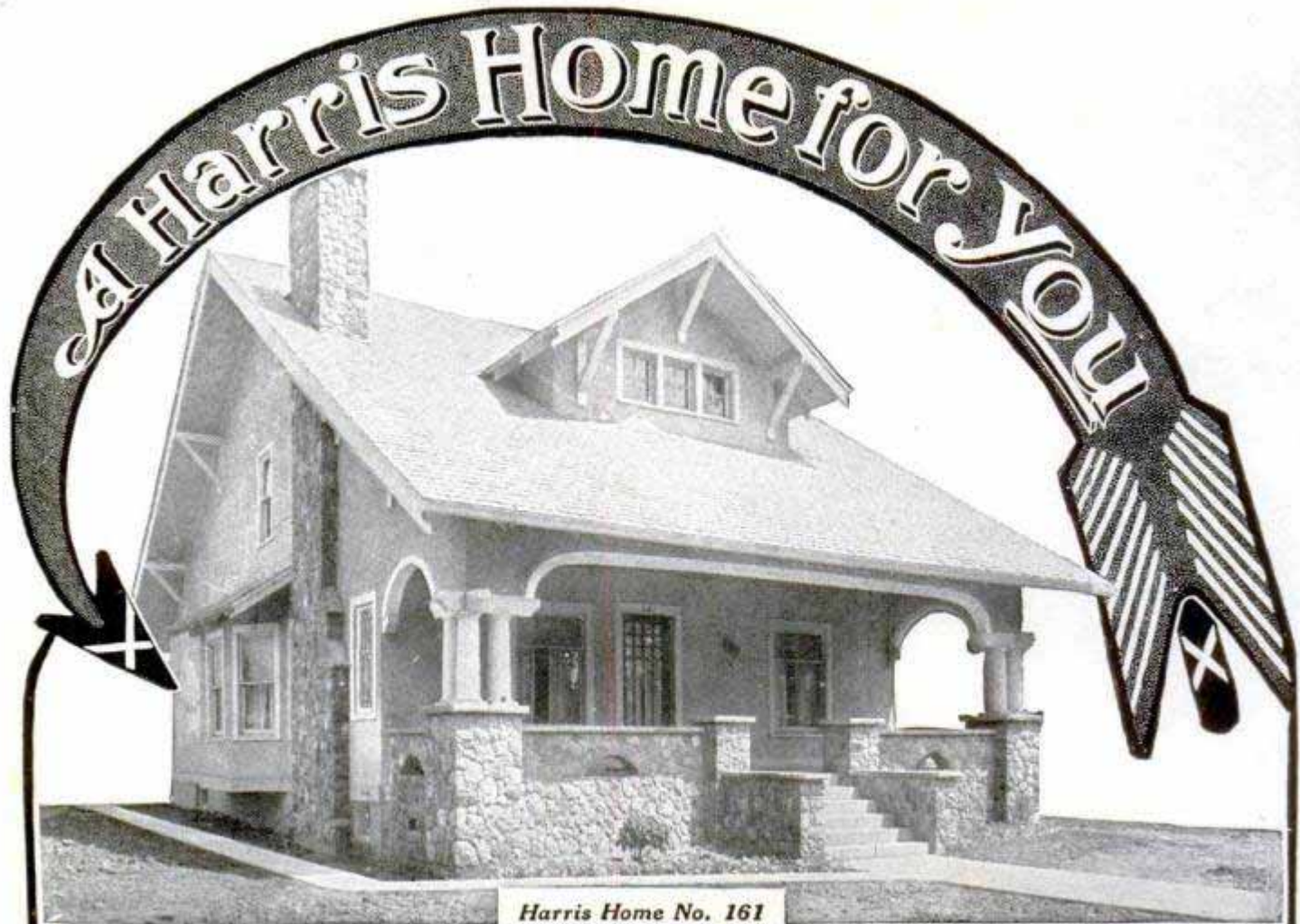


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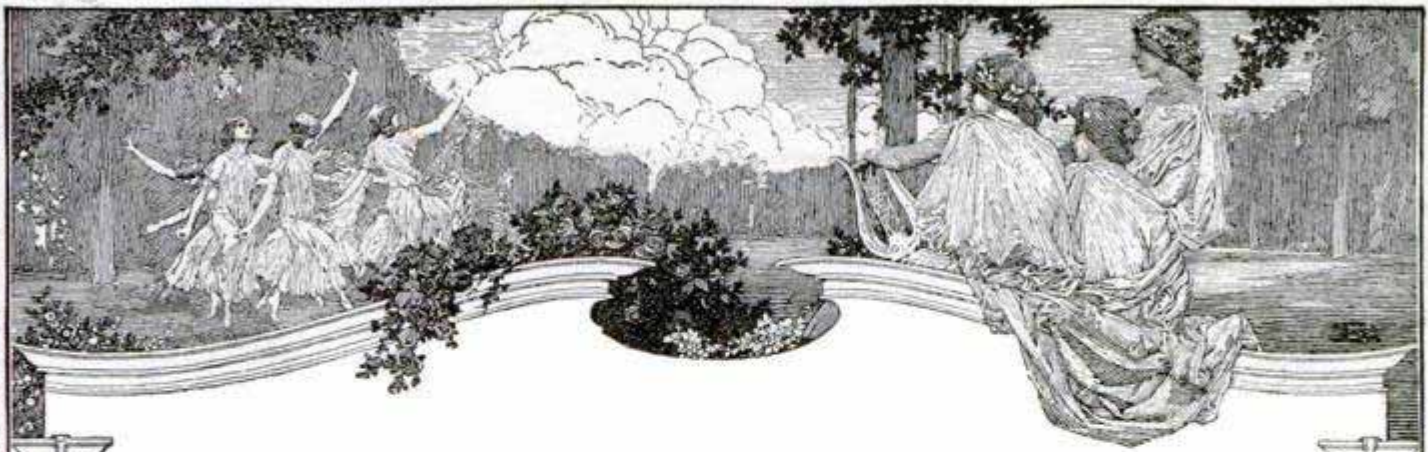
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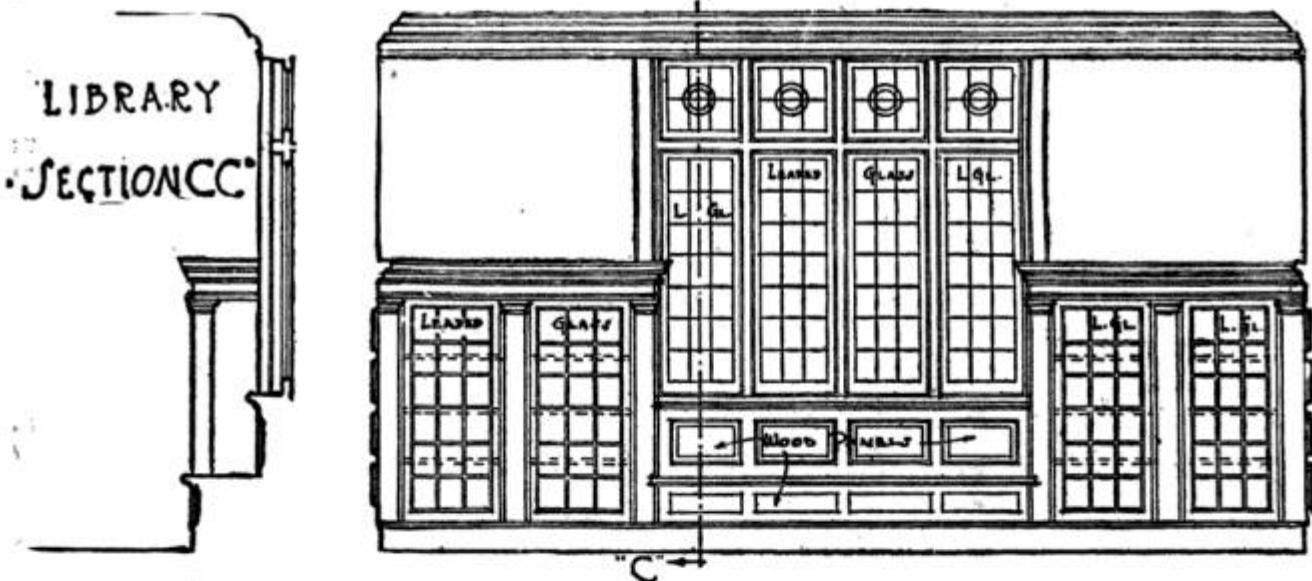
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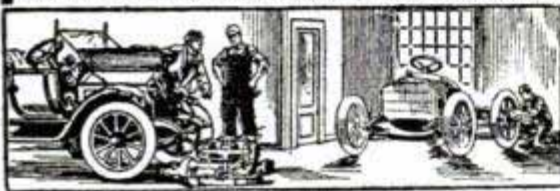
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NOTE—Beware of Imitators—Deal with the Originator

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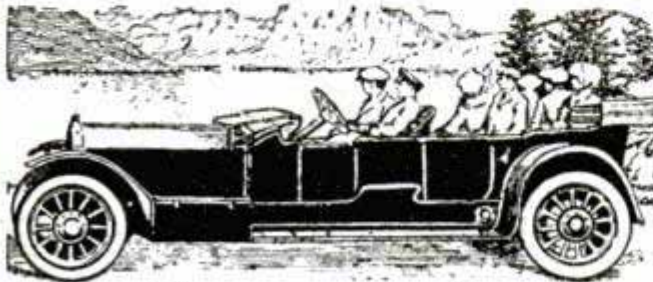
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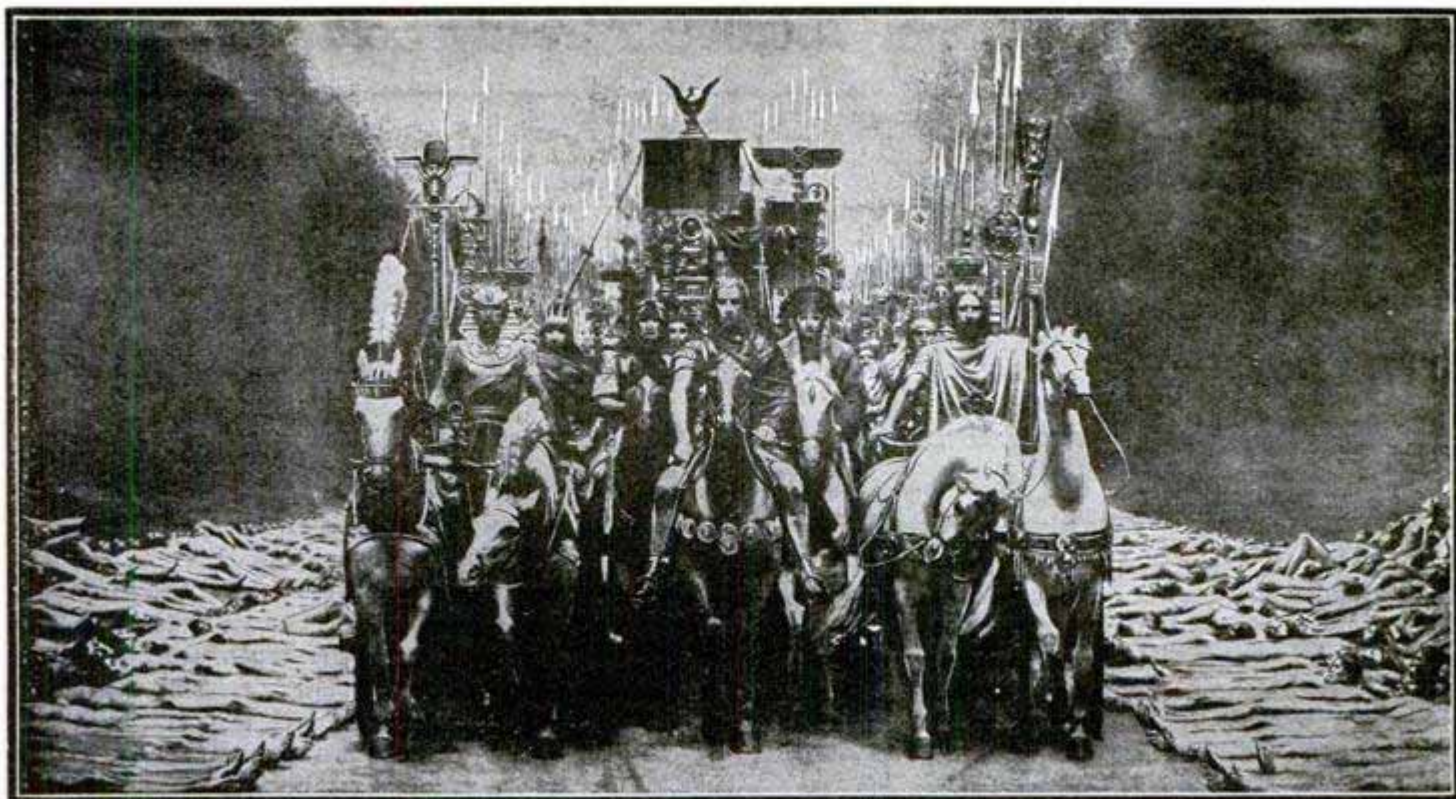
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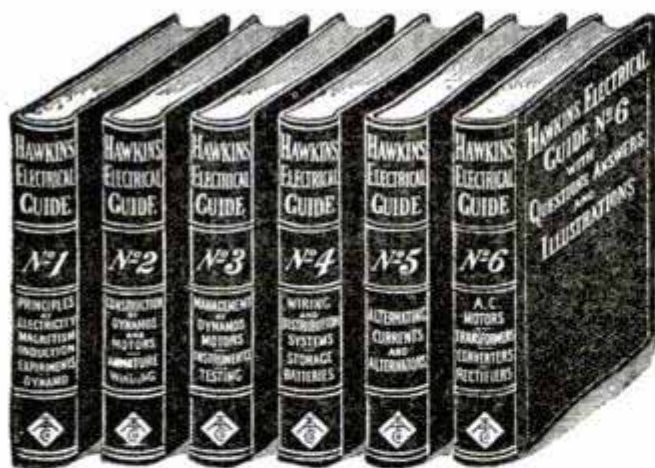
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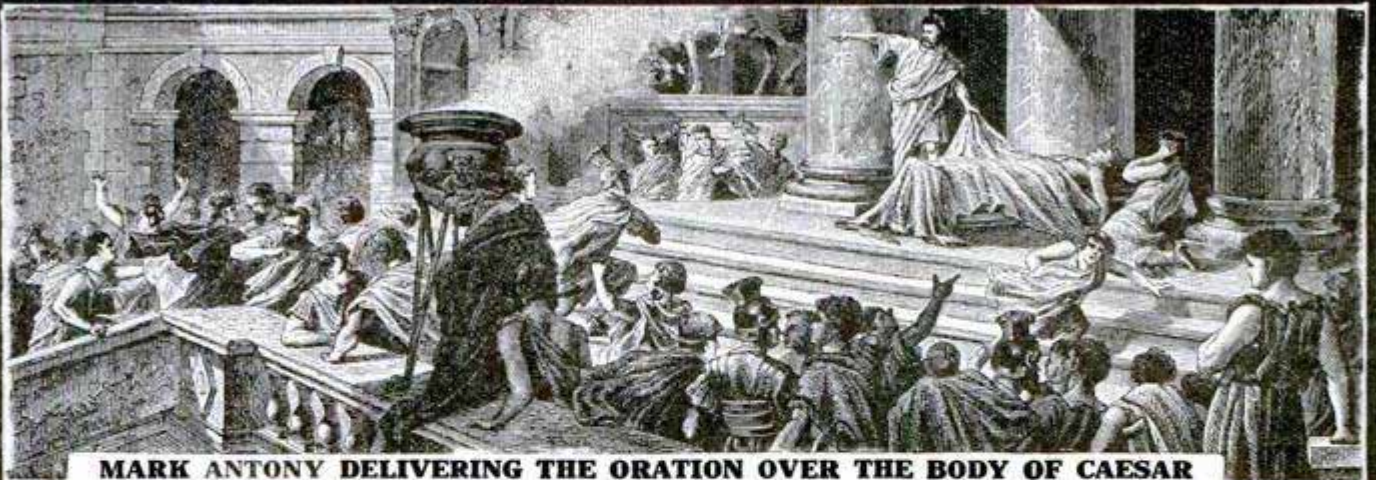
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AN up-to-date and long-established factory with good facilities would be glad to open communication with anyone having machines or appliances which are in demand, and after investigation would take on the manufacturing of one or more meritorious articles. Address G. L., 9th Floor, 78 E. Madison St., Chicago.

RESILVERING mirrors, renewing dry batteries and book filled with formulas and trade secrets, all 25c. Formula Service, 3311-S, Belleplaine Ave., Chicago.

HERE'S your chance! Make \$50 to \$100 a week in my business—honest, clean, easy profit. No canvassing. No mail-order. Your customer comes to you—pays cash. I furnish everything but the elbow grease and grit. Write now. S. Sterling, 556 Broadway, New York City.

RELIABLE Man with Small Capital can start a profitable business selling our guaranteed goods. \$200,000 firm and liberal credit plan backs you. Wm. J. Dick, Mgr., Dept. C-10, 20 West Lake, Chicago.

MR. INVESTOR—Growing Dividends—15% and Up! Up!! Up!!! The dividends from a well-managed fur farm increase year after year. Nature. Our assets, sales and profits increase year after year independent of financial conditions. Here is an opportunity for you to make your money earn more for you—honestly, securely, really. Write for full-free-information today—Now. This is worth looking into. The Canada Fur Farms, Limited, Summerside, Prince Edward Island, Canada.

CAN you handle figures and demonstrate a calculator? Answer. Addiplier, 116M, Alpine Street, San Francisco.

SILVERING Mirrors, Plating Tableware, auto-brass, home. Booklet-plans free. Clarence Sprinkle, East-Grant, Marion, Indiana.

YOU Can Make a Fortune with \$1 capital. Read how in "Success," the greatest book on the Mail Order business. Price 10c. Book Dept. 5, Box 215, Dayton, Ohio.

WOULD You Like to Own a good-paying mail-order business? We have a line that gets repeat orders all the time. You can start in spare time; invest a dollar or two a week and soon own a nice business of your own. Particulars free. Nadico, 1664 Belmont Ave., Chicago, Ill.

FREE to advertisers. Handy book to keep your records. New edition now ready. Advertisers, for results use Classified Section Boyces' Weeklies. Circulation 1,250,000 weekly. Rate 30c per word. Record Book, Dept. A-C, 508 N. Dearborn, Chicago.

GET in the oxyacetylene welding and cutting business. Biggest money-maker on the market. I teach you by mail and furnish you complete outfits on time payments. Write for particulars. J. M. Shevlin, 409 Bird Ave., Buffalo, N. Y.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

ANYBODY can manufacture lead toy soldiers with my casting form outfit. Sample soldier and particulars 15c. Arthur Carlender, South Yarmouth, Mass.

1,000% PROFIT manufacturing inks. Start at home during spare time. Capital and experience unnecessary. Enormous and endless demand. Our secret formulas and sure selling plans insure you a lucrative, steadily increasing business. Investigate immediately. Particulars free. A. Covert, Secretary, 6935-6939 Kenwood Ave., Chicago, Ill.

WE Start You in Business, furnishing everything; men and women, \$30 to \$200 weekly operating our "New System Specialty Candy Factories" home or small room anywhere; no canvassing. Opportunity lifetime; booklet free. W. Ragsdale Co., East Orange, N. J.

MY preparations are coining money. Will sell formulas to parties not living in California. J. O. Mudgett, Peters, Cal.

OWN a business. Co-operate with me evenings at home. Everything furnished. Don't worry about capital. Boyd H. Brown, Dept. K-10, Omaha, Neb.

WORK for yourself, make money operating vending machines; full line, pennies count; small investment, large profits, spare time; outdoor work. Perfection Automatic Machine Co., Easton, Pa.

TIPS to Agents, Beginners—Buying, Selling by mail; formulas; latest novelties. Magazine 10c copy. 4 months, 25c. Big value. Order—"Lever" Mail Trader, 44 Elizabeth, N. J.

CIRCULAR Mailing, pleasant, profitable, spare-time employment. Instructions 10c. Geo. C. Fenner, Louisville, Ky.

LET the parcels post help you. Add (\$15 to \$25 weekly) to your present salary or income. Start during spare time and build up a permanent mail-order business of your own. We show you how and help you make good. No canvassing. Experience unnecessary. The Parcels Post makes success doubly sure. Our new ideas and up-to-date plans bring the money. No so-called "Course of Instruction" to sell. We give that free. Write today. Address Pease Mfg. Co., Inc., Dept. A, 70 Broadway, Buffalo, N. Y.

BUILD a Paying Business of your own: I have the line you have been waiting for; particulars free. H. B. Lane, Box 201-P, Lakewood, N. J.

WRITE Moving Picture Plays. \$50 each. All or spare time. Correspondence course unnecessary. Details free. Atlas Publishing Co., 3046, Cincinnati, Ohio.

MAIL Order Men—Don't go a step further without receiving my proposition. Only one of its kind—protects from failure—helps to success. P. Harry Foster, Rock Hill, South Carolina.

CONDUCT a "Candy Kitchen." Clear \$5 to \$25 daily. Small capital required. Particulars free. The Kennon School, 148 W. Ontario St., Dept. A, Chicago.

HOW to Operate a Mail Order Business. 30 Big Profit Plans and year's Mailing service sent for 10c. Mail Dealers Wholesale House, 521 Franklin Bldg., Chicago.

RAISE Ginseng—\$1 per sq. ft., 1/2 A. \$15,000. Grows anywhere. Write Ginseng Gardens, Sheboygan, Wis.

I MADE \$50,000 in five years with a small mail order business; began with \$5. Send for free booklet. Tells how. Heacock, Lockport, N. Y.

LEARN to collect money. Good income; quick results. Send for free booklet, "Skillful Collecting." Collectors' Association, Long street, Newark, Ohio.

IF you want facts instead of fancies about Patents, address Benjamin & Bassett, 140 S. Dearborn St., Chicago, Ill.

PATENTABLE Ideas Wanted—Send for 3 free books. R. B. Owen, 30 Owen Bldg., Wash., D. C.

EVERY Advertiser Needs our New Advertising Rate Book. Lists 2,000 best advertising mediums in America. Gives circulation and rates. Contains special lists and advertising snaps, including "Ads That Pay," sent prepaid for 10c. Dearborn Advertising Agency, 521 Dearborn St., Chicago.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order business. I furnish Formulas, Manufacturing Processes and Trade Secrets in all lines. Sold under positive guarantee; 18 years' practical experience. Revision and improvement of Formulas and Processes—reduction of manufacturing cost—utilization of waste materials, etc., a specialty. Booklet, Formula List, and Valuable Information Free. W. L. Cummings, Ph. D., 127 Standard St., Syracuse, N. Y.

MAKE Big Money opening Safes and Setting Combinations. Wayne Strong, Box 1430, Los Angeles, Cal.

INVESTMENTS

6% 1ST Mortgage Bonds, \$100, \$500 and \$1,000 each, maturing 1 to 5 years. Secured by first mortgage on strictly high-grade Chicago Apartments and land in choice locations, having dependable net income of 3 to 4 times total interest. Security, 2 for 1. Legal investment for banks. Meet every requirement of the ultraconservative investor. Chicago Title & Trust Co. guarantees titles, acts as trustee and certifies each bond. Interest promptly paid twice a year. Our book of information sent free on request. Ask for No. 50B, W. N. Macqueen & Co., Mortgage & Bond Bankers, 10 S. LaSalle St., Chicago.

PAN-AMERICAN INVESTMENTS, A. B. C. REPUBLICS, SOUTH AMERICAN

CAPITALISTS desiring to investigate with the view to investing in Coal, Iron, Petroleum, Nitrate or Borax deposits, etc.; Mining Properties (Copper, Tin, Silver, Gold, etc.); Real Estate (large land tracts, Government or private, all forest, grazing or agricultural), located in the "ABC" and adjoining South American Republics, are invited to write for information, enclosing 20c in stamps, to T. Dennis Lockling (Pan-American Real Estate Dealer), P. O. Box 1801, Santiago, Chile.

MINING

TALC Deposit—For sale, valuable talc deposit in Georgia. Several thousand tons in sight and indications point to a very large quantity. Crops out in very wide vein, easily workable. For further information address N. L. Jackson, Belvidere, Illinois.

TO INDUSTRIAL ENTERPRISES, MANUFACTURERS, ETC.

GOVERNMENTAL and Municipal Franchises solicited in the "ABC" and adjoining South American Republics, water powers, etc.; bids presented for execution of public works, supplying materials, etc.; legal and commercial representation of manufacturers; reports on establishment of industrial enterprises. Ample and satisfactory references offered. Address, T. Dennis Lockling (Pan-American Industrial Representative), P. O. Box 1801, Santiago, Chile.

TO MANUFACTURERS

EXPERIENCED Sales Manager wants eastern agency or other proposition entertained. Joseph Faatz, 383 Lafayette St., Newark, N. J.

MAIL ORDER SUPPLIES

INCREASE your sales. Place your proposition before the readers of "Cartoons Magazine," 30,000 copies guaranteed every month. Classified rate 2c per word. Mail in a trial ad today. Cartoons Classified Dept., 6 N. Michigan Ave., Chicago.

FOR ADVERTISERS

5c PER Word Places Ads in 200 Monthlies. Lists Free. W. C. Stanford, Canonsburg, Pa.

CUTS for Advertising, 4 for \$1. Size 2x2—your business. U. S. E. Co., New York.

YOUR 25-word advertisement in 16-page, 7x10 magazine reaching 10,000 boys. 25c. Additional words 1c each. Youths' Magazine, Chicago.

ADVERTISERS—Here's your opportunity. Your proposition placed before the readers of "Cartoons Magazine" for only 2c per word. Circulation 30,000 copies guaranteed. Send a trial ad for our next issue. Cartoons Classified Dept., 6 N. Michigan Ave., Chicago.

25 WORD advertisement in 100 magazines \$1. Special newspaper rates. 2c brings list. Gem Advertising Agency, 315-62 Appel Bldg., Denver, Colo.

ORIGINAL, virile letters that land orders. Written in a convincing, impellent style. H. Martin, Advertising Counselor, One Gramercy Park, New York.

YOUR 30-word ad in our big postcard magazine, 25c. Display, 50c inch. Elite Exchange, 3827 North Kenneth, Chicago.

ADVERTISERS—Special—5c per word places your ads in 133 different magazines. Regular price, 7c. Lists free. Kings Magazine, Box 13-P, Little Silver, N. J.

ADVERTISE in Barkley's Magazine. 1c word. Barkley's Magazine, Blairsville, Pa.

START an original mail-order business. Honest, independent. Small Capital. New Methods. Sole Rights. Big Money. R. Clement Moore, Business Specialist, New Egypt, N. J.

ADVERTISERS Special Offer! Your 40 word ad in Boys' Companion, reaching 16,000 live buying boys, 50 cents. Boys' Companion, Chicago.

ADVERTISING SERVICE

BOOKLETS, Folders, Advertisements, Letters, by an expert. Reasonable. Send us your troubles. Advertisers' Service, 1809 Lincoln Street, Evanston, Illinois.

AGENTS WANTED

AGENTS Wanted—Right here is the one big chance of your life. If you want to make good money—\$10 a day or more, as easy as rolling off a log, and get your swell clothes free besides, you can do it by acting as our agent. We are the biggest people in the business and want our agents to make big money and be nifty, stylish dressers. Send a postal today for free \$10 outfit, including a big book of nobby suiting samples to select your swell agent's suit from. Then take orders from people who admire your nifty clothes. They come to you—not you to them. This is the way to get rich—the sure, easy way. Remember, you need no money—everything is furnished by us free. We pay express on everything. Just send a postal, but do it today. You can't get started too quick, making this big money and wearing these stylish clothes. Address card to Paragon Tailoring Co., Dept. 1114, Chicago, Ill.

AGENTS! Double your income! Treble your sales. The Agents and Mail Dealer's Magazine shows how to buy Right, \$2 articles cost you 30c; Quarter articles, 2c. Fifteen other rare bargains. It puts you next to original manufacturing plans, mail-order schemes with enormous profits, etc. Two big money-making issues for 10c. Agents' Magazine, 100 Franklin Building, Chicago.

TAILORING Agents Wanted—To handle our Special value Big 4 Line for Spring 1915. Four prices only. Suits to measure at \$15, \$20, \$25, and \$30. Large assortment to sell at \$15. All exceptional values. Satisfaction guaranteed. State experience and references with application. Nelson Tailoring Company, 241-245 West Van Buren Street, Chicago.

AGENTS are coining money selling our big 10c Packages of 20 Assorted Postal Cards. "5,000 Varieties." "Big Profits." Sell everywhere at Sight. Sample Package 10c. Particulars Free. Sullivan Card Co., 1234 Van Buren St., Chicago, Ill.

200% PROFIT. You can't beat it. Sells everywhere. Free pocket sample. Our goods get the orders. Wm. J. Dick, Mgr., Dept. P-4, 20 W. Lake St., Chicago.

BIG Textile Mills will employ everywhere reliable people to take orders for dresses, fabrics, hosiery, underwear, sweaters, and neckwear from samples. Factory prices. Many making over \$30 weekly. Spare or all time. No experience. Permanent. Credit given. Steadfast Mills, 30 Remsen St., Cohoes, New York.

NEW 1914 Model—Send no money. Just your name written plainly on a postal card and learn by return mail how to get the best Vacuum Cleaner on the market, without costing you one cent! We are putting them out for demonstrating purposes. Guaranteed 5 years. Reliable, live agents wanted everywhere. Write today to Warner Vacuum Cleaner Company, Dept. Z, Muncie, Ind.

\$61.50 WEEKLY. Introducing and Selling a New Gas Light Burner for Kerosene Lamps. Beautiful light. No chimney. No mantle. Perfectly safe. Simple in construction. Nothing to get broken or out of order. Will not burn out. Durable. Will last for years. Low price. Easy to sell. 200 per cent profit. Experience not necessary. Samples free. Why not try one on your lamp? Beware of imitations. No branch offices. Luther Manufacturing Co., Dept. 355, Cincinnati, Ohio.

I NEED Branch Managers for my world-wide mail-order business; operate from your own homes in spare time; no canvassing or peddling; big capital and experience not needed; you should make \$50 weekly. Wouldn't you like to have people everywhere sending you money by mail? If so, write me. C. A. Butler, Mgr., 134 Factories, Toledo, Ohio.

VISIT Panama Exposition Free. Earn big profits; obtain handsome premiums, selling our unexcelled household articles. Most attractive proposition ever offered. Marvella Co., Binghamton, New York.

AGENTS: A free course in General Salesmanship is given to every man of our Sales Organization. This organization is a body of successful men selling the Handy Light; that unique electrical device which cuts the cost of electric lighting in half. Sells for \$3.50, is used in home, office, store, factory; weighs only one pound. Sold by demonstration. All agents furnished with well planned methods for gaining interviews. A high-grade business for a man of ability and standing in his community. General Agents preferred. Inquire for our full proposition by addressing The Handy Light Co., 1108 Handy Light Block, Cincinnati, Ohio.

STOP—Agents, Salesmen, Managers—Just out, brand new invention. Low priced—selling like wildfire—big profits. Deflector for Auto headlights—best "no-glare" ever made—puts the light on the road instead of other people's eyes—not a dimmer—makes stronger light. Endorsed everywhere. Get busy today. Sales guaranteed—success is sure. Write for details. Hickmyer Deflector Co., 410 Nasby Bldg., Toledo, Ohio.

AGENTS—Arnold's Fuel Savers—a new article—proven merit—easily attached. Popular selling price \$1.50. Saves 1-3 fuel and eliminates fire danger. Ready sale in every home, church, school and business house. Territory open now, but going fast. Big profit. Agents enthusiastic. Particulars upon request. Act quick. Hardware Specialty Mfg. Co., 4417 Ravenswood Ave., Chicago, Ill.

AGENTS—Man or Woman, to sell labor-saving kitchen specialty recently invented. Whirlwind seller; costs 10c, sells for 25c. Send 10c stamps or coin for sample and territory. S. B. Co., 3237 S. Wabash Ave., Chicago.

WE manufacture highest grade sanitary wire frame brushes and cleaning specialties. New styles, quick repeats. Largest profits. Your territory is valuable. Write today. Kleenol Company, 71 Taylor St., Springfield, Mass.

AGENTS—Average \$5 to \$12 daily selling astonishing Aztec massage machine. New. Just patented. Different. No electricity or water power required. Nothing complicated. Affords exhilarating massage without cent expense. Lowest priced, but best outfit. Retail \$2.50 allowing you big end of profit. Particulars and "beauty" folder free. Aztec Remedy Co., Dept. 132, Toledo, Ohio.

LIVE Agents. Our new Carpet Cleaning Machine, biggest improvement yet made in vacuum or suction cleaners. New type just out. No bell-ws. No electricity. Unequaled for speed and power. Low price. Exclusive territory. Feeny Mfg. Co., Dept. H-65, Muncie, Ind.

PHOTO Pillow Tops, Portraits, Frames, Sheet Pictures, Photo China Plates. Rejects credited. Prompt shipments; samples and Cat. free to agents. 30 Days' credit. Jas. C. Bailey Co., Desk O-5, Chicago, Ill.

UNUSUAL opportunity for live salesman. Manufacturer wants exclusive agents in each county to sell Automobile Rugs which appeal to individual car owners and garages. Sells for \$5. Sample postpaid \$3.50. Money refunded if not as represented. Write now. White & Co., 1215 Filbert St., Philadelphia, Pa.

AGENTS: Great Opportunity. Be permanent representative largest mfrs. High Grade Soaps and Toilet Goods. \$25-\$75 weekly. Experience unnecessary. Business good year round. Best ever till Xmas. Write for immediate appointment. E. M. Dav's, Pres., R64, Davis Block, Chicago.

WANTED—Agents all over the country, acquainted with the automobile trade, to sell automobile specialties from factory direct to automobile owners. M. Stier, P. O. Box 437, Syracuse, N. Y.

AGENTS—Sell Fibersilk Neckwear and Specialties. Made by new process on patented machines in many rich, beautiful colors. Brilliant silky luster—washable. Sell quickly at 35 and 50 cents each—can sell for 25 cents; and still net you 100% profit. Exceptional proposition for spare time and agents. Send 15 cents for sample tie (guaranteed). Fisher Knitting Co., 40 Whitesboro St., Utica, N. Y.

IMMENSE Profits—Vacuum washer; costs agents \$5 dozen; retails \$1.25 each; sample 75 cents. Box 37, Powhatan Point, Ohio.

ONE dollar starts you in business. Household article does one hour's work in one minute. 200 per cent to representatives. Send 25 cents for sample. One Minute Co., Rowland Building, Detroit, Mich.

100% PROFIT selling our High Grade Goods. Samples Free. Gordon Co., Northwestern Bldg., Chicago.

AGENTS—It costs us \$2 to secure your name and ship sample machine—a dead sure way of convincing you we've best household invention on earth. Quaker Valley Co., 31 Mill St., Aurora, Illinois.

IDEAL Lamp Filler saves bother filling Lamps. Men and women canvassers and agents. Good opportunity to make money. Samples A & B 25c. Harry Otis Mayo, Box A2298, Boston, Mass.

MAKE \$100 a month and be independent. Start a Wall Paper Cleaning Business. A new profession. Practically all profit, \$8.00 a day easy. My booklet shows you how. Write today. Milliken Co., Davenport, Ia.

YOU can make big profits selling our Order Getting Line of Guaranteed Goods. 200,000 firm and Liberal Credit Plan backs you. Valuable Premiums for you and for your customers. Wm. J. Dick, Mgr., Dept. P-31, 20 W. Lake St., Chicago.

AGENTS—300% profit—Rug and Carpet Renovator. \$1.00 can clean 4 rugs; sample 10c; every home, hotel and rooming house buys it. Oriental Chemical Co., 704 W. 12th St., Chicago.

AGENTS—Get our Big Three selling combination. Hundreds reorders. Exclusive territory. Sample free. A. Lederer, 726 West 19th Place, Chicago, Ill.

TODD Check Protectographs, the late model II; you can make big money selling these Protectographs to banks and corporations. Sample \$15.00; agents wanted everywhere at once. Ye Curiosity Shop, 20 S. Second St., Philadelphia, Pa.

AGENTS—You can sell our tailor-made raincoats. You need no money. Outfit free. Temple Raincoat Co., Box 170, Templeton, Mass.

"IT finds your key in the dark." The Key Pilot. Newest lighting seller for agents. Sample 10c. Rollins & Co., Tremont Row, Boston.

MR. Mail-Order Man: Get quick returns. Established corporation supplies fast Mail-Order sellers; factory prices. Classy proposition. Beginners or established firms. Copyrighted Prospectus free. Mississippi Valley Co., Inc., Box N629, Pittsburg, Kans.

GENERAL Agents—Capable of calling on the big trade themselves and handling canvassers for the house to house and office to office business, to sell the newest electric specialty on the market; sold everywhere there is electricity, in the home, office, factory, store, hotel; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; shows how to use one light instead of two and get the same results; sells for \$2.50, \$3.50, \$5.00 and saves the purchaser an investment of \$25.00. Write for particulars. The Handy Light Co., 160 Handy Light Block, Cincinnati, Ohio.

AGENTS—\$50.00 weekly. Exclusive line. Protected territory. Rodolph, Manufacturer, 304M, Northwestern Building, Chicago.

PERFECTION Ford Starters for Ford Cars. Guaranteed to start any Ford Car that is in running condition. Splendid proposition and inducement for state and county agents. The Perfection Auto Starter Co., 1561M Broadway, Denver, Colorado.

WE pay salary and commission to men qualified to sell automobiles to merchants as a premium proposition. Write for details. W. H. McIntyre Co., Dept. K, Auburn, Ind.

AGENTS, if invested in postal will bring you \$35 to \$60 week proposition. No experience required. Outfit free to workers. Bolte & Weyer, Dept. P. M., 125 So. Racine Ave., Chicago.

1,000% PROFIT. Metallic Sign Letters. Co-operative business proposition free. Johnston Co., Quincy, Ill.

\$10.00 PROFIT a day, selling new device for cleaning silver without rubbing. Sells for \$1 to \$5. Gould Sales Co., Dept. 211, Richmond Hill, N. Y.

MAIL Order Novelty, new, catchy, instructive. Wonderful seller. Sample 10c. Columbia Co., 115 North Ave., Chicago.

AGENTS to sell beautiful lithographic and off-set art reproductions to doctors, banks, and residences. Sample 25 cents. M. F., 1809 Lincoln St., Evanston, Illinois.

WANTED—Agent to act as manager in each county. \$150 month easily made. No canvassing. Success guaranteed. Big, expensive samples. Instructions, plans and starter, all 10c postage. Manager (Dept. 48). Myers & Co., Cambridge, Ohio.

NEW Automatic \$2 Adding Machine. Sell 10 a day easy. Big profit. Everyone buys. No competition. Repeat orders. K. Bassett, 5921 Indiana Ave., Chicago.

AGENTS Wanted—If you know a chance when you see it you'll see this one now. Big money—stylish, nifty clothes—little work—no experience or capital needed—can you beat that? We want agents everywhere to take care of our business in their localities and to advertise our nobby, nifty suits by wearing them. We furnish everything complete and charge nothing for agents' outfit. The swellest dressers everywhere are our agents and all we ask is that you tell people who inquire about your fine clothes where and how they can get them. You make big money—\$10 a day—without trouble. Just a postal brings you full outfit free. Big, new sample book of up-to-the-minute suitings sent so you can pick out your first suit; also measuring blanks and everything you need. We pay express on everything—not a penny for you to pay. Send quick before some one else gets the agency there—mail postal today to the American Woolen Mills Co., Dept. 1114, Chicago, Ill.

AGENTS to take orders for Visiting and Business Cards; large profits, outfit free. Forman Printery, Waterbury, Conn.

BIG Profits for High Class Agents—Man or Woman. Patented Specialty, selling to best homes, barber shops, hotels, hospitals, etc. Splendid Holiday Line. Excellent proposition to general agents. S. B. Co., 2327 S. Wabash Ave., Chicago, Ill.

AGENTS—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results sells for \$3.50 and saves the purchaser an investment of \$25; write for particulars. The Handy Light Co., 112 Handy Light Block, Cincinnati, Ohio.

AGENTS—\$10 daily, selling greatest specialty for Autos and Motorcycles, in world. Write today. Particulars free. M. W. Smith, Box 42, Camden, N. J.

400% PROFIT selling our repeat order goods. Samples free. Bencoma Co., 7938 Bennett Ave., Chicago.

LIVE Agents Wanted. Sample 12c; fast sellers. Richard Devine, 1145 Wells St., Chicago.

AGENTS—\$10 daily and more can be earned by everybody undertaking an easy agency as an extra; expert knowledge unnecessary. Write to Mr. Moritz, 696 Prinsengracht, Amsterdam, Netherlands. (Postage 5c).

THE Pencil Sharpener That Sharpens. Just patented. Carried on the pencil. Nickel and steel construction. Last for years. Agents wanted. Samples 15c, 2 for 25c. Practical Pencil Pointer Co., 218 Central Bank Bldg., Denver, Colo.

SELL Safety Razors; good profits. Gold plated sample 75 cents cash. C. Beyen, Roselle, N. J.

THE best paying agency proposition in the United States. Exclusive territory guaranteed. Experience unnecessary. Big money easily earned. We show you how. United Cutlery Company, Canton, Ohio.

AGENTS: Convex Portraits, Pillow Tops and Frames. Lowest prices. Liberal terms. Write for free catalog. Brewer Art Co., Shelbyville, Ind.

If you live in a small town and have a little spare time, get our offer. Easy to make \$100 profit each season; still easier to get your own clothes out of the profit on a few orders. Write for free samples and our new offer. Banner Tailoring Co., Dept. 879, Chicago.

AGENTS: Men, women, new quick-selling office specialties. Big profits. Exclusive territory. Pershing Mfg. Co., South Bend, Indiana.

RAILWAY Mail Clerks—City mail carriers get \$65 to \$150 month. Thousands appointments coming. Examinations frequently. Specimen questions free. Write Franklin Institute, Dept. L22, Rochester, N. Y.

AGENTS: Earn \$1 or more an hour. All or spare time. "Try-it-before-you-buy-it" plan sells Climax Automatic Razor Sharpener to every man—150% profit. Write for exclusive territory and guaranteed sales proposition. Victor Specialty Co., 15 Victor Bldg., Canton, Ohio.

AGENTS—Something new—fastest sellers and quickest repeaters on earth. Permanent, profitable business. Good for \$50 to \$75 a week. Address, American Products Co., 560 Third St., Cincinnati, Ohio.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

I NEED one energetic, dependable, representative in every county to take orders for our new Popular Mechanics book for boys called "The Boy Mechanic." This is not a story book, but a wonderful and interesting collection of 700 things boys love to make and experiment with. A very large attractive book for the price, \$1.50. Every boy's father or mother will want to buy it for their son. It sells itself. Good liberal commission and exclusive territory. You don't have to be a professional agent to be successful with this highly meritorious proposition. Work in and around your home town during spare time only if you cannot devote all your time to it. Write today for full particulars to Manager Book Dept., Popular Mechanics Co., 6 N. Michigan Ave., Chicago.

FIRST dozen free to agents, men, women, demonstrate 25c household article. Quick seller, exclusive territory, constant repeater. P. M. King, Coudersport, Pa.

IT will pay you to write me before taking an agency for guaranteed aluminum utensils. Wm. J. Dick, Mgr., Dept. C-12, 20 W. Lake, Chicago.

MAKE and sell your own goods. Manufacturing processes and formulas by expert chemists. Labels legally written. Formula catalog free. B. Mystic Co., Washington, D. C.

SELL my machine. Doubles quantity of butter; quick sales; big commission. L. A. Brown Co., Clay Center, Neb.

AGENTS Wanted—Agents make 500 per cent profit selling "Novelty Sign Cards." Merchants buy 10 to 100 on sight. 800 varieties. Catalogue free. Sullivan Co., 1234 Van Buren St., Chicago, Ill.

AGENTS—I have an article which sells in every home. Sample and particulars, 10c. H. B. Essex, Box 476, Baltimore, Md.

445% PROFIT with an easy seller of real merit. Particulars free. Inviso Tie Form Co., 800, 20 E. Jackson Blvd., Chicago.

AGENTS: Write for new portrait catalog; also prices on best holiday seller, our Luminous Crucifix. Pioneer Portrait Co., 1259 W. 63rd St., Chicago.

NEWEST doorplate; no polishing required; clear and bright; a beauty worker; free sample. Gross, 2463 Washington St., Boston.

OFFICE Specialty. Big seller. Good profit. Sample prepaid, 85c. Write for territory. Lycin Specialty Co., Rockford, Ill.

SIX Big Manufacturing Opportunities are open. A few dollars start you at home in spare time. Big profits. Complete instructions 10 cents. Arnold, Box 303, Columbus, Indiana.

SOAP Salesmen—Restaurants, hotels, buildings, stores, homes. New scientific Soap for dishes, floors, hands, glassware, clothes. Big commission. Write for proposition. Klenzo Soap Co., 57 E. 43rd St., Chicago, Ill.

AGENTS—Get particulars of one of the best paying propositions ever out. The New Portable Oil Gas Stove for Heating, Cooking and Baking. Sells like wildfire. Light in weight—practical. \$25 to \$50 per week. A postal will bring our Money-Making Proposition. The World Mfg. Co., 6092 World Bldg., Cincinnati, Ohio.

AGENTS—Graham's Self-Gartered Socks. Patented. Price no higher. Guaranteed never creep down. Fine gauge, wear forever quality. Big sellers. Send 25c for samples. State size. Graham Company, 536-P, Forest Ave., Oak Park, Ill.

LET me start you Manufacturing and Selling Extracts. H. Lake Co., Adair, Ill.

AGENTS to sell Vestal's Famous Roach Powder. Exclusive territory. Ten years on the market has proved it to be the best and most positive exterminator of roaches, ants, waterbugs. Large commission. Get our proposition. Vestal Bros. Mfg. Co., 38 N. Delaware, Indianapolis, Ind.

PORTRAIT Agents: Deal direct with a good reliable artist and get your work at first hand. Guaranteed work. D. Jensen, 222 N. State St., Chicago.

MAGIC Ink Eraser. No blade, no acid. Removes blot, letter or line like magic. 10c, sells 25c to 35c. Offices buy 1 to 12. Any man that can't sell hundreds couldn't sell bread in a famine. Sample by mail 10c. S. Mfg. Co., Warren St., N. Y., Dept. 6.

EASY pleasant work for Mechanics, Shop Men, Clerks, during spare hours, will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

HOME Work. Collect names, information, etc., for business concerns. Some clear \$100 monthly. Instructive booklet for stamp. Information System, 225, Marietta, Ohio.

AGENTS: Greatest offer ever made. Eleven-piece toilet article set and \$1 carving set. All cost you 50c; sells for \$1; twenty sales a day easy. Write today. Pierce Chemical Company, Station C, Chicago.

PROMINENT manufacturer of most necessary articles on market desires agents; either sex; profits enormous; will help earnest workers. Rotheo, 212 N. 2nd St., St. Louis, Mo.

SNORE-MUTE positively stops snoring. Sells on sight. Every family wants one or more. Satisfaction guaranteed. Handle exclusively or on side. 100% profit for you. Sample and illustrated booklet 25c. Dr. C. S. Page Co., Ironwood, Mich.

SELL Electrical Specialties. Our interchangeable Electric Signs make big money. High grade proposition to live agents. F. A. Watkins, 571 West Washington St., Chicago, Ill.

AGENTS: make more money selling our "Novelty Sign Cards." Whitman Mfg. Co., Detroit, Mich.

LIFETIME opportunity—Manufacture "Substitute for Eggs." Enormous profit. No canvassing. Particulars free. W. C. Delzell, 419A, South Pickett, Los Angeles, Cal.

AGENTS—To sell Oils, Belting, Hose, Paint, Varnish, to factories, mills, auto owners, stores, threshers; outside large cities. Excellent proposition. Paid weekly. Manufacturers Oil & Grease Co., Cleveland, Ohio.

MAKE and sell your own preparations, formulas, processes and chemical analyses. A. R. Sasse, 195 W. 36th, Kansas City, Mo.

AGENTS. Crew Managers, Five-Piece Cooking Set. Write us today. Pace Bros. Pottery Co., Roseville, Ohio.

CHANGEABLE Sign—Sells \$1—profit 50c—Sell 20 Daily. Sample \$1 prepaid; refund if dissatisfied. Lowry, 2127 Clifton Ave., Chicago.

DON'T be an Agent—Own your own business. We furnish complete, practical, low price outfits for plating in Gold, Silver, Copper, Nickel, etc. We furnish recipes, formulas, trade secrets. Work easy, profit enormous. Send today for particulars. Gray & Co., Plating Works, 430 Gray Bldg., Cincinnati, Ohio.

MATCHBOX Tray. Great Novelty. Good seller. Sample 50 cents cash. C. Beyen, Roselle, N. J.

FREE—Wonderful 6 in 1 pocket necessity. If you accept opportunity to make \$10 weekly spare time. Send 25c stamps or money—to show you mean business, by return mail, will send you combination with our offer. Money back if unsatisfactory. Mink Corporation, 297 Main St., Buffalo, N. Y.

AGENTS—Sell rich looking imported 36x 68 rugs, \$1 each. Carter, Tenn., sold 115 in 4 days. Profit \$57. You can do same. Write for sample offer selling plan. Exclusive territory. Sample rug by parcel post prepaid, 98c. Condon, Importer, Stonington, Maine.

OUR new Safety Tea Kettle is now ready for you. Get acquainted with us, it pays. Particulars. Weber Manufacturing Co., patentees, 1007 Warner Ave., Peoria, Ill.

"EZ" money made selling Handy Andy Cloth and Sponge Holders; cleans, mops, dusts. Sample 25c postpaid. Ricard Co., Bangor, Penna.

AGENTS—Sell the Primus, genuine Swedish wickless, coal-oil stoves. Smokeless, odorless. Twice the heat of gasoline at one-eighth the cost. No danger of explosion. Big profits. James Anderson & Sons, Sidney, Ohio. American distributors.

AGENTS—Here's a winner. The Midget Vest Pocket Garment Hanger—sells on sight. The most attractive Holiday proposition ever offered. 150% profit. No competition, as article is fully protected by U. S. and foreign patents. Address: Dept. "M," The Silvex Company, 171 Madison Ave., New York.

THE Tappan Ideal Sanitary Brushes sell everywhere. Highest quality, largest profits. Tappan Brush Company, 252 Fourth Avenue South, Minneapolis, Minn.

ENDLESS Neckties—Something new, twelve ties in one; costs no more than old style; man made \$70, three days; woman made \$92, week; write for special agents' offer. Endless Necktie Mfg. Co., Dept. 10, Kansas City, Mo.

AGENTS: Sell our goods; we trust you. Sample free. Harsch Mfg. Co., Indianapolis, Ind.

AGENTS, write at once for latest catalogue of fast-selling household specialties. Large profits. The Midwood Co., Dept. 16, 607 Flatbush Ave., Brooklyn, N. Y.

OUTFIT Free to Agents. Best selling Handkerchiefs, Dress Goods and Fancy Goods on the market. Quick sellers, big profits. Deal direct with a large manufacturer. Send stamp for particulars. Freeport Mfg. Co., 59 Main St., Brooklyn, New York.

\$35 TO \$100 weekly made easily selling our match lighting systems and portable lamps; they sell like wildfire both in towns and rural districts. No experience necessary; exclusive territory to right parties. Write for Free catalogue and full information: this is an opportunity of a lifetime. Doud Lighting Company, 174 D. No. Sangamon, Chicago.

PORTRAIT Agents make big money selling our goods. Our Quality High. Prices Low. Delivery Guaranteed. Credit for Rejects. Ask for Catalogue No. 17. Adam J. Kroil & Co., 602 Blue Island Ave., Chicago, Ill.

AGENTS, splendid seller, big profit, for housewives, motorists, farmers, mechanics, electricians, plumbers. Write us. Biddle Distributing Co., Dept. A, 80 Wall St., New York.

AGENTS, take orders from automobile owners, samples free. Fred Cramer, Wichita, Kan.

AGENTS: 100% quick profit. Newest, simplest, most practical safety razor; diagonal stroke. Dandy exclusive feature. Six superfine blades, stropper and magnificent leather case—sells on sight at popular price. Buffalo Specialty Co., Manufacturers of Liquid Veneer, 386 Ellicott St., Buffalo, New York.

FROM Dance Hall to White Slavery. 400-page, cloth book, illustrated, \$1. Immense sale. Experience unnecessary. Outfit free. Big money quick. Charles C. Thompson Co., Manufacturing Publishers, 1128 Wabash Ave., Chicago.

THE Fuller Dustless Mop and Furniture Duster are advertised in leading magazines. We need live representatives for unoccupied territory. These articles contain exclusive features. Fuller Brush Co., 55 Hoadley Place, Hartford, Conn. Western Branch, Rock Island, Ill.

AGENTS Repeater. Costs 6c. Sells for \$1.00. Sample 2c. Dr. Thornber, Ferris, Illinois.

WE need live wire representatives for unoccupied territory to handle The Fuller Sanitary Brushes. Our product is nationally advertised and covers every need. Your territory is valuable. Write for particulars. Fuller Brush Co., 33 Hoadley Place, Hartford, Conn. Western Branch, Rock Island, Ill.

GRAY or Tan plaid-lined Raincoats, cost Agents \$2.75 each delivered. Retail at \$5. Season now on. Remit for sample Raincoat or write for particulars. Boston Raincoat Company, Boston, Mass.

AGENTS of ability and high character wanted on a new household article. Over 100 per cent profit. Special selling plan that pulls results. Address Merritt & Brock, 59 to 69 Temple Place, Boston, Mass.

AGENTS—Electric Sign: Flashes changeable wording in radiant sparkling beams of colored electric light. Outselling everything at \$10. Valuable exclusive territory. Sample free. Flashtrac Sign Works, Chicago.

AGENTS: Your opportunity. It's new. Starr's powdered enamel. Repairs chipped and rusty spots on graniteware. Stops all leaky metalware without heat, soldering iron or tools. Sample with prices, 10c. Circulars. Starr, 1906 Monroe St., Toledo, Ohio.

MAGAZINE subscription solicitors earn liberal commissions and extra prize money working for Scribner's. It does not interfere with your present occupation. A postcard will bring full particulars. Address Desk 15, Scribner's Magazine, 597 Fifth Ave., New York.

WANTED—Distributors, Men and Women—to give away free pkgs. Perfumed Borax Soap Powders; no money or experience needed; good pay. S. Ward & Company, 218 Institute, Chicago.

MEDALLIONS—300% profit. Make up your own goods and be independent. Catalogue free. Resag Co., 1205 Randolph St., Chicago.

GUARANTEED hosiery manufacturer selling direct to consumer wishes agent in every county. Permanent, big paying business. Protected territory. Credit. D. Parker Mills, 2733 No. 12th St., Phila., Pa.

AGENTS in every city to handle our Triplex Folding Handbag; big profits; exclusive territory. Write for terms and free catalog. Other big sellers. S. V. Diamond & Bro., 35 West 21st St., New York City.

SOAP Agents—Our Vegetable Soap, toilet articles flavorings, remedies, excel and out-sell. Sample free. Buchanan & Co., 54 N. Main St., St. Louis, Mo.

AGENTS make \$100 monthly selling our 500 handy household articles. Catalogue free. Scheff Company, Desplaines, Ill.

WE manufacture the largest line of Aluminum Utensils and Specialties in the world. Sales course free, \$50.00 a week easy to hustlers. Answer quick. American Aluminum Mfg. Co., Div. P.M., Lemont, Ill.

BIG Profits for You! Manufacture Barley Crisp. New Confection. 5c package costs you 1c. Machine, instructions complete \$7.50 prepaid. Send 10c for samples. Barley Crisp Co., 1605 Hyde St., San Francisco.

YOU can be your own boss with our Key Check Outfit. Good for \$5 a day stamping names on pocket key checks, fobs, etc. Sample check, with your name and address, 15 cents. Pease Die Works, Dept. M, Winchester, N. H.

500% PROFIT selling our wonderful sign letters for office windows, store fronts and glass signs; resembles finest gold leaf; easily applied; samples free. Metallic Letter Co., 406 N. Clark St., Chicago.

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

AGENTS—250% profit. Wonderful little article. Sells like wildfire. Can be carried in pocket. Write at once for free sample. H. Mathews, 1962 Third St., Dayton, Ohio.

AGENTS and Salesmen wanted to sell Morthank Parcel Post Calculator. 100% profit. Every tradesman a customer. Pocket sample free. Morgan Mfg. Co., Dept. U, Newport, R. I.

AGENTS—Salary or commission. Greatest seller yet. Every user pen and ink buys on sight, 200 to 500 per cent profit. One agent's sales \$620 in six days; another, \$32 in two hours. Monroe Mfg. Co., X6, La Crosse, Wis.

ANYBODY can earn \$30 weekly selling our household and office specialties. Lake Shore Manufacturing Company, Michigan City, Ind.

AGENTS—500% profit, free sample Gold and Silver Sign Letters for store fronts and office windows. Anyone can put on. Big demand everywhere. Write today for liberal offer to agents. Metallic Letter Co., 406 N. Clark, Chicago, U. S. A.

PERFECTION Pocket Adding Machine. Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R. Cincinnati, Ohio.

AGENTS make big money and become sales managers for our goods. Fast office sellers. Fine profits. Particulars and samples free. One Dip Pen Company, Dept. 2, Baltimore, Md.

MAIL-ORDER Opportunities: 25 new Propositions. No competition! Make 95c profit on dollar order; complete outfit 10c. Mail Dealers Wholesale House, 521 Franklin Bldg., Chicago.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

AGENTS make \$5.00 to \$10.00 a day on the start. Atkinson writes: "The best proposition I have found in my forty years canvassing." Permanent work. Household necessity. Saving 80%. Write today for General or Local Agents terms. Free sample. C. H. Stuart & Co., 16 Union St., Newark, New York.

YOU can make \$\$\$\$ as our general or local agent. Household necessity; saves 80 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. J. Pitkin, 113 Redd St., Newark, N. Y.

SALESMEN WANTED

SALESMEN—Earn \$2,000 to \$4,000 a year. New Combination, 12 tools in one. Sells at sight to contractors, farmers, teamsters, fence builders, threshers, miners. Weighs 24 pounds, lifts 3 tons. Stretches wire, pulls posts, hoists, etc. Chance for men who want honest money making proposition. Harrah Manufacturing Co., Box A, Bloomfield, Ind.

SALESMEN for small towns, whole time or side-line. Special sales plan allowing return of unsold goods makes quick, easy daily sales, \$5 commission on each order. Something entirely new. Write for pocket outfit today. May Mfg. Co., 212 Sigel St., Chicago, Ill.

WANTED—Live salesmen to sell our chinaware as a side line. We have propositions suitable for all kinds of retail trade. Big money for hustlers. The Sebring China Pottery Co., Sebring, Ohio.

SALESMEN Wanted, to place a money-back guaranteed corn remover. Send 50¢ for sample outfit. M. E. Bramlee Co., Fond Du Lac, Wis.

EARN \$50 to \$150 weekly selling new specialty to merchants. Retail \$12.50, your profit \$8.50; no competition. Exclusive territory. Free samples and descriptive matter. Sayers Co., 408 Olive St., St. Louis, Mo.

WANTED—First-Class Specialty Salesmen to represent factory direct and sell our chinaware to retailers and premium users. Big money for live wires. Worcester China Co., Sebring, Ohio.

SALESMEN—We have some excellent territory open to salesmen of ability. This is a proposition that appeals to the best class of concerns. Sales are easy and your profits large. Write us today, for catalog P. M., covering the Schick All-Steel Paper Baler. Davenport Mfg. Company, Davenport, Iowa.

SALESMEN: Big, easy money. The only device in existence destroying odors without leaving any other odor. Removes tobacco smoke. No equal, no competition. Business builder. Women overenthusiastic. Gussfeldt, 134 Liberty, New York City.

SALESMEN Wanted—Experience unnecessary. Large profits. C. Beeman, Muskegon, Mich.

VOLTA Electric Lighting System for Automobiles offers good steady job for live auto repair men and electricians. Write for particulars. Irwin D. Groak Engineering Co., Commercial Department, 2009 Michigan Avenue, Chicago, Ill.

SPECIALTY salesmen wanted to sell our Magic Weeder Hoes to hardware trade. Riecard Co., Bangor, Penna.

WANTED—Salesmen who have an automobile or motorcycle; \$10 to \$15 per day wholesaling Junk Patented Combination Locks to dealers and subagents. Write for sample lock and proposition. Junk Keyless Lock, Columbus, Ohio.

SALESMEN—Get our plan for Monogramming Automobiles and Motorcycles by transfer method. Very large profits. Motorists' Accessories Co., Ashland, O.

A WHIRLWIND side-line for Salesman. Descriptive matter submitted on application. Unique Novelty Co., Independence, Iowa.

WANTED—Distributors, Men and Women—to give away free pkgs. Perfumed Borax Soap Powders; no money or experience needed; good pay. S. Ward & Company, 218 Institute, Chicago.

SALESMEN—If you don't sell Japanese Meerscham Health Pipes, we both lose money. Sample outfit and order book 25c. Japanese Novelty Co., Clinton, Iowa.

HELP WANTED

MONEY—Spare time—Report Commercial Information: exceptional opportunity for stamp. "Cico" PMC, Peru, Indiana.

FREE Illustrated Book tells of about 300,000 protected positions in U. S. service. Thousands of vacancies every year. There is a big chance here for you, sure and generous pay, lifetime employment. Just ask for booklet S-29. No obligation. Earl Hopkins, Washington, D. C.

YOUNG Man! Learn Drafting—one of the most practical subjects of study today—invaluable in many occupations—engage in individual study successfully with the aid of our new book, "A Practical Course in Mechanical Drawing," 160 pages, 157 drawings, cloth, 50 cents, postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

BECOME detectives—Large salaries; nice work; experience unnecessary; write Superintendent Wagner, 1243 Lexington Avenue, New York.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

RAILWAY Mail Clerks commence \$75 month. 2,000 appointments yearly. Sample examination questions free. Franklin Institute, Dept. L-21, Rochester, N. Y.

WANTED—Men and Women—18 or over. Get Government Jobs. Thousands appointments this year. \$65 to \$150 month. Write immediately for list of positions available. Franklin Institute, Dept. L21, Rochester, N. Y.

MECHANICS wanted in every city and town to demonstrate new mechanical tool. Hauck Mfg. Co., Brooklyn, N. Y.

WANTED—Ambitious men to open a cleaning, dyeing and pressing shop in every neighborhood. We teach you how. No capital or experience necessary. Write today. Lewis Supply Co., Milwaukee, Wis.

PLEASANT spare-time work; mailing circulars. Good pay. No scheme. Details free. Home Pub. Society, 46 N. 12th, Philadelphia, Pa.

BE a detective; earn \$50 to \$100 weekly; travel all over the world. Write Dept. A, United States Detective & Adjusting Agency, Railway Exchange, St. Louis, Mo.

GET a Government Job! See ad on page 36. Write now—today! Patterson Civil Service School, Rochester, N. Y.

I START you in business free. Send your name on postal. Charles Krepps, Eccles St., Pittsburg, Pa.

WANTED—Distributors of advertising matter everywhere. Send 10c for application contract, sample magazine. None free. American Distributor, 102 Blairsville, Pennsylvania.

MEN—Women. Get Government Jobs. \$65 to \$150 month. Write for list of positions available. Franklin Institute, Dept. L21, Rochester, N. Y.

COLLECT Money: \$10 collection course (fifteen lectures) free to one correspondent in each town. Send stamp for particulars. Creditors National Collection Service, Evansville, Indiana.

RAILWAY Mail Clerks—City mail carriers get \$65.00 to \$150 month. Thousands appointments coming. Examinations frequently. Specimen questions free. Write Franklin Institute, Dept. L21, Rochester, N. Y.

A MONEY Proposition—Co-operate with me in a profit-sharing mail-order business. Will place trial advertisement, furnish printed matter, goods to fill orders and divide the profits. Particulars. Desk 153, Hazen A. Horton, Tekonsha, Mich.

DETECTIVE work easily learned. Big demand for trained investigators. Fascinating work; good pay and traveling. Illustrated booklet free. Write, National School of Detectives, 536 Depew Building, Fifth Avenue, New York.

YOUNG Men become Railway Mail Clerks. \$75.00 month. Examination description free. Franklin Institute, Dept. L-21, Rochester, N. Y.

LEARN California Tartaric Mirror-Silvering Process—It's new. Particulars free. Wm. Barstow, 514 23rd Street, Oakland, Calif.

BE Prosperous. Win success and wealth. Free booklet "How to Win." Address Mental Efficiency League, San Francisco.

DRAFTSMEN, send name, address and stamp to W. D. Browning, Memphis, Tenn.

THOUSANDS Government Jobs open yearly. List free. Franklin Institute, Dept. L21, Rochester, N. Y.

PICTURE plays, \$50 each. Revised and sold in 20 studios here. No school. State experience. Details free. Photoplay Bureau, Box 335 "C," Los Angeles, Cal.

OWN a business. Co-operate with me evenings at home. Everything furnished. Don't worry about capital. Boyd H. Brown, Dept. K-10, Omaha, Nebr.

WANTED—An Ideal Who can think of some simple thing to patent? Protect your ideas; they may bring you wealth. Write for "Needed Inventions" and "How to Get Your Patent and Your Money." Randolph & Co., Patent Attorneys, Dept. 144, Washington, D. C.

FIREMEN, Brakemen, all railroads, \$120. Experience unnecessary. Send age, post-age. Railway Association, Dept. 298, Brooklyn, N. Y.

MONEY—Spare time. Local information, news, names wanted. We have established markets. Particulars for stamp. "Nisco"—HDB—Cincinnati.

LEARN automobile repairing driving on up-to-date cars; electrical, civil engineering, surveying; methods most practical; room and board while learning; positions secured; satisfaction guaranteed; catalog free. National School of Engineering, 2110 West Seventh, Los Angeles.

GOVERNMENT Examinations. Most thorough preparation; \$5; returned if not appointed; particulars free. American Civil Service School, Washington, D. C.

WRITE Moving-Picture Plays. \$50 each. All or spare time. Correspondence course unnecessary. Details free. Atlas Publishing Co., 3045, Cincinnati, Ohio.

BE a detective. Earn big money. Write John J. Gillies, Licensed and Bonded N. Y. State Detective. Retired Member N. Y. Police Dept. 22 years Experience. 254 Huguenot St., New Rochelle, N. Y. Investigation solicited.

BE a Detective—Earn \$25 to \$75 weekly; chance to see the world with all expenses paid. Loraine System, Dept. 304, Boston, Mass.

GO on the Stage. Vaudeville career offered you. Experience unnecessary. Managers endorse my method. Instructive vaudeville book free. Write today. Frederic LaDelle, Sta. 10, Jackson, Mich.

WANTED—Distributors, Men and Women—to give away free pkgs. Perfumed L'orax Soap Powders; no money or experience needed; good pay. S. Ward & Company, 218 Institute, Chicago.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

SITUATIONS WANTED

YOUNG man, student of chemistry for two years, wishes position in laboratory. Do not smoke or drink. Herbert Zschlegner, Wellsville, N. Y.

PARTNERS WANTED

HAVE invention that I can go down 500 ft. in water and work all day. Passed on by reliable engineers. Millions of known sunken treasures less than 500 ft. Pearl, sponge, fisheries. Deep-sea moving-picture companies write me. Want capital to operate. Geo. W. Winslow, 458 E. 47th St., Chicago, Ill.

WANTED

COPPER tube automobile boilers bought, sold, and repaired. Lucas & Son, Bridgeport, Conn.

WANTED—Wood turning lathe, hand drill press, wood boring machine, mortiser. C. H. Hopkins, Cedarville, Mich.

FOR SALE

RARE Bargain—New 100 hp. 3 cyl. Nash Gas Engine and direct-connected Crocker-Wheeler, 125 volts, 100 k.w., D. C. Generator. Set on foundation but never used. Original price \$5,600.00. Special low price for cash. Scheidel-Western X-Ray Coil Co., 411-419 So. Jefferson St., Chicago, Ill.

CHEMICAL laboratory outfit for student of chemistry. Consists of 190 pieces. Send 25c for list of contents. Then make me an offer. Herbert Zschlegner, Wellsville, N. Y.

WILL sell to the highest bidder 360 Myers' Awns, 5,000 stickpins, 10 Ingersoll watches, 8 air rifles. Bids received until November 15. James Casey, Knoxville, Iowa.

\$35 PURCHASES \$100.00 Mail-Order stock, owner retiring: \$90 purchases diamond ring, cost \$150.00; \$35 purchases 17 jewel 14 kt. gold watch, cost \$65.00. Rose, 631 Hanover, Baltimore, Md.

FOR Sale—Blacksmith and wagon shop in Southwestern Iowa. Fully equipped with power machinery. Bert Courcier, Grant, Iowa.

FIELD-MARINE Day and Night Glasses with case, 25-mile adjustment; \$30.00 value only \$6.50. Money back if not satisfied. Ye Curiosity Shop, 20 S. Second St., Philadelphia, Pa.

3,000 ASSORTED postcards, 100 9x12 colored pictures, 100 packages ink powder. Bargain. G. Lindquist, Garden City, N. Y.

STATIC Machine (Van Houten and Ten Broeck), good condition; appliances, X-Ray tube, motor, etc., bargain. R. M. Scott, M. D., Del Rio, Texas, Box 707.

SALE OR EXCHANGE

EIGHT inch reflecting astronomical telescope, for anything of value. Byron, 1524 Lake Ave., Pueblo, Colo.

GUNS, SPORTING GOODS, ETC.

FIREARMS Wanted. Buy or exchange all sorts. Stephen Van Rensselaer, Dept. 18, West Orange, N. J.

TAXIDERMY

TRY us on your next trophy—Expert mounting of fish, birds, animals and fine rugs. Taxidermist supplies. Karl W. Kaumann, 2455 Lincoln Ave., Chicago.

MACHINERY, TOOLS AND SUPPLIES

14"x5 FT. Johnson Lathe, \$140.00; 15"x7 ft. Pratt & Whitney Lathe, \$155; 18"x8 ft. Sebastian Lathe, \$225. Western Machinery Co., Cincinnati, Ohio.

FOR Sale—Good emery wheels 5"x1"x 1/2" hole. 50 cents prepaid to any part of U. S. Francis Reed Co., 43 Hammond St., Worcester, Mass.

PULLEYS, Gears, Sprockets, Shafting, Hangers, see page 120. W. A. Jones Foundry & Machine Co., Chicago.

FOR Sale—25 Lincoln milling machines, \$25 to \$100 each. Lucas & Son, Bridgeport, Conn.

5 HP. hopper cooled stationary engine, \$65. Badger Motor Company, Milwaukee, Wis.

REBUILT Leather Belting. Half the price, equal new in service, excellent appearance, all sizes, satisfaction guaranteed. Also new, 25% under dealers' prices. Canvas Thresher Belting. Friedrich Belting Co., Manufacturer, St. Louis, Mo.

HAVE for sale several sizes of lathes, milling machines, drill presses, punch presses, shapers, planers, boilers, steam engines, oil, gas and gasoline engines and wood-working machinery. Pinner, 122 Water St., New York, N. Y.

ENGINE Lathe, swings 9 1/2", takes 25" between centers. Complete set gears cutting all size threads 3" to 40", \$43.50. Grammes & Sons, Allentown, Pa.

ENGINES AND MOTORS

ALTERNATING current, single phase motors, 1/40 hp. Emerson, \$7; 1/20 hp. Emerson, \$9.50; 1/2 hp. Wagner, \$38; 1 hp. Wagner, \$53; 2 hp. General Electric, \$56. Motors bought, sold, repaired. Tell us your needs. Send for bargain sheet electrical supplies, flashlights, Christmas tree outfits. Hyre Electric Co., 613H So. Dearborn St., Chicago, Ill.

LOT Small Generators, all new, 110 volts; less than 1/2 regular price; 6 lights, \$8; 10 lights, \$12; some larger. Johnston, Evans Ave., Ingram, Pa.

FOR Sale—One 110 horsepower Alberger Gas Engine, 4 cylinder, 12 1/2"x13, double tandem horizontal, 275 r.p.m. Extra heavy flywheel, Rites governor, connected to Type E Smith Suction producer. Condition good. Displaced by Niagara power. Conant-Bryant Power Co., 97 W. Genesee St., Buffalo, N. Y.

CASTINGS—1/2 and 3/4 horsepower gasoline engines; also finished engines. Crown Motor Works, Elgin, Ill.

FORTY horse engine and boiler. Also twelve horse Fairbanks kerosene engine. Practically new. S. L. Ewell, Romeo, Mich.

FOR Sale—First-class electrical goods at half price; motors, dynamos, etc. Write for list and prices. Guy E. Blodgett, Marshfield, Wis.

GAS Engines for autos, trucks or motor-driven machinery, also suited for wood sawing, farm use, etc. A few Planetary Transmissions for \$15. Write immediately. Auburn Motor Chassis Company, Dept. N, Auburn, Ind.

FORT Wayne Induction Motor, 60 cycle, 3-phase, 440 volts, A. C. \$30. Walter H. Martin, 241 North E. St., Hamilton, Ohio.

WE have a few slightly used two and four cylinder Manitowoc engines, that we are offering at a great bargain. Richards Iron Works, Manitowoc, Wis.

12 TWO cylinder steam automobile engines, \$12 each. Lucas & Son, Bridgeport, Conn.

FOR Sale—Two new Peerless engines. Three horsepower, fully equipped; taken in trade, and will sell at half price, forty dollars each. J. K. Reed, Lock Box 24, Station "A," Lansing, Mich.

SEE our ad. on page 145. Amateur Mechanics Supply Co.

FOR Sale at a Bargain. New 5x6 four-cylinder governor-controlled engine, fully equipped with carburetor magneto. Will sell for much less than cost. Fred Hanson, 570 Prior Ave., St. Paul, Minn.

REBUILT Engines—We have on hand a number of rebuilt "Buffalo" engines, guaranteed, at greatly reduced prices. Write for bargain list. Buffalo Gasoline Motor Co., 1293-1305 Niagara Street, Buffalo, N. Y.

FLOUR & FEED MILLING MACHINERY

SPECIAL bargains in second-hand Attrition mills, burr mills, crushers, corn shellers, bran dusters, dust collectors, purifiers, reels, double, single, 2 and 3-pair high roller mills, sieve bolters, receiving separators, scourers, etc. Write for description and prices. Sprout, Waldron & Co., P. O. Box 429, Muncy, Pa.

FOR THE SHOP

14" SCREW cutting lathe, \$45. Lucas & Son, Bridgeport, Conn.

FOR That Boy—He will appreciate a copy of the great boy's book "The Boy Mechanic" that tells about 700 different things for boys to do and has 800 pictures. 480 (7x10) pages, cloth, big, handsome book for the price, \$1.50 postpaid. Popular Mechanics' Book Dept., 6 N. Michigan Ave., Chicago.

BOATS, LAUNCHES, ACCESSORIES

MOTORCRAFT Encyclopedia—A 150-page book that tells 1001 things every motor boatman should know. How to overcome engine troubles. Price \$1, postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

BLACKSMITHS

BLACKSMITHS — Learn hand-wrought ornamental ironwork. Our 200-page book "Hand Forging" points out clearly all the guiding principles and methods which underlie all forge work. Written by a practical authority. 122 illustrations, cloth, \$1 postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

HERE is your opportunity to be an expert blacksmith without help. As life is short, get Toy's Modern Methods of doing hard jobs easy, forging and welding all kinds of steel solid. Also tempering all tools to a standard by colored charts. This is real plain information, not theory, all for \$1. Send for free samples first. W. M. Toy, Sidney, Ohio.

SHOP Notes—Many valuable kinks for blacksmiths are contained in our series of Shop Notes books. 10 volumes, 50c each, postpaid, or \$5 per set prepaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

ELECTRICAL

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DYNAMO, 30-light, \$50; payments \$5 per month. Dynamos and motors repaired. Hobart Bros., Troy, Ohio.

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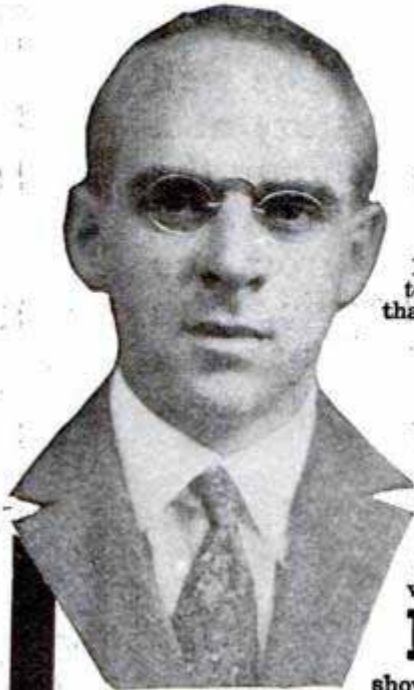
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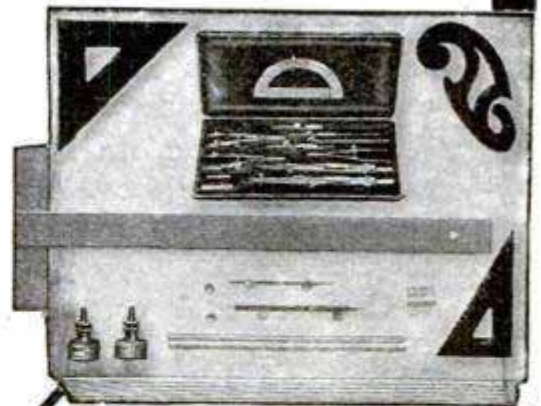
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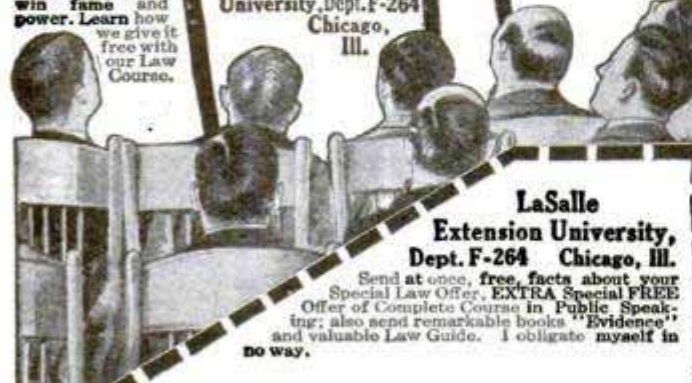
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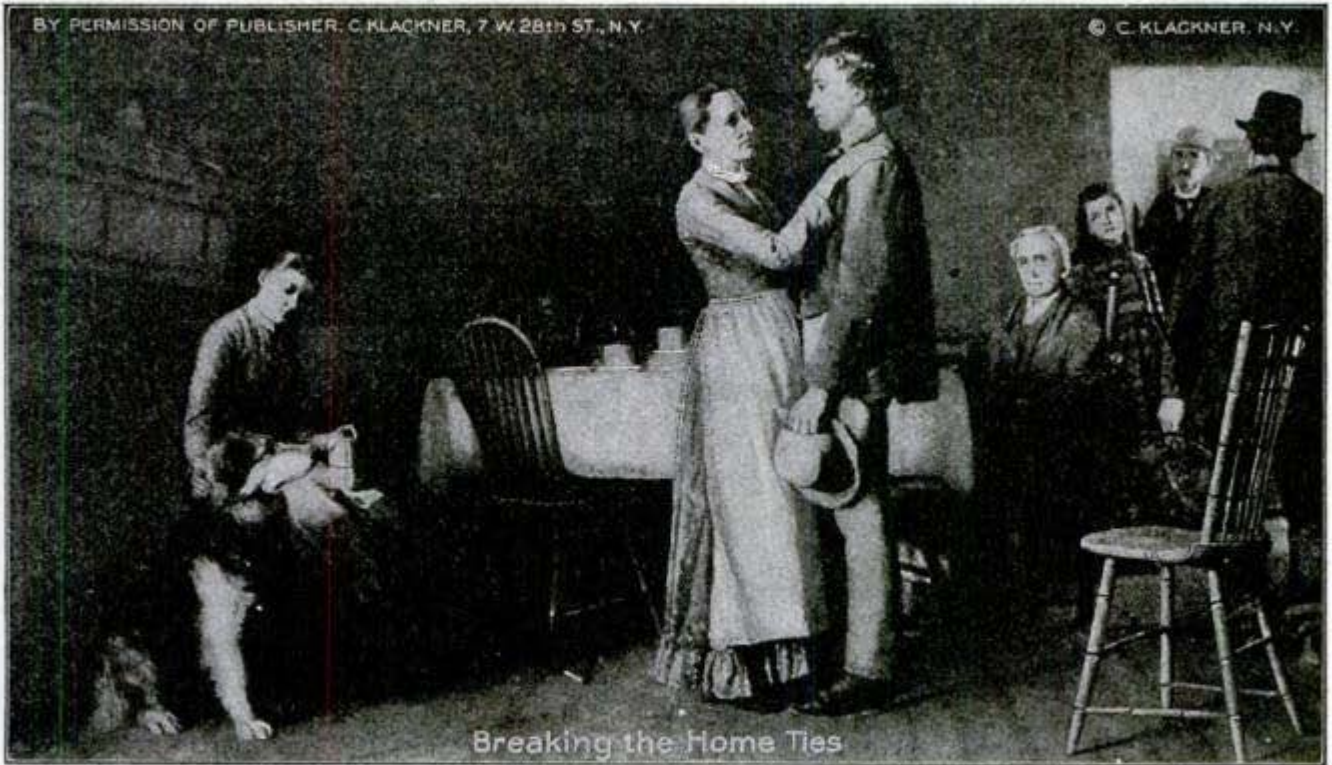
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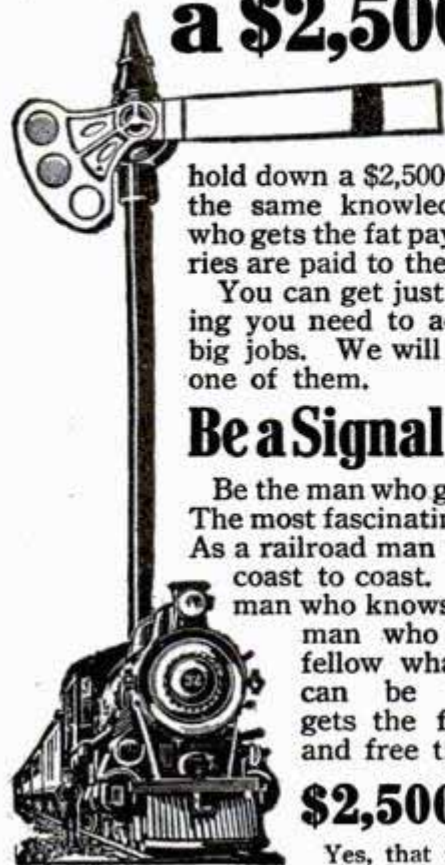
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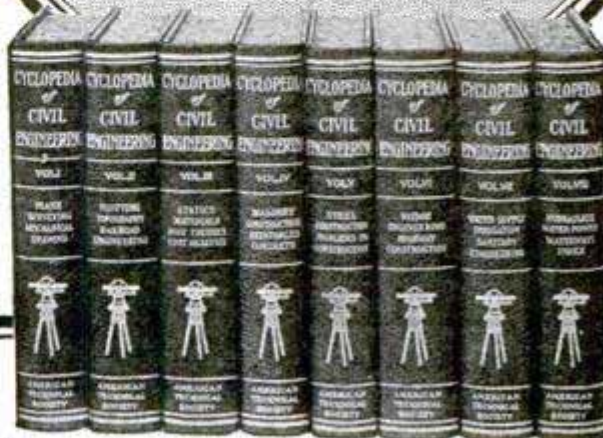


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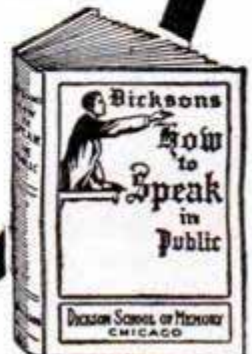
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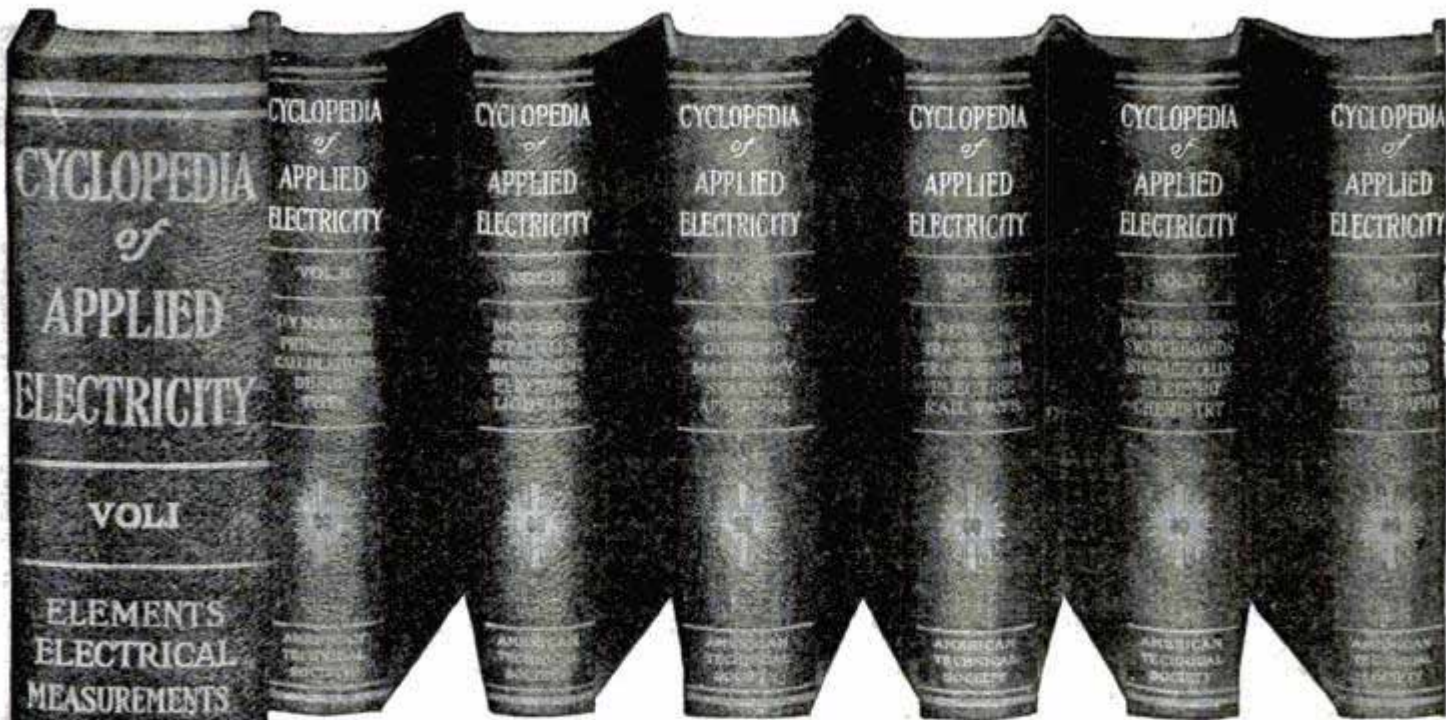
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J. H. Rhynard, with two other graduates, George and Phillip Scheidhauer, is operating two garages, one in Mooreton, N. Dakota, and the other in Hankinson, N. Dakota.

P. Chester Neilson, Preston, Idaho, has garage, repair shop and Maxwell Agency. Earning around \$3500.00 a year.

What these men have done you can do. It's no trick. It's simply a matter of making a start. Why shouldn't you own a garage of your own or hold a good job?

You take no chances

Remember, ours is the old reliable school in the heart of the Automobile Industry. Only auto school in United States recognized by the League of American Chauffeurs. Our course includes membership in the League and also official button.

Our Guarantee

We guarantee to qualify you for a position as chauffeur, repairman, tester, salesman or demonstrator in a short time, or we will refund your money.

Write today for full particulars. Or jump on the train and come to Detroit. Many don't take time to write. Classes going on all the time. No special time to begin. Students are starting every day. Anyone can learn by our method. Send for copy of "AUTO SCHOOL NEWS." It's free. Learn the automobile business in Detroit and get a good start toward success. You will be glad.

And don't forget, we furnish positions, too

MICHIGAN STATE AUTO SCHOOL

Dept. P, 11 Selden Ave. DETROIT, MICH.

On account of being in the auto center, we can furnish positions that cannot be obtained elsewhere

What the Navy Can Do For YOU

☐ The Navy can help **you** win success as it has helped thousands of others. The opportunities it offers are steadily broadening. Each year has brought increased advantages to the men of the Navy. The last naval legislation contained authority to admit fifteen enlisted men each year to the Naval Academy. The appointment of these Midshipmen will be made annually after competitive examination, in which all young men of good character under 20 who have been in the service a year may enter. Schools are provided to prepare them for examination.

☐ The Navy Department has also recently opened the door to the commissioned ranks by restricting appointments to the Navy Pay Corps to candidates from the enlisted force.

☐ These appointments are for the *exceptional* young men. But in the Navy Opportunity awaits **every** young man who strives to win. The chance of learning one of the many trades used on board ship is open to all who are competent to learn. Advancement in rating comes when it is earned, and carries with it increased pay. Provision is made, under certain restrictions, for the discharge of young men who are not satisfied with the Navy as a vocation upon refund of the clothing allowance furnished and three cents per mile from recruiting station to training school. And remember that in the Navy **your pay is nearly all clear**. The advantages of travel and of acquiring a liberal education are unequalled.

☐ If you are an American citizen of good health and character, it will pay you to investigate the Navy's opportunities. Send for the pamphlets, which will tell you all you want to know about the sailor's life in the U. S. Navy.

ADDRESS BOX 69

BUREAU OF NAVIGATION

NAVY DEPARTMENT

WASHINGTON, D. C.



6:30 A.M.

The Untrained Man leaves his comfortable boarding house at half past six in order to be at the shop by seven. He works hard all day, stopping only long enough for his dinner pail lunch, and all he has to show for his day's labor is a dollar and a half or two dollars. All of this goes for room and board, clothes, car fare, etc.—life's bare necessities—leaving him nothing with which to provide against sickness and old age.

8:30 A.M.

The Trained Man doesn't get down to the office until nine, so he leaves his comfortable home about half past eight. He puts in seven hours a day at congenial work, taking an hour or more for lunch, and makes more money each week than the other fellow earns in a month. After his living expenses are paid he has enough left to enjoy some of the good things of life and still lay by a little something for a "rainy day."

The difference between these two men is—**training**. Both have brains and good health, but one has the advantage of training that fits him to fill a responsible job at a big salary. He's no more capable or trustworthy than the other man, but he's trained himself to work with his brain instead of his hands.

Your Opportunity Coupon

Mark the position you want and mail the coupon now

- | | |
|-------------------------------|-------------------------|
|Electrical Engineer |Lawyer |
|Elec. Light & Power Supt. |Business Law |
|Hydroelectric Engineer |Business Manager |
|Telephone Engineer |Auditor |
|Architect |Accountant |
|Architectural Draftsman |Cert'd Public Ac'nt |
|Building Contractor |Private Secretary |
|Building Superintendent |Stenographer |
|Structural Engineer |Bookkeeper |
|Structural Draftsman |Fire Ins. Inspector |
|Mechanical Engineer |Fire Ins. Adjuster |
|Mechanical Draftsman |Fire Ins. Expert |
|Civil Engineer |Sanitary Engineer |
|Steam Engineer |Plumber |
|Shop Foreman |Reclamation Eng. |
|Shop Superintendent |Textile Boss |
|Sheet Metal Draftsman |College Preparatory |

We also prepare for civil service examinations in all engineering subjects

NAME

ADDRESS
Pop. Me.ch. 11-14

Become a Trained Man

Decide to fit yourself for something better in life than a laborer's job and pay. Start now—today—and in a few years hard, disagreeable work and long hours will be a thing of the past. The way is easy for any man with ambition and a willingness to learn.

For over seventeen years the American School has been training men throughout the world for better jobs and bigger pay. It has prepared thousands for entrance into the big resident colleges. It has trained even more in all branches of **Engineering, Business and Law**. If you want to get ahead, the American School will give you the training you need, no matter where you live or what you do. Remember, you don't have to give up your work—we train you in your spare time and in your own home. Not only this, but you can pay for your course as you progress.

Fill in and mail the coupon—it's the first step toward becoming a trained man.

American School

of Correspondence. Chicago, U.S.A.

This school has no connection with any other school using the name "American"

Popular Mechanics Magazine

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 22

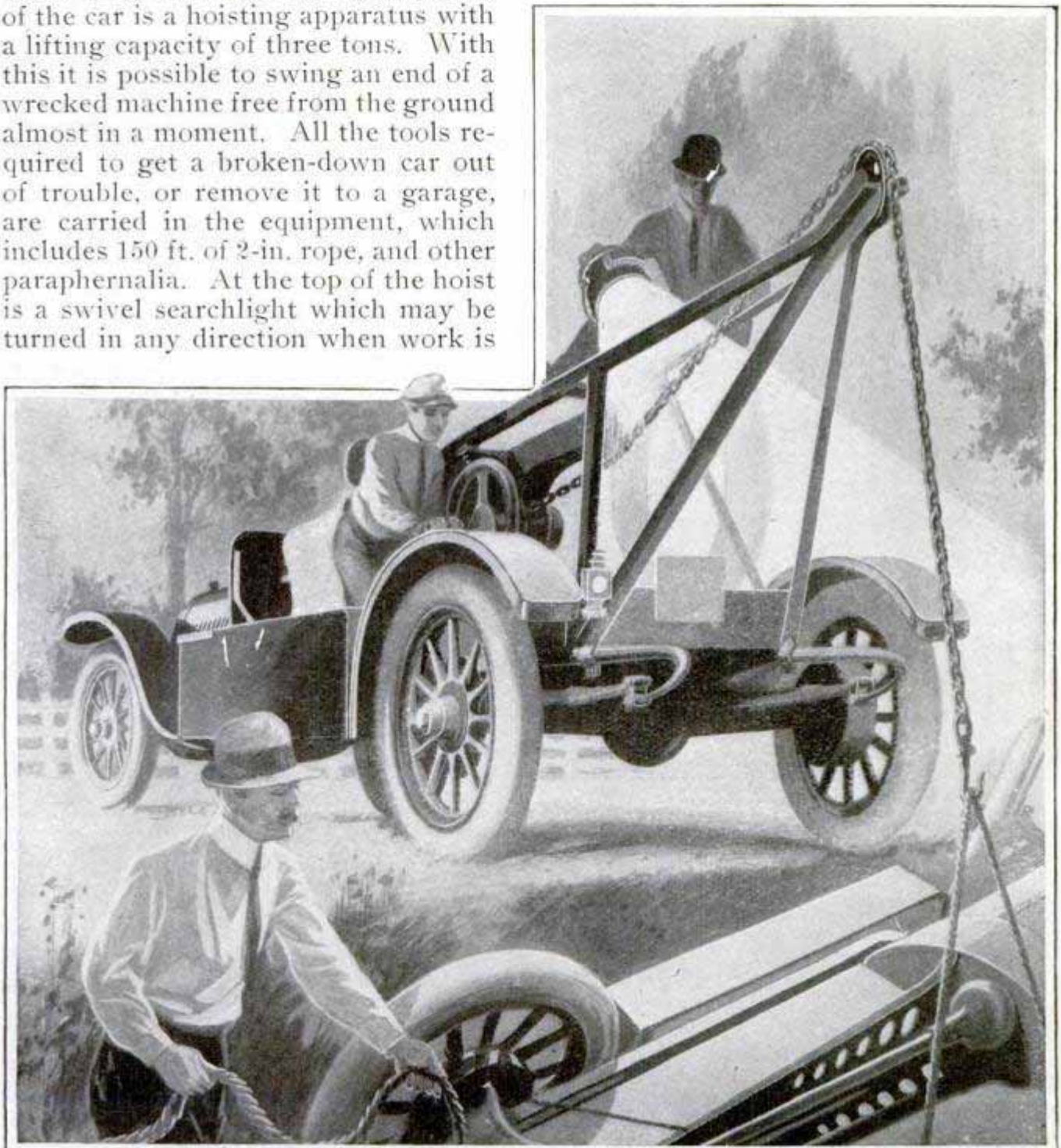
NOVEMBER, 1914

No. 5

Motor Wrecking Car Waits Calls for Help

AN eastern motor company has placed in service a wrecking car with which it responds to calls for assistance from machines disabled in accidents on the streets. At the rear of the car is a hoisting apparatus with a lifting capacity of three tons. With this it is possible to swing an end of a wrecked machine free from the ground almost in a moment. All the tools required to get a broken-down car out of trouble, or remove it to a garage, are carried in the equipment, which includes 150 ft. of 2-in. rope, and other paraphernalia. At the top of the hoist is a swivel searchlight which may be turned in any direction when work is

being done at night. The car is also equipped with side lanterns which may be removed easily whenever they are needed.



This Wrecking Car is Used to Help Disabled Motor Cars

SODA-SERVING TABLE AND DISPLAY CASE

A novel kind of display case that seems worthy of general adoption is



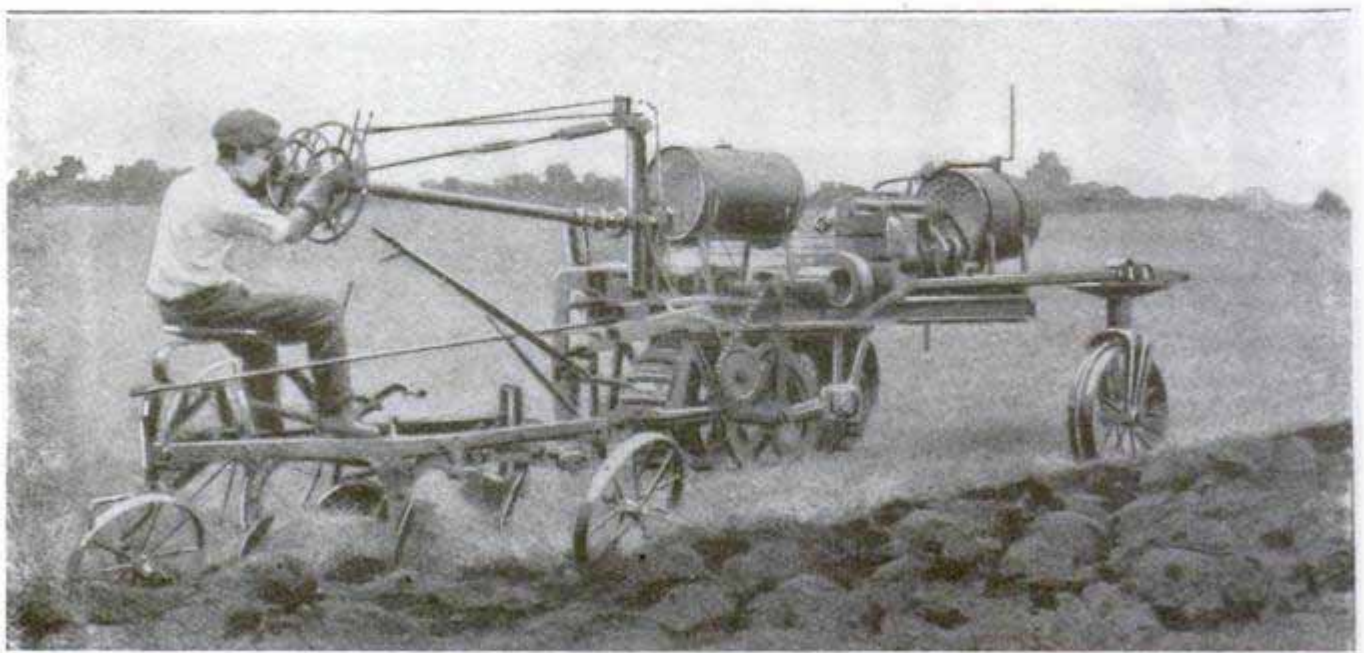
How One Druggist Tempts His Customers with an Attractive Display of Toilet Articles

used by a Maine druggist. It is a table for serving soda, with a shallow glass

case substituted for the usual table top, the bottom of the case being of wood and the top and sides of glass. The case is filled with an attractive display of bottles of perfumery and other toilet articles, and as the ladies drink their soda in leisurely fashion they cannot help becoming interested. This unusual table serves its double purpose very well, having already produced a decided increase in sales.

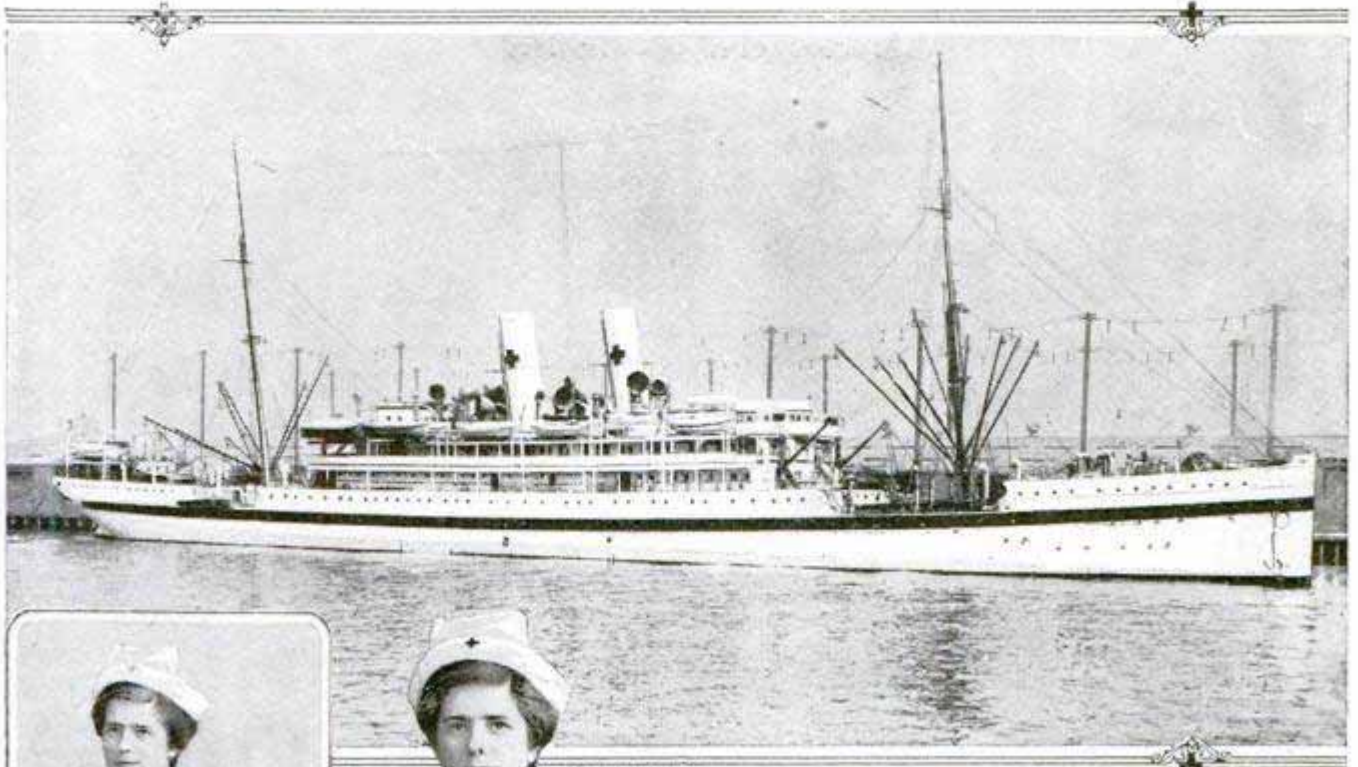
MACHINE BUILT TO REPLACE HORSES ON FARMS

A machine designed to replace horses entirely on small farms, doing practically everything that beasts can do and accomplishing it in less time and at less expense, has been developed. Driven on the same principle as standard "caterpillar" tractors, it is intended to serve more in the sense of a mechanical horse, drawing all ordinary farm implements and working wherever it is possible for horses to work. Its motive power is supplied by an internal-combustion engine. It is built on a steel chassis and carried at the front on two wheels which are adjustable to any furrow width. The center crawler is placed at the rear. In operation, it is used in the same manner as a horse, different implements being hitched to it.



This "Steel Mule" is Propelled by Gasoline with a Single "Caterpillar" Tractive Element in the Middle

AMERICAN RED CROSS ON EUROPEAN BATTLE FIELDS



COPYRIGHT, UNDERWOOD & UNDERWOOD

The American Relief Ship "Red Cross," formerly the "Hamburg"



Working Uniform of American Red Cross Nurses Now in Service on the Battle Fields of Europe: The Cape of Uniform is Blue, and is Conspicuously Marked with Insignia of Society

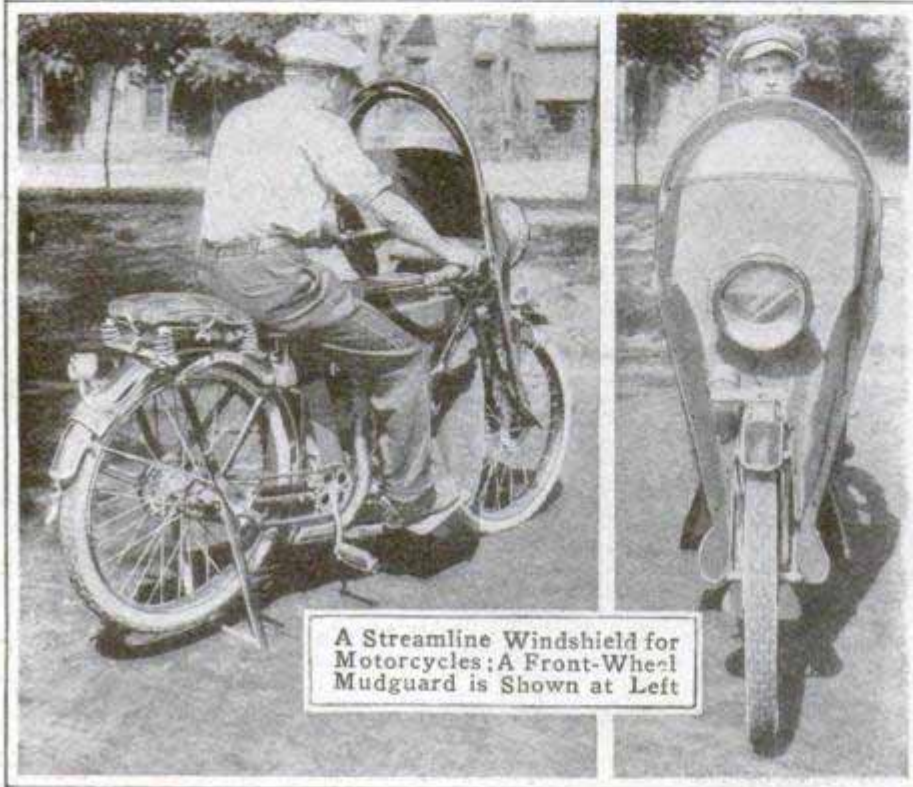
The steamship "Red Cross," formerly the "Hamburg," manned by a crew of citizens of neutral nations, sailed from New York on Sept. 13, 1914, carrying 30 surgeons and 125 nurses of the American Red Cross Society who had volunteered for service on the battle fields of Europe. Before the "Red Cross" sailed, assurances were secured from the British and French ambassadors that its neutrality would

be respected, this precaution being necessary on account of the German ownership of the vessel. While in this service the ship will fly the Red Cross flag and the flag of the United States. The ship carried an ample supply of material and equipment needed by the nurses and surgeons in their work, consisting of thousands of pounds of absorbent cotton and bandages, drugs, and surgical instruments. Each nurse volunteered for a period of six months, and at the end of that time such nurses as desire to return will be relieved by other nurses and sent home at the expense of the Red Cross Society. All will wear the new uniform just adopted by the society, which will distinguish them at a glance as members of the American Red Cross. The colors of this uniform are red, white, and blue, the red-cross insignia of the organization standing out conspicuously on the white cap, soft white collar and white arm band.

Manufacturing fertilizer from the volcanic ashes that cover Pompeii is contemplated.

MOTORCYCLE WINDSHIELD AND MUDGUARD

A windshield for motorcycles constructed of leather and celluloid on a steel frame by an Ohio inventor not



A Streamline Windshield for Motorcycles; A Front-Wheel Mudguard is Shown at Left

only has the advantage of being light in weight and easily detached, but is curved so as to offer the least possible resistance at high speeds. In practice it has been found that this device deflects the air upward so that the main current passes completely over the rider's head. In connection with this shield the inventor uses an ingenious canvas mudguard of his own devising, which completely prevents the splashing of mud from the front wheel onto the rider.

POSITIONS OF LIGHTSHIPS TO BE INDICATED

Relief lightships maintained by the government for the benefit of navigators may in the future indicate the positions they occupy, in addition to displaying the single word "relief" on their sides. Mariners complain that they are often given anxiety through their inability to read the signal flags, which thus leaves them in doubt as to the location of a ship.

SILENCER KILLS NOISES OF POWER PLANT

In order to eliminate the incessant noise made by machinery in a New York power plant, a large silencer has been constructed which breaks up the sound waves and frees the surrounding neighborhood from what previously was a serious nuisance. A strong circulation of air was needed to prevent the generators from overheating, and as a result the noises of the plant were communicated outside with the escaping air currents. The solution of the problem was found in the building of a large well, which was made to pass through the basement of the structure before reaching the outside. A number of flashboards

covered with felt were fitted in this, and as the air is drawn through, the sound waves are broken up by contact with them, the result being that when the air leaves the building it carries with it practically no noise.

SAN DIEGO FAIR BUILDINGS REFLECT SPANISH PERIOD

The Panama-California Exposition, which will be held at San Diego throughout all of next year, is intended to present the evolutionary history of mankind in arts and science. It is to be international in scope, and although reminiscent in many particulars, it will focus attention upon problems and conditions not only of the past, but also of the present era. Education, immigration, irrigation, reclamation, reforestation, and other matters which affect vitally the well-being of the present generation as well as posterity, are included in the central theme of the idea backing the project.



Looking Down the "Paseo del Prado" at the Panama-California Exposition



The Foreign-Arts Building in Which Exhibits from All Over the World will be Housed



The Building of Home Economics Where Every Known Device for Simplifying Household Work will be Displayed

Old Spanish architecture of the colonial period, with the softly toned mission effect predominating, is represented in the buildings which are now nearing completion. While simplicity is the keynote of the plan, richness is characteristic of the detail. The low, broad structures are erected around

large plazas, luxuriant in rare foliage of tropical varieties and creeping vines training over shady pergolas.

¶The ancient wooden roof of Westminster Hall, London, is to be strengthened by concealed steel trusses costing about \$300,000.

THROUGH SLEEPERS FROM NOME TO CAPE HORN A DREAM THAT MAY BE REALIZED BEFORE LONG

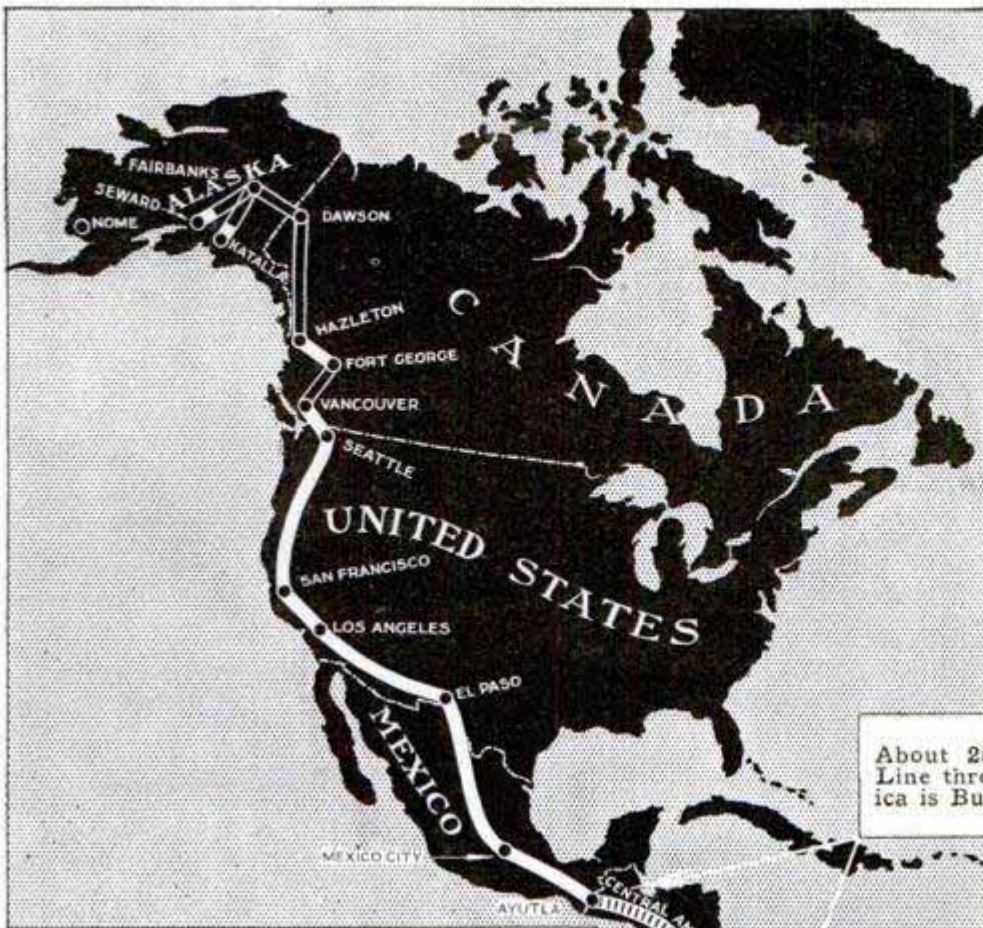
THE stimulation of commerce between North and South America due to the European war has revived interest in the project of an all-rail route connecting the United States with the countries of the southern hemisphere. When this plan is carried out, as it is almost certain to be some day, for strategic as well as commercial reasons it must be extended to include a railway connection with Alaska, where the United States government now has surveying parties in the field selecting routes for a railway system to develop the resources of that country.

Such a railway, reaching continuously from the great plateau of central Alaska to the pampas of South America and beyond, would constitute the biggest enterprise of its kind ever undertaken, if it were not that more than half of the line has already been built and is in operation. Since the surveys for the Pan-American Railway were made, there has been a steady development in railway building in South America, particularly in Peru, Bolivia, Chile, and Argentina, so that much of the work planned at that time has already been done. That portion of western Canada lying east of the Coast Range, formerly considered a forbidding country with an arctic climate, has been invaded by two trunk-line railways, and its resources are being rapidly developed. One of these railways, the Grand Trunk Pacific, reaches as far north as Hazelton, and from this point an 800-mile line has been planned to reach Dawson in the Yukon Territory. Three hundred miles of comparatively easy mountain construction would connect Dawson with Fairbanks, the focus of the Alaskan railway system, while a 360-mile line, already planned, running south from Fort George on the Grand Trunk Pacific to Vancouver, B. C., would form the last link for connecting Alaska with the states of the Pacific coast. There would then be a continuous system of railways running from the central plateau of Alaska

through the United States and Mexico to Ayutla, a Mexican town on the border of Guatemala. The big gap remaining to be closed begins at Ayutla and extends through Central America, Colombia, Ecuador, and northern Peru to a connection with the Bolivian railways. In Central America, Ecuador, and Peru short stretches of existing railways could easily be incorporated in the plan.

Half a dozen different routes would be available for forming the link through the United States. Over a route passing down the Pacific coast to El Paso, Tex., and thence through Mexico City to Ayutla, the total distance by rail from Fairbanks, Alaska, to Buenos Aires, Argentina, would be about 12,700 miles. About 7,000 miles of this distance is covered by existing railways, leaving about 6,000 miles to be built. On the basis of a liberal estimate the entire undertaking could probably be completed for less than \$300,000,000.

Every variety of climate, from arctic to tropical, as well as topographical conditions of the most diverse kind would be encountered in building and operating such a line. The line from Hazelton to Dawson, as proposed, strikes northwest along the mountainous plateau that lies between the Coast Range and the Cassiar Range of the Canadian Rockies to Lake Teslin, and then follows along that lake and down the Teslin and Yukon rivers to Dawson. For reaching Fairbanks the line would doubtless continue down the Yukon River to Forty-Mile Creek. This creek would be used for reaching the divide, and a tributary of the Tanana River would supply a practical route for reaching Fairbanks. The proposed line south from Fort George follows the Fraser River for about 200 miles and then strikes southwest to Vancouver. The construction of these lines would involve much heavy work, and the cost in many places would probably run as high as \$100,000 a mile. In spite of this there is little doubt



then begins the climb to the Andes through a rich and populous section along the Rio Cauca. This river serves as a sort of cave trough for the northern Andes and is followed until the high plains and river basins of the Andes are reached. Through Ecuador the line traverses the "trough" of the Andes, an immense

About 25 Per Cent of the Line through Central America is Built and in Operation

that the construction of these links in Canada and Alaska is only a question of time.

Owing to the difficult construction and the long gaps to be filled, by far the biggest expenditures will be required in building through Central America and the northern part of South America. This is the portion of the line surveyed and estimated for the Pan-American Railway. Starting at Ayutla, the proposed line follows a general line parallel with the Pacific coast through Central America, but in order to find favorable ground the location is in some cases 50 miles or more inland. In the northern part of Central America, particularly in Guatemala, the mountain spurs and streams run almost perpendicularly to the line, and many bridges and considerable tunneling will be required. The line crosses the Panama Canal near the city of Panama, goes over to the Atlantic side and



Map of the Proposed Pan-American Railway: The Heavy White Lines Show Railroads Already in Operation That would Form Part of the System; the Parallel White Lines Show the New Sections Required to Complete the Project, Practically All of Which have been Surveyed

basin which is divided into ten smaller basins by mountain ranges connecting the Pacific or "Occidental" range with the Central range of the Andes. Each of these must be crossed by the railway. Through both Ecuador and Peru the line runs for long distances at elevations greater than 10,000 ft., and in many places is more than 13,000 ft. above sea level.

At Cuzco, Peru, the line joins the existing railway running to Uyuni, Bolivia, at which point there is a direct connection through the Antofagasta Railway with the Longitudinal Railway of Chile, which now stretches along the coast from Iquique to Puerto Montt. A line 200 miles long built from Uyuni to La Guaiaca is all that would be needed for connecting with the railway system of Argentina,

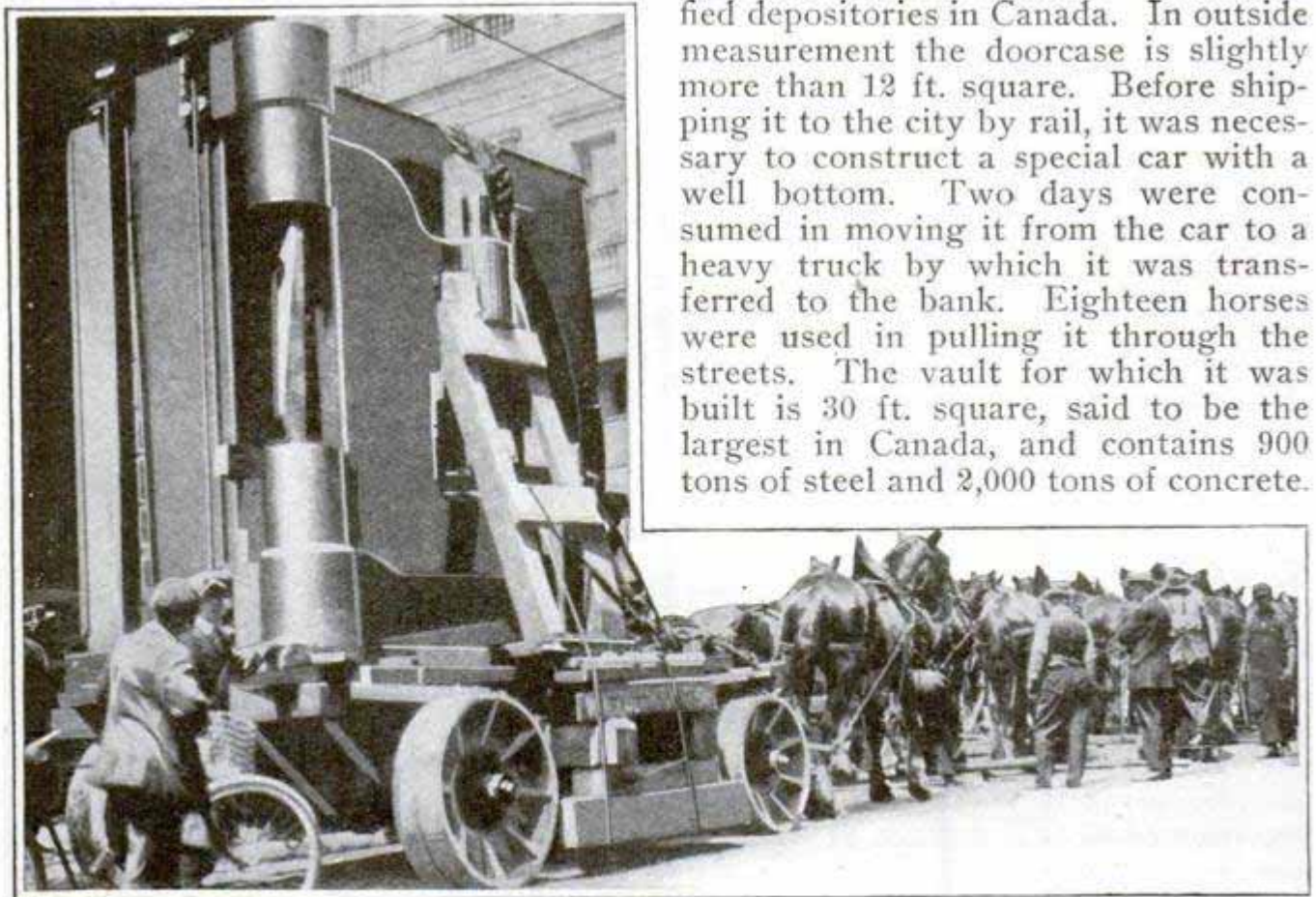
which forms a network of railways similar to the railway systems of the United States. This would complete the true Pan-American Railway, but if the development of the country should ever warrant it, the system could be extended at a comparatively small cost per mile to Punta Arenas, the most southerly port on the American continent.

Daring as the dream of a Pan-American railway seems, it is really no more visionary than was the project of Cecil Rhodes for a railway from the Cape of Good Hope to Cairo, the entire length of the African Continent. Men of affairs laughed at Rhodes as a dreamer when he proposed this gigantic undertaking, but today the Cape-to-Cairo road is nearly half built, and its completion is merely a matter of time.

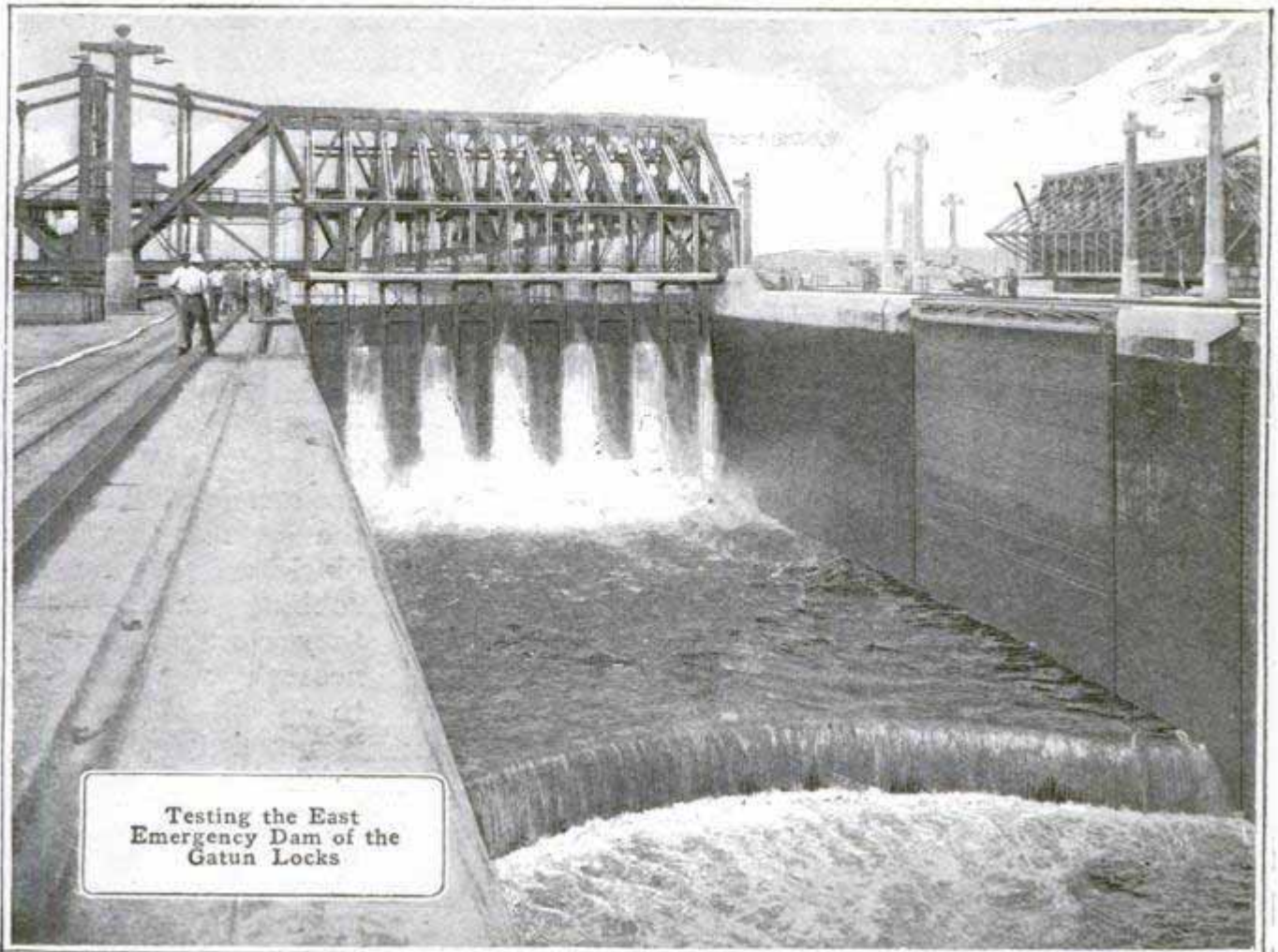
BANK-VAULT DOOR FRAME WEIGHS FORTY TONS

A steel door frame weighing 40 tons has been fitted into the large vault of

the Dominion Bank of Toronto, which will be, from a mechanical standpoint, probably one of the most securely fortified depositories in Canada. In outside measurement the doorcase is slightly more than 12 ft. square. Before shipping it to the city by rail, it was necessary to construct a special car with a well bottom. Two days were consumed in moving it from the car to a heavy truck by which it was transferred to the bank. Eighteen horses were used in pulling it through the streets. The vault for which it was built is 30 ft. square, said to be the largest in Canada, and contains 900 tons of steel and 2,000 tons of concrete.



Eighteen Horses were Required to Haul This 40-Ton Door Frame



Testing the East
Emergency Dam of the
Gatun Locks

TESTING AN EMERGENCY DAM AT PANAMA

Just prior to the official opening of Panama Canal the east emergency dam, guarding the Gatun lock approaches, was tested to ascertain its action under a full head of water, with Gatun Lake at normal level on one side and an empty chamber on the other. The greatest leakage occurred at the bottom of the gates at the pockets into which the girder ends were fitted. Under the maximum head of 45 ft., the 400-ft. section of the lock filled in two hours and 50 minutes. Naturally this was as nearly a final test as could be made, for the primary purpose of the dam is to halt a rush of water through the chambers in the event of an accident to the Gatun gates. The dam is built on a steel-truss bridge and so pivoted that, when not in use, it may be swung free from the canal and rested on the side wall. When it is necessary to use it, it is swung around, and a series of wicket girders are lowered into the

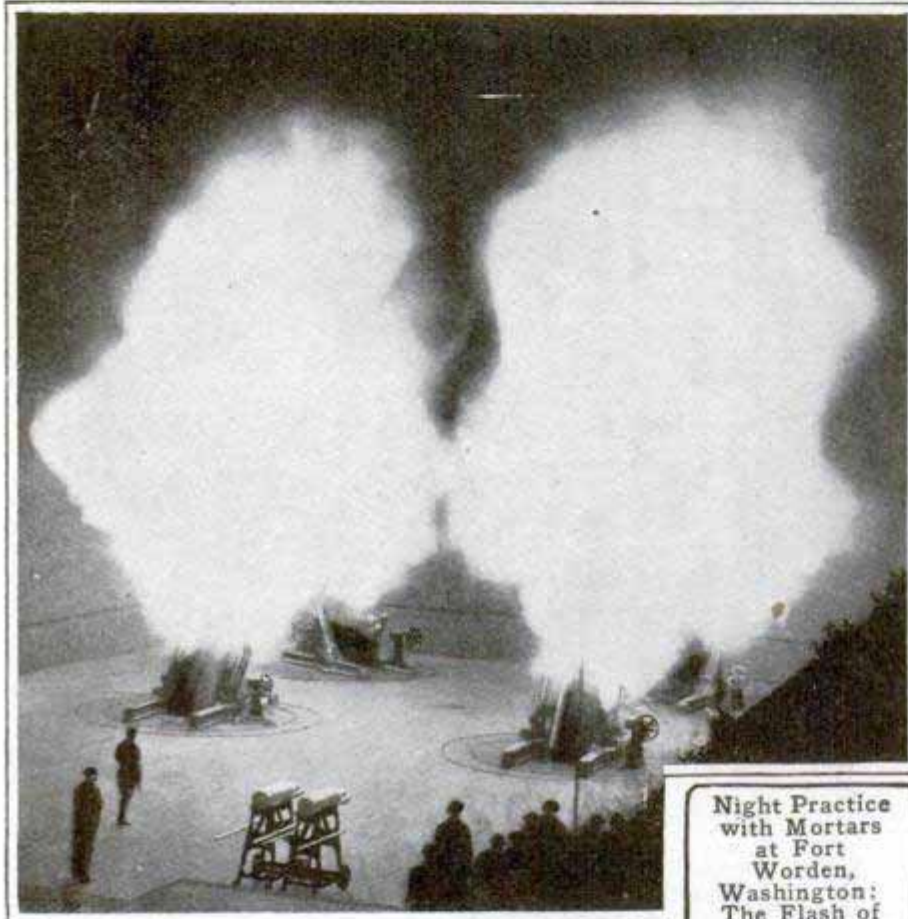
channel. These fit into pockets in the floor and, when firmly in place, act as runways for the gates which are lowered one at a time until a solid wall of steel has been built up from the bottom of the canal.

UNITED STATES' VAST STORE OF GOLD TREASURE

Although the United States has already a greater store of gold than any other nation, the supply is now increasing at a rate which will probably double its treasure in a decade. An estimate, which of course is theoretical, places the value of the gold this country will possess at the close of the century at approximately \$10,000,000,000. That in keeping at the present time is divided among mints and treasuries in various states, of which the Denver mint held \$510,000,000 on the first day of this year. The mint at Philadelphia, which has the second largest store, usually has 600 or more tons of gold in safe-keeping.

COAST-DEFENSE BATTERIES IN NIGHT PRACTICE

To train the officers and men of the coast-defense service in proficiency under all conditions that may arise in the use of their big engines of war, the United States War Department has



Night Practice
with Mortars
at Fort
Worden,
Washington:
The Flash of
the Guns Was
the Only
Illumination
Used in Mak-
ing the Picture

COPYRIGHT, L. LA CROIX

ordered that a part of each practice with full service charges shall be carried out at night. In this practice no lights other than searchlights for illuminating the target, and such lights as are necessary for handling the ammunition and the mechanism of the guns, are permitted. In the accompanying illustration of mortar firing at Fort Worden, Wash., the flash of the guns was the only illumination used in making the plate. Mortar fire is most to be dreaded by a ship of war, as it is directed at the deck, the weakest-armored portion of the vessel. An armor-piercing shell weighing 1,046 lb., such as is fired by these guns, falling from a height of perhaps three miles, would crash through the most powerful battleship, even if the shell did not explode within the vessel.

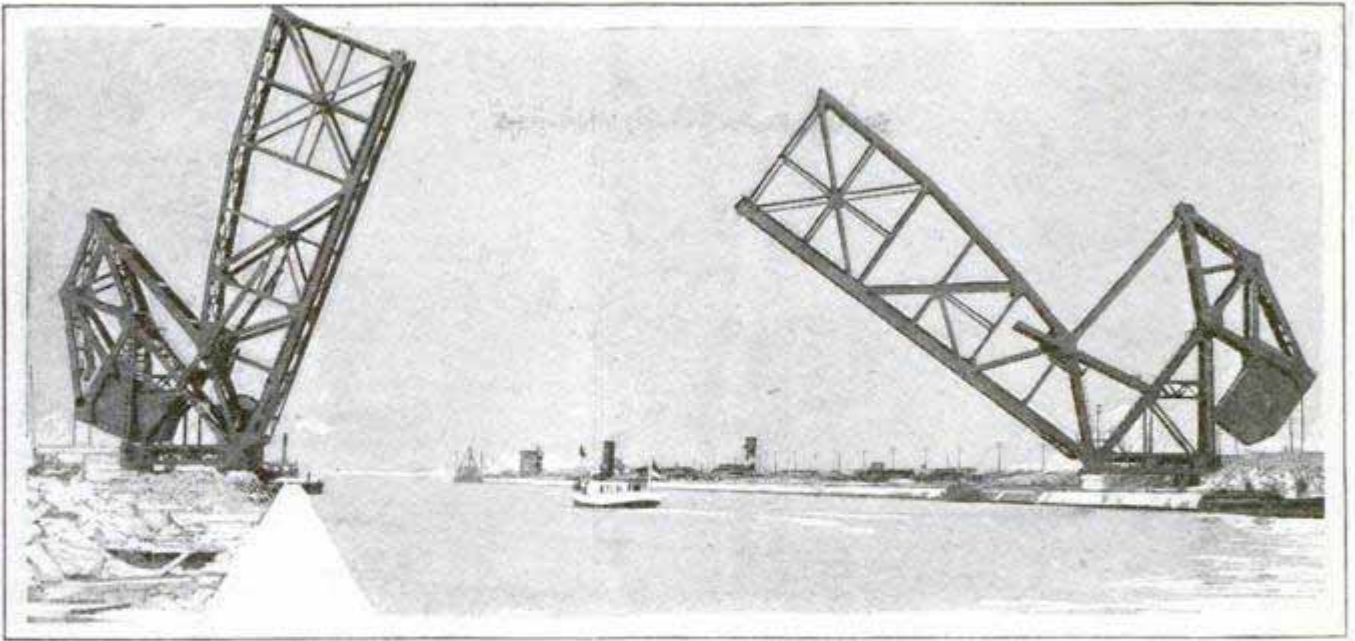
IMPORTANCE OF MICA GROWS WITH ITS INCREASED USE

With the steadily growing use of electrical appliances the importance of mica is becoming more and more pronounced. It is chiefly valuable because it is not inflammable, is a nonconductor

and is both flexible and tough, characteristics which make it useful in numerous ways as an insulation material. When the product is blasted from the ground the larger blocks are sent to hand-cobbing sheds where they are split to thicknesses of from $\frac{1}{16}$ to $\frac{1}{2}$ in. After being trimmed to about the thickness of sheet paper, it becomes "sheet mica," which is used in stoves, phonograph diaphragms, fuse plugs, electric-light bulbs, for windows in motor-car tops, and for many other purposes. Mica which is thin and irregular in shape is split into very thin pieces, coated with shellac and built up to thicknesses ranging from $\frac{1}{16}$ to $\frac{1}{2}$ in., subjected

to a pressure of several tons, ground to a uniform thickness and thus converted into "mica plate," which is much used by electrical companies. Small pieces of the raw material which are too undersized for mica plate are ground for mixture with other materials. When pulverized it is used in rubber, paints, oils, grease, and other products, while that of a coarser mesh is employed with insulation compounds.

CA French railway company has discovered that the wood of the Guiana mangrove tree is highly resistant to decay and the attacks of insects.



New Double-Leaf Bascule Bridge over the "Soo" Canal Has Leaves Each of Which is 168 Feet Long

LONG BASCULE BRIDGE FOR THE "SOO" CANAL

A double-leaf bascule bridge, which measures 336 ft. from center to center and provides a navigation clearance of 279 ft., has been constructed over the ship canal at Sault Ste. Marie for the Canadian Pacific Railway. Especially designed top and bottom-chord locks enable the leaves to act as a single fixed span, while a movable tower, built by placing it with its leaf and counterweights on rollers, allows for the expansion and contraction of the superstructure. The leaves are formed with steel trusses, 168 ft. in length, which are counterbalanced with overhead concrete weights. When the bridge is closed and the top chords engaged, a tongue-and-groove joint secures the leaves against transverse displacement. The lower-chord lock consists of steel castings, one of which has a T-shaped head engaging similarly shaped inner bearings of the casting on the opposite leaf. The end of the span carrying the movable tower is free to adjust itself longitudinally for temperature variations when the bridge is down. Over all, the structure is 426 ft. in length and is credited with establishing a record in this type of bridge construction.

☐ Water-power developments yielding 240,000 kw. will be completed this year.

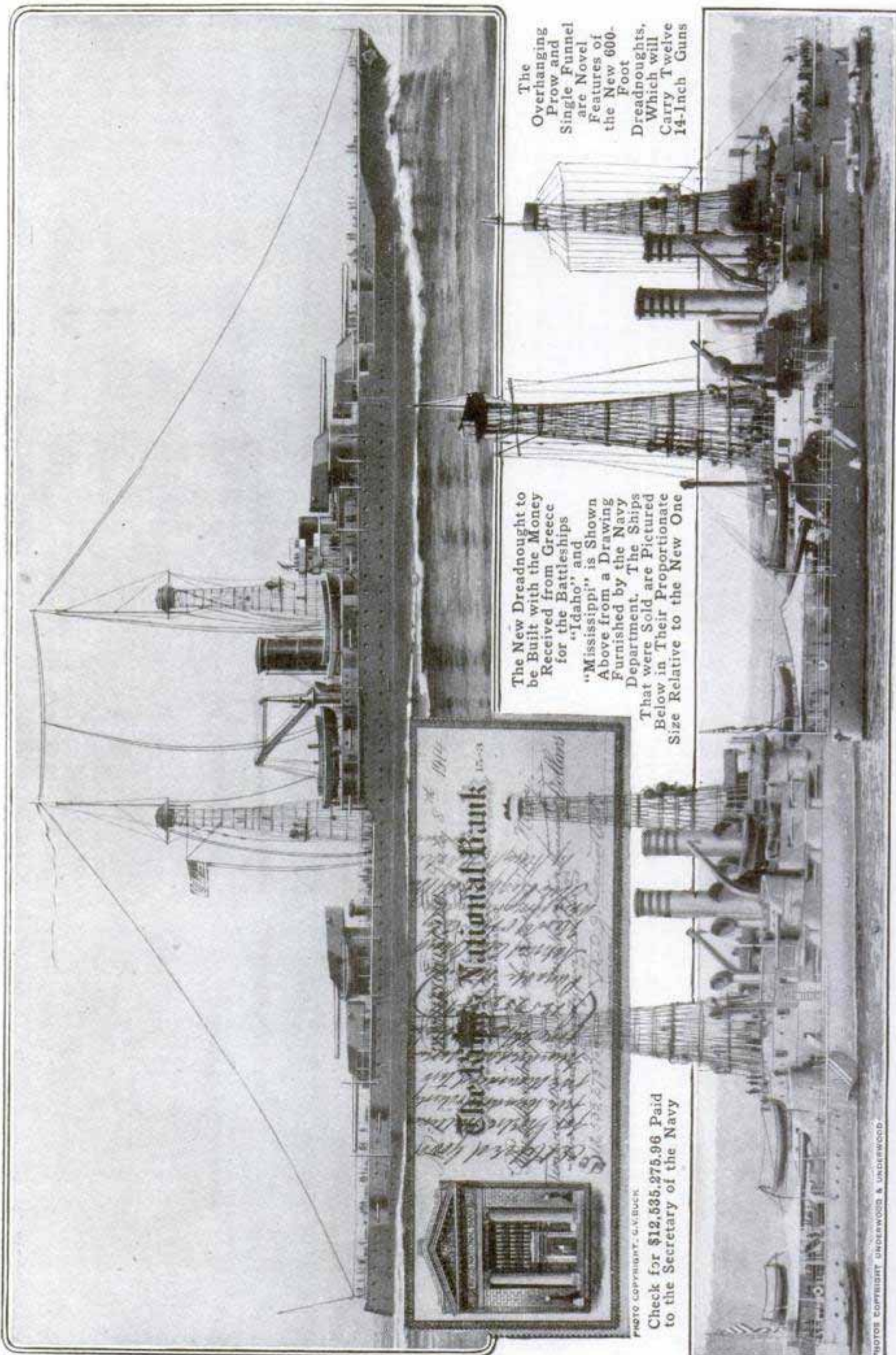
MOTORCYCLE DISPLAY CASE ALSO DELIVERY VAN

A novel advertising medium is used in Chicago by a retail shoe company which has converted a motorcycle delivery truck to make it serve also as a traveling show case. This was accomplished by substituting a glass display case for the ordinary bundle container, while a rack on top is provided for carrying packages. In this manner samples of the company's shoes are displayed whenever the machine is stopped at a curb line, while attention is constantly directed to it as it passes



This Motorcycle Show Case is Used as a Light Delivery Van

through the streets. By fitting electric lights within the case, it has been possible to use it for advertising purposes after dark.



The Overhanging Prow and Single Funnel are Novel Features of the New 600-Foot Dreadnoughts, Which will Carry Twelve 14-Inch Guns

The New Dreadnought to be Built with the Money Received from Greece for the Battleships "Idaho" and "Mississippi" is Shown Above from a Drawing Furnished by the Navy Department. The Ships That were Sold are Pictured Below in Their Proportionate Size Relative to the New One



Check for \$12,535,275.96 Paid to the Secretary of the Navy

PHOTO COPYRIGHT: G.V. BUCK

PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

TWO OLD BATTLESHIPS MAKE ONE DREADNOUGHT

To replace the two United States battleships "Idaho" and "Mississippi," which were sold to Greece recently for a consideration of \$12,535,275.96, a single dreadnought of greater displacement and far greater strength than the two other vessels combined, will be constructed. This ship will be approximately the same as the two authorized in the last appropriation bill, which means that no material departure is to be made in either the construction or equipment. The three new ships will be named "California," "Idaho," and "Mississippi," and will be capable of making 24.18 miles an hour.

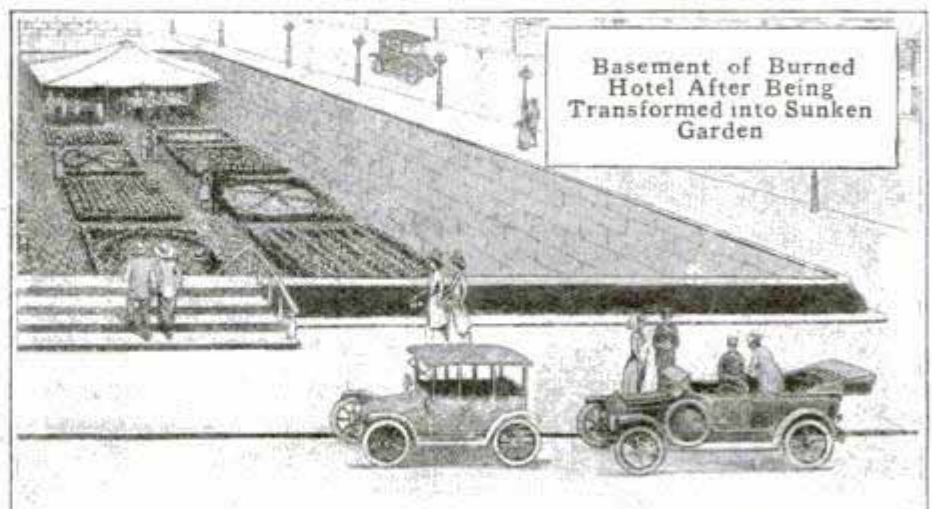
The two vessels disposed of were commissioned in 1908, but despite this they were considered inadequate for first-line service: a striking illustration of the development made in battleship building during the last few years. Both vessels are of the same measurements and strength. Each is 375 ft. in length between perpendiculars, 77 ft. broad, has a normal displacement of 13,000 tons, a full-load displacement of

about 14,400 tons, and a draft of 24.8 ft. Each of them is designed for a speed of 19.57 miles and carries a main battery of four 12-in. and eight 8-in. guns in turrets, eight 7-in. guns broadside, and two submerged torpedo tubes. In contrast to this, the new ship will have a displacement of 32,000 tons, will be 600 ft. in length between perpendiculars, 97 ft. broad and have a draft of 30 ft. Its armament will consist of twelve 14-in. guns, four submerged torpedo tubes, a torpedo-defense battery, and twenty-two 5-in. rapid-fire guns. The three-gun turret arrangement will be followed. The boat will be an oil burner and have turbine engines. One of the reasons that the "Idaho" and "Mississippi" were sold is that they are small, slow, and not of great armament. When the sale was consummated a check for the total amount was delivered to Secretary Daniels by an American agency representing the Greek government. The total cost of each of the new vessels will be about \$14,920,000.

BASEMENT OF BURNED HOTEL MADE INTO SUNKEN GARDEN

By transforming the basement of a burned hotel into a sunken garden the people of Wiscasset, Maine, got rid of an unsightly rubbish-filled excavation and replaced it with what has proved to be one of the most attractive features of the town. The debris of the burned building was removed and the foundation walls were built up to a height of about 3 ft. above the level of the street. From the top of the wall grassed slopes were made running down to the edge of the sidewalk, and a wide stone stairway was built leading over the top of the

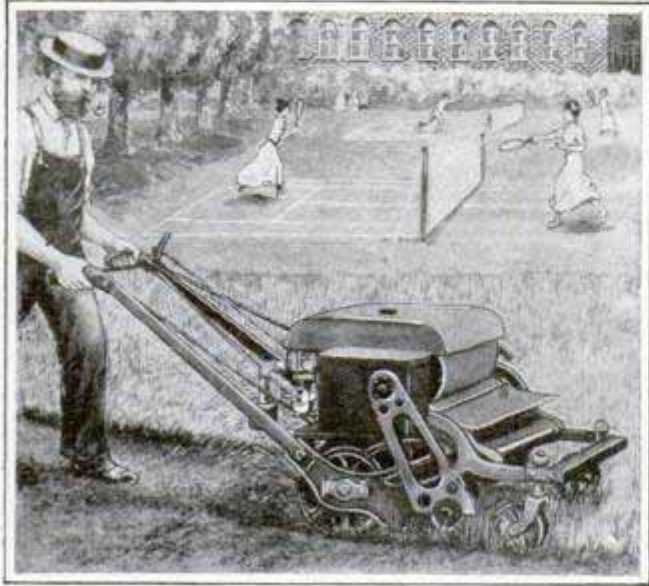
wall and down into the garden, 12 ft. below street level. The garden consists of beds of blooming plants separated by brick walks. In one corner a canvas-covered space is reserved for chairs and tables, the whole producing



an effect that is as attractive as it is unusual.

SMALL MOTOR LAWN MOWER OF NOVEL DESIGN

Intended for use in the upkeep of large lawns, golf courses and parks, a motor-propelled grass mower of the



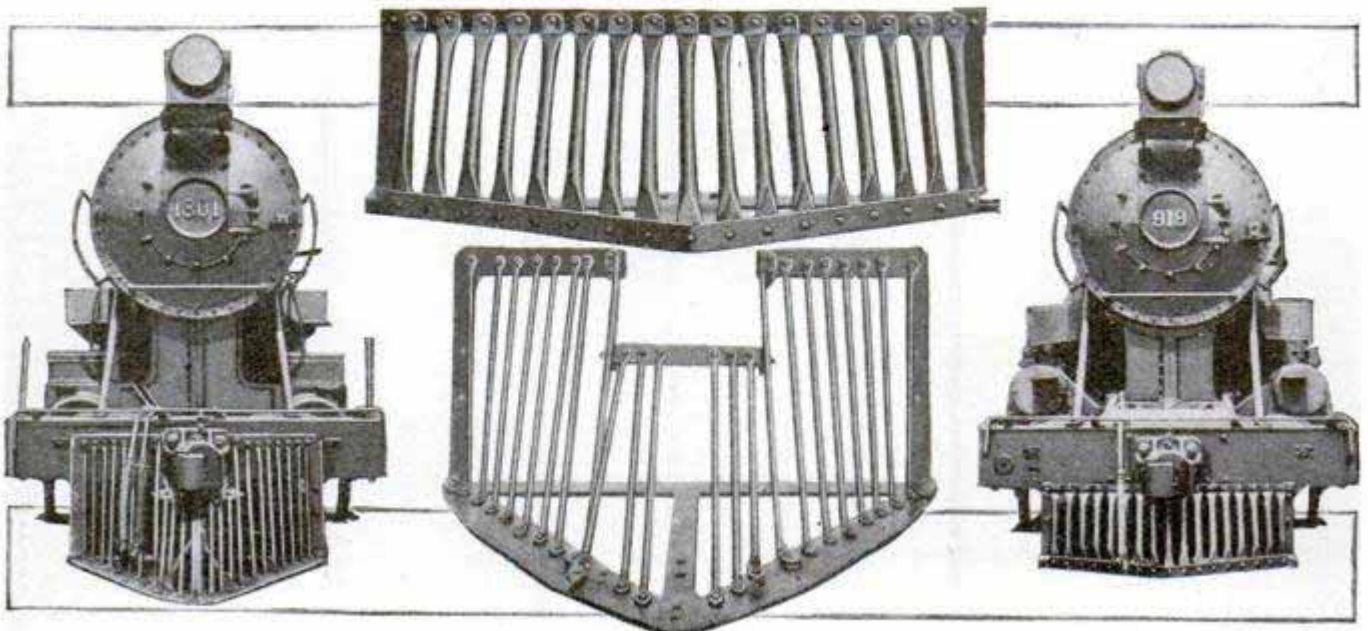
Six Acres of Lawn can be Mowed in a Day with This Motor Machine

hand-implement type has been developed. It weighs 850 lb., has a cutting width of 35 in., a speed of three miles an hour, will operate on a 25-per-cent grade, and costs approximately 30 cents a day for service maintenance. One man with the mower is able to cut six acres of average turf in a day. The machine is built along the same general lines as an ordinary lawn mower, excepting that it is of greater breadth.

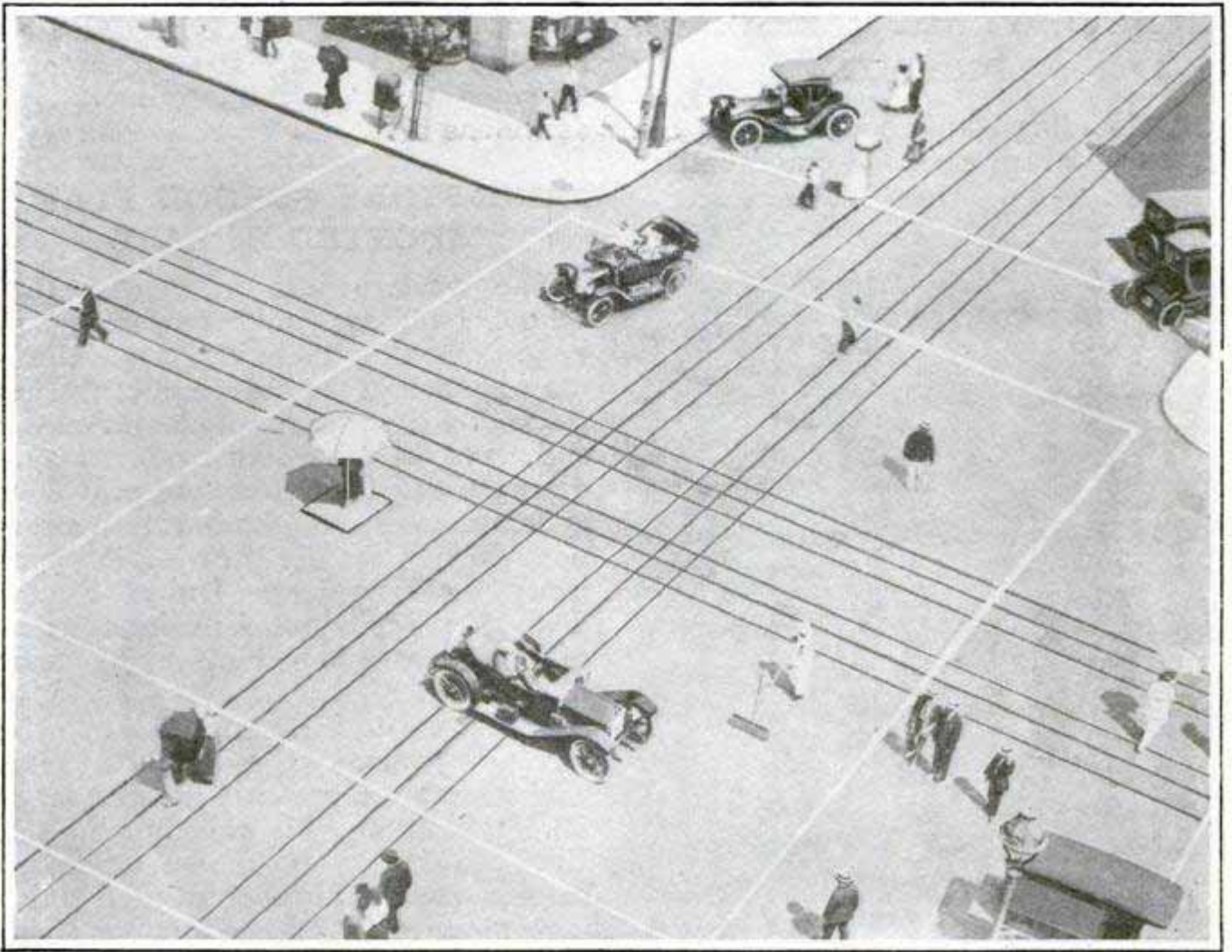
Its handles are like those of a plow and are used in the same manner. On the grips of these are the controls governing the engine, which is mounted over the heavy roller and housed. The operator is not required to exert any strength in propelling the machine, the motor accomplishing that unassisted, and at the same time indirectly turning the knives. It is possible to work around trees and shrubbery much more closely than with a horse-drawn apparatus.

SCRAP-IRON PILOT USED BY RAILROAD COMPANY

The Lehigh Valley Railroad has adopted a short, light, all-metal pilot for its locomotives, which represents both efficiency and economy in construction. The typical long pilot which is commonly seen has been abandoned to a great extent in favor of the recently developed one, which is largely made from scrapped boiler flues, 2 in. in diameter. Instead of costing \$27.58 to build and weighing 586 lb., as was true of the former style, the new pilot costs \$5.47 and weighs 262 lb. The guard drops from the pilot beam at a sharper angle than the ordinary long type, and in appearance resembles quite closely those often employed on electric and gasoline railway motors.



Old and New-Style Pilots: The Short Pilot, Adopted by an Eastern Railroad, is Made of Old Flues



Street Intersection in Washington Showing Traffic-Control Lines

GOVERNMENT REQUESTS HELP IN HALTING ARMY WORM

Unusual methods are being followed by the Department of Agriculture in its attempt to control the spread of army-worm moths in the United States. The plan, which embraces a close study of the habits of the insect, is one which requires the assistance of every person in the eastern and central states. The entomologists are catching the moths, coloring one wing of each and then liberating them in order to determine in what direction they migrate, and how quickly and how far they spread. Agents at Portsmouth, Va., are staining one wing of each specimen red; those at Charlottesville, Va., black or yellow, and those at Hagerstown, Md., violet. The moths are then allowed to follow their natural course, and the success of the experiment is left to the advices returned to the Bureau of Entomology by the people at large.

CROSSING LINES SIMPLIFY TRAFFIC HANDLING

To assist in the regulation of street traffic and distinguish safety zones for pedestrians, the street intersections in the business district of Washington, D. C., were recently marked off with guide lines. The effect was that of one square within another, the inner marks indicating the curb lines extended, and the outer ones, the building lines. The spaces between these parallel lines were reserved for pedestrians, and vehicles were not allowed to encroach upon them. The squares also served to guide drivers in turning corners.

Work has been completed on the new wireless station at Windhuk in German Southwest Africa. Within a short time it will be opened for public service.

SIGNALING LAMP CARRIED ON BICYCLE

A signaling-lamp apparatus that can be packed in a small case and carried



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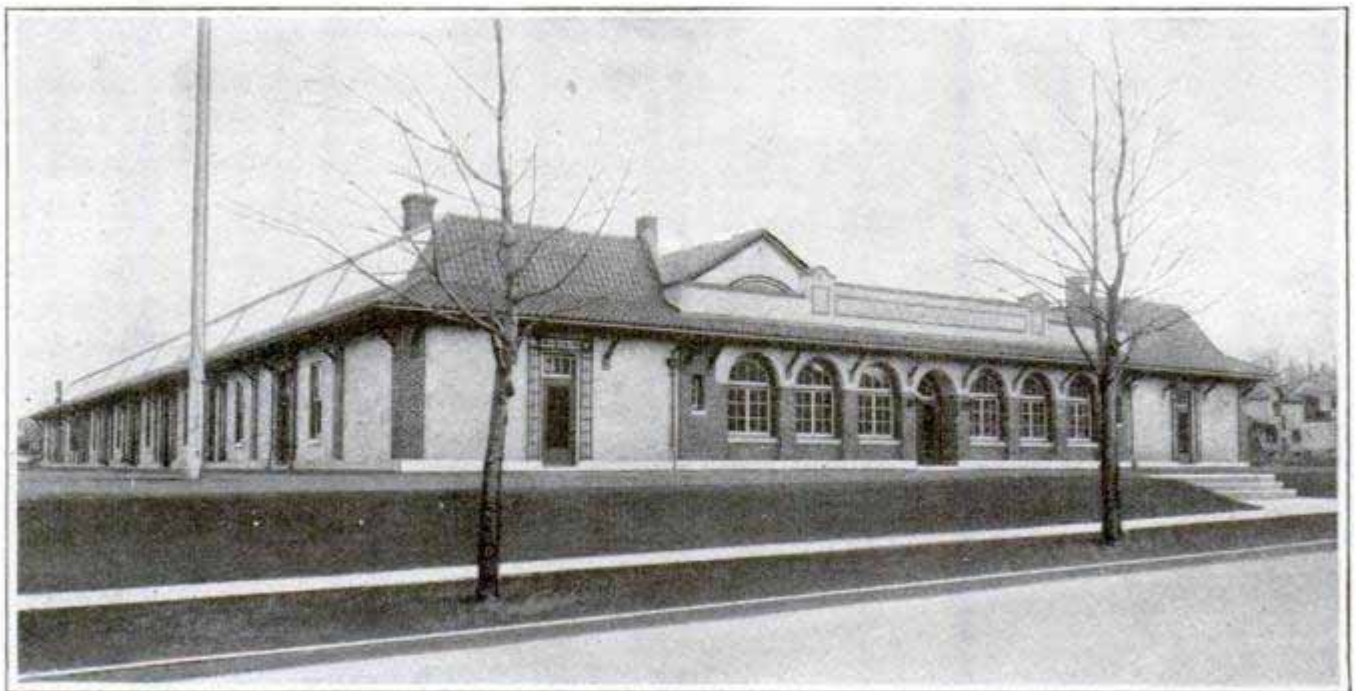
Signaling Lamp Set Up and Ready for Work

on a bicycle has been developed by an English university undergraduate.

When in use this lamp is mounted on a collapsible tripod. It is apparently intended for use in military operations as well as in making extensive surveys.

ONE-STORY SCHOOL PLAN ADOPTED IN EAST

The western idea of constructing school buildings only one story in height, making them fireproof, eliminating much of the noise and confusion caused by the passing of classes on the stairways, safeguarding against tragedies resulting from fires, and providing a maximum of sunlight and fresh air, is one which is rapidly growing in popularity throughout the United States. This plan was adopted in the erection of the latest school built by the city of Rochester, N. Y., every room of which has a door leading direct to the street, or to the playground in the rear. The structure represents the first large school built on this principle in the East, so far as is known. Shower baths, a swimming pool, manual-training and domestic-science rooms, as well as a large auditorium, are provided in the building. Instead of placing the boiler room in a place inaccessible to the pupils, it was built behind plate glass where it could be easily reached and studied by them.



Rochester School Building Where Conservation of Health and Protection against Tragedies has been Considered

DIGGING DIAMONDS OF THE FIRST WATER FROM LITTLE-KNOWN MINES OF ARKANSAS

By TOM SHIRAS

HUNDREDS of diamonds, a large proportion of them of good size and the first water, are being recovered from the blue-clay deposits which were discovered in Pike County, Arkansas, only a few years ago. Although the existence of diamond-bearing formations in this vicinity has been known by geologists, and recently by those in immediate proximity to the fields, it has never become widely known that the deposits are so large as to justify working the fields on a commercial basis.

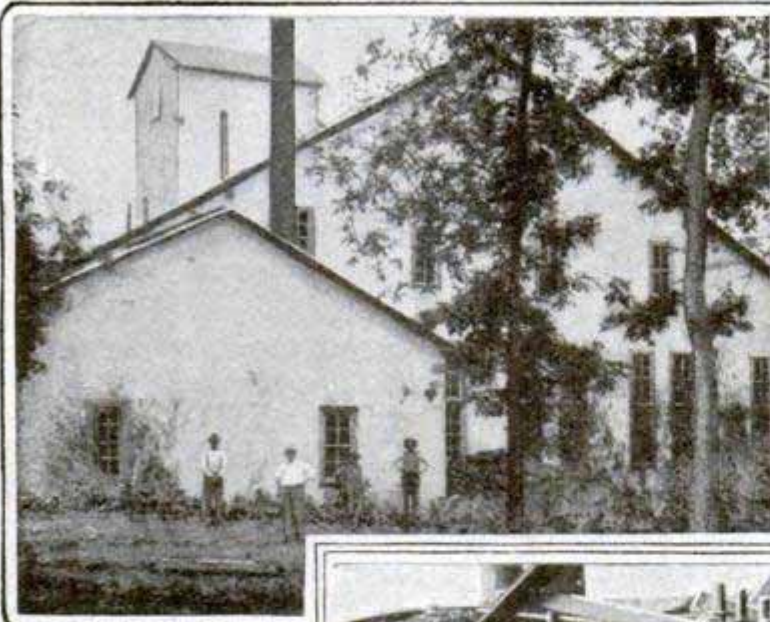
A poor farmer near Murfreesboro made the discovery which subsequently caused the development of the first diamond fields found in the United States. Sitting one day on a rock, brooding over his troubles, the man's attention was attracted by a small pebble glistening in the sunlight. It shone almost as if a live coal were imbedded in its center. Curious, he started into the town with the stone, on the way picking up a second one a few hundred feet from where he had found the first. The banker and merchants of Murfreesboro were ignorant of the nature of the stones, and 50 cents was the top price offered for them. Upon forwarding them to a Little Rock jeweler, however, it was learned that the pebbles were in reality white diamonds of excellent quality, weighing four and one-half and three carats, respectively. In a few weeks the farmer had sold his property for \$39,000.

A typical diamond-bearing formation of several acres' area exists where the first stones were picked up. A second field, showing immense bodies of blue clay, yet unsurveyed, has been found a few miles beyond the first, and it is considered possible that still others may be uncovered in the district. This land is now carefully fenced and constantly guarded. Since beginning its operations, one company has removed 1,400 stones having an aggregate weight of 550 carats. The exact yield

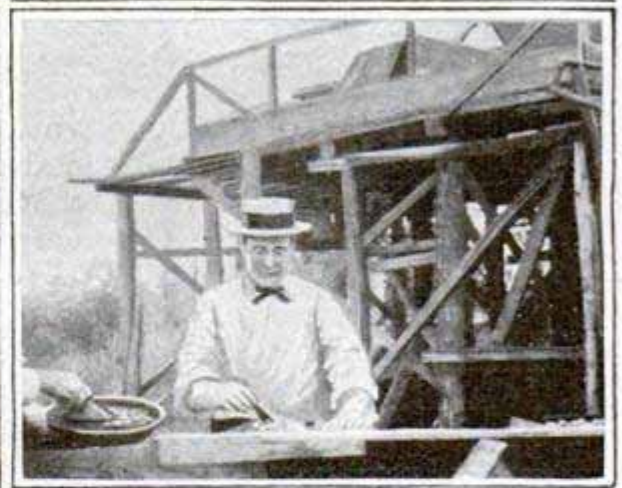
from the other mines is not known, since the results of their operations have been kept secret. An approximate estimate, however, places the total recovery at 3,000 diamonds of unknown weight. The largest stone so far discovered and officially reported weighed eight and one-half carats. Usually the rough diamonds found have been distorted octahedrons, resembling small pieces of alum with a fiery eye in the center which glows and flashes when presented to light. While the sizes are not unusual, some of them even small, the quality is asserted to be exceptional, many of the stones being as nearly flawless as are ordinarily found. A still more startling revelation is the relative richness of the fields. The celebrated De Beers and Kimberley mines of Africa grade 31 carats (approximate average) and are as rich as any in the world, while the first pipe uncovered in Arkansas has tested 20 carats. This grading is computed on the number of carats recovered from 100 loads of dirt, each amounting to 16 cubic feet.

The diamond-bearing formation in these new fields is practically the same as that of South Africa, the pocket deposits, or pipes, of diamantiferous blue earth being of the same character as the peridotite, or kimberlite, of the more famous mines. A "pipe" is a cylindrical vein filled with peridotite and extending vertically into the earth to unknown depths. The surface material is of a greenish-yellow color, caused by the decomposition of the material through atmospheric influences. Below this the dirt is of a bluish hue, from which it derives its name of blue ground, holding diamonds and other minerals. The walls of this so-called pipe mark the extent of the deposits.

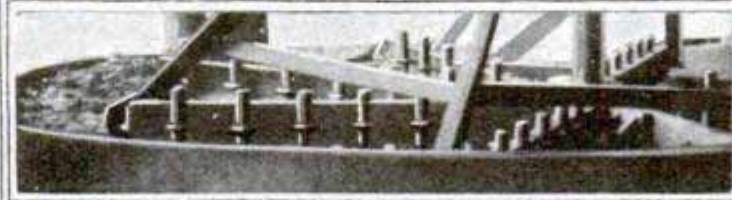
The plants now running at the Arkansas fields are not large, and although operating in a commercial way, can hardly be termed more than testing mills. The largest one of the group



A Steam-Washing and Concentrating Plant on One of the Arkansas Fields Where Diamonds are being Min.d in Commercial Quantities near Murfreesboro



Picking Diamonds by Hand on a Crude Sorting Table: The Stones are Mainly under One Carat, but Many Larger Gems are Found



Concentrating the Peridotite in One of the Large Pans

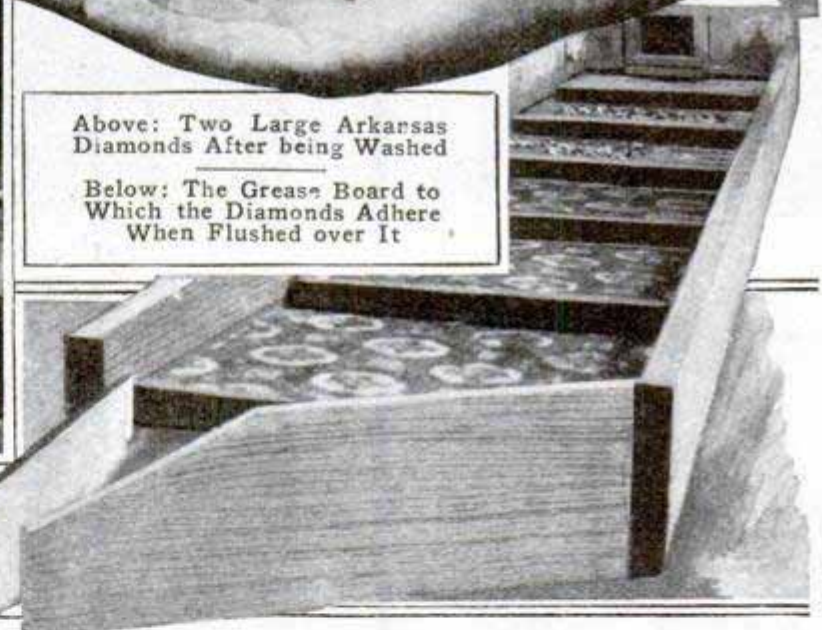


Native Diamond Diggers and Their Hand-Concentrating Plant



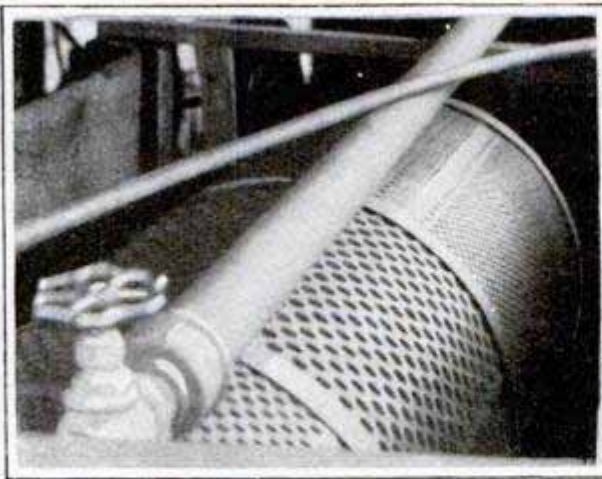
Above: Two Large Arkansas Diamonds After being Washed

Below: The Grease Board to Which the Diamonds Adhere When Flushed over It

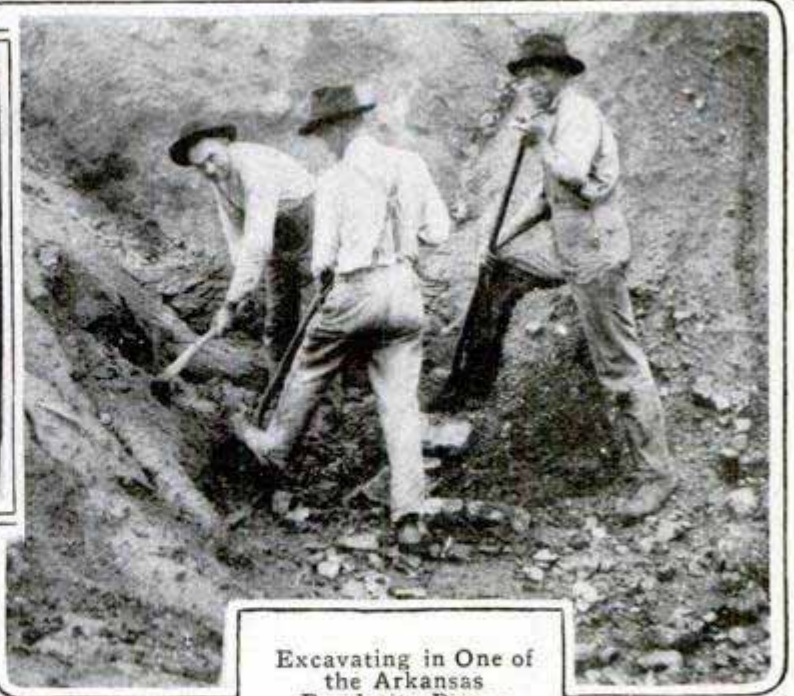


is capable of handling 60 loads of dirt a day, which is infinitesimal in comparison with the immense works of the South African mines. It is for this reason that the recovery so far made from the domestic pipes does not indicate any more than the grading of the mines. What yet may be uncovered is not known because the fields are only in the earliest stage of pit development. In no instance has a company worked through the decomposed peridotite.

The work has been limited to shallow excavations covering three or four acres at different places. In the development of a diamond mine the open-pit method is abandoned on account of caving walls when it has been worked down 200 or 500 ft. A shaft is then sunk in the rim of rock surrounding the pipe and a tunnel cut from it under the bottom of the pit. A second shaft extending through the floor of the pit and connecting with the tunnel is sunk, and the mining con-



The Rotary Screen Which Sizes the Diamond-Bearing Earth



Excavating in One of the Arkansas Peridotite Pipes: These Circular Areas of Blue Earth Extend to an Unknown Depth and Yield Diamonds and Other Gems



In a Rich Surface Zone One Man Found Nearly 100 Stones in Three Days



A Lump of Peridotite with a Diamond in Its Original Matrix



A Plot Showing the Location of the Diamond Fields So Far Discovered in Pike County



A Jig in Which the Last Concentrating is Done in the Process of Separating the Diamonds from the Earth and from Other Stones



tinued by handling the dirt through the outer shaft. This shaft is gradually deepened and other tunnels driven into the pipe at lower levels, the blue ground in this manner being pulled out from beneath.

There are two general methods of treating the dirt as it is first removed. One is known as the flooring process and the other, the direct method. Both of these have been employed at Murfreesboro. In flooring, the peridotite,

upon removal from the earth, is spread to a thickness of about one foot over the ground and then submitted for several months to the action of the atmosphere, the air gradually disintegrating it into fine particles by decomposition. When the material is cleared from the ground it is taken to the plant, and the diamonds contained in it recovered. After being sized by passing through a rotary screen, the dirt is placed in washing machines, or pans,

as they are called. These are circular in shape and approximately 10 ft. in diameter. Water passes through them constantly, while harrowlike teeth in revolving frames agitate the dirt, causing the heavier materials and diamonds to sink to the bottom and the lighter materials to pass off. The settlings are further concentrated in jigs, which by vibratory motion assisted by jets of water reduce the bulk to about one-half. The matter finally left in the jigs consists of fine particles of mineral, heavy gravels, and the diamonds. It is then flushed over a greased board, the diamonds adhering to the surface of this, and the other materials washing away. At intervals the stones are removed from the board and steamed, washed in acids, and sorted. In the direct method of treatment the peridotite is first run through a crusher and then concentrated and washed. The hand operators, of whom there are several in the

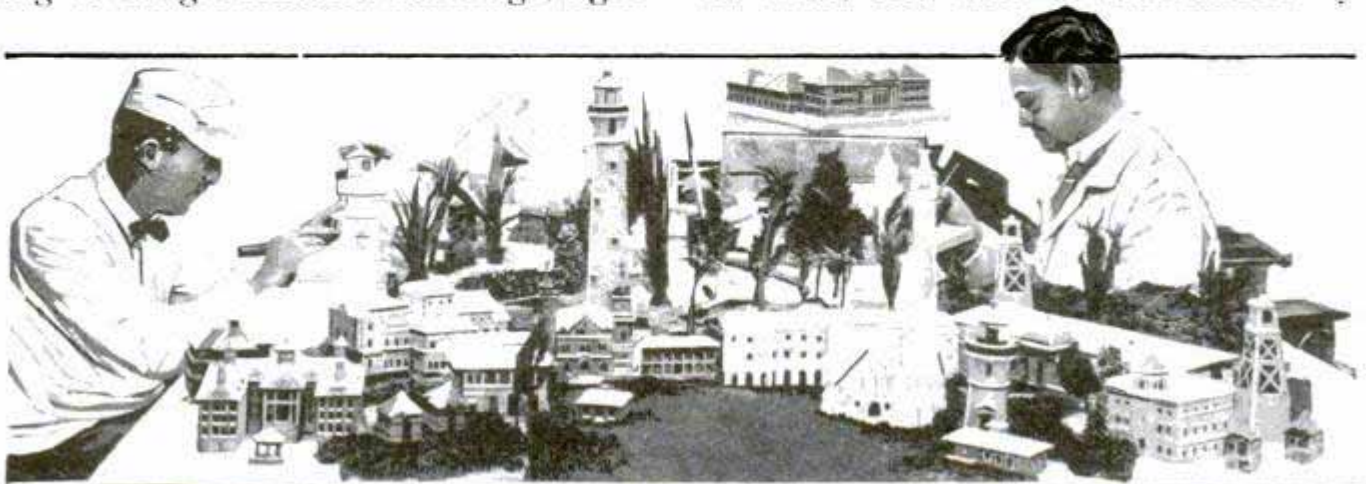
district, work the weathered surface or decomposed peridotite with a crude hand washer and tin pans, much the same as the placer miner panned gold. The concentrates left in the pans are scattered over a sorting table and the diamonds extracted by hand.

It is in this way that the first diamond field in the United States is being developed. What has been accomplished has been done with an absolute minimum of machinery, the capacity of the plants very slowly increasing and taking on the appearance of a real industry. While discoveries of separate stones have been reported from Georgia, North and South Carolina, Virginia, Indiana, Tennessee, Kentucky, Wisconsin, New York, California, and Oregon in the past, they were usually found in alluvial deposits, the results of glaciers, and consequently many hundred miles from their probable source.

EXACT PANAMA CANAL MODEL FOR EXPOSITION

Reproducing accurately in the most careful details practically everything pertaining to the entire zone, a miniature Panama Canal which will be in actual operation, continually passing model ships through its locks, is being constructed for the Panama-Pacific Exposition. The work is being carried out scientifically, with everything built to scale. This is even true of the modeling of the government buildings, light-

houses, range towers, and native huts which skirt the canal. To insure exactness, one of the engineers connected with Governor Goethals' staff was obtained to superintend the work, while, to fashion the contours of the zone, lay out the landscape with its hills, lakes, palms and tropical jungles, and to build miniature cities and villages, only men familiar with the region through actual work there have been employed. The exposition canal will cover a space 500 ft. long and 200 ft. wide, and will be surrounded by



Only Workmen Intimately Familiar with the Canal Zone are Employed in Fashioning the Miniature Buildings and Cities for the Reproduced Panama Canal

a moving platform furnishing seats for 1,200 persons at one time. At each chair will be a telephone receiver connecting with a phonograph which will deliver a continuous lecture, explaining to the spectator each point concerning the canal as he passes it. The trip around the "zone" will consume approximately a half hour. The arrangement of the phonographs to accomplish this function is a thing which is being worked upon at the present time by a leading American inventor. Ships will be operated through the locks, range towers will mark the course through Gatun Lake, and small electric locomotives will tow the vessels, exactly as is done on the real canal.

LAMP PURIFIES ATMOSPHERE AND DESTROYS ODORS

Intended for cleansing the atmosphere of a room of unpleasant odors, a deodorizer for home and office use has



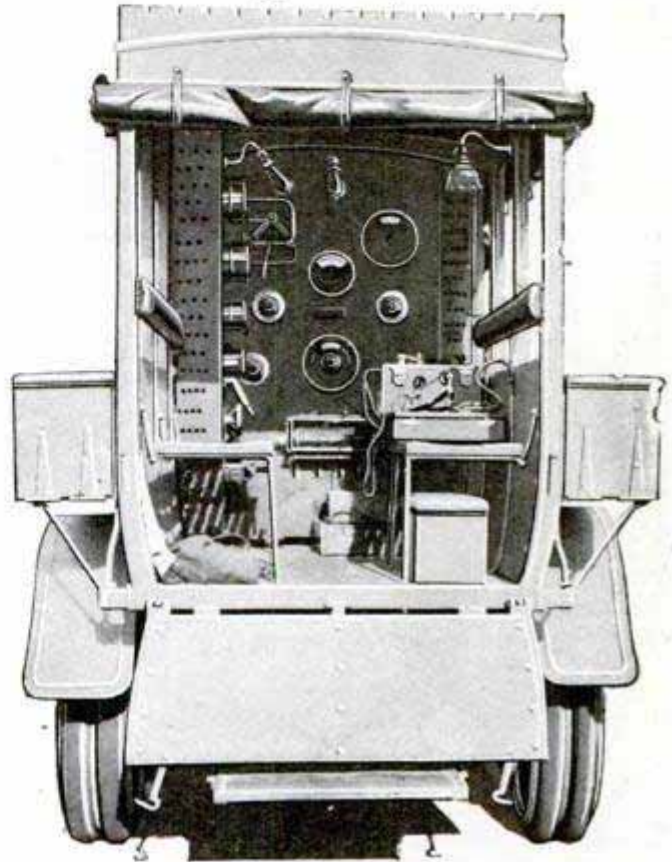
been produced which operates by catalytic action. It consists of a small bottle-shaped lamp which has the appearance of being merely an alcohol burner. A heated piece of platinum kept glowing by alcoholic fumes acts as the catalytic agent by

converting the vapor into formaldehyde. This permeates the air and removes from it the odors of stale tobacco smoke, kitchen smells, and gases. By mixing a small quantity of perfume with the alcohol, the lamp gives off its antiseptic vapor and at the same time scatters the aroma of the perfume.

CIn flying over the Santis Mountain, Switzerland, a German army dirigible established a new altitude record, rising to a height of 10,000 feet.

AUTOMOBILE EQUIPPED WITH ARMY WIRELESS

One of the latest and biggest advances in military communication is the wireless apparatus, mounted on an



The Wireless Apparatus Carried in This Car Has a Range of 800 Miles; It Is the Standard Equipment Now in Use by the United States Army Signal Corps

automobile of special design, that has just been placed in use in the Signal Corps. This apparatus is designed to have an effective range of 800 miles. Its receiving range is much greater than this, as was shown by tests made in Washington, when messages were received from Boston, from Porto Rico, and from ships at sea, one of which was 2,500 miles away. Power for the wireless apparatus is supplied by a generator that is driven through a train of gears by the 30-hp. gasoline engine used in driving the car. The antennae are of the umbrella type, mounted at the top of an 85-ft. mast which is built in nine sections. The sections are designed for quick erection, the first section being raised by hand, and the others by block and tackle. The mast is stayed by guy wires. When taken down, the nine sections can be carried in a compartment at the side of the car.

INDUSTRIAL INDEPENDENCE OF THE UNITED STATES

In the effort to stimulate the development of new industries in the United States to supply products for which this country has been dependent upon Europe and the supply of which has been cut off or seriously diminished by the war, the United States Geological Survey has issued a publication entitled "Our Mineral Reserves" in which it is pointed out that this country possesses undeveloped resources, particularly in minerals, sufficient to supply practically all our needs. It is stated in this bulletin that no other nation in the world so nearly approaches absolute independence in the matter of mineral resources. The only essential minerals of the first rank of which the United States has no known supply, at all commensurate with its needs, are nitrates, potash salts, tin, nickel, and platinum—two essential mineral fertilizers and three useful metals. Our production of coal not only exceeds that of any other nation, but nearly equals the combined output of Great Britain and Germany, the nations that rank second and third. Coal tar obtained in the manufacture of coal gas and of coke is capable of producing hundreds of chemical products, most of which have heretofore been imported, and the development of a tremendous industry along this line is simply a matter of building and equipping the necessary plants. The situation in respect to crude petroleum and petroleum products is much the same so far as production is concerned, and the hardship for American producers in this respect is in the cutting off of exports.

Perhaps the greatest opportunity for American manufacturers, the Geological Survey points out, lies in the fact that great quantities of American metals in crude or semicrude condition have been crossing the Atlantic and then coming back to us in various manufactured forms. There seems to be no reason why this manufacture should not be done in this country, and this neglected opportunity may be one of

the permanent benefits to be derived by the people of the United States from the conditions created by the war. Although there have been considerable imports of iron and steel into this country, the iron-ore reserves of the United States are so enormous that iron-mining operations can easily respond to any demand caused by the cutting off of imports. Much the same situation exists in the production of manganese, and similar alloys, used in the making of special steel products, as well as with practically all the other essential metal, excepting tin, nickel, and platinum. The production of copper in this country has been far in excess of the demand, so that the prosperity of that industry depends on foreign markets. The same is true, on a smaller scale, with radium, and since the United States government is not a buyer of this rare metal the market is at present almost entirely cut off. With a long-continued war, however, other markets than those furnished by the nations now at war will doubtless be found.

HOLLOW STEEL RODS ROLLED BY NEW PROCESS

By means of a process recently developed and patented in England it is now possible to roll hollow steel rods in diameters of from $\frac{3}{4}$ in. to 3 in., and in lengths up to 20 ft. A hole is first drilled lengthwise through the billet from which the rod is to be rolled. This hole is packed with sand of a kind that will resist high temperatures, and the ends of the hole are securely closed with metal plugs. The billet is then heated and subjected to repeated rolling operations until a bar of the required dimensions is produced. The sand appears to act after the manner of a fluid, or an elastic mandrel, during the rolling process, and after the rolling is finished a sand-filled hole of uniform section is found to extend from end to end of the bar. The hollow rod is then finished by cutting off the plugged ends and removing the sand.



Using an Automobile as a "Locomotive" for Hauling a Train of Sight-Seeing Trailer Cars

SIGHT-SEEING CARS HAULED BY AUTOMOBILE

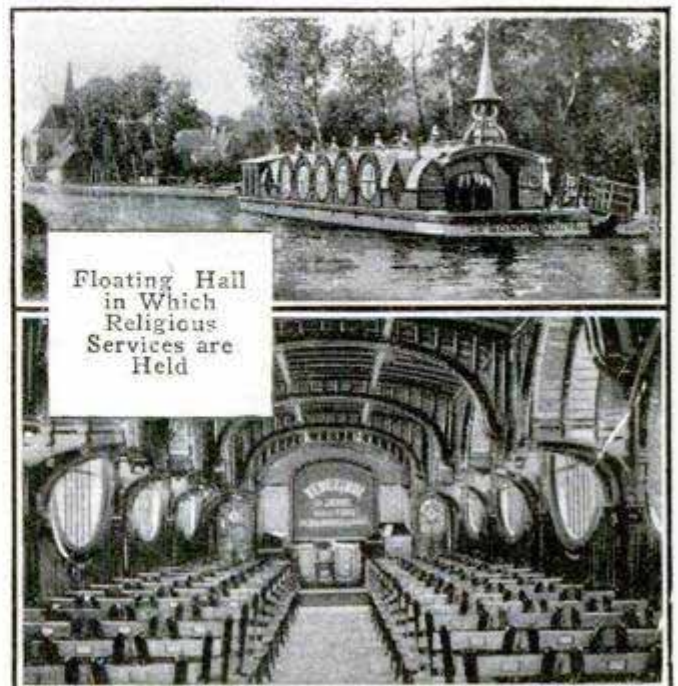
Among the many novel uses for the automobile the latest is that of putting it to work as a "locomotive" for hauling a train of sight-seeing trailer cars. The light car shown in the illustration is regularly employed in hauling the two trailers filled with sight-seers and is said to handle this load without difficulty.

INCANDESCENT LAMPS HEAT LABORATORY OVENS

In chemical, bacteriological and other laboratories where the nature of the work performed necessitates the employment of various degrees of constant temperature, metal and wooden ovens heated by electric lamps are being employed. Instead of there being a burner or series of coils at the base of one of these ovens, there is a socket board carrying a number of 16-cp. bulbs. With a board containing 12 of these globes, for instance, it is possible to obtain a temperature of approximately 198° F., in a metal oven, and about 212°, in one made of wood. Since the wiring is such as to allow any number of the lights to be turned on at one time, one of these ovens offers a wide range of degrees of heat, easily regulated and inexpensively made.

FRENCH MISSION BOAT A FLOATING CHAPEL

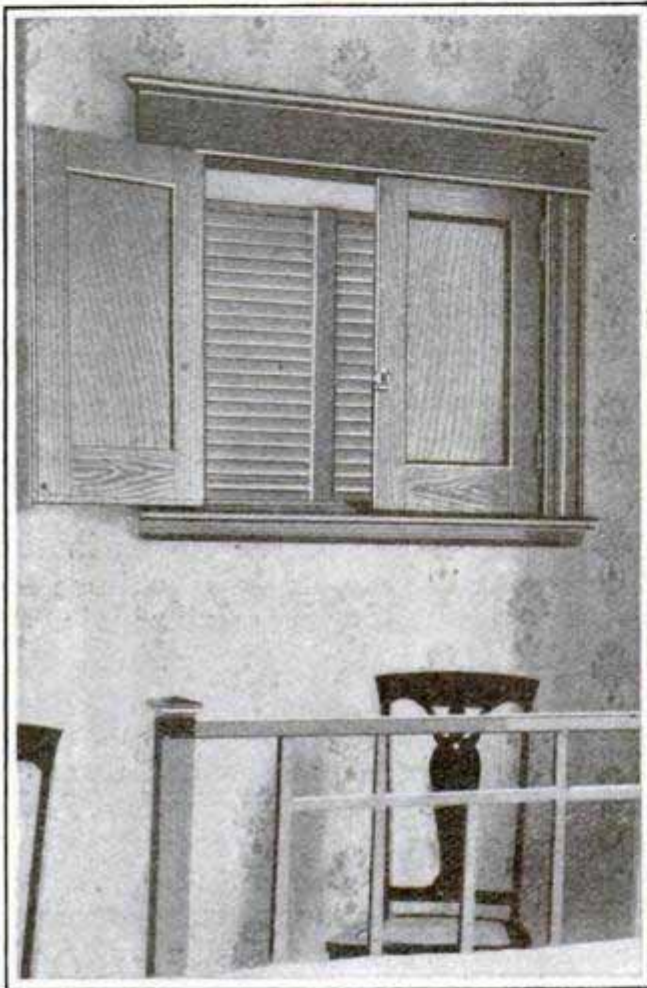
To reach some of the towns in the interior of France, especially those located upon the rivers and canals, an evangelical mission has provided two mission boats, or floating halls, capable of seating over a hundred persons. They are equipped with chancel, stained-glass windows, vaulted roof and an organ, to say nothing of a steeple, and bell with which service is announced. The strange craft is moored at some convenient point, a gangway is provided, and the town has a new chapel forthwith.



Floating Hall in Which Religious Services are Held

VENTILATOR OPENING MADE BURGLAR-PROOF

By placing a steel shutter frame across the window opening a resourceful householder has made what is be-



Steel Shutters Make Window Opening a Burglar-Proof Ventilator

lieved to be a burglar-proof ventilator. The shutter is shaped exactly like an ordinary window shutter and prevents snow and wind from beating in, while providing a means of air circulation. With the swinging doors closed, the ventilator has the appearance of a wall cabinet.

MAKING PHYSICAL VALUATION OF U. S. RAILROADS

The Interstate Commerce Commission has commenced the task of making a physical valuation of the railroads of the United States. This means that every rail, tie, spike, in fact everything pertaining to all railroads in the various states of the Union, covering

some 360,714 miles, must be valued in dollars and cents, not only as it stands at the present time but also on the basis of the original cost. The enormousness of this undertaking is partly illustrated by the fact that while \$2,000,000 was appropriated for the work, it is considered it will require approximately \$10,000,000 annually for several years to actually execute it.

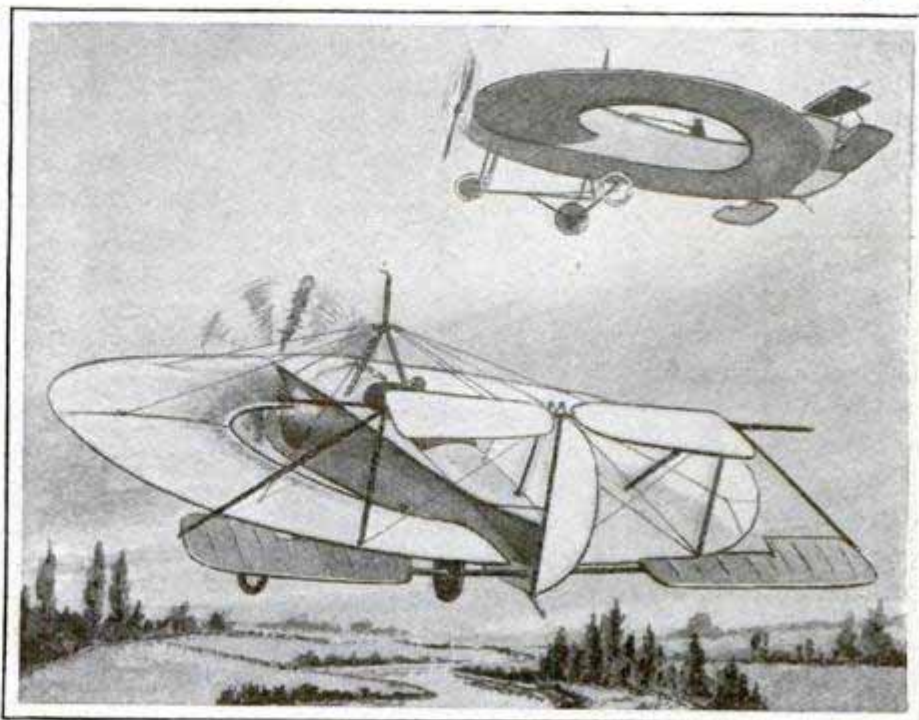
In beginning their work on the Salt Lake line, running between Salt Lake, Utah, and Los Angeles, Cal., the engineers are accepting practically none of the railroad records, but instead are making their own calculations. For instance, in estimating the cost of a railroad bridge the company's record is first secured and then a careful examination of the structure made. Measurements are taken, the quality of the material examined, and the amount of it used calculated. The cost of the material at the time the bridge was erected, the expense of transportation, of labor, of foodstuffs, and of various other things are considered carefully, and the cost of the structure at the time of its erection thus calculated. After this the present cost of reproduction is figured and the valuation made.

The difficulty does not rest in learning the original cost of rails and ties, for example, but in determining their present worth. The same is true of the rolling stock. There are hundreds of thousands of passenger and freight cars and thousands of locomotives. Each of the latter is to be inspected and its present value determined. This, however, is impossible in the case of the cars. The cost of building a company's right of way is another thing which must be considered. To do this, cross sections of the track at various intervals must be made to arrive at the cost of cuts and fills. The valuation of the lands is another task, for in a general way every acre must be compared with adjoining real estate and both present and original values placed upon it. These are a few of the things which the undertaking includes.

DOUGHNUTLIKE MONOPLANE BUILT IN ENGLAND

A curious-looking monoplane, popularly known in Great Britain as the "Flying Teatray," is built ring-shaped, the idea of the inventor being to construct the craft on such lines that it would right itself automatically in the event of being capsized. Correctly speaking, the wings are curved backward to join with the tail, which is enlarged, thus completing a circle. Extending through the center of the ring and joining its two rims, is the body which differs little from that of an ordinary monoplane. Odd-looking plane surfaces and fins at the rear of the machine provide elevators, stabilizers, and a rudder. The craft is still in an

experimental stage, but has made several interesting flights and attracted



New English Monoplane Which is Popularly Known as the "Flying Teatray"

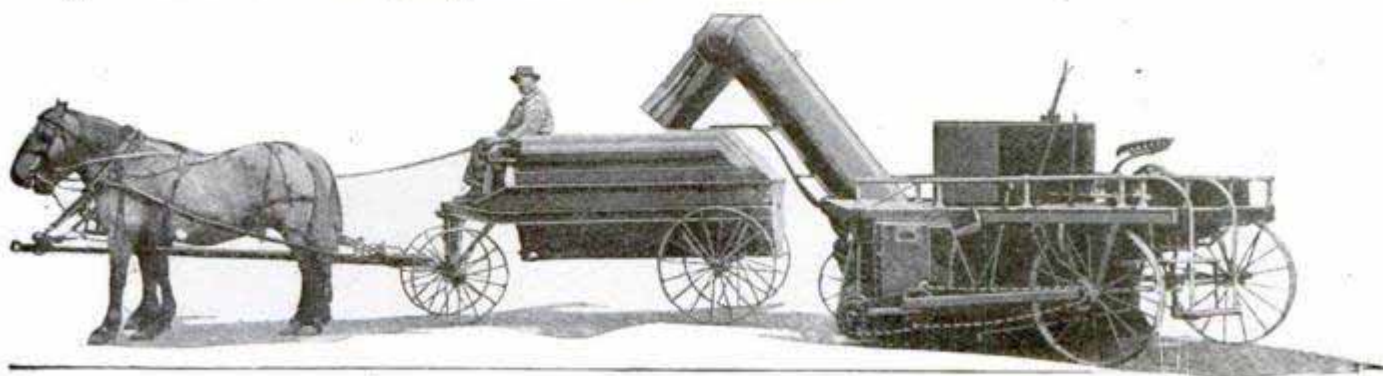
considerable comment on account of its peculiar appearance.

HORSE-OPERATED MACHINE FOR STREET CLEANING

A convenient and economical street-cleaning apparatus now being introduced consists of a combined sweeper and wagon. The sweeper is attached to the wagon by a pivoted-bar coupling, and the whole apparatus is drawn by a team of horses, while the sweepings are taken up by the machine, elevated through a chute, and deposited in the wagon as the work progresses. No

power, other than that required for drawing the apparatus through the street, is used for operating the sweeper. The single front wheel serves to guide the machine as it trails behind the wagon, while the two rear wheels operate the sweeping and elevating mechanism through chain connections.

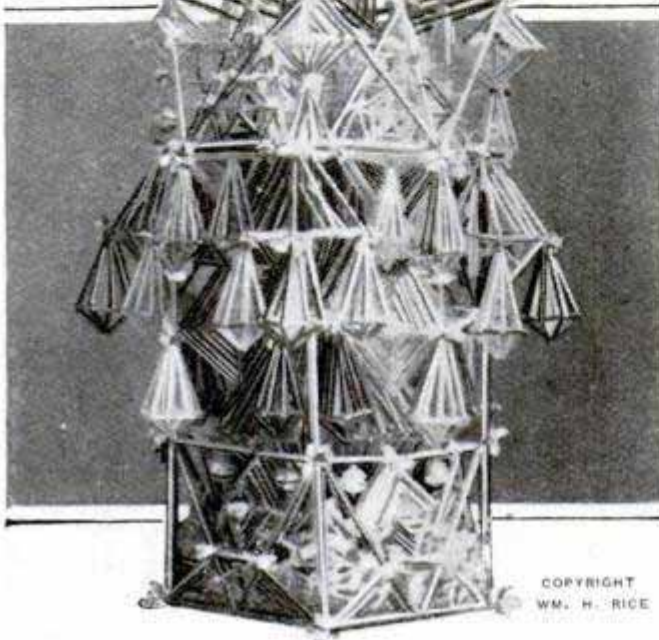
Storage tanks costing \$100,000 are to be built at San Francisco for supplying United States battleships with fuel oil.



The Street Sweepings are Taken Up by the Machine, Hoisted through the Chute, and Deposited in the Wagon; No Power is Used Except That of the Horses Hitched to the Wagon

GLASS-TOWER CONCEPTION OF DREAM TEMPLE

Made to symbolize physically the "air castles" of day dreams, a queer ornamental structure formed from thousands of small pieces of glass bound by hairlike wires of gold



A Fantastic Shaft Made by a Glassworker

and silver, has been built by an Oklahoma glassworker. Constructed like a fantastic tower with a myriad of odd-shaped forms pendant from it, the inside a maze of radiating spires, triangles, diamonds, and needles, it bewilders the eyes with its varicolored hues which blend together into a dazzling flame of light. The "castle" is built from 15,000 separate pieces of glass, is 40 in. in height, and 20 in. in circumference.

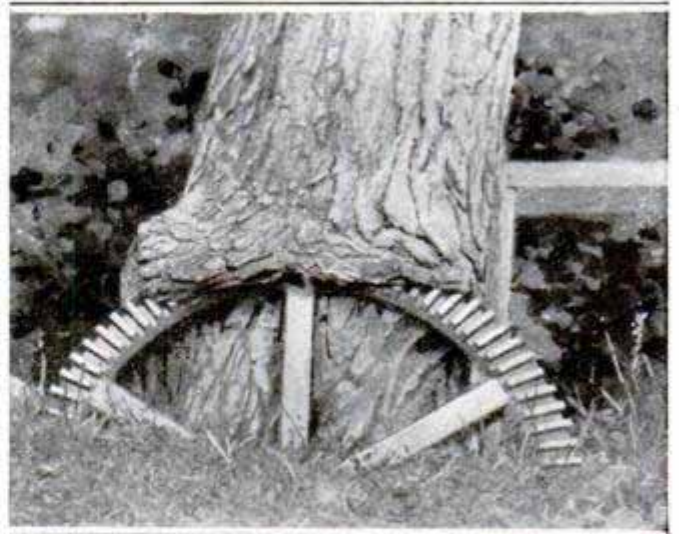
WEATHER BUREAU READOPTS BEAUFORT WIND SCALE

The Beaufort scale for designating various degrees of wind force has recently been readopted by the weather-bureau service of the United States Department of Agriculture. This was originally introduced in the British navy about the beginning of the nineteenth century and at that time referred particularly to the influence of the

winds upon sailing vessels. While this does not apply to present-day conditions, several of the terms are still in current use by mariners throughout the world. The reason for using the scale is that instrumental methods of measuring the wind cannot be used easily at sea, nor, for that matter, in many cases on land. Because of this, it has been necessary to resort to an arbitrary scale, which designates, for instance, a calm as equivalent to a force of from zero to 3 miles an hour; light air, over 3 to 8; light breeze, 8 to 13; gentle breeze, 13 to 18; moderate breeze, 18 to 23; fresh breeze, 23 to 28; strong breeze, 28 to 34; moderate gale, 34 to 40; fresh gale, 40 to 48; strong gale, 48 to 56; whole gale, 56 to 65; storm, 65 to 75, and hurricane, over 75.

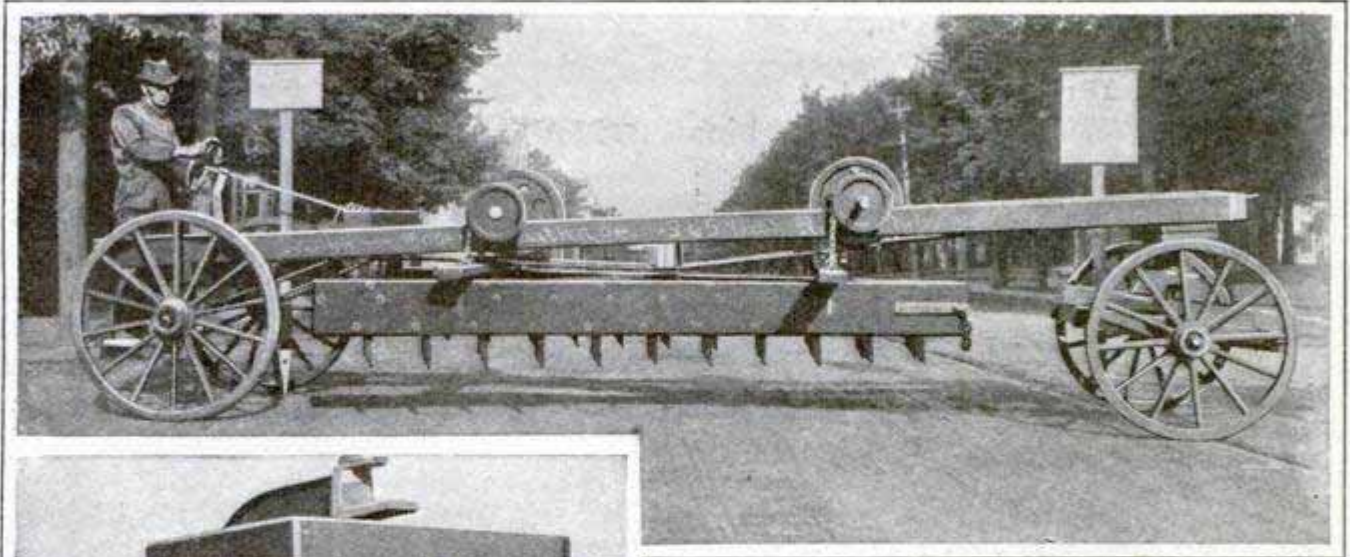
MILL WHEEL IMBEDDED IN A TREE

An old mill wheel almost entirely inclosed by the wood of a tree is one of the curious sights to be seen in the neighborhood of Yaphank, Long Island. A grain mill stands near the tree, and it is said that the wheel, worn out by years of use, was taken from this mill and stood up against the tree about 60 years ago. During these years

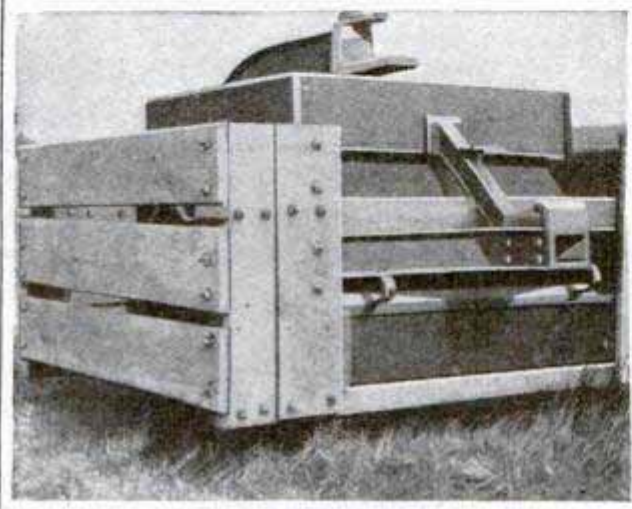


This Mill Wheel, Left Standing against the Tree About 60 Years Ago, is Now Firmly Imbedded in the Wood

it has never been disturbed and the wood and bark of the tree have simply grown around it.



Scarifier Made for Road Work: The Toothed Frame is Easily Adjusted to Take Off Only the High Spots or to Dig Up the Entire Road, as Required



The Weight of This Roller was Increased from Five to Eight Tons by the Addition of Oak Pockets Filled with Stone and Scrap Iron

CONCRETE WALLS PROTECT MINES FROM OLD FIRE

As a protection against a fire which raged several years ago, and which still may be smoldering, concrete bulkheads have been constructed in some of the old drifts and raises of an Arizona copper mine. This was done wherever the engineers considered that there was a possibility of danger from a fresh outbreak of fire. Heavy iron doors were built in some of these concrete walls, to allow the passage of the gases and provide access into the drifts. Concrete also is used to support the sides and roofs of a drift and its raise which it was desired to keep open as an outlet for gases that might form somewhere in the interior of the mine. This work shuts off the old fire area completely from the new workings so that, in case there were an unexpected fanning of the coals, the new flames could not reach the other drifts, nor interrupt work in them.

PRACTICAL MACHINES FOR ROAD WORK

A number of interesting and practical road-working machines have been developed for maintaining the roads in the vicinity of Carthage, Mo. One of these is an adaptation of the scarifier to road work, and consists of a four-wheeled vehicle carrying a metal-toothed frame which is easily raised or lowered by controlling levers. This frame is adjusted to the right height to take off only the high spots, or to dig up the entire road, as may be required. A five-ton roller, bought for road repair and construction, proved to be too light for the work, and an ingenious method was adopted for increasing its weight. Pockets made of heavy oak timbers, heavily bolted and resting on the roller frame, were built around the roller, and these pockets were filled with stone and scrap iron. In this way the weight was increased to eight tons, while there is sufficient space in the pockets to bring the weight up to 10 tons if necessary.

ⒸIn order to remove the drill barge "Teredo" which sank in Panama Canal, condemned fire hose was filled with dynamite and placed on the line along which it was desired to direct the force of the explosion. This made quite a clean cut and sheared off sections, which were raised by dipper dredges.

METAL GRAIN BINS USED IN KANSAS HARVEST

Portable sheet-metal grain bins of several hundred bushels' capacity were used in a number of localities in



Grain Bins of This Kind were Used in Harvesting
Kansas' Wheat Crop

Kansas when the state's heavy wheat yield was being harvested some weeks ago. The bins were placed conveniently about the fields in positions where the machines could deliver the grain into them just as rapidly as it was threshed. In the past, wooden granaries have been used frequently, but the metal bins introduced this year offered advantages in their comparative lightness which permitted their being hauled on ordinary hayracks and handled without difficulty.

GOLDEN TYPEWRITER BUILT FOR ALFONSO OF SPAIN

Bearing more the appearance of an ornament than a machine built for service, a gold typewriter was recently built for the personal use of King Alfonso of Spain. Nearly every part, even including the smallest screw, is heavily plated with gold, the space bar made of mother-of-pearl, while the royal arms occupy the space ordinarily held by the nameplate. The case is made of mahogany and is inlaid with rare woods and pearl.

CONCRETE BLOCKS ARE USED TO STOP LANDSLIDE

Massive concrete blocks laid in trenches running up the slope were recently employed in Switzerland to check the progress of a landslide in a deep railroad cut. The roadbed extended through an old slide where the formation consisted of clay and loam, mixed with boulders and underlain by marl. Cracks appeared in the earth above the summit of the slope and were of such a serious nature that it was readily realized there was not sufficient time at hand for the construction of a retaining wall. Excavations were imme-

diately made into the hard understrata over which the top mass was slipping, and the concrete blocks built up some 33 ft. apart. Four of these were first built, to which two more were soon added. The slide was stopped, but water in the soil caused the blocks partly to rise under the tremendous pressure.

OIL FLOW INCREASED BY ELECTRIC HEATER

Using an electric heater to increase the flow in oil wells, is a method that is being tried with considerable promise of success in the oil fields of California. The heater used is a long brass cylinder containing a large number of coils. This cylinder, with wires of the right length attached, is lowered to the bottom of the well and the wires are connected with a generator. The increased flow that has taken place in the experiments already made is explained on the theory that the heat expands the gas in the oil-bearing stratum and causes a greater upward pressure in the well. The heater consumes about 9 kw. of current an hour.

ARMORED HARDWARE MEN "ON THE WARPATH"



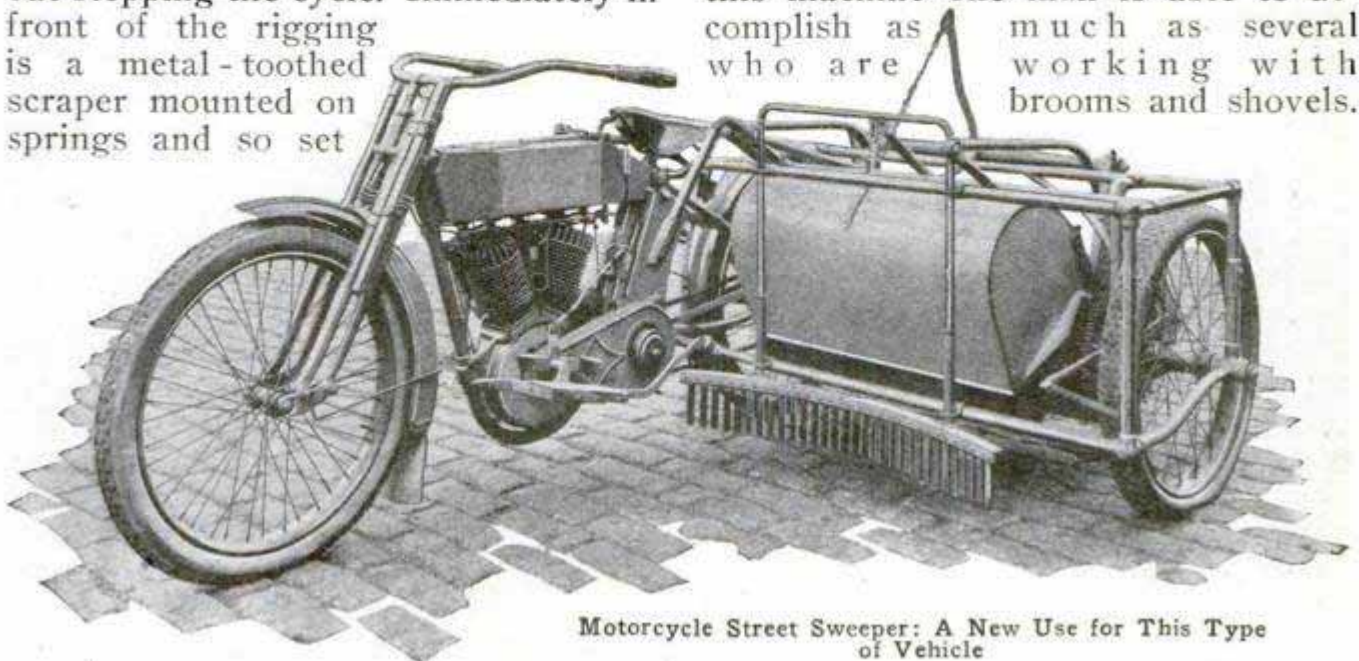
PHOTO BY G. F. MC CALL

A Parade of Savage-Appearing Hardware Men Clad in Medieval Armor Was One of the Most Striking Features of a Convention Held Recently in Waco, Texas

MOTORCYCLE NOW EMPLOYED FOR STREET SWEEPING

Especially designed for use on traffic-crowded thoroughfares and boulevards, a motorcycle street sweeper has been made for city use. The refuse pick-up apparatus is attached to the left side of the machine, similarly to a sidecar, and carries a rotary broom, 30 in. in length and 16 in. in diameter. In front of this is a dustpan which collects the dirt as it is brushed up and may be dumped, by the operation of a hand lever, without stopping the cycle. Immediately in front of the rigging is a metal-toothed scraper mounted on springs and so set

as to loosen any refuse which may adhere to a pavement. The frame of the motorcycle is changed slightly for this function, but its mechanical operation and general appearance are the same as any ordinary machine. One of the advantages claimed for the arrangement is that after a certain territory has been cleaned, the machine may be driven quickly to some other point for use, in that way serving as a time saver. With this machine one man is able to accomplish as much as several who are working with brooms and shovels.



Motorcycle Street Sweeper: A New Use for This Type of Vehicle

RAILWAY PUSH CAR MADE INTO MOTOR CAR

With train service demoralized over a large section of the line on account



This Crude Outfit, Used on a Canadian Railway in Time of Washout, Was Capable of Making a Speed of 20 Miles an Hour

of washouts, the employes of a Canadian railway improvised a motor car for their own convenience and used it successfully until it was discovered and its operation stopped by the railway authorities. This outfit consisted of an ordinary push car driven by a stationary gasoline engine. It operated between Decker and Fraser Lakes and was capable of making 20 miles an hour.

SOLE-LEATHER SUBSTITUTE PRODUCED FROM FELT

The continuous advancement in the price of shoe material has stimulated the development of a substitute for sole leather, which although much less expensive is asserted to possess wearing qualities two or three times as great as that of hide. The product is manufactured by a special treatment of waterproof felt which renders it quite similar in appearance to leather. One of the chief qualities of the sole is that it does not slip on wet or polished surfaces. It is made in various degrees of flexibility, and in use, may be treated as if it were leather. Since felt is a nonconductor of heat and cold it is claimed that shoes with these soles will be comfortable in both winter and summer.

EUROPEAN WAR PREVENTS WORLD AIR RACE

The inability of foreign airmen to participate in the round-the-world flying-machine race which was scheduled for next year, has caused plans for the contest to be abandoned. This announcement was made recently by the Aero Club of America. Elaborate preparations had been made for the meet by the Panama-Pacific Exposition, but the development of the European war made the execution of them impossible. It is now

proposed that a race be routed from New York to San Francisco by way of the Panama Canal. Naturally this would be participated in principally by American airmen.

DANGER IN UNDERINFLATION OF AUTOMOBILE TIRES

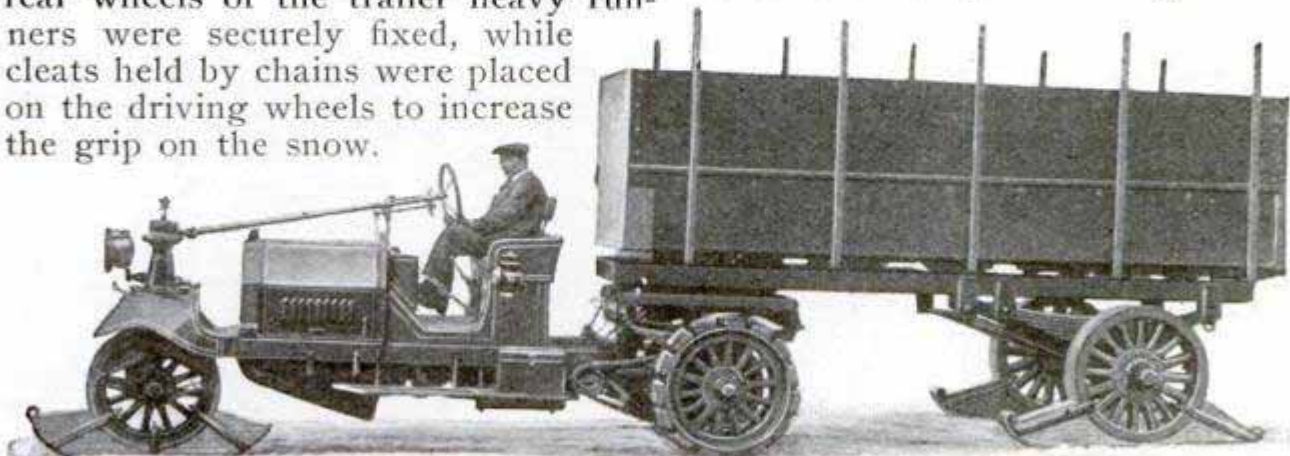
That underinflation of automobile tires is necessary in hot weather on account of the expansion of the air in the tires by the heat is denied by makers, and from careful tests it appears that the real danger is not from overinflation but from underinflation. In one test, a runabout considerably too heavy for the tires with which it was equipped was used, the tires having been pumped to a pressure of 80 lb. in the cool of the garage. After some intermittent driving the car was run continuously for half an hour over hot brick pavements and wood block covered with hot tar, and the test was concluded with a spin of 40 miles an hour over hot brick pavements. The air pressure, which was then measured immediately, showed an increase of only 4 lb. That such an increase is of practically no importance is apparent, since the best grades of tires are tested with pressures as high as 300 pounds.

CHEAPEST ARTIFICIAL GAS PRODUCED IN ENGLAND

The town of Widnes in England, which for years has been accredited with producing the cheapest artificial gas in the world, has announced a still further reduction in price. Through the installation of horizontal retorts which improved the carbonizing results, the cost of production has been lowered. A reduction in the rate was immediately recommended by the engineer and adopted by the council, bringing the price to consumers of less than 3,000,000 cu. ft. a year to 24 cents per 1,000 cu. ft., 20 cents a thousand to others, and 16 cents for gas used for power purposes. This will make the Widnes gas lower by a fourth than that of its nearest advertised competitor, the Sheffield Gas Company.

SNOW RUNNERS KEEP MOTOR TRUCKS IN OPERATION

A novel means of keeping its motor-truck service in operation when the streets were clogged with snow following severe storms was adopted by an automobile company in an eastern city. The equipment used in this service consisted of three-wheeled tractors, the rear of each of which was designed to support the front of a trailer, this arrangement being commonly known as a tractor-trailer combination. Under the front or steering wheel of the tractor and under the two rear wheels of the trailer heavy runners were securely fixed, while cleats held by chains were placed on the driving wheels to increase the grip on the snow.



Uninterrupted Motor-Truck Service was Maintained in the Snow-Clogged Streets of an Eastern City by the Simple Expedient of Placing Snow Runners on All But the Two Driving Wheels

CIGAR LIGHTER USED IN ITALIAN VILLAGES

A crude but successful cigar lighter much used in the country villages of Italy consists simply of a long piece of

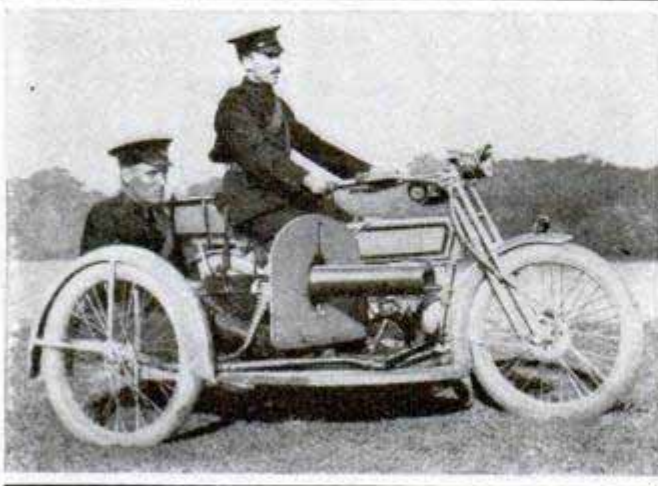


How Smokers in Italy Use One Rope to Light Another

slow-burning rope with one end lighted and supported on an iron stake. This lighter is placed just outside the cigar seller's door so that anyone may use it in passing. It serves also in place of the conventional wooden Indian of America as a cigar-store sign.

MOTORCYCLE MAKES ADVENT INTO ARTILLERY

An interesting adaptation of the motorcycle to military uses has been



Motorcycle Artillery, One of the Most Recently Developed Fighting Tools

made by employing it as a light artillery vehicle. An example of this is illustrated by the accompanying photograph which shows a machine gun mounted on a sidecar chassis. An artillery corps equipped in this manner is able to travel at the regular marching pace one moment and dash ahead to some distant point at a high rate of speed the next. The machine is American built, but was invented by a Canadian militia officer. It was used in maneuvers at Ft. Osborne, Winnipeg, some time ago, where its wide range of action was demonstrated.

PANAMA CANAL STIMULATES MAGNESITE MINING

The largest magnesite deposits in Sonoma County, California, were purchased recently by a new company and are now being reopened and worked. It is planned to make monthly delivery of several thousand tons of the product, shipping to the Atlantic seaboard via the Panama Canal. California has been the only state in this country to produce magnesite on a commercial basis and most of the material has been consumed there in the manufacture of paper, in which it is used as a digester for wood pulp, and in making plastic flooring, tiles, and fireproofing.

CUTTING EFFECT OF PAPER ON HARD METALS

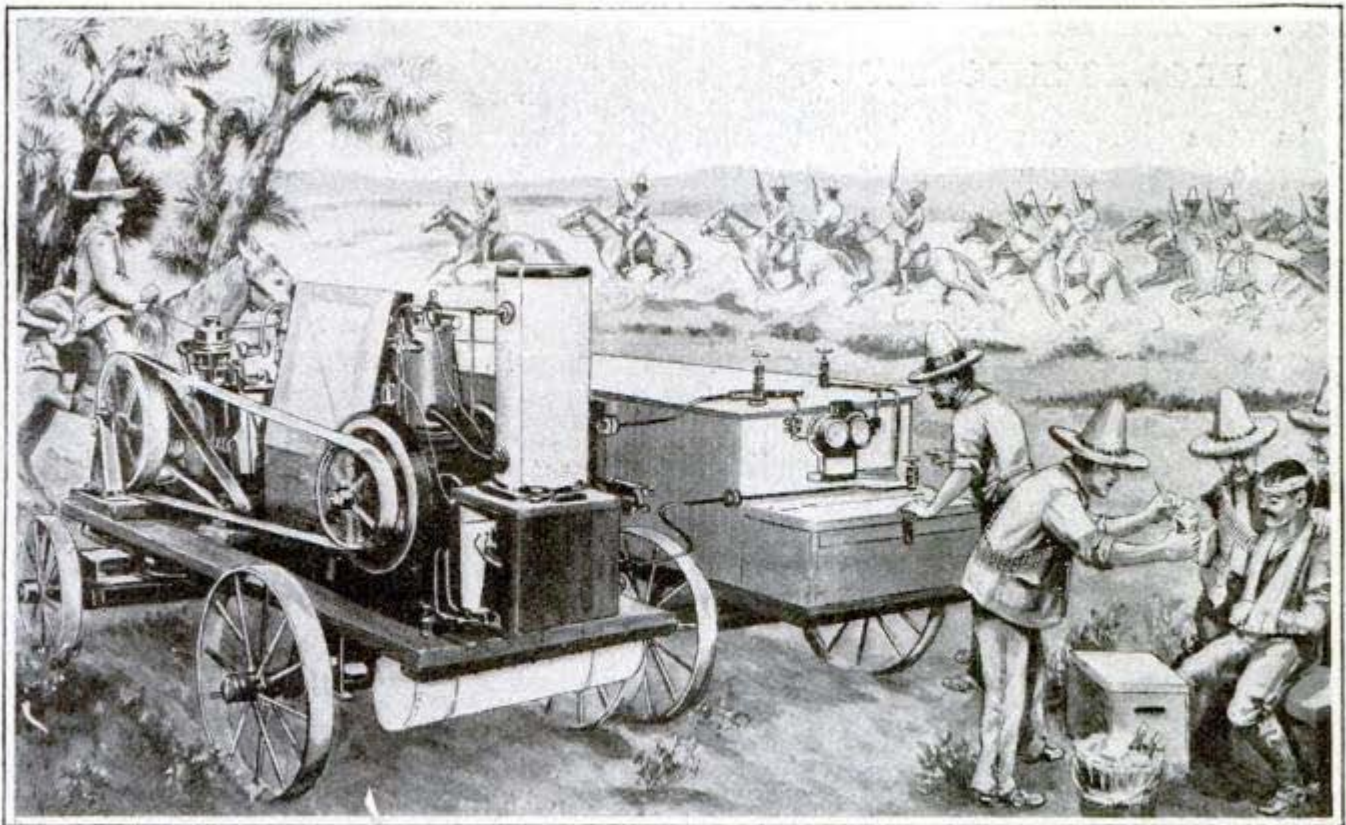
Paper under certain conditions will exert a cutting effect upon even the hardest metals. Where the edges of strips of paper continually rub against a metallic surface they in time cut smooth grooves in it and frequently saw it in two. In illustration of this, a steel screw, which for 20 years helped to hold together the guide board of a wall-paper trimmer, was worn completely in two merely by paper rubbing against it. During that time approximately 400,000 rolls of paper were trimmed by the machine. The screw was cut as smoothly as could have been done by any instrument.

GRAPEVINE COILED ABOUT STICK LIKE SNAKE

Coiled serpentlike around a branch of a poplar tree with its rounded and tapering form closely resembling that of a snake, a grapevine representing a curious example of the unusual in natural formations was found in the Michigan woods. The branch was cut and the bark stripped in making a cane from the two pieces of wood. The only carving which was necessary to make the twisted vine almost perfect in its reptile appearance was the shaping of the head.



Using a new type of diving armor made of rigid metal sections braced to resist water pressure, with watertight joints, a diver recently descended to a depth of 212 ft. in Long Island Sound, establishing a new American record for deep-sea diving.



The Portable Ice Plant Built for the Use of General Villa's Army in Mexico

PORTABLE ICE PLANT USED BY MEXICAN REBELS

General Francisco Villa, commanding the "constitutional" forces in the north of Mexico, had a portable ice-making apparatus constructed for the use of his army and hospital corps during his later operations. The machinery, which is capable of producing 500 lb. of ice at one time, is divided into two sections and mounted on substantial trucks which are attached to motor vehicles and transported when the army is on the march. The engine, cooling tower, and other of the equipment, are arranged on one truck, while the freezing tanks, 20 in number, and each with a capacity of 25 lb., are carried in a refrigeration box on another. When in operation the two trucks are placed alongside and their connecting pipes joined. In this manner ice can be supplied the forces within a short time after encampment, or even during the progress of a battle.

ⒸSafety-first statistics show that one workman is killed in the United States every 15 minutes and that one is injured every 16 seconds.

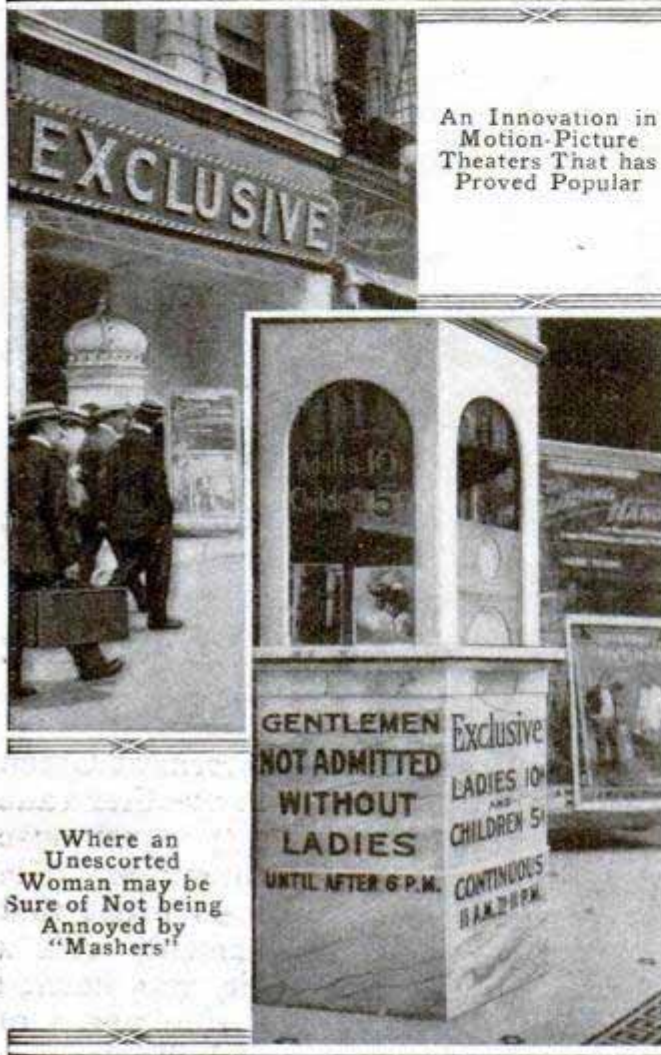
WIND HURLS WEATHER VANE LIKE JAVELIN

During a severe windstorm at Green Lake, Wis., a heavy iron weather vane on the top of the county courthouse was blown from its fastenings. The force of the wind was so great that the arrow-shaped instrument, with a large ball attached to it, was carried through the air to the side porch of the post office. The missile landed, spear-end first, piercing the flooring at one side of a door so deep that it required a strong pull to remove it.



MOVIE THEATER FOR WOMEN PROVES SUCCESSFUL

In the business district of Los Angeles, a motion-picture theater which restricts its patronage during



the daytime exclusively to women and children has met with success. The policy of the house is to present only films which are clean and uplifting and at the same time provide a place which an unescorted woman need have no hesitancy in entering. Until six o'clock in the evening men are not admitted unless they accompany women, a rule which is rigidly adhered to.

WHAT THE CUP-RACE YACHTS COST THEIR OWNERS

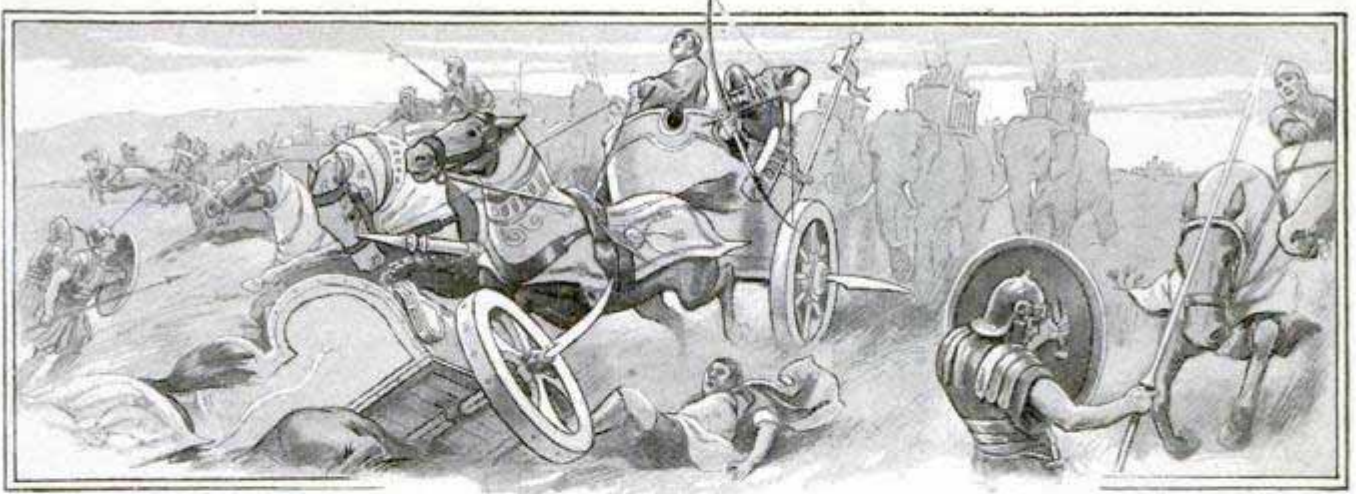
Stripped of their spars and rigging, with their sails stowed away and their decks boxed up for the winter, the three cup defenders and the challenger "Shamrock IV" lie at different ship-

yards in the United States and serve as pathetic reminders of the great "America's Cup" contest that was to have been held in September of this year. While the exact amount of money involved is not known, the three racing yachts, with the money spent in elimination races, in preparations for the final race, and in the numerous changes in rigging and equipment, are thought to represent an investment of at least \$1,500,000. The contest has been officially postponed to 1915, but if the war should last two or three years, the money invested is as good as thrown away, as in that event the deterioration of these yachts would be such that it is not likely any of them would be in condition to use in the cup race.

The "Defiance" is reported to have cost \$75,000, the "Vantie" \$100,000, and the "Resolute" \$125,000. The "Shamrock IV" is thought to have cost somewhat less than the "Vantie." The original cost of the yachts, however, is only a small part of the total expense. One authority estimates that it cost \$2,500 a day to keep the American boats in commission. A suit of sails costs about \$14,000, and in addition to the changes made, it was necessary to carry duplicate suits, while one set of spars cost about \$10,000. Numerous smaller items helped to swell the expense. On one yacht alone \$20,000 was paid in wages to the men, and this sum did not include the captain's salary.

UTAH SALT BEDS USED AS SPEED COURSE

The salt beds at Salduro, Utah, are now being used as a speed course for automobiles, and several runs that came close to breaking records have recently been made over this course. These salt beds have been described as being as smooth as a billiard table and as hard as a cement highway, and are admirably suited to automobile driving. They are 60 miles long, 20 miles wide and from 2 to 30 ft. deep.



The saying of Solomon the Wise, "There is nothing new under the sun," finds verification in the European war. The cable dispatches tell of German military motor trucks with scythe blades fixed to the hubs of the wheels to mow down hedges, fences, and wire obstructions. Four centuries before Christ the Persians used the same device on their chariot wheels to mow down the horses and foot soldiers of the Greeks.

FROM CATAPULT TO HOWITZER

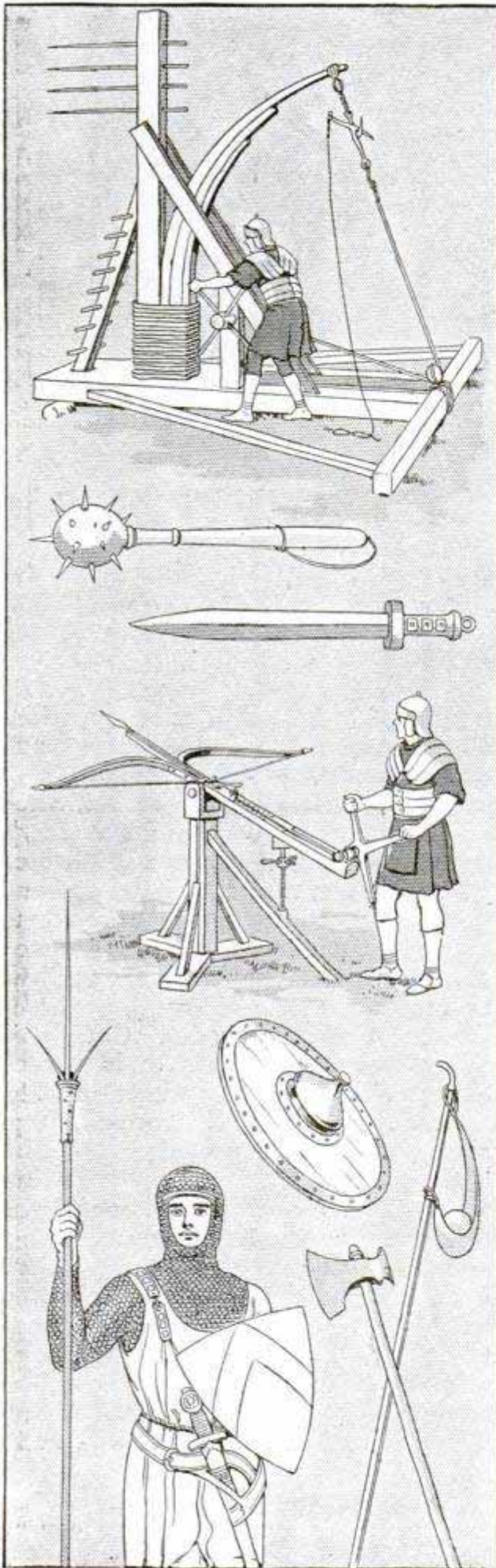
The Scene of the Present War Is the Laboratory in Which Man-Killing Devices have been Developed through Two Thousand Years of Warfare

By FRANK PARKER STOCKBRIDGE.

FROM the stones cast from slings with which the natives of Gaul sought to repel the advance of Caesar's Roman legions to the huge German howitzers hurling 16-in. explosive shells against the allies is as long a step mechanically as it is in point of time. But except for the temper of the weapons, there is no appreciable difference between the hand-to-hand conflicts—short sword against spear—of 59 B. C. and the bayonet charges of the French and English against the Germans in 1914. For nearly 2,000 years the ground on which the Great War is being fought has been almost a continuous battle field. Every form of weapon and every type of armor ever used by civilized man in the settlement of international differences or private quarrels has been tried, tested and developed almost on the same spot where the efficiency of the most modern implements of warfare is now being put to the supreme test. Omitting the one distinctly modern military arm—the flying corps—the differences between the weapons of 2,000 years ago and the weapons of today are differences in detail only, and excepting the class of weapons making use of gunpowder for the

propulsion of missiles, it is questionable whether there has been any marked increase in efficiency, either of men or of arms. As a last resort, when the order comes to rush the enemy's intrenchments, battles are still decided by brute strength and hand-to-hand fighting—sword to spear, bayonet to bayonet—just as in the days when Caesar wrote, "The Belgians are the bravest."

When Caesar invaded Gaul, his soldiers carried, besides their curved oblong shields for protection, the famous Roman short swords, sharp-pointed and two-edged, for close infighting, with javelins or throwing spears as missiles. These were also useful in hand-to-hand conflicts and were the prototype of the modern bayonet. Steel had not yet come into general use, but these soft-iron weapons had at least the merit of being easily sharpened on any convenient stone. And backing up the foot soldiers and horsemen, just as the artillery does today, was the Roman artillery, consisting of catapults, which were huge implements for hurling large rocks into the ranks of the enemy, and the ballista, a device working on the same principle, for throw-



Weapons Used in Europe's Great Wars

ing quantities of arrows. In each of these the propulsive force was produced by the sudden releasing of a great beam or tree trunk which had been bent by means of ropes and winches to form a huge spring. A shower of arrows hurled from a ballista must have created as much havoc in the ranks of the oncoming Gauls as the bursting of a shrapnel shell among the foot soldiers does today, while the great stones thrown by the catapults were often as large and heavy as the shells of the modern howitzers.

Against this formidable armament the Gauls—ancestors of the modern Belgians, French and South Germans—had no weapons that could be classed as artillery. Darts, which could be thrown by hand with considerable force and precision, and small stones cast by means of leather slings, just as David cast the pebble from the brook at Goliath, were hurled as missiles. Many of them used swords, somewhat longer than the Roman swords, while all were armed with wooden clubs, the heads of which were frequently studded with iron or bronze spikes. And their mounted men carried long spears—the weapon which, as the lance, continues to this day to be the favorite arm of European cavalry. The mounted Gauls, too, used the war hammer and to some extent the battle-ax. With variations in detail and in names these weapons—the sword, the lance, the club, the ax, and the throwing spear, together with the ballista and catapult—were, with the exception of a single important addition, the arms with which the great wars of Europe were fought for the next 1,400 years. And if it seems doubtful today that these fighting tools were efficient for their main purpose, that of killing men, the death rolls of the earlier European battles tell a different story. When the Goths and the Romans faced the Huns on the Catalaunian field in the year 451 A. D. and fought the battle which determined for the next 1,500 years whether the civilization of Christian



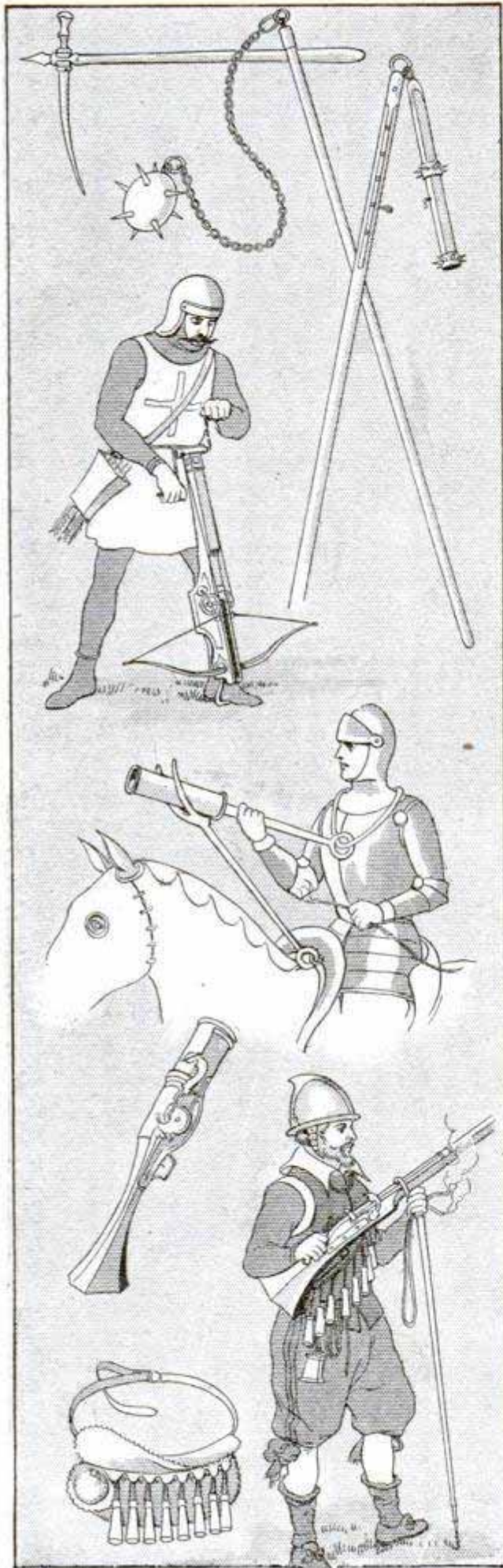
THE FIRST GREAT BATTLE OF NAMUR, 57 B. C.

HISTORY is repeating itself in the European war. Almost 2,000 years ago the Romans, under Julius Caesar, attacked the Belgian fortifications at Namur just as the Germans did in 1914. The catapult, the most powerful engine of war known in Roman days, was the forerunner of the great siege howitzers of the Germans. Supported by this artillery, the Roman soldiers rushed the Belgian defenses in their famous "testudo" or "tortoise" formation, closely massed and with shields overlapping to form an impenetrable defense against the spears and darts of the enemy. The captured Belgians of Namur were sold into slavery.



WHEN FRENCH FOUGHT GERMANS IN 789 A. D.

THE conquest of Saxony by the Franks under the leadership of the Emperor Charlemagne was the result of a war that lasted from the year 772 until 804. By this time chain armor had come into quite general use in warfare. The Saxons defended themselves with the short bow, the battle-ax, and the war club, or mace, as well as the sword and spear, upon which latter weapons and the force of superior numbers the Frankish hosts had largely to rely. Cavalry was at this period beginning to be employed in war to a larger extent than ever before.

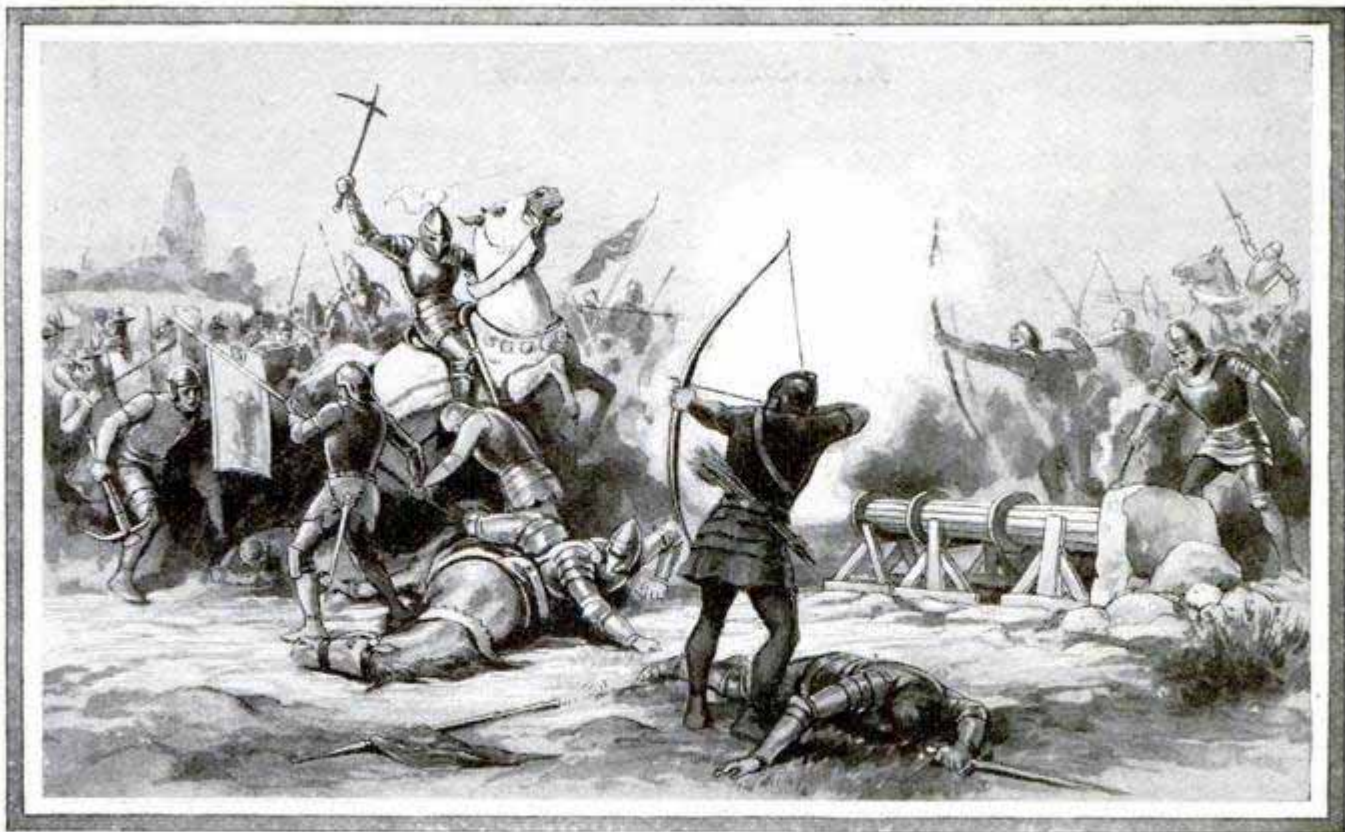


Weapons Used in Europe's Great Wars

Rome or the barbarism of pagan Asia should dominate Europe, there were left on the field 162,000 corpses. Some chroniclers put the number as high as 300,000, but even the lower figure exceeds by many tens of thousands the number killed in any single battle of modern times.

The one important addition that was made to the armament of European soldiers, prior to the introduction of gunpowder, was the bow. The short bow, 2½ to 3 ft. long, shooting an arrow 18 or 20 in. in length, and discharged by drawing the string back to the chest with the right hand, is of Asiatic origin, and while known to the ancient Greeks and Romans through their contacts with Oriental nations, never gained a permanent place in Roman armaments. Doubtless the Huns, as they swarmed into central Europe from the steppes of Asia, brought the bow with them, but so far as its influence in European warfare is concerned, they may be said to have taken it back to Asia with them. It was nearly 1000 A. D. before the bow became what it afterward was for more than four centuries—the principal weapon of the European foot soldier, occupying in one form or another the same position that the magazine rifle does today. The two important developments of the Asiatic short bow were the crossbow of continental Europe and the famous long bow of England. The long bow was about 5 ft. in length and the arrow—the “cloth-yard shaft” of the old chroniclers—3 ft. long. Drawn back to the right ear, the long bow could propel the cloth-yard shaft a surprising distance. Practice with the bow at ranges of less than one furlong—an eighth of a mile—was forbidden by law in the time of Henry the Eighth, so great was the range of this weapon, and it is recorded of a Welsh archer that he drove his arrow through an oak door 4 in. thick with such force that the head stood out a hand's breadth on the other side.

While the English were developing the long bow, the French and Spanish modified the short bow by mounting



THE DEFEAT OF THE FRENCH AT CRESSY, IN 1346

ALMOST within rifle shot of St. Quentin, where fierce fighting has occurred in the present war, the English army defeated the forces of France on August 26, 1346. Here for the first time in European warfare gunpowder was used. The three crude cannon of the English were merely tubes of staves, bound with hoops, and with stones piled up to close the breech. Round rocks were used as projectiles. The victory is not attributed so much to these "bombards," however, as to the superiority of the British archers, using the long bow, over the crossbowmen of the French. From this battle dates the beginning of the decline of the man in armor as a factor in war.



WHEN DUTCH FOUGHT SPANISH AT MALINES

MALINES and Termonde, towns that figure in the war news of today, were scenes of carnage in 1572, when the Duke of Alva marched against the Low Countries and for the first time in history the fate of a nation was decided by firearms. Here the Dutch were armed with the arquebus, a primitive type of gun, so heavy that each soldier had to carry a forked iron rest to steady his piece while firing. The Spanish troops, too, had guns, to which they had given the name of "muskets." The Dutch were victorious, but the Spanish musket, as the better weapon, became the standard arm of all Europe and from it, through many stages, the modern military repeating rifle was evolved.

it horizontally on a wooden stock, and provided a catch, released by a trigger, for holding the string when the bow was bent. This weapon, the crossbow, discharged an arrow with great penetrative force, and for five centuries, until displaced by firearms, was the principal weapon of the common soldier in continental Europe. As steel came into use the bow of the crossbow was frequently made of this metal and some were so powerful that no man could bend them, so mechanical contrivances were devised for this purpose. A steel crossbow, equipped with a winch for bending it, could drive a bolt or short arrow through chain armor, and as the power of this weapon and of the English long bow developed, the armor of the captains of the fighting men was strengthened until, in the 14th century, the kings and wealthier noblemen went to war entirely encased, man and horse, in hammered steel plates.

The superiority of the long bow over the crossbow was demonstrated at the battle of Cressy in 1346, the decisive battle of the One Hundred Years' War between the English and the French, where, as the old chroniclers relate it, the long arrows of the British archers flew in such clouds that they obscured the sun. The man with the long bow could shoot several arrows while the crossbowman was shooting one.

In this battle, fought only a few miles from the scene of some of the fiercest conflicts of the present war, gunpowder was used for the first time, the English forces having three crude cannon, or bombards, using the newly discovered explosive to hurl stones at the French just as Caesar's catapults had hurled stones at the Gauls. It was a hundred years or more after this, however, before the use of firearms became at all general in warfare, and nearly two centuries before the hand gun, mounted on a stock like that of the crossbow, began seriously to displace the bow. The earlier firearms were discharged by touching a live coal or a burning slow match to the prim-

ing powder, and these gunners carried, as part of their field equipment, pieces of rope soaked in saltpeter, which, when once lighted, would continue to smolder and provide the necessary fire for discharging their weapons. Later came the small arms having flint locks which, by means of a spring, struck a piece of flint stone against a sharp edge of steel, throwing off sparks which ignited the priming powder. The percussion cap, which displaced the flint lock in all its various forms, is less than a hundred years old, while the breech-loading rifle with fixed ammunition had only begun to be developed at the time of the Civil War in America, and the repeating rifle, now exclusively used in warfare, has been adopted for this purpose only within the last 25 years.

But, as the news from the battle fields of Europe proves, war is still largely a matter of hand-to-hand encounter. Then the rifle with its bayonet becomes merely a development of the spear of the ancient Gauls and the short sword of the old Romans, and when swung by its barrel it makes a war club somewhat less efficient than the ancient mace and its medieval variations.

GOVERNMENT CLOSES MARCONI WIRELESS STATION

Following the closing of the German-operated wireless station at Tuckerton, N. J., the Marconi station at Siasconset, Mass., was also ordered closed by the Secretary of the Navy because of the refusal of the Marconi company to submit to the censorship imposed by the United States government in the enforcement of neutrality in connection with the European war. The immediate cause of the action, according to newspaper reports, was the receipt and transmission by this station of a wireless request for coal made by a British cruiser.

ⒸShips of all belligerents in the European war are to be permitted to pass through the Panama Canal.

SOME AMERICAN PHASES OF THE GREAT WAR

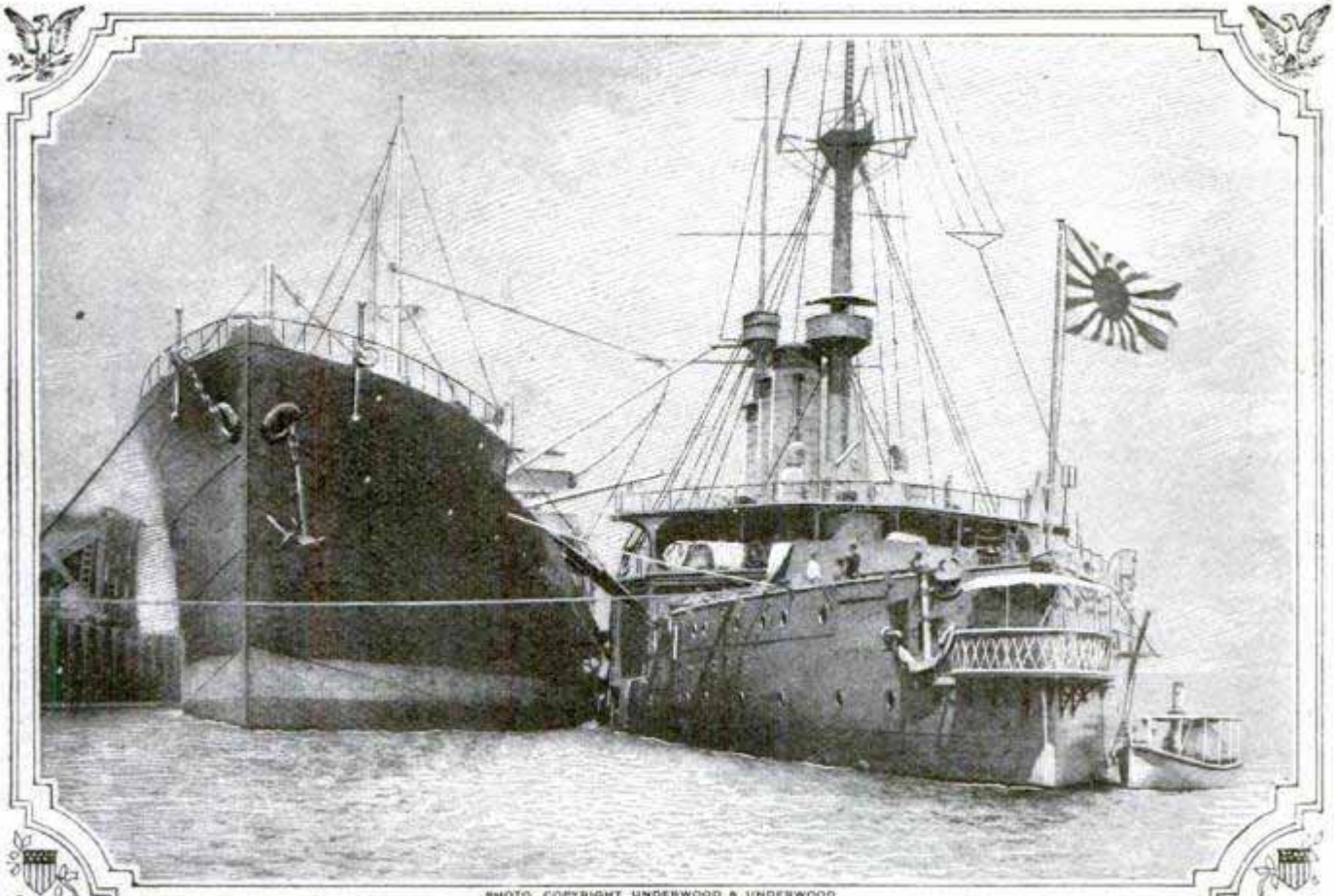


PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

In Various Ways the European War Touches America. Ships of the Belligerents Often Put into Our Neutral Ports for Supplies. The Photograph Shows the Japanese Cruiser "Idzumo" Coaling at San Diego from the British Tramp "Vestalia"

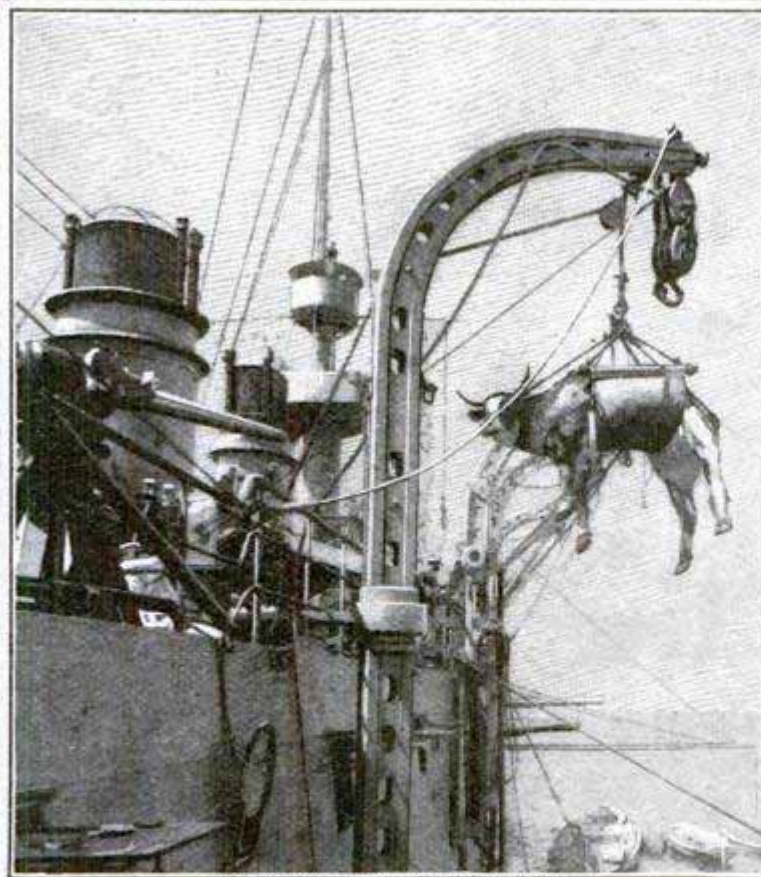


PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

A Warship of a Belligerent may Remain in a Neutral Port Only Long Enough to Take on Supplies. A French Cruiser is Shown Taking on Cattle, at San Diego



This War Map is Painted on the Inside of a Window and the Army Movements are Indicated Outside

THE GREAT WAR VIEWED FROM MANY ANGLES



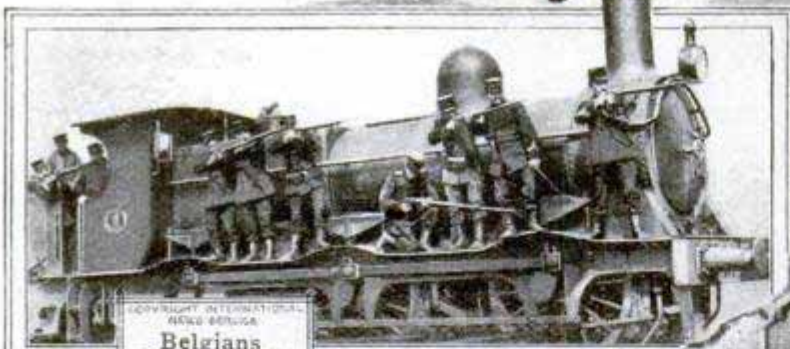
PHOTO COURTESY
UNDERWOOD & UNDERWOOD
**A Belgian
Cycle Corps
"Sniping"
Germans
on the Out-
skirts of
Ostend**



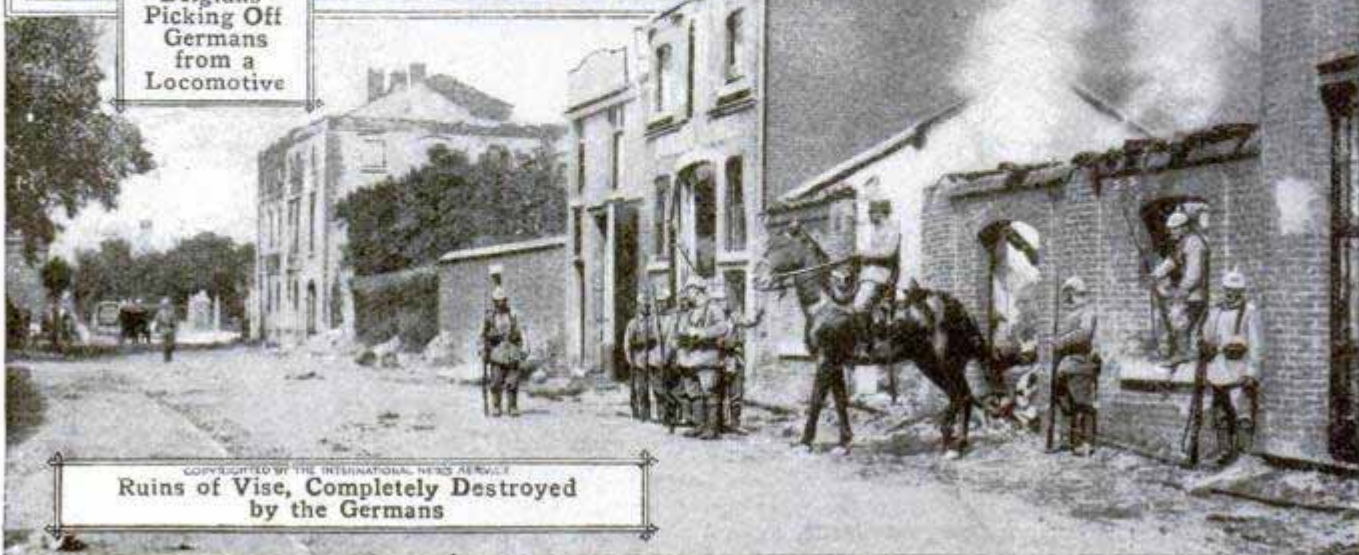
COPYRIGHT, INTERNATIONAL NEWS SERVICE,
**Belgian Armored Motor
Car Used on the
Skirmish Line**



COPYRIGHT, UNDERWOOD & UNDERWOOD
**French Mountaineers in Heavy
Marching Order**



COPYRIGHT, INTERNATIONAL
NEWS SERVICE
**Belgians
Picking Off
Germans
from a
Locomotive**



COPYRIGHT BY THE INTERNATIONAL NEWS SERVICE
**Ruins of Vise, Completely Destroyed
by the Germans**

TRYING TO CHECK THE GERMAN ADVANCE



COPYRIGHTED BY THE INTERNATIONAL NEWS SERVICE
Belgians Destroyed Their Own Railroads at Many Points

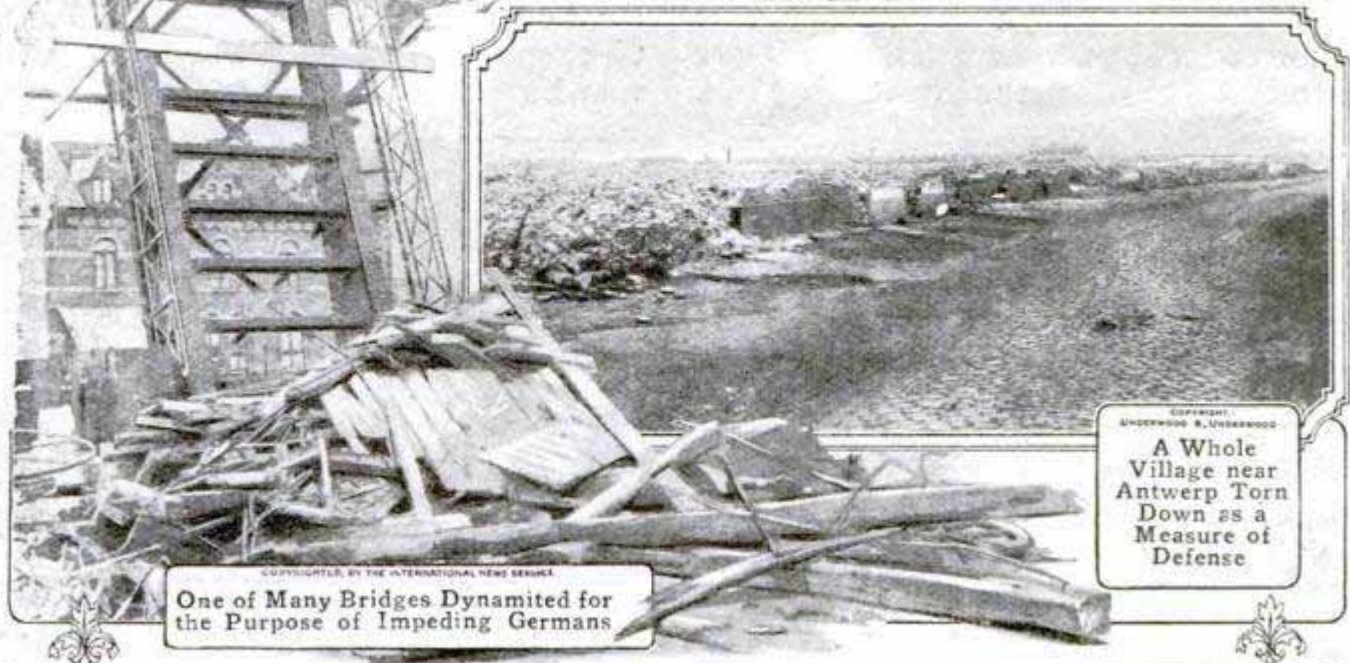


COPYRIGHT UNDERWOOD & UNDERWOOD
Steel Bridge over the River Meuse Blown Up by Belgians



Belgians Burning a Cottage near Waelham to Give a Clear Sweep for the Guns of Antwerp

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COPYRIGHTED BY THE INTERNATIONAL NEWS SERVICE
One of Many Bridges Dynamited for the Purpose of Impeding Germans

COPYRIGHT UNDERWOOD & UNDERWOOD
A Whole Village near Antwerp Torn Down as a Measure of Defense

SIZE AND POWER OF THE GERMAN HOWITZERS

SURPRISING DEVELOPMENT OF THE WAR

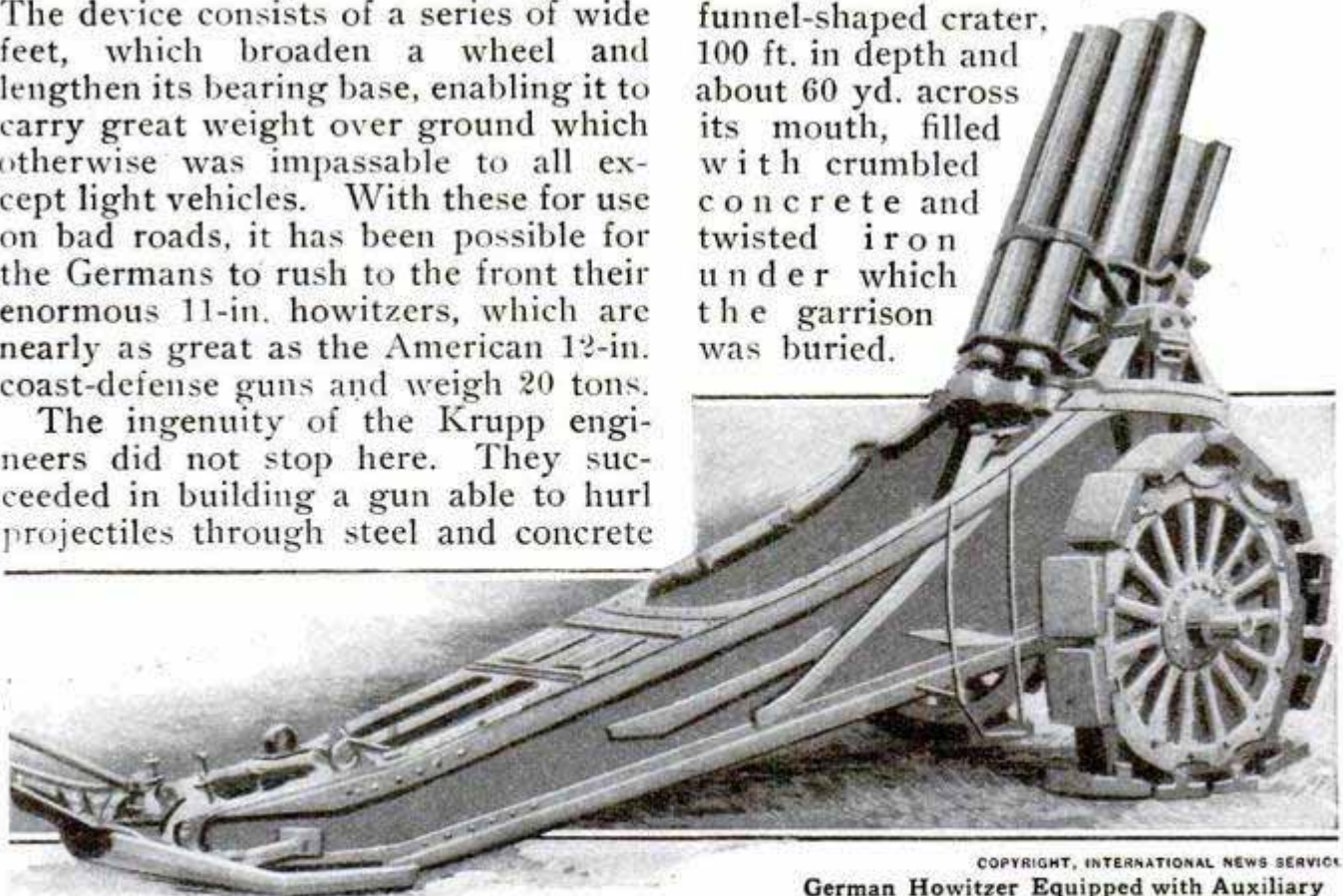
THE one big surprise for military experts thus far developed in the European war is the effectiveness of the heavy guns of the German field artillery. Never before have such terrible engines of annihilation been carried by an invading army as those used in the assaults upon the forts at Liege.

It had long been realized that more powerful guns would be needed in the field if modern inland fortifications were to be made to fall before an army, but there was apparent security in the fact that guns large enough for such a purpose would be too large to be transported from point to point. Even were motive power available, the enormous weight of the guns would make all but the hardest of paved highways impassable for them. But the development of the internal-combustion tractor solved the transportation problem, while that of hauling heavy weights over soft ground was solved by the invention of a detachable tread for the rims of gun-carriage wheels, described some months ago in this magazine. The device consists of a series of wide feet, which broaden a wheel and lengthen its bearing base, enabling it to carry great weight over ground which otherwise was impassable to all except light vehicles. With these for use on bad roads, it has been possible for the Germans to rush to the front their enormous 11-in. howitzers, which are nearly as great as the American 12-in. coast-defense guns and weigh 20 tons.

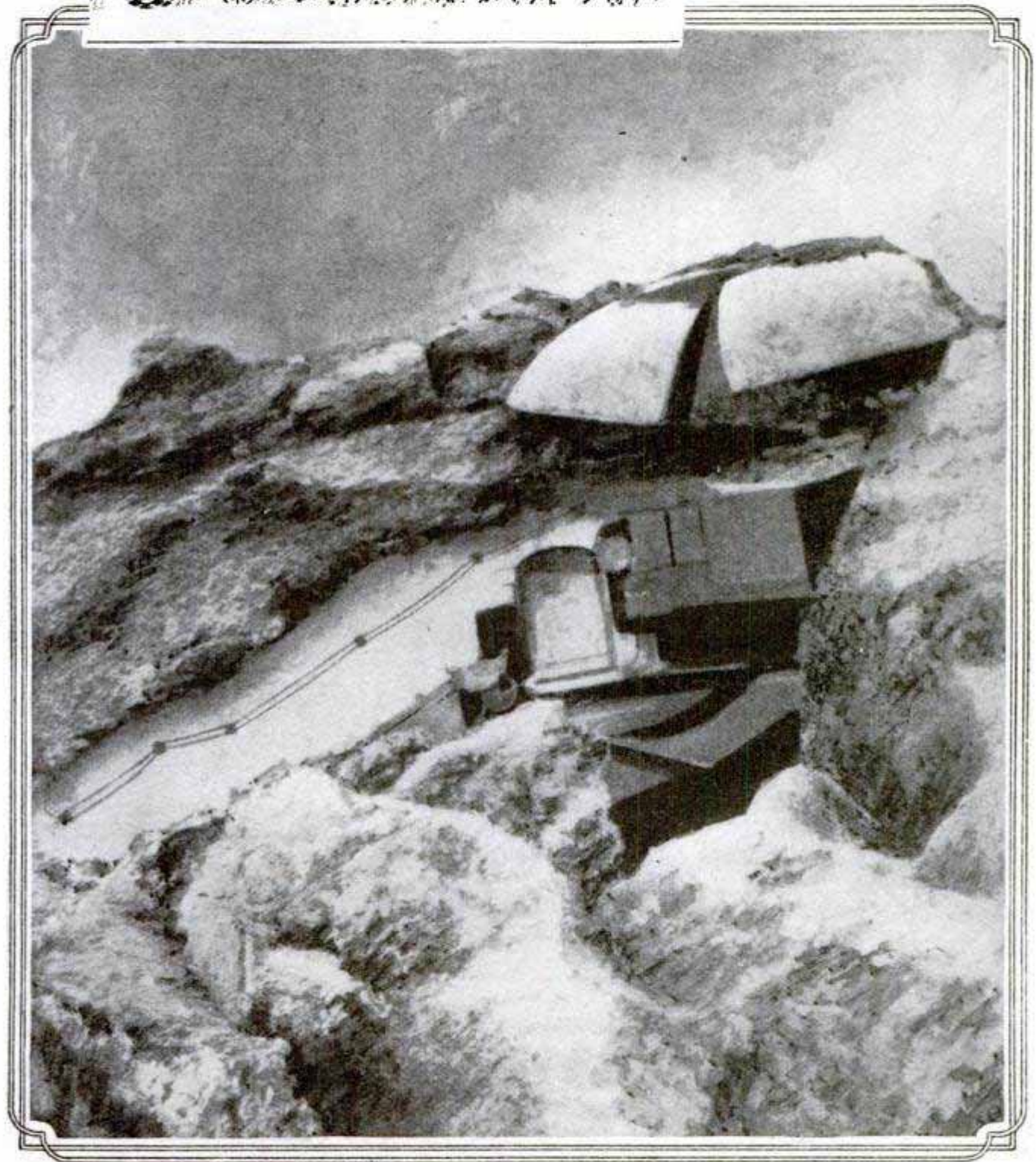
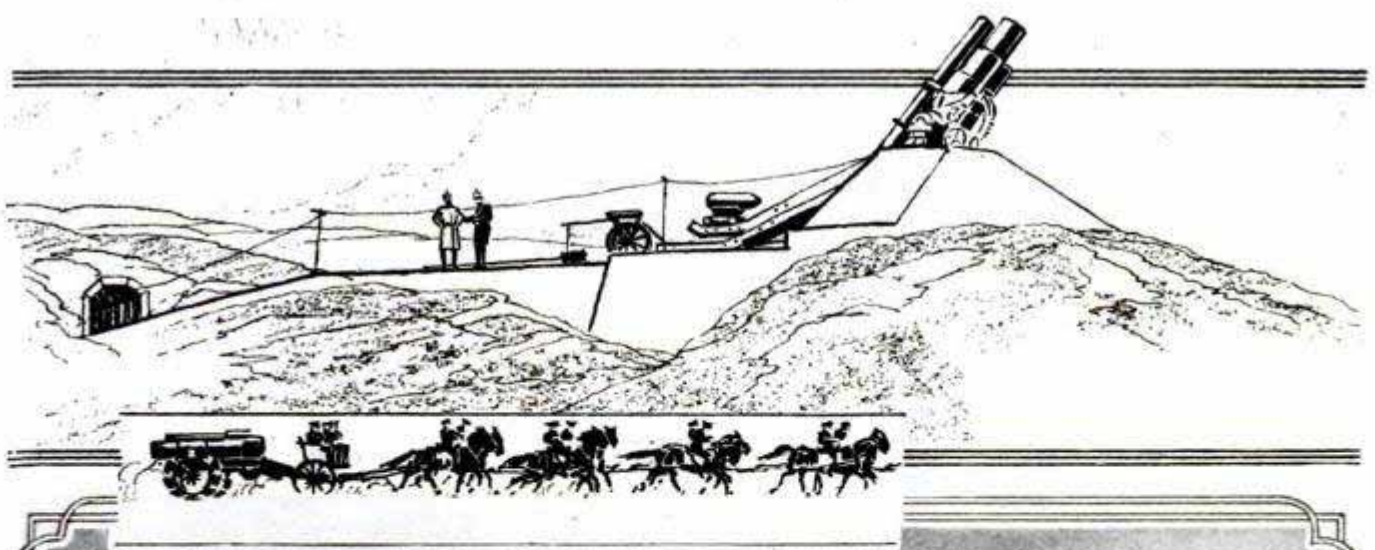
The ingenuity of the Krupp engineers did not stop here. They succeeded in building a gun able to hurl projectiles through steel and concrete

walls, such as those at Liege, almost as easily as if the works were of lath and plaster. The story of carnage and destruction wrought by a single shell from this masterpiece burdens the imagination. Profound secrecy has clothed the details of the construction of the machine, which was invented some eight years ago, tested and for obvious reasons subsequently pronounced a failure. It fires a 16.5-in. projectile, and when used at Liege against Fort Loncin was mounted on a base of concrete having a 100-ft. radius. A tunnel leading to a subterranean chamber was excavated some distance at the rear, from which the gun was fired by electricity.

A single shot from this immense German gun destroyed the principal defense of Liege. What happened is shown by the accompanying photograph. The projectile crashed through a ventilation shaft and bored its way into the bowels of the subterranean works, then burst, exploding the powder magazine. What remained was a funnel-shaped crater, 100 ft. in depth and about 60 yd. across its mouth, filled with crumbled concrete and twisted iron under which the garrison was buried.



COPYRIGHT, INTERNATIONAL NEWS SERVICE
German Howitzer Equipped with Auxiliary Treads, Enabling the Huge Gun to be Hauled Wherever an Army can March

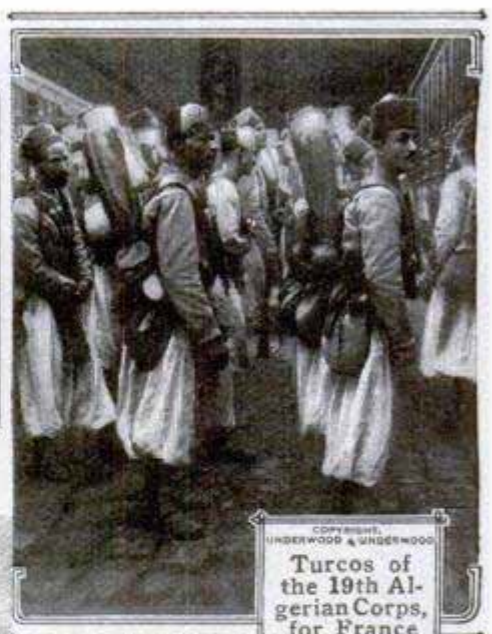


Photograph Shows Fort Loncin, One of the Fortresses Guarding Liege, After It was Struck by a Single Shell Fired from the 16.5-Inch Krupp Siege Gun of the German Artillery. The Fortification was Almost Entirely Subterranean and of Unusual Strength. Above is Illustrated the Method Used in Mounting This Huge Engine of Destruction

SOLDIERS FROM OVERSEAS WITH THE ALLIES



UNDERWOOD & UNDERWOOD
**Canadian Troops
 Crossing Log
 Bridge on Way
 to Transports**



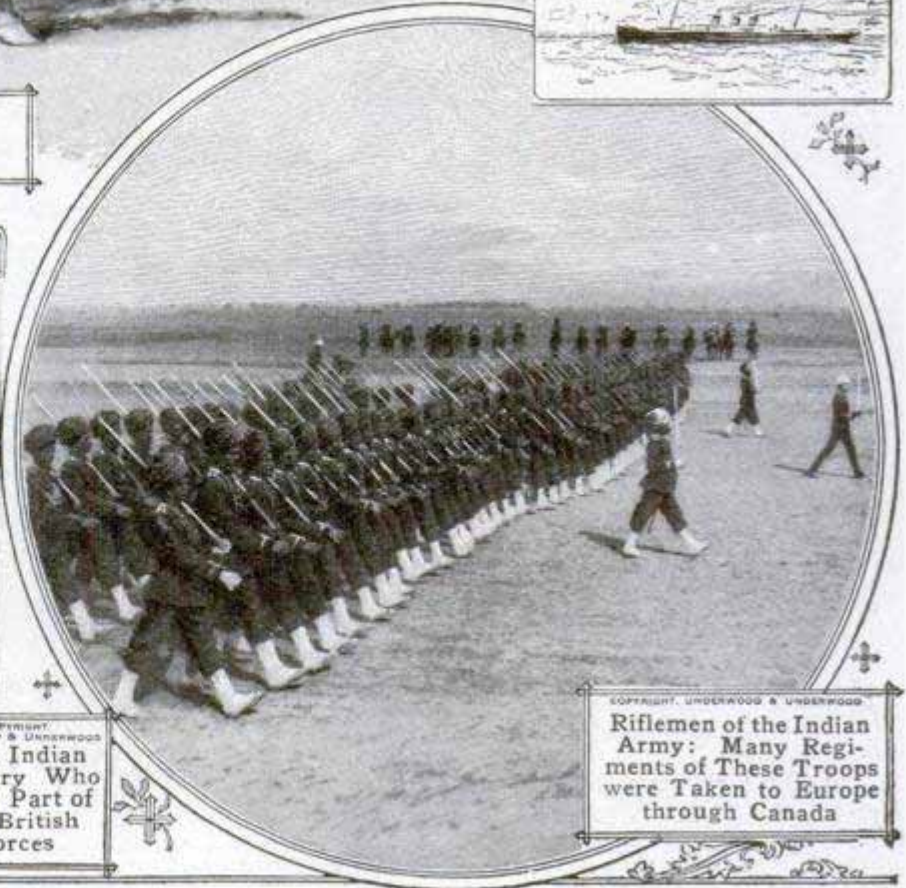
COPYRIGHT,
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**Turcos of
 the 19th Al-
 gerian Corps,
 for France**



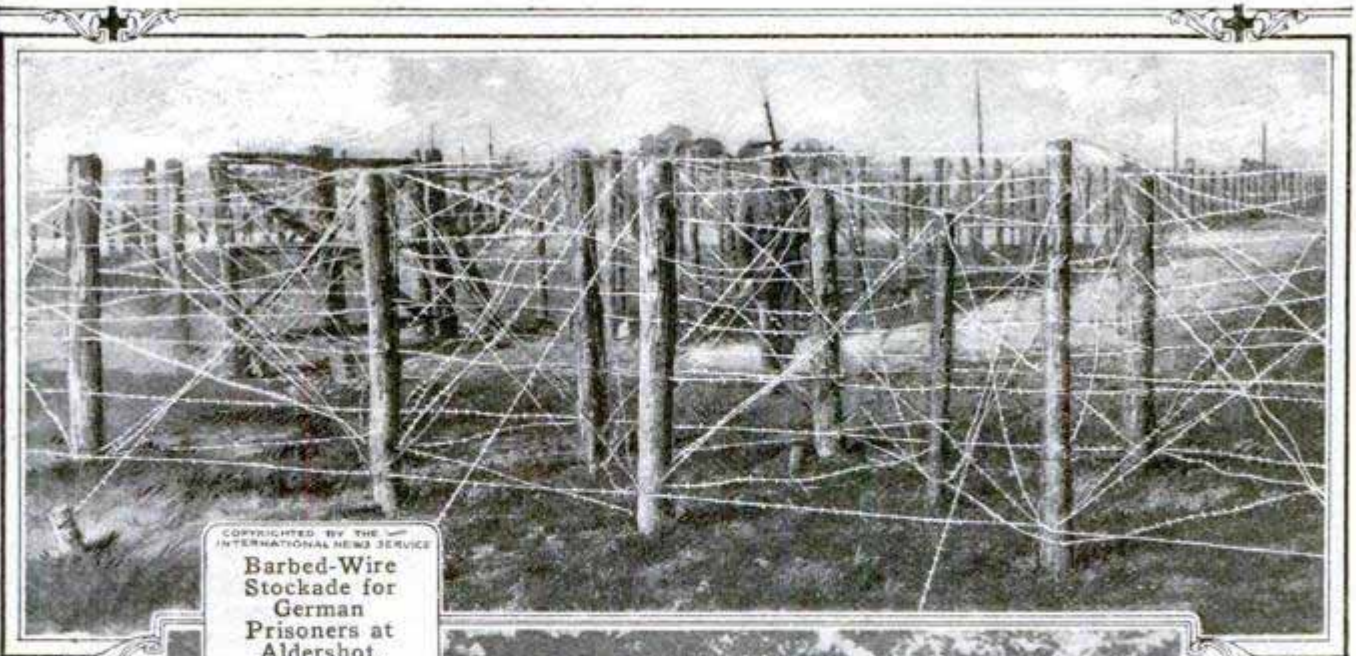
**Russian Cossacks, the Most
 Mobile Cavalry of Europe**



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**East Indian
 Infantry Who
 Form Part of
 the British
 Forces**



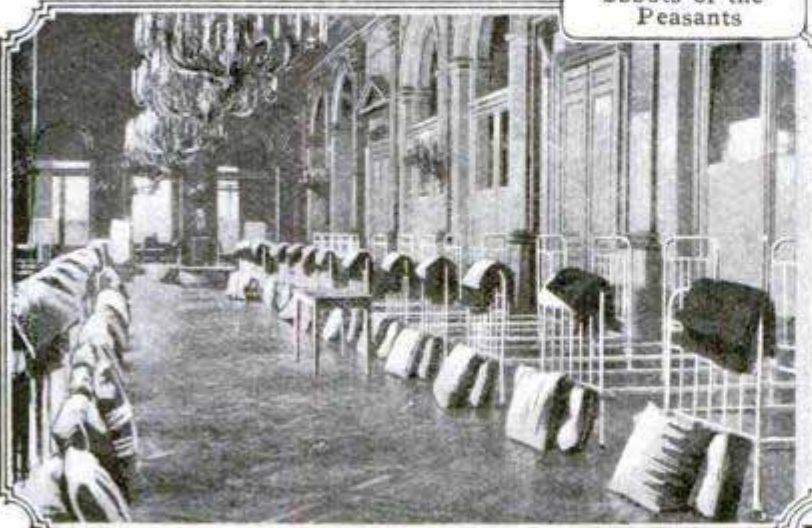
COPYRIGHT, UNDERWOOD & UNDERWOOD
**Riflemen of the Indian
 Army: Many Regi-
 ments of These Troops
 were Taken to Europe
 through Canada**



COPYRIGHTED BY THE INTERNATIONAL NEWS SERVICE
Barbed-Wire Stockade for German Prisoners at Aldershot, England



COPYRIGHTED BY THE INTERNATIONAL NEWS SERVICE
Germans Captured by Belgians had Discarded Their Army Boots for the Wooden Sabots of the Peasants



COPYRIGHTED BY THE INTERNATIONAL NEWS SERVICE
The Famous Ballroom in the Belgian Royal Palace at Brussels Transformed into a Military Hospital

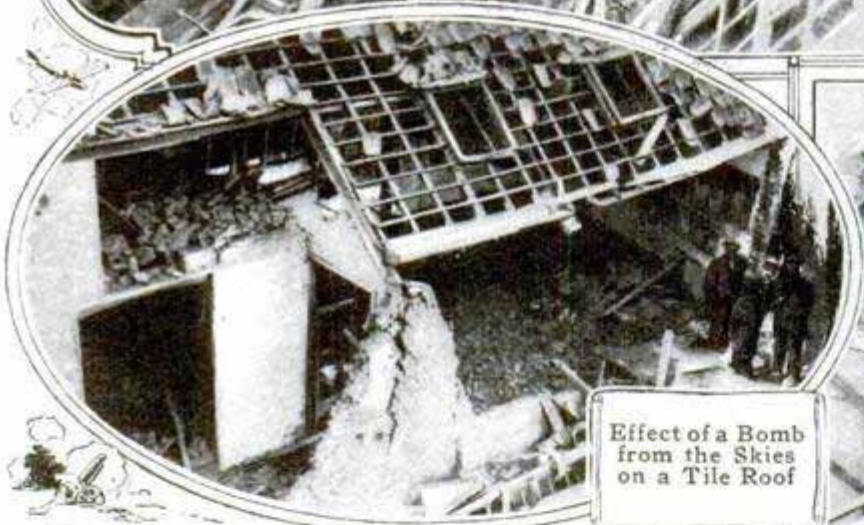


COPYRIGHTED BY UNDERWOOD & UNDERWOOD
Lowering a Wounded Sailor to Hospital Quarters below Decks

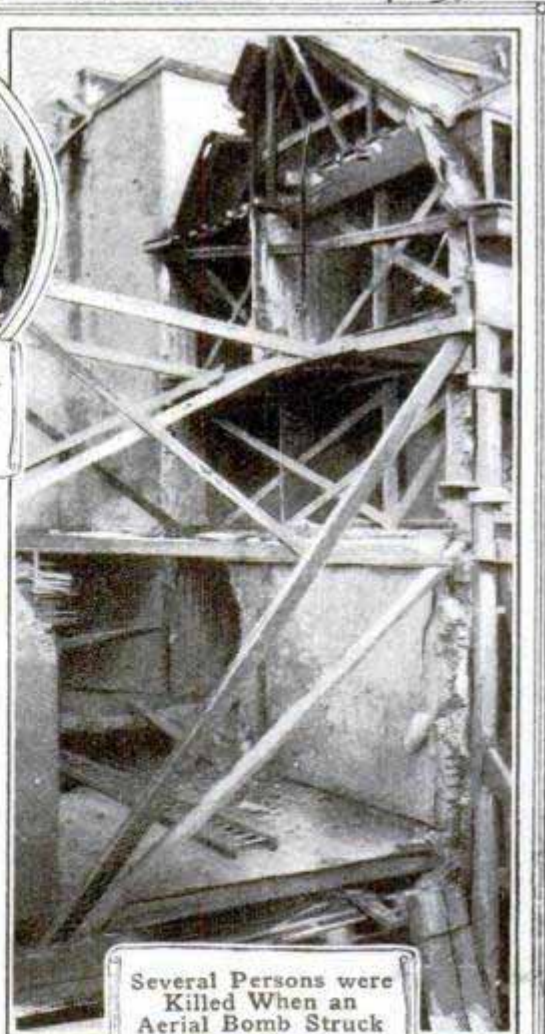
RESULTS OF THE BOMBARDMENT FROM THE SKY



Houses in a Suburb of Antwerp Wrecked by Zeppelin Bombs



Effect of a Bomb from the Skies on a Tile Roof



Several Persons were Killed When an Aerial Bomb Struck This House

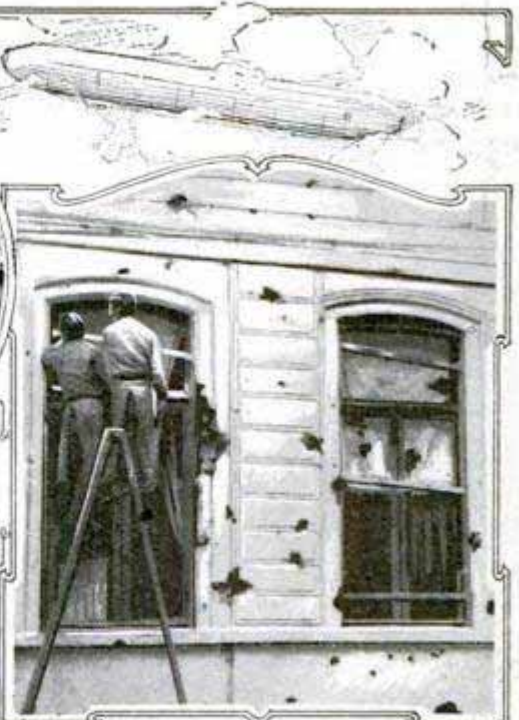


The Second Attack on Antwerp by Airships Caused the Damage Shown on this Page

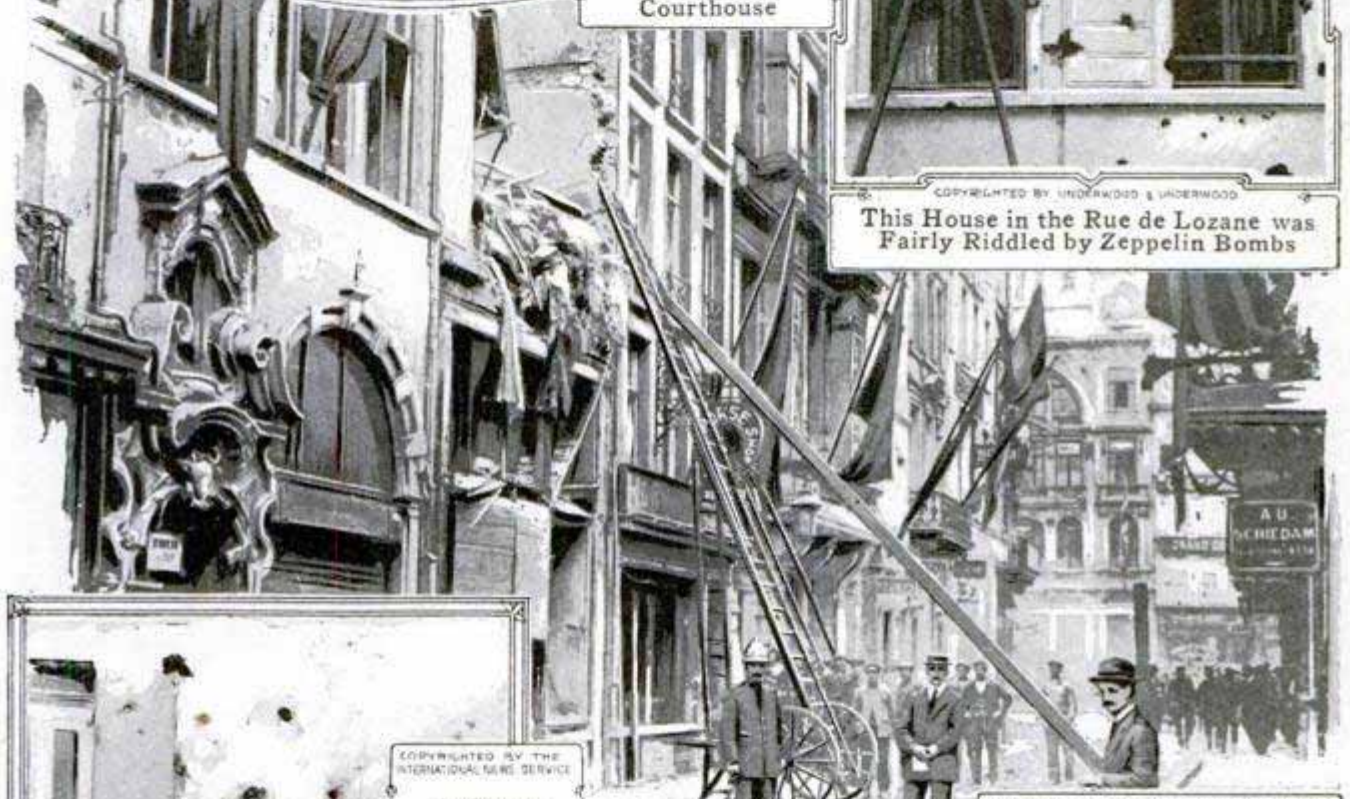
WHERE ZEPPELIN BOMBS DROPPED IN ANTWERP



COPYRIGHT UNDERWOOD & UNDERWOOD
Holes Blown in a House Wall by Exploding Aerial Bombs near the Antwerp Courthouse



COPYRIGHTED BY UNDERWOOD & UNDERWOOD
This House in the Rue de Lozane was Fairly Riddled by Zeppelin Bombs



COPYRIGHTED BY THE INTERNATIONAL NEWS SERVICE
A Single Bomb, Exploding in the Street, Did This Damage

COPYRIGHTED INTERNATIONAL NEWS SERVICE
A House So Wrecked by Zeppelin Bombs That the Fire Department had to Tear Down the Ruins.



COPYRIGHT UNDERWOOD & UNDERWOOD
An Aerial Bomb Exploding in the Fenced-Off Space Killed Seven Persons

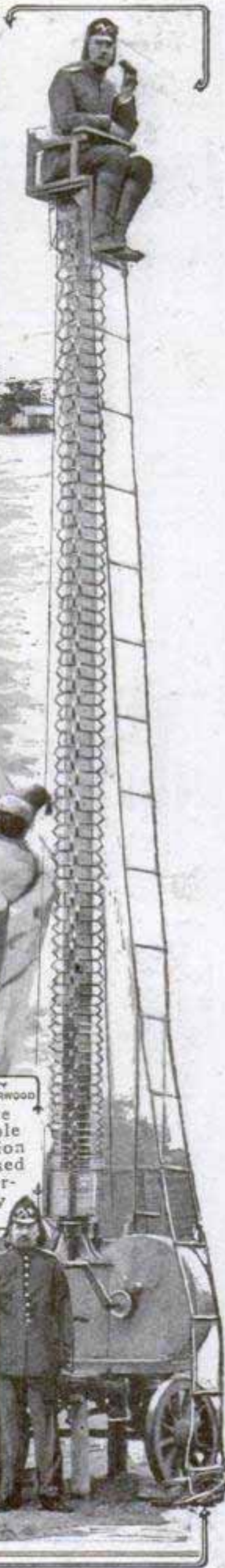
CURIOUS AND INTERESTING PHASES OF WAR



COPYRIGHTED BY THE INTERNATIONAL NEWS SERVICE
Canvas Wash Troughs Used by British Troops



COPYRIGHTED BY UNDERWOOD & UNDERWOOD
Thousands of English Motorcyclists Enlisted as Dispatch Bearers



COPYRIGHTED BY UNDERWOOD & UNDERWOOD
Portable Collapsible Observation Tower Used by the German Army



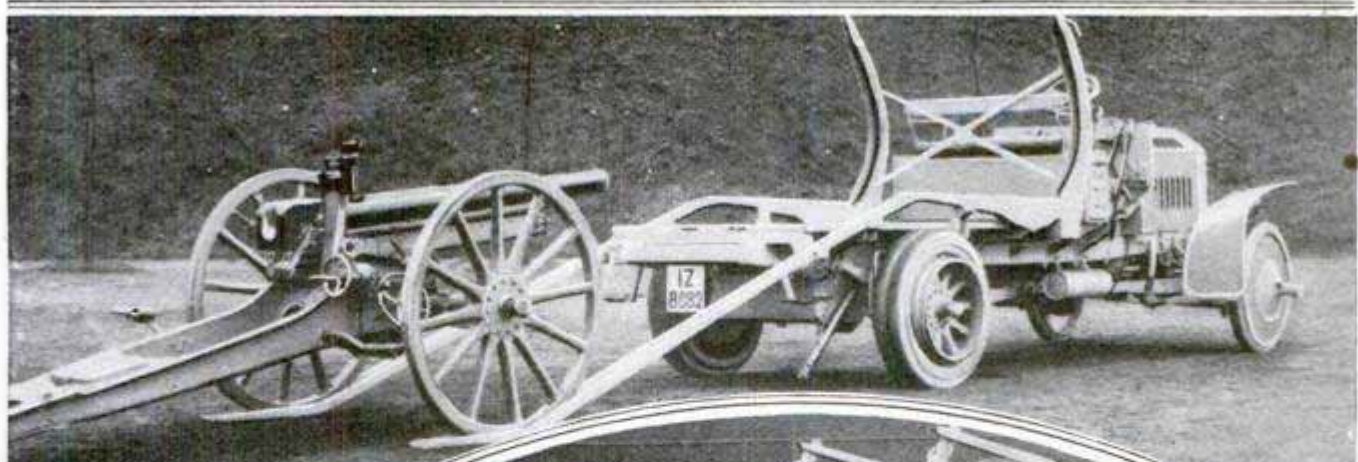
COPYRIGHTED BY UNDERWOOD & UNDERWOOD
The "Turcos" or Native African Troops from Algeria Who Fight for France against the Germans



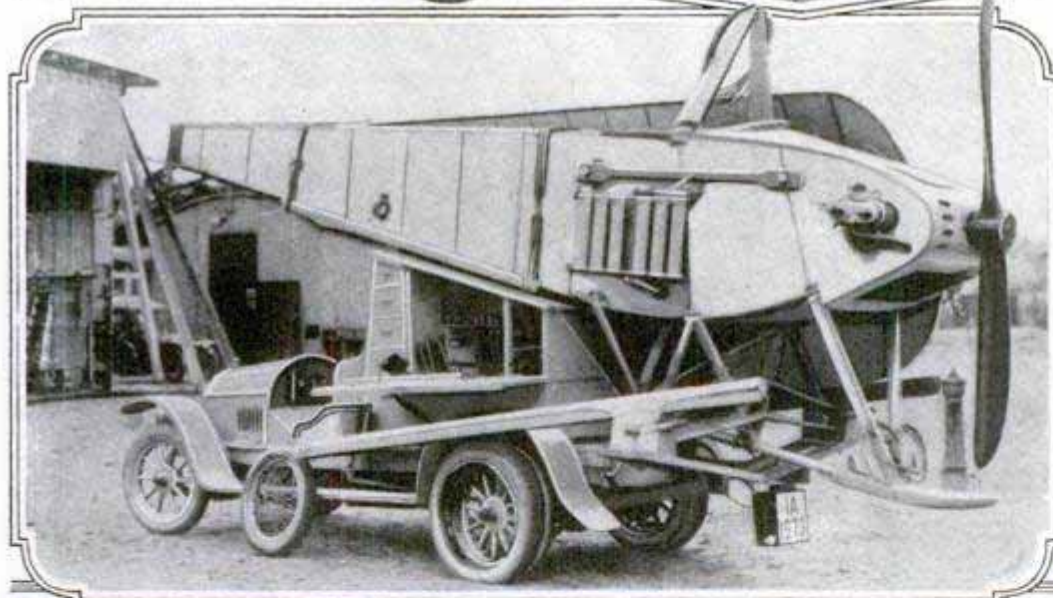
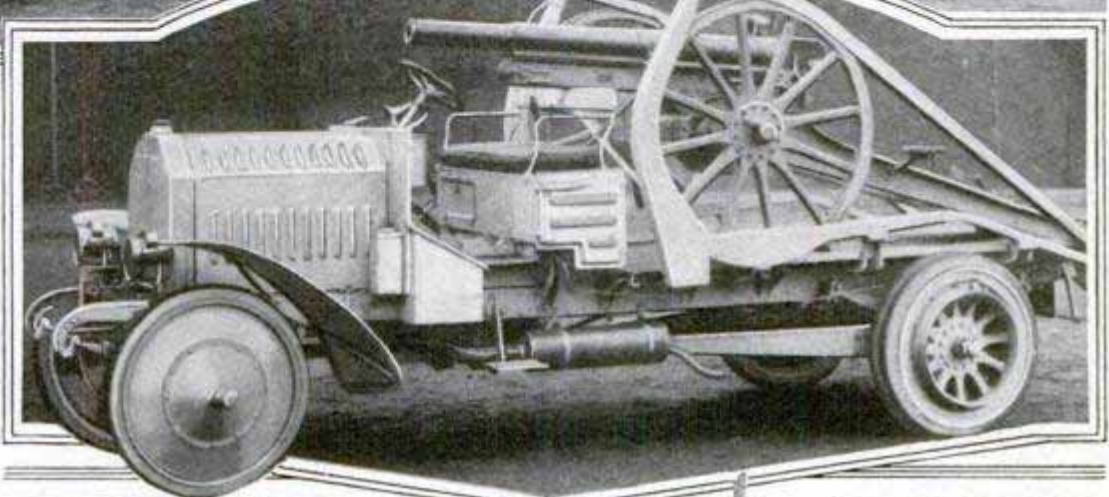
COPYRIGHTED BY THE INTERNATIONAL NEWS SERVICE
English Bloodhounds Used by the Red Cross to Aid in Finding the Wounded



SOME OF THE NOVEL MACHINERY USED IN WAR

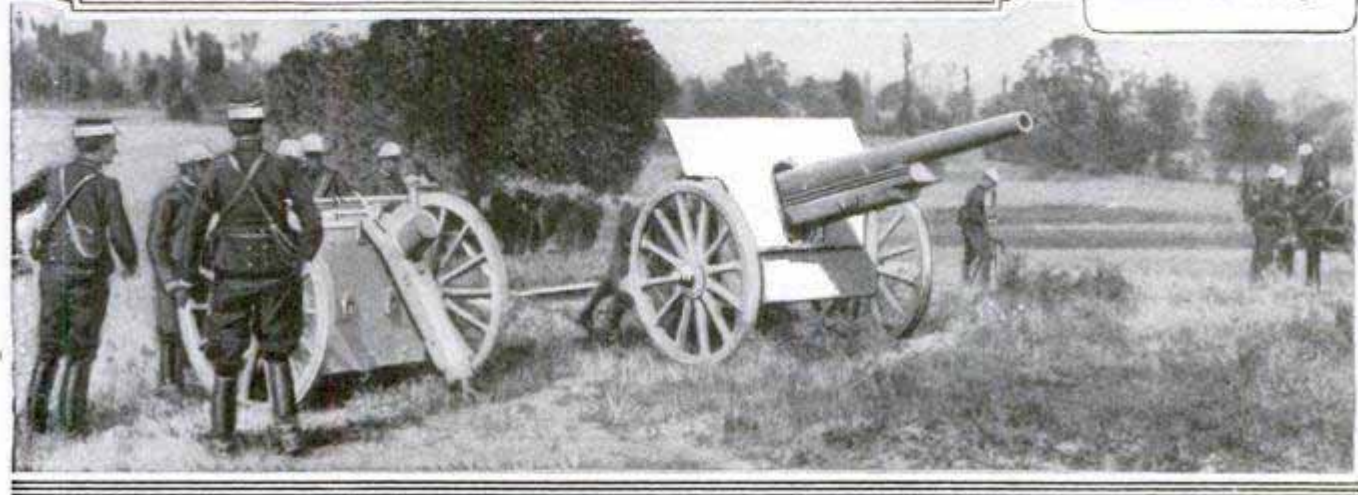


Apparatus for Transporting Ordinary Field Guns on Motor Trucks, Used by the German Army: The Hinged Runways for Loading the Piece on the Truck Also Serve to Secure It in Place While in Transit.



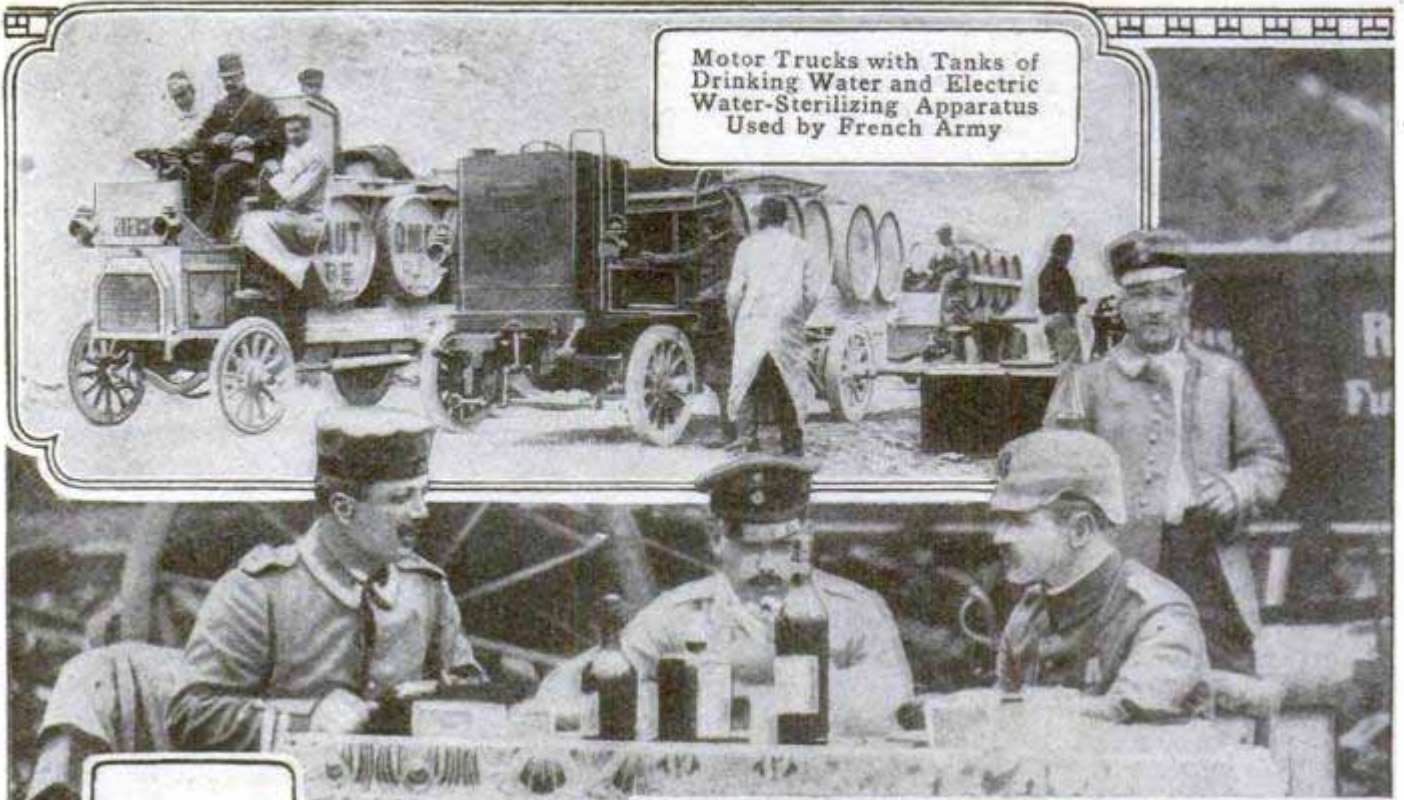
A Dismantled Monoplane can be Packed Securely on a Motor Car and Transported Quickly from One Flying Base to Another in This Way

The New French Field Guns with Pneumatic Recoil Fire Three-Inch Shells and are Supposed to be the Most Effective Weapons Now in Use against Bodies of Troops

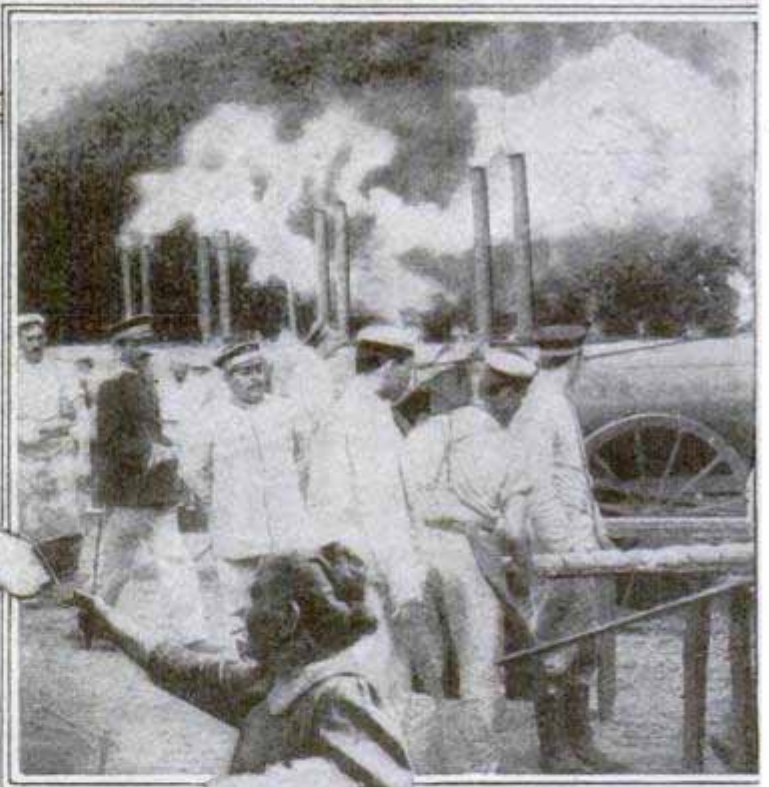


PROVISIONING THE ARMIES IN THE FIELD

Motor Trucks with Tanks of Drinking Water and Electric Water-Sterilizing Apparatus Used by French Army

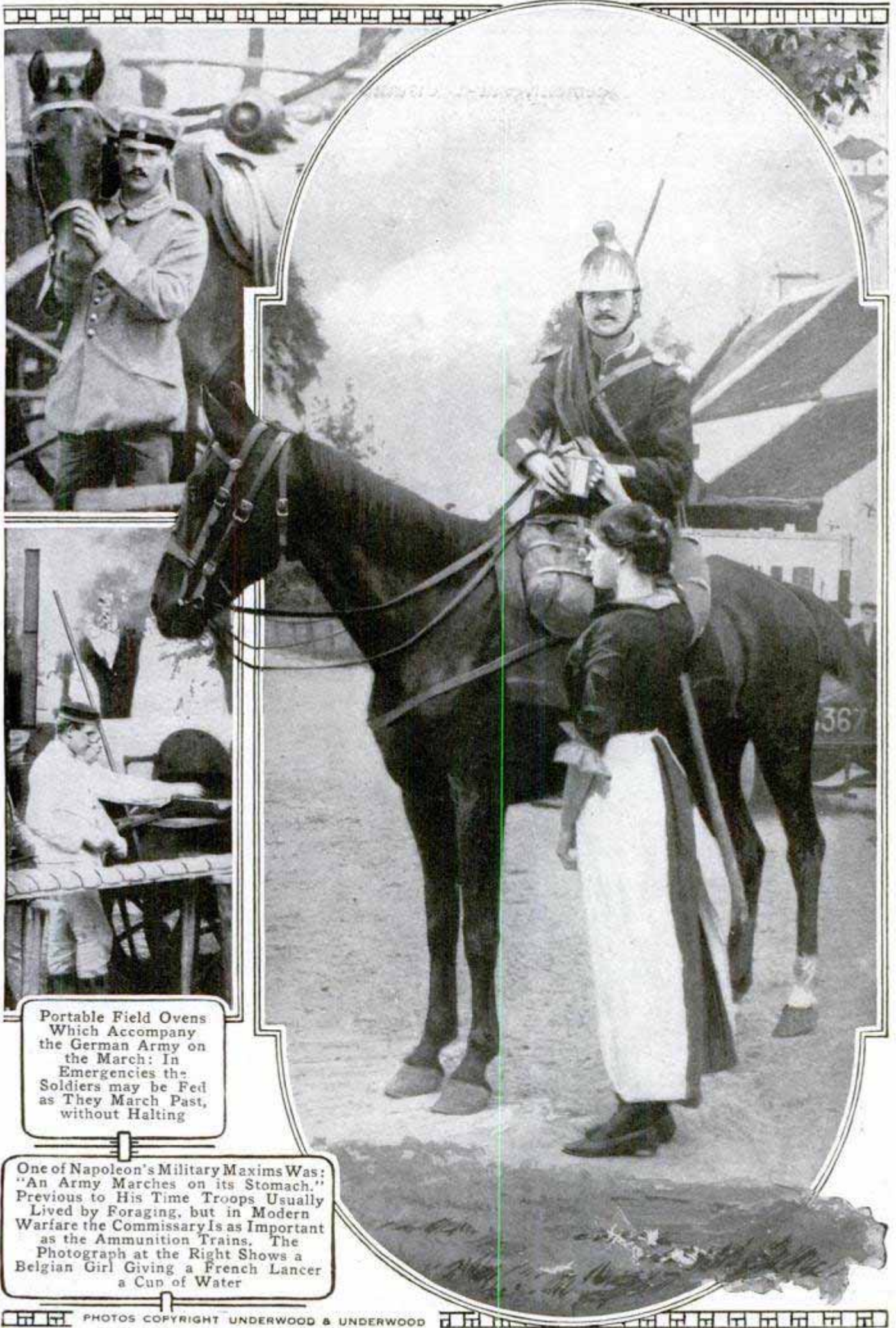


A Group of German Officers at Dinner, Photographed in the Field near Brussels



A Belgian Peasant Woman Giving Bread of Her Own Baking to a French Cuirassier

FOOD AND DRINK FOR EUROPE'S FIGHTING MEN



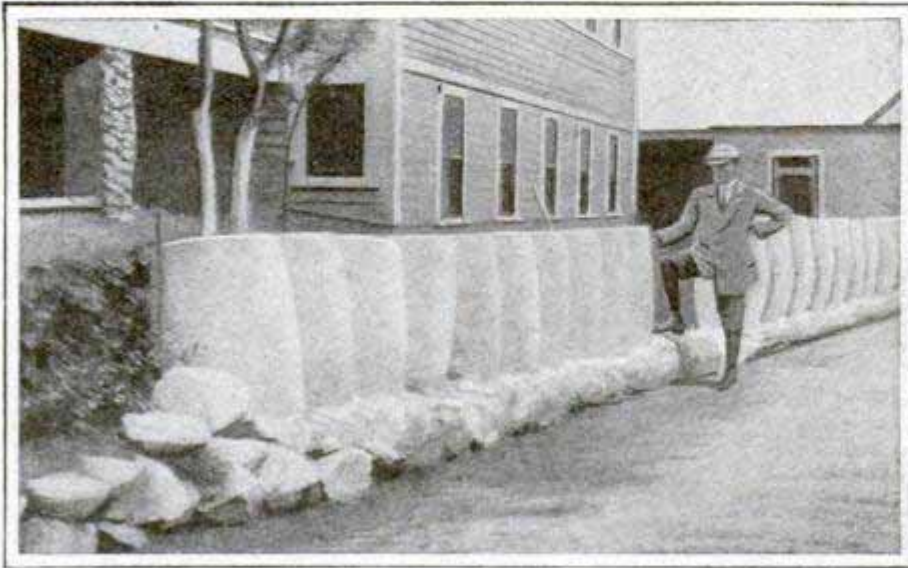
Portable Field Ovens Which Accompany the German Army on the March: In Emergencies the Soldiers may be Fed as They March Past, without Halting

One of Napoleon's Military Maxims Was: "An Army Marches on its Stomach." Previous to His Time Troops Usually Lived by Foraging, but in Modern Warfare the Commissary Is as Important as the Ammunition Trains. The Photograph at the Right Shows a Belgian Girl Giving a French Lancer a Cup of Water

FARMERS USE CEMENT LOST BY STRANDED SHIP

Curious-appearing fences, built with barrel-shaped blocks of cement, surround the homes of many of the farm-

ers dwelling on Block Island, a short distance off the coast of Rhode Island. During a storm a schooner laden with a cargo of cement ran ashore at one point on the island. In attempting to save the vessel the cargo was thrown into the water, causing the cement to harden in the barrels. Many of the farmers knocked the barrels apart and hauled the stone to their farms, where it has been used in constructing permanent fences, porch underpinings, and serving in the capacity of hitching posts, and the like.



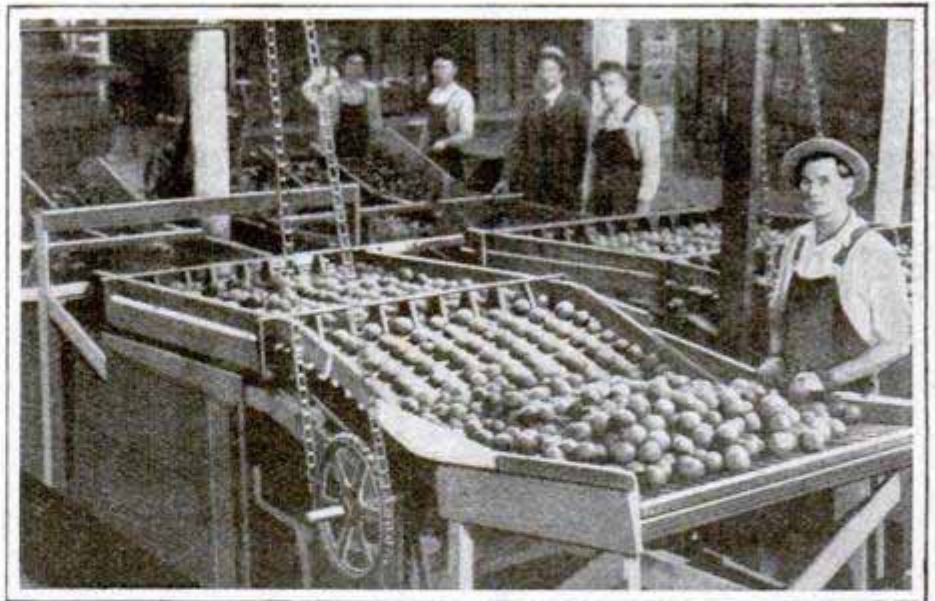
Many Block Island Farmhouses are Surrounded by These Odd Fences

SORTING OUT FROSTED ORANGES AND LEMONS

A device for separating frosted oranges and lemons from those not damaged by frost, now being introduced in California, apparently provides a way for preventing serious losses among the citrus-fruit growers. The particular value of this device lies in the fact that it is practically impossible to distinguish, from the appearance of the peel, which oranges or lemons are sound and which have been damaged, so that in the past much good fruit has been thrown away and much defective fruit has been packed and shipped.

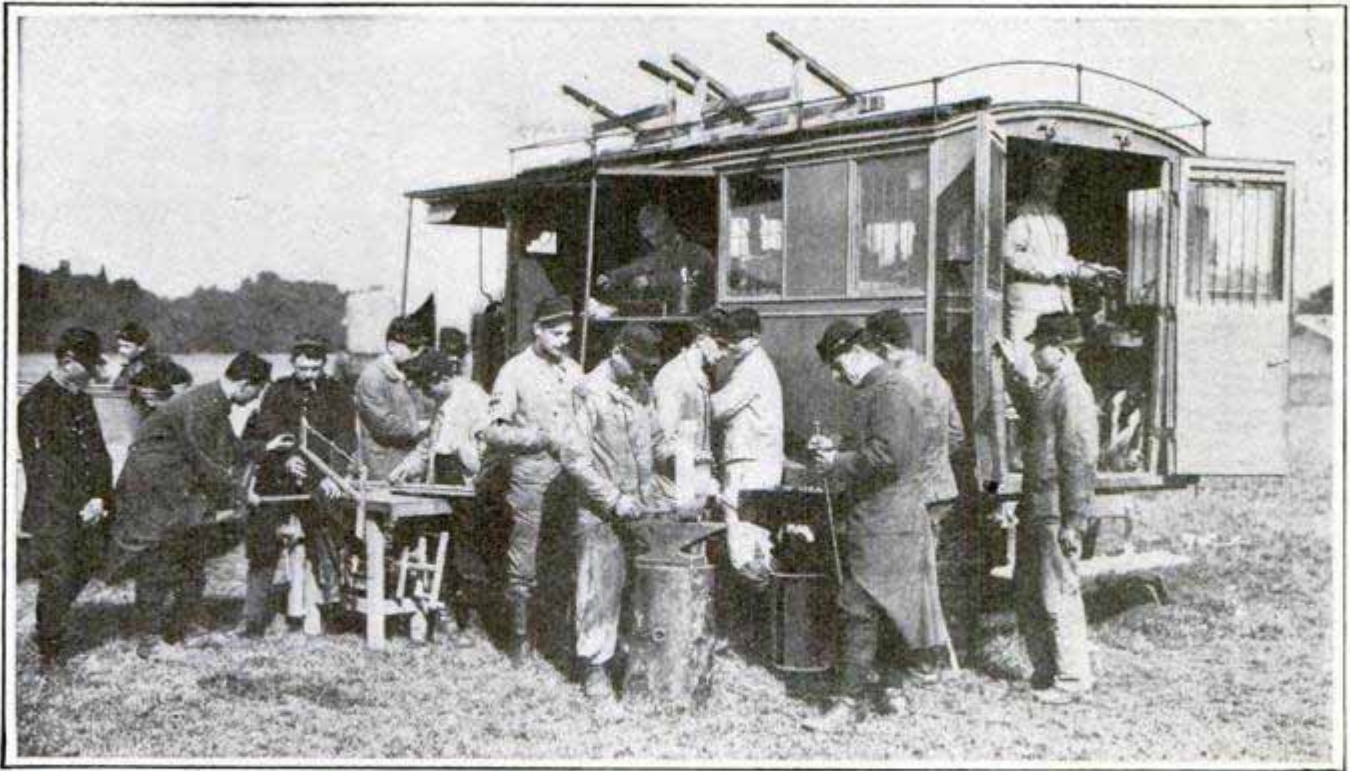
There is a difference in specific gravity, the sound fruit being heavier than frosted fruit of the same size, and it is this difference that forms the basis of operation of the separating device. The oranges are poured upon

a feeding table at one end of a long vat of water, are moved forward by rollers, and are dropped one at a time



This Machine, in Operation in a California Orange-Packing House, Grades the Fruit for Size and Separates the Frosted from the Sound Fruit

into the water. The sound fruit, being the heavier, dives deep into the water and is caught under a screen placed at the proper depth, while the defective fruit misses this screen and



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Repairing French Flying Machine on the Battle Field

floats to the surface. Where the fruit is to be separated into more than two grades, several screens are placed at the required depths in the water. Each grade is then passed along to an elevator that conveys and deposits it in the proper box. It is estimated that something like \$1,000,000 will be saved to the citrus-fruit growers of California each year that there is frost enough to make any of the fruit unmarketable.

POP-CORN MACHINE BURSTS KERNELS IN VACUUM

A new process for popping corn has been introduced by a recently patented machine which causes the kernels to explode by producing a pressure within them through the application of heat while they are maintained under less than normal atmospheric pressure. By creating a partial vacuum in the popper, the moisture in the kernels is changed into steam at a lower temperature than could be accomplished under ordinary pressure. In this manner a larger quantity of water is converted into steam at the moment of popping, while, the atmospheric pressure being below normal, the resulting explosion fluffs the corn greatly.

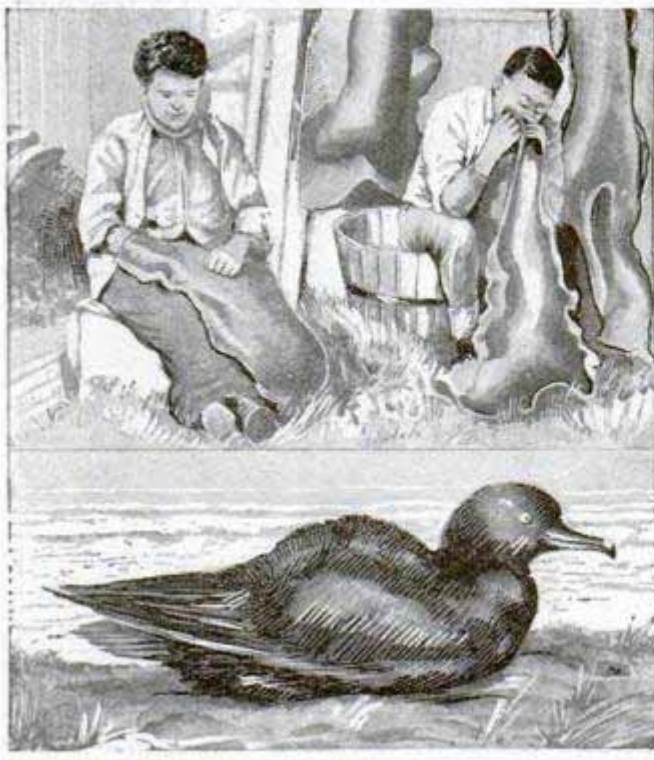
MOTORS CARRY REPAIR SHOP FOR ARMY AIR CRAFT

Careful provisions have been made by the aerial division of the French army for the upkeep and repair of its flying craft on the battle field. An elaborately fitted machine shop which is in charge of experienced mechanics is kept at the base from which a fleet operates. It is built on a motor truck so that it is easily transported with a column of troops or rushed overland with a small detachment following in the wake of the air scouts. If a machine is disabled, practically everything needed for its repair is to be found at a moment's notice.

FOWLS PRESERVED IN ALGÆ BAGS DURING TRANSIT

New Zealanders in shipping mutton birds to various markets pack the dressed fowls in the air bladders of certain marine plants which abound on the coast of that country. Large numbers of the birds migrate from the Antarctic each spring and are such a rare delicacy that there is a great demand for them in many localities. While the method used in shipping them at first thought

appears crude, the importers of the different countries have found no way of



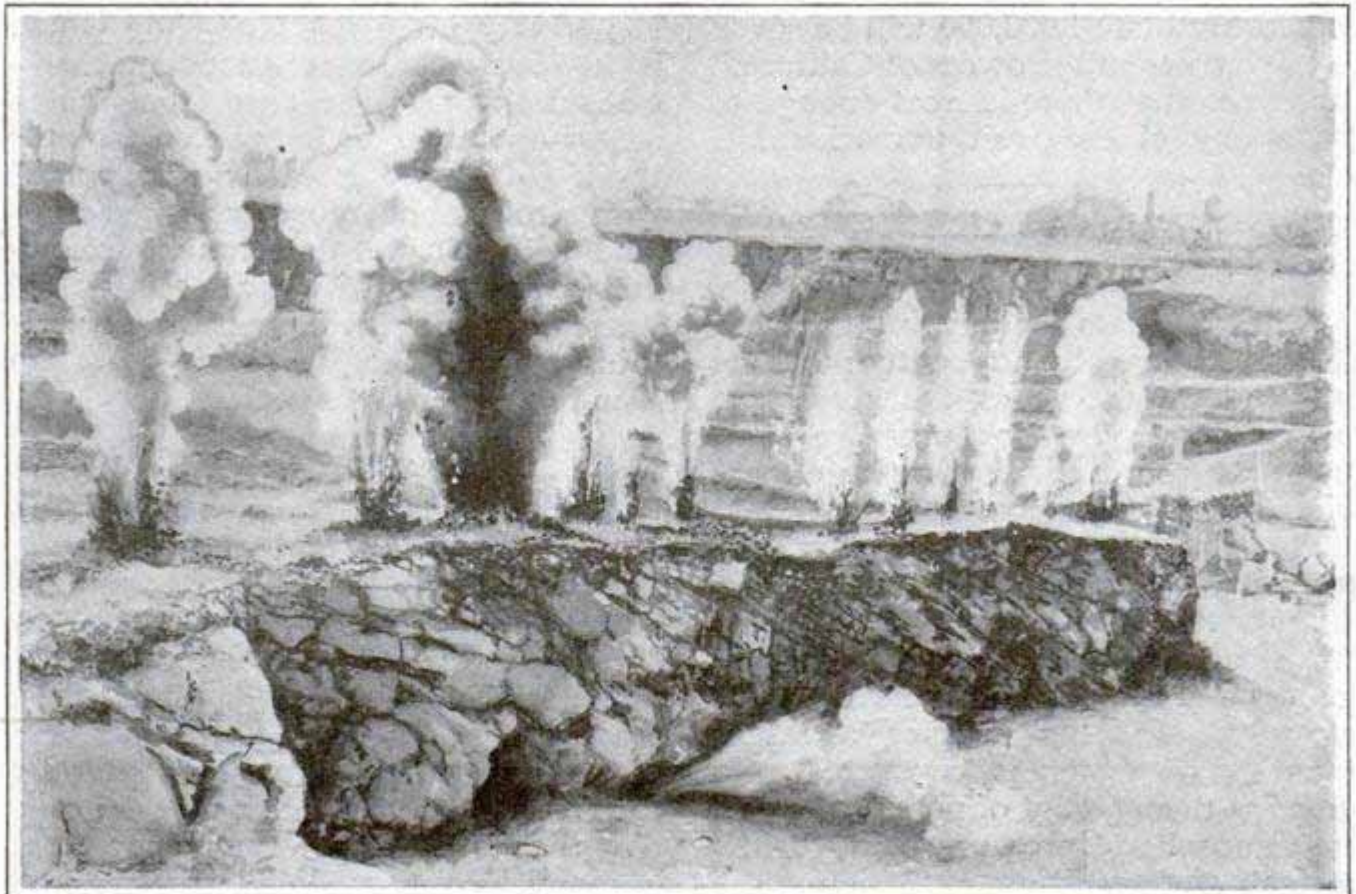
Cleaning the Seaweed Air Bags in Which Birds are Packed for Exportation

improving the aboriginal method. The odd bags are gathered from the sea and when cleaned and dried are water-tight

and flexible. It is because of the chemical properties of iodine and various salts which they contain that they serve adequately in preserving the meat during transit.

QUARRYING IS FACILITATED BY DEEP BLASTING

In certain stone quarries of Pennsylvania deep blasting has of late been employed because of its apparent advantage over the customary system of making daily drills at shallow depths. Numerous holes with a diameter of about 6 in. are bored in the same manner as an artesian well is sunk, to about 40 or 50 ft. beneath the surface. At this level large quantities of explosives are planted and then simultaneously discharged by electricity. The accompanying photograph shows a blast prepared in this manner which in a single flash dislodged 29,000 tons of stone, hurling dust and debris high into the air. In this case, three tons of dynamite, distributed in 14 bores, were exploded at the same time.



Blasting Stone with Dynamite Planted 50 Feet beneath the Surface



Pier after Its Completion, Showing Its Great Length and Slender Piles

DESIGN CARGO MOTORBOATS FOR SOUTHERN RIVERS

Ten steel motorboats capable of carrying a 150-ton cargo with a draft of only 45 in., are being constructed for a southern river-navigation company. The fleet will be used in transporting cotton between Macon and Brunswick, Ga., on the Ocmulgee and Altamaha rivers, which during the dry season are rendered impassable to all excepting boats of slight draft, on account of sand bars. Each of the craft will be fitted with water-tight compartments, three separate rudders, and will have two distinct engine rooms.

LITTLE-KNOWN AUSTRALIAN REGION IS STUDIED

For the purpose of exploring the little-known region in the mountains of South Australia west of Oodnadatta, a government exploration party recently set out from Adelaide for a six-months' expedition over a route 1,200 miles in length. The work to be done embraces a comprehensive program, including geographical, geological, ornithological, zoological, and botanical observations. The government astronomer will accompany the explorers on part of the journey.

LONG CONCRETE PIER BUILT WITH HEAVY PILING

An unusual form of concrete construction was employed recently in the building of a 1,350-ft. pier at a California resort. Instead of building a heavy wall support or using a series of large center piers, concrete piling was employed. Each one of these mem-

bers weighed several thousand pounds. Since it was impossible to sink them into position with the usual pile driver a hydraulic bore was used, which cut its way through sand and clay by means of a jet of water under heavy pressure. The bottom of each pile was made top-shaped, so as to afford a substantial

anchor. After the piling was placed, the superstructure was molded upon it. Although great damage was done along the coast during the winter months by heavy storms, the piling of this recreation pier was not damaged.

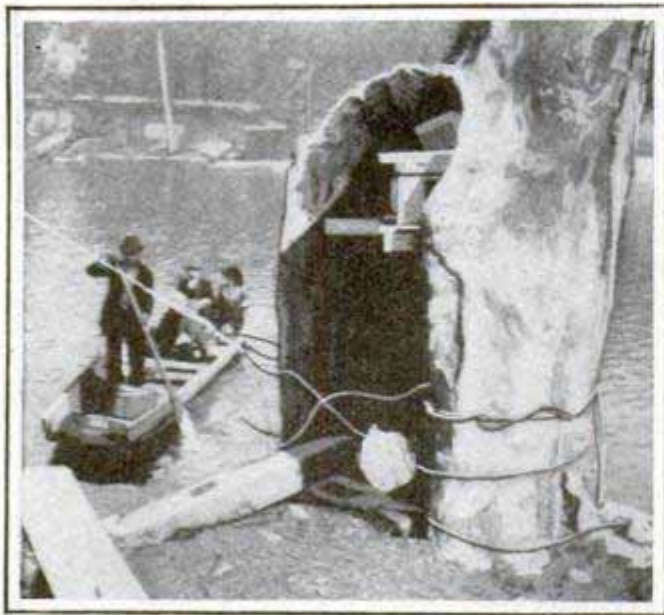


Preparing to Put a Concrete Pile in Place

HOLLOW TREE AN OFFICE DURING EMERGENCY

When floods in Ohio swept away a bridge connecting two river points in the vicinity of Cincinnati, transportation across the stream was dependent upon an improvised ferry service which for some time was maintained between the opposite banks of the river. The ferryman feeling the need of an office in order that his business might have the advantage of a telephone, fitted out one in a hollow sycamore tree which stood in a convenient position near a

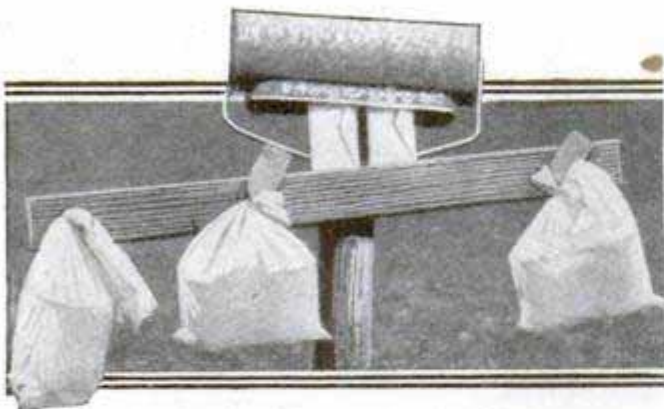
rough landing pier. A desklike arrangement capable of being securely locked and large enough to provide



Hollow Sycamore Tree Shelters Office of Ferryman shelving room for ferry tickets and various papers, besides his telephone, was built into the tree trunk. In this manner, when the river's condition was not the best, the man was able to answer the inquiries of his patrons.

INDIANA FARMER CONDUCTS PARCEL-POST DAIRY

Since the advent of the parcel post, an Indiana farmer has disposed of his entire output of dairy products by



How the Modern Farmer Sends His Butter to Market

shipping direct to consumers in surrounding cities. His mail-order business grew from a start with a single customer until now it extends into two or three of the adjoining states. His

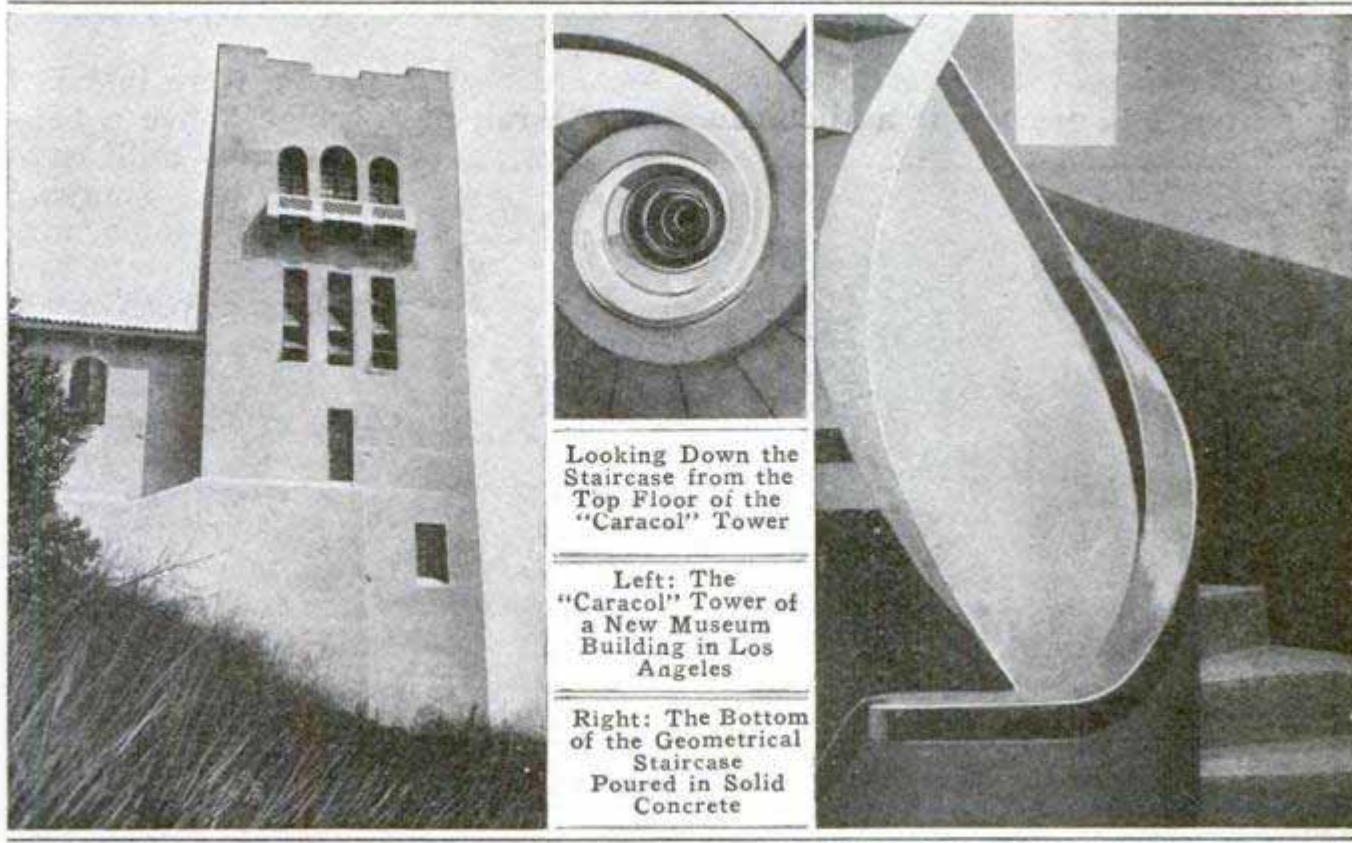
principal trade is in butter. This he packs in pails which in turn are inclosed in cloth sacks addressed to the numerous regular patrons. After hanging the buckets at the roadside post box his part of the work ceases. The postman collects and ultimately returns them for refilling.

TONNAGE OF BATTLESHIPS AND THEIR COST

While the cost of modern warships of the first line of defense has been more than doubled during the last 25 years, the individual tonnage of the vessels produced during that period has more than trebled. In connection with the relative cost and size of battleships, an interesting comparison is given by the latest ships built by the Germans and those now under construction for the Italian navy. The highest price paid by Germany for a ship, one of the "Worth" class, was \$12,500,000. On the other hand, the Italian warships, which will be armed similarly to the most modern German craft, will cost \$18,000,000 each. The three dreadnoughts commenced this year for the United States, when completed, will cost approximately \$14,000,000 each. In contrast to these great ships, it cost just \$5,983,371.98 to build the "Indiana," in 1890. Its tonnage was 10,288, as compared with 32,000 tons of the ships which have been authorized this year.

GEOMETRICAL STAIRCASE BUILT OF CONCRETE

What is believed to be the first geometrical staircase ever built of concrete forms a part of the "Caracol" tower in a museum building that has just been completed in Los Angeles, Cal. The building with its tower is in the quaint ancient Spanish style of architecture and is constructed entirely of poured concrete. The tower is 125 ft. high. In the center is the geometrical stairway, consisting of 160 steps, circling around an open space only 24 in. in



Looking Down the Staircase from the Top Floor of the "Caracol" Tower

Left: The "Caracol" Tower of a New Museum Building in Los Angeles

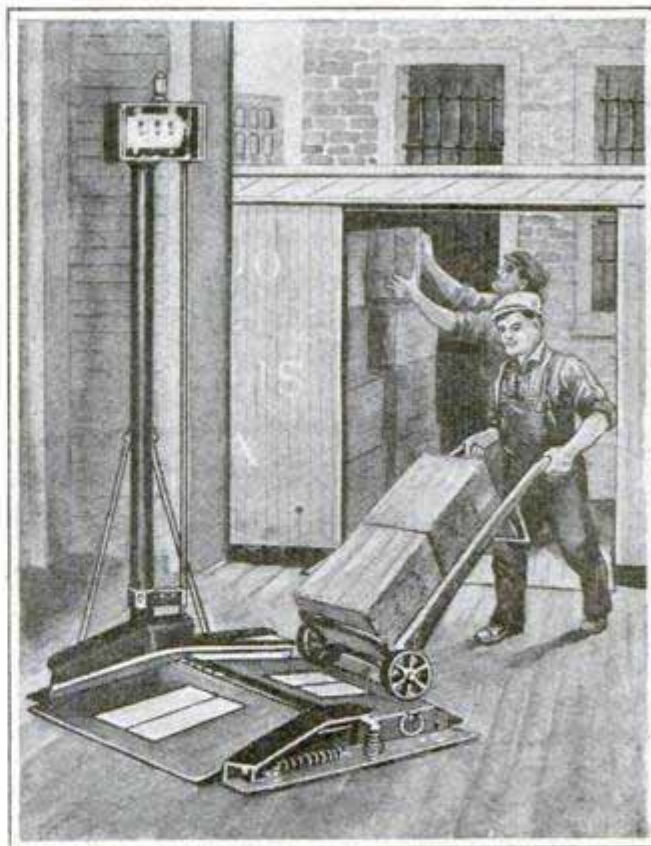
Right: The Bottom of the Geometrical Staircase Poured in Solid Concrete

diameter and mounting to a height of 120 ft. Unlike most geometrical staircases, including the one in St. Paul's cathedral in London, described in the February, 1914, issue of this magazine, this staircase occupies only a small part of the tower, space being left for rooms of fairly large size on each of the seven floors.

PLATFORM REGISTERS TRUCKS PASSING OVER IT

An automatic counting apparatus which indicates the number of trucks passed over it when a car is being loaded, thus keeping a check on the quantity of flour, for instance, actually placed in a consignment, has been built for the use of large shippers. The device consists of a hinged steel-plate platform so supported by springs that it trips a lever actuating a tally machine whenever a loaded truck is pushed over it. The weight of a man or of an empty truck, however, is not sufficient to operate the machine. When a car is being loaded, the platform is placed in a position in the line of haul and a complete record registered of the number of trucks rolled over it. In large ship-

ments disputes often arise through errors made by the checkers for either the shipper or the consignee. The advantage claimed for the counter is that it keeps an infallible record.

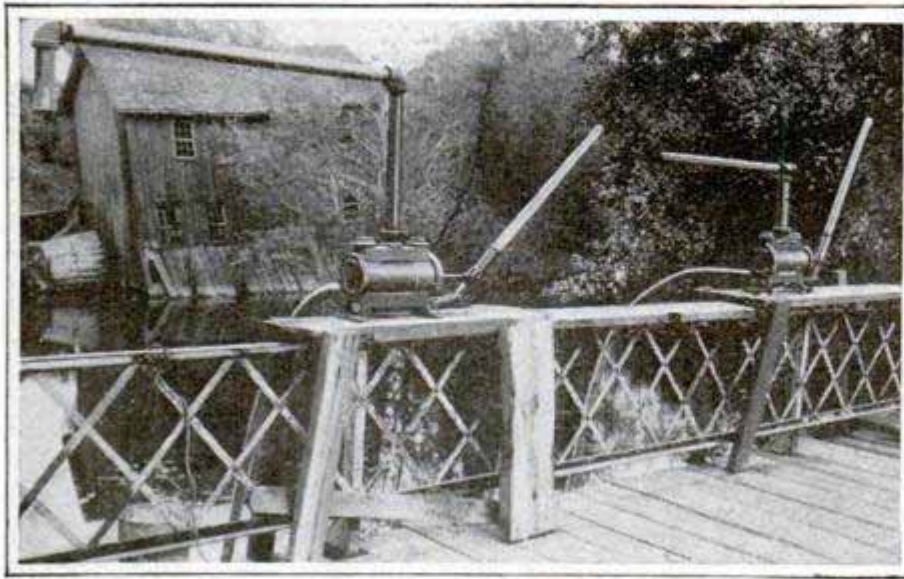


Platform Counts Truck Loads as They are Passed over It

OLD MILL STREAM STILL IMPORTANT ADJUNCT

In order to provide water for spraying purposes to growers in a Michigan orchard region, pumps were installed on the rail of a bridge above a half-century-old mill dam.

During the spraying periods the tank wagons are driven to this place, filled with water and then drawn into the orchards. This dam, which for years furnished the power with which to grind the grain of the territory, now keeps the water of the stream sufficiently deep for steamers to dock at the storage houses on one bank, where they are loaded with fruit.

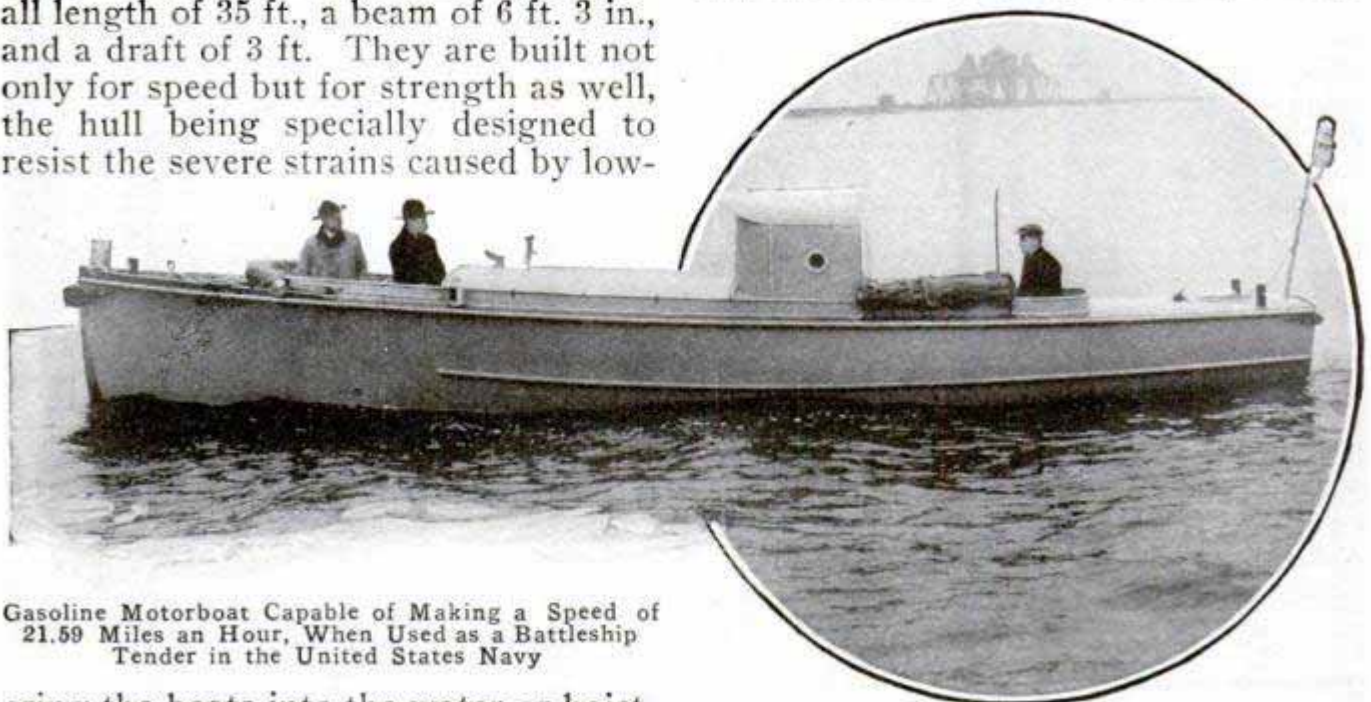


Pumps on Bridge Convenient for Orchard Growers

GASOLINE MOTORBOATS AS BATTLESHIP TENDERS

Two high-power gasoline motorboats recently bought by the Navy Department are now in service as battleship tenders, one being assigned to the "Utah," and the other to the "Montana." Each of these boats has an overall length of 35 ft., a beam of 6 ft. 3 in., and a draft of 3 ft. They are built not only for speed but for strength as well, the hull being specially designed to resist the severe strains caused by low-

150-200-hp. gasoline engine, which is located amidships under a metal hood. The engine controls are in the steersman's cockpit, which is forward of the engine and is protected by a spray hood. The officers' cockpit, capable of carrying 10 or 12 men, is aft of the engine and is provided with a steel shelter, while the boatswain's cockpit is at



Gasoline Motorboat Capable of Making a Speed of 21.59 Miles an Hour, When Used as a Battleship Tender in the United States Navy

ering the boats into the water or hoisting them aboard ship. The power equipment of each boat consists of a

the stern. These boats developed a maximum speed of 21.59 miles an hour.

ENGINEERING SKILL SHOWN IN BRIDGE FEAT

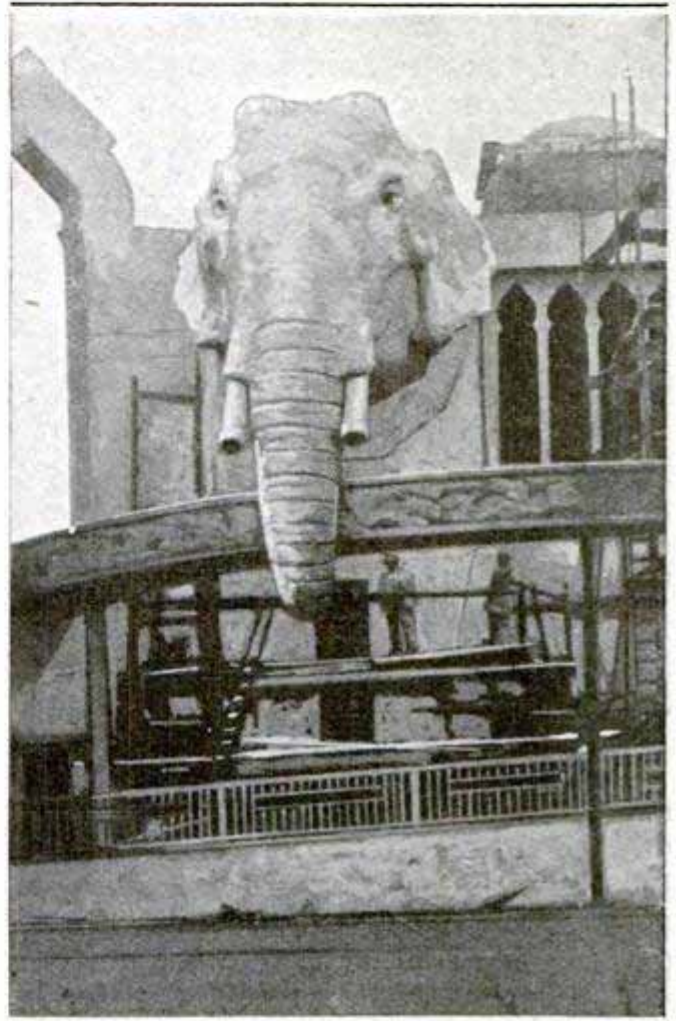
In reinforcing the Williamsburg bridge at New York to strengthen it for the increasing volume of traffic it is being made to carry, a remarkable piece of engineering work was accomplished recently. This consisted of removing a 10-in. bridge pin and substituting for it a 13-in. pin, a feat believed unprecedented. An especially built motor-driven drilling machine was attached to the bottom chord of the structure with its cutting arbor lined with the pin. The metal which the boring bar had to pass through had a thickness of approximately 24 in., while the volume of steel to be bored out amounted to nearly a cubic foot. The work involved the removal of the old pin, the enlargement of the pin bore from 10 to 13 in., and the insertion of the larger piece. The task was made additionally difficult on account of the necessity of opening the bridge to traffic just as quickly as possible, and also for the reason that the only connection between the main and land spans, during the time the pin was out, was a temporary wind chord. The bridge was closed to all except pedestrians between 1 and 5:50 o'clock in the morning, during which time the entire operation was performed.

PROCESS FOR PROTECTING METALS FROM CORROSION

A new process for protecting metals from corrosion uses pure tin or pure lead, either in their natural state or alloyed with some other metal, such as zinc, as a coating for the metal to be protected. The lead or tin is first reduced to a powder. This powder is then mixed with a fluid to the consistency of thick paint and this is applied with a stiff-bristle brush. The next step is to melt the coating, and this may be done by any clean source of heat, such as a heavy blowtorch, fire, or oven. The coating shows no tendency to run, so that vertical or inverted surfaces are easily treated.

LARGE "ELEPHANTS" SUPPORT SCENIC RAILWAY

Two large wood-and-plaster elephants, each 35 ft. in height, their eyes blinking headlights, will support the



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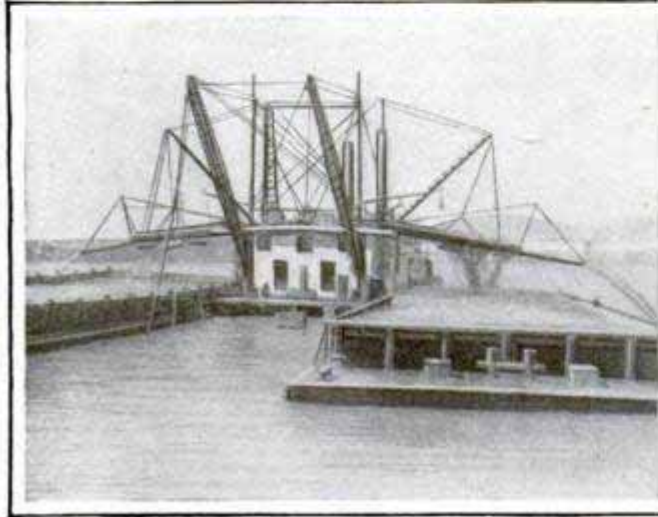
Entrance to the Scenic Railway at the Panama-Pacific Exposition

elevated structure of the scenic railway in front of the concession entrance at the Panama-Pacific Exposition. The trunks of each are sufficiently large to allow the cars to pass through the loops they form. The accompanying photograph shows one of the elephants nearing completion.

PUMPING SAND INTO BARGES ON THE MISSISSIPPI

Sand digging in the Mississippi River has grown within the last few years into an important industry at St. Louis and other river points where thousands of cubic yards are pumped and sluiced into barges daily. This

method of capturing the sand as it is sucked from the bottom is employed when the hydraulic dredges are operating out in the stream at too great a distance to pipe the flow to the banks advantageously, or when they are in such position that there is no available draining ground. The barges are lashed against the sides of the dredge, while suction pumps draw sand and water through pipes planted at oblique



One of the Dredges Pumping Sand into Barges

angles in the river bed. This is drained through troughs with wire bottoms which separate foreign matters and gravel from the product as it drops. The sand settles to the bottom of the barges and part of the water is drained off. When one of the barges is filled, it is towed ashore by a tug where it is unloaded with steam shovels and sand elevators. Besides being profitable in a commercial way, the dredging serves to eliminate shoals from the river and keeps the channel open for navigation.

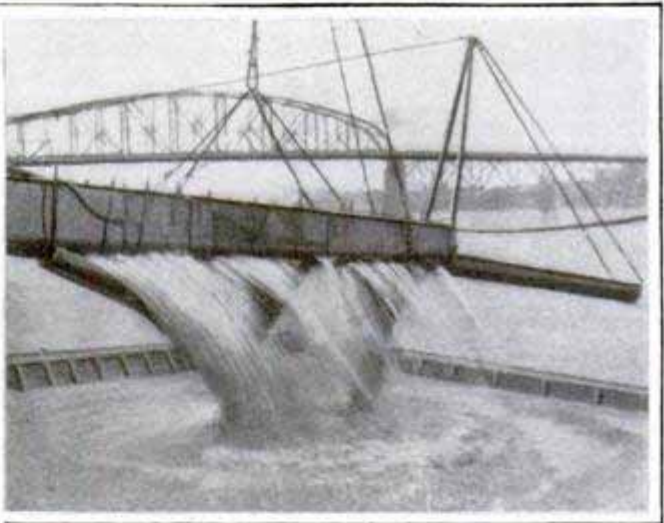
NEW METHOD FOR HARDENING STEEL

Reports have been made in Germany of the discovery of a simple process of hardening cast or forged steel which does not destroy the effect of previous heating treatments, nor cause the metal to undergo a change in form. In hardening a gear, for instance, the whole of a tooth is not heated, but on the con-

trary only its surface to a depth of approximately $\frac{1}{16}$ in. A high-temperature flame is played over the surface with a brushlike motion. Upon its removal, the cooling takes place immediately, the heat radiating into the cold mass of steel and into the atmosphere. In this way the highly hardened part of the steel consists of an outer surface film. By increasing the time of application of the flame, the hardened part may be deepened to about $\frac{3}{16}$ in., the blaze in such a case being given a rotating motion to avoid burning the metal.

NEW STEREOTYPING PROCESS INTRODUCED IN BOHEMIA

A simplified method of stereotyping which eliminates much of the manual labor connected with the present process has been invented by two printers in Bohemia. Through the use of an



Trough through Which Sand is Sluiced into Barge

especially prepared ink which is employed for the purpose of transferring the design, it is possible to make either a positive or negative impression on fully dry six-ply cardboard. This ink hardens in the heat produced in the stereotyping apparatus, thus completing the matrix. It is possible to make several castings from the mat. The process has been patented.

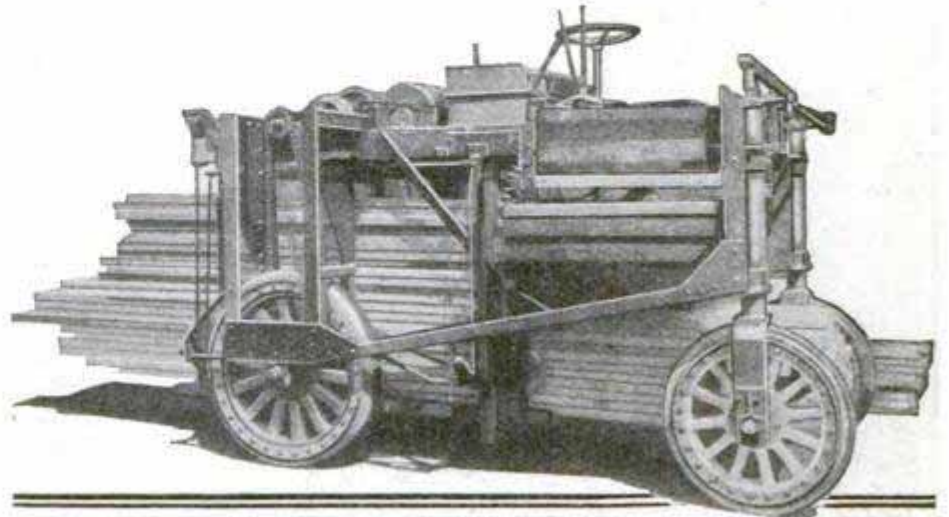
☐ In 22 American hydroelectric plants the line voltage is 100,000, or more.

ODD MOTOR LUMBER TRUCK SUSPENDS LOAD

Designed especially for handling lumber, a steel motor truck which carries its load suspended beneath its chassis instead of in a wagon bed is being used in the Northwest. The purpose of the odd - appearing vehicle is to facilitate hauling by loading and unloading itself mechanically. This feature is accomplished by means of hooked arms which are capable of reaching under a large pile of lumber and swinging it free from the ground, and in this manner holding it securely.

The body of the truck is carried high above the wheels on heavy forks, while the propelling motor is placed

on top at the rear. The driver operates the loading machinery from his seat. When the destination is reached, the car is stopped and the lumber dropped between the wheels, an operation which requires only a moment's



Lumber Wagon Which Loads and Unloads Mechanically

time. An automatic equalizer adjusts the load when a set of wheels passes over an obstruction or drops into a rut.

THATCHED HUTS ARE SCHOOLHOUSES OF GUATEMALA

Although education is nominally compulsory and the government supports more than a thousand schools, 90 per cent of the inhabitants in the Republic of Guatemala can neither read nor write. The schools of the district are said to be among the best in Central Amer-

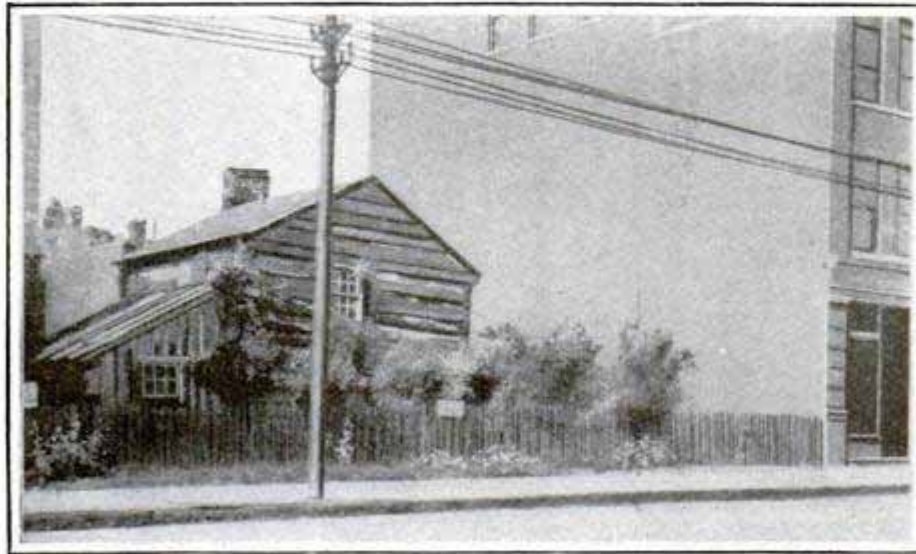
ica, but from an architectural standpoint those attended by most of the native children are merely rough huts of characteristic tropical construction. The walls are built of upright poles fastened together with ropes, made by the women from hemp or leaves, while the steep roofs are thatched. There is only one room in a building of this kind, commonly without flooring.



This Typical Guatemala Schoolhouse
Has Walls of Poles and Thatched Roof

LOG CABIN STANDS ON BUSY CITY STREET

A log cabin built nearly 100 years ago is still standing in a good state of preservation on one of the busiest



This Log Cabin, Built Nearly 100 Years Ago, is Still Standing on One of the Busiest Streets of Pittsburgh

streets of Pittsburgh, where a hundred street cars pass its door every day. This building, shut off from the street by a picket fence and standing in a yard that is filled with shrubbery, forms a strange contrast with the modern store and office buildings that have grown up around it.

NEW HATBAND TO PREVENT BALDNESS

A new type of hatband designed to prevent premature baldness is so made as to fit upon the head in a comfortable manner without interfering with the free circulation of the blood to the scalp. Blood is normally supplied to the hair cells and skin of the scalp by two main arteries, one on each side of the skull, which are branches of the temporal artery. Each of these branches into a number of smaller arteries, which are well defined and which are located in about the same positions on all heads of normal shape. For the purpose of preventing pressure on the blood vessels this hatband is constructed of two thicknesses of material with the inside layer cut away at these points.

COTTON AND OIL MIXTURE SUBSTITUTE FOR CEMENT

Fairly good results have accompanied the use in Turkey of a substitute for cement consisting of a mixture of slaked lime, linseed oil, and cotton fiber. The composition is used for many of the same purposes to which Americans apply concrete or cement, and when employed in exposed places, has been found quite satisfactory. When it is allowed to become thoroughly dry it has been found practicable under water. Usually a hollowed stone is used in mixing the material, the first step of the

process being to pour the oil on a small quantity of cotton, following which the lime is added and the whole then thoroughly kneaded until it is about the consistency of dough.

SUBSTITUTE FOR GASOLINE SUCCESSFULLY TESTED

Motor-car manufacturers are displaying intense interest in the outcome of tests which are being made with a new fuel intended to replace gasoline in internal-combustion engines, and which its inventor claims can be produced at a cost of two cents a gallon. The product is made from naphthalene and other ingredients, the nature of which has not been disclosed by the inventor. In demonstrations on the Indianapolis speedway the fuel has been used in standard six-cylinder cars and made to accomplish practically what gasoline would, driving a machine, weighing 3,800 lb., 12.5 miles on one gallon. After being run 100 miles with the fuel, the valves of one machine showed no material carbon deposit. While it is known what the fuel can accomplish, its real value depends on the cost of manufacture.

GOVERNMENT OPERATES TALLEST RADIO TOWER

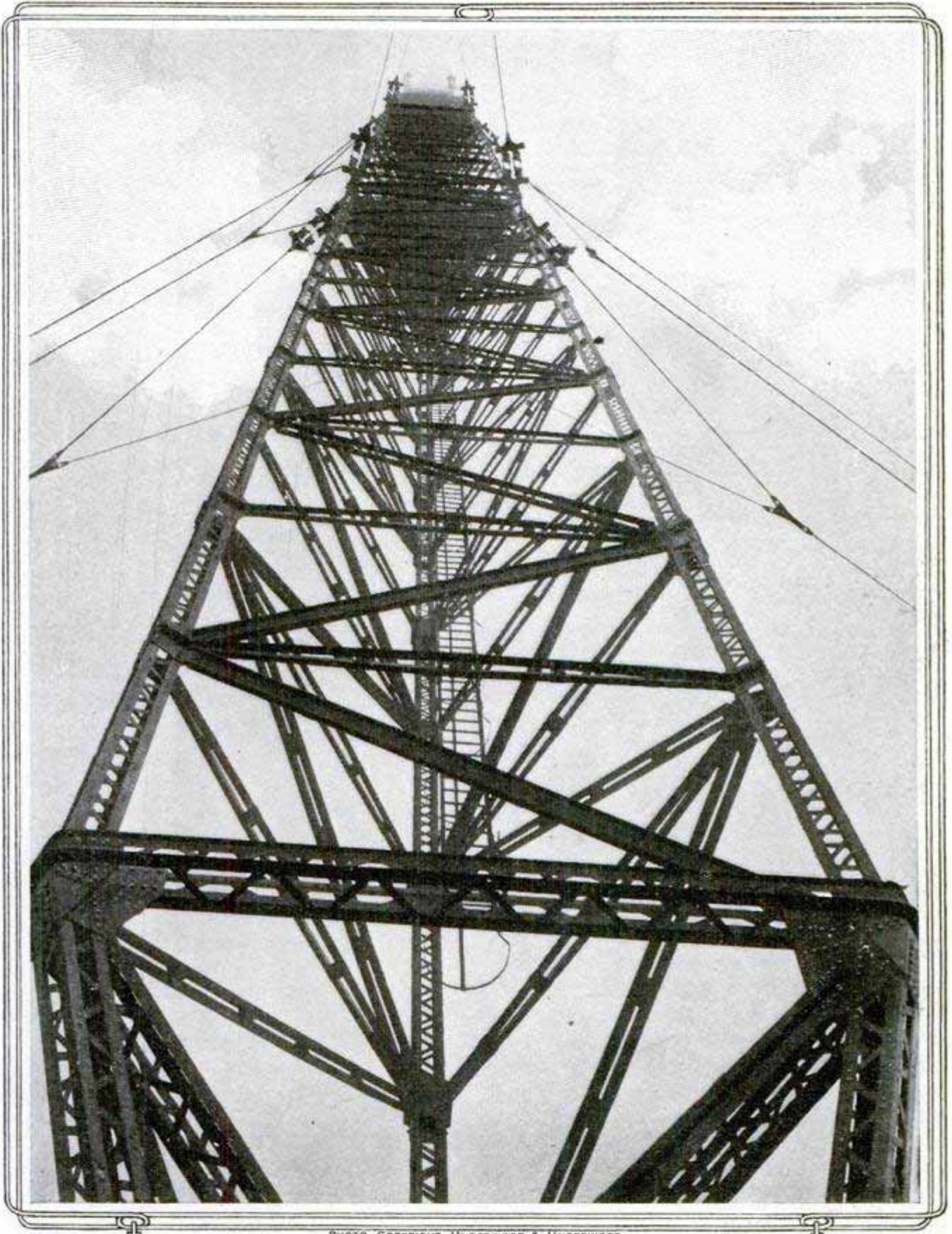
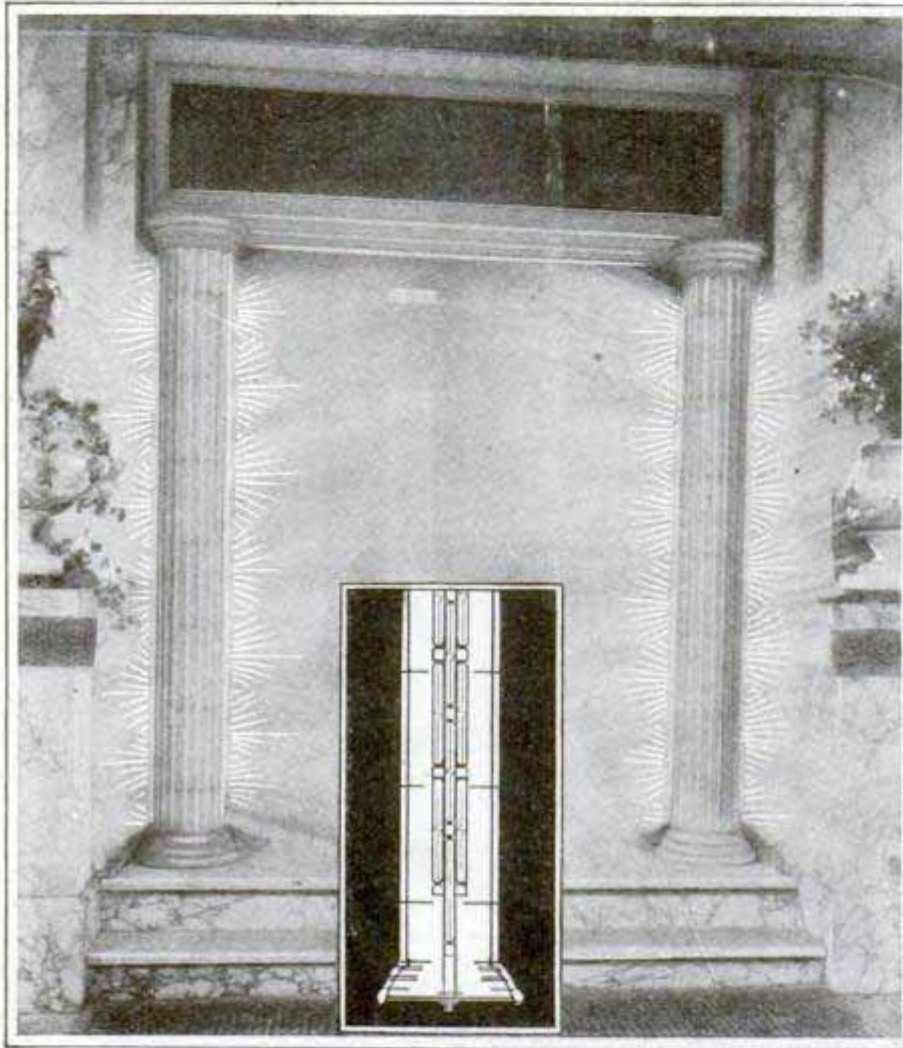


PHOTO COPYRIGHT UNDERWOOD & UNDERWOOD

AN executive order recently issued from Washington has placed the operation of the Tuckerton, N. J., radio station in the hands of the United States Navy Department, which will maintain it on terms of equality for all belligerent and neutral nations until the close of the European war. Since the ownership of the plant is in dispute—both French and German companies having made application for a government license—the government determined to take charge of it until the close of the present hostilities. Code messages will be received under strict censorship by naval officers. While the station will be open for commercial business, the only communications accepted in code will be those of foreign embassies. All other wireless stations capable of transmitting and receiving transatlantic messages are being operated by the owning companies under the supervision of the Navy Department, to insure that the neutrality of this country is not violated. The tower of the Tuckerton station, which was first described and illustrated in this magazine, is 825 feet in height, the tallest structure in America.

GLASS PILLARS ILLUMINATE BUILDING ENTRANCES

Hollow glass columns lighted from the interior by electric lamps are being



Glass Columns, Fitted with Interior Electric Lights, are Used for Illuminating the Entrances of Buildings

produced for ornamental and illuminating purposes in buildings. One particular use to which they have been put is the illumination of entrances, in this position drawing attention and indirectly serving as an advertising medium. The columns are built in sections, which makes them available in almost any height desired. A core carrying the electric lights extends from the base to the top of the pillar, the bulbs, staggered, diffusing the light so that it illuminates the column evenly.

☞The collapse of a 4-ft. sewer in New York City is thought to have been caused by rats gnawing at the mortar between the bricks.

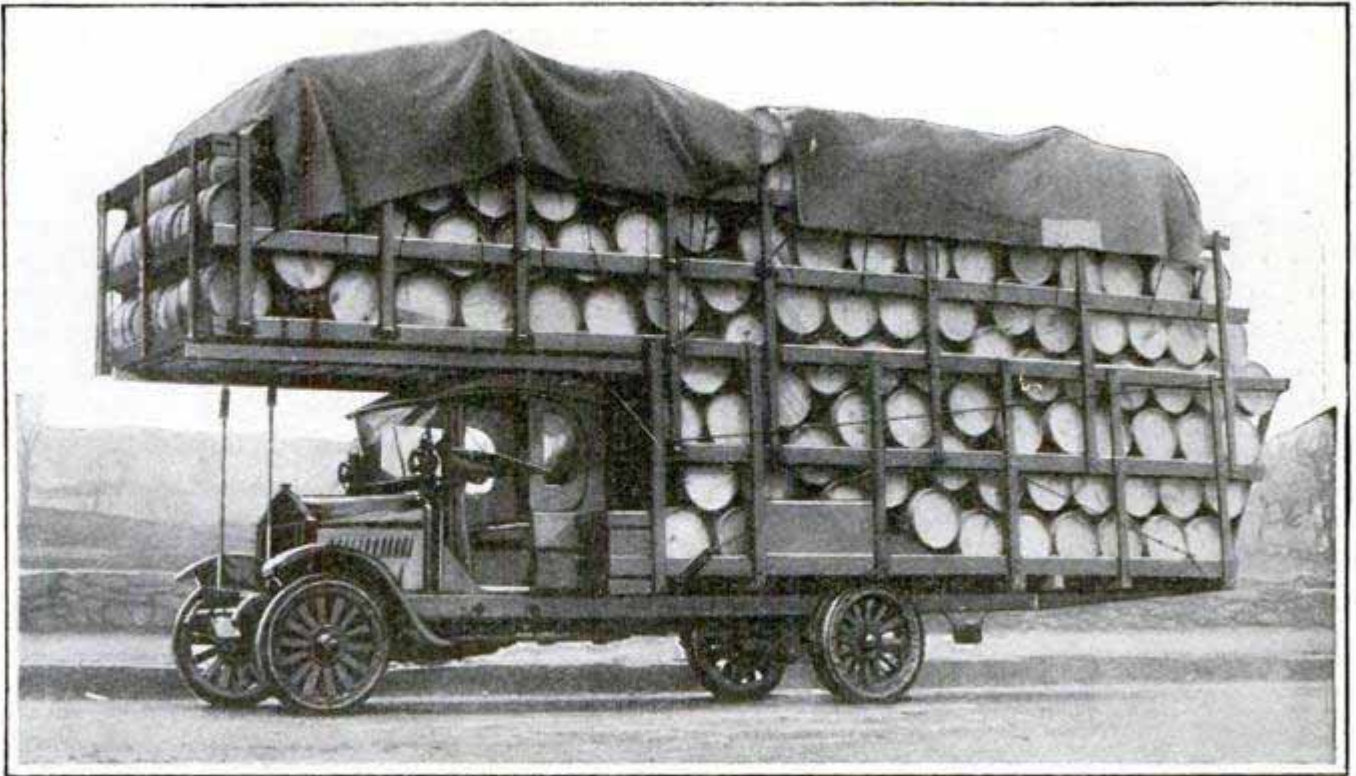
TYPICAL AMERICAN DESIGNS IN LATE DRESS GOODS

An exhibit of truly American designs in silk dress goods has been placed on display by the National Museum at Washington. The patterns were inspired by subjects typically American and frequently historical, and were manufactured by a domestic firm for American women. When the war clouds first commenced to gather over Mexico, artists were set at work designing patterns which were reminiscent of early history on this continent, directing their attention particularly to the symbols, colors, and designs left by the Aztecs and other Indian races. The textile division of the museum has secured a series of pure-dye taffeta silks which shows the adaptations of these designs for present-day uses. Some of the patterns show the Aztec moon in rainbow tones

on blue and taupe, the armadillo and arrow pattern on peacock-blue, while some of the others represent designs taken from the Pueblo Indians.

MOTOR TRUCK APPROACHES FREIGHT-CAR CAPACITY

An eastern cooerage company which employs a large motor truck for the transportation of its commodities has had constructed for the machine a load bed which makes generous use of what otherwise would be wasted space. The bed extends over the front of the machine, leaving room merely for the driver, and this part acts as a counterbalance for the load carried at the back, which reaches far beyond the



Three Hundred and Eighty-Five Barrels is the Load for This Motor Truck, Which Makes Use of Almost Every Inch of Its Space

rear wheels. When loaded, the truck is almost lost sight of, the great bulk it carries towering above and bulging beyond it so far that the machine itself is made inconspicuous. When packed to its practicable capacity it is able to carry 385 barrels.

REFRIGERATOR CARS ICED BY BALED-HAY LOADER

To facilitate the icing of refrigerator cars a baled-hay loader has been successfully employed in Seattle. The elevating apparatus is arranged to ac-

commodate regulation-size cakes of ice instead of hay and convey them from wagons into the cars. In this manner the lifting, which without machinery is a slow process, is done quickly and without much exertion on the part of the workmen. The transfer of a wagon load of ice requires only a few minutes, as the loader handles the cakes almost as rapidly as they can be placed upon it. With this apparatus 100 tons of ice have been loaded in a 12-hour day.



Icing Refrigerator Cars with the Aid of a Baled-Hay Loader

NAVIGATION OF THE PANAMA CANAL AND REGULATIONS CONTROLLING IT

SHIPS which do not draw more than 30 ft. of water nor register more than 10,000 tons are now permitted to pass through the Panama Canal from ocean to ocean. The steamship "Ancon," of the Panama Railroad line, on August 15 sailed through the canal, marking the trail for the world's commerce. Aboard the vessel, which, from its foremast, floated the flag of peace, were Colonel Goethals, the builder of the work and governor of the zone, and guests and officials of the administration. Nearly two weeks previous to this voyage the "Cristobal," a sister ship of the "Ancon," sailed from the Atlantic side to Balboa, testing the locks and the channel in anticipation of the final opening.

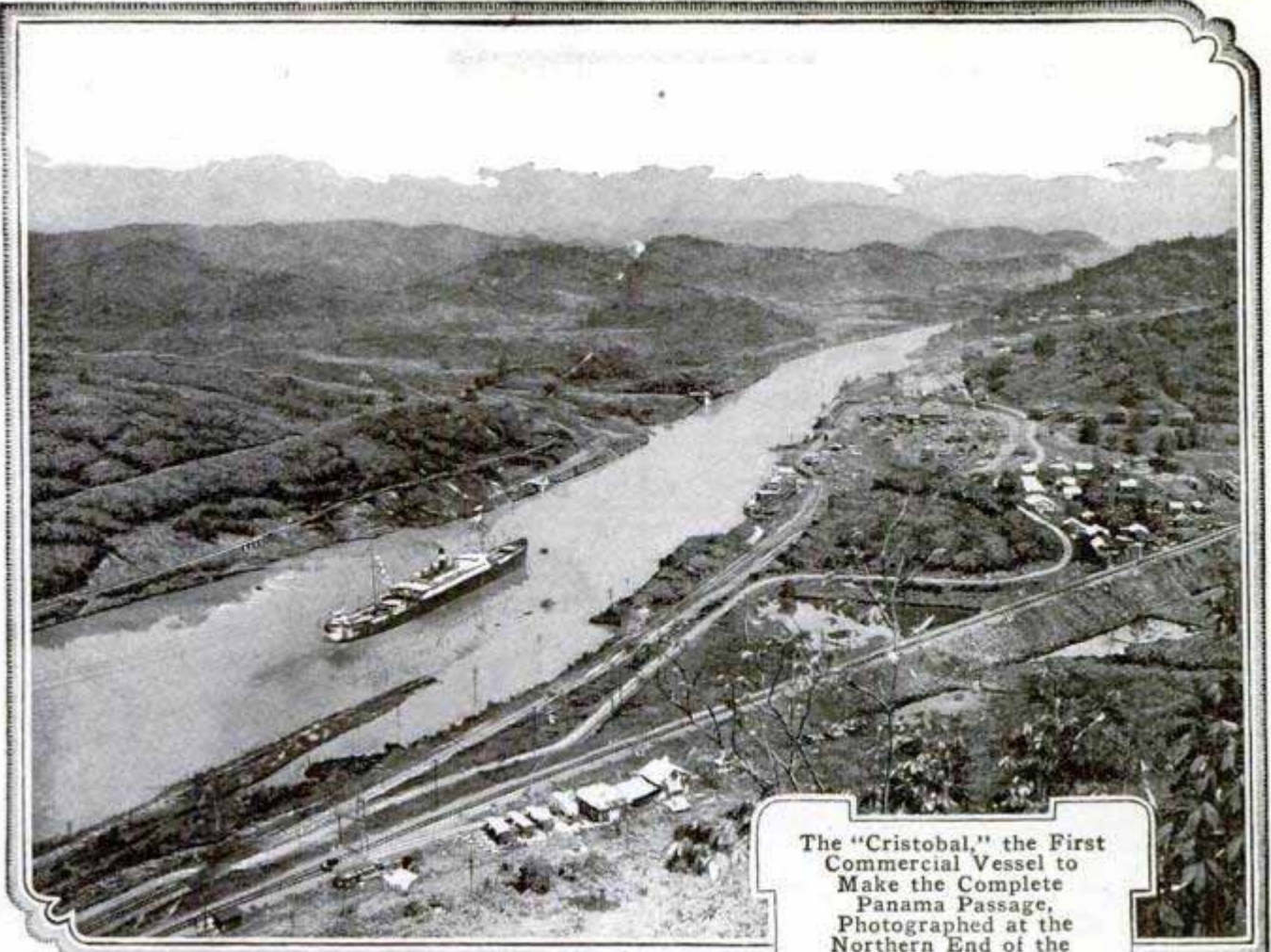
Although the canal has officially been declared open to traffic, its formal opening will not take place before next spring. The ceremony which was marked by the passage of the "Ancon" was merely local in character. While only vessels of not more than 10,000 tons register are given entrance now, it would be possible to pass the super-dreadnoughts of the United States Navy, were it necessary. The condition at Cucaracha slide has been sufficiently remedied so that no difficulty is experienced by a ship in passing it. At the time of the passage of the "Ancon" it would have been physically possible to have sent two or three vessels abreast through the narrowest part of Culebra cut.

Regulations for the operation and navigation of the canal have been promulgated, and cover in every detail the behavior of all ships from the moment they arrive in port at either terminus until they leave the zone of control on the opposite side of the isthmus. After entering one of the terminal ports no vessel is permitted to leave, either for the canal or the ocean, without being given authority to do so. It is within the power of the officials to deny passage to any vessel, or hold it for investigation, if its sanitary condition is questionable

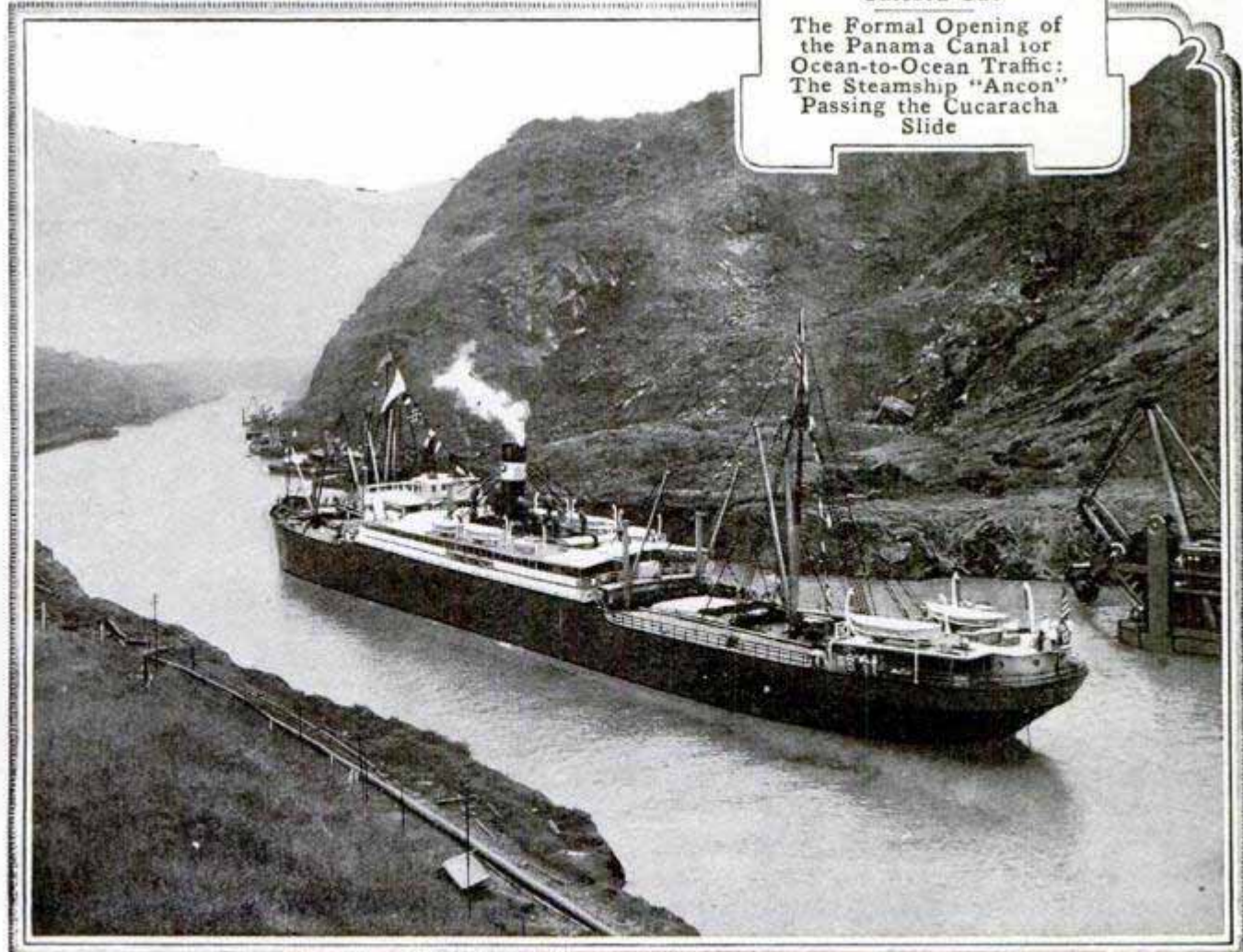
or the status of its cargo, hull, or machinery such as might endanger or obstruct the canal. Craft carrying explosives or inflammable oils are expected to seek permission for passage before leaving ports of departure, and such ships, while crossing the isthmus, must display red flags by day and red lights at night. Each ship must take on a government pilot to direct the course through the canal. Responsibility for accidents resulting from a refusal to follow his advice is placed upon a ship's owners or representatives. All radio apparatus is entirely under control of the canal authorities throughout a voyage. It may be used for canal business, must have an operator in attendance constantly, and must not interfere with the canal radio stations. Excepting while plying the waters of Gatun Lake, ships may not proceed faster than 6.9 miles an hour.

Unnecessary whistling, the discharge of firearms, "cross signaling," the general use of searchlights, the pollution of the canal waters, and the failure to disclose anything pertaining to a ship or its cargo which might cause trouble to either it or the canal, are prohibited. A steam vessel proceeding under sail carries a black ball 2 ft. in diameter, forward; and seagoing suction dredges, when under way and dredging, carry two black balls of the same size.

One of the effects of the opening of Panama Canal upon the internal commerce of the United States is already to be seen in the freight-rate reduction on dried fruits and canned goods. Against the rail charge of 100 cents per hundredweight on dried fruits shipped from Portland and Seattle to New York City, the new water rate will be 37½ cents, to which is added dockage, lighterage and insurance costs, bringing the amount up to about 40 cents. This will mean a saving of approximately \$160 on every carload of dried fruit sent by water. The same initial rate applies to canned goods, which will mean a saving of approximately \$140 a carload to shippers.



The "Cristobal," the First Commercial Vessel to Make the Complete Panama Passage, Photographed at the Northern End of the Culebra Cut



The Formal Opening of the Panama Canal for Ocean-to-Ocean Traffic: The Steamship "Ancon" Passing the Cucaracha Slide

HOMEMADE DRAG NEW CULTIVATING TOOL

A homemade drag designed for breaking the crust of the ground after a rain is a handy implement that is coming into use among farmers of some sections of the country. This drag is made of 3-in. oak lumber, is 36 in. long in the center, 20 in. long at the sides, and 27 in. wide. Five harrow teeth are driven in the back cross bar, and these serve to make little furrows in the ground to prevent the ground from puddling during the next rain. This implement is drawn by horse or by hand between the rows. It is provided with a handle for lifting and dumping when the teeth get clogged with weeds and trash.



This implement is drawn by horse or by hand between the rows. It is provided with a handle for lifting and dumping when the teeth get clogged with weeds and trash.

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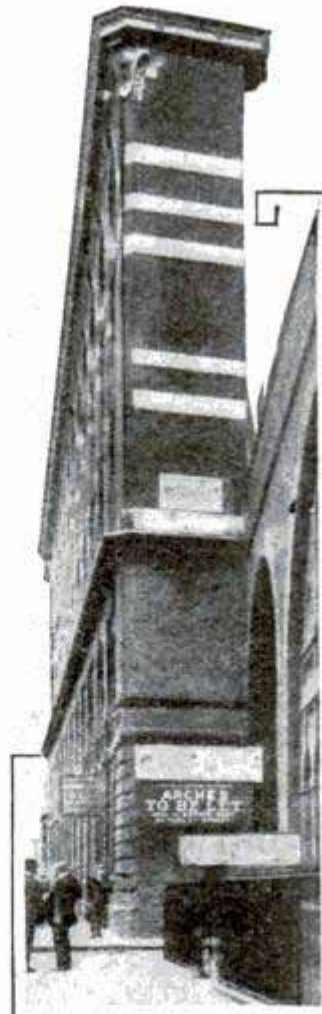
AUTOMOBILES IN PARCEL- POST SERVICE

Statistics covering the operation of the parcel post in 50 cities having a combined population of 20,000,000 show that about 10 per cent of the local deliveries were made by automobiles. Between October 1 and October 15, 1913, a total of 11,000,000 parcels were mailed, and 3,500,000 parcels were received for local delivery at these cities. The average weight of the parcels was 1 lb. 11 oz., and the average postage was 10 cents. Three-quarters of this mail was delivered by regular carriers, and 350,000 parcels were delivered by automobiles at a cost of \$17,653, or at an average cost of about 5 cents.

MOVIE FILM OF MRS. WILSON PRESENTED TO PRESIDENT

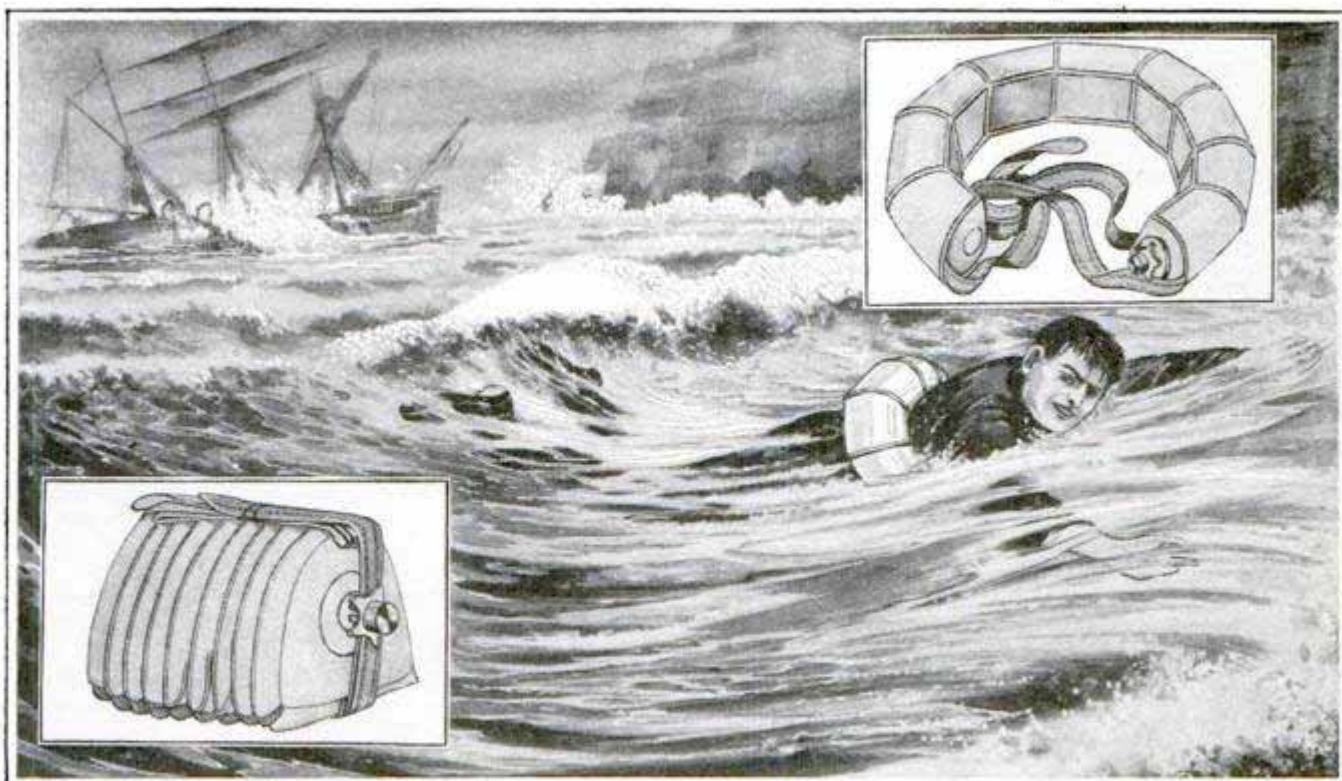
A moving-picture film taken of the late Mrs. Woodrow Wilson and her daughter, Mrs. Francis B. Sayre, while they were on their vacation in New England last summer, has been presented to the President by the producers. The film shows the two women as they arrived at Concord, N. H., while on their way to a quiet retreat in the mountains. Considering it probable that President Wilson would be pleased to have the film which showed Mrs. Wilson during one of her care-free, happy moments, the company communicated through Secretary Tumulty its desire to make the presentation. The strip of film is now in the keeping of the President at the White House.

QUAINT OFFICE BUILDING IN LONDON



An office building that has the appearance of being a slice off the front of a real building is one of the curious structures to be seen in London. This building is 90 ft. high and contains four stories, but is only 10 ft. wide. It was evidently built to fit the only space available.

ⒸA water-power tunnel seven miles long, 16 ft. wide and 19 ft. high, now being built in Shasta County, Cal., will be, it is said, the longest tunnel in America.



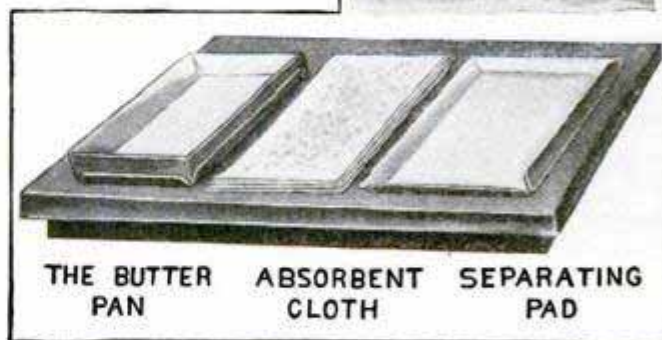
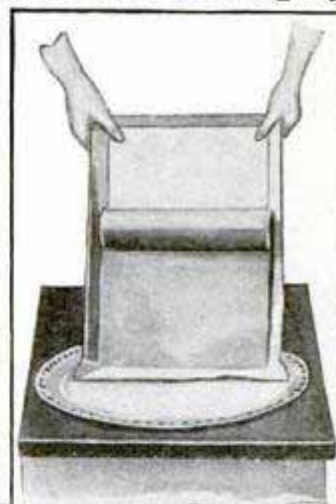
With This Life Belt the Arms and Legs are Left Entirely Free for Swimming. Above: The Life Belt Distended as It would Be in Actual Use. Left: The Life Belt Collapsed and Ready to be Placed in the Case

NEW LIFE PRESERVER IS SELF-INFLATING

A pneumatic life preserver that is self-inflating is one of the latest and apparently one of the most valuable additions to life-saving equipment. This is a life belt that consists of a waterproof canvas, inside which is a series of hollow aluminum ribs. The ribs are securely sewed to the canvas and are circular in form around the outer portion of the belt, and flat where the belt fits against the body. They serve to hold the belt to a tubular shape. The belt is equipped with an automatic air valve and with straps for tying the ends across the chest. When not in use, it is collapsed longitudinally so that it takes up a space of about 4 by 5 in., and is easily carried in a case about the size of a camera case. As the belt is being distended, air enters through the valve and fills the vacuum within the walls, while no air can escape, owing to the automatic action of the valve. The buoyancy of the belt is said to be sufficient to sustain a man for an indefinite period. To fold the belt the valve must first be opened to allow the air to escape.

BUTTER IS MADE IN PAN WITHOUT CHURNING

Butter is made without churning by a new device which consists of a tray fitted with an absorbent cloth and separating pad. In the pan, when assembled, fresh, thick cream is poured and allowed to remain for several hours in a cool place.



An Odd Pan Which Does Away with Butter Churning

Later a sheet of butter is rolled from the separating pad into a wood bowl ready to work.

LAWN SEATS ARE THATCHED WITH PALM LEAVES

Lawn and park benches of the types commonly seen are in many instances



A Park Bench Thatched with Palm Leaves

extremely out of harmony with their surroundings, and detract from the

general appearance of a garden to a greater degree than they add to the comfort of it. In some places in California, however, the use of palm leaves for thatching outdoor seats and in building artistic canopies over them, has become popular. Ordinary rough-lumber benches are in this way made both convenient resting places and landscape adornments.

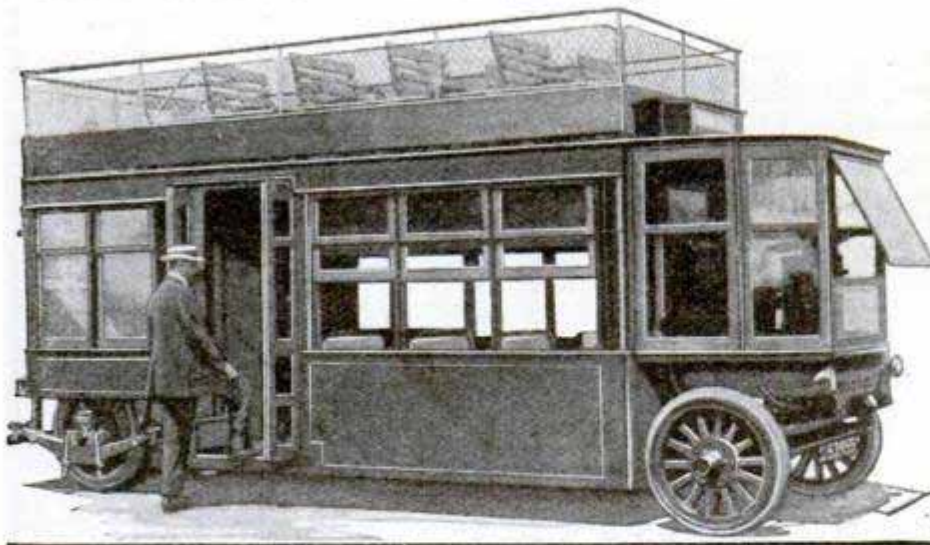
HEAVY CONCRETE PONTOON LANDING STAGE

A pontoon landing stage built of reinforced concrete and weighing approximately 650 tons, has been placed in service for ferries in the harbor at Sydney, Australia. The floating structure is 100 ft. in length, 43 ft. wide at one end, and 68 ft. at the other, and divided into 48 water-tight compartments. It is built to carry a live load of 150 tons and withstand the strain of vessels berthing on both sides concurrently, especial attention being given to the reinforcement.

READY TO OPEN NEW YORK ELECTRIC BUS LINES

Storage-battery omnibus lines, considered for some time for auxiliary

tween points in lower Manhattan and Harlem. The car has shown itself



Electric Omnibus Developed for Transportation Uses over Regularly Maintained Routes throughout Manhattan

transportation mediums at New York, have become a practical reality with the construction of a new electric car which is now making a number of regular trips daily over a route be-

capable of carrying heavy loads up 10-percent grades, and will travel 125 miles on one battery charge. It differs from the Fifth Avenue busses in appearance by being swung low so that a step of only a few inches is necessary in entering the bus through its side door. The stairs leading to the deck extend from the interior instead of the exterior, and be-

sides the machine is $2\frac{1}{2}$ ft. lower than the usual bus. Its manufacturer claims for it that it may be operated at one-third the cost of gasoline cars of equal capacity.

INGENIOUS CAMERA USED BY FRENCH AIR SCOUTS



This Camera Attached below the Body of an Aeroplane Automatically Photographs the Country over Which the Airman is Flying, on a Roll of Film That Unwinds at a Rate Proportionate to the Speed of the Flier

While it is not known how valuable the device has proved in the present war, the French military aviation corps has developed a camera which keeps a detailed photographic record of the territory traversed by a flying machine during its flight. In several respects the apparatus has the characteristics of a motion-picture instrument. It is fixed to a machine so that the lens is constantly directed toward the ground. A small auxiliary propeller regulates the operation of the shutter in accordance with the speed of the aerial craft. Each time that the shutter is opened the position of the needle of the compass and the height as indicated by the aneroid barometer are impressed on the edge of the film.

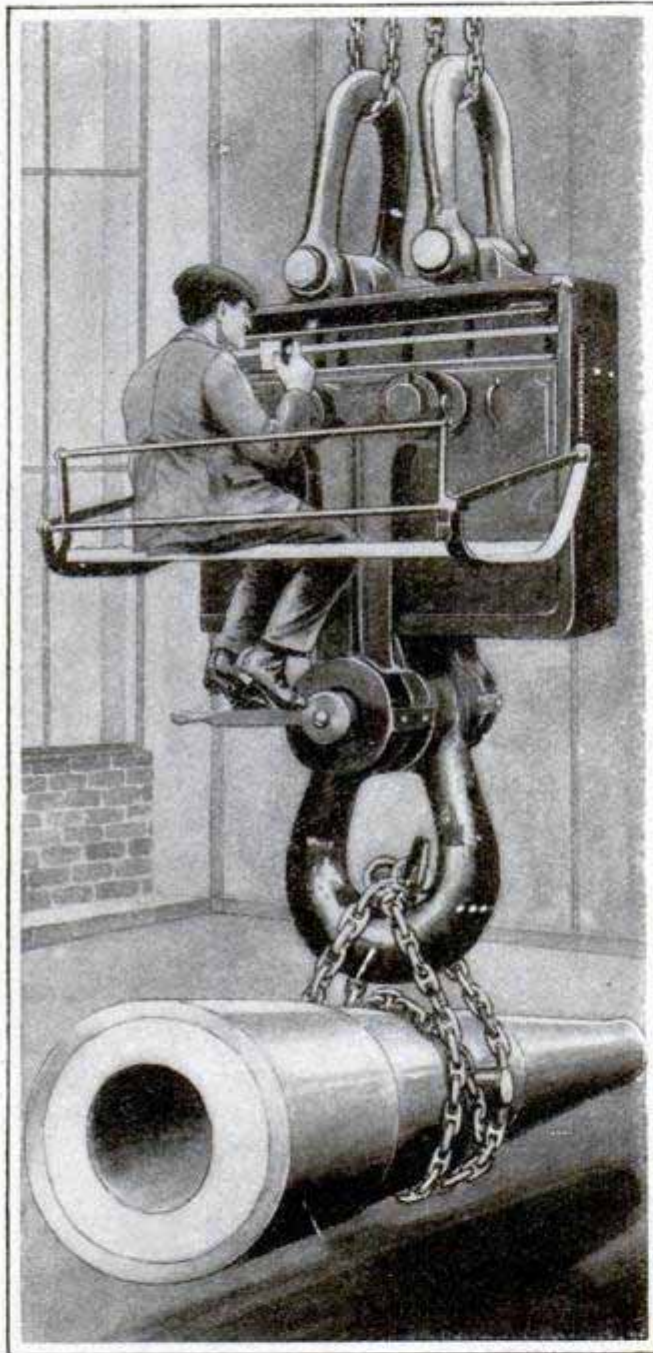
FIND COMMERCIAL USE FOR PEACH SEEDS

Hundreds of tons of peach seeds piled at fruit-canning establishments in California are now to be utilized in a commercial way, and a company has been organized for developing this industry. The seeds are to be cracked by machinery and the meats used in the manufacture of prussic acid and other products. The shells will be sold as fuel.

CA militia troop in Missouri drills at night on a parade ground illuminated by tungsten lamps.

MACHINE FOR WEIGHING HEAVY GUNS

Before a heavy gun leaves the shop it is necessary to determine its weight with considerable accuracy, and this



This Machine Is Capable of Weighing a 100-Ton Gun with a Possible Error of Less Than Seven Pounds

often proves a difficult undertaking with weighing apparatus now in general use. A weighing machine recently built and installed in a British arsenal apparently makes this an easy proceeding. This machine is of the compound-lever type and has a capacity of 100 tons, so that guns of the heaviest kind can be handled, while the mechanism is

so sensitive that weights can be determined within less than 7 lb. The gun is secured to a hook hanging from the machine, and the machine and gun are lifted clear of the ground by a crane. A seat is attached to the frame for the weighman, who is lifted with the machine, but whose weight does not enter into the result. A relieving arrangement is provided by which the load may be taken off the knife edges of the weighing machine, and with this arrangement it is not necessary to remove the machine after each weighing operation, unless the greatest possible lift is required.

SERPENT-BITE ANTIDOTES SAVE MANY IN INDIA

Effective antidotes for snake bites which already have saved the lives of numerous persons in India are being produced as the result of work carried on at the Parel laboratory at Bombay. Between the years 1887 and 1911, it was estimated that 543,991 human beings were killed by poisonous reptiles. The figures were so appalling that scientific experiments were started in an attempt to find something which would counteract the effect of the venom of the various serpents commonly encountered in the central part of the country. Extraction of the poison from the most deadly of these snakes constitutes the work being accomplished at the Bombay laboratory, and this process is as simple as it is interesting. The snake is held so that it cannot strike those about it, while a small wine glass with its top tightly covered by a piece of cloth is placed near the reptile's head. It usually strikes almost immediately, its sharp upper fangs piercing the cloth and the poisonous venom dripping into the glass. From such an operation approximately a half teaspoonful of the liquid is collected, an amount sufficient to kill half a dozen persons. This is dried over lime, dissolved into a salt solution, and injected in small doses into horses. For two years this treatment is continued until an animal is

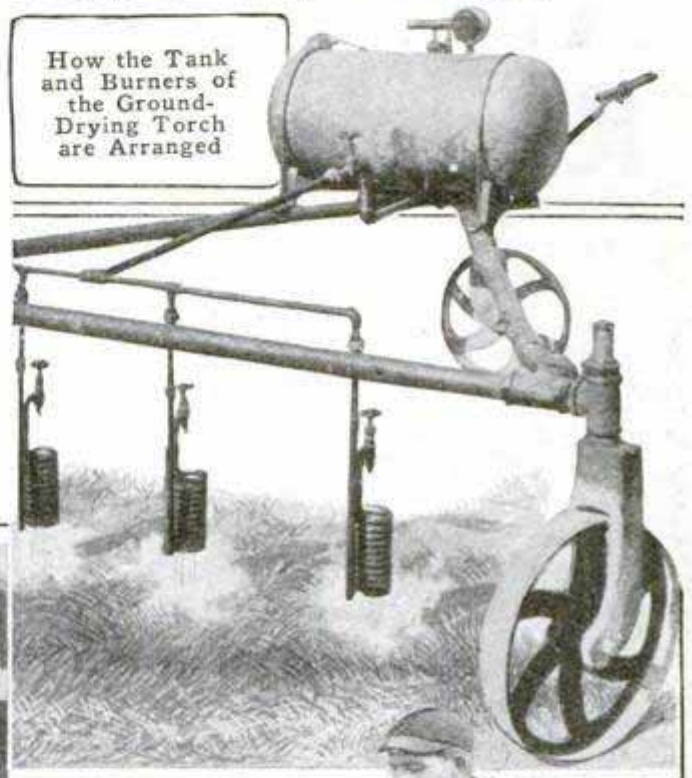
able to take a quantity equal to 200 times the original amount. The horse's immunity to the poison is caused by a material which is gradually built up by his system. This material is contained in the serum of the horse's blood, which is administered to human beings by subcutaneous injection. If the serum is injected immediately, the bite will not result disastrously. It is necessary, however, that a person use an antidote made from the venom of a serpent of the same species as the one that bit him.

GASOLINE-BURNER DEVICE DRIES BALL GROUNDS

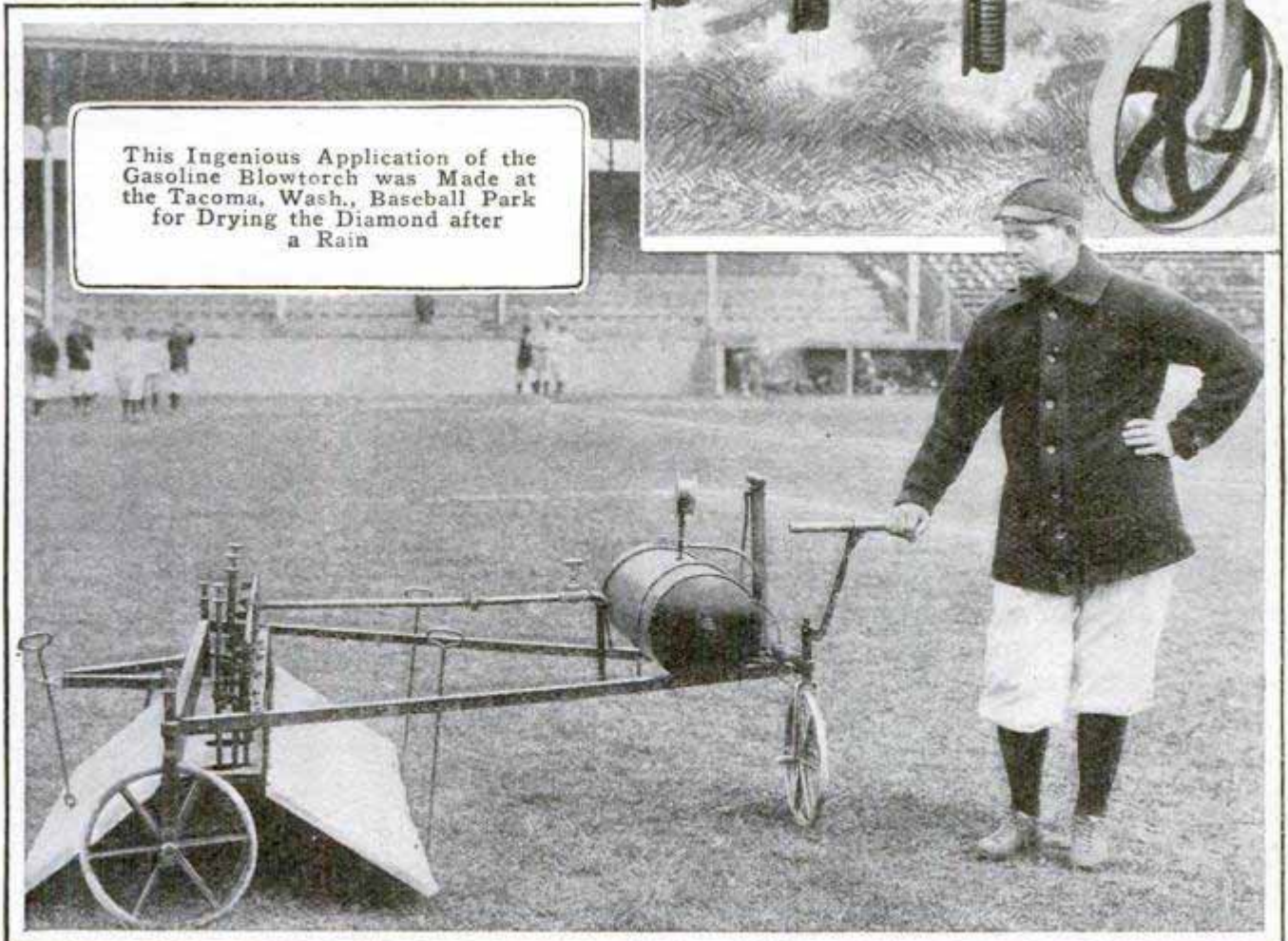
A machine fitted with gasoline blowtorches has been put in use at a Tacoma, Wash., baseball park for the purpose of artificially drying the grounds following rainstorms. The apparatus is similar in principle to devices used in asphalt-pavement repairs. It is built with an iron frame in the shape of an equilateral triangle, mounted horizontally on swivel

wheels, carrying five coil burners with downward-projecting jets. Over these burners is a deflector hood with adjustable wings made of galvanized iron and asbestos. At the front of the carriage is a gasoline tank and pressure pump which supply the fuel. When the machine is drawn slowly over a moderately wet field, it is asserted, the ground is within a short time dried sufficiently for use. Under tests the burners dried a small depression covered with water to a depth of 2 in., in approximately six minutes.

How the Tank and Burners of the Ground-Drying Torch are Arranged



This Ingenious Application of the Gasoline Blowtorch was Made at the Tacoma, Wash., Baseball Park for Drying the Diamond after a Rain



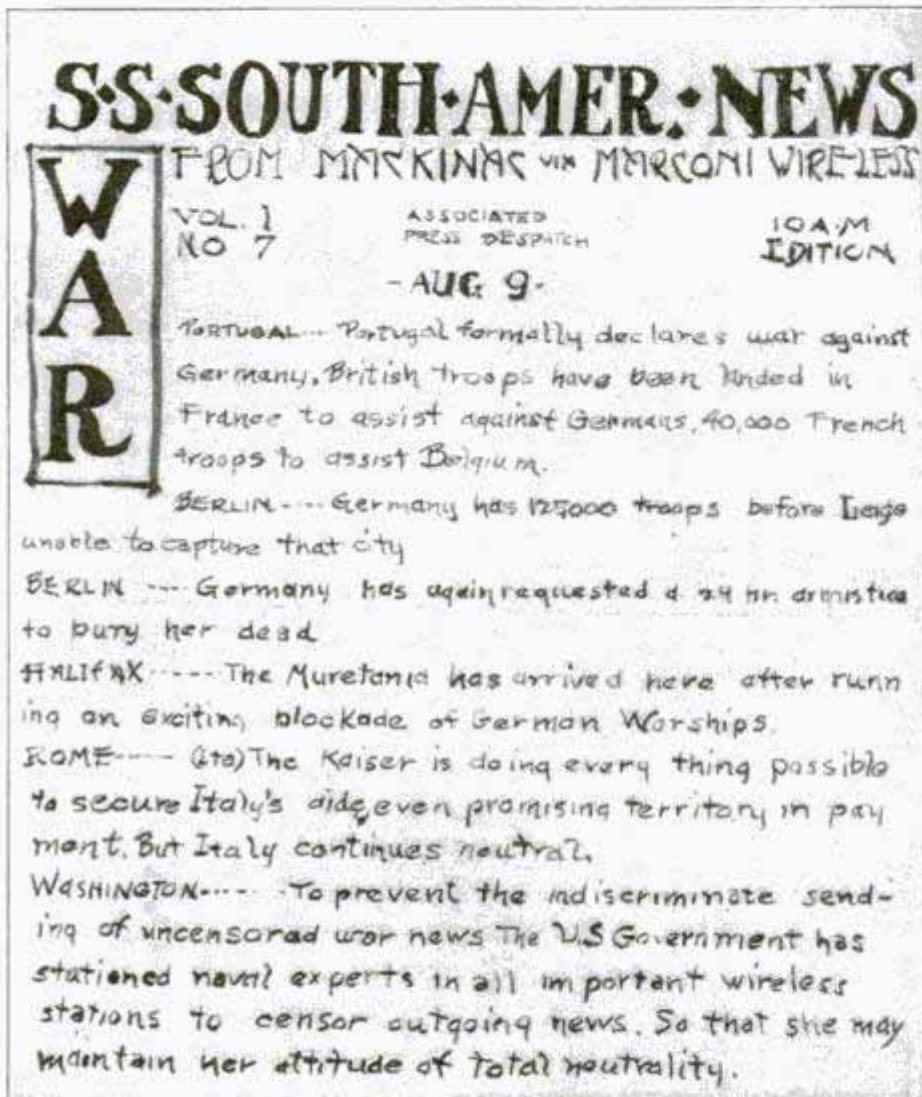
WAR "EXTRAS" PUBLISHED ON LAKE STEAMER

Passengers aboard one of the steamers navigating the Great Lakes were furnished frequent bulletins con-

HOW GASOLINE IS LOST IN POLAR EXPLORATION

That the extreme cold of the polar regions may change ordinary tin into a gray tin powder incapable of holding

liquids for any considerable period seems to be confirmed by the experience of explorers, and particularly by the experiences of the ill-fated antarctic expedition in which Captain Scott lost his life. On the outward journey gasoline in tin cans was left at each of the depots to be picked up and used on the return journey. Later, these supplies were found to have disappeared partly or entirely, and this is thought to have been one of the principal reasons for the disastrous ending of the expedition. All through that part of Captain Scott's diary which covers the return, there are references to the serious inconveniences caused by the finding of empty cans where full cans had been left, entries such as the following being common:



One of the News Bulletins Published Aboard a Lake Steamer, Keeping Passengers Informed Regarding the War Situation

cerning the status of the European war through the publication of wireless communications. At different periods during the day and evening the latest advices from the news centers were hectographed and placed on sale by the radio operator. While the bulletins were brief they nevertheless contained much information and kept those aboard nearly as well informed as if they had been supplied with the hourly editions of metropolitan newspapers.

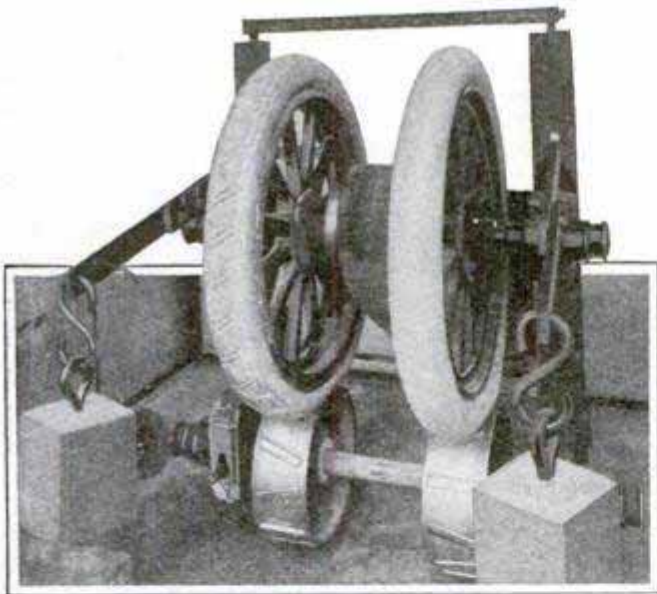
☐ In forestation around the Wachusett reservoir, Boston, 125,000 white-pine seedlings were planted.

"We marched to the Middle Barrier depot fairly easily yesterday afternoon, and since that have suffered three distinct blows which have placed us in a bad condition. First, we found a shortage of oil; with most rigid economy it can scarce carry us to the next depot on this surface." The cans had been left on the tops of the cairns as a precaution against the depredations of animals. At first it was thought that the mysterious disappearance of the oil was due to gradual evaporation through the stoppers, but when it was discovered that the food stored below the cans was in many

cases tainted with oil it became evident that the trouble was due to leakage, and that this leakage could only have been caused by the disintegration of the tin.

EMPLOY METAL TO TOUGHEN RUBBER PRODUCTS

The manufacture of rubber goods by a process consisting of the mixture of vanadium, an element of the nitrogen-phosphorous group, with the rubber at the time it is worked, has been reported as multiplying greatly the tensile strength and resilience of the various products. Automobile tires and similar commodities which are subjected to severe usage have been made by the method and, it is claimed, have held up under severe tests. The theory of the process is identical with the use of vanadium in the manufacture of steel, that by its addition at the time of making a product the base is greatly toughened. The density of the



Metal-Process Tire and Ordinary One being Tested Side by Side

rubber is claimed to be increased, while its resistance to cutting edges is accredited with making a tire to all purposes puncture-proof.

☞The Panama Canal earned about \$55,000 during its first week of operation. This amount does not include money collected for barge service or advance payments.

TELEPHONE ARM LEAVES BOTH HANDS FREE

A new telephone arm that leaves both hands free while the telephone is being used has just been invented.



This Telephone Arm Automatically Opens and Closes the Connection and Leaves Both Hands Free

This arm is pivoted at the bottom of the telephone in such a way as to swing vertically to and from the user and will remain in any position, vertical or inclined, without any further attention from the user. An ordinary receiver is fixed horizontally by means of spring clips to the end of the arm. The telephone is equipped with the ordinary hanger, and when the arm is up this is held down by a notch in the arm. The action of pulling the arm forward releases the hanger so that connection with "central" is made.

NIGHT-SHOOTING RECORD MADE BY ARTILLERY

During a gun practice which was recently held after night at Fort Monroe, a company of United States coast-defense artillery established a new record for marksmanship. Out of seven shots fired, seven hits were recorded, a perfect score. The work was done with 12-in. guns while the targets were placed 7,000 yd. out in Chesapeake Bay.

FAMOUS AND CURIOUS BELLS OF DIFFERENT LANDS

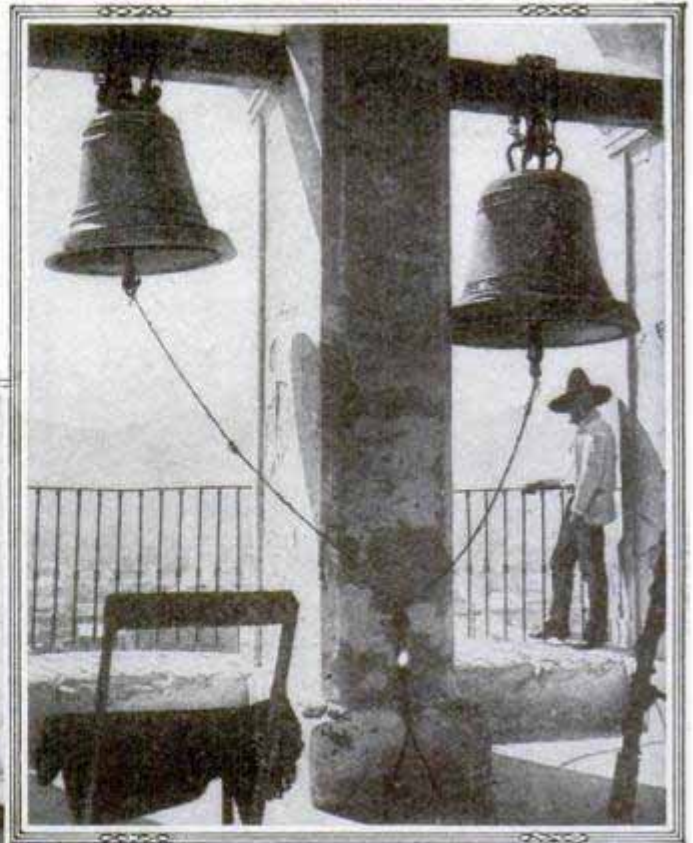
Since the dawn of the Christian era bells not only have been closely associated with religious and social activities in nearly every nation, calling worshipers to church in days of peace and soldiers to arms in times of trouble, but have also exerted an important influence upon architecture, probably being indirectly responsible



Bells before a Buddhist Shrine in Burma: As a Worshiper Leaves, a Bell is Rung to Record His Devotions

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for most of the world's great towers. In early times the person who commanded the bell also ruled the town. It was because of this that conquerors upon taking a town immediately had its bells melted. The massacre of the French by John of Procida, in an attempt to free Sicily, was marked by the ringing of the Sicilian vespers. Likewise the massacre of the Huguenots on St. Bartholomew's day was commenced with the ringing of bells. And in other ways, heralding the births and deaths of kings, a great victory or a national catastrophe, bells have rung

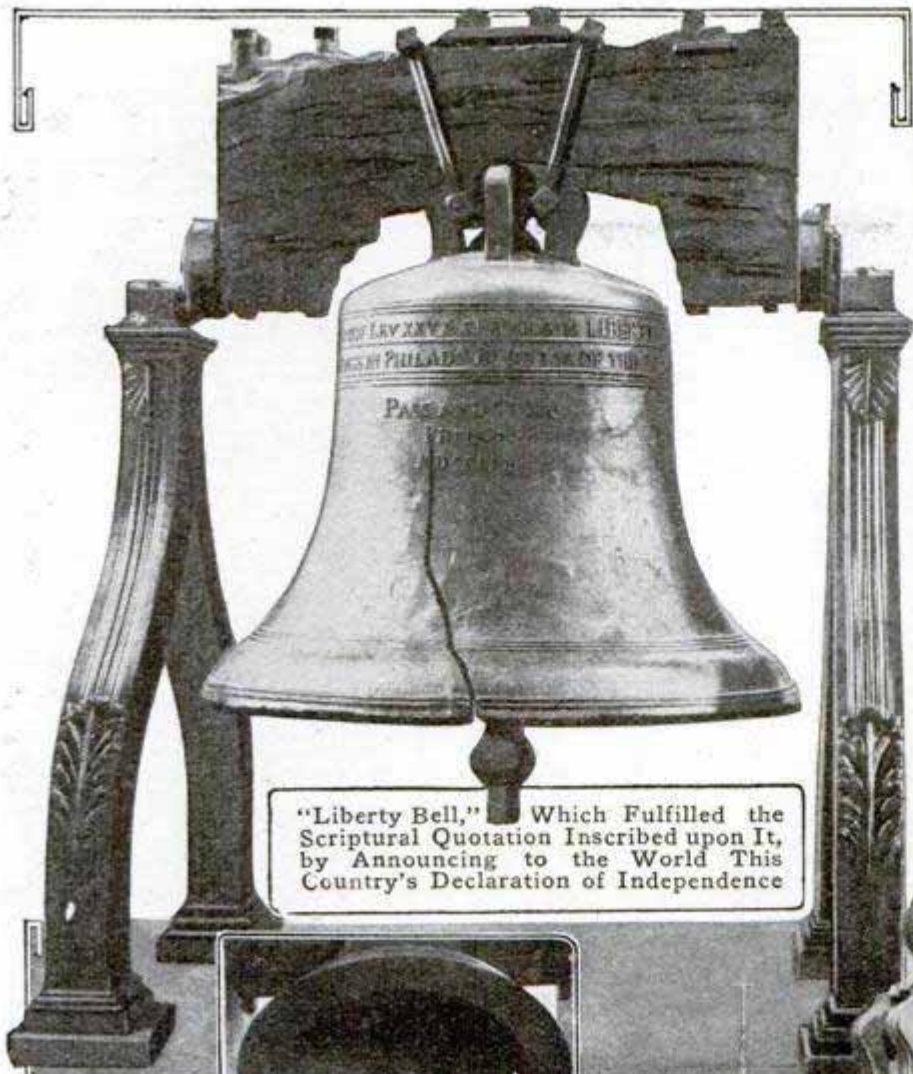


In a Tower Overlooking the City Are the Famous Twin Bells of Monterey. Both are Always Sounded Together

forth many chapters of history.

The bell generally spoken of as the King of Bells, the famous "Czar-Kolokol" at Moscow, weighs slightly more than 198 tons, is 19 ft. in height and 68 ft. in circumference. While its history is somewhat confused it seems never to have been rung, for it is supposed to have been broken shortly after it was cast, in 1733.

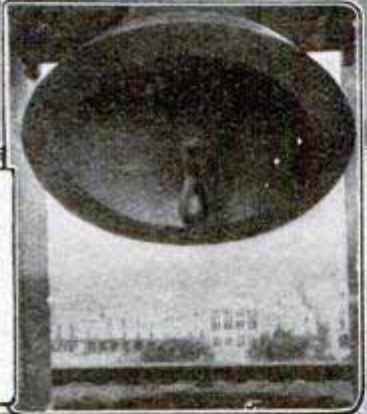
It now stands in a raised position in the middle of a square where it is used as a chapel. To Americans, at least, the most famous bell in the world is "Liberty Bell" which announced the signing of the Declaration of Independence. It weighs 2,800 lb. and bears the prophetic words, "Proclaim liberty throughout all the land unto the inhabitants thereof." In a large tower joining a monastery at Kyoto, Japan, there is a famous bell which has hung in its present position since the early part of the seventeenth century. For nearly five minutes after it is struck it



"Liberty Bell," Which Fulfilled the Scriptural Quotation Inscribed upon It, by Announcing to the World This Country's Declaration of Independence



This Great Bell, at Kyoto, Japan, is Rung by Striking a Heavy Wooden Beam against Its Side



One of the Cathedral Bells at Mexico City Ringing at the Close of Day



This Old Bell, in the Tower of a Venezuela Cathedral, Dates Back to Early Colonial Days Before the Republic was Formed

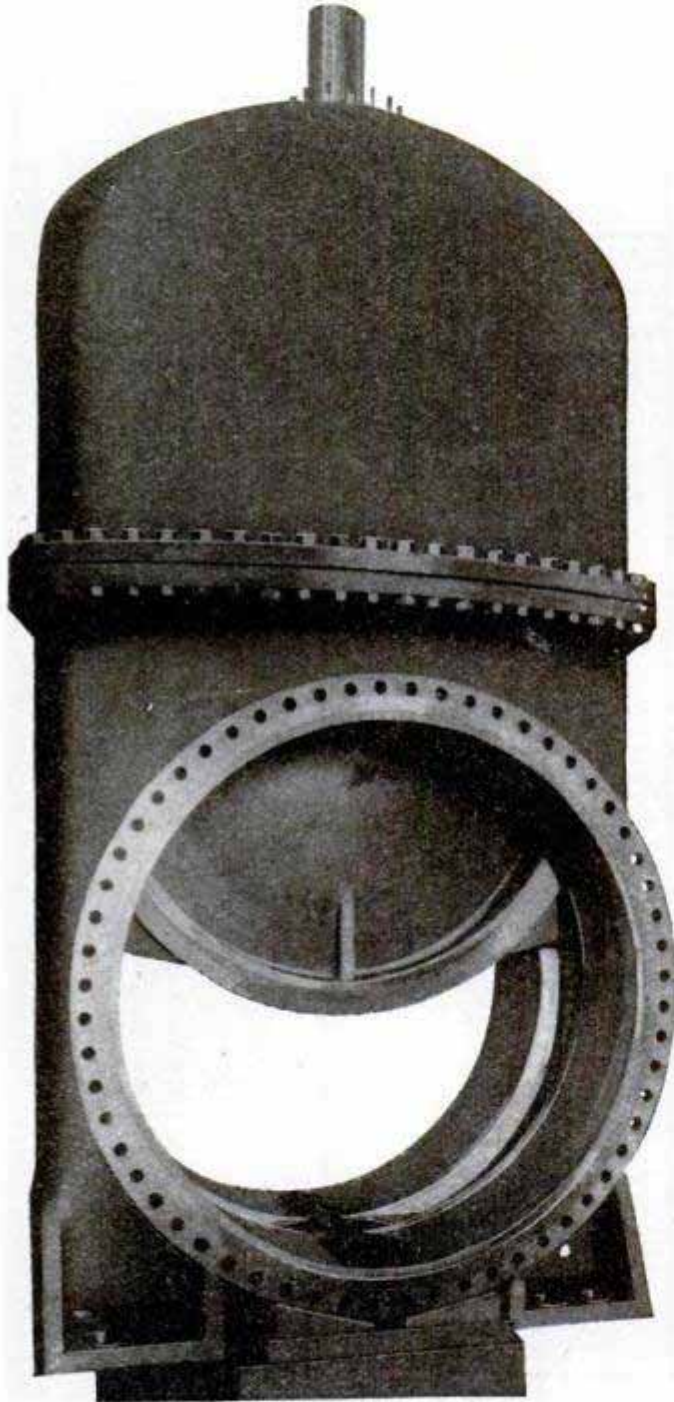


The "Czar-Kolokol," Known as the King of Bells, Which Occupies a Position in a Central Square at Moscow and is Used as a Chapel

gives out a low, sonorous tone. Bells cast in Spain before the discovery of America and brought over by the conquistadores still ring from church towers in many parts of Latin America.

LARGE BRONZE VALVE FOR NEW YORK CITY

What is said to be the largest bronze valve ever made has been completed



Bronze Valve Weighing 20 Tons That is to be Used in the City Pressure Tunnel in New York City

and delivered for use in the city pressure tunnel which forms a part of the

water-supply system of New York City. This is one of two 66-in. valves that will divide the tunnel into three parts, any one of which may be cut out at will. The valve weighs a trifle over 20 tons and is 12 ft. 4½ in. high. The mold for this enormous casting was made of loam, bricked and bound, and was a difficult undertaking, requiring the continuous work of two men for 26 days.

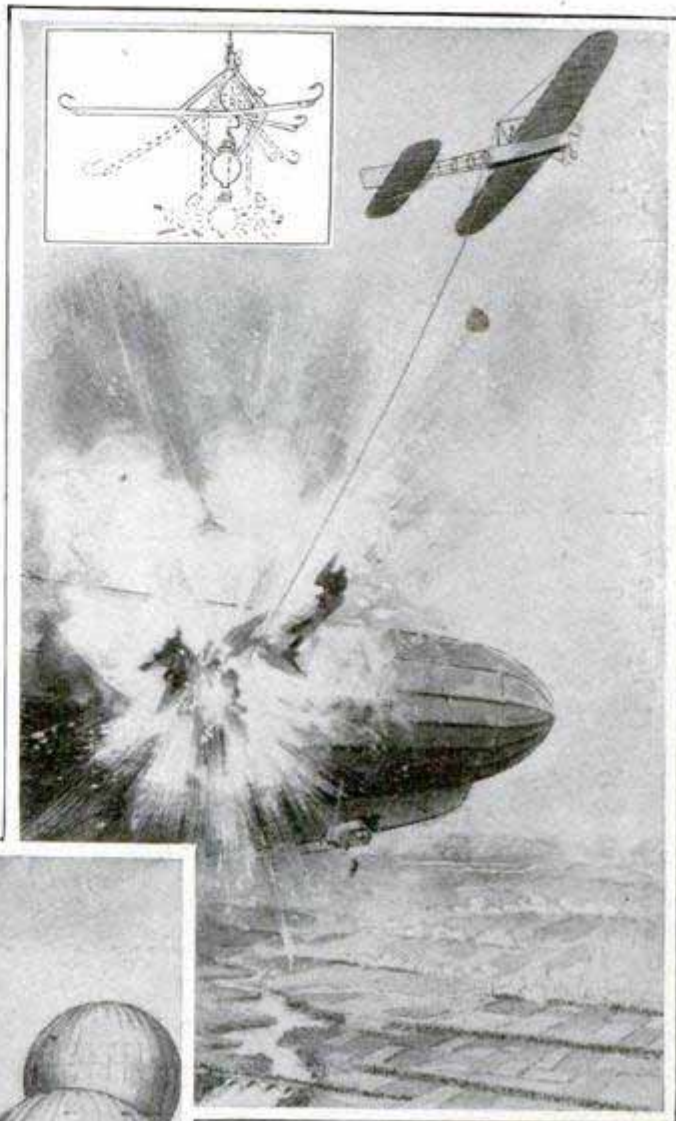
DISGUISED LINERS SAILING ATLANTIC IN DARKNESS

Ocean liners which stole across the Atlantic following the European declarations of war, sailing under the flags of belligerent nations, were frequently disguised painstakingly in order to lessen the danger of capture. In several instances vessels made the entire voyage in complete darkness, save only for masthead and side lights. In nearly all cases the wireless instruments were silenced, while frequently the name of the vessel was either changed or removed. Passengers on a few of the steamers told of their captains having sailed under false colors. When the "Lusitania" slipped out of New York Harbor for Liverpool she sailed practically without lights, plunging through the darkness and fog in silence. On the morning following her departure her passengers were surprised to find that the color of her great funnels had been changed over night to a war gray, while her bridge and fittings were being similarly treated to render her less conspicuous and cover her identity. When viewed from the forecandle she bore an extremely warlike appearance. In one or two instances the funnels on vessels were painted to resemble those of liners belonging to other steamship companies. The decks of many of the vessels were almost completely covered with canvas to prevent lights from the interior showing in the darkness.

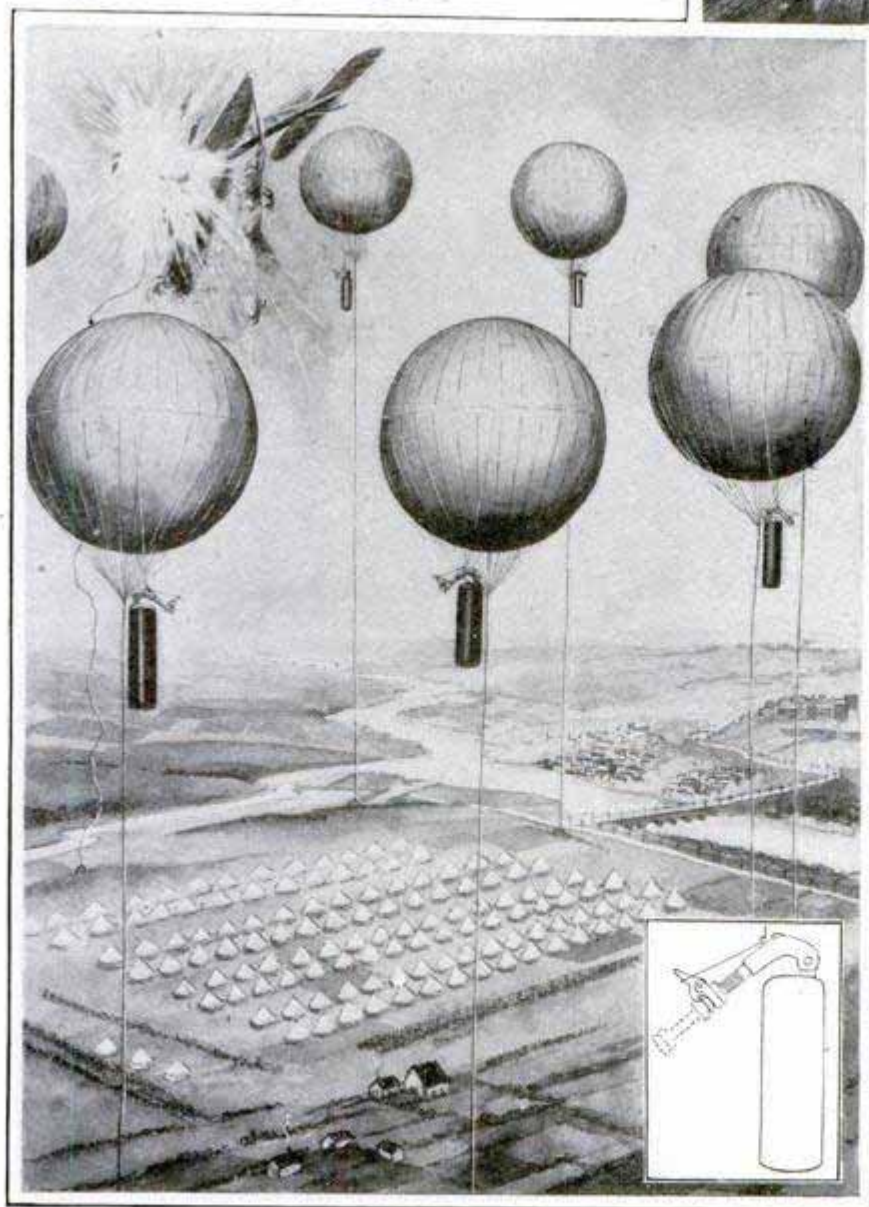
⌈The work of salvaging the wrecked "Empress of Ireland," for which contract has been let, will be done under from 80 to 100 ft. of water.

AERIAL BOMBS DEVISED FOR WAR IN THE SKY

Aerial bombs for offensive and defensive use against an enemy's aerial corps have been devised. The instrument to be used in attacking an airship during flight consists of a cylindrical bomb suspended beneath a metal framework which supports lateral hooked arms. This is swung below a flying machine on a wire. The lower end of this connecting line, which is loose, is attached to the trigger. When a craft is attacked the bomb is swung so that by passing over it the hooks catch into the airship. The jerk resulting from this immediately draws the wire taut, pulling the trigger, exploding the bomb and demolishing the machine.



This Bomb is Intended for Offensive Operations When an Airship Squadron is Attacked

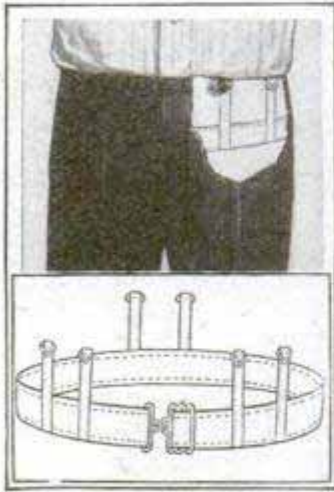


The Defensive Bomb for Mining the Clouds

The other instrument is a tank-shaped device intended to be suspended from captive balloons, mining the clouds to protect a camp or fortress against aerial attack. The line on which the bomb is suspended is attached to the trigger. The weight of the apparatus is not sufficient to trip this, but the slightest additional weight or a jerk would instantaneously cause an explosion. In this way a flying machine approaching unseen during the night might be blown to pieces merely by striking one of the wires completely invisible in the darkness.

BELT THAT IS WORN INSIDE THE TROUSERS

A belt designed to be worn under the trousers is one of the latest features



in the way of accessories to men's clothing. This belt is worn a little below the usual belt line and is provided with stiff uprights for supporting the trousers at the right height. At the upper end of each upright is a ring that is

slipped over the trousers button. It is claimed that the belt worn in this position serves to support the abdomen instead of depressing it.

PANAMA CANAL WIRELESS AIDS SHIPS AT SEA

For the benefit of shipping in the vicinity of the Canal Zone the government wireless stations at Colon and Balboa send broadcast, at regular intervals during the day and night, all notices needed by mariners approaching either end of the canal. An example of the usefulness of this service to mariners was the notice recently sent out that the light on the outer end of the Toro Point breakwater was temporarily out of service. In addition to this the wireless stations send out, for the benefit of travelers at sea, about 200 words of news condensed from the Panama morning papers.

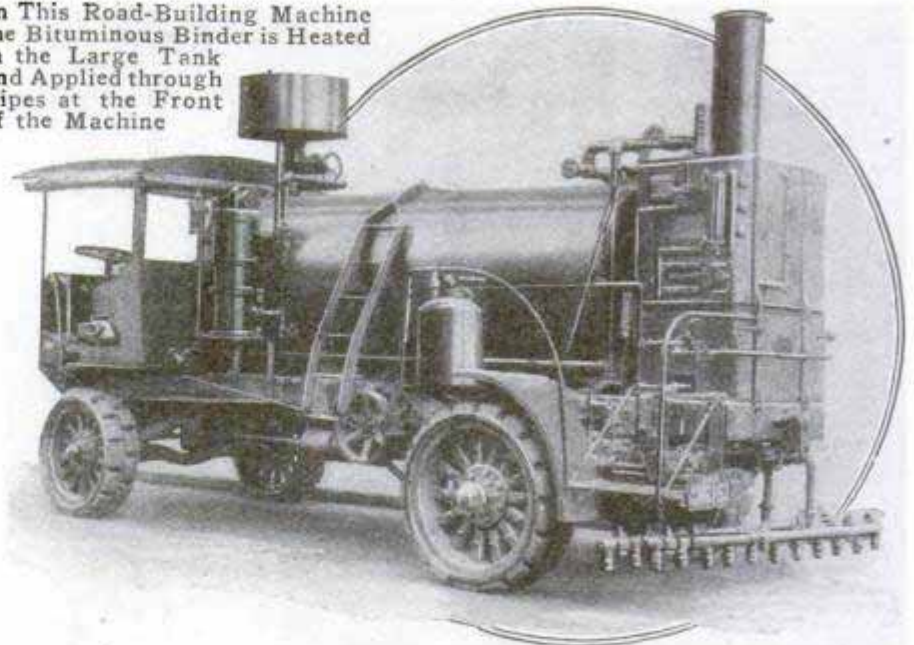
Since the suppression of the use of opium in China soya beans have been extensively planted in fields formerly given to poppy growing.

MACHINE FOR APPLYING THE BINDER IN ROAD BUILDING

A recent addition to road-building equipment is a gasoline-driven machine used for applying the hot bituminous binder under pressure so that it will penetrate and fill the spaces between the stones. After the first course of stone is laid this machine is run over the roads, discharging the bituminous binder through a series of vertical pipes at the forward end. As soon as the binder has hardened, a second course of stone is laid and rolled, the rolling forcing the two courses into one compact layer. The binder is then applied a second time, and the process is repeated until the road is completed. This process makes it possible to build a compact road with no openings into which water

can penetrate. The bituminous binder is carried in the large tank, which has a capacity of 750 gal. It is heated by steam coils in the tank, the steam being supplied by a flash boiler which is fired by fuel oil. Steam supplied by

In This Road-Building Machine the Bituminous Binder is Heated in the Large Tank and Applied through Pipes at the Front of the Machine



this boiler is also used for running an air compressor by which the binder is forced into the spaces between the stones.

NEW PROCESS FOR MAKING PULP FROM SEAWEED

A new process for making from seaweed the bleached or white pulp from which paper is made has been invented and patented in Germany. In this process a mass of the seaweed is exposed to the sun, the mass being turned from time to time to expose all parts to the action of the light. This is done preferably under open sheds covered with glass. As soon as the weed is thoroughly dried it is steeped in an alkaline solution, and is then crushed in a mortar and treated with chlorine, the whole process resulting in making the weed white. A little sulphuric acid is finally added for increasing the resistance of the fibers. This process is thought to be greatly superior to the old method of burying the weed in the ground, which resulted in the decomposition of a large part of the seaweed.

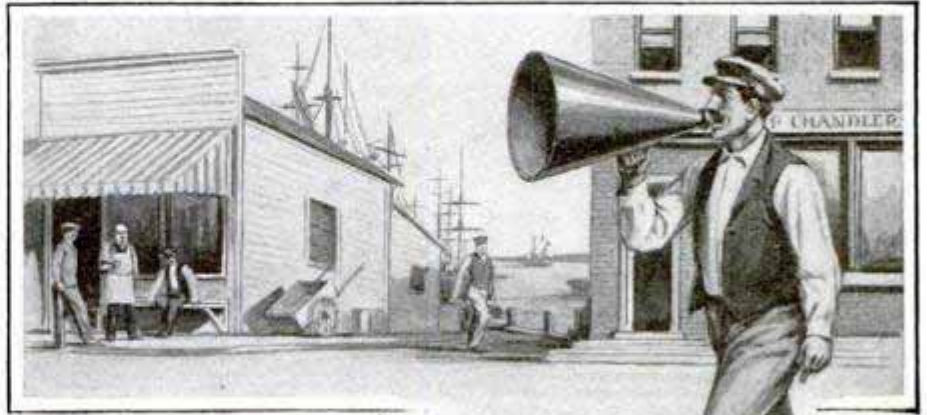
APPLYING VARNISH WITH AN AIR SPRAY

The application of varnish by means of an air spray has heretofore been attended with considerable difficulty on account of the tendency of the varnish to stiffen and turn white when it struck the surface being coated. This has apparently been overcome by the simple expedient of putting an electric heater in the pipe that furnishes the compressed air for forming the spray. With the air heated in this way the varnish flows freely through the orifices of the air brush, and dries quickly and smoothly.

☞ A single power-transmission line, carrying 140,000 volts, now extends from Bishop Creek to San Bernardino and thence to El Centro, Cal., a total distance of 404 miles.

MEGAPHONE TAKES PLACE OF WANT AD

In Rockland, Maine, where there is no daily paper to supply the usual means of advertising for help, a mod-

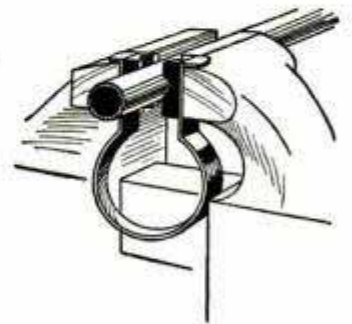


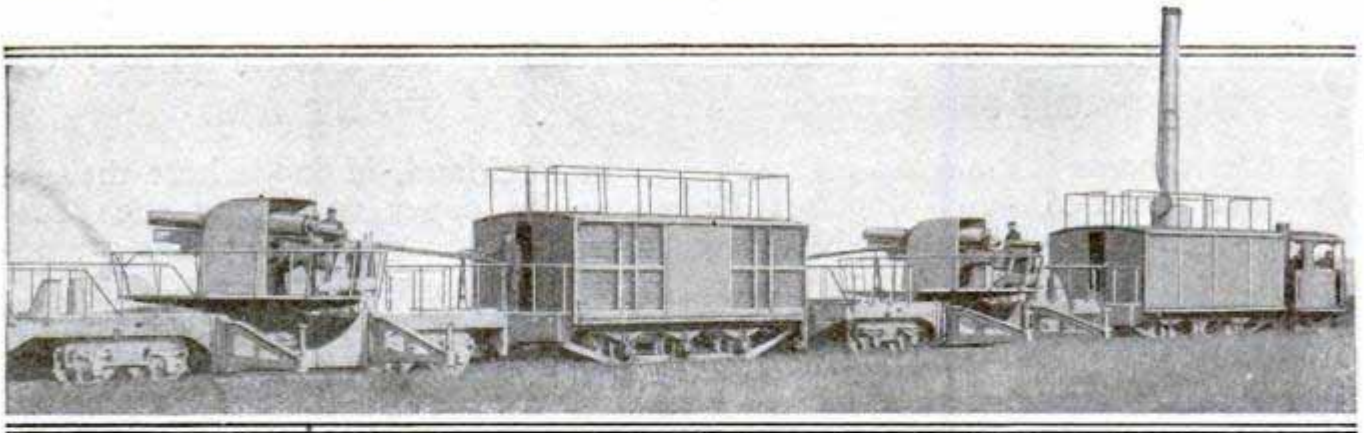
How the News is Spread at a Maine Seaport Town When Workmen are Wanted at the Shipyards

ern adaptation of an ancient method is employed for spreading the news when men are needed to work on the ships that put into the port for repairs. Instead of the old-fashioned crier, ringing a bell to attract attention, a man with a megaphone is sent about the town, calling the number of men wanted and the name of the shipyard where the work is to be found.

AUXILIARY PIPE CLAMP FOR SMALL SHOP

Where only a small amount of pipe fitting is done, an auxiliary pipe vise may be of service. A pair of clamp jaws are connected by a U-shaped spring and designed to be placed between the jaws of an ordinary vise. Lugs on the tops of the clamps hold the auxiliary device in place, and the spring keeps it tight against the vise jaws.





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Armored Train of the French Army Which is One of the Most Modern of European Fighting Machines

SEESAW FOR FOWLS FEEDS THEM AUTOMATICALLY

Operating on the principle of a seesaw and scattering grain over the ground as it is required, a homemade chicken feeder of odd form is installed in the coop of an Illinois chicken fancier. The feed is placed in a water-tight container at the top of the apparatus and falls by gravity into a tilting pan beneath it. The action of this dish is governed by a seesaw pivoted in the base of the pyramid standard and worked by the chickens whenever they desire more grain. When a fowl jumps on the high end of the board, forcing it to the ground, the feed plate is jerked and its contents thrown about the coop.



Chickens Apparently Amuse Themselves with Seesaw Which Feeds Them

POWERFUL FORT ON WHEELS AT COMMAND OF FRENCH

In the fighting equipment of the French army is a completely armored train which takes a conspicuous place with the most modern of all war machinery and represents a powerful transportable fort designed for heavy fighting and able to withstand severe fire. It is composed of an armored locomotive, two heavily plated cars for the troops, and cars carrying rapid-fire guns, mounted so that they may be swung to any point of the compass. On the car which follows immediately behind the engine is a conning tower where the officer directing the fire is positioned. The tops of the cars are fitted for the use of sharpshooters.

TELEPHONES IN LONDON FIRE-ALARM BOXES

In the suburbs of London each fire-alarm box has been equipped with a telephone which is used in place of the usual hook in giving notice of a fire. In case of fire, the glass front of the box is broken, giving access to the telephone receiver. When the receiver is taken off the hanger a little door that covers the transmitter opens automatically, enabling the user to inform headquarters as to the location of the fire.

Because they interfere with the hearing, a warning against the wearing of ear muffers has been issued to its employes by an eastern railroad.

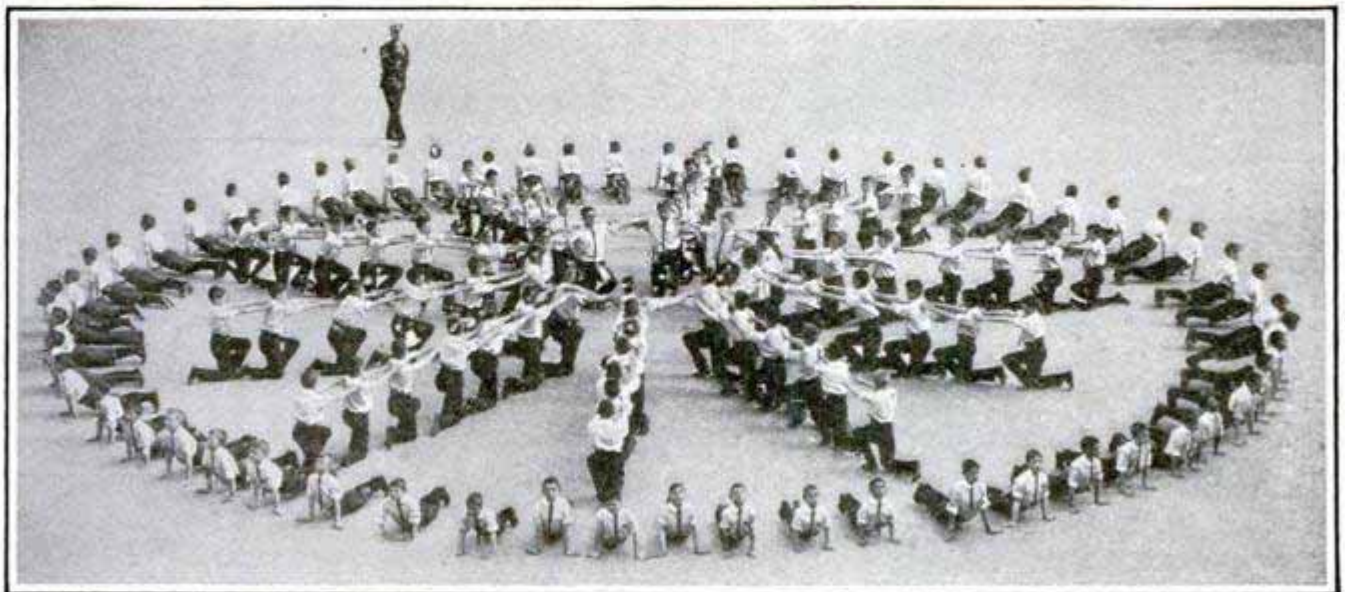
SPECIAL COINS FOR THE SAN FRANCISCO FAIR

Following the precedent established in connection with other important expositions, it is expected that Congress will soon authorize an issue of special coins for the Panama-Pacific Exposition, and a bill has already been introduced providing for an issue of special 25-cent silver pieces for this purpose.

This will be the fourth time that special coins have been issued on account of expositions, the first occasion being the World's Fair at Chicago, when the Columbian half dollars and quarter dollars were coined. In 1904 dollars in honor of the Louisiana Purchase Exposition at St. Louis were coined, while in 1905 there was a special issue of silver dollars in honor of the Léwis and Clark Exposition at Portland, Oregon.

NOVEL DRILLS ARE EXECUTED BY ENGLISH BOYS

The boys of an English orphanage at public exhibitions execute formations which show proficient training and hard work. More than a hundred of them took part in a recent exhibition, forming human wheels, flower beds and mushrooms, and going through many other novel drills.



A Human Wheel Executed by Boys of an English Orphanage during Exhibition Drills Held Recently

MOTORIST USES FIRELESS COOKER ON TOURS

An Ohio man who motors frequently to his country place, a drive of 50 miles, has found a convenient use for a fire-

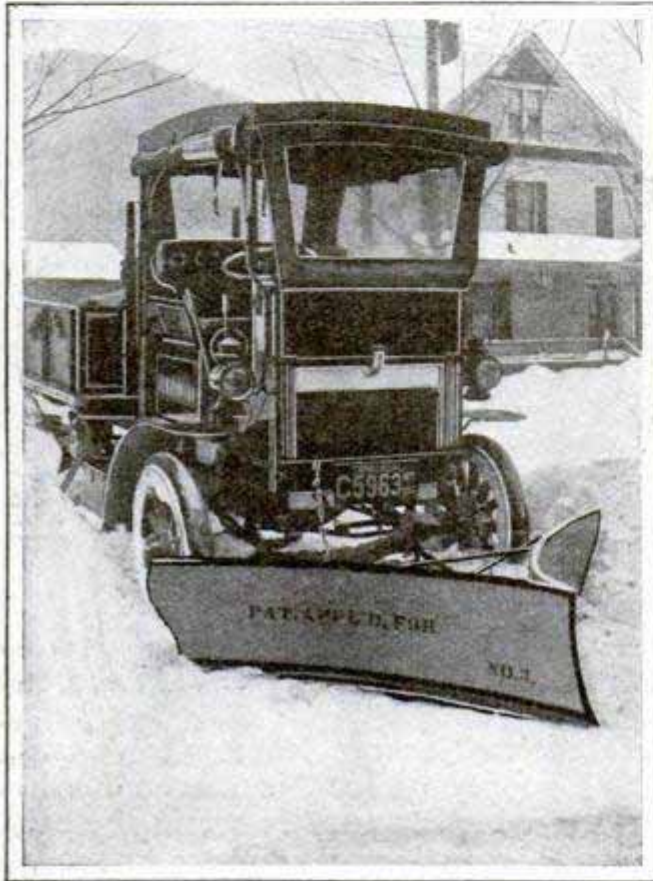


Fireless Cooker Serves as Extra Seat in Motor Car

less cooker. Before leaving town, the day's supply of food is placed in the device, which in turn is set in the car. It occupies little room and may be used as an extra seat if required. Upon arriving at his destination, the meal which has been cooked en route is ready to be served. In order to make the box comfortable as a seat, a cushion was made to fit tightly over its top.

USING AUTOMOBILE TO RUN A SNOWPLOW

The latest scheme for keeping country roads and outlying city streets open in winter is the use of a snow-



Motor Truck Equipped with Snowplow Clearing Roadway through a City Street

plow fixed to the front of an automobile or motor truck, a suitable plow having recently been invented. This plow is adjustable for height so that the road can be entirely cleared of snow, or a layer of from 4 to 6 in. can be left for sleighing if desired. It is readily attached to the front of an automobile by chains and braces, and it is claimed that with an ordinary automobile snow about 3 ft. deep may easily be cleaned from a country road.

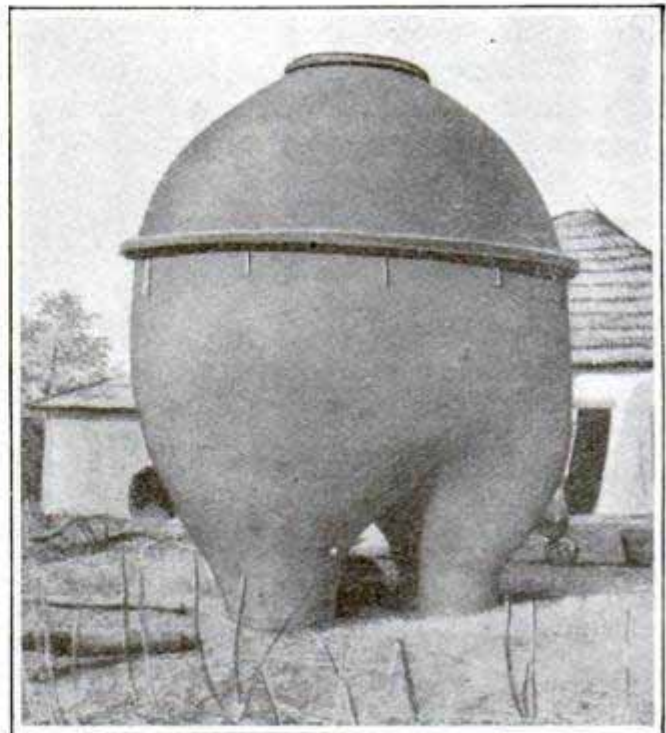
VARIOUS USES BEING FOUND FOR INFUSORIAL EARTH

Numerous and widely varied uses are being found for infusorial earth, the name applied to deposits of the shells of tiny prehistoric marine animals. The output of California and Nevada, repre-

senting 90 per cent of the total product in the United States, last year amounted to 6,528 tons. In the past the material has been employed principally in the manufacture of certain soaps and polishing powders, and as an absorbent of nitroglycerin in making dynamite. Because it is light and a non-conductor of heat, its use as an insulating material is becoming more important. One of the latest uses to which it has been put is in the manufacture of phonograph records. In Europe the material is being used in making artificial fertilizer, various characters of cement and tile glazings, matches, paper, sealing wax, fireworks, and similar things.

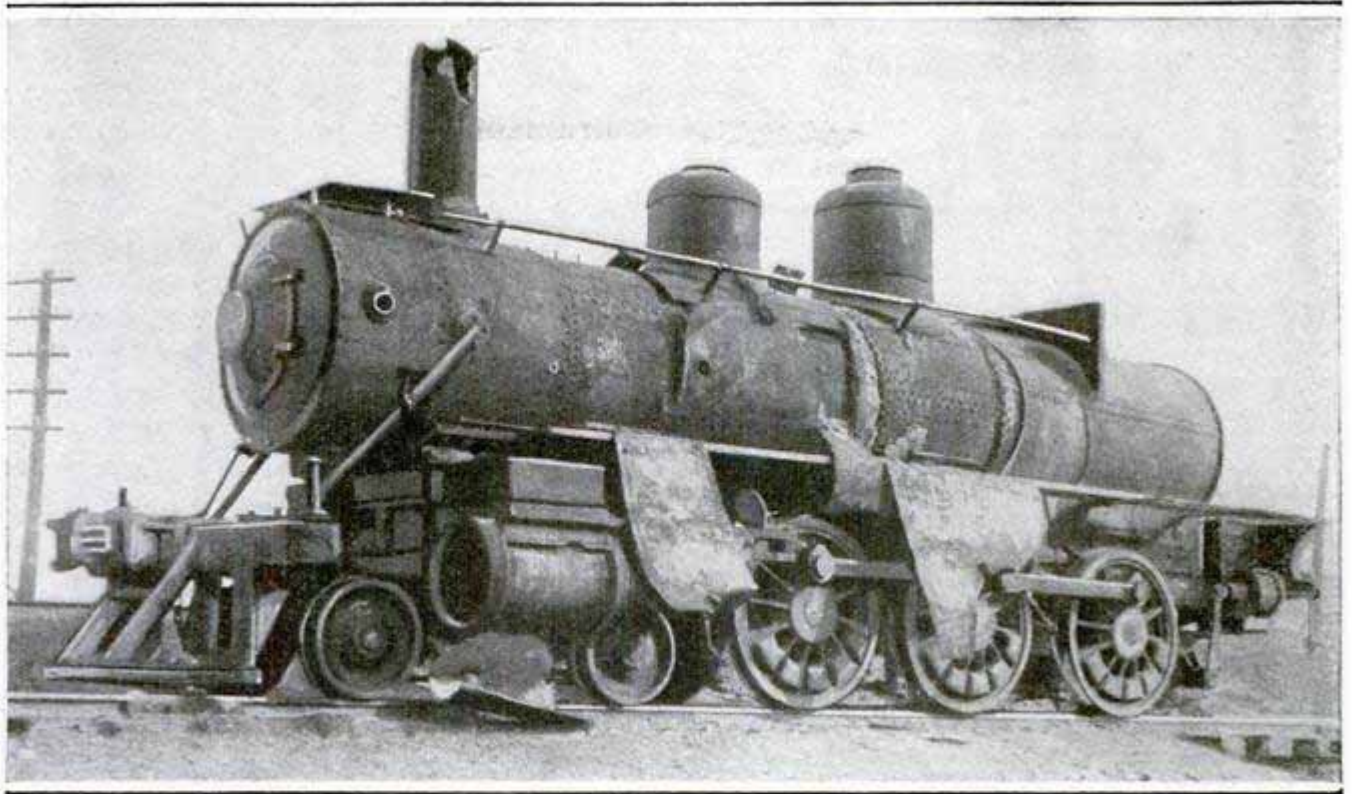
THE CURIOUS CORN BINS OF TOGOLAND

The half-savage natives of Togoland, on the west coast of Africa, store their corn in bins that look more like two-legged elephants than anything else, as will be seen from the illustration. The bin is filled through an opening at the top, and when the corn is to be taken out the entire upper part of the bin is removed.



COURTESY OF THE SKETCH

The Natives of Togoland, Africa, Use Bins of This Curious Shape for Storing Their Corn



After the Sheeting is Removed, the Locomotives are Cut into Pieces with Oxyacetylene Torches

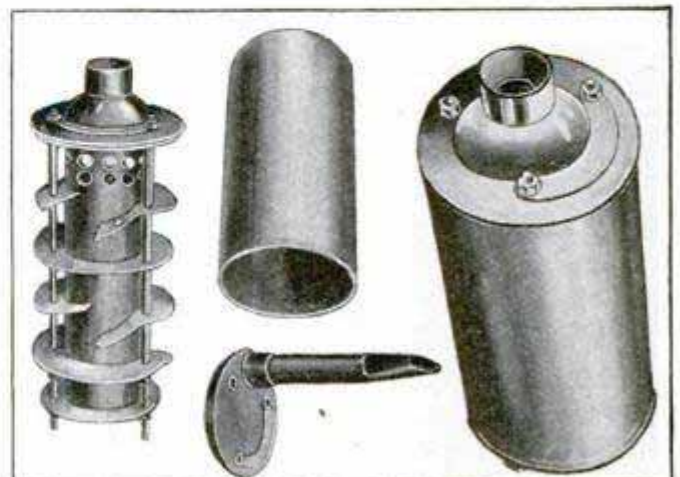
WHAT BECOMES OF WORN-OUT RAILROAD LOCOMOTIVES

When railroad locomotives have served their time of usefulness, or are badly damaged through accidents, they are ordinarily scrapped and disposed of as salvage. This at least is the practice followed by many of the companies which turn over their obsolete equipment of this kind to firms which junk it. The accompanying photograph shows an engine which has completed its service, waiting to be wrecked by the junk man. After the sheeting is removed from the sides of a locomotive, the cutting is done with oxyacetylene torches. Castings, malleable iron, and the different grades of metal are separated as the work proceeds.

SILENCER QUIETS ENGINES OF LIGHT CARS

Built on the same principle as a gun silencer, a device which eliminates the engine noises of light motor cars and makes their action as quiet as more expensive machines, has been produced. It replaces the ordinary muffler and is claimed to lessen the back pressure,

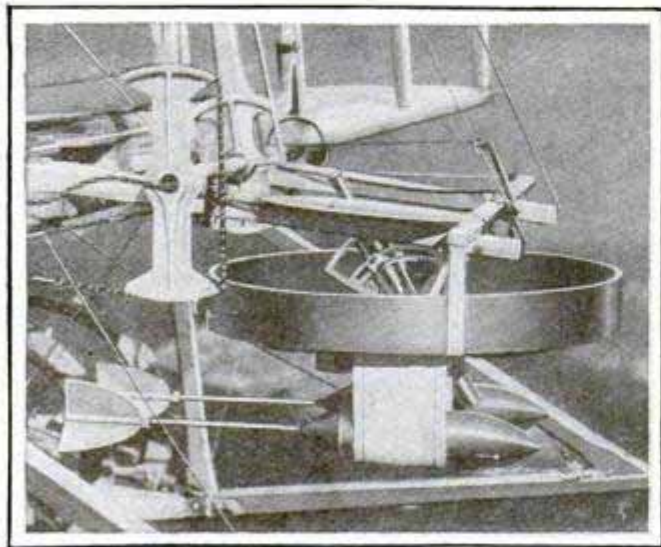
caused by the resistance of exhaust gases, thereby adding power and decreasing fuel consumption. The arrangement consists of a series of chambers in which the gases are made to revolve rapidly after they leave the expansion chamber. The sound waves are broken and turned into a rotary motion, passing gradually from one chamber to the other until dissipated. In this manner both the sound of the gas explosion and the noise caused by rapid passage of gas through an exhaust pipe into the atmosphere is lessened. The appliance is simply constructed and may be attached to a car in a few minutes.



Sound Waves from an Engine Explosion are Broken by Revolving the Gases in This Silencer

AIR-CRAFT RANGE FINDER PLACES BOMBS ACCURATELY

One of the latest bomb-dropping devices which is being used on aerial



The Range Finder for Military Flying Machines Which Increases the Power of the Airman in Warfare

war craft provides the flier with an accurate range finder. This increases

the terror of the flying machine as a medium of human destruction, for it places in the hands of the aviator an instrument which permits him to place his bomb wherever he will. In the past the hurling of these death missiles with accuracy in most cases has depended upon the skill of the man in estimating his distances and speed. The new apparatus consists of a telescope, or finder, which is set to an angle which provides for the lateral distance traveled by a projectile in its fall. The bombs are set in a frame which drops them immediately upon the release of a spring. Vanes on the bombs guide them in their trip through the air. When an airman sights through his finder the object of his attack he releases the bombs. Providing the instrument has been correctly set for his height and speed, the bombs will drop on the spot for which they are aimed.

PLAN TO MAKE NEW ORLEANS ENTIRELY RAT-PROOF

Conversion of insanitary districts into healthful ones and the proofing of the entire city against rats, is contemplated in the plans made by the health authorities of New Orleans for permanently stamping out the causes of bubonic plague. The methods proposed are similar in certain respects to those followed by the Federal government at the Panama Canal, while their execution is as much an engineering problem as it is a medical one. Accomplishment of the work depends upon the passage of enabling legislation which bears directly upon the building regulations and affects practically every structure in the city.

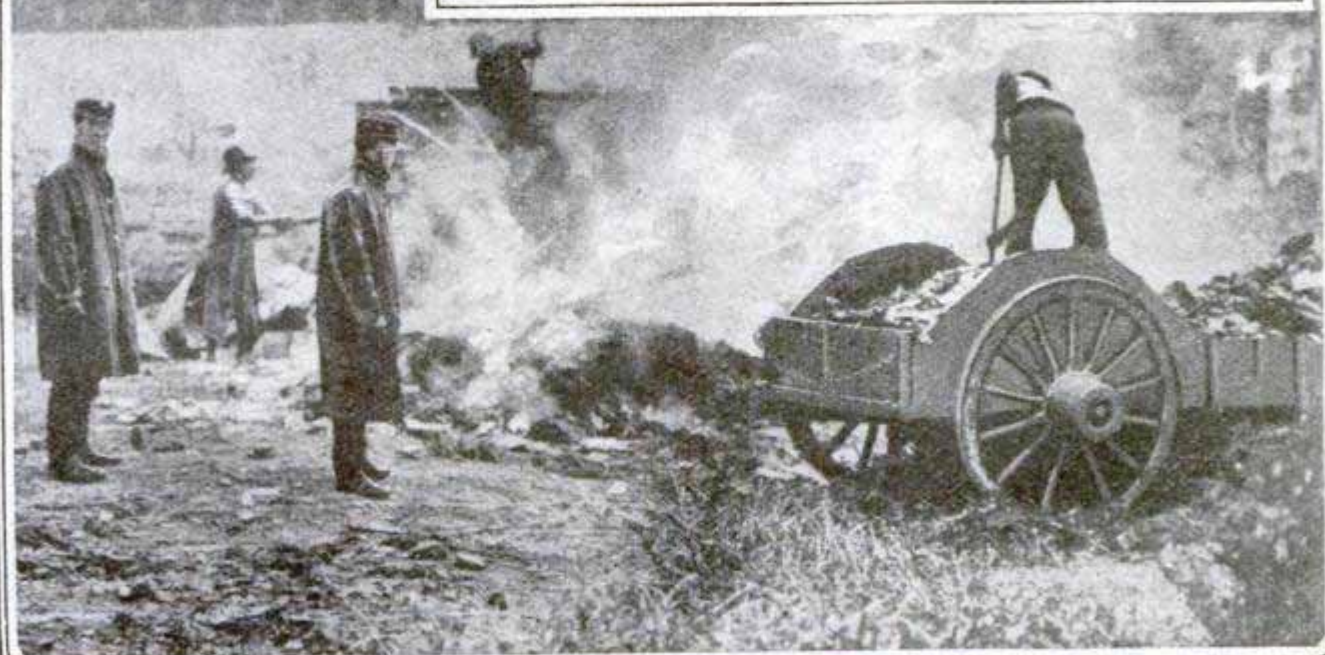
A few months ago, when victims of the plague were found, a district covering an area of four blocks in each direction was placed under quarantine. The first step taken to prevent the spread of the malady was to exterminate all of the rats within the zone. Sheet metal and cement were used to seal the openings around all of the buildings, while the drains and sewers

were screened with wire mesh. The debris from the district was then piled in a central place and burned; literally thousands of rats were killed and almost every inch of building walls, ceilings, and floors sprayed with disinfectants.

From this work grew the plans for comprehensive measures against future epidemics. Ordinances designed to handle the situation provide that all buildings which rest upon the ground shall have concrete floors and every structure shall be proofed against rats. Other ordinances abolish henhouses within the city limits, excepting when they are thoroughly rat-proofed; make stringent rulings concerning the disposal of garbage, and subjects shipping in the harbor to binding regulations intended to prevent rats from landing from boats docked at the wharves. It is planned that ships shall lie 8 ft. from the wharves, have all hawsers fitted with rat guards, and have a guard at the gangplanks whenever they are lowered.



In the Work of Making New Orleans Ratless and Plague-Proof the Rubbish Accumulations of Years are being Gathered and Burned. At the Right is Shown Part of a Day's Catch of Rats, Many Tagged to Indicate the Section Where Caught



INDOOR ROWING TANK USED IN WINTER BY OARSMEN

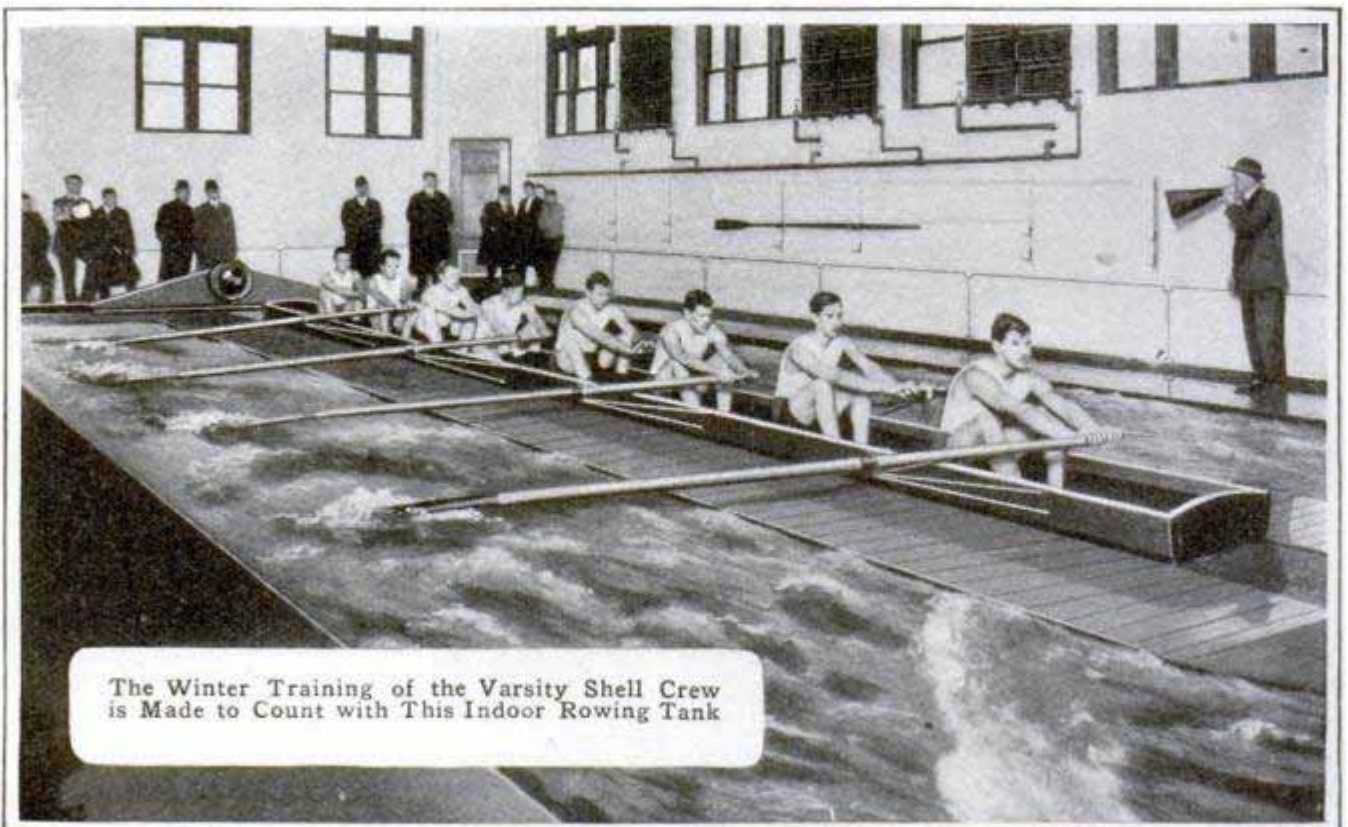
One of the perplexing problems encountered by coaches of the various "varsity" racing-shell crews, that of providing better means for winter training than is offered by the ordinary rowing machine, has been met satisfactorily at Syracuse University through the installation of an indoor rowing tank, provided with mechanical means for simulating the passage of the boat through the water. This provides what might almost be called actual rowing, besides keeping the men in condition.

The tank proper is 60 ft. in length and approximately $31\frac{1}{2}$ ft. in width. The boat substituted for the regulation shell is launched in still water at the middle of the chamber, and held in place by springs which connect with upright iron rods. This arrangement allows sufficient play so that the craft rides naturally. In operation, the effect is like natural rowing, except that the water moves and the boat remains stationary. The arrangement which has been worked out to provide a natural oar pull is ingenious. On the outer sides of the tank, and also on

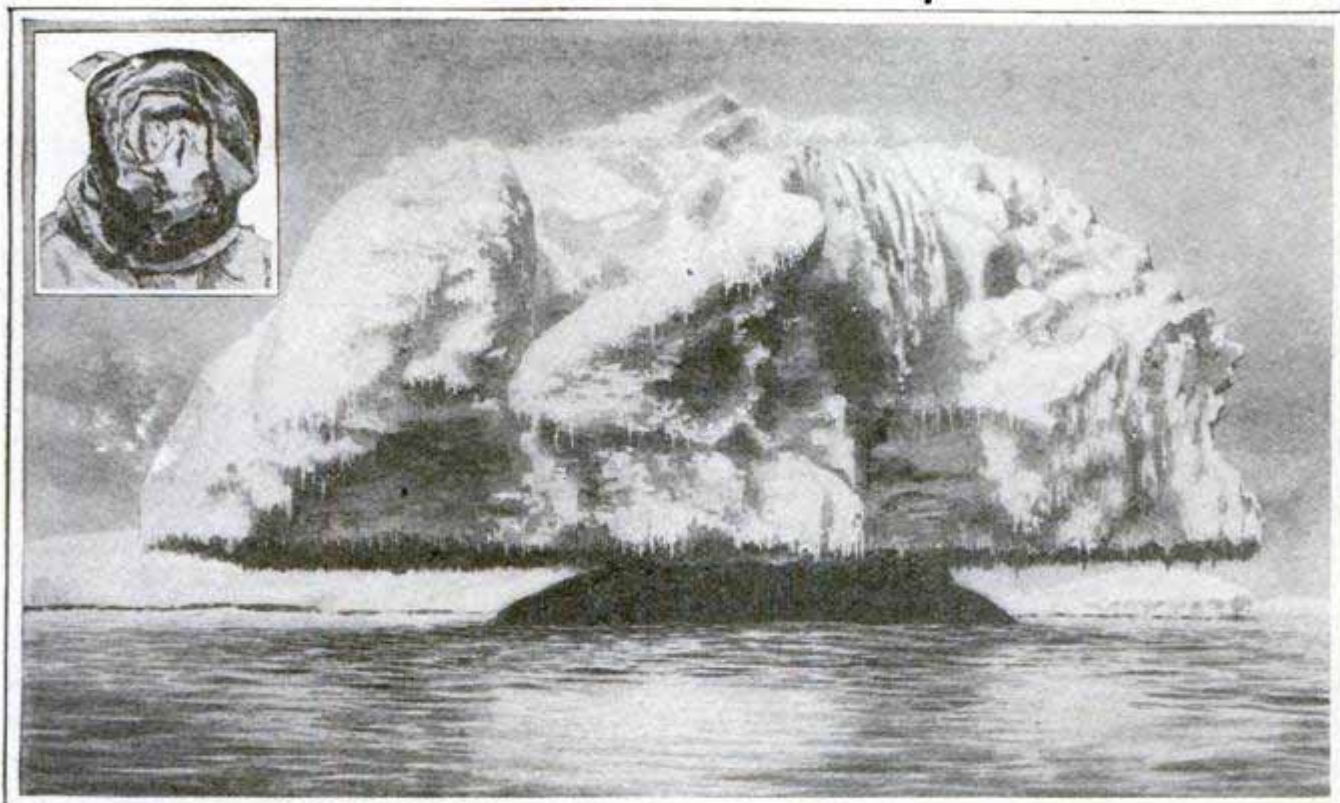
either side of the boat, are sluice ways. Through the medium of a 50-hp. steam engine and a number of propellers, the water is kept in constant circulation, moving past the craft from bow to stern, and then returning through the coverts to be used over again. The engine drives the water at a rate of about six miles an hour, while the oar pull increases this to eight miles, thus making the current and the resistance against the oars approximately equivalent to that met in outdoor practice.

CURIOUS EFFECTS OF ANTARCTIC STORMS

One of the most curious things seen by members of the latest British expedition to the Antarctic Continent was a small island capped with what appeared to be a frozen cloud, which was supported clear of the water and extended far out in every direction beyond the shore line of the island. The explanation of this phenomenon is that the island served as a nucleus during the winter for the gradual deposit of mist and snow, which froze as fast as it was deposited and in this way built up an enormous mass of frozen material. During the following summer



The Winter Training of the Varsity Shell Crew is Made to Count with This Indoor Rowing Tank



COURTESY OF L'ILLUSTRATION

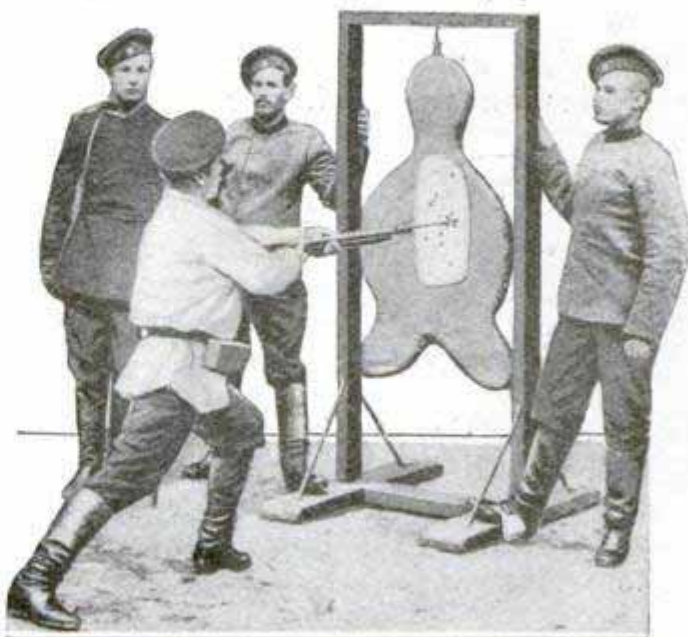
Frozen Mass Hanging Like a Cloud over an Island in Commonwealth Bay on the Coast of the Antarctic Continent. At the Upper Corner is a Photograph of an Explorer with His Face Covered with an Ice Mask as the Result of Ten Minutes' Exposure to a Snowstorm

the warm water melted away the lower portion, while the air was not warm enough to affect materially the upper portion of the frozen-mass. This phenomenon was found in Commonwealth Bay, Adelie Land, which is due south of Australia, and is said to be the stormiest spot in the world. While the expedition was quartered in this bay, the average wind velocity for one winter month was over 114 miles an hour, and velocities of nearly 300 miles an hour were observed during sudden squalls. An exposure of 10 minutes to a severe snowstorm was enough to cover the face with a mask of thick ice.

PAINS TAKEN IN TEACHING RUSSIANS BAYONET USE

Strong faith in the importance of the bayonet as a fighting tool is still held by Russian military authorities, and the training given a recruit in the art of handling this implement is in no manner superficial. The soldier is given painstaking instructions, taught the vital parts of the human body and how to penetrate them in thrusting,

and put through hours of hard drill intended to prepare him for hand-to-hand encounters. Part of this training includes the use of dummies which are charged and bayoneted by the soldiers. These usually are canvas or leather-covered and stuffed. They are hung on the cross bar of a frame so that they swing free from the ground and are attacked with lowered bayonets as if they were an enemy.



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Russian Soldiers Attacking Dummies in Bayonet Practice



FLOATING MISSION PLIES RIVER AT BERLIN

When in port at Berlin a sailor is afforded an opportunity of attending a church service, if he so desires, without venturing ashore. A floating chapel has been built by a religious denomination, and on succeeding Sundays it is moved to different points along the water front, so that the crews of the boats which anchor in various places may have an equal chance of participating frequently in the exercises. The craft is of the barge type, housed over, and furnishes seating accommodation for a large number of persons.



Chapel for Sailors Which Moves About to Different Parts of Berlin

RACING HORSES ON ICE IS RUSSIAN SPORT

Russian horses have won famous victories on the turf, but their performances during the long winters of northern Russia, while less known, are no less exciting. The pick of the stables are chosen for ice racing, and special shoes, very light and with exceedingly sharp calks, are used. The speed commonly attained in these contests is astonishing.



CA new office building in Cincinnati contains an emergency hospital.

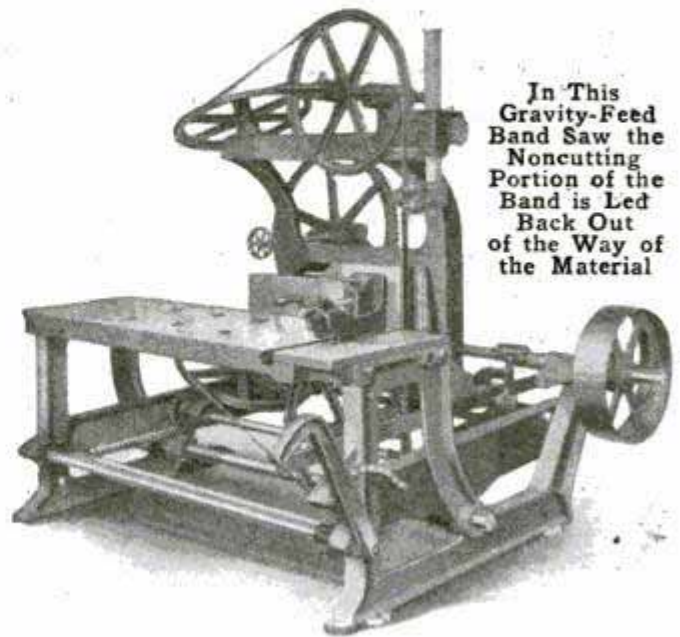
TRACINGS MADE WITHOUT INK BY NEW PROCESS

A radical change in drafting methods may be brought about by a new tracing fabric that has just appeared on the market. This fabric is somewhat similar to ordinary tracing cloth and is coated on one side with a thin skin of hard, brown material which renders it opaque, but which is easily worked with a beveled steel point. This point simply removes the skin where it is applied, leaving a white and transparent line or figure. It is stated that the point may be used as rapidly as a pencil and that it produces clean-cut white lines which form a strong contrast with the colored surface. Erasure is effected by ink applied with an ordinary writing pen which is simply drawn through the line that is to be erased. The drawing point is so designed that it can be inserted in a compass when circular lines are to be drawn. Blueprints from drawings made on this material give dark lines on a white ground.

A NEW GRAVITY-FEED BAND SAW FOR METALS

An ingenious gravity-feed band saw for cutting metal has recently been invented and placed on the market. One of the principal features of this machine is that the noncutting or return portion of the band is led back out of the way of the work so that pieces of practically any size and shape can be cut, while the cutting portion runs between guides that keep it in a vertical position at all times. The arbor, or frame, that supports the saw, is made to roll on two beams that are pivoted at one end and are adjustable at the other end by a ratchet. Through this arrangement the feed is by gravity and the exact amount of pressure desired may be obtained by setting the supporting beams at the angle required. A detachable radial plate with pivot at the right of the arbor may be set at any angle for holding the metal in place when an angular cut is being

made. This saw has a capacity for cutting metal up to 12 by 11 in. The machine is entirely automatic, the saw



In This Gravity-Feed Band Saw the Noncutting Portion of the Band is Led Back Out of the Way of the Material

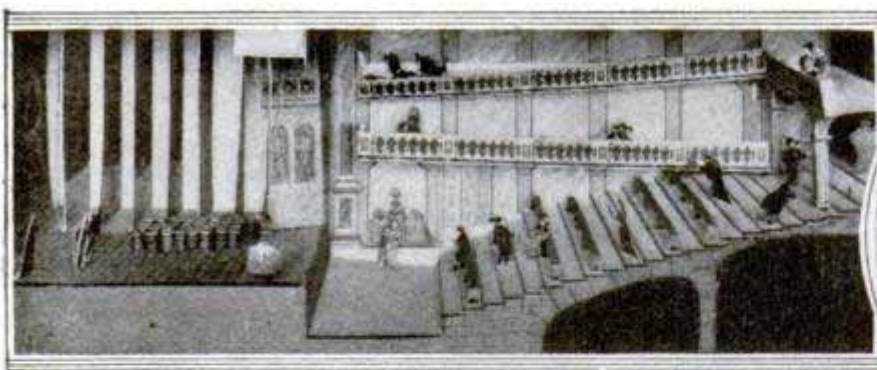
being stopped after a cut is completed by the action of a stop that may be adjusted to correspond to any width of material.

HOW MECHANICAL PROGRESS INFLUENCES DRAMA

That structural and mechanical changes in the theater itself have constituted one of the biggest influences in the development of the drama, is the conclusion to be reached from a study of any comprehensive collection of theater models, such as that now on exhibition in the Dramatic Museum of Columbia University. Every theatergoer recognizes the radical difference in dramatic form between a Greek tragedy and a modern drama. This difference, as a whole, is due to a complexity of causes, but the drama of today is what it is mainly because of architectural and mechanical improvements in the theater.

The Theater of Dionysus, the ruins of which still lie on the slopes of the Acropolis at Athens, is the oldest theater that we know anything about. This theater consisted of an outdoor amphitheater capable of seating 20,000 people. The Greek tragedies were written to be performed in this im-

mense, unroofed space, and are as much out of place in a modern theater as would be a modern play in the Theater of Dionysus. Consideration of the circumstances under which the Greek tragedies were performed gives the chorus, which always forms a part in these tragedies, a logical meaning, although to the modern theatergoer this is likely to seem a wholly artificial feature. In the vast open space of the Theater of Dionysus none but an orator of unusual vocal powers could be heard, while facial expression and make-up, both of which are essential for a modern actor, would be entirely lost. Out of this condition grew the chorus, which could make itself heard, and which was designed to give voice to the more subtle motives and to interpret the actions of the principals. Under these circumstances the finer shades of emotion and character could not be successfully represented, and we find, therefore, that the Greek



Model of the Palais Royal, Built in Paris in 1639, the First Roofed Theater and the First to be Heated and Lighted



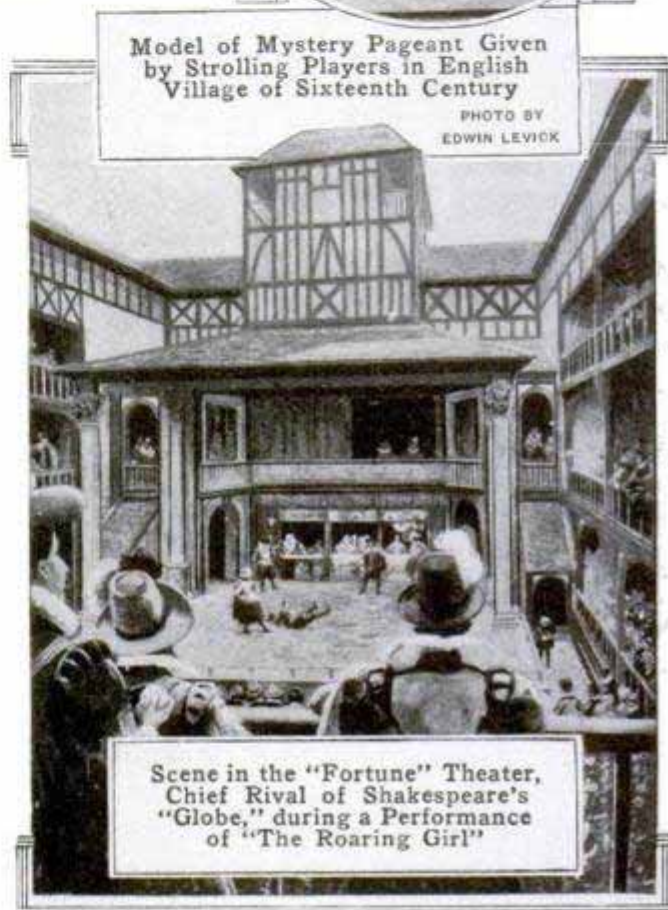
Model of Mystery Pageant Given by Strolling Players in English Village of Sixteenth Century

PHOTO BY EDWIN LEVICK

drama dealt with the simplest motives and was developed with the broadest strokes of the dramatist's brush. And ever since the time of the Greeks, the architecture and mechanical accessories of the theater have been a controlling influence in forming the drama.

The passion plays of the middle ages were an important step in the development of the drama, for they paved the way for the morality plays, the next step toward the drama of Shakespeare. These plays were produced not in a theater, but on a stage set up in an open space. But in the passion play we find the first systematic attempt to make use of scenery. Allegorical representations of Paradise, Hell, Nazareth, the Temple, Jerusalem, the Palace of Herod, the House of the High Priest, the Sea of Galilee, and the Limbo of the Fathers, all had their places on the stage and were exhibited throughout the entire action. The morality plays were produced by strolling players in the courtyard of an inn or in any other convenient space. In these plays we see the same system of placing about the stage at once all the scenery connected with the action.

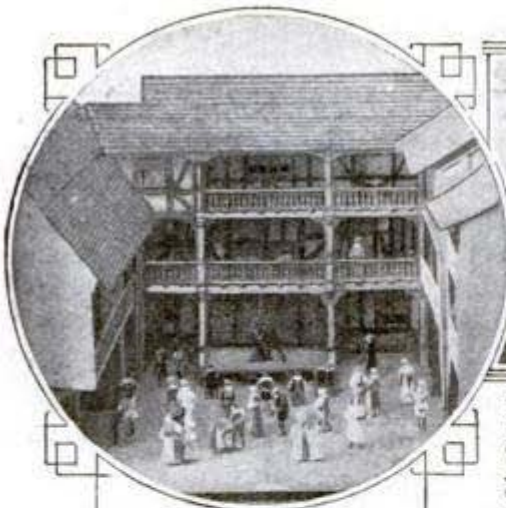
Shakespeare's theater, the Globe, was built to resemble the courtyard of an inn, and although the actors and the wealthier patrons were partly under cover, the theater as a whole was without a roof. There was no means of heating and only the crudest methods of artificial lighting. There was no need for a chorus, as in the Greek drama, but the action was necessarily overemphasized. The fact that Shakespeare's plays were acted practically out of doors is doubtless one of the principal reasons why outdoor scenes predominate in these plays.



Scene in the "Fortune" Theater, Chief Rival of Shakespeare's "Globe," during a Performance of "The Roaring Girl"

COURTESY OF THE ILLUSTRATED LONDON NEWS

One of the first theaters to have a roof was the Palais Royal, erected in Paris many years after the time of Shakespeare. In this theater there was a more intimate connection between the actors and the audience, and here we see the beginning of the modern drama. Following this, there has been a more or less steady progress in the development of the theater and its accessories, and as a result we have the highly complex stagecraft of the present time. Because of this the development of the drama itself has been made possible. To each added facility the drama has responded with finer shades of interpretation of emotion and motive and character.



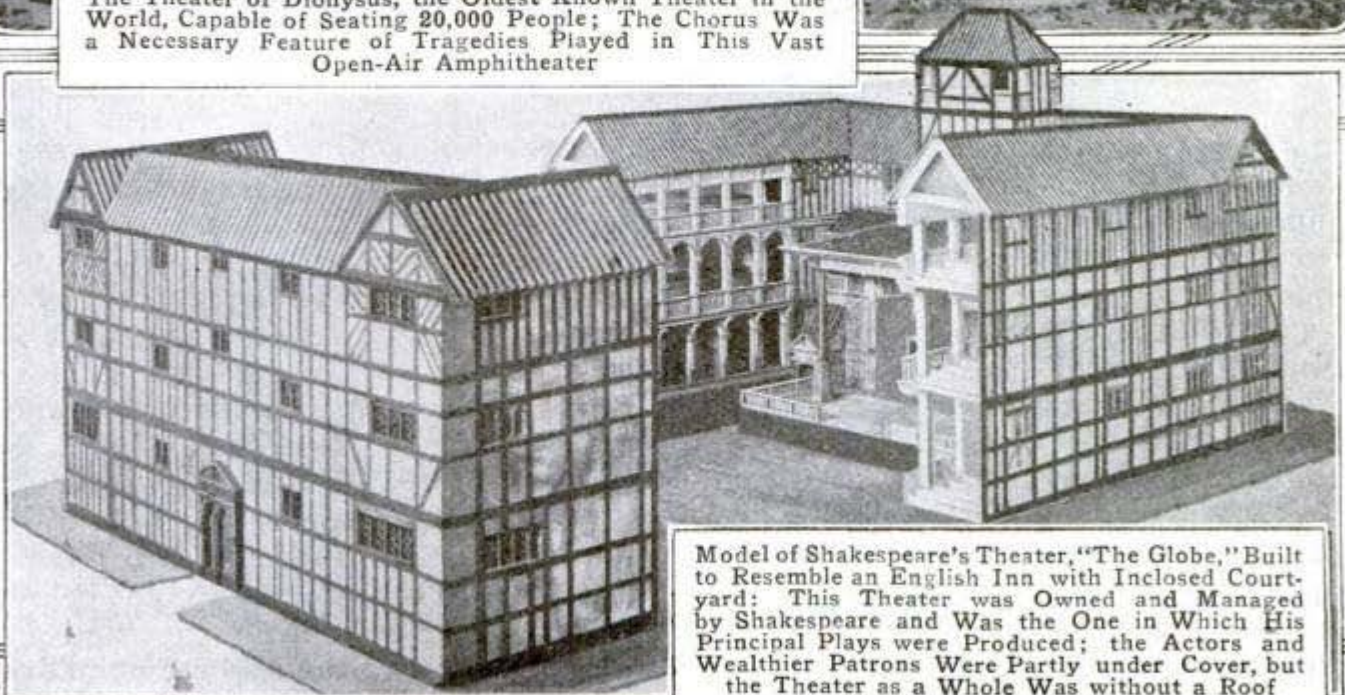
Early English Play Given on a Temporary Stage in the Courtyard of an Inn. Photograph from Model



The Passion Plays of the Middle Ages, Played on an Open Stage, Represent the First Systematic Attempt to Use Scenery; This Consisted of Allegorical Representations of Paradise, Nazareth, the Temple, Jerusalem, the Palace of Herod, the House of the High Priest, the Sea of Galilee, the Limbo of the Fathers, and Hell, and was Exhibited throughout the Action. Photograph from Model



The Theater of Dionysus, the Oldest Known Theater in the World, Capable of Seating 20,000 People; The Chorus Was a Necessary Feature of Tragedies Played in This Vast Open-Air Amphitheater



Model of Shakespeare's Theater, "The Globe," Built to Resemble an English Inn with Inclosed Courtyard: This Theater was Owned and Managed by Shakespeare and Was the One in Which His Principal Plays were Produced; the Actors and Wealthier Patrons Were Partly under Cover, but the Theater as a Whole Was without a Roof

GOLD FOR SHIPMENT ABROAD PACKED IN KEGS

When gold is shipped abroad in a large consignment, such as was re-

England, the kegs of gold were tied securely in a large sail and lowered with a derrick to a small sailing vessel alongside. Shortly before the opening of the European hostilities a con-

signment of millions of dollars in American gold was sent to the Bank of France. One of the photographs shows the arrival of this consignment at Havre, where it was unloaded under heavy guard.



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Sailors Rolling Kegs of Gold Aboard the Cruiser "Tennessee"

cently sent to Europe for the relief of American refugees, it is packed in small kegs. Such a cargo looks no more important than if it were an ordinary shipment of nails. When the armored cruiser "Tennessee," carrying \$3,000,000 in gold belonging to American bankers and the \$2,500,000 appropriated by Congress for the assistance of Americans abroad, reached Falmouth,



Receiving and Weighing Millions of Dollars in American Gold at Havre, France

SIPHONS TAKE PLACE OF VALVES IN CANAL LOCK

A lock that is filled and emptied by siphons, without resort to the big and cumbersome valves ordinarily used for canal locks, has been built and is in operation at Oswego, N. Y., where a branch of the New York State barge canal, that extends down the Oswego River from Syracuse, connects with Lake Ontario. Extending the full length of each of the lock walls, from the river above the lock to the lake below, is a culvert, 5 ft. wide and 7 ft. high. Each culvert is molded in the body of the concrete wall and is of the usual design, except that it is formed into a siphon at the upper and lower

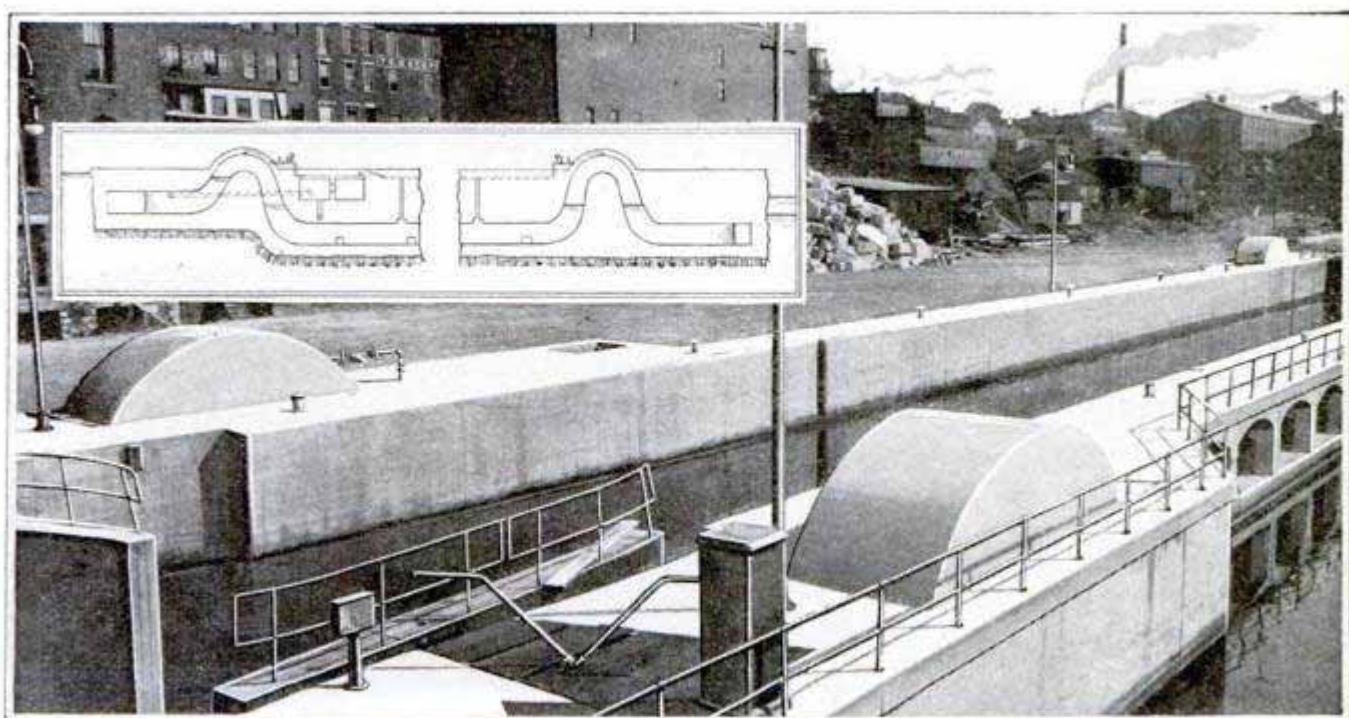
ends, the top of the siphon being several feet above the highest level of the water in the lock chamber. With this arrangement the culverts are as effectually closed when the siphon necks are filled with air as they would be if controlled by valves. Each culvert opens into the lock chamber by a series of ports, and is controlled by an airtight tank of large dimensions which is molded in the top of the lock wall. This tank has an outlet that connects with the lock chamber at a point below the lowest level of the water, and air pipes that lead to the highest points of each of the siphons. At the beginning

of operations, this tank is filled with water through a pipe from the upper pool, while the valves in the air pipes are closed. The water is then held in the tank by atmospheric pressure. For filling the lock chamber, all that is necessary is to open a valve in the air pipe connecting the tank with the upper siphon. The water in the tank then falls through the outlet into the lock chamber, drawing the air from the siphon into the tank, while the pressure of the air fills the siphon with water, and the water starts flowing from the upper pool into the lock chamber. Following this, a curious phase of siphonic action takes place. The rush of water in the siphon creates a suction that draws the air back out of the tank, but so gradually that the operation of the siphon is not interfered with, and before the process of filling is completed, the tank has been exhausted of its air and is again filled with water. As soon as the lock chamber is filled, the valve used in starting the operation is closed and another valve connecting the siphon with the open air is opened, the neck of the siphon is filled with air, and the flow stops. The siphon and controlling tank are then ready for the next job of filling the lock chamber. To empty the lock chamber, a process

exactly like this is followed, except that the valves in the air pipe leading to the lower siphon are used, the water in this case leaving the lock chamber through the same ports that were employed in filling it.

TRAILERS FOR ARMY MOTOR TRUCKS ARE SOUGHT

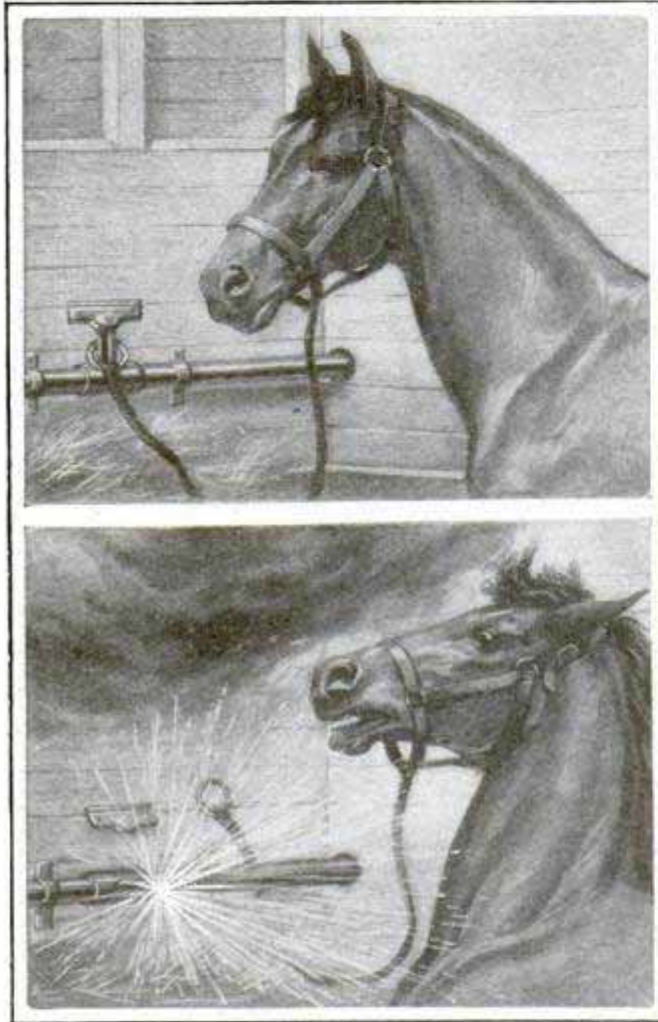
Transportation authorities of the United States Army are conducting an investigation for the purpose of developing a standard trailer which may be used with motor trucks in military service. Manufacturers have been requested to submit designs for a vehicle which will meet the requirements contained in the army specifications, and which may be employed both with the various types of 1½-ton machines now in service and those to be purchased in the future. What the department is seeking is a trailer of light construction which will be capable of transporting a one-ton load and hold up under the heaviest kind of operations. There must be some standard device for attaching the vehicles to the tractors so they may be used interchangeably. The trailer adopted will be one which will carry a body identical with that of the escort wagon.



Siphon Lock on the New York Barge Canal. Insert: Diagram Showing How Siphon is Constructed inside the Lock Walls

HORSES IN BURNING STABLE AUTOMATICALLY FREED

In case of fire in a stable where there is a large number of horses, it is usually a difficult as well as precarious



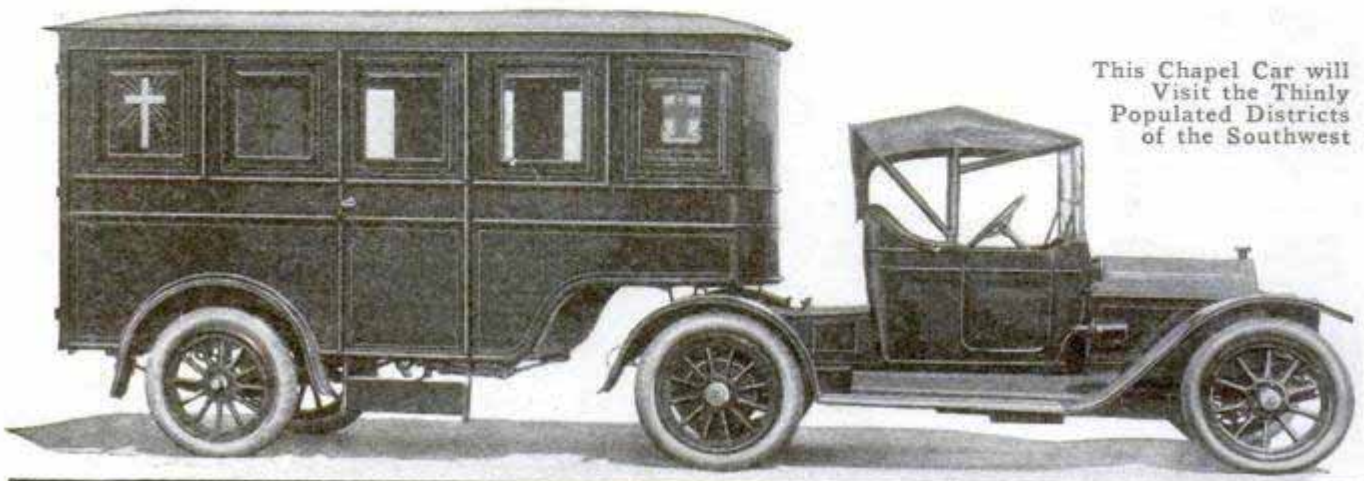
Horses are Released and Driven from Their Stalls in Case of Fire

matter to release and drive the animals from the burning building. In many instances they are burned to death because of the inability of their keepers

to drag them from their stalls. In an attempt to overcome this trouble a releasing device which also frightens an animal from the stable has been invented. It consists of a water pipe which extends along the side of the building and has a nozzle connection in each stall. A ring fastened to the halter drops over the inverted nozzle and holds the horse fast. When there is a fire the pipe may be turned by a lever from a position outside of the building, bringing the nozzles to a horizontal position, and sending streams of water into the faces of the animals. The same action allows the rings to fall from their fastenings, freeing the horses. Besides having the effect of driving the animals into the gangway, the sprays of water assist in extinguishing the fire.

ODD CHAPEL CAR IS BUILT FOR MISSIONARY WORK

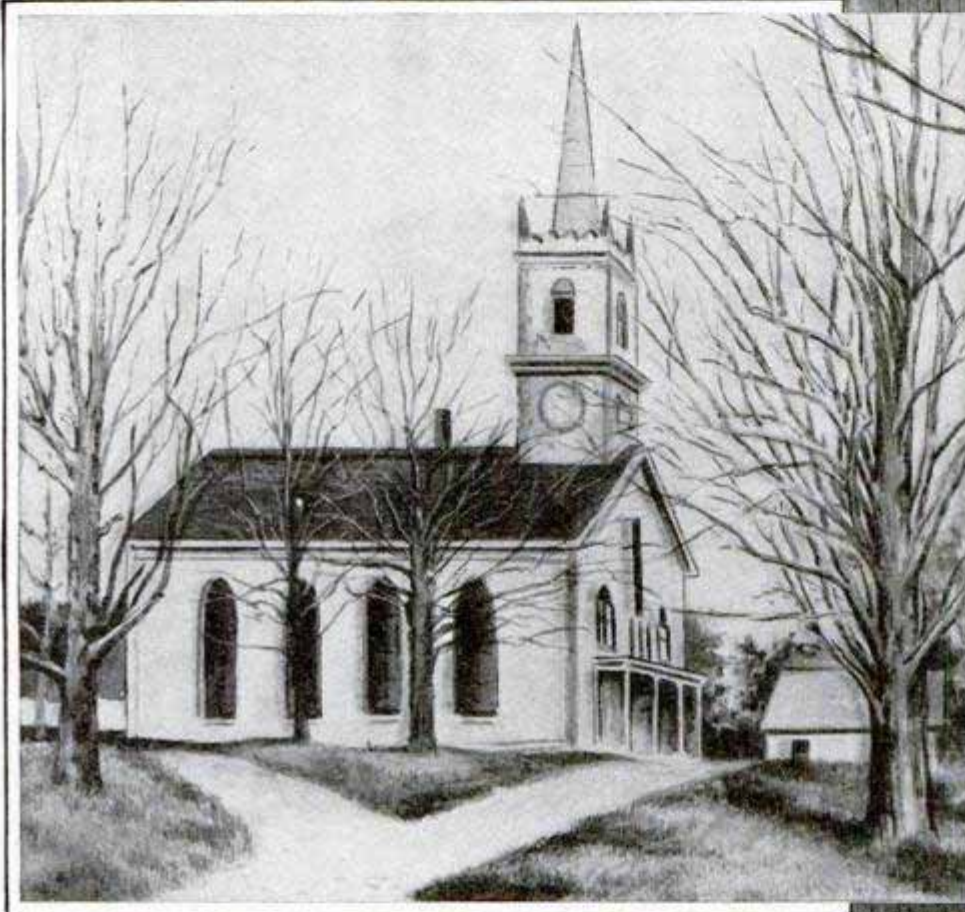
Intended for missionary work in the sparsely settled regions of the Southwest away from the railroads where there are few churches, a motor-car chapel has been constructed which consists of a trailer, or tender, which is attached to a roadster, and is drawn by it. The closed trailer is divided into two parts, carrying an altar in the rear, and providing living and sleeping quarters for two persons in the front. Because the weight is distributed over a long base on three sets of wheels, the car rides lightly on a road and is capable of going almost any place that an ordinary machine can reach.



This Chapel Car will
Visit the Thinly
Populated Districts
of the Southwest

SHINGLES ON OLD CHURCH LAST OVER CENTURY

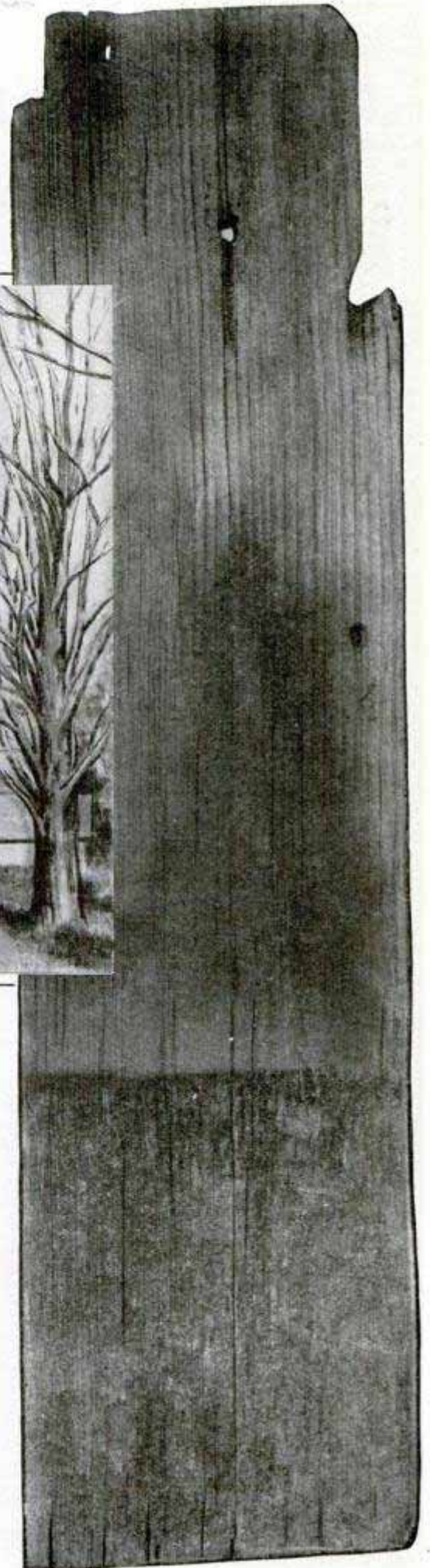
The First Parish Church of Bolton, Mass., was reshingled recently for the first time since its erection 121 years ago. The old, hand-hewed shingles, originally split from native white-pine logs by the founders of the church, had weathered storm after storm since 1793,



Old Church Reshingled for First Time in More Than a Century.
Right: One of the Original Shingles after Weathering
the Elements Since 1793

and during those generations, never once, to the knowledge of anyone now living, ever demanded any repairing or attention whatever. A short time ago the sexton discovered a stained spot in the ceiling, the first blemish of its kind ever to occur, and because of this it was decided that it was time to build a new roof. When the aged hand-made shingles were removed, they were found for the most part to be in excellent condition, nearly all of them physically capable of enduring many more years of service. Red-cedar shingles from Washington have replaced them.

(Since tracks for railroads and street cars are not to be allowed in the streets of Balboa, C. Z., motor busses will be used for transportation.



MAN DANGLES OVER CLIFF SEEKING SENSATION

While in quest of adventure a Californian crawled out over the edge of a boulder, which projected at the top



Dangling over the Mouth of a Cañon to be Photographed

of a deep cañon, and posed for a photographer. Once suspended there, hundreds of feet in the air with nothing beneath him but clouds and the floor of the rift, he found it impossible to climb, unassisted, back to safety. By nerve and main strength, he was able to keep his hold until his companion procured a rope. By kicking his legs about he succeeded finally in working the noose in place so that it could be pulled to encircle his waist. He was then dragged back from the precipice to safety.

ⒸSixteen ships, of which 14 were American, used the Panama Canal during its first week of business.

DEVELOPING THE HUDSON BAY ROUTE

Among the steps being taken to develop the Hudson Bay route into a safe and practical line of travel from the Canadian Northwest to Europe is the establishment of wireless stations making a continuous line of communication from Port Nelson and Fort Churchill to the Atlantic. In addition to this, government forces are at work charting the harbors at Port Nelson and Fort Churchill, both located on the western shore of Hudson Bay, and the harbor at the mouth of the Noddawai River near the southern tip of James Bay. The charting of the harbor at the mouth of this river is in connection with a proposed railway leading to the southeast. Construction is reported as having begun on two lighthouses, one located on each side of the entrance to Port Nelson, while a third lighthouse is to be built on a newly charted shoal some miles out in the bay from that harbor.

EMETIC TO BE MIXED WITH BICHLORIDE OF MERCURY

With the increased use of bichloride of mercury as a disinfecting agent there have resulted numerous cases of suicidal and accidental poisoning, the latter being due to mistaking this powerful corrosive poison for medicine in tablet form. For preventing this, and particularly for preventing accidental poisoning, various ways of preparing the poison so that it will readily be distinguished from any other substance have been proposed, but the solution of the whole problem now seems to have been found in the plan of mixing a powerful emetic with the bichloride of mercury. This is a tartar emetic so compounded that it will exert its full emetic action before the corrosive sublimate can begin its action, causing violent nausea until the stomach is entirely emptied. It is stated that the disinfecting power of the bichloride of mercury is in no way impaired by mixing the emetic with it.

SIGNALING WITH BALLOONS IN GERMAN ARMY

Captive balloons are used to a considerable extent by the signal corps of the German army in transmitting

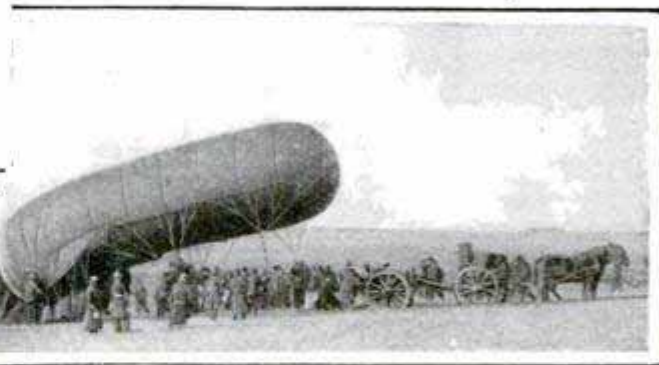


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Raising a Signal Balloon for the Purpose of Transmitting Instructions to Commanding Officers

orders and communications to the various parts of a field during the course of an engagement, or while preparing for one. One of these inflated bags

is raised behind the line to a prominent position where it is clearly visible over



a large radius. Directions from the field headquarters are then conveyed by signals to the officers in command.

Engineers in the water-rights department of British Columbia estimate that the province has a total of approximately 69,832 acres of irrigated land in the more settled valleys south of the railroad belt.

FRENCH AIR CRAFT HAULED IN ARMORED TRUCK

When orders were issued for the mobilization of the French fighting forces, Paris became a center of activity and for days its streets were filled with motor cars transporting military equipment. The accompanying illustration shows army flying machines, loaded in covered trucks, crossing the city. In the rear may be

seen an armored car, its sides protected against the effect of small shells. When placed in one of the vans for transportation, the wings of an air craft are removed while the rest of the parts, with the exception of the propeller, remain assembled. Machines are thus easily carried with an army from one position to another.

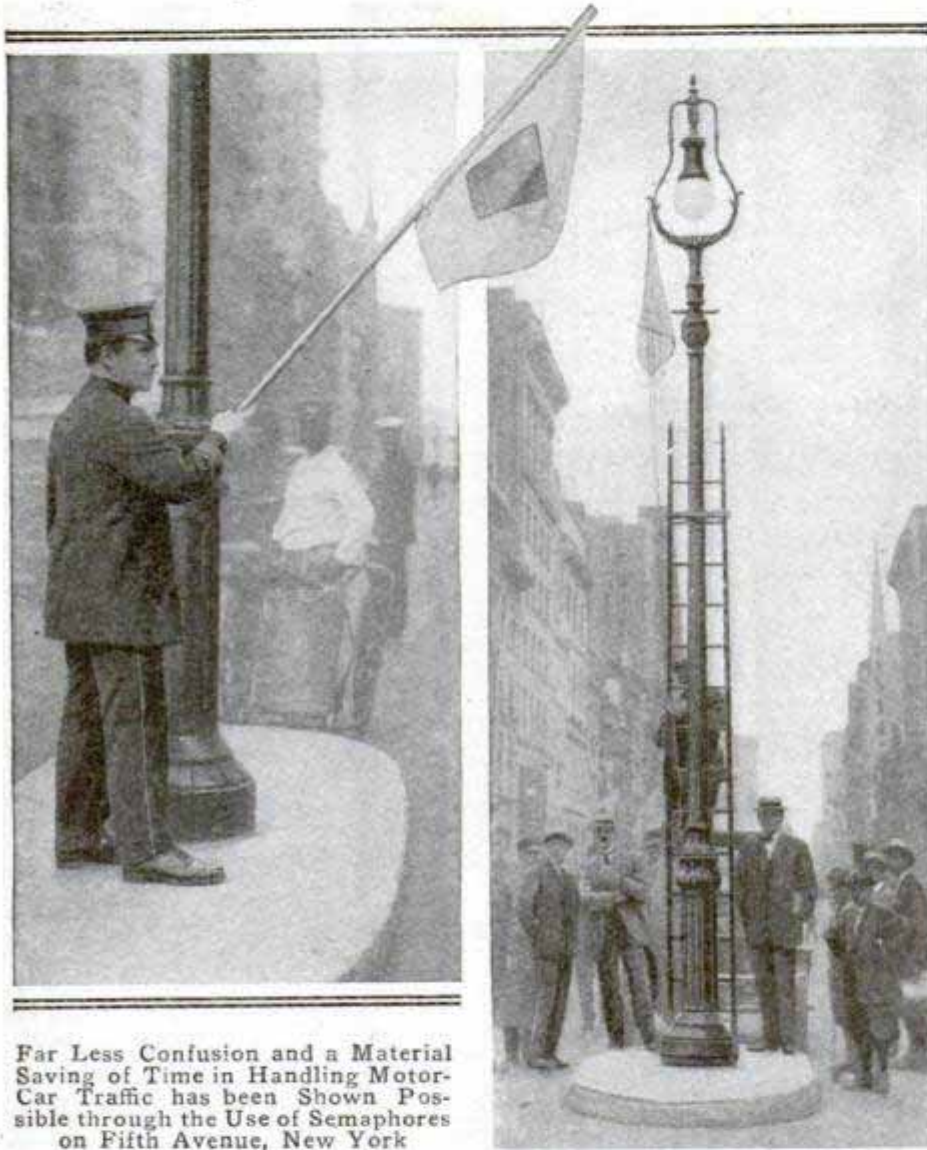


Transporting Flying Machines in Motor Trucks through the Streets of Paris

REGULATE STREET TRAFFIC WITH BLOCK SIGNALS

In experiments conducted at New York recently, an improvised block signal proved efficient in regulating the Fifth Avenue automobile traffic. The results accomplished were such that a

heavy motor omnibuses to retard travel, the distance was covered in approximately two minutes. It was necessary to stop east and west traffic for only about two minutes at a time, while the waiting vehicles then were able to distribute themselves and cross the avenue from the inter-



Far Less Confusion and a Material Saving of Time in Handling Motor-Car Traffic has been Shown Possible through the Use of Semaphores on Fifth Avenue, New York

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complete block-signal system may be inaugurated for governing the travel on certain of the thoroughfares. Without any public announcement that the test was to be made, a semaphore was installed at one of the street intersections and vehicle movement controlled from it entirely without confusion. After experimenting on shorter distances, nonstop runs on the avenue were increased until the motors were speeding along for 10 blocks at a time without halting, and then were stopped for only 50 seconds. Even with the

heavy motor omnibuses to retard travel, the distance was covered in approximately two minutes. It was necessary to stop east and west traffic for only about two minutes at a time, while the waiting vehicles then were able to distribute themselves and cross the avenue from the intersecting streets in less than a minute after the release signal was given. Ten blocks is considered the limit for the nonstop system as it has been arranged, for at a greater distance it is difficult to see the semaphore.

SUBMARINE BOAT FOR OYSTER FISHING

That naval use represents only one of several functions to which submarine boats may ultimately be put, is suggested by the announcement of the invention of an underwater dredging boat designed for oyster and lobster fishing. The craft is intended to scrape along the floor of the ocean, gathering oysters from the submerged beds. The details of the boat have not been disclosed, but

it is the contention of its inventor, who designed one of the types of submarines used by the navy, that it will make oyster gathering an exceedingly simple and rapid operation.

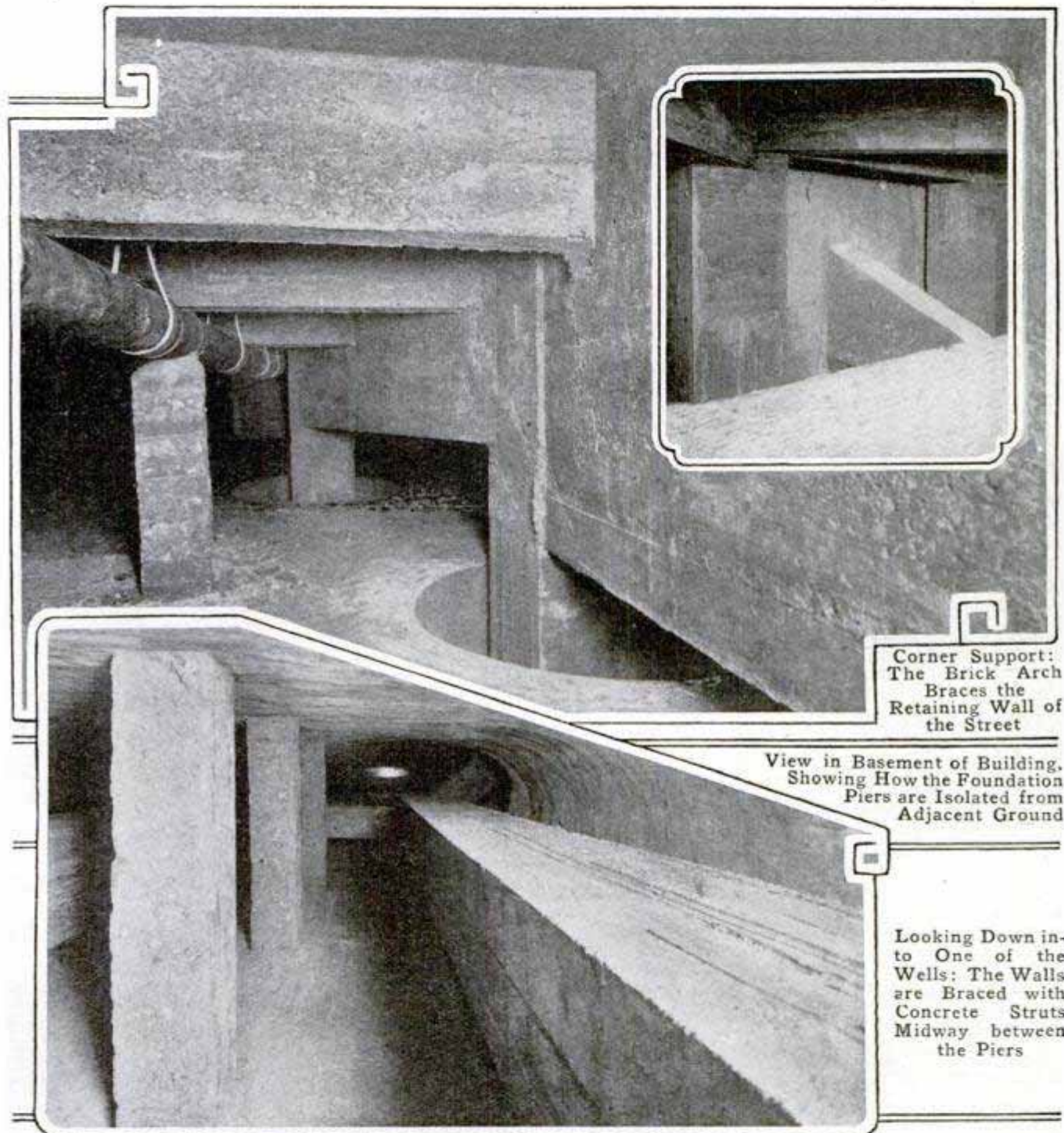
MARKING THE EDGE OF A MOUNTAIN ROAD

Mountain highways are built, as a rule, along the side of the mountain so that on one side the ground often slopes steeply for hundreds of feet down into a valley or cañon. In such

cases it is necessary to provide a guard rail or some other distinctive mark for the edge of the roadway to prevent the danger of driving off the road, particularly during night driving. An inexpensive mode of marking has been adopted in California for roads-used

NEW TYPE OF FOUNDATION PREVENTS VIBRATION

In a building recently completed in Paris, foundations of a novel type were used with the idea of protecting the building from the vibrations



Corner Support:
The Brick Arch
Braces the
Retaining Wall of
the Street

View in Basement of Building.
Showing How the Foundation
Piers are Isolated from
Adjacent Ground

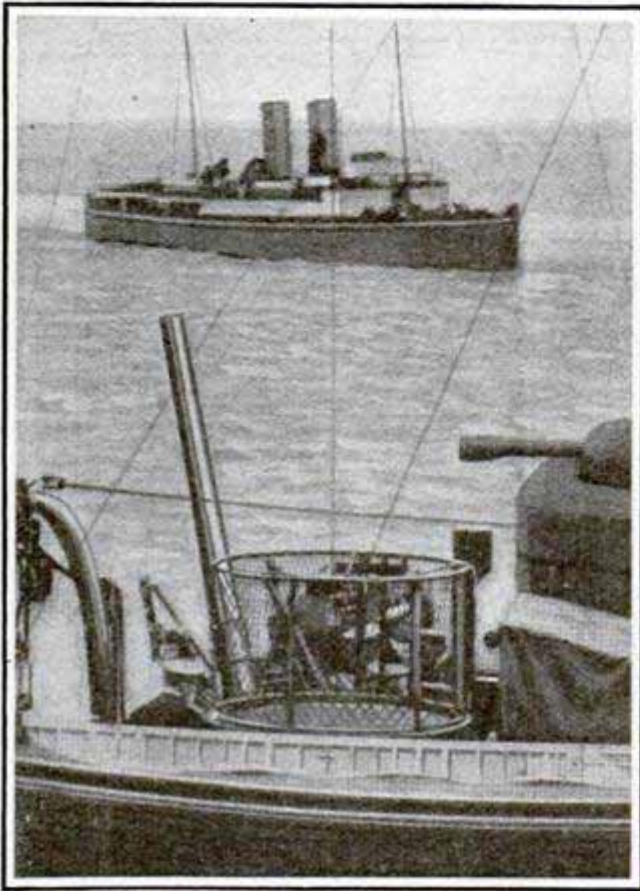
Looking Down in-
to One of the
Wells: The Walls
are Braced with
Concrete Struts
Midway between
the Piers

mainly for teaming. This consists simply of a row of stones placed on end along the edge of the roadway at intervals of from 10 to 20 ft. For the reason that such vehicles rarely carry lights the stones are painted white. They are said to serve as an effective warning on the darkest nights.

caused by street traffic and the operation of a near-by underground railway. This building is supported on reinforced-concrete piers which have their footings $52\frac{1}{2}$ ft. below street level and are located in concrete-lined wells so that they are isolated from the ground above this level.

TWELVE-POUND GUNS DEFEND "IRON DUKE" IN AIR

The "Iron Duke," one of the battle-ships of the British navy, is fortified against attacks from the clouds by



One of the Guns Protecting the "Iron Duke" against Aerial Assault

bomb-dropping flying machines, with two 12-lb. guns designed for defensive work against all types of aerial craft. These instruments are placed on high-angle mountings so that they may be turned quickly to almost any position when an enemy is sighted in the air. There are few, if any, guns of this type, however, which great reliance can be placed upon if the attacking craft is flying at an altitude of more than a mile.

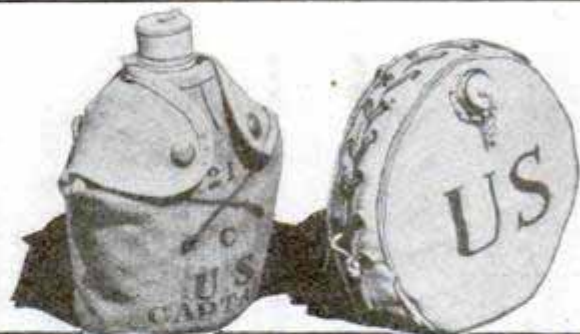
WELLAND CANAL TO SUPPLY HYDROELECTRIC POWER

An international agreement designed to preserve the natural beauty of Niagara Falls prohibits any increase in the diversion of water for power purposes, but a way for developing additional hydroelectric power, to which no ob-

jection can be made, is now being planned in connection with the construction of the new Welland ship canal connecting Lake Erie with Lake Ontario. This plan consists simply in using the waste water from the canal for power purposes, and it is planned to build at the Whirlpool a hydroelectric generating station to which this water will be conveyed. The difference in level between Lake Erie and Lake Ontario is 326 ft., and it is estimated that with this total fall in the canal an enormous power can be developed as a by-product in connection with operating the canal.

TWO-PIECE CANTEEN WASHED WITHOUT DIFFICULTY

A canteen constructed in two pieces so that it may be taken apart readily and cleaned without difficulty is the recent invention of an army officer. The container is circular in shape and flat, instead of bottle-like as the one in use at the present time. A cup which fits over the rim of the utensil, occupying a minimum of space, is provided with it. While the ordinary canteen may be cleaned with the aid of a bottle brush, such things are rarely, if ever, carried by a soldier, and a rinsing is practically the only cleaning given.

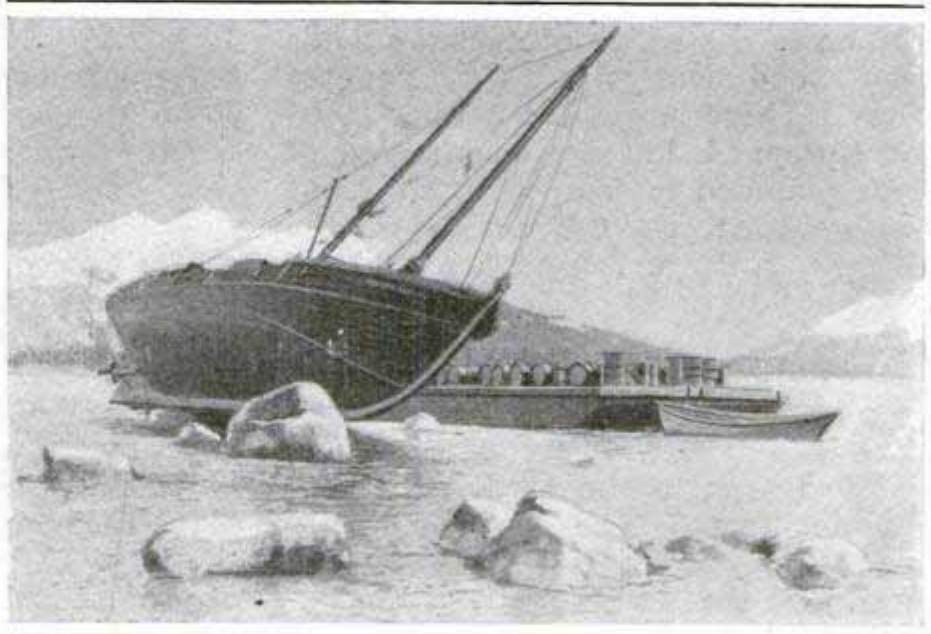


This Canteen may be Taken Apart and Cleaned. Present Type Shown Above, at Left

VESSEL CAUGHT ON ROCKS SAVED BY DYNAMITE

While towing a barge loaded with gasoline the launch "Northland," sailing from Katalla, Alaska, to Cordova, ran upon a reef at high tide and grounded. When the swell went out the vessel was found to be caught firmly between two large boulders, while it was listed so far on its port side that the keel was exposed. The boat had escaped injury, but it was seen that it would be impossible to float her off the rocks at that season of the year when the tides were decreasing. Rather than wait for an uncertain length of time for higher water, thus risking storms which might pound the craft apart, the owner resorted to dynamiting the

rocks. Charges of explosives were set off in each of the boulders and the boat dropped 2 ft. This was sufficient to



Vessel Caught High Out of the Water on a Reef: By Dynamiting the Boulders the Launch was Dropped without Injury

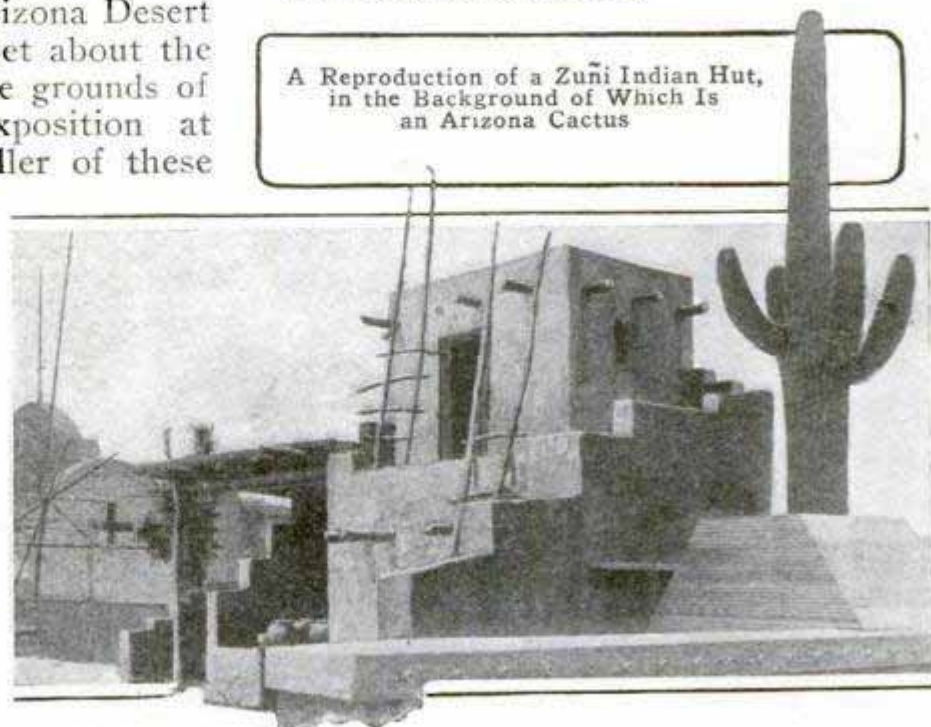
float her at the next tide without difficulty.

ARIZONA DESERT CACTI DUG FOR EXPOSITION

What are considered to be the largest giant cacti ever transplanted have been moved from the Arizona Desert and placed on the parapet about the Zuñi Indian village on the grounds of the Panama-Pacific Exposition at San Francisco. The taller of these two great plants is 35 ft. in height and weighs 4,500 lb., while the other weighs 800 lb. less. The work of digging the cacti, boxing, and then shipping them on flat cars to California, was attended with much care, while the actual expense connected with the work amounted to \$2,000. The Indian village has been made as realistic

as possible and forms a part of the reproduction of the Grand Cañon of the Colorado, which is being constructed at a cost of \$350,000 by one of the western railroads.

A Reproduction of a Zuñi Indian Hut, in the Background of Which Is an Arizona Cactus



QUEER TAMPING APPARATUS USED IN CHINA

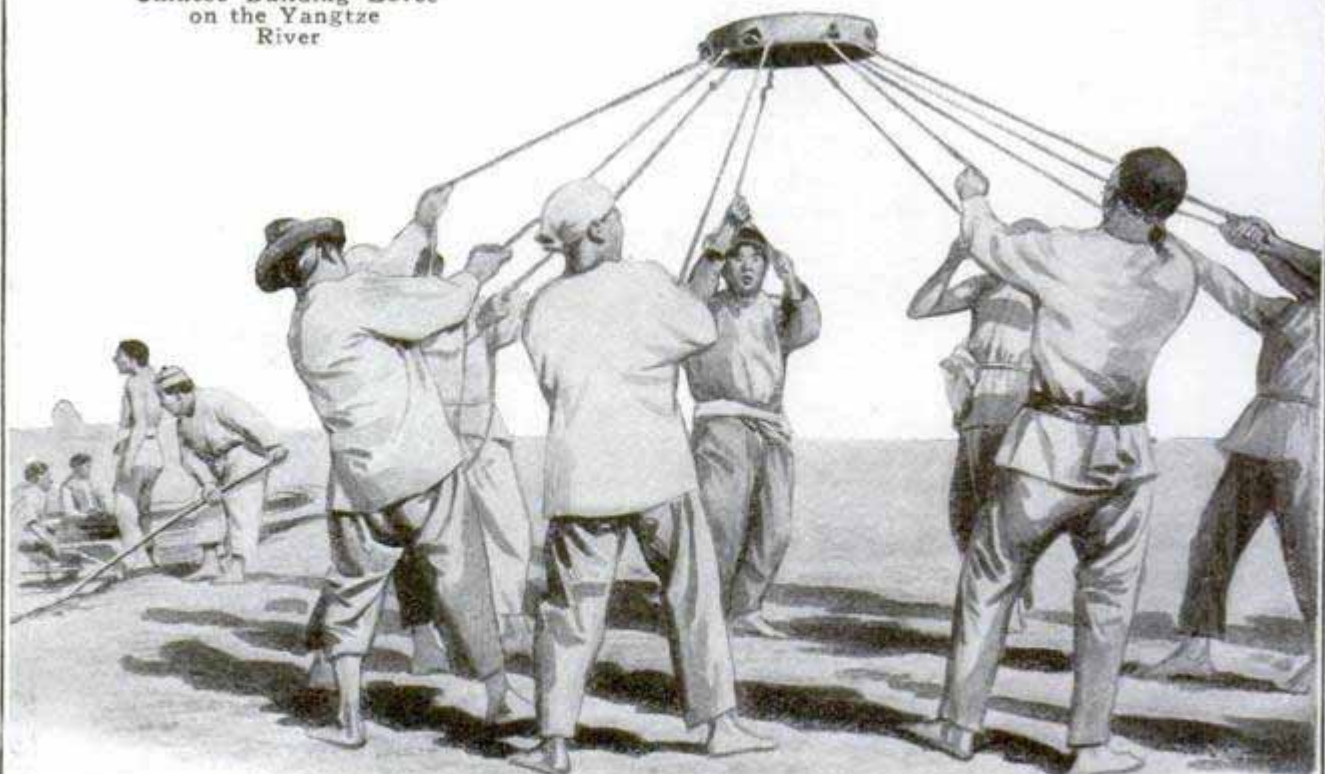
Cheap labor in China and the high cost of stone and timber is responsible for a curious practice in building the earthen levees which protect the fields from flood waters of the Yangtze River. These levees are neither faced nor riprapped, but are constructed of earth pounded or tamped to sufficient density to resist the action of the waters. A large flat section of hard wood has 10 or 12 eyebolts in its rim, and ropes are fastened through these. Coolies grasp the ends of the rope and, by a sudden jerk, throw the wooden block into the air. A second concerted pull brings it to the earth with considerable force. The gang of coolies walk slowly back and forth over a section of the dike until it is considered solid, when a bamboo tube is driven into the embankment and filled with water. If the soil absorbs the liquid it is taken as evidence that the

compression of the soil is incomplete, and the tamping is continued until the dike is impervious.

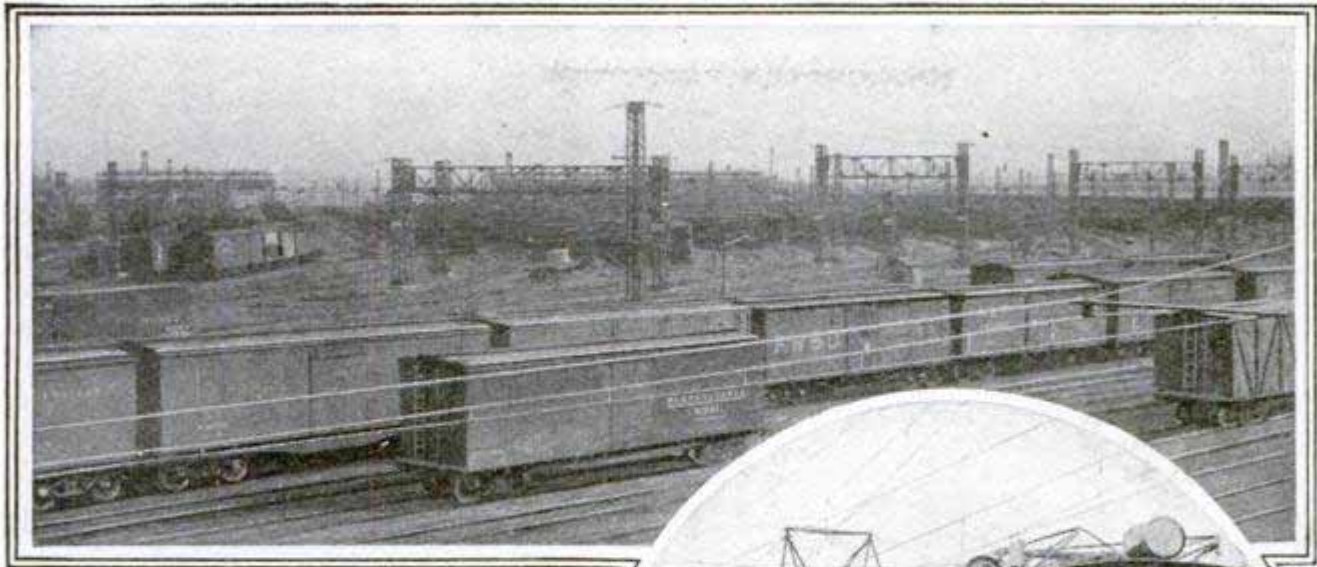
LOS ANGELES INAUGURATES AERIAL POLICE FORCE

Aeroplanes are to be used by the Los Angeles police department for certain classes of criminal-detection work. A request for volunteers to the aerial-police service was recently posted by the department chief with the result that four patrolmen are now being trained to drive aerial machines and form the original "flying squadron." The idea developed after experiments were made some time ago in tracking a fugitive with an aeroplane through the rough country near the city. A professional airman, who at present is a special aerial policeman, is training the policemen for their operations in the air. It is planned to make the branch a regular arm of the service.

Chinese Building Levee
on the Yangtze
River



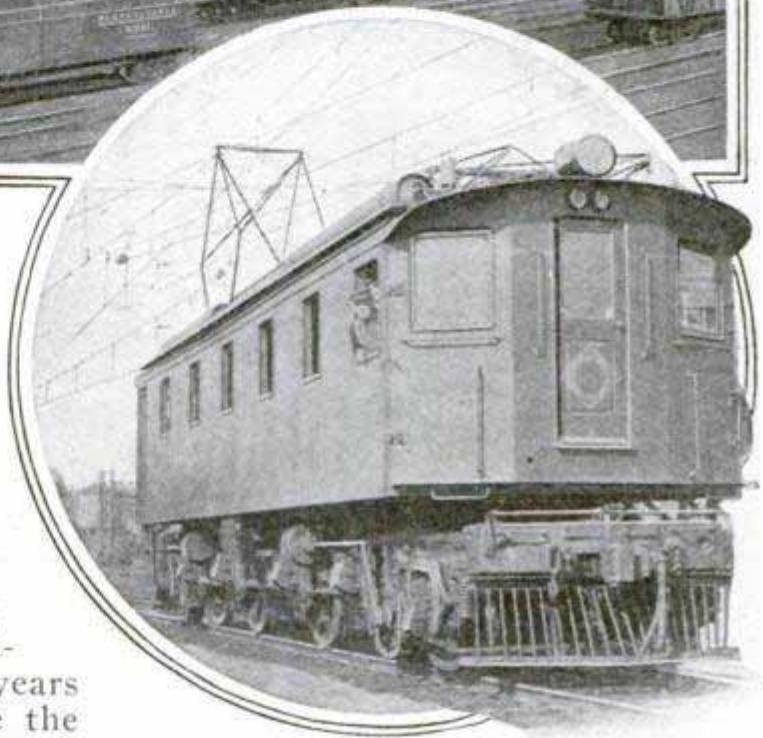
RAILWAY ELECTRIFICATION RECLAIMING PROPERTY



The Electric Freight Terminal of the New Haven Road, Containing 86 Miles of Track and a Spider's Web of Wires in an Area of Half a Square Mile; Steel Towers, 300 Feet Apart, Carry the Overhead Wires

The electrification of steam-railway terminals and yards at New York City has resulted in the reclamation of many acres of land for residential and other uses which in the past has been comparatively worthless except for industrial purposes. Surrounding freight yards where a few years ago smoke, dirt, and noise made the erection of dwellings out of the question, many apartment buildings are now in the course of construction.

Since the agitation for smoke abatement has grown general in many of the larger cities, the electrified yard of the New York, New Haven and Hartford Railway in the Borough of the Bronx has been studied by investigators from different parts of this country and Europe. It is a place where hundreds of trains are handled daily with great efficiency, little noise, and no smoke. This is having the effect of increasing materially the values of adjacent vacant property. Half a square mile is the ground area over which is meshed 86 miles of trackage. Power for the operation of the "Mother Hubbards," as the 80-ton electric locomotives are called, is supplied from a central generating plant and transmitted by a spider web of overhead wires



A 150-Ton Engine Which will Operate between New York and New Haven

carrying an alternating current of 13,000 volts. All the train handling is done from the ground, a brakeman rarely venturing on top of a car because of the closeness of the high-voltage wires. The company is electrifying its line between New York and New Haven, between which all trains will be drawn by electricity.

TO DEVELOP POWER FROM ICELAND'S WATERFALLS

Hydroelectric power is to be developed on a big scale from the waterfalls of Iceland and used in the manufacture of salt, for which there is a heavy demand in that country. The salt is to be extracted from sea water by a special process requiring elaborate and expensive machinery.

TRUCK FITTED WITH COVER FOR OPEN BARRELS

While it usually requires the work of two men to handle a barrel truck in



This Hand Truck for Handling Barrels of Fish, Pickles, or Other Sloppy Loads, Has a Cover to Keep Contents from Splashing Out

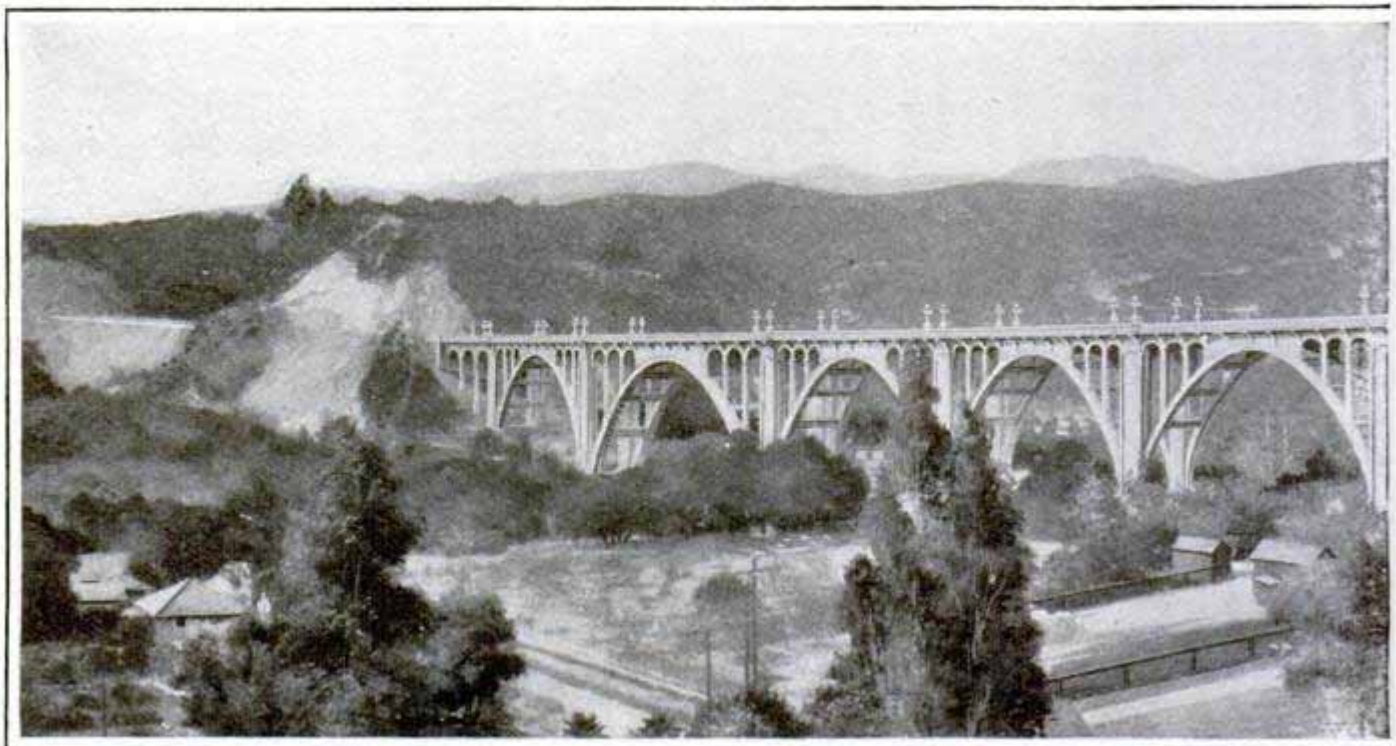
Showing the Simple Construction of the One-Man Hand Truck for Moving Open Barrels

fish houses, it being necessary for one person to hold a cover in place to prevent the contents from spilling, by the

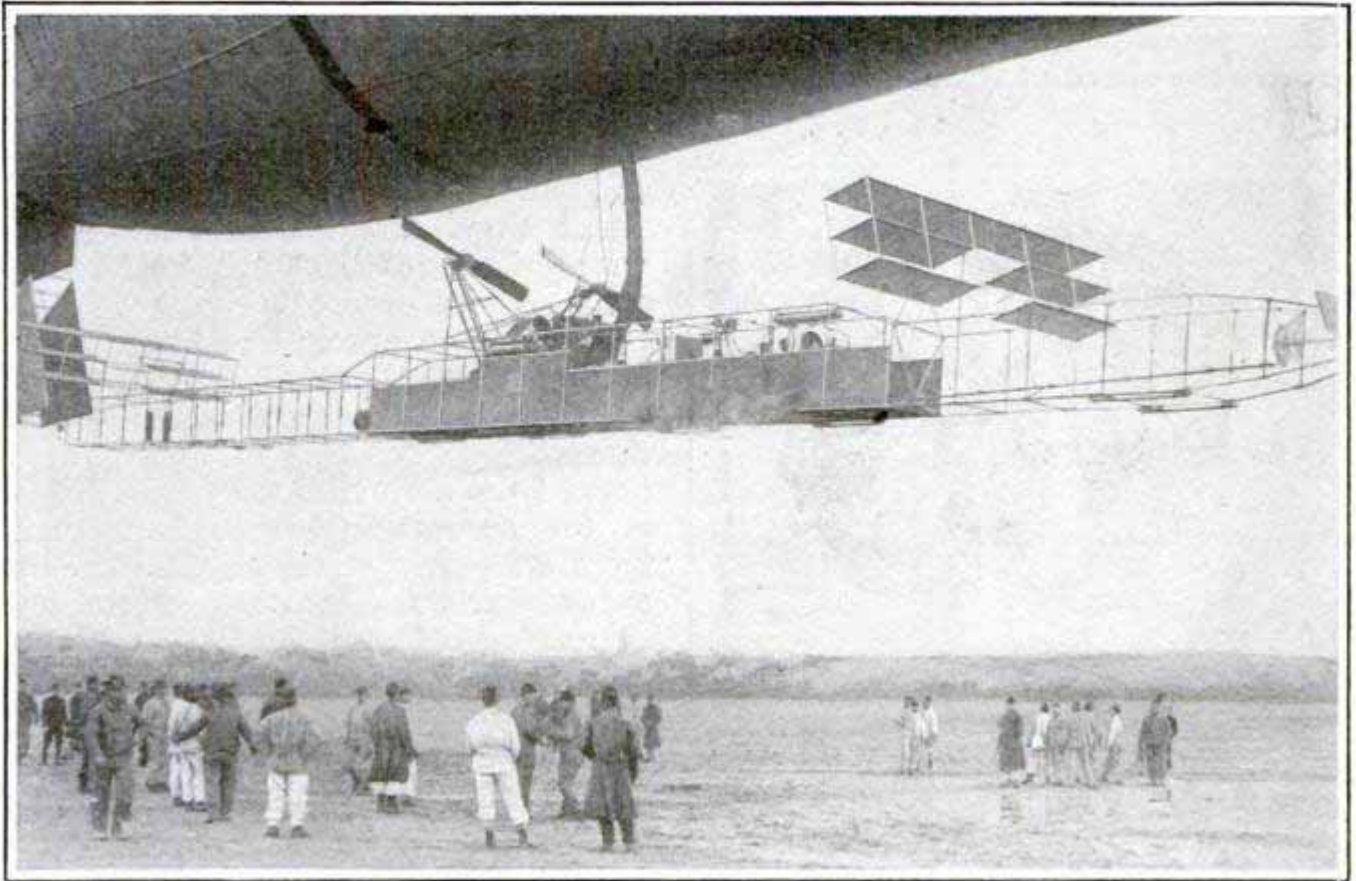
use of a newly devised carrier one man may now do the work alone. A truck invented by a worker in one of the Maine fish stations is supplied with a hinged top which hooks into the rim of the barrel. As the barrel is tipped back on the truck a hook falls into place, which holds the cover securely. Two arms fit beneath the hoops and hold the barrel in place, while a pair of bolts near the bottom prevent it from rolling.

WHAT A MAN'S LIFE IN WAR REPRESENTS IN DOLLARS

Various estimates have been made by different authorities in an attempt to compute the daily cost of the war in Europe. The figures have ranged between \$35,000,000 and \$50,000,000 for the most part. In the absence of statistics of the number killed, no accurate estimates of the cost of killing a man in battle in this particular war can yet be made, but it is probable that this cost has increased materially. The average cost of killing a man in modern warfare is placed by students of the subject at around \$15,000. In the Boer war the British government, according to the best available estimates, expended nearly \$40,000 for every one of the enemy killed.

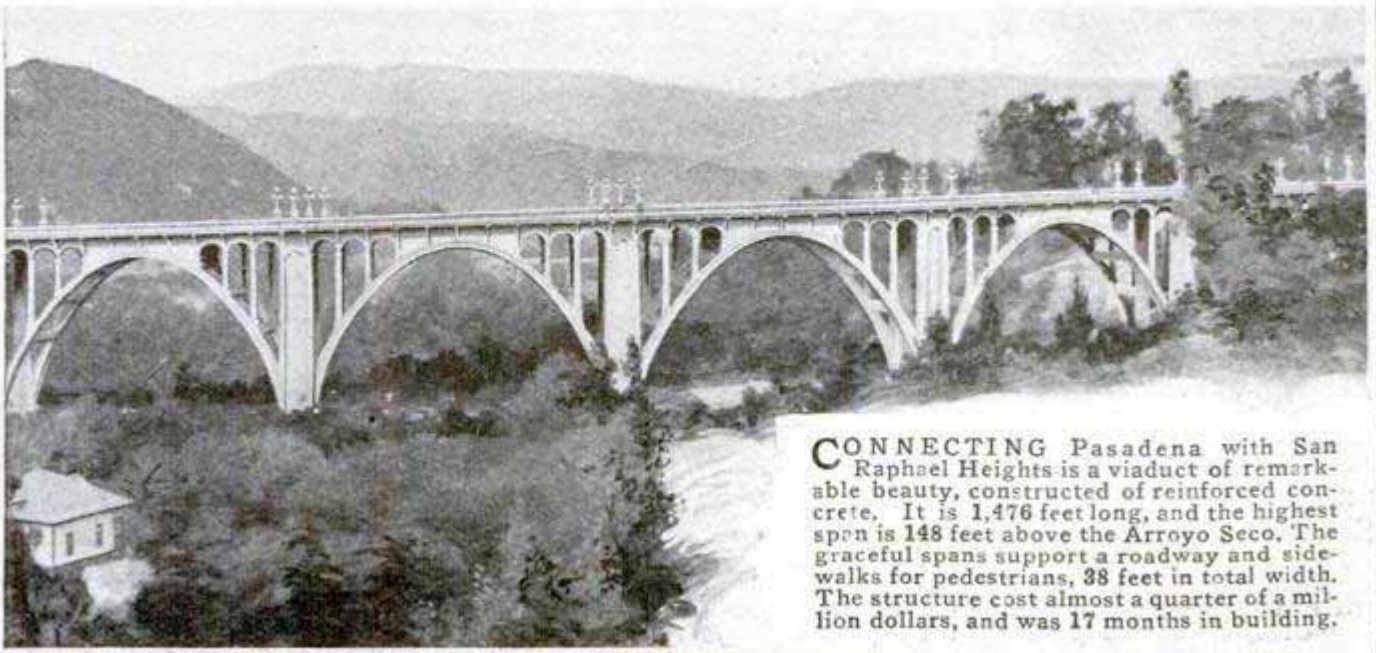


TRIPLANES ON DIRIGIBLE ACT AS ELEVATORS



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WHILE for years the energy of Germany has particularly been directed to the development of the rigid type of airships, notably such as the massive Zeppelins, the French have placed their faith in the flexible dirigible. The accompanying photograph shows the "Adjutant Reau" on the field as it was about to start on a flight with members of the aerial corps of the army. Although the craft has been built for several years, during which time it has made many long voyages, it has never suffered any mishap. It is 284 ft. in length and has motors which develop about 264 hp. The triplanes attached to the frame on either side of the nacelle are used as elevating surfaces.



CONNECTING Pasadena with San Raphael Heights is a viaduct of remarkable beauty, constructed of reinforced concrete. It is 1,476 feet long, and the highest span is 148 feet above the Arroyo Seco. The graceful spans support a roadway and sidewalks for pedestrians, 38 feet in total width. The structure cost almost a quarter of a million dollars, and was 17 months in building.

NEW DEVICE FOR PICKING GRAPES

A new device that is said to increase greatly the speed at which grapes may be gathered without doing the damage



In Using This Grape Picker the Thumb and Three of the Fingers are Left Free to Grasp the Grapes

to the vines that is done by hand picking, is coming into use among California fruit growers. This device consists of a clipper that makes a clean cut through the stem without any danger of tearing. It has two pivoted shear blades. One of the blades is held in a fixed position by a glovelike arrangement, while the other is operated by the index finger. This leaves the thumb, as well as the remaining fingers, free to grasp each bunch of grapes as it is clipped from the stem.

☛ Mushrooms are being cultivated in an old railroad tunnel in Edinburgh, Scotland, which has been abandoned for some time. This is a revival of an industry which flourished in that locality a number of years ago.

REWARD OFFERED IN FRANCE FOR HEROISM IN AIR

Rewards for the demonstration of unusual heroism in aerial operations during the time France is involved in war have been offered by a French aviation enthusiast to the airmen of his country. For this purpose he has appropriated \$200,000 to be divided among those deemed worthy of especial notice on account of brave deeds performed by them. The awards will be made by a committee to be appointed by President Poincaré, members of the aero club and a committee of the aeronautic league. The first prize will amount to \$20,000. In the event that an award is made to an airman who lost his life in carrying out his deed, the money will be presented to his family or nearest relatives.

DENATURING OF SPOILED FOOD FOR SHIPMENT

Spoiled food of every kind will have to be denatured before it can be shipped in interstate commerce, according to a recent ruling of the U. S. Department of Agriculture. This ruling permits the shipment of spoiled eggs for use in tanning, and other spoiled substances for the making of fertilizer, or of oils or greases used in machinery, but requires them to be treated with salt or kerosene, or in some other way that makes it impossible to use the spoiled substances for food, or to make any product from them that can possibly be used as food.

AIR CRUISERS OF BRITISH FLYING SQUADRON

An English armored aerial cruiser, which was produced only a short time before the opening of the European hostilities, is a biplane with an all-steel fuselage. This is arranged so that the gunner sits in a shielded position immediately in front of the pilot. The high-power rifle used is mounted at the

front of the machine with its muzzle extending through the hood so that it has a clear field of fire. The craft has an



New Armored Biplane of British Aerial Corps



Double-Deck Armed Flying Machine of English Forces

operation radius of about 300 miles, and when carrying its crew, 300 rounds of ammunition, and with its oil and fuel tanks filled, it weighs 1,760 lb. It uses a

100-hp. Gnome engine and drives at a normal speed.

Another craft of the British air forces is a biplane built high to ride the gunner in a carriage beneath the lower plane, immediately under the pilot. His rifle is so mounted that it extends back over his lap when sighted straight ahead or toward the earth, but is arranged so that it may be turned to any point of the compass.

TABLECLOTH MADE OF POPLAR VENEER

A tablecloth made of a continuous sheet of rotary-cut poplar veneer, 105 ft. long, 3 ft. wide, and $\frac{1}{8}$ in. thick, was a striking feature of a picnic held recently by the lumbermen's club of Evansville, Ind. This curious table covering was made after a number of tables of the same size had been placed end to end and it was discovered that no tablecloth could be found that was long enough to cover them. Accord-

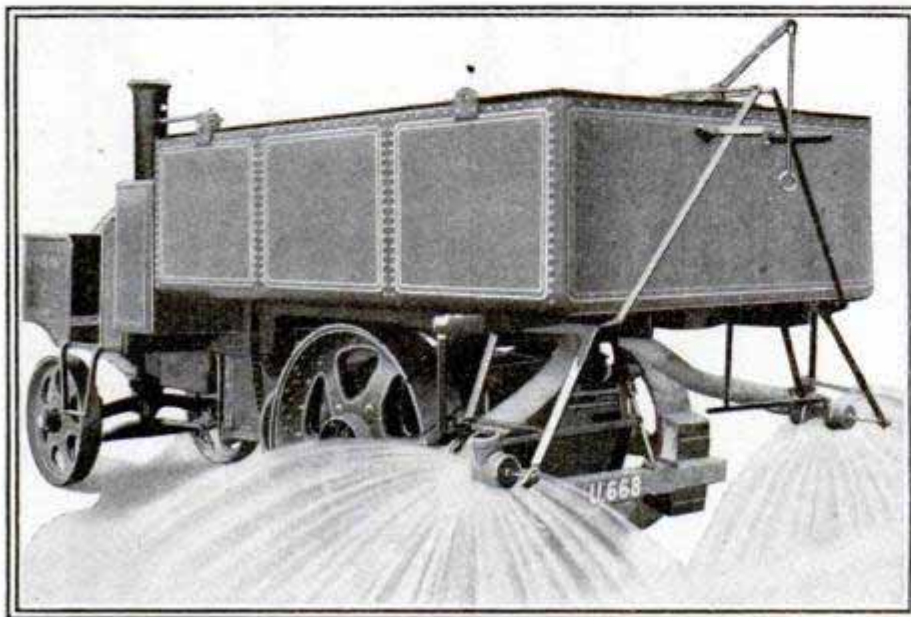
ing to the lumberman's way of speaking, this piece of veneer is 1,260 in. wide and 36 in. long. This curious way of giving the dimensions is due to the fact that the veneer was cut from a poplar log 3 ft. long, and this dimension determined the length of the veneer. The knife, working into the wood spirally as the log was revolved, peeled off a $\frac{1}{8}$ -in. strip continuously until the required "width," 1,260 in., had been obtained.



This Poplar-Veneer Table Covering, 105 Feet Long and Three Feet Wide, was Made from a Log Only Three Feet in Length

ENGLISH WATER WAGON DRIVEN BY STEAM

A street sprinkler of novel type, manufactured by an English concern, consists of a steel tank with usual out-



Steam-Propelled Street Sprinkler Which gives Efficient Service in an English City

lets leading to two branched sprinkler heads, the whole mounted upon a heavy steam truck of the tractor type. The engine, which is placed over the fore truck, may use either fuel oil or coal, and is operated by one man. The wheels have flat steel tires, the drive being on the two rear wheels, the rims of which are provided with diagonal grooves affording good tractive pull.

UNITED STATES TO CONTROL CANAL-TERMINAL WATERS

Under the terms of a treaty that has just been signed at Panama the United States gets control of the waters of the harbor of Colon, at the Atlantic end of the canal, and the harbor of Ancon at the Pacific end. Battery Hook, on the Colon water front, is given to the United States, as well as the control of all the piers at the north entrance to the canal, costing approximately \$2,500,000. The United States also gets two small islands in Ancon Harbor which are to be used for observation and light stations by the coast artillery.

HOW AMERICAN SHIPPERS LOSE BUSINESS

The Daily Consular and Trade Reports contain the tragedy as well as the romance of commerce. An engineer in charge of a nitrate plant at Iquique, Chile, ordered a consignment of American fuel oil, the plant having heretofore used Peruvian oil exclusively. The latter differs from American oil in that the gasoline, naphtha, etc., have not been extracted. The American product is so thick that the storage tanks must be equipped with steam coils for heating the oil so that it will flow. The tanks at the nitrate plant were not so equipped,

and the oil had to be dug out of the tanks with spades, as the American oil formed a solid mass inside and the tanks could not be used. As a result, the business of supplying oil for this company was lost to the American shippers.

NEW METHOD OF PRODUCING HIGH TEMPERATURES

Extremely high temperatures are being obtained by combining a jet of air or oxygen or an oxyacetylene or oxyhydrogen flame with an ordinary electric arc. The simplest form of the apparatus used for this purpose has a hollow carbon electrode through which a blast of air or oxygen is blown inside the electric arc. The metal to be heated forms the positive pole and the carbon electrode the negative pole. It is said that the gases burning within the arc produce a temperature greatly in excess of that produced by the electric arc alone. Other forms of apparatus are used in which an oxyacetylene or oxyhydrogen flame is projected upon the electric arc.

AIR-COOLED ALUMINUM RADIATORS

By the simple expedient of equipping the motor of a motorcycle with aluminum fins, a way has apparently been discovered for making air-cooling nearly, if not quite, as effective as water-cooling in internal-combustion motors generally. Aluminum has a much greater capacity than iron for conducting heat, and this combined with the increased area of radiation provided by the fins goes far in keeping the temperature of the cylinders down. No difficulty is anticipated in applying the principle to automobile motors, the problem being simply the mechanical one of making an aluminum radiator and placing it so that it will practically inclose the cylinders.

the interior, where a stout wick, filled with benzine, supplies the fuel. One



Parisian Invention Warms Ladies' Hands

POCKET HAND HEATER FRENCH NOVELTY

A small heater which may easily be carried in the pocket, in the sleeve, or held in the muff is shown in Paris shops. It consists of a metal tube containing another smaller tube. A screw cap and bottom gives ready access to

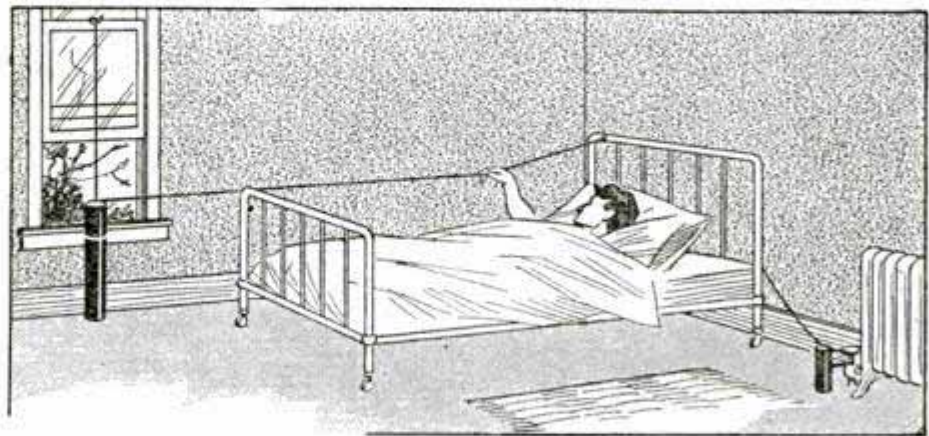
end, protruding into a cap of asbestos, is lighted. The heat brings the asbestos to incandescence, without any flame. Over this a cap is fitted and still another. The latter, being perforated, gives protection while affording warmth to the hands in cold weather.

GRAVITY MOTOR FOR HOUSEHOLD USE

Those who like to sleep in a room with the windows wide open, yet prefer to dress in a room warmed and made comfortable, may be interested in a device recently invented, called a gravity motor. This is a cylinder, 3 in. in diameter and 3 ft. long, which may be hooked on the window sill or fixed permanently if desired. The window is attached by a cord to the motor, which draws a weight up to a point where it is engaged by a latch.

By a clock attachment, or by pulling a cord by the side of the bed, the

window can be closed; and another attachment fastened to the valve of a radiator permits the steam to be

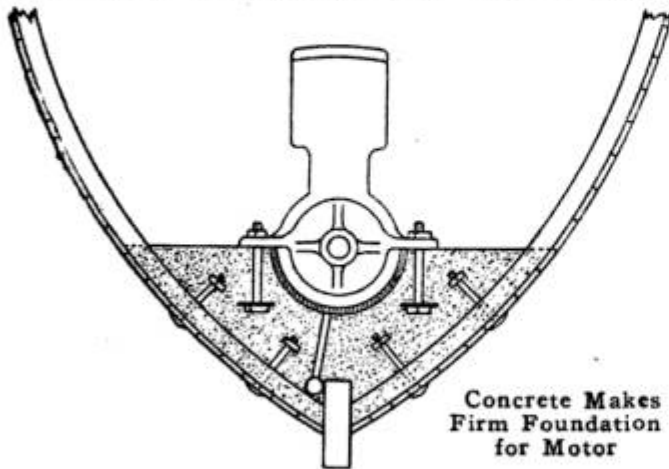


Window-Closing and Radiator-Operating Device for Bedrooms

turned on or off by the same kind of mechanism.

MOTORBOAT HAS CONCRETE FOUNDATION FOR ENGINE

Instead of the usual wooden foundation beneath the engine, a motorboat has been constructed in which con-



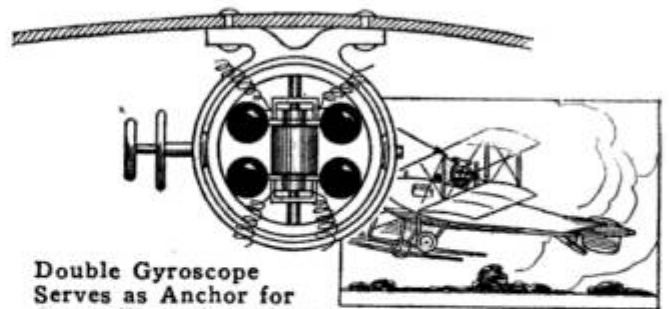
Concrete Makes Firm Foundation for Motor

crete was used for the purpose with excellent effect. At the forward end of the foundation site, a bulkhead was built between the engine flywheel and crank case, rising as far as the engine shaft. A similar bulkhead was built aft, and the engine was suspended in correct alinement by means of heavy wires at the proper height. The propeller shaft was connected to the engine shaft by its bolted coupling. From the four bolt holes in the engine-foundation lugs, were hung the bolts, each with a big washer over the head where the cement would grip it. Paper was wrapped around the crank case to protect it from contact with the concrete. The cement was mixed rather "wet," so that it would run freely, and the result was the engine rested upon a rigid bed when the cement had set. Complete absence of vibration is claimed for this foundation, and its weight, which is but little more than a foundation of hard wood, serves as additional ballast, giving steadiness in rough weather.

NEW GYROSCOPIC CONTROL FOR AEROPLANES

A gyroscopic apparatus recently invented and patented apparently places at the disposal of the airman a complete and reliable means for controlling all the operations of balancing,

banking and steering an aeroplane. The action is direct and simple, the apparatus being used practically as an anchor around which the aeroplane as a whole is turned at will. It consists of two gyroscopes mounted on the same vertical axis and revolving in opposite directions. There is no resort to the action known as precession, the efficiency of the apparatus depending entirely on the tendency of the gyroscope to remain in its original plane of rotation when set to spinning rapidly. The gyroscopes are run by small electric motors, and each consists of a pair of metal spheres carried at the ends of a bar that is secured at the middle to the revolving shaft. The whole apparatus is mounted in rings in such a way that the axle can be swung either in a fore-and-aft direction or transversely to the line of flight. By means of control wheels the airman can bring about either motion quickly and to any degree required, and since the gyroscopes retain their original plane of rotation, either action results simply in tilting the aeroplane in the direction desired. Precession, which is the term used to describe the action of the gyroscope in swinging at a right angle to any force applied to the end of the axle, is overcome by the use of two gyroscopes rotating in opposite directions. Since the precession in one is in a direction



Double Gyroscope Serves as Anchor for Controlling Aeroplane

opposite to that in the other, the two forces balance and cancel each other, and all danger of upsetting from this cause is avoided.

It is reported that the use of the oxyacetylene torch for removing the scale which accumulates in boilers has been found successful in tests made in Germany.

NEW FORM OF CONCRETE BUILDING BLOCK

A concrete building block recently invented by a resident of California is designed especially to resist earthquake shocks and to be moisture and soundproof. This block has a finished face on one side to form part of the exposed surface of the wall, while the opposite side consists of a series of projections and cavities so arranged that the blocks when placed back to back will interlock firmly, the projection on one block fitting closely into the corresponding cavity in the other.

OVERSHOES FOR HORSES FOR WINTER WEAR

A recently patented shoe, designed to save horses on icy streets, consists of an overshoe built to fit over the regular



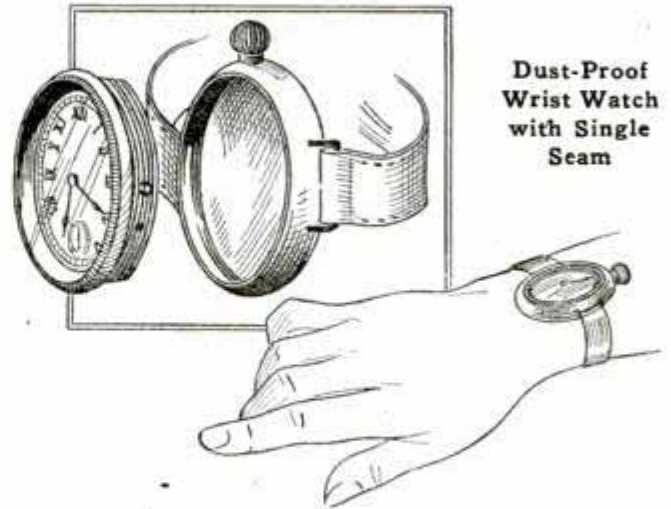
Detachable Overshoes for Horses on Icy Streets

shoe and is kept in place by leather straps which fit neatly around the upper edge of the hoof. The overshoe has five large, sharp calks, the largest being in front. One calk on each side prevents skidding or side slipping, while one on each point holds the foot firmly on the pavement. It is made of malleable iron and adds but slightly to the weight of the foot.

SINGLE-SEAM WRIST WATCH PROOF AGAINST DUST

Wrist watches introduced by a London jeweler are constructed with a single seam so made that the case is dust-proof. The works are all contained in the front section, which threads into the back. This latter piece

also forms the mounting. A deep screw flange is provided in this way, protecting the mechanism from dirt, to which

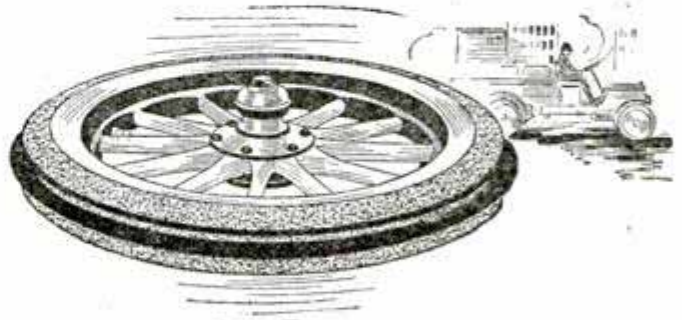


Dust-Proof Wrist Watch with Single Seam

wrist watches naturally are exposed, since they are carried usually by army officers, engineers, explorers and motorists. Metal loops on the sides of the back section of the watch provide places for the insertion of the straps.

RESILIENT TIRE FOR HEAVY VEHICLES

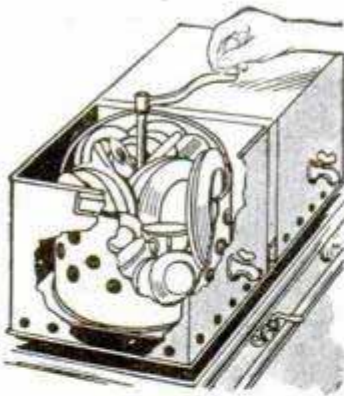
A solid-rubber tire for motor trucks, fire apparatus, and the like, has been placed on the market which is an ingenious modification of the ordinary type. A triple solid-rubber band tire has two outer tires of the usual gray rubber, while the center tire is of a special soft and resilient red rubber, having a slightly larger diameter, so that it stands up above the others. Giving a secure grip upon the road sur-



Projecting Center Tire of Red Rubber a New Feature

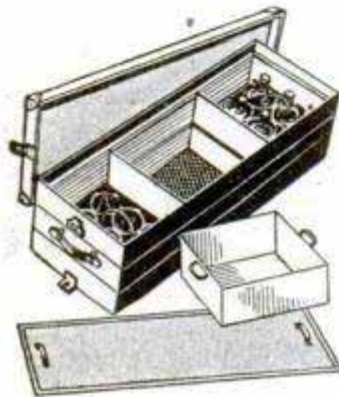
face and having considerably more spring than the ordinary type, the new tire relieves the machine of heavier road shocks and prevents skidding.

NOVEL AND PRACTICAL THINGS FOR DAILY USE



Dish-Washing Machine for Household Use

household use. The apparatus is constructed of sheet metal and divided into two compartments, a washer and a rinser. When it is to be used, the



Small Refrigerator Built for Motor Cars

For the convenience of motor tourists on long trips, a compact refrigerator which is capable of holding 25



Tricycle with Novel Transmission System

may be readily fastened to the running board of a car.

A light tricycle car for a boy, which is propelled by shifting the weight of the body first upon one foot and then upon the other as the rider stands on a tilting board, is being made. The ma-

chine has a steel frame, rubber-tired wheels, and ball bearings. The transmission is effected by a double-bar gear which straddles a cogwheel actuating the axle.

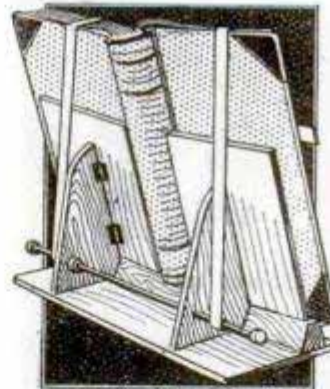
PERFORM-
ing its
function quickly
and in a sanitary
manner, a dish-
washing ma-
chine has been
designed for
household use. The apparatus is con-
structed of sheet metal and divided in-
to two compartments, a washer and
a rinser. When it is to be used, the
dishes are placed
in a cylindrical
receptacle and
this set into the
first section. By
turning a crank
rapidly, hot wa-
ter is forced over
the china, clean-
ing it thorough-
ly. Then the
holder is lifted
bodily and placed
in the rinser.

chine has a steel frame, rubber-tired wheels, and ball bearings. The transmission is effected by a double-bar gear which straddles a cogwheel actuating the axle.



Fishing Gloves are Protection against Mosquitoes

Fishing gloves which are proof against mosquitoes and flies are being introduced for sportsmen. The hand covering is made of leather, leaving the finger tips free. A khaki gauntlet, supplied with an elastic draw string which fastens about the elbow, is sewed to the cuff of the glove. They fully protect the hands and wrists.



Rack Holds Heavy Account and Abstract Books

place straight across a double page. At the rear of the device is a roller which provides for the adjustment of the rule. The holder is made of oak and metal.

Working on the same principle as an ordinary carpet

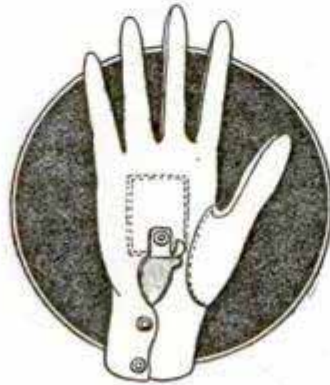


Sweeper Quickly Collects Crumbs from a Table

sweeper, a crumb collector for use on a dining table is among the recently in-

vented household accessories. It is made of metal ornamentally decorated and in measurement is no larger than a medium-sized crumb tray. By passing it over a table cloth the crumbs are quickly gathered.

A woman's glove which has a small pocket in its palm for carrying car fare, a latchkey, or similar things, has been invented. At the wrist opening is a flap which turns back over the pocket and fastens with a clasp. The pocket does not detract particularly from the appearance of a shopping glove, since it is so arranged that it is barely noticeable, unless overfilled.



Glove with Pocket in Palm for Car Fare

An apparatus for cooling liquids in bottles without the use of ice has recently been introduced in France. It consists of two tubes, one within the other, which extend through the neck of the bottle containing the liquid to be cooled. The inner tube is



Apparatus Which Cools Liquids without Using Ice



Electric Lantern Built around a Dry Battery

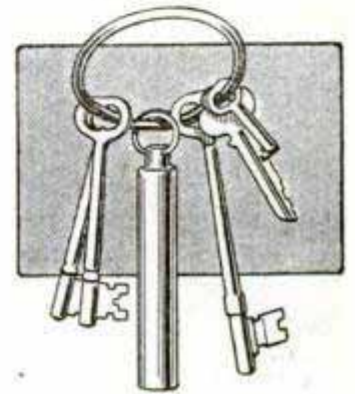
open at the bottom while the outer one is closed. The walls of the latter are curved down hemispherically at the upper end. A stream of cold water is introduced through a funnel into the inner tube, and upon rising through the outer one it drips over the exterior of the bottle.

Using a dry cell to supply it with lighting energy, an electric lantern, made for general use, consists of a metal case which holds a commercial battery. The cap which fits over the top of the device carries a reflector and small bulb on its outer rim. A lever switch allows the light to be turned on or off at will.



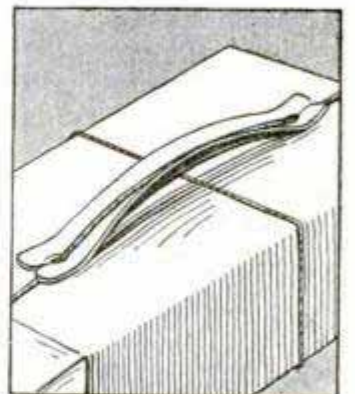
Inkwell Which Prevents Evaporation of the Fluid

A desk inkstand which preserves writing fluid in its natural proportion, preventing evaporation, is arranged so that the liquid is contained in a bulb covered from the air. By pressing down upon a small dipper arrangement which connects with the supply bottle, the ink is forced by gravity to the pen.



Receptacle for Carrying Motorist's License

For the motorist who finds it difficult to carry conveniently his license, an ingenious receptacle has been made. It consists of a small tube sufficiently large to accommodate the license if the latter be wound tightly and inserted into it. It is intended to be attached to a key ring.

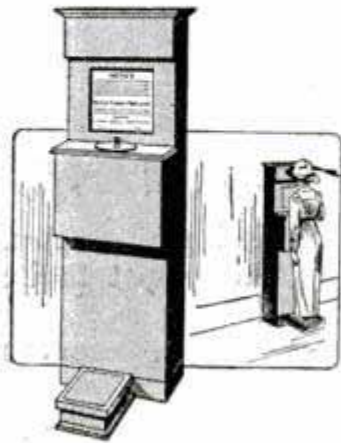


Handle Which may be Attached Quickly to a Package

A convenient handle, which may be attached to a bundle without the need of separate strings, is being made of compressed paper. It consists merely of a grip-shaped piece with notches to engage the wrapping twine.

AUTOMATIC DIRECTORY IS ADVERTISING NOVELTY

A Los Angeles inventor has produced an automatic directory designed to be installed in hotels, waiting rooms,



drug stores, and other public places, in the form of a cabinet of decorative woods, with a small platform in front of it. To operate the machine one steps upon the platform and turns a disk upon a

shelf, so that the indicator button is set at such classification as is desired. Then, by pushing down upon a plunger button, the curtain which carries the directions, rolls up, and there appears behind the glass a card bearing in plain type the information desired. The name, address and telephone number of any advertiser, location of places of amusement, arrival and departure of trains, may be displayed on appropriate cards and easily found by inquirers.

WELDING TUNGSTEN STEEL ON MOTOR VALVES

A new process of welding tungsten steel to soft low-carbon steel is to be applied in the manufacture of valve



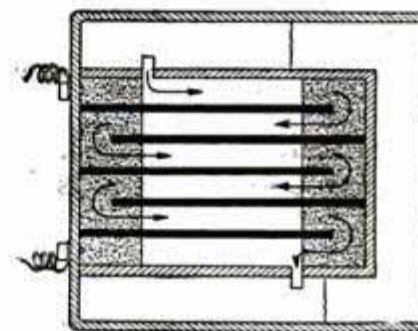
heads and other automobile parts, and the process is one that is expected to result in great economy, as the use of the expensive tungsten steel can then be

confined to the wearing parts, while the stem or shank can be made of soft carbon steel. The welding is done in a gas furnace at a temperature which exceeds 2,000° F., and requires only a

few seconds. The secret of the process lies in this high temperature and in the short time required, together with a special flux, the components of which have not been divulged. It is also planned to use the process in making high-speed cutting tools for lathes and planers, in which case the cutting parts of the tool will be of tungsten steel and the shank of soft carbon steel.

NEW ELECTRIC DEVICE FOR STERILIZING MILK

A French scientist has devised a process for sterilizing milk which makes use of the electric current. Fresh milk is placed in a container



from which it drops by gravity down into a box, insulated and connected with some source of electric power. By means of baffles, the

milk is made to flow back and forth through the box, coming in contact with carbon grains, charged with electricity and providing a sterilizing medium. By the time the milk has completed its course through the box it has been freed from deleterious germs, and passes into suitable tanks for bottling.

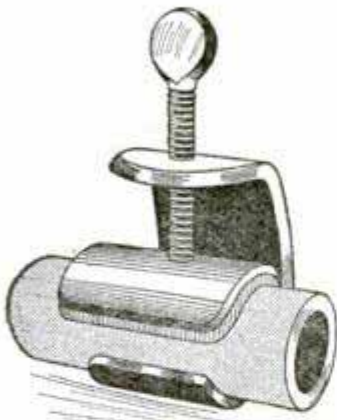
GERMAN APPARATUS FOR MEASURING RIVERS

For measuring and recording the width of a river, the cross section of the river bottom, and the velocity of flow at all points on the section, the topographical corps of the German army now uses an exceedingly simple apparatus that works automatically and makes a graphic record of all the data on a sheet that moves on revolving drums. In making a measurement across a stream a wire is first attached securely to the shore. The other end

of this wire is wound around a drum in the recording apparatus. As the boat carrying the apparatus goes across the stream the wire, which is held taut, unwinds and not only makes a record of the distance traveled, but actuates the drums carrying the record sheet, so that any record made on the sheet corresponds accurately to the distance from shore regardless of the speed at which the boat is driven. For measuring the profile a rod pivoted so that the lower end will drag along the bottom is used. At the upper end this rod, working through a system of levers, moves a pencil point so that it will plot the profile directly on the moving record sheet. The velocity is measured by means of a lever arm suspended in the water, on the lower end of which a weight is carried. The amount that this pendulum is swung downstream depends directly on the velocity of the current. Through a system of levers a curve showing the velocity of flow at each point is also made in pencil on the record sheet.

TEMPORARY STOPPER HOLDS LEAK IN CHECK

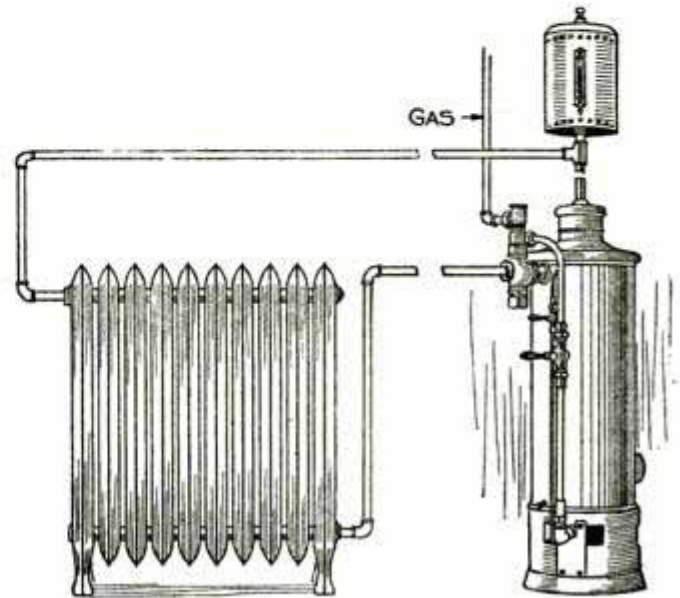
A convenient little "first aid" to the householder during the winter months is shown in the illustration. It is a stopper for temporary use in repairing leaks in iron or lead pipes used for water, gas, or steam. The invention, which is patented, consists of a screw clamp with an iron shield and a rubber washer. The washer is loose, so that it can be put at any point required, and the screw then presses the shield against the washer and closes the leak.



CA Shakespeare national memorial theater is being promoted in London.

A HOT-WATER PLANT FOR EACH APARTMENT

Hot water for heating has several advantages when residences are considered, but there has long been a need for such installations as would permit

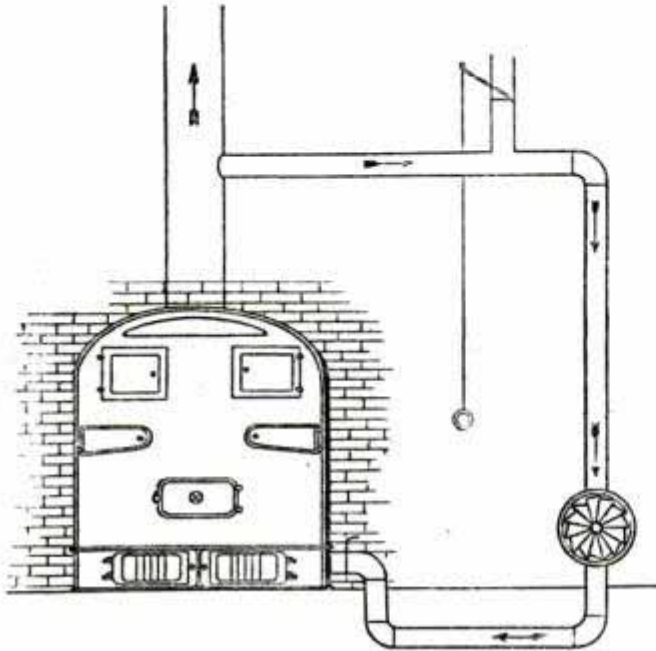


Individual Heating Plant for Flats

each apartment to control the heating in an economical manner, which cannot always be obtained through a central heating plant. A French invention has this need in view, and provides for a heating system adapted to apartments large or small, giving independent service and individual control. The fuel is gas, the boiler being equipped with automatic thermostatic control, and the radiator flow direct. A pilot light burns all the time, lighting the fuel burner when the temperature of the water falls below the standard set, and the difference of a few degrees being sufficient to turn off the gas supply, checking the heat, or turning it on again as needed. The water supply being comparatively small, only small pipes are needed and the boiler may be set in one of the living rooms if necessary, as it takes up but very little space. With this installation a family may not only regulate the temperature of its apartment to very narrow limits, but may rest assured that its fuel bill does not include the extravagant overheating of another apartment.

SIMPLE DEVICE CONSUMES SMOKE OF FURNACES

Acting as a hot-blast draft and also as a fuel saver, a smoke-abatement device has been employed in an eastern factory which may be used in



A Smoke-Abatement System Which may be Applied to Almost Any Furnace

connection with almost any boiler plant. Its simplicity and ease of construction makes it novel. Extended from the smokestack, a pipe, one-fourth the size of the chimney, is directed into the ash pit of the furnace. Near its terminus is a fan which draws the smoke and gases from the chimney. On each side of this fan are dampers, one allowing the introduction of air which mixes with the gases, and the other regulating the blast. In this manner most of the smoke is eliminated, a hot blast furnished the fire, and a certain amount of fuel saved by the added combustion of the heated gases. Operation of the device is controlled by a regulating valve. When the steam pressure is at 82 lb. the action of the fan is slowed. When pressure drops to 80 lb. the fan again is started automatically. The system is not patented and may be applied to almost any furnace.

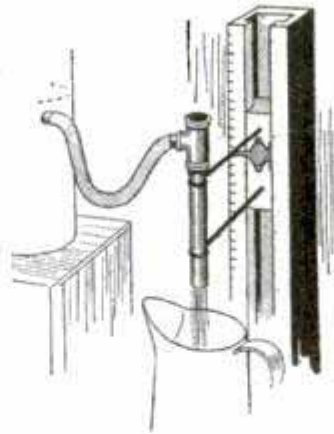
¶The only house remaining in London surrounded by a moat is occupied by the bishop of London.

RED-CROSS EMBLEM MISUSE CAUSES FEDERAL ACTION

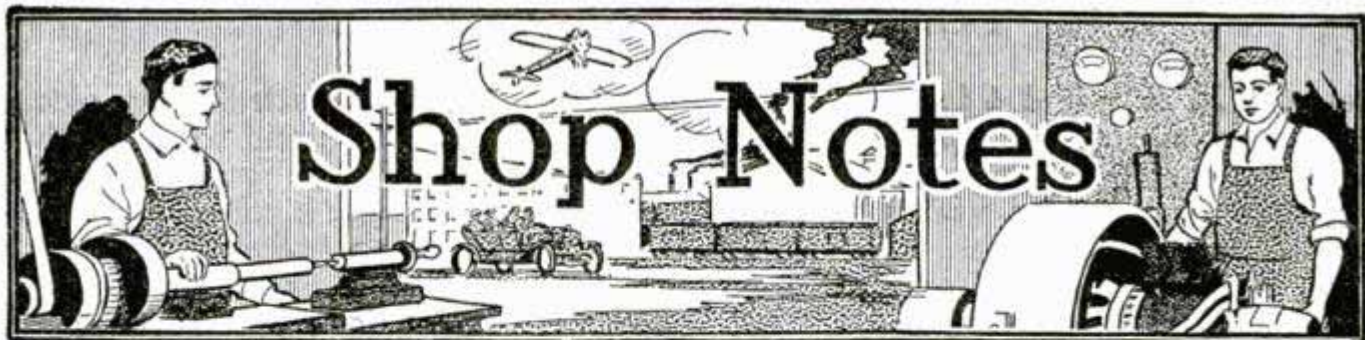
The arrest of the mayor and city clerk of Milwaukee, Wis., by United States authorities on the charge of violating the Federal statute prohibiting the use of the Red-Cross emblem, calls attention to a national law which probably few persons realize exists. War-like atmosphere spreading around the world served to bring the Red Cross Society into the foreground, and simultaneously with this a national crusade was begun against the misuse of its emblem, the red Geneva cross, to which it has the exclusive right by law. The arrest of the Milwaukee officials was caused by the fact that the emblem was used on badges worn by city sanitation inspectors. The use of the green Geneva cross by municipal health officers, physicians, and others similarly engaged, is permitted.

AN AUTOMATIC FLOW REGULATOR

A means for automatically regulating the flow of liquids from tanks, which has been patented recently, consists of a T-pipe and a tube connecting it with the supply tank.



The upper end of the T-pipe is open, exposing the incoming fluid to atmospheric pressure, and the lower end is attached by a reducer to a vertical tube. The important feature of the invention, however, is the vertical guide mounted at some distance from the tank, in which the T-pipe and its connections slide up and down, the level of the fluid in the tank being readily fixed, by moving the T-pipe in the guide to such a position that the top of the open end marks the level desired for the liquid.



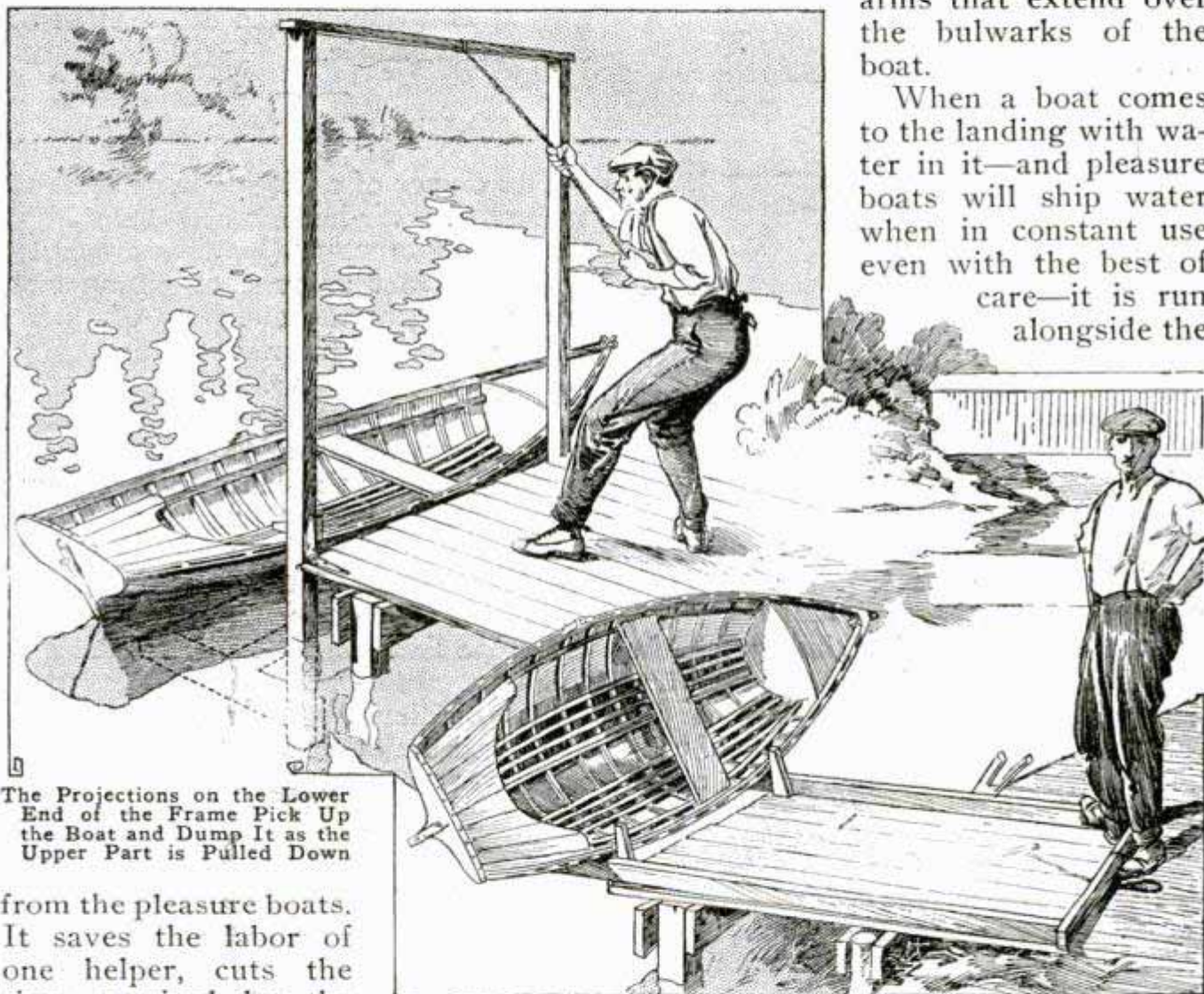
Shop Notes

A Boat Dump

IN a park where a large number of boats were used, the manager constructed a device to remove the water

from the pleasure boat used in the park at any stage of the water. A short distance above the long arms are nailed shorter arms that extend over the bulwarks of the boat.

When a boat comes to the landing with water in it—and pleasure boats will ship water when in constant use even with the best of care—it is run alongside the



The Projections on the Lower End of the Frame Pick Up the Boat and Dump It as the Upper Part is Pulled Down

from the pleasure boats. It saves the labor of one helper, cuts the time required by the other helper to less than one hour a day, and a few dollars represents the entire investment for the pier and all.

The dump consists of a U-shaped frame with the free ends extending downward into the water. At the lower ends of the frame and extending away from the pier are nailed arms, about 3 ft. long, which are placed low enough to extend under the keel of any

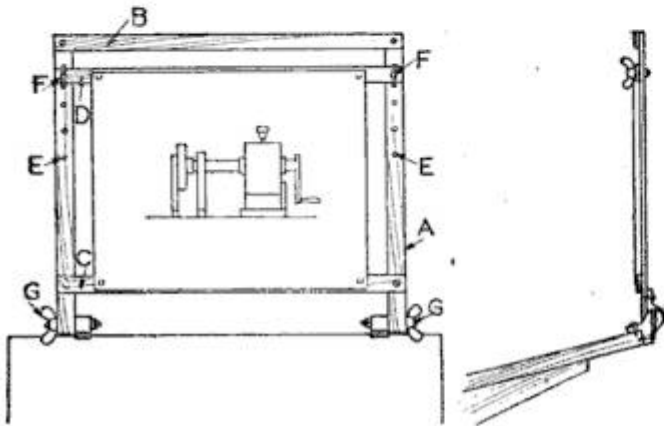
pier and the dump frame is drawn back. The boat is thus turned on its side above the water level and the water within runs out in a very short time and with little effort on the part of the operator.

The sides of the frame are made of timbers, 4 in. square and 10 ft. long, while the top pieces are 6 ft. long and 2 by 4 in. in size. The short arms are

about 1 ft. long and 4 in. wide. The long arms are made of 2-in. material, 6 in. wide and 3 ft. long. The frame is attached to the pier with two long-wing hinges, such as are used on heavy farm gates or doors.—Contributed by J. W. Tudor, Homer, Ill.

Drawing-Board Attachment

In the illustration is shown a useful attachment for the drawing board, consisting of an adjustable frame, or



An Adjustable Drawing Holder Fastened to the Drawing Board in Front and Out of the Draftsman's Way

holder, fastened to the back of the board facing the draftsman. On it can be tacked such drawings or sketches as may be required for constant reference.

The holder may be simply a thin board with strips, A, fastened to the sides, or if desired to have a very light holder, it may consist of a frame of two pieces, A, rigidly fastened to the cross braces B and C. An adjustable cross-piece, D, must then be provided so that

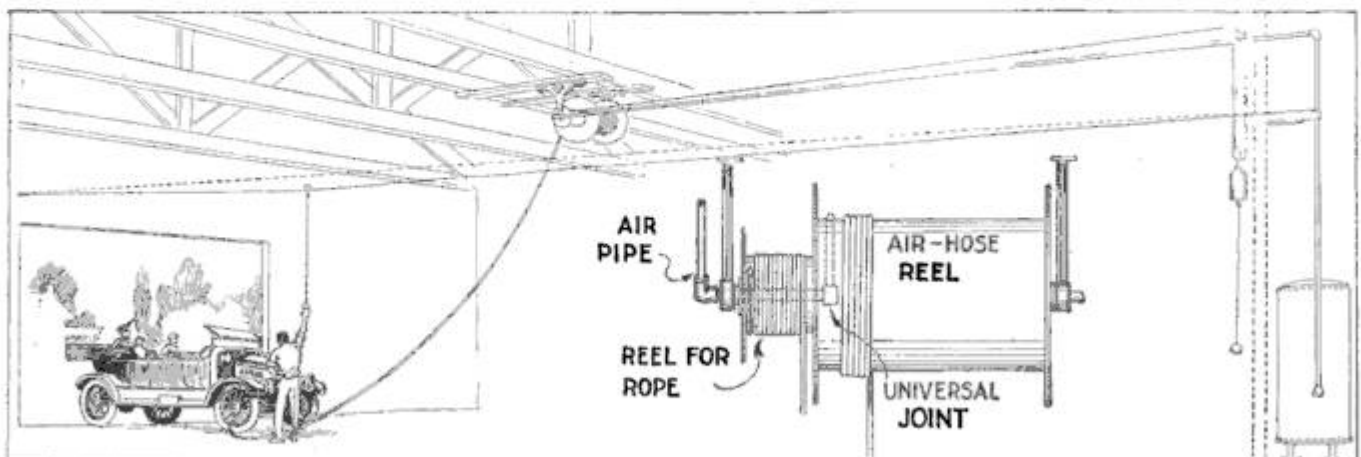
the drawing may be attached to piece B or C, on one edge, and to D, on the opposite edge. It is, therefore, necessary to drill several sets of holes, E, for the thumb nuts and screws, F, which are used to hold the piece D in position. If the sidepieces A are made sufficiently strong, a slot may be cut in each to take the place of the holes E, and a wider range of adjustment is thus obtained.

The finished frame should be attached to the drawing board by means of hinges, G, having a bolt and thumb nut so as to fasten the attachment at any desired angle.

Air-Hose Reel for a Garage

The owner of a large garage desired to have an air-hose outlet for filling tires of automobiles handily arranged with the least amount of piping and connections, as the one fault of an air outfit is that the numerous connections cause a continuous drop in pressure. A successful apparatus was constructed as follows: A hose reel was attached to the ceiling in the center of the room, with enough hose to reach any part within and out in front to the street. The inner end of the hose was connected to a revolving joint on the end of a pipe line run from the air tank in the rear.

The reel has two drums, one for the hose, and the other for a rope provided with a counterweight so that the hose is reeled up by the weight when released from the tire. The end of the



An Automobile Located in Any Part of the Room can be Reached with the End of the Air Hose, and the Tires Filled from a Pressure Tank at the Rear of the Building

hose, having the tire-valve connection, is protected so that it can be drawn back over the floor without injury.

The valve is operated by an ingenious arrangement. A small rope is fastened to the valve lever and drawn taut across the room the long way. On this is run a pulley having a rope drop. The drop can be taken along with the hose end to where it is used, and when connections are made, a pull on the drop opens the valve at the tank. The slight sag in the rope will run the drop back to the center near the reel.

Cleaning Stick for Machine Spindles

The usual method of cleaning hollow spindles for centers or drills is to use waste, frequently wound around some handy article such as a file. A better and safer method would be to use a



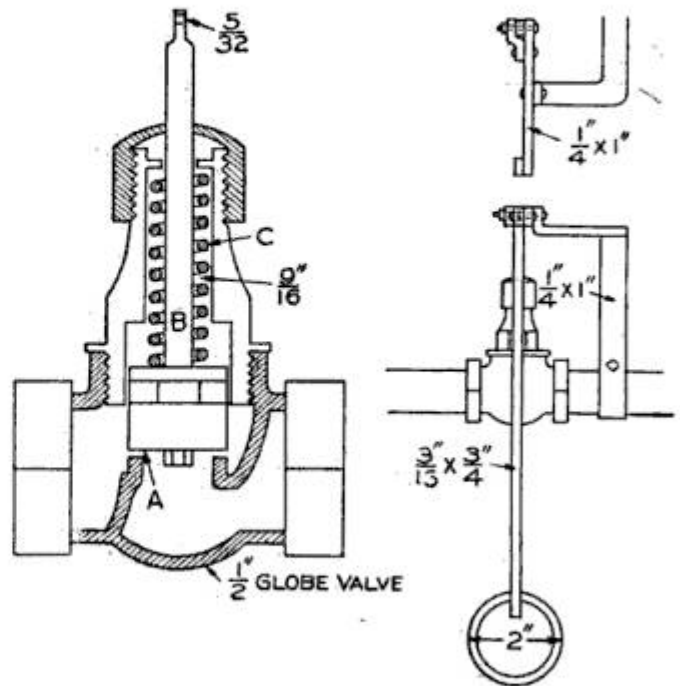
The Notches Catch the Dirt as It is Loosened from the Center Bore

tapered stick, notched as shown, and covered with a layer of felt. As this fits the spindle hole closely, a thorough job of cleaning is done, and the accumulated dirt is brushed off into the notches, thereby preventing any scratching or grinding as often results with waste and a file.—Contributed by John Harger, Honolulu, H. I.

Valve for a Drinking Fountain

To reduce the waste of cooled and filtered drinking water in a large shop, a valve attachment, as shown, was made for each fountain. The nicked disk A of the valve keeps the overflow bowl cleansed at all times without an extravagant waste of water and, besides, keeps the water in circulation through the cooling coils. The threads were turned off from the stem B, out of the bonnet, to allow the insertion of a coiled spring, C, made of No. 14 gauge brass wire. The long lever with the ring at its end will be found valuable by the workman passing through

the shop with his hands full of tools, as the valve can be raised by engaging the



A Valve Operated with a Spring and a Long Lever for Use on a Fountain

ring in almost any manner without necessitating loss of time in dropping or placing the burden to grasp a valve or hand lever.—Contributed by F. W. Bently, Milwaukee, Wis.

Combination Blacksmith Tongs for Round or Square Work

These tongs will hold securely round, square, tapered, and irregular-shaped stock, in sizes from a needle up to the full jaw opening. As shown in Fig. 1, the upper jaw is made with a V-shaped slot, while the lower jaw is shaped to fit into this slot, with the

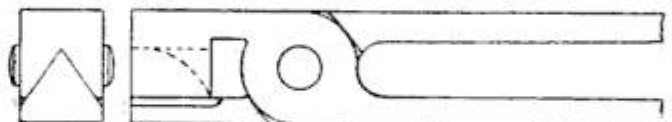


FIG. 1

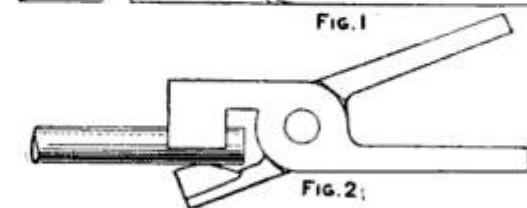


FIG. 2

Round Stock of Any Size within the Capacity of the Tongs is Held Rigidly in the Jaws

inner end rounded off. Figure 2 shows the jaws gripping a large piece of round material.—Contributed by Wm. A. Robinson, Waynesboro, Pa.

Fuel Gauge for Motorcycles

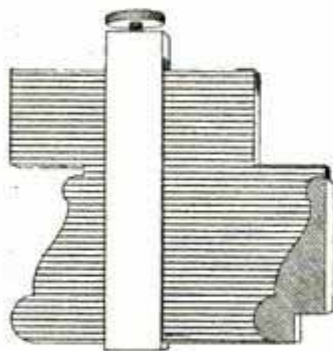
A fuel gauge for a motorcycle can be easily made from a piece of stiff wire and a cork. A small hole, large enough for the wire to pass through, is drilled in the filler cap, and after putting the wire in the hole the cork is stuck on the lower end. The cap is put on the can with the cork float inside and the wire pushed down until the cork end touches the bottom. Cut the wire off just above the cap and



bend the end over so that it will not drop out when the cap is removed. Fasten a small piece of brass on the cap to turn over the end of the wire to keep the float down when not in use.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.

To Duplicate the Contour of Molding

A simple tool for use in the building and interior-decorating trades for duplicating molding without removing it from the wall is shown in the illustration. It consists of fine steel strips held together with a yoke of brass, having a screw at one end to clamp the strips after the impression is taken. The strips are $3\frac{1}{2}$ in. long, $\frac{3}{8}$ in. wide, and about $\frac{1}{8}$ in. thick. Enough of these strips are put together to make the tool about 4 in. long.



To use, simply loosen the screw in the end, allowing the strips to slide free, then place the device against the molding and push each strip with a penknife or other keen-edged instrument until it touches the molding. After all the molding surface has been covered closely, tighten with the screw in the end, and an impression of the molding will be had, as accurate as could be desired.

If the screw is tightened sufficiently, the tool can be carried in the pocket for an indefinite length of time.—Contributed by Fred M. Griswold, New York City.

Saving Time with a Greenhouse Watering System

In using a gasoline engine to pump water through a system of piping for a greenhouse, 15 gal. of water were discharged per minute. The gravity tank on the same system would deliver only 8 gal. per minute. I decided that a great deal of time could be saved, if water were taken directly from the pump and the tank entirely cut out.

To do this, the water must be taken care of in some way while changing the hose from one faucet to another. This was done by running a branch pipe line over the well and attaching an old 2-in. steam blow-off valve on the end of it. A pressure gauge was put in near the pump, and this registered 50 lb. while the pump drove the 15 gal. per minute directly through the hose in the greenhouses. Just enough weight was placed on the arm of the blow-off valve to keep it closed at 50-lb. pressure. As soon as the water in the greenhouses is shut off, the pressure rises, and the valve opens and takes care of the water.—Contributed by Bert H. Stanley, Portage, Wash.

Graphite Used on Automobile Spark Plugs

A very annoying accident, and a difficult one to repair, is that of twisting off the base of a spark plug in trying to remove it from the cylinder head. A simple and sure preventive is to make it a rule to coat the threads of the spark plug and cylinder head with powdered graphite before screwing the two together. The graphite not only facilitates the removal of the plug, but also makes a better joint, permitting greater compression and holding it longer.—Contributed by D. C. Gaff, Knoxville, Tenn.

Pattern and Core Boxes for Water-Jacketed Cylinder

By J. A. SHELLY

In the construction of complicated machine parts much needless work can frequently be prevented in the pattern shop, foundry, and machine shop if the draftsman is acquainted with the various processes necessary to build the machine, from the making of the pattern to the machining of the casting. The simplest machine parts are often drawn so that considerable core work is necessary, where, if a little forethought had been used, and the drawing but slightly changed, a simple coreless pattern might have answered just as well. The water-jacketed cylinder, Fig. 1, has been so designed that the patterns and foundry operations are as simple as could be hoped for in such a large casting. Had the designer—possibly for some unimportant reason—put the side bosses of the cylinder at an angle of 45° instead of on the center

plest construction is made possible, as every part will draw. If the parting had been made through the cylinder center, but at right angles to the one

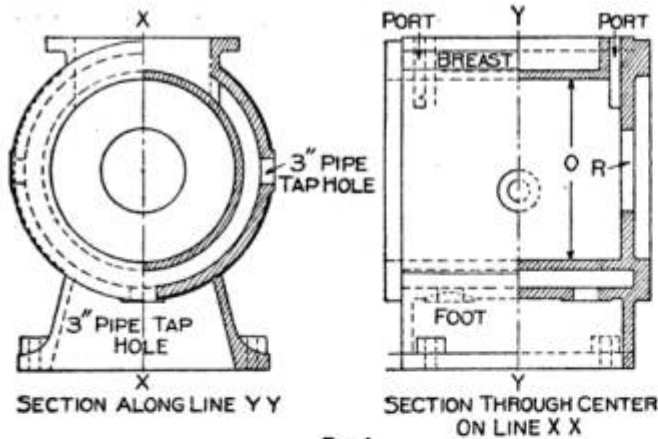


Fig. 1
End and Front Views of a Water-Jacketed Cylinder, with Sections Showing Water Space

line, considerable work would have been added in all departments having to do with its manufacture. Tap holes are frequently added which, though they do not increase the value of the completed machine, may materially reduce the cost of production.

The external appearance of the completed pattern and core prints, for the water-jacketed cylinder, is shown in Fig. 2. The parting line passes through the center of the cylinder, perpendicular to the base. In this way, the sim-

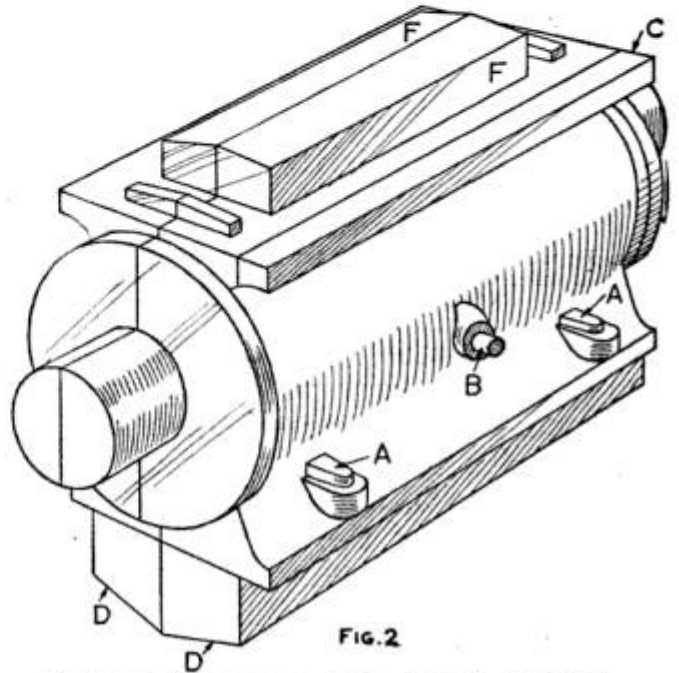


Fig. 2
External Appearance of the Finished Cylinder Pattern with All Core Prints Attached

shown, it would have been necessary to make at least two additional core boxes besides complicating the construction of the pattern. In large work, the smaller parts are usually made loose so they will remain in the sand when drawing the main parts. This is the best construction, as the small, irregular parts can then be drawn out carefully, without breaking the mold; such pieces are shown at A, B, and C, Fig. 2,

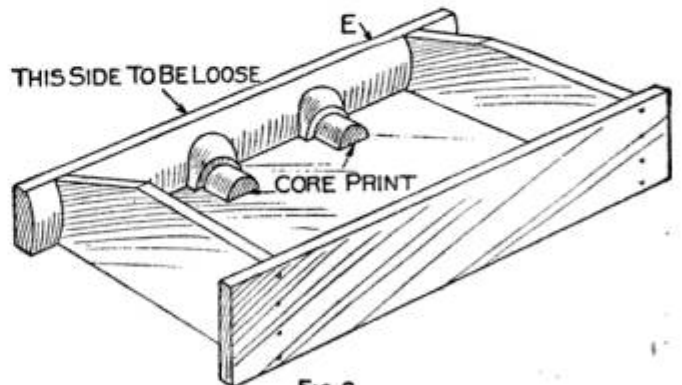


Fig. 3
Core-Box Form for the Cylinder-Base Extension with Loose Side to Separate Core from the Box

In small patterns, the draft can be very slight, sometimes even ignored en-

tirely, due to the clearance between pattern and mold caused by the molder's rapping. In large pieces, such

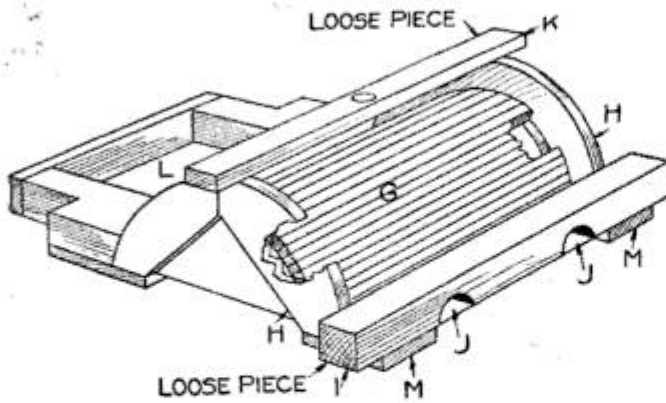


FIG. 4

Core Box for Forming Water Pocket and Cylinder Breast, with Loose Pieces Necessary for Molding Tap-Hole Cores

clearance cannot be produced. It is therefore necessary to check up this draft on long surfaces which are at right angles to the parting line. The pattern, Fig. 2, should have draft on the end faces of the footpiece, on the cylinder heads, on the top and bottom faces of the cylinder, and even on the ends of the main cylinder core, if this be of considerable diameter.

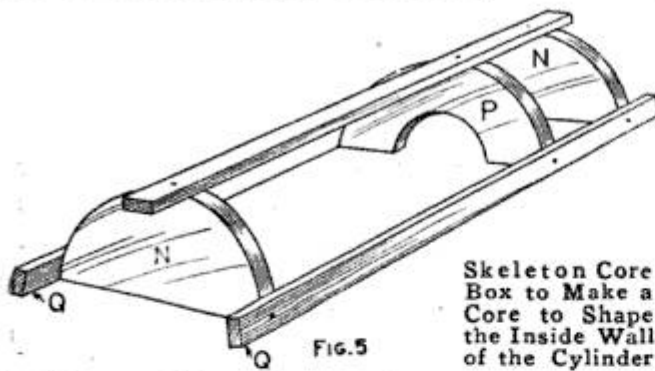


FIG. 5

Skeleton Core Box to Make a Core to Shape the Inside Wall of the Cylinder

From Fig. 1 it can be seen that the core necessary to form the interior of the cylinder footpiece connects to the water jacket at only two places. It is therefore necessary to provide a core print, D, Fig. 2, sufficiently long to balance the part extending into the foot. The core box for this is shown in Fig. 3, and consists of a four-sided box form. The side E, with the bosses and core prints attached to it, should be made loose; the box can then be withdrawn from the core without the necessity of turning it over. The core prints correspond to the cores forming the 3-in. pipe tap holes in the water jacket.

The core box for the water jacket is

the most difficult to make and requires the greatest care, for should this core shift, the thickness of the cylinder wall would be changed. The main anchorage is provided by that part of the core which occupies the space formed by the prints F, Fig. 2. These should be of sufficient length so the core will balance that part of it which forms the cylinder breast, shown in Fig. 1. The core box itself, Fig. 4, consists of a built-up stave cylinder, G, corresponding in diameter and length to the outside surface of the inside cylinder wall. The flanges H form a circle corresponding to the inside diameter of the outer wall. The loose piece I, doweled in place, contains the round sections J,

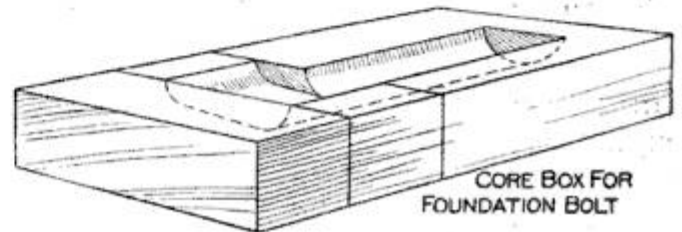


FIG. 6

A Core Box to Form the Core to Make the Foundation Bolt Hole

which form the core holes for the bottom pipe taps. The loose piece K, also doweled in place, forms the core for the side taps. At the end L is formed that part of the core corresponding to the breast, and space shaped by prints F. The various parts of the box are held together by the two bottom cross-pieces M.

The core forming the inside cylinder wall is made in halves and pasted to-

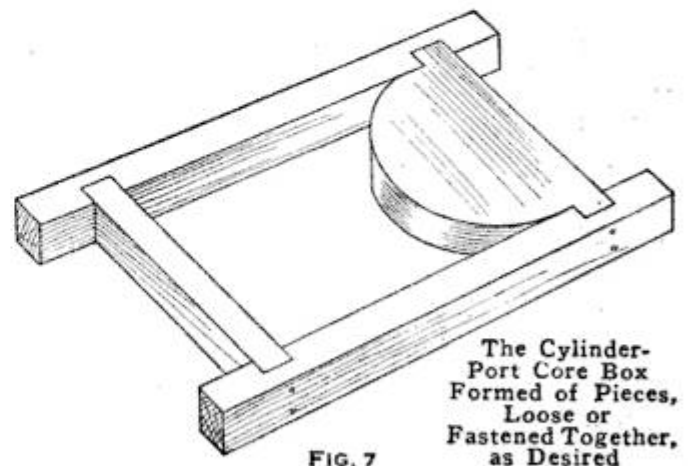


FIG. 7

The Cylinder-Port Core Box Formed of Pieces, Loose or Fastened Together, as Desired

gether. Its core box, Fig. 5, is a simple affair, consisting of two half-circle end pieces, N—corresponding to the

cylinder diameter O, Fig. 1, with stock allowed for machining—and an intermediate section, P, Fig. 5, all fastened together by cross strips, Q. The opening in P corresponds to the cylinder-head opening R, Fig. 1, with stock allowed for machining. Sufficient length of core prints outside of the cylinder heads should be allowed for, so as to overcome the floating tendency of the core, due to the large extent of surface.

Figures 6 and 7 represent the core boxes for the foundation holes and port cores, and are of such simple construction that they require no special explanation.

Emergency Repair for a Rifle Sight

Just when I needed my rifle most I found the bead broken off the front sight, and not having time to order a new one, I made a bead which has proven satisfactory in every respect.

The broken sight was removed and the edge filed smooth, whereupon the top was slotted with a sharp chisel and the sides turned out to form a Y-shaped piece. In the groove thus formed a piece of brass wire, slightly larger in diameter than the required bead, was soldered. The surplus ends of the wire and the solder were removed, and the bead ends polished. To check the height of the sight, fasten the gun securely and set up a target some known distance away. Fire the gun and adjust the rear sight until the sights target properly.

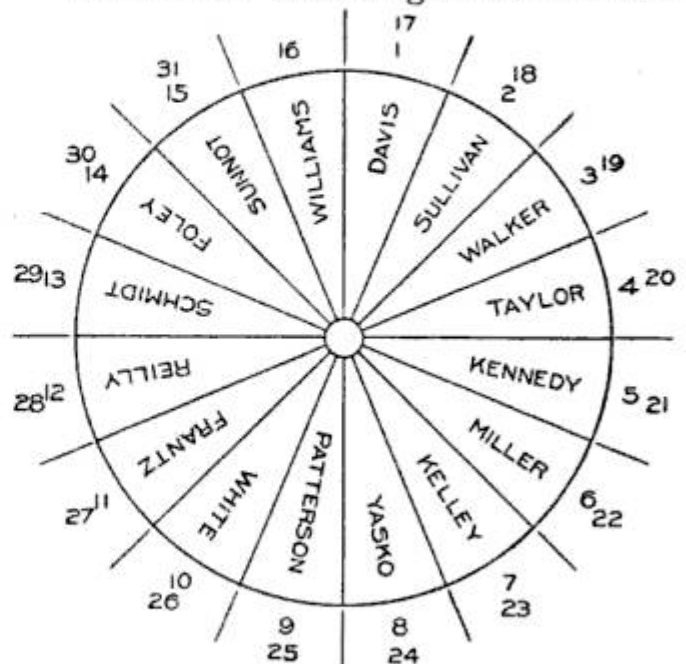
The brass bead proved to be better than the one it replaced, as it does not rust and will take a polish that makes it more visible in a weak light.—Contributed by C. F. Heizer, Falfurrias, Texas.

Chart for a Life-Saving Station

A life-saving station on the coast carries a crew of 16 men, and these men in turn patrol the beach every night. Formerly there was a straight ordinary list of the men's names written and posted. With this list a man could

figure when it was his turn to patrol, but this caused some trouble.

One of the men originated the dial

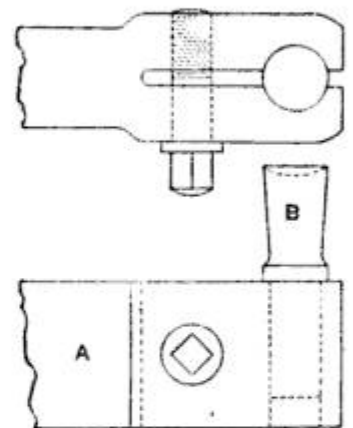


The Dial is Set the First of Each Month and Designates Each Man's Patrol Nights

shown in the illustration which has every man's name on it. This automatically indicates to a man when it is his turn to patrol the beach.—Contributed by Wm. J. Kelly, Jersey City, New Jersey.

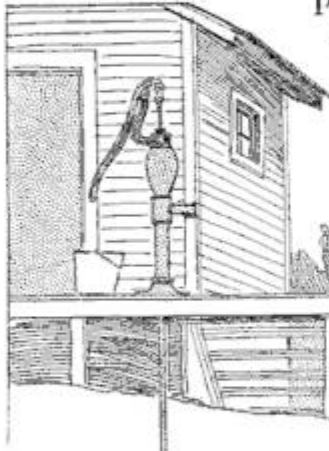
Slotting Tool for the Shaper

The intervening metal between two holes is difficult to remove without a slotting machine, but a very accurate job was accomplished on a few machine parts with the use of a shaper equipped with the tool illustrated. The body A was made of machine steel and case-hardened, one end being drilled and slotted, and a clamping screw securely held the cutting tool B in place. The latter was turned in a lathe, using a good grade of tool steel, then it was tapered, as shown, to give it the proper clearance.—Contributed by A. Dane, Pottstown, Pa.



Pumping Water from a Distance

Considerable time and labor can frequently be saved if, in supplying water from a well or spring, the pump is placed in a convenient spot near or at the place where it is to be used. It is necessary in figuring on such a lo-



A Check Valve is Placed at the Foot of the Line to Hold the Water in the Pipe

GROUND LEVEL

SPRING

FOOT VALVE

OUTLET

cation to determine the probable lift of the pump. In a perfect vacuum, a column of water can be lifted 34 ft. at sea level, but as it is impossible to create such a vacuum in a pump barrel, a smaller lift must always be figured on, a good lift being about 24 ft. In such a lift must be included the so-called friction head. This will cut down the actual height the water can be raised, depending on the size and length of the pipe, and the number of bends and fittings. A small pipe and numerous fittings can cause sufficient friction to cut down the available lift to practically nothing where, if a straight line of large pipe were substituted, a considerable lift might be obtained. It is necessary to have all connections tight, for if air enters, the vacuum of the pump will be spoiled, and its operation interfered with. Every pump suction line should be provided with a foot valve near the extreme end, to prevent the water from leaving the line when once drawn into it. For short, straight lengths, a foot valve may be dispensed with, but in longer lines, especially those over 20 ft., the pump cannot be operated without a foot valve close to the bottom of the suction line. —Contributed by Wm. J. Barkley, Chicago, Ill.

Figuring Sizes of Reamer Drills

Reduce the reamer size to eighths and multiply the numerator by the denominator, which gives the numerator in sixty-fourths. Subtract one from the numerator, and it gives the reamer-drill size. A drill for a $\frac{3}{4}$ -in. reamer would be figured as follows: $\frac{3}{4} = \frac{6}{8}$ and $6 \times 8 = 48$; $48 - 1 = 47$ in., the reamer-drill size.

When the reamer size is in six

teenths, just multiply the numerator by 4, which gives the numerator in sixty-fourths, less $\frac{1}{4}$, which gives the reamer-drill size. Thus a $\frac{7}{16}$ -in. reamer equals $7 \times 4 = 28 - \frac{1}{4}$ or $\frac{27}{4}$ in. the reamer-drill size. — Contributed by Wm. J. Kittle, Pearl River, N. Y.

Safety Collar for Watch Stems

A simple manner to protect a watch from dropping out of the pocket where it is carried is shown in the sketch.



About a shop where a person is continuously stooping in the performance of work, the watch often drops out of the pocket and, if held with a chain, it is liable to strike against something which may result in a damage that will be of considerable expense to the wearer.

A small rubber washer is slipped

over the stem just below the chain ring and prevents the watch, by its own weight, from slipping out of the pocket by engaging the surface of the cloth. The washer can be cut from rubber of almost any kind and drawn into the cupped shape by the application of heat to its center. The arrangement is a trifle unsightly, but as it is worn only about a shop, it is worth while in the saving of many crystals and other damage to a valuable watch.

Weighing Insulated Wire to Determine Length

A storekeeper in an electrical concern was expected to supply the workmen with coils of wire approximately 100 ft. long. As there was no measuring machine, the following method was used to deal out 100-ft. lengths from the large coil. A large coil was first weighed, then 100 ft. of the wire was measured out with a tape and the coil again weighed. It was thus found that the 100-ft. piece weighed $4\frac{1}{2}$ lb. By setting the large coil on the scale platform and placing the balance back $4\frac{1}{2}$ lb. for each 100 ft., the balance would drop when the right amount in length was taken from the coil.—Contributed by R. E. Coram, Lynn, Mass.

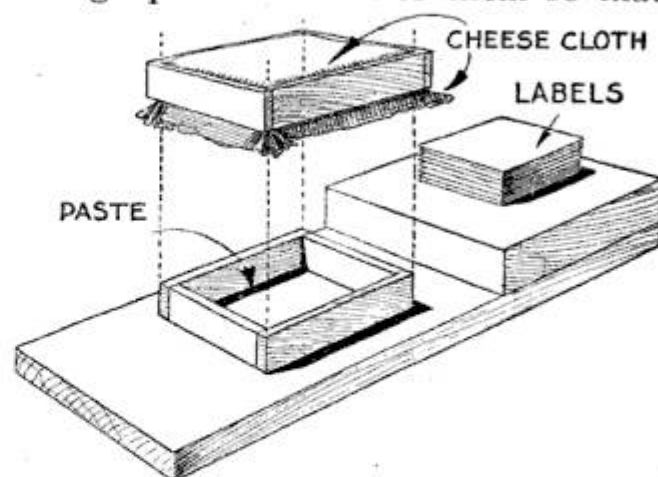
A Pasteboard for Labels

Gum tragacanth is extensively used for labeling, as it makes a clean paste, which also allows the labels to be easily removed if the object is placed in water for a short time. This is a decided advantage in establishments where bottles, etc., are frequently labeled.

The pasteboard shown is a very convenient article to use in connection with this paste. A piece of board is fitted with a square tray to hold the paste which is filled in level with the top. Then a piece of cheesecloth is spread over it and held by a frame fitting tightly around the outside of the tray.

The part on which the labels are kept is built up level with the tray top. The labels are drawn across the cheesecloth

with slight pressure, which causes enough paste to stick to them so that

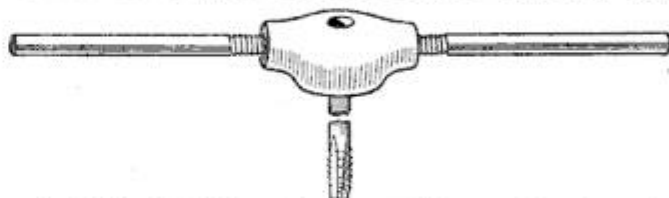


Applying Adhesive to Labels with the Use of a Pasteboard Prepared with Tragacanth

they can be applied to the surface as required.

Individual Tap Holders

Where a number of taps of different sizes are used I found that changing the taps in the holder not only consumed considerable time but was very annoying besides. To overcome this difficulty I made a holder for each tap. A pattern was made of a piece of white pine, and from it I had a dozen castings made in gray iron at a slight cost. The ends were bored and tapped to admit a 4-in. bolt of small diameter—one at each end. The heads were cut off and the ends filed round. A hole was drilled into the body of the casting at right angles to the line of the bolts. This hole was of the same size as for



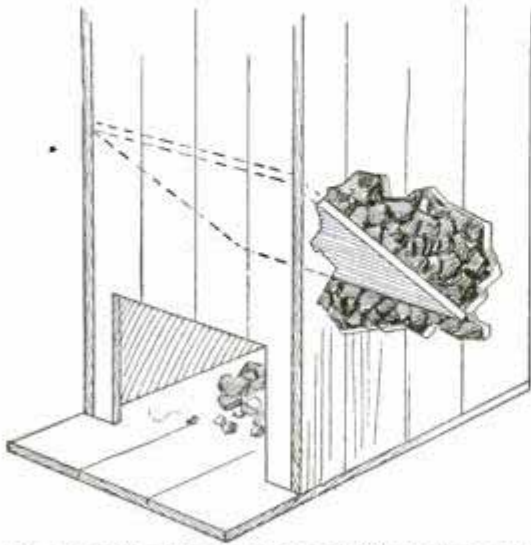
Individual Holders for Taps Where a Number of Them are in Use from Time to Time

the tap used. Each holder was drilled for its tap. The tap is held rigid by screwing the bolts up against the square end.—Contributed by Jas. A. Hart, Philadelphia, Pa.

☞ Paint spruce siding, first coat, with white lead, thinned with raw linseed oil and a small portion of benzol, using very little driers.

Coal Bin Provided with Inclined Chute

To make a coal bin so that the contents will not run out on the floor every time some of it is taken out, an in-

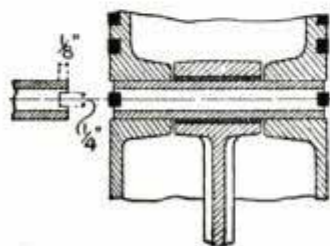


The Slanting Board Provides an Easy Access to the Coal and Keeps It from Falling Out

clined board should be fastened in the bin, as shown. This board must be so long that, when its upper end is fastened about 15 in. above the bottom of the box, the lower end will be about 6 in. from the back and above the bottom. This slant is just sufficient to allow the coal to drop down without having a tendency to roll out of the door at the front. The bottom of the bin is extended out in front of the door to permit easier shoveling of the coal. The cover may be just a plain hinged board, to keep the dust from passing out every time the coal pile settles slightly.—Contributed by L. E. Turner, New York City, N. Y.

Holding a Loose Wrist Pin in Place

Having occasion to repair a gasoline motor on an automobile, it was found that a loose wrist pin had slipped end-



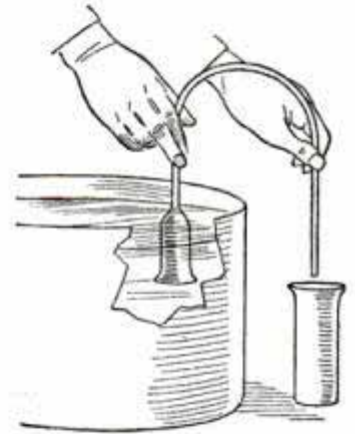
ways and scored the wall of the cylinder. To hold the pin in place a slot, $\frac{1}{4}$ in. wide and $\frac{1}{8}$ in. deep, was milled on each end of the pin, a groove cut in the piston, and an ordinary piston ring in-

serted as shown. This not only prevented the pin from touching the cylinder walls, but it also gave better compression.

An Automatic Siphon

A simple and interesting siphon which is entirely automatic in action and differs from the ordinary type only in that the shorter branch has a bell-like enlargement at the end, is shown in the illustration. To start the siphon the end of the longer arm is stopped with the finger, whereupon the other branch is immersed in the liquid until the enlarged part is below the surface. When the finger is removed from the end of the longer branch, the liquid, which could not enter

the enlarged part on account of the air pressure in the siphon, suddenly rushes up in the siphon to seek its level, and a small quantity is by the momentum carried up into the smaller part and over the bend, and the siphon begins to work.



It stands to reason that the bend of the siphon cannot be very high above the surface of the liquid, but in the laboratory the device can be used to advantage in a number of cases, especially when it is desired to draw off the clear part of a solution from a precipitate, because the wide mouth of the shorter branch can be brought very close to the precipitate without disturbing it, as the suction is very slight.

Singletrees Kept Parallel with Eveners by a Spring

Singletrees attached to eveners on double-span rigs have a tendency, when worn loose, to swing back into the wagon wheels, causing considerable annoyance. This may be prevented if

an ordinary coiled screen-door spring is attached with screw eyes to the inner ends of each singletree. This not only tends to keep them parallel with the evener, but also prevents the reins from slipping under them while driving.—Contributed by G. H. Holter, Jasper, Minn.

Casting Oil Grooves in Babbitted Bearing

One of the simplest means of casting oil grooves in a bearing when babbitting it, is to wind several turns of string around the mandrel or shaft. This will form small spiral grooves in which the oil can freely move, and, being well distributed, will tend to keep the bearing cool and provide a good lubrication.—Contributed by H. Walker, Corvallis, Ore.

Tool for Cutting Long Keyways

The illustration shows a reliable and simple keyway cutter which overcame the troublesome chattering of an ordinary forged tool. The rod A may be made of cold-rolled steel, of a diameter sufficiently small to admit it and the projecting end of the tool B into the place to be keywayed. One end of the rod A is slotted to receive the cutting tool B, allowing for sufficient end clearance so it may freely swing back and forth around a pivot pin, C, thereby preventing injury to the cutting edge on the return stroke. The tool need extend out of the rod only far enough to allow it to cut to the required depth, without having the rod A scrape on the bottom of the shaft hole. The other

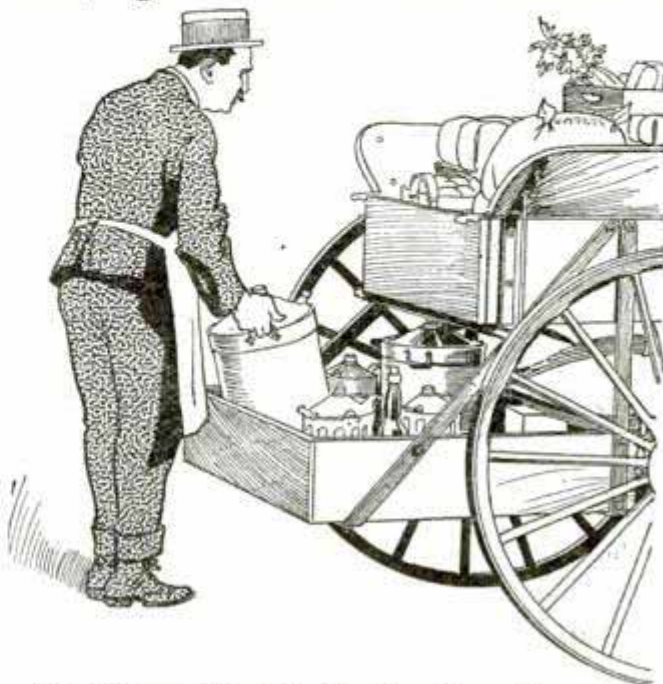


An Oscillating Cutter in a Bar to Provide Clearance for the Edge on the Back Stroke

end of the rod is threaded to fit a lock nut, D, and a tool-post nut, E, thus clamping it securely in position.

Carrying Box for Oils on Delivery Wagon

To prevent the sugar and other groceries from being flavored with kerosene, a grocer has attached an addition



The Oilcans Placed in the Box Beneath cannot Contaminate Articles in the Upper Part

to the delivery wagon which might be adopted by grocers in general.

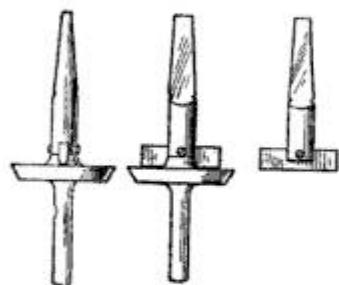
The sketch shows the simple box fixture, which is fastened permanently underneath the box of the wagon, and in which are carried the oils and gasoline, while ordinary articles are kept above, and therefore are not contaminated by contact or exposed to the disagreeable odors. While this may seem crude, it is a fine example of simplicity and effectiveness with a minimum of expense.—Contributed by T. B. Lambert, Chicago.

Drawing Safe to Building with Elevator

In placing a heavy safe on the tenth floor of an office building, one elevator was used to haul it from the truck on the other elevator. A wire cable was wound around the safe and over a pulley at the base of the elevator shaft; and when the car was started, the safe was pulled in from the street and onto the other car. It was then slowly raised to the floor desired.—Contributed by L. T. Ward, Des Moines, Iowa.

Automatic Valve Grinding for Automobiles

This device does away with the slow and tiresome grinding of valves by the use of screwdrivers. Procure a suitable-sized rod



that will fit into the socket of an automatic hand drill. Slot this at the bottom for a rod, $\frac{3}{4}$ in. long, $\frac{1}{2}$ in. wide, and $\frac{1}{16}$ in. thick, and

fasten this to the socket rod. The reciprocating action of the handle gives the valve the necessary rotary motion to produce grinding.—Contributed by P. D. Merrill, Chicago, Ill.

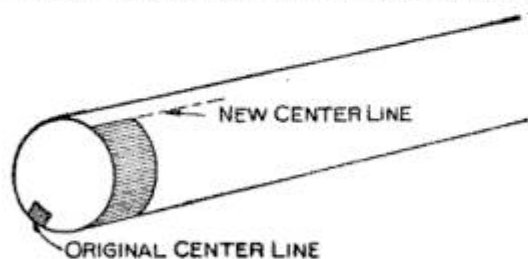
Handle for Starting Split Rivets

This very handy tool is made of sheet metal with two slots cut in one end, forming three tongues, the middle one being as wide as the space between the rivet points. The tack is inserted in the tongues in the manner shown, and is then ready to be driven.—Contributed by Everett V. Hoar, Bowmanville, Massachusetts.



Laying Out New Keyways

A simple method of accurately laying out a keyway on a shaft at some other place than it originally occupied is the following: Plug up the old keyway with wood or lead, and then face



The Old Keyway Filled and Its Center Line Used to Locate the New Keyway

it down to correspond with the surface of the shaft. Get the exact length of the shaft circumference with a squared strip of paper, starting from

a center line marked on the plugged keyway. One end of the paper can then be cut off to a length having the same ratio to the entire strip that the angular distance between the centers of the old and new keyways has to 360. For example, since $\frac{180}{360} = \frac{1}{2}$, one-half of the length is used for a distance of 180 deg.; since $\frac{90}{360} = \frac{1}{4}$, one-fourth of the length, for 90 deg., etc. The new keyway can then be laid out with its center line corresponding to the end of the paper.—Contributed by J. B. Murphy, Plainfield, N. J.

Tub Attachment for a Vacuum Clothes Washer

One of the best ways to wash heavy clothes or blankets is by pounding with an old-fashioned wood pounder, or with one of the vacuum washers. A barrel is best to use in connection with these washers, to prevent the spattering of the suds, but it is very unhandy while wringing the clothes. As the barrel I had leaked, it was sawed in two just below the second or third hoop from the bottom. A piece of old rubber belting was nailed around the barrel near the bottom to make it fit snugly inside the top of the tub, which prevented any water from getting out on the floor.

When the pounding was finished the barrel was removed from the tub and the wringer put on in the regular way. The tub should be set on a low bench to be handy. A barrel and tub of the right size should be selected for this combination.—Contributed by Monroe R. Jenkins, Red Creek, N. Y.

Depth Determined by the Turns of a Bit

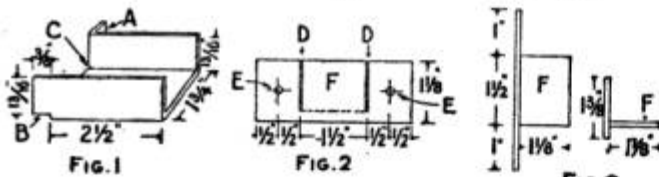
Carpenters using a full set of auger bits will find it very handy to mark them for depth gauges in this manner: Commence to count the turns when the bit begins to remove the stock, and not when the parting lip marks the outside, for boring just 1 in. deep. Mark this number on the shank with a steel stamp.

An Electric Door Lock

By ARTHUR MOORE

The door lock consists of an electromagnet that can be energized from one or more points by simply pressing an ordinary push button, connected in series with the winding of the electromagnet and the source of electrical energy, which may be a battery or bell-ringing transformer. When the armature is drawn up by the magnet it permits the latch of the lock to move back into the housing of the lock and away from in front of the latch on the door.

The housing, or case, of the lock is made from $\frac{1}{8}$ -in. sheet brass, as shown in Fig. 1. The dimensions given are all inside, and in bending the projections A and B back at right angles to the sides, care should be taken to make them exact for length. A cut, $\frac{1}{8}$ in.



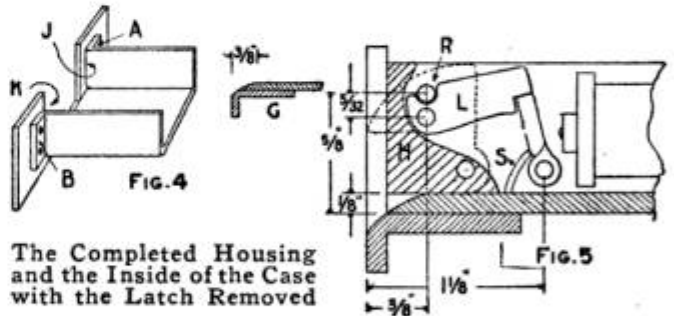
The Lock Housing for the Electromagnets and the Jamb Plate for the Door

deep, is made in each corner, as shown at C, so that the outer surface of the two projections A and B will be flush with the edge of the lower portion of the housing.

The dimensions of the jamb plate, also made of brass, are given in Fig. 2. Two slots, D, are sawed in this piece, as shown, and two holes, E, are drilled and countersunk for good-sized wood screws to fasten it to the jamb. Bend the portion F down at right angles to the remainder of the plate along the dotted line, to make it appear as shown in Fig. 3.

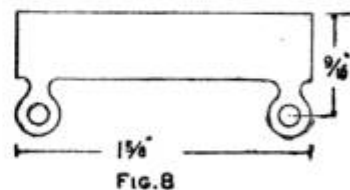
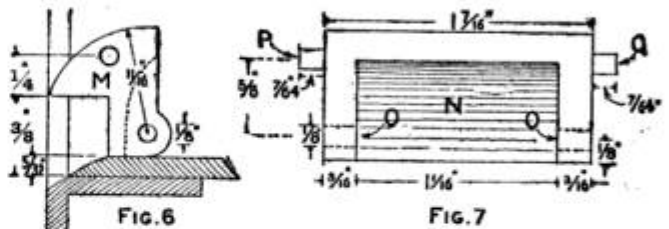
The piece shown in Fig. 1 is riveted to the jamb plate, as shown in Fig. 4. Two rivets are placed in each of the projections A and B, and two or more through the projection F, Fig. 3, and the bottom of the housing. The edge of this bottom is filed off, as shown at G.

Cut two pieces of sheet brass, $\frac{1}{8}$ in. thick, in the shape shown by the shaded portion H, Fig. 5. Solder, or



The Completed Housing and the Inside of the Case with the Latch Removed

rivet, these two pieces in the corners J and K, Fig. 4. Cut two pieces of brass to the shape shown by L, Fig. 5. These two pieces are filed down just a little, so that they will be thinner than the pieces H, and then fastened to the sides of the housing, by means of small rivets, or screws, countersunk in the inside surface of the pieces. These triggers should be perfectly free to turn on the rivets, or screws, holding them. The latch M, Fig. 6, is made of a piece of cast brass. The back side of the completed latch is shown in Fig. 7. A notch, N, is cut in the back side to a depth represented by the dotted line in Fig. 6. Drill two holes, O, in the sides of the latch to be used in mounting it in the housing.



Dimensions and Position of the Latch in the Lock Together with Details of the Armature

Two lugs, P and Q, are provided on the ends so that they will fit into the depression R, Fig. 5, in the triggers L. Provide a coil spring to be

mounted on the small steel shaft that is to support the latch, and coil it up so that it will tend to hold the latch in the position shown in Fig. 6, when one protruding end rests against the latch

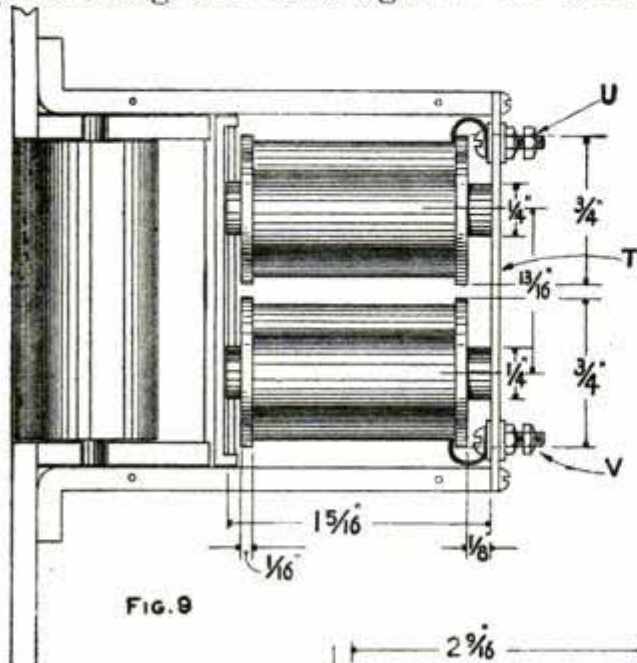


FIG. 9

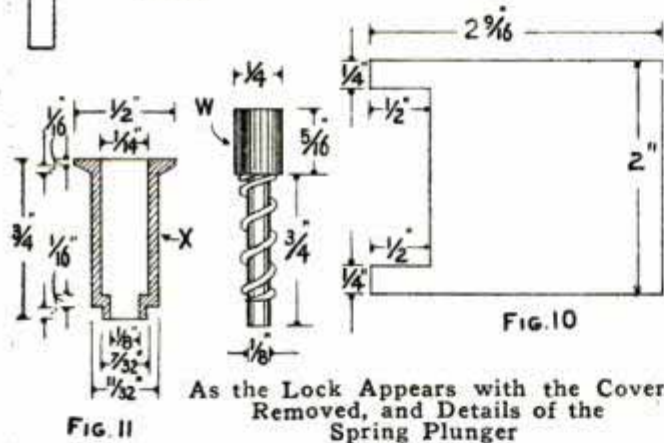


FIG. 10

FIG. 11
As the Lock Appears with the Cover Removed, and Details of the Spring Plunger

and the other against the bottom of the housing.

A small soft-iron armature is made, as shown in Fig. 8, and mounted as shown in Fig. 5. A light coil spring is mounted on the shaft supporting this armature so that it will be held away from the cores of the magnets and against the stop S, Fig. 5.

A top view of the completed lock is shown in Fig. 9, in which the dimensions of the electromagnets are given. The piece T, which is made of soft iron, forms the end of the case for the lock, and is fastened in place with screws, as shown. The soft-iron cores of the electromagnet are riveted to the piece T. The spools are wound full of No. 24 gauge insulated wire, and the ends are brought out to two insulated terminals, U and V. The

dimensions for the top of the lock are given in Fig. 10. This part is fastened in place with four small screws.

A spring plunger is made as shown in Fig. 11. The object of this plunger is to force the door open when the lock is operated. The plunger W fits into the tube X. A spiral spring tends to force the plunger out of the tube, but as the lower end of the plunger is riveted down around the edge, after being put in place in the tube, it cannot come out entirely. This plunger is mounted in the edge of the door jamb so that the door pushes the plunger W into the tube X when it closes. The electric lock, of course, holds the door closed, but upon touching a button the door will be forced partly open by the spring.

Molding-Cutting Attachment for Lathe

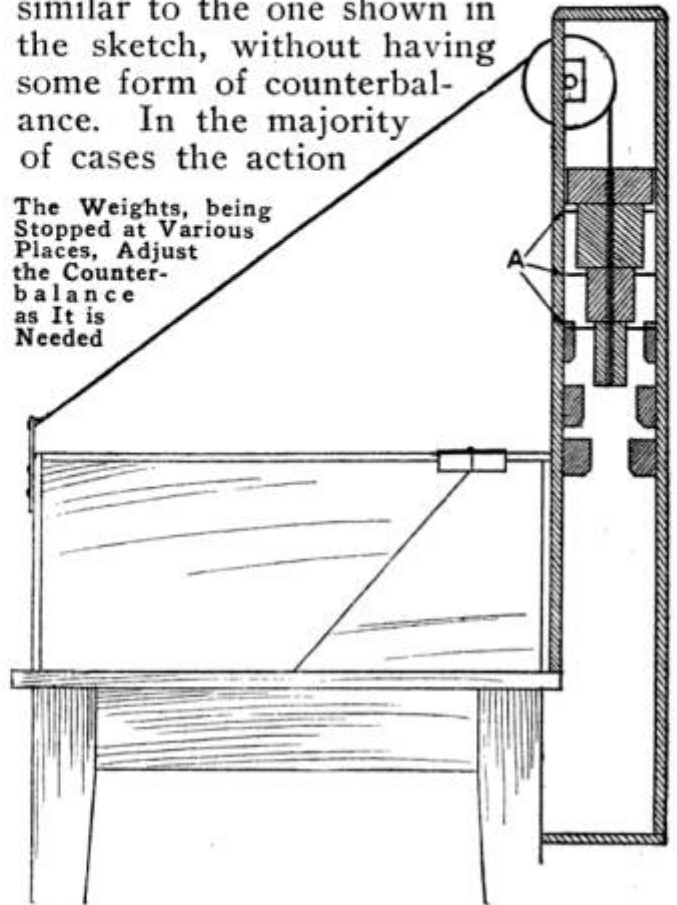
It sometimes occurs that a special shape of wood molding is desired, which is either hard to get or can be had only after a long wait. To avoid such trouble, an ordinary high-speed lathe may be fitted up with a simple attachment to do the work satisfactorily. A special cutter is shown in Fig. 1, driven by the lathe headstock and the guide frame attached to the lathe bed. The cutter head, Fig. 2, consists of a body, A, to which are attached two tool-steel cutters, B, one on each side, by means of two cap screws, which have been machined to the desired shape and slotted for adjustment and wear. The body A consists of a rectangular piece of machine steel, turned at one end to fit the tapered center hole in the headstock shaft. The other end is drilled and countersunk for the tailstock center. The frame, forming the bed of the attachment, consists of a rectangular box of the proper height, so that the stock will be cut to the required depth when guided along the top board C, Fig. 1. The two guide strips D are spaced a distance apart corresponding to the width of the molding stock. The cross strips, or tension pieces, E are attached to the strips F, which, in turn, are fastened—at one end only—to the

guides D. This arrangement permits the strips to spring up when forced from underneath. It should be made so it will exert a slight tension or downward pressure on the molding stock at all times, thereby preventing chattering which would result—due to variations in thickness of the stock—if the strips were rigidly attached, corresponding to one set height. The three-sided box, shown in Fig. 3, is the guard for the cutter head. It is screwed to the bed frame, as shown by the dotted outline in Fig. 1, by four braces, G. When ready for operation, the box frame is securely attached to the lathe bed, then the cutter head is put in place, and the tailstock brought up, so its center will guide the outer end of the cutter head. If at any time it is necessary to regrind the cutters or examine them while on the lathe, the tailstock can be drawn back, and the entire cutter head taken out—without first removing the frame. The direction of rotation being as indicated in Fig. 1, the stock should be fed in from the near side of the lathe, so the cutters will have a tendency to

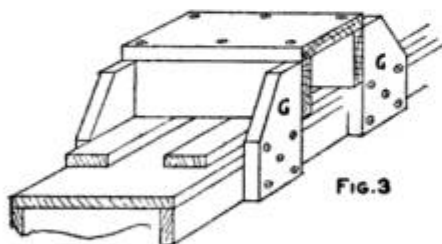
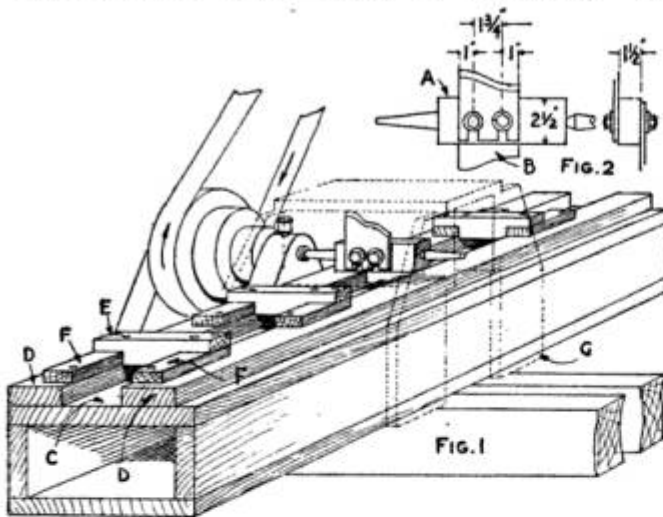
A Varying Counterbalance Weight

It is almost impossible to raise a heavy cellar door, or the top of a table similar to the one shown in the sketch, without having some form of counterbalance. In the majority of cases the action

The Weights, being Stopped at Various Places, Adjust the Counterbalance as It is Needed



of this weight is very different for various positions of the object being lifted, and the results are far from satisfactory. It can be easily seen from the sketch that an unchanged weight will produce a greater and greater effect upon the table top as the top moves toward its vertical position. If the weight is adjusted so that it balances the weight of the table top when the top is horizontal, it will be a great deal too heavy for a balance when the top nears its vertical position. The arrangement shown overcomes this difficulty to a great extent by dividing the counterweight into sections and allowing the different sections in turn, from the top down, to rest upon the projections in the housing for the weights as the cord carrying them moves downward. The total weight, as shown, is divided into four parts, and the three upper parts come to rest at different positions. Each of the three lower weights should be provided with projecting pins, shown at A, two on each of the opposite



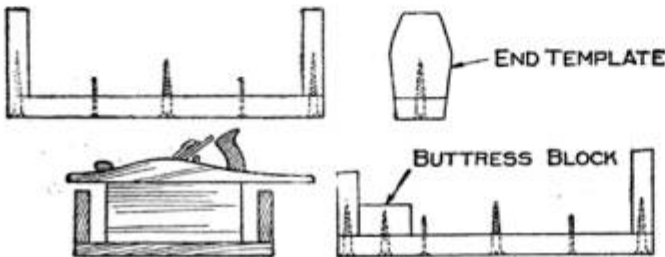
Cutter Attachment for a Speed Lathe to Make Duplicate Pieces of Molding for Matching Work

push the stock out instead of drawing it in.—Contributed by D. D. Gurnee, Hempstead, N. Y.

sides and near the corners so that the weights will always travel in the center of the housing. The projections upon which the weights are to rest do not extend entirely across the sides of the housing, and sufficient space is allowed at each end for the guiding pins to pass. The position of the various supports are determined experimentally, and the weights may be so adjusted that the object being lifted will come to rest at almost any point in its complete travel.

Jig for Forming Gear-Pattern Teeth

In making wooden teeth for gear patterns, the method frequently used is to mark out the required shape on



The Ends of the Jig Guide the Plane and Are the Exact Shape of the Tooth

blank blocks of suitable size, which are then gripped in a vise and planed down to the outline. Unless great care is taken, the teeth will not all be the same shape. By means of the simple jig illustrated, the teeth can be cut exactly to the correct form, with a great saving of time and requiring less skill.

Two blocks of hard wood, about 1 in. thick, are squared up and marked for the tooth outline, after which they should be cut out, filed, and sandpapered to the exact size. A base is provided, consisting of a board sufficiently long to allow several inches of clearance between each end of the tooth blanks and the jig templates, when these are fastened in position as shown. The plane to be used and the size of the jig should be such that neither end of the plane will leave the templates in finishing the gear tooth. The templates are fastened to the ends of the base block; the teeth blanks are secured to the base by means of a screw and nails. The jig can be held in a vise

when ready for use. In using the plane, the protruding cutting edge should be gradually withdrawn, so that, when the plane bottom runs on the jig templates, no cut can be taken. The accuracy of the work can be determined by placing a thin steel straightedge across the templates.

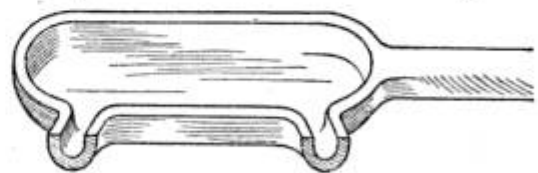
This jig can be used for bevel-gear teeth as well as for spur gears. In this case it would be necessary to have the templates correspondingly larger or smaller, as determined from a drawing layout of the gear. In cutting the teeth, they should all be set and held in place against a buttress block to make them uniform.—Contributed by Joe V. Romig.

To Prevent Headaches Resulting from Handling Dynamite

In handling dynamite, if one wears a pair of canvas gloves, he will escape the otherwise resultant headache. It is not the fumes nor the concussion that causes the headache, but the penetration of the dynamite into the system. In using the explosive, one should always wear gloves and refrain from putting the hands to the face.—Contributed by Alvah H. Pulver, Sodus, N. Y.

Double-Lipped Pouring Ladle

It quite frequently occurs that, in order to produce the best work in pouring molds or babbiting shafts, it is necessary to have two ladles operating at the same time. With the two-lipped ladle shown in the illustration, one man can do the work alone. It is only necessary to have the two pouring



Two-Lipped Ladle to Pour Metal into Two Gates at the Same Time

holes the same distance apart as the ladle lips.—Contributed by J. W. Ladlow, Globe, Ariz.

Making Reamer Cut Oversize

The size of hole that a reamer will cut may be increased by placing a piece of small round rod in one of the reamer flutes. The size cut will depend on the diameter of the rod, which should fit securely in the flute, at the



Small Rod in the Flute of a Reamer to Make it Cut Oversize

same time preventing the teeth on the rod side from cutting.—Contributed by J. J. Kolar, Maywood, Ill.

Aid to Light a Heating Stove

Finding it difficult to light a fire in my heating stove, which has a circular front draft near the bottom, I made a supporting iron for the solid fuel, as shown in the sketch. This holds up the larger sticks of wood, allowing the paper to burn until it ignites the fuel, and gives a quicker fire with less



A Support to Keep the Weight of the Fuel from the Paper While Starting a Fire

both than any other arrangement I have tried.—Contributed by Geo. B. Weaver, Sandpoint, Idaho.

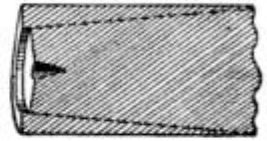
To Prevent Wall Showing between Butted Wall Paper

In hanging oatmeal or any plain paper where it is necessary to butt the edges of the paper, the white wall is liable to show a little in places. To overcome this, procure a colored crayon the same tint as the paper and line the wall. Neither the edges of the paper nor the wall will show where this method is used.—Contributed by A. E. Johnson, Frankfort, Ind.

☞To bleach out a stain in wood, sand-paper the work, and apply a mixture of 7 parts fresh lime and 1 part caustic soda.

Fitting a Handle or Plug

To make an accurately fitting plug, or a properly tapered handle end, proceed as follows: Take the bit that fits the hole into which the plug, or handle, is to be inserted, and bore



into the end of the plug, or handle, for a distance sufficient to mark it with the lips of the bit. The wood can then be cut, or rasped, off evenly down to the edge of the drill hole without danger of a lopsided handle resulting.

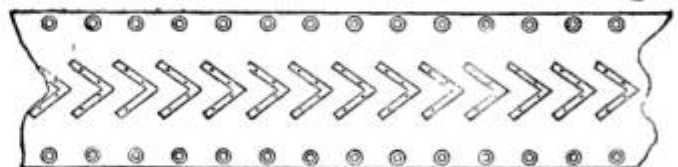


Fitting a Barrel Cover Tightly

An ordinary barrel head is greatly improved by having a groove gouged out of its under surface to fit the stave ends. The groove prevents the cover or head from being pushed off as well as helps to keep out dust and insects.

Nonskid Casing for a Motorcycle Wheel

Having considerable trouble with my motorcycle skidding on the wet pavement, I tried the following method with good results: A long piece of sail canvas was procured, a little longer than the wheel circumference and wide enough for the face of the tire, with about 1 in. surplus on each side, which was turned over, whereupon grommets were placed at intervals of 2 in. An old belt was cut into V-shaped narrow strips, which were riveted to the canvas about 1 in. apart. The canvas was laced over the tire with rawhide thongs.

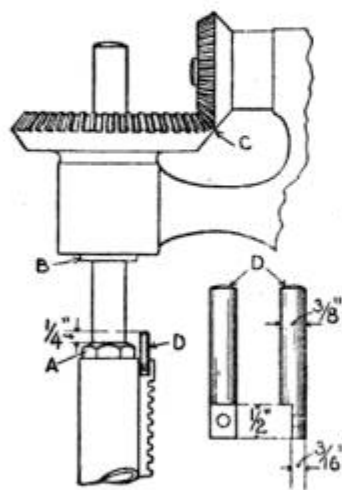


Canvas Strip, with V-Shaped Pieces of Leather Attached, to Make a Nonskid Casing

This will not only prevent the skidding, but it will protect a ripped or cut casing.—Contributed by Joseph C. Laackman, Philadelphia, Pa.

To Prevent Noisy Gears on a Drill Press

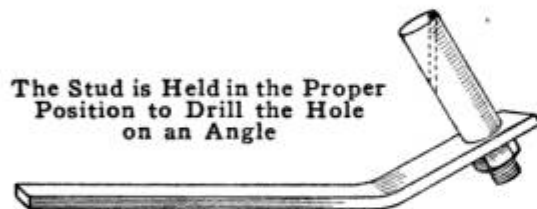
The sketch illustrates a drill-press arm with an attachment to stop the noise of rattling gears caused by raising the spindle too high. The



lock nut A comes in contact with the lower end of the large gear B and pushes it up against the small gear C. A small pin, D, made of cold-rolled steel, is shaped with a file at one end as shown. This is fastened with a screw to the upper end of the rack, so that its end will strike the frame before the locknut comes in contact with the gear.—Contributed by Walter Butz, Pearl River, N. Y.

Drill Jig for Drilling Slanting Holes in Studs

Where it is necessary to drill a hole at an angle in the end of a stud for an oil passage to the grooves in the bearing, the drilling is quite difficult, unless some sort of jig is used. The illustration shows a very simple jig for this work, it being made of a piece of metal of sufficient strength for the work, bent in the shape shown. The



jig can be fastened to the platen of the drill in the desired position for drilling the hole.—Contributed by Russell E. Hollis, Chicago.

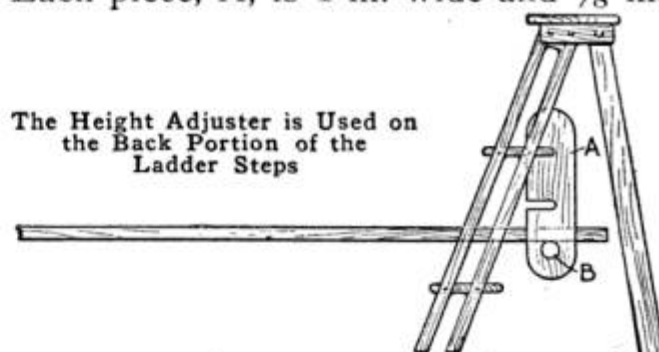
⌄ Gasoline feed pipes should not be allowed to vibrate; tie them with rawhide thongs.

Stopping Nail Holes in Shingles Made with Staging

In putting on shingles with the use of staging there will be holes left where the staging nails were driven. If the shingle directly below that which has the holes is driven slightly upward, it will close the holes and save plugging them.—Contributed by Otto B. Vaughn, Belfast, Me.

Adjustable Ladder Supports for Paper Hangers

A workman using a plank between stepladders for a stage usually finds it either too high or too low to be comfortable for working, owing to the distance between the steps. Adjustments for height can be had by means of the simple arrangement shown in the sketch. Two pieces, A, and the rung B constitute the adjusting device. Each piece, A, is 4 in. wide and $\frac{7}{8}$ in.



thick. Two notches are cut in one edge to fit over the steps of the ladder. The rung B holds the two pieces spaced at the proper distance for the ladder width. With this arrangement, two adjustments for height are possible between each step of the ladder.

Gas-Stove Burner Used as Lawn Sprinkler

A gas-stove burner can be easily converted into a lawn sprinkler without any machine work being necessary. All the holes in it should first be cleaned out, and a hose wired to the spout of the burner. If a better connection is desired, a regular hose coupling may be soldered to the burner spout.—Contributed by I. E. Carpenter, South Bend, Ind.

Lathe Attachment for Turning Circular Work

By J. H. RODGERS

In turning circular work, considerable difficulty may be experienced in obtaining a true circular arc unless some special fixture is used. A simple device of this kind is shown in Fig. 1. A suitable tool post, A, and rest, B, may be selected from a scrapped lathe, or, if such is not at hand, the necessary parts from an idle lathe can be used temporarily. Some suitable worm gear and worm must be provided to furnish the necessary circular feed.

The worm gear should be securely fastened to the bottom of the tool rest B, as shown in Fig. 2. A base, C, must be made, consisting of a cast-iron plate provided with two brackets, D, Fig. 1, at one side, which are to serve as bearings for the worm shaft. In order that the tool rest may revolve on the base C, when bolted to it, the worm gear should be drilled and counterbored in its exact center, to fit the bearing pin E, Fig. 2.

There should be sufficient length between the head of the pin and the lower shoulder to allow the gear, when fastened in place, to have a slight clearance permitting it to revolve freely, without producing unnecessary looseness. The base C should be provided with a tongue to fit in the groove of the rest F, Fig. 1, and may be fastened in place by means of a bolt and T-shaped nut. If there is only one groove in the rest F, the base plate C should be sufficiently wide so it may be provided with a projection to fit this groove and fastened, as before, with bolts and T-shaped nuts. Two lines should be marked on the rest B, one GH, on the side, and the other, IJ, on the end, each corresponding to the center line of the pin E, Fig. 2. The device should be located by these lines with respect to the work in two ways: first, it is necessary to have the line GH at a distance, K, Fig. 3, from the center of the work equal to that of the arc center from the work axis; second, the line IJ must be in an imaginary plane passing, perpendicular to the

work axis, through the center of the curved surface.

With the setting thus done, no further adjustments should be made which

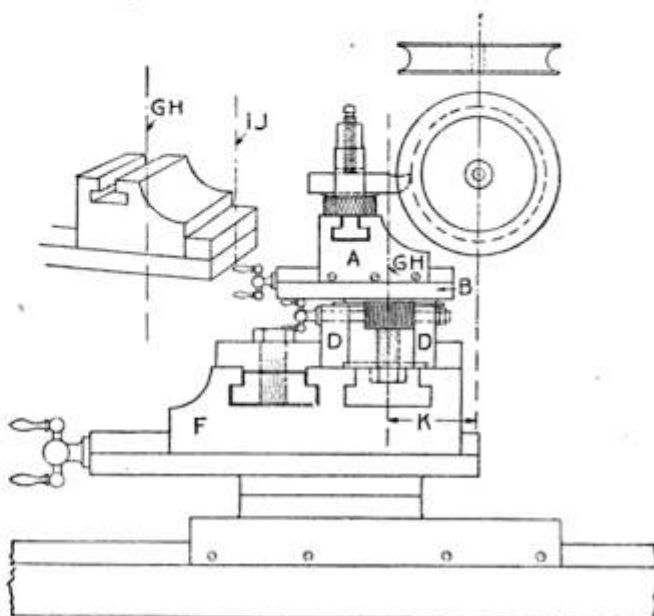


FIG. 1

General Arrangement of the Parts as They are Attached to the Tool Post of a Lathe

will in any way alter the location of the rest B, Fig. 1, with regard to the work. The tool post A can still be moved back or forth as desired, without in any way spoiling the setting of the attachment, and may be drawn a convenient distance away from the work to permit better adjustment. The tool should be set centrally on the tool post with its length approximately perpendicular to the work axis. The cutting edge should line up with the lathe centers and ex-

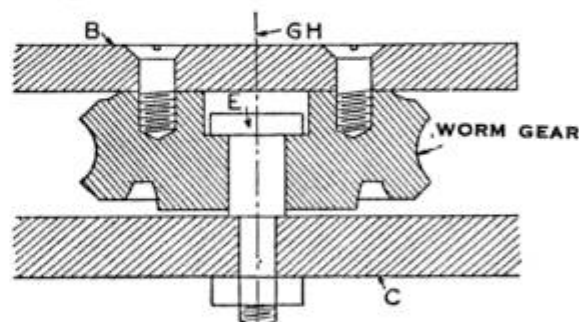
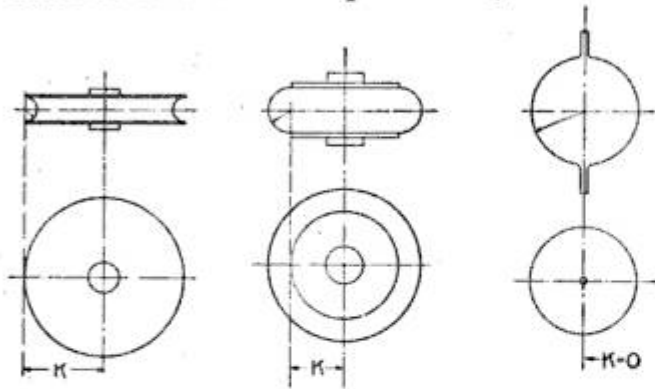


FIG. 2

Method of Fastening the Worm Gear to the Tool Rest with Its Cast-Iron Base

tend beyond the line GH of the rest B a distance equal to the radius of the required arc. If the work is concaved or a groove, the cutting edge must lie

between the line GH and the work axis; if convex or spherical, then it must be outside of these two positions, as shown



K-DISTANCE FROM CENTER OF LATHE TO CENTER OF TURRET

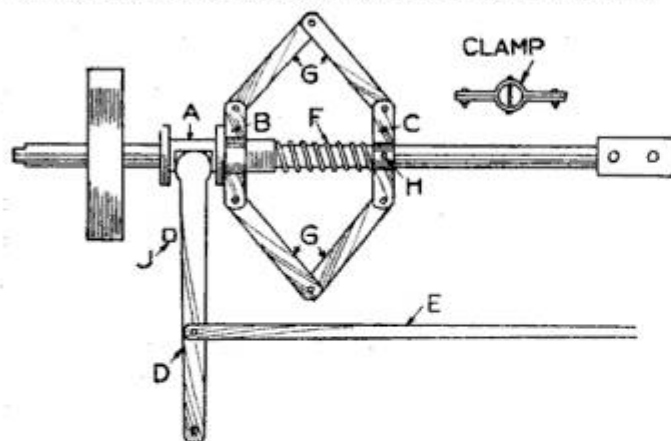
FIG. 3

Tool and Tool Rest Set to Turn Concave, Convex, and Ball-Turning Work

in Fig. 3. With the tool held as thus described, the required radius would be cut. For the roughing cut, the tool post A should be drawn away from the work; in circular grooves this will produce a smaller arc; in convex work, a larger radius. In both cases, the cuts will all be parallel or concentric, as is necessary in all circular-cutting devices.

Throttle Governor for Marine Gasoline Engine

Speed governors are frequently omitted on marine gasoline engines, so, when it is desirable to use them for sta-



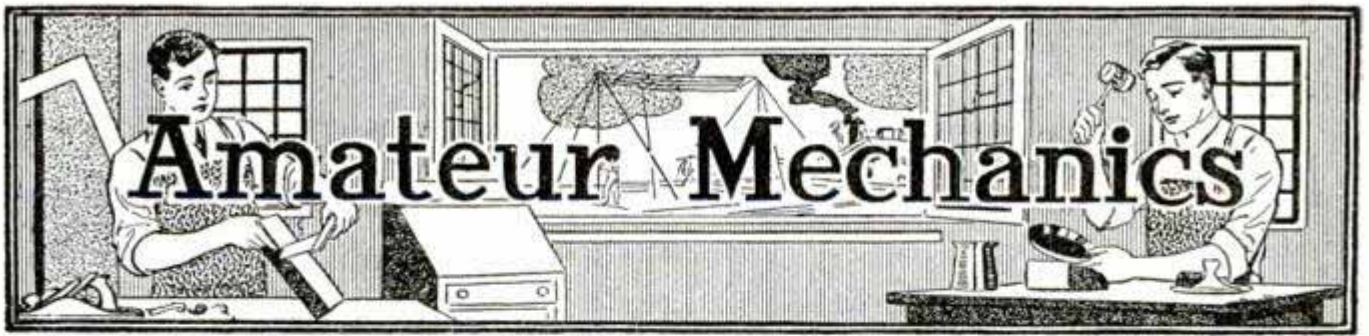
The Toggle Arms Tend to Close as the Speed Increases and Control the Carburetor Lever

tionary purposes, some governor is usually required. An easily constructed throttle type can be made as here described. The parts necessary are: a shaft sleeve, A; one set of sleeve clamps, B; one set of shaft clamps, C; a swinging lever, D; a throttle-connect-

ing lever, E; a spiral spring, F; toggle levers, G; bolts, nuts, and rivets. The shaft sleeve A should be bored for a sliding fit on the shaft and provided with two collars at one end which are spaced to engage the forked end of the lever D, thereby transmitting to it any movement the sleeve A may have in a direction parallel with the shaft. The lever D is fastened at its lower end so it can swing back and forth with the sleeve A. The carburetor connecting lever E is attached to the throttle valve, at one end, and to the swinging lever D, at the other. The sleeve clamps B are made to fit the extension of the sleeve A, and, when in place, should be separated sufficiently to admit one end of the toggle levers G, which can be made of strong wood to any convenient length. These are held in place at one end by the clamp bolts; at the other end they can be held together by a loose-fitting rivet, thereby avoiding the danger of flying bolts and nuts. The shaft clamps C should not only have a tight fit on the shaft, but should be riveted to it as well by a center rivet, H. The spiral spring F should fit the shaft loosely, and have sufficient tension to balance the centrifugal force of the revolving toggle levers, this being most accurately determined through repeated trials.

In starting the engine, the throttle may be opened wide or only to a desired amount, if a stop, J, be provided, preventing the lever D from moving any farther. As the engine speeds up, the centrifugal force in the levers G becomes sufficient to compress the spring, thereby allowing the sleeve to slide toward the right. This movement is imparted to the forked lever D, and through it and the lever E to the throttle. The throttle gradually closes, reducing the power of the engine and thereby the speed, until this drops to a point where a greater throttle opening again increases the power and speed.—Contributed by H. A. Betts, Wallace Bridge, Nova Scotia.

☞ A newly tapped hole should be oiled before turning a bolt into it.



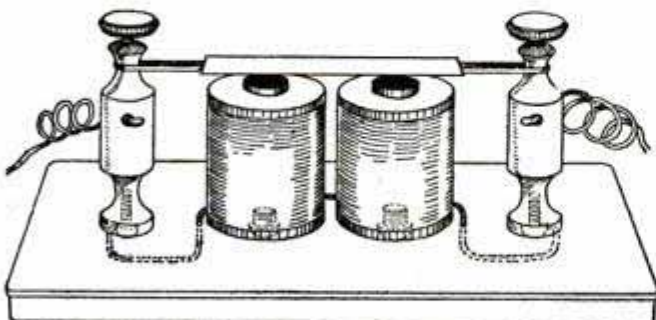
Footstool for Cement Floors

A clerk finding the cement floor of the office uncomfortably cold to the feet, devised a footstool in the following manner: A shallow box was procured, and four small truck casters were fastened to the bottom. A piece of carpet was laid on the inside of the bottom and some old newspapers placed on top of it. When seated at the desk, he placed his feet inside the box on the papers. The casters elevated the box from the cement, just high enough to avoid dampness and cold, and permitted an easy change of position.—Contributed by L. Alberta Norrell, Gainesville, Ga.

Homemade Telegraph Sounder

The material required to construct a telegraph sounder, like the one shown in the sketch, consists of two binding posts, magnets, a piece of sheet metal, and a rubber band. These are arranged as shown, on a wood base or, better still, on a metal box. In using a metal-box base, be sure to insulate the connections at the magnet coils and binding posts.

This instrument will be found by

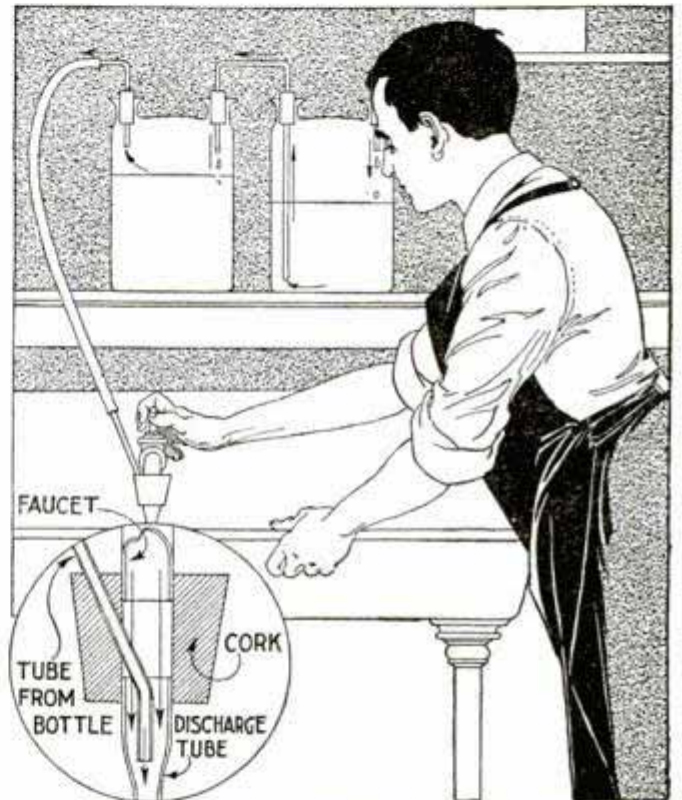


An Inexpensive and Homemade Sounder for Use in Learning the Telegraph Codes

those studying the telegraph codes to give good results, equal to any of the expensive outfits sold for this purpose.—Contributed by Chas. J. La Prille, Flushing, N. Y.

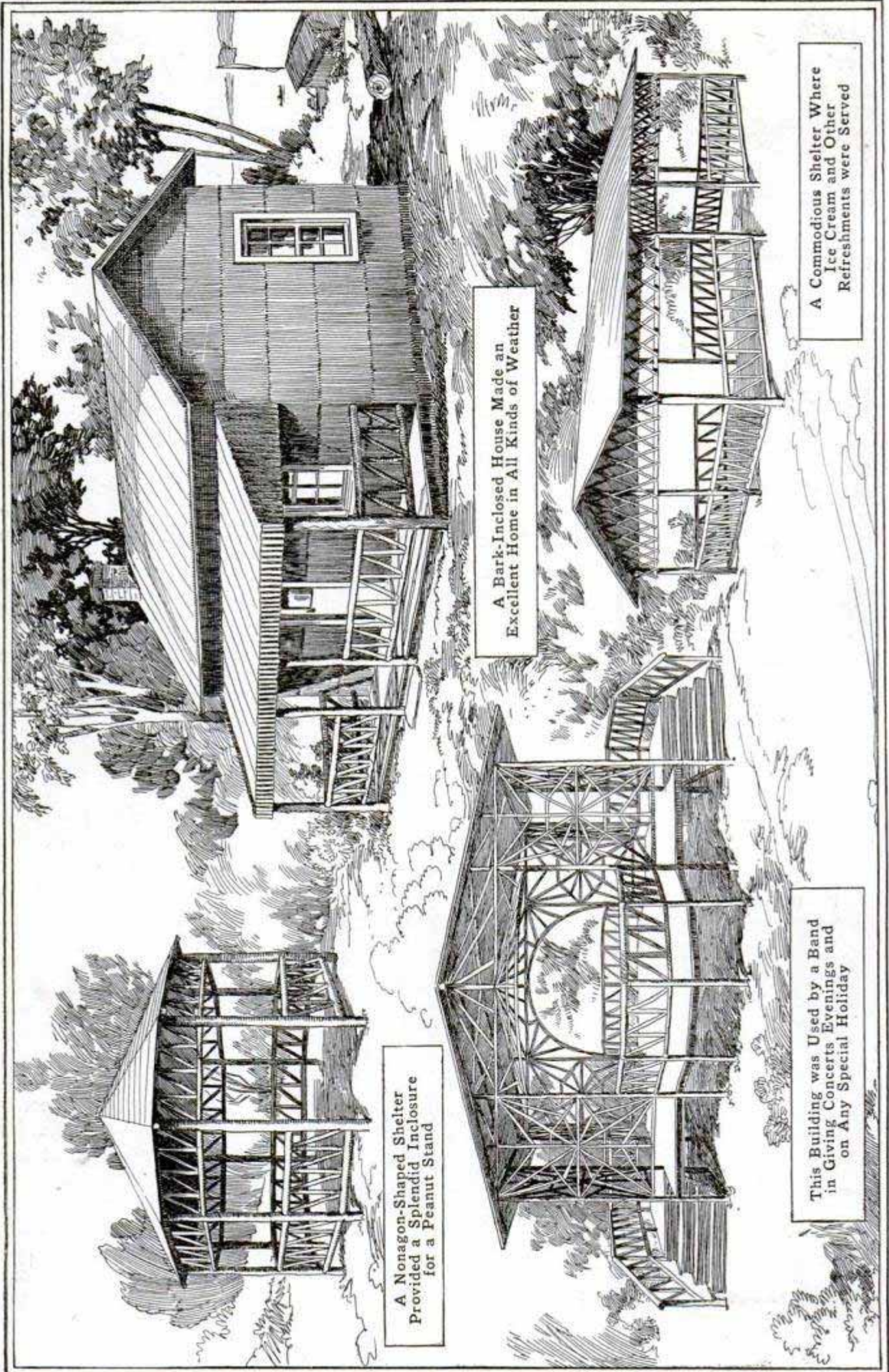
Laboratory Force Filter

The sketch represents a force filter which is well adapted for use in small laboratories. The water is turned on



A Slight Vacuum is Formed by the Water Flowing through the Cork, Which Forces the Filter

at the faucet and draws the air through the side tube by suction, which in turn draws the air in a steady stream through the Wolff bottles. The tubes may be attached to a filter inserted in a filter bottle and filtering thus greatly facilitated. The connection to the faucet can be made, as shown in the detailed sketch, out of a long cork, by boring a hole large enough to fit the faucet through the cork and another slanting hole, joining the central hole, on the side for a pipe or tube. At the lower end of the cork a tube is also fitted, which may be drawn out to increase the suction. The inclined tube should be slightly bent at the lower end.—Contributed by W. M. Mills, Bakersfield, Cal.



A Nonagon-Shaped Shelter Provided a Splendid Inclosure for a Peanut Stand

A Bark-Inclosed House Made an Excellent Home in All Kinds of Weather

This Building was Used by a Band in Giving Concerts Evenings and on Any Special Holiday

A Commodious Shelter Where Ice Cream and Other Refreshments were Served

HOUSES MADE OF POLES

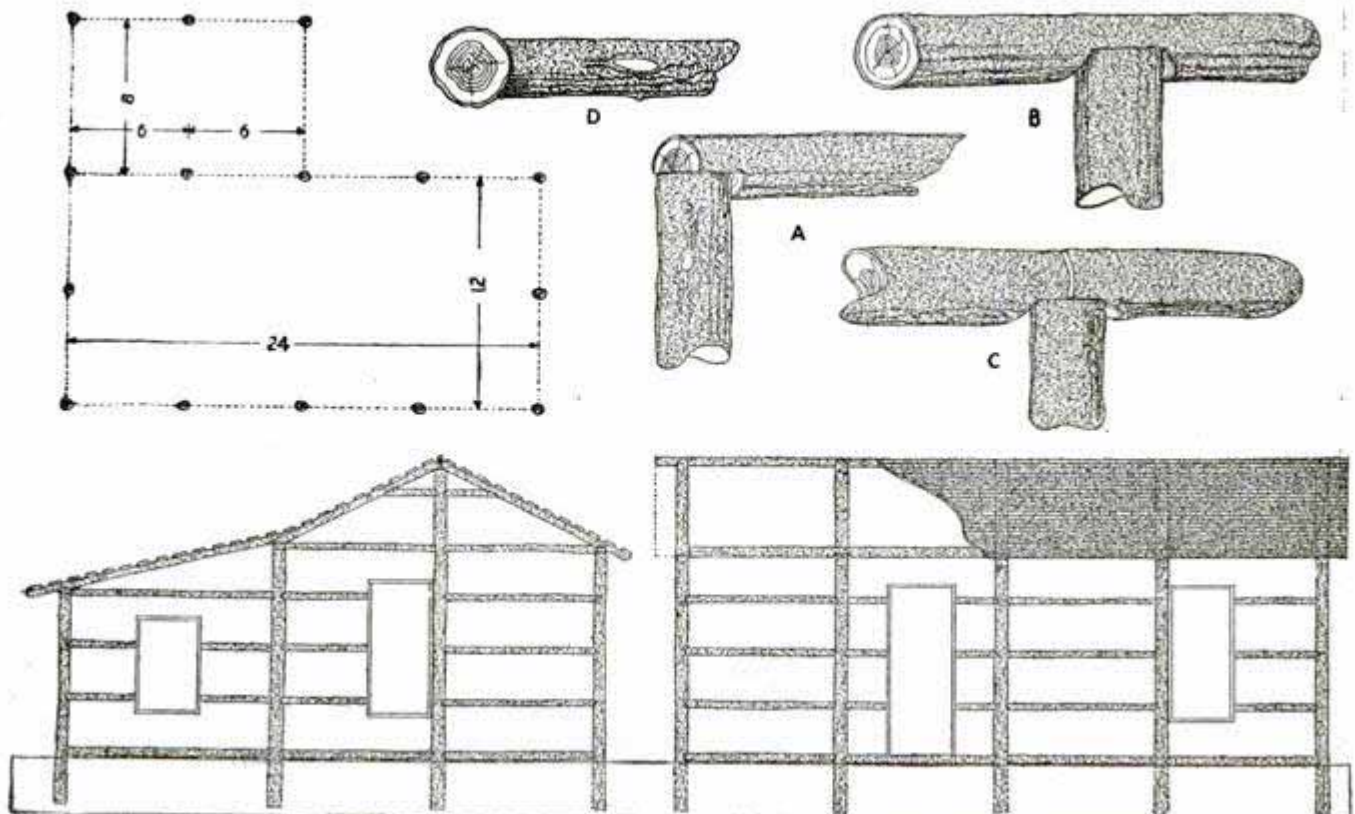
BY LOLA A. PINCHON

[In this article descriptions are given of several shelters suitable for a resort, but the reader may select any one of them that answers his needs and build a camp house, or fit up a more substantial one to make living quarters for the whole year.—Editor.]

BEING forced to take the open-air treatment to regain health, a person adopted the plan of building a pole house in the woods, and the scheme was so successful that it was decided to make a resort grounds, to attract crowds during holidays, by which an income could be realized for living expenses. All the pavilions, stands, furniture, and amusement devices were constructed of straight poles cut from young growth of timber with the bark remaining on them. Outside of boards for flooring and roofing material, the entire construction of the buildings and fences consisted of poles.

A level spot was selected and a house

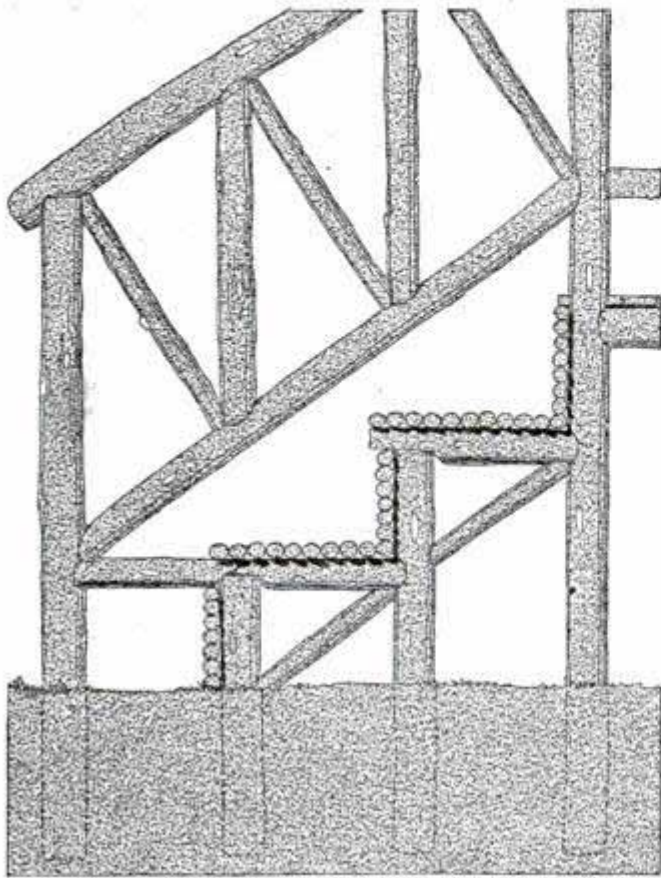
built having three rooms. The location was in a grove of young timbers, most of it being straight, and 13 trees were easily found that would make posts 12 ft. long, required for the sides, and two poles 16 ft. long, for the center of the ends, so that they would reach to the ridge. The plot was laid out rectangular and marked for the poles, which were set in the ground for a depth of 4 ft., at distances of 6 ft. apart. This made the house 8 ft. high at the eaves with a square pitch roof; that is, the ridge was 3 ft. high in the center from the plate surfaces for this width of a house. The rule for finding this height is to take one-quarter of the width of



The Frame Construction of the House Made Entirely of Rough Poles, the Verticals being Set in the Ground, Plumbed, and Sighted to Make a Perfect Rectangle of the Desired Proportions

the house for the height in the center from the plate.

The corner poles were carefully lo-



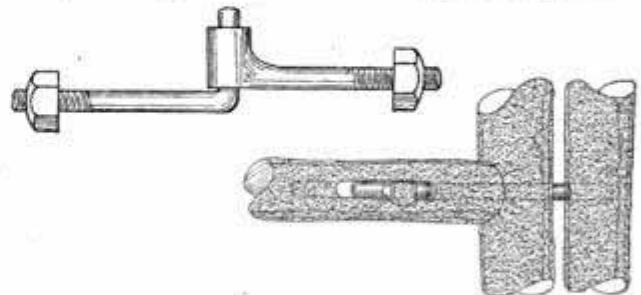
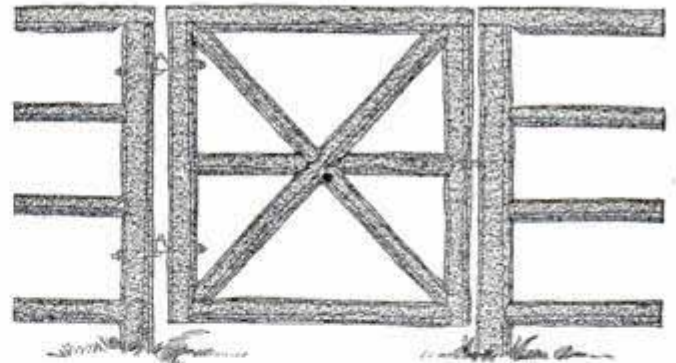
The Steps are Supported on Pairs of Vertical Poles Set in the Ground to Make Different Levels

cated to make the size 12 by 24 ft., with a lean-to 8 by 12 ft., and then plumbed to get them straight vertically. The plates for the sides, consisting of five poles, were selected as straight as possible and their ends and centers hewn down to about one-half their thickness, as shown at A and B, and nailed to the tops of the vertical poles, the connection for center poles being as shown at C.

The next step was to secure the vertical poles with crosspieces between them which were used later for supporting the siding. These poles were cut about 6 ft. long, their ends being cut concave to fit the curve of the upright poles, as shown at D. These were spaced evenly, about 2 ft. apart from center to center, on the sides and ends, as shown in the sketch, and toenailed in place. The doors and window openings were cut in the horizontal poles wherever wanted, and casements set in and nailed. The first row of horizontal poles was placed close to the ground

and used both as support for the lower ends of the siding and to nail the ends of the flooring boards to, which were fastened in the center to poles laid on stones, or, better still, placed on top of short blocks, 5 ft. long, set in the ground. These poles for the floor should be placed not over 2 ft. apart to make the flooring solid.

A lean-to was built by setting three poles at a distance of 8 ft. from one side, beginning at the center and extending to the end of the main building. These poles were about 6 ft. long above the ground. The rafter poles for this part were about $9\frac{1}{2}$ ft. long, notched at both ends for the plates, the ends of the house rafters being sawed off even with the outside of the plate along this edge. The rafter poles for the house were 10 in all, 8 ft. long, and were laid off and cut to fit a ridge made of a board. These poles were notched about 15 in. from their lower ends to fit over the rounding edge of the plate pole, and were then placed directly over each vertical wall pole. They were nailed both to the plate and to the ridge, also further strengthened by a brace made of a piece of board or a

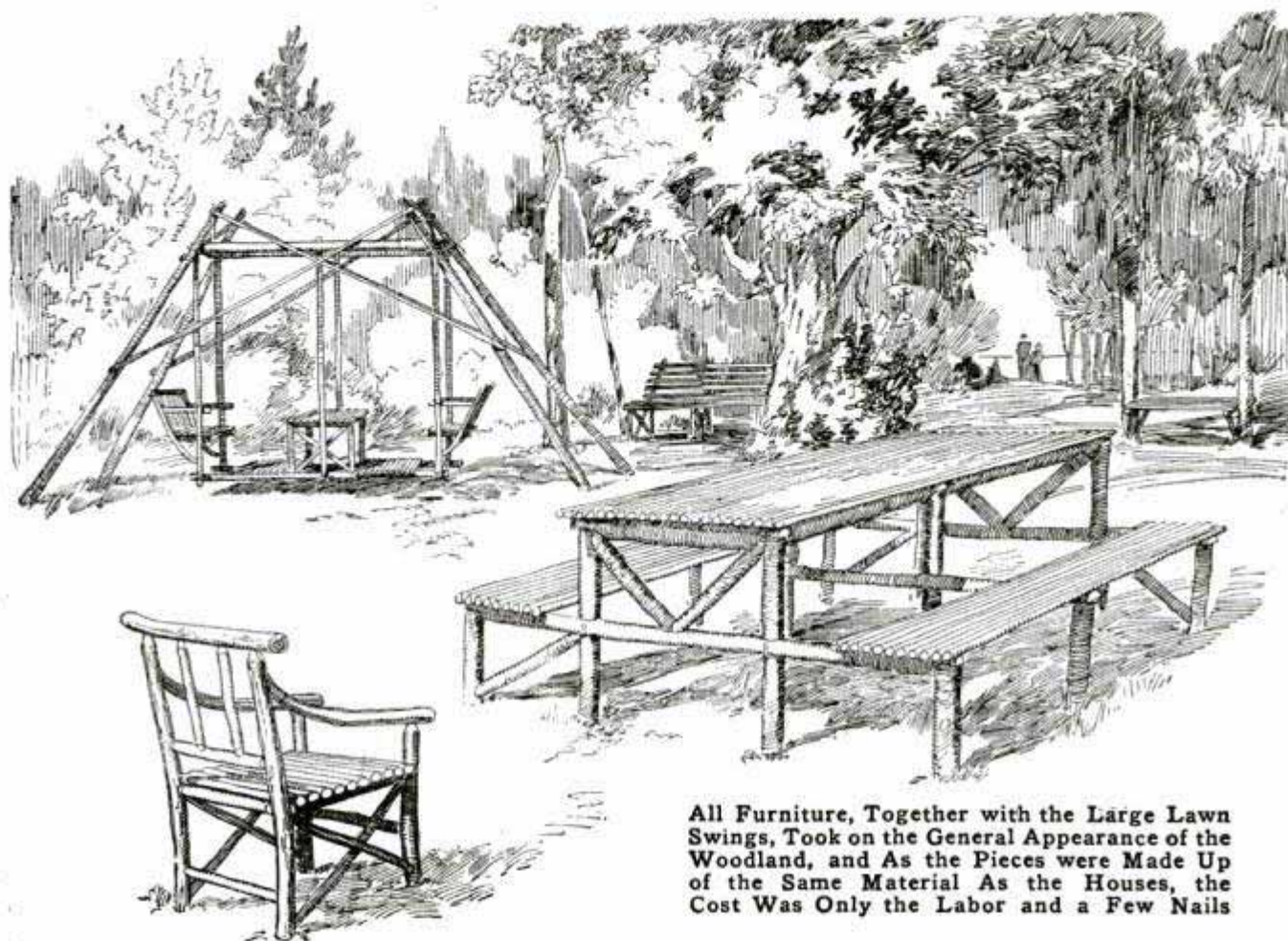


Gate Openings were Made in the Fence Where Necessary, and Gates of Poles Hung in the Ordinary Manner

small pole, placed under the ridge and nailed to both rafters. On top of the rafters boards were placed horizontally, spaced about 1 ft. apart, but this is

optional with the builder, as other roofing material can be used. In this instance metal roofing was used, and

railing. It is very easy to make ornamental parts, such as shown, on the eave of the porch, by splitting sticks



All Furniture, Together with the Large Lawn Swings, Took on the General Appearance of the Woodland, and As the Pieces were Made Up of the Same Material As the Houses, the Cost Was Only the Labor and a Few Nails

it only required fastening at intervals, and to prevent rusting out, it was well painted on the under side before laying it and coated on the outside when fastened in place. If a more substantial shelter is wanted, it is best to lay the roof solid with boards, then cover it with the regular prepared roofing material.

Some large trees were selected and felled, then cut into 4-ft. lengths and the bark removed, or if desired, the bark removed in 4-ft. lengths, and nailed on the outside of the poles, beginning at the bottom in the same manner as laying shingles, to form the siding of the house. If a more substantial house is wanted, boards can be nailed on the poles, then the bark fastened to the boards; also, the interior can be finished in wall board.

The same general construction is used for the porch, with horizontal poles latticed, as shown, to form the

and nailing them on closely together to make a frieze. Floors are laid on the porch and in the house, and doors hung and window sash fitted in the same manner as in an ordinary house.

A band stand was constructed on sloping ground, and after setting the poles, the floor horizontals were placed about 2 ft. above the ground, on the upper side, and 4 ft. on the lower side. The poles used were about 18 ft. long. Instead of having the horizontals 2 ft. apart, the first was placed 1 ft. above the floor, the next at about one-half the distance from the lower one to the plate at the top, and the space between was ornamented with cross poles, as shown. A balcony or bay was constructed at one end, and a fancy roof was made of poles whose ends rested on a curved pole attached to the vertical pieces. Steps were formed of several straight poles, hewn down on their ends to make a level place to rest on horizontal pieces

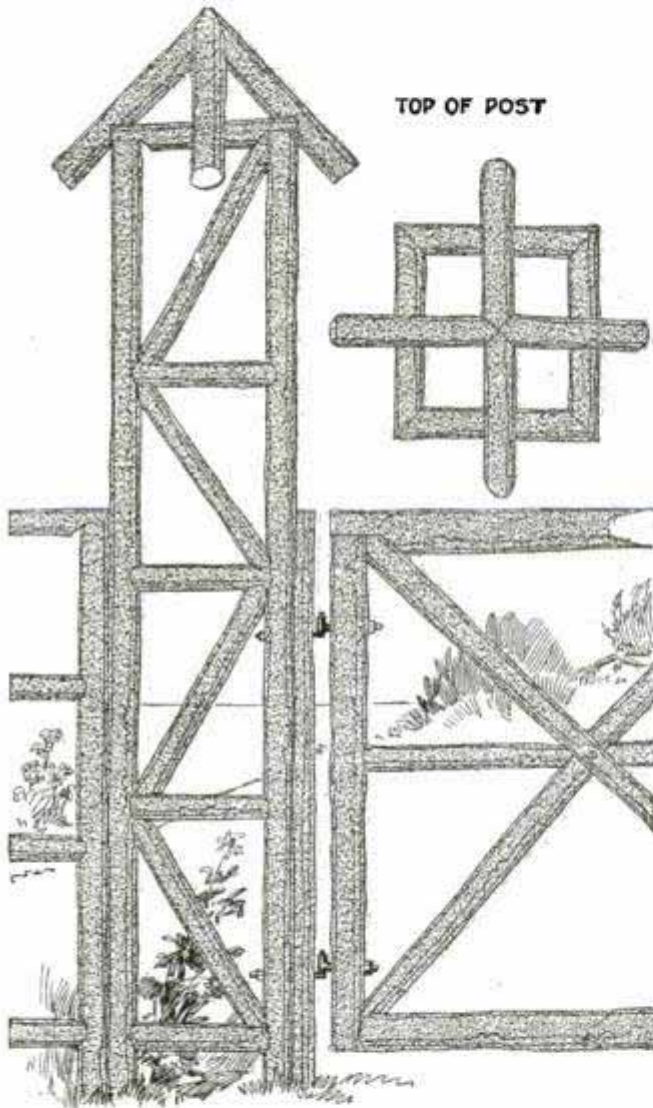
attached to stakes at the ends. A pair of stakes were used at each end of a step, and these were fastened to a slanting piece at the top, their lower ends being set into the ground. The manner of bracing and crossing with horizontals makes a rigid form of construction, and if choice poles are selected for the step pieces, they will be comparatively level and of sufficient strength to hold up all the load put on them. The roof of this building was made for a sun

so that the things kept for sale could be protected in case of a shower.

A peanut stand was also built without a floor, and to make it with nine sides, nine poles were set in the ground to form a perfect nonagon and joined at their tops with latticed horizontals. Then a rafter was run from the top of each post to the center, and boards were fitted on each pair of rafters over the V-shaped openings. The boards were then covered with prepared roofing. A railing was formed of horizontals set in notches, cut in the posts, and then ornamented in the same manner as for the other buildings.

Fences were constructed about the grounds, made of pole posts with horizontals on top, hewn down and fitted as the plates for the house; and the lower pieces were set in the same as for making the house railing. Gates were made of two vertical pieces, the height of the posts, and two horizontals, then braced with a piece running from the lower corner at the hinge side to the upper opposite corner, the other cross brace being joined to the sides of the former, whereupon two short horizontals were fitted in the center. A blacksmith formed some hinges of rods and strap iron, as shown, and these were fastened in holes bored in the post and the gate vertical. A latch was made by boring a hole through the gate vertical and into the end of the short piece. Then a slot was cut in the side to receive a pin inserted in a shaft made to fit the horizontal hole. A keeper was made in the post by boring a hole to receive the end of the latch.

Large posts were constructed at the entrance to the grounds, and on these double swing gates, made up in the same manner as the small one, were attached. These large posts were built up of four slender poles and were considerably higher than the fence poles. The poles were set in a perfect square, having sides about 18 in. long, and a square top put on by mitering the corners, whereupon four small rafters were fitted on top. The gates were swung on hinges made like those for the small gate.



The Entrance to the Grounds was Given an Inviting Appearance with Large Posts and Swinging Gates

shade only and consisted of boards nailed closely together on the rafters.

An ice-cream parlor was built on the same plan, but without any board floor; the ground, being level, was used instead. There were five vertical poles used for each end with a space left between the two poles at the center, on both sides, for an entrance. This building was covered with prepared roofing,

Among the best and most enjoyed amusement devices on the grounds were the swings. Several of these were built, with and without tables. Four poles, about 20 ft. long, were set in the ground at an angle, and each pair of side poles was joined with two horizontals, about 12 ft. long, spreaders being fastened between the two horizontals to keep the tops of the poles evenly spaced. The distance apart of the poles will depend on the size of the swing and the number of persons to be seated. Each pair of side poles are further strengthened with crossed poles, as shown. If no table is to be used in the swing, the poles may be set closer together, so that the top horizontals will be about 8 ft. long. The platform for the swinging part consists of two poles, 12 ft. long, which are swung on six vertical poles, about 14 ft. long. These poles are attached to the top hor-

izontals with long bolts, or rods, running through both, the bottom being attached in the same manner. Poles are nailed across the platform horizontals at the bottom for a floor, and a table with seats at the ends is formed of poles. The construction is obvious.

A short space between two trees can be made into a seat by fastening two horizontals, one on each tree, with the ends supported by braces. Poles are nailed on the upper surface for a seat.

Other furniture for the house and grounds was made of poles in the manner illustrated. Tables were built for picnickers by setting four or six poles in the ground and making a top of poles or boards. Horizontals were placed across the legs with extending ends, on which seats were made for the tables. Chairs and settees were built in the same manner, poles being used for the entire construction.

An Electric Water Heater

Procure the barrel and cap from a hand bicycle pump and prepare them as follows: Make a tube of paper, about double the thickness of a postal card, to fit snugly in the pump barrel and oil it slightly before slipping it into place. Procure some resistance wire of the proper length and size to heat quickly. The wire can be tested out by coiling it on some nonconducting material, such as an earthen jug or glazed tile, and connecting one end to the current supply and running the other wire of the supply over the coil until it heats properly. Cut the resistance at this point and temporarily coil it to fit into the bottom of the pump barrel, allowing one end to extend up through the space in the center with sufficient length to make a connection to supply wires.

Mix some dental plaster to the consistency of thick cream and, while keeping the wire in the center of the pump barrel, pour in the mixture until it is filled to within $1\frac{1}{2}$ in. of the top. Allow the plaster to set for about a day, then remove it from the barrel and take off the paper roll. The coil of wire at

the bottom is now straightened out and wound in a coil over the outside of the plaster core, allowing sufficient end for connecting to the supply wires.

Cut two or three disks of mica to fit snugly in the bottom of the pump barrel, also cut a mica sheet to make a covering tube over the coil on the plaster core and insert the whole into the barrel. The two terminals are connected to the ends of a flexible cord which has a plug attached to the opposite end. Be sure to insulate the ends of the wire where they connect to the flexible cord inside of the pump barrel under the cap. In winding the resist-



An Electric Heating Coil Made of Resistance Wire Placed in a Bicycle-Pump Barrel for Boiling Water

ance wire on the core, be sure that one turn does not touch the other. The heater when connected to a current supply and placed in 1 qt. of water will bring it to a boil quickly.—Contributed by A. H. Waychoff, Lyons, Colo.

Distance Marker for Printing Photographs

A convenient homemade printing device, or distance marker, for printing photographs by artificial light consists



The Same Distance
with the Same
Exposure will Always
Produce Uniform Prints

of a smooth board on which twelve 1-in. marks are drawn, as shown. A wall-base electric socket is attached on the first line and the others are numbered up to 12. A trial test of a negative marks the distance and time of exposure which should be recorded on the negative. Such a device makes uniform prints possible and provides a means of recording time on negative-storage envelopes.—Contributed by Harold Davis, Altoona, Pa.

Mantel Picture Frames Made in Plaster

Procure a small oval or rectangular frame of a suitable size and use it as a pattern in making a mold. If it is not necessary to select an expensive frame, one that is straight without any

floral designs is the best to use. Ordinary molding made into a frame will do as well, or a pattern, whittled out of wood in oval shape, will produce good results.

Make a flask out of any small box, and fill it with clay instead of molding sand. Make an impression of the frame in the clay, and the mold is ready for the plaster.

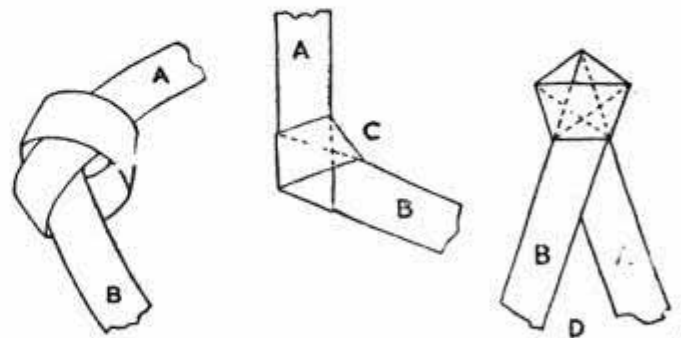
Procure four 8-oz. bottles, fill them with water, and tint the water in three of them red, green, and blue, with dyes. When purchasing the plaster of paris—2 lb. will do—also get some brass filings from a machine shop, and mix it with the plaster while in a dry state; then divide the lot into four parts of $\frac{1}{2}$ lb. each, or equal parts.

Use the tinted water to mix the plaster and pour it into the mold. This will give the combinations red, green, blue, and white.

Picture frames made in this manner will stand enough polishing to keep the brass filings on the surface bright and shining, which gives a pretty effect.—Contributed by J. B. Murphy, Plainfield, N. J.

A Five-Pointed Star

There are many ways of making a five-pointed star, but the one illustrated is new and easy to apply. A long strip of paper, which should be transparent, is tied into a knot. When the ends A and B are drawn tightly, the paper strip takes the position shown in C. The end A is folded for-



Holding the Knot to the Light a Star will be Seen,
Shown by the Dotted Lines

ward, or in front of the knot; then the whole is turned over and it will take

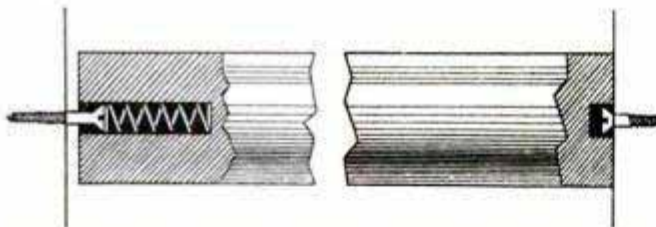
the position shown in D. Hold the paper to a good light and a perfect five-pointed star will be seen.—Contributed by J. J. Kolar, Maywood, Ill.

Fastening Portière Pole in a Doorway

A pole can be fastened between two supports, posts, or in a door casing neatly and without fixtures in the following manner: The pole is cut $\frac{1}{8}$ in. shorter than the space between the casings, and a $\frac{5}{16}$ -in. hole is drilled in each end, one to a depth of $1\frac{1}{2}$ in. and the other $\frac{3}{8}$ in. deep, a coil spring being placed in the deepest hole.

Screws are turned into the center of the location for the pole in the door jambs, allowing one screw head to project $\frac{1}{8}$ in., and the other at least $\frac{1}{4}$ inch.

To place the pole in position, put the end with the spring in the hole on the screw head projecting $\frac{1}{4}$ in. and push the pole against the jamb, allowing the other end to pass over the



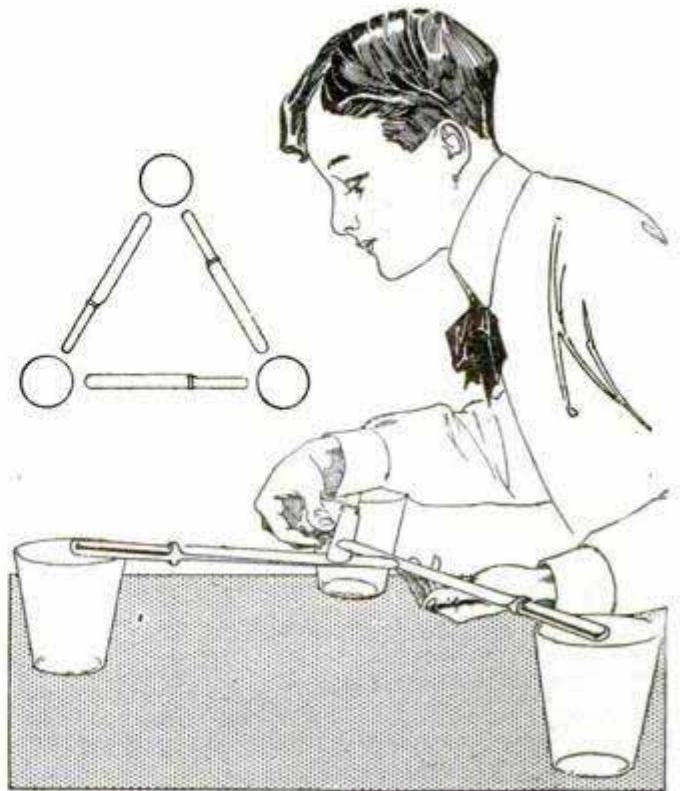
No Fixtures That will Show are Required with This Fastening of a Portière Pole

other projecting screw head until it slips into the hole by pressure from the spring. The spring will keep the pole in position.—Contributed by Ernest F. Dexter, Hartford, Conn.

Trick with Knives and Glasses

An interesting trick may be performed with three tumblers and three table knives. Place the tumblers in an equilateral triangle on a table so the knife ends, when the knives are laid between them, as shown in the plan sketch, are about 1 in. away from the tumblers. The trick is to arrange the knives so that they are supported by the tops of the three tumblers and nothing else. Most observers will say that it is impossible; some will try it

and in most cases fail. It can be done, and the illustration shows how simply

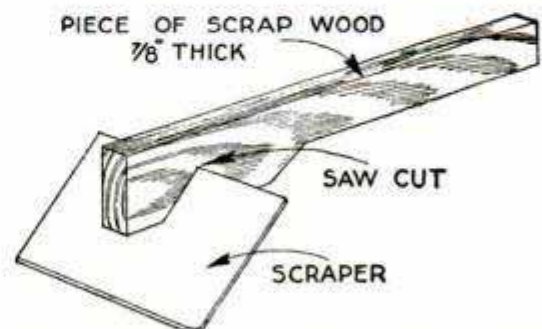


Knives Placed in Such a Manner as to be Supported by the Three Glasses

it may be accomplished.—Contributed by R. Neland, Minneapolis, Minn.

A Scraper Handle

In using the ordinary steel-plate scraper, much inconvenience and cramping of the hands is experienced unless some suitable handle is attached. If a piece of scrap wood is taken and cut to a convenient shape, with a groove tightly fitting the scraper steel, greater pressure can be exerted and more effective work produced, without cramp-

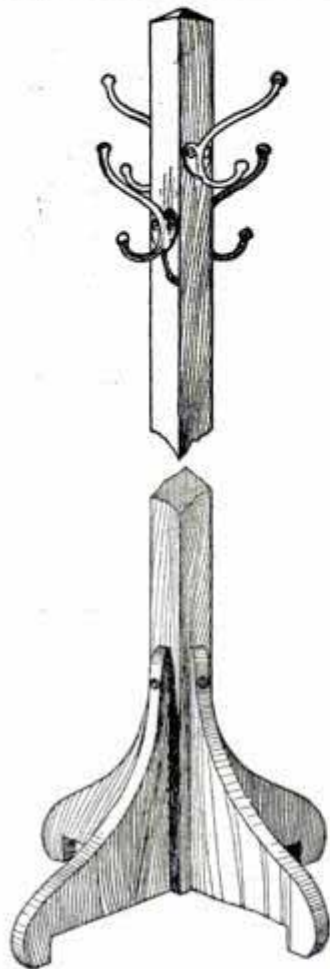


An Ordinary Piece of Board Shaped for a Handle and Notched for the Scraper Blade

ing the hands or tiring out the operator as readily.—Contributed by A. P. Nevin, Hancock, Mich.

How to Make a Costumer

With but little skill, and such tools as are ordinarily found around a home, a plain but serviceable costumer can be made, as shown in the sketch.



The necessary materials for it are: One main post, $1\frac{1}{2}$ in. square and about $6\frac{1}{2}$ ft. long; four legs, or foot brackets, $\frac{3}{4}$ by 6 by 9 in.; four brass clothes hooks, and the necessary screws and varnish for assembling and finishing.

The center post should be chamfered at the top to relieve the abruptness. The four legs should all be made alike and in some shape that allows them to be fastened to the post in a simple manner.

In the sketch, the legs are fastened to the post by one visible screw at the top and one put in on an incline through the bottom edge of the leg. The clothes hooks are fastened to the post in pairs at different heights, thereby preventing the screws of adjacent hooks from running into one another. The finish of the costumer should be such as to match the woodwork of its surroundings.—Contributed by Harry A. Packard, Norway, Maine.

Window Catch Used for Locking an Extension Table

To prevent the two ends of an extension table from pulling apart when not desired, an ordinary window catch can be fastened and locked in place to the under side of the table top with one part on each end of the table. If but

one catch is used and fastened in the center, it is best to mark it off first, and then pull the table ends apart to fasten the catch more easily. It may be desired to use two catches for a very heavy table, in which case it would be best to place one on either side of the center.—Contributed by F. M. Griswold, New York, N. Y.

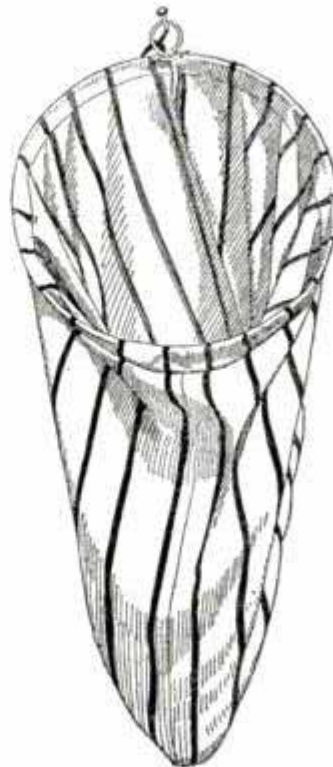
Relieving Pressure on Heated Canned Foods for Opening

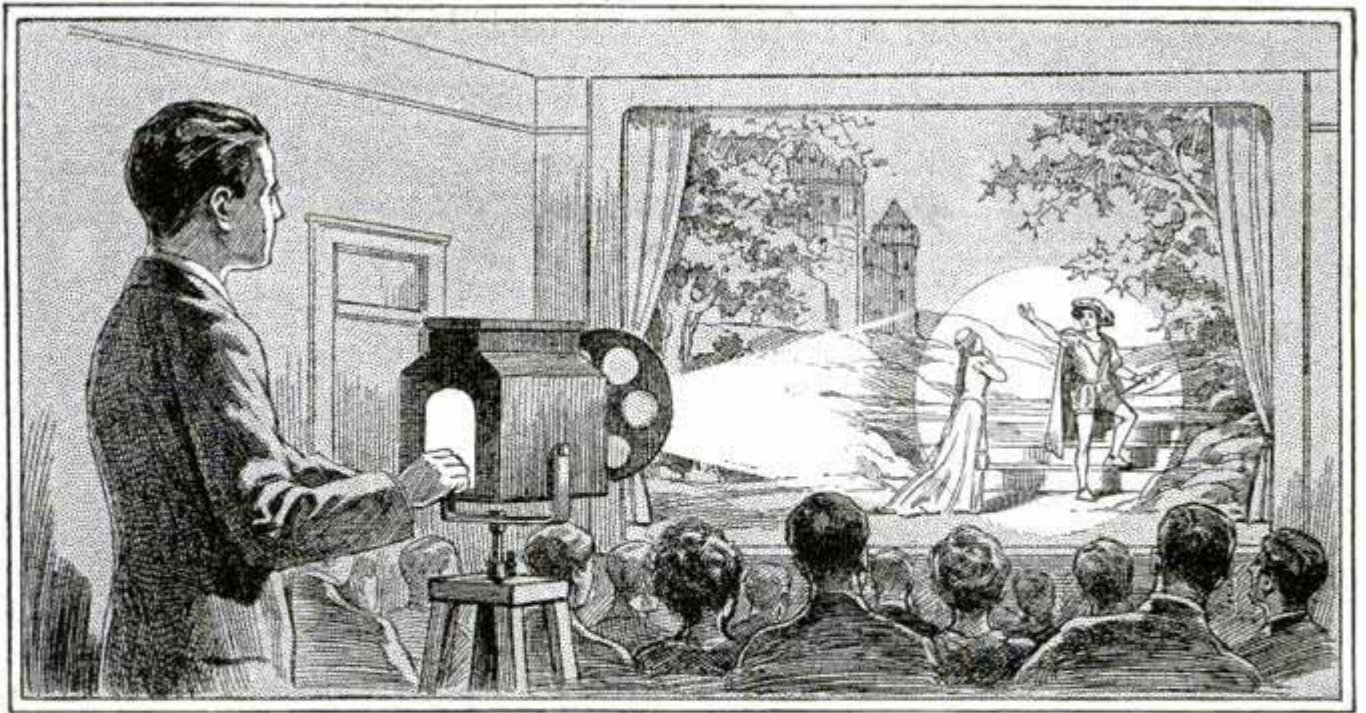
In opening a can of food that has been heated, the instant the cover is punctured the steam will force out a part of the contents, which is very annoying. To avoid this, pour a little cold water on the cover and allow it to remain a few seconds, then turn it off and immediately puncture the cover. This will counteract the interior force, and the can may be opened without trouble.—Contributed by Joseph Kohlbecher, Jr., San Francisco, Cal.

Clothespin Bag

Clothespins are usually kept in a bag, and the one our home possessed had a draw string which would always stick and hold the bag shut. The remedy for this, and a time saver also, was to remove the draw string and insert instead a piece of wire, which was afterward shaped to a circle with an eyelet at the joint. The bag can be hung on a nail and the mouth is always open to its fullest extent, yet lies flat against the

wall.—Contributed by Jas. A. Hart, Philadelphia, Pa.





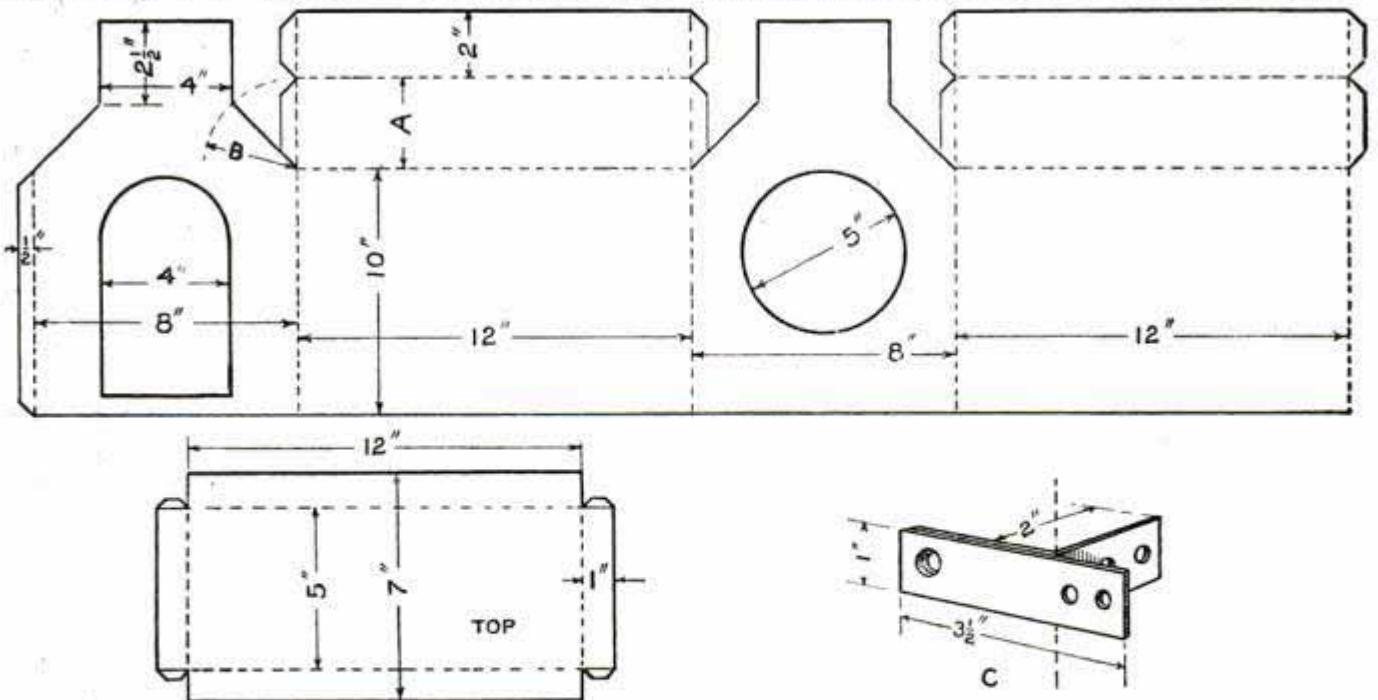
Throwing a Spot Light with the Lantern on Individuals of a Home Play, Which can be Given Brilliant Effects by the Use of the Tinted Celluloid in the Openings of the Revolving Wheel

Lantern for Spot and Colored Lights

The school play in pantomime is not complete unless the different parts of the play are illuminated in different colors, especially if the performers are clad in glittering garments. A spot light is also a feature not to be forgotten in singling out the star player or the one singing a song. The cost of a light for this purpose is entirely out

colored lights can be made at home, and the necessary parts will not cost much.

The metal necessary can be the ordinary stovepipe material, but if it is desired to have a fine-appearing lantern, procure what is called Russian iron. This metal has a gloss, and if used, it should be gone over from time



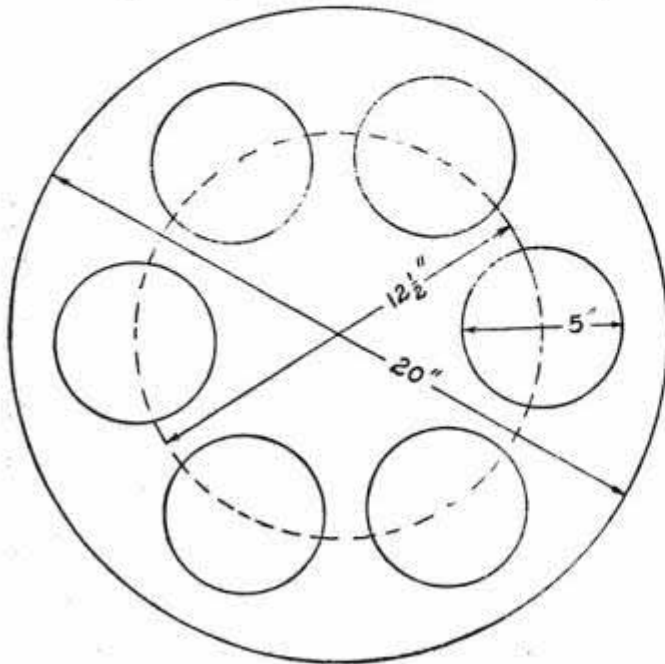
Pattern for Cutting the Metal to Form the Entire Lantern, or Lamp House, Also the Pattern for the Top and the Metal Bracket That Makes a Bearing for the Revolving Wheel, Having Openings Covered with Tinted Celluloid

of the reach of the average schoolboy, but if he has any ingenuity and a little time, a lantern for throwing those

to time with a rag soaked in oil, then wiped dry, to keep it from rusting. The pattern for the body of the lan-

tern, or lamp house, is shown with dimensions.

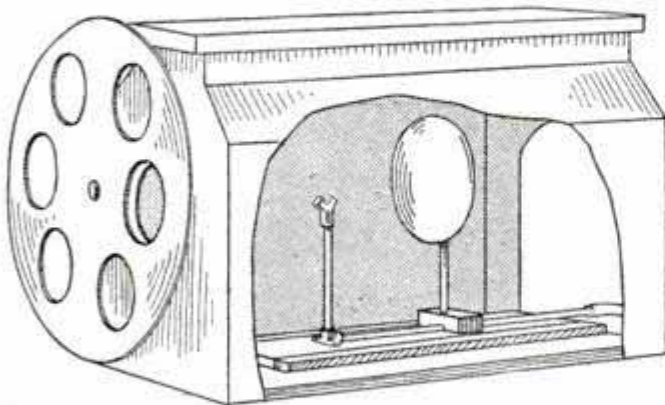
If metal, long enough for the whole length, cannot be procured, then make it in two pieces, being sure to allow $\frac{1}{2}$ -in.



Pattern for the Revolving Wheel in Which Six Holes are Cut and Covered with Tinted Celluloid

end also on the second part, as shown on the first, for a riveted joint. The metal is bent on the dotted lines and cut out on the full ones. The distance between the lines A to be bent is equal to the radius B. The part A forms the sloping side of the top, and the 2-in. part at the top of the side extends vertically on the upper or vertical part, it being $\frac{1}{2}$ in. narrower to provide an outlet for the heat.

An opening is cut in the rear end,



The Base of the Lantern is Provided with a Sliding Part Carrying the Light for Adjustment

as shown, also a hole, 5 in. in diameter, in the front end. The size of the round hole is optional, as it should be cut

to suit the condensing lens provided. If a lens $5\frac{1}{2}$ in. in diameter is used, then a 5-in. hole should be cut. This is enough difference in size to hold the lens from dropping through, while clips riveted on the inside of the lamp-house end will hold it in place. The lens is set in the hole with the curved side outward from the inside of the lamp house.

The top, or covering, is cut out of the same material as used in making the lamp house, the length being 12 in., and the sides are cut to extend $\frac{1}{2}$ in. on each side of the ventilator. The edges, being turned down on the dotted lines, provide a covering to prevent any great amount of light from passing out through the $\frac{1}{2}$ -in. ventilating opening mentioned in connection with the side construction of the lantern. The 1-in. parts of the cover ends are turned down and riveted to the ends of the lamp house. The little extensions on the ends provide a means of riveting the side, to make a solid joint.

The arm C is made of a piece of $\frac{1}{8}$ or $\frac{3}{16}$ -in. metal, shaped as shown, to fit on the corner of the lamp house, where it is riveted. This provides a support and a place for an axis for the large revolving wheel holding the colored-celluloid disks.

The metal forming the lamp house is fastened on a baseboard, cut to snugly fit on the inside. The base has two cleats, nailed lengthwise to form a runway, 4 in. wide, into which another board is fitted to carry the burner. While the illustration shows an acetylene burner, any kind of light may be used so long as it is of a high candle-power. If manufactured gas is at hand, a gas burner with a mantle can be fitted, or a large tungsten electric light will give good results.

The wheel, carrying the colored disks, is made of the same kind of metal as used for the lamp house. The edges should be trimmed smooth, or, better still, turned over and hammered down to prevent injury to the hands while turning it. A washer should be used between this wheel and the arm C on a bolt used for the shaft, to make

the wheel turn freely. The colored disks of celluloid are fastened to the outside of the wheel over the openings.

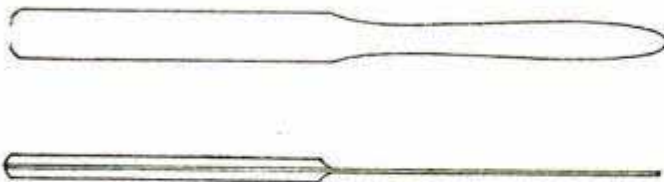
A yoke to support the lantern and provide a way for throwing the light in any direction, is made as shown. A line along which the lantern balances is determined by placing it on something round, as a broom stick, and the upper ends of the yoke are fastened on this line with loosely fitted bolts for pivots.

The lantern is set in front of the stage at the back of the room and the light is directed on the players, the colors being changed by turning the wheel. Sometimes good effects can be obtained by using the lantern in the wings, or for a fire dance, by placing it under the stage, throwing the light upward through grating or a heavy plate glass.



Homemade Palette Knife

A corset steel makes a good substitute for a palette knife because of its flexibility. It gives better satisfaction if cut in the shape shown than if left straight. Should a handle be desired,



A Palette Knife Made of a Corset Steel and a Wood Handle Attached

one can be easily made by gluing two pieces of thin wood on the sides.—Contributed by James M. Kane, Doylestown, Pa.

☞To remove a white mark on wood having a wax surface, rub it lightly with a rag moistened in alcohol; then rub with a little raw linseed oil.

Self-Closing Gate

This gate is suspended from a horizontal bar by chains, and swings freely about a 1-in. gas pipe, placed



The Gate will Swing in Either Direction and Come to a Rest Where It Closes the Opening

vertically in the center of the gate. The chains are of the same length, being fastened equidistant from the pipe, the upper ends farther out than the lower. The distance depends on the weight of the gate and the desired force with which it should close. Any of the numerous styles of latches can be used, if desired.—Contributed by Kenneth Osborn, Loveland, Colo.

A Poultry Shade

If a poultry yard is in an open space where the sun's rays will strike it squarely, a shade can be put up as follows: A piece of old carpet, rug, or canvas, fastened to the wire mesh with clothespins, will produce a shade at any place desired.—Contributed by Walter L. Kaufmann, Santa Ana, Cal.

Electrical Heating Apparatus for the Home

By ARTHUR MOORE

PART VIII—A Curling-Iron Heater

THE curling-iron heater consists of a heating element in the form of a hollow tube into which the curling iron may be inserted. The end of the tube, or heating element, is normally closed with a piece of metal, which must be pushed downward to allow the iron to pass in, and the movement of this piece, which is against the action of a spring, controls a small switch that

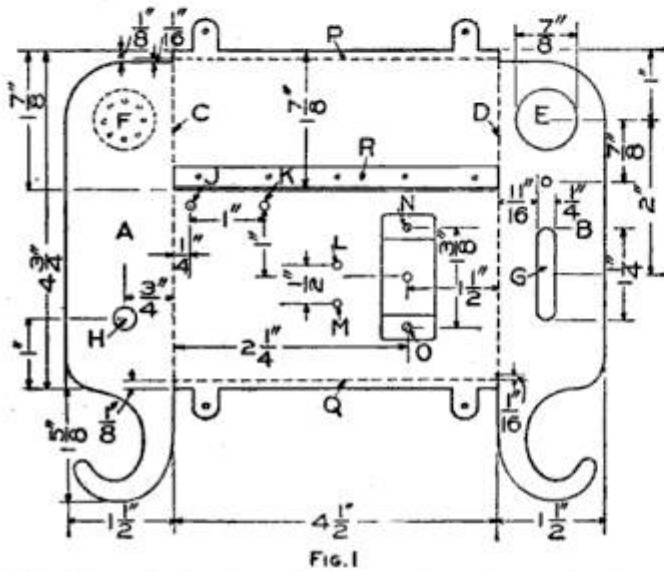


FIG. 1
The General Outline of the Metal to Form the Case for Holding the Heating Element and Switch

is in series with the winding of the heating element. The insertion of the iron closes the heating-element circuit, and its removal allows the switch to return to its normal position, and the circuit of the heating element is opened.

The containing case is made from a piece of sheet brass, at least $\frac{1}{32}$ in. in thickness. The dimensions and form of the back portion of the case are given in Fig. 1. The two portions A and B of this piece, to the left and right of the dotted lines C and D, are to form the ends of the containing case, and are bent up at right angles to the main portion. A rest for the curling iron is provided for by the lower ends of A and B. The dimensions of these ends are not given, but the illustration gives an idea of their general shape. The hole E is for the end of the heating element to rest in, and its diameter must correspond exactly to the diameter of the

metal tube about which the wire forming the heating element is wound.

A series of $\frac{1}{8}$ -in. holes are drilled on a $\frac{1}{2}$ -in. circle, drawn on the portion A and having its center in the same position as the center of the hole E. Provide a thin metal disk, 1 in. in diameter, and drill a $\frac{1}{16}$ -in. hole in its center, and also a $\frac{1}{16}$ -in. hole at F. Fasten the disk on the under side of the portion A, or on the surface that will be on the outside when A is bent into position, with a small rivet drawn up just enough to permit the disk to be turned. Drill $\frac{1}{8}$ -in. holes in the disk opposite those in the piece A. This provides a ventilator for the interior of the heating element, which may be closed by turning the disk. The holes in the piece A must be at least $\frac{1}{8}$ in. from edge to edge so that the metal between them will cover the holes in the disk. The opening G in the portion B is for the end of the lever controlling the switch, the dimensions and location being shown.

The hole H in the portion A is for the connecting leads to pass through, and it should be provided with a suitable insulating bushing, preferably mica or porcelain. The location of this hole may be changed if advantageous to do so.

All the remaining holes, marked J, K, L, M, N, and O, are $\frac{3}{16}$ in. in diameter and drilled in the positions indicated. The screws supporting the various parts of the switch are to pass through these holes.

Bend the upper and lower portions, P and Q, of the main part of the piece over at right angles along the dotted lines. These edges will overlap the edges of the front portion of the case, to improve its appearance. Bend the portions A and B up at right angles to the center portion, and the back of the containing case will be complete.

Obtain a piece of thin metal, about $1\frac{3}{4}$ in. wide and $4\frac{1}{2}$ in. long, and bend one edge over at right angles so that the main portion of the right-angled

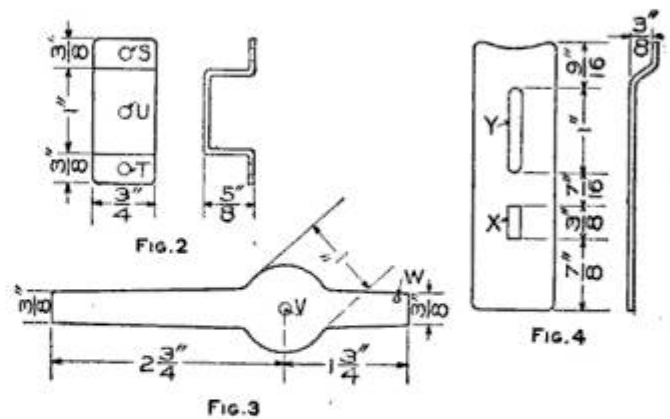
piece will be $1\frac{1}{2}$ in. wide. Rivet this piece in position as shown at R. It is to form a division between the heating element and the compartment for the switch.

The support for the switch lever should be made from $\frac{1}{16}$ -in. sheet brass, and its dimensions must correspond to those given in Fig. 2. The holes S and T are threaded to take the screws which are to pass through the holes N and O, Fig. 1. The hole U is threaded for a $\frac{1}{8}$ -in. machine screw. This piece may be fastened in position as shown in Fig. 1.

The switch lever is made from a piece of $\frac{1}{8}$ -in. insulating fiber, with dimensions as given in Fig. 3. The hole V is drilled so that a $\frac{1}{8}$ -in. machine screw will pass through it freely. Mount the lever in position on the support, placing a good-size washer next to the head of the screw, with a locknut on the end drawn up tightly so that there is no chance of the screw turning. The lever must move freely on the screw, its short end extending through the slot G, Fig. 1. A small spiral steel spring is made and one end attached in the hole W, Fig. 3, in the switch lever and the other end attached to the piece R, Fig. 1, of the containing case, so that the right end of the switch lever is always drawn up and the left end down.

The switch lever is caused to move up and down by means of a piece of brass which slides on the outside surface of the piece B, Fig. 1. The dimensions of this slide and its form are shown in Fig. 4. The slot X is for the end of the switch lever to project through, and must be of such dimensions that the end of the switch lever will not bind in any of the possible positions it is supposed to assume. The slot Y is for supporting the slide. A $\frac{1}{8}$ -in. machine screw passes through this slot and into a threaded hole in the piece B, Fig. 1. The position of this screw should be such that the switch lever may move up and down the entire length of the slot G. Two other screws are placed along the edge of the lower end of the slide and into the piece B, with their heads drawn

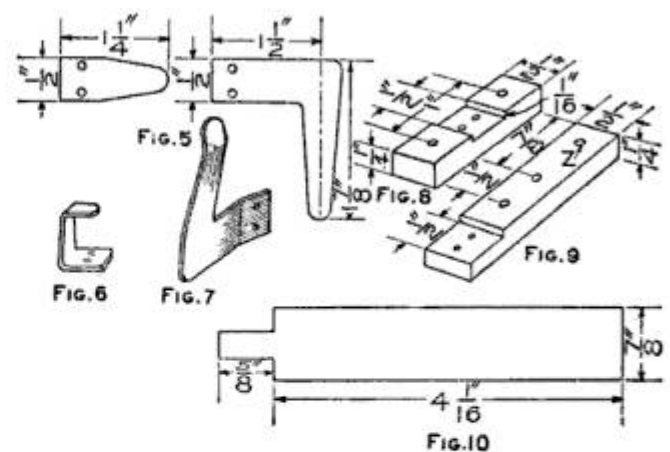
down so that they will assist in holding it in position and guide its up-and-down movements without interfering to any



Support for the Switch Lever, the Switch Lever, and the Sliding Part That Operates the Switch Lever

extent with its free motion. A side view of the slide is shown at the right in Fig. 4. The upper end is bent out about $\frac{3}{8}$ in., so that there will be a good rest formed upon which to place the end of the curling iron when forcing the slide down.

The switch is of the single-pole type, and consists of two pieces of spring brass, mounted on two pieces of insulation and bent to such shape that the left end of the switch lever causes their free ends to make contact when the slide has been forced down past the



Contact Switch Springs, Their Insulation Bases, and the Tube for the Heating Element

opening into the heating element. The dimensions of the two springs are given in Fig. 5. They are bent into the shapes shown in Figs. 6 and 7. Shape two pieces of fiber as shown in Figs. 8 and 9. Mount these two pieces on the back of the containing case with machine screws, which pass through the

holes J, K, L, and M into threaded holes in the under side of the pieces. These screws should not extend more than $\frac{3}{16}$ in. into the pieces. The piece

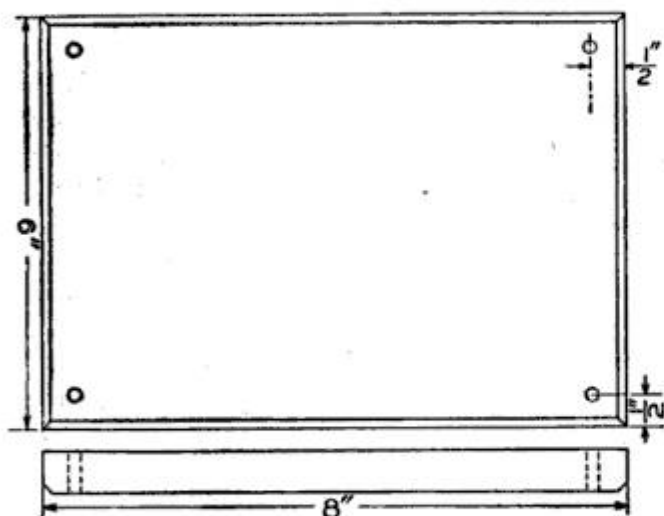


FIG. 11

A Slate or Marble Base is Provided for Mounting the Entire Heater When It is Finished

shown in Fig. 8 is mounted over the holes J and K, and the piece in Fig. 9, over the holes L and M. Mount the spring, Fig. 6, in the groove in the piece of insulation, Fig. 8, and the spring, Fig. 7, in the groove in the insulation, Fig. 9. A good-sized washer is placed on each of the screws used in mounting the springs, as the electrical connections are to be made under these screw heads. A small screw with a washer must be placed in the hole Z, Fig. 9. If the springs are properly shaped they should break contact when the left end of the switch lever is down, and make contact with a small movement of the end of the lever upward caused by moving the slide down. The adjustment of these springs should be carefully made, as the successful operation of the heater in a large measure depends upon the proper operation of the switch.

The heating element must be wound upon a piece of thin-brass tubing, having the dimensions given in Fig. 10. One end of this piece of tubing is to rest in the opening E in the portion B of the containing case, and the other end is to be attached to the portion A. A part of one end of the tube is cut away, as shown, so that two projections on opposite sides are formed. These

two projections are bent out at right angles to the main part of the tube, and are to be used in attaching it to the case. Drill a small hole near the end of each of these projections, then place the tube in position in the containing case, and mark the location of the holes in the projections on the portion A of the case. Drill holes in the latter piece a little larger than those on the tube end, and thread the holes in the projections for small machine screws.

Wind at least two layers of very thin sheet mica around the tube, then drill a large number of small holes through the mica and walls of the tube. Place a single layer of thin mica around the tube after the holes have been drilled. Procure 21 ft. of No. 32 gauge nichrome resistance wire, mark the center of the piece in some manner, and wind one-half of it on the tube, starting at the end with the projections and stopping at least $\frac{1}{4}$ in. from the other end. The turns should be equally spaced, and a thin sheet of mica placed outside the first layer, whereupon the second layer is wound on, but in a reverse direction to the first, to make a noninductive winding. Place a layer of mica outside of the last layer of wire, and then several turns of sheet asbestos outside of the mica. Do not allow the mica and asbestos to come near the end of the tube that is placed in the opening E, Fig. 1. Care should be exercised in terminating the resistance wire, and the following suggestion may not come amiss.

Obtain two small pieces of asbestos-insulated copper wire, about 8 in. long. Attach the ends of the resistance wire to the ends of these two pieces, and anchor the pieces of copper wire securely to the tube.

The free ends of the pieces of copper wire are to pass through an opening in the piece R of the containing case into the switch compartment. The wires should be well insulated where they pass through the openings or bushings provided. Attach one of the wires to one of the screws holding the spring, Fig. 6, and the other under the screw in the hole Z, Fig. 9.

Obtain a piece of lamp cord of suitable length, provide an attachment plug on one end, and put the other end through the opening H in the portion A of the containing case. A knot is tied in the end of the cord inside the case to relieve the electrical connections of any mechanical strain. Remove the insulation from the ends of the lamp-cord conductors and attach them to one of the screws holding the spring, Fig. 7, and the screw in the hole Z, Fig. 9. Be sure that the lamp cord, or other wires, do not in any way interfere with the free operation of the switch.

A cover for the case can be made from some thin brass, the edge of which must extend over the end of the case a short distance, except at the lower side

where it will be inside the ends. The upper and lower edges may be fastened with four small screws placed in holes drilled in the projections shown in Fig. 1.

The completed heater should be tested, and if found to operate satisfactorily, it is carefully finished, nickel-plated, and mounted on a slate, or marble, base. The dimensions of a suitable base are given in Fig. 11. Depressions are made in the surface of this base to admit the heads of screws on the back of the case. It is best to have the case at least $\frac{1}{4}$ in. away from the surface of the base, which can be accomplished by placing several washers on the mounting screws between the back of the case and the base.

To Keep Tan Shoes from Turning Dark

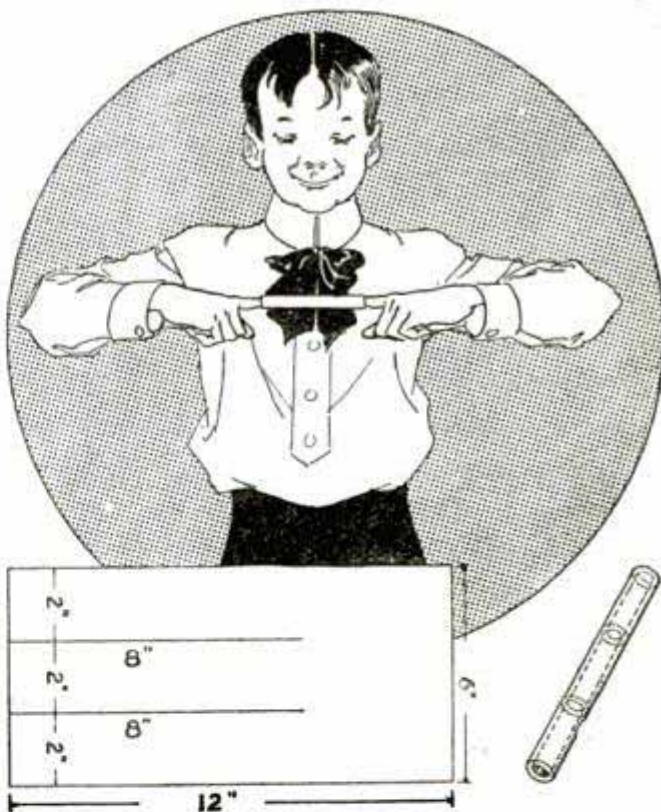
Tan-shoe polishes seem to rub the dirt into the leather and to darken it in a short time. Tan shoes can be kept clean and well polished without losing their original bright tan color if treated in the following simple manner. Instead of using tan polish on a new pair of shoes, dampen the end of a soft clean cloth, and rub a small portion of the leather at a time with the moist end and then rub briskly with the dry end. In this way tan shoes can be kept clean and nicely polished like new.—Contributed by John V. Voorhis, Ocean Grove, N. J.

A Finger-Trap Trick

It is easy to fool one's friends with the little joker made to trap a finger. It consists of a piece of paper, about 6 in. wide and 12 in. or more long. To prepare the paper, cut two slots in one end, as shown, and then roll it up in tube form, beginning at the end with the cuts, then fasten the end with glue. The inside diameter should be about $\frac{1}{2}$ inch.

When the glue is dry, ask some one to push a finger into either end. This will be easy enough to do, but to re-

move the finger is a different matter. The end coils tend to pull out and hold



It is Easy to Insert a Finger in the Tube, but to Get It Out is Almost Impossible

the finger. If the tube is made of tough paper, it will stand considerable pull.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.

ⒸWhen mercury is spilled it can be picked up with a medicine dropper.

INTERESTING NEW PATENTS

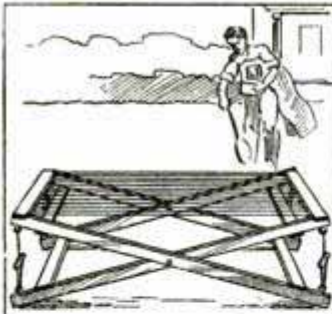


FIG. 1

FRAME FOR CLEANING RUGS (Fig. 1)—This device consists of two rectangular frames, one made to fit loosely within the other, and pivoted together at the sides. In using, the head of each frame is lifted and the ends of the rug are attached. The weight of the device causes it to flatten out downward, and this pulls the rug taut for cleaning.

GOGGLES THAT CHANGE ARTIFICIAL LIGHT TO DAYLIGHT (Fig. 2)—The artificial light entering through the lenses is modified by color filters or absorbing screens so that the effect produced is that of daylight. The goggles are worn like ordinary goggles and are made in such a way that no light can enter except through the lenses.



FIG. 2

PROTECTOR FOR CHILDREN'S SHOES (Fig. 3)—This device consists simply of a protective plate having a tang that is fastened between the heel and the sole, or between the sole and the insole. It is designed to be put on any style of shoe, and is made of metal that is sufficiently pliable to be easily shaped to the curve of the toe, or other part of the shoe.

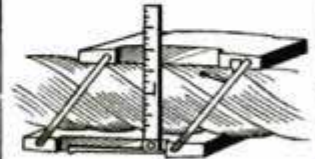


FIG. 4

ROPE CALIPERS (Fig. 4)—The diameters of ropes are hard to measure with ordinary calipers or other measuring instruments where the crests on opposite sides are not diametrically opposite to each other. This instrument consists of two flat blocks connected by links so that the faces are always parallel, and is made long enough to cover several of the crests. It is placed over the rope, as shown, and the diameter is measured by a scale attached to one of the blocks.

BOOK HOLDER (Fig. 5; British patent)—This holder consists of a single strip of metal, with a setscrew at one end and a tongue at the other, which can be slipped in between the loose back and the binding of the book. The tongue is made trough-shaped to fit the curve of the binding when the book is opened. The setscrew serves to attach the holder to the ledge of a reading desk.



FIG. 6

ELASTIC ATTACHMENT FOR FLOUNCE (Fig. 6)—This invention is evidently intended to permit freedom of movement in walking, while producing the effect of a close-fitting garment. The lower portion consists of an accordion-plaited flounce. The upper portion of the skirt fits closely about the hips, is gathered at the lower end, and is attached to the flounce by means of an elastic concealed in a fold and passing around the skirt.

RURAL-DELIVERY MAIL BOX (Fig. 7)—The special feature about this mail box is the hinged front and top, which are connected by levers so that they open and close simultaneously. The front carries a lock which engages a keeper on the top when the box is closed.

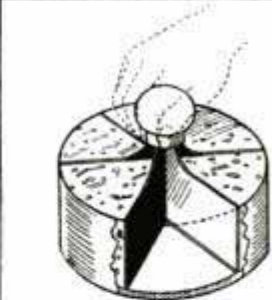


FIG. 8

CHEESE CUTTER (Fig. 8)—This cutter is designed for dividing circular cheeses into equal sectors. It consists of a series of blades arranged radially around a center, above which is a knob that serves as a handle. In using, it is simply placed evenly on top of the cheese and forced downward.

CATERPILLAR TRACTION WHEEL (Fig. 9)—The outer, or caterpillar, portion of the wheel is made in 12 sections. These are so arranged that at any given time three of the sections are flat on the ground under the wheel, while the remaining sections are held away from contact with the main wheel by means of tensing devices.

NOVEL DREDGING DEVICE (Fig. 10; British patent to an American)—This device is mounted on a boat moored in the river and takes its power from the action of the current on the paddle wheels carried on the gunwales of the boat. Power from the paddle wheels is transmitted by chain drive to a cutting wheel resting on the bottom of the river, the silt, as it is loosened, being carried away by the current. The cutting wheel is easily adjustable for depth by means of controlling levers.

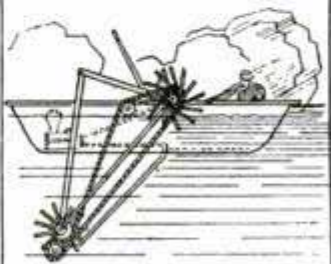


FIG. 10



FIG. 3



FIG. 5



FIG. 7

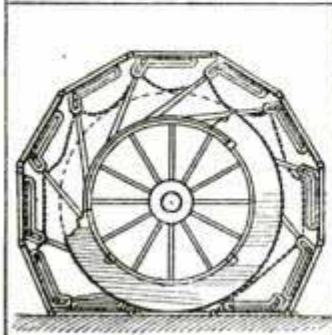


FIG. 9

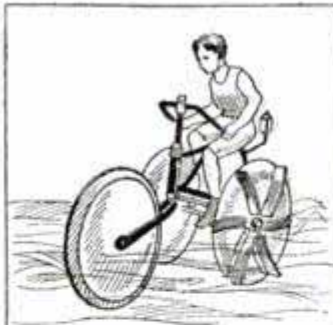


Fig. 11

WATER TRICYCLE (Fig. 11)—This curious craft is much like an ordinary tricycle except that the wheels are made with water-tight walls so that the craft is capable of traveling on the water. Propulsion is by means of the rear wheels, the sides of which are fitted with blades that act against the water.

METALLIC EDGE FOR SLIPPER TOP (Fig. 12)—This attachment is designed to hold the top of the slipper against the foot as well as to prevent it from bending out of shape. It consists of a small metallic tube, inside which is a continuous coil spring.



Fig. 12

NOVEL BOAT-LAUNCHING MECHANISM (Fig. 13)—This is one of the most curious of the many devices that have been invented for launching boats from a ship. The launching ways are pivoted to the gunwales and are equipped with floats that support the outer ends on the water, and the boats are simply slid down into the water over the rollers that form the bottom of the launching ways. When not in use, the whole device is drawn up against the mast, as shown.

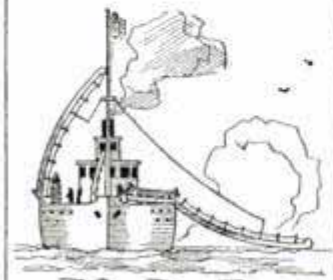


Fig. 13

TABLE THAT IS CONVERTIBLE INTO BOX (Fig. 14)—The table top consists of four leaves hinged together. With the legs removed, the leaves may be folded to form the four sides of a box. Each leaf is provided with a triangular end piece, which projects downward when the device is set up as a table. With the leaves folded, the four end pieces of each set come into contact and form the rectangular end of the box.



Fig. 14

COMBINATION STRAINER AND DRIP TRAY (Fig. 15; British patent)—The strainer is supported over the center of the drip tray by a metallic arm, as shown. The circular frame directly above the drip tray is designed for holding a cup and saucer.



Fig. 15

WASH BOILER (Fig. 16)—The water is heated in the space formed by the double bottom and passes upward through the conical tubes. Through openings near the top the mixture of water and steam is then projected against the conical deflector and falls on the main body of water. Water enters the false-bottom space through openings at the edge of the boiler, and in this way a continual circulation is maintained.



Fig. 16

STUMP BURNER (Fig. 17)—A metallic hood, made in overlapping sections so that it is adjustable to any diameter, is secured around the stump in such a way that while sufficient space is provided in the lower portion for combustion, the top is tightly closed, the whole acting much after the manner of a stove. At one side of the hood is a vertical pipe for carrying off the gases, as well as a pipe by which oil is projected against the stump.

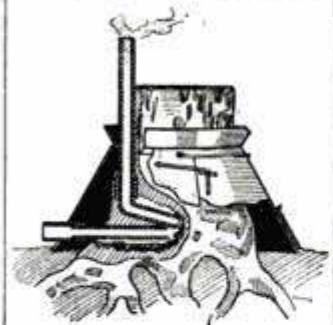


Fig. 17

VEHICLE BODY DESIGNED TO REDUCE AIR RESISTANCE (Fig. 18; British patent)—This type of body, which may be used with sidecar, cyclecar, or automobile, is circular or elliptical in cross section and tapers uniformly from the back to the front. The door may be hinged to swing upward, as shown, or to swing horizontally outward in accordance with the usual practice. Under the seat is a luggage compartment reached through a door at the back.



Fig. 18

UMBRELLA OF NOVEL TYPE (Fig. 19)—The special feature about this umbrella is the staff. This is made in two telescoping sections which are so connected by a link motion that the lower section, when the umbrella is raised, may be swung to one side of the center.



Fig. 19

RAIN-MAKING APPARATUS (Fig. 20)—This apparatus, carried into the upper air by a captive balloon, is designed for carrying out an elaborate process for producing rain, which consists in first violently disturbing the air and then supplying it with moisture and nitrogen. This plan involves the sending up simultaneously of a large number of such balloons over the area to be treated.

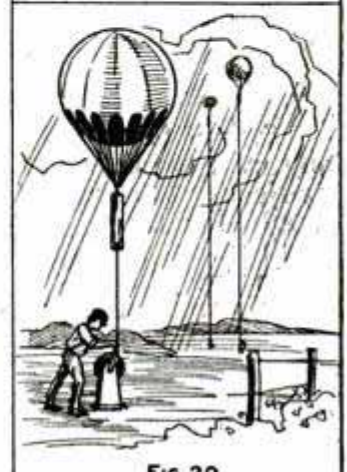
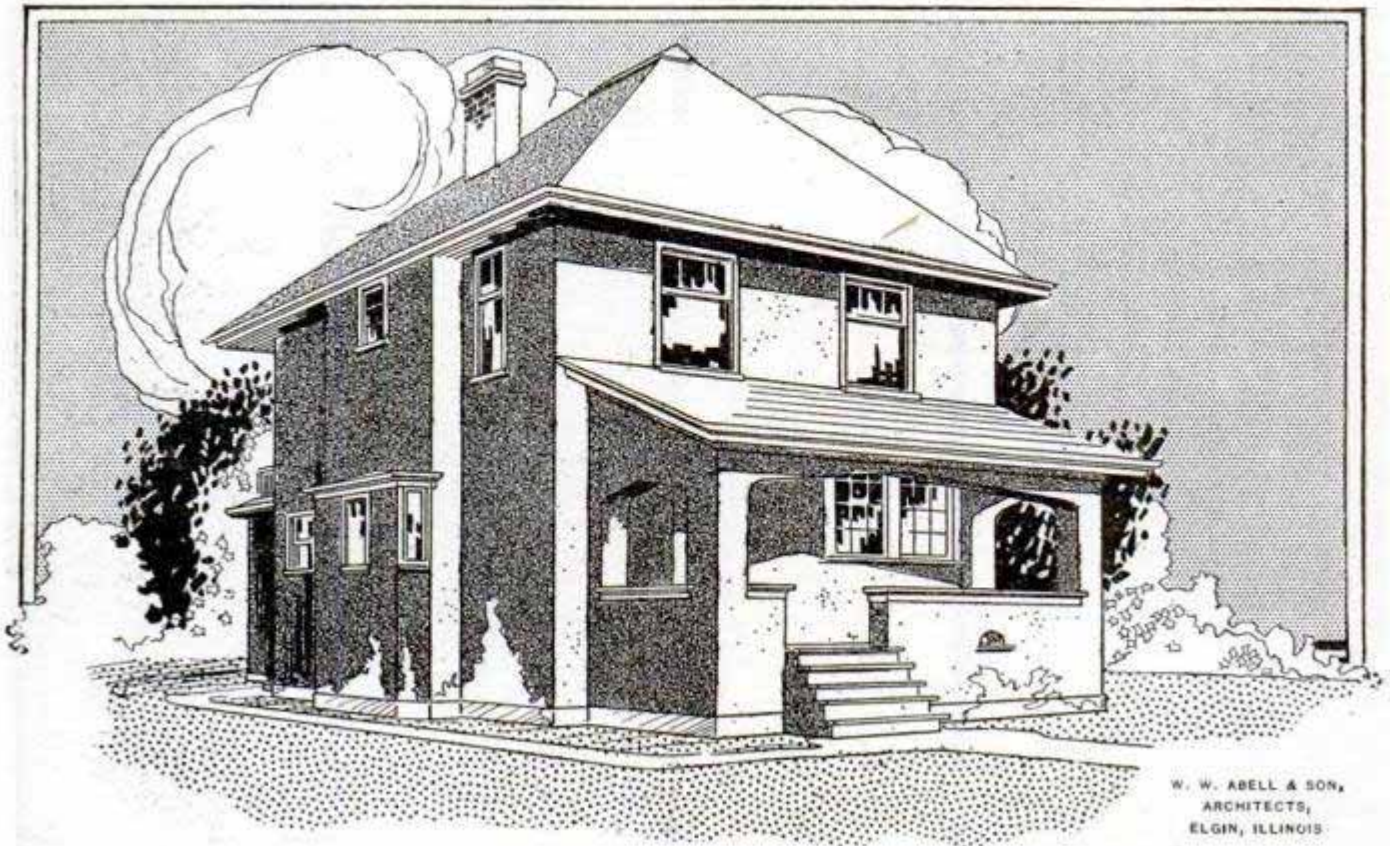
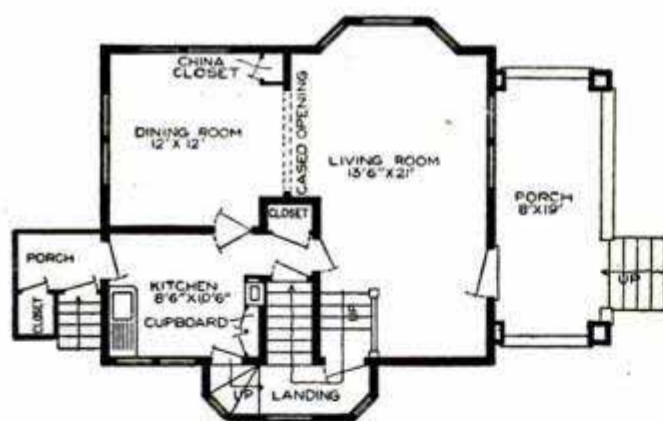


Fig. 20

AN INEXPENSIVE CONCRETE-STUCCO COTTAGE



W. W. ABELL & SON,
ARCHITECTS,
ELGIN, ILLINOIS



First-Floor Plan



Second-Floor Plan

This attractive seven-room cottage is built on simple lines, without exterior decoration, and the attractive general effect is due entirely to a skillful arrangement of line and mass. In the interior, the same simplicity and skillful handling are apparent, all the space being utilized to the utmost in providing conveniently arranged rooms of ample size. The construction consists of wood-frame walls with cement-plaster surface. A basement with unpaved floor extends under the entire building, and in this basement is a hot-air heating plant. This building is estimated to cost from \$2,700 to \$2,800.

Two of the most important features of the design are the front porch, 8 ft. wide and 19 ft. long, and the living room, extending across the whole front of the building. The dining room is adjacent to both the living room and kitchen, while the living room and kitchen are separated by a hallway. By the construction of a slight projection at the side of the building, room is provided outside the general line of the building for the landing at the turn in the stairway, and in this way much space is saved. This landing is reached by separate stairways from the living room and the kitchen.

On the second floor are three bedrooms and bath, and the stairway leads into a hallway that opens directly into each of these four rooms. The most important feature of this floor is the arrangement of closets, and particularly the use of the space above the turn in the stairway for an unusually large closet connecting with one of the front bedrooms. By a slight modification of the plan the porch roof could easily be converted into a sleeping porch if desired.



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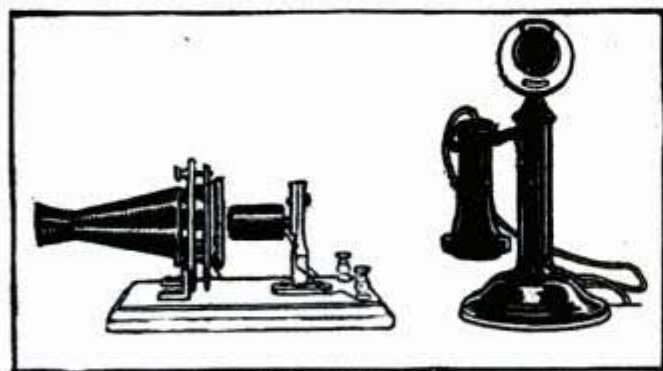
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New York

How the Public Profits By Telephone Improvements

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1876**

**Standard
Bell Telephone
To-day**

Hand in hand with inventions and developments which have improved the service many fold have come operating economies that have greatly cut its cost.

To appreciate these betterments and their resulting economies, consider a few examples:

Your present telephone instrument had seventy-two ancestors; it is better and cheaper than any of them.

Time was when a switchboard required a room full of boys to handle the calls of a few hundred subscribers. Today, two or three girls will serve a greater number without confusion and very much more promptly.

A three-inch underground cable now carries as many as eight hundred wires. If strung in the old way, these would require four sets of poles, each with twenty cross arms—a congestion utterly prohibitive in city streets.

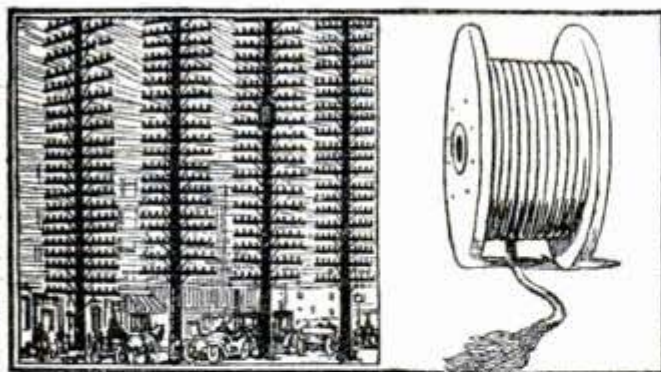
These are some of the familiar improvements. They have saved tens of millions of dollars. But those which have had the most radical effect, resulting in the largest economies and putting the telephone within everyone's reach, are too technical to describe here. And their value can no more be estimated than can the value of the invention of the automobile.

This progress in economy, as well as in service, has given the United States the Bell System with about ten times as many telephones, proportionate to the population, as in all Europe.



**Early
Telephone
Exchange**

**Typical
Present-day
Exchange**



**If City Wires
Were Carried
Overhead**

**800 Wires
in Underground
Cable**



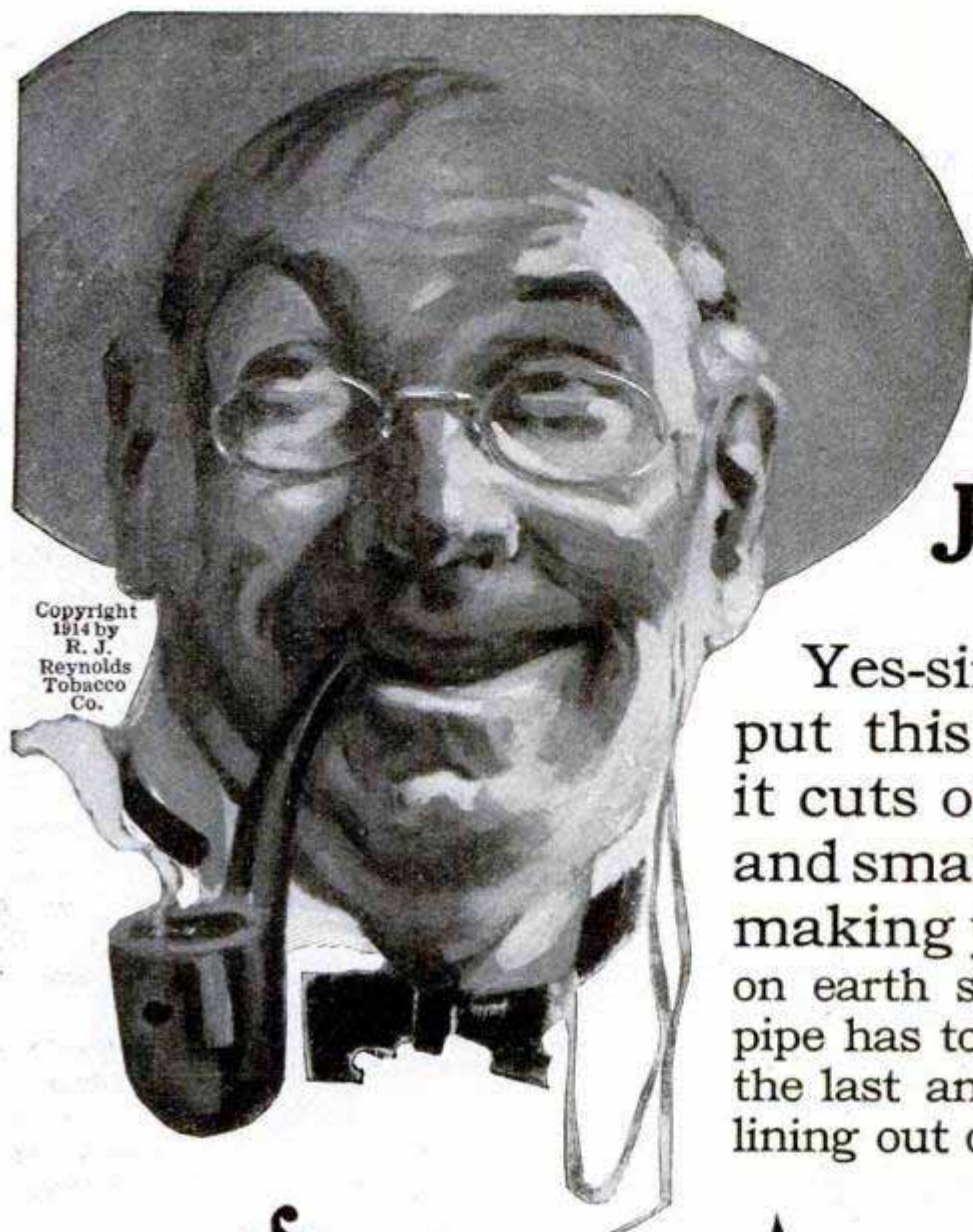
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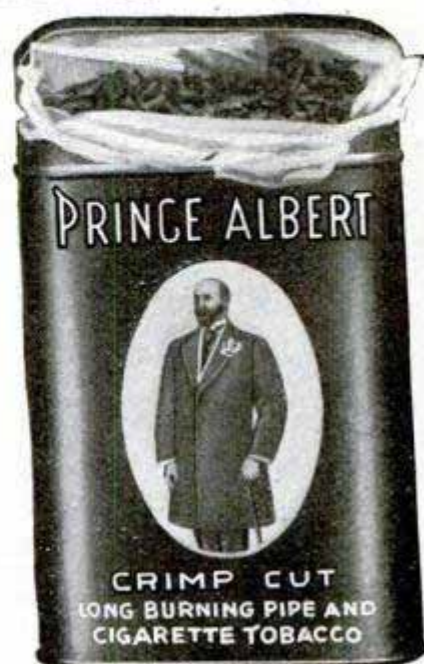
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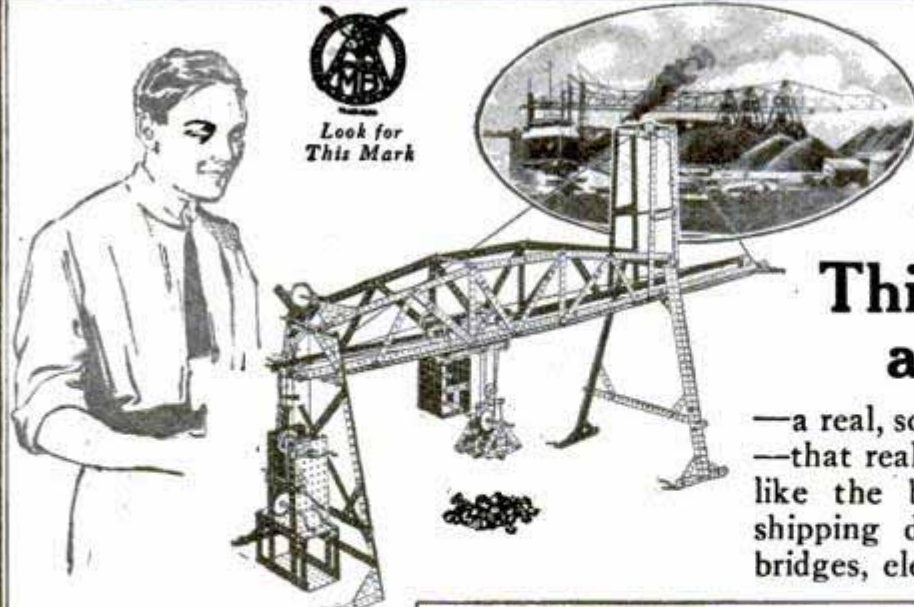
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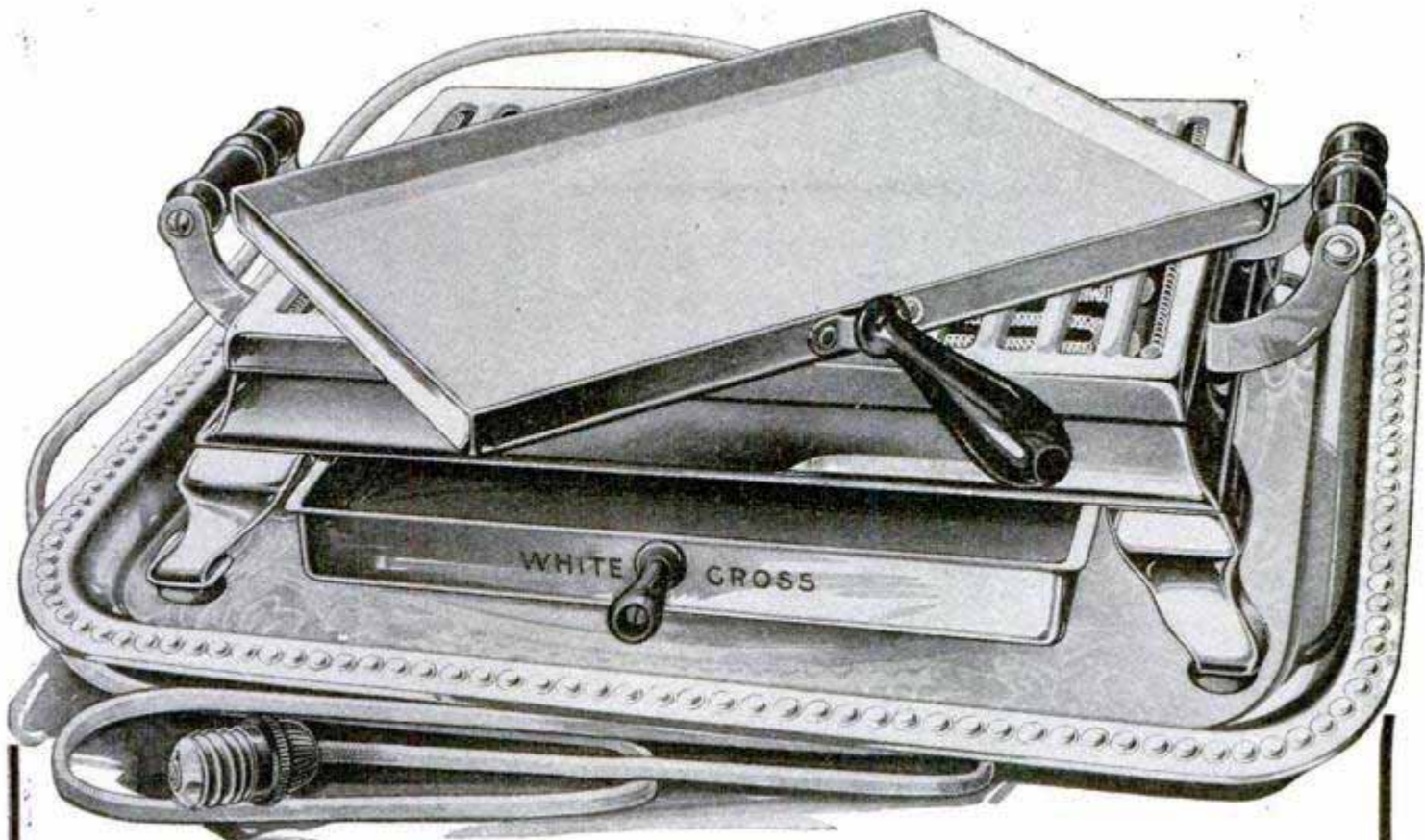
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Try It 10 Days Take the stove into your home—make the most delicious toast—tea—coffee—fry steaks, eggs, ham—use for chafing dish and do many other things. Give it a thorough test for 10 days, and then if you do not wish to keep it return to us and we will send back your money.

Send No Money To get this stove all you need to do is to mail the coupon attached to this announcement. No money necessary. Pay only after stove arrives and then only after examination. We **prepay** expressage or postage.

We prepay the transportation charges on every stove. There is nothing for you to pay but the price of the stove, \$4.50, and that only after examination. And this money will be returned to you any time within 10 days if you do not wish to keep the stove.



Use for boiling anything—water, breakfast food, eggs, vegetables; heat baby's milk, use for candy making.

Mail this Coupon Put your name and address on the coupon and mail to us today. Remember, we do not expect you to send any money. Upon receipt of coupon we will send you the stove **prepaid** for your examination. Then use your own judgment about buying. If you do not think that you would like the stove return at our expense.

Lindstrom-Smith Co.
1100-1110 S. Wabash Ave.
Desk 9198 CHICAGO

Gentlemen: Please send me prepaid one White Cross Electric Stove complete with cord ready to be connected. If after I have seen and examined it and if I like the stove I will pay \$4.50, total price of stove. After I use stove for 10 days I may return it if I wish and you will send my money back.

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For the man who likes tobacco with his golf, nothing is handier, more convenient or more *satisfying* than a chew of "PIPER." It gives just the right flavor to a snappy, vigorous afternoon's pleasure.

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CHEWING TOBACCO—Champagne Flavor

has converted thousands of men to the convenience and the enjoyment of chewing tobacco.

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And for the man who enjoys tobacco, "PIPER'S" delightful *lasting flavor* completely *satisfies* his taste as nothing else can.

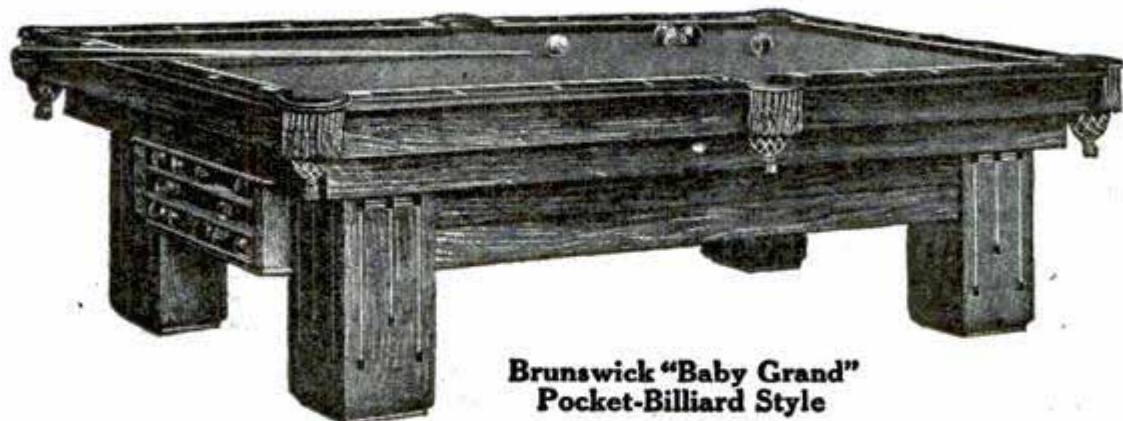
The New 5c Foil-Wrapped Pocket Plug is neat, convenient and very popular. Fits snugly in the vest-pocket, and the foil wrapping keeps the tobacco clean, sweet and full of the delicious "Champagne Flavor."

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Brunswick "Baby Grand"
Pocket-Billiard Style

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△ UR latest volume, "The Home Magnet," sparkles with the sunshine of sport properly played—of facts interestingly told—of pleasure to be easily secured. Billiards—*home* billiards—the tonic for tired brains and unsteady nerves—is graphically explained in simple English and beautifully colored pictures—in "The Home Magnet." This document also tells of the famous Brunswick "Baby Grand" Billiard and Pocket-Billiard Tables, including the "Convertible" Tables which can be instantly changed into dining and library tables. Every page reveals unlimited sources of satisfaction. This book, like the billiard tables it portrays, is a worthy product. Coupon brings it with our compliments.

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are *not* toys, but real billiard tables giving the same speed, the same accurate angles and long life of Brunswick regulation tables. The "Baby Grand" varies in size only, *not* in performance. Sizes 3 x 6 ft., 3½ x 7 and 4 x 8. Larger sizes in different styles. Made in rich San Domingo mahogany, with genuine Vermont slate bed, celebrated Monarch quick-acting cushions and fast imported billiard cloth. Complete playing equipment free with each table.

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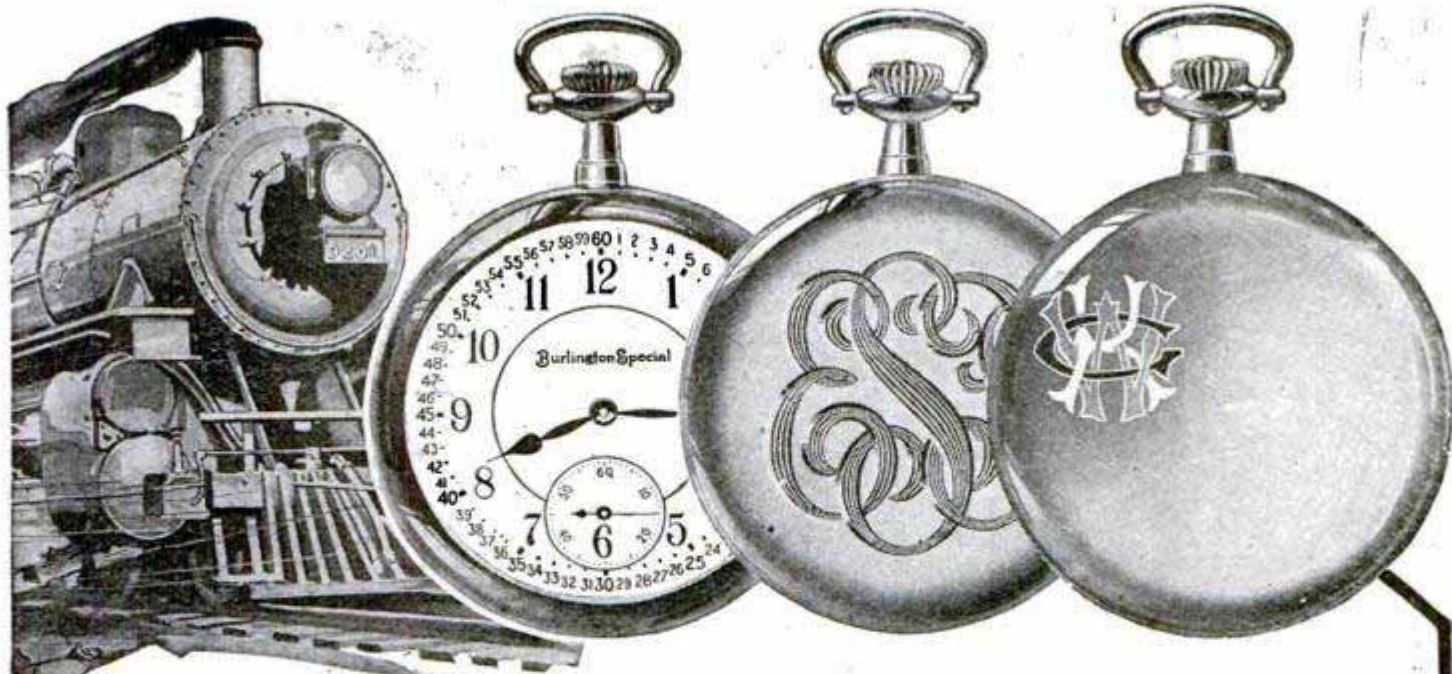
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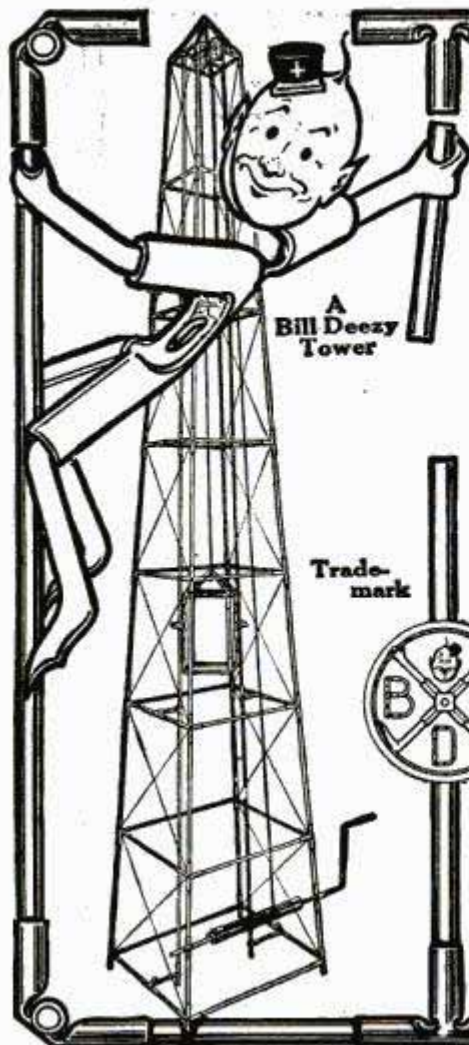
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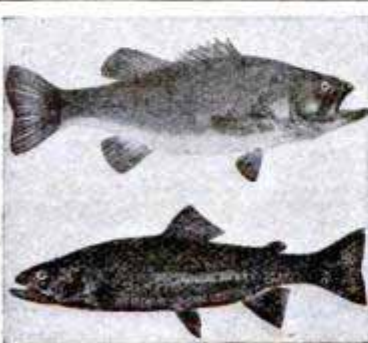
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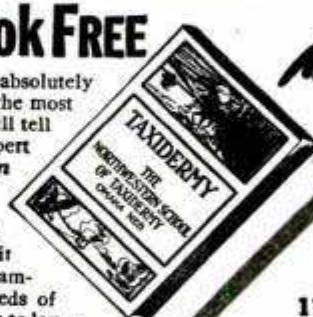
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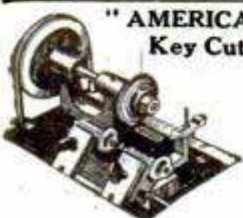
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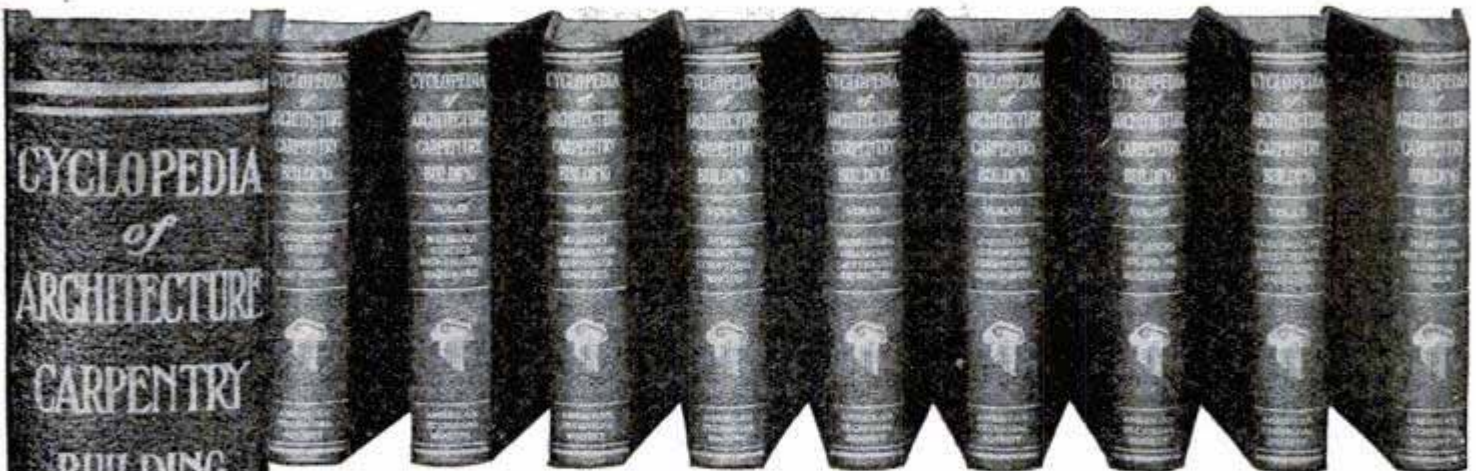
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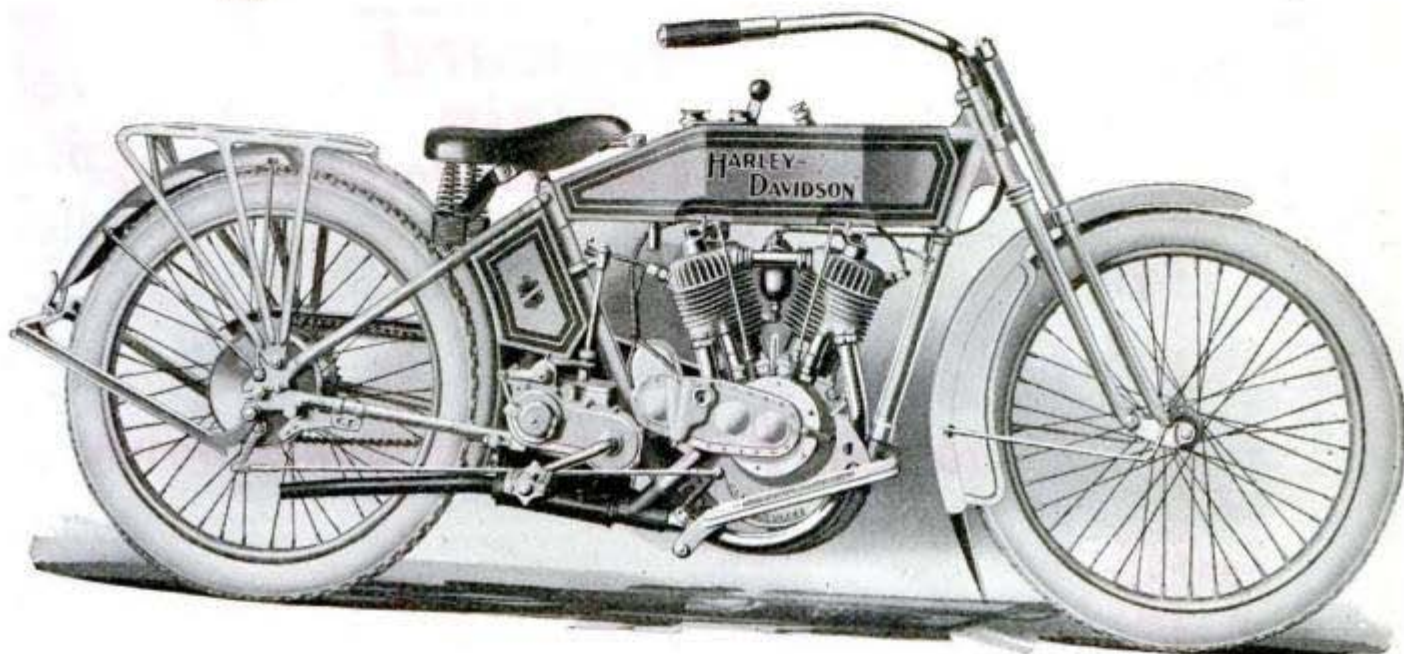
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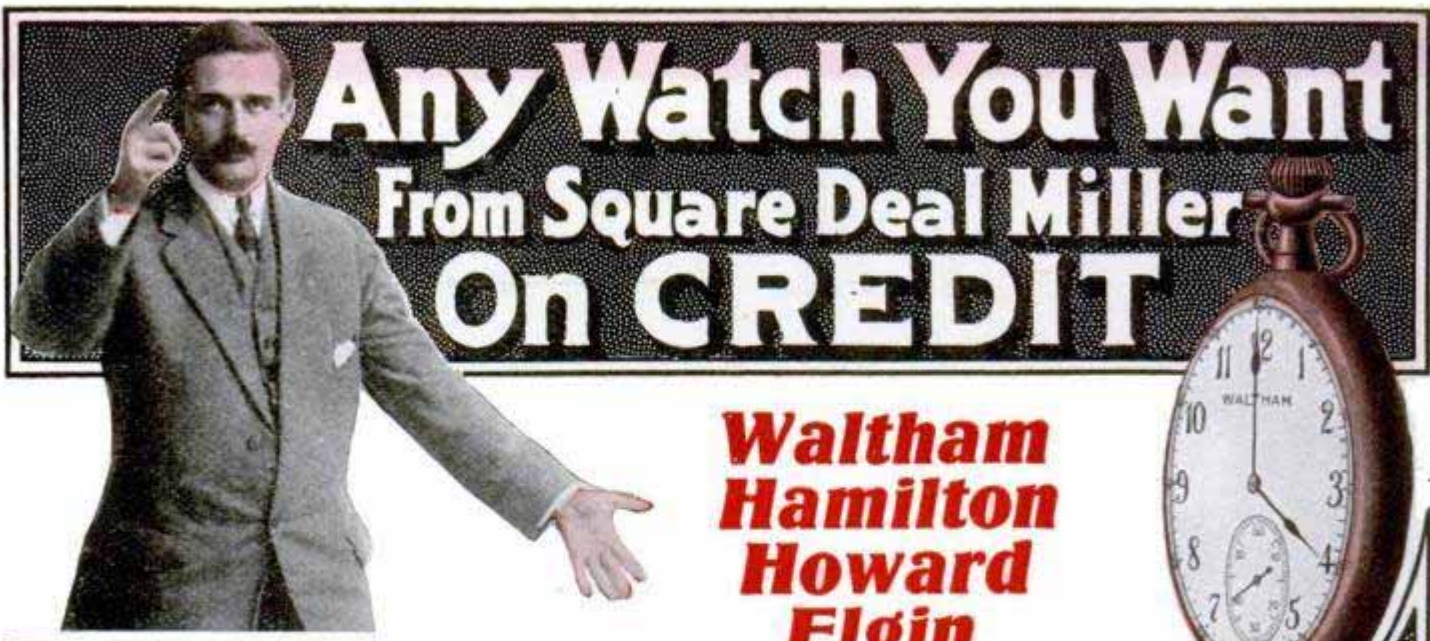
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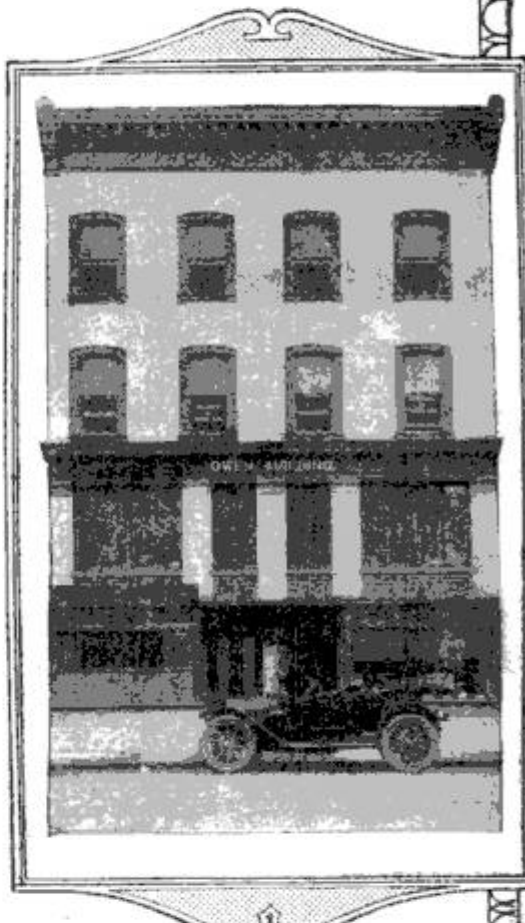
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(By a Washington Patent Attorney)

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I know of 28 concerns that are looking for a new window screen, duly covered by patent, which they can manufacture. I know of 46 manufacturers and others who are ready to manufacture any good patented household article, such as can openers, baking pans, coffee pots, washing machines, carpet sweepers and other devices. Within the last few weeks I have received forty special requests for a dishwasher and drainer. Seventeen others request an improvement in scissors.

Among my letters are sixteen requests for a device to turn sheet music on a music stand or piano, and seventeen people are interested in the purchase of a patent for holding an electric light in any position.

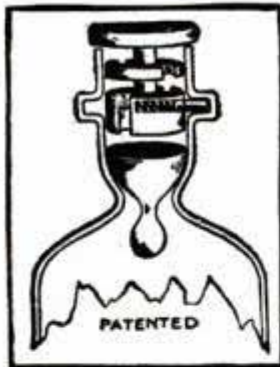
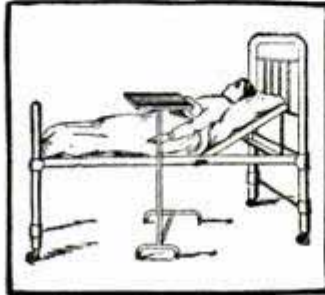
A man at Woodhaven, N. Y., says he is in the market for a small household article, light in weight, which can be sold somewhere around ten cents.

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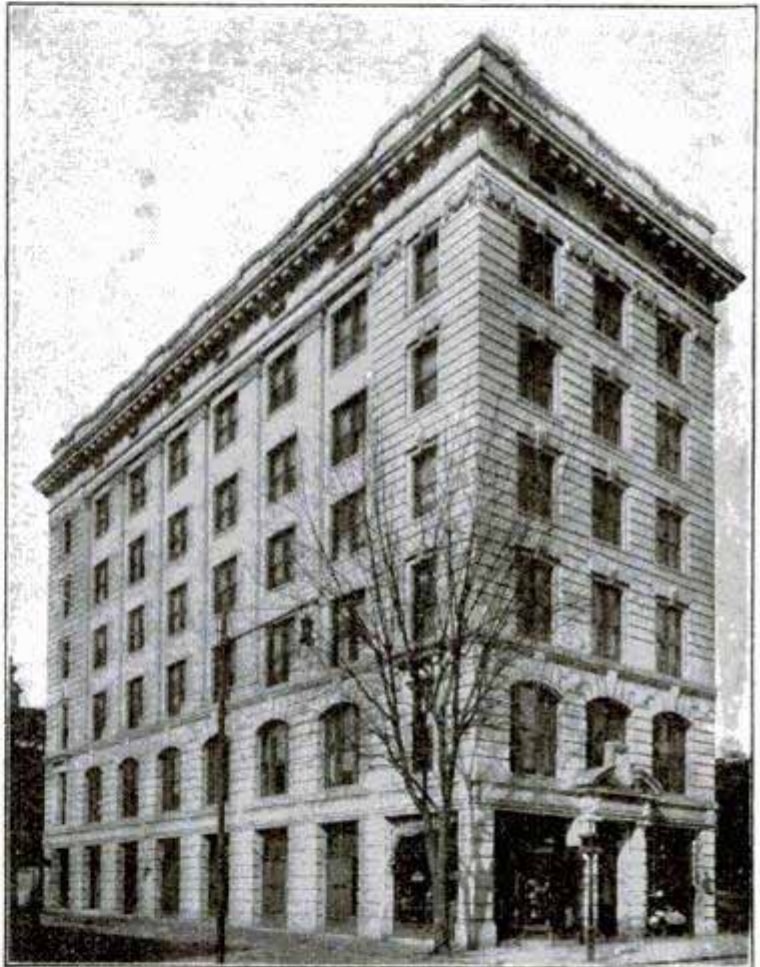
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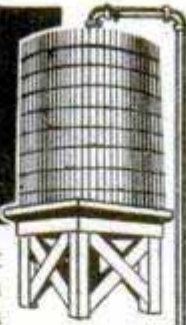
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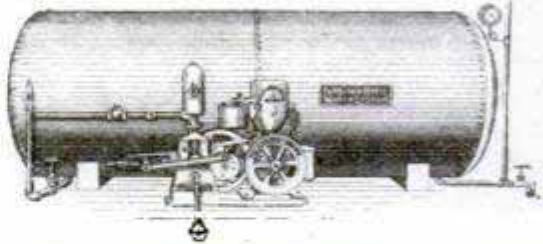


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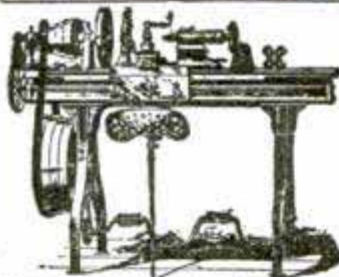
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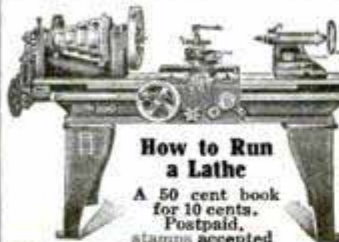
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9 to 13-inch Swing
List price \$75 and up according to size. When ready to buy send for Lathe Catalog and prices.

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DIVINE WATER MOTOR CO. DEPT P. UTICA, N. Y.

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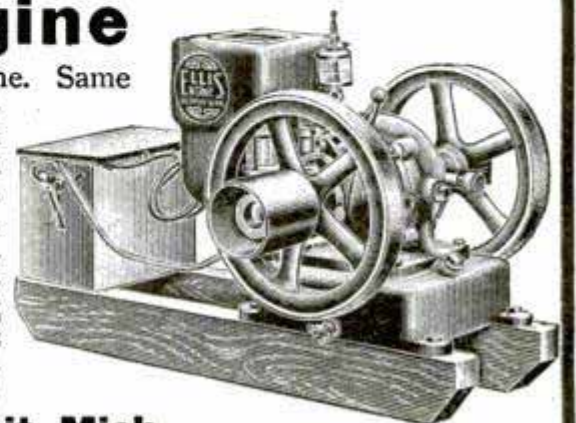
Here's the biggest engine value ever offered in a 1 1/2 H. P. engine. Same cylinder capacity as many 2 1/2 H. P. engines. Throttling governor adjustable while running; crankshaft extends on both sides. Runs either way. Starts without cranking. Equipped with Ellis Patent Fuel Device, guaranteeing successful operation on cheap oils. Beautifully finished in genuine engine enamel.

Runs on 9c a Day Just the engine for pumping, separating, churning, corn-shelling, sawing,

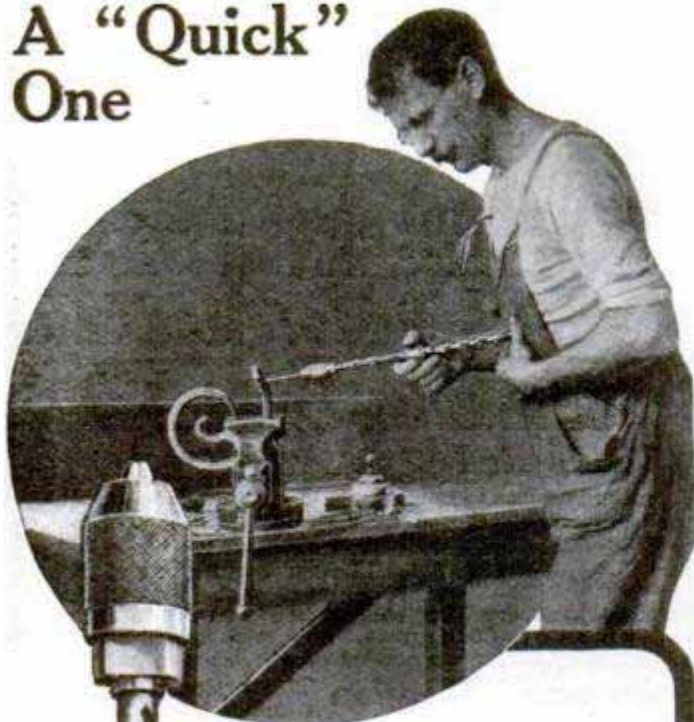
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"YANKEE" TOOLS

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Length, 16 in. Traverse of driver, 8 1/2 in.

"Yankee" Reciprocating Drill No. 50—Price, \$2.50

Your dealer can supply you

"Yankee" Tool Book; free to mechanics and householders. "Yankee" Tools in the Garage" free to motorists.

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The heads of the KIT Pliers are made of carefully tempered special tool steel. Every head is inspected and tested at the factory for hardness and toughness and guaranteed absolutely free from defects. The handle and six heads of the KIT Plier give the use of 15 tools with the weight and bother-of-carrying reduced to one. Packed in either fibre chest or tool roll. Farmer's Kit, Auto Kit or Mechanic's Kit.

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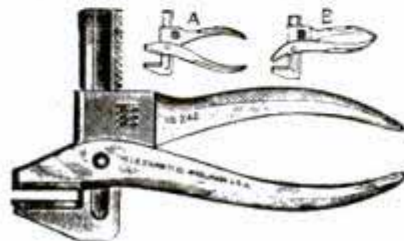
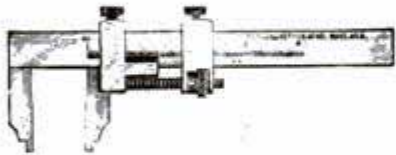
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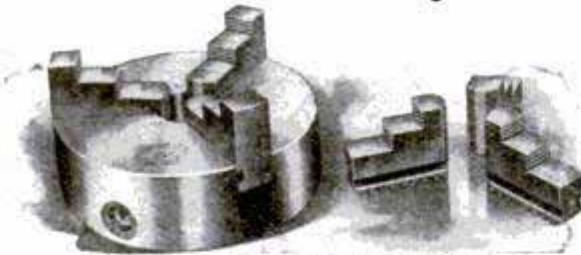
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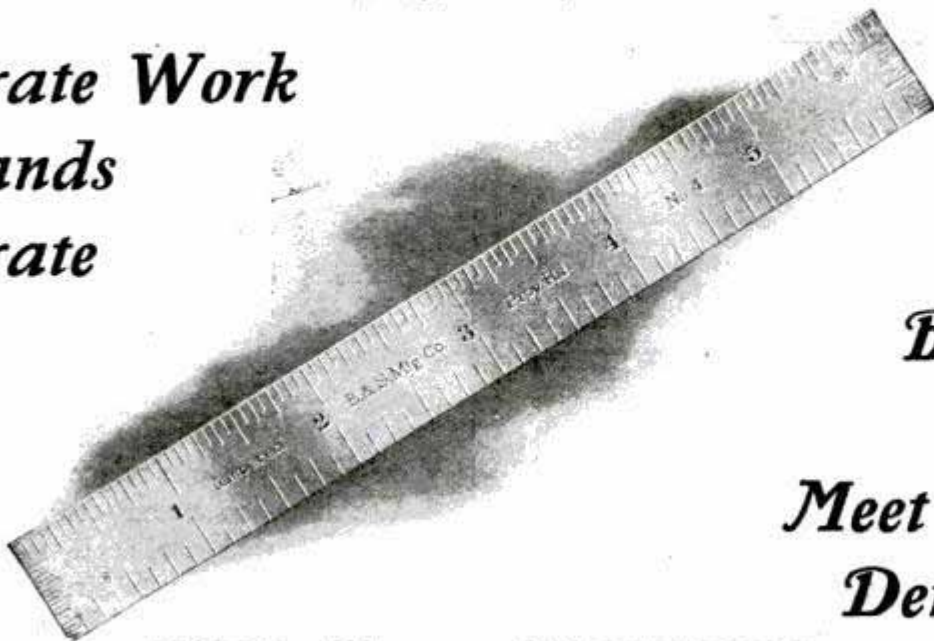
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	For Nuts Diam. Bolts		For Cap Screws Diam. Sew.				
	Small Head	Large Head	Small Head	Large Head			
721	1/8		1/8	3/16			5/16 & 3/8
23	3/16	1/4		5/16			7/16 & 1/2
725A			1/4	3/8			1/2 & 5/8
27	5/16	3/8					3/4 & 7/8
729			7/16	1/2			
731B		1/2	9/16	5/8			
32	7/16	9/16			3/8 & 1/2	5/8 & 3/4	1 & 1 1/4
33C				3/4	1/2 & 5/8	3/4 & 1	
737		3/4	7/8	1	1/2 & 5/8	3/4 & 1	
38	5/8	7/8			1 & 1 1/4		

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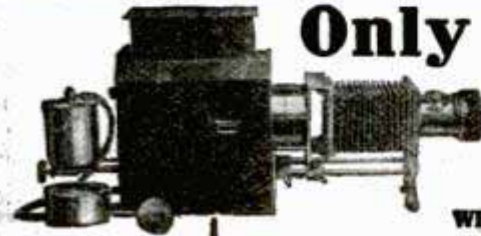
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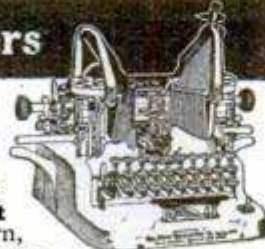
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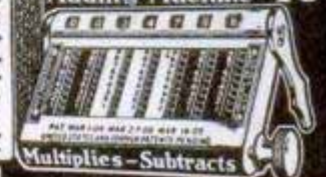


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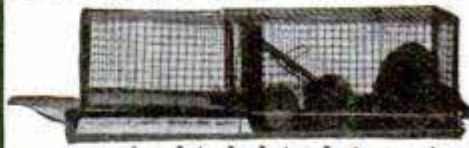
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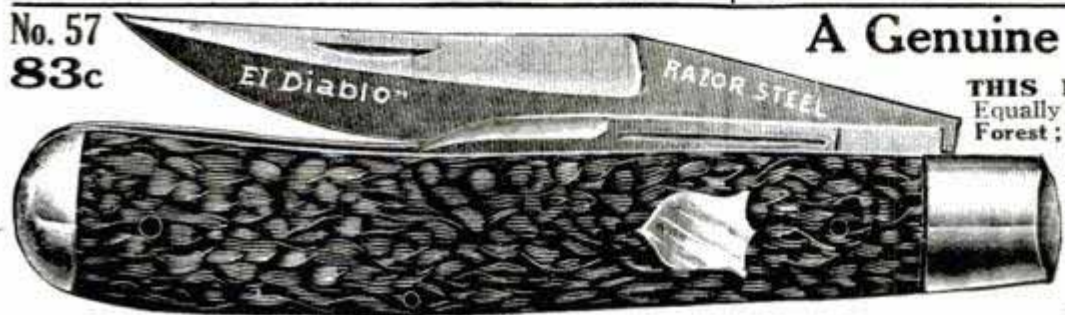


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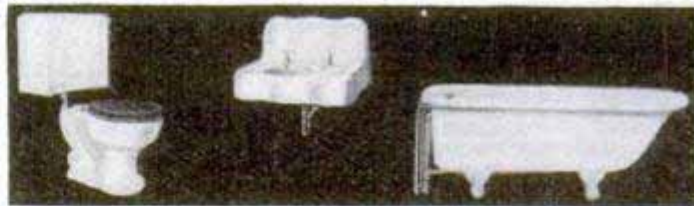
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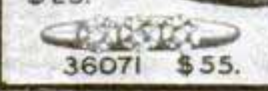
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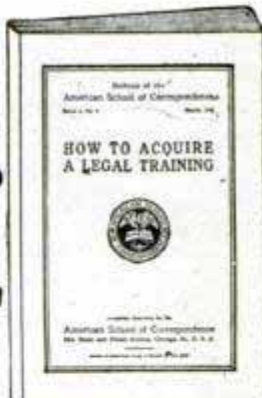
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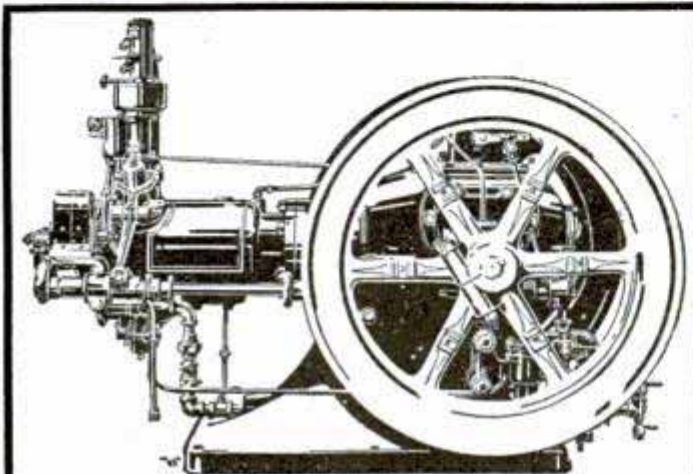


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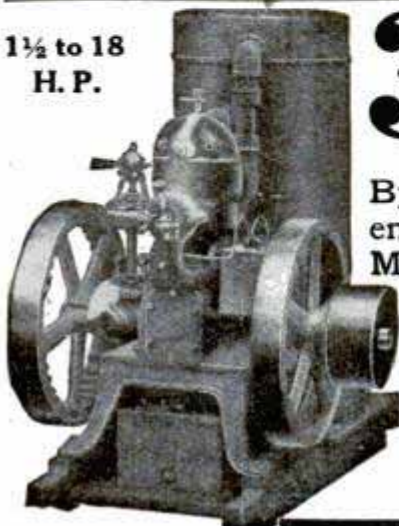
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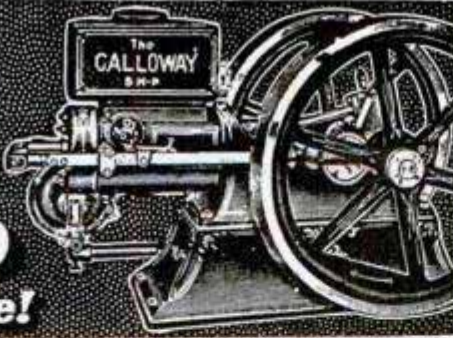
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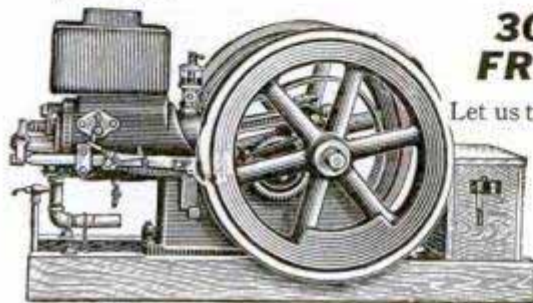
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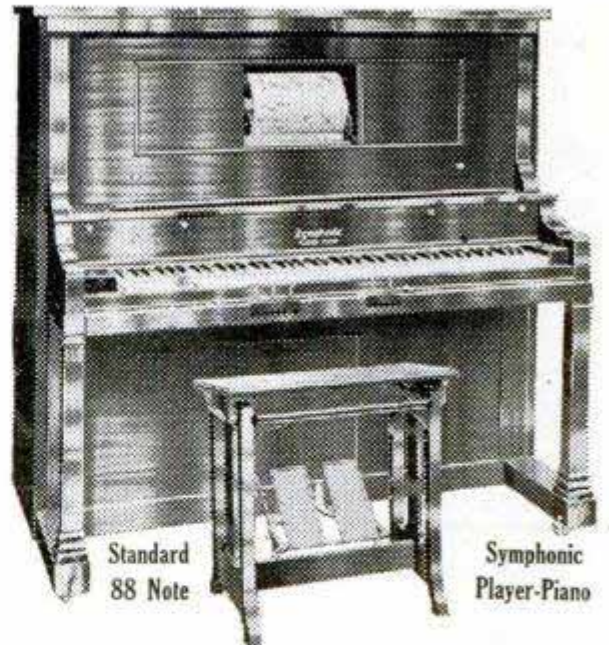
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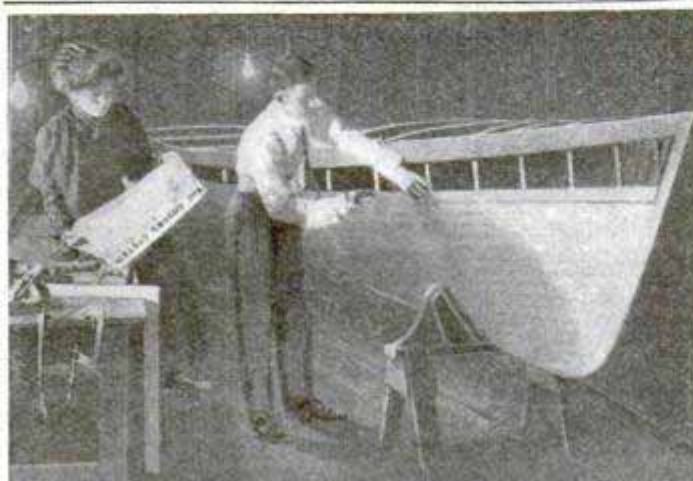
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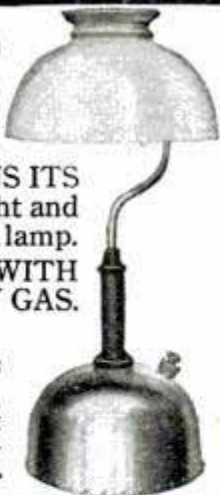
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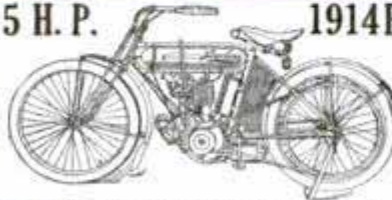
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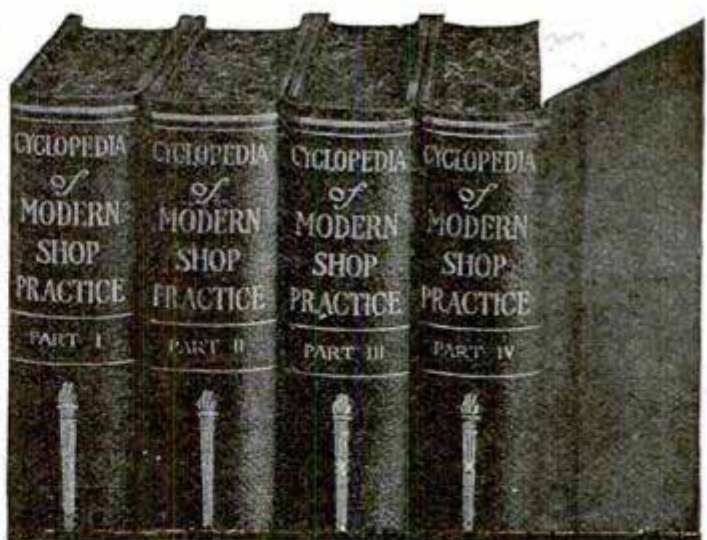
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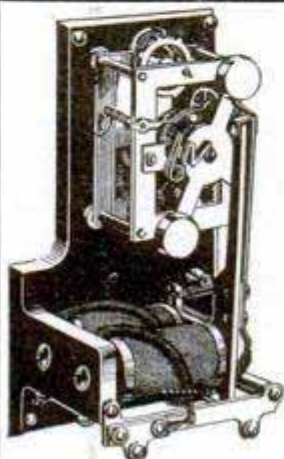
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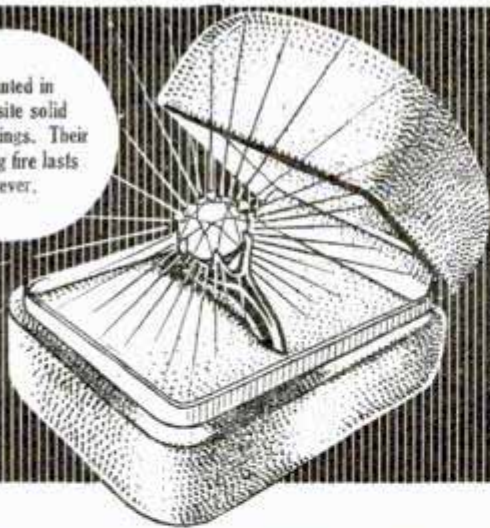
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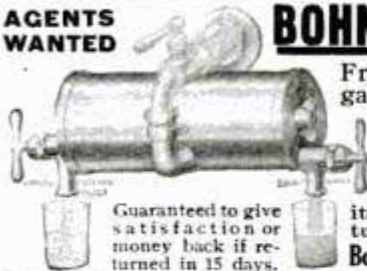
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**\$100
DOWN
FREE TRIAL**

Play Billiards at Home

Billiards and Pool are fine, clean, interesting games—games that fascinate with their close, exciting, constantly changing situations—games that test the skill of hand, eye and brain, and arouse the keenest sort of friendly rivalry—games that the whole family will enjoy. Billiards and Pool are expensive if played in a public poolroom, but almost anyone can afford to have at home a

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You can play on it while you are paying for it. The prices are from \$15 up, on easy terms of \$1 or more down (depending on size and style selected), and a small amount each month. Sizes range up to 4½x9 feet (standard). Complete playing equipment of balls, cues, etc., free.

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FREE TRIAL—NO RED TAPE

On receipt of first installment we will ship Table. Play on it one week. If unsatisfactory return it, and on its receipt we will refund your deposit. This ensures you a free trial. Write today or mail this coupon:

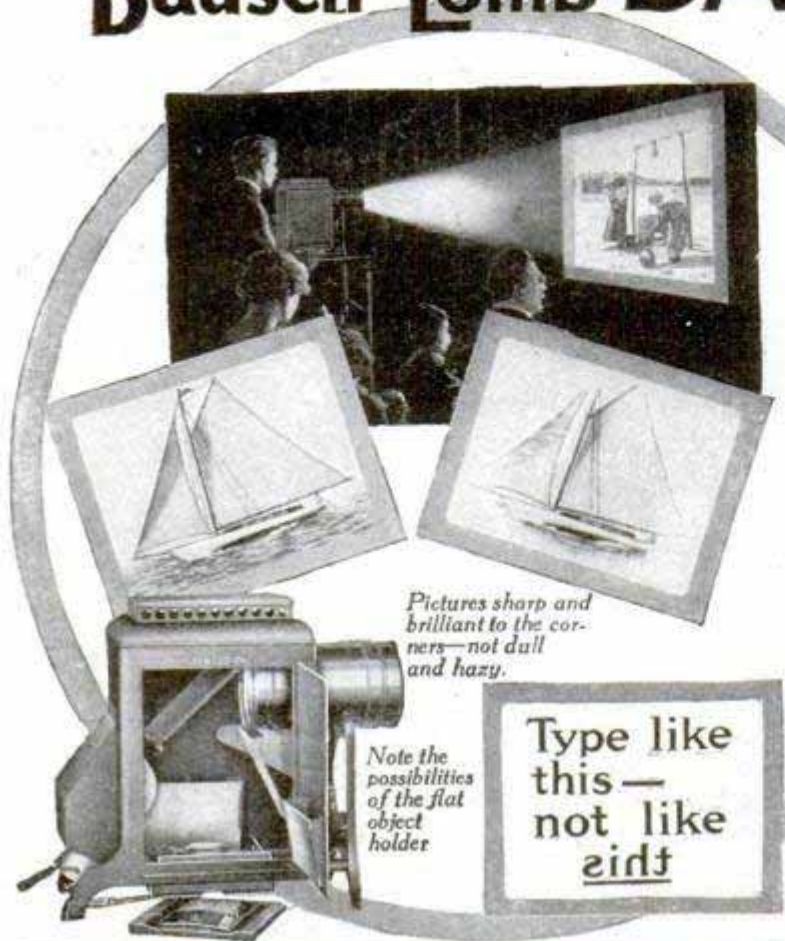
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HOME BALOPTICON

made primarily as a projector of post cards, photographs, and various objects.

Special *nitrogen-filled Mazda lamp* with optically corrected mirror gives an illumination superior to anything heretofore offered.

Automatic, perfectly safe and simple enough for any child to operate. Fitted with high-grade achromatic lens, giving well-defined pictures sharp to the corners.

Price for Home Balopticon complete for the projection of post cards, including aluminum coated screen, only \$35. Sold by optical and photographic supply dealers.

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Successful Methods of Men on Farms or Small Acreage. Complete in twelve parts; printed in one volume.

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The aggregate debt of the 48 state governments, as reported by the Bureau of the Census recently, amounted to \$422,796,525 on June 30, 1913, while on the same date the national government had a total debt of \$2,913,204,914.



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Attached to Common Dry Battery. No mysterious connections. Turn the switch. A big, bright, white light. Scientists are amazed at candle power. Tungsten's latest marvel. Lasts for months. Battery lasts a year or more. Not a toy but a real Electric Lantern. No Oil, Dirt or Smoke. **Safe Always.** Can be bought of Hardware, Electrical and Battery Dealers. **Special Price \$1.00** Sent prepaid direct to you via Parcel Post. Special Agencies Open. 100 Electrical Bargains. HANDY ANDY ELECTRIC CO., 1048 Lawrence Ave., Chicago, Ill.

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A oneminute camera. Eliminates films, plates, printing and dark room. No fuss, muss or trouble. No developer worries. Pictures cost you only 1¢ each to make. Great camera invention. Get a "Mandel-ette" for your vacation. Use it for all occasions. You can't afford to be without one.

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We are the inventors and manufacturers of the "Mandel-ette" Camera and want everybody to own one. We sell it direct to you and at rock bottom price. Order from this ad; make pictures with the camera; and if it does not do all we claim, we will refund your money. This fair offer fully protects you.

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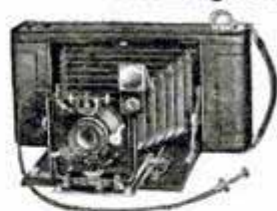
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Mission Furniture — How to Make it PARTS 1, 2 and 3

comprising 98 designs, all different, with full instructions for making each piece, and **Wood-Working for Amateur Craftsmen**, a book explaining every essential step in wood-working.

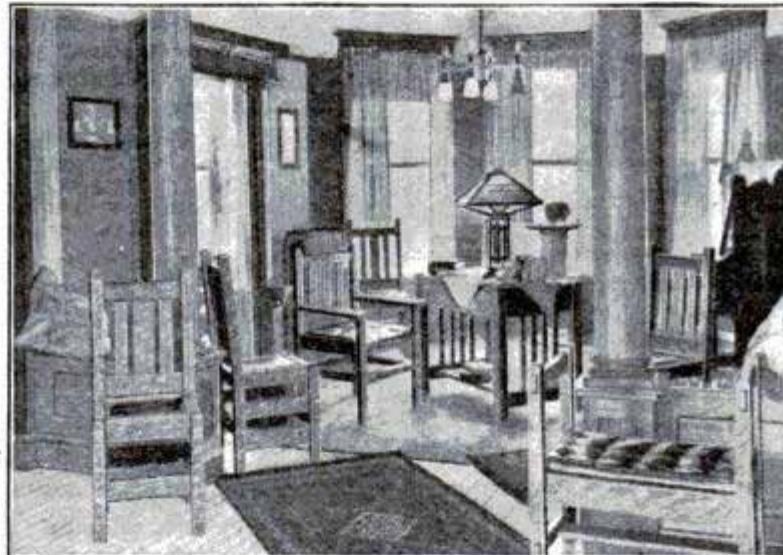


The **Mission Furniture** books describe how to make furniture for every room in the house as well as swings and chairs for the porch and lawn. Whether you need a complete set or only some special article to fill in with here and there, you will find full directions, dimensions and working drawings for making it in these books. The instructions are easy to follow so that even the amateur can get most satisfactory results. Every piece of furniture shown in the picture was made by one of our readers who is strictly an amateur with tools. He experienced no difficulty in the work and was so well pleased that he took this photograph which he has kindly allowed us to use.

The Designs are Attractive and of Most Approved Patterns and Comprise the Following :

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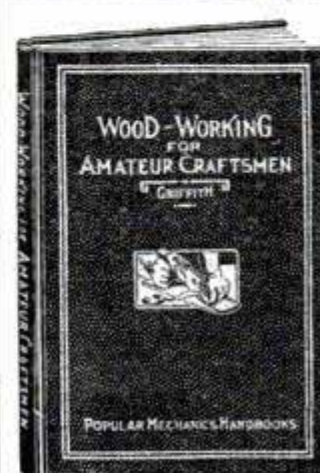
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to anyone who proves that we do not make all OUR garments absolutely tailor-made to your individual order and measurements. We do not carry ready-made garments in stock. We give you a legal guarantee of money back if you are not delighted with the perfect fit, elegant fabrics, style and wonderful wear of our garments.

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An exceedingly useful ornament. No longer necessary to keep a lamp burning all night for emergency purposes. No more stumbling over chairs or stubbing toes in order to find a match. Knight's Electric "Nitelite" is always ready. Just lift it by the handle and the light is on. Simple, Durable, Efficient. Sells on sight. Agents can secure exclusive territory by writing at once.

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It will take you there and back, pay all your expenses and net a big daily profit besides. Takes photo post cards and buttons, finished on the spot in less than a minute. **8c Profit on Every Dime** and more for group pictures, sell for 25c, cost you 25c—there's a fortune in it. Write for free illustrated circular to International Metal & Ferro Co., D. 12 B. Chicago

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In Reserving One of These Choice Citrus Fruit and Truck Farms on Our Special Terms of Only

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We are giving 100 fine, sturdy Citrus Fruit Trees FREE to each purchaser of one of these Florida farms—a full assortment of 100 Citrus Fruit Trees ABSOLUTELY FREE.

These trees, when delivered, will be from one and a half to two years old, budded on strong, hardy, rough lemon and sour orange stock—good, sturdy, healthy young trees that compare favorably with those sold by the reliable nurseries at 45 to 85 cents apiece.

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To Get Your FREE Fruit Trees, Mail Coupon Today

OUR NEW LITHIA TRACT is suburban to Tampa, the metropolis of South Florida, and is one of the few choice citrus fruit tracts left in Hillsboro County, the recognized center of Florida's grape fruit and orange belt.

This is the third great Hillsboro County tract subdivided by our old established, responsible, thoroughly experienced organization. Over 2,500 families are now rejoicing because they bought at opening prices in our two former tracts. Every family can tell you they got a square and generous deal.

Our New Lithia Tract now offers you the same wonderful opportunity—better still, because of the rapid growth and development on all sides within the past four years. Our surveyors have completed their work of subdividing the New Lithia tract into 10, 20 and 40-acre Citrus Fruit and Truck Farms, and it is now being thrown open to home-seekers and investors.

Hillsboro County is building ONE MILLION DOLLARS' WORTH OF NEW BRICK COUNTRY ROADS—the first county in the U. S. to vote such an appropriation. Improvements of all kinds are going rapidly forward. Already buyers are building homes on our new Lithia Tract, and values are due to rise here just as they have in our two former suburban farm tracts in this same county.

The visible supply of select Hillsboro County grape fruit land is fast melting away. Prosperous homes are scattered around the new Lithia Tract—grape fruit and orange groves are flourishing on all sides.

One judicious investment beats years of labor. If you do not wish to improve your farm, you can cash in on it from the investment standpoint in a few years without a stroke of work on your part.

Get our big new Florida book and look at the map—four big railroads intersect our suburban farms—all the comforts of modern life right at hand! The completion of the Panama Canal throws the spotlight on Tampa, the nearest deep water port, and now the traffic of the whole maritime world will pause at Tampa's door.

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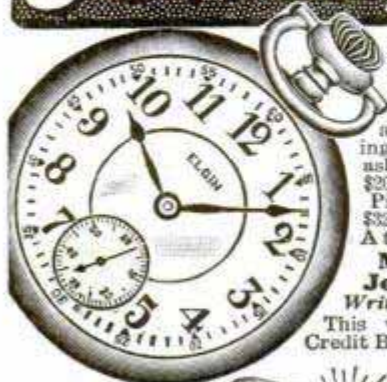
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MAKE \$21 NEXT SATURDAY

BRAND new proposition, patented last January. Amazing invention, compressed air washing machine, weighs but two pounds; excels work of high-priced machines. Customers excited; agents coining money. A sale at every house. Price, only **\$1.50**; 200% profit. Cleans tub of clothes in 3 minutes; works like magic. F. Hughes made \$21 first 8 hours. No charge for territory. Investigate. Write now. **WENDELL CO., 339 Oak Street, LEIPSIC, OHIO**

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Prices on Edwards Steel Shingles have been chiseled down to bed rock. Never before could you buy these famous steel shingles at such low prices. You can now buy steel shingles that won't rot, rust, crack, burn or leak for the cost of old, out-o'-date wood shingles. Edwards STEEL Shingles are in successful use on over 135,000 homes. Will outlast any building.

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Edwards Steel Shingles are cheaper than good wood shingles—will last 5 times longer, over 138 thousand in successful use.

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Come in big clusters ready to put on. A few nails, hammer and a little time—10 times faster and 10 times easier than putting on wood shingles, one at a time. Edwards Steel Shingles are rust and leak proof.

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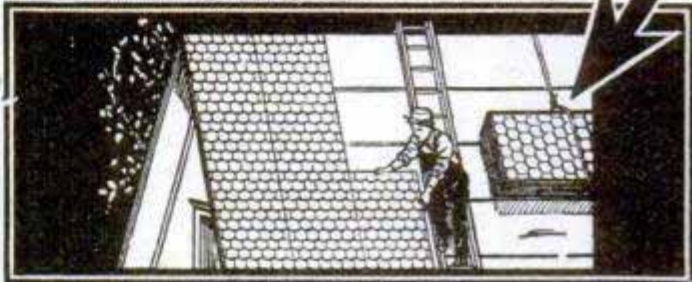
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Write for name of nearest place where you can see the Prest-O-Torch

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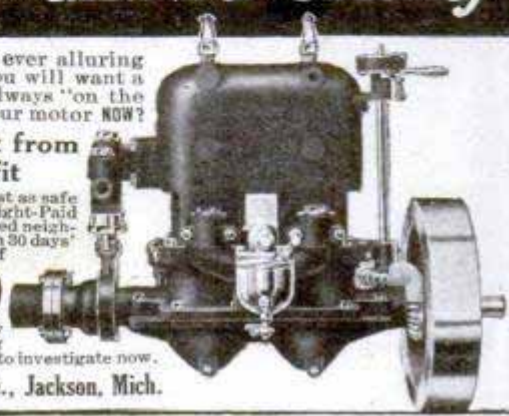


Inevitably, winter will pass. Inevitably summer with the ever alluring joys of motor boating will return. Just as inevitably you will want a staunch, reliable Lockwood-Ash Motor—a motor that's always "on the job." So why not take time by the forelock, and choose your motor NOW?

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Learn about our 30 days' trial offer which makes it just as safe to buy an L-A Motor on our Direct-from-Factory, Freight-Paid plan, as though you were dealing with your most trusted neighbor. Six models all guaranteed for one year and sold on 30 days' trial. No strings to this offer, no freight to pay. If you're not delighted with the motor you return it at our expense. The 5 H.P. Motor with Outfit complete, here illustrated, freight paid, only **\$89.50**—a clear saving of at least 25 per cent. Write today for the L-A Engine book, and take your time in looking over the different models. Why wait? It's worth while to investigate now.

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How did I do it? One day while reading magazine advertisements (as you are doing) I read about LONG'S CRISPETTE MACHINE. It interested me. I sat down and wrote him. His proposition sounded good—was good—and I bought. After buying and paying rent for a window, I had just \$10 left, but I went to work—worked hard—made delicious popcorn crispettes.

The first few days I gave some away—that started crowds coming—they bought and brought more crowds. At the end of thirty days I had



\$1500 CLEAR PROFIT IN BANK

Those were great days. Later I became Mr. Long's partner—am his only partner now—am here to help beginners—to tell you and show you how to build a great big business like ours.

Wouldn't You Like to Own a Store Like This? It began with a modest start like mine—Mr. Long was a struggling candy-maker until he conceived the big idea which has

made hundreds of us independent. There are thousands of just such locations—windows—small store rooms—cozy corners—that offer YOU just as good an opportunity as Mr. Long's or mine.

I have just invented an improved machine—increased its capacity one-third—decreased its size one-half—making it a strictly one man proposition and the biggest earner ever produced. With this new machine I could have cleared \$2,000 first month instead of \$1,500.

The long winter months are ahead. Don't slave them away for some one else. Start in Crispette business for yourself. Build a business like mine—get a place where the rent is low. Keep the profits. I will teach you the business—show you how to cut the corners and make

Every Nickel Taken In Nets You Almost Four Cents Profit

This is one business in a hundred. The profits are splendid and just think of the fortunes built up of 5 cent pieces where the profit was not nearly so great. Everyone likes Crispettes—children, parents, old folks. One sale always means more to follow. Any HONEST, EARNEST, ENERGETIC man can do as well as I, and that means independence.



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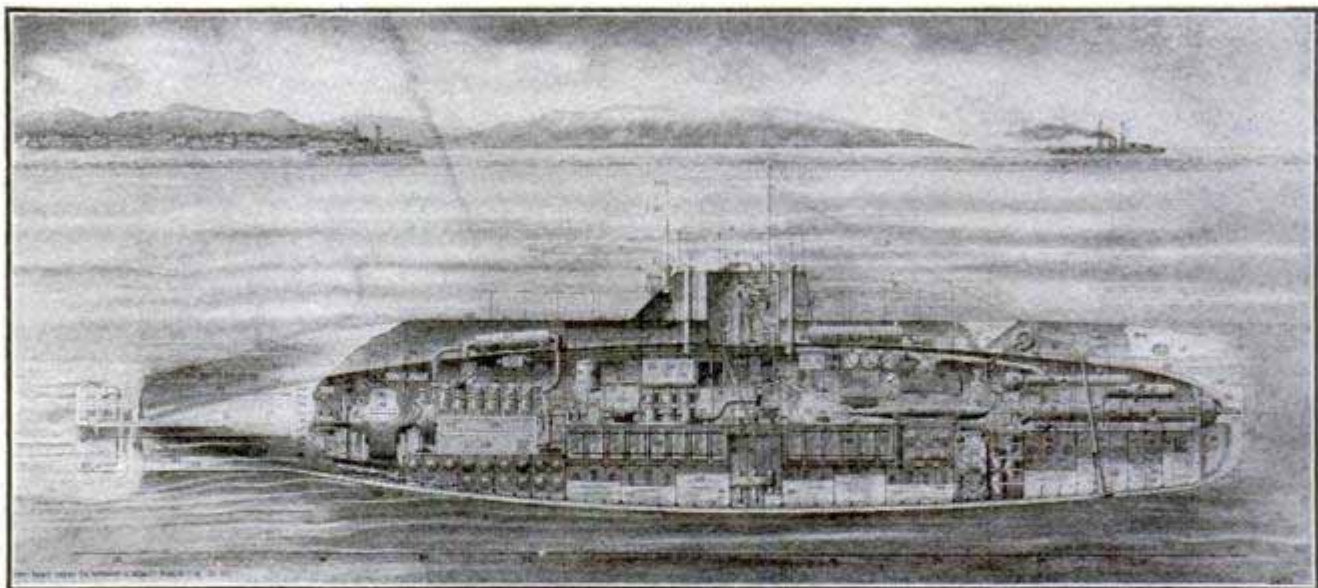
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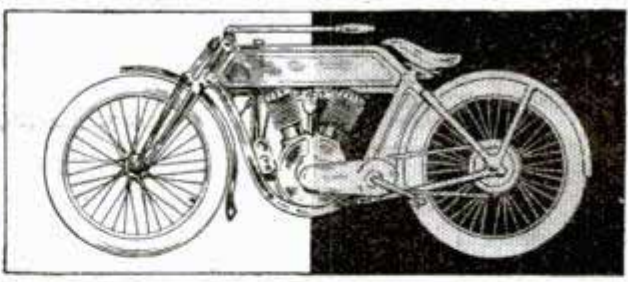
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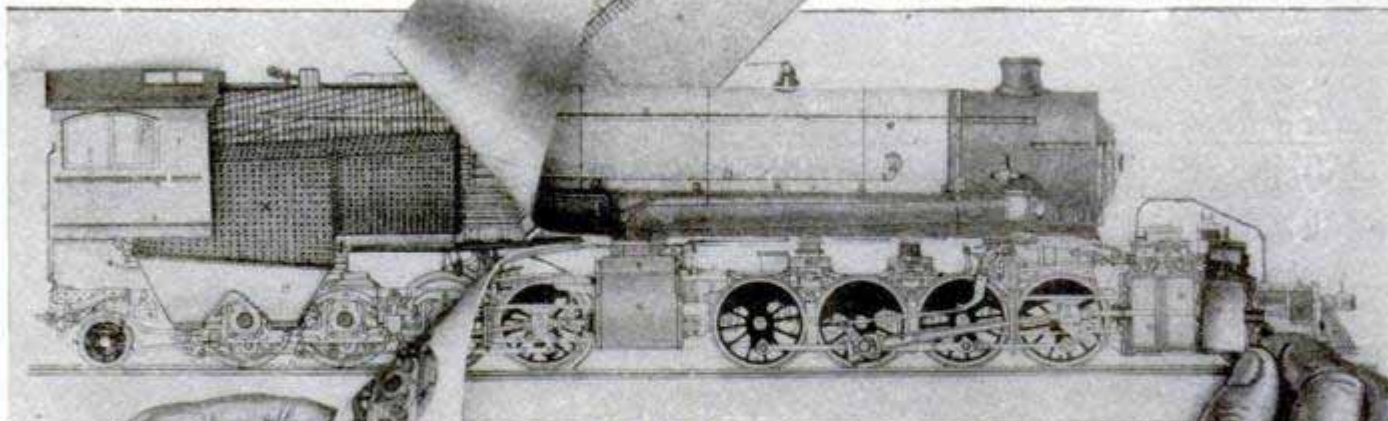


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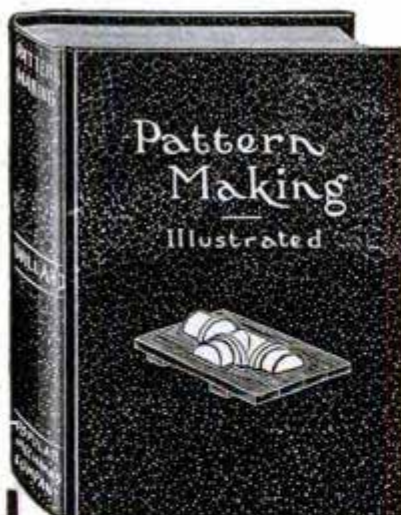
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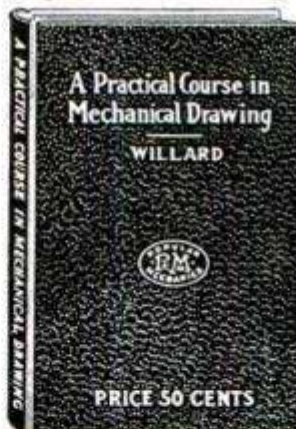
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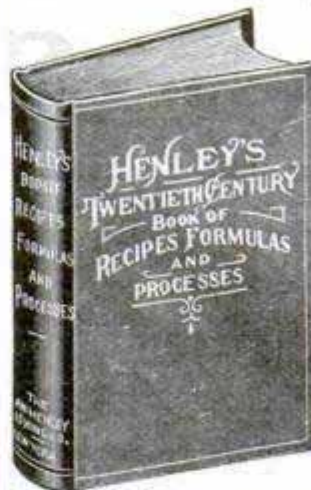
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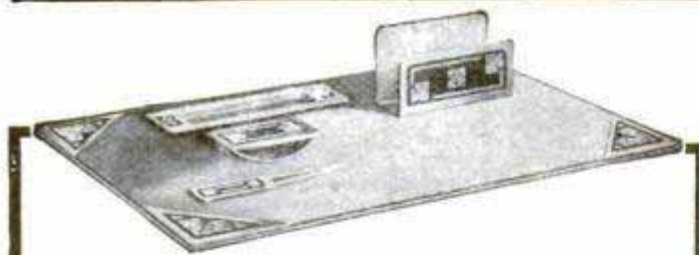
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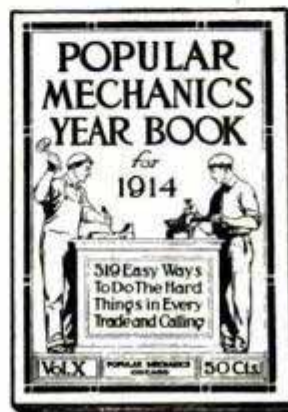
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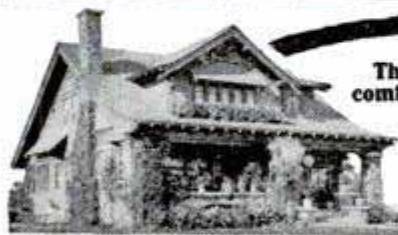
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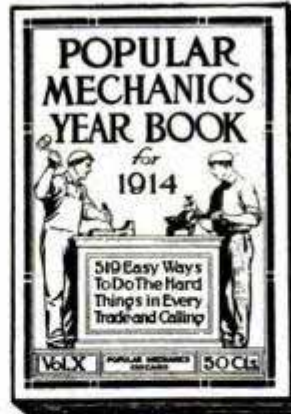
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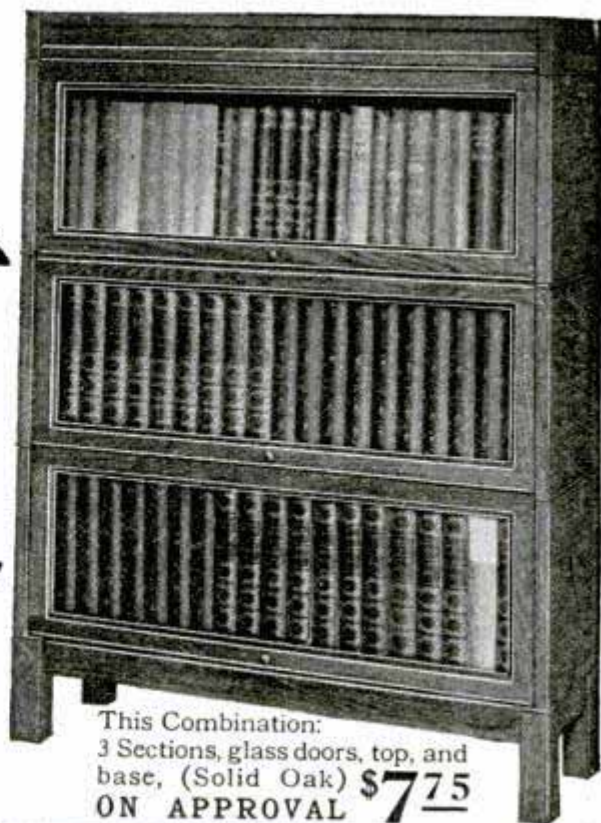
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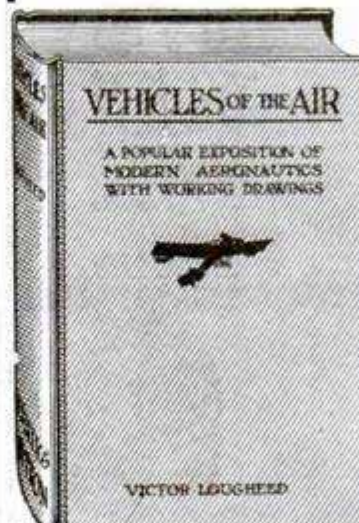
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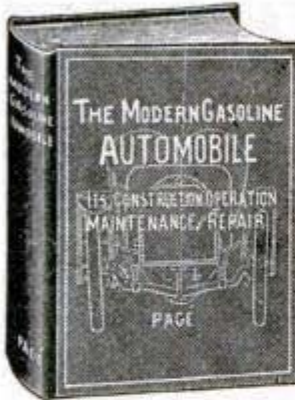
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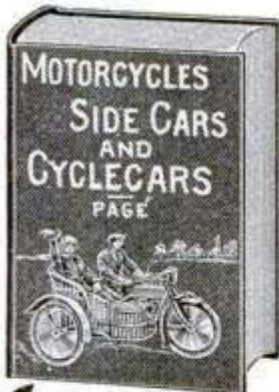
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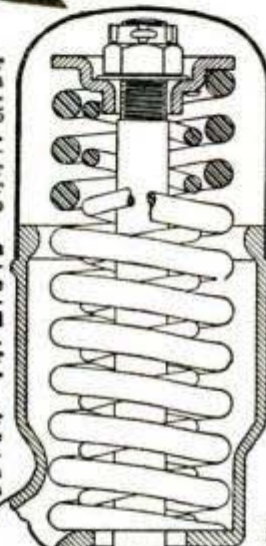
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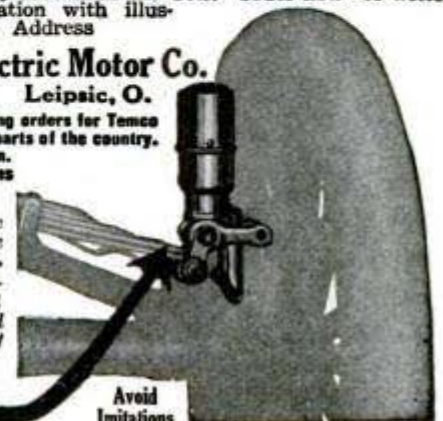
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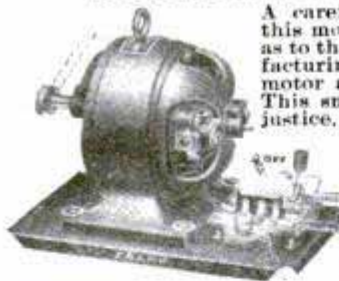
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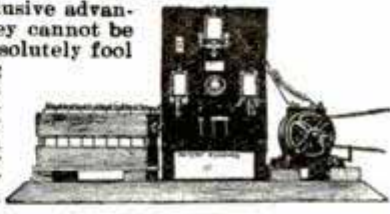
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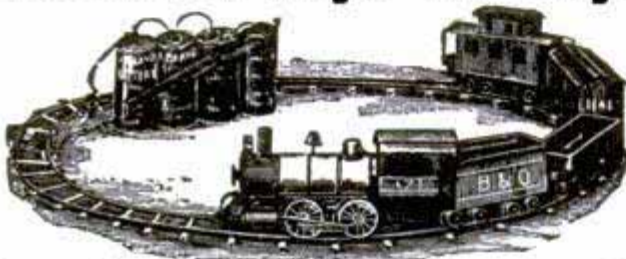
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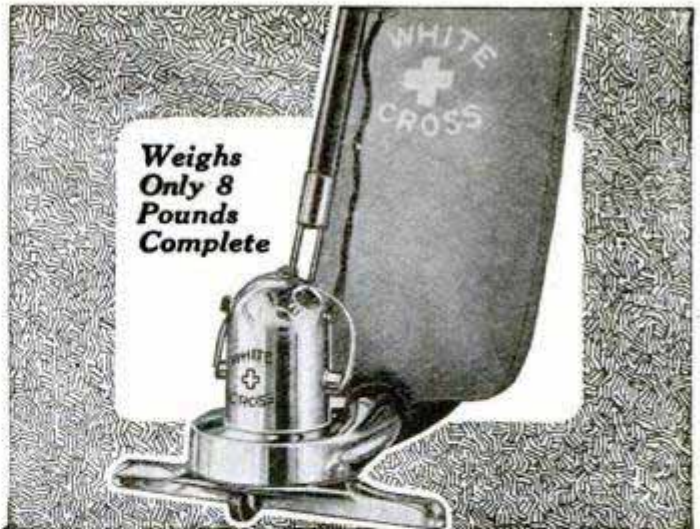
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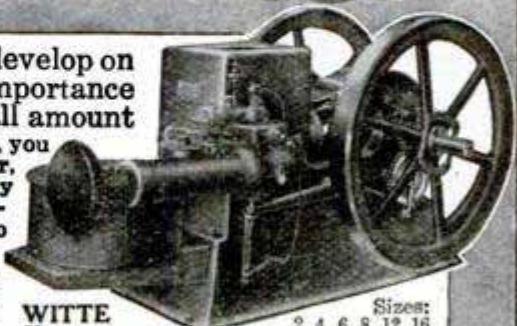




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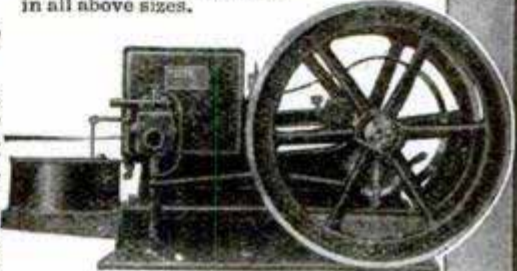
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And they are *exactly* like real steel construction.

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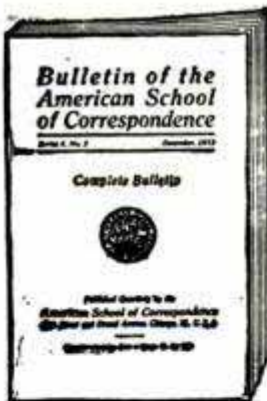
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A MOVING PICTURE

The Conversion of Mr. Prejudice

Mr. Prejudice is hard to convince - but watch him weaken



He uses an old-fashioned shaving mug, which collects dust and germs



When shaving he rubs in the lather with his fingers for some time - a useless and mussy method



- and naturally his face smarts afterward. This annoys him greatly



His son Tom uses a shaving stick and works up the lather on his face with the brush



Tom's face never smarts - he saves lather and time - getting to breakfast first



Tom does not rub in his lather but he does "rub it in" on Mr. Prejudice



Next day after shaving Mr. Prejudice sees much lather left in his mug. He hates waste



He watches Tom who works up on his face just enough lather for a cool, comfortable shave



Tom also shows how he can stick the last 1/4 inch of his old stick on a new one - not a particle wasted



Mr. Prejudice is converted and that day buys a stick like Tom's - sanitary, soothing and convenient



He examines it carefully - reads the scientific directions - finds shaving comfort



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