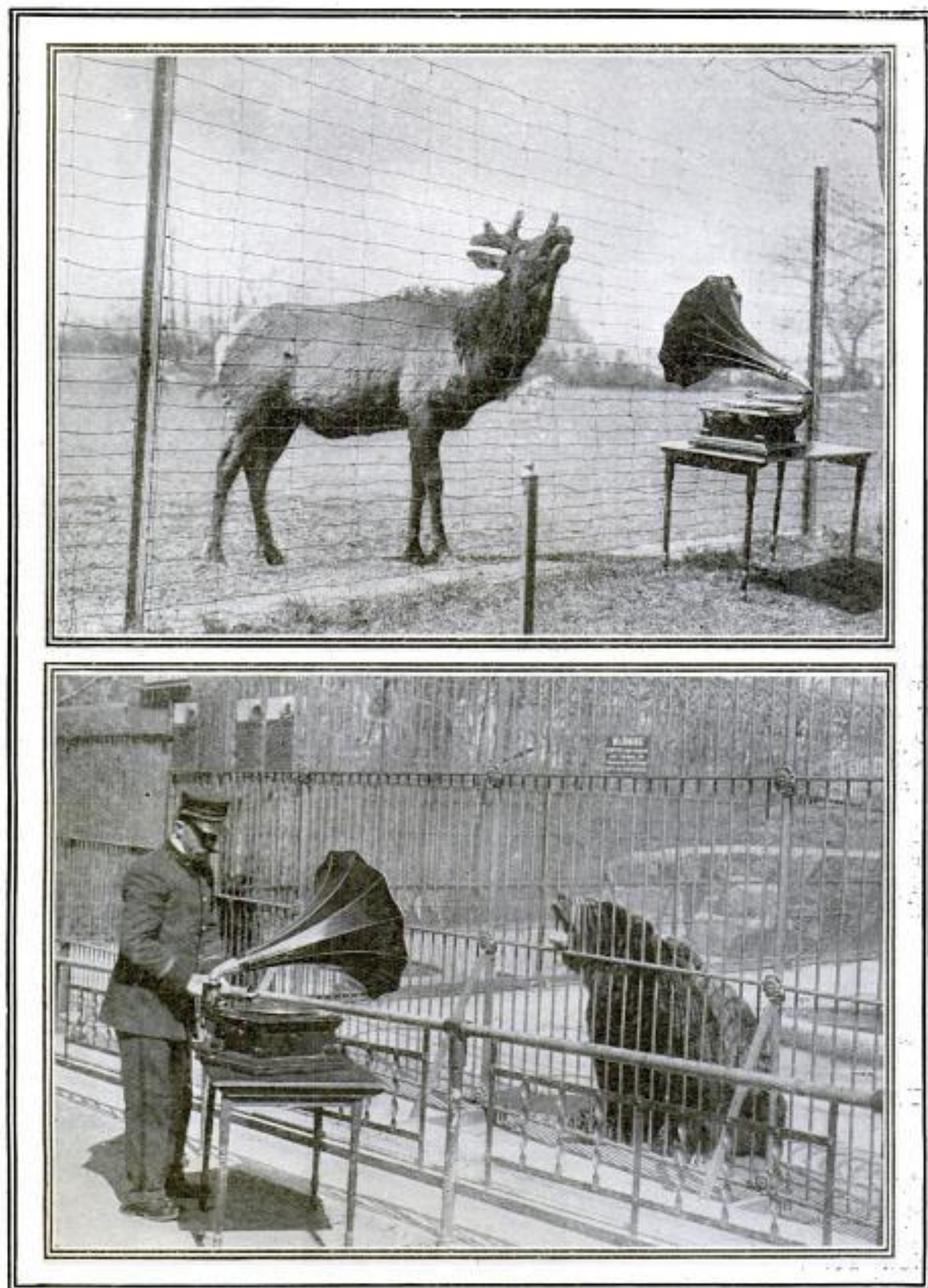
Professional Tattooer at Work

but which will stand for a year or two. The lettering when completed is not as conspicuous as is shown in the illustration, however, but merely shows faintly through the skin. It is necessary to repeat the operation every year, so that if a child is taken from the institution, the marks wear off and do not cause any embarrassment.

GRAND OPERA AT THE NEW YORK ZOO

For the purpose of testing the old adage that "music hath charms to soothe the savage breast," some experiments were conducted recently at the New York Zoological Park.

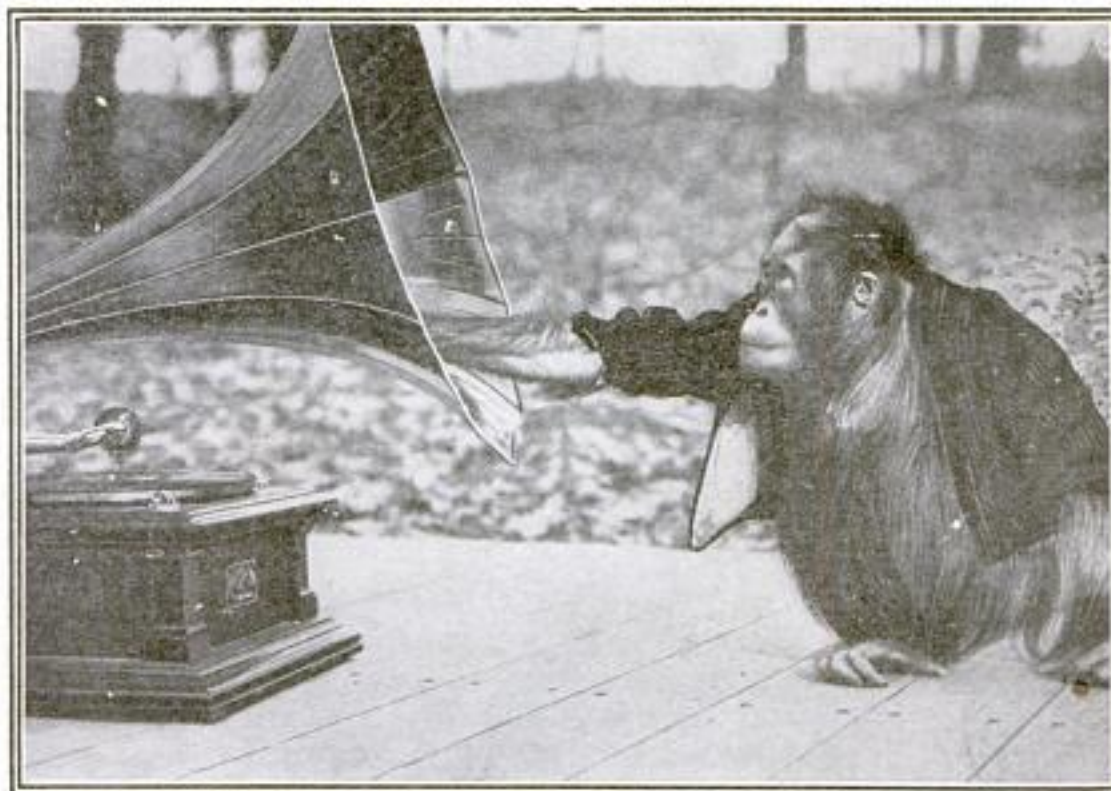
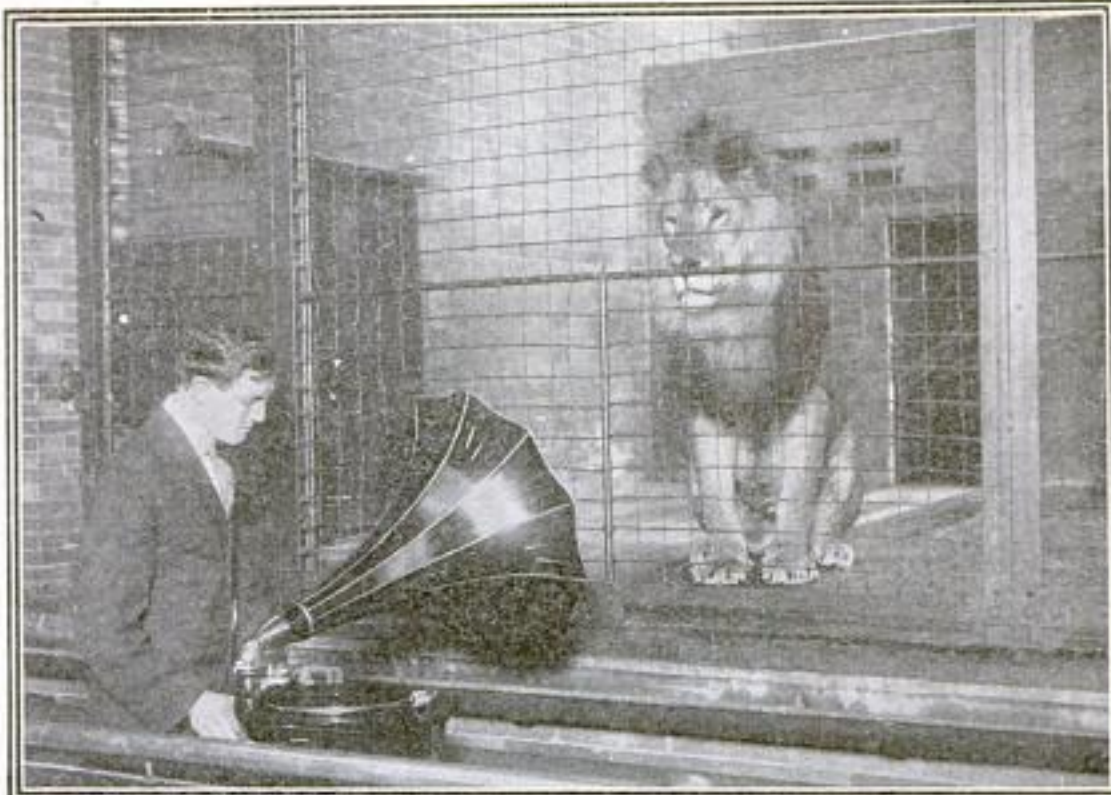
While the wild animals were comfortably enclosed in stout cages, and it was impossible to determine to what extent they were soothed by the phonographic reproductions of grand opera and orchestral music, it was very plain



Grand Opera at the Zoo

that the wild beasts were very much interested.

One or two of the lusty-lunged denizens of the jungle took offense at first,



Giving the Animals a Musical Treat

but later listened with respectful attention. One of the gorillas proved him-

self very vulgar and possessed of no musical taste, for he became angry at

the intrusion of the phonograph and tried to reach out through the bars (of his cage—not of the music) and showed a disposition to smash it up.

usually small, never over 3 ft. in diameter, and the motion from the wheel is imparted direct. The grain is fed to the stones from a hopper suspended from



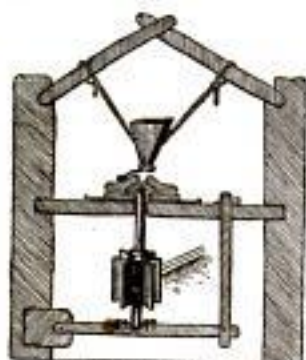
A Daring and Unique Advertisement

FREE BOARD ON CLOUDY DAYS

A hotel keeper of a western mountain resort has such faith in the climate, which is one of the chief attractions of his hostelry, that he advertises free board and lodgings for every day on which the sun does not shine. This offer is announced on a boldly painted sign across the front of his hotel.

ANCIENT NORSE MILL

In the islands of Shetland, Orkney, and the Hebrides, near the northern coast of Scotland, are still to be found



Cross-Section of Mechanism

a number of ancient Norse flour mills, the one shown in the illustration being still in existence in Shetland. Such mills were not owned by regular millers, but by several farmers, each of whom used it

whenever he had occasion.

The water wheel is set vertically, as is shown by the cross-section illustration, the vanes being fitted into a sort of frame or spindle. The millstones are

the roof by ropes, and to the bottom of the hopper is attached a feeder, which receives a vibratory motion from a stone fastened to it by a string and lying on the surface of the upper mill-



Exterior of Ancient Mill

stone. The meal comes out at the sides of the stone and is scooped up from the ledge extending around the base.

It took 16 hours of frantic effort on the part of fellow workmen to secure the body of a man who was smothered in the coal bin of a New York ice factory recently. The man had climbed up a chute to start the coal moving and was buried alive in the avalanche of fuel which followed the removal of the obstruction.

SLIPPERY FINANCIERS WHO PREY ON INVENTIVE ENTERPRISE

By J. Q. Roberts

"INCORPORATION."

That words sounds good to the man who has invented and who wishes to put on the market, an article which he believes the world has been waiting for, or to the small manufacturer who feels that his business has outgrown his workshop and should be spread country-wide so that it may eventually make him one of the captains of industry, or at least a first lieutenant.

And does he have any trouble in finding an agency for transforming himself into one of those vague identities which wield so much power in the business world? He does not. For in the very heart of the financial district, of a great city, he is informed by an attractive advertisement, there is a concern which will incorporate him, sell his stock, and start him on the road to wealth. These kind gentlemen will smooth every wrinkle in his path. And they say right there in the advertisement that they will consider only meritorious propositions. Is not that sufficient proof that the concern is trustworthy? Unfortunately it is for some.

So he writes an answer to the advertisement. And the knights of slippery finance set about to land another victim.

Snuggling closely up to old established financial institutions, often in the same building, fitted out with elaborate office furnishings, and presenting an impressive appearance of prosperity, these pickpockets of finance lay in wait for the seeker for incorporation.

In some of the financial centers of the country these modern bandits work in combination, aiding one another in a most whole souled manner in their attempts to fleece the unwary. Thus it is that when one of these concerns wishes to give references it can do so without fear of having anything but praises heaped upon it.

There are two favorite methods pursued in relieving the delver into the world of finance of his money. In addition to these there are perpetrated by this class of fake financiers innumerable forms of fraud, forms which will suit any purse. But it is the purpose of this article to deal merely with those pitfalls which await the man who, with honest intent, seeks to have a small company incorporated and financed. It must not be understood that all concerns which advertise in this manner are doing business dishonestly. The crooked ones are exceptions.

Hard to Prove Fraud

Under the first method the bogus promoter merely extracts whatever amounts he can for incorporating a company, and failing to sell the stock, the deal is closed so far as he is concerned. No attempt is ever made to sell the stock. But unless the victims can prove intent to defraud, which is next to impossible, they must apply their loss to experience.

The small manufacturer or inventor is informed, when the second method is being worked, that it would be easy to dispose of the stock if it were guaranteed either by paid-up endowment life insurance policies or by a company making it a business to guarantee stocks and bonds. A large fee, generally one per cent of the amount of capital stock to be sold, must accompany the application for the policies. The fee is paid, but no stock being sold, no guarantee is issued.

Coteries of slick swindlers, preying on credulous men, have been broken up by the police and postal authorities in nearly every large city, but they bob up serenely in another place, operating under a different name. They are the bane of the large commercial credit agencies, and it is due, in part, to the unceasing vigilance of the agencies that the fake promoters do not secure

more victims. A few years ago the police of Chicago arrested half a dozen men who had been operating swindles of this kind and who had cleaned up nearly a million dollars.

Plausible sounding statements as to the standing of the concern, its ability to float stocks and bonds, its clientele of investors waiting for something to put their money into, naturally fascinate the man who needs money and who believes he has a good proposition to develop.

"He was looking for something for nothing, and deserved to be trimmed," is the excuse with which swindlers in get-rich-quick and similar schemes placate their own conscience, if they happen to possess one. But in the case of the inventor who is trying to put the product of his brain and toil on the market, and the small manufacturer who wishes to enlarge his plant, there is no such excuse. Here are men who are honest and who are willing to pay for the service which they wish performed. They do not expect something for nothing.

Enticed by Advertisement

The daring manner in which some of these swindlers work is well shown in the case of a Texas box-making company which entered into negotiations with one of these concerns, for the time operating in Minneapolis, under an impressive name. We will call it the Moonlight Securities and Trust Co. The Texas company learned of the existence of this concern through the medium of an advertisement which read about as follows:

Financial assistance arranged for legitimate corporations. Stock and bond issues prepared and sold promptly. Corporations organized and established with no delay. Twenty years of success our best recommendation.

The corporate charter was secured in South Dakota. It was represented to the partners in the box company that there were certain advantages in incorporating in that state. They were not told that one of these advantages was that it cost only \$15. A fee of \$100 was paid for this service.

The charter secured, the partners

were informed that it would be necessary to guarantee the stock before investors would purchase it.

Enter the Redemption Company

"How can that be done?" asked one of the partners of his guide in the labyrinth of finance.

"Easily," was the assuring response. "Get a redemption company that will do it for you for a small fee."

"Do you know of such a company? I am sure I don't," said the box-maker anxiously.

"I would prefer that you choose your own company for this work," said the wily swindler, "but I know just the one for your purpose."

"Go ahead, then," said the Texan; "you know more about this than I do."

The method of guarantee required that the new corporation should pay \$25 on each \$100 received from the sale of its stock. One of the statements in the literature of this so-called redemption company was as follows:

"We pay the expense of making whatever investigations we deem necessary to enable us to intelligently judge whether or not we desire to endorse for you. We cannot, therefore, entertain your proposition until we are indemnified against such expense in your behalf by receiving an advance fee of 1 per cent of the amount of your capital stock."

As the company had been incorporated for \$50,000, this fee amounted to \$500. It was paid.

Bear in mind that up to this time no stock had been sold and all the box manufacturers had was the promise that the Moonlight company would dispose of it.

The stock was not sold. The securities company reported that no one wanted to invest in that particular class of stock. A demand for return of the fee met with indignant refusal. The so-called redemption company likewise refused to return the fee paid it, on the ground that it was put to considerable expense in investigating the box company.



"We've got another one—he's on the way"

Before suit could be brought both securities company and redemption company had taken a train for parts unknown, leaving their office furniture for the installment house from which it had been secured on a few payments made.

"ARE YOU LOOKING FOR CAPITAL?" was the heading of an advertisement inserted by a Chicago fly-by-night concern.

A small manufacturer outside of Columbus, O., was.

Fleeing the Inventor

He had invented an excavator and was trying to put it on the market. A letter to the address given in the advertisement brought him an answer, under a beautifully engraved letter-head, which contained the following paragraph:

"If you desire the immediate promotion of a legitimate, meritorious enterprise, I would appreciate a call from you next Thursday, at which time please be ready to submit the essential details of your proposition. My time is too valuable to waste with triflers, and I assume from the character of your letter that you are not the kind of man who would give attention to an impractical or highly problematical proposition."

These swindlers are pastmasters in the art of seductive letter writing. It is one of their most effective baits.

The Columbus man gathered together the plans he had drawn up, left his business, and was ushered into the office of—we will call him Mr. Shark, because the jury has not yet passed on his guilt—at the time specified. Mr. Shark was not satisfied the first day. It is a part of the game to hesitate.



Chorus—"Fine! We'll give him a good steer"

But he insisted on giving a number of references.

Always Plenty of References

"Of course you want references as I do," he said. "It is customary in this business, because you cannot be too careful who you deal with."

"Well, that would be a convenience," said the Columbus man.

Mr. Shark thereupon gave his client a list of nearly a dozen names, none of whom he had ever heard of before, but which looked very substantial to him. He took the pains to call on one or two of the references, including the proprietor of a small factory and was convinced that the man with whom he was doing business was very well thought of. Another man, doing business in a handsomely furnished office, was very enthusiastic in his recommendation of Mr. Shark's sterling integrity and standing in financial circles.

A few days later Mr. Shark wrote a letter to Ohio, agreeing to take up the case.

"What amount do you want to have for a capital stock," asked Mr. Shark, when the victim called at his office.

"Oh, I was thinking \$20,000 would be enough," replied the Columbus man.

"Twenty thousand—ridiculous, why not \$100,000," said the man who could do such wonderful things in finance.

The Columbus man gasped. But Mr. Shark looked sternly at him, and he acquiesced.

"It will help you because it looks bigger," was the soothing explanation. "Don't be a piker. People won't buy stock in a little corporation. They like to look at lots of zeros."

The man from Columbus may have had a cold in his head. Even then his olfactory nerves did not scent anything. Naturally he was inclined to be conservative, but he felt that Mr. Shark knew best.

The company was incorporated under the laws of the state of Oklahoma, the actual expense amounting to \$25. A fee of \$200 was extracted on this.

The victim was given to understand that the expenses equaled that amount, although the receipt for his \$200 specified that it was a "fee."

The matter was allowed to drag along for a month. Then Mr. Shark wrote a letter to Columbus stating that, while he had several investors ready to take up the entire issue of stock, they hesitated because of the uncertainty connected with the successful marketing of a new invention. He suggested that the only thing to be done was to guarantee these investors against loss. Another trip from Columbus resulted.

"It looks serious," said Mr. Shark, shaking his head, "I have worked on my clients for two weeks, and while I have them at a point where they are willing to go into this corporation, they insist on some security for their money."

"What can we do?" asked the inventor.

"Well, the only means I know of for you to give these gentlemen security for their investment is to secure paid-up endowment policies which they may hold," was the answer.

He then explained that this would be satisfactory to the investors, and ultimately would result in a profit for all concerned. He knew just the company, and its local representative fortunately had an office in the next block.

Somewhat taken back at this unexpected obstacle, the Columbus man called on the representative of the life insurance company, who was as affable and willing to help as Mr. Shark. It was a simple matter, he said. Out of every \$100 received for stock, \$38 would be used to pay for the policies. Thus, if an investor purchased ten shares of stock and paid \$1,000 for them, he would receive as security a paid-up policy for \$1,000. The proceeds at the maturity would revert to the company. Very simple—nothing could be more so.

"But," said the insurance represen-

tative, after the wanderer in the devious path of finance had consented to the new proposition, "but—it will be necessary for you to pay an application fee of 1 per cent of your capital stock. We always require it—always."

This would mean \$1,000. The new phase was a staggerer. It acted like the blow that sometimes brings a man back to consciousness. The inventor was beginning to see light, and his brain, bemuddled by mazes of financial methods, began to clear.

Then the insurance man broke in. His keen eye, like that of a surgeon's, detected the signs of returning consciousness.

"However," he hastened to say, "your proposition looks especially good to me, and I shall recommend that a smaller fee be accepted, say \$250, the remainder to be paid later."

Breaking in at the psychological moment, he caused a relapse in the victim's mental condition.

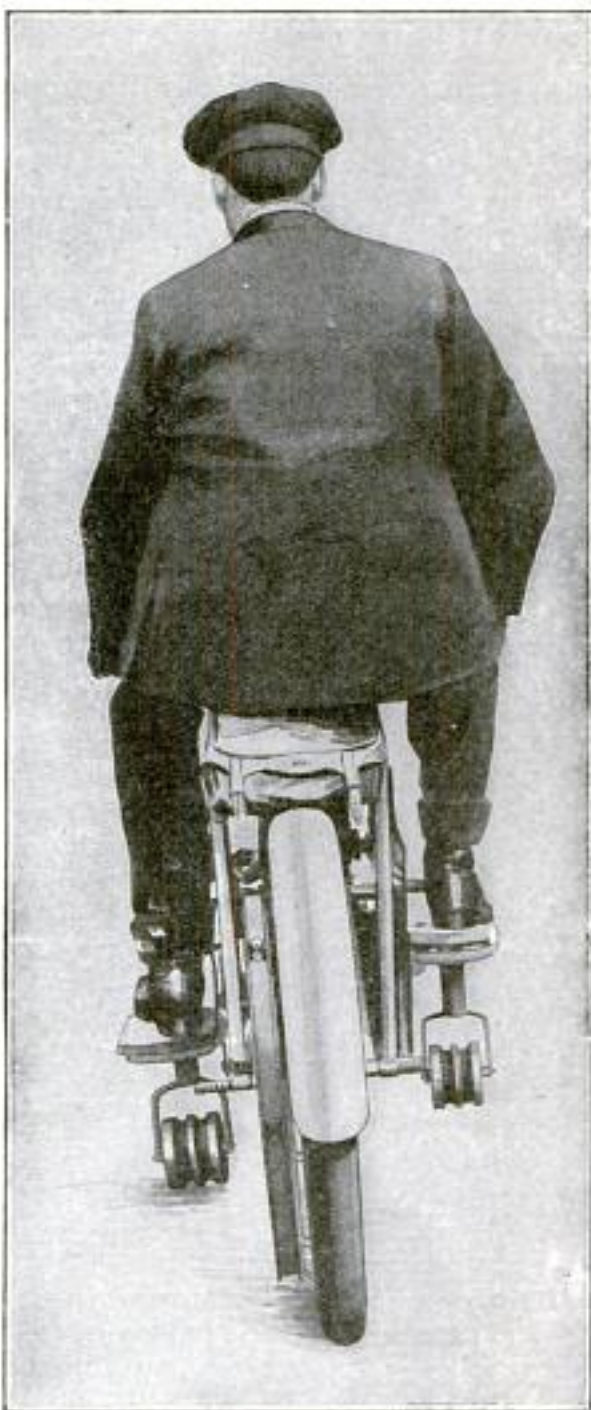
The fee was paid, but in this case, as in the case of the Texas box manufacturers, no attempt was made to sell the stock, and consequently no guarantee was ever required. The swindlers were indicted before they could get a chance to escape, and are now guests of the state of Illinois at the Joliet penitentiary.

But the Columbus man never recovered the \$450.

SIDE-ROLLER ATTACHMENTS FOR MOTORCYCLES

A motorcycle manufactured in England is provided with a small roller on each side of the frame, which can be let down on the surface of the road either when the motorcycle is in motion or at rest. In the first instance, it prevents sideslip on wet pavements, and in the second will keep the motorcycle upright when stopped without the necessity of the cyclist dismounting or lowering one foot to the road. It also makes a good stand when the rider wishes to dismount.

The feet of the rider rest on footboards on each side of the frame instead of on pedals. The rollers are at-

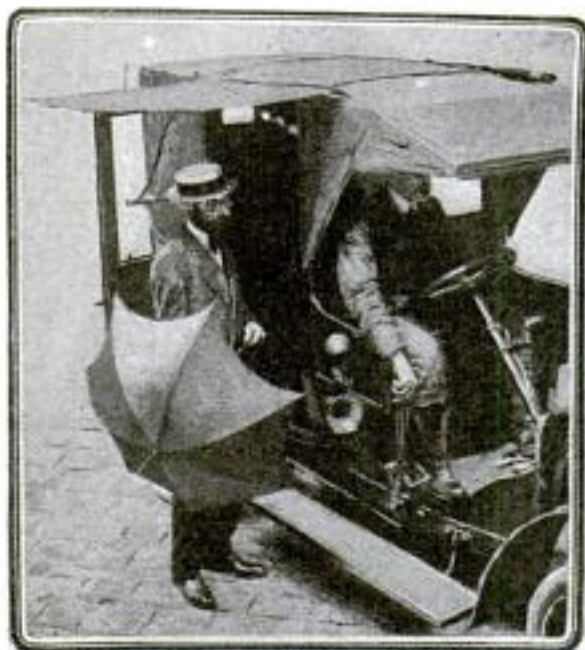


How the Rollers Are Arranged

tached to the under sides of the footboards, and are brought into engagement with the road surface by pushing the heel down on the back end of the rests. Catches are provided to keep the footboards depressed when the rider wishes to leave his machine.

UMBRELLA DEVICE FOR AUTO-MOBILE DOORS

Because the ordinary umbrella does not afford sufficient shelter to a pas-



Protects Passenger from Rain

senger entering or alighting from a motor-car, an awning has been devised which opens when the door of the car is pulled out, and affords a shelter. When about to enter a car the passenger must close up an umbrella before stepping in, standing in the rain during the operation. The door awning affords a shelter while the umbrella is being closed or opened.

IMPERFECT GAS HEATERS CAUSE DEATH

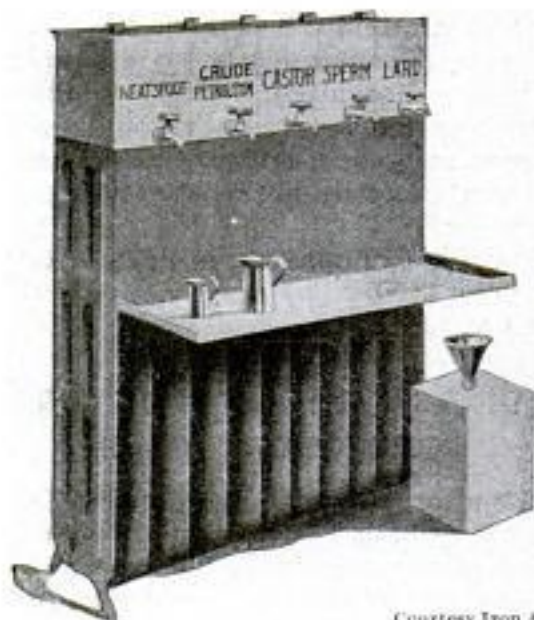
Improperly installed gas water heaters and stoves have caused many deaths from carbon monoxide gas poisoning in different parts of the country recently. Attention was called to this danger in a forceful manner for the first time about a year ago when an entire family was killed at Washington, D. C. Undoubtedly many deaths ascribed to asphyxiation by illuminating gas have been due to this form of poisoning. There is always danger where the gas heater or stove is improperly installed and there

is no ventilation for the room. All the oxygen in the room is quickly consumed, and the poisonous gas fills the lungs. Several instances of death in this form occurred within the last month in Chicago.

RADIATOR KEEPS OILS WARM

A hardware dealer who experienced trouble with his oil stock because several of the slow-flowing oils became so chilled in cold weather that they would hardly run, solved the problem by utilizing one of his radiators as shown in the illustration. A galvanized iron hood, terminating in a drip pan, was placed over the radiator, and on top were placed the cans containing neatsfoot, crude petroleum, castor, sperm, and lard oils. The drip pan is slanting, so that the waste oil will run into a can standing on the floor at the lower end. This mixture of the different oils is disposed of at about cost.

The radiator is regulated, according



Radiator Used as Oil Warmer

to the temperature requirements, so that the oils will flow readily whenever required.

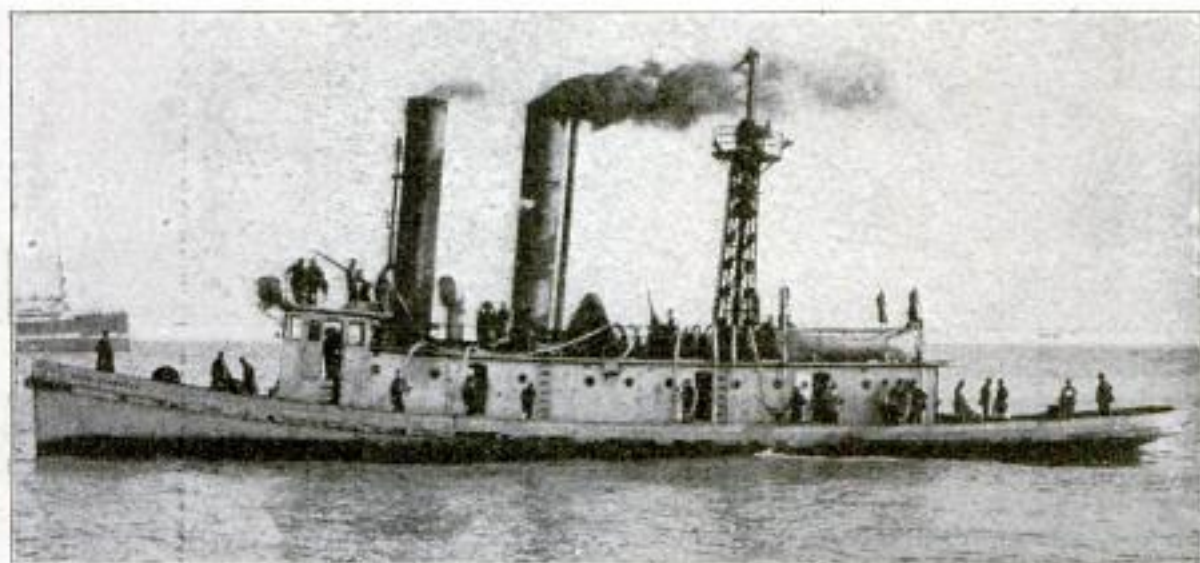
It has been discovered that 2,500 of the sailors in the Atlantic fleet of the U. S. Navy cannot swim.

LATTICE-WORK TOWERS ON FIREBOATS

Two fleets of fireboats, one protecting the waterfront of New York and the other San Francisco, one on the Atlantic border and the other on the Pacific, are of special interest because

pipes, one on the forward deck, one on top of the pilot house, and one on either side amidships.

The purpose of the towers is to enable the boats to throw a powerful



One of the San Francisco Fireboats

their lattice-work water towers, although much smaller, are but slight variations of the curious basket military masts now carried by many American battleships. And while this type of mast on battleships is meeting with much criticism because of the claim that it has a tendency to vibrate under the shock of heavy gun fire, the same principle on fireboats, having no gun fire to withstand, and no cause for vibration through the discharge of water from its water-gun batteries, meets with nothing but highest praise.

The water towers of both the New York and San Francisco fireboats rise to a height of about 35 ft. On the top of each tower is a working platform, and up through the center passes the pipe furnishing water to the powerful water-gun. Besides the water tower, the San Francisco boats are equipped with two main turret nozzles, one above the pilot house, and the other amidships above the deck house. In addition to the water towers, the New York boats have four turret stand-

stream of water directly through second or third-story windows, down upon the decks of vessels, upon shed roofs, or in coal pockets, serving in the same manner as the water tower ashore.

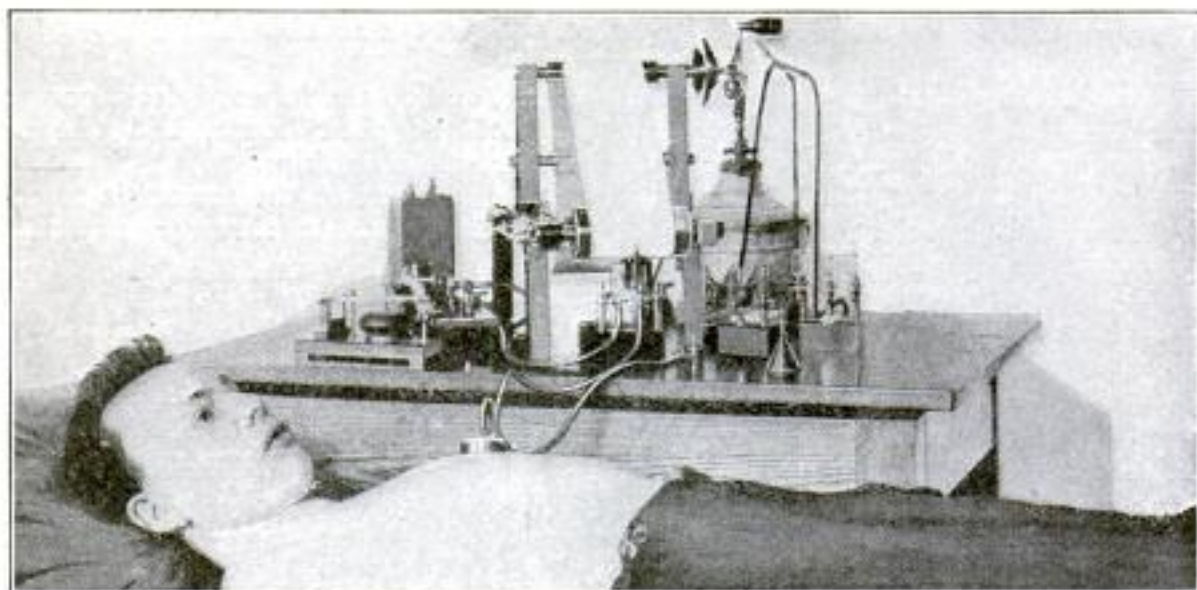
HEART BEATS RECORDED BY SMOKE RINGS

An ingenious device by which the heart beats are recorded in smoke rings



The Acoustic Box

on a paper tape has been devised by Prof. M. K. Marbe, of Frankfort-on-Main, Germany. The main features of



How the Machine Operates

the instrument are an acetylene generator and a recording flame. The oscillations of the flame, caused by the beating of the heart, make the smoke rings on the tape as regularly as a gas meter ticks off the flow of gas. An acoustic box, connected by two rubber tubes with the acetylene generator and recording flame, is placed over the heart. The diaphragm of the box is vibrated by the pulsations of the heart, and the gas in the box, which is provided by the acetylene generator, conveys the shock through the tubes to the flame. This causes the flame to oscillate, and at each oscillation a smoke ring is made upon the tape.

The illustrations show the normal heart beats on the tape, the heart beats

when the person is laboring under some excitement, the box that is placed over the heart, and the machine in operation.

A LESSON IN FIREPROOF CONSTRUCTION

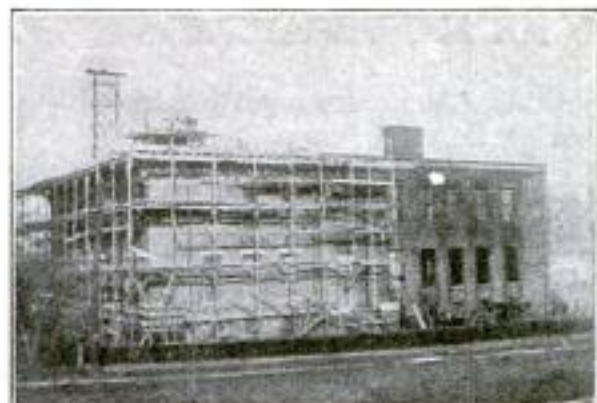
Two fires, burning at the same time, within three or four blocks of each other in a suburb of New Haven, Conn., furnished an excellent opportunity to judge the advisability of fireproof building construction. The fire which started first was at the Connecticut agricultural experiment station, and scarcely had the fire department arrived before another glow in the sky announced the presence of a fire in a large frame dwelling.



Record of Normal Heart Beats



Thrills and Throbs of Excitement



Fireproof and Non-Fireproof
Sections after Fire



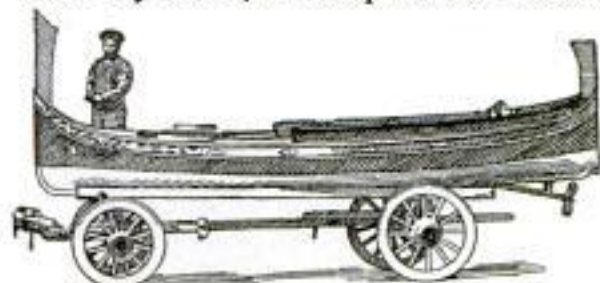
Remains of Large Wooden Building

All that remained of the dwelling after the fire was the heap of charred ruins shown in one of the illustrations. The best contrast between fireproof and non-fireproof construction is gained from a glance at the illustration of the experiment station, which contained within itself both fireproof and non-fireproof sections. The fire completely gutted the interior of the old section, which was constructed of brick and wood, but could not gain an entrance through the brick, steel, and concrete of the remainder. This part was under construction when the fire occurred.

As the water supply to fight both fires was taken from the same main, the supply proved inadequate, and this fact has led the citizens of that part of New Haven to express the belief that high-pressure mains for suburbs are quite as necessary as in the central part of a city.

HISTORIC GONDOLA PROVIDED WITH MOTOR

A historic gondola, "Anthony Tabora" by name, which plied the waters



Gondola Converted Into Motorboat

near Malta for many years, caught the attention of an American motorboat en-

thusiast because of its beautiful lines and was purchased by him for his Long Island home. Equipped with a 3-hp. gasoline engine it is now one of the most unique and interesting small crafts on the Sound.

The purchaser of the gondola, which is said to be the first provided with a motor, is P. H. Pell.

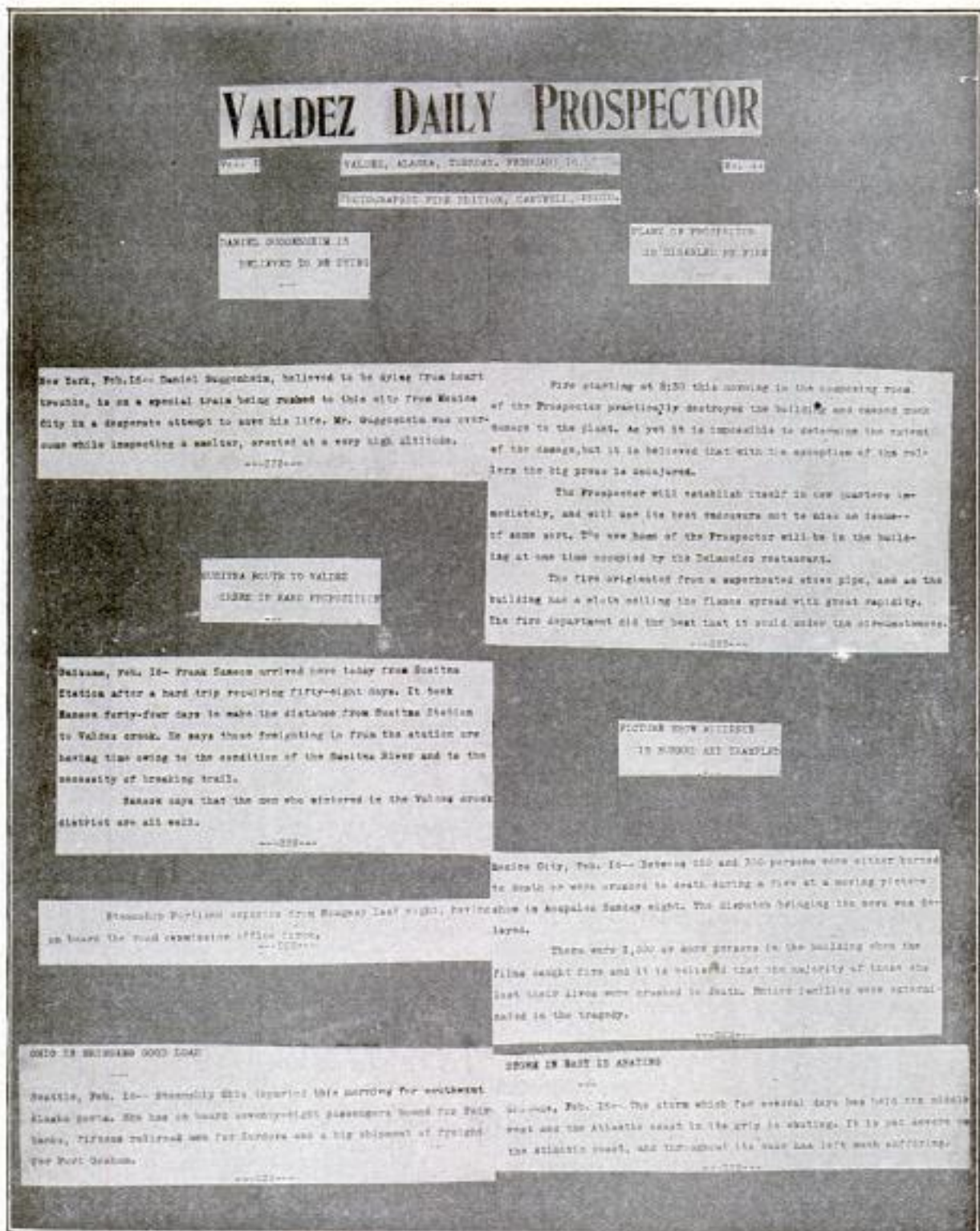
ALCOHOL-HEATED PORTABLE RADIATOR

A radiator that provides about 16 sq. ft. of heating surface, can be carried from room to room as necessity requires, and is heated by an alcohol burner under a small boiler holding one quart of water, is shown in this illustration. The boiler is 7 in. in diameter, and is located under the coils of the radiator. The receptacle at the side is for the denatured alcohol fuel. The radiator is made of pressed steel, and though durable, is light. As there is but little loss of water, which is continually circulating in operation, the boiler does not require filling more often than twice a month. The fuel cost under ordinary heating conditions is about 3 cents an hour.



PHOTOGRAPHS ISSUED AS NEWSPAPERS

A little thing like the burning of the building and the destruction of his com- Valdez, Alaska, from getting his edition out on time.



Newspaper Published Under Difficulties

posing room and presses did not deter the editor of a small newspaper at

As soon as he realized that it would be impossible to get out a paper in the

regular way he cast about for some other means of satisfying his subscribers. The news was typewritten on white paper which was then put on a black cardboard and photographed, the prints being distributed to about twenty subscribers, who, when they had read the news, passed it on to others. The only thing missing was the advertisements.

TUNGSTEN FIXTURE FOR PULLMAN BERTHS

This lighting fixture is designed for use in the corner of a car berth formed by the partition and outside wall, and permits the use of a tungsten bulb. The construction of the fixture prevents the possibility of filaments being broken through carelessness on the part of the person occupying the berth, and the prismatic glass lens distributes an even light. By means of the lock screw at the top of the fixture the front can readily be removed for replacing the electric bulb.



STATUE TO HONOR SANTOS-DUMONT

The heroic figure of a man with wings is to be erected in the Bois de Boulogne, Paris, in commemoration of the epoch-making flights of Santos-Dumont in 1906, and his recent flights with what was the smallest successful aeroplane in the world. The statue is being executed in bronze, and, with its pedestal, will stand 16 ft. 3 in. high. It will be erected by the Aero Club of France.

Santos-Dumont was the first to make a successful flight with a dirigible balloon, but, unsatisfied by his victories with lighter-than-air machines, he turned his creative energies upon the

problem of flight with heavier-than-air machines. For a couple of years he was but little heard of out of France,

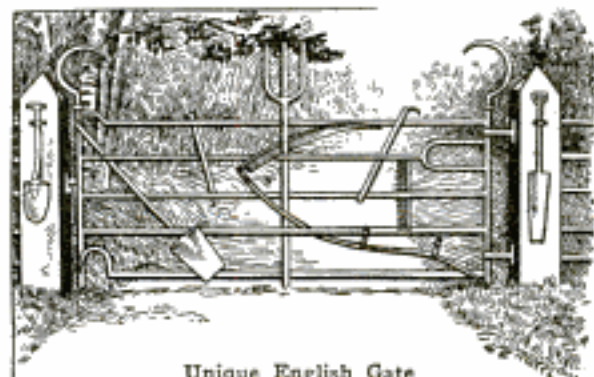


In Honor of Santos-Dumont

but in 1909 he again appeared with a little aeroplane, in which he succeeded in making a speed of 50 miles an hour. He then gave the world permission to copy his machine.

FARM IMPLEMENT GATE

This curious gate, located near the community of Tring, in the British Isles, is composed entirely of implements used in farming. The most prominent is a scythe, and the other



Unique English Gate

parts are made up of shovels of different kinds, long-handled rakes and forks, lifting hooks, and other implements of the kind.

BURNING OF POWDER CHARGE KILLS TUNNEL WORKERS

The death toll, which had been so remarkably low in the construction of the Gunnison tunnel, in Colorado, made a long jump with the firing of the last charge of powder. The tunnel was formally opened by President Taft last September, although at that time it was incomplete. The accident which caused the deaths of nine men was one of the strangest on record. The charge of powder burned instead of exploding,

two hours after the disaster this appeared to be the case, as all the men were feeling as well as could be expected. Then one of the men took sick and, after discharging water from his lungs for several hours, died. The accident occurred late Sunday afternoon. By Monday there were three dead and by Wednesday nine of the total of 22 men that were on the shift had died.

This last catastrophe brings the death



Scene in Gunnison Tunnel at Spot Where Accident Occurred—Photograph Taken a Few Hours Before Charge Was Placed

and the gases overpowered the workmen who had gone to a distant part of the tunnel to wait until the explosion was over.

The workmen dropped, too weak to help themselves. One man crawled to a telephone but was too weak to raise up and give the alarm. A stronger man reached the instrument and sent a call for assistance. Rushing an electric locomotive to the spot other workmen picked up the injured and they were carried to the fresh air.

Practically all of the men believed that as soon as they filled their lungs with pure air they would recover. For

list of this big irrigation project to a total of 22. Seven were killed in a cave in the first month the Government had charge of the project, and six men were killed at various times during the four years in which the work has been going on.

The U. S. scout cruisers "Birmingham" and "Salem" are making wireless tests from long distances. One of the trials was from the coast of South America to Brant Rock, Mass., a distance of 2,000 miles. Later one of the ships will attempt communication from the African coast.

MOTOR SLED BUILT BY BOY

When the snow was thick on the ground last month, James Shrum, a boy of Columbus, Ohio, fashioned a remarkably successful motor sled out of an ordinary sled and a small gasoline engine. To the running surface of the sled was added a third runner for steering purposes, and over three-fourths of the whole was built a sheet metal hood.

Under the hood was placed a gasoline engine in such manner that a circular mill saw could be attached to its shaft. This rapidly revolving saw engaging with the hard snow and ice, provided the means of propulsion. By an ingenious contrivance the saw was so mounted that by operating a lever it could be raised or lowered, thus adjusting it to the unevenness of the surface.

The pipe coming up through the hood is the engine exhaust, and the hole in the front allows the air to circulate around the engine. At the back of the hood is mounted a motorboat steering wheel, and behind this is the seat for the operator.



Ingenious Home-Made Motor Sled

GIANT WAVE STRIKES "LUSITANIA"

A giant wave, which officers of the ship said was nearly 100 ft. high, struck the "Lusitania" during one of her westward trips recently, wrecking the wheel house, carrying away part of the bridge,

smashing one of the lifeboats, and hurling a monster steel derrick from its base into the sea. The quartermaster, clinging to the spokes of the steering wheel, would have been washed from the bridge had not a brother officer caught hold of him as he shot past. The wheel house of the great liner is 70 ft. above the waterline, and the wave, towering high over the bow, threw itself over it.

ARMY SHIELD AND SPADE IN ONE

The Spade as Head Shield

One of the most ingenious small implements for army use devised in the last year or two is the combination spade and shield shown in the accompanying illustrations. When the troops are in movement the spade-shield rests over the left breast, where it provides bullet-proof protection for the heart and other vital organs. When the advance ceases, the shield is quickly converted into a spade, with which the soldier carrying it throws up a mould of dirt to



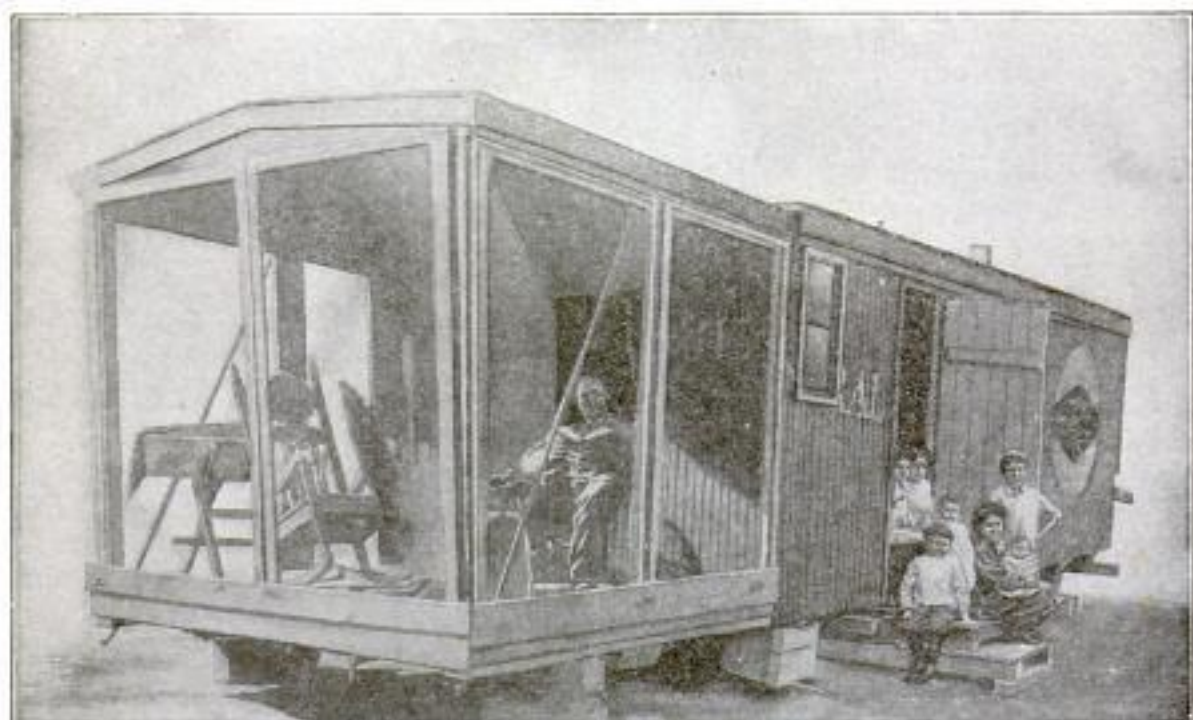
Shielding the Breast

fight behind. The mound protects his body from the fire of the enemy, and the spade, arranged as shown in one of the illustrations, forms a shield for his head.

The idea was developed by the French, and may come into general use in the army of that country.

THE GUARDING OF THE SUBMARINES

Like a veritable hen surrounded by her chicks is the sight of the gunboat "Castine" and the flotilla of submarines, to which she is known as the parent ship, and which together have been en-



Courtesy Guide to Nature

Combined Freight-Car Sun Porch and Den

FREIGHT CAR AS SUBURBAN DEN

When Judge M. C. Mathews of Dubuque, Iowa, is not at the court house he lives with his books in a luxuriously-fitted freight car on the ground of his home in one of the suburbs of that western city. On the outside, the car is as crude and plain as when in active service, with the exception of a netting inclosed porch added to one end. But on entering the car the visitor receives his great surprise. Finely upholstered chairs, leather bound books, a picturesque clock, artistic pictures, and soft carpets and rugs are presented in all the perfection of a pretentious home.

The group of small and large children shown in one illustration are only a few of the judge's ten children, but they live in the house, which is nearby.

gaged in practice maneuvers off the Atlantic coast between Newport News and Florida. The officers of the submarines make their headquarters on the "Castine," and when evolutions are not in progress the little craft are made fast to the sides of the "mother" ship, which is also equipped with cranes capable of lifting any of the diminutive vessels out of water and placing it on her deck. This practice cruise, says the Marine Journal, has proved of great benefit to the officers and men.

Philadelphia claims to lead the world in the manufacture of carpet, rugs, knit goods, oilcloth, woolen goods, upholstery goods, felt hats, leather, ships, street cars, and locomotives. These industries are housed in 16,000 plants and employ 250,000 men.



One Minute Wireless

Apparatus Can Now Be Erected and Put Into Operation in One Minute and Eight Seconds—Complete Outfit Carried in One Wagon or Packed on Backs of Mules

By C. H. Claudy

“**A**RMIES give battles—but generals win them.”

A great soldier said it a hundred years ago, and it is still true. It would be more comprehensive if for “generals” the word “brains” were substituted, for it is not always the commanding officer who does all the thinking. During the Civil War, many an engagement went against the Lost Cause solely because of the genius for organization possessed by General Albert Myer, first chief signal officer of the Union Army, under whose hands the military telegraph formed and took shape.

Yet what a shape it was! Long lines of heavy wagons, filled with light lances, or lance poles, reels of heavy wire, and hundreds of men, to erect the poles and string the wire. Strung, it had to be guarded, for cut, it was so much time wasted. Yet the military telegraph played so important a part in the Civil War that masters of

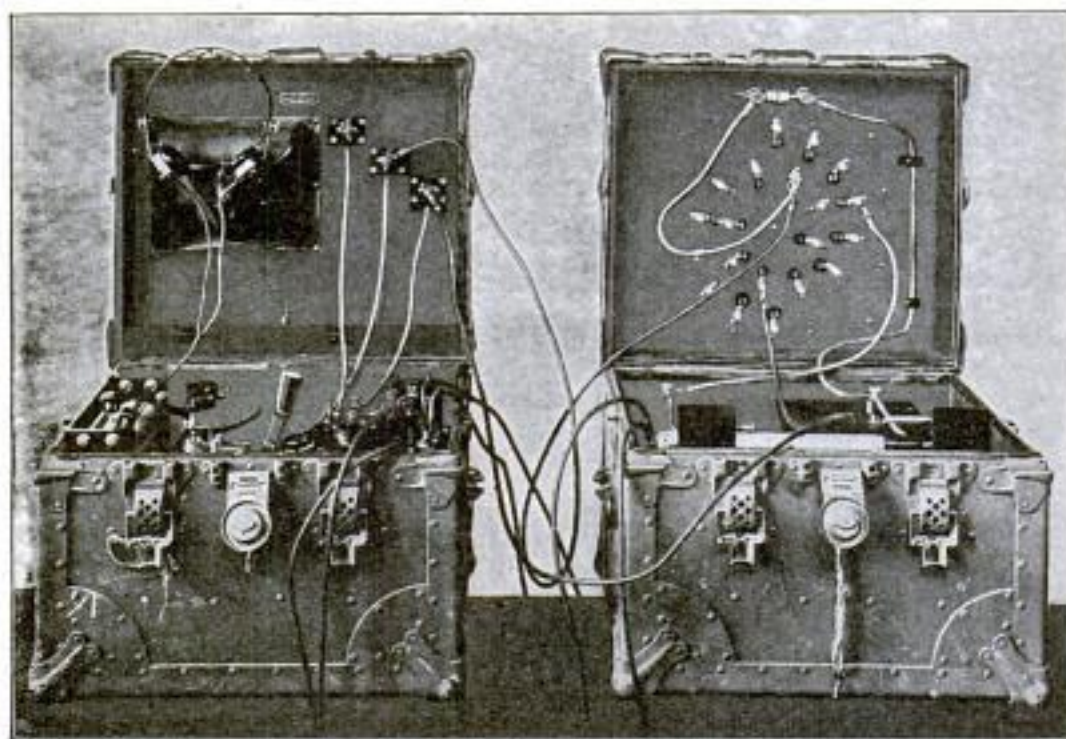
strategy have said that, had Napoleon possessed an American telegraph train at Waterloo, England would be today a French dependency.

However that may be, the telegraph trains of '61-'65, wonderful as they were in that day and generation, speedily gave place to the newer forms of transmitting intelligence. The field buzzer of today, most remarkable of the wire instruments, marked an advanced mile stone in the progress made in perfecting military lines of intelligence in time of war. The buzzer can be laid by one man on horseback at a gallop, the wire is nearly invisible and needs no poles, and, most wonderful of all, cut in half, the current still flows, if the break be not too wide and high. The line can be taken up almost as rapidly as it is put down, and the whole outfit is as far ahead of the heavy telegraph trains of our Civil War as it, for long distances, was ahead of the single mounted courier.

But the standard of measurement of efficiency today is the new portable wireless outfit designed and perfected by the Signal Corps. In these days of the muck-raking article, and the heart rending groans of the space filler, anent our ineffective army, our antediluvian navy, our pitiful unpreparedness for war and the certain annihilation sure to follow the first puff of powder in our shamed faces by the littlest world power across the pond, it is pleasant to be able to chronicle that in one thing, at least, we lead the military world.

stranded wires which perform the double purpose of holding up the mast and of serving as the "antennae" of the wireless set, spreading another, smaller set of insulated wire at the base of the mast for a "ground," and connecting the instruments and the source of power.

When the first portable wireless was made in this country a few years ago, a 60-ft. mast was required, demanding a complicated system of guys, a troublesome "ground," and several hundred feet radius of clear space for



Chest Wireless Field Set Ready for Use

There is no other country which can show a trained squad of men possessed of apparatus which can be taken from a wagon, set up and put in operation, capable of sending a wireless message 25 miles, and occupy one minute and eight seconds only from the time of command, "Halt, open station!" to the first buzz of the wireless-wave-producing spark.

Nor does the wonder of this performance appear in the words. There is more to opening a wireless station than hauling the apparatus from the wagon. It means erecting a mast 40 ft. high, spreading for 150 ft. each four

the erection of the station. The writer well remembers seeing the first tests of erecting this mast at Fort Myer, Virginia, and thinking that a hostile force would have little trouble finding time to demolish such an outfit during the three-quarters of an hour it took to get it in working order.

To halt a column on the march for this period of time might well be a serious matter. The instant feature, however, is now almost accomplished. An apparatus that takes only a few seconds more than a minute to erect, and a minute and a half to take down and store away, is altogether a dif-



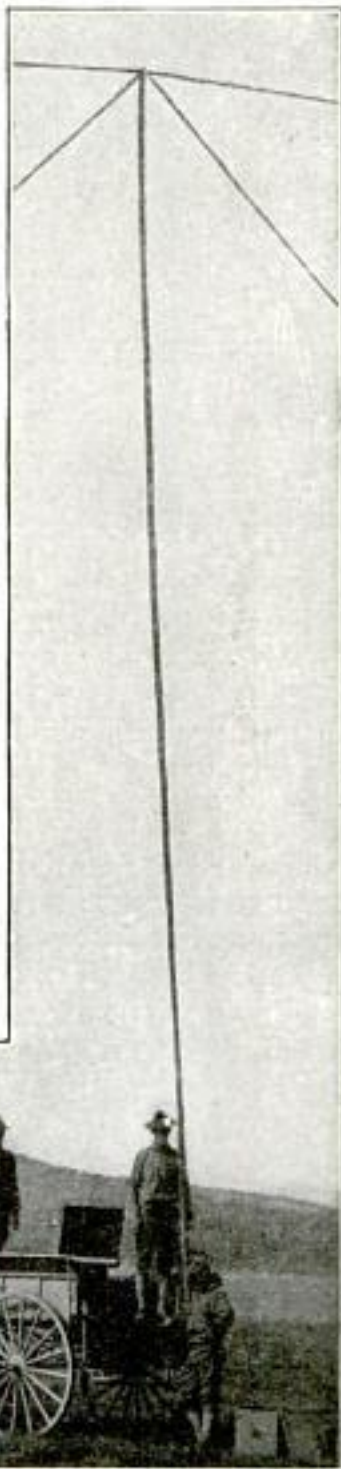
Wireless Detachment Co. A., Fort Leavenworth, Kan.

ferent proposition. Granting a minute of time for sending a message, a column of soldiers 1,000 ft. in length could not pass by the signal corps wagon in the time required to set it up, send the message, take it down and fall into line again.

Just what this may mean to military operations is not apparent on the surface to the non-military reader. Every one understands in a general way that different bodies of soldiers during strategic moves require intercommunication for effective work. But this inter-communication has never been a certainty. In the case of cavalry sent out to get information and report to the general in command, its one object is to get the information and get it back to headquarters. Captain A. S. Cowan, of the Signal Corps, says, in this connection,

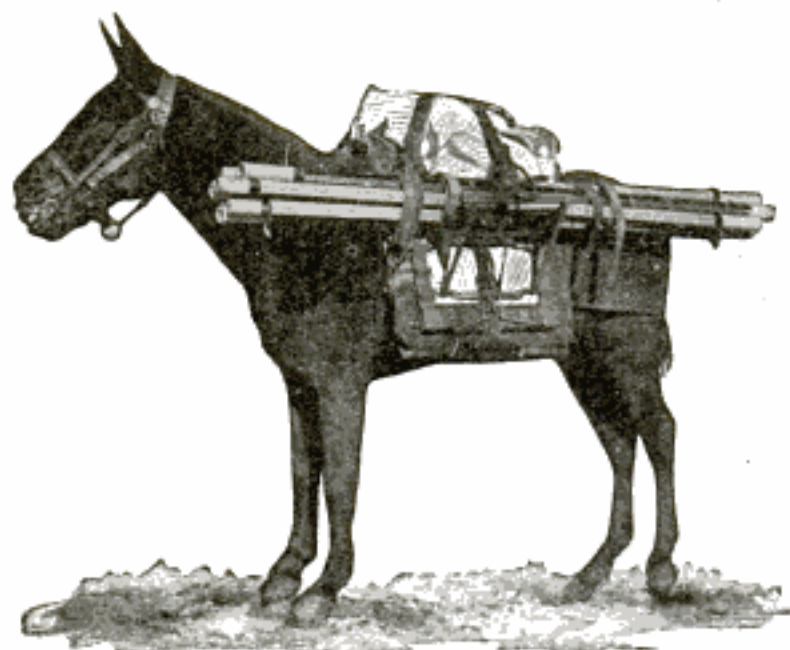
"As a rule, any cavalry worthy of the name will get some information, but history is full of instances where magnificent work in getting information has been absolutely nullified through failure to get it back in time to be of any value. The only practicable method that has ever been found

for handling this problem is to relay the information through by means of mounted messengers. To do this work at all satisfactorily requires a large number of men and horses, thereby reducing the number of actual 'effectives' for the work in hand. Moreover the nature of this duty is such that both men and animals soon break down under the strain. And, after all, this method has never been



Field Station Ready for Business

satisfactory, and never can be. Messengers are always liable to get killed or captured or to get on the wrong road, thus delaying the delivery of the message. The officer who sends the message from the front does not know for hours whether or not it has been



Portable Mast, Pins, Wires, and Ropes Packed on Mule's Back

received by the officer to whom it was sent."

It is obvious that the field wireless presents great possibilities in this work, simply because of the high efficiency to which it has been brought. The old wireless methods, requiring an hour for the erection and demolition of the station, would not do where the time is measured in seconds.

Intercommunication between two columns marching on parallel roads has always been a military puzzle. Couriers lose time and get lost, telegraph lines are an impossibility because of the time required to erect them, buzzer lines take large quantities of wire and must be laid in advance, wigwagging is rarely possible on account of distance, heliographing depends on weather and elevation for long-distance work. But field wireless sets with each column and a pre-arranged schedule of times for opening communication, allow the columns to get in touch with each other every

fifteen minutes if necessary, and make a solid unit of force out of what has always been a divided one.

Flanking parties with a wireless set can keep in constant touch with headquarters. Small scouting parties so equipped can report with certainty, one of the beauties in this method of communication being that the sender knows whether or not the message has been received. Couriers may be killed or captured, and the message lost or delayed without the knowledge of its miscarriage reaching the officer who sent it until too late, but the wireless either works and is known to work, or fails and is known to fail.

The apparatus itself is a marvel of mechanical and electrical condensation and efficiency. Wireless apparatus of all kinds is divided into three parts; the source of power, battery or dynamo; the making and sending of wireless waves,—including the key, spark, condenser and tuning coil; and the receiving apparatus,—head telephones, antennae, ground and detector.

In the field set, the tuning coil, detector—which is of the silicon type, rather than any other, on account of reliability—condenser, key, spark gap, etc., are all fastened rigidly in a chest or chests, so that they may be subjected to rough handling if necessary, without danger of breaking or injuring the apparatus. Power for the field wireless sets comes either from two sets of storage battery, each weighing 30 lb., sufficient for 10 hours' sending, or a small dynamo, worked by two men, which is capable of supplying power for the wireless or of recharging exhausted batteries.

A power dynamo and gasoline engine unit, weighing but little over 300 lb., which can go wherever a wagon can go, is supplied as a part of the



Insulated Wire Counterpoise Rolled Up

apparatus to accompany a division, for recharging exhausted batteries. The one-chest set weighs but 150 lb. This weight is divided into two chests when mule-back transportation becomes necessary.

The 40-ft. mast, necessary to raise the antennae above the ground, is formed of from six to nine sections of artificial bamboo—hollow tubes of spruce strengthened at the ends and joints—a scheme which combines the maximum of strength and rigidity with the minimum of weight. The three-stranded wires, of which there are four, are each 85 ft. long. These form the antennae of the outfit and their continuation, after insulation, by ropes to a length of 150 ft. each, combines the antennae with the guy rope. The insulated wires, each 85 ft. long, which form the counterpoise, or as it is sometimes called, the ground, are so made that they do not kink when coiled, and can be stretched into position in a few seconds.

Twelve men form a portable wireless squad, when short time work is to be done, in erecting and taking down a station. Such a squad is shown in the photograph, with the wagon carrying the apparatus. One man holds the horses, two erect the mast, four stretch and either hold or peg

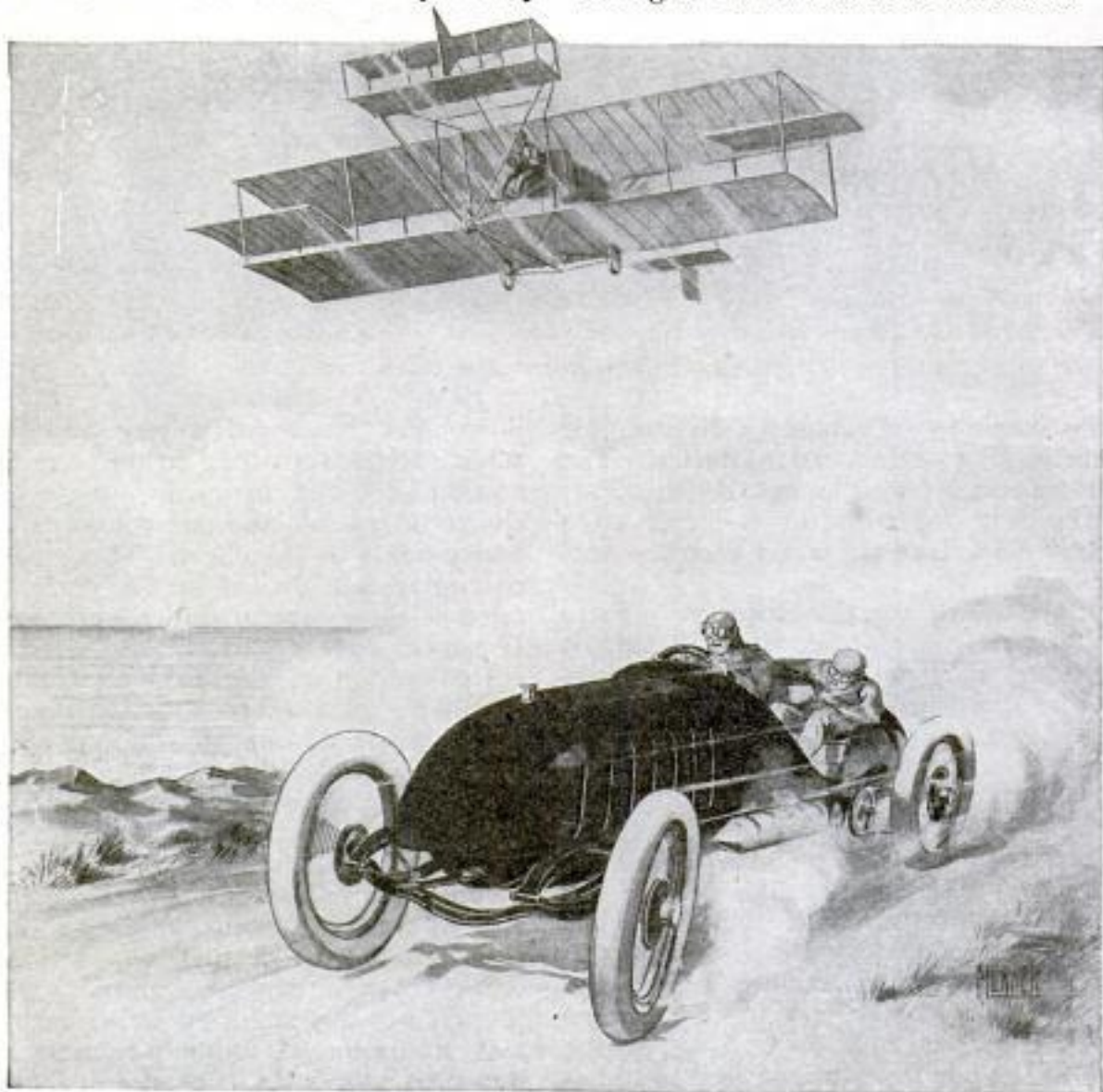
down the combination guy and antennae wires, according to the time the station is to remain open, four stretch the counterpoise, and one connects the instruments in the chest. These men, of course, are drilled in the performance of their several duties until each is perfect in his part. It is the concerted action of the 12 well trained men which makes so short a time to open station as one minute and eight seconds a possibility.

Besides the articles mentioned, insulating trestles are carried in the wagon, and the field set and batteries mounted on these. It has been demonstrated that by so insulating the apparatus from the ground, a greatly increased range can be secured. Although but a year or so back, such a feat was deemed impossible, sets of this character with a mast but 40 ft. high have worked in test to a distance of 31 miles, and with such strength of signal that there seemed no doubt that the messages could have carried much farther. With a large station somewhere in the road to pick up messages, the range is greatly increased, and, by relaying, there seems little doubt that a field wireless set within 75 miles of a large commercial station could get in communication with almost any part of the country in a few minutes.

AEROPLANE-AUTOMOBILE RACE AT PHOENIX AVIATION MEET

There is little cause to doubt that races between aeroplanes and automobiles will be a common occurrence in the near future. What was probably

fast machine. During part of the race the aerial craft and the auto rushed along at the same speed, the aeroplane sailing about 20 ft. above the track.



A Probable Feature of Future Aviation Meets

the first speed contest of this kind to take place in this country, was held at Phoenix, Arizona, in February, when that hustling community conducted the second aviation meet in the United States.

C. K. Hamilton, in his biplane raced with an automobile for ten miles on a mile track, the aeroplane winning. The motor car, however, was not a real

The wireless won another victory over the elements when, on Feb. 4, it brought succor to the sinking "Kentucky," off Cape Hatteras, and saved 46 lives.

The fire loss in the United States and Canada was \$7,500,000 less in January of this year than in the same month in 1909.

EDITORIAL

THE annual free distribution of garden seeds, tons upon tons of them, are now being sent out by congressmen to voters and others in the home district. Like most other things which cost the recipient nothing,—not even the asking—the gift is but lightly regarded. And does anyone suppose, for no one claims, that the 1910 supply of cabbages, tomatoes and hubbard squash would be any less plentiful or of inferior quality if this distribution had been omitted for one year? The yearly distribution includes some thirty-five million packages of garden and flower seeds and costs a quarter of a million dollars. In addition the Postoffice Department has to transport and handle hundreds of tons, which, by the way, explains where part of the deficit occurs.

Doubtless in the early years of seed distribution the scheme and the seeds may have had their good qualities, but in these latter days both appear to have outlived their usefulness. The money expended might be used to vastly better advantage if divided among the various state agricultural colleges.

* * *

WHEN the steamer "Kentucky" was sinking off Cape Hatteras, the last throb from its wireless flashed the word that water was coming into the hold and in a few minutes its dynamo would stop, putting an end to further message sending. This exigency is likely to be repeated in the case of other vessels. The boilers and machinery are placed as low as possible in the ship, on account of their weight, but this means they are quickly put out of action when the water comes in. It would seem essential that provision be at once made for auxiliary power, placed on an upper deck, to provide current for the wireless up to the moment the entire hull goes under. A vessel often remains afloat even when half submerged, and in such condition needs the help of its wireless more than ever, to assist rescue ships in finding her. A gas engine and generator of sufficient power would not occupy much space, and would be usable long after the fires below had been extinguished; or a small steam plant would furnish all the power required; but to depend on the below-decks plant seems to be only half equipped.

* *

THAT the farmer living along the line of an electric interurban railway is not profitable to the passenger department of the road is a statement which will surprise most of our readers. The discovery of this fact has already surprised many of the promotors and builders of such lines, who have been accustomed to estimate in profitable earnings a certain proportion of all rural residents living within walking distance of the track. Experience has found this expectation a mistaken one. This explains why, during the past two years, there has been an increasing tendency to operate interurban cars on "express" service, which either make no stop between towns, or at intervals of one mile, or more, instead of stopping in front of any farmhouse on signal from some one wishing to get on or off.

One well managed road in the Central West determined to know the exact number of passengers using country stops, and put inspectors on all its cars for several weeks. When the count was completed it was found that only 4 per cent of the total number of passengers carried got on or off in the country. The real business of the road was carrying passengers between towns.

When interurban lines were first built the cars used were little, if any, larger than city street cars. Gradually the cars were built larger and stronger and heavier. This meant that more power was needed to start these heavier cars, and power requires coal, and coal costs money. In many instances it was found that the cost of power necessary to get the car in motion was more than the fare paid by the passenger for whom the stop was made.

* *

A CONVENTION was recently held in Chicago, and an association formed, for the purpose of standardizing city paving. Thirty-seven of the larger cities in the country sent representatives. Paving is one of the most necessary as well as one of the most expensive features of city

life. Street traffic and sanitation both demand well paved streets, and whether this paving is good or bad most strongly impresses a stranger in his opinion of the city.

In no other one public improvement has there been more evidence of graft and inferior work. A thousand owners of abutting property are assessed to pay for a new pavement, but few of them as a rule have anything to say as to what it shall be, or who shall do the work. Naturally, defects do not appear for some time, and then at first in spots, hence there is rarely a concerted mass movement of protest, and if there is it seldom does any good. There are so many to share the responsibility for failure that the taxpayer usually gives up in disgust and resigns himself to his fate. In a few large cities there have been honestly laid pavements, but they could all be named in less than a day.

This movement, then, to gather and compare figures on the desirability of the various materials, cost and durability, should, if properly conducted, be a help toward securing that condition which a successful manufacturer attains in his personally conducted business. He does not waste his money in experiments which have already proven failures in other cities. He profits by the experience of others. What they have found good he carefully considers as applicable to his wants; what they reject after a fair trial he is slow to adopt. In the cities of England and Europe they build not for today, but for many years to come. This costs more at first though less in ten years. It is also true that their pavements remain, and are not, as here, dug up the day after they are laid. With all our skyscrapers and things we have yet a lot to learn on how to run a large city, and it is to be hoped this civic school in paving will graduate some worthy scholars, and incidentally, eventually deserve the thanks of the patient taxpayer.

* * *

NO one questions the bravery of the members of our fire departments, especially in the large cities. Scarcely a day passes but the papers tell the story of some daring adventure, which too often includes the tragic death of one or more of the heroes. The commercial articles of modern business life, and the congestion of business districts have caused the storage in basements and other confined apartments of large quantities of commodities which, in burning, explode with terrific effect or give off deadly fumes. Recent deaths from burning gasoline, rubber, tobacco, lime, calcium carbide, nitric and other acids emphasize this statement.

Many of the deaths, especially from noxious gases, may now be prevented by using the smoke protectors and safety helmets, similar to those employed by life-saving crews in mines. There can be no excuse for any fire department failing to provide its men with this equipment, for the taxpayers will be only too glad to foot the bill.

A singular condition has developed in this connection, however, and that is a reluctance on the part of many of the firemen themselves, to wear the apparatus after it has been provided. The explanation is found in a false pride whereby the fireman feels that in putting on the helmet to enter a burning building he is displaying a lack of courage. In this his bravery is more conspicuous than his good judgment, and the sooner the fire laddies get this notion out of their heads the better. No one whose opinion is worth having will think any the less of them for using any and all the safety devices compatible with efficient service, and who will say that a fireman who came out alive for having worn the helmet is not a more useful member of the community than he who perished unnecessarily. As a matter of economy alone the men should use such precaution as is reasonable in performing their duty, for it costs money and years of training to make one expert fireman, to say nothing of their obligation to their own families.

Midnight rides over slippery pavements, falling floors and walls and icy ladders will still provide an abundance of opportunity to risk life and display courage, so let not the thoughtless bystander ever again dare to mention cowardice when the boys don their smoke helmets, for

He who wears his helmet, tight,
May live another fire to fight.

* * *

THE present high cost of provisions furnishes the subject for leading editorials, congressional investigation, and much talk among the neighbors. These discussions have been more or less edifying, as they certainly are exhausting. Meanwhile the prices continue in their Excelsior per-

formance. Although so much has been printed about a movement "Back to the Farm," thus far about the only ones who have reached that delectable destination have been a comparatively few, rich persons, who continue to maintain their city homes, and whose farming is confined to the gentleman variety. They would be unclassed—at least they think they would—if their agricultural operations failed to cost them a good many thousands more than they earned.

There are, however, thousands of city dwellers, men on salaries none too large, who might well consider a home in some small nearby suburb, with an acre or less of ground about the place. None but those who have actually had experience begin to realize the productiveness of a single acre when devoted to those things which so largely constitute provisions. A single acre will provide almost the entire living for a good sized family, *if worked*. An acre of grass may keep a cow, but not a family. The father will find himself a better man physically than he ever dreamed of being, as a result of even a little outdoor work each day; the fresh air and quiet will do wonders for the mother with nervous prostration, and if there are any boys and girls old enough to take a hand it will help them to a vitality which no city-grown child ever knows. Transportation in these days makes such residence possible, and few who try it care to go back to the old life. It's true there are fewer doctors in the block—but then you need them less often. Think it over.

H. H. WINDSOR.

DANGERS OF RAILROAD WORK REDUCED BY SAFETY LAWS

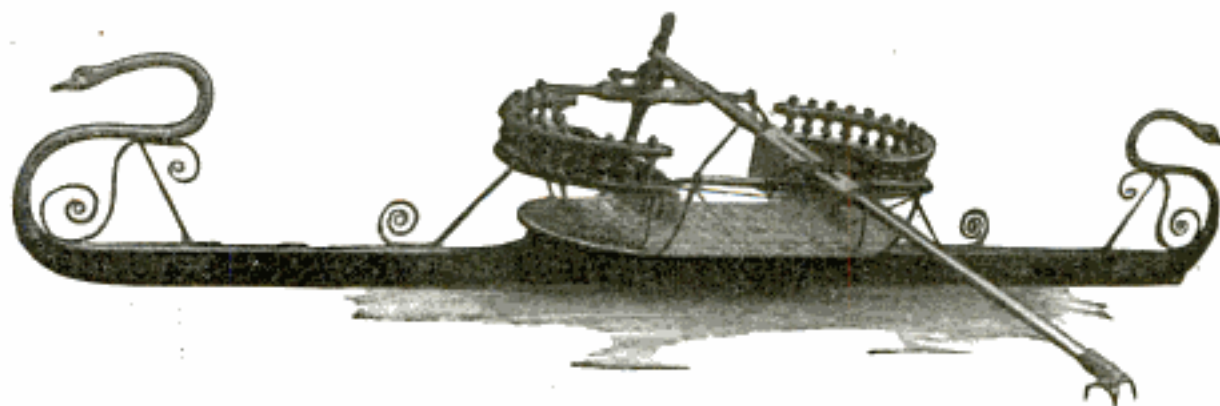
One man in 349 employed in coupling and uncoupling cars in 1893 was killed in the service, while in 1908 the number employed for each man killed was 983, an increase in the factor of safety amounting to 181.66 per cent.

The number employed for each one injured in the coupling of cars in 1893 was 13, while in 1908 the number was 62, an increase in the factor of safety so far as injuries are concerned of 376.92 per cent.

These encouraging figures have just been issued by the interstate commerce

AN ICE ROWBOAT

Among the many curious ice craft designed during the winter just past, the most curious was probably this ice rowboat, the invention of a Detroit man. It rides upon one long runner of graceful design, and is propelled over the ice at a rapid speed by means of a pair of oar-like sweeps, the ends of which are provided with sharp steel points that engage with the ice. The bottom of the runner is shod with steel. On the center rests an oblong platform and above each end of this a seat is provided. Very little energy is required to send the craft forward or backward at a great speed. When



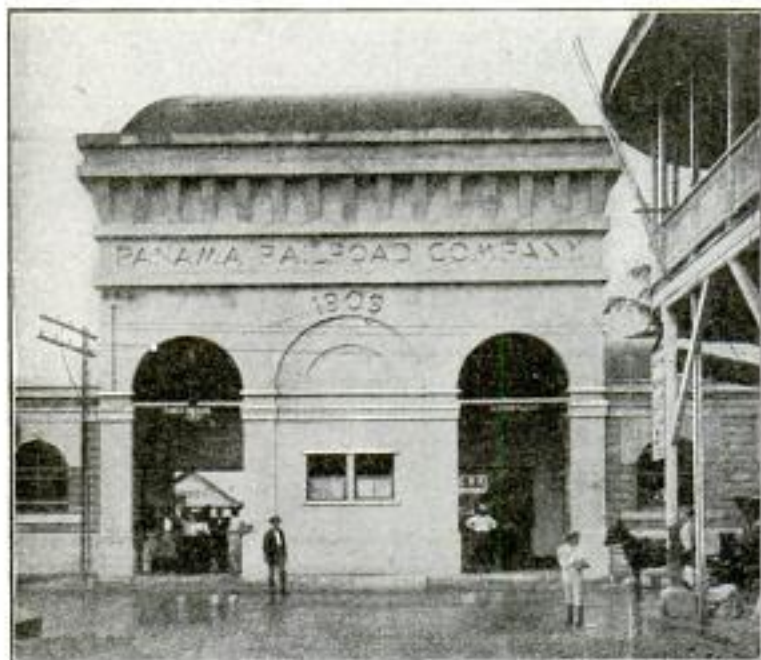
Iceboat That Is Rowed

commission, showing the beneficial results of the operation of the safety-appliance laws.

starting back over the course the rower changes his seat and faces toward the other way.

ARGENTINE TO HAVE BIGGEST BATTLESHIPS

The Argentine Republic is to have two huge battleships, both of which will be larger than any Dreadnought yet planned by any other nation of the world, and both of which are to be built in the United States. The vessels are



Colon's Concrete Railway Station

to be 570 ft. by 95 ft. beam, and of about 27,000-ton displacement, which is 1,000 tons heavier than the two latest sea fighters planned by the American navy.

That these huge ships are to be built in the United States is considered a great triumph for American shipbuilders, as previous orders for big ships from the South American republics have nearly all gone to England. The trip of the American battleships around the world, according to a Buenos Ayres paper, proved to the world that the American yards deserved the fullest confidence, and consequently the order came here.

Every Chinese boat has eyes painted on the bows. The natives have a superstition that a boat cannot be propelled safely without eyes to see where it is going.

CONCRETE STATION IN PANAMA

One of the finest examples of concrete building construction on the Isthmus of Panama is the new terminal station of the Panama railroad at Colon. In general, the style of architecture is old English, especially in the castellated battlements which crown the cornice at both ends of the building, and in the center of the south and longest section. Only a small part of the structure is shown in the illustration. It is only 19 ft. wide, but has a length of 442 ft., with a covered train shed 720 ft. long and 20 ft. wide.

One of the most interesting features of the construction is the utilization of both reinforced concrete and concrete blocks. The tower, which is the central part of the illustration, and its interior arches, are of reinforced concrete, while the walls of the building are composed of concrete blocks, resting on a poured concrete wall 4 ft. high.

LOSS OF NAVAL TUG "NINA" DUE TO OLD AGE, SAY EXPERTS

Old age is held responsible for the foundering of the naval tug "Nina," which left Norfolk, Va., on Feb. 6th, and was heard of no more. The tug carried down the entire crew, 32 members. Although the government sent a number of vessels in search of the craft, and the revenue cutter service patrolled the Atlantic coast for days, no tidings were heard of her. The "Nina" was built in 1865, was 137 ft. long and 26 ft. beam, and while she had been repaired from time to time, it is considered that she was unable to stand up in the face of the heavy gale which she encountered.

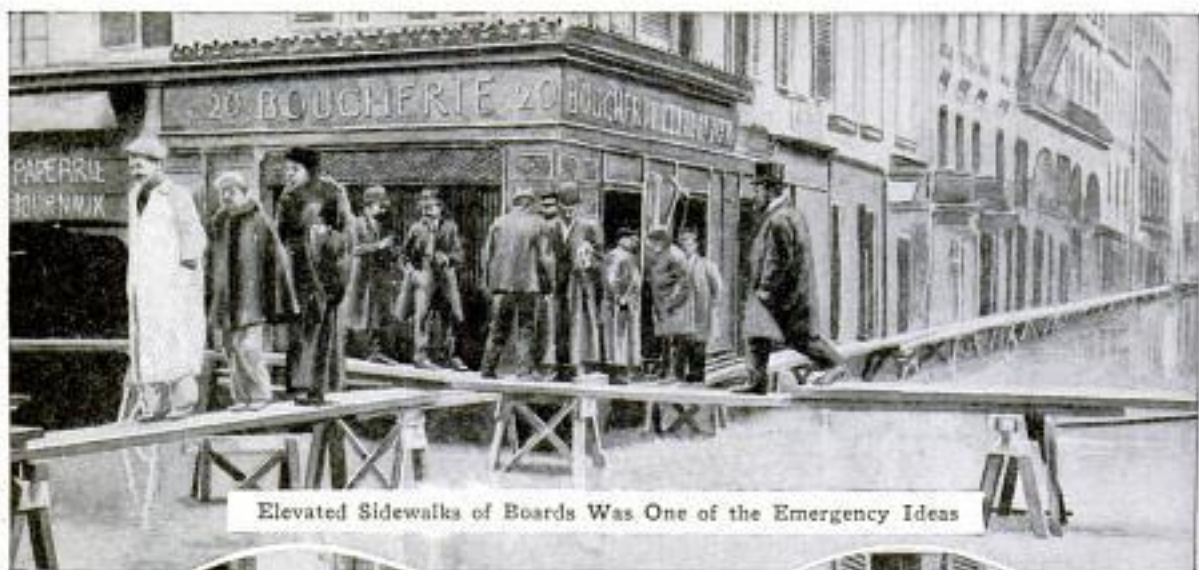
SCENES FROM THE PARIS FLOOD



THE INTERIOR OF THE INVALIDES RAILWAY STATION—With the exception of a few of the more fortunate railways whose terminals and tracks were located outside the more flooded district, the transportation facilities of the French capital were put out of operation.



AVIATORS WAITING TO BE RESCUED—The grim tragedy of the flood naturally plunged the entire nation into deep gloom, especially when the daily reports of the increasing height of the waters of the Seine, seemed to show no abatement of the torrent's fury. Final reports show the total loss to have been \$14,600,000. Yet the catastrophe was not without humorous incidents. In the above illustration the aeroplane operators at the Invesy aviation field, seem to be enjoying their temporary isolation.



Elevated Sidewalks of Boards Was One of the Emergency Ideas



Pick-a-Back Transportation



Delivering the Day's Groceries



Owners of Collapsible Boats Earned Many a Franc

A Few of the Expedients Resorted to by Inundated Paris



Forced to Leave Home by Encroaching Waters



The Gendarmes to the Rescue

FRENCH EXPEDITION FAILS TO PIERCE THE ANTARCTIC

While the French expedition which sought to reach the south pole, under the direction of Dr. Jean M. Charcot, failed in its effort to plant the emblem of France at the southern extremity of the earth, its leader claims to have secured scientific data and observations of value. The "Pourquoi Pas," the ship on which the expedition hoped to achieve the pole, met with a long series of accidents. The party was equipped with automobiles designed for the purpose of traveling over the uneven surface of the ice and snow, but it is reported that the condition of the ice fields prevented their use.

PUSH-CART IN TOWER OF BUILDING

In the open tower of a building at one of the busiest street corners in Los Angeles, in a position where all who pass can see, is an old push-cart with which the owner of the building once peddled hot tamales. The owner of the cart and of the building is what is known as a self-made man, and when

he became rich enough to construct the building and conduct a business within it, he had the tower designed for the express purpose of housing the



Cart Tells of Early Struggle

cart. Some time ago when fire threatened the building the first thing the owner ordered removed was the cart.

CONCRETE HEN-HOUSE AND PIGEON-LOFT AT HOME OF "CHANTICLEER"

The unusual hen-house and pigeon-loft shown in the illustration is located



Palatial Home for Hens and Pigeons

on the farm of Edmond Rostand, the French poet-dramatist, whose farm-yard play, "Chanticleer," was recently produced in Paris. It was designed by M. Rostand, and provides for the sheltering of hundreds of hens and pigeons. It is constructed of concrete and wood. The poet is reported to have said that he conceived the idea for the play when he became interested in farming and was designing houses for his poultry.

THEATRICAL PERFORMANCE AT SEA

On the night of Feb. 11, while the "Mauretania" was speeding across the ocean to England, Charles Frohman presented Marie Doro in what is said to be the first real stage production at sea. The play was "The Climax," and it was given in the saloon of the huge vessel. The company was on its way to England to appear in a London theatre.

Theatrical men say the time is not far distant when theatrical productions will become an ordinary event on the great liners plying between New York and England.

INNOVATIONS IN POSTAL AND TELEGRAPH SERVICE

The London postal authorities have inaugurated a unique service, known as the telephonic-post, by which letters received during Saturday night may be delivered by telephone Sunday morning, thus avoiding a 24-hour delay.

Almost simultaneously with the starting of this service in England comes the announcement of a novel service by one of the American telegraph companies.

Under the new English postal service the hour for telephonic delivery is set for 8:30 a. m., unless otherwise stated by the sender. When the letter is received at the postoffice it is rushed to the central telephone office, where it is opened by a clerk, who calls up the addressee on the telephone, and reads to him everything in the letter. The service costs 6 cents for every 30 words, and 2 cents for rushing it to the telephone office.

The proposed innovation in the service of the telegraph company consists in the transmission of "night letters" by wire to distant points, the message being typewritten by the receiving operator in the form of a letter and placed in the mail for delivery early in the morning. A 50-word letter will be sent in this way for the cost of a 10-word day dispatch to the same point. In case a message is taken for a town where a night telegraphic system is not maintained, it will be sent to the nearest night point and be mailed or telephoned from there.

These letters would be sent after midnight when the wires are idle for the greater part of the time.

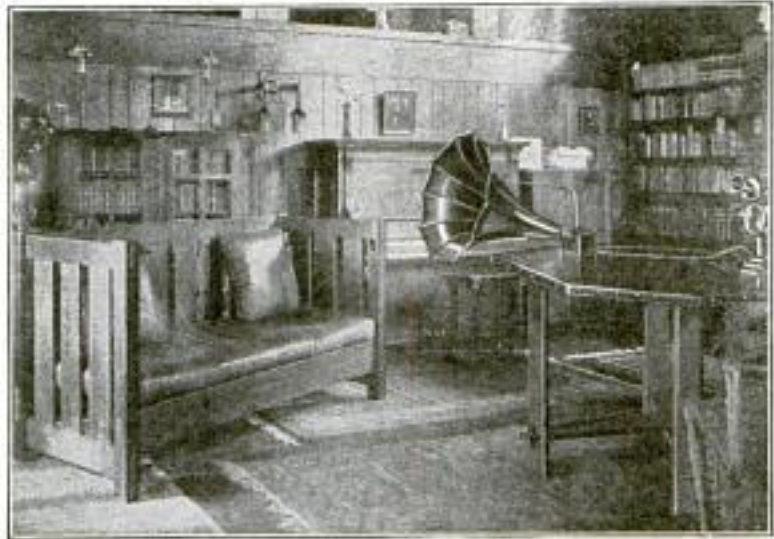
An attempt to count 1,000,000 kernels of wheat in 10 days on a bet caused Thomas Swartz of Seattle to become insane.

PHONOGRAPH SELECTIONS BY TELEPHONE

Phonographic music, carried over the wires from the central telephone exchange to the homes of the subscribers to this unique service, is a novelty tried out with such success in Wilmington, Delaware, that the idea may spread to other cities. The music is carried by the regular telephone wires, but those who subscribe for it must have a special receiver beside the regular telephone box. This receiver, to which a phonograph horn is attached, throws a large volume of sound into the room.

At the central telephone exchange is a music room, which contains a number of phonographs, and an operating board to which the wires of the music subscribers are attached. Each subscriber to the music service is supplied with a special directory giving names and numbers of records. When music is desired, the subscriber calls the music department

on the telephone, asks for a certain record, and screws the horn into position. The music operator plugs up a free phonograph to the line, slips on a



Receiving Music in the Home

record, and starts the machine. At the conclusion of the piece the connection is pulled down, unless more records have been requested.

When several subscribers call for the same piece all the wires can be con-



Phonograph Room in Telephone Exchange

nected to the one phonograph. The telephone company requires each musical subscriber to guarantee \$18 per year. The rate of charge for the service is 3 cents for ordinary records, and 7 cents for grand opera.

FUR AS HAIR DRESS

The fur toque for outdoor wear in the morning and afternoon gives way to fur as a coiffure for evening wear



and afternoon indoor wear, and is the latest European fad. One long, rope-like length of fur is wound around and around the knot of hair on the crown of the head, or, as one illustration shows, a short length may be wound around just once. The fad is called the "beastie bandeau."

FOUR MINE DISASTERS IN TEN DAYS

Three coal mine explosions in three days, involving a loss of 178 lives, with another following within a week, killing six more, has served to emphasize the dangers incident to the coal mining

industry. On Jan. 31 an explosion at Primero, Colo., cost 75 miners their lives and completely wrecked the shafts of the mine. At Drakesboro, Ky., the following day, 100 men were entombed when an explosion occurred. All but 35 escaped.

The Palau mine of the Esperanzas Mining company, at Las Esperanzas, Mexico, was the scene of the third explosion. This occurred on Feb. 2, and was caused by the ignition of gas by the lighting of a cigarette. Every man working in the third level, 68 in number, was killed.

In the Windy Shot mine of the Stearns Coal company, at Stearns, Ky., 6 miners were killed on Feb. 9.

Little success attended the preliminary efforts in the attempt to secure the bodies of victims of the Cherry



Two Styles of Fur Coiffure

mine disaster, at Cherry, Ill., when the mine was unsealed. Only a few bodies were found. After allowing it to remain closed for almost two months in an attempt to smother the fire, the galleries were found to be blocked by tons of debris which it was necessary to remove.

The Approach of Halley's Comet

Will Be Seen Before May 18 in Eastern Sky at Dawn—After May 18 in Western Sky at Sunset—Cannot Be Seen at Nearest Approach to Earth—Head Can Never Collide with Earth—Tail Cannot Harm It

By Francis Buzzell

HALLEY'S comet, a vast but mostly gaseous body about 1,000,000 times larger than the earth, is rushing through space towards the sun at a speed of millions upon millions of miles a day, and on May 18 its tail may envelope the earth. But this, according to the greatest astronomers of the world, need cause no alarm, as the only effect will be a rather pretty display of luminous vapors in the earth's atmosphere. The astronomers indeed express fear, but their fear is that the tail may not be long enough to reach the earth at the moment the comet is in direct line between the earth and the sun, thus robbing them of the chance of witnessing such a phenomenon.

That the chance may not occur again in thousands of years, at least with Halley's comet, is made clear by a glance at the drawing showing the orbits of the earth and of the comet. For the tail to sweep the earth, the comet must be in direct line between the earth and the sun both horizontally and vertically. Or, in other words, it must cut through the plane of the earth's orbit at the moment it is in direct line between the earth and the sun, otherwise the tail, which always streams directly away from the sun would sweep the heavens

in some direction above, below, or away from the earth. Therefore, the fear of the astronomers that this one chance in a thousand may be lost because the tail may not be long enough to reach the earth at the crucial moment. This leads, naturally to an explanation of why the tail may not be long enough.

At the moment the comet cuts through the plane of the earth's orbit it will be about 78,360,000 miles from the sun, and 14,640,000 miles from the earth. The tail, therefore, will have to be more than 14,640,000 miles long to envelope the earth, and at the time this occurs the astronomers fear that the tail will be much shorter than that figure. A comet, it must be understood, is not always provided with a tail, and the length of the tail when it is acquired, grows larger as the sun

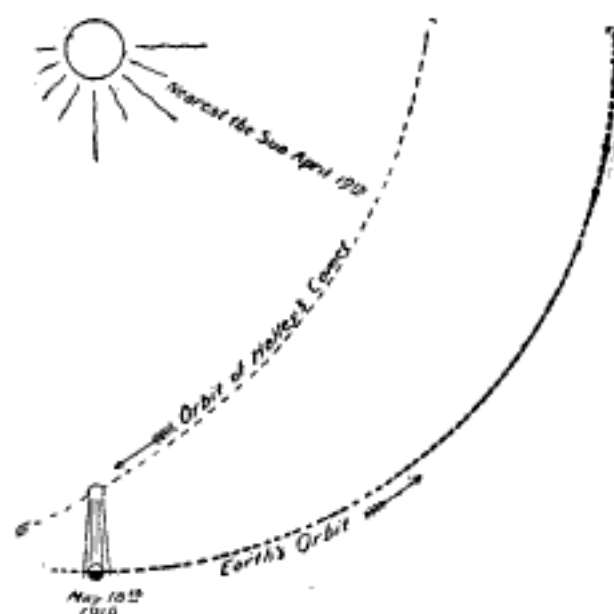
is approached, and then becomes shorter and shorter as the comet travels away from the sun, until it no longer exists.

At the time the comet, the earth, and the sun are in direct line, the comet will be rushing away into space again, having reached its closest point to the sun a month previous to May 18. Consequently the tail will have shortened to a considerable extent.



HOW COMET MAY BE FOUND AFTER MAY 18
—Below the End of the Handle of the Sickle of Leo a Little South of West—Vertical Line Points Directly West

The composition of a comet's tail is a combination of gas and minute particles of metal, not unlike dust. As the comet approaches the sun, drawn by gravitation, this gas and metal dust is



Orbits of Earth and Comet—Position of Sun, Comet, and Earth When Tail May Sweep Latter

forced outward back of the comet's head by waves of force given out by the sun. This force, although not powerful enough to counteract the drawing force of gravitation on the nucleus of the comet, is sufficient to force the gas and minute particles of metal outward in the same manner that wind might blow dust backward from the surface of a ball. An excellent example of this is the ease with which fine dust may be blown upwards from the earth, although the earth's gravitation is acting upon it all the time. The tail of a comet, while the latter is in the vicinity of the sun, is continually changing and being remade, in the same manner as a trail of smoke from the chimney of a speeding locomotive. The particles forming the tail travel outward from the head at about the same speed that light travels and then disappear.

The fact that Halley's comet crosses the earth's orbit, and also cuts through the plane of this orbit, has led many people to express a fear that a collision might occur between the two bodies, but there is absolutely no possibility of

such an event occurring. Just why is clearly explained by Prof. E. E. Barnard, of the Yerkes observatory, and his explanation is made clear by the drawing showing the orbits of the comet and the earth.

"The orbit of Halley's comet does not change to any appreciable extent," says Prof. Barnard, "and the difference between the distance between it and the earth on each visit depends upon the position of the earth in its orbit. The point at which the comet and earth would be the closest to each other would be where the dotted lines that show the two orbits cross each other. If the earth and comet both reached that point at the same time, it would appear on the drawing as if they must collide, but in reality they could not, because the planes of the two orbits are different. That is, the comet would be still several million miles distant. The point in the comet's orbit where the comet is shown in the illustration is the point where it cuts through the plane of the earth's orbit."

Were the comet to cut through the plane of the earth's orbit at the point where its orbit crosses the earth's orbit a collision would occur, were the two bodies to reach that point at the same time, but such an event is an impossibility. The distance between the two bodies would still be, roughly estimated, between three and four million miles.

Besides the possibility that the earth will pass through the comet's tail, this visit of the celestial traveler is of special interest to astronomers because, when it cuts through the plane of the earth's orbit, it will cross the face of the sun. This will occur on May 18, at which time the comet will be nearest the earth, but, contrary to the expectation of the general public, the comet will not be visible to the naked eye at the time, and may not be visible even to the most powerful telescope.

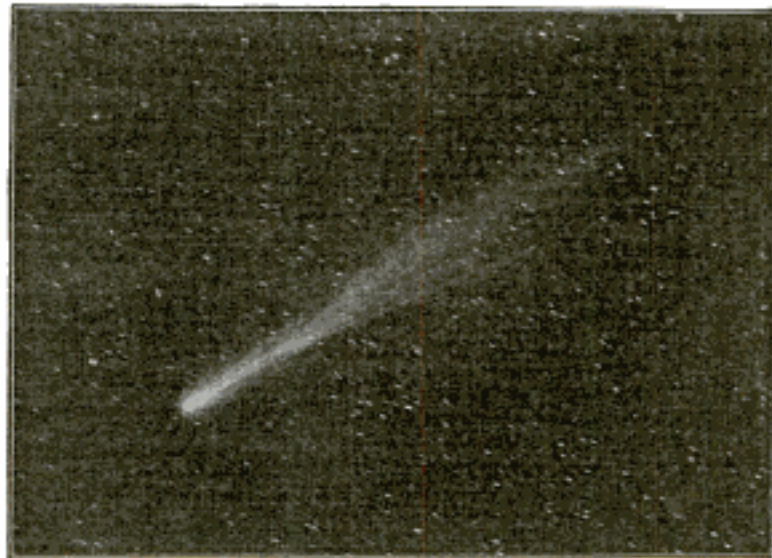
"We will not be able to view this phenomenon from the Yerkes observatory," says Prof. Barnard, "because it will occur between 7:30 and 8:30 on

the evening of May 18, which is after sunset in this location. The comet will cross the sun's surface in just one hour, and it may be that we will get a glimpse of it for a few minutes, but even this is doubtful. The astronomers in California will have a better opportunity because there is two hours difference between the time here and there. It will be viewed better in the Hawaiian Islands, still better in the Philippines, and probably best in Japan. Being vapor, however, as far as we know, it may not appear like anything at all while passing before the sun, or, if its nucleus is more or less solid it may appear like a black speck."

The fact, as above stated, that the comet will not be seen with the naked eye when passing closest to the earth may seem disappointing to many, but even if it could be seen it would not present as excellent a sight as may be had of it with the naked eyes a few weeks before it approaches nearest to the earth and a couple of weeks after it appears again on the other side of the sun. It would have no tail at all as far as the eye could see, because the tail would be directly between the vision and the comet. The best example of this is the searchlight. When it is directed across the sky a long beam of light is seen, but when it is pointed directly at the gazer all that he sees is the face of the light.

The time, therefore, when the general public will get the best view of the comet will be from the middle of April until the first week or so of May, and for a couple of weeks after May 18. During the latter part of April and the first part of May it will be seen just before dawn a little south of where the sun rises, and just a little distance above the horizon. To see it then, however, will require early rising, consequently the majority of those who will see it will have their desire gratified

after it has crossed the sun. It will then appear just after sunset, a little south of west, and at a considerable height above the horizon. One of the accompanying drawings shows about where it will be a few days before and a few days after May 27, which is nine days after it crosses the sun, and its nearest approach to the earth. The



How a Comet Appears with a Long Tail

stars shown are known as the Sickle of Leo, and can easily be found in the sky, although the comet will be so much larger that the searchers will probably find the stars by seeing the comet first. The vertical line running through the drawing, points directly west, and the comet will be a little south of it.

When this article was written Halley's comet had not developed enough of a tail to make possible the taking of a photograph that would show it satisfactorily as it will appear when brightest, but the photograph of a comet reproduced in one of the illustrations is not unlike the photographs that will be made of Halley's comet just before and after May 18. Probably the most interesting spectacle will be on May 1, when the comet nears Venus. The planet and the comet will be practically the same distance from the earth and everyone will be able to see their relative sizes.

The man shown looking through a telescope in one of the illustrations is

Camille Flammarion, the famous astronomer of France, who says that if the comet's tail is composed of poisonous gases it may create havoc upon



Camille Flammarion Watching the Comet

the earth. Flammarion is the scientist who asks why burn coal under a boiler when the earth itself is an enormous furnace, and the heat at its center could be utilized.

A Californian chemist has announced a little poisonous gas in the tail. In

answer to such disquieting reports, Prof. Frost, director of the Yerkes observatory, which is one of the largest and finest equipped in the world, has the following to say: "The density of the tail of the comet is about the density of the vacuum in an electric light bulb, and there could not possibly be enough poisonous gas in it to hurt a fly."

It has already been mentioned that the closest the comet will come to the earth on this visit is about 14,640,000 miles. On its last visit in 1835 it approached as close as 5,000,000, but at that time the earth was not in direct line with it and the sun, consequently its tail was not streaming toward us.

Astronomers hope that this visit of the comet will enable them to determine absolutely the size of the nucleus and its composition. Comets are composed of three parts; the nucleus, the head, and the tail. The nucleus is the center of the head, and it is known that the head is of the same composition as the tail, only denser. When comets pass between the earth and stars it is possible to see the stars through both the tail and the head, which is one proof that both are transparent, but it has never happened that the nucleus of a comet has been in such position between the earth and a star that the astronomers could tell whether or not the star would show through the nucleus as well as through the head.

LARGEST WIRELESS STATION IN EUROPE

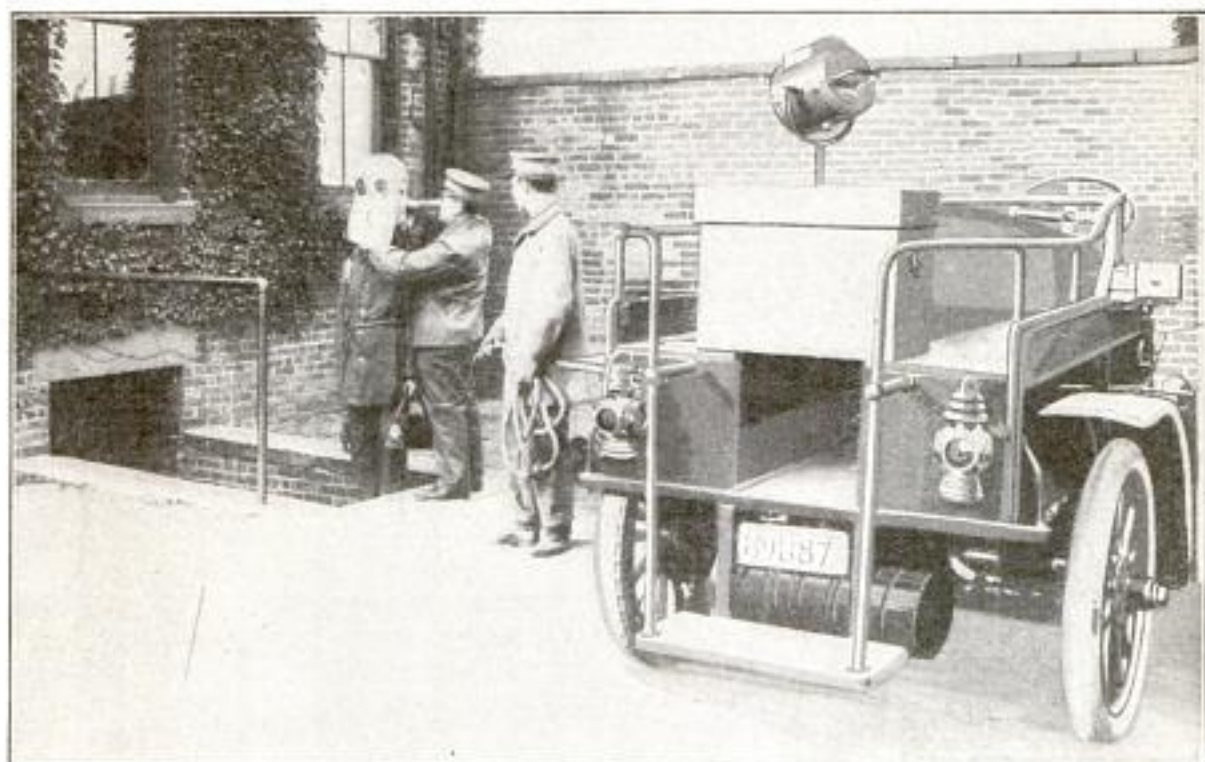
The great wireless station recently completed at Pola, which is on the Adriatic Sea in Austria-Hungary, is said to be the largest on the European continent. It has a tower 300 ft. high, built on a glass foundation, and its antennae spread over a ground surface of about 80 acres. When the Kaiser was on his yacht at Corfu, and during his voyage to Malta, he was kept in regular communication with his ministers in Berlin through this station.

EMERGENCY CREWS RUSH TO GAS LEAKS

The general public in large American cities is familiar with many types of "hurry-up" vehicles that rush through the streets on emergency calls. There are fire-fighting vehicles, police patrol wagons, ambulances, the apparatus operated by the insurance companies to protect stock from fire and water, and the accident wagons of the traction lines. But New York now has another type in the special automobile brigades

lamps, the equipment includes a hundred or more different kinds of tools and emergency implements.

Where there are leaky pipes there is always danger of asphyxiation, consequently the member of the crew who enters the basement or room where the pipe is located is provided with a self-contained life helmet. The supply of oxygen in the metal tank strapped to the back of the helmet will suffice for 30



Ready to Penetrate Basement Filled with Gas

held in readiness by the Consolidated Gas Co. to respond to leaking-gas calls.

Three stations, not unlike fire stations, are provided for the apparatus. The users of gas have a chart showing them the location of the nearest station and its telephone number. When a leak in the gas pipes is discovered, a call is sent over the wire and one of the emergency autos immediately rushes off. These autos are built with rear steps, and the side seats form boxes for part of the tools carried in the equipment. In addition to fire extinguishers, oxygen helmets, and electric hand

or 40 minutes, which is more than sufficient time to shut off the flow of gas. In one hand is carried a kit of tools, and in the other an electric hand lamp. A rope is tied around his waist and held by one of the crew outside, so that, should he stumble into an unseen opening while searching for the pipes, or be overcome by the fumes, he can be dragged back to safety.

Gas leaks, if not immediately attended to, may result in serious explosions, therefore the company believes its emergency service to be of utmost importance.



Working an Electric Drill at a Height of 10,000 Feet

ALPINE CLIMBING LOSING ITS TERRORS

Instead of preparing an elaborate equipment, providing himself with a guide, and climbing wearily for thousands of feet over dangerous crags and passes to reach the top of the Jungfrau, one of the highest Alpine peaks, the tourist, a few months hence, will take a comfortable seat in a car and be conveyed over a railway to the mighty heights.

Mountain climbing possesses a fascination for many who are blessed with endurance and who enjoy fighting their way upward to the dizzy heights of the snow-capped mountains. It is no pastime for weaklings or those lacking courage. These unfortunates are obliged to stand down in the valleys and confine their enjoyment of the great natural scenery to gazing up into the mountain sides which become lost in the clouds.

Hundreds of workmen, under the

direction of engineers in whose vocabulary there is no such word as "impossible," are pushing the railway to the top of the Jungfrau, which rivals the mighty Matterhorn. It is 13,668 ft. high. Several stations of the enterprise have already been opened to passenger traffic. One of the illustrations shows an electric drill at work 10,000 ft. above sea level. A careless backward step would precipitate them 2,000 ft. to the base of an abrupt precipice. A 2,650-hp. dynamo in the valley below, driven by waterpower, furnishes the power to drive the drills and provides the workmen with light and with heat.

The peak of the Wetterhorn is the goal of many daring climbers. It is 12,146 ft. above sea level. A wonderful elevator running on strong cables, scaling its side, has recently been completed. This mode of ascension, how-

ever, is no inducement to many to go up into the clouds and view nature in over the mountain sides than use it. Should the cables part, the heavy car

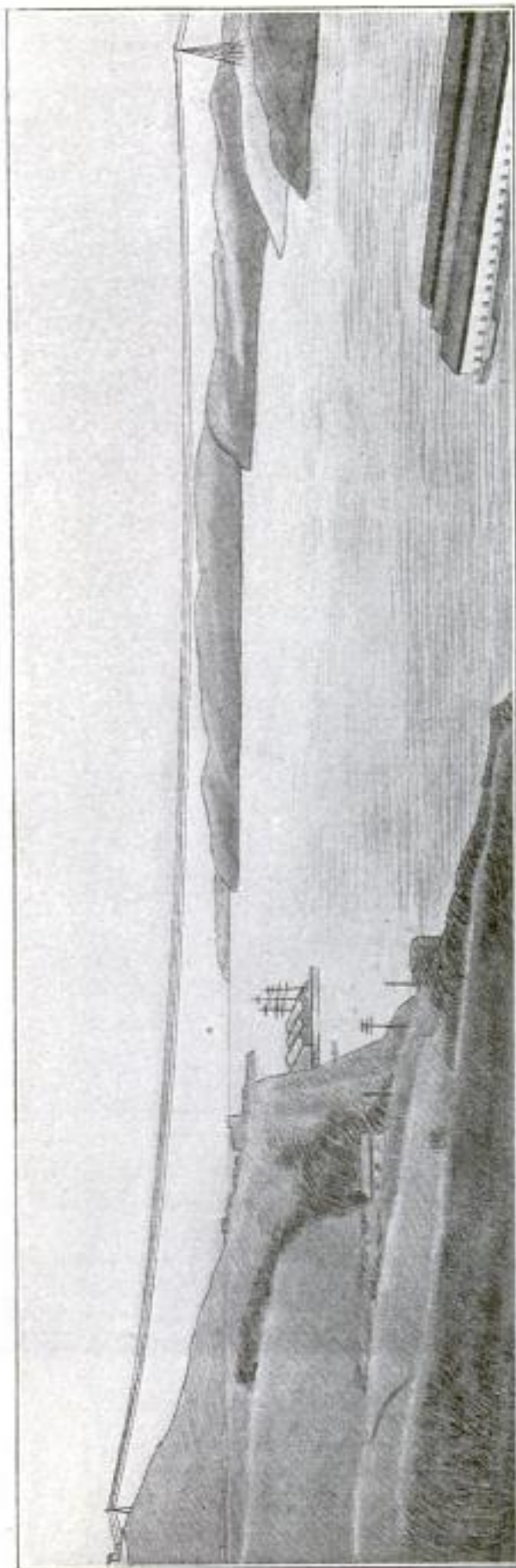


The Elevator into the Clouds

its grandest and most impressive aspect. Some of the experienced mountain climbers, even, look at the frail aerial railway, and conclude that they would rather risk their lives crawling

would descend with the speed of a meteor.

Prof. Percival Lowell declares he has discovered a new canal on Mars.



WATCH WHEELS MADE OF MANY METALS

Because the balance wheels of watches, if made of one metal, expand and contract with changes of temperature, and thus run slower or faster according to the degrees of heat, they must be made of different kinds of metals, having different degrees of expansion with the same increase of temperature. In this manner the effect of changes of temperature on the running of a watch is almost entirely eliminated.

To determine the expansibility of the metals employed an instrument called a dilatometer is used, in which a system of delicate levers or a chain of gear wheels magnifies the motion of a pointer over a scale hundreds of times. A dilatometer recently exhibited in London magnifies 1,500 times. The change in the length of a piece of steel caused by a single degree of rise or fall of temperature is clearly measured by it.

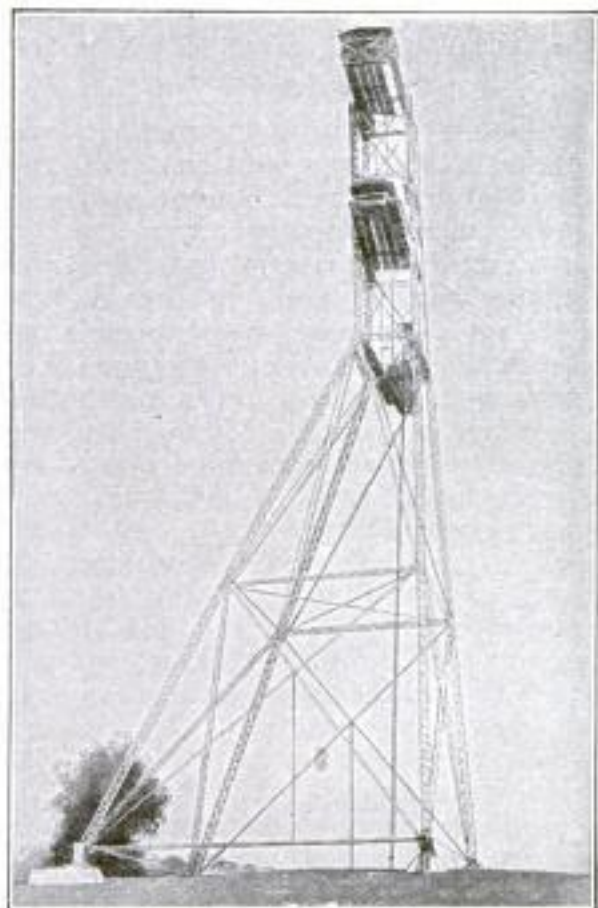
CABLES SPAN NEARLY A MILE OVER CHANNEL

The strength of the current in the channel of the Straits of Carquinez at the northern extremity of San Francisco bay, and the rocky character of its bottom made the laying and operating of high tension power submarine cables impossible, and consequently the engineers of the Pacific Electric Co. devised and put into effect the aerial scheme shown in the accompanying illustration.

At the point selected for the crossing the water is about 2,750 ft. wide with a depth of 120 ft., and through the gap flows the waters of the Sacramento and San Joaquin rivers, making at all times a heavy and dangerous current. On one side of the straits, about half a mile from the water's edge, is a hill that rises to a height of 400 ft. On top of this was placed a 64-ft. tower, and on the other side, known as Dillon's point, a 225-ft. tower was erected. The towers provide a minimum clearance of 200 ft. between the cables and the water.

Another engineering feature of interest in the work is the third, or leaning tower, located north of the 225-ft. tower. The land north of the 225-ft. tower falls away to a marsh at near tide level, which fact made it necessary to turn the cables down to anchorages some 1,700 ft. back. This condition compelled a great change in the dip of the cables between this tower and the north anchorages, and necessitated the erection of the third tower, which, because of the change in direction, was built to lean toward the north. Its inclination is at an angle of 13 degrees from the perpendicular. The distance between the two main towers is 4,427 ft. The cables, of which there are several, carry 60,000 volts.

An accident at the span recently caused one death, and a short circuit set fire to the wooden cross arms of



The Leaning Tower

the towers. Only by the most strenuous efforts was the span saved from destruction.

BUS-TICKET MACHINES IN PARIS

The laws of Paris prohibit the carrying of more than a given number of



First Person at Corner Gets First Bus Ticket

passengers in each omnibus. Consequently, if a bus is nearly filled when it reaches a corner, just a few of the waiting passengers may be taken on. To make it impossible for persons who have just arrived at the corner to enter a bus ahead of persons who had been waiting longer, at each corner automatic ticket booths have been provided. The tickets are numbered, and the first person arriving at the corner has the first chance to enter, the ticket pulled from the slot by him bearing a smaller number than those following.

PORTABLE DOG KENNELS FOR HOTELS

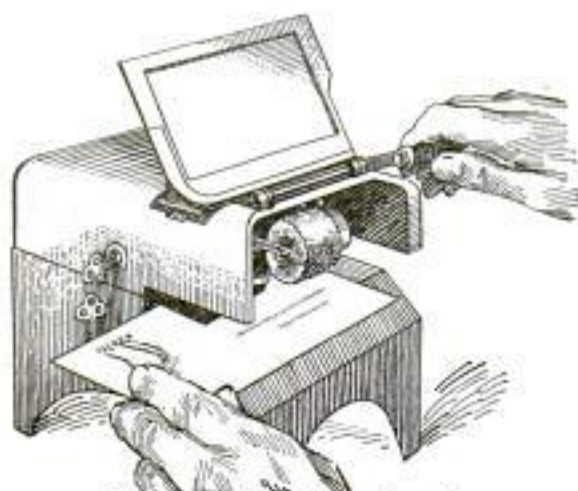
Hotels, according to an article in the *Hotel World*, should be provided with portable dog kennels to be rented to the guests who insist on taking their dogs to rooms. Such a kennel would be about 4 ft. long and of a width that would allow it to go through the door of a room. It should be constructed of wood, lined part way up with zinc or sheet metal. The upper part should be covered with open wire work, and the bottom should be provided with broad-tread casters.



From Oxen to an Automobile

INGENIOUS STAMP AFFIXER

The new stamp affixer shown in this illustration is apparently very simple and certain in operation. By merely sliding an envelope onto the machine and turning the handle around the corner of the envelope is moistened; a stamp is projected, cut off from the strip, and pressed firmly onto the moistened surface; a counter records



Stamping Machine in Operation

the use of the stamp, and the letter is thrown off the machine. A good operator can stamp mail at a speed of about 4,000 an hour.

MECHANICAL EVOLUTION OF A FARM

One of the most interesting farm sights in Michigan, and one that typifies the steady evolution of means of conveyance and power from the day of the ox to the present day of the automobile, can be seen on the land of William Doubleday, a few miles south of Battle Creek. But, strange as it may seem, the oxen, mules and horses were not put out of commission, and all are still in active service along with the automobile, as is also the hand-pushed wheelbarrow.

The yoke of oxen, descendants of oxen that were once the sole beasts of burden on pioneer farms, are still in use on the Doubleday farm for such tasks as pulling drags and rollers over the newly plowed land. The mules, which were next in the evolution, are used for drawing cultivators, seeders, and other tilling implements, while the horses, undisputed aristocrats of all beasts of burden, still plow and draw the market wagons and buggy. The automobile, the latest acquisition, saves valuable time in carrying the farmer to and from the nearby city, and provides a means of visiting distant friends.

The farm is on the rural telephone service, and rural delivery brings and gathers the mail, and the automobile engine can be harnessed to the small cutting and grinding machines in the barn.

INSTRUMENT MAKES ANY SOUND FOR MOVING PICTURES

A veritable box of tricks is a new instrument called a soundograph, which furnishes all the sound effects used in conjunction with the operation of moving picture machines. Producing the sounds which take place in real life it adds to the realism of the scenes depicted on the screen.

By operating 27 different devices, 54 effects can be produced with it, among them the tramping or running of horses, a thunderstorm, the wash of the surf, rain, wind, locomotive exhaust, train whistle, automobile, fire apparatus in action, running water, crash of glass



Imitates Familiar Sounds

or dishes, fall of heavy articles, the firing of arms from a single shot to a fusillade, and many others. The instrument is 3 ft., 6 in. in height.

LEISURELY RESCUE AT SEA

The all-absorbing desire of the average person struggling in a rolling sea, and in imminent danger of being dashed against the side of a huge vessel, would



"Man Overboard"

naturally be to grasp a proffered life-line, and be hauled to safety.

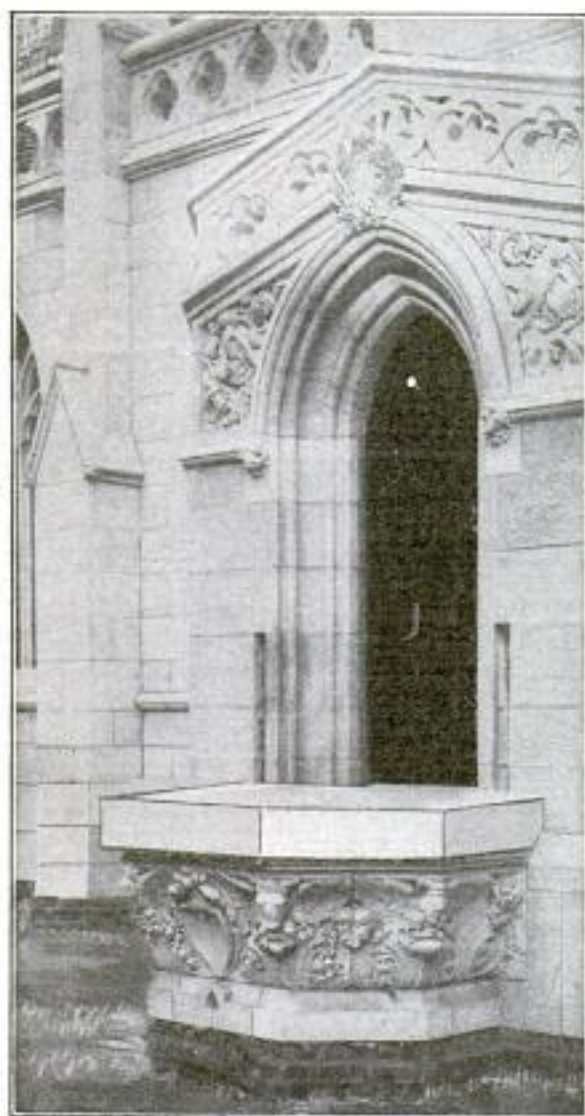
Not so with "Mike" Ryan, able seaman, of the steamship "Philadelphia." Although the sea was so rough that the officers did not dare to lower a small boat, Ryan bobbed about calmly in the water and spurned to use the line thrown him until he had undone the crude knot in it, tied by a well meaning land lubber, and substituted a real sailor's knot. It is said that he voiced his disgust in no uncertain terms, in fact, in the inelegant but forceful language peculiar to the sailorman when he is angry, and that his words could be heard on deck.

Ryan was pitched overboard by a heavy sea which struck the side of the "Philadelphia" and his cry of alarm as he went over was heard in time to stop the ship, reverse the propellers, and get back to where he was swimming around.

The accompanying photograph was taken by an amateur photographer who was a passenger on the ship. It is remarkable because of the fact that it is probably the first photograph of an actual rescue at sea.

FIRST OPEN-AIR PULPIT IN AMERICA

The open-air pulpit just completed as part of the new wing of Grace Episcopal church, Broadway and Tenth street,



Open-Air Pulpit Partially Completed

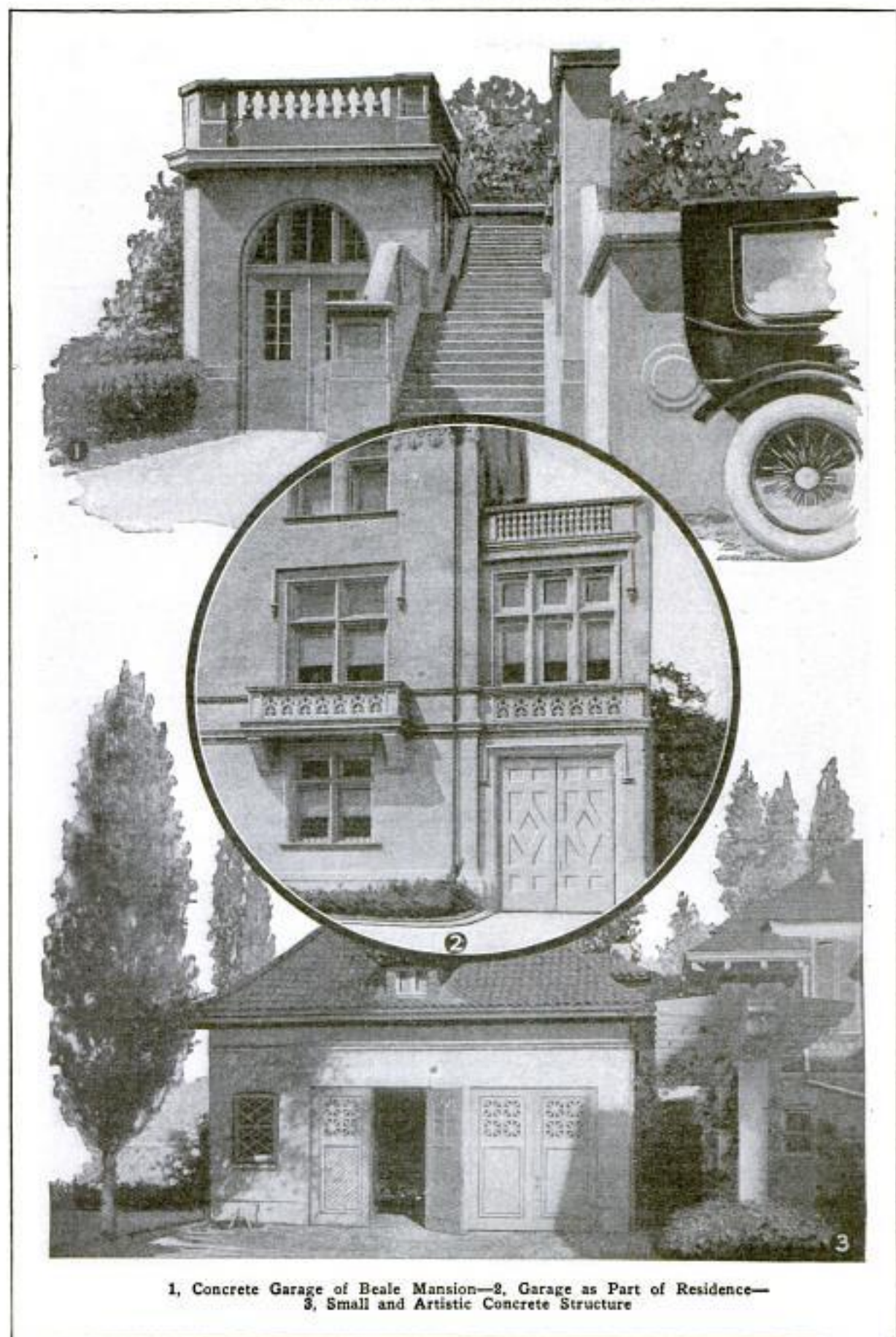
New York, holds the distinction of being the first in America. By demolishing the corner property, which was the bakery made famous as the scene of the nightly gatherings of hungry men waiting for stale bread, and known as "the bread line," a commodious courtyard has been provided, and the open-air pulpit looks out upon it. When the weather permits, outdoor services will be held in the various languages spoken by the people living in the Grace church parish.

ARTISTIC PRIVATE AUTO GARAGES

While the public or livery garage typifies the latest approved ideas in brick, steel, and concrete construction, with every effort to meet the obvious necessity for the best fire protection, they are, to say the least, huge, plain structures with no more individuality than a warehouse. The private garage, on the other hand, offers the greatest opportunity for the exercise of artistic taste and architectural skill. Almost invariably located in close proximity to the residence of the owner of the automobile or automobiles, it becomes doubly desirable that the garage shall be, if not in the exact architectural style of the residence, at least in perfect harmony with the surroundings. And it is this necessity, especially in crowded city blocks, that presents the greatest difficulty to the architect. In residential districts where auto owners are most numerous there seem to be a distressing eccentricity and diversity in the size of the lot apportioned to each mansion, and architects have, in many instances, been driven to their wits ends to provide garages that would not appear incongruous. Some clever ideas have been worked out by providing low-roofed structures on lines not unlike those of the residence building itself, or at least in harmony with the brick or stone garden walls which so often enclose the rear portions of city lots.

For a country or suburban resident, however, the problem of the private garage is greatly simplified, as the ample ground available makes possible the erection of almost any form of building that fancy dictates and the pocketbook permits.

The material best suited for private garage construction presents an issue more or less open to debate. In rural and suburban districts there is a marked tendency to erect frame structures, but the best procedure is to build the garage of the same material that predominates in the residence building. Brick garages are probably



1, Concrete Garage of Beale Mansion—2, Garage as Part of Residence—
3, Small and Artistic Concrete Structure

more numerous in cities than any other type, but this is partly explainable by the fact that many present-day garages are transformed stables, the owners of which have sold their horses. Concrete is generally regarded as an ideal material owing to its fireproof character, but its preferable forms are not as cheap as is often inferred. They include the solid wall, the hollow wall, concrete blocks, and stucco construction. The buildings with solid walls, that is of monolithic construction, are desirable as absolutely fireproof, but are quite costly. Concrete block construction effects many of the same advantages at less cost, but decidedly the most popular form appears to be of stucco, which consists of a coating or veneer of concrete, preferably upon brick. It is favored alike for new construction and for the rejuvenation of old brick stables. A quaint idea is found in the familiar type of garage wherein the foundation and four corners have the brick surface exposed, the remainder of the wall surfaces being of stucco.

An example of the possibilities of the concrete garage in unusual surroundings is shown in one of the illustrations. It is the new garage of the Beale mansion in Washington, D. C., set into the rear of the lot, which rises sharply. The simple classical outlines of the little structure are only partially obscured, and at one side rises a graceful stairway with ornamental balustrade. This gives access to a garden on the hillside, the roof of the garage forming an artistic extension of it.

The example shown of a garage as part of the residence building itself is that of the house erected some time ago in Washington for the late Norwegian minister. It carries out the idea of the rest of the house excellently. The garage with the clock tower is a magnificent structure on the Harrison estate near Philadelphia, while the other large garage is that which holds President Taft's machines at the White House. The other illustrations show artistic garages of concrete and of pressed brick.

SMALL STREAM HARNESSSED FOR DOMESTIC POWER PLANT

A notable example of what can be done with a small hydro-electric plant for private use is shown at Lake Tahoe,



Pipe Line Down Mountain Side

near Tallac, California, where the owner of a beautiful country estate has harnessed a little mountain stream flowing across the property, and put it to work.

Without detracting from the beauty of his ideal summer home Mr. Harry Babcock placed himself in possession of all the conveniences and comforts of a city home by running a pipe line down a mountain side to a small power house at the shore of the lake. The reservoir is approximately 130 ft. above the water-wheel, and ample pressure is supplied to carry the heaviest loads that can be placed on the generators. The power house equipment consists of a Pelton impulse water-wheel which is

belted to a 4-k.w., 1350-revolutions-per-minute, constant-speed, direct-current generator.

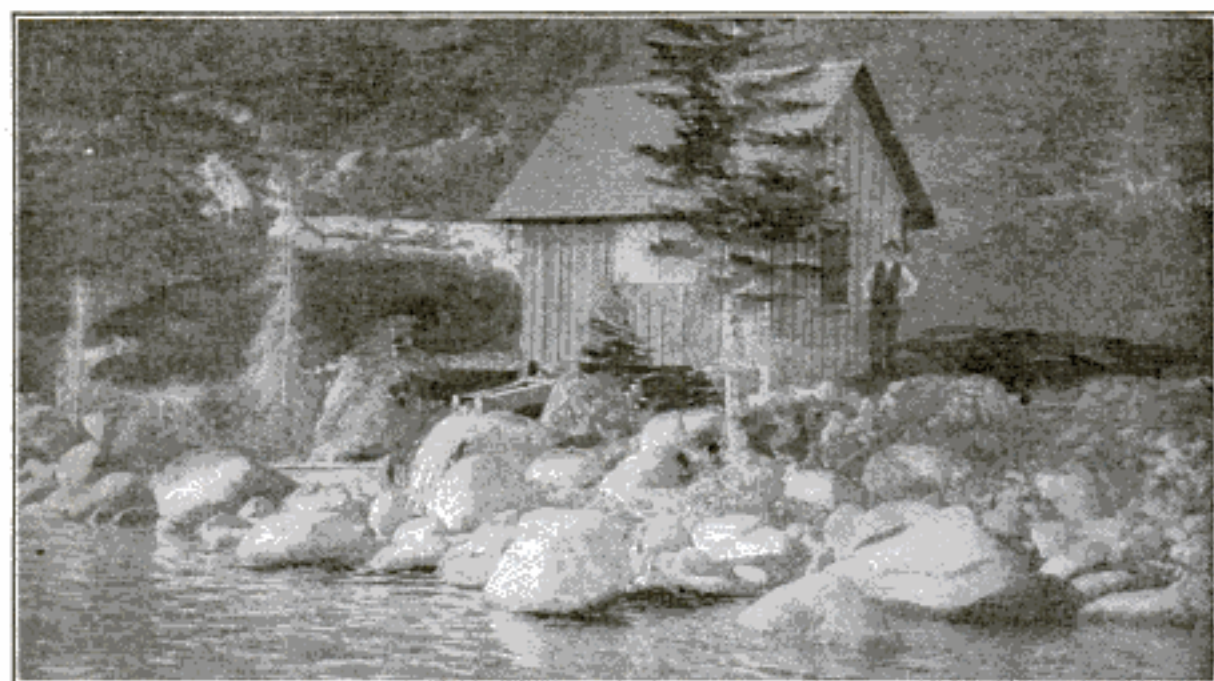
The pipe line which brings the water down the mountain consists of 723 ft. of 6-in. and 722 ft. of 5-in. pipe. Great care was taken in laying the pipe and in making the joints, and when completed not a leak was discovered. In addition to conveying water to the power house, it is also served to the dwelling and to hydrants for fire protection.

By a system of levers and a wire cable terminating on a winding drum

the system can perform, it possesses many advantages over gasoline engines.

MAPLE SYRUP AS ENGINE OIL

When David Bogart, at Gouverneur, N. Y., operator of a wood-sawing outfit driven by a gasoline engine, bought a gallon of cylinder oil, his purchase was placed in a maple syrup can. About the same time his assistant carried a can of maple syrup to the plant, and a day or so later when the engine suddenly stopped Bogart discovered that



Courtesy Journal of Electricity

Domestic Hydro-Electric Plant Installed Near Tallac, Cal.

the water-wheel may be started or stopped from the dwelling, which is located 200 ft. away from the power plant. A needle nozzle, which may be attached to the motor, carries the night load. As the load gradually drops, a solenoid device, cutting in and out a resistance, maintains a constant load on the wheel, thus insuring uniform speed. The generator is controlled by a standard panel on which is mounted a voltmeter, an ammeter, a main switch, field rheostat, and pilot lamp, as well as distribution switches.

The designer of this unique hydraulic plant declares that because of its simplicity and the many functions which

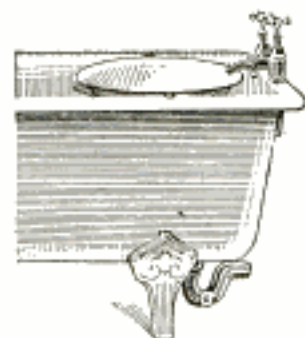
he had been using the syrup for lubrication.

The cans bore the same label, and the maple syrup was of the same color and consistency as the oil, consequently the mistake was easy to make. Examination of the engine showed that the cylinders were filled with a substance analyzed as burned sugar.

President Ballard, of the Ohio society of mechanical and steam engineers, says that the steam consumption of steam pumps is often five times that required for driving generators supplying energy to motors for doing the same work.

ENGLISH NOVELTIES IN BATH-TUBS

Every true Englishman insists on having his "tub" every morning, the

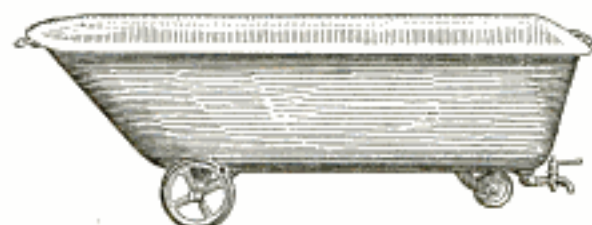


desire to bathe being one of his characteristics. It is natural, therefore, that British manufacturing concerns should keep well to the front in the introduction of new forms of

baths and bath accessories.

One recently brought out is a bath mounted on wheels for use in hospitals when the patient is unable to walk to a bathroom and therefore the bathroom must come to his bedside.

Another innovation is a wash basin



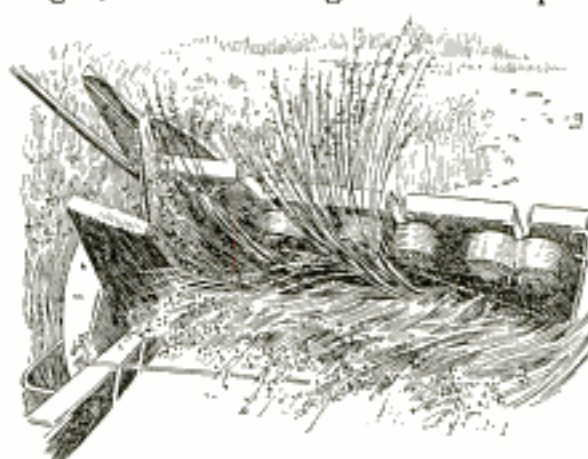
Bath Mounted on Wheels

which sets on the edges of the tub, under the faucet. Anyone who has tried to wash his face or hands at a bathtub will realize its usefulness.

FLAX-PULLING ATTACHMENT FOR BINDERS

A long-felt need of the farmers who raise flax for the fiber as well as the seed has at last been provided by a Canadian minister, who has devised a flax-pulling attachment for standard binders. The device consists of a transversely disposed series of abutting belts inclined at an angle and supported in such a manner that when the machine is advanced against the plant the flax will be gripped between the two belts and uprooted by their movement. Under each pair of belts are placed mud shakers to dislodge any dirt that clings to the roots.

The quantity of flax for fiber purposes is determined largely by its length, while the weight of the crop is



Rear View of Flax Puller

also materially increased when the flax is pulled, which preserves its entire length. Flax harvested by an ordinary binder yields from one to two tons per acre, while flax pulled by hand or by the new binder attachment yields from two to three tons per acre. Hand-pulling, however, is such a laborious and costly process that the majority of flax-growers have preferred to use the ordinary binder, the lower cost of harvesting in this manner offsetting the loss caused by cutting the flax. The new attachment is said to harvest a crop as quickly as a cutting binder.

INGENIOUS HEAD-REST FOR BEDS

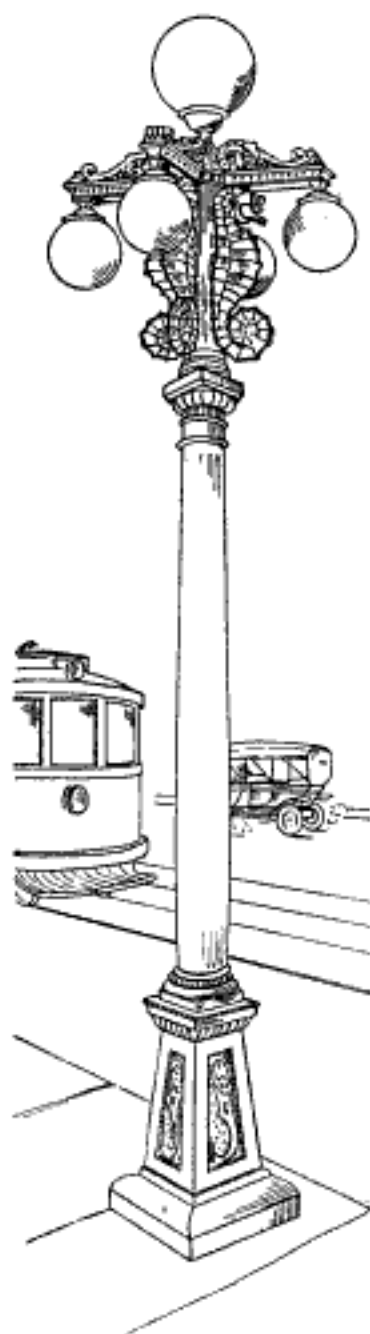
The head and shoulder rest shown in this illustration is being used in several English hospitals. Instead of the head of the bed-frame being a solid piece, the central portion is made to swing on the upper cross-piece, and this, being telescopic, can be set at any required angle.



Inventions patented in England must be manufactured there and kept before the public or the patent soon becomes void.

SPOKANE'S NEW STREET-LAMP STANDARDS

The electric lamp standard shown in this illustration is the result of the



desire expressed by the Chamber of Commerce of Spokane, Wash., for the design that would be most appropriate for that city, as well as most efficient, at a cost that would compare favorably with the cost of similar work in other cities.

The brackets supporting the cross-arms, which in turn support four of the five globes, are conventional reproductions of the sea horse. Unusual attention was given in designing the standard as a whole to avoid unnecessary

lodging places for dust and snow, and to produce a simple but artistic result with as few parts as possible.

The name "Indefatigable" is so well liked by the English people that the old cruiser bearing it has been given another name, and a new and more powerful battleship now bears it.

A SCIENTIFIC RAT-TRAP

Rats, especially old ones, are very suspicious of unfamiliar objects, and it is this phase of rat nature which makes successful trapping of the rodents so difficult. An examination of the rats caught by ordinary traps usually reveals the fact that they are young rats and that the old ones have given the unfamiliar object a wide berth.

Consequently, the first requirement of scientific rat-catching is to familiarize the rodents with the trap that is later to capture them so that they will cease to fear it, and the second requirement is a trap of such nature that the uncaught rats will not be frightened away by the captured ones.

Such a trap has been devised and patented by the truant officer of Lorain, Ohio, and the way it works is of interest. It is made of wood and shaped like a bird house, having a cupola in which the bait is placed. At first the cupola is so arranged that the rats can get the bait without being trapped. This assures them that all is well, but later the sides of the cupola are closed, and to get the bait they must enter the main section of the trap through doors at either end. These doors are the result of a study of rat nature, which divulged the fact that rats are fearful of entering a trap with one exit, and that the sight of two exits reassures them wonderfully.

For a couple of nights they are allowed to enter the trap itself and carry away the bait, then the trap is prepared for business and the rat that enters it is never seen again. This total disappearance of the rodent is the real scientific feature. When the rat enters, his weight on the bait shelf closes and locks the door at both ends, but at the same time it opens a third exit. This is a pipe-like passage which ends in another room. The rat rushes through this exit, and, on reaching its end, is dropped through a false bottom into a barrel of water. The movement of the false bottom automatically opens the doors of the trap for the entrance of the next rat.

The point is that the other rats in the vicinity of the trap see or hear nothing that alarms them. The only rats who learn that the box is dangerous are those who have passed through it, and they have no opportunity to tell the tale.

ANIMALS AID IN PROSPECTING

The borings of animals, such as woodchucks, prairie dogs and gophers, are, according to an article in the Min-

often veritable natural history museums, containing many specimens of botany, zoölogy, and geology.

THE PLANS OF A BATTLESHIP

The preparation of the plans and specifications for a first-class battleship often costs as high as \$80,000, and the number of plans required may reach 1,300 or more. It takes about 500 distinct and separate plans for the steel



All These Creatures Aid Geologists

ing World, often a help in prospecting for coal, iron and other minerals, sometimes even in the search for precious stones.

Coal seams have been traced for a mile or more on the prairie turf by pieces of coal thrown out of the holes of prairie dogs, although there were no other visible signs of coal in the vicinity. Ants frequently bring minute fragments of iron or coal to the surface, thus giving geologists an insight into what lies beneath the soil. In the northern border of Arizona and Utah, tiny garnets, rubies, and other precious stones have been found in ant hills.

Light may also be thrown on geological conditions by the examination of a mountain rat's nest. Such nests are

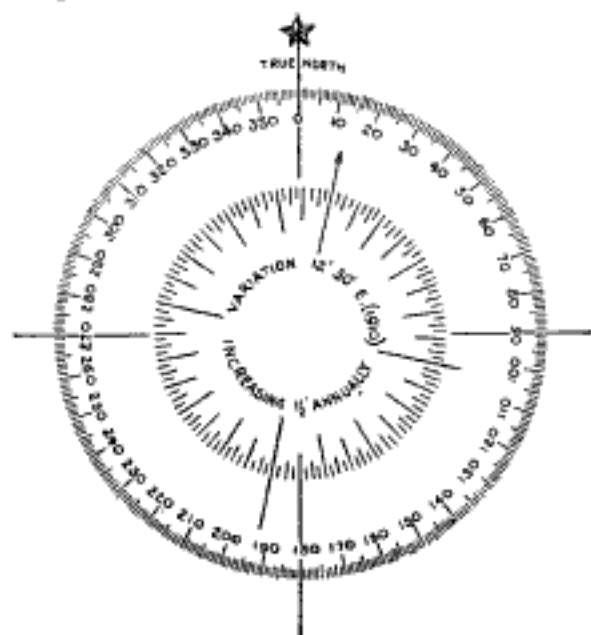
plates of the hull alone, while 800 or 900 are necessary for the construction of the hull.

The size of the plans may vary all the way from a sheet 12 in. square to one 11 ft. long by 2 ft. wide. Then at least a dozen blueprints must be made of each plan, and before the task is accomplished some 18,000 sq. ft. of paper is covered with drawings, to say nothing of an additional 10,000 sq. ft. of paper for the schedules from which the necessary materials and supplies are ordered.

Finally, after the battleship has been built, the government files a duplicate of every plan, not of the originals, but of a new set, containing all the changes developed in the course of construction.

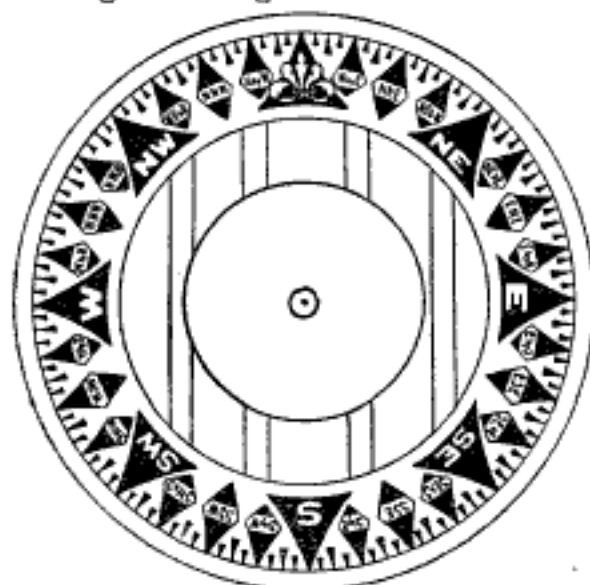
UNITED STATES NAVY ADOPTS NEW COMPASS

For the purpose of securing clearness, simplicity, and precision in the application of compass errors, the hydrographic office of the United States



New Style Navy Compass

Navy has adopted a new form of compass on which there is no north, south, east nor west, but which consists of a circle divided into 360 degrees, beginning with 0 at the true north point and reading to the right.



Old Style Navy Compass

For the present the old style of markings is retained in order that no confusion may result during the period of

transition from the old to the new system of marking.

To head northeast, for example, by this new marking, the order would be to make the course 45 degrees; for a course southeast by south, the order would be 146 $\frac{1}{4}$ degrees.

Naturally the new compass is meeting with opposition, especially from navigators who have, all their lives, been getting their course by the familiar old compass. They say it would be just as reasonable for the almanac makers to wipe out the months and count the days from 1 to 365 as it is to abolish the compass of the ancient mariners.

Then, too, it will annihilate much that is picturesque in ocean navigation.

In the old days the skipper would come out of his cabin, and yell gruffly to the man at the wheel, "How's she headin'?"

"West, nor' west by west, sir," would be the answer.

That has the true ring of the sea.

How different it will sound when the seaman replies, "She's headin' 306 degrees, sir."

OLD RESUSCITATION METHODS FOUND IN VERSE

"There is nothing new under the sun" was a fine sounding old saying, but only those who place great faith in the past, utter it nowadays. There are many processes, however, which we are wont to look upon as the creations of advanced knowledge that were known generations ago. Modern methods of resuscitation of persons who have, to all outward appearances, been drowned, is generally looked upon as one of the fruits of modern science.

Yet more than a hundred years ago the British Royal Humane Society issued directions for the recovery of persons who had apparently died from drowning. A lover of old books was recently wandering through the pages of a musty old volume of anonymous poems, published in 1809, and came

across these directions versified. The directions given therein urge that effort be kept up for four hours to bring back the spark of life.

The application of heat in bottles or bladders filled with hot water, the inflation of the lungs with a bellows, friction by rubbing, the exposure of the body to the sun, and the application of electricity, are some of the means advised.

Some of the quaint verse follows:

*It is a child, yet weak in strength and age,
Then let thy thoughts the gentlest means engage,
In some warm bed between two persons laid,
Infant or child may claim no further aid.*

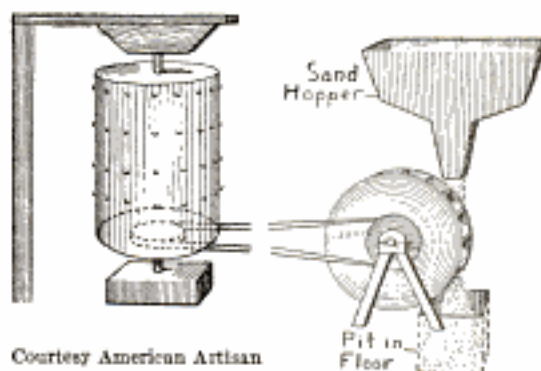
*Let one the mouth and either nostril close,
While through the other, bellows gentle blows.
Thus the pure air with steady force convey,
To put the flaccid lungs again in play.
Should bellows not be found or found too late
Let some kind soul with willing mouth inflate,
Then downward, tho' but gently press the chest,
And let the inflated air be upward pressed.*

*But ah, a fatal error oft has been,
When life though latent, was not quickly seen,
Then thinking that the conflict all was o'er,
That life had fled and could return no more.
Four hours at least, the generous heart will fear
To quit the charge too soon in dark despair.*

Dr. Wiley, government pure food expert, says cracked or nicked plates and cups are menaces to human life because of the germs that find a lodging place therein.

SAND-POWER RUNS WINDOW DISPLAY

A moving window display always attracts attention, regardless of the



Courtesy American Artisan

Freak Window Display

means by which the movement is obtained, but if the power used is unique, the advertising value of the window is usually doubled. A scheme for such a display is here illustrated. The drum, made of light wood, and covered with some such material as denim, is provided with rows of hooks on which to show the goods to be displayed. This is connected by light belting to a small wheel, similar to the waterwheel of a mill, and above it is a hopper filled with sand. The sand, striking the buckets of the wheel, revolve it, and this turns the display drum. The supply of sand in the hopper has to be renewed twice a day.

FIFTY-ONE LETTERS ON PIN HEAD

An ordinary pin was sent to this magazine recently by Paul Wentz, of Sharon, Pa. An examination of the head of the pin under a powerful magnifying glass divulged the fact that upon its surface 51 letters and numerals had been engraved. These



Pinhead Magnified

included the alphabet, "Popular Mechanics," the name of the engraver, and the year, arranged as shown in the accompanying illustration.



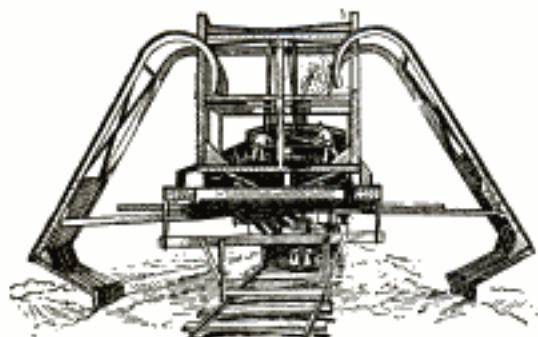
Courtesy Motorcycle, London

A FANCIFUL MOTORCYCLE PLOW.—The conception of an English artist who sees in it a solution of the suburbanites' snow-shoveling troubles.

A MECHANICAL TRACK GRADER

While machines have been steadily taking the place of ordinary laborers in most branches of work, the man with the shovel has held his position unchallenged in the work of grading and ballasting railroad track. Now, however, a railroad builder of Duluth, Minn., has devised a machine that he believes is destined to do the work of lifting jacks and the gangs of shovelers and tampers.

It consists of a self-propelled car, from one end of which extends a 34-ft. trussed boom carrying the track-lifting device and a carriage on which are the shovel arms. The track-lifting device consists of two traveling grappling



The New Rival of the Track Gang

arms which engage the rails at the joints and midpoints, and lift them until there is sufficient clear space beneath the ties for the shovels to oper-

ate. A battery of shovel arms is provided on each side. The battery on one side, or even the individual shovels in each battery, may be operated independently. The shovel arms have both a lateral and vertical motion, and a joint at the point where the shovels are connected with the arms makes it possible to move them at any desired angle with the arms. This is to provide a horizontal instead of radial motion of the shovels while under the ties.

In operation the car is run out to a point where the boom overhangs a depressed portion of the track. The gripping devices are then attached to the track and raise a section of it. The shovels are pushed out, the sashes lowered until the shovels engage with the earth, and then are raised again, the shovels pushing the earth beneath the ties, thus completing the first stages of the operation. The empty shovels may then be operated back and forth to tamp the earth. This operation is repeated continually, the grader moving forward on the battery-length of track it has just finished.

The machine builds embankments without the use of trestles, and, with but five men composing its crew, is said to be capable of doing the work of a hundred men with shovels.

SPRING WHEELS FOR STREET CARS

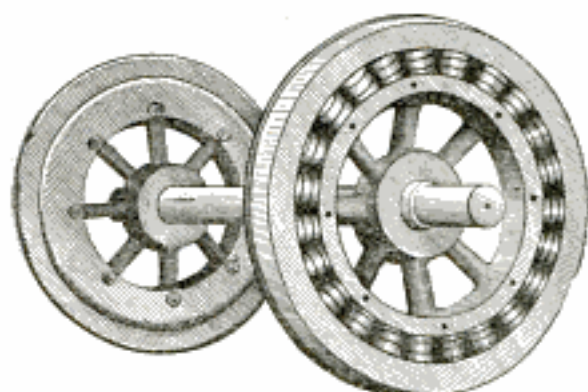
While hundreds of inventors have been attempting to design spring automobile wheels that would meet all the requirements now filled by the pneumatic tire, and at a reduced cost, a street car of the Glasgow, Scotland, traction lines has been running over its tracks on such wheels with a high degree of success.

One of the greatest difficulties so far met with in the attempt to successfully build a spring wheel has been in getting the springs to stand up under the load. Springs, as a rule, last well when they are so disposed as to carry a load vertically, but in a wheel the springs are called into play when in a horizontal as well as a vertical position. They

have, in fact, to stand lateral stress, and this eventually ends in their destruction.

In the wheel now in use in Glasgow this drawback is claimed to be effectively overcome by the simple device of putting the springs in so closely that they touch each other, and without any fastening other than that due to the compression and that provided by a keeper ring, which, bolted to the rim, keeps them from falling out.

The same wheel, provided with a hard rubber tire instead of a flange, is



Scotch Spring Wheel

being tested for automobile uses, and still others are being provided with wooden rims for use on ordinary traffic vehicles.

FLOWER MAGIC

Every magician in the world has probably drawn garlands of flowers from a paper cone, but the public has tired of the cone because it has considerable depth, even though appearing empty. This tray, however, is as lacking in depth as the ordinary serving tray, and both sides of it are shown to the audience, yet from it the magician causes to spring a great cluster of red flowers, which a moment later, without any covering to hide the trick, is replaced by a cluster of white flowers. Then the cluster vanishes completely.

A hog that weighed 1,000 lb. was recently slaughtered in St. Louis.

VIOLIN SHOULDER-REST



the violin without the aid of the hand.

The attachment shown on this violin is a shoulder cushion that can be adjusted to any position, consequently will fit any shoulder. It supports and tilts

GERMAN EXPERIMENTAL RAILWAY

An oval-shaped railway, a little more than a mile in diameter, is being operated in a forest about 20 miles from Berlin, for experimental purposes. The trains that run over it are electrically operated, and its principal purpose is to serve as a proving ground for different types of roadbeds.

The roadbed at present consists partly of wooden ties and partly of steel ties, both laid with varying spacings and in different kinds of rock ballast. Concrete ties are also to be tested. The whole stretch of road is practically level, and the direction of running is reversed from time to time to prevent uneven wear.

The experimental road is also of great value in testing out the power consumption. The method of running the trains is novel and interesting, as they are not provided with operators. As



A Magic Tray Trick

soon as the motors are accelerated, the motorman jumps off, and the train is stopped by simply cutting off the current supply at the control station. The train is run about 600 miles a day, and averages more than 13,000 miles a month.

AN ANCIENT WEIGHBRIDGE

Before the advent of the platform scale the contents of market wagons and carts were weighed by a weigh-



Ancient English Weighing Mechanism

bridge of the type shown in this illustration, which is still in existence at King's Lynn, Norfolk, England. The wagon to be weighed was driven under the arm, and chains or ropes were made fast. It was then drawn a few inches off the ground and the weight recorded by the mechanism within the house. After the load was delivered the wagon had to pay a second visit to the weighbridge so that its weight empty could be deducted from its weight when loaded.

HOW TO TEST MOTOR GOGGLES

The price of motor goggles has often but little to do with their quality, and sometimes the most expensive are fitted with inferior glasses. Consequently, the purchaser should test them thoroughly before buying, especially as such testing is a simple matter. The easiest method is to hold the glass two or three inches from the eye, and look at some distant object through it, moving the glass up and down, from side to side, and partially rotating it, all on

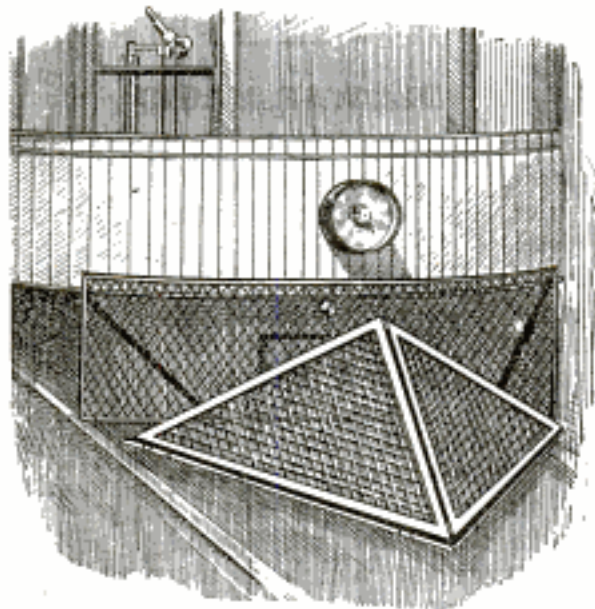
the same plane. If the object on which the gaze is fixed appears to move in the slightest degree while these movements are being made, the glass is faulty.

A second method is to remove the glasses from the goggles, polish them carefully with a clean handkerchief, and then slide one over the other, using a fair amount of pressure. Should colored rings appear, it is certain that the surfaces have been very thoroughly ground and polished.

NOVEL FENDER OF MINNEAPOLIS LINES

The ingenious fender shown in this illustration was recently tested out by the traction lines of Minneapolis. Its most important feature lies in the fact that it is used in two ways, one of which is to throw the person in danger to the side of the track, and the other to pick him up and deposit him in the center of the wicker shovel it can be made to form.

Under ordinary running conditions the fender is in the position shown in the illustration, but if the motorman sees the person in danger in time, he



A Fender That Works in Two Ways

works a lever which releases the outwardly slanting wings of the fender and drops them in such a position that they scoop him up and deposit him in

the center. If the motorman does not see the pedestrian in time the fender remains in the position shown, and he is thrown off to one side of the track.

The two wings of the fender have hinge attachments, the pivot being located on a level with the track. The wicker netting at the back forms a yielding surface to strike against.

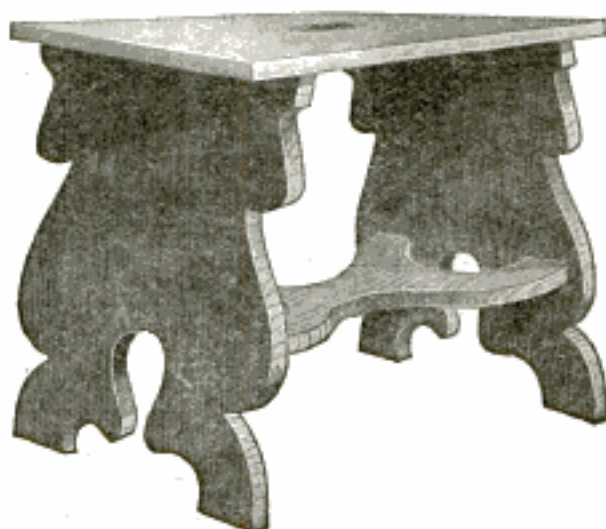
HOW TO MAKE A FOOTSTOOL

The footstool shown in the illustration can be made from any kind of wood, but when it is intended to be finished in mission style, quarter-sawed oak will produce the best effect. The material needed will be as follows:

- 1 top, 1 by 9½ by 12 in., S-1-S.
- 2 legs, ¾ by 8 by 12 in., S-2-S.
- 1 brace, ¾ by 7 by 9 in., S-1-S.

Order these pieces cut to length, squared and sanded. A full-sized layout of the front view should be made to get the correct bevels for the legs and brace. The design of the legs can be varied to suit the fancy of the

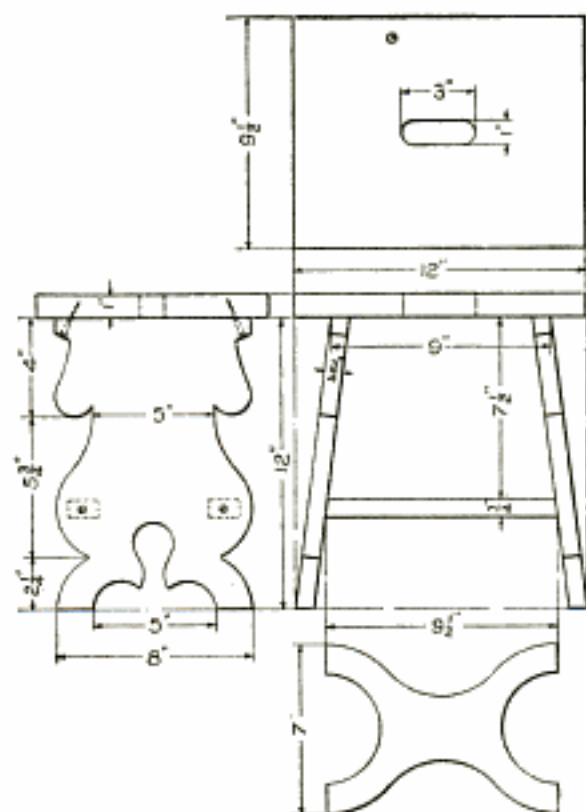
both sides of the outline by following the lines drawn. Trace around this pattern on the wood, and saw out with a compass or keyhole saw. The sawed



edges should be smoothed and sandpapered.

The perforation in the top board is made by first boring holes, then trimming out the edges with a sharp chisel. Be sure to get the best side of the board up.

The legs are fastened to the top and to the braces with 1¾-in. wood screws as shown in the detail drawing. After the stool is assembled, go over it carefully with fine sandpaper and remove all rough spots before applying the finish. This finish can be any one of the many different kinds supplied by the trade for this purpose. If this stool is well made and finished, it will be a useful and attractive article.



Details of Construction

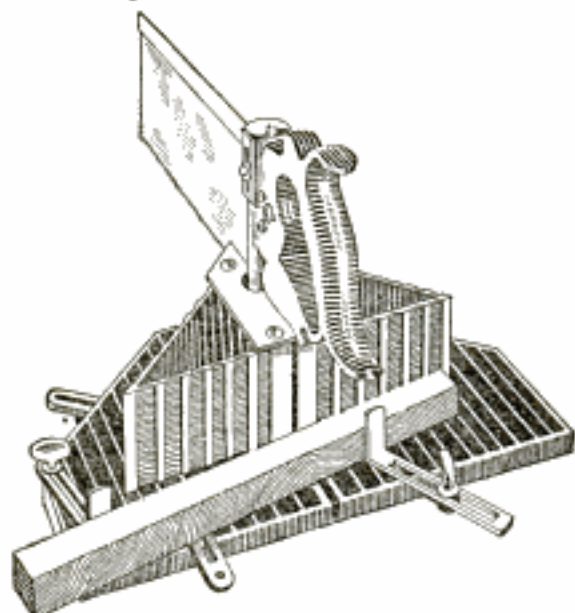
maker. For such a design as shown draw one-half of it on paper; fold on the center line and with scissors cut

LIBRARY PARTIALLY HEATED BY EXHAUST HEAT

The public library in New Haven, Conn., utilizes exhaust heat from its producer gas plant to supplement the heat from the regular fuel. The gas producers operate gas-engine-driven generators, which drive air washers and fans. A pressure chamber system of air distribution is employed, and the exhaust heat from the producers is directed into the air-tube heaters.

A NEW MITER BOX

No miter box having a swinging motion can work as true as one that is stationary. The miter box shown in



Adapted for Electricians' Use

the illustration is set at 45 deg. and square, in which positions 90 per cent of all mitering work is done. The illustration shows how any miter or fraction can be cut by clamping the piece in the desired position. A miter can be sawed on a piece less than $\frac{1}{2}$ in. long. The tool is especially adapted for electricians in cutting electric wire mouldings.

A PREVENTION FOR "JOY-RIDING"

A New York company which operates electric alarm systems for the protection of bank vaults, stores, and offices, has devised and is putting into



Making the Contact

effect an ingenious system by which "joy-riding" may be stopped. Joy-rid-

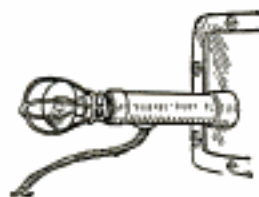
ing is now the universal term used to signify the using without permission of an automobile by the chauffeur and his friends.

The system gives a definite and exact report of the presence of the automobile in its garage, or its absence therefrom through the 24 hours of each day, and its coming or going is electrically signalled to the office of the alarm company without the possibility of collusion between the chauffeur and the garage attendants. When the chauffeur brings the car into the garage he is required to insert a brass plug attached to a flexible cable into a socket on the side of the car. The plug will only fit the lock of this one individual socket, consequently the car must be in the garage to make the connection. When the connection is made a signal is received at the central office, and the removal of the plug to take the car out also records a signal.

A report sent once a week to the owner of the automobile shows just how many times the car left or entered the garage, and at what hours.

MAGNETIZED ELECTRIC LAMP

An electro-magnet electric lamp for use in inspecting the dark recesses of automobiles has been placed on the market by an English firm. Its most important feature is its ability to adhere to any piece of iron or steel it is placed against, but it is likewise of great service as a magnet to lift small tools, nuts, etc., from inaccessible places where they have fallen.



The magnetic portion of the lamp is its metal case, which becomes strongly magnetized the moment it is connected up with the electric supply. The fact that it can be stuck against a surface of steel or iron reminds one of the trick of the magician who makes a hat hang to an imaginary nail on a wall. Such a lamp leaves the hands free to make the required repairs.

FRENCH TOP-AND-BALL GAME

A top-spinning game, in which the achievement of getting one of the hanging balls into the top constitutes the main feature, is shown in this illustration. It is a French invention and consists of a tray-like spinning board, a hollowed-out top, and three balls hung in the manner universally affected by pawn brokers.

The spinning board rests upon a central base, so arranged that the board can be made to swing in any direction or be inclined to any desired degree. The balls hang at a measured height above the board. After the top is set spinning, the player proceeds to get it directly beneath any one of the balls,



A Curious Top Game

accomplishing this by swinging and inclining the board on its base. When he thinks the top is in the right position, he presses a lever attached to the standard. This raises the board to a height that, if the top is in the right position, allows it to receive the ball and lift it from its hook, after which it continues spinning.

CHICKEN RUN UNDER GRAIN SHED

An ingenious Los Angeles dealer in hay, feed, and grain, is utilizing the waste from his storage shed in the unusual manner shown by the illustration. The space under the floor has been converted into a chicken run, and the loose grain, feed and chaff falls or is swept through the cracks. This waste, all of which would otherwise be of no

use, is sufficient to feed a large number of chickens. A small inclosure is also



A Curious Chicken Run

provided outside of the sheds so that the chickens can range in the open.

The dealer derives an income of \$10 a month from the sale of eggs.

NEW TYPE OF HYDROPLANE

The ordinary single-step type of hydroplane motorboat cannot be beaten in moderate sizes on perfectly smooth water, but for larger boats and rough water such a craft has its limitations. To design a hydroplane that will embody the seaworthiness of an ordinary boat with the speed possibilities of the single-step, flat-bottomed hydroplane, is the aim of many boat experts, and one of the latest productions is the hydroplane shown in the illustration.

In reality, the 15 planes that compose its body surface must be considered as a sheathing wrapped around an ordinary hull. The effect, however, is much the same as the conventional type of hydroplane, for, as the speed increases, the little craft lifts forward in



Sheath Type of Hydroplane

the same manner, and runs on the after part of planes, thus greatly reducing the contact surface. The sheathing does not impair the seaworthiness of the boat.

AUTO TRUCK CARRIES SEVEN TONS OF LUMBER

When an auto truck carries 7,000 feet of lumber it is getting along under quite a load. A lumber concern in



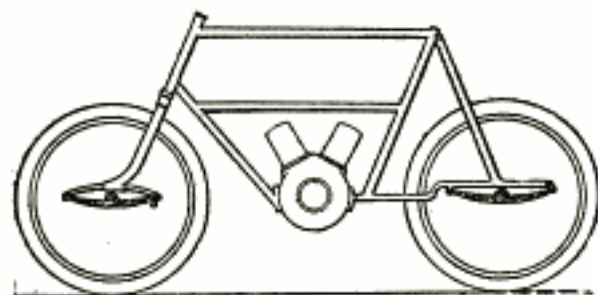
Lumber-Carrying Auto Truck

Buffalo uses a number of auto trucks for the transportation of lumber, and the one shown in the illustration is cheerfully carrying off 7,000 feet, which makes an imposing load. The truck is rated at but 5 tons capacity, although the lumber weighs over 7 tons.

TO ELIMINATE MOTORCYCLE VIBRATION

A writer in an English motoring magazine has suggested the springs shown in this illustration as a means to eliminate the vibration that is such a drawback to motorcycles. The fitting of front forks with spiral springs and other such devices, although better than nothing, is said to be scarcely sufficient for the requirements. Hence this idea of suspending the whole of the weight on semi-elliptical springs.

The motorcycle being a much lighter vehicle than an automobile, the trans-



Semi-Elliptical Springs for Motorcycles

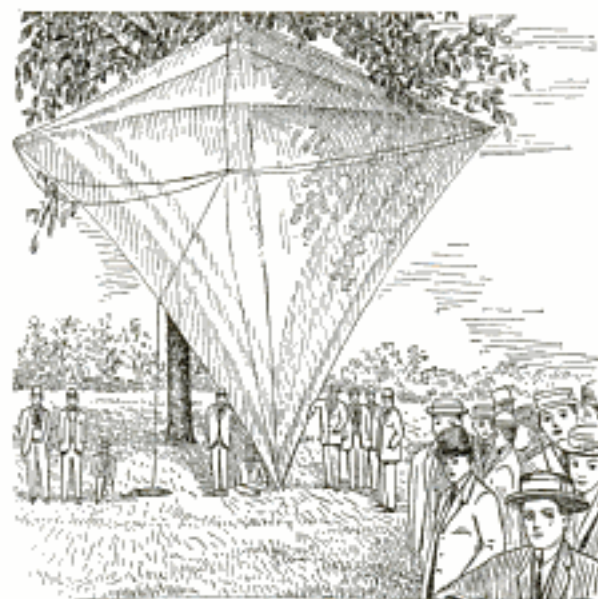
verse of the springs can be much shorter. The oscillations are far more

rapid on a motorcycle, and springs of relatively short span might be advantageously employed.

MAMMOTH AMERICAN KITE

When kite-flying became sufficiently popular in this country to engage the enthusiasm of men as well as the younger generation, the box kite was adopted as most scientific, and the one-surface kite with its two cross-sticks, so dear to the American boy, was almost forgotten.

This kite, made in the old way, has the distinction of being one of the largest kites in the world. Its height is 30 ft., and it weighs 65 lb. As one of the prize kites of a kite-flying asso-



Largest of One-Surface Kites

ciation in Philadelphia, it has lifted itself in the air many times, presenting a fine appearance, especially at night, when lanterns are hung from it. It is collapsible.

DOUBT CONCERNING BASKET MASTS

When the U. S. Navy left all precedent behind and created a stir in the naval circles of the world by placing basket masts on all its big fighting

ships, the idea was heralded as one that would greatly add to their power.

This belief is still held in the main, but a crop of critics has sprung up in opposition, and the claims of partial failure put forward by them have had sufficient ground to cause the Navy department to suspend future construction until further tests are made. The point at issue, however, does not deal with the advisability of doing away altogether with basket masts on future ships, but whether they should be fitted with only one or with two. The criticism of the basket mast lies in its alleged inability to withstand the gunfire of the ship without vibration.

FUEL-SAVING ARRANGEMENT FOR LOCOMOTIVES

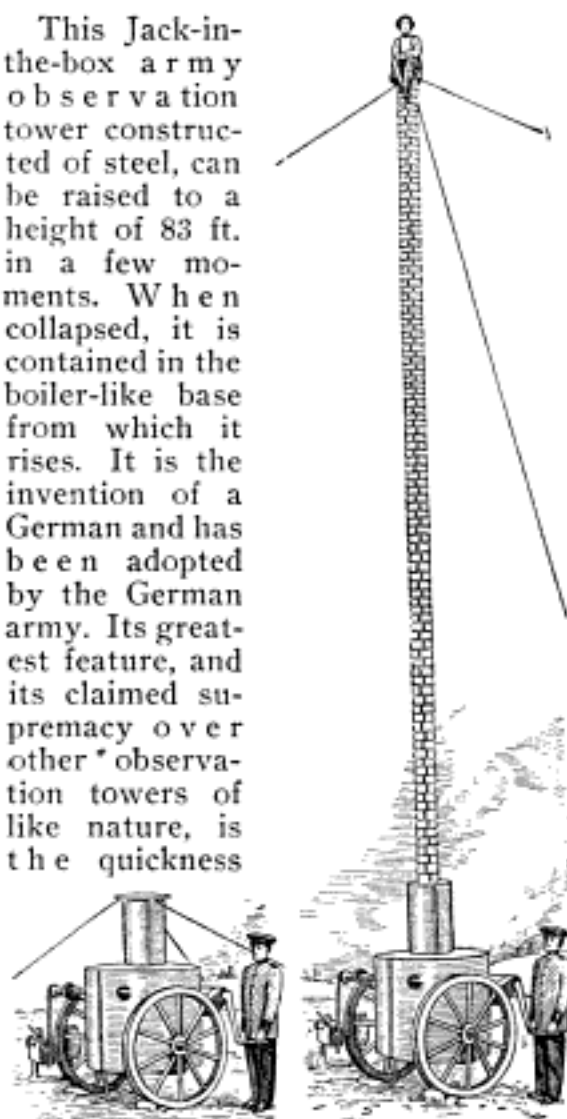
On locomotives the air-brake pumps are operated by steam, and it is the practice to conduct the exhaust steam from the pumps to the smoke-box, the releasing of it through the stack causing a draught. Considerable work, however, is done by the brake pumps when a locomotive is standing still, and the steam, passing out of the stack, causes a draught that burns up a needless amount of fuel. To remedy this, the Lehigh Valley railroad is now running the steam exhaust outside instead of inside the stack, and the result is a saving of about 1,000 lb. of coal per locomotive on the descent of the 26-mile grade between Glen Summit and Penn Haven Junction, Pa.

UNPREMEDITATED TEST OF TUNGSTEN LAMPS

The strength and durability of the tungsten filament lamp when specially adapted for train service was given an excellent, but, needless to say, totally unpremeditated demonstration in the recent wreck of a Pennsylvania passenger train. A steel coach in which there were nine tungsten lamps jumped the track and turned over on its side, badly denting the plating, yet the lamps were found to be in perfect condition when tested out.

COLLAPSIBLE OBSERVATION TOWER RISES 83 FT.

This Jack-in-the-box army observation tower constructed of steel, can be raised to a height of 83 ft. in a few moments. When collapsed, it is contained in the boiler-like base from which it rises. It is the invention of a German and has been adopted by the German army. Its greatest feature, and its claimed supremacy over other observation towers of like nature, is the quickness



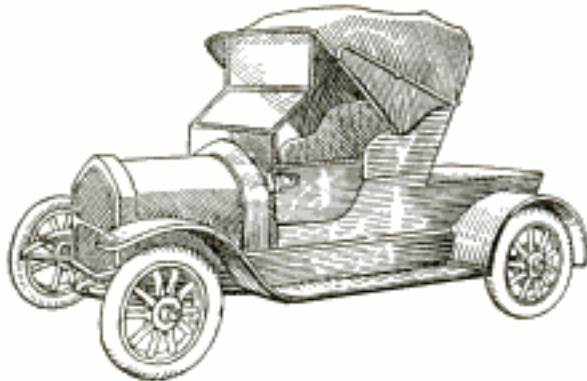
German Army Observation Tower

with which it can be extended. Four guy wires in the hands of soldiers keep it steady while it is being extended and when it has reached its height. The crank by which it is extended is seen in the illustration.

COMMERCIAL TRAVELERS' AUTOMOBILE

The automobile as a means of getting to places is now used by many traveling salesmen whose districts take in many small towns. A few hours, and sometimes only an hour, is required by a salesman to close up his business in a small community, after

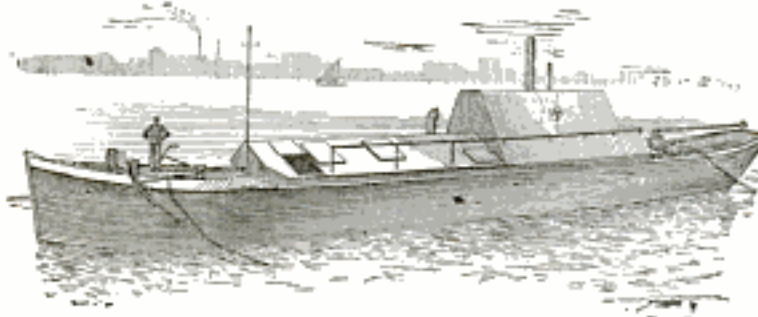
which he kicks his heels against the baseboard of the local hotel while impatiently waiting many hours for the



Special Auto for Commercial Travelers

one train a day running in the direction he wishes to take.

The elimination of such lost time is, of course, the most important service an automobile can perform for the salesman, but there are other excellent features. The automobile will take him to small towns not favored with a railroad. The trouble attending the transportation of his samples from a railroad station to the sample room of a hotel or to the stores themselves is also a thing of the past if he travels by automobile instead of by train, to say nothing of the impression an automobile makes on the storekeeper.



Plant for Disinfecting Ships

A fine example of a commercial traveler's special automobile is shown in this illustration. The seat is well protected against storms by the hood and wind guard, and the back part of the machine provides ample storage space for samples.

The new pumping engine for Wheeling, W. Va., is said to be the largest city pumping engine in the world.

SHIP'S CARGO MAKES OCEAN OF SUDS

When the French steamer "Admiral Oly" entered San Francisco bay it was discovered that there were several feet of water in the hold. Such a state of affairs is disquieting under any circumstance, but especially so in this instance because the cargo consisted of fine Castile soap.

The pumps were immediately set to work, and then San Francisco's waterfront witnessed a spectacular sight. The soap-laden water poured from the pumps in a steady stream and formed such a lather that the bay was soon converted into a gigantic washtub. A southeaster blew up and within an hour's time the soapy foam was dashing over the docks.

LONDON'S FLOATING DISINFECTING PLANT

Owing to the epidemics of cholera and other contagious diseases that break out in different parts of the world the sanitation authorities of London have fitted the barge "Thames" with a complete disinfecting plant and will use it to fumigate all vessels and cargoes that fall under suspicion of the inspectors.

The plant, the main feature of which is its system of combined suction and delivery, consists of a machine that has a capacity of 60,000 cu. ft. of disinfecting gas per hour, boilers, pumps, and sufficient hose to carry the gas to any part of the largest steamer that discharges at London.

When a ship requires disinfecting, the barge is moored alongside, and two flexible pipes, one suction and the other delivery, are connected from the ship's hold to the machine. The machine withdraws the air from the hold, converts it into a disinfecting gas at a high temperature, cools it, and then forces it back into the hold again. This combined suction and delivery not only

causes the gas to circulate well, and to penetrate through a closely packed cargo, but also effects a large economy in the amount of sulphur used.

The barge is 63 ft. long, and has a beam of 14 ft.

HEAT-OPERATED WINDOW LOCK

A window catch that will allow a window to be opened to any extent, yet will be so acted upon by excessive heat that it will cause the window to close



and become locked, has been placed on the market by an English firm. It consists of an upper and lower lock, connected by a chain

with a fusible link. This link will melt in a current of hot air, and the parting of the chain thus brought about allows the heavy ball lever of the top lock to drop, causing the window to close. The window, falling closed, is automatically locked so that its fire-proof glass keeps the flames from passing through and spreading, whether the fire is outside the building or in.

SHOCK-LOADING WAGON

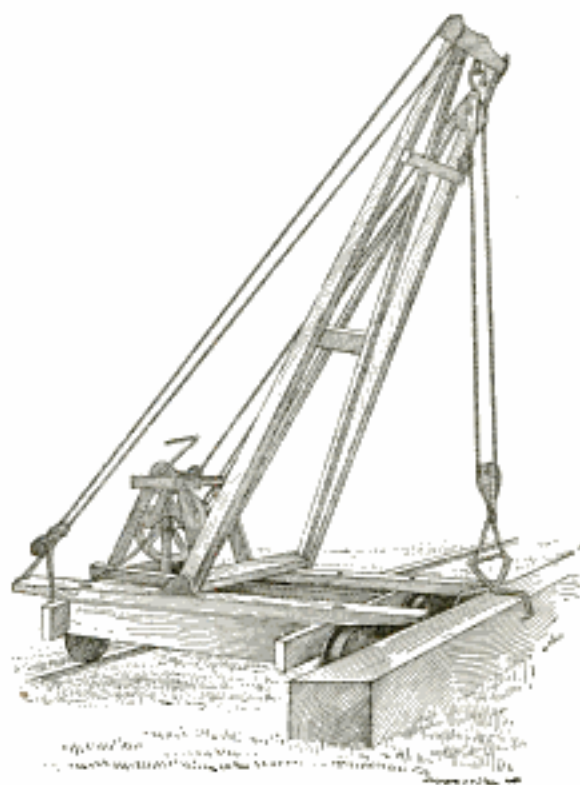
The loading of corn shocks onto a wagon, one of the most back-breaking drudgeries of the farm, is made easy by the new shock-loading wagon shown in this illustration. The wagon itself is provided with an ordinary hay rack, but on the front end of this is a standard, which carries a large pulley. At the back of the rack is a runway. A long rope, running through the pulley, is made fast to the shock, and the third horse, seen just ahead of the team in the illustration, pulls it up the runway onto the wagon.

Only one man is required for the outfit, and it is claimed that a number

of shocks can be handled in three hours that would require 15 hours in the old way. A 16-ft. hayrack will accommodate from 6 to 10 shocks.

PUSH-CAR DERRICK

The bridge gangs of the Chicago & Illinois Eastern railway use a little



Handy Push-Car Derrick

push-car derrick that is a giant in the work it accomplishes. The arm is guyed by ropes in preference to rods, and the hand hoist is anchored down to the rail by means of a chain and hook, the latter tightly gripping the rail flange, so that danger of tipping is



New Way of Loading Shocks

eliminated. It will pick up three 8 by 16-in. stringers 32 ft. long with great ease.

OLDEST VESSEL AFLOAT

What is said to be the oldest vessel afloat is the Danish sloop "Constance," built in Aero in 1723. Just how long



Has Sailed Nearly 200 Years

ago that was may be more clearly impressed upon the mind by the fact that it was some 50 years before the United States of America came into existence. The ancient little vessel is not only afloat, but in service as well.

RAILWAY BUILT IN 1909

The amount of railroad built in the United States during 1909 was 3,784 miles. Of this, Texas claims 666 miles; Nevada, 303 miles; California, 247; and Washington, 162. But 10 of the other states were provided with as much as 100 miles of new road.

Canada built 1,487 miles of railroad, Mexico 281 miles, and Panama 9 miles. The fact that 48 miles of railroad was built in Alaska is notable.

NEW TORPEDO FOLLOWS WARSHIP LIKE A SHARK

If a torpedo which the British Admiralty is now trying out comes up to the claims of the inventor, England's

navy will possess an instrument of destruction from which a hostile vessel has no chance of escape. It is claimed that this torpedo will follow a warship unswervingly. It is fitted out with a delicate instrument called a microphone. When it is aimed at an enemy's warship, the microphone picks up the vibrations of the man-o-war's propellers and deflects the rudders so that the torpedo will take a straight course for the vessel.

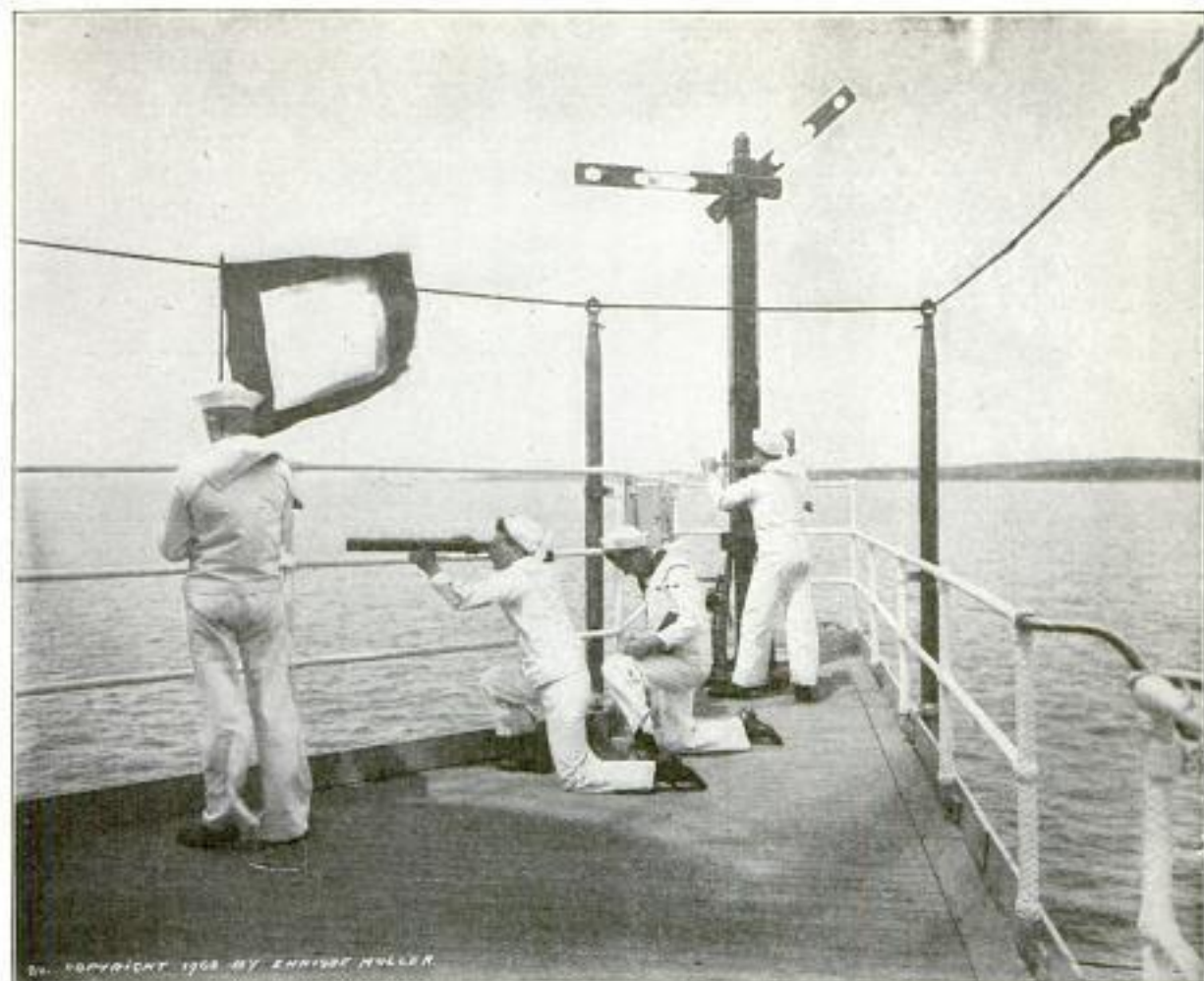
NON-SKIDDING DEVICE FOR RACING AUTOS

The devices that prevent skidding under ordinary running speeds are not sufficient to protect the racing automobile from the danger of disaster when taking curves at a speed of 40 or more miles an hour. Consequently, several of the racing machines recently competing in England have been provided with a rear-wheel attachment that can be engaged with the road to keep the speeding machine from skidding. The illus-



Applying the Non-Skidding Device

tration shows the mechanic of a racing car forcing the non-skidding device into action.



LIFE IN OUR NAVY—No. 9, Signaling on a Flagship

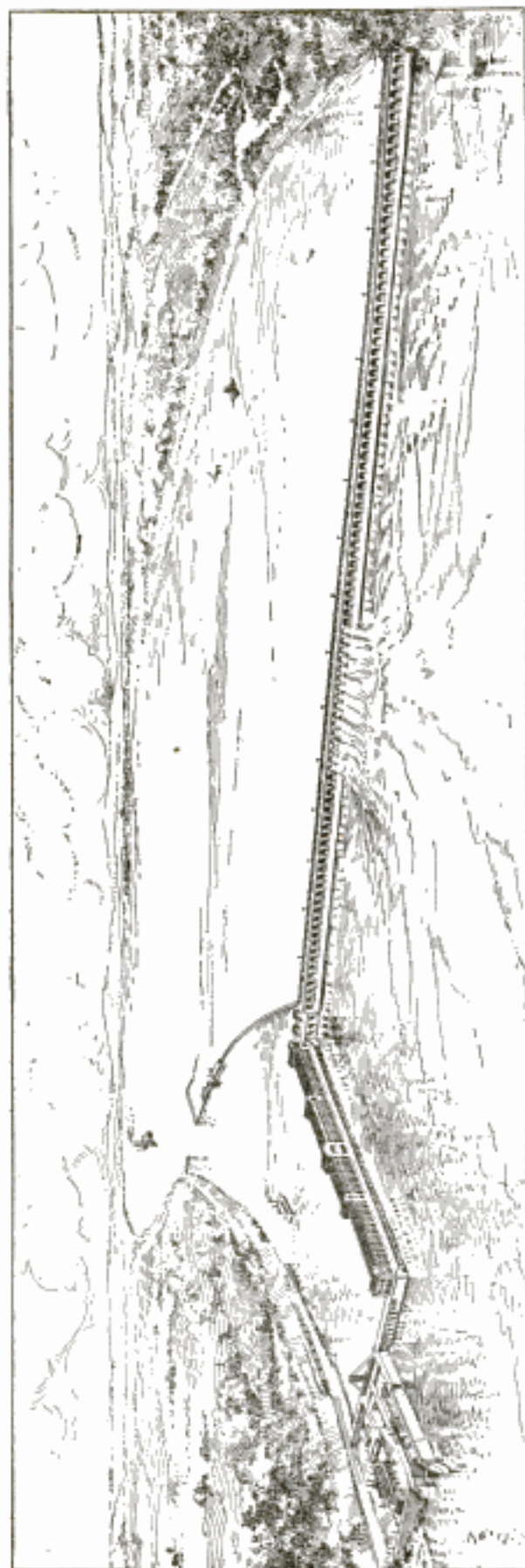
SMOKE RINGS MADE BY OIL-FIELD FURNACES

In a recent issue of this magazine a photograph was reproduced showing a perfect ring rising from the steam exhaust of a factory. One of the most perfect and interesting instances of such ring formations, but of smoke instead of steam, is of common occurrence in the petroleum oil fields, and is caused by the rather crude method of operating the oil-burning furnaces.

The crude oil used for fuel is fed into the furnaces by steam pressure in such a manner as to be self-regulating. When the steam pressure becomes too high this results in an intermittent feed, and between the pulsations of oil supply the charge blown into the furnace is mainly steam. Under this condition, each fresh introduction of oil to the slight flame remaining, explodes

with considerable force. The smoke blows out through the open door of the boiler, which is always left open under these conditions of firing, and produces perfect black rings just about the size and appearance of an ordinary bicycle tire. These rings are as regular as the explosions, and, after being hurled out quite a distance from the furnace, rise and float away one after another for long distances before dissolution. Sometimes a half dozen or more are in sight at the same time. Occasionally, on nearing the point of dissolution, one of them will twist itself into a figure eight or some other curious form.

A French moving-picture production of the opera "Rigoletto" cost \$20,000, the record for that form of entertainment.



\$15,000,000 DAM PROJECTED ON THE MISSISSIPPI

After many years of delay it has been announced that work is to be started on a dam across the Mississippi at Keokuk, Ia., that will be exceeded in size only by the great dam across the Nile.

The estimated cost is \$15,000,000. The dam is to be 5,800 ft., over a mile, in length, and is to be built of reinforced concrete. A power house, 1,400 ft. in length, will be located at one end of the dam. It is planned to install 47 immense generators of 4,500 hp. each, capable of generating 200,000 hp. The generators will be run by turbines.

The plans call for a lock gate for the purpose of permitting boats to pass up and down the river.

CALABASH PIPE GOURD GROWS IN AMERICA

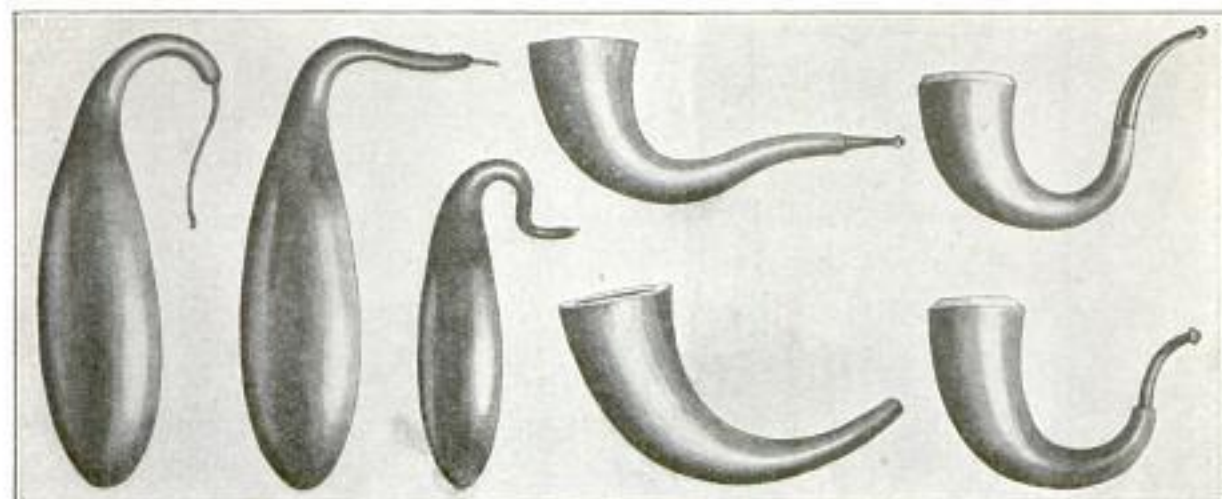
The increasing popularity of the calabash pipe, made from the fruits of a South African calabash, or gourd, has aroused a widespread interest in the growing of the vine, especially now that it has become known that the plant will thrive in all parts of the United States.

The pipes are formed from the crooked necks of the gourd, the natural shape of the gourd becoming the natural shape of the pipe. The pipes are the lightest in the world for their size, are graceful in shape, color like meerschauums, and provide a delightfully cool smoke. But at present they are almost prohibitive because the American dealers, although importing the gourds at prices ranging from 50 cents to \$2 per dozen, sell them in the made-up pipe at prices ranging from \$6 to \$12 each. The price charged is therefore one that depends upon supply and demand, and when an American crop of gourds is raised, the price will probably fall within the reach of everyone. This also means that growing the gourds as a profit-producing business should not be entered into with much hope of gain, but the growing of a few

plants as a means of providing pipes for the grower's private use and for his neighbors will prove interesting.

The department of agriculture is furnishing many seeds, and the demand is rapidly increasing. The vine may be grown almost anywhere, and forms a

cult. If stored in a warm, close room for only a few days, the cuticle will be covered with unsightly spots, which ruin the hard layer underneath by discoloring it. The necks, after being scraped and cleaned, will cure best if hung up in a cool, dry room where



Calabash Gourds and the Pipes They Make

very satisfactory cover for unsightly brush heaps or back fences, although the rather rank odor might prove objectionable if used on an arbor too near a dwelling. To grow the vine for the sake of the gourd is the chief interest, however, and to do this well it should be trained on a trellis, but allowed to trail over the ground. If the fruits are permitted to rest on the ground, they form their crooked necks quite naturally. Standing the gourds up on their big ends when they are half grown is also a good idea, as it produces a more perfect neck for pipes. The plant will thrive in any rich garden soil, and beds of well-rotted manure or mellow loam should be made. The seeds are planted at the same time of season as cucumbers or melons, and in the same way.

To make a pipe the neck end of the gourd should be cut off and all pith carefully removed from the inside. The thin outside cuticle should be scraped off with a sharp knife before it dries, because at that time it comes off easier and if left on will form food for molds. Then the gourd should be dried, a task which seems simple, but is really diffi-

plenty of air is circulating and where they will not freeze.

The making of the pipe should be postponed until the gourds have become well seasoned. The necessary accessories are a rubber mouthpiece, a bowl, and some thin cork strips, the cost of which should not exceed 50 cents. Cut off smoothly the tip of the small end and bore through it with a knife blade into the narrow cavity of the neck. Into this is placed a crooked rubber mouthpiece. The large trumpetlike end of the gourd neck is then cut with a fine saw at the proper angle and low enough so that a regular cheap meerschaum bowl will fit into it, having its rim flush with the outside of the gourd. A few teaspoonfuls of plaster of Paris mixed with water to form a stiff paste is spread as a thick layer for half an inch inside the rim of the gourd neck. The meerschaum bowl is first greased and then forced into place against the fresh plaster and left just long enough to allow the plaster to set slightly, not over three minutes at most; otherwise it will stick fast. The top of the bowl may be fitted with a silver rim if desired.

LARGEST CHAIR IN THE WORLD

A chair which is 13 ft. in height and weighs a ton has just been turned out by a chair factory at Union City, Pa.



Would Be Comfortable for a Giant

The seat is 6 ft. wide and 5½ ft. deep. The young lady occupying a position in the seat is sitting on an ordinary rocking-chair. This monster chair was made to take part in a street parade.

AIRSHIP-DESTROYING GUNS

Realizing that airships will have to be engaged in future wars with projectiles of some sort, whether fired from flying-machines or balloons, or from the ground, every great power is trying to perfect a rifle to demolish aerial craft, but as yet a really efficient gun has not been devised. So far, Krupps, the great German gun concern, has taken the lead. Many guns for the purpose of destroying airships have been

designed by them, and they have proven the possibility of hitting balloons with smoke-tail shells; that is, shells which leave a visible trail of smoke to show the gunner their path and aid him in directing the next shot. But it has also been proven that to simply perforate the gas bag of a dirigible is not sufficient, as the interior is divided into separate compartments, and perforating one, or even a number, may not bring the aerial craft down.

Consequently, it may become necessary to either set fire to the bag by means of an incendiary shell, or to tear it to pieces by the explosion of a shell passing through it. The former has proved difficult in practice, because a strong flame is required to ignite at the instant the shell emerges from the balloon, and the latter still awaits the introduction of a safe yet sensitive fuse, which will act on touching the envelope. Projectile experts are now at work trying to devise such a shell.

SEMI-NAKED ELECTRIC-RAILWAY BUILDERS

The construction of the electric street railway in Bombay, India, presented many novelties in engineering as well as finance, but no feature was more startling or interesting to the European and American travelers in that oriental city than the impression produced by seeing almost naked natives at work on an absolutely modern construction task.



Primitive Workers on Modern Task

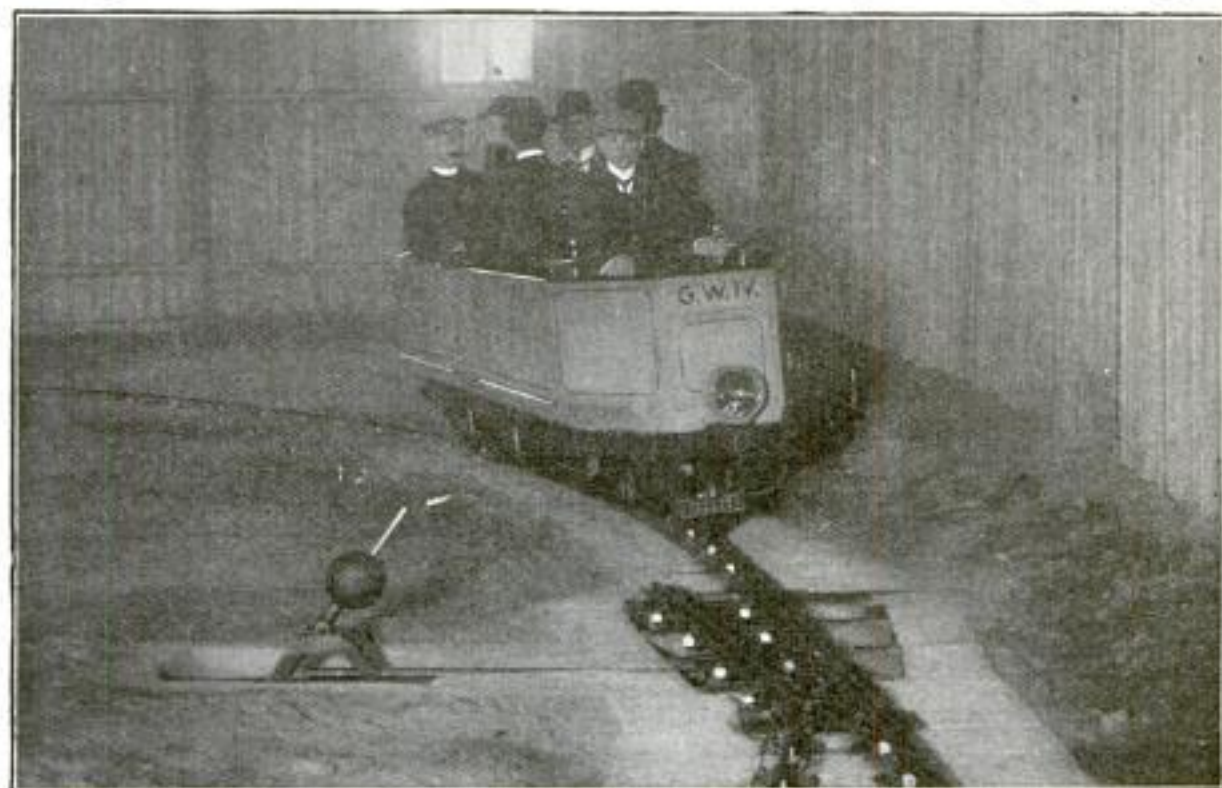
This is excellently shown in the accompanying photograph of two natives

at work drilling bond holes. The cheapness of labor in a country where most of the inhabitants have a daily income of less than 25 cents makes construction work done by hand in the most primitive way more economical than such work done by modern machinery.

THE GERMAN MONORAIL CAR

The German monorail car of August Scherl, although patterned after its English predecessor, the Brennan car, in principle, has several distinctive features.

In the first place, the power is pro-



Taking a Curve with a Load in the Demonstration Building

THE AUTOMOBILE INDUSTRY IN AMERICA

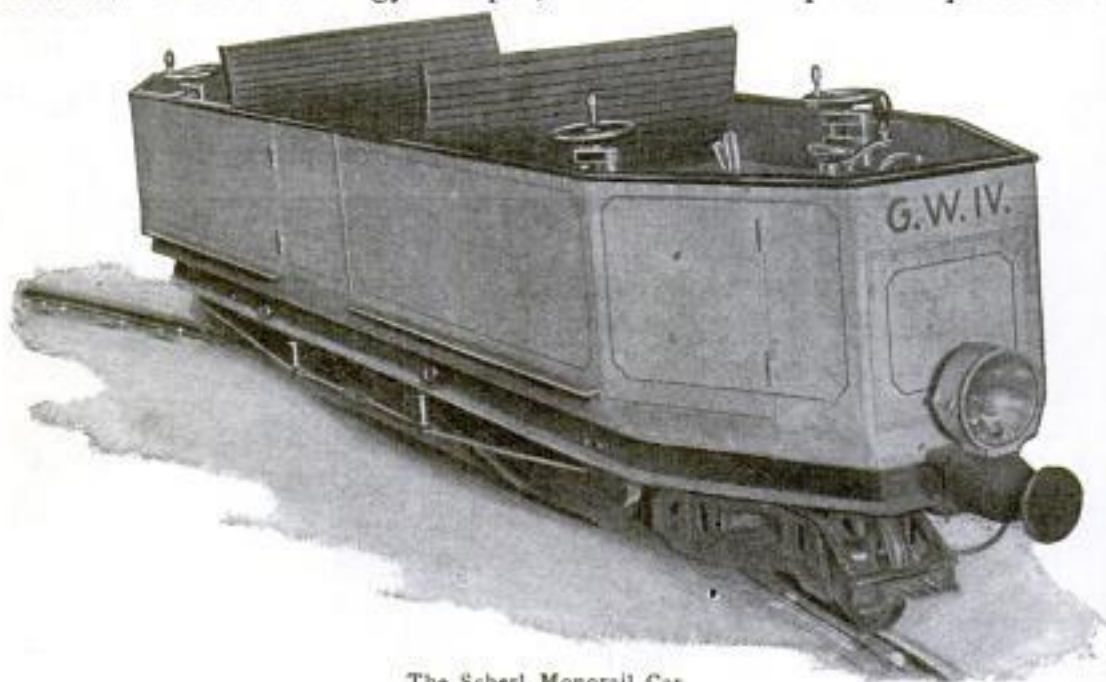
Conservative figures seem to point to an output of 200,000 automobiles in 1910 by the 263 auto firms in the United States. Of these firms, 46 are located in Michigan, 39 in Illinois, 30 in Indiana, 30 in Ohio, 23 in New York, 18 in Pennsylvania, 14 in Massachusetts, 12 in Missouri, and 10 in Connecticut. The number of concerns manufacturing automobiles in other states range from seven to none. As many as 100 of the 263 firms are legitimate makers turning out cars that are factors in the market. Of the remainder, 75 produce fewer than 75 cars each, and the others are beginners whose products are not yet beyond the experimental stage.

vided by a curious trolley arrangement instead of being self-contained as in the Brennan car. It is obviously impractical to provide a monorail car with current by means of an overhead trolley, and the third-rail system, which, if it were used with such cars, would make a second-rail system, is likewise out of the question. Therefore, the German inventor runs a trolley wire along each side of the single rail. These wires, which are lower than the top of the rail, and a couple of inches out from it on each side, are clearly visible in one of the illustrations.

The Scherl car, which is now being demonstrated in this country, is only 18 ft. long, and 4 ft. wide, as compared to the 40-ft. length and 10-ft. width of the successful Brennan car. It weighs about 5,500 lb., the gyroscopes weigh-

ing about 900 lb., or one-sixth the total weight. Larger cars, however, are soon to be built. There are two gyroscopes,

revolve at the extremely high speed of 8,000 revolutions a minute, although the amount of power required for oper-



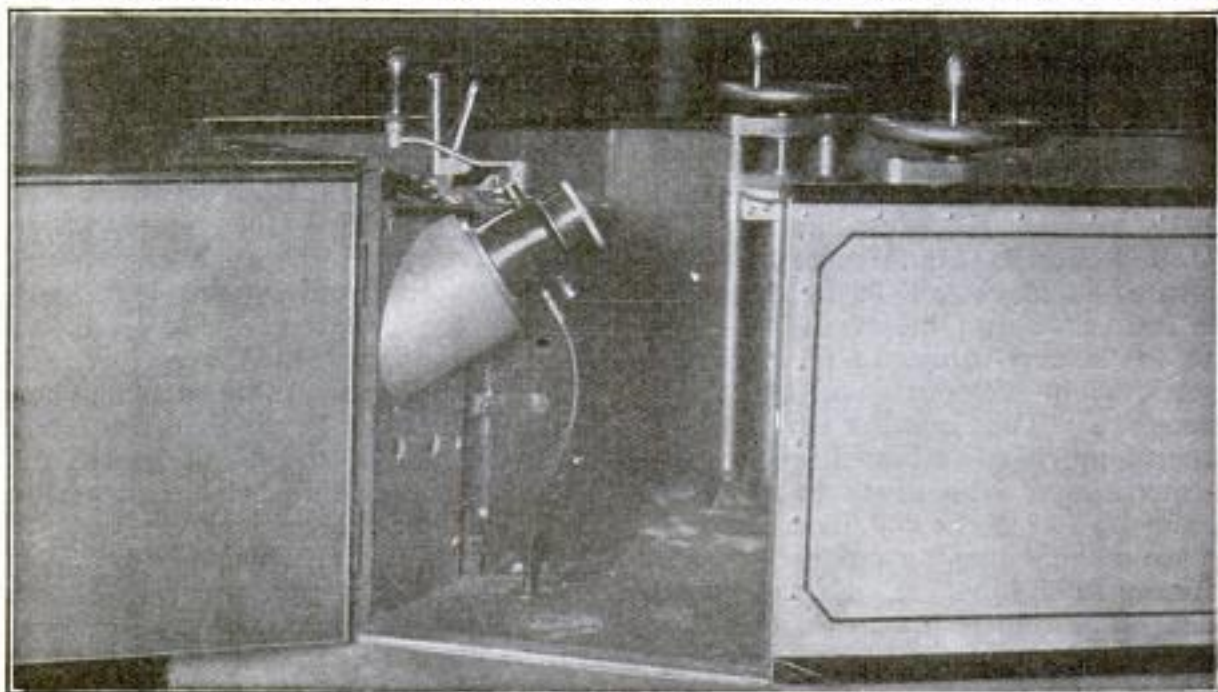
The Scherl Monorail Car

one at each end of the car. They revolve in opposite directions.

Another feature of the Scherl car is the little wheels at each corner, which may be dropped to the track-bed should the gyroscope stop and make such a safety device necessary.

The gyroscopes of the German car

ation is infinitesimal as compared to that required for the driving motors. Consequently, should power be shut off from the gyroscopes by some accident, the vast amount of living energy stored within them would keep them rotating for at least half an hour with sufficient speed to maintain the perfect balance



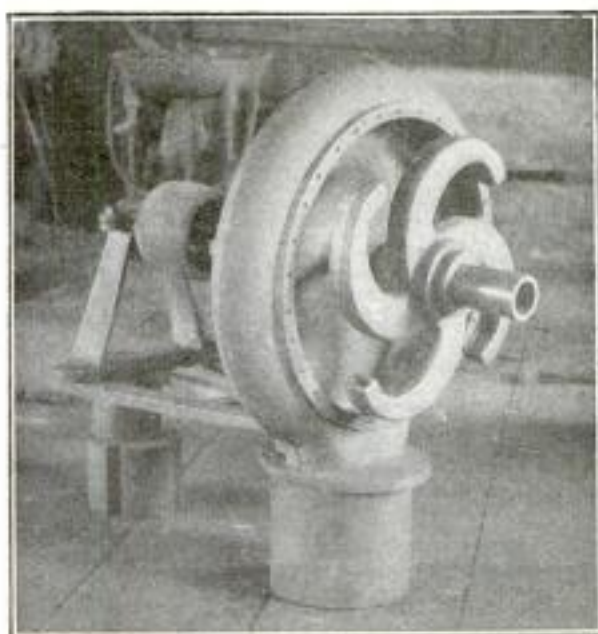
The Motorman's Section

of the car, and for several hours before they stopped completely. This means that disaster need not result from loss of power, and that even a train running at the highest speed may be calmly slowed down and brought to a stop long before it is in the slightest danger of losing its balance. The stability is, therefore, to a certain degree independent of the flow of current. Should the gears of a whirling gyroscope break, the car would lose its balance and disaster probably result, but such disaster is always possible by the breaking of the running gear of a fast railroad train. Consequently the monorail car should not necessarily be considered more dangerous than an ordinary train. Then, too, there are the side wheels to drop to the ground to hold the car in an upright position.

One of the most important features of the monorail car is that it will take abrupt curves at the highest speed it is capable of on a straight track, and with just as much safety.

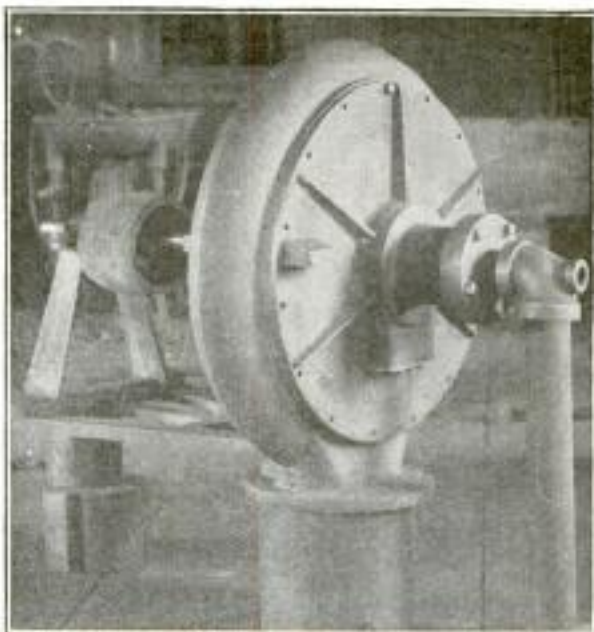
A NEW CENTRIFUGAL PUMP

The working parts of all pumps move in water—the piston moves in a



Open Showing the Parts

cylinder of water and the centrifugal revolves a screw in a case filled with



Closed Ready for Pumping

water. The accompanying illustrations show a new principle in centrifugal pumps—the screw revolves in air instead of water. The casing contains air at the top and a water screw rotates in it, the water being discharged from the screw falls to the bottom of the case. The air within the pump is kept under pressure which forces the water from the discharge pipe. It is claimed that the screw will do double the amount of work when running in air instead of water, with the same power.

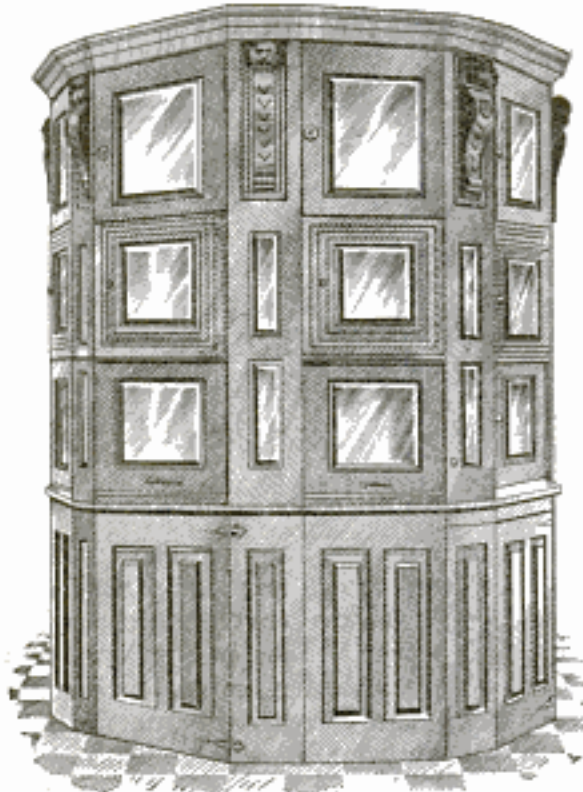
BREAKFAST TRAIN FOR COMMUTERS

London suburban trains with buffet cars for the accommodation of time-driven suburbanites is the latest innovation in English railroad circles, and one that appeals to the suburban resident who is as often as not faced with the alternative of either going without his breakfast or arriving late at the city office.

The idea is now being tested on the morning trains running into London from Aylesbury, about 35 miles outside the city, and if the patronage proves sufficient, other suburban trains will be equipped with buffets.

A REVOLVING REFRIGERATOR

A refrigerator that revolves on its base, enabling a store-keeper to display his goods to advantage, as well as



Any Side Is the Front

to make every one of its eight sides easily accessible, is one of the latest inventions in ice boxes.

The ice is kept in a bunker at the top, and the cold air goes down through a cylinder in the center, thence to the different compartments.

The new refrigerators are made octagonal in shape and each of the sides contains two sections, so that articles of food which usually impart their odor to other articles—with injurious results—can be isolated. The doors are so arranged that when any one of them is opened, the inlet of cold air from the cylinder is closed automatically, thus preventing the escape of the air.

The city council of Trenton, N. J., has passed an ordinance requiring street railways to carry passengers free who are not provided with seats.

THE MECHANICAL IN GRAND OPERA

Although the hundreds of people who listen night after night to the stars of the grand opera world feel a deep and lasting appreciation of the wonderful music and stage settings, few of them realize the mechanical means by which the latter are produced, and it is to the credit of the scenic artists and mechanics that they do not.

One of the finest examples of the combination of the artistic and mechanical on the stage is the scene in Wagner's opera, "The Gold of the Rhine," recently presented in Paris. In one scene the three daughters of the Rhine swim around the rock that Alberick scales to possess himself of the gold, in such a realistic manner that it is difficult for the audience to believe the water depths other than real.

Just how the appearance of reality is produced is partially explained by the illustrations. The water effect is



Scene from the Rear

a gauze curtain thrown across the stage, and the three daughters of the Rhine are suspended at heights varying from 12 to 25 ft. above the stage in the harnesses shown. Each harness is furnished with foot rests, kneepieces, and a girdle, all concealed by a fabric which mingles with and is lost in the costume. Each harness is supported by four steel wires, attached as shown in the illustrations, and rising to a system of pulleys with mov-

ARTIFICIAL SILK

The demand for artificial silk is attaining such proportions that the importation of such material from abroad has grown from 214,781 lb. in 1902, to 1,052,989 lb. in 1909. The importation in 1908 was 884,729 lb. Little artificial silk has been manufactured in the United States, but a large English firm, according to the *Upholsterer* magazine, is now building a plant in

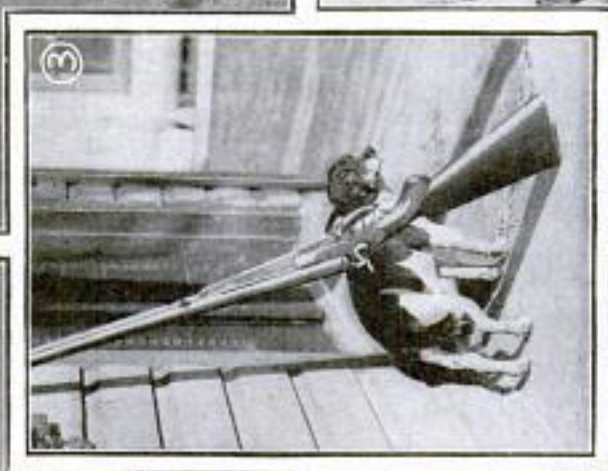
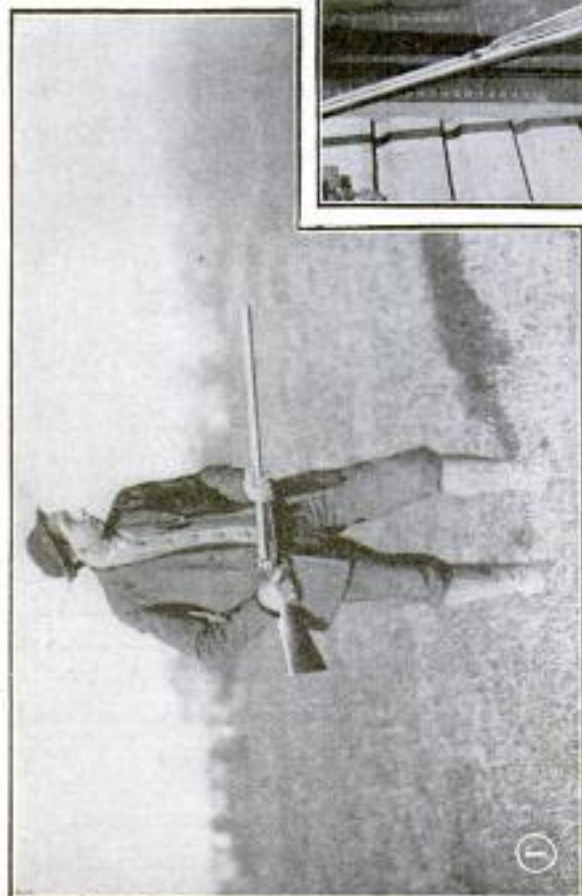


Scene Presented to the Audience and Harness Worn by Performers

able axes which allow them to rise, fall, turn, and be swung in any direction. Hidden at the bottom of the scenic river are men who operate additional wires, thus aiding in the movement of the swimmers. Every movement of wires is perfectly regulated so that the movement of the swimmers in any direction, up and down, or sideways, is in perfect accord with the swimming movements they make with their arms.

one of the suburbs of Philadelphia that will be the largest in the world.

The basis of most artificial silk is wood pulp. Cotton has proved satisfactory for the purpose, although the cost has been a serious drawback. Aside from these materials, any substance susceptible of chemical conversion into cellulose is available for the manufacture of the artificial silk, and experiments will be conducted to develop the possibilities.



1—Don't Sweep the Horizon with Loaded Gun. 2—How Gun Should Be Carried. 3—Don't Leave Loaded Gun Where Dogs or Children Can Knock It Over. 4—Don't Climb Fence This Way. 5—Leave the Gun This Way, Climb the Fence, Then Reach Over and Get It.

SOME "DON'TS" FOR HUNTERS

The large number of accidental shooting tragedies, traced to carelessness in carrying and handling guns has caused the Pennsylvania department of agriculture to promulgate a set of rules for the guidance of hunters. A general observance of the advice and cautions would save many lives.

The rules follow:

Always carry the gun pointed from yourself and others.

Carry a gun with the end pointed either upward towards the sky or downward, toward the ground. Never sweep the horizon with it. If accidentally discharged while in the former position, no harm is likely to result; but if discharged while held horizontally, it may result seriously.

In getting over logs or fences always see that the gun is first put over and in a solid position where it will not fall. Then go to another place to climb over and pick up the weapon with the end pointing where it should be.

Never pull or draw a gun towards you by the muzzle, especially in wagons, boats, over fences, logs, etc.

Do not load the gun until after leaving the house, and draw the loads (or remove the caps if a muzzle loader, and watch that no percussion is left on the tube) as soon as leaving the hunting grounds.

Never keep a loaded gun around the house or tent and do not leave a loaded weapon where it may be knocked down by dogs or children.

Do not carry the gun cocked, except when alert for the game to rise.

Do not shoot into moving bushes or in the direction of a noise without being sure the desired game is there and seeing it for a certainty. The



Don't Pick Up Gun by Muzzle

movement or noise may be caused by some person or by domesticated stock.

Watch the muzzle of the gun that no mud, snow, or other material fill it; and do not load as heavily with white or nitro powder as with black powder. This may prevent accidents from bursting.

Do not start a fire in the woods without first providing against its spreading and do not leave it burning under any circumstances.

The House of Representatives has passed a bill abolishing the lighthouse board and substituting a commission which will be under the department of commerce and labor.



See What Is on Other Side of Bushes Before Shooting

BACTERIA IN AIR ELECTRO-CUTED IN CHICAGO'S LIBRARY

Chicago's public library, for several years subjected to much adverse criticism because of its inadequate venti-



Ozone Generator in Chicago Library

lation system and the attendant ills, has been provided with what is said to be the first ozone apparatus used wholly for the purpose of supplying fresh air for a large building.

The electric ozone generator is said to be the largest ever built for such a purpose. It is 6 ft. high, 11 in. in thickness, and 1 ft. wide, and consumes 6 amperes of electric current an hour. It is inserted in an opening of an air duct between a fan and a spray of water used for washing the air, which passing through it, becomes charged with ozone.

The working of the ozone apparatus is interesting. From a feed wire of 110 volts, the current passes through a step-up reformer, which discharges it at a voltage of 7,000 volts. This current feeds into a series of electrodes, which are in the form of ordinary hair brushes, and a static electrical discharge plays against a series

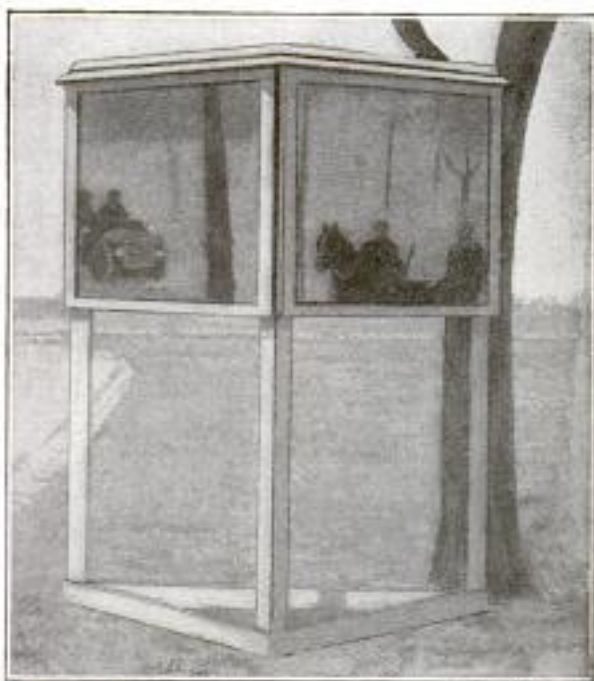
of glass plates. Through this blue electrical discharge of 7,000 volts the air is forced, and the bacteria, germs, etc., are electrocuted.

An ozone gas of over 90 per cent purity is thus generated. When the filtering electrodes become carbonized or clogged with dirt, they are cleaned by rubbing them together in the same manner that hair brushes are cleaned. The output of the ozone generator is 15,000 cu. ft. per hour.

HIGHWAY MIRRORS AS AUTO SAFEGUARDS

The English town of Woodbridge, Suffolk, lays claim to having the most novel danger sign in all the world, and with much justice. At a narrow crossroads has been placed a large double mirror, so set that drivers of approaching automobile or other traffic can see whether or not vehicles are approaching from the other direction, and govern themselves accordingly.

The idea has worked so excellently that persons high in English motoring



The Mirror Danger Sign

circles are advocating the placing of such safeguards at all dangerous turns and corners.

REMARKABLE ROAD MAP FOR AUTOS

Device that Revolves, Giving Autoist the Information He Requires at the Moment

The latest and most ingenious idea in the automobile world is the live-map, spoken of as "alive" because it tells the touring autoist the roads to take and the turns to make at the very moment he should take them. Not only does it do this, but in the night or day warns him of dangerous railway crossings, steep hills, sharp curves and other danger spots several hundred feet before he reaches them. A single glance at the map shows him how many miles have been traveled since setting forth on the journey, the number of miles yet to be traveled, and the exact location of the automobile at the moment.

The nature of the map, and how it accomplishes these seeming wonders, is easy to comprehend by glancing at the illustrations and then reading the following explanation:



In Position by Steering Wheel

The device is a map meter, and it consists of a paper disc which is made

to revolve in its metal case in such a manner that every point on the highway is indicated on the map just before it is reached by the automobile. The paper disc is about the size of a phonograph disc and its outer edge is



Attached to Back of Front Seat

divided into miles and tenths of miles. Inside these numerals are the directions as to the course to take, properly arranged to agree with the distances shown by the numerals. This is clearly illustrated in the reproduction of the New York to Waterbury disc.

In operation the disc is placed in a case made of hard rubber and brass, the disc surface being covered with glass. To the rim of the case is a pointer, which shows the exact distance the automobile has gone and points to the information on the disc that is important at the moment. A long flexible driving shaft, attached to the front wheel by suitable mechanism, revolves the disc in its case in such a way that the number of miles and the information coming under the pointer are exactly the number of miles the machine has traveled and the information that is required. The speed with which the disc revolves is determined by the speed the automobile is making.

Discs of all the popular routes in the country are being produced, so that a touring auto can make trips in any part of the country, if provided with

them. Each disc represents 100 miles of travel, and when that distance has been run, the next disc in the series covering the route is put on, and thus

consumed in Great Britain reach an annual figure of over 450,000,000.

The association has more than 500 districts, with a membership of about



Revolving Disc That Indicates Route

the journey continues indefinitely, if the mapped routes are followed.

CO-OPERATIVE HANDLING OF EGGS IN DENMARK

The egg-producing industry of Denmark is to a great extent in the hands of the producers themselves, several co-operative associations being in a flourishing condition. Of these associations by far the most important is the co-operative egg export association, with headquarters at Velje. In 1906 it exported, chiefly to England, eggs valued at \$6,832,928. The eggs

40,000 contributors from whom eggs are gathered. Each producer must deliver his eggs to the station in his district, and each egg is there stamped with the number of his membership. No member is allowed to keep eggs, except for the immediate use of the family, and if it is discovered at the sorting and examination that the eggs are not fresh, the offender is traced by the number on the eggs and warned. A fine is imposed for the second offense, and expulsion from the association is the punishment for the third. By this system the association is assured of getting the eggs fresh.

The co-operative system dispenses with the expense of dealing through middlemen, and has built up the business in one of the principal products of the country. The producers of eggs receive an average price of 12 cents a pound. They were only receiving 8 cents a pound when the association was started a few years ago.

FLOATING OIL-DEPOT

The English tank steamer "Tancarville" has recently been converted into a floating oil-depot, and presents a peculiar appearance. Just forward of amidships is the navigating bridge which still retains for that part of the vessel the appearance of any ordinary ocean-going ship, but from the stern



A Curious-Appearing Ship

rises an unusual looking stack which gives the whole ship a strange appearance. The reason for such a position for the stack is to provide against the danger of the cargo of oil becoming ignited through falling sparks.

DIAL TO INDICATE AMOUNT OF SUBSCRIPTIONS

In the city of San Diego, Cal., a huge dial has been erected to keep the public posted as to the amount of subscriptions received to promote an exposition to be held in that city in 1915 for the purpose of celebrating the completion of the Panama canal. The dial is 10 ft. square. The large hand points to the hundreds of thousands of dollars subscribed, while the small hand indi-



San Diego's Money Meter

cates the thousands. The dial is located at one of the busy corners of the city and is watched with interest by thousands every day.



Courtesy Motocycling, London

"If they call you 3½-hp., what ought they to call me?" is what this big truck horse would probably say if he could talk.



Sculptures of Nature

TWO PROFILES FORMED BY SNOW AND ICE

Nature is fond of sculpturing human forms and faces, almost every locality having some rock, which, if sufficient imagination is used, has the appearance of a face. Paterson, N. J., is not favored with any good sized rocks or crags, but for a few weeks this winter it was the proud possessor of an ice gorge which made a fair substitute.

On the left of the photograph may be seen the almost perfect face of a man formed from ice and snow, while on the opposite side of the chasm, a little lower, is the profile of an old, toothless hag.

COMPRESSED AIR BATHS FOR WEAK LUNGS

In the treatment of asthma, bronchitis and emphysema, London physicians have found the use of "compressed air baths," to be efficacious. The patients are merely locked up for a few hours at a time in a hermetically sealed boiler and required to breathe the compressed air which is pumped into the chamber. Tuberculosis is also being treated by this method.

A number of patients are sent into the tank at once. The door is closed upon them and the air forced in by a steam pump. It takes half an hour to raise the pressure to the desired point, for it would be injurious to make the change quickly. Then the patients stay under the high pressure for an hour. It takes another half hour to restore it to normal. An air lock, a chamber into which a person may step in order to make the change from high pressure to normal more expeditiously, is provided at one side of the tank. This tank resembles a large boiler, studded with rivets, standing on end. Windows are placed in it so that patients may communicate with physicians or nurses outside by writing on paper and holding it up to the glass. Patients are forbidden to talk while in the tank.

"It is impossible to explain the exact effect of the treatment," said one of the physicians at the Brompton hospital for consumption and diseases of the chest, where the compressed air treatment is used.

"It is beneficial in many cases of bronchitis or asthma, but whether that is caused by the increased amount of oxygen in the bath or the effect of the

expansion of the cells of the lungs and air passages, I am not yet ready to say."

A TUBE ELECTRIC LIGHT

The desk fixture shown in the accompanying illustration contains a



tube inclosing a straight filament, and is a departure from the bulb type of lamp. Many advantages are claimed for it, among them being the fact that the light source is uniformly distributed, forming a veritable

line-of-light, and that the straight filament lies parallel to the space to be illuminated.

NEW HOLDING DEVICE FOR STRAP-HANGERS

While the general public in all cities of the country is fighting for the elimination of hanging-straps in street cars and less crowded conditions, some traction companies are striving for the same elimination, but their purpose is to provide a better means of crowding, not a cessation of crowding.

An excellent example of this move is illustrated by the accompanying interior view of a car that runs between La Porte, Ind., and an amusement park. The straps, it is true, are lacking, but down the center of the car is a railing that provides clinging space for two or three times as many passengers as the seats will accommodate. A gratifying feature of the idea as far as the seated passengers are concerned, however, is the fact that the "clingers" will sway and bump against each other, instead of bumping against those seated, as is the case when straps are used.

The car interior is but 40 ft. long, the seating capacity only 50 persons, but on one trip 225 fares were collected,



Holding Rail Through Car Center

at least 200 of which were riding in the car interior at the same time.

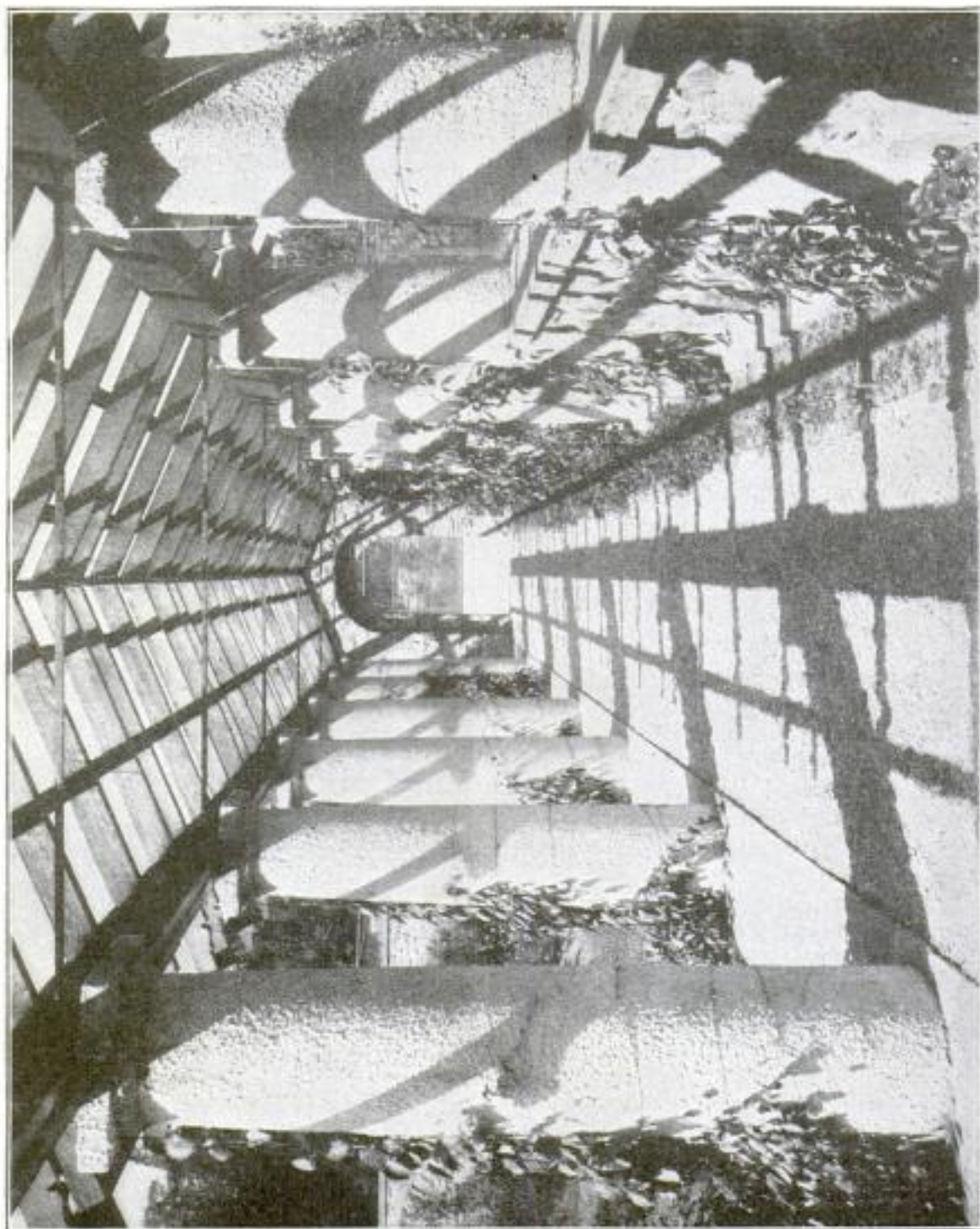
CEYLON SHIP CANAL

This stretch of made waterway looks more like a stretch of canal in a beautiful tropical park than an actual hard-working ship canal, but such it is. Located in Ceylon it provides passage for rubber-laden scows or catamarans. The



Busy, Yet Beautiful Canal

profuse growth of cocoanut palms characteristic of Ceylon gives the impression of a park.



ARTISTIC CONCRETE BUILDING—No. 6, Pergola, Robt. F. Herrick's Garden, Milton, Mass.

HEAT

Part III—Some Effects of Low Temperature Upon Matter

By J. Gordon Ogden, Ph. D., Professor of Physics, Fifth Ave. High School, Pittsburgh

[This is the third article of a series by Dr. Ogden, in which well known subjects will be discussed from the standpoint of their relation to modern mechanics. In the February number "The Nature of Heat and How It Is Measured" was discussed; the March article told "How Low Temperatures Are Produced." Succeeding articles will include Steam, Boilers, Ice, Radiation, etc.]

When Columbus in 1492 opened wide the portals of a vast domain to the restless, eager adventurers of Europe, the ocean between the old world and the new was soon alive with the sails of ships carrying intrepid souls, seeking the wonders and mysteries of an unknown land. So, likewise, has it been with the discovery of an easy entrance to the realms of extremely low temperature. Investigators by the score have gone far into the domain of cold, and it is the purpose of this article to relate some of the wonderful facts that have been discovered. It is difficult for the layman who is unacquainted with the marvels of extreme cold to appreciate the relationship that the temperature of liquid air bears to that of ordinary liquids. Boiling tin bears about the same ratio to water at 70° F., as water at 70° F. does to liquid air. A cake of ice at 32° F. is ordinarily considered to be rather a cold substance, but it is as much hotter than liquid air, as the oven in which bread is baked is hotter than the ice. A tea kettle partly filled with liquid air and placed on a cake of ice receives so much heat from the ice that the liquid air soon boils vigorously, and the boiling can be made more violent by adding a few lumps of ice. If the normal temperature of the earth were at the freezing point of air, and we could obtain a block of ice such as is distributed by the ice-man of to-day, such ice could be used as fuel, and would be put into the furnaces instead of coal. Just imagine how strange it would be for the housewife to roast beef in the Age of Cold by placing it on a lump of ice in the oven!

One peculiarity of liquid air is of great importance to us. We have all noticed what happens when a drop of water is spilt upon a hot stove. The water does not immediately turn to steam, but glides swiftly about on the hot iron. This is due to what is known as the spheroidal condition. A small layer of steam forms immediately under the drop of water, and acts as a cushion and is a poor conductor. The heat from the stove is prevented from acting directly upon the water, or an explosion would occur, due to the rapid formation of steam. In the case of liquid air a similar phenomenon is observed, as a cushion of air all around it acts as a non-conducting medium, which prevents the rapid change of condition. Otherwise the liquid air would act as an explosive. By reason of this spheroidal condition the hand may be plunged for an instant into liquid air without harm. If it were to remain there, however, longer than a second or two, the hand would freeze solidly. Liquid air, poured into a tin bucket boils violently, just as water at ordinary temperature would boil if poured into a red-hot vessel. Hence, the keeping of liquid air for any considerable time is at present an impossibility. Professor Dewar devised a very ingenious arrangement (Fig. 1) by which liquid air may be retained about 30 times as long as when placed in an open vessel. It consists of two or more glass bulbs, one within the other, and separated by a vacuum. Heat travels in three different ways. By conduction: as when one heats the end of a poker, and the molecules of the iron successively take up the vibrations, and travel through the length of the poker. By convection: as when water is heated, and rises, owing to its expansion and its subsequent displacement by the heavier cold water at the

Copyright by H. H. Windsor

top. By radiation: as when the sun shines through the windows of our homes on a cold winter's day, and carries with it some of the solar energy

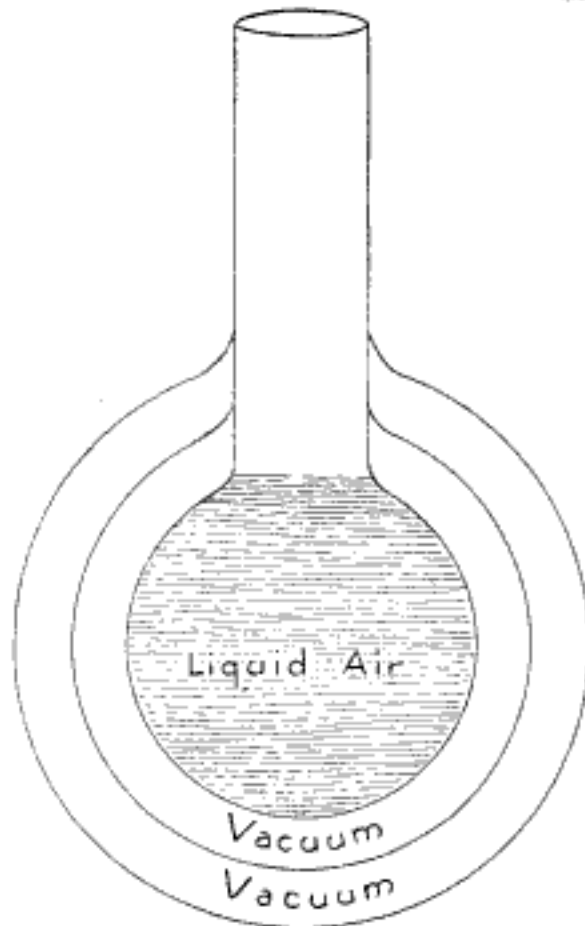


FIG 1
Dewar Bulb

in the form of heat waves. Dewar's device practically eliminates the conduction of heat from the outside air, as the vacuum is a non-conductor. The access of heat by radiation is also prevented to a large extent by silvering the outer surface of the inner bulb. This silver acts as a mirror which reflects any heat that may seek entrance to the liquid air by radiation. Commercially, liquid air is shipped in large galvanized iron tanks, lined with felt, and the surface of the liquid loosely covered with some non-conducting material.

That liquid air has a therapeutic value was demonstrated by an interesting experiment performed in Paris. Professor Pictet, one of the pioneers in low temperature experiments built

what might be termed a "frigorific well," 6 ft. deep and 2 ft. wide, lined with heavy furs. He surrounded this well on all sides with liquid air, and obtained a temperature of about 166 degrees below the Fahrenheit zero. He descended into this cold well and remained eight minutes. The temperature of his body rose slightly due to the increased activity caused by the rapid oxidation, as the body in order to keep its temperature at normal was compelled to literally burn up its available fuel. This oxidation produced a ravenous appetite, and Pictet claims that after his ascent from the well he enjoyed a meal for the first time in many years. By continuing the use of intense cold for several weeks he cured himself of dyspepsia that had been chronic. Physicians also claim that the intense cold produced by the application of liquid air is also a specific for some forms of cancerous growth, as it cuts off the blood circulation in the morbid parts, which circulation may afterwards be prevented from renewing itself.

The effect of liquid air upon metals is remarkable. A spiral of soft solder which may be readily elongated by pulling with the fingers, becomes as steel, when bathed in liquid air, and has the temper and elasticity of a clock spring. Tin becomes almost as brittle as glass. Tuning forks of steel rise perceptibly in pitch. The breaking point of steel, as shown in the table appended below, is practically double, and the same effect is observed upon other metals and alloys.

Table showing breaking stress of metallic wires in pounds. Diameter of wire .098 in. (Dewar).

Material	Temperature	
	59° F.	295° F.
Steel (Soft)	420	700
Iron	320	670
Copper	200	300
Brass	310	440
German Silver	476	608
Gold	255	340
Silver	350	420

Metals become almost perfect conductors of electricity when cooled to the temperature of liquid air, and could this fluid be applied economically in a jacket surrounding the copper con-

ductors which serve as transmitting agents for the immense output of electrical energy from the great dynamos at Niagara, the thinnest kind of wire would be ample, displacing the great conductors now in use, and thereby saving enormously in the cost of installation in copper and other items.

One peculiar fact that has always bothered physicists and chemists has been definitely settled through the agency of low temperatures now so readily reached. Hydrogen gas in

gen, however, has settled this difficulty in a very satisfactory way. The aeronaut can easily carry with him a large quantity of liquefied hydrogen, as it weighs only one-fifteenth of an equal bulk of water, and, upon evaporation will produce 800 times its volume in gas. It can be carried instead of sand for ballast, and has this great advantage; when sand is dropped, the buoyancy of the balloon is increased only by the weight of the sand; while in the case of liquid hydro-

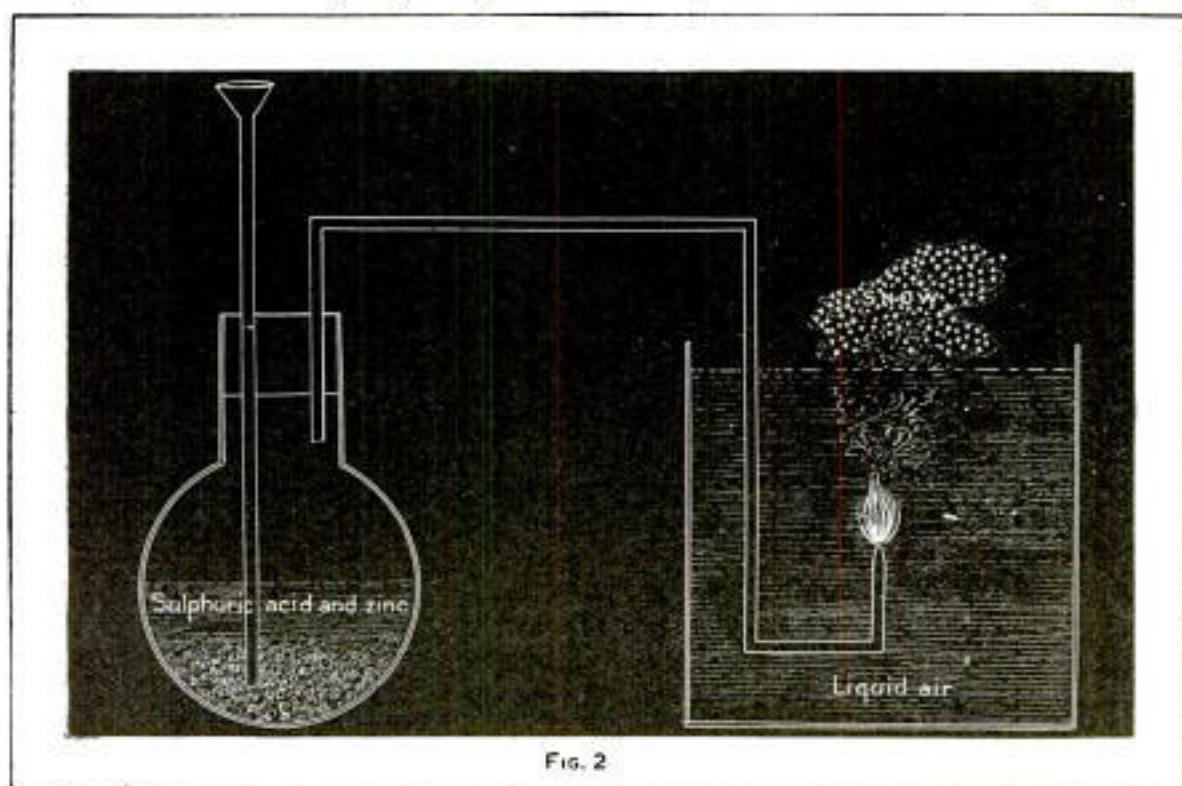


FIG. 2

Burning Hydrogen in Liquid Air, Snow Being the Product of Combustion

many respects is very like a metal, and it was confidently asserted by some theorists that if it were ever liquefied, it would resemble mercury. It was found, however, that liquid hydrogen is not in the least degree of a metallic nature, and is an absolute non-conductor of electricity. Owing to its extreme lightness, hydrogen is used in balloons. The production of the enormous quantity of this gas required for an ordinary balloon necessitates quite an outfit, and it is therefore practically impossible to add more hydrogen to the always collapsing balloon without a return to the garage. Liquid hydro-

gen upon its expansion to the gaseous form all the lifting power of the hydrogen thus added is gained.

A curious experiment is illustrated in Fig. 2. A jet of hydrogen burns readily in liquid air, and the "smoke," the product of combustion, is snow. Surely we are confronted with a marvelous paradox, when we note the presence in the same small vessel, of such extremes of temperature as that of burning hydrogen, and liquid air, and of a flame burning brightly in the midst of a liquid, with snow given off as smoke!

If liquid air be partly frozen, until

it is of the consistency of slush, and a strong bar magnet be held over it, the solid oxygen, which has a beautiful blue color, and is strongly magnetic will be withdrawn, leaving the nitrogen like a jelly in the vessel.

The color phenomena observed at low temperatures is quite puzzling to physicists. Some substances, ordinarily red, become yellow, and yellow substances, white. An egg, or a bit of paraffin when cooled to a very low temperature, and then exposed to the rays of a powerful arc light, will glow with a wonderful phosphorescence, when viewed in a dark room. The egg will radiate a peculiar, wavering blue light. Other substances, such as horn, leather, glycerine, paper, ivory, and rubber, become distinctly luminous. Milk, for example becomes positively brilliant, and impure water glows more brightly than that which is perfectly pure. Whence is this light so contrary to the canons of science? The tiny waves which produce the impression of light upon the retina, are much shorter than those that produce heat. When very high temperatures are produced, as in the boiling of steel, the heat waves are always associated with much shorter waves which give rise to the well known luminous phenomena to be observed in a Bessemer converter. No one, however, would think of obtaining light from an iron rod heated even to 400° F., as the ether waves set up by the heat vibrations are much too long to produce light. And yet, at a temperature almost a thousand degrees below that point, and where the heat waves are longer instead of shorter, many substances glow with a strange, mysterious light. As Professor Dewar has pointed out, the molecules of matter at low temperatures seem to have greatly increased powers of absorption. At any rate, this one fact is demonstrated, that at low temperatures, light is given off with the minimum of heat. Only about 5 per cent of the total energy supplied to an incandescent electric bulb is available as light. The ordi-

nary carbon-filament lamp represents just as much waste of energy as a pianist does who forces down every key in the key-board of his instrument when he wants to strike middle C alone. It is quite probable that this strange phenomenon of light at low temperature is one of the guide posts pointing out the way to the goal so eagerly sought by physicists and chemists,—light without heat.

Through the strange alteration in the properties of matter produced by extreme cold, chemical activity is almost destroyed. If a bottle filled with a mixture of chlorine and hydrogen be exposed for an instant to the action of sunlight, the intense chemical attraction existing between the two gases will cause them to unite instantly with explosive violence. At the temperature of liquid air, however, these two substances will lie quietly side by side, without exhibiting the slightest tendency to combine.

Coal gas loses to a large extent its luminous qualities when cooled to the temperature of liquid air. Rubber becomes like glass. Flowers, meat of different kinds, and eggs, become brittle, while the peculiar condition of matter known as magnetism is wonderfully increased.

It is possible to obtain a practically perfect vacuum by means of liquid air. Air is first frozen in a sealed glass tube by means of liquid hydrogen. After the air has solidified the upper part of the tube is sealed off in a blow-pipe flame, and a vacuum is obtained that can be secured in no other way.

As a means of purification liquid air is of great value. Freezing is a purifying process. Ice is always purer than the water from which it is formed. By taking advantage of this principle, the chemist is able to crystallize to a high degree of purity, many of the chemicals used by man. Chloroform, however, whose purity is of greatest concern to the physician, has a very low freezing point, and cannot be purified in the ordinary way by crystallization. Now, however, it may be frozen quite

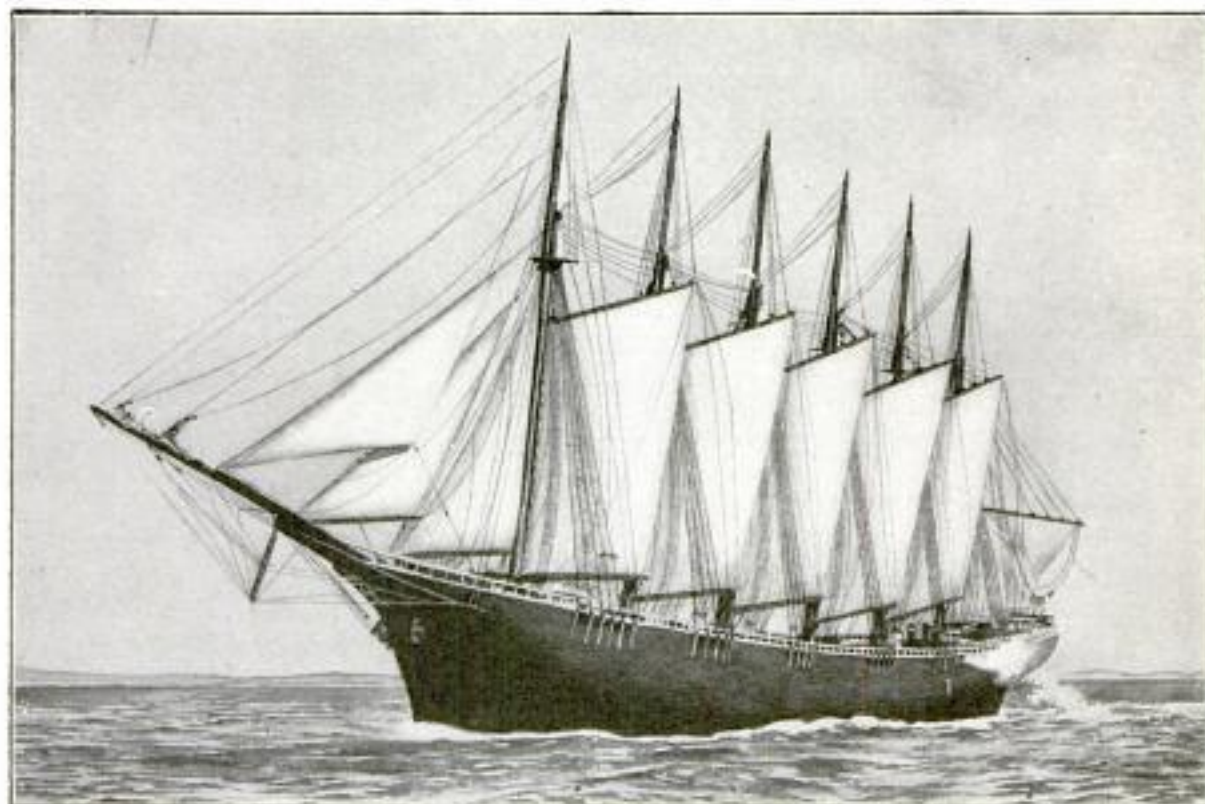
easily by means of liquid air, and the solid crystals of chloroform, absolutely pure, may be removed from the mixture and melted. Other liquids similar to chloroform may be purified in a like manner.

A great deal of nonsense has been written about liquid air, as a source of power. Ten years ago mushroom companies were formed throughout the length and breadth of the land to exploit this wonderful source of energy. Like mushrooms they vanished. A foot-pound of energy when applied

WORLD'S LARGEST WOODEN SCHOONER

The 6-masted schooner "Wyoming," launched recently at Bath, Maine, is the largest wooden schooner in the world. She has a length of 329 ft., a breadth of 50 ft., and her carrying capacity is 6,000 tons. The keel is 304 ft. 6 in. long, of selected oak, in two tiers of 14 by 15 in. The frame is of white oak, and the amount of hard pine used in her construction was 1,500,000 ft.

The "Wyoming" is the largest sailing ship built since the big 5,000-ton



The New Queen of Sailing Vessels

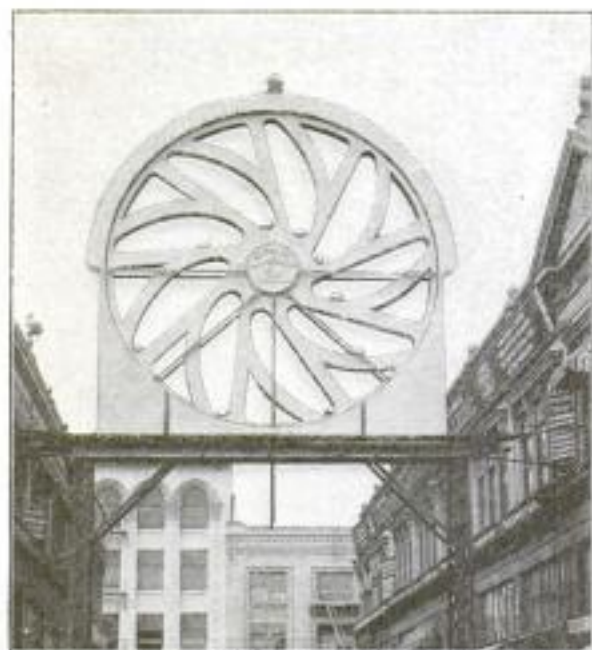
through a machine of any kind will give a foot-pound of work in return, less the friction loss. It is impossible to get something for nothing even in the world of mechanics. While liquid air does not give enormous pressure when confined, and can be made to run engines and do other work, the same elementary law quoted above, still obtains. Air must be liquefied before it will do work as liquefied air, and the liquefaction costs more in work units than are available from it afterwards.

steel schooner "Thomas Lawson" was wrecked on the coast of England. The "Lawson" was not a success, her failure being due to a faulty model. Her underbody was so full that under certain conditions of wind and sea it was impossible to tack her.

All ascents of airships or flying-machines in Russia are now watched closely. The Czar fears that bombs may be dropped on his palace by anarchists.

"PERPETUAL MOTION" ADVERTISING WHEEL

On a bridge-like trestle across one of the streets of Los Angeles is a so-



This Wheel Seems to Run Itself

called "perpetual motion" wheel, used for advertising purposes, which is apparently rotated by the ever-changing positions of nine brass balls. This wheel is 21 ft. in diameter, and its

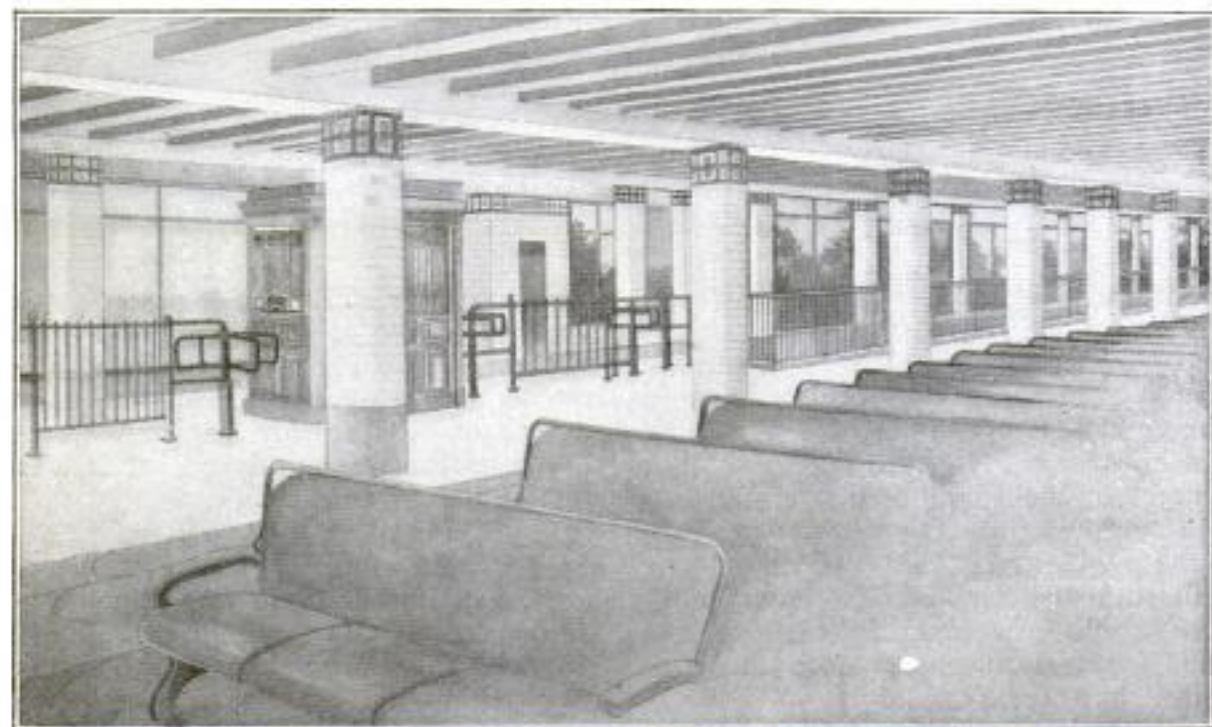
spokes consist of a series of runs on which the balls operate. To the onlooker it appears that the balls provide power by their weight to keep the wheel in motion. The secret of its operation, however, is a small hidden motor.

MOVING PLATFORMS UNDER NEW YORK STREETS

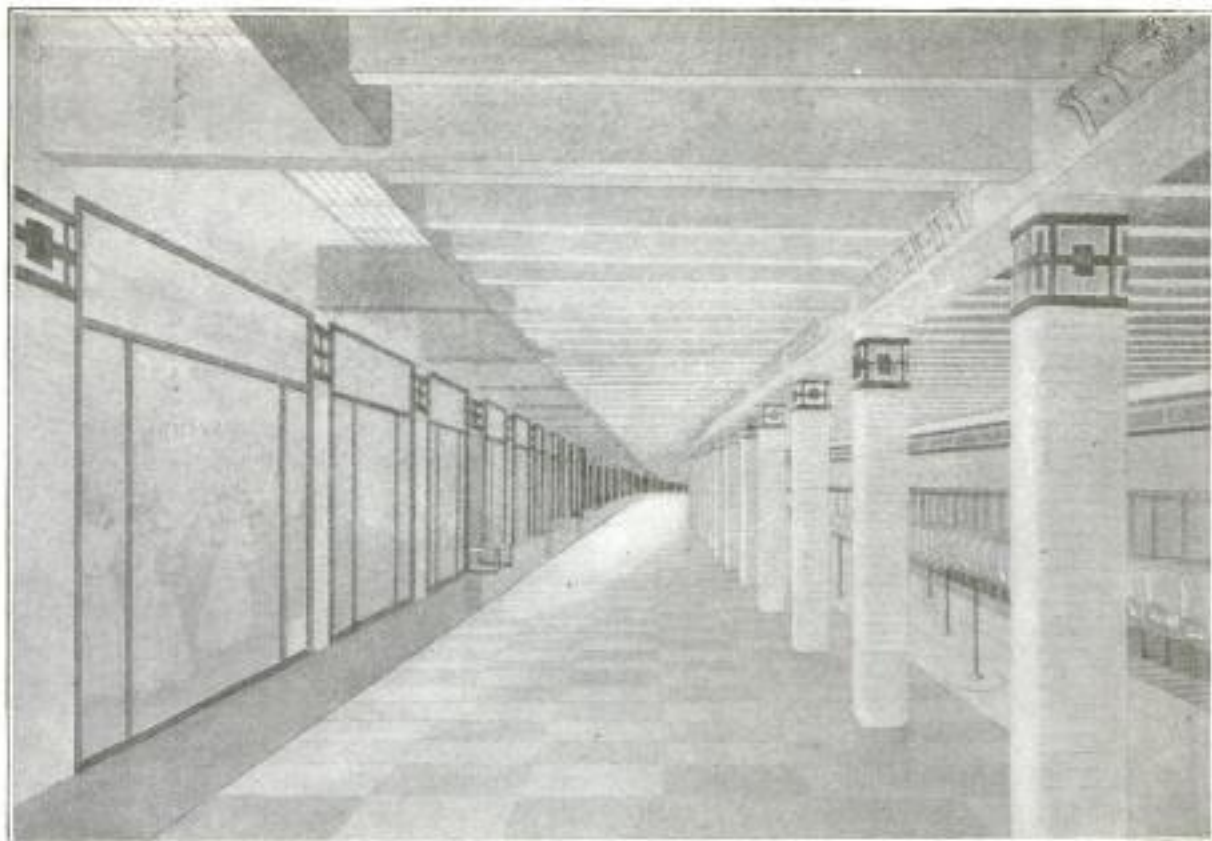
A moving platform railway under the streets of New York is a proposition which has been brought forward by a number of Gotham capitalists who declare their intention to put the plan through within a few years. The matter is now before the city government for approval. The plans have already been approved by the public service commission of the city.

Such a means of transit is necessary to relieve the more congested portions of the business district, it is claimed. The promoters declare that a railway of this kind under Broadway, from 10th to 42nd Street, would relieve the other transportation lines greatly, because it is between those two points that most of the short hauls are made.

The plan could handle thousands of



At a Platform Railway Station



Arcade with Moving Platform

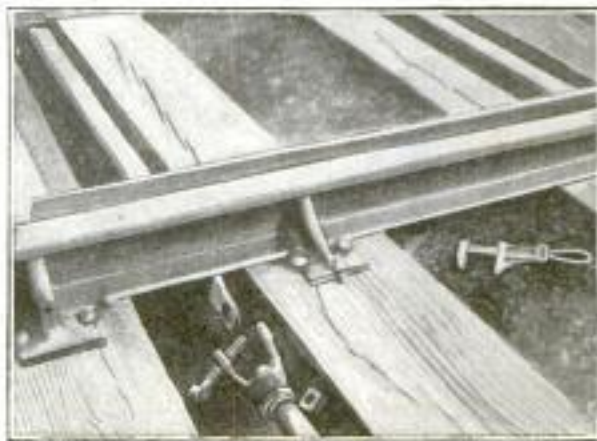
passengers with great dispatch. There would be four platforms, moving at different rates of speed, 3 miles, 6 miles, 9 miles and 12 miles an hour. There would be seats provided on the platforms, also. To reach the 12-mile platform, the passenger would first step from a stationary platform onto the 3-mile platform, from thence onto the 6-mile, from that onto the 9-mile, and thence onto the 12-mile. To leave the fastest platform, the operation would be reversed.

ITALY HAS NEW AUTOMOBILE LAW

A new automobile law has just gone into effect in Italy regulating the operation of machines in all parts of the country. It specifies a speed limit of 9 miles an hour in towns and 25 miles an hour by day and 12 miles by night in the country. The use of exhaust cut-outs and sirens in cities is forbidden. Two powerful headlights must be carried, but unduly glaring lamps are not permitted. Drivers must have a certificate of proficiency.

INTENTIONALLY DERAILED TRAIN WRECKS SAWMILL

After the Nickle Plate flyer was wrecked at Willoughby, Ohio, while running at a speed of 56 miles an hour, a nut and wrench were found beside the switch which caused the wreck. Just how they were found is shown in one of the illustrations, and their presence proved beyond doubt that the train was maliciously derailed. When the train was thrown from the main



Cause of the Wreck



Baggage Car Wrecks Sawmill

line by the tampered switch, the baggage car tore through a mill, completely wrecking it.

The escape of passengers and mill workers was miraculous. No one was killed, and of the 20 injured only 12 were hurt seriously.

TELEPHONE GIRLS IN JAPAN

One would hardly expect to see a big room full of telephone girls in Japan, much less to gaze upon a central office switchboard in front of which

sat scores of kimono-clad Japanese maids. While we have been aware of the great progress made in the land of the Mikado we have been accustomed to think that the Japanese woman has not entered into the spirit of commercial activity as have the women of the Occident. Yet there are hundreds of native women engaged in the work of attending telephone switchboards in Japan. As may be seen in the illustration they are well provided for, their chairs being models of comfort, and the rooms spacious and well lighted.



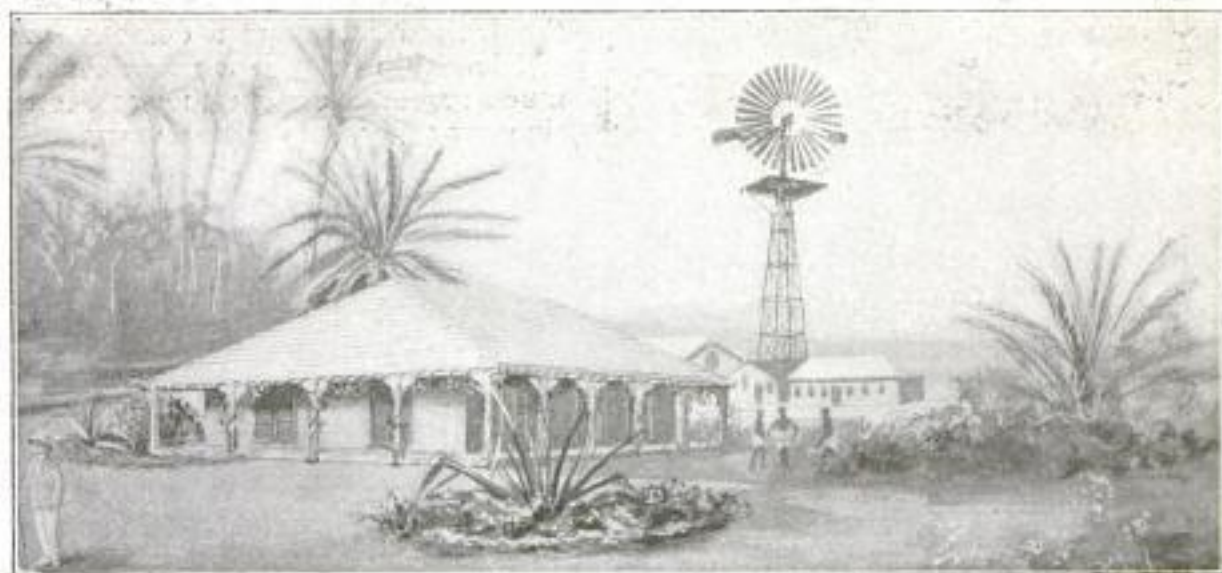
The "Hullo" Girls of the Tokio Exchange

ELECTRICITY FROM THE WIND

The windmill, one of the oldest means known to man of making the elements provide the power to turn the wheels of industry, was considered an antiquated thing of the past when the steam engine reached its development, and the only place where it retained a considerable percentage of its ancient glory was Holland. But, through the medium of electricity, the windmill is again becoming prominent. Only in its general purpose, however, is it like its ancestors. Modern machinery composes its parts, and under the modern

to make the best of light winds. The result is that even in a wind having a velocity of no higher than six miles per hour, the turbine generates electricity. Such a windmill as this is provided with an electric generator and switchboard, and a 55-cell storage battery as its electrical apparatus. The wheel is always in running position, ready to make use of every puff that comes, and it steadily makes and stores current except in times of absolutely still weather.

A wind turbine was recently erected in the Canary islands to generate cur-



Making the Wind Work in the Tropics

name of "wind turbine" it is finding a mission in many parts of the world as a means for the development of electricity.

The machinery of a modern windmill is just as far advanced over the crude machinery of the windmill of 50 years ago as is the works of a fine watch over the works of a dollar alarm clock. One type of wind turbine, for instance, consists of a wheel about 16 ft. in diameter, mounted upon a steel tower 50 ft. in height. The entire wind wheel is of galvanized steel, and all its moving parts run on ball bearings. Its transmission gear works in an oil bath, and the best methods known to engineering have been adopted in order to eliminate friction and enable the wheel

rent for the lighting, ventilating, and cooking purposes of a home of modern size. It also provides the power for a refrigerator, churn, pump, and other domestic appliances. In fact, the wind plant does all that is expected of a gas engine.

Such plants are now in use for pumping and lighting mines, for irrigation, for charging batteries for electric launches, lighting and providing power for small factories, and many other like tasks.

The generator used with a wind turbine 16 ft. in diameter is usually of 2-kw. capacity and of 130 volts. Its armature shaft is placed vertically, and is driven by means of a belt from a pulley placed at the bottom of the vertical

shaft of the wind-turbine tower. The control of the field circuit is maintained



A 24-Ft. Wind Turbine

by resistance worked by relay switches energized by the main circuit. It is obvious that as the velocity of the wind increases the power available on the turbine also increases, and it is possible to so adjust the relay switches that they switch resistance in or out of the field circuit as the velocity of the wind increases or decreases. Thus, instead of governing on the speed of the wheel, the governing is done on the output of the wheel. The object, of course, is to allow the wheel to run at its most economical speed within the range for which it is designed.

A plant with a 16-ft. wheel would cost from \$1,000 to \$1,200 according to the size of the storage batteries.

JAPANESE CHERRY TREES BURNED

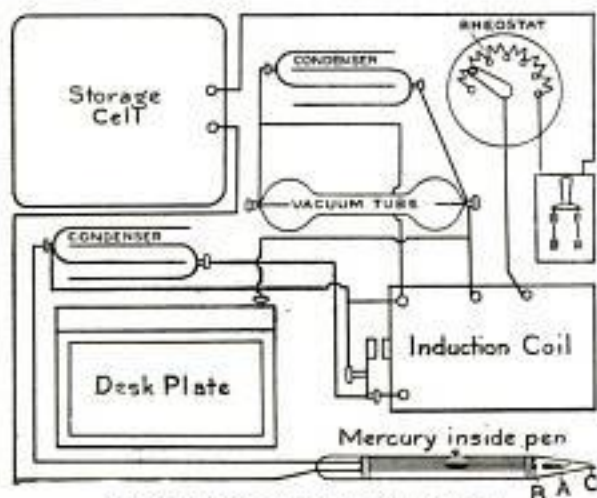
The 2,000 Japanese cherry trees presented to Washington by the city government of Tokio, because Mrs. Taft was known to admire the blossoms, were ordered destroyed by Secretary Wilson of the Department of Agriculture soon after their arrival at the capital.

This action was considered necessary when it was discovered that gall-worms infested the roots of nearly all the trees, causing a fungus disease hitherto unknown in America.

The fact that the trees were sent to the United States as a demonstration of friendship from Japan was cause for much regret, but nevertheless destruction was absolutely necessary. The New England states are now spending hundreds of thousands of dollars in an attempt to wipe out a pest brought over from Europe a few years ago in a consignment of trees.

AN ELECTRIC PEN FOR WRITING WITHOUT INK

An electric pen that will perforate the paper and produce a series of minute punctures, at the same time carbonizing the edge of each perforation, is a new English invention. The pen or stylo produces a high tension electric spark at its point which passes through the paper and the carbonizing



Details of Electric Pen Construction

of the perforations produces a dark line that makes the writing more legible than would result from plain perforation. The pen, which closely resembles an ordinary stylo fountain pen, is operated by a storage battery and an induction coil enclosed in a compact glass-topped case which serves very conveniently as a writing desk.

The paper to be written upon is placed on the desk plate and the writing done with the pen. When the pen is taken up a small drop of mercury will make both the primary and secondary connections, but the coil does not work until the writing begins as there is a break in the line at A and B which are brought together when the point C strikes the paper. This will complete the primary connection which causes the high tension sparks to perforate and carbonize the paper at the same time.

The purpose of such a pen is to prevent alterations or forgeries in connection with the writing and signing of checks, and with filling in and signing other important documents where it is



Electric Pen Ready for Use

desirable to prevent the possibility of tampering with the wording.

ROLLER-SKATING MERRY-GO-ROUND

Many people hesitate to try roller skating because of an apprehension of falls that bring before the gaze a universe of stars and comets that astronomers have failed to chart, but one of the huge London rinks has provided a



Roller Skate Strap Hangers

means by which the beginner can learn to skate without danger of such tumbles. It is a merry-go-round consisting of a framework from which hang a number of pairs of straps. The skaters hang to these straps in the genuine crowded-street-car style. All the strap-hangers skate in the same general direction, and their energy makes the device go round.

DRYDOCKS FOR DREAD-NOUGHTS

The steady growth in numbers of the Dreadnought type of battleships has drawn attention to the fact that there are only 39 drydocks in the world sufficiently large to accommodate them. The big battleships now range from 500 to 550 ft. long, have beams of from 80 to 86 ft., and an average draught of about 27 ft.

Of the drydocks that could accommodate such vessels the United States has 9; England and her colonies, 10; Germany, 6; France, 3; Italy, 2; Japan, 2, and Russia, 2.



The Village Blacksmith Shop

THE PHILIPPINE BLACKSMITH SHOP

On the outskirts of Manila and in the towns of the Philippines, as well as in the more remote and primitive regions, may still be found crude blacksmith shops in which the native works his primitive trade. Among all the tribes,

of their ancestors and turn out better specimens of certain kinds of work than do their new rivals in a modern shop, regardless of crude tools.

Really how crude these means are is shown by two of the illustrations,



A Bolo Shop

from the pure Filipino in the towns to the Moros and Igorrotes in the hills, are iron-workers who retain the skill

while the other, that of a shop interior, is more modern. The naked native standing behind two upright tubes that

look like sections of concrete pipe, is working the bellows that keeps a fire burning, while the older man is welding a knife. The bellows is the two tubes and the air blast is made by working the two plungers up and down. The air is carried from the bellows to the fire by bamboo pipe which enters the bottom of the tubes. No roof covers this curious forge.



Igorrote Smithy

The blacksmith shop provided with an apology for a roof is that of an outlying native town, and is a great improvement over the Igorrote shop. The bellows is fashioned like a squirt gun, and the blacksmith or his apprentice works the plunger in the same manner as that of a bicycle pump. Such a shop, although badly equipped, can repair anything from a buggy to a road roller. Only the anvil and vise are products of civilization.

The blacksmith sitting in an inclosed shop is fitting a handle to the kind of knife the Filipino uses to fight, harvest his crop, or build his home. It is a bolo, and many an American soldier has met death by its sharp edge.

RURAL DELIVERY LIBRARY

Throughout an area of several hundred square miles around Hagerstown, Md., travels a free public library wagon, driven by a man who knows books as well as horses, and is always ready to advise his readers as to just what book would probably please them best and last the longest time. This is an important point, because the

traveling library covers 16 routes, some of which take four days of journeying, and a couple of months may elapse before it comes again.

This ingenious rural delivery library is the project of the Hagerstown public library. Every reading member of a family is allowed two books, and may exchange the books for those of their neighbors.

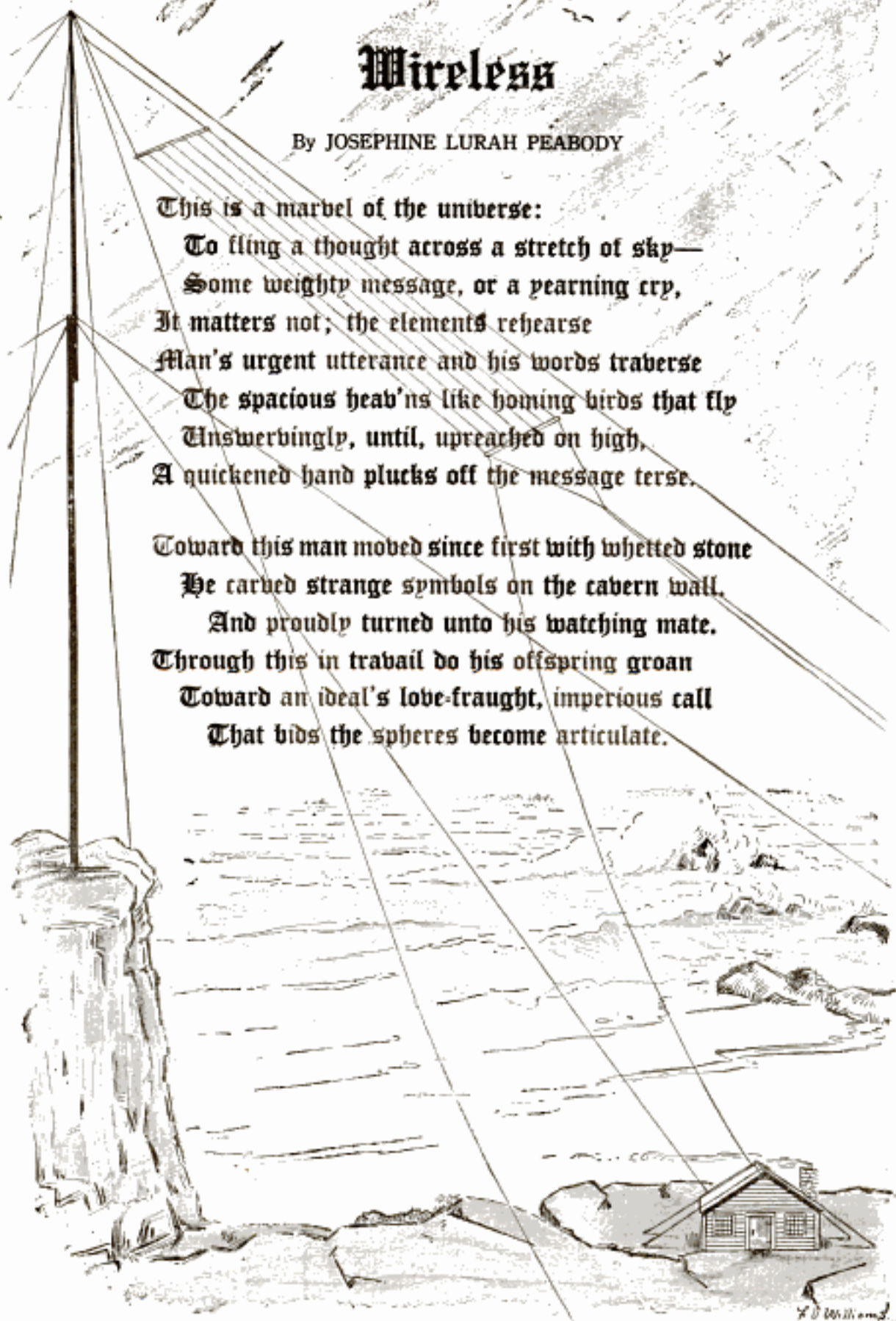
It is estimated that the railroads of the country will transport 100,000 carloads of automobiles this year, and will earn about \$6,000,000 in doing so. What they lose through the automobile, however, runs into many millions.

Wireless

By JOSEPHINE LURAH PEABODY

This is a marvel of the universe:
To fling a thought across a stretch of sky—
Some weighty message, or a yearning cry,
It matters not; the elements rehearse
Man's urgent utterance and his words traverse
The spacious heav'ns like homing birds that fly
Unswervingly, until, upreached on high,
A quickened hand plucks off the message terse.

Toward this man moved since first with whetted stone
He carved strange symbols on the cavern wall,
And proudly turned unto his watching mate,
Through this in travail do his offspring groan
Toward an ideal's love-fraught, imperious call
That bids the spheres become articulate.



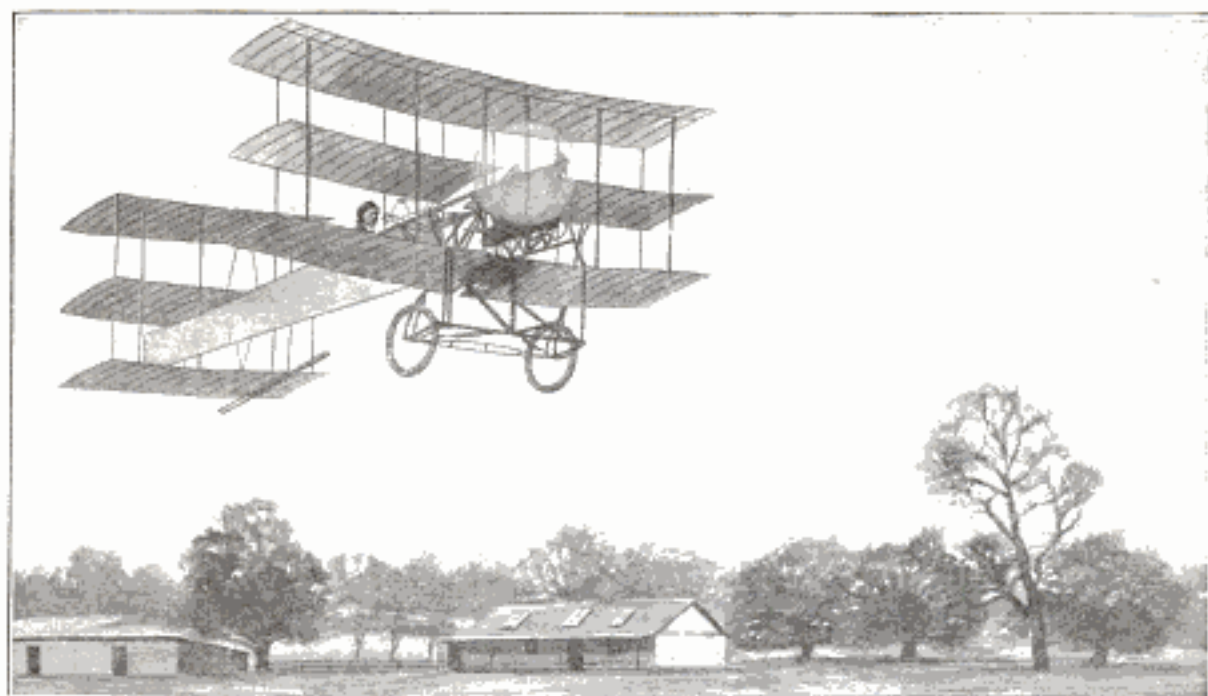


Photo by Edwin Levick, N. Y.

England's Successful Triplane

ENGLAND'S FIRST TRIPLANE

One of the first successful triplanes in the world, and the first really successful all-British aeroplane invented and flown by a native Englishman, is shown in flight in this illustration. Capt. Cody, it is true, made several flights with his army aeroplane before this machine was brought to any degree of excellence, but Capt. Cody is only a naturalized citizen of England, being an American by birth.

The inventor of the triplane is A. V. Roe, and he is a firm believer in a triple-decked machine as compared with a biplane or monoplane. The surfaces of the planes of his triplane are composed of pulp paper instead of canvas. The engine developed 20 hp.

PRODUCTION OF AUTOS IN 1909 REACHES 114,891

It is estimated that 114,891 automobiles were produced in the United States in 1909, an increase of 130 per cent over the previous year. Of this number 94,891 were manufactured under the Selden patents. The full sig-

nificance of this great increase is shown by the fact that the increase of 1908 over 1907 was only 17 per cent. In 1903 only 10,576 machines were produced. In 1905 there was an increase of 51 per cent over the year before, 20,787 automobiles being manufactured.

ELECTRIC LAMP HOLDING-CLIPS

The clip shown in this drawing can be attached to any ordinary electric-lamp holder, and its purpose is to suspend the lamp from a wall, bracket, shelves, or any awkward or difficult place. The use of the clip prevents nails, hooks, or other metallic appliances which come in contact with the flexible wire connections from wearing through the insulation.



BEER-HORN A YARD LONG

This illustration shows a curious old drinking vessel which is still preserved at an inn on the Dover Road, near



Drinking Beer by the Yard

Dartford, in England. Some years ago beer was sold by the yard in that part of the country, and this vessel was often in service, but the user of it had to progress with care, because, when the stem was emptied, the contents of the bulb base were in the habit of coming with a rush and dashing all over the drinker's face.

TRANSPORTING LIVE FISH BY AUTO

Live trout are carried from the streams and breeding beds of France to the markets of Paris by means of specially constructed automobiles which carry a large tank of water where the tonneau usually rests. When the markets are reached the fish are taken from the tanks by means of a net and transferred to a water can. They are then dumped into the tanks provided in all first-class fish shops.

The live fish are often brought from points more than 100 miles distant, this feat being made possible by the speed of the automobile. Trains are too slow for such a purpose, and shipping the live fish by such a means would require too many transfers from tank to tank.

BATTLESHIP-LIKE FORT OF CONCRETE

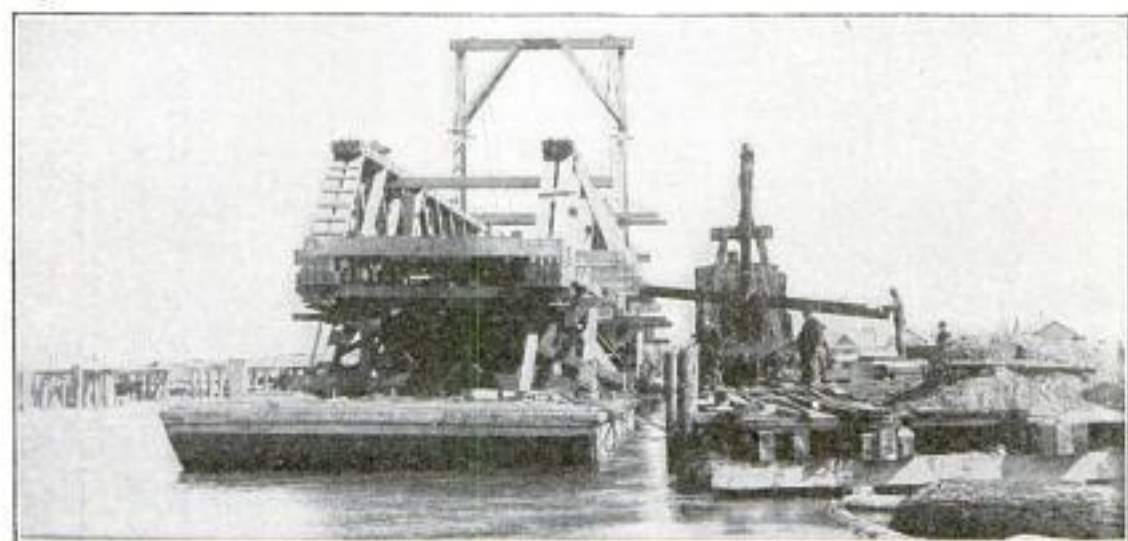
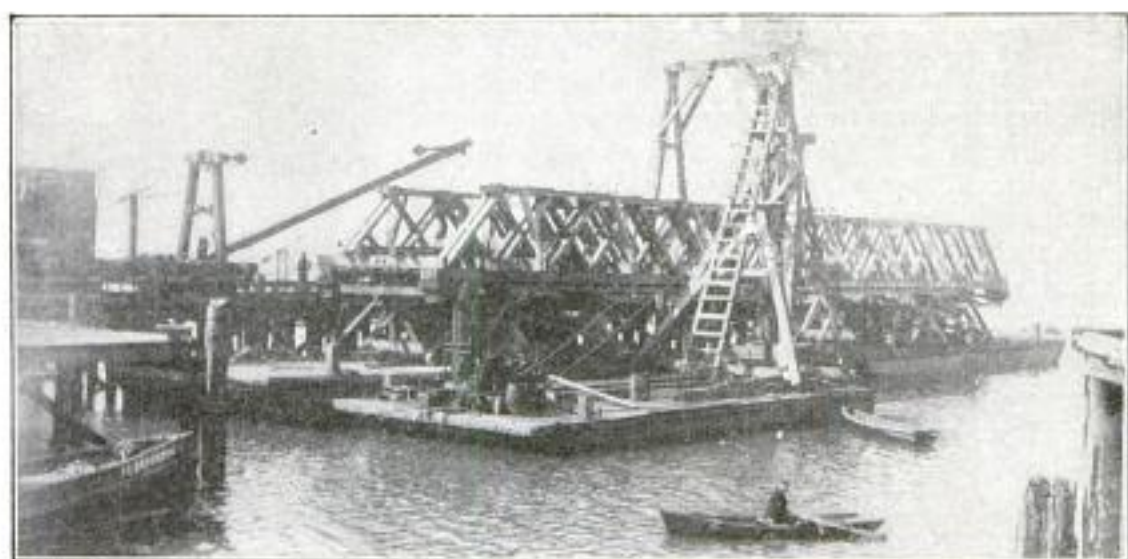
The fort built by the War department on El Fraile island, one of the four islands forming a chain across the mouth of Manila bay, is so unusual that it is known in the Philippines as the concrete battleship. About 1,200 ft. long, and 100 ft. wide, it accommodates two battleship turrets, in each of which are two 14-in. guns of the type contemplated for the 26,000-ton battleships. The guns can be trained in any direction by the gunners, and are operated by the general fire control station on Corregidor island.

The original plan for the fortification of the island called for a fort of the ordinary type, but this would have required its widening, as the little piece of land is long and narrow.

LIFTING A BRIDGE WITH THE INCOMING TIDE

The work of removing a temporary railway bridge constructed of timbers for the erection of a modern steel bridge was recently accomplished on the Northern Pacific railway without obstructing traffic for any great length of time. The bridge was over a river where the waters were affected by the tide from the Pacific ocean.

The temporary structure was swung lengthwise with the river early in the morning at low tide and large scows placed up under the old structure. Time was given for the tide to rise and lift the scows with the large wood structure, hoisting it from its place on the steel drum. After the rising tide had lifted the bridge from its position, work was resumed on the scows at once, the men knocking away the obstruction, while the waters carried the structure 1 ft. above the large steel drum. Two tug boats applied their power in pulling and pushing the scows out into the stream, after which they were towed to a point where the structure was loaded on two flat cars and carried to a place farther inland.



Raising the Bridge from Its Pier—The Bridge on Scows—Loaded on Cars

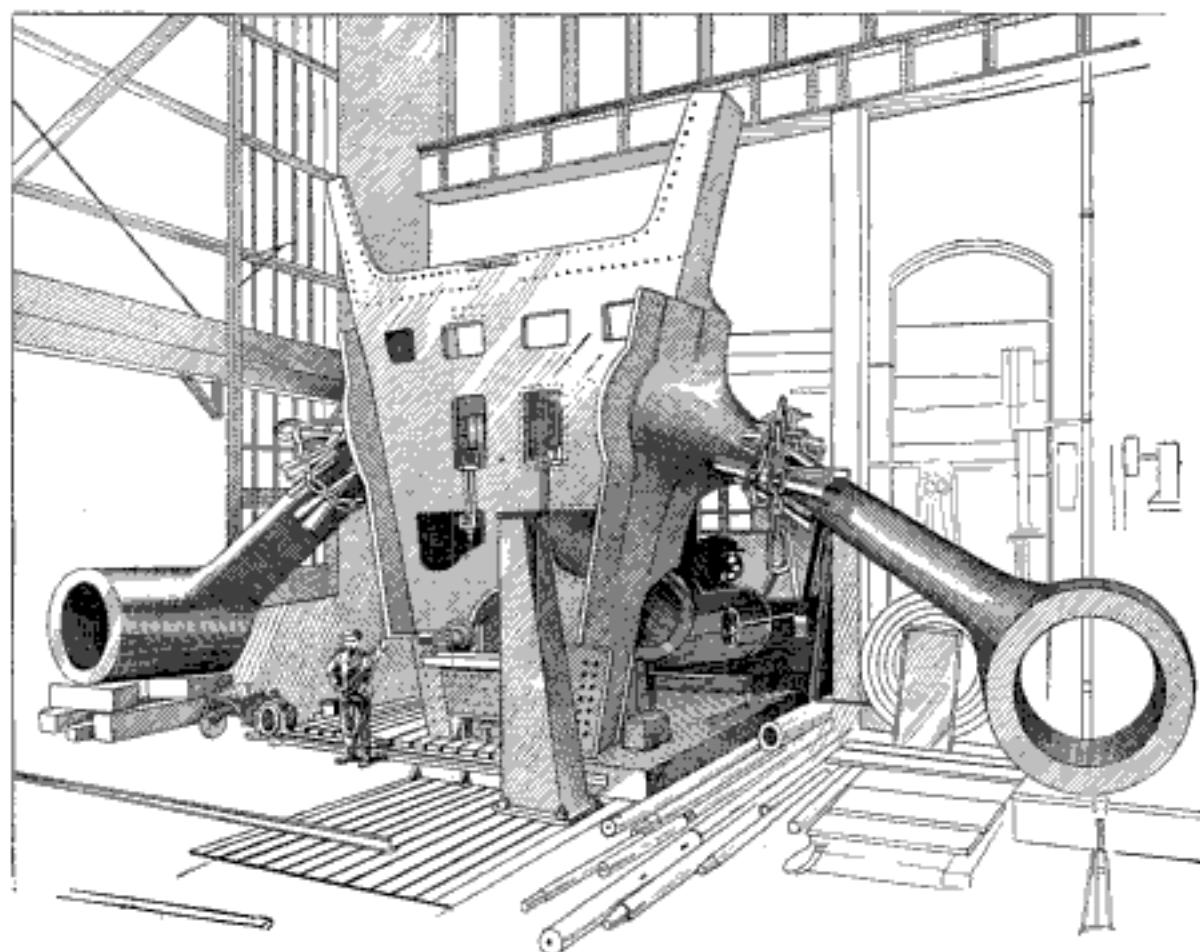
GIANT SHAFT BRACKETS OF THE "OLYMPIC"

The heaviest marine castings ever produced are the cast-steel stern frames, brackets and rudders for the two mammoth new liners of the White Star line, the "Olympic" and "Titanic." The after shaft brackets of the "Olympic," which is the giant structure shown in this illustration, weighs 144 tons. Of this weight, 74 tons is

labor, and, owing to the enormous weights and exceptional dimensions, elaborate railway arrangements had to be made to insure safe transportation between the foundry and the shipyard.

AEROPLANES FOR PROSPECTORS AND ANIMAL HUNTERS

The aeroplane as a means of exploring the American deserts in search of



Castings Weighing 144 Tons

contained in the boss arms, which will extend clear across the stern of the vessel, and form a very strong girder that will prevent vibration at this part of the ship. The arms are of the finest quality of cast steel, and are bolted to the center support. The huge size of the castings can be best realized by comparing them with the man in the illustration.

The making of the molds for the castings took several months of steady

minerals and for the transportation of mail to the little towns and villages bordering these arid regions is suggested by Glenn Curtiss, the aviator, while Louis Paulhan, the daring French operator, sees a future for it in hunting big game in African jungles.

In his travels to and from Los Angeles Curtiss noticed the stillness of air which prevails on the deserts most of the year, and remarked that it was typical for flying. The California des-

erts are laden with rich minerals, but up to the present time intense heat and poor transportation facilities have made exploration almost impossible in some parts.

"The aeroplane," says Curtiss, "offers a solution. The operator can rise sufficiently high off the ground to lessen the burning heat from the hot sands, and he will not be dependent on the slow burro or mule. Also, think of the daily mails being carried in an hour or so over the deserts to the little mountain towns and villages. The aeroplane would be an immense improvement over the 15-day pack-mule system of communication."

"I would suggest the aeroplane for the hunting of big game in the jungles of Africa," says Paulhan. "An operator and hunter could soar above the venomous reptiles and vicious animals without fear of danger. They could smile down on the hissing boa constrictor and graze the backs of the elephants. No animal is cunning enough to find a safe retreat from the aeroplane and every foot of darkest Africa could thus be hunted by man."

W. R. Kimball, a New York instructor in aeronautics, suggests that the flying-machine may be used to advantage in rural free delivery.

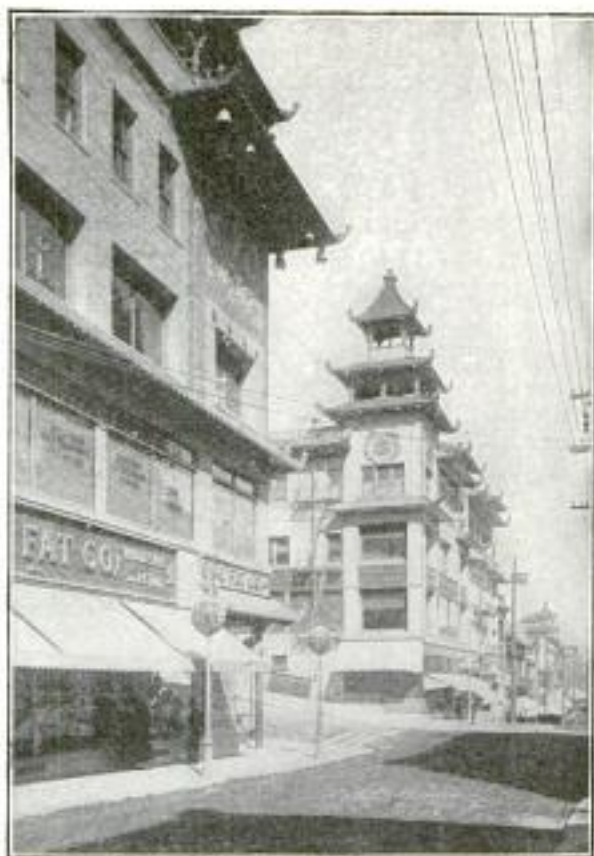
The mail could be dropped in a leather pouch and the aerial delivery wagon could speed on to the next farmhouse, he says.

CHINESE ARCHITECTURE IN SAN FRANCISCO

The new Chinatown of San Francisco, which has sprung up on the site of the old, demolished by the earthquake, is something very different from its dingy, squalid predecessor.

The dwellers in the Chinese quarter occupied buildings that were once the homes of the well-to-do people in the early days of California, and the old-fashioned mansions and hotels were roughly remodeled to suit Chinese taste.

The present Chinatown is composed



A Combination of Chinese and American Architecture

of new buildings, designed for the especial use of the Orientals, and, as the illustration shows, the Chinese architecture or a modification of it prevails. Many of the Chinese own the land, and some of them have accumulated large fortunes, so that after the great fire they were able to rebuild in far better style than before.

AERIAL WARSHIPS FOR NORTH SEA

Reports from England indicate that the British navy is equipping airships with means for discharging projectiles, and will station them at Dover and other points on the east coast of England from which the fleet can fly above the English Channel or over the White Sea. It is known that three dirigibles have been built, or are in course of construction for the English navy, and if the reports of their armaments are correct, England will have the distinction of building the first aerial battleship.

JAPANESE OUTPLAY AMERICANS AT BASEBALL

Things have come to a pretty pass when over in the land of chrysanthemums they can train teams to play rings around a team representing an American University at what we have been wont to call "our" game, the "great American game," baseball. At this game, as well as at almost everything else, the Japanese have demonstrated their remarkable adaptability.

It is at team work that the versatile

odical, says of the games between the All Tokio team and the University of Wisconsin nine:

"The scores of the games show that the teams were very evenly matched. The Wisconsin team is not the best university team in America, but it is a good representative university team. In American universities the teams vary from year to year. One year a university may have the best team in



Japanese Baseball Grandstand at Tokio

athletes of Japan have proved superior to the team representing the University of Wisconsin which played against Waseda and the All Tokio team. Note the "All Tokio." That evidently is a team composed of the best players of numerous teams in the capital city of the Mikado's domain. It may not be long before the fans will be going out to the Polo grounds in New York to see the Giants play Nagasaki, and the championship series will be played by the Pittsburg Pirates and the Yokohama Terrors.

The baseball critic of The Tokio Graphic, an illustrated Japanese peri-

ods section of the country and the next year, on account of some of its best players graduating, it may have the poorest.

"It is my opinion that Wisconsin lost the majority of games in Japan through lack of team play. Wisconsin had good batters and they counted on winning their games by strong offensive play. The Japanese realize that they are not strong at bat and so have developed very strong team work in defensive play. It was in team play, both defensive and offensive that the Japanese out-ranked their opponents."

From this it would appear that not

only have the Japanese become good baseball players, but they have some good baseball writers. However, the sporting editors of Japan are not up to ours on writing baseball slang—yet.

ADJUSTABLE CABLE TO SAVE LIVES AT DAM

A clever device to save motor launches and rowboats from being drawn over a huge dam on the Des Moines river at Ottumwa, Ia., when the motors stop or the oars are lost overboard, has been planned by John F. Fogarty, of that city, and it is expected that the municipality will install it.

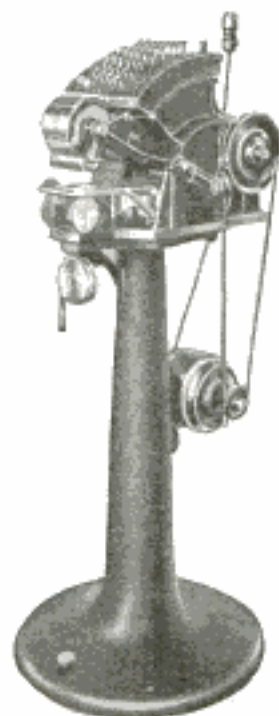
The Des Moines river at certain periods of the year rises and falls 20 ft. in a very short time. Several lives have been lost when small boats have been carried over the dam by the strong current. Cables across the river have been tried, but they were generally too high or too low to be of any assistance when needed. It was found necessary to have an adjustable cable over the river with a man in charge of each end. This has proven a very expensive proposition.

The accompanying plan shows the new safety device that will rise and fall with the river and always be within reach of the occupant of a boat. Two floats keep the cable at the same height above the water, and two pulleys, one on each end, keep it drawn taut. From the cable are suspended hangers with rings, which are always within a foot of the water. The floats

are made round so that driftwood will not accumulate against them.

MOTOR DRIVEN LAUNDRY MARKER

The proper marking of the articles received in a large laundry is a task requiring so much time and care that some kind of machine has become a necessity. Many machines for the purpose are now on the market, and one of them is here illustrated. It is a motor-driven marker that places the letters of each individual laundry mark on the goods in a quick and uniform manner. The method of setting the type for each mark is simple. By pressing certain buttons and pulling a lever the type is set, and the pulling of another lever distributes the type to its original position after use. The type are on the face of 16 type wheels, each of which has the complete alphabet, all the numerals, and a blank space on which may be engraved any special character. Names may be spelled out or a symbol be used consisting of both letters and figures.



Sketch of Device to Save Crippled Boats

HOW LINSEED OIL IS "PREPARED" FOR INDUSTRIAL USES

Linseed oil forms the basis of a number of important industries and is an indispensable article of commerce. As extracted or pressed from the flaxseed it is of little use in the raw condition, it being valued when bleached, chemically treated, or "prepared" or boiled. The oil is used in paints, printing inks, varnishes, floor cloth, elastic rubbers, soaps, water-proof stuffs and many other industries. As America is one of the largest consumers and producers of this oil, an enumeration of the rather simple technical details will be both interesting and instructive.

If the seed be not fully ripe, the oil expressed abounds in mucilage, water, and pulpy matter; but when the seed is full grown and ripe, the oil is limpid, pale colored and bright. Seeds stored from two to six months give the best result—that from fresh seed gives a viscous and turbid oil. The cake is a valuable food for cattle. Of the protein substances, 87 per cent are digestible, the nutritive value being one and one-half times as much as that of hay.

The following three processes are in general use for obtaining the oil:

1. Cold drawn oil:—The seeds are crushed, ground or bruised and expressed without heat. This is by far the best oil and in Russia and some other parts of Europe is used as a table oil. The seeds yield 20 per cent of oil.

2. Hot pressed oil:—Prepared in the same manner as the above, but the seeds are heated before being pressed. The oil is darker in color and has a disagreeable taste, but the yield is 28 per cent. It is used for technical purposes.

3. By extraction, with a yield of 32 to 33 per cent of oil. Bleaching.—For artist's oil and light oil varnishes an almost colorless oil is necessary. This is done by bleaching. The oldest, simplest and by far the surest, though slow method, is by the action of sunlight. The oil in portions of about 18 lb. each is distributed in glass balloons, holding about $4\frac{1}{2}$ gal. each. Next pre-

pare a solution of 220 lb. of copperas in about 50 gal. of rain water and add 5 to 6 qt. of it to every balloon. Expose the balloons to the direct light of the sun and shake frequently, at least once a day. The time varies according to temperature and intensity of light. A still easier method, largely used in England, Japan and to a certain extent in this country is to expose the oil in large cylindrical glass vessels, or zinc boxes, or wooden boxes lined with tin plate and covered with glass plate. The layer of oil should not be deeper than 2 in. Chemicals are used to accelerate bleaching by sunlight. In a small scale, oil in bottles can be bleached with advantage by the addition of a small quantity of 90 per cent alcohol and exposed to the sun for a few days with frequent shaking.

There are various other methods for bleaching and one of the most efficient methods is that of Hartley and Blenkinsop's process by which the oil is cleaned, bleached and boiled in a somewhat same operation.

Hartley & Blenkinsop's Process

First treat the oil with dilute sulphuric acid of 30 per cent strength. Let stand to allow the oil and acid to separate and the clear oil is drawn off from the still, most of the impurities remaining behind as sediment. The drawn oil is treated with a solution of manganese linoleate in turpentine or some other hydrocarbon spirit. Do not add too much of this material. It exerts a bleaching action on the oil, which becomes a very pale color. If too much is added, further oxidation of the oil may occur, which is not desirable. Air is being blown into the oil at the same time. This assists and accelerates the bleaching. After, or concurrently with the above, the oil is gradually heated to about 260 degrees F., and is thus converted into a pale denser drying oil of the highest quality. It is excellent for paint oil, dries

well and rapidly, can be mixed with all pigments and does not lead to discoloration as it so often happens with lead paints. The white paints or other light-tinted paints retain their purity of tone intact indefinitely with this oil.

The following is a very serviceable test for the drying qualities of linseed oil:

Dip into the cold oil a piece of well-sized paper which is afterwards hung up to dry. Thoroughly well-boiled oil will produce a crystalline surface over nearly the entire portion of the sheet dipped in the oil. If the boiling is imperfect, the upper portion of the paper's surface will be simply greasy and only the lower portion will show the varnished coating. When the submerged portion is touched with the finger and shows no grease adhering to it, the boiling may be said to be complete.

We speak of the drying of the linseed oil, but it is a misnomer. The process undergone by the oil is not de-

priving it of moisture, but solidification by taking up oxygen from the air. The use of chemicals and passing of air bubbles through the oil facilitate the oxidation of the oil. When used as a varnish the prepared oil quickly takes up oxygen from the air and forms a hard, but tough, smooth and bright coating. This property of quick absorption of oxygen and forming a varnish is found in a pre-eminent degree in linseed oil, no other oil being able to approach it in this virtue, and it is this for which the oil is so highly prized. A good varnish must be thin enough to apply with the brush, must dry without cracking and with rapidity; give a clear, colorless film, which should be somewhat flexible, and all these properties are possessed by the properly prepared linseed oil and by no other single oil.

In the next article we shall give some other methods of preparation and some practical hints both for the manufacturer and consumer.

LAUNCHING OF AN ENGLISH BATTLESHIP

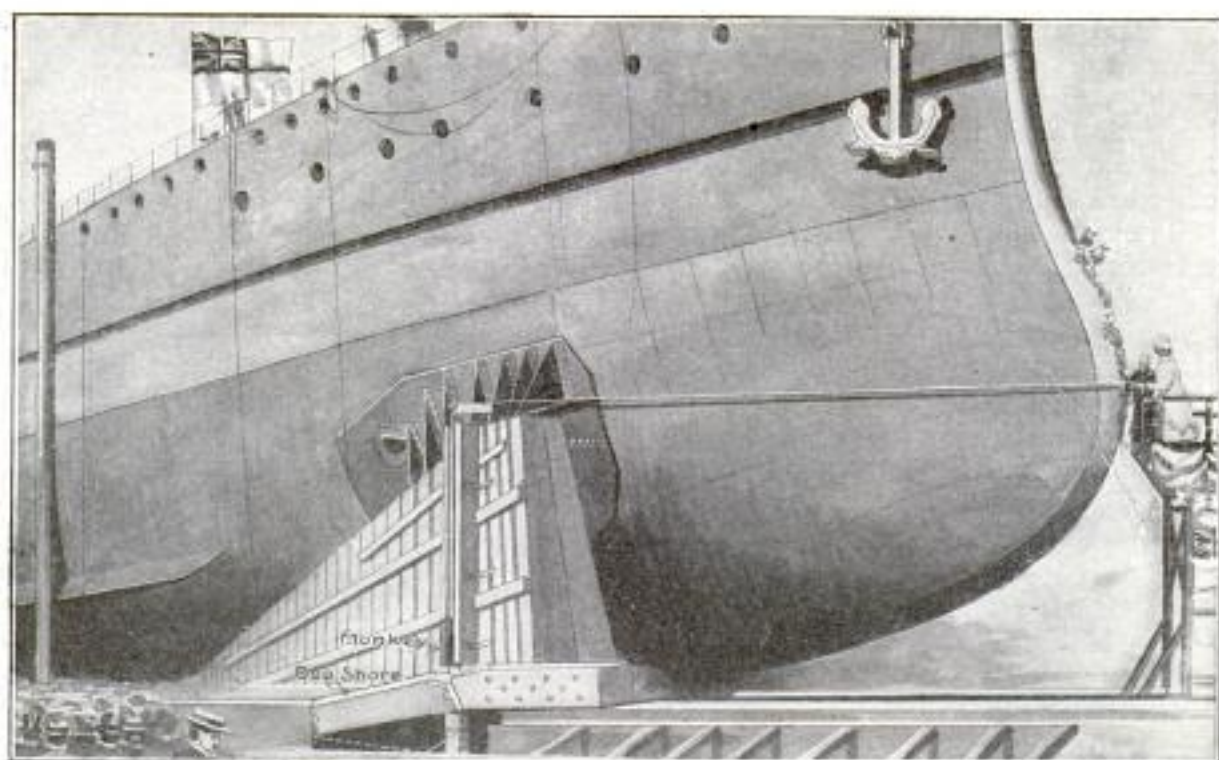
The method by which a great battleship is started in its first plunge into its native element is excellently shown in these illustrations of the launching of one of England's great Dreadnoughts.

The key to the launching is the dogshores, which are the two blocks of

wood that sustain the enormous downward pressure of the vessel while it is resting on the greased ways. These are knocked away by two falling weights, known as monkeys, which are suspended above them by a cord running around the bow of the ship. The



Raising Her by Hammer Blows



Method of Launching a Battleship

person, usually a woman, who carries out the launching ceremony, taps the end of a chisel with a hammer, this action cutting the cord and allowing the weights to fall and perform their mission. The moment the dog-shores are thus knocked out, the vessel starts to slide.

Just before the day of launching, the vessel is raised from its permanent way into the sliding ways. This is done by placing over 2,000 wedges under the keel, and, as these are struck by hundreds of workmen with hammers, the bow of the vessel rises. After rising, the vessel is held in position by means of the dog-shores, and until a few min-

utes before the moment of launching, safety blocks remain under them to offset any possibility of their dropping before the crucial moment. One of these is shown in position in the larger illustration, which shows the launching mechanism on one side. The other side is, of course, a duplicate.

The smaller illustration shows the method of raising the ship from its permanent to the sliding ways.

NEW AUTOMOBILE DEVELOPMENTS

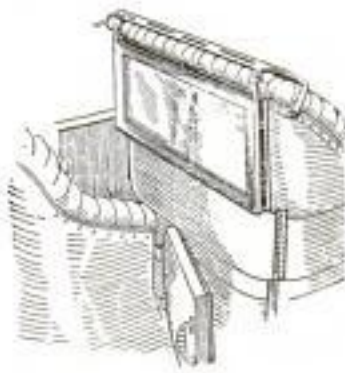
The accompanying drawings illustrate a dust screen for the protection



New Type of Auto Tire



Rear Seat Shield Extended and Folded Away



of the persons in the rear seat of an open automobile, and an entirely new type of auto wheel, both of which are English. The former is an extending shield, which fits to the rear of the front seat, and gives as complete protection from dust and draughts as does the shield widely used for the front of automobiles.

The new tire is neither pneumatic, nor, correctly speaking, a spring wheel, since no pawls, ratchets, or springs are used in its construction. It consists of two metal discs, the inner one being rigidly attached to the hub, while the other one, which can move around the hub, is attached by a special ball joint. The tire is of the solid type, made in sections, with small spaces intervening through which pass bolts coupling the flanges together. Owing to its peculiar construction, the wheel utilizes both its upper and its lower portions for absorbing road shocks, a means of adjusting it to various loads being provided in the ball joint, which can be tightened up to any required degree. The fact that the combined lateral movement of the disc and tire is greater than the majority of pneumatic tires does away with the "pounding" that is so detrimental, it is claimed.

MAKING BALLOON ASCENSIONS ON A BICYCLE

The familiar balloon ascension and parachute drop has become so common that the public now demands additional features in connection with the feat. Captain Penfold, an aeronaut who is performing in Australia, determined to get a thrill into his performance and now makes the ascension seated on a bicycle. The bicycle is attached to the parachute, and he makes his descent astride the machine also. After alighting he folds up the parachute and pedals back to the starting point.

He attaches rings over the handle bars and in back of the seat, and fas-



Where Bicycles Are Out of Their Element

tens cords from them to the wooden ring which hangs under the parachute. Penfold makes ascensions of over 7,000 ft. with this outfit.

THE FREE SEED HUMBUG

[From Editorial in Grain Dealers Journal.]

Sixty-one mail bags chock full of seeds have been shipped to an Indianapolis congressman by the Department of Agriculture free of transportation cost. The stuff may not be suitable for chicken feed, but that does not matter, the government has paid for it and the people who receive it will have the opportunity to experiment with it. At the same time an economical president, who overlooks the great expense of buying and transporting free seeds and of printing and transporting thousands of tons of congressional buncomb insists that postage rates be increased in order that the Postoffice department may continue to frank all the business of the government and still have a surplus.

AN AUTO BAGGAGE TRUCK

The slow progress of heavily-loaded baggage trucks on the platforms of great railroad terminals, and the strenuous pushing and pulling that is required to give them motion, necessitating the services of anywhere from two to four men, has caused the Pennsylvania system to install 12 auto baggage trucks at its New Jersey terminal.

This truck, which is a distinct innovation in the auto world, has many unique features. It has a length of

All that is required to change operation from one end to the other is to transfer the steering and controlling handles. In running the truck, the operator stands upright on a little platform, with his back against the end of the truck. One hand rests on the steering gear and the other handles the control. Each end, as before stated, has the same arrangement, and the platform of the end not in use folds up out of the way.

The trucks, which are driven by elec-



Newest Thing in Baggage Trucks

12 ft., a width of 44 in., and is provided with three speeds in either direction, varying from 4 to 7 miles an hour.

The most distinctive features of the truck are that it can be operated and steered from either end, and the way in which the wheels are mounted. Both pairs of wheels have knuckled axles, with the steering gear so connected that both pairs are used in steering. This permits of very short turns being made, an important consideration in crowded quarters. Both the steering and controlling gears are linked up to duplicate lever sockets, each end of the truck having a socket.

tric motors, weigh 2,390 lb., and their carrying capacity is 4,000 lb. The truck shown in the illustration is loaded with 20 trunks and bags.

DESTROYERS AS WIRELESS STATIONS

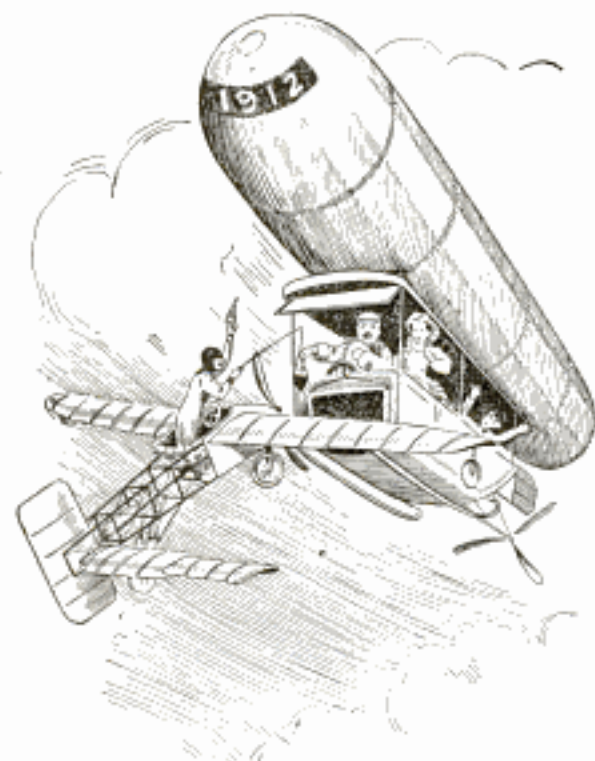
Torpedo-boat destroyers, long considered wicked little fighters and efficient scouts, may now serve as wireless transmission stations, according to plans being developed by the Navy department. The time has passed when admirals of the American fight-

ing fleets will be for long out of touch with Washington in times of trouble, and when the fleets are too far out at sea for the sending and receiving of aerograms direct, the speedy little fighters of the Navy will be sent out 500 or 1,000 miles to bridge the gaps and relay the messages back and forth on their journey.

Speedier than the heavy battleships, the destroyers will be able to run to other points if molested by the enemy, all the while keeping communication open. Thus the big fighting ships would not be drawn away and scattered for communication purposes.

AERIAL HIGHWAYMEN

The most timid need not fear that the long-buried "knight-of-the-road" will be resurrected to scour the heavens astraddle an aeroplane, for the accompanying illustration is only a fanciful



An Aerial Hold-Up

sketch. But, regardless of the improbability of such "airwaymen," the idea is one that would add spice to modern juvenile fiction.

STATUE WITH HUMAN SKULL AND HAIR

When the chief of a tribe on Malekula Island, New Hebrides, dies, the



A Curious Native Sculpture

sculptors of the tribe make a statue of him so that he may still watch over the living. A framework of wood and bamboo is set up, and over this is placed a composition of clay and vegetable fiber. The skull of the dead chief is used for the head, and this is filled in and modeled to resemble the living face. The dead chief's beard and hair are used to complete the likeness. The knees, elbow joints, and shoulders are decorated with faces, and the whole is colored a bright red.

One of the most interesting speeches delivered during the recent election excitement in England was made by a grey parrot at Walworth. The bird had been an attentive listener to election arguments, and one night astounded a gathering by shrieking "Vote for tariff reform."

HOW TO CONSTRUCT A MISSION WINDOW SEAT

A portable window seat of neat appearance, which is designed to take the place of a cedar chest, is shown in the accompanying sketch. If care is taken to make the joints fit well, the box will be practically airtight and mothproof, providing a place in which to store extra bedding or furs. The following list of materials will be needed:

- 26 ft. 1-in. thick cedar boards for the box.
- 1 piece pine, 2 by 2 in. by 12 ft. long.
- 32 ft. of $\frac{1}{4}$ by 2-in. oak strips.
- 54 ft. of $\frac{3}{4}$ by 1-in. oak strips.
- 16 doz. R. H. $\frac{3}{4}$ -in. long brass screws.
- 1 piece green burlap, 24 by 48 in.
- 2 pieces green burlap, 20 by 44 in.
- 2 pieces green burlap, 20 by 20 in.
- 20 pieces red burlap, $3\frac{1}{4}$ in. square.

The box as shown in Fig. 1 is made first. Nail the sides and the bottom to the ends, being careful to get the box perfectly square. The corners can be dovetailed together if desired. The extra time it takes in making the dovetailed joints will greatly add to the durability of the box. The box can be made much stronger by nailing the

in. square, to the bottom for the box to rest upon. These can be attached with long screws run through from the bottom of the box.

The green burlap is glued to the outside of the box. Be careful not to apply too much glue on the burlap, or it will soak through. This should be tried out on a scrap piece, and when the proper application of glue is ascertained, applied to one side of the burlap and stuck on the box. Place the cloth on so the weave will run in the same direction on all sides.

The oak slats are cut and fit over the burlap as shown in Fig. 2. Care should be taken to make the mitered joints a tight fit. After the miters are all cut and the location of the squares found, they are marked so that pieces of red burlap may be placed over the green before the slats are fastened permanently. The slats are put in place over

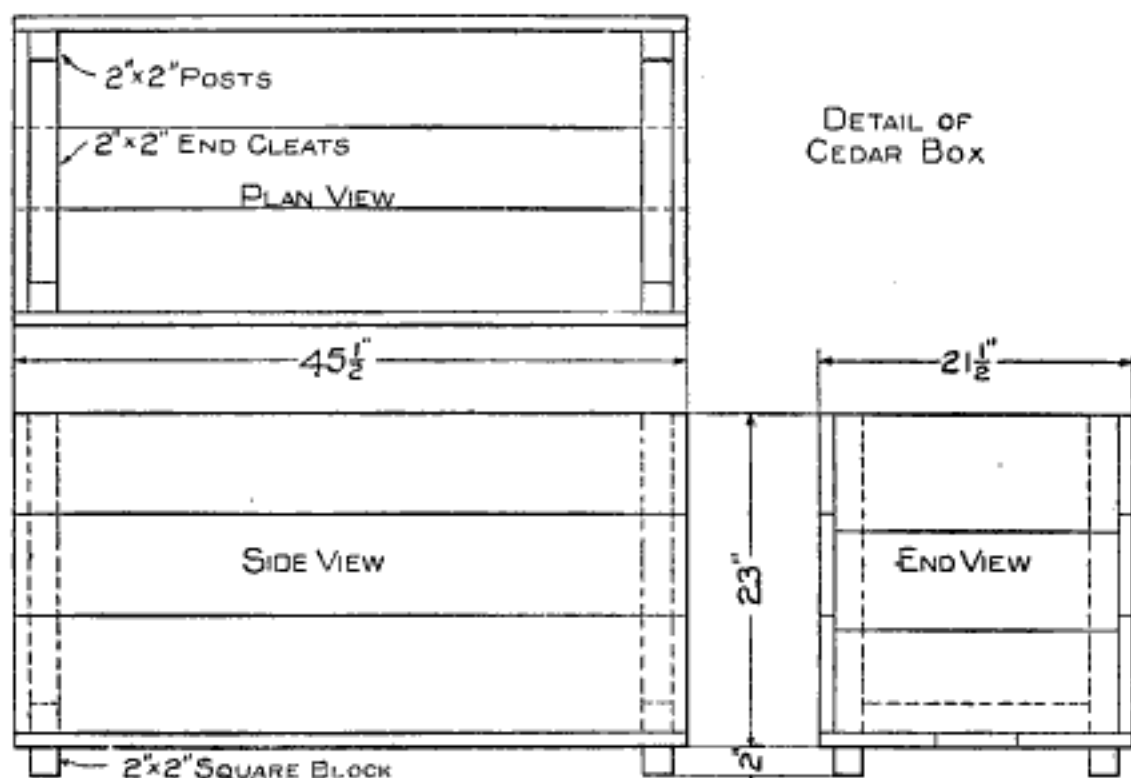


Fig. 1—The Rough Cedar Box Without the Covering

sides and ends to posts 2 in. square placed on the inside. Cleats should also be placed on the inside, at the bottom, as shown. Fasten four blocks, 2

the burlap and fastened with small brass screws.

Cover the top or lid with green burlap, allowing the edges to lap over the

ends and sides and fasten under the side strips. This top can be stuffed with excelsior, if desired, and tacks with large heads driven in to hold it in

The basket seat for the passenger is provided with apron, transparent shield, and leather hood, while the motorcycle driver is protected by

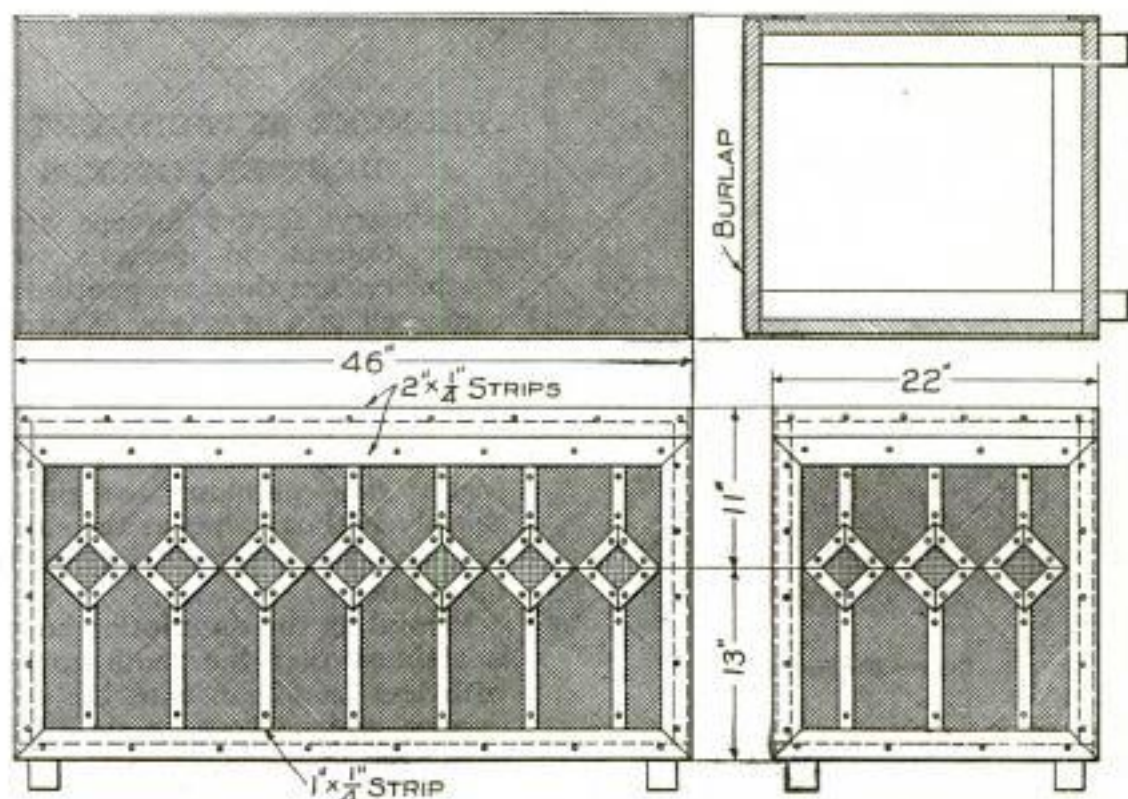


Fig. 2—Design of the Covering Strip Put on Over the Burlap

place. The slats can be stained any color to suit the maker. They should be removed from the box when being stained so as not to spot or stain the burlap.

STORM-CLOTHED MOTOR-CYCLE

In Europe, where people are less afraid of attracting public attention than in this country, the motorcycle with a third-wheel attachment for the accommodation of a passenger, is rapidly growing in favor as a vehicle for people who cannot afford the more costly automobile. Hundreds of such machines as the one shown in the illustration may be seen on the boulevards of London and Paris, and many of them are so equipped with weather protectors that the owners no longer fear being caught in the rain miles from home.

waterproof jacket, cap, gauntlets, and high-topped leggings.



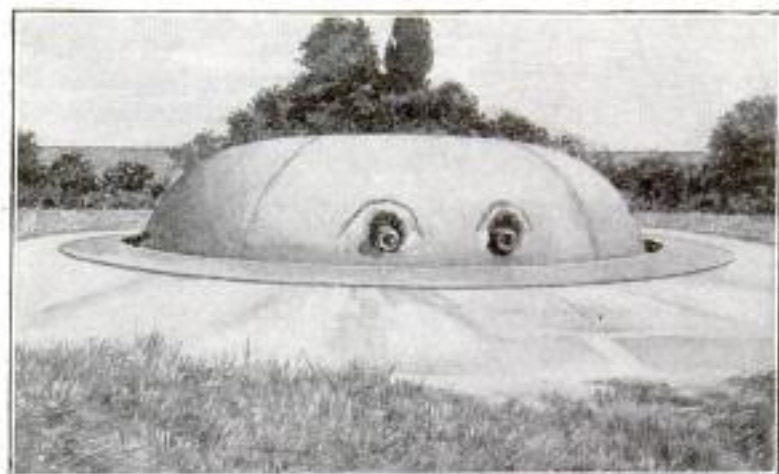
Courtesy Motor Cycling, London
Prepared for Bad Weather



Curious Russian Livery

PADDED LIVRY OF RUSSIAN COACHMEN

The coachman of an aristocratic Russian family makes himself look as fat as possible, for the larger he appears to be the more aristocratic and wealthy do the ordinary people consider the family to which he is attached. Many



A Turret Fort

of the coachmen are naturally fat, but even the fattest of them sometimes

wear a heavily padded livery that is really more of a gown than a coat.

The padded coachman shown in the illustration is only an ordinary example. He has many companions of greater magnitude.

PLUNGER ATTACHMENT FOR DENTIST FORCEPS

Ordinary dentist forceps are fearsome objects to persons with a toothache, but they are gentle tools as compared to a new type of forceps, in appearance at least. One handle of the new implement is a long rod-like affair on which a heavy weight slides. When the forceps are attached to the tooth, this plunging weight slides sharply against a stop at the end of the rod, and the resultant jerk dislodges the tooth.

Painful as the description sounds, it is claimed that the tooth comes out with less pain than with the ordinary forceps, and without an application of muscular force on the part of the dentist.

MODERN BELGIAN FORTS

The latest land fortifications in Belgium are curious cylindrical turrets of steel sunk into concrete wells in such manner that they turn, thus allowing the two guns to be trained in any direction. In fact the scheme is a land adaptation of the turret principle of battleships, and takes the place of the built-up earth fortifications so common in Belgium for many years.

Within the wells, under the crown-like tops of the turrets, are chambers for the men, magazines for the projectiles, and a machinery room. The concrete

walls of the wells are from 9 to 15 ft. in thickness.

SHOP NOTES

Heating Water for Cement

Having a quantity of cement left over from building a new house I concluded to build a creamery with it, and, as I had tried the old plan of heating irons in the fire and using them to heat the cement without much success, I devised the plan of heating the water in a coil attached to a barrel. This proved very satisfactory as the temperature was below zero and the water had to be heated for the concrete. I set two barrels about 6 ft. apart, one elevated about 3 ft. above the other, and then bent three coils in a 16-ft. piece of $\frac{3}{4}$ -

both barrels to a level just above the top pipe and the circulation will be free enough to heat the water quickly. The other method is to attach a pipe coil to one barrel as shown. This will cause a circulation free enough to heat the water rapidly.—Contributed by E. L. Jones, Nelson, Ill.

Tapping a Pressure Main

Tapping a water main while the pressure is on usually results in the workman getting wet. This wetting



Two Methods of Heating Water in Barrels

in. pipe, putting one end in each barrel. This left the pipe on a slant between the barrels. A fire was built under the coil and cold water was poured into the elevated barrel. As the water ran through the coil it was heated and passed into the lower barrel hot and ready for use.

Two other methods may be used as shown in the accompanying sketch. The first one shown is two barrels on the same level, connected with a pipe and having a coil in the center attached to the bottoms of the barrels. A straight pipe is put in about one-third the way down from the top of the barrels. Water can be put in

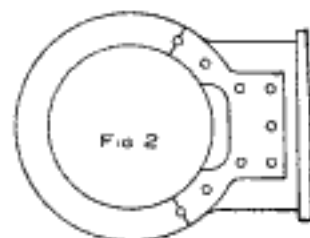
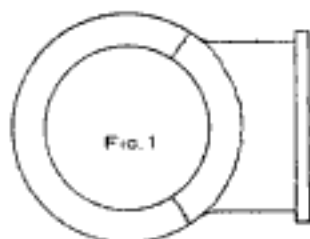
can be avoided if the simple device herein described is used.

Secure an empty lard pail and nail a block of wood to the bottom on the inside. Run the drill through this clear up to the shank, and cut the pail to such a length that the drill projects about $\frac{1}{2}$ in. below the open end. When the hole is drilled, the outrushing water will strike this pail and be deflected from the operator of the drill.—Contributed by Edwin S. Culver, Oakland, Cal.

A marble slab is much better for a paint stone than a board, as it can be readily cleaned off.

Repairing a Broken Cylinder

The wrist pin on a 75-hp. steam engine broke, which allowed the piston to smash through the cylinder head,



breaking it, also carrying away the steam port as shown by Fig. 1 in the accompanying sketch. A patch was made to fit the broken part in the following manner: The ragged edges were squared up so that a new piece could be fitted on as shown in Fig. 2. A brass patch could not be secured at the foundry as it was too large to cast in one piece, so an iron casting had to be used. As this could not be made steam-tight at the joints, allowance was made for a $\frac{1}{4}$ -in. boiler plate to be put in back of it. The plate was cut as shown in Fig. 3. Studs were put in as shown, the ones at the joints to make them steam-tight. After the casting and plate were in place and secured, the plate was calked both inside and out. The new head of the cylinder was allowed to project so as to take in all of the studs. The patch never leaked and the engine was used until discarded.—Contributed by W. E. Heist, Saskatoon, Canada.

A New Rabbit Trap

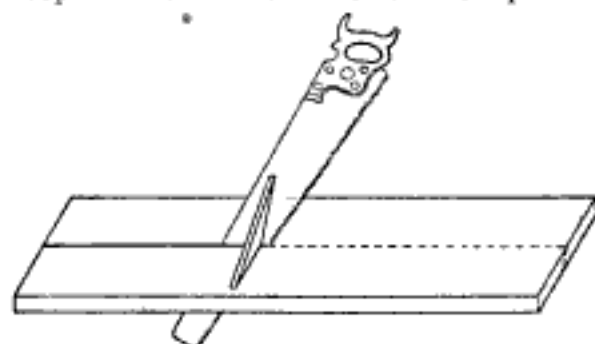
In a recent issue of Popular Mechanics I read a description of a rabbit trap. I have in mind a rabbit trap used by an overseer on a fruit farm of mine, which I think surpasses anything of the kind I ever saw. You must have a lively dog to help you out, however.

First, it requires a length of stovepipe inserted in a pile of brush or hedge. On the reverse end of the stovepipe there is a board $\frac{1}{2}$ in. thick, put on a hinge so that when the rabbit enters one end, the board drops back by gravity, preventing the return of the rabbit. There is a gunny sack or something of the kind on the end of the stovepipe, where the door drops, to receive the rabbit. This can be substituted with anything available. Rabbits have been known to gnaw out of gunny sacks, but this can be easily prevented by substituting something else. This trap is very successful where there is a good dog. He scares the rabbits up and they start with a rush for the first hole in sight, which is the stovepipe. I have found as many as six or eight rabbits in a single trap.—Contributed by W. E. Clark, Kansas City, Mo.

How to Bevel Rip a Board

A long board is hard to rip perfectly true to bevel, but with the little device shown in the illustration the ripping may be made easy. The device is made of a block of wood cut to the required bevel, which is held against the saw as a guide to make an even slant or bevel for the full length of the board.

This block of wood will save lots of unnecessary work when a quantity of bevel ripping is wanted, says a correspondent of the American Carpenter

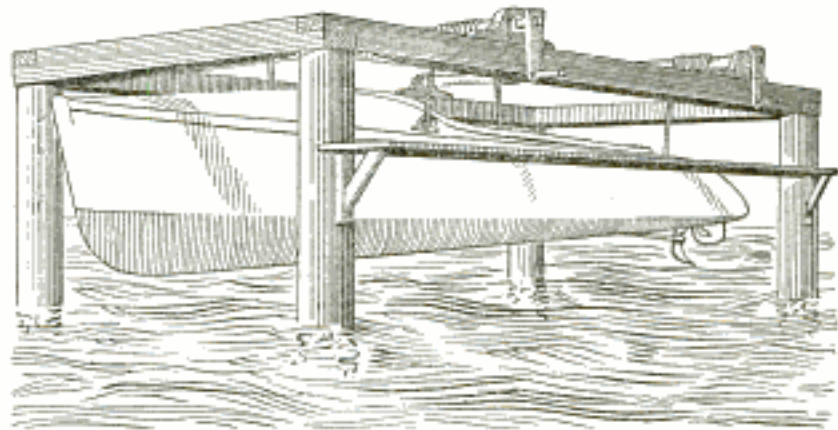


Sawing a Bevel

and Builder, and comes in very handy for ripping saddle boards or hip boards for a roof. The edges may be run over a joiner and the bevel retained in perfect condition.

A Substitute Harbor

A sandy beach makes a poor harbor for a motorboat, especially if it faces an open stretch of sea. It is very difficult to beach any but the smallest launches, and the owner does not care to risk his craft at an unsheltered anchorage. The illustration shows how one owner makes sure that the surf will not destroy his boat. He drove four large piles at a place where the water had sufficient depth to float the boat, cut the tops off level and spiked a frame on top of them. Two winches were attached to the frame. The motorboat is raised by means of the winches sufficiently to clear the combers.—Contributed by J. J. O'Brien, Buffalo, N. Y.



The Boat Is Raised Out of the Water

Vacuum Relieved on an Under-Water Exhaust Pipe

One of the worst troubles the owner of a motorboat with an under-water exhaust has is that of getting water in the cylinders of his engine. I have cranked for over an hour just to get out a little water which rendered the whole engine useless while it was in there. I have since discovered a way out of the difficulty, however, which may easily be applied to any boat.

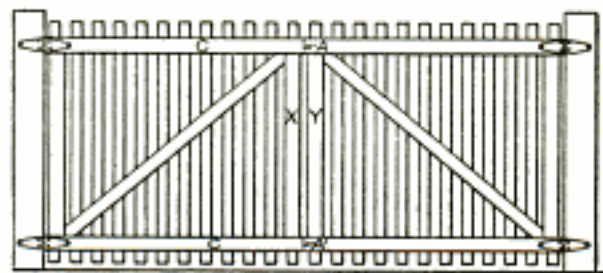
The cause of the water getting in the cylinders is that when an engine is stopped and left for any length of time, the air in the cylinders and exhaust valve casings cools and contracts. As it contracts it naturally creates a vacuum which is filled by water running into the valve casings, and, if the valves are open or not well-fitted, into the cylinders as well.

The remedy for this is to place a small pet cock in the exhaust pipe at its highest point, and to leave it open

after stopping the engine. Then instead of drawing in water, the cooling cylinder will take in air which is much better for the engine's well-being, and its owner's temper the next time he tries to run it.—Contributed by Harold H. Cutler, Springfield, Mass.

How to Hang a Double Gate

A simple and easy method of constructing and hanging a double gate so that it will swing perfectly true when complete is shown in the accompanying sketch. Make the gate in one piece by running the crosspieces C from one post to the other. Leave a small space between the upright pieces X and Y so that they will swing free of each other when the gate is cut in two. Hinge the gate to the posts at all four corners, testing the crosspieces with a



Gate Ready to Be Sawed in Two

level. Then saw the gate in two at A and A' and the two halves will swing perfectly true and match each other.—Contributed by Walter E. Wright, Granville, Ohio.

Use an old knife in cutting sandpaper; not the putty knife.

Spring Fork for Bicycles

The vibration on the handle bars of a bicycle, caused by running over

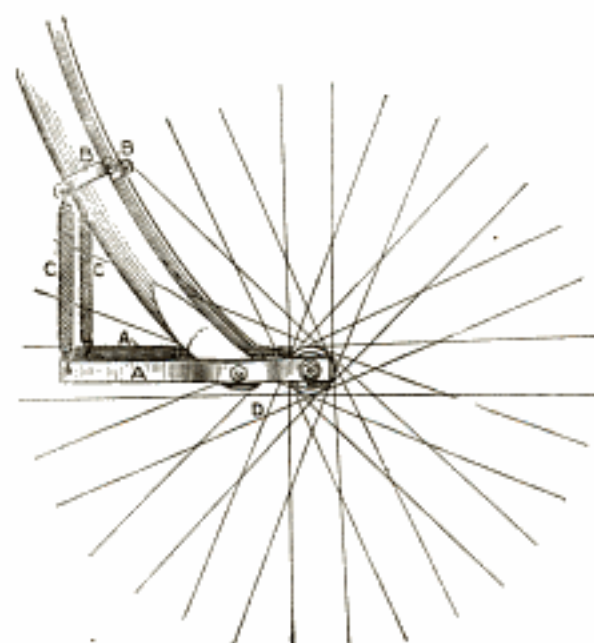
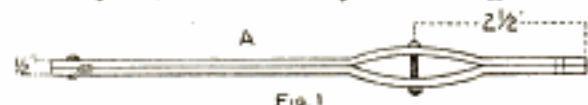


Fig. 2
Springs Attached to the Front Fork

rough roads, may be eliminated by attaching a spring fork. Such a contrivance that requires no special skill to make is shown in the accompanying sketch. Two strips of iron, A, Fig. 1, are welded or riveted together, leaving an open space $2\frac{1}{2}$ in. from one end which is to receive the end of the bicycle fork and bolt. Two of these pieces are required, one for each side of the wheels. They are attached to the wheel and forks as shown at AA, Fig. 2, and connected with springs, CC, to clamps, BB, on the bicycle forks. The method of working is apparent.—Contributed by Donald H. Fairchild, Pana, Ill.

Fumigating a Greenhouse

The best way to get action on the insects in a greenhouse is to put the fumigating apparatus up in the ridge of the house and let the fumes fall, says a correspondent of *Florists' Review*. With the source of the fumigant

placed on the walks, the vapor rising often leaves the lower part of the greenhouse only lightly fumigated, if at all. If the fumigator is hung close to the ridge the fumes given off are quickly cooled by contact with the glass and thereby become heavier than the atmosphere. This results in the fumes settling just as one sees a fog settle upon the ground. In this way the house will be filled evenly full of vapor clear down to the ground, completely enveloping the benches and the plants on them.

A fumigator can be made as a wire net in the shape of a cylinder. This is packed full of wet tobacco stems and hung up close to the ridge and the stems set afire at the bottom. The result is that instead of giving off smoke, the fumigator gives off steam. The only point necessary to watch is to see that the tobacco stems are properly moistened.

Supports for the Care of Paint Brushes

Common wood clothespins may be used as supports for holding paint brushes in a liquid while they are not in use. The pins are clamped on the brush handles and then placed on two sticks across the top of the pot as shown in Fig. 1. This method of supporting them in the liquid is especially good for camel's hair or any other brush made of fine hair. The brushes will become very much deformed if they are allowed to rest on the bottom

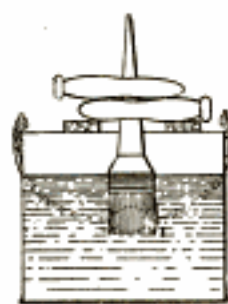


Fig. 1



Fig. 2

Caring for the Paint Brush

of the pot. Several brushes can be put in one pot, as shown in Fig. 2.—Contributed by James M. Kane, Doylestown, Pa.

Rosin as an Aid in Picking Fowls

All of those who have had the troublesome experience of picking wild ducks will find it quite easy the next time they have ducks to pick if powdered rosin is sprinkled among the feathers before placing the bird in the hot water. The heated water will run the rosin, and the feathers will all pull out like a solid mass. All the fine down will come out with the feathers. This method can be applied to tame fowls as well.—Contributed by C. Howell Dockson, Springfield, Ill.

How to Empty a Large Bottle

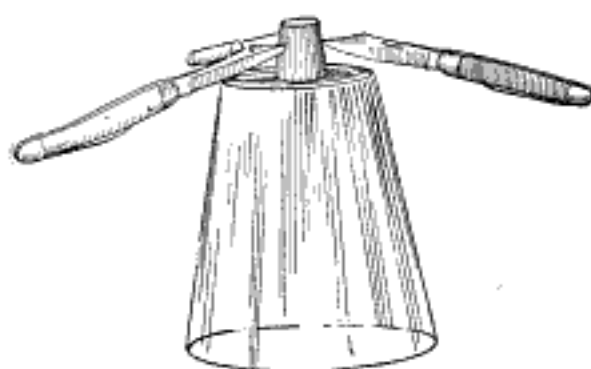
A bottle, and especially a large one, can be quickly emptied if you take hold and invert it over the receptacle into which you wish to turn the contents, as shown in the sketch, and, while holding the neck in a steady position, give the bottom a rotary motion. This will form a small whirlpool that will admit air to the space vacated by the liquid and cause it to run freely from the bottle.—Contributed by Maurice Baudier, New Orleans, La.



Window Display for Cutlery

An attractive moving window display for cutlery and hardware dealers is shown in the accompanying sketch. The articles necessary are an electric fan, several old-fashioned glass tumblers and some corks. The tumblers are set upside down in the window so the current of air from the fan will strike forcibly against one side of them. Select for each tumbler three knives of about the same weight so they will balance well, open the longest blade of each and stick them into a cork at equal distances apart. Place the cork

in the sunk portion of the glass as illustrated. The current of air striking on



Cork on the Tumbler

one side will cause the knives and cork to turn around. The fan should be placed in a corner where it can be concealed, or placed behind some larger object in the window display.—Contributed by Harry Miller, Lujane, Colo.

A Surf Bait Net

The simple device illustrated is the invention of an angler to aid him in securing sea clams and other marine creatures to be used as lures in catching Pacific coast fish.

The device consists of a cone of $\frac{1}{4}$ -in. mesh wire firmly secured to the extremity of a stout bamboo pole, 12 ft. long. The lower portion, as shown in the cut, is flattened to form the horizontal plane when brought in contact with the sand.

The operator wades into the surf, extending the bait net through an incoming breaker to the sandy bottom, and drags it slowly toward himself as the wave recedes. Each successive haul discloses a number of sea clams which it would be almost impossible to capture without the aid of this device. The rigid pole permits placing



Bait Net

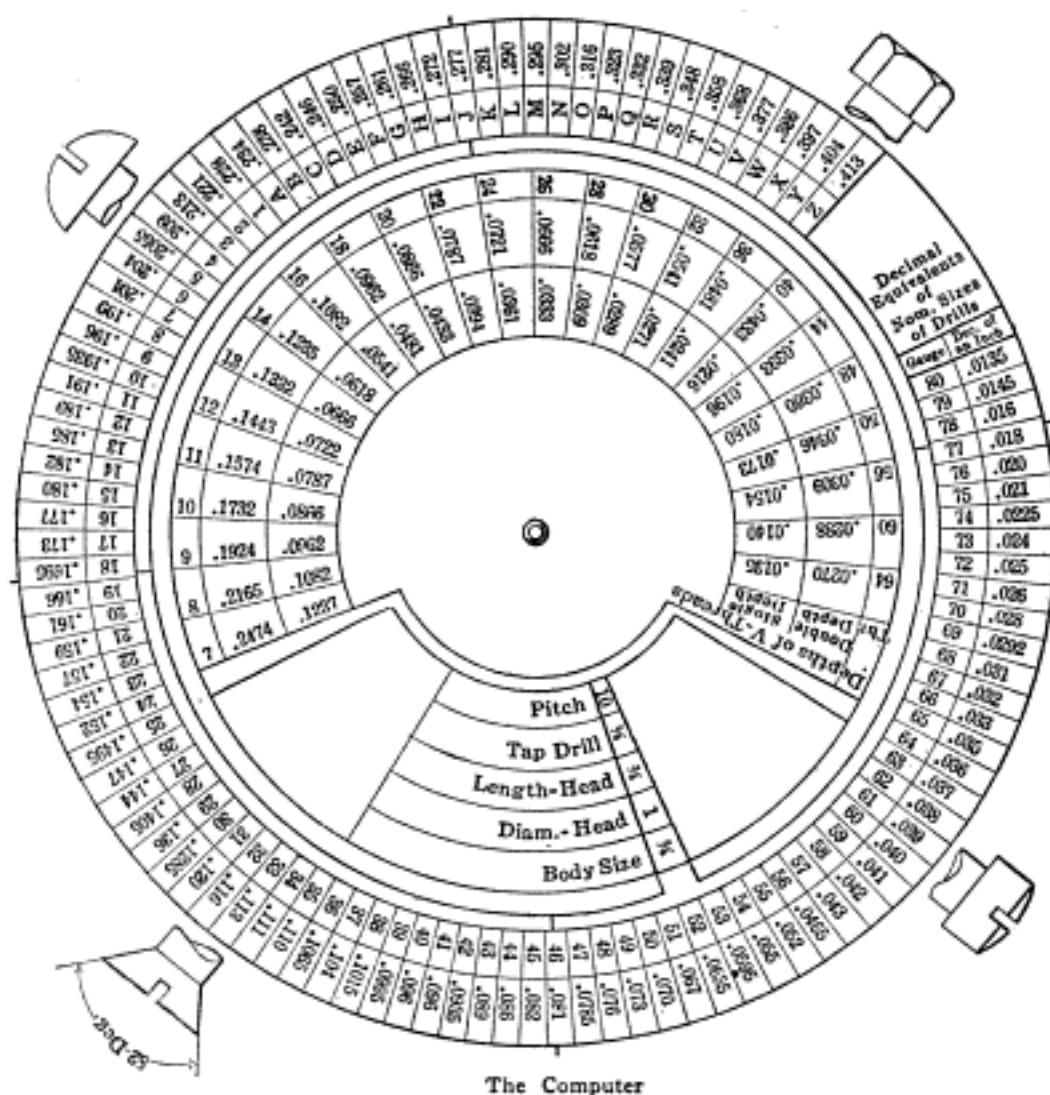
and holding the trap in any desired position, and serves as a lever to tilt the whole at any angle in scraping the wave-washed sands.—Contributed by H. M. Meinell, Sawtelle, Calif.

A Machine Screw Computer

Tables of machine screws are not convenient for frequent reference and a correspondent of American Machinist devised a computer as shown in the accompanying sketch for quickly finding the desired result. The computer was made by fastening blue prints on sheet metal.

How to Construct a Road Through Swampy Land

A road almost one mile long through bottom land and swamps in the state of Illinois was graded up about 3 ft. above the level of the ground to receive a covering of stone. Before the stone arrived, high water covered the newly made roadbed and made it impossible



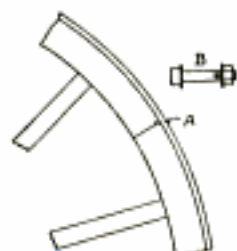
The outer circle gives decimal equivalents of nominal size of drills. The table on the center disk gives single and double depths of V-threads from 7 to 64 per inch. Under the center disk are five circles of figures giving the dimensions called for on the disk, opposite each circle. These give the sizes most used in machine-shop work and show only the size you want, preventing confusion of sizes.

to travel over the soft earth. Efforts were made to get the grade to specifications, but this was abandoned as the grade could not be kept in shape. The stone was hauled from the car and the building on the end of the road begun next to a railroad by unloading the stone in the center of the dump and not spreading any for the final course. The final course was dumped out in the mud for about 200 yd. and the road

builders dropped back and commenced with the second course, dumping it in the center as before. When the teams running over it did not fill the ruts, a man was employed to spread the stone and keep the ruts about level. The wheels of the wagons pressed out the sides of the embankment and made a protection of earth to keep the stone from spreading and rolling too far. By doing this the builders made most of the road about 8 ft. wide and 8 in. deep, except for about 150 ft. which was water and mud that could not be drained. On this part of the road boulders from 24 in. to as large as the men could handle were placed to make a firm foundation. Stone was placed on top of the boulders, which made a good road. A short distance was made up by placing stone in the mud and water, a yard in a place to cover 8 ft. wide and 10 ft. long; then covering the stone with sand and putting on more stone alternately several times, which cemented the stone and made a good road. The worst place was made by putting in 1 ft. of wheat straw and weighting it down with sand and stone put on the sand. This seems to be the best part of the constructed roadbed.

How to Fasten a Loose Wagon Tire

Tires often come loose in hot weather and if the wheels are so old or badly dished that it would not pay to have them reset, the following method to keep them on may be used to advantage. Drill small holes at the felloe joints and against the tire as shown at A in the sketch. Use an iron drill if you have one, as rubbing against the tire will not injure it. Put a bolt of proper size and length through the hole with washers on both sides of tire and fasten with a nut. This will hold the tire on the wheel and also make a solid joint if the felloes are loose.—Contributed by Allen L. Barnes, Harrisburg, Ill.



A Concrete Fountain

This unique fountain as shown in the illustration, is made of concrete



Unique Form of a Concrete Fountain

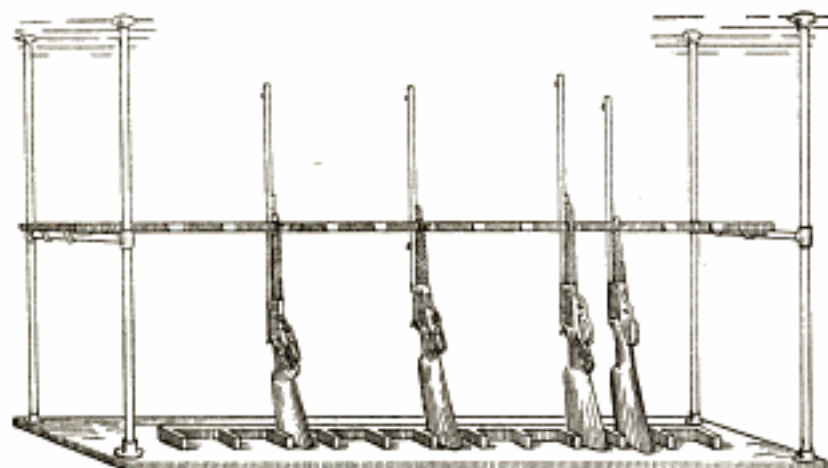
formed over six small barrels and two box forms. While the concrete was still plastic, small stones were stuck in to give them the appearance of being laid in mortar. A small pipe connected to two faucets, one at each end of the top barrel, supplies the fountain with water. The basin resting on the first four barrels is the right height for watering horses and the overflow runs into the second or smaller basin at the bottom where dogs or other small animals may drink. The water overflows from the second basin through pipes into the nearby sewer.—Contributed by Frank H. Miller, Woronoco, Mass.

How to Restore Hones

Hones made of natural or artificial stone soon lose their original cutting properties on account of metallic particles filling up the pores. This can be remedied and the stone made to work as good as ever by carefully applying hydrochloric acid, which will convert the metal particles into chlorides. The chlorides are easily washed off with water.—Contributed by H. F. Jensen, San Francisco, Calif.

An Insulator Lightning Discharge Gap

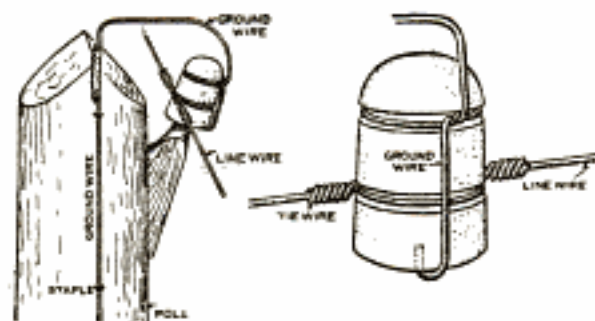
We use a device such as is shown in the accompanying diagram to relieve our lines of lightning charges, says a correspondent of Telephony. The only



Gun Rack Fastened to Ceiling

material required is a piece of No. 12 iron wire and a double-groove porcelain insulator.

Bend the piece of iron wire so as to make a hook about $\frac{1}{2}$ -in. deep with which to clasp the bottom of the insulator. The line wire is placed in the lower groove and tied in the regular way. The wire carrying the hook is then set in place on the rim of the insulator, properly bent, tied in the upper groove, and connected to a ground wire. Between this and the tie wire there will be a small gap, the width of which can be regulated by the lineman.



Method of Tying the Wire

This will provide an escape to the ground for lightning. The hooked wire must be drawn tightly around the groove so that it cannot move, and ground the line.

A Display Gun Rack

Most gun racks in retail stores are placed against the wall, but sometimes every available space is needed and a rack suspended from the ceiling, as shown in the accompanying illustration, will be found of value. The guns can be seen from either side and are within easy reach.

The rack is made of $\frac{1}{2}$ -in. iron pipe, which is cut in lengths suitable for the height of the ceiling. The upper lengths of the pipe are screwed into floor plates attached to a joist in the ceiling with screws turned through the plastering.

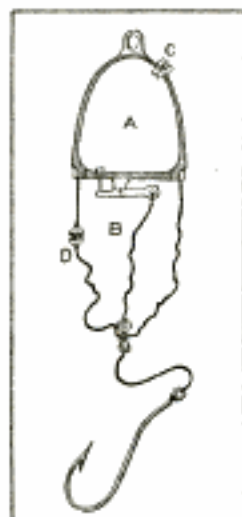
These pipes are fitted with tees and a cross pipe. Four other lengths of pipe are turned into the bottom opening of the tees and their lower ends fitted with floor plates fastened with screws to a bottom board or shelf. Small stalls or divisions are nailed to the board in which to place the gun stocks. A narrow notched board is fastened with clips to the cross pipes for supporting the gun barrels.

Keeping Dry While Making a Joint Under Pressure

A plumber sometimes finds it necessary to start a pipe in a fitting from which water is flowing under pressure. This is an unpleasant task and the person attempting to do this will undoubtedly get wet. The water may be diverted by attaching a stop-cock to a long nipple and on this a pair of ells to form a reverse bend. Leaving the cock open while starting the thread removes practically all pressure from the branch and the reverse bend throws the water away from the workman while he runs up the thread by hand, after which the cock can be closed, and the work completed in the usual manner.—Contributed by E. S. Culver, Oakland, Cal.

Raising a Fish Line Sinker with Compressed Air

The sinker is constructed with two compartments, viz.: a pressure cylinder, A, with walls thick enough to carry a high pressure of air and a collapsible bag, B, to receive a part of the air pressure to increase the displacement when the fish is hooked. The pressure cylinder has an air valve, C, for filling and a lift valve in the wall between the two compartments. The fish when hooked operates the lift valve by the pull on the line



which allows the high pressure of air to pass through into the collapsible tube causing it to expand to its full size. The increased size of the bag produces sufficient displacement to draw itself, line and fish to the surface of the water. The sinker is to be used when fishing for perch or other small fish. The collapsible bag has a safety valve, D, to prevent excessive pressure.—Contributed by W. S. Jacobs, Malden, Mass.

Home-Made Can Opener

There are not many households that do not have one or two broken case knives. One of these will make a serviceable can opener if the part of the blade shown by the dotted lines in the sketch is filed away, and the top edge of the remaining metal sharpened for the full length as well as the lower edge on the end. This little tool will

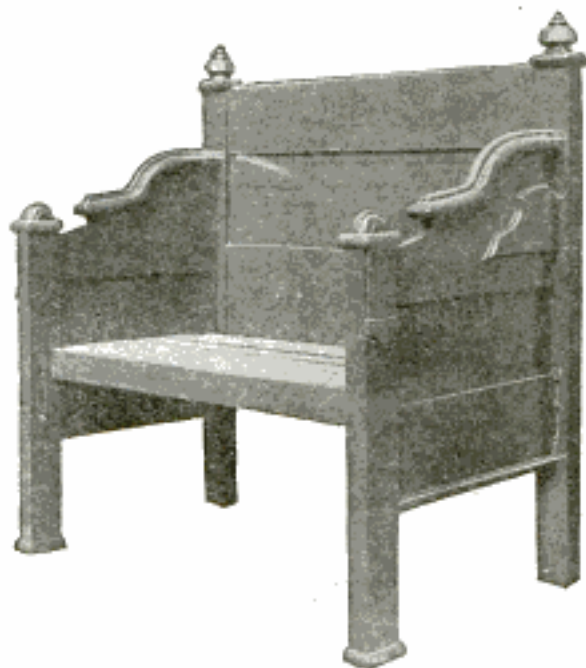


Knife Formed into a Can Opener

be found very useful about the kitchen as it can be put to various other uses as well as that of opening cans.—Contributed by R. A. Bryan, Corsicana, Texas.

Home-Made Settee

Many people have old wooden beds stored away which can easily be made into handy settees like the one shown



Settee Made from an Old Bed

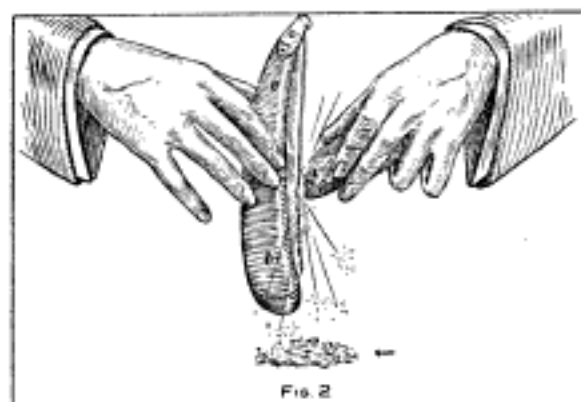
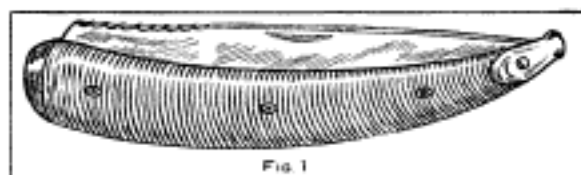
in the accompanying photograph. A few nails and one-half dozen 3-in. screws are all the materials necessary besides the old bed. The tools needed are a saw, hammer and a screwdriver. The headboard, if too high, can be cut off and some of the ornaments replaced. The footboard must be cut in two to make the ends or arms of the settee. The side rails and a few of the slats are used in making the seat.—Contributed by Wm. F. Hild, Lake Forest, Ill.

Red and Green Glass for the Moving Picture Machine Operator

The peep hole in the lamp house where moving picture machines are operated is covered with red glass. When the operator is watching his carbons and then occasionally looks at the pictures they will blur his eyes for the instant. Take a piece of green glass and place it in front of the red one and when the pictures are examined through both glasses no blurring will be noticed.—Contributed by Thomas Finn, Baltimore, Md.

Lighting a Fire Without Matches

The small nicks cut in the backs of Italian knives are for the purpose of



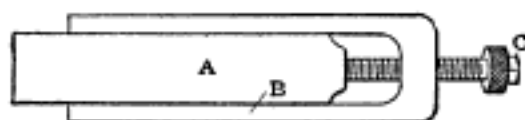
Lighting a Fire with Flint

making a fire when matches are not at hand. The notches are cut as shown in Fig. 1. The method of striking a fire is shown in Fig. 2.—Contributed by James M. Kane, Doylestown, Pa.

An Adjustable Wedge for Use on the Machine Table

The accompanying sketch shows an adjustable wedge which I use quite extensively in my shop in connection with milling, shaping, and planing machine tables, says a correspondent of the American Machinist.

The tool consists of a wedge, A, which slides in a hollow block, B, under the pressure of a screw, C, which



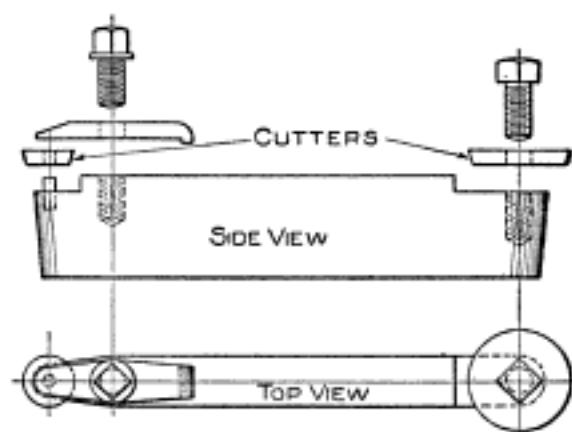
An Adjustable Wedge

has a portion of its head knurled for a finger grip, and the rest made square or hexagonal to fit a wrench. A num-

ber of wedges having different thicknesses can be used on the same blocks for obtaining a wider range. The tool has proved very useful, not only for setting pieces on the table of a machine, but also for clamping and holding irregular shapes in vises.

Universal Forming Tool

A universal forming tool for the lathe or shaper is shown in the accompanying sketch. The cutters are made of tool steel and can be of various sizes as they are interchangeable. The sizes ranging from $3/16$ to $1/2$ -in. should have a $1/8$ -in. hole drilled in them, while the larger ones should be drilled $1/4$ -in. The cutting edges of the cutters should be ground at an angle of about 10 deg. The holder is made of a piece of $1/2$ by 1-in. steel about 5 in. long. Cut and round the ends as shown in the sketch. Drill a tight fit hole for a $1/8$ -in. diameter pin in one end and tap a $1/4$ -in. hole in the other. The small cutters are fastened by means of a clamp and a



Detail of Universal Forming Tool

$1/4$ -in. cap screw. The large ones are also held by a $1/4$ -in. cap screw. Not only round tools, but straight and irregular ones can be used.—Contributed by Max Lange, Hartford, Conn.

Repairing a Water Main Break

A 12-in. gravity supply main sprung a leak at a point where the line passed through a swamp. The crack was about 4 ft. long, not straight, but running spirally from one end to the other of the pipe. The crack would

remain closed almost tight, but whenever high pressure occurred would open to about $\frac{3}{4}$ in. The pipe was buried about 3 ft. in quicksand. After digging down to the pipe it was decided that it could not be replaced without sheeting the excavation, and the following method for closing the break was used: Heavy iron screw bands $\frac{5}{8}$ in. thick, $\frac{3}{8}$ in. wide and having 1-in. thick jaws clamped with $\frac{1}{4}$ -in. screw bolts were placed around the pipe at equal intervals over the break. After setting all bands tight, a strip of gum rubber was fitted tightly over the crack with strips of wood and wedges between the jaws under the bolts. No doubt the crack will be rusted tight by the time the rubber has decayed.

While the foregoing plan is a good one, the safest and surest way would be to make a box form around the pipe, and, after clamping the pipe and stopping the leak, fill the form with a neat mixture of concrete, using some kind of metal reinforcement.

Repairing a Damaged Commutator

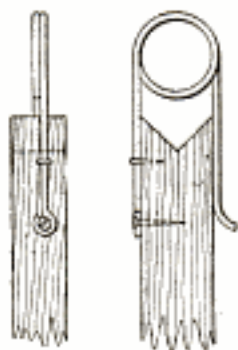
A method of repairing a large hole which was burned in two adjacent bars of a commutator, the intervening mica being pierced and destroyed by the arc set up, is from a description given in Feilden's Magazine.

Figure 1 shows the general shape and dimensions of the hole. The first operation was to clean carefully and tin the surface of the hole. The two bars were then wedged apart and mica strips, A B, of the requisite size and thickness forced in. The commutator was then warmed up as much as possible by means of soldering irons and strips of mica, C D, E F, placed at the front and back of the hole, being kept in position by pieces of wood, W. Solder was then poured

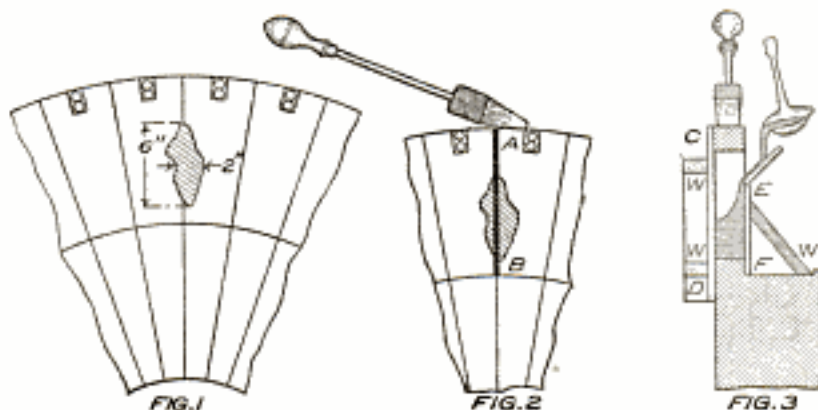
into the hole from a ladle, using a rough mica funnel to guide it. This method proved to be a thoroughly good mechanical and electrical one, and saved the time and cost of dismantling the commutator entirely and fitting new bars. The details of the operation are shown by Figs. 2 and 3.

A Clip for a Clothesline Pole

Often, in windy weather when clothes are hung on a line to dry, the wind swings the line to and fro, causing the props to drop from under it and letting the clothes drag on the ground. A simple and effective means of preventing this mishap is shown in the accompanying sketch. A piece of steel wire of 12 or 14 gauge is formed around a stick or pipe, leaving the ends in the shape shown. The



clip is fastened to the pole by means of a wood screw through the eye at one end of the wire. A small staple should be driven over the wire near the end of the pole to prevent the clip turning on the screw. To put the prop under the line, the hook end of the wire is



Filling the Hole with Solder

drawn over the line until the hook opens sufficiently to allow the line to pass under it, where it stays until released.—Contributed by O. E. Miller, Philadelphia, Pa.

Protector for a Water Gauge Glass

Water gauge glasses on boilers often break from one cause or another, and it is a very difficult task to close the stop cocks without getting scalded from the escaping steam and hot water. The accompanying sketch shows how a contrivance can be made in a few minutes' time which will protect the glass from getting broken, and if broken, will keep the person in charge from being burned when he closes the steam and water cocks.

When putting in a new glass slip over it two rubber washers, and on the outer side of these, two iron washers. Insert glass in the usual manner, then push the iron washers, one each way, and the

rubber washers tight against them. Now get the distance between the two rubber washers and cut a $\frac{3}{4}$ -in. iron or brass pipe, the same length as the distance between these rubber washers. Slot this pipe from end to end, pry it open and slip it over the glass between the two rubber washers. Now close it with a pair of pincers, close up until you have a $\frac{1}{4}$ or $\frac{3}{8}$ -in. opening between the edges of the pipe. The water level can be seen through this slot, and if the glass breaks one can get behind it and close the cocks without being burned. Paint the pipe red on the inside and the water level will show up better in the glass.—Contributed by H. C. Faber, Monongah, W. Va.

How to Waterproof Canvas

The method used by the British navy yards for waterproofing and painting canvas so it will not become stiff and crack is as follows: One ounce of yellow soap and $\frac{1}{2}$ pt. of hot

water are mixed with every 7 lb. of paint you wish to use. The mixture is applied to the canvas with a brush. This is allowed to dry for two days and then a coat of the same paint without the soap is laid on. When this last coat is dry the canvas may be painted any color desired. After three days of drying the canvas may be folded up without sticking together, and, of course, it is waterproof. The canvas waterproofed in this manner makes an excellent covering for portable canoes and canvas boats. The color mixture for the soap and second application is made from 1 lb. of lampblack and 6 lb. of yellow ochre, both in oil; the finish coat may be any color you wish. When no paint is to be used on the canvas it may be waterproofed with a mixture made from soft soap dissolved in hot water, and a solution of iron sulphate added. Iron sulphate, or ferrous sulphate, is the green vitriol. The vitriol combines with the potash of the soap, and the iron oxide is precipitated with the fatty acid as insoluble iron soap. This precipitate is then washed, dried and mixed with linseed oil and applied to the canvas. This will render the cloth waterproof, and at the same time the material is quite flexible and not inclined to crack.

Ironing-Board Stand

When an ironing-board is placed upon the backs of chairs for convenience it will not stay in place as the



Board on the Chairs

clothes are ironed. If the board is notched, as shown in the illustration, to fit the back posts of each chair, both

the chairs and board will stand as solid as a table while the work is being pressed.—Contributed by Nathan Tornausk, Rockville, Conn.

How to Drill Odd-Sized Holes Smooth and True

Quite often a machinist has several small holes to drill of an odd size that should be smooth and exact. An ordinary drill will not make a smooth hole and invariably drills a larger hole than the drill size and because of the odd size a reamer cannot be used. A good way to do the job and get a smooth hole is to first drill through with a drill $\frac{1}{8}$ in. smaller than the size required, then take the regular size drill and round the corners of the cutting edges as shown in the accompanying sketch and finish the hole out with this. The drill acts as a rose reamer and the result will be a perfectly smooth hole of standard size.



A Plumber's Socket Wrench

A useful device that may be resorted to in case of necessity is a socket wrench made from wrought-iron pipe to fit over the square heads on

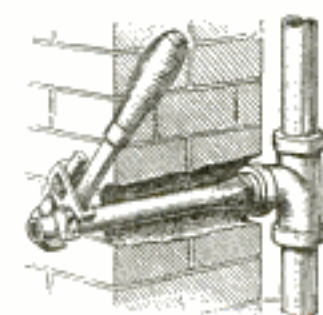


Fig. 2

plugs used to stop an outlet when a plumbing system is to be tested, or has been left for the connection of a fixture at some future time. A little oversight may leave these plugs in position where they cannot be turned with a common wrench after a plumbing system has been tested and the tiling has been set and the walls finished, says Metal Worker. To attempt their removal by means of a wrench in the ordinary way would mean a great deal of expensive work.

Socket wrenches made as shown in the accompanying sketch, Fig. 1, provide a way to remove plugs left in

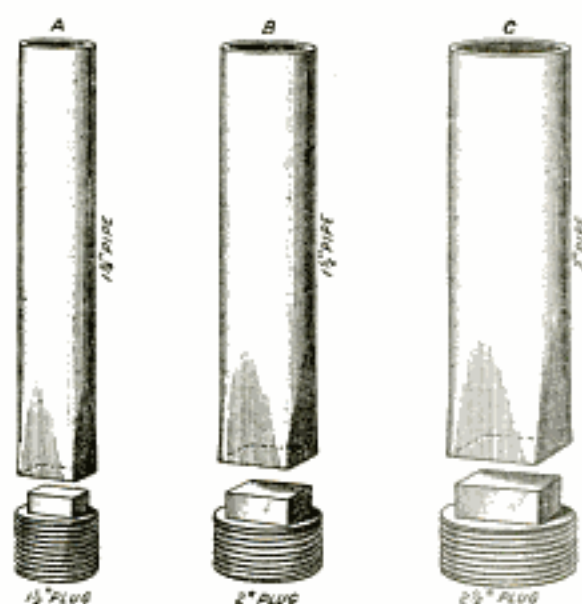


Fig. 1—Set of Socket Wrenches

places that cannot be reached with the ordinary wrench. Each socket wrench is made from a piece of wrought-iron pipe, heated in the forge and one end formed square with a hammer, so it will fit over the square head of a plug. The socket wrenches should be about 18 in. long.

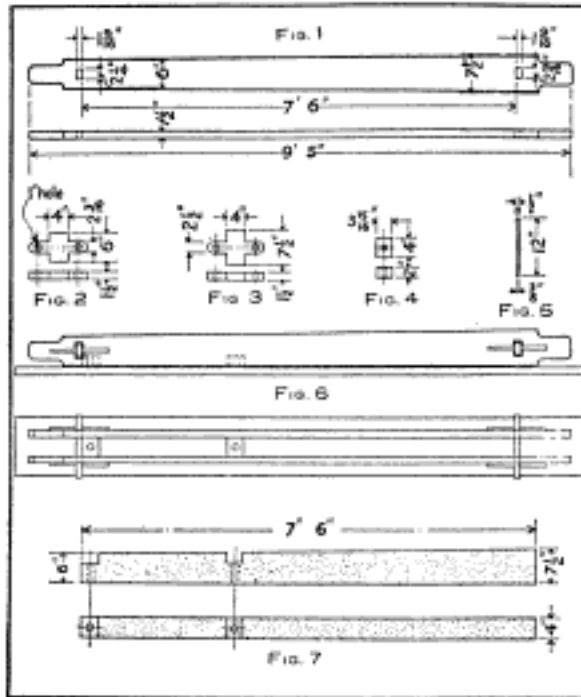
In making up such wrenches it will be found that $1\frac{1}{4}$ -in. pipe is the best size to use for making a wrench for a $1\frac{1}{2}$ -in. plug, $1\frac{1}{2}$ -in. pipe for a 2-in. plug, and a 2-in. pipe for a $2\frac{1}{2}$ -in. plug. When these socket wrenches are used in connection with a pipe wrench, as shown in Fig. 2, the plugs of various sizes set in unhandy places may be easily removed.

Preventing Blueprints from Fading

Expose the print until it is somewhat "burned," remove from the frame and wash until all the emulsion is removed. Immediately after the washing spread the print or prints out on a smooth surface and paint the blue side over with peroxide of hydrogen. This will bring out the ground very blue and the lines perfectly white. Such a print will not fade in sunlight.

Mold for Making Concrete Fence Posts

The detail drawing gives the sizes to construct an ordinary post. The mold requires two sides as shown in



Fence Post Mold Details

Fig. 1, which are spaced with the end pieces, Figs. 2 and 3, and clamped with pins. Two blocks, Fig. 4, are fastened to the board forming the bottom of the mold, Fig. 6, to make the mortises for the rails. Two iron pins, Fig. 5, are placed upright in the blocks after the mold is set up. These pins should be removed before the cement sets.

As many bottom boards should be used as there are posts to be made. After tamping in the concrete and forming the post take out the pins and remove the four form pieces and set the bottom board with the green post aside to cure.—Contributed by Harry M. Wynn, Warwick, Pa.

Preservation of a Leather Carriage Top

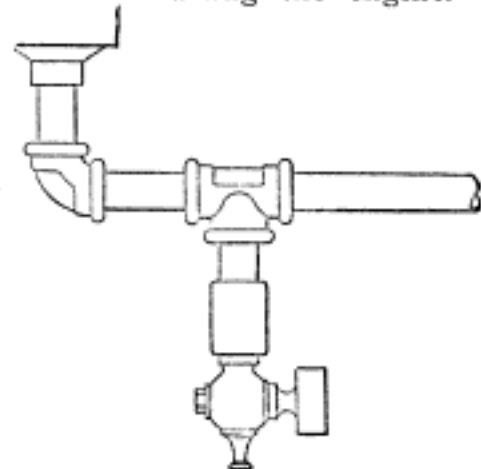
The hand-buffed leather top, so long as its enamel remains unimpaired, needs no dressing. An occasional washing of the leather with castile soap, or with an oil soap in which the oil counteracts the activity of the alkali, will serve to remove any injurious

substances accumulated during service. Cleanliness will keep the top elastic so it will be responsive to the ordinary demands imposed upon it.

When the enamel has fractured and worn down close, and in many places worn away altogether, the leather needs something to both restore and preserve it. Cleanse off the leather first with castile soap and water. Dry off with a soft woolen cloth. Melt 2 oz. of beef suet in a scant pint of neatsfoot oil, after which darken with drop black. Take a piece of beeswax about the size of an ordinary thimble, melt, and add to the oil and suet; mix thoroughly and apply with a cotton cloth saturated with the material, rubbing it on smooth and uniform. Apply this mixture every 4 or 5 months.

Removing Water from Gasoline

The water from condensation or otherwise found in gasoline may be removed through a drain drip cock attached at the lower end of a vertical pipe connected in a horizontal supply pipe coming from the bottom of a tank when the oil is used in an ordinary gasoline engine. The water being heavier than the oil will collect in the bottom of the tank and run through the pipes first, causing considerable trouble in starting the engine. The



Water Drain Attached to the Pipe

supply pipe connected as shown in the illustration with the drip extension at the bottom provides a way for the collecting water to be drained off before reaching the engine cylinder.

A New Method of Planting Tomatoes

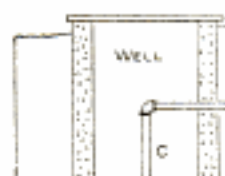
Instead of planting tomato seeds in a box as most people do, cut a hole in a small potato, fill with dirt and plant your seed in this. When you wish to transplant, set the potato just as it is into the ground. In this way you do not disturb the roots of the young plant and it is not set back by the transplanting.—Contributed by Vigne M. Carey, Grand Rapids, Wis.

Formula for Depth of Threads

In accurate thread cutting on a lathe it is often necessary to find the depth of the threads in order to determine the proper clearance. The usual method of doing this involves considerable figuring but this can be avoided by using the simple formula:

$$\text{Depth of Thread} = \frac{.866}{\text{No. of Threads per in.}}$$

This formula is correct to within 1/100,000 of an inch, and is intended only for standard V threads. The decimal .866 is the cosine of 30 deg.—Contributed by E. W. Davis, Chicago.

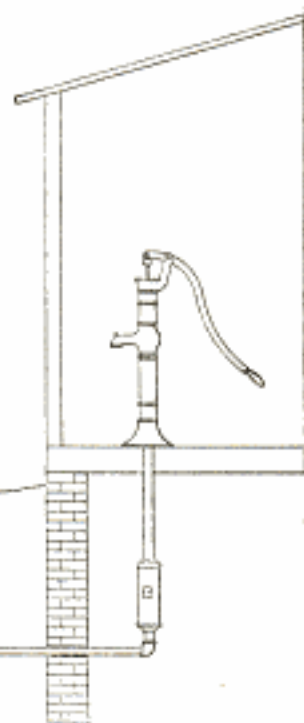


Method of Connecting Pump to the Well

trouble may be easily eliminated by boring a hole about 1/8 in. in diameter at the top of the thread, as shown in the illustration, so that when the cap is loosened about two turns the air pressure can rapidly escape.

A Lift Pump

Many country homes have wells or cisterns located at some distance from the house, making it necessary to pump and carry the water in all kinds of weather. The water can be drawn from such a well or cistern in a more convenient manner if the pump is connected as shown in the illustration. The pipes should be placed in the ground at such a



Venting the Air Pressure Plug on a Gasoline Tank

It is not uncommon to see people rush into a garage to obtain a supply of gasoline; then loosen up the plug on the gasoline tank a few turns and wait a couple of minutes for the pressure to



leak out, says Motor Age. It is also annoying to have the plug fly out and either hit the driver in the face or roll under the car or some other undesirable place, when he does not wait till the pressure has leaked out. All such

depth that they will not freeze in winter. The distance the pump is away from the well is immaterial as long as the water level is within 29 ft. 6 in. of the cylinder. Lay the horizontal pipe perfectly level and be careful to avoid all unnecessary crooks and turns. The pipe should be 1 in. in size on extra long runs. Place a foot valve on the lower end of suction pipe C, and the pump is ready for use. A pitcher pump can be used as shown in the sketch, if it is provided with an extension cylinder, B. This scheme will work satisfactorily, providing the water in the well is not below the limit of suction.—Contributed by R. F. Wahl, Morrisonville, Ill.

Paper Washer Cutter

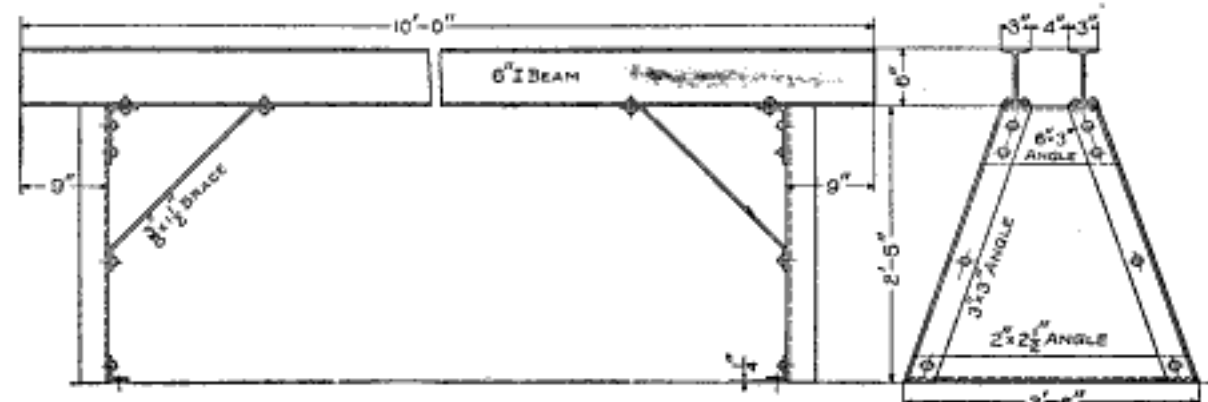
A milling machine operator knows the value of paper washers in making fits between the cutters placed on a mandrel. As these washers are usually cut with a knife, making the work very tedious, I devised the tool illustrated to cut them rapidly. The tool can be made from machine steel and case-hardened, or tool steel hardened the same as any wood-cutting tools. The tool has two rings with cutting edges turned on the metal with a distance apart equal to the desired width of the washer ring. The paper is placed on a block of wood, the tool set on it the same as a punch, and a blow struck with a hammer. Washers up to 1-16 in. in thickness can be cut this way with one blow.—Contributed by W. F. Oliver, Plainfield, N. J.



Structural Steel Lathe Frame

The accompanying sketch shows the design of a structural steel frame for a wood-worker's lathe which has been in use for some time and is found to give much better satisfaction than a wooden frame.

The bed is made of two 6-in. I-beams, 10 ft. long. A light cut should

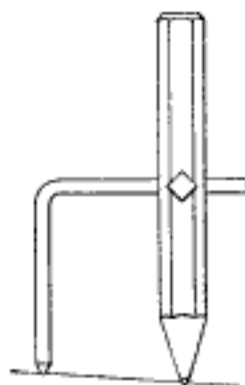


Steel Lathe Frame and Bed

be taken off the inside of the top flanges, with a planer, so that the tail stock will slide easily. The legs are made of 3 by 3-in. angles and are connected at the top to the bed with 6 by 3-in. angles. The bottom brace angles are 2½ by 2 in. and are placed ¼ in. above the floor so that the legs will take all the bearing. There should be two holes in each of these angles for lag screws for bolting the frame to the floor. The legs are set back from the end of the bed 9 in., so as to provide plenty of room to work with the floor stand at the end of the lathe. Knee braces of ¾ by 1½-in. bars should be put in to brace the frame lengthwise.—Contributed by M. E. Duggan, Kenosha, Wis.

Laying Out a Large Hole

When a large hole is to be drilled or bored the usual way of laying it out is to make a ring of center punch marks on a circular line, drawn with a compass, as a guide. I have found that the holes can be laid out much more quickly by the use of the tool shown in the accompanying sketch. The tool is made of steel rod, bent and pointed at one end as shown.



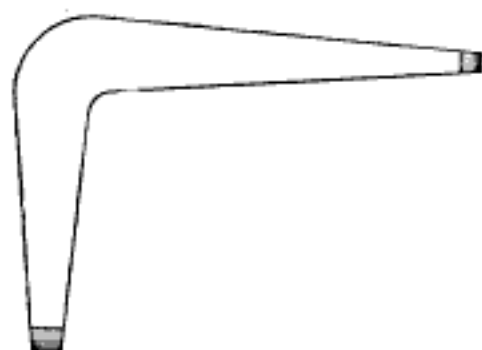
The other end passes through the shank of the punch and is held in place by a setscrew or a wedge pin.

When in use, the tool is set at the

desired radius and placed in the position illustrated, with the point of the rod in the punch mark at the center of the hole to be drilled. The tool should be so made that in this position it will stand somewhat out of vertical. The punch is then brought back to the vertical, the blow struck, the point of the rod dropped back to the original position, and the punch moved around to another point.—Contributed by C. W. Nieman, New York City.

A Strong Home-Made Screwdriver

The accompanying sketch shows a handy screwdriver that can be made out of an old file in a few minutes. First take the temper out of the file by heating it red hot and letting it cool slowly. Taper and grind each of the ends to a screwdriver point. One end



Double-End Screwdriver

can be made for large screws and the other for small. Heat the file in the fire at about the middle point, place it in a vise and bend it as shown in the sketch. Hammer the bend out flat and smooth all rough edges. The arm that is for the large screws should be the shortest. Screws can be loosened with this tool that the ordinary screwdriver will not start. It can also be used in combination with a monkey wrench which gives it an extra strong grip.—Contributed by J. W. Sorenson, Everett, Wash.

Slot Plugs for Milling Machine Beds

A great many milling machine beds are not equipped with oil pans, and consequently oil cannot be used on the cutters in any quantity without it get-

ting all over the machines and on the floor. It is for these machines that the little device shown in the accompany-

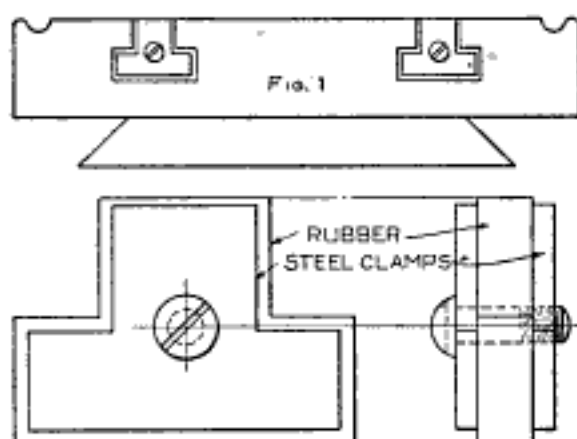


Fig. 2

The Stop Placed in the Grooves

ing sketch is intended. Cut two steel plates, making them about 1-16 in. smaller in size than the T-slot in the machine bed. Drill one plate and tap the other for a machine screw as shown in Fig. 2. Secure a piece of soft rubber, cut it so that it will easily fit in the T-slot, place it between the two plates, and the plug is complete. Insert the plug in the end of the T-slot and tighten the screw. This draws the plates together and expands the soft rubber between them, thus making an oil-tight joint. Figure 1 is a general view showing how the plugs are placed in a milling machine bed.—Contributed by H. D. Chapman, Washington, D. C.

Lathe Mandrel for Emery Wheels

It sometimes happens that one wishes to use a small carborundum or emery wheel in the lathe but has no mandrel to fit it. The accompanying

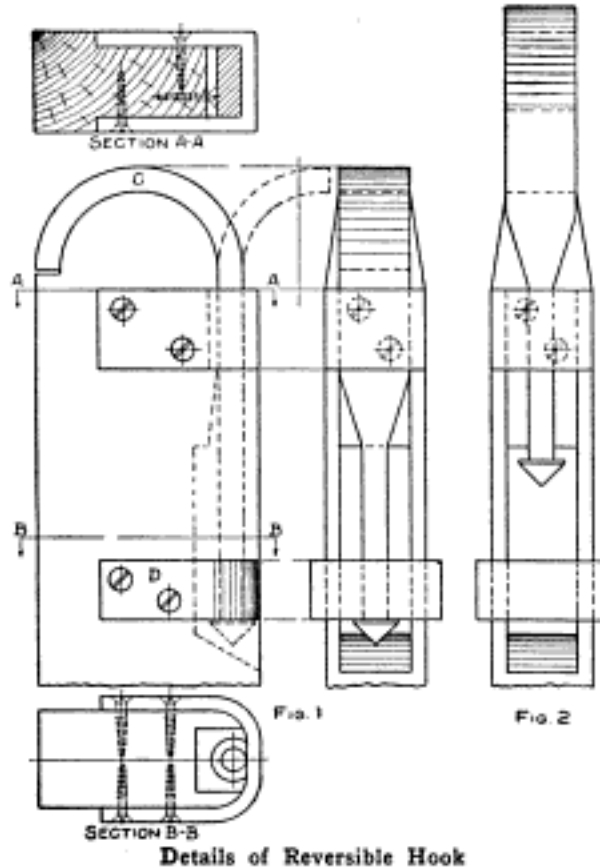


Emery Wheel Mandrel

sketch shows the design of a substitute that is very easy to make and is also adjustable to any size wheel. It can be quickly made in any machine shop and it will be found a very useful tool to have about.—Contributed by J. H. Norrell, Augusta, Ga.

A Reversible Hook for Machine Shop Ladders

A hook on the end of a machine shop ladder that is reversible or can be turned back out of the way when not



in use is shown in the accompanying sketch. The idea is to have hooks for use on line shafting in the usual manner and at the same time have them so they can be turned back out of the way when it is desired to use the ladder for other purposes. In the sketch the hook C may be swung in or out by pressing on lower part of hook until it disengages from lock bar D and then raising C as in Fig. 2 until the round portion is high enough to let it swing around 180 deg. It is then pushed down again until it is locked as before. The lower portion of hook is round and also small enough to be somewhat flexible.—Contributed by W. E. Morey, Chicago.

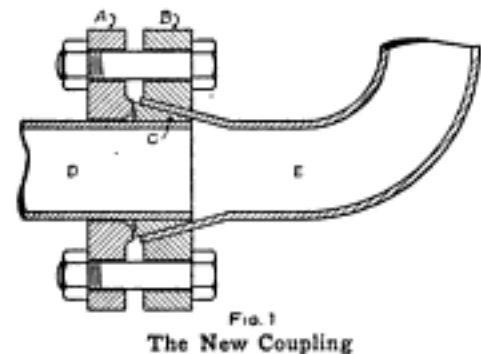
Do not think that any old paint is good enough for barn or other common work. The best is none too good.

A New Coupling for Copper Pipe

[Condensed from Marine Engineer, London.]

Cases innumerable have demonstrated, and it is now very generally recognized, that strains arising from expansion and vibration in copper piping on board ship, especially in the case of lengths of piping having bends, are chiefly borne by the copper near the flanges of the coupling. This, conjoined to the other fact that it is just here where weakness in the piping exists as a rule, through the impaired strength due to brazing, has led to the introduction of a good many modifications on the ordinary methods of coupling. A new and also novel type of coupling which appears to have all the advantages claimed for it concerned with greater efficiency and much less cost in fitting is illustrated by the sketches herewith. It has already been fitted on high pressure steam piping on board a steamer, after being tested by hydraulic pressure to 800 lb. per square inch, and is giving every satisfaction.

The new coupling consists of a purely metallic joint between the two meeting ends of piping, and is maintained by flanges fitted loose on the pipes, coupled, of course, by the necessary bolts and nuts. It will be gathered from the illustrations that the end of one length of piping is bell-mouthed and is drawn up on a brass conical ferrule brazed upon the other end of piping. Closely drawn up, and bearing with absolute accuracy on this softer conical piece, the two harder materials



thus make the metallic joint steam and water-tight and not liable to leakage in any way. No jointing material being used, water from any condensation

taking place in the piping will not impair the joint. There is no brazing required on the bell-mouthed piping, and the only brazing involved is that required in fixing the conical brass ferrule, C (Fig. 1), to the end of the other length of piping. This, of course, does not punish the end of the pipe nearly so much as if an ordinary flange had to be brazed upon it. The great defect in the present method, as is well known, is the weakening of the pipes caused by the brazing on the flanges, and leading sooner or later to the fracturing of the pipes immediately at the back of the flanges. The thickness lost at the back of flange when in position, due to the stretch in belling the end of pipe, is very little; in fact, only about one gauge, and on smaller pipes not so much. In short lengths of pipes, joined to valves or cocks, there is no brazing necessary. The bell-mouth also lends itself to taking away any strain which may become localized on the pipe at back of flange.

Both flanges of this new type of coupling (A and B, Fig. 1) are fitted loose on the pipes, and are made of either cast-steel or stamped mild-steel forgings. This material makes a much stronger flange, not liable to bend or to crack so easily as the present flanges, but if for any special reason brass is required, then manganese or hard brass can be satisfactorily adopted. The flanges are preferably oval in shape, for small-bore pipes especially, and require only half the number of bolts and nuts for secure fastening. These facts, and others which might be enumerated, mean a very considerable saving of time at the hurried later stages in fitting out new ships. Much, if not all, of the temporary fitting up, marking and taking down to bore and cut joints is rendered unnecessary. A big saving also to engineers and shipowners arises from the fact that no jointing material of any kind is required.

Regarding the coppersmith's time on work where these couplings are adopted there is no increase as compared with work done according to the

present system. The bell-mouthing is made on the end of the pipe by means of a smooth-turned steel drift, either by

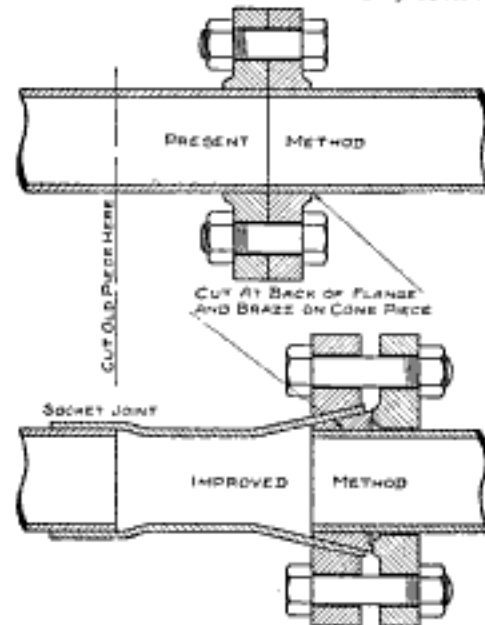


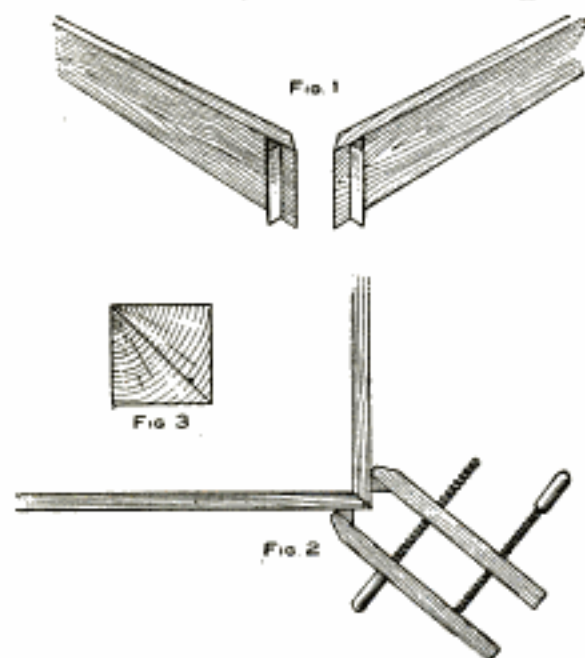
FIG. 2
Changing from Old to New

hand or by hydraulic power. If done by hand, the pipe is first heated and expanded with a smooth bar, similar to the practice in making saddle branches, to within half an inch of the finished bell, and then a drift is driven up cold to shoulder of same. If hydraulic power is employed, the end of the pipe is first annealed in the coppersmith's pipe-bending machine, and the drift is driven up to shoulder in one operation. In the case of smaller pipes, the bell-mouthing is done by means of a fluted tapered widener, with a square on end for ratchet, the pipe, of course, being caught in the vise with lead grips. The brazing metal brass cone-piece, C, is first turned to taper required, then brazed on with fire-clay round turned part. No grinding or polishing is required after brazing. If flange A be made of brazing metal, the tapered piece C can be cast in one with flange.

In repair work this new coupling adapts itself very easily, Fig. 2 being illustrative of this. The fact that all flanges and cone-pieces are interchangeable for same bore of pipe is of importance in this connection. Thus, at sea, if one pipe from any cause bursts, another pipe of same bore not in use can easily be made to replace it.

Method of Clamping a Miter Joint

After the miters have been cut true two blocks are glued on about 1 in. from the miter, as shown in Fig. 1.



Clamping Miter Joints

After the glue has set on the blocks the miters can be glued and a clamp screwed on, as shown in Fig. 2, and left until the joint is thoroughly dry, says a correspondent of *Work*, London. Remove the clamp and plane off the blocks. The blocks are made as shown in Fig. 3. A piece of 1 or 1 $\frac{1}{4}$ -in. square stick, about as long as the base is deep, is sawed through its length diagonally endways to make the two triangular pieces.

A Convenient Method of Making Patterns

How often does the inventor want to see how a thing will "look in metal," but on account of the expense and delay involved dislikes to make a pattern and take it to the foundry. A wood pattern of some design, say, a handle, would take considerable time to make and finish up so it will make a decent casting.

In the case of many small articles, much trouble may be saved by making what the writer has termed "beeswax patterns." They may be made as fol-

lows: Pour the melted beeswax into a rough mould (a paper box will do) approximately the size you wish for your pattern. When this wax is cold, carve it to the desired shape, using a sharp knife slightly warmed. Make another rough mould similar to the first and fill with plaster of paris mixed with water to the consistency of cream. Immerse the beeswax pattern in this, leaving vents and gates, and taking care that no air bubbles form, and let stand until set and thoroughly dry. Slowly heat the plaster to a temperature sufficient to cause all the beeswax to run out of the gates and vents which have been provided. Pour in melted solder to replace the wax, allow it to harden and break open the plaster. You will then have a smooth solder casting, which, if necessary, can be worked to a better shape with the soldering iron. This solder casting may be used for a pattern which will give excellent results.

Beeswax lends itself well to this kind of "sculpturing," if rightly handled. It may be turned on a lathe, drilled and generally fashioned at will. This method is not practicable where a core, as for the inside of a ball, is required, but otherwise has a wide range of usefulness.—Contributed by C. W. Neiman, New York City.



Courtesy American Vehicle

Carriage Body Corner Design

AMATEUR MECHANICS

A Simple Steamboat Model

The small boat shown in the accompanying sketch may have a length of 12 to 18 in. and is constructed in the following manner: A small steam boiler, A, is supported by two braces over an alcohol lamp in the middle of the boat. A small pipe is fastened to the top of the boiler in such a way that the open end will be opposite the open end of another pipe, B, somewhat larger in size. The pipe B opens into the stern of the boat at C, as shown in Fig. 1. The steam, coming through

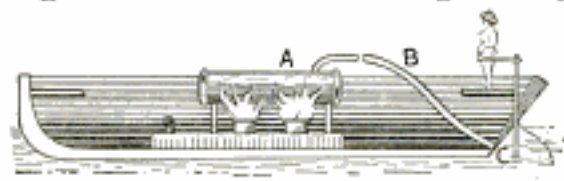


Fig. 1

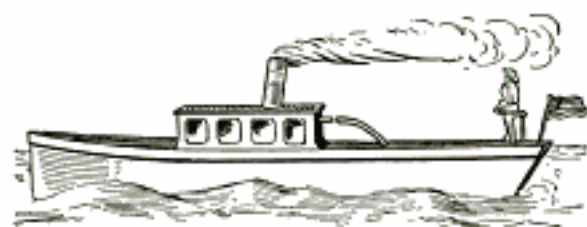


Fig. 2

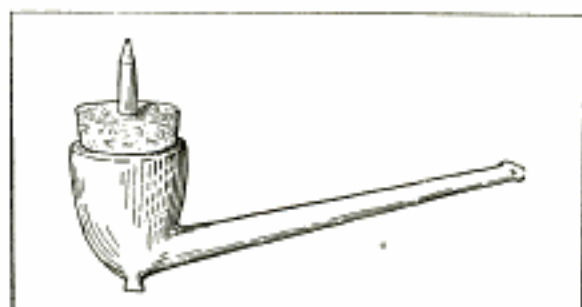
Sectional View and Completed Boat

the small pipe A, is driven forcibly through the largest pipe, B, which carries with it a certain amount of air out through the opening C into the water. As the boat is driven forward by this force, the steam arises to the surface in the form of bubbles. The boat soon attains considerable speed, leaving behind a long wake.

Home-Made Blowpipe

Procure a clay pipe, a cork and a small glass or metal tube drawn to a small opening in one end. Make a hole in the cork just large enough to permit the tube to pass through tightly so no air can pass out except through the hole in the tube. Put the tube in the hole

with the small opening at the top or projecting end. Push the cork into the

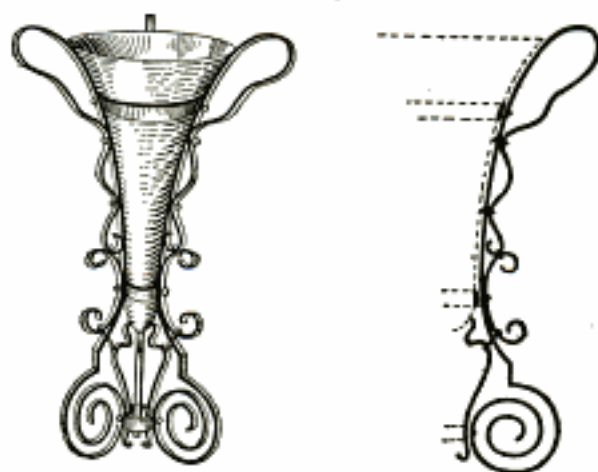


A Pipe Blowpipe

bowl of the pipe and the blowpipe is ready for use.—Contributed by Wilbur Cryderman, Walkerton, Ont.

Ornamental Iron Flower Stand

The illustration shows an ornamental iron stand constructed to hold a glass or china vase. This stand can be made by first drawing an outline of the vase on a heavy piece of paper. The vase is to have three supports. The shape of the scrolls forming each support should be drawn on the paper around the shape of the vase. A single line will be sufficient, but care must be taken to get the shapes of the scrolls



The Stand with Vase

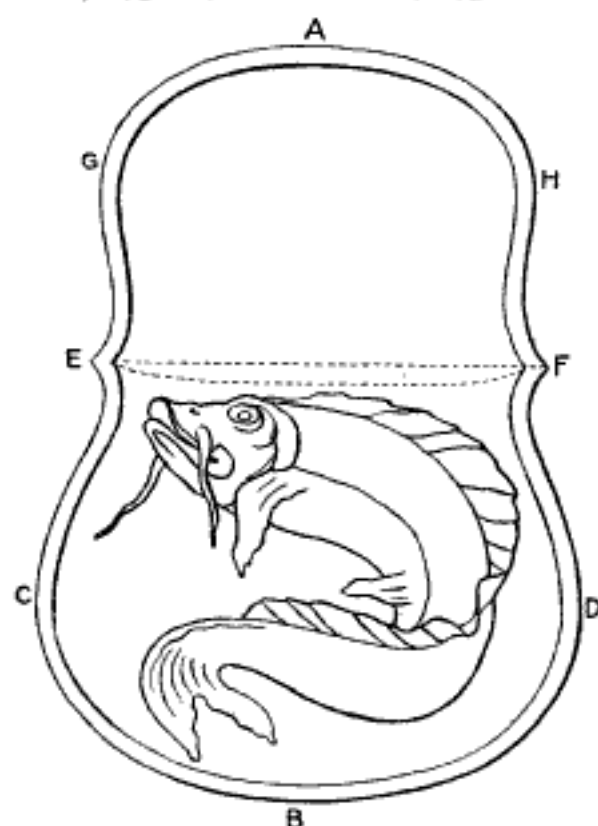
true. Take a piece of string or, better still, a piece of small wire, and pass it around the scroll shape on the paper.

This will give the exact length of the iron required to make the scroll. As sheet metal is used for making the scrolls, it can be cut in the right lengths with a pair of tinner's shears. Take a pair of round-nose pliers, begin with the smallest scrolls, and bend each strip in shape, using the flat-nose pliers when necessary to keep the iron

straight, placing it on the sketch from time to time to see that the scrolls are kept to the shape required. The scrolls are riveted and bolted together. The supports are fastened together with rings of strip iron $\frac{3}{8}$ in. wide, to which the supports are fastened with rivets. The metal can be covered with any desired color of enamel paint.

How to Make a Coin Purse

The dimensions for a leather coin purse are as follows: from A to B, as shown in the sketch, $6\frac{3}{8}$ in.; from C to D, $4\frac{1}{4}$ in.; from E to F, $3\frac{1}{2}$ in. and



B
Leather Design for a Purse

from G to H, $3\frac{1}{4}$ in. Russian calf modeling leather is the material used. A shade of brown is best as it does not soil easily, and does not require coloring.

Cut out the leather to the size of the pattern, then moisten the surface on the rough side with a sponge soaked in water. Be careful not to moisten the leather too much or the water will go through to the smooth side. Have the

design drawn or traced on the pattern. Then lay the pattern on the smooth side of the leather and trace over the design with the small end of the leather tool or a hard, sharp pencil. Trace also the line around the purse. Dampen the leather as often as is necessary to keep it properly moistened.

After taking off the pattern, retrace the design directly on the leather to make it more distinct, using a duller point of the tool. Press or model down the leather all around the design, making it as smooth as possible with the round side of the tool. Work down the outside line of the design, thus raising it.

Fold the leather on the line EF. Cut another piece of leather the size of the side ECBD of the purse, and after putting the wrong sides of the leather together, stitch around the edge as designated by the letters above mentioned. Do not make this piece come quite up to the line EF, so that the coins may be more easily put in and taken out. About 1 in. from the lines EF on the piece, stitch in a strip of leather about $\frac{1}{4}$ in. wide when stitching up the purse, through which to slip the fly AGH.

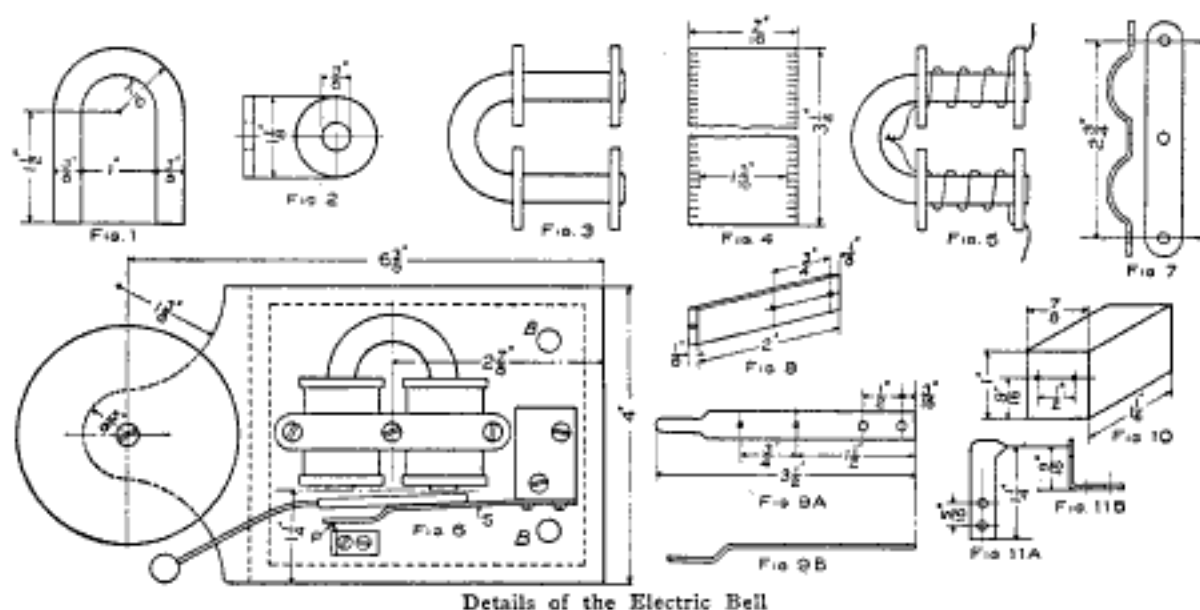
A window glass may be kept from frosting by rubbing over the inner surface a solution of 55 parts of glycerine and 1,000 parts of 60 per cent alcohol. The odor may be improved by adding a little oil of amber. This solution will also prevent a glass from sweating in warm weather.

How to Make a Useful Electric Bell

The most familiar use for an electric bell is for a door bell, although it may be applied in numerous ways to transmit signals of different kinds. Such a bell can be made by a boy of ordinary ability, as follows:

Procure from your local blacksmith a piece of soft iron about $\frac{3}{8}$ in. in diameter and $5\frac{1}{2}$ in. long. As this iron must be bent as shown in Fig. 1, you may as well have the blacksmith do the bending as it is quite difficult to get the proper shape. The ends of the iron should be filed off perfectly flat, so they will rest on a level surface. File off any rough surface that may have been pro-

duced in bending, in the other two drill them near the edges of the holes. These small holes are for the ends of the magnet wire to pass through. The washers should fit snugly on the iron when they are slipped into place as shown in Fig. 3. A small cut in the metal made with a cold chisel, near the edge of each washer, will prevent them from moving on the rod. Wind two or three layers of a good quality of writing paper on the iron between the washers. It would be well to cut the paper a little wider than the distance between the washers and slit the edges as shown in Fig. 4,



Details of the Electric Bell

duced in bending, to a distance of $1\frac{1}{2}$ in. from each end. File evenly so as to keep the metal round. Secure some pieces of hard rubber or fiber about $\frac{1}{8}$ in. thick and of sufficient size to cut out four washers of the dimensions given in Fig. 2. When cutting the hole in the center be sure and make it square with the surface of the washer. Those who have a lathe or drill press will find this quite easy, but it can be done by hand. If you are unable to secure rubber or fiber, some hard wood, such as oak or maple, will do. If the washers are made of wood, they should be well coated with shellac to prevent them from warping. Drill a $\frac{1}{16}$ -in. hole in

which will allow them to turn up against the washers when the paper is wound on the core. If a little shellac is applied to the inside of the paper before wrapping, it will hold both paper and washers in place. Secure 2 oz. of No. 24 gauge double cotton-covered copper wire and wind each spool with about 425 turns, placing a sheet of paper between the layers of wire. Be sure to wind both coils in the same direction (Fig. 5), and that you allow 5 or 6 in. of wire at each end for making connections. When complete, cover the coils with three or four layers of strong paper, connect the two inside ends of the wire, as shown in Fig. 5,

and solder them. The magnets finished in this manner are ready to be mounted on the base.

The base is made of a well seasoned piece of hard wood about $\frac{1}{2}$ in. thick cut to the dimensions given in Fig. 6. When this piece of wood is cut out and the holes all made it should be well covered with shellac to prevent its warping. Take a piece of thin metal about $\frac{1}{16}$ in. thick and $\frac{1}{2}$ in. wide and bend it as shown in Fig. 7 to fit over the magnets. Drill three holes in the metal to take round-headed screws, $\frac{1}{8}$ in. in diameter, and mount the magnets as shown in Fig. 6. Place several sheets of paper under the metal to prevent it from injuring the coils.

The armature of the bell should be made from a piece of soft iron about $\frac{1}{8}$ in. thick, $\frac{1}{2}$ in. wide and 2 in. long. Drill a $\frac{1}{16}$ -in. hole in the center of one end and solder into it a piece of $\frac{1}{16}$ -in. spring brass wire 4 in. long. In the other end of the armature drill two $\frac{1}{16}$ -in. holes, as shown in Fig. 8. Take a piece of spring brass $\frac{1}{16}$ in. thick, $\frac{3}{8}$ in. wide and $3\frac{1}{2}$ in. long and drill two $\frac{1}{16}$ -in. holes in one end to match those in the armature, and two $\frac{1}{8}$ -in. holes in the other end as shown in Fig. 9A. Bend the brass to the form shown in Fig. 9B and rivet it to the armature with two short pieces of soft brass wire to serve as rivets. Cut a piece of hard wood to the dimensions given in Fig. 10. Fasten the free end of the spring attached to the armature to this block and then mount it on the base by means of two wood screws so that the armature is parallel to the face of the ends of the magnets and just touching them. After mounting the block, remove the armature and bend the spring so that the armature is about $\frac{1}{16}$ to $\frac{1}{8}$ in. from the extreme magnet when it is put back in place. Cut a piece from $\frac{1}{16}$ -in. brass with dimensions as given in Fig. 11A and drill two $\frac{1}{8}$ -in. holes in one end and bend as shown in Fig. 11B. Mount this on the base by means of two wood screws so that the point P bears quite firmly against the center of the spring S near its end.

Any kind of a gong can be used for

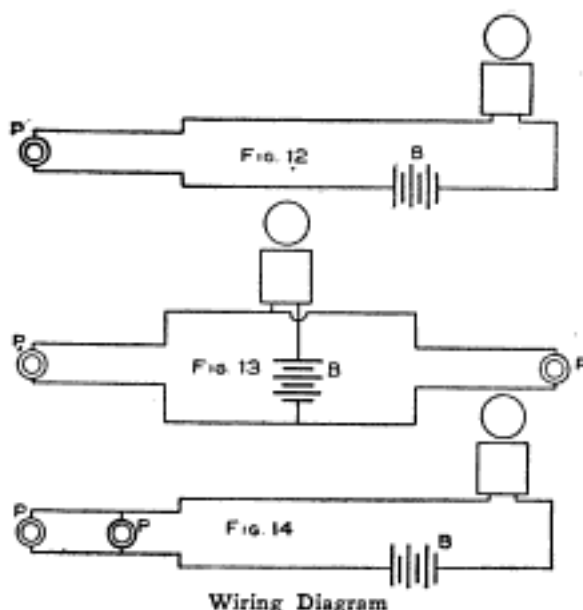
the bell—one from an old alarm clock, a sleigh bell or a small dinner bell will serve the purpose. Fasten the gong to the small end of the base by means of a small wood pedestal or other convenient support. The wire fastened to the end of the armature is cut off to such a length that when a $\frac{1}{4}$ or $\frac{5}{16}$ -in. lead ball is fastened on the end it will strike the gong as shown in Fig. 6. In connecting up the electrical circuit place one extreme of the free ends of the magnet windings under the head of the screw holding the spring that supports the armature in place. Connect another piece of wire 4 or 5 in. long under the head of one of the screws holding the point P in place. This wire and the other end of the magnet winding are the terminals of the bell. These ends are connected to two binding-posts, B B, placed in the corners of the base. It might be well to run these wires in grooves cut in the back of the base to protect them, also to make a better appearance.

Connect three dry cells to the terminals of the bell and if it is properly adjusted it should ring. The current flows through the magnet windings and contacts S and P. The current magnetizes the cores of the windings and the armature is attracted to them. When the armature has moved some distance toward the cores, the spring S leaves the point P and the circuit through the windings is broken and the current ceases to flow. The cores are no longer magnetized and the spring attached to the armature returns it to the original position, thus closing the circuit and causing the armature to be attracted again. The vibration of the armature makes the lead ball strike against the gong, thus making it ring. The bell may not be in adjustment at first, but a little patience in setting the points of contacts will soon have it working nicely. There is quite a tendency for the metals to be eaten away at the point of contact P, due to the arc formed when the circuit is broken. This can be reduced by making point P and the surface of the spring S at the point of contact out of platinum. Drill a

small hole in the end of P, insert a short piece of platinum wire and hammer the brass down around it to hold it in place. A piece should be fastened to S by drilling a hole through the spring where the point P makes the contact and inserting a short piece of platinum wire and riveting it down. A wood cover will add greatly to the appearance of the bell and will prevent dust collecting at the point P, which is a source of annoyance, oftentimes preventing the circuit from being closed.

The bell is shown connected in series with a battery, B, and push button, P, in Fig. 12. The push button is nothing more than a device for completing the electrical circuit. The circuit through the bell is normally open, but when the button is pressed the circuit is closed and the bell rings. The bell may be operated from more than one push button as shown in Figs. 13 and 14. It is difficult to tell which button is pushed, unless a different bell with

different tones is used for each one, or a code of signals, but a device called an



annunciator can be used which will indicate from which button the signal was sent.

Woodworking for Beginners

By Ira S. Griffith

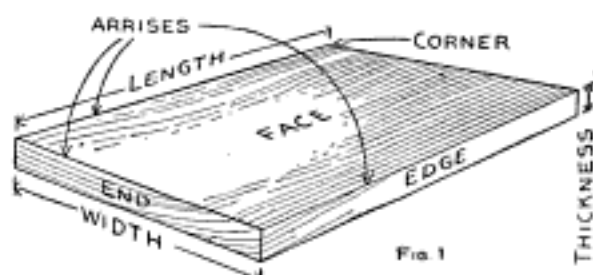
CHAPTER I

Making Out a Stock Bill

The first thing a beginner must learn to do when he takes a drawing from which he is to make a piece of woodwork, is to prepare a stock bill of materials that can be given to the lumberman to fill. Whether the worker gets what he wants or not will depend greatly upon the specifications he gives the dealer, whether they are intelligible or not, and whether they allow one and only one interpretation.

Three practices are common in preparing lumber for use. (1) To sell it to the workman in the rough, just as it comes from the sawmill. (2) To machine-plane the pieces to thicknesses and widths such as the finished pieces demand, so that only the lengths require the attention of the worker—aside from the making of the joints. (3) To mill-plane the stock on two surfaces to stock thicknesses, but allowing the lengths and widths to remain as in rough stock.

The first is cheapest in first cost; the second is the most expensive because of the frequent changes in setting the planing machine to the different sizes. The third is most common, except where there are to be a great number of pieces of a given size, because it utilizes hand work and machine work to the best advantage.



Board Surfaces Named

Lumber Terms—Length always extends parallel to the grain of the wood—the way the wood splits easiest. Other terms are as indicated in Fig. 1.

The unit of measurement is the board foot. This is 1 by 12 by 12 in. Prices

are usually based upon the 1000 ft. If a board is less than 1 in. thick, it is customary to figure it at surface measure. The price per foot is reduced correspondingly, however, so that no advantage is taken of the purchaser.

Lumber is graded at the yards according to lumbermen's standards.

are packed in bunches; laths in bundles. Mouldings are sold by the running or lineal measure, the price being based on the 1000 ft.

The abbreviations for lumber that is to be sized, surfaced or machine-planed on two or four sides are S-2-S and S-4-S respectively.

TICKET NUMBER	NO. OF FEET	NO. OF PIECES	SIZE	LENGTH	DESCRIPTION	PRICE				
	48	1	6X8	12	YELLOW PINE S-4-S	30		1	44	
		16	M		EX X-A-A WHITE CEDAR SHINGLES	3	25	52		
	406		1X6	14	#2 WHITE PINE FLOORING	26		10	50	
										63 94

Form of Stock Bill

Clear lumber is free from knots, sap, wind shakes and other imperfections. Shingles are sold by the thousand and

For especially seasoned stock, the letters K D (kiln dried) are added to the description.

To Be Continued.

Balloon Ascension Illusion

By C. W. Nieman

In these days of startling revelations in air-craft flight we are prepared to see any day some marvelous machine-driven bird cutting figure-eights all over the sky above our heads. One boy recently took advantage of this state of expectancy to have an evening's harmless amusement, through an illusion which deceived even the most incredulous. He caused a whole hotel-full of people to gaze open mouthed at a sort of "Zeppelin XXIII," which skimmed along the distant horizon, just visible against the dark evening sky, disappearing only to reappear again, and working the whole crowd up to a frenzy of excitement. And all he used was a black thread, a big piece of cardboard and a pair of field-glasses.

He stretched the thread between two buildings, about 100 ft. apart, in an endless belt, passing through a screw-eye at either end. On this thread he fastened a cardboard "cut-out" of a dirigible, not much to look at in daytime, but most deceptive at dusk. By

pulling one or the other string he moved the "airship" in either direction. He took the precaution of stretching his thread just beyond a blackberry hedge, and thus kept over-inquisitive persons at a safe distance. He also saw to it that there was a black background at either end so that the reversing of the direction of the craft would not be noticed.

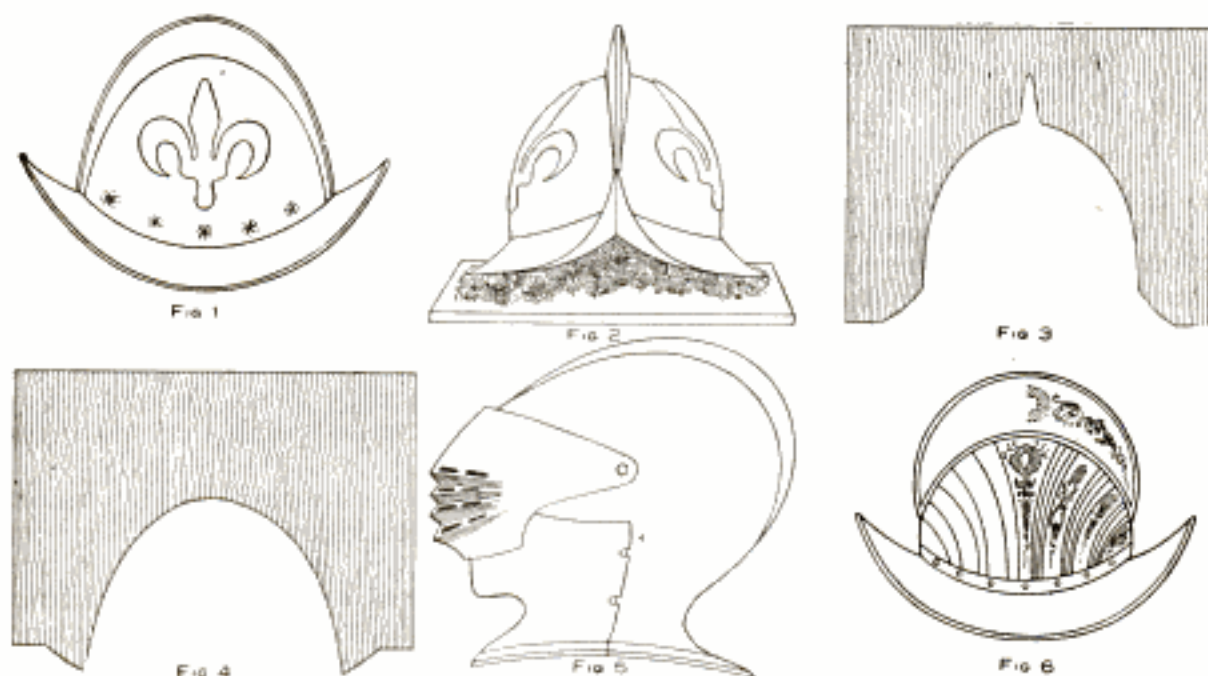
In attracting the crowd he had a confederate stand looking at the moving ship through a field glass, which at once gave the suggestion of distance, and materially heightened the illusion. When the interest of the crowd, which at once gathered, was at its height, the "aeronaut" pulled his craft out of sight and let the disillusion come when the light of day laid bare his fraud.

A solution consisting of 1 dr. of sodium carbonate and 1 qt. of milk makes an excellent cleaner for motorists' gloves.

Imitation Arms and Armor—Part V

The preceding chapters gave descriptions of making arms in imitation of ancient weapons, and now the amateur armorer must have some helmets to add to his collection. There is no limit to the size of the helmet, and it may be made as a model or full sized. In constructing helmets, a mass of clay of any kind that is easily workable and fairly stiff, is necessary, says the English Mechanic, London. It must be kept moist and well kneaded. A large

The fleur-de-lis are slightly raised, as in bas-relief. To aid in getting the helmet in correct proportion on both sides, and over the crest on top, cut out the shape from a piece of wood, as shown in Fig. 3, with a keyhole saw. This wood being passed carefully and firmly over the clay will bring it into shape, and will also show where there may be any deficiencies in the modeling, which can then be easily remedied by adding more clay. The cut-out



Making the Clay Model and Three Helmet Designs

board or several planks, joined closely together, on which to place the clay, will be necessary. The size of this board will depend on the size of the work that is intended to be modeled upon it.

The way to make a helmet is described in the following method of producing a German morion, shown in Fig. 1. This helmet has fleur-de-lis in embossed work, and on each side is a badge of the civic regiment of the city of Munich. The side view of the helmet is shown in Fig. 1.

The clay is put on the board and modeled into the shape shown in Fig. 2. This is done with the aid of a pair of compasses, a few clay-modeling tools, and the deft use of the fingers.

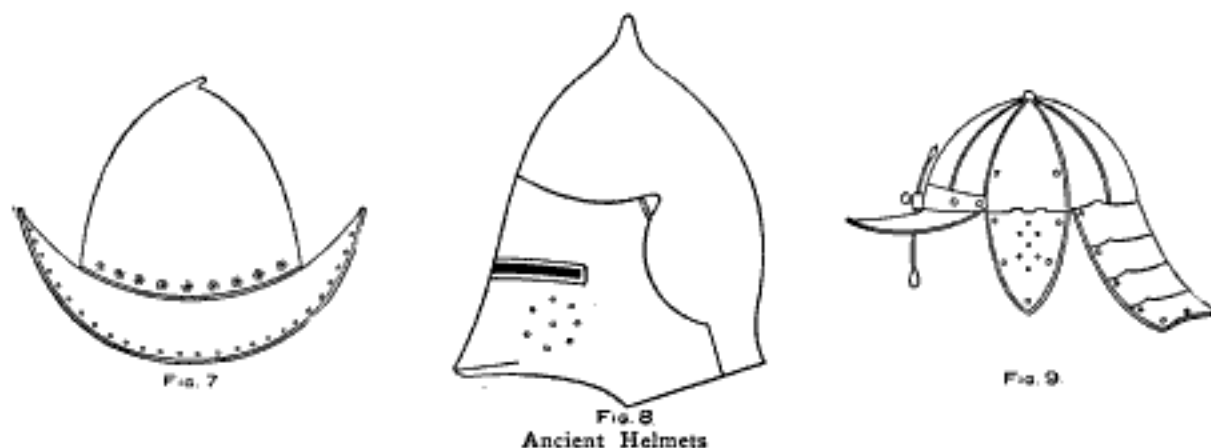
pattern shown in Fig. 4 is the side outline of the helmet.

Scraps of thin, brown, wrapping paper are put to soak in a basin of water to which has been added about a tablespoonful of size melted and well stirred, or some thin glue, and left over night to soak. The paper should be torn in irregular shapes about as large as the palm of the hand. After the clay model is finished, give it a thin coat of oil—sweet or olive oil will answer the purpose very well. All being ready, the clay model oiled, and the basin of soaked paper near to hand, take up one piece of paper at a time and very carefully place it upon the model, pressing it well on the clay and into and around any crevices and pat-

terns, and continue until the clay is completely covered.

This being done, give the paper a thin and even coating of glue, which must be quite hot and put on as quickly

In Fig. 6 is shown an Italian casque of a foot soldier of the sixteenth century. This helmet may have the appearance of being richly engraved as shown in one-half of the drawing, or,



as possible. Put on a second layer of paper as carefully as before, then another coating of glue, and so on, until there are from four to six coats of glue and paper. When dry, the paper coating should be quite stout and strong enough for the helmet to be used for ornamental purposes. Before taking it off the model, which should be no difficult matter, owing to the clay being oiled, trim off any ragged edges of paper with a sharp knife, and smooth and finish all over with some fine sandpaper. The paper is then given a thin coat of glue and sections of tinfoil stuck on to give it a finished appearance. When the helmet is off the model, make holes with a small awl at equal distances, through which to insert some fancy brass nails, bending the points over and flat against the inside of the helmet.

A visor helmet is shown in Fig. 5. This helmet has a movable visor in the front that can be lifted up, a crest on top, and around the neck a narrow gorget which rests upon the wearer's shoulders. The whole helmet, with the exception of the visor, should be modeled and made in one piece. The visor can then be made and put in place with a brass-headed nail on each side. The oblong slits in front of the visor must be carefully marked out with a pencil and cut through with a knife or chisel.

a few lines running down, as seen in the other part of the sketch, will make it look neat. The band is decorated with brass studs.

An Italian cabasset of the sixteenth century is shown in Fig. 7. This helmet is elaborately decorated with fancy and round-headed nails, as shown in the design.

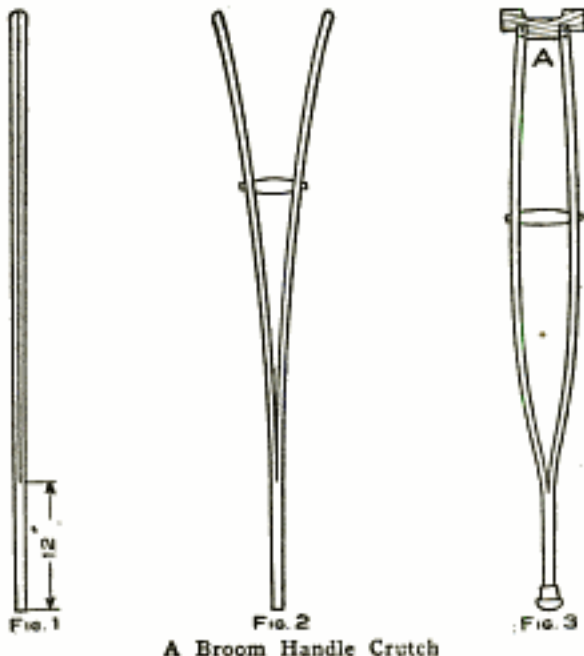
In Fig. 8 is shown a large bassinet with a hinged visor which comes very much forward, so as to allow the wearer to breathe freely. This helmet was worn about the sixteenth century, and was probably used for tilting and tournaments.

A burgonet skull-cap of the seventeenth century is shown in Fig. 9. The visor is composed of a single bar of metal, square in shape, which slides up and down in an iron socket attached to the front of the helmet, and is held in any position by a thumbscrew as shown in the illustration.

A hole in the peak of the helmet allows it to hang in front of the wearer's face. This contrivance should be made of wood, the helmet to be modeled in three pieces, the skullcap, peak and lobster shell neck guard in one piece, and the ear guards in two pieces, one for each side. The center of the ear guards are perforated. All of the helmets are made in the same manner as described for Fig. 1. They are all covered with tinfoil.

Home-Made Crutch

While a fractured bone was healing in the limb of my boy he needed a pair of crutches and not being able to secure the right length, I set about to make the crutches from two broom handles. I split the handles to within 1 ft. of the end (Fig. 1) with a rip saw, and then stuck them in a barrel of water for three days to make the wood pliable for bending. A grip for each stick was made as long as the hand is wide and a hole bored through the center the size of a No. 10 gauge wire. These grips were placed between the two halves of each stick at the right distance for the length of the boy's arm and a wire run through both split



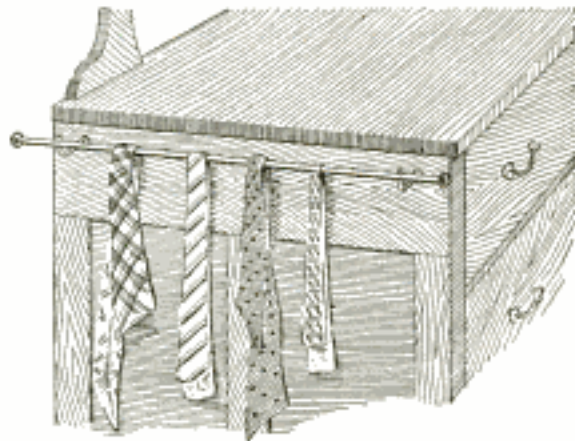
A Broom Handle Crutch

pieces and the handle then riveted as shown in Fig. 2. Another piece was cut as shown at A, Fig. 3, and nailed to the upper ends of each half of the broom handle.—Contributed by Geo. P. Grehore, Nashville, Tenn.

Home-Made Necktie Holder

The gas bracket is considered a good place to hang neckties, even if it does crowd them together. The illustration shows a better method, a curtain rod attached to one end of a bureau. Two long-shanked, square-hooked screws should be used, so they may be screwed

beneath and close up to the projecting top. When removed they will leave no

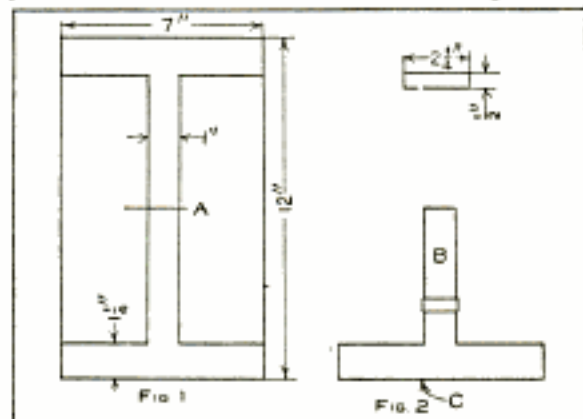


Hanger for Ties

disfiguring holes.—Contributed by C. W. Neiman, New York City.

How to Make a Trousers Hanger

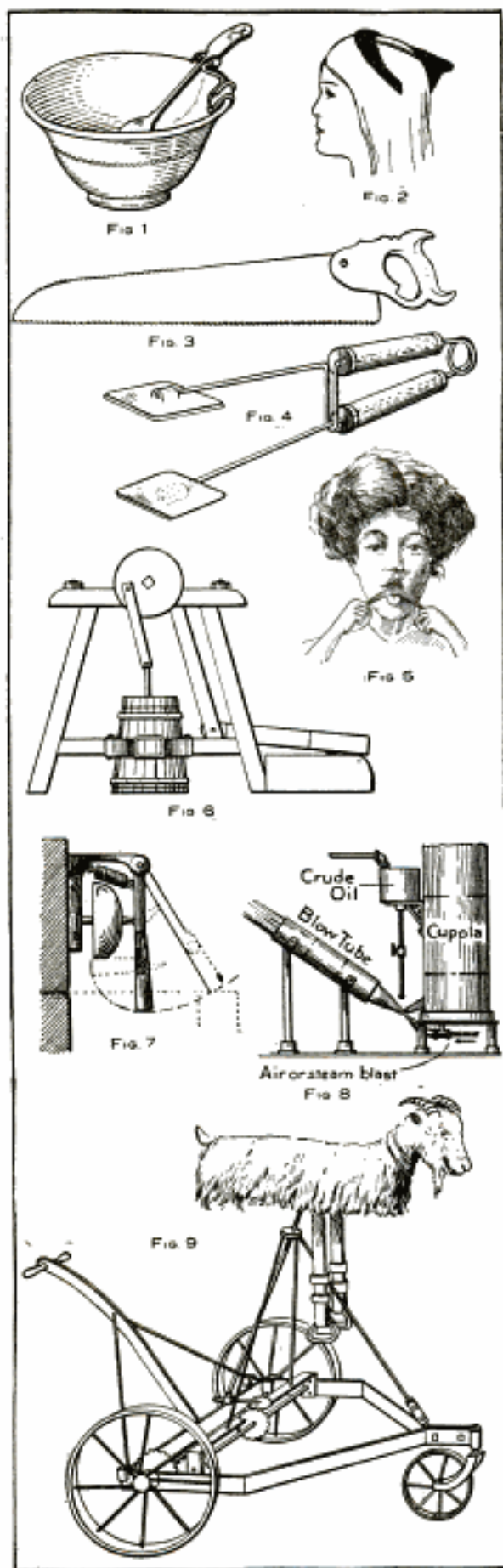
Secure from your tinsmith a piece of sheet metal 7 in. wide and 12 in. long. Cut the metal as shown in Fig. 1 and make a close bend at the point A, but not too close to cause it to break. The piece will then appear as shown in Fig. 2. Cut a piece from the waste material $\frac{1}{2}$ in. wide and $2\frac{1}{4}$ in. long and bend it around the two pieces B, Fig. 2, so it will slide freely on their length. Bend the edges C in for $\frac{1}{8}$ in. to hold the trousers firmly. Drill a hole through the top end of B and attach a wire formed into a hook for use in hanging on a nail. The bottom end of the trousers is inserted between the jaws C and the small ferrule pushed



Cut from Sheet Metal

down to clamp them on the cloth.—Contributed by A. Levinson, Saginaw, Michigan.

RECENT



FORK AND SPOON HOLDER.—Figure 1 shows a wire holder that can be placed on the rim of any bowl or dish to keep the handle of a spoon or fork from sinking into the contents. The holder is formed from a single piece of wire, bent to provide U-shaped rim clasps and holding clip.

HAIR-SUPPORTER.—Figure 2 illustrates a combination hair support or rat around which to twist the hair. The hair is wound around and round the top of the head, the spur in the back building it up at that point and keeping it in position.

DOUBLE-EDGED SAW-BLADE.—The main cutting edge of the saw shown in Fig. 3 is like that of any ordinary saw, but the forward part of the back of the blade is also provided with teeth, thereby combining a straight and curved saw in the one implement.

DEVICE FOR STRAIGHTENING HAIR.—The implement illustrated in Fig. 4 is designed for the purpose of straightening hair that has a tendency to curl. The flat surfaces at the outer ends of the arms are pressing plates.

TONGUE-CLEANER.—The drawing designated as Fig. 5 was found among recent trade marks and is presumably a recent invention. It is the device the girl is pulling over the surface of her tongue, and is described as a tongue-cleaner. Just what it is made of and the condition of its surface are not explained.

FOOT-OPERATED CHURN.—Hundreds of churns of all kinds have been invented in past years, but the idea embodied in Fig. 6 is somewhat unique because patterned after the foot-worked grindstone. A wooden wheel takes the place of the grindstone, and to this is attached the plunger connection. The churn is attached to the under part of the frame by a belt.

NOVEL DOOR-BELL.—There are many door sounders of both the bell and knocker variety, but the bell shown in Fig. 7 is a combination of the two principles. The knocker, instead of striking an ordinary plate, delivers a blow against a gong, and the resultant sound is far-reaching.

FOR MANUFACTURING MINERAL WOOL.—The invention illustrated in Fig. 8 is interesting because it gives an idea of how mineral wool is manufactured. It consists of four units, comprising a blow tube, crude oil receptacle, cupola, and an air or steam blast pipe. Molten slag, in the form of highly heated filaments, drops from the cupola at a point where it is struck by the air or by a steam blast. The crude oil is also diverted to the same point, and the blast drives the mixture through the blow tube. The molten slag, each individual filament of which becomes coated with the oil, is thus subjected while in transit through the tube to the action of the vaporized hydro-carbon oil and smoke generated by the contact of the oil with it.

INITIATION DEVICE.—A goat usually has something to do with the majority of secret order initiations, and the goat device shown in Fig. 9 is no exception, but instead of being designed for butting purposes, it is made to be ridden. The blind-folded candidate for honors straddles the beast, and its carriage is pushed around the room. The movement of the carriage wheels actuates a mechanism which causes the goat to go through a series of bucking movements which keep the rider in continual discomfort and danger of being pitched off.

NON-SPILLING FUNNEL.—The funnel shown in Fig. 10, is designed especially for use in filling auto tanks with gasoline, and for such a purpose is a great saver. When the gasoline tank is filled through an ordinary funnel, and becomes full, there is usually left a considerable amount of the fluid in the funnel. This not only becomes a dead loss, but runs over the outside of the tank. The funnel illustrated, however, does away with this waste. Just at the top of the outlet hole of the funnel is a ball. When the funnel is inserted in a tank the clips, shown on the outside of the spout, raise a rod that lifts the ball above the opening. When the tank

PATENTS

has become full the funnel is slightly raised, the ball drops back over the hole, and the surplus gasoline that is thus held in it may be poured back into the can again.

COMBINED SHOVEL AND SIFTER.—A shovel that not only lifts the coal but sifts it as well is shown in Fig. 11. An inch or so below the shovel rim is a screen, and this, as far as the coal itself is concerned, forms the shovel foundation, but underneath the screen is more depth, increasing toward the rear end. This forms a pocket for the coal dust or slack that has sifted through. After the shovel has received its load and been shaken, the cord or wire, seen running under the handle to the hand-grasp, is pulled, and the hinged side of the shovel opens out so that the slack may be discharged.

SLEEPING-CAP.—The steadily increasing number of people who believe that sleeping in the open air, regardless of zero weather, is the best way to keep healthy, has made a market for the type of sleeping-cap shown in Fig. 12. It is made of felt, and extends down over the face, leaving the nose and mouth free for unobstructed breathing. Pockets, formed of opaque material, are provided for the eyes, so that the eye winkers and lids will have room in which to move, and the light will not be shut out. The portions over the ears are padded.

ANTI-FRICTION BIT STOP.—The purpose of the bit attachment shown in Fig. 13 is to gauge the depth to be bored, but it is the engaging end of this stop arrangement, not the stop itself, that is the feature of interest. In its socket is an anti-friction steel ball, which, in turn, runs on six smaller balls. The object is to prevent the stop from defacing the delicate or polished surface it might come in contact with in operation. When the bit has sunk so far into the material that the stop engages with the surface, the ball runs over it without marring.

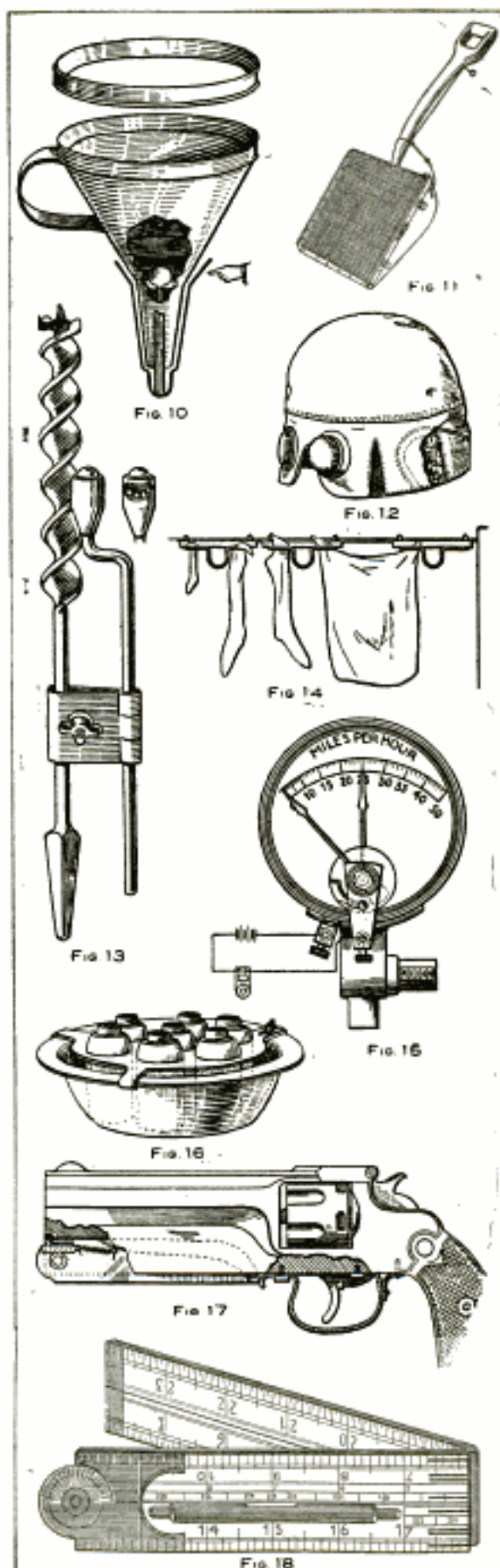
INGENIOUS CLOTHESPINS.—In using the ordinary wooden clothespin the material hung out on the line comes in contact with it, and unless the line is perfectly clean the result is disastrous. With the clothespin shown in Fig. 14, an absolutely clean line is not so imperative. The clothes or materials hung out to dry are caught between the wire and the wood and do not come in contact with the line.

SPEEDOMETER WITH SPEED-LIMIT ALARM.—The speedometer illustrated in Fig. 15 is of the ordinary type, but it is provided with an attachment which rings a bell when a designated speed is being exceeded. The second or extra hand, which may be adjusted to any position on the scale, carries an electric contact piece connected to one side of a circuit. The speedometer indicating hand carries a similar contact adapted to touch that of the extra hand whenever the figure indicated by the latter is reached or exceeded. This electric circuit is provided with an alarm bell, and when the contact is made this rings, thus notifying the driver that he is exceeding the set limit.

JAR-HOLDER.—The jar-holder shown in Fig. 16 consists of a frame which can be placed across the top of a receptacle. Circular openings are provided to receive the jars, so that they will sit absolutely steady without touching each other.

KNIFE-ATTACHMENT FOR REVOLVERS.—The revolver illustrated in Fig. 17 is an especially wicked instrument because it is provided with a knife attachment. The trigger guard is movable, and when drawn back brings the knife into position. When engaging with big game at close quarters, the knife is very handy, should the bullets be ineffective.

COMBINED RULE, LEVEL, AND PROTRACTOR.—The 4-fold pocket rule shown in Fig. 18 has two interesting features, one being a brass-cased spirit level, and the other 180 degrees of a circle cut on the brass joint. The combination of the three things in one enables workmen to readily determine the desired grade, pitch, and length for innumerable purposes of not too exacting a nature. The rule folded is 1½ in. wide.



PATENT CURIOSITIES

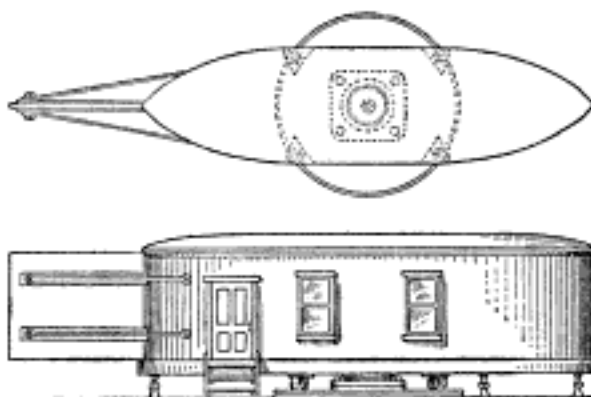
SELF-TIPPING HAT.—One of the most curious of all labor-saving devices is that for a self-tipping hat patented March 10, 1896. The inventor, believing



that even a Beau Brummel wastes much valuable energy in the frequent lifting of his hat, describes his invention as "a novel device for automatically effecting polite salutations by the elevation and rotation of the hat on the head of the saluting party, when said person bows to the person or persons saluted, the actuation of the hat being produced by mechanism therein and without the use of the hands in any manner." The hat is provided in the crown with a clock gearing which is set into action by a pendulum. When the man bows, the pendulum swings and the spring gearing, being released thereby, raises and tips the hat.

TORNADO-PROOF HOUSE WITH TAIL.—Tails for windmills and flying-machines are required to keep them head on to the wind, but to provide a house with a tail for the same purpose is extraordinary. Yet, this tornado-proof house, patented in 1890, is so equipped. The object of the invention, in the words of the inventor, is to provide more perfectly than heretofore against injury from tornadoes or other violent storms. The building is constructed in an elongated and sharpened form, adapted to part the currents of air like the bow of a vessel parts the water. The tail provides the means for automatically turning the curious house so that its prow will face the direction from which the wind is blowing. The house is mounted centrally on a vertical axis with a circular track around it to form a turn-table.

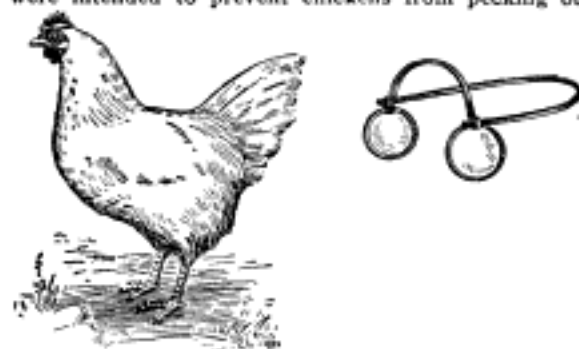
The house, according to the inventor, may have all the accommodations for continuous and perma-



nent residence, or it may be especially adapted for use as a hospital. For the latter purpose it may be turned at will, so that the sick room will be in the sunshine all day, or, if desired, in the shade. Or it may be turned in such manner that the wind will air it out.

EYE GLASSES FOR CHICKENS.—It might be supposed from a glance at these spectacles that chickens, like human beings, suffer from diseases of the eye, and that the inventor designed them as an

aid in their search for bugs, but such was not his intent. The eye glasses were patented in 1906, and were intended to prevent chickens from pecking out



each other's eyes. A flock of them so equipped would present a very intellectual appearance.

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FOWLER'S MECHANICS' POCKET BOOK AND DIARY FOR 1910.—Price, 25 cents postpaid. A synopsis of practical rules for fitters, turners, millwrights, erectors, pattern makers, draftsmen, students, etc. Scientific Pub. Co., Manchester, England.

HENLEY'S ENCYCLOPEDIA OF PRACTICAL ENGINEERING AND ALLIED TRADES.—Edited by Joseph G. Horner. A modern treatise in five volumes. Handsomely bound in half morocco, each volume containing nearly 500 pages, with thousands of illustrations, including diagrammatic and sectional drawings with full explanatory details. Size of each volume 7½x9 inches. Weight complete set 20 lbs. Price, \$25.00. This work covers the entire practice of civil and mechanical engineering. Contributions by the best known experts in all branches of engineering. The Norman W. Henley Pub. Co., New York.

THE MOTOR MANUAL, (12th Edition). Cloth; illus.; 272 pp. Price, 50 cents. A practical handbook dealing with the working principles, construction and management of all types of motorcars. Temple Press, Ltd., 9-15 Rosebery av., E. C. London.

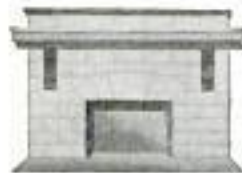
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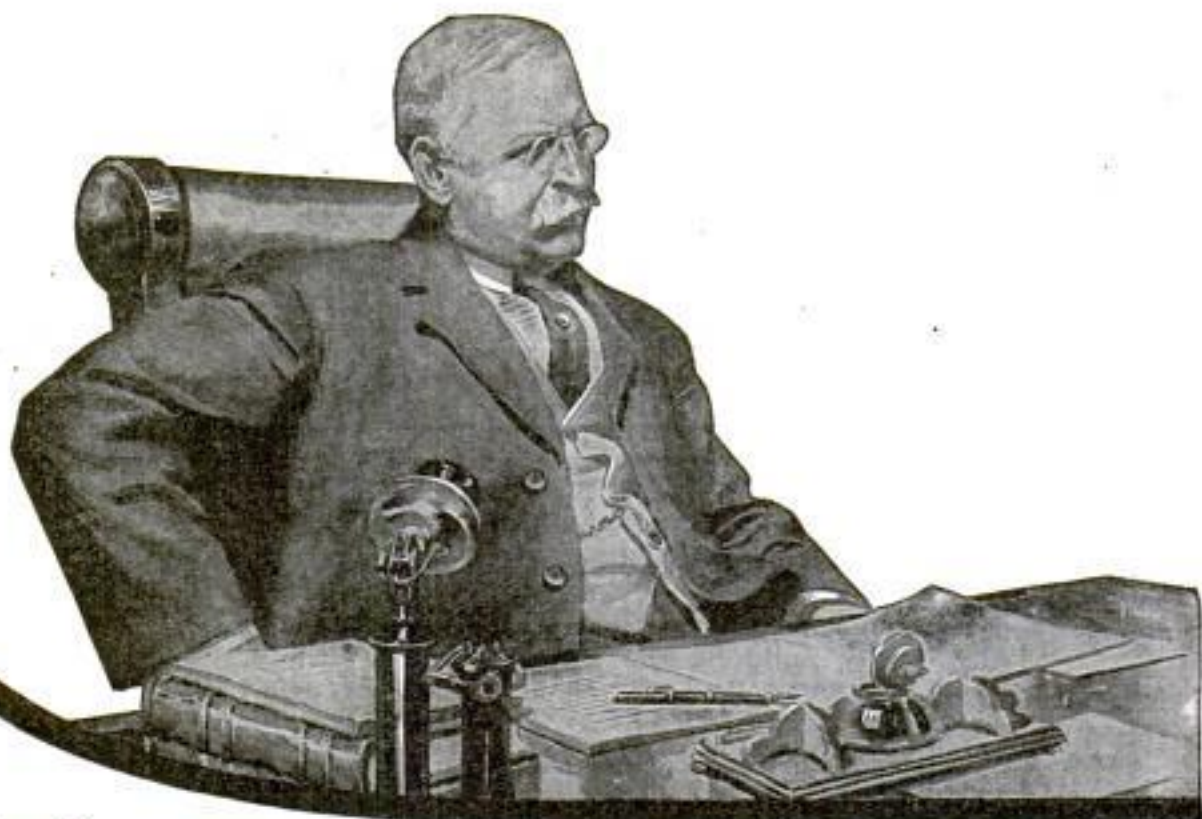
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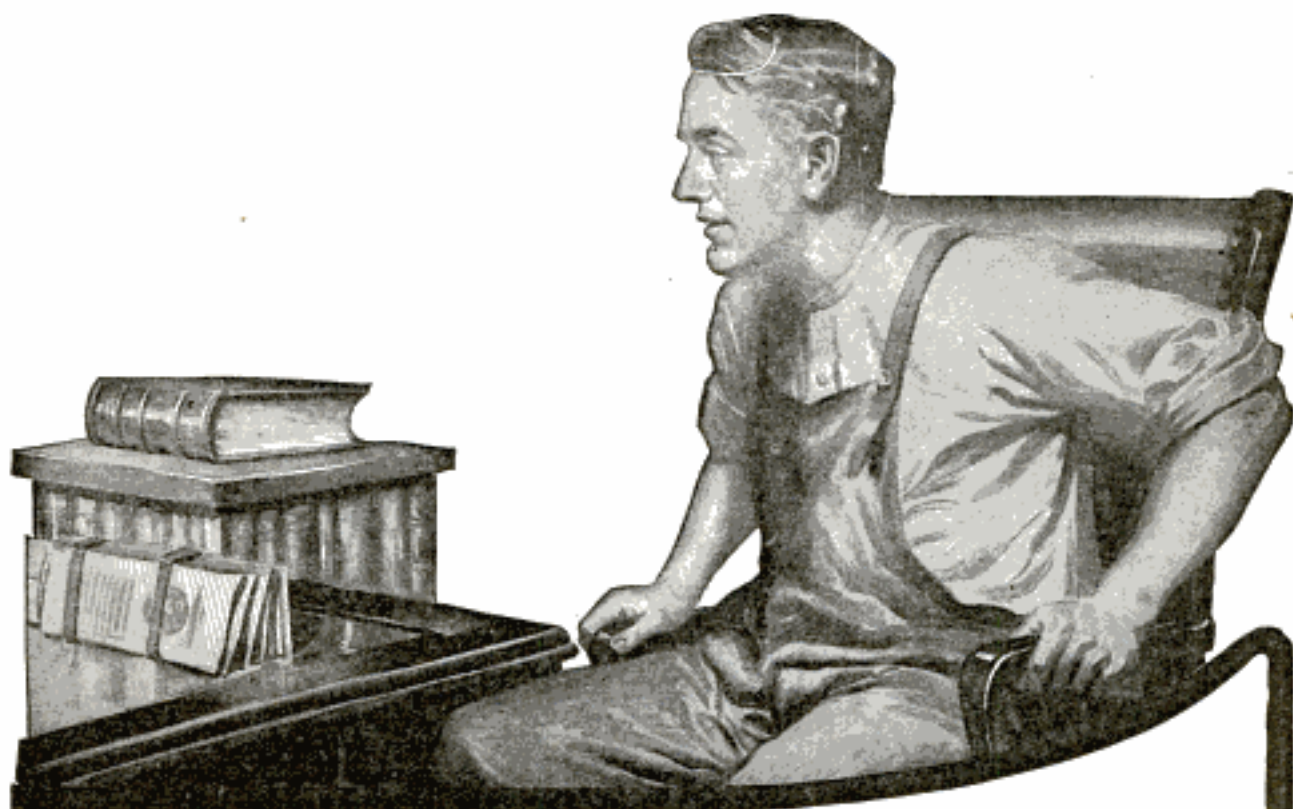
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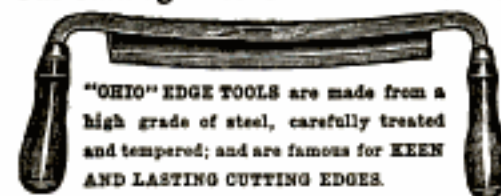
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A turn of the screw takes up the shrink of the wood. No "burning out" a broken handle—spoiling the tool's temper and your own, by "cutting out" the handle from the eye of the tool. "Just turn the screw" and the handle comes out. Easily fitted to any handle. Simple directions for use of this ingenious device and two fasteners (axe and hatchet or hammer sizes) sent postpaid for 25 cents—regular retail price 40 cents. Reliable agents wanted for this wonderful invention that does away with wedges, etc. Big profit. Easy seller. V. H. JONES, Box 1305, BOSTON, MASS.

AN ENGINEERING FEAT.—The man who stole a red hot stove will have a kindly feeling for the three men now under arrest at Binghamton, N. Y., charged with stealing a railway bridge. The bridge was a small, 40-ton structure, which had been replaced by a heavier one and was temporarily stored along the track near by. The three men are said to have carted the bridge in pieces to the city and sold it to a junk dealer for \$18 and three drinks.—Engineering-Contracting.

Our Catalogue of CARPENTERS' TOOLS will be sent to Anyone Interested in GOOD TOOLS



"OHIO" EDGE TOOLS are made from a high grade of steel, carefully treated and tempered; and are famous for KEEN AND LASTING CUTTING EDGES.

Under our "Ohio" trade-mark, which is a guarantee of highest quality, we manufacture a full line of

Planes (both Iron and Wood), Chisels, Drawing Knives, Gouges, Auger Bits, Spoke Shaves, Bench and Hand Screws, Cabinet Makers' and Manual Training Benches, etc.



Insist on "Ohio" Tools when buying anything in these lines. They are carefully made from best materials, skillfully treated and tempered, and well worth insisting upon.



OHIO TOOL COMPANY, Dept. No. 3, Columbus, Ohio

Please Mention Popular Mechanics



Here's Another Handy "Yankee"

"Yankee" Magazine Ratchet Screw Driver is 4 screw drivers in one. You'll see that it has 4 blades

of varying width and thickness. Stored in a magazine in the handle when not in use.

Blades are held securely in place by an ingenious "Yankee" device, yet you can change them in a jiffy with thumb and forefinger.

Ratchets right hand, or left hand. Or right. You'll appreciate the convenience and economy of it.

Made with two lengths of shank—

No. 65, with one inch shank - 95c

with six inch shank - 1.10

Your dealer can supply you.

It's mighty handy, like all 66 of the

"YANKEE" TOOLS

Write for the "Yankee Tool Book"—it tells all about the handiness, for householder as well as mechanic, of "Yankee" Tools, and shows how they're used.

NORTH BROS. MFG. CO., Sta. Q, PHILA., PA.

"Please, your Satanic majesty," begged a lost soul who was fishing from the banks of a boiling lake, "can't I try my luck somewhere else? I've been fishing from this blamed place for the last hundred years and haven't had a bite yet."

"That's the h——— I of it," explained his Satanic majesty.—Everybodys.



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Now made with **Instantaneous Readings**, the big improvement in markings. Saves time and eliminates errors. Send for sample piece of tape and our complete catalog.

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Tool Cases—"FOR THE MAN WHO CARES." Style No. 21. A Portable Tool Case for toolmakers and mechanics. It is the best that can be built, and appeals to the up-to-date mechanic who desires a tool case that is high grade in workmanship, material and design. We ship direct from the factory, and refund your money if not satisfied. For further information ask for circular No. 21.

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The Magic of 17 Cents Explained!

How 17 Cents a Day Buys the \$100 Oliver Typewriter

This, ladies and gentlemen, is the correct solution of the Typewriter Problem, which has puzzled hundreds who were anxious to own the Oliver but didn't happen to have in their pockets its price—\$100.

The Key to the Problem is *seventeen*, the magic number.

The first thing is to forget all about the \$100. Concentrate your mind on the question, "Can I save 17 cents a day?"

The answer, of course, is YES! It's *easy* for everybody. Now watch the blackboard, while we do a little rapid calculation.

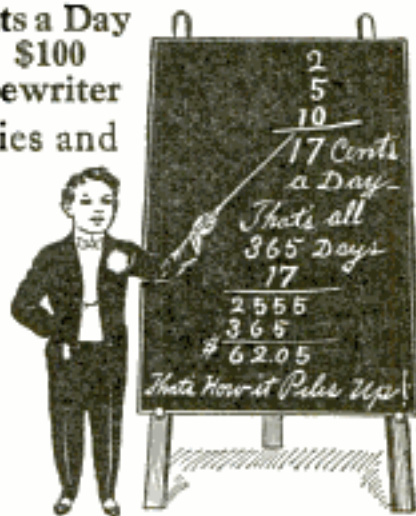
Add two cents, a nickel and a dime, and you get 17 cents. That's what you pay *per day*.

We multiply the 365 days in a year by the magic number and—behold! the surprising total of \$62.05.

In a little over a year, at 17 cents a day, you have paid for the world's best \$100 machine.

Please understand that you get the machine before you begin to save 17 cents a day.

A small first payment, to show good faith, puts the Oliver in your possession. Then, if you wish, you can make the machine *earn* the money to pay the rest of the \$100.



The OLIVER Typewriter

"The Standard Visible Writer"

The Oliver is so easy to operate that you can master it in *seventeen minutes' practice*.

And inside of *seventeen days* you can be so proficient that your services will be worth *money*.

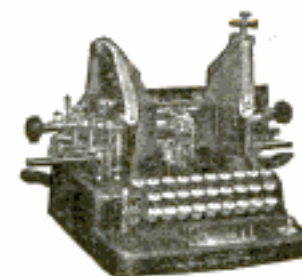
The Oliver Typewriter is as simple as the *plan* on which it is *sold*.

It has about *seven hundred and seventeen less parts* than other standard typewriters. Think what that means in added *life*, increased *efficiency*, freedom from *wear* or need of *repair*.

The basic principle of the Oliver Typewriter, the *U-shaped Type Bar*, puts it *seventeen years* in advance of its nearest competitors.

Upon this fundamental advantage, covered by world-wide patents, has been reared the towering supremacy of this greatest of writing machines.

Write for full particulars of the "17-Cents-a-Day" Plan and Catalog telling the fascinating facts about the Oliver Typewriter. (25)



The Oliver Typewriter Company
107 Oliver Typewriter Building, Chicago

Please Mention Popular Mechanics

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When you go to your dealers for tools you want the best and most up-to-date.

You want tools that are well designed, thoroughly made of the best materials, and nicely finished.

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These are tools with a reputation that every user of tools knows. Dealers everywhere are carrying them.

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Get it, select what you need and we will see that your nearest hardware store can supply you.

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"Yemco" Quick Set, Ball Bearing Wrench

For Automobilists and
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Sent postpaid on receipt of
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adjust-
ment.

Will
Slide
to any
hundredth
part
of an
inch and
hold to
that point
until
released.

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Of the naming of new diseases there is no end. Without doubt the cranking of necks occasioned by the passing of airships will create a malady that some brisk medical man is quite sure to classify.

Then there is the nod that accompanies the refusal to accept storage eggs.

And the wrist twisting movement that goes with the extraction from an unwilling pocket of the cash for the butcher's bill.

We must keep the doctors entertained.—Cleveland Plain Dealer.

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Invaluable for Home
Workshop and

Repair Kit

\$1.25

Prepaid

Produces

intensely hot

flame for soldering,

welding, removing paint

and 101 odd jobs around the home,

repair shop, automobile, motorboat,

etc. Powerful, compact, purely auto-

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Gasoline Soldering Iron Blow Torch



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For
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The gas and air become thoroughly mixed for perfect combustion while passing through deflectors in base of tubes. The flames penetrate each other at cross angles, producing a clean, intense heat, free from smoke and with no waste of gas.

Useful in the machine shop for tempering small tools, melting lead, babbitt, etc., and as a forge for light work. For laboratory and household use it has no equal.

Over it a quart of water will boil in six minutes. Soldering irons with short handles can be used without fear of heating the handle.

The two and three burner heaters are made with a graduated adjusting tube on the end to supply the gas to one or more burners as desired.

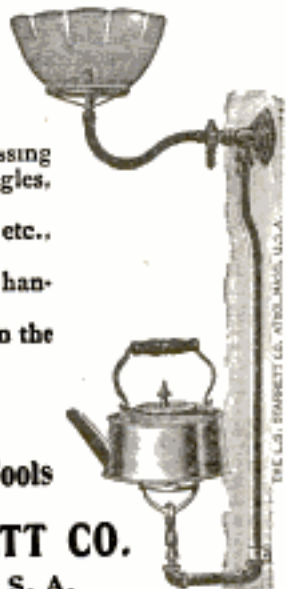
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No. 100 D	Three " "	3.00
No. 100 E	Tool holder only15
No. 100 F	Dish holder25
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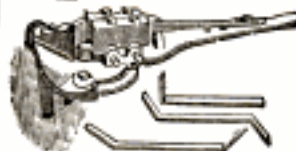
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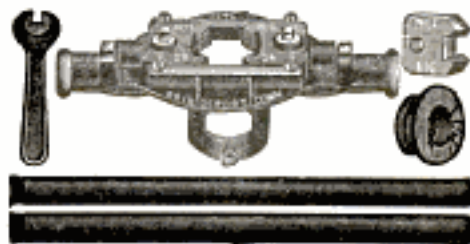


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wishing to bore a hole in steel, iron or wood. We make drills in 9 sizes. Our large size will drill a 3/4-inch hole in steel. Our Electric Midget weighs only 4 pounds, and will drill in steel up to 3-16 inch. Great for manual training schools. We also make electric driven grinders. Let us send you one on 10 days' trial. Send for catalogue.

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Easy to Work, no Bellows, no Air Compressor.

No. A Blow pipe for brazing and general work . . . \$12.50
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SEND YOUR
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NATIONAL ECONOMIC GAS BLAST CO., 88 John St., NEW YORK

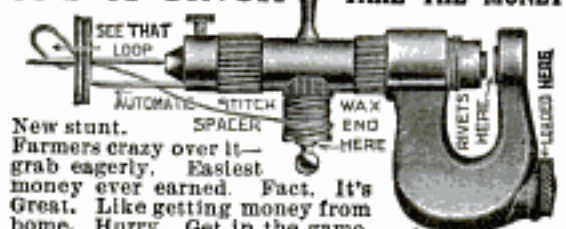
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This Tool Holder is $7\frac{1}{2}$ inches in length. The hollow handle is cocobola wood and contains a set of ten tools, 4 inches long, viz: 1 chisel, 1 file, 1 gouge, 2 screwdrivers, 1 reamer, 1 gimlet, 1 bradawl, 1 scratchawl and 1 saw. The tools are of the highest grade and guaranteed to give satisfaction. A sample will be mailed to you on receipt of \$1.50. It will be found exceedingly convenient for a thousand and one small jobs.

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POCKET \$10 DAILY AGENTS IT'S A CINCH JUST HAND IT OUT TAKE THE MONEY



New stunt. Farmers crazy over it—grab eagerly. Easiest money ever earned. Fact. It's Great. Like getting money from home. Hurry. Get in the game. **Mend-a-Rip.** Hand sewing machine. Does finest, coarsest sewing; leather and tough material of all kinds. Rivets, too. Easy to use—needed everywhere—everybody buys. Hilton, Mo., writes, "Nothing to it. Just hand them out like circus tickets. Money rolling in—send fifty more." Henson, Mont., says, "Everybody buys. Say it's the finest thing out. Sold 23 today. This is fine." Guaranteed—no chance to lose. Does the business right. You can't fail. **Not sold in stores.** You've worked hard long enough. Get the easy money. Change to fascinating business—free to come and go. What's the use of plodding? Just start—then it's easy. **Make \$1,000 to \$2,000 this year selling Mend-a-Rip.**

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Write for it today. Begin now. Success is great. You feel fine. Gets in your blood—gingers you up. Pretty soon easier to make big money than little. Cut loose! Break away! Don't stick to irksome tasks—long hours—bosses. We'll start you. We'll help you. We'll give you a boost—good territory. Write. We need managers, salesmen, solicitors, agents everywhere to appoint, control, take orders. No money needed, just write a card.

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All Progressive and Up-to-date Mechanics as well as Manufacturers having use for a Level are getting one. An instrument with which at one glance you can get the true slant on any line or grade either in degrees, inches or percentage, or all at the same time, and will at once give the exact distance need to plum up to a true level. A Civil Engineer that you may have with you at all times. The most practical, durable and convenient instrument of the day. The longitudinal recess which is shown in cut is well worth the low price of the instrument. Write **AT ONCE** for large list of Testimonials from all over the United States and Special Introductory Price, given only to First Applicants with privilege of taking agency. Address,

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While Brum was collecting he would travel all over the country, walking down the corridor carriages and wagging his tail joyfully whenever a coin was dropped into his box. The cost of his keep was defrayed by the fund. He loved his work and seemed to realize he was an important factor on the London and Northwestern road.

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This 7x7 ft. Wall Tent

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Our flag department is unusually complete and extensive. Our flags are infinitely superior in quality to those usually offered at retail. Our prices for these highest grade goods will surprise you.

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Will keep your house surprisingly cool in the hottest weather. Easily erected. Fits any size window. Only..... **\$1.50**

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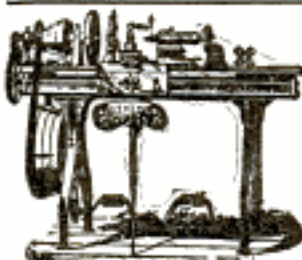


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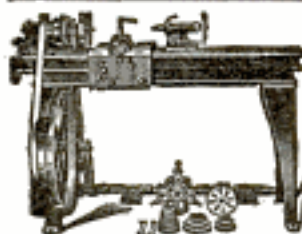


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For foot or power as wanted. Has power cross feed and compound rest. A strictly high-grade modern tool. We also build a 9-inch lathe. Descriptive circulars of each lathe upon request.

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Screw Cutting Engine Lathes—9-in., 11-in., 13-in. and 14-in. This cut shows our No. 4 Bench Lathe. Swings 8 inches, takes 21 inches between centers.

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- Indolence.
- Headstrongness.
- The gambling instinct.
- Lack of concentration.
- A great sorrow.
- Living in the future.
- Slovenliness.
- Lack of early training.

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"KNIFE" PAT. BALL BEARINGS

1-4 in. Shaft and up. No fitting, just push them on. 10 cents in stamps for sample.

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THE CHERINGTON SUCTION CLEANER
IS THE MOST EFFICIENT AND EASIEST OPERATED HAND CLEANER MADE. HAS GLASS DUST SIGHT. BLOWER ATTACHMENT AND CONTINUOUS SUCTION GUARANTEED IN EVERY RESPECT. SEND FOR PRINTED MATTER. AGENTS WANTED.
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If It's a Sebastian, It's a Good Lathe

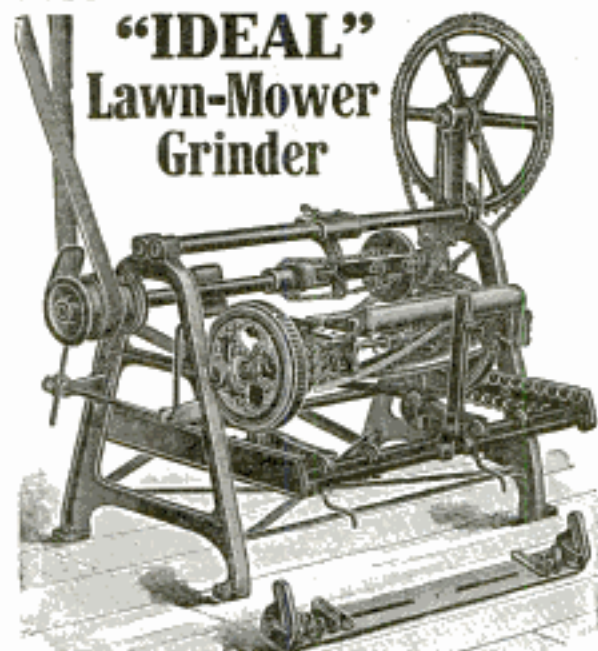
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9 to 15 in. Swing.
New Features.

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Grinds the reel knife to fit either a crooked or straight lower blade — something never done before. Nothing like it on the market. Sharpens a mower perfectly in 15 minutes. The biggest money-maker you can have in your shop. Write for circular and price TODAY.

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WIRELESS RECORDS.—"I noticed in your issue of January, 1910, a statement that a new wireless record for the Pacific had been made from Honolulu to San Francisco, a distance of 2100 miles. I beg to state that in March, 1909, the U. S. A. transport 'Sheridan,' with the Ninth Cavalry on board, made a record with San Francisco, of 3200 miles, shortly after leaving Nagasaki, Japan."—R. K. Smith, Fort Sam Houston, San Antonio, Tex.



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are durable, substantial and give satisfaction to particular users. Built in five sizes to suit all classes of service. No matter what price you pay you cannot get better value for the money than you will get in the CRESCENT line of

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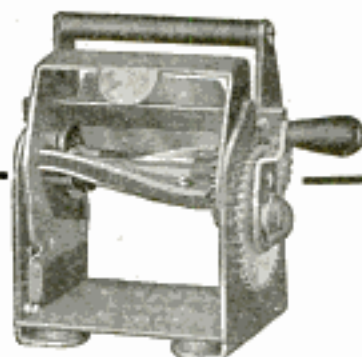
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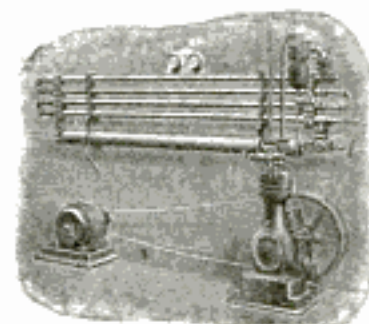
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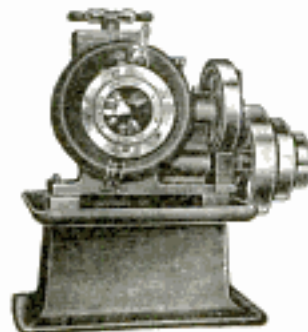
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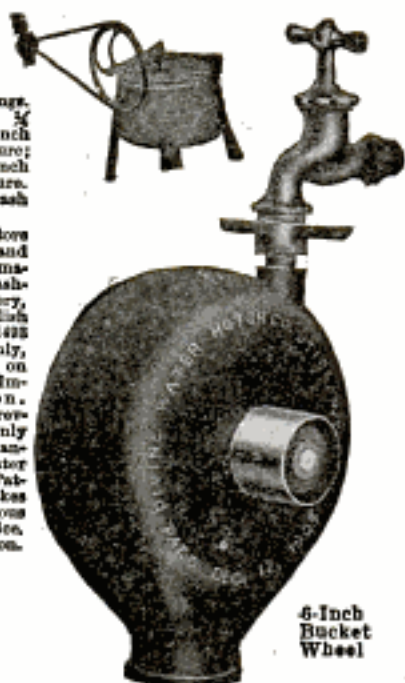
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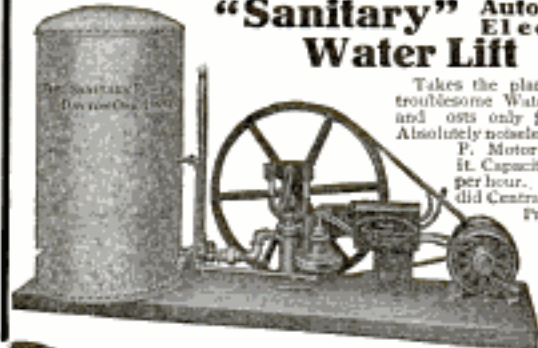
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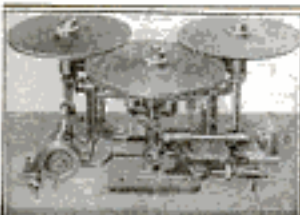
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CAMBRIDGE, MASS., August 10, 1909.

I wish to express my thankfulness to you for your good service in attending to the patenting of my invention. I am very well satisfied with your work, and assure you that my next invention will pass through your hands. MORRIS DAVIDSON,
 Box 1304 Cambridge St.

LILY DALE, N. Y., July 27, 1909.

I was surprised to receive notice that my patent had been allowed in such a short time. You are certainly prompt, just as you claim. I thank you for your manly way of handling this case.
 WILLIAM J. UARD.

GRAND HAVEN, MICH., April 11, 1908.

I am well pleased with your work. In fact, you and your draftsman have done well. I realize the value of good work and know good work when I see it. I also feel that your charges are reasonable, considering the amount of work to be done.
 ANDREW J. OFFORD, 834 Washington Ave.

TUPELO, ARK., February 19, 1908.

We desire to thank you for the promptness with which you secured our patent on guides for Roller Band Saws. Taking into consideration the completeness of the claims allowed and the short time you required for the work, we desire to say that you are to be depended upon for prompt and efficient work. We are working on another idea which we shall be pleased to entrust to you, if we decide that it will be a success.
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 E. C. LIPPMAN.

BLOOMINGTON, ILL., November 15, 1909.

I have received the papers and am very much pleased with them. I am very glad to know that I have an attorney who deals honestly, and my opinion is that I have the King of patent attorneys.
 SIMPSON EDWARDS.

The following is a copy of a letter written to a prospective client, who made inquiry of the Bankers' and Attorneys' Publishing Co. of St. Louis, Mo., publishers of the Gast-Paul Directory of Bankers and Attorneys:

ST. LOUIS, MO., November 20, 1908.

KYLE B. FARIS, Esq., Whitesburg, Tenn.
 DEAR SIR: Replying to your favor of November 16, we can cheerfully recommend Mr. Watson E. Coleman as being both competent and reliable in the handling of patent or other legal business. He has represented our Directory in Washington for several years, and has given complete satisfaction.
 Yours very truly,
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EL PASO, TEXAS, December 9, 1908.

You are to be congratulated on the way you have handled my case. I am sending you \$100 at this time, and on January 10 I shall take great pleasure and delight in sending you the balance.
 S. C. PANDOLFO, Superintendent of Agents,
 Western Dept. Missouri State Life Ins. Co.

MANOR, TEXAS, January 16, 1909.

Please accept my thanks for your strictly upright, prompt and honest dealings with me; and if I ever invent anything more, I will certainly have you attend to my business for me, and will also recommend you to others, for I know you are honest.
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CLAYTON, N. M., April 25, 1908.

I desire to thank you for the attention and proficiency in connection with my patent. I will remember you with my business in the future, and will cheerfully recommend you to any parties in need of business in your line.
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WALKER, MINN., December 21, 1908.

I will take this occasion to thank you for the very prompt, business-like and careful attention you have given my application for a patent. I shall be pleased to recommend you to any I may find desiring similar services.
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February 2, 1916.

"Signed" WILLIAM C. BRIDGES,
Wapello, Iowa.

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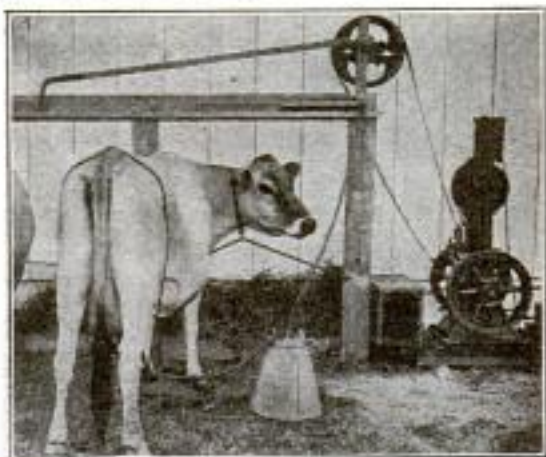
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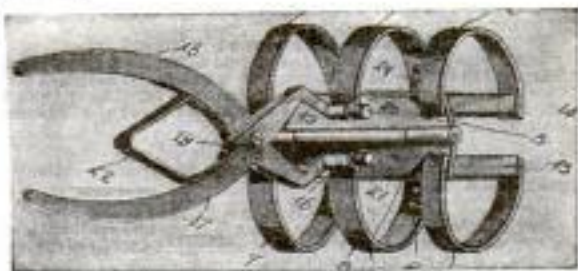


Ralph L. Hinman of Munsville, N.Y. says of his milking machine: "As soon as others saw how practical the machine was they bought readily and at the present time, after ten months, about 1,000 cows are milked daily with our machines." We obtained his patent for him.



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Washington Post.

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Thanking both of you for the courteous treatment shown me when in Washington recently and the careful consideration given our business, remain,

Sincerely yours,

A. D. Hadsel

ADH:JL

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NOTE.—Our Mr. Beeler, after ten years service, resigned as an Examiner in the U. S. Patent Office in 1906.

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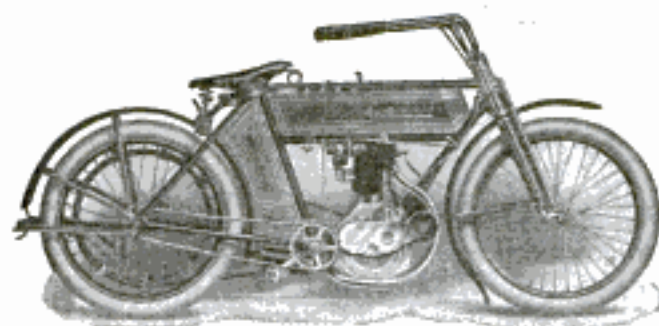
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SEND POSTAL WITH NAME OF YOUR DEALER AND WE WILL PRESENT YOU WITH A SAMPLE OF PUTZ CREAM ABSOLUTELY FREE

WE ALSO MAKE SILVA PUTZ THE ONLY PERFECT SILVER POLISH NO BETTER SILVER POLISH CAN BE MADE

AMERICAN METAL POLISH CO
66 WINSLOW AVE., WEST SOMERVILLE, MASS.

THE VALUE OF TIME—No business man has a more important asset than time, but comparatively few business men know that. A great many men, more than you would like to believe, think they can take it easy

AGENTS WANTED



All over the U. S. to sell our lighting systems and install agencies throughout the country. We are one of the oldest firms in the business, and manufacture a lighting system that has proven to be the best on the market. Our generator has the needle cleaner and air regulator (our exclusive patent), and that is why our lamps are giving the best satisfaction and that is why a Tures agency is a live proposition and a money maker for hustling, live agents. 100% profit on money invested. Write today for complete particulars.

THE TURES MANUF'G CO.
400 Sixth Street MILWAUKEE, WIS.



FROM THE FACTORY

REST-MORE Kitchen Cabinets

Less Steps—Labor Savers. As necessary in the home as machinery in the shop. Built for years of service. Guaranteed by the maker. You deal direct and save two profits. Shipped subject to inspection. Cash or credit. Send for circular and kitchen novelty.

INDIANA CABINET & MFG. CO.
Dept. P 1, ANDREWS, IND.

Reference: State Bank of Andrews

Home-Made Gas From Crushed Stone and Water For Lighting and Cooking

JUST suppose, when company comes, you could pull a little chain and turn on a flood of light in a cluster of globes hanging from the parlor ceiling.

And suppose, a little later you could pull another little chain and turn on a beautiful light in a colored dome hanging over the dining room table.

Pull still other chains and turn on lights in your bed rooms, your kitchen, your cellar or porches.

Pull another and fill your barn with light that would show up every hair, straw or buckle as plain as these things would show by daylight.

And suppose you made all the gas for these lights yourself, right on the place.

Made it so easy that the work required only fifteen minutes of your time once a month.

Make it so cheaply that the light costs you no more than kerosene.

In other words, suppose you had a little acetylene light plant built for country home use.

A strictly automatic plant that would furnish genuine acetylene light that you could actually turn on with the pull of a chain whenever or wherever you wanted it, without using a match.

A plant that would do away with the danger of matches and tipped over lamps—two things that are responsible for the burning of thousands of country homes every year.

Picture the advantages in your mind's eye—stop and think of the safety, comfort, satisfaction and happiness it would bring to your family.

Do this and you will understand why it is that over one hundred and seventy-six thousand farm houses have been equipped with acetylene lights to date.

Consider also that these one hundred and seventy-six thousand country home owners simply followed the lead of over twenty million city people who have used gas light so long that they don't know what an oil lamp looks like.

Like these city friends, you wouldn't keep your oil lamps a day if city gas could be piped to your place, and this new rural gas, "Acetylene," beats city gas all hollow in forty ways.

Unlike city gas, your acetylene will not be poisonous to breathe—you can sleep all night in a room with an open burner with no injurious effects whatever.

Volume for volume, your acetylene will give you ten times more light than your city cousin gets from the best city gas.

Also you will find acetylene an economical and satisfactory fuel burned in a cooking range built for the purpose.

Once a month you will have to drop a few pounds of Union Carbide in a small tank-like machine that sets in your basement or in an out-building.

The machine will do all the work and supply gas automatically to any room or point to which you run small iron pipes.

Won't you let us tell you how little it will cost to make this wonderful light yourself for your home and all the other buildings on your place?

Just address **UNION CARBIDE SALES CO.**, Dept. C., 40 Adams St., Chicago, Ill., for estimate and free booklets.



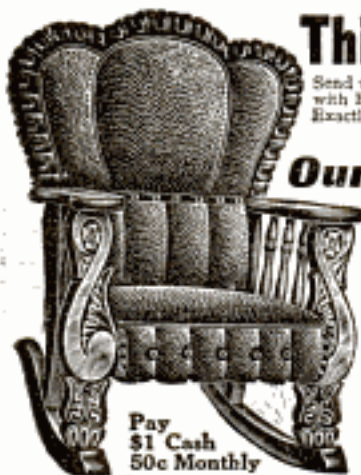
CRUSHED
STONE



LIGHTING



COOKING



Pay
\$1 Cash
50c Monthly

This Massive Easy Rocker Sent for \$1.00

Send us \$1.00 and we will ship this elegant, massive Easy Rocker, solid Golden Oak, spring construction, upholstered with Boston Leather, tufted front. High padded back, tufted edge. Fancy shaped carved front posts, broad arms. Exactly like this illustration. Satisfaction Guaranteed or Money Refunded. Order chair No. 1152.

Price \$5.45—\$1.00 Down and 50 Cents Per Month

Our Great Catalogue Sent FREE

Simply mail us a post card today. It gives all information and tells you how to save money on housefurnishings, such as Furniture, Carpets and Rugs shown in actual colors, Curtains, Stoves, Washing Machines, Crockery, Silverware, Office Desks, Baby Carriages, Refrigerators, Fireless Cookers, etc.

Credit Given to Everybody

allows the use of goods while paying for them. Trade with us, America's Great Original Housefurnishing Concern, who for over a quarter of a century has furnished satisfactorily thousands of happy homes throughout the country.

You Must Have Our Free Catalog It quotes lowest prices on thousands of articles, shows latest styles and prevents you paying too much. We give you from 4 to 12 months to pay while using the goods in your home. We have special catalogs of Furniture, Carpets, Sewing Machines, Musical Instruments, Watches, Jewelry. Say which you want—they are Free.

SPECIAL !!
OUR BIG SEWING
MACHINE CATALOG
Just Out.
Get it now FREE

STRAUS & SCHRAM
Inc.
1067 25th St., Chicago, Ill.

Clothing for men, women and children—Credit given—Catalogue free—Ask for it



The Gurney

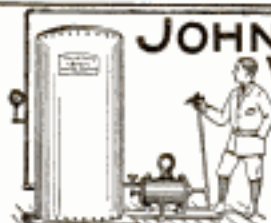
When you start out to buy a refrigerator, the first cost is unimportant as compared with the cost of maintaining it after it has once been established in your home.

The Gurney is the most economical in the use of ice of any refrigerator on the market. It is therefore the cheapest to buy.

Every part of The Gurney is cleanable, and it is the owner's gross negligence if it is unsanitary.

The Gurneys are constructed with the best possible materials available, and they are thoroughly insulated with Mineral Wool, the best non-conductor in existence. Send for Catalog.

The Gurney Stands for Quality
MANUFACTURED BY THE
GURNEY REFRIGERATOR CO.
FOND DU LAC, WIS.



JOHNSTON'S BEST WATER SYSTEM

affords you every convenience of City water. Fire protection adds value to property, cuts out water tax and labor. Freight prepaid. Write for complete literature.

JOHNSTON MFG. COMPANY
No. 18 Sharp, Kansas City, Mo.

after they get into business and some do, to their undoing later on.

The influence of a business house works while you sleep and if it's your business and you sleep too much the influence will work against you. Somebody must lose more or less sleep to make a success of any business undertaking, no matter whether it is a new business entirely or a new department of an old business. Time is the most important asset of any business and if the men running the business do not make good use of that time

Don't Drink Impure Water

and risk your life and health. Make sure that your water supply is absolutely safe by sending \$1.00 for the

Little Brown Jug Germ-Proof Water Filter

Simple and efficient—does the work of high-priced filters—saves hundreds of dollars in doctor bills. Has unlimited capacity—never wears out. Only filter that can be perfectly cleaned. Collects dirt outside instead of inside—as other filters do. Sent prepaid, with full directions, on receipt of \$1.00.

Big Profits for Agents

We want one agent in each locality. Write now for good thing. Fastest selling filter made. Send for sample and start at once.

PLANET MANUFACTURING COMPANY
Estab. 1868 Dept. 15, St. Louis, Mo

HESS SANITARY LOCKER

THE only modern Sanitary Steel Medicine Cabinet or Locker.

Handsome beveled mirror door. Snow white, everlasting enamel, inside and out.

FOR YOUR BATHROOM

Costs less than wood and is better. Should be in every bathroom. Is dust, germ and vermin proof and easily cleaned with warm water.

Made in four styles and three sizes. Price \$7.00 and up.

Send for illustrated circular.

HESS, 910 L Tacoma Bld., Chicago

Makers of the Hess Steel Furnace.
Sold on Approval. Free Booklet.

THE "BEST" LIGHT



A very brilliant, pure white light, powerful, steady, odorless and absolutely safe



For Homes, Stores, Hotels, Factories, Churches, Offices etc.

ANY NUMBER OF LIGHTS



MAKES AND BURNS IT'S OWN GAS

BETTER THAN ELECTRICITY OR ACETYLENE GAS AND CHEAPER THAN KEROSENE LAMPS.

Each one is a complete self-contained miniature light works—clean—bright—odorless. Made in over 200 styles and sizes. Fully guaranteed. Agents wanted everywhere. Catalog Free. Write to-day.

THE BEST LIGHT COMPANY
324 East 5th Street, Canton, Ohio

100 TO 2000 CANDLE POWER

OVER 200 STYLES

SHIPPED IN SECTIONS **BROOKS** FINISHED AT HOME
FURNITURE
 GUARANTEED TO BE SATISFACTORY

Do You Know What Our Knock Down Furniture Is?

That it is easy to put together?
 That it is shipped in sections from factory to you?
 That it is made of solid oak?
 That it saves you over half?

Why? Because

You do not pay exorbitant freight charges;
 You do not pay expensive crating charges;
 You do not pay high finishing costs;
 You do not pay jobber's profit;
 You do not pay dealer's profit;
 You pay but one profit only—our profit.

In fact, do you know that retail furniture dealers purchase our furniture—set it up—and sell it to you at a handsome profit?

Our best customer is the United States Government. We furnished one of the buildings at the Seattle-Yukon Exposition. We just furnished a large new building for the State of So. Dakota. These orders run up in the thousands—purchased at catalog prices. The point is, you can buy one piece, if desired, at exactly the same price and terms.

Our Guarantee You take no risk—We absolutely guarantee that you will be satisfied with everything you purchase of us, or your money will be instantly refunded—can we make it stronger?
BROOKS MFG. COMPANY, 3704 Ship St., SAGINAW, MICH., U. S. A.
 Established 1901

ORIGINATORS OF THE KNOCK DOWN SYSTEM OF HOME FURNISHING

Send today—not tomorrow—for our
Catalog No. 10—It's Free

It best tells the story—explains in detail our proposition—which is to furnish you with the best arts and crafts furniture—at a cost that is ridiculously low.



As you receive it, with cushions made, ready to drop in place. Just six joints to put together in the grooves provided.

Davenport No. 6—Height 35 inches—Depth 30 inches—Length 38 inches—Leas 3 inches square. Ordinary Retail Price, \$50.00. Our Price, \$19.25.

Can be assembled by any woman. No skill required; the only tool necessary is a screw driver; and the holes are bored. Each piece can go together but one way, and that is the right way.

from day to day, the business will suffer in just that proportion. When you see the head of a going concern sailing up and down the avenue in an automobile two or three afternoons a week, look out for him. Don't lend him money and don't let him owe you enough to hurt you when the smash comes.

When you see a head of a business concern showing his face around in public places in the evening, look out for him. Don't let him owe you much money. Try to get in with his competitor who is so interested in his business that he takes pleasure in staying home nights and spend-

IRON AND WIRE FENCES



For All Purposes High Grade Catalog Free

ENTERPRISE FOUNDRY & FENCE CO.
 286 South Senate Avenue : INDIANAPOLIS, INDIANA

Have Running Water On Your Place

Whenever and wherever you like—Bath, Laundry, Toilet, Kitchen, Upstairs and down, Barns, Lawn. Force enough for fire protection. Air pressure guaranteed at all times by our patent pump. So simple anyone can install. Every detail worked out for your individual needs by expert engineers without charge. Complete specifications furnished.

Burton Water Works

received only medal ever awarded a water supply system—proof of its superiority. Best constructed tank on market. Sold on 30 Days' Free Trial. Correspondence with Villages, Towns, Public Institutions as well as farms, ranches, country houses solicited. Write for testimony of satisfied users near you and booklet, "An Interesting Tale Simply Told."

C. A. Burton Water Supply Co., 26 West 7th St., Kansas City, Mo.

30 Days
 FREE



Write
 for
 Book

\$50.00 UP.
 Lasts a Lifetime.

BETTER AND QUICKER THAN SOAP

for cleaning and keeping your hands in a healthy condition. Does wonders for the housewife, cleaning woodwork, sinks, kitchen utensils, etc. Write for sample.

FLASH CHEMICAL CO., 10 Fulton Place, Boston, U. S. A.



FREE BOOK ON BYSTROM LIGHT

Great for Agents

Brightest, safest, cheapest light for home or store. Burns 96% air to 4% gasoline; 400 candle-power per mantle. Runs 44 hours from 1 gallon. Costs 1/2 cent an hour. Leaks impossible. Endorsed by insurance companies. No noise. No smell. Least heat. Write BYSTROM GAS LAMP CO., Dept. F, DEFIANCE, O.

ALLEN SOLDERSSET MEND THAT PAN

or leaking pan, kettle, boiler, sink, etc. Fix that broken clep or tin—all metal things, with holes, breaks or cracks, any size. Complete home mending outfit. A touch mends a break. REMAKES in one solid piece stronger than original. Tin, copper, brass, phosphor-bronze, lead, galvanized iron, steel, etc. Also for plumbing, auto, cycle, gas, repair, carpenters, pump mechanics, vessel men, tinkers, electricians, tinsmiths, hotels and restaurants. 10c postpaid. Agents wanted. L. B. Allen Co., Inc., 1245 Columbia Ave., Chicago, Ill.

JUBILEE SELF-HEATING FLAT IRON

Best in the world. Construction—simplest and most practical. Automatic cleaning device. Burner entirely of brass. Lasts a life time. Cost of fuel Three Cents for 10 hours. Gives perfect satisfaction. Write for free Booklet.

Jubilee Mfg. Company, 14th and Howard, OMAHA, NEBR.





A
YEAR
TO
PAY

1.50 cash 75c per month

Bed, Springs and Mattress

Bed just as illustrated above—in gold bronze, or enameled in any color, any width, posts 1½ inch diameter, also fine cotton top mattress, durable ticking, best woven wire springs with spiral steel spring supports. Terms \$1.50 cash, 75c per month.

9.65

HOMES FURNISHED

We'll sell you a single article or furnish your home complete on small monthly payments. You enjoy the full use of the goods while paying for them. It's strictly confidential credit—very simple and thoroughly pleasant. It matters not where you live. We charge absolutely nothing for this credit service—no interest—no extras of any kind. No security required. Absolute satisfaction or money refunded. Everything confidential.

Catalog No. 148 Free

Write for our Big New Catalog. It's an immense volume, beautifully illustrated in colors, quoting factory prices on Furniture, Carpets, Rugs, Pianos, Sewing Machines, Crockery, Clocks, Silverware, Go-Carts, Refrigerators, Stoves, Ranges, etc., etc. Write today.

Hartman Furniture & Carpet Co.

Dept. 09 223 to 229 Wabash Ave., Chicago, U. S. A.
Largest, oldest and best known homefurnishing concern in America—established 1855—55 years of success—22 big stores—over 700,000 customers—capital and resources greater than that of any similar concern in the country.

LUMO KEROSENE BURNER

Burns a mantle like gas making a gas light from kerosene. Odorless, noiseless and absolutely safe. Produces 100 candle power 16 hours on one quart of kerosene. Best and easiest light on the eyes. Gives a pure, white light. Requires no generating light as any lamp, and you have a perfect light instantly. Burner fits any lamp, including the famous Rayo. Nothing cumbersome or unsightly. Used everywhere in the best homes. Satisfaction guaranteed.

We want agents everywhere. Big money made by dealers. Buy two and sell one, getting yours free. Then sell to your friends and neighbors. Write today for free catalog.

JOHN S. NOEL CO.
104 Division St. Grand Rapids, Mich.

Costs 80 Per Cent. Less than Electricity or Gas

Operate Your Own Light Plant

Makes and Burns Its Own Gas

Is brighter and more pleasing to the eye and the nearest approach to daylight. For full particulars and agent's proposition, address

NATIONAL STAMPING AND ELECTRIC WORKS
210 South Jefferson Street, CHICAGO

ing a quiet hour or so in thought over his business. This latter man will pay his bills inside the discount time limit and will leave other people's notes in his own safe until they are due, instead of taking them to a bank to be discounted.

No time waster ever has succeeded and never will. It is against the nature of things. You can not make time, but you can control its use. You can not make one second, but you can waste years.—Modern Methods.

WANTED

SOLAR LIGHTS SAVE MONEY

Salesmen Wanted—Large Profits. Make \$300 a month selling Solar Lighting Systems for Stores, Dwellings, Streets, etc. Free Catalog. Write today. CHICAGO SOLAR LIGHT CO., 222 South Jefferson St., Chicago, Ill.

AGENTS

WHEN YOU WANT ANYTHING AND DON'T KNOW WHERE TO FIND IT
WRITE BUREAU OF INFORMATION,
POPULAR MECHANICS CHICAGO

HANDY LAMP

Gasoline Lighting System

Give a 300 Candle Power Shadowless Light the instant you move the lever. Turns up or down, like gas, burns dim when not in use, or can be turned up instantly when more light is needed. It floods a 30-foot space with a brilliancy like daylight. For cheaper than gas, kerosene or electricity, and so simple that any one can use it. You can depend on it for years for any purpose demanding a big, strong light. Catalog POP tells why. Send for it Now.

BRILLIANT GAS LAMP CO.
Dept. 1
42 State Street, CHICAGO, ILL.

You Can't be fooled on "COME-PACKT" and You Save over Half

SECTIONAL FURNITURE

You can't be fooled on "Come-packt" Sectional Furniture for it comes unstained and the finished sections are ready to put together. You see just what you get—and you get Quarter-sawed genuine White Oak every time. A few minutes only needed to fasten and apply whatever stain you select—your choice of seven finishes free.

One Hundred other splendid pieces (\$3 up) all Quarter-sawed White Oak—rich in beautiful hake.

You save over one half because we manufacture and ship direct to you at lower prices than dealers pay. Why pay middlemen's profits, store rents, clerks' wages, etc., as well as high freights and costly packing—all add to the PRICE not the value of store furniture.

Try our way ONCE—that's the proof. "Your money back if you say so."

Beautiful catalog free.

Study Table, \$17

Serving Table, \$7.50

\$7.00 with cushions

COME-PACKT FURNITURE CO., 401 Edwin St., Ann Arbor, Mich.

How To Save \$5 to \$40 On Your Stove

By Our Direct-From-Factory-To-You Selling Plan



This Oven Thermometer saves fuel—makes baking easy.

Write for our Catalog No. 473 and compare our prices with others. That's all the proof you need.

Thousands of our customers have written us there's no better stove than the Kalamazoo, anywhere at any price.

Our catalog tells you how to buy—how to know a good stove. Our credit plan makes paying easy, for all responsible persons.

We make all kinds of stoves and ranges for all purposes. Select from our Catalog—buy direct from us—the manufacturers—for

We make a full line of high grade Gas Ranges. Write for Catalog No. 885.

Cash or Credit

300 days' approval test. Freight prepaid. Safe delivery guaranteed.

Write for Stove and Range Catalog, No. 473.

Kalamazoo Stove Co.

Manufacturers

Kalamazoo, Mich.

**"A Kalamazoo
Direct to You"**

TRADE MARK REGISTERED

FACE MADE TO ORDER.—A St. Louis newspaper tells of a man who is being provided with a new face. The man, according to the story, was the driver of a coal wagon. He was thrown to the road and one of the wheels passed over his face, crushing it so badly that the hospital surgeons had to build an entirely new one. The operation was said to be completely successful, and, furthermore, the new face is said to be a much better looking one than the face the wagon wheel obliterated.



An Automatic, Modern, Individual Gas Lighting and Cooking Plant for Country and Suburban Homes.

The Original Walther Improved Gasoline Gas Machine is simple, durable and reliable; operated by weight power. Over 50% of our machines are operated by women. It is the cheapest and most perfect light known.

Endorsed by all Insurance Companies. Write for Specifications Etc. Jubbett, N.E. Nelson Mfg. Co., St. Louis, Mo., Col., Los Angeles Cal., Oakland, Cal.

WALTHER-VOGLER GAS MACHINE CO.
711-715 Harrison Street, DAVENPORT, IOWA

Geisha Diamonds

THE LATEST SCIENTIFIC DISCOVERY

Bright, sparkling, beautiful. For brilliancy they equal the genuine, standing all test and puzzle experts. One twentieth the expense. Sent free with privilege of examination. For particulars, prices, etc., address

THE R. GREGG MFG. & IMPT. CO.
Dept. B, 517 Jackson Blvd., Chicago, Ill.



Transform your barren attic or cold, damp cellar with walls and ceilings of **BEAVER BOARD**

LIGHT BEAVER BOARD panels can be easily and quickly cut by any one handy with tools, and nailed to the studding and rafters of the attic.

The seams can be covered with wide or narrow decorative strips of wood, the whole given two coats of paint, and the work is done.

A place that was once cold in winter and stifling in summer will give you a comfortable bedroom, workshop, playroom for the children, and store-room for trunks, etc.

The result can be had at surprisingly low cost.



A Living-room and Attic Transformed by BEAVER BOARD Walls and Ceilings.



What Beaver Board Is

BEAVER BOARD takes the place of lath, plaster and wall-paper in every type of building, new or remodeled.

It is made of selected woods, reduced to fibrous form and pressed into panels of uniform thickness, with pebbled mat surface.

It deadens sound; it resists heat, cold, fire and strains, shocks or vibrations that bring down plaster in ruins.

Beaver Board is sold by hardware, lumber, paint, wall-paper and builders' supply dealers and decorators everywhere. For your protection every panel is stamped on the back with the BEAVER BOARD Trade-mark.



AN ATTRACTIVE BEAVER BOARD Dining-room.

Write for Beaver Board Booklets. They tell all about BEAVER BOARD and how to use it, with many views of attractive interiors. Sent free if you give name of your dealer.

Useful and decorative articles for the home can be made of BEAVER BOARD at surprisingly low cost. One of the booklets, "Beaver Board Handicraft," gives full details.

The BEAVER COMPANY of BUFFALO

OFFICES AND WAREHOUSE, 123 BEAVER ROAD
Mills and Factory, Beaver Falls, N. Y.
Canadian Factory
Ottawa, Ontario

Please Mention Popular Mechanics

10 PENNIES LEAD 10 PEOPLE TO GET \$32,000.00!

Amazing-Startling-Even Sensational-But True-Overwhelming Proof

Men—Women—Wake-up! There's something coming to you. Strange invention opens New, Gigantic Money Making Opportunity. At last! All barriers to your success wiped out—One Cent starts you. Leads to handsome fortune, wage freedom, ownership—\$3,000 to \$10,000 yearly income.

STARTLING RESULTS: ACTUAL RECORDS

Over \$2,000 in 2 Weeks; \$1281 in 1 Month; \$800 in 8 Days; \$51.50 in 15 Minutes

Proven by sworn statements. No wonder Lodawick sends this enthusiastic message from Maine: "It's great! Money coming fast. How lucky I answered your ad. 17 orders today." Hear the grand glorious news how 10 people like yourself earned over \$32,000 simply because they had exclusive selling rights on something everybody was longing, hoping, wishing for.

Korstad, (Miss. farmer) sold \$2,312.13 in 2 weeks; Zimmerman (Ind. farmer) sees great opportunity—starts—succeeds—sells farm—result; orders \$3,456 in 39 days. Why shouldn't Cashman write. "The person who can't sell it couldn't sell bread in a famine. Send 48 more." But listen! Rasp (Wis. Agent) sold \$1,445 in 75 days; Oviatt (Iowa Minister) \$800 first 11 days, \$4,000 to date; Rogers (Kan. Surveyor) \$2,800; Hoard (N. D. doctor) \$2,200; Rogers writes: "Selling baths got me one piece of property expect to get another." Miss Edwards of Nev. writes: "Sold 15 one afternoon. Everybody thinks apparatus finest thing." Reese (Pa. carpenter) "Canvassed 60 people—got 55 orders." Beem (Kan.) "I averaged \$164.25 weekly for three months. Undoubtedly the best line on the market."



M. G. Stoneman, photographer, Neb. sworn to sales in less than 3 years on partial time total \$15,000. Biggest month \$3,381.65, biggest day \$181.75. Says: "Best thing ever sold; not one complaint from 2,000 customers."



J. H. Hart, farmer, N. C., sales for one year total over \$5,000, never sold goods before. Took 15 orders in three hours. Writes: "Can't keep from selling it if properly demonstrated. Appeals to every one."



M. Juell, railroad man, Canada, started on spare time and later excluded everything for the bath business. Not a regular salesman, yet sold about \$5,800 worth in about 18 months.

MILLIONS longing for this blessing Truly wonderful. What goods, field, everything just right. Mark these wonderful features. Used wherever water in any form exists—in any room. So energizes water that 1 gallon does more than tubful old way. Gives cleansing, friction, massage, shower baths—hot or cold. Makes bathing 5 minute operation. Cleanses almost automatically—self-heating. Only clean running energized water touches body, no immersion, no using same water twice. No tubs, bowls, buckets, wash rags, or sponges. No water-works, plumbing. Insures cleanliness without drudgery—prolongs life—prevents disease. Small but mighty—carried in grip. Over 100,000 sold.

Used by United States Government Famous Battle Creek Sanitarium, other celebrated authorities.

Own a private enterprise paying 75% profit Experience unnecessary. Almost sells itself. How easy—just show—money yours. Simply supply enormous demand already made—that's all. Every customer anxious to boost your business. Absolutely no competition—everything your own way. Fascinating, exciting work—new patent—exclusive territory—credit given—co-operation, assistance, supervision, by an old reliable \$50,000.00 house. We want more agents, salesmen, managers, men or women, at home or traveling, all or spare time, to fill orders, appoint, supply and manage sub-agencies.

Send no money, but do investigate Meet us that far other time," but now. You may not see this ad. again. Mad race for appointments. Let nothing delay. Risk 1 cent now—a postal—for free yet valuable data, sworn to proofs of phenomenal success, personal trial offer. You will forever after associate this act with prosperity.



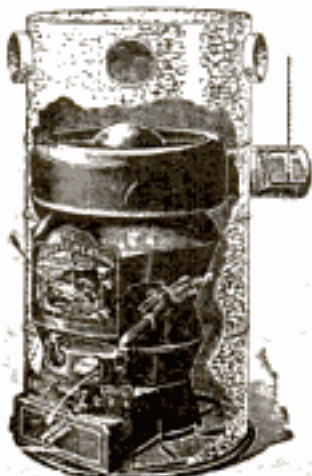
If \$3,000 to \$10,000 Yearly Appeals to You

do in your locality as they did in theirs. Here's the secret—no trick at all. Simply get busy equipping farm, town and city homes with Allen's Portable Bath Apparatus. Just think! Gives every home a modern bathroom for \$4.50; all others \$150, yet do less. Really could anything be more popular, irresistible, easy to sell? Unquestionably best thing ever happened for agents. Who doesn't want a bathroom at this insignificant price—who couldn't sell 6 to 12 daily? Think of

"SEE IT ENERGIZE."

THE ALLEN MANUFACTURING CO.

1853 ALLEN BLDG., TOLEDO, O.



Buy Direct—Save Money—We Pay Freight

Our monthly installment plan of selling direct saves you all the dealer's profit and his excessive charges for installation and repairs. You can save at least 1/3 the cost of your furnace. We have been building Jahant Furnaces for over thirty years and guarantee satisfaction.

JAHANT DOWN DRAFT FURNACE

The Best Heating System Made for residences, schools, hotels, churches, etc. It is the most economical furnace too and saves 1/3 to 1/2 the cost of fuel because the patented "Down-Draft System" burns wood, hard or soft coal, and burns it all without cinders, clinkers or any waste. Needs less attention, yet heats much better than any other furnace, hot air, steam or hot water heating system. Our plan of monthly payments

ONLY \$10 DOWN and \$10 A MONTH

makes it easy for any one to have the best heating system made. Every Jahant Furnace is sold with a strong "Guaranty Bond" that allows you 365 DAYS TRIAL. You don't run any risk buying from us.

We send complete outfit, furnace, pipes, registers, etc., together with special plans, full directions and all tools for installing. If you can drive a nail you can install a Jahant Furnace without the aid of a tinner.

Write To-Day for Catalog

which explains the Jahant Down-Draft System and tells why it gives more heat at less cost.

THE JAHANT HEATING CO., 204 Howard St., AKRON, O.

HOT WATER IN TWO MINUTES

The PEERLESS is a combination boiler and water heater, has furnace, stove and gas connections—either can be used independent of the other. We are going to prove to you that

The PEERLESS Has No Equal

from a standpoint of **ECONOMY, SIMPLICITY, SAFETY** and **PURITY**. Look at the cuts on the left-hand side and follow the small arrows. You will find that the cold water does not enter directly into the boiler, but flows down an independent tube, and is carried to the bottom of the disc or water spreader. The disc is situated directly over the flame and consumes 98% of the heat generated. This intense heat instantly goes into the water, which rises as it warms through the center tube. This shows you the *continuous circulation* which always keeps the water **PURE** and **HEALTHY—NEVER STAGNANT**. The PEERLESS is the only water heater with a direct circulating system. No coils or dead arms to endanger the purity of the water or consume fuel. There is nothing in its construction to clog or choke up. On the right-hand side you will find an arrow pointing between the burner and the disc. The heat generated from the burner, strikes the disc or water spreader, and prevents the flame from coming in contact with the bottom of the boiler. The water is heated to 160 degrees Fahrenheit, day or night, at a cost of one-half cent an hour, giving you hot water whenever you want it, wherever you want it, hot as you want it, and as much as you want of it. Can be operated with either natural or artificial gas or gasoline.

The PEERLESS Is Absolutely Guaranteed for Three Years

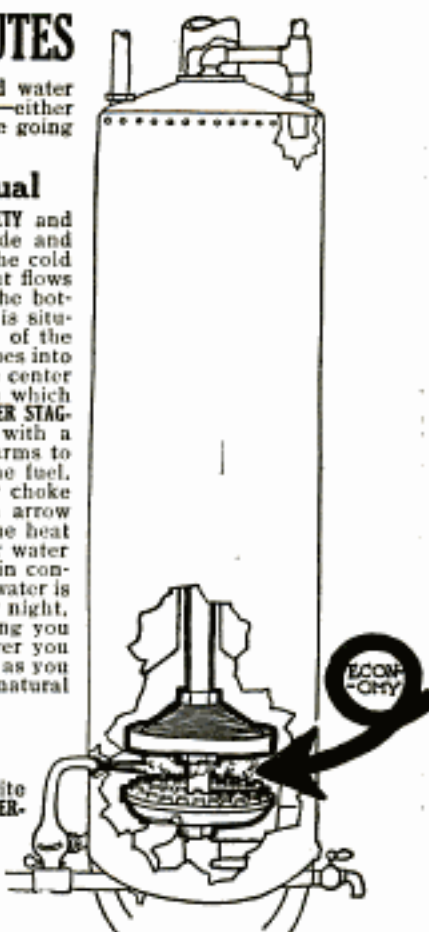
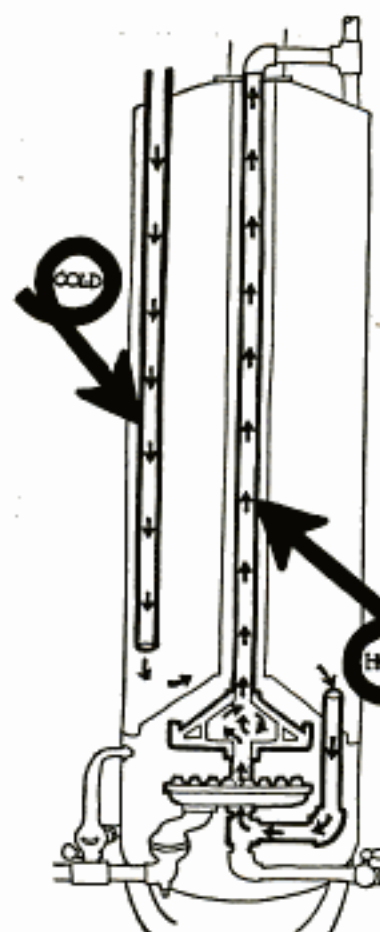
and is good for a quarter of a century. Write for illustrated booklet explaining how the PEERLESS has solved the hot water problem.

IT IS FREE

PEERLESS HEATER COMPANY

Dept. D, 39 State St.

CHICAGO, ILL.



DYE-FED HEN LAYS COLORED EGGS.—This fantastic story comes from Ithaca, N. Y.: "So contagious is the 'Cornell spirit' that a white Ithaca hen of unblemished character has been persuaded, after a course of dietetics with professors of the Cornell State College of Agriculture, to lay eggs bright with the Cornell colors. The yolks are red and the albumen white. A harmless dye was given the hen with her feed, and when it was seen that her plumage began to turn a delicate pink her eggs were examined and found to be still more deeply colored. Other admixtures of dye turned the yolk of the eggs pink and the hen's feet the same color.

HESS Sent on Approve FURNACE



We will deliver a complete heating equipment at your station at factory prices and wait for our pay while you test it during 60 days of winter weather.

The entire outfit must satisfy you or you pay nothing. Isn't this worth looking into? Could we offer such liberal terms if we didn't know that the Hess Furnace excels in service, simplicity, efficiency, economy?

We are makers—not dealers—and will save you all middlemen's profits. No room for more details here. Write today for free 48-page booklet which tells all about it.

Your name and address on a post card is sufficient.

HESS, 910 Tacoma Bldg., Chicago

No. 48
"Leader" Hess
Heat Furnace
Price \$49
Delivered here of course and
kind of this heater
Type and Register Extra

SUCCESS HAND VACUUM CLEANER \$15.00

Cleans, sweeps and dusts in one operation. No pipes or wires. Ready for instant use. Weighs only 8 lbs. Lasts for years. A whirlwind proposition for **DEALERS AND AGENTS**

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The *Ann Arbor* Lighting Systems
"MAGNIFICENT WIRE TRIP"






A Complete Lighting System for Homes, Stores, Churches, etc.

Ann Arbor Lighting Systems are brighter than gas, steadier and clearer than electric light, and cost about one-tenth as much to operate. Each lamp gives 300 to 500 candle power for less than 1/4 cent per hour. Fuel is gasoline; perfectly safe. Price \$10 up, according to number of lamps desired. We make inverted arcs especially adapted for use in stores, halls, factories, etc.

WE WANT AGENTS

who will push our line. Special terms to those who write early. Catalog and prices on request.

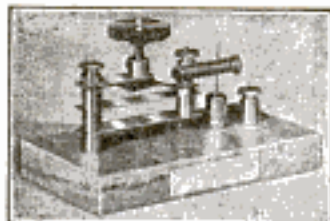
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Best grade cedar canoe for \$20

We sell direct, saving you \$26.00 on a canoe. All canoes cedar and copper fastened. We make all sizes and styles, also power canoes. Write for free catalog giving prices with retailer's profit cut out. We are the largest manufacturers of canoes in the world.

DETROIT BOAT CO., 156 Bellevue Ave., Detroit, Mich.

HIGH-GRADE WIRELESS EQUIPMENT The Celebrated Ferron Detector



Price \$5.00

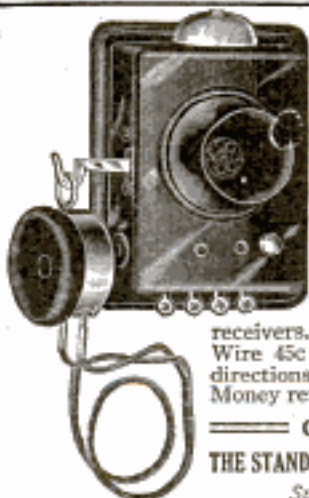
is rapidly becoming the acknowledged detector for high class work, because of its extreme sensitiveness. No battery or potentiometer is needed. It will remain adjusted for weeks. No detector selling for three times the price excels it. Beautifully finished; admirable in adjustment. Note the second enthusiastic letter from the Texas operator:

"My profound felicitations; your detector is certainly a bird, and as the President would say: 'It has all others done to a frazzle.' While in Beverly, Mass., I tested it out with a silicon; and I could get P. C. (135 miles) as loud as I could P. G. (15 miles) on the other, etc." (See first letter for great range in last month's issue.)

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Send 3c stamp for our BIG CATALOG (No. 3) of ANYTHING ELECTRICAL OR WIRELESS. Over 40 pages of unexcelled wireless instruments for the experimenter and for private and commercial installation. Unrivalled line of motors, dynamos, flash-lights, Tungsten lamps, miniature trains, import toys, etc.

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\$2.50 Each

All Charges Paid to Any Point

These phones are not toys, but practical instruments, guaranteed to be mechanically and electrically correct. Good for 500 feet. Operated by regular dry batteries. Sensitive watch case receivers. Fine carbon transmitters. Wire 45c per 100 ft; easily installed; directions with each pair; \$5.00 per pair. Money refunded if not as represented.

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FREE A Pocket Cigar Self Lighter

(retails 50c) with every purchase of \$1.00 and over. Our No. 9, 25-page catalog, containing valuable information and Real Bargains in our New Novelties, Toys, Wireless, Electric and Auto Supplies, is just out, and make the above offer, for this month only, in order to induce everybody to get a copy. New \$1.25 Flashlight with 4 C. P. Tungsten Lamp, 15,000 Flashes, now postpaid 75c; with Extra Battery \$1.00. Send Today

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We Buy, Sell, Rent, Trade and Repair Electrical Machinery.

Our Stocks are Large, Prices

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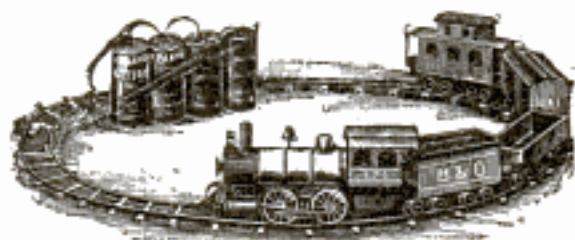
Write for Bargain Booklet Number Twenty.

Tell us what you have and what

you need. We can interest you.

The F. BISSELL COMPANY

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Electrical railways, tracks, switches, trolley cars, dynamos, motors, dynamo castings, gas engine castings, everything for the young electrician. Send for our complete catalog "B."

The Carlisle & Finch Co.

262 E. Clifton Ave.

Cincinnati, Ohio

FARMER BUYS 30 AUTOS.—J. C. Coe, a farmer, of Saskatchewan, a district of the Canadian northwest, dropped into Detroit, Mich., recently, and by the time he had finished his errands he had purchased 30 automobiles for his friends of the northwest. The deals were mostly cash and aggregated \$100,000. Coe told his neighbors that he was going East to buy an auto, and they loaded him up with orders accompanied by bank drafts. Bumper crops in the northwest caused the prosperity which permitted the farmers to invest in high-grade machines.

"Give us a garage and some speed regulations and we'll be right up to date," were Coe's last words as he started back home.

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We have the finest lighting system for Residences, Stores, Small Factories, Laboratories, or Motor Boats made. Dynamo, Storage Battery and switchboard, with automatic circuit breaker, simple, reliable, durable and low prices, cheap to maintain. You should write us at once for latest catalog: we have the outfit you have been looking for.

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This little transformer will operate your door bells, buzzers, burglar alarm systems, etc., so that you can **always** rely on them. It can be installed in places where the size and appearance of batteries would not permit of their being used.

Can be connected to any ordinary house circuit and 4, 8 or 12 volts obtained.

If you cannot secure one from your dealer, we can supply you direct. Anyway it will pay you to send for our free illustrated leaflet—4511R.

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The list of satisfied "Red Seal" customers is growing larger each day. A trial is assuring; a comparative test with other makes is convincing that our "satisfaction guaranteed" cells will do all we claim for them.

CATALOG 24P FOR THE ASKING
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NEW YORK, 17 Park Place CHICAGO, 188 Fifth Av

THE FIRST PHONOGRAPH.—A reporter was interviewing Thomas A. Edison.

"And you, sir," he said to the inventor, "made the first talking machine!"

"No," Mr. Edison replied, "The first one was made—long before my time—out of a rib!"—New York Sun.

The struggle of centuries has been to make a fool-proof machine, and the race between the inventors and fools is still on and tuck.—Exchange.

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No Wireless Station is complete without our LOOSE COUPLE COIL
Price \$10
Send 2c stamp for our Wireless Catalog.
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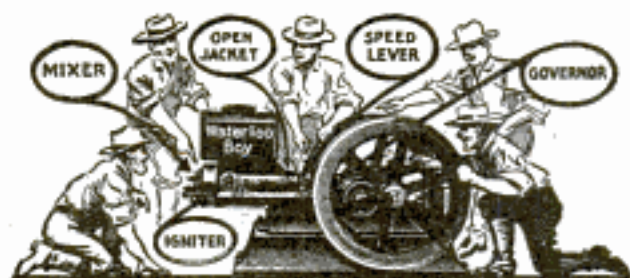
A FLOOD OF LIGHT FROM KEROSENE (Coal Oil)
Burning common kerosene the ALADDIN MANTLE LAMP generates gas that gives a light more brilliant than city gas, gasoline or electricity. Simple, odorless, clean, safe and durable.
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is revolutionizing lighting everywhere. Needed in every home. Every lamp guaranteed. Sells itself. Our Sunbeam Burners fit other lamps. Ask our nearest office how you can get a lamp free or apply for Agency Proposition. **THE MANTLE LAMP CO. of America, Desk 335**
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Holtzer-Cabot
Wireless Receivers
are well made and comfortable to wear. Very sensitive and permanent in adjustment. **Silk Wound Coils.**
SEND FOR FOLDER 20 PZ
THE HOLTZER-CABOT ELEC. CO.
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DYNAMO-MOTOR \$3.85
(A Dynamo and Motor in One)
As a dynamo, it will develop 40 C. P.; easily operate induction coils; charge storage batteries; decompose water; electrolyze, etc. As a motor, will operate sewing machine, jewelers' lathe, emery wheel, circular saw, advertising devices, and other useful appliances. Size, 3x4 1/2 inches. Weight, 5 lbs. Send stamp for our 1910 catalogs Nos. 15 and 16 of new things electrical.
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ELECTRIC
World's headquarters for Dynamos, Motors, Fans, Toys, Batteries, Belts, Bells, Pocket Lamps, Toy Railways, Books, etc. We undersell All. Fortune for Agents. If it's electric we have it. Big Catalogue, 3 cents.
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ATTENTION, PLEASE! These high grade Wireless Coils, like the illustration, are perfectly balanced, wound with the highest quality of enameled wire, and are capable of producing good hot spots from 1-3 inch to 2 1-2 inches in length. Prices extremely low. Storage Batteries of the very highest type and quality, capable of delivering 6 volts for 60 ampere hours and guaranteed for one year for \$12.00. Large discount to dealers. Write today for particulars.
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has all of the good points that go into any gasoline engine besides many exclusive patented features. A few days' trial will enable you to point out the superior points that make the

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the best engine for every conceivable purpose. We will send to any responsible person a Waterloo Boy on 30 days' free trial, and if it does not do all and more than we claim, if you are not satisfied that it is the best, send it back and we will pay the freight both ways. Can you think of a more liberal proposition than this? Write today for our free catalogue, showing styles and sizes and our free trial offer blank.

Waterloo Gasoline Engine Co.

1021 W. 3rd Ave., WATERLOO, IOWA

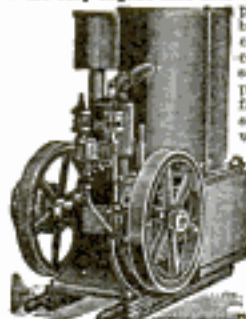
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30 DAYS FREE TRIAL

Try Kerosene Engine 30 Days Free

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You can't run a farm engine profitably on gasoline much longer. Price of gasoline going sky high. Oil Companies have soured the warning. Kerosene is the future fuel and is now 6c to 10c a gallon cheaper than gasoline. The Amazing "Detroit" is the only engine that uses common lamp Kerosene (coal oil)



perfectly. Run on gasoline, too, better than any other. Basic patent. Only 3 moving parts. Comes complete ready to run. We will send a "Detroit" on free trial to prove all claims. Runs all kinds of farm machinery, pumps, saw rigs, separators, churns, feed grinders, washing machines, Silo fillers and electric lights. Money back and freight paid both ways if it does not meet every claim that we have made for it. Don't buy till you get our free catalog. 2 to 24 h. p. in stock. Price \$29.50 up. Special demonstrator agency price on first outfit sold in each community. 2000 satisfied users. We have a stack of testimonials. Write quick. (20)

The Amazing "DETROIT"

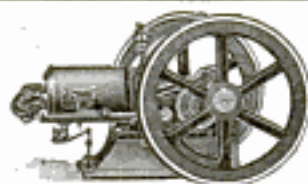
Detroit Engine Works, 213 Bellevue Ave., Detroit, Mich.

The ECONOMIZER

2 and 5 H. P.

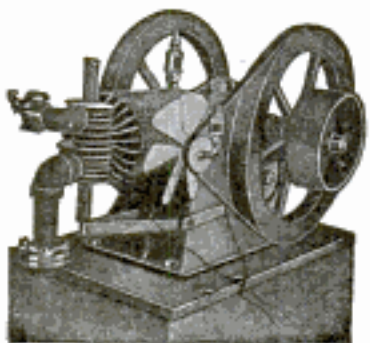
That name means something. Seven years sales, and every one satisfied, means something. It's all in the engine—no shoddy goods, highest economy. Want to know more? Address

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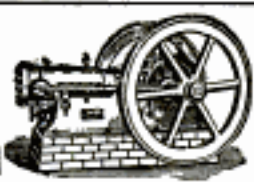


1 1/4 and 2 1/4 H. P. equipped with short connections for spray pump and walking beam attachment for pumping water from wells. Will work against 200 pound pressure all day without heating. Gasoline in base of engine.

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are superior to all others—in principle—construction and the actual work they do. You'll be interested to get this information. Write now.

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"The 1 1/2 H. P. Regal engine I installed two years ago in my 22 ft. x 8 ft. 6 in. cruiser is doing as good work today as when first installed. I have travelled during the two years about 2500 miles. Have not been delayed five minutes' time on account of the engine and have not spent 10c for repairs. The engine was ready to go at any time and I find the compression as good today as when engine was received." A. LANZetta, Vancouver, B. C.

REGAL GASOLINE ENGINES are as simple as a perfect operating motor can be made. They are weather-proof. Built for high speed or heavy duty, with 1 to 4 cylinders and from 2 to 45 h. p. Satisfactory operation guaranteed. Awarded gold medal for exhibit of marine engines at Alaska-Yukon Exposition at Seattle, Wash., '06. Before you buy an engine

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THE MOST PERFECT LIGHTING SYSTEM IN THE WORLD

For Homes, Factories, Stores, Hotels—Complete Lighting Apparatus for Villages and Towns. Satisfaction guaranteed. Write for particulars.

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UNTIL YOU INVESTIGATE "THE MASTER WORKMAN"

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**Stands for
Durability,
Strength,
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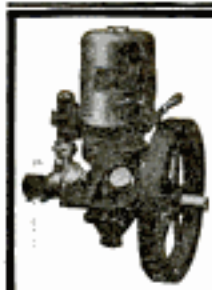
Pioneer Power Boats are in use in every civilized country. We will furnish you the **COMPLETED BOAT** with the engine installed, ready to run, or you can **BUILD IT YOURSELF**.

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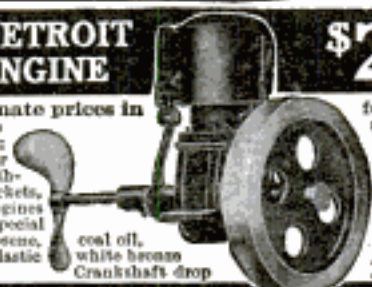
3 HORSE POWER—30 Lbs.

Aluminum base, copper water jacket, steel shaft, bronze bearings, special carburetor, **IN A CLASS BY ITSELF HAS NO COMPETITION**

Made in large quantities, therefore price right. Especially adapted for **Cases or Light Boat.**
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2 H. P. DETROIT ENGINE

Other sizes at proportionate prices in stock ready to ship. Single cylinder engines, 2 to 8 h. p.; double cylinders, 8 to 20 h. p.; four cylinder, 50 h. p. Engines start without cranking. No cams, no sprockets, only three moving parts. All engines counterbalanced. No vibration. Special fuel injector burns gasoline, kerosene, alcohol, naphtha distillate. Plastic bearings (no cheap habits used).



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Engine only, without Electrical or Boat Equipment

forged steel. Bearing surfaces ground. Adjustable steel connecting rod. Waterproof ignition system. For your launch, sailboat, rowboat, stern wheel boat or railroad track car. 50,000 satisfied users. Free catalog and testimonials. Demonstrating Agents wanted in every boating community. Special wholesale price on first outfit sold. [31]

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Just like a 30-Footer
only
smaller.



Do not think of Buying a Launch or Engine until you see our Handsome Book
WHICH EXPLAINS FOUR WONDERFUL LAUNCH BARGAINS

Only \$121 for this complete 16-ft. Launch—3 H. P., guaranteed self-starting Engine, weedless and Wheel Rudder. Result of 30 years' experience. Money back if not as represented. Write for free catalog today.

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Special Bargains in WECO reversible, self-starting engines to those building or buying their own Hulls. Engine controlled by one lever



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Write for Marine Catalog describing Whistles and Whistle Outfits, Fog Bells, Gasoline Strainers, etc., or Auto Catalog describing Gray Mufflers, the Genuine Gray Autochime Cut-out Valves, Foot Pedals and other Superior Accessories.

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Write today. Agents Wanted.

THE STRELINGER MARINE ENGINE CO.
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45 E. Congress Street, DETROIT, MICH., U. S. A.



EATS YEAST AND EXPLODES—A curious story comes from Des Moines, Iowa, of a duck which devoured a pan of yeast, then exploded with such force that one of the pieces struck the owner and put one of his eyes out. The duck was named "Rhadamanthus." The yeast had been placed on the back porch. When the owner of the duck went after the yeast he found the duck wandering around in a stupid way and picked it up. A moment later it exploded with a loud report and the man ran into the house holding both hands over one eye. A physician was called and found that the eyeball had been pierced by a fragment of flying duck.

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GUARANTEED TO BE SATISFACTORY

YOU WANT A BOAT BUILD IT YOURSELF
and SAVE TWO-THIRDS

We will furnish you with all the parts of a boat machined, cut to shape and accurately fitted together prior to shipment, so that with a little labor on your part you can own your own boat, at a price that is ridiculously low, or we will furnish you with instructions and full-sized paper patterns, from which you can build a boat yourself, by purchasing the material locally.

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is that you will be perfectly satisfied with everything you purchase of us, or your money will be instantly refunded.

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Originators of the Pattern and Knock-Down System of Boat Building

Established 1901

THE RETORT COURTEOUS.—Street Railway Superintendent—I don't think we can use you any longer. Your cash register doesn't ring often enough.

Conductor—I have got rheumatism and can't reach up to the register cord.

Superintendent—All right. I think you need a long vacation.

Conductor—I am much obliged to you for allowing me to run the car as long as you have.

Superintendent—Don't mention it. I am much obliged to you for bringing the car back.

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"SIMPLE"—"RELIABLE"—"DURABLE"
2 and 4 CYCLE, 2 to 20 H. P.

\$45.00, 2 1/2 H. P. Motor, complete outfit ready to install in boat. Everything from battery to propeller, except gasoline tank and piping. We also furnish castings if you wish to build your own motor. Write for catalog and price list of castings; we will quote figures which cannot fail to interest you.

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for motor boat THAT PASS GOVERNMENT INSPECTION; also for automobile or factory, loud and durable, easy to put on, operated at any point by push buttons, run on a few ordinary dry batteries or storage battery, use the O'Brien make. Send for catalogue and low prices on motor boat and automobile accessories, electric whistles, search-lights, dynamos, etc.

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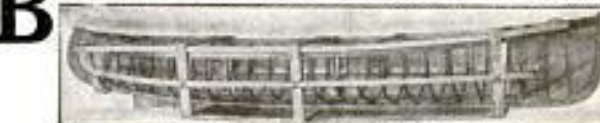
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3 H. P. Reversible Engine

(12)

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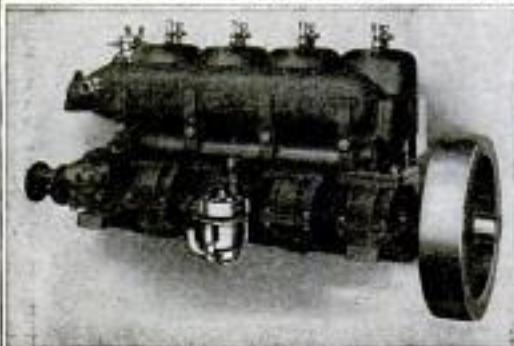
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Roberts 1910 Models are the Perfection of Simplicity

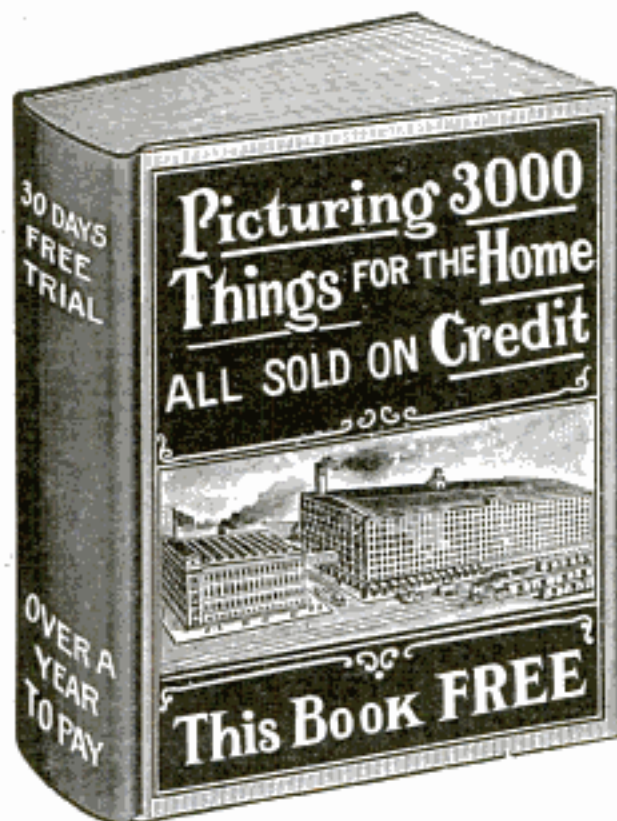
The large ports which have proved such a success on 1909 Model P will be used on all 1910 Models—the new noiseless carburetor, with but one adjustment (the gasoline), is a great improvement. Gear driven mechanical oilers will be supplied with all motors from 10 H. P. up, also gear pump—readily accessible and easy to remove for packing or cleaning without disturbing the piping. The Roberts is the only two-cycle engine made that is absolutely guaranteed against backfiring or base explosions. It is the lightest and most efficient engine built. Every part is so accurately adjusted that it starts on the first turn of the crank, and will not stall at any speed. The Roberts gives greater power and more speed than any other motor of the same Dimensions made.

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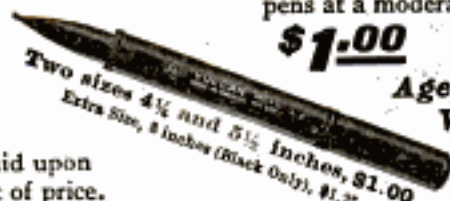
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COMMENT ON "TIME AND ITS MEASUREMENT."—A series of articles on time and its measurement, written by James Arthur for "Popular Mechanics" and published in recent issues is commented on as follows by F. J. Britten, author of Watch and Clockmaker's handbooks, in the "Jeweller and Metalworker," a scientific magazine published in London, Eng.:

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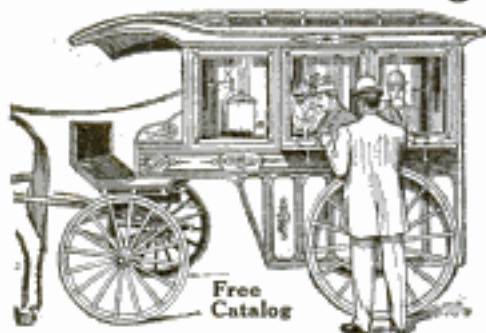
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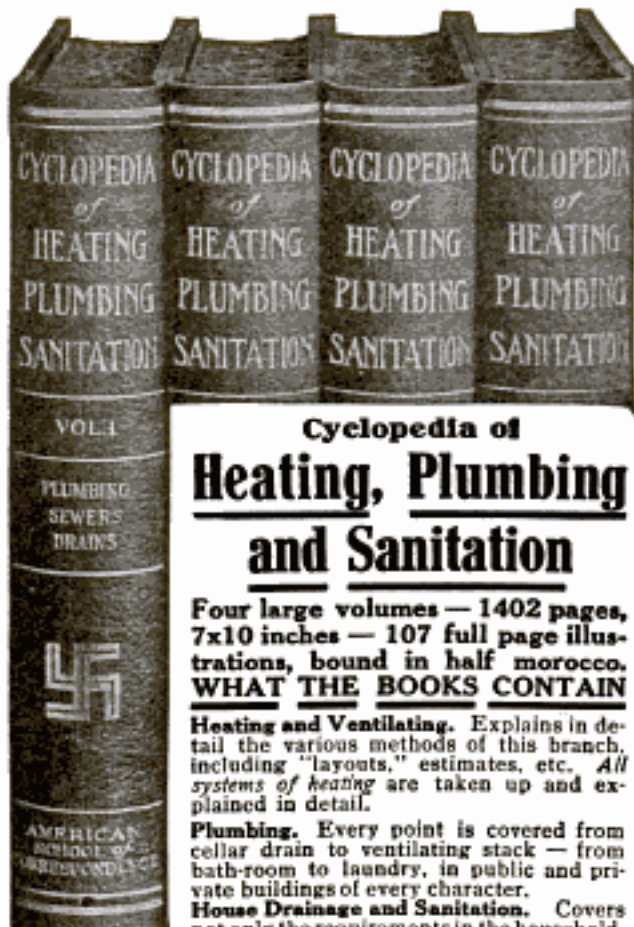
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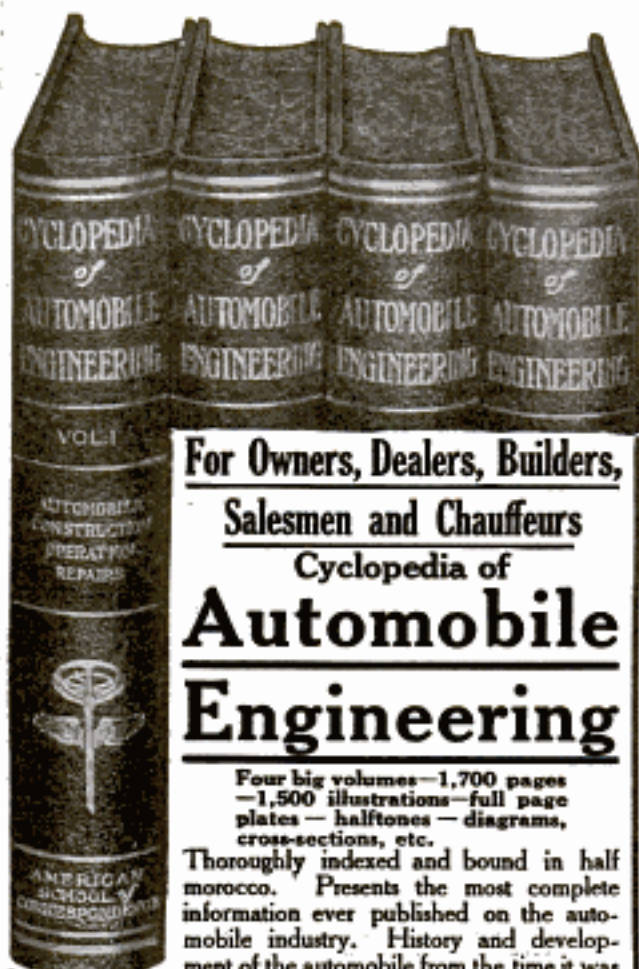
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There were once four flies which made their way into a certain pantry, and determined to have a feast.

One flew to the sugar and ate heartily; but he soon died, for the sugar was full of white lead.

The second chose the flour as his diet, but he fared no better, for the flour was loaded with plaster of paris.

The third sampled the sirup, and his six legs were presently raised in the air, for the sirup was colored with aniline dyes.

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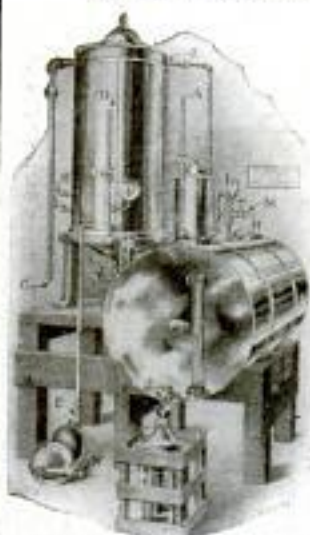
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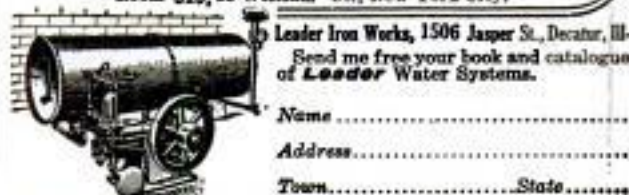
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Tuesday.—Sighed a little for the flesh-pots to-day, but nothing serious, I imagine. Wife agreed that we are not to have beans again to-morrow.

Wednesday.—Breakfast and dinner meatless, but a little sausage (on the sly) for lunch. Feel considerably stronger than I did last night.

Thursday.—Roast beef at lunch to-day. Wife asked me what I ate. Lied to her. She and the children look considerably thinner than they did the first of the week. Conscience hurts me a little.

Friday.—Steak for lunch. Best steak I ever tasted. Still ashamed to tell my wife what I am doing. The poor kids! They look more peaked every day.

Saturday.—Confessed at breakfast. Wife and children almost died laughing. They had been having meat, too, for lunch every day and thought it was I looked peaked. Ha! ha!—St. Louis Post-Dispatch.

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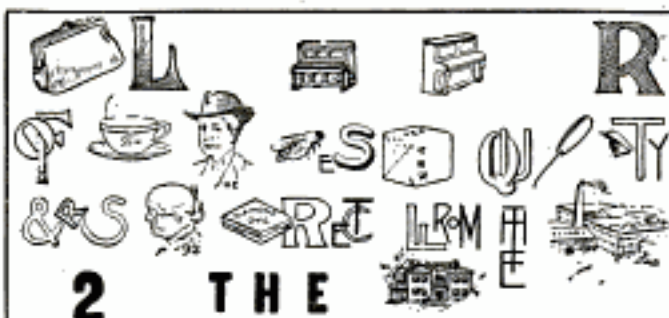
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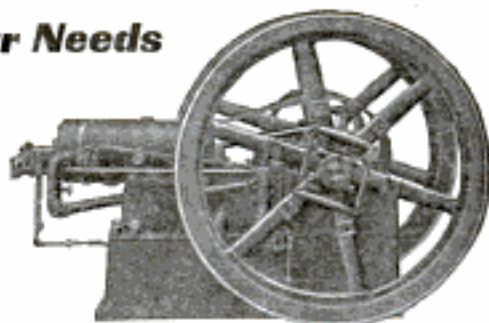
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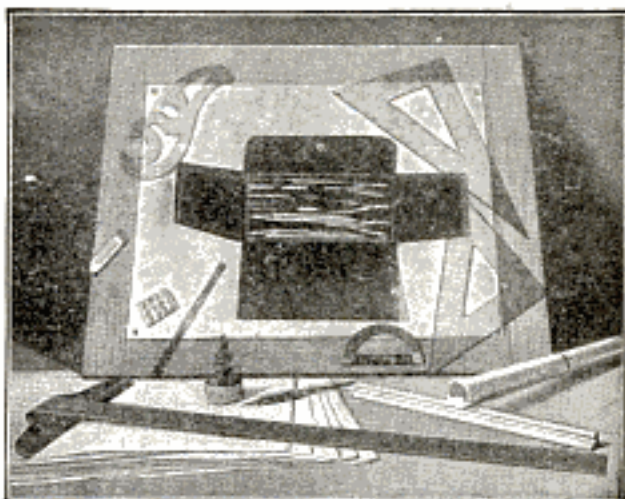
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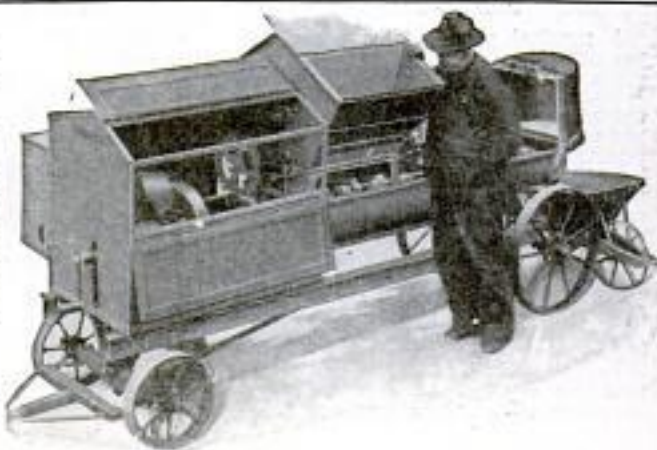
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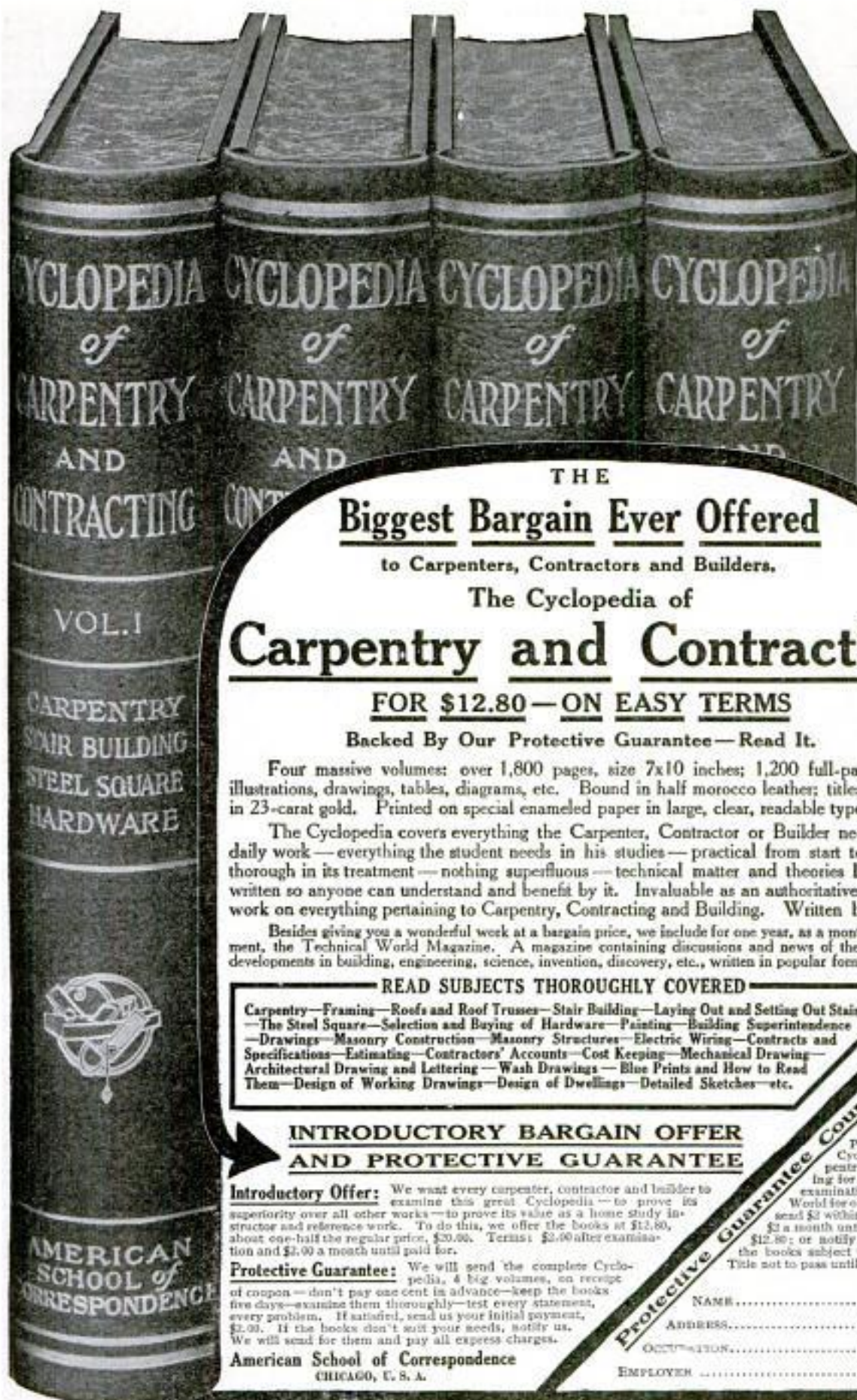
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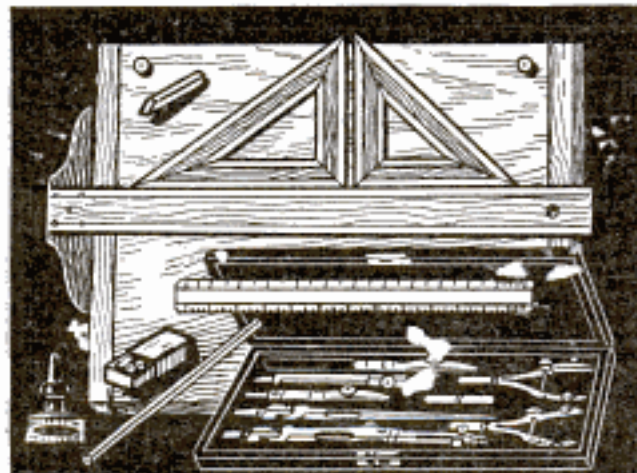
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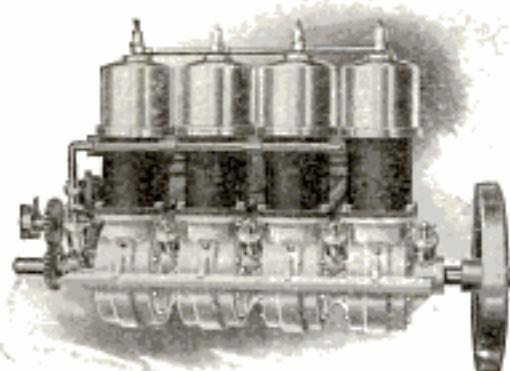
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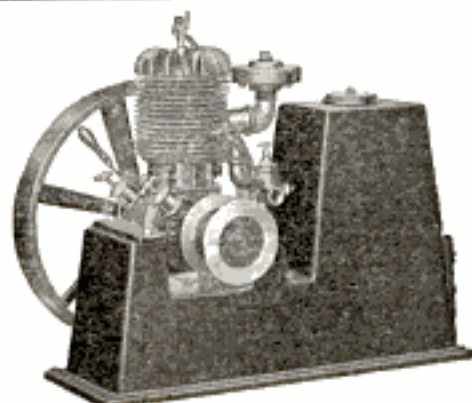
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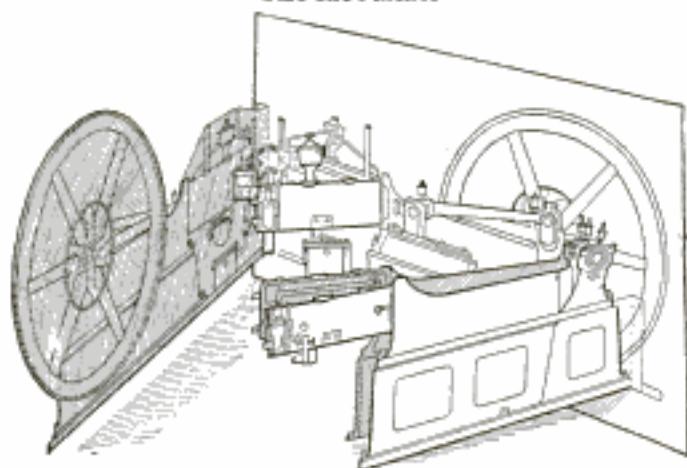
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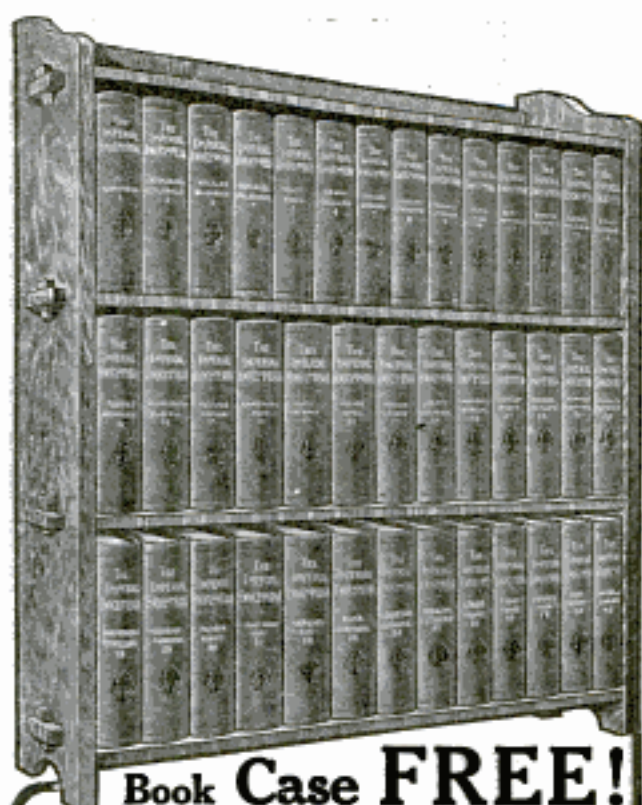
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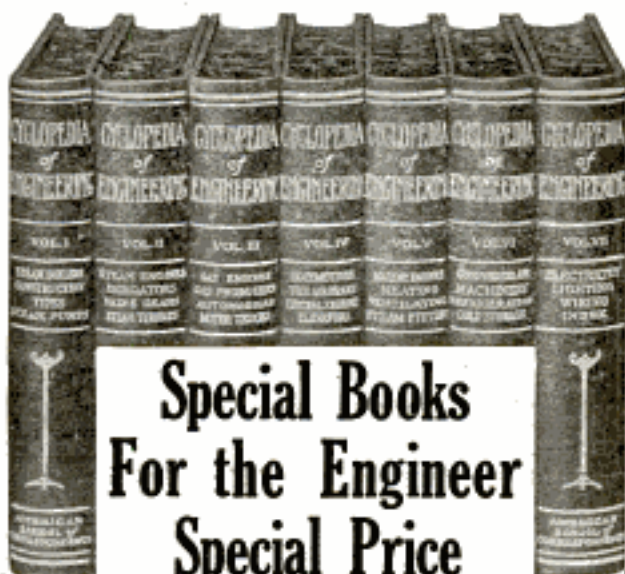
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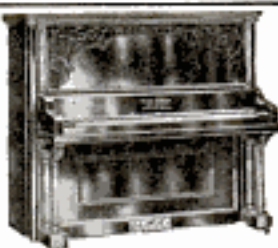
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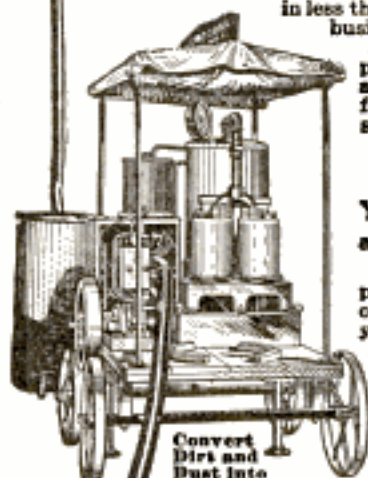
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