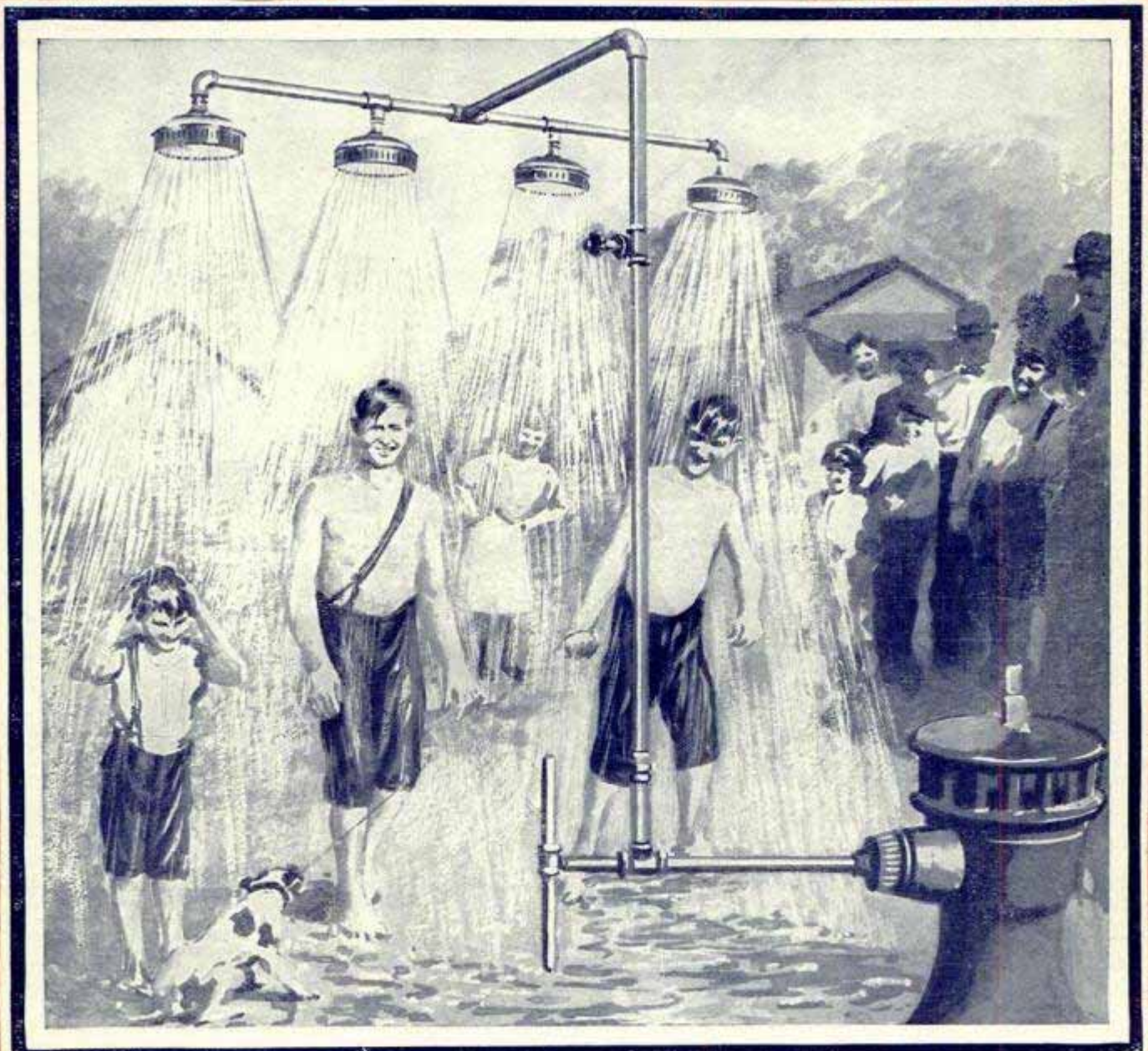


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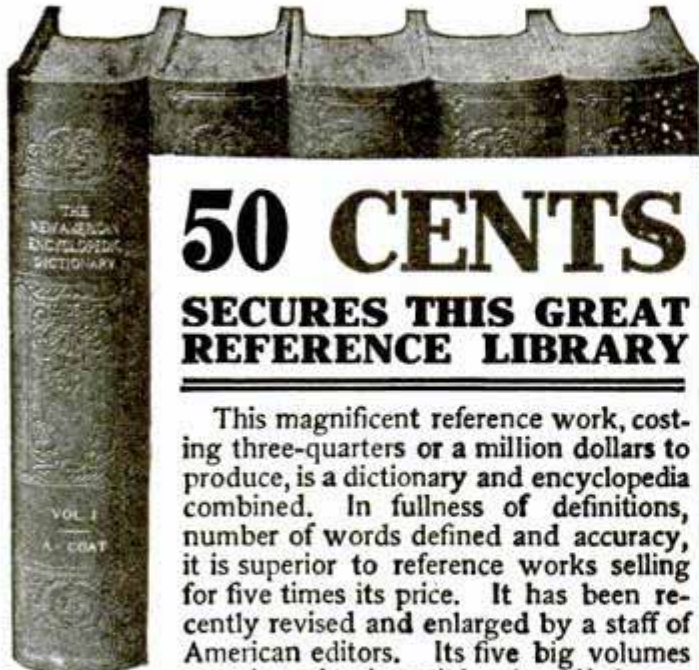
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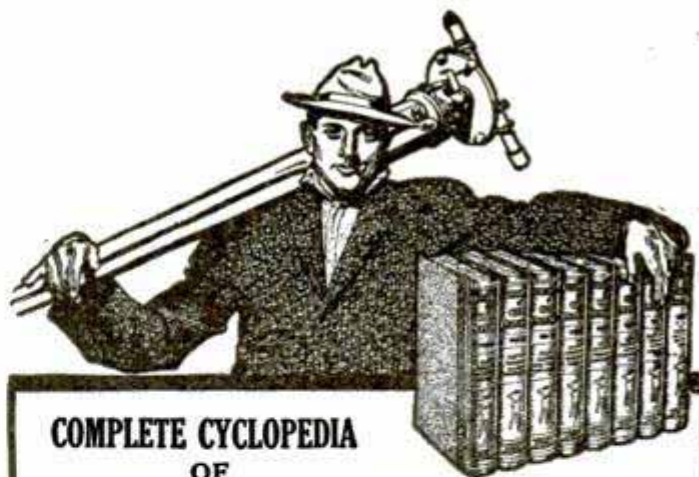
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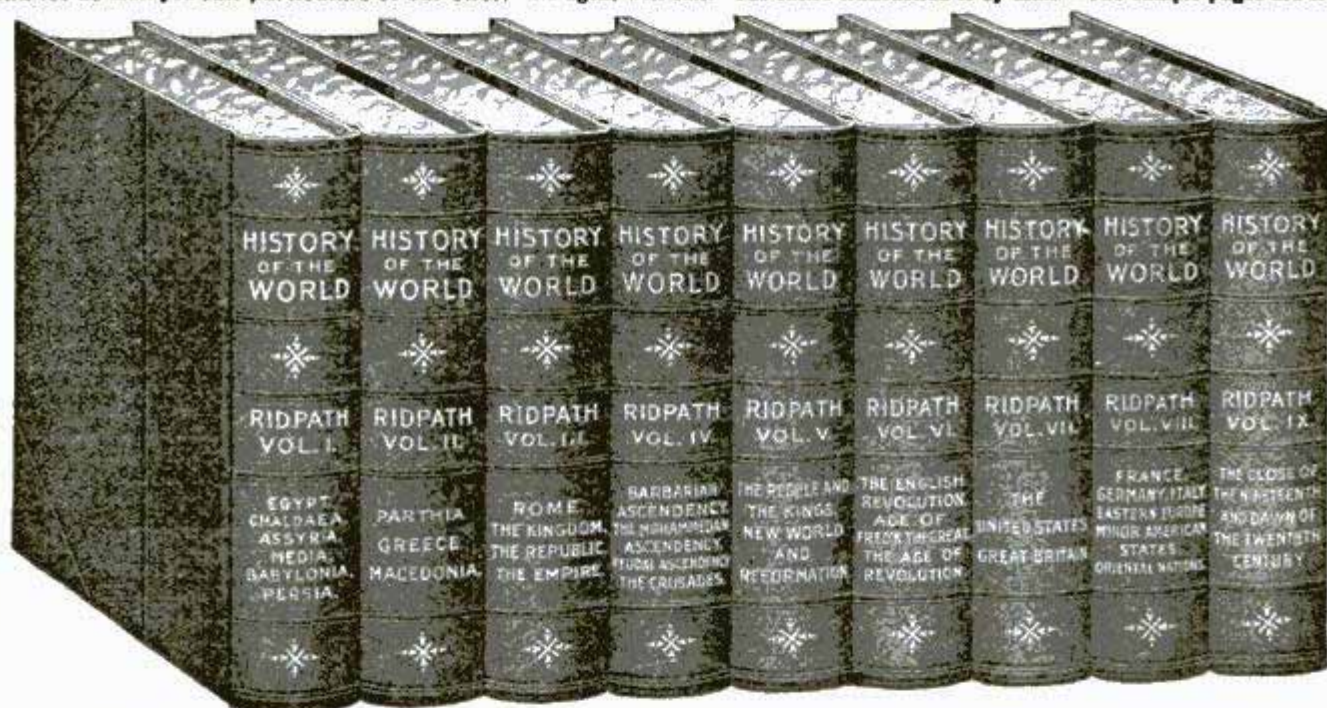
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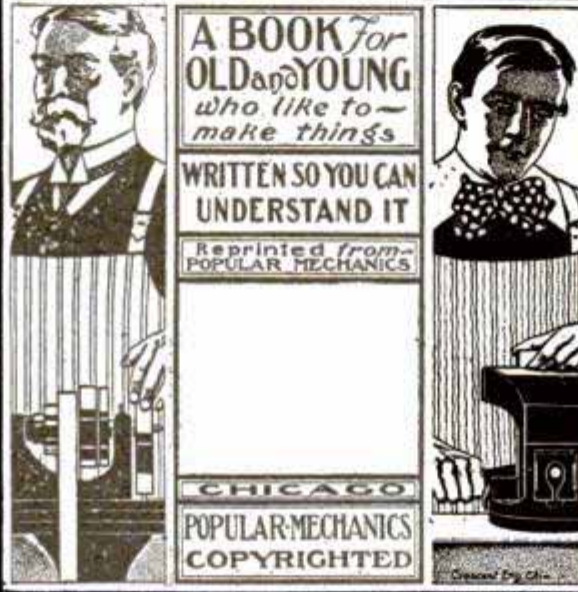
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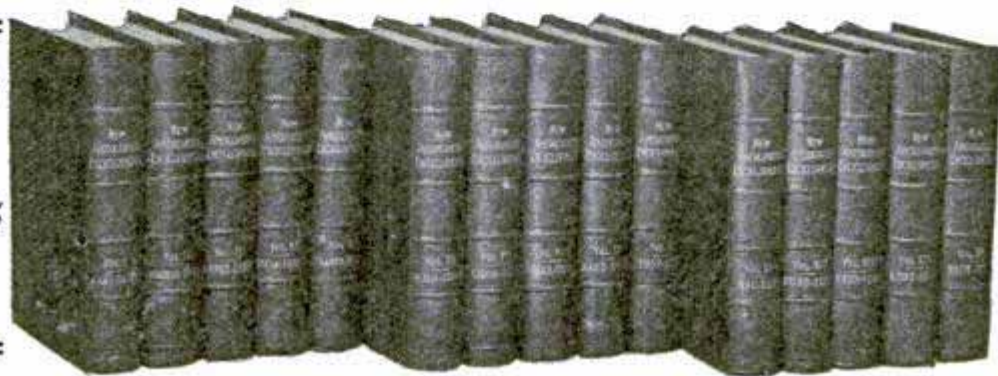
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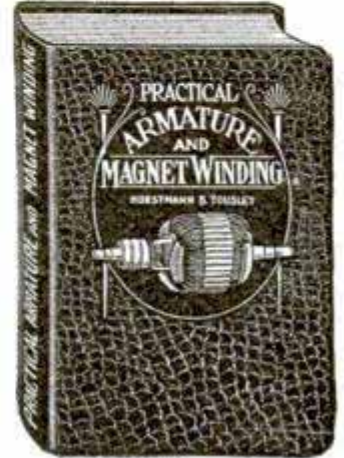
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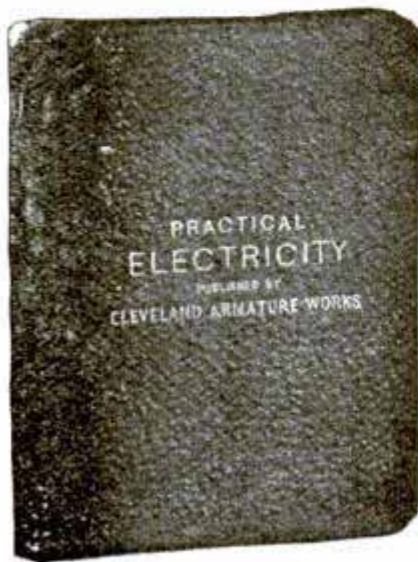
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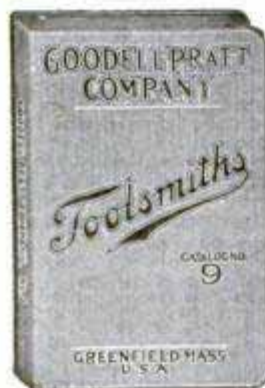
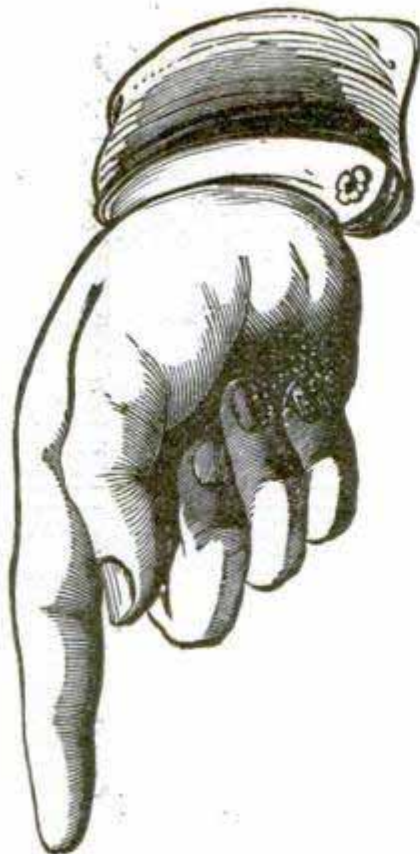
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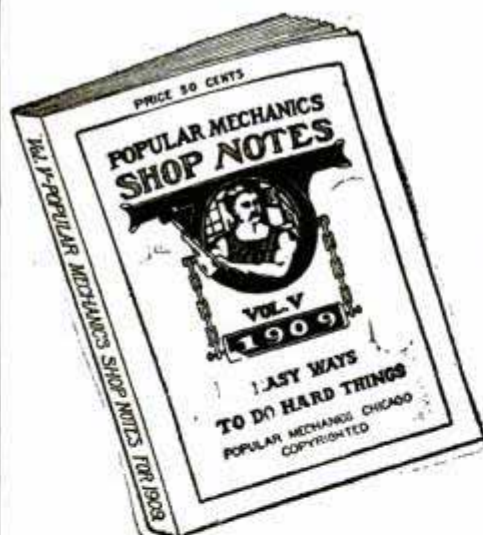


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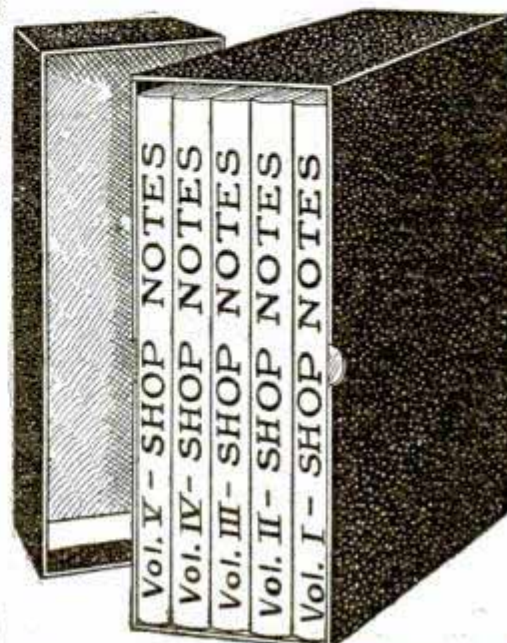
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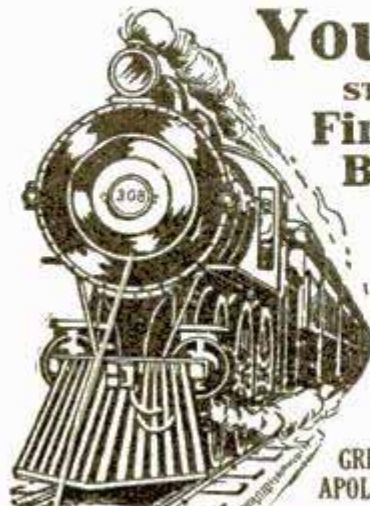


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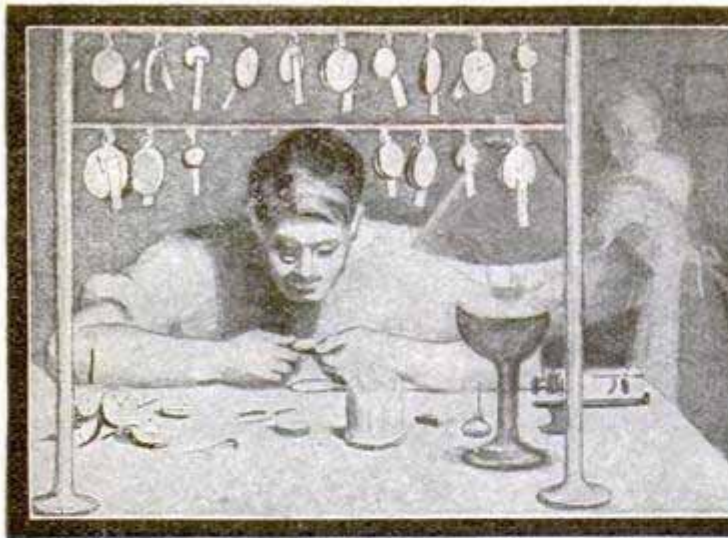
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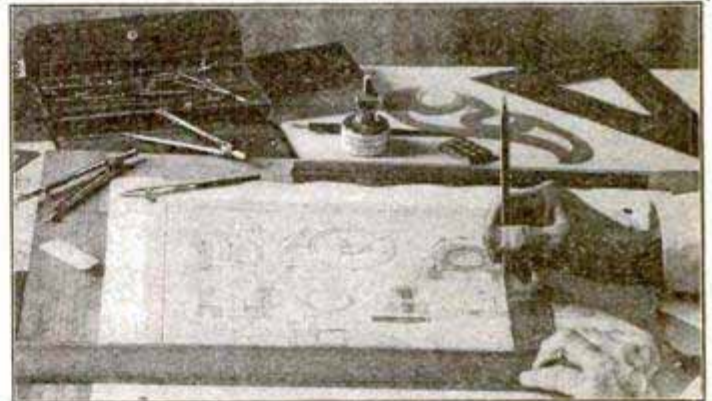
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1909 CLINCHER CASES & TUBES—28x2½ case, \$8.50; tube, \$2.25; 28x3 case, \$10.50; tube, \$2.75; 30x3 case, \$12; tube, \$3; 30x3½ case, \$15.50; tube, \$3.60; 32x3½ case, \$18; tube, \$3.90; 30x4 case, \$19.80; tube, \$4.20; 32x4 case, \$20.40; tube, \$4.50; 34x4 case, \$21.60; tube, \$4.80; 34x4½ case, \$28; tube, \$5.50. Single tube tires, 28x2½, \$10; 28x3, \$12. 1 ship. Pay for tires after examination. Wm. Vanderpool, Springfield, O. Bell Phone.

BELOW COST PRICES on engines, transmissions, oilers, axles, steerings and auto parts generally. Real bargains in new and second-hand cars. Let us know your needs. John H. Blacker & Co., Chillicothe, Ohio.

FOR SALE—Automobile engine, 4 cyl. air cooled Model "G" Knox. Apply The L. Schreiber & Sons Co., Cincinnati, Ohio.

MOTORCYCLES

INDIANS, \$75. Yales, \$60. R. S., \$70. Marshes, \$40. Engines, \$15 up. Other bargains, stamp for catalogue. A. F. Wolke, Louisville, Ky.

THREE MODELS OF 1909. Curtiss motorcycles, and 18 other machines; new motorcycle engines. Bare, \$17.00 each. New list for stamp. Robert O. Rubel, Jr., Louisville, Ky.

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BEFORE YOU BUY a Motorcycle, Motor or any Motorcycle Accessories, get our prices and save money. Motorcycle Equipment Co., Hammondsport, N. Y.

FOR SALE—'08 Motor Racycle, thoroughly overhauled, new tires and chains, \$85. C. R. Miller, R. D. No. 1, Galton, O.

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FOR SALE—Thor Motorcycle with Side Car 2½ H. P., only used 2½ months. Fine condition. Keith's Pharmacy, Hinckley, Ill.

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CONSTRUCTION, MANAGEMENT AND CARE OF MOTORCYCLES—"Keller's Booklet," containing 64 pages of valuable information for every Motorcycle Rider, Beginner or Prospective Buyer. Postpaid for 25c stamps. Keller & Risque Motor Co., St. Paul, Minn.

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AGENTS—Men and women in every town to sell the celebrated Triplex Handbag for women, four bags for four separate purposes, all in one. Can be enlarged to meet your needs as you go along. Write for terms and particulars of other new patented articles. S. J. Diamond & Bro. Co., Manufacturers, 35 West 21st St., New York.

LARGE WHOLESALE TAILORING HOUSE wants local agent. No experience or capital necessary. We carry the burden. We send you complete outfit, costing us \$12, absolutely free—with no after charges. Whitney Tailoring Co., 272 E. Adams St., Chicago.

MONEY MAKING IDEAS in BOOSTERS our New Book. Helps. Hints. Pointers that TELL. FREE particulars. Koepke, 101 Oak Harbor, O.

\$1.00 FIRELESS COOKER—Complete with granite utensil. Aluminum Cover, Cookbook—Regular full sized guaranteed practical cooker sent possible agents on receipt of \$1.00. Royal Fireless Cooker Co., Battle Creek, Mich.

AGENTS and Mail Order men we are making pocket knives with a non-rusting blade of hardened copper. New and a big chance to make money. Box 372, Greenville, Pa.

VALUABLE INVENTION, agents wanted to introduce The Success envelope and stamp moistener. Can be carried in pocket. Sold in offices and homes. Success Moistener Co., 1720 State St., Harrisburg, Pa.

AGENTS wanting strictly legitimate business, good profit, send for particulars about New Improved Modern Duplicator. C-curity Selling Co., Box 556, San Mateo, Cal.

AGENTS WANTED, \$2.10 SAMPLE OUTFIT FREE. 50 per cent profit. Credit given. Premiums. Freight paid. Chance to win \$500 in gold extra. Let the largest wholesale agency house in the United States start you in a profitable business without one cent of capital. Experience unnecessary. Write for free outfit at once. McLean, Black & Co., Inc., 54 Beverly St., Boston, Mass.

MAKE \$3,000 a year in the Mail Order Business. We tell you how, free. Murphy Mfg. Co., So. Norwalk, Conn.

\$25 TO \$100 WEEKLY easily made in optical business. We teach you in 2 to 4 weeks. You make money right from the start. We refer customers to you. We are largest mail-order spectacle concern in the world. Write for free booklet and full particulars. Trusight Optical College, B. 2, Kansas City, Mo.

MERRY WIDOW HANDKERCHIEFS, the joke of the season, nuf said. Agents price, 15c pp. Percy Ewing, Decatur, Ill.

I WANT MEN AND WOMEN in all localities to sell the Peerless Gas Flame Covers, house to house. Cost \$5.00 per dozen sets, sell for \$1.00 per set. Write for further information. E. H. Levinstein, 109 N. Canal St., Chicago, Ill.

LEARN to make raised letter signs; mastered in 20 minutes; enormous profits; booklet of instruction, 10c; worth \$5.00; other big propositions free. Green Sales Agency, Chicago.

WANTED AGENTS to sell our entirely new line of specialties as main or side line liberal commissions paid. Further information furnished upon request. Hagstrom Bros. Mfg. Co., Lindsborg, Kan.

RELIABLE MEN AND WOMEN AGENTS wanted to sell our specialty. Big money easily earned. Write today. Pfancuff Specialty Company, Jackson, Ohio.

AGENTS, get busy now, new Christmas novelty, sells at sight. Investigate. Neff National Floral Co., Bellevue, Pa.

SALES-AGENTS wanted in every populated center for "King of fire killers." \$25.00 weekly salary to start, guaranteed. Address, Hayward, 34 Murray St., New York.

AGENTS. Brand new. Nothing like it ever sold. Our own patent. All women buy. Your profit large. Write for particulars today. Boyle & Co., Box 672, Centerville, Iowa.

AGENTS—Make perfumes, sachets. Large profits. All formulas, 20c each. Cal. Chem. Co., 517 S. Sichel St., Los Angeles, Cal.

AGENTS—Everywhere. Vaco-Hook, greatest seller, \$10 per day. Sample, 5 cents. Desk E, 325 First National Bank, Oakland, Cal.

START HOSIERY BUSINESS selling goods that are replaced free when hole appears. Biggest "Money Maker" known. No capital required. Write at once to secure exclusive territory. Triplewear Mills, Franklin & Girard, Philadelphia.

MUSICAL PEOPLE. Teachers, tuners, players, singers; an opportunity in your department. Easy money for active people. Sheldon Piano Tone Improver Co., Vineland, N. J.

AGENTS—We have cornered the brightest money-making propositions on this continent; own your own business; get out of the rut; write for details of 100 ways of handling it. J. W. Arnold, Three Rivers, Mich.

AGENTS—**SALESMEN**—Quickest seller yet; simple, practical—every user lead pencil buys at sight. Big profits; day's supply carried in pocket. Sample 25c. Arne Co., Desk 4, Racine, Wis.

\$150.00 worth goods free; free advertising to sell them, and \$60 expense allowance first month, to start you as Manager for big Chicago mail order house. Address President, 1274 State Street, Chicago.

AGENTS WANTED to sell our Beautiful Floral Mottoes, size 12x16, quick sales, large profits, express paid. Write for terms. Frank V. Shilling Co., Navarre, Ohio.

AGENTS make \$5.00 daily selling our 11-piece kitchen set and other fast selling specialties, all money makers. G. W. Woods, 2013 West Twenty-fifth St., Cleveland, O.

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.

\$5 TO \$10 A DAY, is what my agents are earning, selling my wonderful Buttonhole Gauge Knife, absolutely the best and quickest 25c seller ever handled by agents; every woman buys one. 15 other articles, all necessities and rapid money makers. Big offer for house to house agents only. A. M. Young & Co., 12 Young's Bldg., Chicago, Ill.

AGENTS WANTED in every county. Exclusive territory for our Patented Automatic Door Holder. Big profits. Household necessity. Sells on sight. Sample and terms by mail 25c. Crescent Door Holder Co., Santa Monica, Cal.

50 CENTS makes your own Razor a better Safety than any known device. Reverses automatically for either hand. Is also Safety Stropper. Territory going fast. Silver-plated sample 50c. Automatic Guard Co., Douglas Building, Los Angeles, Cal.

AGENTS WANTED—Exclusive sale; sells in every house; 10c; cost \$3 per 100; big money maker; send 10c for sample; start at once. Cline Mfg. Co., 1224 Wabash Ave., Chicago.

PORTRAITS AGENTS—Big money till Xmas. Leather and cloth Pillow Tops, Crayons, Pastels, Oilettes, New Sheet Pictures, New "Pillow Top" Wall Hangers, New small sized Portraits and Frames, Berlin Art Assn., Dept. 76, Chicago.

AGENTS—\$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, Ohio.

STIKPATCH MENDS STOCKINGS quicker and better than darning, wears longer, will wash, 20 patches, 10c, postpaid. Agents write for terms. Excellent profit. Sells on sight. The Stikpatch Co., Box 3294, Dept. C, Boston, Mass.

ONE CENT—A Postal costs one cent. Our Catalogue costs many dollars—it contains Brand New Specialties.—It is yours for the asking. For territory, first come, first served. Agents Supply Company, 3629 Willett Ave., New York.

AGENTS are coining money selling our great combination tool, the Washington Hatchet. Ten tools in one. Sells at sight to farmers, housekeepers, storekeepers, etc. We can show you how to make from \$3 to \$10 a day; experience unnecessary. Write today for our agents' offer. H. Thomas Mfg. Co., 562 Third St., Dayton, O.

WANTED—Capable agents to handle new, high grade, up-to-date articles; lightning sellers in all homes, offices, stores, shops, \$3 to \$10 daily. Thomas Mfg. Co., 662 Third St., Dayton, Ohio.

ONLY THINK! \$30 a Week Easy with our NoSew Hooks and Eyes, and 70 other Big Money Makers; 6 brand new sellers; everybody buys. Anybody can sell. Biggest profits. Outfit free. P. M. Miller & Co., Box 155, Muskegon, Mich.

AGENTS—Sell Patented Radiumite Self-Honing Strop. Just being put out as an agency proposition. Strop covered by 16 patents. A \$2.00 razor given free with every strop sold. Strop retails for \$1.50. Millions being sold and agents coining money. Throw away old, worn-out propositions for something new and salable. F. J. King made 33 sales one Saturday afternoon in two hours. Outfit free. Thomas Mfg. Co., 762 Third St., Dayton, Ohio.

BURGLAR PROOF LOCK, "The Cannon" locks windows with 1 to 6-inch opening, 25c each. Agents send for prices. Cannon Mfg. Co., 1522 Kenmore Ave., Chicago.

DASHBOARD LINE HOLDER, beautifully enameled, best snap for agents on the market; easily attached to any dashboard; holds lines securely while horse and buggy are standing. 24c. Illustrated catalogue free. Eureka Company, Wheaton, Ill.

PERFUME—GLOSS IN STARCH—Gives clothes lasting perfume of Azure Violets. Makes them white as snow. Other quick sellers, large profits. Agents Wanted. Sample, 4 cents. Shipman, Lewis Block, Buffalo, N. Y.

AGENTS, CREW MANAGERS, AGENTS—We want your name. New Catalogue—brand new specialties—each article an improved household need. Find out what the other fellow is doing, a postal will bring the catalogue and a chance for big money. Agents Supply Company, 3629 Willett Ave., New York.

IN SIX MONTHS a boy made \$1,000 with our great Soap and Toilet Combinations. Be a Davis agent—work six hours a day—make \$200 a month. Get our profit sharing plan. Davis Soap Co., 80 Union Park Ct., Chicago.

POPULAR MECHANICS wishes to secure an agent in every town and city in this country to sell our 5-volume set of Shop Notes. These books sell readily among machinists, shopmen, farmers, carpenters, blacksmiths and all who use tools. The commission to agents is very liberal. If interested write Mgr. of Book Dept., Popular Mechanics Co., 225 Washington St., Chicago.

GOOD THING FOR AGENTS—Door Knob and Bell, combined, where door bell should be; fits any door, by anyone. Write F. B. Black Co., Station A, Kansas City, Mo.

WONDERFUL INVENTION—Canchester Incandescent Kerosene Lamp. Burns with or without mantle, 10 times brighter than electricity, gas, acetylene, at 1/10 cost. Burner fits all standard lamps; saves 75% oil. No trimming wicks. \$10 daily. Beware of imitations. Outfit free. Canchester Light Co., 26 State St., Dept. P. M., Chicago.

AGENTS—It's so easy to make \$200 monthly with our Dash Board Line Holder. We are shipping them in 10 gross lots. Sample, prepaid, 30c, silver. Wholesale Supply Co., D. 15, Valdosta, Ga.

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

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AGENTS make big money selling our new sign letters for office windows, store fronts and glass signs. Anyone can put them on. Write today for free sample and full particulars. Metallic Sign Letter Co., 77 N. Clark St., Chicago.

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 Resag Co., 366 W. Randolph St., Chicago.

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MALE HELP

WANTED good Salesman in every large town to sell Simplex Hose Menders to Hardware trade. Handle sub-agents. Good proposition to right man. Don't answer unless you are it. Simplex Mfg. Co., Box 8, Sta. D., Los Angeles, Cal.

MEN WANTED. Young, strong, account increasing business on all railroads, for firemen or brakemen; \$75 or \$100 monthly; rapid promotion. State age, weight, height. Railway Association, Room 89, 227 Monroe St., Brooklyn, N. Y. Distance no bar. Positions guaranteed competent men. Experience unnecessary.

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 BL, Omaha, Neb.

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WANTED—CENSUS CLERKS, RAILWAY MAIL CLERKS, City Carriers, Postoffice Clerks. Examinations everywhere November 17th. \$600 to \$1,400 yearly. Candidates coached free. Write immediately for schedule. Franklin Institute, Dept. K21, Rochester, N. Y.

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LEARN to make new and resilver old mirrors. \$5.00 a day can be made at home or traveling. Stamp brings sample and advice. Magnatone Co., Dept. V, Buffalo, N. Y.

WE WANT A GOOD SALESMAN in every city in the United States to handle Ideal Metallic Packing. Manufacturers' agents and engineers preferred. Ideal Metallic Packing Co., South Stillwater, Minn.

MEN AND BOYS in our offices to learn telegraphy. \$75, \$100, \$125, \$150, and \$200 paid monthly. Union Electric Telegraph Company, 88 LaSalle St., Chicago.

SUCCESSFUL GASOLINE LIGHT SALESMEN to handle the only instantaneous lighting system known to science; no alcohol, step ladders, torches, matches or time wasted; pull the chain and they light instantly; for home and commercial lighting; write for territory; small capital required. Gloria Light Co., 1275 Washington Blvd., Chicago.

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CHAUFFEURS—\$5 per day paid to competent automobile drivers; a complete instruction book that will qualify you for these positions will be sent postpaid for 25c. This valuable book tells all about driving and adjusting automobiles; explains all gasoline engine troubles; satisfaction guaranteed or money refunded. George N. Pearson, Bala, Pa.

AGENTS WANTED for our new 25c Darning Machine; just out. Weaves new heel or toe in sock in a few minutes. One agent sold 288 in one day. Send 15c for sample or \$1.25 for doz. Hutton Co., Walnut St., Desk 2, Philadelphia, Pa.

WANTED

WANTED—Motorcycle, condition no object. Bcx 541, Louisville, Ky.

SECONDHAND motorcycles and engines. A. Wolke, Louisville, Ky.

WANTED—Paying (printed) imprint circulars to mail with books. Wiley Sanderson, Ypsilanti, Mich.

I WANT PLANS, practical ideas and patents covering gasoline traction engines, automobile plows and gasoline business wagons. Glasgow, Frisco Bldg., St. Louis, Mo.

WE REQUIRE the following Merchandise for exchange orders—Panoramic, Graflex, Eastman Cameras, fine Photographic Lenses, Viascope, Powers or other Picture Machines, Gas Outfits, Watchmakers and Engine Lathes, Optical Trial Cases, Chronometers, Typewriters, Engraving Machines, etc. Send fullest description, valuation, etc. We offer merchandise or cash in exchange for above. List for stamp. Jenkins Universal Exchange, Chicago.

WANTED A MAN OR WOMAN in every County in the United States to furnish us information from their locality. To interview their neighbors and the residents of each county. No experience necessary. Can devote only spare time to the work, or we can furnish requests for information to keep a man or woman busy all the time. Nice and refined work, easy and delightful and you can earn good wages. You have nothing to sell. An opportunity for each man or woman accepted. Send a stamp for particulars today. Manufacturers Sales-Information Association, 751 Odd Fellow Building, Indianapolis, Ind.

WANTED—Moving Picture outfit. Fred L. Smith, Amsterdam, N. Y.

WANTED a secondhand foot power screw-lathe, with variety of gears, seven feet or less over all. Homer Barr, Steelton, Pa.

WANTED—Wire wound boilers, any condition if one end is good. J. L. Lucas, Bridgeport, Conn.

WOOD WORKERS to send postal for free trial of the most important little tool patented in recent years. Roberts Dowling-Gig Company, 3933 Lancaster Ave., Philadelphia, Pa.

ONE 3x3 Gasoline Motor complete, for foot power lathe. W. W. Carlile, Morgan, Minn.

WANTED, AUTOMOBILE, for Pat. Cork Puller, used in all Hotels, Bars, etc. E. S., 1562 N. Clark St., Chicago.

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THREE New lists on Printing Presses, Cameras, and Odds and Ends. All for stamp. Robert O. Rubel, Jr., Louisville, Ky.

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CHEMISTRY AND ASSAYING OUTFIT at a bargain. Becker analytical balance, agate edges, \$58.50. Becker balance, capacity 100 grs., agate edges, \$15.00. Kohlbrouch portable assay balance, sensitive to 1/50 milligram, \$85.00. 3 sets of weights first quality, \$18.00. \$60.99 worth of chemicals and glassware. \$40.00 assay furnace gasoline. I. C. S. course, general chemistry, \$84.00. All for \$140.00 cash. John Sheda, 2111 W. 18th St., Chicago.

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I. C. S. Bound Volumes, Complete Steam-Electric course, \$20. R. P. Blanchard, Bourg, La.

FOR SALE—Moving picture film 1c per ft.; machines \$40. H. Davis, Watertown, Wis.

SACRIFICE. I. C. S. Mechanical-Drafting course complete—unfinished. \$65.00 takes it. Glenn McQueen, Hudson, Mich.

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FOR SALE—3 forge general Blacksmith and wagon shop, fully equipped with power and machinery. Must sell, snap for right man. For particulars address, Gordon Bros., Halbrite, Sask., Can.

1 STEAM LOCOMOBILE, good condition, \$100.00. 1 Gasoline delivery car, double opposed 14 H. P., \$175.00. M. Kiedinger, Pensacola, Fla.

FOR SALE—I. C. S. steam electric, cost \$100, never used, will sell or trade for diamond. Full course can be transferred. Arthur Sumner, 103 Vernon St., Rockland, Mass.

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SHEET STEEL PIECES in assorted gauges and sizes. Just what every blacksmith, amateur, and experimenter needs. 100 pound bundle for \$1.00 bill. Jarvis Engine & Machine Works, Lansing, Mich.

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FOR SALE—One three and one four Horse Power Gasoline Engine, cheap. Jesse Defoy, Muncie, Ind.

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FOR SALE—2 Oster Pipe Threading Machines, 1 Murchey Pipe Cutting Machine. G. W. Irving, Utica, N. Y.

1 1908 MODEL E. 12 H. P. Motor Surrey, seats four, top, side curtains and lamps, cost \$825.00, good as new. I do not need it. Make me an offer. Wm. F. Gubitz, Glenn Falls, N. Y.

6 H. P. STEAM runabout complete, or parts. Semi-flash boiler, kerosene burner, compound engine, steam pumps, automatics. Clement Wegeng, Norborne, Mo.

SUCTION CLEANING OUTFIT for sale, consisting of Wagon, Engine, Generator, and Cleaning Machine. Has been used only a short time and is in first class condition. Big field for this work. C. B. Day, 126 Jerome St., Brooklyn, N. Y.

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GOOD condition 2 1/2 H. P. Motorcycle, for foot power screw cutting lathe. Chas. Curtin, Whiting, Ind.

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\$500 one track Bowling Alley with all equipments, in storage, for Runabout or light car. A. M. Ericson, Hector, Minn.

FOR SALE—Complete heating and ventilation course, I. C. S. and new drafting outfit, cost \$70, will take \$30; or what have you to trade? L. J. Beuret, Auburn, Ind.

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WOULD TRADE for a 4x5 Graflex Stereopticon, gas tanks, slides, etc. Cost over \$150. All first class. E. M. Gordon, Melrose, Mass.

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FOR SALE OR EXCHANGE for good Automobile, Wait & Bartlett Static Machine, 12 30 inch plates in mahogany case. Galvanic and Faradic cabinet, X-Ray tube. Excellent equipment for physician. Also spark coil, high frequency set, etc. Edward E. Sheldon, 47 Hudson Ave., Albany, N. Y.

FOR SALE OR TRADE—Men's Crescent tandem, \$10.00. Will trade for camera. Perry Parsons, Fairfield, Iowa.

COMPLETE Steam Auto plant. Axles, wheels, tires, etc. All new, for cash or good gasoline car. Box 596, Danville, Ky.

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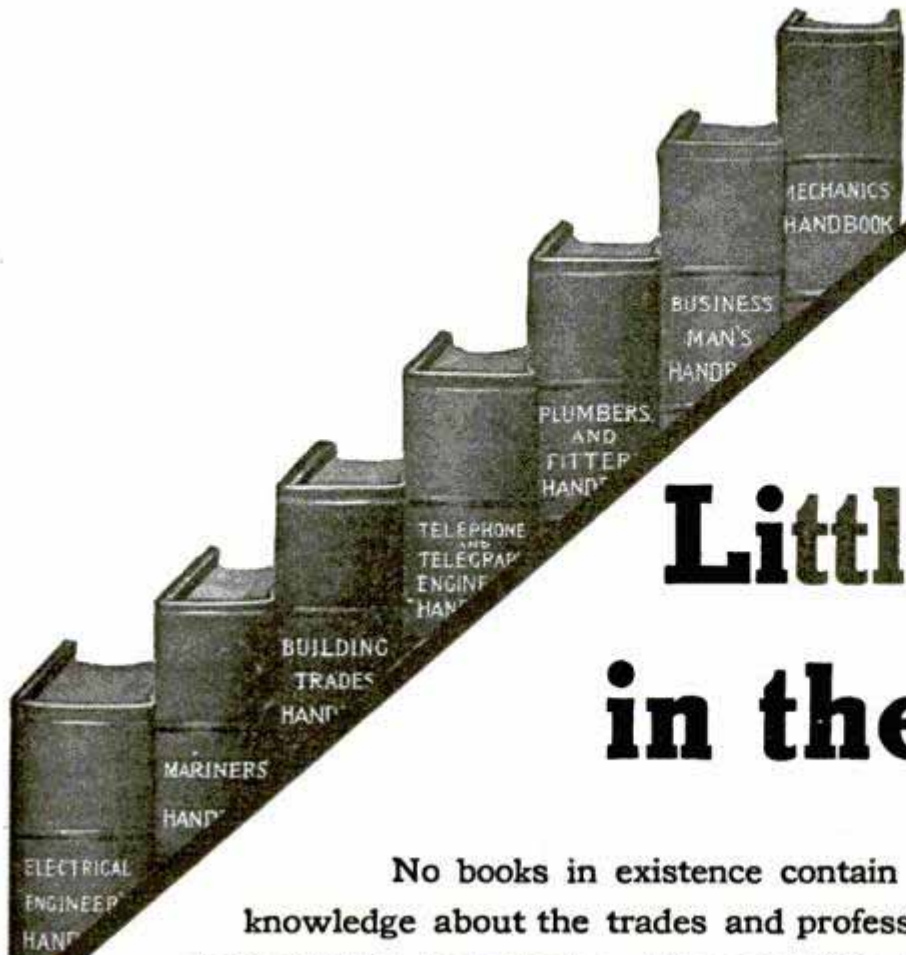
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(Continued on Page 30)



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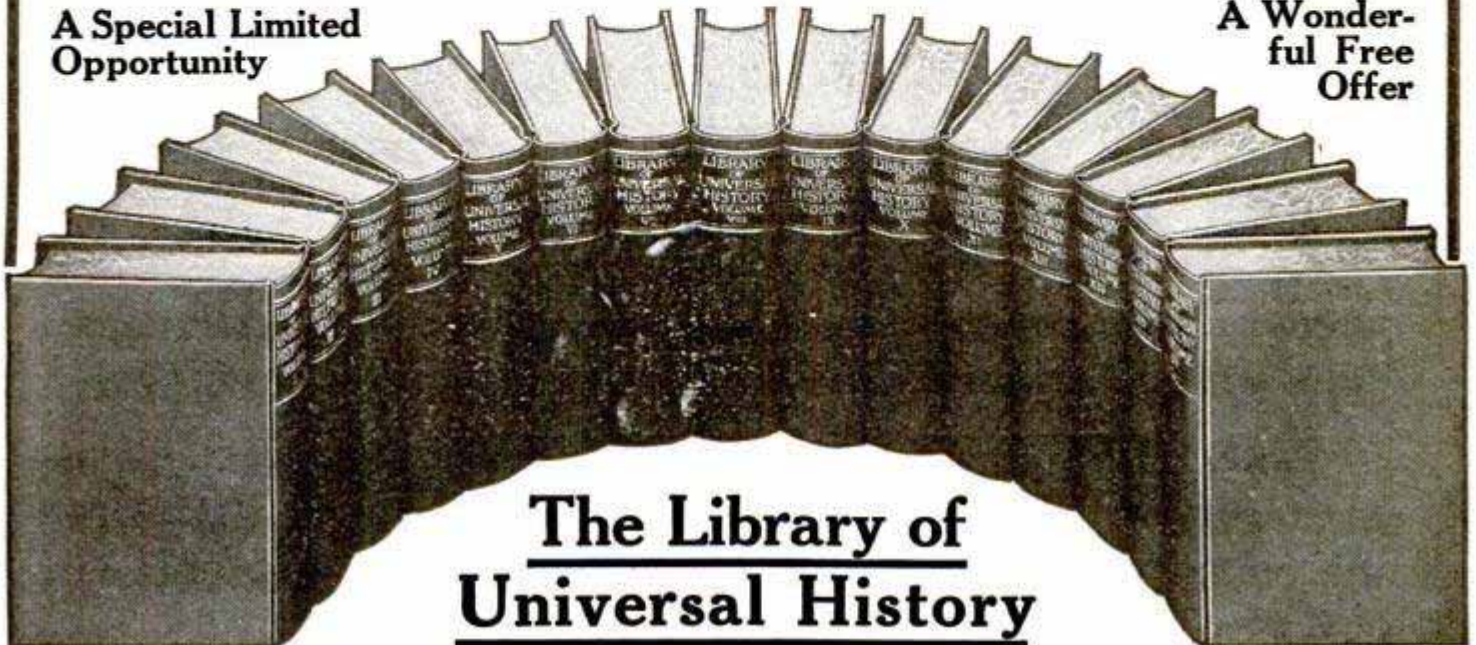
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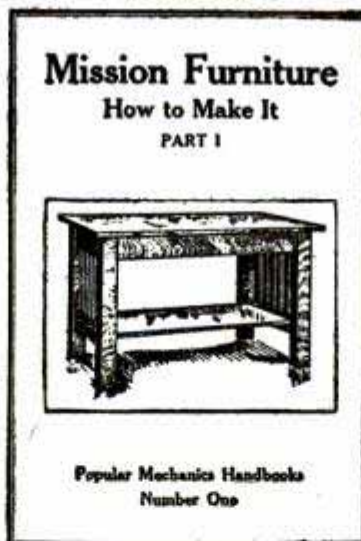
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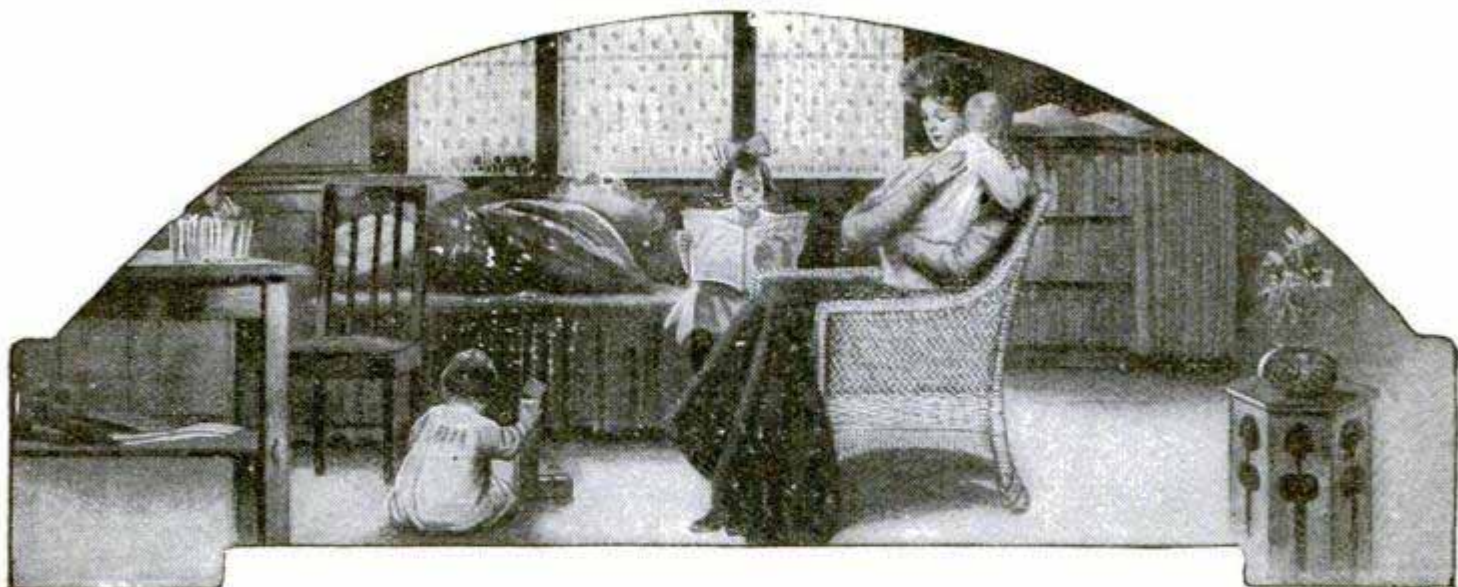
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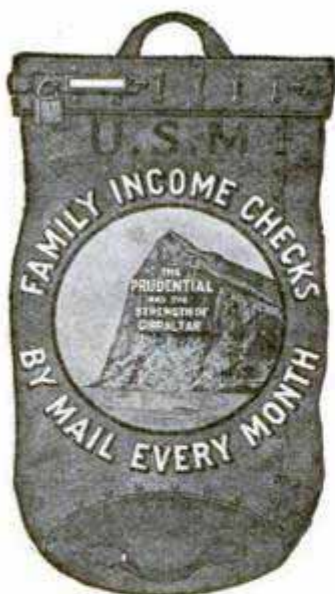
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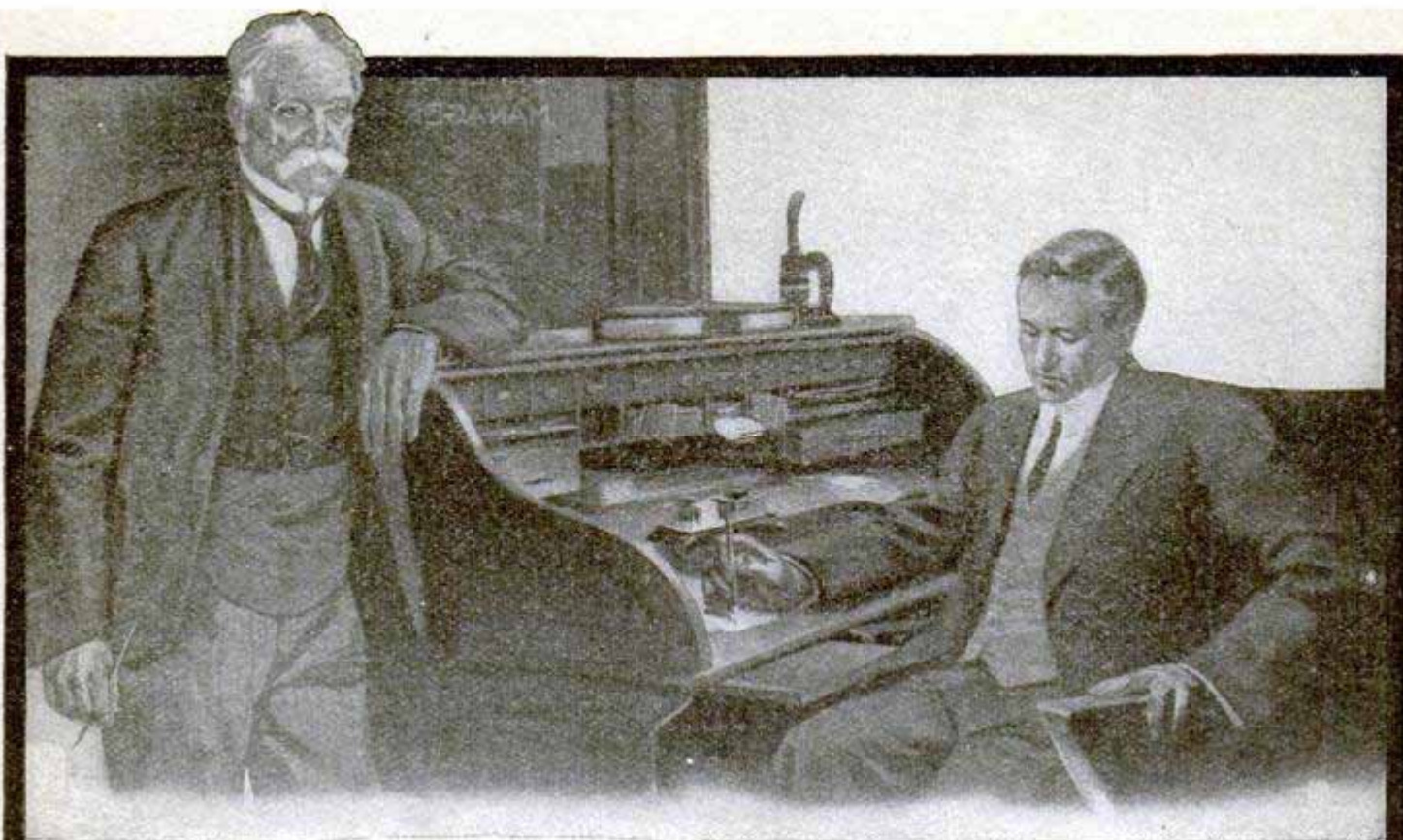
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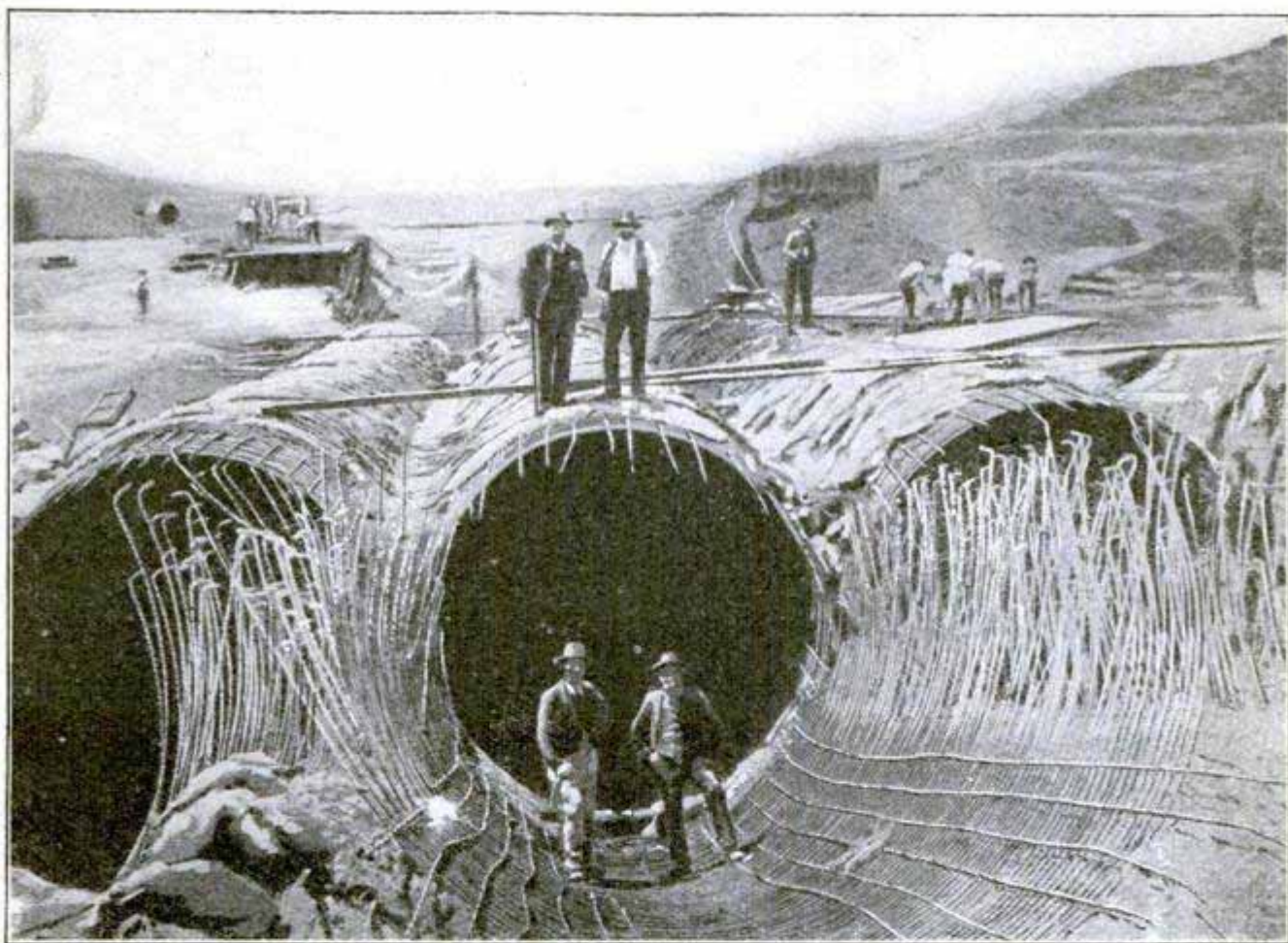
OCTOBER

No. 4

IRRIGATION IN AUSTRALIA

This illustration shows the connecting link between the irrigable areas on the eastern and western sides of the Campaspe river in Australia. It is a syphon consisting of three reinforced

the river, and in front of the entrance to the tubes, is a regulator, consisting of piers and drop bars, for controlling the flow of water through the tubes or stopping it altogether. On the eastern



Courtesy Australian Traveler

Concrete Tubes of Australian Syphon

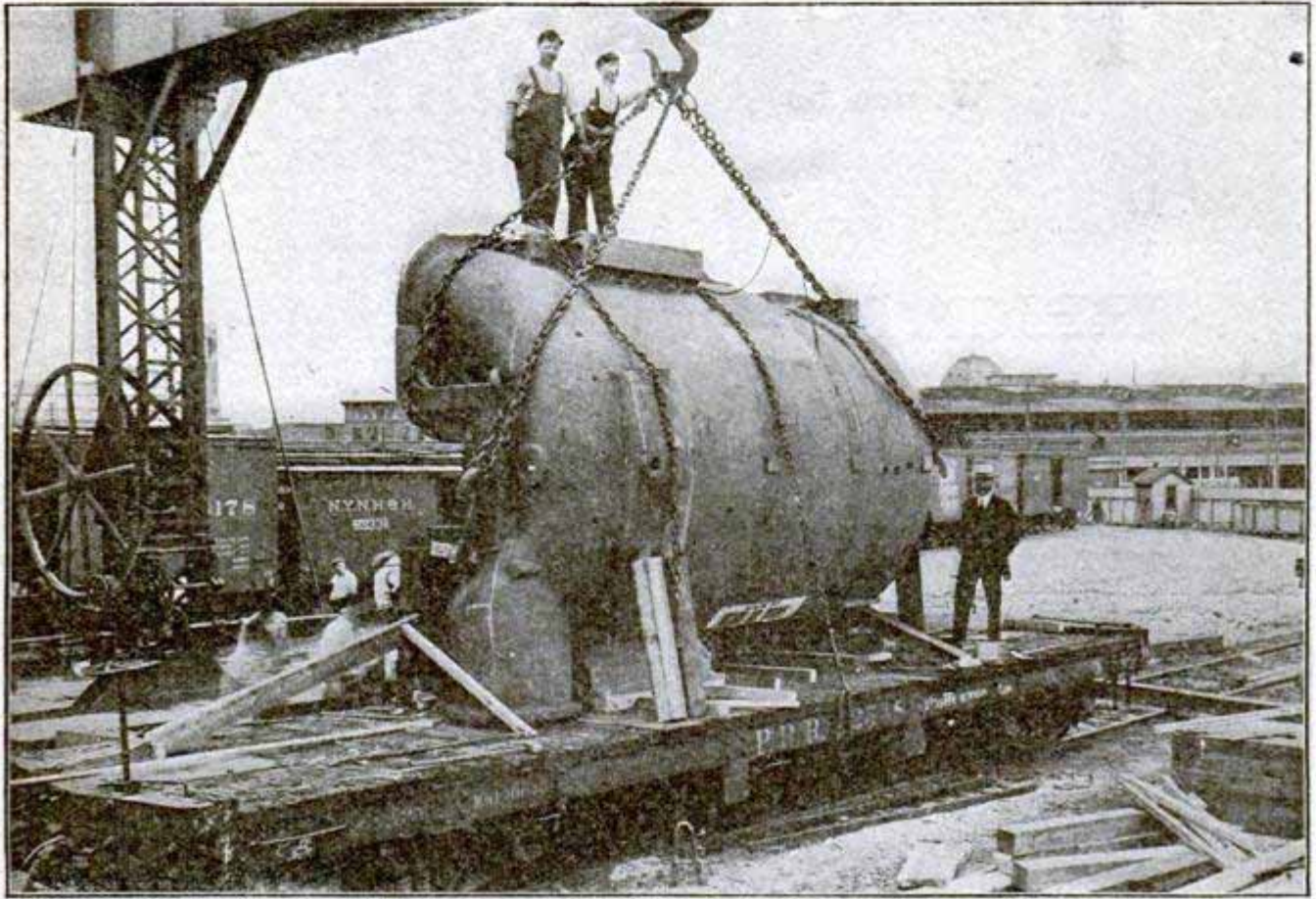
concrete tubes, each 11 ft. clear inside diameter, set side by side on a reinforced concrete cradle, which acts as a foundation in the river bed and support to the tubes. On either side of

side of the river the regulator widens out into a spillway or bywash, so that the Waranga Mallee channel bringing water from the River Goulburn can be emptied into the Campaspe river be-

low the syphon in case of emergency or during repairs.

The illustration shows the ends of the tubes while under construction.

out over the opposite track; and if stood up as shown in the illustration, would strike bridges and tunnels in transit. The railroad finally found a



30-Ton Turbine Casting on Flat Car

HUGE TURBINE CASTING FOR U. S. S. "UTAH"

The huge casting shown in this illustration, part of a low-pressure turbine engine for the United States battleship "Utah," is claimed to be the largest turbine casting ever made in this country. It is 18 ft. long, 13 ft. wide, 7½ ft. high, and weighs 30 tons.

It took 9 months to make the pattern and the mould preparatory to the pouring, which took only two minutes. The 30 tons of molten metal were poured into the 60-ton mould (twice the weight of the casting itself) in two ladles. After the casting cooled off, a matter of nearly two days, it took the workmen a week to dig it out of the mould, and another week to get it ready for shipment. The railroad companies at first refused to transport it from Providence, R. I., to Camden, N. J., because, if placed on its side, it would project

flat car low enough to allow the casting to clear bridges and tunnels.

ZEPPELIN MAY ATTEMPT NORTH POLE

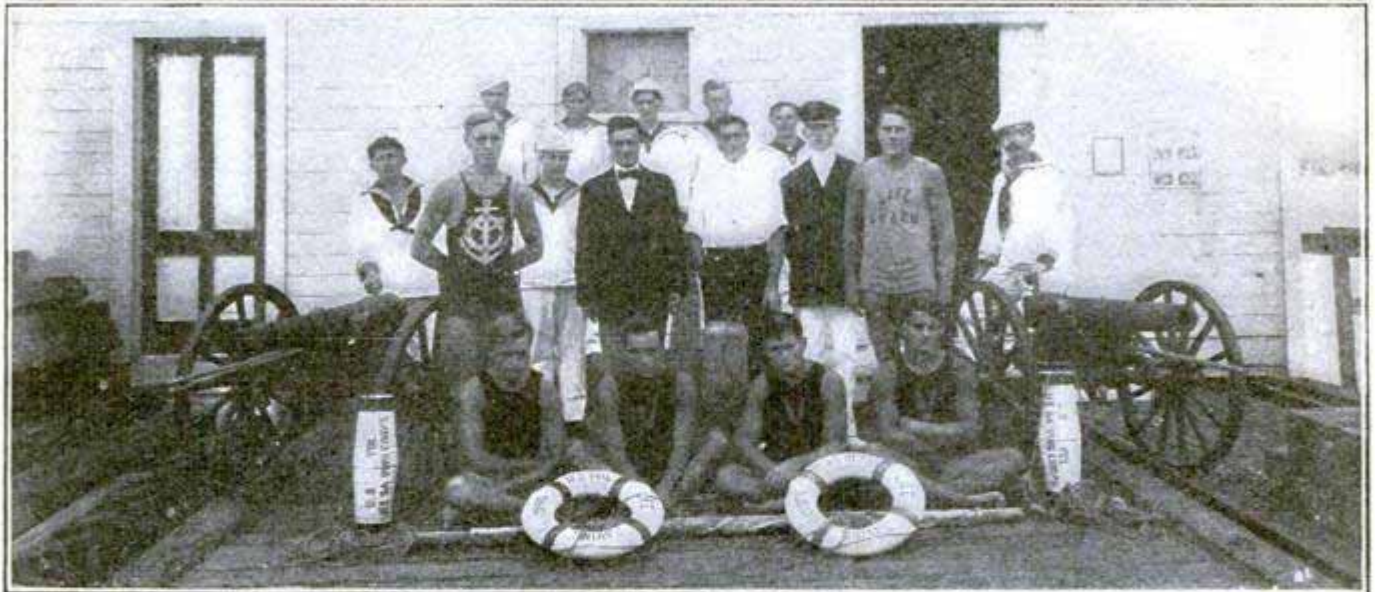
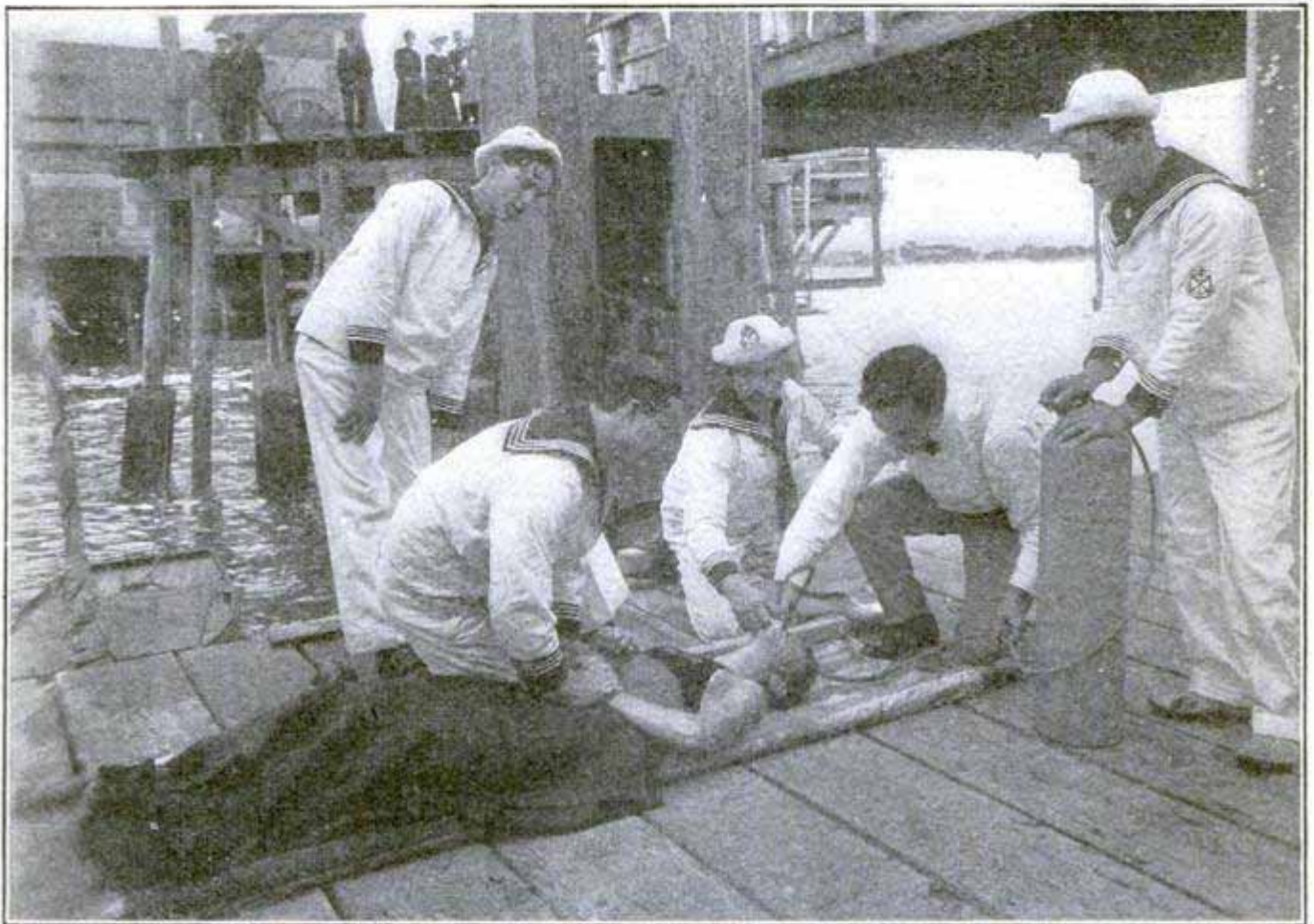
For the past couple of months the press of the world, and especially of Germany, has been announcing that Count Zeppelin may make a dash for the North Pole in his great dirigible balloon, some papers even going so far as to insist that the dean of aerial travelers will be backed in such an attempt by the German emperor.

German aeronautics experts believe that the Zeppelin could reach the North Pole from Spitzbergen in 20 hours and return again before gas and fuel were exhausted. The distance to the Pole from Spitzbergen is about 600 miles.

U. S. VOLUNTEER LIFE-SAVING CREW

The only station of the United States volunteer life-saving corps on the Pacific coast, located at Venice,

bers, a full crew of whom is on duty at all times. In December of last year the corps saved the lives of a dozen



Compressed Oxygen Method of Resuscitation—The Volunteer Crew at Venice

California, is shown in these illustrations, as well as the method of compressed-oxygen resuscitation as practiced by the members in their drills.

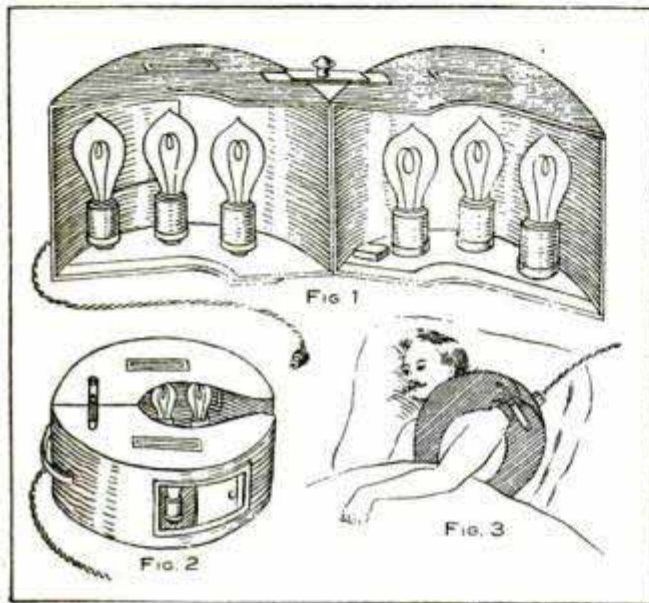
The corps is composed of 30 mem-

bers, a full crew of whom is on duty at all times. In December of last year the corps saved the lives of a dozen Japanese fishermen, who were thrown out of their fishing boats in a severe storm. The crew holds regular drills with life-boats, lines, and the resuscitation apparatus, and must answer calls

as faithfully as the regular service. As a body of drilled men, as well as for active life-saving duty, they have made many records, being awarded first prize in marching organization in the "Tournament of Roses" parade at Pasadena in January.

PORTABLE ELECTRIC BATH APPARATUS

The apparatus shown in this illustration is an electric-light bath outfit invented by a French army surgeon



Small, But Effective, Electric Bath

and designed to be used in private homes or army camps. From a medical standpoint such baths are considered of great value, especially in European medical circles, but the ordinary apparatus is too cumbersome for other than hospital operation.

This apparatus is small, light, simple, and easily portable, consisting of two jaws which open and close upon a hinged joint. Within the two curved receptacles thus formed are placed three electric lamps of variable intensity, evolving altogether an intense light and a powerful heat. Owing to the shape of the apparatus it can be applied to any part of the body. One drawing shows it attached to a shoulder, and it fits just as neatly about the waist, chest or limbs.

All electric wires in the city of Guadalajara, Mexico, have been placed underground.

CURIOUS NEWSPAPER PRACTICES IN INDIA

By a complicated system of newspaper circulation, in which the same paper is circulated in as many as three different households, a Bombay firm which contracts with the newspapers for fresh supplies every day shows a thriftiness that would put an American newsboy to shame.

The price of the leading morning newspapers in Bombay, delivered by mail, is 66 cents a month, but if a subscriber will take it from a carrier who delivers it at 7 o'clock and will read and return it when he calls again at 11 o'clock, the price is only 50 cents a month. If the subscriber is willing to wait for his morning paper until 4 o'clock in the afternoon, he may have it at that hour and return it to the carrier the next morning for 33 cents a month. Or, if he likes to keep his old papers, he may wait until the next morning after publication, have his paper for 33 cents a month, and be under no obligation to return it at all. Thus the same paper may be circulated through three different households, and the total revenue therefrom will amount to \$1.05 per month.

THUMBSCREWS AS AID TO BEAUTY

In olden times, thumbscrews were used to torture prisoners into confession, and thus gain from them secrets that only intense bodily pain would bring forth; but this, with many other fiendish means of torture, was left behind by advancing civilization. Now, however, it has made its appearance again, but as a means of self-inflicted torture. It is the newest aid-to-beauty fad of Europe, and its mission is to

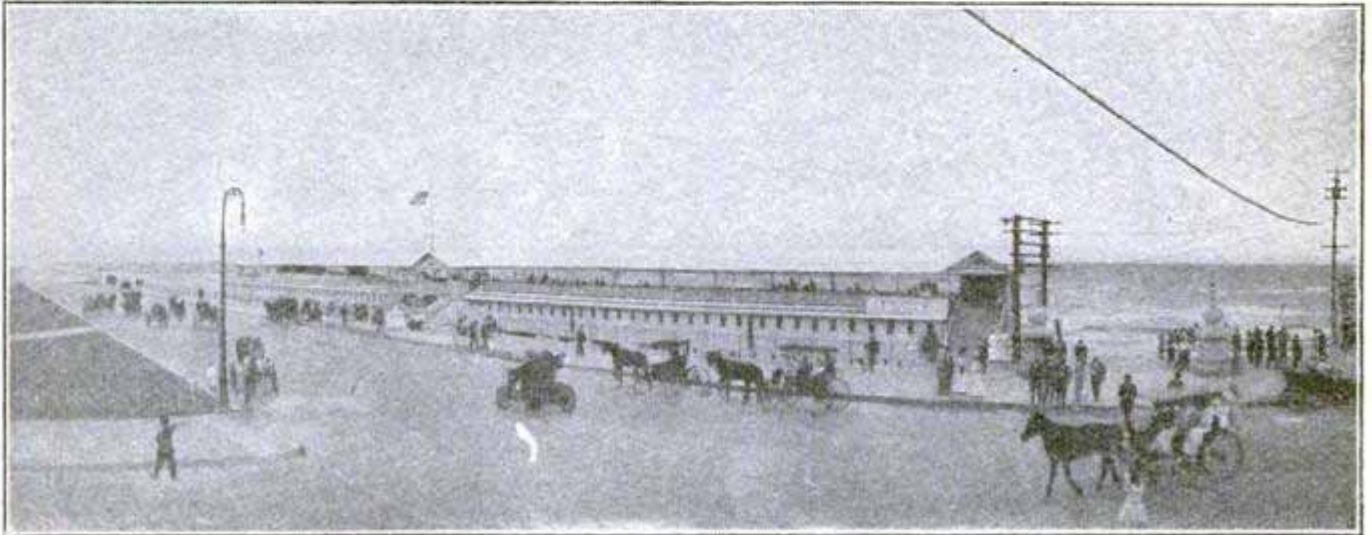


squeeze the tips of the fingers until they change from fat and pudgy to long and tapering. The clamps are placed on the fingers when retiring for the night, screwed as tight as the seeker of beauty considers advisable, and left until the first call for breakfast the following morning.

THE DAMAGE AT GALVESTON BY TIDAL WAVE IN JULY

Sea Wall Saves the City

Although the great storm which struck Galveston in July did not reach a wind velocity of more than 75 miles an hour, while the storm of 1900, which



Photos by M. E. Verkin

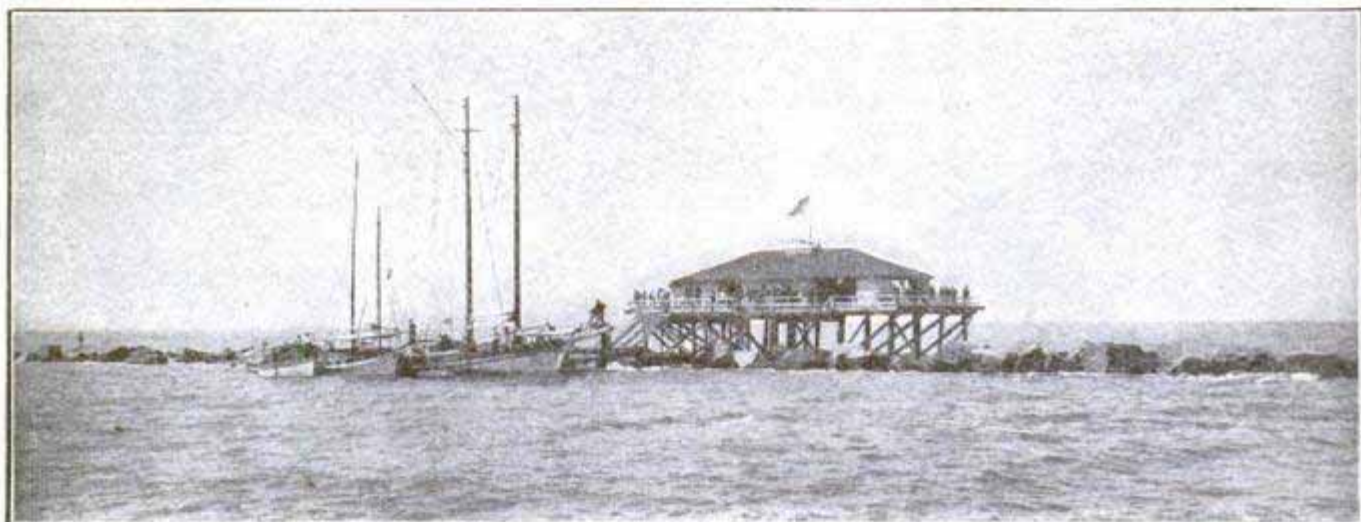
Murdock's Bathhouse Before and After the Storm

FIRST OIL WELL IN 1859

That the first oil well in the world was sunk only 50 years ago was brought forcibly to notice the latter part of August by the celebration of the event at Titusville, Pa. The qualities of petroleum had been known for centuries, but the first artesian well to be sunk in its search was the venture of Col. Edwin W. Drake near Titusville, August 28, 1859. On that date the drill tapped a vein of oil which lay 70 ft. below the surface, and the result was 40 barrels a day.

killed 6,000 people and destroyed the city, blew the anemometer on the government building away after registering 100 miles an hour, the great sea wall has demonstrated its ability to protect the city.

That the test was a severe one, and that the residents of the Texas city have reason to be jubilant, is amply shown by these illustrations of the damage inflicted to bathing and amusement pavilions along the city front. Had it not been for the wall the damage would undoubtedly have extended far into the city, carrying in its wake



Carting Away Lumber—Fishing Pavilion from Which 38 Persons Were Rescued—General View of Wreckage Photos by M. E. Verkin

death, as well as property destruction.

The great wall extends along the city's water front for 17,593 ft., or 3 1/3 miles, and its top is 17 ft. above mean low water of the gulf, or 1.3 ft. higher than the highest point reached by the flood that was driven over the city by the 1900 hurricane. The wall proper is 5 ft. thick at the top and 16 ft. thick at the base, built on a foundation of piles that are driven 43 ft. into the

damage caused by it. The first group shows Murdock's bathhouse before the storm and all that was left of it after the hurricane had passed. The damage was \$20,000. Another group gives an excellent idea of the damage wrought by the wind and waves on the "Breakers" bathhouse. Nothing but a skeleton of a foundation and scattered lumber was left where the building, valued at \$40,000, had stood.



Photos by M. E. Verkin

The "Breakers" Pavilion Before and After the Storm

ground. In front of the wall for 27 ft. seaward a massive bed of granite riprap, 3 to 7 ft. thick, provides a further protection to the foundation. The wall itself, calculated to resist by itself the shock of waves and hydrostatic pressure, is backed by sand filling extending inland far enough to provide a walk 13 ft. wide and a driveway 38 ft. wide.

The illustrations, arranged in groups, show the appearance of the waterfront before the recent storm and the

The huge log shown in one photograph completely demolished a 1,000-ft. fishing pier valued at \$16,500 in less than five minutes, after which it was repeatedly hurled against the sea wall until a 10-ft. wave threw it upon the top. It is a cypress log, 21 ft. long and 7 1/2 ft. wide, weighing 9 tons. It was probably washed from the shores of South America.

The page group gives an idea of the general destruction just outside the

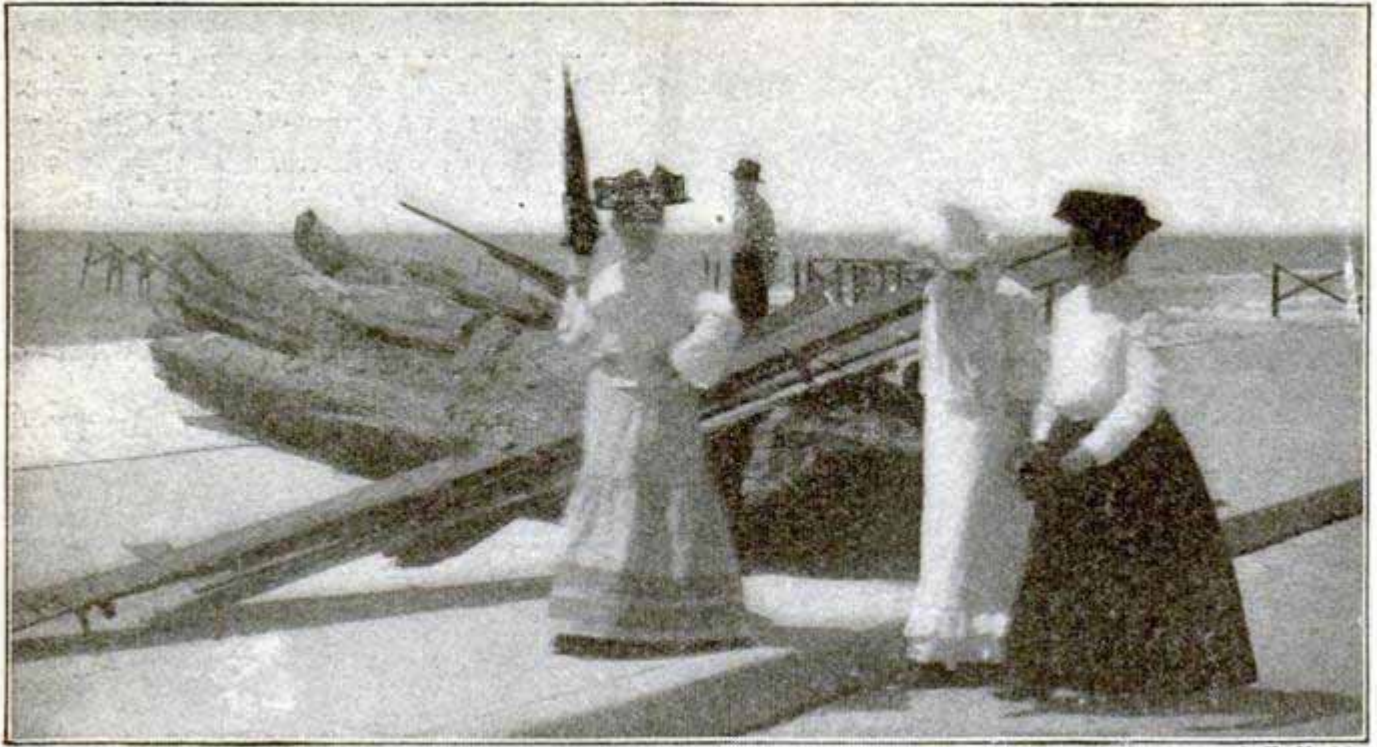


Photo by M. E. Verkin

A Log That Did Great Damage

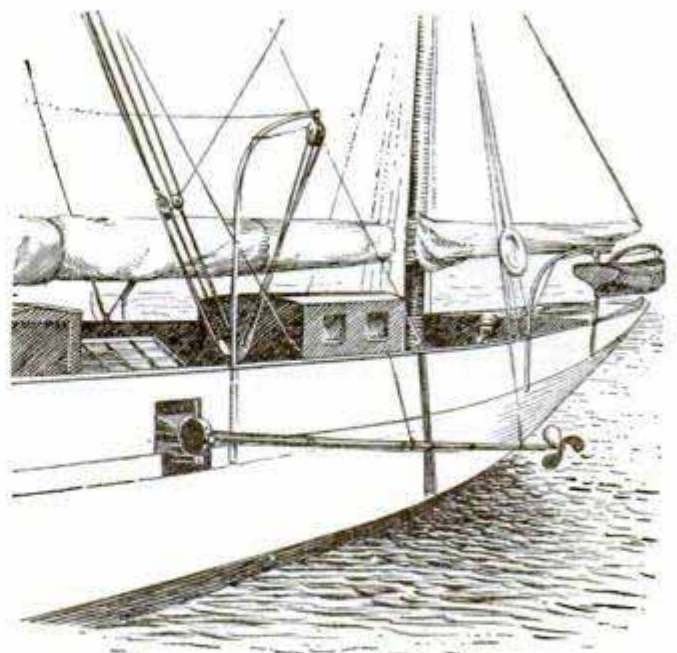
wall, as well as showing the fishing pavilion from which 38 people were rescued by a small skiff. The boat made 6 trips in its work of rescue. On the sixth trip the foundation of the pavilion collapsed, the people still unrescued being carried away with the building. They were finally picked up five miles from the city. The two other photographs in this group show the work of gathering up the debris of lumber from the sea-wall boulevard.

ENGLAND'S DAYLIGHT BILL IS DOOMED

The daylight-saving bill which has been up before the public and the legislature of England for some time will fail to pass, according to several authorities, even though its trial by some of the manufacturing concerns in Birmingham proved it sufficiently welcome to the employes to be repeated again next year, legislation or no legislation. The idea of the bill was to make compulsory the opening of all shops and factories an hour earlier in the morning and closing them an hour earlier at night, so that the workers could take advantage of the summertime for evening recreation before darkness closed in.

OVER-HANGING AUXILIARY PROPULSION SHAFTS

A most interesting method of equipping a sailing yacht with auxiliary gasoline power is shown in this illustration of an English yacht fitted with such an equipment by an American concern. The idea is very ingenious, and of great advantage to sailing



Ingenious Auxiliary Installation

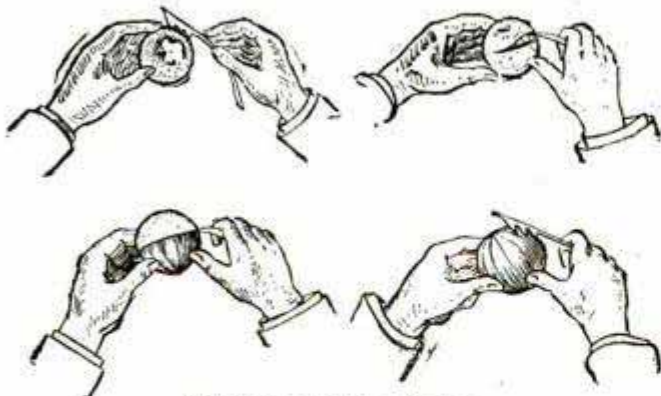
yachts, especially those entering sailing regattas.

The propeller shafts, one on each side, are pivoted to the driving shafts of the engines in such manner that, hanging outside the hull as shown in the illustration, they can be lowered into or raised from the water at a moment's notice, without the necessity of disconnecting them.

The majority of auxiliary installations are made through the keel of the vessel in the same manner as on an ordinary power-driven vessel, and the propellers are made to fold, so as to offer as little resistance to the water as possible when not in use. Even so, however, there is enough resistance to make a considerable difference in speed in a long sailing race. When a matter of a few minutes or even seconds may mean the loss of a great race the question of even slightly handicapping a racer with auxiliary power is a serious one.

INGENIOUS ORANGE PEELER

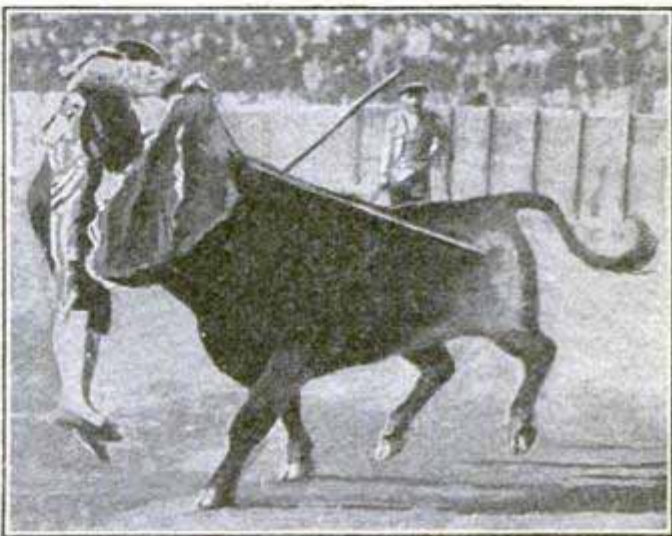
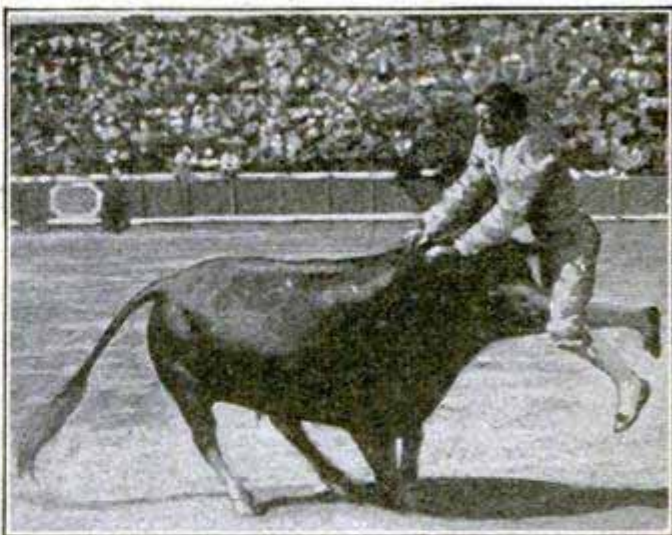
The illustration shows a new instrument by which oranges can be peeled with a degree of cleanliness impossible with an ordinary fruit knife. The teeth at one end slits the rind without tearing the surface of the fruit, and when this is made completely around the orange, the peeler is reversed and



Sanitary Orange Peeler

the curved end is slid under the rind, turning it back neatly.

The tug "Grayling," which started out from Seattle on May 27, in an attempt to reach Panama, had not been heard of 61 days after leaving port. She had provisions for only 45 days.



PHOTOGRAPHED AT CRITICAL MOMENT

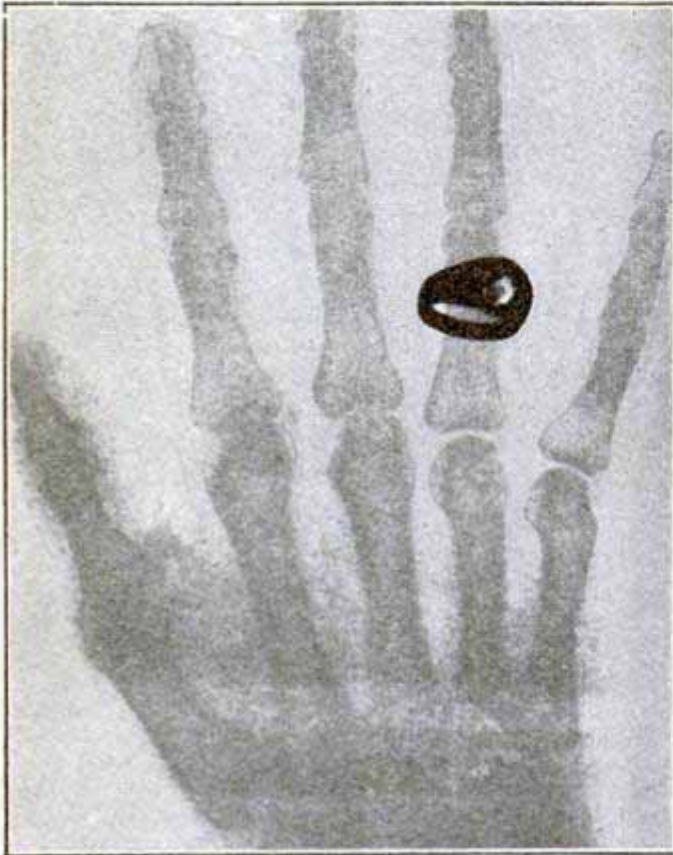
These remarkable photographs, attesting to the alertness of the camera men, were taken at the two exact moments when bull-fighters were seriously wounded in the ring at Seville, Spain. The former failed to get his sword home at the right moment, and was gored by the bull as he jumped aside. The second was gored a short time later while attacking.

John J. Flanagan, one of the stars of the American Olympic team, threw a 16-lb. hammer 180 ft. in a New York contest, breaking his own world's record by more than 5 ft.

A state law has been passed in California making it an offense to use the American flag for advertising purposes. The penalty is a \$200 fine or a year's imprisonment.

TESTING DIAMONDS WITH X-RAY MACHINE

While a diamond is almost perfectly transparent to the rays of the X-ray



Appearance of Real Diamond—Ring with Imitation Diamond

machine, its spurious counterpart is almost perfectly opaque. In this way the most ingenious imitation of the diamond may readily be detected, as is shown in these reproductions taken

by Dr. Edward Haentze, of Philadelphia.

It will be noticed in the first illustration, which shows a real diamond, that the setting seems to be missing, so transparent is the real gem to the rays, whereas, the setting in the second illustration, which was an excellent imitation stone, shows up quite dark.

WORK OF THE WIRES AND WIRELESS

In communicating with each other by telephone and telegraph, the people of the United States used, in 1907, more than 15,000,000 miles of single wire, of which 12,999,369 miles were telephone wires, and 2,072,851 were telegraph wires. Over the telegraph wires there were flashed 368,470,509 messages, of which 5,869,317 were cablegrams.

The telegraph was established in 1844, while the telephone did not come until 32 years later, yet, in 1907, the telephone wire mileage was eight times as great as that for telegraph service. All this information is contained in the report of the Department of Commerce and Labor, which is the third of its kind ever issued. According to the bulletin, the wireless telegraph was operated at a loss of \$47,628 in this country in 1907.

PITCH AND WAX AS SUBSTITUTE FOR GLUE

Both American and European organ and piano manufacturers have experienced great difficulty in the shipment of these instruments to tropical countries, because the damp climate moistens the glue used in sticking leather and felt on wood, causing the material to peel off. Therefore European firms, according to the U. S. consul in the capital of Paraguay, are now using pitch and wax as a substitute for glue with perfect satisfaction. The composition is melted in a glue pot, and is made hard or soft, according to the amount of wax used.



A Wall of Human Bones

SKULLS IN PARIS CATACOMBS

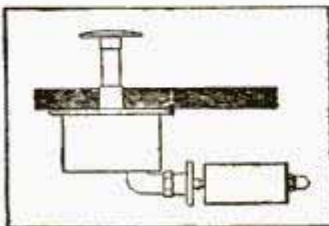
The famous catacombs of Paris, formed by the galleries left in the quarrying of stone, cover a large area under that city. In years past, when different cemeteries of Paris were abolished, the remains were taken to the catacombs. The walls, as shown in the illustration, are lined with skulls and bones, leaving but very few bare surfaces.

foot. The air thus compressed is driven through a tube to the horn or whistle, and the result is a clear, strong blast.

An automobile horn blown by a rubber bulb has several disadvantages, the greatest being in the fact that when careful steering is required the horn is also necessary and one hand must be taken from the steering wheel in order to sound it.

AUTO HORN SOUNDED BY FOOT

An automobile signal-blowing device that is sounded with the foot in the same way the motorman of a street car sounds his bell, and to which can be attached either an auto horn or a whistle, has been placed on the market. It consists of a box under the floor of the automobile in which air is compressed by striking a brass plunger with the



SCENIC PICTURES OF POSTAGE STAMPS

The walls of the Saint Jean de Dieu hospital at Ghent, Belgium, are decorated with gorgeous landscapes, glowing with color, formed entirely of canceled postage stamps of all nations. Palaces, forests, streams, and mountains are represented in this unique scheme of scenic reproduction, while fitting butterflies, birds, snakes, and other animals are indicated here and there with consummate skill. The pictures are in the Chinese style, and it is estimated that the monks have used nearly 12,000,000 stamps in the scheme.

INGENIOUS CAMERA TIMES SPEEDING AUTOS

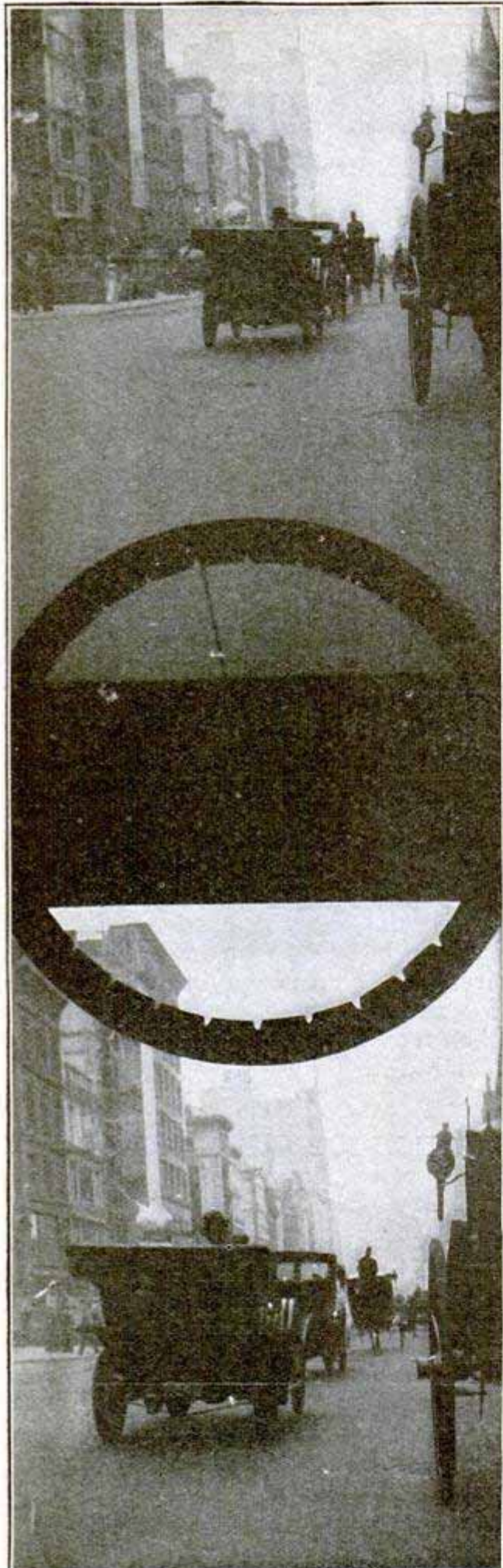
The most up-to-date method of timing and convicting automobile speeders is by means of an ingenious camera adopted by the Boston police. The camera, invented by a Boston physician, takes two pictures of the speeding automobile, as shown in the illustration, one picture approximately a second after the first.

From a simple law of physics governing the relation between the size of image and object to the distance of image and object from the lens, the distance of the automobile from the camera at each exposure is readily calculated. In the computation, the wheel tread of the machine, usually the 56-in. standard, is regarded as the true size of the object, and the size of the image is measured directly from the photograph by means of a steel scale divided into hundredths of an inch. The distance of the image from the lens is the same as that of the plate from the opening.

The pointer of a chronometer is shown at each exposure on a dial, and indicates the time between exposures to one-thirtieth of a second. The mechanism is situated directly in front of the plate holder. Having found the distance and the time, the velocity is determined, it being readily figured out to within a fraction of a mile per hour.

All the officer with the camera has to do is to step either behind or in front of the speeding auto, point the camera, and press a lever. All other operations are accomplished mechanically, the camera not only indicating the speed of the automobile, but showing its number, and its occupants as well.

Because only a small percentage of women preferred to ride in the special cars provided for their use in the Hudson underground railways of New York, the idea was abandoned after a three-months' trial.



Reproduced from Photographs Made with Timing Camera

FREIGHT TRAIN WRECKS SELF AND BRIDGE

The wreck shown in these illustrations occurred at Goldsboro, North Carolina, in July, and was caused by

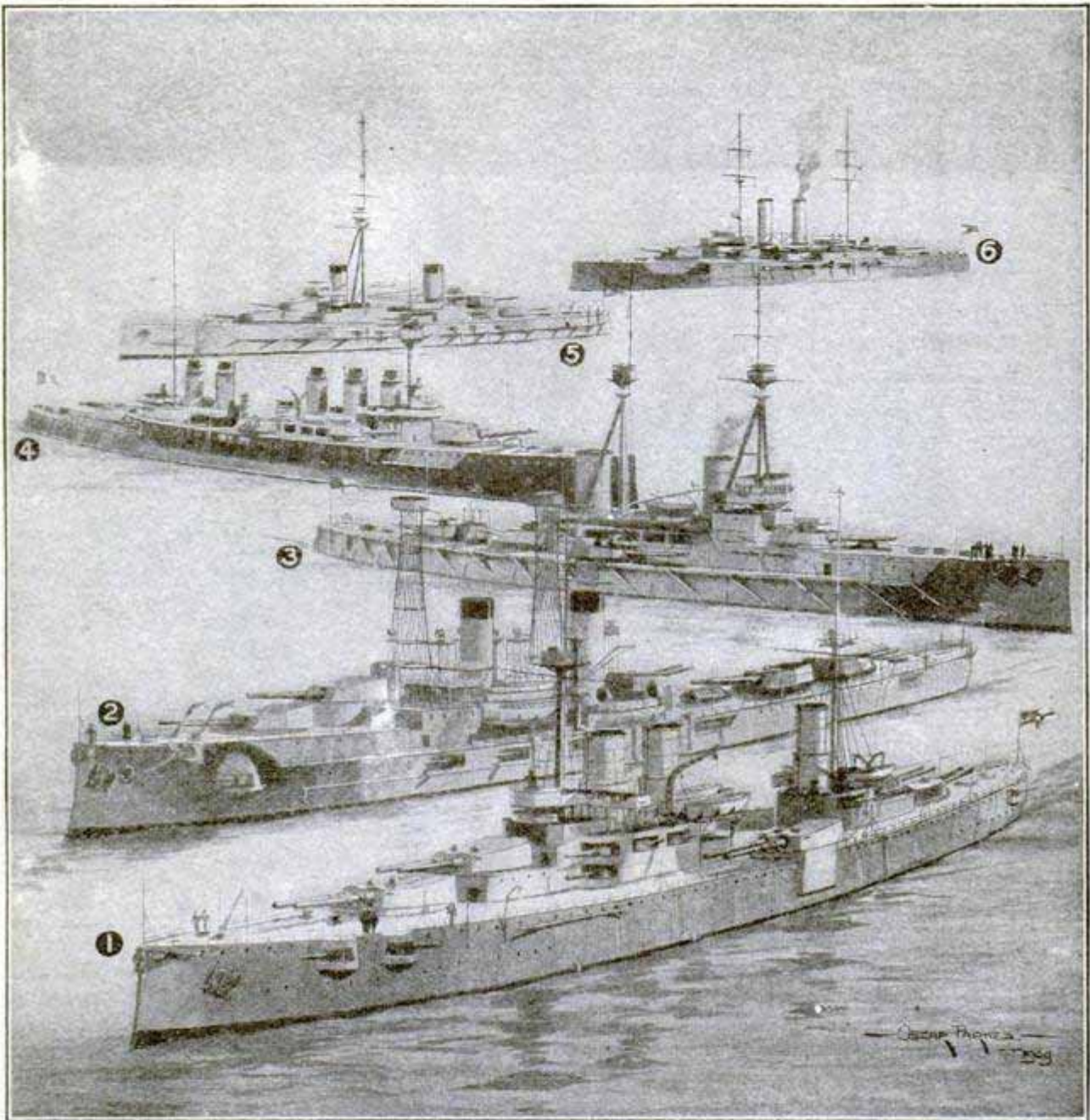
one of the freight cars jumping the track while on the bridge. About 30 of the 40 cars in the train were demolished



Photos by L. W. Barnes

Two Views of Bridge and Train Wreck

as well as the entire bridge. Structural work, bridge foundations, shattered cars, and freight piled up in a tangled mass, completely filling the river bed.



Courtesy London Graphic

1. GERMANY—Rheinland, 19,000 tons; armament, twelve 11-in. guns and twelve 6-in.; speed, 21 knots. (Figures very doubtful.)
2. UNITED STATES—North Dakota, 22,075 tons; armament, ten 12-in. guns and fourteen 5-in.; speed, 21 knots.
3. GREAT BRITAIN—St. Vincent, 19,250 tons; armament, ten 12-in. guns and an anti-torpedo battery of 4.7 quick-firers; speed, 21 knots.
4. FRANCE—Danton, 18,400 tons; armament, four 12-in. guns and twelve 9.4-in.; speed, 19 $\frac{1}{4}$ knots.
5. BRAZIL—Minas Geraes, 18,000 tons; armament, twelve 12-in. guns; speed, 21 knots.
6. AUSTRIA—Erzherzog Franz Ferdinand, 14,500 tons; armament, four 12-in. guns and eight 9.4-in.; speed, 20 knots.

TIRE-MAKING MACHINES

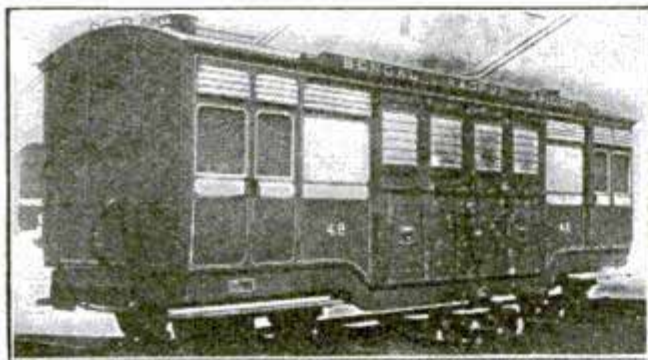
Finding that the French tire-making machines, which were the first machines of the kind invented, were not altogether satisfactory, two of the largest automobile tire-manufacturing concerns in America have invented and

placed in active operation machines of their own design. One operator with either one of the machines can make from 40 to 50 tires in an eight-hour day, while it is claimed that a hand tire-maker can turn out only five or six when working rapidly.

CARS FOR TRANSPORTATION OF HORSES IN INDIA

The car shown in this illustration is one of several designed for the transportation of horses on the Bengal-Nagpur Railway in India. It is divided into four apartments, two of which are 10 ft. long while the others are 4 ft. 6 in. The larger compartments are for the horses, two of which are placed in each, and the smaller ones are for the attendants. The former take up the central part of the car, with the attendants' compartments at each end. The compartments for the horses are well padded, and each is provided with two mangers with receptacles below for the fodder.

The roof is double with a 2-in. air space and asbestos lining, in order to protect the horses adequately from the



Courtesy Indian Railway Gazette

Palace Car for Horses

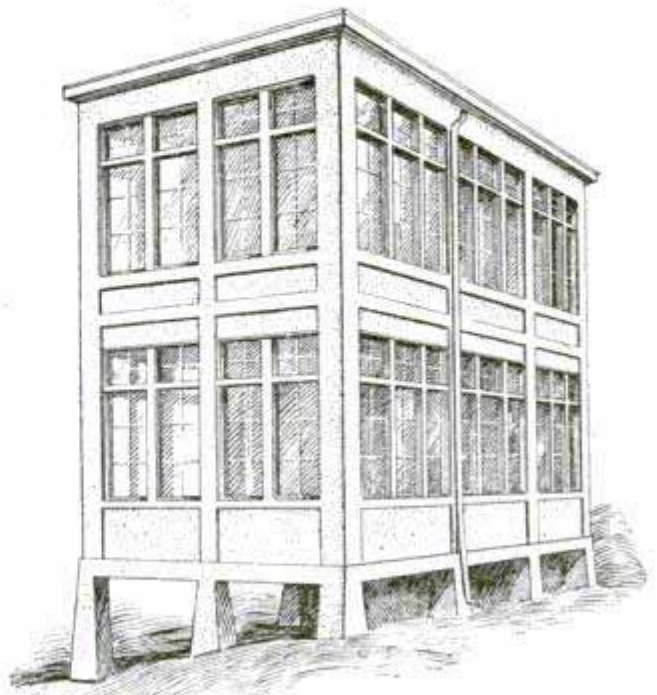
sun's rays. The cars are also lighted with incandescent gas lamps.

CONCRETE HOSPITAL FOR TUBERCULAR PATIENTS

The new building for tubercular patients at the Woman's and Children's hospital in Syracuse, N. Y., has many interesting features. It is constructed of reinforced concrete, and the sash are hinged, so that windows may be opened wide, practically making it as open as a porch.

The floors are of reinforced concrete, covered with painted canvas, similar to the deck covering of a ship, and scupper-holes are provided as an outlet for water, as well as small shut-

ters, which can be opened for the shoveling out of snow in the winter.



Courtesy Concrete

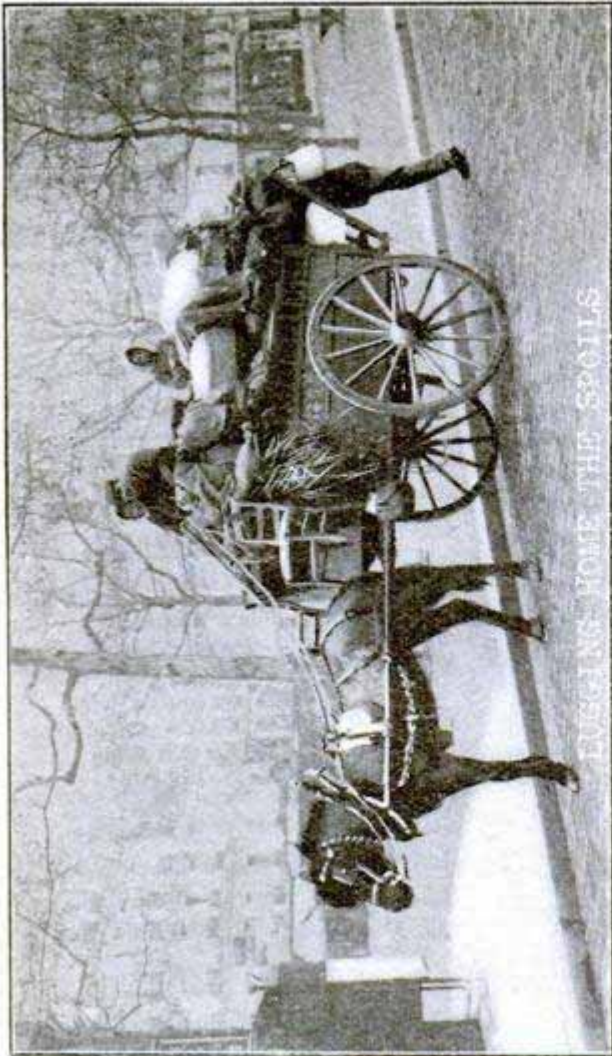
Strictly Modern Hospital

A small gutter is also made around the floors at the walls for the drainage of water to the outlets, and curved corners are provided to avoid the accumulation of dirt.

THE RAG-PICKERS OF PARIS

In olden days the father's occupation was passed down to the son, then the grandson, and so on through the generations. This inheritance of a certain kind of labor is still the rule to a great extent in European countries, but in emulation of conditions shown so excellent in the United States, the younger generation is beginning to learn that there are other and better ways of earning a living a step higher up in the scale than is often that of the father, and that birth does not necessarily doom one to such an inheritance.

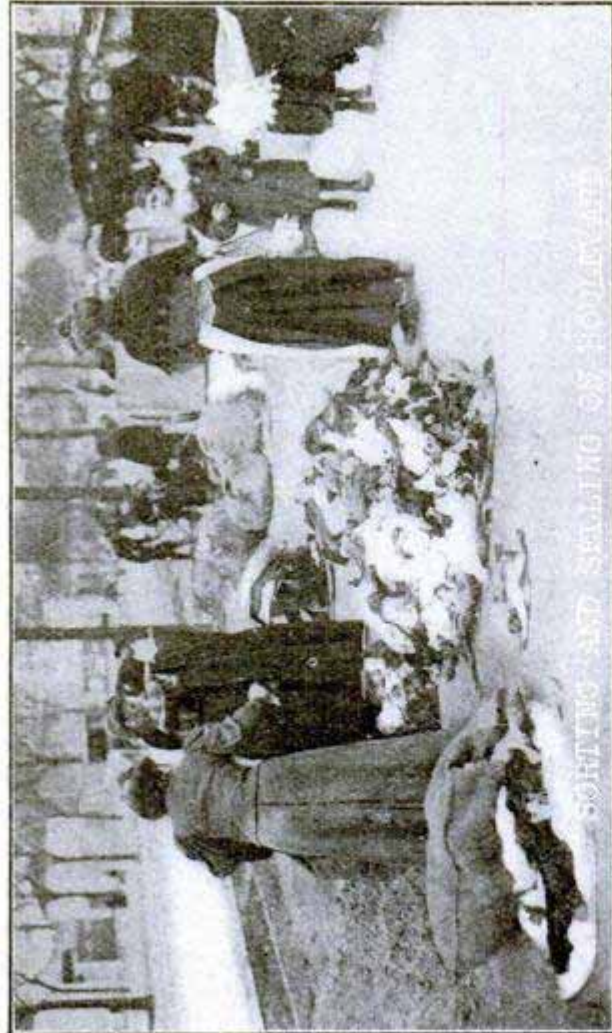
The old scheme, however, still holds good with the rag-pickers of Paris, as with many other such poor occupations. Each rag-picker family has its own district which is inherited by children and grandchildren, and it is this occupation that the accompanying photographs illustrate. In spite of all the progress made in modern and elegant Paris, barrels of waste are piled up on



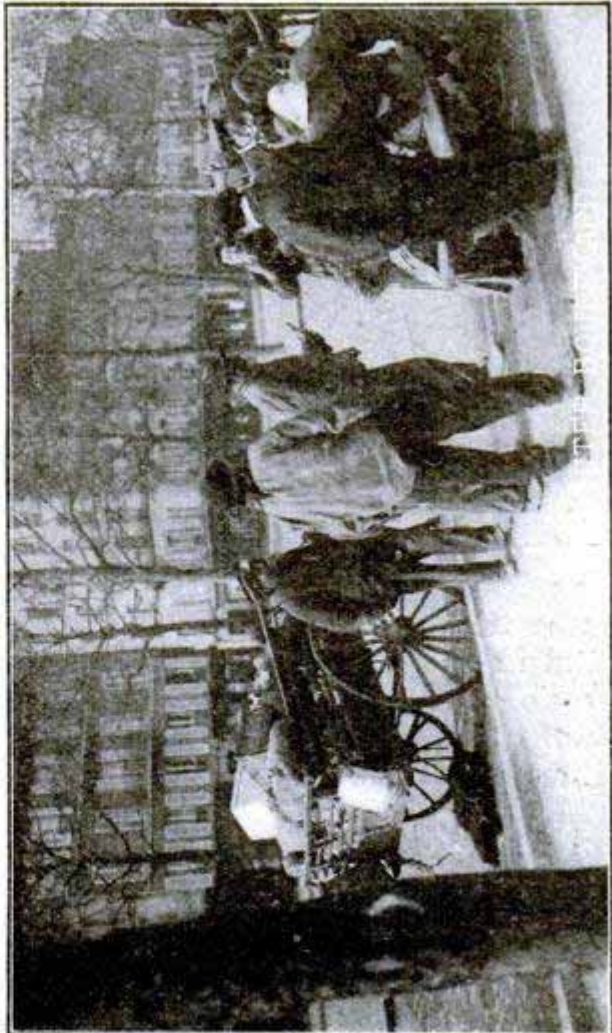
BRINGING HOME THE WOOL



MORNING IN A PAIR'S BOULEVARD



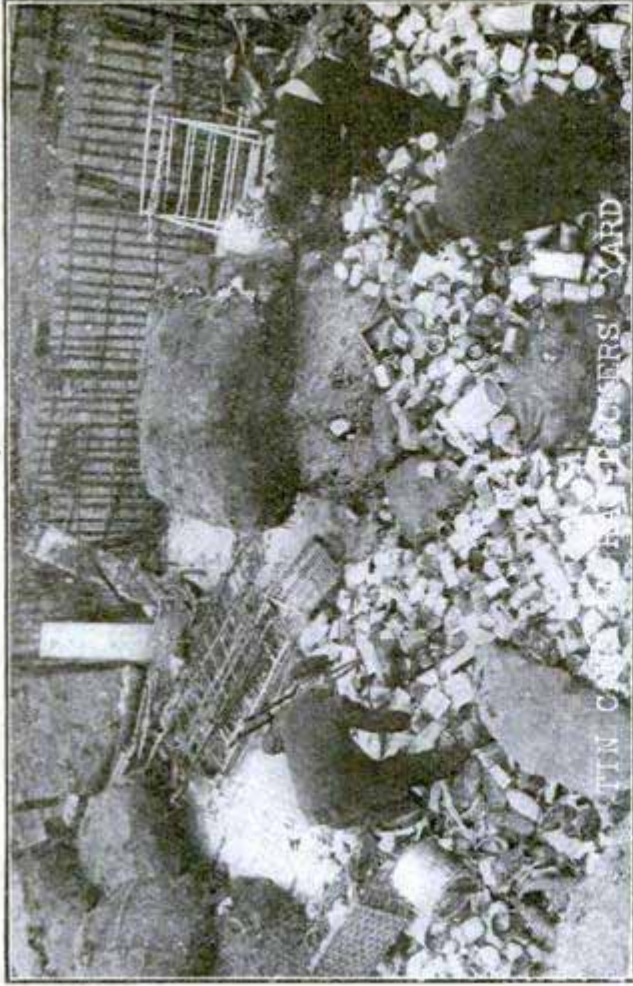
SELLING AND SORTING OF WOOL



THE BOULEVARD



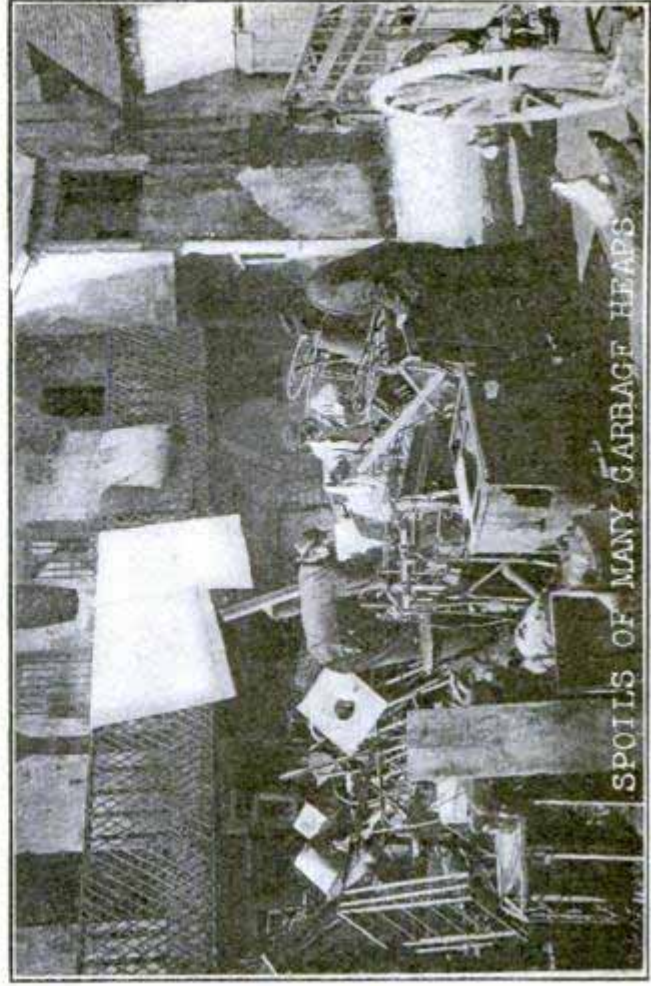
NEW MATTRESSES FROM OLD



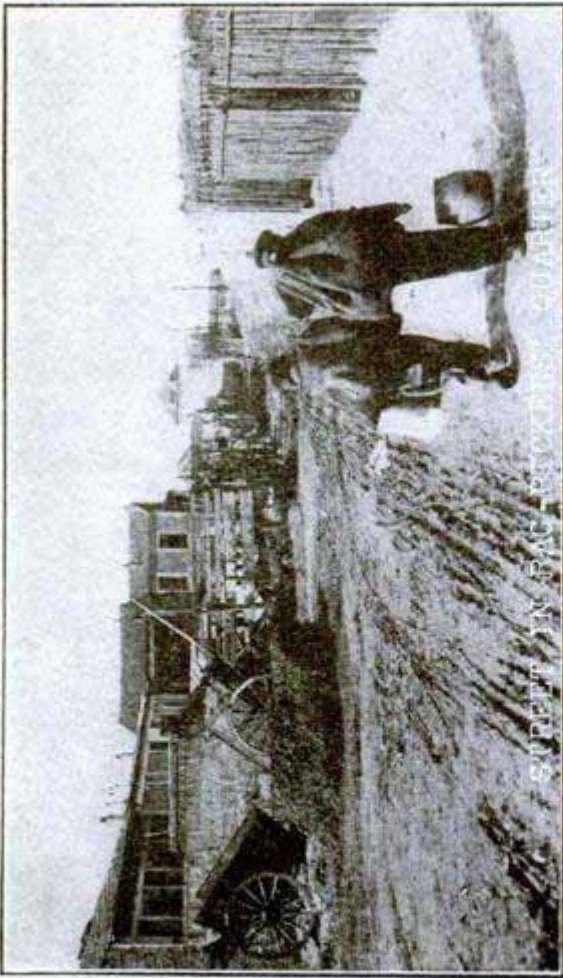
TIN CANS' YARD



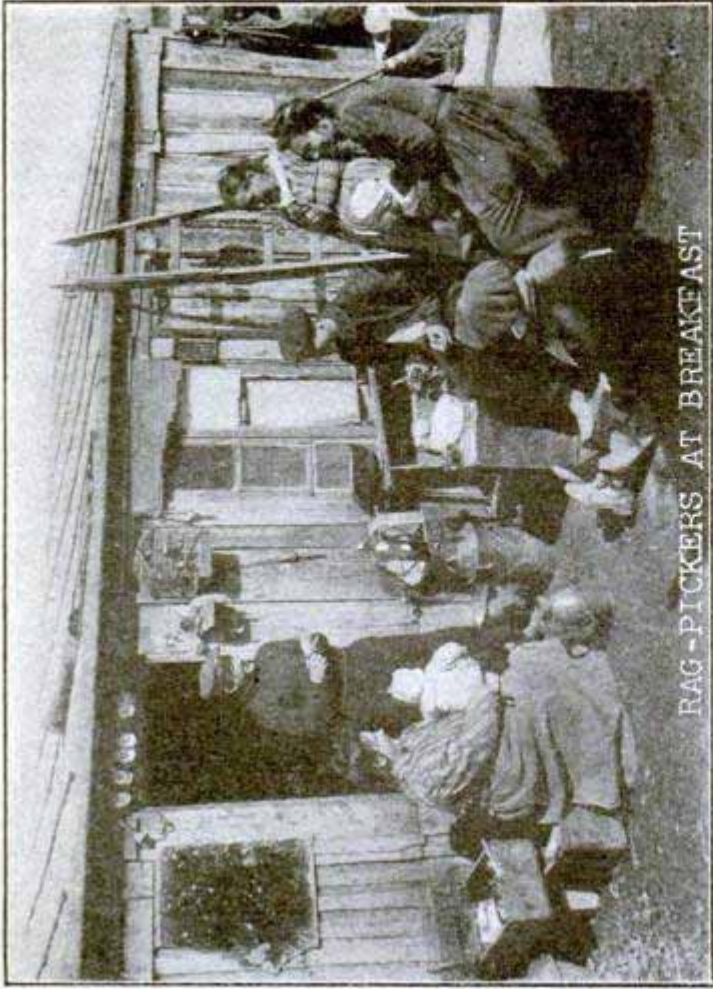
SORTING MORE VALUABLE RUBBISH



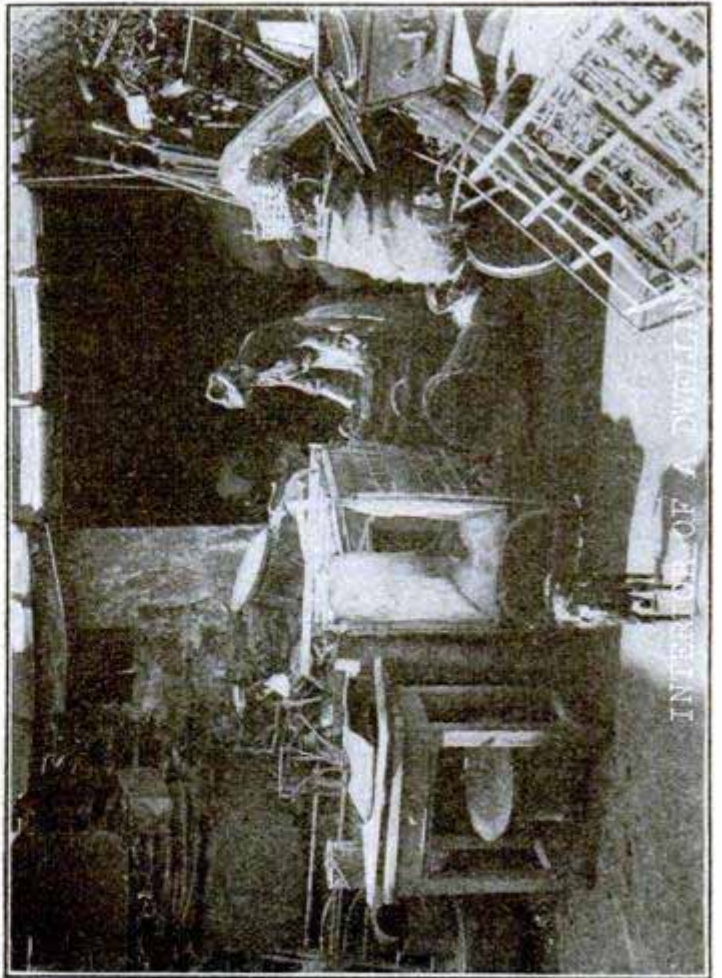
SPOILS OF MANY GARBAGE HEAPS



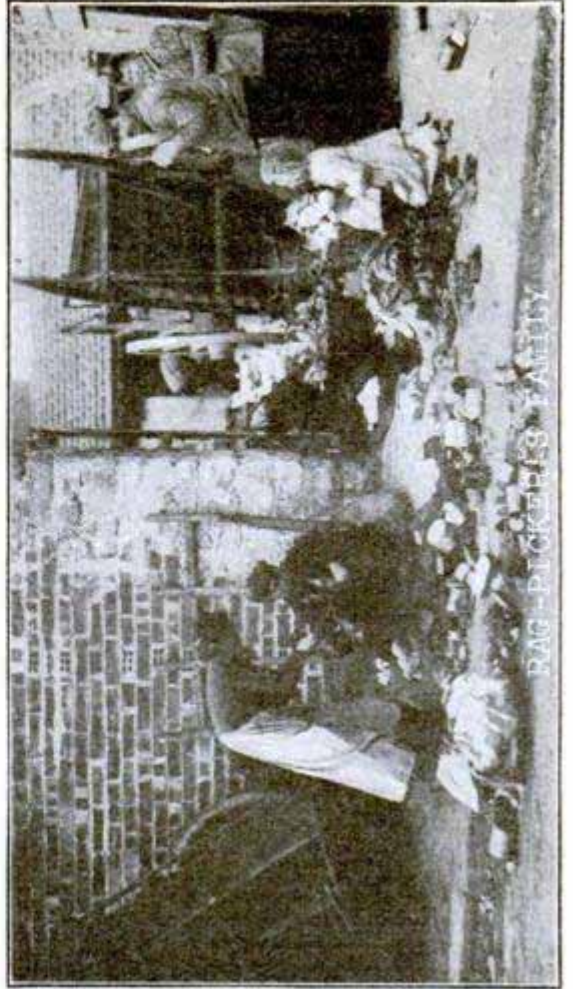
SUPPER IN RAG-PICKERS' QUARTER



RAG-PICKERS AT BREAKFAST



INTERIOR OF A DWELLING



RAG-PICKERS' FAMILY

the streets in front of many buildings on beautiful boulevards in the early morning hours, and it is the privilege, and in fact the mission, of the rag-pickers to examine this refuse. They have use for everything, and but little is left after they have passed, their very thoroughness being one reason why the system is still allowed.

Every scrap of paper has its market, rags are gathered for paper manufacture, shoes go back to leather dealers, old sardine and preserved meat tins are used for making playthings, old bones produce gelatine and glue, lemon and orange peels are greatly sought after and sold at the rate of one cent a pound to perfume and syrup manufacturers, old metals are highly prized, cigar stubs go to tobacco factories, and even stale vegetables are carted away.

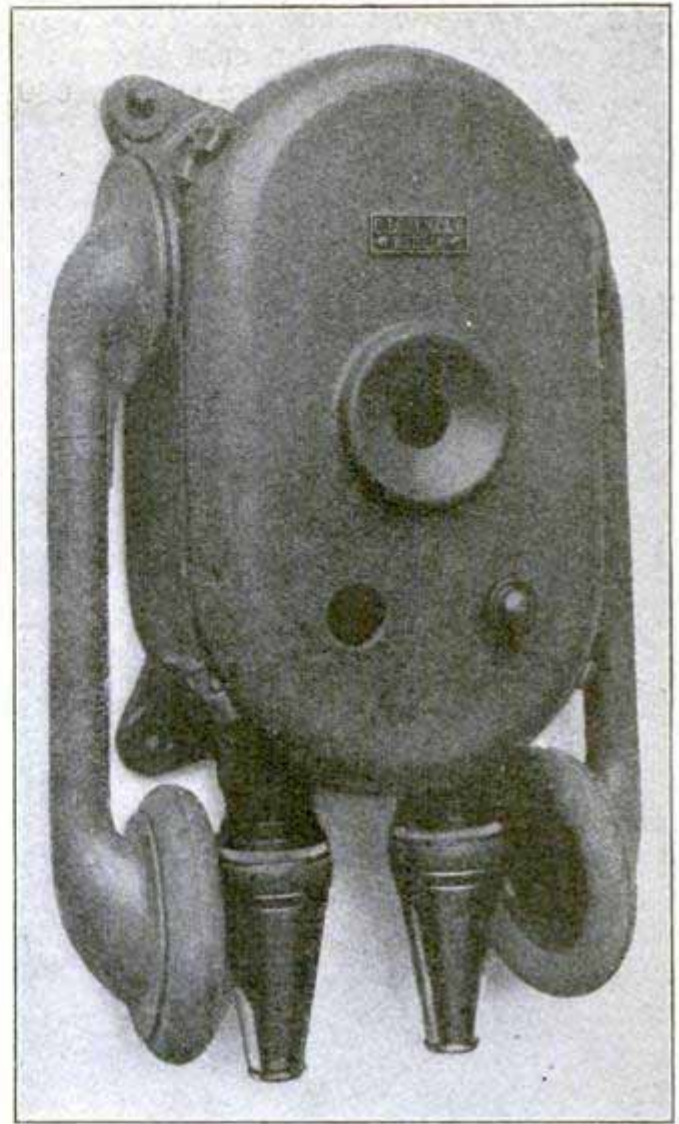
The quarters of the rag-pickers of Paris are just outside of the confines of the city, sections carefully avoided by most people who do not belong to the guild. Little huts made of boards and often without doors serve as dwellings. Their clothing is taken from the rags collected, and very often the boiled dinner consists of the meats and vegetables found in the waste barrels.

Every member of the family, from the oldest to the 3-year-old, takes part in the sorting of the spoils, and it often happens that members of a family die either from poisoning from stale food or from a cut from one of the tins.

LOUD-SPEAKING, WATER-TIGHT TELEPHONE

The illustration shows a watertight, loud-speaking telephone instrument designed for marine and mining service. It consists of a watertight casing of bronze casting, the front section of which closes upon a rubber gasket. The receivers, of which there are two, are located just inside the bronze casing, and are provided with two swinging ear tubes.

The instrument is also being used to great advantage in chemical works and other plants where the telephone apparatus is liable to be damaged by



For Marine and Mining Service

smoke, gases or other detrimental atmospheric conditions.

GREAT CONNECTING LINK BETWEEN NEW YORK AND LONG ISLAND CITY

The great Queensboro bridge, of cantilever construction, connecting New York with Long Island City, forms a link which can be traversed by more than 300,000 persons a day on foot, in vehicles, and by the four trolley and two elevated railway lines that cross it.

In many respects this bridge is the greatest of the four structures spanning the East river. Its total length, including approaches, is 7,424 ft. The Manhattan approach is at Fifty-ninth street, and the bridge crosses the river and Blackwell's Island. The length of the bridge proper is 3,724 ft., the river

span west of the island being 1,182 ft. in length; the river span east of the island, 984 ft., and the island span, 630

daily traffic capacity is 315,000 persons. The total cost of the huge structure was \$20,000,000.



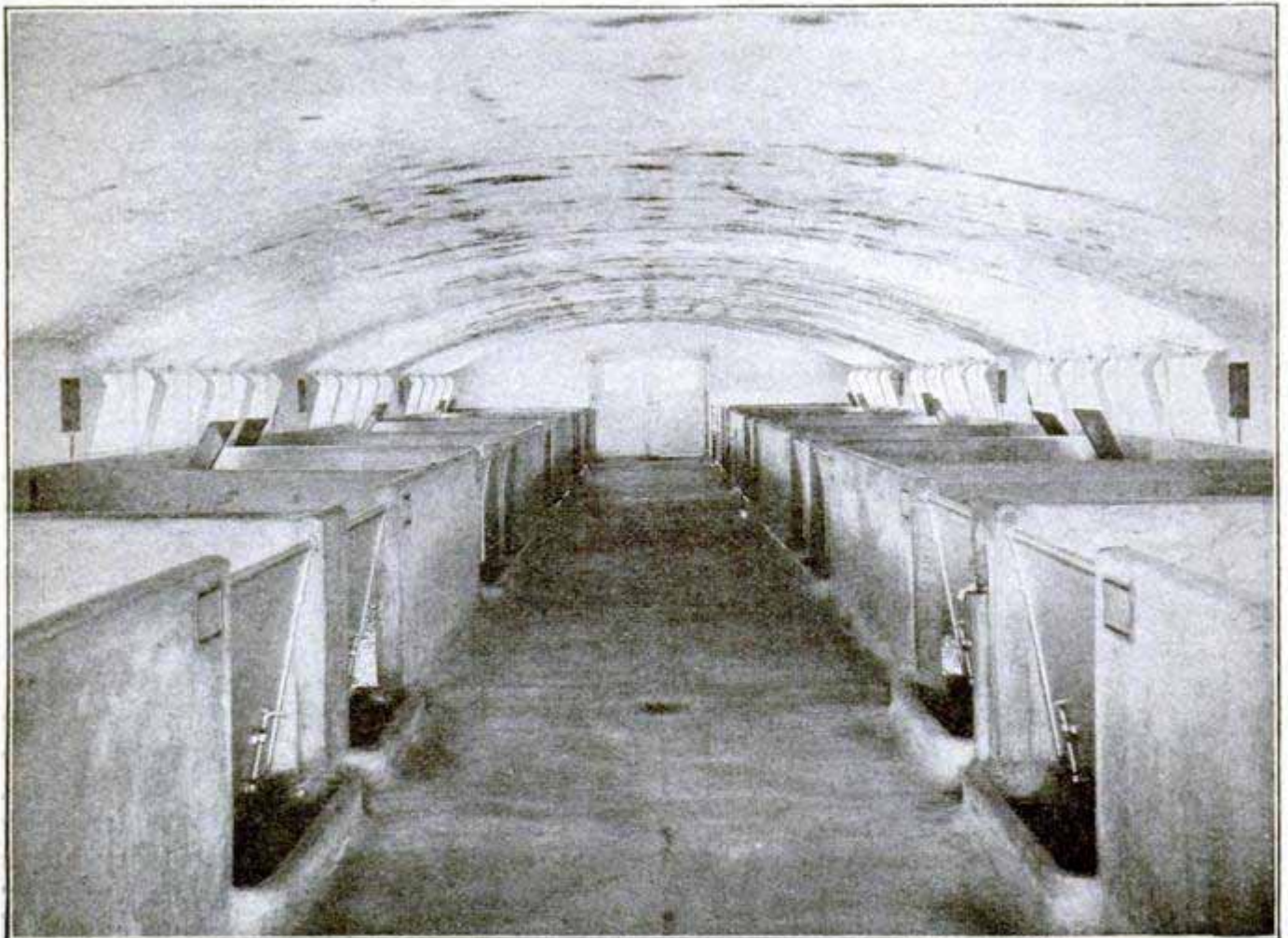
The New Bridge Over the East River

ft. The clear height above high water is 135 ft., the height of the towers above bottom chord, 185 ft., the approximate total dead load, including steel paving, etc., 120,000,000 lb., and the maximum live load, 16,000 lb. per foot of bridge.

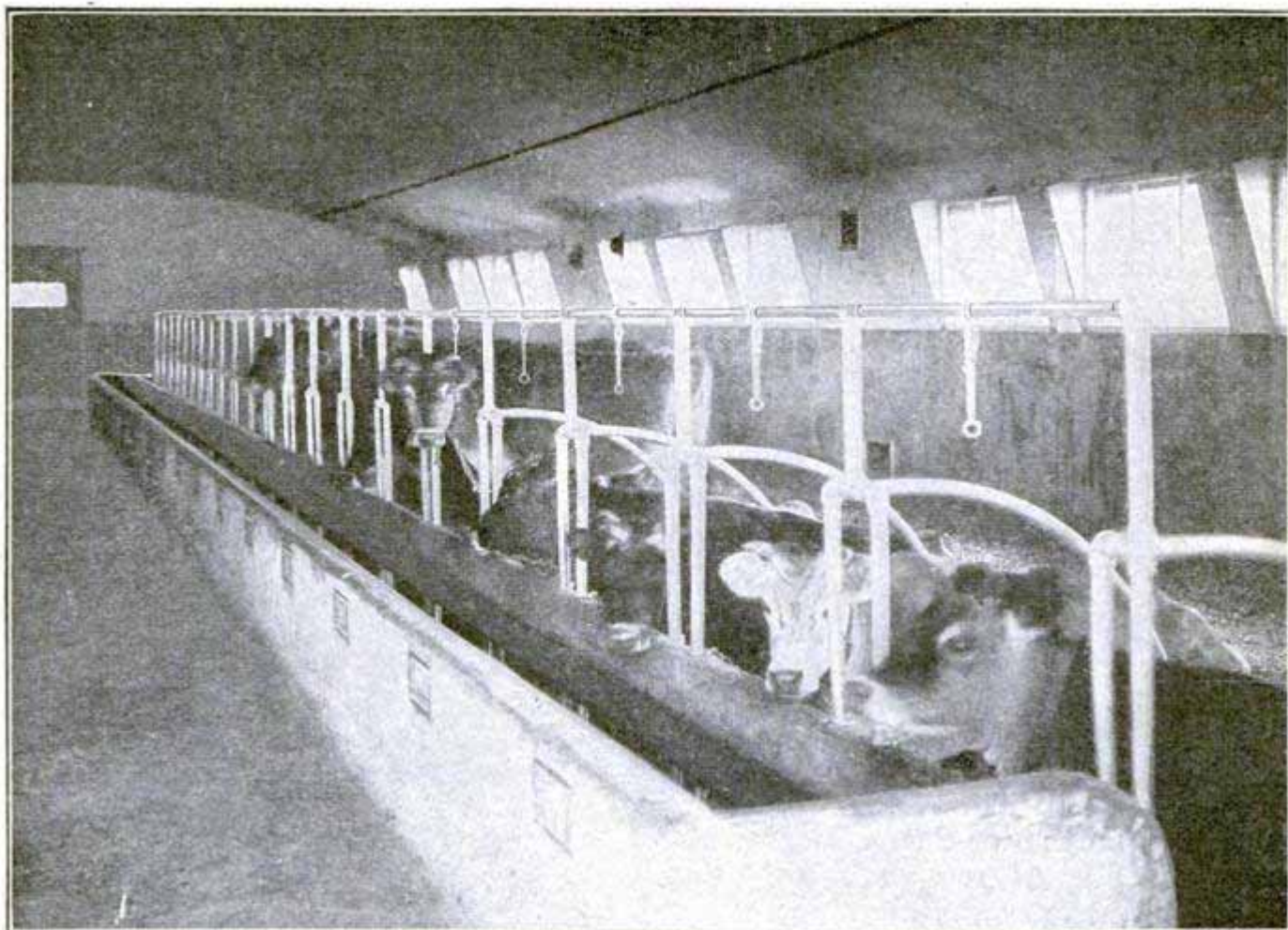
The bridge contains four trolley tracks, two elevated railway tracks, two floors, a roadway 53 ft. wide, and two foot walks, each 15 ft. wide. The

CONCRETE BARNS FOR LIVESTOCK

The concrete barns on the Gedney farms at White Plains, N. Y., are excellent illustrations of what is being accomplished in this line in concrete. The photographs show interior views of one of the cow barns, and of the "palace" pig pens, both buildings, with



Palace Pig Pen, Concrete Throughout



Interior of One of the Cow Barns

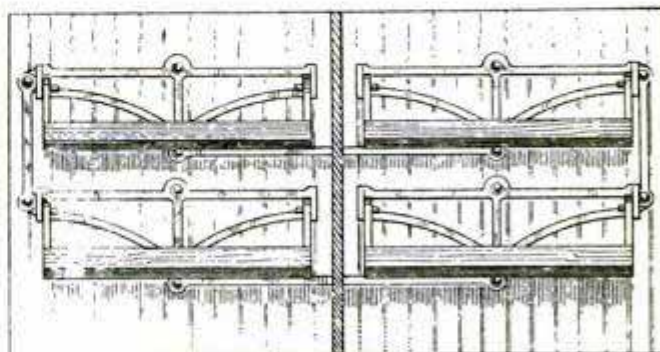
interior fittings, being entirely of concrete, with arched roofs. The cow-barn photograph gives an idea of how the cattle are sectioned off and an excellent view of the long concrete trough from which they both feed and drink.

One of the noticeable features of the concrete pig pens is the arrangement of the food troughs and the steel barriers or curtains just above them and across the entrance to the pens. These swing on a bar, so that the troughs can be barricaded against the pigs when desired.

Probably one of the most curious wireless messages ever sent or received was recently flashed from the trans-Atlantic liner "Amerika" to a gas company in New York. It read "Turn gas on, 1690 Broadway, L. M. Bowker apartment," and when Mrs. Bowker arrived at the apartment the gas stove and other fixtures were ready for business.

ANTI-SEASICK BERTHS

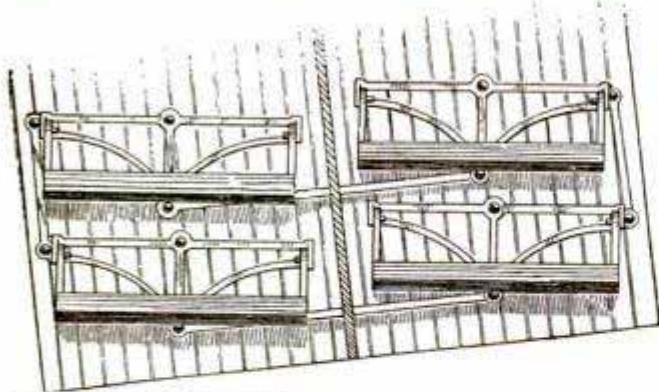
The working model of a berth that remains absolutely horizontal while a ship rolls and pitches in a sea is shown in these illustrations. The mechanism is simple, consisting of a bar which is pivoted in the center to the side of the cabin, and from the ends of which two arms about 1 ft. long project. To these arms the berths are suspended. From the center of the bar an arm de-



While Ship Is on Level

scends and is jointed at the lower end to a rod which connects up all the

berths in the series. In this way the upper and lower series are made to move in unison. Each berth has a



Courtesy Steamship, London
Berths Level While Ship Is Rolling

stop which fixes its ends to the bracket arms, so that it can be made stationary while the passenger is entering or leaving it. The invention also allows of one or two berths being swung separately, instead of as part of a series.

One of the illustrations shows a series of berths as they appear when the vessel is at rest, and the other shows their action as the ship rolls.

MARKET DAY IN IRELAND

Market day in an Irish village is as important and enjoyable weekly event as is Saturday night in an American

country village. The illustration shows a market day scene in Galway with the church as a background.—Photo by Miss Beatrice Oliver.

SUN FANS A NEW FAD

A fad that is expected to prove a serious rival for the parasol as a protector from the sun, is the sun fan shown in this illustration.

When not in use, it folds up, and a ring made of cord and attached to a ribbon, slips over it to keep it from coming open. The canopy or fan part is adjustable to any angle, so that the person holding it can shade the face or head no matter from what point the sun's rays are beating. Although rounded and very slightly curved like a parasol, it can be used as a fan with perfect comfort. It is ideal for use on the sunny porch of a club, hotel, or home, or when riding in automobiles or other vehicles.



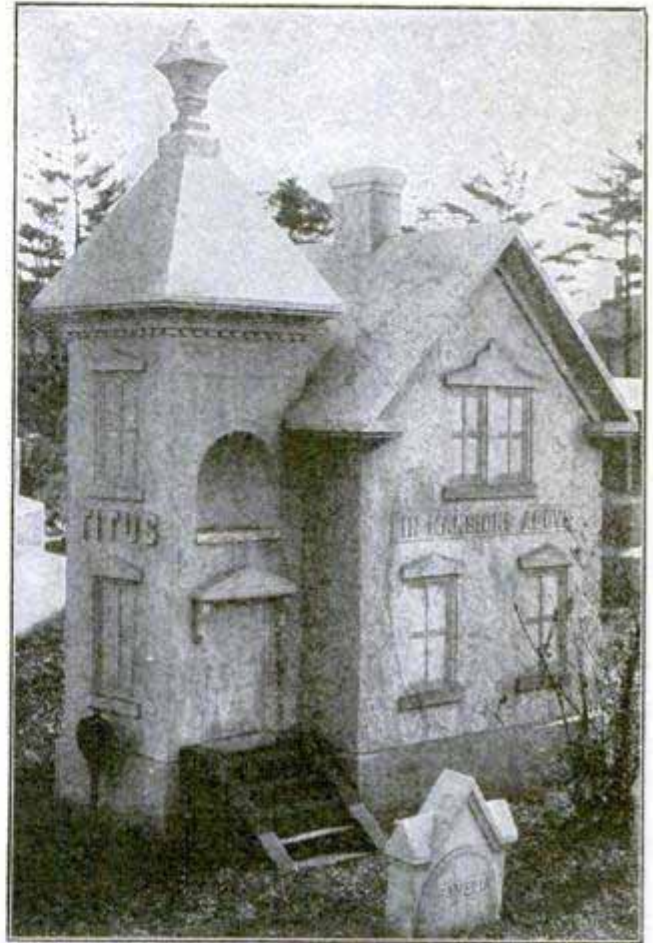
Irish Market Day Scene

AMERICAN FREAK MONUMENTS

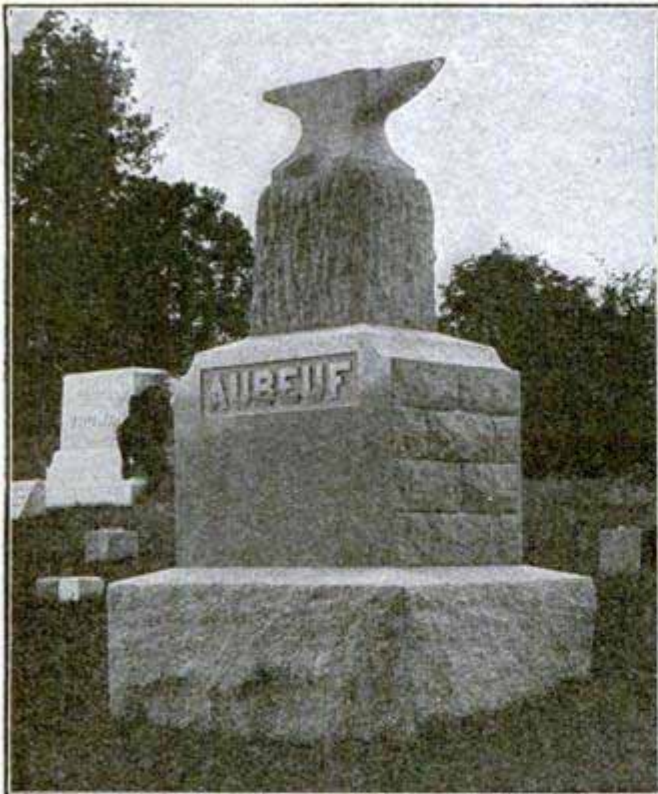
By O. H. Sample

Every community has its eccentric citizens whose sayings and doings furnish the comic page to local life. If they are wealthy or otherwise prominent, their little departures from conventionality are credited to originality of thought or individuality of character; if their station is humble, they are often the butt of the wits, or the pegs on which to hang freak stories. Whether famed or obscure, they seldom fail to leave some record of their eccentricities on their monuments in the village cemetery or some more public place, and frequently they take no chances with post-mortem fame, but order their fancies carved in stone before they pass away. With the growth of good taste, these freak monuments are becoming rare, and one must look for them in the smaller cemeteries where the absence of strict regulations allows full sway to individual freedom in desecrating the landscape.

Instances are still not wanting, however, where sculptors have been or-



Real Estate Agent's Monument, Springfield, Mass.



A Blacksmith's Monument, Oneida, N. Y.

dered to execute costly works to satisfy runaway fancies or emotions gone

awry. Said a prominent sculptor recently: "I turn out lots of freak statuary. Not that I like to; I have to. Some of our millionaires have uncouth tastes. I did last month a bust of a young girl in colors. The marble hair I gilded; the marble eyes I painted blue; the marble lips and cheeks I flecked with red. A hideous thing, yet the family were immensely pleased. The freakiest of my freak statues stands in a Boston garden, as a tribute to the owner's grandfather, an old Presbyterian divine. The aged man stands in the center of a bed of jonquils, and out of the top of his silk hat a jet of water spouts falling in a marble basin he holds in his hands as a swimming pool for a half dozen goldfish. The idea of treating one's grandfather like that!"

When it comes to the common garden variety of the tombstone of commerce, individual bad taste runs

riots in several forms, the most common of which is seen in attempts to



A Horse Trader's Monument

express the occupation of the deceased in his monument. In a cemetery in Springfield, Mass., a real estate agent named Titus has petrified his memory in a miniature marble house, with the doors, windows, and gables, wrought out to the last detail. Lest any careless visitor miss the point, he has carefully labeled it, "In Mansions Above," and inscribed over a niche above the door, "Gone Home."

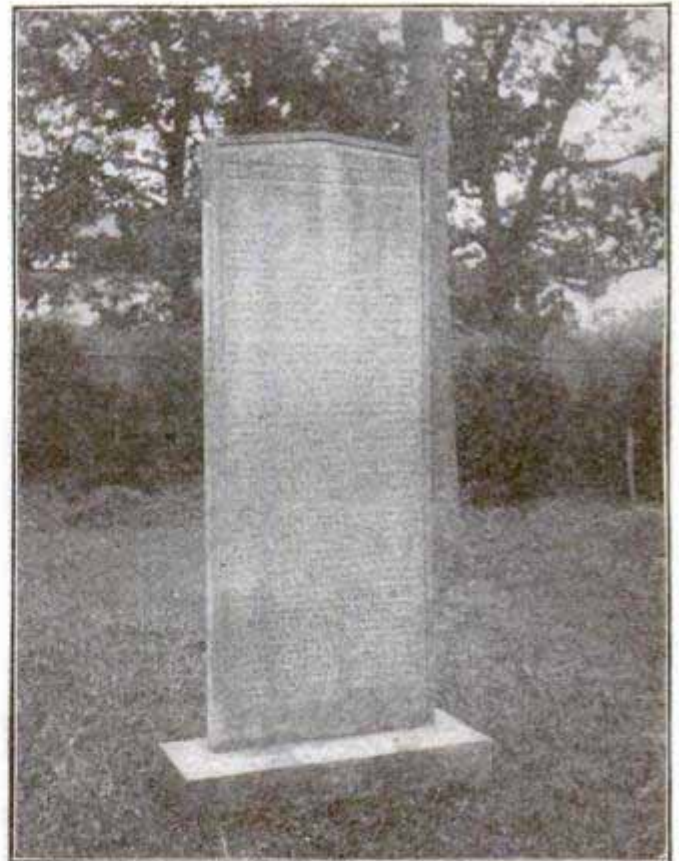
A blacksmith of Oneida, N. Y., has thought to immortalize his name and his occupation by erecting a granite anvil on his family lot in the local cemetery. The anvil block has been carefully corrugated with the chisel in imitation of the stump that forms the support of the iron in the shop, and the whole mounted on a granite pedestal 10 ft. high. Another interesting example of this class of freak is found in a cemetery in Reading, Pa., where a horse buyer named Eyrich has had a horse's head carved above the family name, leaving some doubt in the mind of the observer as to whether it is the man or the horse that is commemorated.

Long inscriptions have gone out of fashion and the ancient headstone to Captain James Fanning in the cemetery at Riverhead, Long Island, N. Y., with an historic record of 1,860 letters carved in its marble face will doubtless never be surpassed for lack of brevity. It traces the genealogy of the Fanning family from the time of Charles I in 1649 down to present generations. In full it reads:

"Captain James Fanning, died 1776 in the 93d year of his age.

He was the great grandson of Dominicus Fanning, who was a Mayor of a city in Ireland (under Charles I), was taken prisoner at the battle of Drogheda, 1649, all the garrison except himself being put to the sword; he was beheaded by Cromwell, his head stuck on a pole, at the principal gate of the city, his property confiscated because, when Charles I made proclamation of peace, as a member of the Irish Council, he advised not to accept unless the British Government would secure to the Irish their religion, their property and their lives.

His son Edmund was born in Kilkenny, Ireland, married Catherine, daughter of Hugh Hayes, Earl of Connaught, and emigrated to this country with his family, consisting of his wife, two sons, Thomas and William, and two servants, Lahom and Orna, and settled in Stonington, Conn. William, in a battle with the Indians, was killed by King William, who split his head open with a tomahawk. Thomas had a daughter, Catherine Page, and one son, James. This Captain James Fanning served under Great Britain, which government was at war with France; married Hannah Smith, of Smithtown, had five sons and four daughters, viz.: Phineas, Thomas, Gilbert, Edmund, James,



Fanning Headstone with Inscription of 1,860 Letters

Catherine, Bethia, Sally, and Nancy. Phineas had a son, Phineas, who graduated at Yale College, 1768, and two of whose sons are now living, viz.: William Fanning in New York City, and P. W. Fanning in

Wilmington, N. C. His wife Hannah, son Thomas, and daughter Catherine are buried beside their father. Gilbert settled in Stonington, Conn., Edmund became Lieutenant Governor of Nova Scotia, where he held large estates. James settled on Long Island, and had two sons, John and James. The latter was a merchant many years, residing three miles east of Riverhead, had five sons, four of whom are now living; the elder, James, died at Moriches in his 72d year, 1848. Nathaniel resides in the town of Southampton; two, Manasseh and Israel, reside in Riverhead town, and the fifth son, Joshua, physician at Greenport, Southold Town. Sally Fanning married Captain Josiah Lupton. Catherine married a Mumford. Bethia married a Terry, and Nancy married Major John Wickham." L. S. Hill, sculptor.

There is a cemetery for dogs and cats at Hartsdale, N. Y., which contains some pretentious stones erected to the pets of the rich. One of these, known as the Primrose stone, marks the resting place of a pet terrier belonging to the famous minstrel, and a bas-relief of the animal, standing beside his toy ball is carved on the front.

Another class of cemetery freak includes monuments whose inscriptions record an odd bit of history or reveal personalities not usually given to the public in permanent form. Under this head comes a simple little shaft at Muskegon, Mich., to the memory of Captain Jonathan Walker, "the man with the branded hand." Captain Walker was a sailor who in his travels helped many slaves to escape. In 1835 he assisted in colonizing slaves who had escaped from their masters in Mexico. He was imprisoned for a year, then given a trial, found guilty and branded on one hand with the letters



In the Dog Cemetery, Hartsdale, N. Y.

"S. S.," with a hot iron to signify that he was guilty of slave stealing. A number of years later the people of

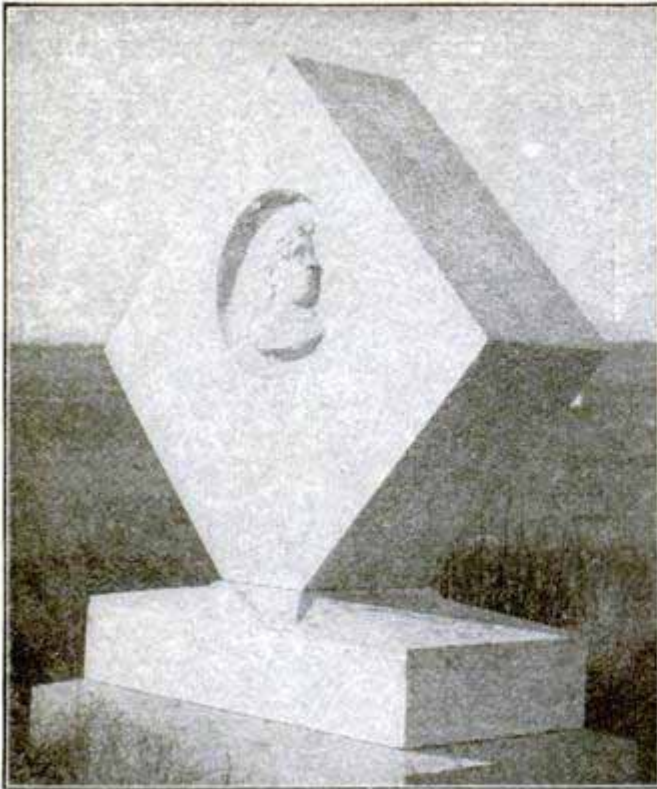
Muskegon erected this monument to him, and carved a hand on it, with the



Monument to Slaves' Friend at Muskegon, Mich.

letters S. S. inscribed in a conspicuous place.

Another of this class is one erected by Mrs. Rose Sayer, of Britton, S. D., in memory of herself, her cousin, her brother, and the family horse. The front of the stone bears a portrait relief of Mrs. Sayer, and the back, portraits of the two relatives. The inscription tells its own story. It reads as follows: "Carl Romey, a cousin, aged fourteen years; came from Germany August 1, 1885; fell from a horse



Monument to Rose Sayer, Her Cousin, Brother and Family Horse, Britton, S. D.

and broke his neck, August 2, 1886. Henry Otto, a brother; born January 1, 1864; perished in the blizzard of January 12; 1888. Old Kit, the family horse, and my first investment in 1876; died March, 1896." On the front of the stone is this: "Mrs. Rose Sayer, formerly known as Rose Otto, or Rose of the Prairie; mother of Harold and Lillian Sayer; bust was taken while on a



The Mechanics' Fountain, San Francisco

visit to Germany in 1885, by a cousin, Carl Roeschka, aged 14 years."

While the elaborate Mechanics' Fountain in San Francisco is not to be classed with such freak statuary as described above, it is probably the most bizarre and daring expression of unbridled fancy among the great works of sculpture in America, and is so unusual as to bring it within the scope of this study. It was modeled by Douglas Tilden, the deaf mute sculptor of San Francisco, and the leader in his art on the Pacific Coast. It represents five huge muscled gnomes of the foundry operating a great press, and is one of the chief sights of the city.

A memorial erected to the explorer Nicolet at Menasha, Wis., to mark the site of the ancient fort of the Winnebago Indians, appropriately takes the



Winnebago Stone or Spirit Rock Monument to Nicolet, Menasha, Wis.

form of a huge boulder of basalt rock, known as Winnebago Manitou stone, or spirit rock, and is mounted on a plain pyramid of sandstone 12 ft. high. It is inscribed: "Near this spot landed, 1634, Jean Nicolet, first white man in Wisconsin, met the Winnebago tribe, held earliest white council with 5,000 savages. Erected by the City and Women's Clubs of Menasha, 1906."

Accidents and the workings of nature are responsible for some curious monumental oddities such as the giant tree growing directly out of an ancient vault tomb in the old Trinity Churchyard in Rector street, Newark, N. J. The tree is one of the largest in the cemetery, and is thriving on its grow-

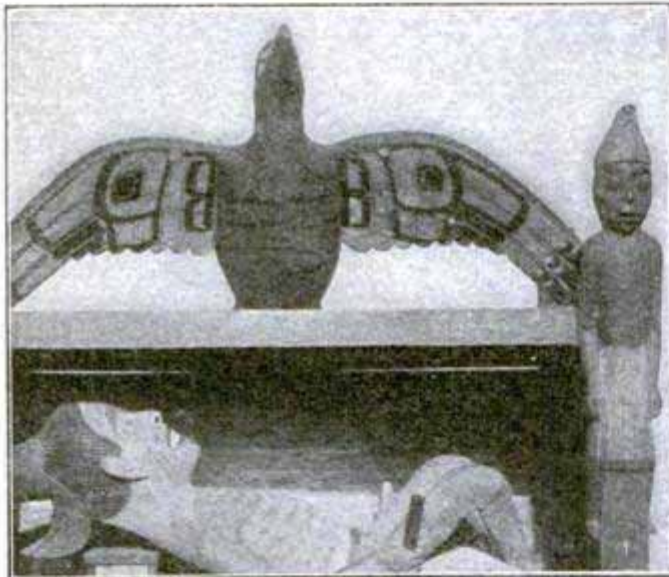
some site. The roots have spread in every direction through the mound over the tomb, and give more security than the stone arched entrance which is in a dilapidated condition.

The statue of an athlete balanced on one broken leg, that stood for a number of years in St. Clair park, Indianapolis, has been mistaken by strangers for a representation of an ancient Roman on a Bacchanalian spree, but was originally nothing more startling than a plaster statue of a runner, erected in honor of the American Gymnastic Union Meeting, and after the meeting purchased by the park board as permanent decoration. He was never intended for long life, however, and one night his leg broke, leaving him poised on the iron skeleton



An Athlete with Broken Legs—Indianapolis

going is the wooden tombstone of an Alaskan Shaman, or magic doctor. Above is seen the giant wooden sculpture of the eagle, his protective totem and mythical ancestor whose influence it was thought aided him to perform supernatural deeds. The carved figure of the Shaman is represented in a lying



Wooden Tombstone of an Alaskan Shaman, or Magic Doctor

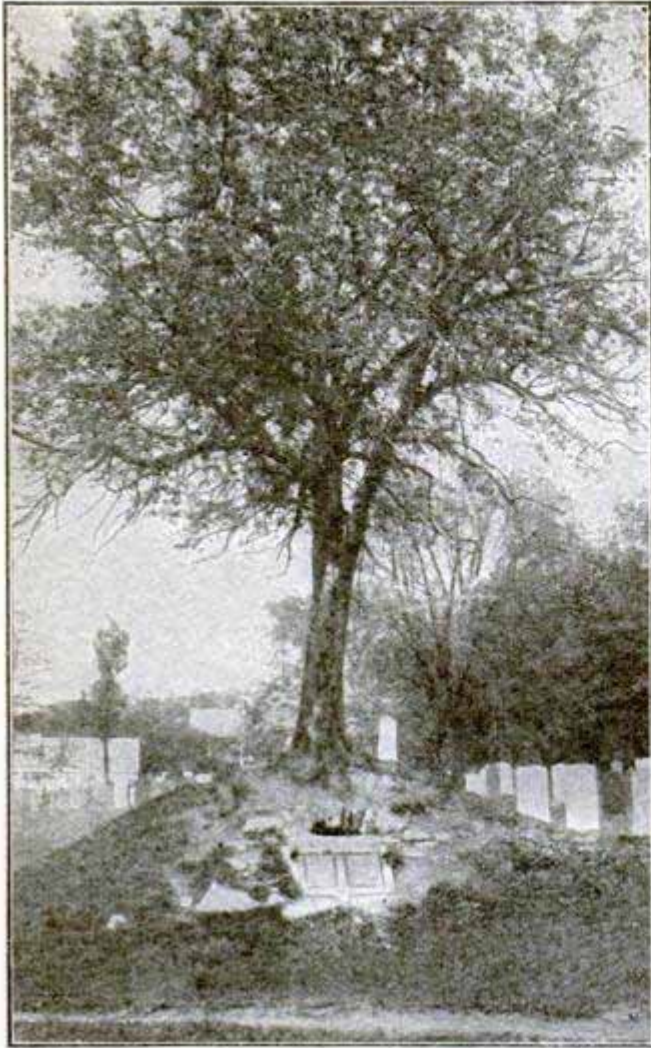
which formed the framework of the ephemeral limb.

There are a number of curios in historic monuments that are notable for what they commemorate, and eccentric in the method of commemoration. The only monument to Thomas Jefferson erected in the Louisiana Purchase is the simple pile of stones designed by Jefferson himself that stood originally over his grave at Monticello. The inscription was found among his papers after his death. This monument now stands on the campus of The University of Missouri at Columbia.

In interesting contrast to the fore-



Monument to Thomas Jefferson at Columbia, Mo.



Tree Growing from a Tomb, Newark, N. J.

position with one of his slaves above on the right, standing guard.

LONDON HEARS OF AMERICAN DISCOVERY FOR ELECTRO-CUTTING AIRSHIPS

A report comes from London that the reason why the American government remains apparently so little concerned about the advances in aerial navigation made by foreign experimenters is that an officer in the American army stationed at Fort Omaha has worked out an electric invention which would stop any aerial engine and bring an airship to the ground.

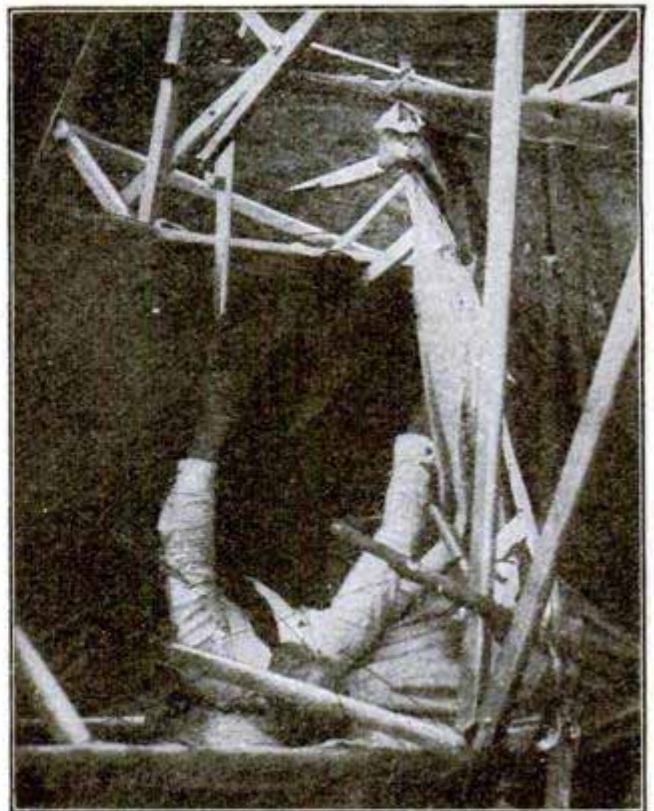
Americans, however, cannot see that the U. S. government is not taking interest in aerial navigation, and are quite certain that the apparent unconcern is due to the fact that American "experimenters" have proved themselves equal, if not superior, to foreign "experimenters." Also because the United States government now has

a Baldwin dirigible airship which has no superior except, perhaps, the Zepelin, and has recently acquired a Wright aeroplane.

The report, however, and there may be something to it, so far as the invention is concerned, states that the machine, the details of which are carefully guarded, will project through the air a column of electric energy of almost any desired strength at any given object for a distance of many hundreds of yards, the shock of which would render helpless any persons in the aerial craft and stop its engines.

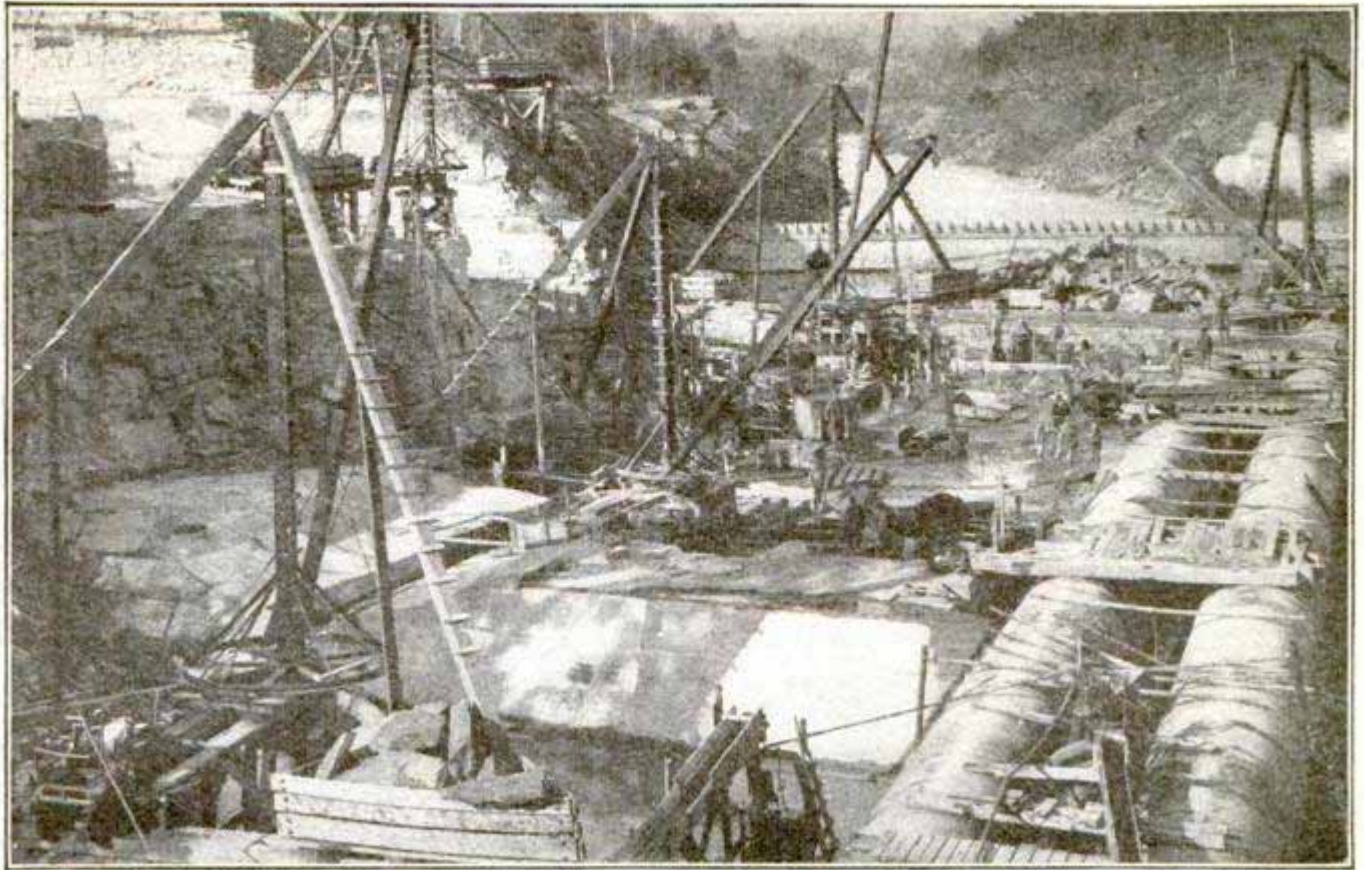
WRECK OF THE SCHNEIDER AEROPLANE

This photograph was taken at the moment the Schneider aeroplane was wrecked on July 12 at Morris Park, New York, and graphically shows the somewhat unusual position of the operator as he struck the ground. From the standpoint of the photographer it is an extraordinary picture, being the first ever taken at the very moment an aeroplane and its operator struck the ground in a fall. The operator was not seriously injured.



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Snapped at the Moment of Impact



Working on a Great Dam—Esopus Creek in Background

HIGH PRESSURE PUMPS IN TALL BUILDINGS

A special committee of the Chicago board of underwriters is seeking to obtain a provision in the new building ordinance of that city to compel the installation of high pressure pumps in all buildings over 100 ft. in height. The tentative provision requires a standpipe and hose equipment for all buildings of six stories or over, and with 5,000 or more square feet of ground area, attached to electrically driven pumps, with a capacity of not less than 500 gal. per minute. The pump must be directly connected to a motor, properly installed and protected so that it can be started by touching a button.

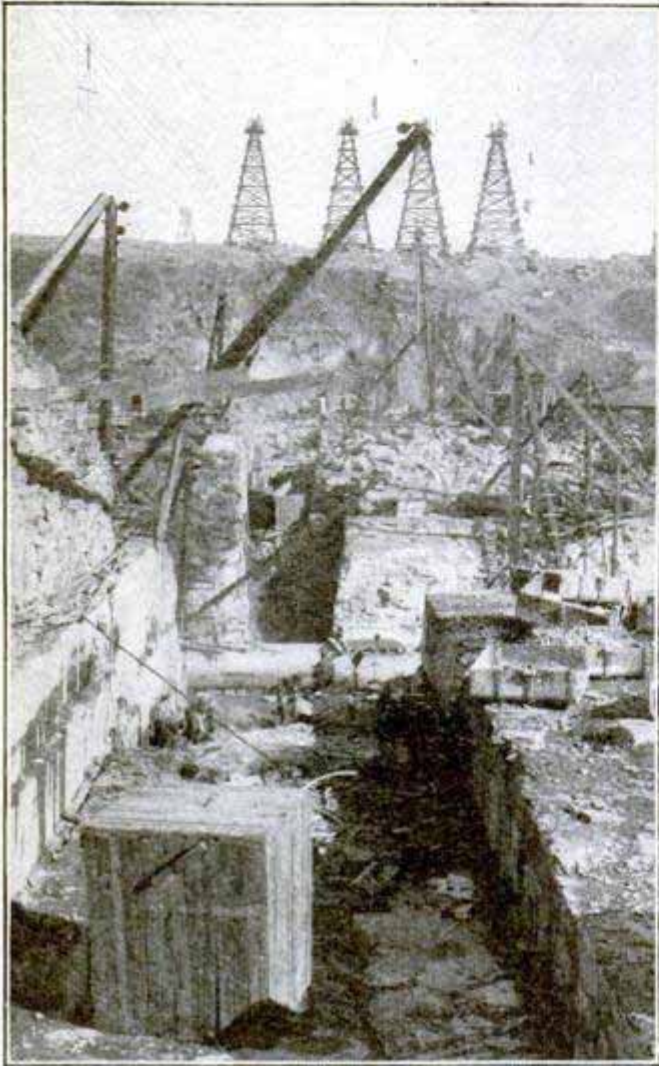
The underwriters believe that this would practically provide a high pressure system all through the downtown district and would protect several hundred buildings in which the fire department is now unable to cope with fire in the upper stories until it has carried up hose. More than 100 such buildings are already equipped with inside standpipes and private pumps.

SCENES AT THE ASHOKAN RESERVOIR

About eight miles from the city of Kingston, N. Y., in the Catskill mountains, one of the largest dams in the world is being constructed as part of the great system that will furnish New York City with fresh water. The reservoir, which is at Brown's Station has a capacity of 121,000,000,000 gal. of water, and will supply 250,000,000 gal. a day. It covers a stretch 12 miles long by 2 miles wide, and an aqueduct 17 ft. in diameter will carry the water from it for a distance of about 120 miles to the New York stations.

The illustrations show the work at the dam. The pyramid towers in one of the photographs were erected to aid in the task of excavating until a solid rock foundation was reached. Towers of the same kind are located on the other side of the valley, and from the tops of these are stretched cables upon which "skips" are operated. These are lowered into the valley from the cables and loaded with the rock blasted away in excavating to solid strata. The skids are operated by winding and un-

winding over a drum the steel cable to which they are attached.



A Cut Through the Rock

The other photograph shows the site of the dam. The two pipes to the right are located where the Esopus creek, shown in the background, flows through. When the dam is finished, the creek will be wiped out altogether.

INTERNATIONAL CANDLE-POWER

The international candle is a unit of light that has been submitted to the International Electrotechnical Commission for approval and adoption in all countries. It is already common to the national standardizing laboratories of America, France, and Great Britain, having been adopted in the United States in 1908. The lamps now rated at 16 cp. will be 16.26 cp. of the new unit, and it is expected that manufacturers of electric lamps will soon adopt it.

THE CAPE COD CANAL

The Cape Cod canal, which is being cut from Sandwich, in Barnstable bay, to Buzzard's bay, Mass., will not only shorten the distance by boat between New York and Boston by nearly 100 miles, but it will also avoid the dangerous shoals and storms which are claimed to have been responsible for nearly 2,000 shipwrecks since 1800.

The canal, upon which work was started in June, will be 8 miles long, 30 ft. deep, and will have a minimum bottom width of 100 ft. In addition to the cutting of the canal, four miles of channel must be dredged at each end to connect with deep water, and breakwaters must be provided.

BASINS AS WATER-SHOES

Just ordinary plunging and swimming in the water soon grows tiresome to even the most enthusiastic lovers of water sports, as can be proved by going down to the water anywhere and watching the swimmers devise new ways and means of enlivening the sport. In England, where the circular tin bathtub is still much in evidence, such a scene as this is not exceptional. The swimmer is trying to walk on the water in two such tubs, and his companions are expectantly waiting for the



Great Sport in the Water

moment when one will slide out from under and tumble him in.



Windmills for Water Drainage, Amsterdam, Holland—16 Mills Working Always Together

CLEVER HOG-DISINFECTING DEVICE

That it is the most natural thing in the world for a hog to rub its sides against a post is the fact that caused this clever if somewhat laughable "daily hog disinfectant" to be developed. It is an absolutely automatic device which enables every hog to disinfect himself, and the results, although he is only thinking of the rubbing, are so pleasing that he becomes a willing auxiliary to the operation.

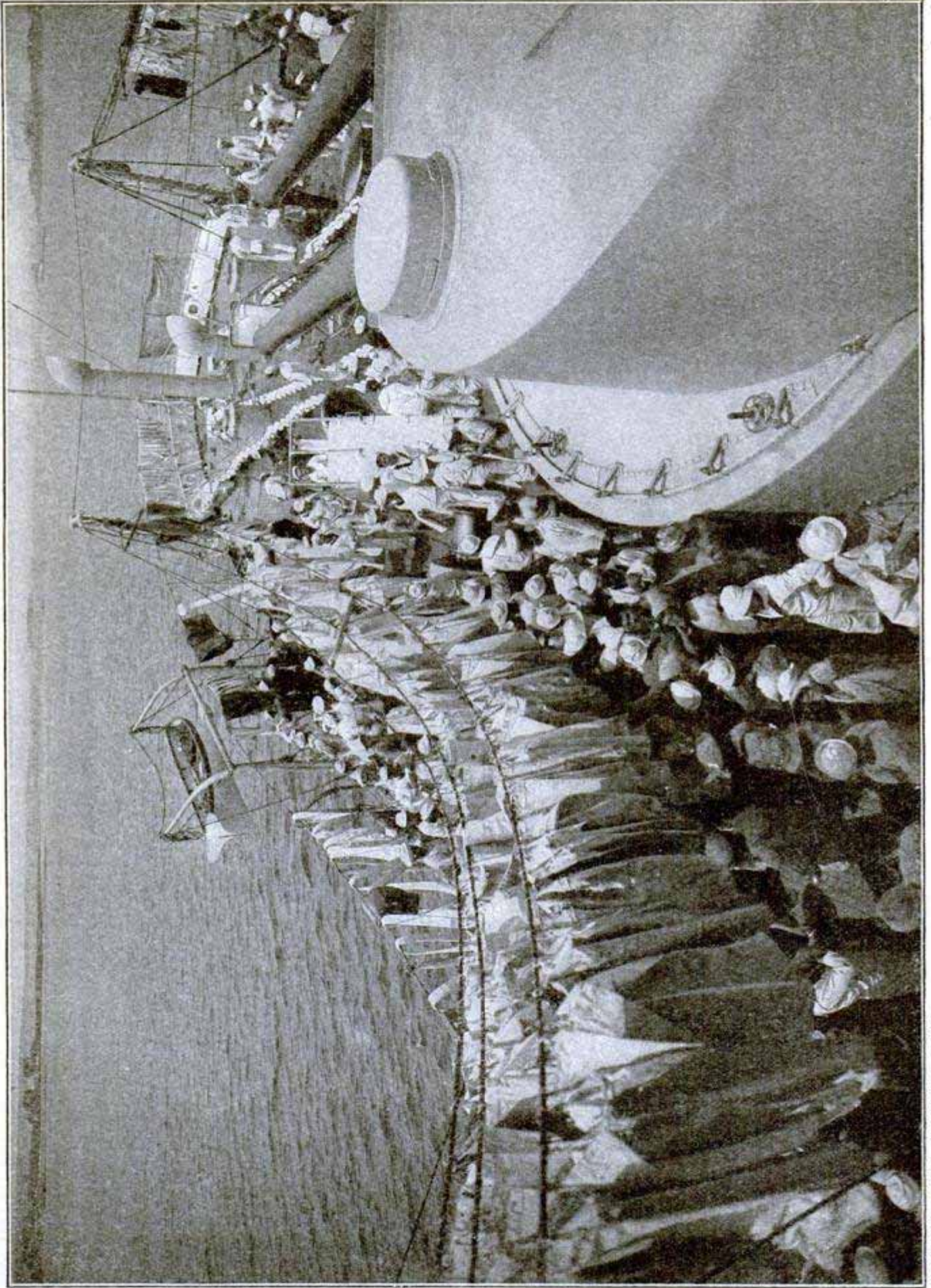
All that is necessary in the operation is to keep the tank filled with the disinfectant and to place it where the



hogs have access to it. The lever is covered with burlap, and when the hog rubs against it the action opens a valve, releasing the contents of the pipe leading from the disinfectant tank and spraying it over his back. This also closes a valve at the base of the tank so that the hog will only get his share of the disinfectant. When the pressure against the lever is removed it springs back to its original position, closing the valve at the spray head and opening the valve at the base of the tank. This automatically reloads the spray pipe.

INDUSTRIAL GERMANY

As soon as a man in Germany employs in his business one person outside the members of his own family, his business becomes an industrial concern and is subject to government regulation. The census of 1907 shows that there were then employed in the 4,025,591 industrial concerns in Germany a total of 14,348,389 persons, of whom 3,510,466 were women. Of these concerns 3,423,645 were independent or main concerns and 601,946 were branch shops or factories.



Copyright, 1908, by Enrique Muller

OUR NAVY—No. 3, Washday on a Man-o'-War

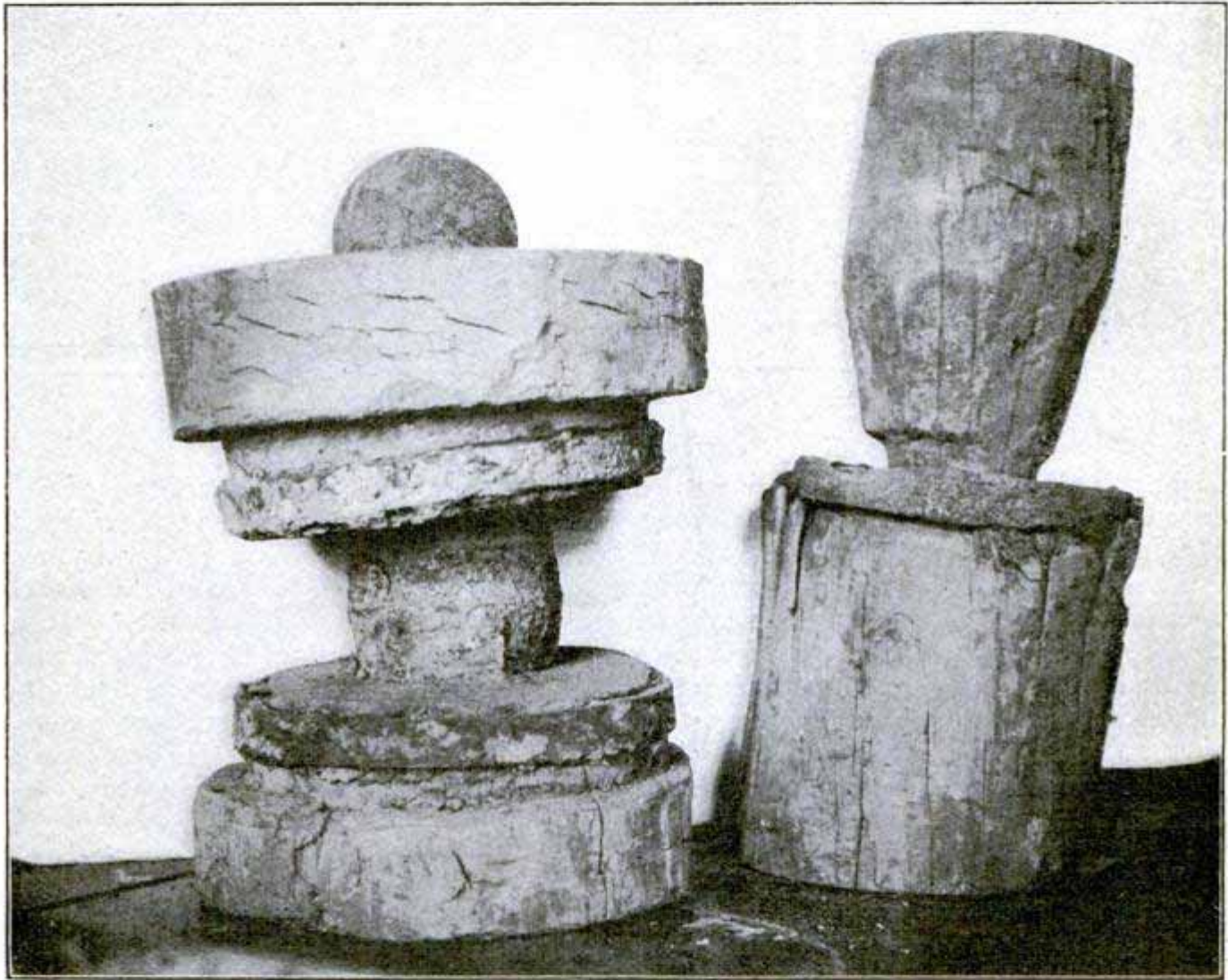
WOODEN PIPE LINE RELICS

Furnished the Public Water Service of New York and Baltimore 100 Years Ago

By Stuart Stevens Scott

Engineers all over the world will, no doubt, be interested in two relics of the work of water engineers in the early part of 1800 which are now in the possession of Mr. Calvin W. Hendrick,

The New York pipe was made of logs 16 ft. long with a 4-in. bore. The end of one log was bound with a hoop of iron and the corresponding end of the other log was whittled down until



Sections of Wooden Pipe Line Laid in 1800 and 1803

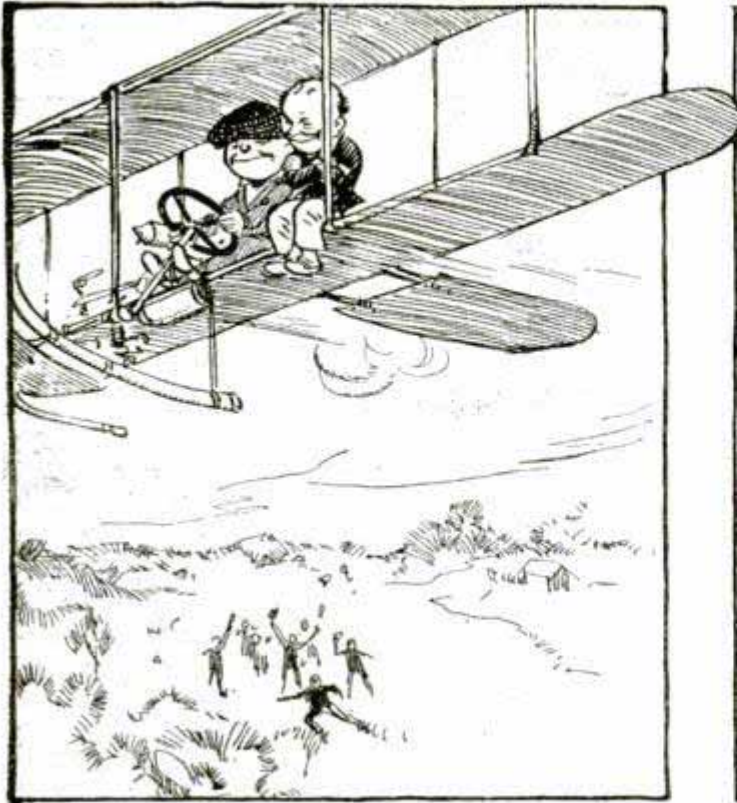
chief engineer of the sewerage commission of Baltimore, and which are shown in the accompanying illustration.

To the left is seen a section of a wooden water pipe line that was laid in Baltimore in 1803 and to the right is shown a section of pipe for the same purpose, laid in New York City in 1800. The sections show the methods of joining the sections of pipe and a comparison between the methods employed in 1800 and three years later is interesting.

it made a plug, a very simple process.

The Baltimore engineers, however, being under the impression that they could improve upon the method of joining their 16-ft. lengths, made a shoulder on each end of their pipe, bound the shoulders with iron bands, and connected them with a short piece of iron pipe.

Upon the top of the Baltimore pipe in the illustration is a cannon ball that was dug up by the sewerage commission on Pratt street and it is believed



The Wright Brothers



The Wrong Brothers

to be a ball that was thrown into the city when the British bombarded Fort McHenry in 1814.

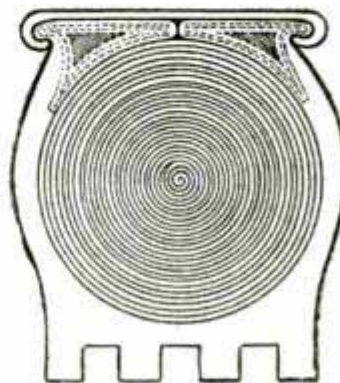
The section of the New York pipe was one of the first water pipes laid in this country and as crude as was the method of joining the sections, the method of making sub-connections was even more so, for all that was done was to bore a hole into the pipe and into it stick a small pipe of wood, the end of which was whittled to a point to form a plug.

This pipe line was laid by the Manhattan Water Company of which Aaron Burr was the president. The company also had banking privileges and in later years the banking rights became so valuable that the water end was abandoned. Upon the charter obtained by this company the present Manhattan National Bank is founded. Owing to the charter prescribing that the company shall furnish water, the bank now has on its premises a small tank in which water is stored and this water is for sale to any who wish to purchase it. The selling of water is regarded somewhat of a joke but were the bank to cease to keep the supply, its charter might be attacked.

Mr. Hendrick was in charge of the sewerage rearrangement in New York and Brooklyn made necessary by the building of the subway, and the wooden pipe was excavated near the Battery. He was delighted when his workmen brought him the wooden pipe from the depths of a street in Baltimore and he declares that these are the best specimens of their kind in this country.

AUTO TIRE MADE LIKE GOLF BALL

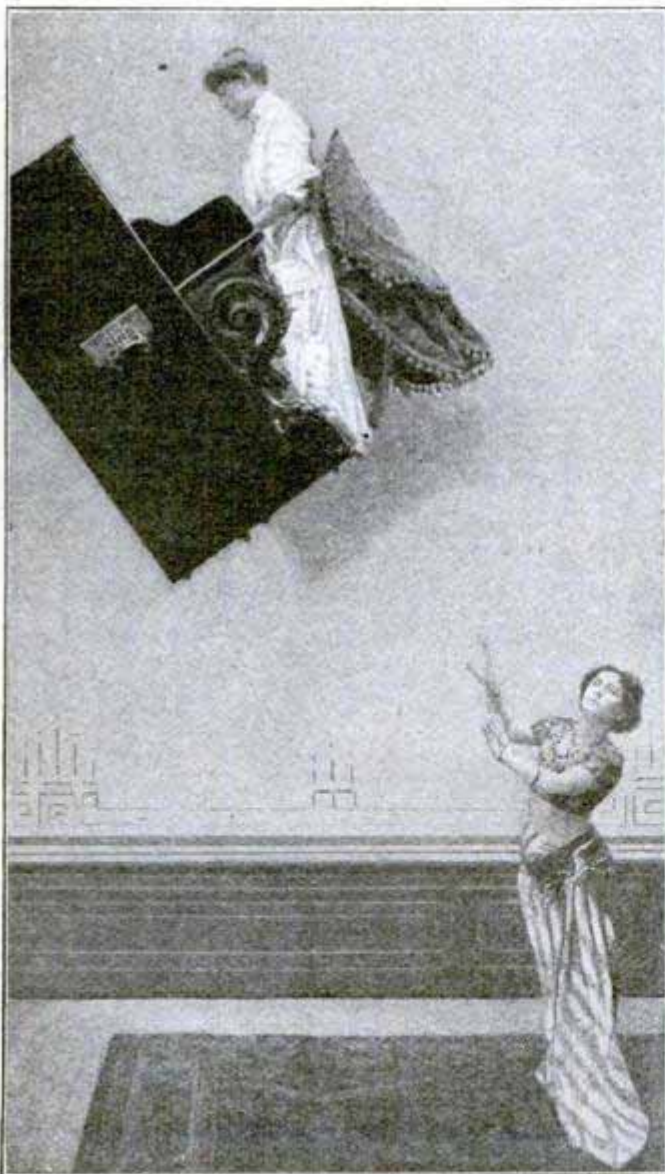
A rubber tire for automobiles that is not solid as usually understood in the auto world, although the material extends right through, has been placed on the market in England. The interior is a core, made along the lines of a golf ball. To make the core a sheet of pure Para rubber is slightly stretched, sideways and lengthwise, and rolled up as close as possible until



of sufficient size to fill the cover. It is then vulcanized in an ingenious manner, and the ends simultaneously joined, the result being a complete ring of rubber retaining the highly desirable characteristic of resiliency. The cover is made from the usual ingredients employed in tire manufacture, but has no canvas or fabric in the tread or side walls, only sufficient being provided in the two beaded edges to give lateral strength. The pure rubber core is then secured inside the cover by a method akin to vulcanizing, so that core and cover are practically one.

FLIGHTS ON THE STAGE

Two interesting acts in which the performers rise from the stage are shown in these illustrations. The man is one of a troupe of Russian dancers



Playing a Flying Piano



Dancing in the Air

appearing in Paris. He commences dancing on the stage floor, but every few moments takes flight and gracefully dances on the air. The other illustration, showing a pianist and her instrument flying through the air, was taken in Berlin, where the act is drawing considerable interest.

ANCIENT STEAM-BLOWER FOR FIRES

Water, the most largely used agent for quenching a fire, is made up of two elements, either of which will burn vigorously in an atmosphere composed of the other. It was not until comparatively recent years that the fact was recognized in what is called the civilized world, but, to certain races of mankind, notably the people of Thibet, this has been known for ages and steam has been utilized to assist in the production of flame. Until the interior of that mysterious country was

recently opened up, the civilized world was in utter ignorance of the degree



Courtesy Electric Magazine, London
Steam Fire-Blower of Thibet

of civilization of its inhabitants; now the world is astonished at the evidences of ancient civilization discovered.

This illustration of an ingenious method of blowing a fire shows that the Thibetans have long had a knowledge of steam as an aid to flame. The vessel, which is a unique representation of a bird, is first heated by placing it near to the fire, thus expanding the air within it and expelling a large proportion. The spout is then dipped under the surface of water, and as the vessel cools a vacuum is formed and water is drawn into the interior. When required, the vessel is placed on a newly-kindled or nearly extinguished fire. Steam is soon generated, and coming out of the spout in the form of a jet it quickly blows up a brisk flame.

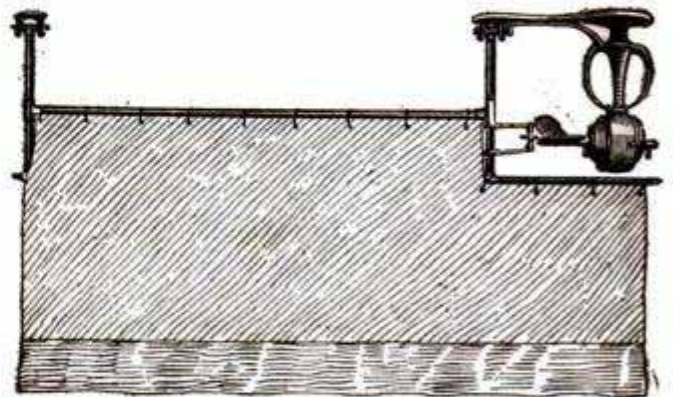
The Japanese are building several types of airships, but the progress made in aerial science is being kept secret from the rest of the world.

WHY HERTZIAN WAVES TRANSMIT BETTER OVER WATER

That Hertzian waves can be transmitted more readily over water than over land is well known, but the reason is not altogether clear in many minds. A current of high frequency can be transmitted over a galvanized-iron wire as readily as over a copper wire, but if the zinc is burned off the wire the current has to traverse an iron path, which means considerable resistance. This shows that high-frequency currents, which normally travel over the skin surface of a wire, will penetrate further into the metal of low conductivity, and this applies as well to land and water. The Hertzian waves do not penetrate water to a depth of more than a few feet, but when traveling over dry soil there is a much greater penetration, resulting in a greater loss of energy.

MECHANICAL PUNKAH-WALLA

One of the features of the five vessels ordered last year by the Orient Line of steamships, one of which, the "Orsova" has just been delivered by a Clyde shipbuilding company, is the electric punkah-wallas, one of which is shown in the illustration. In India the weather is so hot and oppressive that the members of the white race living there must be almost continuously fanned when at rest, to live in any degree of comfort. The fans are huge



Courtesy London Marine Engineer
Mechanical Punkah Driven by Electricity

contrivances called punkahs, and the servants who swing them to and fro

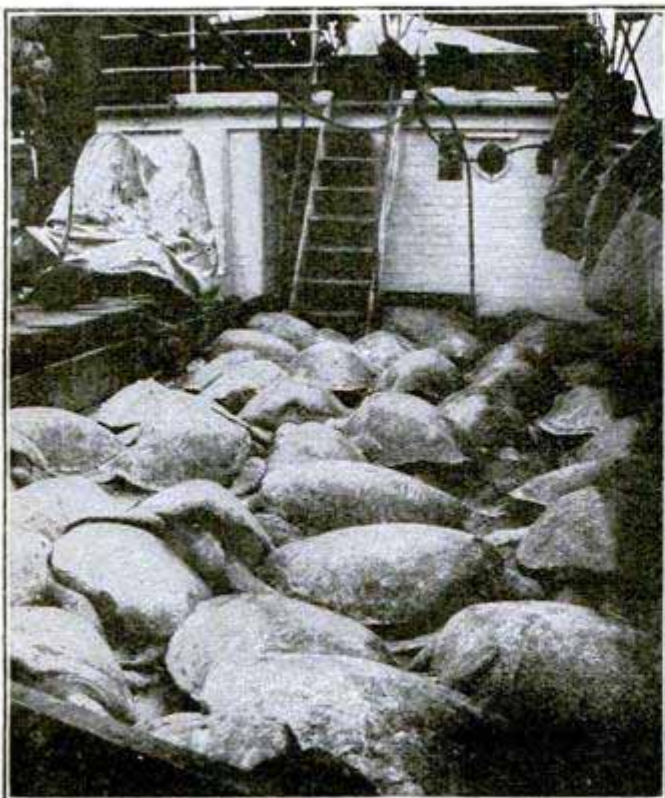
over the white sahibs or mem-sahibs are called punkah-wallas.

The mechanical punkahs on these steamers are driven or flapped by an electric motor of the type used to drive the ordinary electric fan. It took some time to perfect the invention, many difficulties presenting themselves, consisting chiefly of the "flick" which has previously invaded inventors and which the punkah-wallas have done so fine, but it is claimed that this has been accomplished, and that the machines are absolutely noiseless.

The advantage claimed for this curious fan over the ordinary electric fan is that the movement of air is general, instead of being shot directly out like a projectile from a gun.

DECK LOAD OF HUGE TURTLES

This illustration shows nearly 50 huge turtles, sufficient to make enough soup to float the vessel, on the deck of a Pacific sailing ship. They were being transported, all alive of course, from the South Sea Islands to San Francisco, where by this time probably they have been made into soup.



A Cargo of Soup in the "Crude"

ONE OF THE LARGEST SIGNS EVER CONSTRUCTED

San Francisco's greatest celebration since the earthquake, the Portola Festival



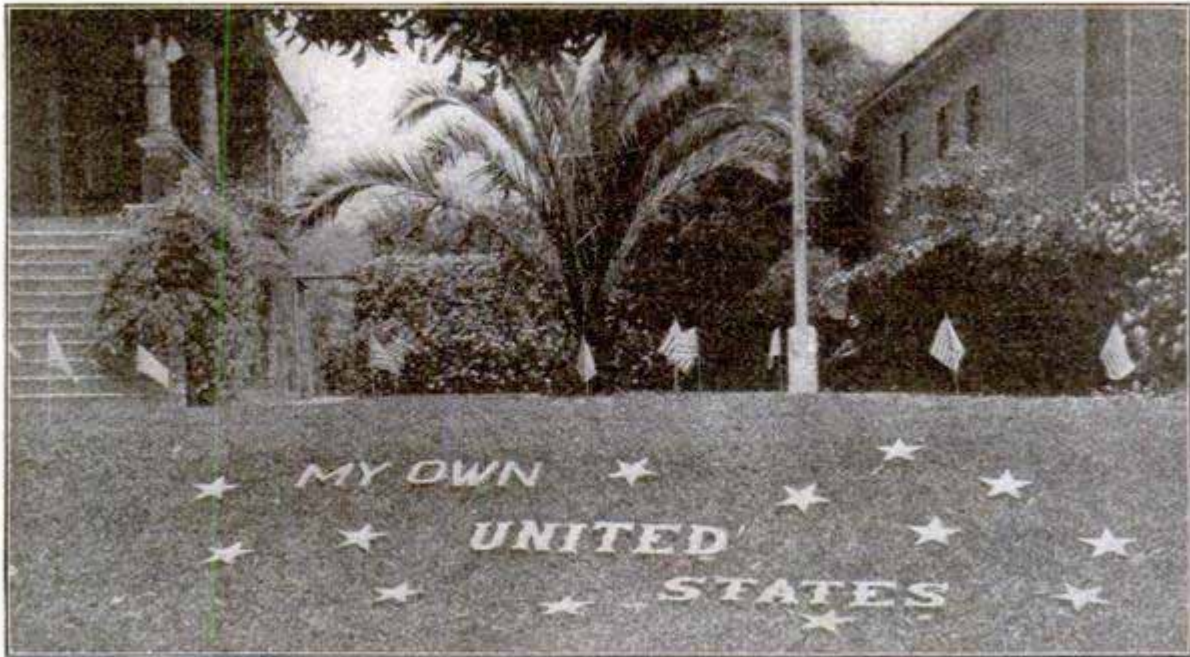
The Portola Festival Sign

tival, to be held from Oct. 19 to Oct. 23, has been made known to all the ships that pass into and out of the bay for the past few months by a giant sign, one of the largest ever constructed.

Work on the sign, which is on the side of Yerba Buena island, was commenced more than five months ago. A heavy growth of brush and small trees had to be cut away, and a trench 8 in. deep made for each letter, these letters being formed by filling the trenches with lime. Each letter is 45 ft. high, and the two lines make a total height of 135 ft., while the length of the entire sign is 1,300 ft.

It is believed that the only way to make a fair comparison of high and low wheels for automobiles is to have some manufacturer have two sets of wheels made for the same car, one set being, say, 36 in. in diameter, and the other a third larger. A thorough test of the amount of fuel consumed over given and varying highways and at different speeds would give satisfactory data.

INGENIOUS FOURTH OF JULY LAWN PIECE



A Genuine Fourth of July Celebration

Many of the cities of the country reported a sane Fourth of July, but no better manner of a genuine, patriotic celebration without gunpowder and the often attending injuries and deaths is recorded than this idea of Howard M. Smith, of Berkeley, Cal. According to his own statement the illustration shows how he spent his "fireworks money." The letters, "My Own United States," and the stars surrounding them were made of wood $\frac{3}{4}$ -in. thick by 8 in. long, covered with flags, the red, white, and blue making a pleasing contrast to the green lawn.

LACK OF WATER IN ALASKA

Contrary to popular ideas, the chief obstacle in the way of a large and increasing gold output from Alaska is the lack of water. Over the whole of Seward Peninsula, which produces a fourth of the gold of Alaska, and in most of the interior as well, the climate is comparatively arid, except in small mountain areas. The total yearly precipitation ranges from 10 to 25 or 30 in., and as much of this comes in the form of snow, which melts and runs off in a few days in spring, the dis-

charge of the streams becomes very small in an ordinarily dry summer.

MAN'S FORM MADE BY WATERFALL

The manner in which this volume of water at a falls near Woonsocket, R. I., runs over the rocks in its path forms a man's face and outlines the upper part of his body. It gives the form and



Curious Portrayal by Waterfall

face it makes the appearance of stooping over to peer into the depths.

DENATURED ALCOHOL (INDUSTRIAL ALCOHOL)

By Dr. Harvey W. Wiley, Chief of Bureau of Chemistry, U. S. Department of Agriculture

ARTICLE II

Stills and Distillation

Vaporization. There is no natural phenomenon of wider extent and more constant occurrence than the conversion of a liquid into a vapor. The air always contains large quantities of vapor of water taken from the surface of the sea and other bodies of water, and also very extensively from the surface of the earth. We do not notice this vapor until it becomes separated from the air in the form of fog or clouds, or is precipitated as rain, hail or snow.

The artificial conversion of a liquid into a vapor is accomplished by the aid of heat and when this is strong enough the vapor escapes in large volume, producing the phenomenon of ebullition. If the vapor arising from a heated liquid is collected, cooled, and restored to a liquid form, the whole process is termed distillation. Boiling must have been known to man from the earliest stages of his intelligence, but the condensa-

tion of the evolved vapor appears to have been of accidental and not intentional discovery.

It is not the purpose of this article to go into the history of distillation, a work that has been admirably done by

many authors, but it will be helpful to refer to some of the more interesting types of the stills which show the progress made from early historical times until we reach the perfected still of today, producing industrial alcohol in the most economical manner.

One of the earliest types of distilling apparatus is reproduced in Fairley's

early history of distillation. The essential parts of the apparatus are illustrated in Fig. 1. Every essential part of the modern still is found in this simple apparatus.

The Arabs appear to have been the first to practice the modern processes of distillation and the names of the apparatus and products bear the impress of that people. The terms *alembic* and *alcohol* still obtain, witnesses of the



Dr. Harvey W. Wiley

Arabian origin of this most interesting industry.

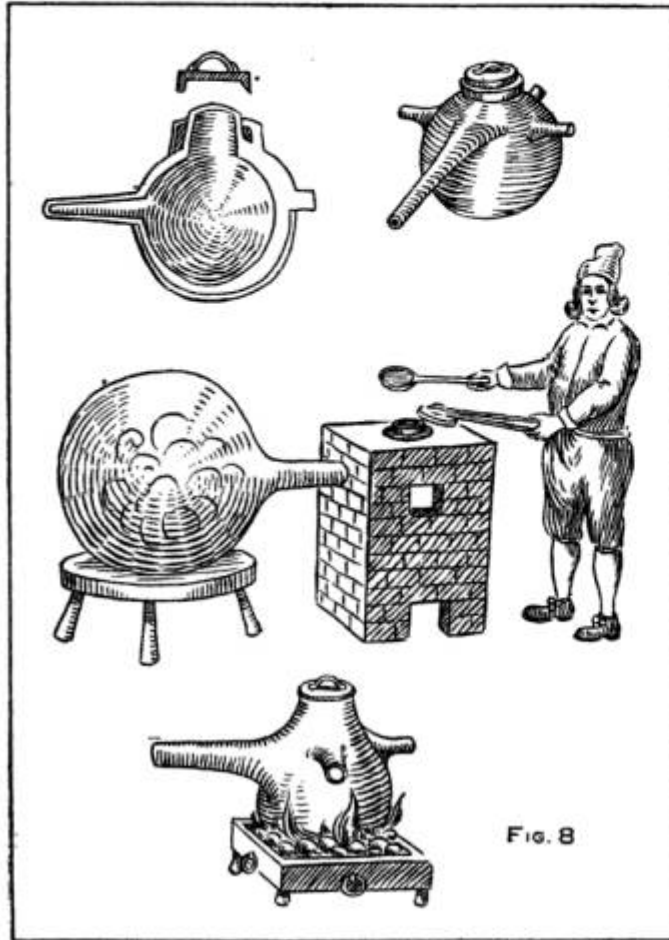


FIG. 8

Early Economic Methods of Applying Heat (Fairley)

The proper and economic methods of applying heat to stills engaged the early attention of the builders of these apparatus and Fairley gives an illustration of the improvements made in this direction at the very beginning of the development of the modern industry. In distilling spirits and oils out of minerals, vegetables, bones, horns and juices, and in a greater quantity in one hour than in the common way in twenty-four, such a furnace as is shown in Fig. 8 must be used.

Such an important art could not be long kept in one country and Morewood in his history of inebriating liquors describes types of distilling apparatus employed even in savage or only partly civilized communities. Figure 9 shows a still used by the tribes of the Caucasus. The pot is made of earthenware or of copper covered with a luted lid carrying a tube connected with a condenser. This is a near approach to the modern worm.

Figure 10 shows a primitive still

used in Tahiti. In many of the South Sea Islands the knowledge of distillation and of distilled liquors has been introduced by Europeans. When Captain Cook first visited these Islands, he found them in possession of the art with an apparatus of the most primitive form as shown in the illustrations.

During the age of alchemy, distillation was the most commonly practiced method of attempting to transmute metals and conducting other mystic researches. During this time stills were made in the most fantastic forms, often in representation of animals whose names they bore. Such forms of stills are illustrated in the Figs. 11, 12, 13 and 14.

The simplest form of modern distilling apparatus is known as the pot still. It consists of a kettle or boiler of many different shapes, attached to a condenser immersed in cold water. A common tea kettle may well represent the boiling apparatus, and a tube leading from the spout and immersed in water would represent the "worm" or condenser. The condensing apparatus must of course be so arranged as to lead the condensed liquid away from and not back into the still.

These simple pot stills are now used chiefly for making distilled spirits for beverage purposes, such as whisky, brandy and rum. The best types of stills of this kind are found in Scotland and Ireland, where they are used in making whisky.

In the United States the pot still is

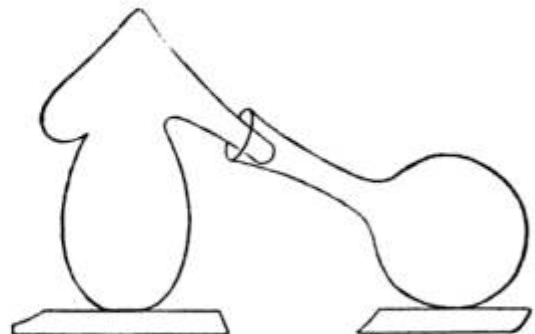


FIG. 7

Alembic and Receiver Figured by Zosimus the Pano- politain, of Alexandria, Said to Have Been Copied from the Ancient Temple of Memphis, in Egypt

not usually of the shape of the Scotch and Irish apparatus, although in the type of still in use in earlier times the

Scotch and Irish forms were predominant. This is easily explained when it is remembered that the art of making whisky in this country was introduced by emigrants from those countries. This type of still is yet in use in some places by the illicit distillers or "moonshiners," and there is no doubt of the fact that it makes a good beverage spirit—having the greatest and best distributed amounts of those products not alcohol which give to whisky, brandy, and rum their characteristic odor and flavor.

In the large whisky distilleries of this country the pot still usually is more of the type of a horizontal boiler, the alcoholic vapors rising from the steam dome and passing thence to the condensing worm.

There are three methods of heating stills in common use. In the first dis-

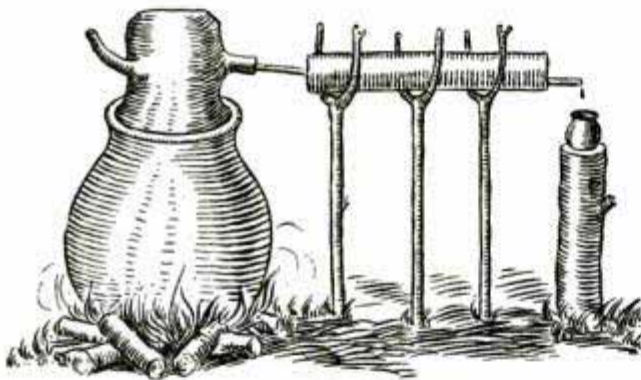


FIG. 10

Primitive Still Used in Tahiti, the Largest of the Society Islands (Fairley)

tillation of the original beer in this country it is quite the common practice to introduce the alcoholic liquor into the top one of three superimposed pot stills. Live steam is admitted to the lower of the stills and the vapors arising therefrom are used to boil the middle still, being directly introduced thereto. The vapors of the middle still are led directly into the top still and the alcoholic vapors from this still are carried to the condenser and thus made ready for the final distillation in the pot still or spirit still (yet to be described), as the case may be. This method of first distillation has the merit of economy and is wholly unobjectionable if the object of manufacture is industrial alcohol or pure spirits. If a beverage spirit is contemplated, how-

ever, such a method of preliminary separation of the distillate is not advisable,

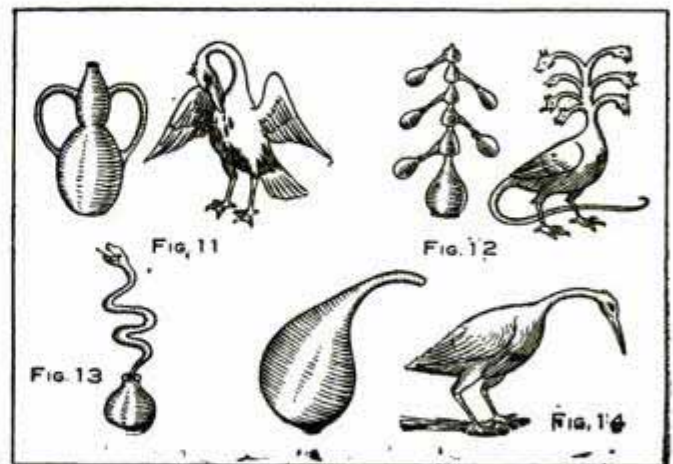


FIG. 9

Still Used by the Tribes of the Caucasus (Fairley)

except on the score of economy. Objectionable odors and substances are thereby introduced which are with difficulty removed by a subsequent distillation in a pot still. The second method of heating is by direct fire under the still. This, while not economical nor advisable in the manufacture of industrial alcohol or pure spirits, is regarded, and I think justly so, as the best method of effecting pot distillation for the production of beverages. It is exclusively used in making the fine brandies of France and very largely used in making Scotch whisky. It is not used to any extent in this country.

The third method of heating the still

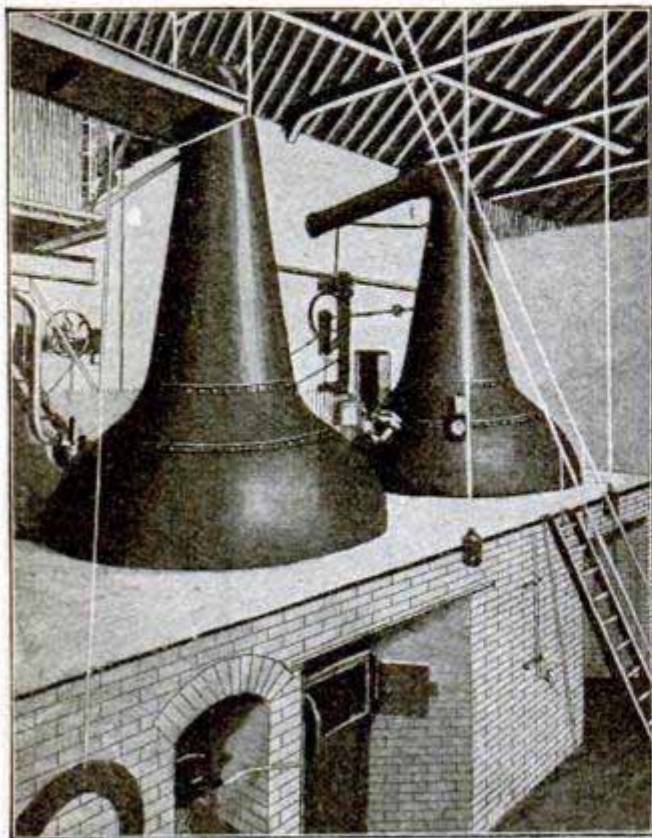


Forms of Distilling Apparatus (Fairley)

Fig. 11—Pelicanum; Fig. 12—Hydra; Fig. 13—Serpentino; Fig. 14—Ciconia

is by means of steam coils immersed in the contents of the still. This

method of heating is practiced largely in Ireland, to some extent in Scotland,



U. S. Dept. Agr., Bureau of Chemistry, Bul. 102
Fig. 15—Scotch Pot Stills, Showing Installment

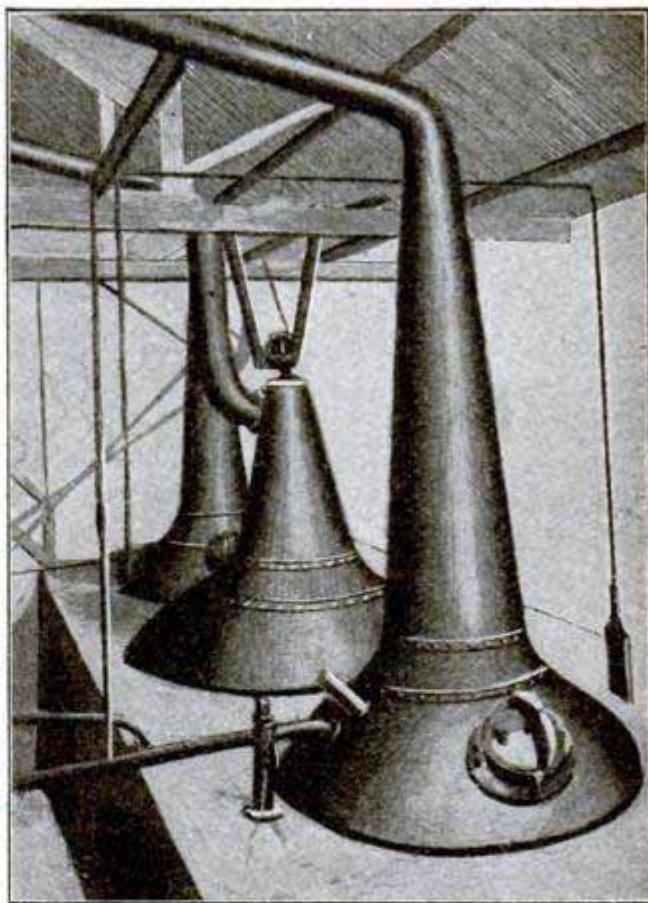
and almost exclusively in the United States. It is effective, economical and convenient, and I know of no good scientific reason why it should not produce just as good a beverage spirit as heating over the open fire. This method of final distillation is used exclusively in the production of industrial alcohol and of pure, high proof spirit in this country. The pure high proof spirit thus produced is commonly known as high proof, Cologne, neutral or velvet spirit, and is the purest form of ethyl alcohol on the market.

A less pure high proof alcohol, known to the trade as "alcohol" or "commercial alcohol," and secured by separating about five per cent of the first and last distillates in the manufacture of the pure article, is used for denaturing purposes. The less pure an alcohol is, as long as its alcoholic strength is retained, the better it is suited for common industrial purposes.

Distillation for Industrial Purposes. When used for industrial purposes, free of tax, alcohol must have at least a content of 90 per cent spirit equiva-

lent to a proof of 180. By a special Act of Congress rum to be denatured for use in the manufacture of certain grades of tobacco may contain as little as 75 per cent alcohol, corresponding to 150 proof. Any form of distilling apparatus which would yield an alcoholic distillate of legal strength could, therefore, be used for manufacturing purposes. But since the future of tax-free industrial alcohol depends largely on the ability of the manufacturer to offer it to the consumer at a low price, it is obvious that a form of apparatus must be used which is economical in operation, which secures all the alcohol produced by fermentation and of at least the minimum strength. Experience has shown that an alcohol of legal strength can not be produced in a pot still of any kind, except with a ruinous waste of material and an inhibiting cost of manufacture.

To avoid these obstacles a distilling apparatus has been evolved by a series of brilliant inventions which now deliv-



U. S. Dept. Agr., Bureau of Chemistry, Bul. 102
Fig. 16—Irish Pot Stills, Showing Attachments

ers all the alcohol produced during fermentation and of a proper legal

strength, and at a minimum of cost. This form of apparatus, in distinction from the simple pot still of the earlier periods of the art, is known as the patent still. This apparatus has many forms, but they are all based on the same principle. This principle consists in the superposition of a large number of simple stills, from 20 to 40 in number, the vapor of the one below passing into a layer of liquor on the floor of the one above, reboiling that liquor and thus proceeding in order to the top. By this process the water and other high boiling point products are gradually separated from the alcohol, which finally emerges from the top compartment approximately at 95 per cent strength. If still a little too much water is retained in the vapor, it is passed through a special condenser at the top and side of the column called a goose, where by the action of water of the proper temperature, viz., just below the boiling point of pure alcohol, a portion of the more watery alcohol vapors is condensed and returned to the still. The rest of the alcohol vapors, now deprived practically of all the water that can be squeezed out of them by mechanical means, pass to the condenser where by the action of cold water they are condensed to the alcohol of commerce. The general arrangement of a column of this kind is shown in Fig. 17. Where cologne or neutral spirit is to be made in such an apparatus, the alcohol from the first distillate at the usual proof of 100 is filtered through charcoal before the final distillation for the purpose of freeing it from certain disagreeable odors coming from the products of fermentation or introduced by the steam in the first distillation. In this case too, a portion of the first run and a portion of the last run are cut off and sold as commercial alcohol. The remaining 90 per cent of the run is odorless and tasteless, except the odor and taste of pure alcohol, and is used chiefly for mixing with whisky, brandy and rum, and for making various compounded alcoholic beverages by the addition of appropriate flavors and colors.

When industrial alcohol is made, the filtration through charcoal is not either necessary or desirable, and the separation of the heads and tails is omitted.

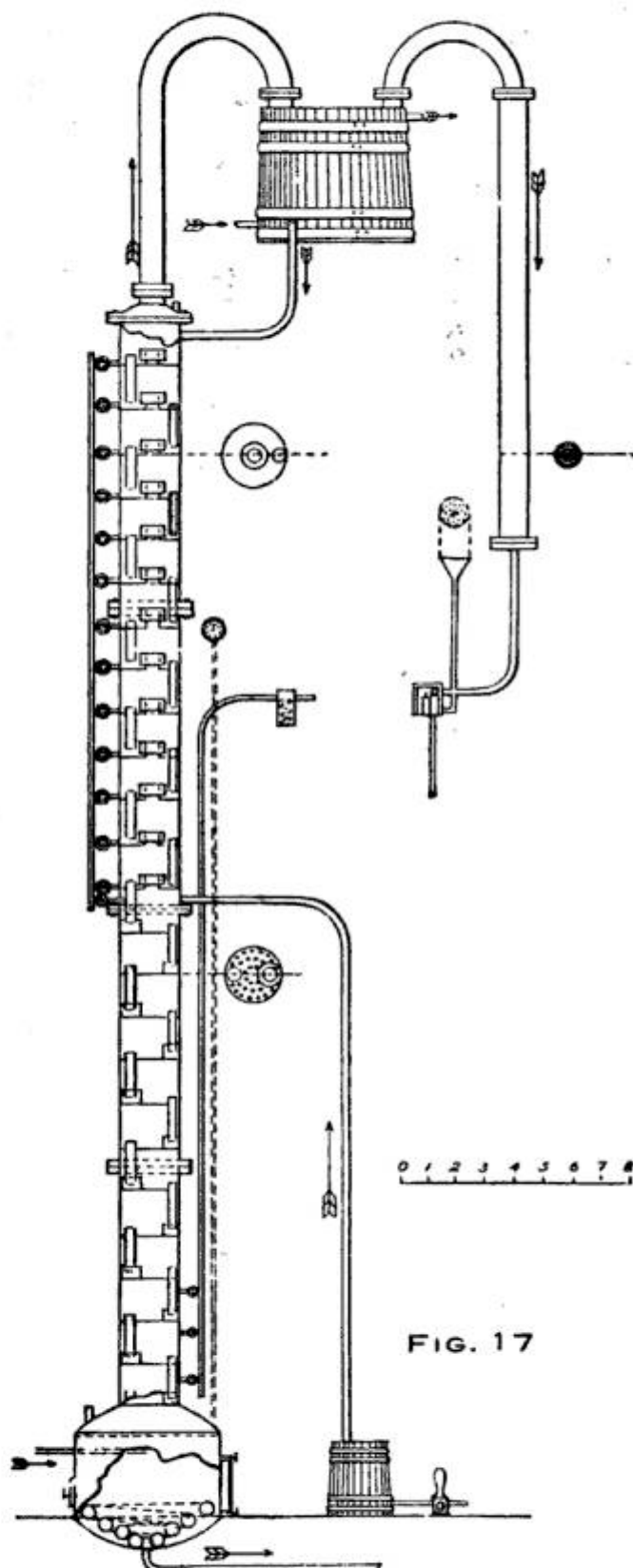


FIG. 17

U. S. Dept. Agr., Farmers' Bul. 268
Continuous Distilling Apparatus

This of course refers to the ordinary uses of the denatured article for heating, lighting and power, and for solvent purposes not connected with foods or drugs.

(To be continued.)

DIRIGIBLE BALLOON EXPLODES, KILLING OPERATOR



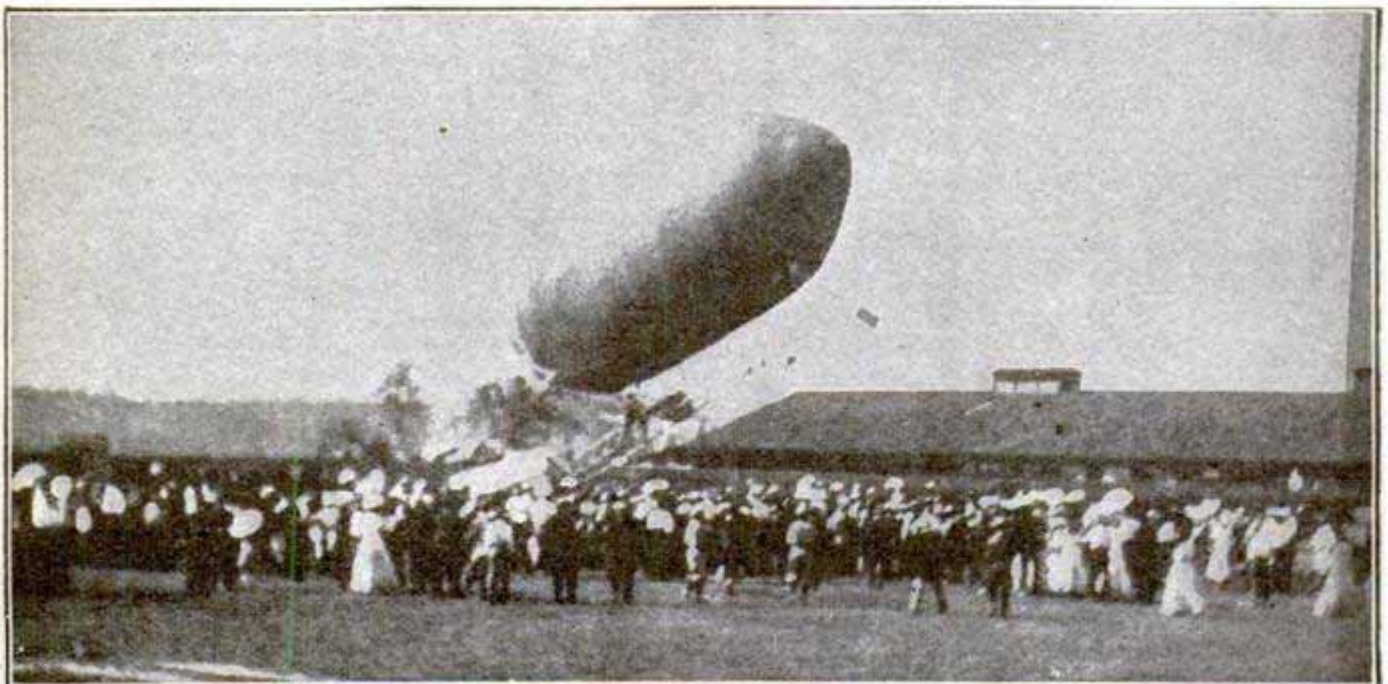
Copyright, 1909, by Eastman View Co.

A Fatal Finish—Streak at Right Is Smoke from Aeronaut's Burning Body

These illustrations show a dirigible airship just leaving the ground and its appearance as it exploded a moment later, causing the death of its operator, Prof. Moore. The fatal ascension of the dirigible was made at Redlands, Cal., on July 5. When it had risen to a height of about 40 ft. the propeller ripped a hole in the envelope, the gas caught fire from the exhaust pipe of the motor, and the bag exploded. Prof. Moore was so badly burned that he died four hours later. The heavier streak at the right of the first illustration is the smoke which rose from Moore's body as he fell, and the lighter streak is smoke from the machinery.

COST OF LIVING ON A FARM

Studies in the cost of living on a farm in Wisconsin show that the average farm family in that state uses annually farm produce worth \$222.97, groceries and fuel costing \$170.89, and house furnishings costing \$32.57, while the value of women's labor involved is worth \$216.66, and that of men and horses \$57.64, making a total cost of \$700.73 per family per year. The cost of the human labor added to the actual



The Start of an Ill-Fated Balloon

Copyright, 1909, by Eastman View Co.

cost, however, is what this labor would represent if the persons concerned were working outside their homes for a salary. The actual cost, therefore, would be about \$526.26, which is slightly more than \$10 per week. Of this, \$203.35 represents actual cash outlay for supplies, to which must be added whatever wages may be paid to hired help in the house. The balance represents the produce of the farm.

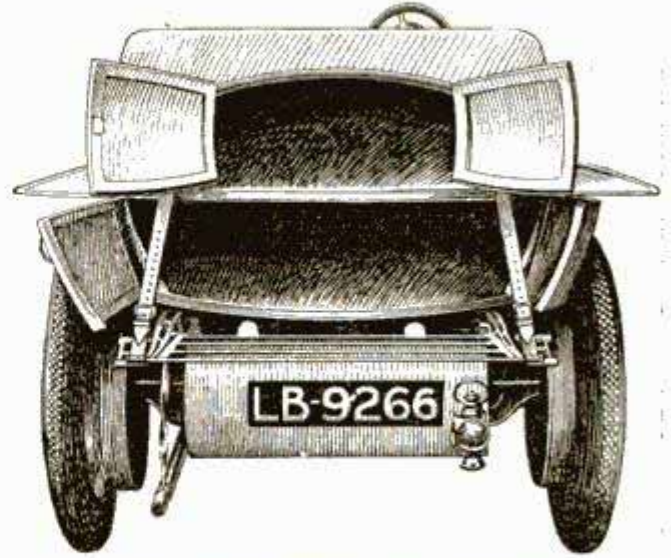
TORPEDO AUTOMOBILE BODIES IN EUROPE

Spurred on by the increasing calls for something new, different, or original in automobile bodies, continental and English automobile manufacturers are devising new types, a large number of which are of the torpedo design shown in these illustrations. This torpedo type is so radically different that automobile enthusiasts at once line up in one of two classes; either considering them a great improvement, or insisting they are far the most ugly specimens of auto bodies ever turned out.

While looking very peculiar, appearance alone has little to do with the shape, which has been evolved as a solution of the dust problem. The idea of the huge and unusual bulge at the rear is to prevent the suction of dust, which is always present when a body has flat space at that point, whether vertical, horizontal or inclined.

Aside from the elimination of much of the dust, this bulge is an excellent place for the storage of tools and other

sundries. In actual capacity it is a veritable storehouse, as is shown in one

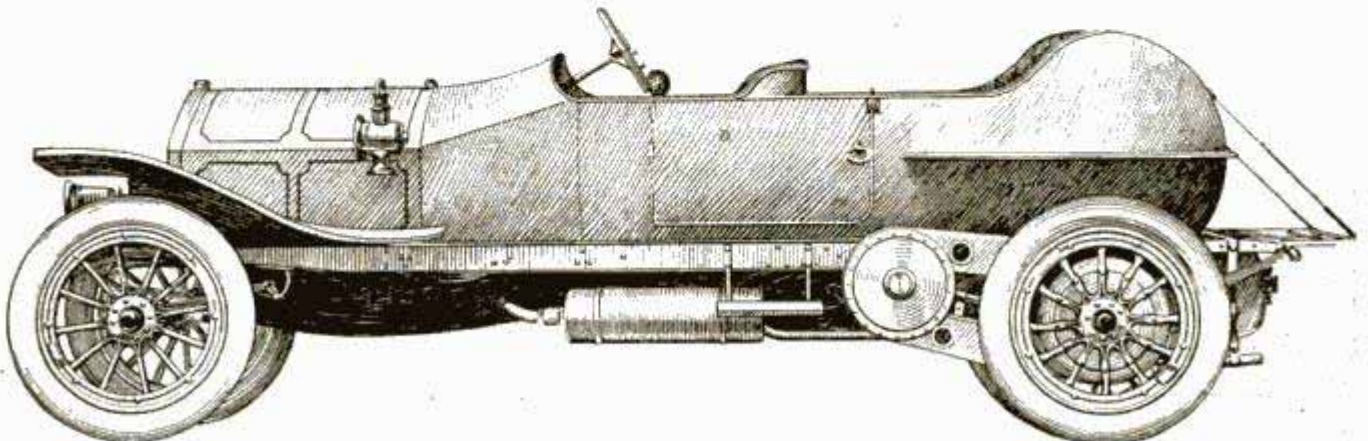


Rear View, Showing Storage Space

of the illustrations. In addition to making the rear of the car dustless, so that in dry weather the tonneau is more comfortable even than the front seats, the bulge also allows of the practical removal of the rear mud guards.

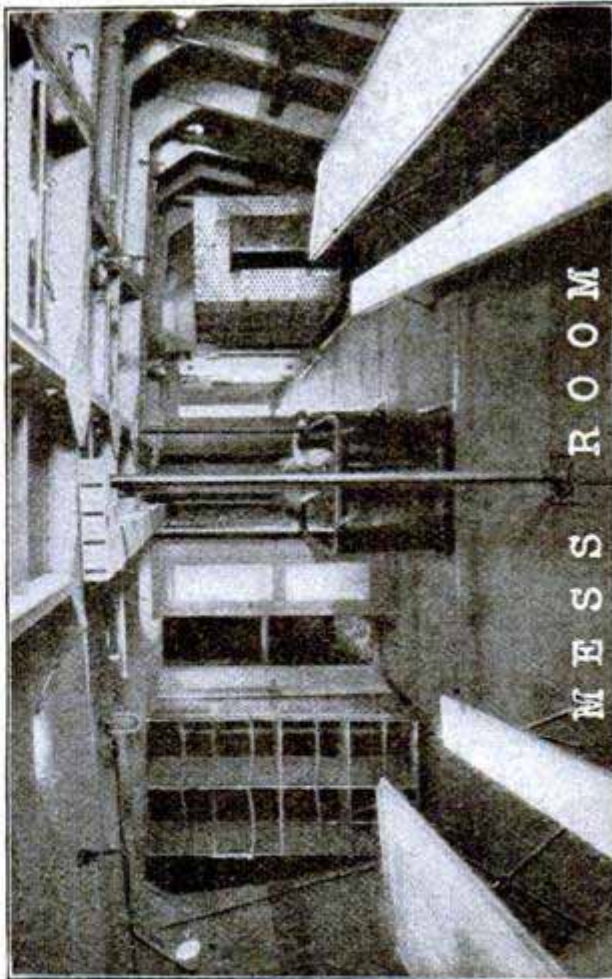
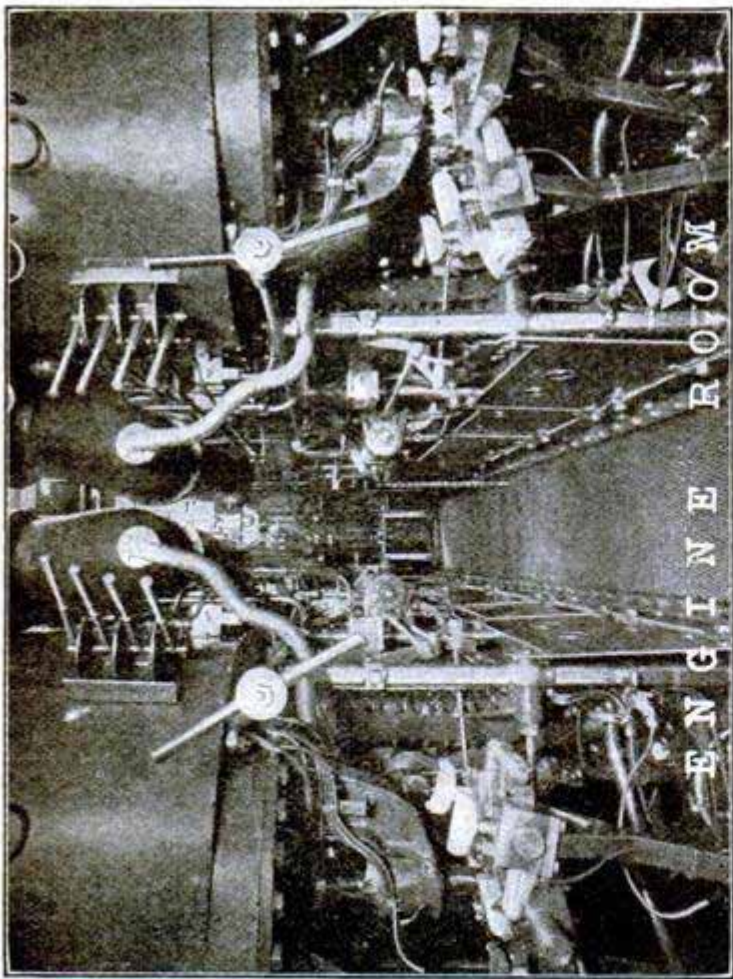
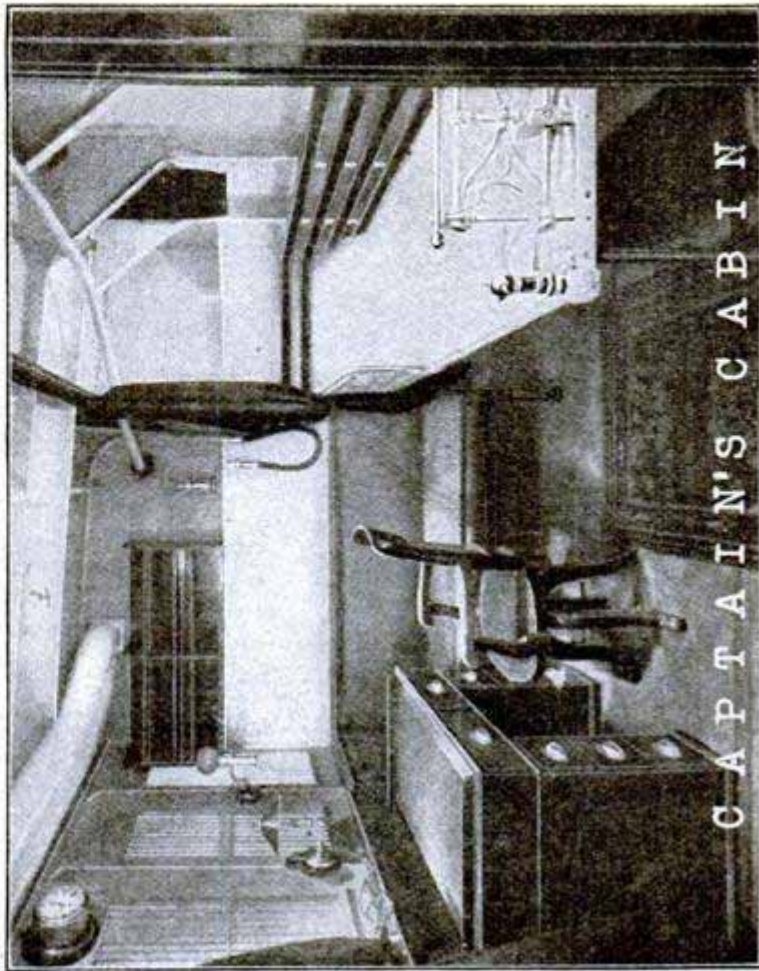
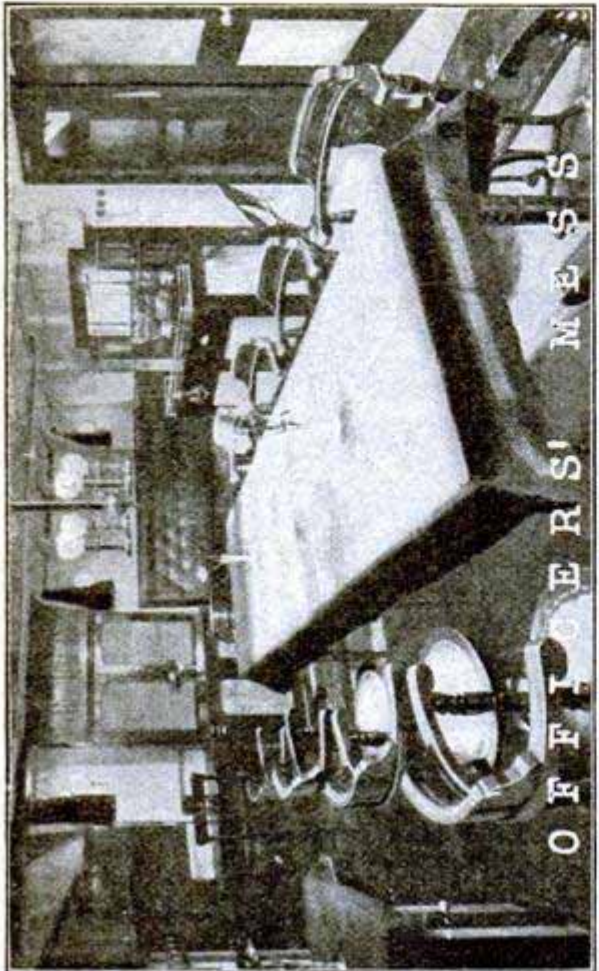
AUTOMATIC CHECK FOR AUTO-SPEEDING

The U. S. vice-consul at Bristol, Eng., states that a device has been invented by which the speed of automobiles may be automatically held within the speed limit. The device consists of an attachment which throws the control clutch when the speed of the automobile becomes faster than a set limit, and also automatically applies the brake so that the speed is almost immediately reduced just below that limit. The brake is then released by the driver and the clutch put in again.



Courtesy Automobile

General Appearance of Torpedo Body



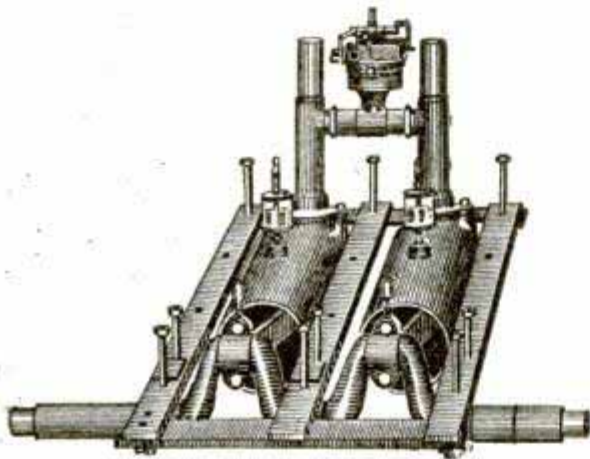
Interior of New Brazilian Torpedo Boat Destroyer, "Matto Grosso"

NEW BRAZILIAN TORPEDO BOAT DESTROYER

The accompanying set of illustrations are interesting views of the interior of the new Brazilian torpedo boat destroyer "Matto Grosso." The accommodations for both officers and crew seem exceptionally good for a vessel of its class. The captain's cabin, the ward room, and one of the crew's spaces are shown, as well as the engine room.

MOTOR SECTION CARS

While motor inspection cars have been used here and there on various

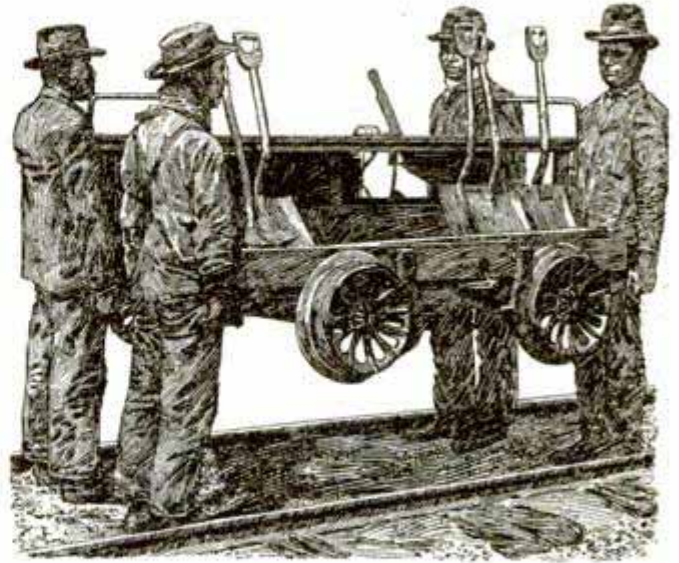


Direct-Connected Engine

railroads for the past few years, the Chicago, Milwaukee & St. Paul railroad is the first adopting such cars for its section crews covering an entire division. The first division thus equipped is that beginning with the Chicago terminal and extending to Galewood, Ill., a distance of 129 miles. From the standpoint of traffic handled, this division is the busiest on the entire system, and the fact that all of the hand pump cars of the division have been dispensed with and turned in shows the confidence of the officials in the motor-driven cars.

The use of motor section cars was decided upon mainly for reasons of economy in operating expense, but the increased facility of transportation and track inspection is also greatly appreciated. The cars used embody two items without which such operation could not be successful, the first

being reduction of weight to such a point that two men can quickly remove a car from the track, and the



Car and Tools Lifted Bodily by Four Men

second being an engine of such simple design that men of ordinary intelligence and skill can operate them without too much tinkering to keep them in working order, and without frequent annoyance and delays from breakdowns.

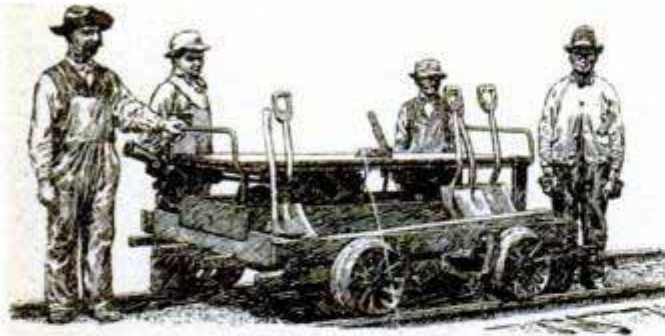
The type of car used weighs 750 lb., and to simplify matters gears and chains have been eliminated and the cylinders of the engine are direct-connected with the axle. One car will comfortably carry 10 men, and, should requirements demand it, has sufficient



Motor Section Car Carrying Nine Men and Tools

power to carry as many men and tools as can be crowded upon the platform,

which is 6 ft. long by 52 in. wide. The engines develop $7\frac{1}{2}$ hp., and drive the



Ready to Start

cars at a speed ranging from 3 to 30 miles per hour.

RHODE ISLAND TURKEYS DOOMED

Rhode Island, which is famous for its turkeys and for many years has supplied the Presidential Thanksgiving table, is confronted with the prospect of their extermination. Some 16 years ago the United States experiment station at Kingston began an investigation of the so-called "turkey ail," later denominated the blackhead disease, which has and still is killing turkey flocks. The net results of the study, continued ever since, has been the identification of an organism which causes "blackhead" by attacking the

caeca or blind canals of the intestine, but no method of fighting it successfully has been discovered.

The disease is easily transmissible, and is contracted by birds of the air without fatal results, while in the case of the turkey few attacked survive. Land which has been used by an infected flock retains the infection and passes the disease on to younger generations of turkeys.

SELF-REGISTERING SEATS FOR PUBLIC CONVEYANCES

A Nebraskan has invented a self-registering seat for public carriages and other conveyances. The seats are in sockets and mounted on springs. When not in use they are partly raised, and when a person sits on them they set in operation an electric registering device which records the length of time the person is seated, the number of persons who use the seat and the distance covered during the time the said seats are occupied. This last record is obtained by means of a chain gear which is attached to a wheel of the carriage, and is similar to the device used on taxicabs. Just how the device is to be used to profit seems to be a question.



A Flock of Young Rhode Island Turkeys

THE BROWN RAT ARMIES IN THE UNITED STATES

Dwellings and Other Buildings Should Be Made Rat-Proof with Cement or Concrete — Municipal Laws Should Be Enacted for Disposal of Garbage and Storing of Food Stuffs — Fighting Rats with Traps, Poison, and Bacteria Cultures — Annual Loss in United States Exceeds \$100,000,000 — Rats Cause Fires

Condensed from Agricultural Bulletin

The depredations of the rat, the worst mammalian pest known to man, result in losses throughout the world amounting to millions of dollars annually. These losses, great as they are, are of less importance than the fact that these rats carry from house to house and from seaport to seaport the germs of the dreaded plague, but this greater reason for waging a continual war of extermination was exhaustively dealt with in a previous issue of this magazine. This article will therefore be confined to the rat as a destroyer of the fruits of human energy and the methods by which the war of extermination must be waged.

Once occupying only a comparatively small part of the Old World, through the spread of commerce the brown rat has been furnished free transportation to the uttermost parts of the earth, while its fecundity, cunning, and adaptability to almost every kind of environment have enabled it to flourish and multiply wherever it has secured a foothold.

For centuries the rat has been banned, and human ingenuity has been taxed to the utmost to suppress it. Innumerable devices in the way of traps, poisons, gases, and, more recently cultures supposed to spread fatal diseases, have been resorted to. Nevertheless, the pest continues to prosper, and its number and destructiveness keep pace with the advance of civilization. Everywhere the history of the contest is the same. Though thousands are killed, the relief is only temporary, and other thousands soon replace the same. Therefore, if conducted along the old lines the war promises to be never-ending.

The futility of past efforts and the lack of permanent results indicate that

the real cure for the rat evil in cities, especially seaports, lies in preventive rather than curative methods. The extraordinary success that has attended

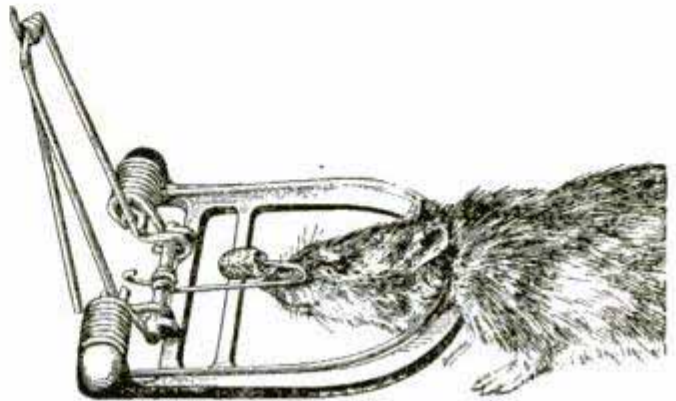


Fig. 1—Guillotine Trap

the rat's struggle for existence is to be explained largely by the abundance of food and shelter furnished by man. Preventive measures should be directed to withholding these advantages. The curtailing of food is less important in its effect on the present rat population than in its certain result in lessening production. Abundance of food means many young in a litter and many litters in a year; a restricted supply means fewer young and fewer litters. The most important steps, therefore, toward the suppression of the rat are: The enactment and strict enforcement of municipal ordinances providing for the disposal of garbage and the protection of food supplies, and the rat-proof construction of dwellings and other buildings.

The above mentioned precautions are of the greatest importance, but, as they will not entirely solve the problem, the destruction of rats, wherever they are numerous, is very essential and at times absolutely necessary in the interests of public health. Hence the best methods known for destroying rats are given. Such methods, how-

ever, are fallible and at best inferior to preventive measures.

Owing to their cunning it is not easy to clear premises of rats by trap-

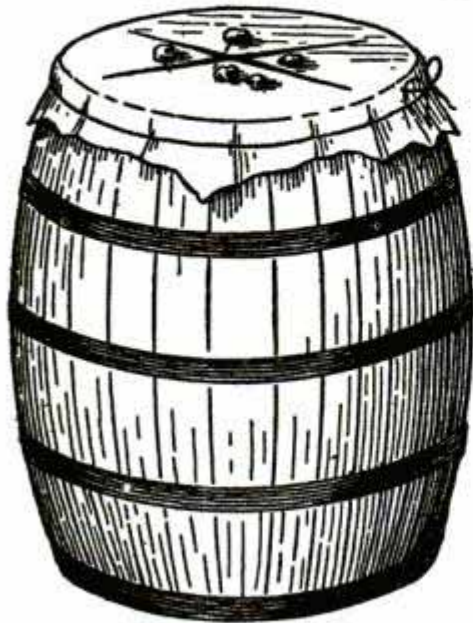


Fig. 2—Barrel Trap with Stiff Paper Cover

ping. A few adults refuse to enter the most innocent-looking trap, yet trapping, if persistently followed, is one of the most effective means of destruction. For general use the improved modern traps with a wire fall released by a baited trigger and driven by a coiled spring have marked advantages over the old form. These traps, sometimes called guillotine traps, are of many designs, but the more simply constructed are to be preferred. Those made entirely of metal are the best, as they are more durable and are less likely to absorb and retain odors. These traps should be baited with small pieces of sausage or fried bacon. Other excellent baits for rats are oatmeal, toasted cheese, toasted and buttered bread, fish, liver, raw meat, pine nuts, apples, carrots, corn, and sunflower, squash, or pumpkin seeds. Broken fresh eggs are good bait at all seasons. The method of baiting a guillotine trap is shown in Fig. 1.

When rats are numerous, the large French wire cage traps can be used to advantage. They should be made of stiff, heavy wire, well reinforced. Many of those sold in hardware stores are useless, because a full-grown rat can bend the light wires apart and escape. Cage traps should be baited and left

open for several nights until the rats are accustomed to enter them to obtain food. Rats, however, are not fools and men are not always wise enough to circumvent them. Sometimes, when a trap is lying in the open, not a rat will touch it; but if hidden under an old mat or under a bunch of hay or straw, it may prove especially effective. A decoy rat has often been found useful.

A simple deadfall—a flat stone or a heavy plank—supported by a figure 4 trigger, is often useful to kill a wise old rat that refuses to be enticed into a modern trap. The animal will go under such a contrivance to feed without fear.

Barrel traps are also effective. Some years ago details were given of a number of such by means of which 3,000 rats were caught in one warehouse in a single night. The plan involved tolling the rats to the place and feeding them for several nights on the tops of barrels covered with coarse brown paper. Afterwards a cross was cut in the paper, so that the rats fell through. Reports are frequently made of large catches of rats by means of a barrel



Fig. 3—Barrel Trap with Hinged Cover

fitted with a light cover of wood, hinged on a rod so as to turn with the weight of a rat. Both of these ideas are shown in Figs. 2 and 3.

In the rice fields of the Far East the

natives build numerous piles of brush and rice straw and leave them for several days until many rats have taken shelter in them. A portable bamboo enclosure several feet in height is then set up around each pile in succession and brush thrown over the top. Men and dogs then kill the trapped rodents. This plan, with modifications, may be used in America with satisfactory results, a wire netting of fine mesh being used for the enclosure.

The Burmese use the ingenious and simple method shown in Fig. 4. A large jar with a weighted cover is sunk into the ground. A hole is punched in the side of the jar on a level with the surface of the ground and just large enough to admit a large rat. Rice is then placed within it as a bait, and the rats enter and tumble to the bottom. As many as 70 rats have been caught in one night by such a contrivance.

While the use of poison is the best and quickest way to get rid of rats, the odor from the dead animals makes the method impracticable in occupied houses or buildings in which men are continually at work, and it is quite possible to poison other than the rodents. There are few laws in the United States which prohibit the laying of poisons on lands owned by the poisoner, therefore it is all the more necessary to exercise extreme caution. Poison for rats should never be placed in open or unsheltered places.

Several micro-organisms, or bacteria, have been exploited in Europe and America, but laboratory and field experiments with some of them give results by no means uniform, although the majority are negative. The cultures tested by the biological survey have given poor results, the reasons being that: the virulence is not great enough to kill a sufficiently high percentage of rats that eat the food containing the micro-organisms, the virulence decreases with the age of the cultures and deteriorates in warm weather and in bright sunlight, and the fact that the comparative cost of the cultures is too great for general use.

The early history of the brown rat is practically unknown, but the species

is generally supposed to be of Asiatic origin. It first reached Europe from the east by way of the Volga river, crossing that river in 1727 and soon

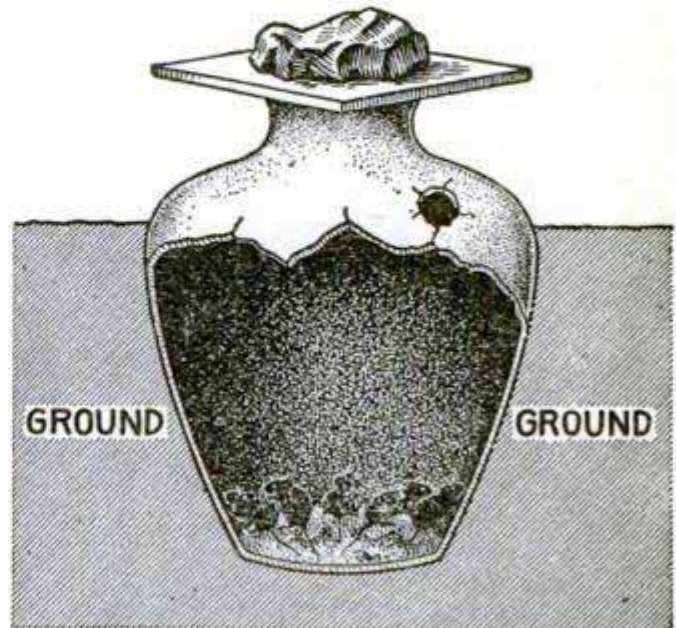


Fig. 4—A Burmese Trap

afterward spreading over the greater part of Russia. It reached England from some eastern port about 1728 or 1729, appeared first in Paris about 1750, and was brought to the United States, probably from England, about the beginning of the Revolution, 1775. According to Audubon, it was unknown on the Pacific coast of the United States in 1851, although its introduction there must have occurred soon after that date.

The brown rat is practically omnivorous. Its bill of fare includes seeds and grains of all kinds, flour, meal, and food products made from them; fruits and garden vegetables, mushrooms, bark of growing trees, bulbs, roots, stems, leaves, and flowers of herbaceous plants, eggs, chicks, ducklings, young pigeons, young rabbits, milk, butter, cheese, fresh meat, carion, mice, fish, frogs, and mussels. This great variety of food explains the ease with which rats adapt themselves to almost any environment.

Experiments show that the average quantity of grain consumed by a full-grown rat is fully two ounces a day, and a half-grown rat eats about as much as an adult. Fed on grain, a rat eats 45 to 50 lb. a year, worth about 60 cents if wheat, or \$1.80 if oatmeal.

Fed on beefsteaks worth 25 cents a pound, or on chicks or squabs with a much higher prospective value, the cost of maintaining a rat is proportion-

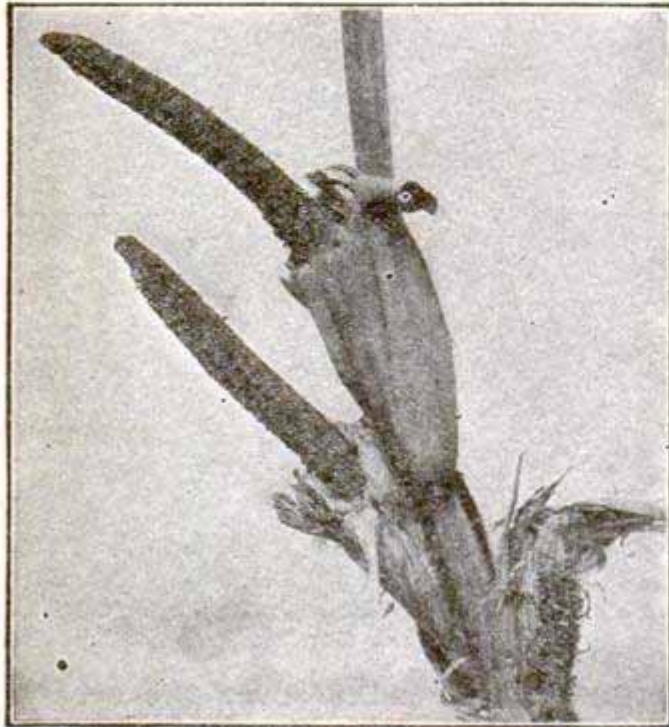


Fig. 5—Single Cornstalk After the Meal

ately increased. Granted that more than half the food of rats is waste, the average cost of keeping one rat is still upward of 25 cents a year.

If an accurate census of the rats of the United States were possible, a reasonably correct calculation of the minimum cost of feeding them could be made from the above data. If the number of rats supported by the people throughout the United States were no more than equal to the number of domestic animals on the farms—horses, cattle, sheep, and hogs—the minimum cost of feeding them would be upward of \$100,000,000 a year. To some such enormous total every farmer, and every householder who has rats upon his premises, contributes a share.

But, worse yet, the actual depredations of rats are by no means confined to what they eat. They destroy fully as much grain as they consume, and they pollute and render unfit for human consumption a much larger portion of all other food materials that they attack. In addition, the damage they do to property of other kinds is often as great as that done to food supplies.

Cultivated grains may be regarded as the favorite food. They dig the seed from the ground as soon as sown, eat the tender sprouts when they appear, and later feast upon the maturing crop. After harvest they attack grain in shock, stack, and mow, and when thrashing is over, in crib, granary, elevator, mill, and warehouse. The toll thus taken varies with the numbers of the rodents, and in some places amounts to a considerable percentage of the crop. In exceptional cases entire crops have been ruined.

The depredations of rats upon poultry are a source of serious loss, and the total for the entire country is very large. Eggs are also destroyed in great numbers, and in game preserves the rodents are a most serious pest. The damage done to fruits and vegetables while stored in cellars and pits is well known, as well as on vessels. Tomatoes, cucumbers, sweet potatoes, bananas, oranges, grape fruit, peanuts, and other products shipped by water from the South reach their destination with a heavy percentage of damage.

Next to the loss on grains, the largest item is on miscellaneous merchandise in stores, markets, and warehouses. Food materials of all kinds are subject to attack, but the destruction of dry goods, clothing, books, leather goods, and so on, is equally serious. Many of these supply material for nests, but books and pamphlets, especially the newly bound, fur-

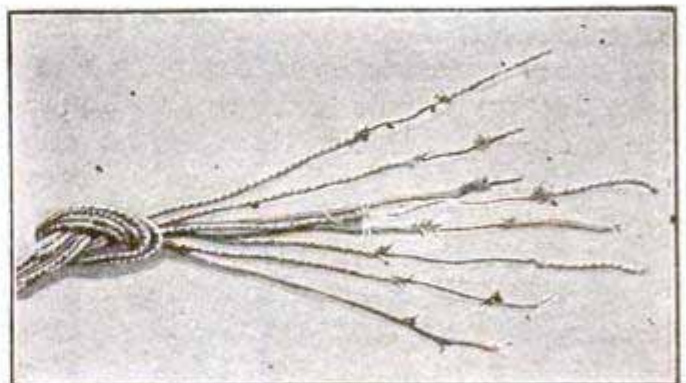


Fig. 6—Telephone Wires Gnawed by Rodents

nish food in the glue and paste used in the binding. The loss in the cities of the United States having a population of 10,000 and upward, is probably close to \$25,000,000 a year.

Many fires are attributed to the rodents, and the most common way they now cause such destruction is by gnawing away the insulating covering from wires. The insulating materials are used for nests, which are often built of combustibles placed in contact with the naked wires. Insurance companies a few years ago estimated the fire loss in the United States due to defective insulation at \$15,000,000 yearly; and since rats and mice are the chief agents in impairing the insulation after the wires are in place, a large part of the above sum must be charged to their account.

Rats often gnaw the hoofs of horses until the feet bleed, kill young lambs and pigs, and attack fat hogs and eat holes in their bodies, causing death. Many accounts of rats attacking human beings have been published, and the modern reporter seems to delight in such harrowing tales, but the majority of such reports are the product of fertile imagination, although the rodents will fight if closely cornered or made desperate by lack of food.

AUSTRALIAN ASBESTOS HOUSES

Many houses are now being built in different parts of Australia of asbestos material. The material is made in sheets for walling and in tiles or slates for roofing. It is not only fireproof but impervious to water, unaffected by



Fire and Waterproof

heat or cold, and of high insulating properties. Still another favorable feature is the fact that it is not attacked by white ants or other insects that abound in southern countries.

INGENIOUS "WELL" REFRIGERATOR

One of the chief drawbacks of many refrigerators is that, although keeping everything cool, they do not allow of



Air Circulates Continually

the free circulation of air. Fresh air is one of the surest antidotes of staleness, and to be satisfactory the air should be continually renewed, otherwise one article will become tainted by the flavor of another.

The "well" cooler here illustrated is designed to overcome these drawbacks. The well in which the food is placed is sunk within and below an ice-holding trough, the entrance of the well being always fully open to the atmosphere and only covered with a wire gauze to keep out flies and foreign substances. In thus arranging the cooling chamber, the air is free to pass in and out, and, before reaching the food, is cooled by the ice in the surrounding trough. In passing out of the chamber, the air escapes without affecting the food.

AEROPLANE SHAPED LIKE BUTTERFLY

The peculiar arrangement of the planes of this flying-machine, which is the invention of two Minneapolis men, and for which the press of that city claim a successful midnight flight, has caused it to be called a "butterfly" aeroplane. The inventors are J. Stewart, a retired engineer, and S. Bromwell, a farmer with considerable mechanical skill.

The entire machine, including a special engine that it is claimed will de-

velop between 12 and 15 hp., weighs only 200 lb. The extreme width of the main arm of the frame, which, with the second arm, forms a T-shaped

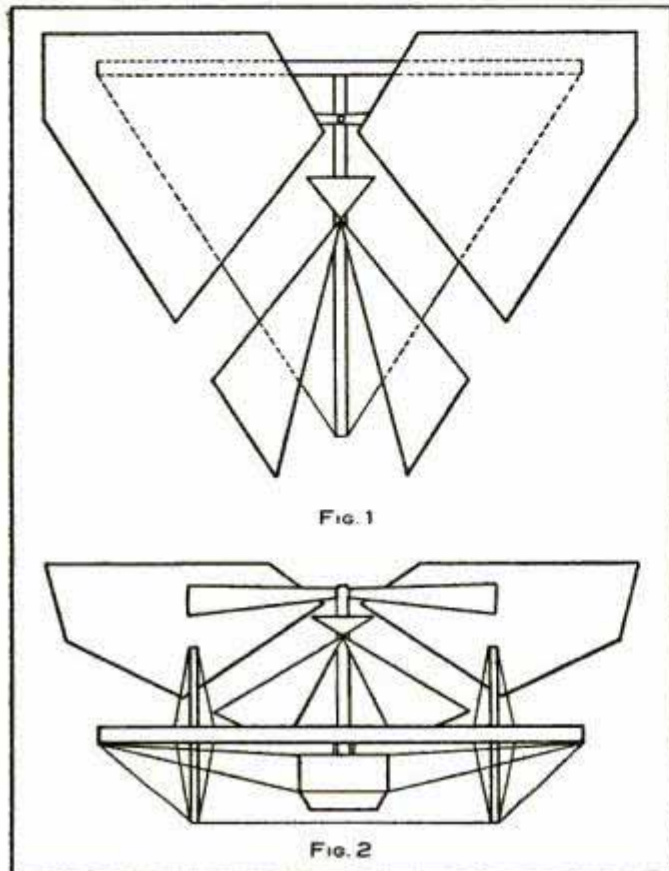


FIG. 1

FIG. 2

"Butterfly" Aeroplane As It Appears from Above
—View of Machine from Directly in Front

frame, is 24 ft. The second arm is 18 ft. long. The sustaining surface is composed of two large and two small wings, as shown in the illustrations. The propeller blades swing through a circle of 7 ft.

The two inventors are men over 60 years old, but the machine is operated for them by Fred Parker, who has made several flights for Roy Knabenshue and Captain Baldwin. He claims that on its first trial the aeroplane rose to a height of 300 ft. and was kept in the air for 10 minutes. It rises directly from the ground, without assistance from running wheels or launching devices.

CRUISING YACHT OF WHALEBACK TYPE

The accompanying illustration shows a new type of auxiliary yacht that is now in course of construction at a shipyard in Baltimore for Mr. R. E. Barry, of the Bureau of Construction, U. S. N.,

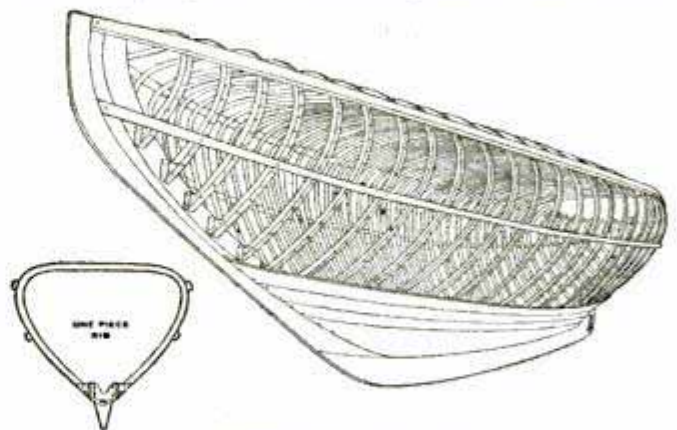
Washington. This vessel, which is 54 ft. over all, 40 ft. waterline, 11 ft. beam, and will have a draft of 6½ ft., represents a new idea in construction and might aptly be termed a "whaleback."

Mr. Barry designed the vessel himself and, as he intends her for deep-sea cruising, he determined upon composite construction—steel frames with wooden planking. The frames are each in one piece instead of sections as frames usually are. The result is that now that they are set up they give the vessel a shape not unlike a barrel.

The peculiar feature of the framing is shown clearly in the cuts. The absence of angle irons and right angles will be noted. The lower ribband on the hull shows about where the waterline will be, while the ribband above will mark the division of the boot top and deck planking.

The yacht is being heavily constructed. The continuous frames extend aft about 40 ft. from the bow from which point aft they are of ordinary design to allow for a cockpit under which will be a gasoline engine of about 40 hp. For ballast, the yacht has a cast-iron keel, weighing 12 tons; and her planking is 3 in. thick, of selected Georgia pine.

Beneath the flush deck there will be 6 ft. headroom, and the arrangement of the interior provides for a stateroom for the owner and all the conveniences usually found on a vessel of her size. The skylights will be placed between



Framework of Hull

the frames and though they will be small, there will be a number of decklights set into the planking to furnish illumination below.

ENCOURAGING WILLOW CULTURE

The Forest Service of the U. S. agricultural department has recently harvested at one of its experimental farms a crop of 100,000 basket willow cuttings for free distribution. The government is encouraging the growing of high-grade willow rods in this country, and in the five years since the establishment of the holts at Arlington, on the Potomac, approximately 500,000 select cuttings have been distributed among farmers, with directions for planting and preparing for market.

An article on the willow basket industry in the United States was published in a recent issue of this magazine.

OLD AND NEW LIFE HELMETS

The first illustration shows the air-producing end of a fireman's life helmet used in London. The helmet is



Pumping Air to a Fireman

connected by a hose with the bellows, which is strapped around the waist of

a fireman out in the open air. Through the tube held to the ear, the fireman



Filling Life Helmet with Liquid Air

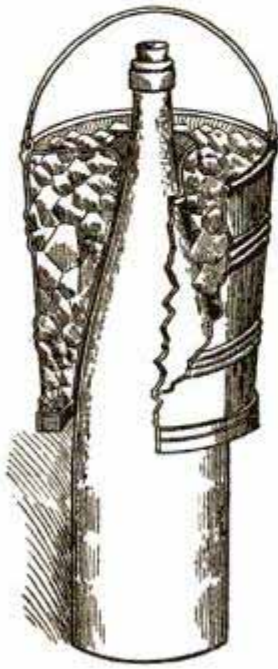
wearing the helmet tells his aide when and when not to work the bellows. This system of an inside and an outside fireman, connected by long lengths of hose, is now antiquated by the helmet shown in the second illustration. Liquid air is poured into the air tank on the fireman's back before he enters the smoke-filled building, and this furnishes him with fresh, cool air for some time.

TRAINING DOGS AS MURDERERS

Police dogs have proved so successful on the continent in tracking criminals or overpowering them when caught that the thieving fraternity, especially in France, are claimed to be retaliating by training dogs to attack their victims, and especially policemen. At Toulouse, France, a band of thieves were recently caught who made a business of training mastiffs for such work. The attention of the police was called to the gang by the fact that a landowner had been found dead outside his ransacked house with his throat bitten through.

NEW BOTTLE-COOLING IDEA

The ordinary bottle cooler is a device in which the bottle is set. No provision is made for covering the upper part of the bottle with ice, and, as a consequence, the liquid first drawn out is not as cool as it should be. A German inventor remedies this by placing the ice over the top of the bottle in the manner shown by the illustration. The liquid at the top of bottle cools, and falls, owing to its greater weight, and the warmer liquid at the bottom rises to the top.



The ice is placed between the two walls of the cylinder, and a rubber band on the inner wall, pressing against the bottle neck, holds the bottle in the cooler when the latter is lifted by means of its handle.

BASEBALL SHOE THAT WILL NOT "SPIKE"

A new baseball shoe, designed to prevent injuries by "spiking" yet embodying the feature that makes it possible for the wearer to clutch the ground firmly in running, has made its appearance in Chicago and several other cities. Instead of the present



Chain Clutches Instead of Spikes

razor-like spikes, a slack chain is attached to the three corners of a metal plate which is riveted to the ball and heel of the shoe.

ANOTHER MISSION TABLE

The accompanying illustration shows another style of a mission table. The stock for this table if ordered as follows and sanded will require only the work of making the joints and putting them together:

- 4 posts 2 in. square 30 $\frac{1}{2}$ in. S-4-S.
- 4 upper rails $\frac{7}{8}$ by 6 $\frac{1}{2}$ by 22 $\frac{1}{2}$ in. S-2-S.
- 2 lower rails $\frac{7}{8}$ by 3 by 22 $\frac{1}{2}$ in. S-2-S.
- 2 top pieces $\frac{7}{8}$ by 12 $\frac{1}{2}$ by 24 $\frac{1}{2}$ in. S-2-S.
- 6 slats $\frac{3}{4}$ by 3 $\frac{1}{2}$ by 15 $\frac{1}{2}$ in. S-2-S.
- 1 stretcher $\frac{7}{8}$ by 8 $\frac{1}{2}$ by 21 $\frac{1}{2}$ in. S-2-S.

This table may be made with mortise and tenon joints or with dowels as desired. If dowels are used, the upper and lower rails should be made 2 in. shorter than shown in the drawing.

Be sure to get the pieces for the posts with their surfaces square to each other and their ends sawed square off. This will simplify the assembling a great deal. Make the posts exactly the same length, 30 $\frac{1}{2}$ in., and chamfer a $\frac{3}{8}$ -in. bevel on their tops.

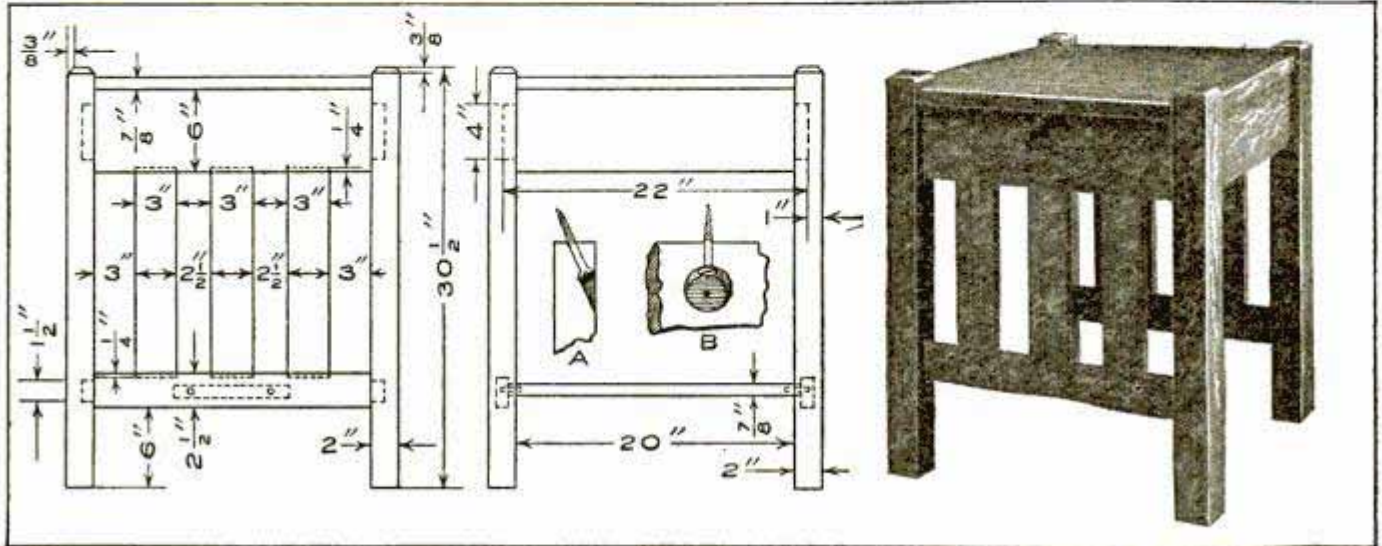
Square up the four upper rails 6 by 22 in., marking the working face and edge to work from when laying out the tenons later. Square up the two lower rails 2 $\frac{1}{2}$ by 22 in. These must be exactly the same length as the upper rails. The two ends of the table having the slats should be glued up first. Lay out the tenons on the upper and lower rails for these two ends and be sure to work from the marked face and edges, using a knife line. Cut the tenons, and, by placing them against the posts in the exact position they are to occupy, mark the places for the mortises. These joints should be numbered so that each mortise may be cut to fit its own tenon.

Square up the slats 3 by 15 $\frac{1}{8}$ in. and cut mortises in the upper and lower rails $\frac{1}{4}$ in. deep to let them in. The number of these slats, their size and spacing may be arranged to suit one's own idea. Put the posts, upper and lower rails, and slats together without glue first to determine if the parts fit properly and then glue and clamp them together. Hot glue will hold best, if the room and lumber are warm; if not, it is best to use ordinary liquid glue. While the glue on these two

ends of the table is setting, the other upper rails, top, and stretcher may be finished.

The top will have to be made of two or three pieces joined together with dowels and glue. If possible use

After this has dried, finish with two coats of wax. The shellac prevents the turpentine in the wax from rubbing out the stain. To get a good wax finish the work should dry until it will not show finger marks, before rubbing.



Details of Construction

Finished Table

only two boards and be sure the grain in both pieces runs the same way when they are put together.

After the ends which were glued have set at least 24 hours, the clamps may be taken off and the other two upper rails tenoned and mortised in place. The stretcher may be held with two $\frac{3}{8}$ -in. dowels in each end, or with two roundhead screws put through the lower rails. When gluing up the whole table, be sure the sides are square to each other. The top may now be squared up 24 by 24 in. and the corners cut out for the top of the posts. The top may be fastened as shown at A and B in the drawing, or by cleats screwed to the inside of the upper rails and top.

Before staining, be sure that all surplus glue is scraped off and the surfaces sanded clean. A weathered or fumed oak stain is suitable for this table. A good weathered oak stain may be made by mixing a little drop black ground in oil with turpentine and a little linseed oil. Put this stain on with a brush and allow to stand until it begins to flatten or dull, then rub off across the grain with a rag or piece of cotton waste. When thoroughly dry, apply one coat of very thin shellac.

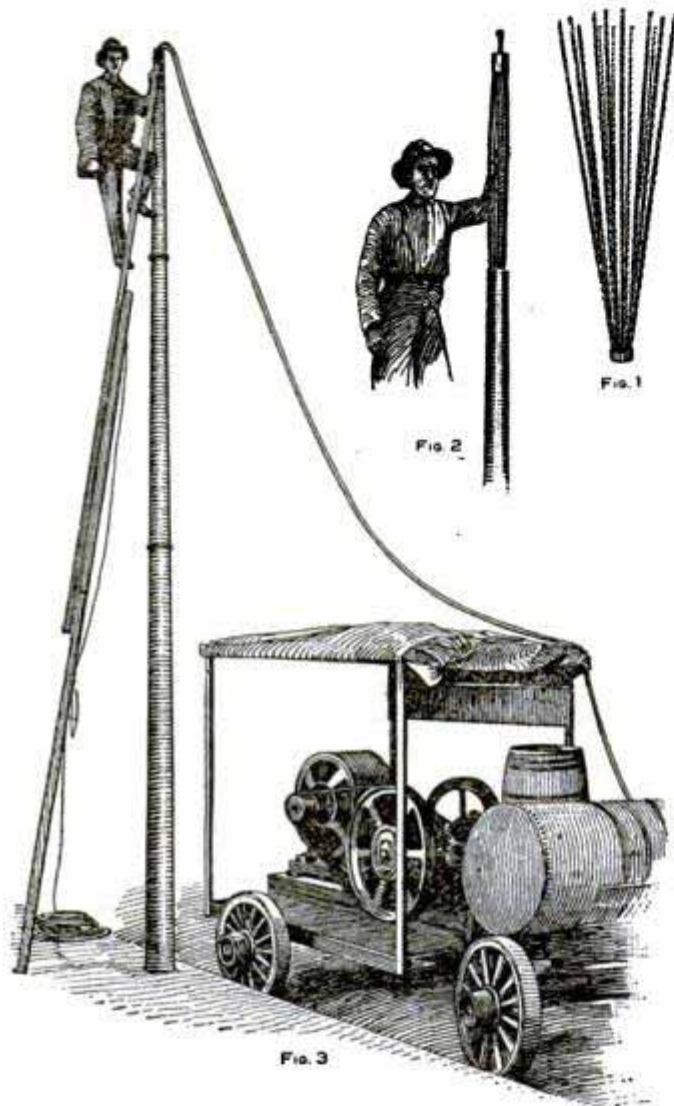
REINFORCING METAL POLES WITH CEMENT

Experience has shown that the metal poles used to suspend the trolley wires of the electric railways of the country will not last a lifetime, as originally supposed, but that after about 10 years of service serious corrosion begins to take place, usually at the base of the pole just above the ground line and extending down several inches.

The best method of repairing these corroded poles, as is aptly shown in the work of the Brooklyn Rapid Transit Co., is to place reinforcing rods within them and fill the bases with cement mortar. The illustrations show some of the material and implements used.

Nothing but the pole caps need be disturbed, and these can be easily lifted off. Twisted steel rods of any desired number, formed into a so-called cage by means of steel castings or caps at the ends, are inserted in the top of the pole and forced to the base. The rods are usually about 5 ft. long and to insure their proper position with respect to the point of weakness, the bottom of the pole is filled with sand, so that the cage will rest at the desired point.

The rods when inserted in the top of the pole require a little pressure to force them through the upper and smaller section, but after passing into



Inserting the Rods in the Pole—Cage of Rods Used for Reinforcement—Pumping the Liquid Cement into the Pole

the middle section, fall easily to the bottom. In this position the rods will expand very close to the inner wall of the pole. If there be a hole in the side of the pole, caused by the corrosion, a piece of tar paper is fastened over it to keep the cement from running out. The cement mortar, which is wet enough to run, is then forced through a hose to the top of the pole, thence dropping to the base. Enough cement is used to cover the rods by a foot or more, and the replacement of the cap completes the job.

The amount of reinforcement can be varied by increasing the number and size of the rods and their disposition in the pole.

SEEING OVER TELEPHONE WIRES

The idea of being able to see as well as talk over telephone wires is one that has at times tickled the press of the country to such an extent that much fun has arisen over its remote possibility, yet the "Politiken" of Copenhagen announces that it has been made possible.

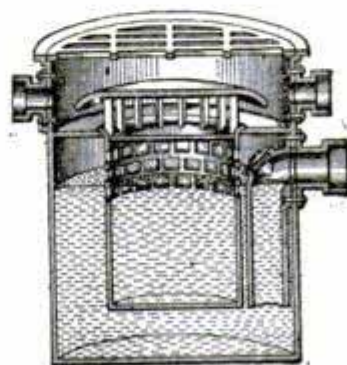
Two Danes, the brothers Anderson, already known as successful inventors, have invented an apparatus by the use of which it is possible to see what is going on at the other end of the wire. The technical details of the invention are being kept secret, but the newspaper mentioned, recently employed an engineer of repute to test the brothers' claim, and this expert declared the claim to be justified. He also stated that the process was entirely new and very simple.

"The process differs from the systems of phototelegraphy," says the engineer of repute, "in that it makes no use of photography, but transmits light and colors directly. A speaker at a telephone fitted with the apparatus can be seen, and he can show anything he likes across the wires."

Some two years ago a western inventor was claimed to have perfected such an apparatus and this magazine recorded the fact at the time, but nothing has been heard of it since.

FLOOR DRAIN FOR GARAGES

This floor drain, designed especially for garages, is provided with a large receptacle for receiving mud, sand, lint or other matter which may be washed from the automobiles or discharged from large steam washers. With this arrangement, such refuse can be accumulated for

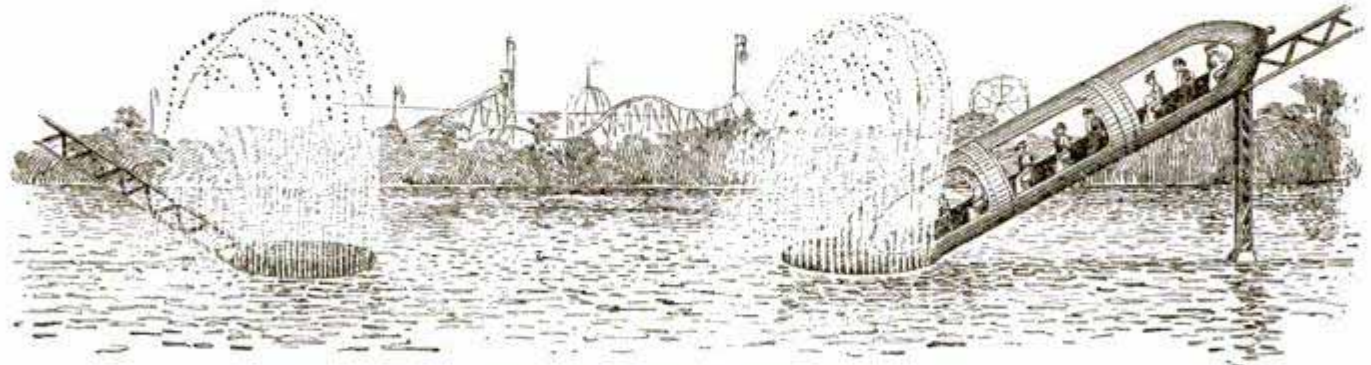


some time and not interfere with the

operation of the drain. The solid-top grate bar prevents matches, sticks and string from getting down into the receptacle, which can be lifted out and cleaned in a moment when necessary. The basin is provided with a large air chamber between the top of the strainer and the water seal, and this has hub vent outlet connections on either side. Waste gasoline and grease flowing into the basin evaporates and the gases escape to the outside of the building. The vent pipes are so arranged that a current of fresh air is continually flowing through the air chamber, preventing gases from forming.

PHONOGRAPH FIRE ALARM

A Minneapolis inventor has designed a phonograph fire alarm which is intended to notify inmates of a house of a fire in the night and to call the fire department, but its usefulness depends upon someone from outside discovering the fire, should that someone be passing at the time the fire starts. The device consists of a phonograph and gong in connection with the telephone and an outside switch. The switch is labeled "turn this if fire," and is placed near the door bell at the front entrance. If a passing pedestrian sees a fire in the house, he turns the switch, which causes the gong to ring and at the same time lifts the telephone receiver and starts the phonograph. On the record is the



Dive into the Sea at Coney Island

address of the house and a call of fire, which the phonograph shouts into the telephone a dozen times.

TRAVELING REPAIR SHOP

A mechanic and his son of Colorado Springs, Col., start out with this traveling repair shop equipment when work



Peddling Repairs

at their stationary shop becomes scarce. They call it the "Burro Novelty shop," and succeed in earning about \$4 per day with it.

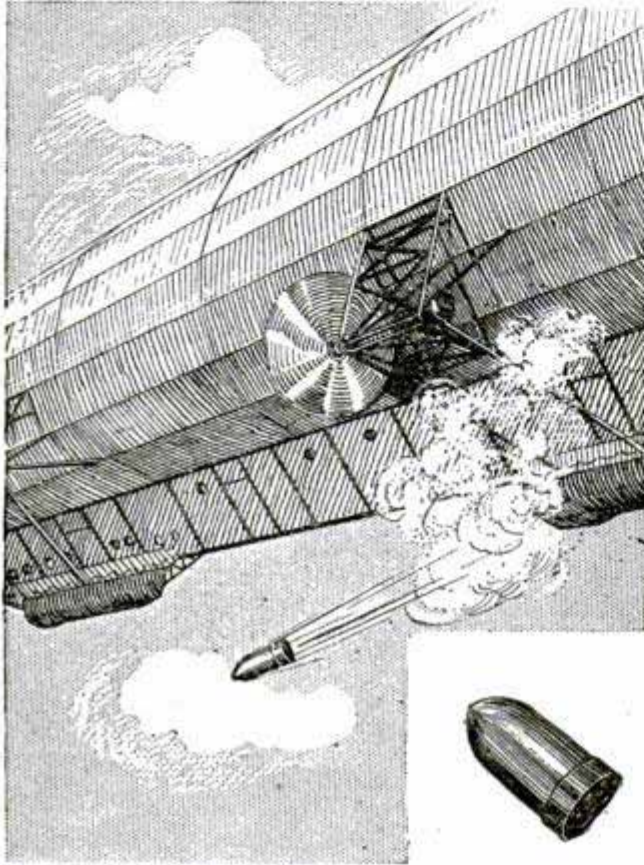
MONO-RAIL COASTER TO DIP UNDER WATER

A roller coaster being built at Coney Island, New York's great amusement park, embodies many new features, including a dip under the water. Instead of having two tracks, as do other such railways, the cars slide on a one-rail structure, which extends over the water as well as over the shore. The plunge under the water will seem to the passengers of the cars to be a genuine submarine dive, but in reality the cars enter a glass tube which has

its entrance and exit just above the water's surface. Water is sprayed into the air around the entrances.

"ZEPPELIN" ARMED WITH AERIAL TORPEDOES

In the event of a German war the Zeppelin type of dirigible balloon will be armed with torpedoes of the kind



Courtesy Black & White, London

Airship Armed with Torpedoes

shown in this illustration, which depicts an aerial war scene. The torpedo is the invention of Major Unge, a Swedish military officer, and has been purchased by the German government. It will be launched from a cradle hanging beneath the envelope of the airship. The torpedo is a steel shell carrying 4 lb. of high explosive, and it is driven through the air by a turbine at the rear, which is rotated by the smoke of a slow-burning compound within the shell.

IMPORTATION OF DESTRUCTIVE INSECTS

The brown-tail moth, which is causing so much destruction in eastern states, was accidentally introduced into the United States upon plants imported from Europe. Many other injurious insects have been brought in the same

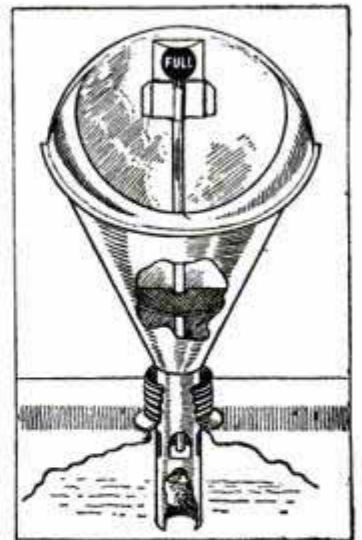
way, and the danger still exists in the absence of any national quarantine and inspection law.

The United States, according to the department of agriculture, is almost unique in its indifference to this great danger. Such quarantine and inspection laws are in force in nearly all the civilized countries of the world, and the amount of money that has been spent by the different New England states in fighting the gipsy moth and the brown-tail moth alone would support a national inspection service for many years.

Last winter, there were brought to the United States, mainly at the port of New York, thousands of apple and pear seedlings from France, which carried the winter nests of the brown-tail moth. These seedlings were distributed all over the country. An effort was made to trace all these shipments to their destination and to secure inspection and destruction of the insects before the opening of spring. It is probable that these efforts were successful, but the experience emphasizes the necessity for a national law.

INDICATOR-FUNNEL TELLS WHEN TANK IS FULL

A novelty in automobile accessories which will prove of considerable value is the funnel shown in this illustration. It has an indicator disc which tells when the gasoline tank is nearly full. The disc is concealed in a pocket on the inner side of the funnel, and from it runs a rod which carries a cork float and extends down into the tank. When the gasoline level rises almost to the top of the tank, the disc pops out of its pocket.

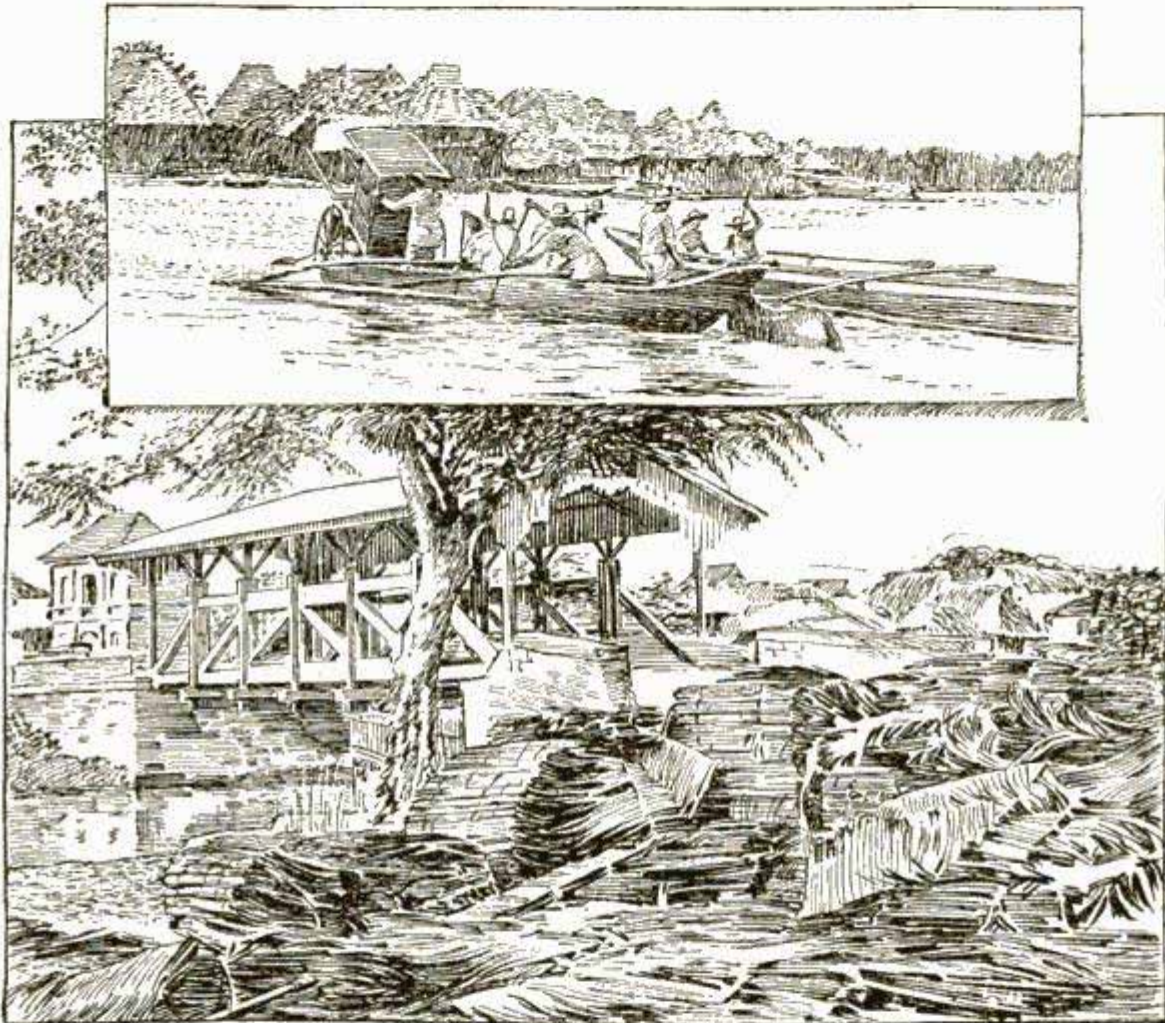


PHILIPPINE CONSTRUCTION ON LAND AND WATER

The accompanying illustrations show the nipa thatching with which the roofs of native Philippine buildings are covered, and a primitive ferry boat operat-

MOTOR FIRE APPARATUS IN CANADIAN NORTHWEST

It is usual to associate such up-to-date devices as automobile fire-fighting brigades with metropolitan cities or at least with communities in thickly



Primitive Ferry Boat—Philippine Lumber Yard

ing about seven miles from Manila. The nipa blades are bent double over a stick of bamboo, laced with blades of grass and piled up in the native lumber yards to dry. When dry they are overlapped on the framework of a roof in about the same manner as American shingles.

The ferry boat is transporting a native carriage across the river. The horse swims behind.

According to government estimates, the amount of wood annually consumed in the United States at the present time is 23,000,000,000 ft., while the growth of the forest is only 7,000,000,000 ft.

settled parts of the world, yet such an assumption is often a mistake. Far off in the Canadian Northwest are a number of little cities that are rapidly acquiring the "hustle and bustle" of more mature American cities, and one of these, Calgary, Alberta, is to have the first automobile fire-fighting brigade in the Dominion of Canada. The machine, which is intended to carry the crew, consisting of eight men, is equipped with a 60-gal. chemical tank and will be employed to answer all alarms in the little city. With its acquisition it is expected that the number of firemen at the substations can be cut down from six to three men, thus effecting a saving in salaries.

ARMED WITH DEADLY GRENADES

The shrapnel grenade, recently devised and furnished to the English



army, is one of the most deadly missiles of its kind ever invented for destruction. It can be fired from an ordinary army rifle, as was mentioned in a recent article in this magazine describing it. Weighing a little less than $1\frac{1}{2}$ -lb. it is propelled by means of an ordinary cartridge. Until a certain pin is removed from

it, it is harmless and will not explode accidentally, or even when struck by a bullet. The illustration shows a soldier of England's newly organized territorial force carrying two of the grenades in his ammunition belt.

The territorials, by the way, correspond to our own state militia, and the growth of the organization is one of the results of the German scare.

LICENSING PRIVATE WIRELESS INSTALLATIONS

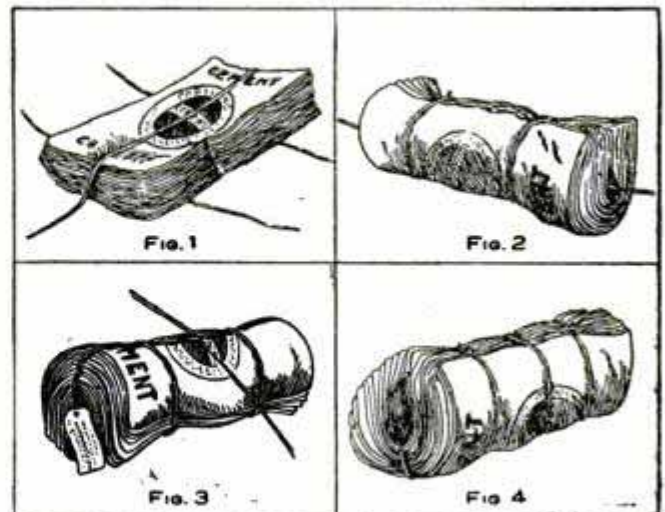
In England it is illegal to establish any wireless telegraph station or work any apparatus for wireless telegraphy except under and in accordance with a license granted for this purpose by the postmaster-general. Among the requirements are: The full name and address of person by whom the license is desired; particulars of the situation of the station or stations to which the license would apply; particulars of any other stations with which it is desired

to carry on communication; particulars of the purpose or purposes of the installation; general description of the apparatus, its normal range of signaling by day and by night, etc.

The idea, of course, is to make possible a supervision of every station, amateur or professional, so that confusion in the air can be controlled and done away with as much as possible. When the "Republic" was sunk, for instance, great difficulty was experienced in sending and receiving messages for several hours because of the confusion caused by so many stations signaling in the same zone.

RETURNING CEMENT SACKS

In returning empty cement sacks they should be laid out flat in piles of 50 each, then two ropes, 40 in. long, should be passed under the pile, one about 8 in. from each end, and a rope $8\frac{1}{2}$ ft. long laid lengthwise on top. Bringing the two short ropes up over the pile of sacks and tying them tightly rolls the sacks over the long rope, as shown in Fig. 2. The bundle is then turned over, and the long rope brought around it lengthwise and crossed in the middle of the bundle as shown in Fig. 3. Carrying the ends around the bundle sideways and tying it completes the operation, and the result as is seen in



Proper Method of Tying Cement Sacks

Fig. 4 is a compact package that can be easily carried, and that cannot be broken open by any ordinary accident.

NEW METHOD OF CONCRETE HOUSE CONSTRUCTION

A new method of combining reinforcing and concrete in the building of concrete homes is shown in these illustrations. It is an entirely original com-

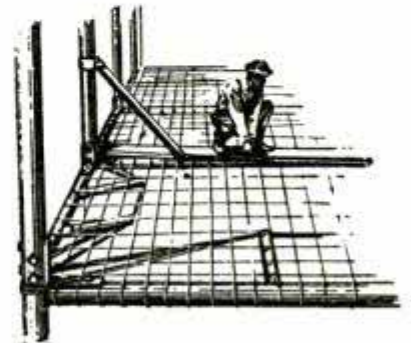
through columns and girders. After the pipe frame is completed, a system of horizontal trusses is constructed around the outside of the building on



Courtesy Concrete
Frame of Steel Tubing and
Wire



Completed House



Horizontal Truss System of
Floors

bination of steel tubing, wire, malleable fittings and concrete, and with the exception of piers, the concrete is not depended on to carry any of the load, but is used only as stiffener or body to the building.

The entire framework can be erected before the concrete work is started, making it possible to inspect the position and quality of the steel and to erect a building in much shorter time than if required by other methods. No forms or centering are required, which is another great advantage.

The walls and floors are hollow, which reduces the weight of the building to a minimum, and the strain on the floors is carried by wire in tension, tests showing, it is claimed, that steel used in this way gives nearly twice the strength of other forms of construction. Every partition, floor and ceiling is interwoven with wire, and all steel and wire is incased in cement, which prevents corrosion or rust. The exterior is of cement mortar, which permits any finish or form of ornamentation desired.

A complete skeleton of steel tubing is first erected, all pipe being cut to length and drilled at the shop. The tube columns they form extend down to the basement floor and rest on concrete piers. None of the pipes are threaded, but are put together with special malleable fittings, bolted

the level of the floors, and to these are drawn the floor wires.

After the truss wires are put in place, wire is drawn around the girders in both directions, either the entire length of the structure or in such sections as desired. This process gives a continuous wire drawn under a tension of nearly 1,000 lb., left free to adjust itself to the strain as applied.

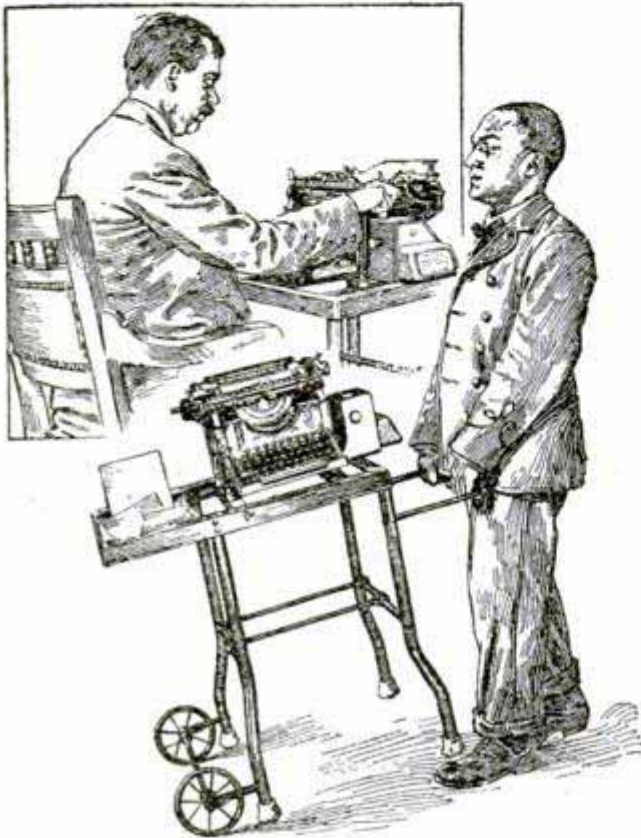
To serve as a medium to hold the concrete until it is hardened, expanded metal or wire cloth is placed under the top wires of the floor and to the vertical wires of the outside walls. In constructing the floors, the concrete is then dumped or shoveled onto the mattress thus formed and leveled off to an even surface. In the wall construction, the cement plaster is put on in the same way as any other plaster finish, the same also applying to the ceilings, to which is applied the wire cloth after the floor above has hardened.

THE "LOUISIANA'S" TROPHIES

The crew of the U. S. S. "Louisiana" prides itself on having more cups and trophies than any other ship in the American Navy. Among them are the Battenburg cup which stands about 26 in. high and is of solid gold, and 16 trophies of silver, attesting to the excellence every ship in every navy strives for.

DROP A NICKEL: GET A TYPEWRITER

The nickel-in-the-slot typewriter is about to be installed at leading hotels, on ocean steamers, trains, etc. If you



A New Public Accommodation

want to use the typewriter, you drop a nickel in the slot and it is workable for half an hour, at the end of which time it automatically locks itself up again. Another nickel releases it for a second half hour. A guest at a hotel can have these slot typewriters taken to his room by notifying the clerk. They are wheeled up by one of the bell boys as shown in the photograph.

HOSPITAL SHIP SERVES FISHERMEN

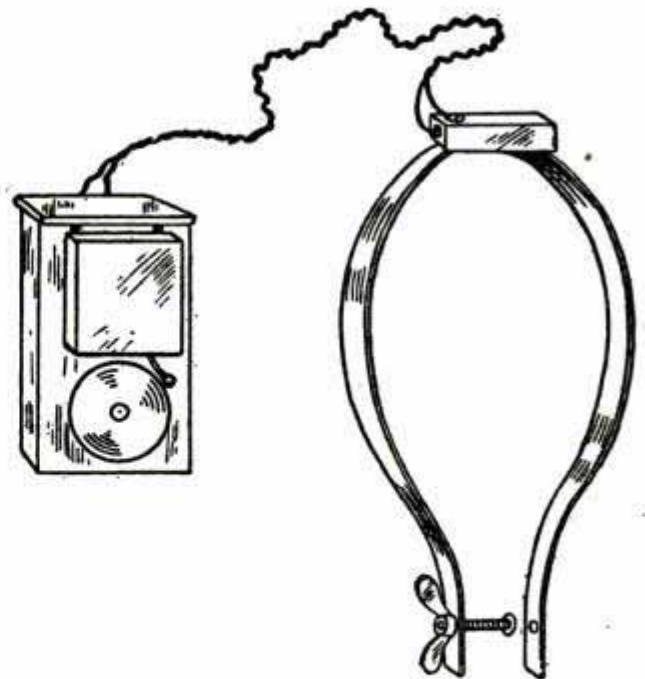
Of all hospital ships probably one of the most interesting is that which patrols the ocean in the vicinity of the Quero fishing bank and ministers to all fishermen irrespective of nationality or creed. It is a French hospital ship and captains of the fishing vessels report that the good done by it in a season cannot be overestimated.

It frequently happens that a mem-

ber of the crew of a fishing vessel receives injuries in the discharge of his duties which require immediate expert medical attention, or becomes ill. To get help for him a vessel may have to leave the grounds just when the fishing is at its best, but if the hospital ship can be hailed much valuable time can be saved. The ship is supported by subscriptions from all the fishermen that can afford to help.

ALARM ANNOUNCES HOT BEARINGS

A device, consisting of a tiny tube and bulb filled with mercury, into which are set the positive and negative terminals of an electric battery, has been designed to give the alarm when the bearings of an engine become overheated. The mercury tube is inserted in a case, 2 in. square, to prevent breakage. On the heating of a bearing the mercury expands and reaches the terminal at the upper end of the tube. This closes the circuit and the bell rings. When there are a large number of bearings, an indicator board is provided to show just which bearing is hot, thus saving the necessity of a hunt



Hot-Bearing Annunciator

for the one affected. The device is in fact an engine-room detective, and can be used on large steamships or small motor boats.

EDITORIAL

The possibilities of the automobile in warfare have certainly been overlooked by the military authorities; although the great mass of "citizens on foot" have known it for a long time. It is true Germany and England have built a number of armored motor cars carrying rapid-fire guns, but they would appear almost harmless beside the plain, every-day article, when properly applied.

The ancients set much store by their war chariots, some of which were provided with great scythes, sharp as razors, which projected on either side of the chariot. When a battery of these led a charge they literally mowed down the enemy by hundreds before the drivers and horses could be slain.

Hundreds of years later, in fact only a few weeks ago, the idea is re-incarnated and comes to life at a review of the Colonial, or volunteer, corps in an English village. A party of newspaper reporters, embarked in an automobile, were taking notes and making pictures of the event, and for a time all went well. The car was one of the common, ordinary variety, guaranteed to stand without hitching and all that. Whether after centuries of lethargy the genii of the machine became suddenly aroused at the sight of soldiery, and possessed of an uncontrollable desire to again plunge into a sea of blood, or whether it was a simple case of the chauffeur getting rattled, matters little. The important fact is that the car which had been standing docile at one side, without warning plunged into the lines of some 500 troopers, which broke in consternation. During the few seconds of its activity the machine knocked down or ran over several score soldiers, and before it could be calmed into obedience had filled a big hospital with the wounded and injured.

Had the attack come from a company of German cavalry or infantry with rapid-fire guns, or even an airship, it is believable the Colonials would have stood their ground until the last man fell; but the awful, irresistible panic of a wild and enraged motor car—and only a two-cylinder car at that—was something which put the bravest to flight.

In explanation it is offered that the action of the troopers was involuntary, like the closing of one's eye to danger; that the habit of leaping and breaking away on the approach of a car had become so fixed as to be practically automatic. The average citizen, however, would always be inclined to make considerable allowance for a firing line which became restless on the approach of an hundred motor cars abreast, at 45 miles or more per hour.

* * *

As our readers are likely to be served with coal which has been whitewashed, an explanation of this novel and unusual condition is in order. Whitewashing coal is not done to improve its appearance or increase its burning qualities; the treatment neither improves nor harms the fuel. It is a detective scheme on the part of the railroads to locate and prevent theft of the coal as it is hauled from the mines to the consumer. These depredations amount to thousands of tons annually, and the railroads are the sufferers, as it is up to them to deliver as many tons at destination, often a thousand miles away, as was weighed in when the car was turned over for transportation.

Two or three tons may be removed from a carload containing forty tons without attracting attention to its decreased quantity until the car is again placed on the scales. To locate the loss, lime water is sprayed over a trainload of coal. In a short time the water has evaporated, leaving a load of white coal. Then removal of any coal leaves a big black spot which is quickly noticed by inspectors and station agents and the leak found and stopped.

* * *

The crossing from France to England in an aircraft, while at present remarkable and unusual, presages the day when such flights will cease to cause newspaper mention. As the machines require no light visible from below, and can travel in the dark, their development would seem to provide unusual facilities for the smuggler. Articles of size and weight would not be available, but the small and costly things, such as diamonds and other jewels, and certain drugs, etc., offer a cargo of great value which can be carried in hand satchels.

The "State Roads" of Massachusetts are models of what the country highway should be. It is said there are as many miles of really "good" roads in that state as in all the other states combined. However this may be, the experience and example of Massachusetts is being felt throughout the east and communities which formerly fought road improvement are now rapidly changing their minds, for thousands of motor cars are touring through New England and scattering tourist money in their wake. Not only New Englanders', but hundreds of cars from the Central West are there. The good roads influence is even crossing the line and the counties in Quebec bordering on Vermont and New Hampshire are waking up and inviting tourists from this side by good roads.

In those local sections, especially in the Middle West where road building is expensive on account of scarcity of suitable material, we believe some temporary help might be obtained by erecting a box in which contributions could be placed by users of cars going over the road. A notice over the box stating the road commission was handicapped by an insufficient appropriation and that every cent contributed would be spent on that particular piece of road might call out some quarter and half dollars which in the course of a season should help considerably. The success of the plan, however, would depend on the road commissioner showing results. The contributions would not be expected to do more than repair some of the worst places.

* * *

A fine point in law is likely to develop with the perfection of flying-machines. In other words, "Is there a High Seas in the air?" At present an owner might welcome the landing of an airship on his property because of the distinction such an event would give him in the eyes of his neighbors; yet there have already been numerous cases of damage caused by falling ballast or low-hanging anchors, and as aircraft increase there will doubtless be more serious and frequent cause for complaint, and legislative action may be necessary to define limitations of ownership. According to Blackstone, "Land hath also, in its legal signification, an indefinite extent, upward as well as downward."

The courts have repeatedly declared the shooting of a bullet over another man's land to be a trespass, even though the offender owned the land from which he shot, and the land on which the bullet came to rest. A celebrated English judge, Sir Frederick Pollock, states: "Clearly it would be a trespass to sail over another man's land in a balloon, much more in a controllable airship, at a level within the height of ordinary buildings, and it might be a nuisance to keep a balloon hovering over the land at even a greater height."

* * *

The roughly finished, crudely executed examples of concrete in residence construction are rapidly giving way to ornate and attractive homes, many of them costing well up in the thousands. Because a house is small it need not be inartistic, serving merely as a shelter and little more.

The best architects are taking advantage of the infinite adaptability to which cement lends itself, and what was once only a poor imitation is rapidly coming into a class of its own. Many of the early types were built after the often erratic ideas of the owners with the result that imitation pillars which in real stone would support a massive edifice, were made to uphold a porch roof about as expansive as a dining room table.

When builders began to use cement as cement, the result was as pleasing as the imitative efforts were freaky and atrocious. What is being done in the way of handsome residence effects in cement will be seen in these pages during the next few months.

Smoothly finished cement, either in the white or a gentle tint, makes a background with great possibilities and the planning of a cement residence is an instance where the landscape gardener and the architect should work together from the start if the most satisfactory results are to be obtained.

H. H. WINDSOR.

TARGET AND FORMATION PRACTICE OF THE "BATTLE FLEET"

During the summer months the cannonading of the North Atlantic fleet was almost continual along the Atlantic coast, first in and around Cape Cod bay, in the vicinity of Provincetown and Boston, then in the deep-sea drills 30 miles off the Virginia capes. On many days the cannonading could be distinctly heard in Boston, even when the fleet was out 30 or 40 miles, while on other days, when the fleet was in closer, the reports rattled windows and shook buildings along the shore of the bay.

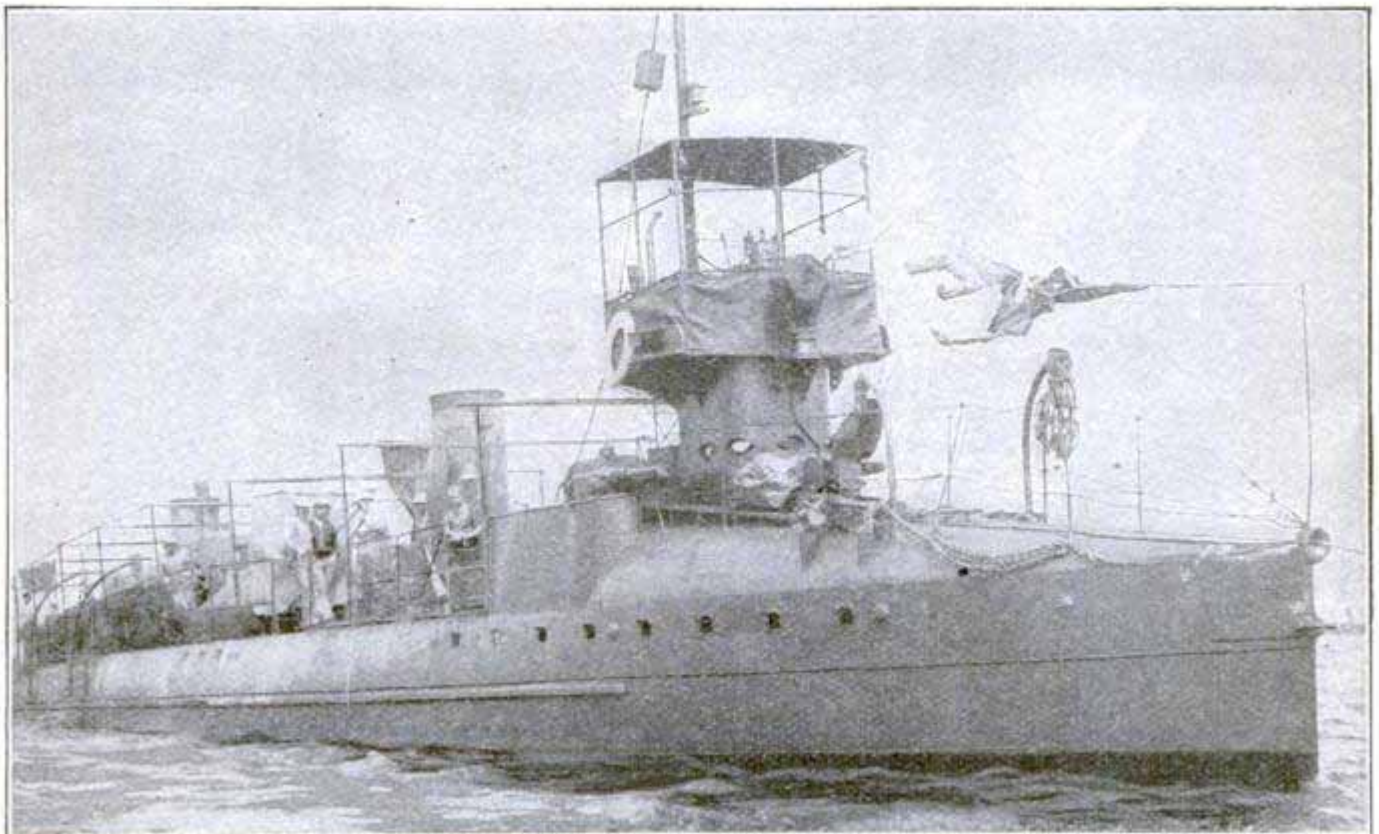
In towing practice, which is one of the new and most interesting features of the drills, the vessels often approached as close as a mile to shore. This practice consisted of one great battleship towing one or more of her mates, the idea being that if in battle one ship becomes disabled because of damage to her machinery, another should take her in tow, thus making it possible for the disabled ship to continue the fight in battle formation, or to beat a retreat.

The target practice of the summer

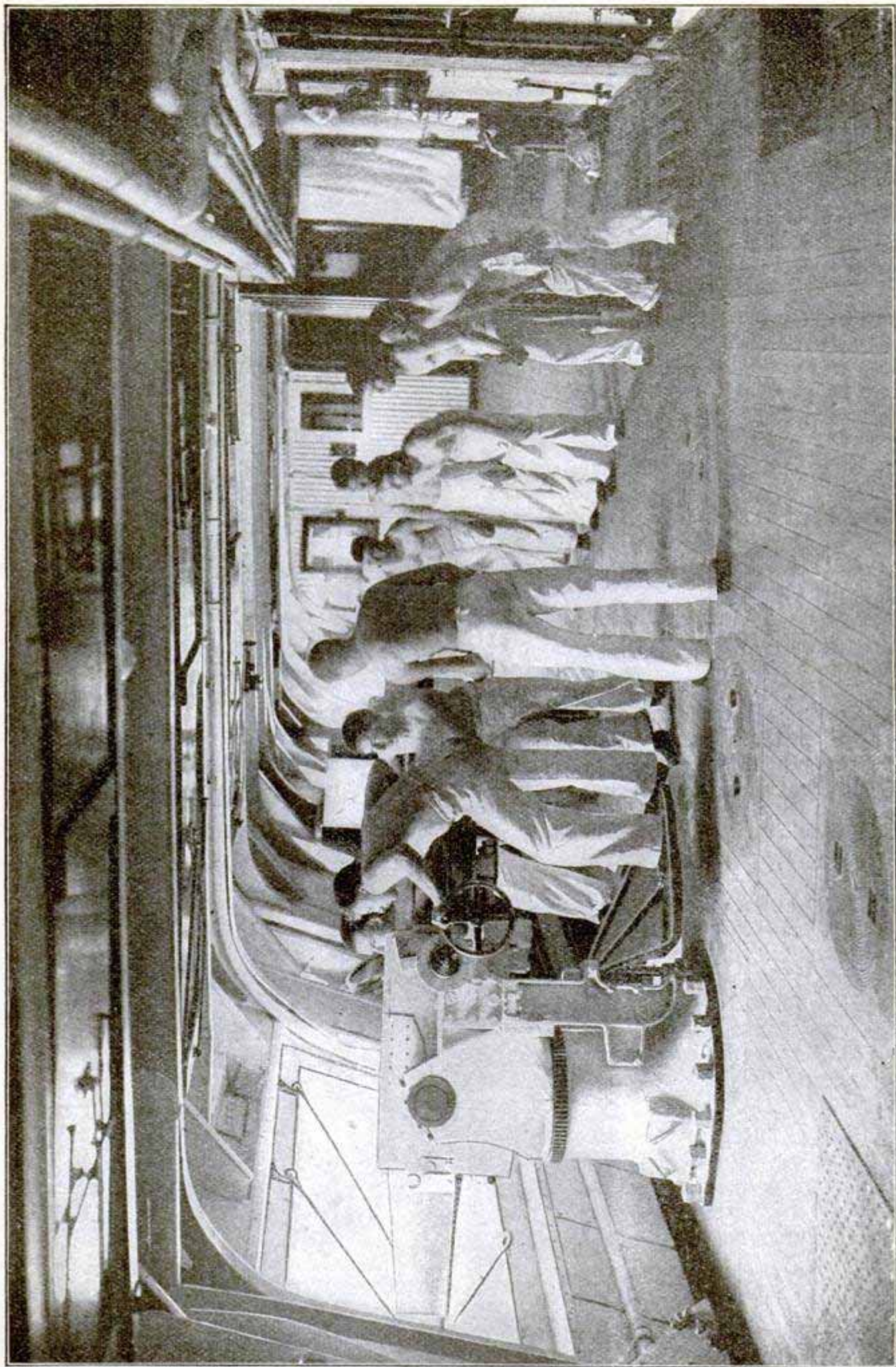


Telephone Signal System

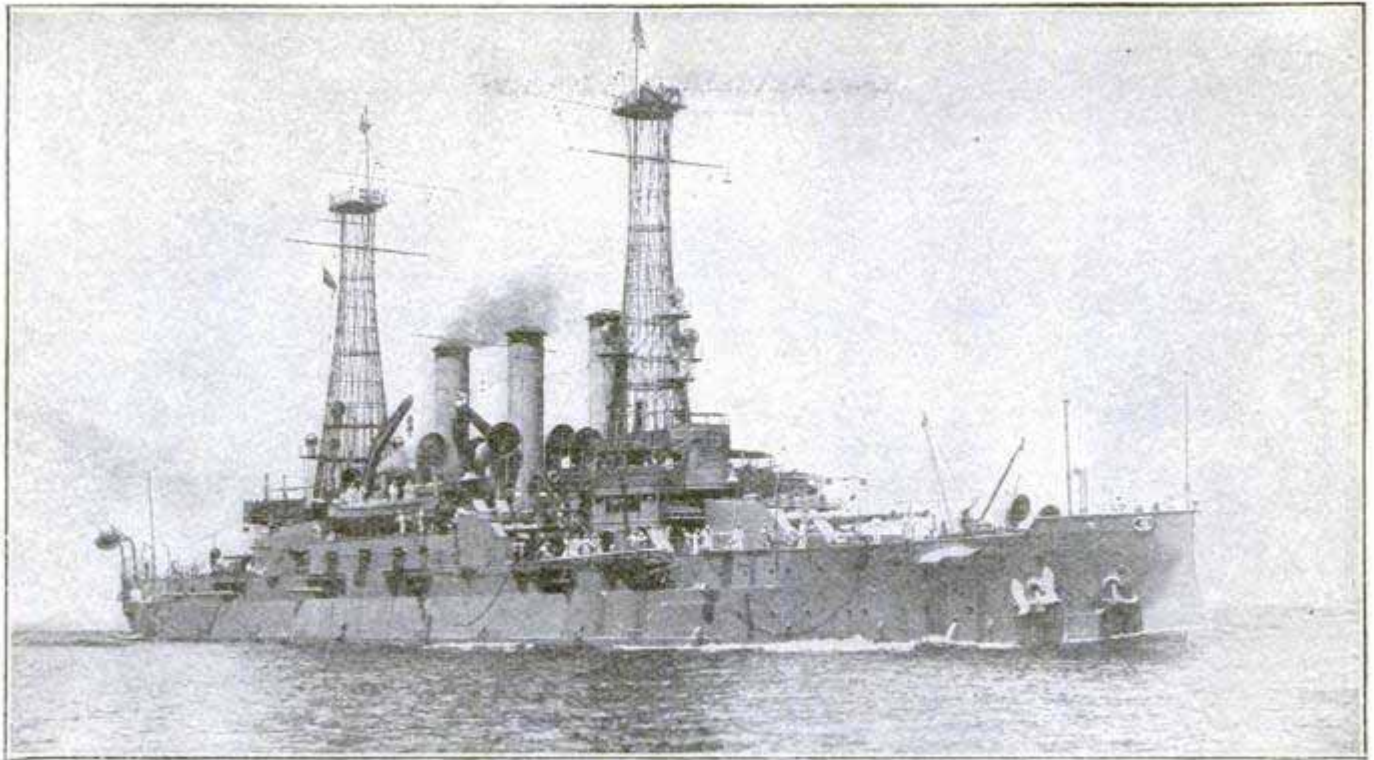
months also gave the fleet the opportunity to thoroughly test out the effi-



U. S. Torpedo Boat "Biddle"



Scene 3: veen Decks in Action

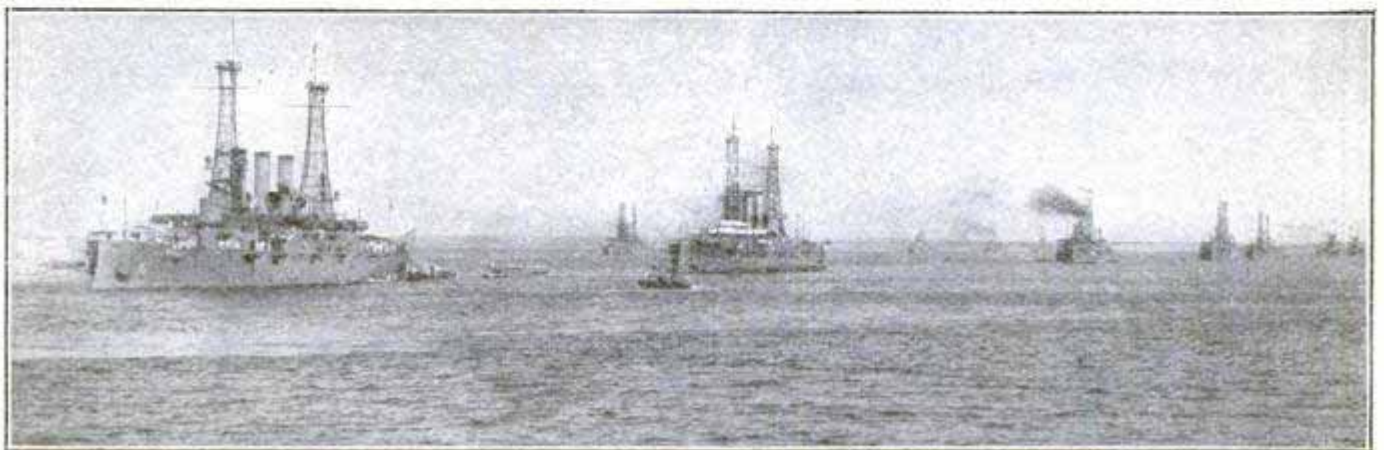


"Connecticut," Flagship of Atlantic Fleet

ciency of the new fighting-tops and the new telephone signal system. This system is one worked out during the world-girdling trip, the mechanics among the crews fitting up the instruments. The first requirement was a telephone that could be effectively used during the deafening turmoil of a sea fight, and the second was an instrument that would leave the gunner's hands absolutely free. The instrument devised is shown in one of the illustrations. The receivers are fastened to the ears of the gunner by a harness attachment that fits over his head and straps under his chin. A pad of felt or other material fits around the receiver proper as a brim fits around the crown of a straw hat, and this drawn tightly against the side of the head deadens

outside sound. The transmitter is fastened to the chest in such a position that the gunner can shout into it by slightly inclining his head. The officer at the fire-control mast telephones his orders to the captain of the turret, who transmits them to the man working the gun. Should the fire-control mast be shot away, the fire-control officer can plug his telephone into connections arranged at other vantage places and on the deck.

In the illustrations are shown the flagship "Connecticut" as she appears with the new lattice-work fighting-tops; a view of the fleet, so equipped, as it was steaming just outside Provincetown Harbor; one of the smaller guns below decks while in action, a close view of the torpedo boat "Biddle," and the telephone apparatus mentioned.



Atlantic Fleet Outside Provincetown Harbor—Flagship in Left Foreground

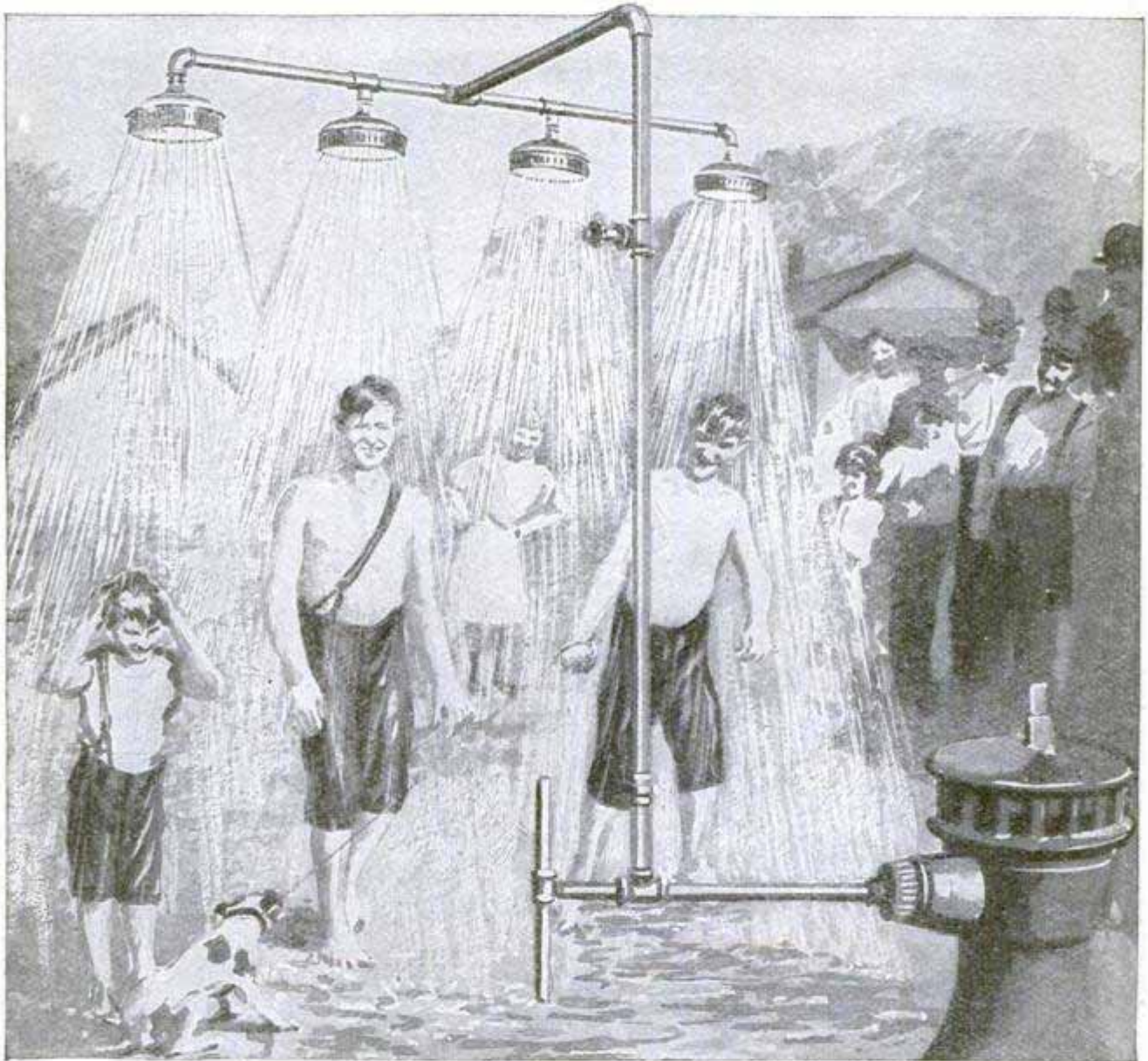


SCENES ACCOMPANYING SPAIN'S RECENT TROUBLES—1—Destruction on a Railroad, Barcelona; 2—An Overturned Street Car, Barcelona; 3—Barricade Shelled by Soldiers, Barcelona; 4—Spanish Soldiers Kissing the Forehead of Lieut.-Colonel Marin, Killed at Melilla.

PORTABLE STREET BATH DELIGHTS THOUSANDS

Through the genius of E. T. Bingham, superintendent of the Helping Hand institute of Kansas City, several thousand children in the thickly populated tenement district of that western city were made happy through the hot summer days by means of a portable shower bath. Simple indeed is the shower device, so simple, in fact, that

other, the whole costing only \$5 to make. Each afternoon an employe of the society carried it through the thickly populated part of the city, stopping every block or so to connect it with a water plug. The boys soon learned to watch for it, and to prepare for the bath by donning, if they saw fit, still older clothes. In this way several thousand



Portable Shower Bath on Kansas City Streets

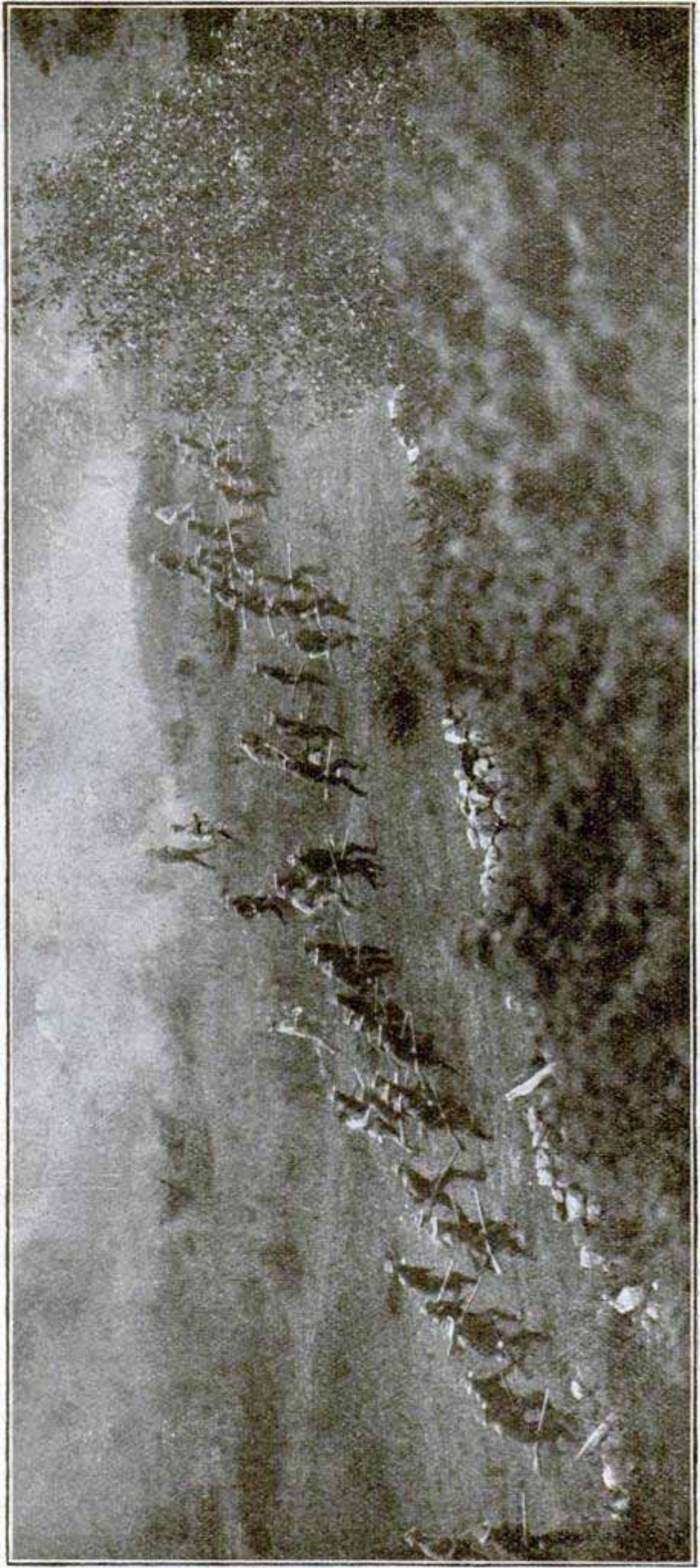
it can be adopted with excellent results by all the large and congested cities of the country, but like many inexpensive things its mission is of great importance.

It is composed of several lengths of 2-in. iron pipe with a water plug connection on one end and four common shower bath sprays arranged at the

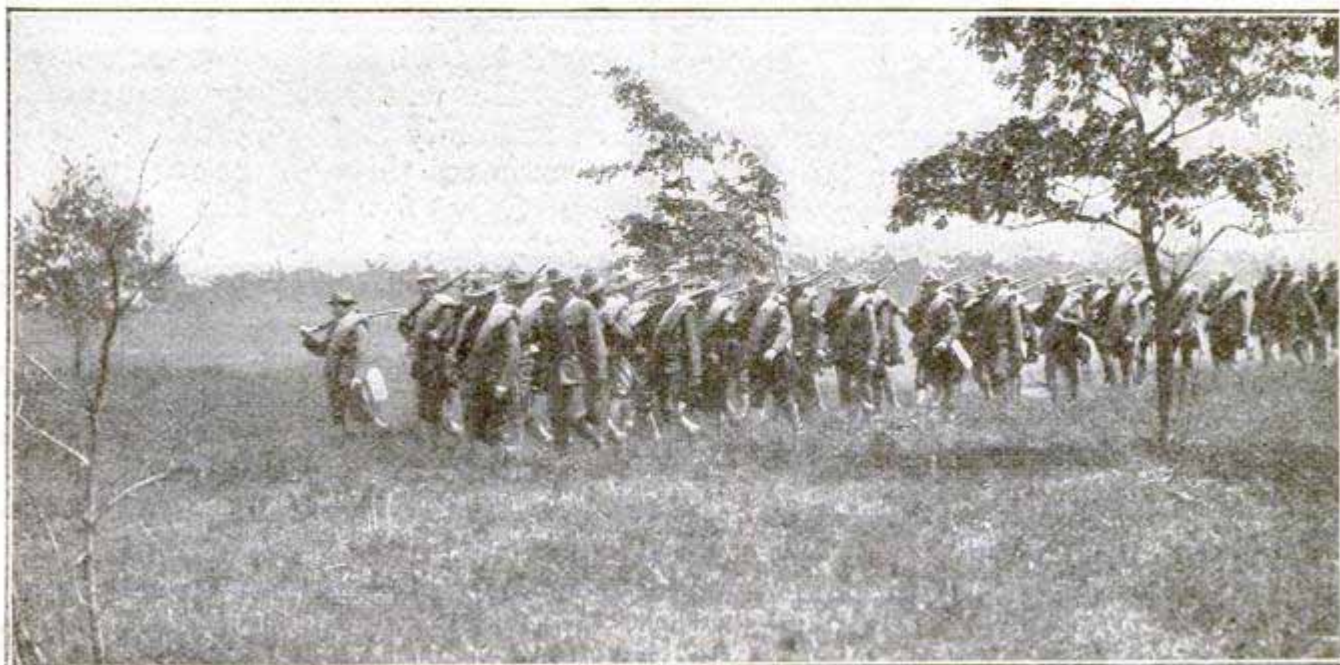
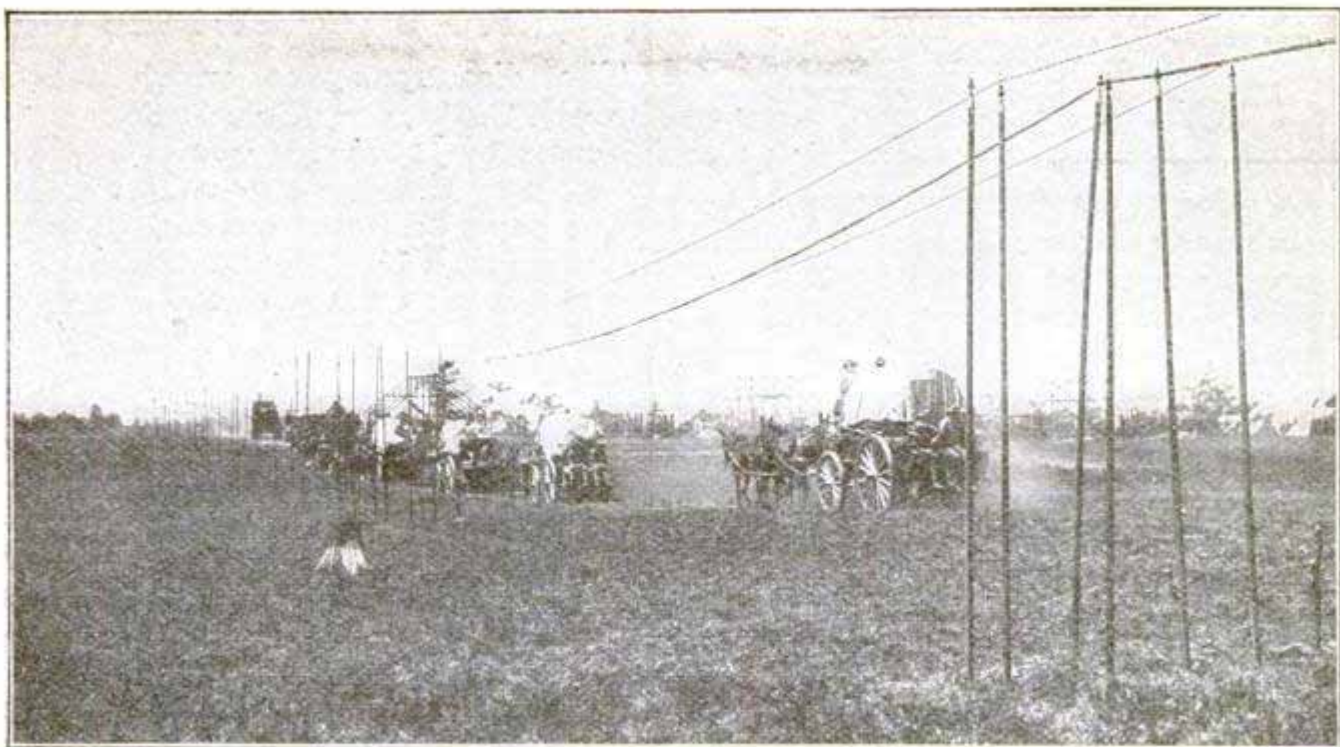
children were given a street shower bath once a day.

The city provided the necessary water free. Men, women, and even horses, as well as the children, are also given the privilege of a bath.

The submarine cables of the world have a total length of 278,208 miles.



Detachment of Cavalry Moving to Take Enemy in the Rear—An Engagement Detachment of Infantry Come Across Advance Force of the Enemy



Building a Military Telegraph Line — Sniping the Enemy from the Shelter of Sand Dunes — At an Easy Stride Through Level Country

THE MIMIC WAR AROUND BOSTON

The war game held in August, in which some 14,000 militia, divided into an invading and a defensive army, battled in mimic warfare for the possession of Boston was probably the most extensive ever played in the United States. The invading force, known as the Red Army, was composed of militiamen from New York, New Jersey, and the District of Columbia, while the defensive force, known as the Blue Army, was mainly composed of Massachusetts militia.

The campaign lasted nearly a week, and before it was over a theoretical fleet of battleships, consisting of transports, tugs and mine-planters, masquerading as "Dreadnoughts," cruisers, and torpedo boats made night attacks on the Boston harbor defenses. The harbor forts received reinforcements from New York in the form of six companies of coast artillery, a total of 750 men.

The illustrations show cavalry and infantry charges, the method of bringing field telegraph into operation, and fighting from the sand dunes.

CURTISS MACHINE BREAKS AMERICAN CROSS-COUNTRY RECORD

The aeroplane in which Glen Curtiss made his 52-minute flight and which he later sold to a New York aeronautic society, made a cross-country flight of 12 miles in 19½ minutes on Aug. 13. The machine, which is known as the "Golden Flyer," was operated by C. Foster Willard, and the trip exceeded the 10-mile flight which won for the Wrights the U. S. government contract. Willard's route lay around an irregular square and carried him from Mineola, N. Y., over Garden City, Westbury and Hicksville, all of the same state. He came to earth when only two miles remained to be covered to carry him back to the starting place, because telegraph wires slightly deranged his magneto.

JAPAN'S GREAT FIRE

The disastrous fire which raged through Osaka, one of the three Imperial cities of Japan, Saturday, July 31, ate its way through four square miles of the city's best architecture, destroying more than 13,000 buildings, including the stock exchange, the museum, government edifices, temples, banks, and factories.

The conflagration lasted more than 24 hours, the flames, fanned by a strong wind, jumping from building to building despite the efforts of the fire department. The list of deaths may never be complete, but the hospitals overflowed with the hundreds of seriously injured.

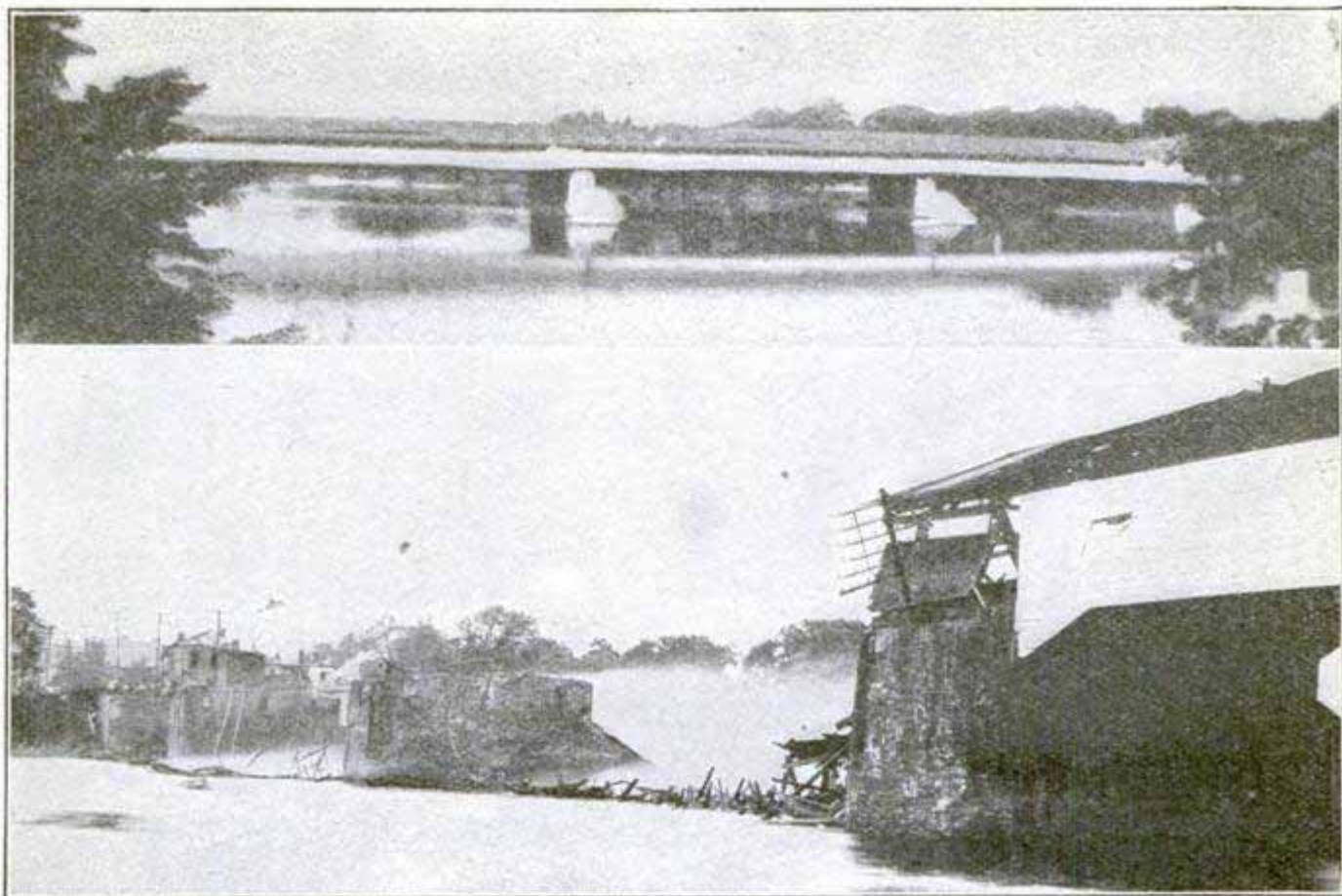
In 1898 the population of Osaka proper was given as 821,235, and with the suburbs included, 1,311,909.

WIRELESS WARNS OF EARTH- QUAKE

The weather stations of California reported a slight earthquake in the vicinity of San Francisco on Aug. 4, but A. S. Macdonald, of Oakland, was conscious of the disturbance two seconds before it arrived, although the movement was so faint that the quake was not generally known even after it was over.

Macdonald's information that something was about to happen came through his wireless telegraph instrument. He was awaiting a message, when suddenly a sharp, crackling rumble was heard through the receiver. It lasted fully five seconds and then stopped. About two seconds later the quake occurred, but the instrument had given at least a couple of seconds' warning that one was coming. The only way the operator accounts for this somewhat new mission of the wireless telegraph is that the disturbance in the earth was picked up by the ground current.

Electric lifting magnets are being used by one of the large steel companies in handling railroad rails.



Appearance of Bridge Before the Fire and After

OLDEST BRIDGE IN NEW YORK BURNED

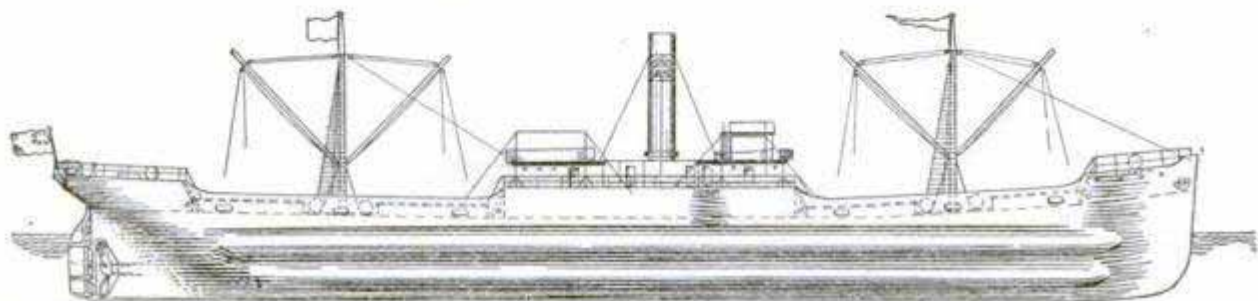
The covered wooden bridge across the Hudson river, connecting upper Troy and Waterford, was burned on July 10. This bridge, of which the illustrations show its appearance before and after the fire, was the oldest in New York state, having been opened to the public after six years of work in 1804.

THE FIRST "MONITOR" STEAMSHIP

The first "monitor" steamship, an interesting type of vessel construction recently patented by an English ma-

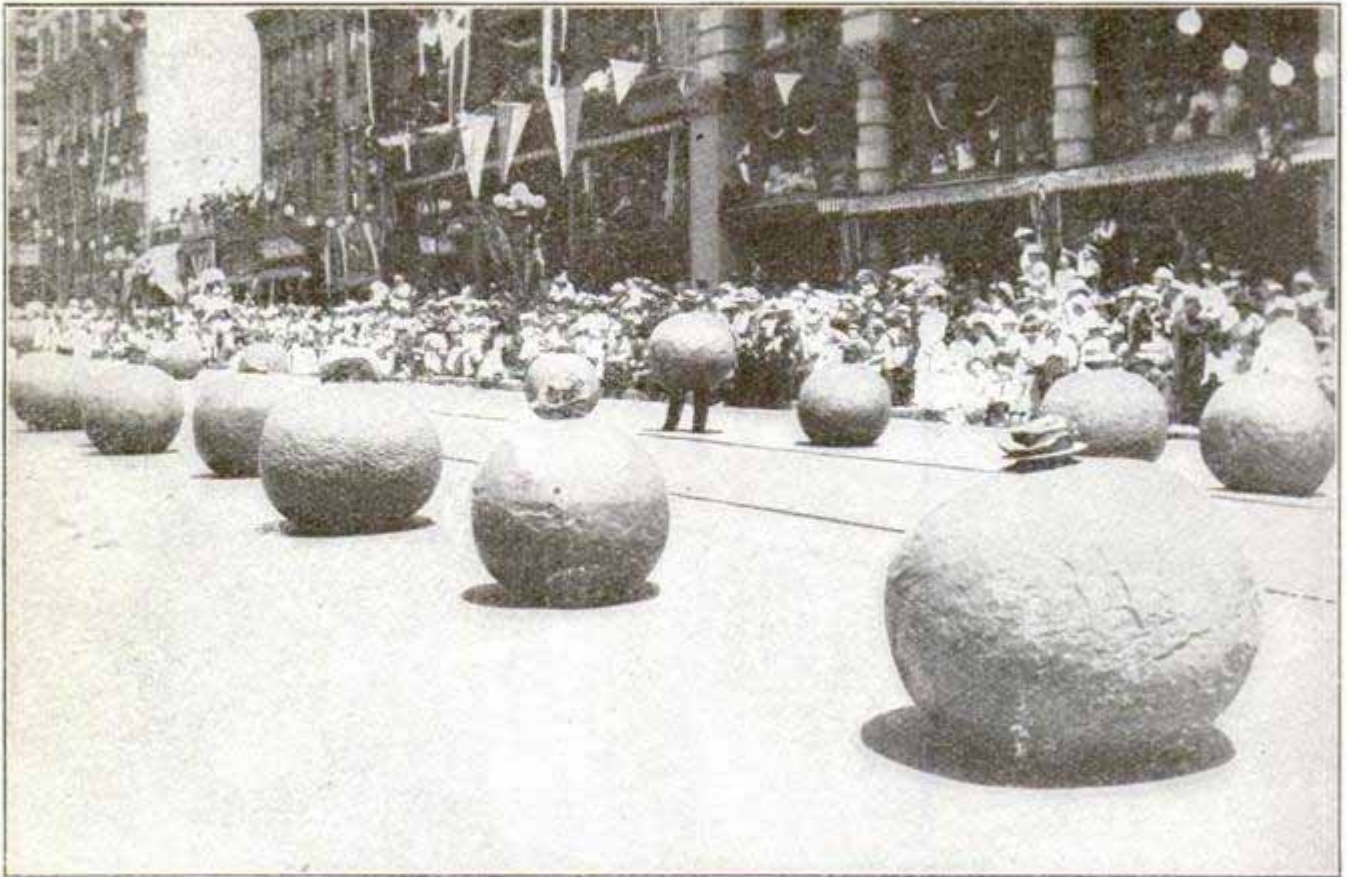
rine engineer, has just been launched for a Newcastle shipping company. It has a length of 279 ft., an extreme breadth of 41 ft. 9 in., and a depth of 20 ft.

The distinctive peculiarity of the new vessel, three of which are now building, is the groove formed by the long corrugations between the light and load waterlines along practically the entire length of the hull on both sides and merging into the ends fore and aft. The builders claim that this feature adds to the displacement and cubic feet capacity, without at the same time increasing the registered tonnage; that the hull is strengthened thereby, that a greater resistance to rolling is afforded, and that a greater speed is possible.



Courtesy Shipping World, London

Eliminates Part of the Rolling of Ships



An "Elk" Inside of Every Orange

PAPIER MACHÉ ORANGES IN PARADE

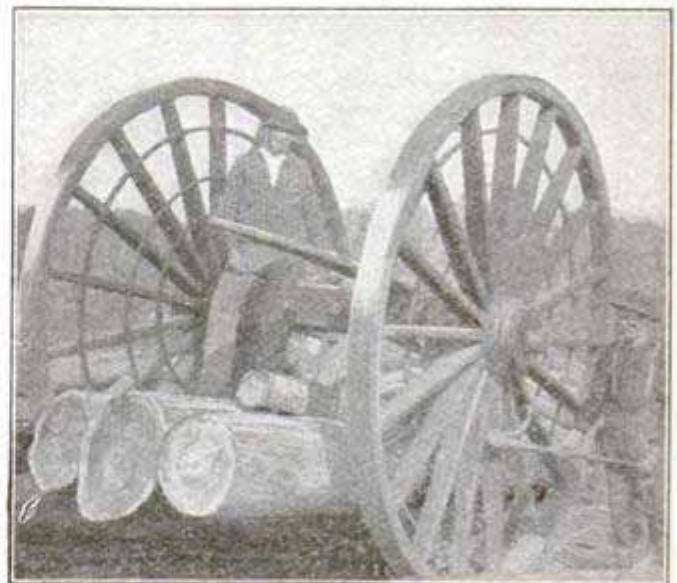
One of the most interesting parade sights during the convention of the Elks at Los Angeles, Cal., was the delegation from Santa Ana, Orange Country, in its papier maché marching costume. Each huge orange in the illustration contains a full-grown man, all but one of whom is seated inside his orange skin, resting from the fatigue of the march.

TUNNEL PROJECT TO CONNECT SWEDEN AND DENMARK

A tunnel project to connect Copenhagen, Denmark, and Malmo, Sweden, is at present the subject of much discussion in both countries. The plan is to run an electric railway through such a tunnel, the distance between the two places being about 18 miles. The journey between these points in Denmark and Sweden now takes nearly two and one-half hours, while by the submarine electric railway this time would be cut down to about 40 minutes.

WHEELS 11 FT. HIGH

Near Mancelona, Mich., the ground is so soft that an ordinary wagon with a heavy load of logs would find progress difficult through parts of the forest. The overcoming of this condition has caused one company to build several wheels of the kind shown in the illustration. The wheels are about 11 ft. in diameter, and two of



Michigan Logging Wheels

them, joined by a heavy axle, suffice to draw as many as three heavy logs.

HOTEL'S CREST ON EVERY BED

Nearly every hotel in America has its name or crest stamped on its china, silverware, linen, and other such articles, but a hotel in San Antonio, Tex., is believed to be the first to have its crest branded upon the beds. The idea of stamping the smaller articles, of course, is as a precaution against having them carried away by absent-minded guests, but it hardly seems possible that the same reason would apply to the brass beds.

DIVER WORKS IN LAKE 500 FT. UNDER GROUND

Five hundred feet beneath the surface near Scranton, Pa., is a subterranean lake that covers acres and drains a large system of anthracite coal mines. Down at that depth and at the edge of the lake is a pump room containing a centrifugal pump which forces 4,500 gal. of water to the surface per minute during 12 out of each 24 hours. In addition to this is a bucket hoist which drops two huge buckets into the lake, lifts them to the surface, and dumps them into a great concrete basin with a splash like a miniature Niagara. These buckets lift alternately 4,000 gal. of water, and the pump and buckets together, by discharging a volume of water equivalent to the surface and underground drainage which continually trickles and flows into the mines, protects millions of dollars of property and insures safety to the miners.

Recently it became necessary to remove the old iron brackets which held the timbers at the base of the water hoist, 30 ft. beneath the water of the subterranean lake, and to replace them with non-corrosive bronze brackets. To accomplish this, the coal interests made a demand on a New York wrecking company for a submarine diver. They sent Capt. Everett, probably the oldest diver now actively employed, and dressed in the outfit in which he has made many downward trips into the ocean, he, for the first time in his experience, slipped into a subterranean

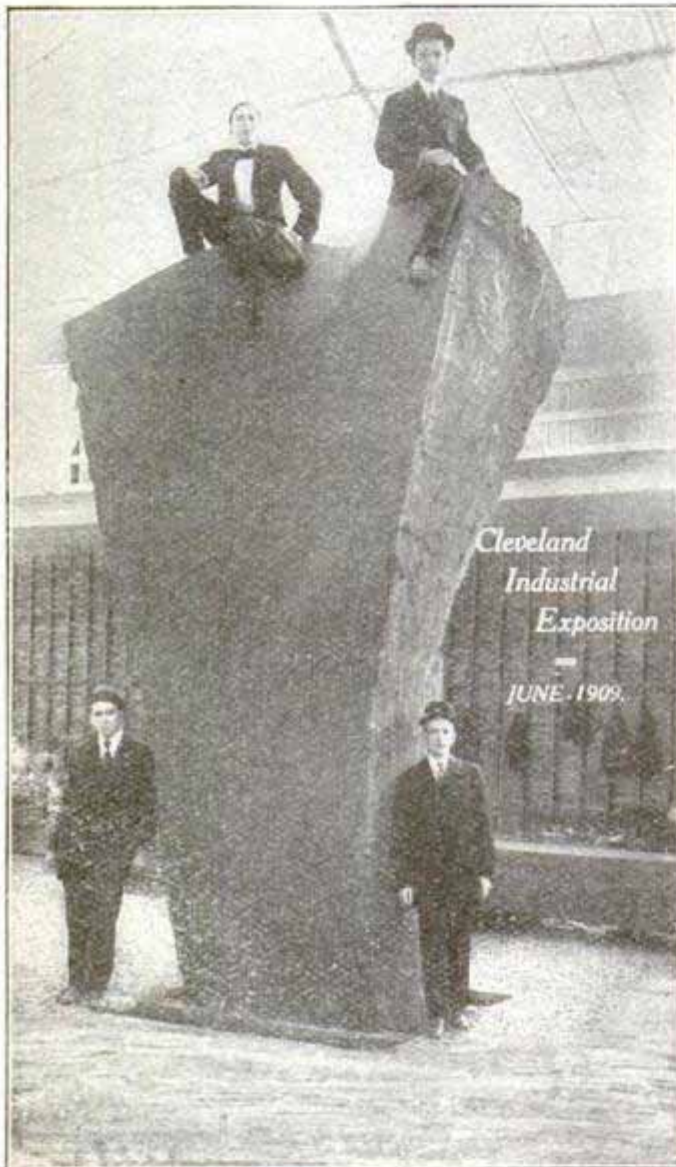


Ready to Descend into Subterranean Lake—Hoisting Water from the Mine

lake. His work required the unscrewing of the nuts of 66 rusty bolts before he could remove the iron brackets, and the substitution of the new brackets, all in total darkness.

MAHOGANY CROTCH WEIGHS 16,800 POUNDS

The illustration shows what is



Giant Mahogany Crotch

claimed to be the largest African mahogany crotch ever brought to any market. It drew considerable interest at the Cleveland Industrial exposition in June, its length being 14 ft., its width, 9 ft., and its weight, 16,800 lb. It contains 2,700 board feet.

FEW FOREST FIRES IN EUROPE

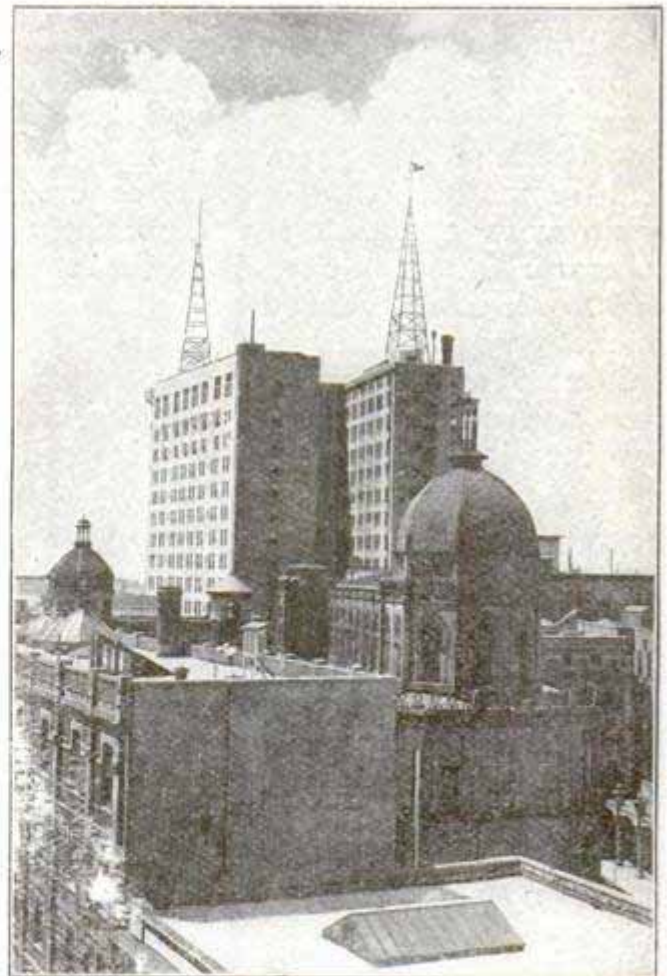
The reason why there are so very few fires in the forests of Europe as compared to the American forests is claimed to be because when trees are cut in Germany, France, Switzerland, and in fact all continental countries, the entire material of the tree is removed and marketed. No inflammable material is left

on the ground, while in American forests, owing to the lack of market for such material, fully one-half of the tree—the limbs, smaller branches, twigs, and foliage—are left upon the ground, where they become dry and furnish material for a forest fire.

In the European forests, says a writer in *Outing*, every part of the tree, including the smaller twigs, is sold, the sale of the parts American lumbermen throw away constituting over one-half the revenue.

DOUBLE WIRELESS INSTALLATION ON HOTEL ROOF

The wireless installation shown in this illustration is on the roof of a hotel in New Orleans, La. The towers reach a height of 350 ft., the highest point for several hundred miles in any direction from New Orleans. It is believed that communication will be possible direct



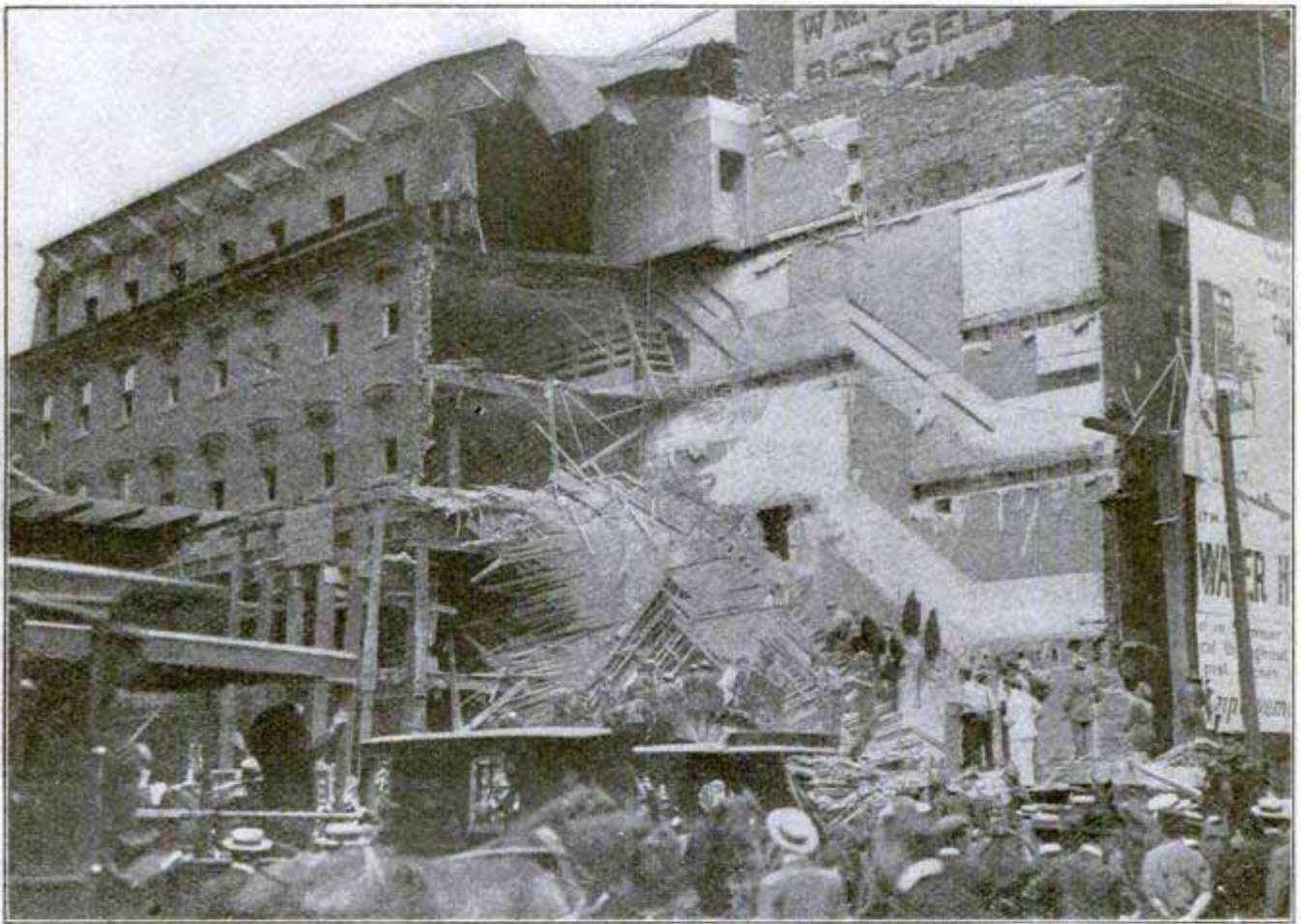
New Orleans Hotel Equipped with Wireless

from New York, Chicago, and many of the other cities of the country.

COLLAPSE OF PHILADELPHIA BUILDING

This building, at Eleventh and Market streets, Philadelphia, was in process of reconstruction when on July 15, without warning, the entire front half collapsed with a dull roar, killing six persons and seriously injuring 24 others. Following the collapse, the neighborhood was enveloped in a dense cloud of impenetrable dust, the debris completely blocked both streets, and

but several pedestrians who were passing at the time were numbered in the list. Many were miraculously saved by heavy timbers wedging above them in such position as to shield them from the falling masonry, and were eventually rescued from their imprisonment practically unharmed. Some of the police and hospital ambulances will be noticed in the foreground.



Five-Story Building Falls

the entrance to the nearby subway was partially choked, placing west-bound trains out of commission.

The building, which was a 5-story brick structure, was being remodeled and modernized for occupancy as show-rooms, and the front and side walls had been removed to the level of the third floor, the superstructure being shored up with heavy timbers when the accident occurred.

The killed and injured were chiefly workmen engaged upon the building,

ILLUMINATION OF HUDSON-FULTON CELEBRATION

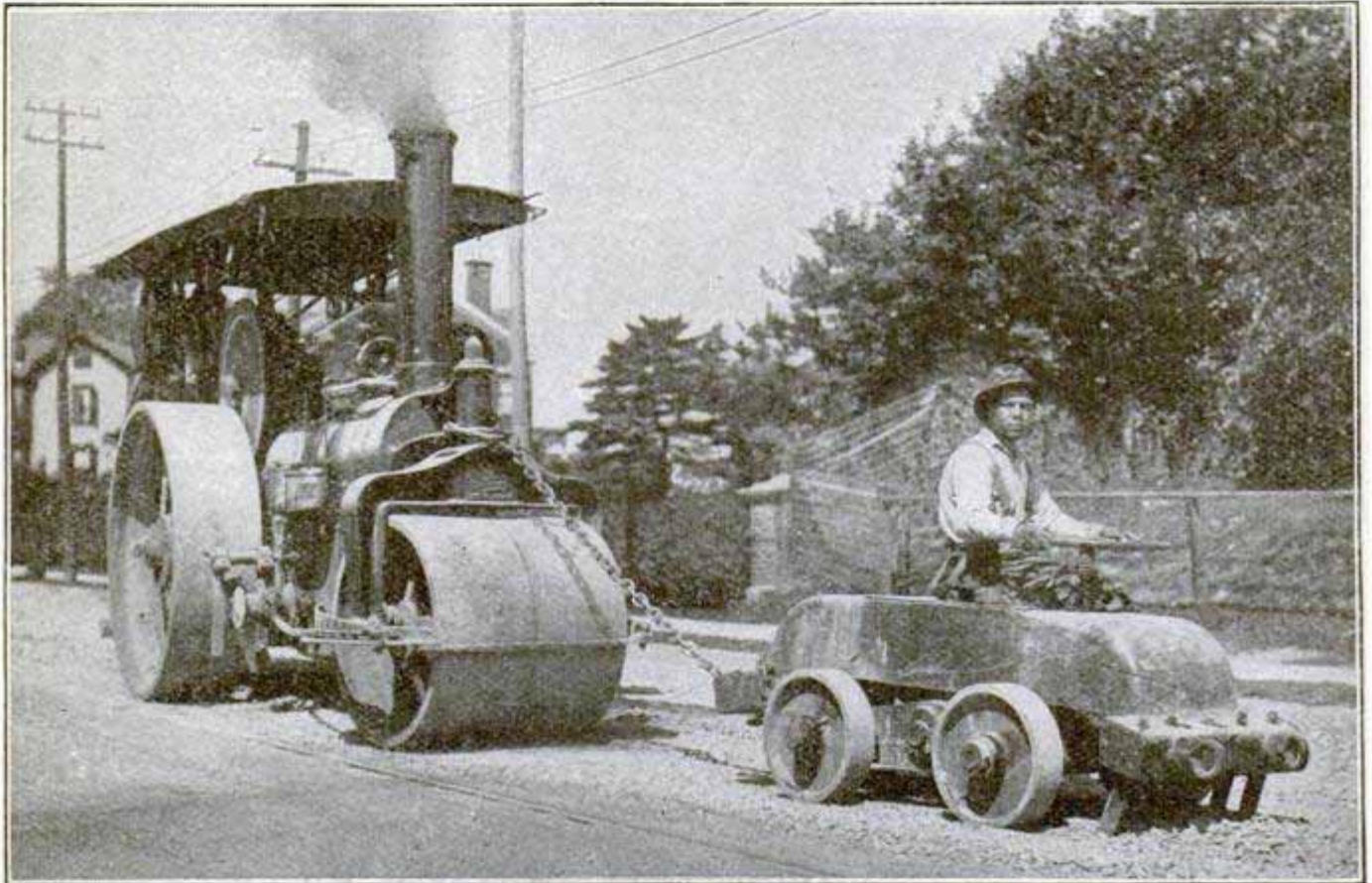
The illumination of the Hudson-Fulton celebration in New York is, according to illuminating engineers, the greatest ever produced, far surpassing anything that has ever before been attempted in any part of the world. Some of the most experienced illuminating engineers in the line of spectacular lighting worked upon the scheme for several months, the differ-

ent lights at their disposal being: nearly 1,500,000 incandescent electric lamps, 700,000 carbon arcs, 300 flaming arcs, one battery of four searchlights of 100,000 cp. each, and one battery of 12 searchlights aggregating 1,700,000 cp. All these make a total of over 26,000,000 cp. in addition to the regular lighting, both public and private, of the city.

RAPID-FIRE RIFLES FOR JAPANESE ARMY

A machine-gun corps of the Japanese army, organized especially to devise new and improved firing arms, has brought forth a rapid-fire rifle that the Japanese Emperor has approved and ordered adopted.

In construction, the new rifle em-



A 15,000-Lb. Rake, Called a "Go-Devil"

STEAM RAKE DIGS UP PAVING

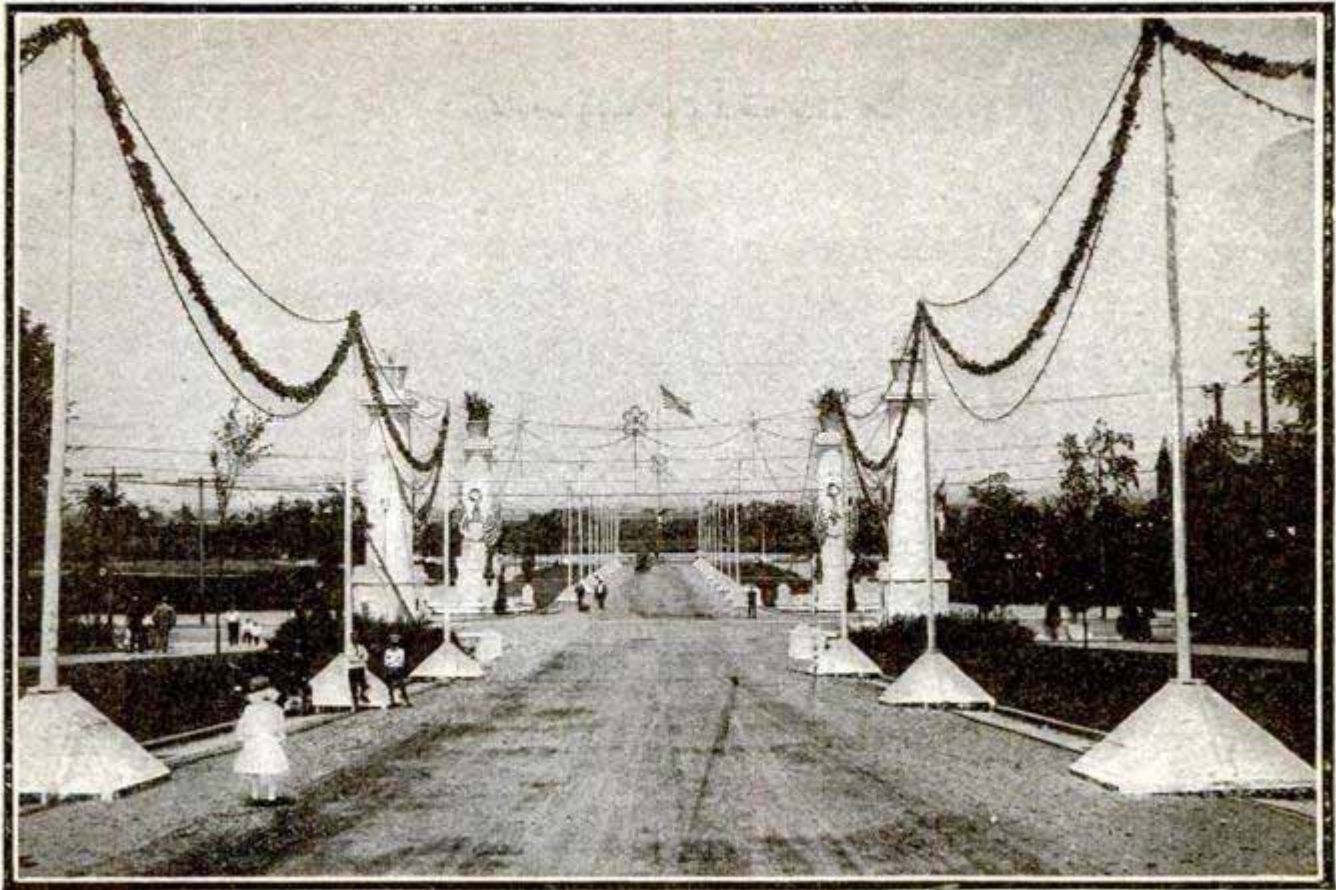
Instead of employing hundreds of men with picks to dig up streets for the purpose of resurfacing them, the city of Cincinnati now uses a 15,000-lb. rake, which enjoys the gentle name of "go-devil." When dragged along by a steam roller, it does the work of the laborers with their picks in about one-fifth of the time and 50 per cent better. The picture shows the rake in operation. The big steel teeth dig into the street 6 in. deep and 3 ft. wide and travel about 25 ft. per minute.

It is estimated that the machine saves the work of hundreds of laborers and pays for itself in every two days' work.

bodies all the principles of the rapid-fire gun, but its improvement lies in the fact that it can be carried by a soldier, quite the same as an ordinary rifle. It fires several hundred shots a minute, the cartridges being fed to it from a holder carried at the soldier's waist.

A new automatic revolver has also been devised which fires 10 shots at one movement of the trigger.

An American consul in Chile reports that there is an excellent opening in the cities and towns of that country for Americans to establish laundries equipped with up-to-date American machinery.



Street Decoration in Jersey City

NEW YORK-JERSEY CITY TUNNELS OPENED

The lower Hudson tunnels, the two cast-iron tubes under the Hudson river between New York City and Jersey City, were opened to traffic July 19. The easterly ends of the tubes are in Fulton and Cortlandt streets, New York, about 500 ft. apart, while the New Jersey ends join in a station excavated in rock directly below the Pennsylvania Railroad's terminal shed.

These tubes give direct access from Jersey City and Hoboken to the heart of New York's financial district, and are expected to take a large part of the traffic which in the past has fallen into the hands of the ferries. The illustration shows how Jersey City celebrated the event.

MOTORBOATS SUPERSEDE GONDOLAS

Probably the two most written about vehicles in Europe, in both poetry and prose, are, or were in one instance at least, the hansom cabs of London and the gondolas of Venice. The former have already been mown down before

the onslaughts of the motor cab, and the latter are now threatened by the motorboat.

The Venetian gondoliers have protested, and the socialists have appealed to the municipal council to prohibit motorboats on the famous canals, but in vain. The presiding officer of that city has decided that it is time to deprive the gondoliers of their monopoly in the interest of progress, and the motorboat is rapidly gaining a footing.

AUTO EYE-SHIELDS FOR DOGS

Among other articles for dogs, a St.

Louis concern is placing on the market a dust eye-shield similar in every way to the same article worn by human automobile riders. The illustration shows a Boston bull equipped with the eye-shield. It is held in position on the dog's nose by straps which fasten to the collar.



THE STEAMBOAT

See how yon flaming herald treads
The ridged and rolling waves,
As, crashing o'er the crested heads,
She bows her surly staves!

With foam before and fire behind,
She rends the clinging sea,
That flies before the roaring wind,
Beneath her hissing lee.

The morning spray, like sea-born flowers
With heaped and glistening bells,
Falls round her fast in ringing showers,
With every wave that swells;

And flowing o'er the midnight deep,
In lurid fringes thrown,
The living gems of ocean sweep
Along her flashing zone.

With flashing wheel and lofty keel,
And smoking torch on high,
When winds are loud and billows reel,
She thunders foaming by!

When seas are silent and serene,
With every beam she glides,
The sunshine shimmering through the
green
That skirts her gleaming sides.

Now, like a wild nymph, far apart
She veils her shadow form,
The beating of her restless heart
Still sounding through the storm,

Now answer, like a courtly dame,
The reddening surges o'er,
With flying scarf of spangled flame,
The pharos of the shore.

Tonight yon pilot shall not sleep;
Who trims his narrowed sail;
Tonight yon frigate scarce shall keep
Her broad breast to the gale;

And many a foresail, scooped and strained,
Shall break from yard and stay,
Before the smoky wreath hath stained
The rising mist of day.

Hark! hark! I hear yon whistling shroud,
I see yon quivering mast—
The black throat of the hunted cloud
Is panting forth the blast!

An hour, and, whirled like winnowing
chaff,
The giant surge shall fling
Her tresses o'er yon pennon-staff,
White as the sea bird's wing.

Yet rest, ye wanderers of the deep;
Nor wind nor wave shall tire
Those fleshless arms, whose pulses leap,
With floods of living fire;

Sleep on, and when the morning light
Streams o'er the shining bay,
Think of those for whom the night
Shall never wake by day!

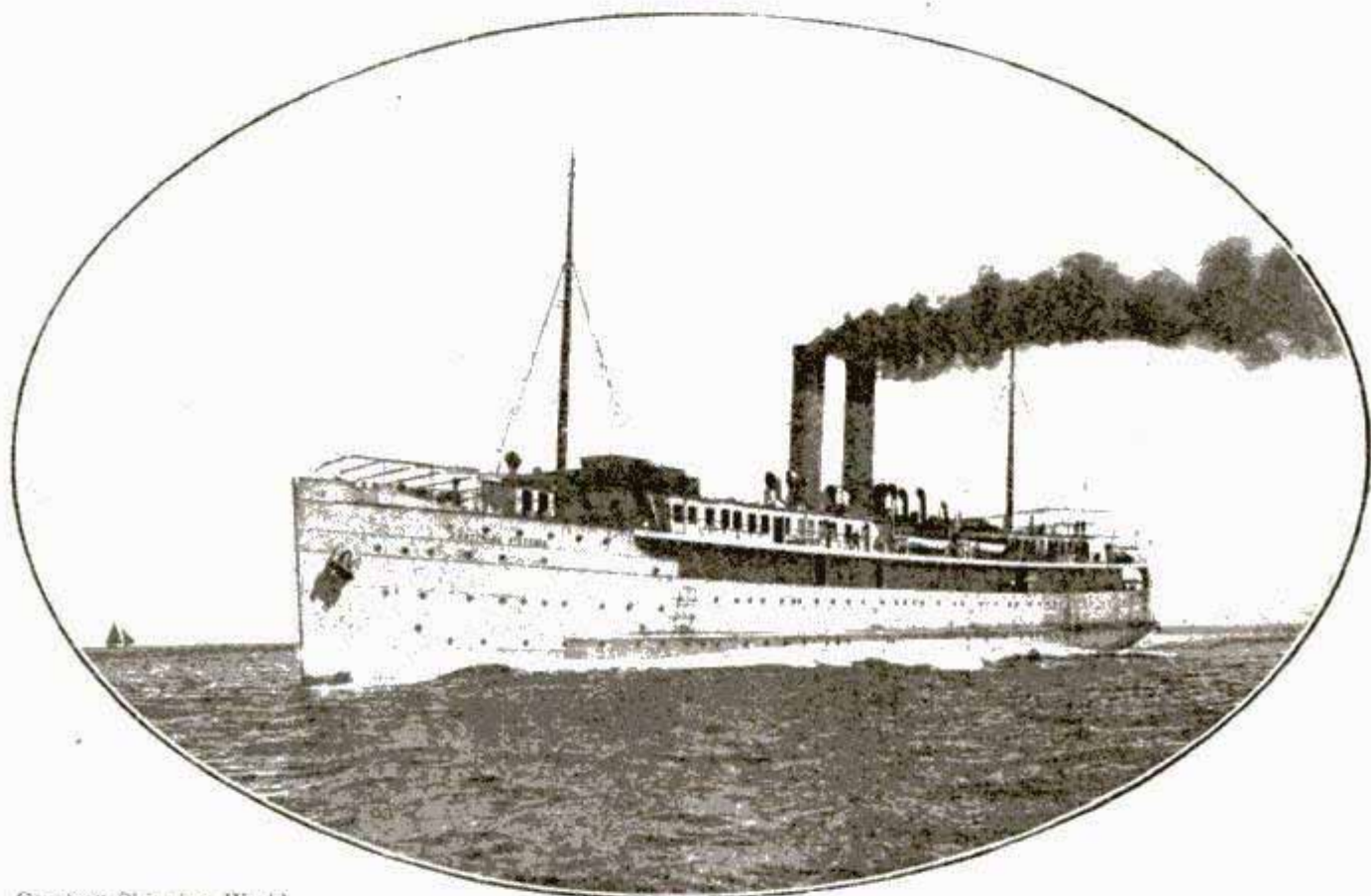
—OLIVER WENDELL HOLMES

AN OCEAN CAR FERRY

An interesting type of car ferry for ocean travel has been built by the Swedish government to transport trains from Sassnitz, Germany, to Trelleborg, Sweden, a distance of 65 miles across the Baltic. The vessel is 354 ft. in length by over 50 ft. beam, and has two tracks for the accommodation of trains. Above the train deck are luxuriously equipped rooms for the

MACHINE EXCAVATES IN FROZEN GROUND

A machine for excavating frozen ground was introduced in Winnipeg, Can., last winter and proved a great success in sewer trenching and foundation work. In that city the frost penetrates to a depth of from 5 to 6½ ft., and previous to the introduction of the machine, all earth excavation during 5 or 6 months of the winter had to be



Courtesy Shipping World

Sea-Going Car Ferry

passengers, including smoking room, lounge, and special suites. Below the car deck are many state rooms for passengers who are not occupying sleeping berths on the train.

The vessel has been designed for steadiness in a sea, as she will meet with considerable rough weather on her trips. Her speed of a little over 17 miles an hour will allow her to make the trip one way in about 4 hours.

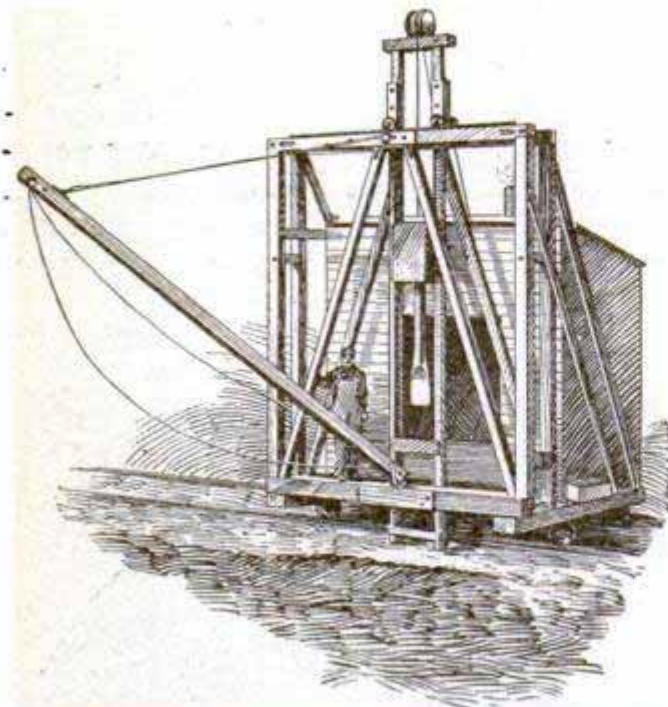
Although Uruguay has only 1,000,000 inhabitants more than \$1,224,500 of perfumery has been used there in the last 15 years.

done by hand picking or by blasting the frozen earth with black powder.

In principle, the machine is similar to a pile-driver, or to the rock-breaking machines used in submarine excavation. A frame mounted on a platform carries a set of leads for a hammer or ram attached to the head of a chisel bar. This hammer is raised about 15 ft. and released, the force of the blow causing the chisel to penetrate the frozen earth and break it away in large blocks. Attached to the platform is a derrick boom for removing the large blocks broken away.

With such a machine, earth excava-

tion in winter, a troublesome task in northern cities, may prove less expensive than the same excavation work in



Drop-Chisel Machine Excavates Frozen Ground

summer, because no shoring or timbering of the sides of the trench is required. This means a large saving in both material and labor.

A fire alarm box in an American city was recently put out of service by ants that had filled it and grounded the circuit.

WIRELESS OF THE FUTURE

(Nikola Tesla in the New York Times)

"The practical applications of the revolutionary principles of the wireless art have only begun. What will be accomplished in the future baffles one's comprehension."

This startling prophecy is made by Mr. Nikola Tesla. In speaking of the utility of wireless transmission in the near future he said: "The attention of the world has been caught and held by the wireless telegraph, and yet this is a very primitive use of the art. So far only electric waves have been used, which have been quickly damped out in their passage through the air. It is possible, however, to transmit electric currents of enormous power for thousands of miles without diminishing their energy. This is not a theory, but a truth established by many practical experiments. It will soon be possible to transmit wireless messages all over the world so simply that any individual can carry and operate his own apparatus. The wireless transmission of power across the ocean, for instance, obviously opens up an entirely new era in mechanical developments.

"It will soon be possible, for instance, for a business man in New York to



Bathing Beach at Sydney, Australia

dictate instructions and have them appear instantly in type in London or elsewhere. He will be able to call up from his desk and talk with any telephone subscriber in the world. It will only be necessary to carry an inexpensive instrument not bigger than a watch, which will enable its bearer to hear anywhere on sea or land for distances of thousands of miles. One may listen or transmit speech or song to the uttermost parts of the world. In the same way any kind of picture, drawing, or print can be transferred from one place to another. It will be possible to operate millions of such instruments from a single station. Thus it will be a simple matter to keep the uttermost parts of the world in instant touch with each other. The song of a great singer, the speech of a political leader, the sermon of a great divine, the lecture of a man of science may thus be delivered to an audience scattered all over the world.

"More important than this, however, will be the transmission of power without wires over great distances. I have been experimenting with a model of a boat operated by electric power transmitted without wires, and the results are astounding. It is possible, I find, to control the movements of the boat absolutely from a central station without electrical connections of any kind. What has been done with a little boat on a small body of water will eventually be done by the largest liners at any distance from land. In other words, an ocean liner may be propelled across the Atlantic ocean at high speed by power directed from a wireless station on shore. We may confidently expect that within a few years many wonders now not dreamed of will be mere commonplaces."

LEATHER TANNED BY HYDRO-DYNAMIC PRESSURE

The United States consul at Liege has drawn attention to a new Belgian process for tanning leather by exerting hydrodynamic pressure. A number of continental tanneries have already

adopted the method, which the inventor claims will revolutionize the industry, and several samples of the leather have been sent to the American bureau of manufactures.

TEARING DOWN RUINS IN MESSINA

When the wall of a building in Messina is judged to be unsafe, it is torn down in the manner shown in the illustration. Italian infantrymen do the work, using a long extension fire ladder as a support.

Messina, unlike San Francisco, is not rapidly recovering from its earthquake.

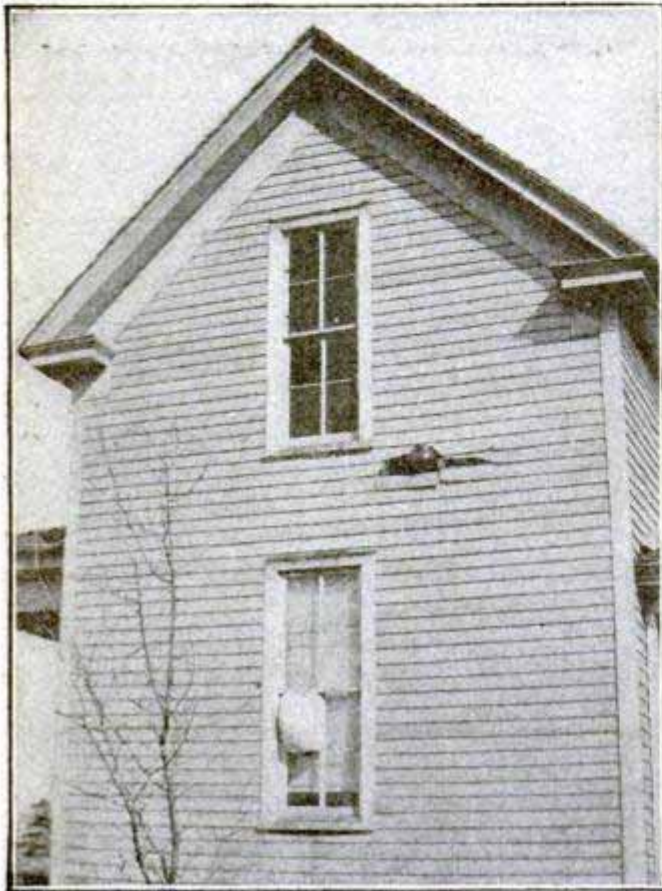


Aiding the Earthquake in Messina

Certain of the debris has, of course, been removed, but much is left, and a permanent rebuilding has not yet been commenced. Many attribute this slowness in recovery as compared with that of San Francisco to the difference in the two races. Undoubtedly this is the main reason, but it must also be remembered that only a few people were killed in San Francisco, while nearly all of Messina's population were either killed or badly injured.

STONE JAR DRIVEN THROUGH HOUSE BY CYCLONE

During a cyclone in Tennessee the stone jar protruding through the wall



Prank of a Cyclone

of this house was picked up from another house by the wind and driven to the resting place shown. Although the force of the impact was sufficient to drive the jar through the boarding of the house, the jar was not even scratched.

DE-RUSTING OF IRON IN CONCRETE

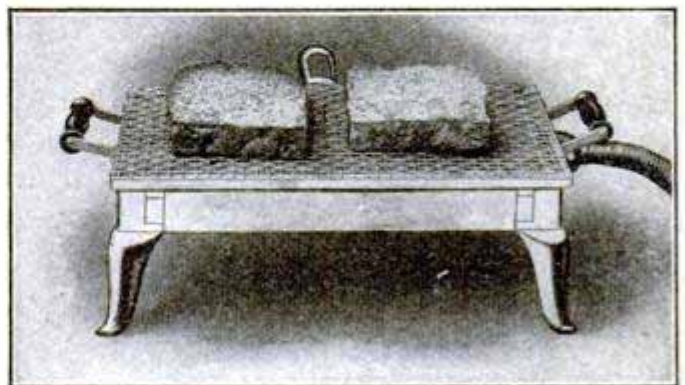
The cause of the disappearance of rust from iron reinforcing in concrete structures has been traced to the presence of acid carbonates and sulphates in the cement, these salts dissolving the iron oxide and leaving the metal bright. The cement in setting absorbs carbonic acid from the air, thus forming the necessary acid carbonates, and experiments show that the de-rusting process is effected while the concrete is setting and commencing to harden.

FIRE ALARM GOES 200 MILES IN CIRCLE

An alarm of fire when flames started in the northern part of Edwardsville, Ill., recently was sent over 200 miles in a circuit and returned to a point 10 blocks away. Late in the afternoon a crew in a tower of the Wabash railroad at Edwardsville Junction reported to the agent in the yard station that a car of coal was on fire. There was no telephone in the yard station, therefore the agent notified the superintendent's office at Decatur, 100 miles away, by telegraph. The dispatcher there called Poag, the nearest station to Edwardsville which had a long-distance telephone, and he notified the exchange at Edwardsville, the operator there sending in the alarm to the engine house. Three minutes from the time the fire was first reported the apparatus was on its way.

ELECTRIC TOASTER AND PANCAKE IRON

An electric cooking plate, small enough to be placed conveniently on the breakfast table, yet of sufficient cooking capacity to make toast, bake pancakes, or boil tea, coffee, or water, is shown in this illustration. It measures 7 by 11 in. and weighs 5 lb. When used for toast, the heating plate is covered with a wire grid upon which the bread is placed. This is removed when the stove is used for boiling liquids, and when pancakes are to be



Makes Toast on Breakfast Table

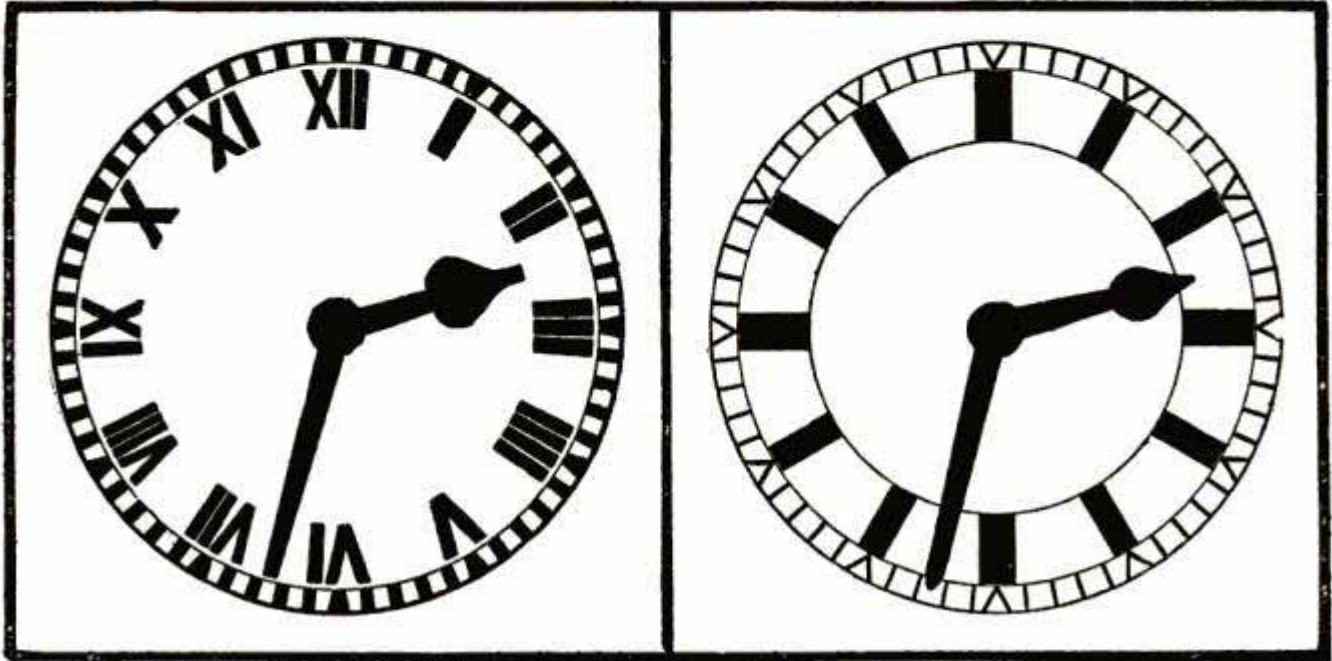
made the plate is inverted, turning up a narrow rim which serves to keep the batter on the plate.

TIME AND ITS MEASUREMENT

By James Arthur

[The first chapter of this series of articles, which appeared in the August number, treated of the historic features of the subject, with introductory remarks on the world's viewpoint. Chapter II, in September, was devoted to Japanese clocks and a presentation of the Japanese mental attitude towards "hours"—Editor.]

PART III



Public Dial by James Arthur

Fig. 24

Dial of Philadelphia City Hall Clock

Modern clocks commence with De Vick's of 1364 which is the first unquestioned clock consisting of toothed wheels and containing the fundamental features of our present clocks. References are often quoted back to about 1000 A. D., but the words translated "clocks" were used for bells and dials at that date; so we are forced to consider the De Vick clock as the first till more evidence is obtained. It has been pointed out, however, that this clock could hardly have been invented all at once; and therefore it is probable that many inventions leading up to it have been lost to history. The part of a clock which does the ticking is called the "escapement" and the oldest form known is the "verge," Fig. 25, the date of which is unknown, but safely 300 years before De Vick. The "foliot" is on the vertical verge, or spindle, which has the pallets A B. As the foliot swings horizontally, from rest to rest, we hear one tick, but it requires two of these single swings, or two ticks, to liberate one tooth of the escape wheel; so there are twice as many

ticks in one turn of the escape wheel as it has teeth. We thus see that an escapement is a device in which something moves back and forth and allows the teeth of an "escape wheel" to escape. While this escapement is, in some respects, the simplest one, it has always been difficult to make it plain in a drawing, so I have made an effort to explain it by making the side of the wheel and its pallet B, which is nearest the eye, solid black, and farther side and its pallet A, shaded as in the figure. The wheel moves in the direction of the arrow, and tooth D is very near escaping from pallet B. The tooth

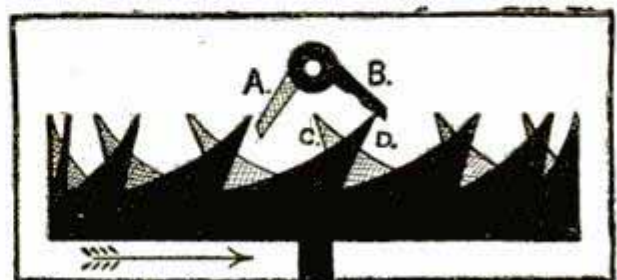


Fig. 25—Verge Escapement

C on the farther side of wheel is moving left, so it will fall on pallet A, to be

in its turn liberated as the pallets and foliot swing back and forth. It is easy

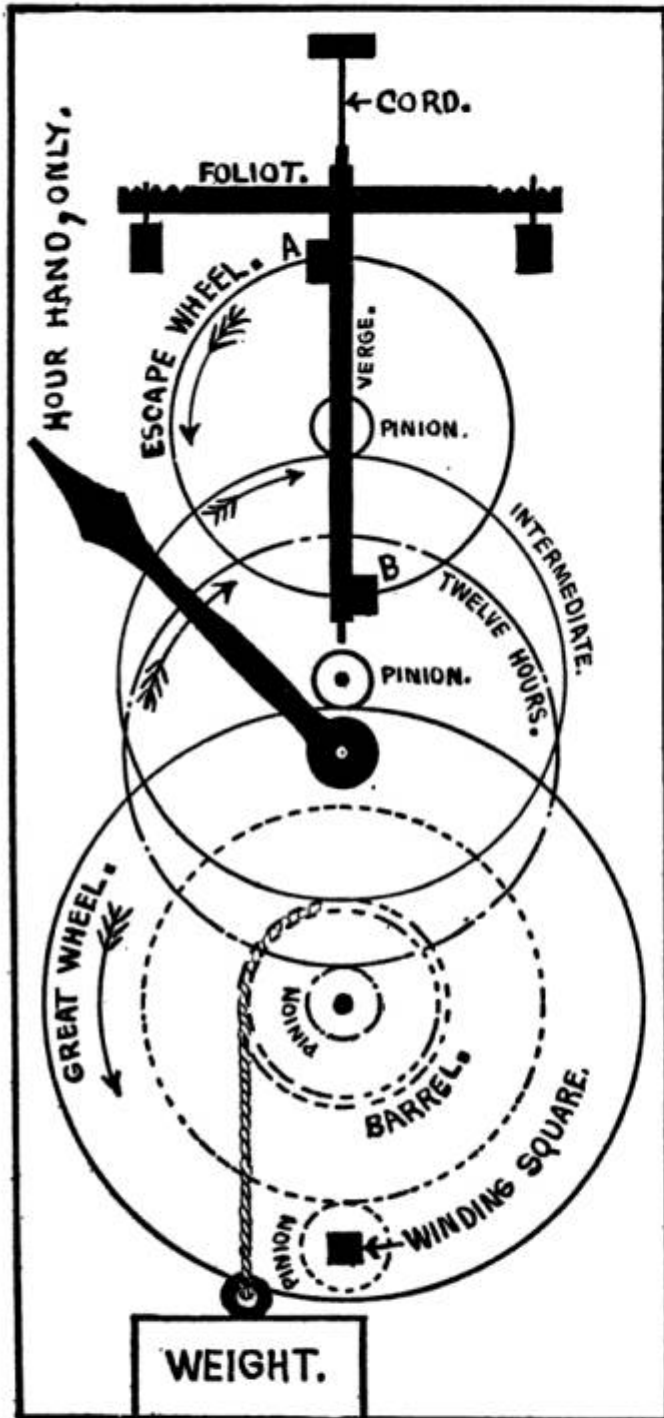


Fig. 26—De Vick's Clock of 1364

to see that each tooth of the wheel will give a little push to the pallet as it escapes, and thus keep the balance swinging. This escapement is a very poor time-keeper, but it was one of the great inventions and held the field for about 600 years, that is, from the days when it regulated bells up to the "onion" watches of our grandfathers. Scattered references in old writings make it reasonably certain that from about 1,000 to 1,300 bells were struck

by machines regulated with this verge escapement, thus showing that the striking part of a clock is older than the clock itself. It seems strange to us to say that many of the earlier clocks were strikers, only, and had no dials or hands, just as if you turned the face of your clock to the wall and depended on the striking for the time. Keeping this action of the verge escapement in mind we can easily understand its application, as made by De Vick, in Fig. 26, where I have marked the same pallets A B. A tooth is just escaping from pallet B and then one on the other side of the wheel will fall on pallet A. Foliot, verge and pallets form one solid piece which is suspended by a cord, so as to enable it to swing with little friction. For the purpose of making the motions very plain I have left out the dial and framework from the drawing. The wheel marked "twelve hours," and the pinion which drives it, are both outside the frame, just under the dial, and are drawn in dash and dot. The axle of this twelve-hour wheel goes through the dial and carries the hand, which marks hours only. The winding pinion and wheel, in dotted lines, are inside the frame. Now follow the "great wheel" — "intermediate" — "es-

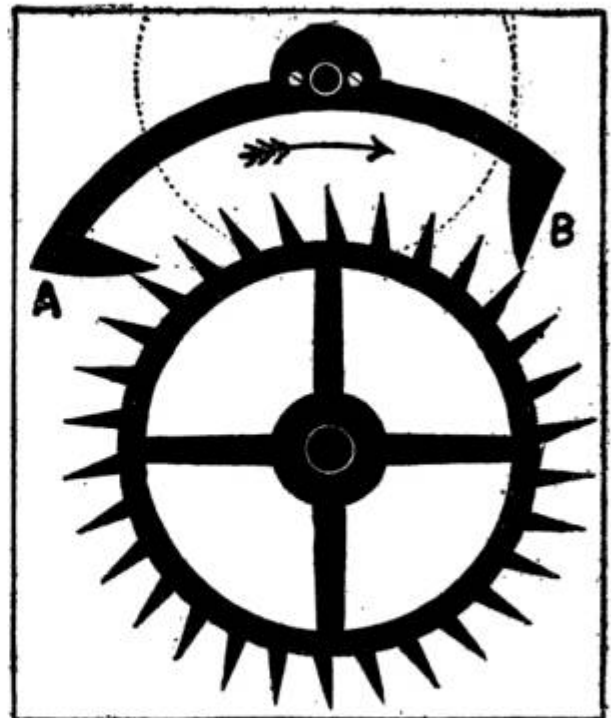


Fig. 27—Anchor Escapement

cape wheel" and the two pinions, all in solid lines, and you have the "train"

which is the principal part of all clocks. This clock has an escapement, wheels, pinions, dial, hand, weight, and winding square. We have only added the pendulum, a better escapement, the minute and second hands in over 500 years! The "anchor" escapement, Fig. 27, came about 1680 and is attributed to Dr. Hooke, an Englishman. It gets its name from the resemblance of the pallets to the flukes of an anchor. This anchor is connected to the pendulum and as it swings right and left, the teeth of the escape wheel are liberated, one tooth for each two swings from rest to rest, the little push on the pallets A B, as the teeth escape, keeping the pendulum going. It is astonishing how many, even among the educated, think that the pendulum drives the clock! The pendulum must always be driven by some power.

This escapement will be found in nearly all the grandfather clocks in connection with a seconds pendulum. It is a good time-keeper, runs well, wears well, stands some rough handling and will keep going even when pretty well covered with dust and cobwebs; so it is used more than all the numerous types ever invented. Figure

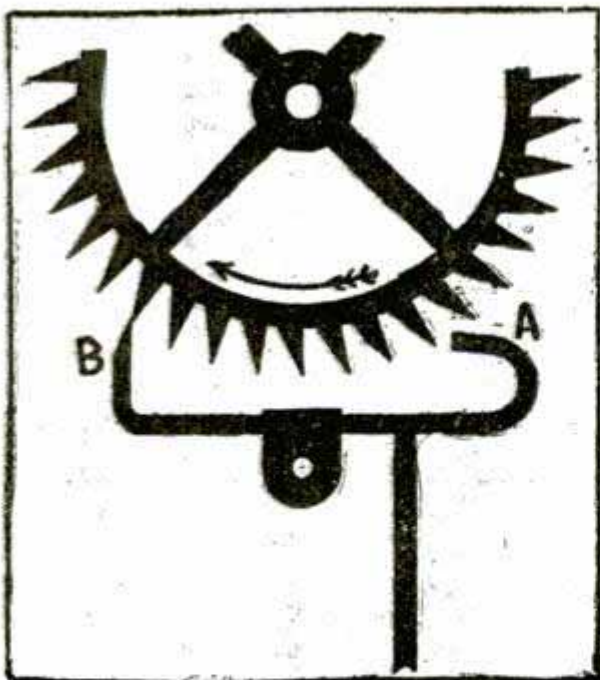


Fig. 28—American Anchor Escapement

28 gives the general American form of the "anchor", which is made by bend-

ing a strip of steel; but it is not the best form, as the acting surfaces of the

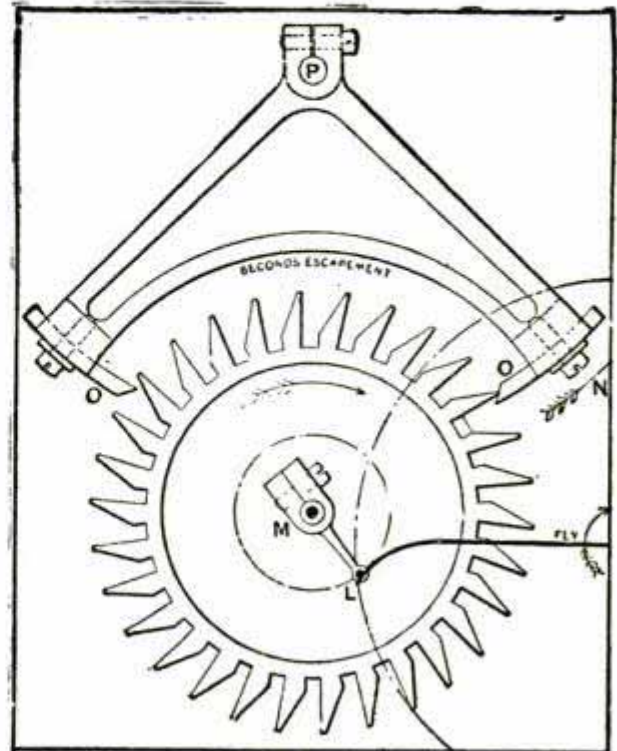


Fig. 29—Dead Beat Escapement

pallets are straight. It is, therefore, inferior to Fig. 27 where the acting surfaces are curved, since these curves give an easier "recoil." This recoil is the slight motion *backwards* which the escape wheel makes at each tick. The "dead beat" escapement is shown in Fig. 29, and is used in clocks of a high grade, generally with a seconds pendulum. It has no recoil as you can easily see that the surfaces O O on which the teeth fall, are portions of a circle around the center P. The beveled ends of these pallets are called the impulse surfaces, and a tooth is just giving the little push on the right-hand pallet. It is found in good railroad clocks, watchmakers' regulators and in many astronomical clocks. These terms are merely comparative, a "regulator" being a good clock and an "astronomical," an extra good one. Figure 30 gives the movement of a "remontoir" clock in which the dead beat shown is used. The upper one of the three dials indicates seconds, and the lever which crosses its center carries the large wheel on the left.

This wheel makes the left end of the lever heavier than the right, and in sinking it drives the clock for one min-

ute, but at the sixtieth second it "re-mounts" by the action of the clock



Fig. 31—Remontoir Clock
by James Arthur

weight; hence the name, "re-montoir." Note here that the big weight does not directly drive the clock: it only re-winds it every minute. The minutes are shown on the dial to the right and its hand jumps forward one minute at each sixtieth second as the lever remounts; so if you wish to set your watch to this clock the proper way is to set it to the even minute "on the jump." The hour hand is on the dial to the left. By this re-mounting, or re-winding, the clock receives the same amount of driving force each minute. The complete clock is shown in Fig. 31, the large weight which does the rewinding each minute being plainly visible. The pendulum is compensated with steel and aluminum, so that the rate of the clock may not be influenced by hot and cold weather. Was built in 1901 and is the only one I can find room for here. It is fully described in "Machinery," New York, for Nov., 1901. I have built a considerable number, all for experimental purposes, several of them much more complicated than this one, but all differing from clocks for commercial purposes. Pallets like O O in Fig. 29 are often made of jewels; in one clock I used agates and in another, running thirteen months with one winding, I used pallets jeweled with diamonds.

This is done to avoid friction and wear. Those interested in the improvement of clocks are constantly striving after light action and small driving weights. Conversely, the inferior clock has a heavy weight and ticks loud. The "gravity escapement" and others giving a "free" pendulum action would require too much space here, so we must be satisfied with the few successful ones shown out of hundreds of inventions, dozens of them patented. The pendulum stands at the top as a time measurer and was known to the ancients for measuring short periods of time just as musicians now use the metronome to get regular beats. Galileo is credited with noticing its regular beats, but did not apply it to clocks, although his son made a partially successful attempt. The first mathematical investigation of the pendulum was made by Huyghens about 1670, and he is generally credited with applying it to clocks, so there is a "Huyghens" clock with a pendulum instead of the foliot of De Vick's. Mathematically, the longer and heavier the pendulum

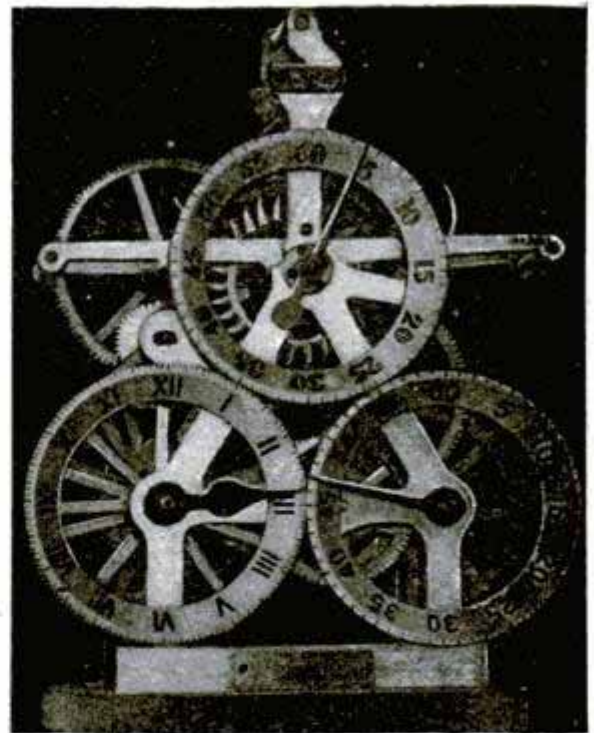


Fig. 30—Remontoir Clock Movement

the better is the time-keeping, but nature does not permit us to carry anything to the extreme; so the difficulty

of finding a tower high enough and steady enough, the cumbersomeness of weight, the elasticity of the rod, and many other difficulties render very long and heavy pendulums impracticable beyond about 13 ft. which beats once in two seconds. "Big Ben" of Westminster, London, has one of this length weighing 700 lb. and measuring, over all, 15 ft.

It runs with an error under one second a week. This is surpassed only by some of the astronomical clocks which run sometimes two months within a second. This wonderful time-keeping is done with seconds pendulums of about 39 in., so the theoretical advantage of long pendulums is lost in the difficulties of constructing them. Fractions are left out of these lengths as they would only confuse the explanations. At the Naval observatory in Washington, D. C., the standard clocks have seconds pendulums, the rods of which are nickel steel, called "Invar," which is little influenced by changes of temperature. These clocks are kept in a special basement, so they stand on the solid earth. The clock room is kept at a nearly uniform temperature and each clock is in a glass cylinder exhausted to about half an atmosphere. They are electric remontoirs, so no winding is necessary and they can be kept sealed up tight in their glass cylinders. Nor is any adjustment of their pendulums necessary, or setting of the hands, as the correction of their small variations is effected by slight changes in the air pressure within the glass cylinders. When a clock runs fast they let a little air into its cylinder to raise the resistance to the pendulum and slow it down, and the reverse for slow. Don't forget that we are now considering variations of less than a second a week.

The clock room has double doors, so the outer one can be shut before the inner one is opened, to avoid air currents. Visitors are not permitted to see these clocks because the less the doors are opened the better; but the Commander will sometimes issue a special permit and detail a responsible

assistant to show them, so if you wish to see them you must prove to him that you have a head above your shoul-

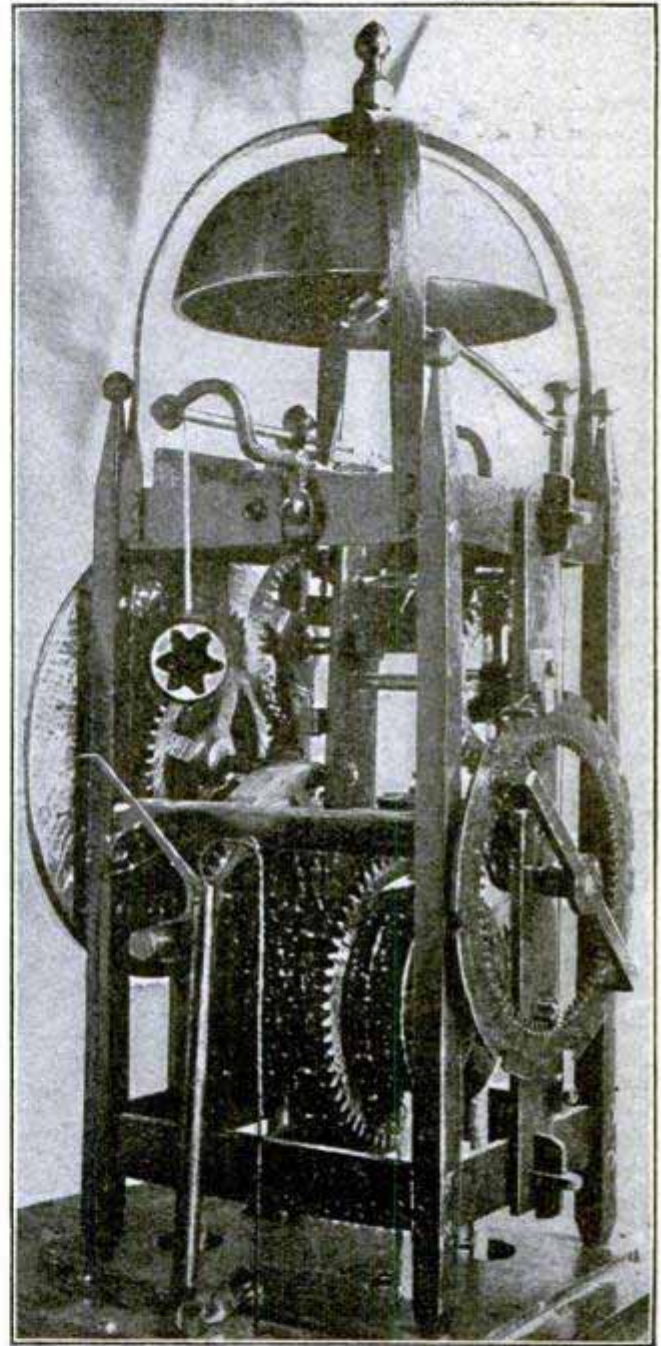


Fig. 32—Antique Clock, Entirely Hand-Made

ders and are worthy of such a great favor.

The best thing the young student could do at this point would be to grasp the remarkable fact that the clock is not an old machine, since it covers only the comparatively short period from 1364 to the present day. Compared with the period of man's history and inventions it is of yesterday. Strictly speaking, as we use the word clock, its age from De Vick to the modern astronomical is only about

540 years. If we take the year 1660, we find that it represents the center of

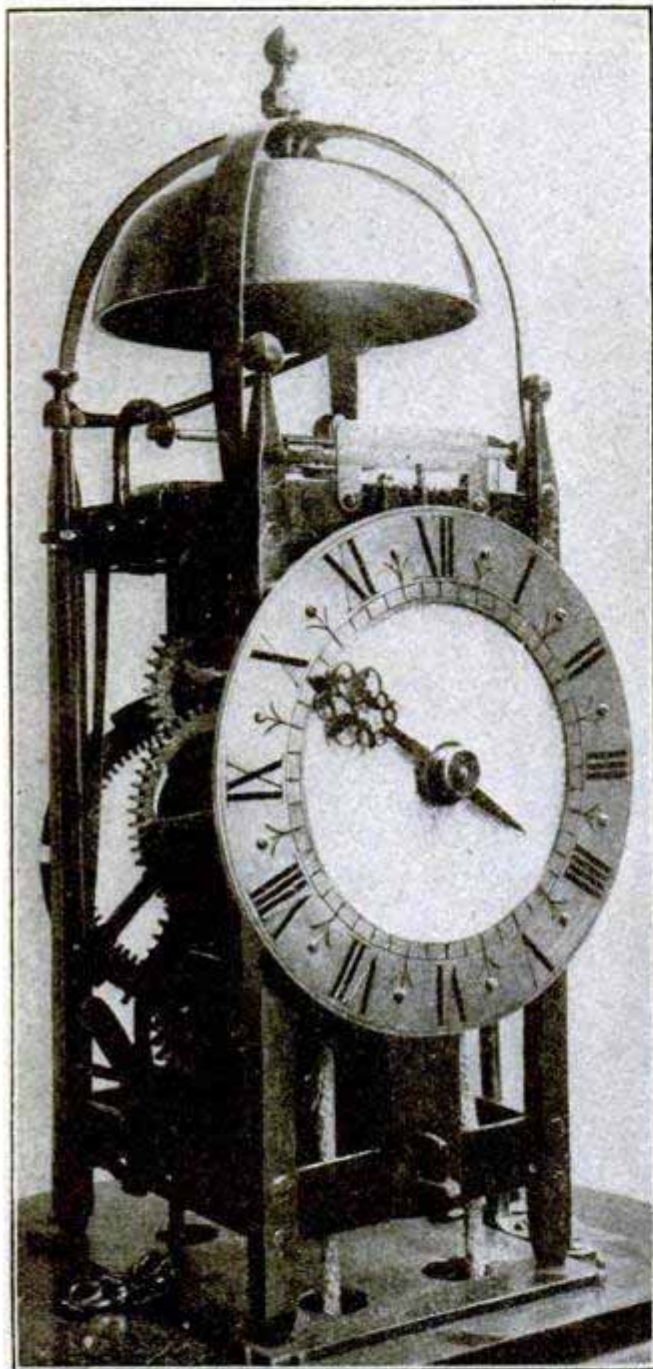


Fig. 33—Antique Clock, Entirely Hand-Made

modern improvements in clocks, a few years before and after that date includes the pendulum, the anchor and dead beat escapements, the minute and second hands, the circular balance and the hair spring, along with minor improvements. Since the end of that period, which we may make 1700, no fundamental invention has been added to clocks and watches. This becomes impressive when we remember that the last 200 years have produced more inventions than all previous known history—but only minor improvements

in clocks! The application of electricity for winding, driving, or regulating clocks is not fundamental, for the time-keeping is done by the master clock with its pendulum and wheels, just as by any grandfather's clock 200 years old. This broad survey of time measuring does not permit us to go into minute mechanical details. Those wishing to follow up the subject would require a large "horological library"—and Dr. Eliot's five-foot shelf would be altogether too short to hold the books.

A good idea of the old church clocks may be obtained from Fig. 32 which is one of my valued antiques. Tradition has followed it down as the "English Blacksmith's Clock." It has the very earliest application of the pendulum. The pendulum, which I have marked by a star to enable the reader to find it, is less than 3 in. long and is hung on the verge, or pallet axle, and beats 222 per minute. This clock may be safely put at 250 years old, and contains nothing invented since that date. Wheels are cast brass and all teeth laboriously filed out by hand. Pinions are solid with the axles, or "staves," and also filed



Fig. 36—Double-Case Watch of Repousse' Work

out by hand. It is put together, generally by mortise, tenon and cotter, but

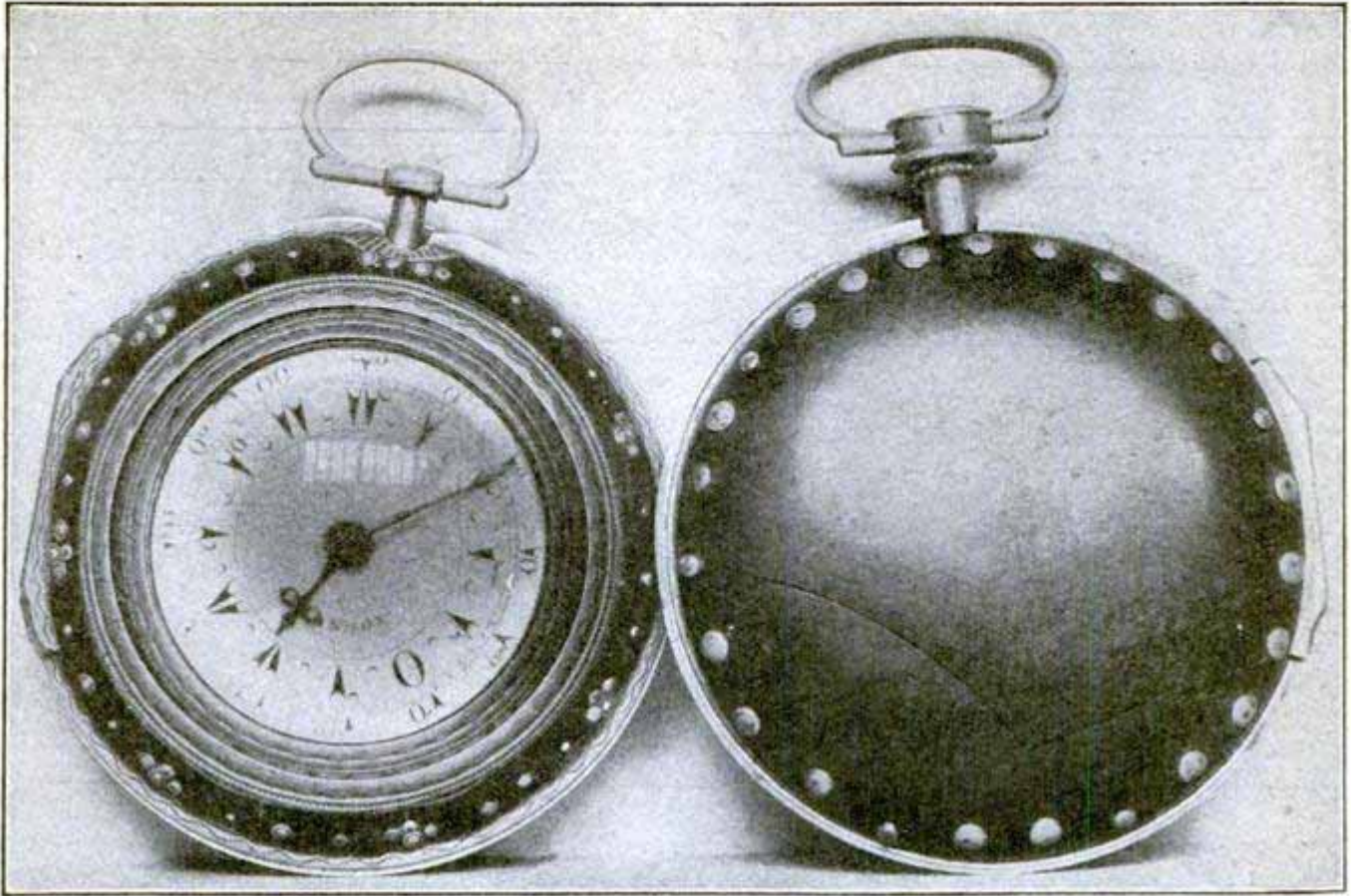


Fig. 34—Triple-Case Turkish Watches

it has four original screws all made by hand with the file. How did he thread the holes for these screws? Probably made a tap by hand as he made the screws. But the most remarkable feature is the fact that no lathe was used in forming any part—all staffs, pinions and pivots being filed by hand. This is simply extraordinary when it is pointed out that a little dead center lathe is the simplest machine in the world, and he could have made one in less than a day and saved himself weeks of hard labor. It is probable that he had great skill in hand work and that learning to use a lathe would have been a great and tedious effort for him. So we have a complete striking clock made by a man so poor that he had only his anvil, hammer and file. The weights are hung on cords as thick as an ordinary lead pencil and pass over pulleys having spikes set around them to prevent the cords from slipping. The weights descend 7 ft. in 12 hours, so they must be pulled up—not wound up—twice a day. The single hour hand is a work of art and is cut through like lace. Public clocks may

still be seen in Europe with only one hand. Many have been puzzled by finding that old, rudely made clocks often have fine dials, but this is not remarkable when we state that art and engraving had reached a high level before the days of clocks. It is worthy of



Fig. 38—Watch Showing Dutch Art Work

note that clocks in the early days were generally built in the form of a church

tower with the bell under the dome and Figs. 32, 33 show a good example. It is highly probable that the maker of

given it up at this point, so the seconds and fifths seconds came easily.

The first watches, about 1500, had

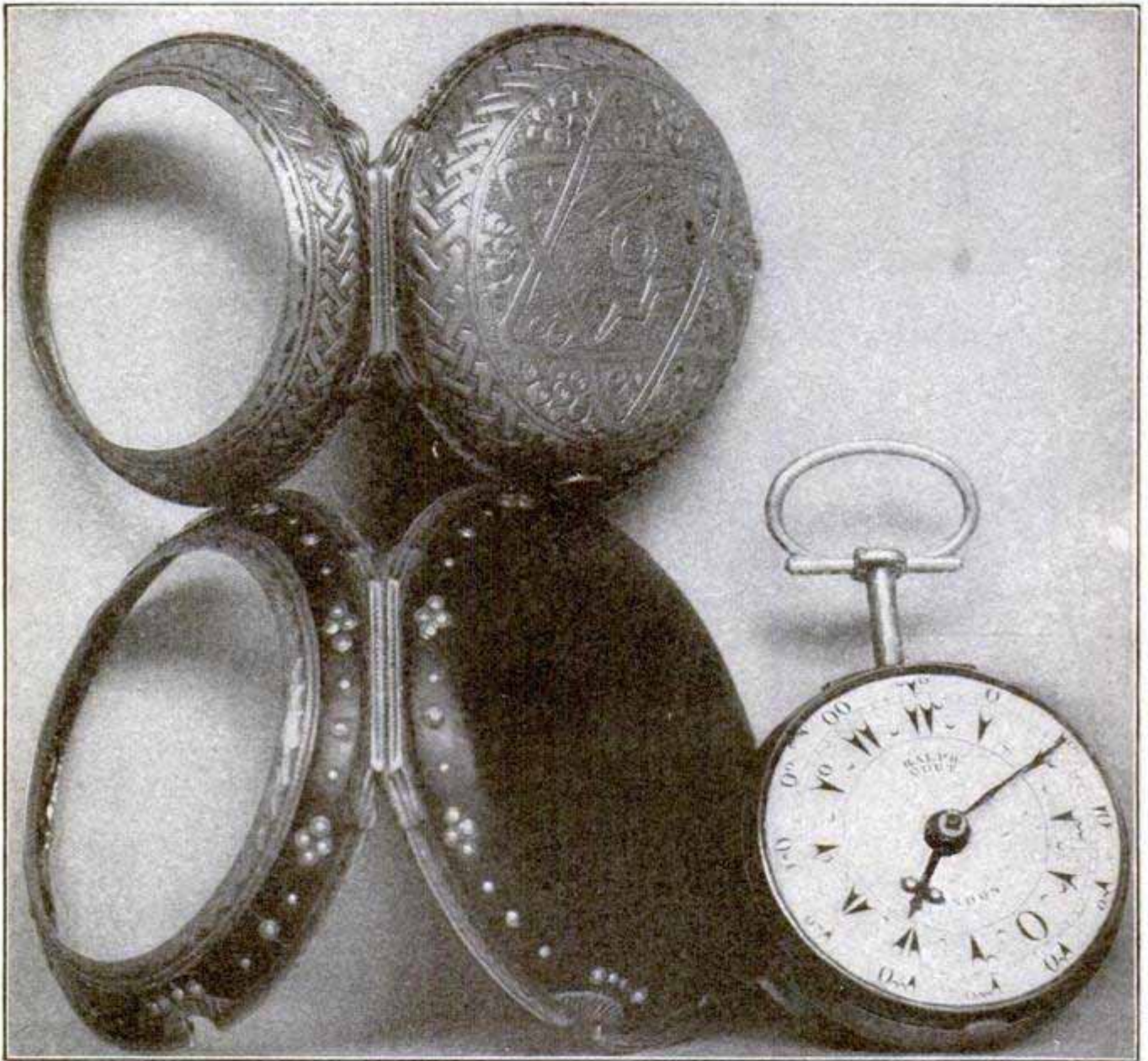


Fig. 35—Triple-Case Turkish Watch

this clock had access to some old church clock—a wonderful machine in those days—and that he laboriously copied it. It strikes the hours, only, by the old “count wheel” or “locking plate” method. Between this and our modern clocks appeared a type showing quarter hours on a small dial under the hour dial. No doubt this was at that time a great advance and looked like cutting time up pretty fine. As the hand on the quarter dial made the circuit in an hour the next step was easy, by simply dividing the circle of quarters into sixty minutes. The old fellows who thought in hours must have

the foliot and verge escapement, and in some early attempts to govern the foliot a hog’s bristle was used as a spring. By putting a ring around the ends of the foliot and adding the hair spring of Dr. Hooke, about 1640, we have the verge watches of our grandfathers. This balance wheel and hair spring stand today, but the “lever” escapement has taken the place of the verge. It is a modification of the dead beat, Fig. 29, by adding a lever to the anchor, and this lever is acted on by the balance, hence the name “lever watch.” All this you can see by opening your watch, so no detailed expla-

nation is necessary. Figure 34 shows two triple-cased Turkish watches with verge escapements, the one to the left

Cromwell wore an immense triple-case watch of this kind, and the poor plebeians who were permitted to examine

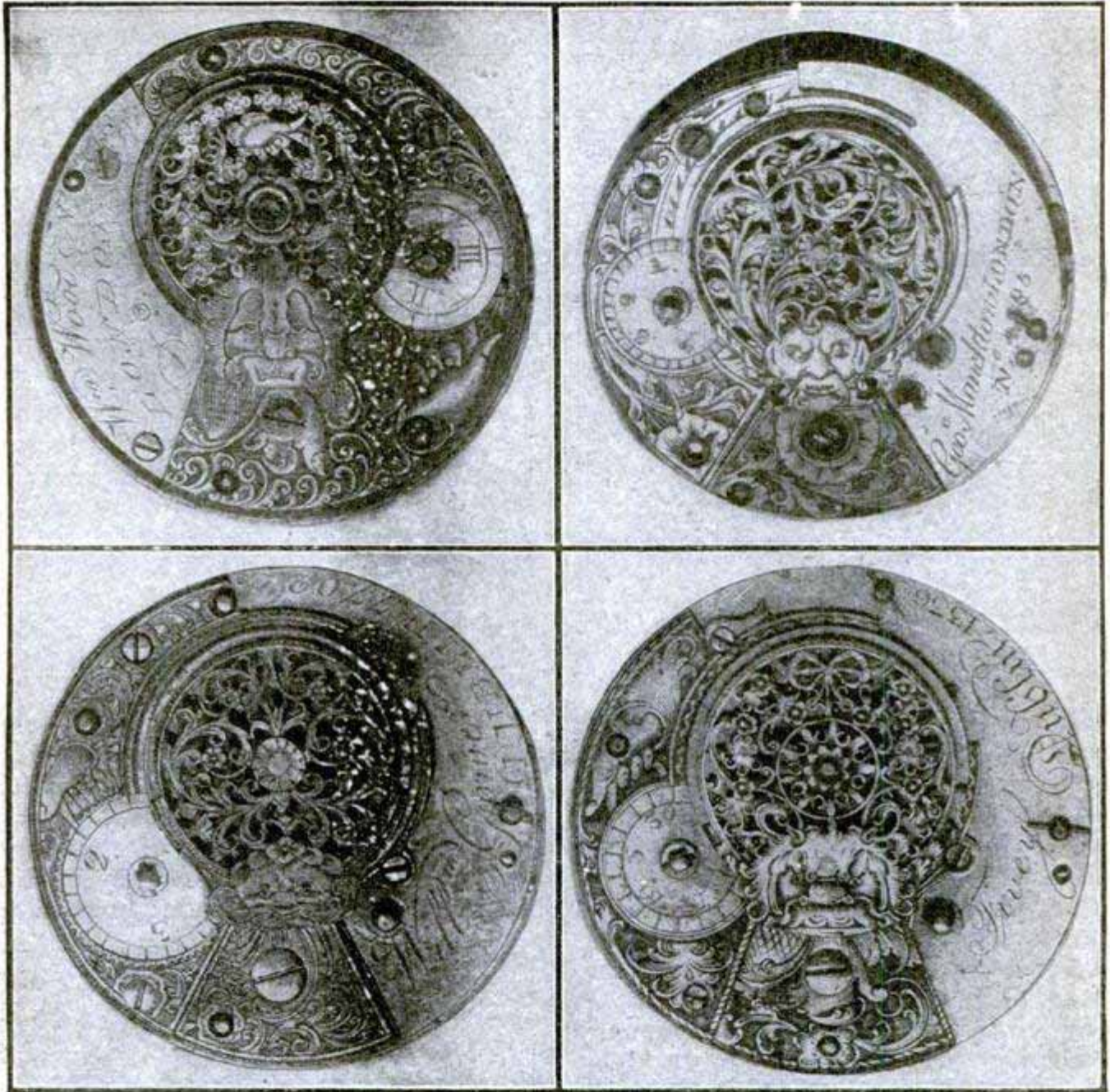


Fig. 37—Watches Showing Art Work

being shown partly opened in Fig. 35. The watch with its inner case, including the glass, is shown to the right. This inner case is complete with two hinges and has a winding hole in the back. The upper case, of "chased" work, goes on next, and then the third, or outer case, covered with tortoise shell fastened with silver rivets, goes on outside the other two. When all three cases are opened and laid on the table, they look like a heap of oyster shells, but they go easily together, forming the grand and dignified watch shown to the left in Fig. 34. Oliver

such a magnificent instrument were favored!

Our boys' watches costing one dollar keep much better time than this type of watch. Comparing the Syrian dial, Fig. 42, with that on Fig. 35, it is evident that the strange hour numerals on both are a variation of the same characters. These, so-called, "Turkish watches" were made in Europe for the Eastern trade. First-class samples of this triple-case type are getting scarce, but I have found four, two of them in Constantinople. Figure 36 shows the double-case style, called

"pair cases," the outer case thin silver, the figures and ornaments being hammered and punched up from the inside



Fig. 39—Antique Watch Cock

and called "repoussé." Before we leave the old watches, the question of art work deserves notice, for it looks as if ornamentation and time-keeping varied inversely in those days—the more art the worse the watch. I presume, as they could not make a good time-keeper at that date, the watch-maker decided to give the buyer something of great size and style for his money. In Fig. 37 four old movements are shown, and there is no doubt about the art, since the work is purely individual and no dies or templates used. In examining a large number of these watches, I have never found the art work on any two of them alike. Note the grotesque faces in these, and in Fig. 39 which is a fine example of pierced, engraved work. Figure 38 is a fine example of pierced work with animals and flowers carved in relief. Figure 40 is a "Chinese" watch but made in Europe for the Chinese market. In Fig. 41 we have what remains of a quarter repeater with musical attachment. Each of the 24 straight gongs, commencing with the longest one, goes a little nearer the center of

the large wheel, so a circle of pins is set in the wheel for each gong, or note, and there is plenty of room for several tunes which the wearer can set off at pleasure. Figure 43 is a modern watch with Hebrew hour numerals. Figure 44 is a modern 24-hour watch used on some railroads and steamship lines. I have a pretty clean-cut recollection of one event in connection with the 24-hour system, as I left Messina between 18 and 19 o'clock on the night of the earthquake! Dials and hands constitute an important branch of the subject. The general fault of hands is that they are too much alike; in many instances they are the same, excepting that the minute hand is a little longer than the hour. The dial shown on the left of Fig. 24 was designed by me for a public clock and can be read twice as far away as the usual dial. Just why we should make the worst dials and hands for public clocks in the United States is more than I can find out, for there is no possible excuse, since the "spade and pointer" hands have been known for generations. Figure 45 is offered as a properly designed dial for watches and domestic clocks, having flat-faced Gothic figures of moderate height, leaving a clear center in the dial, and the heavy "spade" hour hand

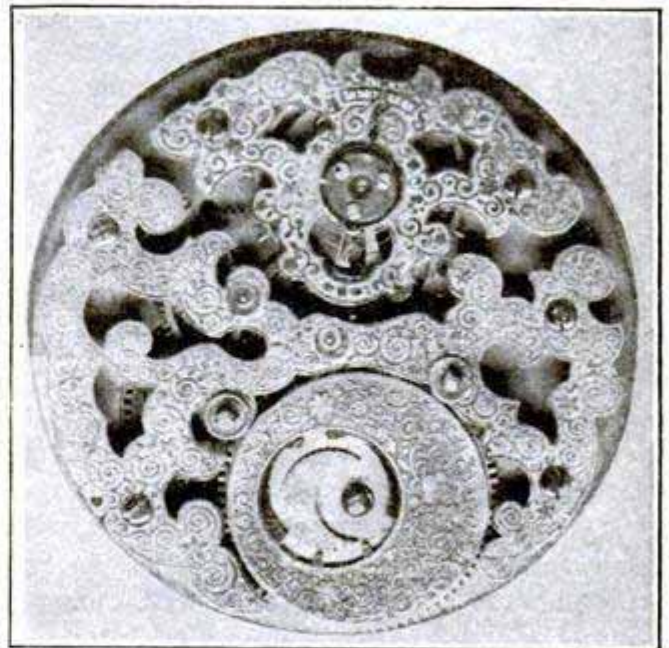


Fig. 40—"Chinese" Watch

reaching only to the inner edges of the figures. For public clocks the Arabic

numerals are the worst, for at a distance they look like twelve thumb marks on the dial; while the flat-faced Roman remain distinct as twelve clear marks.

Do you know that you do not read a public clock by the figures, but by the position of the hands? This was discovered long ago. Lord Grimthorp had one with twelve solid marks on the dial and also speaks of one at the Athenæum Club, both before 1860. The Philadelphia City Hall clock has dials of this kind as shown on right side of Fig. 24. It has also good hands and can be read at a great distance. Very few persons, even in Philadelphia, know that it has no hour numerals on its dials. Still further, there is no clock in the tower, the great hands being moved every minute by air pressure which is regulated by a master clock set in a clock room down below where the walls are 10 ft. thick. Call and see this clock and you will find that the City Hall officials sustain the good name of Philadelphia for politeness. Generally, we give no attention to the hour numerals, even of our watches, as the following proves. When you have taken out your watch and looked at the time, for yourself, and put it back in your pocket, and when a friend asks



Fig. 41—Musical Watch, Repeating Hours and Quarters

the time you take it out again to find the time for him! Why? Because, for

yourself, you did not read hours and minutes, but only got a mental impres-

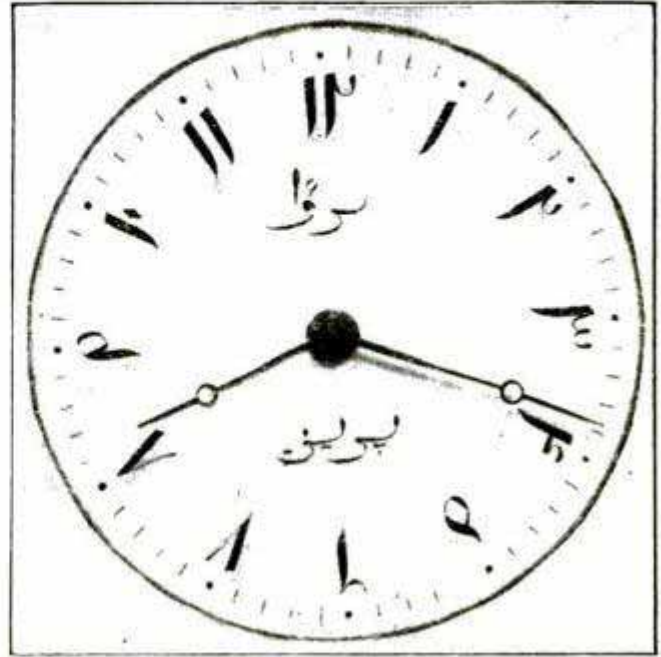


Fig. 42—Syrian Dial

sion from the position of the hands; so we only read hours and minutes when we are called on to proclaim the time.

We must find a little space for striking clocks. The simplest is one blow at each hour just to draw attention to the clock. Striking the hours and also one blow at each half hour as well as the quarter double blow, called "ting tong" quarters, are too well known to need description. The next stage after this is "chiming quarters" with three or more musical gongs, or bells. One of the best strikers I have has three trains, three weights and four bells. It strikes the hour on a large bell and two minutes after the hour it strikes it again, so as to give you another chance to count correctly. At the first quarter it repeats the last hour followed by a musical chord of three bells, which we will call *one triple blow*: at the second quarter the hour again and two triple blows and at the third quarter, the hour again and three triple blows. Suppose a sample hour's striking from four o'clock, this is what you hear, and there can be no mistake. "Four" and in two minutes "four"—"four and one quarter"—"four and two quarters"—"four and three quarters," and the same for all other hours. This is definite, for the clock proclaims the

hour, or the hour and so much past. It can be set silent, but that only stops it from striking automatically, and

blow on a small bell; at the half hour it strikes the last hour over again on the small bell; at the third quarter it

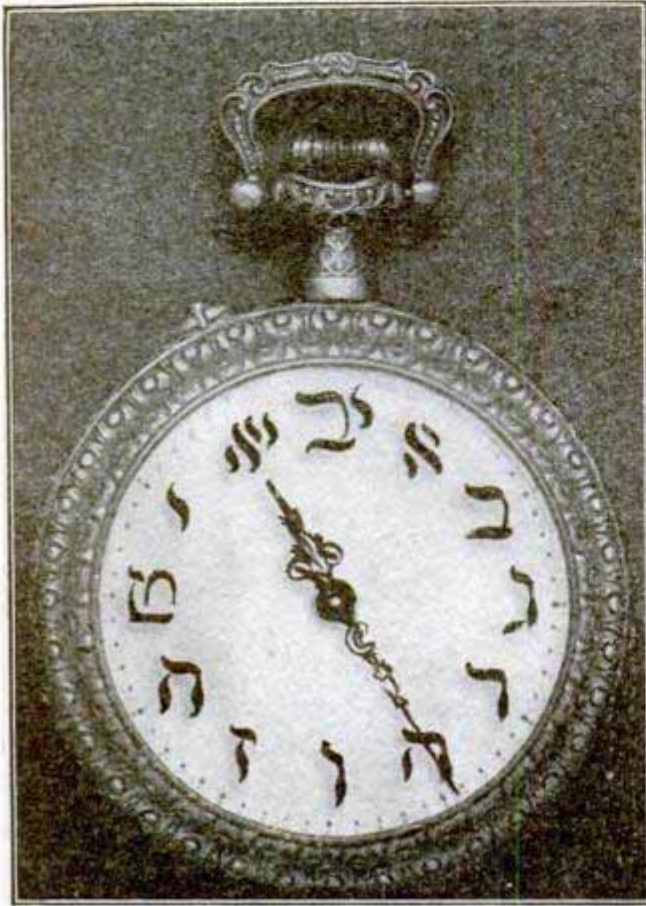


Fig. 43—Hebrew Numerals

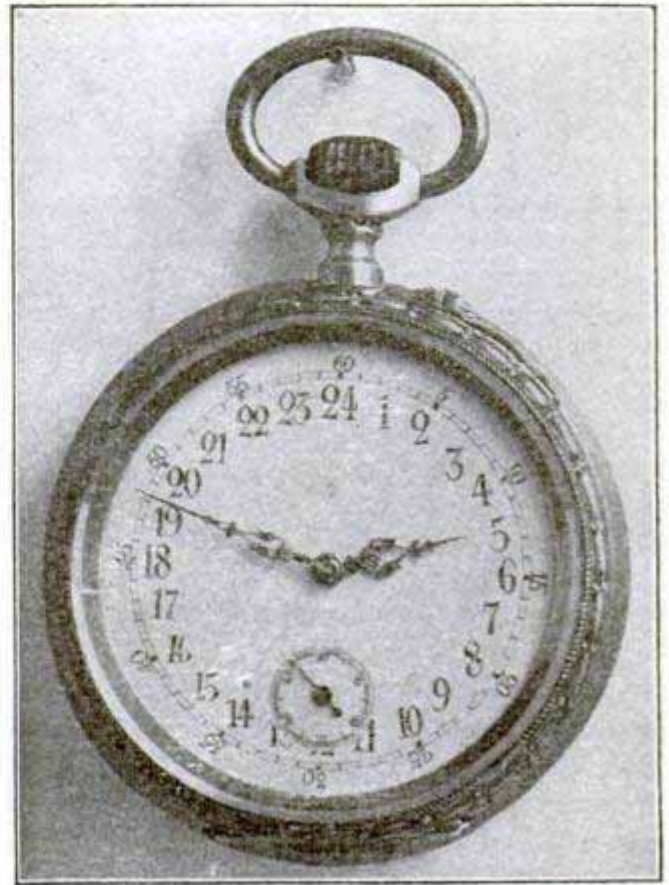


Fig. 44—24-Hour Watch

whether so set or not, it will repeat by pulling a cord. You awake in the night and pull the cord, and then in mellow musical tones, almost as if the clock were speaking, you hear—"four and two quarters." This I consider a perfect striking clock. It is a large movement of fine workmanship and was made in the department of the Jura, France. When a clock or watch only repeats, I consider the old "five-minute repeater" the best. I used this method in a clock which, on pulling the cord, strikes the hour on a large bell and if that is all it strikes, then it is less than five minutes past. If more than five minutes past it follows the hour by one blow on a small bell for every five minutes. This gives the time within five minutes. It is fully described and illustrated in "Machinery," New York, for March, 1905. Just one more. An old Dutch clock which I restored strikes the hour on a large bell; at the first quarter it strikes one

strikes one blow on the large bell. But this in spite of its great ingenuity, only gives definite information at the hour and half hour.

Of curious clocks there is no end, so I shall just refer to one invented by William Congreve, an Englishman, over one hundred years ago, and often coming up since as something new. A plate about 8 in. long and 4 in. wide has a long zigzag groove crosswise. This plate is pivoted at its center so either end can be tipped up a little. A ball smaller than a boy's marble will roll back and forth across this plate till it reaches the lower end, at which point it strikes a click and the main-spring of the clock tips the plate the other way and the ball comes slowly back again till it strikes the disk at the other end of the plate, etc. Every time the plate tips, the hands are moved a little just like the remontoir clock already described. Clocks of this kind are often used for deceptive purposes

and those ignorant of mechanics are deceived into the belief that they see perpetual motion. The extent to which modern machine builders are indebted to the inventions of the ancient clock-maker, I think has never been appreciated.

In its earlier stages the clock was almost the only machine containing toothed gearing, and the "clock tooth" is still necessary in our delicate machines. It is entirely different from our standard gear tooth as used in heavy machines. The clock-makers led for a long time in working steel for tools, springs and wearing surfaces. They also made investigations in friction, bearings, oils, etc., etc. Any one restoring old clocks for amusement and pleasure will be astonished at the high-class mechanics displayed in them—nearly always by unknown inventors. Here is an example: The old clock-maker found that when he wished to drill a hole in a piece of thick wire so as to make a short tube of it, he could only get the hole central and straight by rotating the piece and holding the drill stationary. By this method the drill tends to follow the center line of rotation; and our great guns as well as

with the astronomical motions on which our time-keeping is founded, our present hour zones of time, and close with suggestions for a universal time system over the whole world.

(To be continued.)

CONCRETE NESTS FOR HENS

Among other things, a concern in Iowa is making concrete hens' nests,



Another Use for Concrete

one of which is here shown in active operation. The hen shown hatched 15 chicks in the nest, and then used it as a place of shelter for herself and family at night and on stormy days.

IRRIGATION PROGRESS IN AMERICA

When the national reclamation act was passed in 1902 there were in the government's name, in the 16 states affected, 600,000,000 acres of arid land, of which it was estimated possible to reclaim sufficient to support 50,000,000 people. By 1911 the reclamation service will have reclaimed nearly 2,000,000 acres, at an estimated cost of \$70,000,000.

The construction cost of irrigation is returned to the government from the sale of land, the proceeds to be again used in furthering irrigation. The work of the irrigation congress is yet in its infancy, yet it is making a garden spot and an empire of the "Great American Desert."

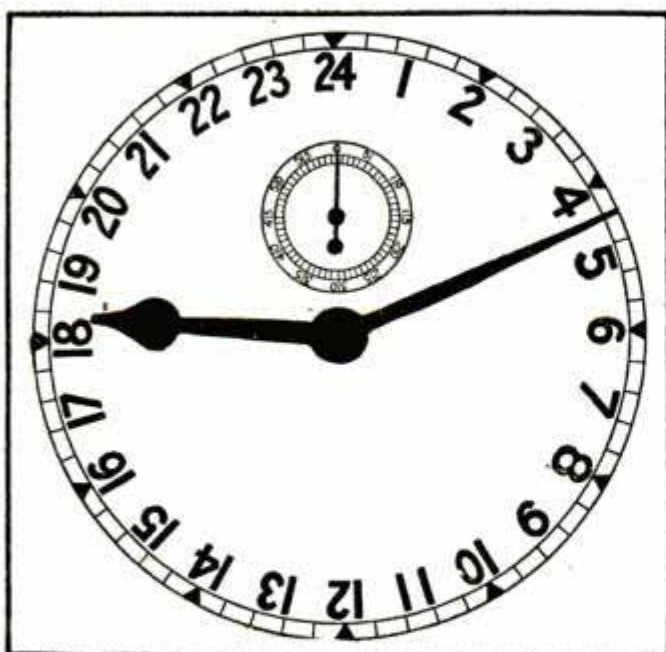
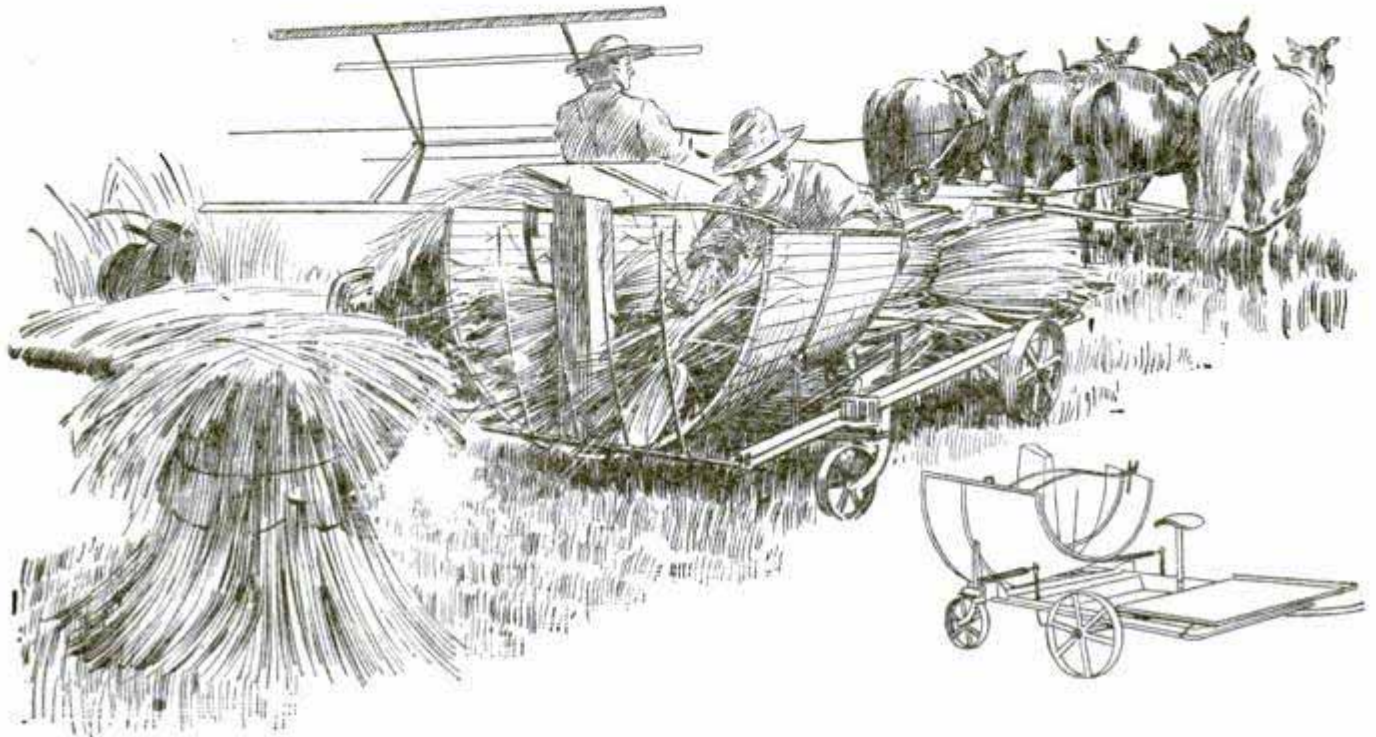


Fig. 45—Domestic Dial by James Arthur

our small rifles are bored just that way to get bores which will shoot straight. The fourth and last chapter will deal

MACHINE FOR SHOCKING GRAIN

A grain-shocking machine, invented by an Illinois man, and successfully tested, is shown in the accompanying



Saves Grain Ordinarily Lost

illustration. It works independent of the binder, but is clamped to the main frame of that machine in the place ordinarily occupied by the bundle carrier.

In operation, the bundles of grain are discharged from the binder upon a solid apron and then turned and placed in the hopper or receptacle by the operator, who rides on the machine. The loose straw is gathered on the table of the shocker and placed with the bundled in the receptacle, instead of being strewn on the ground; and the grain which is shaken loose falls into a box that can be shoveled out when required, thus saving a large amount of grain ordinarily lost. After the required number of bundles have been placed in the receptacle, the compressor bar is closed, holding the shock firmly until it strikes the ground. The shocker can be attached to any make of binder, and can be adjusted to shock any number of bundles from 7 to 13.

The Japanese have started a new steamship line from Hongkong to South Africa.

WIDTHS OF COUNTRY ROADS IN AMERICA AND GERMANY

According to Robert J. Thompson, U. S. Consul at Hanover, German country roads are perhaps subject to a

hundred times more traffic than are American country roads, yet the former range only from 20 to 30 ft. in width, while in the American western states especially, where the traffic is comparatively light, land of an average value of \$100 an acre is cut up with roadways 66 ft. wide. Practically two-thirds of this is given over to weeds, which furnish an inexhaustible supply of seeds for the adjoining farm lands.

The farmer in Germany who has conquered the weeds on his ground need have no fear of their being started again from uncultivated or uncared for land along the roadways. There are no weeds, no mud or chuck holes, no sand stretches in the roads. Looking into the valleys from one of the thousands of lookout towers, which have been placed on the summit of nearly every high elevation of land or mountain in Germany, the roads lie before one's view like bright white ribbons, running past squares of green or brown fields, along the verges of cultivated woods, binding village to

village—a solution of the first and most important problem of human economy and evolution, that of transportation.

Mr. Thompson estimates that in 13 of the great agricultural states of the Middle West there is a total of 700,000 miles of country roads. By reducing the width of these highways from 66 to 36 ft., there would be given back to the farmers for cultivation 2,500,000 acres of generally tillable land, which, at an average valuation of \$100 an acre would mean the restoration to the producing values of the states mentioned of \$250,000,000. This sum has an annual interest value of \$12,500,000, an amount which might be recovered, and, if applied to the proper scientific construction of roads, would in a few years give the United States the most extensive and finest country road system in the world.

A SEA OF MOLTEN FIRE

This photograph, taken at night, shows the lake of boiling lava in the crater of Kilauea, an active volcano in Hawaii. The crater is oval and 9 miles in circumference, with the lake of boiling, red lava over 1,000 ft. below its mouth. To stand at the edge of the crater and look down upon this sea of fire is more startling than the pits of



Photo by Herbert Green

A Pit of Molten Lava

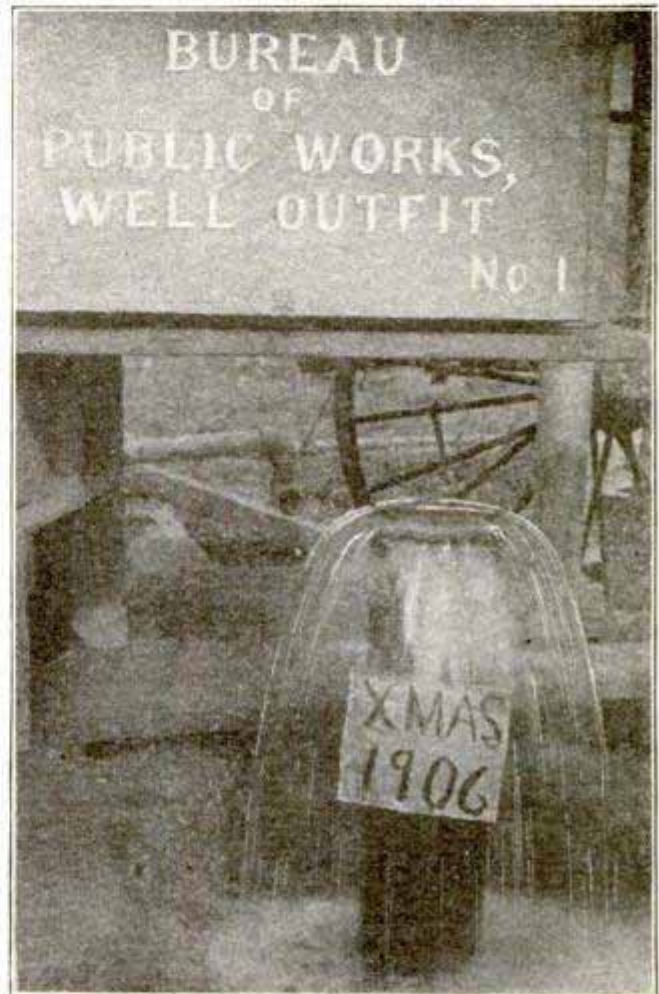
fire Dante imagined in his "Inferno" and Milton in his "Paradise Lost."

The 4-light Gothic windows for the Liverpool cathedral will be 76 ft. high and 38 ft. wide, probably making them the largest windows in the world.

PHILIPPINE ARTESIAN WELLS

By Monroe Woolley

One of the most serious problems which confronted our Philippine Board



A Steady, Profuse Flow—At Bulacan, P. I.

of Health in the outlying provinces of the islands was a clean and wholesome water supply for the hundreds of provincial towns and villages. In Spanish times water was either taken from nearby springs which were, as a rule, pure enough in quality but became wholly unsanitary in the way the water was taken out, and besides the springs were invariably located at an inconvenient point for some people of the town, necessitating long journeys for a day's supply. The natives carry their water in long, bamboo poles, hollowed out. These are carried across the shoulder after the fashion in which a rifle is carried. It is the custom with an open spring or stream to wade in, 20 or more in number and up to the hips, and then fill the vessels from the mud and slime kicked up by the car-

riers and others who may be in for a morning or evening bath.



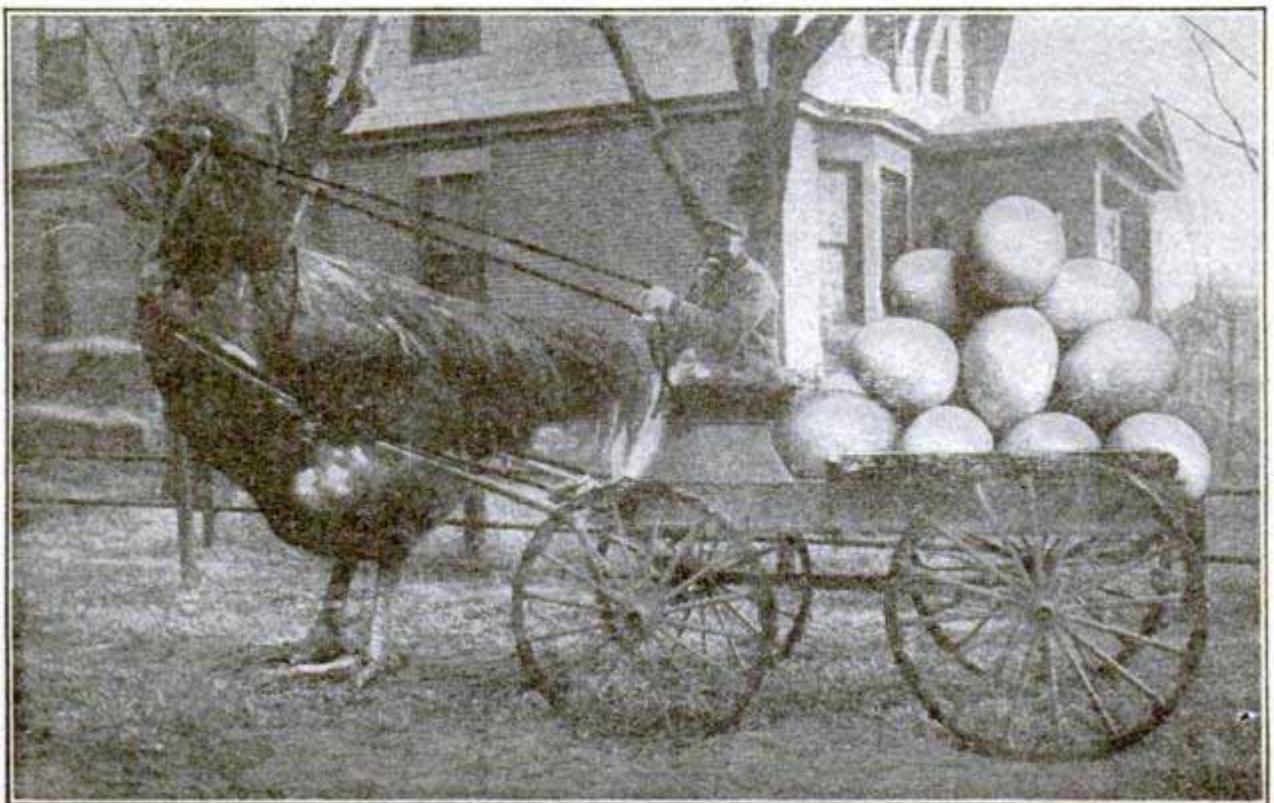
Well-Drilling Machine in Operation—Filipino Laborers and Sikh Indian Watchman

The civil government as a means of preventing disease and to give the more important communities a central,

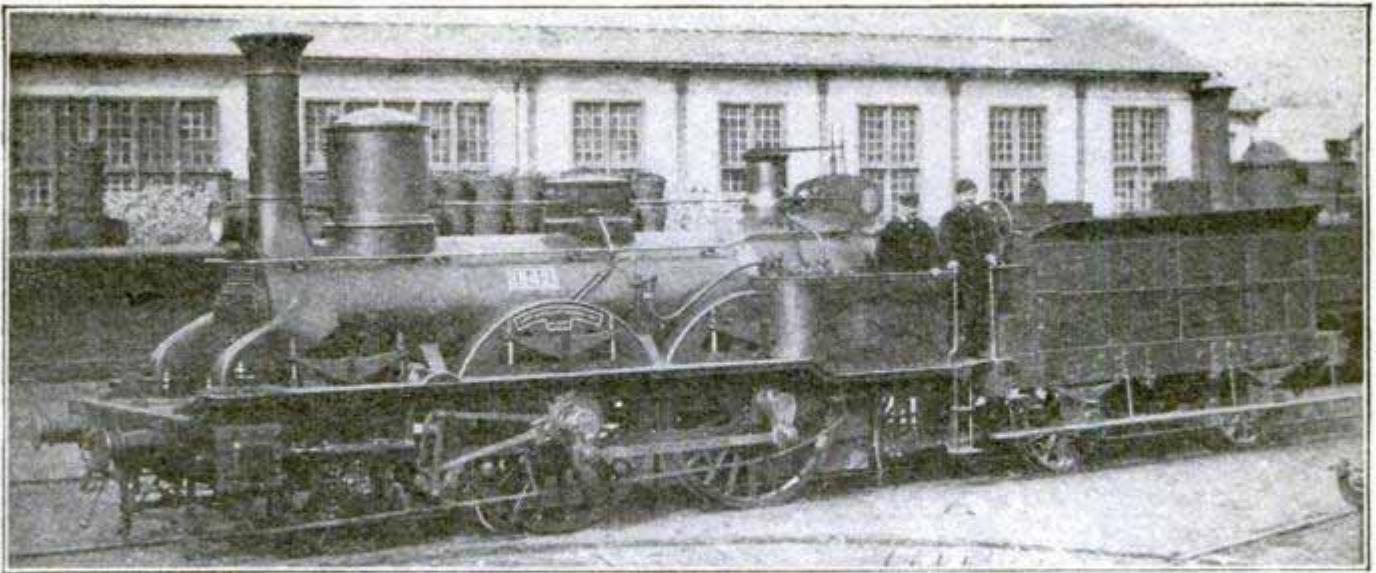
fresh, and inexhaustible water supply commenced the installation of an elaborate and extensive system of driven wells. The work was placed in charge of the Bureau of Public Works, which carried on operations under Mr. Frank L. Irwin, a competent oil and artesian well driller, who originally came from the oil fields of the United States, but who had for the past 15 years been engaged in driving wells for water and oil, principally the latter, for the English in India.

The provinces of Northern Luzon were first invaded, Mr. Irwin taking a mixed crew of Americans and Filipinos to operate the portable drilling machinery. Wells were sunk at all depths, but a good average is from 90 to 125 ft., giving a steady, profuse flow as shown in the photo taken Christmas day in Bulacan province. These wells are looked upon with great pride by the natives, but at first they were superstitious regarding them.

The system is costing the government thousands of dollars, but in time the principal towns of Luzon, and other islands, will have sources of water quite adequate to their needs and as pure as nature and the ingenuity of man can make them.



Iowa Reports a Large Egg Crop This Year

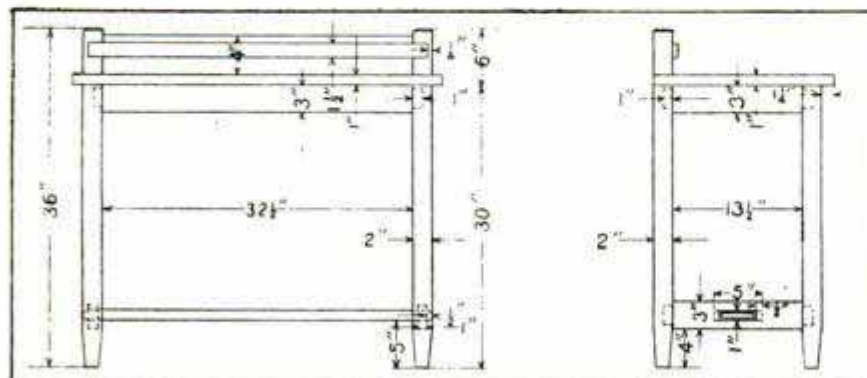


Old Express Locomotive, Western Railway of France

IRON EXCELSIOR IN CON- CRETE PAVING

A new paving combination which is being watched with considerable interest in France is a combination of concrete and iron shavings or excelsior. The metallic excelsior ordinarily comes in sheets or masses, which can be broken apart only with difficulty, owing to the intertwining of the filaments, which are somewhat elastic.

The paving is constructed in blocks, the moulds first being filled with the iron shavings and the interstices filled with cement grout sufficiently fluid to penetrate the entire mass. The blocks thus formed are said to possess great strength and resistance to abrasion, tests showing a resistance to compression of 150,000 lb. per square foot. One



Details of Serving Table Construction

advantage claimed is that joints may be almost eliminated, thus doing away with the points where greatest destruction generally occurs.

HOW TO MAKE A MISSION SERVING TABLE

The serving table is another useful piece of furniture that can be made in mission style. This table should be made in quarter-sawed oak and stained very light. The stock order is as follows:

- 2 posts, 2 by 2 by 37 in., S-4-S.
- 2 posts, 2 by 2 by 31 in., S-4-S.
- 1 top, 1 by 21 by 40 in., S-2-S.
- 2 side rails, 3/4 by 3 by 34 1/2 in., S-2-S.
- 4 end rails, 3/4 by 3 by 15 1/2 in., S-2-S.
- 1 back panel, 3/4 by 4 by 34 1/2 in., S-2-S.
- 1 stretcher, 1 by 5 by 36 1/2 in., S-4-S.
- 1 slat, 1/2 by 1 1/2 by 36 in., S-4-S.

The four posts are ordered 1 in. longer than necessary for squaring to length and the two back posts should be chamfered 1/4 in. on top, as they are the longest and project above the back panel. All of the posts are cut tapering for a space of 4 in. from the bottom ends. Mortises in the posts and tenons on the rails are laid out and cut as shown by the dimensions in the drawing. These parts are then well glued and put together. The top, which should be of well seasoned wood, is cut to fit around the back posts so the back edge and the back side of the posts are flush. The back panel is placed in mortises cut in the corners of the back posts. This is done so the back surface of the panel will be flush the

same as the edge of the top. The slat is fastened with round-headed brass screws on the front of the two back



Serving Table Complete

posts about half way between the top and the ends of the posts.

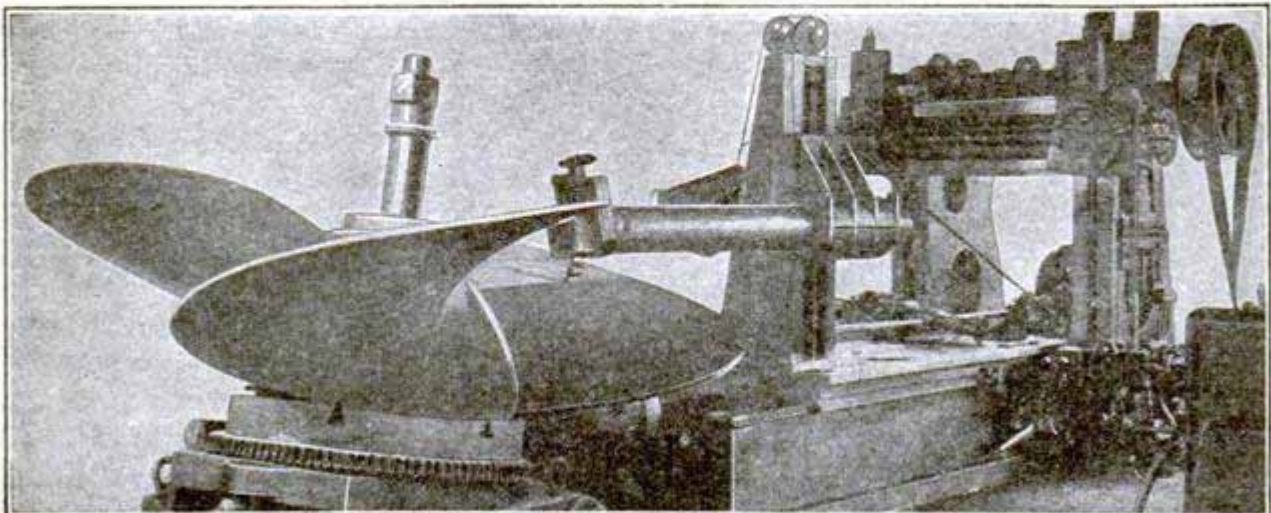
The top may be fastened to the rails by one of two methods. One way is to use a small button made of wood and so mortised as to set in the rails and then fastened to the top with screws. About six of these buttons will be sufficient to hold the top in place. The other method is to bore a hole slanting on the inside of the rails, directing the bit toward the top,

EXTRAORDINARY BUILDING FEAT

An outdoor theatre conducted by a Boston suburban railway burned to the ground early in June. The fire was discovered at two o'clock in the morning, but the general manager was on the scene in 20 minutes. A telephone station was immediately established, and within two hours a designing engineer was on the ground planning a new structure. An hour later the carpenter and contractors arrived, ready to estimate the cost of reconstruction. By this time the ruins were cool enough to permit of starting work, and within 10 days a brand-new theatre, complete in every detail and seating 3,000 persons, was ready for use.

PLANING A GREAT PROPELLER

Anything having to do with the sea is usually a fascinating subject to everyone, especially if it is part of the mechanism that makes a ship go. This illustration shows one of the most modern machines used for planing the propellers of great steamships. The feature of this special planer is in the fact that it is a small machine for the size of the object it works upon. Usually a much larger machine is used, and the propeller is mounted upon it. With this new machine the propeller is



A Propeller Planing Machine

Courtesy American Machinist

which will make a seat—if not cut too deep—for a screw that can be turned direct into the top.

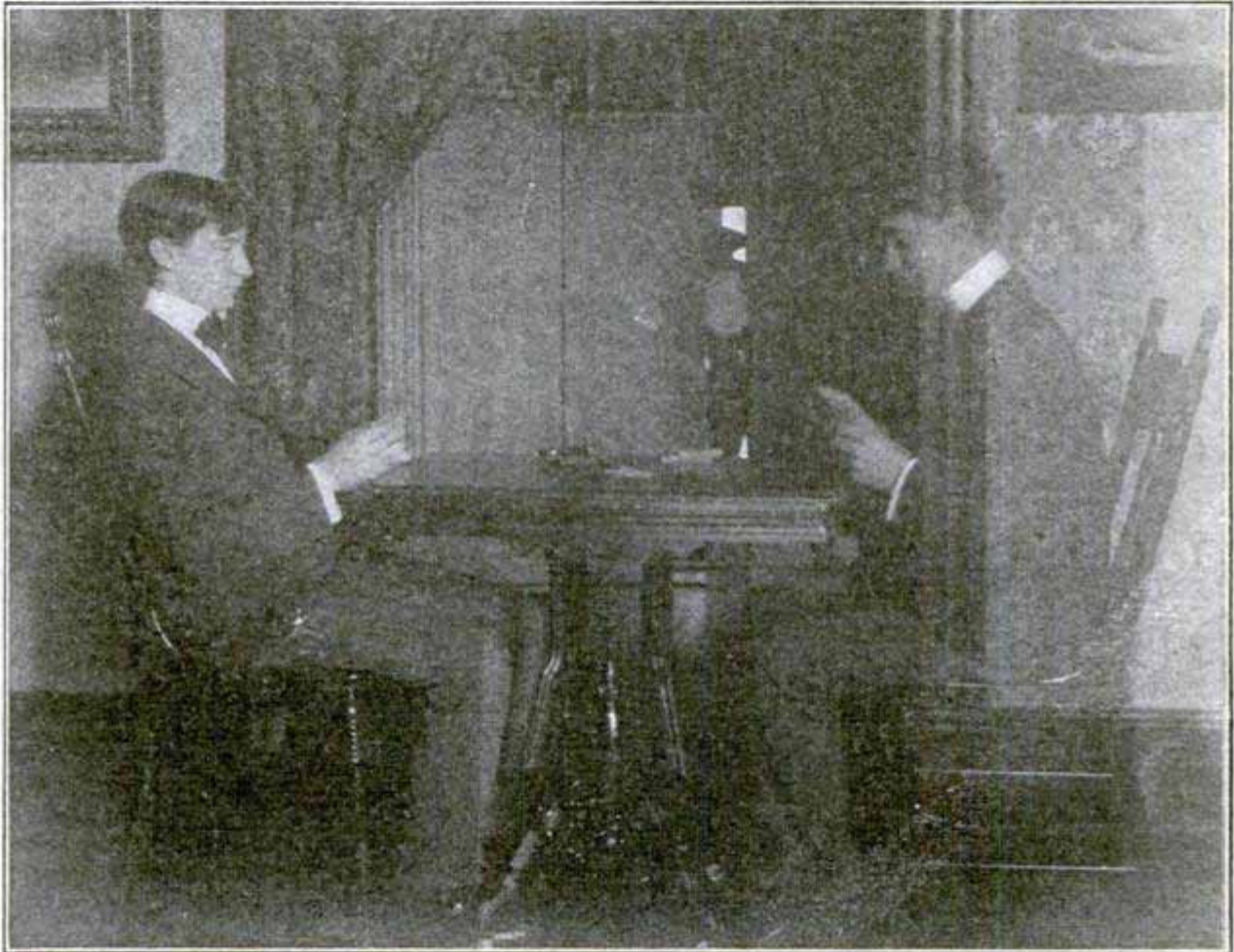
mounted upon an independent tilting-table at the end of the planer bed. The table is revolved by screw gear.

SOME TRICKS WITH THE CAMERA

By C. H. Claudy

"The camera does not lie." Some one invented this catchy phrase and it persists in spite of the very obvious facts against it. There is no greater

dence, save to the photographic expert, as to how it was managed and you can puzzle your friends and have them looking your house over for the mir-



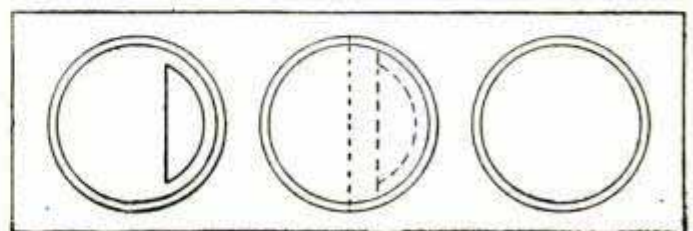
Playing Games with the Ghost of Himself

prevaricator than the camera, if it is handled to that end.

Making trick photographs is not a difficult art to any one who can manage a camera in the ordinary way, and the greater number of photographic tricks can be done with the camera just as it is, or with such alterations as any boy can make in a few minutes with home materials.

There is the duplicate photograph, for instance, where a man plays ball with himself, or fights a mighty fight with a second edition of himself, or crosses foils and lunges at another man who is, strange to say, as much himself as if he lunged at a mirror. And this simple little trick bears no evi-

ror big enough to accomplish the trick, when you didn't use a mirror at all—merely a pill box. Yes, I said pill box. Get from the druggist, or from the medicine chest, a pill box just as big or a little bigger than the size of the lens on your camera. Draw a line across



Construction of Duplicator

the bottom of the box, dividing it into halves. Then to one side of this line, draw another line, distant

from the first line one-sixth of the diameter of the box. This second line



Chasing a Butterfly

divides the box into two parts, one of which is one-third and the other two-thirds of the whole. With a sharp knife cut around the one-third part and

remove it. The sketches will illustrate this exactly.

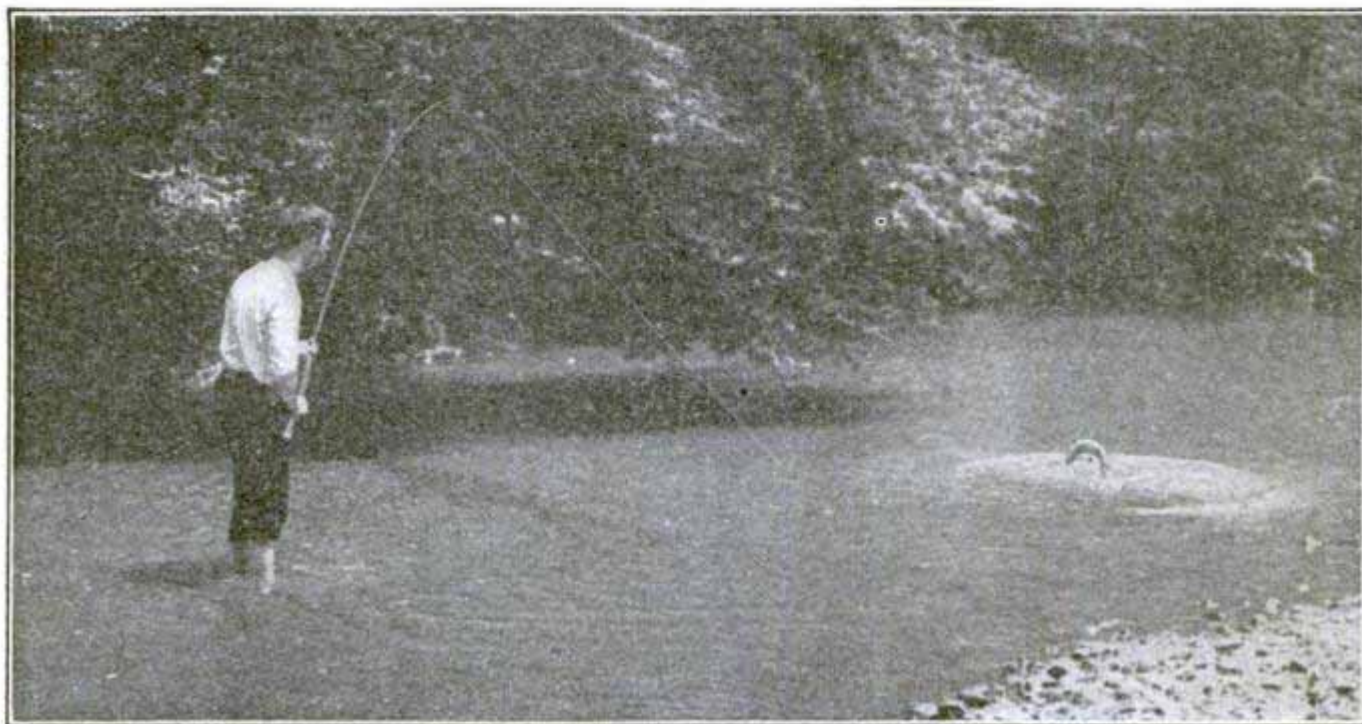
You now have the instrument, called the duplicator—you can buy them ready-made from stock houses for a quarter, but they are no better than the home-made kind, and it only remains for it to be carefully blackened with ink on the inside and edges of the cut-out portion, to use it.

The principle of the duplicator is this: Placed over the lens, with the straight edge of the opening perpendicular, it cuts off from use the greater part of the lens. The part that is left throws an image on the sensitive plate which is just about half of what is actually in front of the camera, within the field of view. As the duplicator can be reversed by revolving it, it is obvious that both halves of the view can be taken, one at a time, and that during the exposure of one half, nothing is being taken in the other half. So you can pose a boy with a sword, lunging viciously at space and take his picture with the duplicator, and then take another one with the duplicator reversed, and the boy on the other side of the space in front of the camera, and have him parrying the lunge, or being "stricken to the heart" or any other pose you fancy.

Or he can box with himself, or play cards or chess or checkers with himself, or do any other duplicate operation of similar character. The thing to look out for is to see that nothing inanimate in the scene is moved during the time of making the two pictures—that is, for instance, in a chess playing scene, the chairs and table must not be moved accidentally in changing the player(s) from one side to the other. The duplicator may be found to work a little too well—that is, leave an unexposed strip up and down the middle of the plate, which shows that the opening is not quite large enough, or, if it is a little too large, it may produce a pair of ghosts, or one ghost, by showing all of the background through both or one of the images of the actor. This can be utilized in making a picture as in one of the illustrations shown herewith,

where a boy is playing a game of euchre with his own "ghost" or "astral body." In making this picture the left-hand side was made as usual, without a dup-

we make the butterfly at home! We take some light colored wood—pith is good, or a dead reed, and cut it down to about 2 in. long. To this we fasten



A Lucky Sportsman—Apparently

licator, and then the lens was capped (shutter closed) the boy moved around to the other side of the table, and another exposure was given, with the duplicator on it. As the result, the first exposure took the boy and all the room; the second took the boy and half the room, and the room shows through the boy, making him "ghostly" on the right-hand side.

Some out-door trick pictures which are very deceptive and interesting to make, are to be had by taking pictures of objects which we are accustomed to regard as in motion, while they are, in the making of the picture, actually stationary. Such a picture is "The Chase" in which the little girl is reaching vainly in the air after a big butterfly. It needs no thinking to know that the combination of the little girl, butterfly, a pretty background, a boy with a camera and a good light in which to take the picture would not be apt to occur without some hunting for it. But this sort of a chase after a butterfly can be made any time, anywhere, given a little girl and a camera. "And a butterfly," you say. No, not given a butterfly, because

white paper wings of the proper shape by means of a couple of slits in the wood. Then we need a fishing pole—any old long pole will do—a clothes line prop is a good thing—some fine black silk thread, and we are all ready. We need, of course, a boy with a camera and some one to hold the long pole. The thread is connected to the "butterfly" by means of a peg in the "back" and the other end attached to the pole. By holding the pole in the air, the "butterfly" can be made to "fly" at any desired height. Remains only to have the little girl or other person who is to attempt to catch the "butterfly" pose. But if the light is good enough to allow a snap shot, it will result in a more realistic picture if the "butterfly" is really chased. We then have the same conditions as would obtain in a real field, chasing a real butterfly, with the advantage that our "butterfly" goes where it is told to go and remains always at the proper height, and does not hide itself in weeds or grasses or disappear just as we are ready to take the picture! Accommodating butterfly! The "behind the scenes" of this little photo-

graphic comedy is shown in another illustration. You will observe that the



A Clever and Simple Trick

black thread is entirely invisible. It is practically so in the sight of the eye, and reduced in size as its image is in the photograph it is too small for the eye to detect.

Another such fraud picture, which will delight the heart of the boy who is fond of fishing and fish stories, is the one of the jumping fish, which is illustrated herewith. I know this is a true fish story because I made it up myself. I bought the fish in the market.

I took a stiff piece of wire, and bent it into a curve and shoved it down the dead fish's mouth and through his body until he had a nice fishy curve to his back! Then, with a pin, the black silk thread was fastened to his back so that he balanced, and the other end of the thread was secured overhead in the branches of a tree so that the fish hung over the water. A fish line was secured to the fish's mouth and weighted with a stone so it would remain under water, and the other end was attached to the rod which the "fisherman" held in his hand. The camera was then focused, and, when all was ready, an assistant cast a stone in the water directly under the fish. This made the circles in the water, which would naturally occur when the fish jumps from the water, as he is supposed to be doing in the picture. An instant later the shutter was snapped—a snap shot, of course, to get the rings in the water, and behold! An angler fishing for trout, or bass or whatever the fish may be, the fish jumping from the water and the camera being on hand and snapped at the precise instant when it would make the best picture. Most remarkable!

There are dozens of such things which may be done in the same manner. You can suspend a ball and be hitting it with a bat, catch it just as the bat touches the ball; you can juggle in the air a dozen balls at once by hanging them from convenient tree limbs; you can catch a flying pigeon in your hands on the jump, etc., etc.

There is a clever trick with a camera which requires only a bottle, some white or light object like a statue, or a girl in a white dress or something similar, and a black background. The trick is to make a photograph which will show an object in a bottle which common sense and experience tells the observer is quite impossible. In the illustration it is a statue of Clytie in a glass-stoppered bottle, and you will admit that it looks as if the bottle had been made around the statue.

The secret of this, as in many other trick photographs, is a double ex-

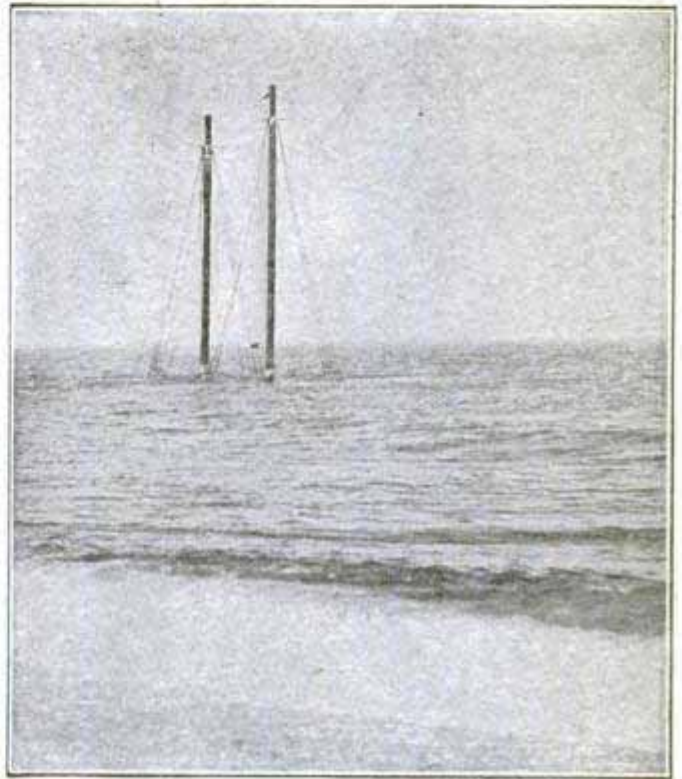
posure. In this picture the statue was "posed" upon some black cloth which extended backwards and upwards to form a perfectly black background. This was arranged over a pile of books on a table near a window and the background was so slanted that no light from the window fell directly on the background, but did fall on the statue. An exposure was made, the lens capped, slide returned to the plate holder and the plate holder withdrawn. Then, before the camera was moved, two pencil marks were made on the ground glass, showing where the top and bottom of the statue came. The statue was then removed, and a clean glass bottle put in its place, and the camera moved forward and refocused, until the glass bottle nearly filled the plate and came above and below the marks on the glass showing where the head and foot of the Clytie had been. Another exposure was made and the result is as you see. The image of Clytie is so much stronger than that of the rear side of the bottle, that the bottle does not show through her, and this is the reason for making the contained object white or light in color. The black background is a necessity for the same reason, if it were light or had lines in it, these would photograph through both images in the two exposures and the whole thing would be a "ghost."

Toys, a cat, a human being, anything may be "put in a bottle," and the same scheme can be worked to make a picture of a man holding himself in reduced size upon his hand, or eating his head off a plate, or carrying a girl in his vest pocket, or any such absurd combination, the only requirements being a perfectly black background and an accurate registration of the two images, easily accomplished with the pencil marks on the ground glass.

The dredges excavating the Pacific entrance to the Panama canal frequently encounter masses of sticky, varicolored clay. Lumps of it have been modeled into forms, such as paperweights, and because of the peculiar streakings are very attractive.

SPARS OF A SUNKEN SHIP

All that remains above water of the 4-masted schooner, "Lizzie H. Brayton," which was wrecked at Bay Head,



Buried in the Sea

N. J., in 1905, is one of the two masts shown in the illustration. She went ashore in a blinding snow storm, and marine men predicted that she would go to pieces in several months, but her hull is still sound, although only the one mast now remains.

DESERT AUTO ROAD OF MATTING

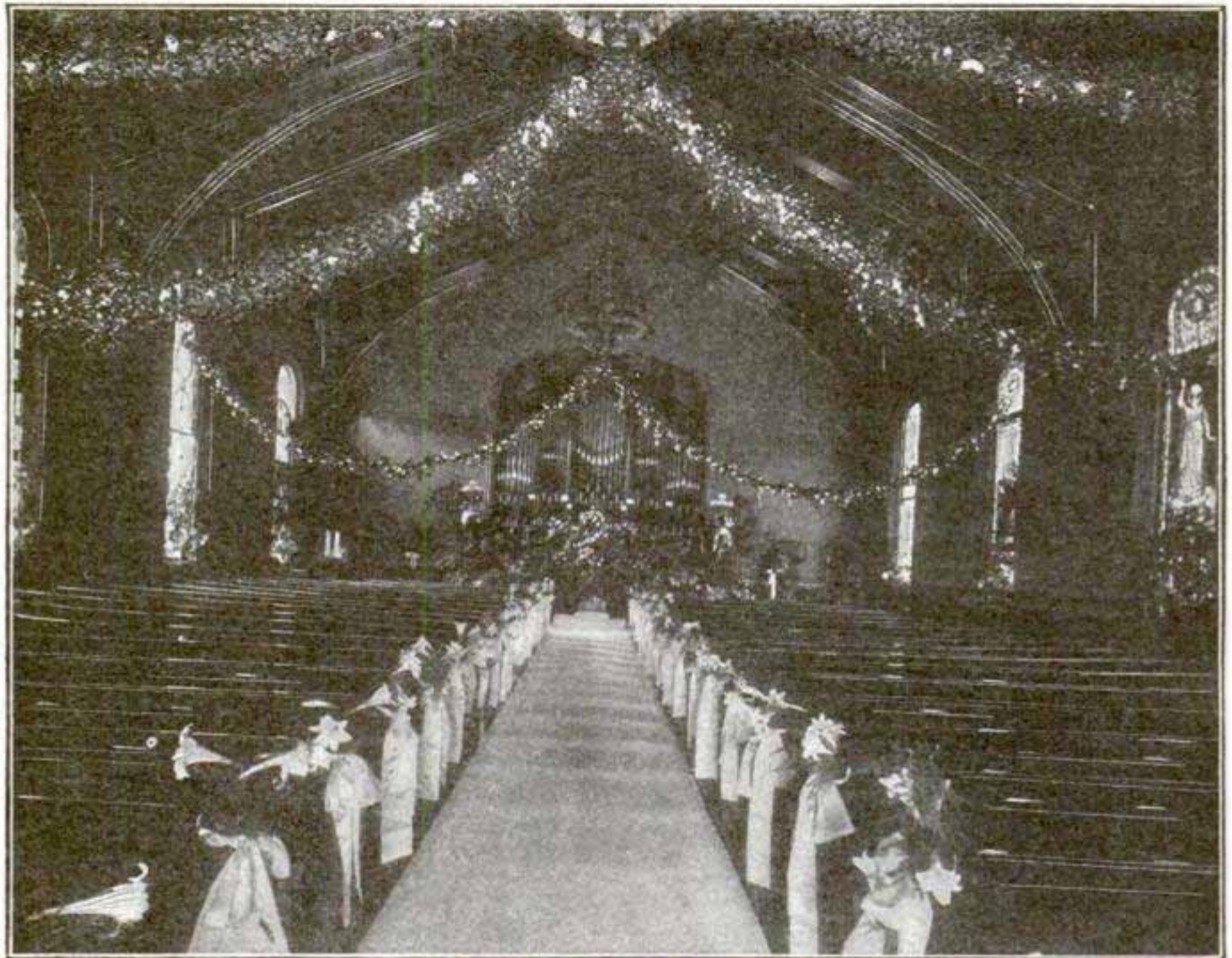
The first automobile journey into the heart of the Sahara desert has just been accomplished by a Chicago party. Their course was south to the Baskra oasis, where they found 100,000 date palms growing, and thence 150 miles to the heart of the desert. During the trip they were forced to carry strips of matting, each 30 ft. in length, to be stretched over soft sand before the machine.

The auto, so far into the desert, created great curiosity, several Arab bands meeting and following it for some time and all displaying the delight of a child with a new toy.

ARTISTIC CHURCH DECORATION

When churches are to be decorated for Easter, Christmas, or for special services such as weddings, etc., an attempt should be made to develop a decoration scheme as artistic and harmonious as possible, whether the limit

of cost is large or small. If small, it is well to arrange the decoration around one objective point, such, for instance, as the altar, but if additional expense is not prohibitive, the entire interior should be included in the scheme.



Wedding Decoration Scheme

Courtesy Florists' Review

of cost is large or small. If small, it is well to arrange the decoration around one objective point, such, for instance, as the altar, but if additional expense is not prohibitive, the entire interior should be included in the scheme.

This illustration shows an artistic wedding decoration scheme in a church at Wilmington, N. C. The main aisle was carpeted with white bleaching, and at the end of each pew a bunch of Easter lilies and asparagus was placed, tied with white satin ribbon. The windows, in which were placed vases of Easter lilies, were banked with southern smilax, and garlands or fes-

GREAT COAL PIER AT HAMPTON ROADS

The recently completed coal pier of the Virginian railway at Hampton Roads, Va., is one of the largest and most modern structures of its kind in the world. It has 2,000 ft. of berthing space in which are arranged thirty-one 60-ton pockets and chutes, providing for the dumping of 15,000 tons of coal every 10 hours. The pier extends 1,860 ft. out from the shore line, 1,000 ft. being of massive steel structure resting upon 42 concrete foundations. The height at the shore is 76 ft., the outer

end gently sloping downward to a height of 69 ft.

The most interesting feature of the pier is the method of handling coal. Instead of running the coal direct from

aerial traveler: "Have no fear of tumbling out for the car is well constructed and there is no danger of derailment. Do not jump about in your joy, for the car is not a balcony. Do not smoke



Great Coal Pier and Electric Cars That Operate Upon It

the mines to the pier and dropping it from the bottom of the cars into the pockets, it is transported from the mines in solid-bottom gondolas to a car-dumper, which turns the cars upside down and drops their contents into special carrier cars. These carrier cars are electrically self-propelling, receiving the current from a third rail. As the incline rising to the pier is rather steep, a cable also is provided at this point. The capacity of each car is 60 tons and they have four bottom doors, opened and closed by pneumatic apparatus. After loading, the cars run over a scale, mount the incline, dump in the prescribed pocket, and run to the end of the pier, where they are switched over and returned on another track.

AERIAL TRUNKS AND ADVERTISING

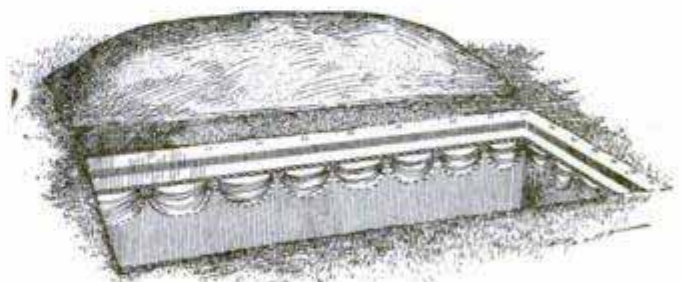
An enterprising trunk-maker in Paris has placed a number of specially shaped trunks for aerial travel upon the market and is using a unique way to advertise them. On the outside, painted in white letters, are the words "aero trunk," and on the inside of the cover are the following jocular hints for the

or carry a spirit stove. Clothe yourself well, for in the air it will be fresh. Do not be vexed if you do not find an aerial inn every mile or so. Do not point the finger of scorn at mortals less fortunate than yourself, who cannot delight in the beauties of the air."

The trunks are of great lightness, the framework being of aluminum, with rings to attach them to the car.

NEW BURIAL DEVICE

In order to make modern burials less distasteful, graves are lined with canvas which has been decorated with various dignified designs.

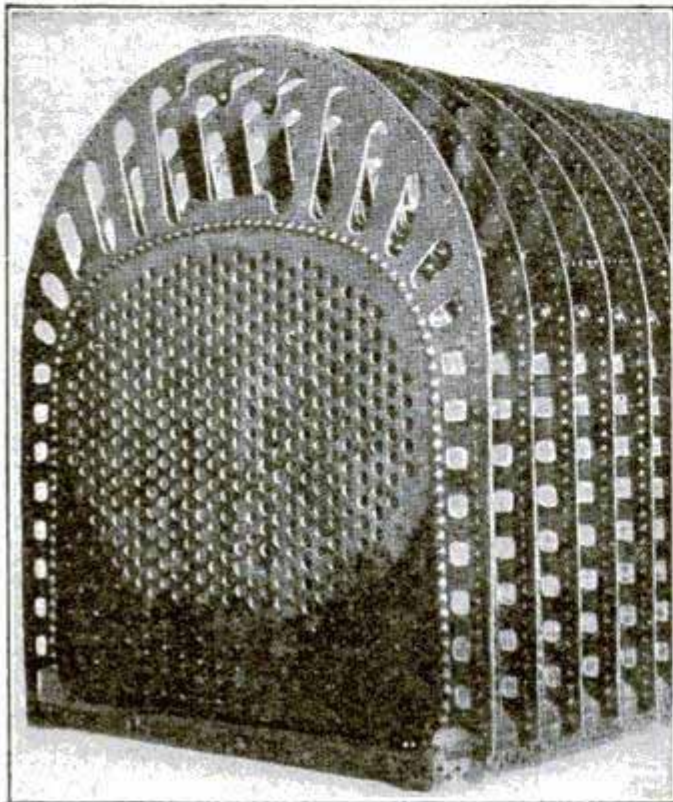


Canvas Lined Grave

The earth from the grave is covered with specially devised cloth covering. Both of these are fastened with long push pins.

NEW TYPE OF LOCOMOTIVE FIREBOX

In the main, locomotive boiler designs have not changed since the earliest types of horizontal fire-tube boiler.



The New Firebox Partially Assembled

ers, but the firebox shown in this illustration is a radical departure, the usual flat firebox sheets and outer shell being replaced by sets of channel sections riveted together, and the usual form, with troublesome staybolts, is replaced by stay sheets, except at the front and door sheets.

The channel sections forming the outer shell and the firebox proper are made from long, narrow strips of steel. Each channel section is formed by pressing hot informers under the hydraulic press. The straight channel is then bent by formers, also operated by the hydraulic press, to conform to the contour of the outer shell or firebox as desired. The curvature of the webs is so formed as to assume the natural curvature when under pressure and the arches formed by the inner and outer channels represent a construction that insures against undue and enormous local stresses resulting either from pressure or sudden changes in temper-

ature. The illustration shows the openings in the radial stay sheets for the horizontal circulation of water.

MOTORCYCLE KILLS ELEVEN PERSONS

The most disastrous motorcycle accident that has ever occurred took place at the botanic gardens in Berlin during a cycle race in July, in which 11 persons were killed and scores were injured through the explosion of one of the racing machines. The motorcycle making the pace burst a tire and the driver lost control. A moment later the benzine tank exploded, and the motorcycle, a veritable flaming comet, broke through the track inclosure and ran amuck among the thousands of spectators. Women's gowns were set ablaze and a panic ensued which crushed many, but nearly all of those who met death were burned so seriously that they died a short time later.

CAT FOSTERS THREE SQUIRRELS

Having lost all but one of a litter of kittens, this cat was provided with three young squirrels as substitutes. Many people in Lewisburg, Tenn., became greatly interested in the experiment, and several expressed belief that the cat would devour them. She proved, however, to be an excellent



Cat Mothering Squirrels

foster mother, as this interesting example of photographic art shows, but the activity of the squirrels in climbing about was a continual surprise to her.

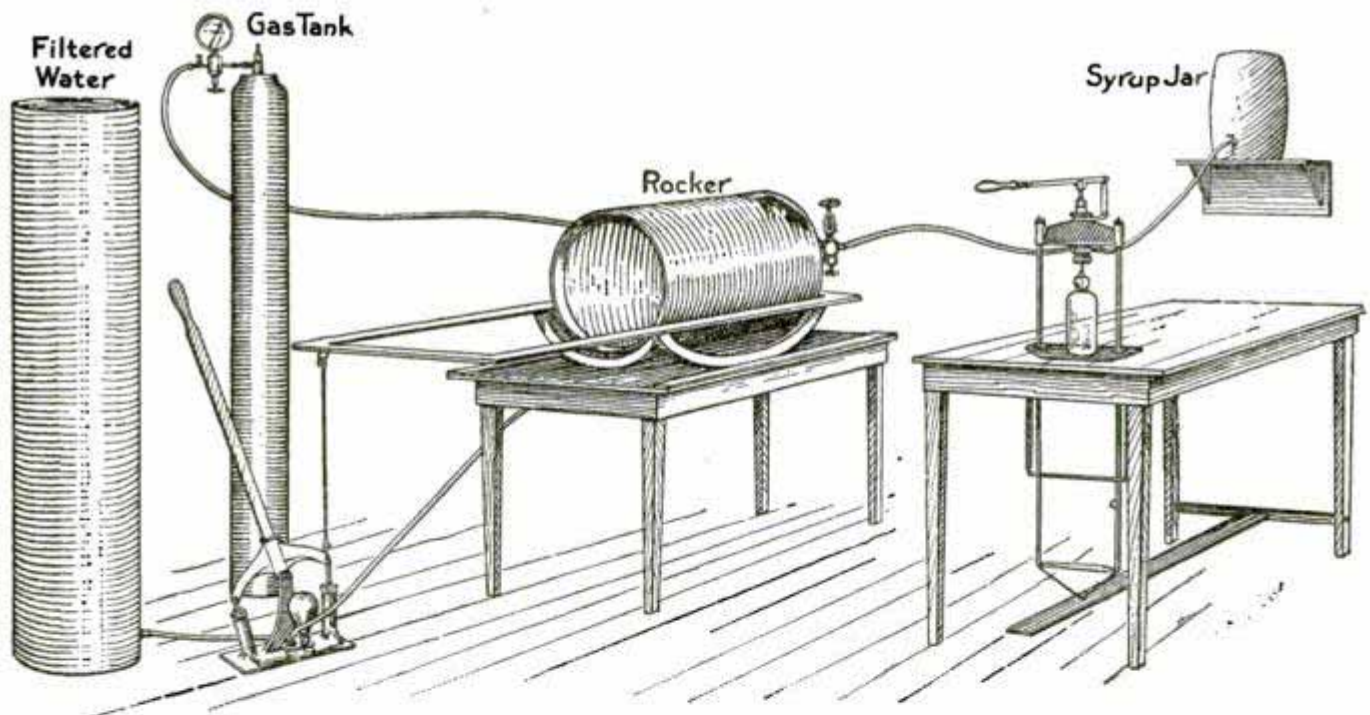
SHOP NOTES

Home-Made Soda Water Bottling Outfit

A small bottling plant with a capacity of 35 cases when operated by two persons can be constructed by using only a few parts that must be purchased from a manufacturer of these goods. A regular soda fountain drum is used for mixing the gas and water and the only changes necessary are to drill a hole in the thickest part where banded and fit in a check valve. This valve is used for the injection of water and gas and should be set to hold the pressure within the fountain. The fountain drum is placed on a regu-

bottling head that has the attachment for the syrup and soda water. The lever on this attachment controls the amount of syrup for each bottle, the filling with soda water and the setting of the rubber cork.

The pump, fountain drum, and bottle-filling device, with the hose connections and gauge, are the only parts that are purchased and these will require very little outlay. The gas is purchased in drums, the drum itself is not sold.—Contributed by G. K. Watson, Farrell, Miss.



A Complete 35-Case Capacity Bottling Outfit

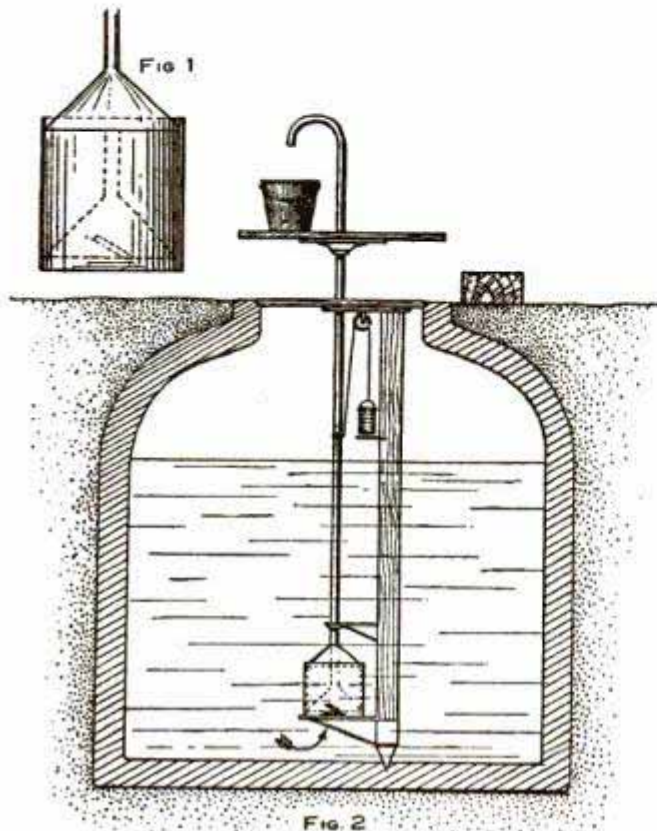
lar rocker which is fitted with an extension frame to make connections with the rocking motion of the water pump. The water is filtered into a tank and then pumped into the fountain drum where it is mixed with the gas as it slushes from end to end. The soda water is then forced by pressure from the fountain to the bottling device attached to the work table. This table is fitted with the regular

Cement Cider Wells

An orchardist in Missouri has adopted an ingenious method of saving his apple crop. He dug a well in his orchard, cemented the walls and bottom and filled it with cider from hundreds of bushels of Missouri apples. This man resorted to the cider well after using all the barrels that he could buy, beg or borrow in that vicinity.

An Automatic Well or Cistern Pump

This outfit can be made very cheaply and in some homes it would save considerable labor as it is only necessary



Raising Water by a Person's Weight

to step upon the platform and the weight of the body will elevate the water. To make this outfit take a 5-gal. funnel top oil can, melt the solder and remove the top, then trim the edges so it will have a working fit inside of the can part as shown in Fig. 1. Cut a 3-in. round hole in the bottom of the can for the inlet of water and make a leather valve to cover the hole.

An extra well top or covering is made and fastened to a plate that is attached to the pipe. The lower end of the pipe is soldered fast to the center of the funnel-shaped cover. The can is placed at the bottom of the well or cistern and fixed permanently to a post support.

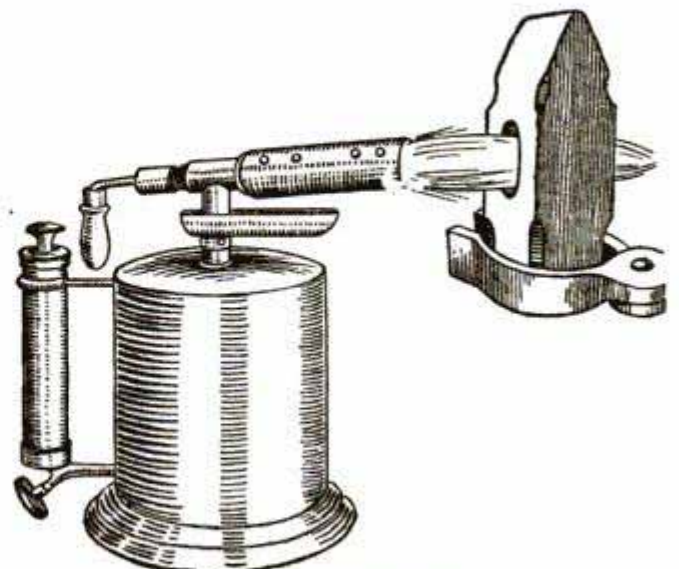
A counterbalance is used to keep the cover at the top of the can and the extra well top or platform above the level of the well opening. The weight of a person standing on the platform will push the pipe and can cover down, causing the valve to close and compressing the water in the can. The only

free opening for the pressure is through the pipe to the top. About the entire amount of water contained in the can will be elevated and run in a bucket at the top. Such a device is suitable for cisterns and shallow wells.—Contributed by A. T. Smith, Long Beach, Cal.

How to Temper a Hammer

If a hammer is hardened all over the same as the face and peen it is liable to crack at the eye. The only way to prevent this is to temper the face and peen hard enough to prevent battering and leave the metal around the eye soft so it will not break. A great many mechanics try to do this tempering by heating the hammer all over, then plunging the pole and then the peen into the water or hardening solution and letting the heat run up both sides at once. The heat is almost sure to run up one side faster than the other by this process, thereby causing the temper to be lost on one of the two sides or both.

The proper way is to heat the hammer all over even and plunge it into the water or hardening solution, after which clean bright with emery cloth. Then hold it over a gasoline torch, allowing the blaze to go through the eye. In a short time the metal will turn a light straw color around the eye,



Heating the Eye First

gradually spreading toward the face and peen. As the color spreads, the part close to the eye will become

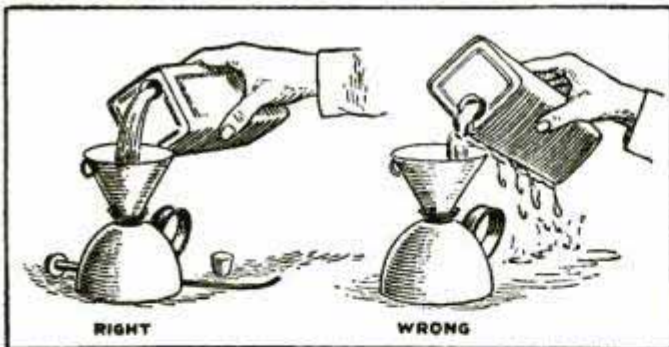
darker, of course, and the darker it is, the softer the metal. After the color reaches a dark straw it will turn to a deep purple and at this color it is soft enough for the eye. The face and peen should be a dark straw or brown.

If the color spreads too fast, turn off some of the heat; and if too slow, draw pole and peen over the blaze to help spread the heat. In most cases the heat will run up the peen faster than up the pole as the former has less metal in it. In this case, let the blaze strike a little to one side of the eye toward the face. Treat double-face and claw hammers in the same way.

If a torch is not at hand, heat a large bar of metal red hot and lay the hammer across it. This is not so good as a torch, however, as it applies too much heat at once.—Contributed by R. D. Benjamin, Harper's Ferry, W. Va.

Turning Oil from a Square Can

A great many oil cans in which oil is sold are square with the opening at the side or corner. The contents of



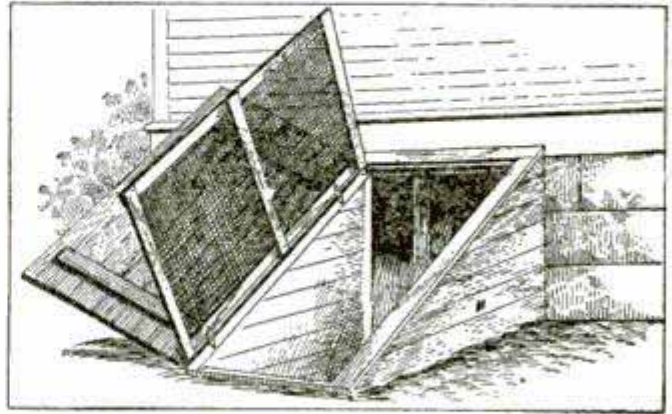
Pouring Oil from a Square Can

such a can may be poured out without wasting a drop, if the can is held properly with the opening at the top. This will permit the can to be tipped so the oil will flow without a gurgle. If the can is held so the opening will be at the lower corner the oil will try to follow down the outside of the can and cause considerable waste.

The approximate length of a belt to run over two pulleys may be obtained by adding the diameters of the two pulleys and multiplying by 1.5625, and adding the result to twice the distance between the centers of the shaft.

Screen Covering for an Open Cellar Door

A cellar door must be left open at times for ventilation and when in this condition the opening is quite danger-



Protects the Open Cellarway

ous for the little ones, and much more so if the door is located on the porch or in the house. To prevent anyone from falling into the opening and yet allowing a thorough ventilation of the cellar the following described device will prove very effective: Make a frame from 1- by 4-in. pine boards, $\frac{1}{4}$ in. shorter and $1\frac{1}{4}$ in. narrower than the opening. Cover the frame with wire netting and securely staple it to the wood. Hang the screen frame low enough to allow the main door to close down over it. Hinges may be fastened to 1-in. blocks nailed to the side of the opening. Similar blocks are nailed to the opposite side to support the other side of the door. The wire screen door may be held in an upright position by a loop of cord hooked over a nail driven in the edge of a cleat on the main door.—Contributed by B. Orlando Taylor.

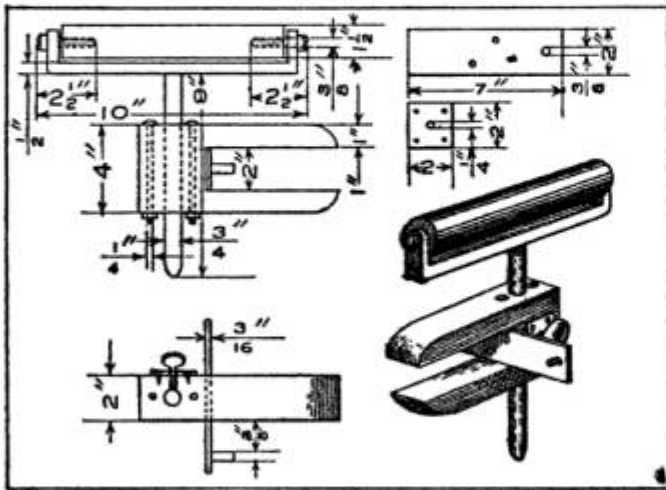
A Peculiar Watchspring Break

The accompanying sketch shows an unusual break in a watchspring. The sketch is an exact reproduction of the break as it appeared when the drum was taken from the watch. An arc of a circle was broken from each coil of the spring.



Bench Roller for Handling Lumber

The handling of lumber on a bench can be easily accomplished with the aid of a small roller or bench support.



Details of a Bench Roller

The dimensions given in the accompanying sketch will make up a very good sized support. The roller is turned from hard wood and fitted with metal pins for axles which turn in metal bearings made in a U-shaped piece of stake iron. A round pin is securely fastened to the center of the U-shaped iron and the projecting end passes through a hole in the bench clamp and is adjusted with a set screw. The bench clamp resembles a carpenter's clamp and has a piece of 3/16-in. metal fastened with screws at the base of the opening which has a metal pin riveted in one end. This pin is used to hold the support at any place on the bench. Holes are bored at various places in the edge of the bench to receive this pin, and, when the support is set and the pin pushed in a hole, the stock may be run over the roller instead of sliding on top of the bench.—Contributed by G. T. Stichnothe, Jonesboro, Ark.

An Easy Way to Clean Brass

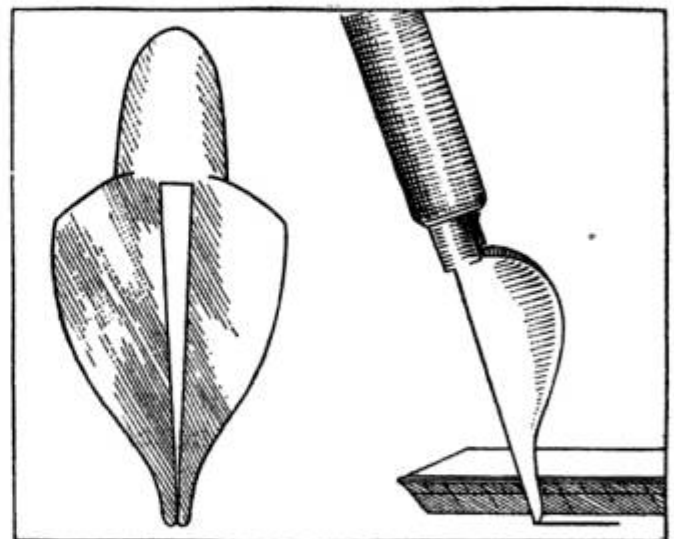
One morning last winter I noticed a splash of buckwheat batter on my hydrant faucet that had splattered there when I mixed the cakes the night before. It was dry and brushed off easily leaving a clean bright spot on the metal. Many times that day I

noticed that spot. Scouring faucets was a bugbear with me. That night I painted my faucet thick with buckwheat batter. The experiment was quite a success; the dried batter was fairly green, and upon brushing it off with a dry cloth the spigots were bright and clean.

I continued to clean my faucets that way all winter and found that while it did not give the luster of a polish it gave an apparently cleaner surface as the batter seemed to eat off every bit of discoloration.—Contributed by Mrs. Grace L. Shaver.

Home-Made Ruling Pen for Large Ink Capacity

This pen is made from a thin piece of tin, or, better still, a piece of stencil brass cut as shown in the sketch. The upper end is bent in a semi-circle to fit the penholder and the lower end made quite flat at the ruling point. Make the opening between the sides wedge shaped, 1/8 in. wide at the top and tapering down to practically nothing at the point. If a fine line is wanted, hammer it quite close at the point; and if a heavy line is required, the points can be opened to suit by pressing a knife blade in between them. The pen should be held with the open side or edge up, as shown in the illus-



Ruling Pen Made from Tin

tration. The pen is filled the same as a draftsman's ruling pen and not dipped in the ink.—Contributed by C. E. Bimson, Berthoud, Colo.

Decorating by the Use of Stencils

The popularity, which the stencil form of decoration is enjoying, is hardly surprising when the ease of manipulation together with the beautiful effects obtainable are taken into consideration. Stencils should be cut from heavy manila paper which has been treated with a coat of oil, says *Wall-Paper News*. The design can

be given both sides of the stencil, in order to render it durable, inasmuch as it can be washed from time to time. Stencil knives and brushes can be obtained from almost any paint dealer or art store, and very often the air brush is used to a good effect.

Stencils can be divided into three general classes: First—The single



FIG. 1



FIG. 2



FIG. 3

Double Cut Stencils for Producing Complete Designs

be drawn on the paper before it is oiled, or can be transferred to it after the oil has been applied. The first method is preferable. Then the paper is laid on a piece of thick glass and the design is cut out with a sharp knife. Before using, a thin coat of shellac should

be given both sides of the stencil, in order to render it durable, inasmuch as it can be washed from time to time. Stencil knives and brushes can be obtained from almost any paint dealer or art store, and very often the air brush is used to a good effect.

Second—The double stencil, where half of the design is cut on one sheet and the other half on another. When

the two sheets have been stenciled on the design, it is complete and no



Stencil of a Head

ties are visible. Some wonderful effects can be produced in this way, as the stencil appearance is entirely

Third—Parti-colored stencils which are cut in sets. For instance, if a stencil design is required to be reproduced in two or more colors, each color has a separate stencil plate as in the case of a conventional flower border, the flower, the leaves and the stem are each cut in a separate sheet.

In case of all stencils, it is necessary to cut a small portion of the repeat to act as a guide for the shifting of the stencil. In the case of double or parti-colored stencils, a small dot is punched at each end of the design to insure proper registration.

The pigments used in reproducing the designs vary according to the material or ground which it is proposed to ornament. For walls and ceilings painted in oil, oil colors either opaque or thinned to a glaze must be used. For grounds prepared in distemper, distemper colors must be employed.



FIG. 4

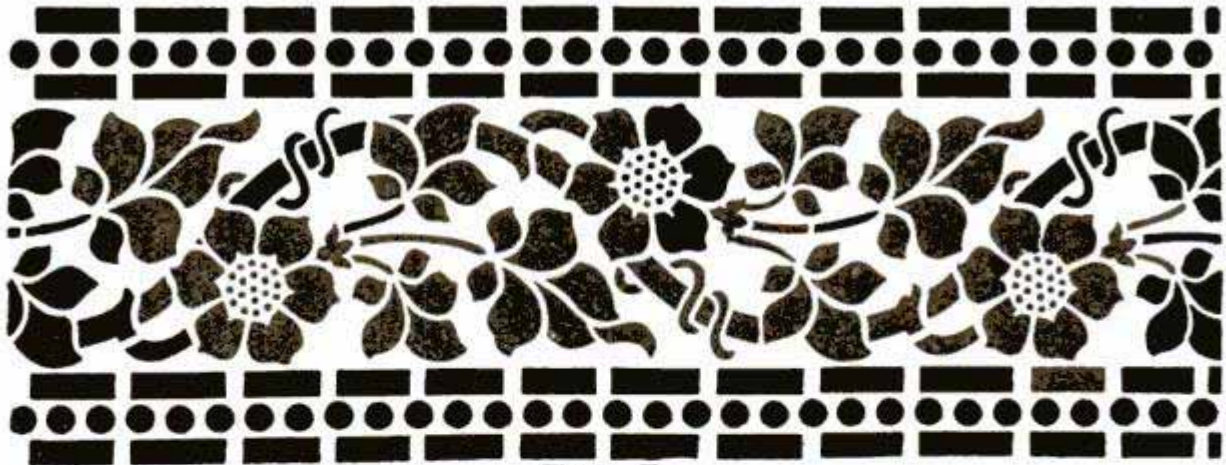


FIG. 5



FIG. 6

Single Cut Stencils

eliminated, with the result that the decoration has the appearance of hand-work.

For fabrics such as duck, canvas, denim or burlap, oil colors thinned with turpentine are best, and care must be

taken to remove anything superfluous to the color before applying it with the stencil.

A gentle scrubbing motion is best in applying the paint, but a few experiments on some waste pieces of material will soon show the beginner the proper way, and "experience is the best teacher" in this as in other things.

In the illustrations are shown the three kinds of stencils, Figures 1 and 2 are two sheets of a double stencil cut separately and which when stenciled one over the other, produce the complete effect as shown in Fig. 3. A sample of the single cut stencil is shown in Fig. 4; Fig. 5 shows a good example of a single stencil which can be cut for three colors. In this case a separate stencil would be cut for the flowers, one for the leaves and another for the stems. Figure 6 is a double cut stencil.

A Bolt Puller

The accompanying sketch shows a tool that is very useful for the black-



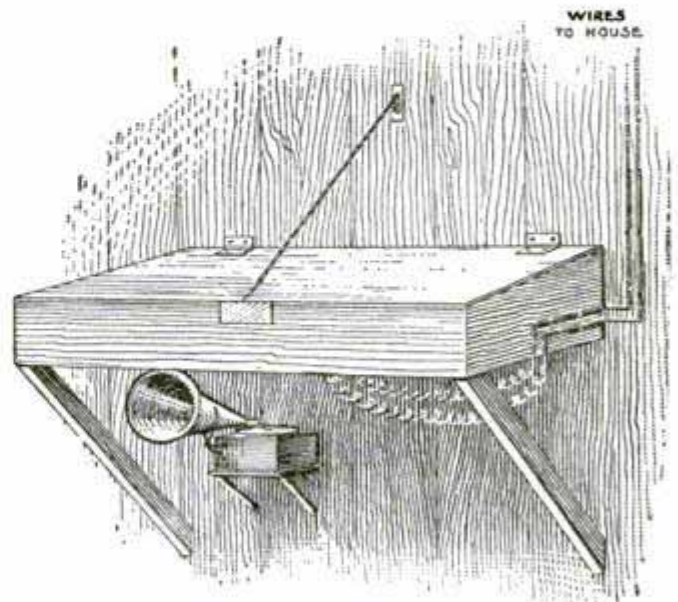
For Pulling Tire Bolts

smith. This tool will be found handy for pulling tire bolts as well as pole and shaft bolts. The illustration needs no description.

Electric Operated Feeding Trough for a Horse

Often having to be away from home when my horse would need his breakfast, I thought of a scheme that would give him his feed at the proper time even though I was away from home, or, if at home, when I did not care to rise as early as I would like for him to be fed. By means of an electric door opener, I arranged a feed trough with compartments for corn and hay, very much like an ordinary horse trough, with the exception that it had a hinged, slatted door or lid, and

fastening by means of an ordinary door lock, and the electric door opener. The lid was arranged to be pulled up by



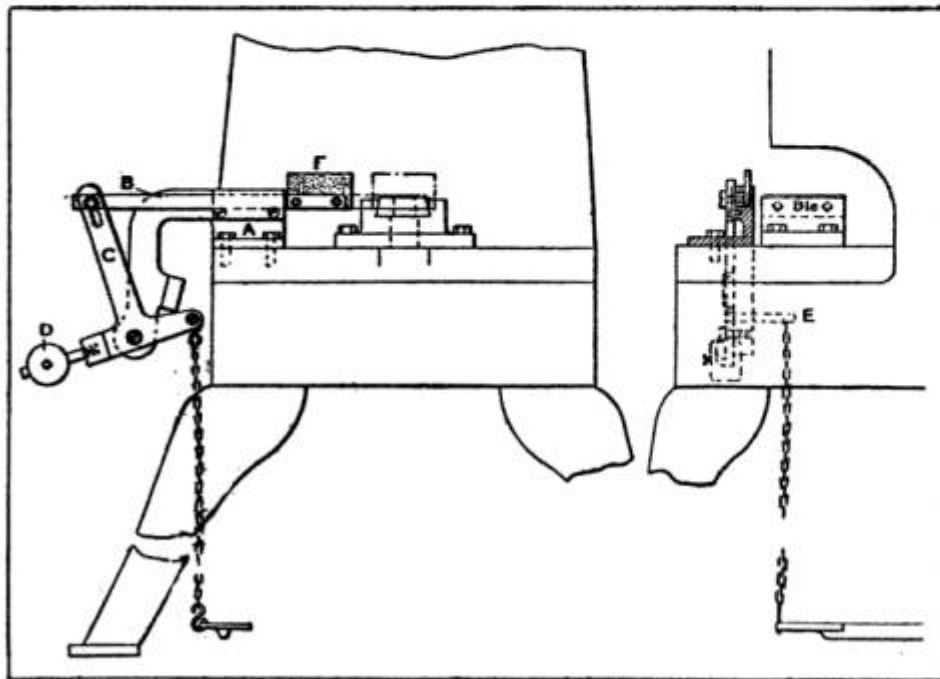
A Push Button Opens the Cover

means of a cord and weight, when released.

I then ran wires into the house, first connecting them with a push button, near the head of my bed, and later connecting the wires to an electric clock, which I could set for any desired hour. If I awoke at six o'clock in the morning, and wanted my horse fed at once, I would simply press the button and the lid on the trough would fly up, exposing the feed in the trough to the horse; or when I left town on an early train, and wanted my horse fed at his usual time, I would simply connect the clock to the horse feeder, and it would feed him, with me miles from home.

At first the horse did not know his food was ready when he would hear the lid fly up and would not come immediately into the stable. I therefore made a record especially for the purpose on my phonograph, and after concealing the phonograph from dust and dirt near the trough, I also connected it by means of a trip spring so that when the lid of the trough flew up, the phonograph would start, and call "Cope, cope, Bud, come on," and whistle, calling him, until the horse would come into the stable and find the trough open. Many thought this

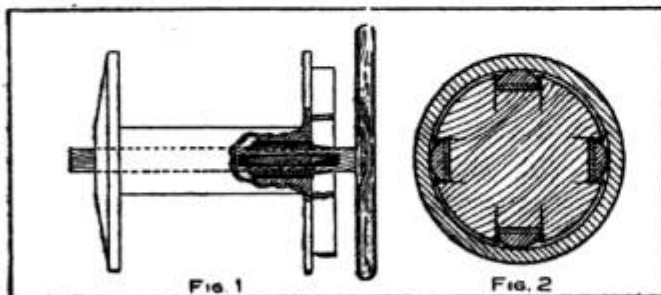
simply a story on my part, and consequently came to see it, and all pronounced it a great success.—Contributed by R. G. Robbins, Mayfield, Kentucky.



Showing Guard Applied to Power Press

Reaming a Large Hole with Files

A new rope drum was received for a hoist and the bronze bearings would not fit the shaft. There was nothing at hand that could be used for making the hole to the right size and a temporary arrangement had to be devised to cut out the bearings. A piece of wood was trimmed up smooth and round, and four slots cut in the rounding surface to hold four half-round files. A handle was fastened to the round piece of wood as shown in Fig. 1. Liners were put under the files, as shown in



Position of the Files for Reaming

the enlarged end section, Fig. 2, to make them cut the metal to the right size.—Contributed by Geo. C. Badger, Mayger, Oregon.

Finger Guard for Power Presses

There are but few operators of power presses that have a full set of fingers remaining on each hand after a year's work. Some one of the fingers will be mashed in the press, due to the quick action of the die after the trip. Herewith is illustrated a guard so constructed as to bring a shield right across the front of the press die before the plunger descends, therefore, as it operates in front of the punch, should the operator's fingers be in the way, it will push them out of danger before the punch is low enough to catch his hand, says American Machinist.

This guard is made up with a cast-iron bracket cored out to receive a piece of flat iron for a slide, and fixed to the table of the press by two $\frac{3}{8}$ -in. set screws, slots being cored in the base of the bracket for adjusting the position. There is also a cranked cast-iron lever which operates the slide. This is connected to the bracket and slide by shoulder screws, the lever being slotted to allow for the travel of the slide as shown. A piece of $\frac{3}{8}$ -in. round steel is screwed into the bottom end of the lever with a small hole in the end into which is inserted an S-hook to carry a small chain leading down to the pedal of the press. It is found to be necessary to have right and left finger guards, as some jobs require a guard on the left-hand side and others on the right-hand side, so by drilling a hole on each side of pedal it is easily changed from right to left.

The cast-iron bracket, A, holds the steel slide, B, and also the crank arm, C. The cast-iron balance weight, D, brings the slide back directly the operator releases the pedal for the next movement. Should the operator keep

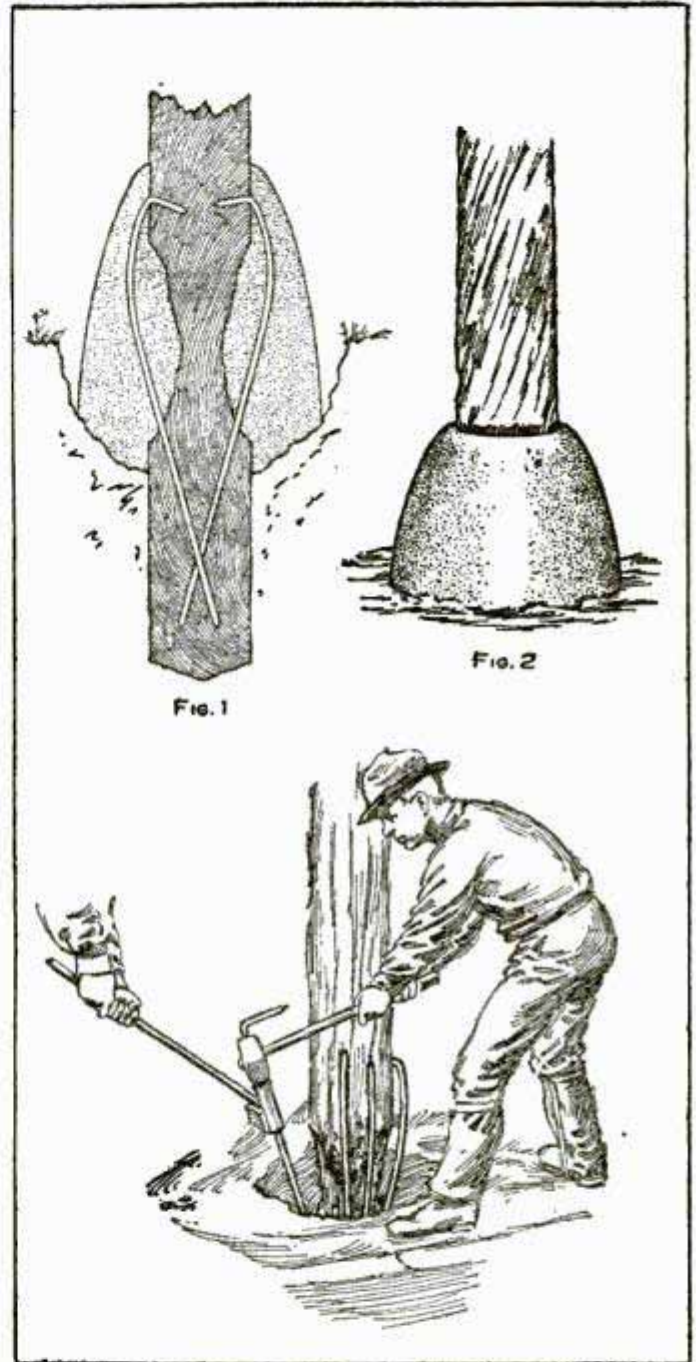
his foot on the pedal and the press continue running, he cannot easily get his finger into danger, because the shield will remain in front of the die, thereby compelling him to release the pedal for every operation. It is common and dangerous practice for expert operators when on piece work to try and catch every stroke of the press. A piece of $\frac{3}{8}$ -in. round iron, E, is screwed into the crank arm in which is inserted the S-hook for connecting the chain. A chain makes the most convenient connection as you can take up or let out a link, according to the travel required by the slide. The shield, F, is made from a piece of ordinary 3-in. leather belt and fixed to slide by two $\frac{3}{16}$ -in. screws.

Reinforcing Wooden Line Poles

The limited supply and steadily increasing cost of wooden poles for electric light, telephone, and railway transmission lines, present a serious problem to large consumers of this kind of timber, says *Electric Railway Journal*. Preservatives are used to prolong the life and service of poles to be set in the future, but the constant renewals of old poles which were set before the value of preservatives was realized require large quantities of new poles each year to take the place of those dangerously decayed at the ground line. These poles are perfectly sound above the ground line and a plan for reinforcing them, consisting of a cage of steel rods surrounded with a shell of concrete, was recently devised.

The pole to be reinforced is supported by tripods or held securely in place by temporary guy ropes or wires; the earth is then removed for a distance of about 18 in. from the sides of the pole to a depth that will expose the solid portion of the butt remaining. The decayed portion of the pole is then scraped out. Steel rods, $\frac{1}{2}$ in. in diameter and from $3\frac{1}{2}$ ft. to 6 ft. long, are used for reinforcing. The rods are pointed at both ends, the upper end being bent at right angles to form a dog or point from 5 in. to 6 in. long. The straight end of the rod is

driven into the sound portion of the butt at an angle by the use of a special driving tool, as shown in the illustra-



Reinforcing Poles with Concrete

tion. The upper portion of the rod is then bent in toward the pole and the dog driven in to its full length. The length of the rod used is such as to permit the proper anchorage of its lower end in the sound wood of the butt and to allow the portion extending above ground to be of sufficient length to span the decayed section of the pole and be driven into perfectly sound wood. The points of the rods are usually driven into the pole from 12 in. to 18 in. above the ground level. From four to eight rods are used to

form the reinforcing cage, depending on the diameter of the pole. Concrete is filled in around the pole, replacing the decayed portions of the wood and forming a protecting sleeve or en-



Catching the Fowl

velope for the rods about 6 in. thick, as shown in Fig. 1. This concrete extends above the ground sufficiently to cover the upper terminals of the rods and protect them from the action of the moisture in the air, forming a collar above ground and tapering from about 3 in. thick at the ground level to about 1½ in. at the top. The top is finished neatly by a special sheet metal form designed for the purpose and when complete, the top appears as shown in Fig. 2.

Where the butt of the pole is partly rotted away, the rotten portions are removed and the space is filled in with concrete, thus providing an anchorage for the rods either in the solid wood of the butt or in the concrete. If the butt is entirely rotted away, a concrete base is made of slightly larger dimensions than the pole and the reinforcing rods are firmly anchored in at the bottom. The pole is then cut off square and allowed to rest on this concrete base. The upper portion of the rods projecting from the base and surrounding the pole are then bent in and the dogs driven home in the usual manner. A concrete shell is carried up around the pole to protect the rods, thus giving poles reinforced by either method a similar appearance above ground.

Electric bulbs may be colored or frosted as follows: Dip the bulb in a thin solution of white shellac and alcohol, which gives it a frosted appearance. Add diamond dyes of the desired shade to the solution for colors.

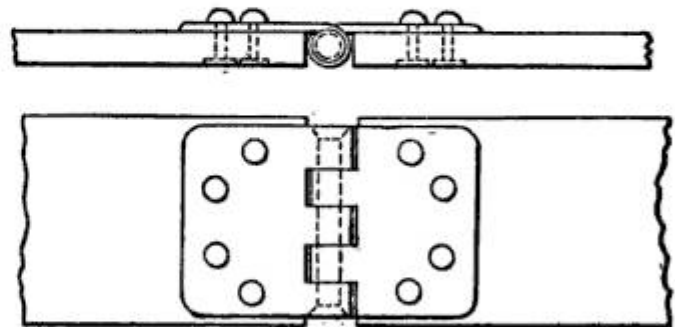
A Fowl Catcher

A long piece of heavy wire is fastened to a broom handle with screws or by binding with a finer wire. A long

hook is bent on the extending end of the heavy wire, allowing only a small space in the hook part. The fowl is caught by the leg. This device can be used where fowls are in a yard or coop that is too large to make it possible to reach them with the hand.—Contributed by O. B. Eve, Augusta, Georgia.

A Hinge Belt Fastener

The accompanying sketch shows a belt fastener, attached to a 3-in. double belt, that will more than equal the strength of the belt itself, and last as long, says a correspondent of Machinery. The fastener is made of a common hinge of the proper width, which is secured to the belt by copper rivets as shown. The hole in the hinge for the pin should be countersunk at both ends and the edges of the hinge nicely rounded. A brass pin should be in-



Hinge Used Instead of Lacing

serted instead of a steel one and riveted over on the ends. The knuckle part of the hinge comes in between the ends of the belt. Two or three hinges may be used on wide belts.

How to Make a Concrete Boat

[Condensed from an Article by Paul Wilkes in Concrete]

The usual methods of boat building make it a difficult proposition for the average person, but the recent use of concrete for this purpose simplifies the problem to such an extent that a trustworthy boat can be built at very little expense. Only a few dollars are necessary for the purchase of Portland cement, steel rods and wire, while nature furnishes the sand and clay in almost all localities.

A wood or metal boat is borrowed or rented to serve as the inside form for the concrete structure. Hang the

the clay wall and a uniformly thick concrete wall.

In building boats of such a size that they can be lifted by one or two men, the clay may be pressed tightly against the original boat itself. The boat may then be lifted and the clay walls compressed by it in such a way as to form a space the thickness of the concrete wall required for the surface of concrete. In every case the boat should be forced against the clay with short strokes, like those of a hammer. Care should be taken not to crack the clay

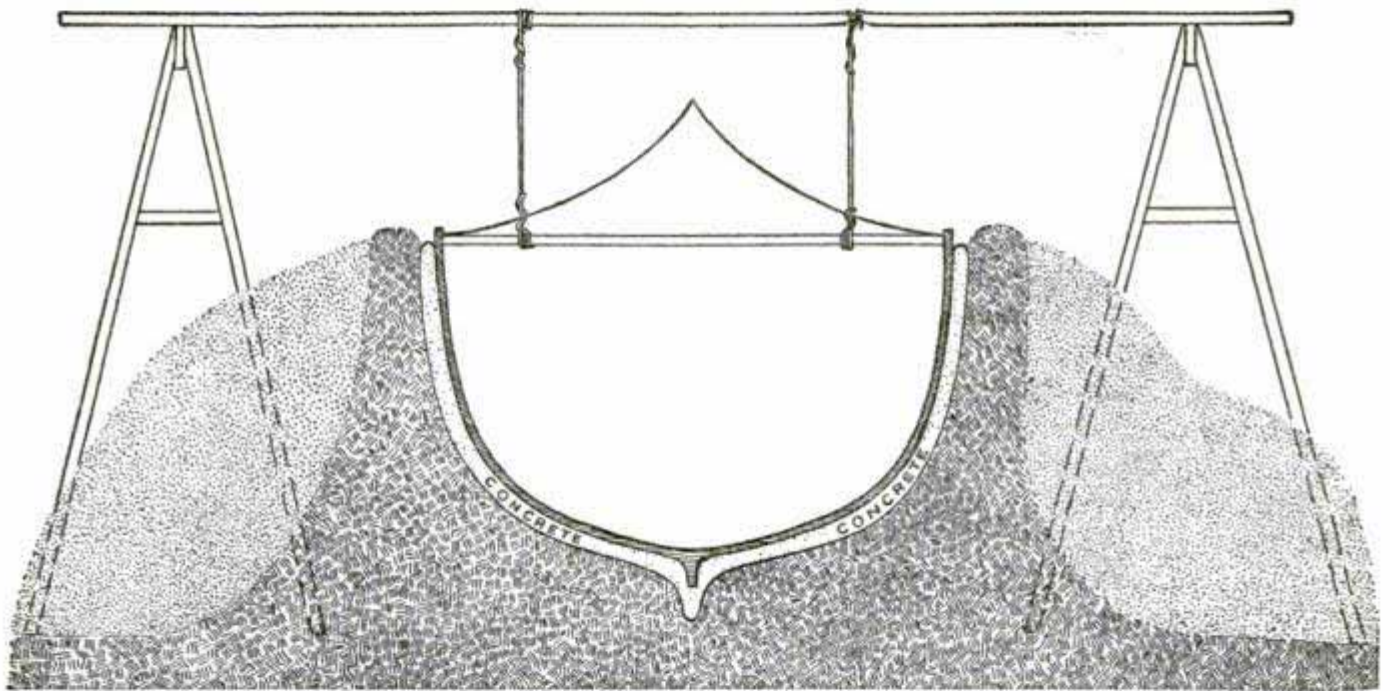


Fig. 1—Sectional View of the Boat Form and Clay Mould

boat near the shore where the completed concrete boat is to be launched, following the method shown in Fig. 1. The outside form consists of clay, worked to the consistency of painter's putty and pressed into the shape shown in the illustration. Build up a wall of clay around the suspended boat from 6 to 10 in. thick, keeping the inside surface perfectly smooth and leaving an even space between it and the wood boat, the thickness of this space corresponding to the thickness of the wall of the concrete boat as planned. A small piece of board as wide as the thickness of the concrete wall will be of use in securing a smooth surface on

the wall and to secure an even space all around the boat when it hangs free in the mould. Lift the boat out and cut away the clay at the keel and other places so as to secure a uniform thickness of the concrete wall when it is poured.

In order to protect the clay mould from settling or other damage, shovel sand all around it as indicated in Fig. 1. Take the boat out and repair all imperfections in the clay negative and brush the whole surface smooth and even with a painter's brush and water. The model boat may now be hung in its original position, and the form is ready to receive the concrete.

In order to protect the paint on the original boat and to facilitate its removal from the concrete after the latter has set, stick straw paper, or two or three thicknesses of newspaper, over



Fig. 2—Reinforcing Web of Wires

the outside, using only enough paste to hold the paper to the boat's surface. Then paint over the paper a coat of grease, composed of talc dissolved in hot petroleum. By using these precautions no difficulty will be encountered in removing the original boat after the casting.

The even spacing of steel rods and wire, in both directions, has an important bearing upon the strength of the finished boat. The stresses produced by water pressure upon the walls when the boat is afloat are small, in a small craft, compared to the stresses produced by handling the boat on land. For this reason it is advisable to place the reinforcement nearer the outer surface of the boat's wall. In most cases if the steel is distributed in an area at a distance from the outside surface equal to one-third the thickness of the wall, the best results will be obtained.

In order to assure the even spacing of the reinforcement, a web of steel rods and wire may be woven on the outside of the paper covered boat, the wire impinging on the sides at different points, keeping the heavy reinforcement at a uniform distance away.

one method of weaving the web. Expanded metal might also be utilized, and perhaps with less trouble.

With the mould and the reinforcement ready for the pouring, it is imperative that there should be no delays in placing the concrete. To secure the best results the work should be completed in one day, so as not to allow one pouring of concrete to set partially before the balance is deposited. In mixing the concrete use Portland cement and clean, sharp, well graded sand in the proportion of one to three. Mix the cement and sand thoroughly before adding the water, and use enough water to make a thin cream or grout. Pour this into the mould to an even height all around and smooth off the tops of the walls.

Allow the mould to remain undisturbed for about six days, after which time the wood or iron boat can be lifted out easily and cleaned. Remove all paper adhesions from the inside of the concrete boat and paint over the surface with a mixture of cement and sour milk, mixed to the consistency of paint. This will give the inside of the boat a smooth finish and make it absolutely waterproof. The addition of a waterproofing compound to the concrete mixture will make it doubly sure in the matter of being waterproof.

Airtight tanks can be built in the boat without trouble to prevent it overturning. Build a false floor of boards in the bottom of the boat and seal with a layer of concrete, reinforced with wire mesh a little stronger than fly

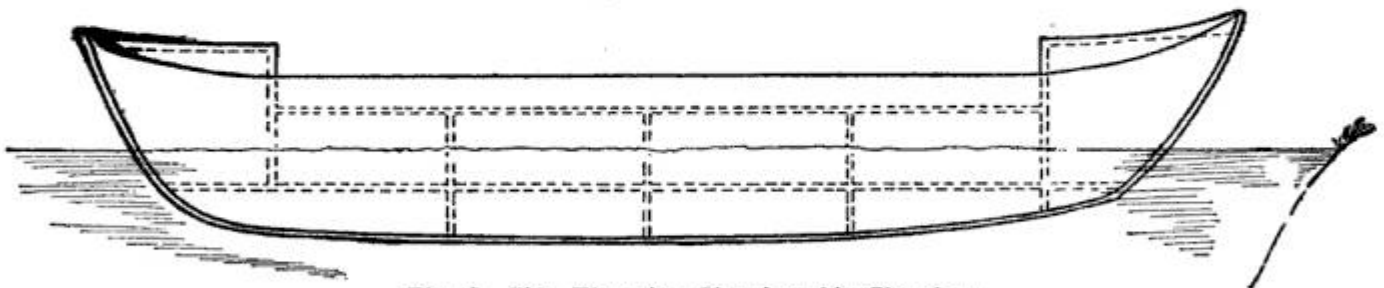


Fig. 3—Side Elevation Showing Air Chambers

The crossing points of rods and wires may be bound, to give greater stability to the metal skeleton that swings in the space between the clay mould and the model boat. Figure 2 illustrates

screen. Partitions in the air chamber below this floor can easily be built. In like manner, tanks may be constructed at the sides to serve as seats, and at the stern and bow. (Figs. 3 and 4.)

In order to be sure that these tanks will do the service for which they are designed in case of accident, figure the amount of concrete in the boat, with the proposed partitions, in cubic feet, and multiply it by the weight of a cubic foot of concrete; add to this the weight of the reinforcement, the machinery and the passengers. This will give the complete weight of the boat and contents. Figure the clear air space in the tanks and multiply by the weight of a cubic foot of water. This weight should be greater than the gross weight of the boat and contents in order to insure the craft against sinking, in case of accident.

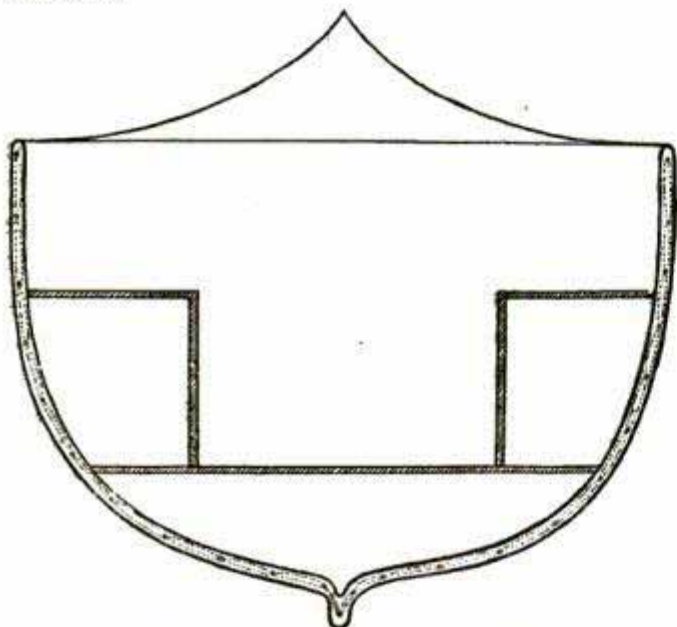


Fig. 4—Section Through Middle

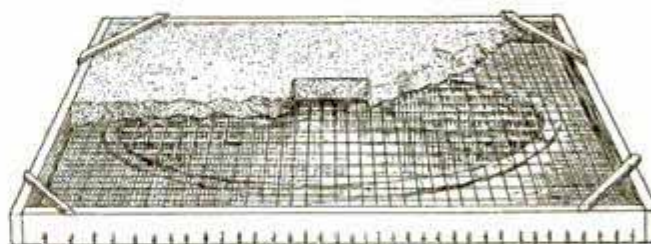
Before attempting to build a concrete boat by this method, it is advisable to draw the plans and indicate carefully the size and position of all the machinery parts, partitions and tanks, and provide for the placing of all metal fastenings, chains, hooks, etc., as most of these can be attached to the inside mould and embedded in the concrete when it is poured.

After the boat has stood in the clay mould for two or three weeks, it may be removed, turned over and finished on the outside. All clay deposits should be washed off, and all unevenness in the concrete should be removed. The finishing touch is the application of a paint of Portland cement and sour milk, to which has been added mineral color to suit the owner.

Ordinarily a concrete boat with walls from $1\frac{1}{2}$ to $2\frac{1}{2}$ in. in thickness will be suitable for use with a motor or gasoline engine. For a boat of this character the reinforcing should consist of $\frac{1}{4}$ -in. rods, spaced to form 6-in. squares. Tank walls and partitions should be from $1\frac{1}{2}$ to 2 in. thick and braced every 3 or 4 ft.

How to Make a Concrete Well or Cistern Cover

A square frame is made from 2- by 6-in. material of such a size as desired for the covering. Fence wire is then stretched across one side of this frame and well stapled, forming in appearance a large screen sifter. The frame is then placed over the well or cistern opening with the wire side down. A small frame is made of boards and placed in the large frame on the wires to make an opening in the concrete for the pump. Some finer screen wire is placed on top of the fence wire to hold the cement mixture. Mix the concrete and fill in the corners first and tamp well. This will expand the frame and stretch the wire taut. The mixture can then be placed on over the well opening without the wire sagging to any great extent. The top is then finished over the same as in making a sidewalk. When the concrete is set, pull the staples and remove the frame. Cut off the end of the wire on the outside and remove the part over the opening where the small frame was set. This will make a reinforced well cover-



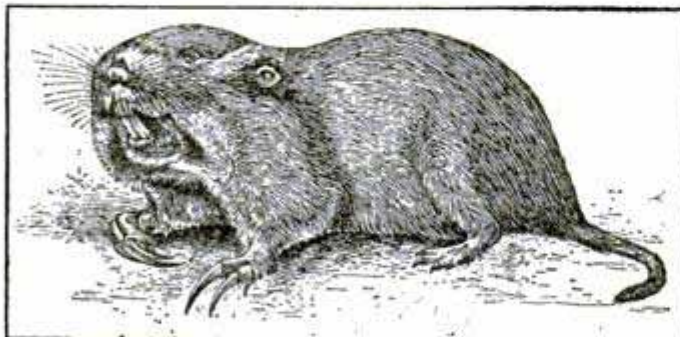
Form for Concrete Well Cover

ing without any boards left to rot or be taken out.—Contributed by C. A. Lawson, Monroe City, Mo.

For outside painting use a little turpentine with the boiled oil.

Small Turn-Buckles for Aeroplane Trussing Wires

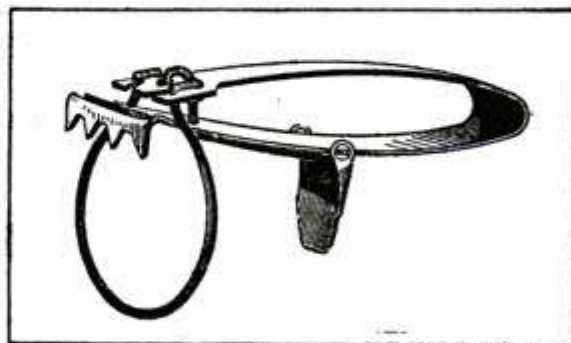
A lightweight turn-buckle is a potent factor for tightening the brace or trussing wires on aeroplanes. The brass



A Pocket Gopher

How to Destroy Pocket Gophers

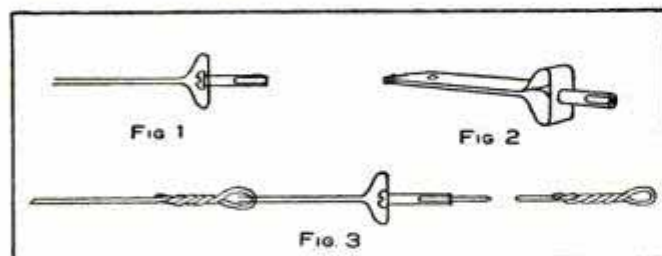
All the species of pocket gophers live underground in ramifying tunnels, and all bring to the surface quantities of earth, which is heaped up in the shape



Special Gopher Trap

turn-buckles used on motorboats and small yachts are not strong enough to stand the strain of the severe shocks experienced by aviators in motor-driven aeroplanes. The accompanying sketch illustrates a turn-buckle devised and used with success by an aviator.

This turn-buckle is made from a motorcycle spoke and nipple. The spoke is cut in the center and a loop or eye made on the opposite end from the thread and nipple. A 2-in. piece of 32-gauge sheet steel $\frac{1}{4}$ in. wide is bent, drilled and the nipple inserted as shown in Fig. 1. Drill a hole through the ends of both pieces as shown in Fig. 2 and fasten the trussing wire, and the turn-buckle will be complete as shown in Fig. 3. One of these turn-buckles was tried out on



Details of the Turn-Buckle

No. 24 piano wire trussing which pulled 600 lb.—Contributed by Geo. A. Lawrence, New York City.

If a fan belt is constantly causing trouble, either from the belt flying off or breaking, suspect the alignment of the pulleys.

of mounds. The habits of these animals are everywhere much the same, and they infest all of the western states. The pocket gophers are very destructive to crops. They eat the roots of fruit trees and in this way sometimes ruin whole orchards. They eat both roots and tops of clover, alfalfa, grasses, grains and vegetables, and are especially harmful to potatoes and other tuberous crops. Their mounds are very numerous in places and cover and destroy vegetation.

Poisoning with strychnine is the most effective means known for killing pocket gophers and is recommended for general use. To disguise the bitterness of the strychnine it is mixed with a sirup as follows:

Dissolve 1 oz. of strychnia sulphate in 1 pt. of boiling water. Add 1 pt. of thick sugar sirup, and stir thoroughly. The sirup is usually scented by adding a few drops of oil of anise, but this is not essential. If preserved in a closed vessel the sirup will keep indefinitely.

The above quantity is sufficient to poison a half bushel of shelled corn or other grain (corn recommended). The grain is steeped in hot water and allowed to soak over night. It is then drained and soaked for several hours in the poisoned sirup. Before using, corn meal may be added to take up the excess of moisture.

Dry crystals of strychnine also may

be used. They are introduced, by means of a knife, into small pieces of potato, carrot, or sweet potato, or into entire raisins or dried prunes. A single large crystal, or several small ones is enough for each bait. Raisins are especially recommended because they are easily handled and contain enough sugar to disguise the bitterness of the poison.

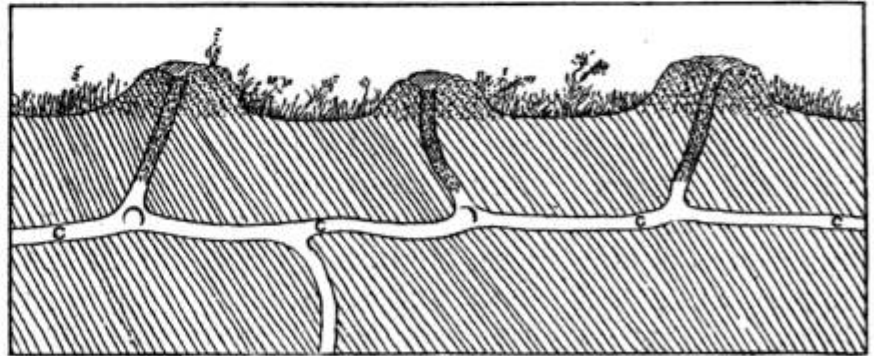
Pocket gophers in ditch banks may be poisoned in the following manner: Select the freshest hill or mound and with a narrow garden trowel follow the soft earth of the tunnel until the main runway, C, is reached. By noting the direction from which the earth was pushed out, and locating the closed entrance, the burrow may be readily followed and the main runway quickly found. The poisoned raisin, corn, or small potato should be placed well back in the main runway and the opening closed. It is usual for one gopher only to occupy the burrows connected with a group of hills, and when a burrow remains open it indicates that the animal has been killed.

Trapping is a successful method when followed intelligently and persistently, and is especially adapted for small fields where only a few gophers are present. Some of the special gopher traps will kill the animals instantly. They are set in the laterals leading into the main tunnel of the gopher, or at the entrance of open burrows where fresh earth is being thrown out. The trapper should choose the freshest of a series of mounds and dig along the lateral until it is found clear of soil.

A large nut may be made to do for emergency service by hammering one side until the hole assumes an oval shape. The threads of the nut will take hold on two sides of the bolt and maintain the position until the right size can be procured.

How to Establish a Trout Pond

The one necessary thing in making a trout pond is to have pure water and plenty of it, with, if possible, an inflow and an overflow which should be regulated with movable gates. If spring water has a low temperature, say, 46 to 54 deg. F., it is the best to be used. While trout will live and flourish in still water they will become tame and languid, stunted in growth, and the



Tunnelway and Mounds Made by Gophers

flavor of the flesh much affected. Certain conditions are necessary for the successful cultivation of trout or any of the better kinds of fish, viz., pure and abundant water, shallows for spawning and deeper portions for hiding and wintering in, food in plenty and variety, and shadow and shelter from glaring sunlight. A portion of a small stream, creek, or spring water should be so diverted by a narrow channel or underground pipe that a continuous flow of water can be supplied to the pond or small lake. By having such an inflow the trout will be healthier, more gamey and in better condition generally.

The bottom of the pond should be of rock, clay, or sand. Soft loam, mud or peat bottoms are avoided by trout as much as possible and if these bottoms are used in a pond, they will impart a flavor and color to the water which affect the trout unfavorably. If portions of the bottom are covered for a few inches with clear river sand, making a smooth surface, the fish will be found to lie there in preference to any mud. Shallows covered with coarse gravel or pebbles are absolutely essential and should be provided in order that the trout may resort there at the spawning time. A good supply of

water pouring over the gravel and producing the favorable conditions of the natural spawning beds will, of course, enable the eggs to be incubated and hatch out in due time.

The ideal trout pond should increase in depth from the upper gravelly end where the water flows in, and where it is 3 to 6 in. in depth, down to the lower clay or rocky portion, where the depth should be 8 to 10 ft. or more. The trout will move to these deeper portions for safety and shelter, especially in the winter, when the danger of freezing in the shallow parts is thus avoided. The small trout will haunt the shallow bottom, while the larger fish will keep in the deep water. Large trout will at times readily feed on young trout, and sometimes prefer them, though a good supply of insect food fully satisfies them. Considerable shallow area should be provided in all trout ponds for safety of the small fish. A good arrangement is to have three ponds, one for fry and yearlings, not more than 24 in. deep at the lower end; a second for young trout up to 2 or 2½ years of age, 36 or 40 in. maximum depth of water, and a third pond with 5 ft. of water at the deepest end for 3 and 4 year old fish.

Shallow ponds, being exposed to the glaring sun, readily become warm. Trout cannot bear heat, and can live in health only where the water is cool, clear, and sparkling. Not only so, but their large sensitive eyes, unprovided with lids or shaded by eyebrows, are exposed to bright light, which blinds and injures them. If the sun is very bright, they hide away, when living under natural conditions, moving into deeper, shady places, and only coming out in the evening or early morning when the sun's rays are oblique and less powerful. A few trees carrying thick foliage, or a row of low, overhanging bushes, willows or alders, will provide the necessary cool shelter, if so situated that some of the deeper parts lie in shadow when the sun is high at midday.

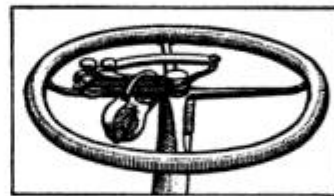
A pond having been prepared as described should be left for two or three

months in spring until its newness has worn off and the insect and minnow life have become established. The question of a supply of appropriate food is all-important. Insect food is really the best, and in a new pond, before an insect fauna is established in it, and May-flies, dragon and stone-flies, etc., take possession and breed, an effective means of creating a supply of water insects is the introduction of a tubful of green weeds, scraped from the bottom of an old established pond or weedy creek, into the pond. Such weed material will be found to contain an incredible amount of insect life, eggs, and small water snails in abundance. The weeds chosen should be matted mosses found in still parts of a creek or river. This is the readiest method of establishing a supply of insect food, which is the most favorable feature in any successful trout pond.

A few dozen of adult wild trout are netted, conveyed in casks of water or tanks, and liberated in the pond. They should be left undisturbed for a year, fed if it seems necessary, but not fished or caught. Many of them will be seen seeking the gravelly shallows in due time for the purpose of spawning, and in the course of time the ponds will be filled with the trout.

How to Lock an Automobile

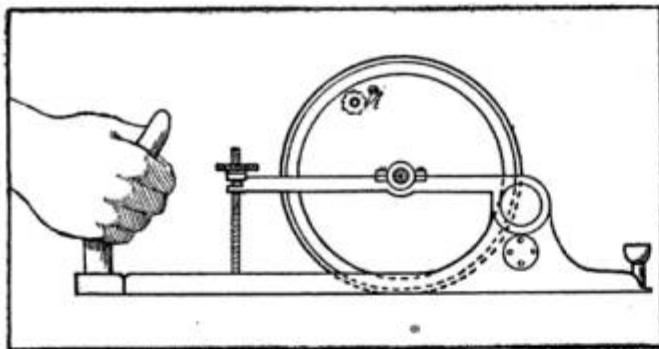
Removing the plug in a coil box is a very common way to break the circuit and prevent anyone taking an automobile, but a nail or similar piece of metal will complete the circuit and



furnish the current necessary for the engine. A more simple and secure way to keep anyone from using your automobile is to move the gas and spark lever to the left and over the wheel spoke and place a padlock on them as shown in the sketch. The automobile cannot be started until the lock is removed.—Contributed by Harold Granquist, Chicago, Ill.

A Sandpaper Plane

Not only carpenters, but anybody who has had his hands lacerated by using sandpaper in the old way will appreciate the importance of the ingenious device shown in the cut. This is a sandpapering hand plane which operates as does an ordinary plane and by means of which rough surfaces may be made smooth with a maximum of efficiency and a minimum of energy and discomfort, says Woodworker's Review. The device consists of a body like that of an ordinary plane, but where the bit would be in the old style tool, there is a wheel covered with sandpaper. As the plane is pushed backward and forward it works both ways, taking down the rough spots and the fingers gripping the handle are safe from cuts and bruises, which are so often the result of sandpapering by hand. When the paper on the wheel



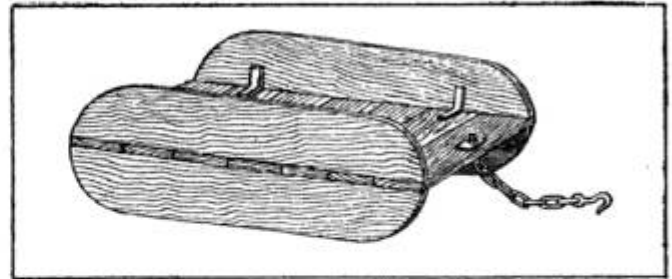
Operates Like a Hand Plane

becomes worn in one spot the wheel can be turned till a fresh spot is found, and so on until all the paper is used, when it can be easily replaced.

Double-Runner Sled for Hauling Stones

An excellent device for clearing off stones, stalks, or for hauling out manure daily in the winter is a double-runner sled that can be used either side up. This sled is made of 2-in. plank, 1 ft. wide and well spiked and braced. Constructing it from this heavy material makes it strong and lasting for rough usage and exposure to the weather, says the American Thresherman. The sled must have a

chain attached permanently to both ends, and when it arrives at the place to unload, the draft chain is unhooked

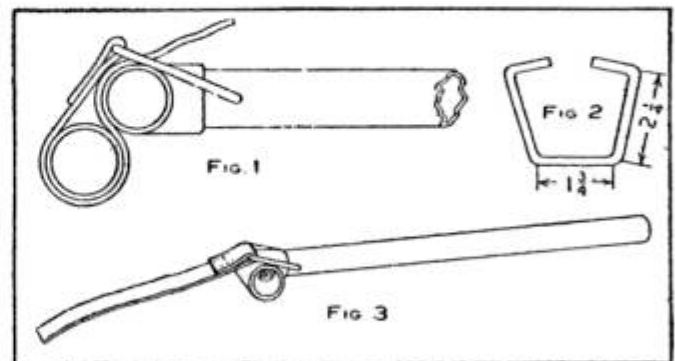


Runners on Both Sides

and the rear chain caught on. Just as soon as the team starts, the sled will turn bottom side up and leave the load on the ground. The sled has merely rocked over and is ready to load again.

A Strap Wrench for Nickel-Plated or Brass Pipe

The lever of this wrench is made from a piece of $\frac{1}{2}$ -in. gas pipe and a $\frac{1}{2}$ -in. tee. The tee must be smooth and one without the beads. Thread the pipe on one end and turn it tightly into the middle opening of the tee. Drill a $\frac{5}{16}$ -in. hole in the pipe about $\frac{3}{4}$ in. back of the tee. The pipe and tee will appear as shown in Fig. 1. Take a piece of $\frac{1}{4}$ -in. round iron or a bolt 8 in. long and bend it as shown in Fig. 2. Spring the link thus formed into the holes drilled in the pipe and press it together in a vise, or hammer so the ends will meet in the center. A strap is fastened to the link as shown

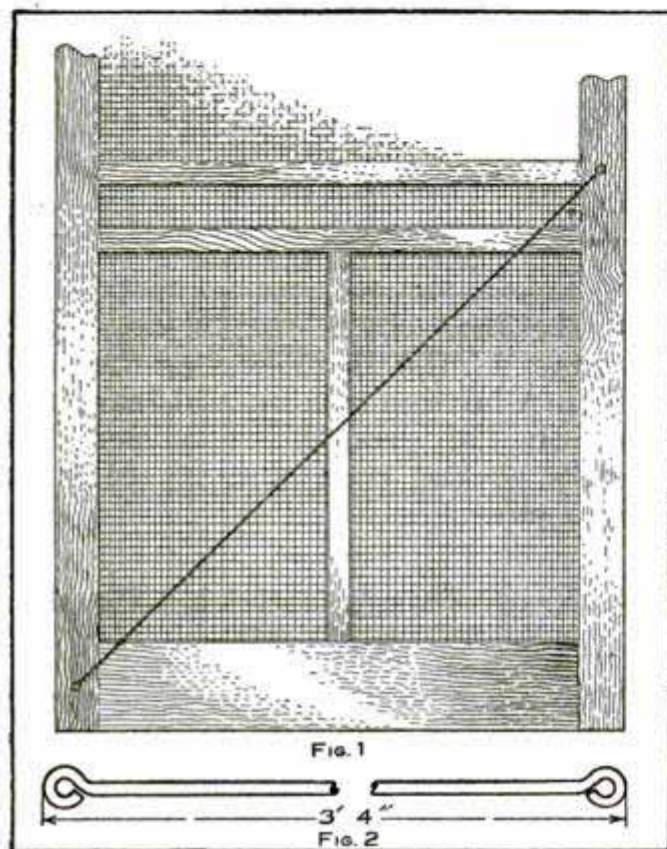


Details of the Strap Wrench

in Fig. 3. Rub the strap well with powdered resin to insure a good grip on the pipe.—Contributed by F. G. Lee, Mt. Vernon, N. Y.

To Prevent Screen Door from Sagging

The average screen door does not have the necessary braces to keep the frame square, especially if a heavy



Screen Door Brace

spring or weight is used for closing the door. The accompanying sketch shows the simple application of a wire brace held in place by two round-headed wood screws to prevent a sag in a light frame door.

Common picture frame wire can be used, but heavy wire is much better. It will be necessary to twist a loop on each end of the picture frame wire for the screws, while a brace made from heavy wire will allow an eye to be turned on the ends, as shown in Fig. 2, for the screws. Place a $\frac{1}{4}$ -in. wedge under the corner of the door opposite the hinges and set the screw at this corner first and raise the wire to the position shown and set the other screw. When the wedge is removed, the door will swing free with plenty of clearance.—Contributed by Archibald Owen, Youngstown, Ohio.

A piece of tissue paper used for packing crackers makes a fine focusing screen.

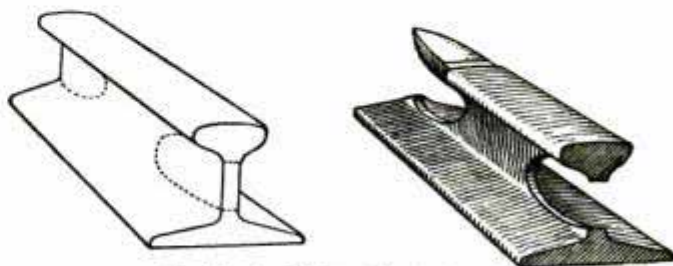
An Expansion Reamer

Almost all solid reamers can be used as expansion reamers though a large proportion of mechanics fail to use them as such, even if they know it can be done. The flutes on reamers are cut in various depths and these provide the means of expansion. This method is used to an advantage in a place, for instance, where a pulley is bored too small for the shaft and the only tool at hand that will go in the hole is a reamer. Select a wire that will fit snug in the deepest flute of the reamer when the reamer is in the hole. Take out the wire and insert it in the first or second flute from the deepest and proceed to ream out the hole. If this will not make the hole large enough, put the wire in a flute not quite so deep, and so on until the right size is obtained.

One of the old style reamers with the flutes all the same depth will do the same work, if different sizes of wire are provided; the principle in both cases is the same; the wire in one flute will force the cutting edge of the opposite flute into the side of the hole being bored.—Contributed by Donald A. Hampson, Middletown, N. Y.

How to Make a Small Anvil

The accompanying sketch shows how a small anvil can be made from a piece of railroad rail. A part of the web is cut from the rail giving it the shape of an anvil. One end of the top is heated and carefully drawn out and shaped for the horn while the other end is left square. The anvil can be

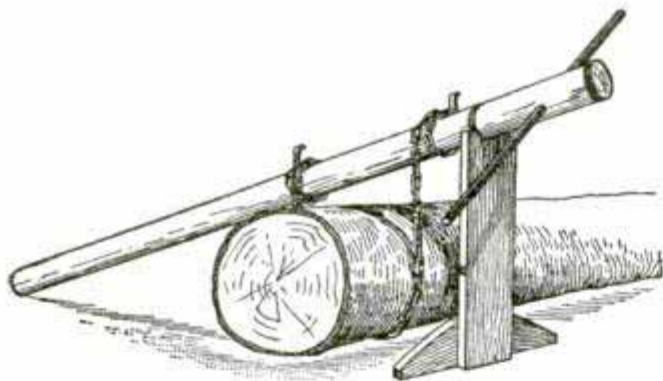


Small Anvil for Light Work

fastened to a block or used on a bench for light work.—Contributed by Geo. Ponting, Laramie, Wyo.

Another Log Jack

This log lifting device consists of a round straight stick, 6 in. in diameter and 10 ft. long. The upper end is banded with iron to prevent splitting and a 1½-in. hole bored through it, 3 or 4 in. below the band. Two large spikes are driven into one side about 3 ft. apart. A heavy plank support is made about 4½ ft. high with a half-round notch in the top and a crosspiece at the bottom. A groove is cut in the circumference of the capstan stick so that the notched upper end of the plank support will fit it loosely. Put a chain under the log and draw both ends up tight on the same side of the capstan piece and slip a link of each end over each one of the spikes. Run a common iron bar through the hole in the capstan piece, grasp the bar and turn the capstan as if screwing up a bench



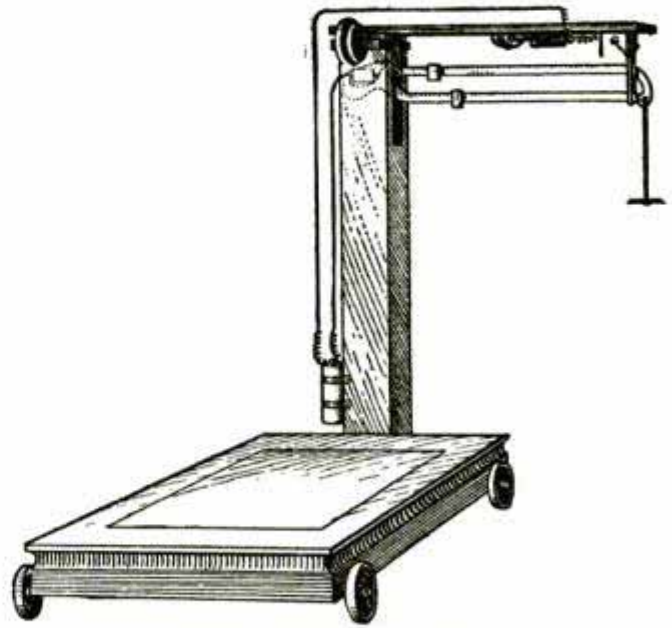
Capstan for Raising Logs

vice, thus winding the chain upon the wood and lifting the log.—H. L. Crockett, Syracuse, N. Y.

An Alarm for Scales

An electric device for use on scales to sound an alarm when the proper weight has been reached is shown in the accompanying sketch. This device was used on a scale in a factory for filling cans of liquid from a tank, each can to contain a certain amount by weight. One terminal from the battery was connected to the bronze beam of the scale and the other attached to a bell and then to a point where the pea would set on the beam for the proper weight. When the can was

filled, the beam would rise and make the connection with the wire and pea



Alarm Attached to Scale

and cause the bell to ring. This device could be used in many other instances where bags are to be filled to a certain weight.—Contributed by D. Higbee, Omaha, Nebr.

How to Prevent Conveyor Boxes from Wearing

A screw conveyor used for moving clinkers, sand, crushed stone or any rough material will drag it on the bottom and sides of the conveyor box, which wears them out in a short time. The ordinary conveyor box is made as shown in Fig. 1. The best way to make a conveyor box is to have the sides and bottom about 4 in. away from the screw, as shown in Fig. 2. When the screw turns, the material will be

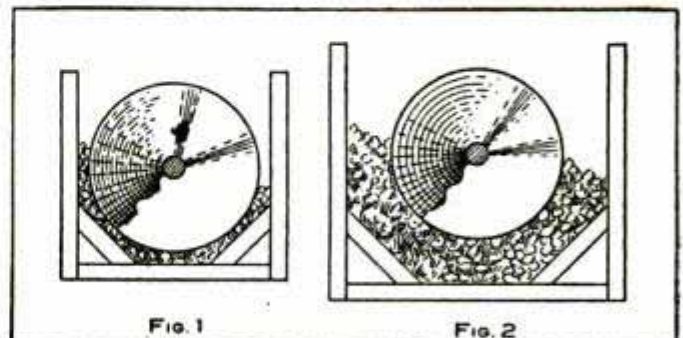


FIG. 1

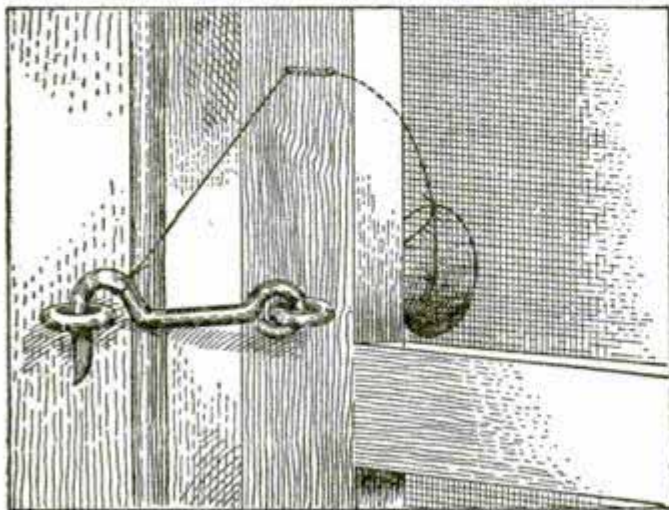
FIG. 2

Two Forms of Conveyor Box

pushed along on its own parts instead of on the conveyor box.—Contributed by Harry F. Hann, Bloomsbury, N. J.

Latchstring for a Screen Door Hook

How many times have you tried to open a screen door from the outside and found it hooked. Someone must release the door for you before you



A String Pulls the Hook

can enter. The accompanying sketch shows how to release the hook from the outside by the use of a string. A cord is fastened to the hook then passed through a hole in the door and tied to the knob on the outside. A pull on the string will remove the hook. Slip the string off the hook and the door cannot be opened from the outside.—Contributed by A. Ellis Frampton, Easton, Md.

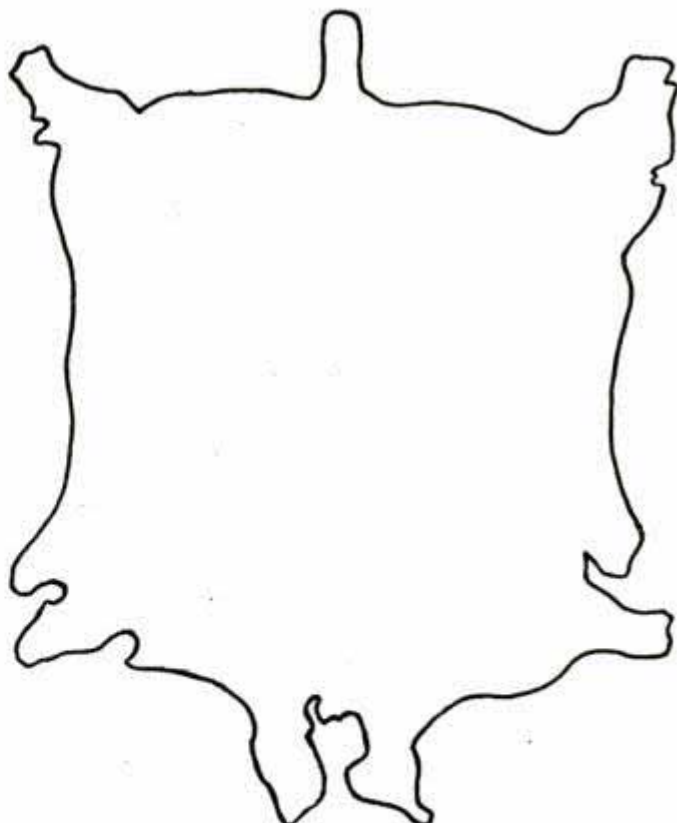
Filling Oak

A very good hardwood filler for oak, either for a natural or golden effect, may be made from two parts of turpentine and one part of raw linseed oil, with a small amount of good japan to dry in the usual time. To this liquid add bolted gilder's whiting to form a suitable paste; it may be made thin enough for use if to be used at once, or into a stiff paste for future use, when it can be thinned down for use, says *Woodworkers' Review*. After applying a coat of filler, let stand until it turns gray, which requires about 20 minutes, depending upon the amount of japan in the filler, when it should be rubbed off with cotton waste or whatever you use for the purpose. A filler must be rubbed well into the wood, the surplus only being removed.

The application of a coat of burnt umber stain to the wood before filling is in order, which will darken the wood to the proper depth if you rub off the surplus, showing the grain and giving a golden oak effect. The filling should stand at least a day and night before applying shellac and varnish.

How to Remove Hides

When a hide is taken off properly it should appear as shown in the sketch. It will be noticed that the hide is as square as possible, with full shanks, tail bones and all foreign matter removed. With no cut or scored hides to contend with, the tanner gets the full benefit and is able to produce first-class leather, says *The Butcher's Advocate*. Hides taken off in this way are considered almost equal to the packers' and range in favor with the best the country produces. The difference in taking off a hide carefully and carelessly is simply a matter of time. It will take the careful butcher 15 minutes longer than the careless



The Hide Removed

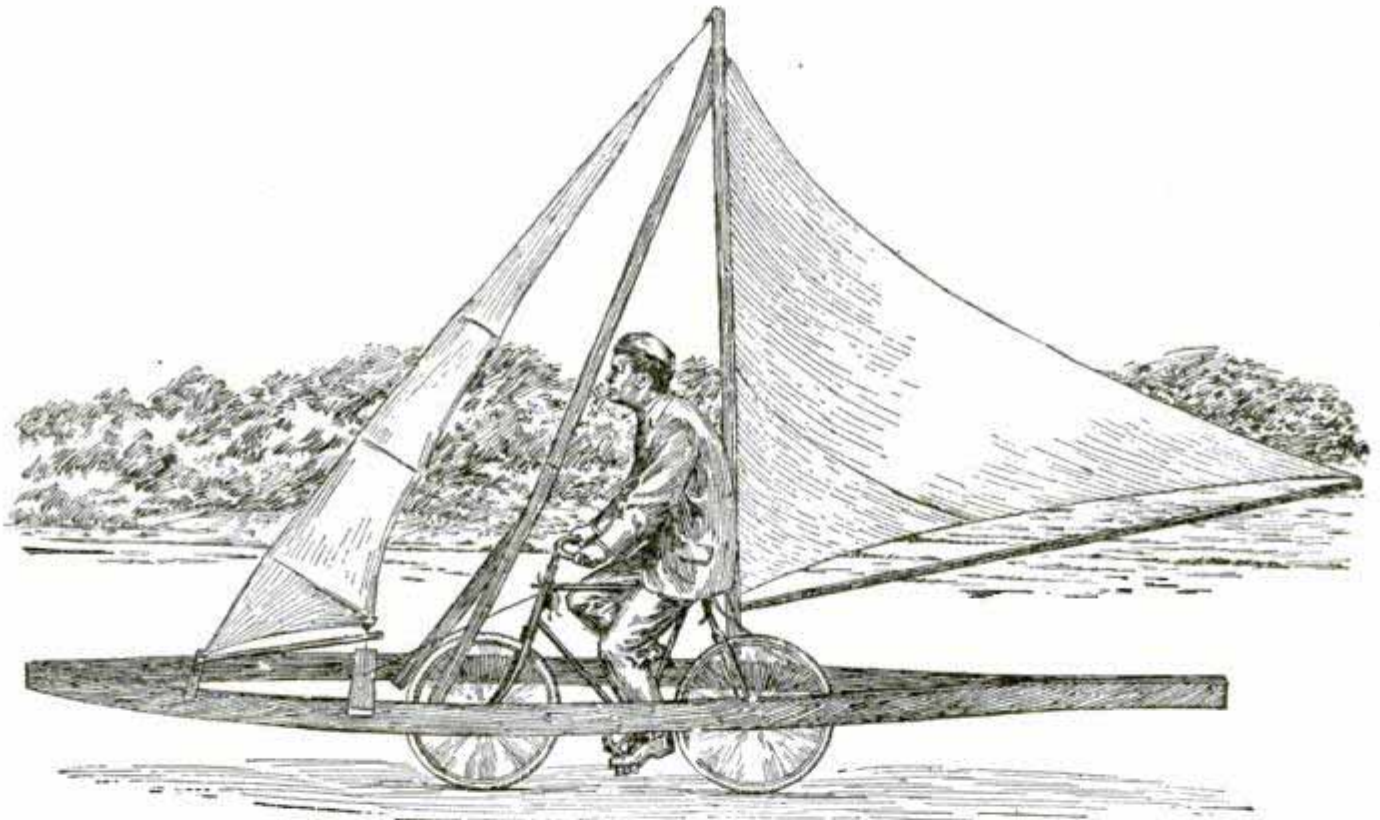
one, which at most is only 10 cents for the extra time, while the loss on the hides is 50 cents each.

AMATEUR MECHANICS

How to Attach a Sail to a Bicycle

This attachment was constructed for use on a bicycle to be ridden on the well packed sands of a beach; however, it could be used on a smooth level road. The illustration shows that the main frame consists of two boards, each about 16 ft. long, bent in the shape of a boat to give plenty of room for turning the front wheel. On this main

sult. A turn must be made by turning out of the wind, instead of, as in ordinary sailing, into it; the boom supporting the bottom of the mainsail is then swung over to the opposite tack, when one is traveling at a good speed. If the speed is slow, this swinging over of the sail and boom is sufficient to upset your balance and a fall will result.



Bicycle Sailing on a Beach

frame is built up a triangular mast to carry the mainsail and jib, having a combined area of about 40 sq. ft. The frame is fastened to the bicycle by numerous pieces of rope.

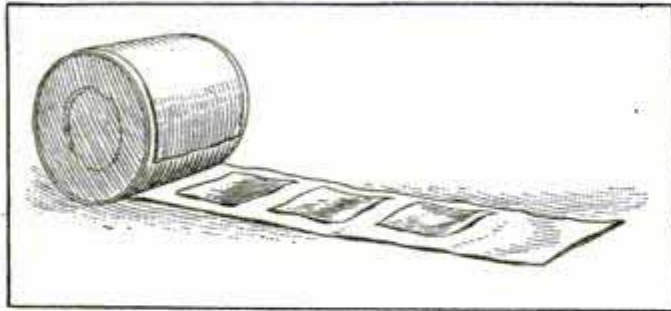
The action of sailing on a bicycle is very much different from a boat, for it leans up against, instead of heeling over with, the wind like an ordinary boat. It takes some time to learn the supporting power of the wind, and the angle at which one must ride makes it appear that a fall is almost sure to re-

Drying Photograph Prints Without Curling

Having made some photograph prints at one time that I wanted to dry without the edges curling, I took an ordinary tin can and a strip of clean cotton cloth as wide as the can was long and wound it one turn around the can and then placed the prints one after the other, while they were damp, on the cloth, face downward, and proceeded to roll the cloth and prints quite

close on the can. I then pinned the end of the cloth to keep it from unwinding and set the whole in a draft for drying.

The curvature of the can just about

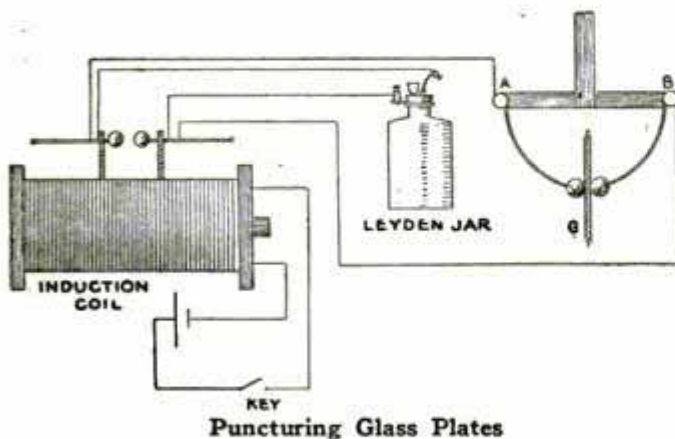


Rolling Up the Prints

counteracted the tendency of the coating on the paper to make the prints curl and when they were thoroughly dried and removed they remained nice and flat.—Contributed by W. H. Eppens, Chicago.

Piercing Glass Plates with a Spark Coil

Anyone possessing a 1-in. induction coil and a 1-qt. Leyden jar can easily perform the interesting experiment of piercing glass plates. Connect the Leyden jar to the induction coil as shown in the diagram. A discharger is now constructed of very dry wood and boiled in paraffine for about 15 minutes. The main part of the discharger, A B, is a piece of wood about 6 in. long and to the middle of it is fastened a wood handle by means of one or two wood screws. A binding-post is fastened to each end of the main piece or at A and B as shown in the diagram.



Puncturing Glass Plates

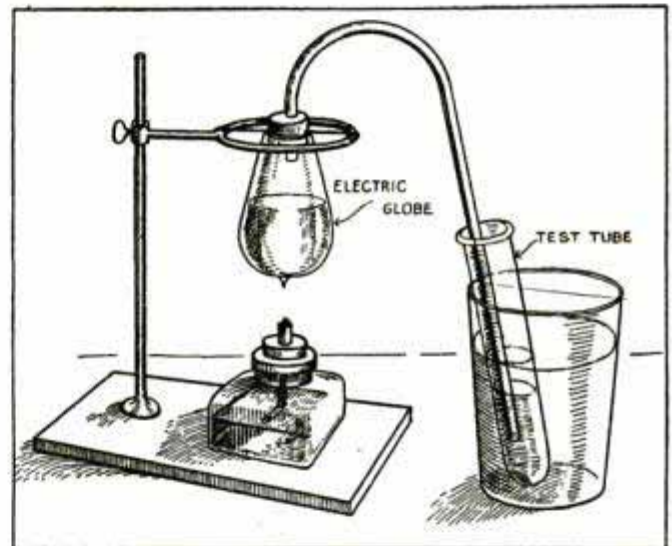
Two stiff brass wires of No. 14 gauge and 6 in. long, with a small brass ball attached to one end of each, are bent

in an arc of a circle and attached one to each binding-post.

A plate of glass, G, is now placed between the two brass balls and the coil set in action. The plate will soon be pierced by the spark. Larger coils will pierce heavier glass plates.—Contributed by I. Wolff, Brooklyn, N. Y.

A Home-Made Still

Remove the metal end of an old electric light globe. This can be done by soaking a piece of twine in alcohol and tying it around the globe at the place the break is to be made. Light the string and after it is burned off, turn cold water on the globe. The result will be a smooth break where the string



The Complete Still

was placed. Purchase a piece of glass tubing from your druggist and secure a cork that will fit the opening in the glass bulb. Bore a hole in the cork the right size for the glass tube to fit in tightly. If you cannot get a glass tube with a bend in it, you will have to make a bend, as shown in the illustration, by heating the tube at the right place over an alcohol lamp and allowing the weight of the glass to make the bend while it is hot.

Insert the short end of the tube in the cork and place the other end in a test tube that is placed in water as shown. The globe may be fastened in position by a wire passed through the cork and tied to a ring stand. If you do not have a ring stand, suspend the

globe by a wire from a hook that is screwed into any convenient place.

A neat alcohol lamp may be made of an old ink or muscilage bottle. Insert a wick in a piece of the glass tubing and put this through a hole bored in a cork and the lamp is ready to burn alcohol or kerosene. Alcohol is cleaner to use as a fuel. Fill the globe about two-thirds full of water or other liquid and apply the heat below as shown. The distilled liquid will collect in the test tube.—Contributed by Clarence D. Luther, Ironwood, Mich.

Old-Time Magic—Part VII

Balancing Forks on a Pin Head

Two, three and four common table forks can be made to balance on a pin head as follows: Procure an empty



bottle and insert a cork in the neck. Stick a pin in the center of this cork so that the end will be about $1\frac{1}{2}$ in. above the top. Procure another cork about 1 in. in diameter by $1\frac{3}{4}$ in. long. The forks are

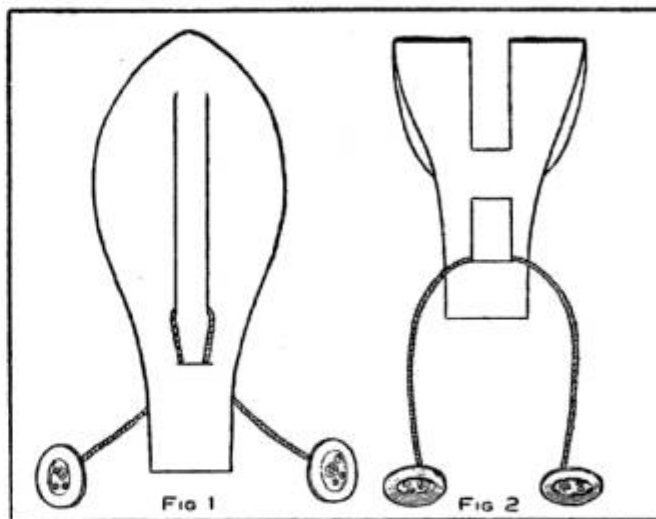
now stuck into the latter cork at equal distances apart, each having the same angle from the cork. A long needle with a good sharp point is run through the cork with the forks and $\frac{1}{2}$ in. of the needle end allowed to project through the lower end.

The point of the needle now may be placed on the pin head. The forks will balance and if given a slight push they will appear to dance. Different angles of the forks will produce various feats of balancing.—Contributed by O. E. Tronnes, Wilmette, Ill.

The Buttoned Cord

Cut a piece of heavy paper in the shape shown in Fig. 1 and make two cuts down the center and a slit as long as the two cuts are wide at a point

about 1 in. below them. A string is put through the slit, the long cuts and back through the slit and then a but-

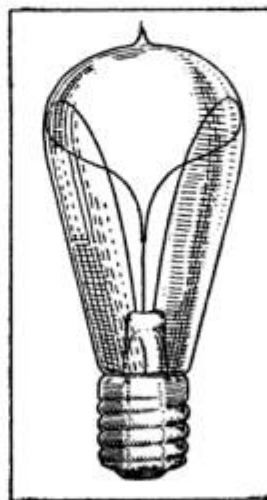


Removing the String

ton is fastened to each end. The small slit should not be so large as the buttons. The trick is to remove the string. The solution is quite simple. Fold the paper in the middle and the part between the long cuts will form a loop. Bend this loop down and pass it through the small slit. Turn the paper around and it will appear as shown in Fig. 2. One of the buttons may now be drawn through and the paper restored to its original shape.

Experiment with an Incandescent Lamp

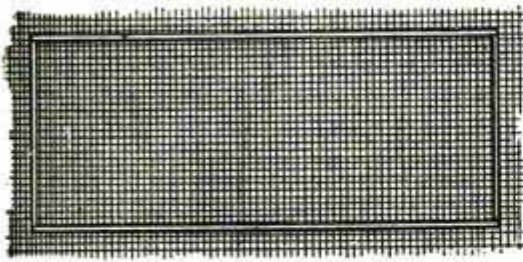
When rubbing briskly an ordinary incandescent lamp on a piece of cloth and at the same time slightly revolving it, a luminous effect is produced similar to an X-ray tube. The room must be dark and the lamp perfectly dry to obtain good results. It appears that the inner surface of the globe becomes charged, probably by induction, and will sometimes hold the filament as shown in



the sketch.—Contributed by E. W. Davis, Chicago.

A Home-Made Elderberry Huller

As we had only one day to pick elderberries, we wanted to get as many of them as we could in that time. We could pick them faster than they could



FRAME WITH WIRE
Fig. 1



END
Fig. 5

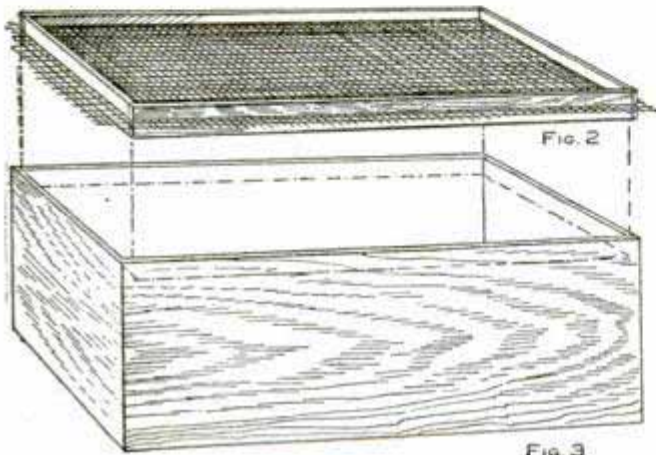


Fig. 2



NATURAL SIZE OF WIRE
Details of the Elderberry Huller
Fig. 4

be hulled by hand so we made a huller to take along with us to hull the berries as fast as they were picked. We procured a box and made a frame, Fig. 1, to fit it easily, then made another frame the same size and put a piece of wire mesh between them as shown in Fig. 2, allowing a small portion of the mesh to stick out of the frames. The top frame would keep the berries from rolling or jumping off, and the bottom frame kept the wire mesh and frame from being shaken off the box. The projecting edges of the mesh would

keep the frame on the top edge of the box. The top view of the frame is shown in Fig. 1 and the end in Fig. 5, and the box on which the frame rests in Fig. 3. The actual size of the wire mesh used is shown in Fig. 4. One person could hull with this huller as many berries as two persons would pick.—Contributed by Albert Niemann, Pittsburg, Pa.

How to Make a Bulb on a Glass Tube

As a great many persons during the winter months are taking advantage of the long evenings to experiment in one way or another, the following method of forming bulbs on glass tubes may be of interest. A common method is to heat the part to be formed and by blowing in one end of the tube gradually expand the glass. This way has its drawbacks, as many are not sufficiently familiar with the work to blow a uniform blast, and the result is, a hole is blown through the side of the tube by uneven heating or blowing.

A good way to handle this work, is to take the tube and 1 or 2 in. more in length than the finished article is to be and place one end over an alcohol flame, and by holding a spare piece of tubing against the end allow them both to come to a melting heat, then pull apart and instead of breaking off the long thread thus formed, simply hold it in the flame at an angle of 45 deg. and melt it down and close the end at the same time. Close the other end with the same operation; this makes the tube airtight.

Gradually heat the tube at the point where the bulb is to be formed, slowly turning the tube to get a uniform heat. The air inside of the tube becoming heated will expand, and the glass, being softer where the flame has been applied, will be pushed out in the shape of a bulb. A great deal of care should be taken not to go to extremes, as the bulb will burst with a loud report if the heat is applied too long. The best results are obtained by heating the glass slowly and then the bulb can be formed with regularity. This is an

easy way to make a thermometer tube. After the bulb is formed, the other end of the tube can be opened by heating, drawing out and breaking the thread like glass.—Contributed by A. Oswald.

center along concentric rings outward, then reverse.

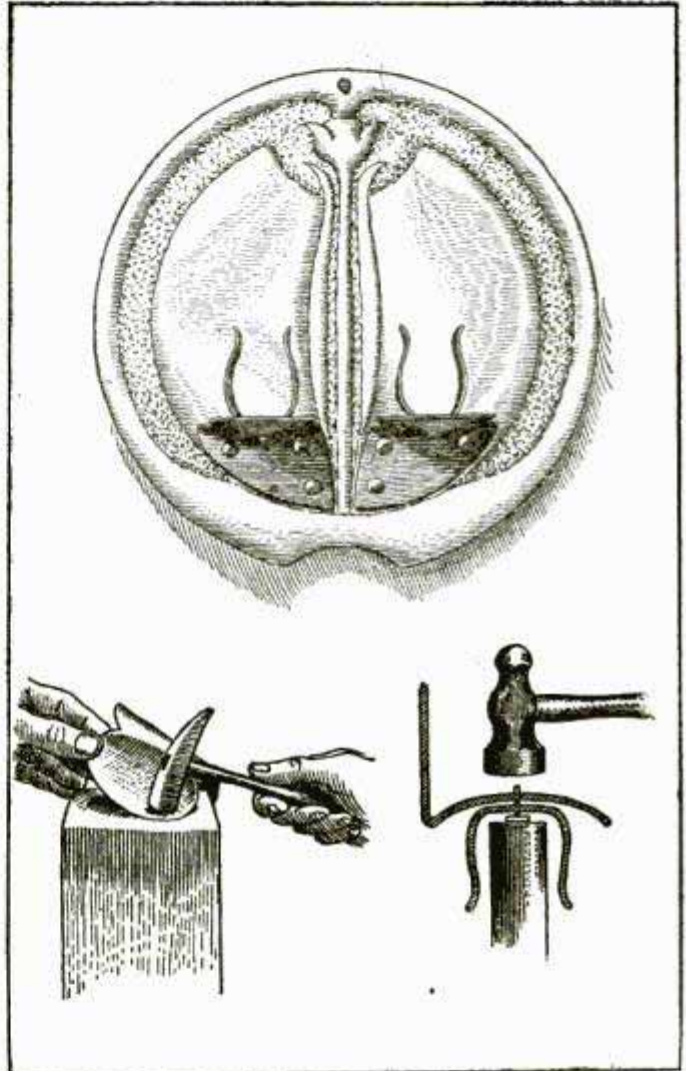
The candle holders may have two, three, four, or six arms, and are bent to shape by means of the round-nosed

How to Make a Sconce

A sconce is a candlestick holder, so made that it has a reflector of brass or copper and is to hang upon the wall. The tools necessary are a riveting hammer, file, metal shears, rivet punch, flat and round-nosed pliers, screwdriver and sheet brass or copper No. 23 gauge.

To make the sconce proceed as follows: First, cut off a piece of brass so that it shall have $\frac{1}{2}$ in. extra metal all around; second, with a piece of carbon paper, trace upon the brass lines that shall represent the margin of the sconce proper, also trace the decorative design; third, with a nailset make a series of holes in the extra margin about $\frac{3}{4}$ in. apart and large enough to take in a $\frac{3}{4}$ -in. thin screw; fourth, fasten the metal to a thick board by inserting screws in these holes; fifth, with a twenty-penny wire nail that has had the sharpness of its point filed off, stamp the background of the design promiscuously. By holding the nail about $\frac{1}{4}$ in. above the work and striking it with the hammer, at the same time striving to keep its point at $\frac{1}{4}$ in. above the metal, very rapid progress can be made. This stamping lowers the background and at the same time raises the design. Sixth, chase or stamp along the border of the design and background using a nail filed to a chisel edge. This is to make a clean sharp division between background and design. Seventh, when the stamping is complete remove the screws and metal from the board and cut off the extra margin with the metal shears. File the edges until they are smooth to the touch.

The drip cup is a piece of brass cut circular and shaped by placing the brass over a hollow in one end of a block. Give the metal a circular motion, at the same time beat it with a round-nosed mallet. Work from the



Completed Sconce

Shaping the Holders

Riveting

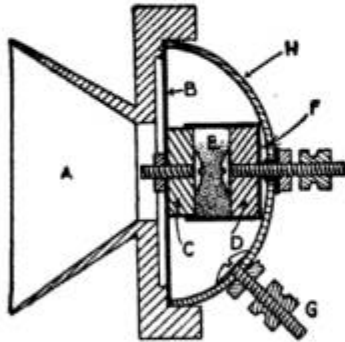
pliers. The form of the brackets which support the drip cups may be seen in the illustration.

Having pierced the bracket, drip cup, and holder, these three parts are riveted together as indicated in the drawing. It will be found easier usually if the holder is not shaped until after the riveting is done. The bracket is then riveted to the back of the sconce. Small copper rivets are used.

It is better to polish all the pieces before fastening any of them together. Metal polish of any kind will do. After the parts have been assembled a lacquer may be applied to keep the metal from tarnishing.

Home-Made Telephone Transmitter

The parts for transmitting the sound are encased in a covering, H, made from the gong of an old electric bell. A round button, D, is turned or filed from the carbon electrode of an old



dry cell and a hole drilled through the center to fit in a binding-post taken from the same battery cell. This button must be carefully insulated from the shell, H, by running the binding-post through a piece of small rubber tube where it passes through the hole and placing a rubber or paper washer, F, under the carbon button, and an insulating washer under the nut on the outside. This will provide one of the terminals of the instrument. Construct a paper tube having the same diameter as the button and with a length equal to the depth of the bell case, less $\frac{1}{8}$ in. Glue or paste this tube to the button so it will form a paper cup with a carbon bottom.

The diaphragm, B, which is the essential part of the instrument, should be made as carefully as possible from ferrotype tin, commonly called tintype tin. Cut a circular piece from this metal the exact size of the outside of the shell. A hole is made in the center of the disk a little larger than a binding-post that is taken from another old battery cell. When making the hole in the disk be careful not to bend or crease the tin. Scrape the black coating from the tin around the outside about $\frac{1}{4}$ in. wide and a place about 1 in. in diameter at the center.

The second electrode, C, is made the same as D, and fastened to the tin diaphragm with the binding-post without using any insulation. A third binding-post, G, is fastened to the shell through a drilled hole to make the other terminal. The mouthpiece, A, may be turned from wood in any shape desired, but have a flange on the back

side that will make a tight fit with the outside of the shell.

Fill the paper tube with powdered carbon, E, which can be made by pounding and breaking up pieces of carbon to about the size of pin heads. Powdered carbon can be purchased, but if you make it be sure to sift out all the very fine particles. Assemble the parts as shown and the transmitter is ready for use. If speech is not heard distinctly, put in a little more, or remove some of the carbon and try it out until you get the instrument working nicely.—Contributed by Harold H. Cutter, Springfield, Mass.

Quickly Made Lawn Tent

A very simple way of erecting a lawn tent for the children is to take a large umbrella such as used on delivery wagons and drive the handle into the ground deep enough to hold it solid. Fasten canvas or cotton cloth to the ends of the ribs and let it hang so that the bottom edge will touch the ground. Light ropes can be tied to the ends of the ribs and fastened to stakes driven in the ground in a tent-like manner to make the whole more substantial and to stand against a heavy wind. This makes an exceptionally fine tent, as the umbrella



Lawn Tent Complete

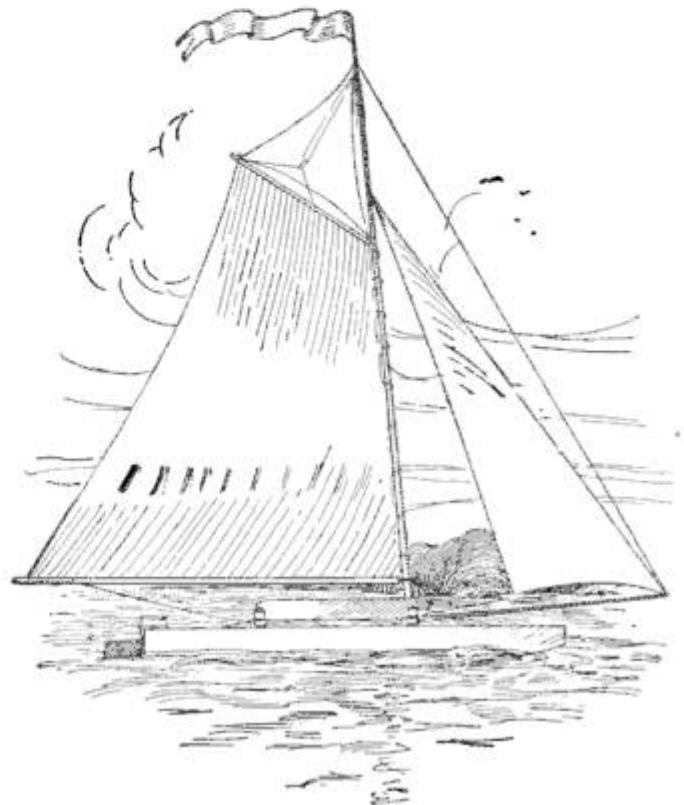
is waterproof; also, there is more room to stand up in than in a tent that is in the shape of a wigwam.—Contributed by J. A. Whamer, Schenectady, N. Y.

How to Make a Cruising Catamaran

A launch is much safer than a sailing boat, yet there is not the real sport to be derived from it as in sailing. Herein is given a description of a sailing catamaran especially adapted for those who desire to sail and have a safe craft. The main part of the craft is made from two boats or pontoons with watertight tops, bottoms and sides and fixed at a certain distance apart with a platform on top for the passengers. Such a craft cannot be capsized easily, and, as the pontoons are watertight, it will weather almost any rough water. If the craft is intended for rough waters, care must be taken to make the platform pliable yet stiff and as narrow as convenient to take care of the rocking movements.

This catamaran has been designed to simplify the construction, and, if a larger size than the dimensions shown in Fig. 1 is desired, the pontoons may be made longer by using two boards end to end and putting battens on the inside over the joint. Each pontoon is made of two boards 1 in. thick, 14 in. wide and 16 ft. long, dressed and cut to the shape shown in Fig. 2. Spreaders are cut from 2-in. planks, 10 in. wide and 12 in. long, and placed 6 ft. apart between the board sides and fastened with screws. White lead should be put in the joints before turning in the screws. Cut the ends of the boards so they will fit perfectly and make pointed ends to the pontoons as shown

Turn this shell upside down and lay a board $\frac{1}{2}$ in. thick, 12 in. wide and 16 ft. long on the edges of the sides, mark



Completed Boat

on the under side the outside line of the shell and cut to shape roughly. See that the spreaders and sides fit true all over, then put white lead on the joint and nail with $1\frac{3}{4}$ -in. finishing nails as close as possible without weakening the wood. Slightly stagger the nails in the sides, the 1-in. side boards will allow for this, trim off the sides, turn the box over and paint the joints and

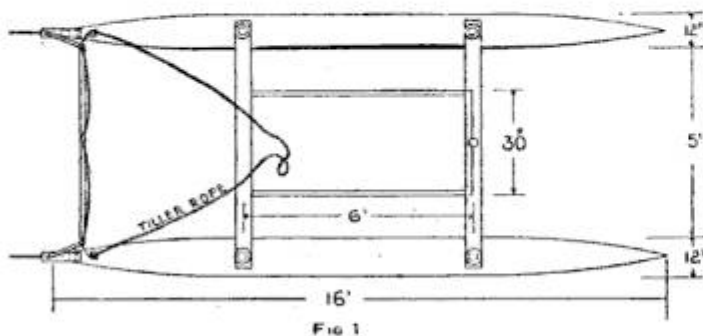


FIG 1

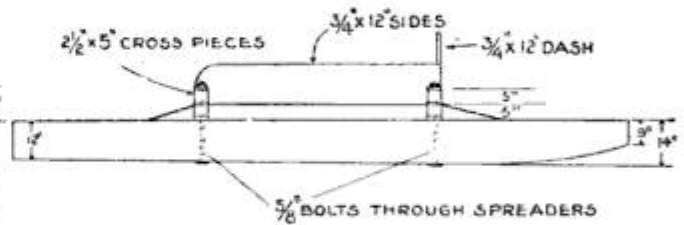


FIG 2

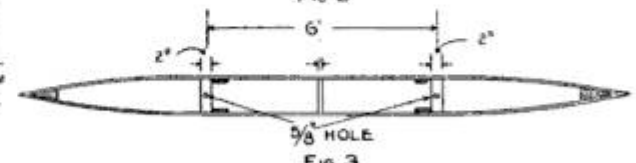


FIG 3

Details of the pontoons

in Fig. 3, and fit in a wedge shaped piece; white lead the joints and fasten well with screws.

ends of the spreaders, giving them two or three coats and let them dry.

Try each compartment for leaks by

turning water in them one at a time. Bore a $\frac{5}{8}$ -in. hole through each spreader in the center and through the

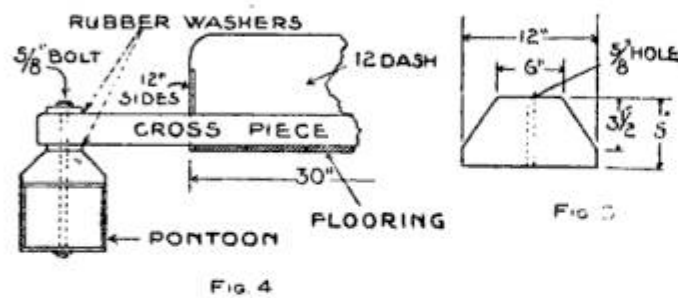


Fig. 4

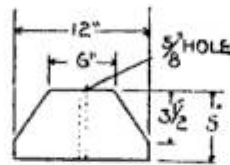


Fig. 5

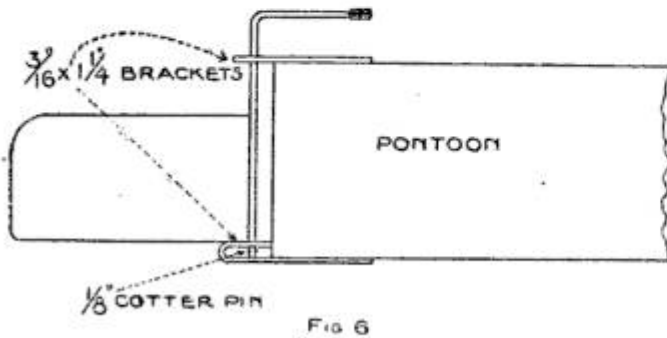


Fig. 6

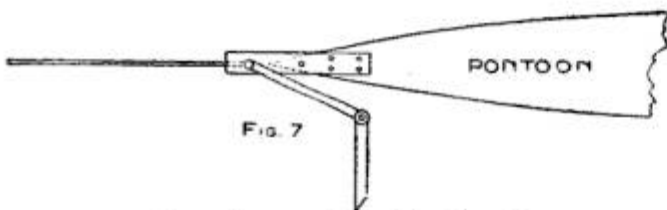


Fig. 7

Crosspiece and Rudder Details

bottom board as shown. The top board, which is $\frac{1}{4}$ -in. thick, 12 in. wide and 16 ft. long, is put on the same as the bottom.

After finishing both pontoons in this way place them parallel. A block of wood is fastened on top of each pontoon and exactly over each spreader on which to bolt the crosspieces as shown in Fig. 4. Each block is cut to the shape and with the dimensions shown in Fig. 5.

The crosspieces are made from hickory or ash and each piece is $2\frac{1}{2}$ in. thick, 5 in. wide and $6\frac{1}{2}$ ft. long. Bore a $\frac{5}{8}$ -in. hole 3 in. from each end through the 5-in. way of the wood. Take maple flooring $\frac{3}{4}$ in. thick, 6 in. wide, $74\frac{1}{2}$ in. long and fasten with large screws and washers to the crosspieces and put battens across every 18 in. Turn the flooring and crosspieces upside down and fasten to the pontoons with long $\frac{5}{8}$ -in. bolts put

through the spreaders. Put a washer on the head of each bolt and run them through from the under side. Place a thick rubber washer under and on top of each crosspiece at the ends as shown in Fig. 4. This will make a rigid yet flexible joint for rough waters. The flooring being placed on the under side of the crosspieces makes it possible to get the sail boom very low. The sides put on and well fastened will greatly assist in stiffening the platform and help it to stand the racking strains. These sides will also keep the water and spray out and much more so if a 12-in. dash is put on in front on top of the crosspiece.

The rudders are made as shown in Fig. 6, by using an iron rod $\frac{5}{8}$ in. in diameter and 2 ft. long for the bearing of each. This rod is split with a hacksaw for 7 in. of its length and a sheet metal plate $\frac{3}{32}$ in. thick, 6 in. wide, and 12 in. long inserted and riveted in the split. This will allow $\frac{3}{4}$ in. of the iron rod to project from the bottom edge of the metal through which a hole is drilled for a cotter pin. The bottom bracket is made from stake iron bent in the shape of a U as shown, the rudder bearing passing through a hole drilled in the upper leg and resting on the lower. Slip the top bracket on and then bend the top end of the bearing rod at an angle as shown in both Figs. 6 and 7. Connect the two bent ends with a crosspiece which has a hole drilled in its center to fasten a rope as shown in Fig. 1.

Attach the mast to the front crosspiece, also bowsprit, bracing them both to the pontoons. A set of sails having about 300 sq. ft. of area will be about right for racing. Two sails, main and fore, of about 175 to 200 sq. ft. will be sufficient for cruising.—Contributed by J. Appleton, Des Moines, Iowa.

Rough alligator finished photograph mounts will not receive a good impression from a die. If a carbon paper is placed on the mounts before making the impression, a good clear imprint will be the result.

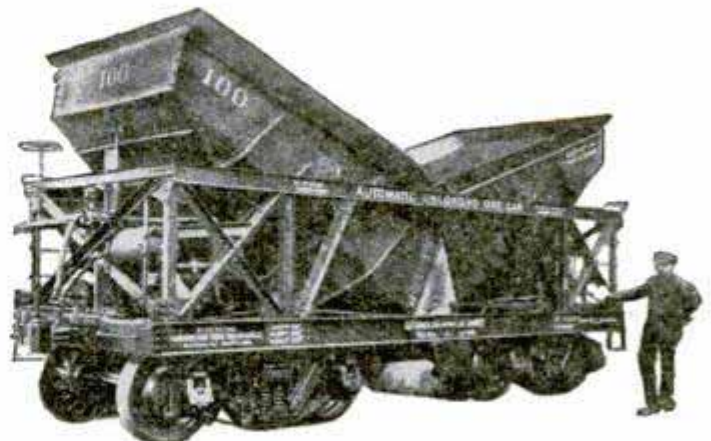
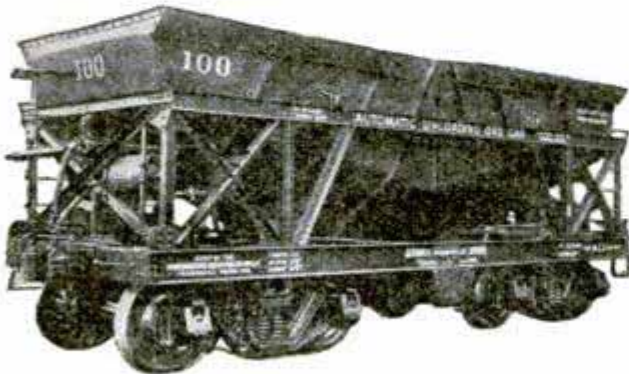
GREAT PROFIT FROM ONE-ACRE FARMS

That the possibilities of profitable gardening on one acre of land are not confined to France, where the system of extensive culture on such small plots has become the most developed, is shown in this article. An acre of land cultivated on the French system near London yielded in the last complete year \$3,100 in gross returns, which is a record for England. The nearest approach to it is an acre of land between London and Oxford which has yielded in one year flower seeds to the value of \$1,350.

In Thibet there is an acre of land that yields an annual revenue exceeding \$15,000. Upon it grows the sacred "tree of a thousand images," the leaves of which bring this amount of money. There is also an acre of land in the Moselle wine-growing district which yields \$12,000 a year.

UNLOADING CARS BY COMPRESSED AIR

A Duluth engineer has invented an ore car which is operated by compressed air and will discharge its load and be ready for another in less than a minute. The carrying body of the car is composed of two buckets, as shown in the illustration. These buckets come together in the center and are held closed by center locks.



Air Unloaded Car Closed and Open

this position until all the ore is out by compressed air in a cylinder at each end of the car. Releasing the air in these cylinders allows the jaws of the buckets to close again, the weight of the upper part of the buckets bringing them together.

A train of 50 cars can be unloaded, relocked and drawn off the ore docks in five minutes, and only two men are required for the operation. In one of the tests a car was unlocked, dumped of 50 tons of soft, sticky iron ore, and relocked in 18 seconds, which is claimed to be a world's record. The air is compressed by the locomotive and the connections between the cars are the same as those in an air-brake system.

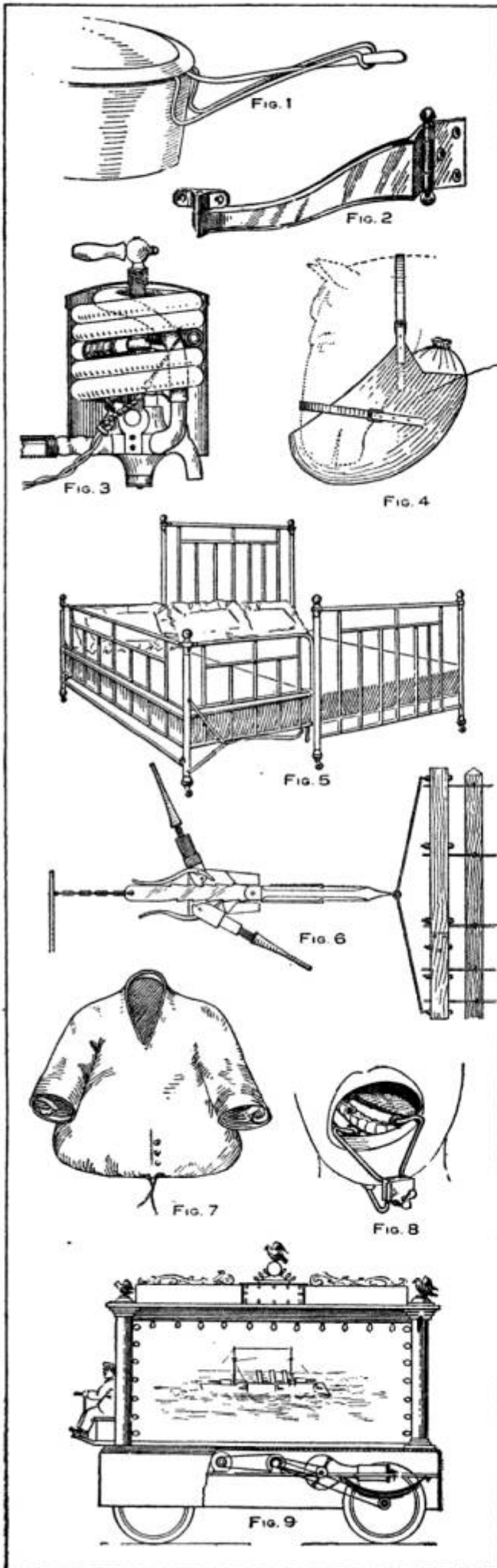
BRAKE OPERATES ON RAILS INSTEAD OF WHEELS

An electro-magnetic brake, adapted particularly for mountain railroads, and operating on the rails rather than on the car wheels, is being manufactured in Germany. It comprises a pair of pole shoes, which are parallel to the rails and close to them. The weight of the brake is but 3 per cent of the pressure it exerts, and the braking effect may be increased by lengthening the shoes.

A similar idea was brought out by a Chicago inventor several years ago,

When these locks are released, the weight of the ore swings the jaws of the buckets open and they are held in

but the electricity was applied directly through the wheels to the track instead of through pole shoes.



SPOON REST FOR COOKING UTENSILS.—The spoon rest shown in Fig. 1, a useful device for stewing pans or kettles, is made from a single length of wire, opposite end portions of which are bent to form the hook by which it is held in position.

DOUBLE-AXIS HINGES FOR MIRROR DOORS.—The double-axis hinge illustrated by Fig. 2 is designed for mirror doors, that is, for such doors as are used to inclose wall cabinets and the like in bath or dressing rooms and having mirrors attached to them. When the door is opened or closed the arms of the hinges move with the door and it swings in the usual manner. After the door has been opened, and it is desired to swing it horizontally in a position where the light, either from a window or lamp, will strike it perfectly, all that is necessary is to disengage a small spring catch and the door becomes free to swing horizontally.

ELECTRICALLY-HEATED WATER-FAUCET.—Among the most interesting of the recent patents is the electrically-heated faucet idea shown in Fig. 3. Around the upper part of the faucet, incased in a metal cap, is a coil of pipe or a conduit. This is electrically heated by attaching to it a flexible wire leading from an ordinary electric lamp socket.

FEED BAG FOR HORSES.—Figure 4 illustrates a feed bag for horses, the back part of which forms a feed-supply compartment. The amount of feed the horse is to be given is placed in the supply-compartment, and, as the animal eats from the nose bag, the grain is slowly fed to him through an opening between the two compartments. The purpose of the idea is to furnish the horse with sufficient grain without at any time having the nose bag so full that he pushes it out with his nose or shakes it out, thus losing it.

FOLDING EXTENSION FOR BEDS.—The folding extension for beds shown in Fig. 5 is designed for the convenience of parents when they desire to have a child sleeping close beside them. When not in use it folds up and can be slipped under the larger bed or be hung from its side. It is provided with a side rail to keep the child from falling out, and when in use couples to one of the side rails of the large bed.

WIRE STRETCHER.—Figure 6 shows an ingenious device for stretching wire fences. It is provided with two handles pivoted in the head on opposite sides so as to be alternately engaged with the ratchet-teeth of the draft bar in moving it forward.

A GARMENT FRUIT-GATHERER.—The blouse with the curious sleeves shown in Fig. 7 is not for ordinary wear, but for fruit picking. It is worn as an ordinary blouse, the bottom being securely belted or tied around the waist. Each sleeve really has two openings, through one of which the arms pass, while the other opening or channel in each sleeve forms a chute through which the fruit drops into the baggy part of the garment. The picker, standing on a ladder or in the tree branches, lifts his hands above his head and picks the fruit, then bends his wrists downward and drops it into the chute compartment of each sleeve. When the blouse is filled he descends to the ground, unloads and refasts his blouse, and ascends again for more picking.

LIP AND TONGUE GUARD FOR DENTISTS' USE.—The device illustrated in Fig. 8 is designed to aid the dentist in doing difficult work upon a tooth. It is clamped into position by means of a chin plate, and its purpose is to hold the lips and cheek away from the outside of the tooth being operated upon, and the tongue away from the inside. This is accomplished by two rollers, one on each side of the teeth, and held in position by spring jaws.

PATENTS

AUTOMOBILE ADVERTISING DEVICE.—Figure 9 is an automobile advertising device, the scenes shown being operated by gear attached to the wheels of the machine.

CANTEEN LIFE-PRESERVER.—The life-preserver shown in Fig. 10 is formed of four air-tight floats somewhat resembling army canteens, fastened in a belt in such manner that their movement is free and independent of each other. Straps attached to the belt are slipped over the legs of the wearer to hold the device in proper position.

BARREL TRUCK.—In many grocery and produce stores the articles for sale are often displayed in barrels, arranged on the sidewalk in front or along the passageways inside. Such barrels have often to be moved from one position to another, and this necessity is the reason for the barrel truck illustrated in Fig. 11. It is formed of a circular body of slightly greater diameter than the end portions of a regulation barrel, and under this body are arranged four sets of rollers.

SAFETY POCKET FOR WOMEN.—The fact that carrying money in a bag held in the hands offers too excellent an opportunity for street thieves, has resulted in many safety pockets of the kind shown in Fig. 12. It is laced around the leg just below the knee and contains two pockets in which money or jewelry can be safely placed.

REAR DUST-GUARD FOR AUTOMOBILES.—With the ordinary type of automobile body the dust nuisance is most pronounced in the rear seat, the dust thrown up by the drive wheels being caught by the suction and drawn in over the back. Many automobile manufacturers are now building cars with huge bulging backs in an attempt to solve the problem, but in the meantime the dust guard illustrated in Fig. 13 has been designed for this purpose on the ordinary car. It is composed of a perforated shield attached to the back of the rear seat and rising above it. The rush of air caused by the speed of the automobile is supposed to pass through these perforations and blow the dust back.

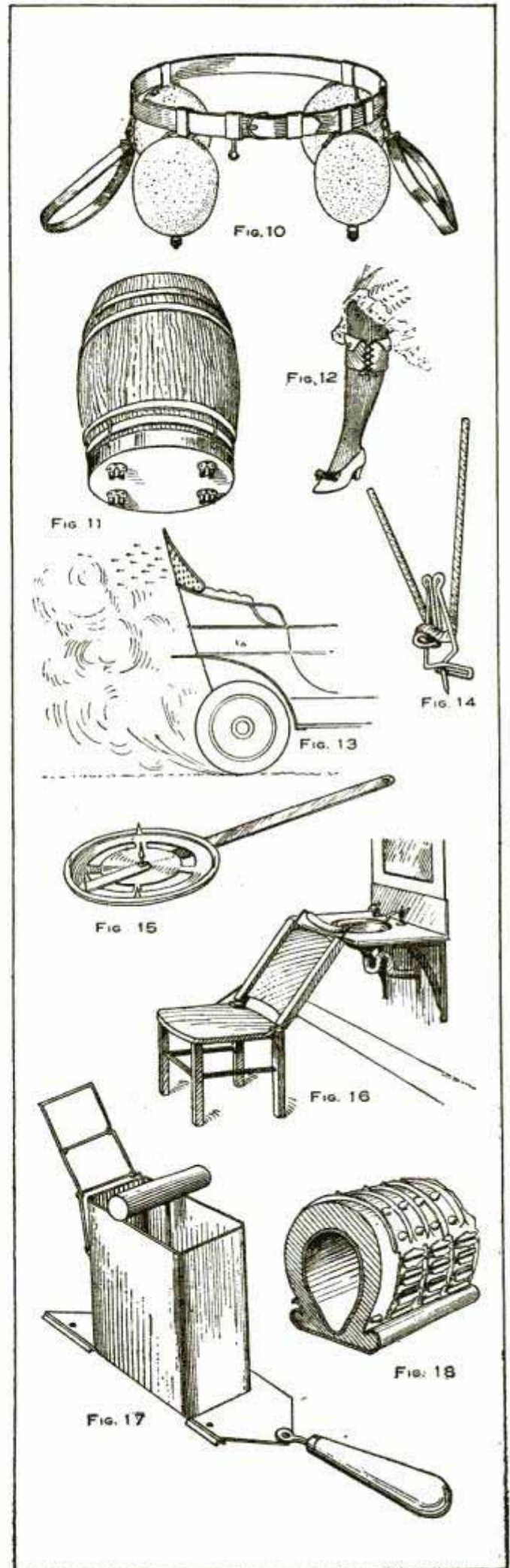
HOLDER FOR CLOTHESLINES.—The hook arrangement in Fig. 14 obviates the necessity of tying and untying knots in clotheslines when attaching or removing them from the posts. It is composed of heavy wire, so shaped that the line can be looped over its hook in such manner that it will be held absolutely secure. The holder is screwed into the post.

SAFETY CAN-OPENER.—Very few people who are in the habit of opening cans with ordinary can-openers can boast of never having been cut by the implement slipping. The can-opener shown in Fig. 15 is designated as a "safety" because it contains a spur in the center which enters the tin and holds it in position as it is twisted around the can. Also because it has a sufficiently long handle to keep the hands away from the cutting teeth.

TOILET-CHAIR.—Figure 16 illustrates a chair designed for use in a toilet room and especially adapted for the washing of the hair, a somewhat tiresome operation when the person involved has to stand up through the operation and lean over the basin. The back of the chair can be dropped back to any angle, and at its top is a rest for the head.

A SELF-FEEDING TROWEL.—The trowel shown in Fig. 17 is provided with a hopper into which the mortar to be used is placed. At the bottom of the hopper is a slot through which the mortar is forced as required by a plunger.

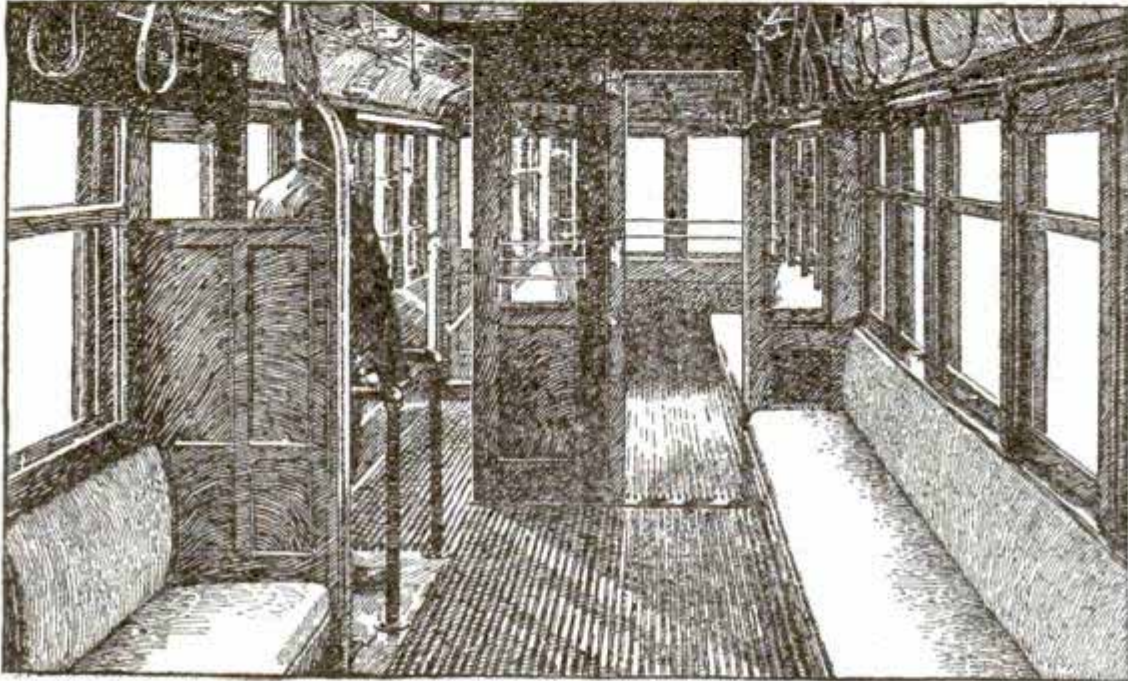
PROTECTOR FOR AUTOMOBILE TIRES.—The article shown in Fig. 18 is an armor for automobile tires, comprising a number of tread plates, and a pair of continuous retaining members arranged to be interposed between the armor and the rim.



ADVANCED TYPE OF PAY-AS-YOU-ENTER CAR

A new type of pay-as-you-enter street car which seems to have some advantages over the ordinary type of such cars has been tried out success-

The area selected for the experiments comprises several thousand acres on the Soleduck river, and was one time covered over with a magnificent forest of Douglas fir. It was first burned over in 1890, fire again devastating it in 1895, and still again in



Interior View of the Car

fully on one of the Pittsburg railways. Platforms have been entirely eliminated, and a narrow corridor running along one side of the car for about one-third its length takes the place of the rear platform. From the rear steps the passengers enter directly into the corridor and walk to its end, where the conductor stands collecting fares. Just beyond the conductor's stall in the center of the car is the exit. Passengers cannot enter the car through this door nor leave by the entrance door at the rear, thus doing away with considerable congestion.

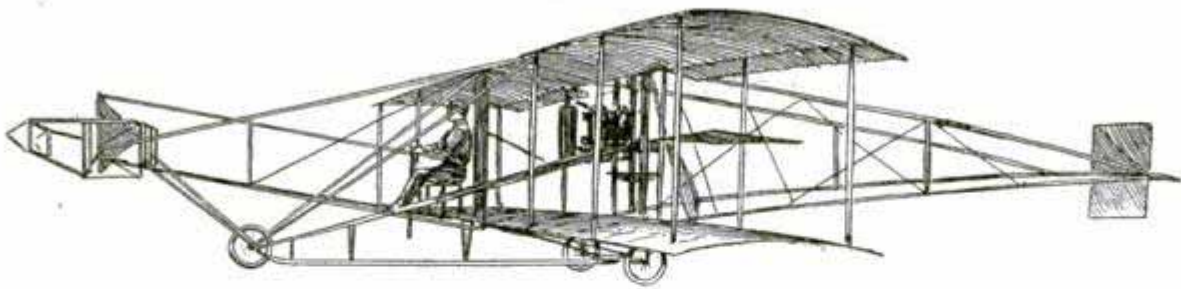
REFORESTING BURNED FOREST LAND

Experiments are being made by the U. S. forest service in the Olympic national forest in the state of Washington to determine the practicability of reforesting the great areas of forest lands that have been devastated by fire, and which now lie barren and unproductive.

1906, destroying the last remnant of the original forest and leaving the entire area treeless.

It is believed that on the greater part of the area simply scattering seed over the ground in the fall before snow falls or in early spring will be sufficient to start a new growth. On other portions of the area, however, where a growth of grass and weeds have covered the ground, it will probably be necessary to work the seeds into the soil by raking or dragging brush, while in still other localities, sowing by what is called the seed spot method will be resorted to. In this, several seeds are dropped together in spots and covered with soil. To test the various methods several spots have been selected, representing the various conditions found on the burn, such as difference in slope, altitude, exposure, and vegetation.

During the past year 400,000 rubber trees have been planted on the Hawaiian Islands.



Curtiss' Biplane

ALL AEROPLANE RECORDS BROKEN

Aviation Week at Rheims, France, Greatest Event in Aerial Navigation—Glen Curtiss Wins Blue Ribbon of the Air by Capturing International Cup of Aviation—Henry Farman Breaks Records For Length of Flight and Distance Covered

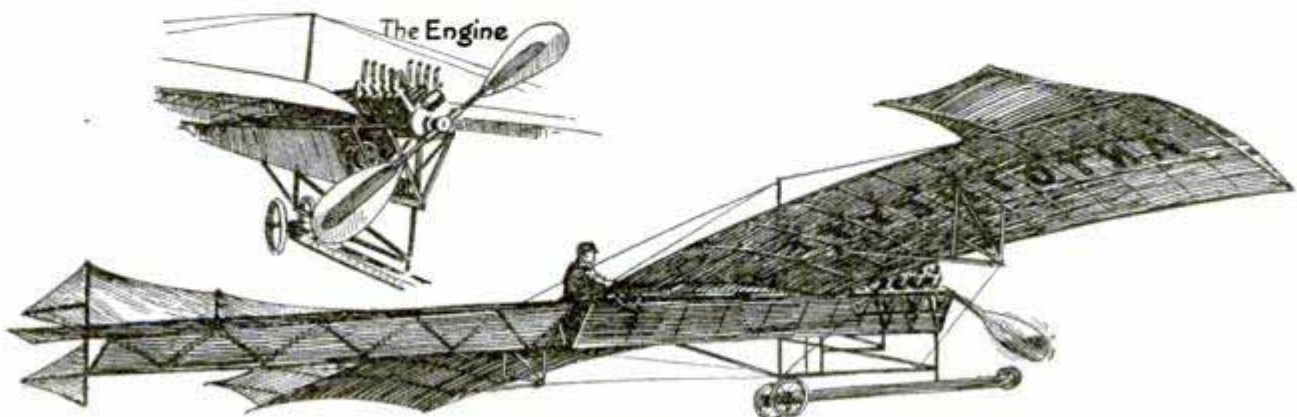
Man-birds had made wonderful flights in France, England and America; the Wrights, Farman, Curtiss, Bleriot, Latham and Sommer all were instrumental in startling the world in the past year, but never before in the history of man's attempt to usurp the birds had such a scene been witnessed as that at Rheims during the week commencing Aug. 22 and ending Aug. 29. During that period all aeroplane records for speed, distance, and time in air were broken, and on one day six machines were flying at once, like a flock of giant birds, circling above a historic field from which thousands of spectators watched and wondered.

The breaking of world's records commenced early in the week, and then as time passed each new day brought forth a new and greater flight until, when all was over, Glen Curtiss, the

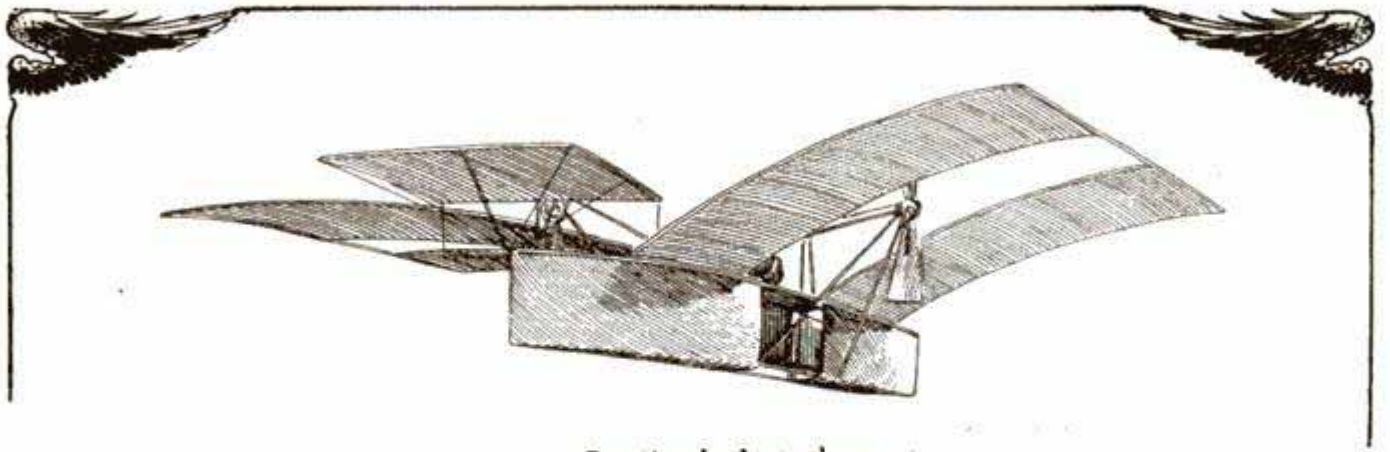
only American entry, had won the blue ribbon of the air, which is the International cup of aviation donated by James Gordon Bennett; and Henry Farman, of English parentage but always accredited as a French aviator, had carried away the Champagne prize of \$10,000 for length of flight.

The International cup was considered the main prize of the contest, and America is duly proud of the fact that it was captured by an American. The other great event was, of course, the contest for the Champagne prizes, which consisted of \$10,000 for the aviator covering the greatest distance, \$5,000 for the second best flight, \$2,000 for the third, and \$1,000 each for the fourth, fifth and sixth. Latham won the \$5,000 prize, Paulhan the \$2,000 prize, and Lambert, Tissandier, and Sommer the \$1,000 prizes.

The story of the flights of the first three of these Champagne prize winners is more than ordinarily interesting as each one broke a world's record by his flight and fully believed that he could not be beaten. Paulhan was the first to make a great record, flying 82 miles in 2 hr., 43 min., 24 sec. on Wednesday. He was immediately hailed as



Latham's Antoinette



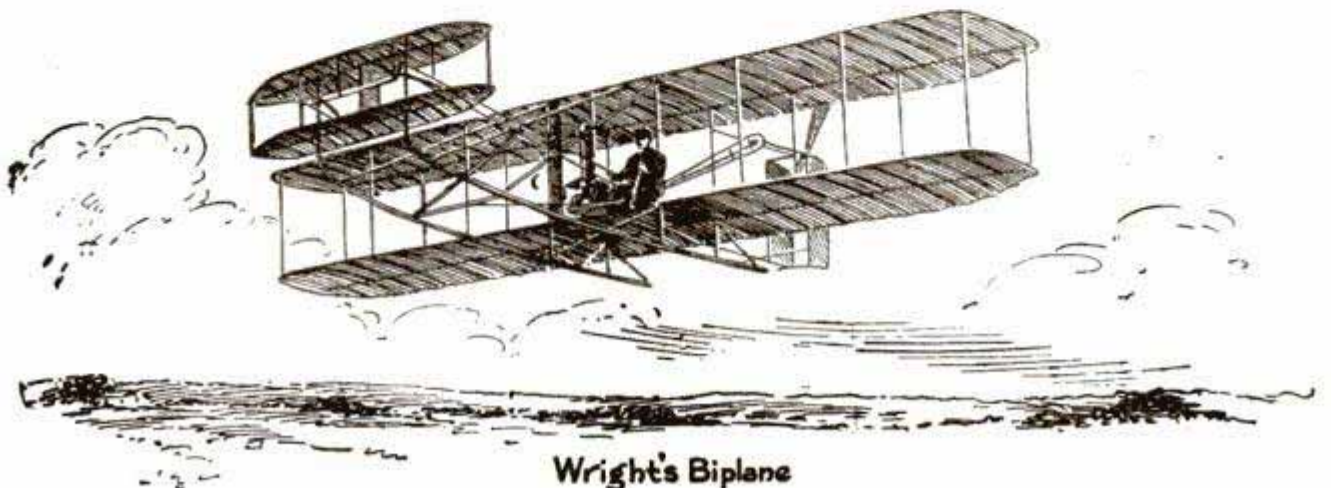
Paulhan's Aeroplane

the leader and held this honor until Thursday, on which day Herbert Latham, the young French aviator who first tried to fly the English channel and failed only to see Bleriot win, flew 96½ miles in 2 hr., 18 min., 9 3-5 sec. Then he was raised above Paulhan in the estimation of the people and hailed as king, only to find himself beaten on the following day by Henry Farman in an official flight of 111.78 miles in 3 hr., 4 min., 56 sec. Farman's flight, however, really lasted nearly 3½ hours and the distance covered was 118.06 miles, but the time limit within which the flights had to be made expired when he was ending his 112th mile.

Farman's victory has its dramatic side. It was this man who was the foremost aviator of France when Wilbur Wright went to Europe a little over a year ago. He had flown as many as 25 or 30 miles to the great astonishment of the world, and it was just after one of these, then considered long flights, that Wright began making flights of over an hour and then two

hours. Farman was almost forgotten and but little mention was made of his name anywhere but locally. When he brought out his machine Friday afternoon the great throng paid but little attention to him. He started to fly about 25 ft. from the ground and had been flying for sometime before the multitude awoke and realized that he was a serious contender to Latham and Paulhan. Record after record fell before his methodical flight. Dusk came, darkness fell, and still he continued to fly. Finally the announcement was made that the timing of the flight had ended under the rules. Some time later a ghostly shape suddenly appeared out of the darkness and came to earth in front of the main grandstand. Farman, numb with the cold, fell rather than stepped from his machine and was carried forward to receive congratulations.

In direct contrast to these long distance flights was the short flight by which Glen Curtiss won the International cup. Speed was the main factor, not distance, and the prize fell to



Wright's Biplane

Curtiss because he made the best time in the two laps of the course, a distance of 12.42 miles. He made the flight in 15 min., 50 3-5 sec.,—at a speed of 47.65 miles an hour. This time was only 5 3-5 seconds faster than that made by Bleriot over the same course. The other two aviators who won the right in the earlier trials to represent France in this race were Latham and Lefebvre, who finished respectively in 17 min., 32 sec., and in 20 min., 47 3-5 sec. Cock-

speed. The first round, measuring 6.21 miles, was made in 7 min., 57 2-5 sec., and the second round was covered even two seconds faster.

This remarkable showing created consternation in Bleriot's camp, and for hours he tried with different propellers to make the course in faster time, only to fail each time.

Much disappointment has been evinced in America that Curtiss did not make a serious attempt to win the



M. Roger Sommer



Glen Curtiss

burn, an Englishman, ran into a haystack when maneuvering for a start, consequently did not even cross the line.

The race lay between Bleriot and Curtiss, and as Bleriot had badly beaten the American earlier in the week the cup was practically considered as Bleriot's until on Saturday, the last day, Curtiss wrested it from him. Curtiss started a little after 10 o'clock in the morning. He handled his machine, which flew along at a speed never before witnessed, in a masterly style, especially at the turns, which he took on the down grade to advance his

Grand Prix de la Champagne first prize, but he had only one aeroplane with him and as his chief desire was to win the cup he did not wish to take chances of accident.

When the limit of time was up and Curtiss's victory was assured the judges ran up the American flag on the signal pole in front of the tribunes and the bands played the "Star Spangled Banner." Hundreds of Americans rushed to congratulate Curtiss, and he was dragged to the box occupied by Ambassador Henry White, Mrs. Theodore Roosevelt, and three of the Roosevelt children. Ambassador White con-

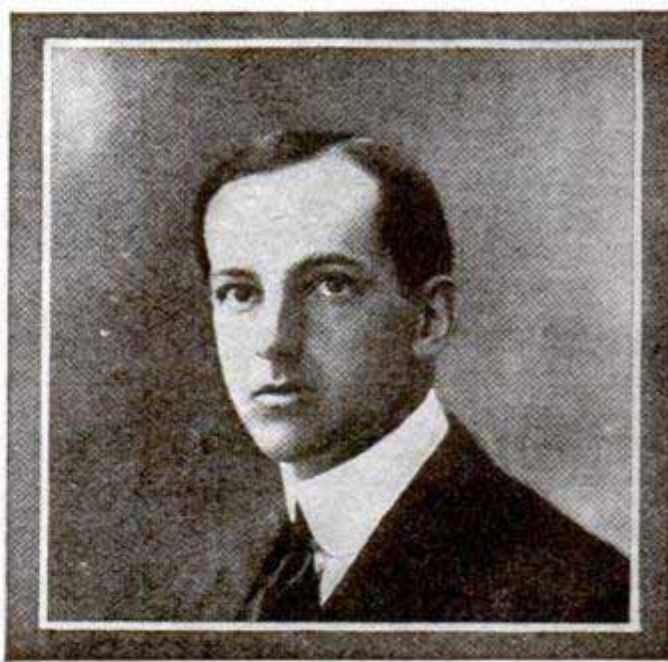
gratulated the winning American in the name of the government and the people of the United States.

Not content with winning this greatest prize of all, Curtiss won the first of the La Vitesse speed prizes and the second prize in the one lap race on the last day of the meet, which was Sunday, Aug. 29. He had some trouble in winning the first prize of \$2,000, because of penalties imposed. He covered 18 miles in 24 min., 15½ sec., but being under a penalty of 10 per cent in addition to 5 per cent each for not contesting on Sunday and Tuesday in the same race, his time became 27 min.,

what difficult in view of what actually occurred to clearly define one type as superior to the other. The two great prizes were won by biplanes it is true, one of American design and one of French, but the second best records in both events were made by monoplanes, and it was a monoplane that flew the English channel. It was quite evident, however, that the Wright machines, as operated by French aviators, were not in the running after records really began to break. What the result would have been had either Wilbur or Orville personally operated Wright machines is another question. Neither took any



Louis Bleriot



Hubert Latham

51 2-5 sec. Then he was penalized still another 5 per cent, which made his time 29.11½, but even at that he won over Latham, his nearest competitor. Second place in the one-lap race brought him a prize of \$600. In this race Bleriot made better time than Curtiss and carried off first prize.

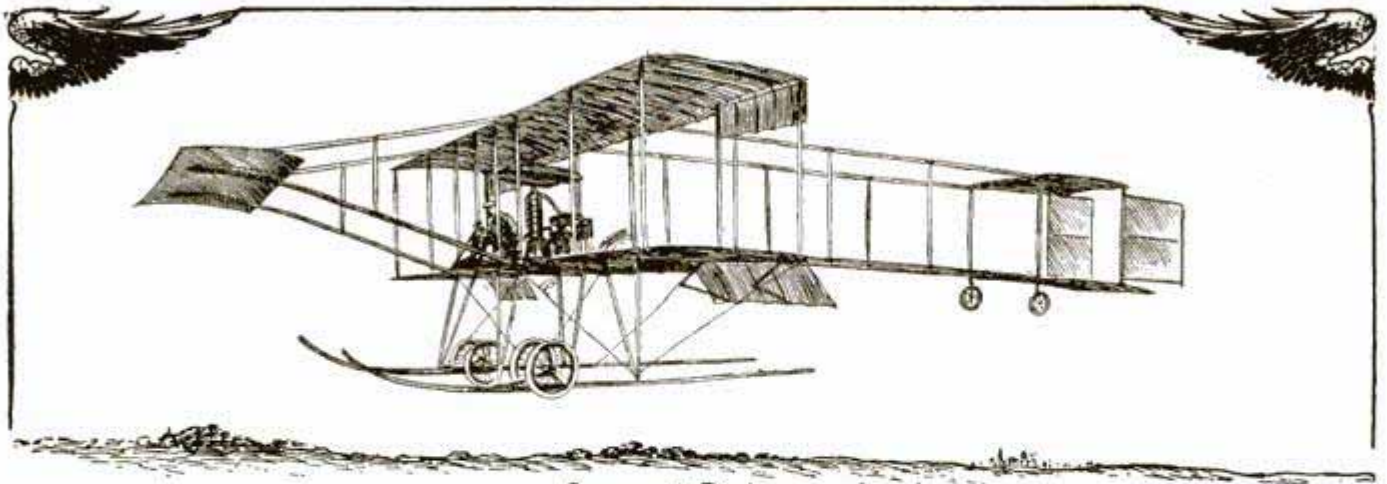
The height prize was won by Latham, who reached an altitude of 400 ft. in his monoplane, and Farman, with two passengers won the passenger race.

The real interest of aerial experts in the event at Rheims was the opportunity it gave of determining the respective merits of the monoplane and biplane types of aeroplanes. It is some-

part in the events, having refused the invitation of the Aero Club of America to be their representatives.

WELLMAN AGAIN FAILS

Walter Wellman's second attempt to fly to the North pole in the dirigible airship "America," occurring in August, resulted in failure after some 32 miles had been traveled, and the great balloon is now a wreck. The first mishap was caused by the breaking loose of the leather guide rope, to which 1,000 lb. of provisions and stores were attached. Released from this great weight the dirigible shot upward at a terrific pace until it was high above the clouds. This



Sommer's Biplane

occurred just as the airship was nearing the pack ice of North Spitzbergen, which is about 35 miles from the starting point. With some difficulty the pilots succeeded in getting the "America" back near earth again, a tow line was gotten aboard the steamship "Fram" and the trip back to Camp Wellman commenced.

But the ill luck of the expedition was not yet over. Just as the landing stage was reached a gust of wind caught the big inflated bag broadside and snatched it away from its lines. It was carried, careening, over rough ice hummocks for some distance, then exploded.

BLERIOT'S RECEPTION IN ENGLAND

Following his successful passage of the English channel, Louis Bleriot received a welcome at the hands of the English of a nature that is seldom given to others than royalty or a great national hero, and herein lies a demonstration of one of the deepest principles

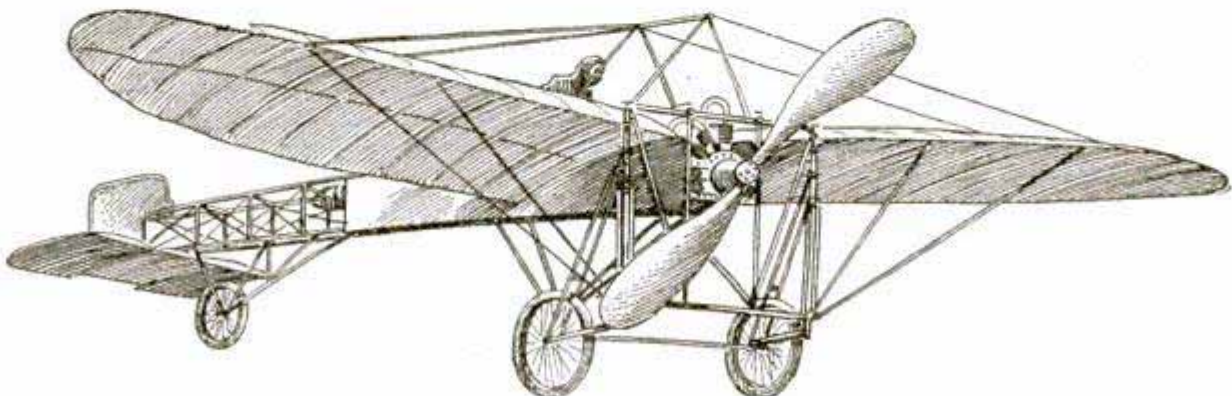
of the Anglo-Saxon race—sportsmanship and fair-mindedness.

England has always dreaded a crossing of the English channel and for months past the fear that it might be crossed through the air has been a nightmare to its people, yet the moment it was crossed the successful aviator was almost mobbed with enthusiasm. Why? Simply because Bleriot's flight was considered a sporting proposition in the strictest meaning of the word, and its brilliant finish was worthy of great acclaim.

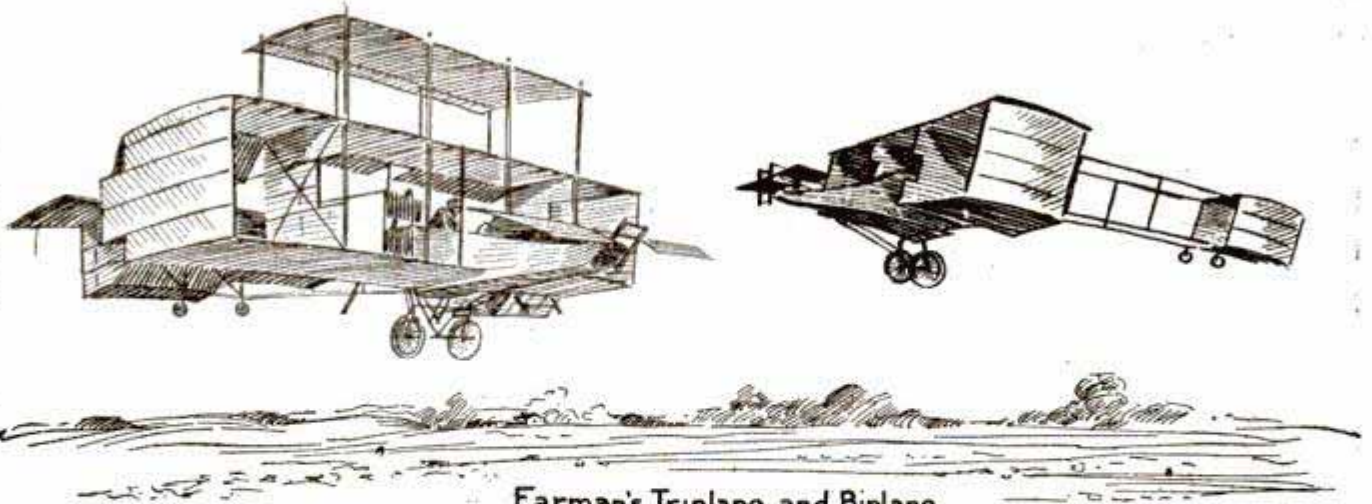
Yet, it is not unjust to wonder whether or not the British liking for fairness and sport would have stood the test had the aerial visitor and its operator been German rather than French.

PEKIN'S TELEPHONE SERVICE

In all China, with its 400,000,000 population, there has been virtually no telephone service, as the 2,000 or so instruments in the whole empire were in private use by foreign residents.



Bleriot's Monoplane



Farman's Triplane and Biplane

Now, however, the installation of a general telephone system in Peking is practically complete, making one Chinese city that is as up-to-date in this respect as many American and European cities.

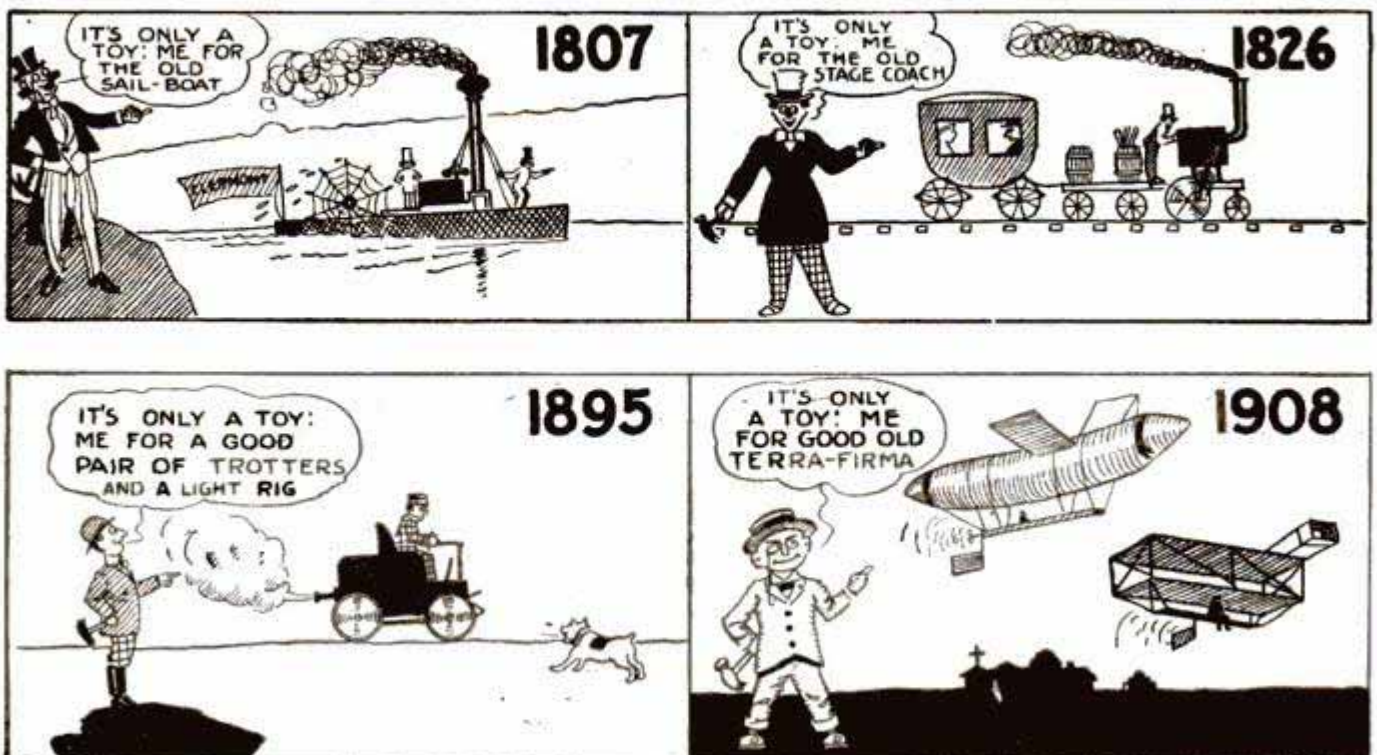
It is also of satisfaction to most Americans to know that the system is entirely and absolutely American, although English, French, and German concerns were contestants. American telephone systems are also to be installed in Canton, Tientsin, Hankau, and other of the larger cities.

As we go to press news is received of the discovery of the North Pole by Dr. Cook, an American.

NON-MAGNETIC EXPLORER SAILS

The non-magnetic ship "Carnegie," the building of which was described in this magazine some time ago, sailed in August on the first of the many cruises that will be made by her in the service of science. Constructed with the least possible quantity of magnetic material about her—only 600 lb. in all—she will secure long sought data on the distribution of magnetism over all the parts of the world's surface covered by oceans and seas.

The curious vessel, the only one of her kind in the world, is in charge of members of the department of terrestrial magnetism of the Carnegie Institute.



Put the Knock Down Sections together yourself and save over Half

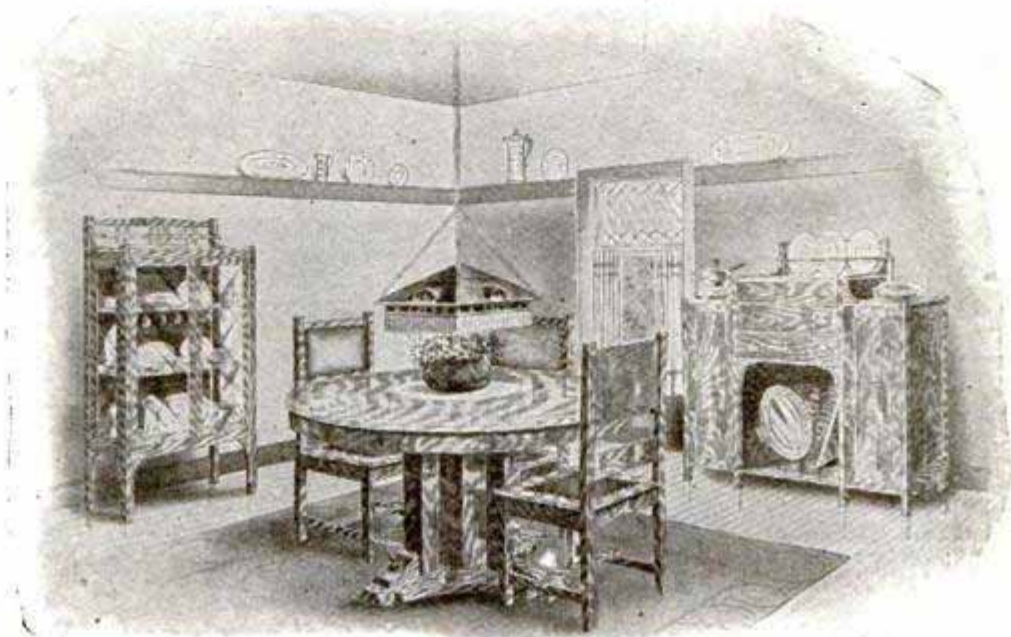
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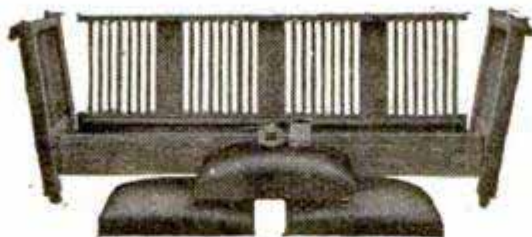
No. 311—Solid Oak Dining Table—Top, 54 inches diameter, extended 7 ft. 6 in., height 30 inches. Our price K. D. **\$18.50**

No. 412—Solid Oak Buffet, height 51 in., length 61 in. Our price K. D. **\$18.75**

No. 420—Solid Oak China Closet, 61 in. high, 36 in. wide, 15 in. deep. Price K. D. (without glass) **\$13.50**

No. 15—Solid Oak Dining Chairs, height 39 in., width 17 in. Our price K. D., seat and back upholstered in Chase Leather, set of four \$16.00. Set of six **\$22.50**

We save you, (1) all the dealer's profit; (2) three-fourths the freight; (3) cost of finishing; (4) expense in crating and packing; (5) in factory cost; (6) in factory profit. *Figure it out yourself.*



No. 6

Can be assembled by any woman. Easy to put together; no holes to bore, no toolwork necessary, no skill required; the only tools necessary are a hammer and screw-driver.

As you receive it, with cushions made ready to drop in place. Just six joints to put together in the grooves provided, a few minutes work in staining and the piece is finished.

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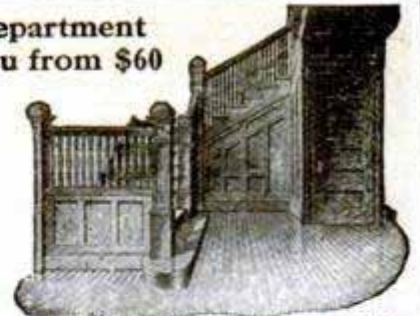
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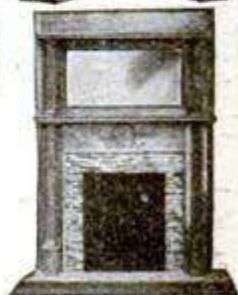
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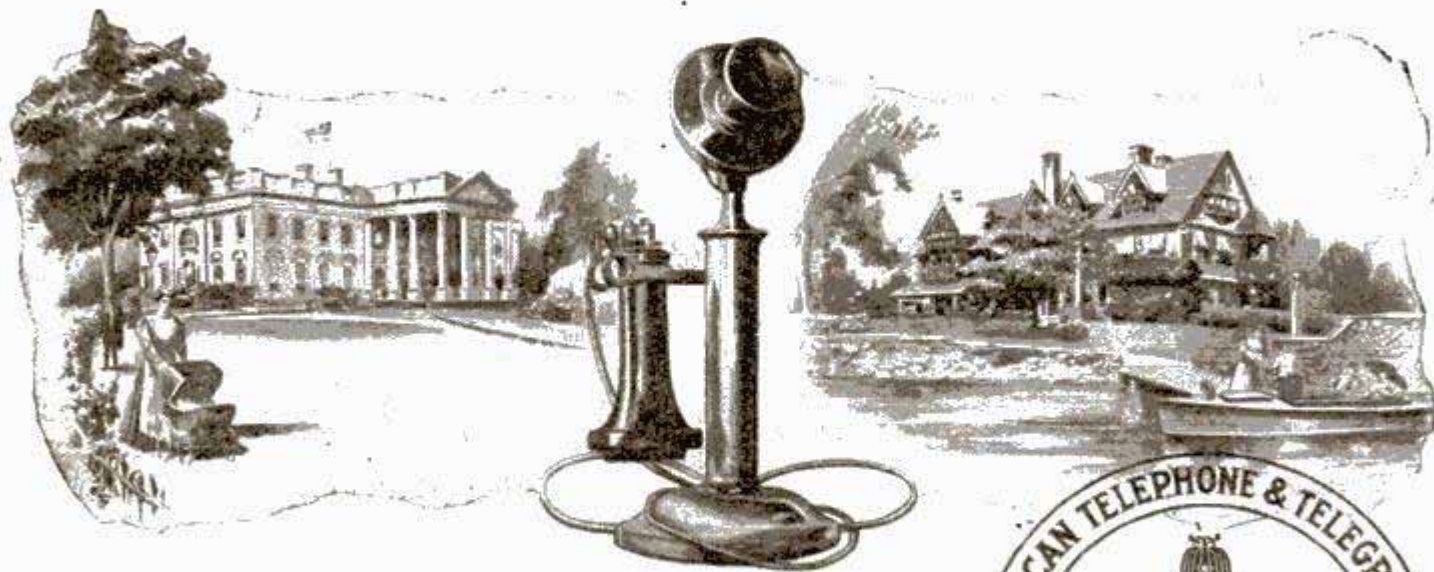
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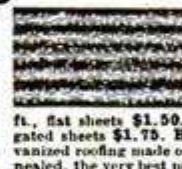
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Odessa has a well-established and growing telephone system. Some time ago the management sent an order to a certain manufacturing firm in the United States for a lot of instruments. The goods were desired at once in order to meet almost immediate demands. Delay succeeded delay in receiving the goods, and it was six months before they arrived, during which time the management was obliged to order from Germany supplies sufficient to provide the most pressing demands. Owing to this lack of attention on the part of the American firm, the local company has decided henceforth to order its supplies from Berlin and of German make. Perhaps this incident may serve as a reminder to American houses desiring foreign trade that if they wish to keep or gain it they should be prompt in filling orders.

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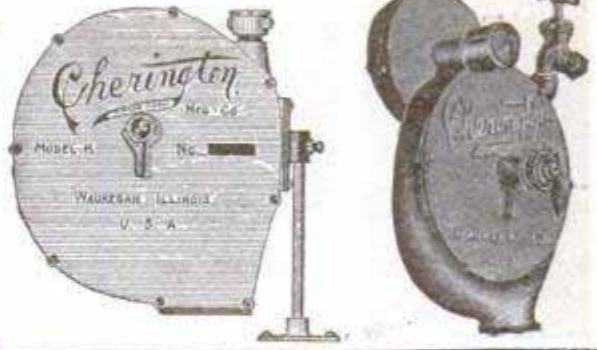
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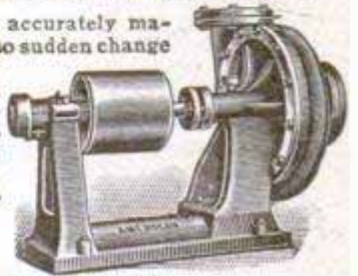
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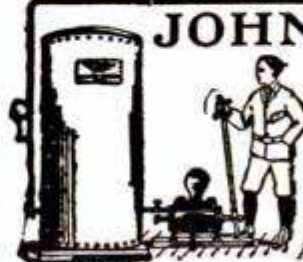


NEW COMPASS FOR WARSHIPS.—The new compass recently adopted by the German government for their warships is a remarkable instrument. It is known as the gyroscope compass, and is the invention of Dr. Anschütz-Haempfe.

A 9-lb. wheel mounted in a holder of quicksilver is made to rotate at the rate of 21,000 revolutions a minute by an electric motor. After running two hours the wheel is set in the direction of the mathematical meridian, which direction it maintains. The advantage of the new compass is that it is entirely unaffected by neighboring iron or steel or by vibrations and rolling of the vessel.

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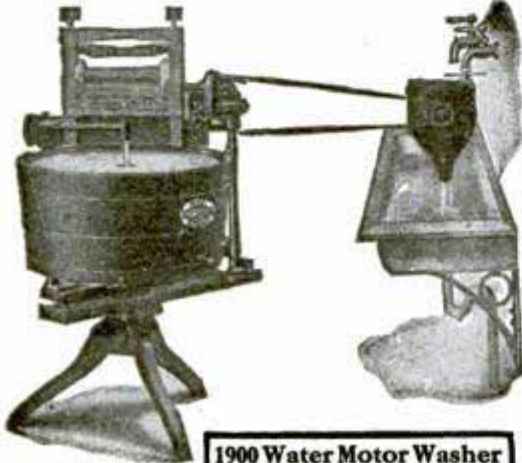
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—The belief that the man who had to wear glasses was too old to be good for much any more used to be the rule. It still exists, but not so firmly as in earlier times, cropping out here and there when it is least expected. We may feel quite sure that on the average in every company of workers there will be a few who for at least their own personal safety should wear glasses, and yet they do not, under the belief that should they do so they would be marked to lose their jobs. We read, for instance, from time to time, of accidents, as for instance men falling from high buildings, which might be due to glasses being needed and not worn for fear of the consequences. When the young man starts into such lines of work, work requiring great surefootedness, his vision for ordinary working distances may be very exact and keen, but as he grows older, if he happens to be hyperopic, the time may come when he no longer sees with the great exactness demanded by his calling, and this may be, at least in some cases, the cause of fatal accidents.—Optical Journal.

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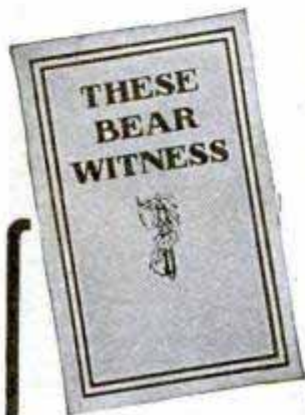
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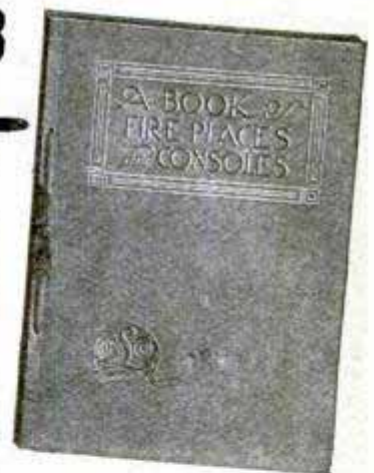
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It was invented a half century ago, but, unfortunately (speaking from a practical standpoint) it has lain dormant since its conception, except its use amongst college students and others who have to do with advanced engineering projects.

Improvements in slide rule construction in the past has not advanced to any great extent, except it was the adoption of the runner by Mannheim; and also the advance in price. Until recently the price of a slide rule ranged from \$4 to \$5 and the book of instruction accompanying the rule was generally too technical for the average mechanic, engineer, or business man to comprehend. The result was that the high price made the rule prohibitive to the one class while to the other the book was not "written so you could understand it," therefore its universal adoption as a rapid calculator was not forth coming.

Mr. Geo. W. Richardson, a consulting engineer of Chicago, Ill., has wrestled with the problem for several years; believing that if he could produce a slide rule that would not be prohibitive by price, and also a book of instruction that the average person could comprehend, the demand for such a rule and book would repay him for the time spent in its development, and has not only produced a slide rule that fulfils the above requirements, but he went one step further and produced a **Direct Reading** slide rule. To accomplish the direct reading feature of the rule it was necessary to depart from the usual form of construction, therefore aluminum was substituted for wood and in this substitution the sticking of the slide due to changes in the condition of the atmosphere was eliminated.

A much wider slide is made permissible, and the "keys" for the solution of the different problems are printed in red upon the margins of the slide, and the upper and lower scales usually termed the A and B scales have over-lapping edges with "key holes" (sight openings) punched therein, in such a manner that when the slide is moved any selected "key" may appear in the "key hole" and when such is the case the slide rule is direct reading for that particular problem. Upon the back of the rule is printed the different problems, that may be solved directly upon the face of the rule, and the "key" for its solution is also printed in red, thus facilitating the operation. The direct reading feature of the slide rule is not limited to the problems and "keys" printed upon the back of the rule. But instead any additional "keys" or problems may be added to suit the wishes of the person operating the rule.

The "keys" or problems selected, are only those in which Mr. Richardson, has, by long experience found to most frequently come up for calculation in the office, field, or engine room, but as stated before the direct reading feature is unlimited. The operation consists simply of placing the "key" in the "key hole" and reading the answer direct without any other manipulation of the rule. For checking up your work in civil service examinations, in the shop, office, field, or engine room it has no equal. Space will not permit of going into details and naming the problems that are made direct reading, yet it is hoped that it will be sufficient to mention the fact that there are over 40 problems printed on the back of the rule which are direct reading by use of the "keys."

The book of instruction which goes with each rule is neatly gotten up, and written in plain language so you can understand it. Each problem is explained in as few words as possible, and in addition to the explanation of the direct reading feature of the rule. Much space is devoted to the explanation of how to perform the following upon the slide rule:

- How to square a number.
- How to extract the square root.
- How to cube a number.
- How to extract the cube root.
- How to find the decimal equivalent of any vulgar fraction.

- How to find the vulgar fraction of an equivalent decimal.
- How to work proportion.
- How to solve multiplication.
- How to work division.
- How to work the combination of multiplication and division.

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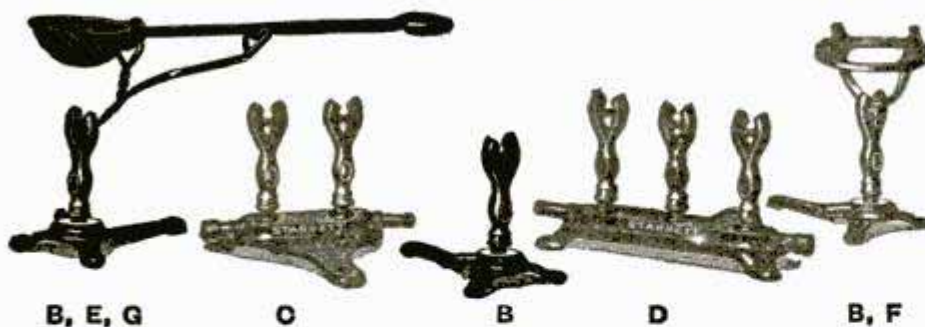
- The horse power of an engine.
- The weight to be placed upon a safety valve.
- The size of a motor to run a pump.
- The size of change gears for screw cutting lathes.
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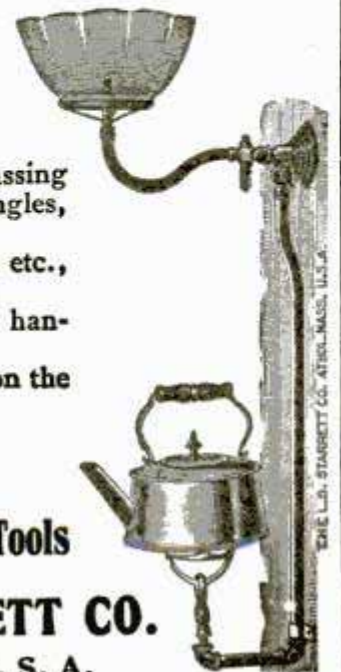
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\$18 to \$30 a Week Sure

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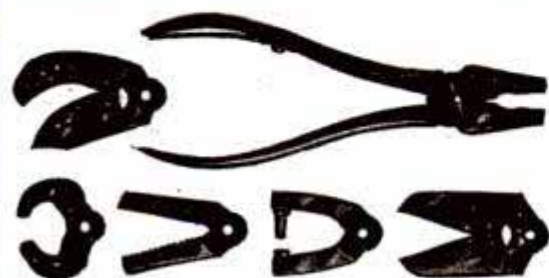
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THE COLLEGE PRISONS OF HEIDELBERG.—On the top floor of one of the university buildings in Heidelberg, according to the Travel Magazine, are "prisons," ostensibly for the punishment of students found dueling or otherwise transgressing the rules laid down by the faculty. As a matter of fact the students consider it something of an honor to be given a few days of detention within these highly entertaining walls. It is part of the honor associated with the sabre fights practiced by the members of different student corps. The offending ones are deprived of liberty and the luxury of inviting beds, but the visitor concludes they are not otherwise very seriously disciplined, noting with a smile an abandoned deck of cards, a wine flask and numerous cigarette ends.

Walls and ceilings are thickly frescoed with the handcraft of the "prisoners"—cartoons, verses, autographs, quotations (usually amusingly paraphrased to suit the occasion), and the backs of the doors form a "rogues' gallery" of no mean proportions, containing scores of photographs of the incarcerated ones, attached to the panels with melted lead.

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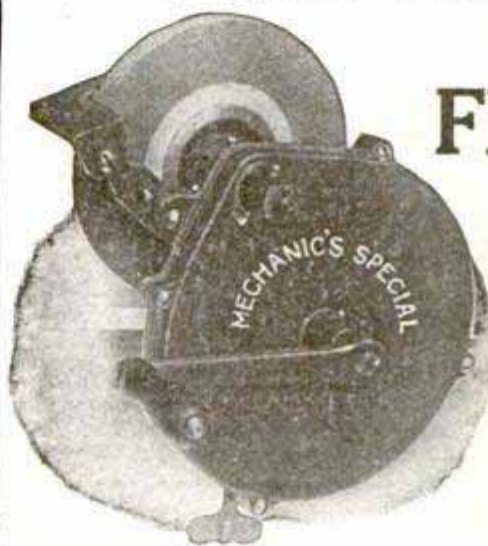
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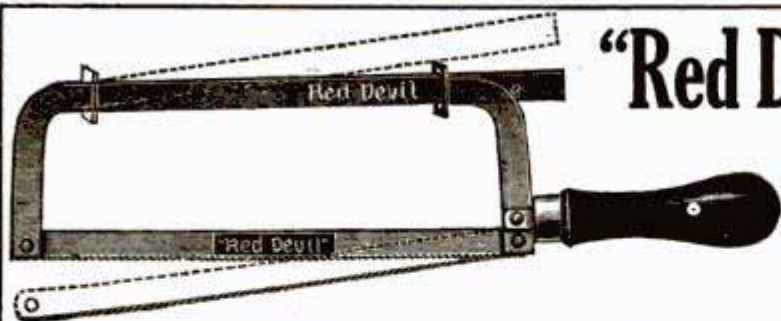
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ELEVATORS ON BATTLESHIPS.—Passenger elevators are one of the novelties of equipment which will characterize the new vessels of the type of the Florida, the Utah, the Delaware and the North Dakota. Three automatic electric passenger elevators will be installed on each of these vessels. They are to be placed in the fireroom ventilator trunks, and will accommodate two or three passengers. They will travel about twenty-one feet, and are to be used for the convenience of watch officers on duty in the firerooms, to facilitate going from one to another of those departments on board ship. On the new vessels the firerooms are completely separated from each other. Formerly there were doors in the bulkheads, but on the new ships it was considered that the draft would be improved if there were no such doors.

This has led to a protest from some of the ships in behalf of the men, who believe that they do not have sufficient opportunity for escape in time of accident, and there has been some talk of cutting in doors, which at least would restore confidence among the members of the fireroom force. It appears that this is not to be done, as the elevators are to be installed on the four new ships. The elevators, of course, will be of no use in time of panic, as they are not designed to lift more than five hundred pounds.—Marine Journal.



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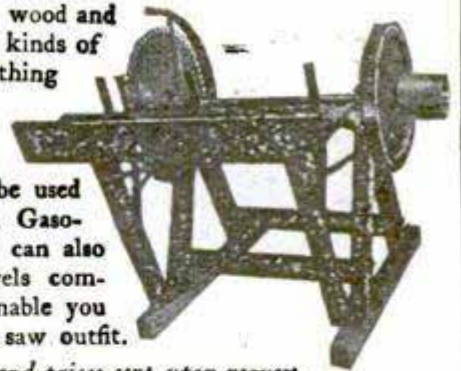
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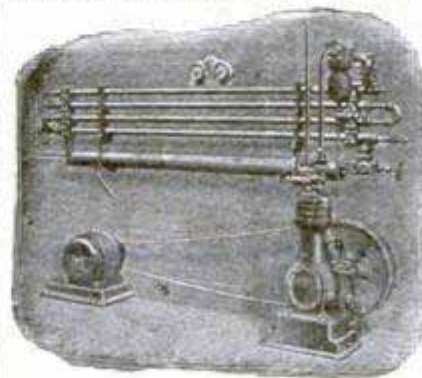
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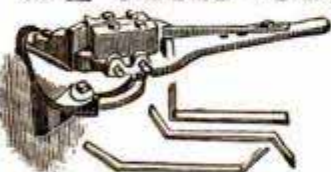


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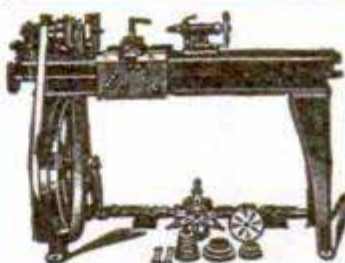
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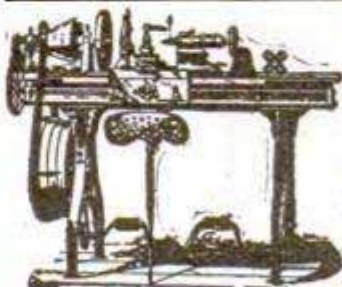


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For foot or power as wanted. Has power cross feed and compound rest. A strictly high-grade modern tool. We also build a 9-inch lathe. Descriptive circulars of each lathe upon request.

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SMALL VS. LARGE FIRE ENGINES.—Chief Dahill, of New Bedford, Mass., does not favor the idea held by so many that first-size engines can always afford the best service. He calls them the "heavy artillery of fire apparatus" and holds that they are not needed for single-alarm fires. "The big engines," he says, "are slower in getting to a fire, and it takes ten or fifteen minutes to get them working effectively. The smaller engines can travel faster and get up steam pressure much more quickly, and two of them coupled together are just as effective as one of the large size machines. The big engines are fine for use in case of a large fire."—Fireman's Herald.



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SAVING AND TRAVELING—Some officials of the marine product guild in Tochigi prefecture have recently hit on an interesting way of saving money while traveling. The idea is to deposit money in the postal savings bank while traveling here and there as a reminder of the happy time spent. It is stated that the practice is coming into vogue.—Japan Times.

The average American when on vacation usually has to write home for additional money to get there, hence Tochigi plan would hardly work here.

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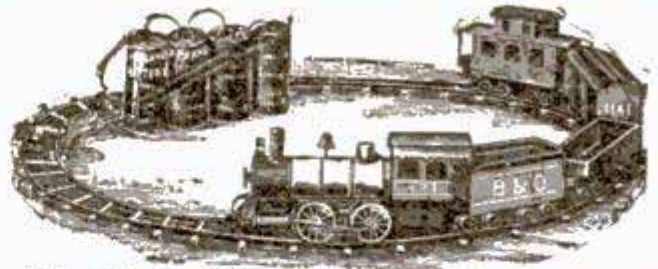
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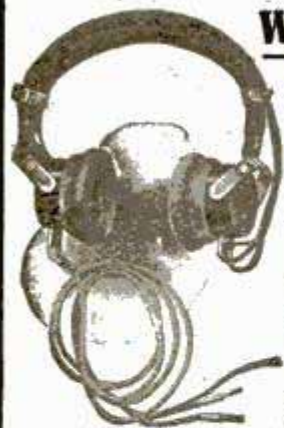
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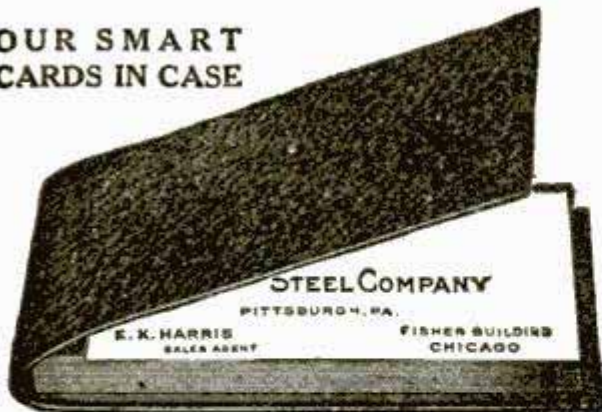
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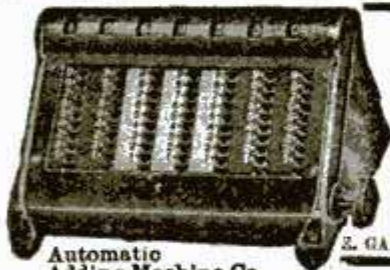
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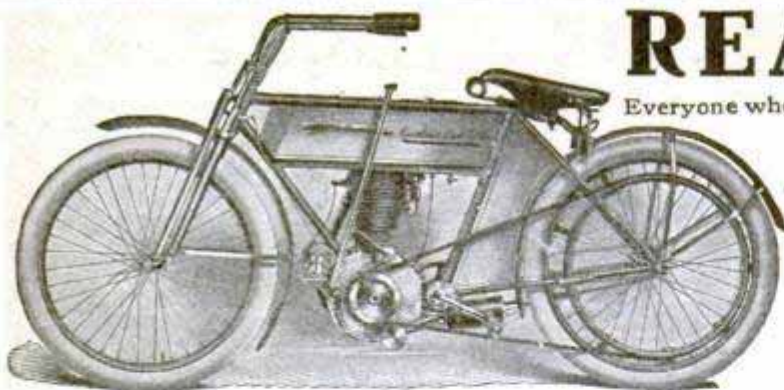
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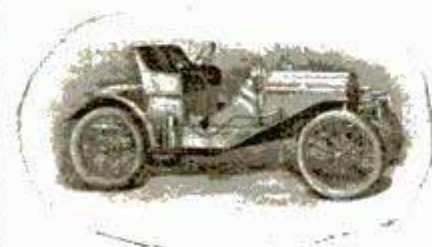
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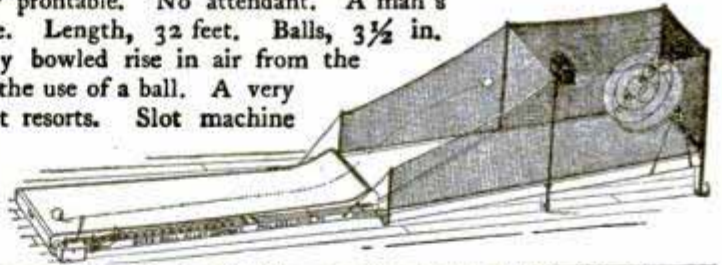
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tree for five hours," he sobbed, "an' just when I was about all in and givin' up hope a big snake come along. Seenin' the fix I was in, the varmint, with eyes fairly bulgin' out with sympathy, coiled one end of hisself around the tree and then took a couple of wraps an' a half-hitch with the other end around my body. Every now and then he'd give me a friendly squeeze like a mother squeezin' her kid, just to sort'er cheer me up. I was so wore out I went to sleep, and I must 'a stayed there that way fer two hours. When I woke up the storm was over and the snake was gone. He unwrapped hisself so gentle-like that it didn't even stir me. I bet there ain't another snake in Texas as would have done so much fer me." Lockhart and his men had tears in their eyes when he finished his story. They carried him up to the rooming house. "I'm a' goin' to spend the rest of my life hunting that snake," said the rescued one, as they laid him on his little cot, "an' when I find him I'm goin' to treat him like a brother. A brother couldn't a' done more fer me." Lockhart promised he would go out to the tree and look for the snake next morning, and Lockhart went. But he didn't find the snake. All he found was an empty whisky bottle, labeled "Pride of Muskogee."—Oil Investors Review.

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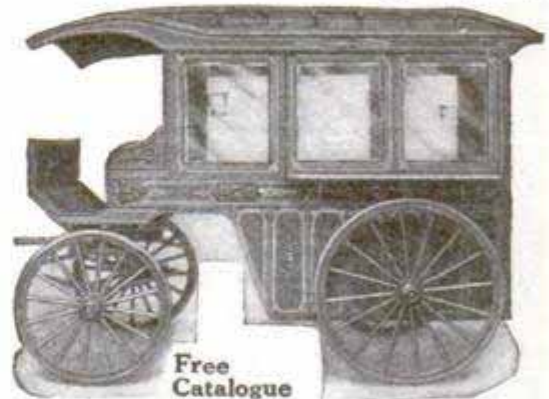
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Orville Wright failed to do one thing that would have placed the efficiency of his machine beyond all doubt. He might have taken Mr. Taft for a ride.—Los Angeles Times.

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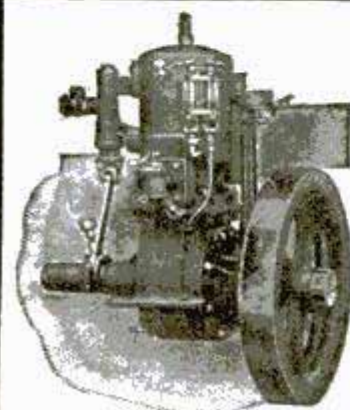
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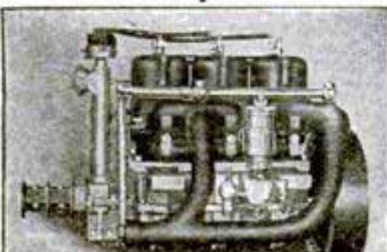
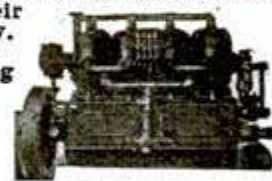
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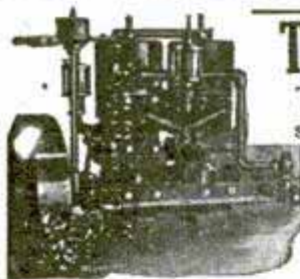
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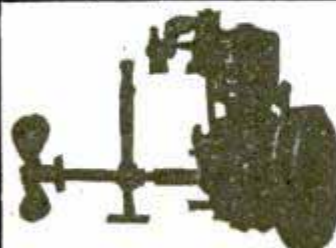
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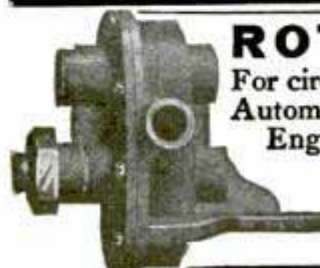
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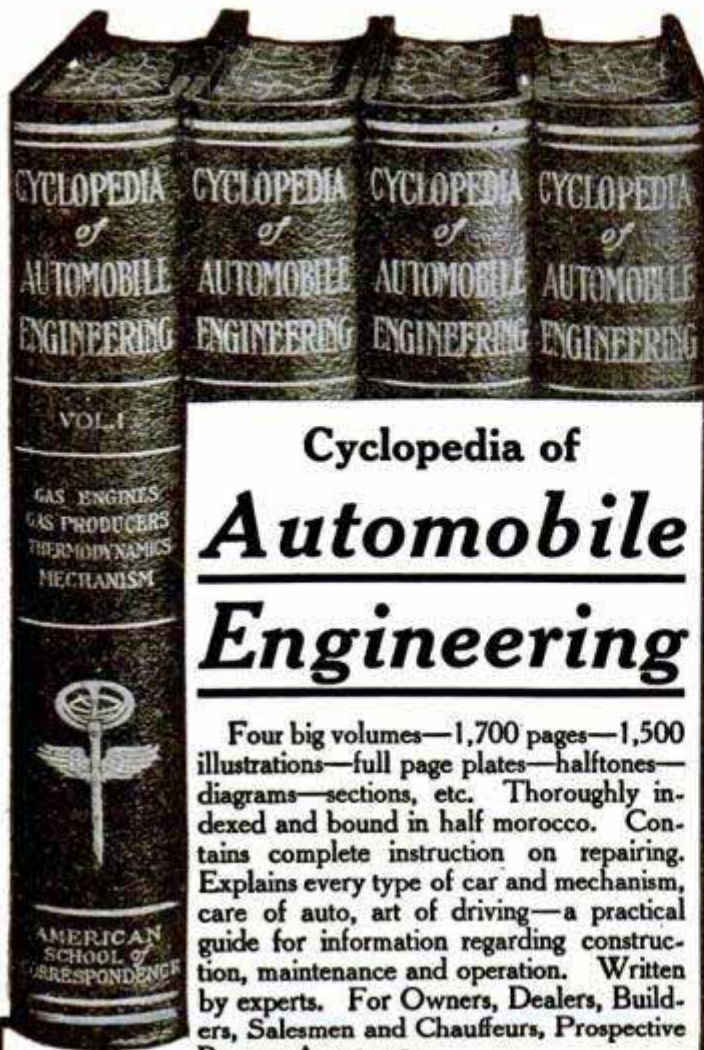
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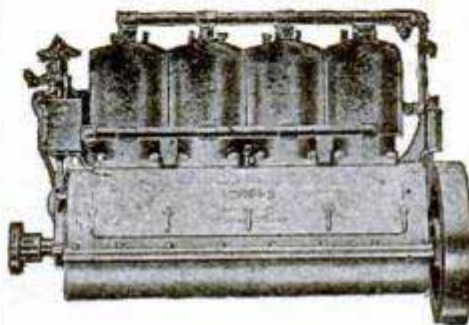
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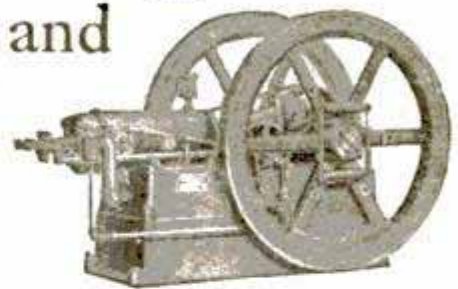
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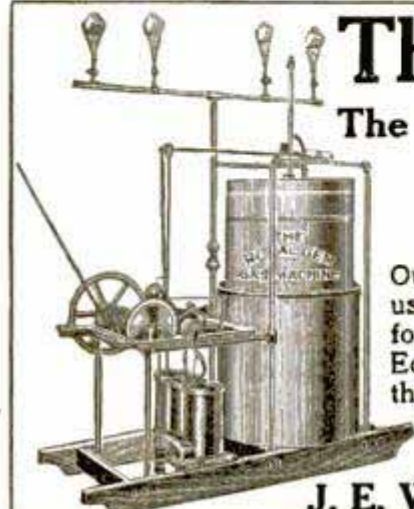
The Royal Gem Gas Machine

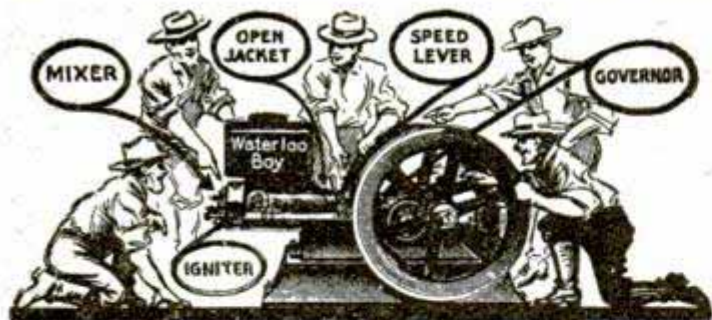
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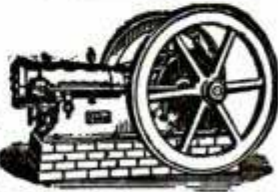
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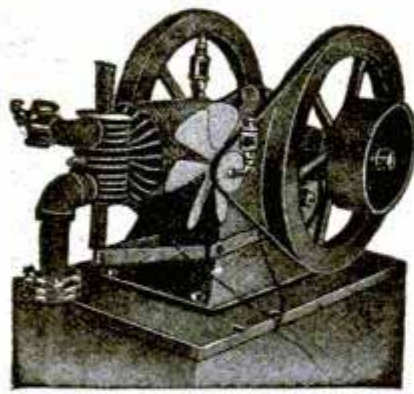
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1 1/4 and 2 1/2 H. P. equipped with short connections for spray pump and walking beam attachment for pumping water from wells. Will work against 200 pound pressure all day without heating. Gasoline in base of engine.

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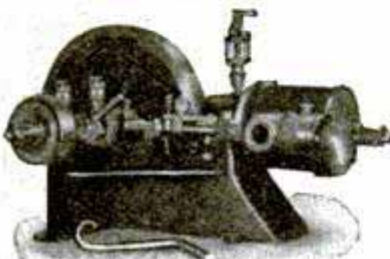
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We haven't met Cromwell, but we will venture the assertion that he does not turn his trousers up six inches from his shoes nor play pool nor stand upon the street corners. He is too busy getting into the good company of the Wrights and Zeppelin.—Dayton, O., Journal.

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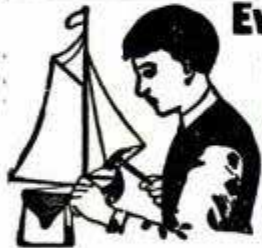


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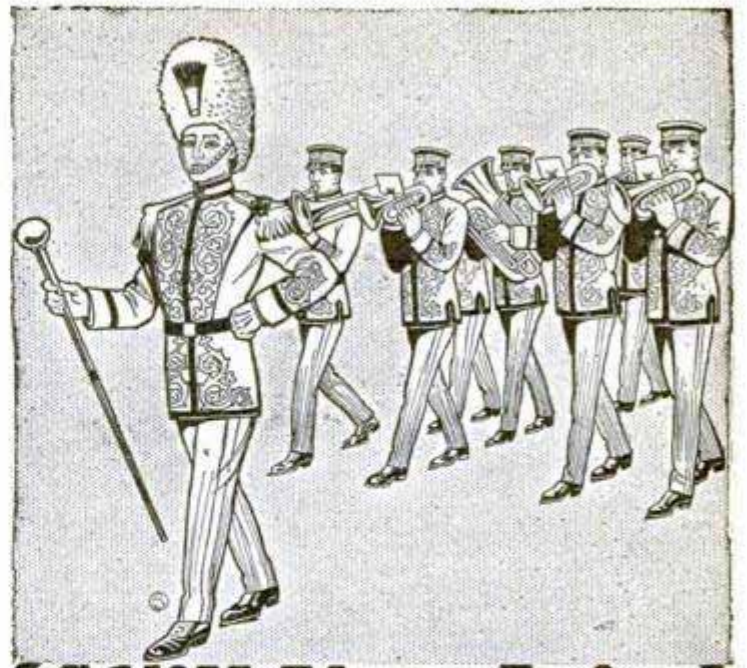
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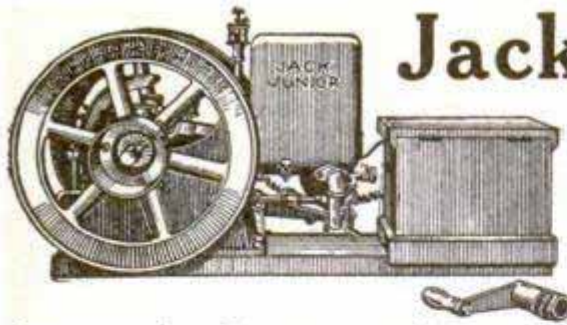
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It's an easy matter to keep the boy at home if he's got a work bench to play with. Then, too, it cultivates a taste for employing spare moments doing something worth while. Winter is coming. Now is the best time to set up a little work shop in the cellar or attic. If in doubt, ask the boy. Boys, if papa hasn't seen this advertisement, tell him how much you would like a work bench, and ask him to send at once for catalog. It's full of interesting information.

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know that it is the only reasonable HAIR GROWER known to science. No Drugs Used. Write for application blank, testimonials, and booklet on "HAIR," sent sealed in plain envelope, FREE.

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The "Caldwell Special" is as clean cut as a race horse. Built right—works right. Simply built—always gives full H. P. Costs little to run—big profit producer to pump water, run cream separator, shred or grind corn and a dozen other things.

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Now it is a mighty fortunate thing for the ones of us who have unlearned this second lesson in department as soon as we got into business. I will show you why on a dollars and cents basis. I am not a preacher, so I won't tell you anything about turning the other cheek to the hand of the slapper. Personally, that particular sort of humility never appealed to me; that is not the way my hair is parted.

But, put a pin in this—it pays a man in business to meet all comers politely. They may not be buying at the instant, but if treated right when they stop in to ask the time of day or something equally profitable to you, they at least have no reason not to buy from you later. If you turn them down in a surly way they have a good reason to leave you alone.

A month ago I had a twenty-dollar bill—got it honestly—and wanted to get it changed. I started out in the town where I happened to be at that time, and here's what happened: First, a cigar store, where I got this answer, "Haven't got it;" second, a drug store, "No sir; no change for that;" third, a saloon—



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The Imperial Electric Clock Co.,

Makers of the simplest electric clock
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Get an Oliver Typewriter for 17c a Day!

Write at once for the most liberal offer ever made on a high grade, brand new typewriter. Let your pennies pay for the splendid New Model Oliver No. 5. Thousands are buying on this convenient plan. See the nearest Oliver agent or address

THE OLIVER TYPEWRITER CO., 107 Typewriter Building, CHICAGO

wasn't acquainted there, of course—"No, we ain't runnin' the Mint." And so on down the line until I had called at seven places without getting either change or a polite excuse for not accommodating me.

Next I tried a small drug store. "Good morning, sir," was the smiling greeting of the proprietor. "What can I do for you?" I told him what I wanted. "No," he replied, "I am sorry to say that I haven't it, but I'll get it for you if you don't mind waiting a moment. Have a chair, sir."

He could have taken my money and my watch, too, before I recovered from that! I was not a customer, simply a stranger asking for a favor, and he not only treated me politely, but was going out of his way to accommodate me. He did, too—went out to another store somewhere and returned with the change I desired.

I was so pleased with him that I related my experience with the other storekeepers and asked him why he had gone out of his way for me. He said, "I was taught a lesson in politeness once that I will never forget. One day I was pretty busy with three

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I want one thousand hard pluggers to learn this business at an income of \$5.00 to \$15.00 per day.

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You have got to learn how yourself, but it pays. Our SANITARY DUSTLESS METHOD is cheaper and cleaner than a carpet sweeper; cheaper, cleaner and faster than a broom; purifies, disinfects and cleans in half the time of any other method.

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SAMPLES LOANED

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You can do as well or better. The Kirk Vending Machine is the simplest constructed, most accurate and durable vending machine made. It never gets out of order and requires but little attention—a child can take care of it. You can easily place Kirk Vending Machines in waiting rooms, stores, pool rooms, hotels, cafes, or wherever people congregate, for 20% of the sales. The Kirk Machine is very attractive to the eye and an ornament to any place. After your machines are placed, they require only to be filled once a week and the money taken out.



The Kirk Peanut Vending Machines

vend peanuts, costing you 7c, at the rate of 40c a pound. Your profit is enormous, the business permanent and capable of indefinite extension. If you start small, you can continue your present occupation until you place enough machines to pay you to devote all your time to it.

KIRK MFG. CO., Providence, R. I.

Enclosed find \$12.00 (P. O. or Express Money Order) for which please ship at once 1 Kirk Vending Machine and 30 pounds of peanuts, as per your special offer in Popular Mechanics. It is understood that I may return the machine if it is not exactly as represented.

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Send us \$12.00 (the price of one Kirk Machine) and we will ship your machine immediately, sending you absolutely FREE 30 pounds of peanuts, which when vended, will give you your money back in about 5 weeks. Thus the machine will have cost you nothing. *We guarantee every Kirk Machine to be exactly as represented.*

ORDER NOW ON THIS COUPON

and we will reserve your territory while you try this machine.

Name.....

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prescriptions to be filled and delivered all at once, and trying to get through as well as I could, in spite of a headache, when a lady came in and asked me if there was anyone of the name of So-and-So living near my store, and would I kindly give her the right address, as she was a stranger in the neighborhood? I was not in the sweetest humor, I'll admit, and I turned her off rather shortly with advice that she look in the directory. I was not insulting, but I fell short of being gracious, that's sure.

"Now, do you know what happened? Her friend had asked her to come and look at a vacant house in the neighborhood. She rented the house and moved in with a delicate daughter and a rheumatic husband, and every cent that family has spent in the last three years for drugs, prescriptions, toilet articles, etc., has gone into the hands of my competitor, although he is half a square farther from them than I am.

"It has cost me a pretty penny in that time for being 'sassy,' hasn't it? I can figure it out in cash profit at about twenty-five dollars a year. That's seventy-five dollars' fine for not being polite."

"Well," I answered, "I feel so grateful to you that I will show you the rule works the other way also. I'm very much obliged. Good-day, sir."

I told my little tale when I got back to the house and that druggist has gotten just about twenty-seven dollars' worth of trade from under that particular roof since.

Here is another case that came under my notice: I was making a small purchase at a grocery store just before closing time

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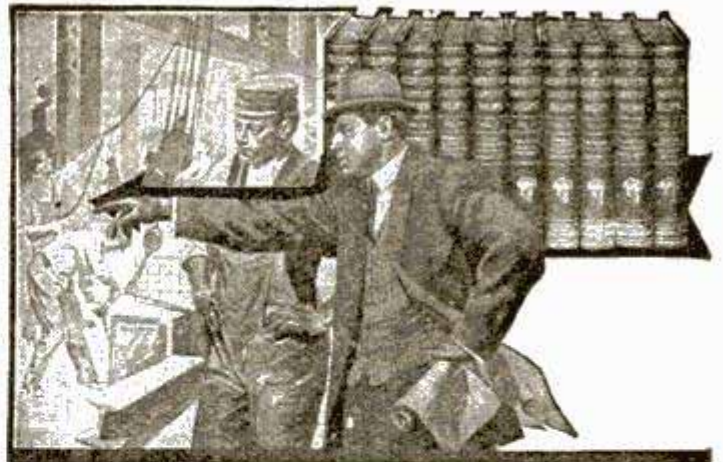
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NAME.....
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OCCUPATION.....
EMPLOYER.....

Pop. Mech., 109

one evening when a woman came in and asked for a bunch of parsley.

"Can't get it for you," the grocer answered. "It is packed up for the night in the ice box along with the meats. Can't open it until morning."

"Why did you refuse that woman?" I asked.

"Well, she only comes here for things when she can not get them elsewhere. She is no good to me."

Now, what do you think of that? Maybe it would have been a minute's trouble to get at the parsley, but that wasn't his reason. He wouldn't sell her what she wanted because she only came to buy from him what she could not get elsewhere. There was the best chance in the world to show her he had what some

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other dealer did not have and treat her in such a way that she would depend on him and come to him oftener. But he could not see that. She wanted to be a customer and he would not let her. He did not want to increase his business—just wanted to keep on selling to the old customers until they died off or moved away and left him to die of dry rot.

I did not care a snap about him or the woman, but I let him know, right there, his mistake. He saw the thing my way before I finished and I really believe my little tearing-out will do him good the rest of his life. If that woman comes in again he'll probably treat her better, anyhow, even if he can not apply the same principle to other cases. If he smiles and treats her pleasantly she will be so surprised to find he is not a Teddy Bear with a sore ear that she will deal there more than she ever would the other way.

If I have only been telling you something you know, look around a little and watch things and see if your clerks know it, and never forget it. If you have a clerk who "snaps" people off short and acts independently and is unaccommodating, chase him out of your store with an axe. Do not waste politeness on him if he can not understand its value.—American Artisan.

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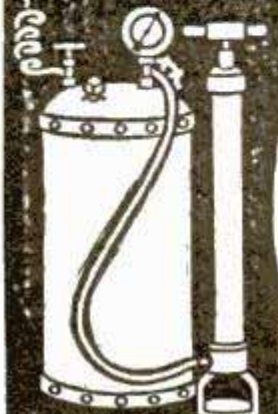
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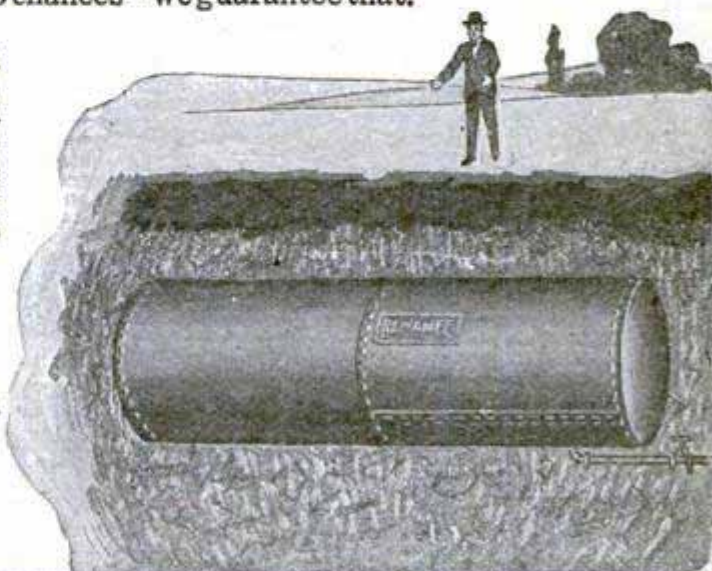
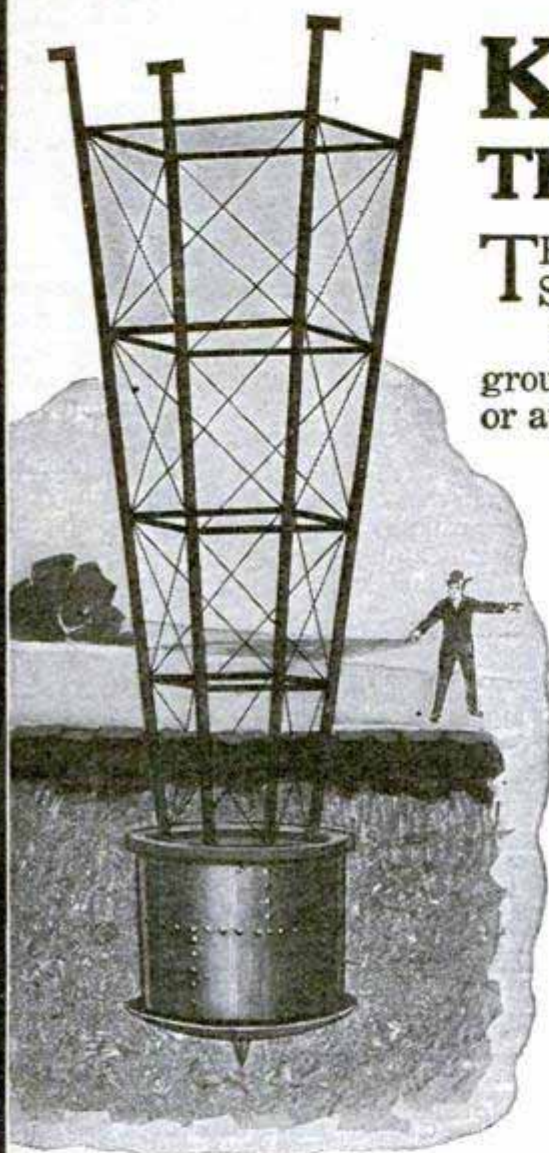
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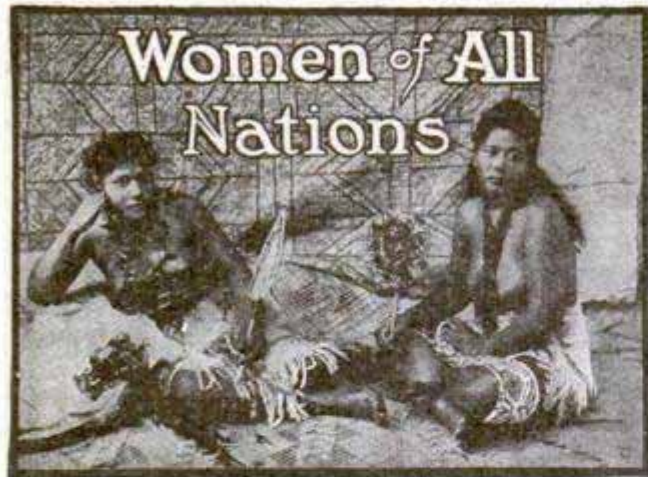
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Except for the "Mars," a 5451-ton collier building for the Government, and the "Mohawk," a 4623-ton steamer for the Clyde line, there were no ocean steamers built and officially numbered. One of the American sailing vessels which went into commission was the schooner "Edward B. Winslow," of 3,424 gross tons, the largest wooden craft of her character ever built. It is stated that no vessels for the foreign trade and no full rigged ships were built, and of the total output no less than 60,952 tons was made up of barges and canal boats.

As has been usual in recent years, the Great Lakes supplied the largest number of big vessels built, there having been no less than 36 steel steamers, of 88,426 gross tons built. Among these was the "Shenango," an 8,047-ton, 607-ft. cargo carrier, the largest ever built for service in fresh water.

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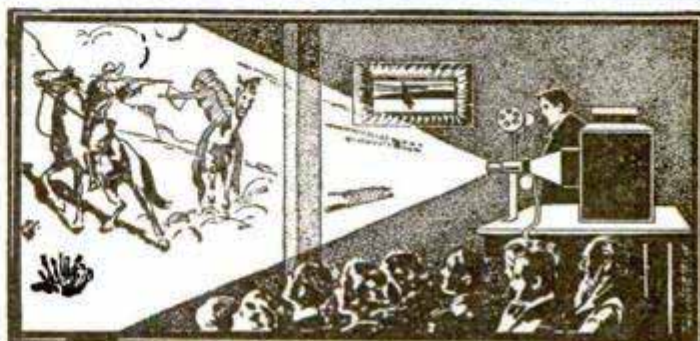
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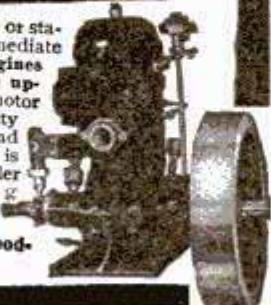
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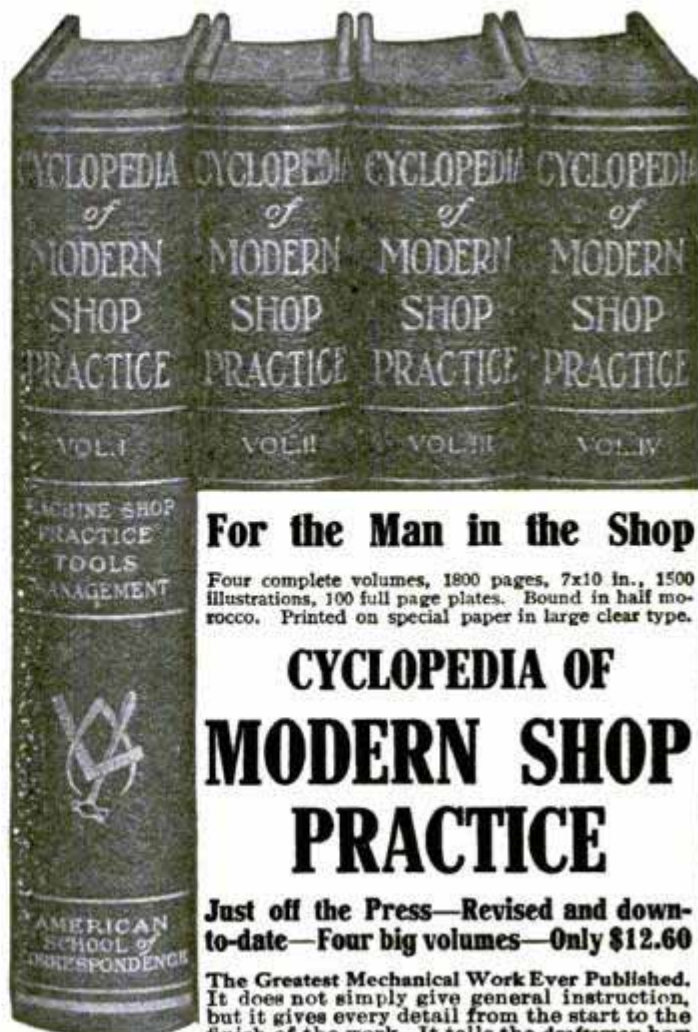
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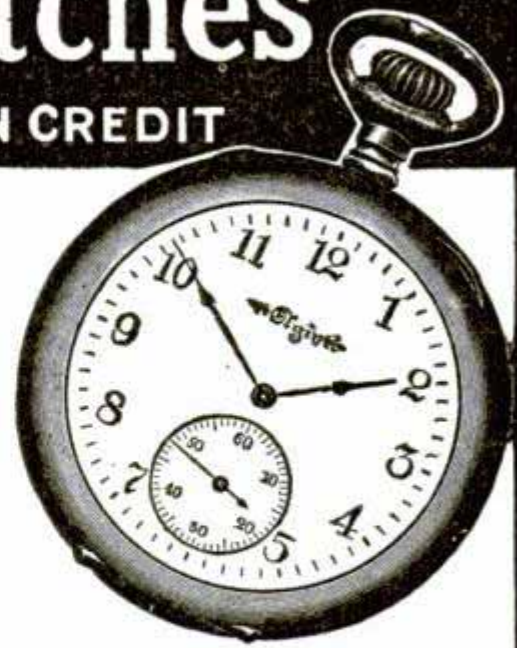
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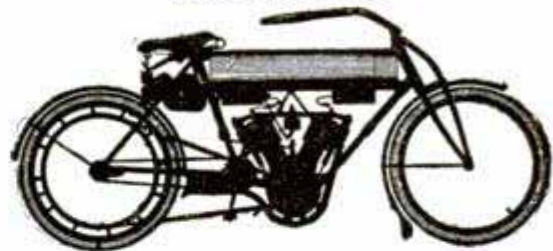
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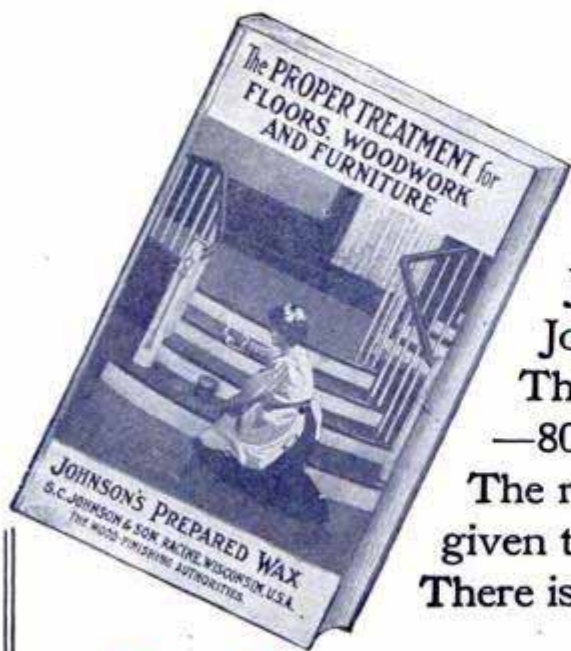
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