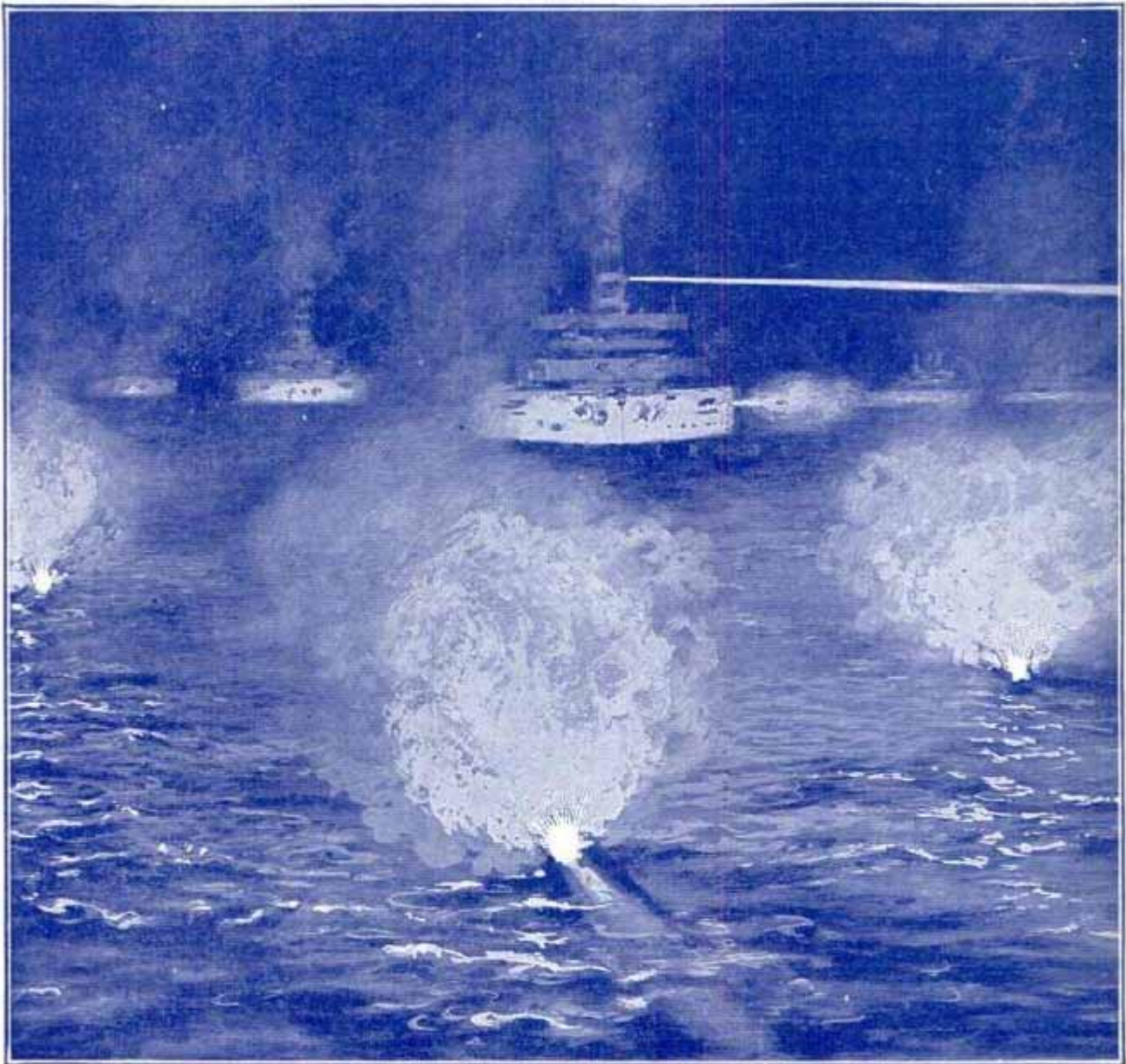


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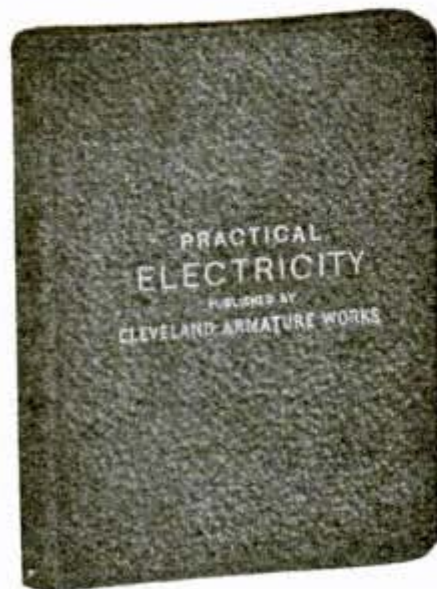
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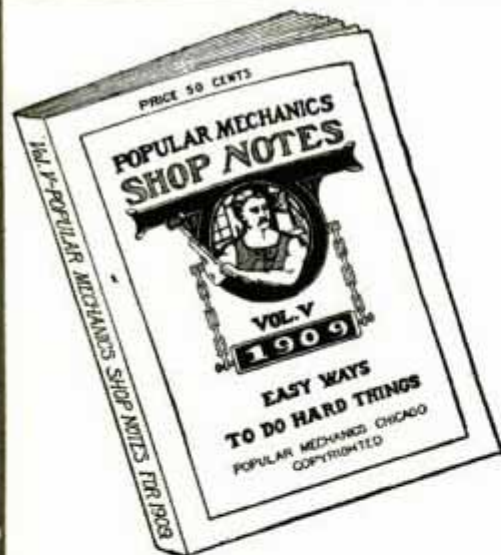
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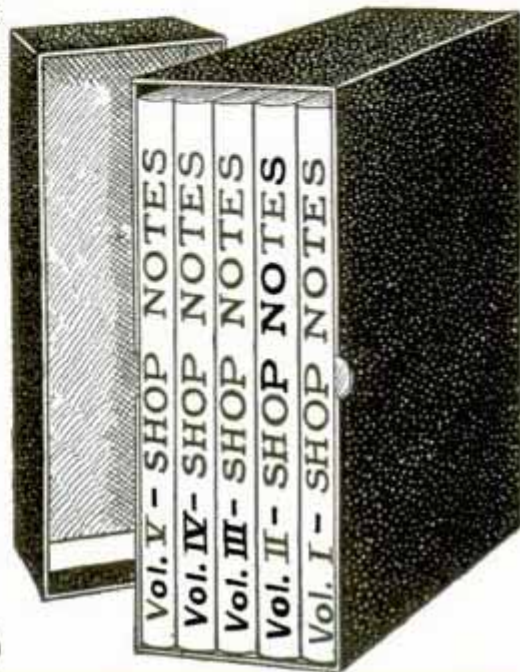
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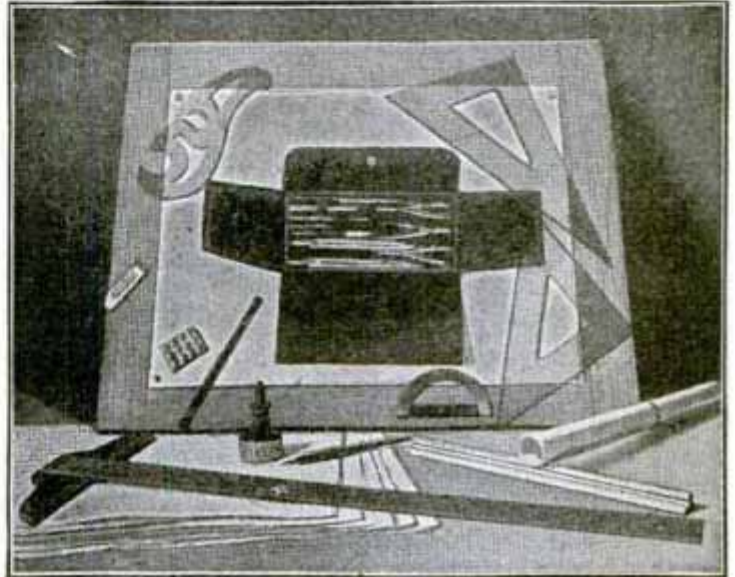
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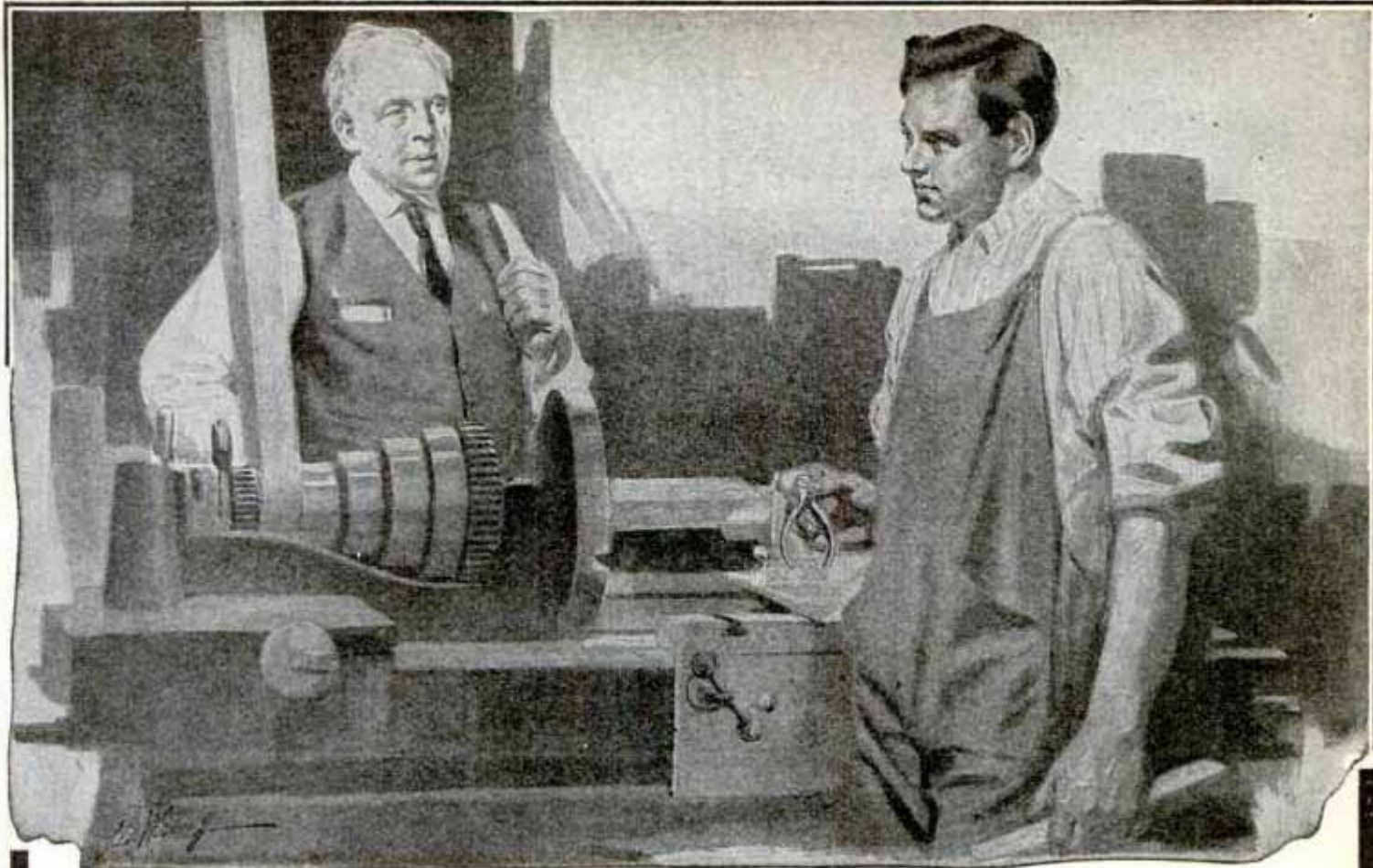
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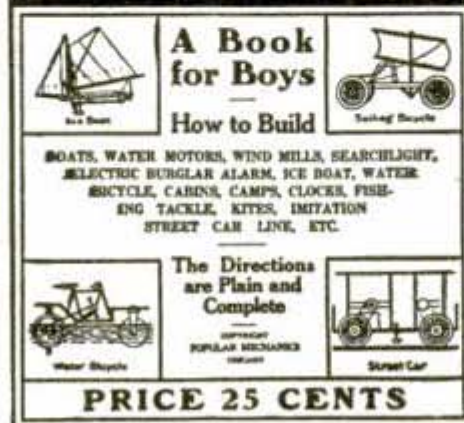
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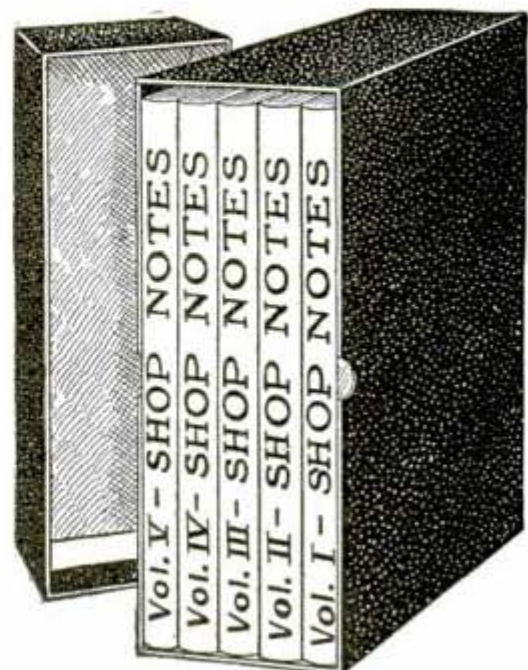
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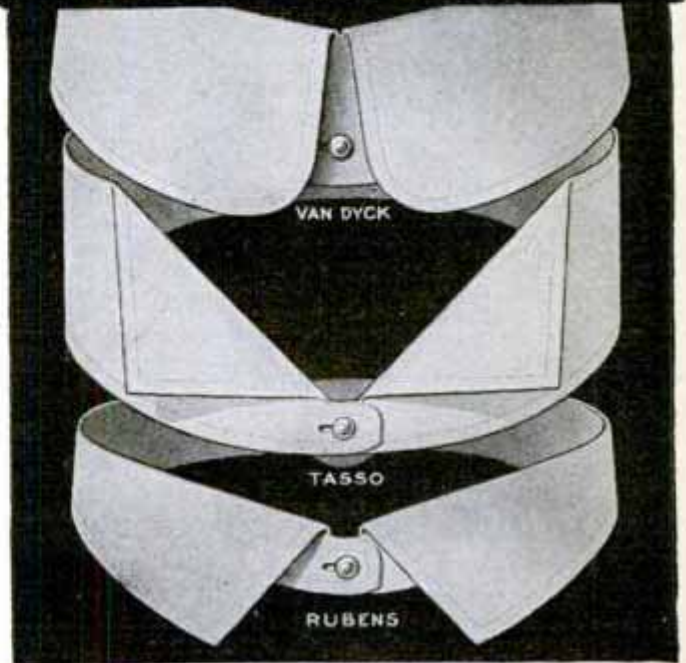


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N. S. U. MOTORCYCLES. "The World's Best." Write for our Catalogue. 206 West 76th St., New York City.

MARSH motorcycle just overhauled, \$60. Steffey, in good condition, \$40. First check takes them. Geo. R. Gustafson, Memphis, Tenn.

FOR SALE—Used motorcycles, accessories, etc. Half price. Catalogue free. Hultz & Co., Magnolia, Ill.

ALMOST NEW THOMAS. Just overhauled. \$75 takes it; worth \$125. Selling because of illness. A snap. Hugh Zpeheer, Dansville, N. Y.

CARE AND REPAIR OF MOTORCYCLES. Illustrated, linen covered book, 64 pages. Chockful of advice and suggestions necessary to keep a motorcycle in order and to get it going in case it should balk. 25 cents, postpaid. General Supply Co., Box 263, Allentown, Pa.

MOTORCYCLISTS, ATTENTION—A combination Volt & Ammeter 30 amp., 10 volts, \$3, postpaid. A special mica motorcycle spark plug, 95c, postpaid. Alb. Wolke, Nightingale Ave., Louisville, Ky.

FOR SALE—1 Indian A, No. 1, \$85; Marsh, \$35. Send for list. Alb. F. Wolke, Nightingale Ave., Louisville, Ky.

N. S. U. MOTORCYCLES. "The World's Best." Write for our Catalogue. 206 West 76th St., New York City.

WANTED—Second-hand motorcycles. Send description and lowest price to Alb. F. Wolke, Nightingale Ave., Louisville, Ky.

THOMAS, \$50; Yale, \$60; R. S., \$85; Columba, \$65; Marsh, \$40; Curtiss '08, \$125; Indian, \$65 and \$95. R. O. Rubel, Jr., Louisville, Ky.

SEND FOR OUR motorcycle specialty booklet. Motorcycle Specialty Co., 258 Col. Ave., Boston.

FOR SALE—Marsh motorcycle, 3 H. P., fine running order—just completely overhauled and re-enameled. Machinist's care. Tires excellent, \$68, worth \$100. Can furnish photo. Robt. L. Wright, 219 McKinley, Salem, Ohio.

FOR SALE—1908 3½-H.-P. Indian motorcycle; nearly new. Renner Repair Co., New Midway, Md.

THE MOTORCYCLIST, a \$1.50 magazine, for 25c a trial year. Motorcycle Equipment Co., Hammondsport, N. Y.

40 PAGE CATALOG of new Motorcycle Accessories. Free for the asking. Motorcycle Equipment Co., Hammondsport, N. Y.

BICYCLE MOTOR CASTINGS and sets for the bicycle. Send stamps for catalog. Bicycle Motor Co., Hammondsport, N. Y.

WE HAVE A FEW BARGAINS in used Motorcycles. They will not last long. Write for particulars. Hendee Mfg. Co., 1251 Michigan Ave., Chicago.

WANTED—SECOND HAND MOTORCYCLES. Send description and lowest price. Harry R. Geer Co., St. Louis, Mo.

AERONAUTICS

TWO CAPTIVE Balloon outfits; one-man gas balloon, used; new 7-H.-P. airship and gas works, cheap. Anything aerial built to order. Established 30 years. Stamp for information. Carl E. Myers, Balloon Farm, Frankfort, N. Y.

AUTOMOBILES

Advertisements in this section, 5 cents per word, payable in advance. To insure ads being inserted under proper classified head in the July issue, copy must reach this office not later than June 1.

FOR SALE—Olds Runabout, new tires, A-1 condition, \$150.00; Franklin, 4-cylinder, air-cooled runabout, \$400.00; Cadillac, 5-passenger touring car, A-1 condition, \$350.00; Winton, Model B, 4-cylinder touring car, newly painted and overhauled, \$775.00. Send for list of other bargains. Co-operative Exchange, Akron, Ohio.

OLDSMOBILE runabout, A-1 condition, \$125; Rambler, \$150. Others. Get list. R. O. Rubel, Jr., Louisville, Ky.

TWO-CYLINDER engine, 4½x4, good order, \$30. Good transmission, \$8. Radiator, \$3. Quick. R. R. Howard, Cairo, Ill.

MONARCH RUNABOUT, 8 H. P., air-cooled, in fine condition, just repainted and engine overhauled. First check for \$90 takes it. E. E. Bush, Parkersburg, W. Va.

WE will allow you good price for your old car for new Frontenac. Write us for particulars and agency. Abendroth & Root Mfg. Co., 1621 Broadway, New York, builders of gasoline pleasure cars and trucks.

AUTOMOBILE BARGAIN, 2-cylinder, 16-18 H. P., detachable tonneau; needs repairing, price, \$275. 1 35 H. P. 4-cylinder touring car, \$500. Address. Box 275, Burlington, Wis.

\$5,000 twenty-passenger, 40 H. P. gasoline omnibus, \$650. Shaft drive touring car, \$225. Wills, Canal Dover, Ohio.

HAYNES-APPERSON RUNABOUT, 2-cylinder, fine condition, leather top, \$300. 4 H. P. motorcycle, \$65. Winton runabout chassis, no engine, \$35. John Breslawsky, Passaic, N. J.

POPE-HARTFORD, 10 H. P., \$250; Reliance, side entrance, 20 H. P., \$350; Foster steam car, 78" wheelbase, \$150. For photographs and particulars, address Lock Box 323, Barre, Vt.

OLDSMOBILE, good condition, \$100. Also engine and other automobile parts. Box 356, Charleston, W. Va.

NOW is the time to brighten up your auto for the summer. Blue Ribbon Metal Polish in cream will do it. Write for circulars and prices. Free sample. Claude R. Thompson, Bradford, Ills.

FOR SALE—Gasoline runabout, artillery wheels, solid tires; fine condition save broken crankshaft; given away for \$75. B. B. Stone, Flemingsburg, Ky.

HILL-CLIMBING PUMPS for '03-'04 White steam cars. E. S. Clark, 242 Freeport St., Boston, Mass.

BEST offer over \$75 takes Olds curved dash runabout or Orient Buckboard, like new. R. J. Edwards, Shullsburg, Wis.

PROFITABLE WORK—Making Electric Light Outfits for Automobiles, Motor-Boats, Houses, Stores. Everybody wants them. Instructions, illustrated booklet, 10 cents. Lintern Car Signal Co., 9710 Denison Ave., Cleveland, O.

AUTOMOBILE SCHOOL—Chicago School of Motoring; the original automobile school in Chicago. Four hundred and fifty graduates the past year, to whom we refer upon request. Automobile owners, prospective buyers and young men wanting to become expert chauffeurs will save a great deal of money and a lot of worry by studying the mechanism, care and repair of gasoline automobiles in our shop, where all parts are open so you can see how they are made, and how they operate. We give thorough and practical instruction. Competent chauffeurs supplied. Address Chicago School of Motoring, Dept. B, 1436 Wabash Ave., Chicago, Ill.

RENEW OLD DRY BATTERIES. Send 25c for tested recipes. Graham's Garage, Clyde, Kan.

MOTORCYCLES—BICYCLES

FOR SALE—3½ H. P. M. M. Special motorcycle, in first class running order. Full equipment, stand, etc. Price. \$125. M. P. Woodward, Coldwater, Mich.

dirigible. Let me build your glider at a popular price. Aitken, Advocate office, Chester, Pa.

BOOKS AND PERIODICALS

"KELLER'S" NEW BOOK on motorcycles, revised and enlarged third edition, just off the press. Prepaid for 25c stamps. Keller & Risque, St. Paul, Minn.

"TRICKS WITH CARDS"; complete book of directions, with many diagrams. O. K. Pub. Co., Decatur, Ill.

SECRETS OF THE ROCKS—An interesting and instructive book about prospecting, placer and quartz mining, ore testing, geology, mineralogy, metallurgy, chemistry, etc.; invaluable to any one interested in mining; 500 pages, handsome cloth binding; postpaid, \$2.15. Hall & Williams, 1742 Stout St., Denver.

"PHRENOLOGY; or How to Read the Character." Price, 10 cents. Wm. Kofoed, 2740 Germantown Ave., Philadelphia, Pa.

375 MONEY MAKING secrets and formulas, 10c. A 64-page book. W. P. Thornton, Dept. M., Lambertville, N. J.

1000 WAYS TO MAKE MONEY—This 125-page book, worth dollars, only 20c, prepaid. Satisfaction guaranteed. Landin & Co., Dept. 21, 97 E. Chicago Ave., Chicago, Ill.

THE ROADMAN'S GUIDE—New book of over one hundred ways, plans and schemes to make money easy and quick. Learns you how to make hot chili, tamales, candy, orange cider, root beer, etc.; how to get up shows, how to make and run amusement games, and how to work big crowds, etc. Greatest money-making book ever published. Write for free descriptive circular. Address The Wayside Book Co., 16 Argyle St., Everett, Mass.

500 WAYS TO MAKE MONEY—220-page, cloth bound book, only 40c, prepaid. Satisfaction guaranteed. Wiley Sanderson, Dept. M, Ypsilanti, Mich.

IF IT'S PRINTED—MacDonald can supply it—Domestic and Foreign publications of every description—Plays—readings and recitation books—Dramatic Journals supplied by mail. "Catalogue P. M. sent free." Chas. MacDonald, 53 Washington St., Chicago, Ill.

PICTURES AND POSTCARDS

RICH, racy post cards, the real kind, selected, 6 for 15c; 12 for 25c. Box 162, Albion, Mich.

EXCHANGE post cards with people in U. S., Cuba, Philippines. List, 10 cents. United Post Card Co., Rochester, N. Y.

SOUVENIR POST CARDS in beautiful colors of the Pacific Coast grandest scenery and of the Alaska-Yukon-Pacific Exposition at Seattle. 12 selected views for 25c. 25 for 50c. N. B. Pearson, 214½ 4th St., Portland, Ore.

MARY and Her Bear, a most comical novelty, 12c, postpaid. Ewing's, Decatur, Ill.

POST CARD FIENDS—Here is your chance. 25 names of post card collectors from different states sent to you for ten cents in silver. Midwest Card Exchange, Box 62, Lincoln, Neb.

FRAMELETS—The very latest fad. Makes your view cards look like oil paintings. Assorted colors to match rooms. 5c each. Sample six for 20c, postpaid. Michigan Novelty Co., Detroit, Mich.

12 APPLE POST CARDS, 10c. Beautiful colors, catchy captions. Merchandise Mailing Co., Tribune Bldg, New York.

HIGH GRADE colored views White Mountains and Maine Coast, 10 for 20c. No two alike. Gold embossed birthday best quality, 10 for 20c, both sets, 35c. Shaylor Engraving Co., Portland, Me.

EIGHT 12-COLOR VIEWS OF PITTSBURG, 15c; post card puzzles, 6 for 15c. Terrace Manufacturing, Belmor, Pittsburg, Pa.

100 STAMP PHOTOS OF YOURSELF, perforated and gummed, 50c; with name, 60c; send cabinet photo or postal. Returned uninjured. You'll like them. K, Charles Photo Co., Mt. Vernon, Pittsburg, Pa.

each. John Roeschlau, 10 Grant St., Middletown, N. Y.

POST CARDS, BIRTHDAY, ten for 15c; comic, ten for 10c. Send for our catalogue of photo supplies. McDonald Photo Supply Company, Aurora, Ohio.

POST CARDS—Trip around the world. Latest fad. Very beautiful; scenic, marine, etc. Colored. 20, prepaid, 25c. Jones Supply Co., M, 2078 East Cumberland, Philadelphia, Pa.

AMATEUR PHOTOGRAPHERS—8x10 bromide from any size film for 25c. Printing, 15c a doz. Developing films, 15c a doz. Postal cards printed from films, negatives or photographs at 50c a doz. A 12x16 bromide free with a \$3 order. Work guaranteed. Goldman, Dept. K, Cleveland, O.

ONE DOZEN PHOTO POST CARDS made from any photograph for 50 cents. Your photograph returned with order, postpaid. All work guaranteed. Enough said. Give us a trial. Photo Card Co., 395 W. 17th St., Chicago, Ill.

EDUCATIONAL AND INSTRUCTION

LEARN TO LETTER SHOW CARDS and earn from \$18 to \$25 per week. I teach you by a natural, easy method at a price within your reach. Full particulars mailed free. Bert L. Dally, Dept. A, Dayton, Ohio.

LEARN A TRADE FREE—We teach taxidermy. You make money while learning. Costs \$2 for tools, etc. Circular. Liebel Co., 600 Jefferson St., Milwaukee.

DO you make or sell signs? Every merchant and clerk values good signs as dollars producers; our book of instructions with nearly 300 photographic illustrations solves the question; mailed with 5 complete samples for 10c. Money back if not satisfied; merchants and bankers often pay \$1 each for signs that cost less than 5c. Agents wanted. H. Habben & Co., 334 Chestnut St., St. Louis, Mo.

MAKE raised letter signs. Big money. Book of instructions, 25 cents. Vienna, East Syracuse, N. Y.

VACATION MANUAL TRAINING SCHOOL for boys on a farm. Information from O. J. Milliken, Wheaton, Ill.

PRACTICAL INSTRUCTION in the engineering use of algebra, geometry, logarithms, trigonometry, slide rule, planimeter, prospective and scales. All by mail. Write Geert Blaauw, 25 Broad St., 20th floor, New York City.

CIVIL SERVICE EMPLOYEES are paid well for easy work; examinations of all kinds soon; expert advice, sample questions and Booklet 29 describing positions and telling easiest and quickest way to secure them, free. Write now. Washington Civil Service School, Washington, D. C.

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

TRADE SCHOOLS

WANTED—The Master Plumbers' Trade School of St. Louis wants men and boys to learn the plumbing and gas-fitting trades, and will teach these trades and give practical experience on new buildings while learning, which is something no other trade school in the country can do. The course covers from 3 to 4 months, and the tuition fee has been reduced from \$100 to \$50 for a short time only. For catalogue and full information address Master Plumbers' Trade School, 3415 Lindell Ave., St. Louis, Mo.

YOU CAN EARN \$100 per month. We show you the way. Largest automobile and repair school in the world situated in our big factory. Best of expert teachers. 160 automobiles of all kinds always in the school; practical road lessons given. Write Dept. 7 for particulars and terms. International Auto School, 1241-1243-1245 Wabash Ave., Chicago, Ill.

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

LET me start you in a pleasant, profitable manufacturing business of your own. No mechanical ability, experience or capital required. I supply all material, teach you how to do the work and assist you in selling the goods. Exclusive territory, good profits, big demand. Be your own boss. Write today and secure your territory. H. M. Sheer, Dept. 1, Quincy, Ill.

MAIL ORDER BUSINESS that's a winner. Plan shows \$5,000 made with \$6. Particulars stamp. Full plan mailed, 25c. Essex Association, Glen Ridge, New Jersey.

MAIL ORDER SUCCESS, monthly; teaches how to succeed in mail order business; series articles teaching beginners now running; each issue gives starters full schemes, etc.; teaches advertising; \$1 year; three months' trial, 25c. J. Galvin, Publisher, Jamestown, Ohio.

SKEE-BALL BOWLING for an easy and profitable business. Send for booklet. Skee-Ball Alley Co., Philadelphia, Pa.

MILLIONS MADE IN OPTIONS—Cheapest and best method of Stock Speculation. Ten dollars upward, often returns big profit, no further liability. Send for our System. American Security Contract Co., Inc., Temple Building, Broad & Cherry Sts., Philadelphia, Pa.

SAVE YOUR MONEY by investing it in an absolutely safe proposition that pays you a dividend of 25 per cent after two years and 50 per cent after three. Dept. F. Write Mexican Banana Co., Box 117-Bis., Mexico, Mex.

CHEMICAL ANALYSIS, formulas of all kinds. Processes developed. Chas. Bacon, Chemist, Bayonne, N. J.

MEN AND WOMEN—I furnish you complete details of a variety of new ways of engaging in permanent, profitable enterprises for yourself at home, on small capital. Prepaid, \$1. Circulars for stamp. C. B. Woods, Denver, Colo., Box 1367.

BIG interest on small investments. Chas. Cook, 508 Carondelet, New Orleans, La.

BLACKSMITH shop. Good trade; near Seattle. For particulars, owner, G. Gustafsson, O'Brien, Wash.

VALUABLE PATENT FOR SALE—Time saving office necessity. Small equipment and investment; large profits. Practical monopoly. Splendid chance to start manufacturing, or to expand present business. Descriptive folder on request. C. P., Box 64, Montpelier, Vt.

ANYBODY—EITHER SEX—can make \$4 daily entire year raising mushrooms for hotels and restaurants with my spawn, in cellars, sheds, boxes, etc. Free illustrated instruction booklet D. Hiram Barton, 329 W. 48th St., New York.

EARN \$75 PER WEEK on 110 used salted peanut machines; guaranteed in good working order as new, and re-enameled for almost half price. Also sold in lots to suit. Write for cuts and prices. C. E. Case, 10 Owen St., Hartford, Conn.

AGENTS started in business, household specialties selling 10c to 25c; samples, sure sellers for 60c, sent for 10c. Crystal Commission Co., P. O. Box 241, Madison Square, N. Y.

\$3,000 TO \$10,000 YEARLY easily made in real estate business. No capital required. We teach the business by mail, appoint you special representative, assist you to success. Valuable book free. The Cross Co., 2734 Reaper Block, Chicago. See our other advertisements in this magazine.

WE START YOU in a permanent business with us and furnish everything. Full course of instructions free. We are manufacturers and have a new plan in the mail order line. Large profits. Small capital. You pay us in three months and make big profit. References given. Sworn statements. Pease Mfg. Co., 1012 Pease Bldg., Buffalo, N. Y.

THE OPPORTUNITY of a life time. Picture machines, and contract for a long term of years to operate same on one of the leading railroads is for sale. Machines are now in full operation. H. Greason, 2333 6th Ave., Troy, N. Y.

3,000 SECRETS, 25 CENTS—270-page book of miscellaneous recipes for the farm, home, laboratory, workshop, barber, baker, painter, etc., and every department of human endeavor. An excellent investment. E. O. Headrick, 7501 Tioga St., Pittsburg, Pa.

ideal location. Cheap wood, cheap fuel, cheap labor. The best of reasons given for wanting to sell. Acme Excelsior Co., Harvey, Iowa.

500% PROFIT—Send us 10c. silver, for copy "How to Make Money Making Mirrors." Money refunded if not satisfactory. Economy Chemical Co., Box M, Ludington, Mich.

ENORMOUS PROFITS realized in making imitation maple syrup. Easily made. Particulars free. Sanborn Syrup Co., Dept. B, Bakersfield, Cal.

CHEMICALS for metalizing flowers for hatpins, already prepared, \$1; formula 25c. coin. Gem Novelty Works, Box 441, Sacramento, Cal.

WE SWAP anything you require for whatever you don't need. Send stamp for complete lists. Jenkins Universal Exchange, Chicago.

"MAKE RICE CRISP," the new confection; costs 1c per package; sells like hot cakes for 5c. Profits \$10 a day sure. Machines and instructions, \$10 to \$20. Send 10c for samples and literature. Shaw Mfg. Co., 900 Laguna St., San Francisco.

CAN START you in good home business for 10c to \$1. Twenty-page catalog of books on mail business, compounding canvassing, advertising, etc., free. Puritan P. Book Co., Buffalo.

SPECIAL AGENTS WANTED—Firearms-Searchlight attachment. Marvelous invention. Immense prospects. Write quick, or wire. Boust, Audubon, Iowa.

\$20 TO \$50 DAILY EARNED—Contractors, builders, hustlers, look here. Electric Floor Finishing Outfit; smooths floors; polishes to piano finish. Big outfit—outside generator, inside surfacer, cable connection. Life-long business. County monopoly. John Crook, Austin, Ill.

SEND 10c for rubber stamp with your name in script letters for stamping books, papers, linen, etc. Star Stamp Works, 232 North Fourth, Philadelphia, Pa.

BIG MONEY—Start a dyeing, cleaning and pressing establishment, unlimited field, enormous profits, no capital needed. We teach you the secrets by mail. Particulars free. Ben-Vonde Co., Dept. C, Charlotte, N. C.

INDUSTRIES LOCATED—Business projects promoted. Consolidations. Effective service. Sawyer Systems Co., Cattaraugus, N. Y.

"ART OF FINANCIERING," showing how business men may raise capital for business projects without recourse to brokers or promoters. Valuable Booklet free. Business and Finance Pub. Co., 119 Nassau St., New York.

\$ Money \$ Making \$ Secrets \$—If you want to start a business of your own and make money, send 10 cents at once for a Valuable Collection of Over Two Hundred Ways to Get the Dollars. Satisfaction guaranteed or dime refunded. B. C. Frankson Co., Baltimore, Md.

BUILD a \$5,000 business in two years. Let us start you in the collection business. No capital needed; big field. We teach you secrets of collecting money, refer business to you. Write today for free pointers and new plan. American Collection Service, 101 State St., Detroit, Mich.

BIG MONEY, any locality, operating or selling our Combined "Crystalets" Penny or Nickel Vending Machines. New idea. Lawful. Fine side line. Exclusive territory granted. Crystal Vending Co., P. Moneypeny Bldg., Columbus, O.

WANTED—Good man to buy interest and take management of Bed Spring Factory; fine opportunity. Box 151, Independence, Ia.

LEARN CHAIR-CANING AT HOME. Octagonal type. Clean, profitable employment for every member of the family. Large demand for this work in every community. We teach you by mail. Send 2c stamp for further information. The R. B. Strong Instruction Bureau, Desk 11, Homer, Mich.

MY BOOK, "Building a Business," tells how mail order agency business can be started with capital of \$50 to \$100, and make several thousand dollars annually. It's free. Robert Hicks, St. Louis, Mo.

FREE TO LEGITIMATE INVESTORS—How to make money in legitimate mining, with investment of few hundred dollars in proven mining propositions. Address A. R. Perry, Empire, Colo.

AGENTS—\$300 every month selling our wonderful 7-piece Kitchen Set. Send for sworn statement of \$12 daily profit. Outfit free. Thomas Mfg. Co., 305 Home Bldg., Dayton, Ohio.

yourself. Portunes made operating automatic penny weighing machines. Our scale speaks your weight. Write for Talking Scale circular. The United Vending Machine Co., 629 Caxton Bldg., Cleveland, O.

MY NEW STORE necessity is better than a telephone. Sells better than cash registers or scales ever sold. Sells for \$50 to \$1,000. Your ability alone limits your possibilities. Salesmen, Territory Managers and Local Agents wanted. Ref. First National Bank, Chicago, M. L. Pitner, 183-189 Lake St., Chicago.

START MAIL-ORDER BUSINESS—Sell goods by mail; cash orders, big profits conducted by anyone, anywhere; we supply everything. Our plan positively successful; satisfaction guaranteed. Write for free booklet and sample catalogue. Central Supply Co., Kansas City, Mo.

AGENTS make \$103.50 per month selling wonderful self-sharpening scissors and cutlery. V. C. Giebner sold 22 pairs in 3 hours, made \$13; you can do it. We show how. Free outfit. Thomas Mfg. Co., 49 Home Bldg., Dayton, Ohio.

"DOLLARS & SENSE" FREE! Col. Hunter's great book free with Advertisers' Magazine one year at 50 cents. Indispensable to business men who advertise. Best "Ad School" in existence. Three months' trial subscription, 10 cents. Advertisers' Magazine, 747 Commerce Bldg., Kansas City, Mo.

AGENTS WANTED

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. Cancheater Light Co., 26 State St., Dept. P. M., Chicago.

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.

BURGLAR PROOF—Windows locked, with six-inch opening, 15c each. Great sellers. Agents, Cannon Mfg. Co., 1522 Kenmore Ave., Chicago.

AGENTS—Something entirely new. Patent Invisible Tone Modifier for Victor and other talking machines, rendering harsh machines soft and melodious. They can now be played in small rooms—and pleasant to hear. Sells for \$1. Sample, 25c, by mail. 1329 F St., Room 1, San Diego, Cal.

AGENTS—either sex. How does household specialty, giving you 250% strike you? Write us. C. S. Dade Co., Mark St., Roxbury, Mass.

PARAGON SHORTHAND—Learned in one week. Valuable invention by expert stenographer; not by mere theorist. Speed capacity beyond reach of the hand. Easiest to read. Ten cents stamps for lesson and full particulars. A. Lichtentag, 1432 Camp St., New Orleans, La.

AGENTS—OUR ROPE-MAKING MACHINE will make you rich; every farmer and stockman buys one; just shipped our North Dakota agent ten gross; second order in two months. Sample, \$1.50, prepaid. Get territory at once. E. O. Berg Manufacturing Co., Madison, Minn.

MERRY WIDOW HANDKERCHIEFS. The joke of the season. 'Nuf said. 25c, postpaid. Ewing's, Decatur, Ill.

AGENTS—TWENTIETH CENTURY FERTILIZER Formulas are the best side line for agents selling farmers. 1,527 sold in 1909; nearly every farmer buys. Sample, \$1, the retail price. Our price to agents—10, \$3.50; 25, \$5. Send your orders now and get the good trade of spring and summer. Clarence Dade, Mark St., Roxbury, Mass.

AGENTS! Want something good? Soft metal rivets—banish soldering, no heat, mends graniteware, tinware, etc.; big profits. Terms and particulars free; sample box, 10c. M. Guard Sales Company, Phoenixville, Pa.

AGENTS wanted everywhere for the sale of the Thiel Foot Scraper. Good commission. Rapid seller. The Thiel Specialty Co., Sheboygan, Wis.

AGENTS WANTED—Something new; sells at sight; 100 per cent profit. \$50 to \$100 a week easily made. Write today for full particulars. Goodson Electric & Mfg. Co., 32 Point St., Providence, R. I.

OUR PLAN exceeds all others for success. Pay us when you make it out of the business. Booklet free. Ohio Mail Order Supply Co., Columbus, Ohio.

VEST POCKET SECRETARY—Greatest pocket tool ever invented. Contains pen, pencil, marking point, T-square, rule, compass, knife, etc. Sample, 25c. Rose Novelty Co., 1907 Park Ave., Chicago.

AGENTS wanted for household remedy. Lady or gentleman. Builds and holds its own business. Simeon Belknap, Niles, Mich.

FREE samples and quotation of "All 26 Presidents" post card. Theo. Boerner, 28 Union Square, New York.

AGENTS—Manufacturers' agents, jobbers, crew managers, general agents, to handle our 4-piece "Dutch Cooking Set." Fast selling household necessity. Big profits. Sells every house. Full sized sample set. Special courses in salesmanship pertaining to same. Circulars describing set. Outfit and agency, \$1. Pace Brothers & Sons Pottery Co., Roseville, Ohio.

AGENTS—MAKE \$10 per day metalizing flowers, leaves, insects, etc., at home. Shape and beauty, as in life. Big sellers. Original formula, 25c. Etna Novelty Co., Box 134, Seattle, Wash.

YOU can earn \$200 per month operating and selling the "Wonder Photo Cannon." Everybody wants to wear a photo button; they sell for 10c each—cost 2c; no experience necessary. Complete outfit, \$25. The Chicago Ferrotypes Co., Room 114 Ferrotypes Bldg., corner Laflin and Congress Sts., Chicago, Ill.

AGENTS WANTED in every shop to sell our "Midget" knurled handle pocket screw-driver; sample, 10c. Sterling Novelty Co., Plainfield, N. J.

AGENTS—Here is an opportunity to secure agency for a new American invention that is proving a phenomenal seller. See our display advertisement on page 148 and write today for agents' proposition. Dept. P, The Mantle Lamp Co., Chicago, Portland, Winnipeg.

AGENTS, LOOK! Women and Men. We have just added four new big sellers. Rockford, Ill., agent worked 3 days, then ordered 100 doz. Write for particulars and \$2 free offer. Fair Mfg. Co., Box 148, Racine, Wis.

ELEVATING Clothes Rack; costs 40c, sells for \$1. Wonderful seller. A. C. D. Co., Leipsic, Ohio.

LEATHER NECKTIES—Our latest creation. Made of finest velvet sheepskin. Silk lined. Send 50c for sample, any color, terms, and full agent's outfit. Tracey & Co., Tippecanoe City, Ohio.

BIG MONEY MADE—Showing our cardboard signs, price tickets and other rapid selling novelties to merchants. (They sell themselves.) Agent's sample outfit, postpaid, 20c. Grand opportunity. Order now. Michigan Novelty Co., Detroit, Mich.

GOLD and silver sign letters for store and office windows. Particulars and sample free. P. Johnston Mfg. Co., Quincy, Ill.

POSITIVELY the best clothes cleaner. Same used at my cleaning and dyeing store; harmless; removes severest stains, paint, etc; simple; trial, 25c. Agents, Levin, Henry St., South Amboy, N. J.

AGENTS wanted to handle new patent for holding spools in sewing machine drawer. Some of our agents make from \$5 to \$8 a day. For particulars send 2c stamp, or 25c if you want a sample. A. Stewart, 2938 Zuni St., Denver, Colo.

BREATH PERFUME VENDING MACHINE. Sure winner. Penny play and assures good, steady income on small investment. The DeGraff Co., 2217 Fremont Ave. North, Minneapolis, Minn.

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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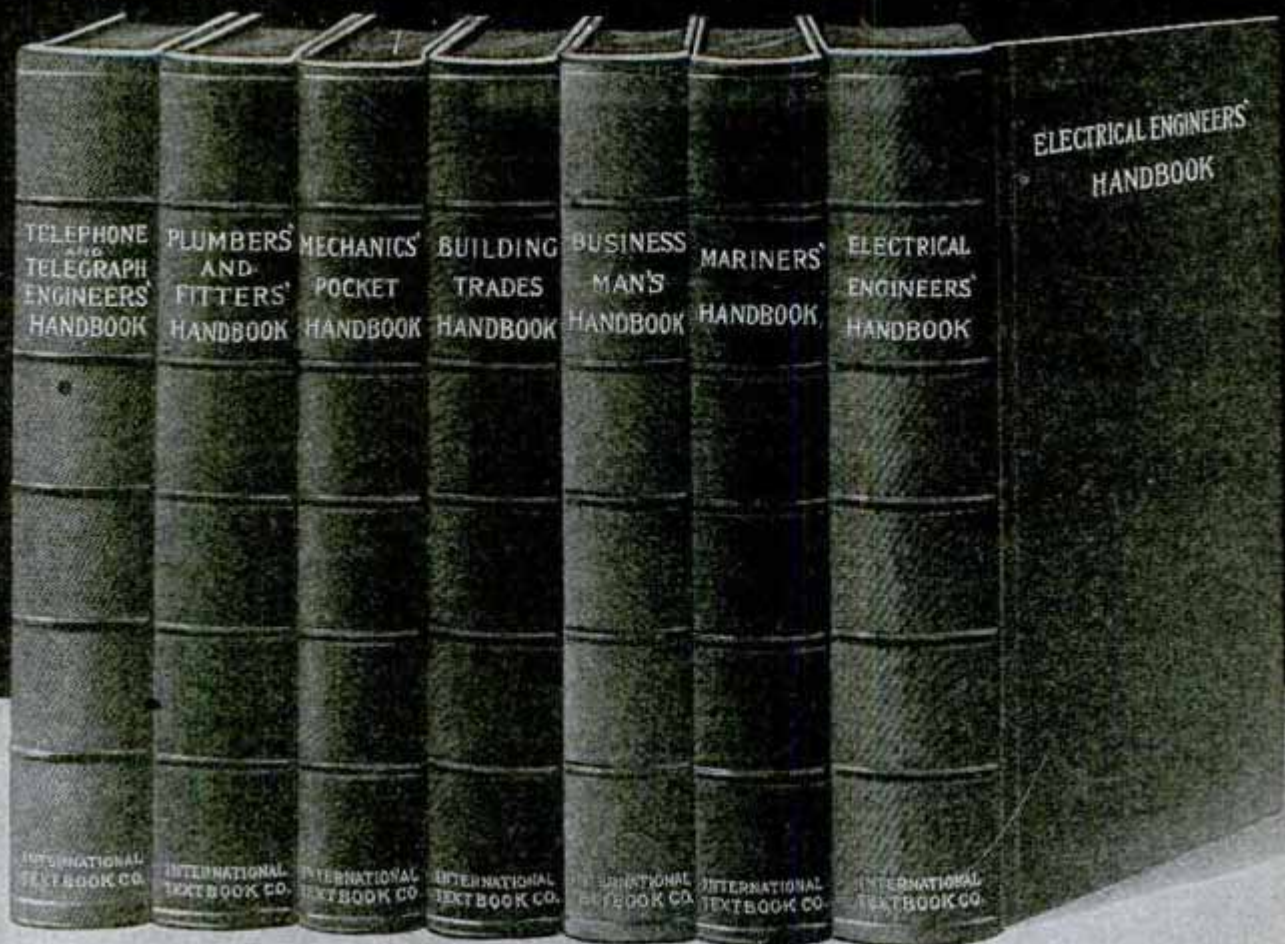
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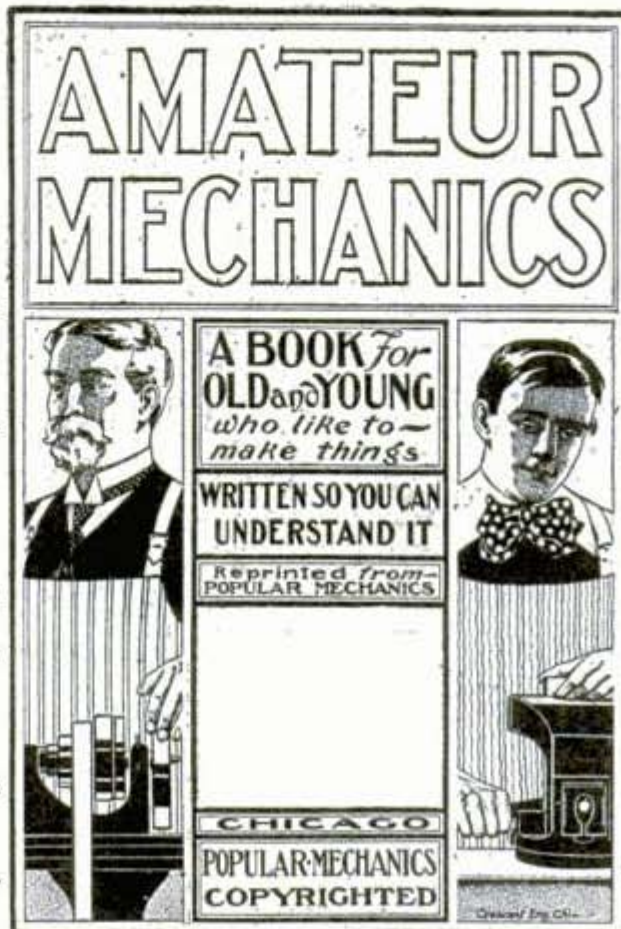
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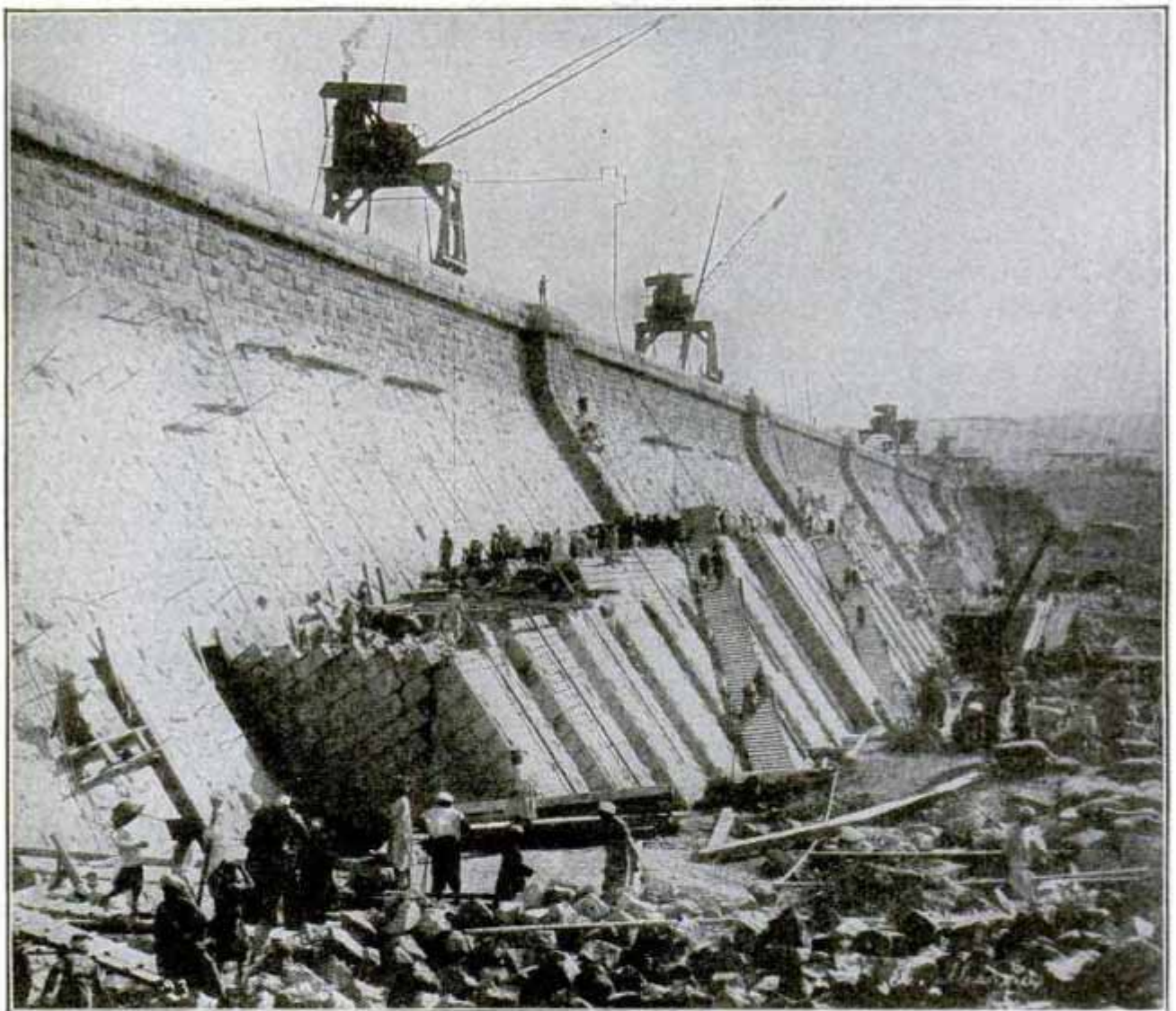
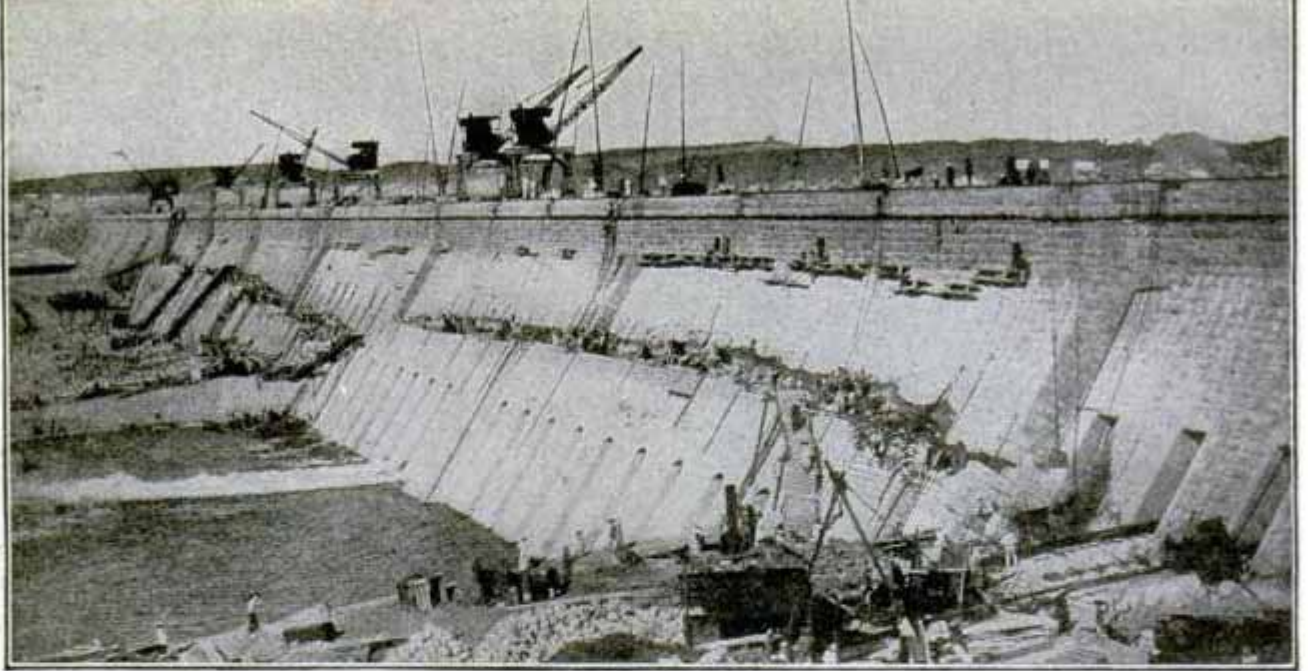
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POPULAR MECHANICS

Vol. XI.

JUNE, 1909.

No. 6

New York Fire Department's Life Gun



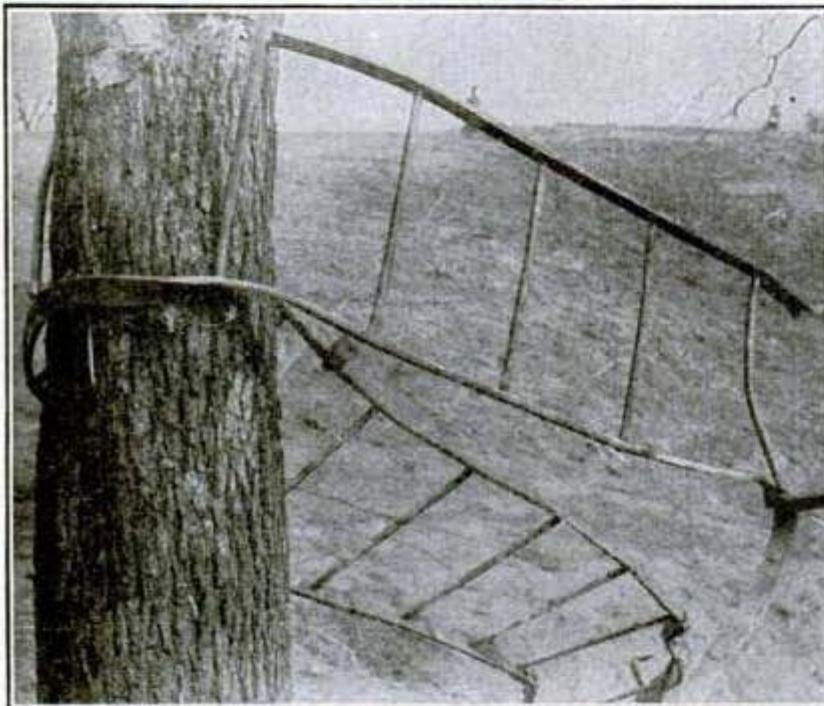
Shooting the Lifeline Over a Skyscraper

The number of times persons, trapped at the top of big buildings, have burned to death or dropped to destruction before hundreds of people, simply because the fire departments had no equipment with which to reach them, makes the use of this life gun obvious. The illustration shows the chief of the school of instruction of the New York fire department instructing student firemen how to shoot the lifeline over a high building. The projectile carries a light line to the end of which is attached a heavier rope. This is pulled up by the persons cut off by the fire and provides a means of reaching the ground in safety.

TWO GREAT BURST DESTROY

These illustrations tell far more graphically than words the result of the bursting of two great water tanks of 1,000,000 gal. capacity each, at Parkersburg, W. Va., in March. Besides the damage to city property, three houses were entirely destroyed, one church and one tenement house wrecked beyond repair, 20 cottages seriously damaged, two lives were lost, and four persons seriously injured.

The first illustration gives a comprehensive idea of how one section of Avery street looked after the disaster. The second shows the 45-ft. iron ladder of one of the tanks wrapped around the trunk of a tree by the force of the bursting, while the third is a startling photographic picture of the wreck of a home. The accident occurred at night, and the bed shown in the foreground of the third photograph was probably occupied, some of the persons living there being among the injured. The fourth illustration shows a section of the roof of St. John's church, which was lifted from the walls and carried a block away. The fifth illustration is a section of the collapsed tanks, looking as much like a collapsed balloon as a structure of metal, and the sixth is a school, four blocks distant from the tank, with two uprooted trees which crashed partly through its foundation and the basement windows.



Avery Street After the Disaster

Tank Ladder Wrapped Around Tree

The Wreck of a Home

WATER TANKS ING PROPERTY

Both tanks were 65 ft. in diameter and 40 ft. high, erected about 1885 by a Pittsburg company. The bottoms of the tanks were made of $\frac{3}{8}$ -in. plates, laid on a bed of mortar, with a course of stone masonry about 2 ft. wide around the perimeter. The walls of the tanks were composed of 10 courses of plates, each 4 ft. wide, and of thickness varying from $\frac{3}{4}$ in. at the bottom of the tank to $\frac{3}{16}$ in. at the top.

The tanks burst with two loud reports, which many people at first believed to be thunder. The time between the two reports was estimated to be from 20 seconds to one minute. The tanks were about 11 ft. apart, and undoubtedly the bursting of the second was caused by the flying plates of the first. The amount of street area flooded is rather surprising, considering the fact that the two tanks only held 2,000,000 gal. Nearly half the sidewalks were flooded over an area $\frac{1}{2}$ mile wide and $\frac{3}{4}$ mile long, the water between curbs reaching a depth of 12 and 14 in.

By an examination of the wrecked sheets, and from the position of the ladders and manholes, it was conceded that the walls of both tanks parted in nearly straight lines perpendicular to their bottoms, and at points commencing a few feet from the base and extending more than half way to the top.



Roof of St. John's Church

Section of Collapsed Tanks

Four Blocks from the Disaster

ILLUMINATING THE EYES THROUGH THE MOUTH

This illustration does not show a wild man eating electric light fixtures,



Examining the Back of the Human Eye

but an ordinary man who is having his eyes illuminated by an electric light bulb placed within his mouth. The apparatus is known as the ophthalmodiaphanoscope, and it is used to examine the back of the human eye.

Essentially, the apparatus consists of a portable cylindrical electric lamp of about 80-cp., with self-contained tube, providing for water-cooling. The pa-

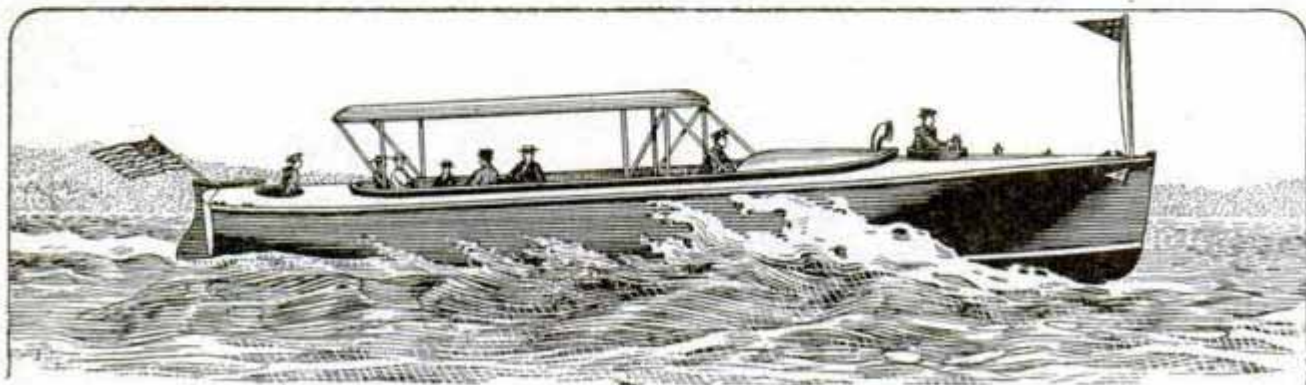
tient places the bulb in the mouth as far back as possible and against the upper wall of the buccal cavity. Viewing the pupil of the eye from the front, the highly illuminated retina is brought before the surgeon, who is able thus to diagnose the appearance of the membranes and pathological conditions at the back of the eye.

The mask which lends such a ferocious aspect to the face is worn so that the impression given by the central field of illumination may not be impaired.

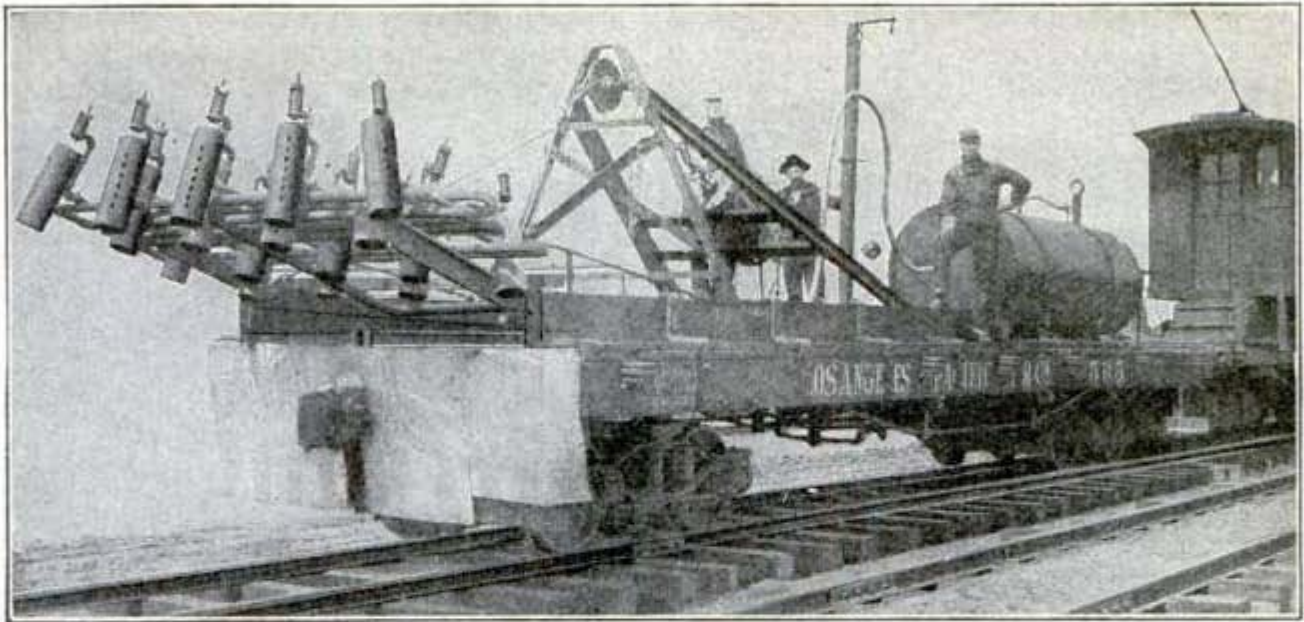
HIGH-SPEED ROUGH-WEATHER YACHT TENDER

The latest and most up-to-date design and construction are embodied in this high-speed motor tender to be used on George Gould's magnificent yacht "Atalanta." Its length is 35 ft., it has a beam of 8 ft., is driven at a speed of 18 miles an hour by two 6-cylinder gasoline engines, and its hull and all finishings are of mahogany.

The feature of the little rough-weather boat is its arrangement of fore and aft hatchways, which resemble manholes. The boat can be steered by a seaman in the forward hatch, or if the weather is unusually rough or something goes wrong with the steering gear, from the aft hatchway. The boat and engines can also be handled from the forward end of the large cockpit, in the same manner as an automobile. There is room for all on board under the fore and aft decks, should the sea drive over her.



Gasoline Yacht Tender for Rough Weather



Powerful Californian Weed-Burner

BURNING OFF THE RIGHT-OF-WAY

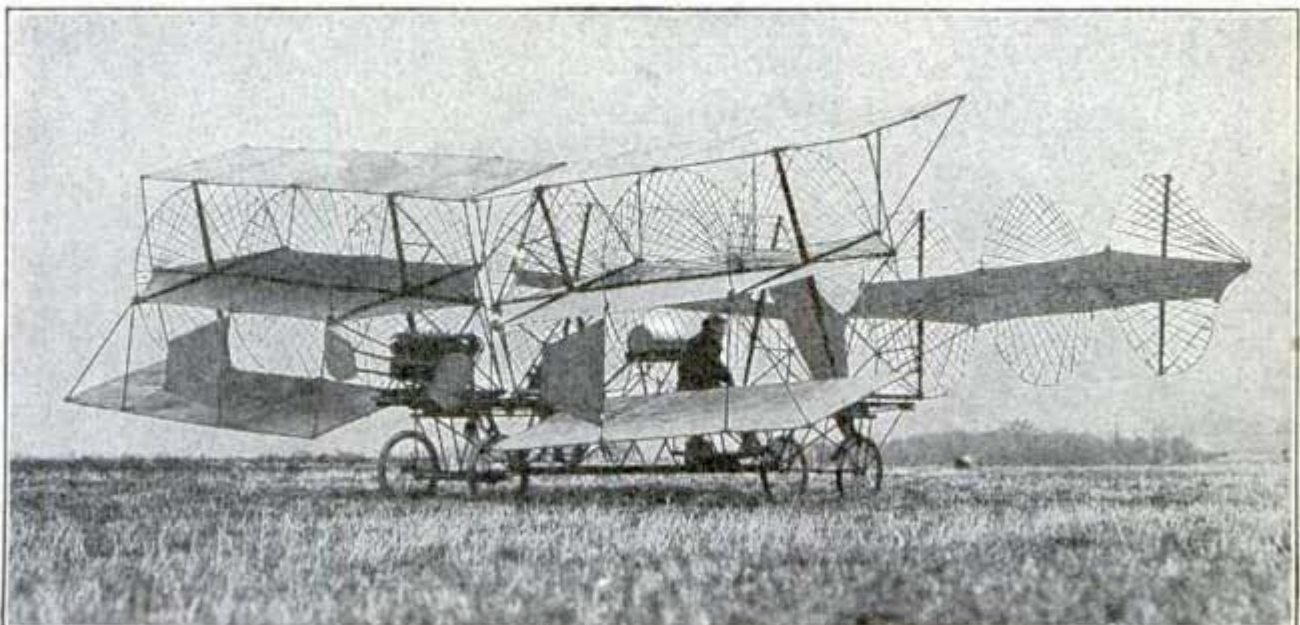
The weed-burning machine shown in this illustration is being used to a great extent on the railroads in California, particularly in the sections where the fine climate and rich soil constantly produce a prolific crop of weeds. The machine is a gasoline burner, consuming between 75 and 100 gal. an hour under 100-lb. air pressure. It kills all vegetation on or near the surface, and for three or four feet beyond the ties on each side, covering about 80 miles a day.

The machine consists of an ordinary flat car on which is carried a 1,000-

gal. tank and a battery of powerful burners. It is all under complete control of one operator, the battery of burners being raised and lowered by a derrick attachment.

ENTRY FOR U. S. ARMY TESTS

This is the aeroplane of J. F. Scott, of Chicago, one of the three inventors who has fulfilled the construction specifications required by the United States army for the tests to be held at Fort Myer this summer. The machine is of the triplane type, about 35 ft. wide and 25 ft. long, propelled by a 2-bladed screw fan driven by a 40-hp.



To Be Tested for Government Use

engine. Its construction differs materially from that of the Wright aeroplane and the other successful biplane machines of the French aviators.

Whether or not the machine will fulfill the government's demand for speed, stability, and length of flight has yet to be demonstrated. The photograph of the machine was taken while it was being tried out near Lawrenceburg, Ind.

AN ELECTRIC TABLE CLOTH

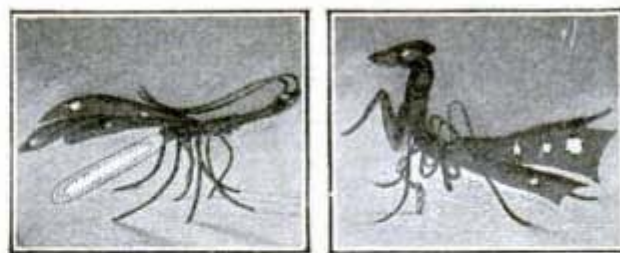
An electrically wired table cloth, upon which ornamental electric light fixtures diffuse illumination the moment they are set down, is one of the latest and most interesting illuminating devices designed in England. To the uninitiated the ability to get light by simply placing a fixture on the table is nothing less than extraordinary, but the explanation is simple.

The magic table cloth has every appearance of an ordinary baize undercloth, and, in reality, consists of a bottom cloth of baize, into which are sewn, at regular intervals, strips of



A Table Lighted by the Magic Cloth and Set with Electric Fixtures Called Fairy Lamps

metallic braiding alternately connected at one end, the whole terminating in a length of flexible cord which can be attached to a plug in the floor. Upon



One of Many Bug Fixtures Used on Magic Cloth

this undercloth is sewn an upper cloth, specially treated on the under side with a coating of India rubber. Over this is placed an ordinary linen tablecloth and the table is then ready for illumination.

The connection between the lighting fixtures and the metallic braid is made possible by connectors permanently attached to the bottoms of the fixtures. These connectors consist of two sharp metallic points, it being only necessary to press the points through the outer linen tablecloth and the upper waterproofed cloth to make the connection with the electrically-charged braid.

The illustrations show a table thus illuminated, and the type of ornamental fixtures used, many of which are fantastic.

READY-MADE LECTURES PROVIDED WITH MOVING PICTURES

Ready-made lectures, or lecturettes, taking five or ten minutes to deliver, are now being provided with moving pictures having an educational value. Many subjects of timely interest are now obtainable by the proprietors of moving-picture shows. Films showing the ships of the U. S. navy have a short lecture setting forth their size, the number of guns they carry, the number of the ships of the same type the United States now has, etc. Views of interesting foreign scenes or events are provided with lectures which explain them.



MASKING DETECTIVES IN IDENTIFICATION PROCESS

This gathering of masked men is not a gang of desperate bandits, but a detail of criminal catchers in disguise. The idea of masking detectives before lining criminals up before them for identification is a new one. It gives the detectives an excellent opportunity to study the features and characteristic points of a criminal without giving the criminal the opportunity to study them in turn.

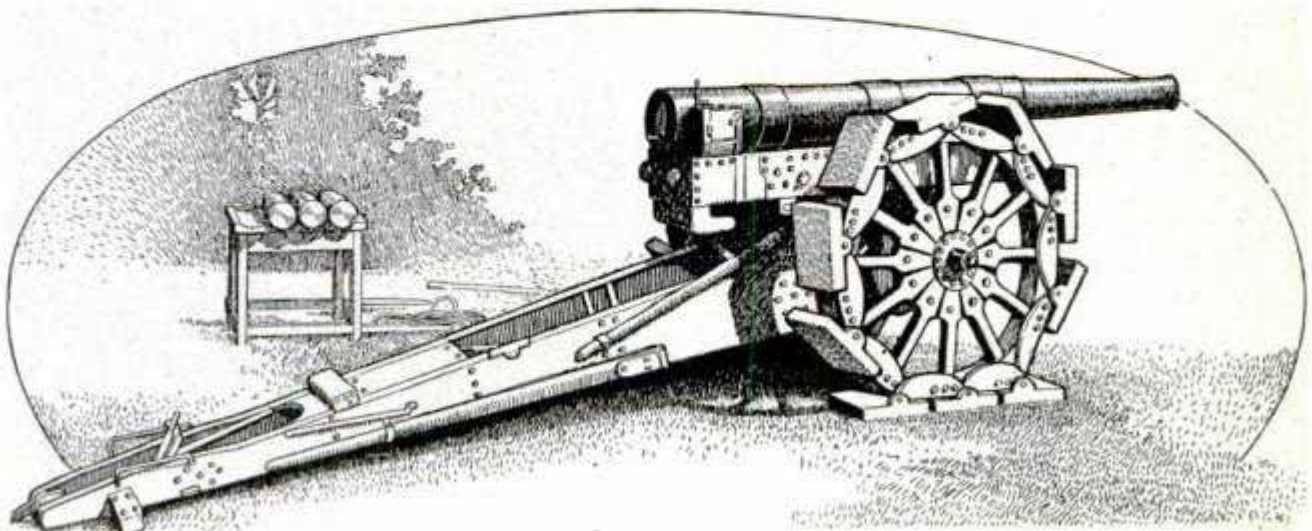
GUN CARRIES ITS OWN ROAD

A new gun carriage, which carries its own road along with it, has been adopted by the German army for work on soft or rough ground. Its wheels are of the "pedrail" type, and as the

wheels turn these pedals or blocks strike the ground, thus practically making a road and taking it up as the carriage advances. Three of the blocks are on the ground at all times.

HARVESTING ICE WITH STEAM-BOAT

In order to get in the last 10,000 tons of ice of the winter harvest a company at Congamond Lake, Mass., had to employ a side-wheel steamboat and a small launch, rather a unique feature in ice harvesting. All the ice in the main portion of the lake had melted, but in a small cove at the extreme end of the lake from which the ice houses were situated, there was a field of sev-



eral acres of good 10-in. ice. Gangs of men marked and plowed this ice, and then the boats were used to tow the floes across the lake.

SNOW TUNNEL ACROSS BUSINESS STREET

Following a heavy fall of snow in



Passage Under a Drift

Silver City, Idaho, last winter the business streets became so filled that not only was traffic impossible but pedestrians were unable to cross from sidewalk to sidewalk. An enterprising merchant of the town dug this tunnel so that customers could pass from his store to the opposite side of the street.

ELECTRICITY DIRECT FROM THE SUN'S RAYS

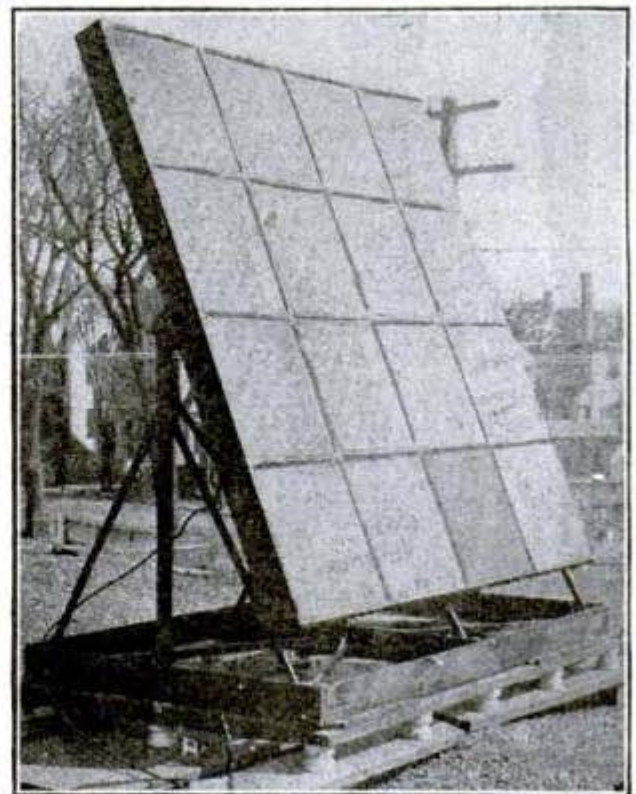
There have been many devices invented for the storing of the sun's energy and converting it into electricity, such as thermo-electric compositions, etc. The currents thus developed have been of but little practical value, but a Boston engineer has invented a machine that is claimed to

convert the sun's rays into electrical energy direct, without the use of any intermediate apparatus.

The machine is composed of a large number of plugs of a peculiar metal composition, set in insulating material and connected in series, one end of each plug being in an airtight space exposed to the sun, and the other end in the open air. The difference in temperature of the two ends, usually about 60 deg. F., causes a flow of current. The voltage in each plug is, of course, low, but there are 976 connected in a series, and they store enough electricity in ordinary batteries to light his shop.

Like all new inventions, some of which never become practical while others revolutionize existing conditions, there are many improvements that will have to be made, but during the last winter, in which there were many dark days, the apparatus proved sufficient for the inventor's needs.

The apparatus contains absolutely no moving parts, has no chemical action, is weather proof, and is claimed to need no attention from one year's end to another, with the exception of keeping the glass which covers it clean. The action is automatic, the circuit-



Thermo-Electric Apparatus

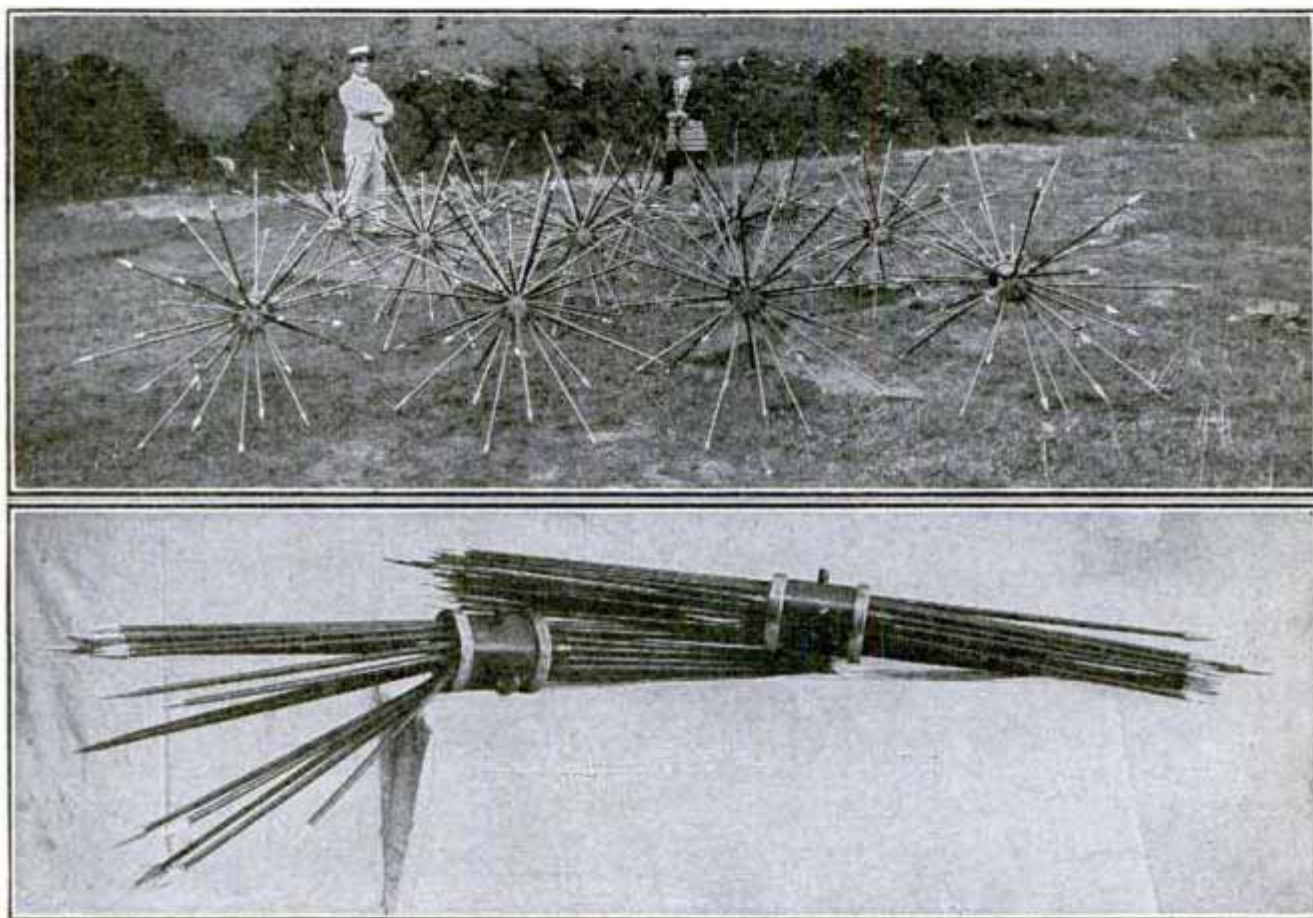
breaker opening and closing the circuit when the voltage drops below that of the battery or rises above it. The illustration shows the apparatus on the roof of the inventor's shop.—Contributed by Herbert Lester Moore.

PORTABLE SPEAR OBSTRUCTIONS FOR FIELDS OF BATTLE

It is a well known fact that in the Russo-Japanese war the Japanese forces

sists of a double connected bundle of spear-pointed steel rods, the inner ends of which are held in a cylindrical hub. When being transported they fold into a convenient bundle or sheaf, as shown in one of the illustrations. When required for service the spears are quickly extended in lines radiating from the hub and held solidly in this position by the turning of a key which is then carried away by the soldier in charge of the sheaf.

The sheafs weigh about 75 lb., and, if carried in a suitable number by the



The Spear Obstructions in the Sheaf and Set Up

suffered terribly on account of the barbed wire fences employed by the Russians to stop advances at Port Arthur and on the Manchurian battlefields. Therefore, immediately after the war, an Americanized Jap undertook to devise some means of effectually destroying them, and failing in this, devised what he claims to be a still more effective obstructing device than the wire.

As a result, he has now had patented in all parts of the world the device shown in these illustrations. It con-

different regiments or divisions of an army, can be set in an effective barrier in less than 30 minutes. The difficulty of breaking through such a line of obstructions in making a sudden charge against an army is clearly evident. Horses or men would become tangled up, and the whole front of the advancing troops demoralized, offering deadly marks for the defensive army so protected.

The advantages claimed for the spear obstructions over the barbed wire fence system are in the fact that they can

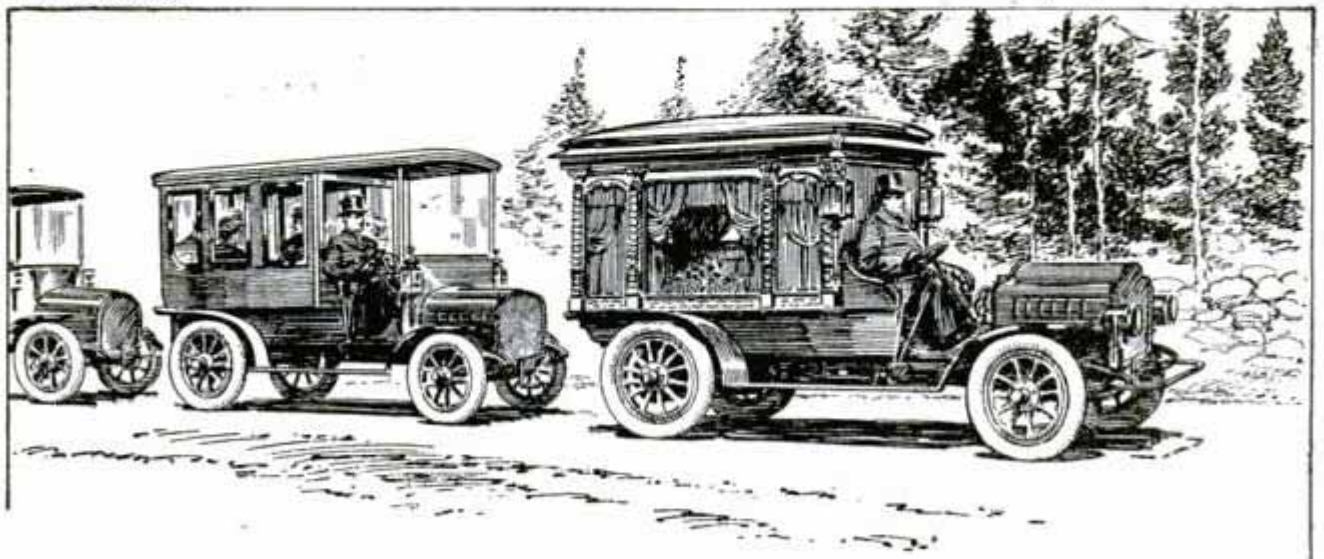
be used on rocks and in gorges, marshes, etc., as well as in fields; that they can be moved at any time as necessity may demand, be set up at night as well as in the daytime, and can be quickly folded up after stopping an enemy's advance, so as to permit a counter assault and pursuit.

Barbed wire fences, being composed of wire and posts, can be set up only where the ground is suitable for the erection of posts, cannot be easily taken down for use elsewhere, are not possible in sudden emergencies, unless the commander has foreseen the emergency and prepared for it; cannot be set up in the dark without artificial light, and are so bulky that transportation and handling is difficult.

MOTOR FUNERAL CORTEGES

A Chicago undertaker not only has the motor hearse shown in this illustration, but a white motor hearse for children and three special cars for carrying mourners. The three mourners' cars will carry 24 persons.

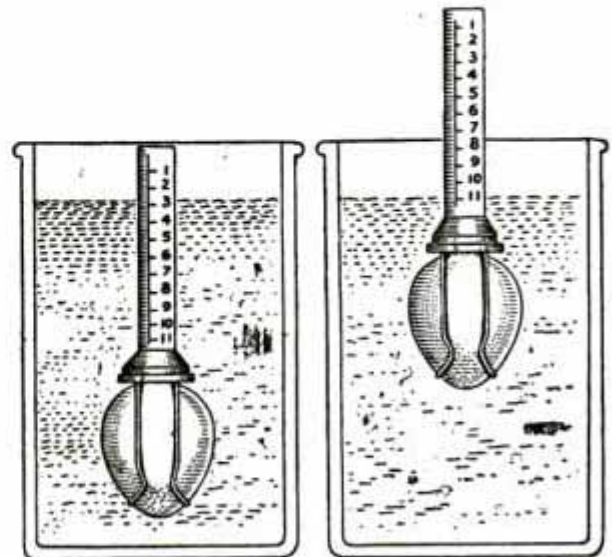
Chicago's cemeteries are nearly all located more than 10 miles from the central sections of the city, and to drive to them in carriages, especially when the weather is cold, is a long and wearisome journey. The motor funeral cortege has traveled over city pavements and muddy roads to a cemetery 11 miles distant in one hour, the return journey being made in about 45 minutes.



Motor Hearse In Use in Chicago

TESTING FRESHNESS OF EGGS

The density of an egg is an excellent indication of its age, eggs that float being a bad investment. With this device it is not only possible to determine whether an egg is fresh or not, but whether it was laid yesterday, the day



Determining the Age of Eggs

before, or three or four days ago. It consists of an air chamber of aluminum, on the outside of the stem of which is a rule. The egg is placed on a wire holder at the bottom of the instrument and placed in water. The depth the instrument sinks, as shown by the rule, indicates the density of the egg, and therefore its relative freshness.

Peru is to have two turbine vessels, one of which is already launched.

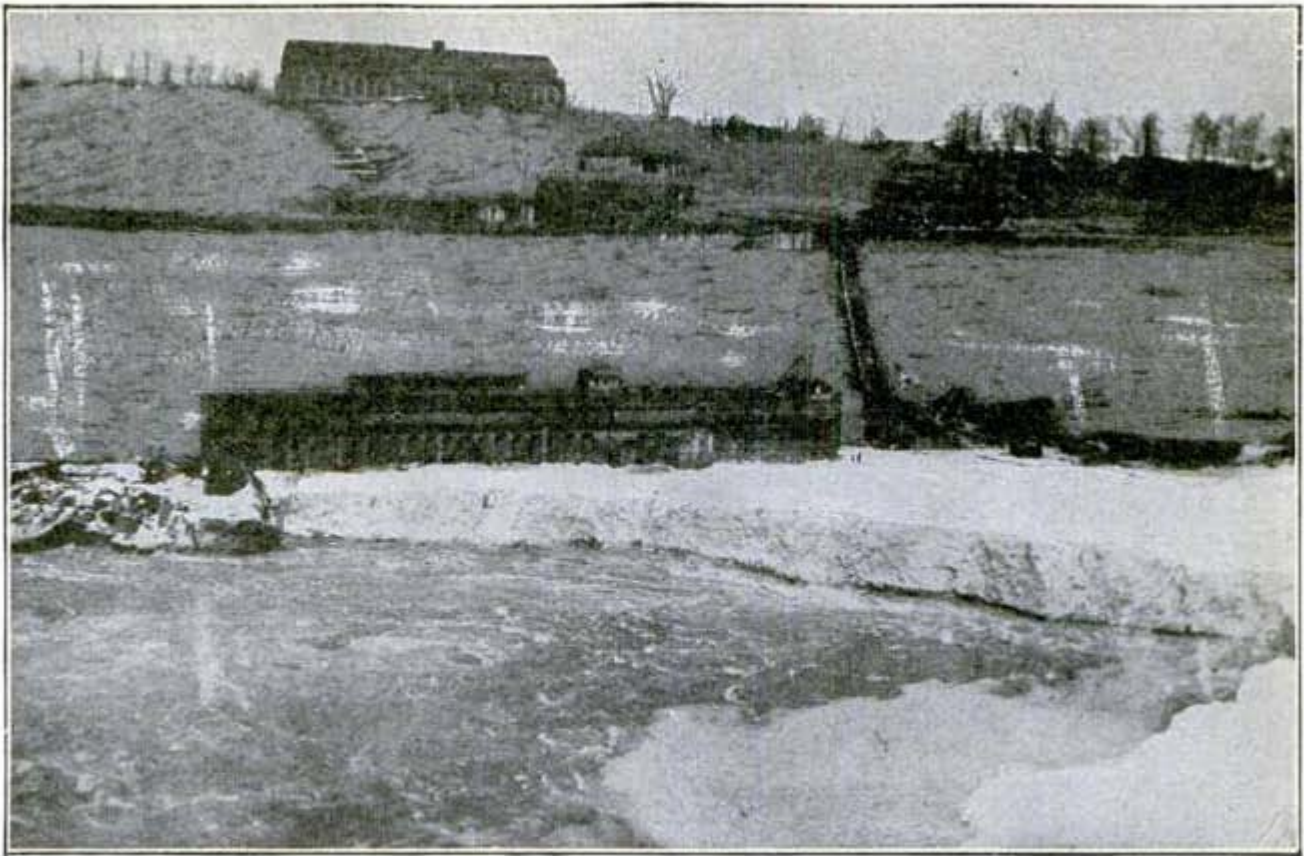


Fig. 1—Ice Jam at Ontario Power Company's Plant

THE ICE JAM AT NIAGARA FALLS

nomenally dry Niagara Falls, as illustrated in the April issue of this magazine.

Falls and Rapids Frozen Over to Such an Extent that the Mighty Body of Water Had Almost to Be Searched For—Ice Jam at Lewiston Raised Water 40 Feet Above Normal at Point Just Below Falls — Power Houses Put Out of Commission— Electric Railway Lines Buried Under 20 Feet of Ice

On account of the peculiar conditions of ice, wind and water, Niagara Falls experienced an ice jam in the lower river which has never been equalled since the white race first gazed awestruck at its mighty volume. The heavy and continuous winds blowing against the natural downward flow of the water of the Great Lakes in February resulted in holding back the waters of Lake Erie, causing a phe-

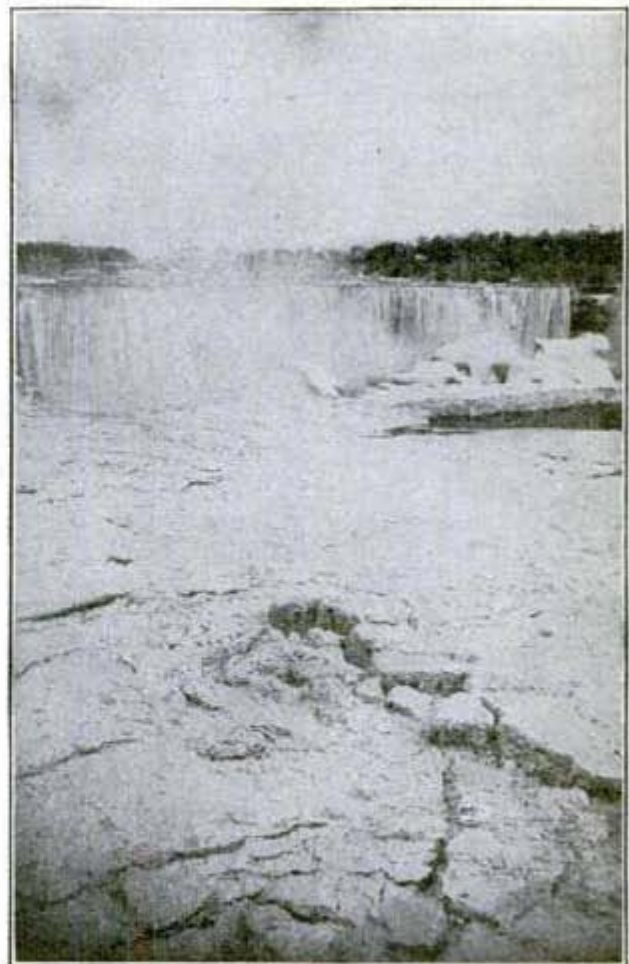


Fig. 2—Just Below the Falls



Fig. 3—Looking Towards Lewiston

The severe winds of the week of April 10 resulted in a great ice jam in the Niagara Gorge, the conditions combining to produce this effect being high water, carrying the large quantities of ice previously held back, over the falls, and the winds blowing in just the required direction to hold the ice back in the lower river. Vast quantities of

ice passing under the bridges and through the rapids and whirlpool became wedged against the banks at Lewiston, which is seven miles below the falls proper, forming a dam that raised the level of the water to a height of more than 40 ft. above normal at a point extending from just below the falls to the piled up ice. This extraordinary height of water was nearly 25 ft. greater than any height previously recorded.

The first illustration shows the power plant of the Ontario Power Co. and its transformer house on the bank above. The water entered the windows and doors of this plant, completely stopping the machinery for several days with most disastrous results. The high-tension machinery was completely submerged, the electrical generators were put out of commission, and the transmission lines on the American as well as the Canadian sides became useless for the time being.

The second and third illustrations show the ice jam at the falls and the appearance of the river, filled with thousands of tons of ice. These photographs were taken looking toward Lewiston.

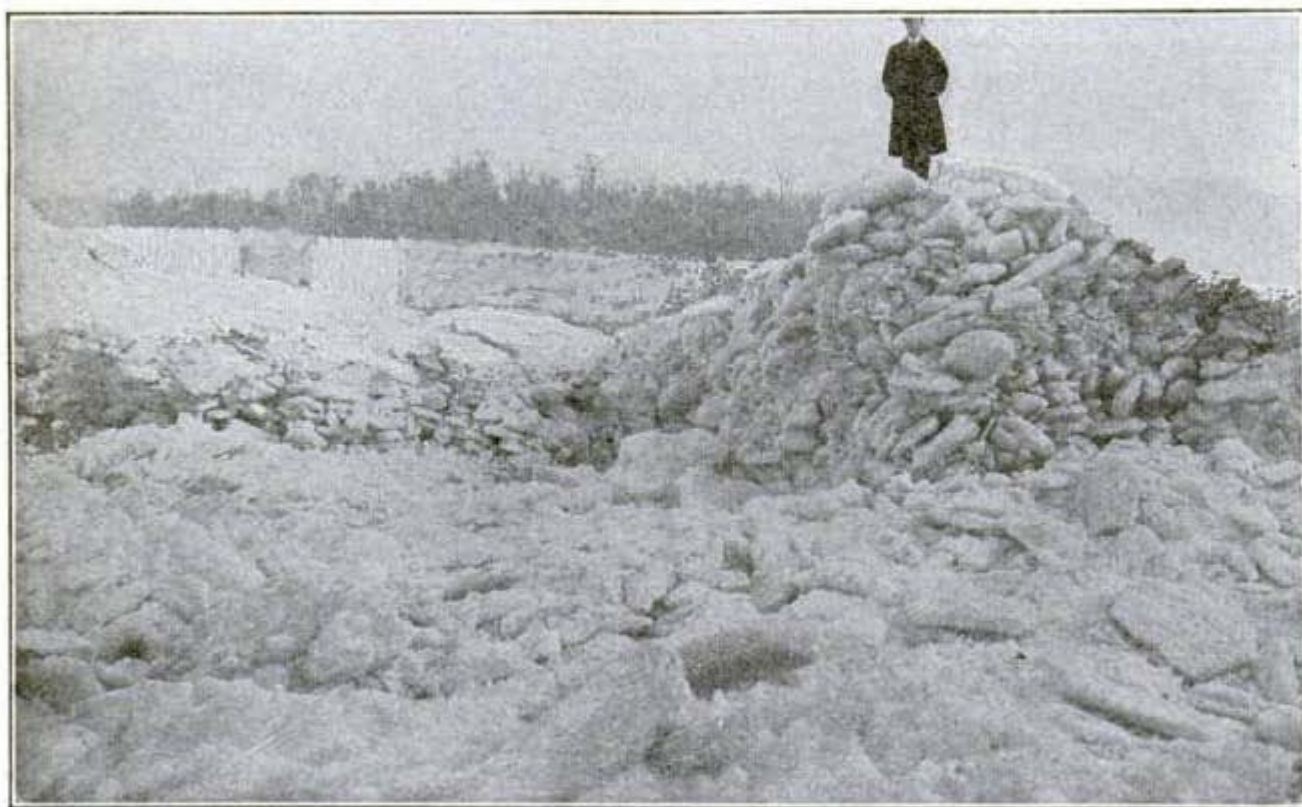


Fig. 4—Ice 50 Ft. Thick on Canadian Side



Fig. 5—Wreck of Incline Railway

The fourth and fifth illustrations show the ice piled 50 ft. high below the falls on the Canadian side, and the electric incline railway wrecked in the jam.

The "Maid of the Mist," the famous little vessel of the rapids, is shown carried up high and dry on its dock, completely wrecked. It was feared at one time that the bridge shown in the sev-

enth photograph, as well as the other bridges both above and below, would be carried away on account of the ice jamming into and carrying away the piers and abutments sustaining its great arch.

As illustrated in the eighth photograph the Great Gorge electric railway on the American side was completely buried 20 ft. under the ice. Poles,



Fig. 6—"Maid of the Mist" Carried Up the Bank

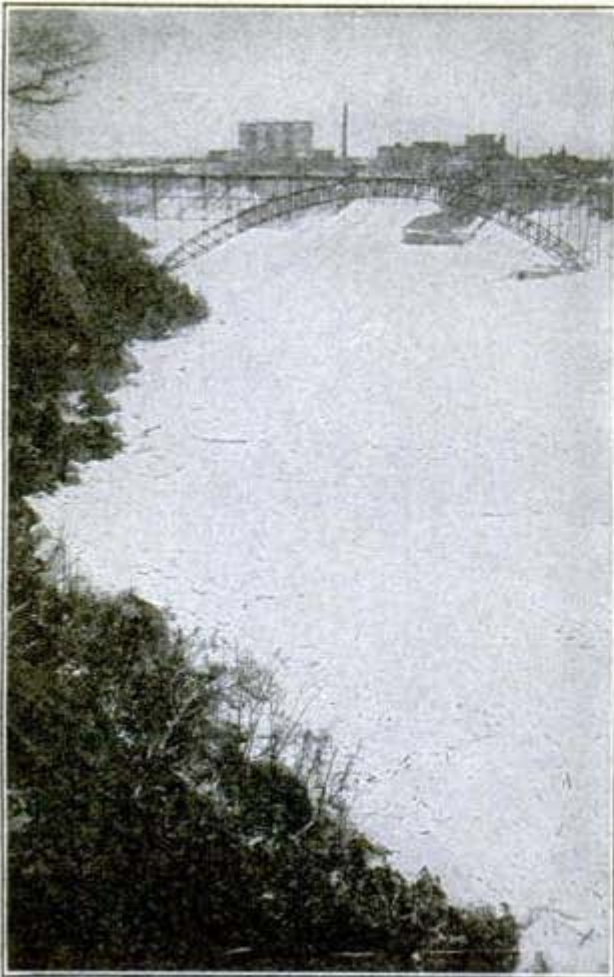


Fig. 7— This Bridge Was In Great Danger

trolley wires and tracks were badly damaged.

An ice bridge which forms across

the river just below the falls when a severe winter grips the water, is considered a wonderful attraction to the people who visit Niagara during the winter months, but never before has it been possible to cross the river on the ice at the rapids, as shown in the ninth



Fig. 8—Gorge Railway 20 Ft. Under Ice

photograph. The tenth illustration shows the wreckage of the Niagara Gorge electric railway at the Whirlpool Rapids and Devil's Hole, not far from Lewiston.

The eleventh, twelfth and thirteenth illustrations show the conditions existing at Lewiston and Queenstown, the points where the most damage was ac-

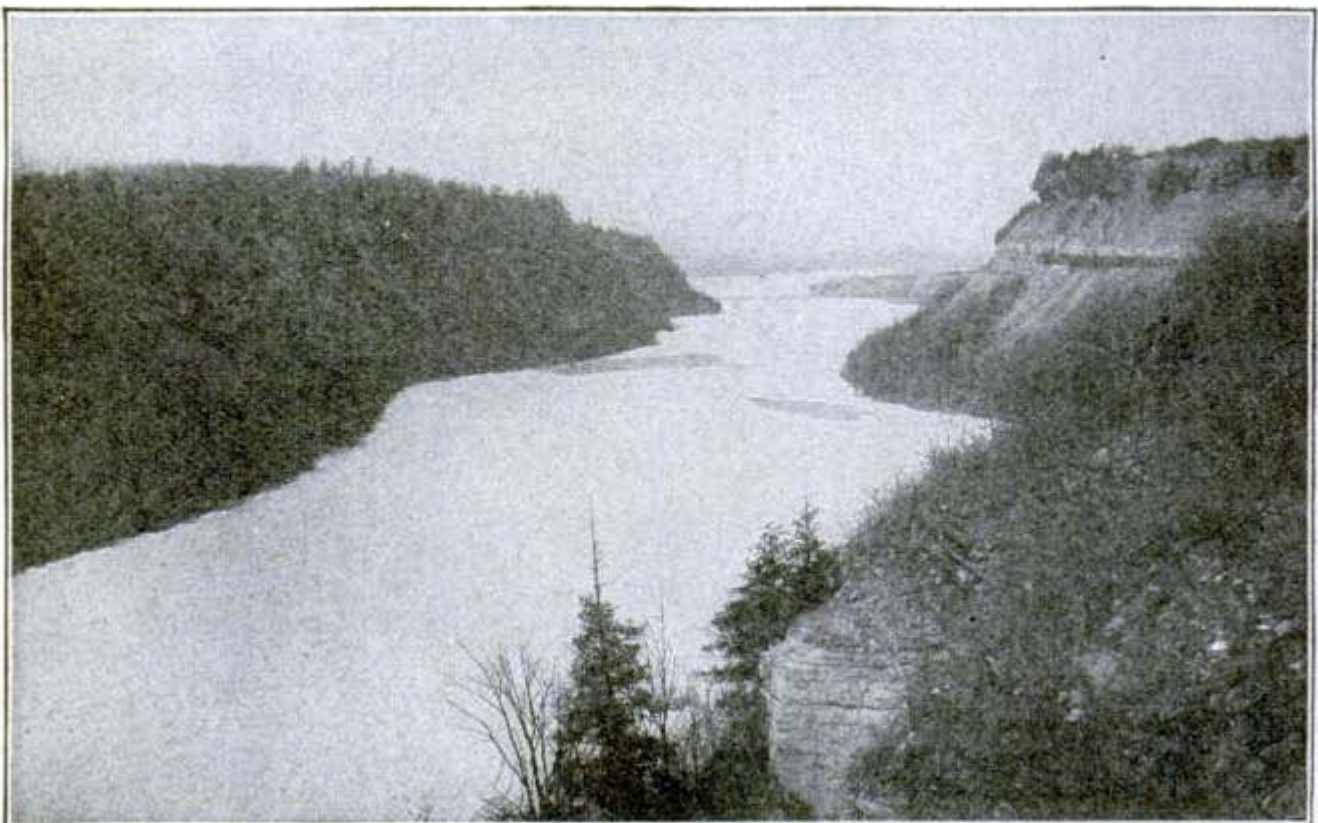


Fig. 9—Ice from Bank to Bank—First Time in History

complished. Many buildings were destroyed as well as docks and electric railway tracks. The railway lines were buried 15 ft. with ice and debris. Great havoc resulted along the banks of the lower Niagara river for the entire distance from the Falls to "Niagara on the Lake."

As a result of this phenomenal and costly jam, the damage of which reaches half a million, many improvements will be made in the most damaged districts

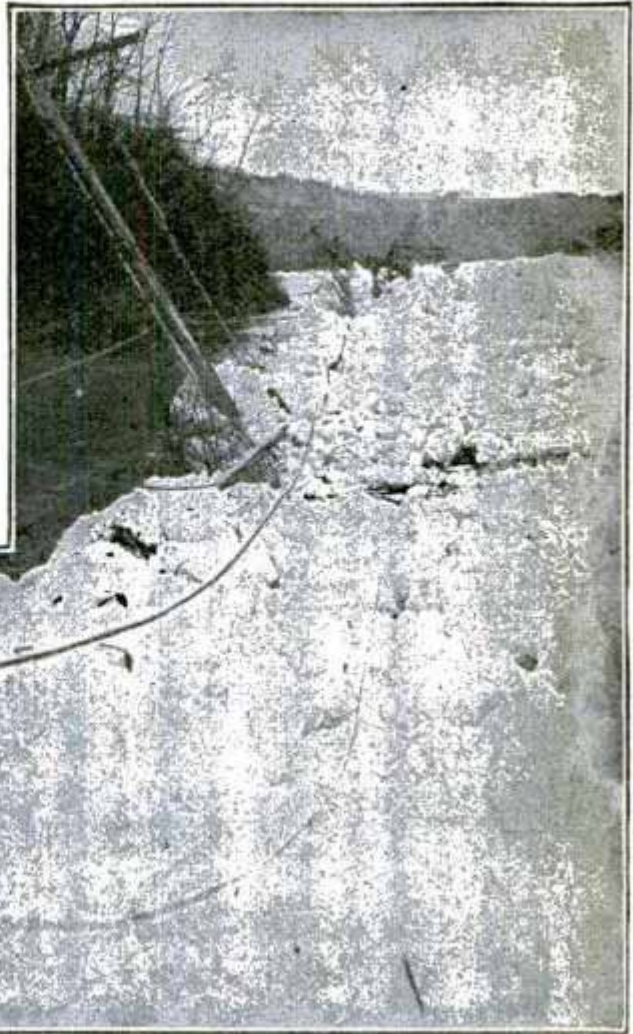


Fig. 10—Wreck of Trolley Line at the Whirlpool

to insure against a possible repetition. The Ontario Power Co. has decided to

close all the water-side windows and doors of its plant with concrete and



Fig. 11—Wreck of Docks at Lewiston



Fig. 12—Trolley Line Under 25 Ft. of Ice at This Point

masonry as a precaution against future interruption of the electric power service from causes of this kind.

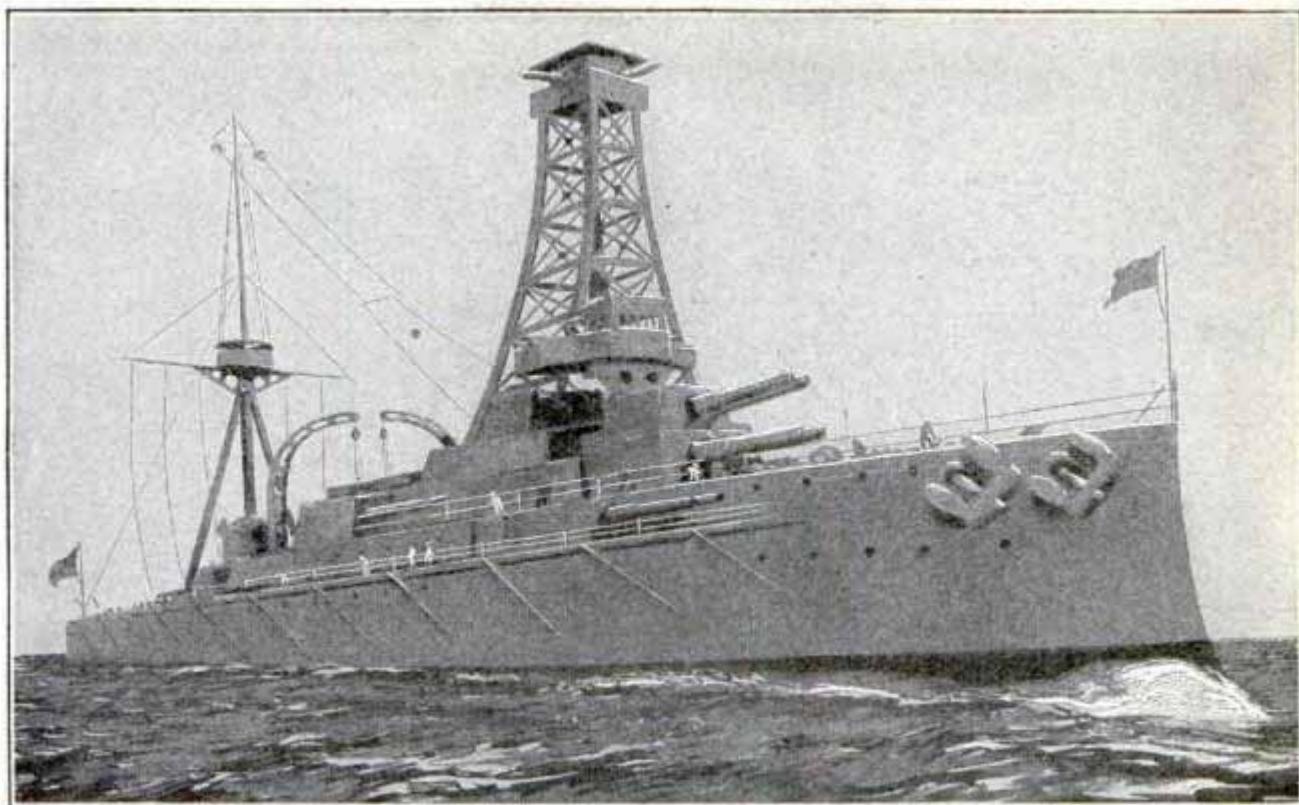
So serious did the jam grow during the latter part of April that for several days there seemed to be grave danger of all the great power plants being completely wrecked and parts of

the city of Niagara Falls carried away. The ice jammed until officials feared that it would form a solid barrier resting on the very river bed itself. Appeal was made to Governor Hughes, and a force of experts succeeded at last in opening a channel by the use of dynamite.



Fig. 13—A Short Distance Above Lewiston

SMOKELESS BATTLESHIPS OF THE FUTURE



The Steamless, Smokeless Battleship, Which Marks the Next Step in Naval Construction

The possibility of the adoption of internal combustion engines for the propulsion of battleships has been discussed pro and con for the past two years by naval experts on both sides of the Atlantic, England taking the lead in the experiments. Now, according to the English press, the internal combustion engine for such purposes has ceased to be only a possibility and has become a fact. England's experiments, it is claimed, have been so successful that a huge battleship, 540 ft. long, 88 ft. broad, and having a displacement of 21,000 tons, has been designed and will soon be laid down, if indeed the work has not already been secretly commenced.

If the reports are correct, the vessel is designed for a speed of 29 miles an hour, and will carry an armament of 12 guns of 13.5 in. calibre, firing projectiles of 1,500-lb. weight, capable of piercing 32 in. of armor at a distance of 9,000 ft.

The advantages of the internal combustion engine over steam power are

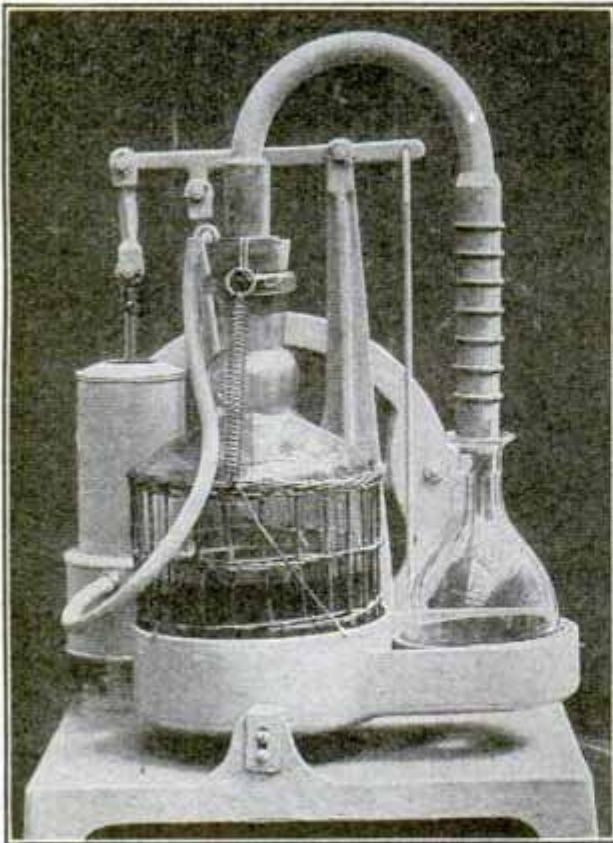
numerous. There will be no smoke to draw the attention of the enemy, no funnels to obstruct the decks, the engines will be better protected, and oil tanks will be easier filled both at sea and in harbor than bunkers with coal. It is the absence of funnels, however, that will cause the most radical change in the exterior appearance of the war dogs. Except for masts, bridges, and conning towers the decks will be practically clear, making possible the arranging of big guns for firing in any direction. The huge funnels now in use offer fine targets to the enemy, their injury may reduce the draught and so the speed of the vessel, and their fall would probably put several guns out of action.

The illustration shows three warships as they probably would appear should the internal combustion engine be generally adopted, the first in the group being drawn in an attempt to portray a ship answering to the description of the English ship. The ship flying the American flag is the sugges-



'Three Types of Internal Combustion Battleships

tion of an American designer for the United States internal combustion battleship of the future. The arrangement of her turrets allows her to fire eight big guns ahead or astern and 12 on either broadside. The third ship is still another conception of the gas-driven war vessel.



Home Ice-Manufacturing Plant

SPECIAL ORDER ICE

This modern addition to the cook's domain acts upon the well known principle that water will freeze when rapidly evaporated by means of a vacuum pump and a powerful absorbent. This apparatus will ice a carafe, or bottle of water in three minutes and in twenty minutes will produce for you a 1-lb. block of ice, and with no more trouble than the labor involved in freezing a quart of ice cream.

The expense connected with the manufacture of ice by this means is very moderate, after the initial cost of the machine is reckoned upon. The machine sells for something less than \$50.00. After this, the only expense for the operation of the plant is the local cost of sulphuric acid, which acts as the necessary absorbent. With a half gallon of the acid, which is a full charge for the machine, from fifty to one hundred carafes of water may be iced.

The machine's construction is simplicity itself, and after being charged (the acid being somewhat dangerous to handle) a child may operate it with perfect safety. It is mounted upon a base about one foot square, and may be operated upon any level surface

The pump, the acid container, or technically speaking, the absorber, and the ice mould are all operated by the hand wheel seen at the back of the machine.

To charge the machine the plug in the mouth of the absorber is removed and the acid poured in through a funnel until it attains a certain level. This accomplished, the plug is returned and fastened in place by means of the spring shown in the illustration. A flexible pipe runs from the acid container to the water bottle and enters here without any special attachment. With the aid of a little water poured around the nozzle in the neck of the

mates and on board yachts, etc., where ice is not always readily obtainable.

ROOSEVELT INSPECTS AMERICAN-BUILT HOUSES AT MESSINA

After an inspection of the frame houses donated to the Sicilian earthquake sufferers by the American people, ex-President Roosevelt wrote the following for publication:

"Before leaving Messina I desire to say that I am sure the American people do not realize the splendid work that is being done at Messina and Reggio with the lumber sent from the United States.



Praiseworthy Relief Work at Messina, Italy

carafe, the air space becomes water-sealed. Now the crank on the wheel is turned gently from twenty to thirty revolutions per minute and gradually increased to about one hundred. This increased speed will cause the acid in the absorber to splash thoroughly, and in a very short time the freezing process may be readily noticed. At first the water in the bottle appears to be boiling hot. You look again, to find that ice is forming.

In case solid ice is wanted, the nozzle is fitted to the mould, and the machine operated as usual. There is no doubt but what the hand ice machine will prove to be one of the greatest conveniences of the age, and will be of especial value in remote country houses, in the sick room, in all hot cli-

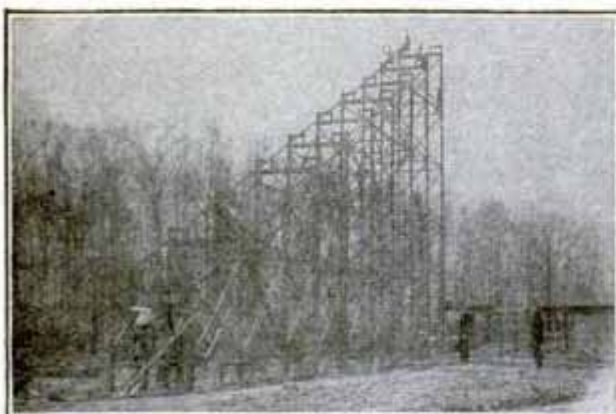
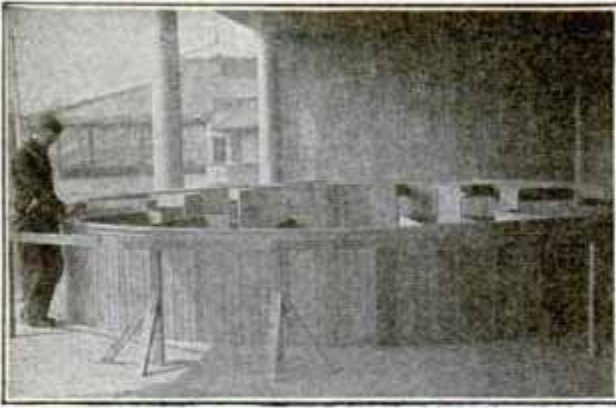
"I have visited the American camp and seen 250 houses already completed, and arrangements have been perfected for the rapid construction of 1,250 more.

"The whole work, which is under the general direction of Ambassador Griscom, has been organized and perfected by Lieut. Commander Belknap, with the assistance of Lieut. Buchanan, Ensigns Wilcox and Spofford, Dr. Donelson, Paymaster Rogers, forty enlisted men of our navy and a number of stalwart American carpenters. In addition, there is a fine group of Americans, such as J. Elliot, Winthrop Chandler, J. Bush, and R. Hale, who are giving their time and energies to help the philanthropic work.

"I wish to say I consider that the American people are deeply indebted to each and every one of these men.

"I cannot exaggerate the pleasure it gave me to see the officers and enlisted men of our navy adapting themselves to strange and unexpected circumstances and performing with ability and thorough good will this most difficult task. Our nation will be proud of them."

Those who figure in advance estimate that greater New York's population in 1950 will be close to 18,000,000.



SPRING SCENES AT AMUSEMENT PARKS

A sure sign that spring has arrived is the sudden activity that strikes an amusement park of a metropolitan city during the latter part of April and through all of May. Builders, repairers, and painters vie with each other until about June 1, when the gates are thrown open and the crowds rush in to get the first view of old favorites and new thrillers.

These illustrations show the activity which occurs in such places every spring. The first is a new and somewhat startling amusement device known as the "Get-Together." It is a whirling contrivance with seats that tip and slide, eventually pitching its load of laughing, struggling humanity into a tangled heap in the center, to the amusement of the spectators as well as those taking part. The "Bump the Bumps" contrivance is a gentle motion when compared to this.

The second illustration shows the workmen oiling the works of a Ferris wheel. In the third the track of a scenic railway is being patched up, and in the fourth the scenery of the railway is being rebuilt and painted. The fifth illustration shows the work of building a shoot-the-chutes.

CANDLE TO BURN NEARLY FIVE YEARS

A great candle that will burn 4 years and 7 months, claimed to be the largest ever manufactured, is to be enshrined at the birthplace of Joseph Petrosino in Italy. Petrosino was assassinated while on a secret mission to Sicily for the United States. The candle is 9 ft. high, $3\frac{1}{2}$ ft. in circumference, and weighs 178 lb. It is almost covered with 14-carat gold leaf, and its composition is Austrian beeswax, to which a substance has been added to retard combustion. The cost of the candle was about \$400, and it is the present of the manufacturer, in whose home Petrosino lived when a boy.

A COMBINATION WORK AND CENTER TABLE

In the majority of apartment buildings space is at a premium, and too many tables in a room give an apartment a cluttered appearance. This piece of furniture is designed as a center table, but the receptacles under its top are so ingeniously arranged that they offer commodious storage facilities for such household articles as sewing baskets and the like, and materials, such as laces and embroideries, that are



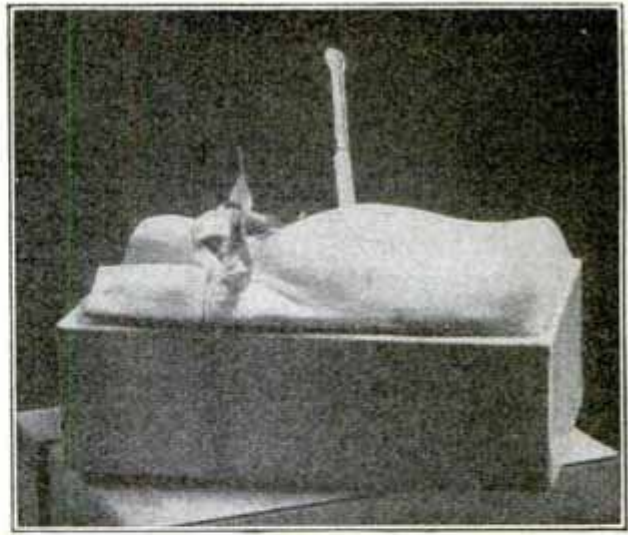
Handy Inside Arrangement

being worked upon. When working at the table, the sides are swung out, revealing lower shelves upon which the materials in use may be placed.

GRUESOME DINNER SOUVENIR

Undoubtedly one of the most gruesome and unique souvenirs ever given to guests was the one here illustrated, representing a human trunk with a knife inserted at the spot where the surgeon is accustomed to begin the search for the troublesome little appendix. To make the representation still more realistic, the trunk was flesh tinted.

The affair at which this souvenir was given to the guests was a dinner ten-

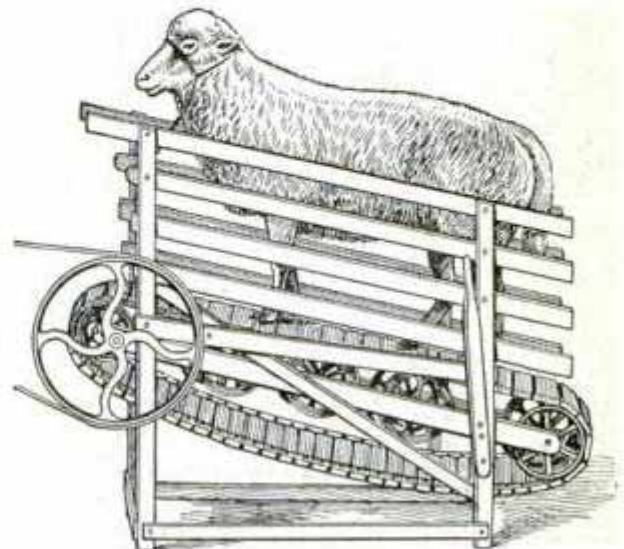


Knife Shows Location of Appendix

dered to Dr. John B. Deaver, one of America's greatest operators for appendicitis, by a number of doctors upon whom he had operated. Aside from its curiosity this illustration should put at rest in the minds of all who see it the worry over the exact position of the appendix. Almost invariably, if a severe pain is felt on either the right or the left side, the person affected has forgotten or never knew for a certainty on which side this troublesome part of the anatomy is located.

SHEEP-POWER TREADMILL

Treadmills, run by horses or dogs, are as old as civilization, but this treadmill is made and advertised as a machinery-driving apparatus driven by



Used for Driving Farm Machinery

sheep-power. It is used for driving butter-making, cream-separating, feed-cutting and other farm machinery of like nature.

REMOVABLE BRIM MATINEE HAT

As a costume feature of a play being staged in London one of the stars in the cast wears for exhibition a removable brim matinee hat. In the play the brim leaves the hat and ascends into the air. One of the drawings shows the hat with brim in place, absolutely obstructing the view of the person sitting behind it, and another shows the brim being removed.



For Stage Use Only, But—



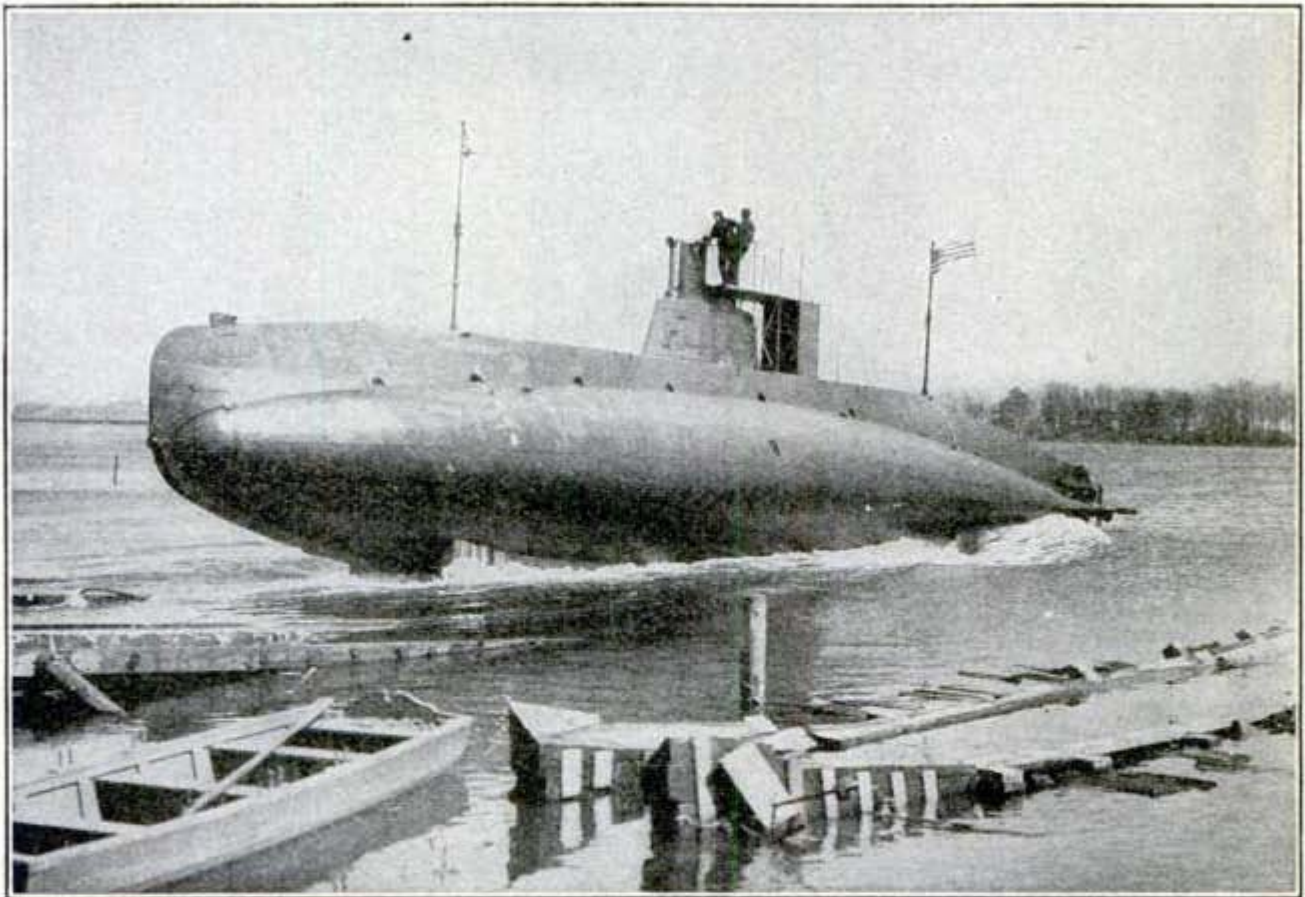
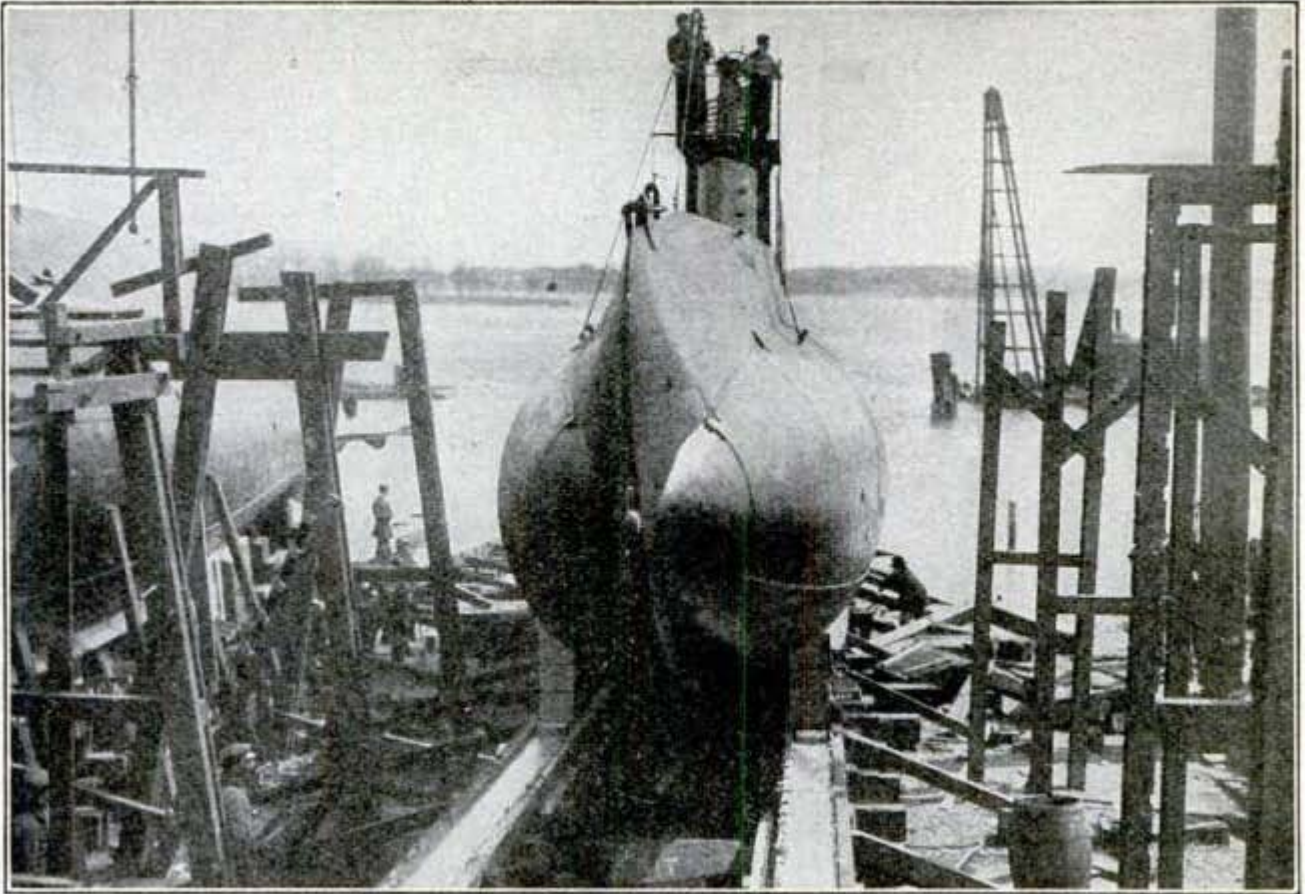
Would Be a Boon Elsewhere, Also

from the standpoint of the mere man who frequents theatres that the hat is not worn by the feminine members of the audience instead of by one of the performers.

It is spoken of as a matinee hat because a hat is never part of a well dressed English or continental woman's evening attire.



Photo of Glider at the Moment of Rising



LAUNCHING OF SUBMARINES—Three U. S. submarine torpedo boats were launched in April from the shipyards at Quincy, Mass. They are named the "Stingray," "Tarpon," and "Norwhal," the two former being shown in the illustration. The "Norwhal" is 135 ft. long, while the "Stingray" and "Tarpon" are but 105 ft. long, being duplicates of the "Octopus."

**RECORD-BREAKING FLOOD
AT HARTFORD, CONN.**

Following two days of heavy rain in the early part of the week of April 12, the Connecticut river rose 24½ ft. above low-water mark at Hartford, doing great damage in both the city proper and East Hartford, and flooding business and residence streets alike to an

impassable depth. From Connecticut boulevard in East Hartford the water area extended on both sides as far as the eye could reach. Small boats of all kinds were drafted into service to glide over streets where horses and automobiles had held undisputed sway only a few hours before. The illustrations tell the story more graphically than words.

The first illustration shows the lake-



Lake-Like Appearance of East Hartford

State and Commerce Streets, Hartford

Automobiles and Rowboats Close Companions in Flooded District



Darling Street, East Hartford

like appearance of East Hartford with rowboats traversing the streets, while the second gives an idea of the appearance and depth of water at State and Commerce streets in a business section of Hartford. The third and fourth illustrations are more views of East Hartford, the former showing Pleasant street, far from pleasant for the householders, and the latter giving a view of Darling street. The mingling of boats and automobiles in the photograph of Pleasant street certainly typifies two extremes.

SERIOUS ACCIDENT ON PITTSBURG'S INCLINES

Two young men were killed and several passengers seriously injured when the engineer of one of the incline railways of Pittsburg fainted while the two cars were midway up and down the plane. The cars are drawn by cables operated from a powerhouse. When the engineer fainted, he inadvertently threw the throttle open and fell prostrate out of the door, the two cars, going in opposite directions, taking on full speed. As the upbound car, loaded with its human freight struck

the bumper block at the top, both cables and safety cable pulled out of the eye-bolts, and the released car dashed on the rebound to the bottom of the incline. The two passengers killed and the two most seriously hurt received their injuries by jumping from the car, those that remained within it escaping with more or less painful fractures and bruises. The down-bound car was empty.

The accident occurred while the cars were making the first morning trip about 3 a. m.

"PUZZLE" PICTURE POST CARDS

A Chicago picture post card company is publishing cards so perforated that after the message is written upon them the cards may be torn into blocks like a puzzle and sent in a sealed envelope. The recipient must put the pieces together again to read the com-



Picture Post Card Puzzle



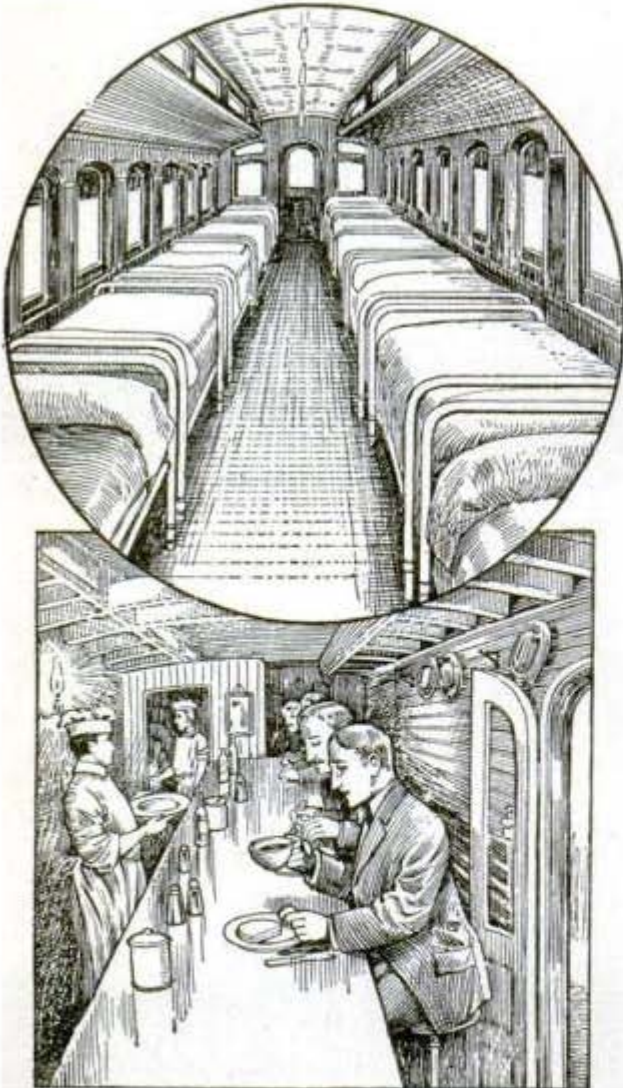
Recent Parisian Hat Creations

munication on the back. This can be done either by piecing together the design of the picture or the disjointed sentences of writing.

RAILROAD Y. M. C. A. IN DISCARDED COACHES

The illustrations show interior sec-

tions of a railroad men's Y. M. C. A. on wheels at West Springfield, Mass. Each of the old cars of which it is made up serves some separate and distinct purpose, such as reading rooms, sleeping quarters, etc. Although association work under such conditions is not always the most pleasant, the association on wheels usually develops into a modern building, with all the facilities for doing an effective work.



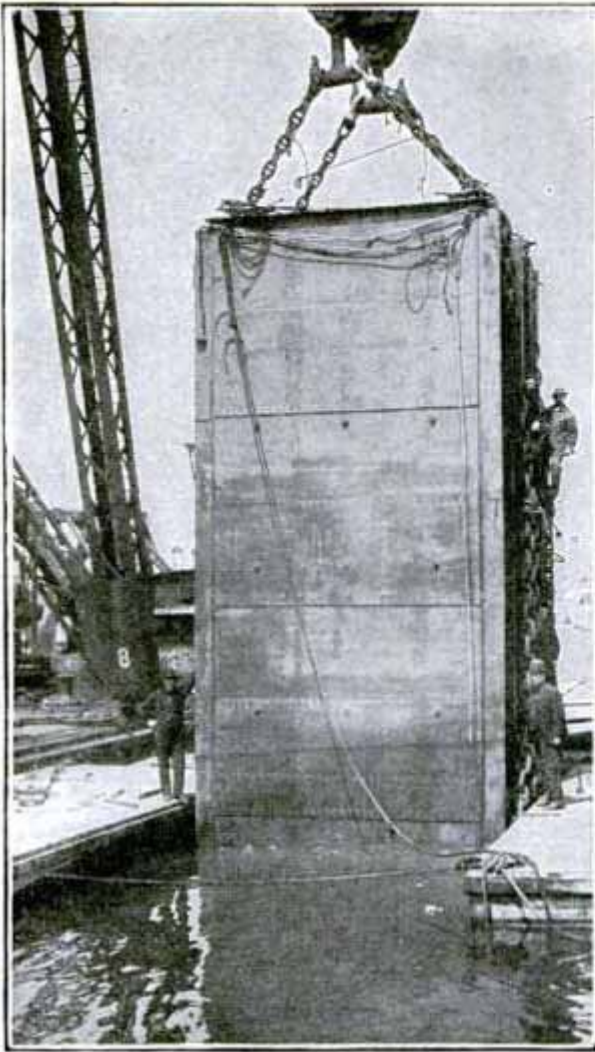
Courtesy Railroad Men's Magazine

Dining Room and Dormitory of Y. M. C. A. on Wheels



Evening Gown—Paris

U. S. NAVY TORPEDO TESTS



Armored Compartment Before and After Being Struck

These illustrations show an exact section of the armored hull of the present type of U. S. battleship before and after being struck by a new torpedo adopted by the naval authorities. The effect of the terrific shock and blow, which sent the target to the bottom, made a rent nearly 15 ft. long and 4 ft. deep in the armor. The experiment demonstrated that no vessel of the present day could stand such a blow, if struck by a torpedo having a similar charge. The explosive used in the torpedo is a secret.

ELECTRIC FANS PICK CHICKENS

One of the most unique tasks electricity is to be compelled to accomplish is the picking of chickens. An electric fan for this purpose has been devised for wholesale poultry dealers. The fan

is placed in a receptacle through which it drives a blast of air, claimed to be sufficient to remove all the feathers and down from a fowl in a few seconds.

HOW THE EYES MOVE IN READING

Most people, according to the Optical Journal, believe that the eyes in reading follow the letters in a steady movement clear across the column, but if the reader's eyes are watched closely while in action it will be seen that they make a series of jumping movements, each jump corresponding to about one-half inch of letters. This shows that reading is done more by words than by letters, and that the words are read without having to look directly at them. In a line of printed matter, the eye fixates a number of points along the

line, and from these points, taken in succession, it reads the words on that line.

HOTEL ADVERTISES ACCOMMODATION FOR AERIAL CRAFT

The first hotel in England to announce that it has accommodations for aerial craft is the White Lion at Cob-



Preparing for the Future

ham, an inn famous to coaching parties since 1650. The proprietor has set up the sign here shown in anticipation of a future rush of aeroplanes and dirigibles. He claims to have acres of

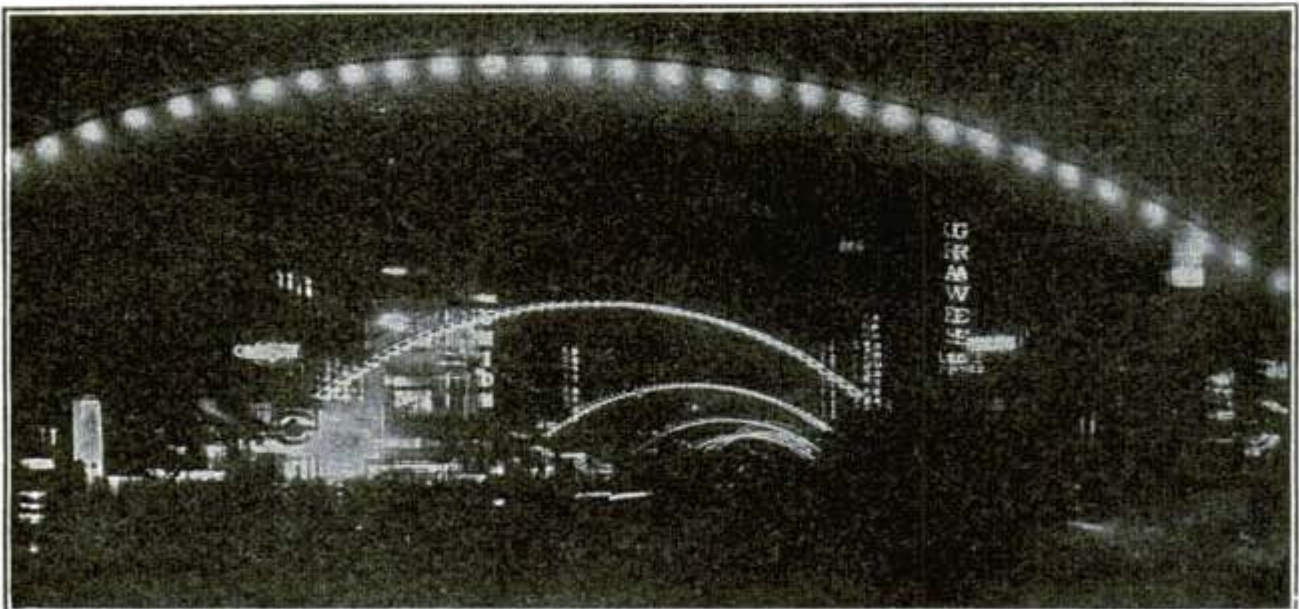
accommodation for the new means of transportation.

BRAZIL TO HAVE PUBLIC WIRELESS SERVICE

A commission, composed of the national telegraph department, the army, and the navy, is establishing a wireless telegraph system for all Brazil. Not only will it be used for army, navy and national purposes, but for a public service as well.

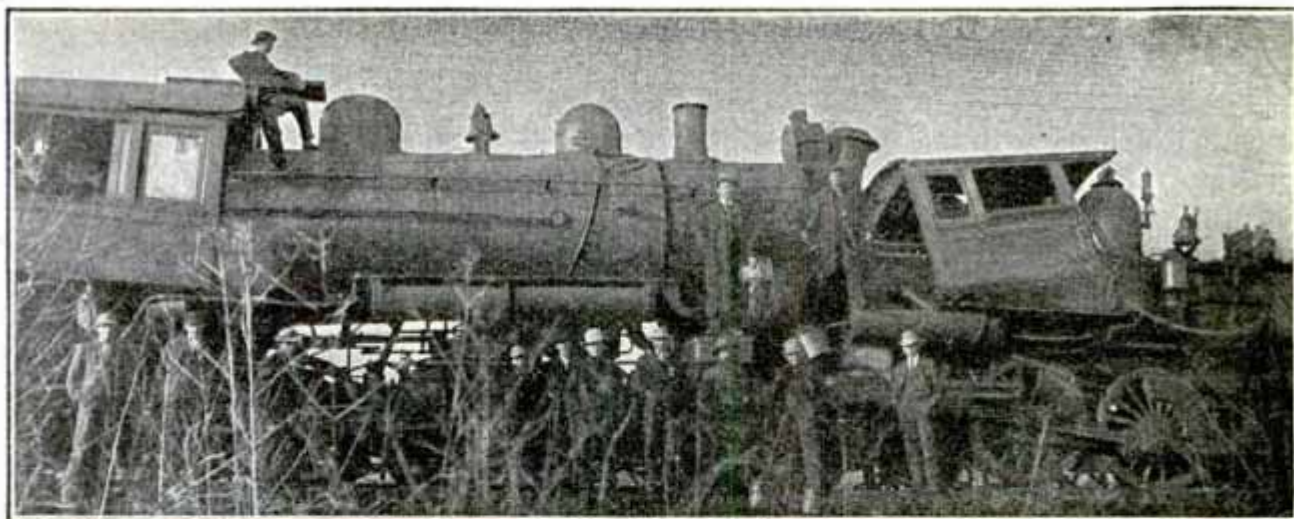
GREAT ELECTRIC STREET ARCHES

Columbus, Ohio, has been officially christened the "Arch City" for a reason most clearly shown in the accompanying illustration. Starting with a few arches erected over South High street for a distance of three blocks about eight years ago, the system has been enlarged upon until now nearly every part of the business section of the Ohio city is in this manner illuminated. The great iron arches extend across the streets from sidewalk to sidewalk, and, studded with thousands of electric bulbs, make a wonderful display. A German writer makes the statement that Columbus is lighted every night as Berlin is only on fete days.



Courtesy Columbus Dispatch

Electric Arches in Columbus, Ohio



In February a head-on collision occurred between a passenger and a freight train on the N. C. & St. L. railway near McKinzie, Tenn. Several persons were injured but none died. The force of the impact is shown in the illustration. The cab of one of the engines was torn almost bodily away from its fastenings, landing on the boiler just back of the smokestack.

ESKIMO WOMAN IS A MAGNATE

Probably one of the most remarkable woman magnates in the world is Mary Coonie, a full-blooded Eskimo whose possessions of earthly wealth are all within the Arctic circle. She is an absolute opposite to Hetty Green, the most noted woman magnate of the civilized world, in that she knows no civilization other than that of the Arctic circle, and cannot even read or write her name.

Besides having an interest in a large number of rich mining claims, the discoverers of which she "grub-staked," thus becoming their partners, she owns a valuable freight-carrying business and the largest privately owned reindeer herd in the world. Nearly 2,000 of these valuable animals, worth \$100 each in the Yukon region, bear her brand, and she also has hundreds more in young herds which will some day make a rich harvest.

From her appearance, as is shown in the illustration, she would be as liable to be passed by as a woman of ordinary means as is Hetty Green. That is, according to the civilized conception of things, but in the region where she holds sway her dress and appearance are considered distinguished.

The man by her side is not an Eskimo, but a full-blooded English gen-

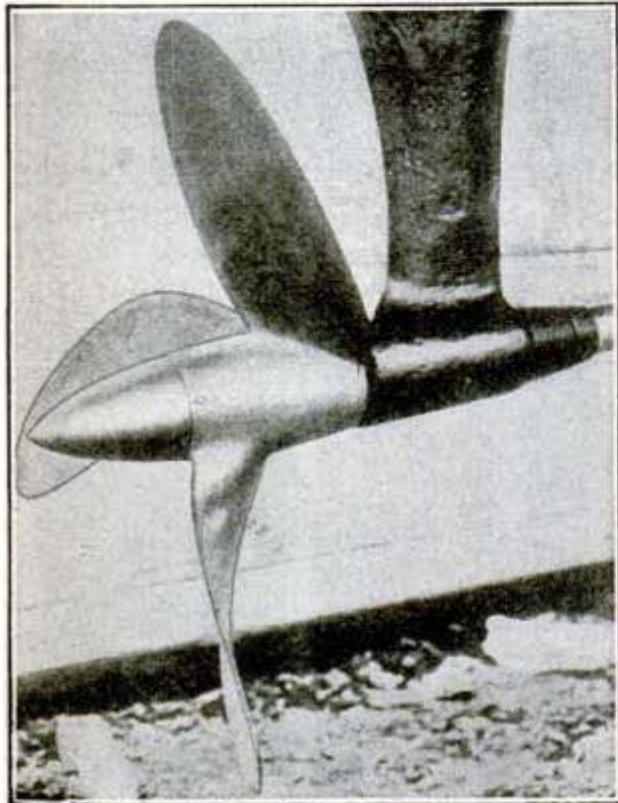
tleman, graduated from Oxford University. He is Dr. Seldon G. Forsythe, and his official position is that of private secretary to Mrs. Coonie. Upon his shoulders rests the executive and clerical part of the business, although the genius for acquiring wealth is vested in Mrs. Coonie.



Dr. Forsythe and Mrs. Coonie

SCREW PROPELLER INVENTED BY A GRAND DUKE

One of the latest steamship propellers, and one which has shown itself to be highly successful in actual hard work, is the invention of His Royal Highness the Grand Duke of Olden-



Courtesy Marine Engineer, London

An Improved Screw Propeller

burg. He conceived the idea of a screw propeller in which the blades should not, as is usually the case, lie in a plane at right angles to the shaft, but be placed in an advancing screw-line as shown in the illustrations. It is this arrangement of the blades on the hub, not their shape, which gives the additional power.

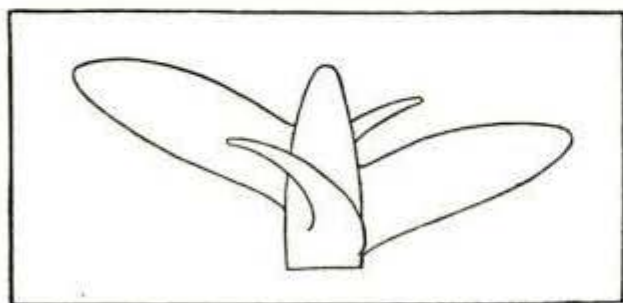


Diagram Showing Disposition of Blades

The advantage claimed for the invention is the lessening of that bugbear of the marine engineer, the slip. This means a consequent proportional in-

crease in the useful effect of the screw, as the losses by friction and side displacement of the water do not increase by this axial displacement as when the slip is lessened by increase of blade surface and diminution of screw diameter. The arrangement makes possible a smaller propeller without loss of propulsion, as its less diameter and pitch and smaller surface give with the same rotative speed and engine power greater propulsion than the ordinary propeller of the same dimensions.

For steamers such as run on the Elbe, Orinoco and other shallow rivers this matter of decreased diameter without loss of power is of great importance, as such vessels are usually compelled to have screws with too small diameter in proportion to the pitch and engine power.

MOVING PICTURES OF IMMIGRANTS

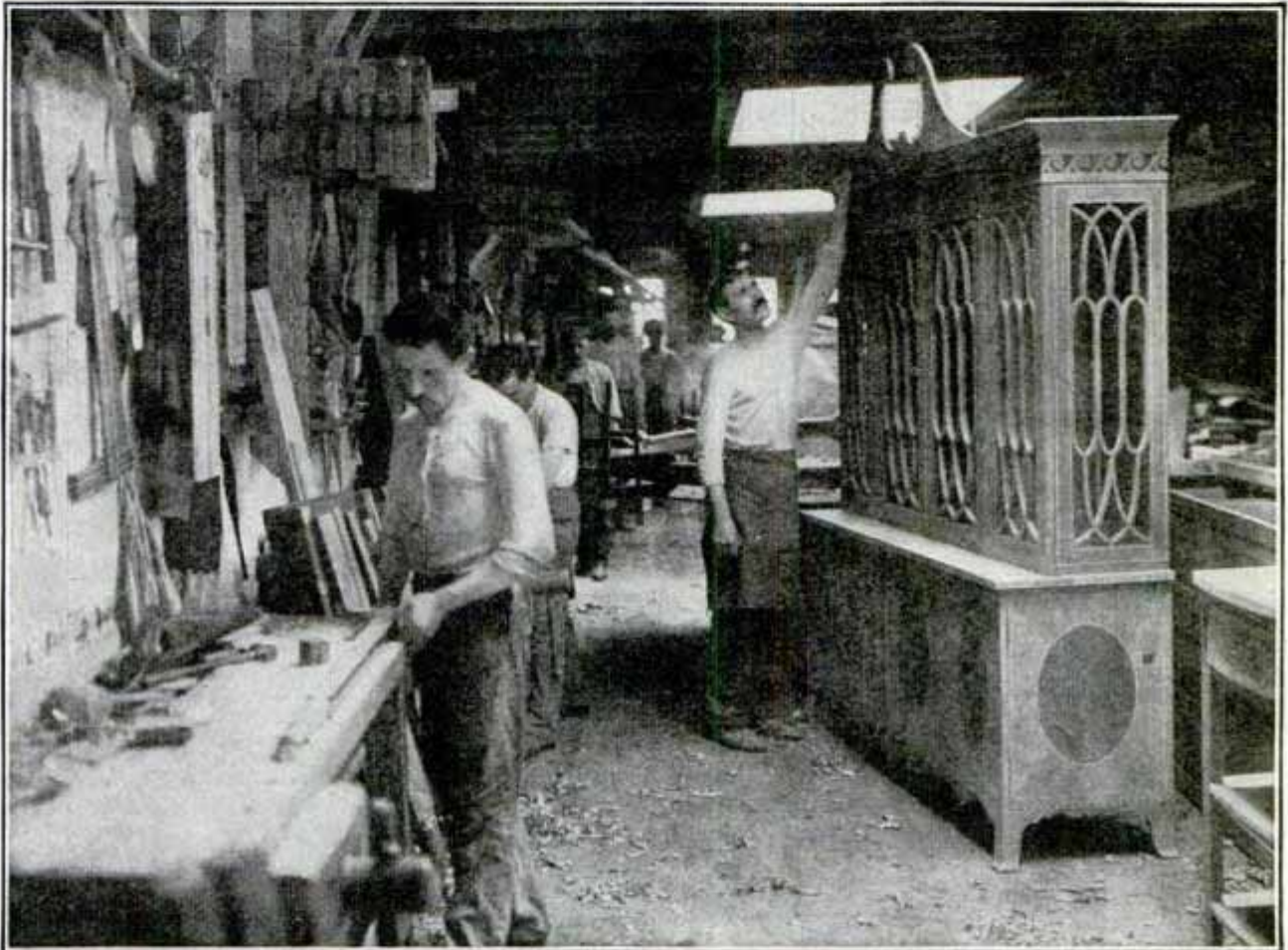
As a means of identifying aliens who come to this country Fourth Deputy Police Commissioner Woods, of New York, suggests that the federal authorities take moving pictures of every immigrant entering the port of New York. The idea has been taken under consideration. One suggestion is to form the immigrants in line, six or eight abreast, and march them into the photographing zone of the picture machine. Numbers would be pinned to their breasts so that they would show clearly in the reproduction of the films, and these numbers with the names of the wearers would be listed by the officers.

The photographing of a shipload of immigrants in this manner would not be as difficult or tedious as photographing them separately, and all would be on one long film instead of on innumerable individual plates.

Weather reports by wireless telegraph are furnished the British bureau by ships in the Atlantic. The ocean has been divided into numbered areas, so as to locate all reports.

MANUFACTURE AND SALE OF "MODERN" ANTIQUE FURNITURE

Some Buy the Imitation Antique Knowing It as Such—Others Pay High Prices for Their Credulity—Queer Reasons Why the Business Is a Thriving and Profitable One



Making of Antiques a Regular Business

The sale of "modern" antique furniture is pushed by two methods, one of which is honest and aboveboard, while the other is a highly developed system of victimizing the rich, in which not only furniture dealers but seemingly sleepy country dwellers have their allotted parts to play. In the first instance, the purchaser buys the imitation article because of a fondness for things that do not appear new, and because the imitation of famous old Chippendale and other designs or periods of furniture are so much more artistic and beautiful than the modern designs. Also because it does not cost much more than the ordinary, shiny American furniture, and because,

although the purchaser knows it is imitation, it is not necessary to proclaim the fact broadcast.

In the second instance, the purchaser buys it as a real antique at a price double what it should be, but only about half as much as he really thinks it worth. This fact, backed by the average amount of credulity, is the reason that the dishonest method of selling modern antique furniture has become a thriving business. Both the purchaser and the dealer are made happy. The purchaser, because he convinces himself that the dealer does not know the real value of the article he sells; and the dealer, because of the innocence of the purchaser, and an ex-

cellent deal carried through. The dealer chuckles in his sleeve; and the purchaser, in his home.

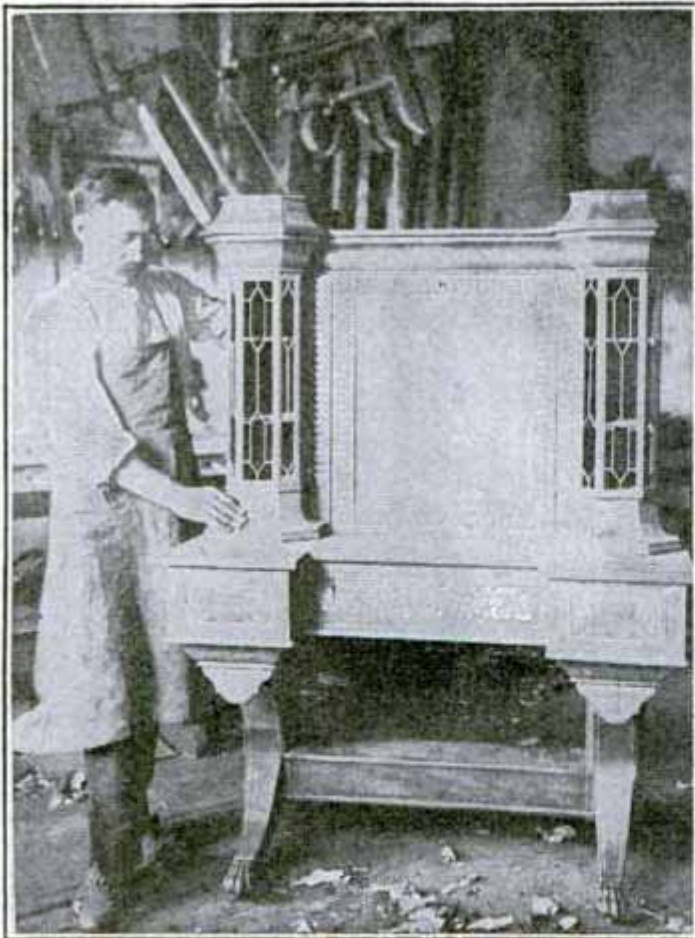
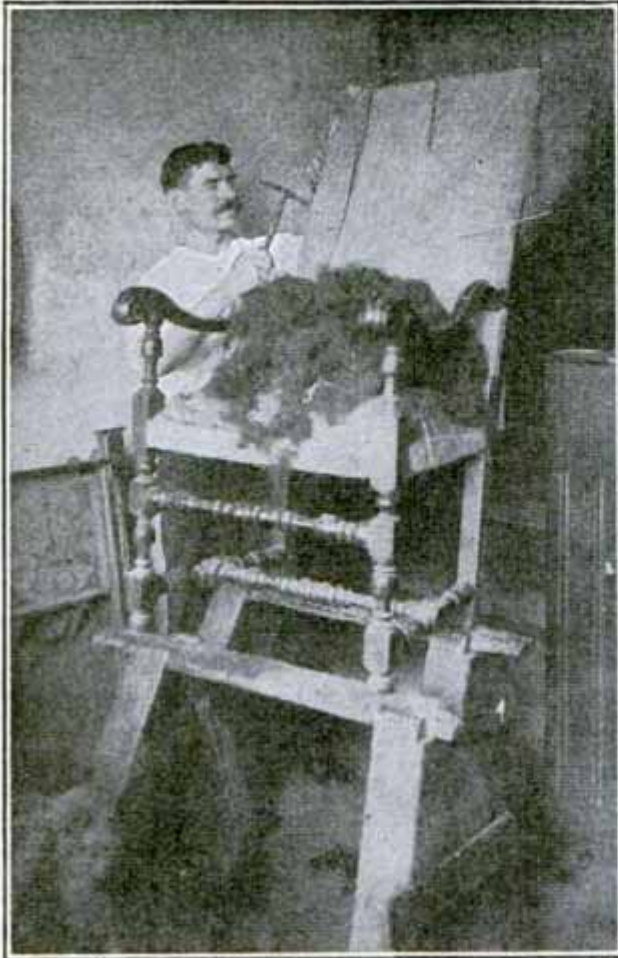
Of course, it is usually the small, comparatively unknown curio dealer that is developing this business, and his chief assistants in many cases are country dwellers. Summer guests at farmhouses are charmed with the antique furniture. It is taken for granted, of course, that the ancient walnut sideboards, the quaint chairs, and the couches that suggest the days of the Pilgrim Fathers are genuine. It is natural to suppose that such things should be found in a farmhouse in which one family has lived, presumedly, for generations. What more natural than that these heirlooms, familiar to the farmer and his practical, unromantic wife for decades, should have no real monetary value in their eyes? The farmer's wife, argue the designing summer boarders, would doubtless sooner see her home fitted up with dazzling new furniture than the somber old pieces. An offer is made, and, if it is high enough, accepted after some hesitation. The summer boarder can scarcely wait to get the furniture away, for fear that the farmer and his wife may repent of their haste. Could this particular boarder see the delight of the old couple as they check off the amount received for the fake antiques against the sum at which the dealer who left them there at the beginning of the year priced them, the joy of getting something for comparatively nothing would be tinged with sorrow.

So far has this business developed that agents tour the country, "salting" farmhouses with this bait for unsuspecting summer boarders. So cunning are some of the imitations made, that it is difficult for any but experts to detect the differences; and in this, at least, the victim has something for his money. The appearance of age is easily conveyed by carefully removing the gloss from varnish, boring worm holes, or accomplishing the same result with bird shot. Edges are sandpapered and then dulled, to give the appearance of wear.

The aging is a simple process compared to the making. It is necessary to copy the design of the antiques correctly, and a false move in the arranging of a scroll, or the turning or carving of a leg, may disclose the fake. Most of the fake furniture is copied from genuine antiques. In many instances this is done so successfully that, were the imitation to be substituted in the night for the genuine, the change probably would not be detected for some time, and it is such substitution, done legitimately, that is the queerest part of the fake antique industry.

There are many old families in the United States whose fortunes have been gradually drained, and whose inherited pride will not permit them to admit to the world that evil times have befallen them. The first things that go in the fight against poverty are the family jewels. These can be duplicated in paste and society is none the wiser. If money shortage still continues the beautiful old furniture must follow. Such furniture is worth much in these days of a craze for the possession of antiques. The newer the advent of the "newly rich" the more intense the craving for old furniture. The dealer in imitation antiques comes to the help of both the poverty stricken gentlefolks and the antique stricken people of wealth. He makes, for a fraction of the price received for the genuine antiques, an entirely new set, the work of imitation being done so well that visitors at the house will not notice the substitution. The real furniture, taken away supposedly to be repaired, soon becomes part of the furnishings of a splendid new palace, and the imitation comes back in its stead. The illustrations show the manufacture of furniture in a modern, up-to-date antique shop.

Some idea of the prices genuine antique furniture often sells for is shown in these figures of a recent sale in London: One Chippendale gothic bookcase, \$2,000; one Chippendale bookcase, \$500; a Georgian mahogany wardrobe, \$155; a carved Chippendale wardrobe, \$360; Adam suite of 12 arm



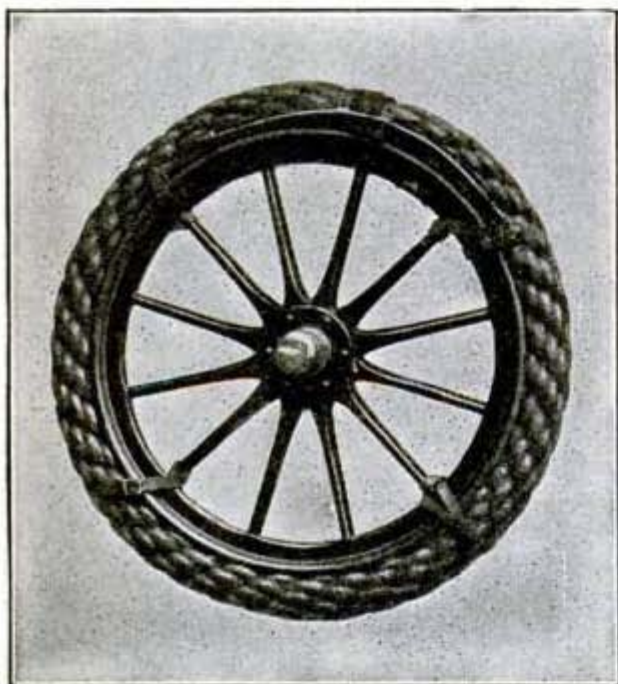
**An Antique Chair in the Making
Ready for Shipment**

**Completing the Inlaid Work
Egus Antiques, All Hand Work**

and three occasional chairs and a settee, \$815; one pair of Chippendale occasional chairs with carved ornament and interlaced backs, \$210; one pair of Sheraton card tables, \$235; a Chippendale oval jardiniere, \$185; Sheraton writing table, \$250; one pair of small Sheraton open wall bookcases, \$255.

EMERGENCY ROPE TIRES

One of the automobile enthusiast's greatest worries is the fear that his tires will be punctured or blown out. This tire is for just such an emergency, and the rubber tire can be replaced



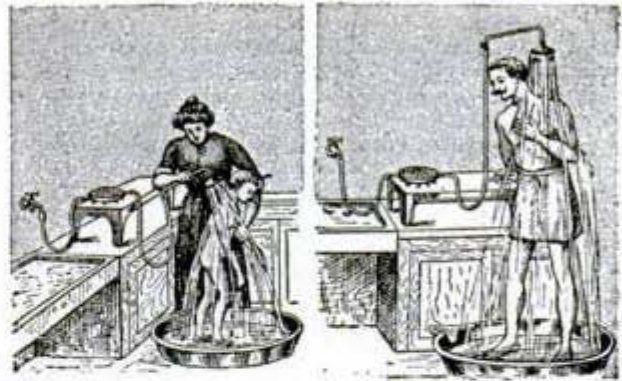
An Emergency Auto Tire

with it in a few minutes. It is a water-proof rope tire and can be carried in a straight tube under the car, or on the running board.

INSTANTANEOUS HOT WATER SHOWER

A most ingenious arrangement of a hot-water shower bath has been devised by a French inventor. It consists of a spray, a rubber hose, and a flat heating-coil arrangement. This coil is placed over a gas, alcohol, gasoline or oil burner, and the fire lighted. One end of the rubber hose connecting with the heating device is attached to a

water tap and a second rubber hose carries the heated water from the coil to the arm of the spray. It is claimed

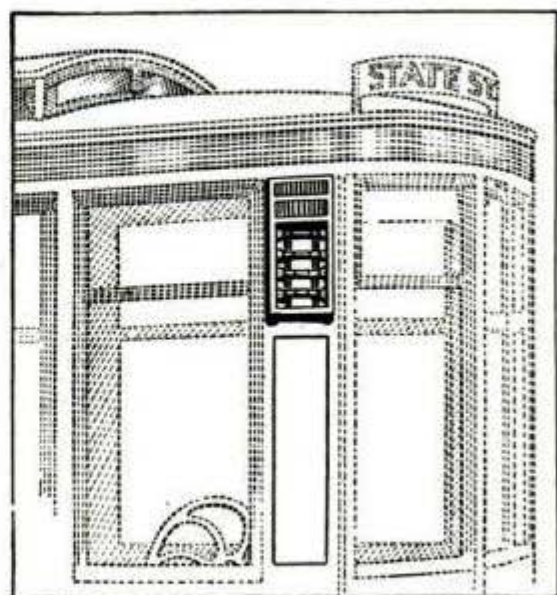


Temperature Always Even

that the water is heated as rapidly as it can pass through the hose, that the stream has considerable force, and that the temperature of the water is at all times even. The amount of heat is regulated by the amount of fire allowed under the heater. It sells for \$5.

NEW FUSE BOX FOR STREET CARS

Owing to the fact that the blowing out of a fuse often causes a panic on street cars, with resultant injuries to passengers, the new steel cars of the St. Louis railways are equipped with a specially designed fuse box which is placed between the two posts at the



Fuse Box That Will Not Frighten Passengers

forward right-hand corner of the motorman's vestibule. When a fuse blows out, the discharge passes to the outside

of the car through slat-covered openings. The report of the explosion is on the outside of the car, likewise the smoke and discharge of material, therefore the passengers give it no more consideration than any other outside noises and panic is forestalled.

The box is built with a door which opens into the vestibule, and the motorman can replace the fuse without leaving his position at the controller. On the door are carried contact points which are so wired that when the door is not tightly closed no electrical connection is made with the fuse holder. Thus the opening of the door by the motorman disconnects the fuse-holder terminal, and he can proceed to handle the terminal and parts without danger of shock.

TESTING COAL FOR COKE PRODUCTION

In the time that the fuel-testing plant of the U. S. geological survey at Denver has been in operation results have been achieved which will prove of the greatest importance to the entire western part of the country. Of 37 coals tested from the Rocky Mountain region all but three produced good coke under proper treatment, although a much greater number had been considered non-coking.

The tests were made by the government for the general purpose of increasing efficiency in the utilization of the fuel supply of the United States by devising improvements in washing and coking coals, these being two important methods of conserving one of the country's most important natural resources.

Specifically the washing tests were made to determine the possibility of so improving the quality of the coal as to render it available for coke production. Coal used for this purpose must be free as possible from ash, sulphur and other impurities, because of the prospective use of coke in metallurgical processes.

The washing tests have already dem-

onstrated that many coals which are too high in ash and sulphur for economical use under the steam boiler or for the production of coke may be rendered of commercial value by proper treatment in the washery.

PHOTOGRAPH OF GREAT OIL WELL FIRE

This photograph was taken at night and is of a great oil well fire in Kansas. The well burned for a period of two months, during which time the efforts to extinguish it were carried on unceasingly. The method at last adopted, and which finally proved successful, is interesting. A great metal hood, provided with a valve, was placed on a truck and run over the blazing mouth of the well. The first and second hoods used were melted by the intense heat, but



the third withstood the test, the valve in the hood was closed, and the well was at last under control.

The well had an output of nearly 50,000,000 cu. ft. a day. When the photograph was taken the flame was burning to a height of 150 ft.

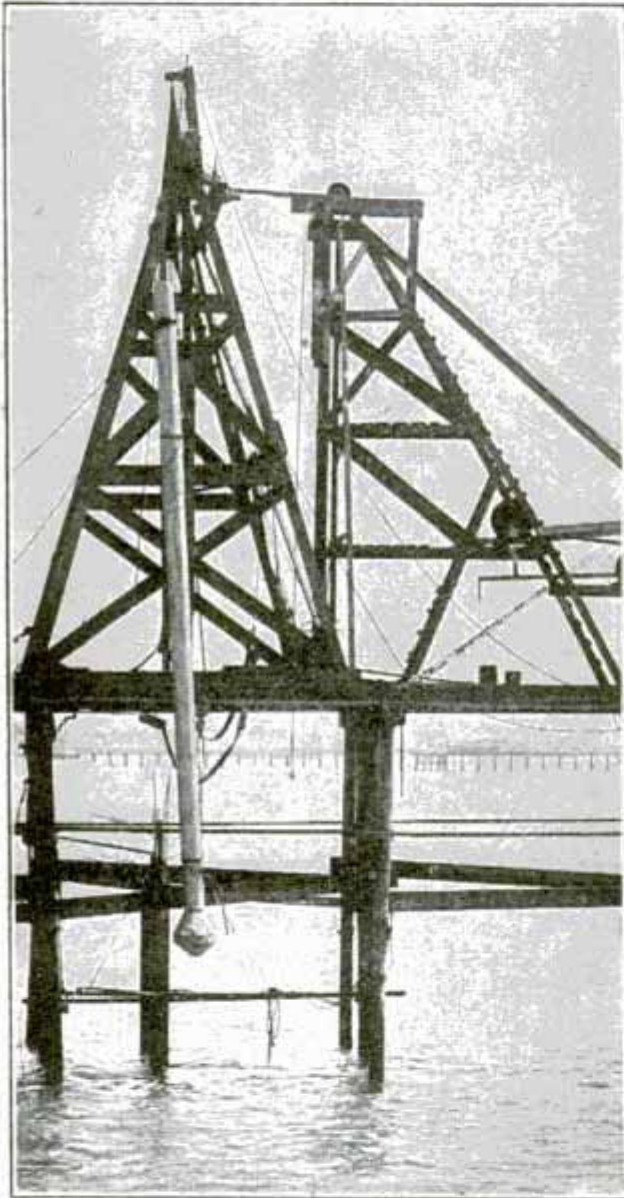
ATLANTIC DISASTERS

During the fall and winter season of 1908-09, which ended March 21, 221 persons perished by shipwreck and 89 vessels met with disaster off the New England and British North American coasts, or while engaged in the New

England or Canadian trade. Of the 89 vessels cast ashore or lost at sea, 6 steamers and 56 sailing craft were totally wrecked. The financial loss exceeded \$3,000,000.

THIRTY-TON CONCRETE DOCK PILE

The work of constructing the \$100,000 municipal pier of reinforced concrete goes steadily on at Santa Mon-



Placing a 30-Ton Concrete Pile

ica, Cal. This is the first structure of the kind to be attempted on the Pacific coast, and on previous occasions this magazine has presented photographs of different features of the structure as developed in the progress of the work. The accompanying illustration is that of a 30-ton artificial

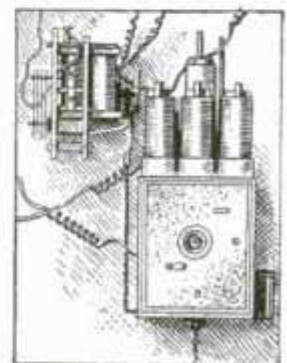
stone pile being lowered from the derrick into the water, preparatory to being jettied into the sandy bed of the sea. The pier is to have a length of 1600 ft. The piles have been sunk for the first 1300 ft. and mechanical ingenuity has succeeded in overcoming the numerous obstacles that have arisen from time to time. The greatest difficulty has been experienced in the arrangement of a traveling crane to lift the piles from the moulds and carry them horizontally so that they could be placed in the tram car. Owing to the vibration, the heaviest of the piles being 72 ft. in length, derricks that were built and guaranteed to carry three times the weight of the piles have been known to snap.

LATTICE-WORK FIGHTING-TOPS FOR ATLANTIC FLEET

Secretary of the Navy Meyer issued a statement in which he announced that the repairs necessary for the Atlantic fleet, recently returned from the trip around the world, are less than were anticipated. The extension of the time for the completion of the work from May 15 to June 15 was made simply for the purpose of substituting the new lattice-work fighting-tops for the old solid design. When this is done, all the great battleships of the American navy will be ready for the fall target practice.

BURGLAR ALARM PHOTOGRAPHS INTRUDER

An Italian inventor has designed a burglar alarm and camera attachment known as the cleptograph. An intruder cannot enter a room where it is arranged without disturbing one of the wires. The movement of any wire turns the machine in the direction



from which the disturbance arises, sets fire to a magnesium light, rings an alarm bell, and takes a snapshot of the intruder.

BED BREAKFAST TRAY

For invalids, and other persons who make a habit of breakfasting in bed, this ornamental cane-work bed tray will be of considerable interest. It measures 2 ft. wide and provides plenty of accommodation for a breakfast service. It is very light and can be easily carried in and set down beside the bed.



SHOOTING COMPETITIONS BY TELEPHONE

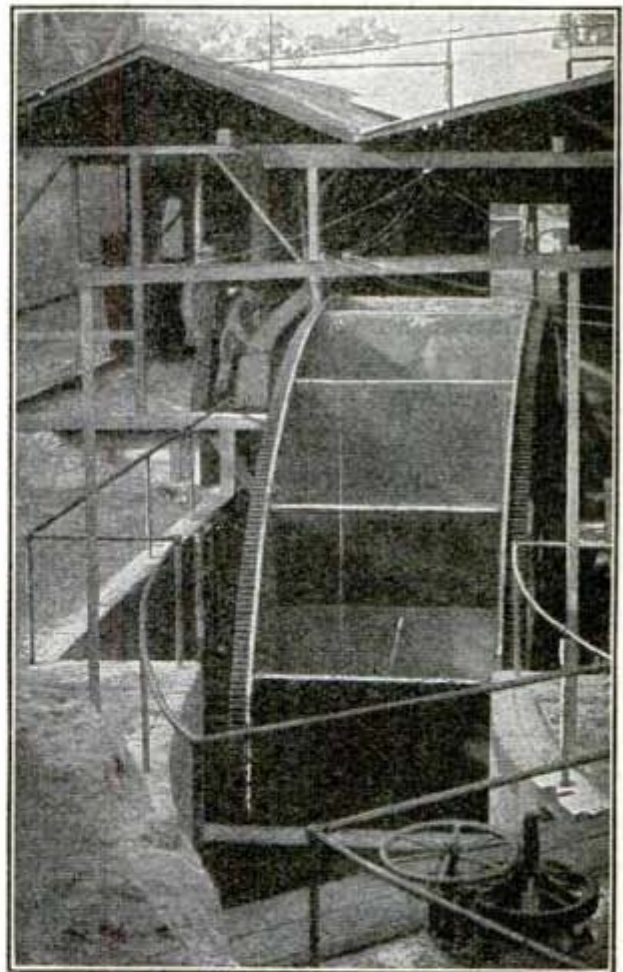
Competitions between various clubs of different cities, made possible by the telephone, are not new, even chess players on both sides of the Atlantic playing the game with each move flashed across the ocean by cable, but such competitions are always interesting. Revolver clubs in St. Louis and Belleville recently carried on such a competition. Following each shot the scores were telephoned back and forth, the club accountant at each end figuring up the total and giving out the winning figures. At the end of the match, the winning team gathered around the telephone and enjoyed a long-distance triumph over the losers.

RECLAMATION OF LAND IN ARIZONA

Near Yuma, Arizona, in a single project, the reclamation service of the United States government has two widely dissimilar problems of reclamation to solve. One is to drain damp river bottom land already protected by dams, and the other, only half a mile distant, is to raise water for the irrigation of land too dry for successful farming.

Just below Yuma is the heading of the Farmer's canal, a ditch which is not low enough to tap the Colorado river at its lowest stages, a condition which will not exist a couple of years from now when the project is completed. A temporary solving of the problem has been accomplished by the giant steel scoop wheel shown in the illustration. This lifts the water from the river into the ditch.

The wheel is 6 ft. wide by 26 ft. in diameter. Its buckets have no flare, and really should be termed paddles, for they merely push the water up the convex slope of the solid concrete pit within which the wheel is operated. The lift is ordinarily about 6 ft., and to this height the wheel is capable of readily handling enough water to irrigate 10,000 acres of land. The power for operating the wheel is supplied by



Raising Water for Irrigation

two 50-hp. gasoline engines. Such wheels were in use in Egypt and India more than 1,000 years ago.

The Colorado is rated as one of the five great rivers of the United States

and its volume will be but little diminished by the draft of canals that will irrigate hundreds of thousands of acres of land when the reclamation project is completed.

A FACE IN THE ROCK

This remarkable example of the work of nature is to be found on the Stark ranch near Oakland, Cal. From the ground to the top of the head is 150



"Pat Reilly"

ft. The rock is called "Pat Reilly" for reasons that are obvious. The pipe in his mouth is made of wood and is of considerable size.—Photo contributed by Ray Travers.

BUTTER PRESERVED 200 YEARS

Ghee is used in India as is butter in American and European countries, and in fact is butter, so prepared that it never grows stale, instances being known of its preservation for as long as 200 years. In preparing ghee, butter is boiled until all the watery particles and curds have been thrown off by repeated skimmings. When the liquor is clear oil it is poured into a vessel to cool. When cooled it is in granulated form, and will keep for years without becoming rancid or of

bad odor. Ghee has been found in deserted castles where it must have been left more than two centuries ago.

The price of ghee has increased 125 per cent in India during the last two years. It sells now for twice the price of ordinary butter, and the value of the amount produced last year is estimated at about \$20,000,000.

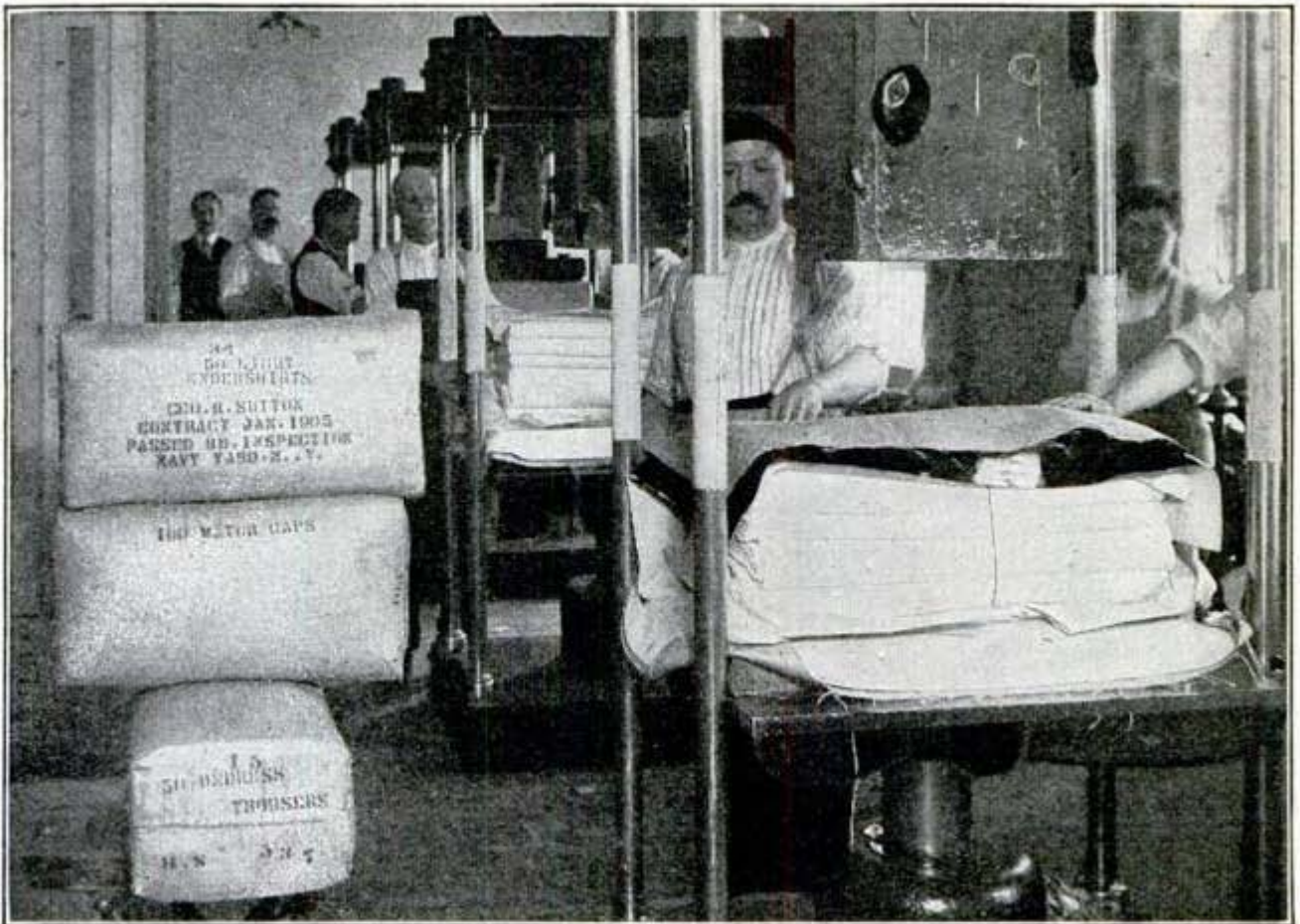
POWDER MILL EXPLOSION IN IDAHO

Three men were blown to atoms and one severely injured in an explosion that totally destroyed a powder mill located a couple of miles from Wallace, Idaho. The explosion occurred in the mixing room. All that was found of the bodies was one piece weighing about 20 lb., and the location of this was revealed by coyotes more than half a mile from the place where the explosion occurred. All that remained of the plant after the explosion is shown in the illustration.

One startling feature of the explosion lies in the fact that the destruction of the Missoula train on the Northern Pacific was probably averted by a margin of less than a minute, as it was approaching the works a half mile distant when the powder let go.



Result of Powder Mill Explosion



BUNDLING CLOTHES WITH HYDRAULIC PRESSES

The problem of storage on a great battleship is always an important one, and to make the proportionately limited space allowed hold the required stores means close figuring. No better example could be given of the methods resorted to than that of the putting up of the ready-made suits and other wearing apparel for the sailor boys. These garments are reduced to small compact, water-proof bundles by the hydraulic process shown in the illustration. In this shape and size they are easily stored.

To the left of the illustration are shown three completed bundles. The first contains 50 light undershirts, the second 100 watch caps, and the third 50 undress trousers.

REAL LIONS DEVOUR MAIDEN FOR MOVING-PICTURE MACHINE

In a suburb of Paris is a factory where cinematograph films are made. The company operating the business has a large tract of land fitted up as an amphitheater, within which are enacted the blood-curdling scenes which delight American and other audiences in the moving-picture shows.

Recently pictures were made depicting the death of a young Christian maiden in a den of lions. Vestal virgins, courtiers and knights marched around the arena and then took seats

safely outside a huge cage. A young girl was strapped upon a cross within the cage and seventeen real lions were let loose. The lions were exceptionally hungry and made short work of the poor martyr. They had been borrowed from an animal show and had been kept without food for three or four days. They tore the maiden limb from limb and spilled her blood all over the cage, but the maiden didn't even scream for help—her flesh was papier maché stuffed with raw beefsteaks.

NUMBER OF TAXICABS IN LONDON AND PARIS

The number of taxicabs in use in Paris at the beginning of this year was officially given as 2,937, while the number of horse cabs at that time was 8,790. Twelve months previous the number of taxicabs was only 1,465, and horse cabs 9,608, which shows that the taxicabs were doubled in number in one year.

London had 2,805 taxicabs at the beginning of this year, which is 1,080 more than at the beginning of 1908, and 2,709 more than at the beginning of 1906. The number of motor omnibuses now in use in London is 1,150. Paris only has about 175.

TRANSPLANTING SHADE TREES

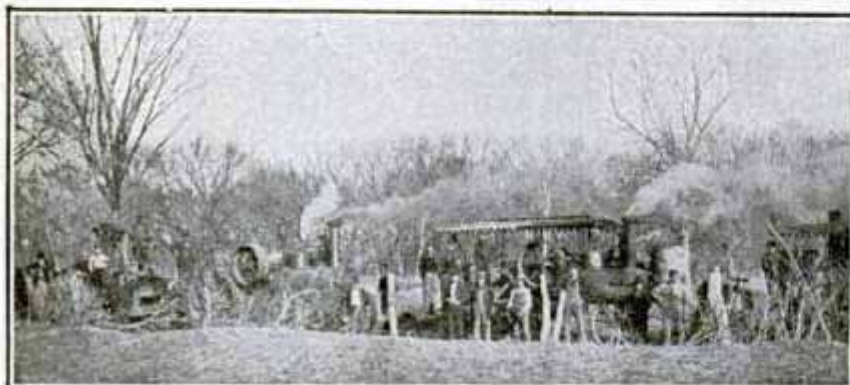
In Lincoln, Neb., and the surrounding suburban towns, thousands of dollars are expended annually for trees, which are taken from the Salt creek bottoms near the city and transplanted in the yards of the residents. The illustrations show an elm tree some 35 ft. high, with a trunk diameter of 16 in., and an approximate weight, with

the earth around the roots, of 14 tons, being moved by traction power. The trees are cut out of the ground while the soil is frozen, so that the earth will cling to the roots, and placed upright on specially constructed drags. Three traction engines are required to drag a tree of this size.

RUBBER FOUNDATIONS FOR STEAM TURBINE

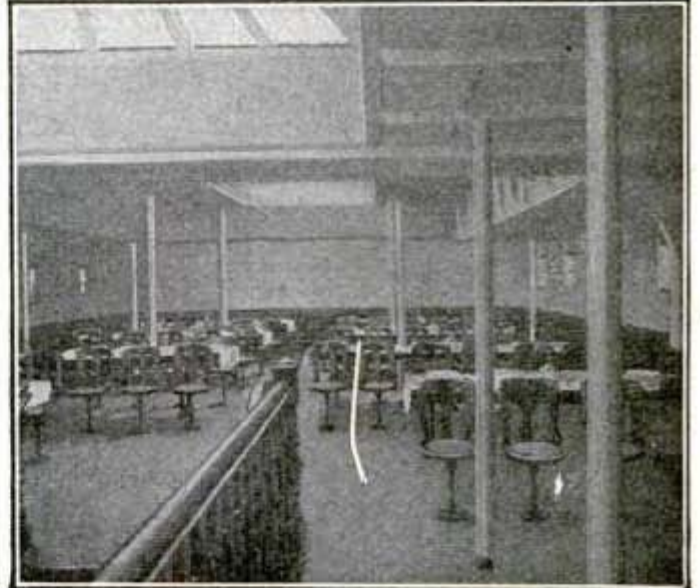
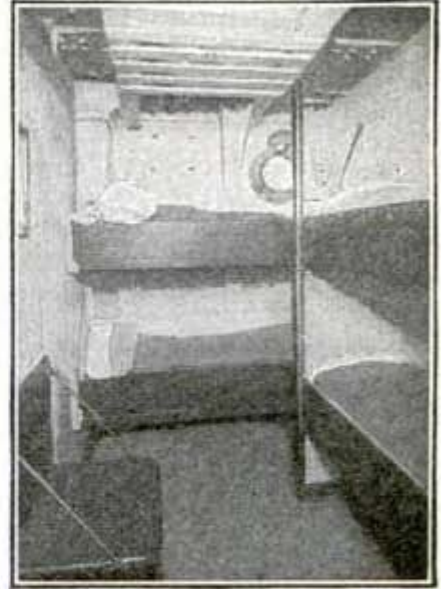
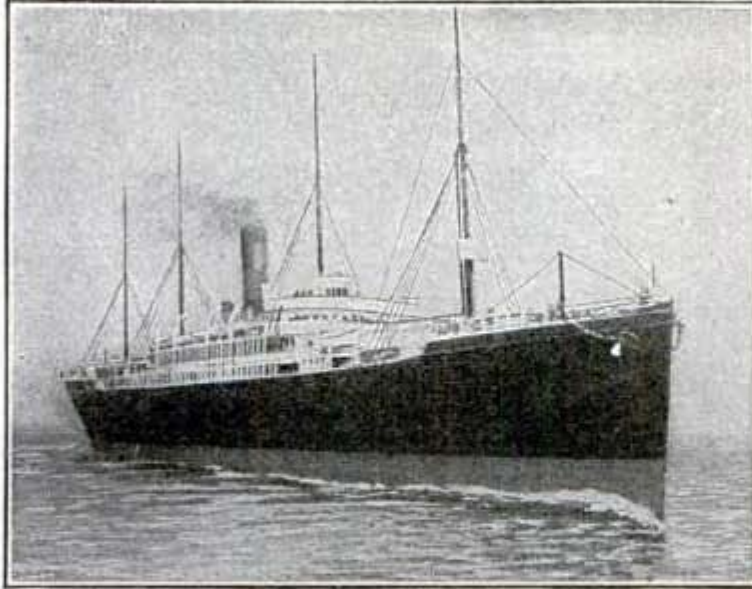
A steam turbine of 2,000 K.W. for the St. Pancras church property in one of England's cities has been mounted on special rubber foundations with a view to avoiding vibration, although the contractors were prepared to guarantee the turbine would run free from vibration on an ordinary concrete bed. In accomplishing this, the turbine set was bolted to a concrete slab about 2 ft. thick, spoken of as a floating slab, and this rests on a number of rubber stools, the stools in turn resting on an ordinary concrete foundation. Each rubber stool is a cylinder about 4 in. in diameter and 3 in. in height, when compressed by the weight upon it.

The turbine in question is the largest hitherto mounted in this way.



Transplanting Trees in Lincoln, Neb.

AN EMIGRANT TRANS-ATLANTIC LINER



The "Gothland"—One of the State Rooms—A Smoking Room—Dining Room

The Red Star liner "Gothland," new in name and comparatively so in service, made her maiden trip a short time ago in the trans-Atlantic third-class trade, and is unique in the fact that she is equipped for third-class passengers only and has unusually elaborate accommodations throughout.

As shown by the photographs, these accommodations are much superior to those ordinarily assigned for this class of passengers, and one of her best features is the fact that all her wide expanse of deck is entirely at the service of the 1,700 emigrant passengers she can carry. Her cabin arrangement is excellent. A large number of 2-berth

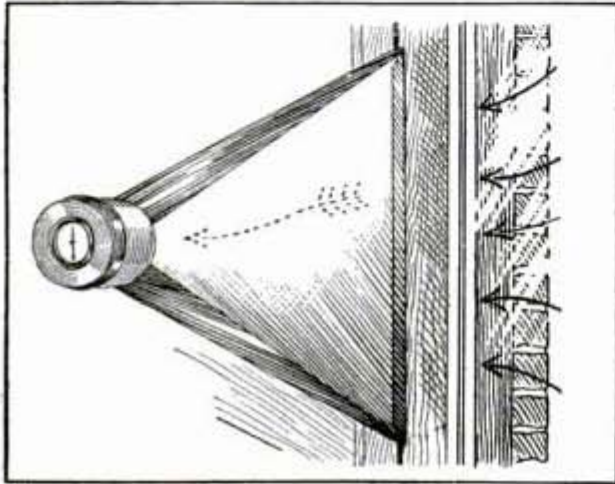
rooms are set aside for the use of married couples, families also being assigned to small rooms, and the old type of open-berth sections, which is the usual accommodation for such passengers, is entirely done away with. Two large dining rooms of ample seating capacity are situated on the upper and lower decks, and smoking, reading and lounging rooms are also provided; unheard-of luxuries for emigrants hitherto.

The "Gothland" was formerly one of the crack steamers in the Australian and New Zealand service of the Red Star line, as the "Gothic." Last year she underwent extensive alterations

and now sails between New York and Antwerp. Her length is 504 ft., and her beam 53 ft. 3 in. She will run at least 16 miles an hour.

MEASURING AIR LEAKAGE THROUGH WINDOW JOINTS

One of the greatest problems confronting the engineer in modern heating is to provide sufficient heat and air change under any weather condi-



Device Measures Air Leakage

tions liable to occur, and to aid him in his specifications this device for measuring the leakage of air through any section of a window joint has been devised.

The drawings show its construction, the air movement being registered by a 4-in. anemometer placed in its nozzle. Tests with it have uniformly shown that the outflow from window crevices on the leeward sides of buildings exceeds the inflow from the windward sides, especially so when the building is heated by the indirect method with forced circulation.

The inward and outward movement of air through crevices in the window joints is practically unimpeded. Tests made with a fan forcing air against a sash show that a pressure equal to a wind movement of 15 miles per hour will force about 185 cu. ft. of air through one lineal foot of sash crevice 1/16-in. wide in an hour.

COST OF KEEPING BATTLE- SHIPS IN CONDITION

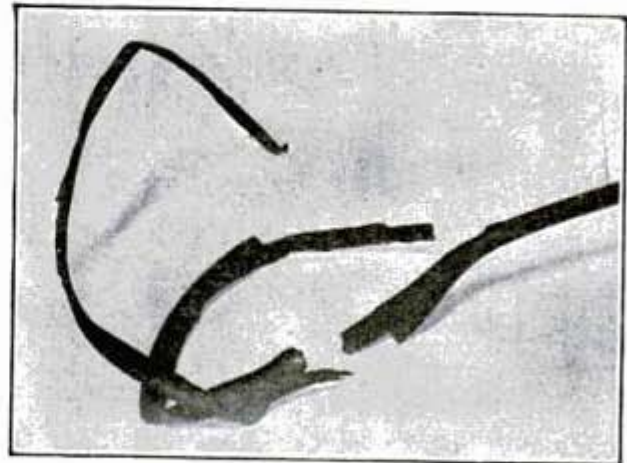
According to the Secretary of the Navy it costs \$110,000 to keep a first-class battleship in repair and in first-class seaworthy condition for one year. This figure does not include extraordinary repairs, such as the remodeling of a ship that has been taken out of commission for the purpose. The estimate was gained by striking the average of the amount of money spent on 17 battleships during the fiscal year 1908.

The coal bill for the United States navy during the same year was \$3,163,900, without the expense of handling and storing the coal, which brings the total up to \$5,544,945.

ASH HOE EXPLODES

While an ash hoe and fire scraper was being used in cleaning the fire in the boiler room of the Wait building in Decatur, Ill., the implement exploded, blowing the engineer back a distance of 10 ft., and also blowing out all the doors of the furnace. The report of the explosion was heard a block away.

The hoe was made of 1-in. gas pipe, 9½ ft. long, with scraper on the end. One end of the pipe handle was open, and it is believed that the hollow interior became filled with slack coal. The handle became hot and the slack



An Ash Hoe That Exploded

formed a gas which caused it to explode. What was left of the hoe is shown in the illustration.

MILL SAW STRIKES HORSESHOE IN LOG

While sawing through a bitternut hickory log in a mill at Pierpont, Ohio, a horseshoe, embedded nearly 4 in. within the wood, was struck and cut through transversely for 3 in. without breaking any of the teeth of the saw, although the friction melted the iron and it attached itself to the plate in six different places. The saw was running at a speed of 600 revolutions per minute.

The shoe was hanging on a nail within the wood, and, according to the rings of growth outside of it, must have been placed there at least 25 years ago.—Contributed by A. Lamson.

A business communication in Arabic recently reached a Manchester firm, and when translated by an interpreter proved to contain a request for the price of coppering "two water sheep." This was the nearest it approached "hydraulic rams."

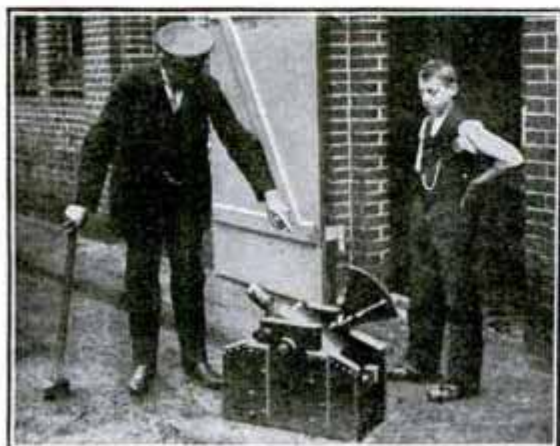
TRAINING MEN TO SLAUGHTER CATTLE

One of the illustrations shows the method of slaughtering cattle with a revolver at the central abattoir in Berlin, Germany. The others are views of an apparatus used at the same institution to train the butcher's apprentices in the killing of animals by the hammer method. The apparatus has



Butcher's Apprentice Practicing

an indicator and scale which tells the force of the blow, so that the apprentices soon learn just the force they require to make the killing as humane as possible.



Blow-Testing Machine



Slaughtering with Revolver



ACTIVITY OF MISSISSIPPI WHARVES

Both of these photographs are typical Mississippi river scenes at New Orleans. At one of the wharves is shown a small, flat-bottomed Mississippi steamboat, and at the other an ocean steamship of the kind that will supplant the smaller boat, if the "Lakes to the Gulf" deep waterway project is ever carried out. The barrels in one of the photographs are filled with sugar and molasses.

WIRELESS OPERATOR STRUCK BY LIGHTNING

Lightning is an infrequent phenomena on the Pacific coast, and owing to this fact the wireless stations are not adequately equipped to protect the appliances from being struck. In February, while the operator of the Massie

wireless station near the Cliff House at San Francisco was communicating with the steamship "Lurline," he was suddenly enveloped with a flash and rendered unconscious, burning mementoes of the experience being imprinted on the flesh of his arms, chest, and back. The wireless mast and wires acted as a lightning rod.

EDITORIAL

Have you ever bought any cob meal? If so, you did it unintentionally. Cob meal is made by grinding corn cobs, and the industry is one shrouded in great mystery. Not that there is any secret of particular value in the process of grinding, but the ultimate purpose of the corn cob meal is not such as to make publicity desirable. Thousands of dollars have been spent in perfecting the grinding machinery, and the process is now reduced to a practical science.

It is apparently reassuring to learn that "it is necessary, of course, to have the cobs clean of husks, stones and pieces of chain, brick, etc."; but investigation develops the fact that this precaution is taken not on account of the meal, but to safeguard the grinding machinery. Even so ignoble a thing as a corn cob grinder rebels at being fed on pieces of stone, chain and brick, and the machines are rather expensive.

Where the cob meal goes finds a ready explanation in the fact that it can be made at a cost of \$6 to \$7 per ton, while ground feed brings \$25 to \$28 per ton.

To such an extent has this class of deception developed that several states have already imposed severe penalties on the use of cob meal as adulteration. Inasmuch as the nutrition in cob meal is on a par with pine sawdust, it would seem a proper subject for national pure food legislation. The leading milling journals insist that the millers of wheat flour seldom are offenders, and that cob grinding is chiefly done by manufacturers of mixed and compound feeds, especially those composed largely of molasses.

It's a mighty mean and contemptible man whose automobile is purchased with the stealings from the rations of a faithful, helpless animal.

* * *

The Bradley patents covering a process of manufacture which reduced the price of aluminum from \$12 a pound to less than one dollar, expire during the present year. It is a certainty that present prices will never again be maintained. The materials most used in its production are bauxite and cryolite, which are very widely distributed in this country. Aluminum was discovered in 1827; it began to be used in 1850 in a small way, but as late as 1884 when the aluminum cap for the Washington monument was cast, the event was much talked of, for at that time aluminum was produced for the most part only in scientific laboratories as a curiosity.

The application of electric heat to large retorts reduced the cost of manufacture in Germany to about 15 cents a pound, hence the present market price of 32 cents may be expected to suffer a heavy decline before the close of the year. This will at once largely expand its use as it will then be available for the manufacture of many articles which the present price makes prohibitive.

Under ordinary conditions aluminum is as little affected by air and water as gold; it is easily melted and cast or rolled; is lighter than glass; has a much higher tensile strength than copper and is an excellent conductor of electricity. Since 1895 the public has come to connect it chiefly with cooking utensils and more recently in the construction of submarines, and for other purposes where extreme lightness of construction is desirable. It will shortly enter into the manufacture of hundreds of articles of common use, and what in 1857 sold for \$32 a pound can be had for about 20 cents.

Modern warfare is very like a game of chess: One nation makes a move which jeopardizes the queen, and all the others combine in a countermove which will at once protect their side and put the first player in danger.

Last month an article in this magazine explained the danger in which a battleship was placed when using her searchlights to pick up an approaching torpedo boat of the enemy. The brilliant flaming arc which throws the searching beams for miles makes the finest kind of a mark for other craft. Thus what was designed as protection becomes a source of positive danger; indeed, some of the best naval authorities declare that for a ship to use her searchlights during a torpedo attack is certain suicide. In one of the night attacks during the last war, all the ships which burned their searchlights were captured by the enemy's boats which displayed no light whatever.

Now for the next move on the war board. The Germans are experimenting, with reported success, with acetylene shells, which are fired as far as six miles, from a specially constructed gun. These shells are so balanced that upon striking the water, a tube admits the required amount of water to the carbide, producing sufficient acetylene gas to make a light of 3,000 candlepower. By this means a battleship can quickly illuminate an area of several square miles where the enemy is supposed to be. Just what would happen should a ship accidentally fire in a direction opposite the enemy, and thus make a silhouette target of itself, has not been explained.

All authorities agree that the safety of a big ship at night lies in darkness, and the demand now is not for more light, but for some improved form of night glass which will enable the lookouts to see in the dark.

* * *

Cities prescribe heavy fines for window washers who fail to make use of safety belts when at work on the outside. This is proper, not only to protect the careless workman against the fatal results of his own folly, but also out of consideration for those other citizens who are compelled to use the sidewalks, and who object to having an able-bodied man fall upon them unawares from the fifteenth or twentieth story. But the safety belts are of no value unless they are used.

In the thrilling rescue of the 742 passengers of the "Republic" the public has been led to believe that all ships are similarly equipped with wireless telegraph. Such, however, is far from being true. There are vessels at this moment crossing the Atlantic with no less than 1000 passengers aboard, which have no means of communicating their distress farther than a flag signal can be seen, should emergency occur. It is positively criminal in these days for ship owners to put a passenger vessel out to sea without a wireless equipment, and an experienced operator in charge.

There are other safeguards to ships and life, which invention has recently provided: There is the submarine signal bell, which sends its warning message of impending collision under weather conditions when the wireless may not work; there are safety bulkhead doors operated from the bridge with which an incoming flood can be confined to one or more sections of the hull; there are automatic alarms which tell the story of a smouldering fire away down in the most inaccessible portions of the hold; there are devices for launching lifeboats promptly and in such a manner as to be of real value in saving life. There are wings to be fastened to the hull below the water line, which can be released in an instant and serve as brakes to greatly retard the

progress of the ship. There can be no collision so long as two vessels are even a few inches apart. There are instruments which indicate unerringly in the thickest fog the exact direction from which a whistle is sounding.

All these and numerous other devices have had ample test in actual use, and have been approved by the navies of the leading powers; yet how many ocean liners are thus equipped?

Obviously such safeguards should be required by law. How many freight cars would to-day be equipped with automatic couplers if their adoption had remained optional with the railroads?

With ships of many nations landing at our shores, and bidding for the patronage of the public, it is doubtless a question of considerable time to compel the adoption of all these necessary safeguards. Owners are loath to spend the money which these things cost. It remains, therefore, for the traveling public to exert its influence in a manner which is direct and which appeals strongly to indifferent ship companies, viz: To demand these safeguards and decline to book on such steamers as are unprovided. This is an argument which strikes at their pocket-books, and has a galvanic effect, which is the next best thing to the desired legislation.

* * *

Farming is now a mechanical and chemical proposition. To raise any given crop to best advantage, or to raise it at all, one must understand the chemical requirements of the plant and the chemistry of the soil.

The mechanical side of farming is the more visible and easily understood. Farm machinery today is prepared to perform nearly all the outdoor work. Plowing, harrowing, planting, cultivating, reaping, stacking and threshing are all mechanical operations, in most of which the farmer rides. His machines even are frequently propelled by their own gas or steam engine power, or drawn by a separate traction engine. There are machines for planting, digging, sorting and bagging potatoes; milking machines for the dairy; cream separators; power churns; machines to spread fertilizer and to stack hay in the barn; the horses are curried and clipped with a machine. Most recent of all is a device which picks feathers from fowls. The modern farmer operates his own electric light and waterworks; a telephone not only connects him with his neighbors and town, but stations are established at intervals over the farm. When he needs a tool from the house in a hurry, he phones and somebody brings it out.

He has his own road-making apparatus; he lays drainage systems reaching into miles; he builds irrigation ditches and his own gas engine fills them with water. The farmer with an automobile and motor wagon is no longer an unusual sight.

Yes, farming has become pre-eminently a mechanical industry.

In view of this fact the organization of the American Society of Agricultural Engineers need occasion no surprise. The second annual convention of this association was held recently, at which Prof. Davidson, of the University of Iowa, said:

"The object of the American Society of Agricultural Engineers is to promote the art and science of engineering as applied to agriculture.

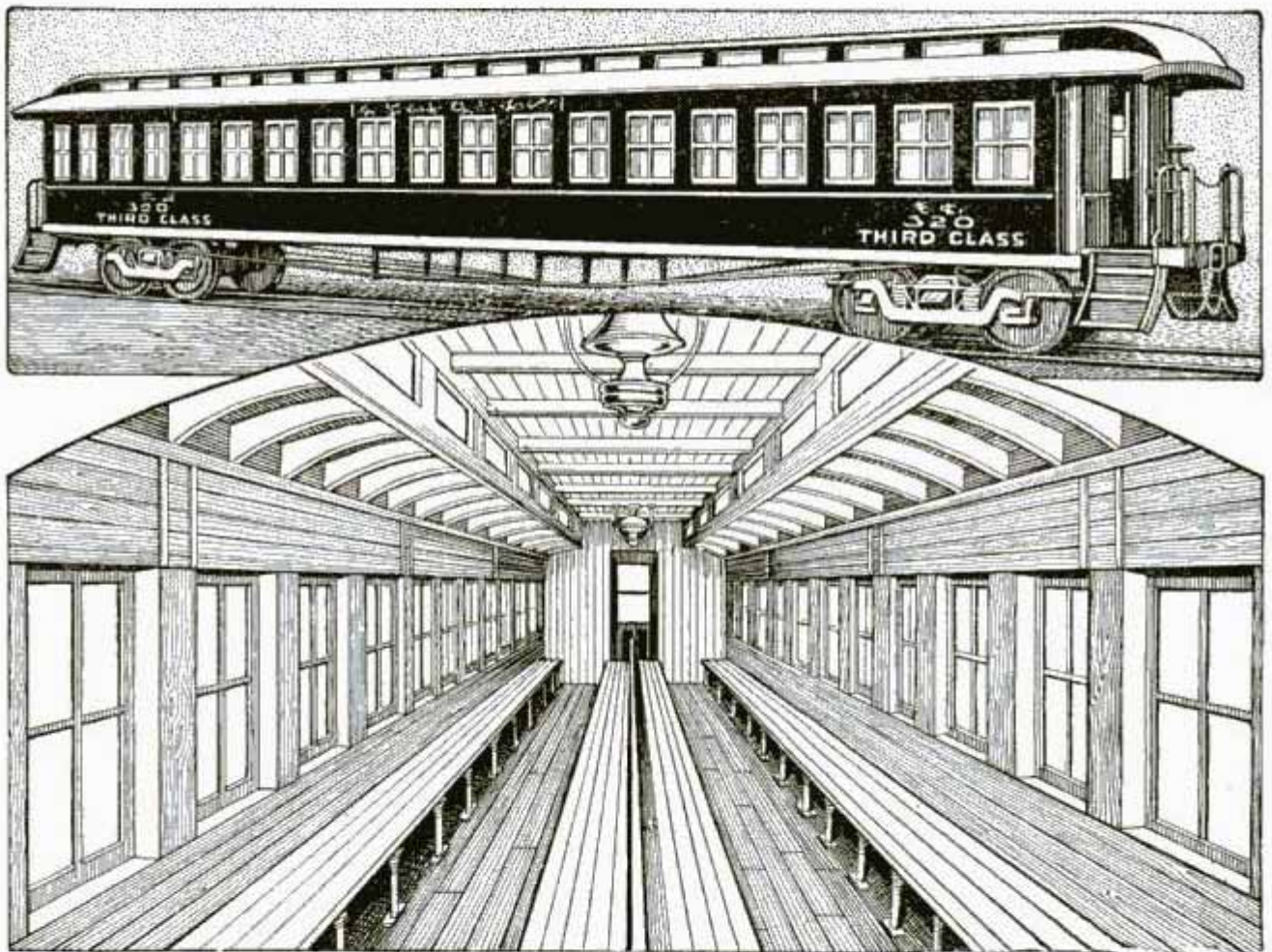
"The past decade has witnessed a wide extension of engineering into agriculture that is almost beyond comprehension. Engineering has come to the farmer to make farming one of the most desirable of all vocations. It is engineering that has been one

of the chief factors in raising agriculture to the high standard it has attained. This has been brought about by machinery utilizing power other than human power, by better farm buildings, better field and sanitary drainage, more adequate water supply, improved methods of securing and applying irrigation water, and good roads—all phases of engineering. With a good training in agricultural engineering the agricultural worker will be better equipped to cope with the world's problems. The engineering training demanded today in the successful management of a modern farm, as well as a thorough knowledge of engineering subjects, is absolute evidence that this branch of agriculture must and will be given a more important place in the agricultural college curriculum."

All hail the Agricultural Engineer!

H. H. WINDSOR.

CHINESE THIRD-CLASS RAILWAY COACH



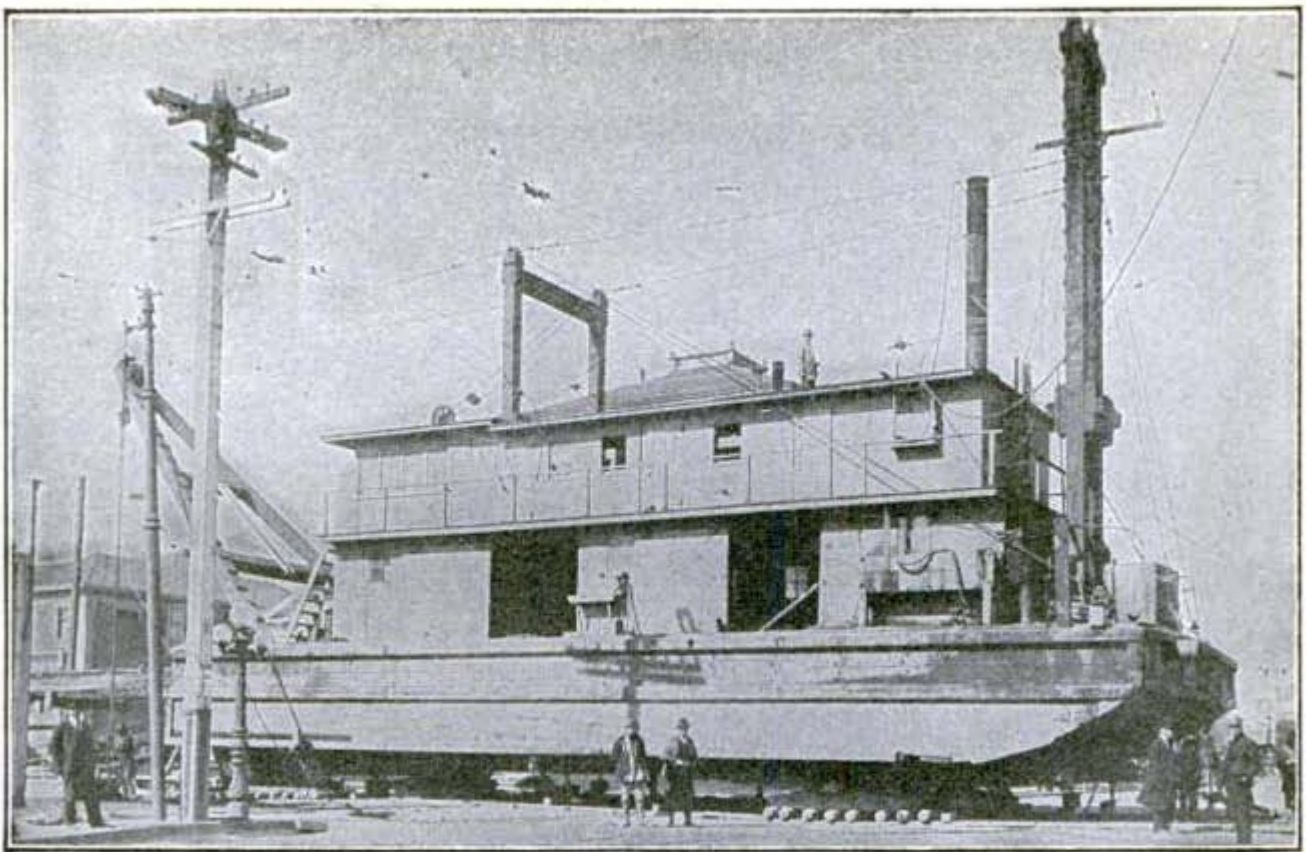
Exterior and Interior of Chinese Railway Coach

Courtesy of Brill's Magazine

The new third-class cars for the Kwang Tsch Tung Han railway in the Chinese Empire are admirable examples of what can be accomplished for this class of traffic. The features of the cars are the design of windows, with small lights of glass to permit easy and economical replacement should they be broken, and the interior ar-

angement and finish, designed for the hardest kind of usage. The interior finish of the cars is in North Carolina pine, including the wood slat seats, four in all, two running along the sides and two more down the center. The cars are 60 ft. long, with platforms built in the American style.

Few people realize that the long-



Huge Dredge in City Street

sleeping Chinese, aided by outside forces, are developing a modern railway system, but China is undergoing an industrial awakening which will be powerful before this century begins to decline.

NON-INTERRUPTING WIRELESS 'PHONE

A Boston inventor claims to have perfected a wireless telephone system the waves of which cannot be interrupted by other wireless waves in the same zone. In recent tests of the system, the station at Brant Rock forwarded messages to Washington while coast stations and government vessels equipped with wireless apparatus made unsuccessful attempts to interfere.

MOVING A DREDGE THROUGH THE STREETS

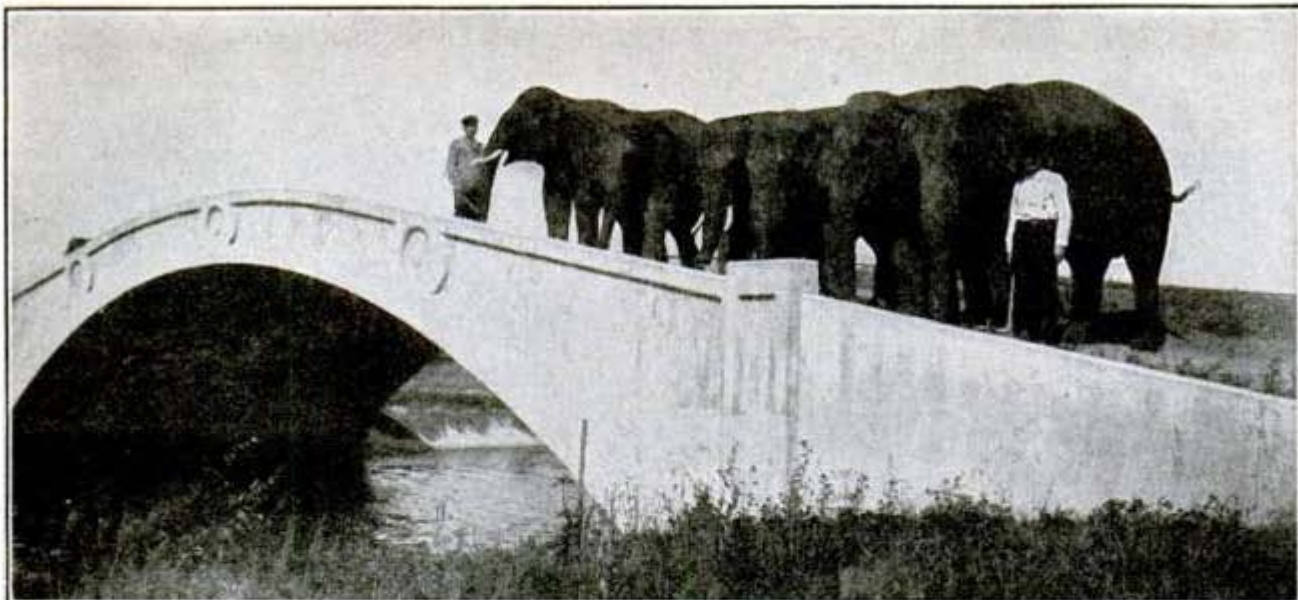
The moving of this large sucker dredge through the streets of Oakland, Cal., interrupted traffic and put one of the city's busiest street car lines out of business for an entire day. It was dragged across the city nearly a mile

to a tide lake. The ocean water in the lake is held by gates and is to be one of the finest water parks on the Pacific coast. The silt taken from the bottom of the lake will fill the surrounding swamp, converting it into a park.

Owing to the great size of the dredge, all the overhead wires in its path had to be taken down to allow it to pass. The motive power was a donkey engine.

WEED-CUTTING MOTORBOAT

In Egypt an enormous amount of trouble and expense has been caused by weeds and other vegetable growths, which spread so rapidly as to choke canals and other waterways in a few days. Clearing by hand has been found impossible in one district, so a motorboat has been equipped with a unique weed-cutter and placed in service. The cutting attachment consists of a pair of V-shaped knives, with sharp and powerful blades, worked by belt from the propeller shaft. They trail along the bottom of the waterway, cutting the growth off at the roots. It is said that the little boat will clear as much as 5 acres an hour.



TESTING SAFETY OF BRIDGES WITH LIVE ELEPHANTS

Across the artificial canals at Venice, on Santa Monica bay, in California, bridges of reinforced concrete have been constructed. The illustration herewith shows the novel method that was pursued in testing the strength of these structures. The elephants advanced with hesitating step, but the entire herd finally took position on the several bridges and viewed the scenery with evident satisfaction.

HOW THE JAPANESE TATTOO

Among the less civilized Japanese, especially those inhabiting the northern isles of the island empire, tattooing still

prevails. In some parts of Japan this ornamentation of the body takes the place of clothing, even with the women.

The "Matai" is the name given to the man who makes a profession of "improving" the appearance of the human skin. The instrument is a comb, composed of many fine needles bound to a piece of bamboo as a base. The Matai takes this comb, places it upon the skin of his patient, victim, or whatever term best designates the person who is about to be "beautified," and pounds the sharp teeth into the flesh by means of a mallet. The torture is exquisite and the patient groans and writhes in his extreme agony, while attendants remove the blood which flows freely. Sometimes driven to madness the sufferer tears himself away and



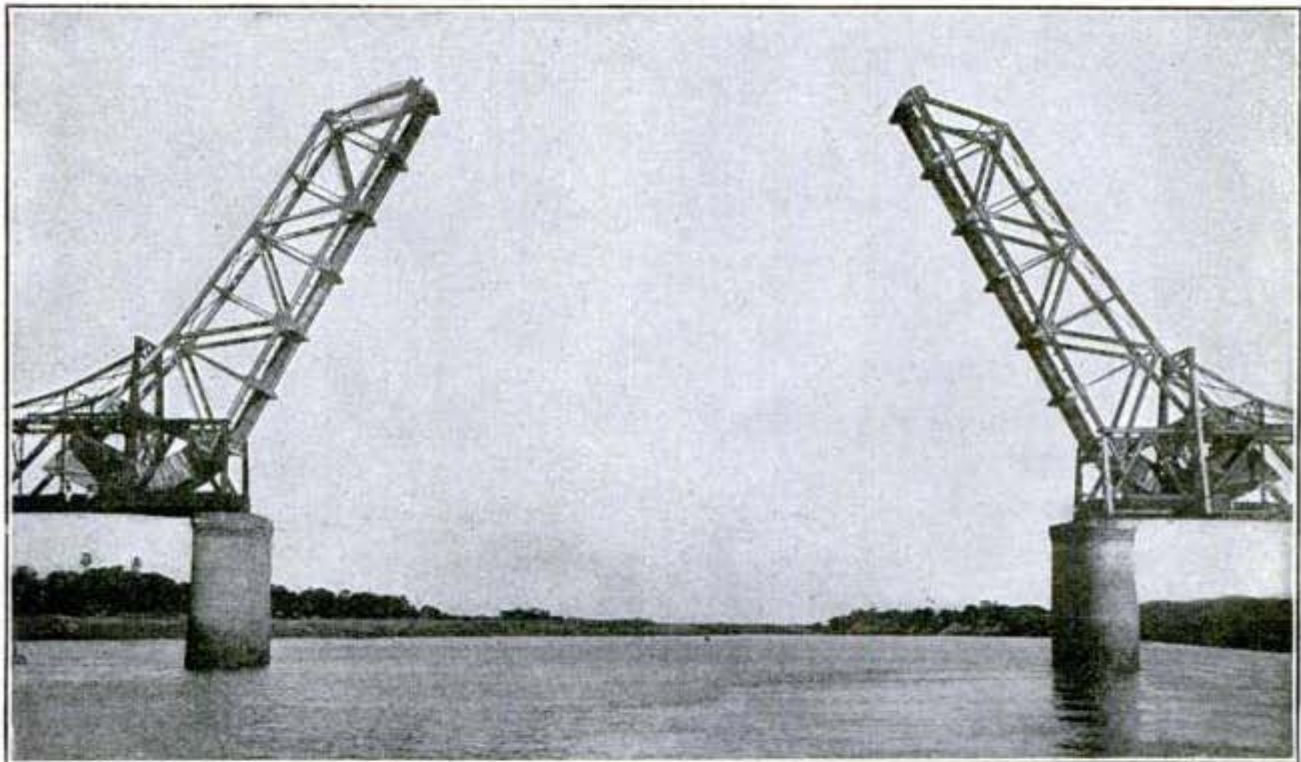
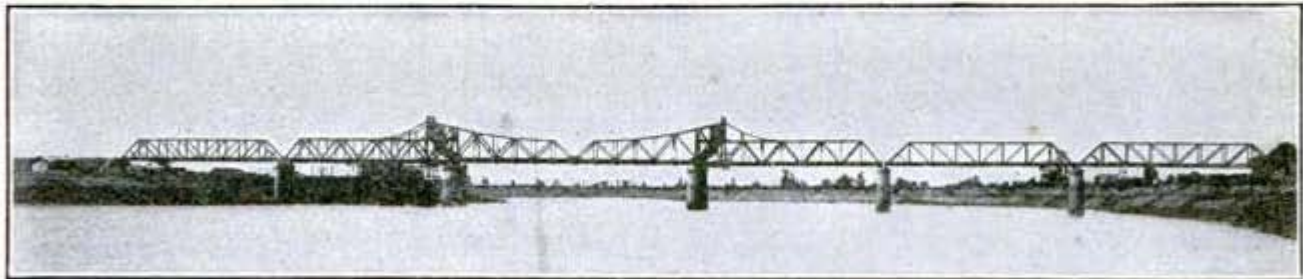
Human Bodies Clothed in Intricate Designs

refuses to have the work completed. In such event he is branded as a coward and despised for all time by his fellows.

AMERICAN ROLLER LIFT BRIDGE IN INDIA

The new railroad bridge across the Ngawun river in Burma, India, is the largest movable bridge yet constructed in Asia, and is a victory for American

construction commonly used in India. These piers are one of the features of the construction, their small size providing ample support to the superstructure with the least possible obstruction to the flow of water. The river, during the rainy season, is subjected to heavy floods and obstructions to the flow cause deep holes to scour in the river bed, necessitating great care in foundation design.



Courtesy Scherzer Lift Bridge Co.

Modern Roller Lift Bridge Over River in India

construction in the fact that it was designed by a Chicago bridge construction company. Its length is about 950 ft., and the center span, through which the vessels pass, is 220 ft. from center to center, providing a clear channel of 200 ft. The movable part of the bridge is of the double-leaf rolling lift construction.

The substructure of the bridge consists of brick masonry piers resting on wells filled with concrete, the type of

Extensive navigation is carried on along the Ngawun river by a flotilla company, which operates steamers for both freight and passenger traffic.

When an automobile is stopped after running for some time it is hard to start as the heated lubricating oil becomes thin and the compression passes the piston. Use thicker oil to overcome this trouble.

BARBER-POLE FLAG POLE



An enterprising barber in the southern section of Chicago uses his barber pole as the base of a flag pole and at its top flies the stars and stripes. He believes the American flag to be the best kind of a sign, and flies it on all clear days.

The amount of blast furnace gas power lost each year approximates

2,000,000 hp., although this is being reduced by the installation of gas engines to utilize the power.

TRIPLE-HULL STEAMSHIP IMPRACTICABLE

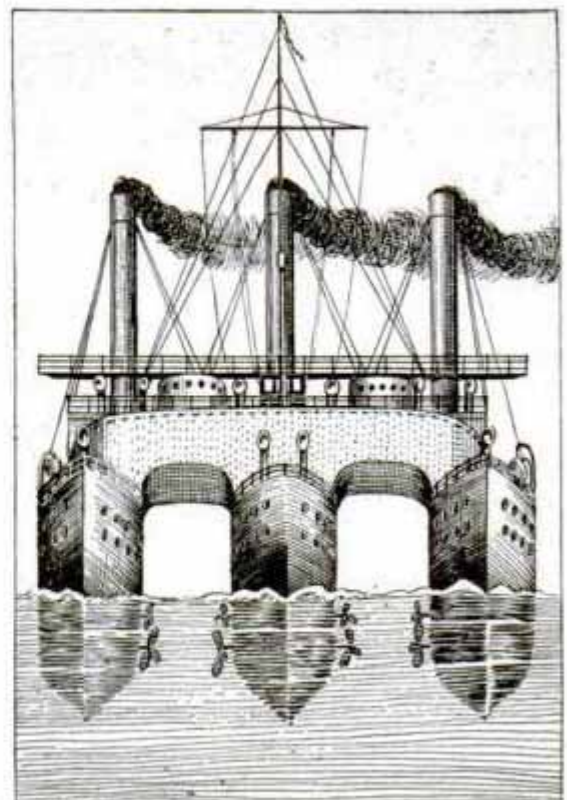
For many centuries budding marine architects have aspired to build ships with hulls that are a radical departure from the time-tried and approved methods. It is noticeable that the shape and general dimensions relative to height and length of ship hulls, as built today and conceded to be the best by marine experts, differ but little from the shape and dimensions of the "Ark" as given in Biblical history.

The triple-hull steamship shown in this illustration is the latest idea of the kind to be advanced, and the inventor claims he solves the problem of trans-Atlantic travel by it, but a close study of the project should dispel any hope he entertains. An article in the Scientific American enumerates a few of the reasons why such a ship would be impracticable:

"The inventor of the idea seems to be

of the opinion that the principle defect of the present type of ship is that it presents too great a head resistance to the sea, and that there is a considerable loss of power, due to eddy-making at the stern. These defects are attributed to the concentrating of the whole of the energy of the engines upon propellers placed at the stern of the ship. He would overcome these defects by dividing the displacement between three hulls, each 25 ft. wide, 500 ft. long, and separated by two water channels, each 25 ft. in width, making the whole beam of the ship 125 ft. for a total length of only 500 ft. The propellers would be carried by torpedo-shaped protuberances, which project from the sides of the hulls into the water channels between the hulls.

"It is noticeable, however, that the inventor has entirely lost sight of the important question of skin friction, which has been shown to account for fully one-half of the total resistance of the water to the ship. Since the triple-hull ship must, because of its narrow beam, draw as much water to secure the same displacement as the single-hull ship, the immersed area will be represented by the six immersed sides of the three hulls, instead of the two



Design of a Marine-Architectural Dreamer

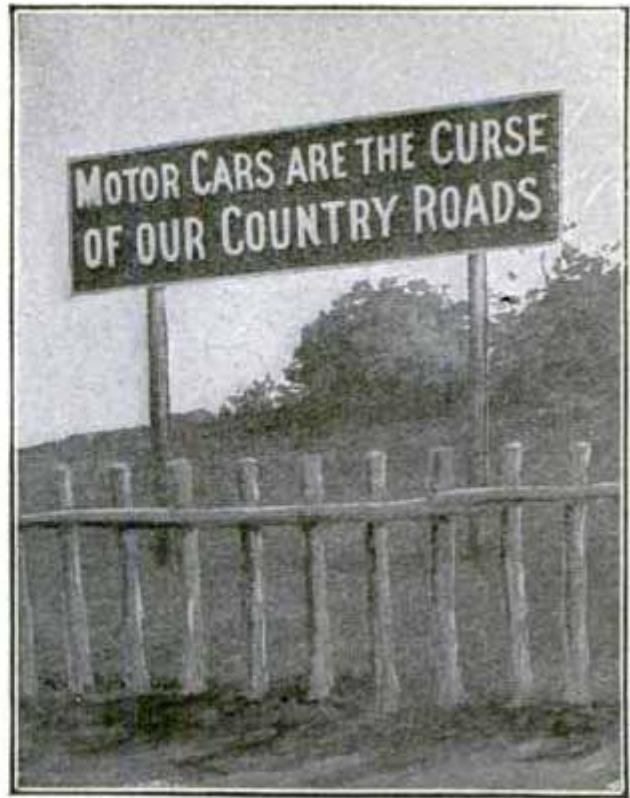
sides of the ordinary ship. It is safe to state that the resistance due to skin friction would, in the triple-hull vessel, be at least 100 per cent greater than an ordinary ship of the same displacement."

The character of the structural work, however, is the most impracticable. Anyone who has crossed the Atlantic ocean on a great liner and watched the starting of rivets and springing of plates and beams when driven at a high speed into a head sea, will conceive that it would be impossible to tie three separate hulls together with sufficient rigidity, except by loading the vessel down with a mass of stiffening transverse girders and other steel work that would sink her nearly to her load line. Moreover, in running into a head sea, the long and narrow hulls would bury themselves in water up to the superstructure, subjecting it to a bombardment which would soon tear things loose.

TREATING RAILWAY TIES IN MEXICO

The tie-treating plant of the Mexican Central railroad at Aguascalientes has reached an output of 3,500 ties per day, making it one of the largest concerns of its kind in the world. It uses the Ebano oil process and it is expected that the treatment will prolong the life of each tie from 8 to 12 years.

The process consists of placing the ties in huge cylinders, which are then filled with oil and subjected to heat and pressure. After seven hours the oil is forced out of the cylinders and the ties removed. The average tie absorbs about 3 gal. of oil. This oil contains a large amount of solid matter, and it is this that acts as the preservative. The average penetration into pine ties is about 2 in. In harder woods it is less, but in all cases the oil protects the ties from water and will keep out moisture for years. The process is comparatively inexpensive.

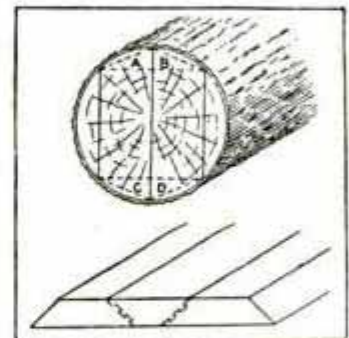


SIGNBOARDS DENOUNCE AUTOMOBILES

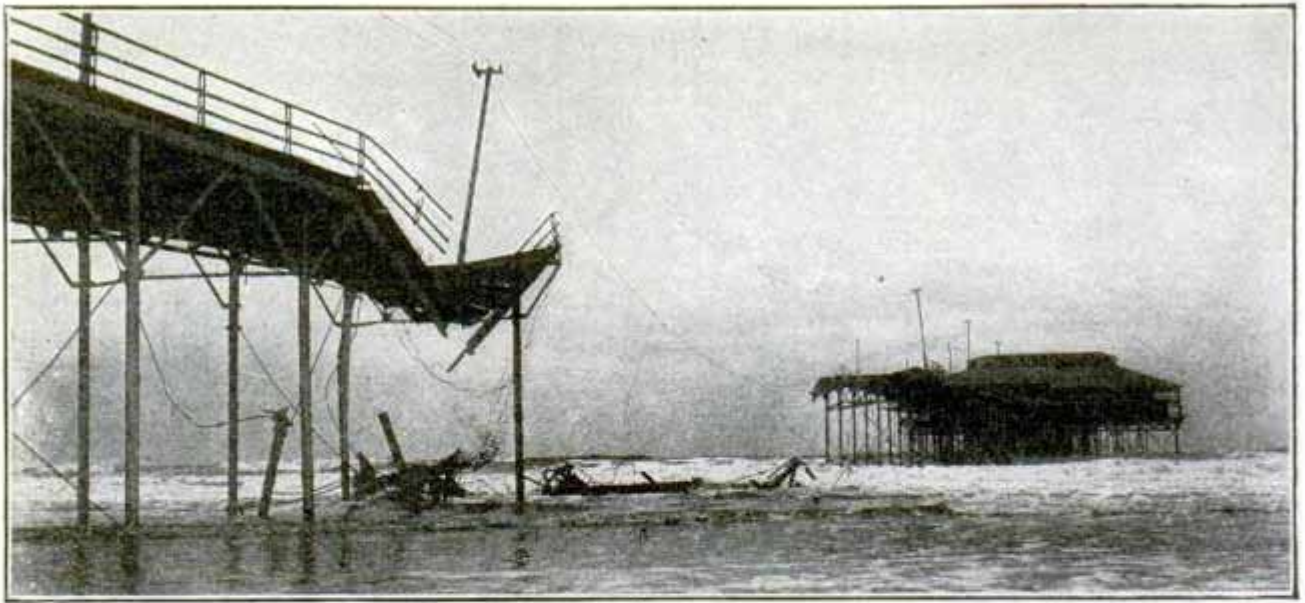
A striking example of the opposition to the automobile expressed by the country people in some parts of England is shown in this illustration. The sign is on the Canterbury road between Sarre and Sturry.

SAVING SAWMILL WASTE

A large lumber and box company in Norway has recently equipped its mills with two automatic dovetail glue-joiners, with the idea of avoiding as much waste as possible in sawing small logs. Instead of edging stock square as is the practice in the United States, the bark-edge timber will be fed into the machine and edged and joined on the bevel, saving the triangular pieces as shown in the sketch.



Safety valves on boilers should be inspected each day, as they are liable to become stuck fast to their seats.



GREAT STEEL PIER WRECKED BY STORM

The long steel pier at Old Orchard, Maine, on which was erected many attractions of the type usually found in amusement parks, was badly wrecked in March by one of the most severe storms that ever has ravaged the Maine coast. The wind velocity was close to 60 miles an hour, and big waves pounded at the flooring of the pier and threw great volumes of water 25 ft. above it. The damaged part of the pier commenced near the middle and extended several hundred feet, 200 ft. being completely torn away.

Also immense damage was done in Old Orchard and in Portland, the total running into many thousands. The wind entered the open door of a freight car and blew off the top, while dams in the rivers were washed out, roofs blown away, telephone and telegraph wires blown down, small boats were lost, and the sea drove 300 ft. up the beaches.



China's Traveling Lunch

CHINESE PORTABLE RESTAURANT

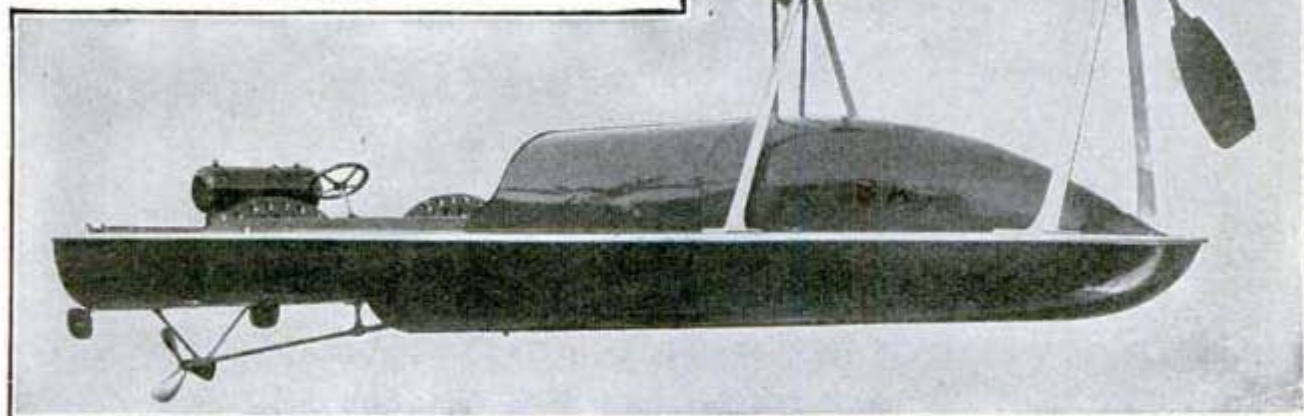
The cities of the United States have their night-owl lunch wagons, but China, not quite so progressive, has its portable coolie restaurant. The proprietor travels from place to place with the crowd, not only carrying the food he sells and his stand, but his stove as well.

CARS FOR WOMEN ONLY

Owing to agitation by the Women's Municipal League of New York, the Hudson and Manhattan railroad company has reserved cars exclusively for women on its subway trains. These cars are even more absolutely for the use of women and children than the

smoking car is for men, women not being prohibited from the latter, while men are from the former. Special porters have also been provided to do nothing but help women on and off.

**MOTORBOATING 46
MILES AN HOUR**



Courtesy Detroit Boat Co.

Water and Air Propellers Combined

This motorboat, for which a speed of 46 miles an hour is claimed, is creating great interest on the Detroit river. It is called the "Bat," and is an aeromarine craft on the order of a hydroplane. The most interesting feature of the little racer is not the aerial propeller alone, but the fact that it has both an aerial and a water propeller. Both are driven by the same engine, which is of the 4-cylinder type, capable of developing 50 hp. The water propeller pushes the boat ahead, and the aerial propeller pulls it.

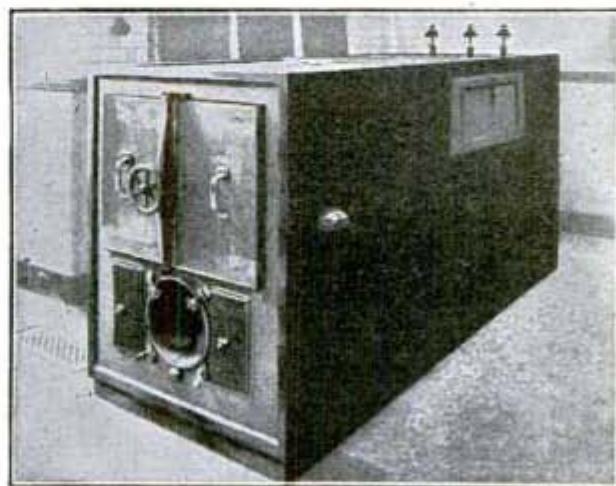
The hull is built of cedar, and is 23 ft. over all with a beam of 5 ft. 6 in. The bottom of the hull forms two planes, each 11 ft. 6 in. long, with a raise of 7 in. amidships and with slightly rounded bilges. The deck is perfectly flat and covers the entire hull with the exception of the cockpit, which is 18 ft. long and 24 in. wide. The cockpit is protected by a sea-hood for nearly two-thirds of its length, completely covering the engine.

The aerial propeller, made of aluminum and measuring 8 ft. from tip to tip, is driven at 700 revolutions per minute by a sprocket chain. The under-water propeller is 3-bladed, 18 in. in diameter, and makes 1,250 revo-

lutions per minute. The rudders and all shaftings are hung either on ball or roller bearings, which reduces the friction to a minimum. The total weight of the boat is 1,190 lb.

AIR-TIGHT CABINET FOR PRESERVING BODIES

London, Eng., has adopted this airtight cabinet for the preserving of the bodies that must be viewed by coroner's juries. A body placed in it for a day or two and saturated with formalin can be preserved almost indefinitely. The viewing of bodies can never be pleasant under any circum-



Preserves Bodies Indefinitely

stances, but this innovation will make the task far less disagreeable.

ICE TUMBLER MOULD

Drinking tumblers made entirely of ice are a novelty of considerable interest. If desired, the tumblers can be made with varying degrees of transparency, or even colored by the addition of some harmless coloring matter. The illustrations show the mould in which the tumblers are frozen, and a completed tumbler inserted in a paper shell for convenience in handling. First, a measured quantity of water is poured into the mould and then the core is inserted, which forces the water upwards in the space between the two. The mould is then placed in the freezing tank and the tumbler is ready for use in about 15 minutes.



Mould and an Ice Tumbler in a Paper Shell

DO CANNON AND ROCKETS DISPEL HAIL STORMS?

The rain maker, a character of the west of the last century with an occupation almost as picturesque and extraordinary as any the country has ever known and partially believed in, has long been classed with the "gold brick" confidence man. Yet in France, the discharging of cannon, not to make rain, but to dispel hail, is now believed in more than at any time since the idea was originated, notwithstanding the fact that science laughs.

It is a case of science versus practice, and as far, at least, as the continuance of the idea is concerned, practice is winning. In answer to inquiries from New York and California grape growers, John C. Covert, U. S. consul

at Lyons, France, called at the central office of the Union of Agricultural Societies of Southeastern France and was told that more hail cannon were used

last year than at any time since their adoption.

"In fact," says Consul Covert, "I learned that while some very learned men oppose a scientific theory to the use of cannon, the practical farmers continue to use them, and persistently maintain that the practice knocks out the theory. In the great Beaujolais wine-growing district, where hail often falls three or four times a week, cannon are claimed to be very effective. I have interviewed many business men who own vineyards, and they say that their managers insist that money is saved by the practice."

A member of the French academy of sciences recently made an investigation at the request of the minister of agriculture. After two years of study he reported that it was very difficult to determine the precise effect of the firing of cannon into storm clouds, where heavy winds and other elements of nature combine to form an atmospheric condition. But he does say that it does not seem impossible to successfully combat a slowly moving storm emerg-

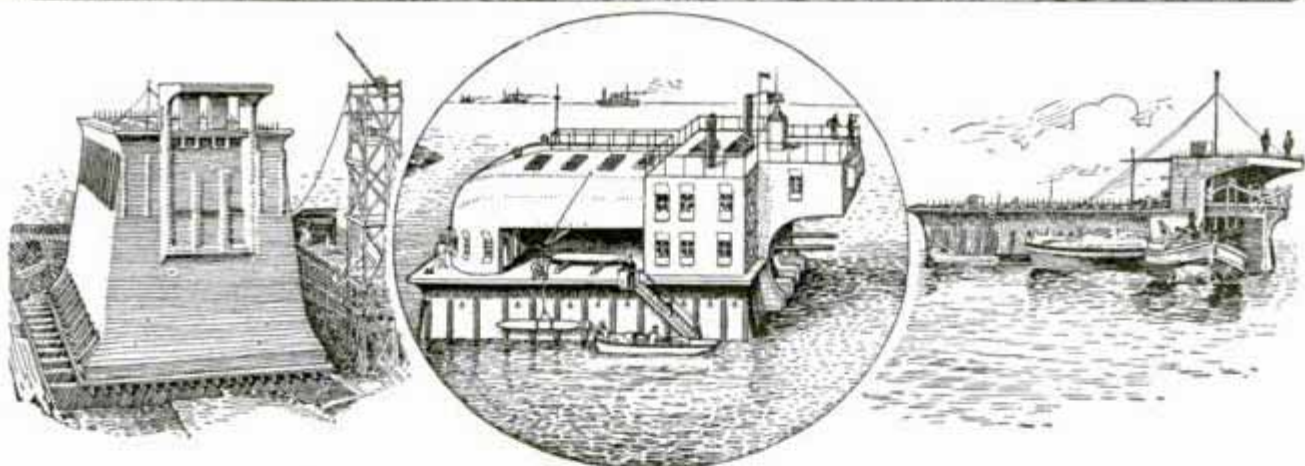
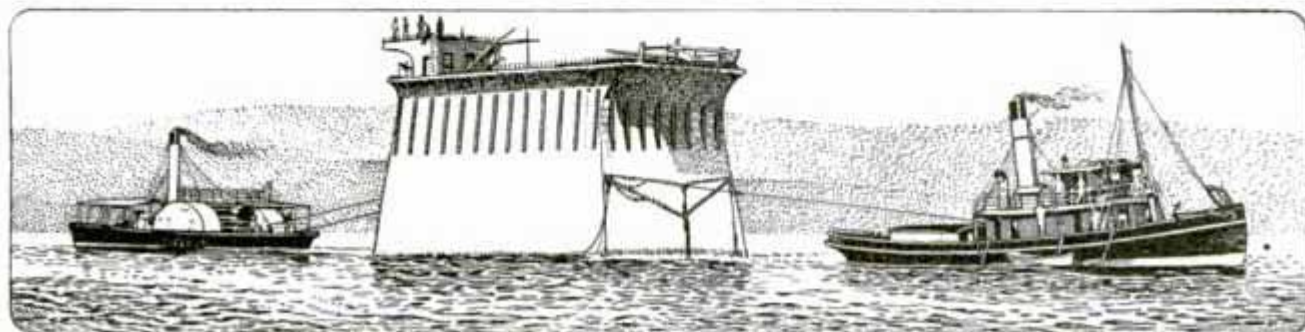
ing from a mountain pass, which is the habitual path of storm clouds, if this pass and the neighboring heights are provided with systematically located and regularly handled cannon.

Not only cannon are being used by the grape growers, but rockets as well, as the latter do not need a small hut to house them and are sold for a little less than \$1. The rockets throw a bomb

into the air and it explodes in the clouds.

A New York grape grower recently imported a number of hail cannon through the Lyons consulate and believes that they protect him from hail storms, notwithstanding the adverse opinion of the U. S. weather bureau. Whatever the merits of the idea may be, it is at least interesting.

MEDITERRANEAN ISLAND OF TORPEDOES

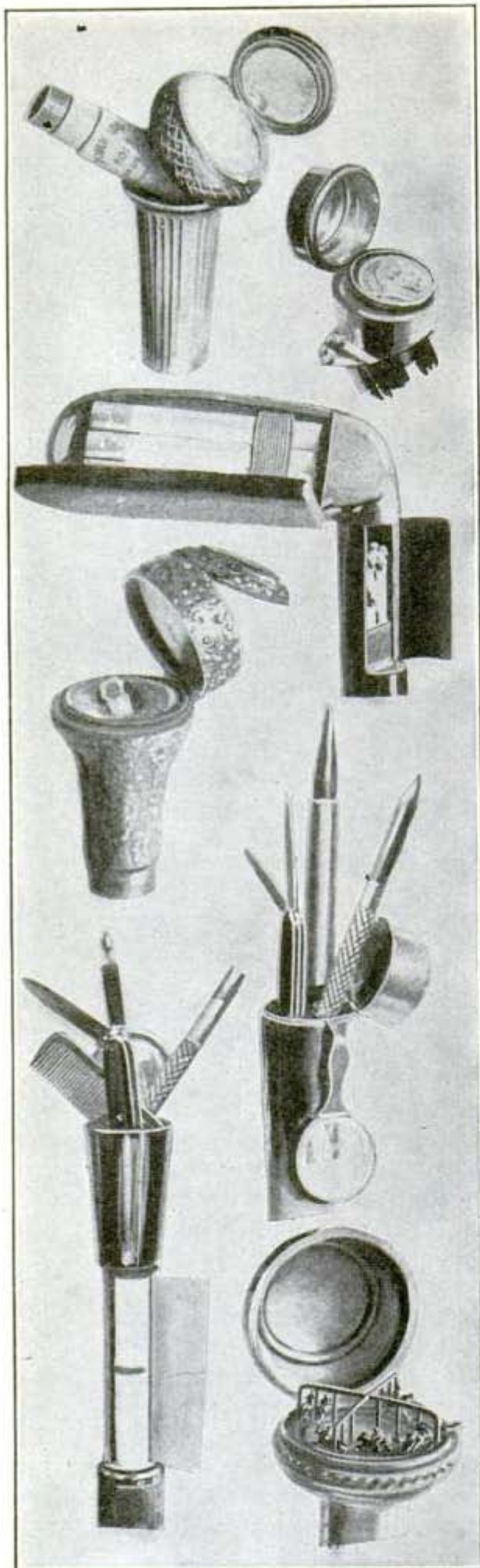


A great French gun company has constructed an artificial island in the Mediterranean sea some distance out from Toulon to be used as an experimental station for torpedoes. It is called the "L'île des Torpilles," which means the Island of Torpedoes, and the method of its construction is ingenious.

When the idea first presented itself to the company a small island in a proper locality was searched for, but without success. Therefore the company decided to build a hollow concrete island, float it to the position desired, and sink it to the sea bottom. The huge structure, 75 ft. long, 50 ft. wide,

and about 70 ft. in height, was constructed on the banks of the Seine, launched, and towed to its position in the Mediterranean.

The lower half of the island, or caisson, as it should be called, was divided into ballast cells. These were empty, of course, while the structure was being floated, and in this condition the caisson weighed not less than 8,600 tons. When its permanent resting place was reached water was allowed to flow into the cells and the structure gradually sank, striking the rock bottom of the sea in about 45 ft. of water. The cells were then emptied of water one at a time and concrete



Courtesy of "The Sketch," London

Useful Umbrella and Cane Handles

substituted, forming a solid foundation, the whole being firmly anchored to the bottom of the sea.

The upper half of the caisson is divided into two stories, the lower being for the launching of torpedoes under water. The upper contains two torpedo tubes for the launching of torpedoes above water. On top of the caisson was built a superstructure for the housing of the workshop, store rooms, and quarters for the engineers and mechanics. This extends some distance over the caisson on the side from which the torpedoes are fired, and on its top is an observation platform from which the course of the torpedoes can be watched.

UMBRELLA AND CANE HANDLES HAVE CARRYING RECEPTACLES

It seems from this series of drawings that English gentlemen are as faddy as English gentlewomen. Along with such novelties as umbrella handles which contain receptacles for the carrying of small toilet articles, are ingenious canes, the heads of which have receptacles for smoking, toilet, and writing articles, as well as both canes and umbrellas that contain such gaming devices as roulette wheels, petits chevaux, and mechanical fortune-tellers.

One of the umbrella handles holds a toilet set composed of a looking-glass, powder-puff, and a tube of lip salve. Another contains a powder puff and scent bottle. One of the cane handles contains a cigarette case and match box, while another has a cigar holder and match box, and still another a match box and sovereign purse. Other canes contain scissors, combs, mirrors, moustache brushes, stylographic pens, pen knives, magnifying glasses, and rolls of note paper in appropriate sets.

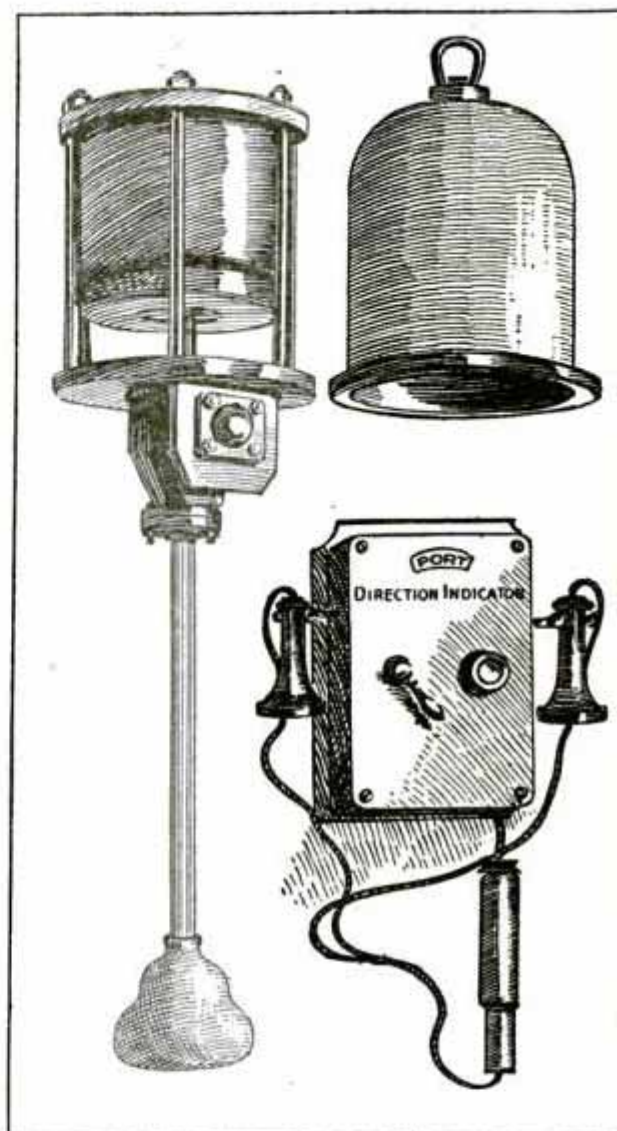
A \$10,000 prize has been put up for the first flight of an aerial craft from New York to Albany, a distance of 145 miles. Both dirigible airships and flying-machines are eligible.

SUBMARINE "COLLISION" BELLS

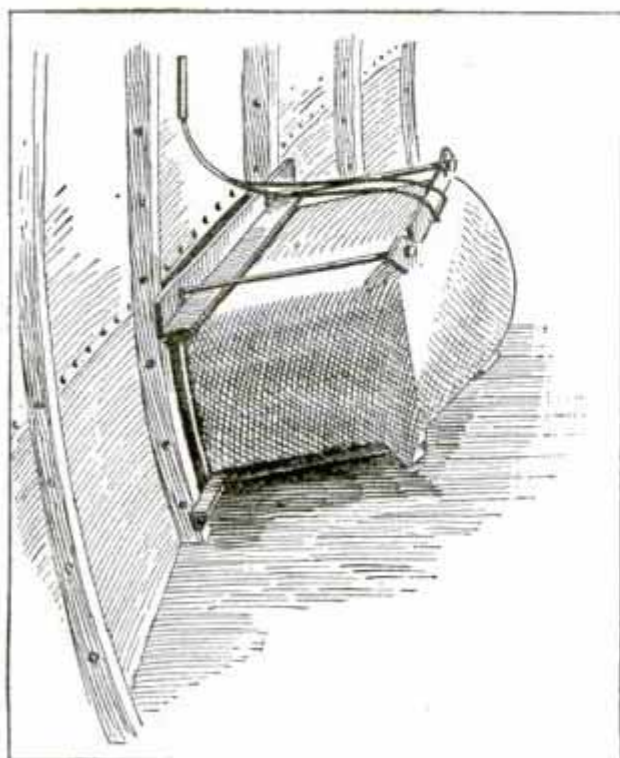
A Submarine Wireless More Effective Under Certain Conditions Than the Aerial

Besides wireless apparatus many of the great trans-Atlantic liners are equipped with another device, little heard of outside of marine circles, to direct ships to their position should accident occur. This is a submarine bell, known as the collision electric bell. It is arranged in the fore-peak of the ship, which is the portion of the hold farthest forward, and the bell itself is immersed in the water. Should a ship be in trouble, a signal is rung out by the bell, and if other ships are close enough and have a receiving apparatus, the sound of the bell, which carries a great distance in the water, is picked up.

The apparatus for receiving the sound consists of two metal tanks about 22 in. square filled with sea water and fastened securely against the inside skin of the ship below the water line, one on each side. A specially designed microphone is suspended, wholly immersed, in each tank, and wires connect these microphones with an indicator box on the bridge, pilot house, or elsewhere. When the sound of a distant collision bell is caught by the receiving



Parts of Submarine Bell



The Receiving Apparatus

box the fact is announced by the indicator, and by taking down one of the ear pieces the bell can be heard. By the simple process of moving a switch, which action throws one or the other of the receiving tanks off the circuit, the listener can locate the bell as being either on the port or starboard side. Two ear pieces are provided so that two persons can listen at the same time.

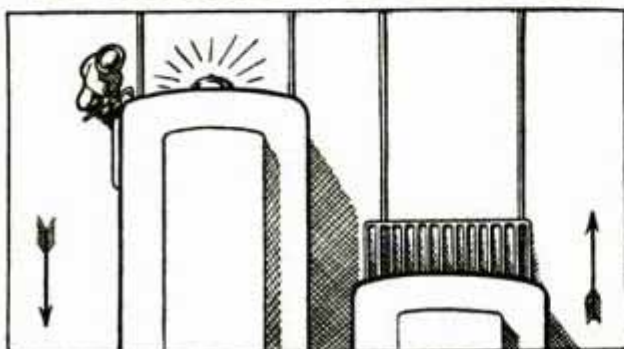
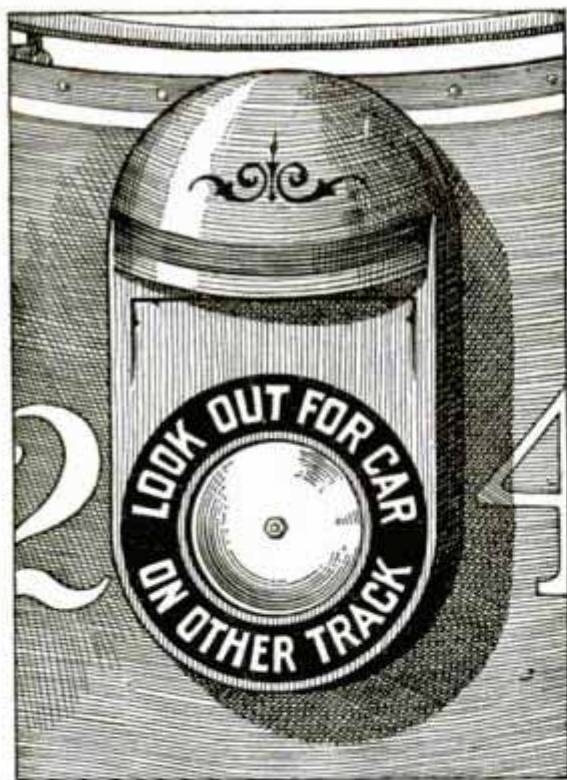
A practical demonstration of the utility of the apparatus was given when the White Star liner "Republic" was sunk by the "Florida," but the greater achievement of the wireless telegraph overshadowed it in the press accounts. The wireless calls sent out by the "Republic" were picked up by the French liner "La Lorraine," and she immedi-

ately sent a wireless message back saying "Make all noise possible with submarine bells so that we can find you." This was done, with the apparatus here described, and shortly after the bells were distinctly heard on the French liner, thus enabling her to make her way through the fog to the scene of the disaster.

WARNING DEVICE FOR ALIGHTING PASSENGERS

Statistics from all over the country show that of the people killed or injured annually by the street car lines a large number experience accident by alighting from one car and stepping in front of another coming from the opposite direction, yet very few companies have adopted any special means of warning.

At present, however, a number of



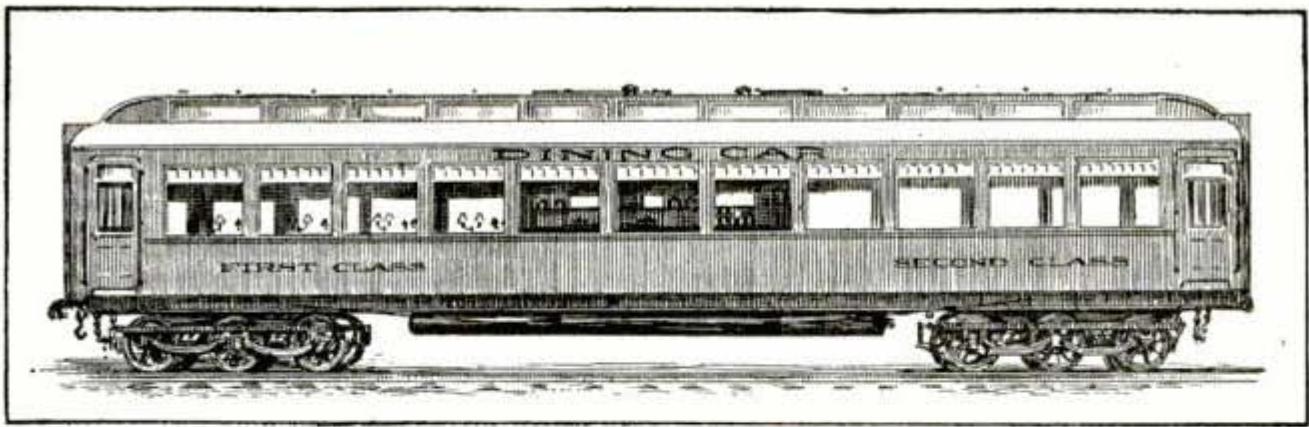
Danger Signal for Rear End

street car companies are interested in the device of an Omaha inventor, which, if adopted, will be of the greatest value. It consists of a sign which reads, "Look Out for Car on Other Track," a bell and a hooded lamp, and is hung upon the rear dasher. It is operated by the motorman, who sets the bell ringing if a car is approaching on the other track while he is making a stop. The electric light illuminates the warning at night when the bell rings, so that the alighting passenger, whose attention is drawn by the clamor of the bell, will read its meaning.

THE MUTTON-BIRD INDUSTRY

The mutton-bird industry of the Furneaux group of islands, situated near Tasmania and under the Australian government, is an interesting means of gaining a livelihood, and in fact the principal means of support of the inhabitants. The mutton bird is, when full grown, about the size of the silver gull of North America, and their broods are hunted as food, for the oil and fat they contain, and for their feathers. The oil is used for the tanning of leather and the lubrication of machinery, and the fat is used chiefly for greasing timber skids.

Only the newly hatched birds have a commercial value, and it is rather dangerous capturing them, as the rookeries are infested with poisonous snakes. Frequently the hunter, when he puts his hand and arm into the hole, lays hold of a snake instead of a bird. When a couple of hundred birds have been collected the oil is extracted by squeezing firmly and passing the hand along toward the neck until the oil exudes from the beak. This oil, which is of reddish color, has an odor like that of cod liver oil, and if properly refined it might possibly be used for the same medicinal purposes. There are said to be a number of cases of benefit from mutton-bird diet to persons with pulmonary troubles, anaemia and other wasting diseases. According to the Forest and Stream magazine it takes



Dining Cars Are Now Built in Australia

about 100 birds to produce one gallon of oil.

The birds are then plucked and the skin with the fat is taken off. The skins are "tried out" in a pot and the fat collected. The third stage in the industry is the salting of the bodies. This is done by packing them in barrels with salt, and pouring sea water in, often with an addition of solid brine to make the water still more salty. The birds are shipped to Northern Tasmania, where they sell as food at about \$2.50 per hundred.

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AN AUSTRALIAN DINING CAR
 —◆◆◆—

This dining car, built for the new Victorian railways of Australia, differs from the American type of dining cars in the fact that it is divided into first and second-class compartments, with the kitchen in the center. The first-class compartment seats 24 persons and the second only 18 persons. The cooking and storage are sufficient for at least three relays of diners, or a total of 156.

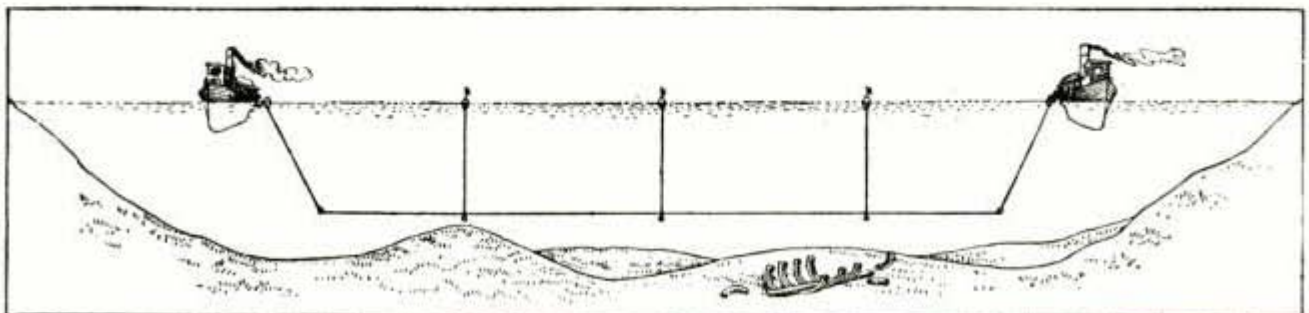
The length of the car is 71 ft., and the interior of both compartments are in

handsomely finished Queensland cedar, with specially designed steel ceilings, relieved with copper bronze decorations. The windows are constructed without frames, thus affording a maximum amount of light, besides being carefully balanced so as to be easily set to any position.

It is interesting to note that, while meals are served on the European plan on American railways, in the diners of this Australian road the American plan is almost wholly adopted. Dinners are \$1 and breakfast and lunch are 75 cents in the first-class compartment, and 75 and 50 cents in the second class.

—◆◆◆—
DRAGGING FOR NAVIGATION OBSTRUCTIONS
 —◆◆◆—

Where rivers run into the sea the bed of the ocean suffers change and a coastline erosion, hills of sand often obstructing navigation. An ingenious method of surveying the ocean bottom to find such obstructions is shown in this illustration, which was originally one of the drawings in G. R. Putnam's work on nautical charts. It is a long

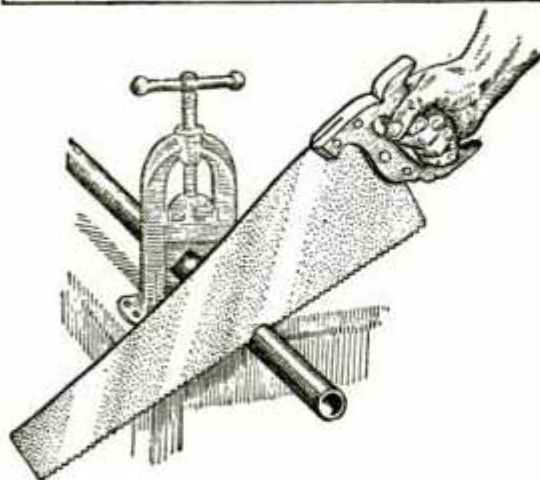
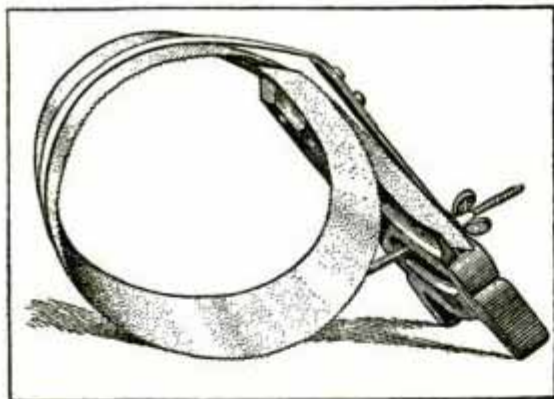


Simple Method of Sounding for Required Depth

wire sunk between two tugs, with weights arranged at both sides to keep it on an even plane across the channel. If any part of it strikes an obstruction the flag buoys on the surface of the water bob.

REMARKABLE HAND SAW

This apparently ordinary carpenter's hand saw is capable of being rolled into a complete spiral without breaking or straining beyond its limit, and, although designed for wood cutting, can saw through large nails and gas pipe without changing its set of teeth or dulling them. The saw is made of vanadium steel, and it is due to this fact and the skillful tempering that it can be used to the point of abuse without injury. The steel contains 0.18 per cent of vanadium.



This Saw Cuts Iron Pipe

The photographs show one of the saws rolled to a volute and clamped, and the same saw being used to cut gas pipe. It is claimed that the saw can be clamped in a spiral shape for any

length of time and when unclamped will immediately become absolutely straight again.

TELEPHONE-NEWSPAPER AND MUSIC CONVEYER

Budapest, the capital of Hungary, which is part of the Austrian empire, undoubtedly has one of the most unique and ingenious systems of distributing news and music among its residents ever conceived in any time of the world's history. It is a system by which the telephone assumes the role of the modern newspaper, and, in addition, carries to the home the strains of the opera and the music of the military bands.

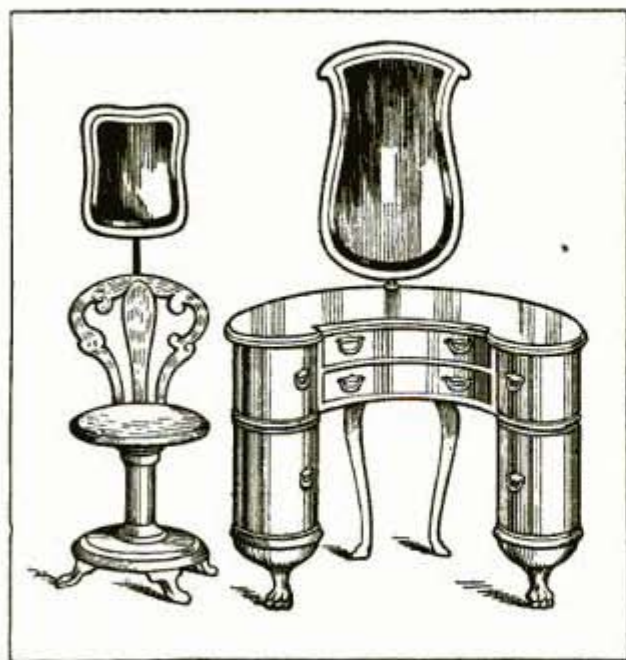
The system is owned and managed by a private corporation, whereas the regular telephone service is owned by the government. The annual subscription is about \$7 and the subscriber has to pay the cost of installment and removal, which is about \$8.50. This amount of money entitles the subscriber to two receivers and the full service of news, music, etc.

An idea of the service received is clearly shown by the following schedule. The program is sufficiently varied to satisfy the desires of all classes of subscribers and give the utmost satisfaction. The service begins at 8.55 a. m., when a buzzing noise, loud enough to be heard across a large room, announces the correct time. At 9.30 the day's program of important events is announced, such as ceremonies, lectures, plays, races, etc. At 10 and 11 o'clock stock quotations and general news items are given. At noon comes a second announcement of the correct time, followed by parliamentary news and general items of interest. At 12.45 stock quotations from the local, Vienna and Berlin exchanges and general news. At 2 o'clock more parliamentary and general news, and at 3 p. m. the closing prices of stocks, meteorological forecast, local personals and small items, and in winter the condition of the various skating places. At 4 p. m. court news

and miscellaneous news. From 4.30 to 6.30 military music from one of the great cafés or gardens. In the evening the subscriber may choose between the royal opera or one of the theatres, and still later, music from one of the tzigane orchestras. Attention is drawn to extras, such as great disasters, by a buzzing sound and the general schedule is broken into to announce the news. The regular schedule is not heard, of course, except when the receiver is down, but the subscriber knows just what class of news can be expected during the different hours of the day and takes down a receiver if interested.

DRESSING TABLE AND COMPANION CHAIR

The shape of these two pieces of bedroom furniture is an interesting feature, but more important is the adjustable mirror which forms the upper part of the back of the chair. Seated in this chair before the mirror of the dressing table, which is also adjustable, it is possible, by adjusting the chair mirror and moving slightly, to get a complete view of the back of the head and shoulders.

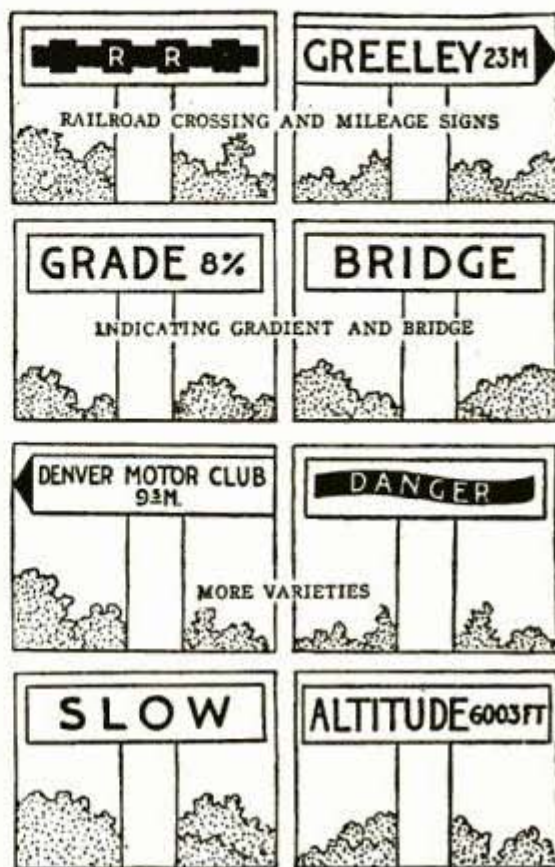


New Bed-Room Furniture

The production of gas from peat is being experimentally tried by the Canadian government.

AUTOMOBILE SIGNS IN COLORADO

Through the efforts of the Denver Motor club the state of Colorado can lay claim to being one of the best



Pointing the Way in Colorado

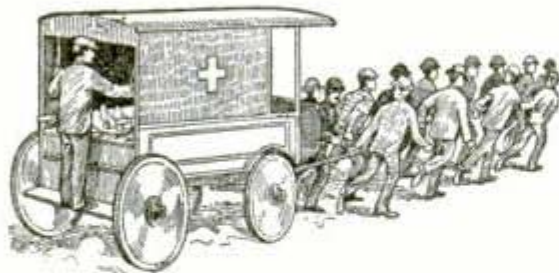
placarded states in the country for the benefit of the automobile enthusiast. The work accomplished includes the sign-boarding of numerous routes out of Denver, along various cross roads and up the canyons. Hundreds of miles of roads have been so placarded.

The signs are made of the finest grade of Oregon pine, covered with two coats of white lead, and about 2 ft. long. Black arrow tips are used on all mileage signs to give the proper direction, and all boards are placed at just the right height to catch the light from a car at night. The signs cover a wide range of information, some being erected to give the altitude alone. Signs for different items of information and warning are shown in the illustration.

Telegraph and telephone wires were temporarily strung on fence posts for miles in northern Indiana after the sleet storm of January and February.

CROWD PULLS AMBULANCE TO HOSPITAL

An ambulance in which a man was being rushed to a hospital in an attempt to save him from bleeding to death from

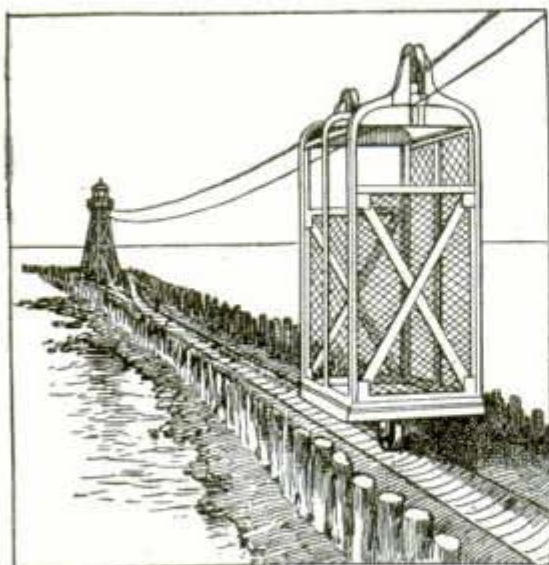


Bystanders Drew the Ambulance

an injury, was struck by a car on one of the streets of Chicago and the horses injured. Passengers of the car and pedestrians cut the ambulance away from the fallen horses and ran it several blocks to the hospital, but the injured man died before it was reached.

CAGE FOR RESCUING SHIP-WRECK VICTIMS

When the "Berlin" was wrecked some time ago at the Hook of Holland, great difficulty was experienced in rescuing the passengers, although the vessel was but a short distance from the



Hook of Holland Prepared for Wrecks

open-frame lighthouse at the end of the pier. Now a set of cables runs from this lighthouse to an erection on the pier about 500 ft. nearer shore. The

cables are directly above the pier and upon them is carried a rescue cage. The cage also has a wheel which runs along the pier.

Should a ship be wrecked near the lighthouse, lines can be shot over the ship and the passengers transferred to the lighthouse in suitable apparatus. From the lighthouse they enter the cage and are carried ashore. During severe storms the water sweeps completely over the pier.

THE EVOLUTION OF THE BRAKESHOE

The brakeshoe is that part of the braking mechanism which comes in direct contact with the wheel during an application of the brakes, and its function is to control the moving wheel and make it subject to the will of the engineer. From the wooden shoes used in the early days of railroading to the present standard shoe of cast hard iron and expanded mild sheet steel is a long jump, bridged by successive betterments in the form and material used.

According to an article in the Santa Fe Employes' Magazine, wooden shoes were universally used prior to 1850, the low speed and light tonnage of the trains permitting brake blocks of oak, hickory and other hard, tough woods. But heavier trains, greater speeds and steeper grades proved too much for the wooden shoes, which were constantly ignited from the friction, and from 1850 to 1860 shoes constructed partly of wood and partly of wrought or cast iron took the place of the all-wood article. It is also recorded that stone brake blocks were tried out on at least one railroad.

Then, for several years wrought iron strips riveted to cast iron blocks were used, and during this period the cast iron wheel was in universal use. The first cast iron shoe was patented by Stephen Morse in 1853, and has a combined head and shoe of cast iron. About 1870 the question of power brakes began to be seriously considered, and the brakeshoe secured a

greater amount of consideration. Since then cast iron has remained supreme as the most important part of the brakeshoe. All efforts to provide better metal than cast iron have not produced anything more satisfactory, and all improvements have literally been ways and means of reinforcing the cast iron.

In 1884, the rapid wear of cast iron having created dissatisfaction, another shoe was put into use. This consisted of forming the shoe of a hard iron, cast against chill blocks, this forming chilled areas at intervals in the wearing face. These chilled areas were necessarily obtained at the sacrifice of some of the frictional qualities of the unchilled areas of the shoe; therefore, in 1896, a shoe, consisting of hard chilling cast iron with chilled ends, soft machinery iron being disposed in the wearing ends, was adopted.

The next step forward in the development of the brakeshoe occurred in 1897. This new step consisted of casting hard iron about a bundle of expanded mild sheet steel, producing a shoe with composite wearing face of strong iron interlaced with strands of mild steel which interrupted the grinding away of the cast iron, securing a high degree of durability with the least sacrifice of frictional effect.

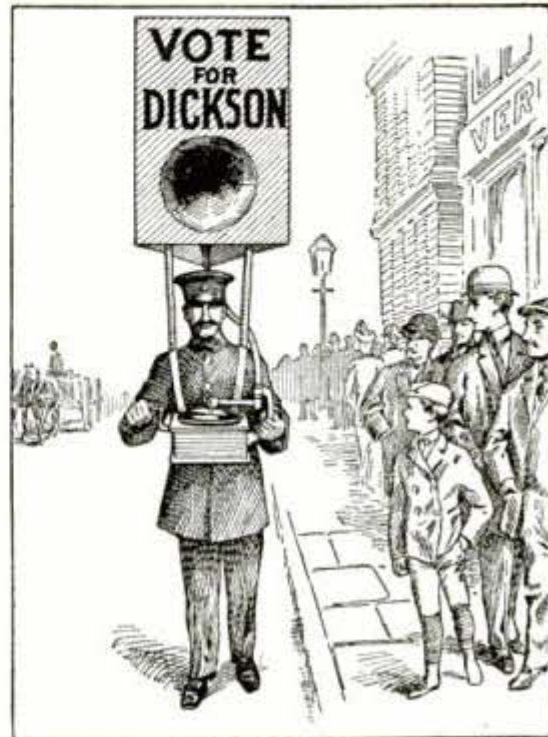
In 1899 a shoe came into use which had a body of soft non-chilling iron, surrounding a continuous spiral insert of very hard white iron disposed in the wearing face. By this means a stronger shoe was obtained than were the hardness integral with the body of the shoe.

A still better shoe was devised in 1900, in which the chill was applied on the inclined end from the back. Thus the hardest part of the shoe does not come in contact with the wheel or receive the heat direct.

The most modern shoe has a body of strong cast iron, a wearing face of cast iron or a composite face of cast iron and harder or tougher metal in which the cast iron largely predominates, and a back of tough, mild steel to which the body metal is firmly attached.

SANDWICHMAN AND TALKING SIGN

During a recent election campaign in Glasgow, Scotland, one of the candidates spread his speeches in an in-



"Canned" Election Speeches

genious manner. A sandwichman, bearing a gramophone and a number of records of the candidate's short addresses, slowly walked the streets, the machine talking the while.

The same idea was carried out in some of the cities of this country during the last campaign, but the machines were mounted on wagons.

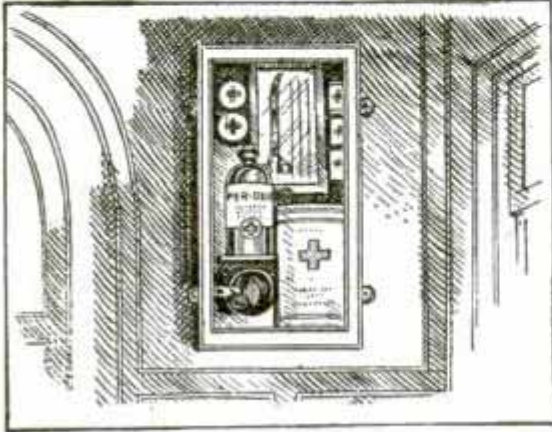
DEATH BY TOUCHING ELECTRIC STREET-LIGHT REELS

Several deaths have been caused in Omaha by persons coming in contact with the reels used to raise and lower the arcs used for lighting the streets. At one time the reels were grounded, but after the first couple of deaths the company discontinued this practice. Then another death occurred from the same source and now the company is placing the reels 8 ft. above the ground on the poles, instead of only 4 ft. When the arc is to be lowered for refilling it is necessary to use a ladder or

climbers to reach the reels, but the height places them out of reach of the ordinary person.

SURGICAL KITS ON PASSENGER TRAINS

If the New York society for instruction in first-aid-to-the-injured has



Surgical Kit for Cars

its way, a case containing emergency surgical appliances will be as familiar a sight in passenger coaches as the cases containing saws and axes. Resolutions demanding that all passenger trains be so equipped were passed at a recent meeting, and an attempt will be made to put through the special legislation necessary before the roads can be compelled to take such action.

AMERICAN DIRIGIBLE FOR GERMANY

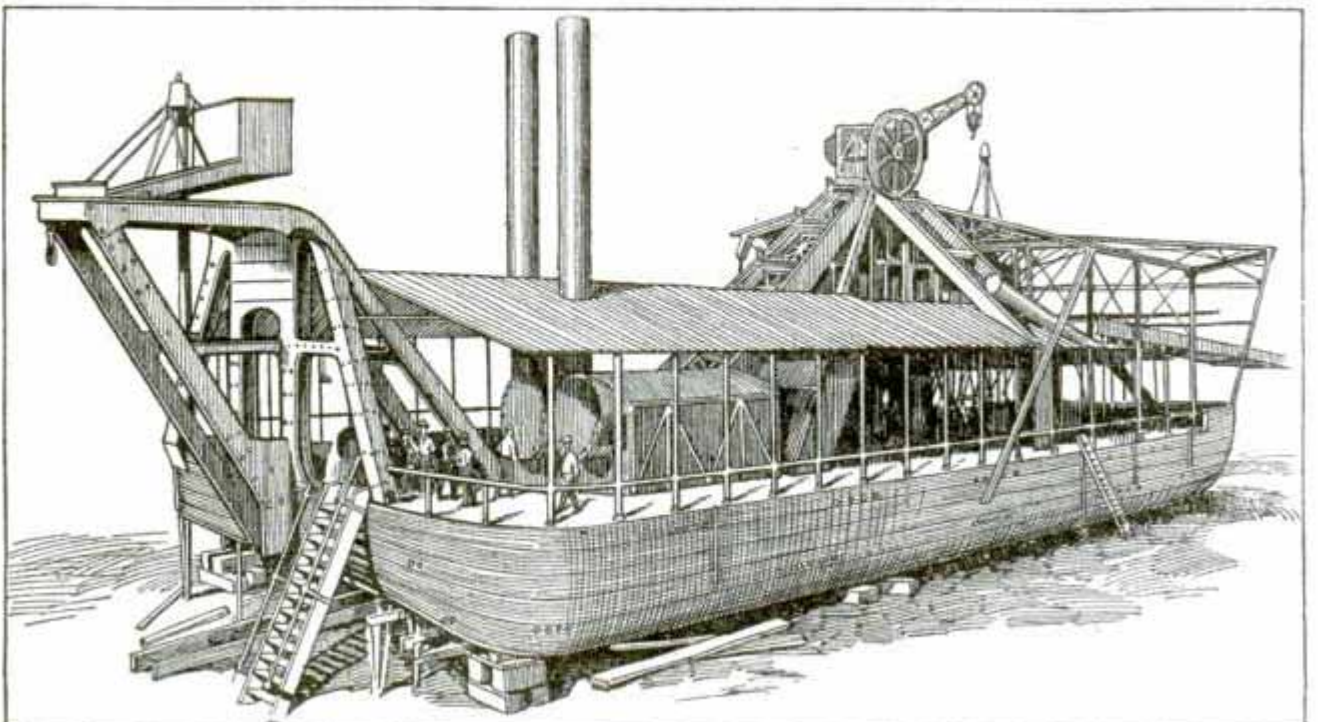
Cables from abroad say that there is more than a little surprise in German aeronautic circles at the fact that a Baldwin dirigible airship has arrived in Berlin for the well-known aeronaut, Captain Hildebrandt. The German press confesses that it cannot understand why the airship was brought from America, which, it asserts, is not so far advanced as Germany in the dirigible branch of the science.

However, it may well be that Baldwin's aerial machine will startle the dirigible airship world as successfully as did the Wrights' that of the aeroplane.

A store has been opened in Paris, the first of its kind in the world, for the exclusive sale of accessories for aerial flight.

SIAM TIN DREDGER

This powerful dredge, being built in Holland, is to be used to work the alluvial tin deposits of the Renong valley in Siam. The dredge is 118 ft. long, 40 ft. wide, and has a maximum dredging depth of 39 ft.

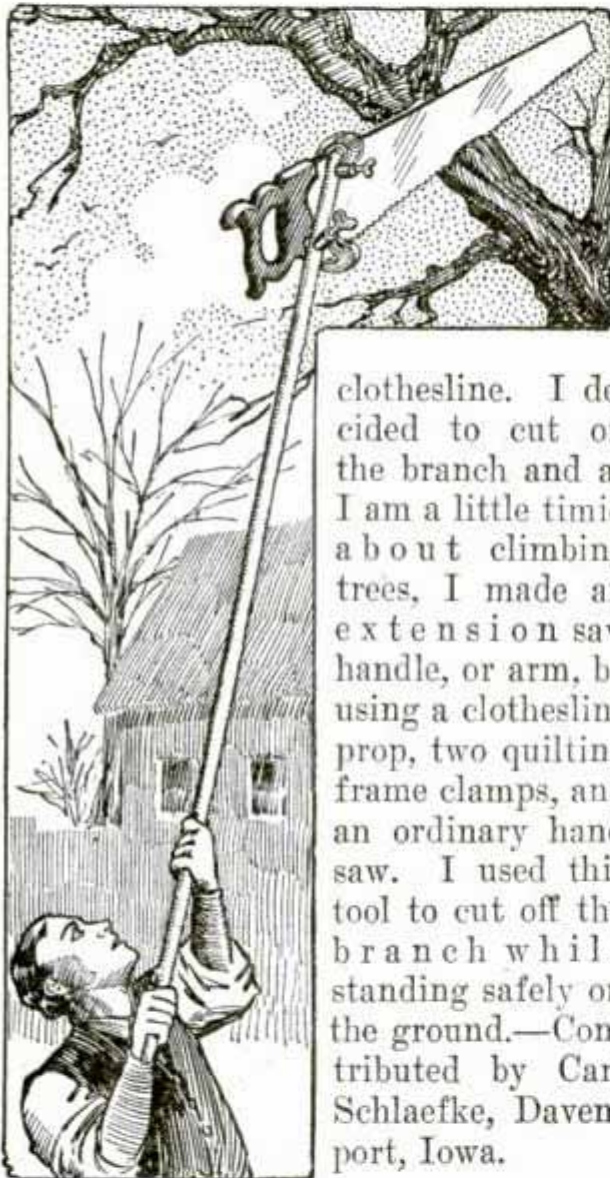


Built in Holland for Mining Tin in Siam

SHOP NOTES

Extension Saw Handle for Pruning

There is a tree in my yard with a branch that came in the way of a



clothesline. I decided to cut off the branch and as I am a little timid about climbing trees, I made an extension saw handle, or arm, by using a clothesline prop, two quilting frame clamps, and an ordinary hand saw. I used this tool to cut off the branch while standing safely on the ground.—Contributed by Carl Schlaefke, Davenport, Iowa.

Removing Dents from Gun Barrels

Secure a lead plug that will fit the inside of the barrel and push it from one end with a rod until the plug comes to the dent. Insert another rod from the other end of the barrel and swage the lead between the rods. This will expand the lead so it will push out any dents, providing the shell of the barrel is not too thick. The plug can be re-

moved by ramming a rod from one end. When this method can be used it will not mar the finish of the barrel.—Contributed by W. O. Hay, Camden, S. C.

Opening a Door on a Stair Without a Landing

Sometimes houses have a cellar door and stairway situated so the steps end at the bottom of the door without any landing. When going up the steps the door cannot be opened unless a step or two are taken backward to make way for the door to swing. The accompanying sketch shows how in one instance the door was made to open freely by the person before he started to climb the steps. Two sprocket wheels, such as used on the hubs of bicycles, were attached, one to the original door knob and the other to an extra knob



An Extra Knob on the Door

fastened at the bottom of the door. A regular bicycle chain connected the two sprocket wheels. The extra knob supplied at the bottom of the door came within easy reach of a person standing on the bottom steps.



Stationary Props for a Clothesline

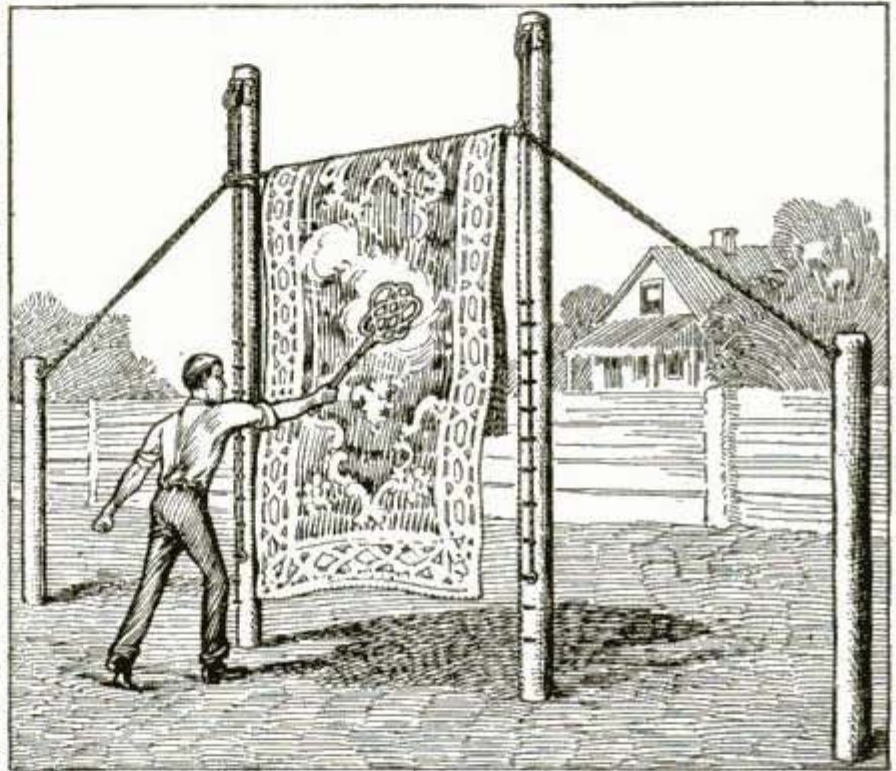
The average clothesline will not hold a large rug or carpet high enough so the dust can be beat out at the ends and if the line is raised with props, it will swing around so the props usually fall down before the dust can be entirely removed. The accompanying illustration shows a good way to set the posts and equip a clothesline for beating rugs, as well as making it handy for the week's washing. The regular height posts are set the proper distance apart for the line and two extra posts much higher are set between the two end posts so there will be three equal spaces one between each pair of posts. The two middle posts being much higher are supplied with pulleys at their tops. Two ropes with rings attached to each end are run through these pulleys and the line is passed through the two rings to be used for the top ends. At regular intervals along the sides of the posts, pins or large nails are driven in, leaving a portion of their lengths projecting over which to slip the bottom rings. The line is let down by releasing the bottom rings from the pins and the carpet or rug is thrown over. The line is then raised so the rug will clear the ground and held there by the rings slipped over the proper pins. This line is very useful for the regular washing, as the clothes can be hung on the line while within easy reach

and then they can be swung high with the ropes on the center posts.



Proper Care of an Automobile Horn

In case dust gets on the tongue of the reed of the horn it may be removed by passing a slip of thin paper under the reed—a cure that seems too simple to record, but many a motorist under these circumstances jumps to the conclusion that the tongue has lost its set, and begins to bend it about or pass a knife blade under it, with the result



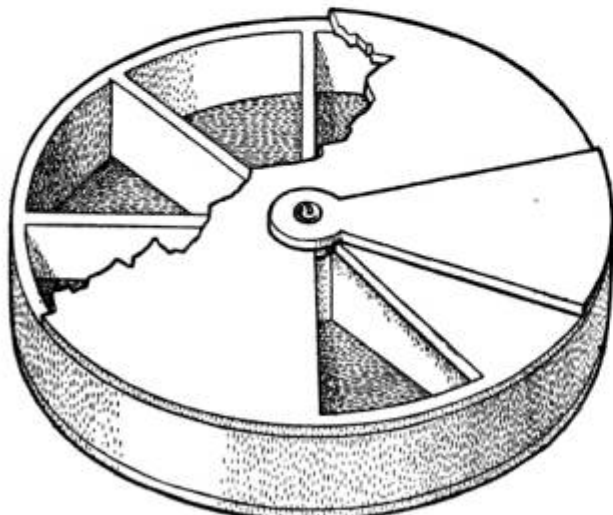
The Rug Swings Clear of the Ground

that a new reed is required. Another trouble is a leaky or punctured bulb, generally curable by patching; and the third is a broken flexible connection. Breaks in the flexible tube are due to want of support, and it is not the slightest use to mend the break without adding proper support, says The Automobile Dealer and Repairer. When sufficiently supported the flexible may be rendered airtight temporarily by wrapping it in thin rubber sheeting taken from the repair outfit, and binding tightly with thread for an inch on each side of the break, after which a piece of canvas should be wrapped over the rubber and tightly bound down.

The first opportunity should then be taken to shorten the flexible tube, and to solder the union piece on to the cut end.

A Nail Box for Different Sized Nails

Secure a block of wood 3 or 4 in. thick and 8 in. square, and draw on one side three circles, the large one, 8 in., the next, $7\frac{3}{8}$ in., and the center one, $1\frac{1}{4}$ in., in diameter. Lay out between the center circle and the circle $7\frac{3}{8}$ in. in diameter the number of compartments wanted for nails, spacing the parts equally and allowing divisions for $\frac{3}{8}$ -in. walls, the same thickness as the distance between the two outside circles. Saw out the marked compartments on a scroll saw thus leaving a piece of wood resembling the hub, spokes and rim of a wheel. Saw two circular pieces from $\frac{1}{4}$ -in. hardwood 8 in. in diameter and nail or glue one of them to one side of the block with the compartments. Cut a hole in the remaining circular piece the same shape and size as one of the compartments. Fit another piece over this hole for a cover and fasten both pieces on the other side of the block with one round head wood screw, as shown. If the screw is not drawn too tight the covers will rotate easily so that nails can be taken from any one of the compartments at one time while the others will remain covered.—Contributed by Geo. Sorensen, Rockford, Ill.

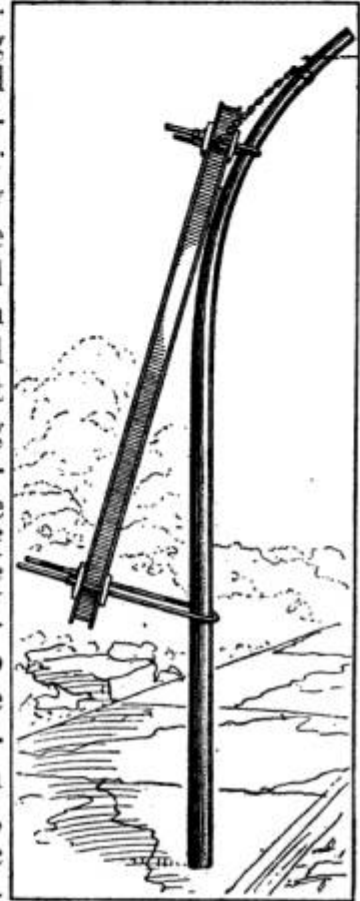


A Place for Each Kind of Nails

Straightening Bent Iron Side Trolley Wire Poles

The iron side poles used for supporting the trolley wires in the city of San Francisco became badly bent from the falling walls and the great heat of the earthquake fire.

In the rebuilding of the city and the reconstruction of the car lines, many thought that the iron poles would have to be taken down and straightened, but after making some experiments a simple adaptation of the principle of leverage was devised and used to straighten the poles without removing them from the ground, says *Electric Railway Journal*.

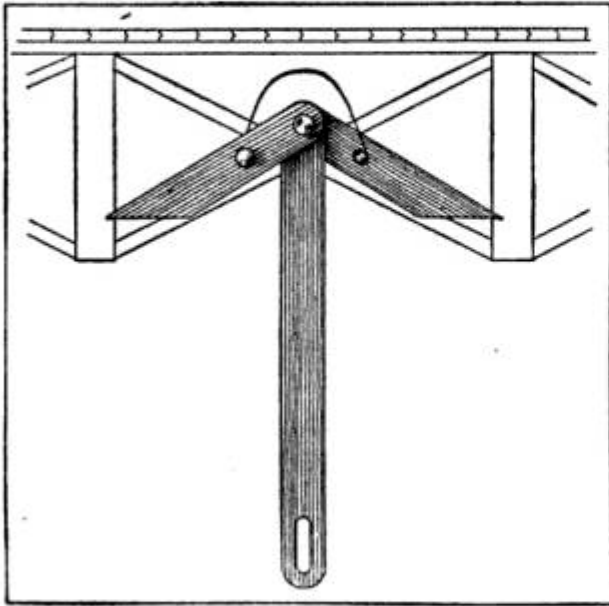


The device consisted of two U-bolts, a piece of 7-in. I-beam, 10 ft. long, and a wooden fulcrum block whose location could be varied along the rail. As the strain would naturally tend to pull the limbs of the U-bolts into a position where they would be at right angles to the pole, there was danger of the threads on the bolts being abraded by the sides of the holes in the crossbar back of the rail. To obviate this, hemispherical washers working in hemispherical shaped countersinks in the crossbars were devised, which, with plenty of lubrication, preserved the threads on the bolts. The operation of the device was produced by two men using 12-in. wrenches to turn the nuts which straightened the bend in the poles.

Sandpaper will cut old paint faster if kept wet with benzine.

Tool for Lifting Heavy Parts in a Garage

A handy device for lifting heavy parts of automobiles in a garage is shown in the sketch. The device con-



The Arms Grip the Two Joists

sists of a flat piece of steel 2 in. wide with two arms pivoted to the upper end. These arms are kept apart or held outwardly by a flat spring whose ends are bent around a pin in each arm. The device is to be placed between overhead joist and the tackle fastened in the slot cut in the lower end of the main piece. The weight on the main piece tends to spread the arms which will take a tighter grip on the beams. The principal advantage is that the tool can be placed directly over the load regardless of the position of the automobile. This saves the time of rigging up a scaffold on which to attach the tackle.—C. G. Smith, Brooklyn, N. Y.

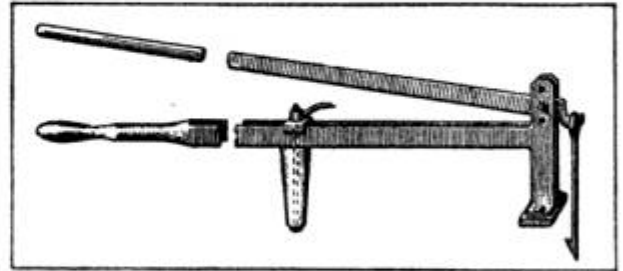
Preparing Enamelled Ware for Soldering

The surface around a hole in enamelled ware can be cleaned and prepared for soldering by holding something solid against one side of the metal and striking the other on the place to be soldered a few light blows with a hammer. The enamel being brittle will break away in shell-like pieces and

leave the steel bare and bright, ready to be soldered.

A Wide Wagon Tire Puller

Herewith is illustrated a device for pulling wide tires without injuring the rims. The levers are 5 ft. long, made from all iron with the exception of the



For Pulling Wide Tires

part that fits into the hub of the wheel, which is wood, says Blacksmith and Wheelwright. The sketch plainly shows the construction of this tire puller so that anyone can make it for his shop.

Another Drawing-Table

The accompanying sketch shows the construction of a folding drawing board stand. The supports for holding the board can easily be adjusted for height or slant, and as the sloping legs are hinged at the top of the vertical posts, the whole stand can be folded into a small space. Hard pine is a very

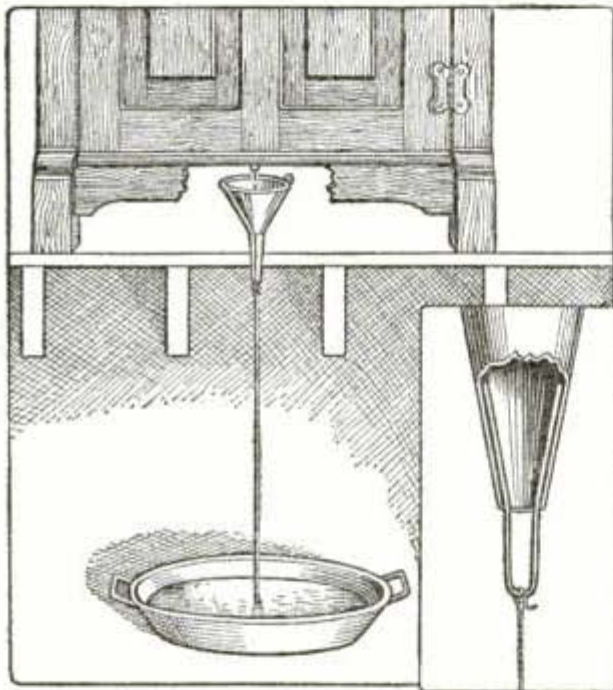


Home-Made Drawing-Table Stand

good wood to make the parts, while oak or any other hard wood would do as well if not better. The pieces are held together with $\frac{1}{4}$ -in. bolts, a thumb screw being used in each sliding vertical piece at the back part of the stand.

Drain for a Refrigerator

The drain from a refrigerator is sometimes taken care of by allowing the water to run through a hole in the floor to be caught in a pan placed on the basement floor. The water will splash and keep the floor wet all around the pan if some means is not supplied to



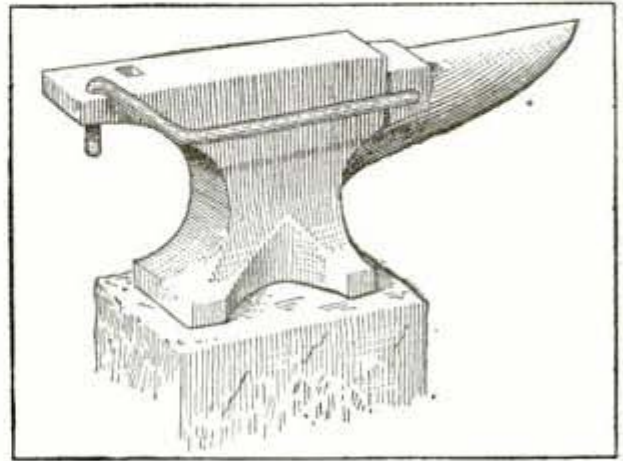
The Water Will Not Splash

carry the water into the pan. Instead of using a piece of pipe, tie a string to a hairpin and fit the hairpin in a funnel as shown in the sketch. Place this funnel in a hole bored in the floor and let the string hang down in the pan. The water will follow the string and run in the pan without splashing.—Contributed by W. A. Humphrey, Columbus, O.

Lead pipes may be polished by rubbing them with pulverized pumice and a wet rag until they are bright. Polish with a dry cloth and coat with thin white shellac varnish or very light colored copal.

Holding Iron for an Anvil

Here is a simple little device which will greatly help the blacksmith. Take a piece of round stock the size of the round hole in the anvil and about 3 in. long; bend it in the shape shown, allowing 18 in. for the longest arm of the

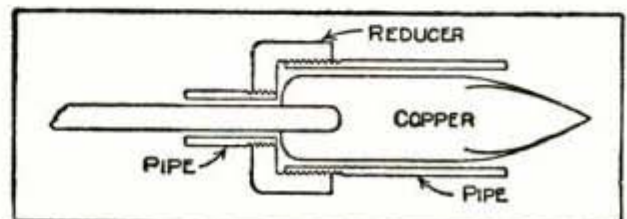


Handy Holder for the Smith

device, 8 in. between the two bends and 3 in. for the short part to be inserted in the anvil hole, says a correspondent of American Blacksmith. This will make one of the best helpers for holding iron, or any work, on the anvil while welding.

Casing for a Soldering Copper

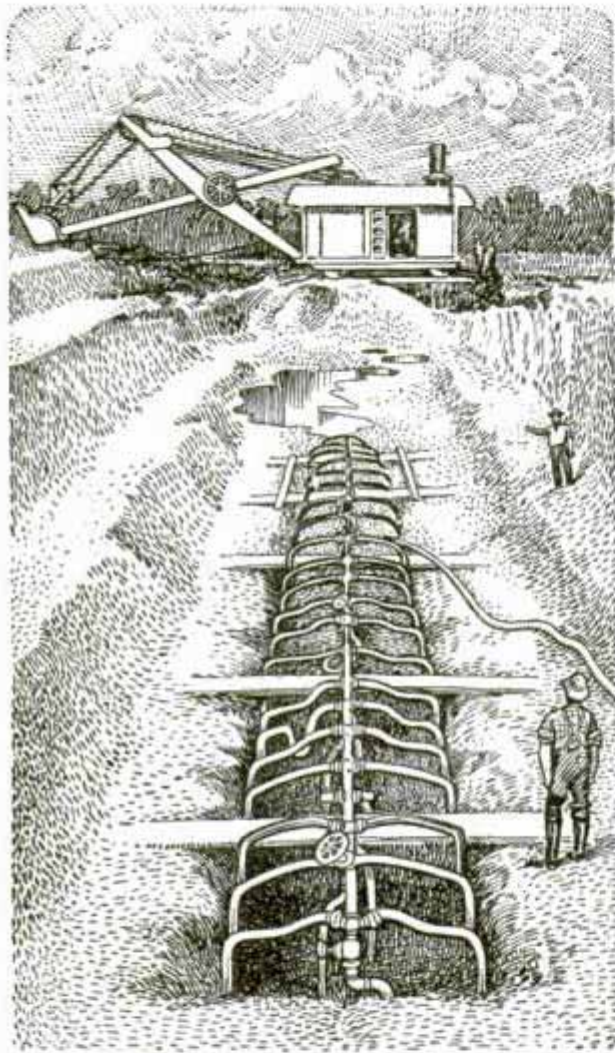
When a tinner is doing outside work, such as putting on a tin roof, the heated soldering-iron will quickly cool from the air striking the heated surface. A little device, as shown in the sketch, made from two pieces of pipe and a reducing bushing, keeps the air from the copper and retains the heat. When putting the copper into the fire the covering will push back on the handle.—Contributed by Robert B. Crump, Brooklyn, N. Y.



Covering for a Soldering Copper

How to Excavate Wet Sand

The digging of the ditches for the sewer pipe in the new city of Gary, Indiana, presented a serious proposition, as the sand unconfined will flow in from a radius of 15 ft. if an excavation is made 1 ft. deep. This sand when dry is very fine. The land is low



Pumping Water from the Trench

and in many places there are surface ponds 3 or 4 ft. deep, says Railroad Age Gazette. The contractors overcome this difficulty by using a series of 2-in. well points 3 ft. long, connected to each other with 2-in. pipes 13 ft. long, which are jetted in a double row near the center of the trench. This arrangement allows the sheeting to be driven on either side. The series of well points are connected to three pumps and the vacuum pump attached to the first section drains the excavation immediately adjacent to the scraper bucket excavator.

The 4-in. horizontal suction pipe to which the first pump is connected is made up of six sections joined by flanges. When the work has advanced 22 ft. the rear section is removed and placed in front. Gate valves at frequent intervals make it possible to do this without shutting down; thus the pump can remain in one position even though the excavation has been carried forward approximately 120 ft. The vertical pipes leading down to the well points have ells at the top and a 4-ft. length of hard wire-lined rubber suction hose makes the connection to the 4-in. main pipe. Each 22-ft. length of this latter pipe has eleven cross valves with two bushings each to accommodate the rubber connection.

After the draining has been carried on for a couple of hours in the first of the six sections attached to the first pump, 2 by 8 in. sheet piling, 12 ft. long, is driven on both sides of the sixth section. Excavation is then started by six shovelers and is carried down about 6 ft. more. It is at this level that the well points attached to the second and third pumps are jetted down another 16 ft. so that they penetrate below the bottom of the lowest excavation and 6 ft. below the bottom of the sheeting. The second and third pumps have their suction pipes drawing water from the same piping system, each drawing from a 4-in. suction hose straight below the pump and two 4-in. rubber hose leading in opposite directions. This arrangement is accomplished by a four-way connection in the suction of each pump about 1 ft. below the pump. The two 4-in. rubber hose, branching off horizontally from the four-way connection and at right angles to the trench, are but long enough to connect with a tee with 2-in. horizontal iron pipes which extend along the sides of the trench just inside the sheeting. It is to these latter pipes that the 1½-in. well points are connected, and jetted down as close to the sheeting as possible so that the excavation can go on without hindrance. A laborer can handle several times as much sand in a damp state as he could if it were

either dry or wet, as the dry sand falls off the shovel and the wet sand is washed off.

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Starting a Cut with a Round-End Saw

Many times a carpenter finds it necessary to cut through a board wall or partition with a saw. The usual method is to bore a hole and start the saw cut with a compass saw. A cleaner and better cut can be started and made with a common hand saw if the end of the saw blade is rounding as shown in the sketch. This rounding part should be cut on a radius of about 6 in. The cutting can be accomplished by describing the arc of a circle and clamping the saw blade in a vise with the line at the edge of the jaws. The blade can be cut easily with a cold chisel and hammer. The teeth are then filed in the circle the same as the other part



The End of the Saw Is Round

of the blade. The round end will start a cut in the surface of wood at any point.—Contributed by Charles Lederer Sr., Pierce, Nebr.

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Removing an Obstruction from a Wash Bowl Drain Pipe

Fill the bowl half full of water and press the palm of the left hand over the opening as shown in the sketch. Form an inverted cup in the hollow of the hand and give two or three quick pushes on the knuckles with the right



Pushing Out the Obstruction

hand. This will move the obstruction back and forth which releases the particles from the pipe to be washed away with the flow of water.—Contributed by W. A. Humphrey, Columbus, O.

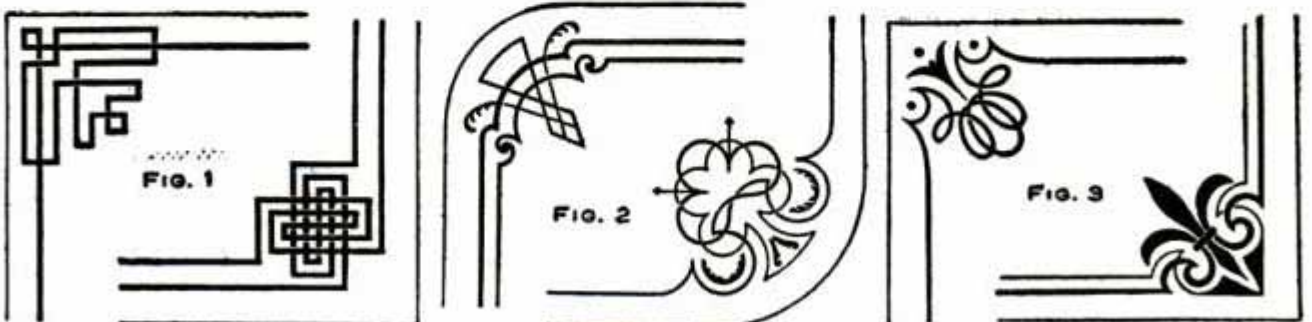
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If rubber is put under the legs of shop benches it will deaden the noise from hammering on the top.

◆ ◆ ◆

Corner Designs for Wagon Panels

Corner pieces that will suitably decorate the ends of stripes on wagon panels are shown in the accompanying illustration. As most of the patterns are single lines, it is not necessary to specify colors, says the Hub. Fig. 1 shows two interlaced designs which can be used to an advantage on the panels of business wagons. In Fig. 2 is shown designs of less rigid character than those of Fig. 1. The two designs of mixed character shown in Fig. 3 have



Ornaments for Wagon Box Panels

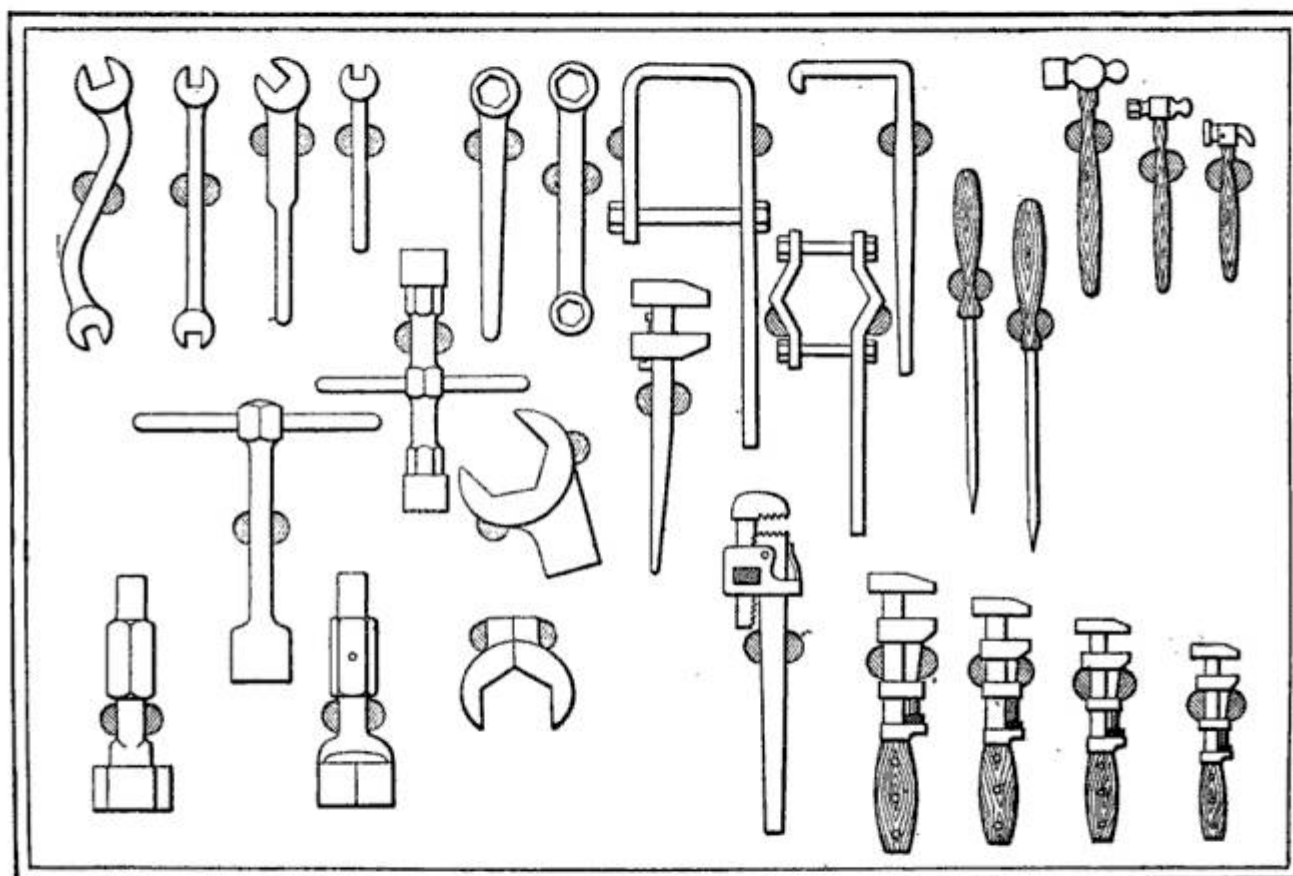
straight and curved lines which are interwoven and have floral effects given.

How to Make a Tool Board

Condensed Article from *Power*, by Henry Barnes

A tool board having sufficient size to hold all the wrenches, hammers and tools necessary, and to keep them in a handy place for the boiler or engine room, can be made as described. The tools are first gathered together and ar-

The best lumber for the front board is butt-jointed, glued, clamped well together and left to dry. When dry the tools are again arranged on this board and a pencil line made around the outside of each tool. The second quality of 1-in. lumber is nailed to the back with the boards running at right angles to the front boards. Then a hole is bored in each tool space marked and a jig saw used to cut out the spaces to conform to the shapes and sizes of the tools, making the fit snug. Mark each piece, 1, 2, 3, etc., as they are sawed out; also



The Tools Are Set In the Board

ranged on a table in the positions desired so as to take up the least space and yet not be crowded when placing the heavy part of all tools upward. Measure the width and length of the space covered by the tools to determine the amount of lumber required. The thickness of the boards should be the same as the thickest tool. If the thickest tool is 2 in. then get enough clear pine 1 in. thick for the front part and the same amount of second quality, also 1 in. thick, to make up the proper thickness.

number the places from which they were taken.

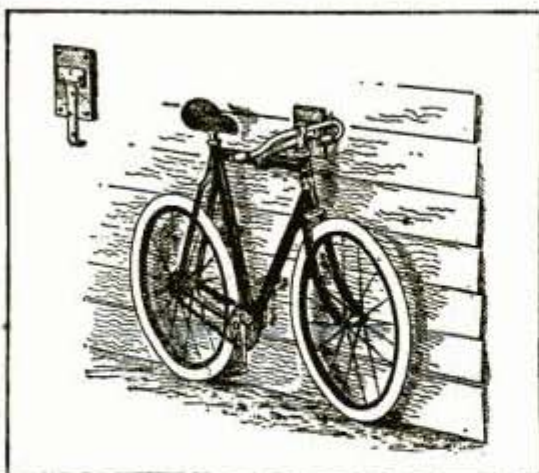
The center of gravity of each tool is found by placing them one at a time across a knife edge and changing the location until it balances. Mark the spot on the tool with chalk and place the tool back in the sawed-out space. Then, in order to allow a good grip to be taken on each tool, gouge out an opening on each side in proportion to the size and weight of the tool. Nail any length $\frac{3}{8}$ or $\frac{1}{2}$ -in. lumber on the back, and so cover up all the openings

at the back, and saw, split, or plane those "cut-out pieces," 1, 2, 3, etc., so that any difference of thickness between the tools will thus be compensated for by placing this backing in the openings. Glue or nail them in, and when the tools are in place all will be flush with the outside of the board. Put a moulding around the edges and finish with sandpaper. Paint, first with drop black, then a good coat of wood filler on front, back and side, then two coats of shellac and two of furniture varnish. Rub down with mineral wool before applying the last coat of varnish. Next paint the bottom only of each tool receptacle white. The board when finished will have an appearance something as shown in the illustration.

With this tool board all the tools are in sight, and if one is missing the white back will act as a telltale. They are so arranged that no amount of brushing past them will knock them out.

A Support for Bicycles

A very convenient device which may be attached to the front of a store or any other support, to hold a bicycle, is shown in the accompanying sketch. The device consists of a gate hinge with one leaf secured to a block and the block



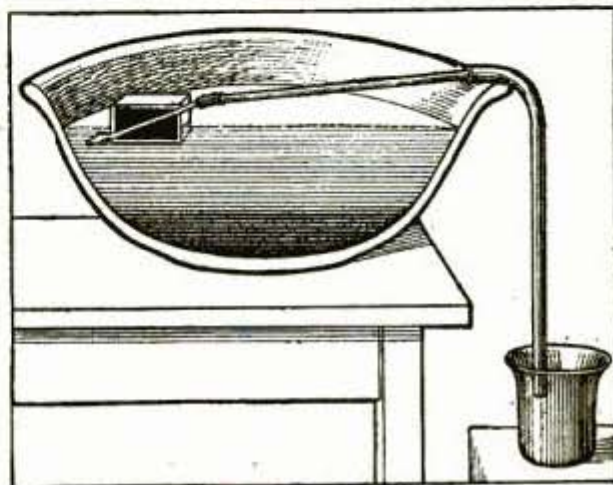
Bicycle Support

nailed to the support, says Scientific American. The other leaf of the hinge, which should be a very strong one, is bent over at the end to form a hook. This is caught over the upper horizontal bar of the bicycle frame. The bicycle

wheels are placed close to the house, so that the upper part leans forward, and is held from falling by engagement with the hook.

A Float for a Siphon

The siphon as illustrated is designed to remove clear fluid from solutions containing sediment and floating particles on the surface. The short arm of the siphon is fitted in a little float in such a manner that the end dips just



Intake End Is Beneath the Surface

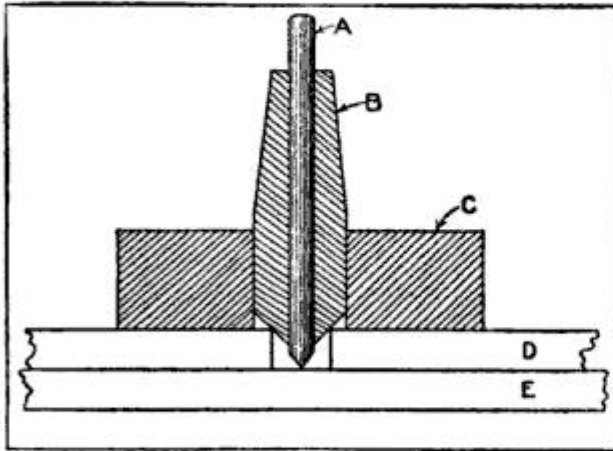
under the surface of the fluid, thus avoiding the floating particles. The float sinks with the receding surface, keeping the end always just submerged. For watery, oily or spirituous fluids a wooden block is used for the float, but hard rubber is necessary for siphoning acids, etc., which might attack the wood.

Nickel Substitute Contact Points on a Motorcycle Engine

When out on a motorcycle trip last summer my motor refused to run. After removing the commutator cover I saw that the platinum point was gone. For a time I did not know what to do, but with the aid of a chisel and hammer, which I carried in the tool box, I made a rivet from one-half of a five-cent coin. This worked as well, if not better, than the original platinum point and it has stood as much wear.—Contributed by O. H. Crooker, Unadilla, N. Y.

How to Make a Self-Centering Punch

The device consists of a $\frac{1}{4}$ -in. pin, A, fitted snugly in a sleeve, B, which is tapered short on one end and long on the other. The sleeve, B, is made a



Details of the Punch

close fit in the collar C. When the collar, C, is placed over a hole as in plate D, the sleeve, B, will adjust itself so the center punch, A, will be exactly central in the hole drilled in D. Strike the center punch, A, a light blow to mark the plate E. A light blow is necessary so the device will not be thrown out of center.

This device will easily mark the center of holes to be drilled in E that will coincide with holes in D. This will beat the old method of using a scribe and dividers to locate the center.—C. G. S.

Filling a Hole in a Smooth Metal Surface

After making a surface on metal smooth by planing, sometimes a blow-hole will appear which must be filled up after removing the piece from the planer. A metal plug is driven in and cut off close to the surface. The small portion projecting must be filed down level with the surface. This can be done without scoring the smooth surface by cutting a slot as wide as the diameter of the pin in a sheet of rather thick paper and placing it over the pin, the paper covering the surrounding

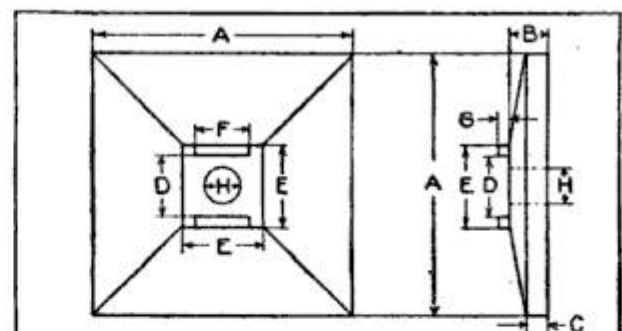
smooth surface. While filing, the paper slides back and forth on the surface with the movements of the file. The point and heel of the file are prevented from scoring the smooth surface.—Contributed by Donald Hampson, Middletown, N. Y.

Grinding Gasoline Engine Valves to a Perfect Fit

When grinding gasoline engine valves a good and quick way to tell when a perfect joint has been formed is to mark the beveled edge of the valve with a lead pencil, and replace the valve on its seat and turn it a few revolutions. If a perfect fit has not been obtained, the pencil marks will be only partly removed. When all the marks have been erased, you will know a perfect joint is made.—W. O. H.

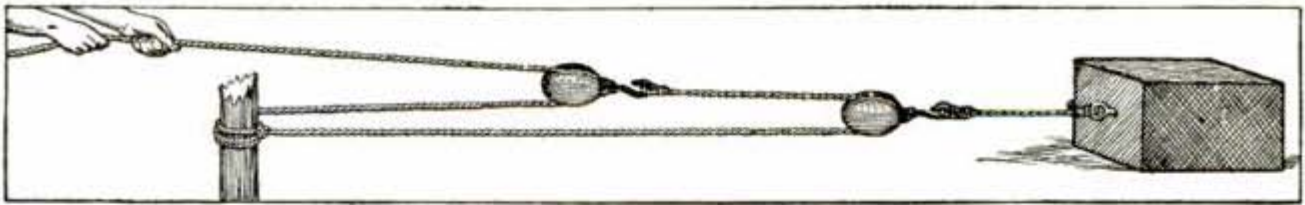
Foundation Bolt Washers

The accompanying table gives dimensions for washers used on foundation bolts varying in sizes from $\frac{7}{8}$ in. to 3 in. in diameter. These are for use



DIAMETER OF BOLT	DIMENSIONS GIVEN IN INCHES							
	A	B	C	D	E	E	G	H
$\frac{7}{8}$	7	$\frac{7}{8}$	$\frac{7}{16}$	$\frac{19}{16}$	$2\frac{9}{16}$	$\frac{19}{16}$	$\frac{1}{2}$	1
1	8	1	$\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{3}{4}$	$1\frac{3}{4}$	$\frac{1}{2}$	$1\frac{1}{8}$
$1\frac{1}{8}$	9	$\frac{1}{8}$	$\frac{9}{16}$	2	3	2	$\frac{1}{2}$	$1\frac{1}{4}$
$1\frac{1}{4}$	10	$\frac{1}{4}$	$\frac{5}{8}$	$2\frac{1}{2}$	$3\frac{5}{8}$	$2\frac{1}{8}$	$\frac{1}{2}$	$1\frac{3}{8}$
$1\frac{3}{8}$	11	$\frac{3}{8}$	$\frac{11}{16}$	$2\frac{3}{4}$	$3\frac{3}{8}$	$2\frac{3}{8}$	$\frac{1}{2}$	$1\frac{1}{2}$
$1\frac{1}{2}$	12	$\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{2}$	$3\frac{3}{4}$	$2\frac{1}{2}$	$\frac{1}{2}$	$1\frac{5}{8}$
$1\frac{3}{4}$	14	$\frac{3}{4}$	$\frac{7}{8}$	3	$4\frac{1}{4}$	3	$\frac{1}{2}$	2
2	16	2	1	$3\frac{3}{8}$	$4\frac{5}{8}$	$3\frac{3}{8}$	$\frac{1}{2}$	$2\frac{1}{4}$
$2\frac{1}{4}$	18	$2\frac{1}{4}$	$1\frac{1}{8}$	$3\frac{3}{4}$	5	$3\frac{3}{4}$	$\frac{1}{2}$	$2\frac{1}{2}$
$2\frac{1}{2}$	20	$2\frac{1}{2}$	$1\frac{1}{4}$	$4\frac{1}{8}$	$5\frac{5}{8}$	$4\frac{1}{8}$	$\frac{1}{2}$	$2\frac{3}{4}$
$2\frac{3}{4}$	22	$2\frac{3}{4}$	$1\frac{3}{8}$	$4\frac{1}{2}$	6	$4\frac{1}{2}$	1	3
3	24	3	$1\frac{1}{2}$	5	$6\frac{1}{2}$	5	1	$3\frac{1}{4}$

Table of Washer Dimensions

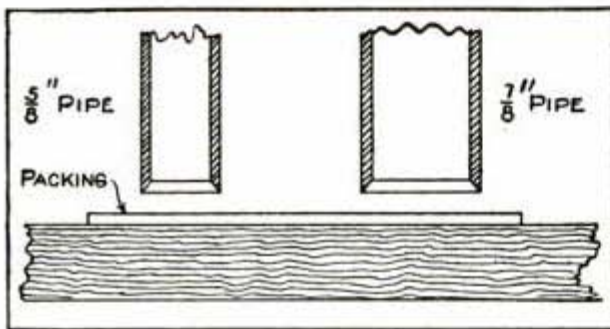


Arrangement of Two Single Pulley Blocks as a Tackle

on bolts not upset. The washers are made of cast iron and can be used for foundations, chimneys, and columns, or for brickwork or concrete. The tables will be found very useful for reference purposes and will save much time in figuring.

Cutting Out Packing Rings for Gauge Glasses

Gaskets for gauge glasses may be cut by using a piece of pipe for the cutter. If you want to make gaskets for a $\frac{5}{8}$ -in. glass, inside diameter of the gasket,



Cutting the Packing

take a piece of pipe that measures $\frac{5}{8}$ in. outside and about 3 in. long and sharpen one end so it will cut the packing. This size pipe will remove the inside of the gasket, and for the outside, use the same process, only have the pipe larger. If the outside is $\frac{7}{8}$ in. in diameter, use a $\frac{7}{8}$ -in. pipe sharpened in the same way. Cut out the inside first and then the outside. This will make a gasket the exact size required. Almost any size can be made in the same way.

A Tackle Without Double Sheaved Pulleys

The same result can be obtained from two single pulleys as secured from the usual single and double sheaved block by placing the pulleys on a continuous rope as shown in the sketch.

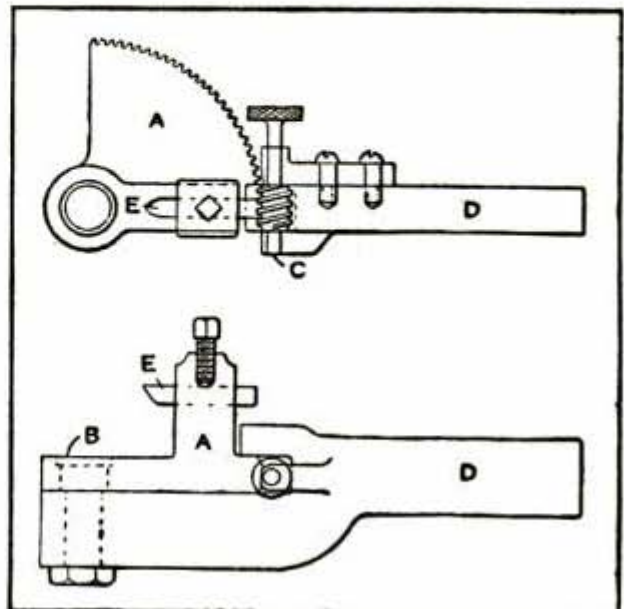
Where there are no double sheave blocks at hand this simple arrangement of single pulleys on one rope makes it possible to use such a tackle in an emergency.—Contributed by C. G. Smith, Brooklyn, N. Y.

To Prevent the Head Bumping a Low Rafter

A joist or low doorway in a cellar will cause a good many bumps on the head. This can be prevented by stretching a small rope in front and about 2 in. below the joist or low door casing. A piece of string and two spikes will answer the purpose. The railroads use a like device to warn brakemen of the approach to a low bridge.—W. A. Humphrey, Columbus, O.

Turning Spherical Valves

The accompanying illustration shows a device for turning spherical valves. The device consists of a shank, D, to which is pivoted a segment worm gear, A, carrying a cutting tool, E. The seg-



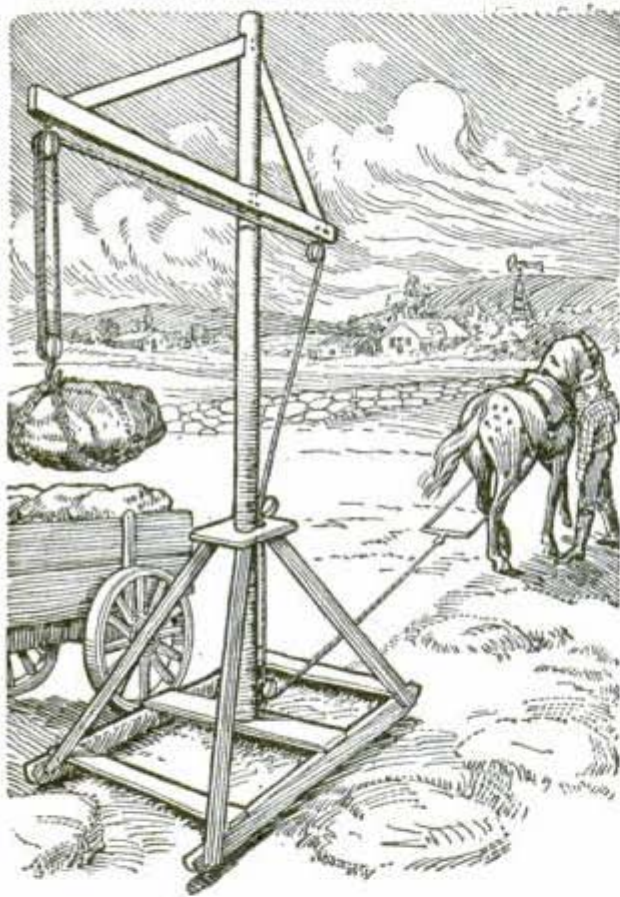
Details of the Turning Tool

ment is rotated by a worm, C. The tool made as shown is adapted only for turning valves, but if the gear segment were made 180 deg. it could be used to turn ball ends, says American Machinist, and if the tool boss were located on the opposite side of the fulcrum stud, B, it could be used for turning internal spherical surfaces.



How to Make a Farm Derrick

This home-made derrick is very useful for doing the heavy weight lifting on most farms. The whole derrick can



The Derrick Lifting Stone

be made at home out of materials found on the farm with a little iron work done at the home blacksmith shop, says the American Thresherman. The foundation sticks, or runners, are 10-in. logs or heavy plank, 14 ft. long, rounded at each end so they will slide. These runners are connected by two 3-in. plank, 12 ft. long, bolted to their upper sides, and a 6 by 10-in. timber securely fastened across the middle on which rests an iron plate with a 2-in. hole in the center for the mast which carries the

weight. The mast is 22 ft. long and has a heavy iron pin set in its base. This goes through the iron plate. The mast is supported 8 ft. from the bed by an iron-bound 3-in. plank platform 4 ft. square. At a point 16 ft. from the base of the mast a flat place is worked on two sides and 10-in. planks 14 ft. long are bolted to it, one on either side. This double cross piece forms the crane arm and must project 8 ft. It may be built with a still wider sweep, but the operator will be obliged to stake down the base so it will not overbalance when heavily loaded. To make it most complete, the crane arm may be laid with strap iron or barn door track and a car or pulleys arranged to run on it, thus discharging its load at any point between the mast and outer end of the arm. A ratchet will enable the hoisting horse to draw the load towards the mast at any point. The derrick without this attachment is just as useful for most work. Brace poles must be firmly bolted to the mast as shown in the illustration to stiffen and relieve it of all strain. A 1-in. pure manila rope is required and it should run the length of the crane arm and thence to its pulley at the base of the mast through a slot in the mast to prevent wear against the platform. From this pulley it runs to the single-tree. A steady horse or pair will accomplish rapid and easy transfers of heavy loads.

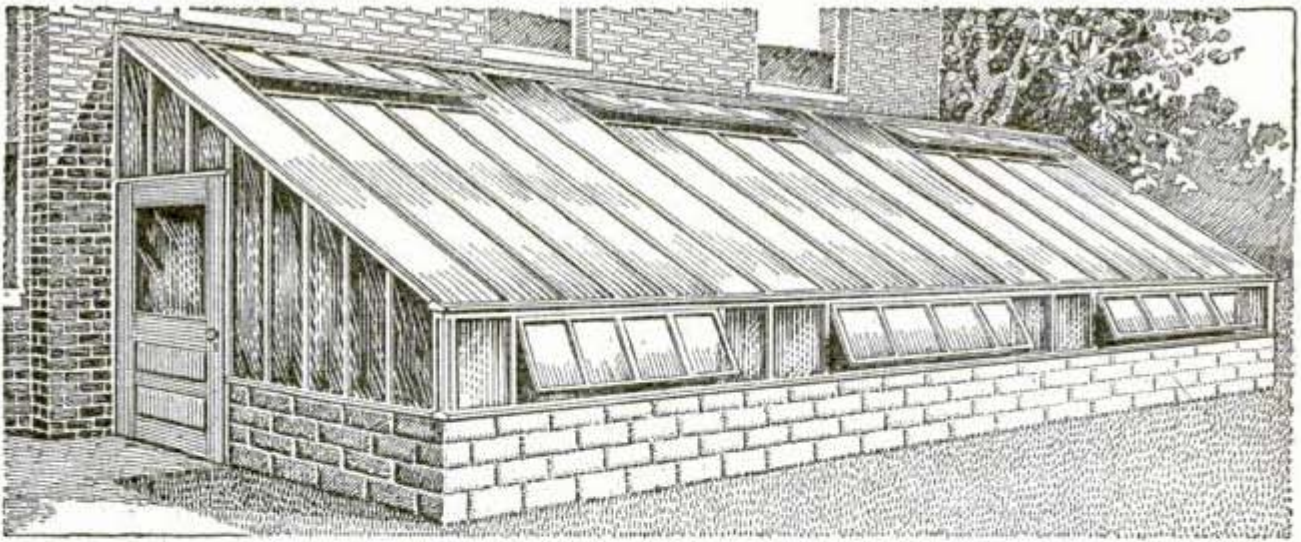


Cement Wheel for Grinding Glass

A manufacturing company making a sliding shoe of glass for furniture grinds the glass with a wheel made from equal parts of the best cement and silica sand. The two are mixed and tamped even. The glass is ground without scratching, as there are no hard and soft spots in such a stone. The cost of making the stone is much less than for the regular grindstone.



Old broken gas mantles pulverized make a fine metal polish.

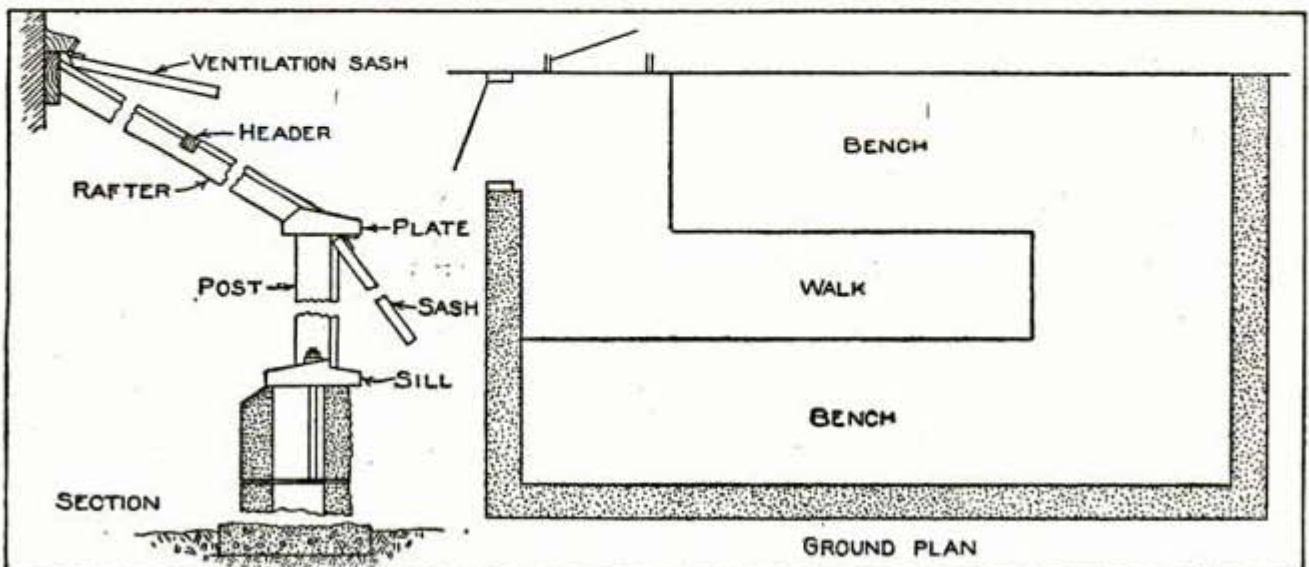


How to Build a Small Greenhouse

A greenhouse or conservatory made as a lean-to forms an ideal house for the gardener. Few gardeners know the results and profits from growing beautiful, vigorous plants under glass. The foundation can be best made from concrete blocks which are set on a concrete base made in a trench dug on lines where the wall is to be located. This wall of blocks should be about 3 ft. high. A sill is fastened on top of the blocks with bolts placed at intervals, the heads being held with strips of metal put in between the first and second tier of blocks. On top of the sill are fitted the posts, set at the right distance apart for the width of the glass to be used. Each post is rabbeted on one edge for the glass to set in and to hold the putty. A plate with the

top edge dressed as shown is nailed on top of the posts. Rafters rabbeted the same as the posts are cut with the proper slope to fit the rail, and a ridge piece nailed to the side of the house. The ridge has a cap fitted watertight to the building, to keep the rain or snow from running down the wall on the inside. Ventilation sash are hinged at the top on the roof part; also, sash are hinged at the top of the wall part as shown. The ground plan shows how benches are placed. These can be built of wood or concrete, as desired.

Heat can be supplied to such a greenhouse through pipes from a steam or hot-water boiler. While it is better to have a separate heating plant, the one used for the house will furnish the heat for such a greenhouse. The pipes are



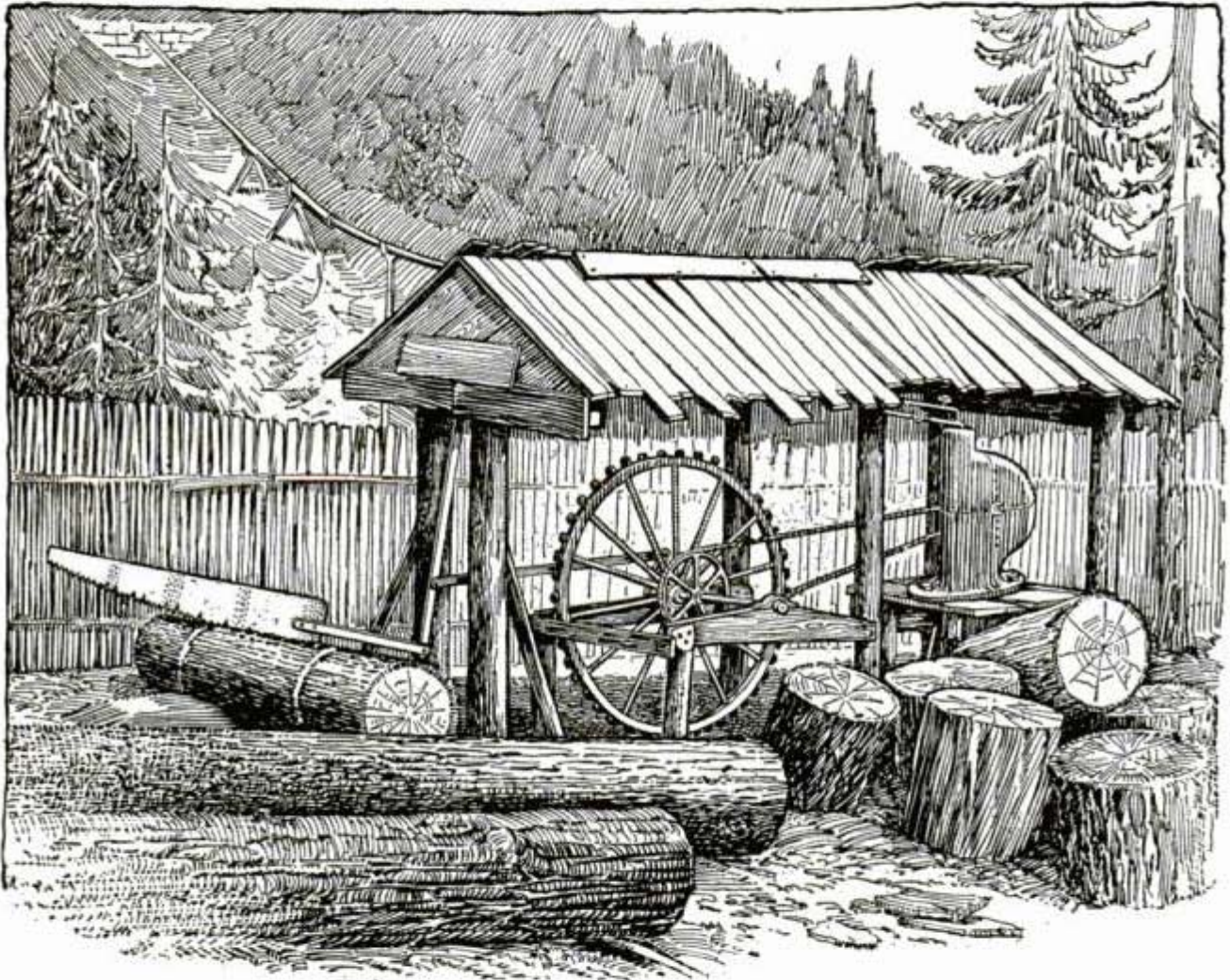
Details of the Greenhouse

connected beneath the benches and they must have surface radiation sufficient for the size of the greenhouse built.

Home-Made Water Power Driven Cross-Cut Saw

The smallest water power driven sawmill is situated in the state of Washington. The water used to propel the water wheel comes from a spring on an elevation of about 70 ft. above the mill. The water runs through a 2-in.

is belted to a 20-in. pulley on the power shaft which also carries a light 50-in. fly-wheel. This fly-wheel is made from a light buggy wheel with weights attached to the rim. The crank is connected with a pitman, and also the saw, to an arm swung from a shaft having two bearings at the top of the shed. The saw will cut 30 blocks of 20-in. diameter fir logs in a day of 10 hours. The power is also used for running a cider mill, grindstone and other machines where power can be applied.



Smallest Water Power Sawmill

pipe which is reduced at the mill to $1\frac{1}{2}$ in. and then at the water wheel to 1 in. The water wheel is made from a small size bicycle wheel with a metal rim. The buckets to catch the water are made from sheet copper and soldered to the rim of the wheel. The wheel is enclosed in a metal covering which carries the bearings for the axle. A 6-in. pulley is fastened to one end of the water wheel shaft. This wheel

—Contributed by M. P. Hoy, Gig Harbor, Washington.

If an engine speeds up nicely when the automobile is standing still and misses fire under a load you will know the batteries are getting weak. A good plan is to use two sets of cells alternately, as one weak cell will spoil a whole set.

Gasoline for Engines

A very simple test can be made to show the volatility of gasoline by moistening the hand with the liquid and noting the time it takes to evaporate. Common stove gasoline known as 74 test will take from 7 to 10 seconds to evaporate, leaving the surface of the hand perfectly dry. Lower grades will take much longer time. Should there be any greasy residue left on the hand the fuel is not fit for use in a gasoline engine.

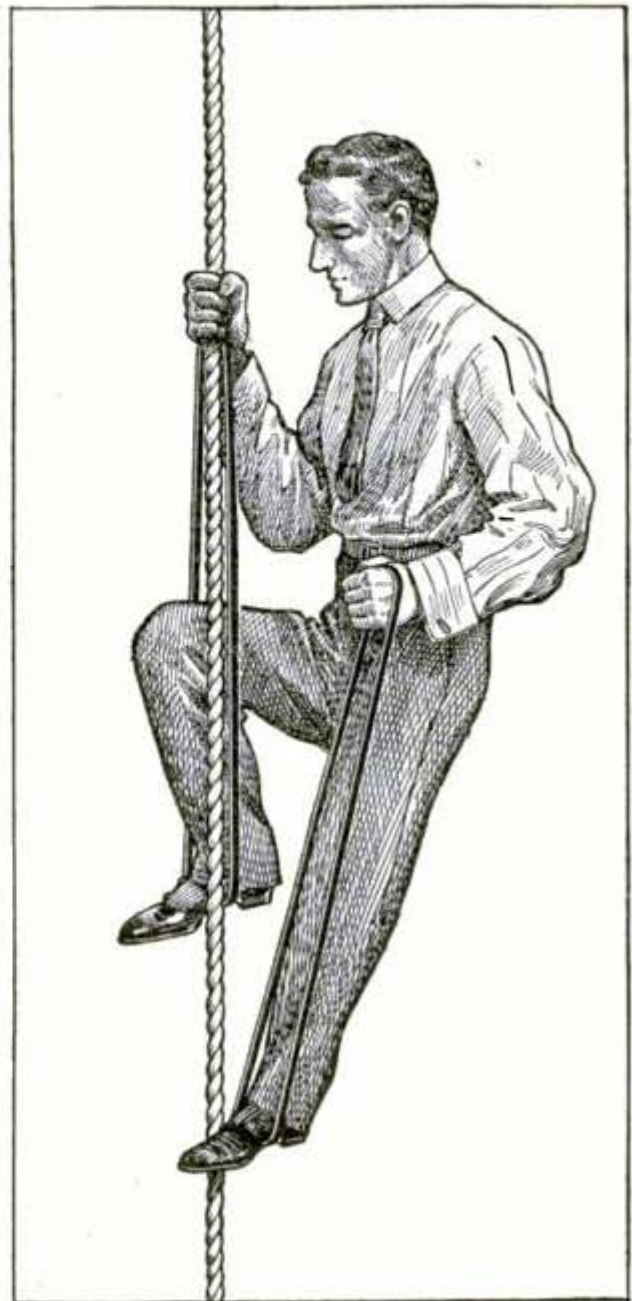
The lower grades of fuel may be used successfully in an ordinary gasoline engine, although it may become necessary to heat the air before it is brought in contact with the fuel. When using low-grade fuels during cold weather it may be necessary to use the 74 test gasoline for a few minutes until the engine has warmed up sufficiently to allow the heavier fuel to be vaporized.

Metal for Cleaning Wiping Solder

When wiping solder cannot be applied satisfactorily, caused by overheating or oxidation, put a small piece of phosphor tin about the size of a pea into the pot of melted metal and the solder will be revived again. A piece the size mentioned is sufficient for an ordinary pot full of solder, says a correspondent of the Metal Worker. Phosphor tin can be purchased from any tin or roofing supply house.

To Climb a Rope Like a Ladder

The accompanying illustration shows one way of climbing, or rather walking, up a rope. The climber uses two loops made from straps or ropes which he grasps, one in each hand. The right and left-hand loops carry the right and left foot, respectively. The climber grasps the rope with his hands, as in climbing a rope hand over hand, grasping both rope and strap at the same time, thus holding the loop so some



Walking Up a Rope

weight can be carried on the foot.—Contributed by W. S. Jacobs, Malden, Mass.

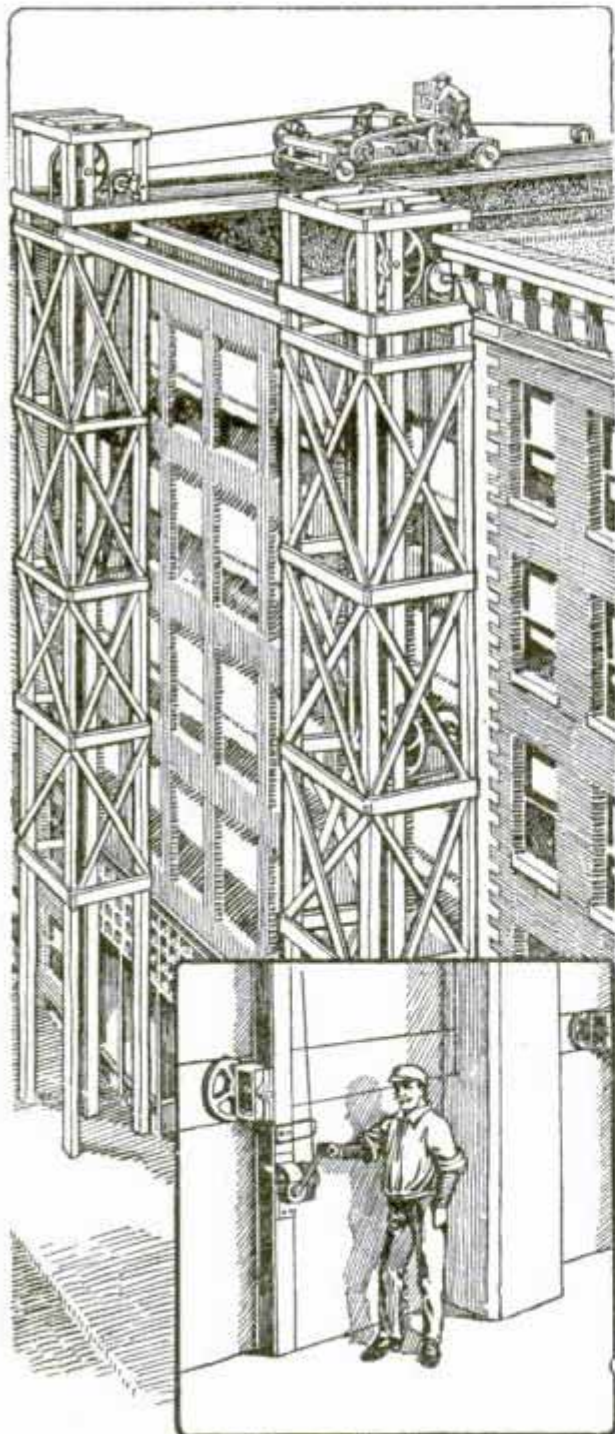
Cleaning Automobile Bodies

Automobiles which are constantly driven in town and seldom in the country should be washed as rapidly as possible at the end of the day's journey, because the mud collected from the town roads contains impurities which are far more likely to damage the varnish work than ordinary mud which is collected from country roads, says Automobile Dealer and Repairer. It is almost superfluous to say that buckets of water should be thrown over the body

before a sponge or leather comes near it, otherwise the highly varnished body will be scratched by minute particles of grit, which will cut like diamonds. In winter great care should be taken to prevent the water freezing on the paint-work, as it is liable to crack the varnished surface and cause it to peel.

Cutting Through a Building with Wire

An extraordinary piece of engineering has recently been accomplished in cutting a building like cutting a piece



Severing Buildings with a Wire Cut

of cheese. The building belonged to a company that wished to install heavy machinery, and fearing that the neighbors might complain of the vibration, the directors resolved to sever all contact with the adjacent buildings. The house was sawn apart by a spiral wire. Scaffolds were built on the outside of the building to carry the pulleys over which the spiral wire runs like a belt. Tension devices were placed at intervals through the building to keep the cutting wire under pressure. A motor furnished the power to drive the twisted wire and this motor, with the necessary wheels and shafts for reducing the speed, were mounted on a truck having flanged wheels on a track. The truck carrying the power plant was drawn with a weight to keep the wire tight at all times.

Launching a Boat

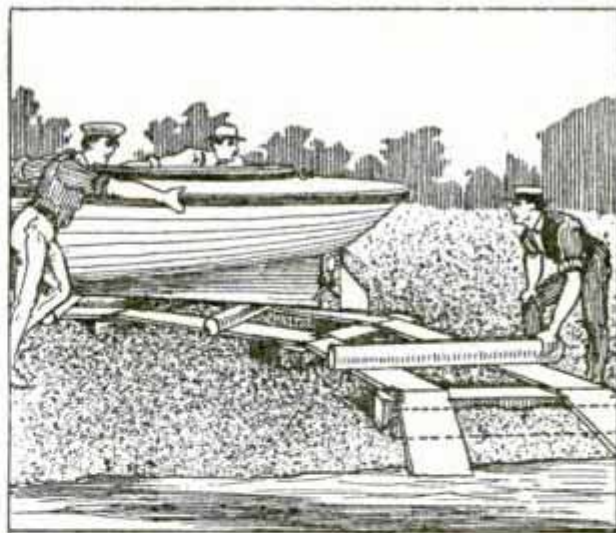
Condensed Article from *Motor Boat*

The person who becomes an owner of a motor boat for the first time feels helpless when the time comes to put her overboard. We see other men and boys get their boats off into the water with no apparent trouble, but to the novice it is a "white elephant" job. Even a small boat which is but a mere toy when afloat, represents considerable dead weight when lying on the shore. The task is more difficult because the boat is new and has a new coat of paint and varnish that must not be scratched or grasped with dirty hands. Boat builders have no trouble in launching boats, as they have the means for doing this work. The experienced yachtsman knows enough to buy or borrow the appliances necessary before he attempts launching a boat.

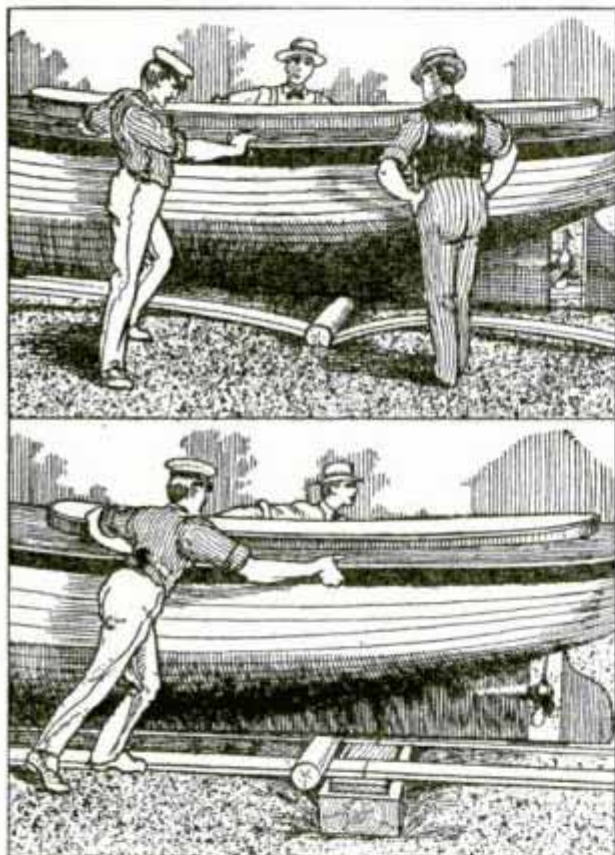
Anyone can grab a small skiff by the nose and drag it over the sand or gravel to the water, but a heavier boat requires more men and rollers. What makes most motorboats so difficult to launch is the shaft, propeller skeg and rudder that sticks down aft and must not be hit in moving. A straight keel

launch up to about 25 ft. can be supported on either side by a man or two, and with rollers under the keel and another man to lay boards ahead of her down the beach and shift the rollers forward as they roll out aft, the boat can be launched easily enough as far as the water.

We often see men rolling a boat toward the water on planks laid just so their ends meet on soft ground. On hard packed earth this might cause no trouble, but the chances are that you will have sand and the ends of the



Turning a Boat on Rollers



Improper and Proper Plank End Supports

boards will sink when the roller strikes that point. Watch an experienced man and you will notice how he scrapes away the soft top soil and with great care lays down a log or a stout plank on which to place the ends of the plank.

Secure three round wood rollers; an old mast 5 or 6 in. in diameter, sawed in 3 or 4-ft. lengths, makes the best rollers, as they will not bruise a boat's keel as an iron pipe will do. A boat can be handled on two rollers, but a third roller is a far easier way of doing it, and in case of a heavy boat, absolutely necessary. By "cutting" the

rollers, as the process of hammering them so they are not square with the line of the keel is called, a boat can be made to go around in a circle or to move over sideways.

With a rocker-keel boat, or one of the modern speed boats with no keel and with the shaft supported by brackets or struts or hangers, as they are variously called, it is impossible to roll the boat unless you first build a skid to lay her on and then put the rollers under the skid.

Get two square pieces of joist about half the length of your boat, lay them parallel on the ground about half the width of the boat apart and lay several cross pieces stout enough to carry the boat with an X bracing between the two joist to keep them from shutting up like a parallel ruler. Spike all these securely together or put them together



Launching a Boat Sideways

with bolts and nuts, if you want to preserve the skid by taking it apart and piling the pieces up snug until wanted again in the fall.

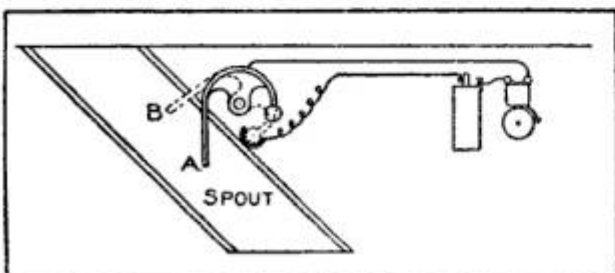
Where there is a steep bank with deep water to launch into, it is easier to shove a boat off sideways than it is endways.

Lay two stout spruce or yellow pine stringers so they extend over the bank far enough to take the boat out into deep water. Grease the top edges and put two greased sliders under the launch as she stands blocked up off the ground high enough to permit of these being passed under her. Then stay both the sliders with an X bracing of wood to prevent one end getting ahead of the other and possibly dumping the boat off. Take out the blocking under the boat and let her lay over toward the shore on her bilge so that, as she goes over the bank, she will straighten up and hit the water keel first, or she can be left standing plumb. In either case it's a quick way of launching, as the slide is so short. As the hull goes over the edge of the bank it tips up the slides and she drops quickly into the water with sometimes considerable fuss where the bank is steep.

All heavy boats are handled on grease. It would not be practical to handle them any other way. The weight then bears on, or is distributed over, the entire length of the sliders upon which it rests.

Alarm for the Grinding Bin

The accompanying sketch shows an alarm, the purpose of which is to notify the miller when the grinding bin is empty. The parts are simple and the

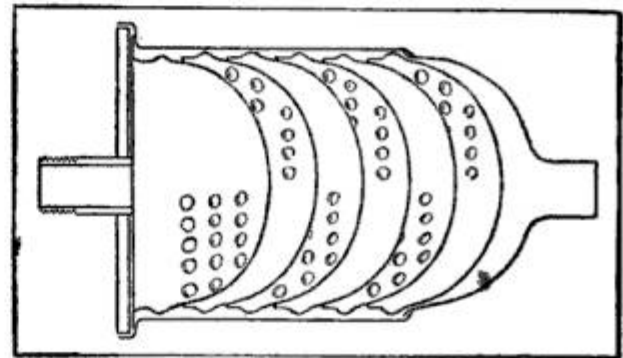


Empty Bin Alarm

device is easily made, says American Miller. A common electric bell is employed and one or two cells of dry battery, according to the size of the bell. The wires from the bell and battery are connected to a device made from a piece of heavy tin to fit the spout. This piece of tin is pivoted and made to work freely in the spout so the grain will keep the contact points open. When there is no grain in the spout the tin will take the position shown by the dotted lines, thus making the connection and ringing the bell.

New Type of Gasoline Engine Muffler

This muffler is built on lines different from the majority of the standard types, as instead of a very long cham-



Cup-Shaped Partitions

ber this one is cup-shaped, containing a number of baffle plates all the same size and shape and separated by very small spaces. The cups have a series of holes on one side only, alternate cups being placed with the holes at the side opposite to the preceding ones, so the exhaust is compelled to take a zigzag course after entering the cover, the outlet being at the narrowest portion of the exterior chamber. No asbestos packing is employed, and there are no projections on which soot can settle, or corners where undischarged gases can congregate.

Rusted or tight screws holding metal parts together can be loosened by holding a red hot iron of the proper size on the head of the screw. After cooling, the screws can be turned out easily.



How to Make a Copper Bowl

To make a copper bowl such as is shown in the illustration, secure a piece of sheet copper, No. 21 gauge, B and S, of a size sufficient to make a circular disk $6\frac{1}{2}$ in. in diameter.

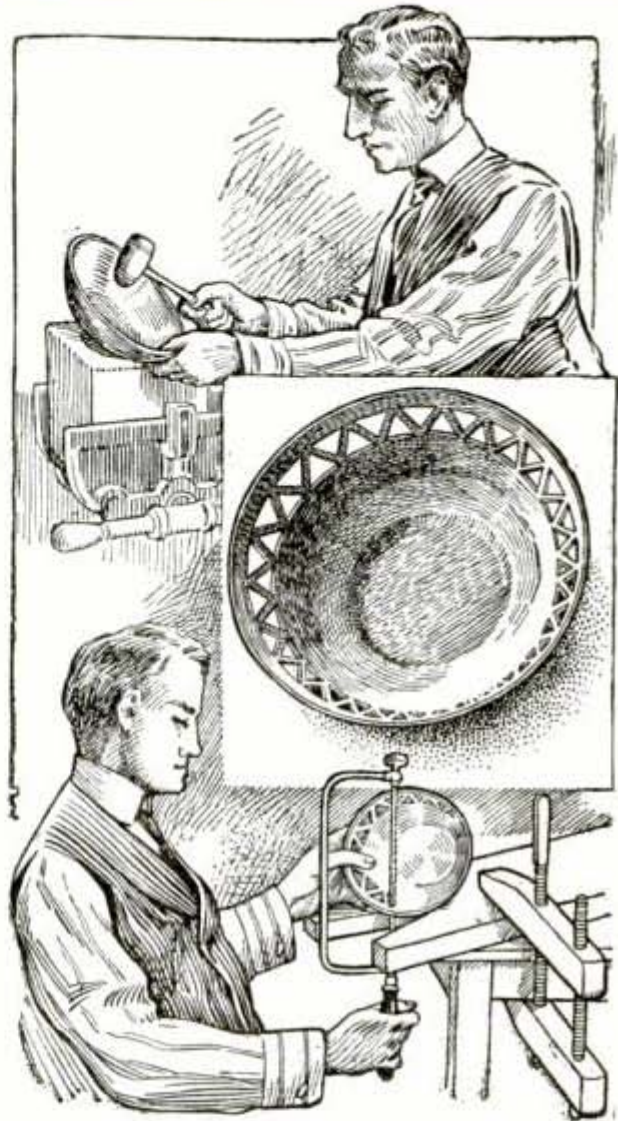
Cut the copper to the circular form and size just mentioned and file the edge so that it shall be smooth and free from sharp places. With a pencil compass put on a series of concentric rings about $\frac{1}{2}$ in. apart. These are to aid the eye in beating the bowl to form.

The tools are simple and can be made easily. First make a round-nosed mallet of some hard wood which shall have a diameter of about $1\frac{1}{4}$ in. across the head. If nothing better is at hand, saw off a section of a broom handle, round one end and insert a handle into a hole bored in its middle. Next take a block of wood about 3 by 3 by 6 in. and make in one end a hollow about 2 in. across and $\frac{1}{2}$ in. deep. Fasten the block solidly, as in a vise, and while holding the copper on the hollowed end of the block, beat with the mallet along the concentric rings.

Begin at the center and work along the rings—giving the copper a circular movement as the beating proceeds—out toward the rim. Continue the circular movement and work from the rim back towards the center. This operation is to be continued until the bowl has the shape desired, when the bottom is flattened by placing the bowl bottom side up on a flat surface and beating the raised part flat.

Beating copper tends to harden it, and if continued too long without proper treatment, will cause the metal to break. To overcome this hardness, heat the copper over a bed of coals or a bunsen burner to a good heat. This process is called annealing, as it softens the metal.

The appearance of a bowl is greatly enhanced by the addition of a border.



Shaping the Bowl and Sawing the Lace

In the illustration the border design shown was laid out in pencil, a small hole was drilled with a hand drill in each space and a small bladed metal saw inserted and the part sawed out.

To produce color effects on copper, cover the copper with turpentine and hold over a bunsen burner until all parts are well heated.

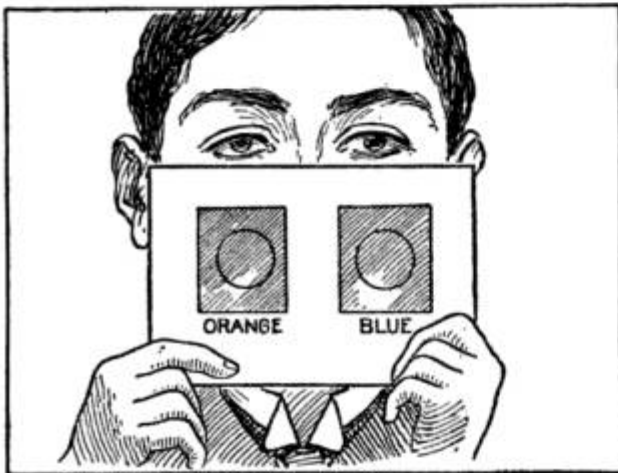
Melting Lead In Tissue Paper

Take a buckshot, wrap it tightly in one thickness of tissue paper, and holding the ends of the paper in the fingers of each hand, place the part that holds the shot over the flame of a match just far enough away from the flame not to burn the paper. In a few seconds un-

fold the paper and you will find that the shot has melted without even scorching the paper.—Contributed by W. O. Hay, Camden, S. C.

The Principles of the Stereograph

Each of our eyes sees a different picture of any object; the one sees a trifle more to the right-hand side, the other to the left, especially when the object is near to the observer. The stereoscope is the instrument which effects this result by bringing the two pictures together in the senses. The stereograph produces this result in another way than by prisms as in the stereoscope. In the first place there is



Looking Through the Colored Gelatine

only one picture, not two mounted side by side. The stereograph consists of a piece of card, having therein two circular openings about $1\frac{1}{4}$ in. diameter, at a distance apart corresponding to the distance between the centers of the pupils. The openings are covered with transparent gelatine, the one for the left eye being blue, that for the right, orange. The picture is viewed at a distance of about 7 in. from the stereograph. As a result of looking at it through the stereograph, one sees a colorless black and white picture which stands out from the background. Try looking at the front cover of Popular Mechanics through these colored gelatine openings and the effect will be produced.

If one looks at the picture first with the right eye alone through the orange

glass, and then with the left eye through the blue glass, one will understand the principle on which the little instrument works. Looking through the blue glass with the left eye, one sees only those portions which are red on the picture. But they seem black. The reason is that the red rays are absorbed by the blue filter. Through the orange gelatine all the white portions of the picture seem orange, because of the rays coming from them, and which contain all the colors of the spectrum; only the orange rays may pass through. The red portions of the picture are not seen, because, although they pass through the screen, they are not seen against the red ground of the picture. It is just as though they were not there. The left eye therefore sees a black picture on a red background.

In the same way the right eye sees through the orange screen only a black picture on a red background; this black image consisting only of the blue portions of the picture.

Any other part of complementary colors than blue and orange, as for instance red and green, would serve the same purpose.

The principle on which the stereograph works may be demonstrated by a very simple experiment. On white paper one makes a picture or mark with a red pencil. Looking at this through a green glass it appears black on a green ground; looking at it through a red glass of exactly the same color as the picture, it, however, disappears fully.

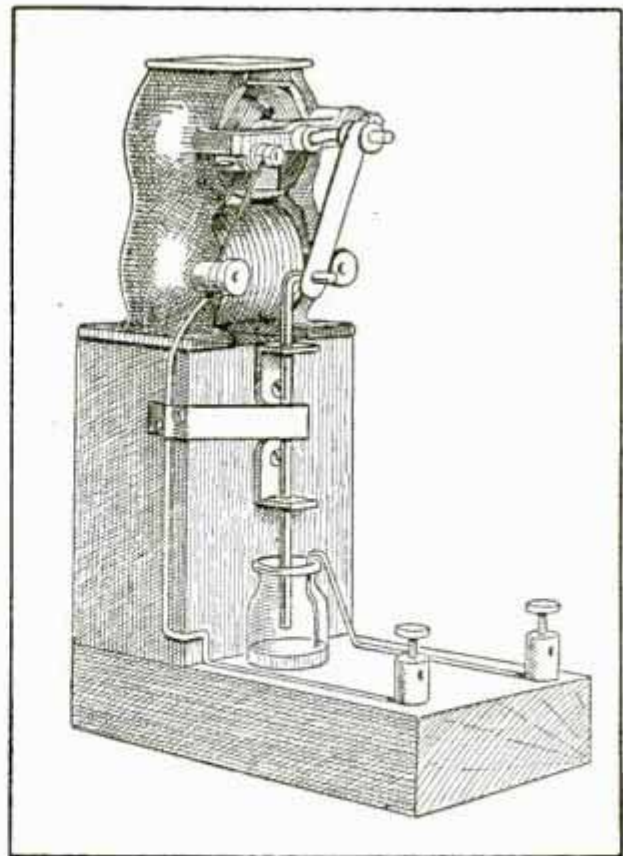
Through the glass one will see only a regular surface of the color of the glass itself, and without any picture. Through a red glass a green picture will appear black.

So with the stereograph; each eye sees a black picture representing one of the pictures given by the stereoscope; the only difference being that in the case of the stereograph the background for each eye is colored; while both eyes together see a white background.

In the pictures the red and the green lines and dots must not coin-

side; neither can they be very far apart in order to produce the desired result. In order that the picture shall be "plastic," which increases the sense of depth and shows the effect of distance in the picture, they must be a very trifle apart. The arrangement of the two pictures can be so that one sees the pictures either in front of or on the back of the card on which they are printed. In order to make them appear before the card, the left eye sees through a blue screen, but the red picture which is seen by it is a black one, and lies to the right on the picture; and the right eye sees the left-hand picture. The further apart the pictures are, the further from the card will the composite image appear.

In the manufacture of a stereoscope the difficulty is in the proper arrangement of the prisms; with the stereograph, in the proper choice of colors.



Motor-Driven Make-and-Break

Mercury Make-and-Break Connections for Induction Coils

Induction coils operating on low voltage have a make-and-break connection called the "buzzer" to increase the secondary discharge. Two types of make-and-break connection are used, the common "buzzer" operated by the magnetism of the core in the coil and the mercury break operated by a small motor. The sketch herewith shows how to make the motor-operated break. Two blocks of wood are nailed together in the shape of an L and a small motor fastened to the top of the vertical piece. The shaft of the motor is bent about $\frac{1}{8}$ in. in the shape of a crank, so that in turning it will describe a circle $\frac{1}{4}$ in. in diameter. A small connecting bar is cut from a piece of brass $\frac{1}{8}$ in. thick, $\frac{1}{4}$ in. wide and 1 in. long and a hole drilled in each end; one hole to fit the motor shaft and the other to slip on a No. 12 gauge wire. Two L-shaped pieces of brass are fastened to the side of the block and drilled with holes of such a size that a No. 12 gauge wire will slip through snugly. Place a No.

12 gauge wire in these holes and bend the top end at right angles.

Put the connecting brass bar on the motor shaft with washers fitted tight on each side and slip the other end over the bent end of the wire. Have the wire plenty long so it can be cut to the proper length when the parts are all in place. A small round bottle about $\frac{1}{2}$ in. in diameter is now fitted in a hole that has been previously bored into the middle of the bottom block and close up to the vertical piece. This should only be bored about half way through the block. The wire is now cut so at the length of the stroke the end will come to about one-half the depth, or the middle of the bottle.

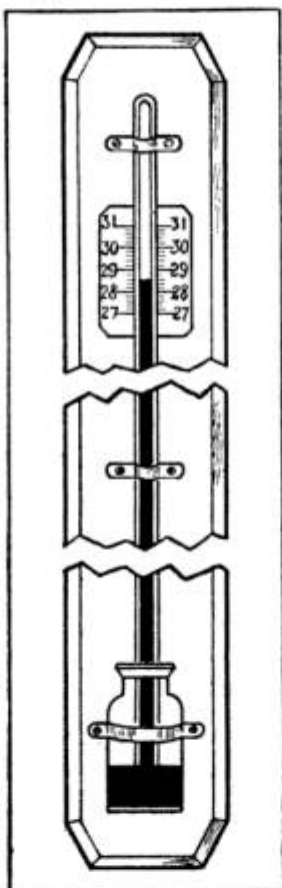
Fill the bottle with mercury to a point so that when the motor is running, the end of the wire will be in the mercury for about one-half of the stroke. Cover the mercury over with a little alcohol. A No. 14 gauge iron wire is bent and put into the side of the bottle with the end extending to the bottom. The other end of this wire is attached to one binding-post placed at the end of the bottom block. The other binding-post is connected to a small brass brush attached to the side of the

vertical piece, which is placed with some pressure on the moving wire. The motor can be run with a current from a separate course or connected as shown on the same batteries with the coil. The proper height of the mercury can be regulated for best results. The motor must run continuous if the coil is used for writing code signals, wireless, etc.—Contributed by Haraden Pratt, San Francisco, Cal.

How to Make a Barometer

Atmospheric pressure is measured by the barometer. The weight of the air in round numbers is 15 lb. to the square inch and will support a column of water 1 in. square, 34 in. high, or a column of mercury (density 13.6) 1 in. square, 30 in. high.

The parts necessary to make a simple barometer are, a glass tube $\frac{1}{8}$ in. internal diameter and about 34 in. long, a bottle 1 in. inside diameter and 2 in. high. Seal one end of the tube by holding it in the flame of a gas burner, which will soon soften the glass so it can be pinched together with pliers. Put a little paraffin in the bottle and melt it by holding the bottle over a small flame. When cool the paraffin should cover the bottom about $\frac{1}{16}$ in. thick. The tube is now to be filled with mercury. This may be accomplished with a paper funnel, but before attempting to put in the mercury, place a large dish or tray beneath the tube to catch any mercury that may accidentally be spilled. Only redistilled mercury should be used, and the tube should be perfectly clean before filling. When the tube is filled to



within 1 in. of the open end place the forefinger over the hole and tilt the tube up and down so all the air will gather at the finger end. The filling is continued until the tube is full of mercury. The glass bottle containing the wax covered bottom is now placed over the end of the tube and pressed firmly to insure an airtight fit with the tube. The bottle and tube are inverted and after a few ounces of mercury are put in the bottle the tube may be raised out of the wax, but be careful not to bring its edge above the surface of the mercury.

The instrument is put aside while the base is being made, or, if you choose, have the base ready to receive the parts just described when they are completed. Cut a base from a piece of $\frac{3}{8}$ -in. pine 3 in. wide and 40 in. long. In this base cut a groove to fit the tube and the space to be occupied by the bottle is hollowed out with a chisel to a depth of $\frac{3}{4}$ in., so the bottle rests on one-half of its diameter above the surface of the board and one-half below. The instrument is made secure to the base with brass strips tacked on as shown in the sketch. After the instrument is in place put enough mercury in the bottle so the depth of the mercury above the bottom end of the tube will be about $\frac{1}{2}$ in.

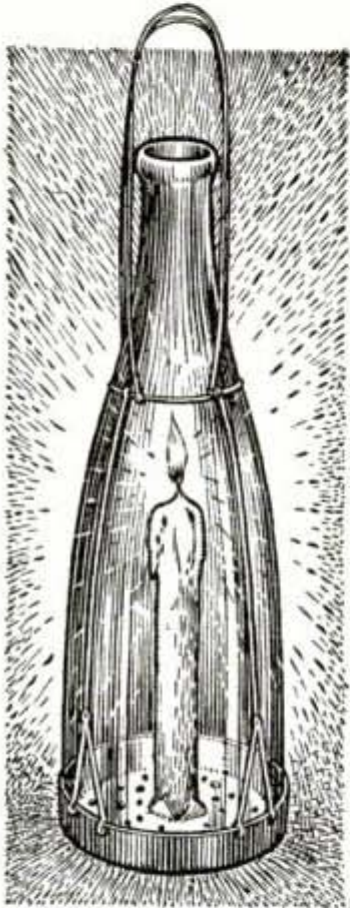
The scale is made on a piece of cardboard 2 in. wide and 4 in. long. The 4 in. are marked off and divided into sixteenths, and the inches numbered 27 up to 31. The scale is fastened to the base with glue or tacks and in the position behind the tube as shown in the sketch. Before fastening the scale, the instrument should be compared with a standard barometer and the scale adjusted so both readings are the same. But if a standard barometer is not available, the instrument, if accurately constructed, will calibrate itself.

In general, a drop in the mercury indicates a storm and bad weather, while a rise indicates fair weather and in winter a frost. Sudden changes in the barometer are followed by like changes in weather. The slow rise of

the mercury predicts fair weather, and a slow fall, the contrary. During the frosty days the drop of the mercury is followed by a thaw and a rise indicates snow.

Home-Made Post or Swinging Light

Remove the bottom from a round bottle of sufficient size to admit a wax or tallow candle.



This can be done with a glass cutter or a hot ring the size of the outside of the bottle, which is slipped quickly over the end. Procure a metal can cover, a cover from a baking powder can will do, and fit it on the end where the bottom was removed. The cover is punched full of holes to admit the air and a cross cut in the center with the four wings thus made

by the cutting turned up to form a place to insert the candle. The metal cover is fastened to the bottle with wires as shown in the sketch. This light can be used on a post or hung from a metal support.

A Checker Puzzle

Cut a block from a board about 3 in. wide and 10 in. long. Sandpaper all the surfaces and round the edges slightly. Mark out seven 1-in. squares on the surface to be used for the top and color the squares alternately white and black. Make six men by sawing a curtain roller into pieces about $\frac{3}{8}$ in. thick. Number the pieces 1, 2, 3, 5, 6 and 7,

and place them as shown in Fig. 1. The puzzle is to make the first three change places with the last three and

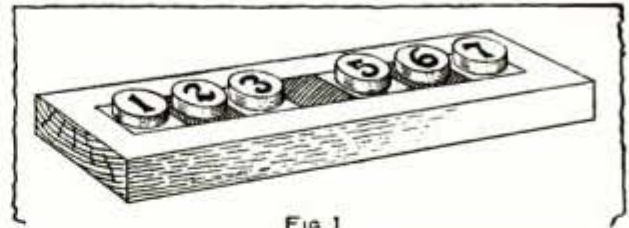


FIG 1

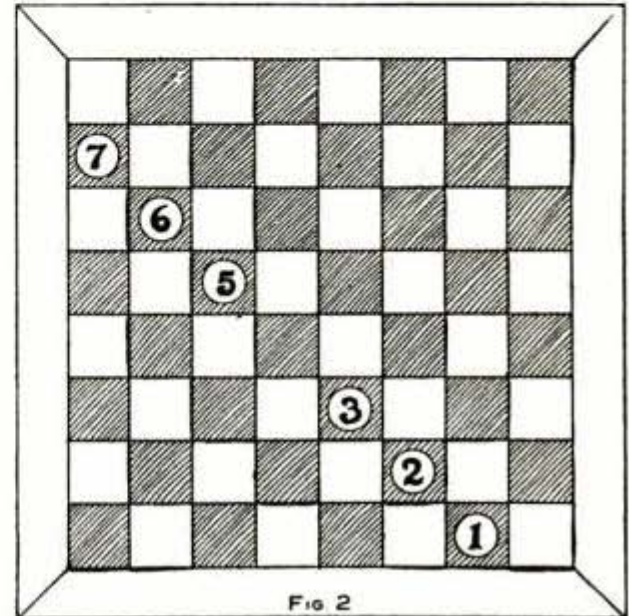


FIG 2

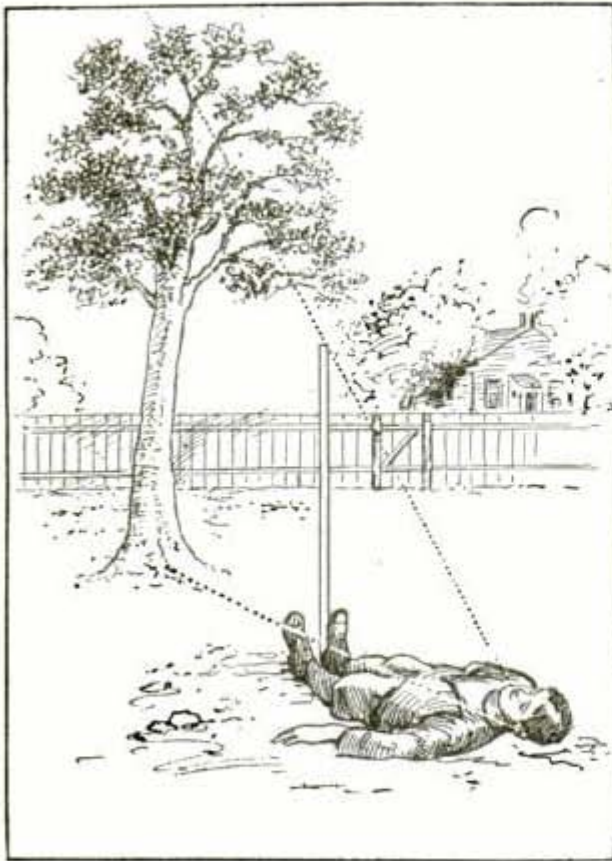
Position of the Men

move only one at a time. This may be done as follows:

- Move 1—Move No. 3 to the center.
- Move 2—Jump No. 5 over No. 3.
- Move 3—Move No. 6 to No. 5's place.
- Move 4—Jump No. 3 over No. 6.
- Move 5—Jump No. 2 over No. 5.
- Move 6—Move No. 1 to No. 2's place.
- Move 7—Jump No. 5 over No. 1.
- Move 8—Jump No. 6 over No. 2.
- Move 9—Jump No. 7 over No. 3.
- Move 10—Move No. 3 into No. 7's place.
- Move 11—Jump No. 2 over No. 7.
- Move 12—Jump No. 1 over No. 6.
- Move 13—Move No. 6 into No. 2's place.
- Move 14—Jump No. 7 over No. 1.
- Move 15—Move No. 1 into No. 5's place.

After the 15 moves are made the men will have changed places. This can be done on a checker board, as shown in Fig. 2, using checkers for men, but be sure you so situate the men that they will occupy a row containing only 7 spaces.—Contributed by W. L. Woolson, Cape May Point, N. J.

Covering railroad signals with gold leaf has taken the place of painting on some roads. Gold leaf will stand the wear of the weather for 15 or 20 years, while paint requires recovering three or four times a year.



Method of Applying the Triangle Measure

Measuring the Height of a Tree

"Near the end of the season our boy announced the height of our tall maple tree to be 33 ft.

"Why, how do you know?" was the general question.

"Measured it."

"How?"

"Foot rule and yardstick."

"You didn't climb that tall tree?" his mother asked anxiously.

"No'm; I found the length of the shadow and measured that."

"But the length of the shadow changes."

"Yes'm; but twice a day the shadows are just as long as the things themselves. I've been trying it all summer. I drove a stick into the ground, and when its shadow was just as long as the stick I knew that the shadow of the tree would be just as long as the tree, and that's 33 ft."

The above paragraph appeared in one of the daily papers which come to our office. The item was headed, "A Clever Boy." Now we do not know who this advertised boy was, but we knew quite as clever a boy, one who could have got

the approximate height of the tree without waiting for the sun to shine at a particular angle or to shine at all for that matter. The way boy No. 2 went about the same problem was this: He got a stick and planted it in the ground and then cut it off just at the level of his eyes. Then he went out and took a look at the tree and made a rough estimate of the tree's height in his mind, and judging the same distance along the ground from the tree trunk, he planted his stick in the ground. Then he lay down on his back with his feet against the standing stick and looked at the top of the tree over the stick.

If he found the top of stick and tree did not agree he tried a new position and kept at it until he could just see the tree top over the end of the upright stick. Then all he had to do was to measure along the ground to where his eye had been when lying down and that gave him the height of the tree.

The point about this method is that the boy and stick made a right-angled triangle with boy for base, stick for perpendicular, both of the same length, and the "line of sight" the hypotenuse or long line of the triangle. When he got into the position which enabled him to just see the tree top over the top of the stick he again had a right-angled triangle with tree as perpendicular, his eye's distance away from the trunk, the base, and the line of sight the hypotenuse. He could measure the base line along the ground and knew it must equal the vertical height, and he could do this without reference to the sun. It was an ingenious application of the well known properties of a right-angled triangle.—Railway and Locomotive Engineer.

White putty on a black window frame can be made to harmonize by rubbing the fresh putty with a piece of cotton dipped in lampblack.

Sandpaper may be kept from slipping under the hand by chalking the back.

Old-Time Magic—Part IV

Cutting a Thread Inside of a Glass Bottle

This is a trick which can only be performed when the sun shines, but it



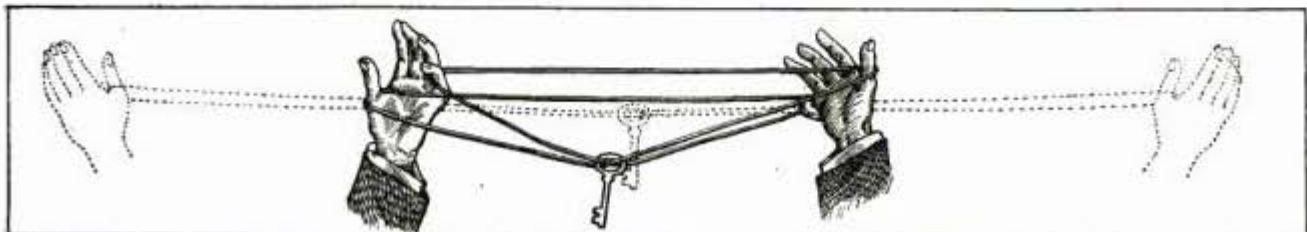
The Glass Directs the Sun's Rays

is a good one. Procure a clear glass bottle and stick a pin in the lower end of the cork. Attach a thread to the pin and tie a small weight to the end of the thread so it will hang inside the bottle when the cork is in place. Inform your audience that you will sever the thread and cause the weight to drop without removing the cork.

All that is required to perform the feat is to hold a magnifying glass so as to direct the sun's rays on the thread. The thread will quickly burn and the weight fall.

Removing a Key from a Double String

Tie the ends of a 5-ft. string together, making a double line on which a key is placed and the string held as shown by the dotted lines in the sketch. Turn the palms of the hands toward you and reach over with the little finger of the right hand and take hold of the inside line near the left-hand thumb.

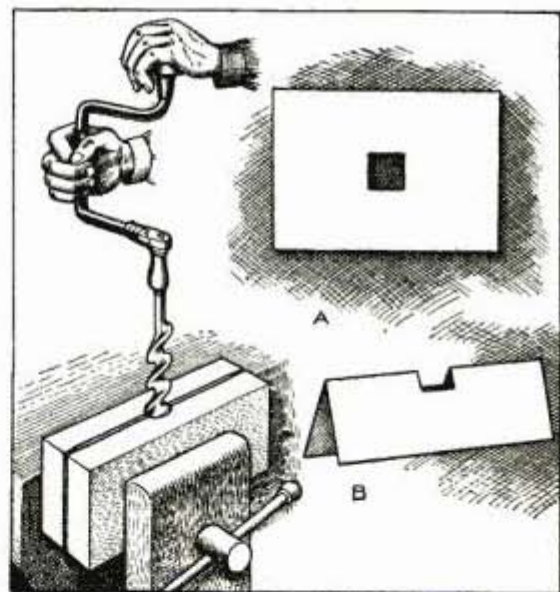


The Key Will Drop from the String"

Reverse the operation and take hold of the inside line near right-hand thumb with the little finger of the left hand. You will then have the string as it appears in the sketch. Quickly let loose of the string with a little finger on one hand and a thumb on the other and pull the string taut. The key will drop from the string.

How to Bore a Square Hole

You would not consider it possible to bore a square hole in a piece of cardboard, yet such a thing can be done. Take a cardboard or a thin piece of wood, fold and place it between two pieces of board with the fold up; the boards are then put in a vise as shown. Start the bit with the screw point in the fold, using a 1-in. bit, and bore a



Boring a Square Hole

hole $\frac{1}{2}$ in. deep. When the cardboard is taken from the vise it will appear as shown at B and when unfolded, as at A.



A BLACKING CASE TABOURET

A substantial piece of mission furniture which may be used as a tabouret or plant stand as well as a blacking case, in which there is a receptacle for brushes, blacking and a shoe rest, is shown in the illustration. The stock can be secured millplaned, sandpapered and in lengths almost ready to be assembled. The stock list consists of the following pieces:

- 4 posts, 1½ by 1½ by 17 in.
- 4 side rails, 1 by 6½ by 9½ in.
- 2 top pieces, 1 by 8¼ by 16½ in.
- 1 bottom, ¼ by 9½ by 9½ in.
- 1 cleat, 1 by 1 by 18 in.

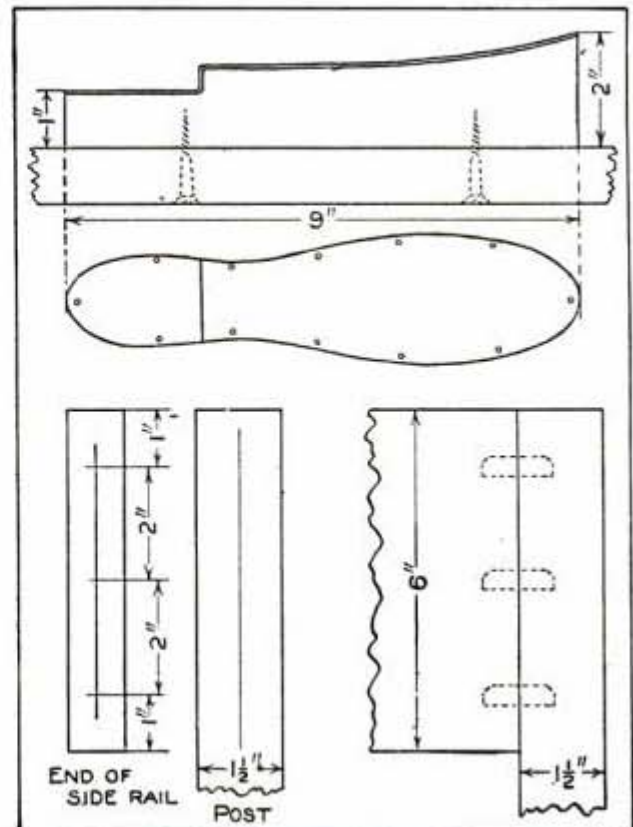
The posts and cleat are surfaced on four sides, while the other pieces are surfaced on only two sides. The allowance of ½ in. on the side rails, top and bottom, is for fitting the joints. Be sure the surfaces of the pieces for the posts are square and the ends sawed square off, making the posts exactly the same length when they come from the mill. This will simplify the work to a great extent.

Square up the four side rails to 6 by 9 in. Cut one end of each post tapering with a chisel; face and sandpaper the posts and side rails before making the joints. The side rails are attached to the posts with three dowels to each joint. The place for each dowel is located by making a line exactly in the

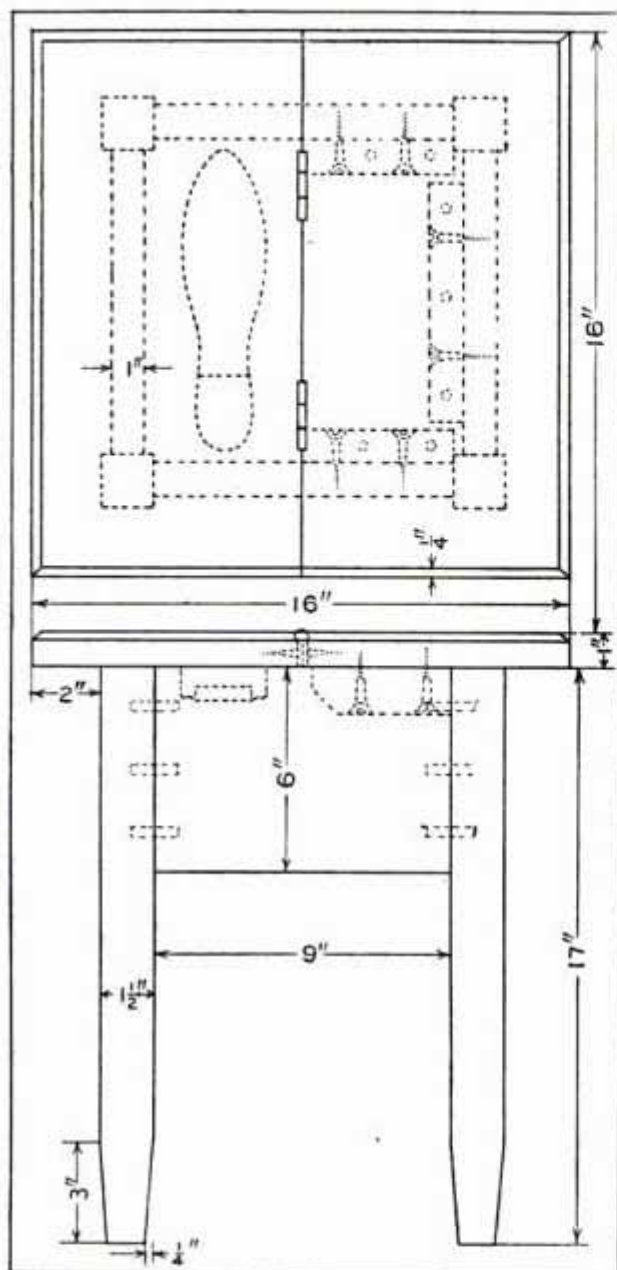
middle lengthwise on each end of each side rail. Three lines are made to intersect this middle line, as shown in the detail drawing. Drive a ½-in. brad in each intersection allowing a small portion of each brad to project, and cut off the heads. Gauge a line in the middle of each post at the top where the joints are to be made and press the end of a side rail containing the brads against the post. This will mark the places to bore holes for the dowels. Pull out the brads and bore holes for the dowel pins.

When gluing up the side rails and posts, first put on a coat of glue on the ends of the side rails and let it dry. This will fill up the pores in the end grain of the wood which will make a strong joint when finally glued together. The dowel pins are made ¾ in. square with a slight taper at the ends. These can be easily forced into the holes, when the ends of the side rails are coated with glue and ready to be put together, by clamps pressing on the outside of the posts.

The bottom is held in position with narrow strips tacked on the lower edge of the side rails. Square up the top pieces to 8 by 16 in. and fasten one



Details of Shoe Rest



Details of Taboret Construction

piece to the top with cleats and screws as shown in the drawing. The other piece is hinged to the first one with two 2-in. hinges.

The shoe rest can be made from a block of wood and covered with sheet tin, copper or brass, or a cast-iron rest can be purchased. The rest is fastened to the under side of the hinged top. Stain the wood any dark color and apply a very thin coat of shellac. Put on wax and you will have a finish that can be renewed at any time by wiping with a little turpentine and rewaxing.

The Canary Islands will soon be placed in communication by wireless telegraphy with Europe, Africa and America.

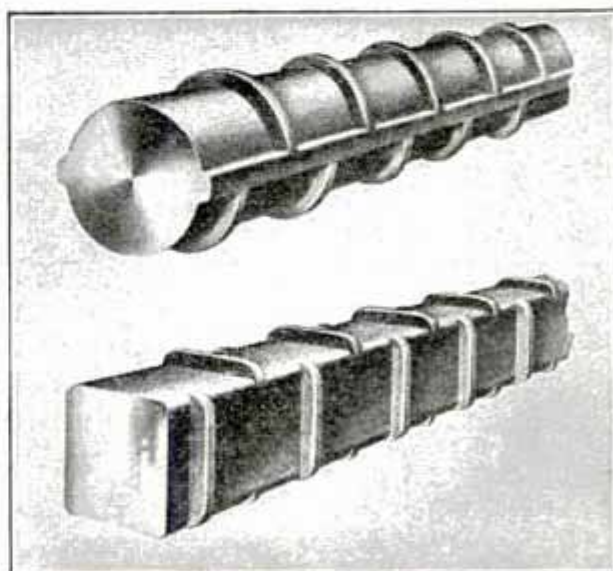
THE STRENGTH OF THE UNITED STATES

The statements made by James S. Sherman, vice-president of the United States, at a recent banquet, should be of the greatest interest to every American.

"We have but 5 per cent of the population of the earth," said Mr. Sherman. "Our nation possesses only 7 per cent of the area of the earth, yet industrially we about equal one-half of the balance of mankind. We have twice as much life insurance, and one-half as much money on deposit in our savings banks as all the rest of the world. Our expenditure for education is two-thirds as much as is spent by all the rest of the world. We have enrolled in our schools 20,000,000 students, 17,000,000 being in the public schools alone, for which we pay annually \$200,000,000. This amount is more than is spent for educational purposes by the five greatest countries of Europe, including Great Britain."

CORRUGATED REINFORCEMENT FOR CONCRETE

The high efficiency of this reinforcement, one round and the other square, is due to the bond formed with the concrete by the ribs or corrugations shown. These corrugated bars are rolled from billets of medium or high carbon steel as desired, in sizes that range from $\frac{1}{4}$

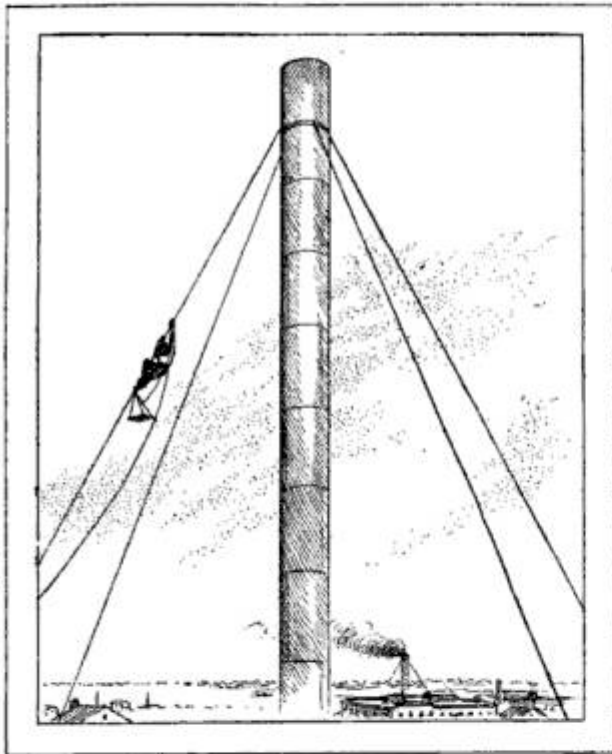


Ribs Form Strong Bond with Concrete

to $1\frac{1}{4}$ in. in diameter. The weight varies from .22 lb. per foot to 5.35 lb. per foot. The bars are rolled at various steel mills. The operation does not differ from that of rolling ordinary bars except in the last pass, in which the corrugation is made.

A HAZARDOUS JOB OF STACK CLIMBING

It being necessary to paint a stack 125 ft. high, a reward was offered by the contractors to any man who would secure a tackle to the top. The stack was supported by four guy-ropes, secured to the stack, about 25 ft. from the top. There was no ladder. A man



Perilous and Unnecessary

offered to undertake the job, and was watched with interest by a big crowd of curiosity seekers.

Putting a ball of twine into his pocket, and furnishing himself with a painter's bolster, or chair, which he pulled after him, he began climbing one of the guy-ropes, hand over hand. Before reaching the stack end of the rope, he made three stops, securing the bolster firmly to the guy-ropes and sitting in it, until he overcame his fatigue.

Reaching the stack, he again secured the bolster, and let down the twine to the ground. Here it was attached to a 20-ft. pole which had a large hook firmly secured to it. The pole was pulled up, and hooked over the top of the stack, when to the astonishment of all, the man left his chair and quietly climbed the pole to the top of the stack. Here he once more let down the string, to which his helper below secured a strong rope, which was pulled up.

Once the rope was secured to the top of the stack, it was an easy matter to pull up the tackle, and firmly secure it to the top. The man was then let down by his helper, to where he had left his chair or bolster, which he unhitched, bringing it and the pole with him, as he was lowered to the ground, amid the applause of the crowd who had watched him.

While the man's nerve and daring are commendable, his method is not. Several better and safer plans have been published in these columns.

CULTIVATING MUSHROOMS IN FORMOSA

Mushrooms are now a product of Formosa, a small island near the coast of Japan, as well as savage head-hunters, photographs of which were run in the May issue. The mushroom has been grown extensively in Japan for ages, but until a little over a year ago none were raised in Formosa, although the climate in the higher mountain regions is exceptionally well adapted to its growth. Now, however, the industry is gaining a substantial footing on the island, the mushroom attaching itself to a tree known as the "Shii". In preparing for the cultivation of the mushroom, these trees are cut down and trimmed of all the smaller branches. Then rice water is thrown over them at intervals to prepare the wood for the crop of mushrooms. In Formosa it takes about one year to get the first crop, while in Japan it takes three.

NATURAL BRIDGE WITH ARTIFICIAL ABUTMENTS

One of the principal attractions of the petrified forest of Arizona, located near Adamana on the Santa Fe railroad, is a huge petrified tree trunk more than 100 ft. long which spans a ravine, forming a natural bridge. For years it served as a substantial passageway for pedestrians, but some time ago the trunk, forming a clear span of about 90 ft. without central support of any kind, began to show transverse cracks. Fearing that the bridge would tumble to ruins the stone abutments shown in the illustration, three in number, were erected under it. It will probably remain intact for many years to come.



Petrified Tree Trunk Serves as Bridge

and mixed with cold water, with a little salt to enliven the microbe, it is poured over bread or crushed oats, and

VIRUS FOR EXTERMINATING RATS

The virus for the extermination of rats, invented by Dr. Danysz of the Pasteur Institute in Paris, has proved so successful abroad that it is now to be made in America. It clears the rats from warehouses, tunnels, ships, and sewers effectually and without danger, damage or annoyance to men or animals other than the rats.

The virus is not a poison, but causes a disease to which only rodents are susceptible, and which resembles typhus fever. Being a fever, the rats do not die at once in their holes, but make for the air and water, dying in the open. Other animals can consume any amount of the virus and not become inoculated with the disease.

The amount to be used varies with the floor space, about 12 tubes being used to every 5,000 sq. ft. Crushed

placed on the floor or other places visited by rats. It comes packed in 6-in. tubes, and resembles gelatine.

PAPER FROM SCRUB PINE

The United States forest service, which has been experimenting with scrub pine in its Washington, D. C. laboratories, announces that it has developed a process by which paper can be made from this material. In treatment the scrub pine requires from 8 to 11 hours, with a maximum steam pressure not over 60 lb. The unbleached pulp is of a light grayish or brownish color, not unlike that from spruce, this depending, of course, upon the cooking conditions, which can be controlled to suit the manufacturer. A good white color is readily brought about by using slightly more bleach than is ordinarily practical or economical. By cooking properly, the amount of bleach required has been brought down to 300 lb. per ton of pulp, and it is believed that a still lower per cent may be employed and the color still remain the best white.

Up to the present time there has

been practically no general use for scrub pine timber, other than as fuel and as a coarse lumber. About 500,000 acres, or 20 per cent of the wooded area of Maryland, and about 130,000 acres, or 10 per cent of that of Virginia, is covered with fairly dense stands of scrub pine, while the broad range of the tree extends along the Atlantic coast from southern New York to South Carolina, and west to central Indiana, where the largest specimens are found.

CANADA'S FLOATING STORES

One of the most interesting features of the Muskoka lake country in Ontario, which forms Canada's most pop-



Interior of Floating Store

ular watering-place, is the floating stores. A good-sized steam vessel is fitted out with every imaginable item of merchandise that might be required and makes a tour of an assigned chain of lakes once each week. On a certain hour of a certain day the boat is expected at the different resorts and summer homes, and enough merchandise

must be bought at each to tide over until the next trip of the floating store.

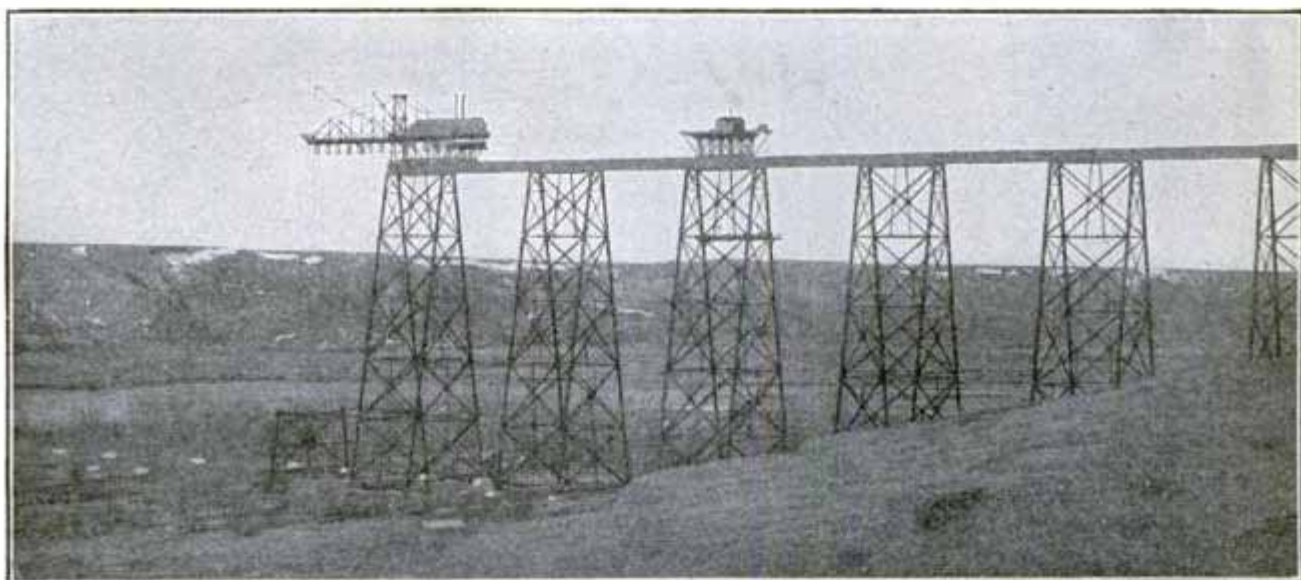
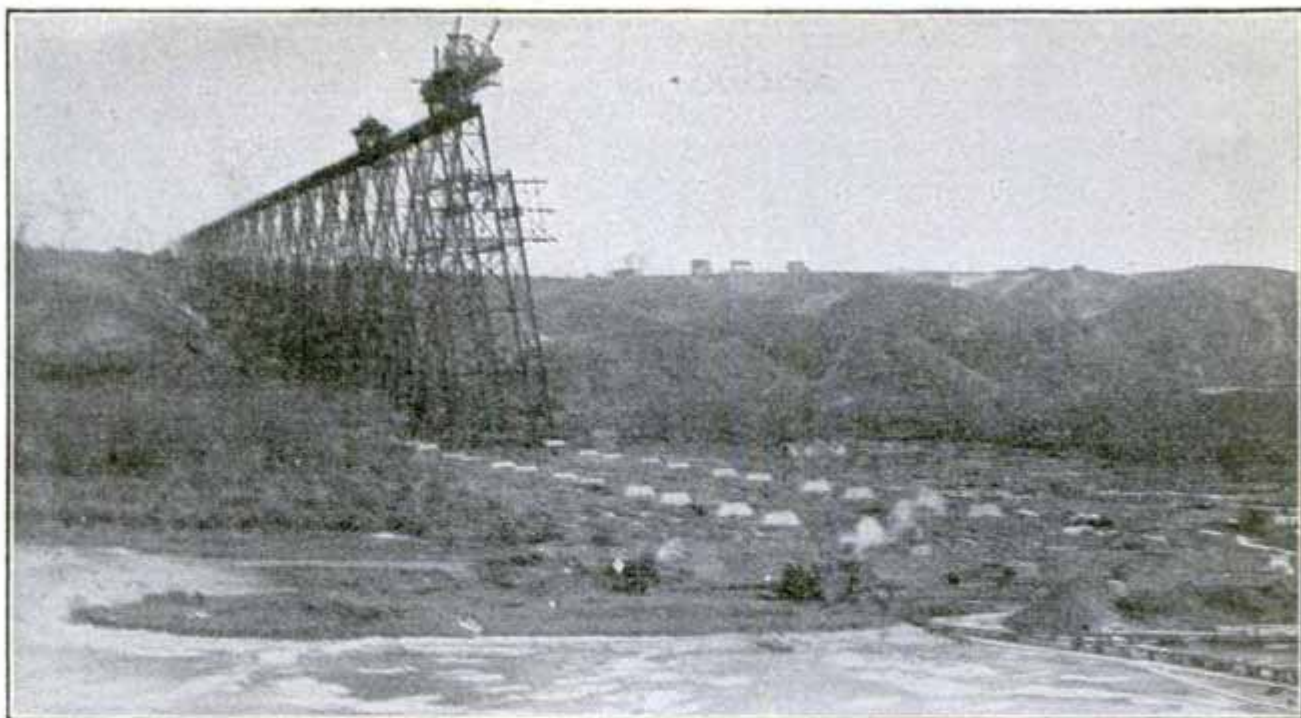
Upon stepping on board the store boats the purchaser approaches a counter with scales and cash drawer, as in any other kind of store. Behind the counter are shelves on which are displayed such articles as may tempt the eye. Behind these shelves is the entrance to the storeroom and hold in which more merchandise is stored. Each article has its place and the store-keeper can find it in a moment.

Sometimes isolated farms on the lakes are not worth stopping at every trip, so a flag is flown when stores are desired. The store vessel drops anchor when the signal flag is flown and some member of the family rows out and makes the purchases.

ANCIENT RELICS OF PERU

Hewitt Myring, an English antiquarian, has returned to his country from Peru with 2,000 remains and relics which shed light on the people and customs of the ancient race that lived there as far back as from 4,000 to 7,000 B. C. The discovery was made under an Inca burying ground located in the mountains about 200 miles inland from Lima.

When the bodies were exposed to the air the bones and skulls crumbled. Each grave contained the remains of food and glazed clay jugs with two handles, covers, and long, tapering spouts. The most valuable portion of the discovery was a number of great urns, some of which are 6 ft. long, and so heavy that it required three men to lift them. They were found buried beside mummies, and the majority of them had the features of the dead man or woman delicately carved upon them. The ancient warriors could be easily distinguished by their great wooden clubs resting on the left arm or their huge copper-headed battle axes, beaten out from the pure metal. Ancient coins of gold and silver, also were found in some of the graves, hidden in double-bottomed pottery plates.



STEEL BRIDGE 307 FT. HIGH

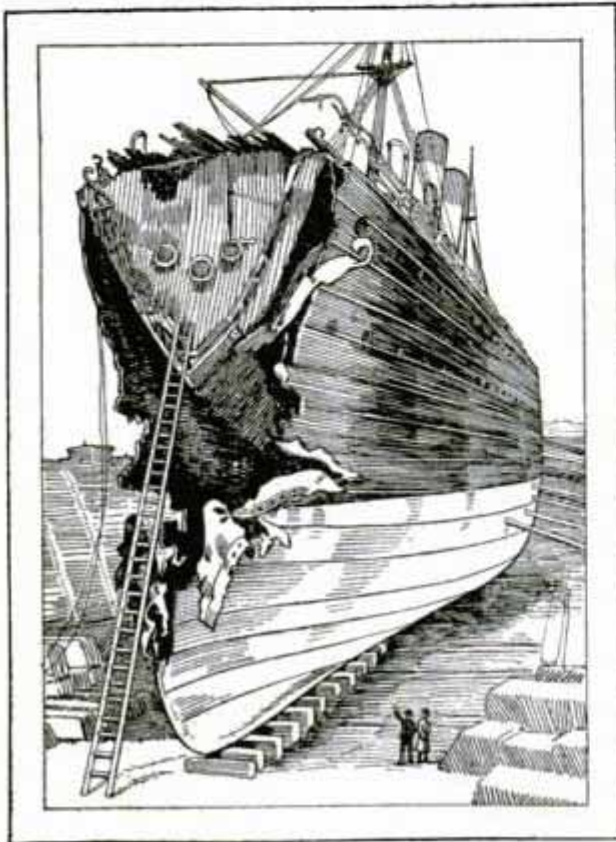
The great steel bridge being built over the "Old Man" river at Lethbridge, Alberta, Canada, by the Canadian Pacific railway is claimed to be one of the largest in the world, considering both length and height. It is 5,327 ft. long, and 307 ft. above the surface of the river. It will cost \$1,500,000. One of the illustrations shows it about two-thirds completed, and the other gives a closer view of the concrete foundations upon which the piers rest.

A number of motor boats have been shipped to Iceland by American manufacturers.

GREAT LAKES CONTAIN AMERICAN SHIPPING

During the fiscal year ending June, 1908, American shipbuilding surpassed all previous records. The total number of vessels built during that period was 1,457, with a gross tonnage of 614,216. It will probably surprise most Americans to know that the United States is ranked only by England in the aggregate documental merchant shipping. America has 25,425 vessels, gross tonnage 7,365,445, against England's 11,563 vessels, gross tonnage 18,709,537. The tonnage, however, shows a vital difference in the size of the prospective vessels. But most of the large shipping of the

United States is carried on the Great Lakes or in purely domestic coastwise trade, therefore the world at large sees but little of the American flag.



**THE WRECKED BOW OF THE
"FLORIDA"**

The damage to the bow of the "Florida", which collided with the ill-fated "Republic" off Nantucket in January, was undoubtedly greater than that of any other ship ever limping into an American port after being struck. As can be seen by this illustration, the force of the collision turned the part of the bow of the "Florida" below the

waterline back on the port side, folding it tightly, while the plating back of it was badly corrugated. It was certainly a test of the efficiency of the watertight bulkhead that she did not sink with the "Republic."

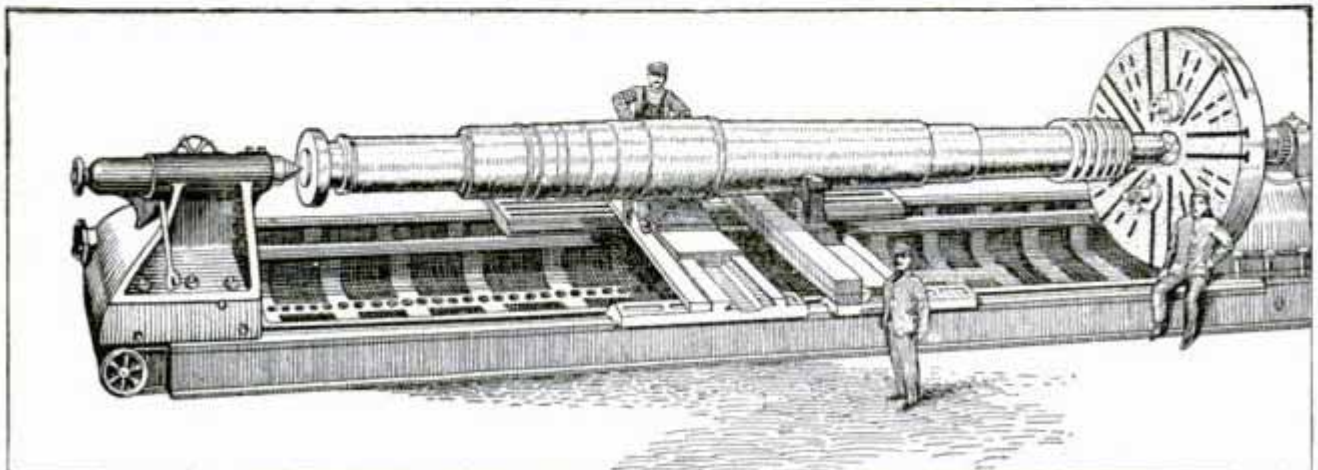
SPECIAL TRAIN FOR DOGS

When the dog show was held in Manchester, Eng., in March, a special train was provided to carry the London dogs to that city and return them to that city when the show was over. Every provision was made for the comfort of the prize animals. They were placed in steam-heated compartments, some of the largest dogs having a whole car, or van as they are called in England, to themselves. Each dog had a mattress of straw and a pannikin of water at its disposal, and the menu consisted chiefly of dog biscuit.

The train was called "the kennel special," and accommodations were also provided for the owners of the dogs, who could walk through the cars during the course of the 5-hour journey to see if their pets were in good condition.

TURBINE SHAFT FOR U. S. S. "DAKOTA"

An interesting piece of work now going through the shops at Quincy, Mass., is one of the hollow nickel steel turbine shafts for the "Dakota".



Hollow Nickel Steel Turbine Shaft Has 30 Diameters

This shaft is 30 ft. long and is 30 $\frac{3}{4}$ in. at its largest diameter. It is hollow having a 7-in. bore at each end and a 19-in. bore through the middle. From end to end there are nearly 30 different outside diameters. It will have four stages and a large drum for going ahead, and two stages for astern. The shaft weighs 20 tons, will cost about \$32,000 and is expected to make 338 revolutions per minute transmitting 12,000 hp.



CONDITION OF COUNTRY ROADS IN ILLINOIS

There seem to be many reasons why convict labor could be used to good profit on the roads in the state of Illinois, the same reasons applying to a great extent to many of the other states of the country. Illinois has 94,141 miles of public roads, and, according to road statistics, last taken in 1904, but 6,800 miles were surfaced with gravel, 1,106 miles with stone, 4 $\frac{1}{2}$ miles with brick, 6 miles with slag, 6 miles with burnt shale, and 1 mile with cinders, making in all about 7,900 miles of improved road. It is also claimed that the convict labor problem in Illinois is more perplexing than in any other state, with the exception of New York and Pennsylvania, and that the state has lost over \$1,000,000 in the last 10 years through prison labor contracts and its own manufacturing ventures.



WRECK OF STEEL COAL CARS

The damage caused by a runaway coal train collision on the famous horse-shoe curve of the Pennsylvania railroad near Altoona, Pa., is clearly shown in these illustrations. The train was made up of 33 steel coal cars, heavily loaded, and was descending the eastern slope of the mountain when the locomotive and three forward cars broke away from the rest of the train. The brakes stopped the rear portion of the train, and the engine with the three cars attached proceeded to Kittanning Point, where the



On the Embankment—In the Valley Below—
Wreck of a Steel Car

cars were switched onto a siding. The engine then returned up the mountain for the missing cars, but in the meantime the engineless string broke away from the control of the brakeman and rushed down upon the engine. The result was a collision which threw many of the cars to the valley several hundred feet below and left the others on the embankment in the smashed-up condition shown. One of the illustrations shows a heavy steel car buckled up as if it were only a pasteboard box.

Three big train wrecking crews and 100 shovelers succeeded in opening the line after 10 hours of work.



During the month of January the 16 postoffices in the Canal Zone issued \$409,240.04 in money orders, most of which went to the United States.

FLYING IN THE WRIGHT AEROPLANE

Condensed from an Article in London "Motor"

The moment had arrived, and I was wedged into a canvas-covered, straw-stuffed seat, mounted on the center of the oil-bespattered wing of the aeroplane. Wilbur Wright stepped to the side of the engine, injected a little gasoline into the head of each cylinder, then, for the first time in half an hour, raised his head and commanded go ahead, and the cannonade of the exhaust burst forth. He then stepped into the open, gave a look around at the tree tops, came back to the engine with quick, short steps, but without any sign of haste, cut out the ignition a few times, stood listening to the noise of the engine, and climbed into his seat.

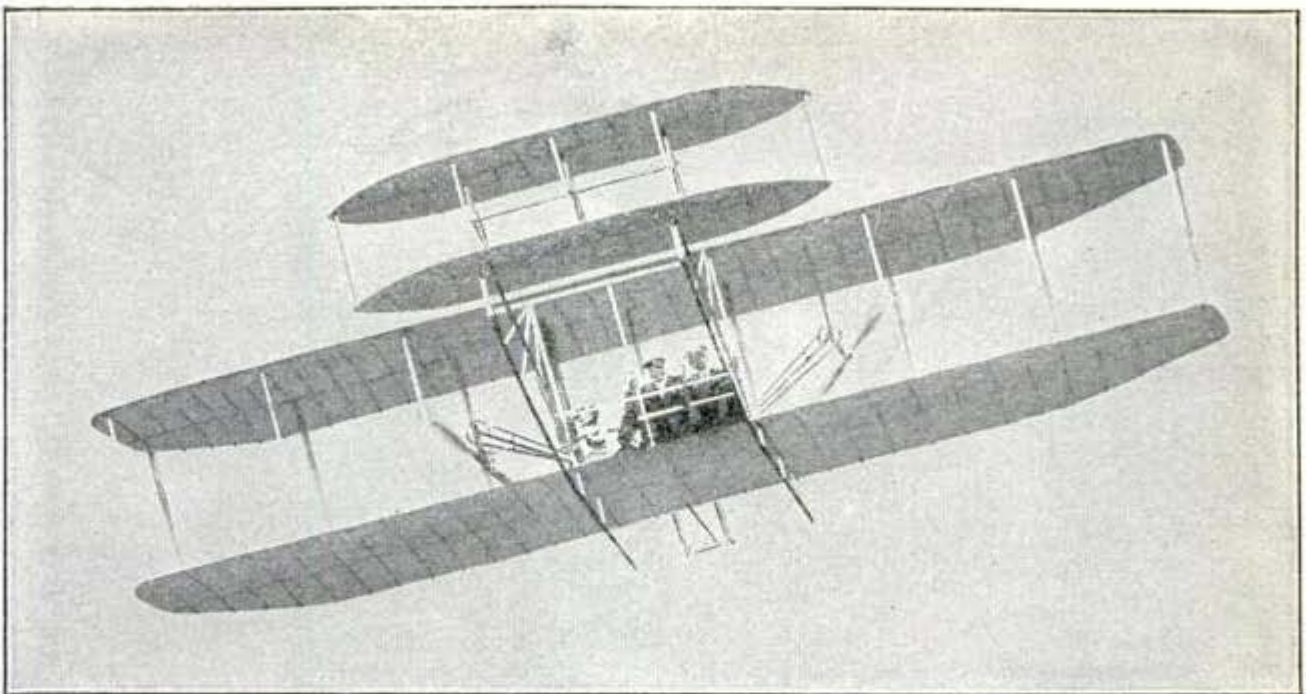
At last the familiar signal was given; Wilbur Wright released the catch and we were off. Yes, off, and with such a rush that we seemed to have been shot forth from the mouth of a cannon. Prepared as I was for a quick start, the terrific impulse, nevertheless, staggered me. Had it been possible, I should have shouted out, for surely there was something wrong with the high-speed switchback, which did not even provide the momentary lull before the downward plunge.

But almost before my thoughts had time to definitely shape themselves it was over, and we were being gently swayed in a calm atmosphere. We were climbing upward, moderately fast, to judge from the way the ground was slipping away underneath, but a minute later even this had stopped, and we were slowly advancing with a gently undulating motion, which made one smile at the thought that this could end in disaster.

Why, we were hardly moving, and even if the engine should stop, or if the pilot should lose his head, we could never come to any harm at this speed. There was no vibration, no need to clutch the sides of the seat as we had done when starting. If only the engine, roaring and sputtering an occasional spark on my right, would behave as a self-respecting engine ought to behave, the sensation would have been the embodiment of peace. Calmness without stagnation; a gentle cradling by invisible hands; the motion of a boat without the lap of water or the splash of oars.

But how deceiving it was! The sensation suggests that you are being cradled in the air; you are moving so gently that you could not come to harm even if you fell; there is not much wind, only a gentle breeze—nothing whatever to disturb you. And Reason insisted: You are traveling 40 miles an hour; you have nothing to support you; down there, 50 ft. away, is the hard ground waiting to smash you and the machine. If the engine stops, the air which is now lulling you will turn traitor and let you fall cruelly. If the pilot forgets himself for a moment you may dash downward at the speed of an express train, or you may overturn altogether. Sensation's reply was "Nonsense!" And Sensation won.

After the first novelty of being aloft had passed away and I had observed the view, I turned around and watched the two slowly moving propellers and the chains crawling out of the ends of their casings. And my companion—the man whose inventive genius had transformed these roughly-joined spars and common canvas into a graceful, soaring bird—what of him? He was leaning forward with his peaked cap drawn well down over his eyes, with his gaze directed far ahead. Nay, he was not gazing, for his eyes appeared to be half-closed, and his body was immobile, as if lulled by the gentle swaying of the machine, yet with something in the pose of his body, the tightly-compressed lips and the stern features, that suggested a new instinct. The bird nature in



"We Seemed to Have Been Shot from a Cannon"

the man appeared to be straining ahead, as if it would rush forward to interrogate the currents and probe the mysteries of the atmosphere.

Although in each hand Wright held a wooden lever, controlling respectively the front and rear rudders, no movement was perceptible on the straightaway. There doubtless was a movement, but it was so slight that, to one who had not flown before, it could not be detected. The turning movement began, but instead of the heeling movement I expected, there was, strangely, nothing whatever to indicate that we were not on an even keel. Wilbur Wright operated both levers, but so quickly that my untrained eye could not follow the movements. The machine began to swing around to the left, and, as it did so, suddenly dropped downwards, thus regaining the speed that had been lost by the turn. Although I could not follow the movements of Wright's hands it was possible to see the results on the wing tips, the left tips being given a decided turn upwards and the right ones pointing downwards. What appeared to have taken place was that the wings had been flexed and the rear vertical rudder carried over to the left simultaneously. It lasted but a second, then the wing tips were straightened out, and we were climbing upward again. In so masterly a manner was the machine handled that in very much less time than it takes to tell it we were round in the opposite direction, with such a slight effort on the part of the pilot that it needed a close observer to tell that he had acted at all.



AMERICA'S "DREADNOUGHT DESTROYERS"

The two new monster battleships for which provision was made by the last Congress are so much more powerful than those of the "Dreadnought" type which have recently been added to the American and European navies that the secretary of the navy has classed them as "Dreadnought destroyers." They are to be 26,000-ton and they will carry

heavier batteries than any battleship of any nation now afloat or contracted for.

The names these two greatest of great ships will bear will be "Wyoming" and "Arkansas," and they will be laid down sometime this fall. The naming of the vessels so far in advance of their building or launching is unusual.

UNITED STATES POSTOFFICE IN PORTO RICO

Condensed from *Cement Era*

The United States government is to erect a reinforced concrete administration building at San Juan, Porto Rico, which will have many interesting features, among them being its size and the peculiarities of its construction. The structure will be about half the size of the treasury building at Washington, and will cost \$400,000. Its length will be 228 ft. and its height 140 ft.

The peculiarities of construction, according to the story, are due to the fact that when James Knox Taylor, supervising architect of the treasury, made a trip to San Juan, he found that the Porto Ricans would be struck in a heap if they had massive doors to swing and much window glass to look through. It was a shock to Mr. Taylor's assistants to dispense with doors and glass altogether, so they compromised on a row of large glass-filled windows around the second story. The other windows will all be smaller, protected by grill work, and solid doors will be conspicuous for their absence. When the building is completed the curious San Juan people may go right up to the grill work that takes the place of doors and look in to their heart's content. On the ground floor not a window glass will trouble their vision. This is all made possible by the gentle climate of the island. There is never occasion to keep out the heat or cold, and the wind does not blow strong enough to interfere with the work inside.

The use of concrete for the building was decided upon because of its cheapness. To use granite, marble or sandstone would have required heavy

charges for transportation, as Porto Rico is without these building materials. An unlimited amount of material for the making of concrete was found close at hand.

The building will shelter the courts, postoffice, customs, and other federal offices.



Doorless U. S. Government Building

LONGEST RAILROAD IN THE WORLD

When the African railroad from the Cape to Cairo is completed, it will be the longest in the world, and will have cost about \$1,000,000,000. The main line from Cape Town to Buluwayo is 1,360 miles long, and has been in operation since the year 1897. The stretch of line between Broken Hill and Khartoum in the British Egyptian Soudan is to be pushed forward with vigor from now on. When all is completed the length of the line will be approximately 6,000 miles.

Some of the best railroad engineers in the world, British, American, and German, are employed in the work.

LOUISIANA LEADS IN SULPHUR PRODUCTION

Although but little mention has been made of it, Louisiana is now producing two-thirds of the world's consumption of sulphur. One company, 14 miles west of Lake Charles, is using 48 boilers, each of 150-hp., for the purpose

of producing steam and boiling water by means of which the sulphur, 600 ft. underground, is melted and piped to the surface. Oil fuel is used exclusively, and the amount consumed daily almost equals the output of a good-sized gusher.

CHEAP TAXICAB FARES IN LONDON

Taxicab fares in London and Paris are but half as much as in the cities of the United States, and in some instances only one-third as much. In London the fare is 16 cents for the first mile or fraction of a mile, and 4 cents for each additional quarter mile, which makes a fare of 16 cents per mile for any distance of a mile or more. Washington, D. C., serves as an excellent example of the cost of taxicab service in America. For $3\frac{1}{2}$ miles in Washington the taxicab fare is \$1.40 cents. The same distance in London would be but 52 cents.

REPAIRING A WRECKED YACHT

This sail yacht was driven ashore in a severe storm and consequently repairs were necessary. The new ribs had been bent and fitted into place when the photograph was taken and the owner was just figuring out how to go ahead with the planking. The steam used for shaping the timber was generated in the old kitchen hot water tank shown at the right of the illustration.



Emergency Ship Yard

COLD WEATHER SAILING CLOTHES

The rolled lapel, open neck jumpers ordinarily worn by "Jack Tars" in



New Naval Duffle Suit

nearly all navies are now hidden under a new design of cold-weather suit when the ships of England's home fleet are cruising in the North Sea or in other latitudes where severe cold weather is encountered. It is called the new naval "duffle" suit, and it gives its wearers something of the appearance of Laplanders.

SIX-CENT COPPER PREDICTED FOR ALASKA

Mining experts declare the copper deposits in the Copper River valley, Alaska, to be the greatest ever discovered, not only in quantity, but the ore will run 10 to 50 per cent pure copper. A railroad is now building into the district, which when completed will enable the ore to be brought to tide water for shipment to smelters in Tacoma. The experts estimate the cost of the copper not to exceed 6 cents per pound; Lake Superior copper now costs from 9 to 10 cents per pound to produce. Two years will be required to complete the necessary work before the copper can reach the market.

Device for Weather Bureaus.—The device shown in Fig. 1 is designed for the assistance of forecasters in the comparison of weather maps of different dates. It consists of a long box attachment for the rear portion of a desk, and in this is placed a transparent map. Illumination is provided from the rear by an electric lamp. In front of the first map is placed a transparent weather map of another date, thus making it possible to compare the two.

An Oil-Burning Arrangement.—Oil burns more fiercely if mixed with steam, and it is for this purpose that the oil-burning arrangement illustrated in Fig. 2 was designed. The oil is contained in the tank on the stationary standard, while the water from which the steam is made is contained in the tank hung from the pulley-block fastened to the ceiling. The water tank is raised or lowered in height so that the water can be retained at a level to suit all requirements. The steam is generated in a pipe or dome over the fire pan, and an atomizer discharges the steam onto the spreader in this pan. As the steam passes through the atomizer it picks up the oil and carries it into the burners.

Fixing Blasting Charges in Mining or Tunneling.—The device illustrated in Fig. 3 is designed for the purpose of mixing and fixing blasting charges in tunneling and mining. It is composed essentially of a mixing cylinder, an outlet or tubing to carry the charge to its position, a piston, and a standard. The ingredients of the charge are placed in the cylinder. The hand wheel shown communicates a rotary movement to the cylinder, and this action mixes the materials of the charge and feeds it into position.

Door Stop and Retainer.—The baseboard attachment shown in Fig. 4 not only stops the door when it is swung open, but clasps it as well. This is accomplished by a bail pivotally connected to the door stop and a hook fastened to the door, which engages it.

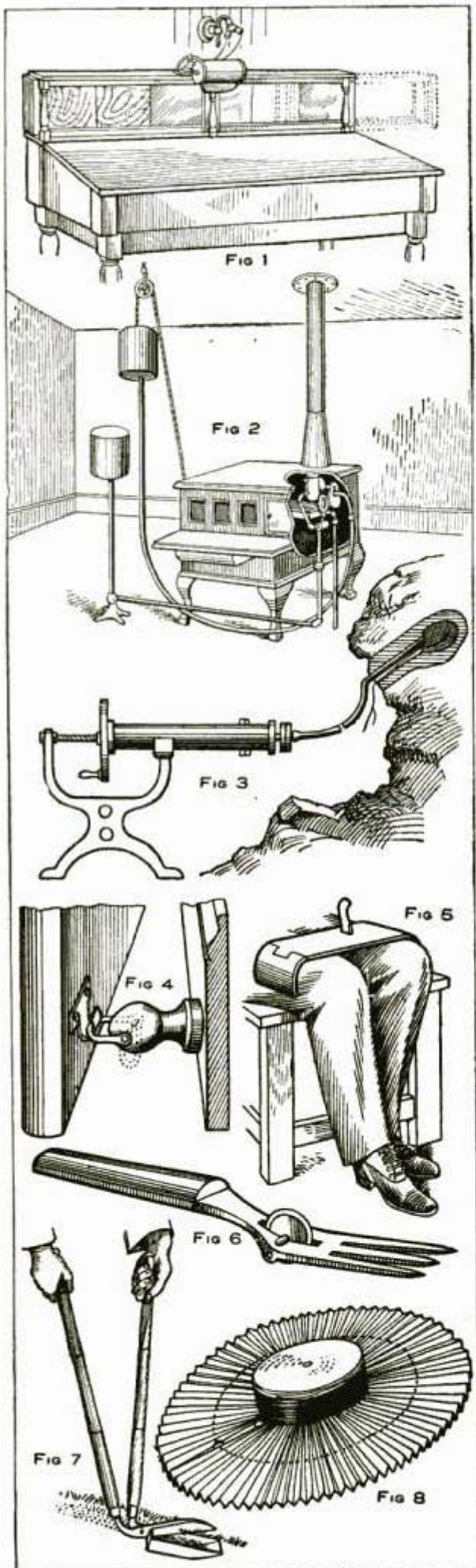
Ingenious Seam-Ripper.—Ripping seams with a cutting device held in one hand is awkward, therefore the device illustrated in Fig. 5. It is a cutting implement fastened to an attachment which passes around the legs, holding it in position. It is thus possible to hold the cloth to be ripped in both hands and draw the seam against the knife.

Combined Table Knife and Fork.—The device shown in Fig. 6 is a combined knife and fork, designed for one-armed persons. The knife part is the rotary cutter mounted through the fork just back of the inner ends of the tines. By pushing this roller-knife over the food the cutting is accomplished, and the person using the device can proceed to pick up the pieces with the fork part of the device.

Shears for Clipping Lawn Borders.—The ingenious border shears shown in Fig. 7 are fitted with a box to catch the grass that has been cut off, thus preventing its distribution over the sidewalks. The box part is made of galvanized iron, firmly fastened to the blades.

Collapsible Sunshade for Hats.—The collapsible sunshade for hats illustrated in Fig. 8 is of very simple construction. It is made like a collapsible circular fan, and is made fast by a series of clips which attach it solidly to the hat. Clips also fasten the edges together, which meet when the sunshade is extended.

Device for Trimming Lawns.—The device shown in Fig. 9 is for trimming or edging a lawn adjoining a walk. It cuts a strip an inch wide and an inch deep out of the sod,



PATENTS

overcoming the usual ragged appearance of lawn edges. The upper drawing shows the nature of the cut made, and the lower shows the method of operation. The cutter is made of mower knife steel and can be easily sharpened with a fine file or emery stone.

Pocket Fish-Hook Holder.—A fishing tackle specialty of interest is shown in Fig. 10. It keeps the hooks in perfect condition and carries a full set in the pocket without danger of snagging. Its dimensions are 3 in. by 6½ in., and it is made of non-corroding metal, highly nickled.

Compound Lever Snips.—Fig. 11 shows a powerful pair of snips designed for small metal work. They are made of sheet metal and by the use of compound levers and a link the power necessary for cutting is no greater at the extreme ends of the blades than it is close to where they are pivoted. The blades are so formed that circles or square corners can be cut. They are 7 in. long, weight 5 oz., and will cut 26-gauge soft steel and 20-gauge brass or copper.

Anchor Bushes for Valves.—Air pump and other valves will often be quite good and yet have to be discarded before the body is worn out, owing to the enlargement of the central hole. The device shown in Fig. 12 is a gun-metal anchor bush, designed to remedy this trouble. The bush is both embedded and vulcanized into the valve, consequently it cannot under any circumstances work loose. The arms of this anchor bush are hinged, as it is used on flexible valves, thus allowing the valve to "saucer" readily.

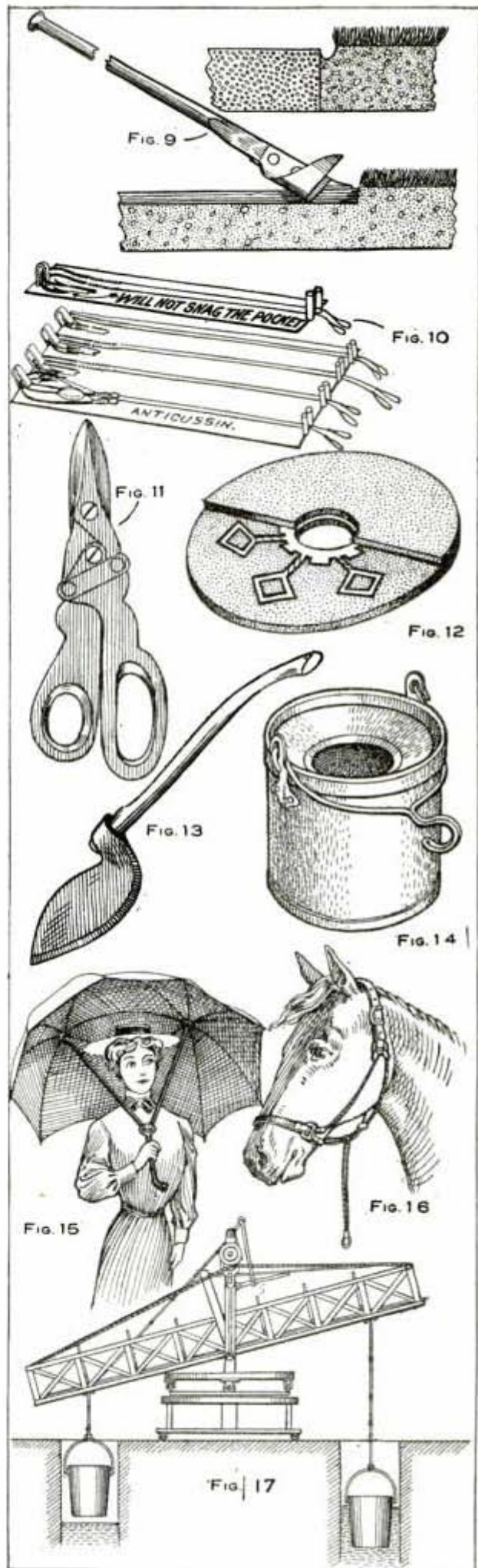
Axe for Cutting Brush.—The curious looking axe illustrated in Fig. 13 is for use in cutting down brush. The shape of the blade makes this axe much more adaptable for such work than the ordinary axe.

Ingenious Paint Pail.—The paint pail shown in Fig. 14 is made with a removable brim, which effectively prevents the contents from being spilt and running down the outside, and makes possible its removal for cleaning. Not only does this brim keep the outside of the pail clean, but it saves the large amount of paint invariably spilled from the ordinary pails. Both brim and pail are made of galvanized iron.

New Umbrella Design.—Among the claims made for the unique umbrella shown in Fig. 15 are that it is the only one ever made that is large enough to protect a large person, and yet small enough to go into a suitcase. Its originality lies in the fact that it is practically a "Siamese-twin" umbrella, the two rods meeting in one handle. The handle is but a few inches long, and when in use the user's head is between the two rods. The top effectively covers both shoulders, having a spread of 40 in. When closed it is but 20 in. long, the handle being turned back along the rods.

Halter.—The halter shown in Fig. 16 has head and nose straps, the former being adjustable, and the ends of both being connected by runners. The strap adjusted to the runners under the jaw can be used as a short leading strap, or have a leading rope hooked into it.

Animal-Power Plant.—Although steam, electricity, and gas have pretty well done away with animal power in the last 50 or so years, devices are still being patented for the utilization of animal-power, as is shown in this illustration (Fig. 17) of a recent United States patent. It is described as an apparatus the main part of which is an oscillating structure in the form of an enclosure adapted to be actuated by an animal traveling alternately from end to end, a frame upon which the structure is pivoted, and sundry operating levers and brakes.





Depot Demolished by Runaway Train—Note the Baggage Car on Second Story

TRAIN KILLS IN WAITING ROOM

Six persons were killed and 30 others more or less seriously injured recently by a passenger train which dashed into the Windsor street station of the Canadian Pacific railway in Montreal, Can. When about three miles out from the station a washout pipe on the locomotive blew out, and the scalding steam forced the engineer and fireman to jump. The train, without a guiding hand at the throttle, dashed into the station, through the granite wall into the woman's waiting room and then into the rotunda, where the locomotive, after demolishing one granite pillar, was stopped by another. Two women and a small boy and girl who were sitting in the waiting room were among those killed.

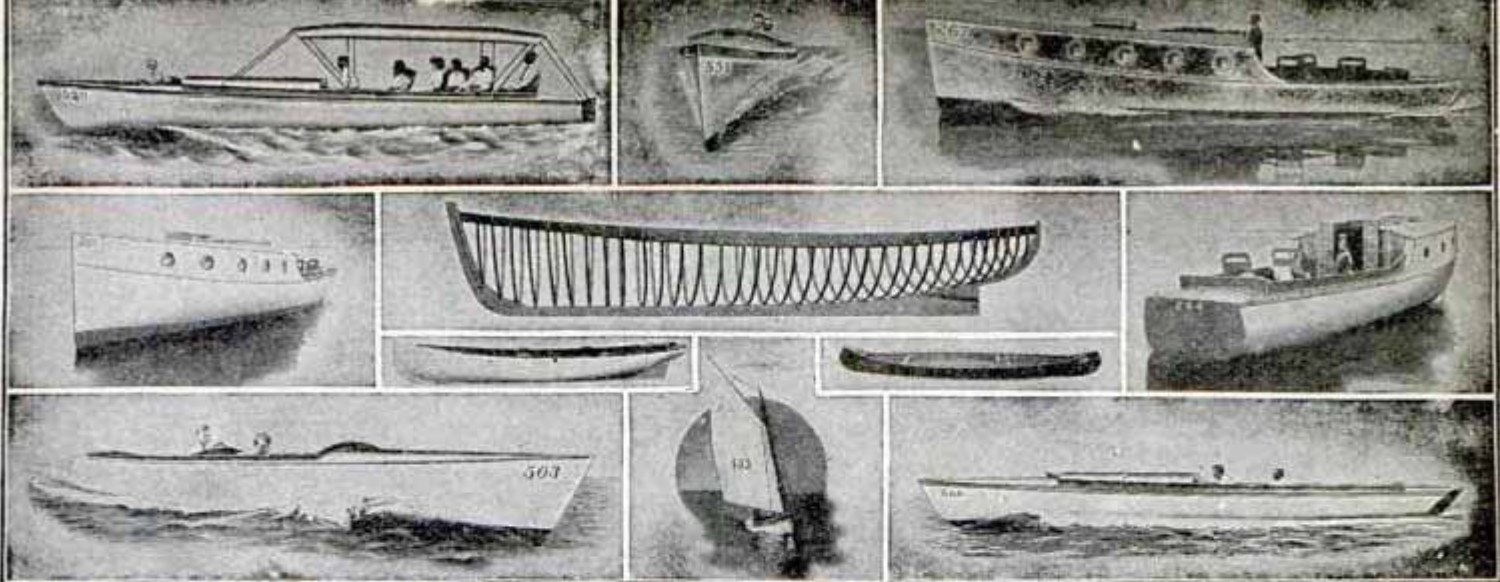
One of the illustrations shows the engine within the station, and the other shows the fallen wall. The car seen in this illustration is in the waiting room.

PREDICTING THE WEATHER BY TEMPERATURE OF GREAT LAKES

Working on the idea that the temperature of all the cities of the Great Lakes is controlled by the temperature of the water, Major Hersey, one of the experts of the United States weather bureau, declares that by testing the water of the lakes at different levels it will be possible to make successful long-distance forecasts. In the plan proposed by this expert the work of secur-

ing the necessary data will require three years of experiments, ascertaining the temperature of the water at the surface, and at depths 25 and 50 ft. below the surface, under varying conditions for three seasons.

To carry out such work an appropriation from the weather bureau at Washington will be necessary. Major Hersey's desire is to test the idea at Milwaukee, where he is now located, and if the experiment proves successful, the same work could be undertaken at other cities on the Great Lakes, such as Chicago, Detroit, and Cleveland.



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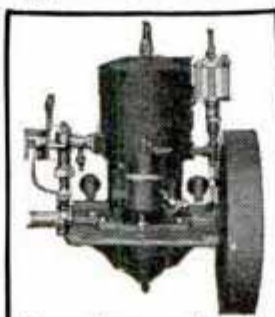
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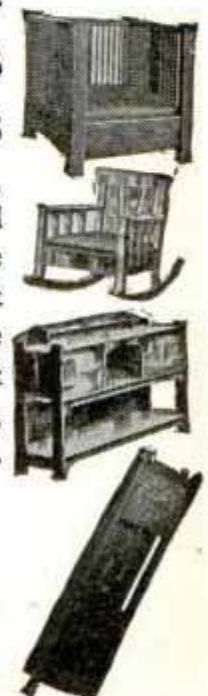
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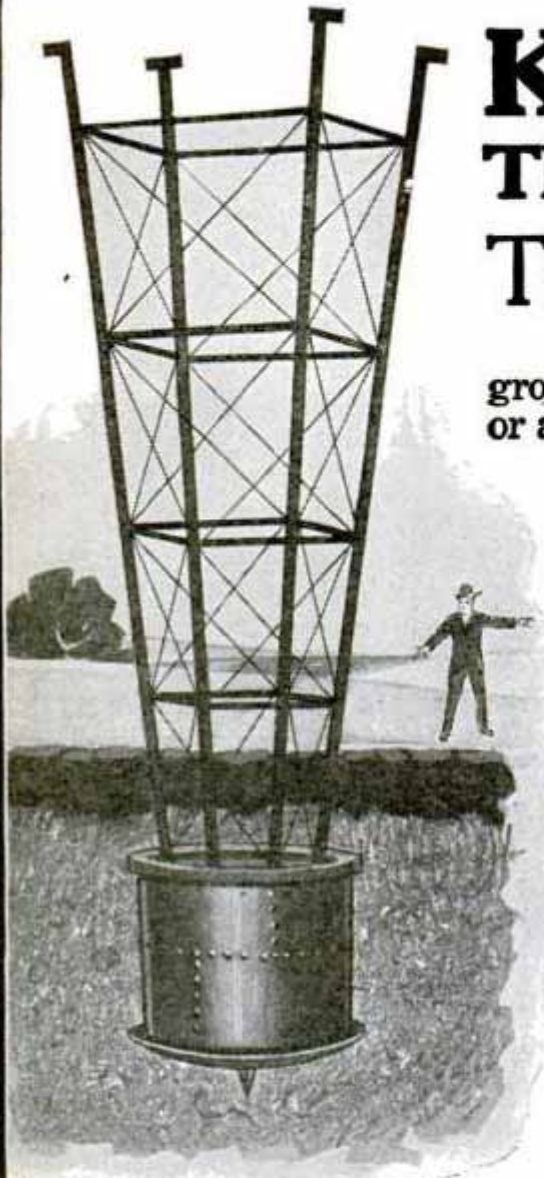
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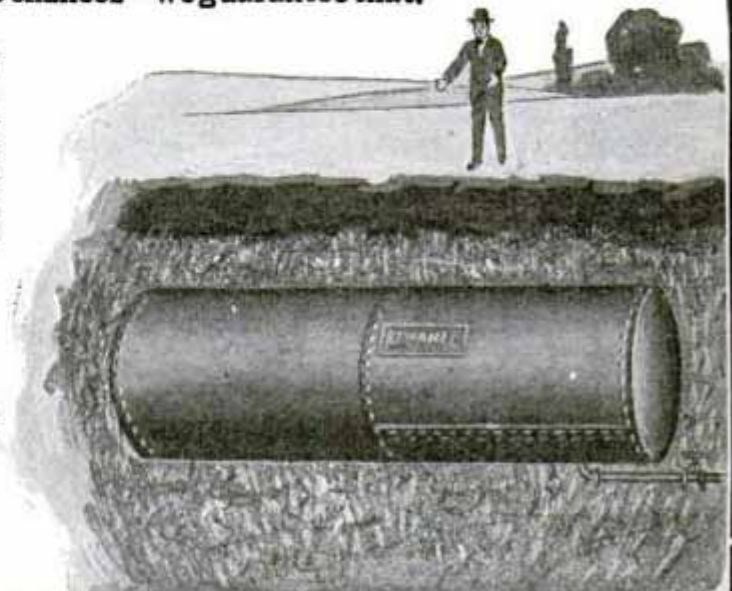
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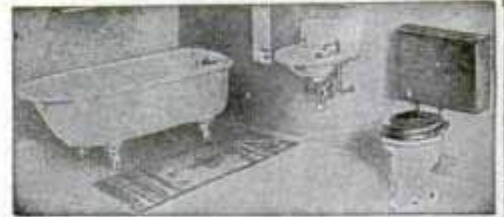
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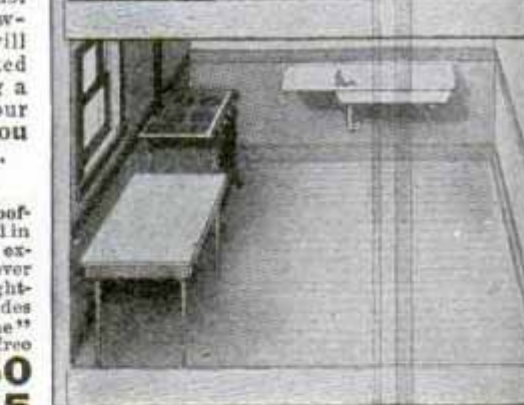


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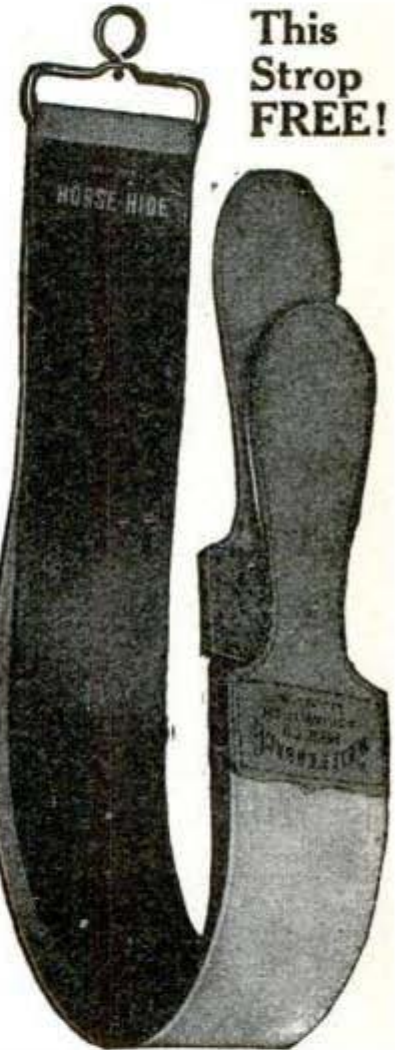


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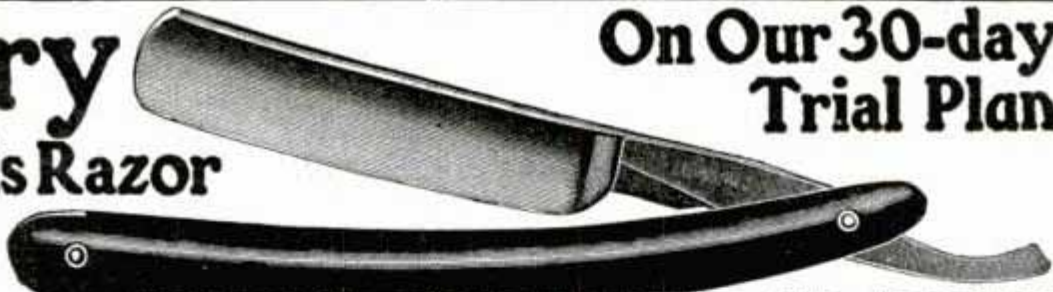
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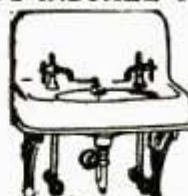
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with emphasis, "If so many rats are found in Mitsui warehouses." Tsuchizo pretended that he would go and ascertain the number of the warehouse he caught the rats in, and left the police box. He now visited another police box and tried to pass the rats, saying that he killed them in a godown near the Pier Company. But the poor fellow was now confronted by a policeman harder to deal with than the previous one. For evidently he was a man of the world; and after a great deal of close scanning and head-shaking he suspiciously remarked: "The hair of these rats is somewhat yellowish and not at all like those found in the city." Tsuchizo turned as pale as his namesake, that is, clay-man. The policeman knew at once where the wind blew, and caught the poor fellow by the neck and hauled him to the station. Tsuchizo was cross-examined and was obliged to confess all. The police lodged a criminal procedure against Tsuchizo charging him with attempted fraud.—The Japan Times.

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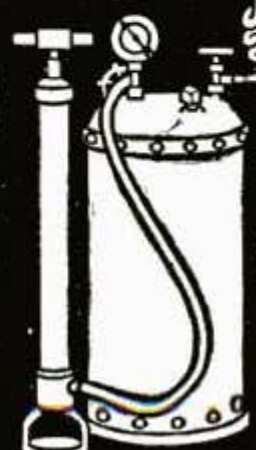
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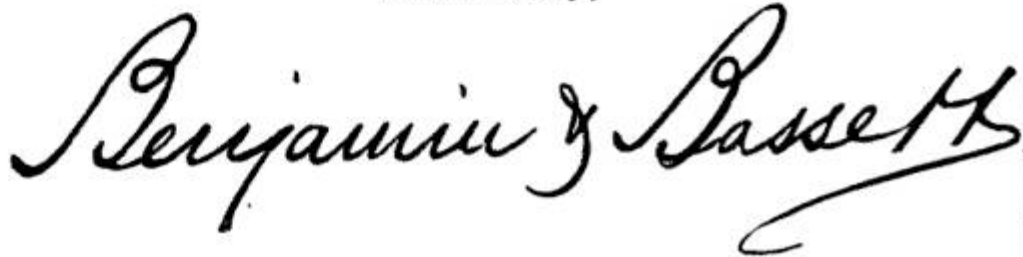
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* * *

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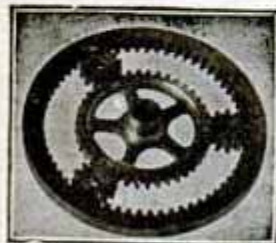


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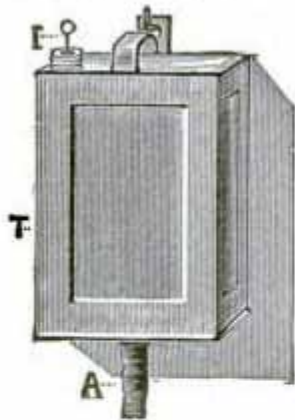


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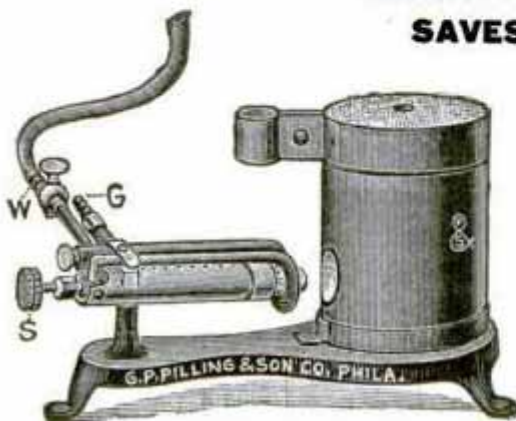
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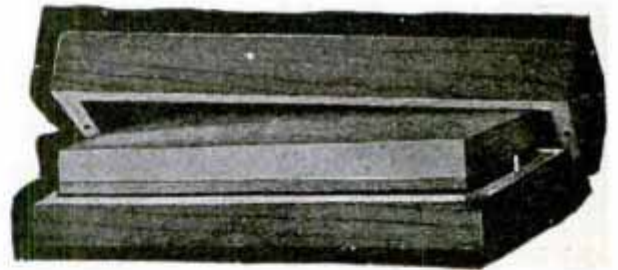
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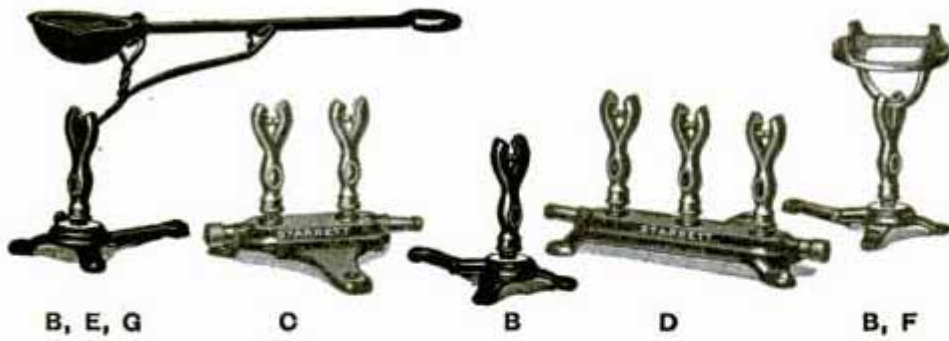
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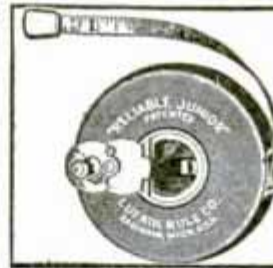
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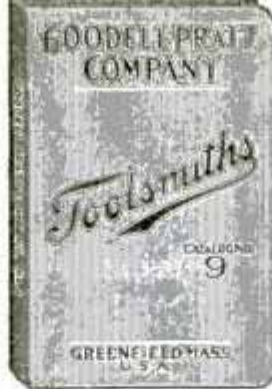
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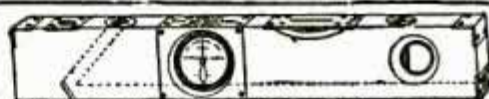
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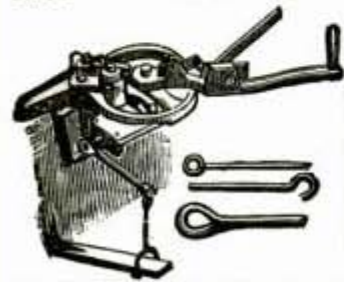
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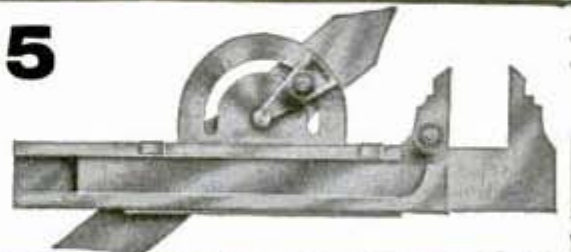
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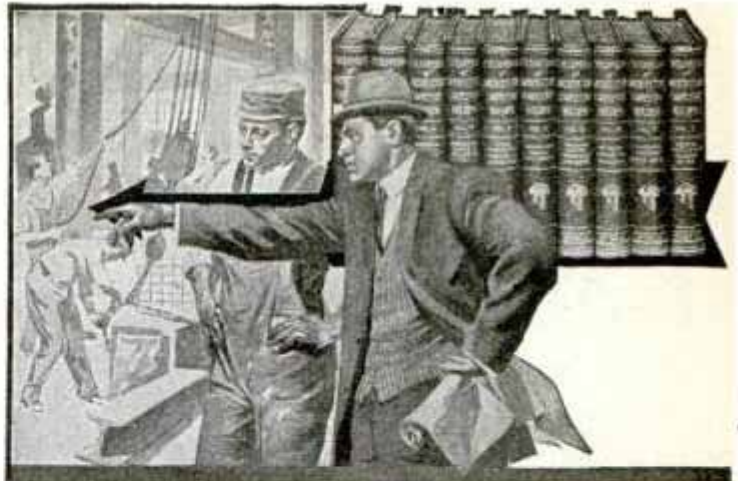
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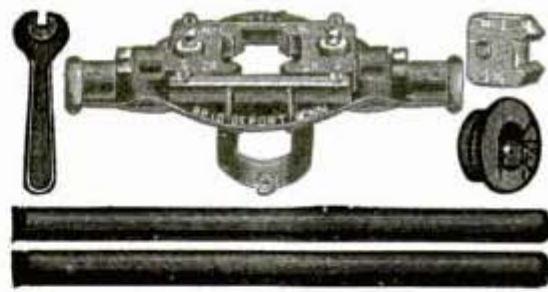
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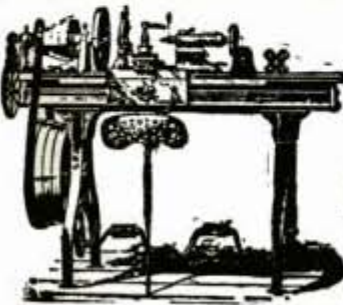
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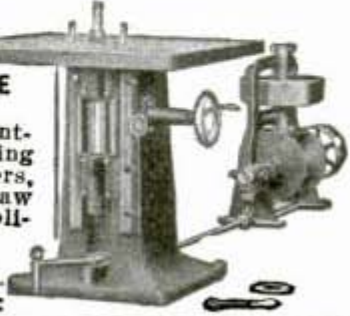
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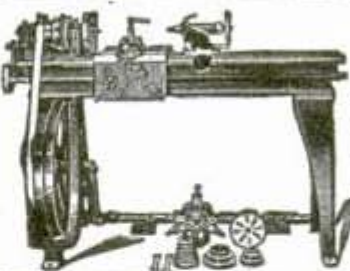
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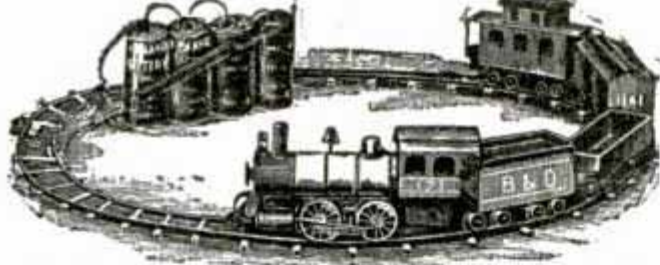
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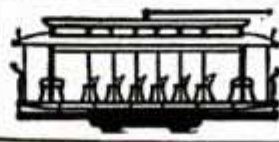
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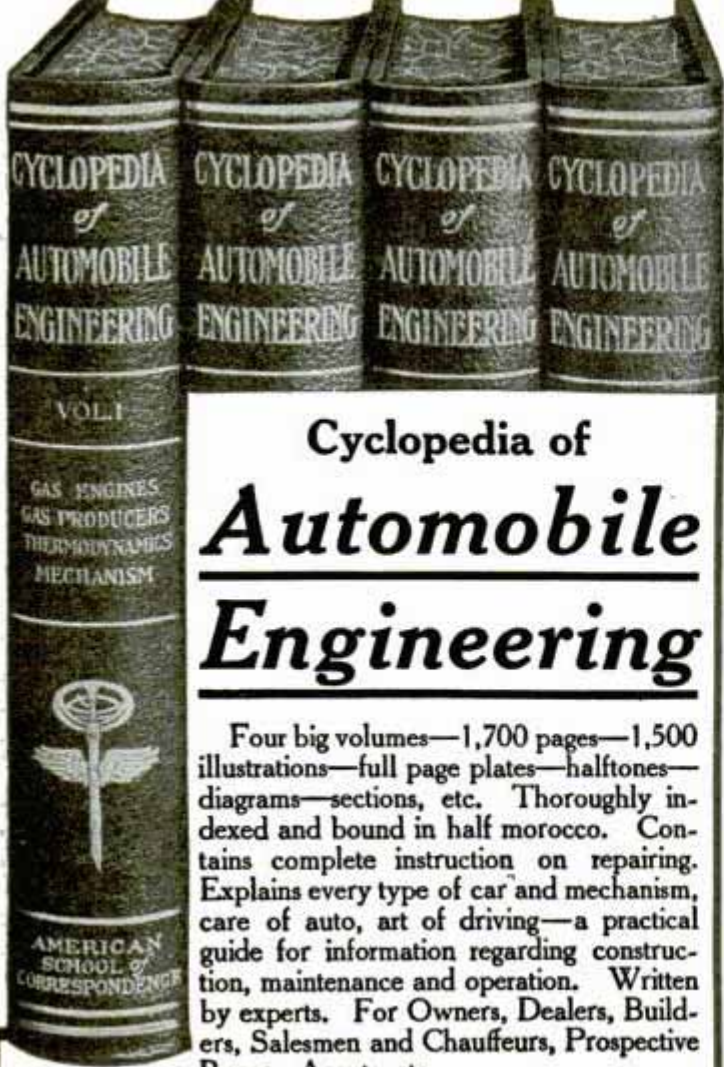
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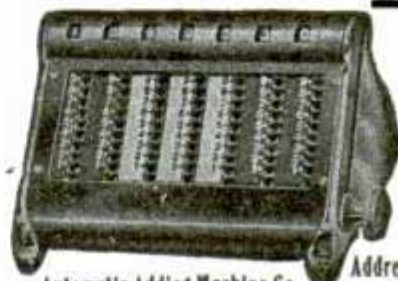
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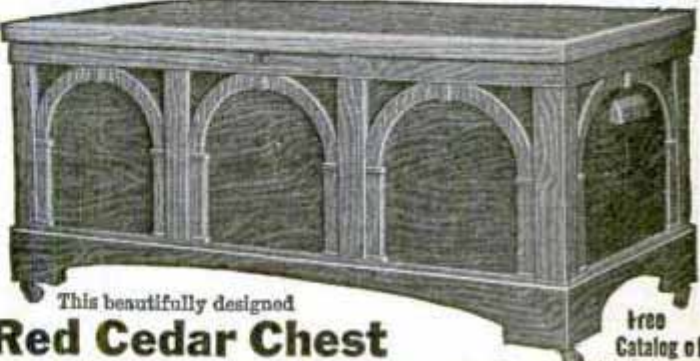
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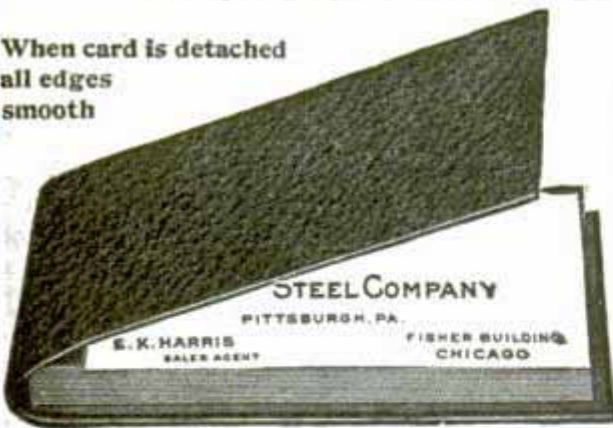


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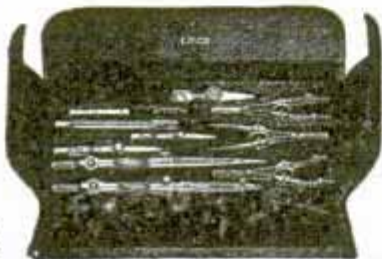
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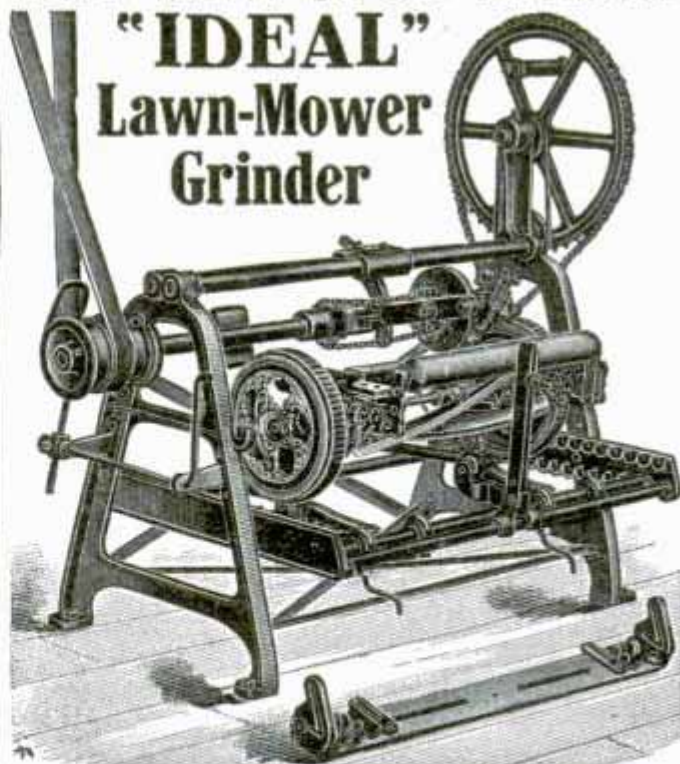
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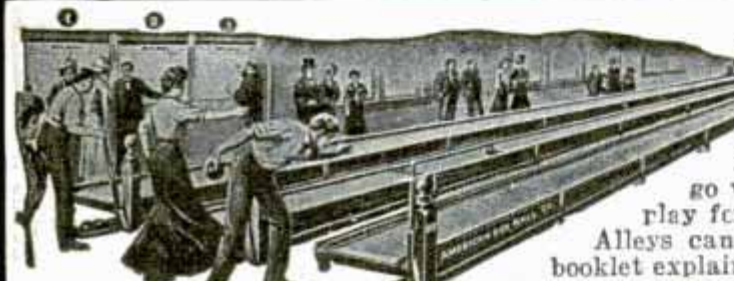
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scurried out of the carriage and packed themselves away in other parts of the train.

The smile on the face of the young man was childlike and bland as he settled himself spaciouly in the corner of the empty carriage, and lit a cigar.

"Ah," he murmured, "it's a grand thing for me that I was born clever! I wish that they'd hurry up and start!"

Presently the station master put his head in the window and said:

"I s'pose you're the smart young feller what told the people this here carriage were not going?"

"Yes," said the clever one. And he smiled a dazzling, seven-carat smile.

"Well," said the station master, who was somewhat of a smiler himself, "she ain't. The porter heard you telling them people, and he cut her off. He thought you was a director of the road."—S. S. Messenger.



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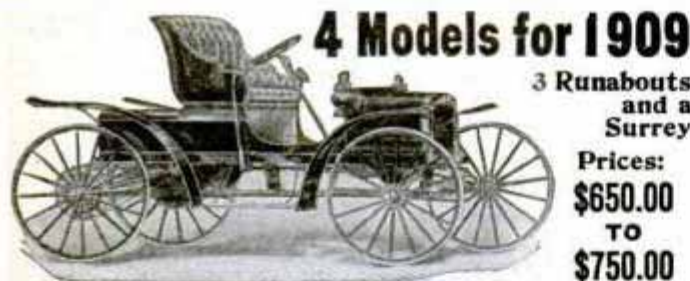
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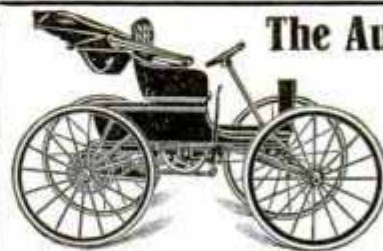
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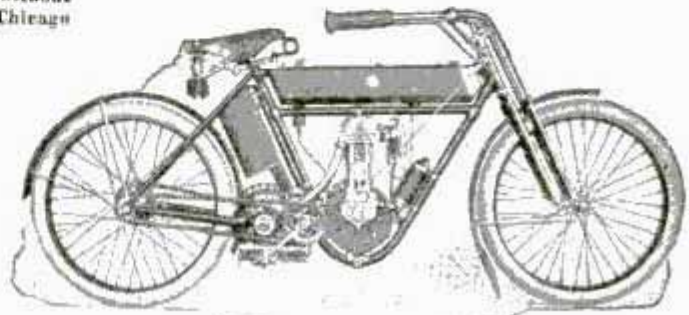
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pushes farther and faster, with less work, than any other bicycle. This isn't a mystery. The Racycle has 27.9% less pressure on the bearings than any ordinary bicycle. It is the best hill climber and easiest running wheel made.

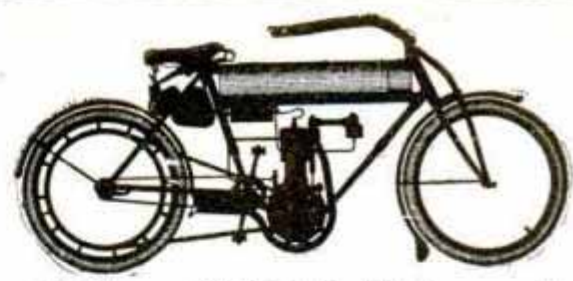
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THE RACYCLE

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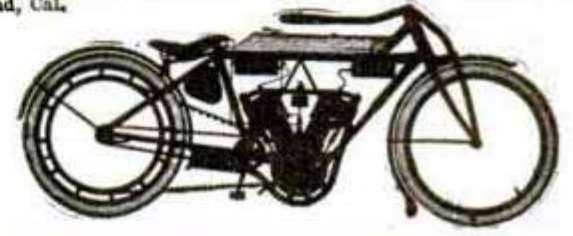
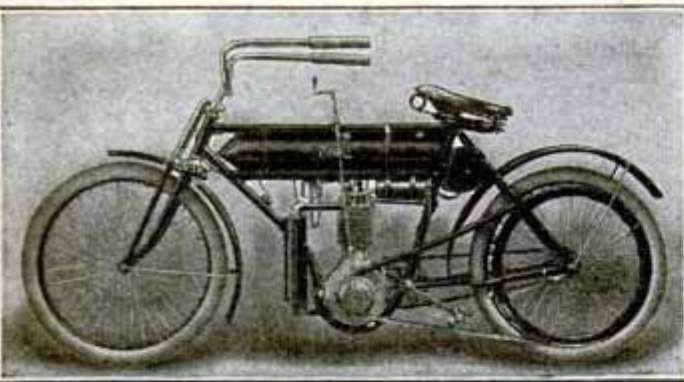


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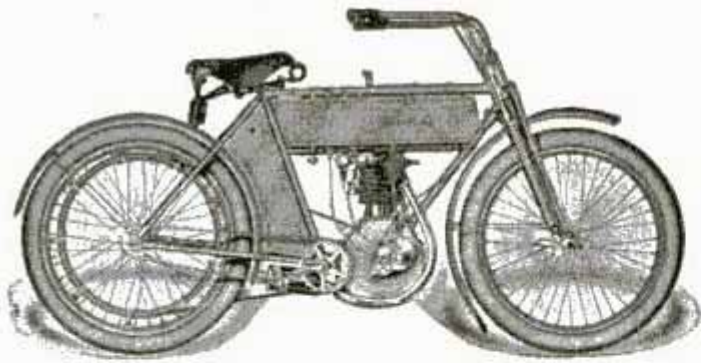
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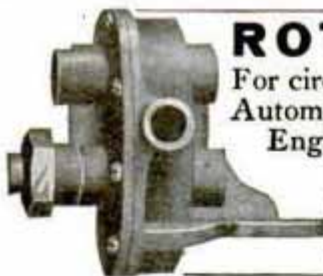
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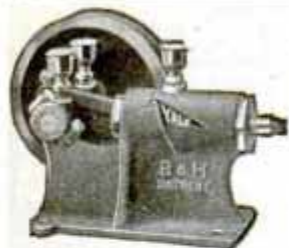
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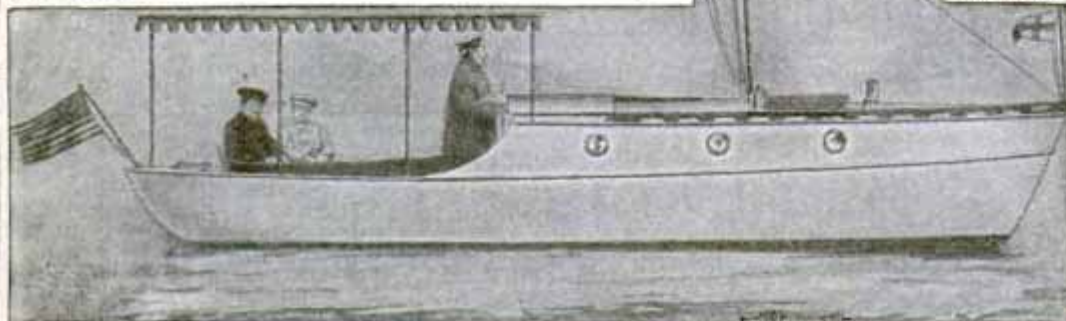
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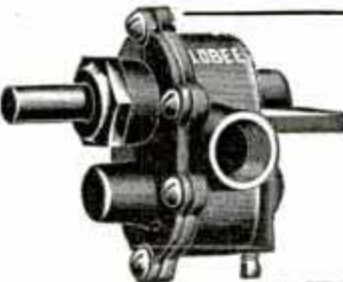
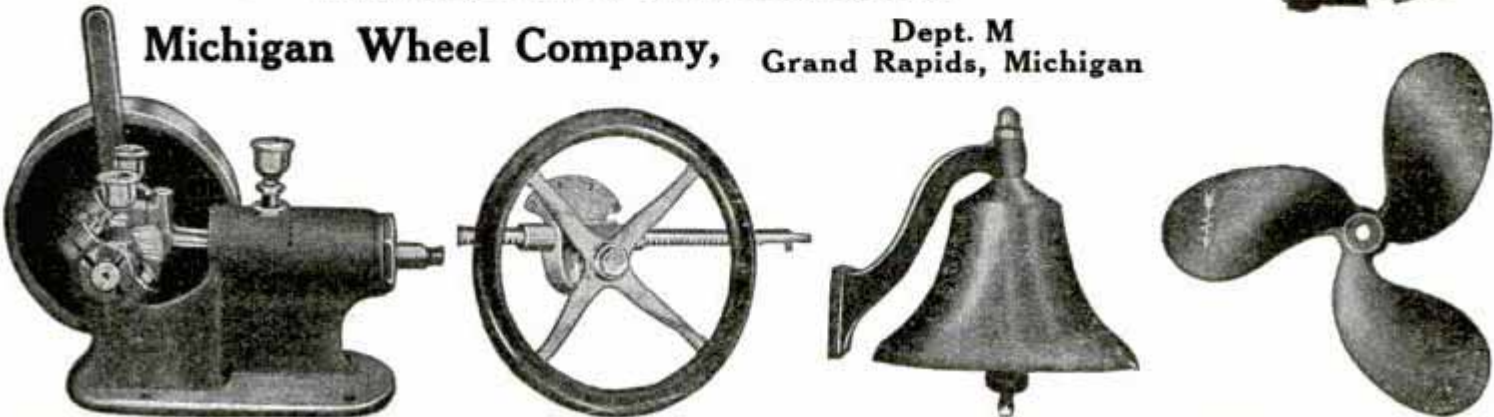
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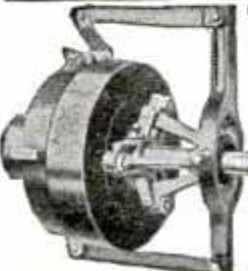
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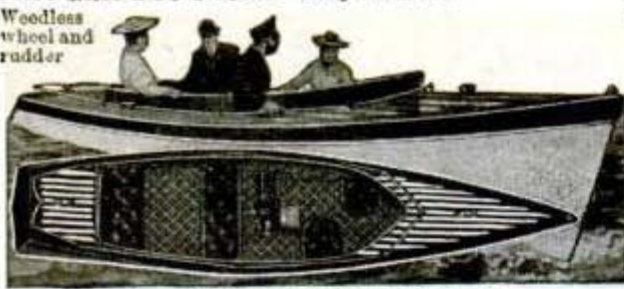


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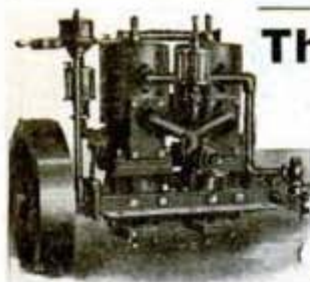
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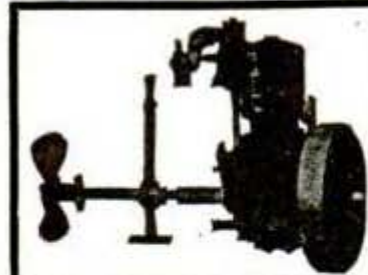
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A German peddler rapped timidly at the kitchen entrance. Mrs. Kelly, angry at being interrupted in her washing, flung open the door and glowered at him.

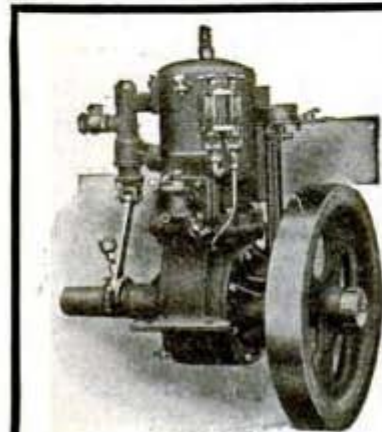
"Did yez wish to see me?" she demanded in threatening tones.

The peddler backed off a few steps.

"Vel, if I did," he assured her with an apologetic grin.

"I got my vish; thank you."

WHEN YOU WANT ANYTHING AND DON'T KNOW WHERE TO FIND IT—WRITE BUREAU OF INFORMATION, POPULAR MECHANICS, CHICAGO



T & M

REVERSIBLE MARINE MOTORS

Neat and original design. High quality; moderately priced. Various types and all sizes from 2 to 150 horsepower. Every engine guaranteed to develop full rated power. Investigate carefully before buying. Beautiful '09 catalog gives full description and general treatise. Ask for a copy.

Termaat & Monahan Co.
OSHKOSH, WIS.

THE LEADER Horizontal Opposed MARINE ENGINES

have six cardinal virtues worth being authentically informed about if you are really in the market. These are, Non-vibration, low center of weight, accessibility, economy, both of fuel and upkeep, power reliability and compactness. We will send a good question answering gas engine book to actual buyers.

THE SINTZ-WALLIN CO., Grand Rapids, Mich.
Southern Office, 340 Carondelet St., New Orleans

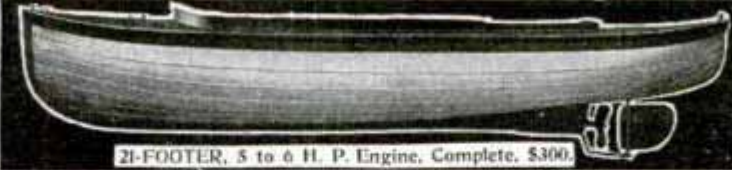


16-FOOT LAUNCH WITH 2-CY. P. Engine, Complete, \$66.00



18-FOOT Auto Express, 3 1/2-H.P. Engine, Complete, \$147

Why are the side towers of patents for the manufacturer of rolled steel, locked seamed, concealed riveted steel boats. Don't confound these boats with cheap stamped steel boats with exposed rivets and lapped seams. If you are in doubt as to the strength of Michigan Steel Boats, write us for testimonials received unsolicited from livery men who have used our boats, and sample of our lock seam which will speedily convince you that we have the staunchest boat made.

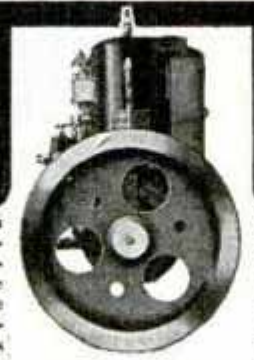


21-FOOTER, 5 to 6 H. P. Engine, Complete, \$300.

L. S. CAMPBELL, of Tampa, Fla. writes: "I have used your boats for several years in the water. The old fashioned boats are not around Tampa and do not even exist, it is all in this world. I would like to see the live boat built on this water every where I should like to see and if you ever run about me a boat just as some others that the salt water has in it they was made the lightest made so far they ever knew the boat. There was some time in my knowledge back from the Michigan Steel Boat, and enjoy in the water sailing in my boat, I would like to know if there from the boat and price how the price has on my body of water." "All boats fitted with water-tight arrangements, concealed shaft. Lock seam very tight, making them for use in any water, in any weather, and under ordinary conditions for use in salt water. The boats are painted with anti-rust and aluminum paint and are built in accordance with the Michigan Steel Boat, and are built in accordance with the effects of salt water on the hull.



14 FOOT "B" ROW BOAT, 1 PR. OARS, Complete, \$28.00



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16-foot Launch \$96.00
18, 21 and 25-Foot at Proportionate Prices

All Launches fitted with Detroit Two-Cycle Reversible Engine. Starts without cranking, has positive speed control, only three moving parts piston, connecting rod and crank shaft. White bronze bearings, piston and crank shaft ground and polished, drop forged steel crank shaft, centrifugal ring oiler on crank pins, exhaust water-jacketed and water-cooled Muffler. Fuel Injector burns gasoline, kerosene, coal oil or alcohol.

ings, piston and crank shaft ground and polished, drop forged steel crank shaft, centrifugal ring oiler on crank pins, exhaust water-jacketed and water-cooled Muffler. Fuel Injector burns gasoline, kerosene, coal oil or alcohol.

Over 40 Different Styles to choose from. ON HAND AND READY TO SHIP

ROWBOATS, \$20.00 AND UPWARDS

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Make a Motor Boat of Any Boat in Five Minutes



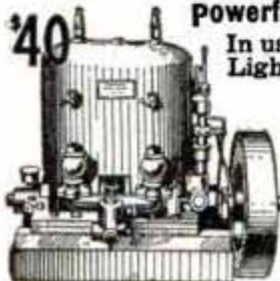
You can do it with the Waterman Outboard Motor, which you can quickly attach (and detach) to the stern of any skiff, row boat, dinghy, punt, sail boat, and have a good motor boat. It is not a toy, but a reliable 2 H. P. Marine Motor that will drive an 18-foot row boat 7 miles an hour, 4 hours on gallon gasoline. Simplest motor made. Weight 40 lbs. Equipped with Schebler Carburetor. Four years' successful results behind it. Send for Catalog C. Canoe Motors, 1, 2, 3, 4 Cylinders—Catalog K. Standard Type Motors, 1 to 30 H. P.—Catalog A.

Waterman Marine Motor Co.
1507 Fort Street, West, Detroit, Mich., U. S. A.



ATTENTION: BOAT OWNERS AND BUILDERS!
It will pay you to send six cents for our Catalog D, Boat Hardware. A saving on all boat supplies. C. KAUFMAN, OSHKOSH, WIS.

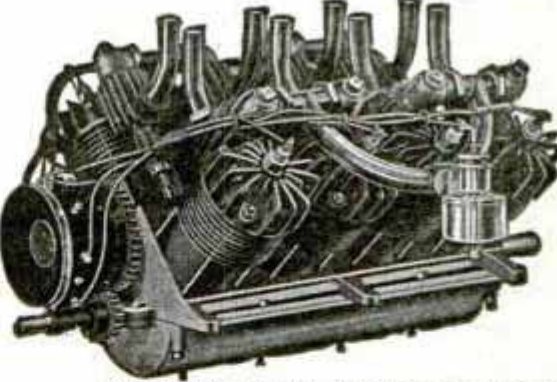
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Adopted by the U. S. War Department and used by all prominent Aeronauts. Absolutely essential where great power and light weight are required.

One to eight cylinder. Two to one hundred H. P. Send stamps for catalogue X. **G. H. CURTISS MFG. CO., Hammondsport, N. Y.**

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Baldrige

Reverse Gear

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1909 Sportsman's SPECIAL

The best fishing craft made. Absolutely the boat to meet your demand for trolling. Speed Control, Noiseless, Strong, Safe and Fast. Length 16 feet. Beam, 4 feet 6 inches. Speed from 1 to 8 miles per hour. Special offer—Complete, 2 H. P.

\$129.00

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64 Styles of Boats

in Stock ready to ship at the FOLLOWING PRICES:

14 ft. Launch, 2 h. p.	\$ 94.50	21 ft. Family Boat, 5-6 h. p.	\$300.
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OUR 1909 CATALOGUE FREE UPON REQUEST

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1100 Jefferson Ave., Detroit, Mich., U. S. A.

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OUR NEW 18 FT. FAMILY SPEED BOAT. 10 MILES PER HOUR.

THE BEST FAMILY BOAT MADE. Length, 18 feet, beam, 4 ft. 4 in., draught, 13 in., 2 h. p. '09 engine; capacity, 10-12 persons. SPECIAL INTRODUCTORY OFFER \$185.00



THE PRIDE OF 1909

CRUISING PROPOSITION

"THE BEST

Here is a \$1,000.00 Boat. Furnished for cruising. Length, 25 ft. Beam, 6 ft. 6 in., Draught, 24 in., H. P., 5-6; Reversible Detroit Engine; Capacity, 22 Persons; Speed about 8 miles per hr. Cabin is removable or can be fastened stationary. OUR BIGGEST BOAT BARGAIN AT \$455.00

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3 to 20 H. P.

\$60.00 and upwards. Complete in every detail, all ready to install in your boat.



Made in the largest and most up-to-date plant in the world devoted exclusively to the manufacture of 2-cycle marine motors.

1, 2 and 3 cylinder. Write for story of how these motors are made and catalog.

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It only proves again that our engines are built to stand up under all conditions of service and our record proves that they do.

Our catalog No. 18 will give you full information. Send for it. IT'S FREE.

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NOTHING EXTERNAL REVOLVES

REVERSE GEAR

STARTS REVERSES INSTANTANEOUSLY STOPS

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The Simplest, Most Reliable, Most Compact and the Smallest Perfect Marine Reverse Gear ever offered. No outside moving parts to throw the oil or grease, tear the skirts, bruise the hands or catch waste. No noise manufactured in sizes from 2 to 80 H. P. We carry all sizes in stock for immediate shipment. Guaranteed for 1 year. Write for special prices.



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Aluminum base, copper water jacket, steel shaft, bronze bearings, special carburetor, IN A CLASS BY ITSELF HAS NO COMPETITION

Made in large quantities, therefore price right. Especially adapted for Canoe or Light Boat.

THE WATKINS MOTOR CO.

837-839 West Sixth St., Cincinnati, Ohio

New Invention!

Nothing Else Like It

THE MOST WONDERFUL STOVE EVER INVENTED

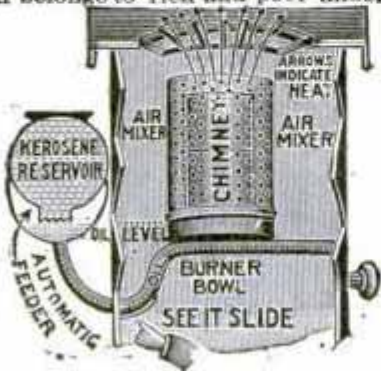
Consumes 395 Barrels of Air to One Gallon Common Kerosene Oil

Causing Great Excitement Wherever Exhibited

Fuel drawn principally from atmosphere, Uses 395 barrels of air white consuming one gallon of oil. Wood and coal cost money. ONLY FREE FUEL IS AIR. Supply unlimited. No trust in control. Air belongs to rich and poor alike.

Harrison's Valveless, Wickless, Automatic Oil-Gas and Air-Burner Stove

Automatically generates gas from kerosene oil, mixing it with air. Burns like gas. Intense hot fire. Combustion perfect. To operate—turn knob—oil runs into burner—touch a match: it generates gas, which passes through air mixer, drawing in about a barrel of air to every large spoonful of oil consumed. That's all. It is self-regulating, no more attention. Same heat all day or all night. For more or less heat, simply turn knob. There it remains until you come again. To put fire out turn knob, raising burner—oil runs back into can, fire's out. As near perfection as anything in this world. No dirt, soot or ashes. No leaks—nothing to clog or close up. No wick—not even a valve, yet heat is under proper control. D. CARN, IND., writes: "It costs me only 4½ cents a day for fuel." L. NORRIS, VT., writes: "The Harrison Oil-Gas Generators are wonderful savers of fuel, at least 50 to 75 per cent. over wood and coal." E. ARNOLD, NEB., writes: "Saved \$4.25 a month for fuel by using the Harrison Oil-Gas Stove. My range cost me \$5.50 per month, and the Harrison \$1.25 per month. Objectionable features of other stoves wiped out."



Sectional Cut of Generator.



NOT LIKE THOSE SOLD IN STORES

One, two or three burner sizes—with or without oven.

Ideal for cooking, roasting, baking, ironing, canning fruit, picnics, cottages, camping, also for heating houses, stores, rooms, etc., with radiating attachment. No more carrying coal, kindling, ashes, soot and dirt. No hot fiery kitchens. Absolutely safe from explosion. Not dangerous like gasoline. Simple, durable—lasts for years. Saves expense, drudgery and fuel bills.

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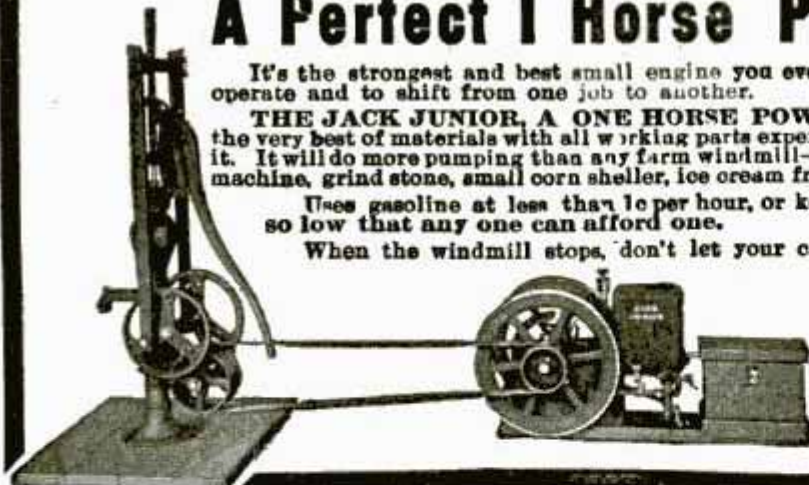
A Perfect 1 Horse Power Engine At Last

It's the strongest and best small engine you ever saw. The work it will do will delight you—so easy to operate and to shift from one job to another.

THE JACK JUNIOR, A ONE HORSE POWER MARVEL, has evaporator tank, and is made of the very best of materials with all working parts expertly machine finished. Weather conditions do not affect it. It will do more pumping than any farm windmill—runs cream separator, milking machine, churn, washing machine, grind stone, small corn sheller, ice cream freezer—in fact, any small machine.

Uses gasoline at less than 1c per hour, or kerosene (with one small extra attachment). The price is so low that any one can afford one.

When the windmill stops, don't let your cattle suffer. Jack Junior will do the pumping.



Get our free catalogue No. BA 449 now—today. There's a lot more you ought to know about it.

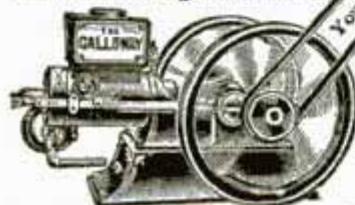
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Direct From My Factory on 30 Days' Free Trial. Satisfaction or money back. Write for special proposition. All you pay me is for raw material, labor and one small profit. Send for my big BOOK FREE.

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RELIABLE AS STEAM REMINGTON OIL ENGINE

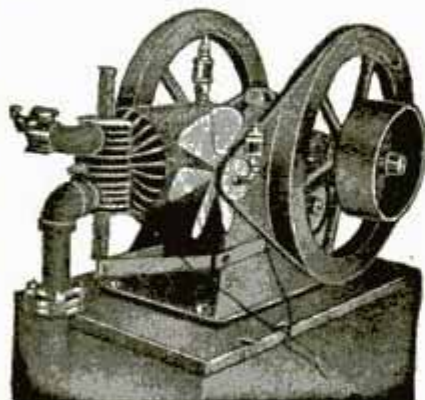
Will not carbonize. Cost to operate $\frac{1}{4}$ as much as gasoline. This is **not** a gasoline engine supposed to run on kerosene.

IT IS A KEROSENE ENGINE

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**1 1/2 H. P. to
10 H. P.**

1 1/4 and 2 1/4 H. P. equipped with short connections for spray pump and walking beam attachment for pumping water from wells. Will work against 200 pound pressure all day without heating. Gasoline in base of engine.

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Special Offer

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THE BADGER

is the Gasoline Engine

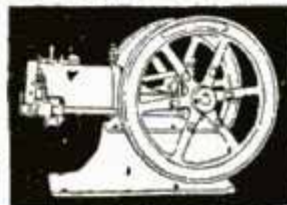
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All types and sizes, 2 1/2 to 50 H. P.

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POPULAR MECHANICS BOOK DEPT., - - CHICAGO

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We are now filling orders for the wonderful new "No Flux" aluminum solder. The sensation of the day in mechanical circles. Aluminum soldered to aluminum and other metals by the most ordinary and simple methods. Good size sample bars sufficient for test and repairing, 25 and 50 cents by mail. Small samples of work included. Live agents wanted among the metal trades and manufacturers. Send today.

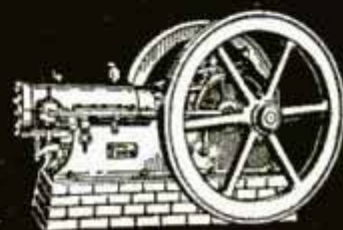
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Buy a Foos and buy certainty. 21 years' use establishes their superiority, and you have the guaranty of the greatest gas engine factory in the world behind your purchase. We cannot afford to send out engines that prove failures. All styles and sizes. Let us send you Free Book No. 50 with facts.

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2 HORSE POWER DETROIT ENGINE 29 ⁵⁰

OTHER SIZES AT PROPORTIONATE PRICES IN STOCK READY TO SHIP

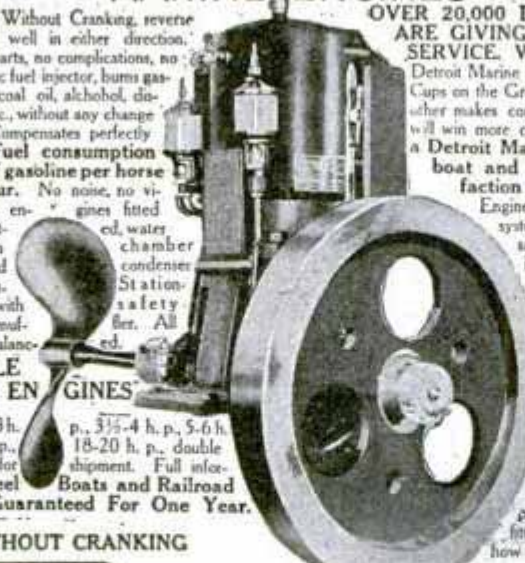
REVERSE GEARS



Reverse gears from 1 1/2 h. p. up to 120 h. p. Suited for work boats and speed boats. All moving parts enclosed in oil tight case. All gears are spur gears hardened and cut. All gears run in bath of oil, impossible to wear out. Go ahead and reverse bands positively lubricated adjustable. All gears tested before shipment, all gears balanced for high and low speed, ball thrust taken and thrust on go ahead or reverse. No external revolving parts to catch clothing, throw oil or grease. Reverse band cannot ride on the drum and heat up. The Detroit Gear is compact, simple and reliable. Special proposition on first gear purchased in a community.

2 h. p., 2 1/2 h. p., 3 h. p., 7-8 h. p., single cylinder; 8 h. p., 10 h. p., 12-14 h. p., cylinder; 50 h. p., four cylinders. Sizes in stock ready for outfit about engines for Launches, Stern Wheel Track Cars. All Engines and Gears Guaranteed For One Year.

MARINE ENGINES

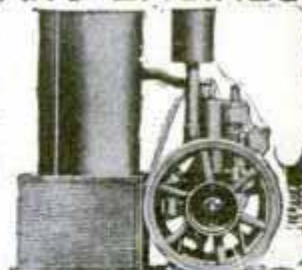


Engines Start Without Cranking, reverse and run equally well in either direction. Only 3 moving parts, no complications, no troubles, automatic fuel injector, burns gasoline, kerosene, coal oil, alcohol, distillate, naphtha, etc., without any change in equipment. Compensates perfectly at all speeds. Fuel consumption 1/5 of a pint of gasoline per horse power per hour. No noise, no vibration. Marine engines fitted with water-jacketed, water chamber sprayed expansion which cools and the exhaust gaseous engines fitted with type, stationary multi-engines counterbalanced.

REVERSIBLE MARINE ENGINES

2 h. p., 2 1/2 h. p., 3 h. p., 3 1/2 h. p., 4 h. p., 5-6 h. p., 18-20 h. p., double shipment. Full information. Boats and Railroad.

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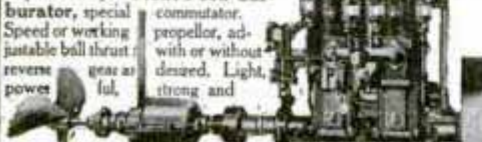
Detroit Marine Engines won more Trophy Cups on the Great Lakes last summer than other makes combined. Detroit Engines will win more cups this summer. Place a Detroit Marine Engine in your boat and have absolute satisfaction (every Detroit Marine Engine has a water proof ignition system, suited for fresh or salt water). All bearings of plastic white bronze (no cheap babbit used). All bearing surfaces ground to a mirror finish. Piston pin of hard steel and turning in hard bronze bushing. Crank shaft drop forged steel. All parts interchangeable and fitted to 1-2000 of an inch. Connecting rod of selected steel (I-beam section) and adjustable for wear. Centrifugal ring oiler on crank pin. Piston and cylinder oiled by separate lubricator. Marine engines fitted with flat bed flanges on sides of crank case and instructions tell just how to place in boat (anyone can do it). Stationary engines mounted on skids.

REVERSIBLE GOVERNING STATIONARY ENGINE

Starts without cranking. Sizes 2 h. p. to 8 h. p., complete outfit, mounted on skids all ready to run. Speed controlling lever starts, reverses and stops motor. Burns gasoline or coal oil (kerosene).

DETROIT ENGINES START WITHOUT CRANKING

Two-Cylinder Engines in sizes from 8 h. p. to 20 h. p. Float Feed Carburetor, special commutator, propeller, adjustable ball thrust reverse gear as desired. Light, strong and



speedy pump. Absolutely no vibration. Positive circulating Perfect speed control. Simple, Reliable.

We desire an Agent Demonstrator in every community. Special wholesale price on first outfit sold. Write for full information.

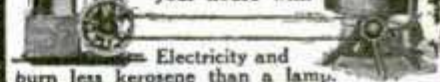
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Dept. A, Marine Engines Dept. B, Stationary Engines
Dept. C, Marine Reverse Dept. F, Launch Hardware
Gears and Boat Fittings

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With a Detroit Stationary Engine you can save the hired man's wages. It will run a pump, a lighting dynamo, a washing machine, a sewing machine, a churn, a steam separator, a printing press, emulsi cutter, a feed mill, a corn sheller. It will light your house with



Electricity and burn less kerosene than a lamp.

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At Home or Traveling, all or spare time. Easily Learned
GET MONEY—I DID—GOT \$301.27
worth of plating in two weeks, writes M. L. Smith, of Pa. (Used Small Outfit)

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in the Gold, Silver, Nickel and Metal Plating business. \$5 to \$15 a day can be made doing plating with Prof. Gray's new line of guaranteed Plating Outfits. Unequaled for plating watches, jewelry, tableware, bicycles, and metal goods. Heavy plate. Warranted. No experience required. We do plating ourselves. Have years of experience. Use same materials we sell. Materials cost about 10c to do \$1.00 worth of plating. Manufacture only practical outfits, including all tools, lathes and materials. All sizes complete. Ready for work when received. Guaranteed. We teach you the art, furnish recipes, formulas and trade secrets Free. The Royal, Prof. Gray's New Immersion Process. Quick. Easy. Latest method. Goods dipped in melted metal, taken out instantly with fine, brilliant, beautiful plate, ready to deliver. Thick plate every time. Guaranteed 5 to 10 years. A boy plates from 100 to 200 pieces tableware daily, \$10 to \$30 worth of goods. No polishing, grinding or electricity necessary. Demand for Plating is Enormous. Every family, hotel and restaurant have goods plated instead of buying new. It's cheaper and better. Every store, jeweler, shop, factory, has goods needing plating. Agents have all the work they can do. People bring it. You can hire boys cheap to do your plating, the same as we, and solicitors to gather work for a small per cent. Replating is honest and legitimate. Customers delighted. We are an old established firm. Been in business for years. Capital, \$100,000.00. We know what is required. Our customers have the benefit of our experience, so that failure is next to impossible. We Are Responsible and guarantee everything. Reader, here is the chance of a lifetime to own and boss a business of your own. **WE START YOU.** Now is the time to make money. Call or write today. Our new plan. Samples of plating, testimonials and circulars FREE. Don't wait. Send us your address, anyway. **GRAY & CO. PLATING WORKS, 1183 Gray Bldg., Cincinnati, O.**

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You should be satisfied that it can be DEPENDENT
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are built on such simple lines that an inexperienced person has no trouble in mastering their management. Thousands of them are at work today, their years of service telling of thorough efficiency.

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Vertical in 2, 3 and 25 horsepower.

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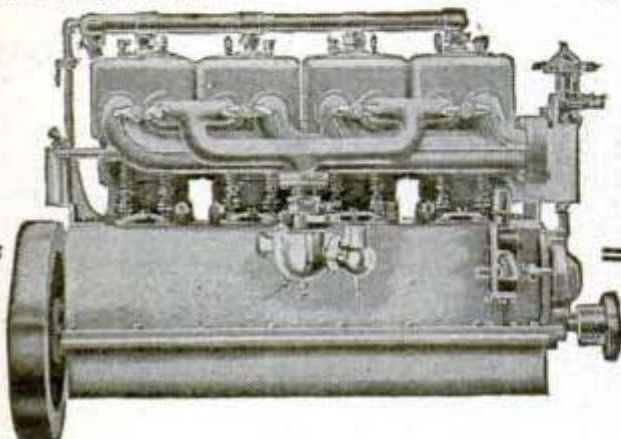
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Hot sharp spark at all speeds. Not effected by moisture. Increases the power of the engine. Packed in water tight steel case. No short circuits. Thoroughly insulated. No chemical leaks. Runs in any position. Most reliable and cheapest battery on the market for all gas or gasoline engines. Write for descriptive circular and catalog of supplies.

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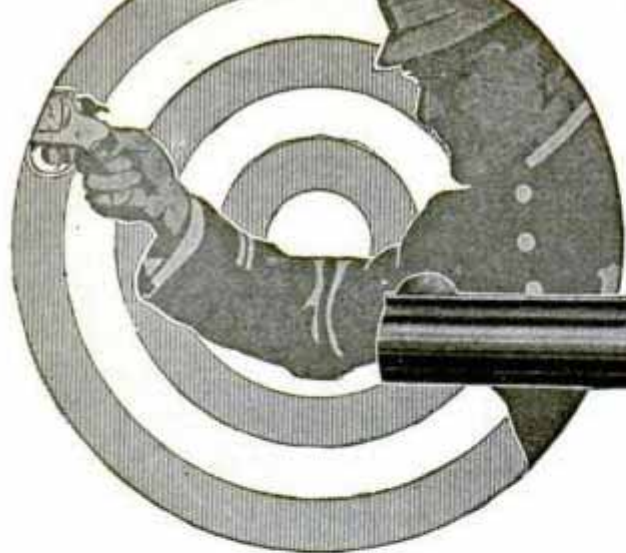
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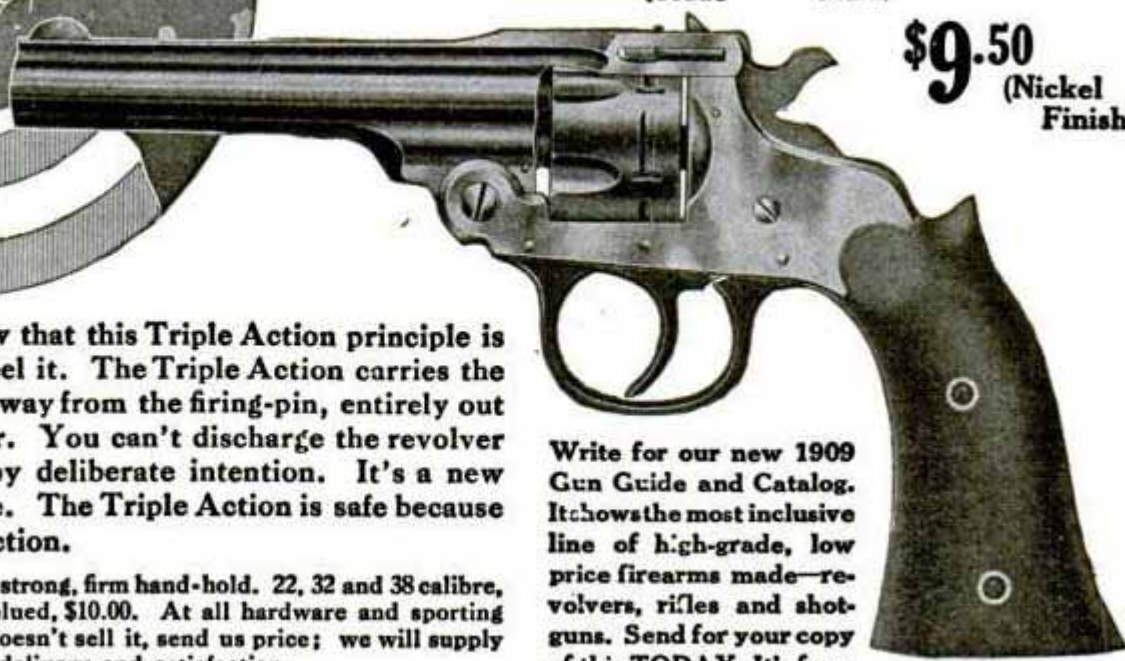


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A child can see and know that this Triple Action principle is safe. A blind man can feel it. The Triple Action carries the hammer up after firing, away from the firing-pin, entirely out of the suspicion of danger. You can't discharge the revolver if you want to, except by deliberate intention. It's a new construction, a better one. The Triple Action is safe because basically safe in construction.

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Killing the Collar

A collar gets most worn when not worn—chewed up and rubbed to death at the laundry. Here's the difference:

LITHOLIN Waterproofed Linen COLLARS and CUFFS

need no laundering as they can be wiped white as new with a damp cloth. See what that saves in wear and tear. Will not wilt or fray. The same collar you have always worn, only waterproofed. All styles and sizes.

COLLARS 25c. CUFFS 50c.

Always sold from a RED box. Avoid substitution. If not sold at your dealer's, send, giving styles, size, how many, with remittance, and we will mail, postpaid.

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Detachable Post Card Brings Oliver Typewriter Art Catalog and "17-Cents-a-Day" Selling Plan

The Detachable Post Card printed below will quickly pave the way to the purchase of the Oliver Typewriter for "17c-a-Day."

A one-cent stamp brings the plan at once—without obligation to buy.

You'll say when you get it that never was a cent better spent.

This plan appeals alike to the man who needs many machines and to the one whose bread-and-butter is earned by operating a typewriter.

And it is influencing thousands who have hitherto written with pen to enjoy the convenience of "*The Oliver in the Home.*"

We are willing to wait while you pay at the rate of "17c-a-Day."

We take the risk—you take the typewriter! Isn't that an attractive proposition on the world's best \$100 machine?

The **OLIVER** Typewriter

The Standard Visible Writer

America rings with praise for the Oliver—the Typewriter that Excels.

They praise its splendid strength—its marvelous speed. They appreciate its multiplied forms of service. They like its easy action—its beautiful printing—its amazing simplicity.

That's why it holds a dominant position regardless of the combined opposition of "57 varieties" of typewriters.

The Oliver originated successful "*visible writing*" and is the only visible writing typewriter that has demonstrated its efficiency by years of satisfactory service.

It operates on the only scientifically correct principle, the downward stroke—LIKE THE BLOW OF A HAMMER.

The visible writing of other machines is done with upward stroke—AGAINST THE FORCE OF GRAVITY.

The *downward* blow is the *strongest*, hence the Oliver is a heavier manifolder than any other typewriter.

The *downward* blow is the *easiest*, hence the wonderfully light touch of the Oliver.

Get in touch with the Oliver! Send for the Plan today. Learn how easy it is to own the machine that makes work like play.

The Oliver Art Catalog—sent free on request—is brimful and bubbling over with typewriter information. Ask for it.

For quick action, fill out and forward the Detachable Post Card—NOW.

THE OLIVER TYPEWRITER CO.

Oliver Typewriter Building
107 Dearborn Street Chicago, Ill.

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Gentlemen:—

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Oliver Art Catalog

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The Oliver Typewriter Company Needs
Help to Handle Sales on the New
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Apply on Detachable Post Card below

Owing to the great popularity and success of our "17-Cents-a-Day" plan of selling Oliver Typewriters, we must have more local agents at once.

Inquiries are coming in from everywhere on such a scale that our present sales force is inadequate. *More men must be added at once.* They must be men in every sense that the term implies.

We want men who will climb the ladder of salesmanship—whose ambition is to RISE.

Men of *initiative.* Men who *think* and *act.* Men of *good breeding—of tact.* Men who can be trusted.

If you are such a man, we offer you a great big opportunity. Just *how* great will be better understood by reading

"The Rise of the Local Agent"

A Book for Live Men

Fill out and mail the Detachable Post Card below and this free book and full information will be sent you by first mail.

The Oliver Typewriter Co.

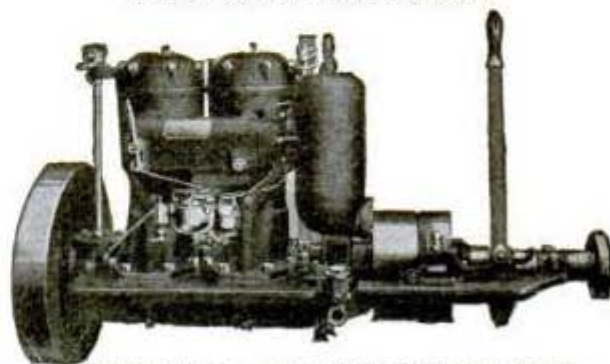
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MARINE ENGINE

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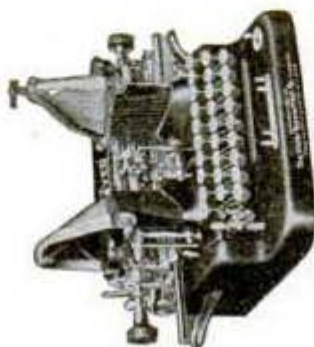
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Place a
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They are designed by E. W. Roberts, M. E., one of the most expert mechanical engineers in the United States, and constructed under his personal supervision.

Roberts Motors

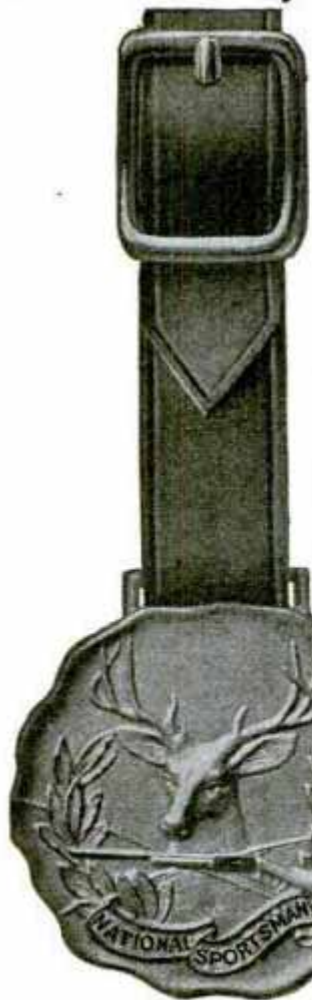
1½ to 60 Horse-power

have such remarkable flexibility of control that they are adaptable for either speed or pleasure boats. You can "loaf" with them, troll with them or run at *full speed* without any danger of base explosions or back fire. They have no "freak" ideas—no gaskets—have interchangeable parts that fit perfectly, are tested in the best testing-room in the United States, economical in use of fuel, and every one is fully guaranteed. Write for Free Catalogue and "Book of Testimonials." Good Agents Wanted.

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"GASOLINE WIRE TEST"






A Complete Lighting System for Homes, Stores, Churches, etc.

Ann Arbor Lighting Systems are brighter than gas, steadier and clearer than electric light, and cost about one-tenth as much to operate. Each lamp gives 300 to 500 candle power for less than 1/4 cent per hour. Fuel is gasolene; perfectly safe.

Price \$10 up, according to number of lamps desired. We make inverted arcs especially adapted for use in stores, halls, factories, etc.

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The best ever invented. Can be used on any standard size nut. Can be used where others cannot. Will never wear corners of nuts round. Will never slip to bruise your hands. No nut too tight to turn.

NOTICE: It is light. Can carry it in your pocket. Price is \$2.00 net. Special inducement to introduce this Wrench, \$1.00. Fill out the order below and mail it to us with \$1.00, for which we will send you one **Lightning Socket Wrench**, postage prepaid to any point in the U. S. Will sell but one wrench to each person. If it does not do all or more than we claim for it we will refund you your money. Don't miss your chance. If you do, you will pay more money later. Send today and don't wait until tomorrow.

Lightning Socket Wrench Company

2 to 24 Depot Street
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CUT OR TEAR ON THIS LINE

Lightning Socket Wrench Co.,
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Enclosed find \$1.00 for which please mail me, postage prepaid, one Lightning Socket Wrench.

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Automobile, Motor Cycle, Motor Boat owners, Mechanics, Machinists and Handy in every home

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Make your work at home a pleasure. Buy a Home Bench that will enable you to do your work as it should be done—one that is convenient and satisfactory.

The Bench shown in cut is 50 in. long, with 20 in. top, exclusive of vises, Michigan Hard Maple, 13 in. glued-up top and 6 in. well for tools. This Bench will last a lifetime and will give satisfaction every minute.

We manufacture a complete line of Benches for Youths, Manual Training, Home and Factory.

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Largest Bench Manufacturers in the World.
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JUST OUT—A 3c. stamp will secure our NEW BIG CATALOG. Positively the most comprehensive of its kind published. 26 pages of EXPERIMENTAL and HIGHER GRADE WIRELESS OUTFITS ALONE.

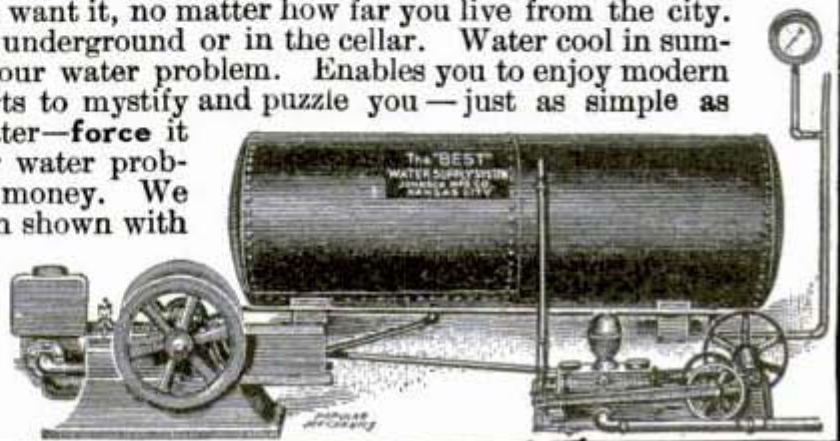
J. J. DUCK, 424-6 St. Clair Street, TOLEDO, O.

THE STOWAWAY.—The Philadelphia Inquirer describes how the U. S. S. "Idaho" left the Philadelphia navy yard on her way to meet the fleet. "Bells were clanging, boat-swain's mates piping, and the powerful propellers of the sea fighter thrashing the water into lather, when came the cry of—no, no, not "Man overboard," but worse still, "Woman on board!" There was immediate consternation among the officers and men. "Find that woman, stand by your guns and hawsers," commanded the navigator, at the same time directing shutting down of engines. The "Idaho" had meanwhile put considerable water between herself and the dock. Way down where hammocks are swung a bluejacket found a fair stowaway, a Baltimore girl. She had lingered for one last embrace, shielded from the eyes of vigilant petty officers. A jealous bluejacket saw the young woman and gave the alarm. Miss Stowaway laughed as though it was the best joke in the world to delay the sailing of 13,000 tons and some hundreds of men.

The JOHNSTON 'Best' Water System

You can have running water where you want it, no matter how far you live from the city. Delivers water under Air Pressure. Tank underground or in the cellar. Water cool in summer. Will not freeze in winter. Solves your water problem. Enables you to enjoy modern convenience in the country. No useless parts to mystify and puzzle you—just as simple as A B C. Save the drudgery of carrying water—**force** it where you want it. Consult us about your water problem; our years of experience may save you money. We have a System as low as \$45.00. The System shown with Tank, Power Pump and 2 H. P. Gasoline Engine for \$139.15.

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First and foremost toward such an end is ignorance of the conditions which produce blindness, ignorance of the care of the eye necessary in the schoolroom and in the home, and ignorance of the eye's delicacy. The neglect is of many kinds, but the most serious is the neglect to prevent infection. At least a fourth of the students in the American schools for the blind were brought to such a state because a simple prophylactic was not used in the eyes of the child soon after birth. Besides this blindness at birth, not a few cases occur from later infections by means of towels, handkerchiefs, bedding or clothing. When anyone in a family is afflicted with sore eyes, the other members should not use the same towels. All clothes and pieces of cotton used should be immediately burned.

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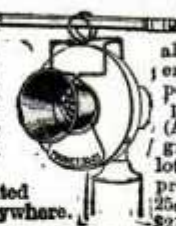


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 Don't loaf along an' chew the rag, nor beef, nor whine, nor roar;
 Spit on yer hands an' hump yourself, an'

Don't Get Sore.

There's times when things don't go just right, an' mighty frequent, too,
 When things are needed, money scarce, an' rent a-comin' due;
 It may be you're not paid enough; your work may be worth more,
 But thank the Lord for what you've got, an'

Don't Get Sore.

No use in kickin' 'cause a man who's not as good as you Has things a-comin' easy an' don't do the work you do;
 The richest man that ever lived once did the humblest chore;

Your chance will come; jest do yer best, an'
 Don't Get Sore.

The world has no kind of use fer him that's always glum;
 The man who's got a grievance is the man all people shun;
 For folk have troubles of their own; your woes just merely bore;

Brace up, keep mum, an' grin, old sport, an'
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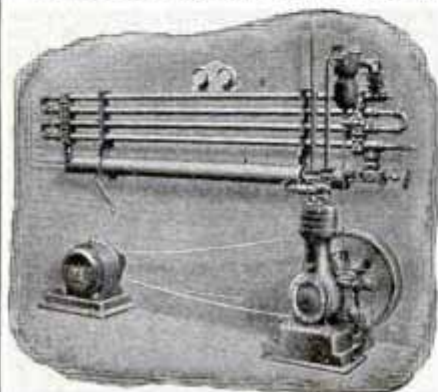
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REBUILDING MESSINA.—Consul C. S. Crowninshield, of Naples, submits the following report relating to a possible opening for American capital and enterprise in Italy:

It is almost certain that the city of Messina will be reconstructed, the sentiment of the people being entirely in favor of such a course. Large sums have been spent on the harbor, which is excellent and too valuable in its situation to abandon. No definite plans have been made by the government as yet, but it is generally understood that rebuilding will begin as soon as the bodies which are still among the fallen masonry have disintegrated sufficiently to allow of removing the rubbish. Work will not begin for several months.

An unusual opportunity for American building methods is here presented. Fireproof and earthquake-proof houses will be demanded by popular feeling, and American constructors can best furnish the desired article. The San Francisco disaster proved the superiority of the steel frame over the stone building. Concrete and wire work may also be in demand, and it should be the aim of those interested in modern construction to be first in the field.

In addition to Messina, Reggio and many smaller cities will probably be rebuilt, and in the aggregate a vast sum of money will be expended for reconstruction.

The American builder will do well to present his plans, estimates, and the advantages of steel structure to the Italian authorities, as well as to the interested companies and individuals, and it is advisable that skilled representatives be employed. In this matter a clever agent will prove of far more value than any number of specifications on paper.

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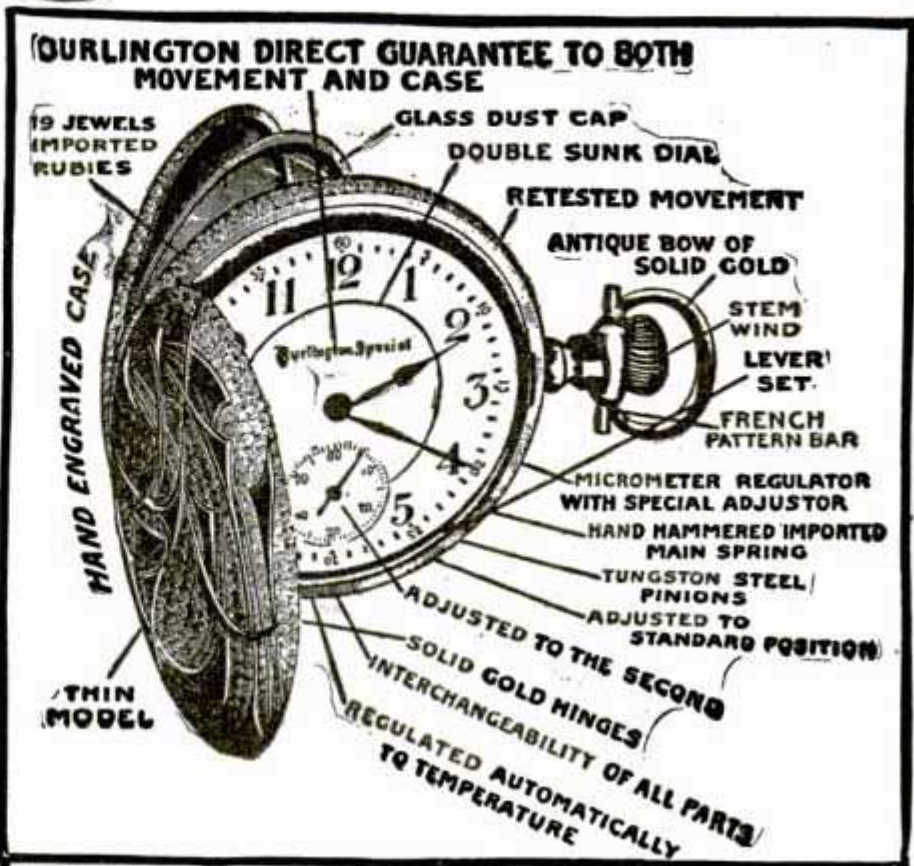
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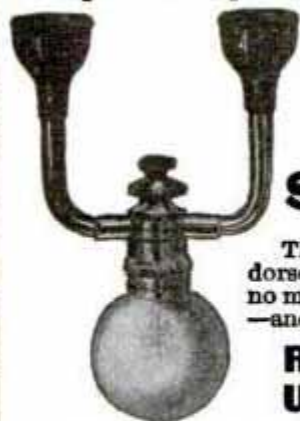
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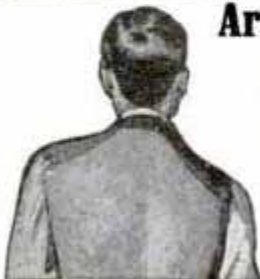
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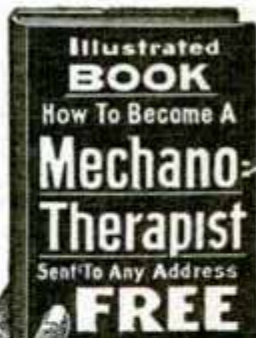
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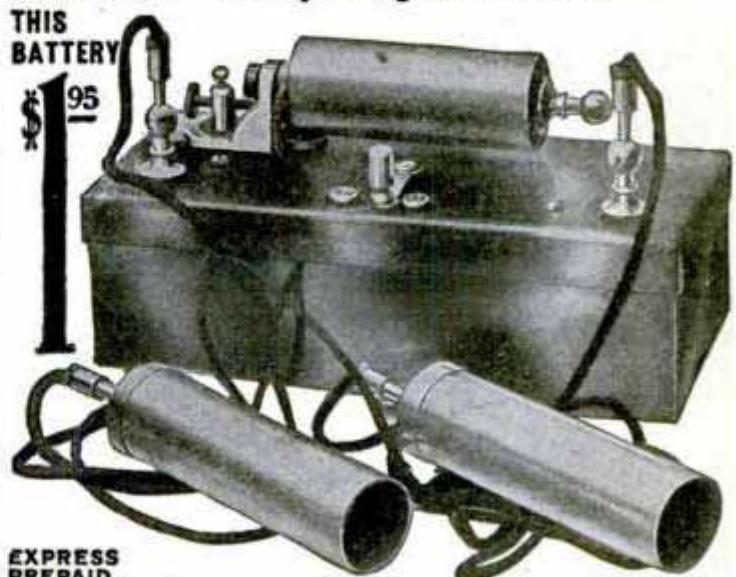
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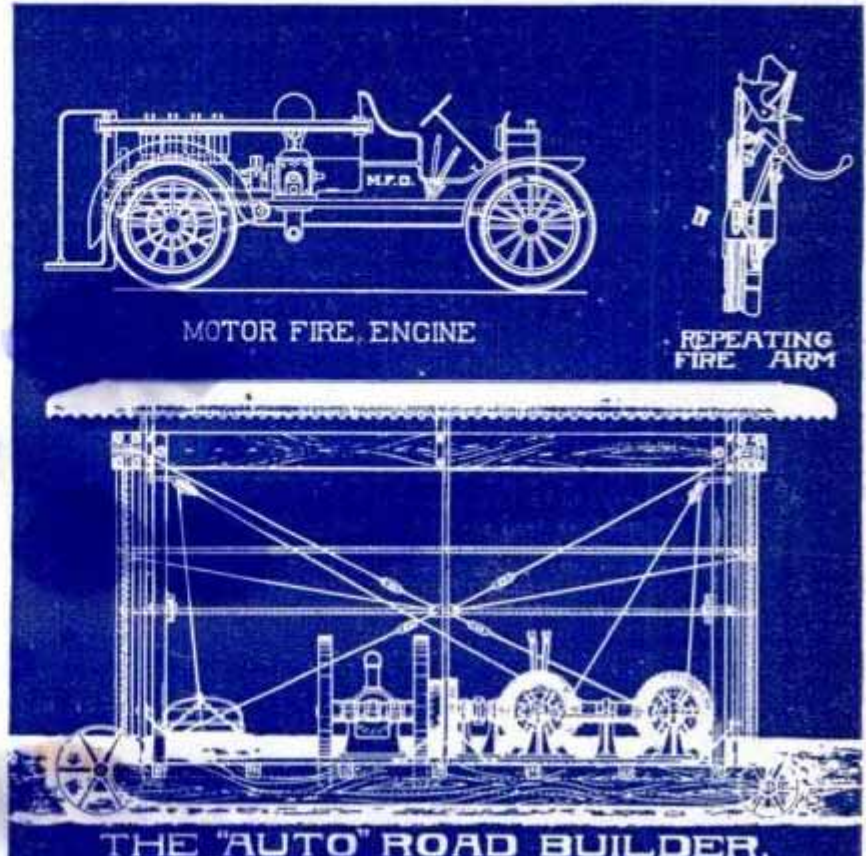
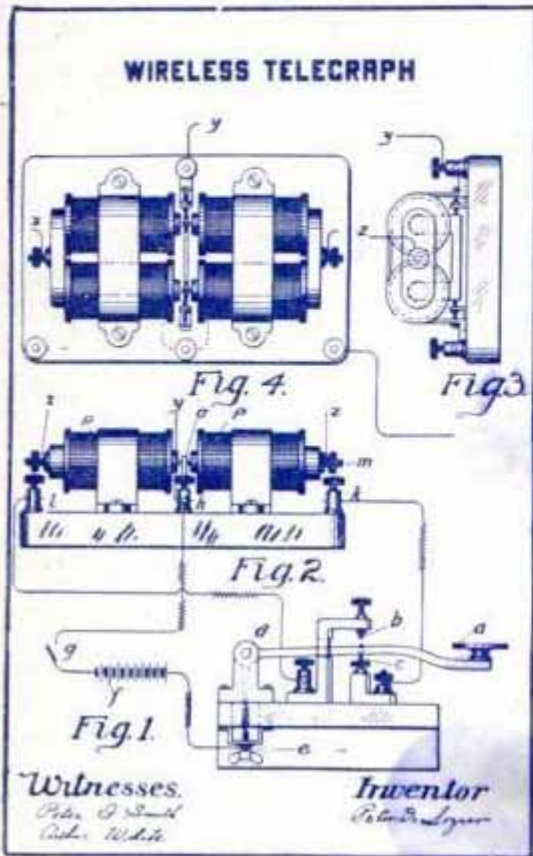
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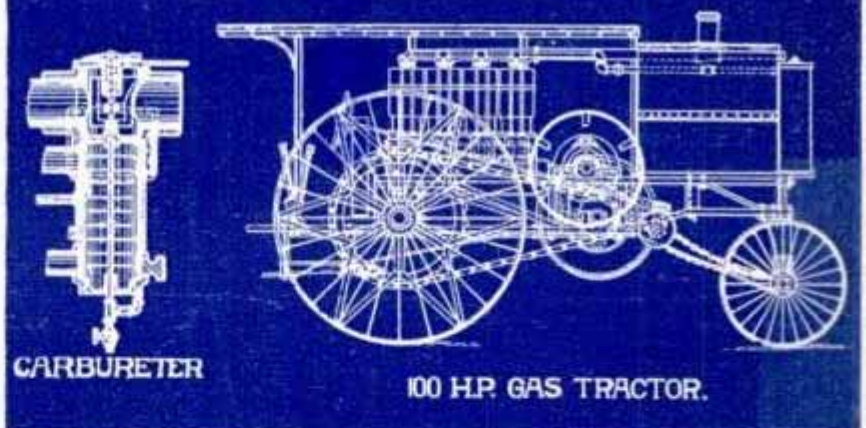
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