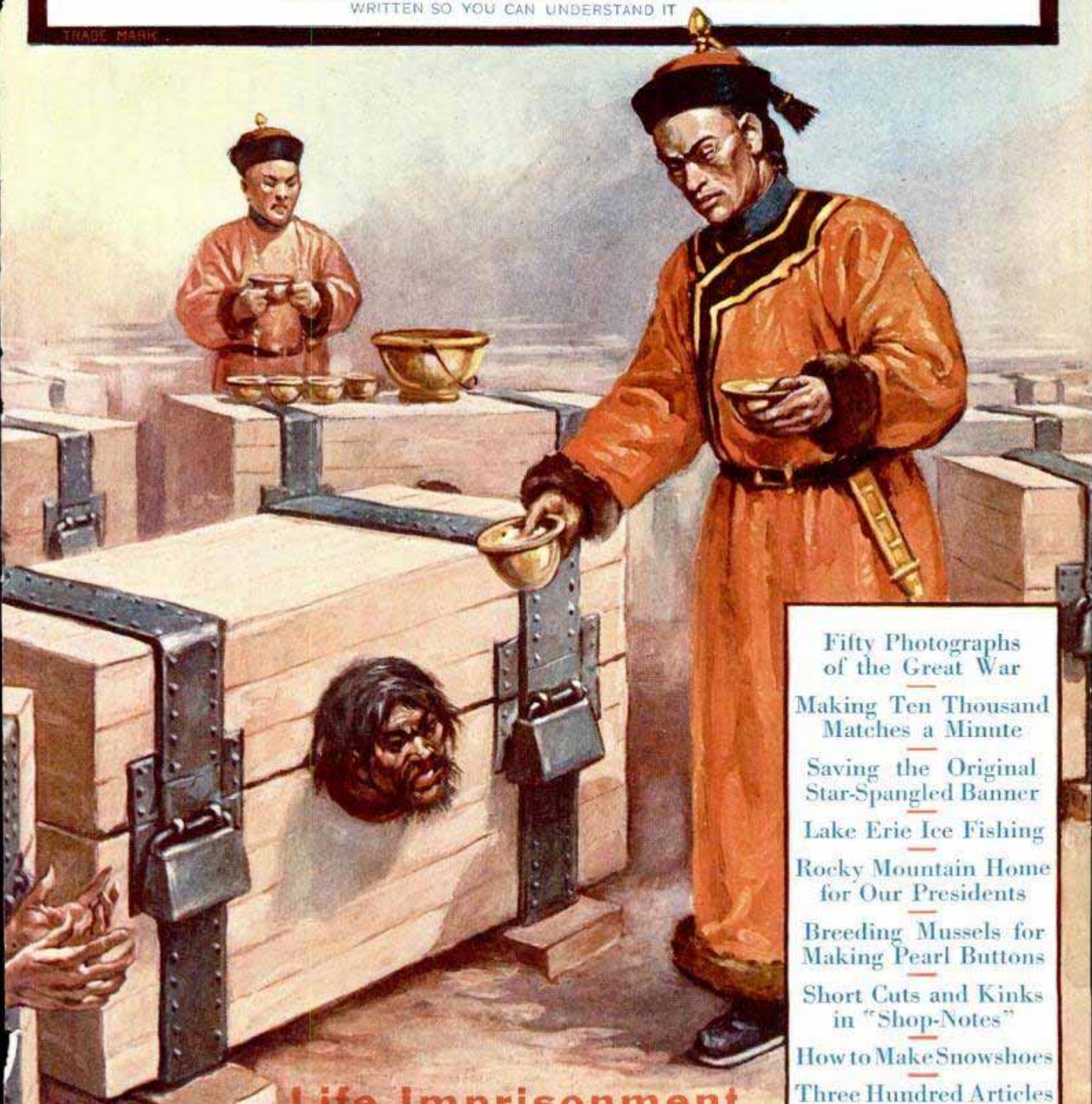


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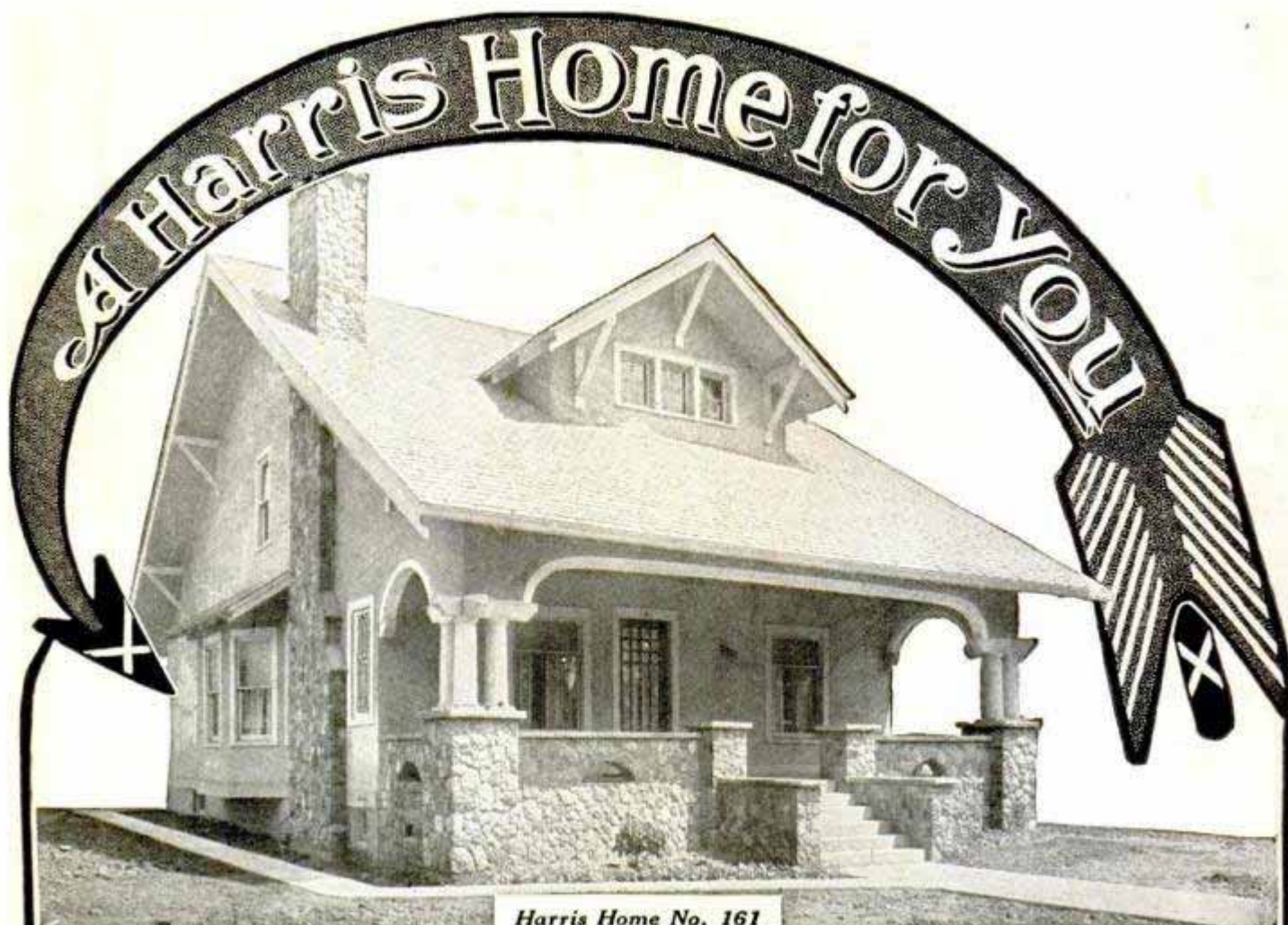
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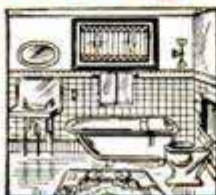
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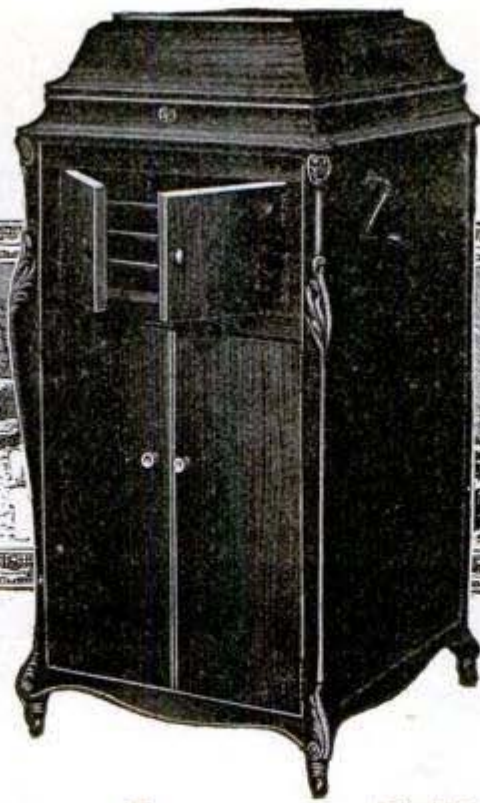
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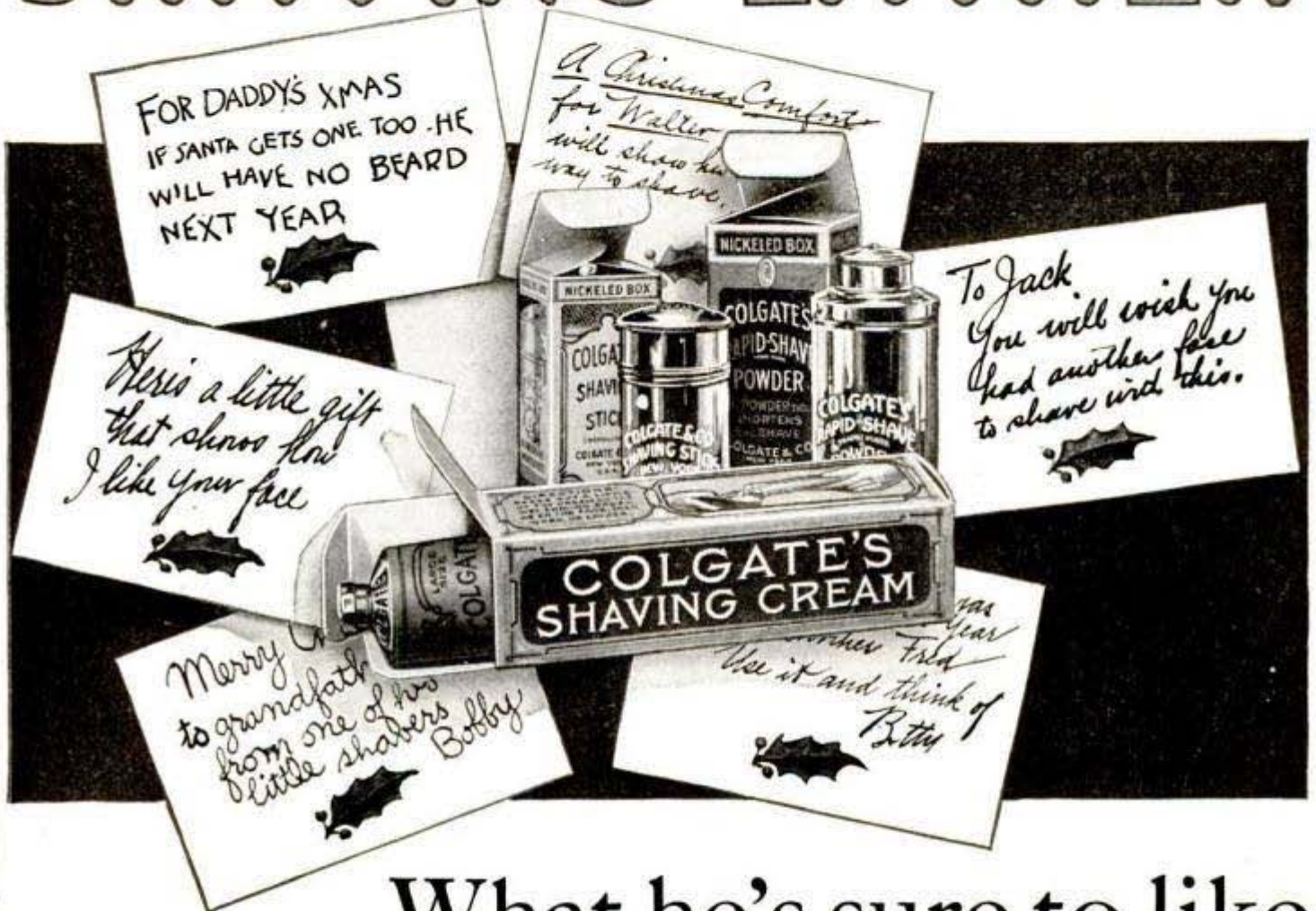
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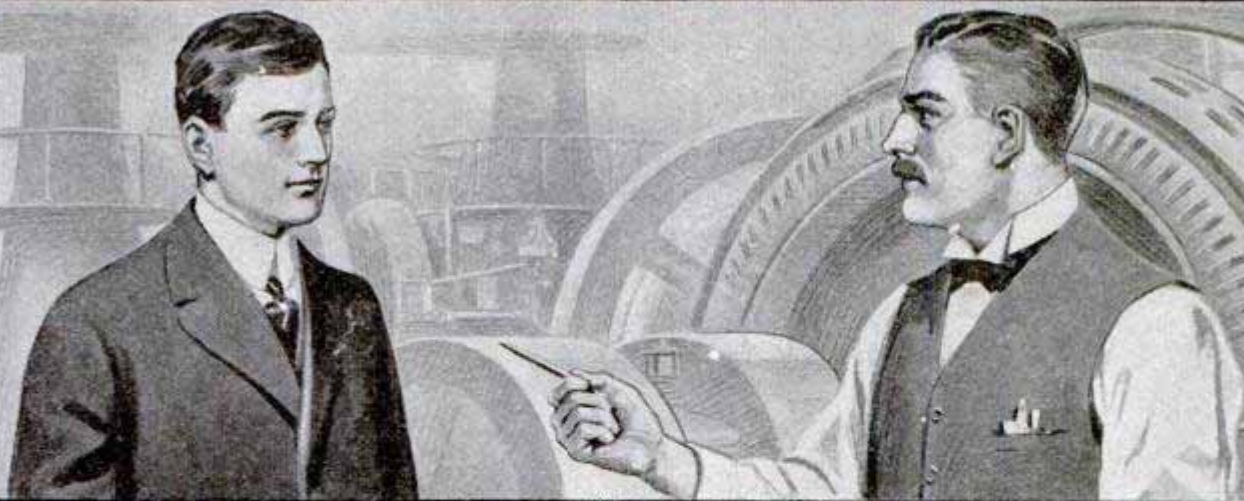
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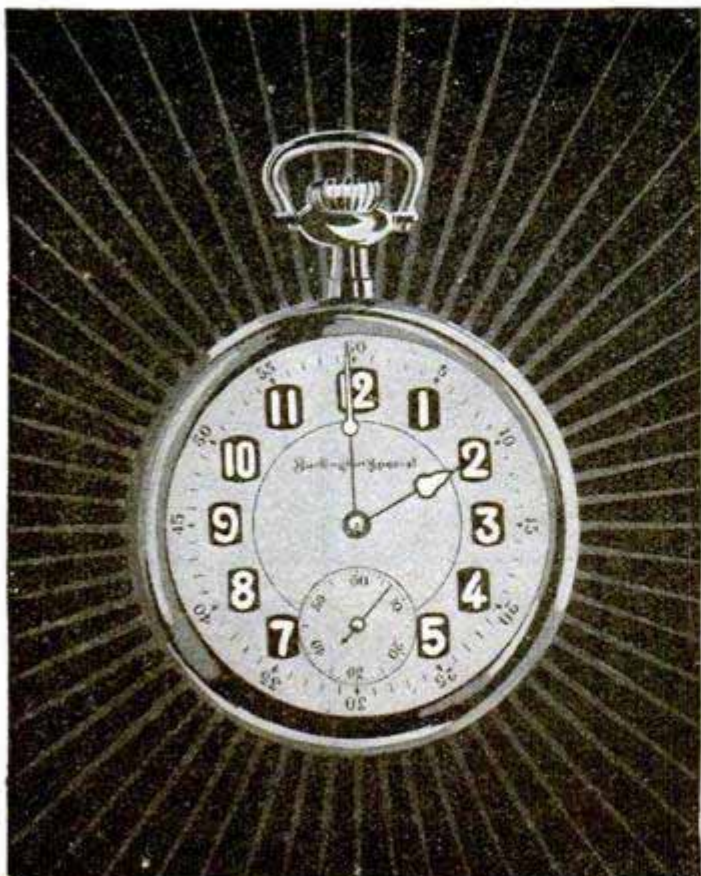
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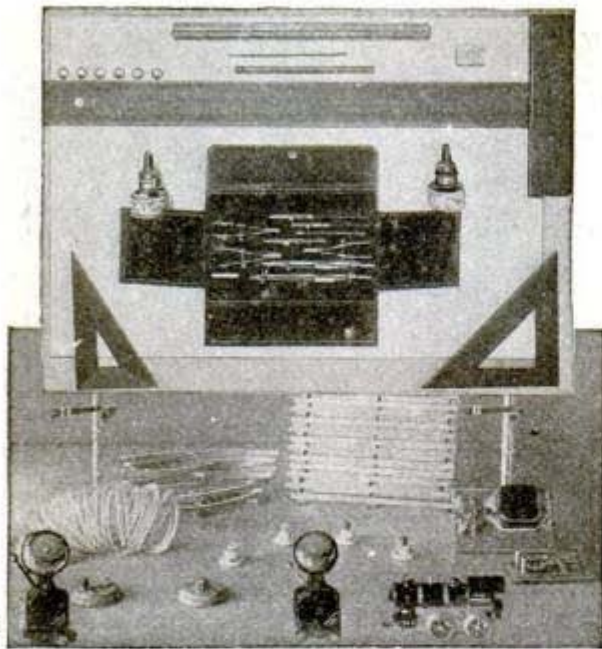
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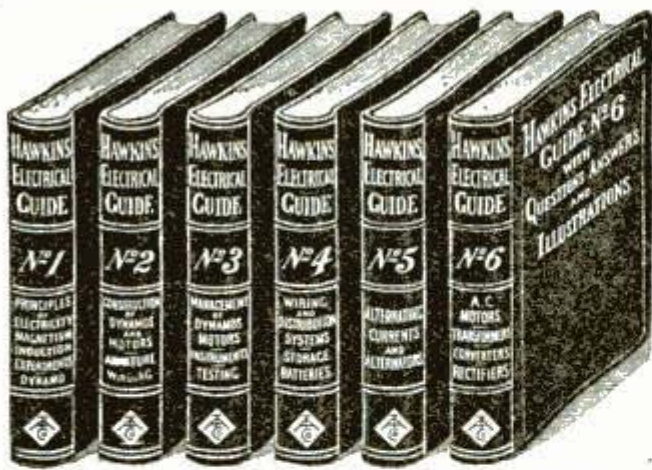


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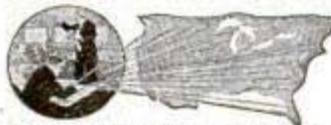
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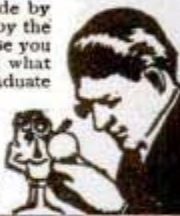
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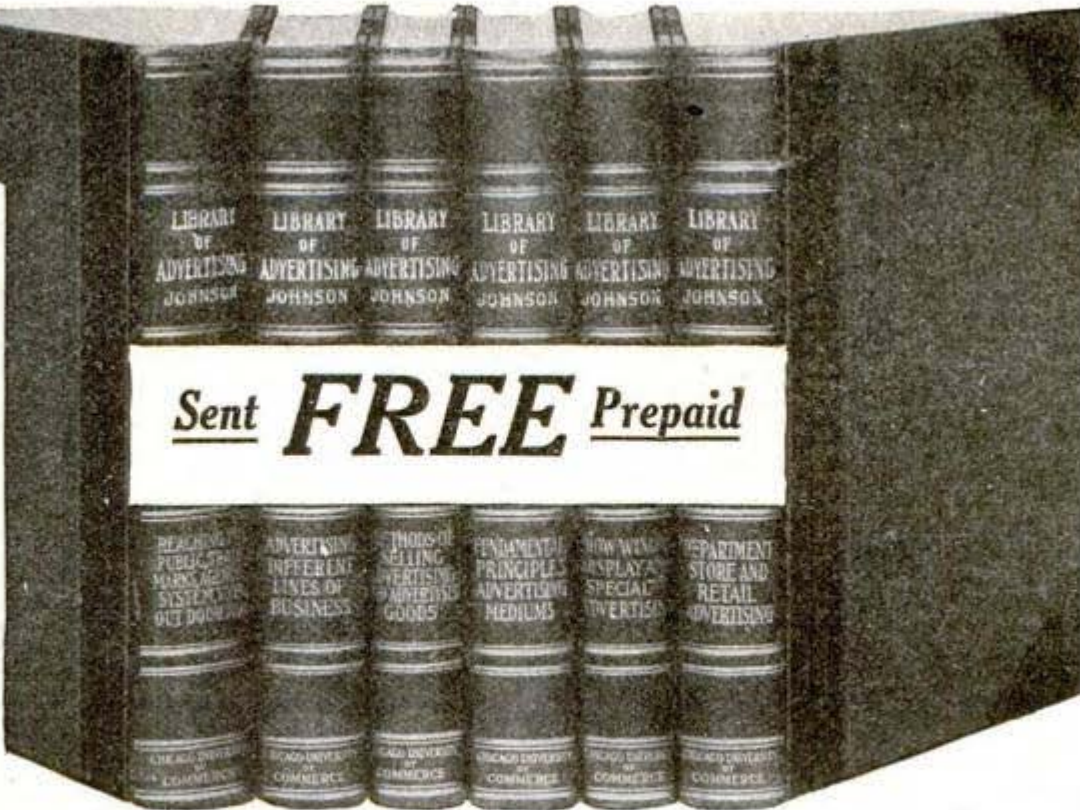
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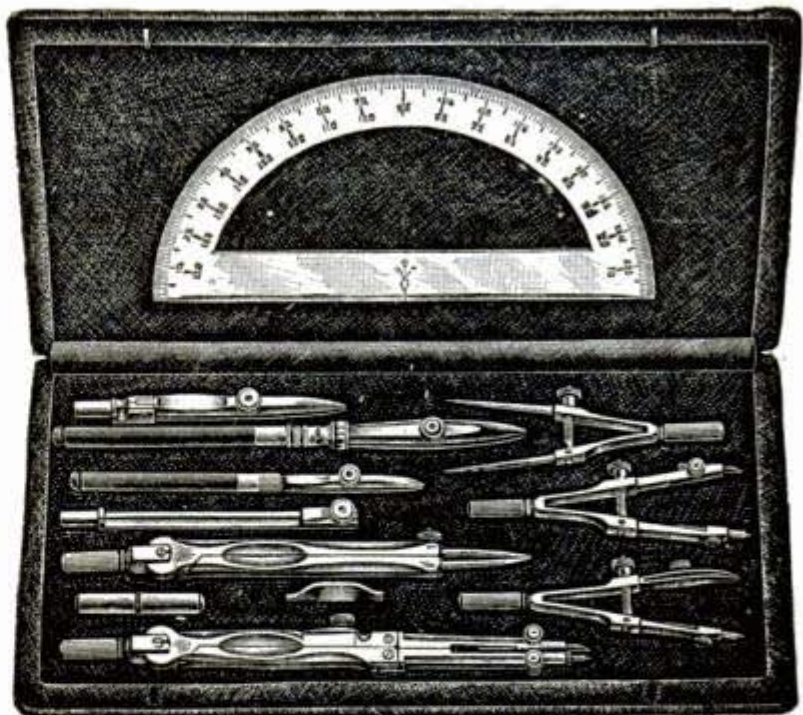
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HOW to Operate a Mail Order Business. 30 Big Profit Plans and year's Mailing service sent for 10c. Mail Dealers Wholesale House, 521 Franklin Bldg., Chicago.

TAP the richest vein in the mail order field—the one branch of this great industry that covers the largest field, quickest orders and endless prospects. We have a proposition appealing direct to the largest class of buyers in the world. We are originators and promoters—we do not retail—we leave the retail field to the retailer, to whom it belongs. We will furnish this proposition as a side line for established dealers, or will establish you in your own business, furnishing the most advanced grade of advertising matter, and protecting you in the sale under copyright. Let us send you, without cost or obligation, a full explanation with samples of advertising matter, etc. Send today. Just give us your name and address, we'll send the offer. L. B. Grimm & Co., 702 M Greenwich St., N. Y.

SPARE Time Money Getters. Thirty to fifty dollars a week. Forty opportunities. Catalog and sample 35c. Abestall Company, 3715 West Forty-Second St., Cleveland, Ohio.

WE start you in business, furnishing everything; men and women, \$30.00 to \$200.00 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.

TWO dollars an hour profit at home. Formulas and particulars 10c. French Co., Desk P, Bradley, Fla.

LEARN Banking—Young men who want to become bank cashiers, write. Fulton System, Murray, Ky.

THE State and County rights for sale to manufacture a twenty per cent gasoline saver and carbon remover, a proposition that makes good; only small capital needed; profits big. B. M. Solomon, 1561P Broadway, Denver, Colo.

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

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.

HERB recipe book and herb catalog, 10c; worth dollars; teaches how to make medicine from herbs for all diseases. Ind. Herb Gardens, Dept. 44, Hammond, Ind.

START a Mail Order or local business. Whole or spare time; unlimited possibilities. Write for interesting literature. H. B. Essex, Box 476, Baltimore, Md.

EARN \$7 daily, restoring faded colors in rugs and carpets. No capital. Particulars free. Eldred, D. 75, Detroit, Mich.

RAISE Frogs—"French Frog Farming" tells how. Fifty cents. Weybret-Lee Co., Publishers, Monterey, Cal.

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. D-10, 20 West Lake, Chicago.

THE Direct Mail, 1951 Germantown Ave., Philadelphia, contains 100 Rural Names, also 95 Agents. Copy 5c.

WE will start you in the cleaning and dyeing business; little capital needed; excellent profits. Write for booklet. Ben-Vonde System, Dept. C, Charlotte, N. C.

MUST Sell quick, 10 acres, \$85 cash. Fine for fruit, poultry, etc. Title perfect. Henry Matheson, Benkelman, Nebr.

\$50 WEEKLY easy. Start cleaning-dyeing business, or learn candy making; small expense, large profits. I'll tell you. Matthews, 69 East 87th North, Portland, Oregon.

KOKO-Wheat Crisp. New Winter Confection. \$10.00 daily profit. Beats popcorn. 5c package costs 1 1/2c. Can of samples, 10c. Particulars free. Machine and instructions, \$7.50 prepaid. Corneau & Co., 541 No. Parkside, Chicago.

CUBAN concession, covered by patent ready for exploiting; big proposition—for disposal outright, in part, or royalty. W. R. J. Miller, The Leamington, Minneapolis, Minn.

CASH Quick—Earn \$25 to \$75 Weekly—Really trading—anywhere—without capital or experience. Ambitious men become independent. Our practical instruction starts you. Interesting brotherly offer free. Stephens, Expert Dealer, Muncie, Indiana.

SPARE Time Evenings? Operate profitable Mail Order Book business. 700% clear profit each sale. Gives perfect satisfaction. Descriptive folders. Rollins, Box 5272, Boston.

"MYSTERIES of Money" free. C. C. White, Hazlehurst, Miss.

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.

CANDY Making a fine art. Splendid instructions how to make and sell. Get busy and learn before Christmas. 50c. Auburn Supply Co., Dept. C12, 7745 Peoria St., Chicago.

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

WE Sell Patents. Established 1900. If you wish to add a new product to your line, write us. Charles A. Scott Co., 596 Central Bldg., Rochester, N. Y.

START own business; manufacture profitable chemical preparations. We analyze and duplicate samples and give reliable advice on merits of new processes and chemical patents. Dr. Balke Analytical Laboratories, 103 Park Avenue, New York.

BUSINESS wanted for cash buyers. Send description and price. John B. Wright, successor to Frank P. Cleveland, Real Estate Expert, 1308 Adams Express Building, Chicago. Established 1881.

I WANT to send you proof of the wonderful pulling power of Popular Mechanics classified pages. What's your proposition? Write me today. F. W. Johnson, Classified Dept., Popular Mechanics Magazine, 6 N. Michigan Ave., Chicago.

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

"DOLLARS" yearly in your back yard. No ginseng, mushroom dope. New ideas never before published, particulars free. Metz, M 306 East 88th St., New York.

OPERATE Hahn's Premium Machines, the best seller for cigars and candies. J. Hahn, 1016 Germantown Ave., Philadelphia.

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

MAIL Order Men: Would you like to know how 61 successful mail order men do business; get business; hold business? Especially if these men tell you their own experiences in their own words. The Mail Order Business Builder gives you such information direct from these men's private offices. Send dime for sample copy of this 68-page magazine. Randolph Rose, Publisher, 100 Market St., Chattanooga, Tennessee.

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

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.

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.

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.

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 Peace Mfg. Co., Inc., Dent, 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.

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

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

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.

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.

INVESTMENTS

MR. Investor! Whether you have one hundred or one hundred thousand dollars to invest, you need "The Careful Investor," a new book by E. S. Mead, as a guide. It exposes the innumerable pitfalls in the path of an investor and gives information, the careful heading of which would save the public millions of dollars annually. You cannot afford to do without it. 290 pages. Cloth. Supplied postpaid at \$1.62 a copy, by Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

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.

MAIL ORDER SUPPLIES

DON'T complain about hard times, but write for our excellent proposition. Gee Mfg. Co., Bridgeport, Conn.

FASTEST selling specialties, 16 samples for dime. Chambers Works, 11B65, Plainwell, Mich.

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.

DUPLICATORS AND DEVICES

THE Modern Duplicator, made without glue or gelatine, is the World's Standard. Fifty to seventy-five exact duplicate copies can be made from each one you write or draw with pen, pencil or typewriter. \$2.40 to \$6.00 according to size. Booklet Free. Purkin, Reeves & Co., Mfrs., 339 Fifth Ave., Pittsburgh, Pa.

A DUPLICATOR \$1.00. Letter size. Make over 50 copies from pen or typewritten original. Send for circulars. Scientek Laboratories, Dept. 1, Madison, Maine.

FOR ADVERTISERS

M. & M. SALES Letters, virile and original, land orders. Bring you thousands, but cost you pennies. Martin & Miller, Advertising Counselors, 1 Gramercy Park, New York.

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

ADVERTISERS Special Offer! 80 word ad in next issue Boys' Companion, circulation now reaching 22,000 live buying boys, \$1.00. Inch display \$1.40. Boys' Companion, Chicago.

TRIAL—25 words in three issues 100 magazines, \$1.25. C. Stanford, Canonsburg, Pa.

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

ADVERTISE in Barkley's Magazine, 1c word. Barkley's Magazine, 102 Blairsville, Pennsylvania.

YOUR 25 word advertisement in 100 monthly magazines, \$1. Bennett, 442 East 184th St., New York.

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.

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, Ill.

ADVERTISING SERVICE

MAIL-ORDER Sales Plans, letters, booklets, "broadsides," ads—complete campaigns originated or revamped—every piece of copy loaded with profit-producing pep. Get my quotations. Submit your proposed plan or sales literature for complete analysis and constructive criticism—free this month. Or send 25c to cover mailing expense on my 60-page book, "More Dollars for the Mail-Order Man"—interesting and instructive. Ernest F. Gardner, 923 Gloyd Building, Kansas City, Mo.

AGENTS WANTED

AGENTS and Dealers Wanted—Every owner of a Ford car will buy the Hackney Foot Accelerator. It increases the efficiency of the car; is a great deal more convenient and makes driving a comfort and pleasure. Ask anyone who drives with a Hackney Foot Accelerator and they will tell you they would not be without one. It rolls on the sole of the shoe, giving a perfectly even flow of mixture at all times. Write for particulars at once or send \$3 for complete outfit. Easily attached. Roller Bearing Foot Pedal Co., St. Paul, Minn.

WANTED—Patented novelty in sheet metal or other materials. Have well equipped factory with expert help. Will buy outright, royalty or partnership. Could manufacture only or make and sell. What have you? Send cut or sample. Describe fully first letter and save time. S. B. Co., Dept. D., 2337 So. Wabash Ave., Chicago.

AGENTS—\$50 weekly. We manufacture the best needle case made; a wonderful seller; 200% to 500% profit; talking unnecessary; our "Trust Scheme" envelopes do the work; general agents can make \$100 weekly; particulars free; 25c sample outfit for 10c; buy direct from the factory. Paty Needle Co., 102 Davis Sq., W. Somerville, Mass.

USE your spare time to build up a mail order business of your own. We help you start for a share in profits, 27 opportunities. Particulars free, Dept. C-5, Opportunities Exchange, Buffalo, N. Y.

\$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. Sample free. Why not try one on your lamp? Beware of imitations. No branch offices. Luther Manufacturing Co., Dept. 369, Cincinnati, Ohio.

MAGIC Ink Eraser. No blade, no acid. Removes ink like magic. 10c, sells 25c to 35c. Offices buy 1 to 12. Anyone that can't sell hundreds couldn't sell bread in a famine. Sample, 10c. S. Mfg. Co., 20 Warren St., N. Y., Dept. 6.

MAGAZINE Solicitors—For a high grade established national magazine, subscription price of which is \$3 per year. Is taken by bankers, lawyers, and the well-to-do class of readers. The commission is liberal, and in some respects the proposition is a bit different from the ordinary magazine work. Only agents who can furnish unquestioned references as to reliability need apply; but to the right agents our proposition should appeal as a good and profitable one. The work is strictly on a commission basis. Address Publisher, 9th floor, 78 East Madison St., Chicago.

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.

OPERATE profitable mail order book business. 700% clear profit each sale. Gives perfect satisfaction. Descriptive folders. Rollins, Tremont Row, Boston.

CHRISTY Mathewson's Invention—Home Baseball Game. Scientific, exciting. Everyone wants it. \$1 prepaid. Satisfaction guaranteed. Free particulars. Agents wanted. Mathewson Game Co., Dept. 36, Cincinnati, Ohio.

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.

AGENTS—Male or female. An easy selling article—the Novelty Rug Machine and Rug Patterns. Make 50 to 200% profit. Write for particulars. E. Ross & Co., 930 Dorr St., Toledo, Ohio.

SELLS like hot cakes—laundry wax, perfumes clothes with lasting violet perfume; working outfit 5c. New offer. Perfume-Gloss, 12 Water St., New York.

AGENTS—Stamping names on Pocket Key Protectors; sample Check with your name and address, 12c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates, Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

AGENTS: Take orders for our engraved style visiting and business cards. Easy, dignified work. Large profits. Outfit free. Race Bros., Hudson, N. Y.

AGENTS—Here's a whirlwind seller; every family needs it. No limit to money you can make. No competition. Sample free. Address Dept. P., W. E. Co., Delta, Colorado.

PHONE-MEGA makes your telephone conversation private. "Don't Shout—Just Whisper." Sample 12c. Agents make 400%. Phone-Mega Mfg. Co., Walnut Park, St. Louis.

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

OUR Agents are coming big money selling "Necktie Fasteners." Big demand, sells rapidly. Full proposition and sample 20c. Novelty Co., Box 208, Chicago Heights, Ill.

AGENTS Wanted—Something new in pen-nants for high school students. Send stamp for particulars. H. W. Abbott, 1605 Clifton Park Ave., Chicago, Ill.

AGENTS, write for latest catalogue of household specialties; good sellers. H. Tidd, 428 Prospect St., Norwood, Mass.

AGENTS—Get posted where to buy everything the mail dealer or agent needs. Our new Directory is just off the press. Price \$1.00. R. B. Reeder, Dennison, Ohio.

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

AGENTS make \$5 profit daily. Name Plates, House Numbers, Signs, Particulars free. Roscoe Lynch, Bausman, Pa., Dept. B.

AGENTS—Represent factory with new line household and office specialties. Quick sellers. Hundreds reorders. Exclusive territory granted. A Lederer, 726 West 19th Place, Chicago, Ill.

445% PROFIT selling the new Inviso Necktie Form. Saves tying and pulling the tie through the collar. A needed article, easily sold. A holiday suggestion—sell a tie and the form in an Xmas box. Write the Rouse-Smith Co., 809, 20 E. Jackson Blvd., Chicago.

BOYS—You can earn five dollars easily. Particulars free. P. Simco, Havemeyer Bldg., New York.

REPRESENT, not one but many large manufacturers. Profitable employment the year round. Goods of proven merit. Sound business proposition. Federal Sales Co., Indianapolis, Ind.

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 the big money and wearing these stylish clothes. Address card to Paragon Tailoring Co., Dept. 1214, Chicago, Ill.

AGENTS—Sell our attractive cards in every home for Xmas gifts. Large profits. Outfit free. Send today. Forman Printery Waterbury, Conn.

AGENTS—Sell rich-looking imported 36x58 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.

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., Dept. D, 2337 So. Wabash Ave., Chicago.

AGENTS—Biggest line, biggest profit. Extracts, Perfumes, Medicines, Spices, Jelly Powders. Premiums for your customers. Western Laboratories, 1939 Van Buren St., Chicago.

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

AGENTS wanted for best selling book published. "Causes and Issues of the Great War." "History of Mexico." "The Panama Canal." etc. Outfit free. American Book Co., Dept. H, Scranton, Pa.

HOME Work. Collect names, information etc., for business concerns. Some clear \$100 monthly. Instructive booklet for stamp information system. 226 Marietta, Ohio.

AGENTS—The "Never-Slip" Clothes Liner Fastener is the best seller on the market today. Send 10c for sample and special prices to agents. See our display "Ad" in this Magazine. Standard Wire Co., Dept. S, Saginaw, Mich.

COST 1c, sell for 10c. Ready-made sign letters anyone can apply. Unlimited demand. Five samples, instructions, 10c. Particulars free. Everbrite Co., Long Island City, New York.

BONANZA for Agents and Mail Order Men. Novelty Sign Cards. Adam Fisher Mfg. Co., D 61, St. Louis, Mo.

WANTED—Nursery Agents. Pay weekly. Perry Nurseries, Rochester, N. Y.

AGENTS—\$1 starts you selling For Resigns. Particulars free. Popular Show Card Co., Box 433, Chicago.

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, weight 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., 113 Hand Light Block, Cincinnati, Ohio.

BIG Profits, quick seller. Patent No-Wire Edge Hone. Sharpens razor perfectly. Every demonstration means sale. No competition. Booklet free. Hone Co., Haverhill, Mass.

AGENTS—Let us make your Perfumes and Toilet Articles at rock bottom prices. Tell us what you need. Beardley Special Laboratory, Rock Island, Ill.

GASOLINE table lamps with or without semi-automatic cleaning device. Ribbed or decorated shade. We also handle the famous Nulite, Acme and Standard gasoline lighting systems. Money refunded if not satisfactory. Our prices enable agents to meet all competition. Mantles furnished at lowest possible price. Grand Rapids Novelty Co., 551 Woodlawn St., Grand Rapids, Mich.

SELL Dry Goods Remnants. Greater bargains on earth. Remnant Store Co., Cincinnati, O.

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 swiftest 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. 1214, Chicago, Ill.

GENERAL Agents—Capable of calling on 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., 161 Handy Light Block, Cincinnati, Ohio.

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. Davis, Pres., R64, Davis Block, Chicago.

AGENTS, Men or Women, earning less than \$2,000, to take orders for our Superior Line of Household Necessities and Christmas Packages. Big Profits—Ready Sellers—Exclusive Territory. Lessons in Salesmanship Free. Write for our special Get Acquainted Offer today. Address, Roberts Mfg. Co., 2126 Walnut St., St. Louis, Mo.

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.

GET Money—I Did; got \$301.27 in two weeks doing plating, writes M. L. Smith of Pennsylvania (used small outfit); start as Smith did, that's easy; hundreds already started, money coming in, goods going out; people everywhere have tableware, watches, jewelry, etc., for the "Gray Plating Man." Practical outfits, all sizes, heavy plate, guaranteed. Pure Gold, Silver, Nickel, Metal Plating, latest process, taught free, quickly; experience unnecessary; secrets exposed; own and boss a business that pays \$15 to \$50 weekly—you can; write today. Gray & Co., Plating Works, 431 Gray Bldg., Cincinnati, O.

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

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.

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.

GOOD pay, steady work, growing income, selling our Invincible Brush and Mop Holder. State experience. Eagle Specialty Company, Jamestown, N. Y.

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., 1205 Broadway, San Francisco.

AGENTS wanted for line of goods used in every household; good margin of profit. Particulars free. Centerwest Sales Co., Boulder, Colo.

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., 1109 Handy Light Block, Cincinnati, Ohio.

233% PROFIT selling our 25c Sheet Music at 5c. Particulars free. Keller, Robinson & Munk, 36 W. 118th St., New York.

ALUMINUM Check Perforator. Wonderful seller at \$1. Sample 50c. Michigan Novelty Co., Detroit.

AGENTS. Make \$25 to \$50 weekly. For 25c, I will mail you ten different dollar samples. Your profit—\$9.75. C. Crane, 1654 College, Racine, Wis.

BIG Money—Selling Collection Cabinets. Free samples. Ye Clark Stationery Shop, Syracuse, N. Y.

2,349 EXTRA Railway Mail Clerks to be appointed. Commence \$75.00 month. Pull unnecessary. Examinations coming everywhere. Sample questions free. Franklin Institute, Dept. M-22, Rochester, N. Y.

DON'T waste your evenings!—Sell our attractive brass easel poster frames to theaters; big demand; easy sales; liberal commissions. Newman Manufacturing Co., Cincinnati, O.

CHRISTMAS is coming. Secure agency now for our Wonderful Luminous Crucifix; shines in darkest room. Put up in beautiful holly box. Pioneer Co., 1259 W. 63rd St., Chicago.

ENERGETIC agents calling on engineers, mills, public institutions, can make \$25.00 to \$50.00 weekly handling our building specialties. Write now. The Colorcraft Co., Cleveland, Ohio.

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

YOUR address on postal brings you the biggest money-making proposition you ever received. Try it. X. L. Products Co., 117 Worth St., New York.

400% PROFIT—Evergrip Gliders—No rollers; pocket samples free; anyone can attach; cost 3c, sell 15c; homes buy dozens, hotels hundreds; save floors and carpets. S. Mfg. Co., 20H, Warren St., New York.

OUR national advertising helps you sell Fuller Sanitary Brushes and Dustless Mops and Dusters—full line—easy sellers. We tell you how. Biggest factory for twisted wire brushes in U. S.—reliable strong concern. Your territory is valuable. Write at once. Fuller Brush Co., 33 Hoadley Place, Hartford, Conn. Western Branch, Rock Island, Ill.

AGENTS Wanted—To advertise our goods by distributing free sample to consumer. 90 cents an hour. Write for full particulars. The Favori Company, 1062 West St., Dayton, O.

AGENTS make \$5,000 this year. Be your own boss—Independent—abundant money—your time your own. All or spare time—at home or traveling. Write E. M. Feltman, Sales Mgr., 560 Third St., Cincinnati, O.

AGENTS—\$2.50 razors free to hustlers. "Try-it-before-you-buy-it" plan sells Climax Automatic Razor Sharpener to every man—150% profit. Write quick for territory, guarantee, and free offer. Victor Specialty Co., 15 Victor Bldg., Canton, O.

MAIL Order Dealers, Agents—Nothing better for Christmas trade than our medium size, light-weight articles, mailing for one or two cents. Write promptly. Ajax Company, Bulletin Building, Philadelphia.

HANDLE my mouth-organ self-instructor; quick seller everywhere; hustlers can make 100% profit; sample and particulars, 10c. Peter Monfort, 10M Bridge St., New York.

BE Independent; own a Wallpaper-Cleaning Business; whole or spare time; \$150-\$300 a month easy; big profits; no experience required; my booklet shows you how; write today. Milliken Co., Davenport, Iowa.

QUICKERLIGHTNING cleans the hands quicker/lightning. Agents wanted. Joliet Novelty Co., Joliet, Ill.

AGENTS—The greatest 50c article on earth sells anywhere and everywhere. Send 20c for sample and full particulars. Ideal Specialty Co., Duluth, Minn.

AGENTS: Raincoat Free. Big cash commissions. Low prices. Guaranteed. Made to measure. Men and women. Free samples. The Brookline Co., Dept. B., Springfield, Mass.

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. Q-21, 20 W. Lake St., Chicago.

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-6, Chicago, Ill.

300 To 400% Profit to Agents selling our guaranteed U. S. Fire Extinguishers. Tremendous demand. Orders repeat. Exclusive territory to county and district managers. United Mfg. Co., 1025 Jefferson, Toledo, Ohio.

I HAVE a contract to distribute a million free packages Borax Soap Powder. Want reliable men and women to help. Chance to earn good pay. L. Waverly Brown, 730 N. Franklin St., Chicago.

AGENTS—War album. Sells on sight. Finest pictures, Merrill Field Co., 2839 Burling St., Chicago.

VISIT Panama Exposition Free—Earn big profits. Obtain handsome premiums, selling our unexcelled household articles; most attractive proposition ever offered. Marvella Co., Binghamton, N. Y.

AGENTS—Try our new invention, Sharpshod Overshoes for Horses; prevent slipping on icy streets; guaranteed; buckled on hoof in a minute; every horse owner wants them; \$3 per set. Big money for you; the fastest seller out. Write for prices. Herman Mfg. Co., 1420 Pa. Ave., Washington, D. C.

AGENTS—"Radiant," the new home light. 350 candlepower of brilliant light for 5 cents a week. Lights with a match. Makes its own gas. No home complete without it. Gloria Light Co., 1284 Washington Blvd., 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.

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

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.

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

LINOLENS—Something new; an invention for magnifying lines in telephone directories and other small print. Will hold the place until removed. Patented Jan. 20th, 1914, No. 1,084,921. Price fifty cents, delivered by parcel post. Agents wanted. Adams Novelty Company, Westmont, N. J.

CHOOSE your territory. New automatic window-closer (described, page 753, November number). Frank Terry, Milwaukee, Wis.

AGENTS are coming 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.

250% PROFIT. success guaranteed. Unsold goods returnable. Sample 10c. Rodolph, Manufacturer, 304M Northwestern Building, Chicago.

SEND ten cents postage, sample; sell auto owners. Fred Cramer, Wichita, Kan.

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., Dept. D, 2337 S. Wabash Ave., Chicago.

LIVE Agents can make big money handling our article. Address Dept. M., W. E. Co., Delta, Colorado.

\$9.00 TO \$18.00 a day easily made selling our Guaranteed Fire Extinguishers; tremendous demand. Send for particulars. Emmons Supply House, Springfield, N. J.

AGENTS—Souvenir Badges Kaiser William. Send 60c for dozen. Big profits. Philadelphia Badge Co., 134 N. 8th St., Philadelphia, Pa.

AT last, a pencil sharpener that sharpens. Carried on your pencil. Nickel and steel construction. Lasts for years. Agents write. Samples 15c, 2 for 25c. Practical Pencil Pointer Co., A218 Central Bank Bldg., Denver, Colo.

AGENTS—I have the slickest little scheme for getting in the houses. Simple, easy, legitimate. Secures an audience in every home. I guarantee this scheme will double your sales. A silver quarter securely wrapped secures this plan. Money back if dissatisfied. W. J. Lynch, Room 40, Schmidt Bldg., Davenport, Iowa.

AGENTS—Get our household specialty. Used in every home. Repeats. Twelve sales daily makes \$32.40 weekly profit. You can do better easy. Extra free goods. Best money-maker going. Don't miss this and be sorry. Write today. Now. Elkhart Specialty Co., Elkhart, Ind.

AGENTS—It's new—your opportunity. We trust you to \$3.60 worth. Starr's Powdered Enamel. Repairs chipped and rusty spots on graniteware. Stops all leaky metal-ware without heat, soldering irons or tools. Agents coining money. Sample with particulars, 10c. Starr, 1910 Monroe St., Toledo, O.

AGENTS be your own boss. Start a factory in your own home on less than \$5 capital, manufacturing rugs and floor coverings from odd material, imitating any colors or designs desired. A 9x12 rug can be made in less than one hour at a cost of less than \$2. Patented December 9, 1913. Free pictures, circulars and particulars. Mail your inquiry today. Be first to learn of this Wonderful Protected Home Manufacturing Business. Novelty Rug Manufacturing Co., Toledo, Ohio.

ONE dollar commission on two-dollar book for every office and home. Attractive permanent employment for high grade agents, men and women. William F. Butler, 201 Loan and Trust Building, Milwaukee, Wis.

AGENTS. To sell Vest Pocket Hair Brush in Leather Case. Sample, 25c. Big profit; entirely new. Taylor-Gendron Co., Holyoke, Mass., P. O. Box 173, Dept. P.

\$60 WEEKLY to deliver "KeroSafe" Lamp. Burns common coal oil. (Kerosene.) 300 candle power—low priced. Portable light. Costs one-third cent per hour to operate. Every home needs one. Big profits for agents. No experience needed. No capital required. Credit given. Hinkson sold 24 first week, West, 3 first night. Write today for terms of free sample. Thomas Mfg. Co., 1162 West St., Dayton, O.

\$15.00 MADE first day by 13 year old boy with Shomescope. Woman made \$8.00 first hour. Particulars free. Shomescope Mfg. Co., 532 W. 13th St., Kansas City, Mo.

"ENCYCLOPEDIA. Extraordinary Offer. 512 pages, 2,000 subjects; 191 page World's Atlas; 51 maps. 65 cents silver; 140 per cent profit. William Norris, 4337 Haight Ave., Cincinnati, Ohio.

AGENTS—We show you how to double your income; write for special Agents' Proposition. Merchants buy on sight, sample sent—large exclusive territories. Nager, 253 Broadway, New York.

AGENTS—Big demand for our new household utilities. Special inducements. Duplicate orders. Big profits. Write at once. Lowell Mfg. Co., 108 Fulton Street, New York.

GENERAL Special Agents everywhere; new automobile fuel; big money; permanent. Standard Chemical Co., Cleveland, Ohio.

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—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.

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.

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

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

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

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.

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.

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.

SELL Electrical Specialties. Our Interchangeable Electric Signs make big money. High grade proposition to live agents. F. A. Watkins, 371 West Washington St., Chicago, Ill.

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.

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 Silvev Company, 171 Madison Ave., New York.

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.

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. Kroll & Co., 602 Blue Island Ave., Chicago, Ill.

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.

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.

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.

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.

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.

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—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.

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—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 Baker. Davenport Mfg. Company, Davenport, Iowa.

MAGAZINE Solicitors—For a high-grade established national magazine, subscription price of which is \$3 per year. Is taken by bankers, lawyers, and the well-to-do class of readers. The commission is liberal and in some respects the proposition is a bit different from the ordinary magazine work. Only agents who can furnish unquestioned references as to reliability need apply; but to the right agents our proposition should appeal as a good one and profitable. The work is strictly on a commission basis. Address Publisher, 9th floor, 78 East Madison St., Chicago.

AN Opportunity for Salesmen. We have several territories, open, for business producers to handle our lines of Showcases, Mirrors, Garment Backs and Hangers, etc.; as a "Side Line." Strictly "Pick Up" business, and straight commission pays from 20% to 35%. State territory desired. American Fixture & Showcase Mfg. Company, St. Louis, Mo.

MANUFACTURER requires general agents for patented demand of centuries. Three-minute demonstration convinces. A financial independence to acceptable parties. Samuel C. Osborn, Masonic Temple, Chicago.

SALESMAN—Experienced traveling salesman. State experience and references first letter. Well advertised line. Satisfactory commissions. The Limoges China Co., Sebring, Ohio.

WANTED—Salesmen and saleswomen. Our representatives are earning \$50 to \$150 per week. Write quick for sample and territory. It's selling like wild-fire. Everybody's a customer. Hytee's Factories, 116 Majestic, Indianapolis, Indiana.

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: High-class man to sell trees, shrubs, roses, vines, berry bushes, bulbs, etc. Good wages—permanent. Exclusive territory. Brown Brothers Nurseries, Rochester, N. Y.

SALESMEN—New plan that gets the big money. Exclusive territory. Opportunity to close some big deals. U. S. Mfg. Co., Dept. 3, Columbus, O.

SIDE Line—Electric sign; flashes changeable wording in radiant, sparkling beams of colored electric light; outselling everything at \$10. Terms, thirty days; \$100 weekly profits. Plastric Sign Works, Chicago.

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.

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.

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.

HELP WANTED

MAKE your spare time earn \$1.00 per hour. Are you satisfied with your income? On short time? Out of a job? Make your spare time net you \$1.00 per hour. The "Four Lamps in One" Single-Cell Battery Lamp sells on sight in the night by anyone. Send \$1.00 for a sample and agent's proposition. Money back if you want it. The Patent Devices Co., Lock Box 2623, Boston, Mass.

2349 EXTRA Railway Mail Clerks to be appointed. Commence \$75.00 month. Pull unnecessary. Examinations coming everywhere. Sample questions free. Franklin Institute, Dept. M21, Rochester, N. Y.

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

I HAVE a contract to distribute a million free packages of Borax Soap Powder. Want reliable men and women to help. Chance to earn good pay. E. Waverly Brown, 734 N. Franklin St., Chicago.

USE your spare time to build up a mail order business of your own. We help you start for a share in profits. 27 opportunities. Particulars free. Dept. C-6, Opportunities Exchange, Buffalo, N. Y.

GET a Government Job! See ad on page 12. Write now—today! Patterson Civil Service School, Rochester, N. Y.

RAILWAY Mail Clerks Wanted. Commence \$75.00 month. Sample examination questions free. Franklin Institute, Dept. M21, Rochester, N. Y.

MAKE Money Writing Stories or Articles. Big pay. Free booklet tells how. Address United Press Syndicate, San Francisco.

WANTED—Electrical and Mechanical Engineer, to take charge of established utility. Must qualify to assume charge of entire organization located in Central States. State salary wanted and detail experience. Address B. V., 9th Floor, 78 E. Madison St., Chicago.

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.

WANTED—An Idea! 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.

POSITIONS open Central and South America. For particulars address The Universal Co., Panama, Republic Panama.

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.

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.

WANTED—Railway Mail Clerks. Commence \$75.00 month. 3,000 appointments coming. Sample examination questions free. Franklin Institute, Dept. M21, Rochester, N. Y.

DISTRICT Managers Wanted for newly patented massage machine. Requires no electricity or water power. Nothing complicated. Affords exhilarating massage without cent expense. Lowest priced but best outfit. Retail \$2.50. New field. New business. Lifetime opportunity for hustlers. Descriptive matter on request. Aztec Remedy Co., Dept. 143, Toledo, O.

THOUSANDS Government Jobs now obtainable. List free. Franklin Institute, Dept. M 21, Rochester, N. Y.

WANTED—Distributors of advertising matter everywhere, send 10c for application contract, sample magazine (none free). American Distributor, 192 Blairsville, Pennsylvania.

INVESTIGATORS work in every county in the United States, \$15 to \$75 per week to start. Write, Fidelity Secret Service, Desk 176, Wheeling, West Va.

BE a detective—Earn from \$150.00 to \$300.00 per month. Travel over the world. Write C. T. Ludwig, 340 Westover Building, Kansas City, Mo.

MEN and women over 18 wanted. \$65.00 to \$150 month. U. S. Government Life Jobs. Common education. Write immediately for list of positions open to you. Franklin Institute, Dept. M 21, Rochester, N. Y.

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

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.

RELIABLE party to investigate credits. Nothing to sell. Particulars for stamp. Write today. Mr. Watson, 104 Tremont St., Brighton, Mass.

THOUSANDS government jobs open to men and women. \$65.00 to \$150.00 month. Write for list. Franklin Institute, Dept. M 21, Rochester, N. Y.

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

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

YOUNG Man! Learn Drafting—one of the most practical subjects of study today—indispensable 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.

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

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

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, 2116 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. Gilles, 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 Borax 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.

PARTNERS WANTED

POSITIVELY have the fastest Calculating Device in existence. Sells for \$30.00. Will revolutionize all present methods. Need capital to finish models and patents. W. F. Fratcher, Detroit.

WANTED

WANTED—Second-hand Calculagraph Factory Time Stamp. K. M., 9th Floor, 6 N. Michigan Ave., Chicago.

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

FOR SALE

COLUMBIA Grafanola and eight records used one week. \$20. Typewriter, two-color ribbon, back spacer, tabulator, etc., \$30. Full particulars. Frank Cowles, Canton, Conn.

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. Fine Christmas present.

MANUFACTURING jewelry establishment; well equipped for special order and repair work; good stock of material; can be bought right. 627 S. Los Robles, Pasadena, Cal.

100 IMITATION Elks' Teeth, guaranteed very fine. \$2 each. H. Beddow, 2156 5th West, Seattle, Wash.

FOR Sale—8- to 12-H. P. Aultman & Taylor tractors, 30x46 New Century separator. 17x22 Ell press, No. 4 Enterprise sawmill. J. R. Slagle, R. F. D., Youngstown, Ohio.

NATIONAL Cash Register No. 95, keys from 1c to \$99, cost \$360 when new. Letters for six clerks, issues checks, in first-class condition. Price \$150. L. J. Libbing & Co., Fort Wayne, Ind.

VACUUM cleaner pumps and parts for assembling, save 75%. Vacuum Supply Co., Ann Arbor, Mich.

SALE OR EXCHANGE

1914 MODEL R. Pope Two-Speed Motorcycle—Will exchange for 18-inch swing Engine Lathe. E. H. E. Thieroff, Sherwood, Ohio.

PATENT Electric surgical device. Parts dies. Trade for automobile. Running order. Heyder, Hansford, W. Va.

TYPEWRITER Moving Picture machine. Reflex camera. E. O. Waltz, Medina, O.

GUNS, SPORTING GOODS, ETC.

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

TAXIDERMY

FOR Sale—Bull Moose and Deer Heads. Reuben Saylor, Taxidermist, 497 Broadway, Dayton, Ohio.

MACHINERY, TOOLS AND SUPPLIES

24 IN. Pony Planer, extra set knives, \$95. Universal Woodworkers cheap. Standard Machine, Tool & Supply Co., Kansas City, Mo.

FOR Sale—Rebuilt lathes, drills, boring mills, hydraulic presses, pumps, compressors, steam engines, foundry equipment, marine gasoline engines, valves, fittings, etc.; condition guaranteed; send for catalogue specifying requirements. Pennsylvania Iron Works, Dept. G, Eddystone, Pa.

FOR Sale—One 500-Light Davis Automatic Acetylene Generator. Good as new. Used but very little, for small town or factory. W. H. Brosman, Albion, Ill.

CELLAR drainer operated by water from city water pipes. One-inch size. Four Dollars. Frank C. Douds & Co., New Castle, Pa.

PULLEYS, Gears, Sprockets, Shafting, Hangers; see page 128. W. A. Jones Foundry & Machine Co., Chicago.

VACUUM cleaner pumps, tools, etc., for stationary house or wagon outfit. Vacuum Supply Co., Ann Arbor, Mich.

JUST Published—Popular Mechanics Shop Notes for 1915—626 Easy Ways to do Hard Things. This is Vol XI and is similar in style to the other numbers in the series. 224 pages, 517 illustrations. Paper 50 cents. Cloth, \$1, postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

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

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. Fredrich 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 1/4", takes 25" between centers. Complete set gears cutting all size threads 3" to 40". \$43.50. Grammes & Sons, Allentown, Pa.

ENGINES AND MOTORS

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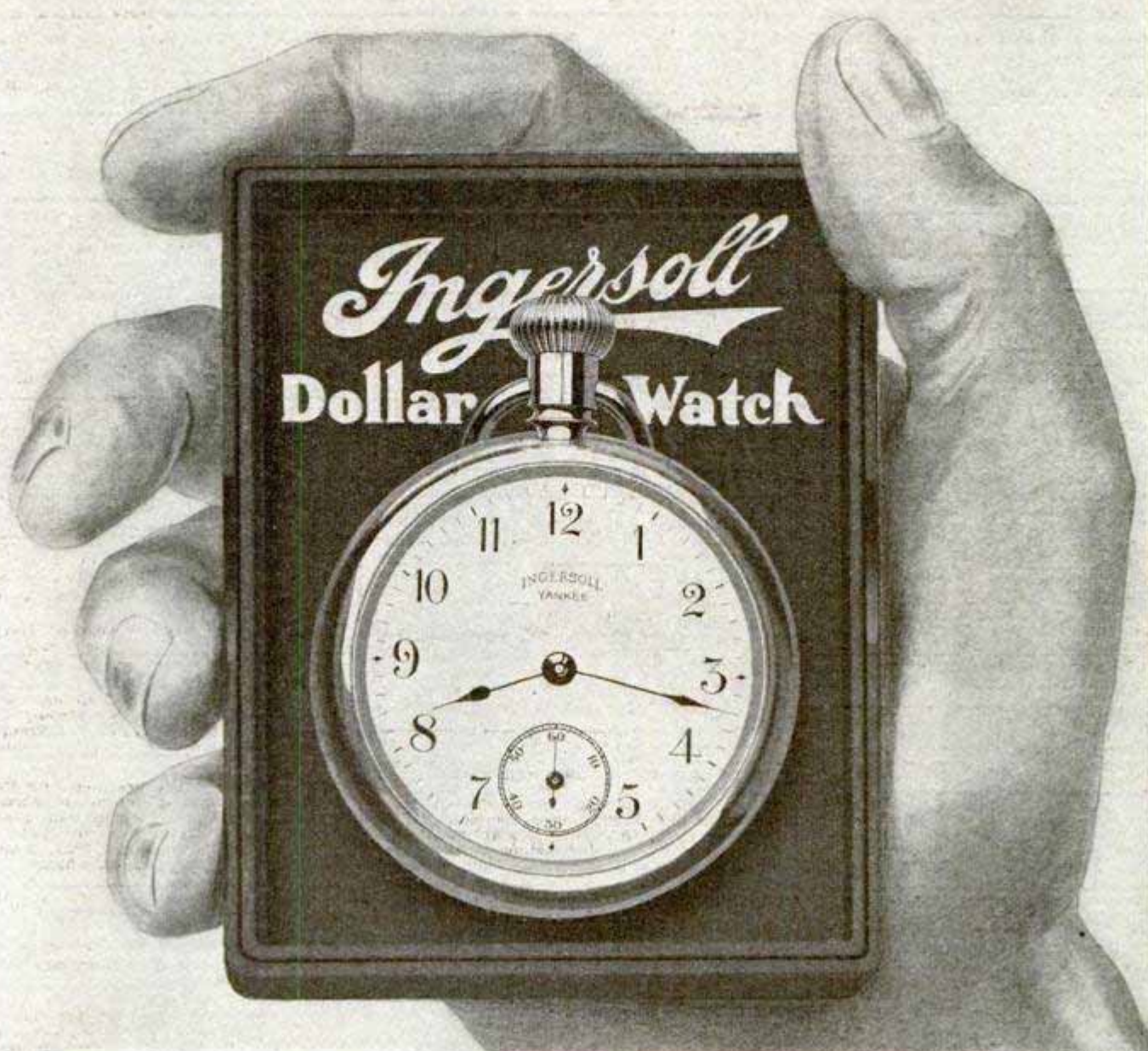
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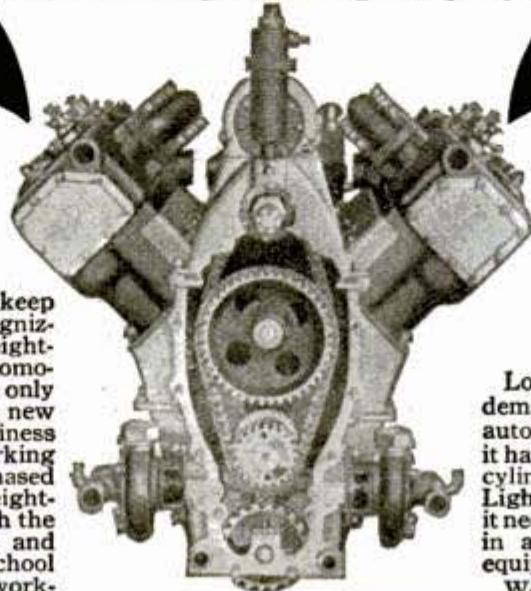
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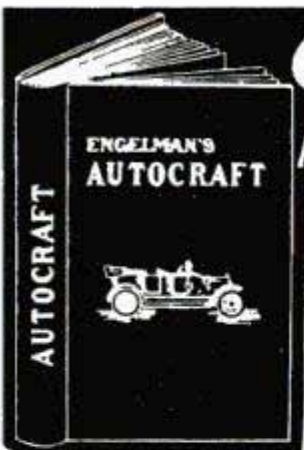
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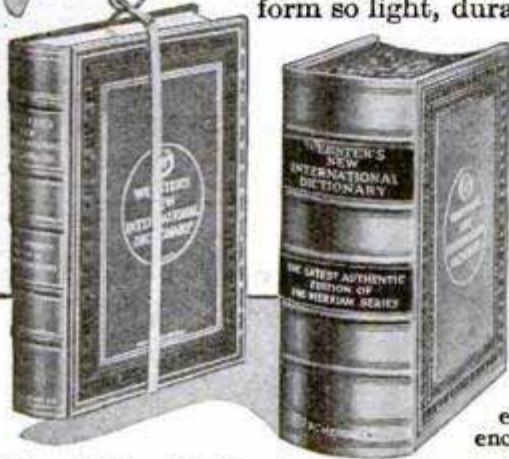
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no matter how long you've been at it, or how successful you are, or how large or small are your operations, or what you're raising, write for our book "How to Make the Farm Pay More." It has opened the eyes of thousands of farmers—many of them "old timers"—to great, new possibilities for profit on their own farms. The scientific methods taught by our 30 agricultural experts have all been proved up. Many of our students have doubled, tripled or quadrupled their profits. Fill out the coupon and mail tonight. The book is free. No obligation. No agents to bother you.

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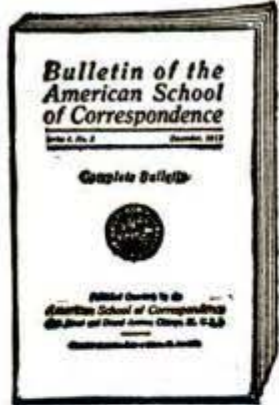
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Wonderful opportunities everywhere for Detroit-trained men in every branch of this big, fascinating and growing business. Every locality needs ambitious men to start garage and repair shops in down-town and residence districts.

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Alfred Sutfin



J. H. Rhynard



R. C. Smith



J. Wilhelm



P. C. Neilson

Read How These Six Men Are Making Good

Here are brief but telling records of six of our graduates. We have scores of others who are doing as well.

H. C. Reichow, Orchard Lake, Mich. Private chauffeur for Mr. Ward, earning \$100 per month and room and board.

Roscoe C. Smith, of Ansonia, Ohio, is all-around factory man with Hupp Motor Company.

Alfred Sutfin, Bannister, Mich. Owns garage and repair shop. Earning big money.

Jake Wilhelm. Service man travelling for Lozier Motor Company at \$125.00 per month and travelling expenses.

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?

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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.

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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.

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The War Cost Him His Job

The great war in Europe is causing hard times in America, and factories everywhere are laying off men. Thousands are already out of work, with jobs scarcer today than they have been in years.

Whenever it's necessary to cut down the force, the **untrained** man is the first to go. **Trained** men—foremen, superintendents and managers—keep their jobs, but the **untrained** man—the man who can be easily replaced as soon as business picks up—is sure to be let out.

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Protect yourself and your family against hard times by training yourself for a responsible position—a **position that's lay-off proof**. Not only will it mean shorter hours, better pay and more interesting work, but you'll be sure of your job under all circumstances.

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Vol. 22

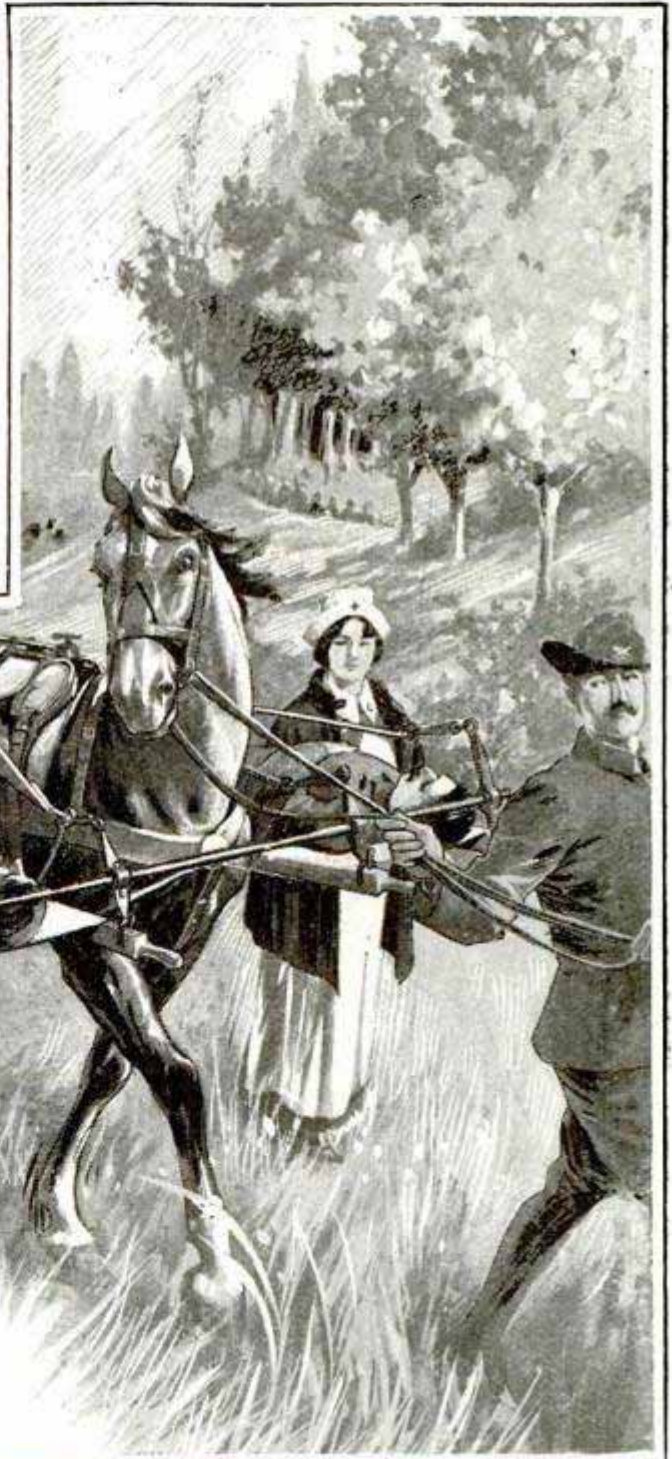
DECEMBER, 1914

No. 6

Horse-Borne Litter for Carrying Wounded

FOR the transportation of wounded soldiers when conditions are such as to render the use of an ambulance impracticable, a double litter for carrying two persons has been invented which may be strapped to a horse's back. Two ordinary stretchers are suspended, one on either side of a horse, by canvas straps attached to heavy springs which fasten to a pack saddle. Sectional bars extend in front of and behind the animal, forming a framework which holds the stretchers securely, while a breeching and breast strap keep the apparatus in place when it is being carried up or down a hill. The two springs upon which the whole contrivance is swung absorb the jolts, and brace straps, connecting with the harness underneath the horse, prevent

a swinging motion. It is an operation requiring only a moment's time to remove one of the stretchers when the destination is reached.



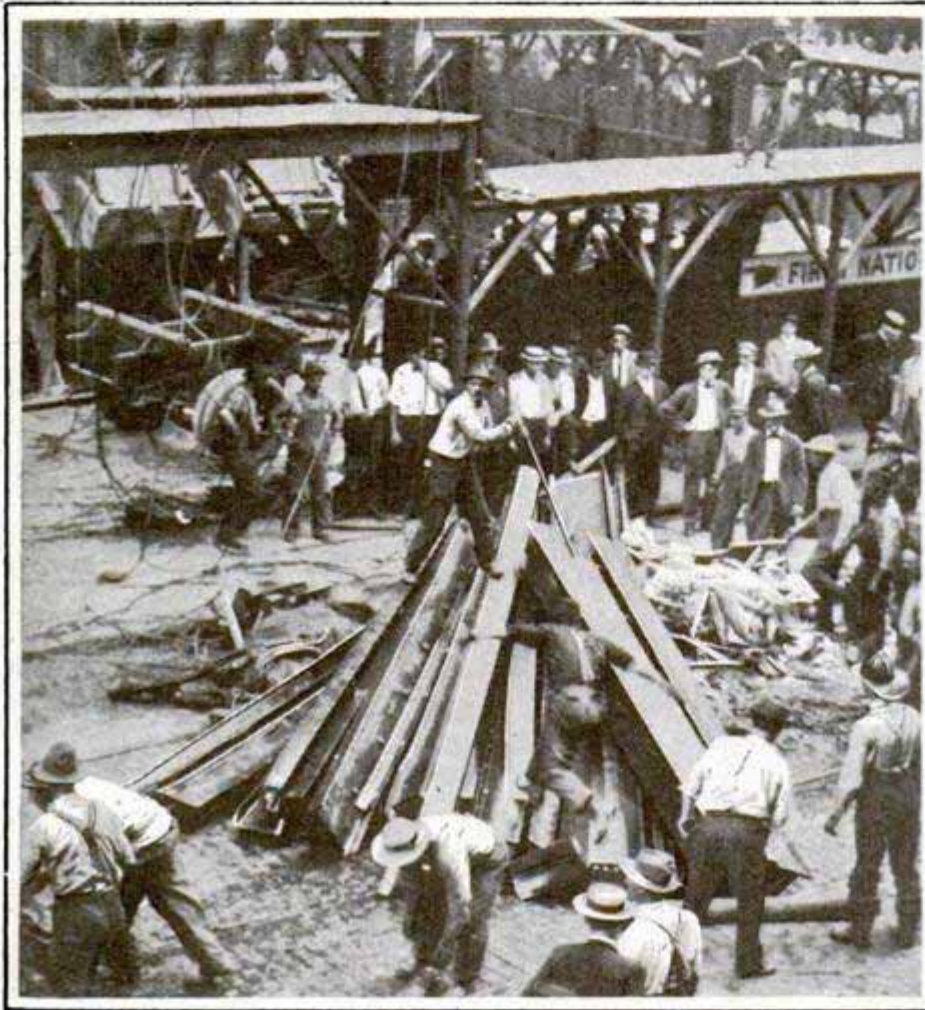
By Means of This Newly Invented Litter,
One Horse can Carry Two Wounded
Soldiers in Rough Country Where
Ambulances cannot Travel

*NOTICE:—In order to protect the public from the substitution for POPULAR MECHANICS of periodicals which have been given similar or analogous titles, the name of this magazine has been registered as a trade-mark in the United States Patent Office, and the publishers hereof give notice of their intention to enforce their rights under such registration.

GIRDERS FALL INTO STREET FROM HIGH BUILDING

At an hour when traffic was at its heaviest, a load of 18 steel girders

crashed into the street below. It was



This Pile of Steel Girders was Dropped into the Street While being Hoisted to the Eighteenth Floor of a Minneapolis Building

a realization of what hundreds of persons in many cities have daily expected while watching the erection of modern office structures. When the accident happened, street cars, automobiles, wagons, and crowds of pedestrians were passing, the latter so used to the sight of a bundle of beams being lifted as if they were so many sticks of wood, that they considered their safety a matter of course. The 9-ton weight was being lifted by an electric crane. As the load neared the top of the structure the cables slipped and the load fell. The hoisting beam of the derrick struck an edge of the building, snapped in two and followed the mass of steel down-

ward. The girders struck and killed two men and a team of horses.

ward. The girders struck and killed two men and a team of horses.

SAVING THE ORIGINAL "STAR-SPANGLED BANNER"

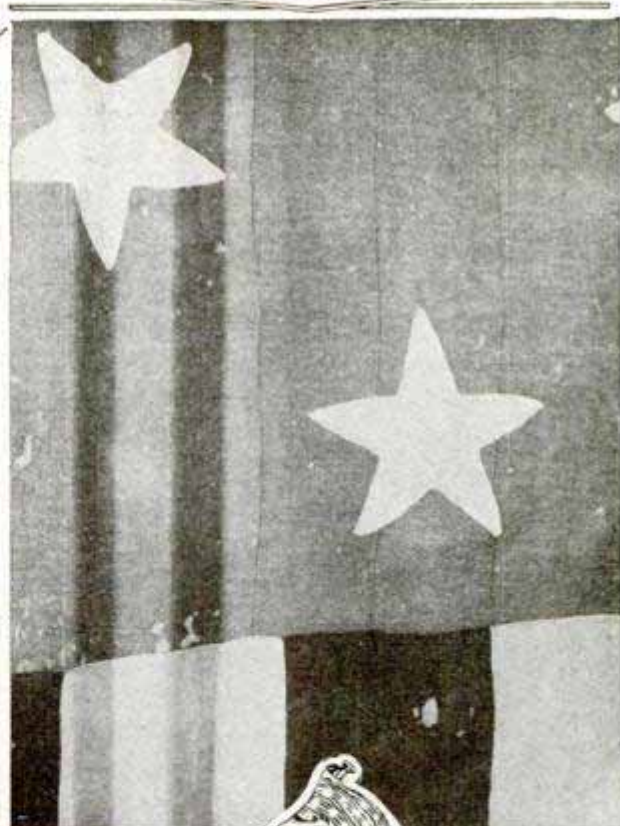
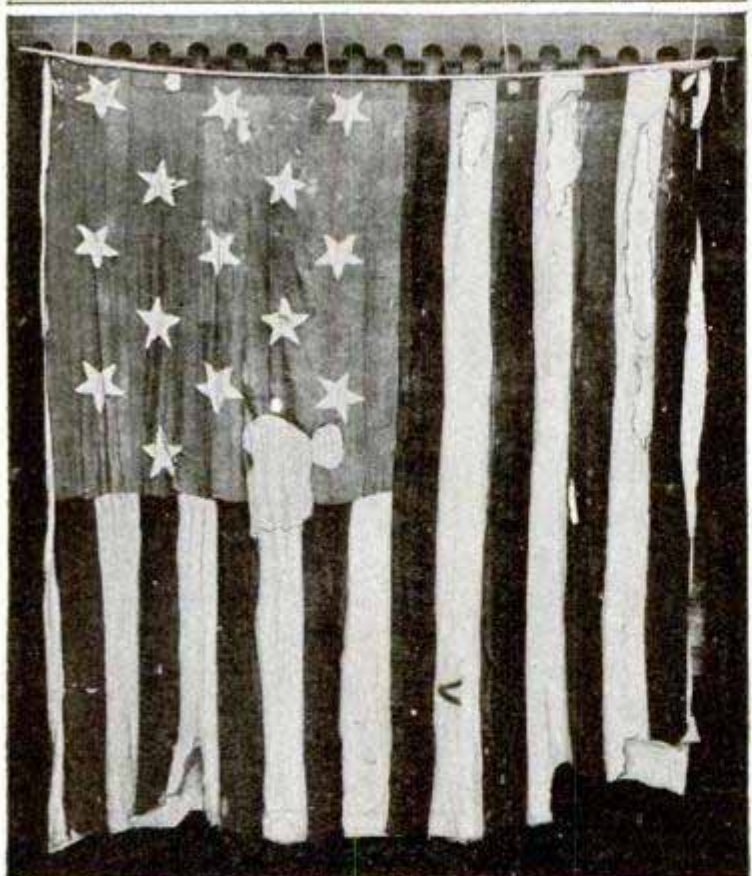
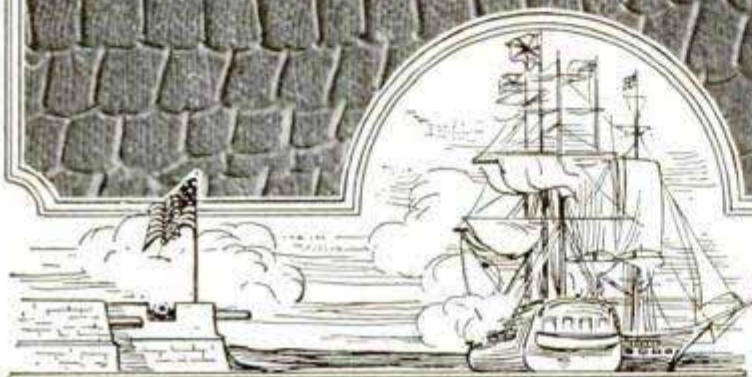
After several months of constant work of a most delicate character, the powder-burned, bullet-scarred "Star-Spangled Banner," which floated above Fort McHenry a hundred years ago when the British fleet was repulsed while attempting to reach Baltimore, has been preserved for posterity. The faded and tattered remnants of the flag that inspired Francis Scott Key to write America's national anthem during the summer were subjected to a process of restoration, which it is be-

lieved will prevent further disintegration of the fabric.

The work of preservation was accomplished by backing the banner with specially woven Irish linen. The flag was basted to this, care being taken that not a single thread should be stretched too tightly, after which the final sewing required weeks of time to complete, and took the services of more than a dozen needleworkers. Linen thread, dyed to match the different colors, was used in stitching the banner to its re-



Close View, Showing Character and Size of Stitches Used to Preserve Flag



Left: "Star-Spangled Banner" Before the Work was Begun

Above: A Section of the Flag as It Appears Today



After Months of Work the Original "Star-Spangled Banner," Which was Falling into Decay, has been Preserved by Backing It with Linen and Honeycombing It with Special Stitches

inforcement, the work being done so closely that it now gives the flag a honeycombed appearance over its entire surface. It is estimated that more than a million and a half stitches were taken. No attempt was made to patch the battle-torn holes, since the effort was to preserve, not restore the banner. The mesh stitching, however, covers these portions of the linen backing in order that the effect may be uniform. By this method the historic flag has been made literally a part of the cloth to which it is sewed, and has been given the strength of it. The work was done in the west hall of the Smithsonian Institution, in a room commonly referred to as the chapel. The flag has 15 bars, the same number of stars, and measures 29 by 35 ft. In the future it will be displayed at the National Museum in a large glass case.

DETACHABLE ELECTRIC LAMP MADE FOR HUNTING GUN

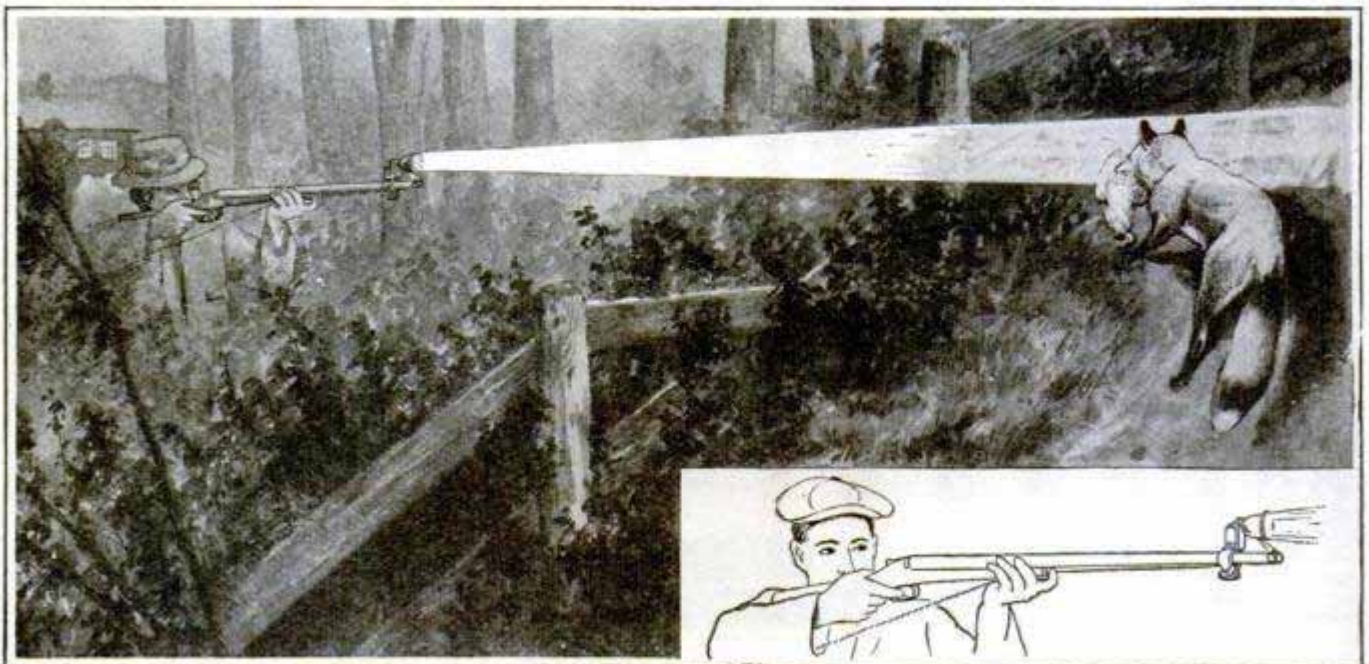
An electric-lighting attachment which may be fitted to any shotgun or rifle, enabling accurate shooting after night without necessitating the purchase of a special firearm, has been devised. The projector illuminates objects at a distance of approximately 100 yd. in front of the sight, which

makes it possible for a hunter to aim at his target instead of firing blindly into the darkness. The lamp is arranged so that it may be clamped to the barrel of a weapon 4 in. back of the muzzle and dimly illuminates the front sight. It adds only 2 oz. weight to the gun, since it connects with a battery which is carried in a pocket. The device may be attached or detached easily.

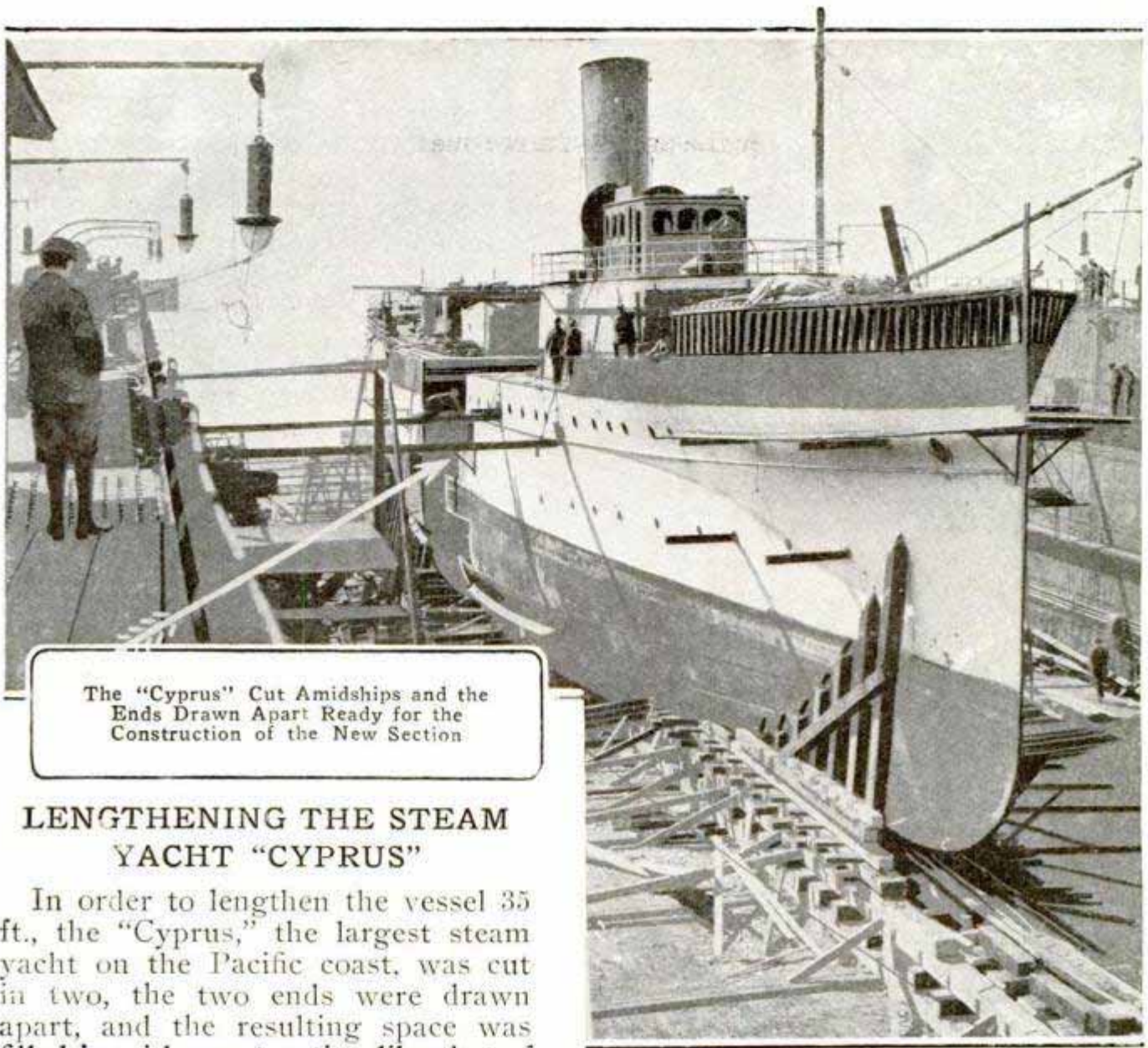
AMERICAN ALTITUDE RECORD BROKEN BY ARMY AIRMAN

During the course of a flight at San Diego, Cal., early in October, Capt. H. Le R. Muller of the United States Army aerial corps established a new American altitude record by reaching a height of 17,441 ft. in a domestic-built machine. The previous record was 15,600 ft., which was attained by De Lloyd Thompson last summer at Kansas City, who at that time surpassed Lincoln Beachey's 11,642-ft. climb made at Chicago in 1913. A German airman still retains the title to the world's record, however, which he established by reaching an altitude of four and two-thirds miles.

¶ In July, 1914, 159 men were killed in and about coal mines in the United States.



Detachable Electric Light for Gun Illuminates Objects 100 Yards Away



The "Cyprus" Cut Amidships and the Ends Drawn Apart Ready for the Construction of the New Section

LENGTHENING THE STEAM YACHT "CYPRUS"

In order to lengthen the vessel 35 ft., the "Cyprus," the largest steam yacht on the Pacific coast, was cut in two, the two ends were drawn apart, and the resulting space was filled in with construction like that of the remainder of the vessel. The "Cyprus" as originally built was 231 ft. long, and had a beam of 28 ft. In preparing the yacht for lengthening, the joiner work was first torn out, the yacht was placed in a dry dock, and a launching cradle was constructed under the forward end of the hull. The steel plates of the hull were then cut, the cut being made between the engine and boilers without disturbing either. Strong cables, operated by an electric winch, were attached to the bow, and at a signal this section of the yacht was pulled forward the required distance on the launching cradle. This part of the work had been so carefully planned that only one haul was necessary. The 35-ft. space was then filled in with steel plates and finished, and the yacht was again ready for service.

SINGLE PUSH BUTTON FOR ELECTRIC-LAMP SOCKET

A new feature in an electric-lamp socket is a single push button that takes the place of the usual rotary key. The device extends through the socket and projects from each side, and is simply pushed from one side to the other, as required, for turning the current on or off. It is held in either extreme position by a spring-controlled catch.



GRANITE CASTLE IN THE ROCKIES

A SUMMER HOME FOR PRESIDENTS

A SUMMER home in the heart of the Rocky Mountains for the presidents of the United States, built and presented to the nation by the citizens of the 22 states west of the Mississippi, is projected by citizens of Denver. Six hundred and forty acres of land on Mount Falcon, 15 miles west of Denver, has been given as a site, and a considerable part of the \$1,000,000 which it is proposed to spend in the construction of the building and the development of its surrounding park has been subscribed. The formal laying of the cornerstone is to take place as soon as President Wilson can find an opportunity to attend the ceremony in person.

The purpose in view is not only to provide a sumptuous and appropriate summer home for the head of the nation, but to bring those responsible for the administration of affairs in Washington into closer touch with the West, its needs, and its interests. To this end the building has been planned so as to provide ample room, not only for a home but for the presidential offices, as well as accommodations for other public officials, space for public gatherings, and suitable accommodations for visiting ambassadors, governors, and other dignitaries.

Constructed of granite and marble over steel frames on concrete foundations, the building as planned is to be castlelike in general effect, fitting into the rugged, rocky surroundings. An area of about 40 acres on the summit of Mount Falcon has been chosen for the house itself and its immediate grounds and gardens. The approach will be from the south, over a crest on which are located the garage, stables, water tower and sally port, thence over a three-span masonry bridge to the inner court, 240 by 244 ft. Here the road branches, one part leading through a tunnel to the service court at the east of the main tower, in the base of which are the engine and storerooms. The other branch of the road sweeps around a circle, 160 ft. in diameter, to the

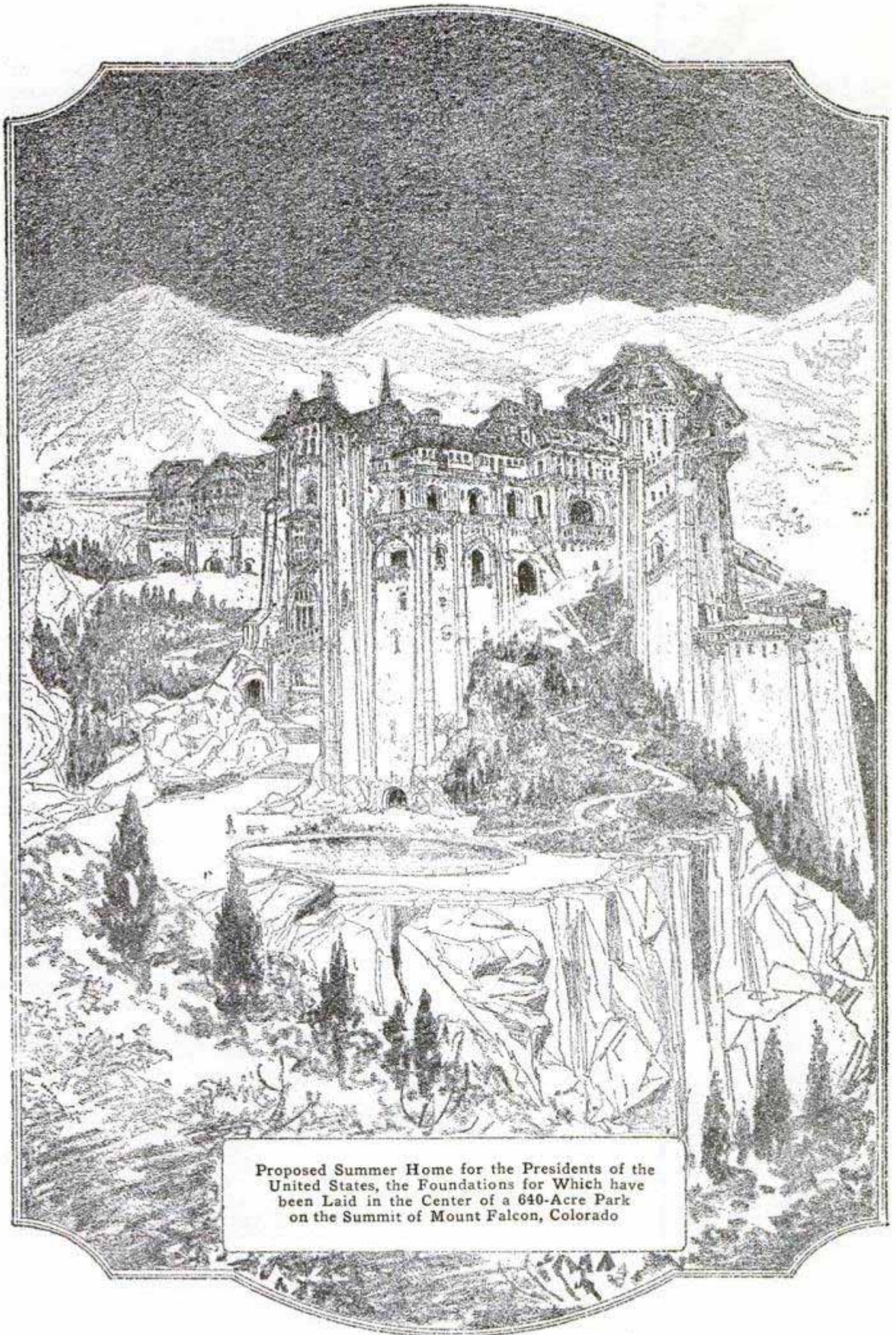
porte-cochère, giving access to the three main units of the structure, the administration wing, the public space, and the state wing.

The administration wing contains the offices of the president and his secretaries, a conference room, reception rooms, and a library, above which are the private apartments of the president. The position of the wing is such that a view of the plains, the valleys and peaks is always obtainable, and provision is made for private approaches so the president may come and go unobserved.

The public space under the tower is arranged for gatherings and exhibitions. The monumental stairway leads up through five stories to the observatory and the wireless-telegraph station on the roof. This portion can be opened into the state suite, containing, besides waiting, reception and dining rooms, and a conservatory, the hall of state, two stories high, with trussed ceiling and clerestory windows, the library, the art gallery, the chapel and cloister, rooms for the reception and entertainment of state officials, ambassadors, committees, and such gatherings as the president must meet. Above these rooms are suites and apartments for visitors to the president and those who visit the mansion on business.

Some idea of the grandeur of the scenic setting for the building can be obtained from the accompanying illustration reproduced from the architects' drawings. From the north terrace, upon which the drawing room and library will open, the steep mountain side drops down 2,000 ft. To the west, the granite cliffs drop vertically 500 ft. into a little wooded valley. North, south, and west, mountains loom, while the plains slope downward to the east.

Funds for the building are being raised partly by popular subscription and partly through state appropriations. The property is to be held in trust for the nation by a board composed of the governors of the 22 trans-Mississippi states.



Proposed Summer Home for the Presidents of the United States, the Foundations for Which have been Laid in the Center of a 640-Acre Park on the Summit of Mount Falcon, Colorado

CONVERTIBLE WATCH WORN IN SEVEN STYLES

A convertible watch recently devised is provided with an ingenious set of interchangeable attachments that make



Convertible Watch with Interchangeable Attachments That Make It Equivalent to Seven Watches So Far as Styles of Wearing are Concerned

the one watch equivalent to seven so far as styles of wearing are concerned. By means of these attachments it may be worn as a bracelet watch, as a moire, silk-elastic, or leather-wristlet watch, as a silk or chain-sautoir watch, or as a chatelaine brooch watch. The

changes are all easily made as occasion or fancy dictates, and do not require the services of a jeweler. The bracelet attachment is provided with two extensible links which, when released, permit the bracelet to be slipped on or off over the hand without detaching either end from the watch.

EXCAVATING AND LOADING EARTH AT LONG RANGE

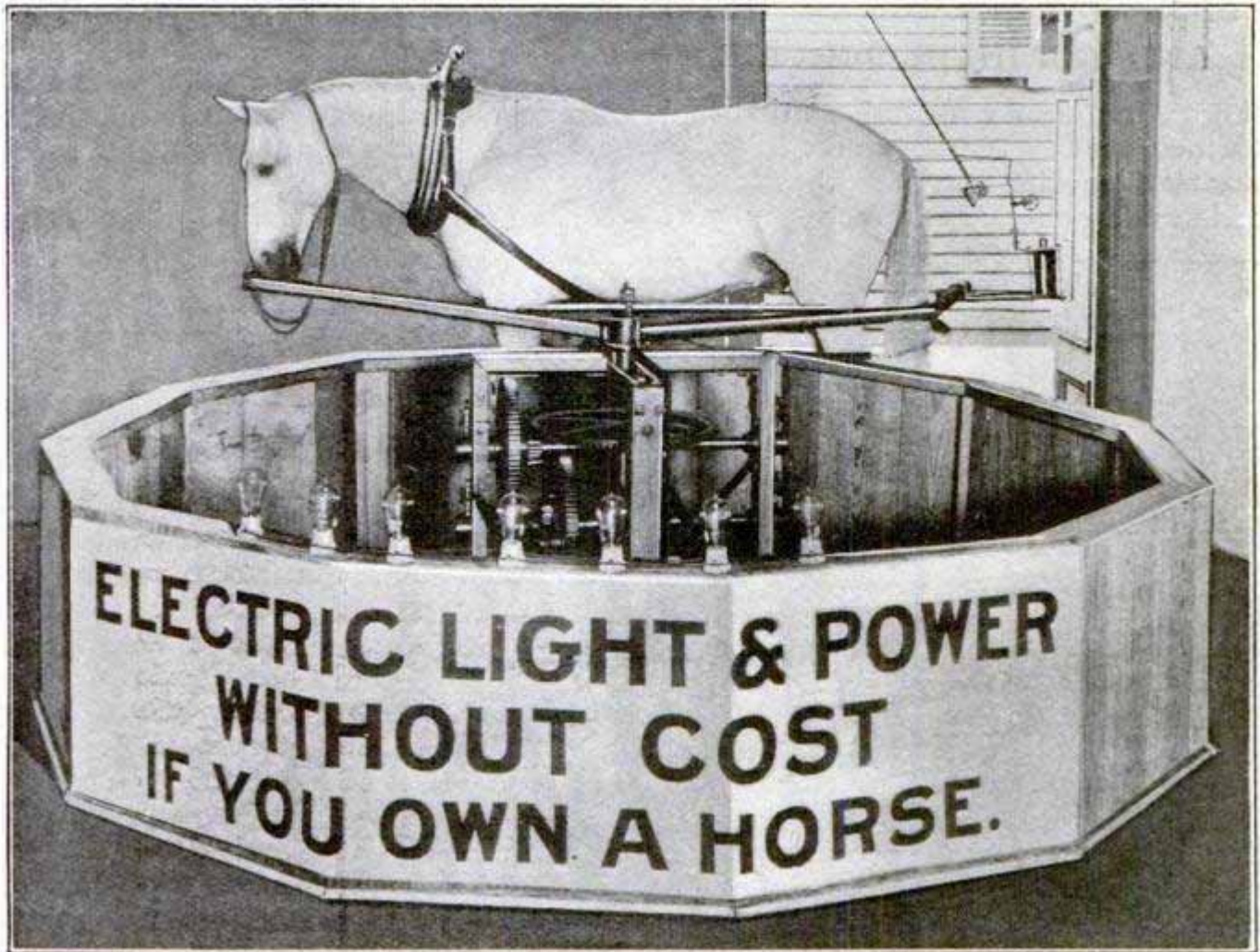
Digging a ditch with power supplied by a hoisting engine situated 500 ft. from the point of excavation and pulling all the dirt out of the end of the ditch directly into wagons, is the novel plan of earth handling employed by a contractor on the waterworks improvements at Baltimore. The plant consists of a timber incline, at the top of which is a chute for loading the wagons as they stand underneath, and a hoisting engine with cables for handling the steel excavating bucket. The bucket has a swinging bail at the front and handles at the back by which two men can guide it in digging as they would a plow. The cable is attached to the bail of the bucket, runs over a sheave at the head of the incline to the winding drum of the engine, then back above the bucket to a second sheave made fast to timber back of the excavation in the trench, and finally to an attachment at the back of the bucket. With this arrangement the bucket is readily drawn either forward or backward by the engine. As it is drawn



Loading Chute: The Loaded Buckets are Drawn to the Top of the Incline Where They Dump Automatically through the Chute into the Wagons



The End of the Trench: The Bucket is Provided with Handles by Which Two Men Guide It in Digging as They would a Plow



This Horse in a Few Hours can Produce Enough Electric Energy to Light a House

forward the bucket digs up a load of earth and is pulled up the incline. As it reaches the chute the front of the bucket drops while the back is held by a rod extending across the back, and the load is dumped automatically. The engine is then reversed and the bucket is drawn back to a digging position in the trench. The bucket takes $1\frac{1}{2}$ cu. yd. of earth to the load and is capable of loading as many as 30 wagons in an hour.

MAKING HORSE ILLUMINATE HOUSE WITH ELECTRICITY

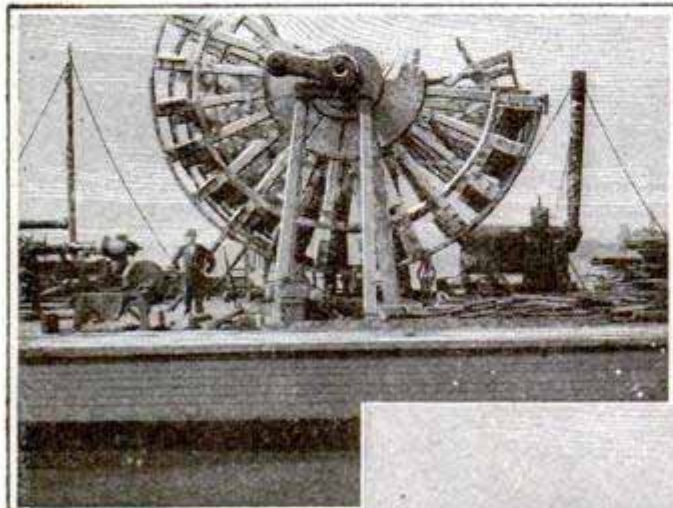
An Ohio inventor has devised an apparatus intended to transform a horse's energy into electricity with which to light a house, or charge storage batteries for the motor car which has replaced it for family driving purposes. The arrangement consists of a circular sweep which operates a dynamo, the animal causing power to be generated

as it walks slowly around the 14-ft. track. An electric bell and whip attachment keeps the horse going steadily ahead. If the animal should slow down too much, or should stop, the bell would immediately commence ringing and the whip striking, neither of them stopping until the horse regained a normal gait. It is claimed that in approximately three hours a horse in this manner can develop enough electric energy to illuminate a small house for more than an evening, or store sufficient current to operate various appliances. The device is intended for use on farms where electric power is not provided.

Ⓒ Approximately \$48,000,000 is deposited in the postal savings banks of this country. Great Britain before the war had more than \$859,000,000 in similar deposits, while France exceeded \$329,000,000, and Italy \$324,000,000.

CAPSIZED STEAMER RIGHTED AND AGAIN IN SERVICE

Righting a river steamer that had "turned turtle" as the result of collision with another boat was the difficult undertaking carried out successfully at



Stern Paddle Wheel Erected on Deck for Repairing

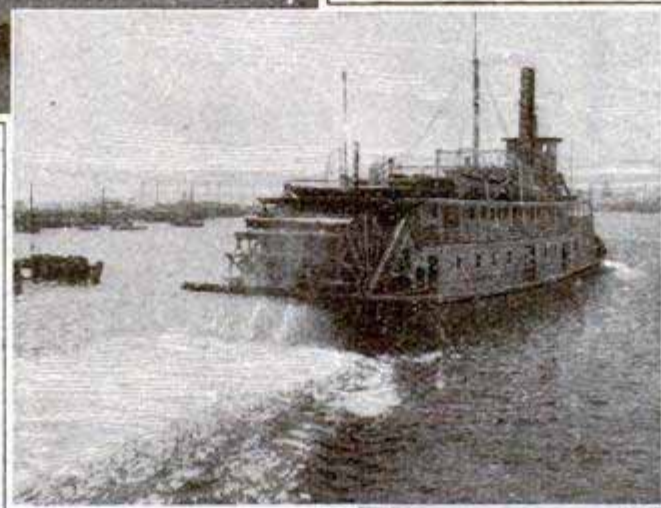
San Francisco recently. The collision occurred in San Francisco Bay during a dense fog, as explained in the June, 1913, number of this magazine, in which a photograph of the craft, floating bottom up, was shown. The vessel that has been remodeled carried a safe that contained \$30,000 in bullion. This safe was torn from its fastenings when the vessel turned over and crashed through the upper works to the bottom of the bay. The treasure has never been recovered, although much diving has been done in an effort to locate it.

When it was decided to right the vessel, it was towed broadside to the beach and cables with anchorages out in the bay were passed under the hull and attached to the inshore gunwale, in the belief that the incoming tide would turn the vessel over. This scheme was only partly successful, and the vessel was finally righted by means of heavy tackle worked from

large scows. The superstructure was destroyed during this operation and parts of the frame were badly wrenched, while the engines and boilers broke through the deck and sank in the water, but the vessel was still considered worth repairing and refitting. This was done at a total cost of about \$30,000, and the steamer was rechristened and replaced in service on the bay.

AEROPLANE HELPS TO SELL REAL ESTATE

Photographing a tract of land from an aeroplane is the latest method of advertising the sale of lots in a new subdivision. After the negatives were obtained, enlarged prints were made and displayed in store windows, and these are said



The Rebuilt Steamboat Back on Its Regular Run



What was Left of a Steamboat That had been Righted after having "Turned Turtle" as the Result of a Collision

to have been successful in attracting attention, not only on account of the novelty of the scheme, but because they were recognized as being faithful representations of the tract, without distortions or exaggerations. The property advertised in this way has a frontage on Long Island Sound and runs back to a trolley line—two features that it was desired to emphasize.

LANGLEY AERODROME MAKES LONGER FLIGHTS

That the old Langley aerodrome is capable of sustained flight was conclusively proved recently when, after being equipped with a modern 100-hp. motor, it made two successful flights over the lake at Hammondsport, N. Y. Each flight was about a quarter of a mile in length and the craft was at times more than 20 ft. above the water. With the exception of the new motor, no changes had been made in the machine since its inventor made his unsuccessful attempt to fly it over the Potomac in 1903. Trials made in May, 1914, and reported in the July, 1914, number of this magazine, resulted in several short flights, but these were not regarded as entirely satisfactory. This was apparently due to the weakness of the old Manley motor with which the aerodrome was originally equipped and which was capable of developing only 52 horsepower.

PHONOGRAPH MOUNTED ON WHEELS FOR SCHOOL USE

The value of the phonograph in schools is now well recognized, not only as an aid in cultivating musical taste, but for supplying the music for marching, physical-culture exercises, and folk-dancing. There has recently been placed on the market a phonograph, designed for school use, that is easily transported from room to room as required. The front of the case is

mounted on wheels and the back on casters, and with a handle conveniently



Phonograph Cabinet with Wheels like a Tea Wagon

placed the instrument is easily trundled about without any necessity for removing the horn.

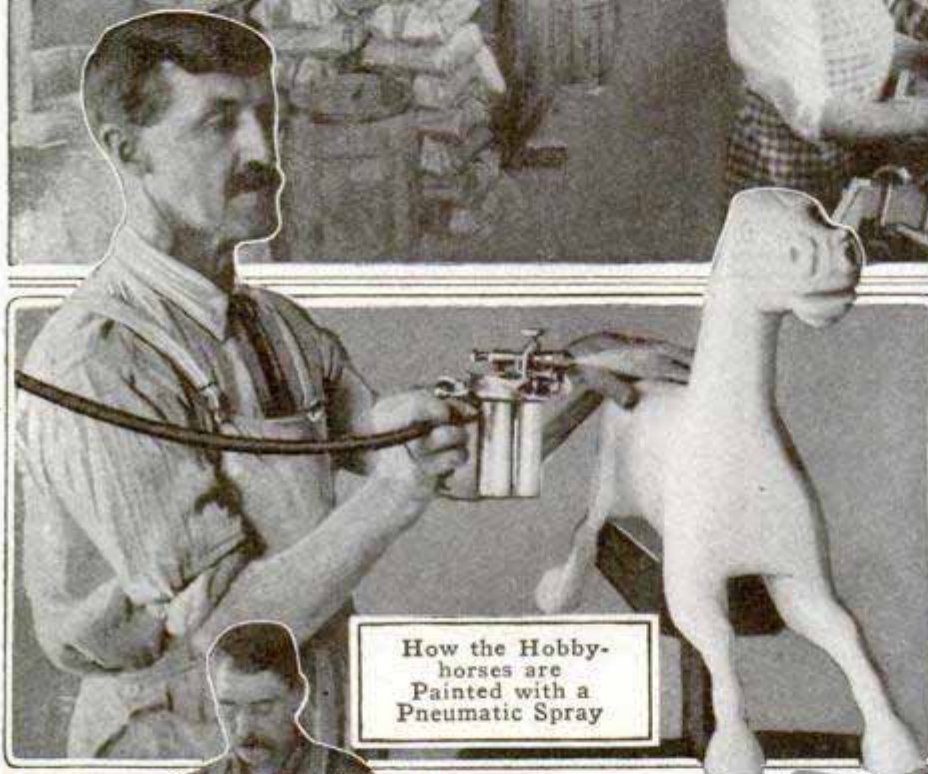
CHRISTMAS TOYS SUPPLIED BY AMERICAN MAKERS

There is no danger of a Christmas-toy famine on account of the European war. Some kinds of playthings for which this country has been dependent upon Germany may not be so abundant as formerly, but American manufacturers are already producing toys to an annual value almost equal to that of the German imports, and American children are no longer exclusively supplied from Nuremberg.

Last year the toy imports from Germany were valued at \$8,856,575, while in the same year the value of the toys made in American factories was \$8,264,000. This year only one-fourth of the usual German supply had been imported when the war broke out, and importations ceased, but American makers have risen to the opportunity and are producing enough additional goods to make up the shortage.



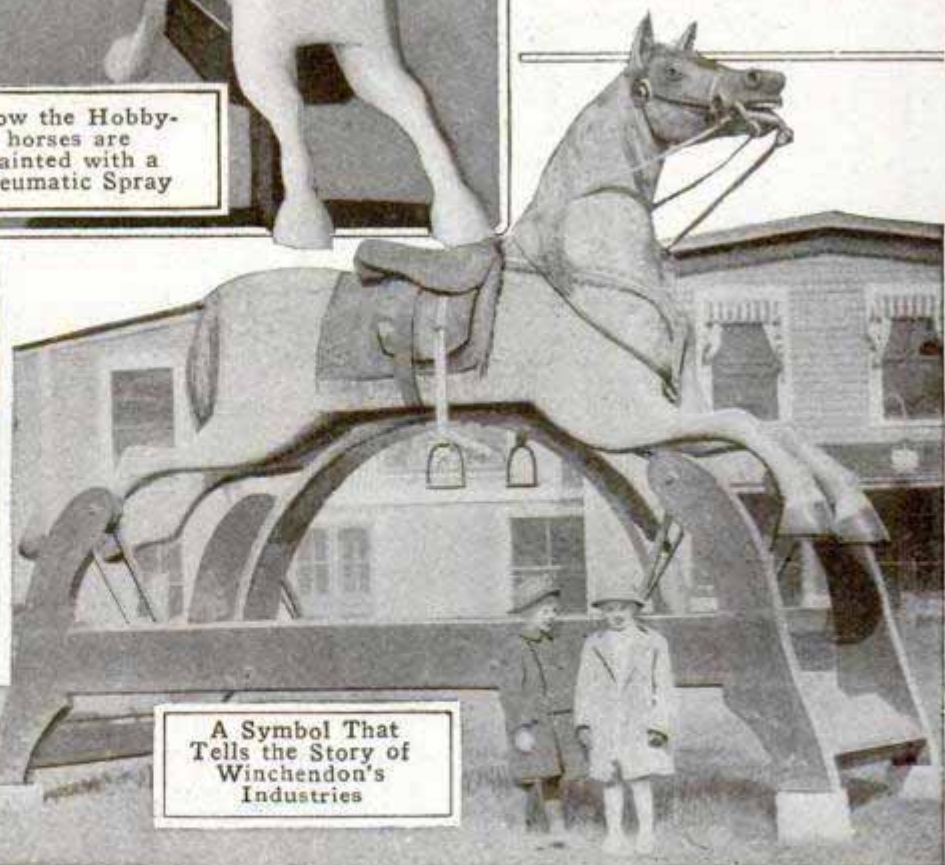
Scenes in an American Toy-Making Factory: This Factory, Where Toys are Made by the Thousands Every Day, has Played an Important Part in Making Up the Shortage Brought About by the European War. In the Shop Shown Above, the Animals are Assembled for the Noah's Arks



How the Hobby-horses are Painted with a Pneumatic Spray



At This Stage a Hobby-horse is a Grotesque Figure, Having Little Resemblance to the Finished Product



A Symbol That Tells the Story of Winchendon's Industries



In the Shop Shown Above the Toy Drums are Finished and Made Ready for Shipment



How the Hobby-horses are Finished and Made Attractive to the Youngsters



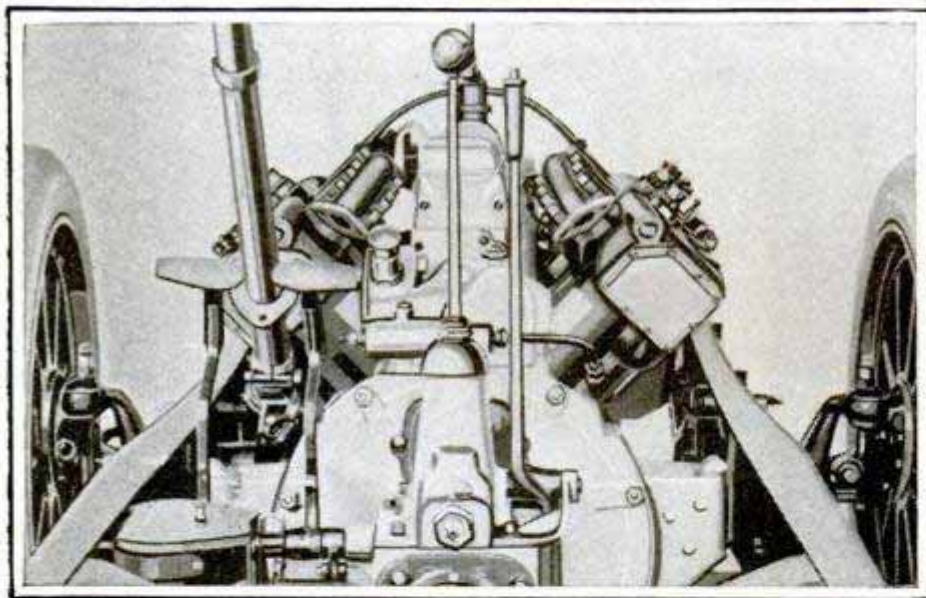
The Last Stage in the Making of a Noah's Ark

The center of the American toy industry is at Winchendon, Mass., where several of the most important factories are located. Opposite the railway station in this city is an enormous hobbyhorse, and this symbol very nearly tells the story in regard to the city's industries. Even before the war broke out, toys of every kind were being produced in enormous quantities in this city. These included even the

Noah's arks, which for many years were turned out exclusively by German makers. The situation is one that may result in a big change in the toy-making industry. After the war ends, it will take European toy makers a long time to recover and get back into the market, and it is quite possible that in the meantime America will have learned to supply itself with toys.

PASSENGER AUTOMOBILE HAS EIGHT-CYLINDER ENGINE

The most striking innovations in automobile design announced for 1915 is a passenger car equipped with an eight-cylinder engine, recently brought out by a well-known American manufacturer. While some racing cars have heretofore been equipped with eight-cylinder engines, this is believed to be the first pleasure car commercially manufactured in the United States having more than six cylinders. The



Eight-Cylinder Engine Installed on Chassis of Passenger Automobile

engine is of the V-type, a style that is in common use on aeroplanes and motorboats, the cylinders being arranged in pairs and firing alternately from side to side. The engine operates on the four-cycle principle, so that there are eight explosions to two revolutions of the crankshaft, or four explosions to one revolution. In this

frequent rate of explosion an approach is made to the continuous torque, or application of turning power, that reaches its ideal in the electric motor. The cylinders have a $3\frac{1}{8}$ -in. bore and a $5\frac{1}{8}$ -in. stroke, and the engine is capable of developing over 60 horsepower.

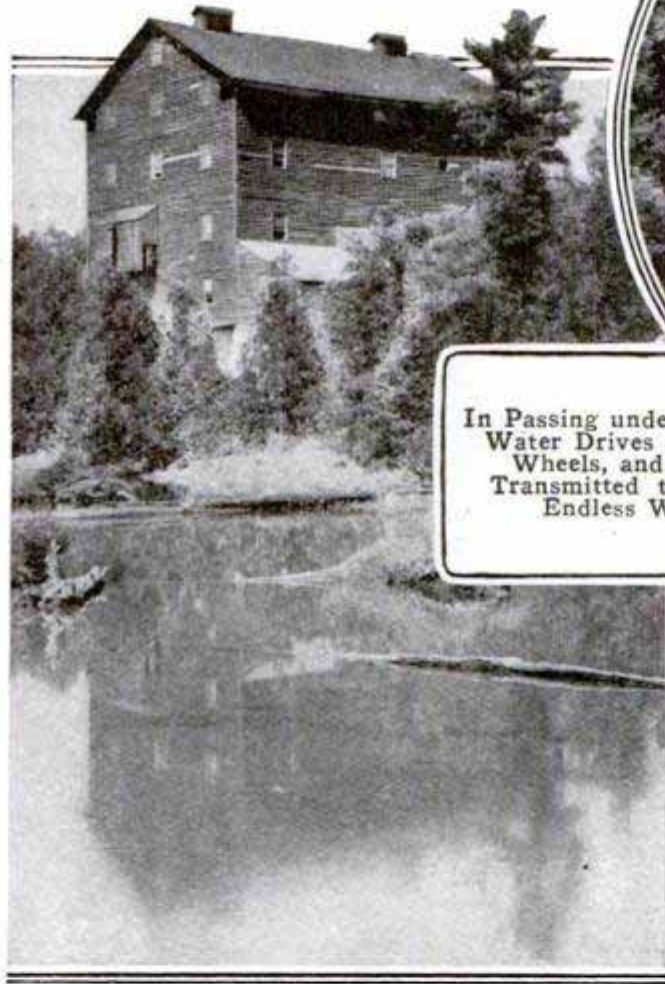
EXTRACTING OIL, GAS, AND AMMONIA FROM BRICK

Clay found in the neighborhood of Petersborough, England, contains so much bituminous matter that brick made from this clay not only burn of themselves in the kiln, but are capable of yielding oil, gas, and ammonia when heated in a retort, and patents have recently been taken out for utilizing these products that have heretofore gone to waste. The plan is to place the green brick in a retort and extract the oil, gas, and ammonia. The brick will then be burned in the usual way by the use of fuel, and the waste heat from the kiln will be utilized in heating the retort for extracting the by-products from the next batch of brick.

☞ Metal freight cars have been in use in India for a number of years. The climatic conditions there cause wood to warp, making its use unsatisfactory for heavy cars.

NEW PROCESS FOR MAKING HYDROGEN GAS

Hydrogen gas, containing less than .01 of one per cent of impurities and coming from the apparatus under high pressure so that it can be stored immediately in cast-iron bottles, is being produced by a new process developed by a German chemist. Hydrogen is obtained by the decomposition of water. With this process the water is decomposed under high pressure by means of iron at a temperature of about 572° F. The chemical reaction takes place rapidly and can be made still more rapid either by adding an elec-

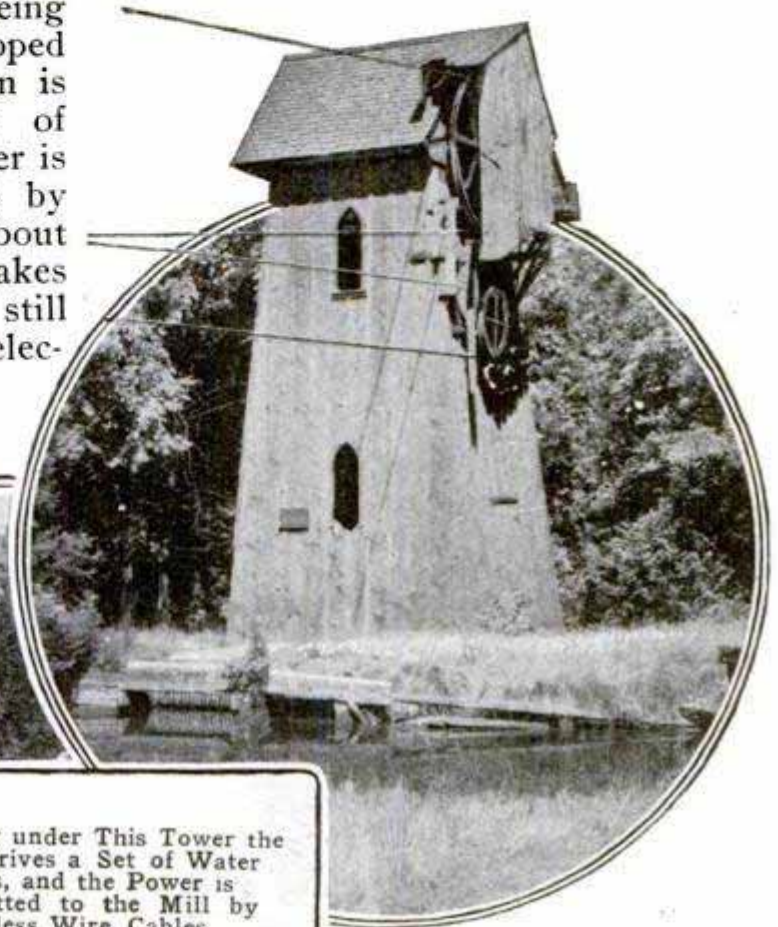


Water Mill in Ontario Where the Water is Used Twice

trolyte to the water or by raising the temperature. The hot hydrogen gas as it comes from the apparatus is first cooled by liquid air and is then purified by being passed over charcoal. The cost of production on a large scale is estimated at about 40 cents per thousand cubic feet.

MILL THAT GRINDS WITH THE WATER THAT HAS PASSED

A water mill in Ontario has the unusual distinction of using the water twice. After the water has passed through the turbine at the mill, it



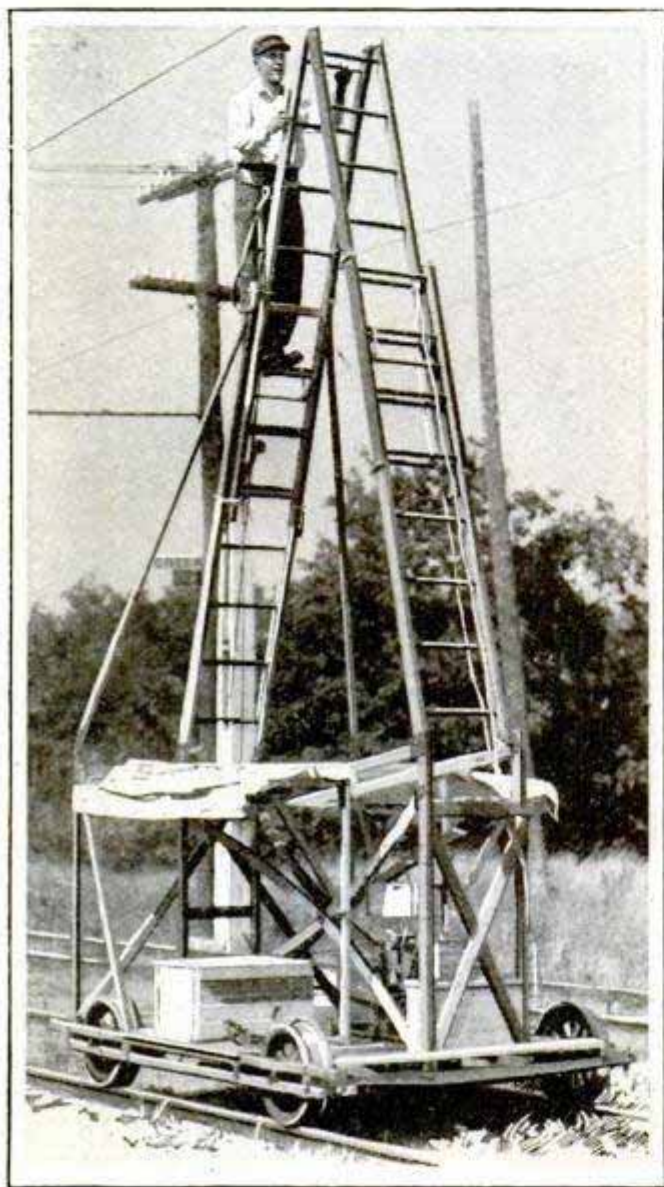
In Passing under This Tower the Water Drives a Set of Water Wheels, and the Power is Transmitted to the Mill by Endless Wire Cables

acquires a new velocity by flowing down a steep slope in the creek and then passes under a tower a short distance downstream, driving a set of water wheels located in the base of the tower. The power developed by this set of wheels is transmitted back to the mill by a set of endless wire cables and helps to drive the machinery in the mill.

GASOLINE-DRIVEN CAR FOR ELECTRIC LINEMEN

A lineman's car that is light enough for two men to lift on and off the track and is equipped with all the facilities for making repairs is in service on an electric railway in Indiana. The special feature about the car is two hinged extension ladders which may be folded

down out of the way when the car is running, but which, when extended, furnish a ready means for reaching the overhead wiring. The car is



A Lineman's Car for Electric-Railway Work:
The Ladders, When Raised and Extended,
Furnish a Ready Means for Reaching
the Overhead Wiring

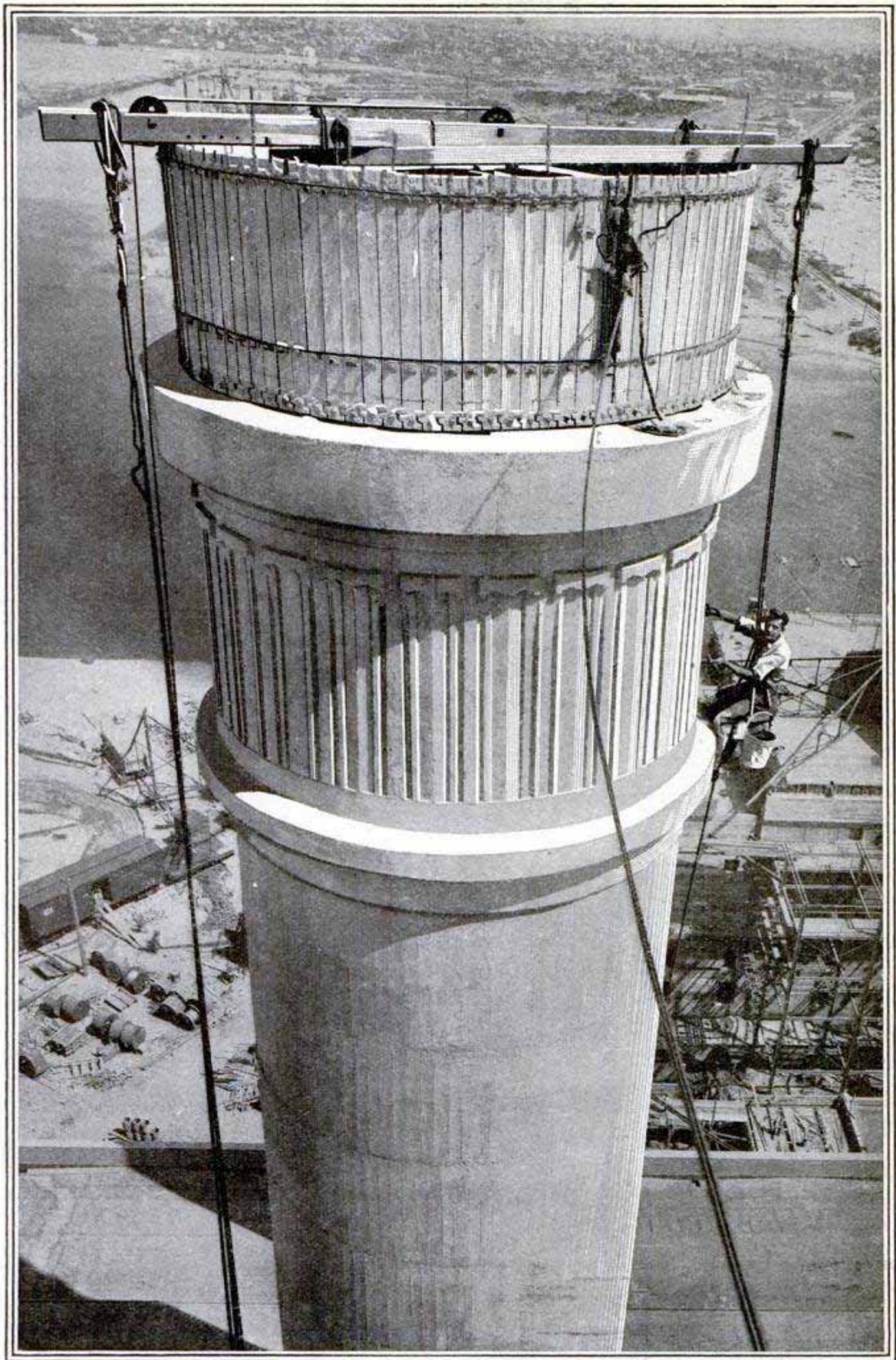
driven by a two-cylinder 7-hp. motor-cycle engine, equipped with a two-speed clutch, and is about the size of an ordinary hand car. In the center is a well-braced rack for supporting the ladders, and on each side is a tool box, the two serving as seats for the lineman and his helper. The top of the rack is covered with canvas, and when necessary for the protection of the linemen, canvas curtains with a glass panel at the front may be fastened entirely around the car. The car is capable of making a speed of from 25 to 30 miles an hour. The raised ladders reach 20 ft. above the rail.

LONDON OMNIBUSES TO USE COKE AS FUEL

Many of the motor omnibuses of London are to be fitted with steam-driven motors fired by coke. These vehicles have been operated heretofore by steam with kerosene as a fuel. It is estimated that a considerable saving in fuel cost will be brought about by the change, and the cost of operating the coke-fired motors is only about one-third that of operating a gasoline motor. The construction of the coke grates is such that there is a continuous and automatic supply of fuel and removal of ash. The boiler consists of a number of seamless steel tubes, radiating from a central reservoir and supplying steam to the motor at a pressure of 300 lb. to the square inch. A supply of coke and water sufficient for driving the car 60 miles will ordinarily be carried, while, if necessary, a supplementary supply can be carried sufficient for driving the car an additional 50 miles.

HUGE REINFORCED-CONCRETE SMOKESTACKS

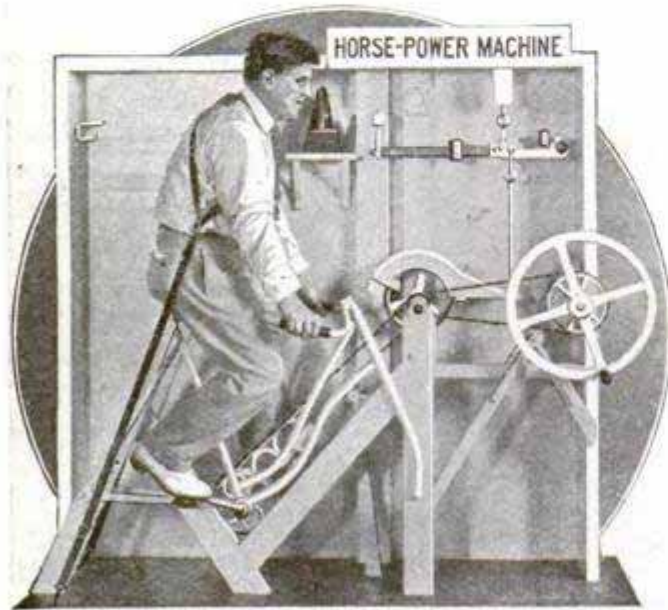
Four reinforced-concrete smokestacks, each 185 ft. in height, have been erected at a Long Beach, Cal., electric plant. They serve as a striking example of the advance which has been made in concrete-construction work, and the position it is assuming in the development of American cities. One of these immense structures, a tall, white column which may be seen for miles along the water front, is shown in the accompanying illustration. The photograph was taken from the top of a companion stack and gives the chimney the appearance of being larger at the apex than at the bottom. The reason for this is that in taking the picture the camera was tilted forward, making the structure seem to taper from the crown downward. The clamps used in securing the form, employed in shaping the upper portion of the stack, are also shown in the photograph.



Building a Reinforced-Concrete Smokestack 185 Feet High: The Photograph was Taken from the Top of a Similar Stack. There Are Four in All

PHYSICAL ENERGY OF MAN SHOWN BY MACHINE

In order to measure a man's strength in horsepower units for the purpose of determining the character of exercise



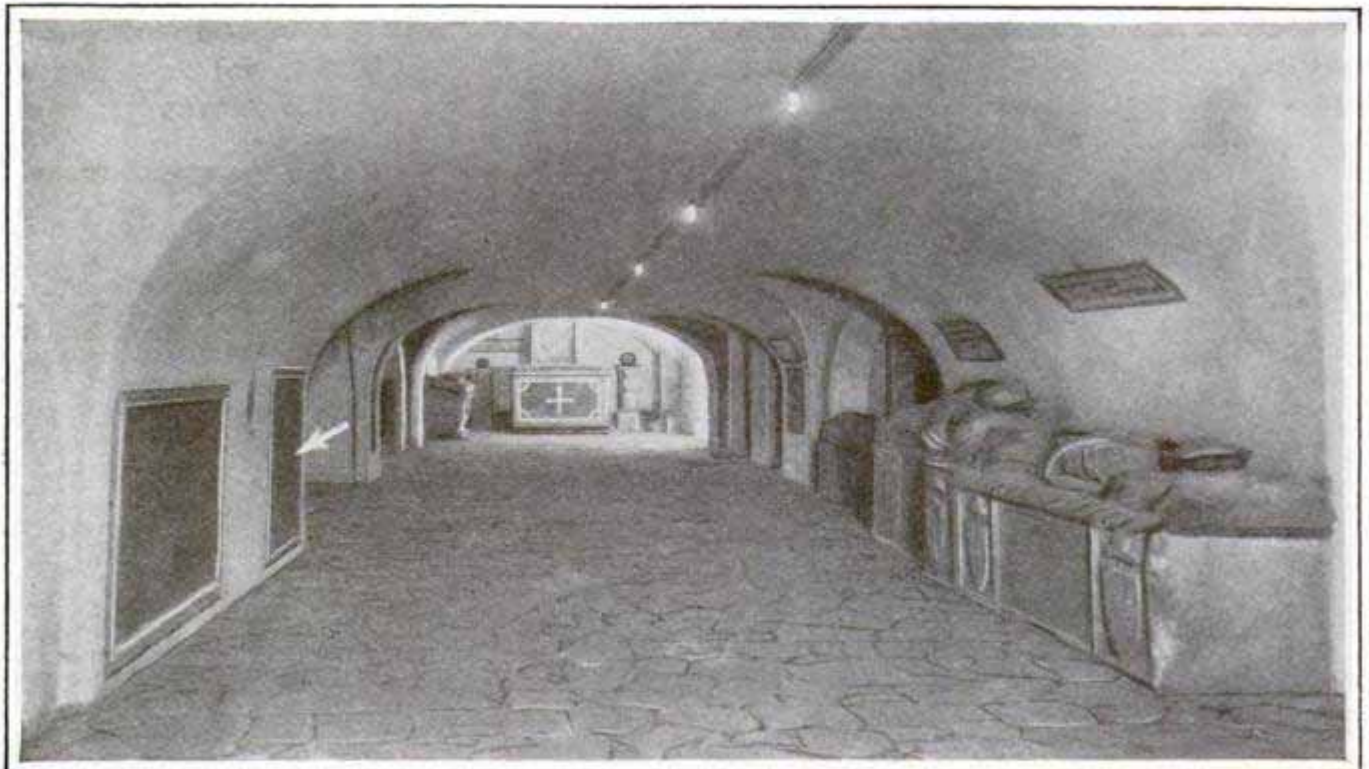
Machine Which Measures a Person's Strength and Indicates the Character of Exercise Needed by Him

needed by him, an apparatus, which is known as the eurostometer, has been invented. The machine consists of a stationarily mounted bicycle frame, a handwheel, a weight brake, and a meter. In testing the strength of the

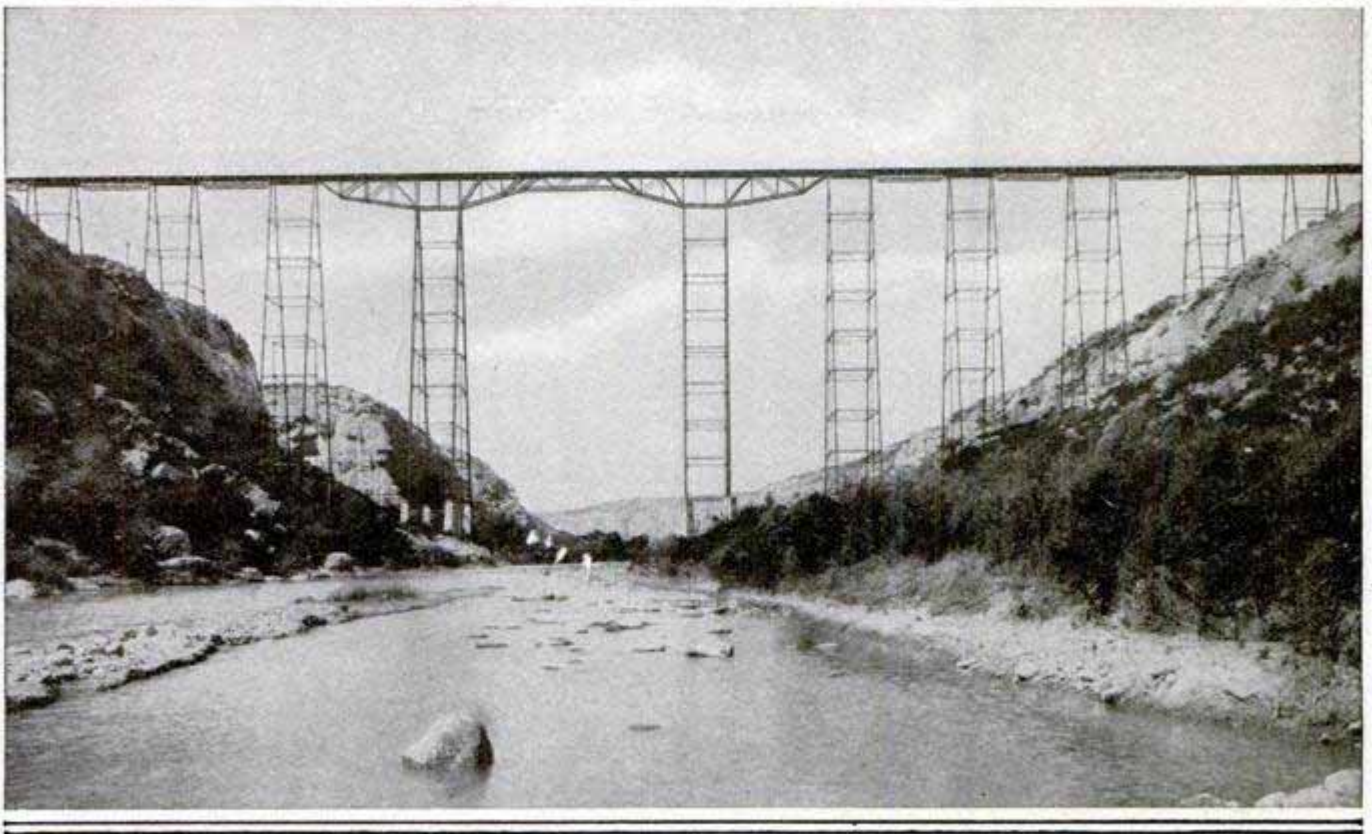
lower limbs and back, the subject uses the bicycle arrangement, by pedaling and attempting to maintain a certain rate of revolution of the wheel while a brake weight is applied upon it gradually. The energy used in operating the machine is registered by a meter in horsepower terms. The same principle governs the use of the handwheel, which shows the strength of other parts of the body.

CRYPT BENEATH ST. PETER'S BURIAL PLACE OF POPES

The centuries-old crypt beneath St. Peter's at Rome is the place where the body of a pope of the Roman Catholic Church is interred at his death. It is one of the most famous subterranean burial grounds in the world, and part of it was in existence years before the erection of the present cathedral. The flooring in the arched passages, some of which are little more than 6 ft. in height, has been worn by the feet of thousands of persons who visit them yearly. The accompanying photograph shows the position of the vault in which the body of Pope Pius X, who died late last summer following a protracted illness, has been placed.



The Burial Place of Pope Pius X, the Late Head of the Roman Catholic Church



Pecos River Bridge, One of the Highest Railroad Structures in the United States:
The Distance from Bed of Stream to Track Is 321 Feet

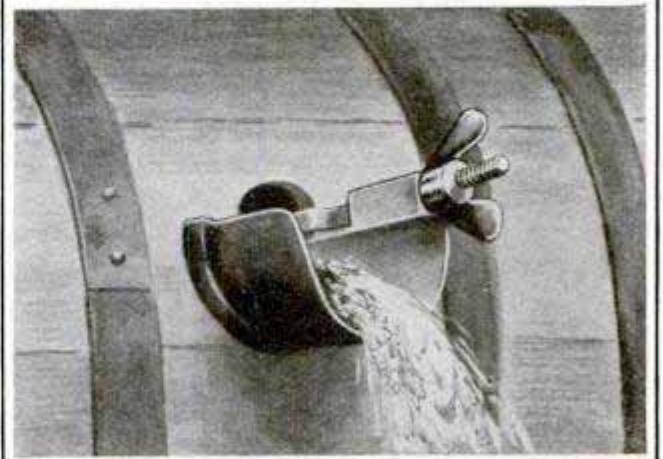
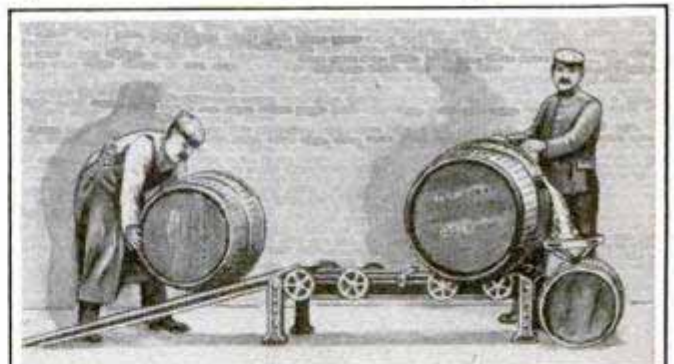
HIGH BRIDGE THAT SPANS WESTERN CAÑON

One of the highest railroad structures in the United States is the bridge spanning the Pecos River Cañon, 216 miles west of San Antonio, Texas. The distance from the bed of the stream to the track is 321 ft. The bridge is a light-appearing structure consisting of girders and deck trusses carried on lofty steel towers. The magnificence of the view from the deck of this bridge is said to be exceeded only by that of the Grand Cañon.

NEW CRADLE FOR HANDLING AND EMPTYING BARRELS

Rapid handling and emptying of barrels is made possible by a new cradle and spigot that have just been brought out in Germany. The cradle consists of a low frame with an incline, and is equipped with small wheels so that the barrel can not only be rolled along the top easily but can be turned to the required position for emptying after it is brought to the end

of the cradle. The spigot is made of metal and is attached to the bung-hole by a screw clamp and wing nut.



COURTESY OF DIE EXPORT WOCH

The Barrel is Rolled to the End of the Cradle and Then Turned on the Rollers to the Right Position for Emptying

BREEDING PEARL-BUTTON SHELLS A NEW TASK FOR THE GOVERNMENT

THE government of the United States has gone into the business of breeding pearl buttons!

That, at least, is what the latest venture of the Bureau of Fisheries comes to in the long run, although it is the button material rather than the buttons themselves that result from this new field of administrative activity.

Within the last few years the so-called "pearl" button—really made of mother-of-pearl—has displaced almost completely all other kinds of buttons for the white garments of both sexes in America. One does not have to be very old to remember when the only cheap button in general use was made of porcelain. Today the old-fashioned "china" button has almost entirely disappeared. In its place, even on the cheapest ready-made garments, is found the pearl button—far stouter and more durable than the china button, as well as more attractive in appearance. Formerly too expensive to be used on any but the better grades of goods, the pearl button is cheaper now than the cheap china buttons used to be.

The change came about through the discovery that the shells of the fresh-water mussels which abound in all the rivers and streams tributary to the Mississippi are the best of all raw material for button manufacture—easily worked, cheaply gathered, and in apparently inexhaustible quantities. From a single small factory establishment at Muscatine, Ia., a few years ago, there has developed an industry that has made several men millionaires, gives employment in many different plants to thousands, and, best of all, supplies the people of the whole United States with good buttons at a low price.

A short time ago, however, the alarming discovery was made that the mussel beds were giving out. The shellfish were not reproducing themselves as rapidly as they were being made up into buttons. The Federal government stepped in and estab-

lished limitations to the dredging of mussels in certain streams. Still the supply continued to diminish in spite of the known wonderful fertility of the parent mussels. So a more careful scientific study was made by biological experts employed by the government, and some curious and interesting facts about the life history of the mussel were disclosed.

The diminution in the supply of pearl-button material, it was discovered, was due not to the taking out of mussels but to the destruction of fish in the rivers.

It was learned that in its early stages of development the fresh-water mussel is a parasite, its existence depending largely upon its ability to fasten itself to the gills or fins of a fish. Certain kinds of the mollusks attach themselves to only a particular kind of fish. The "niggerhead" mussel, for instance, one of the most prolific and valuable varieties, is parasitic to river herring almost exclusively, and the partial extermination of this fish has had a material effect upon the natural reproduction of mussels. With this and similar information as a guide, the government has now established a research laboratory a few miles from Muscatine, and has gone into the business of mussel farming.

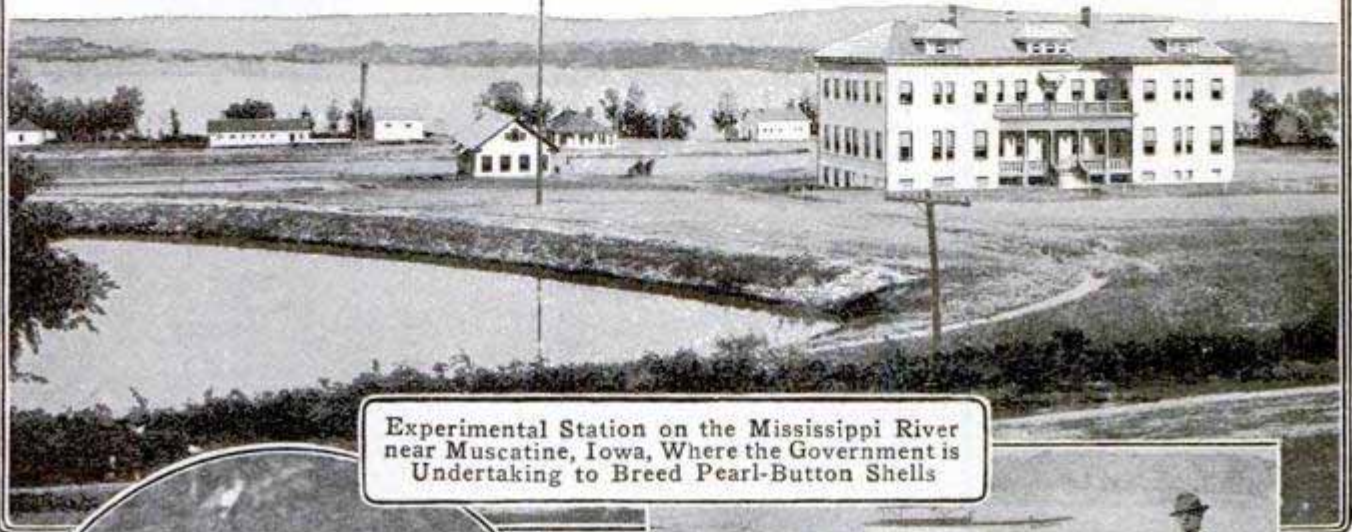
There are three distinct steps in the actual cultivation of the mussel. The first step is to obtain a quantity of undeveloped infant mussels, which are taken from the mother mollusk. A large number of fish are then caught in nets and transferred into tanks. The baby mussels, known at this stage of their development as glachidia, are released in the tanks and allowed to attach themselves to the fish, which they do in a few minutes by means of their spined beaks. After examination has shown that the young mussels are firmly attached, the fish are released into the stream. From this point the mussel undergoes an extensive structural change, or rebuilding. When nearly all its organs are developed, the



Seining the Fish
Preparatory to
Infecting Them
with Embryonic
Mussels



Making
Biological Tests
in the
Laboratory of
the New Federal
Station



Experimental Station on the Mississippi River
near Muscatine, Iowa, Where the Government is
Undertaking to Breed Pearl-Button Shells



Lifting Fish from the Nets into Tubs from
Which They are Transferred to Tanks
Where the Glachidia Attack Them



After the Baby Mussels have Attached Themselves,
the Fish are Removed from the Inoculating
Tanks and Returned to the River

mussel leaves the fish and sinks to the bottom, fastening itself to some fixed object and entering upon its life work of growing shell.

Several field parties from the new laboratory are constantly employed in this work of accelerating the processes of nature, conserving probably billions of baby mussels which otherwise would have no opportunity to develop. Those connected with the station also carry on investigations in fresh-

water biology generally, the intention being to develop means of conserving and upbuilding inland fisheries in other directions, in much the same manner as the experiment stations of the Department of Agriculture have developed the farming resources of the United States.

¶The horsepower of electric motors used last year by 62 steel companies aggregated 1,250,000.

ODD HEADGEAR OF NATIVES IN THE ORIENT

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Turban-like Hat Made of Strips of Cloth, Worn by Burmese Women

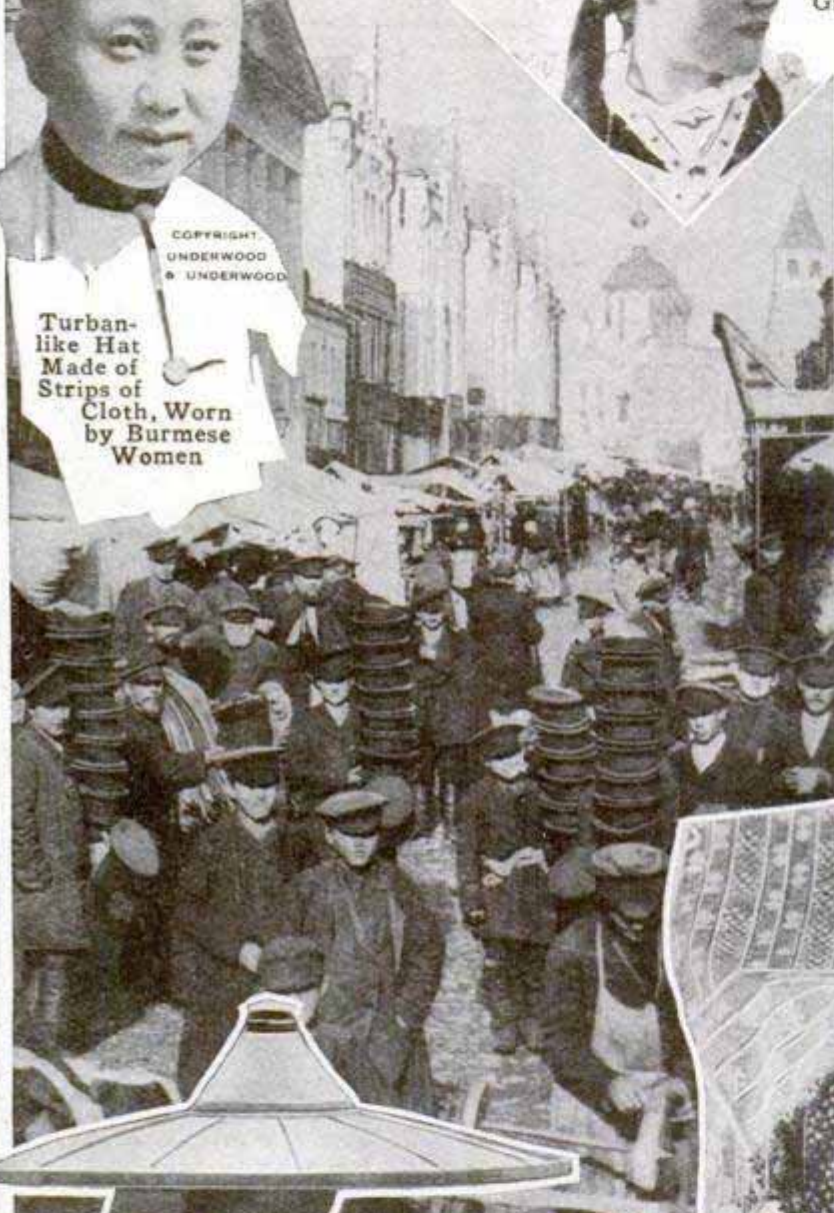
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Headdress of Swedish Peasant Girl



Headgear of Chinese Actors Consists of Metal Flowers, Ornaments, and Feathers



Above: Hat Venders in a Moscow Market. Left: Straw Hat Worn in the Fields by Men in Burma



This Odd Headgear is Worn by the Siamese Women

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The Burmese Robber Usually Wears a Flexible Straw Plaque. His Head is Bound by Strips of Colored Cloth

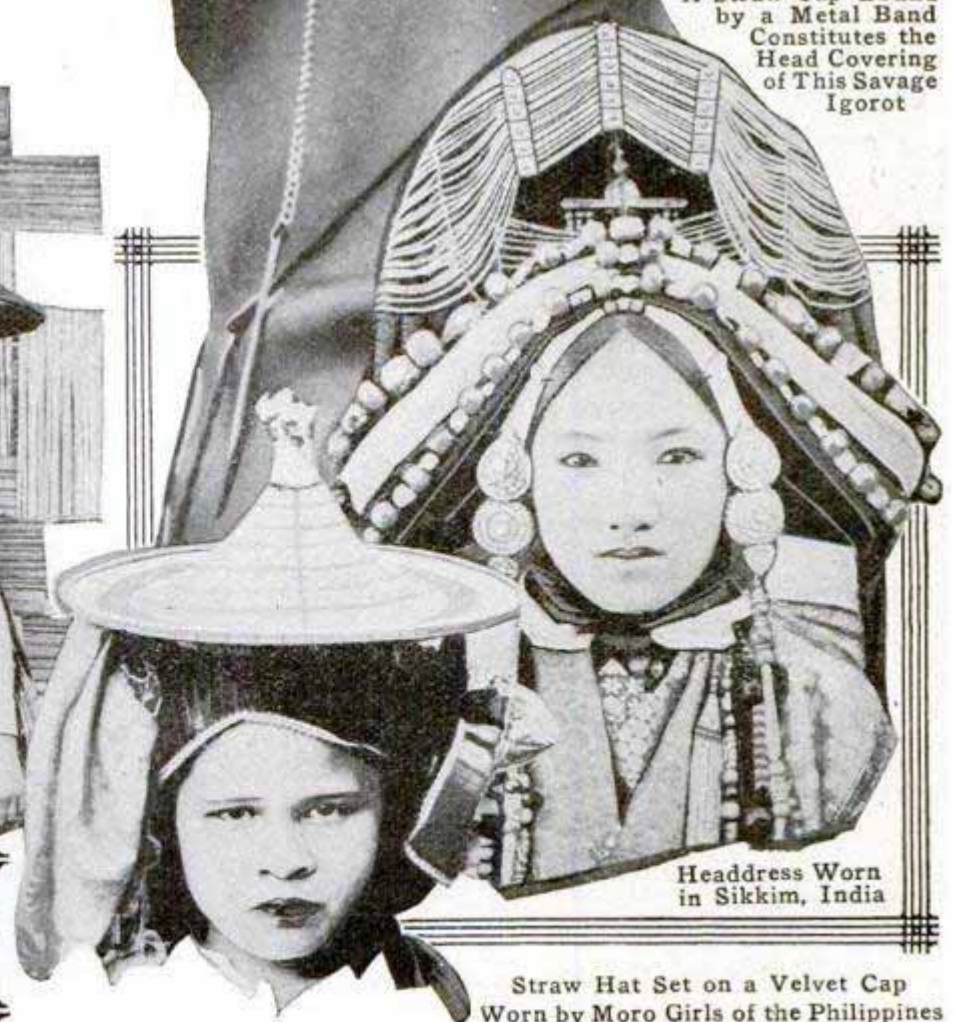


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A Straw Cap Bound by a Metal Band Constitutes the Head Covering of This Savage Igorot



A Straw Hat with a Shaped Crown Worn over a Turban by Shan Girls of Indo-China



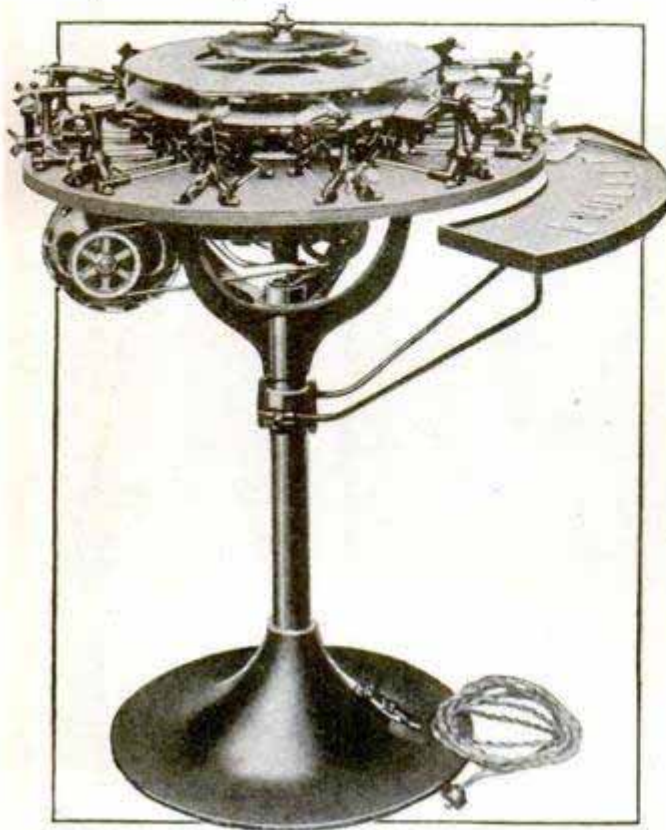
Headdress Worn in Sikkim, India



Straw Hat Set on a Velvet Cap Worn by Moro Girls of the Philippines

MACHINE FOR RESHARPENING SAFETY-RAZOR BLADES

A machine for resharpening safety-razor blades in large quantities has recently been patented which subjects



This Machine Sharpens Hundreds of Safety-Razor Blades in One Day

the cutting surfaces of the knives to 1,200 ft. of stropping leather a minute. The apparatus consists of a pedestal carrying a revolving table upon which 12 holders are mounted in such a manner that they oscillate the blades between two leather-covered aluminum disks which are speeded to 300 revolutions a minute. At the top of the machine is a device for honing the blades, an operation which is completed before the razors are placed in their holders. Since the table revolves, the operator may bring any holder before him when he so desires. From four to eight dozen blades may be sharpened in one hour.

On account of the European war, plans for the issue of postage stamps to commemorate the one-hundredth anniversary of peace between the United States and Great Britain have been abandoned.

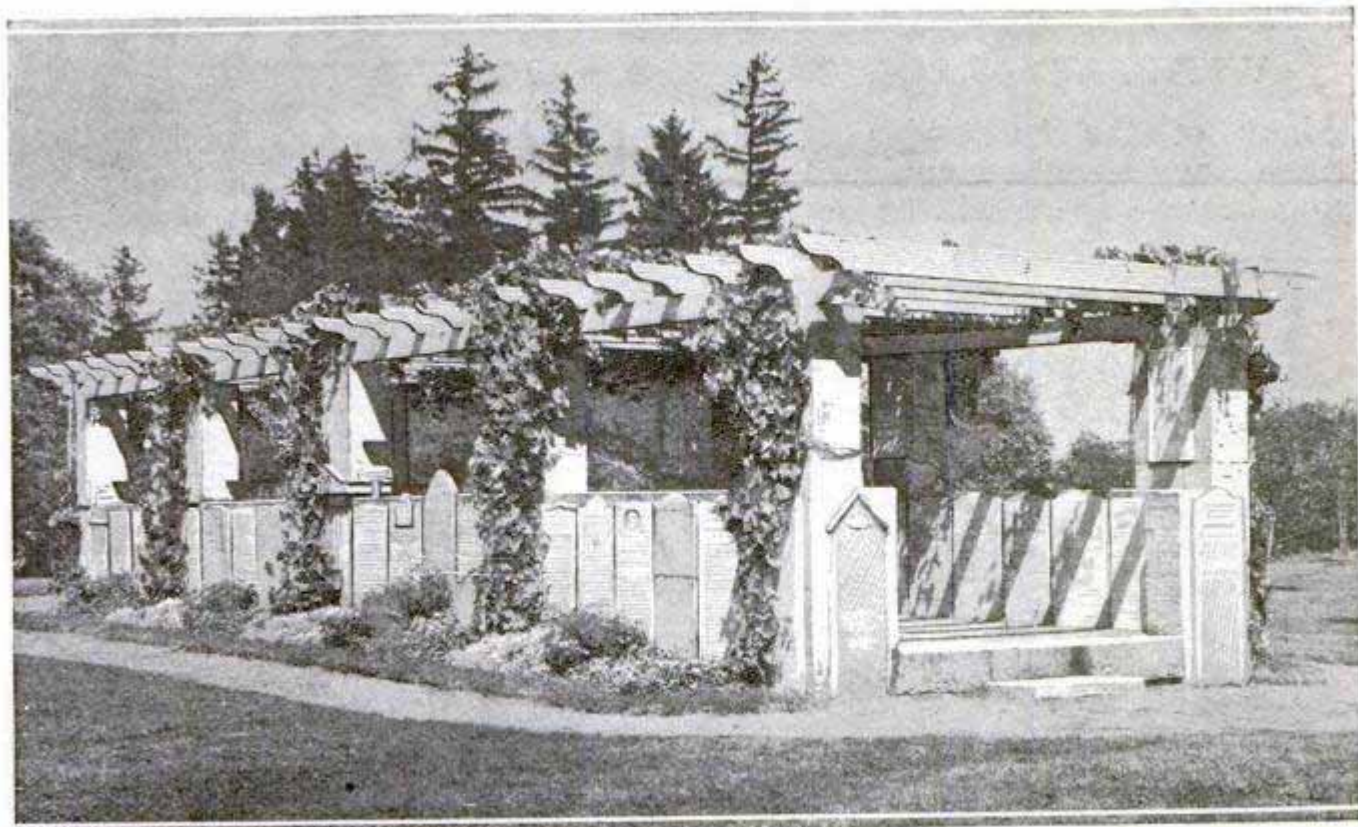
NEW DEVICE ELECTROCUTES INSECTS

A curious electrical device, invented in Argentina, is designed for the wholesale electrocution of insects that are harmful to trees and grain. It consists of a metallic net suspended over the ground where the insects are to be killed and carried on a two-wheeled vehicle, so that it can be moved from point to point as required. Electric current is supplied to the net at 6,000 volts, and this is allowed to discharge from the net to the ground through the insect-covered plants. A metallic broom, energized by the same apparatus, is used in brushing the trees for killing insects on the bark and leaves.

GAS AND ELECTRIC METERS OUTSIDE OF BUILDING

In many of the houses now being built the gas and electric meters are installed in steel boxes set in one of the outside walls, an arrangement that enables the meter man to read the meter without entering the basement, or any other part of the building. The box is equipped with a small door, having a glass panel through which the meter is read without opening the door. This door is provided with a lock for the protection of the meter against tampering.





With the Exception of the Beams across the Top, Every Part of This Pergola, Located at Galt, Ontario, is Made of Tombstones

CURIOUS PERGOLA MADE OF TOMBSTONES

One of the most curious pergolas ever built is one at Galt, Ontario, which, with the exception of the beams across the top, is made up entirely of tombstones. This pergola is 14 ft. wide and 48 ft. long, and 146 tombstones, dating from 1828, were used in its construction. It is covered with vines and flowers, and presents an attractive appearance in spite of the depressing nature of the material used in building it.

SQUEEGEE GIVES MOTORMAN CLEAR VIEW AHEAD

To prevent the obstruction of the motorman's vision by rain drops, sleet or snow accumulating on the windows of car vestibules, a device which keeps the exterior of a pane of glass clean has been invented. The apparatus consists of a rubber-edged squeegee which is held firmly in place against a window by a metal rod. This is arranged so that it may be moved readily by turning a handle in convenient reach of the motorman. As snow or

sleet begins to be deposited it is scraped away by moving the squeegee.

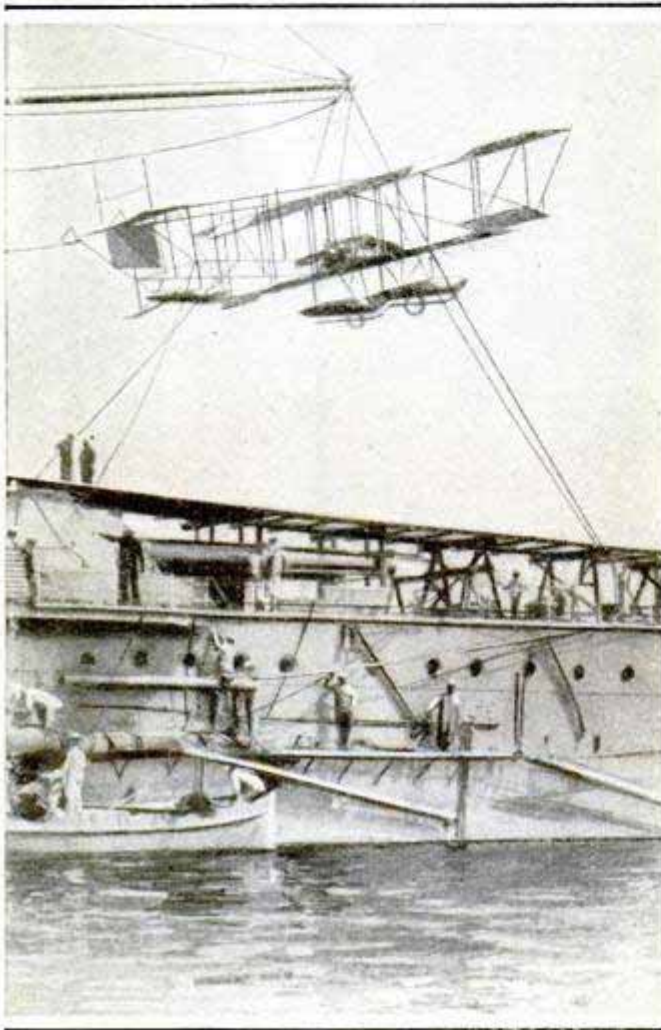


Device Which Prevents the Vision of a Motorman from being Obstructed during a Storm

Two pounds of metallic tungsten are sufficient to supply filament material for approximately 50,000 electric-light globes.

BRITISH NAVY IS EQUIPPED WITH FLYING BOATS

Many of the battleships of the British Navy have been equipped with flying boats. These will be used for



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Flying Boats are Lifted aboard Battleships Almost in a Moment's Time

marine scouting purposes and for carrying on communication between a fleet and the shore during occasions when the atmospheric conditions interrupt seriously the radio transmission of messages. Just how important several of these craft would be for offensive operations during a sea engagement is still somewhat a matter of theory, although their possible effect is not difficult to appreciate.

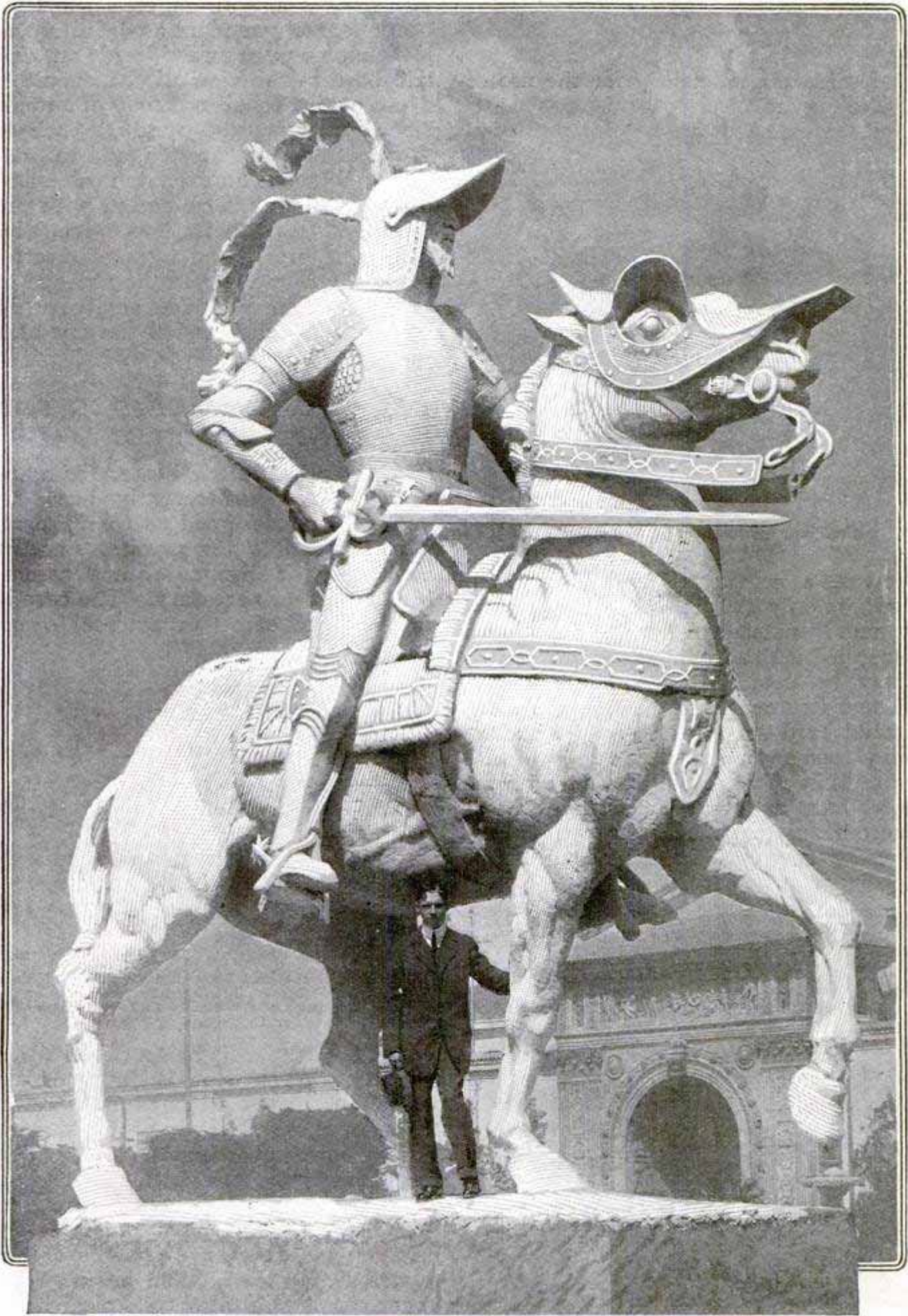
¶The railways of India are experimenting with all-steel passenger cars. Teakwood, which is used quite generally in that country, has advanced in price while the cost of steel has declined.

QUEBEC BRIDGE SPAN TO BE FLOATED INTO PLACE

Practically a year's time will be saved in the erection of the Quebec bridge by the expedient of floating the center suspended truss into place, a method that is not uncommon in erecting smaller structures, but has probably never before been used on such a scale as this. The entire bridge is 3,239 ft. long and consists of two cantilevers, between which a center truss, 640 ft. long, is to be suspended, and approach spans for connecting the outer ends of the cantilevers with the shores. The distance between centers of the piers on which the cantilevers are supported is 1,800 ft., and this span is to be 150 ft. above the highest water, to allow headroom for navigation. The suspended span is to be built on shore, floated to the site on pontoons, and lifted into position by hydraulic jacks.

SCULPTURAL MASTERPIECE FOR SAN FRANCISCO FAIR

Mounted on an armored charger of giant size, standing at the entrance to the semitropical South Gardens at the Panama-Pacific Exposition, is a spirited statue of Francisco Pizarro, the discoverer and conqueror of Peru. The heavily mailed figure of the Spaniard, which reflects the romance of the first days of exploration in the New World, represents the type of sculptural work which has been done for the grounds at San Francisco. Pizarro takes a prominent place in the early history of the Pacific country. After having had charge of the unfortunate settlement at San Sebastian, his career became that of an explorer and conqueror. He was present with Balboa at the discovery of the Pacific, and after a time spent as a cattle raiser at Panama, he headed an expedition down the west coast of South America, obtaining information regarding the Peruvian empire. It was following this that he directed his energies to the conquering of Peru.



This Gigantic Equestrian Figure of Pizarro, the Conqueror of Peru, Is an Example of the Temporary Statues Which have been Sculptured for Use at the San Francisco Fair

PORTABLE PIANO IS MADE FOR ROAD USE

Designed particularly for the use of traveling musical organizations and amusement companies playing small



Light Piano Which may be Shipped the Same as a Trunk

towns, a compact harp-piano, which weighs only 120 lb., is being manufactured. Instead of having legs it is supplied with a folding floor rack which may be detached in a few minutes. The instrument is rigidly built to withstand hard usage, and may be packed in a case and shipped as baggage. Its tone is in effect similar to that of a concert harp and may be used for vocal accompaniments. The range covers five octaves, while the keyboard is of ordinary piano style.

NEW TESTER FOR FINDING MOTOR TROUBLES

A device that has just been invented for detecting and locating trouble in internal-combustion motors is said to re-



With This Tester Connected to the Cylinders, Motor Troubles are Detected and Located

veal defects in ignition, electrical connections, and gas plant as definitely as if the motor were turned inside out and laid bare to the view of the operator. The machine consists mainly of a number of vacuum tubes, one for each of the cylinders to be tested, and to each tube is attached an insulated cable and clip by which it is connected with the cylinder. The indications given by the tester are in the form of electric sparks and flashes, and the absence of these or their presence singly or in certain combinations tell the operator just what the trouble is.

NEW ELECTRIC HEATER FOR AUTOMOBILES

A compact electric heater for automobiles that has recently been invented is so designed as to make all parts accessible for repairs, since it can easily be dismantled and assembled whenever necessary. The case is in the form of an ornamental open-



With One of the End Plates Removed from This Electric Heater the Insulated Frame Carrying the Heating Coils is Easily Slid Out of the Case for Inspection or Repairs

ended box, the ends being closed when the heating element is in place by means of plates attached by screws. Each of these plates is provided with a foot for supporting the case. The insulated frame on which the heating coils are mounted is held securely in place by the end plates, but is easily slid out of the case when one of the plates is removed. The heating element consists of three coils placed one above the other and running longitudinally of the case.

INGENIOUS MECHANISM THAT MAKES TEN THOUSAND MATCHES A MINUTE

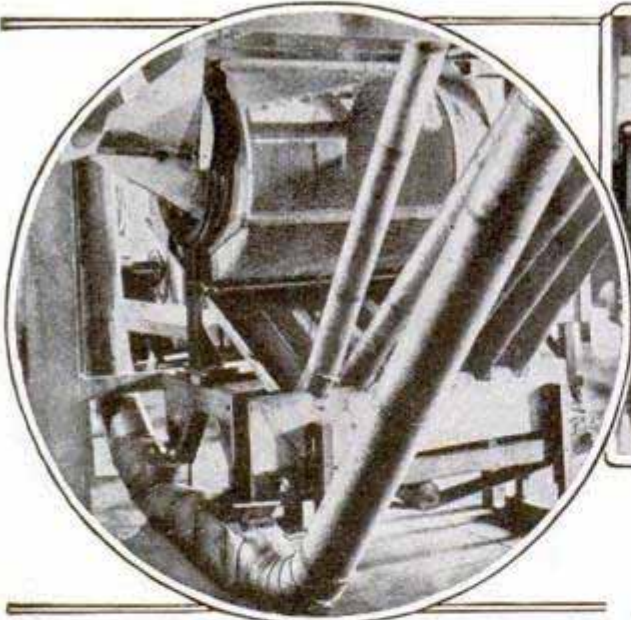
SIMPLE and insignificant as a match is, its manufacture is a complicated and elaborate process that can be carried on commercially only by means of a succession of ingenious machines and devices that must work at all times with the utmost precision and delicacy.

Recent improvements in the process of making square matches make it possible to turn out matches from a single dipping machine at the rate of more than 600,000 an hour, and a green log is made into matches and packed for shipment in less than two hours. Poplar, basswood, pine, or any other soft wood, may be used, but basswood, which is both abundant and cheap, is generally preferred. The logs are first cut into "bolts" about 21 in. long, which are stripped of their bark by large curved chisels operated by steam power. They then go to the peeler. This is a rotary cutting machine which cuts a continuous ribbon, $\frac{1}{10}$ in. thick, as the log is revolved, and which works in the same manner as a veneer-cutting machine. Each ribbon is broken into lengths of about 10 ft., and these are piled, one over the other, until there are about 40 pieces in the pile. The whole pile of ribbons is then fed into the chopper, which cuts the ribbons into match splints, $\frac{1}{10}$ in. wide and $2\frac{1}{4}$ in. long, the exact size of the finished match.

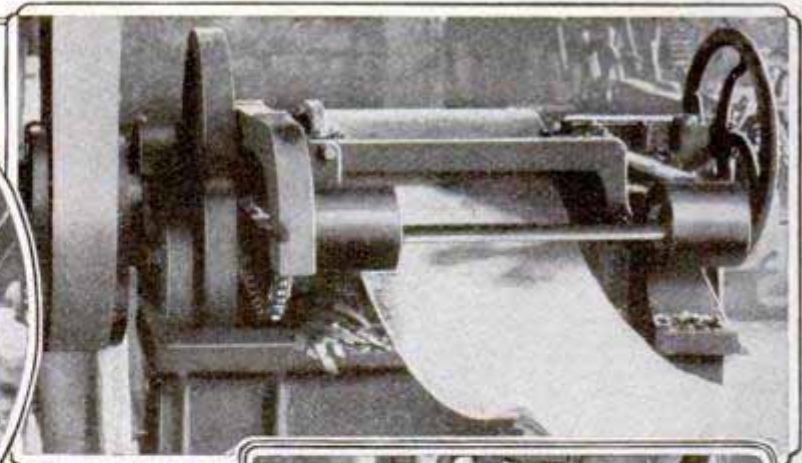
As the splints come from the machine they fall into a hopper and are picked up by a conveyor, which lifts them by air suction and transports them to the impregnating tank, the latter, because of the fumes thrown off by the impregnating liquid, being located outside the building. Impregnation is done by a secret composition, and its purpose is to prevent afterglow, or fire, in the stick after the lighted match has been blown out. Over the impregnating tank is a series of buckets with wire bottoms, carried on an endless belt. The splints are dumped into these buckets by the air pipe, and are carried the full length of the tank, immersed in the liquid.

On the return trip they are carried along above the tank and given a chance to drip, and are then taken up by a second air conveyor and carried to a kiln, where they are thoroughly dried. After leaving the kiln, they are again picked up by an air conveyor and carried to the tumbling cylinder, where they are tumbled much after the fashion of castings, and the feather edges and splinters are taken off. Following this, the splints pass to a wire cylinder, called a feeder, which distributes them to six air conveyors, communicating with six dipping machines. On the way, however, the splints pass through straightening machines, where they are automatically fed into grooves which pass them in parallel rows to the hoppers of the dipping machines.

Up to this point the process is comparatively simple, but the remainder of the process involves operations that baffled inventors for a good many years. In dipping the matches into the igniting compound, it is required that the splints be held firmly, and that they shall not touch each other during the dipping and drying process, which takes about 55 minutes. Owing to the extreme lightness of the splints, great delicacy is required in handling them separately at high speed. At the bottom of the hopper is a moving plate made in two parts, each containing 50 parallel grooves, and so placed that when the plates are edge to edge the grooves are continuous. The hopper feeds the splints to these plates in such a way that there is one splint in each groove. Then the plates separate just enough to permit any broken splints to be drawn out by air suction, while supporting the ends of the perfect splints. Following this, the plates come together and move forward, and the end of each splint is driven by a setting head into a perforation in another plate, which forms one link in an endless chain having 1,000 such links. Each plate, or link, contains 12 rows of 50 holes each, or 600 in all, so that the



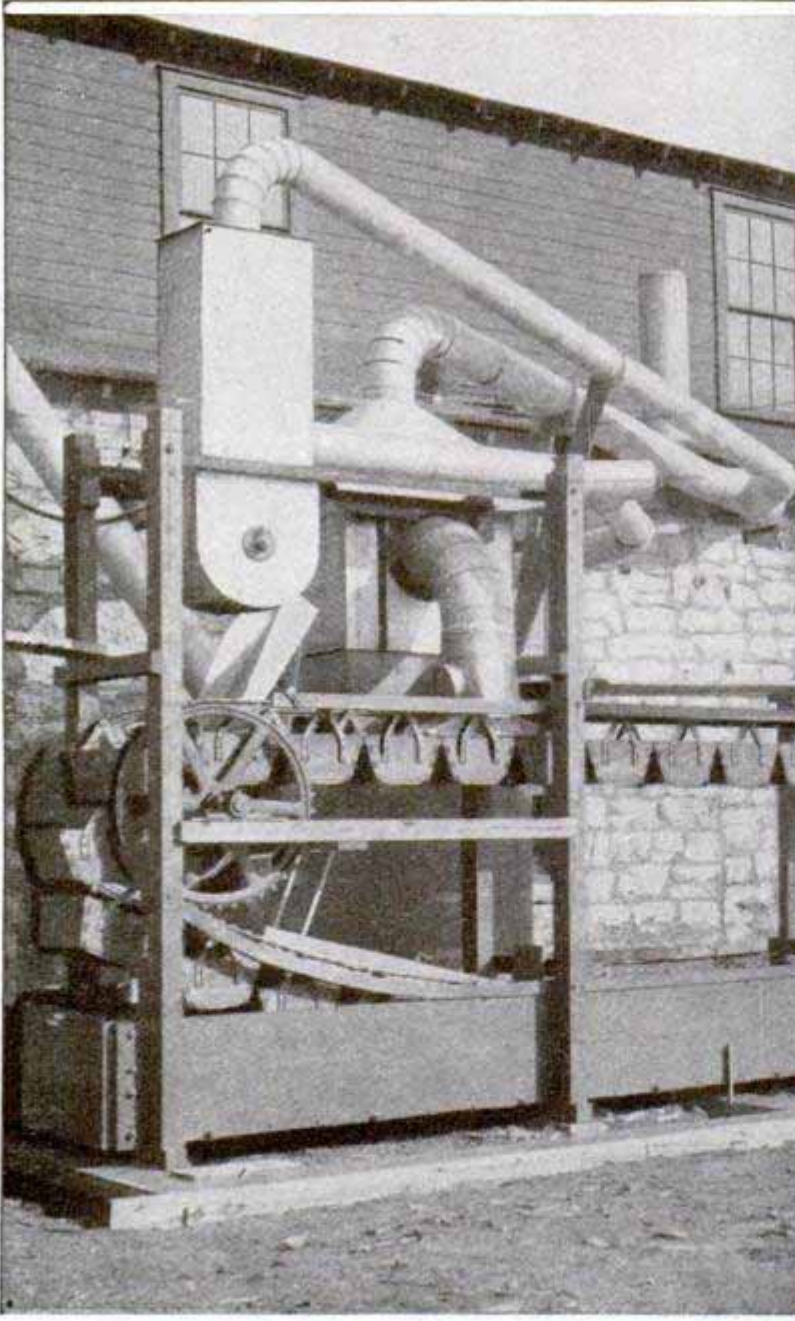
After Passing through the Kiln and Tumbling Cylinder, the Splints are Distributed by This Rotary Screen to Conveyors Leading to the Six Dipping Machines



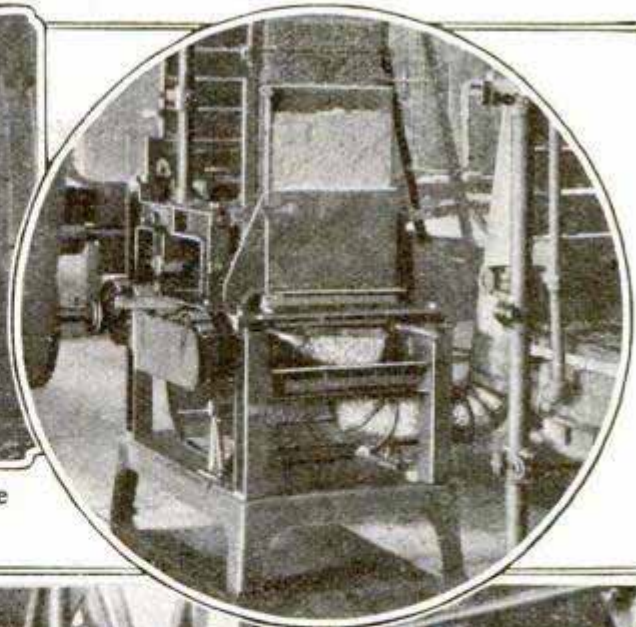
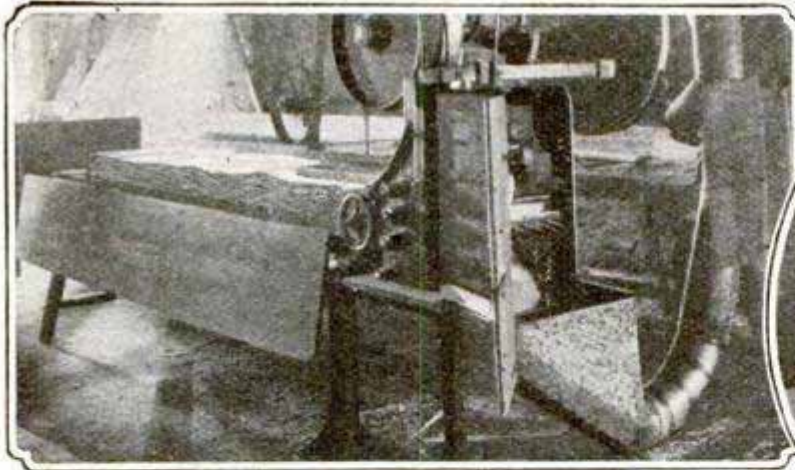
Above: The Peeler, a Rotary Cutting Machine Which Cuts the Log into a Ribbon One-Tenth Inch Thick



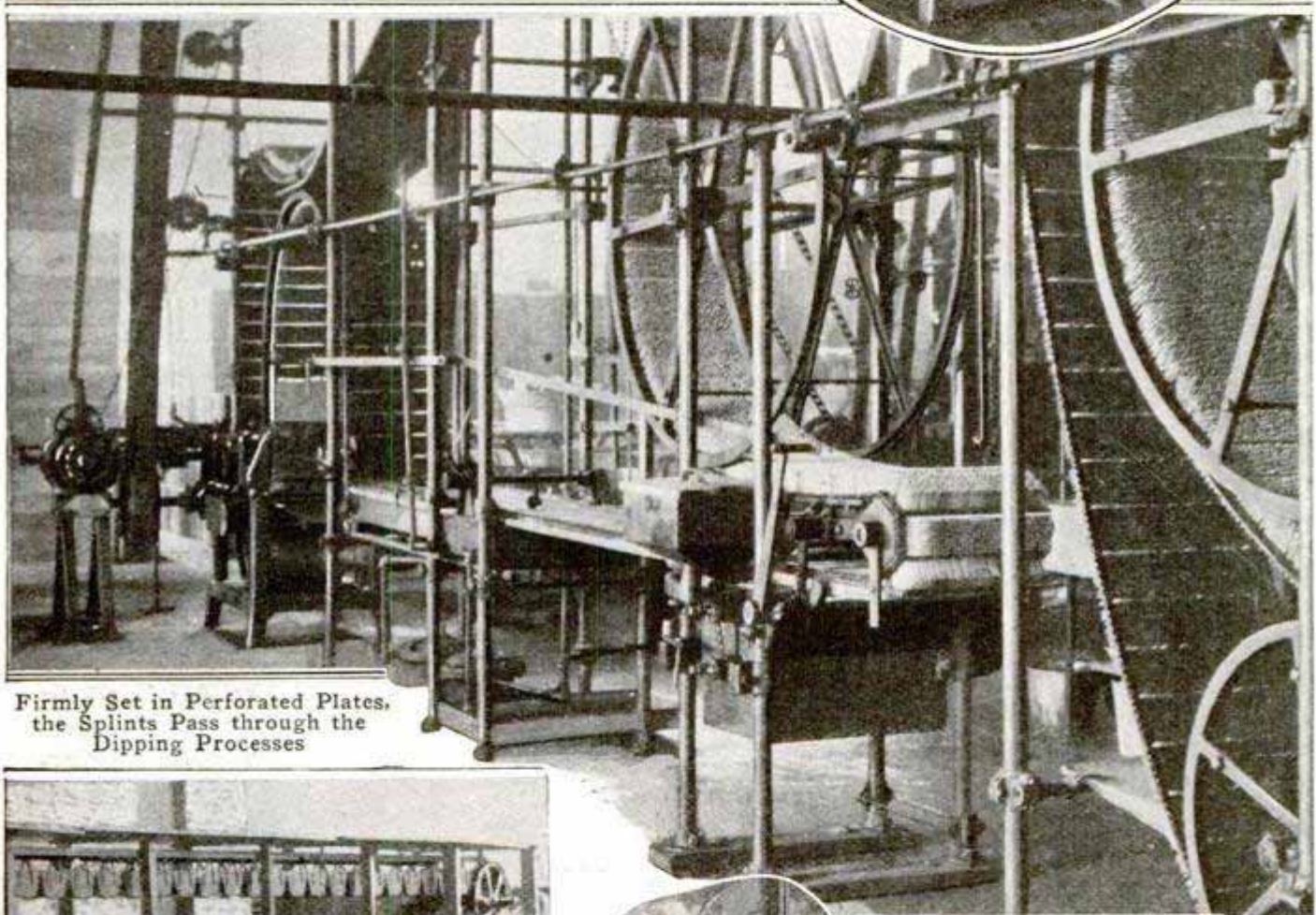
The Curved Blade of the Barking Machine Strips Off the Bark, Preparing the Log for the Peeler



The Impregnating Tank: The Splints are Dumped into the Buckets by a Pneumatic Conveyor, Travel the Full Length of the Tank, Immersed in the Impregnating Liquid, and are Then Carried Back to a Second Conveyor Which Picks Them Up and Takes Them to the Kiln for Drying



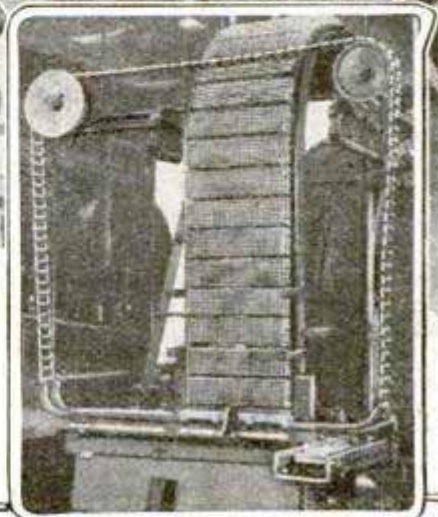
The Chopper Cuts the Ribbons into Splints the Size of the Finished Match. At Right: Hopper of Match Machine, with Splints Piled Like Cordwood



Firmly Set in Perforated Plates, the Splints Pass through the Dipping Processes



This Machine Arranges the Splints in Parallel Rows and Feeds Them into the Hoppers of the Match Machine, Where a Setting Head Drives Them into Perforated Steel Plates. At Right: Steel Plungers Push the Finished Matches Out of the Perforations



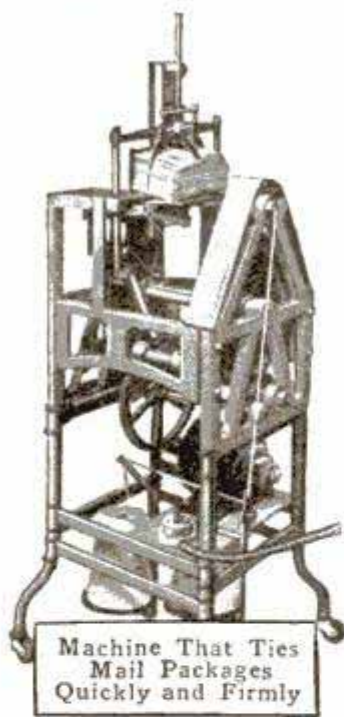
entire chain, when filled, contains 600,000 splints. With each stroke of the setting head the chain moves just far enough to present the next row of holes to the grooved plate for filling. The chain makes one complete revolution in 55 minutes.

Each filled plate, as it moves away from the setting head, passes over a heated surface, to prepare the splints for the hot-paraffin bath, into which they are plunged to a depth of a quarter of an inch. The splints are then carried over a composition roller, which puts on the base, or larger part, of the match head. The head composition dries slowly, and 15 minutes are therefore allowed for the splints to reach the next roller, where the tip or

striking part of the match is applied in the same manner. The matches are then complete and ready for the final drying, and in order to allow time for this, the plates are led up and down over enormous wheels, as will be seen from one of the illustrations. The end of the process is at the packing table, where plungers entering the perforations in the plates from the opposite side push the matches out and into a trough. From this trough the matches are fed into the match boxes, which move just fast enough to be completely filled as they pass. Working at revolving tables, the packers then put the telescope covers on the boxes, and the matches are ready to be packed and shipped.

BUNDLE TIER IS DESIGNED FOR POSTAL SERVICE

One of the latest pieces of machinery designed to facilitate the rapid handling of mails is a bundle tier, to be



used in "tying out" bundles of letters at the various post offices and in railway mail cars. It is operated by electricity and can tie about 30 packages a minute. When the envelopes are placed on the wrapping rack, the yoke and plunger—the latter actuating fingers which hold and compress the pile—are raised. An arm

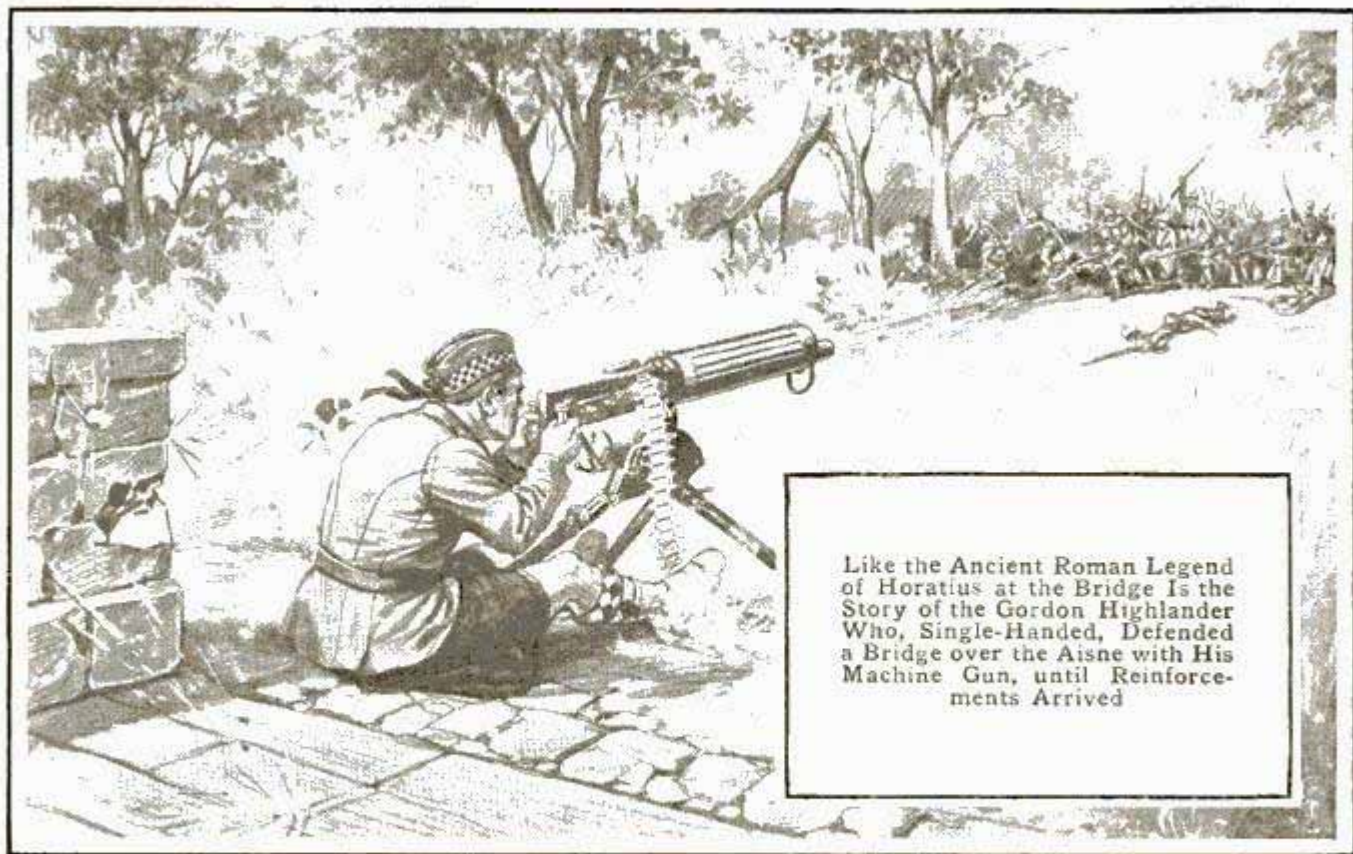
passes quickly around the package, drawing a cord about it, and as this is done the yoke and plunger drop, pressing the bundle tightly while it is turned to receive the string lengthwise. When this operation is completed, the package is tied firmly by a knotter

which is similar to that used on a binder. The bundle is then thrown automatically from the rack, and the machine is ready to receive another bunch of letters. It is claimed that besides being valuable as a speed medium, the machine reduces the twine expense, nearly 40 per cent.

TWO-CENT LETTER RATE FOR WESTERN HEMISPHERE

A two-cent letter-postage rate, effective over the entire western hemisphere is to be established, if plans now being considered by the postmaster-general are carried out. Except with Canada, Mexico, and Cuba the rate is now five cents. Proposals have also been made to the representatives of Central American and South American countries with which we do not have money-order arrangements, with the idea of forming conventions for that purpose, the intention being to bring this country into closer commercial relations with the other countries of this hemisphere.

ⒸThe five and one-half mile Canadian Pacific tunnel through the Selkirk Mountains is to be operated by electricity.



Like the Ancient Roman Legend of Horatius at the Bridge Is the Story of the Gordon Highlander Who, Single-Handed, Defended a Bridge over the Aisne with His Machine Gun, until Reinforcements Arrived

HISTORY REPEATING ITSELF IN THE WAR

HISTORY, as always, is repeating itself in the European war. Many of the incidents which the cable dispatches tell are duplicates of events that happened centuries, even thousands of years ago.

In the traditions of ancient Rome no more heroic feat stands out than that attributed to Horatius Cocles, who held the advancing Etruscans back until the Roman forces could cut down the Sublician bridge over the Tiber and so prevent the foe from sacking the city. This feat was duplicated in the autumn of 1914 by a Scottish soldier. A party of 150 men, guarding a bridge across the Aisne, were fired upon by a strong force of Germans. In an unprotected spot a machine gun was standing silent on its tripod in the middle of a ring of fallen soldiers. A lone Highlander, wearing the costume of the Gordons, jumped from his shelter, grabbed the gun, swung it over his back, dashed across the bridge, faced the Germans, and turned loose a rain of bullets. The enemy wavered, broke, and scattered to cover. Almost at the instant the tide was turned the Highlander fell dead. Thirty bullet wounds were found in his body.

Even more interestingly linking the present with the past is the manner in which suspected German spies are put to the test by the French. Many of these have been shot even when there was no definite proof that they were not French citizens. "But," says a correspondent, "it is claimed that no German tongue can ever pronounce certain French words without betraying its Teuton origin. It is the failure to pass tests of this kind which condemn."

More than 3,000 years ago exactly the same test was applied. The story is told in the Bible, in the 12th chapter of the Book of Judges:

"And the Gileadites took the passages of Jordan before the Ephraimites: and it was so, that when those Ephraimites which were escaped said, Let me go over; that the men of Gilead said unto him, Art thou an Ephraimite? If he said, Nay; then said they unto him, Say now Shibboleth: and he said Sibboleth: for he could not frame to pronounce it right. Then they took him, and slew him at the passages of Jordan: and there fell at that time of the Ephraimites forty and two thousand."

MILITARY FLIERS OF THE WARRING NATIONS SET NEW RECORDS FOR DARING AERIAL FEATS

THE one new thing that has been definitely proved by the experience of the European war thus far, is the value of the aeroplane as a military arm. Without the flying machine—the bird-shaped "Taube" craft of the Germans, the high-powered monoplanes of the French, and the slower but steadier and none the less efficient English biplanes—no such tremendous bodies of troops could have been handled, no such extended battle lines have been controlled and directed as has been the case in the great war.

The reports of observers near the battle lines daily tell of daring exploits of the airmen of all nations. Ingenious methods of signaling the position of the enemy's troops make it possible for these courageous fliers to locate with accuracy the positions of the enemy's forces and direct the gun fire of their own armies accordingly. The simple method of signaling is for the airman to fly directly over the enemy's position and when vertically above the point which it is desired to attack to let fall long strips of tinsel, which glitter in the sunlight as they descend and are visible for miles. Observers within the airmen's own lines have their telescopes and range finders turned upon the flying scouts continuously. When the tinsel drops the range is instantly obtained, and the guns aimed accordingly. In dull or cloudy air, smoke bombs are used by some of the forces instead of the tinsel.

For code signals a glittering disk suspended by a wire a number of feet below the air craft is used. By swinging this disk, the airman can signal as though it were a flag, using the dot-and-dash "wigwag" code. The German observation balloons, derisively called "sausages" by the allies because of their peculiar shape, use this "wigwag" code. One of the most thrilling air battles reported from the field centered about one of these sausage balloons. Anchored at a height of 2,000 ft., well within the German lines, the observer in the balloon was watching the French

advance and signaling back to his commanding general. Two French airmen were detailed to attack and destroy the "sausage." Flying at a height of a mile above the two armies they pounced down upon the observation balloon from above, bent on puncturing the gas bag and putting it out of commission. Two German aeroplanes rose in the air and flew to the defense of the "sausage." A Krupp aeroplane rifle from within the German ranks took part in the engagement, the gunners attempting to bring down the French machine without injuring either their own aeroplanes or the balloon. Finally so many bullets tore through the envelope of the balloon that it collapsed and, with the aid of daring and skill, the French fliers succeeded in rising high above their German foes and escaped back to their own lines, their work completed.

Such incidents as this are typical of many aerial engagements. Nor does dare-devil aerial bravery begin and end with the aeroplane men. The crews of the Zeppelins and of the dirigible balloons of the allies are also called upon for exhibitions of reckless courage. While patrolling the French coast to see that the way was clear for the landing of a British expeditionary force, one of the English dirigibles was disabled by the breaking of a propeller blade. Two members of the crew volunteered to undertake the hazardous feat of putting on a new blade without descending. While the dirigible floated 2,000 ft. in air, these men climbed out on the slender framework, unfastened the broken propeller and dropped it into the sea, and put the new one in place without mishap. Not long after came the report from Berlin of the decoration with the Iron Cross of a mechanic of one of the German Zeppelins for performing a similar feat. The big dirigible had been dropping bombs on Antwerp when a shell shattered the framework of one propeller, and the damage threatened to disable the airship entirely. The mechanician



A Battle in the Air: French Airmen Attacking a German Observation Balloon

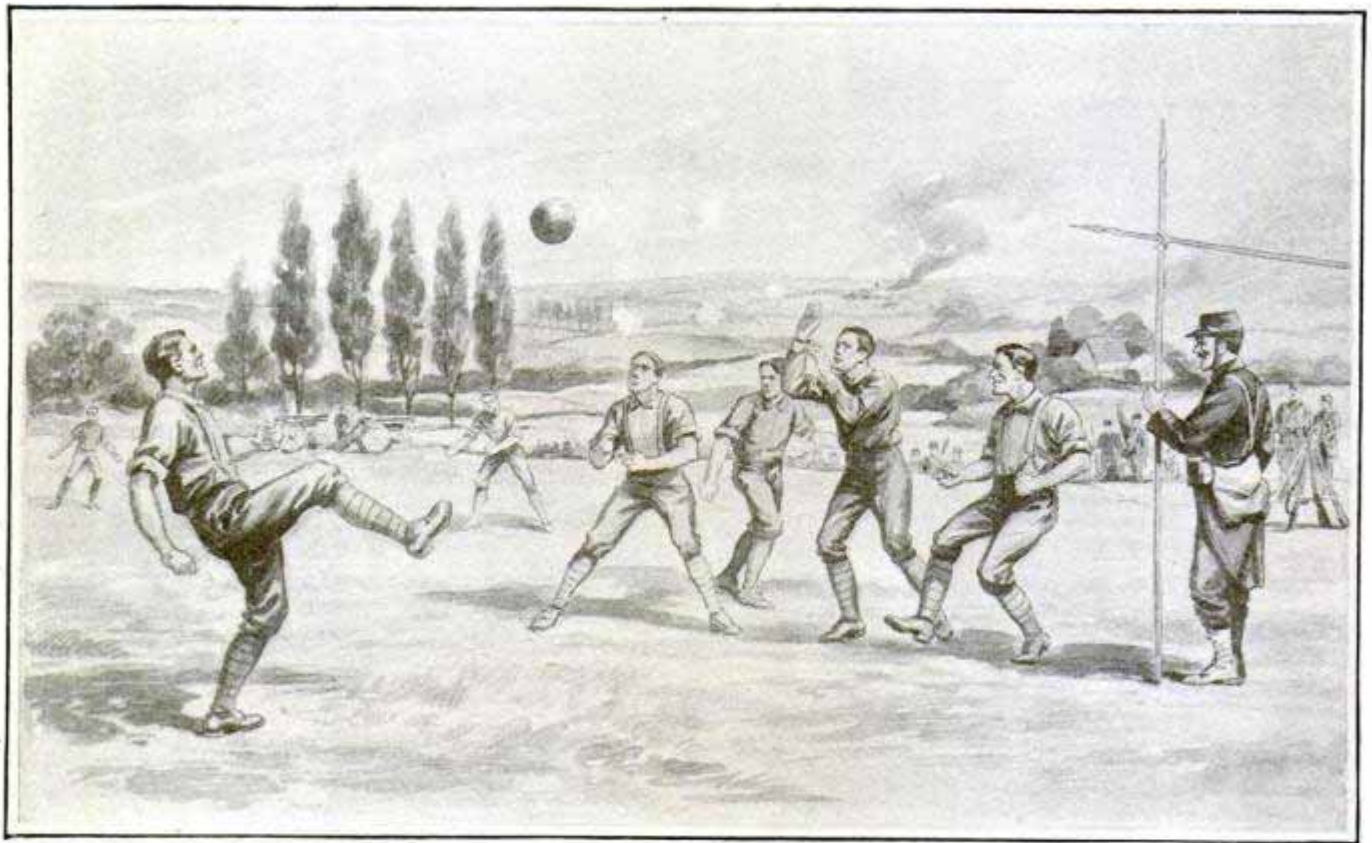
volunteered to saw off the broken propeller, which he did in half an hour while clinging to the broken frame, 6,000 ft. above the city.

Aerial duels between German airmen and those of the allies have been

of frequent occurrence. A German airman has told vividly of his own part in one of these battles in the air. With an army officer as observer, he had flown nearly an hour over the enemy's lines when a French monoplane was seen approaching. The German tried to ascend into the clouds, but the French machine blocked this move. Suddenly another French machine appeared.

"Now it was time to act," says the German pilot. "I darted at the flier before us, then a turn—the major raised a rifle to his cheek. Once, twice, thrice he fired. Then the hostile machine, now beside us and hardly 100 meters away, quivered and fell like a stone. Our other pursuer had meantime reached a position almost over us and was shooting at us with revolvers. One bullet struck in the body close beside the fuel controller. Then impenetrable mist enfolded us. When we came out from the clouds there began to burst before us, behind us and beside us, roaring shrapnel shells. I found myself still always over hostile positions and exposed to French artillery. A yellow-white burst of flame made the machine bound upward. The motor still booms as before, but the propeller fails. An exploding French grenade had knocked it to pieces, torn one of the wings to shreds and smashed the major's shoulder. Steeply my machine sinks to the ground."

Neither of these heroes was seriously injured and they landed safely within their own lines.



During a Lull in the Fighting the British Troops Amazed Their French Brothers-in-Arms by Organizing a Football Game Back of the Firing Line

CURIOUS AND PATHETIC INCIDENTS OF WAR

Among the odd, curious, and pathetic incidents in connection with the European war, a few of the more striking are here recorded.

During a lull in the fighting a short time ago at one point in the long battle line in the West, the French soldiers were awed when they observed their British allies withdraw from the trenches to a position in the rear and begin a football game. Tunics and caps were thrown aside, teams representing different bodies of troops were organized, and war for the moment became a minor matter. Several of the battalions had lost heavily during the fighting which preceded the recess, but for the moment this was forgotten, and although the men were covered with clay, and stiff from hours in the ditches, the spirit of the sport ruled for the time being.

The dictagraph has played an interesting part in this world struggle. By the use of one of these machines a plan to send coal and food supplies from New York to German battleships off

the coast of South America was blocked. Records of a conference between representatives of a German steamship company and the owners of two Norwegian freighters, then loaded and ready to leave port, disclosed the destination of the cargoes and resulted in the sailing of both vessels being canceled.

Among the dumb victims of the war are not only innumerable horses and mules, but many wild beasts. When the German bombardment reached serious proportions the directors of the Antwerp zoölogical gardens, realizing the danger to the populace if the animal cages should be broken open by shells and their inmates loosed, ordered the destruction of all the dangerous carnivora. Four magnificent lions, several tigers, leopards, and other animals, were shot by their keepers, who approached the task reluctantly, almost tearfully. The death of these fine beasts is described by an eyewitness as one of the pathetic sights incident to the war.

RHEIMS CATHEDRAL, RUINED BY BOMBARDMENT, A FINE EXAMPLE OF MEDIEVAL ARCHITECTURE

THE destruction of the cathedral at Rheims by German guns removed a monument of medieval architecture which cannot be restored. Wrecked walls and towers are all that remain of one of the choicest specimens of Gothic art, with a history clothed in tradition and filled with the romance of centuries.

For nearly six hundred years the Rheims cathedral was the coronation place of the French kings, excepting Henry IV and Louis XVII. In it they were anointed with oil from the sacred "Sainte Ampoule," the vessel used by St. Remigius when he baptized Clovis, King of the Franks, in 496. It was in this church, also, that Joan of Arc caused Charles VII to be consecrated after the British had been driven back by her approach to the city. In 1481, fire burned the roof and some of the spires of the structure, while during the French Revolution it was attacked by the populace who damaged it somewhat and broke the Sainte Ampoule.

The building was begun in 1211, and was never entirely completed, although the original work on it was finished in the fourteenth century. Its greatest beauty lay in its western façade, which was one of the most nearly perfect architectural masterpieces. Triple portals, richly chiseled and adorned by nearly 600 statues, were surmounted by the "gallery of kings," where 42 large statues of French sovereigns were placed in niches. The sculptures around the central portal depicted the story of the Virgin Mary. Above this was the magnificent rose window, made of rare amber-colored thirteenth-century glass. The right portal bore the figures of apostles, patriarchs, angels, and the virtues and vices, and the one at the left, those of the patron saints of Rheims, guardian angels, and an interpretation of the conversion of St. Paul.

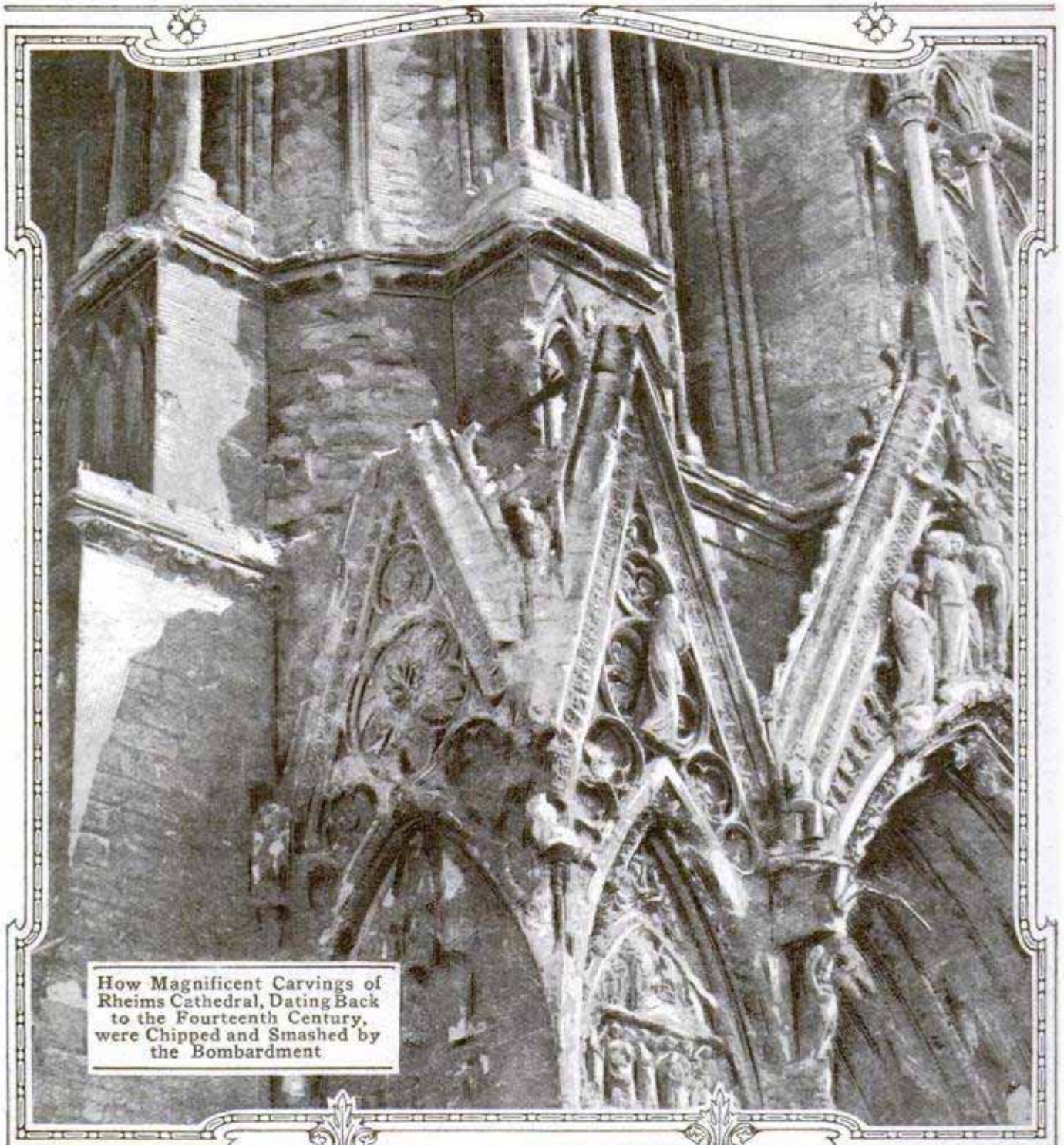
The twin towers, 267 ft. high, were designed to carry spires rising to the height of 394 ft., but these were never built. The south tower held two fa-

mous bells, one of which, the "Charlotte," weighed more than 11 tons. Sculptures also adorned the façades of the transept, which were flanked by four towers. A beautiful rose window with the prophets and apostles was in the south façade, while back of this and rising 59 ft. above the choir, was a bell tower of wood and lead. The portal in the north façade was famous for its remarkable closed doorway, over which was one of the most priceless statues pertaining to the cathedral, the Last Judgment, with a figure of the Christ, a hand upraised in benediction. Here also were the statues of the principal bishops of Rheims. Everywhere, even in the highest places, the walls were richly ornamented with sculptured stone. Much of the exquisite charm of the structure was in its perfect symmetry of outline and its massiveness, which lent to it an indefinable atmosphere of harmony, which has been termed mystery.

The interior of the cathedral was rich in statuary and old glass, and filled with rare treasures of art, among which were some famous paintings and remarkable tapestries. In size it was majestic, having a length of 455 ft., and, at the center, a height of 125 ft. The nave was 98 ft. in width with a transept of 160 ft. The carved woodwork and the railing of the choir was of note, while the choir clock was curiously ornamented with antique mechanical figures. Here at one side was a large apse, leading from which was a passage to the radiating chapels. In the north arm of the transept was one of the finest organs in France with a flamboyant Gothic case, of the fifteenth century.

In the opinion of architects who have viewed the ruins, photographs of which are shown on the following pages, its restoration is impossible. The heavy projectiles which flaked the carvings on the walls and façades, and shattered the statuary, converted the interior of the building into a mass of crumbled stone, broken glass, and charred wood.

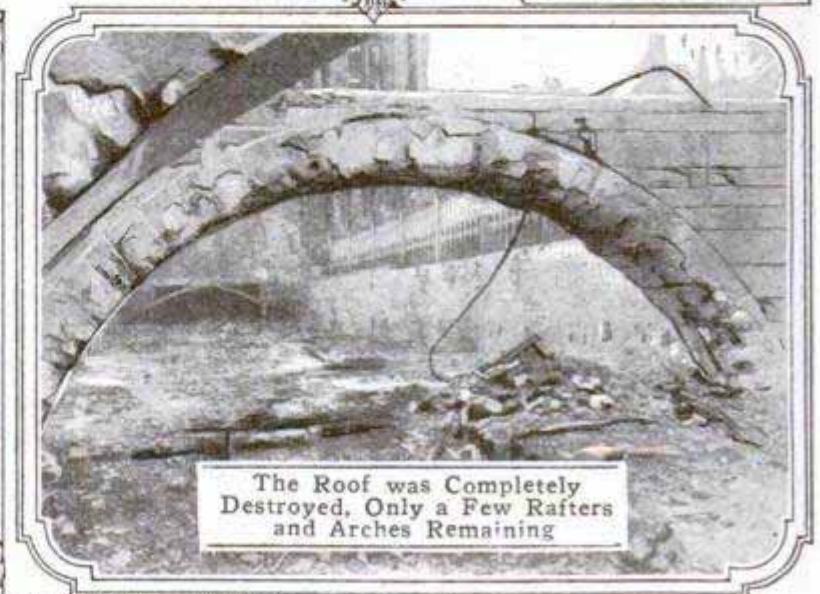
A WORLD-FAMOUS ARCHITECTURAL MONUMENT



How Magnificent Carvings of Rheims Cathedral, Dating Back to the Fourteenth Century, were Chipped and Smashed by the Bombardment

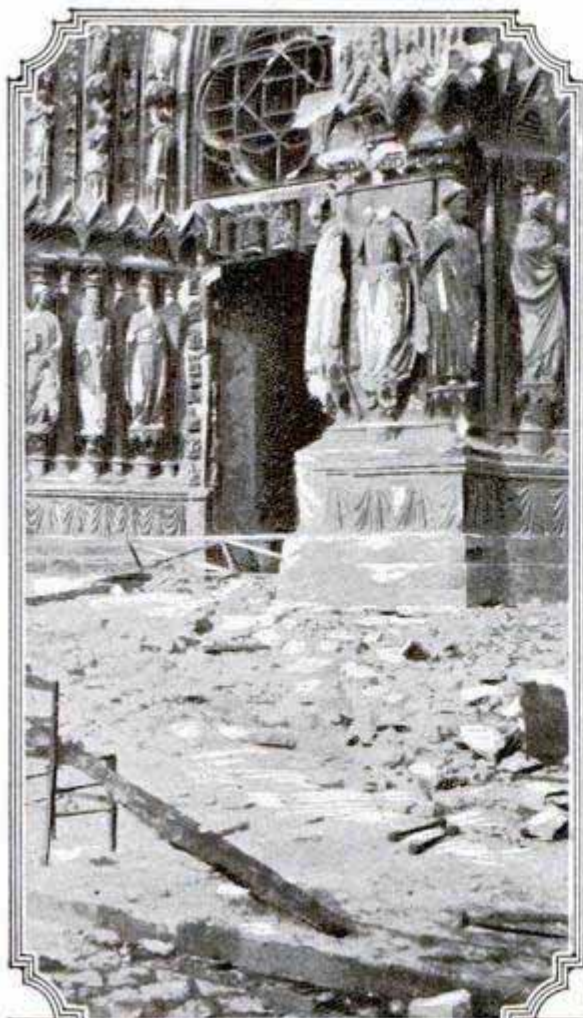


Two of the Great Bells That will Ring No More

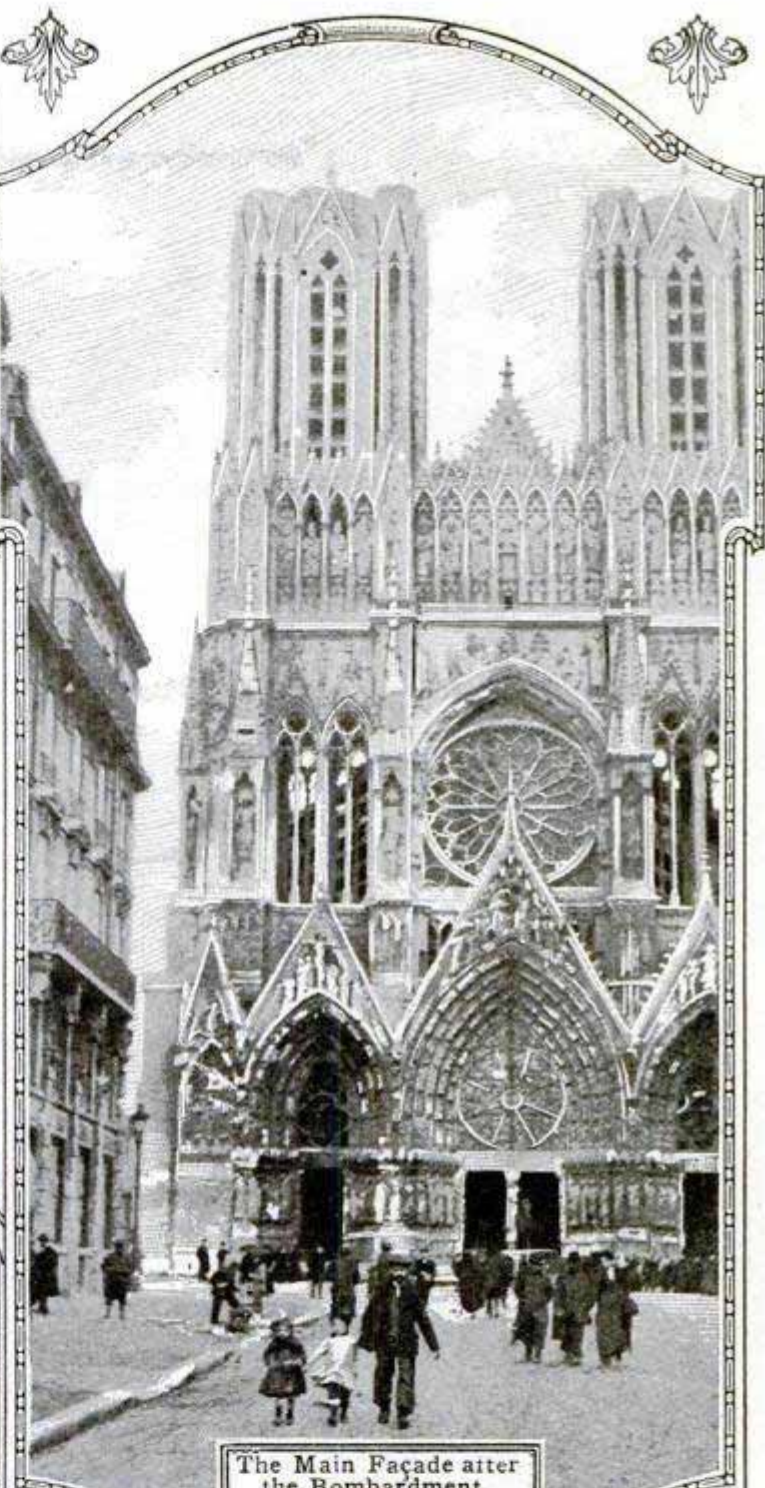


The Roof was Completely Destroyed, Only a Few Rafters and Arches Remaining

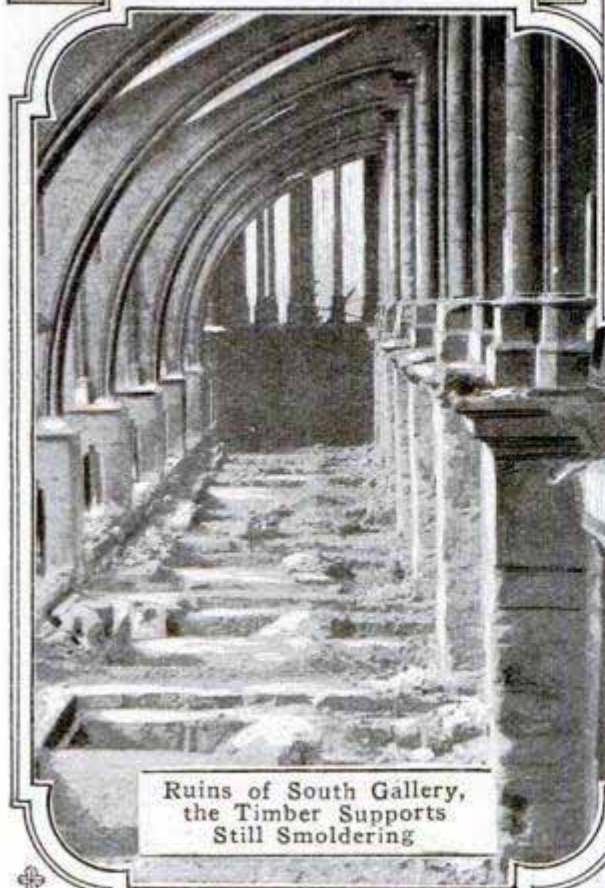
IRREPARABLY DAMAGED BY GERMAN SHELLS



The Statues of the Saints That Decorated the Main Entrance were Ruined, Many of the Heads being Shot Away and All So Chipped as to Be beyond Restoration



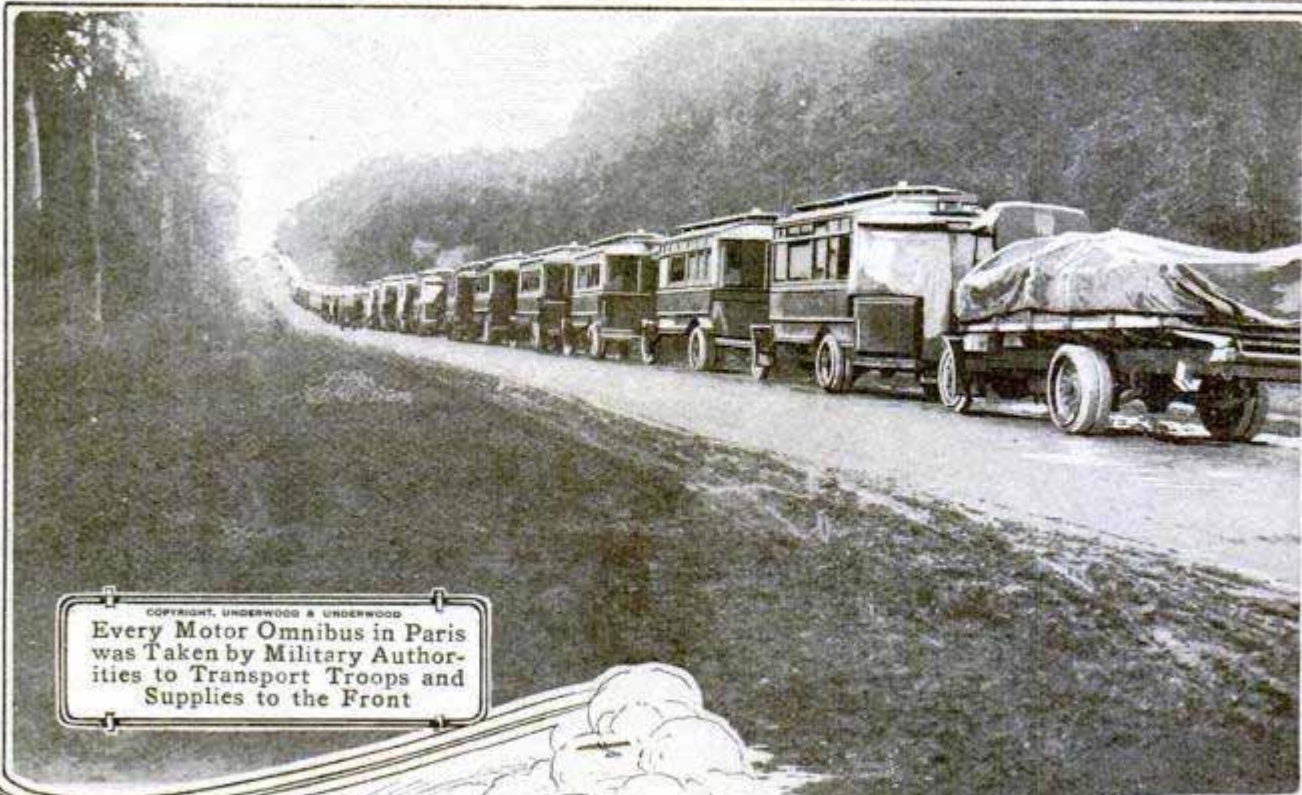
The Main Façade after the Bombardment, with Daylight Showing through the Broken Windows



Ruins of South Gallery, the Timber Supports Still Smoldering



Part of the Set of Chimes That Fell When the Belfry Took Fire



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Every Motor Omnibus in Paris
was Taken by Military Authorities
to Transport Troops and
Supplies to the Front



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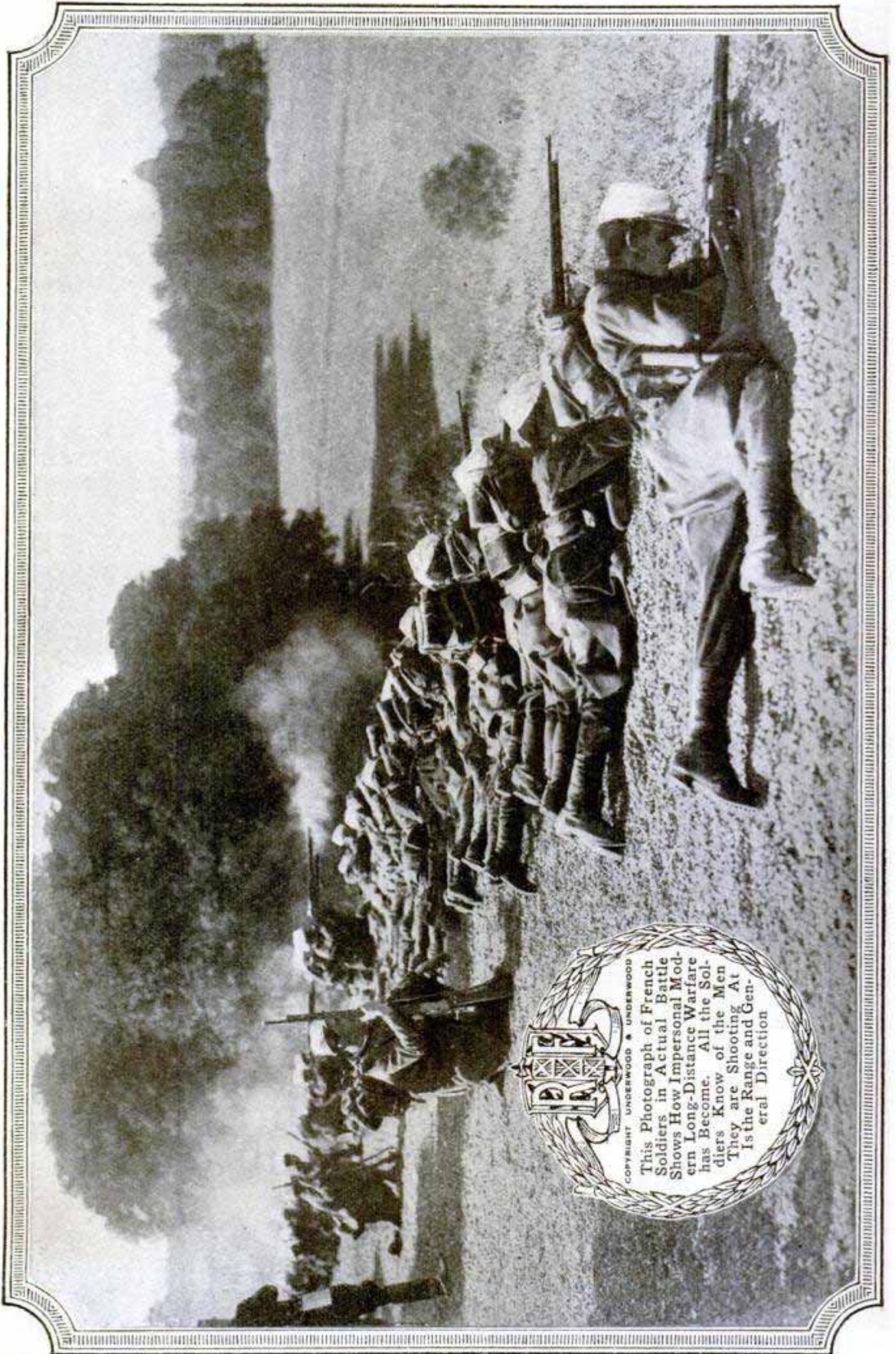
The Famous Crystal Palace of London Turned into a Barracks for the Royal Naval Reserve.
Here the Volunteers Who Enlist for Service in the British Navy Get Their First
Experience in Sleeping in Hammocks

SUNKEN BARRELS MAKE TRAPS FOR CAVALRY



When the Germans Occupied Brussels They Commandeered All the Barrels in the City and Buried Them in the Roads to Make Pitfalls for the Horses of the Allies in Case of an Attack

HOW MODERN SOLDIERS FIRE AT UNSEEN FOES



REUTERS

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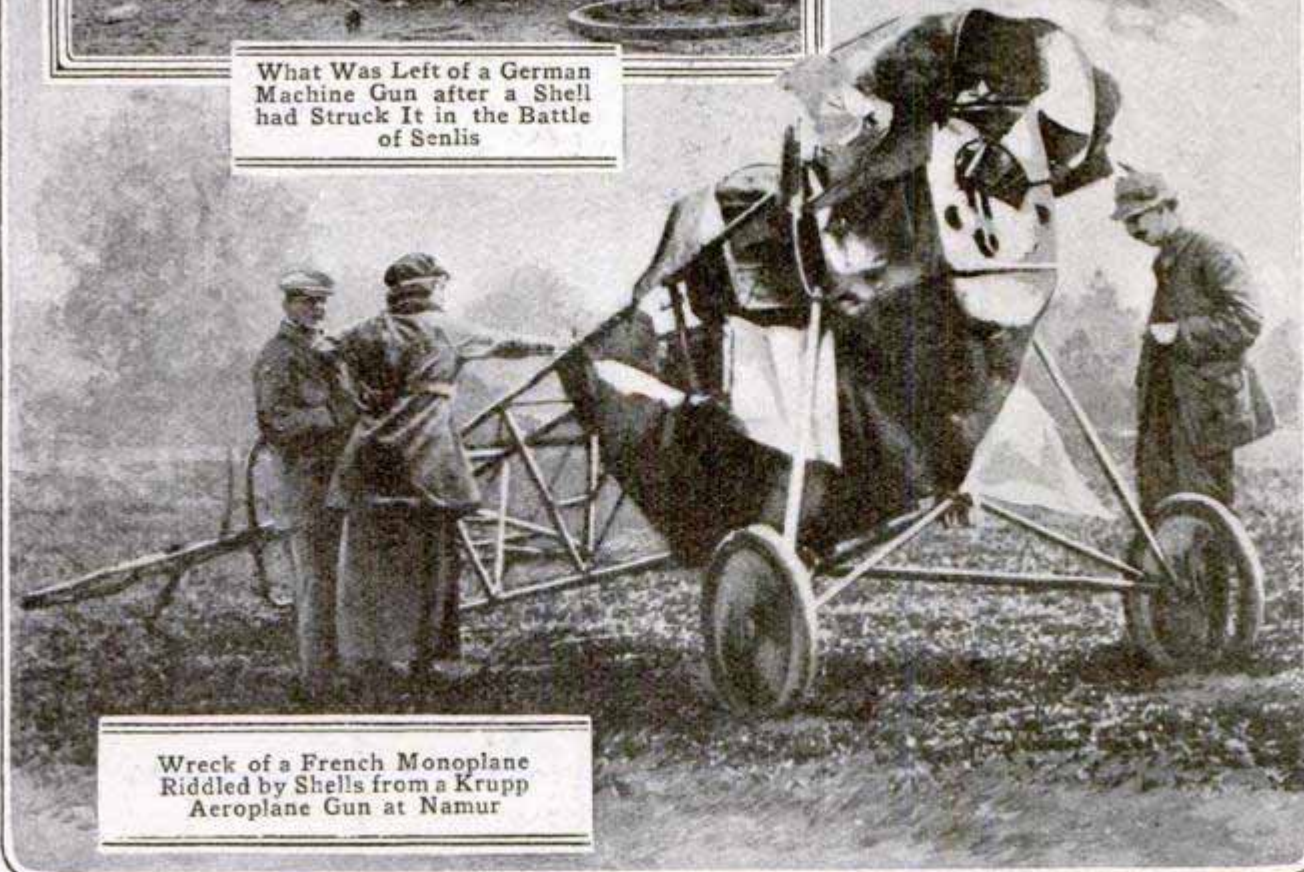
This Photograph of French Soldiers in Actual Battle Shows How Impersonal Modern Long-Distance Warfare has become. All the Soldiers know of the Men They are Shooting At Is the Range and General Direction

COSTLY WAR MACHINES DESTROYED IN BATTLE



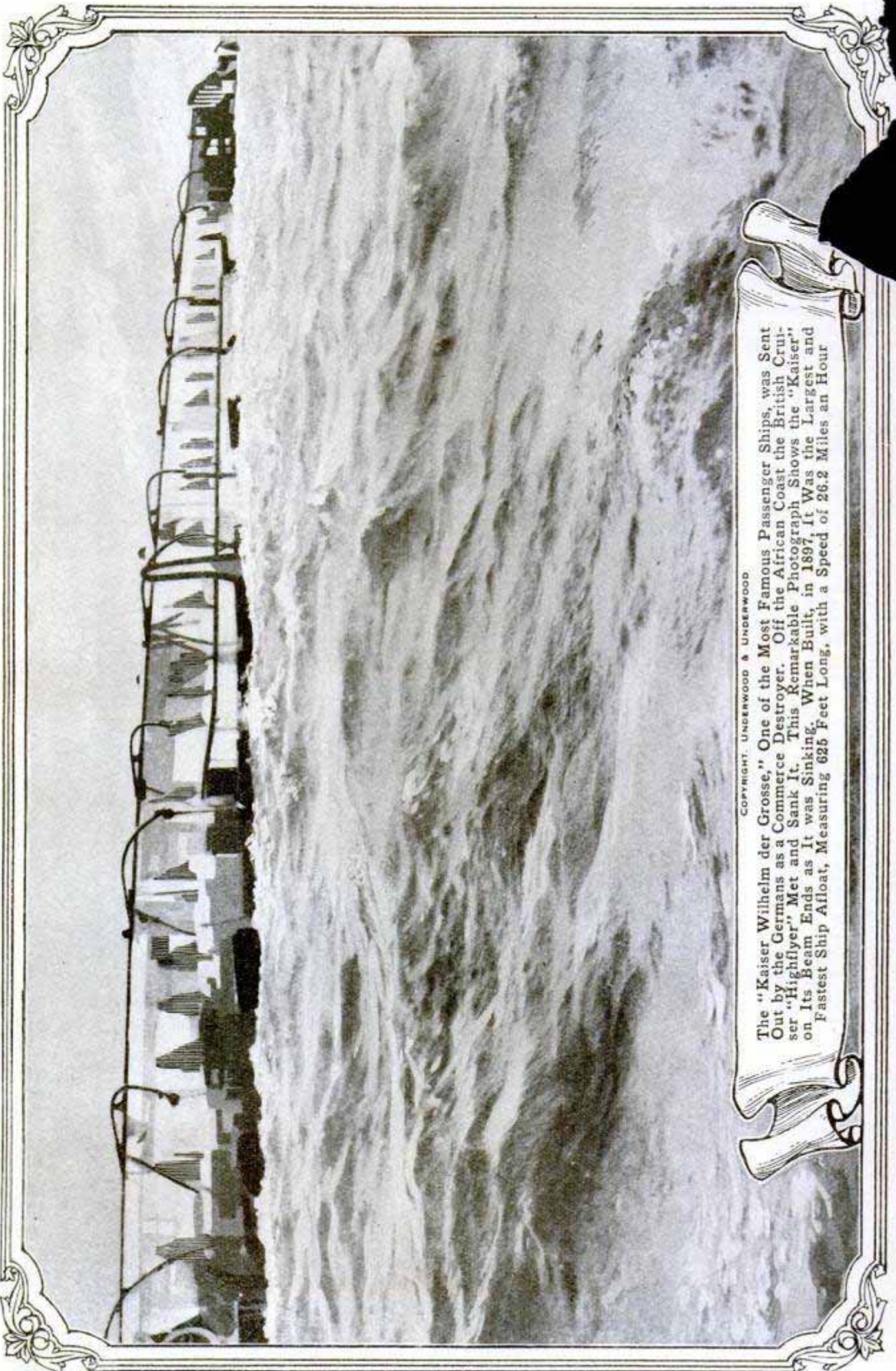
What Was Left of a German Machine Gun after a Shell had Struck It in the Battle of Senlis

Ruins of a German Military Motor Train Set on Fire by Shells in Belgium



Wreck of a French Monoplane Riddled by Shells from a Krupp Aeroplane Gun at Namur

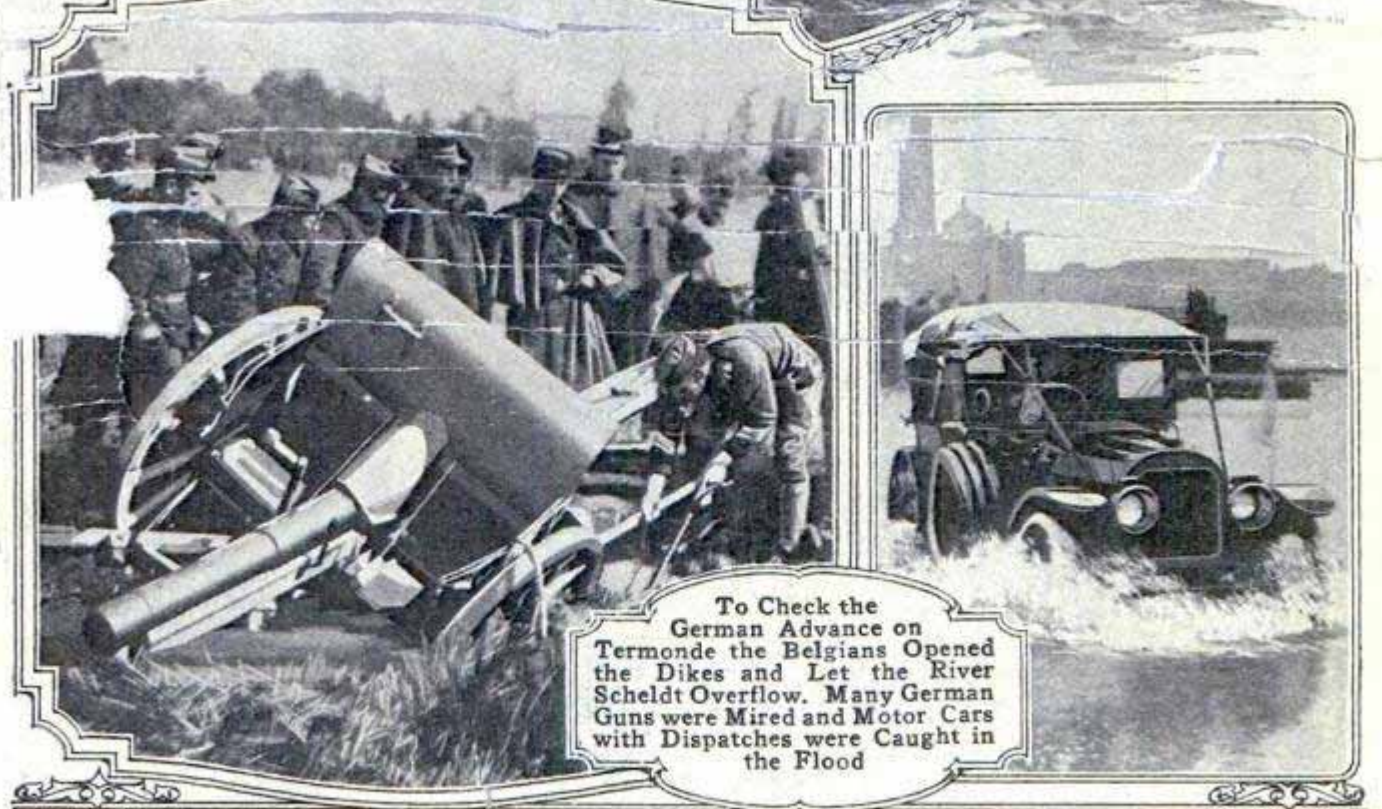
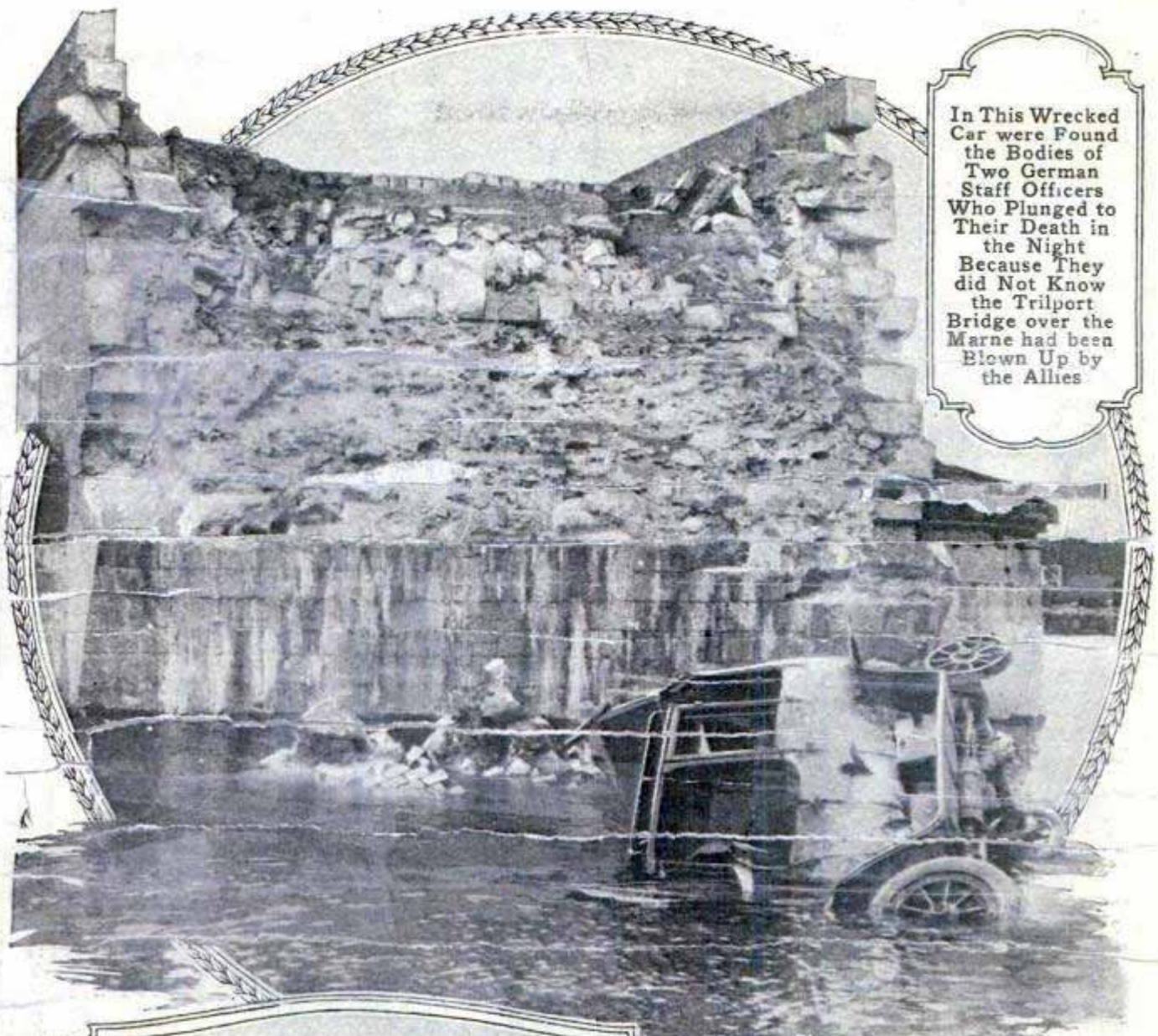
GREAT ATLANTIC LINER SUNK BY A CRUISER



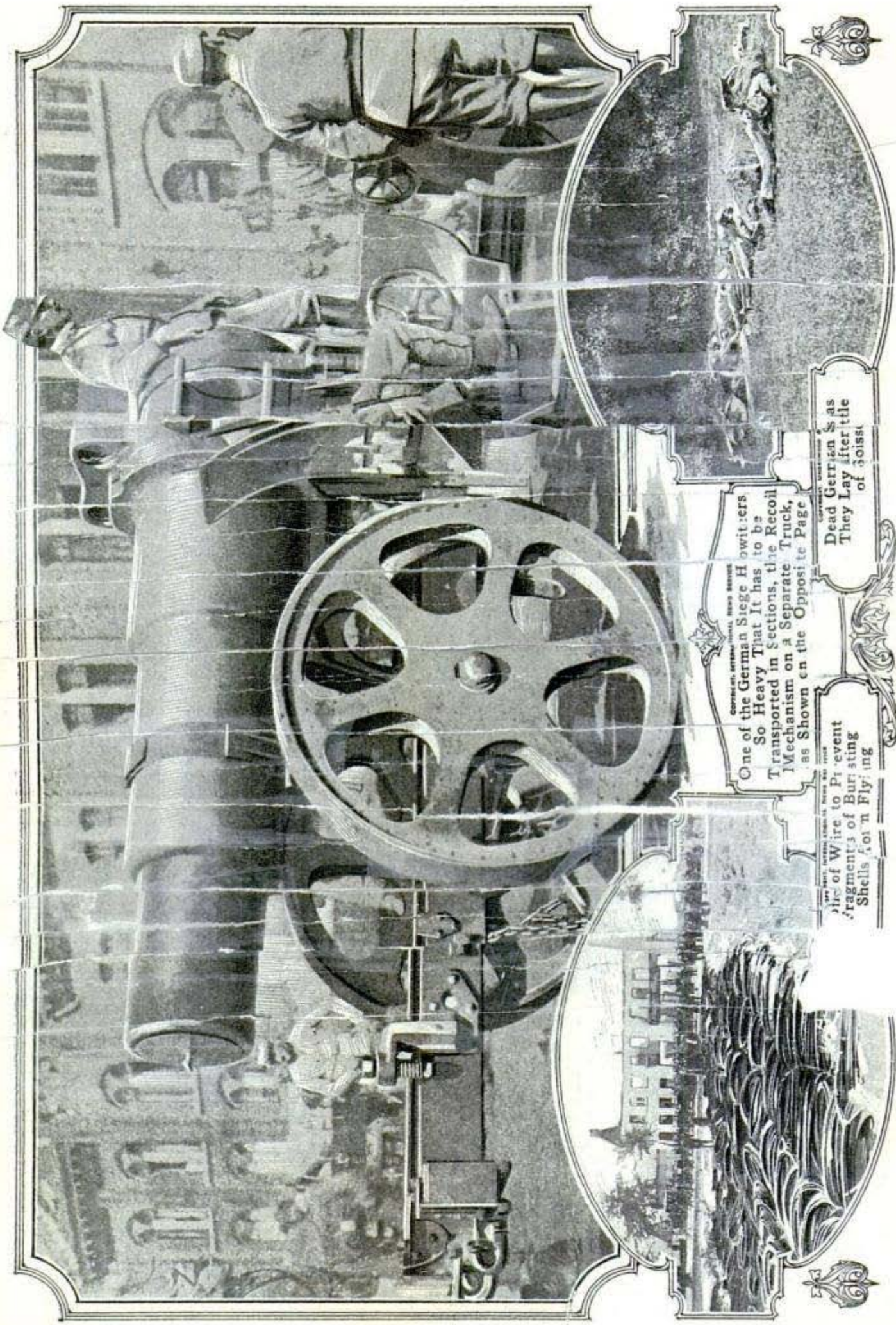
Copyright, Underwood & Underwood

The "Kaiser Wilhelm der Grosse," One of the Most Famous Passenger Ships, was Sent Out by the Germans as a Commerce Destroyer. Off the African Coast the British Cruiser "Highflyer" Met and Sank It. This Remarkable Photograph Shows the "Kaiser" on Its Beam Ends as It was Sinking. When Built, in 1897, It Was the Largest and Fastest Ship Afloat, Measuring 625 Feet Long, with a Speed of 26.2 Miles an Hour

In This Wrecked Car were Found the Bodies of Two German Staff Officers Who Plunged to Their Death in the Night Because They did Not Know the Trilport Bridge over the Marne had been Blown Up by the Allies



To Check the German Advance on Termonde the Belgians Opened the Dikes and Let the River Scheldt Overflow. Many German Guns were Mired and Motor Cars with Dispatches were Caught in the Flood

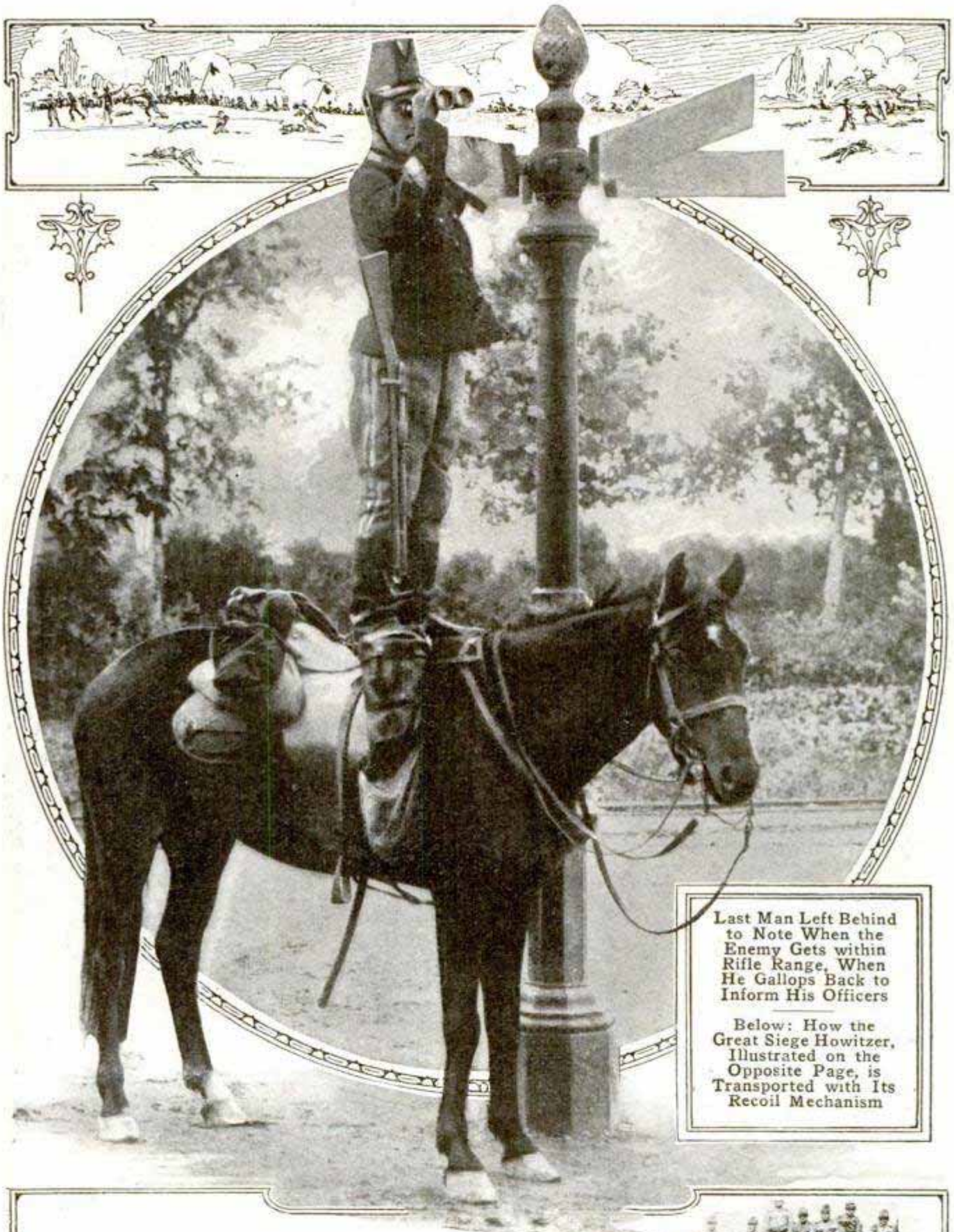


GERMAN, INTERNATIONAL NEWS SERVICE
 One of the German Siege Howitzers
 So Heavy That It has to be
 Transported in Sections, the Recoil
 Mechanism on a Separate Truck,
 as Shown on the Opposite Page

APRIL 1915
 Dead German Soldiers
 They Lay after the
 Battle of Soissons

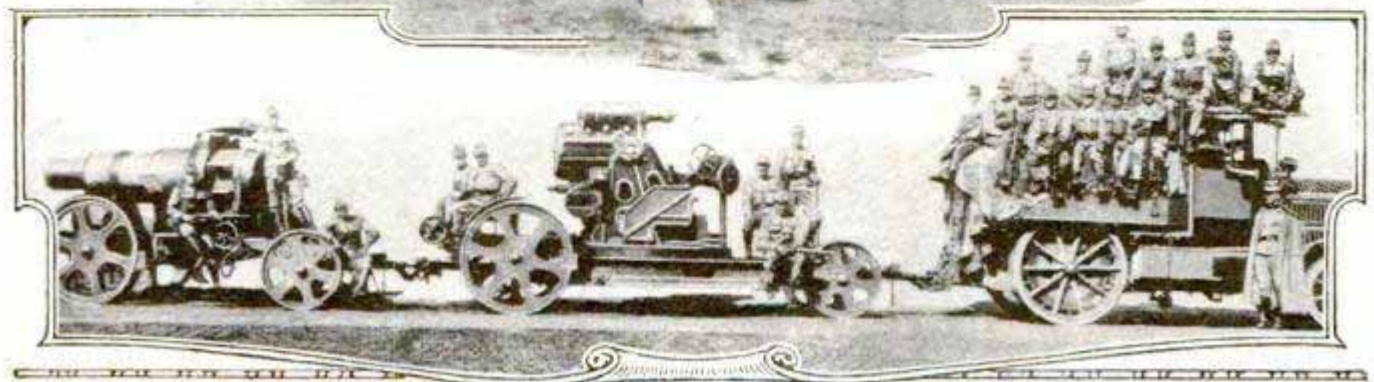
APRIL 1915
 Wire to Prevent
 Bursts of Bursting
 Shells from Flying

BELGIAN PATROL WATCHING FOR THE GERMANS



Last Man Left Behind to Note When the Enemy Gets within Rifle Range, When He Gallops Back to Inform His Officers

Below: How the Great Siege Howitzer, Illustrated on the Opposite Page, is Transported with Its Recoil Mechanism



PICTURES OF SOME OF THE SPOILS OF WAR



COPYRIGHT INTERNATIONAL NEWS SERVICE
Russian Rifles Captured by Germans



COPYRIGHT UNDERWOOD & UNDERWOOD
German Soldiers Examining a Captured Russian Machine Gun



COPYRIGHT UNDERWOOD & UNDERWOOD
British Troops Guarding Field Guns Abandoned by Germans after the Battle of the Marne



COPYRIGHT UNDERWOOD & UNDERWOOD
French Peasants Collecting Rifles Left Behind by Retreating Germans after the Marne Engagement



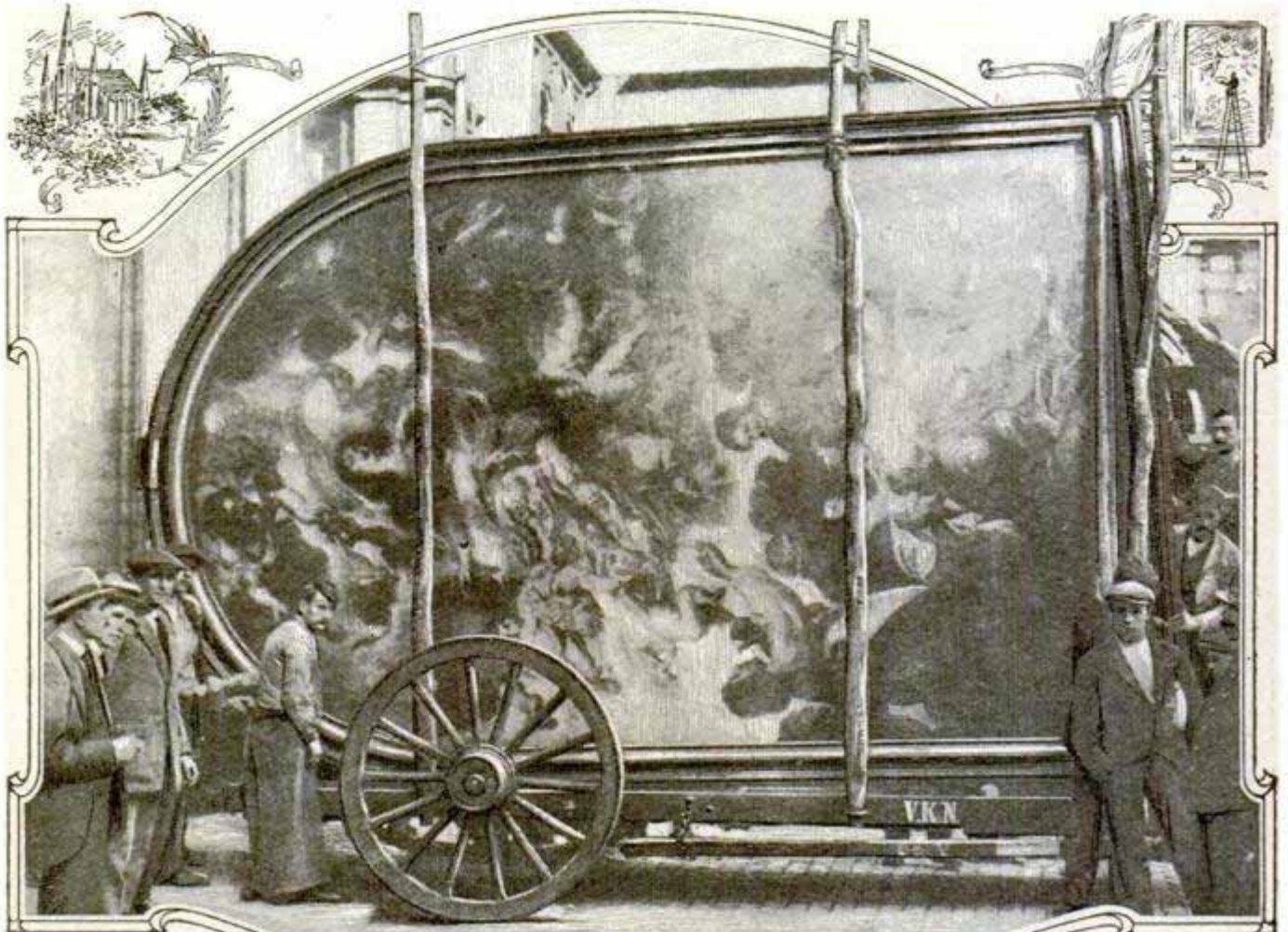
COPYRIGHT UNDERWOOD & UNDERWOOD
Loaded Shells Left Behind by Germans

GIVING "FIRST AID" ON THE BATTLE FIELD



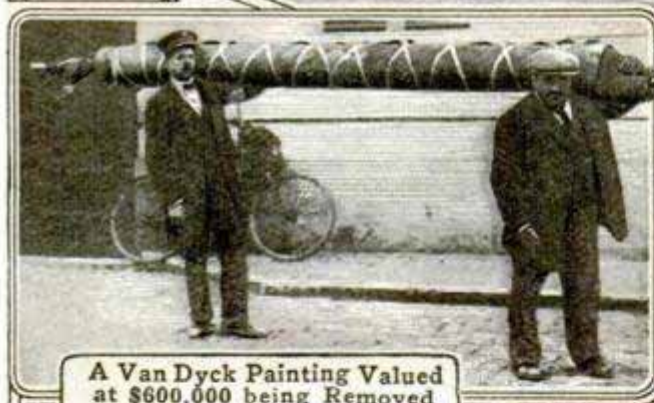
This Photograph was Taken on the Edge of the Battle Field at St. Quentin, France, While the Fighting Was Still in Progress. Two French Dragoons are Removing the Steel Breastplate from One of Their Officers Who has been Wounded

REMOVING ART TREASURES FROM WAR'S PATH



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The Famous Painting by Peter Paul Rubens, "The Assumption of the Virgin," being Taken from the Antwerp Cathedral to a Place of Safety



A Van Dyck Painting Valued at \$600,000 being Removed from the Malines Cathedral



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A Few Days after the Removal of Its Art Treasure the Cathedral at Malines was Riddled by German Shells, as This Photograph Shows

WITH "TOMMY ATKINS" IN FIELD AND CAMP



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Canadian Troops Bathing Their Feet in Cold Water to Keep in Condition for Marching



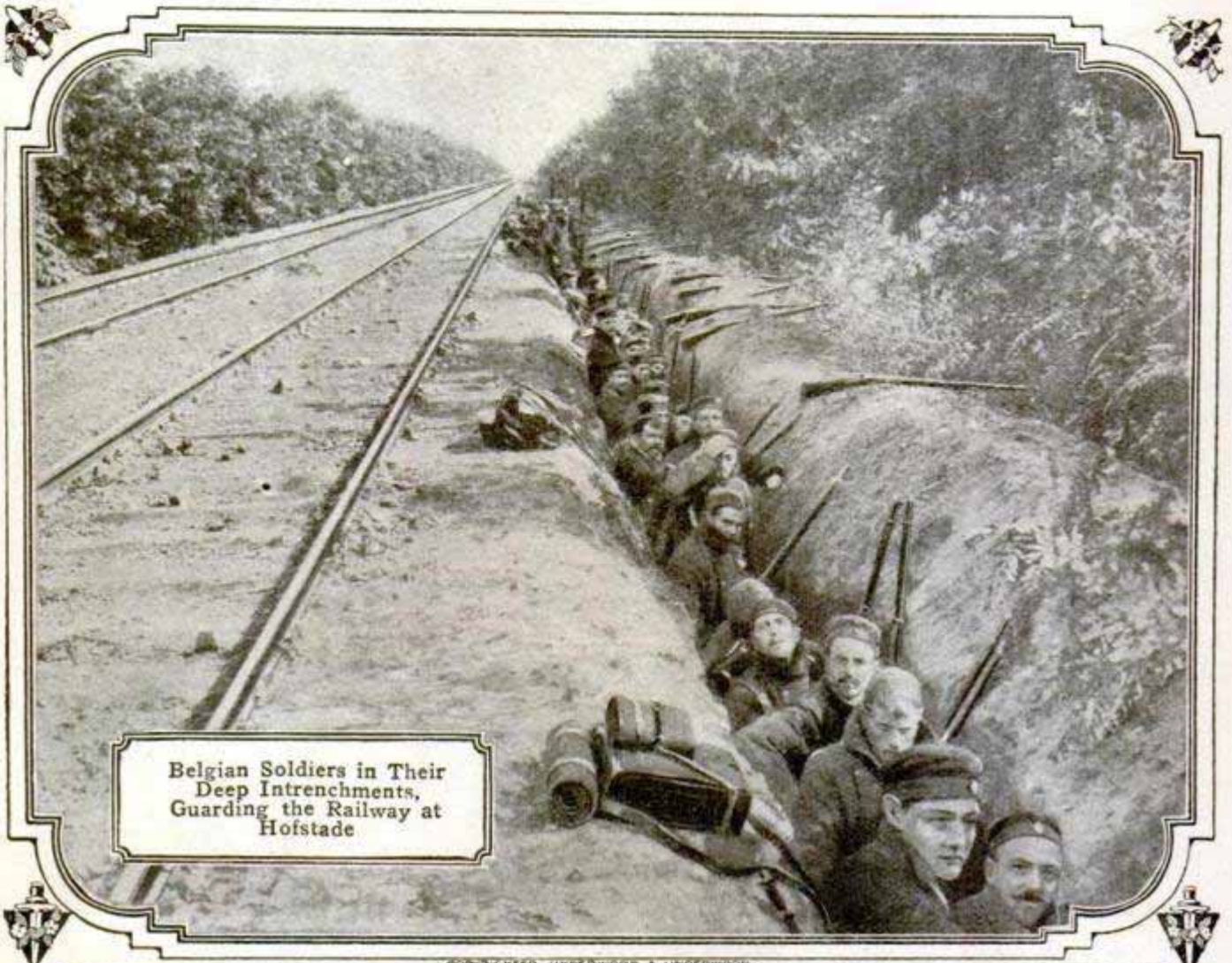
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Soldiers of a British Cycle Corps with Their Machine Gun, Fording a Stream



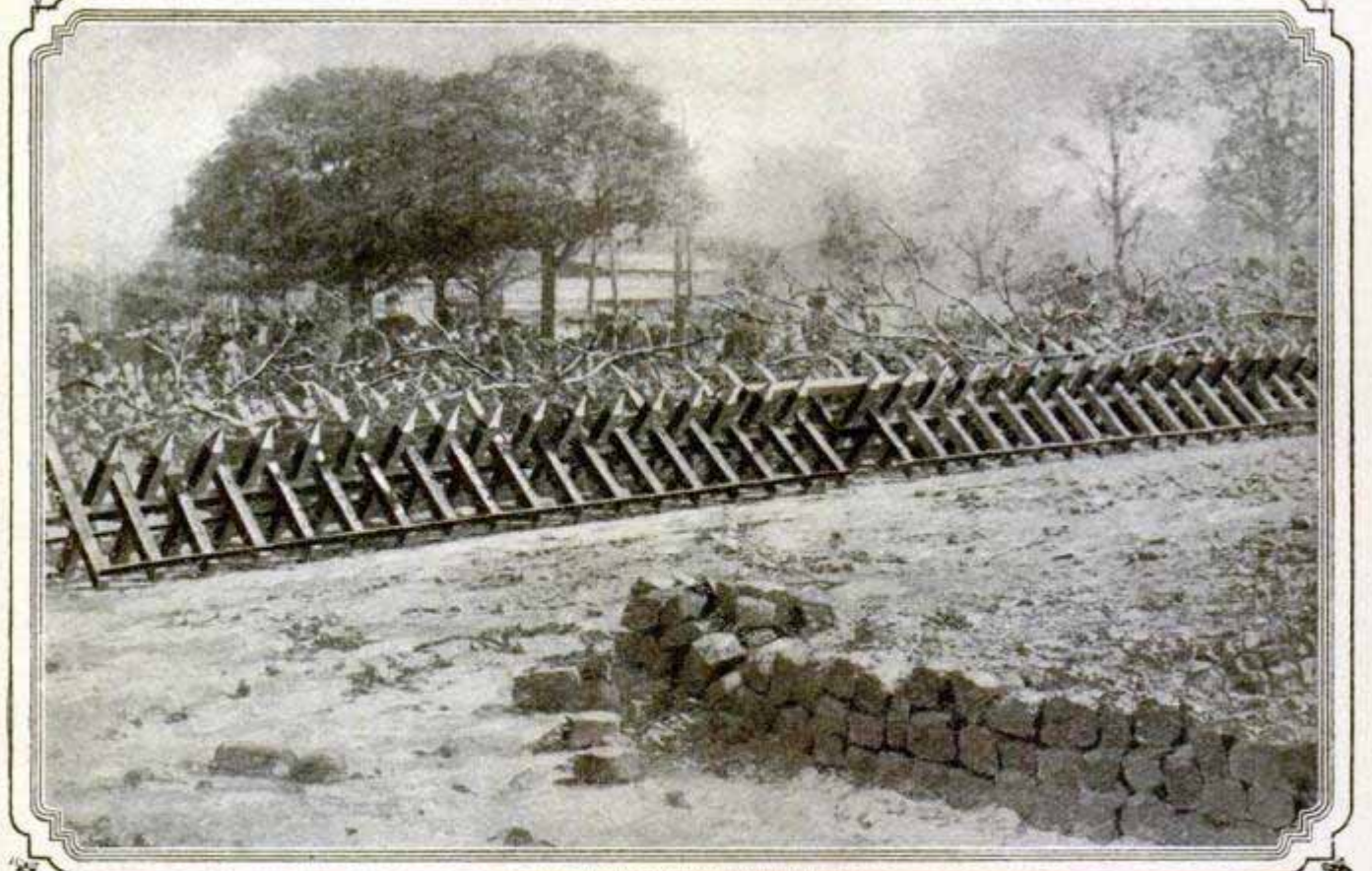
COPYRIGHTED BY THE INTERNATIONAL NEWS SERVICE

Gunners of the British Field Artillery Drinking from a Water Cart during a Halt



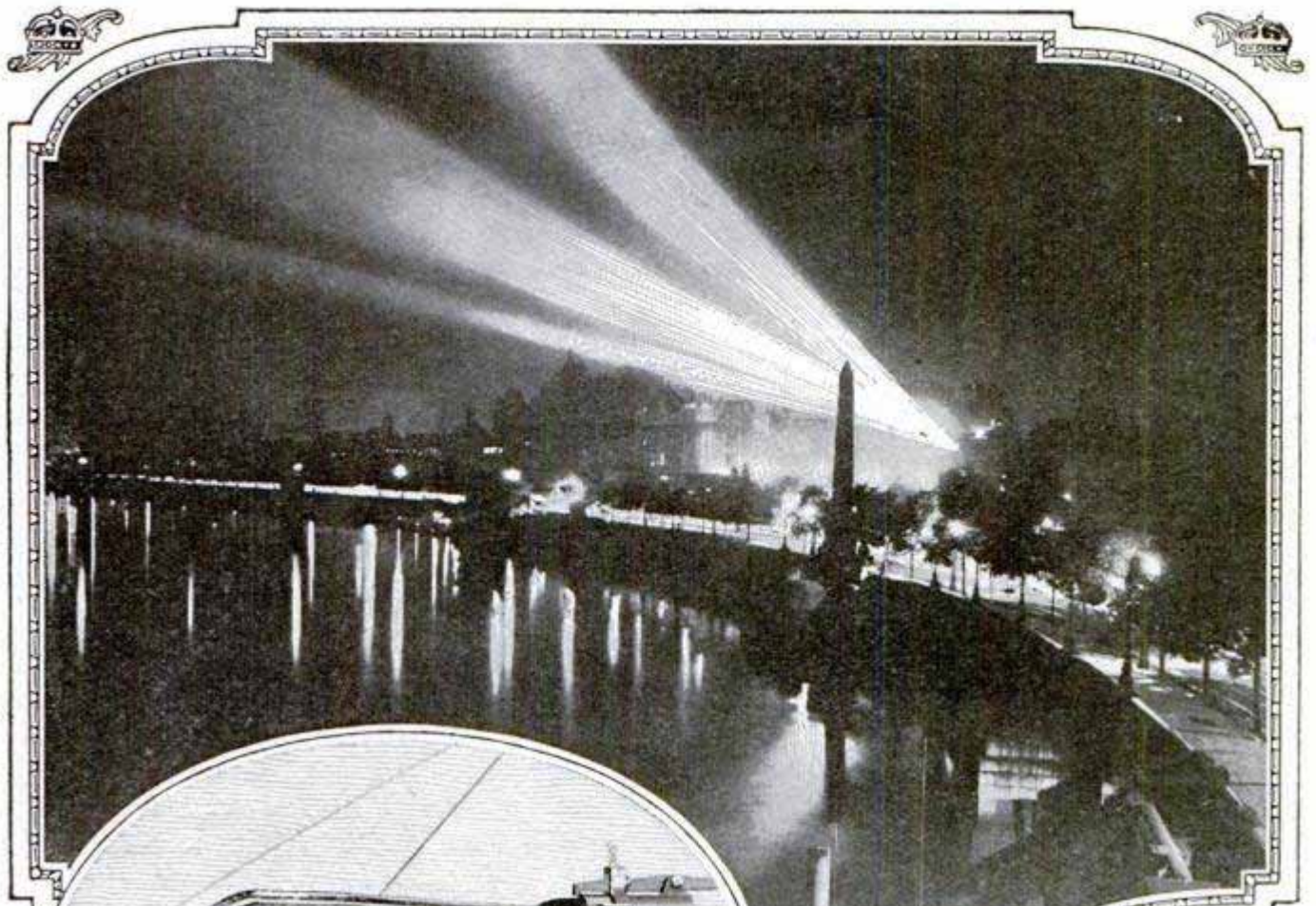
Belgian Soldiers in Their
Deep Intrenchments,
Guarding the Railway at
Hofstade

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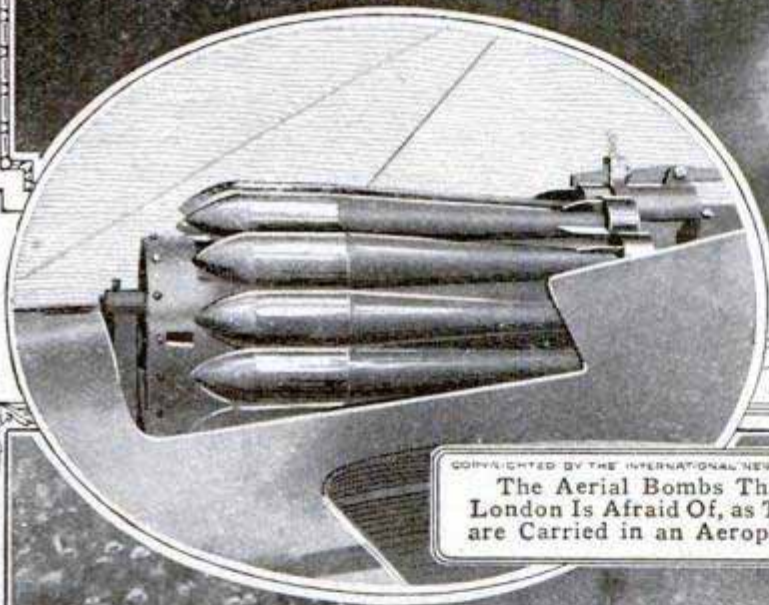
COPYRIGHTED INTERNATIONAL NEWS SERVICE.

Among the Oldest and Still Most Effective Devices for Obstructing Cavalry are the "Chevaux-de-Frise,"
Made of Pointed Stakes Set at an Angle. These Barricades have been Placed
All around Paris as a Defense against the German Uhlans

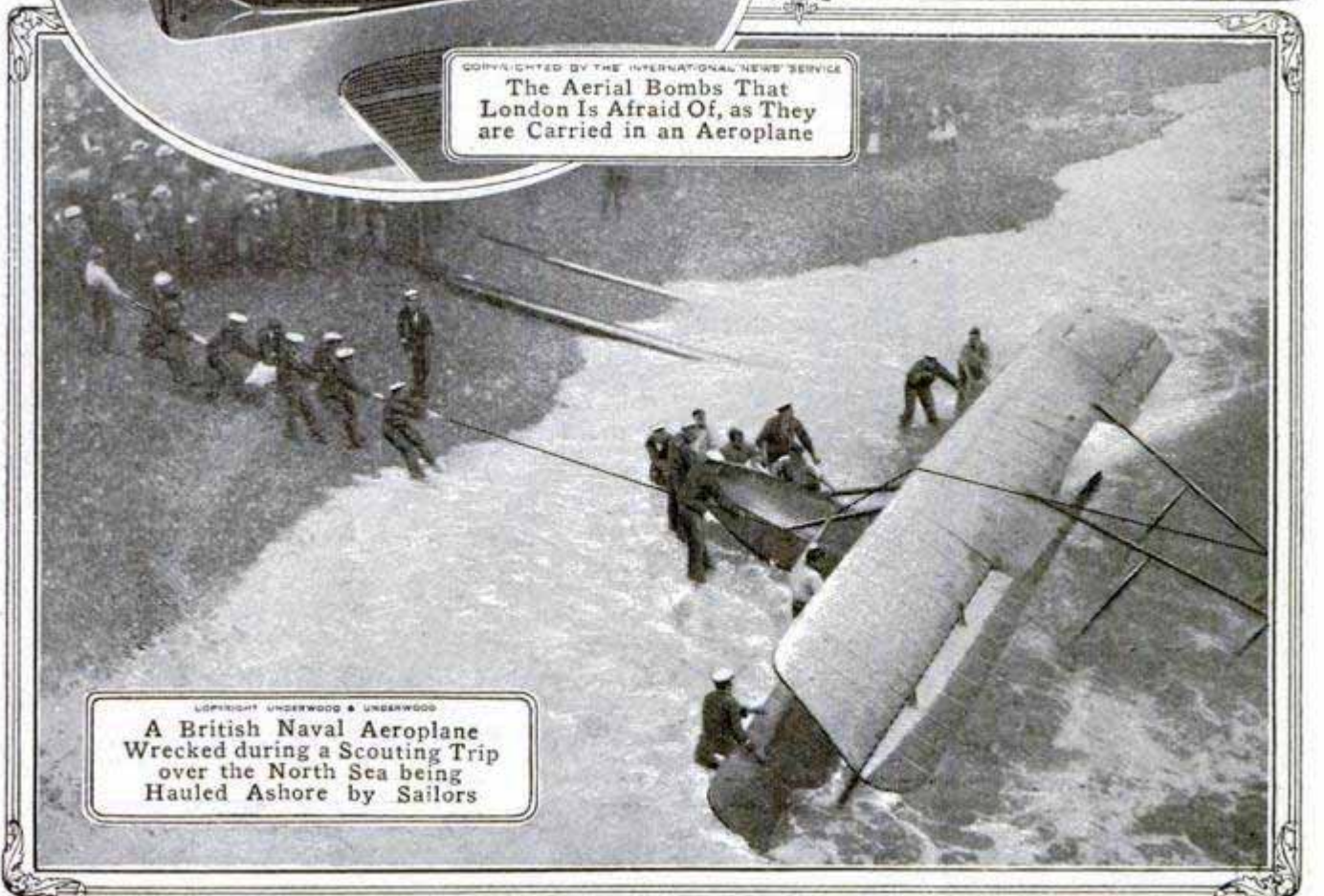


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London is Guarded at Night by Searchlights on the Lookout for Invading Air Craft



COPYRIGHT BY THE INTERNATIONAL NEWS SERVICE
The Aerial Bombs That London Is Afraid Of, as They are Carried in an Aeroplane



COPYRIGHT UNDERWOOD & UNDERWOOD
A British Naval Aeroplane Wrecked during a Scouting Trip over the North Sea being Hauled Ashore by Sailors

BRITISH PROPERTY INSURED AGAINST AERIAL ATTACK

Underwriters at Lloyd's are insuring private property in and about London against damage or destruction from possible aerial attacks upon the city by Zeppelins, or other hostile air craft. Although the fear which for years has been in British minds, that eventually a fleet of German airships would storm the Isles from the clouds, is unrelieved, insurance writers are accepting

such risks at lower premiums now than at the opening of the war. It is reported that when advices reached England that Count Zeppelin had personal charge of an aerial mobilization at Wilhelmshaven, where men were said to be working day and night to build more dirigibles with which to attack Great Britain, many applications for insurance were posted. The fact that individuals are being insured against injury at the hands of the enemy indicates the fear of the British.

BIRDS CARRY WAR MESSAGES AND TAKE PICTURES

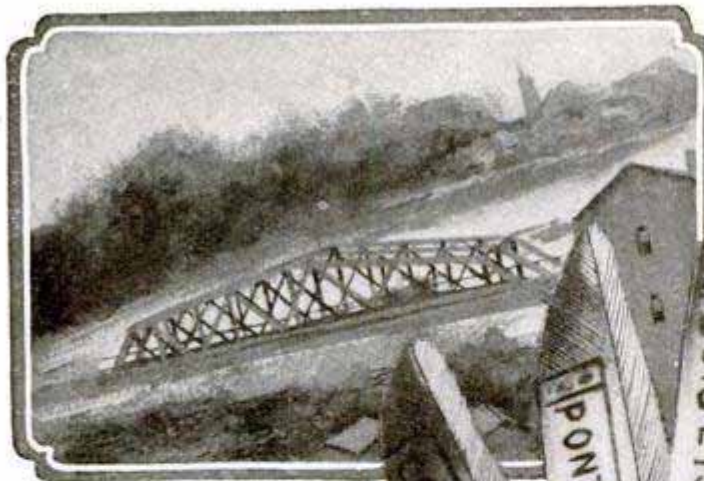
Thousands of carrier pigeons are being used as bearers of dispatches for the armies at war in Europe. In Germany some 8,000 of these aerial messengers have been trained for military service, while French statistics show that the number in that country approaches 15,000. Some are also in service as military photographers. A small, light camera is strapped to the breast of a pigeon. As the bird flies the camera operates, making numerous exposures which record details of the territory beneath. The use of the birds is most common, however, as a means of communication between fortifications under siege, or to and from spies in hostile territory.

Many ingenious methods have been devised for perfecting this form of transmitting advices, such as stamping the messages in cipher on the under feathers of the wings. During the Franco-Prussian War of 1870-71, when Paris was besieged, the pigeon post assumed an important place. A system was developed for reducing messages, by means of photography, to microscopic size and transferring them to thin strips of collodion. Approximately 16,000 words could be put on a film no larger than a couple of postage stamps. Eighteen or 20 of these pellicles, containing words enough to fill three or four large books, were wound tightly and inserted in a quill attached to a tail feather of a pigeon. For private

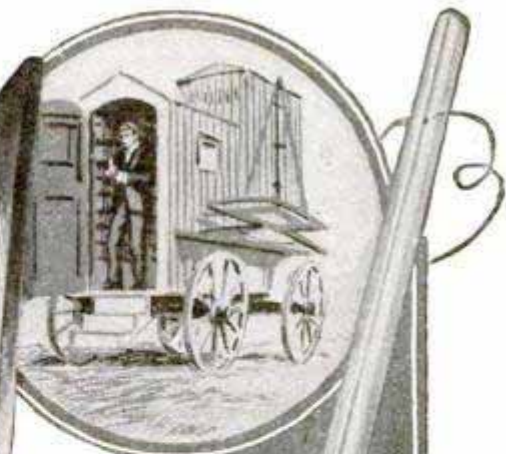
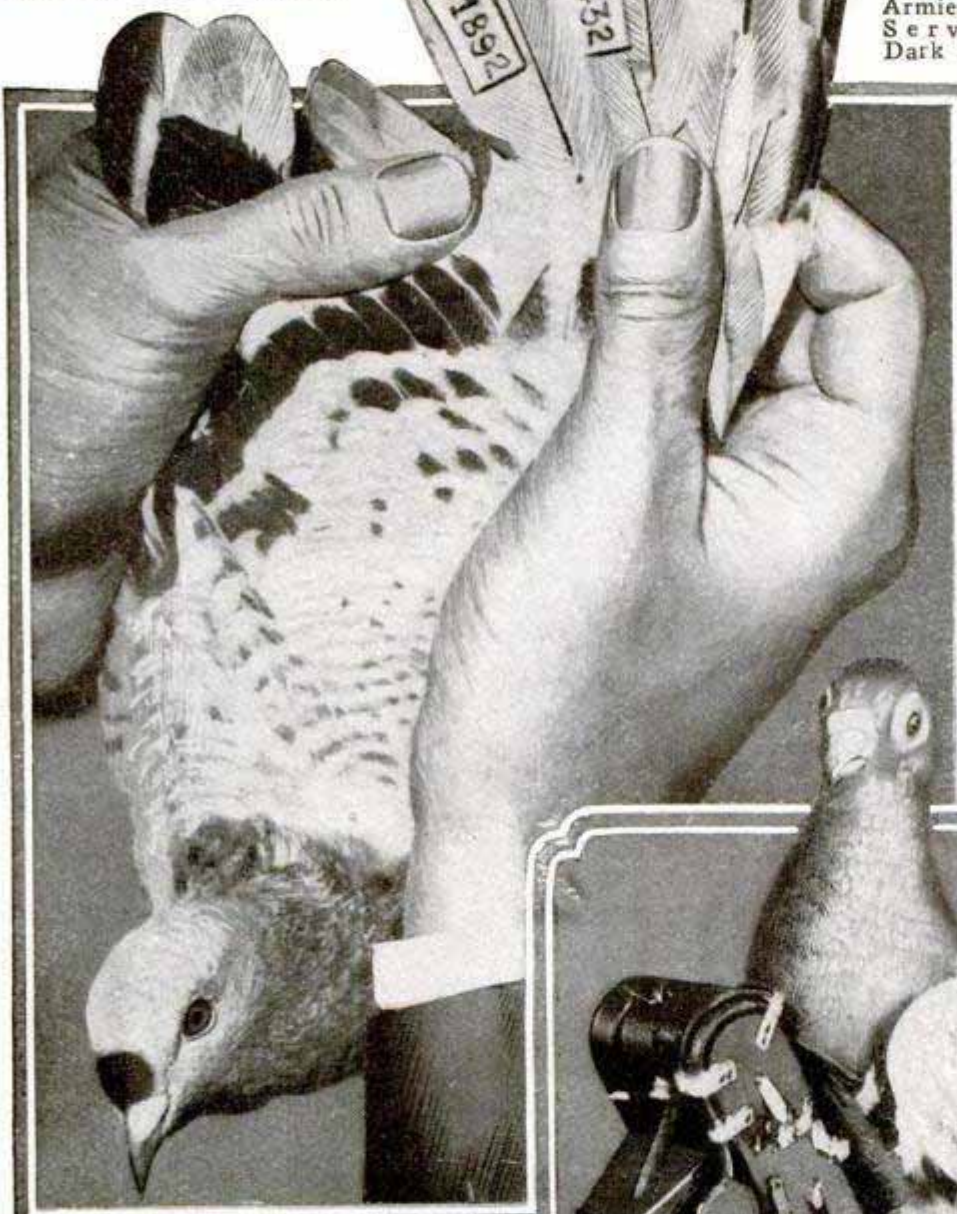
letters not more than 20 words in length, sent by this aerial post from London by birds trained to fly to their home lofts in Paris, a charge of 10 cents a word and 12 cents for registration was made. A single bird could carry messages for which postage fees of between \$50,000 and \$60,000 were paid. When the dispatches were received the collodion films were placed on lantern slides and projected on a screen, to be copied and sent on to their destinations. This system was later replaced by the use of sensitive paper instead of a screen, which eliminated the copying difficulty.

Advices from Belgium early in the present war recounted the arrest of a German spy, the circumstances of which serve to illustrate some of the methods used in employing the pigeons in secret operations. The man was seated on a river bank, apparently fishing, when he was discovered. To an inquiry he responded that he was not getting a bite. At the same time unmistakable sounds of cooing came from the direction of his basket. Investigation disclosed a number of carrier pigeons with which he expected to report to German headquarters information about the Belgian forces in that vicinity.

⌈The French government has placed an order in St. Louis for 4,500 cavalry horses.



A Reproduction of a Photograph Taken by One of the Pigeon Photographers



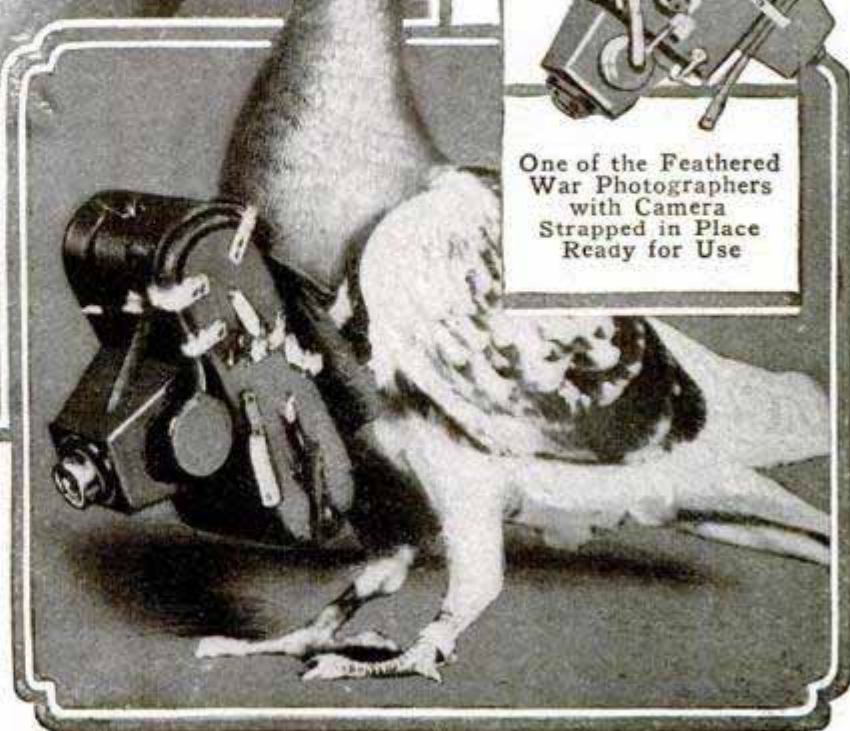
Pigeon Lofts Such as This are Carried by Several of the European Armies and Serve as Dark Rooms



A Quill Containing Strips of Collodion on Which Messages are Printed



One of the Feathered War Photographers with Camera Strapped in Place Ready for Use



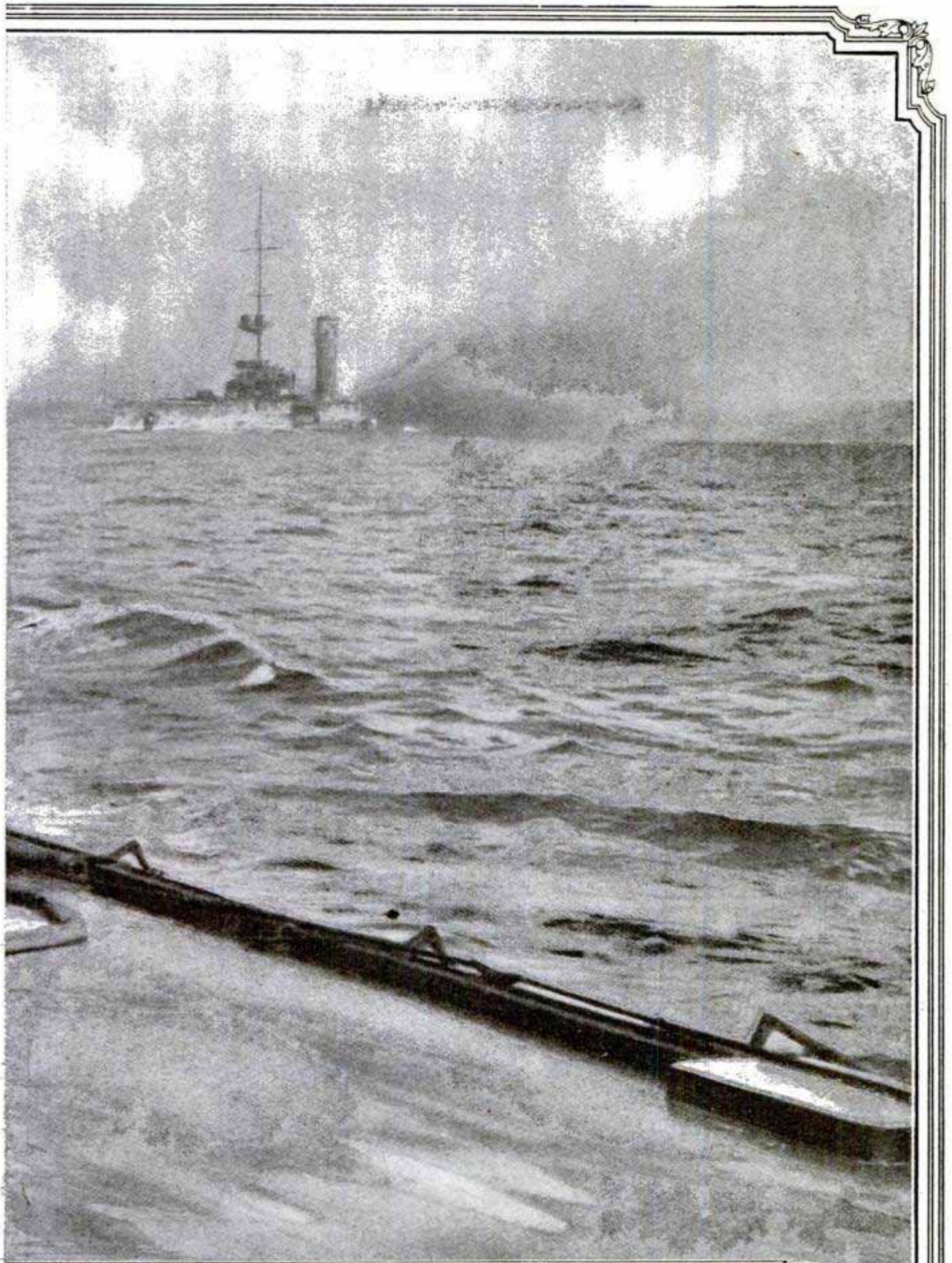
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This Shows One of the Many Ingenious Methods Employed in Transmitting Important Advices by Carrier Pigeons. The Dispatches are Printed in Code on the Wing Feathers of the Bird so That if It Falls into the Hands of the Enemy They may Escape Notice

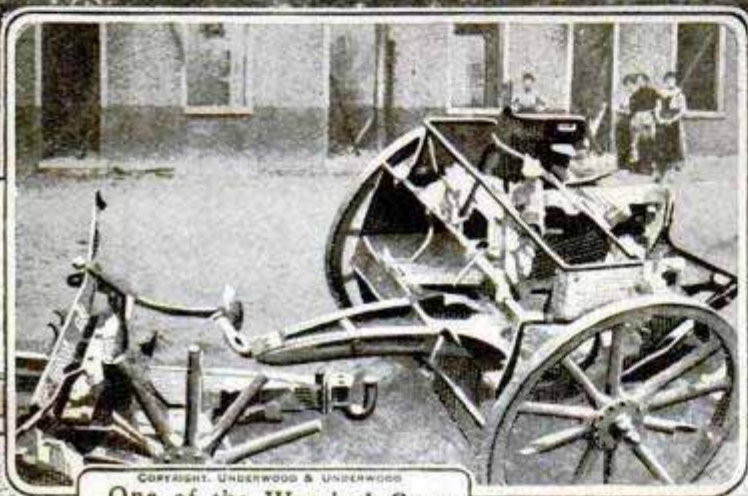
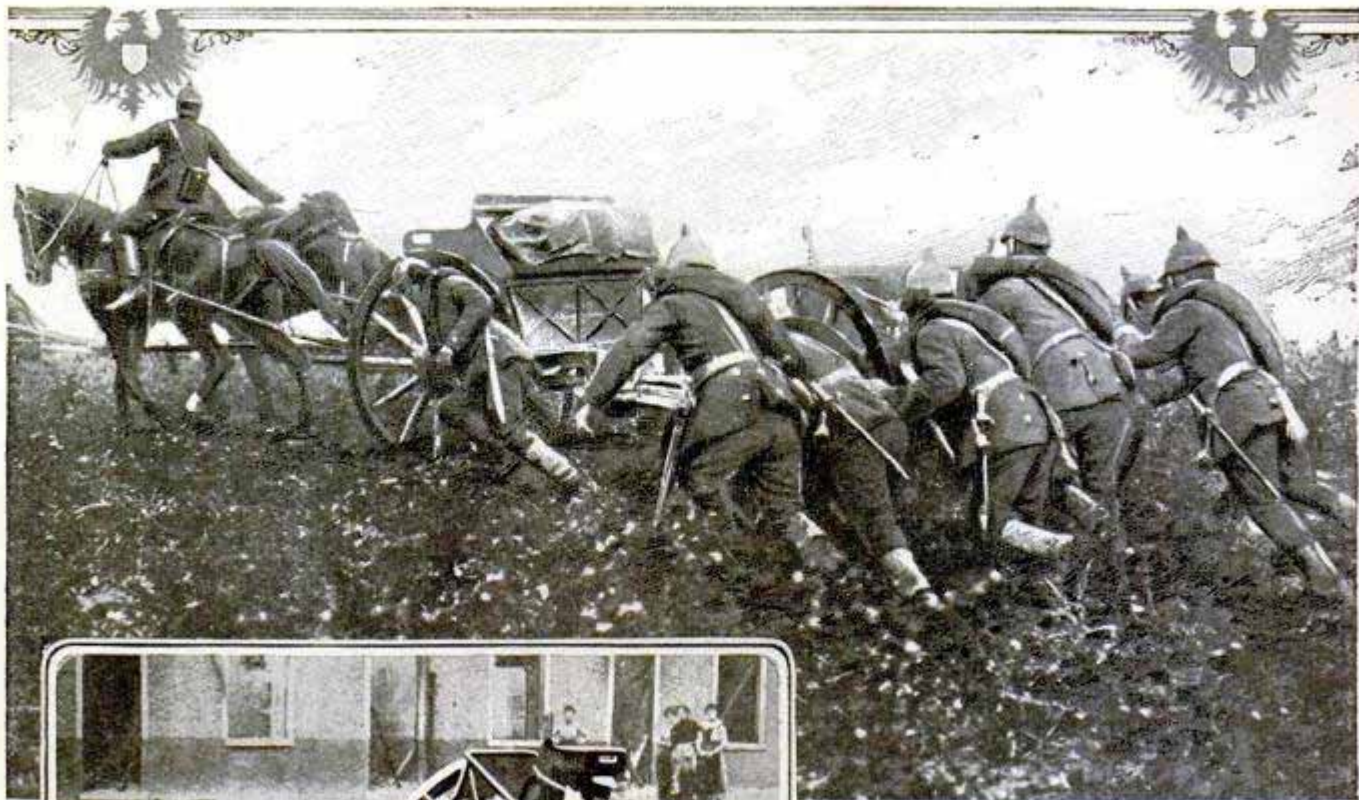


This Remarkable Photograph, Perhaps the First Ever Made under Similar Circumstances, The First Important Sea Fight of the Great War was Just Finished and the Two Funnels Shot Away and One Mast Gone. A Few Minutes

THE SINKING OF THE "MAINZ" OFF HELGOLAND

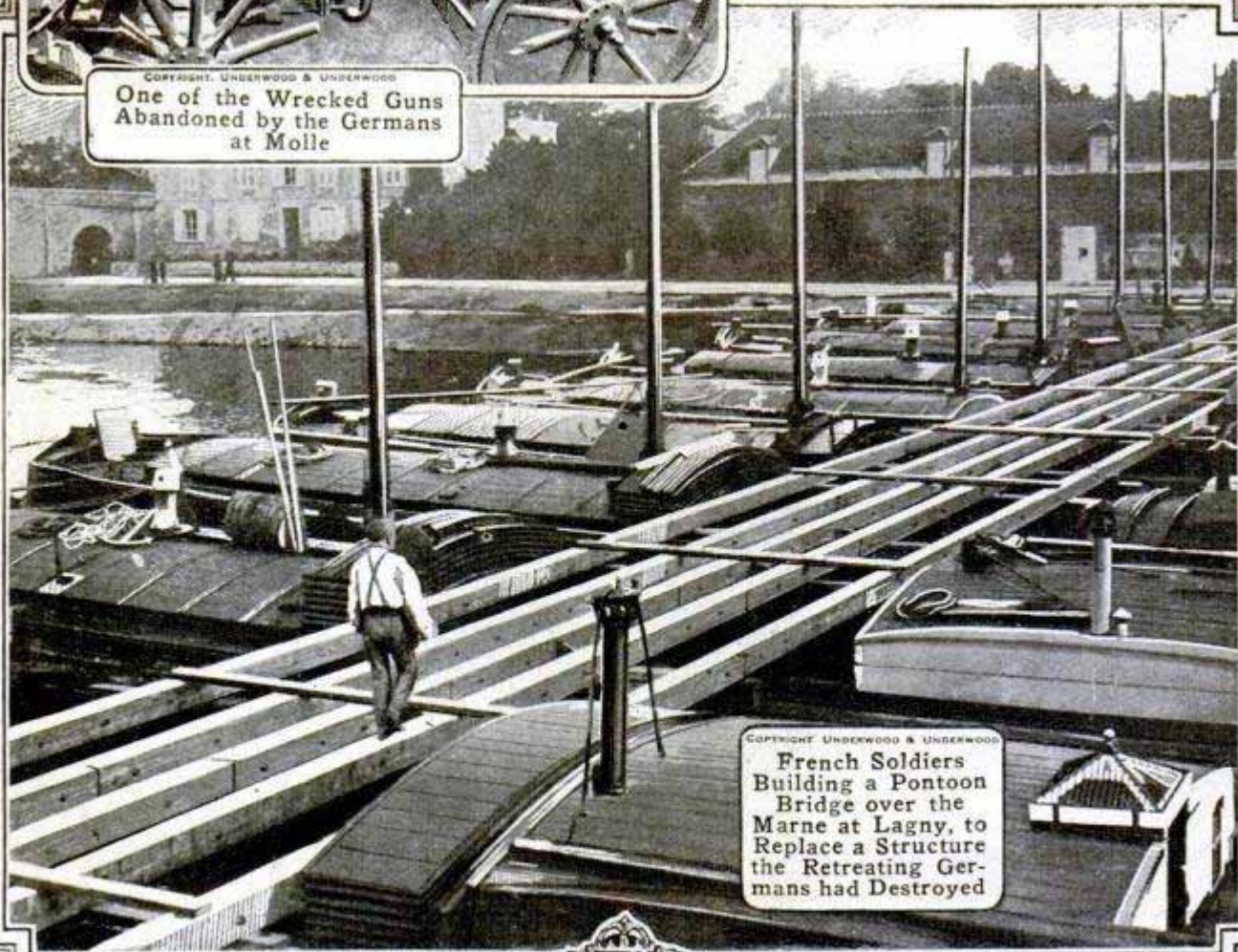


was Taken by a British Naval Officer from the Deck of a British Cruiser, on August 28.
"Mainz," Riddled by Shells, Was a Smoking Mass of Twisted Wreckage, with
After the Photograph was Made the "Mainz" Sank



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One of the Wrecked Guns Abandoned by the Germans at Molle

When the First Advance of the Germans toward Paris was Checked, Much Difficulty was Experienced in Moving the Field Guns across Country. Soldiers Often Had to Aid the Horses in Plowed Ground



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French Soldiers Building a Pontoon Bridge over the Marne at Lagny, to Replace a Structure the Retreating Germans had Destroyed

COMMENT AND REVIEW

[This section of the magazine was printed October 24th.]

THERE is no doubt we had become very extravagant. The fault is not confined to any geographical section, nor to any particular occupation or profession. East and West, North and South; the banker and the blacksmith; the high-salaried and the day laborer, have all breathed the air of prosperity so long as to become more careless of the future than is good for us. The disarrangement of the normal financial conditions in our own land by reason of the war has suddenly brought people to a realization of the fact that springs which have been unfailing for years can, under circumstances, diminish or even go dry. It should do us good to take notice and get back somewhat to our former and more prudent manner of life.

*When
Not to
Save*

On the other hand, the natural tendency is always for the pendulum which has swung too far in one direction to go to the other extreme in its return. To shut off all purchases entirely, on the part of thousands of people who really can well afford to spend, is a grave mistake. It only adds to the number of unemployed and increases a condition of stagnation which, in its first stages, is harmful, and later must inevitably become serious. Those accustomed to expend more or less on luxuries should curtail in such directions and use the money—or a part at least—in the employment of labor. Repairs to buildings, inside and out; contemplated improvements of grounds, and the thousand and one things that ordinarily would have been done now, or even a few months or a year later, can be made without delay, and thus relieve the present situation. A little by each one who can well afford it will in the aggregate go a long way to relieve anxiety and distress which otherwise must result, and is infinitely better than the same amount contributed to charity. The American workman doesn't want charity; he wants a job. What we must do is to help one another tide over the present emergency, for the indications are that better days are not far distant.



MOTHER Nature was generous to this country in the harvests of 1914, and our elevators and granaries are filled to overflowing. Under normal conditions of supply and demand this crop was worth about nine billion dollars. With Europe at war and ten million men producing absolutely nothing and consuming abnormally, the home supply becomes more than ordinarily insufficient, and a national vacuum where food should be is no less irresistible than the physical vacuum which a cyclone hastens to fill. It is presumable that a certain surplus of food has been stored against the drain of war, but even surpluses cannot last long. Already food values have had a big advance and our 1914 crops are now worth upward of three billion dollars more than the same crops brought one year ago. There may or may not be a still further

*Big Crops
and
Big Prices*

advance in value, but we have actually in sight at this moment a net profit of three billion dollars in addition to the ordinary profits of production.

The corn, and oats, and hay, and all the other products of the farm, even cotton—which is temporarily not salable—are as so much accumulated wealth. Already the movement of the crops has begun and money is being spread over the land like a gigantic blanket. This money will soon commence to flow toward manufacturing centers and the wheels of industry will be whirling once more. Signs point to a period of great prosperity for these United States in the immediate future.

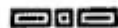


THE "Buy-a-Bale" was a brilliant and, so far as it can be worked, a practical method of helping the southern planter over a time of distress. The need of help is large because the cotton crop this

*Buy a
Bale*

year was a bumper one, and, perpetuating the practice of ante-bellum days, cotton has always been largely a credit crop. Many planters of the South begin to borrow on their next cotton crop when they buy the seed to plant it, and continue to borrow at the progressive intervals of raising, picking, ginning, and baling. What in the latter part of July promised easy times in the cotton belt suddenly, on August 1st, became a big proposition to finance. Cotton can be stored with less expense and suffers probably less depreciation than any other soil-raised product. It will keep and it will be needed, but temporarily it is like money in a bank which can't be drawn out—perfectly safe, but not spendable. Individuals and syndicates may well—and, if properly managed, profitably—buy and hold cotton against the time when foreign mills resume.

In the meantime it will be necessary to greatly reduce the cotton acreage next year and plant other crops. This should not be an unmixed evil, and may possibly serve to break down that old tradition that to raise cotton is more genteel than to grow grains and vegetables. When the "planter" finds how much wider is the range of crops and markets, he should not regret having turned "farmer."



IN this war, for the first time, the submarine has justified the hopes of its inventor, who died only a short time before war was declared. Up to the present war the submarine had not positively

*New
Machinery
of War*

scored a single victory. It had cost many lives, but they were of its own crews. If the average efficiency already achieved shall be carried out in the great fleets of submarines yet in reserve, the policy of navies may have to be revised. The aeroplane also has proved its value and necessity, and has already met expectations. At this writing the dirigibles have accomplished

practically nothing. A few bombs have been dropped here and there, blowing up cathedrals, hospitals, and private houses, and killing a few women and children, but with one exception having caused no particular damage to either navy or army. What opportunities the dark, foggy days of November and December will afford, may change conditions materially, but thus far the dirigible is more a threat than an execution. The big siege guns are really only enlargements and developments of artillery used for years.

The motor vehicle is something to credit with great performances and is used for the first time on a large scale. Every type of motor car seems to find a wide field of usefulness. The city motor bus for moving infantry rapidly, transfers small bodies of troops as far in an hour as they could march in a day, and delivers the men fresh for action. The armored car has given a good account of itself for scouting; the touring car, for officer's work and dispatches; while for transporting supplies and for ambulance service, cars similar to those in general use have made good everywhere. For hauling heavy guns, the motor is vastly easier to manage than horses or mules. It is true this war is being waged in countries noted for their good roads, but the efficiency, capacity, and rapidity of the motor vehicle of war has demonstrated abundantly the tremendous advantage accruing to the army so equipped over one that is dependent wholly on animals for transportation.



THINGS have moved along so smoothly for years that few of us have realized how many important links in our industrial chain were held abroad. We have moved along the path of least resistance

*Mending
Our
Fences*

with apparently little concern as to a possible failure of supply of many essential parts in our manufacturing scheme. The war has suddenly opened our eyes to the fact that important processes in our own mills were wholly dependent on the continuous supply of certain chemicals, for instance, which either are not made at all here, or only in inferior grade or insufficient quantities. It is anything but creditable that we should have so long complacently bought abroad with little or no thought of eventualities. Now we suddenly face the predicament of certain large mills shutting down, with thousands of employes thrown out of work, just for want of necessary dyes. Either on account of some prejudice in favor of the foreign goods, or because the price or quality was somewhat better, it is a fact that comparatively little encouragement has been given our home chemical products. We are told, however, that our own natural resources will provide nearly all the raw materials for making these chemicals here, but chemical works are costly and cannot be built in a day. While it is not good for a nation to hope to be so self-contained it need buy nothing abroad, the other extreme of absolutely no production at home is also bad. If we are wise, present conditions will not again be possible.

IN this connection it is well for our young men casting about for their opportunity to consider what industrial chemistry has to offer. For some years certain large corporations have been establishing their own laboratories with a view to discover less expensive methods of manufacture, and improved quality, or increased production. What was a few years ago considered an extravagance justified only by such large undertakings as the Steel Company is now realized as a profitable investment in all lines of manufacturing. Many a concern has been surprised to discover that an expenditure of \$5,000 for a chemist has made a saving of \$50,000 for the owners. Processes which were failures have been turned into rich profits by the work of the industrial chemist. For a young man with a willingness to work hard and possessed of good initiative and executive ability, few lines of usefulness offer better returns today than this. Our state universities have been quick to recognize this demand and are enlarging and improving their courses in chemistry. The bright, capable graduates in this new field are in demand, and by very reason of the fact that the knowledge is not to be acquired in a few months, but requires several years of hard study, the profession is not likely to be overdone for some years to come. The position is one of trust as well as efficiency, the salaries paid are attractive, and the ever-present possibility of some specially valuable discovery which will bring the finder a fortune unites to make the work fascinating to a young man of ambition.

*Industrial
Chemistry
Attractive*



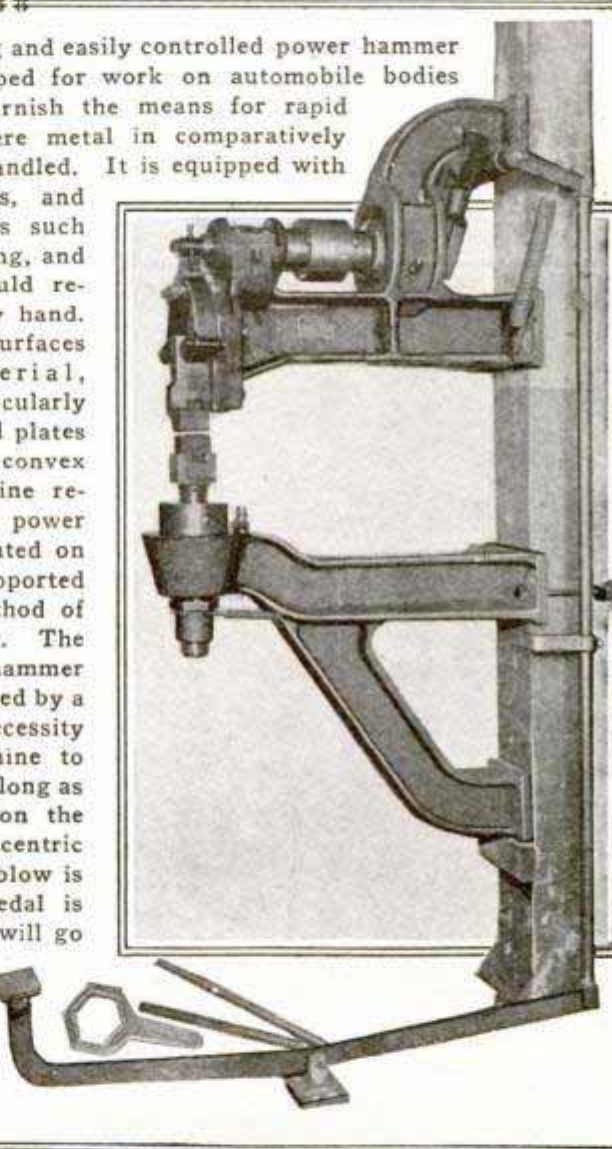
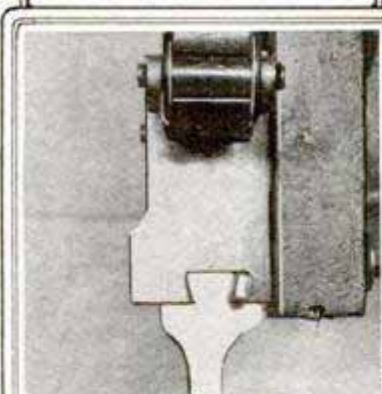
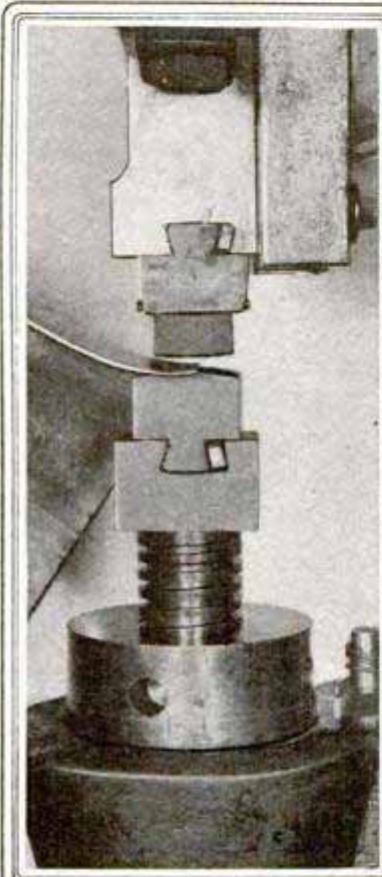
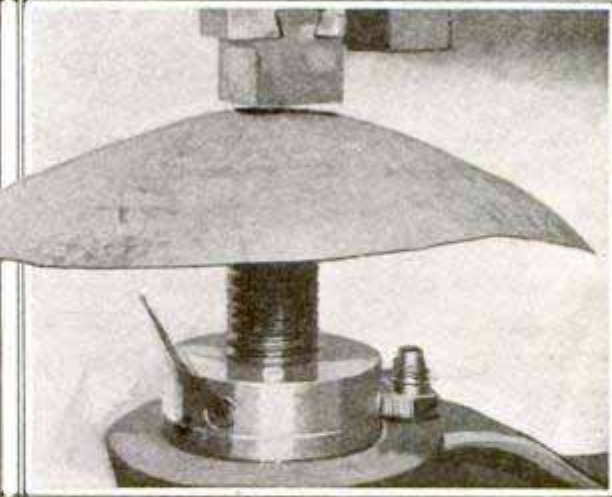
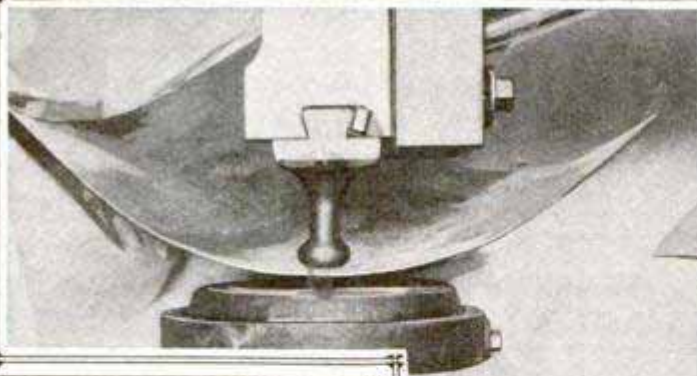
THE year now drawing to a close was full of promise of many things which have been laid aside or hidden beneath the black cloud of war. Among them all none was more attractive than the plan to cross the Atlantic Ocean in an airship. On both sides of the Atlantic large sums of money were spent, and many trained minds were working on the problem. That the crossing will be made some day, there is little doubt; that ultimately the journey will be accomplished with the same precision as by our present ocean liners is also probable. However, the prediction made in these pages early in the year that 1914 would not be the historical year of ocean mastery has come true, and there are some who will view the first crossing with less enthusiasm and satisfaction now than six months ago. The air is so much vaster than the ocean and correspondingly harder to patrol, that our feeling of security will in no measure be increased when a fleet of airships can leave the other side and hover overhead between two sunsets.

*Neptune
Not
Subdued*

H. H. WINDSOR

October 20, 1914.

POWER HAMMER FOR RAPID METAL WORKING



THIS quick-working and easily controlled power hammer has been developed for work on automobile bodies and seems to furnish the means for rapid working generally where metal in comparatively small pieces is to be handled. It is equipped with interchangeable dies, and does in a few minutes such work as fluting, bending, and straightening that would require hours if done by hand. Some of the dies have surfaces made of resilient material, which makes them particularly suited to bending metal plates and forming them to convex shapes. This machine resembles the ordinary power hammer in being mounted on brackets which are supported on a post, but the method of control is entirely new. The pintle which jigs the hammer up and down is controlled by a pedal, and there is no necessity for stopping the machine to make adjustments. So long as there is no pressure on the pedal the pintle is concentric with the shaft, and no blow is struck. When the pedal is thrust down as far as it will go the maximum blow is struck, while any degree of stroke can be readily obtained by varying the position of the pedal.

SPEED IN BUILDING STEEL AND WOODEN WARSHIPS

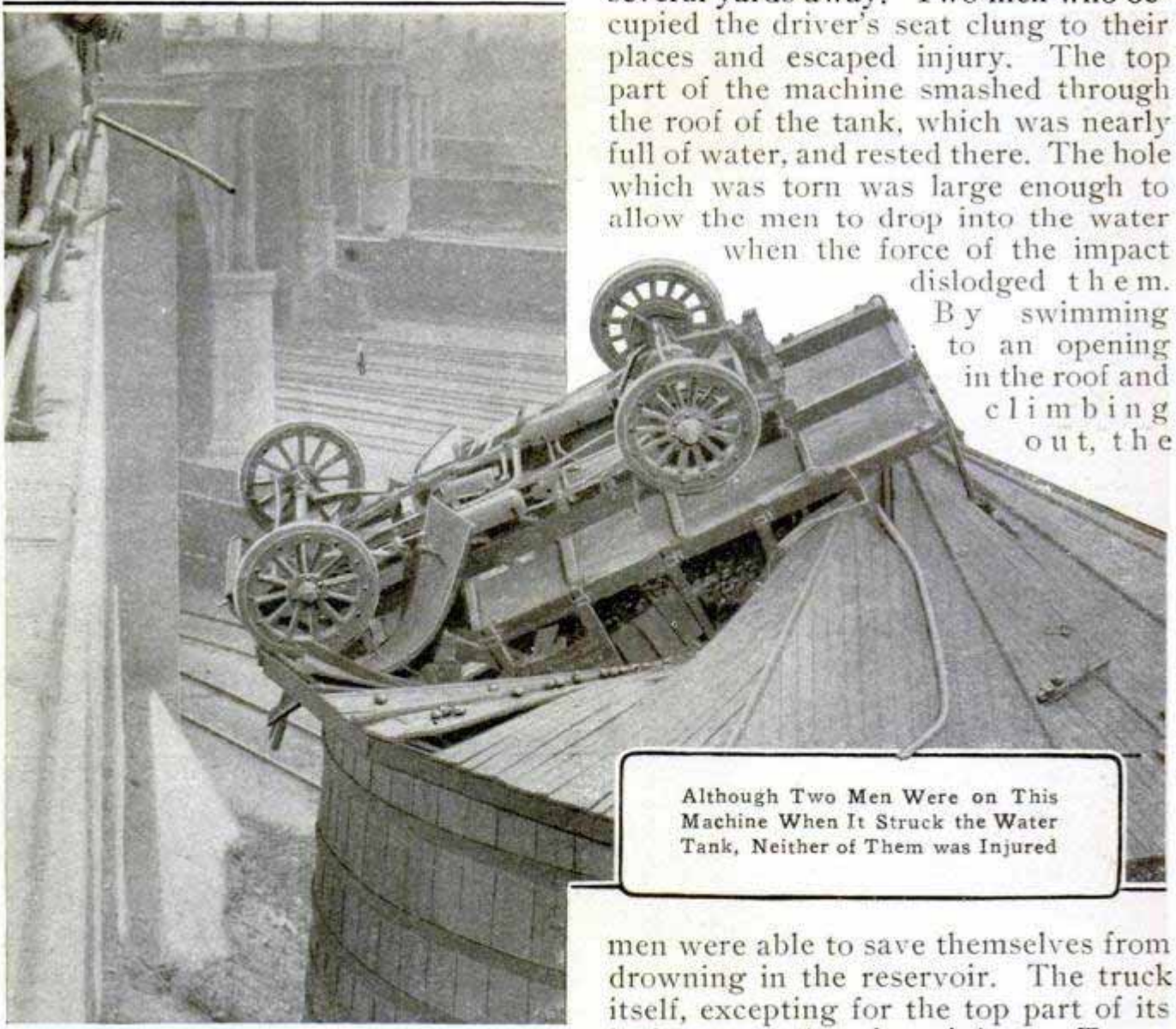
Both England and Germany are making strenuous efforts to increase the power of their navies by building new battleships for service in the present war. It is estimated that by the employment of every possible means for obtaining speed in construction, the building of such ships will take a year. The time required for building warships when the American colonies were fighting for their independence furnishes an interesting contrast with this. The Canadian ship "Inflexible" was built, rigged and equipped, and had gone out and met and defeated one of the American ships in five

days after the keel was laid the ship was launched, and on the evening of the following day the "Inflexible" sailed, fully manned, victualled, and equipped for service. While the ship was building, it was not an uncommon thing that trees, which were growing at dawn, were completely installed as parts of the ship before night.

SERIOUS-LOOKING ACCIDENT ENDS WITH SMALL INJURY

While crossing a Los Angeles, Cal., viaduct, a motor truck, heavily loaded with tomatoes, skidded, crashed through the side railing, somersaulted through the air, and landed upside down on the top of a large water tank several yards away. Two men who occupied the driver's seat clung to their places and escaped injury. The top part of the machine smashed through the roof of the tank, which was nearly full of water, and rested there. The hole which was torn was large enough to allow the men to drop into the water when the force of the impact dislodged them.

By swimming to an opening in the roof and climbing out, the



Although Two Men Were on This Machine When It Struck the Water Tank, Neither of Them was Injured

weeks and three days from the time construction began. Twenty-eight

men were able to save themselves from drowning in the reservoir. The truck itself, excepting for the top part of its body, escaped serious injury. To remove it, however, it was necessary to take it apart.

FISHING THROUGH LAKE ERIE'S ICE IS LIKE A TASTE OF ARCTIC EXPLORATION

With Dog-Drawn Sledges the Sturdy Fishermen
Ply Their Winter Trade, Often at the Risk of Life

By ROY C. DOWNER

FEW and far between are the winters that do not provide an opportunity to fish through the ice of Lake Erie. As soon as a period of still, cold weather has formed a thick enough covering to warrant the venture, scores of men with dog sledges, and other equipment suggestive of polar exploration; open the winter fishing season. To these bold, hardy men who push their way out across the uneven ice a dozen or so miles from the shore line, ice fishing is not a sport, however, but a matter of breadwinning.

While none wears a fur-lined coat, all dress as warmly as sweaters and plain heavy clothing can keep them. The equipment and supplies carried on these trips consist principally of dogs, sleighs, poles to anchor the windbreaks, fishing lines, a supply of minnows for bait, a crowbar for an alpenstock and to dig holes in the ice, a ladle with which to remove floating ice from the fishing holes, and sticks for the "tip-ups." Out from Buffalo, where this method of fishing is a recognized occupation, sometimes as many as 100 men push their way to the fishing grounds in a single day. No man ever goes alone; sometimes there are two together, while at other times as many as a dozen may be seen wending their way, single file, over the rough field of snow and ice.

There are two routes to the fishing grounds, one shorter than the other, each offering its difficulties. The more direct trail leads straight up the lake a half mile from shore, and crosses the breakwater, which is always buried by a hill of rough, jagged cakes of ice. It is a laborious task to work over this, but it consumes less time than is required in following the path leading through the gap in the wall, which is the one taken by those who accompany the dog sleds.

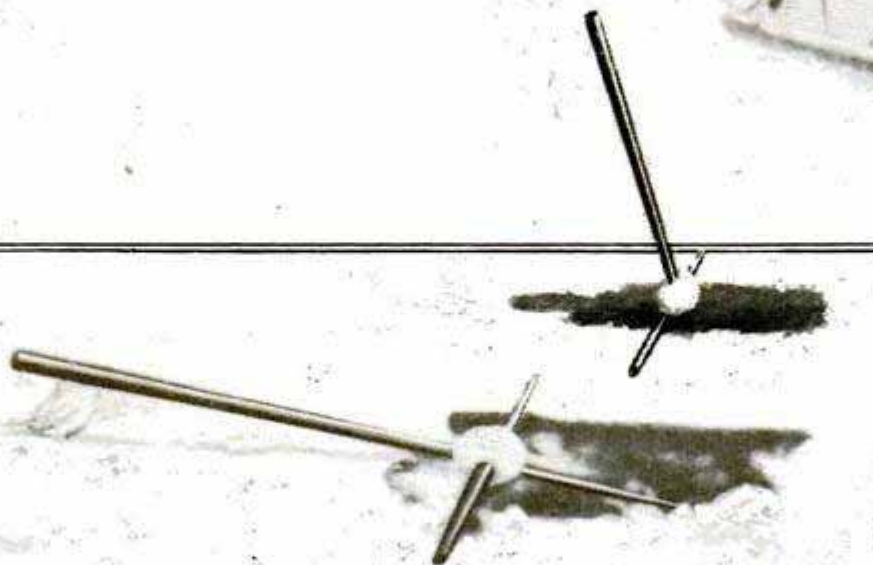
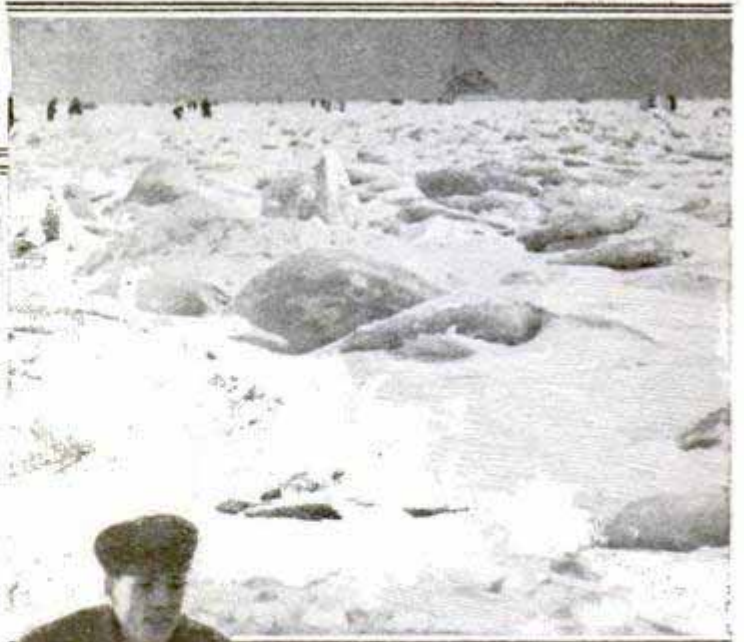
Arriving at the fishing ground, the

men choose their posts and set to work cutting holes through the ice, which may be from 10 to 20 in. in thickness. The law, which prohibits the use of nets, permits each fisherman to employ five lines. A separate hole is cut for each of these, while a stick, frozen in place by throwing snow and water over it, is set across the middle of each of the openings thus made. Another, and somewhat longer stick is then fastened to the end of the fishing line and in turn bound to the first one, forming a cross. When a fish grabs a hook and pulls upon the line the resulting jerk throws this second stick from a horizontal to a vertical position, attracting the attention of the fisherman. This apparatus is known as a "tip-up," and when one man has five of them to watch it is necessary for him to be attentive to business. After the holes have been cut and the lines dropped into the water, the men turn their attention to the matter of personal comfort. The first step in this direction entails cutting two or more small holes in the ice from 8 to 10 ft. apart. Poles are frozen into position in these, and canvas or carpet stretched across them to form a shelter from the wind. Long before this, the dogs have curled themselves up in the sleigh, and a fire has been kindled, so that unless the weather is exceptionally cold the camp is comparatively comfortable.

Regardless of how luck is running, care is taken not to stay out too long. It is the aim of the fishermen to be close ashore by the time darkness sets in, which means that a start must be made by 4:30 o'clock in the afternoon, unless a sudden drop in temperature compels breaking camp earlier. The lines are hauled in, the "tip-up" sticks removed, and the windbreak taken down with the exception of the poles, which are left standing for the following day. All the equipment, together

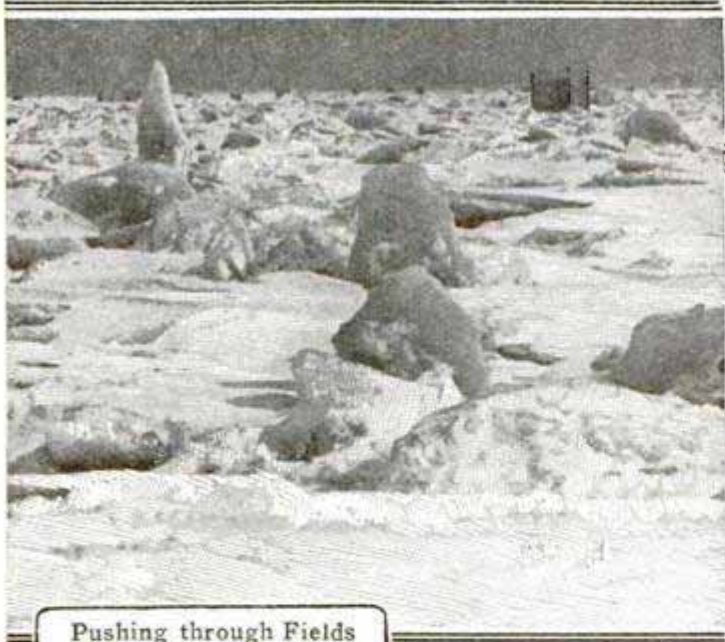
SCENES IN THE JAGGED ICE FIELDS OF LAKE ERIE,

Catching Two
Fish at One
Time: A Matter
Which Requires
Attention



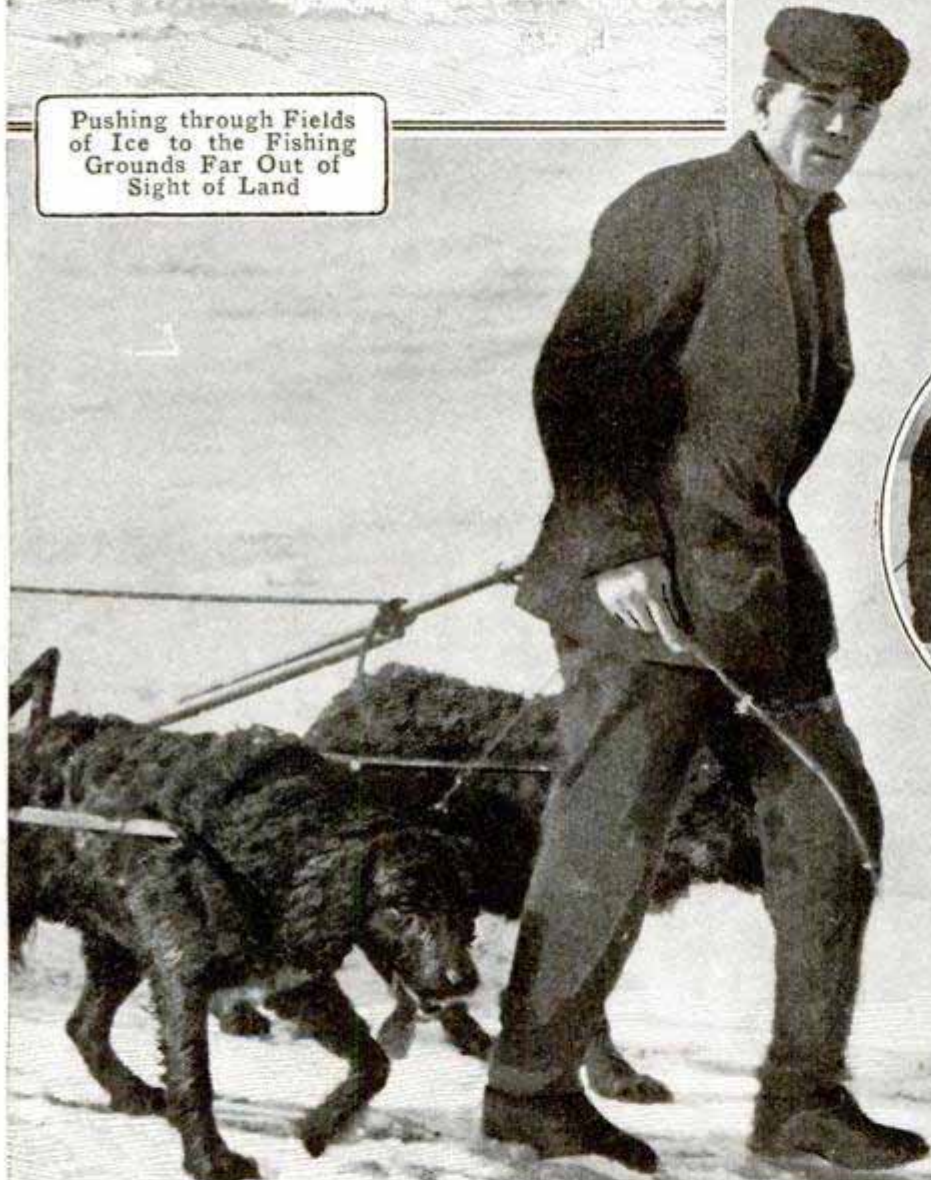
Above: A Typical Group of
and Hard Work. At the Shore
Purchase Their Catch. Left:
Position It Is a Signal

WHERE WINTER FISHING IS A TRADE, NOT A SPORT



Pushing through Fields of Ice to the Fishing Grounds Far Out of Sight of Land

Landing a Catch Just in Time to Turn to the Second "Tip-Up"



Fishermen Homeward Bound After a Day of Exposure Line They are Met by Buyers from the Markets Who When One of the "Tip-Ups" is Thrown to a Vertical That a Fish has Taken the Hook

with the "catch," is then packed in the sleighs and the homeward journey begun. If a fisherman spends six hours watching his "tip-ups" and succeeds in landing one fish each hour, he considers himself in fair luck. For the most part blue and yellow pike, and whitefish are caught, and disposed of without trouble. Frequently buyers, representing city fish markets, wait at the shore for the fishermen to return from the ice. The average price paid is about 17 cents a pound.

Fishing through the ice of Lake Erie is not all picturesqueness and profit. It means discomfort most of the time, peril not infrequently, frozen ears and noses often, and even death sometimes. A few days of sun and wind will wear out and soften the ice, and men who go out to the fishing grounds in apparent security in the morning, sometimes have to make swift dashes homeward a few hours later, breaking through the ice now and then, and win-

ning land by the merest smile of fortune. A stiff breeze and a bright, sunny day often will part the ice utterly without warning, so that a man may suddenly discover to his consternation that there is a wide sheet of deep, blue water between him and land. Sometimes such men get across the gap by waiting for an opportunity and then making a good leap; at other times the wind jams the floating blocks together, and still again, not infrequently, some one is missing at nightfall. There are instances of men who have been rescued from the floes, and also of those who have not been found. During the latter part of the season, men are sometimes caught in this manner and forced to wait the coming of dawn before they can be rescued, spending the night in imminent peril. Yet each year, when the ice is right, the little parties of fishermen venture out, establish shelters, and return to them day after day as long as the weather permits.

CRANBERRY PICKER PUSHED LIKE LAWN MOWER

A machine for harvesting cranberries, which it is claimed neither crushes



the fruit nor injures the plants, has been invented by a Massachusetts agriculturist. From the side the appearance of the device is not unlike that of

an enlarged lawn mower, while it is operated in a similar manner. It is supplied with a set of teeth which engage in the vines and pull off the berries. As these fall they are caught by revolving vanes which throw them into a conveyor that carries them into a hopper. This may be removed from the machine as it is filled. The apparatus is of simple construction and operates as rapidly as it is pushed.

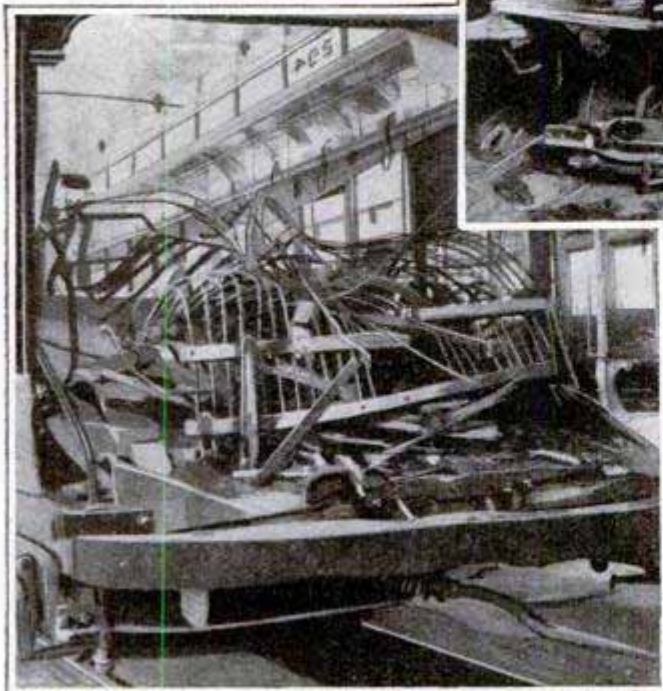
USE CROSSBOW TO TEACH RIFLE SHOOTING

A new crossbow having a rifle stock, trigger and gun sight has been invented in Japan for the purpose of teaching the principles of rifle shooting, the idea being that it is not necessary for people to handle real guns in order to learn how to shoot. This weapon shoots an arrow of Japanese type. The invention was suggested by the fact that during the Boxer revolution in China hundreds of guns were laid aside as useless because many Japanese knew nothing about

guns, which led to the effort to provide a convenient and inexpensive equivalent for rifle practice.

TWO STREET CARS WRECKED IN HEAD-ON COLLISION

Because of an error made in reading signal lights at night, two street cars crashed together in a head-on collision at Westport, Conn., some time ago, resulting in the death of four persons and the injury of a large number of others. The accident, which was an unusual one for trolley cars, nearly demolished the lighter of the two, which was filled with a crowd of picnickers, many of whom were children. The other car was heavily loaded with freight, which no doubt was responsible for the seriousness of the collision. When the two carriers came together, the front end of the picnic car was knocked completely in, even the fender being hurled back into the passenger compartment. The freight car suffered almost as badly, most of its platform being smashed off and its front trucks injured.



The Picnic Car Shortly After the Collision

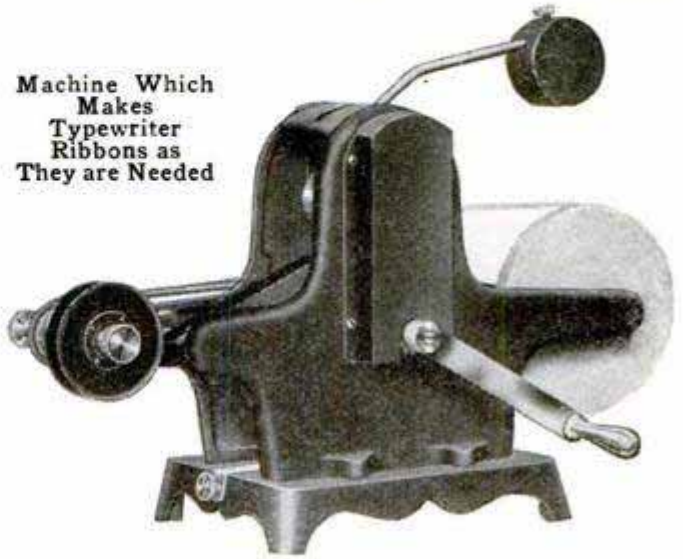


Effect of the Impact upon the Heavy Freight Car

MACHINE MAKES RIBBONS FOR TYPEWRITERS

Intended for the use of companies which employ a large number of add-

Machine Which
Makes
Typewriter
Ribbons as
They are Needed



ing machines or typewriters, a new machine that makes inked ribbons at a minimum cost and in a few minutes as they are needed, has been produced. The device is simple and may be operated by anyone, a few turns of a crank producing a spool of ribbon for use in any kind of machine. At one end it carries a roll of unstamped fabric which threads through guide plates and passes between inking and pressing cylinders. The ink is rolled into the ribbon, and that which is not needed removed from it by pressure. The reel at the opposite end of the machine on which the finished ribbon is wound, may be the standard spool for any make of typewriter, so that the ribbon is ready for use without being transferred to another spool.

One million toothpicks were held up at San Francisco because each was not stamped with the word "Japan" in accordance with the law requiring articles to be stamped with the name of the country from which they are imported.

NOVEL VEHICLE PROPELLED BY LITTLE FEET

A novel vehicle designed for the use of children is intended to take the place of the pushmobile. This vehicle is made with a sloping body on which is mounted an endless tread belt consisting of wooden slats fastened together by steel links. The belt works over sprockets which drive the rear wheels through gearing, and in this way the weight of a child as it



This Vehicle is Propelled by the Weight of the Child as It Walks on the Endless Tread Belt

walks on the belt is sufficient for propelling the vehicle. The vehicle is steered by handle bars that control the front wheel and is capable of making 12 miles an hour on smooth pavements or sidewalks.

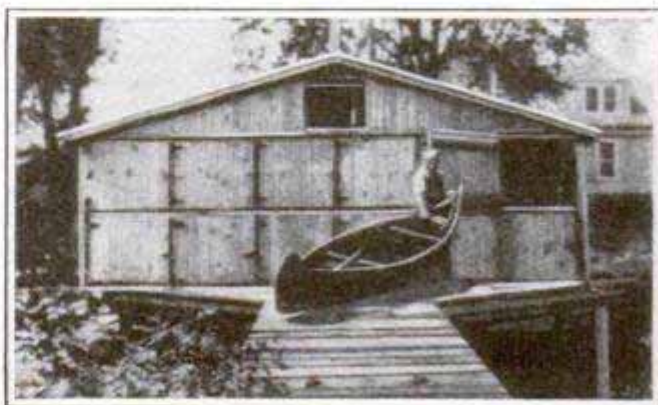
PUMPS FOR EMPTYING THE PANAMA CANAL LOCKS

For completely emptying the lock chambers of the Panama Canal when cleaning or repairing is to be done, an operation that is not accomplished by the regular operating equipment, a floating pumping plant has been built to serve as an auxiliary to the pumping system of the floating caisson dams. An old iron barge, 125 ft. long and 25 ft. wide, and drawing about 4 ft. of water, has been pressed into service as

the pontoon on which to mount the pumping system. When a chamber is to be pumped out, this outfit will be towed inside and moored alongside the lower gate and at the completion of the process will rest on the floor of the lock chamber. The outlet pipes consist of vertical standpipes, 60 ft. high, a height that permits the discharge of the water over the lock gate when the barge is at the lowest level. Electric power for pumping is transmitted to the barge through flexible cables leading from the lock walls.

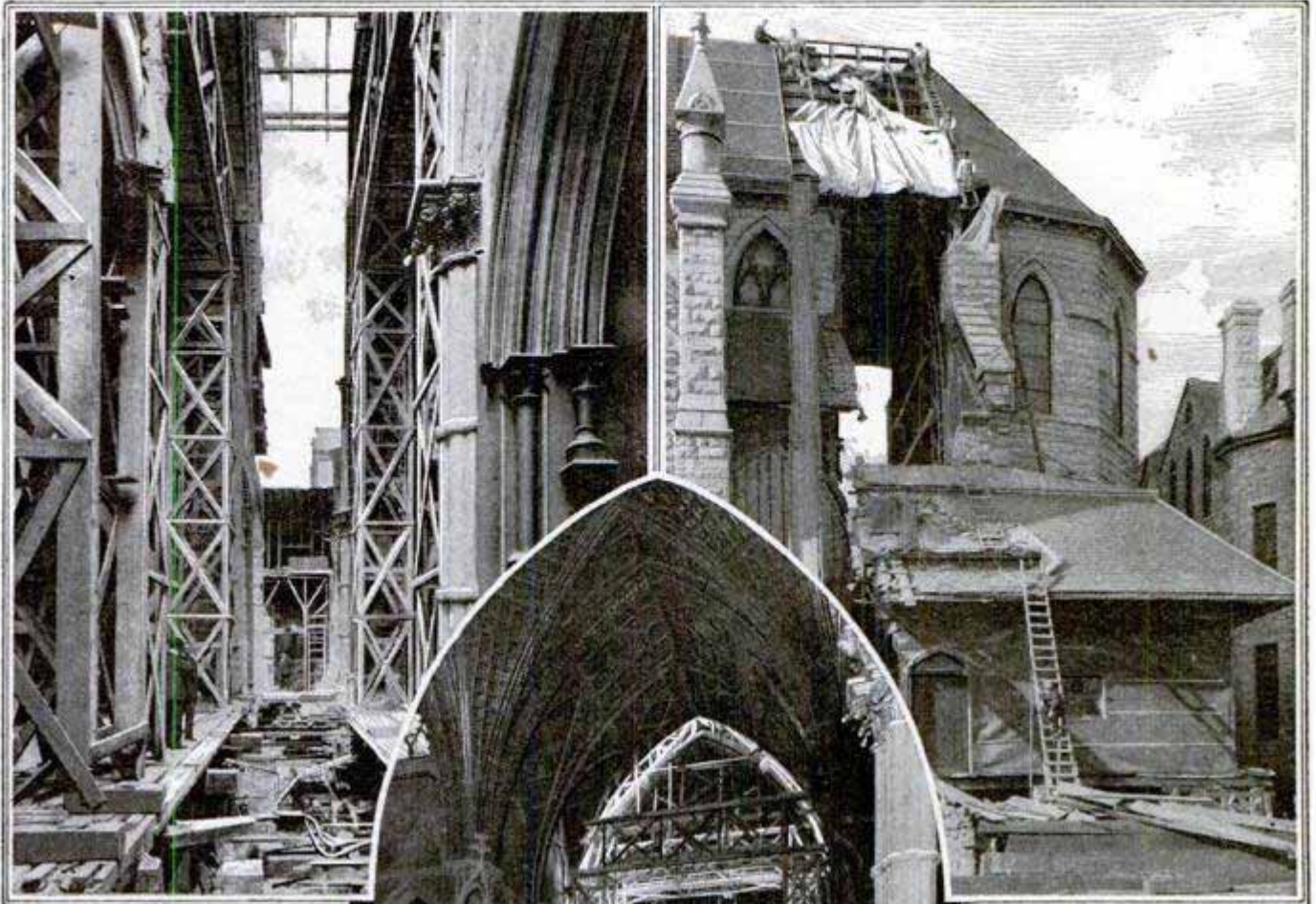
CANOE HOUSE HAS LOCKER FOR EACH CANOE

The type of canoe house having an individual compartment or locker for each canoe is becoming popular in many parts of the country. With this arrangement the owner of a canoe carries a key that will unlock his own compartment and that compartment only, and in this way is assured that neither the canoe nor its equipment will be disturbed by others. In the house illustrated there are 12 compartments arranged in two rows of six each, one row being placed above the other. Rollers are placed in each compartment, on the platform, and on the incline that leads to the edge of the water. The canoes are carried up and down on these rollers, and there is never any necessity for lifting more than one end of a canoe at one time. This style of boathouse was developed on the Charles River, near Boston.



Canoe House with an Individual Locker for Each Canoe: The Canoes are Easily Handled In and Out over the Rollers

CATHEDRAL LENGTHENED BY NOVEL METHOD



View through 14-Foot Space Made by Moving Rear End of Structure

Rear Section of Church Moved and New Roof Framing in Place

An unusual building operation was carried out successfully when a large stone church building in Chicago was lengthened 14 ft. by moving the rear section back that amount, and filling the space

The Rear End of This Church, Weighing Several Hundred Tons, was Moved Back 14 Feet. The Photograph was Made Just After the Moving was Completed

with a structure exactly like the remainder of the church. The section weighed several hundred tons, and to obtain a firm support in the new location it was necessary to sink nine caissons 93 ft. to bedrock. Heavy rollers supported on steel tracks were placed under the building as the foundation was removed, and on these the structure was forced back by jackscrews to the new position. Twenty men were required to turn the ten jackscrews, which moved the structure at

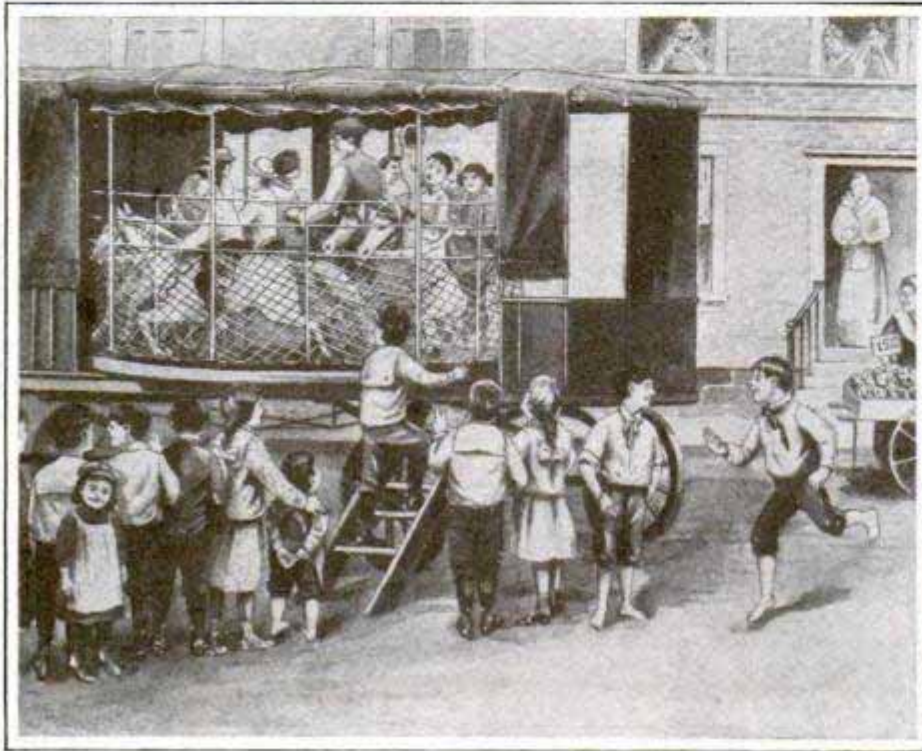
the rate of 1 ft. an hour. On account of the expensive marble and woodwork in the walls and floor, the greatest care was necessary in cutting the building. Two months were required in making the building

ready for moving and placing it on the screws, while the actual moving was finished in two working days. The work cost about \$35,000.

ITINERANT MERRY-GO-ROUND OF NEW YORK'S EAST SIDE

Among the many curious things peculiar to New York City's east-side district is an itinerant merry-go-round which moves through that densely inhabited part, stopping here and there

for a few hours during an afternoon and gathering about it hordes of little urchins who patronize it eagerly when it chances that they possess a penny. The merry-go-round is built on a broad wagon, its circular platform, some 10



The Itinerant Merry-Go-Round, Familiar to Every Child in New York's East Side

ft. in diameter, carrying eight brightly painted wooden animals. Above it, under the roof of the wagon, is a canopy, while around it is a heavy wire netting. In the center of the platform is a tiny but lusty "hurdy-gurdy" which squeaks out somewhat discordantly a repertory of popular airs. The motive power is furnished by the owner who turns by hand a large crank which sends the carriage spinning around. The fare is a cent, and the ride lasts about three minutes.

AEROPLANE "AMERICA" NOW IN WAR SERVICE

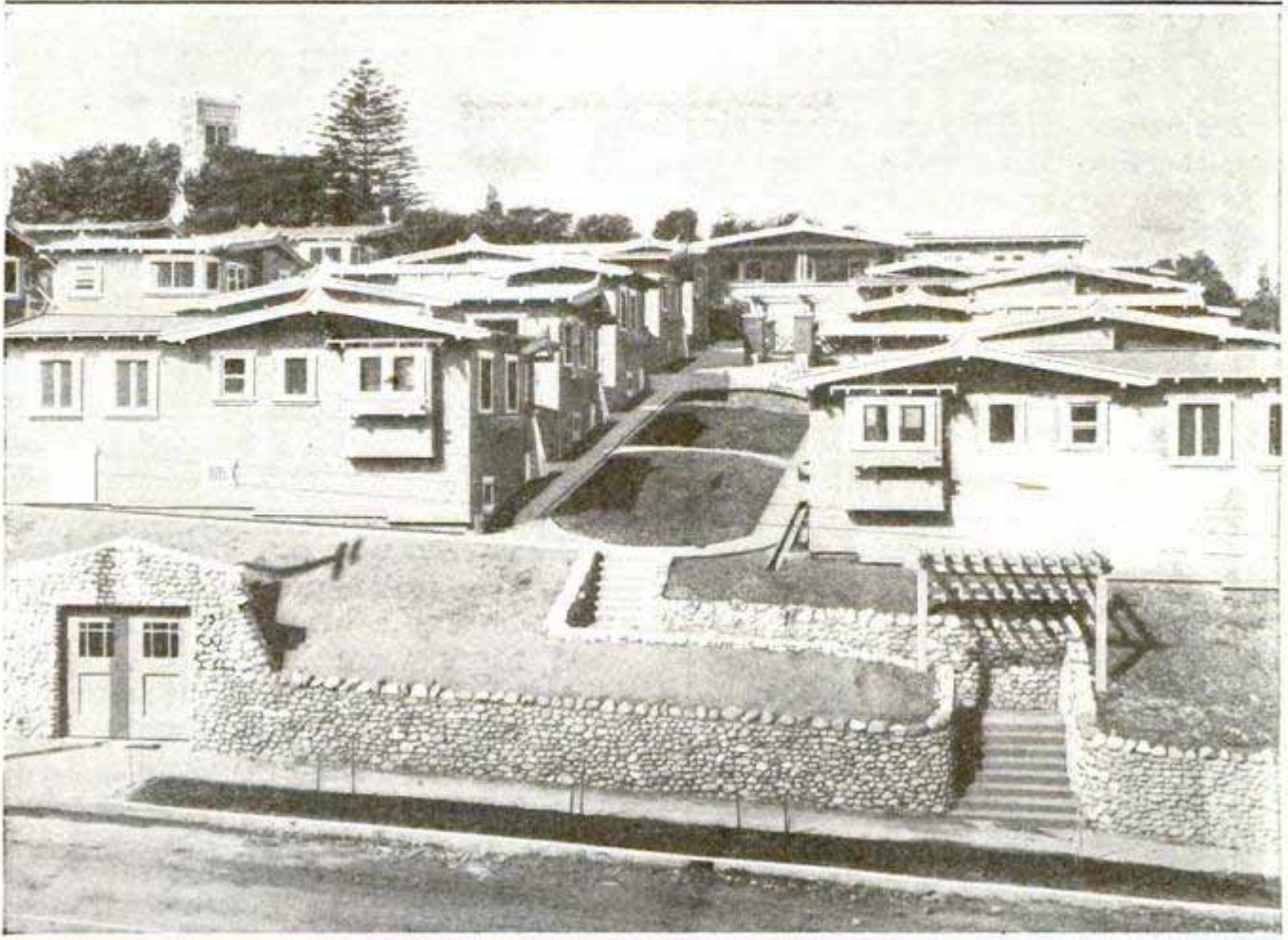
The aeroplane "America," with which the attempt to fly across the Atlantic Ocean was to have been made, has been shipped to England for use in the European war. It is reported that six other aeroplanes have been ordered by the purchaser of the "America" and will be presented to the British government.

NEW SHIP FOR REPAIRING SUBMARINE CABLES

The "Transmitter," a steamship equipped with the most modern machinery for the difficult and delicate work of laying and repairing submarine cables, has recently been placed in service by an English telegraph company. This ship is a trifle over 221 ft. in length, has a beam of 30 ft., and is designed to carry a crew of 55 men. When a cable is to be repaired the electrician first finds the approximate location of the fault by electrical tests made from shore. After marking this point with a buoy and determining the depth and nature of the sea bottom by soundings, the ship proceeds to grapple for the cable.

This is an operation requiring the greatest care, as there is always danger of breaking the cable. The ship takes a position about a mile from the line of the cable, lowers the grapnel and drags it across the cable at a speed of not more than one mile an hour. After the cable has been hooked it is raised to the surface and cut, and the ends are taken on board the ship. Electrical tests then show which way the fault lies and how far it is from the ship. New cable is spliced in to take the place of the defective part and to connect the cut ends, and the repaired cable, as good as new, is lowered carefully to the bottom. The grapnels are kept very clean and are painted gray, as a speck of tar on the grapnel is the best of evidence that the cable has been broken.

☞ To reduce the strain on couplings in long freight trains one railway is trying the plan of placing a locomotive in the middle of the train.



A Bungalow Court in California Equivalent to a 16-Apartment Building: A Novel Feature of This Court Is the Garage, with Entrance Shown at the Left of the Picture, Which was Formed by Tunneling into the Face of the Hill

A DOUBLE BUNGALOW COURT IN LOS ANGELES

The bungalow court is fast becoming one of the characteristic features of life in southern California, where the single bungalow has long been a popular type of residence because of its adaptability to the climate. One of the most attractive of these groups, recently completed in Los Angeles, consists of three rows of bungalows built to inclose two courts. In this group there are 15 single bungalows, and one double bungalow built for two families. Each building is equipped with every modern convenience, including disappearing beds. The court lies on ground that slopes upward from the street, and this feature naturally leads to a terraced effect in the arrangement of the buildings. Among the novel features of this court is the garage, which is entered directly from the street, and which was formed by tunneling into the face of the hill.

AUTOMOBILE HOOD SHAPED LIKE FURNACE

A novel and effective method of using an automobile for advertising purposes is that of shaping the hood to represent the thing advertised. This method is in use in Pittsburgh by a furnace company, which has in service a car in which the usual hood is replaced by one shaped like a hot-air furnace.



☐ An exact model of the famous Japanese religious center "Nikko," with temples, shrines, falls, and avenues represented in scrupulous detail, is to be exhibited at the Panama-Pacific Exposition.

WORLD'S TIME INDICATED ON SINGLE DIAL

A chronometer, indicating on a single dial the time at any city in the world, was recently awarded a patent. The



Odd Clock Which Shows the Time of Every Place in the World

instrument consists of a globe of the earth inclosed in a glass dome, around the circumference of which is an hour-and-minute scale. Half of the characters are in white and the other half black, indicating day and night. The dome is so mounted that it revolves once every 24 hours, so that if it is desired to know the time at Paris, it is only necessary to follow a longitudinal line leading from the position occupied by that city on the globe to the dial. If the figure appears in white, the hour which it represents is that of day. A second dial at the base of the sphere shows the local time, although this could be read on the universal dial.

July 25, 1914, was the centenary of the first run ever made by a railway locomotive.

TESTS OF DURABILITY OF WIRE ROPE

Recent tests to determine the strength and durability of wire ropes show the loss in durability due to the twisting of the wires into strands and ropes. One type of patented cast-steel wire showed a tensile strength of from 247,000 to 255,000 lb. to the square inch. To determine its durability under repeated bending, which is the important thing in the practical use of wire rope, this wire was tested singly; in twisted strands made of six wires with a softer wire as a core, and finally in ropes made up of five of these strands with a hemp core. The wires and ropes were bent over a pulley through an angle of about 90° at the rate of 1,000 turns an hour, a turn meaning the bending from the straight to the curved shape and back again to straight. The single wires stood 198,710 bends, the twisted strands had one or two wires broken after about 45,000 bends, while the five-strand ropes failed under less than 40,000 bends.

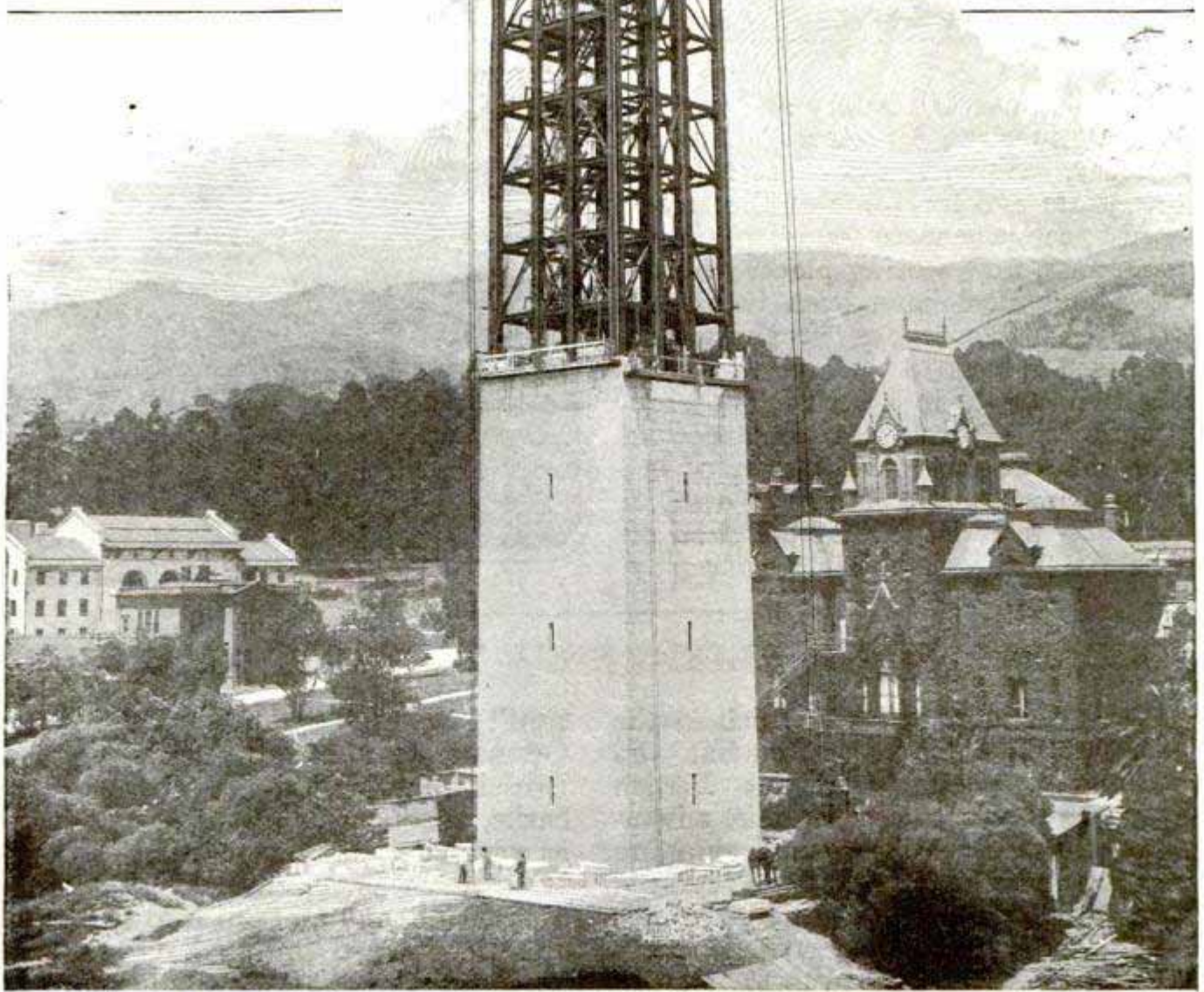
CAMPANILE DESIGNED TO RESIST EARTHQUAKES

A concrete-steel campanile, 302 ft. high, now being built on the campus of the University of California, is remarkable not only for its height but for the fact that it represents a type of structure exceedingly rare in this country. The campanile had its origin in Italy as a bell tower connected with a church but detached from it, and few of the bell towers of this country or of England answer this description. The California structure, known as the "Sather Campanile," in honor of one of the donors to the funds of the university, is said to be the highest memorial tower in the country with the exception of the Washington Monument, at Washington, D. C. It is 30 ft. square at the base, which contains a room large enough to hold banquets in. The belfry is to be faced with an enormous clock which will contain 10

or 12 bells arranged as chimes. These chimes will be played by means of a keyboard much after the fashion of an organ. The top of the campanile is to be of white marble and will be surmounted by a light visible to ships entering the Golden Gate. An elevator will be installed for taking sight-seers to the top.

A remarkable feature about this campanile is the method employed for minimizing the danger from earthquakes. The center of gravity is placed as low as possible and the steel frame has been planned to resist earthquake shocks. In addition to this, the period of vibration of the structure

with reference to that of an earthquake has been carefully planned. It has been found that an earthquake usually has a period of vibration of about one second. In order to neutralize the effect of earthquake vibration and to prevent cumulative swaying, such as would occur if the two periods were the same, and which, if severe enough, might lead to the collapse of the structure, the arrangement of the mass and framing has been planned to give the campanile a period of vibration of about two seconds, thus minimizing a possible danger.



Concrete-Steel Campanile at the University of California: This Campanile Is 302 Feet High and is Ingeniously Planned to Resist Damage from Earthquakes

RELICS OF PASSING RACE CAREFULLY PROTECTED

With the intent of preserving for a thousand years the relics of the rapidly vanishing tribes of North American Indians, every precaution is being taken

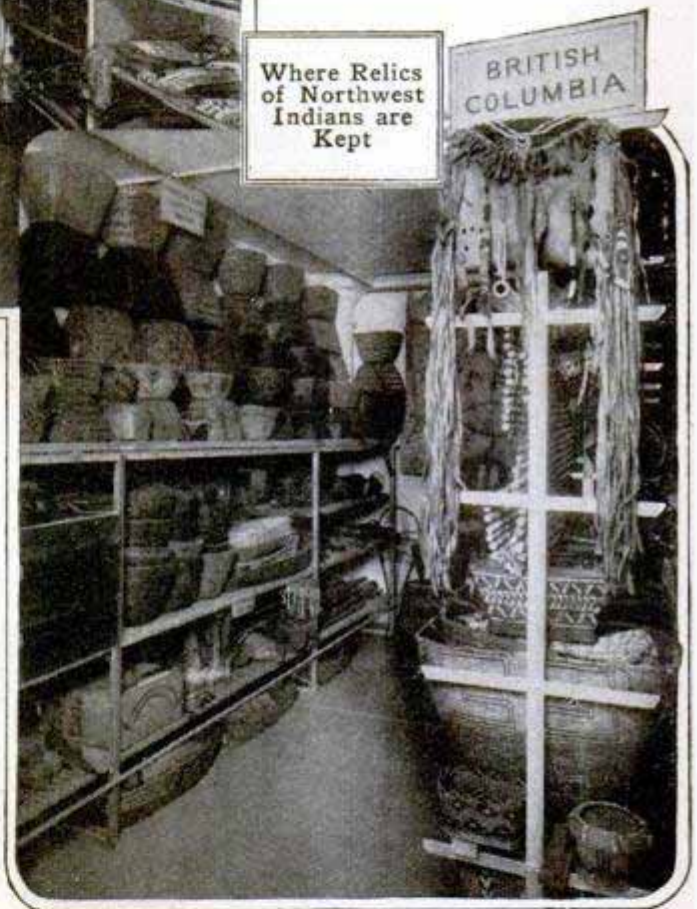
all animal and germ life with cyanide gas with entire safety, for the walls are air-tight and are provided with ventilating systems which, when in operation, will clear the vaults of the poisonous gases within a short time. The specimens, while in storage, are accessible to special students, but it is believed they will be better cared for if not publicly exhibited.



Time-Proof Storage Room for Relics of Plains Indians

Where Relics of Northwest Indians are Kept

BRITISH COLUMBIA



COURTESY AMERICAN MUSEUM OF NATURAL HISTORY

to provide absolutely dry storerooms at the American Museum of Natural History. While vaults constructed a few years ago for some of the treasured specimens were found to gather dampness, new storing places of concrete and steel have been furnished recently. The racks in these are arranged in back-to-back rows extending two stories in height. They are practically of fireproof construction and are safe from the danger of injurious insects and dust. In case of infection through the introduction of new material, it is possible to destroy

"OCEANA" FIRST ALIEN SHIP TO HOIST U. S. FLAG

The "Oceana," a liner which in the past has plied between Canadian and Bermudian ports under the British flag, was the first vessel to take advantage of the recently enacted shipping bill and come under American registry. The total number of foreign ships, hoisting the "stars and stripes" previous to September 25, was 37. All of these, with the exception of the "Bra-

bant" and the "Brindilla," Belgian and German steam-screw vessels, were of British nationality. In the list are barks, schooners and ships, and liners of various types and capacities. The "Oceana" was purchased by a United States company and put into the transatlantic service, sailing between New York and Genoa, Italy. It has a gross tonnage of 7,815 tons, a length of 531

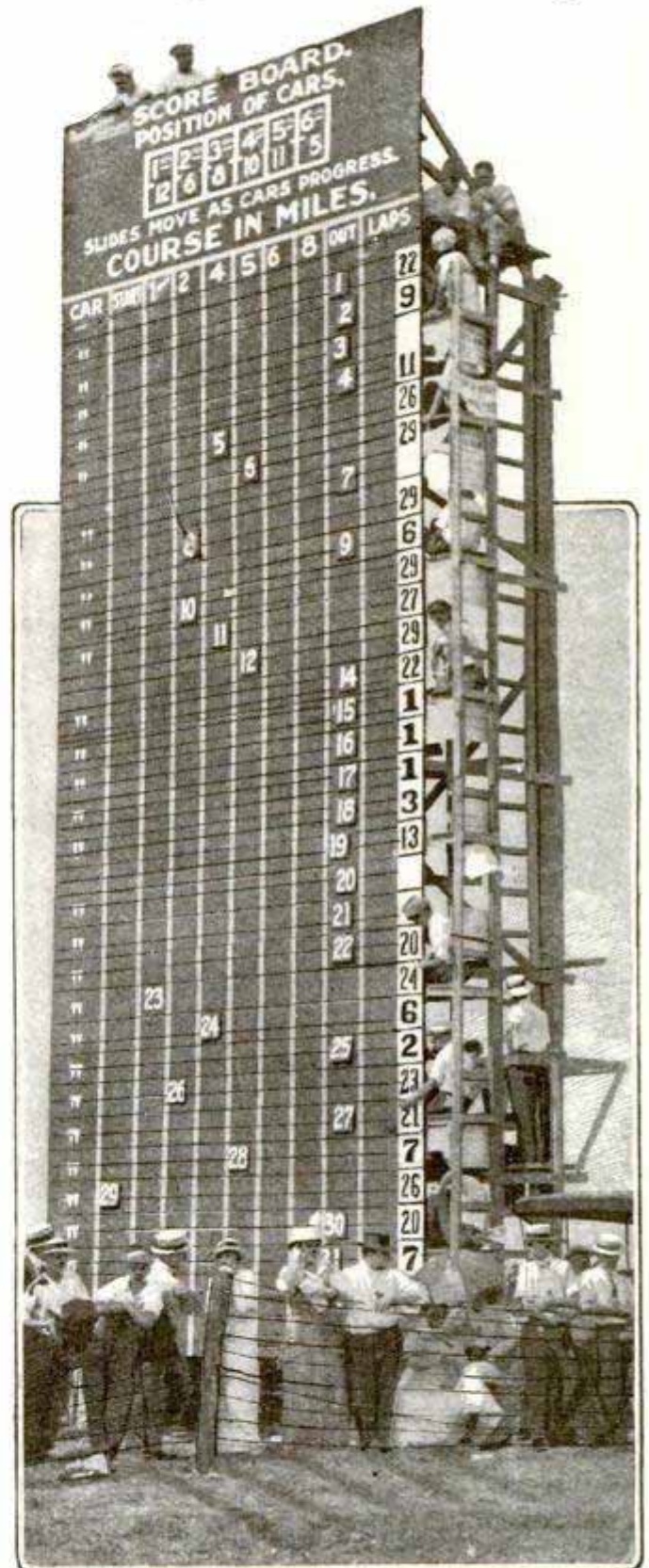
ft., will accommodate 650 first-class cabin passengers, and is fitted with submarine signaling and wireless apparatus.

In view of the present shipping situation it is interesting to note that the merchant ships of the world aggregate 47,000,000 gross tons, of which Great Britain owns 40 per cent; the United States, 11 per cent; Germany, 11 per cent; Norway and France, each five per cent, and Holland, Italy, and Japan, each three per cent. Although this country is second only to the United Kingdom, the majority of its ships are engaged in lake and coast-wise trade, the foreign shipping amounting to only 1,027,000 tons.

AUTOMOBILE RACE SHOWN ON SCORE BOARD

The spectators at a recent automobile race were enabled to follow the progress of the race closely over the eight-mile course and to know at all times the exact position of each car, by means of an ingenious score board carrying movable numbers corresponding to the numbers assigned to the different cars. The board is divided by vertical lines into 10 columns and the numbers, which are arranged in consecutive order vertically, slide across these columns. Until a car starts, the number representing it remains in the column at the left. As soon as the car starts this number is drawn to the next column, at the top of which the word "Start" is marked. Then, as the car advances, the number is drawn across to the successive mile columns. At the completion of the eight-mile course, the number is drawn back to the left and started on the record of the car over the second lap, while the number "1" is displayed in the right-hand column, this column being used for indicating the number of laps that have been completed by each car. The number plates are drawn back and forth by a simple arrangement of cords working along the back of the board. At the top of the

board is another record showing the relative standing of the six cars that are leading in the race. The figures



COURTESY OF MOTOR AGE

This Score Board Enabled Spectators to Follow Every Move in a 300-Mile Automobile Race on an Eight-Mile Track

in this record show how the cars stood at an advanced stage in a 300-mile race on an eight-mile track, the car No. 12 being in the lead.

REPLACE STEPS AT EAST FRONT OF CAPITOL

Weathered and worn by more than 80 years of service, the wide stone steps leading to the east entrance of the Capitol at Washington are to be



The Battered Steps at the East Entrance of the United States Capitol Which are to be Replaced After More Than 80 Years' Service

replaced. The wear on the steps, caused by hundreds of thousands of persons climbing them, has been so great that they have become not only unsightly, but also dangerous in their present chipped and battered condition. It is at the bottom of this flight of steps that the president takes the oath of office every four years. When they were set in place in 1830, the Senate and House wings had not yet been erected, and the old wooden dome was still a part of the structure. For beginning the present improvement congress appropriated \$50,000, but it is expected that at least \$75,000 additional will be necessary to complete it.

It is interesting to note that when the District of Columbia was originally laid out, it was the belief that the ultimate growth would be to the south-east. It was because of this that the main entrance of the Capitol was made to face the east. Contrary to plans, however, the growth took an opposite direction, and years ago necessitated the construction of the west entrance to the Capitol, which since that time has been the one chiefly used.

EUROPEAN AERONAUTICAL LABORATORIES

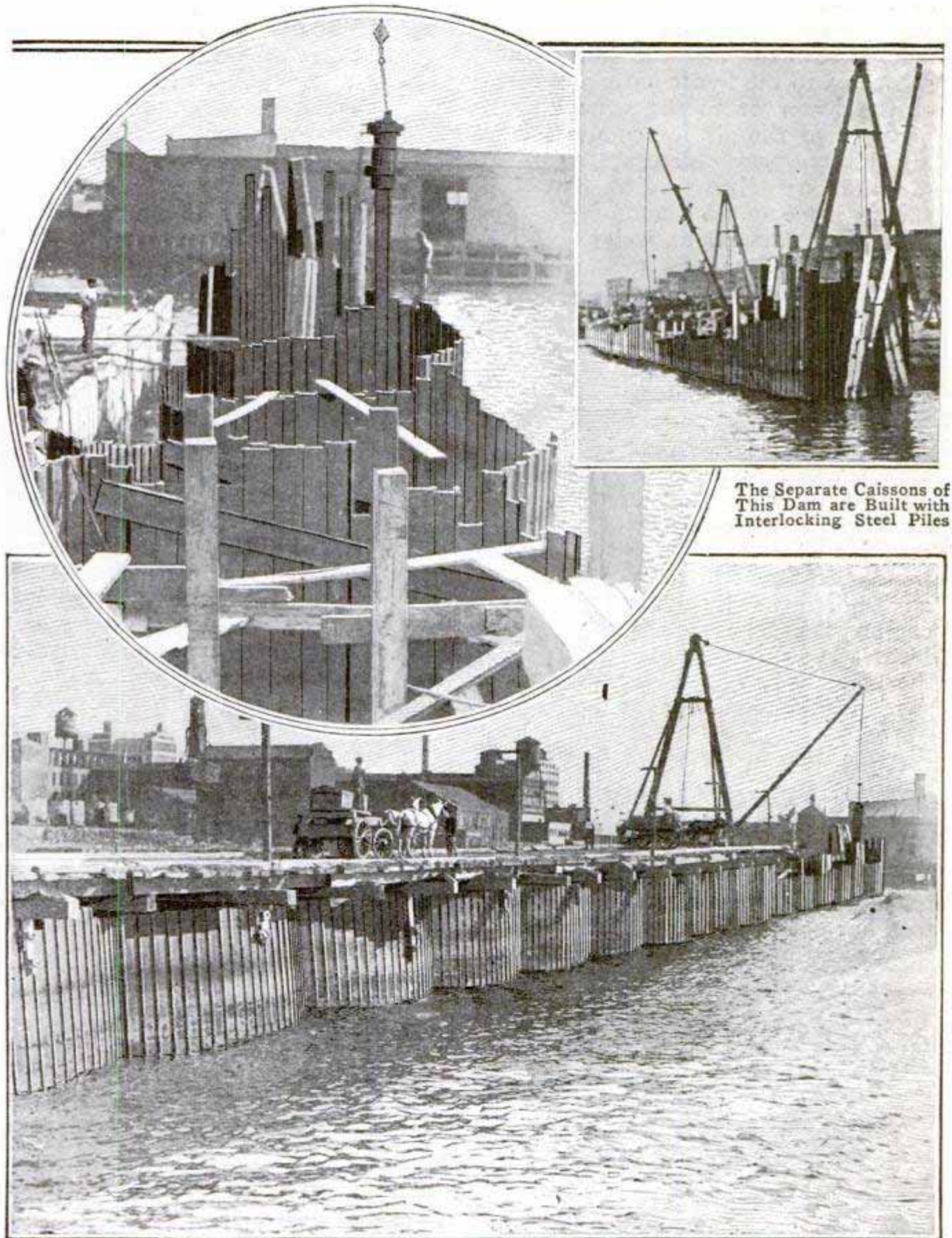
There are now six great laboratories in Europe devoted to investigations of the problems of flight and flying craft. The oldest of these is in Russia, at Koutchino. The next in point of age is a private institution in Paris, where researches of the greatest value have been carried out. In addition to this, there is another important laboratory in Paris controlled by the University of Paris. At Rome there is a laboratory belonging to the Italian Aviation Corps, while the National Physical Laboratory at Teddington, England, includes a well-equipped aeronautical section. In Germany there is a laboratory where much important work has been done, operated in connection with the University of Goettingen.

HOLDING BACK THE HUDSON WITH COFFERDAM

One of the greatest single pieces of cofferdam work ever undertaken in this country is now in the course of construction in New York Harbor, where the Hudson River is being dammed preliminary to the building of three 1,050-ft. steamship piers for the accommodation of the largest liners afloat. The dam is being extended between Forty-Fourth and Forty-Eighth streets to hold back the river, inclose the shore line, and allow excavations to be made, and the piers built. When completed, it will be approximately 800 ft. long and will have cost about \$500,000. The

effect of the dam is that of temporarily moving the river bank farther out in the stream. The separate caissons are built with interlocking steel piles which are sunk to bedrock, forming pockets

16 by 24 ft. which are filled with rocks. The water between the dam thus formed and the shore line is pumped out to enable the construction of the permanent work.



The Separate Caissons of This Dam are Built with Interlocking Steel Piles

A Section of the Cofferdam under Construction in the Hudson River Which will Hold Back the Water During the Building of 1,050-Foot Ship Piers in New York Harbor

DIVING SUIT FOR REACHING EXTREME DEPTHS

The new armored diving suit in which a diver went down to a depth of 212 ft. in Long Island Sound, as noted in a recent number of this magazine, is so made that the diver is not subjected to the hydrostatic pressure of the water or to the equalizing pressure of the air for counteracting the hydrostatic pressure, as in the ordinary diving suit. The suit is made of an aluminum alloy of great strength, weighs about 480 lb., and is in effect an articulated caisson. The articulated joints are provided with roller bearings to give the diver the utmost freedom of movement and permit so slight a leakage that what water enters is easily taken care of by a small pump operated by compressed air, the air being forced down through an armored tube by an air compressor. The pump is located in a recess back of the main body of the suit, and has a suction intake in a bilge at the back of



With This Articulated Armor a Diver can Reach Great Depths

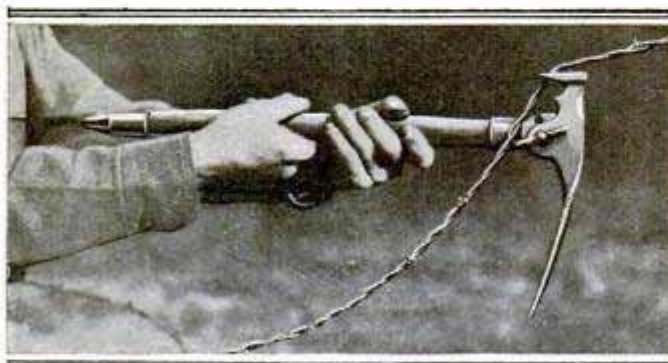
each foot. The discharge is outward against the pressure of the water, while the exhaust air from the pump passes into the diving suit, and the pump is so adjusted that this exhaust supplies the diver with air for breathing at atmospheric pressure. In the armored tube are also the electric-light and telephone circuits, as well as a duct for carrying off the used air.

There is no life line to take the attention of the diver, and he is able to keep in constant communication with the surface by means of his telephone. Each arm is equipped with a mechanical hand, with which the diver is able to pick up the smallest objects, and which is equipped with an electric light. The suit, with the diver in it, is hoisted in and out of the water by a derrick, as shown in the illustration. This is the perfected form of the diving suit which, in its experimental stage,

was first described in this magazine more than a year ago.

COMBINATION MATTOCK MADE FOR VARIED USES

Embodying in one instrument the functions of several, a combination mattock has been invented by an officer of the United States Army which has al-



Mattock Which Combines the Functions of Several Tools

most as many uses for the camper or motor tourist as for the military man. The tool is approximately the same size and weight as the pick mattock, now used by the fighting forces, but may be employed as a crowbar, hammer, nail puller, wire stretcher and cutter, mattock, and adz. It can be used for sharpening and driving posts and stakes, cutting through wire entanglements, and for various other purposes. The implement is made in two pieces, permitting it to be packed compactly with the other tools of a soldier's equipment.

⌈The Brazilian government has placed with an English firm a contract for a battleship that will rank as the most powerful in the world.



A CURIOUS example of balanced rocks is that known as the "Ticklish Rock" in the Allegheny Mountains near Picture Rocks, Pennsylvania. This rock rests on a slender rock shaft, six feet tall, which is jagged and worn and seems scarcely able to support the load. The balanced rock is not attached to this, but rests on a bearing that does not exceed 18 inches in any direction. It is six feet thick, 10 feet long, and three feet wide. It is so delicately balanced that it is easily rocked with the hand.

STEPS ENABLE CHILDREN TO DRINK AT FOUNTAIN

A solid block of concrete comprising two steps has been placed at one side of each public drinking fountain in a



Steps Placed at the Side of a Drinking Fountain Enable Children of Four to Get a Drink without being Lifted

western city. The steps are built for the convenience of little children. By standing on the top step a child of four can get a drink without assistance.

TAKING NITROGEN FROM AIR WITHOUT ELECTRICITY

A method for the commercial extraction of nitrogen from the atmosphere without the use of electricity has been discovered by a Japanese chemist and is now being utilized in that country. The process first followed by the inventor, which was the same as a method widely used in Europe, entailed the manufacture of carbide by passing electricity through a mixture of charcoal and lime. The resulting carbide was then ground to a powder and heated to a high degree of temperature by electricity while nitrogen was passed through it, chang-

ing the whole to calcium cyanamide. Owing to certain physical features attending this method the manufacture was intermittent and not entirely satisfactory. A discovery was subsequently made which showed the inventor how to make calcium nitrate by utilizing the chemical heat of the elements themselves, doing away with the necessity of using electricity. The nitrogen average in the product of this system is about 19 per cent.

MAKING RECORDS OF RADIO MESSAGES ON WAX

Through the use of wax disks, such as are used in making phonograph records, a Massachusetts wireless operator has devised an apparatus which automatically records radio messages. His first step in this direction was accomplished by connecting a receiving apparatus to a loud-speaking telephone fitted with a phonograph horn which intensifies the vibrations from the sounder so that they may be heard distinctly any place in a large room. This arrangement clicks out the dots and dashes so clearly that the use of the customary telephonic headgear is unnecessary. He then constructed a recording apparatus which operates essentially in the same manner as a machine for taking dictation. In this manner it is possible for him to depend upon a wax disk to record a message when he is very busy.



With His Automatic Recording Apparatus It Is Possible for This Radio Operator to Receive Two Messages at One Time

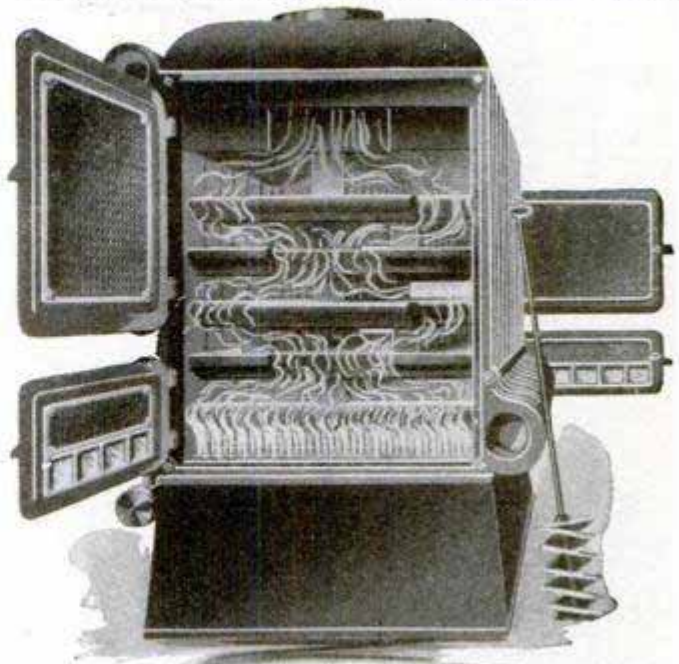
WORK OF MILITIA SHOWN IN MOTION-PICTURE FILMS

Motion-picture films have been in use for some time for representing the maneuvers and camp life of the regular army, and this means of spreading information relating to our national defenses has now been adopted by the Kansas National Guard. The plan is not only valuable in acquainting the people of the country with the necessity for the technical training required by modern methods of warfare, but is of the greatest help in spreading among members of one branch of the service a knowledge of other branches, and it is likely to come into general use for depicting the activities of the state militias during encampments.

NEW GAS FURNACE FOR HEATING BUILDINGS

A new gas furnace for supplying hot water or steam for buildings is designed with the idea of giving the hot gases the longest possible contact with the water tubes, and of baffling the gases in their progress so that practically all their heat will be extracted

before they enter the flue, and used in heating the water. The water is contained in small shallow cast-iron tubes



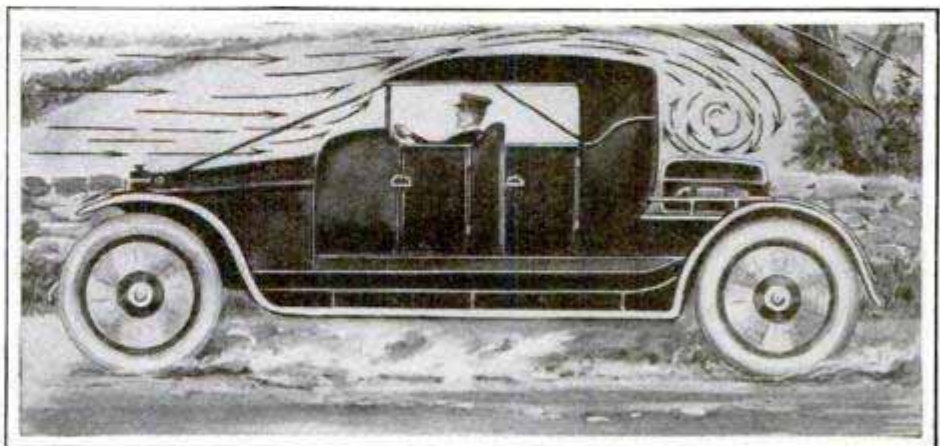
Section of New Gas Furnace Showing How the Hot Gases are Baffled in Their Travel toward the Flue

which present a large heating surface to the gases, and which are connected by risers or vertical waterways. Each section is made up of a tier of these tubes with a gas burner at the bottom. At the top of the furnace is a steam dome. In this furnace the hot gases are in contact with the water tubes during a travel of about six feet.

AUTOMOBILE WITH NOVEL SEAT ARRANGEMENT

In a new four-seater automobile body that has just been built the rear seat is brought forward from its usual place over the rear axle and this space is utilized as a luggage carrier. This is accomplished, without increasing the length of the body, simply by a closer spacing of the seats than is usual and by providing a clear space under the front seat to serve as foot room for the occupants of the rear seat. This arrangement not only places the rear seat where there will be the least

vibration, but gets it out of the eddy of air and dust at the rear of the car.



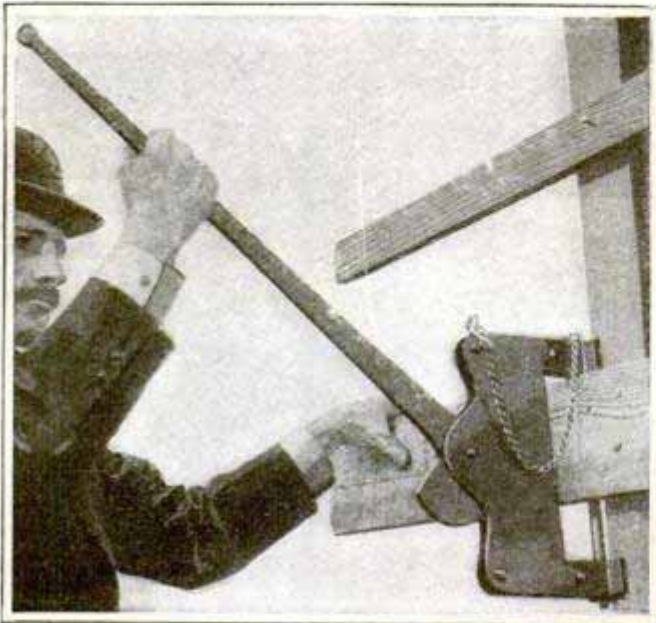
COURTESY OF THE CAR

Without Adding to the Length of the Car, the Rear Seat is Set Ahead of the Rear Axle and Ample Room is Provided for Luggage

The chassis has a wheel base of 132 in. and body space of 104 inches.

TOOL FOR TEARING DOWN SCAFFOLDING

Tearing down scaffolding and stagings with ordinary tools usually results in considerable damage to the planking



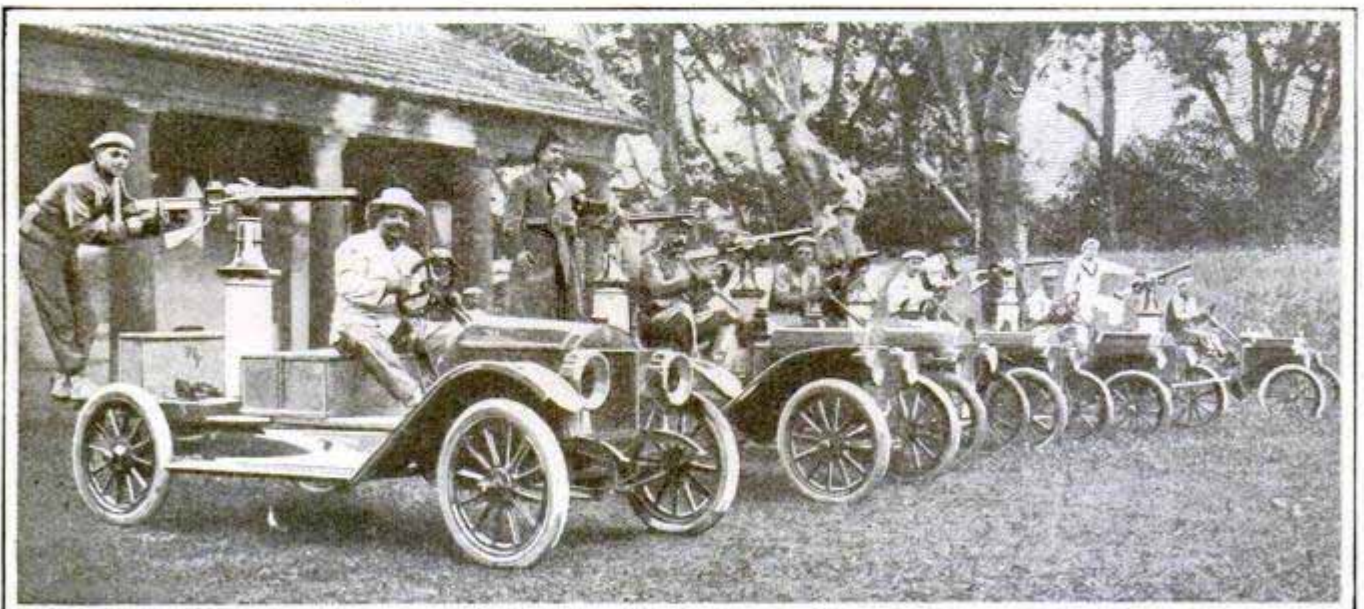
With the Device Set in This Position, the Plank is Drawn Free from the Post When the Lever is Pulled Downward

even when the utmost care is used, and to overcome this, a new and ingenious tool has been invented. In using, the device is hooked over the plank with the legs bearing against the post, as shown. The lever is then pulled downward and this results in pulling the plank away from the post with little or no danger of breakage. The device consists of two parts, one sliding within the other. The two spaced plates, com-

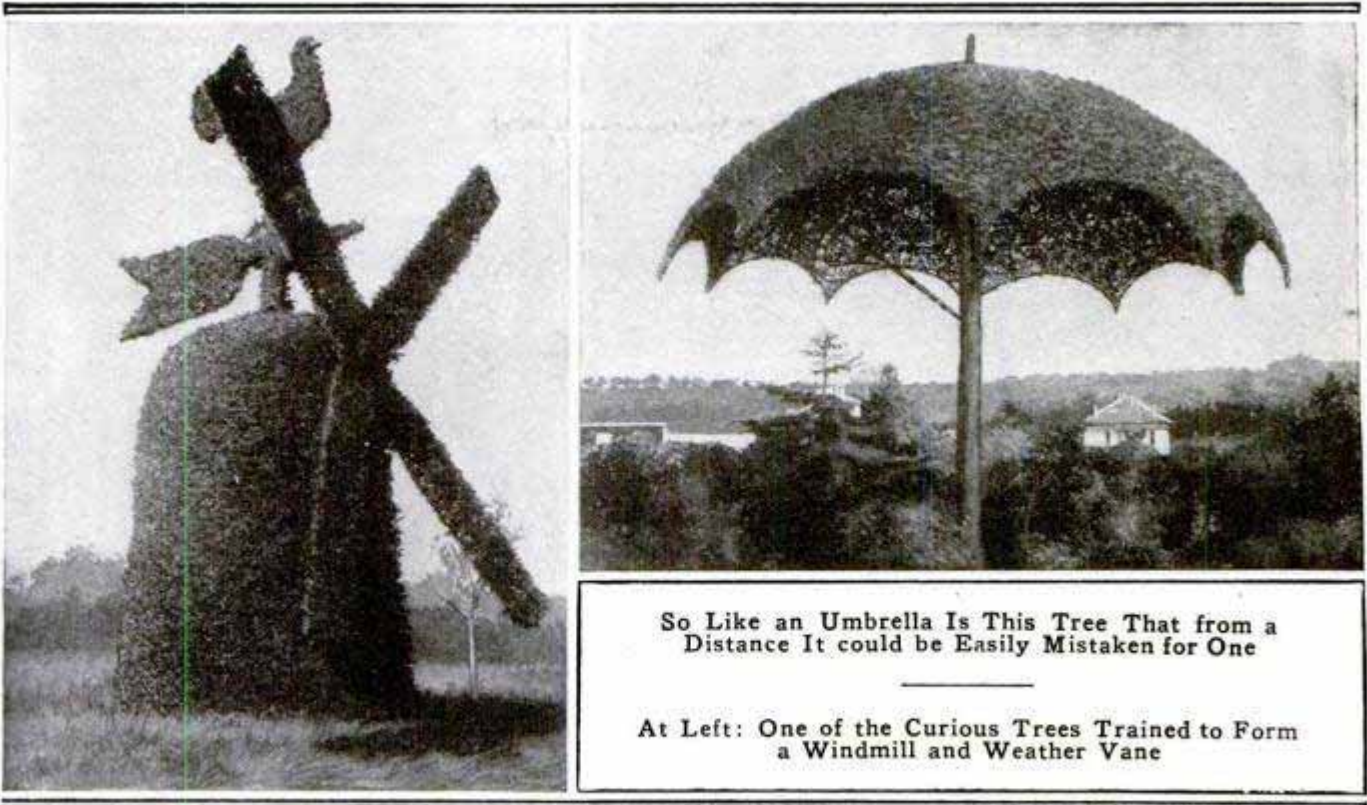
prising a sort of casing, form one of the parts, and to these plates is rigidly fixed the rod that is hooked behind the plank. The legs run back into the casing and are connected to a plate that extends from the upper to the lower side, and is arranged to slide easily. The lever, which terminates in a cam, is pivoted between the plates of the casing and bears against the edge of the plate to which the legs are attached. When the lever is pulled downward the tendency is to thrust the legs outward, but as these are braced against the post the result is that the casing, and with it the plank, is drawn away from the post.

CONVERT LIGHT MOTOR CARS INTO DEFENSE BATTERIES

Cable dispatches from Bordeaux recently recounted the bombardment and partial destruction, by German cruisers, of Papeete, the principal town on the island of Tahiti, in the Society group, one of the main possessions of the French in the South Pacific. When a radio message was picked up at the port by the cruiser "Montcalm," early in August, advising the inhabitants of the outbreak of the European war, preparations were immediately made for defending the colony against possible hostilities. A military order was issued requisitioning six motor cars



American Motor Cars Converted into Machine-Gun Batteries to Defend the French Possessions in the Society Islands



So Like an Umbrella Is This Tree That from a Distance It could be Easily Mistaken for One

At Left: One of the Curious Trees Trained to Form a Windmill and Weather Vane

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for army service. The bodies of these machines, all of which were of American manufacture, were removed and heavy lumber floorings substituted, upon which quick-fire guns were mounted. With these improvised batteries it was intended to try to repel any attempted invasion. The advices do not indicate, however, that the Germans landed forces, for it is stated that the battleships withdrew after the bombardment.

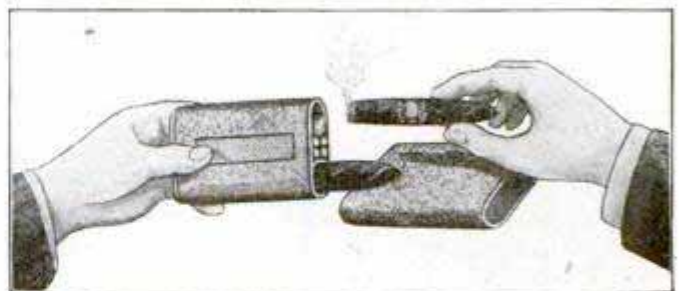
TREES TRAINED TO GROW IN ODD SHAPES

Undoubtedly one of the most fantastic as well as remarkable collections of trees in the world has been produced at Versailles by a horticulturist who has spent years in training them into abnormal shapes. The trees represent anything except natural formations. Some of them resemble different objects so completely that, at a short distance, they appear like vines covering lattice or wire forms. One of these is umbrella-shaped, and, from a distance of a very few yards, appears almost anything but a tree. Its curved surface is shaped nearly perfectly. Other queer specimens represent a

windmill, a battleship, a pagoda, the Arc de Triomphe in Paris, flower vases, the temple of Trianon, garden chairs, and tables.

CASE FOR CARRYING LIGHTED CIGAR

A new feature in smokers' accessories is a cigar case in which a lighted and partly smoked cigar may be placed and carried in safety. The case is lined



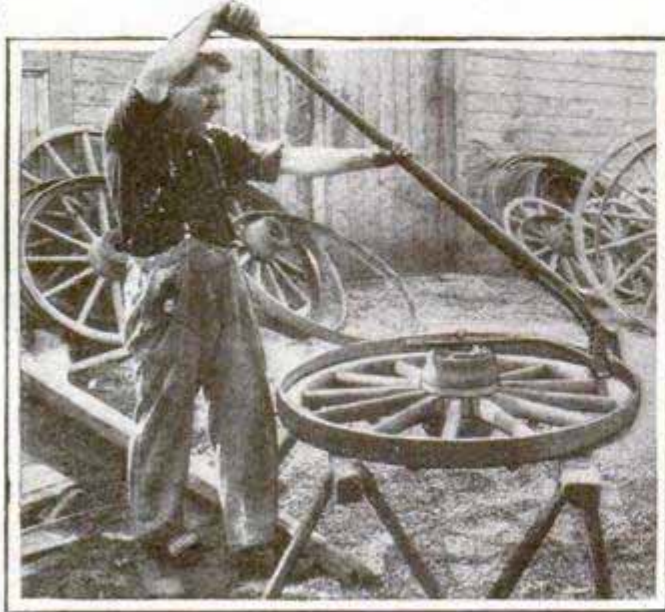
Pocket Cigar Case to Hold a Lighted Cigar

with asbestos and has compartments for two cigars as well as for a number of cigarettes or matches.

By using electric driers with a capacity of 3,000 watts, motion-picture manufacturers are able to dry a 1,000-ft. film in less than an hour instead of four hours.

DEVICE FOR REMOVING WAGON-WHEEL TIRES

A simple but powerful device for removing tires from wagon wheels, that has recently been invented, weighs



This Simple Device is Capable of Exerting a Pull of Over a Ton on the Tire

only 25 lb. and is capable of exerting a pull of over a ton. The end of the lever carries a link that hooks under the tire and the lever is pivoted to a base that bears on the rim of the wheel. The whole device is held in the right position by an arm attached to the wheel hub.

FARM PROVIDES WORK FOR PANAMA CANAL EMPLOYEES

A farm for the benefit of "silver" or unskilled workmen thrown out of employment by the completion of the Panama Canal has been established by the government on the Canal Zone. There are now about 100 men on this farm, all of whom are earning a comfortable living for themselves. Nearly all these farmers are crippled, some having lost an arm or a leg or having been incapacitated in some other way for hard work. The farm grows bananas, oranges, cocoanuts and other tropical products and is stocked with cows, chickens, ducks and pigs. It is managed by the medical corps of the United States Army. Each workman is to have a life job on the farm.

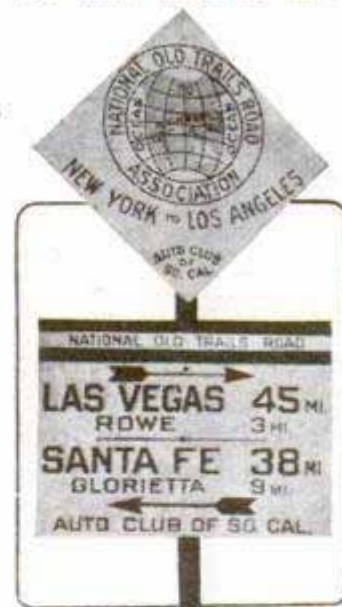
NUGGETS AND METEORITES HAVE ODD RESEMBLANCE

Experiments made with gold nuggets for the purpose of ascertaining their structure have shown that, when subjected to certain conditions, they bear a curious resemblance to meteorites. If, after being polished, either a meteorite or nugget is etched with chlorine, it displays a crystalline formation. This likeness between the two, however, is considered superficial, since the character of the crystals is different. Another interesting thing concerning nuggets is that when one is heated in a Bunsen flame, blisters rise on its surface, exploding with sharp reports. This is taken as an indication that nuggets contain either some gas, or substances which pass into the gaseous form when heated.

ROAD SIGNS TO MARK WAY TO PACIFIC FAIRS

In order to mark the trail from Kansas City west to the Pacific Coast for the benefit of motorists from the

East who will drive overland to the expositions at San Diego and San Francisco in 1915, more than 3,000 signs are being erected along a route covering 2,218 miles. The signs are enameled and supported on iron pipes. The trail will lead through the Grand Cañon, desert and mountainous



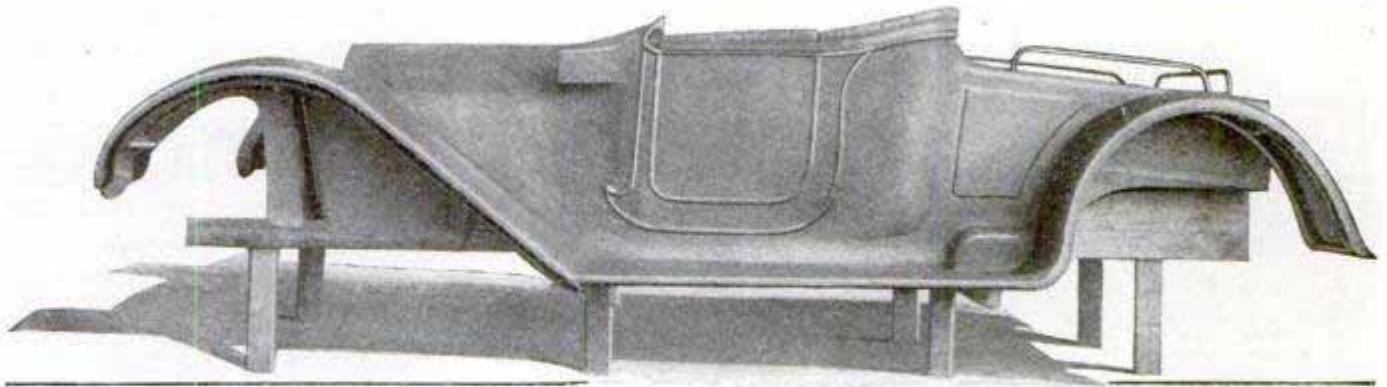
Enameled Signs Mark the Way to the California Expositions

country, Indian settlements, and other interesting and picturesque places. It is estimated that it will require four months to complete the work of placing the signs.

MOTOR-CAR BODIES BUILT FROM CLAY MODELS

With the development of all-steel motor-car bodies, the method of designing has resolved itself largely into

and then welded together by various processes. Since wood is eliminated, it is possible to place them in baking



A Clay Model of an All-Steel Motor-Car Body

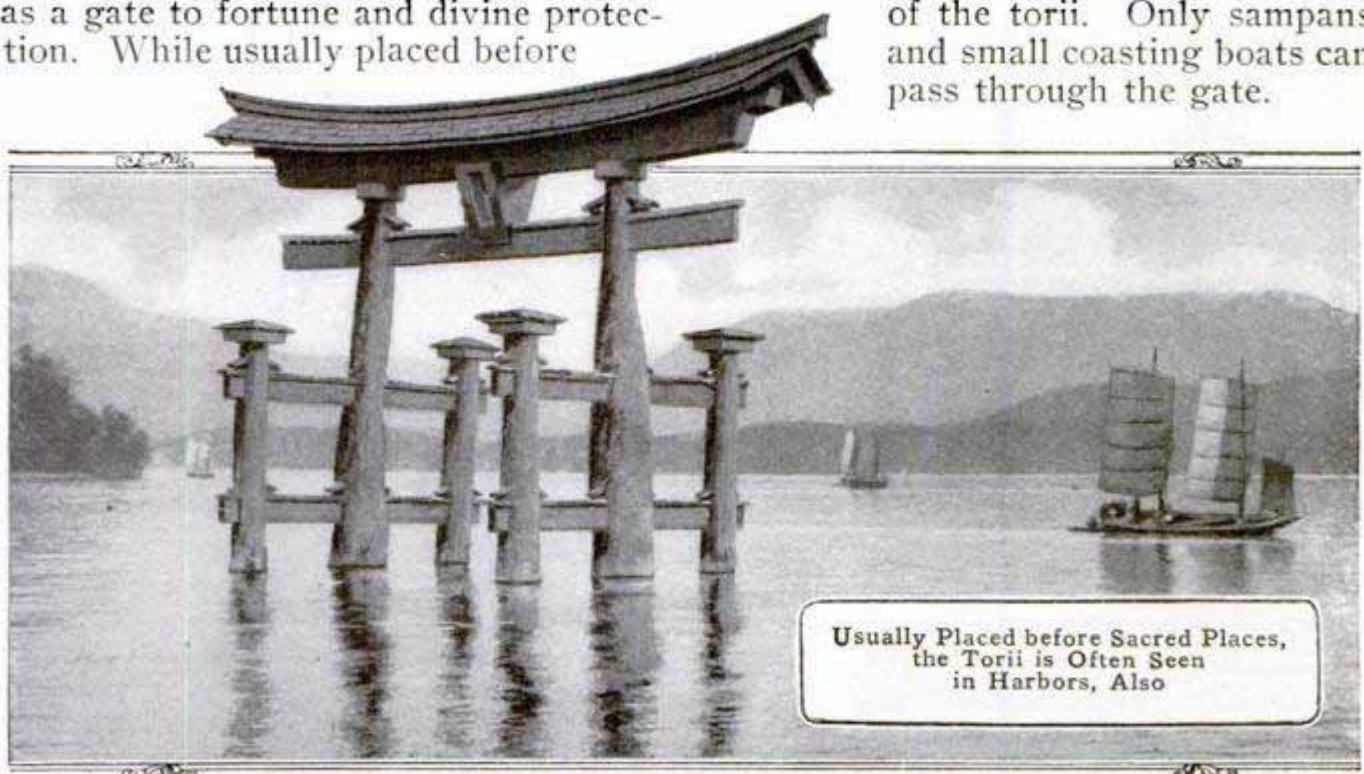
a matter of clay modeling. Full-sized clay models are now made in order to bring out the graceful lines and curves which cannot be accomplished so well on paper. In construction, the bodies are pressed out of sheet metal

ovens after the enameling has been done, the high temperature giving the coating a hard finish which both wears well and retains its luster. The clay used in the work is imported and is employed over and over.

JAPANESE TORII IS GATE TO SUCCESS AND SAFETY

Delicate harmony of lines and individuality of form, always present in the architecture of Japan, are exemplified in the torii. This queer structure, usually of heavy construction, which often lends picturesque tones to a view, is not erected merely as an ornament, but as a gate to fortune and divine protection. While usually placed before

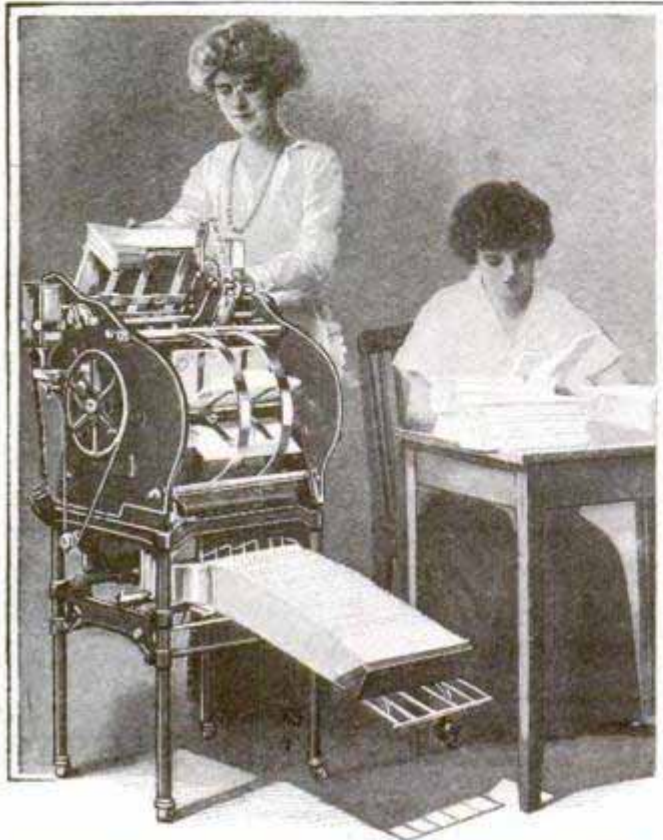
the entrance of some sacred place, it also is sometimes seen in harbors and waterways, as in the Inland Sea. It is a superstition of the native sailors that fair weather and success will be with them on their voyage, or fishing junket, if their craft is sailed beneath the lintel of the torii. Only sampans and small coasting boats can pass through the gate.



Usually Placed before Sacred Places, the Torii is Often Seen in Harbors, Also

MAILING MACHINE SEALS AND STAMPS LETTERS

Among the mechanical office appliances which attracted attention at



This Machine Is Able to Stamp and Seal 6,000 Envelopes in One Hour

the fall business shows, was a high-speed automatic-feed mailing machine

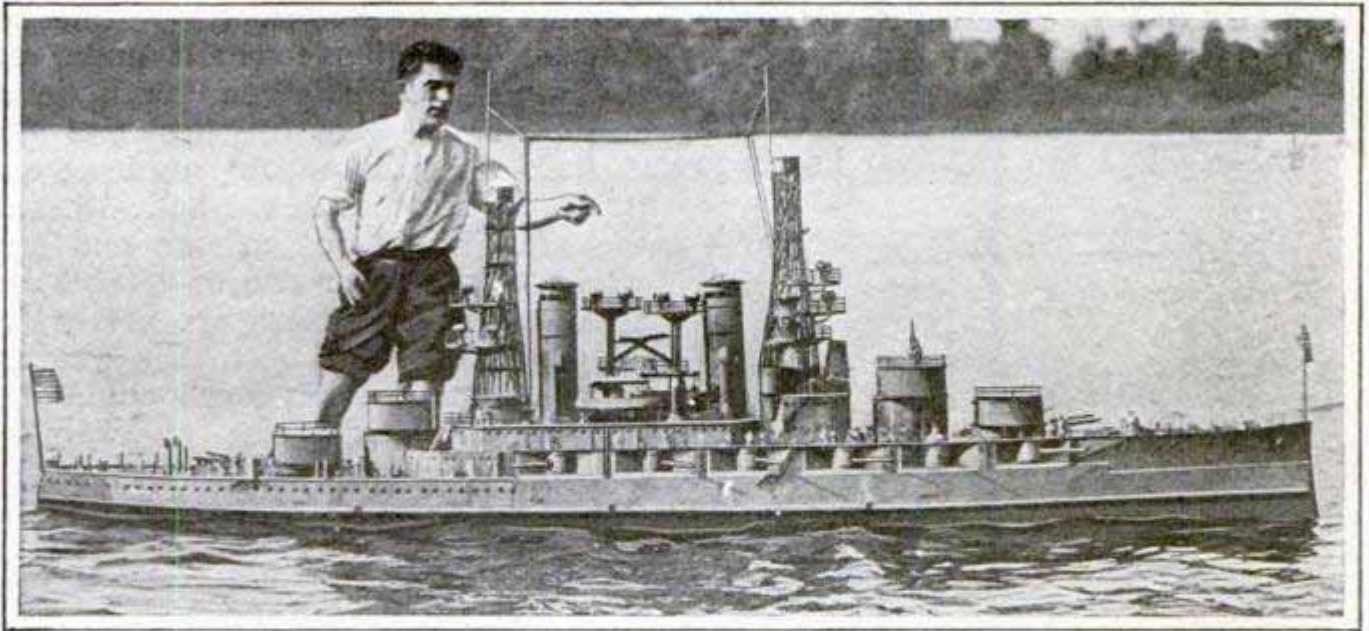
which seals envelopes and affixes stamps and stickers in a single operation. It is possible with this apparatus to prepare 6,000 letters for posting in one hour, causing them to be stamped or not, as desired. The feeding device delivers the envelopes, with the flaps extended, to a wetting roll which dampens the gummed surface. They are then carried through sealing rollers and stacked under pressure in a receiving rack, where they remain until dry. In the course of a day it is possible to get out thousands of circular letters, which would require a large staff of workers for several days, if the work were attempted by the hand process.

PLANTING ORCHARDS ON STEEP HILLSIDES

An ingenious method has been adopted by a California fruit grower for utilizing steep hillsides for the planting of fruit trees. At regular spacings he built semicircular walls of cement and cobblestones, the walls curving outward from the hillside and forming retaining walls for holding the soil to a level surface. Trees were then planted in the centers of these level



How a California Fruit Grower, by Building Semicircular Retaining Walls, Utilized a Steep Hillside for Planting Fruit Trees



Constructed for Pastime, This Miniature Dreadnought Embodies Practically All the Latest Ideas in Battleship Designing

spaces. This method not only makes what would otherwise be waste land valuable, but converts the bare hillsides into attractive orchard areas.

MINIATURE DREADNOUGHT BUILT FOR PASTIME

A Massachusetts jeweler has built a vessel which embodies almost every late idea in superdreadnought construction and also includes several features which are said to be new. The boat is 13 ft. in length, made of steel, and has a double bottom and specially patterned bulkheads for rendering it practically nonsinkable. It has two turrets and heavy broadside batteries, searchlights, Krupp-type aeroplane rifles, sirens, wireless instruments, range finders, signaling devices, and nearly everything that is to be found aboard the most modern warships. Its complement of officers, marines, and sailors is not only aboard, correctly uniformed, but each individual is so controlled mechanically that he goes through the motions of performing real work. When the heavy rifles are fired, the gunners move about with striking lifelikeness. There is also a band which plays, or provides the motions, while a hidden phonograph produces marine music. The "dreadnought" was recently christened the "Massachusetts" and given its try-out. Through the as-

sistance of an automatic steering apparatus the vessel sailed to the middle of a stream and returned without difficulty at a speed of about 10 miles an hour. It is propelled by electricity, while clockworks and electric appliances play an important part in the construction. Various features of the vessel are covered by patents. It required two years to build and is valued at approximately \$15,000.

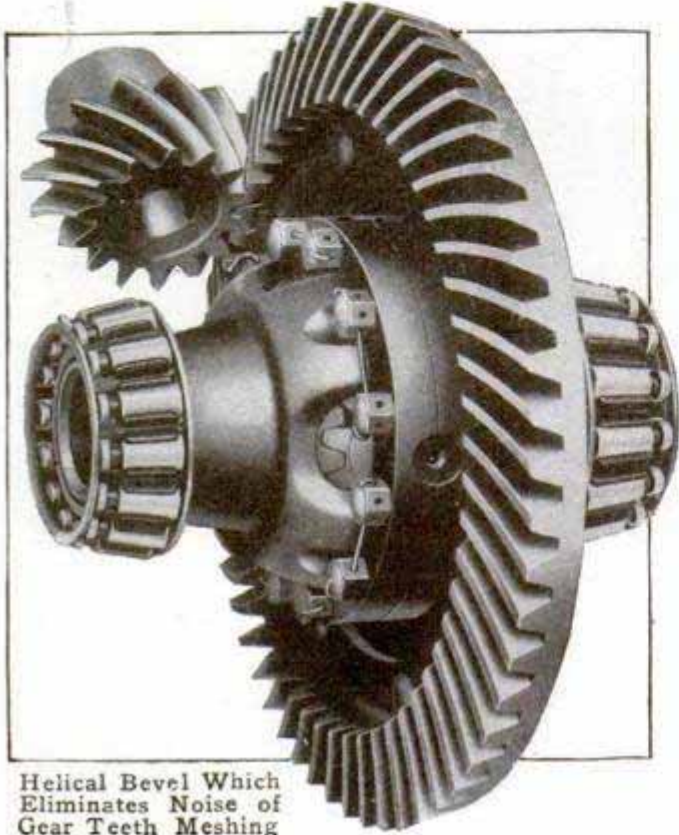
NATURAL-GAS WASTE SHOWN TO BE TREMENDOUS

Investigation by the government has shown that the waste of gas in the mid-continent field during the last few years has been enormous, the estimates embracing figures so large that they are difficult to comprehend. In the state of Oklahoma alone the volume of gas lost, if saved, would have been sufficient to serve the district for 60 years at the present rate of consumption. On the other hand, the intrinsic value of the gas if now available would be greater than that of the oil which has been produced from the fields. The total amount of gas wasted in the mid-continent area is placed at 425,000,000,000 cubic feet.

ⒸA telegraph cable costing \$1,500,000 is being made to be laid from New York to Colon.

HELICAL BEVEL INTRODUCED IN MOTOR-CAR GEARS

For rear-axle use on motor cars, a helical-bevel pinion and gear has been



Helical Bevel Which Eliminates Noise of Gear Teeth Meshing

developed after a long series of experiments, and commercially introduced to replace the straight bevel. Silence in action is one of the chief advantages

claimed for the construction, while the efficiency remains constant under all conditions. Any given tooth in a straight-bevel gear meshes and demeshes along its entire length at one time. In the case of the helical bevel, the meshing begins at one end and works to the other end of a tooth, so that at least two teeth are partly engaged all of the time. This gradual entering and leaving mesh eliminates the clicking and noise of ordinary gearing.

GOLD, SILVER, AND COPPER OUTPUT OF ALASKA

From the beginning of mining operations in Alaska, in 1880, to the end of 1913, approximately \$228,000,000 worth of gold, \$2,000,000 worth of silver, and \$17,000,000 worth of copper have been taken from the mines of that territory. During the first year of mining only \$20,000 worth of gold was taken out. The production of these metals in 1913 shows a decrease of \$3,082,727 in comparison with that of the preceding year. During 1913 the production of gold was \$15,626,813, that of silver was \$218,988, and that of copper, \$3,357,293.

FRENCH HAMMOCK SERVES AS LAWN SEAT

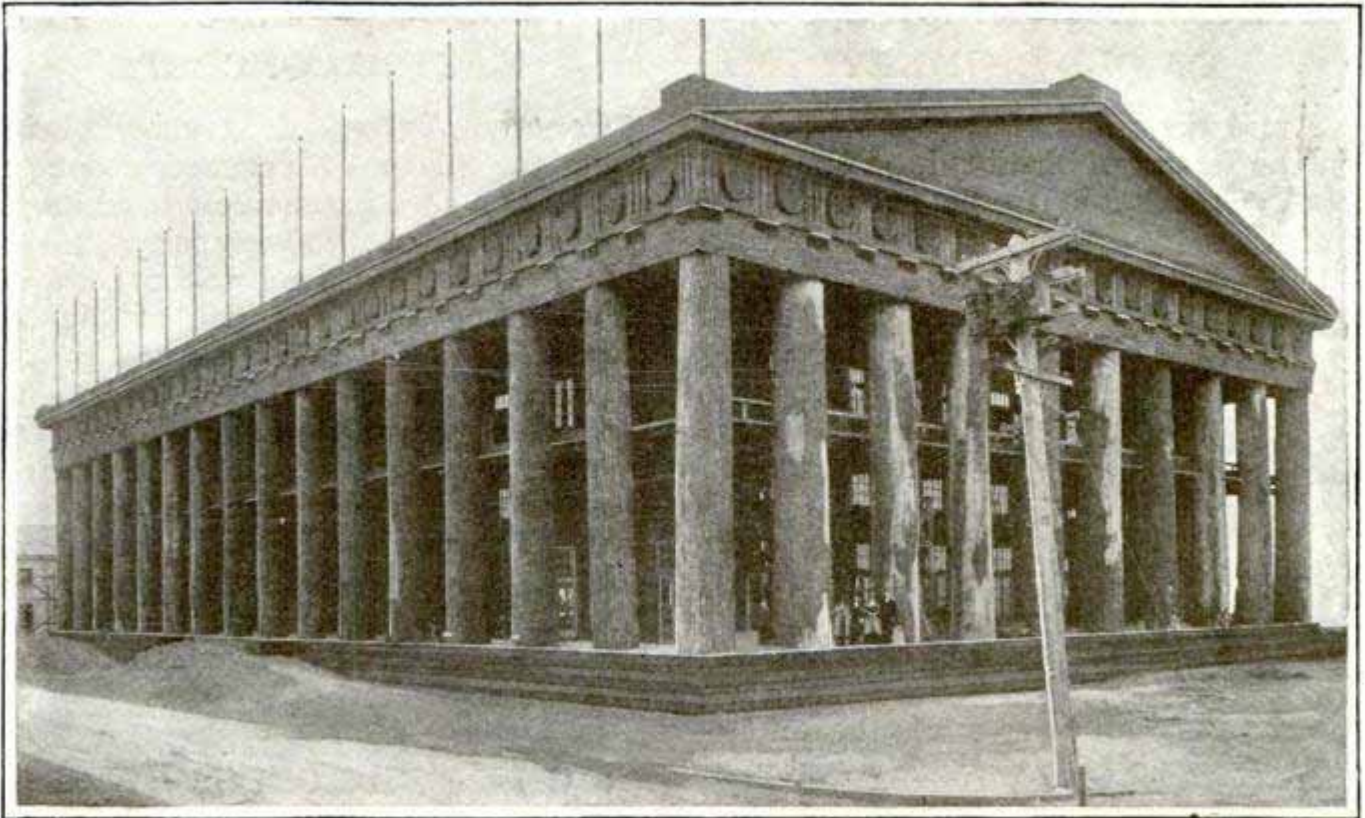
Among recently introduced French novelties is a hammock which may be converted into a comfortable seat with

an inclining back, and foot rest. When in use as a seat the head end is suspended from a higher position than the opposite part. Ropes are attached from the cross brace to the middle of the hammock on either side, forming a frame for the seat and back. The foot end is made adjustable so that by loosening it a rest is afforded for the feet. Extending beneath the hammock at the middle point, which becomes the front edge of the seat, is a rope which holds the net in place.



French Hammock Which may be Converted at Will into a Comfortable Lawn Seat

COURTESY OF LA NATURE



The Oregon State Building at the Panama-Pacific Exposition, Built Largely of Rough and Undressed Logs and Modeled After the Parthenon

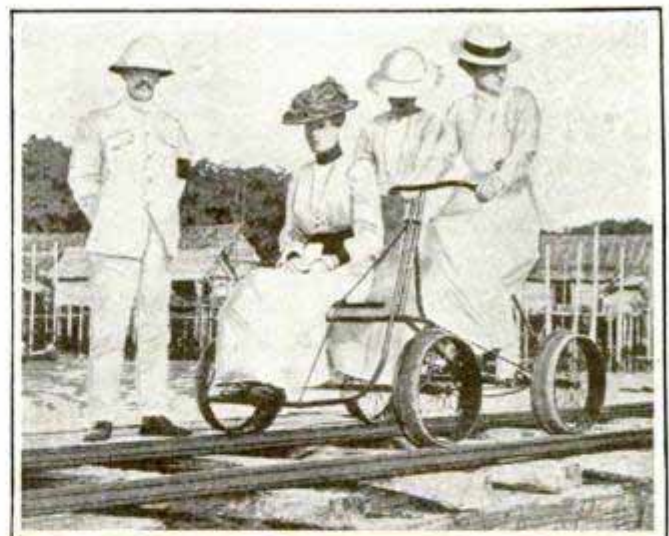
GIANT OREGON TREES USED IN EXPOSITION BUILDING

Probably in no instance will any of the structures erected at the Panama-Pacific Exposition be more thoroughly typical of the state or country represented than the Oregon building, which is now nearing completion. This structure is 150 ft. in width and 250 ft. long, two stories high, and patterned in a general way after the Parthenon at Athens. Surrounding it are great columns of undressed fir, pine, cedar, hemlock, spruce, and cedar timber which have been cut in different districts of the state. There are 42 of these tree trunks, each 40 ft. in height, one of which verges upon the colossal, containing enough lumber for the construction of an average-size house.

WHERE ENGLISH IN BORNEO FIND DIVERSION

Extending along the coast of Brunei Bay between Jesselton and Weston in British North Borneo is a rambling railroad of rather indifferent construction and infrequent travel. White persons living in this section of the country have few diversions other than

that afforded them in driving a bicycle car over the road to different points. When in need of exercise or amusement this is one of the very few methods of obtaining it that is at their disposal. One of these cars, such as



One of the Railway Bicycles Used by English Residents of North Borneo

is shown in the accompanying photograph, usually seats three persons, one of whom supplies the motive power.

⌈The decrease in the sales of bottled mineral waters is attributed to the general improvement of municipal water supplies.

TREE TOP BRANCHES OUT OF OLD CHIMNEY

Amid the ruins of an old sugar mill on the Island of Trinidad, off the coast of Venezuela, is to be seen a most



unusual curiosity, that of a sturdy tropical tree spreading its branches through the top of an abandoned chimney. The crumbled walls of the building are covered with an overgrowth of vegetation, while the smoke-stack rises out of this mass of green — from a distance the only vestige visible of the old structure. The brick walls of the chimney completely hide all evidence of

the tree trunk which has grown up through the opening within.

EFFICIENCY OF ELECTRIC AND STEAM LOCOMOTIVES

In comparing the efficiency of electric and steam locomotives the experience of the New York, New Haven and Hartford Railroad, which used both types, is that a pound of coal burned under the boilers of a central electric station will develop twice the drawbar pull that is developed when the same weight of coal is burned in the firebox of a steam locomotive. The cost of upkeep also shows in favor of electricity as motive power. For an electric locomotive it is from 5 to 7 cents per locomotive-mile for each 100 tons of weight, while a steam locomotive costs from 8 to 25 cents per 100 tons per mile for repairs and maintenance, with an average of 11 cents, or about twice the cost of the electric.

CRUSHED BRICK USED IN MAKING CONCRETE

Concrete in which crushed brick took the place of crushed stone or gravel has been extensively used in the construction of the new city hall at San Francisco. The brick used were those taken from the site of the old city hall, which was wrecked in the earthquake of 1906. These brick were fed into a gyratory crusher with lumps of mortar adhering, just as they came from the ruins, were crushed to a size to pass through a 1½-in. screen, and used in the concrete without cleaning. No trouble has been experienced from the lime and brick dust which entered into the concrete in this way.

SIGN OF THE CROSS MARKS SURVEYORS' POINTS

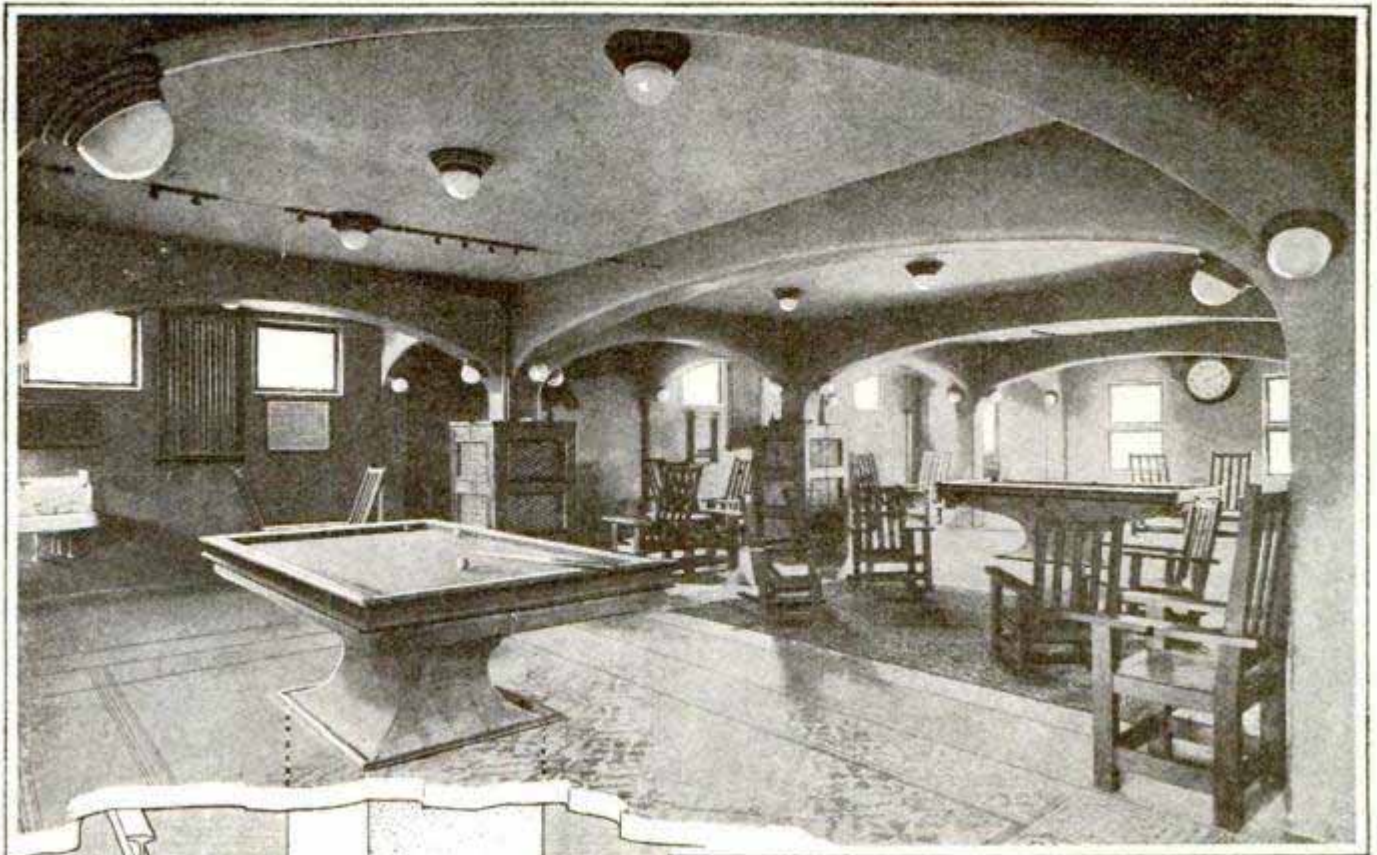
Engineers running a survey through a district in Mexico recently took advantage of a custom of the natives in order to prevent the molestation of signal flags placed at observation points. The party had experienced



much trouble, for almost as fast as flags could be erected they would be stolen, which sometimes meant a material loss of time. It was learned that in that section wherever the death of a person has occurred, either through accident or other cause, it is customary to erect

a cross with drapery of some kind hung over it. The engineers accordingly substituted tall crosses for their signal flags and suspended strips of cloth from them. The plan worked admirably, for at no time was one of these signals touched.

BILLIARD TABLES THAT REST ON SOLID ROCK



The Billiard Room of a Pacific Coast Residence; the Tables Rest on Concrete Bases Having Their Footings on Solid Rock

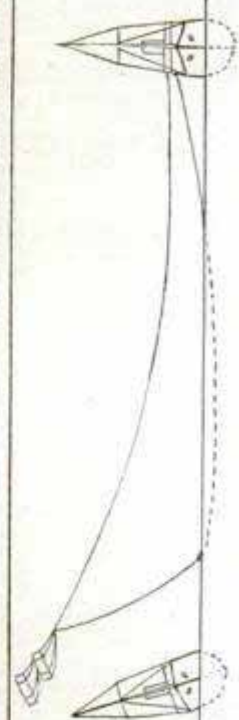
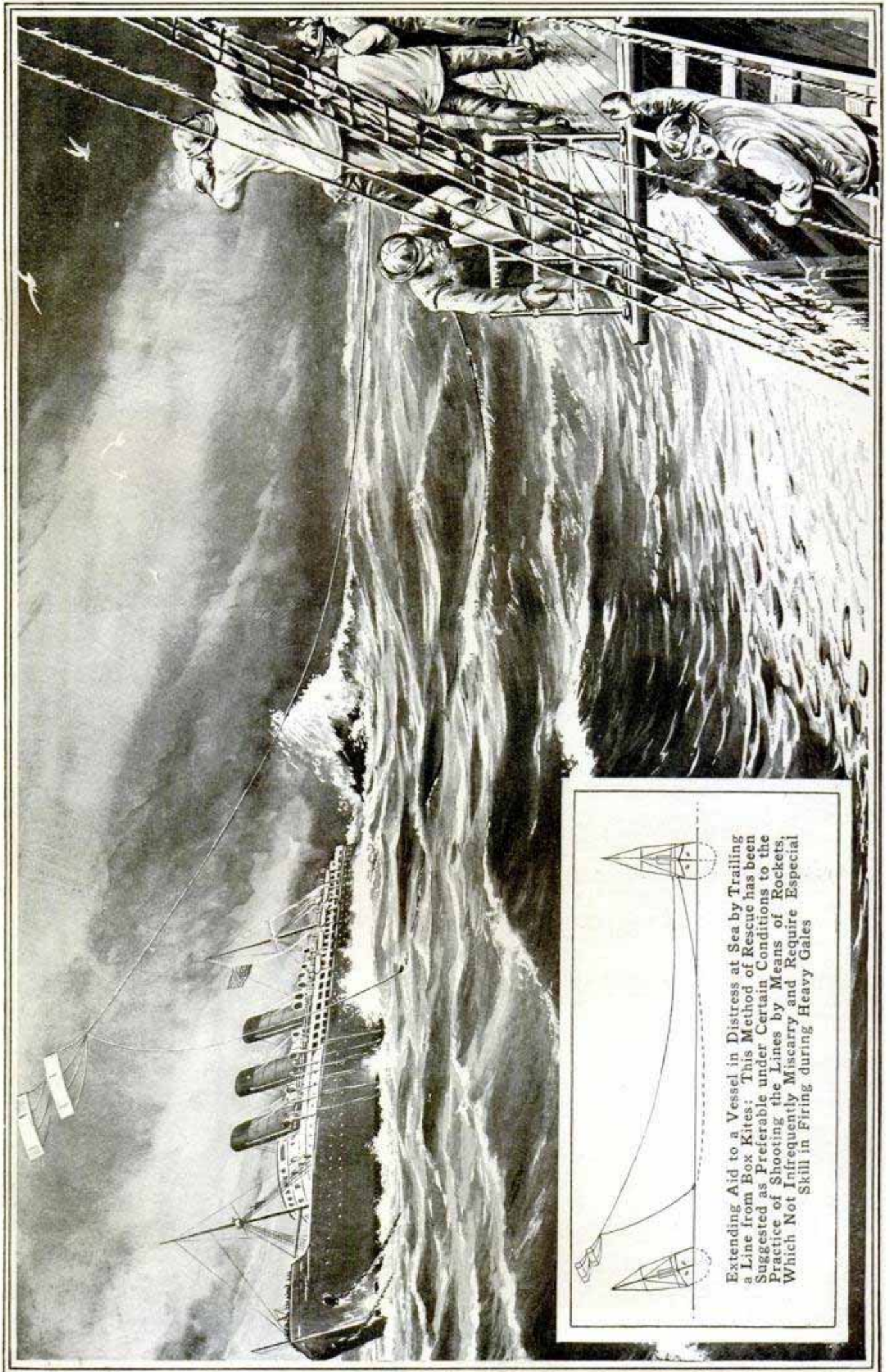
COURTESY OF SUBURBAN LIFE

Billiard tables supported on solid rock are among the novel features of a 36-room concrete residence located on one of the islands of the San Juan Archipelago in Puget Sound. Each table rests on a massive concrete base which extends through an opening in the floor and has its footing on bed-rock, and is therefore as solid and as free from vibration as if it were a part of the island itself. This house has many other curious and quaint features, among which are a brass ship's bell used as a front doorbell,

and a battleship cable used as a hitching rack. The regular rising signal is Mendelssohn's "Spring Song" played on the pipe organ, which is said to be one of the finest instruments on the Pacific coast.

SAME MOVIE FILM IS SHOWN TWO AUDIENCES AT ONCE

In order to provide facilities for the accommodation of negro patrons, the manager of a photo-play house in a Maryland town recently had a room built at the rear of the building occupied by his theater. This was supplied with seats and separated from the main auditorium only by the movie screen, a curtain without a backing. Since the light from the projector shows through this, pictures may be seen from the back, thus making it possible to utilize both sides of the screen at once. All caption lines and printed matter, of course, appear in a reversed position, but this does not interfere with filling the back-room seats, which are sold at half price.



Extending Aid to a Vessel in Distress at Sea by Trailing a Line from Box Kites: This Method of Rescue has been Suggested as Preferable under Certain Conditions to the Practice of Shooting the Lines by Means of Rockets, Which Not Infrequently Miscarry and Require Especial Skill in Firing during Heavy Gales

KITES FOR LIFE-SAVING SERVICE PROPOSED

The employment of kites instead of rockets for extending life lines to vessels in distress at sea has been suggested as having a marked advantage in certain instances over the methods ordinarily followed. The plan anticipates the use of box kites such as are used in military service for the purpose of making observations. Instead of throwing a line to a sinking ship by using a rocket, which sometimes miscarries, it is proposed that this be accomplished by attaching a trailing cable to a series of kites which from a windward position might easily be directed over the middle of a ship. After reaching the line, it would only be necessary for those aboard a sinking steamer to draw in a hawser with this lighter rope, and attach it in a position which would allow the operation of a breeches buoy. When the wind is blowing steadily a series of kites attached some 18 ft. apart has a good carrying capacity, and if the distance to be traversed were not great, it would often be possible to extend a heavy cable in the first place, thus saving valuable time.

HAND PUMPS SUPPLY WATER IN SAGINAW

A city of 60,000 inhabitants obtaining practically all its water supply from deep wells by means of hand pumps is the unusual situation that exists in Saginaw, Mich., a city that is thoroughly modern in other particulars. There is a city plant that takes water from the Saginaw River, but the water from this source is said to be so impure that it is unfit for domestic and most other uses, and the resort to deep wells has been, up to the present time, the only practical solution of the problem of obtaining a usable water supply. These wells were sunk by the city with the coöperation of the residents of the different sections and are scattered in convenient locations all over the city. This primitive method of water supply

is regarded as temporary, and there is a movement on foot for erecting a treating plant for the Saginaw River water

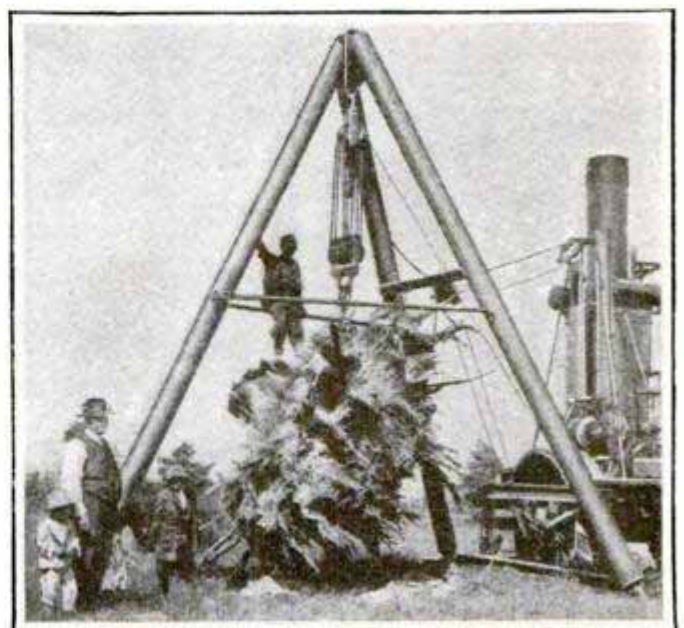


How the Water Supply is Distributed in Saginaw

as well as for bringing in water from lakes located 15 miles or more north of Saginaw.

STUMP-PULLING MACHINE CLEARS LARGE AREAS

For the purpose of clearing large areas of stump lands in territories abandoned by lumbermen, thus preparing the ground for agricultural purposes, a self-propelling steam grubber has been invented, and is now being



Using the Tripod in Lifting a Large Stump Bodily from the Earth

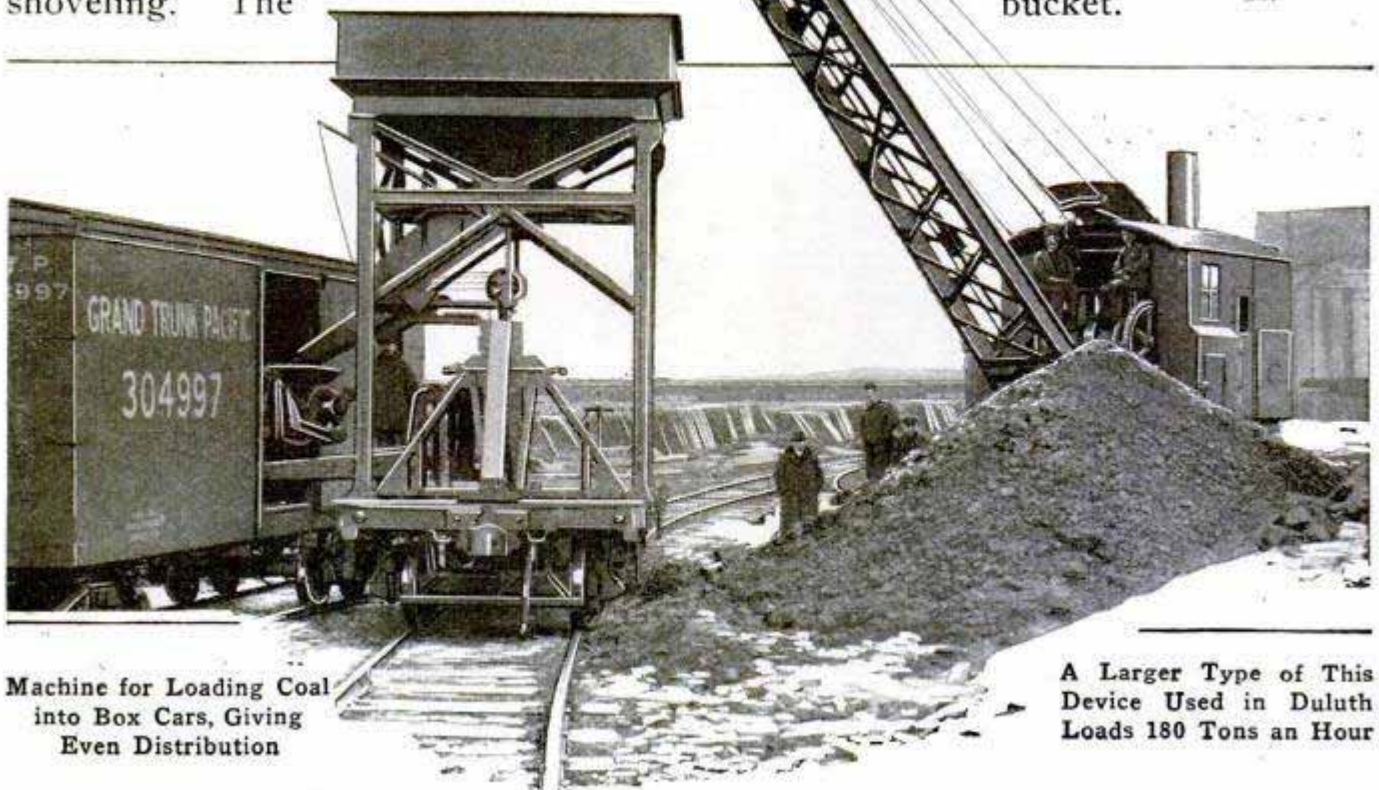
used successfully in certain districts in the north. In general appearance the machine is not unlike many tractors, excepting that it has a vertical boiler which extends to some height at the rear. For all ordinary work, it is first securely anchored and the stumps removed with cables by a direct pull of about seven tons, the steel ropes being wound by drums at the

front of the carriage frame. For heavy work, there is an auxiliary tripod which is fitted with five-sheave blocks which increase the pulling power of the machine to approximately 60 tons. This tripod is arranged so that, when not in use, it folds back on a running board. When it is in use, however, it is lowered so that all its legs rest firmly on the ground.

MACHINES LOAD COAL INTO BOX CARS

An electric box-car loader that loads at the rate of six 30-ton cars an hour is one of the machines in use at a Lake Superior port where coal in enormous quantities is brought in by lake vessels for distribution inland by rail. The principal feature of this loader is a swinging arm that is inserted through the car door and can be swung freely to any position. Carried on this arm is a belt conveyor, and by this means the coal is easily deposited in every part of the car without any necessity for shoveling. The

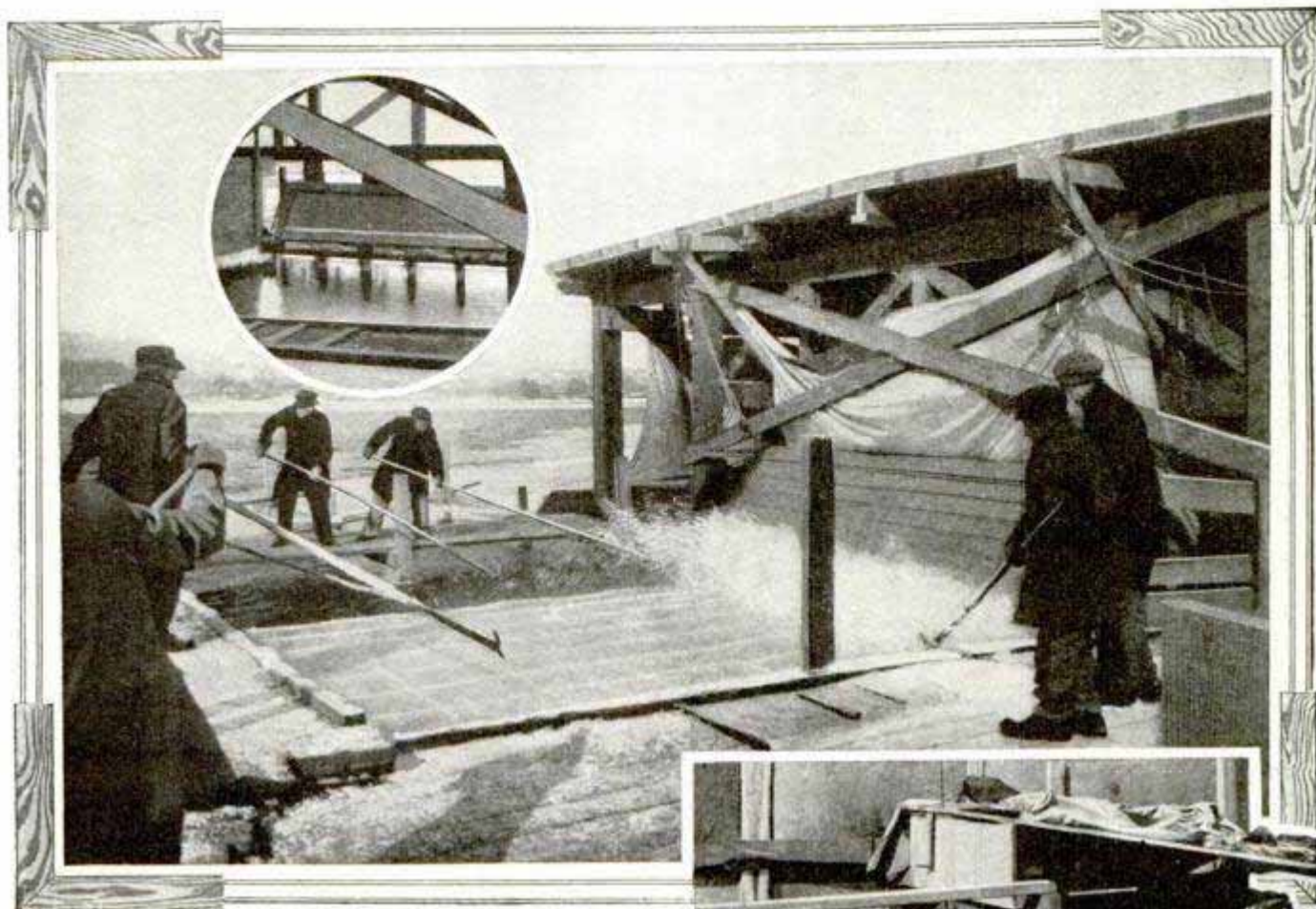
coal is fed to the conveyor by a chute which is provided with an adjustable deflector, for depositing the coal evenly on the belt when the arm is turned toward either end of the car. This machine is run by a 15-hp. electric motor, and is moved along a track adjacent to the coal pile as conditions may require. A smaller machine with loading equipment of the same type is more in the nature of a traveling loader, since it is capable of going anywhere on a standard-gauge track. This machine is equipped with a hopper through which the coal is supplied to the loading chute, the coal being picked up and deposited in the hopper by a clamshell bucket.



Machine for Loading Coal into Box Cars, Giving Even Distribution

A Larger Type of This Device Used in Duluth Loads 180 Tons an Hour

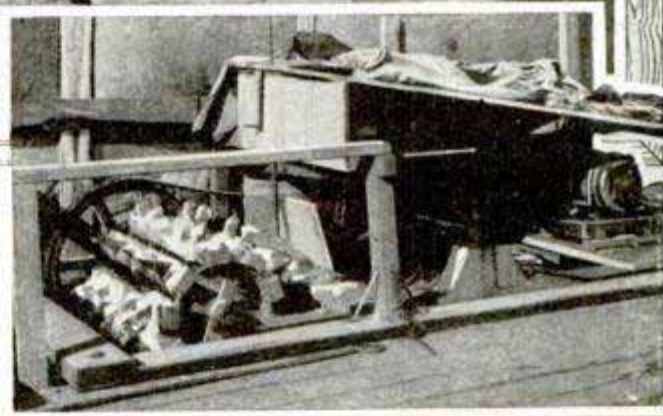
ELECTRIC SAWMILL REAPS HARVEST OF ICE



Cutting Ice with Electrically Driven Saws

Above: the First Set of Saws Which Cut It into Strips

An electric sawmill at Worcester, Mass., applies modern methods to ice harvesting. The plant comprises two gangs of saws with suitable devices for controlling the movement of the ice, as well as for skidding it up the long incline to the ice house. The sawmill is located within a few rods of the ice house and derives its power from a near-by electric power plant. The ice is sawed into blocks, approximately 16 ft. by 15 ft., out in the small lake, and poled to the mill. Here an artificial channel, about 20 ft. wide, is made, through which these cakes are driven, meeting first a set of six 36-in. saws, which cut the block into seven parallel strips 28 in. wide. These segments, still in close contact, are given a quarter-turn by the channel men with their long poles, and pass beneath a second set of eight saws, which cut the strips into cakes, each 28 in. by 20 in., there being 63 cakes cut from each



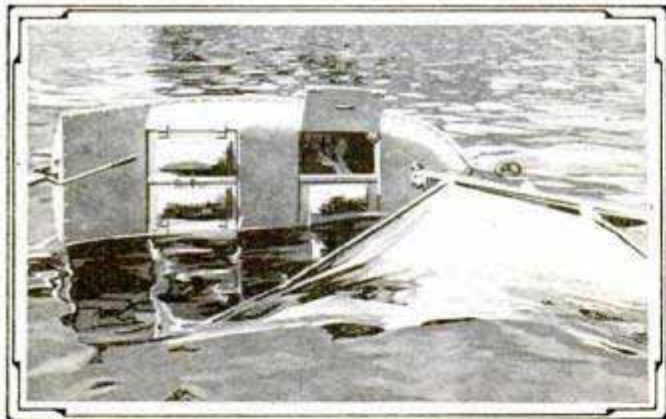
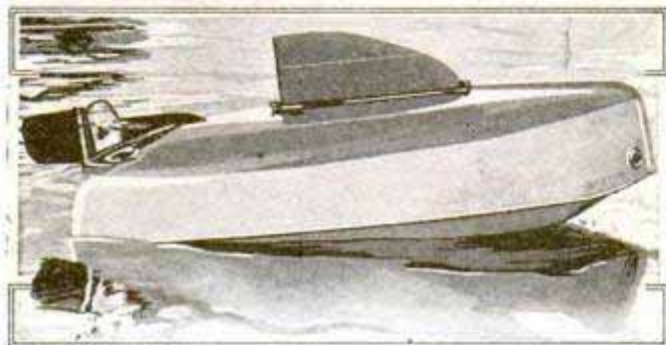
Electrically Driven Accelerator Which Feeds the Ice to the Saws

block. These small cakes, weighing approximately 200 lb. each, are then poled to a chain hoist which carries them into the ice house, which has a capacity of 40,000 tons. The entire operation of cutting the big block into 63 cakes consumes barely half a minute, and the installation is so compact and efficient that the services of 20 two-horse teams and 40 men are eliminated. The day's run is over 5,000 tons of ice.

☞ By means of a direction finder invented by Marconi a secret wireless station in Rome capable of communicating with foreign countries was discovered, and was destroyed by the government.

BOAT PROVES UNSINKABLE IN TESTS AT BERLIN

An unsinkable sailing lifeboat, which is fitted with an auxiliary motor, has been built by a German inventor and



The Doors in the Deck of This Craft Close Automatically When It is Capsized and, Though It be Bottom Side Up, the Occupants are Kept Dry and Supplied with Air; When the Boat is on Its Side the Trapdoors may be Opened

submitted to tests at Berlin which have demonstrated it to be seaworthy. The craft is built with a rounded bottom and broad beam, quite similar to the lines of a dinghy, while its top is decked. Two-leaved doors in the deck are opened when the boat is right side up, its occupants sitting in the hold. When a wave strikes the craft and capsizes it, the doors are automatically closed. The passengers are then within the craft. An aperture in one of the sides fur-

nishes them with air, while it is also possible for them to open one of the deck doors on the up side. In this way they can loosen the mast, and by throwing their weight to one gunwale, right the craft again. If it is impossible to reclaim the sail, the auxiliary motor may be put in use.

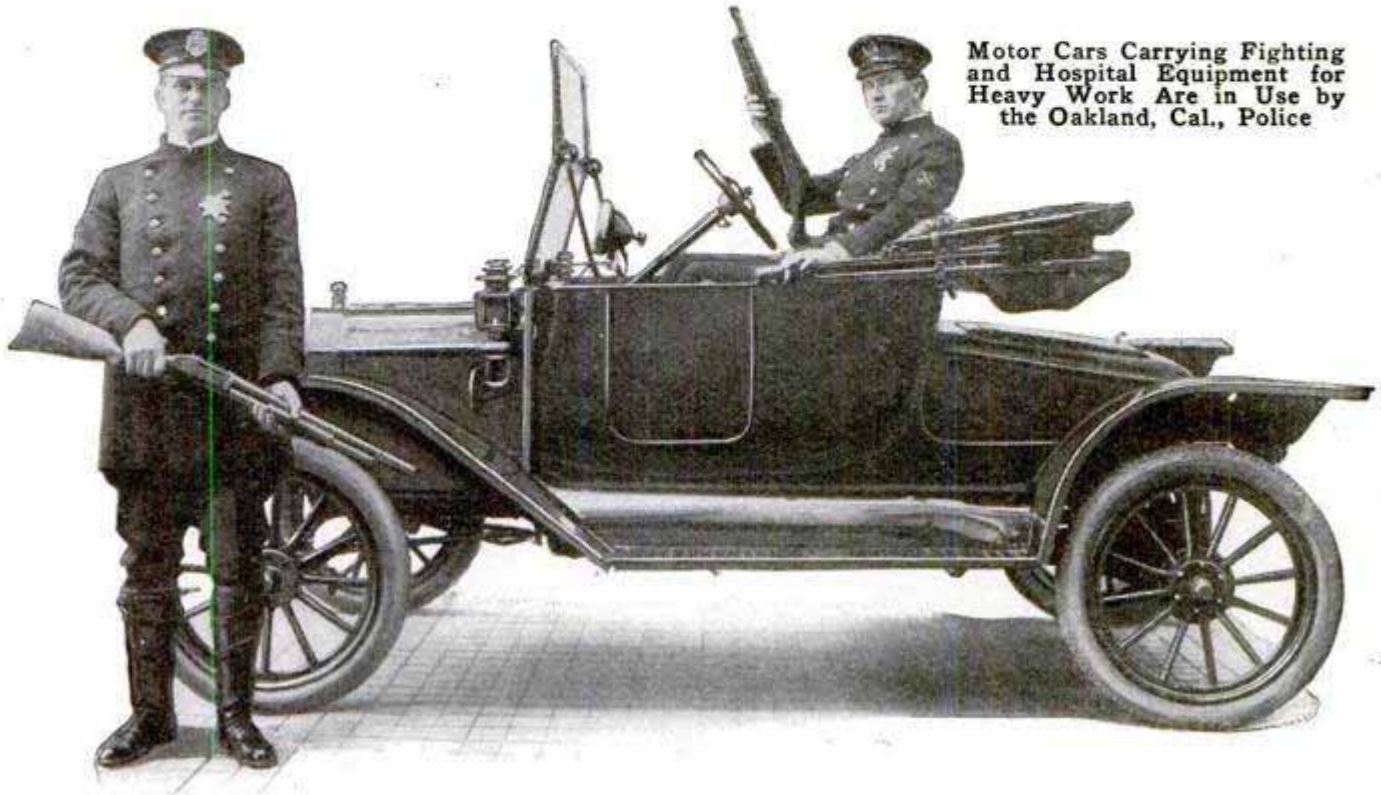
PROTECTING METALS WITH ALUMINUM ALLOY

A new step in the process of protecting iron and other metals from the effects of high temperatures by means of a metallic coating having a high degree of resistance to such effects has been taken in the development of the process known as calorizing. At a temperature much above red heat, iron, when exposed to the air, rapidly oxidizes and scales away, and the same thing happens with copper when it is heated above 572° F. The new process overcomes this by coating the metal with a mixture containing aluminum, and subjecting it to heat treatment so that a skin consisting of an aluminum alloy is formed over the metal under treatment. The apparatus consists simply of a revolving drum in which the metal to be treated is tumbled and which is filled with a mixture containing, among other things, aluminum in a finely divided state. The drum is highly heated so that the two metals unite as an alloy. In the case of copper this alloy is of the nature of an aluminum bronze, but is richer in aluminum and more resistant to heat than the ordinary alloy of that name. After iron is calorized the effect of heating is slight, and there is none of the burning and scaling that occurs when untreated iron is subjected to high temperatures. The process has already been used successfully for iron and copper vessels of various kinds, as well as for copper soldering irons and iron resistance wires used in heating devices. Pieces too large to be tumbled may be calorized by painting them with a suitable mixture, and then heating them to the required temperature.

MOTOR-CAR BATTERIES USED BY WESTERN POLICE

For patrolling the outlying districts of Oakland, Cal., the police department has been equipped with six motor cars,

that it may be possible to devise an instrument of such delicacy that the presence of a submarine, even when miles away, may be detected with certainty and its direction and distance determined. Such an instrument, like



Motor Cars Carrying Fighting and Hospital Equipment for Heavy Work Are in Use by the Oakland, Cal., Police

some of which are fitted with rapid-fire guns, hospital apparatus, portable fire extinguishers, and sawed-off shot-guns. Besides being fully prepared for emergencies, the machine makes it possible for the squad to cover a large territory much more efficiently than previously when horses were employed. The cars are intended for use at night and are reserved for such service, excepting in special instances. Since the patrolmen are in frequent communication with headquarters, it would be possible in cases of riots to rush more than a score of armed men and several machine-gun batteries to a scene of trouble in a comparatively short time.

DETECTION OF SUBMARINES MAY BE POSSIBLE

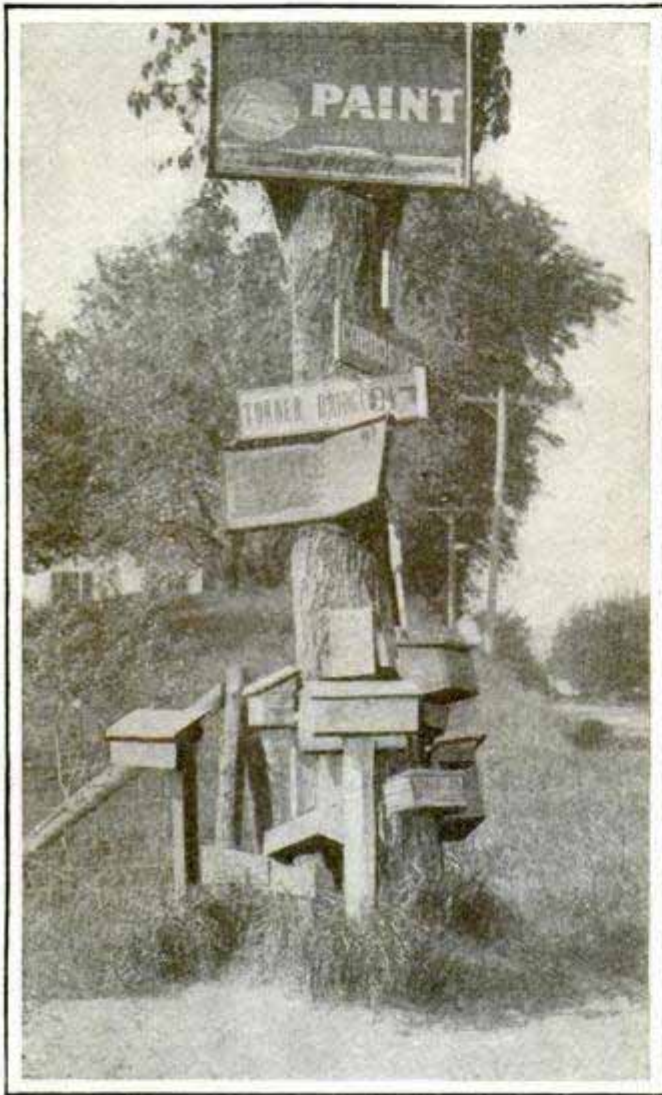
No matter how silently the engines of a submarine torpedo boat may work, the propellers are bound to set up vibrations that are transmitted through the water, and the suggestion is made

the submarine telephone, would simply take advantage of the strong transmission of sound waves through the water. It would practically rob naval warfare of one of its worst terrors. Seated far below deck in a battleship, the watcher with such an instrument could hear the throb of the propellers while the submarine was miles away and long before it would be possible to see its periscope, and its efficiency would not be affected by darkness or by muddy water. The presence of a submarine could doubtless now be detected by the submarine telephone. The problem for the inventor is that of devising a means of ascertaining the direction of the submarine and the distance to it.

President Wilson's message to the Governor of Hawaii, "May God bind the nations together in thought and purpose and lasting peace," was the first to be transmitted from the new wireless station at Marshall, California.

ELM TREE CARRIES LOAD OF MAIL BOXES

At a crossroad near Lewiston, Me., is an elm tree which bears the distinction of being harder worked than any



The Hardest-Worked Tree in Maine

other tree in the state. It acts as a support for 11 wooden rural mail boxes, and besides that furnishes a hanging place for seven signs, six of which are advertisements. This is the case despite a state law which provides that advertising matter shall not be displayed closer than 400 ft. from a junction of two highways.

FRENCH JOURNAL DESCRIBES GERMAN AIRSHIPS

Interesting sidelights are thrown on the European war by a recent issue of *L'Aerophile*, a French publication devoted to the interests of airmen. As announced on the cover the

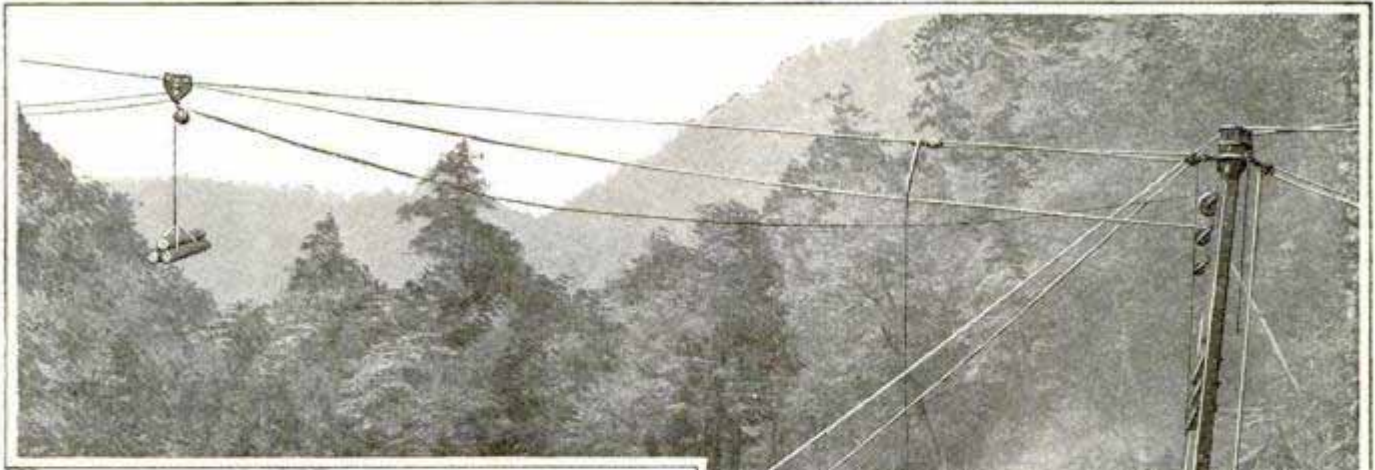
issue is devoted entirely to, "What One Should Know of the Aerial Enemy." In addition to descriptive text four pages are given to diagrams of the German biplanes and monoplanes in order that any of these may be recognized at a glance. The three types of German dirigibles, the "Zepelin," "Schuette-Lanz" and "Parseval," are also illustrated. In tabulated statements the characteristic features of these machines, such as dimensions, method of control, kind and horsepower of motors and speed in kilometers per hour, are given. One map shows all the aviation stations in Germany while another shows the aerial lighthouses. One page is devoted to the aerial military equipment of Austria-Hungary.

PORTABLE GANGPLANK AT GATUN LOCKS

A portable gangplank for the debarkation of the pilot and of the special canal crews assigned to vessels that do not carry a sufficient number of men for handling the lines in the locks, is to be installed on the center wall of the Gatun locks. The idea of this gangplank is that it can be run out to a vessel while the water in the lock chamber is equalizing and the debarkation of anyone on board can be carried out without delay to the vessel.

SHORT LOGGING ROAD HAS NINE SWITCHBACKS

Although it is less than 17 miles long, a railroad just completed in North Carolina has nine switchbacks and is described as consisting of an almost continuous succession of curves. This railroad, which is said to be the highest steam road east of the Rocky Mountains, is a logging road built to bring out spruce and balsam timber from a 9,000-acre tract of land around Clingman's Dome, Mt. Mitchell, and others of the highest peaks in western North Carolina. The road has a gauge of 3 ft., is located along the eastern side of



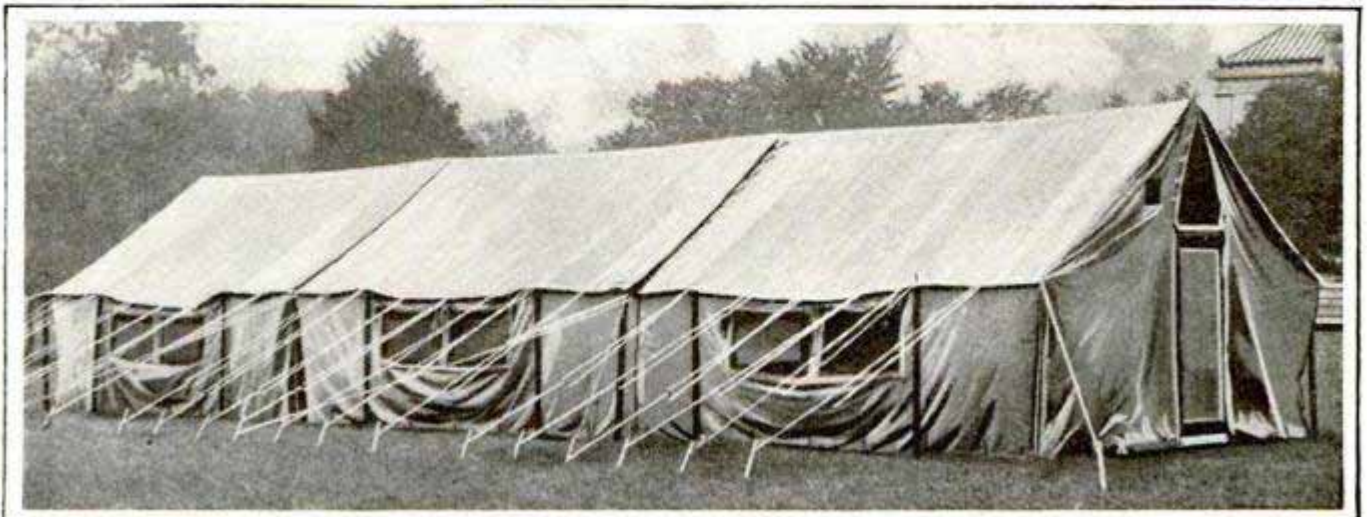
Aerial Tramway and Loading Crane at Work Bringing in the Timber from the Forest and Loading It for Shipment

the Black Mountains, and reaches an elevation only a few feet lower than that of Mt. Mitchell, which has an altitude of 6,711 ft. above sea level. At present this railroad is used exclusively for bringing out timber, but it is planned to install passenger equipment for the benefit of tourists. Along the upper end of the road are aerial tramways for bringing the timber in from the forest, and modern equipment for handling and loading. The maximum grade is about five per cent, which necessitates the use of geared locomotives.

INSECT-PROOF ARMY TENT IS TIGHTLY SCREENED

Tests have recently been conducted at Washington with a combination kitchen and mess tent, which is de-

signed for military use, and is proof against both flies and mosquitoes. The doors, windows, and all ventilating openings are provided with wire screens of fine mesh. In dimensions the tent is 16 by 54 ft., while its interior is divided so that a third of the space is occupied by the kitchen and the remainder by the dining room, which is large enough to accommodate

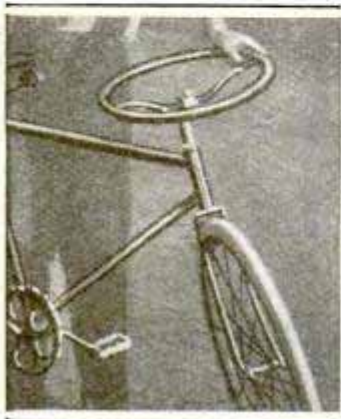


Flyless Tent Which the Government is Considering Adopting for Military Service

a company of infantrymen. The screened spaces are fitted with drops so that they may be covered in case of storm. When open, however, the ventilation thus obtained frees the inclosure from smoke and cooking odors.

STEERING WHEEL FOR BICYCLES

A steering wheel instead of the usual



handlebar is a feature of bicycle construction that is coming into vogue. The steering wheel is 16 in. in diameter and is mounted on a special steering post. It is said to add to the comfort and convenience of the rider in handling his wheel.

MOTOR TRUCK IS DESIGNED AS REFUSE COLLECTOR

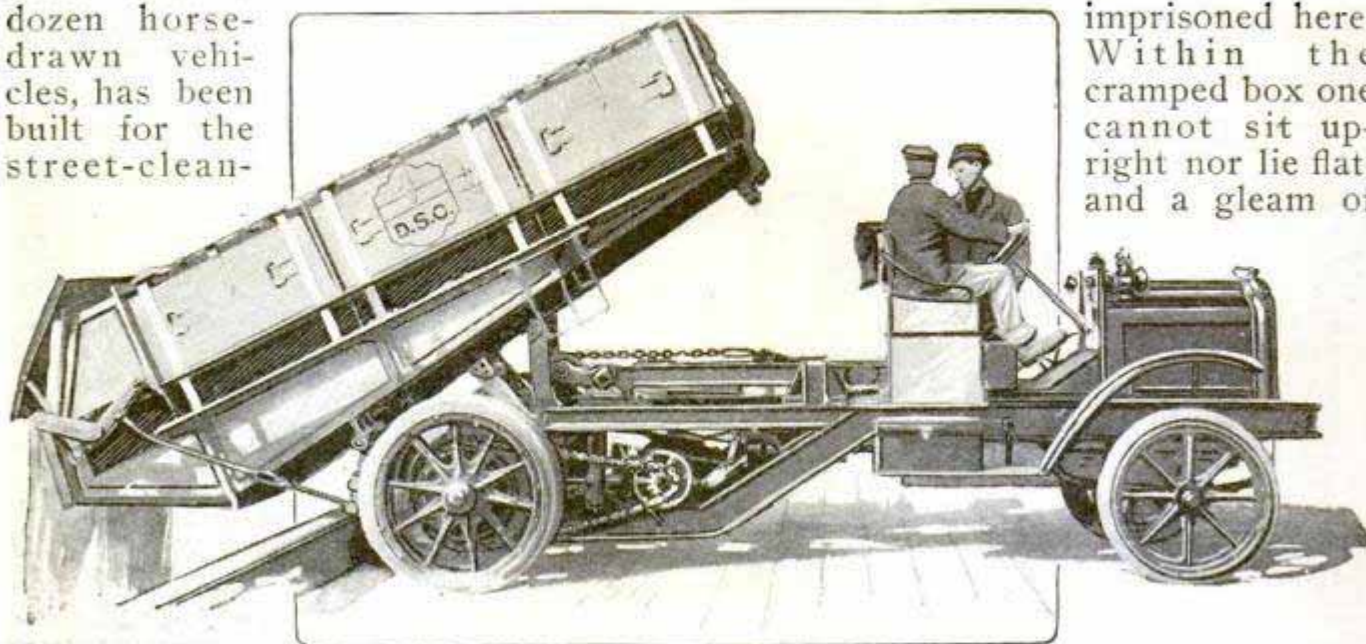
Through coöperation between municipal engineers and representatives of a motor-car company, an especially designed refuse-collection truck, which, it is estimated, performs the work of more than a dozen horse-drawn vehicles, has been built for the street-clean-

ing department of New York City. The machine was constructed in an attempt both to decrease the cost of long haulage and to increase the efficiency of the collection system. The truck is built with an underslung frame, has a carrying capacity of 252 cu. ft., has sectional sides, which are removable, making it unnecessary in loading to lift refuse receptacles more than waist-high, and is provided with a tight sectional-door covering. It is possible for one man to handle the machine, a simple operation dumping the contents in almost any place, the body rising to an angle of 53°. One of the chief advantages claimed for the truck, aside from its general efficiency, is its sanitary features.

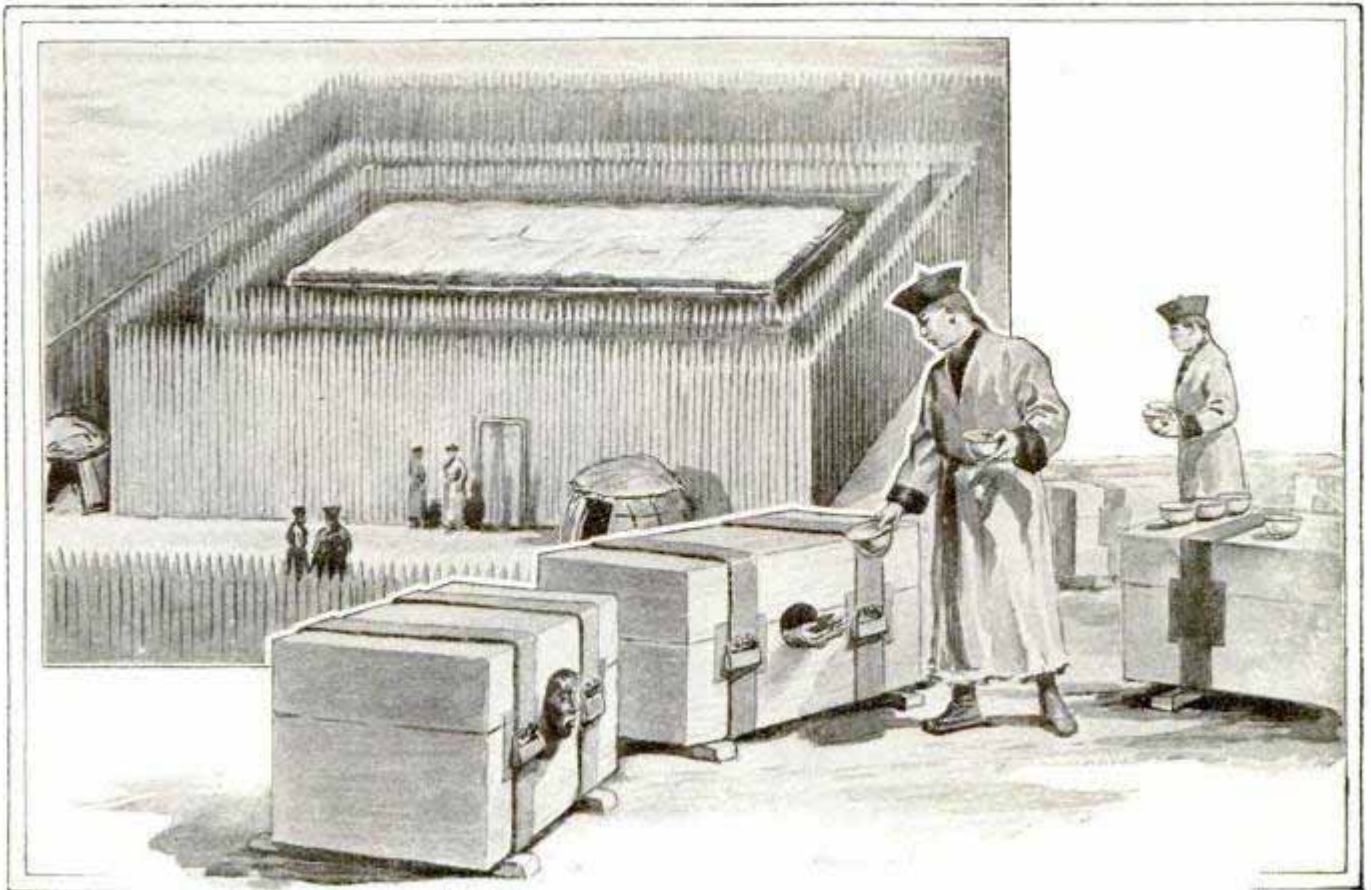
MOST TERRIBLE PUNISHMENT IN THE WORLD

Political offenders in parts of Mongolia are punished by lifetime immolation in coffinlike boxes stored away in dark dungeons. These boxes are only large enough to contain a man. There is but one aperture, and that no larger than his head. His hands are manacled, and twice a day attendants bring food and drink, which are placed in the shackled hands outstretched through these round windows, which are his only communication with the world. Many highly educated Chinese,

so it is said, are imprisoned here. Within the cramped box one cannot sit upright nor lie flat, and a gleam of



Dumping the Contents of the Refuse Collector into a Barge



COURTESY OF ILLUSTRATED LONDON NEWS

Confinement in Boxes Used as a Means of Punishment for Political Offenders in Mongolia

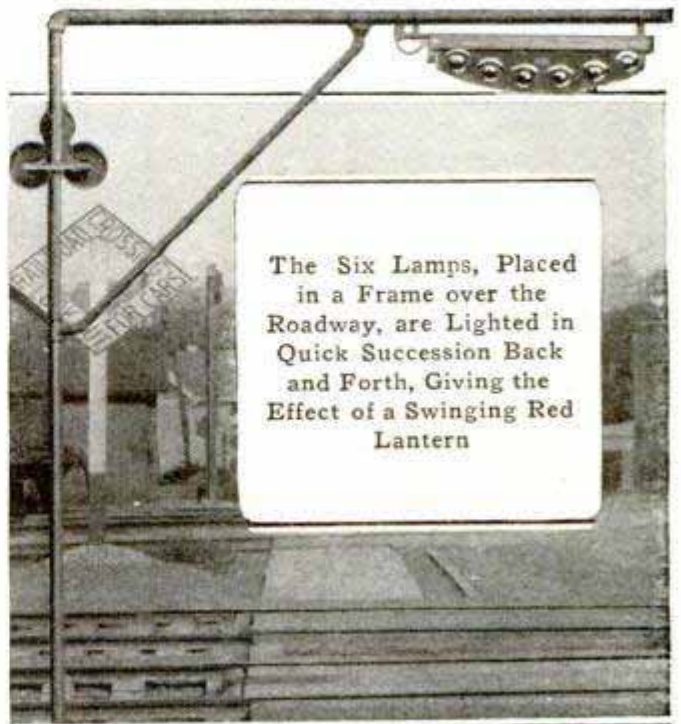
daylight is seen only when the door swings open to admit the attendants bearing food. The picture shows some of the prison boxes in a dungeon in Urga, in northern Mongolia.

GOVERNMENT GIVES WARNING TO APPLE GROWERS

In view of present trade conditions, the Department of Agriculture has issued a statement admonishing the apple growers of the nation to place their crop in cold storage, in order to steady the market and lengthen the selling period. The advice amounts to a warning, the hope being to forestall glutting which would result in prices representing a net loss to the grower. The fruit should be picked at full maturity and placed in refrigeration immediately. The picking should be done when the ground color begins to whiten or yellow. Apples taken from the trees at that time are less affected by scald and decay than those harvested when they are either immature or over-mature.

APPARATUS THAT IMITATES SWINGING OF LANTERN

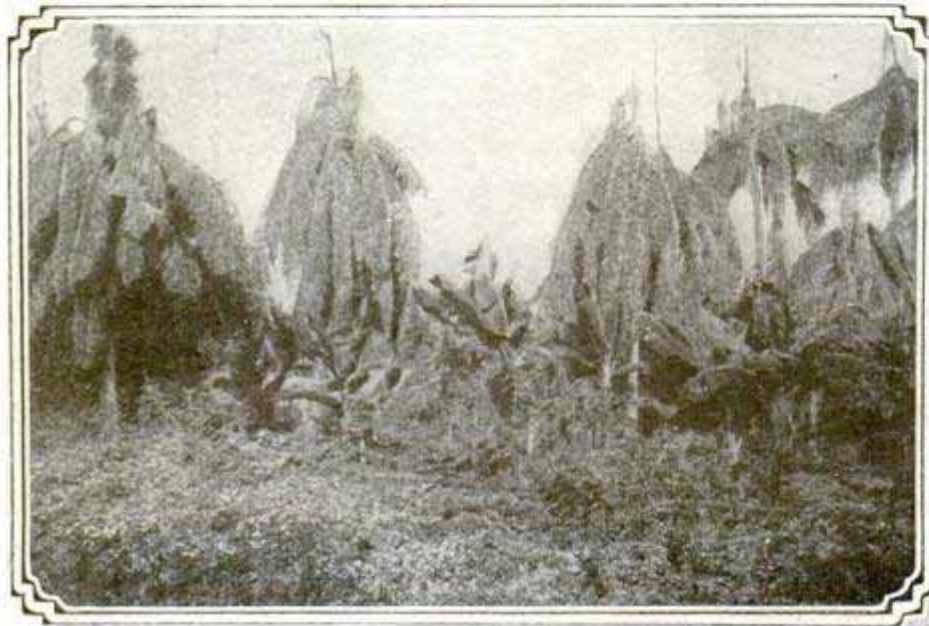
By an ingenious arrangement of red lamps, the swinging of a flagman's lantern is closely imitated by an automatic "flagman" recently placed in service on a railway in New York. The



frame carrying the six lamps is suspended on an arm that projects out over the roadway in such a position that it is in plain view of approaching traffic. The lamps are arranged in a curve having its convex side downward. They are connected with the track circuit that operates the crossing

bell, and the lamps are therefore in operation whenever the bell is ringing. By means of a circuit-breaking apparatus they are lighted and extinguished rapidly in succession back and forth, so that the effect is that of a swinging lantern, a signal more likely to be seen than a stationary light.

A PLAGUE OF LOCUSTS IN THE PHILIPPINES



Branches of Palm Trees
Broken by the Weight
of Hosts of Locusts



The Cornfield When the Locusts had
Passed On

Agricultural conditions in the Philippines are constantly being studied by the Department of Agriculture with a view to improvement. A not uncommon problem is that presented by swarms of locusts which sometimes devastate whole districts. A cloud of these pests



A Cloud of Locusts Swarming Down on a
Cornfield in the Philippines

was photographed while settling down upon a cornfield near a grove of palms. The leaves were stripped, the branches of the palm trees were broken down by the weight of the masses of locusts swarming upon them, and after a brief period of rest, the locusts passed on, leaving desolation behind them. No means of controlling locusts has been discovered.

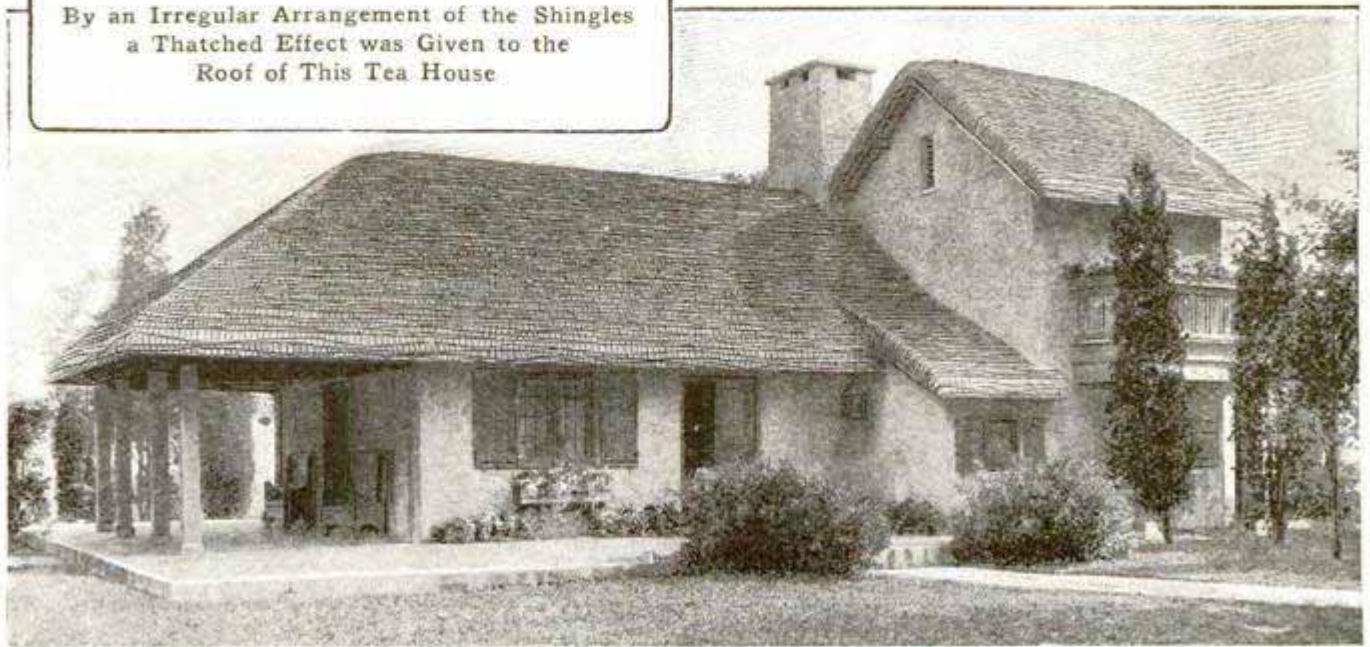
PARIS ENDS USE OF WAGONS WITH STEEL TIRES

Vehicles with steel-tired wheels will be prohibited in the principal parts of Paris after the first of January, according to a traffic ruling promulgated recently. The result of the order has been that many wagons and carriages fitted with the passing type of tires have been remodeled to meet the requirements. Those vehicles which are still using metal tires are being compelled to drive slowly.

ODD SHINGLE ARRANGEMENT IMITATES THATCHED ROOF

A cozy little tea house which was recently built on a New Jersey country estate has been given an unusually quaint roof effect. The shingles are laid in an irregular manner so that they closely imitate a thatched roof, yet this artistic effect has not been achieved at the sacrifice of service. Before being used the shingles were steamed and stained in golden and dark-brown colors, which blend together harmoniously. They were then used indiscriminately, without attention to tone, and placed unevenly, the result being that from a short distance the roof bears an extremely odd and pleasing appearance.

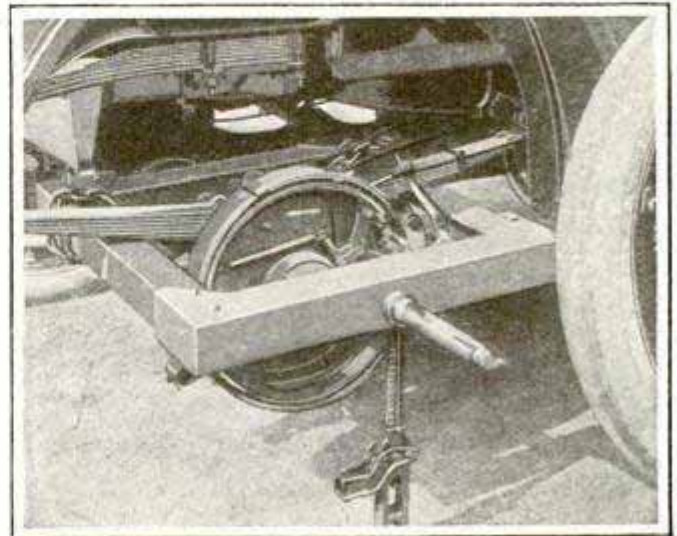
By an Irregular Arrangement of the Shingles a Thatched Effect was Given to the Roof of This Tea House



E. H. JAMES, ARCHITECT

TRUCK FOR MOTOR VEHICLE WITH BROKEN AXLE

As a part of the wrecking equipment for a service car, an apparatus which makes it possible to attach a dummy



A Device Which Eliminates Trouble in Towing a Motor Car Which Has a Broken Axle

wheel to a motor car, disabled by a broken axle, has recently been patented. The device consists of a rectangular frame, constructed from angle iron, which carries on one end a stub shaft and wheel. By chaining this under the springs and to the broken axle of a car, jacking it up and fitting an extra wheel on the shaft thus provided, the towing of a wrecked car to a garage is made a comparatively simple operation. The temporary wheel is purposely held several inches out of line in order to avoid damaging the fender.

CHRISTMAS-TREE SUPPORT KEEPS NEEDLES FRESH

A Christmas-tree holder which keeps the tree green and prevents the leaves



A Christmas-Tree Support Which Keeps the Branches Green

from falling, has been devised. It consists of a japanned pan which has a conical receptacle fitted in the middle of it into which the tree is set. Three metal braces, which may be folded

down when not in use, extend from the rim of the pan and are screwed to the trunk of the tree. When the tree is in place, water is poured into the container, preventing the tree from drying out, and to a degree making it less inflammable.

NOVEL SCHEME FOR LIGHT- ING WINDOW DISPLAY

Instead of leaving the lights turned on continuously to illuminate his display window an enterprising jeweler connected the lights with a push-button switch outside the entrance to his establishment and placed over it the sign "You can see our store by pushing this button." The scheme is said to have been successful in attracting attention to the window display.

TIME-WORN BRIDGE STANDS IN HILLS OF EPIRUS

In little-known Epirus, the ancient district joining the boundary of northern Greece, which, lying along the Ionian Sea, corresponds to the southern part of Albania, are to be found many enchanting places tucked away



Old Bridge in Picturesque Spot in the Mountains of Epirus

in the mountains which speak of the days of Homer and the far-famed oracle of Dodona. In these romantic passes, studded with age-worn rocks, are picturesque streams where the water carriers occasionally come to fill their earthen urns. In some of these secluded places are weathered bridges of masonry, built—many of them—years ago by the Turks. It is in this district that a rebellion recently occurred as an aftermath of the Balkan War.

MEAT-BRANDING INK SUPPLY IS THREATENED BY WAR

Because existing trade conditions have rendered it practically impossible to obtain the materials used in making branding ink, such as is employed in stamping hams, bacons, and various other meats, the Department of Agriculture has issued a warning, impressing the importance of eliminating all waste in connection with its use. It has been found necessary to discontinue furnishing packing companies with the ink for their private brands. Temporary permission has been given, however, for the use of an ink composed of lampblack, grain alcohol, glucose, and glycerin for this purpose. Stamps which in the past have been applied to the burlap and other covers of the meat with official branding ink, will be applied in the future with the lampblack mixture.

TO CLEAR PATENT OFFICE OF OLD APPLICATIONS

Efforts are being made by the commissioner of patents to clear the department of applications which have been on file for long periods. An order is now in force making special every application, including those purporting to be divisions or continuations, which has been filed for five years or longer. Amendments in behalf of long-pending applications, or papers of similar character, after November 30, this year, cannot be entered except by first calling the matter to the attention of the commissioner.

DOUBLE SOAP-BUBBLE PIPE AMUSEMENT NOVELTY

A pipe for blowing double soap bubbles, one within the other, is a recently invented novelty. The stem



Pipe Which Blows One Soap Bubble within the Other

has two openings, each leading to a separate bowl, the smaller of which is contained in the larger and protrudes out of it. By blowing through the hole leading to the outer bowl the large bubble is started, and then by passing air through both of them simultaneously the double bubble is formed. By a quick, short blow the inner bubble may be broken from the pipe so that it floats within the other, revolving rapidly.

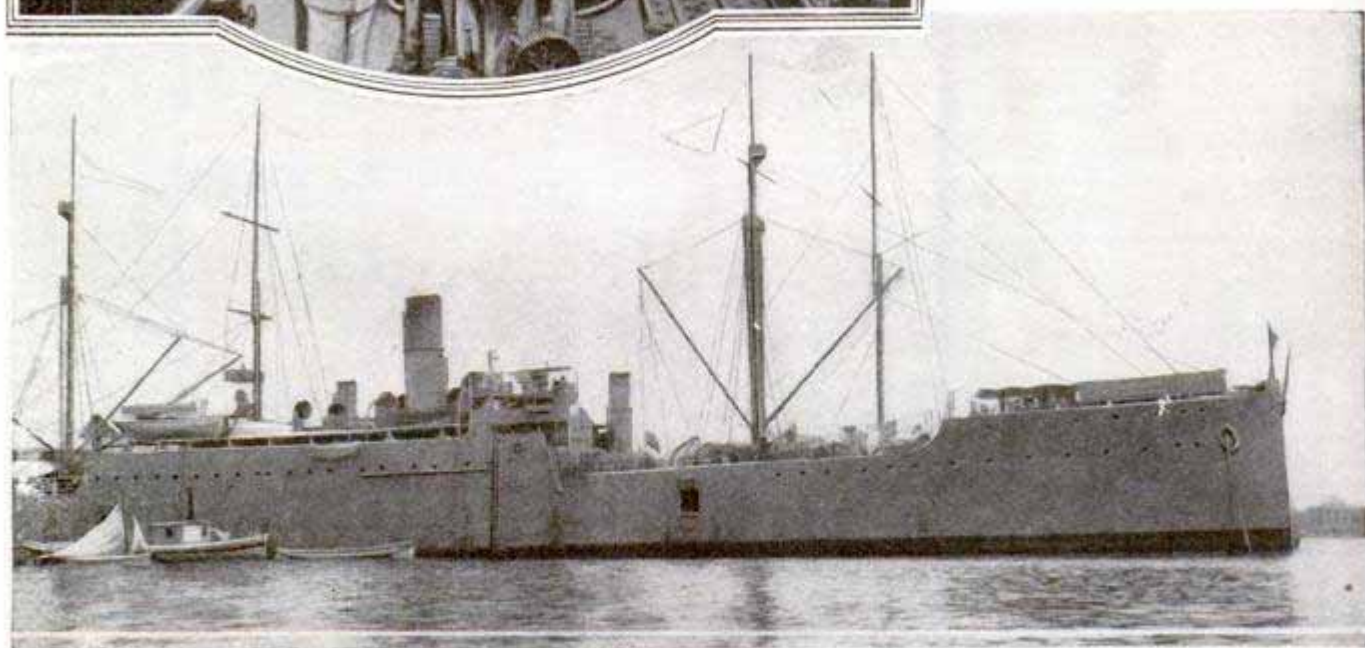
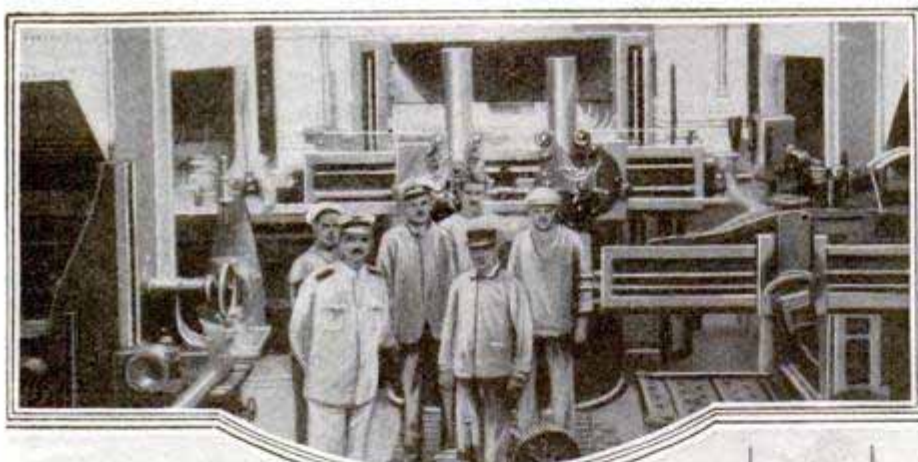
ⒸPipes made of asphalt paper and capable of being used for anything except hot liquids, concentrated acids and petroleum products, are being introduced in Austria.

NAVY REPAIR SHIP IS FLOATING MACHINE SHOP

One of the biggest factors in the efficiency of the United States Navy is not a fighting ship at all, but a repair ship. This ship, the "Vestal," the first of its kind to be placed in service in the United States Navy, is in effect a floating navy yard, capable of doing practically anything in the way of repairs to the fighting ships and their equipment, with the exception of cases where dry-docking is necessary. The "Vestal" was originally built as a collier, was later converted into a repair ship at a cost of about \$1,800,000, and was placed in service with the navy less than a year ago. At the time this work was done, the plan of operating a repair ship was regarded as an experiment. But the "Vestal" has already demonstrated the value of the plan by keeping the entire

fleet constantly on the job and ready for instant action, and has saved at least two vessels, the cruiser "Salem" and the gunboat "Nashville," from being towed thousands of miles to the nearest navy yard.

Aside from the space required for the operation of the ship and the quartering of the crew and workmen, the whole of this vessel is given up to shops of various kinds, all equipped with machinery and tools of the latest type. Distributed among the different decks are a machine shop, foundry, blacksmith shop, tin and copper smithy, boiler works, galvanizing plant, pattern and carpenter shop, cooper shop, shipfitter's store, electrical shop, optical and watch-repair shop, and a drafting room. In every shop are the best of skilled workmen. Practically every kind of repair work required by the fleet, from putting a new mainspring in a watch to shaping a new propeller shaft for one of the big war vessels, is being done on board the "Vestal," while it is said that only one fac-



COURTESY OF CHICAGO DAILY NEWS

Above: One End of the Machine Shop: In This Shop are Lathes Capable of Shaping the Heaviest Repair Parts for the Fighting Ships

Below: View of the Repair Ship "Vestal" Anchored in Vera Cruz Harbor, Showing How the Upper Decks are Arranged and Equipped for the Transfer of Heavy Material

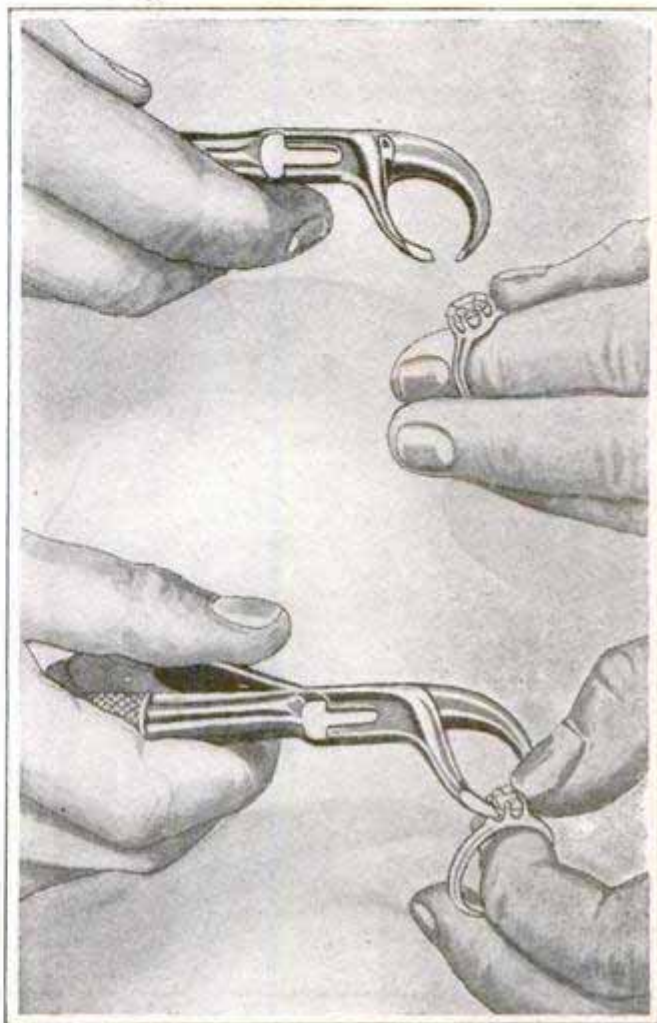
tory in the United States can do the delicate work on the high-power lenses of binoculars, telescopes, and range finders that is done regularly in the optical shop of this vessel. The machine shop occupies the greater part of two decks, the middle part of the upper deck being cut away to give headroom and the remainder made into galleries extending along the sides of the ship. In the center is a 3-ton traveling crane for carrying material to and from the big machines on the lower deck. In the foundry is a 150-ton hydraulic press. This was installed for the reason that a steam hammer would not be suitable for ship use.

When a new shaft for the fast scout cruiser "Salem" was needed while that vessel was on blockading duty at Vera Cruz, it was turned on one of the lathes of the "Vestal," and when General Funston needed additional ammunition cases for getting into the Mexican sand hills, an appeal to the commander of the "Vestal" brought an ample supply within two days. An explosion on the "Salem" wrecked its boilers. These were repaired and made as sound as ever without that ship being compelled to leave Mexican waters, while entirely new boilers were made and installed on the "Nashville" when it was discovered that its boiler equipment was defective. The upper deck of the "Vestal" is arranged for convenient transfer of material to and from the ships being repaired, and is equipped with powerful hoisting apparatus. The shops work 24 hours a day. Keeping the American fleet in fighting trim is a big undertaking, and it was not uncommon at Vera Cruz to see as many as five warships tied up at one time alongside the "Vestal," undergoing repairs.

EXTRACTOR REMOVES GEMS FROM SETTINGS

To overcome the difficulty encountered by jewelers who frequently find it necessary to remove a diamond or other stone from its mounting in order that it may be weighed or examined, an extractor has been made which per-

forms the operation quickly. The instrument is supplied with two tongs, one of which spreads the claws of the



Instrument Which Removes Diamonds from Their Setting for Examination

mounting apart by wedging between them, while the other exerts an upward pressure upon the stone, lifting it out. The procedure consumes only a moment's time and injures neither the stone nor its setting.

BRITISH SOLDIERS' LETTERS ARE PRINTED FORMS

Communications sent by soldiers engaged in the present European war to their families, sweethearts, and friends, are being subjected to what is undoubtedly the strictest censorship ever imposed by any government during time of war. Great Britain has supplied her troops with printed postcards which bear a series of general statements regarding the sender's personal condition, but to which absolutely nothing may be added excepting the

name of the soldier and the date of posting. The sentences are merely conventional remarks that "I am well,"

NOTHING is to be written on this except the date and signature of the sender. Sentences not required may be erased. If anything else is added the postcard will be destroyed.

I am quite well

~~I have been admitted into hospital.~~

~~{sick} and am going on well~~
~~{wounded} and hope to be discharged soon.~~

~~I am being sent down to the base.~~

~~I have received your {letter, telegram, parcel.}~~

~~Letter follows at first opportunity.~~

I have received no letter from you.

~~{lately.}~~
{for a long time.}

Signature only.

Date *30/8/14*

[Postage must be prepaid on any letter or postcard addressed to the sender of this card.]

The Love Letter of a British Soldier, Printed for Him by His Government

"I have been admitted into hospital," or "I have received no letter from you." In using the card the soldier crosses out the sentences which do not apply to himself. No postmark is stamped on these cards.

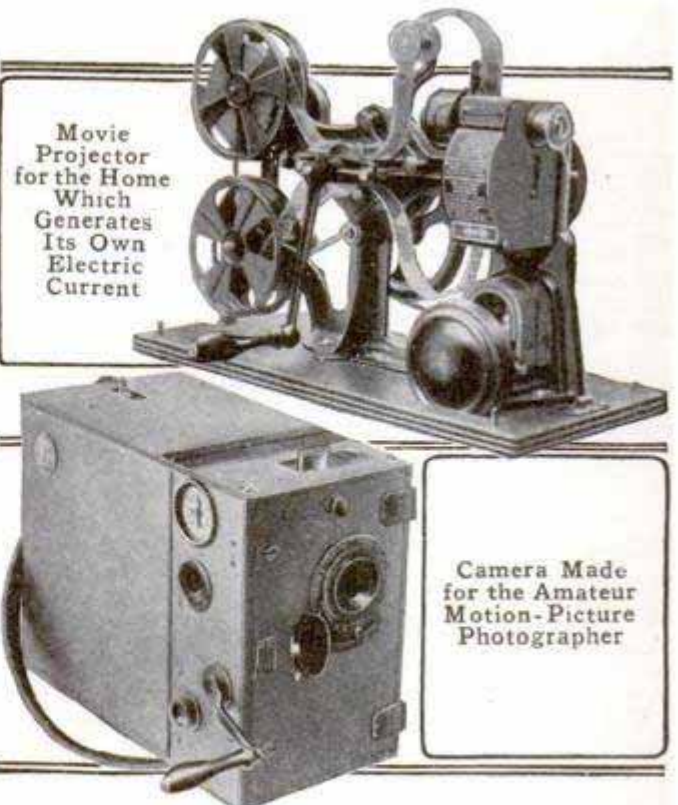
OXYGEN NOT INJURIOUS TO IRON

Contrary to the general belief that any considerable amount of oxygen contained in iron has an injurious effect, a series of experiments extending over a period of two years have proved, according to the statement of an expert, that all exceptionally good iron has an oxygen content of from .04 to .10 of one per cent, while poor iron, in addition to being high in carbon, usually contains less than .01 of one per cent of oxygen. Following this discovery, additional oxygen was put

into poor iron by remelting it with highly oxidized products, with the result that it was converted into the best quality of iron, while good iron after being weakened with a deoxidizer was greatly reduced in strength. The explanation offered for this action is that the oxygen closes up the grain of the iron by reducing the graphite from flat flakes to small round balls, and that it seems to cause the easily melted alloys to form a meshlike crystalline structure in which there are no gashes or planes of cleavage.

PARLOR MOVIE PROJECTOR MAKES ITS OWN LIGHT

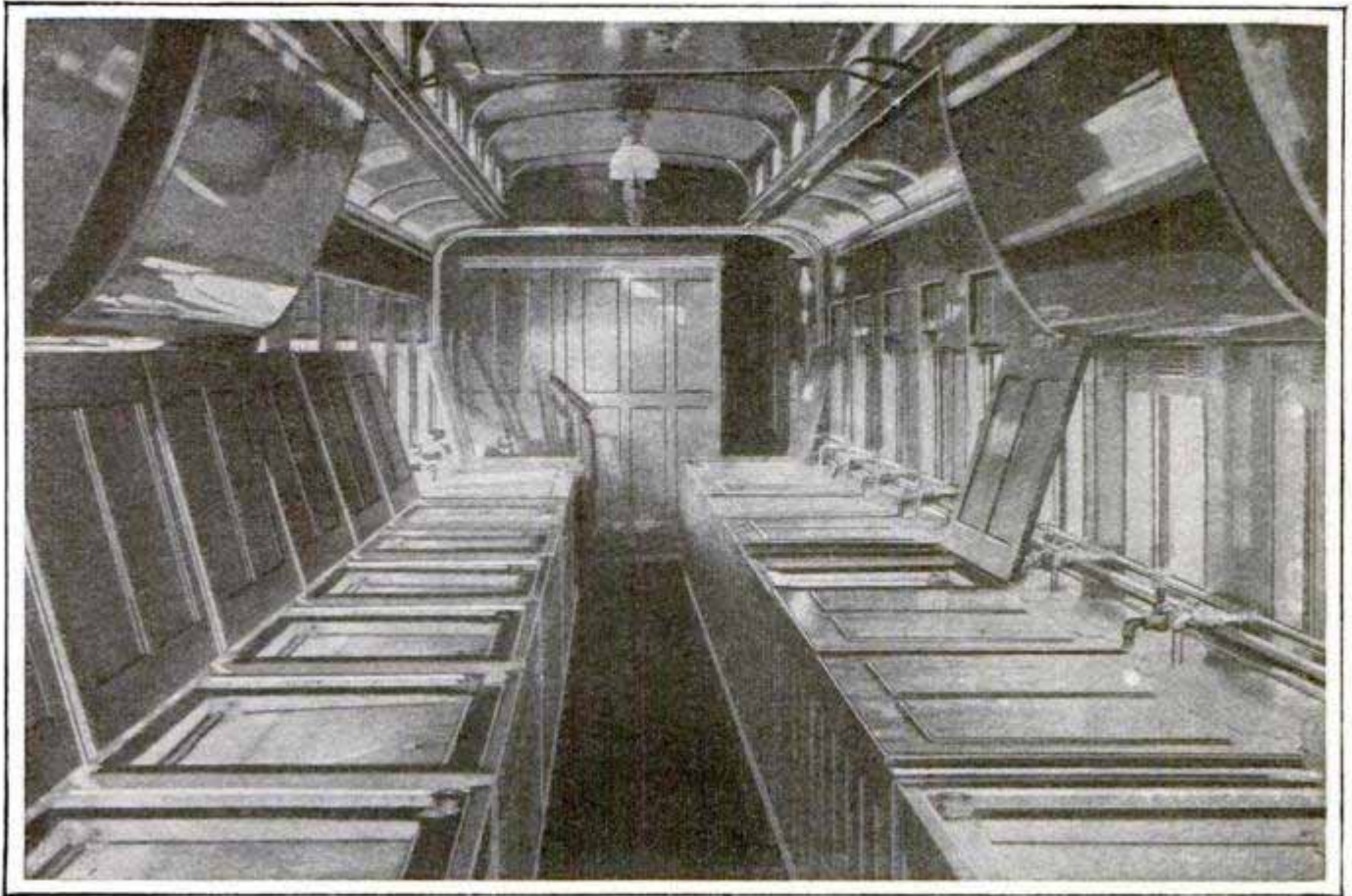
A motion-picture projector designed primarily for residence use is entirely self-contained, and generates* its own lighting current, making it unnecessary to supply electric wiring in order to operate it. In case electric current is available, however, it may be made both to turn and light the machine. The machine uses special films, supplied by the manufacturer, which are narrower than the standard and non-inflammable, making the apparatus



Movie Projector for the Home Which Generates Its Own Electric Current

Camera Made for the Amateur Motion-Picture Photographer

safe for even a child to use. A camera for making motion pictures on this special film is also being introduced.



Car in Which Fish are Carried throughout Iowa When Rivers and Lakes are being Stocked

FISH TRAVEL IN "PULLMAN" TO STOCKING PLACES

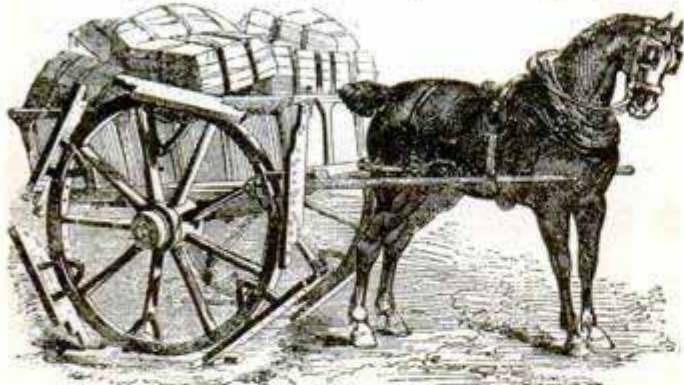
For the purpose of transporting fish over the interior of Iowa during the season when the rivers and lakes are stocked, an aquarium car has been built for the use of the state fish and game warden. Two-thirds of its space is occupied by a series of tanks in which the fish are carried, saved in every possible way from jolts and rough handling. The water is kept fresh by continual changing and is aerated constantly by means of compressed-air pumps. During the fall, fish are seined from the shallow ponds and bayous along the Mississippi River where they have been caught by the receding water. Medium and large-sized fish are transferred to the car, while the small ones, or "fingerlings," are deposited in the main channel of the river. Last year 527,000 bass, pike, and perch were distributed during the fall, while it was estimated that ten times that number were saved from death by being removed from the shallow pock-

ets. Pullman berths are arranged in the main part of the car for the attendants, while a living room and office are provided at one end for the warden.

BRITISH CRIMEAN EQUIPAGE APPLIED IN WAR TODAY

Although detachable rims with flat feet for gun-carriage wheels, such as are used in the present European war, have been considered of recent development, essentially the same device was used by the British during the Crimean War. At that time the arrangement was only crudely worked out and consisted merely of movable rails attached to the wheels in such a manner that a large bearing surface was afforded on the ground. With wheels fitted with these feet, it was possible for the British to push their equipment trains over marshy or uneven ground, which in many instances would have otherwise been impassable. The detachable treads which have enabled the German artillery to introduce 11-in. howitzers, weighing many tons, on the

battle field, are not different in principle from this improvised apparatus used by the English years ago, al-



COURTESY OF THE CAR

Crude Wheels of British Army Cart Used Years Ago, Significant Now in View of Their Adaptation to the Heavy German Guns

though the Krupp engineers have been given credit for them as a new invention. The principal difference in the modern device is that it is detachable.

ELECTRIC FANS ARE USED IN FIGHTING FIRE

Electric fans were recently employed by the Boston fire department to drive dense smoke and pungent gases from the basement of a burning building in which a large stock of chemicals had taken fire. The blaze was gaining headway because it was impossible for the firemen to enter the storeroom and remain there without suffocating. Six electric fans were placed in the rear of the basement so that their force was directed against the smoke, driving it out through the front windows. The plan proved successful, and it was only a comparatively short time until the smoke was sufficiently cleared to allow the firemen to work in the room without serious difficulty.

CURIOUS BOAT USED AS FERRY IN INDIA

The broad, slow streams in the Punjab are crossed by Indian ferry-men on strange-looking boats, made from inflated buffalo skins. These may be carried on the

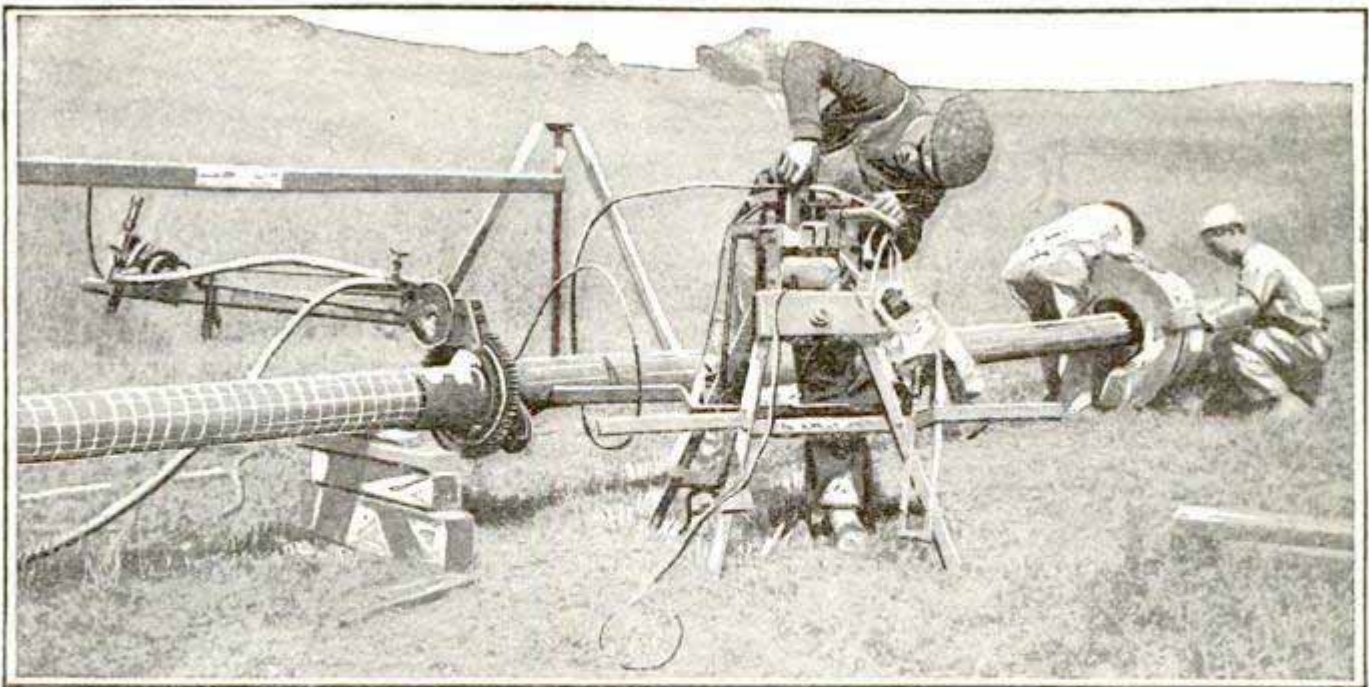
Inflated Buffalo Skins Used as Boats

back, or rolled up and inflated at the river's brim. When used as a ferry, the ferryman stretches himself flat upon the inflated skin, and paddles and steers with hands and feet, while his passenger perches as best he may on the skin. Several of these inflated skins, joined together and carrying



COURTESY ILLUSTRATED LONDON NEWS

sticks or boards, make a safe raft, and are by no means uncommon modes of journeying downstream throughout India.



Machine That Winds Wood-Stave Pipe with Wire. In the Foreground the Electric Welder for Attaching a Fresh Reel of Wire

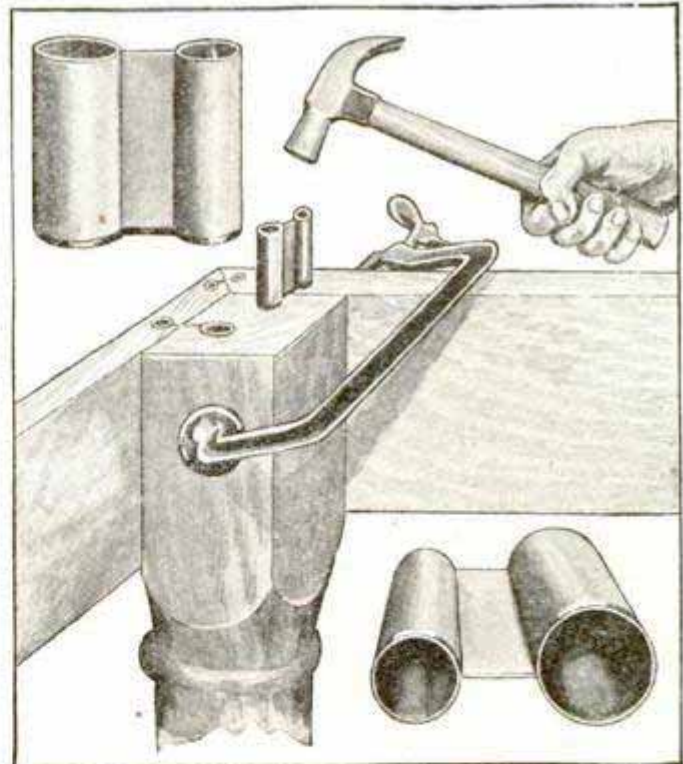
MACHINE FOR WINDING WOOD-STAVE PIPE

In a new method of constructing wood-stave pipe for irrigation and power purposes, now in use in California, the staves are secured in place by wire wound continuously around the pipe by a machine operated by compressed air, while the successive coils of wire are joined together by electric welding. The winding machine travels along the pipe as it works and is held in a horizontal position by an arm suspended from a rail that is in turn supported on tripods. The machine works rapidly, and when one coil of wire is exhausted it is the work of about a minute to adjust the next coil on the reel and weld the ends of the coils together. The finished pipe is uniform throughout and has no joints or collars. Power for winding is supplied by a portable air compressor.

NEW JOINT FASTENER FOR WOOD WORKING

A simple joint fastener that has just been invented and patented is designed to simplify the work of both the carpenter and the cabinetmaker, since it does away in many kinds of work with the necessity for mortises and dove-

tails, and the special tools used in making joints. The fastener is made from a sheet-metal blank which is simply bent to a circular loop at each end, leaving a straight intermediate section, or bridge. The loops are bent in opposite directions to each other, and a space



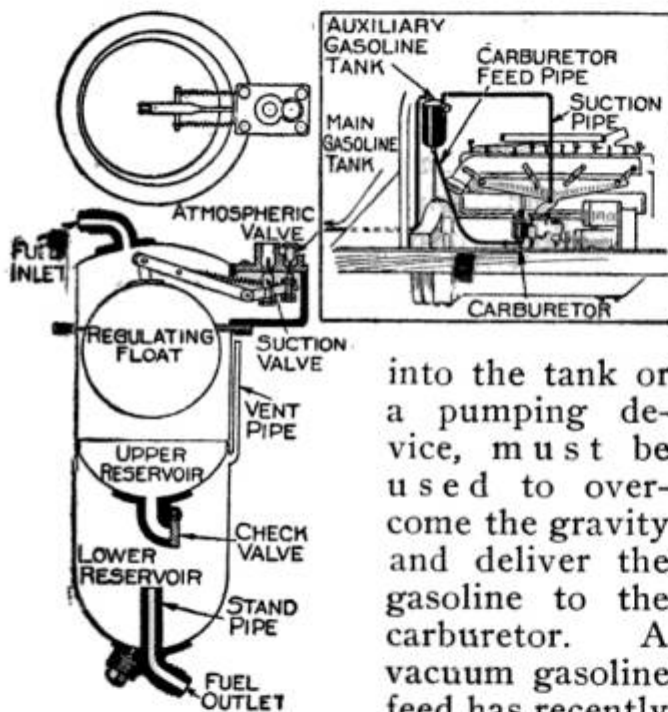
The Fastener is Placed across the Joint and Driven Flush with the Top, Binding the Two Pieces Securely Together

is left between the end of each loop and the adjacent end of the bridge. One edge of the plate is beveled to a cutting edge so that it can be driven into

the wood. As ordinarily used the two pieces of wood to be connected are clamped together, and the fastener is driven in flush with the top with one loop in each of the pieces. The fastener may also be used in connection with receiving sockets. In this case a wood plug driven tightly inside the fastener forces it to grip the sides of the socket.

A VACUUM GASOLINE FEED FOR AUTOMOBILES

When the gasoline tank is suspended from the frame of the automobile, usually at the rear of the car, some form of pressure feed, either by forcing air



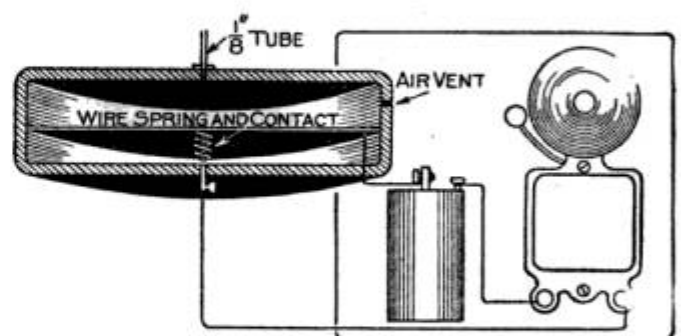
into the tank or a pumping device, must be used to overcome the gravity and deliver the gasoline to the carburetor. A vacuum gasoline feed has recently been invented

for which simplicity and efficiency are claimed. The vacuum device is placed upon the dashboard of the car in such position that the gasoline in it will flow to the carburetor on the motor by gravity. The device consists of two separate reservoirs, one above the other and connected by a check valve of the flap type. A float inside the upper chamber controls valves through which the gasoline flows from the main tank into this upper chamber. The fuel which goes to the carburetor is drawn from the lower chamber, the outlet of which acts as a separator, the water or dirt falling below the entrance to the standpipe which serves as outlet to the

engine. There are but three connections to the device, one from the gasoline tank beneath the frame to the upper chamber of the feed; one from the lower chamber of the feed to the carburetor; and one from the suction valve at the top of the device to the manifold intake of the motor. The suction of the motor when running is sufficient to draw the gasoline from the rear tank to the upper chamber of the feed. The carburetor is fed from the lower chamber while the upper one is filling, and when that is filled, the flow of gasoline from the main tank stops automatically, the fluid thus raised being allowed to flow down through the check valve into the lower chamber and from thence to the carburetor. The process is repeated so long as the motor is running and any gasoline remains in the main tank.

EXPANSION OF AIR GIVES ALARM OF FIRE

An air fire alarm has been devised which is extremely sensitive, and avoids a common fault met with in the use of fusible alloys, in that it can be used in fire rooms and other places where the temperature is normally high, with as good results as in cold storage or outdoor positions. Copper tubing, $\frac{1}{8}$ in. in diameter, is attached to the ceiling at 5-ft. intervals. A detector, an iron case containing a flexible diaphragm, is connected to each tube. There is an air vent in the de-



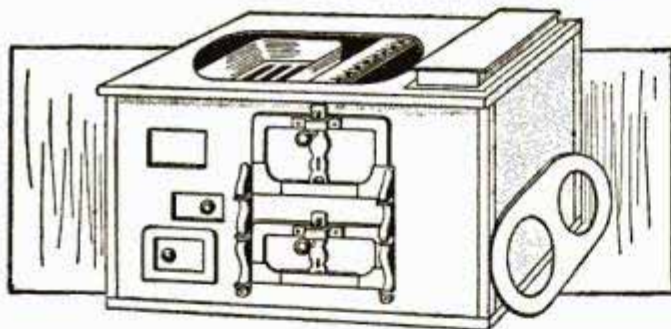
Novel Fire Alarm Works through Expansion of Air

tector, only one one-thousandth of an inch in diameter, and if the air within the room rises more than five degrees a second, the air within the detector

expands too rapidly to escape through the vent, and consequently forces the diaphragm down, making an electric connection with a circuit operating a fire gong.

SMOKE CONSUMER FOR THE KITCHEN RANGE

A practical smoke consumer of simple design and construction for use in coal-burning kitchen ranges has been recently developed in France. The device consists of a flattened, perforated iron pipe, suspended some 6 or 8 in. from the firepot, and above the oven, but within the range itself. The open end of the pipe is screwed into a hole in the front of the range, admitting fresh air. When the fire is started the heated gases play upon the pipe, setting up a draft. Pure air is drawn in, becomes superheated, and escapes at high temperature through the perforations, when the oxygen

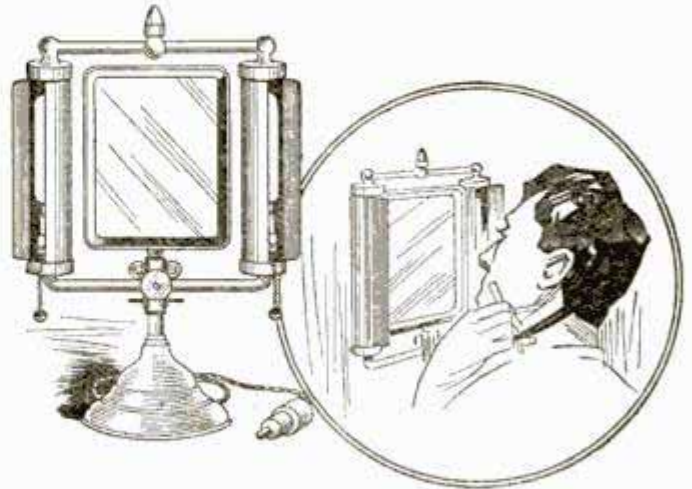


Smokeless Coal Range Showing Flattened Tube through Which Heated Oxygen Reaches Gases

combines with the carbon monoxide and fine coal dust, causing complete combustion and raising the temperature of the oven materially. In a seven-hour test the amount of coal saved was over 14 per cent, while the temperature within the oven was 82° higher than without the device. A mica window was inserted for observation purposes above the tube, and as soon as the fire was burning freely one could see what appeared to be small blue flames emerge from the tube. What really happened was that the heated air passing from the tube ignited the gases which otherwise would have passed out through the chimney.

CONVENIENT ARRANGEMENT OF SHAVING LAMPS

An adjustable shaving mirror has protected electric lights on either side, so arranged as to throw the light on

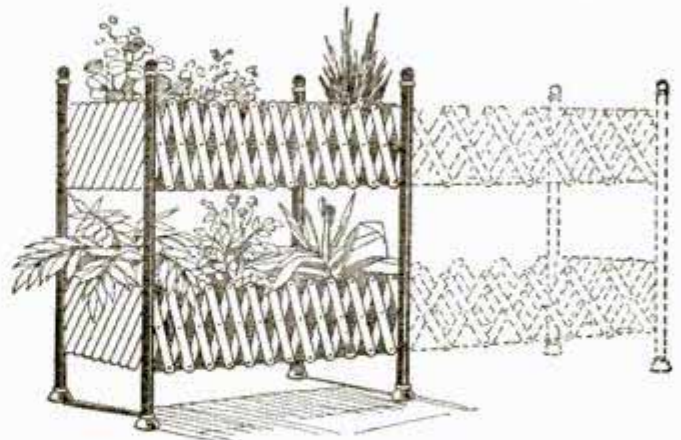


Long Electric Lamps Attached to Shaving Mirror

the face without giving an objectionable glare in the eyes. It is also made with the light below the glass and may be used by ladies as a dressing lamp and mirror.

EXTENSIBLE FLOWER STAND FITS ANY SPACE

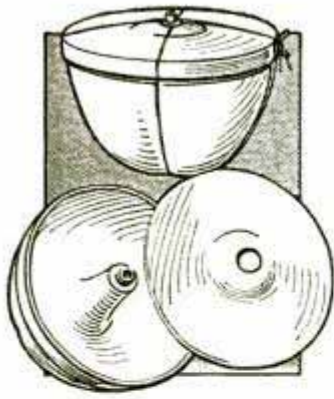
An adjustable flower stand, which may be extended from a small square to occupy an elongated position across a window, is the product of a German factory. The construction is simple,



Flower Stand Adjustable to Fit Any Space

the material being iron or steel coated with some rust-preventing paint, and the ordinary extension joint being utilized.

NOVEL AND PRACTICAL THINGS FOR DAILY USE



New Earthenware
Pudding Dish

similar things, may be steamed in this device without becoming soggy. A nipple extending through the bottom of the dish so distributes the heat that

CHINA pudding dishes are being introduced to take the place of the old-fashioned pudding bags. Fruit dumplings and

the contents are cooked quickly and thoroughly. Grooves around the outer surface are the sole remnants of the time-honored bag, these being provided to accommodate a string with which to tie the

cover securely in place over the pudding dish.

Patent rights have been asked for a stopper intended for preserving the partly used contents of a bottle.



Gas Burner for Wall Use

Intended for emergency needs in a nursery, sick room, or toilet, a recently introduced gas burner is designed to be attached to a wall, and serves several useful functions. The appliance is compact and may be employed either as a permanent or temporary fixture. For

warming children's food and serving in similar capacities it is particularly convenient in homes not supplied with a continuous flow of hot water.



All-Wire Clothespin

of injuring clothing when placing or removing the pin is eliminated, since the



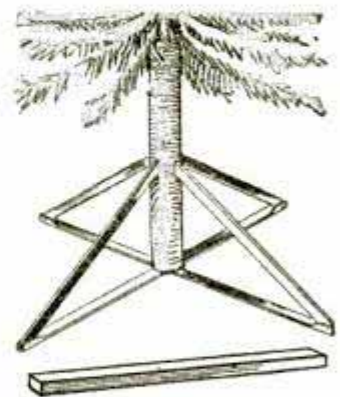
Bean Cutter and Stringer

tion shows a bean stringer and cutter which is designed to be clamped to a kitchen table. A sharp blade attached to the frame at the rear removes the string as a bean pod is drawn over it. Above this in a forward-bent position is a rotary cutter. By turning the handle the beans are

Several serviceable points are embodied in a recently invented wire clothespin which by its strong spring action is capable of holding articles of apparel securely to a line even during severe storms. Danger

of injuring clothing when placing or removing the pin is eliminated, since the jaws open wide when the top lugs are drawn together between the thumb and forefinger. Being made of wire, a large number of the pins may be contained in a small bag.

The accompanying illustration shows

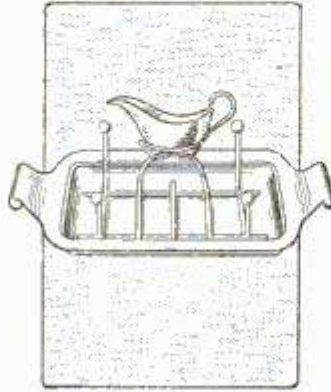


Support for Christmas Tree

above this in a forward-bent position is a rotary cutter. By turning the handle the beans are

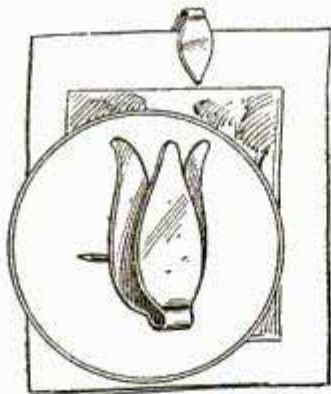
fed through the device and chopped in equal lengths.

Capable of being folded into a narrow strip, a Christmas-tree holder constructed of metal, which is easily applied and eliminates the unsightliness of the ordinary wooden base, is being introduced. The base of the tree is pushed over the point of a nail which keeps it in position, while the sharpened ends of the bracing members hold it rigidly and prevent its tipping.



Asparagus Dish with Rack and Boat

An asparagus dish which is serviceable and also an attractive piece for the table is supplied with a rack and dressing-boat holder. The wire supports hold the asparagus away from the moisture draining from it, allowing the tips to be served easily. The upper frame furnishes a basket for the second dish.



Nondefacing Thumb Tack

Thumb tacks which do not penetrate the article they hold in

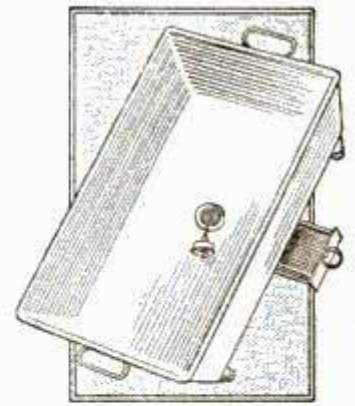
place, represent a simple device useful in both the home and office. A small piece of metal bent in the form of a clasp, secures the tack and holds a photograph, for instance, firmly between its lips, thus performing



Electric Flashlight for Umbrella

its function without marring the article.

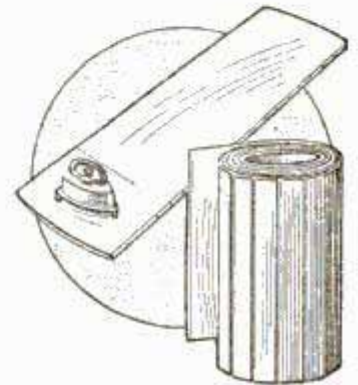
An umbrella flashlight, so arranged that it may be attached at will, is cylindrical in shape and provided with an elbow joint which fits over the end of the handle, at the same time inclining the light



Dish Pan Designed for Sink Use

so that its rays are thrown a suitable distance in front of a person walking.

A dish pan has been designed for use in a sink which protects the porcelain surface from becoming stained or marred, and also prevents the waste drain from becoming clogged. It is rectangular in shape and fits snugly in place when in use. An outlet in the center, similar to that of a stationary washstand, is provided, under which is a strainer drawer that separates refuse from the dish water as it passes into the sink.



Flexible Ironing Board

For the convenience of those who have limited storage space at their command, a flexible ironing board, which may be rolled up, has been invented.

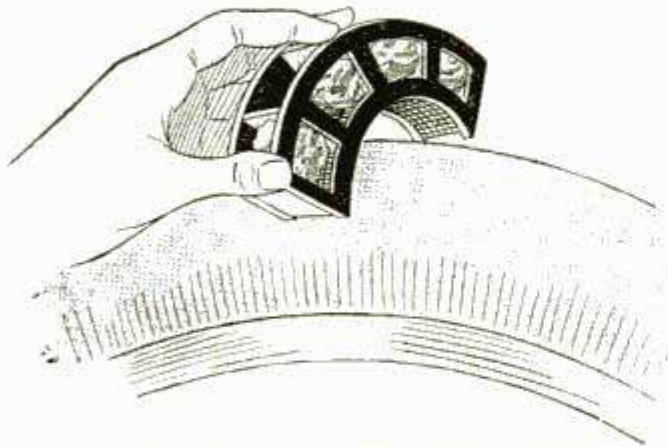


Upper-Story Window Cleaner

An arrangement which makes it possible to clean the outside of upper-story windows without serious inconvenience or danger, consists of a metal grip which holds an absorbent cloth at the end of a handle and on its top side carries a rubber squeegee.

NEW PUNCTURE FINDER FOR SMOOTH-TREAD TIRES

The invisible puncture is a most annoying feature of motorcycling, and a little device recently patented which

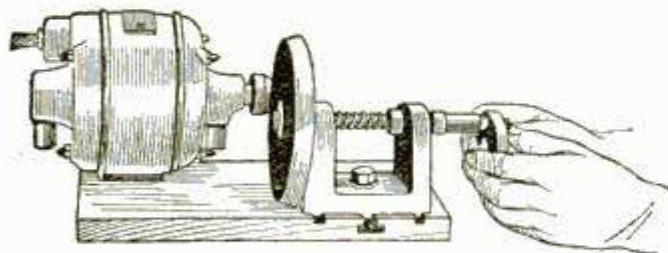


Escaping Air Makes Cotton Dance

enables a rider to quickly find the leaky spot will be appreciated. It is a quadrant-shaped box divided into four compartments, with the inside curve made to fit the tire. The bottom of the box is formed of fine gauze, above which is placed a piece of very light cotton in each compartment. When the device is passed over a punctured spot, the escaping air sets the cotton in motion, thus locating the leak. This can only be used with smooth-tread tires.

AN ELECTRICALLY DRIVEN SCREWDRIVER

Speed makes the electrically operated screwdriver economical in one of the big automobile factories of Detroit. A large friction wheel is driven by a small one on the armature shaft of a



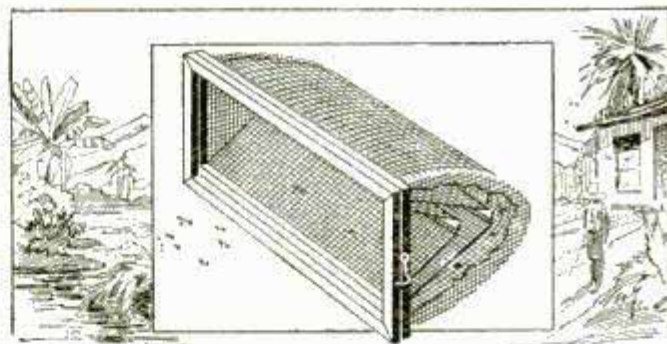
Device Speeds Up Efficiency in Auto Factory

small dynamo, a little spring on the driver shaft keeping the disks apart when not in use. The device is used in

setting up nuts in carburetors by rotating the cap screws to which they are attached. The screws are inserted first, the nut brought up against the screw by the thumb, and then the head of the screw pressed against the electric screwdriver, the pressure forcing the large wheel against the rapidly revolving small one. The instant the two wheels touch, the screw is rotated and the nut brought up tightly. The friction wheels slip the instant the nut is tight. One operator with this machine can now set up over 4,000 nuts a day, while with the old spiral type of screwdriver, operated by hand, eight operators were necessary.

INSECT TRAP INVENTED BY SANITATION OFFICER

An inspector in the department of sanitation in the Canal Zone has invented an insect trap of wire screening, designed to be placed at the top of a window or other opening in a room,



Trap for Mosquitoes and Other Insects, Made of Wire Gauze

in which successive chambers of wire gauze or screening readily admit mosquitoes, flies and other insects, but prevent their exit. The caging projects inward in a long V-shaped trough, the length of the window, ventilator or transom to which it is to be attached. The operation of the inlets is based upon the observed habits of the insects, which readily enter the base of a cage or trap, and leave through openings at the top, but will not enter the trap at the top. These openings from one chamber of the trap to the other are thus arranged to afford a passageway from the bottom to the top, and in

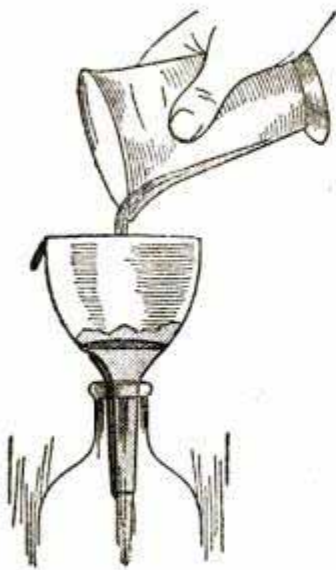
practice, thousands of mosquitoes have been caught in one night by a single trap. Moths and other insects may be attracted into the trap by such a disposition of lights as will draw them to the opening.

MAGNETIC CRANE HANDLES IRON RODS IN BUNDLES

Successful handling of bar-iron rods by an electric crane equipped with magnetic lift has been accomplished at a New Jersey ironworks by the simple expedient of having the bars wired together, before shipment, in bundles containing a dozen or more rods. In an attempt to do away with unloading by hand, a process both slow and expensive, the plan of lifting the loose rods from the cars with the magnetic lift was tried. This proved unsatisfactory, as it was impossible to pick up a clean load. When a load was lifted in this way many of the rods would come up hanging by one end. With the rods wired in bundles, the crane lifts a clean load consisting of several bundles.

FUNNEL WHICH WILL NOT OVERFLOW

A new type of funnel has a small pipe soldered on the inside of the funnel with its vent opening on the outside. When filling a bottle by means of a funnel which fits snugly into the neck, difficulty is met by reason of the air, which can find no escape from the bottle. With the new funnel the air finds a ready outlet, and the flow of the liquid into the bottle is steady. The device is patented.



MONOGRAM FORMS OF FELT EXPAND WHEN WASHED

A new initial embroidery form, which is made of felt instead of paper and cloth, has been invented. The ar-



Monogram Form
Holds Shape of
Embroidery during
Washing

gument made against the ordinary paper forms is that when they are sent through the laundry the paper breaks, causing the needlework to lose its shape. The new bases are heavily starched and compressed to one-eighth of their original thickness during the manufacturing process. When the starch is washed out, during the laundering of the linens, the felt expands, filling out tightly the slack in the embroidery threads and giving a well-rounded surface.

A COMBINATION GAS AND FIRELESS COOKER

The convenience and economy of the fireless cooker has stimulated inventors to combine in one range, the apparatus for first cooking the food, and heating a retaining compartment, and then, by heavily insulated walls, conserving the heat until the operation is completed. A gas range has been patented which unites these functions in an ingenious manner. One compartment is arranged with gas burners above and below, the heat from which is directed upon thick walls whose outer covering is asbestos or similar nonconducting material. While these burners are turned on,

the ventilators are open, and the products of combustion pass out and into the chimney. When the gas is turned

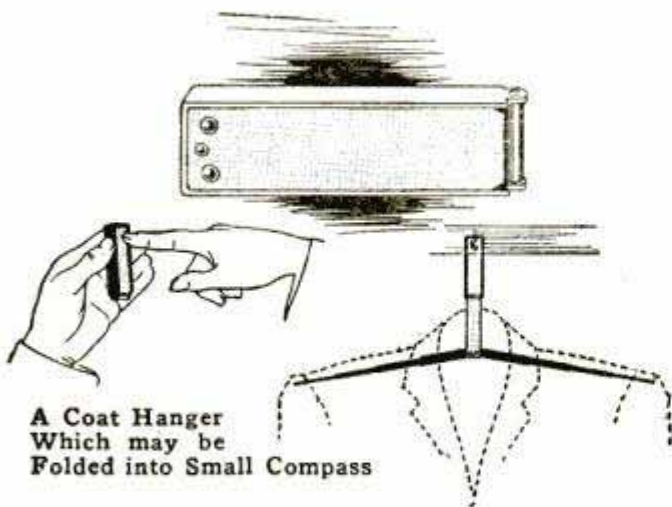


Thickly Insulated Walls Retain the Heat for Hours after Burning Gas a Few Minutes

off, the ventilators are automatically closed, retaining in the chamber, which now becomes a fireless cooker, all the heat of the previous combustion.

A COLLAPSIBLE GARMENT HANGER

A folding hanger for coats and other garments has just been patented, which, when folded, takes up no more space than a pocket knife, and when opened is a full-sized coat hanger,



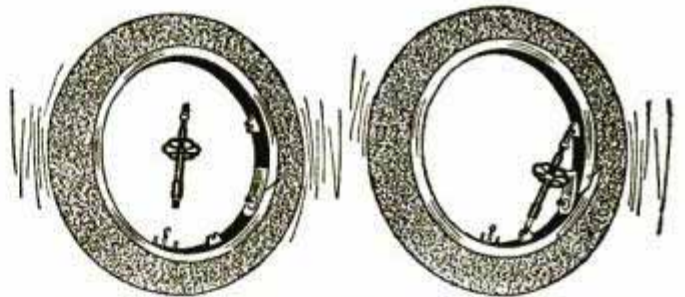
A Coat Hanger Which may be Folded into Small Compass

capable of sustaining 30 lb. This ingenious contrivance is so arranged that the pressure of a finger at the

upper end of the little case releases the telescoped sides, which fall, and the arms may be pulled out to full length. To close, the ends of the arms are simply pushed back and the sides are then snapped together, making the whole thing pocketable.

NEW TYPE OF DETACHABLE RIM FOR AUTOS

A novel device for quickly removing tires from detachable rims has been patented by an English automobile firm. The new rim is a ring of steel, the free ends overlapping on a bevel. Both ends are provided with lugs to which a screw jack may be attached, and the ends drawn together, lessening the diameter of the rim, and permitting the tire to be withdrawn readily, and repairs made or a new tire substituted. When the tire is adjusted, the screw jack is un-



A Contractible Rim Makes Tire Repairs Easy

screwed, the rim resumes its normal diameter and is slipped on the wheel and locked by suitable means.

MANY NEW TUNGSTEN MINES DISCOVERED IN WEST

As a result of information gathered during a recent geological survey, it is reported that the tungsten resources of this country are probably much greater than previously realized. Many new deposits have been found in several of the western states, and while they have not been sufficiently developed to indicate their extent, it is believed that several of them are large. In case values should advance materially these deposits would be tapped.



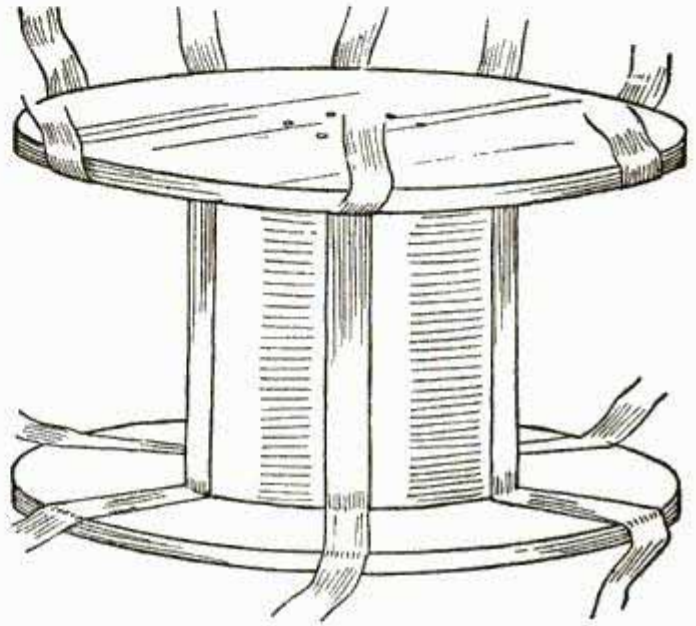
Small Homemade Electric Lifting Magnet

By J. H. MILLER

IN a large number of shops electro-magnets are now being used for lifting and transferring bulky pieces of iron and steel, which otherwise would have to be specially bound with cables and chains or placed in boxes before they could be hoisted by a crane. A magnet of this kind, having a maximum lifting capacity of about 1,000 lb., is shown in the illustration. Its current consumption is about five amperes at 110 volts, causing an operating expense of approximately five to seven cents an hour.

The body of the magnet consists of a circular piece of wrought iron, or steel, $7\frac{3}{4}$ in. in diameter by $2\frac{9}{16}$ in. thick. Cast iron may be used as well, but its lifting power would not be as great. The bottom face of the body should be machined true, and a circular groove of rectangular cross section turned out in it to fit the magnet coil. The outer end of the groove is counterbored, $\frac{1}{16}$ in. deep by $1\frac{3}{4}$ in.

the plate, which is countersunk to fit the sides of the screw heads. When

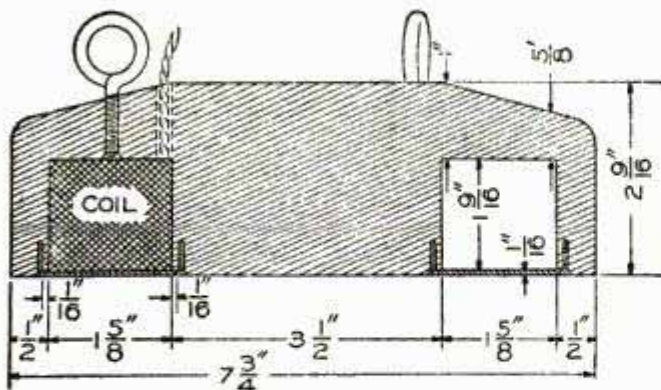


A Temporary Spool for Winding on the Coil of Wire Used in the Magnet

fastened in place, the screws and brass plate should be slightly below the surface of the magnet body.

To support the magnet, three screw eyes, of $\frac{3}{16}$ -in. stock, should be provided, and fastened in three tapped holes, equally spaced on a 5-in. diameter circle. The inner ends of the holes are countersunk so the ends of the screw eyes can be riveted over to prevent them from unscrewing.

For winding the wire coil a wooden spool must be provided. It is made with a cylindrical core, $3\frac{1}{2}$ in. in diameter by $1\frac{1}{2}$ in. long, and slightly tapered so the coil may be easily removed when finished. The flanges of the spool are $7\frac{1}{8}$ -in.-diameter wooden disks, fastened on the cylindrical piece so as to be easily removed. The finished spool is mounted on an axle,



Detail of the Magnet, Giving Dimensions for One That will Lift a Half Ton

wide, to fit a brass ring, which keeps the coil in place. The ring is held in position by eight small flat-head machine screws, equally spaced around the outer and inner edges of

or between lathe centers, to allow it to rotate while winding the coil.

Before starting the coil, about a dozen pieces of insulating tape, 7 in. long, should be equally spaced around the spool, and tied or pasted in place, fitting lengthwise with the spool center and up along the inner sides of both flanges. The coil will require about 7 lb. of No. 20 gauge, single cotton-covered copper wire. With a 220-volt circuit, the same amount of No. 23 gauge wire should be used. In starting the coil, about 1 ft. of wire must be allowed for a magnet lead, which is passed through a hole near the center of one of the flanges. The winding should be even and fairly tight, with each layer carefully insulated by a heavy coat of shellac. When the winding is completed, about 1 ft. of wire must be allowed for the outside lead of the coil. The strips of tape can then be brought over and pasted together. To hold the ring in shape more securely, and insulate it from the magnet body, several turns of tape are wound around on the out-

side. The finished coil should then be baked in a warm oven for a day, to harden the shellac, after which the flanges of the spool may be removed and the center forced out.

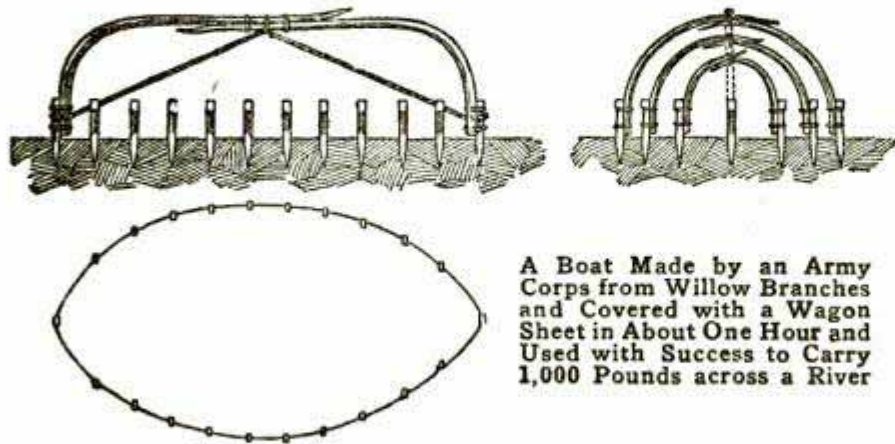
The magnet leads can then be spliced to a piece of heavy lamp cord. A $\frac{3}{8}$ -in. hole should be drilled from the coil groove to the top of the magnet body, and bushed with an insulating tube. In assembling the parts, the lamp cord is passed through the tube, and the coil put in place in the groove. If it has any play, several extra turns of tape should be wound on it. When it is sufficiently tight to stay in the groove of its own accord, the brass plate is fastened in place.

To suspend the magnet from a crane, three equal lengths of chain are attached to one common supporting ring. The loose ends must be fastened to the screw eyes so the magnet will hang level when lifted by the ring. The end of the flexible lamp cord can be attached to a plug to make connection with a convenient lamp socket on a 110-volt electric circuit.

A Basketwork Boat

A rough and ready, temporary expedient for a river boat is described as follows by a brigadier-general of the U. S. Army in the U. S. Cavalry Journal. The boat is constructed in a reverse position, or upside down. The outline of the boat is marked out

tent stake to which the keel is to be attached. At intervals along the sides drive tent pins for attaching the ribs. The material for the ribs and keel is cut from cottonwood, basswood, or willow. Sticks from this material are lashed to the stakes and bent to form



A Boat Made by an Army Corps from Willow Branches and Covered with a Wagon Sheet in About One Hour and Used with Success to Carry 1,000 Pounds across a River



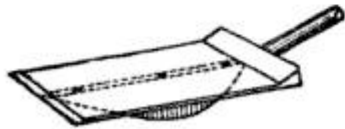
on the ground, about 12 ft. long and 6 ft. wide and pointed at both ends. At each end, or bow and stern, drive a

the keel and ribs. To prevent them from straightening out, a rope or chain is tied from bow to keel, and thence to

stern, as shown. The gunwale is formed of flexible sticks, lashed along the ends of the ribs inside and out. Smaller sticks of willow are woven in between the ribs to form a basket-work. The shape of the boat is formed upside down. When finished, cut it loose from the tent stakes and cover it with a perfectly good wagon sheet, tying the edges inside of the boat. If the sides tend to spring out, fasten a rope from one side to the other. Such a boat will carry 1,000 lb. and draw but a few inches of water.

Snow-Shovel Attachment

The snow shovel here illustrated has an addition to it that relieves one of a lot of strain in prying snow loose which is packed solid. A rounded piece of wood, about $\frac{3}{4}$ in. thick, is fastened

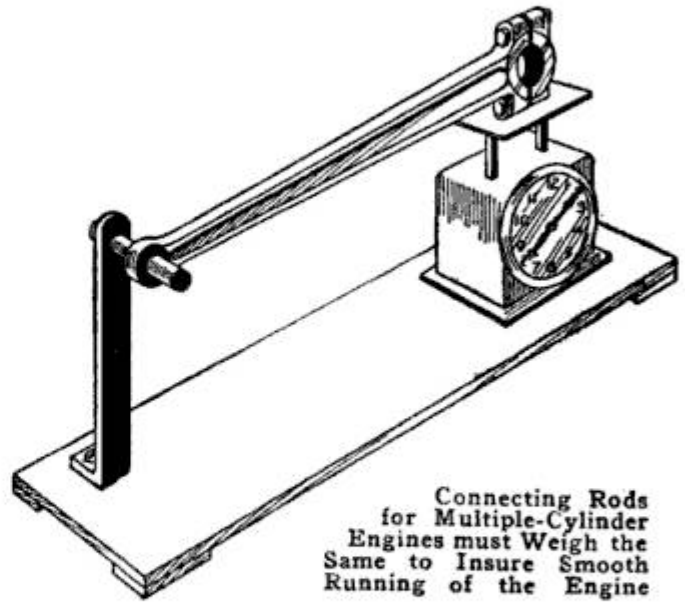


to the under side of the shovel in the center, as shown. When the shovel is pushed into deep or solidly packed snow, pressure is applied to the extreme end of the handle before lifting. Owing to the fact that the shovel rests on the curved piece of wood, the snow will be pried loose easily. If the board is tapered along the edge to a V-shape, it will offer considerably less resistance to the snow.

Connecting-Rod Balancing Fixture

In assembling multiple-cylinder gasoline engines, it is essential that the connecting rods have very nearly the same weight. A simple little fixture for weighing the rods can be made as shown in the illustration. It consists of an upright post, provided with a pin freely fitting the small end of the rod. When necessary to weigh the rod, one end is hung on the pin, the crankpin end being supported on a suitable platform scale. The supports should remain the same distance apart, while rods for the same engine are weighed, to have the weighing uniform. The

purpose of weighing by means of hinging at one end is to get the same metal

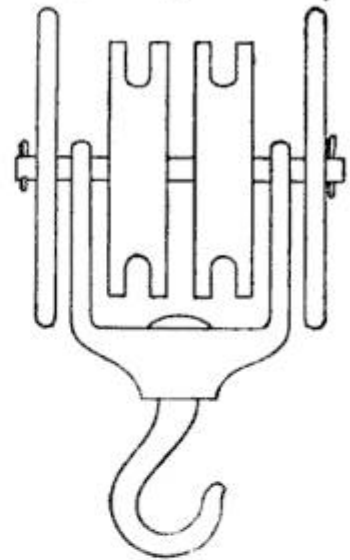


Connecting Rods for Multiple-Cylinder Engines must Weigh the Same to Insure Smooth Running of the Engine

distribution in every rod.—Contributed by Adolph Kline, Newark, N. J.

Protecting Pulley Sheaves of a Light Chain Block

The pulley sheaves of a light chain block are easily broken through carelessness, which consequently makes a considerable increase in the cost of repair to shop tools. The sketch illustrates a method of protecting the light sheaves. This requires a longer pulley pin, but as the sheaves cost more than the pin, a few accidents prevented would make the manufacture

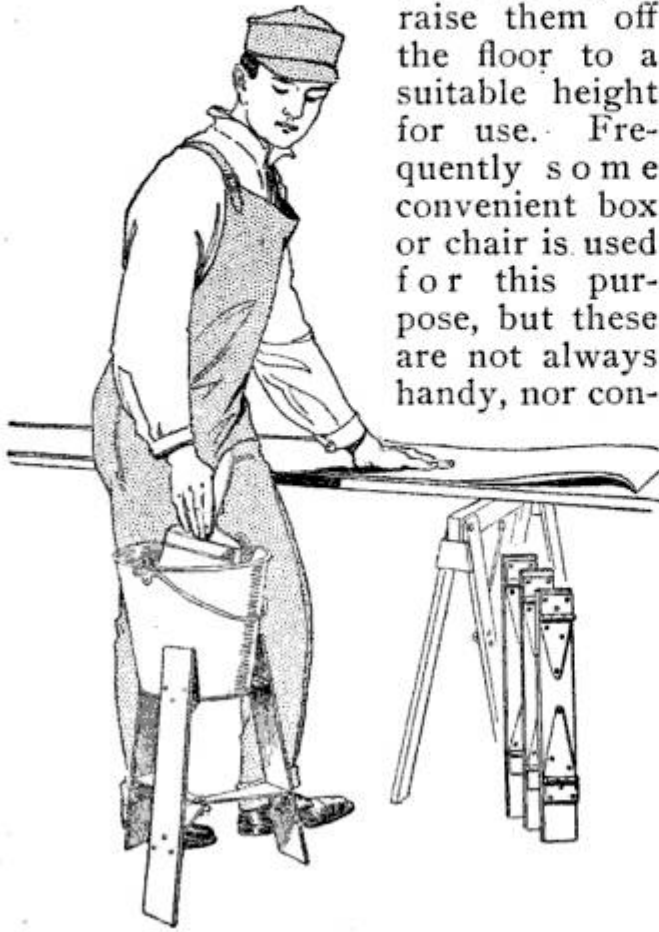


of a new one a paying proposition. The guards can be of $\frac{3}{16}$ or $\frac{1}{2}$ -in. iron. They are easy to make and apply.—Contributed by F. W. Bentley, Milwaukee, Wis.

¶ In cutting irregular shapes of labels, etc., place the paper on strawboard or bookbinder's board, then, by moving the board carefully, no back gauge will be required.

Collapsible Stand for Buckets

Decorators and paper hangers usually desire a support for their paste buckets, to raise them off the floor to a suitable height for use. Frequently some convenient box or chair is used for this purpose, but these are not always handy, nor con-



Support for the Paste Pail That can be Folded into a Small Space for Carrying

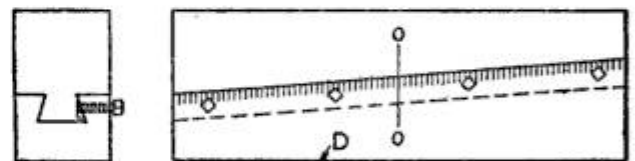
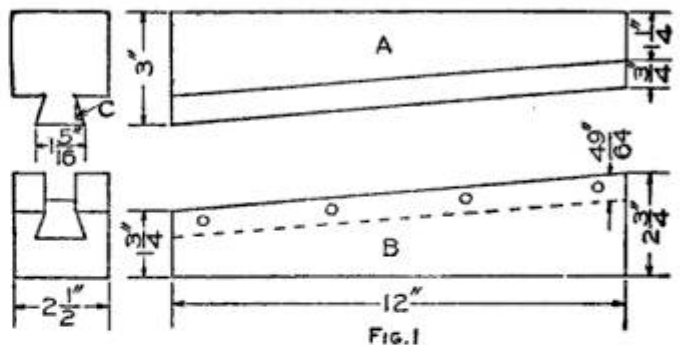
venient to carry around. In the illustration is represented an easily made collapsible stand, which can be readily unfolded for use or closed up into a small package when carried around.

To make the support, three boards of the same length are necessary, to serve as legs. Near the bottom of each is fastened an ordinary strap hinge, with a hole through the end of the loose half so the three pieces can be rigidly clamped together with a thumb nut and bolt. The hinges should be sufficiently long so that the distance from the bolt to the legs will be several inches longer than the radius of the pail bottom, thereby providing a good base for the stand. Several inches from the upper ends of the legs, three shorter hinges are required, similarly secured with thumb nut and bolt, and acting not only as the upper

braces for the stand, but also as a support for the bucket. By using shorter upper hinges, the legs will slant inward and form a more rigid support. The ends of the legs, extending up on the bucket, hold it in place securely.—Contributed by A. E. Johnson, Frankfort, Ind.

An Adjustable Parallel Bar

Considerable inconvenience may frequently be caused by not having parallel bars of quite the correct height. Such trouble can be avoided if the bar is made as shown in the sketch, providing not only an adjustable height but one which can be correctly read at all times from a scale marked on the bars. The dimensions given in Fig. 1 allow an adjustment of from $3\frac{1}{2}$ to $4\frac{1}{2}$ in. The two parts, A and B, should be accurately dovetailed and have an easy sliding fit. They are held in place, at any setting, by means of setscrews. The tongue in the upper part A should be machined for a special groove, C, to form a square seat for the setscrews; at the same time avoiding the danger, which might otherwise arise, of marring the fit and surface of the dovetail, were the screws allowed to fit against the inclined surface. The center line, Fig. 2, is drawn across both pieces when they are flush on the



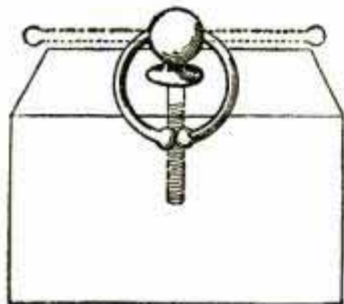
Adjustable Taper Bars for Surface Plates and Machine Tables to Obtain Various Heights Perfectly Parallel

ends, the bar then measuring 4 in. in height. On the lower bar, divisions are marked on each side of the center

line, perpendicular to the base D, and spaced $\frac{3}{16}$ in. apart, measured along a line parallel with the base. The spacing together with the taper of 1 in. in 12 must be followed strictly, or the scale will not be correct. Every division corresponds to an adjustment of $\frac{1}{64}$ in.; thus, if it is desired to have the bar $4\frac{1}{8}$ in. high, it would be necessary to place the center line of the upper part eight divisions above the center line of the lower piece ($\frac{1}{8} = \frac{8}{64}$; since every division corresponds to a $\frac{1}{64}$ -in. adjustment). By dividing the $\frac{3}{16}$ -in. divisions into equal parts, each of these will correspond to the same proportion of the $\frac{1}{64}$ -in. adjustment, thus enabling extreme accuracy if desired.—Contributed by R. McGinness, Pawtucket, R. I.

Hitching Ring for Cement Horse Block

With any scrapped jaw screw from a bench vise a neat and serviceable hitching ring can be made, by first bending the ends of the lever together, as shown, and then sinking the screw into the cement, leaving the ball or head flush with the surface of the block.—Contributed by Wm. J. Tolson, Lyons, Iowa.



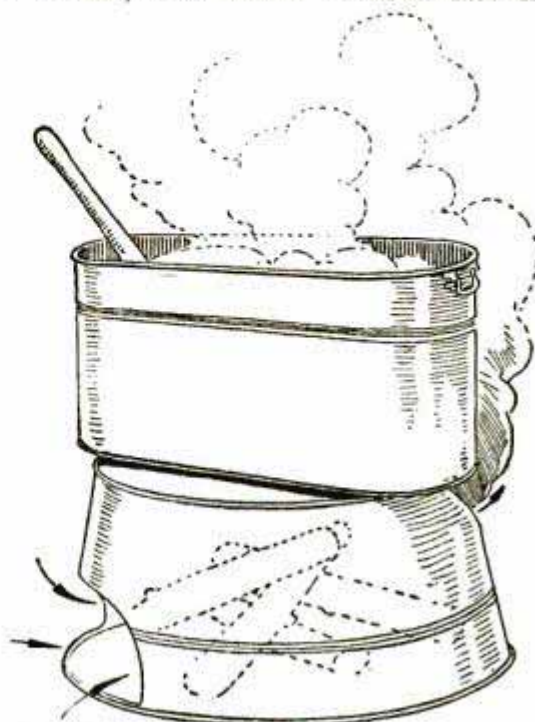
Drilling Holes in Brick Smoothly

When drilling a brick wall with a star drill dampen the brick. This will prevent the chipping of the brick at the surface, and will also make the drill cut faster and hold its edge longer.—Contributed by C. W. Elliott, Toronto, Can.

☞ Celery can be kept fresh for several days by wrapping it in a wet cloth similar to a turkish towel, which is then covered with paper.

An Outdoor Fireplace

An old galvanized tub, turned upside down, and with a hole cut in its

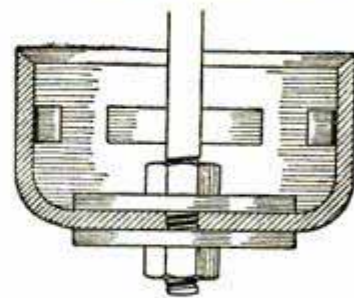


An Old Wash Boiler Fitted Up to Make Outdoor Fireplace for Wash Days

bottom to suit the kind of boiler to be used, makes an ideal outdoor fireplace for washdays. A small half circle is cut out, on the upper side, at the back, for the smoke, and another is cut in the lower side, at the front, for putting in fuel, and for draft.—Contributed by Mrs. Julia Bertelsman, San Angelo, Texas.

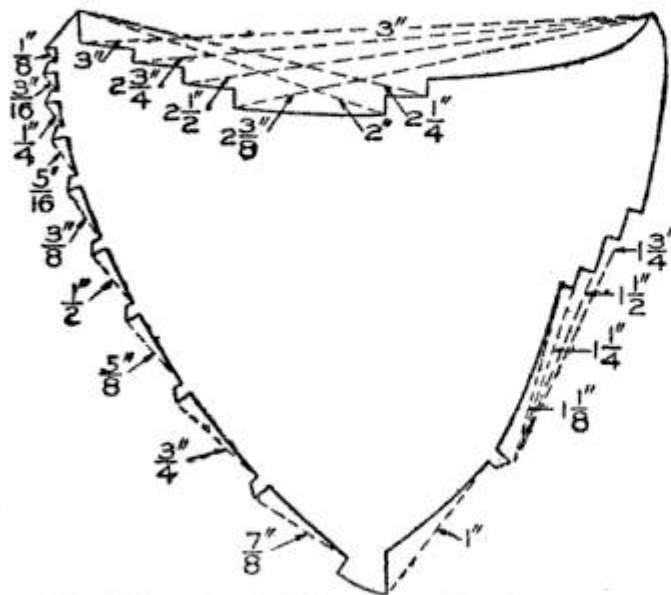
Watch Spring to Expand Plunger Leather

To overcome the tendency of a dry plunger leather to shrink away from the cylinder walls of a pump and thereby spoil its action, a piece of flat watch spring may be placed around the inside of the cup. This will keep the leather expanded at all times. The spring may be secured by weaving it in and through vertical slots in the leather cup.—Contributed by Edward M. Davis, Philadelphia, Pennsylvania.



Sheet-Metal Worker's Marking Gauge

In marking sheet metal for various widths, considerable time can be saved and greater accuracy attained if a sta-



The Points on the Edge Serve Two Purposes, as a Marker and as a Gauge for the Adjoining Length

tionary-point gauge is used, as is shown in the illustration. This should be made of machine-steel plate, about 1/8 in. thick, a section of a broken saw blade being well adapted for the purpose. The various widths desired are marked on the edge of the triangular-shaped piece, in such a way that the gauging distances run from the point of one to the heel of the next, and so on, all around the piece. Where several sizes are used but seldom, one point may be arranged to act as marker for all of them, as there would be but little wear from the small use made of it.—Contributed by David J. More, Peterborough, Ont.

A Center Square

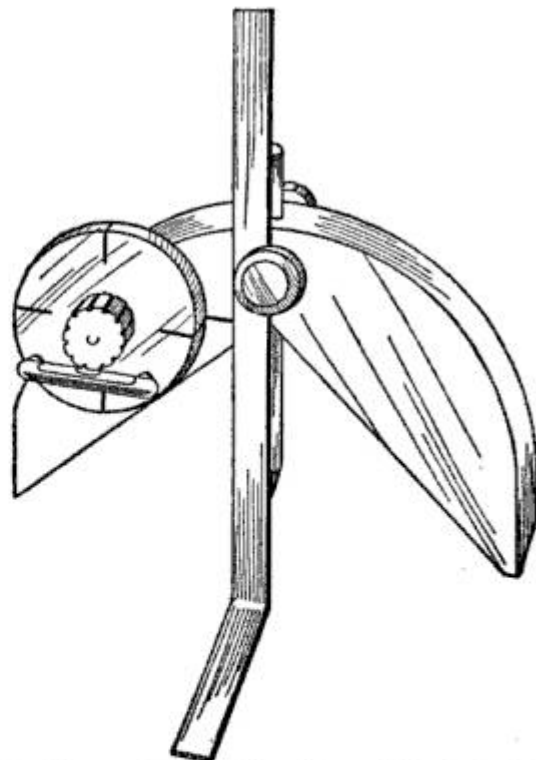
The body of the center square is shaped from a piece of metal, about 1/2 in. thick, and a perfect right angle is cut in it, as shown. Exactly in the center of the corner, drill a 3/16-in. hole for a center punch, which is made of steel and hardened. An L-shaped piece is fitted in one side, so that one of its edges will exactly center the intersection of the angle. The extending L-portion should be carefully turned out

at right angles so that its edge will be at exact right angles to the face of the body. The piece is clamped in place with the head of a bolt whose body is drilled to admit the center punch. Both the punch and the L-shaped piece are clamped with the same bolt.

A disk is fastened with a knurled-head screw to one arm of the main part. A level is fastened on this disk at one side of the screw. The disk has four marks evenly spaced, quartering it. The level should be accurately set so that the markings will register level when the angle in the body is perfectly vertical.

It will be readily seen that, when the level bubble registers level, a line can be drawn on the end of the shaft perfectly vertical on its diameter, and that, by giving the disk a quarter turn, a line can be drawn perfectly horizontal, or at right angles to the vertical line across the diameter.

If, for some reason or other, the shaft is taken out of the clamps, and it is then desired to work on it again, clamp it down as before, and set the center square on top of it. The shaft can be



Center Square for Marking Round Stock to Locate the Center and to Lay Out Keyways

set up by letting the center punch touch the line already scratched, and it will bring the shaft up level as before.

Homemade Measuring Pump

By A. H. WAYCHOFF

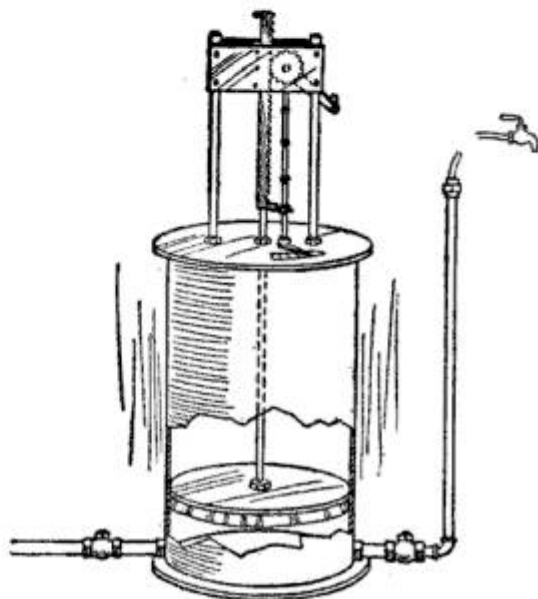
Time and labor can be saved by using an automatic measuring pump. A contrivance of this kind is not so complicated but that it can be made by the average mechanic, from parts obtainable in most places.

The largest and most important part of the homemade machine illustrated is the pump cylinder, which should be a piece of seamless brass or steel tubing, varying in size according to the desired capacity; a cylinder, 6 in. in diameter and 12 in. high, will provide ample storage for a gallon of liquid. The cylinder should be threaded at each end and provided with blank flanges screwed onto the ends. At the lower end it is drilled and tapped for a $\frac{3}{4}$ -in. pipe nipple which connects with the supply tank through a check valve, so placed that it will allow the fluid to enter the cylinder but prevent any escape from it. A similar opening is drilled and tapped at any other convenient place at the bottom, for the outlet, and provided with nipple and check valve as before; in this case, however, the check allows the fluid to leave the cylinder, but prevents its return as well as the admission of air, which would spoil the action of the pump.

The top flange should be drilled and tapped for two pieces of $\frac{3}{4}$ -in. pipe, about 16 in. long and spaced about 4 in. apart. These serve as uprights for the pump head. Two pieces of strap iron, of sufficient length to extend from one pipe to the other, are drilled for bolts which clamp them in place, leaving a space sufficient to allow a rack and pinion to fit in between. The rack should be about 16 in. long and provided with a toe at each end. The pump plunger may consist of two plates of $\frac{1}{8}$ -in. sheet steel, cut to loosely fit the cylinder, between which is placed a cupped leather washer closely fitting the cylinder. The various parts are held together by the piston rod, which passes through a hole in the center, and is provided with a nut on each side. This rod extends through a hole in the

upper flange, and is fastened to the lower end of the rack.

In order to produce the necessary reciprocating movement for the rack and piston, a pinion, engaging with the rack, is secured to a shaft supported on each side in suitable holes in the iron straps, clamped between the uprights, and provided at the outer end with a



The Size of the Cylinder and the Stroke of the Piston Determine the Measurement of the Gasoline

crank. By turning the crank the rack and plunger will be raised or lowered as required. To prevent the rack slipping away from the pinion, a strip of iron is provided and fastened between the straps so that it will bear against the back side of the rack. If desired, two bolts can be used for the same purpose.

To provide the measuring device, a round rod of sufficient length is pivoted at one end in a countersunk hole in the top flange, in line with the rack and pipe uprights, and, at the other end, in a countersunk block fastened between the iron straps at the top. To this gauge rod, at its lower end, is fastened an indicator, or pointer, which may be shifted to one side or the other, according to the amount desired to be pumped. A scale, over which the indicator passes, is marked on the top flange to some convenient measurements, as, for example, quarts or fractional gallons.

In order to provide the necessary stops for the piston for any particular measurement, gauge stops are drilled to fit the rod and secured to it by means of setscrews. These stops are made with a projecting lug on one side which can be set to strike the toe of the rack, thereby preventing any further upward movement.

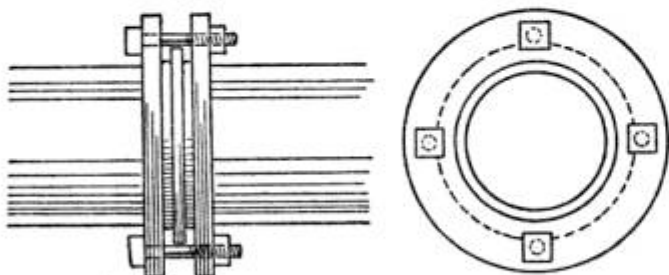
In calibrating the tank, the piston is first so adjusted, by means of the upper toe on the rack or washers screwed to the piston rod, that there will always be sufficient liquid in the cylinder producing a level above the check valves when the plunger is at the bottom of its stroke. This will tend to keep the leather in good condition, and give greater accuracy when operating the device. With the cylinder filled up to this lowest or zero mark, the calibration can be continued. The smallest amount indicated on the scale should then be carefully measured and put into the cylinder through the inlet check valve. This will raise the plunger and with it the rack. When the full amount has been added and the plunger has come to rest, the indicator arm is set to the amount corresponding to that let in, and the lowest gauge stop is fastened in position on the rod so as to rest against the lower toe of the rack. This

completes the first setting. The second and following positions may be obtained in much the same way. Every time a setting is completed the indicator arm should be moved over to the next point. By so doing, the lug, just set, is swung away from the rack, permitting the plunger to rise on the addition of another quantity of liquid. With the plunger once more at rest, the next corresponding gauge stop is secured in position, locking the rack and plunger against any further movement, and preventing the addition of any more liquid.

In operating the device it is first necessary to place the indicator in the position corresponding to the desired amount. This movement of the indicator brings in place the required stop-gauge. The crank can then be turned and the rack and plunger caused to rise. This will form a vacuum under the plunger which will be filled from the supply tank. With the required amount in the cylinder the crank is turned in the opposite direction, which will cause the plunger to descend, forcing the liquid through the outlet check valve. It is best to have the supply tank above the level of the pump, thereby preventing air from leaking in, which would spoil the vacuum and hinder the operation of the pump.

Boiler Tubes Fitted with Flanges Substituted for Regular Pipe

Boiler tubes, after their removal, are frequently scrapped for old iron. With but little extra labor and change, however, they can be made to serve as



Boiler Tubes Fitted with Companion Flanges to Form a Substitute for Pipe and Couplings

low-pressure pipe. As their diameters do not correspond to standard pipe sizes, they must be fitted with flanges.

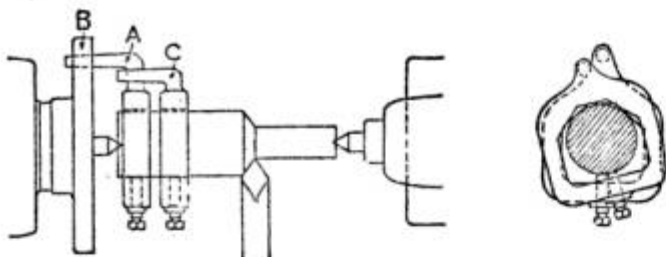
These should be sufficiently large and strong to permit their being drawn together by bolts, and clearance space must be figured on for turning the nuts. The flanges should all match in the spacing of holes for clamp bolts, and should be drilled for a loose fit on the boiler tubes. Each length of tubing should be provided with two flanges, and then heated and beaded at the ends, to form a shoulder for the flanges. For high pressure, the ends should be faced off, but with low pressure this is not so necessary, if a good job has been done in the beading. A soft gasket should be placed between the ends of adjacent tubes, and the flanges drawn together, thereby forming a tight joint.—Contributed by John H. Pietgenter.

To Prevent Poisoning from Lead Paints

Many painters do not realize the danger of lead poisoning from white, black, and red-lead paints. Outside of cuts, the most accessible place for the lead to enter is the flesh around the finger nails. Its entrance there can be prevented by dipping the finger tips into warm paraffin, or beeswax, whereupon gloves are put on and one proceeds with the work. The paraffin can be easily removed when the work is completed, or at the end of the day.—Contributed by Edmond Von Kaenel, Chicago.

Double Lathe Dogs for Heavy Cuts

Slipping can be prevented on work being turned in a lathe, by using an additional dog for driving purposes. The first dog A is clamped to the work in the usual manner with the tail driven by the faceplate B. The second dog C is fastened so the tail bears

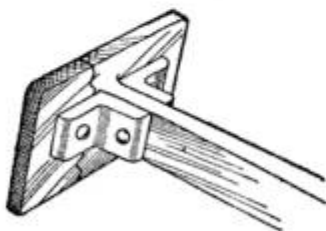


Work on a Lathe Driven by Two Dogs to Provide More Gripping Surface

firmly against that of A. With this arrangement, if the first dog were to slip, the second would still drive the work.

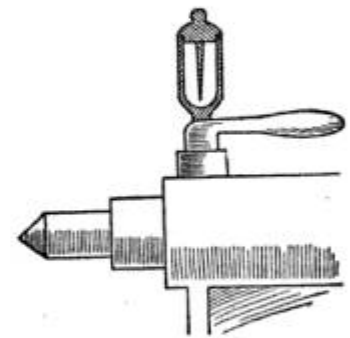
Repair for Broken Automobile Pedal

A simple repair for a broken pedal can be made, as shown, by riveting or bolting the broken section securely in place by means of a suitable-sized angle brace. For the sake of appearance, another brace may be fitted on the unbroken side.



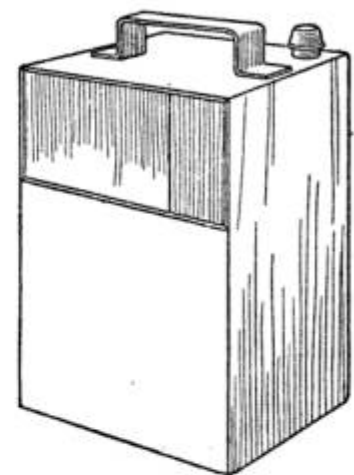
Supply Cup for Lathe-Center Lubrication

In most tailstocks a hole is drilled in some convenient place for the oil, or white-lead mixture, used to lubricate the center, preventing it from scoring or running hot. This hole is usually small so that, after a few dips, it must be refilled. To avoid this frequent refilling a special oil chamber may be attached, which can be of sufficient capacity to provide a supply for a long time. The usual hole in the tailstock is tapped and the oil cup threaded to fit. A suitable dropper may be attached to the cap, so it may serve the double purpose of not only supplying the lubricant to the center, but also protecting it from dust and dirt.—Contributed by John Harger, Honolulu, Hawaiian Islands.



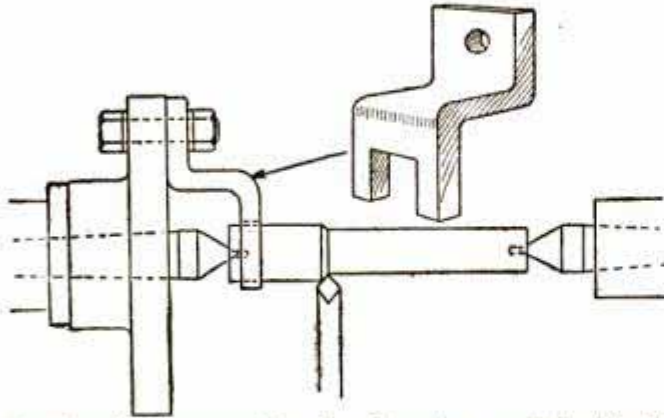
A Labor-Saving Coal Bucket

The bucket is constructed by cutting a hole the full width in the upper part of one side on a square 1-gal. oil-can, making the cut extend 4 in. down and allowing $\frac{1}{4}$ in. of the material to turn in all around to prevent injuring the hands. Such a bucket holds more than the usual amount of fuel that is put on a fire at one time, and it will not spill over the edges while pouring the coal into the stove. It does away with carrying and lifting a heavy bucket of fuel—a job that most women dread—when only a few shovelfuls are needed.—Contributed by L. E. Turner, New York City.



Lathe Dog for Driving Square Stock

A simple lathe dog for driving square stock can be made from bar iron of the proper width and strength



The Dog is Fastened to the Faceplate and the Stock is Slipped into the Square Opening

which is bent to the shape shown in the cut and notched to hold the stock. It is drilled for an ordinary bolt and nut, and clamped in position to the faceplate, but requires no setscrew to hold the stock. One size of dog will drive stock which is not too large to enter the notch nor so small that it will turn around in it.—Contributed by F. H. Mayoli, Pawtucket, R. I.

Patternmaker's Sandpaper Cone

Turn a piece of maple or close-grained wood to the desired shape of a cone on one end, making the sides as straight as possible, and to form a



A Handy Tool for Smoothing Various-Sized Holes and Curved Parts on Patterns

handle on the other end. Then cut a rectangular groove on the cone end, sufficiently wide and deep to admit the sandpaper ends and a strip of wood, the wood acting as a wedge to hold the paper in place.—Contributed by Carl G. Olson, Chicago, Ill.

ⒸTo prevent rust, it is a good plan occasionally to oil the hinged joints of an umbrella.

Tool Chest with Combined Drawer and Cover Lock

Serviceable tool chests can be made out of scrap lumber or box boards which will answer all ordinary requirements. The material necessary for the illustrated chest is as follows:

- 1 cover, $\frac{3}{4}$ by 15 by 20 in.
- 2 side pieces, $\frac{3}{4}$ by 12 by 14 in.
- 1 back, $\frac{1}{2}$ by 12 by $16\frac{1}{2}$ in.
- 1 lower rail, $\frac{1}{2}$ by $1\frac{1}{2}$ by $15\frac{1}{2}$ in.
- 1 center rail, $\frac{1}{2}$ by $\frac{3}{4}$ by $15\frac{1}{2}$ in.
- 1 top rail, $\frac{1}{2}$ by 4 by $15\frac{1}{2}$ in.
- 2 stiles, $\frac{1}{2}$ by $1\frac{1}{4}$ by 12 in.
- 2 front finish strips, $\frac{1}{2}$ by $1\frac{1}{2}$ by 19 in.
- 2 side finish strips, $\frac{1}{2}$ by $1\frac{1}{2}$ by $14\frac{1}{2}$ in.

For drawers:

- 2 fronts, $\frac{1}{2}$ by $2\frac{7}{8}$ by $15\frac{1}{2}$ in.
- 2 bottoms, $\frac{1}{2}$ by $11\frac{1}{2}$ by $15\frac{1}{2}$ in.
- 4 sides, $\frac{1}{2}$ by $2\frac{7}{8}$ by $13\frac{1}{4}$ in.
- 2 ends, $\frac{1}{2}$ by $2\frac{7}{8}$ by $14\frac{1}{2}$ in.

For drawer slides on chest end pieces:

- 2 bottom slides, $\frac{1}{2}$ by 1 by 13 in.
- 2 middle slides, $\frac{1}{2}$ by $\frac{3}{4}$ by 13 in.
- 2 top guides, $\frac{1}{2}$ by 1 by 13 in.
- 2 middle guides, $\frac{1}{2}$ by $1\frac{1}{4}$ by $12\frac{1}{2}$ in.
- 2 bottom guides, $\frac{1}{2}$ by $1\frac{1}{2}$ by $12\frac{1}{2}$ in.
- 2 vertical end strips, $\frac{1}{2}$ by $\frac{1}{2}$ by 12 in.
- 1 lock bar, $\frac{3}{4}$ by $\frac{3}{4}$ by 9 in.
- 2 cleats, 2 hooks, 1 spring, 1 guide pin, box hinges, and chest lock.

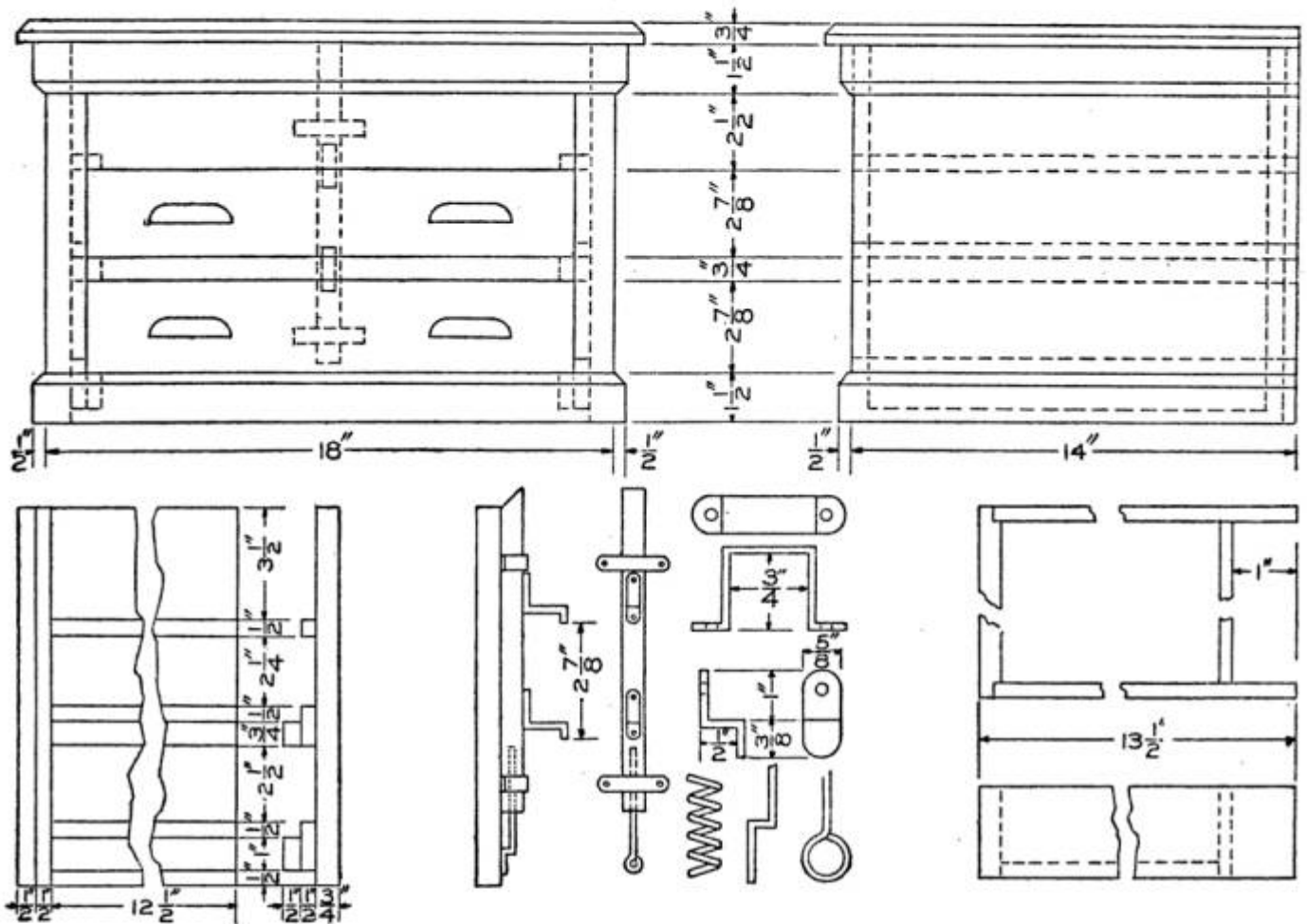
The side pieces should be carefully squared and finished to 14 in. wide by 12 in. high. To these ends are nailed the drawer guides and slides, so that one becomes the right and the other the left-hand side. The slides extend $\frac{1}{2}$ in. farther back than the guides; both are flush with the front edges of the end pieces. The two vertical end strips are nailed to the end pieces and guides. The two stiles, being carefully squared, can then be attached to the end pieces. All the rails should be exactly the same length and perfectly squared, and can then be fastened in place with finishing nails driven into the drawer slides and through the front stiles. The back can then be added and nailed to both the vertical end strips and chest ends. In putting on the chamfered finish strips, they should be mitered on the corners. After attaching the cover in the usual manner with butt hinges, the frame is completed.

In making the drawers, the fronts should be notched $\frac{3}{8}$ in. deep to fit the sides which are nailed in place. The bottom can be nailed in place, flush with the lower edges of the sides and fronts, and the ends added, completing the drawer, except for the

drawer pulls, which may be added after the chest is finished.

It will be noticed that a 1-in. clearance space exists between the back of the drawer and the chest back. This is to provide space for the combina-

is their unlocked position. The drawers should be removed and the cleats fastened in place. In order that the bar may not spring up above its unlocked position, the upper strap should be located so the upper cleat will



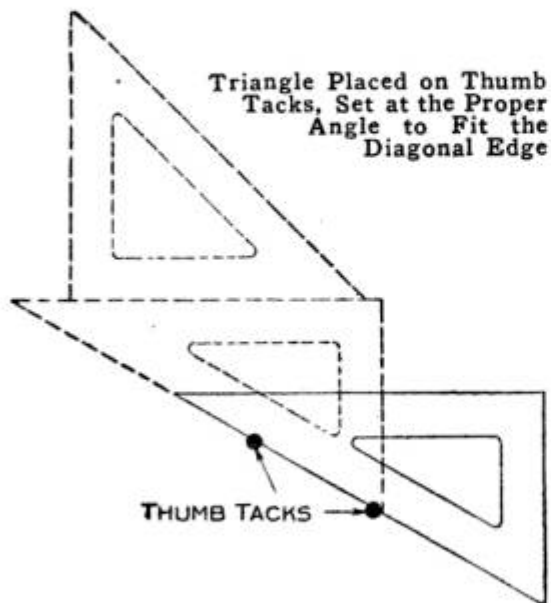
While the Original Chest was Made of Soap Boxes, the Wood Required for Its Construction Would Not be Expensive, and It can be Built of Any Material to Suit, and Finished as Elaborately as Desired

tion locking device. It consists of a $\frac{3}{4}$ -in. square lock bar, about 9 in. long, made of strong wood. At the lower end it is drilled for a guide pin which is fastened to the chest back. A coil spring fits over the pin, supported at one end by the guide pin and butting up against the lock bar at the other. The spring tends to keep the bar in its unlocked or upper position. The bar is held in a vertical position at the center of the chest by two metal straps screwed to the back piece. In locating the position of the cleats, the chest cover should be open. The bar should extend beyond the upper edge of the back about $\frac{1}{2}$ in., and be secured there until the cleats are located. They should be placed and marked so as to clear the upper edge of the drawer backs by about $\frac{1}{8}$ in., as this

strike against it, thereby preventing any further movement of the bar; the spring must be set to keep the bar in this position. It is best to round off the upper back edge of the bar, producing an easier closing effect. A good chest lock must be provided and fastened in the usual way. With the drawers pushed in as far as they will go and the cover closed and locked, the cleats hook over the ends of the drawers, preventing them from being withdrawn. When unlocked and the cover opened, the lock bar is pushed up by the spring, thereby releasing the drawers. The chest, after being stained, or painted and varnished, and the handles and drawer pulls fastened in place, will prove a secure receptacle for tools.—Contributed by G. M. Heinrich, Whitstone, S. D.

A T-Square Substitute

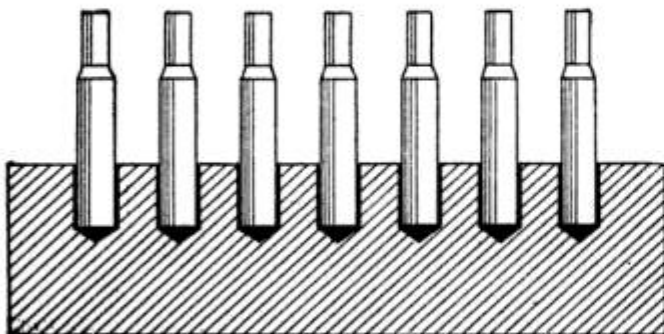
On small work, a 30-deg. triangle can be made to serve the same purpose as a T-square, with accuracy and ease of



manipulation. It is only necessary to place two thumb tacks in the drawing board, a convenient distance apart and in such manner that when the diagonal edge of the triangle rests against the tacks, the other two sides will form the vertical and horizontal lines on the drawing. If desired, another triangle may be used on either of the sides, affording all the advantages of a T-square.—Contributed by G. B. Pollock, Chicago, Ill.

Block for Tempering Several Tools at Once

A frequently followed method for tempering tools after hardening is to



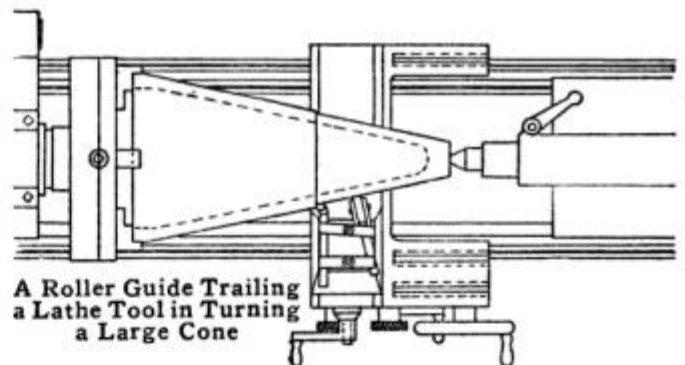
Block to Hold a Number of Tools to be Given a Certain Temper

take one at a time with a pair of tongs, get it to the required heat, and plunge it in a cooling solution. If a large

number of similar tools, as punches, are to be tempered, time can be saved and more uniform work produced by using a heated cast-iron or steel block. It is drilled for holes to receive the tools, about $\frac{1}{32}$ in. larger than the diameter of the latter and to a depth corresponding to the length of tempering; in punches, equal to about one-fourth of their length. The tools should be polished for tempering, then placed in the holes of the heated plate and, as they come to the desired color, immersed in water or the cooling solution, as in regular practice.—Contributed by J. F. Tholl, Detroit, Mich.

Turning a Large Cone

A method of turning a large cone on a lathe is shown in the illustration. A short portion, of the proper slope, is first turned at the apex of the cone with the compound rest set to the required angle. The nut is then taken



from the cross-feed screw, allowing the slide rest to move freely. The forked holder, carrying the roller, is then secured along with the cutting tool. The action of the roller on the turned surface causes the tool to move in a straight line, but making an angle with the axis of the cone.—Contributed by James H. Rodgers, Hamilton, Ont.

Marking Steel with Identification Tags

One of the simplest methods of marking steel is to paint it with a colored stripe, a certain color having been assigned to each kind: red, for example, might be used to indicate "Colonial;" white, "Jessop;" yellow, "Ketos," etc.

But if the steel is handled frequently, the color stripes gradually become coated with grease and dirt until they are too dark to be distinguished, or they may even wear off entirely so that the identity of the steel is destroyed. An improvement on this method is to drill a small hole close to the edge of one end of the bar. A metal tag, with the proper identification data on it, can then be wired to the bar. The steel should be used starting with the opposite end so the mark may remain until the last piece is required, when the tag is removed and fastened to the next bar of similar steel.

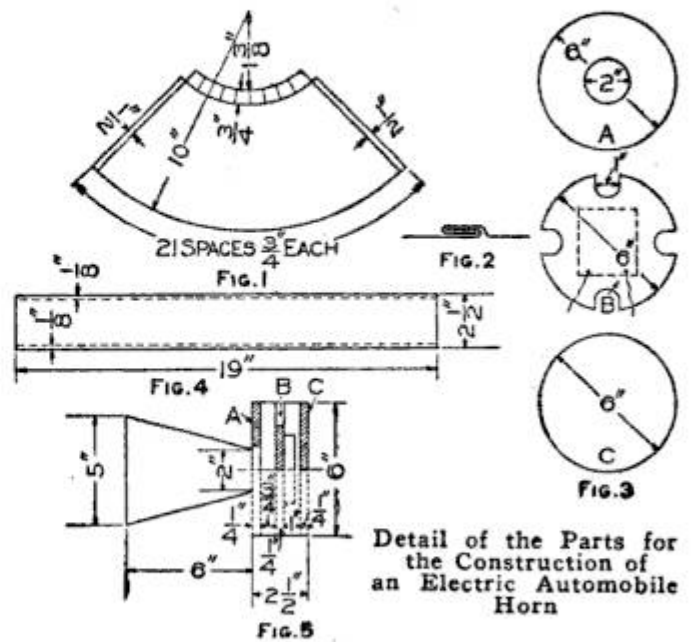
Homemade Electric Automobile Horn

In making this horn the two main parts to be considered are the electric buzzer and the homemade horn, or sounding box. The former can be bought at a small cost in any electrical shop or hardware store. The mechanical part of the horn consists of a sounding box attached to a funnel for magnifying the buzzer sound. This funnel can be made from a piece of tin or other thin sheet metal, $10\frac{1}{2}$ in. square and cut to the shape shown in Fig. 1. A $\frac{3}{4}$ -in. strip is marked off at the inner edge and notched to make projections that can be turned up to fasten the horn to the sounding box. In connecting the edges of the funnel to hold it in shape, the $\frac{1}{2}$ -in. strips at each end can either be soldered together or, if more convenient, bent up to form a hook, and these interlocked and hammered down, as shown in Fig. 2.

The sounding box consists of three wooden disks held together by a strip of metal fastened around their outside edges. The disk A, Fig. 3, is provided with a 2-in. hole to fit the funnel, which is placed with its small end projecting through the disk, and its $\frac{3}{4}$ -in. notched edge turned up all around, securely holding it in place. To insure its being fastened, nails or screws may be put through the strip into the disk. The sounding board consists of the disk B, to which is attached

the buzzer. The back side of the box is formed by the blank disk C.

In assembling the horn, the metal strip, Fig. 4, is first provided with



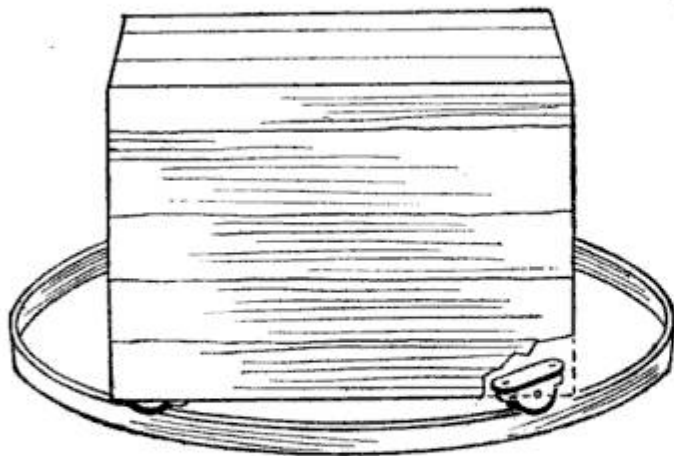
suitable holes to fit the screws for attaching it to the wooden frame. It is then bent to form a circle, and the disk C, Fig. 5, is fastened in place. The sounding board B, with buzzer attached, can then be secured in place, precaution being taken to first connect the battery wires to the buzzer, and allowing them to pass out through the end disk C. To complete the horn, the disk A, with the attached funnel, is placed in position, and secured to the shell with screws.

Any convenient method may be used to hold the horn in place on the auto, the simplest being to fasten it with screws into the end disk C, from some part of the frame. For operating the buzzer, a battery and push button must be provided and properly connected.—Contributed by J. J. Flood, Philadelphia, Pa.

Revolving Stand for Painters

A simple revolving stand, or table, may be made out of a dry-goods box, four sash pulleys, and an iron tire from a wagon wheel. The box should be sufficiently large so that its corners will extend over the tire. The positions for the sash pulleys are located by placing the tire so it will lie an

equal distance inside all four corners and scratching lines on the box on each side of the tire. The pulleys are then located and holes drilled to fit

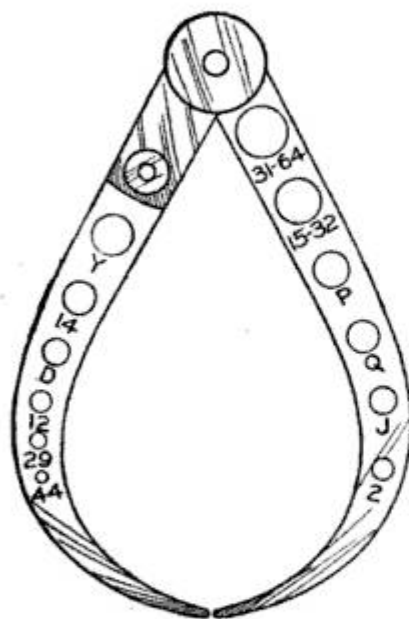


The Revolving Box Used as a Table on a Track
Made of a Wagon Tire

them, so the wheels will straddle the marked lines, after which they are fastened in position. The finished stand may be placed in position with the sash pulleys straddling the tire, when any motion given the box will cause it to revolve around the track.—Contributed by William S. Thompson, Hopkinsville, Ky.

Combination Calipers and Drill Gauge

Considerable time can frequently be saved by using an instrument provided with a combination of gauges, or one



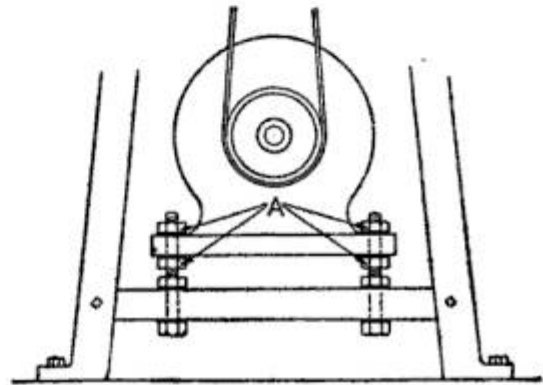
which can be used for several purposes. An ordinary pair of calipers can be so arranged. It may be drilled, reamed, and marked for various sizes of drills, or rods, most frequently made use of.

It is then merely necessary to slip the proper-size gauge hole over the round stock, and its size can be read off directly, thereby

avoiding the necessity of first carefully adjusting the calipers and then finding the size on a rule. The calipers would in no way be spoiled for their regular service.

Arrangement for Adjusting or Leveling Machinery

The following arrangement, while chiefly intended for electric motors, can be applied to other machinery as well. It consists of stud bolts, or plain bolts, threaded their entire length. One end is fastened permanently to a foundation or machine frame, as shown, and the other end is attached to the motor, or other machine, to be held by the bolts. On each bolt, one



The Long Threads of the Bolt Provide a Means to
Adjust the Base of a Machine

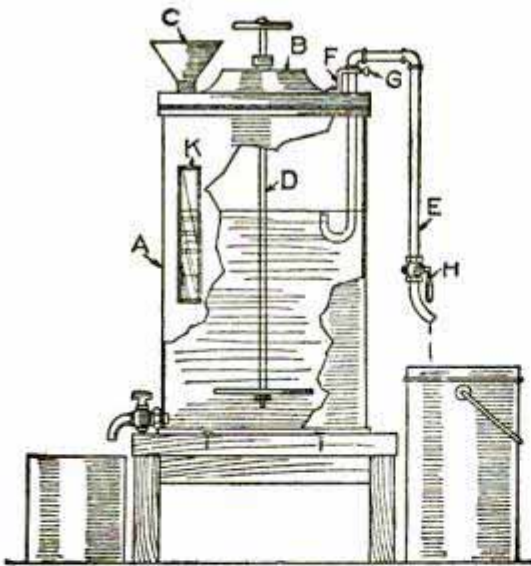
nut supports the machine, while a top nut secures it in place. When necessary to make an adjustment, for leveling or for belt tension, the nuts A should be loosened and turned until the desired position is obtained, when they are again screwed up tight.—Contributed by A. P. Connor, Washington, District of Columbia.

Filtering Tank for Engine Oil

The average small shop, or power plant, frequently cannot afford complicated and expensive oil-filtering devices, nor does it want the cheap affairs which are often no better than ordinary buckets. An efficient and easily constructed filtering tank can be made as shown in the illustration. It consists of a plain tank, A, with a large outlet at the bottom, and is provided with a cover, B. This has three

openings: one for a receiving funnel, C; another, in the center, for a plunger rod, D, having a handle at the upper end and a perforated plunger at the lower end; and a third for a siphon, or drain pipe, E, which conducts the filtered oil from the tank to an outside can. At the inner end, the siphon E is U-shaped so it may remove the top or purest oil without disturbing the remainder. The siphon is fastened in place by means of the bracket F and the thumbscrew G. The valve H regulates or shuts off the flow of oil from the tank. When operating the filter, the impure oil is poured into A, until it fills the tank about three-eighths full; then warm water of from 90 to 100-deg. temperature is turned in with the oil and the two thoroughly mixed by means of the reciprocating plunger, after which the mixture should be allowed to settle for several hours.

The oil will come to the top, leaving the impurities with the water at the bottom where they may be drained off. A sight-glass, K, should be placed in the side so the settling process can be observed and the siphon intake ad-



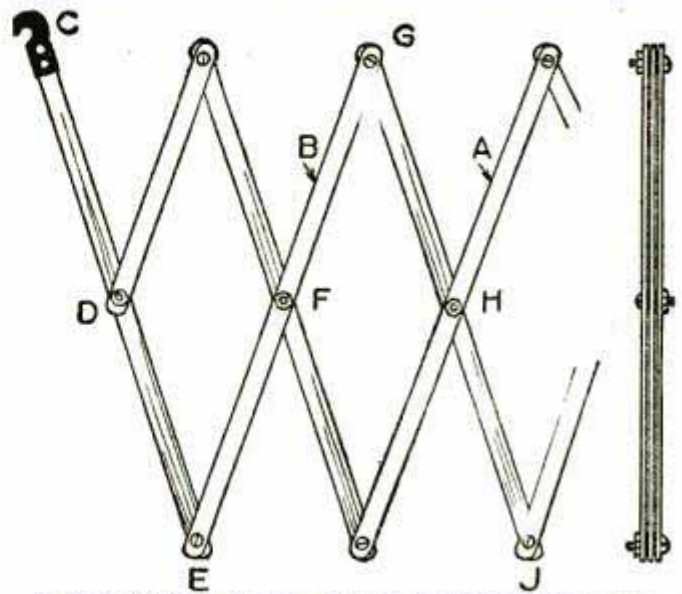
A Filter Tank for Separating Engine Oil from All Its Impurities

justed. In order to get the best results, it is advisable to wash out the tank thoroughly and frequently.—Contributed by F. W. Bentley, Jr., Milwaukee, Wis.

ⒸAn abrasive wheel will glaze over if it is too hard or run at a high speed.

A Collapsible Contact Maker

The collapsible contact maker shown in the sketch is very serviceable to linemen making frequent tests on tele-



A Lazy-Tong Contact Maker for Linemen to Use Instead of Climbing a Pole

phone and power lines that require electrical connection with the wires, as the desired connection can be made without climbing a pole.

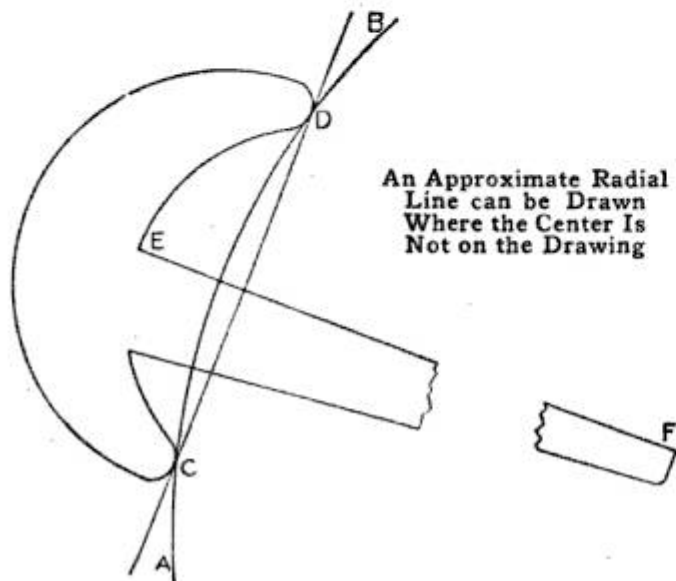
The device consists of a number of pieces of dried hickory, about $3\frac{1}{2}$ ft. long, $1\frac{1}{4}$ in. wide, and $\frac{3}{8}$ in. thick, fastened together with bolts to make it similar to lazy tongs. The number of pieces required will depend on the desired length of the extended device. Alternate pieces, such as A and B, are in duplicate, which places a uniform strain on both ends of all the bolts, thus lessening the tendency of the pieces to split out at the ends and also increasing the ease of operation. It is best to put locknuts on all the bolts, so that their tension may be adjusted and locked. Washers are placed between the ends and centers of the various pieces, so that they will move past each other without rubbing. Suitable handles are fastened to the outside ends of the bottom pieces.

A metal hook, C, is attached to the free end of the uppermost piece, to be used in making electrical connection with the wire. The electrical circuit may be carried to the ground by means of a flexible conductor attached to the hook C, and run through the openings

in small screw eyes turned in the pieces at the points D, E, F, G, H, J, etc., which prevents the wire from becoming tangled when the device is closed without interfering with the free operation of the device at any time.

A Radial Rule

In locating center lines of tie rods, or other radial lines, along a curve whose center is not on the drawing, the



radial rule offers a simple and convenient method when the approximate location is wanted.

To find the approximate radius of the curve AB, for instance, points C and D of the radial rule are placed on the curve, and the line, or edge, EF of the rule indicates the radial line.—Contributed by H. A. Thompson, Johnstown, Pennsylvania.

Fastening Split Patterns for Turning

It is frequently necessary to make patterns split, or in halves, in a lathe in order to be easily drawn from the mold, and it is also desirable to have the split, or joint, exactly in the center of the turned piece. One of the simplest and probably one of the best ways of fastening the two pieces together for turning is to glue the ends for about $\frac{3}{4}$ in., allowing $1\frac{1}{4}$ in. of material on each end to be cut off; but if it is a job that must be removed from the lathe and taken apart to fit a flange or something of the kind, this method is not suitable.

In this case it is customary to use a screw in each end, countersinking them so that they will not come in contact with the turning tools, or to depend on dogs driven into the ends, which, however, is to be avoided, as the dogs are apt to loosen, permitting the pieces to leave the lathe centers.

Another method, sometimes used on pieces that are not doweled together, is to make a center mark on one piece with the divider point, and place a small bird shot on the point or center mark, whereupon the other half is placed on this and struck sharply with the hand or a hammer, the shot transferring the center to the upper half. Holes are drilled in both center marks to take the screw part of an ordinary wood screw, after removing the head and shank. The upper, or larger, part of the threads are filed slightly tapering and screwed into one of the pieces with the use of a pair of pliers. The pointed end of the screw is started in the hole in the second piece and the two screwed tightly together by turning the second piece as if it were a nut.

Center plates are ordinarily used on large pieces for centering and holding the joints together while being turned. They are usually made of metal, from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. in thickness, and vary in shape and form, some being round and others square or oblong. The round kind is the best, but they should be finished all over and have three screw holes each side of the center line; and after the center recesses are turned in them, the hole should be continued through the plates with a small drill, preferably one that will be a fit for a $1\frac{1}{2}$ -in. brad. It is only necessary then to locate the center on the stock and drive the brad in about $1\frac{1}{4}$ in. It is then withdrawn and slipped through the small hole in the center of the plate where it serves as a pin for centering the plate on the piece to be turned.

Center plates cannot be used very well on small pieces, and it becomes necessary to drive a spur and dead center exactly on the joint—a very difficult thing to do—and to correct the

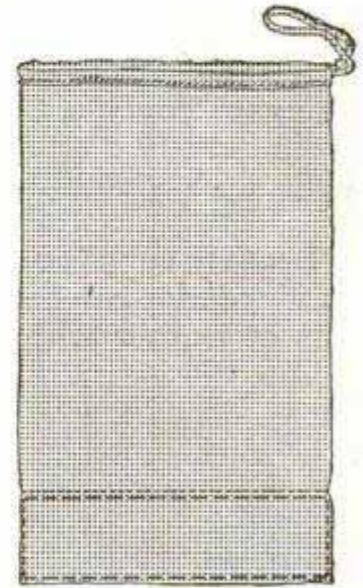
variations by tapping the ends of the piece with a hammer to force the piece to one side of the center or the other as the case may demand. To determine how much a piece is off center and which way to tap it in order to correct the mistake, scribe three or four circles about $\frac{1}{16}$ in. apart on the ends of the pieces. These lines should be made from the joint on each end of the pieces before fastening them together, locating the outer line close to what will be the periphery of the piece. Turn the ends down first, and if the turned part coincides with the first line each side of the joint, the piece is central. If the line is turned away on one side and still shows on the other, it is off center, and must be tapped on the side where the line is turned off. After it has been forced over as far as may be considered enough to bring it central, turn down to the second line and note the result. The reason for having three or four sets of parallel lines is obvious. Three or four concentric circles drawn on each end with a pair of dividers will answer the same purpose, or the piece may be stepped off with a pair of dividers after a spot on each end has been turned up, but the use of gauged lines will be found more accurate than either of these methods.—Contributed by J. A. Shelley, Brooklyn, N. Y.

Motorcycle Carrier for a Traveling Bag

While touring on a motorcycle I had considerable trouble in keeping the traveling bag, which I take along, fastened to the luggage carrier. Finally I made a simple device which overcame all this trouble. It was simply a tray made of wood and fastened to the luggage carrier with U-bolts. The inside dimensions of the tray were the same as the dimensions of the bottom of the bag, and the sides were about $1\frac{1}{2}$ in. high. To attach the bag, it is set in the tray and fastened down with one strap.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.

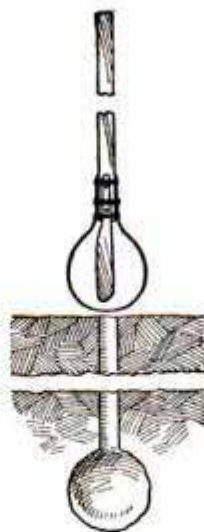
Mailing Bag for Parcel Post

A mailing bag that can be used to inclose a great variety of goods is made as illustrated. An ordinary sack is procured, such as a salt sack, and a strip of cardboard, about 1 in. wide and equal in length to the width of the bag, is placed in the bottom. The bag is then stitched on a machine just above the strip of cardboard. This keeps a space of 1 in. at the bottom stiff enough to write upon where it is easily seen. The remaining space of the bag is used for the goods.—Contributed by J. J. Kolar, Maywood, Ill.



Cleaning Out Blast Holes After Explosion

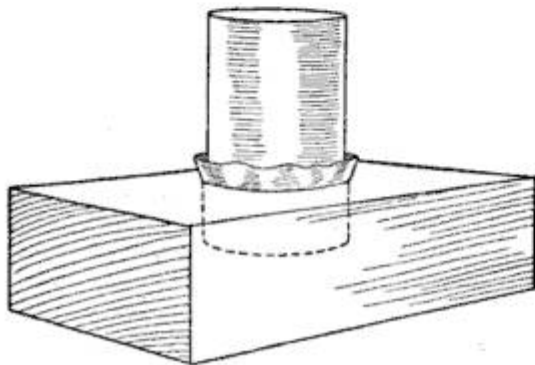
In order that lack of water during a dry season should not injure trees grown on sand rock only slightly covered with soil, it was decided to form storage pockets in the rock, in which the water could collect. Holes were drilled and the bottom blasted out with dynamite, but considerable loose sand still remained. To remove this, the device shown in the sketch was made. It consists of a handle somewhat longer than the total depth of the drilled hole, to which are fastened two cutting blades, on opposite sides, and a wide clock spring, or spring band. When necessary to clean out a hole the spring was compressed so it would enter at the top, and the entire device shoved to the



bottom. The handle is then turned which causes the knives and spring to cut out the sand. In drawing out the tool, part of the sand will be brought up by being wedged in between the spring and the cutters; this must be done several times before the hole is all cleaned out.—Contributed by F. E. Dougan, Pawnee, Okla.

Forming Leather Cups for Air Pumps

Leather cups for replacing worn ones on air pumps can be easily formed from bits of leather with the use of the device illustrated.



Driving a Piece of Leather into a Wood Mold to Form a Pump Cup

The mold consists of a block of hard wood, bored to make a hole of the same diameter as the pump barrel. The depth of the hole should be the same as the width of the flange on the leather. A plunger is cut from another piece of hard wood and turned to a diameter to make a drive fit when a piece of leather is placed under it.

The leather is thoroughly soaked, then driven into the hole and allowed to remain until it dries out. The edge is trimmed before removing the cup from the mold.—Contributed by Wm. A. Robinson, Waynesboro, Pa.

Tool for Testing Irregularities on a Circular Surface

It is frequently necessary to test revolving work for projecting pins, teeth, or outlines, so they may all be finished

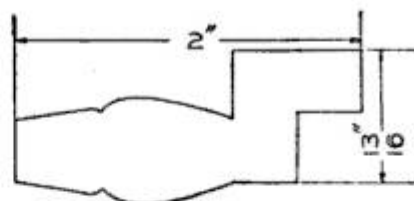


Revolving the Wheel with an Irregular Periphery Causes the Pointer to Indicate the Outline

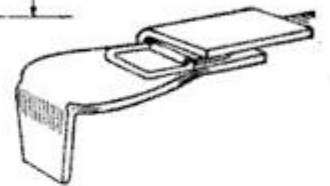
alike. A simple device for this purpose can be made as illustrated. On a suitable base is attached a round pin to fit the bore of the wheel, or part, to be tested. An indicator arm is pinned in place near one end, so as to have a free circular movement when pressed against the irregular surface of the test piece. The outer end of the indicator travels over a graduated scale fastened to the base. A spring is attached to the indicator, to keep it in contact with the face of the part tested, so that when this is rotated, its irregularities will be indicated on the graduated scale.—Contributed by George Jaques, Chicago, Illinois.

Detachable Hook for a Steel Tape

Steel tapes are not provided with any kind of arrangement for holding the end so that one person can use the tape in making a measurement. The cut illustrates a one-piece hook which is small enough to be carried in the vest pocket and can be attached to or detached from a tape in an instant. It will not slip, or let go, when in use. The groove shown should be bent slightly rounding, with the slot on the



Hook Made of Sheet Metal and Bent So That It will Attach on the Tape End



near side just wide enough to allow free entrance of the tape end. Insert the tape into the slot and draw it back against the ring; the rivet heads at the splice will wedge it tightly in position.—Contributed by E. O. Ritter, San Francisco, Cal.

It is false economy to purchase cheap inner tubes, for they will quickly put an expensive casing in the scrap pile.

Homemade Thread-Cutting Machine

By J. B. MURPHY

One of the most frequent difficulties experienced by the home mechanic, or machine operator in an out-of-the-way place, is to provide an inexpensive means for threading bolts, pipes, and machine parts. For such purposes a thread-cutting machine, as shown in Fig. 1, can be made, which will cut all intermediate sizes up to the largest. By using one head, all threads cut will be exactly the same. No other driving power is required than that applied with a pipe wrench.

The machine consists of a cutter head, and a vise for holding the stock. Three main parts constitute the cutter head. They are: a stationary head; a pipe or tube, attached to it and threaded with the desired master thread; and a rotating tool holder. The pipe should be of such size as to allow the largest diameter of stock to be threaded to enter freely. One end must have sufficient threads for a coupling to screw on to it completely. Two holes are drilled through the center of the pipe, at the unthreaded end, for bolting it to a wooden frame, or headstock, which, when completely assembled, is fastened to a workbench. The block is provided with a semicircular, or V-shaped, groove, to hold the pipe, and should be sufficiently high, so that the threading tools will have ample clearance above the bench.

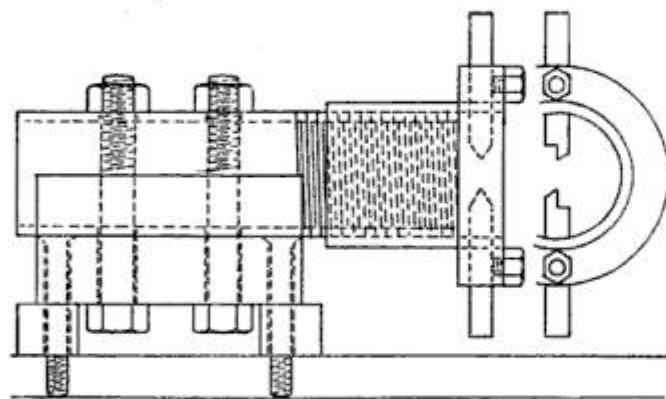
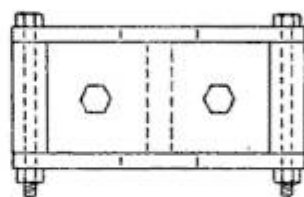


FIG. 1

An Inexpensive Machine for the Small or Home Shop to Thread Pipe or Bolts

The bolt holes in the block are countersunk in the base, to admit the bolt heads.

The rotating tool holder consists of a coupling, threaded to match the pipe thread, and having a tool-holder ring



A Vise for Holding the Material Rigidly While Its End is being Threaded

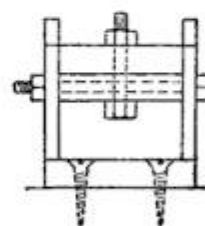
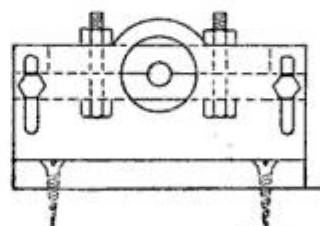


FIG. 2

shrank on at one end. Two slots, on directly opposite sides, are cut through the ring and coupling, to admit the threading tools. Their distances from the outside face of the ring must differ by one-half the thread pitch, so the tools will track when ground exactly alike. To clamp the cutters in place, holes are drilled and tapped in the slots for setscrews.

To clamp the stock in position for threading it, any portable vise will answer, which, when bolted in place, will hold the stock so its center lines up with the center of the cutter head.

If no suitable vise is at hand, a substitute can be made, as shown in Fig. 2, which will answer as well. For this purpose a strong, three-sided wooden frame is made. The intermediate piece serves as the base for the vise, and should space the two parallel sides about 2 in. apart. These should have sufficient width at the center, so that a circular hole may be cut through, having a diameter slightly greater than the largest-size stock to be threaded. The distance of the center of the hole from the workbench must be exactly the same as that of the center of the cutter head from the same base.

The clamping device consists of two iron bars, 1 in. thick by 2 in. wide. These are drilled and clamped to-

gether with two bolts and nuts, which are spaced sufficiently far apart so that the largest stock will easily fit between them, when clamped in place. A hole is drilled through the 2-in. width

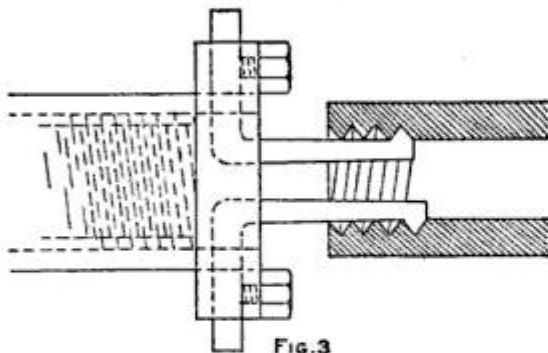


FIG. 3
Cutters Used in the Head for Making Threads
on the Inside Surface of a Hole

of the clamp, midway between the bolts and with one half in each bar. This must correspond to the smallest size of stock to be held; the larger sizes will be gripped on the four edges of the circular opening. The upper bar is only long enough to provide a bearing for the clamping nuts; the lower bar must extend out farther, so that it can be drilled at each end for adjusting bolts, which fit in slots in the wooden uprights. The completed vise is fastened in position so that it lines up as closely as possible with the cutter head, allowing sufficient space between to permit removing of the coupling.

In using the machine, the tool holder is first turned on the pipe as far as it will go, and the stock is then set. It is clamped in the vise, with the end to be threaded extending to within a short distance of the tools. To adjust the stock centrally with the cutter head, a pair of inside calipers, or a common rule, may be used. The distances from the stock to the edge of the holes in the vise frame, should be measured, and when these are all alike, the stock is in proper alinement with the cutter head, and is fastened in that position by the adjusting bolts.

In setting the tools, the one nearest the outside face of the tool holder is adjusted first for a suitable cut in the metal. The holder is then given a half turn, and the other tool set so it

will track in the cut made with the first setting, but sufficiently deep to remove an additional amount of metal. If the tools have been ground alike, not only with respect to shape but also as to length, the cuts can be determined by measuring the distances the tools project from the ring.

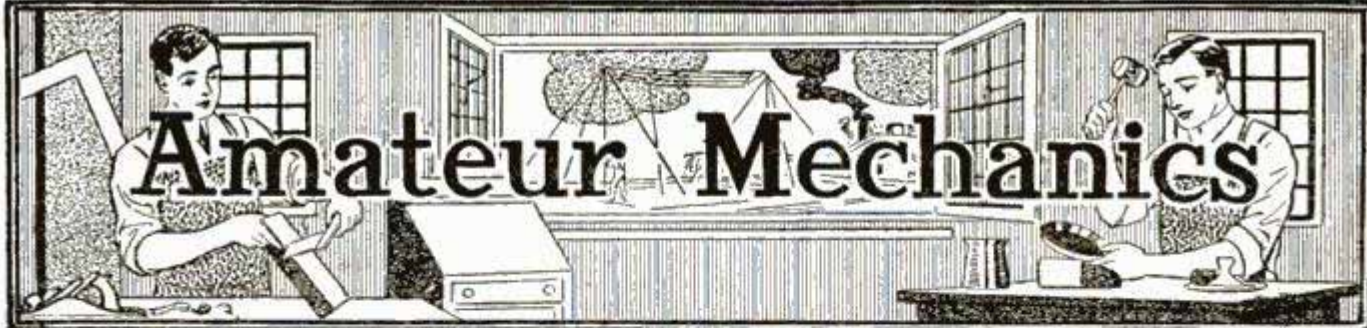
When all parts have been adjusted and fastened, the tool holder may be turned with a small pipe wrench, the tools meanwhile cutting and advancing along the stock with the rotated coupling. When the required length of thread has been cut, or the limit of the machine has been reached, the coupling is turned back to the starting point, the setscrews are slightly loosened, and the tools are driven in and fastened for another cut, and so on, until the thread is completed.

When cutting pipe threads, if the setscrews are loosened slightly near the end of the cut, the tools will be forced out, thereby producing the taper necessary for a tight joint.

To cut inside threads for nuts and pipe couplings, the tools shown in Fig. 3 may be used. As before, they should be alike. The cuts are produced by forcing the tools away from the center into the stock.

Building Up Current in Generator with Dry Batteries

When starting up electric generators, difficulty is frequently experienced in building up the current. The brush-holder ring may be fastened in position corresponding to the greatest efficiency at full load, but interfering with the shifting of brushes when starting up. This difficulty can be avoided by the use of a battery. The carbon of the battery should be connected to the armature terminal of the generator; the zinc, to the field terminal, and a push-button switch put into the battery circuit. In using the battery, the current should be switched on only long enough to start the pilot lamp glowing.—Contributed by M. R. Jenkins, Red Creek, N. Y.



An Ice Glider

By MILDRED E. THOMAS

THE enthusiastic pushmobilitist need not put aside his hobby during the winter, as an amusement device for use on ice, which will surpass the very best pushmobile, can be easily made as shown in the illustration.

Similar to an ice yacht, only a great deal smaller, the ice glider will require three ordinary skates, two of which are fastened to the ends of the front crosspiece, so that their blades will stand at an angle of about 30 deg. with their edges outward. To get this angle, tapering blocks are fastened to the crosspiece ends, as shown. The skates are then fastened to these blocks.

The crosspiece is 30 in. long and about 8 in. wide. In the center of this piece an upright is constructed, 26 in. high. The edges of the front crosspiece are cut on a slant so that a piece nailed to its front and back edge will stand sloping toward the rear. A handle, 24 in. long, is fastened between

the two uprights at the upper end. The rear part is made of a board, 8 in. wide and 40 in. long. The remaining skate is fastened in a perfectly straight position on the rear end. The skates may be attached with screws run through holes drilled in the top plates, or with straps. The front end of the rear board has a hole for a bolt to attach it to the center of the front cross-

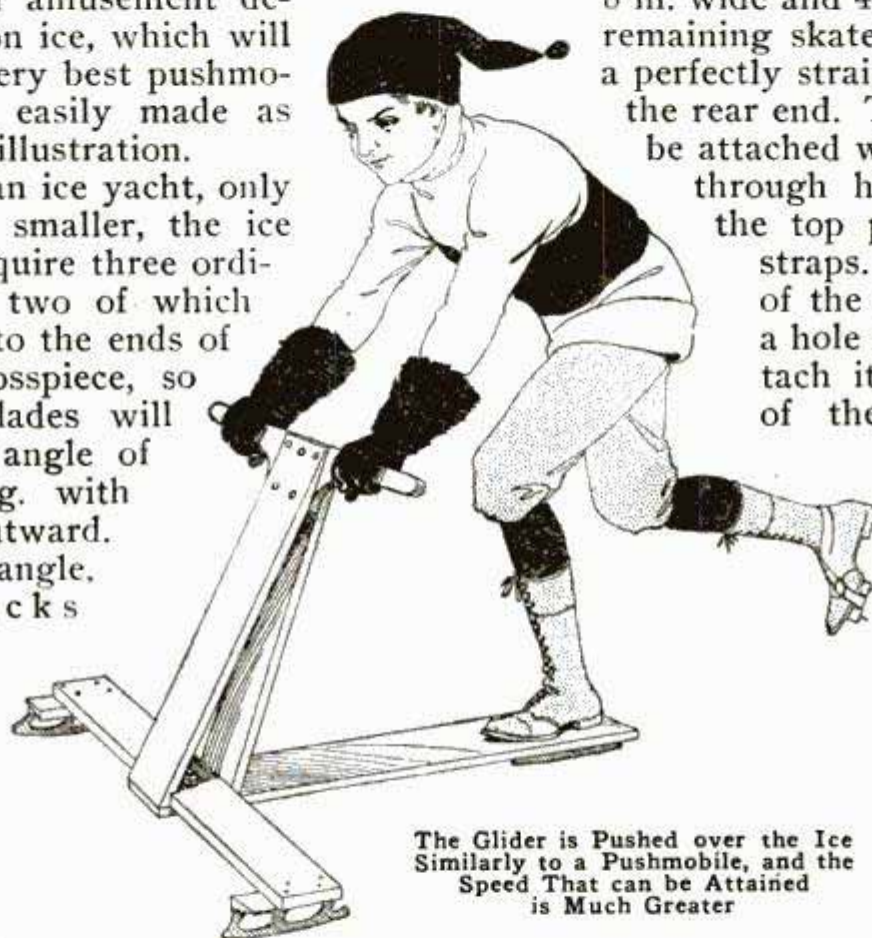
piece, so that the latter will turn to guide the glider.

A pusher is prepared from a block of wood, into which nails are driven with their ends projecting on the

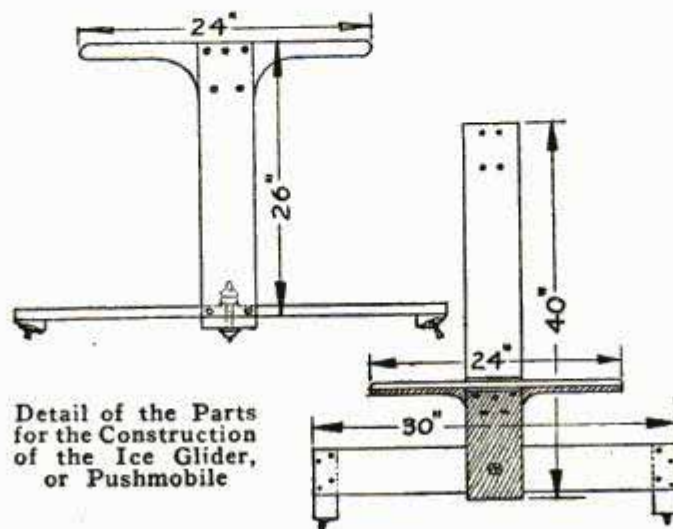
under side. The block is strapped to one shoe, as shown.

The glider is used in the same manner as a pushmobile.

The pusher can be made in another way by using sole leather instead of the block. Small slots are cut in the sides for the straps. Nails are driven

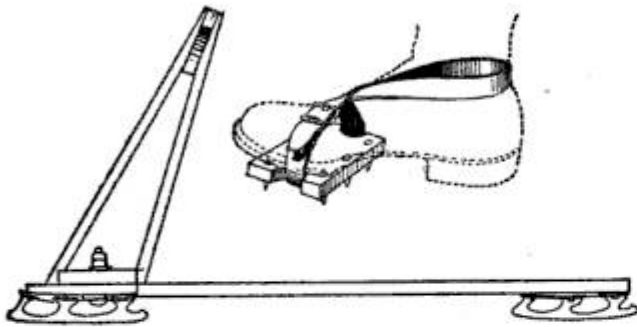


The Glider is Pushed over the Ice Similarly to a Pushmobile, and the Speed That can be Attained is Much Greater



Detail of the Parts for the Construction of the Ice Glider, or Pushmobile

through the leather so that the points project. Either kind of pusher is



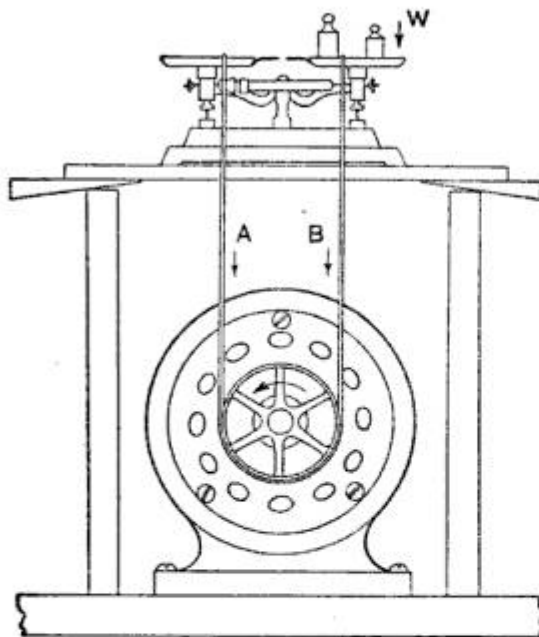
The Block of Wood with Protecting Nails to Fasten on the Shoe That Does the Pushing

especially adapted for the pushmobile to prevent wear on the shoe.

Prony Brake for Testing Small Motors

The ordinary prony brake is not, as a rule, sensitive enough to make an accurate test on small motors, such as those used in driving sewing machines, washing machines, vacuum cleaners, etc. The arrangement shown in the accompanying sketch has been used for this purpose with good results and was very accurate. The operation of the brake is exceedingly simple.

A pulley without a crown face is attached to the shaft of the motor, which



Prony Brake Used in Connection with a Small Balance to Find the Horsepower

is fastened to the top of a table or bench, and a balance mounted directly over the pulley. The support for the balance should be a narrow strip, which

in turn is supported on two upright pieces, as shown. A light rope is put under the pulley, and the ends are looped over the platforms of the balance so that it does not interfere with the operation of the balance. The ends of the rope should be vertical and parallel. The piece upon which the balance rests is raised by inserting wedges, thus increasing the tension in the rope. The resulting friction of the rope on the pulley increases the load.

If the motor is running in the direction indicated by the arrow on the pulley, the tension in the left-hand end of the rope will be greater than in the right-hand end and a weight must be placed on the right-hand platform of the balance. When the weight W is adjusted so that the two pointers on the platforms are exactly opposite each other, the value of the weight W , in pounds, will represent the difference in pull, in pounds, between A and B . If the value of the weight W is known and also the speed of the machine when the weight was determined, the horsepower output can be computed by means of the following equation:

$$Hp. = \frac{6.2832 \times L \times W \times R.P.M.}{33,000 \times 12}$$

In this equation, L is the distance in inches from the center of the pulley to the center of the rope. Two ordinary spring balances may be substituted for the beam balance and the difference in their readings taken for the value W . For best results, the tension in the slack end of the rope should be as small as possible, and it may be necessary to wrap the rope one or more times completely around the pulley.

A Mystic Fortune Teller

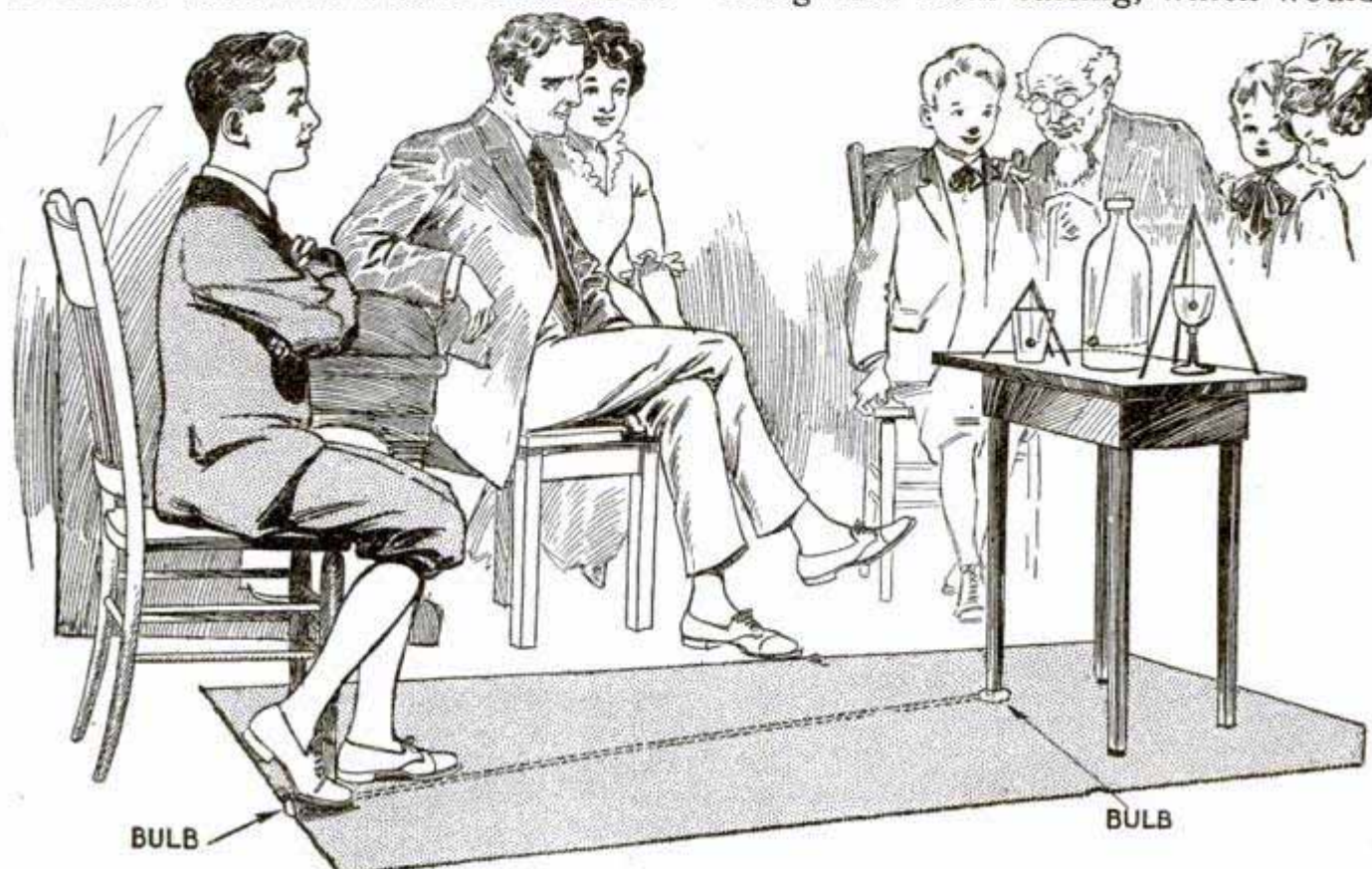
Fortune telling by means of weights striking glasses or bottles is quite mysterious if controlled in a manner that cannot be seen by the audience. The performer can arrange two strikes for "no," and three for "yes" to answer questions. Any kind of bottles, glass, or cups may be used. In the

bottles the pendulum can be suspended from the cork, and in the glasses from small tripods set on the table.

The secret of the trick is as follows: A rubber tube with a bulb attached to

Holding Prints in a Liquid-Filled Tray

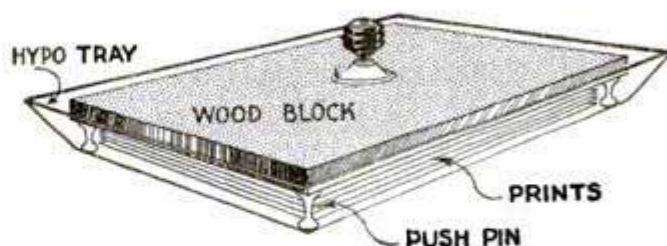
After having considerable trouble in keeping my paper prints in the hypo fixing bath from curling, which would



The Rocking of the Table is Caused by the Pressure of Air in the Bulb under the Foot, the Movement Causing the Pendulum to Swing and Strike the Glass

each end is placed under a rug, one bulb being located under one table leg and the other near the chair of the performer set at some distance from the table where it can be pressed with the foot. Some one selects a pendulum; the performer gazes intently at it, and presses the bulb under his foot lightly at first; then, by watching the swaying of the pendulum selected, he will know when to give the second impulse, and continue until the weight strikes the glass. As the pendulums are of different lengths they must necessarily swing at different rates per second. The impulses must be given at the proper time or else the pendulum will be retarded instead of increased in amplitude. A table with four legs is best to use, and the leg diagonally opposite that with the bulb beneath it must not touch the carpet or floor. This can be arranged by placing pieces of cardboard under the other two legs.—Contributed by James J. McIntyre.

force the edges out of the liquid, I found the plan here illustrated a success. I procured a piece of wood, the size of a postcard, and stuck four glass push pins into one surface, one at each corner, and fastened a handle to the center of the upper side. The papers are first placed in the bath, then



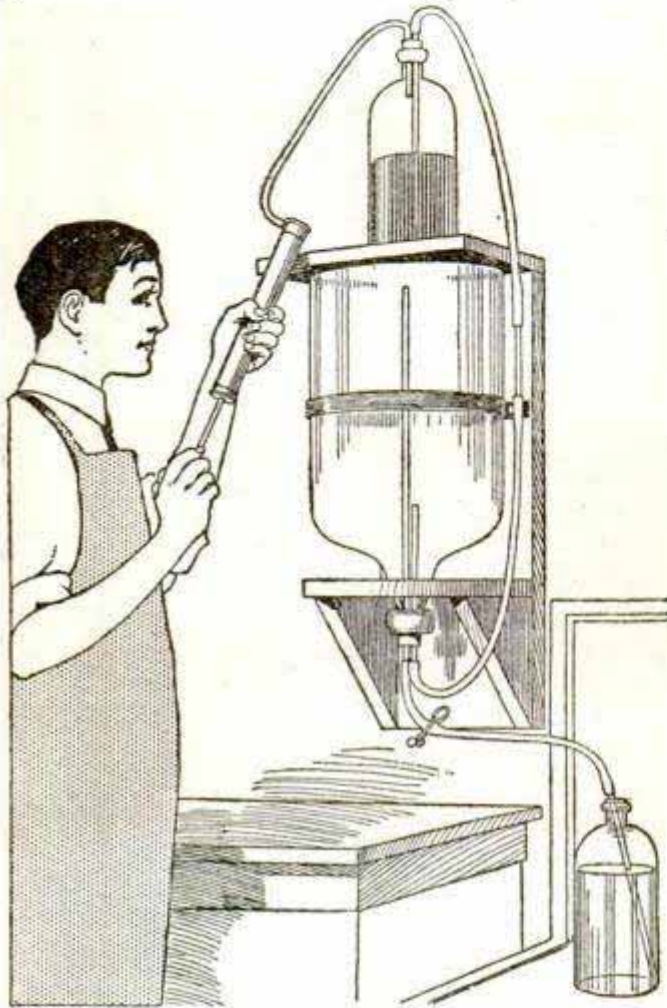
Push Pins on the Under Side of the Board Raise It and Provide a Space for the Prints in the Liquid

the board is set over them with the pins down. This holds the prints under the liquid but does not press them tightly together.—Contributed by J. J. Kolar, Maywood, Ill.

CA piece of an old gunny sack will polish brass work very nicely.

A Laboratory Gas Generator

The sketch illustrates a gas generator designed for laboratories where gases are needed in large quantities



Gas Generator of Large Capacity That will Work Automatically as the Gas is Removed

and frequently. The shelf holding the large inverted bottle is of thick wood, and to reinforce the whole apparatus, a 1-in. copper strip is placed around the bottle tightly and fastened with screws turned into the woodwork. The shelf above is attached last, and upon it rests the bottle of commercial acid required in the gas generation. The pump shown is for use in starting the siphon.

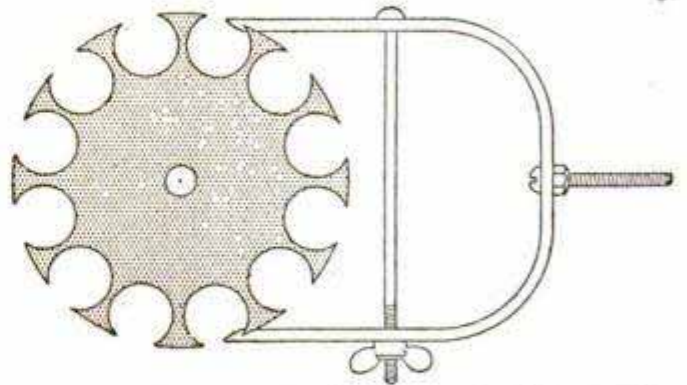
The large bottle used as a generator may be either a 3 or 5-gal. size, and after it is placed in the position shown, a sufficient amount of the solid reagent needed in gas generating is placed in the mouth before the exit tube, leading away below, is fixed in position. If sulphureted hydrogen is required, ferrous sulphide is used; if hydrogen is required, zinc is placed within; and to

make a carbon dioxide, marble, or its equivalent, is inserted. Whatever gas is required, a sufficient quantity of the solid material is put in to last for some time in order not to disturb the fastenings.

When all is ready, the pump is used gently to start the acid over the siphon and into the generator from below. The gas generated by the action of the acid on the solid soon fills the bottle. The screw clamp on the exit tube is loosened and the gas passes into the bottle of water and charges it, in the case when sulphureted hydrogen is required. In the other cases, when sufficient gas has been generated, the screw clamp is tightened, and the gas soon attains considerable pressure which forces the acid back out of the generator and into the acid bottle above. The whole apparatus now comes to an equilibrium, and the gas in the generator is ready for another use.—Contributed by W. M. Mills, Bakersfield, Cal.

Holding Small Armatures for Winding

Procure a strip of sheet metal, 6 in. long, 1 in. wide, or as wide as the armature core is long, and $\frac{3}{8}$ in. thick. Bend this into a U-shape, as shown, and file each end similar to the barb on a fishhook. Drill two holes for a bolt to pass through the sheet-metal ends. Fasten a screw or bolt in the center of the bend, to be used for gripping in a chuck



Armature Cores are Easily Revolved to Fill the Core Openings with Insulated Wire

or polishing head. Core segments can be quickly wound with this device.—Contributed by Geo. B. Schulz, Austin, Illinois.

SNOWSHOES

How to Make and Use Them

By Stillman Taylor

PART I—Shapes of Snowshoes



well as in shape, and the filling of hide is often woven in many varied and intricate patterns. The frame or bow—usually made of ash in order to get strength with light weight—is bent in many shapes, but the one shown in the diagram is a typical general-purpose shoe, and may be called standard. The frame is held in shape by means of two wooden cross braces, neatly mortised into the frame. These braces are spaced some 15 or 16 in. apart, and so divide the shoe into three sections, known as the toe, center, and heel. The filling is woven into a lanyard, which is a light strip of hide firmly laced to the frame through a double row of holes drilled in the wood. The center filling is woven of heavy strands of rawhide, in a fairly coarse mesh, because this part of the shoe must bear the weight of the body and the brunt of wear. The end fillers for toe and heel are woven of lighter strands of hide, and the mesh is, of course, smaller.

TO the inventive mind of the North American Indian we owe the snowshoe, and its conception was doubtless brought about through that prolific source of invention—necessity. The first models were crude web-footed affairs, but improvements in model and manner of filling the frames were gradually added until the perfected and graceful shoe of the present was finally reached. The first snowshoes were made by the Indians, and the Indians of Maine and Canada continue to fashion the finest models today.

The snowshoe is a necessity for the sportsman and trapper whose pleasure or business leads him out in the open during the winter season, when roads and trails are heavily blanketed by a deep fall of powdery snow. But the use of the web shoe is by no means confined to the dweller in the wilderness, since the charm of wintry wood and plain beckons many lovers of the outdoors to participate in this invigorating sport, and snowshoe tramps are fast growing in popularity in and about our cities and towns.

All the modern snowshoes are constructed upon practically the same general lines, although the types of frames differ considerably in size as

As may be noted by referring to the drawing, a center opening or "toe hole" is provided, and as the greater strain on the filling lies directly under the ball of the foot, the shoe is reinforced at this point by the "toe cord" running across, and the "toe-cord stays," which are tied in on each side of the toe hole—one end being fastened to the toe cord and the other lashed over the wooden cross bar of the frame. These reinforcing cords are formed of several strands of hide, the

stays being again wound with finer strands.

To prevent slipping and to secure a good foothold while walking, the manner of attaching the foot to the shoe is of importance, and this is done by making use of a toe strap, which will allow the toe to push down through the toe opening as the heel of the foot is lifted in the act of walking. A second strap, or thong, leading from the top around the foot, above the curve of the heel, is needed to lend additional support in lifting the snowshoe, to effect the easy shambling stride characteristic of the snowshoer.

There are, of course, a great number of models or styles, some one style being popular in one locality, while an altogether different style is preferred in another part of the country. The most representative types are well shown in the illustrations, and a brief description will point out their practical advantages, because each model possesses certain merits—one model being designed for fast traveling in the open, another better adapted for brush travel, while others are more convenient for use in a hilly country where much climbing is done, and so on.

Style A is regarded by snowshoe experts as an extreme style, for it is long and narrow. It is designed for fast traveling over smooth and level country, and over loose, powdery snow. This style is much used by the Cree Indians, and is usually made 12 in. wide by 60 in. long, with a deeply up-curved toe. It is a good shoe for cross-country work, but is somewhat difficult to manage on broken trails, when the snow is packed, and also affords rather slippery footing when crossing ice. Owing to the stout construction of the frame and reinforcement needed to retain the high, curved toe, style A is more difficult to manage than the more conservative models, and its stiffness of frame makes it more fatiguing to wear, while its use is a decided handicap in mountainous districts, because a curved toe always makes hill climbing more difficult.

Style B may be considered the ordinary eastern model, and a common style best adapted for all-around use. It is a neat and gracefully designed frame, about 12 in. wide and 42 in. long, and is usually made with a slightly upcurving toe, about 2 in. turn at the toe being correct. When made by the Indians of Maine, this model is fashioned with a rather heavy heel, which is an advantage for fast walking, while it increases the difficulty in quick turning.

Style C is a favorite model among the hunters and woodsmen of New England. This is a splendid style for general purposes in this section of the country, since the full, round toe keeps the toe up near the surface, and lets the heel cut down more than the narrow-toe models. Style C is an easy shoe to wear, and while not so fast as the long, narrow frame, its full shape is more convenient for use in the woods. It is usually made with about 1 to 1½-in. turn at the toe.

Style D is the familiar "bear's paw," a model originating with the northeastern trapper. This model is well adapted for short tramps in the brush, and having a flat toe, is likewise a good shoe for mountain climbing. For tramping about in thick brush, a short, full shoe enables one to take a shorter stride and turn more quickly, but it is a slow shoe for straight-ahead traveling.

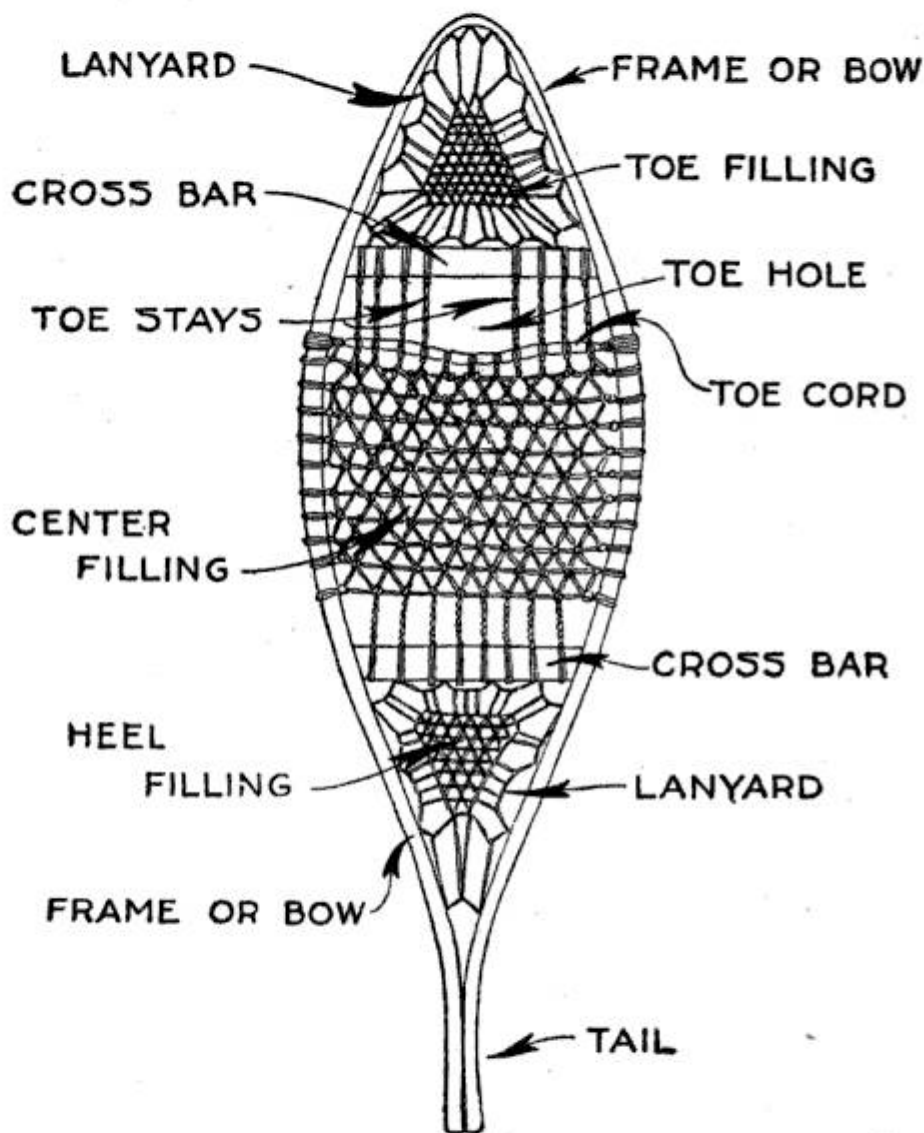
When purchasing a pair of snowshoes, some few important considerations should be kept in mind, and the size and model will depend upon the man to some extent, since a large, heavy man will require a larger snowshoe than would suffice for a person of lighter weight. Height also enters into the choice, and while a small person can travel faster and with less fatigue when equipped with a proportionately small shoe, a tall man will naturally pick out a larger-sized snowshoe for his use. For a country where deep snows prevail, larger sizes are best, but in localities where the snow packs solidly and there is considerable ice, and in mountainous districts,

or for rough-country traveling, the smaller sizes will give more satisfaction and prove more durable also. For a wet-snow locality, the center filling should be strung in rather coarse mesh, while for soft, powdery snow, a finer mesh will be the logical choice.

There are snowshoes and snowshoes, and while there are fine models regularly stocked by a few of the better sporting-goods firms, there is likewise a deal of poorly made snowshoes on the market. It is well to pay a fair price and secure a dependable handmade article, for the cheaper snowshoes—often filled with seine twine and the cheapest hide (commonly known in the trade as "gut")—will warp and twist in the frame, and the shoddy filling will soon become loosened up and "bag" after a little use. The best snowshoes that the writer is acquainted with are made by the Indians, and the filling is ordinarily made of neat's hide; cowhide for the center filling, and calfskin for the toe and heel. A first-class pair of snowshoes may be had for about \$6 to \$7.50, and when possible to do so, it is best to have them made to order. This plan is, of course, necessary in case one wishes to incorporate any little wrinkles of his own into their making, or desires a flatter toe, lighter heel, or a different mesh from the usual stock models.

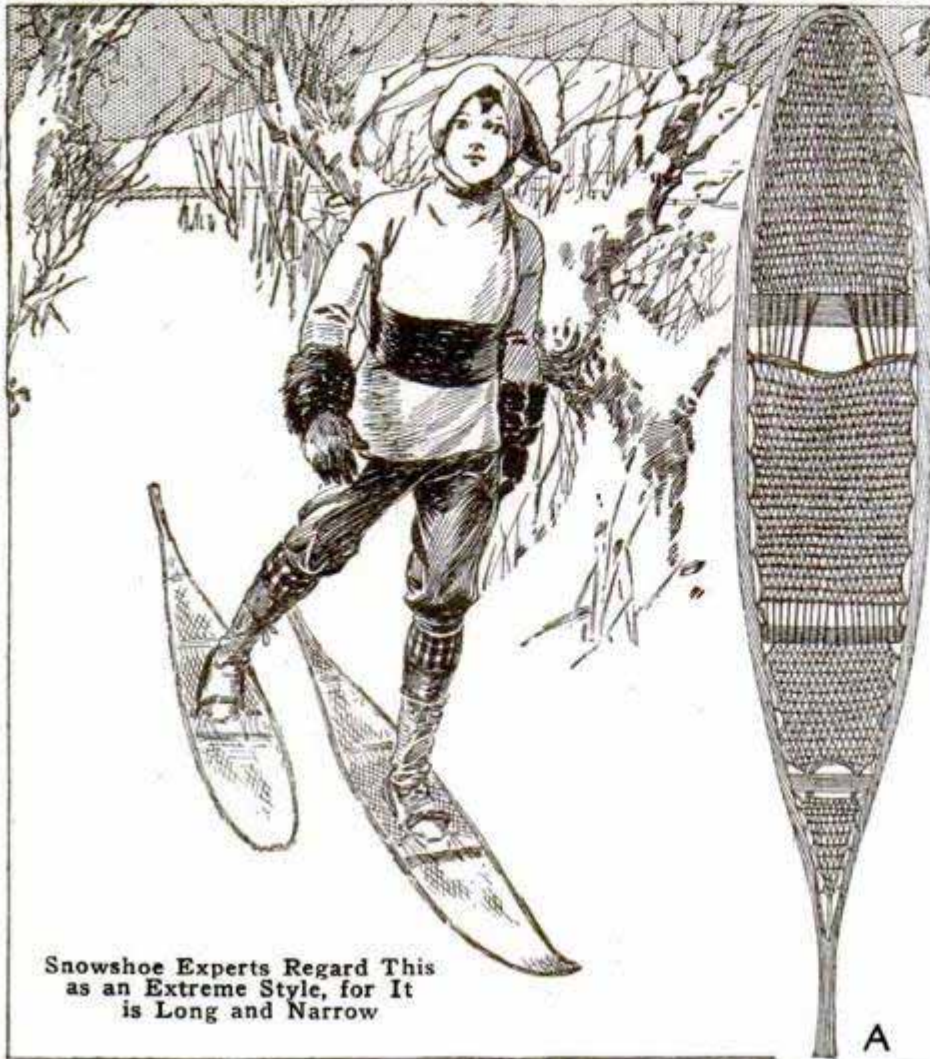
Where but one pair of snowshoes is purchased, style B will probably prove the best selection, and should be ordered with the flat toe, or a turn not greater than 1 in. The frame may be

in either one or two pieces, depending upon the size of the shoe and the ideas of the Indian maker, but it is well to specify white ash for the frames in the order. No Indian maker would be guilty of using screws or other metal fastenings, but many of the cheap and poorly fashioned snowshoes are fastened at the heel with screws, thus making this a decidedly weak



The Frame of a Snowshoe in Its Usual Construction, Showing the Crosspieces with Their Laced Fillings of Hide and the Different Parts Named, for a Ready Reference

point, since the wood is quite certain to split after a little rough service. In contrast to the poor workmanship of these low-priced snowshoes, the Indian-made article is fashioned from sound and properly seasoned wood; the cross bars are snugly fitted by mortising to the frame; the filling is tightly woven, and the heel is properly fastened by lacing with a rawhide



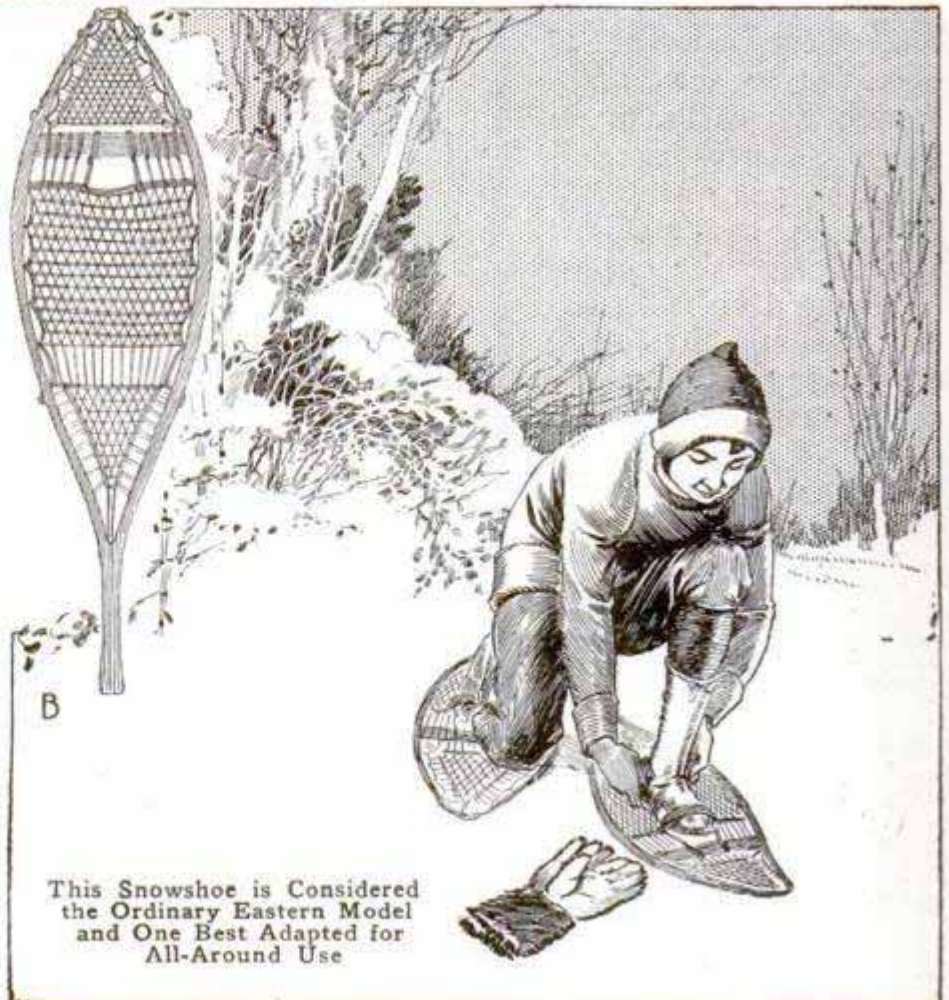
Snowshoe Experts Regard This as an Extreme Style, for It is Long and Narrow

it is a good idea to select a filling of good heavy weight and with a firmly woven and open mesh, say, about $\frac{3}{4}$ in. The toe and heel sections will, of course, be of finer-cut hide and smaller mesh, and it is wise to avoid those shoes employing seine twine for the end filling. Some factory-made snowshoes are given a coat or two of varnish, but this, while serving to make them partly waterproof, makes them rather slippery when crossing logs and ice. Most woodsmen prefer to leave both frame and filling in their natural condition.

The Indian-made snowshoe is always

thong. However, Indian makers are likely to make the toe small and leave the wood to form a rather heavy heel. Some few woodsmen and sportsmen may prefer this model, but the majority favor a fuller toe and a lighter heel for general use, because the regulation Indian model, cutting down at toe and heel equally deep, increases the difficulty of easy traveling over soft snow, although it is a good shoe when used over broken trails.

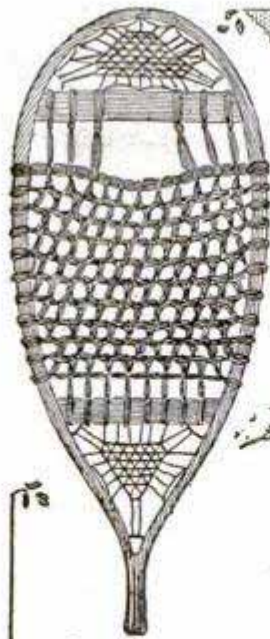
When buying snowshoes at the store, see that the frames are stoutly and well made, and for all-around use,



This Snowshoe is Considered the Ordinary Eastern Model and One Best Adapted for All-Around Use

provided with a generously large toe hole, so that ample foot covering may be used. This point is generally overlooked in the machine-made product, and the toe cords are also frequently roughly formed, thus chafing the feet and making them sore. These details may or may not prove a handicap for short tramps near town, but for long trips through the woods, they are important considerations.

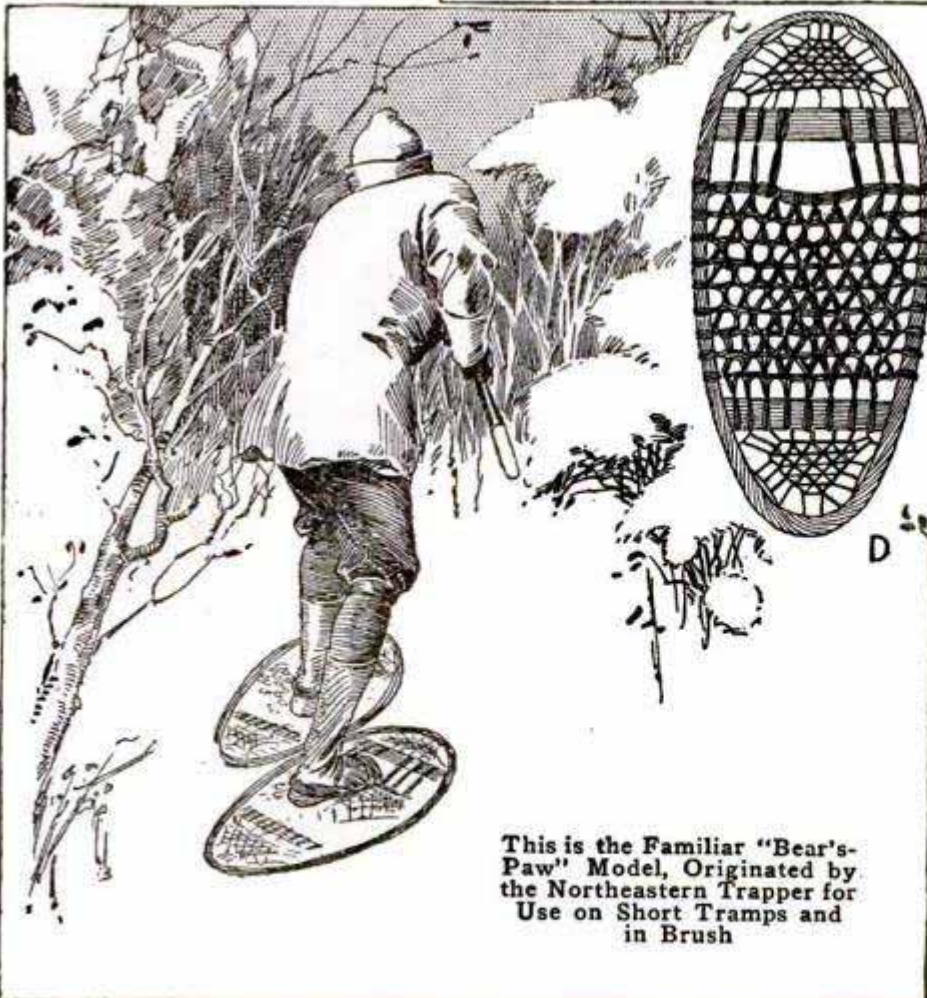
The Indian manner of tying the snowshoe to the foot by means of a single twisted and knotted thong is a good method of attachment, in that, if the thong is properly ad-



C



The Style Illustrated Here is Splendid for General Purposes and is a Favorite among Hunters and Woodsmen



This is the Familiar "Bear's-Paw" Model, Originated by the Northeastern Trapper for Use on Short Tramps and in Brush

justed to the requisite snugness in the first place, the shoes may be quickly removed by a simple twist of the ankle. A better fastening is secured by using a fairly wide ($\frac{3}{4}$ in.) toe strap and a long thong. The toe strap is placed over the toes, immediately over the ball of the foot, and secured against slipping by weaving the ends in and out between the meshes of the filling until it reaches the frame on either side. This grips the toe strap firmly and does away with the necessity of tying a knot. A narrow thong, about 4 ft. long, is now doubled, the center placed just

above the heel of the foot, and the ends passed under the toe cord, just outside of the toe-cord stays on each side. The thong is then brought up and across the toes, one end passing over and the other under the toe strap. Each end of the thong is now looped around the crossed thong, on either side, and then carried back over the back of the heel and knotted with a common square or reef knot. Calf-skin makes a good flexible foot binding, or a suitable strip of folded cloth or canvas may be used.

The regulation snowshoe harness, consisting of a leather stirrup for the toe and an instep and heel strap, will be found more comfortable than the thong, and when once adjusted snugly to the foot, the shoes may be quickly

taken off and put on again by pushing the heel strap down, when the foot may be slipped out of the toe stirrup.

The use of heavy leather shoes is of course undesirable, and the only correct footwear for snowshoeing is a pair of high-cut moccasins, cut roomy enough to allow one or more pairs of heavy woolen stockings to be worn. The heavy and long German socks, extending halfway to the knee, drawn on over the trouser legs, are by far the most comfortable for cold-weather wear. The feet, thus shod, will not only be warm in the coldest weather, but the free use of the toes is not interfered with. Leather shoes are cold and stiff, and the heavy soles and heels, chafing against the snowshoes, will soon ruin the filling.

Soldering and Riveting

By JOHN D. ADAMS

There are two simple processes that every experimenter should master: soldering and riveting. The large soldering copper will find only a very re-

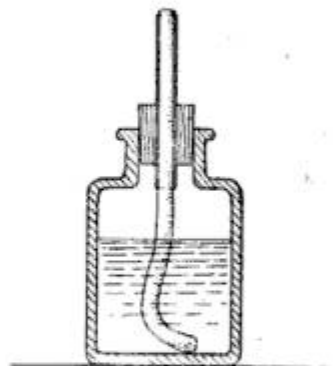


A Small Torch Made of a Penholder is Handy to Use in Soldering Electrical Apparatus

stricted use with the amateur on account not only of its clumsiness, but of the fact that it requires a fire, which is often impracticable to obtain. The experimenter should therefore construct a small alcohol lamp, which, after a little experience, will reveal the following advantages: It may be brought into instant use at any place; it will make a more perfect connection; with a small blowpipe places may be reached that are entirely inaccessible to the large iron; several small pieces may be set in position and soldered without disturbing them, which is quite impossible with the large iron.

To make such a lamp, procure a small wide-mouthed bottle so that very little alcohol will be necessary and the lamp may be tipped at any desired angle. A short piece of seamless brass

tubing should be procured, or, preferably, one of those capped brass cylinders for holding pencil leads, the bottom of which should be sawn off and the cap used to keep the alcohol from evaporating. A good, sound cork is next in order, and in cutting the central hole, use the brass tube, which should be sharpened around the lower end. Proceed with a rotary motion, and a clean core will be removed. If an ordinary lamp wick is not at hand, soft cotton string may be bundled up as a substitute. Such a lamp is safe, odorless and will not blacken the work in the least as in the case of kerosene or gasoline.



There are many good soldering fluxes on the market, but that obtained by dissolving as much scrap of zinc as possible in muriatic acid will solder practically everything that may be necessary, provided, of course, the surfaces are filed or scraped bright. Wire

solder is usually the most convenient, as small pieces can be readily cut off and placed directly on the work where required. A small blowpipe is often a valuable adjunct, as it makes possible a long, narrow flame that may be directed in almost any direction.

Where numerous small connections are to be made, as is often the case with electrical apparatus, the small torch illustrated will be found very convenient. It is simply an old penholder with the wood portion shortened

somewhat and the metal end filed off square and cleaned out.

This is then filled with wicking, and it is only necessary to dip it in alcohol in order to soak up enough to solder an ordinary connection.

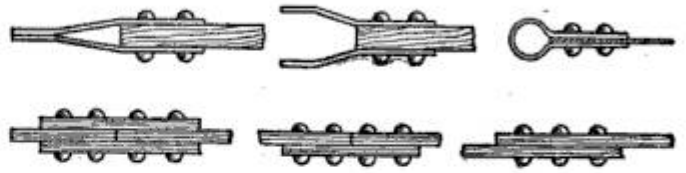
The second simple process, of which many fail to appreciate the usefulness in experimental work, is that of riveting—particularly when done on a small scale. Very often the material in hand is tempered steel and cannot, therefore, be soldered to advantage, or it may be a case where subsequent heating makes a heat-proof connection imperative. Then, again, the joint may require the combined strength of both solder and rivet.

When properly set, the strength of the ordinary brass pin, when used as a rivet, is quite great. Should the work require a particularly soft rivet, it is only necessary to hold the pin for a moment in the flame of a match. A somewhat larger and stronger rivet may be made by softening and cutting to the required length the small flat-headed nails used in making cigar boxes. The ordinary shingle nail is also of a suitable shape after the burrs have been filed off under the head.

In setting these small rivets, it is absolutely necessary that they closely fit the holes, as at A, otherwise the result will be as indicated at B in the sketch. Be careful not to leave too great a length for rounding over on the metal. This extra length should approximately equal the diameter of the



rivet and must be filed flat on the top before riveting. In case of pins, it will be found easier to cut them off to the

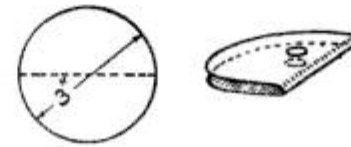


A Few Joints Where Rivets are Used to Hold the Parts Solidly Together

proper length after they are inserted. Use the smallest hammer available, striking many light blows rather than a few heavy ones.

A Whistle

Cut a circular piece of tin any convenient size, preferably 3 in. in diameter, and bend it across the diameter so that it will be in a narrow U-shape. Then drill or punch a hole through both parts as shown.



Place it in the mouth with the open edges out, being sure to press the lips on the metal tightly on both upper and lower pieces outside of the holes and to rest the tongue against the edge of the tin, even with the holes, and blow.

The result of the first attempt may not be a sound, but with a little practice any familiar tune may be whistled.—Contributed by Chas. C. Bradley, W. Toledo, O.

Card-and-Coin Trick

If a card is balanced on the finger and a coin placed on the card directly over the finger, one would not think that the card could be flipped out leaving the coin on the finger end. This is easily accomplished, if care is taken to snap the card sharply and squarely.—Contributed by R. Neland, Minneapolis, Minn.



Homemade Graining Tools

Desiring to do some fancy graining and having no tools at hand, I hastily made two of them from pieces of garden hose, as shown in the sketch.



Tools Cut from Pieces of Garden Hose for Making Grains of Wood in Painted Surfaces

Two pieces were cut from the hose, each 5 in. long, and the first one made as follows: A small hole, about $\frac{1}{4}$ in. in diameter, was cut through the outside layer of rubber with a sharp knife at two points on opposite sides of the hose and exactly in the center for length. Around these holes rings of the rubber were cut out, or rather peeled off from the canvas part, the rings being $\frac{3}{8}$ in. wide, and the grooves, or parts removed, also $\frac{3}{8}$ in. wide. The hose will then appear as shown in the upper left-hand corner of the sketch.

To use this grainer, first paint the ground color, using a buff tint for imitation light oak, and allow it to dry, then put on a light coat of raw sienna, and while wet, take the prepared hose and draw it slowly over the length of wood, at the same time revolving the grainer slowly.

The other piece of hose, at the other corner, is made to take the place of a steel graining comb. The rubber is cut away lengthwise, leaving four segments, about $\frac{1}{4}$ in. wide, on four sides of the hose. These segments are then notched out, like threads on a tap, each segment having a different number to the inch. These are used in the same manner as steel combs.—Contributed by A. H. Waychoff, Koenig, Colo.

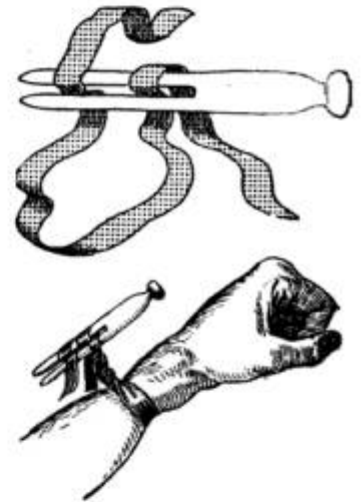
Needle for Repairing Screens

In attaching patches to window or door screens, the work requires a continual shifting from one side to the other, or two persons, one on each side, must be present to pass the threaded needle back and forth. The operation can be easily simplified by using a bent needle, which has been heated and suitably shaped. The point of this needle can always be made to return to the side from which it entered, thereby avoiding the need of an assistant or the tiresome shifting back and forth.—Contributed by G. Jaques, Chicago, Ill.

An Emergency Tourniquet

A valuable addition to any shop medicine cabinet is the tourniquet. A device that will answer the purpose of the

tourniquet can be made from an ordinary clothespin and a piece of binding tape, about $\frac{3}{4}$ in. wide and 14 in. long. To stop the bleeding from a wound on a limb, pass the tape around the injured member



between the wound and the blood supply. Pass the tape through the slot in the pin, wind the ends around the pin two or three times to prevent slipping, then turn the pin to draw up the tape tightly until the flow of blood is stopped.

Mechanical Aid to Singers

Procure a large cigar box, of the square variety, and three ordinary drinking glasses with very thin walls and of different sizes, and place them in the box, as follows: Space them evenly, and drive three brads close to the circumference of each glass bottom,

so that the glasses will have to be forced in between them. To prevent the glasses from touching the wood place a one-cent piece under each one.

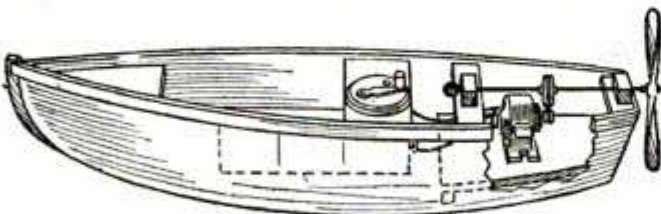
A fourth glass is used, but from this the bottom must be removed. This can be done by saturating a string, or piece of yarn, in kerosene oil, wrapping it once around the glass near the bottom, then lighting it and allowing the string to burn out. The glass is then quickly dropped into cold water, which will remove the bottom.

A hole is cut in the cover of the box to receive the bottomless glass from the upper side, so that its lower edge will be flush with the under surface. Cut a slot, 3 in. long and $\frac{1}{8}$ in. wide, in the cover near the back side.

To use, close the cover and at a distance of about $\frac{1}{2}$ in. from the glass in the cover, or mouthpiece, sing into it. The glasses will impart to the voice a peculiar tone delightful to hear.—Contributed by J. B. Murphy, Plainfield, New Jersey.

Model Boat with Aerial Propeller

Procure or make a small model boat, 12 or 18 in. long, and place in the hold one or two cells of dry battery. Make a small platform in the stern and mount on it a small battery motor with the shaft parallel with the length of the boat and in the center. Directly above and parallel with the motor shaft run a shaft—a hatpin will do—in bearings fastened to the deck. Attach a drive pulley directly over the pulley on the motor and belt it up with a cord or rubber band. Purchase or make a propeller blade and attach it

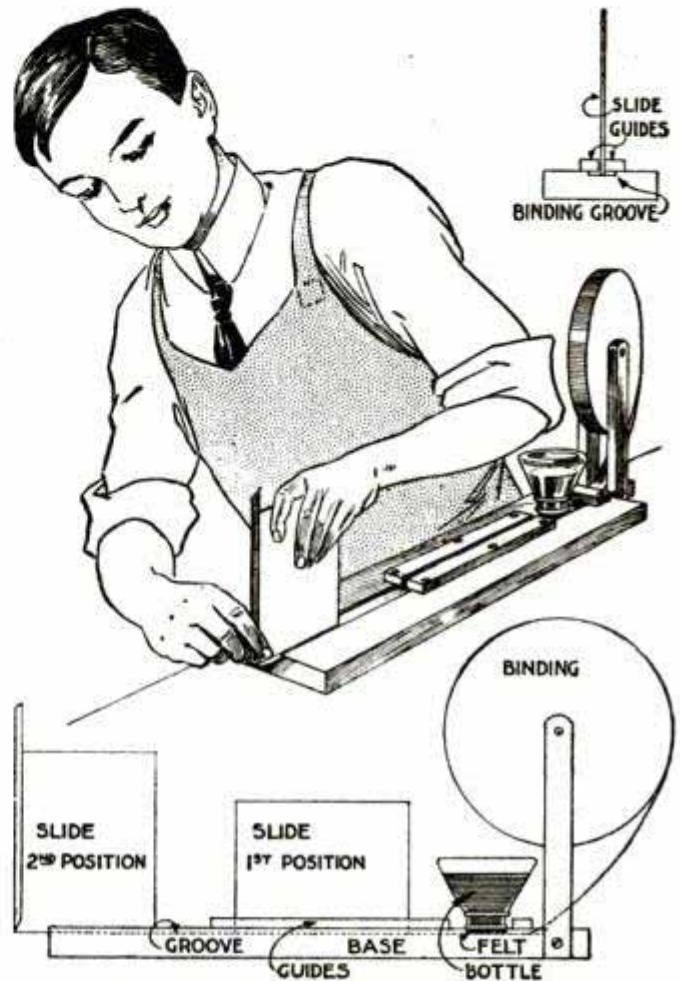


The Aerial Propeller is Driven by a Small Battery Motor Placed in the Boat

to the rear end of the shaft. A switch can be located on the deck for controlling the motor.—Contributed by Geo. B. Riker, Ft. Wayne, Ind.

Lantern-Slide Binding Machine

The machine shown in the illustration is very simple to make and when complete is one of the greatest time



A Machine That will Help to Bind Lantern Slides Quickly and Neatly

savers that a photographer can possess. The base is made of a piece of board, 9 in. long, 2 in. wide, and $\frac{7}{8}$ in. thick. The uprights support a small bar upon which the roll of binding revolves. An old ink bottle filled with water and with some cotton stuffed in the neck serves as a moistener for the binding. The use of this machine insures a neat job in a very short space of time. The slide is always in the center of the binding. The end of the slide should run a little over the end of the base so that the binding may be fixed to the edge with the fingers, using a downward motion. The slide is then turned over on the other edge with a rolling motion and the operation repeated.—Contributed by Alvin G. Steier, Union Hill, N. Y.

Electrical Heating Apparatus for the Home

By ARTHUR MOORE

PART IX—Corn Popper

THE electrically heated corn popper consists of a circular metal pan, with a hemispherical wire-screen cover, rigidly mounted on a heating element,

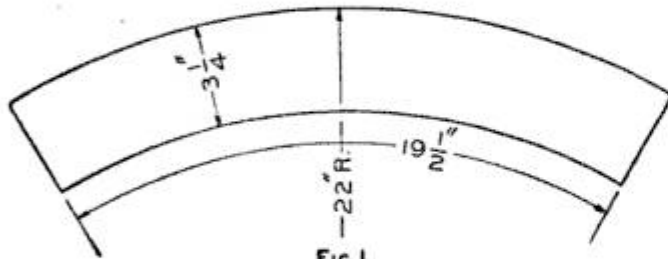
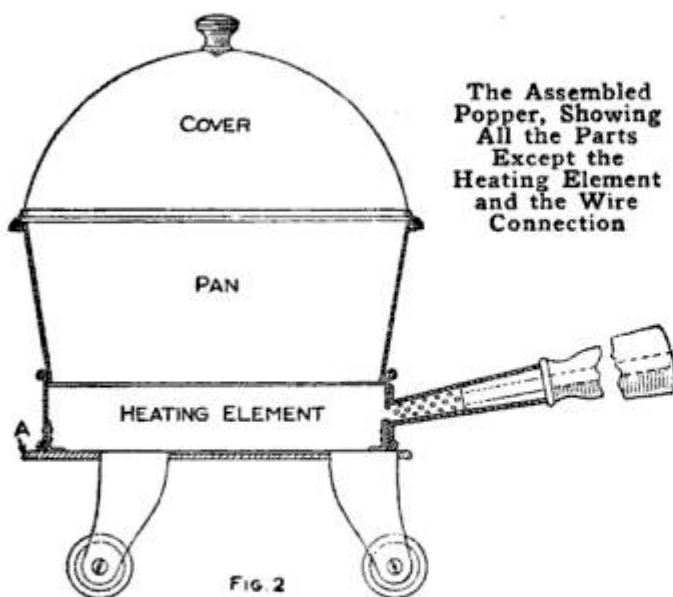


FIG. 1
To Make the Walls of the Pan Slightly Tapering the Metal is Cut on a Long Radius

and the combination supported on three legs, each of which is provided with a felt-faced roller. A combination metal-and-wood handle is attached to one side of the device, by means of which it may be handled and a reciprocating motion imparted to it, to agitate the corn while it is in the popper. The heating element is connected to the source of electrical energy by means of a duplex conductor, which passes through an opening drilled lengthwise in the handle. A detailed description of its construction follows.

Procure a piece of thin sheet copper, or brass, not more than $\frac{1}{64}$ in. thick and about $6\frac{1}{2}$ in. wide by 23 in. long,



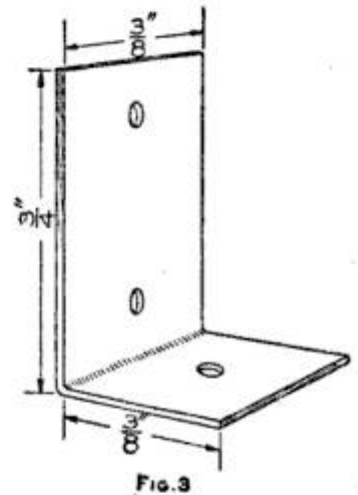
The Assembled Popper, Showing All the Parts Except the Heating Element and the Wire Connection

and cut from it a piece of the dimensions given in Fig. 1. Bend this piece around a piece of pipe, or other cylindrical object, and braze the two ends

together, making a butt joint. The tapered cylinder thus made is to form the wall of the compartment for the corn in the completed popper.

From another piece of thin sheet brass, 20 in. long and $1\frac{3}{4}$ in. wide, form a cylinder and cut off the ends so that, when a butt joint is made, it will permit the small end of the tapered cylinder to enter about $\frac{3}{8}$ in. Take both these cylinders to a tin shop, and have both edges of the straight cylinder and the edge of the large end on the tapered one formed over a piece of wire as shown in Fig. 2, which represents a cross section of the completed popper

with the heating element removed. Place the short cylinder in position outside the tapered one and braze them together, applying the flame on the inside. Cut a disk from a thin piece of sheet brass of such a diameter



that it will fit snugly inside the short cylinder and close up against the lower edge of the tapered cylinder. This disk is to form the bottom of the pan for the corn, and after it has been properly fitted, it must be brazed to secure rigidity.

Form at least six right-angled pieces from $\frac{1}{16}$ -in. sheet brass, similar to the one shown in Fig. 3. These pieces are evenly spaced and fastened by means of small rivets inside the lower edge of the short cylinder, so that the surface of the projecting portion will be flush with, or preferably a little beneath, the edge of the cylinder. Cut a circular piece, $7\frac{1}{4}$ in. in diameter, from a piece of thin sheet brass, and have its edge curved, as shown at A, Fig. 2. This piece is

fastened to the lower end of the small cylinder by means of small screws through the piece and into threaded holes in the projections of the right-angled pieces, riveted inside of the cylinder. Flat-head screws are used, set in countersunk holes.

The support for the popper may be made from a piece of sheet brass from which four projections, for legs, are formed, as shown in Fig. 4, then bent on the dotted lines so that they are at right angles to the main portion of the piece. These projections, which form three legs, may be curved, as shown in Fig. 5, which will give a much neater appearance and add to the stability of the popper, as the lower ends of the legs will not be so close together, and hence the apparatus will be less top-heavy.

Three small wood rollers are turned from a piece of hard wood, as shown in Fig. 5. A hole, $\frac{7}{32}$ in. in diameter, is drilled through each of the rollers, and a piece of heavy and firm felt is glued to the surface. The roller B revolves on an axle made of a $\frac{3}{16}$ -in. brass bolt. The rollers C and D are fitted on a brass bolt of the same diameter, but of such a length that the rollers will be outside of the legs, as shown. This completed portion may then be fastened to the bottom of the popper by means of machine screws, which pass through it and into threaded holes in the bottom.

The top of the popper is made of brass gauze, similar to ordinary fly screen. Obtain a hemispherical object having a diameter equal to the diameter of the top of the pan. If such an object cannot be obtained, it is necessary to form one on the end of a piece of timber. Shape the piece of gauze over the object by stretching, or pulling, on the corners. Be careful to draw an equal amount on each corner, and fasten it with double pointed tacks. Place a thin piece of brass, about $\frac{1}{2}$ in. wide, around what is to form the lower edge of the dome-shaped screen, and solder it to the gauze. The gauze is then removed from the form and trimmed off along

the edge of the piece of brass. Bend the piece of brass over on itself so that it will be in a U-shape with the edge of the gauze between the branches.

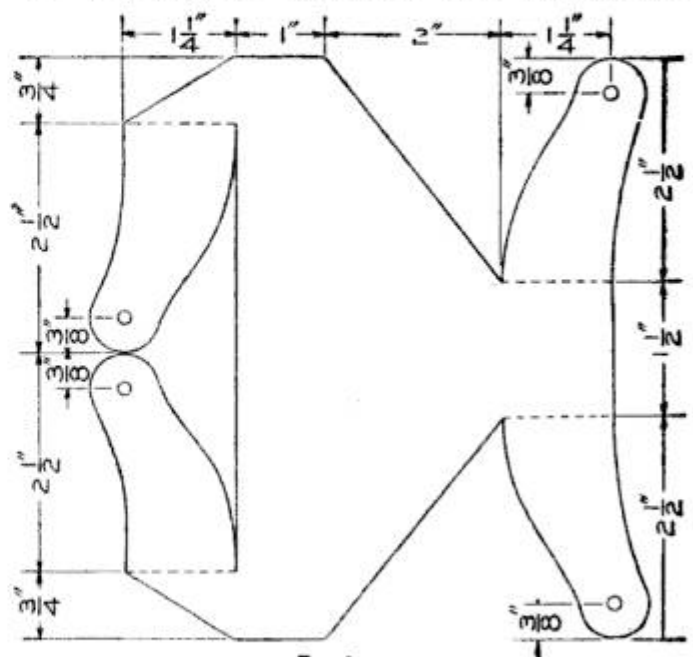


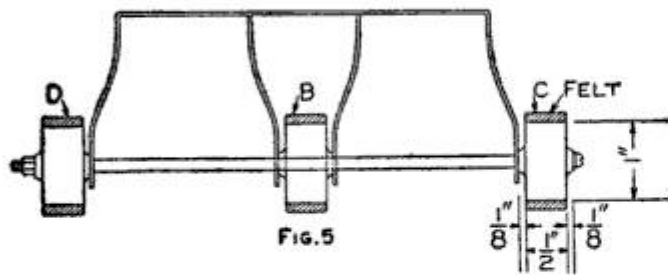
FIG. 4

One Piece of Metal is Cut to Form Projections, on Which Felt-Face Rollers are Attached

Take this to a tin shop and have the metal band crimped and expanded so that it will fit over the top of the pan. The brass strip must be properly crimped to hold the gauze, as the soldering is only for temporary purposes and will soon melt out in use. A small wood handle is turned up and fastened in the center of the top, as shown.

The handle for the popper is a combination of metal and wood, and is made as follows: Procure a piece of brass pipe, $\frac{5}{8}$ in. outside diameter and having a $\frac{1}{16}$ -in. wall. This piece should be about $3\frac{1}{2}$ in. long and gradually expanded toward one end, until its outside diameter is about $\frac{7}{8}$ in. Slot the small end, bend the various pieces over, and fit them to the cylindrical portion of the popper, as shown in Fig. 2. Holes are drilled in all these projections and also in the side of the popper, in which suitable rivets are fastened. Before riveting the piece of pipe in place, a $\frac{1}{4}$ -in. hole should be drilled in the side of the popper through which the duplex lead is to pass. In this tube a number of small holes may be drilled for a distance of $1\frac{1}{2}$ in. from the small end, which will give a good ventilation so

that less heat will be conducted to the handle. The remainder of the handle is made from a piece of wood, as shown. A $\frac{1}{4}$ -in. hole is drilled through its center, to accommodate



The Rollers Provide a Way to Shake the Kernels of Corn, While They are Popping

the duplex connecting lead. It is fastened in the end of a piece of pipe by means of a metal pin or small wood screw, through a hole in the pipe and wood. When finished, all metal parts can be made smooth and nickelplated.

The heating element is made with only one degree of heat, and no switch is provided in the circuit except the one at the socket where the plug is inserted. The heating element is placed as near the under side of the pan bottom as possible, so that the heat generated by it will be readily transmitted to the bottom of the pan and its interior. A thin piece of mica is used to separate the heating element from the bottom. A disk of the mica is cut to fit in the straight cylinder. A second disk is cut in a similar manner but from very thick and stiff mica, which is used to hold the wires of the heating element. Draw a number of parallel lines across this second disk, spacing them $\frac{1}{4}$ in. apart. Draw a circle on the disk having a diameter $\frac{1}{2}$ in. less than the diameter of the disk. Next drill a $\frac{1}{16}$ -in. hole at each point of intersection of the circle and the parallel lines, and cut very narrow slots from the edge of the disk into each of these holes. The size and kind of wire to use in winding the heating element will depend upon the number of watts it is desired the popper should take, and the voltage of the circuit to which it is to be connected. This size popper will require at least 350 watts to operate satisfactorily; and if it is connected to a 110-volt circuit it will

take a little over 3 amperes. To be exact, it will take $350 \div 110$, or 3.18 amperes. Of course, a variation of a few tenths of an ampere will not make a great deal of difference in the operation of the device. Assuming the current is to be 3.2 amperes and the voltage of the circuit is 110, the resistance of the heating element should be equal to $110 \div 3.2$, or 34.3 ohms.

A No. 24 gauge nichrome resistance wire will meet the above requirements so far as current-carrying capacity is concerned, and a length of 20.5 ft. will be required to give the desired resistance. This wire is wound around a piece of wire about the size of a hat-pin, which will form it into a long spiral. The spiral is wound back and forth across one side of the mica disk having the holes and notches in the edge. Start with the center of the wire in the center of the disk of mica, and put the ends down through two of the small holes directly opposite each other, and then up through the adjacent holes, but in such a way that the wire will pass back across the surface of the disk on opposite sides of the first piece. The method of winding suggested is diagrammatically indicated in Fig. 6. With this arrangement the two ends will be on opposite sides of the disk. About 1 in. of free wire is left at each end for making connections.

Place the heating element in position with the surface of the disk on which the greater part of the wire has been placed in contact with the bottom of the pan. Procure a piece of well insulated lamp cord, about 8 ft. long, provide a suitable connecting plug on one end, and pass the other end through the handle and into the heating compartment. Open up the end of the common braiding for a distance of several inches, and remove all the insulation from each of the wires for a

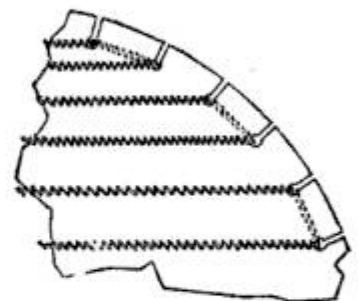


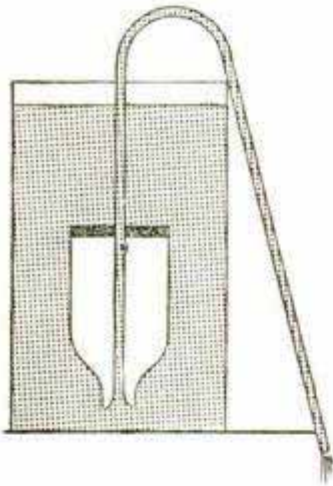
FIG. 6

short distance. Fasten these two ends to the ends of the resistance wire by means of two small bolts, or other suitable clamps. Pack the compartment beneath the heating element with asbestos wool, being careful to keep the lamp cord as far away from the heating element as possible, and fasten

the bottom in position. It is best to use asbestos-insulated wires for making the connection between the heating element and the ends of the conductors of the lamp cord. The joint between the lamp cord and the asbestos-insulated wires may be made in the metal portion of the handle.

Siphon for Corrosive Liquids

A siphon for corrosive liquids, which can be used with complete safety, is described as follows in a French magazine: Procure a bottle, about $2\frac{1}{2}$ in. in diameter, and cut off the bottom. A glass tube is bent, as shown, so that one branch is shorter than the other. A cork stopper, fitting the bottom of the bottle, is perforated to fit tightly over the glass tube and at a point a short distance below the cork, a small hole is made in the tube with a blow-torch or a file. The end of the same branch of the tube, which should reach to the top of the bottle, as shown, is flared out so that the distance



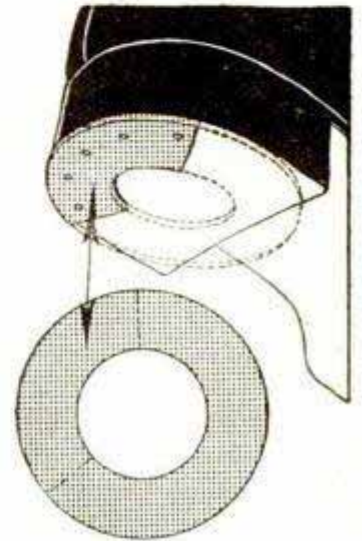
between its edge and the neck of the bottle is very small (not more than $\frac{1}{16}$ or $\frac{3}{32}$ in.). The cork with the tube is then fitted to the bottom of the bottle. To start the siphon it is only necessary to plunge the bottle quickly into the liquid.

The explanation is that the air in the bottle cannot escape through the narrow space between the neck and the tube, nor the liquid enter there, but the air, seeking its outlet through the small hole in the tube under the cork, creates a suction which draws the liquid to the other end of the tube.

⚠ Never use a turpentine substitute in exterior paints, as it will cause trouble with future painting.

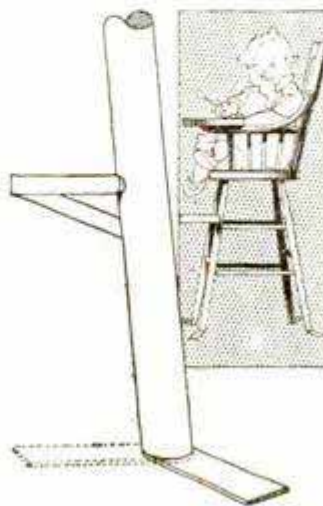
Heelplates Made of Washers

A good, serviceable heelplate, which will wear as well as any store article, can be made from a common iron washer. In selecting the washer, a size should be taken which best conforms to the outline of the heel. This can be cut with a chisel or hacksaw to the size of segment desired, after which it should be drilled and countersunk for the screws, or nails, necessary to fasten it to the shoe heel.



To Prevent a High Chair from Tipping Over

Attachments are made of light bar iron and fastened to the lower end of each chair post with screws. These are flat, and the projections will not interfere with a person walking about the chair. With the use of these feet, an infant will be saved many hard bumps caused by the upsetting of his high chair. — Contributed by W.



A. Jaquythe, San Diego, Cal.

INTERESTING NEW PATENTS

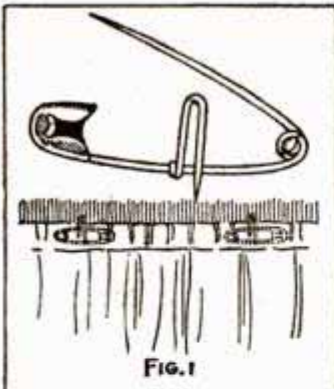


FIG. 1

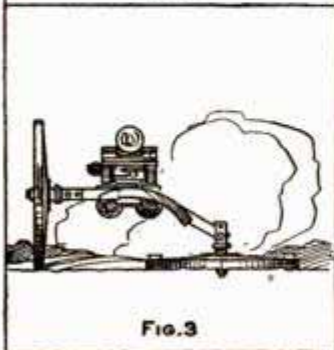


FIG. 3

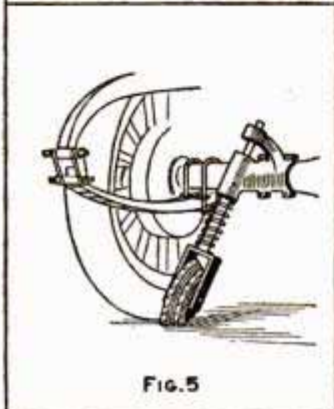


FIG. 5

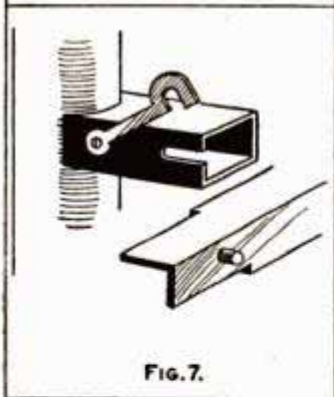


FIG. 7.

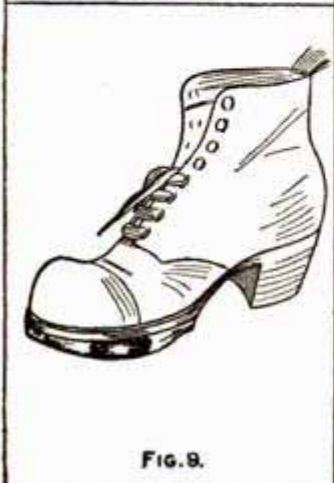


FIG. 9.

HOOK HANGER FOR FABRICS (Fig. 1)—This simple device, designed for hanging fabrics of every kind, consists of an ordinary safety pin, to the rigid arm of which a hook is fixed, as shown. The free arm of the safety pin is threaded through the fabric to be supported, and is secured in the clasp in the usual way. The hook is then passed through eyelets suspended from a rod, or is hooked into a supporting fabric as required. The essential feature of the invention is that, when in place, the free arm is on top, so that the device is covered by the supported fabric.

PROTECTIVE COVERING FOR FRUIT TREES (Fig. 2)—This device consists of a framework over which curtains are drawn for protecting the trees from frost. The curtains are made in sections of convenient width, are wound on a roller, at one end of the frame, and are pulled across the top by wires working over a winding drum, at the opposite end.

CARRIAGE FOR FIELD GUN (Fig. 3; British patent to a Frenchman)—The axle is made in three parts, which are so arranged that one or both of the wheels may be laid flat on the ground. This is accomplished by a pivot near each end of the axle, and a curved gear arrangement by which the ends of the axle may be inclined downward. The gun is roughly trained with one wheel laid flat, but both wheels are laid flat and staked to the ground when the gun is to be fired.

LEG COVERING (Fig. 4)—This device consists of a loose covering made of fringe, or other light fabric, and suspended from a garter which is worn in the usual way, the purpose being concealment rather than protection. The fabric is made of the proper length to hang to the level of the ankle.

APPARATUS FOR PREVENTING SKIDDING OF VEHICLES (Fig. 5; American patent to an Englishman)—Two beveled disks, rigidly connected and having rims made of nonslipping material, are mounted on an inclined post so that they will bear against the ground, or pavement, at a point adjacent to the traction wheel. The inclined post is fixed to the axle, and is equipped with a spring for maintaining uniformity of pressure.

SHOE FOR ROOF WALKING (Fig. 6)—The base consists of a strip provided with points that sink into the roof and prevent slipping. Carried on the base, is a light steel frame that supports the shoe, and is provided with pivots and clamps by which the shoe may be adjusted to a horizontal position when used on a roof of any pitch.

BEDSTEAD WITH HOOK CONNECTIONS (Fig. 7; British patent to a Frenchman)—Welded to the bed post is a boxlike holder designed to receive the end of the angle iron that forms the side of the frame. The angle iron is equipped with a lug that slides into a slot in the side of the holder, and with a plate that prevents it from being thrust in too far. A hook, pivoted to the holder, engages the lug and holds the parts securely together.

ANCHOR FOR SMALL BOAT (Fig. 8)—The particular feature of this invention is the apparatus for handling the anchor. This consists of a casing, fixed to the boat, into which the anchor is drawn when not in use, and a windlass drum and cable for lowering and raising the anchor. A pawl and ratchet holds the drum in any desired position.

PNEUMATIC SOLE FOR SHOE (Fig. 9)—This pneumatic sole is so made that it can be easily attached to the sole of an ordinary shoe. It consists of upper and lower soles or plates, held apart to produce a hollow space, the sides of the space being closed by flexible walls. An air bag placed within the space holds the walls flexed outwardly.

HAND MOWER (Fig. 10)—This mower works much like a horse-drawn mower. Power from the main axle is transmitted through a train of gears to a crankshaft which operates the cutter. The cutter is easily put out of action, when desired, by means of a lever that slides the gear on the axle.

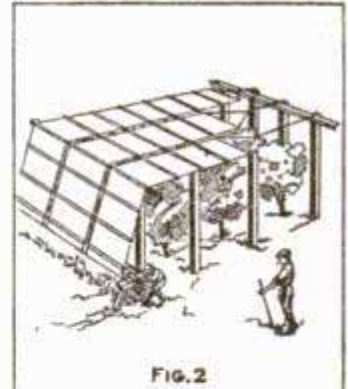


FIG. 2

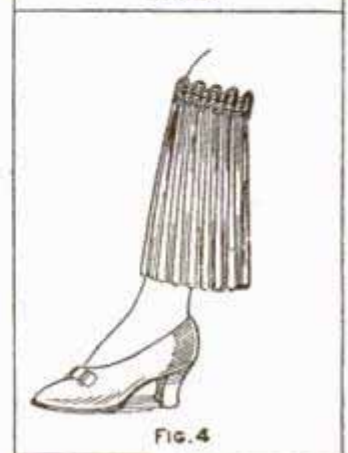


FIG. 4



FIG. 6

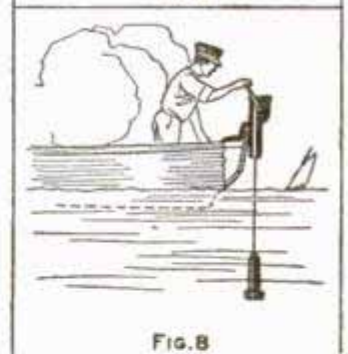


FIG. 8

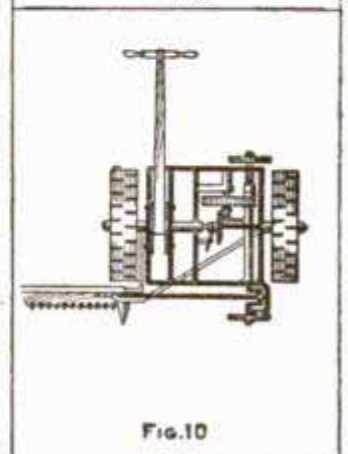


FIG. 10

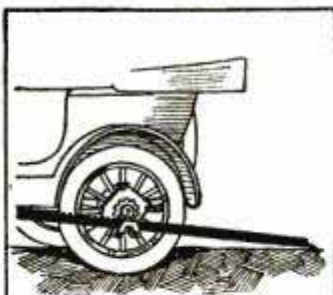


Fig. 11



Fig. 13

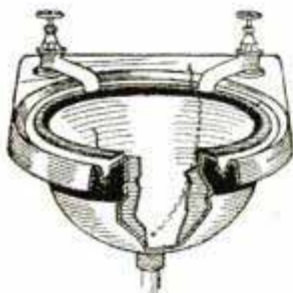


Fig. 15

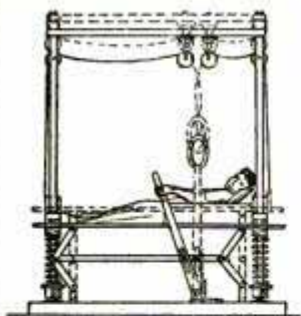


Fig. 17

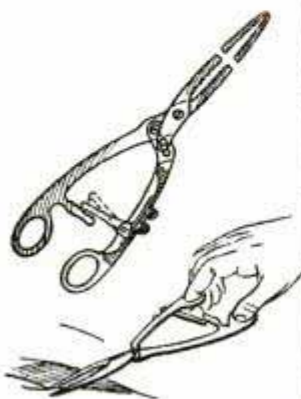


Fig. 19

TRACTION ATTACHMENT FOR MOTOR VEHICLES (Fig. 11)—This invention is intended to supply a practical means for pushing a motor vehicle of any kind out of a hole. The device consists of a rack bar, worked by a pinion, that is easily attached to one of the rear wheels. The pinion is fixed to a plate that fits over the hub, and is secured to the wheel by hooks that engage the spokes.

GUTTER CLEANER (Fig. 12)—The body of this machine consists of a beam carried on wheels that run on the edge of the sidewalk. Attached to the side of the beam is a blade arranged to cut vertically along the edge of the walk and horizontally for some distance out from the walk. As the material is cut it is thrust away from the gutter by a curved moldboard attached to the rear of the blade.

PROTECTOR FOR TROUSERS (Fig. 13; British patent to a German)—This device is made of wire and is intended for holding the trouser leg clear of the ground in rainy weather. The upper end is inserted in the boot strap while the lower end is hooked under the bottom of the trouser leg.

ATTACHMENT TO PREVENT RATTLING OF WINDOWS (Fig. 14)—The body of this device consists of a sheet-metal plate bent to a right angle. One side of the plate is secured to the window casing by screws, while the other side carries a roller that is made to bear against the window frame by the spring action of the plate.

REMOVABLE SANITARY LINING FOR WASHBASIN (Fig. 15)—The lining consists of paper, or other cheap material, and is made anti-septic. It is held in position, when in use, by the pressure of the water, and by the reinforced flange that extends over the edge of the basin. Imbedded in the material is a thread with free end by which it is torn apart, and the water allowed to escape when the lining is to be removed.

DOOR HOLDER (Fig. 16)—With this holder the door may be locked securely in any position, or partly locked to prevent it from swinging too freely. The essential feature is a device that acts after the manner of a band brake on a cylinder placed around the pintle of the specially designed hinge. The brake is operated by a lever, which in turn is controlled by a link and cam, carried on the door as shown.

APPARATUS FOR PREVENTING SEASICKNESS (Fig. 17; British patent)—Each of the supporting levers is pivoted at the middle, and a to-and-fro movement of the lever causes an up-and-down movement of the berth or seat, which may be timed to neutralize the up-and-down movement of the ship. The same effect may be produced by pulling on the ring suspended above the user's head.

WINDSHIELD FOR CIGARS (Fig. 18)—The shield consists of a light covering of noncombustible material, placed over the lighted cigar as shown. It is so made as to provide air passages past the body of the cigar.

LOCKING ATTACHMENT FOR TONGS, OR FORCEPS (Fig. 19; American patent to a Swiss)—One of the handles carries a toothed arm and the other a pivoted hook designed to engage the toothed arm. The hook is controlled by a spring which holds it in a clear or operative position, as desired.

MARBLE SHOOTER (Fig. 20)—The marble is ejected by a plate that is actuated by a spring, and is pivoted to revolve about the center of the return bend of the stock. This plate is drawn back to the extreme end of the return bend when the shooter is cocked. The bend is so shaped as to prevent the marble from falling out when the shooter is pointed downward.



Fig. 12

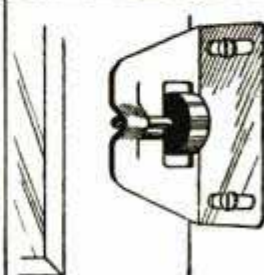


Fig. 14

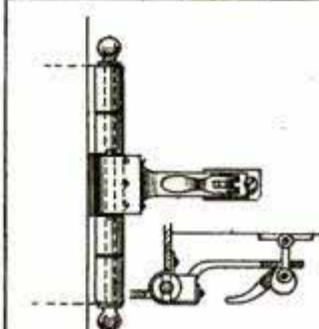


Fig. 16

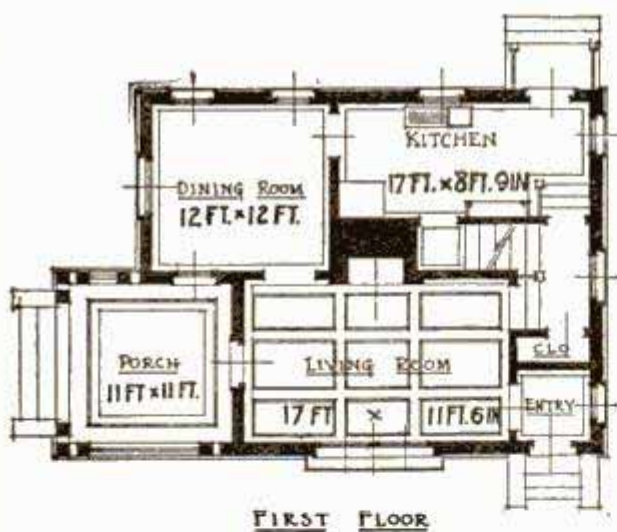


Fig. 18

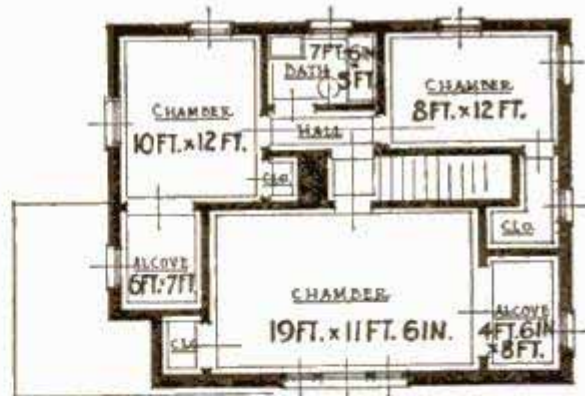


Fig. 20

SPACIOUS BUT INEXPENSIVE BRICK RESIDENCE



FIRST FLOOR



SECOND FLOOR

ERNEST C. REDSTONE, ARCHITECT, BOSTON, MASS.

ONE of the most striking features about this residence is the effect of spaciousness, evidently due not so much to the actual size of the house as to the skillful division of floor space. The exterior dimensions of the house are approximately 25 by 29 ft. It is built of texture brick and is estimated to cost \$3,200. The basement occupies the space under the living room and kitchen and contains the heating plant, cold-storage room, laundry, and other utilities. The house is equipped with standard plumbing fixtures, and is piped for gas and wired for electricity.

The exterior color scheme has been carefully studied to produce a soft and harmonious effect. The brickwork varies in color from a light yellow to a deep brownish yellow, the doors, window blinds, and other exterior woodwork are in brown, and the shingles in silver-gray. All interior trim is of cypress, stained to a light oak color. The living room and dining room have hardwood floors and rough-floated plaster walls with stenciled borders at the ceilings. In the remainder of the house, the floors are of soft pine, and the walls are of plaster with hard white finish. The ceiling heights on both floors are 8 ft. Some of the distinctive features of the house are the spacious front porch, the alcoves on the second floor, and the living room with its beamed ceiling and massive fireplace, built of golden texture brick.



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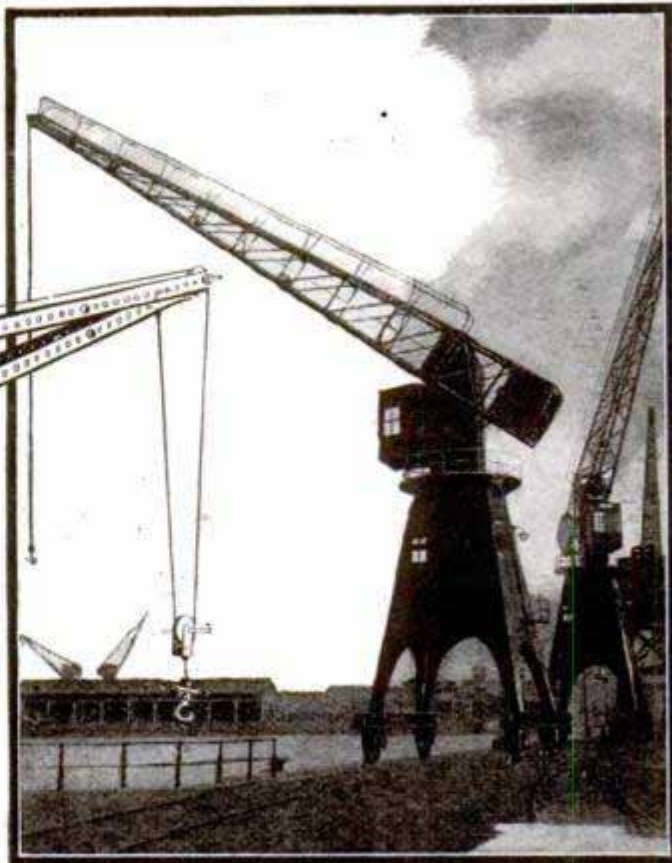
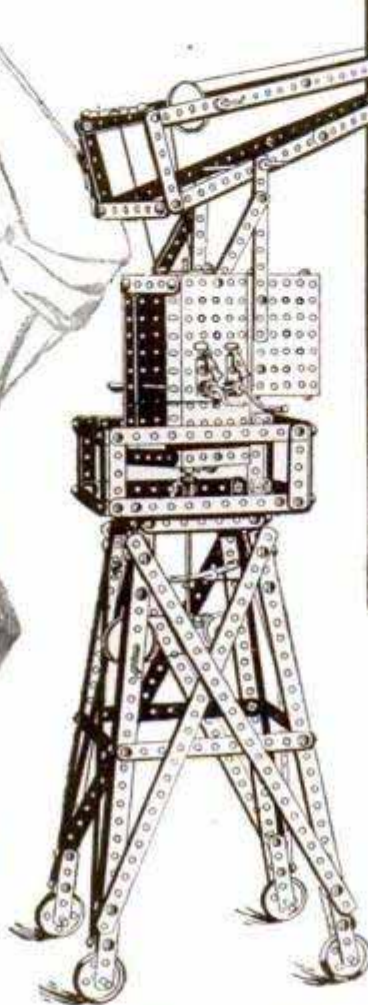
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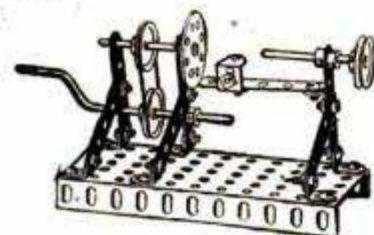
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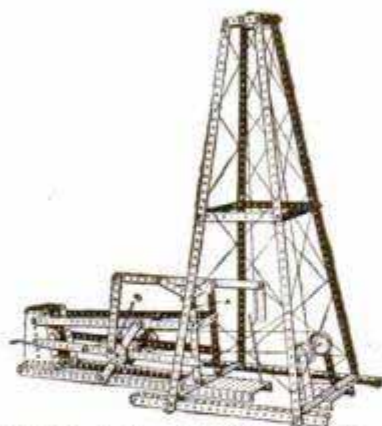
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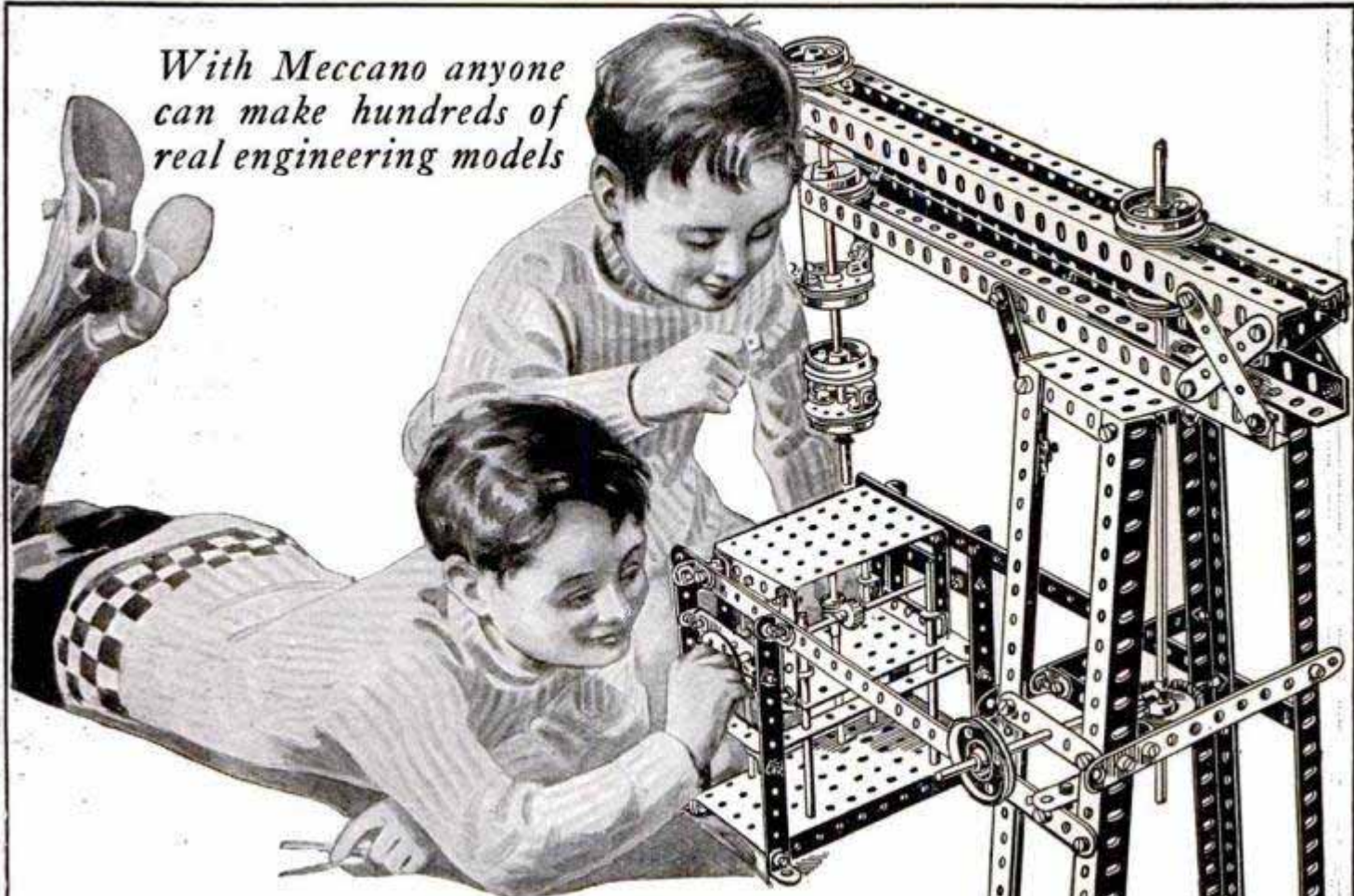
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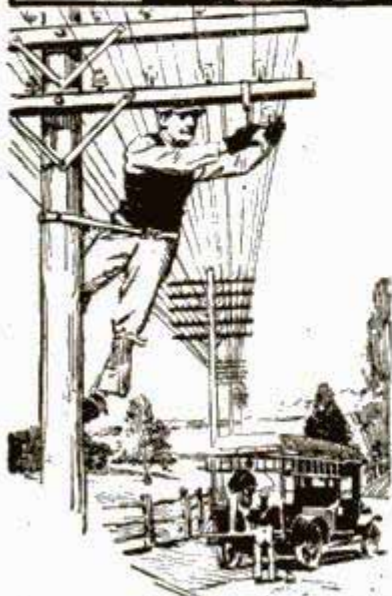
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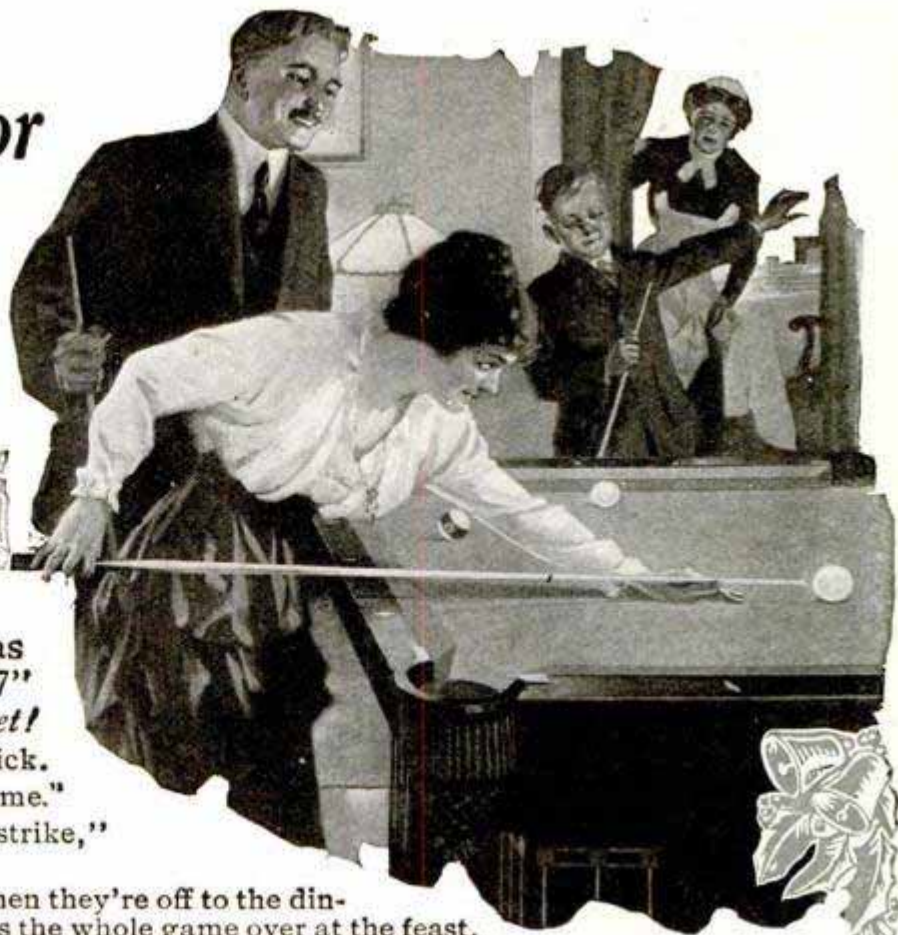
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I have marked the kinds of insurance I wish to know about: Accident Health Disability \$250 Life Certificate My age is..... years. I am in good health.

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Typewriter Sensation

Pay only \$2.00 a month until the low total price of \$29.80 is paid and the machine is yours. And you

Use As You Pay

ing a \$100.00 machine for \$29.80. anything like this been attempted.

This is absolutely the most generous typewriter offer ever made. Do not rent a machine when you can pay \$2.00 a month and own one. Think of it—Buy—Cash price \$28.60. Never before has

Genuine Standard Model No. 6 **REMINGTON** **Typewriter Guaranteed—Free Trial**

Perfect machines only, complete outfit, nothing extra to buy, no strings of any kind to this offer. Just think of buying such a typewriter for \$7.80 down and \$2.00 a month. Cash price \$28.60. Thousands of people have paid \$100.00 cash for Remingtons. This typewriter built the reputation of writing machines in the business world. It's standard; as fast as the fastest operator; so reliable and strong the shrewdest business men choose it above all others; so wonderfully simple a child can operate it with half an hour's practice and rapidly attain speed. Comes to you with two color ribbon, complete operating instructions, tools, waterproof cover, practice paper, carbon paper, universal keyboard arrangement, everything ready. It runs beautifully. Writes as perfect and clean-cut a letter as quickly and easily as any typewriter bought for \$100.00. It's wonderfully simple; it's strongly built and will give you years and years of honest service and complete satisfaction.



You Take No Risk. Put in Your Order NOW

When the typewriter arrives, deposit with the express agent \$7.80 and take the typewriter three days and try it. If you find it to be the best typewriter you ever saw, satisfactory in every respect, keep it and send us \$2.00 each month, until our special price of \$29.80 is paid. If you don't want to keep it, return it to the express agent, and he will give you back your \$7.80, and return the typewriter to us. We will pay the return express charges.

You won't want to send this machine back after you have seen it and tried it. You can't imagine the perfection of these machines till you see one, and the price is \$70.20 less than the catalogue price, and it is guaranteed just as if you paid \$100.

The supply at this price is very limited, the price will probably be raised when next advertisement appears so don't delay. Simply fill in the coupon—mail to me—the typewriter will be shipped promptly. There is no red tape. I employ no solicitors—no collectors—no chattel mortgage. It is simply understood that I retain title to the machine until the full \$29.80 is paid. You cannot lose. It is the greatest typewriter opportunity you will ever have. Without sending any money, let me now ship you this typewriter for free trial.

COUPON

HARRY A. SMITH, 231 No. Fifth Ave., CHICAGO

Ship me a No. 6 Remington, f. o. b. Chicago, as described in this advertisement. I will pay you the \$22.00 balance of the special \$29.80 purchase price, at the rate of \$2.00 per month. The title to remain in you until fully paid for. It is understood that I have three days in which to examine and try the typewriter. If I choose not to keep it I will carefully repack it and return it to the express agent. It is understood that you give the standard guarantee for one year.

Name

Address

Pop. Mech. Dec.

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Trade Mark Registered **B.V.D.** U.S. Patent Office and Foreign Countries **UNDERWEAR**

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Our 1/2, 1 and 1 1/2 H. P. Gasoline Engines for Farm and Shop are the best small engines made, because we specialize on them. The "SIEVERKROPP" at \$19.50 will run a washing machine, grinder or any small machine. Buy one for your Boy! Shipped on trial. Send stamp for Booklet and Special Offer.

Sieverkropp Engine Co., 1224 18th St., Racine, Wis.

THE USES OF PEAT IN ENGLAND—First of all there is peat fuel and peat charcoal, and in the making of these such by-products result as naphtha, sulphate of ammonia, acetic acid, tar, and paraffin wax. Then there is moss litter, already an important industry upon the European continent, manure, preservatives, and sheep dips, paper, cardboard and millboards, disinfectants, artificial wool, surgical wool, and filtering and absorbing material. In the low distillation of 100 tons of peat the

Press Your Trousers over night at home



Send for booklet and prices.

Use it sixty days. Money returned if not satisfactory.

Perfect Pants Presser Co.

226 South 5th Ave., Maywood, Ill.



Baden "Long-Wear" **SHIRTS 3**

Made - to - Measure **SHIRTS 3**

By Prepaid Parcel Post

For

Why pay \$2 to \$3 for a ready-made misfit "store" shirt when you can get three guaranteed, high-quality BADEN made-to-measure shirts

\$5

for only \$5—every piece cut and fitted to your individual measurements—guaranteed to completely satisfy you or money promptly refunded.

Other Prices to Suit You



BADEN Patented Neck Reinforcement

BADEN shirts wear twice as long as other shirts as result of our exclusive, patented neck reinforcement as shown in illustration—no holes all around neckband before shirt is half worn out. One test order will make you a permanent BADEN customer. Send for descriptive literature, measurement blank and beautiful assortment of samples free. Know the comfort and satisfaction of wearing perfectly fitting, neat looking, long wearing custom-made BADEN Shirts. No agents. Entire output sold direct to wearer. Write today. Address

BADEN SHIRT CO. Dept. 171 St. Joseph, Mo.

Get Your Canadian Home From The Canadian Pacific

One-twentieth down—the balance in 19 equal annual payments. Good land in Western Canada—every kind of farming—\$11 to \$30 an acre.

\$2,000 Improvement Loan

20 years to pay—only 6% interest. Best livestock supplied, actual cost. Expert demonstration work at your service. FREE BOOKLETS on Manitoba, Alberta-Saskatchewan, Irrigation Farming. Write today.

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JOHNSON'S WOOD DYE 17 Standard Shades

Artistic Coloring Hard—soft wood, floors, furniture, etc.

Johnson's Prepared Wax Unsurpassed finish and polish for pianos, automobile bodies, etc. Ask for free book "Proper Treatment for Floors, Furniture, etc."

S. C. Johnson & Son, Racine, Wis. "The Wood Finishing Authorities"

Pabst Extract Panama Girl Calendar FOR 1915

If you have seen the Pabst Extract calendars of past seasons—and admired them, as thousands do—you'll appreciate the 1915 Panama Girl Calendar tenfold.

The newest addition to the series of Pabst Extract Beauty Calendars comes from the brush of Alfred Everett Orr. It is a masterpiece of life-painting—wonderfully expressive of the typical American girl with all her charm of person and manner.

The calendar is on heavy art paper, seven inches wide and thirty-six inches high, beautifully lithographed in twelve colors. It is entirely *free from advertising* on the front, just as shown by the illustration herewith. The size and shape are admirably adapted to the adornment of those odd places so hard to fill and the color scheme is sure to harmonize with the furnishings of any room.

Our aim in sending out these beautiful calendars free is to remind you, and others, that

Pabst Extract The Best Tonic

"Brings the Roses to Your Cheeks"

—that it is a natural tonic which enriches the blood, rebuilds the wasted tissues of the body, steadies the nerves and tones the entire system. Being a perfect blending of choicest malt and hops with iron, it is nature's own builder and reinvigorator—a splendid tonic, recommended by leading physicians for nursing mothers, convalescents, anaemics, all who are run down from any cause, and as a revitalizer for the aged.

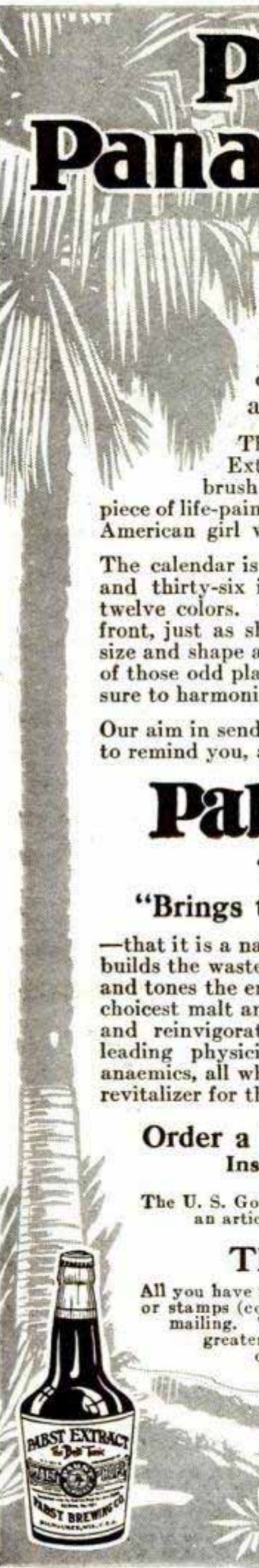
**Order a Dozen from Your Druggist
Insist Upon It Being "Pabst"**

The U. S. Government specifically classifies Pabst Extract as an article of medicine—not an alcoholic beverage.

This Calendar is Free

All you have to do to obtain one is to send us 10 cents in coin or stamps (coin preferred) to cover the cost of packing and mailing. The demand for these beautiful calendars grows greater each year, so send for yours at once to avoid disappointment.

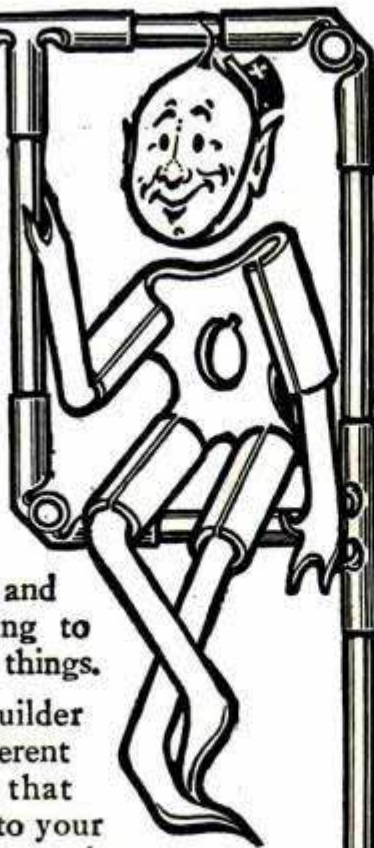
**Pabst Extract Co., Dept. 15
Milwaukee, Wis.**



A Worth-while Gift for Your Boy

For Christmas give your boy Bill Deezy. It's a construction toy he won't tire of; one that will keep him contentedly playing at home and satisfy his craving to know the why of things.

The Wizard Builder is based on a different principle, one that gives free scope to your boy's ingenuity, strengthens his inventiveness and sustains his interest.



BILL DEEZY
BUILD EASY

Bill Deezy Tower



does these things because, instead of girders of set lengths, there are easily handled rods that can be bent, cut any length and connected by flexible joints at any angle. So it is possible for your boy to make, besides the usual construction models, anything his imagination can picture.

Look over Bill Deezy at your toy dealer's. Sets cost 50c to \$5.00. If you can't find Bill Deezy there, send me your dealer's name. Enclose fourteen cents in stamps and I'll send you a sample box.

BILL DEEZY
145 Milk Street

Boston
Mass.



Trade-mark

Please Mention Popular Mechanics

Xmas
1914

Shirley President Suspenders

For Christmas

50¢

A pair for every suit makes a man's whole year merry—saves time and temper every time he dresses. Try it and see! The 12 beautifully designed boxes add the final touch to an ever-welcome gift. At stores or prepaid, 50c.

"Satisfaction or money back"

Be sure "Shirley President" is on buckles
THE C. A. EDGARTON MFG. CO.
SHIRLEY, MASS.



principal resultants are some 35 tons of peat charcoal and 1¼ tons of sulphate of ammonia. It is from peat charcoal that the carbon pencils for the electric-arc lights are obtained, and of these Germany has heretofore had the exclusive supply. Peat charcoal, too, promises to play an important part in overcoming the smoke nuisance, and it has recently been used extensively and successfully in the



EVERYTHING in Guaranteed Plumbing and Heating Supplies at wholesale. Our \$200,000 establishment behind our Guarantee. Send for complete CATALOG 61.

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Save \$8.25

This Rocker
36 in. high
—30 in. wide—
24 in. deep, Maro-
kene leather cushions.
Retailers' Price is \$18.00.

**Master-Built
Rocker**

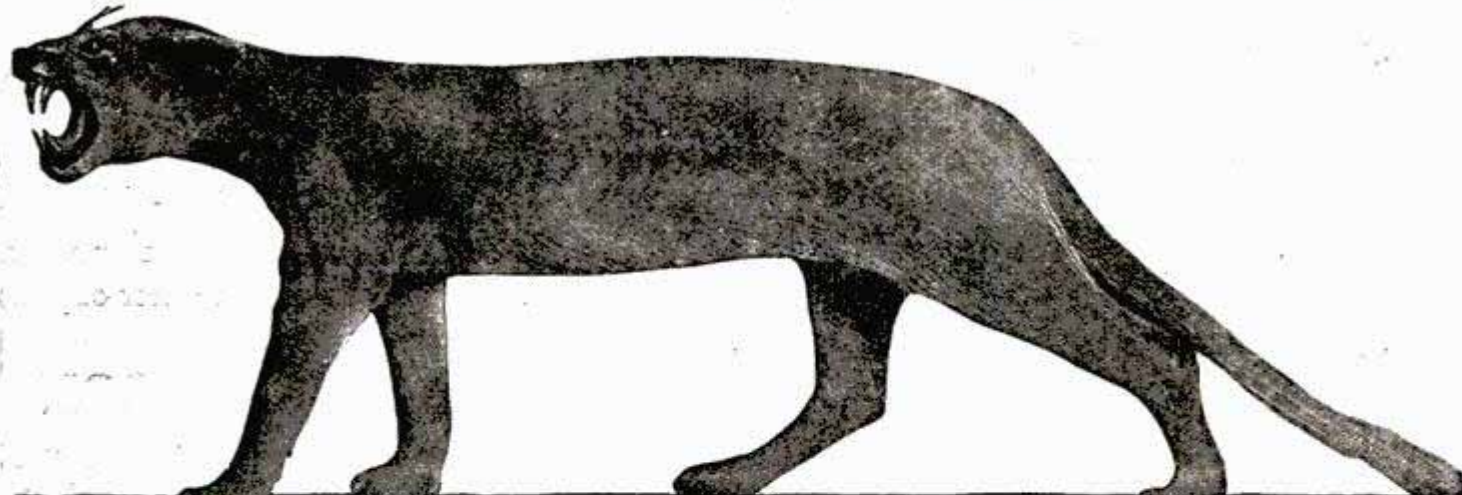
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Mount Your Own Game Heads, Birds and Animals

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By taking our course of forty (40) lessons you will soon be able to do perfect mounting, and can *decorate your home, office or den* with the choicest of art. You will have a delightful diversion for your leisure time, and will *enjoy every moment* you give to the subject. Thousands of men and women of every vocation — bankers, lawyers and business men — are members of our school and endorse it in the highest terms,

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Professional Taxidermists earn from \$2,000.00 to \$3,000.00 per year, and there are not half enough Taxidermists to supply the demand. By giving only your *spare time* to this work you can easily earn from \$20.00 to \$50.00 per month, without interfering with your regular business or occupation. Mounted specimens sell readily for big prices. Many birds and animals that are now killed and thrown away are *valuable* and can be turned into cash.

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WE INVITE YOU TO INVESTIGATE FULLY. Send for our printed matter today. It will interest you, and it's **Free**. We want every sportsman or nature lover in the country to become a member of the only school in the world "for sportsmen by sportsmen."

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NORTHWESTERN SCHOOL OF TAXIDERMISTRY
1199 Elwood Bldg., OMAHA, NEB.

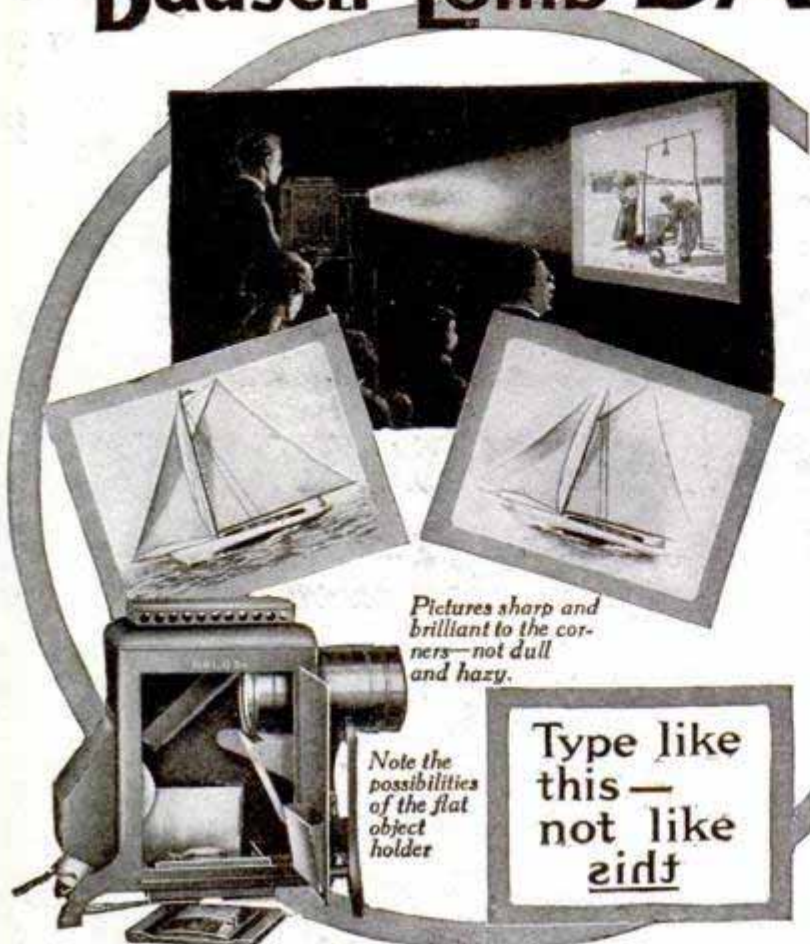
We mount or sell all kinds of birds, animals and game heads. Price list on request. Sign the coupon today.

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116 POPULAR MECHANICS ADVERTISING SECTION

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Pictures sharp and brilliant to the corners—not dull and hazy.

Note the possibilities of the flat object holder

Type like this — not like zidt

The pleasure and instruction which the ear gets from the talking machine, the eye gets from pictures and other objects shown by the

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. Other models to meet any requirement, \$22. and up.

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with the Vista Motion Picture Camera and Projector is as simple as snapping pictures with a kodak.

Uses EASTMAN Standard Motion Picture Film

Price of Camera \$50.00

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"Have you looked into it?"

This wonderful little instrument transforms the most commonplace articles into the most beautiful, original, varied and unusual designs imaginable.

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CONGRESS PLAYING CARDS

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THE OFFICIAL RULES OF CARD GAMES Hoyle up-to-date SEND 15¢ IN STAMPS

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Always something new. See Mona Lisa, Rembrandt and other recent art backs of unusual beauty.

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The new Brooks Appliance for rupture so thoroughly meets every test and requirement that it is ordered by the U. S. War Dept. and is recognized as the most reliable support ever invented. It is fitted with an *Automatic Air Cushion* which follows every movement of the body and always covers the ruptured spot. The cushion which comes in contact with the skin is soft, pliable gum rubber and clings closely, so that slipping is impossible, and it is cool and comfortable because of the constant circulation of air through it.

This Appliance is sold under a positive guarantee of money refunded if not satisfactory. We do not guarantee to cure any more than any doctor will guarantee to cure his patient. We do guarantee to furnish a perfect fitting Appliance, which will give the wearer solid comfort and retain the protrusion at all times. The purchaser is the sole judge and if for any reason whatever (which does not have to be furnished us) it is returned, the price paid will be refunded in full.

Further information regarding the Appliance, rules for self-measurements and catalog sent FREE. Just send your name and address to

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Make \$20 to \$50 PER NIGHT
With our moving picture outfit. We sell everything—Films, etc.
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Strange invention startles world—agents amazed. Ten inexperienced men divide \$40,000. Korstad, a farmer, did \$2,200 in 14 days. Schleicher, a minister, \$195 first 12 hours. \$1,200 cold cash made, paid, banked by Stoneman in 30 days; \$15,000 to date. A hot or cold running water bath equipment for any home at only \$6.50. Self-heating. No plumbing or water-works required. Investigate. Exclusive sale. Credit given. Send no money. Write letter or postal today.

ALLEN MFG. CO., 3964 Allen Bldg., Toledo, Ohio

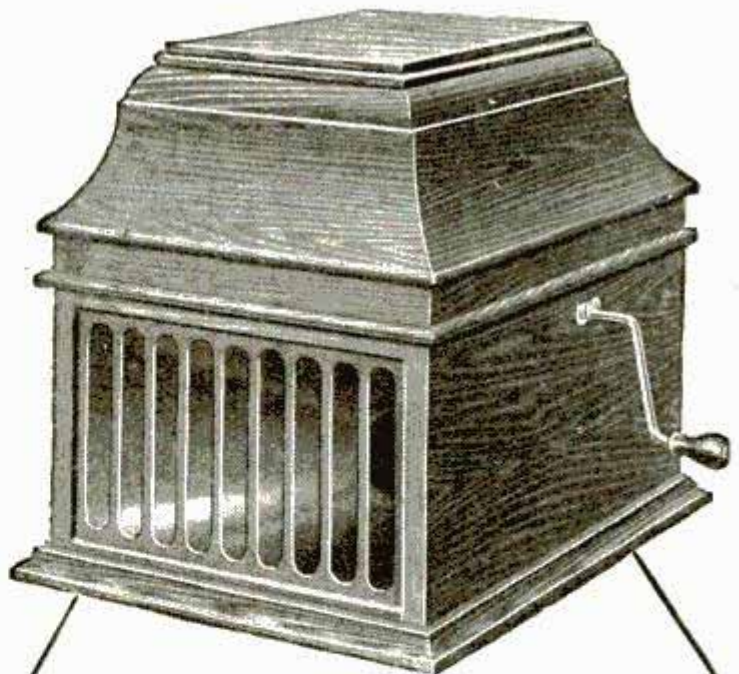


Something new. Big seller. Good repeater. No competition. Immense demand. "ZANOL" Concentrated Non-Alcoholic Food Flavors. Over 50 kinds. Put up in tubes. Four drops go as far as a teaspoonful of bottle extract. Also Soaps, Perfumes, Toilet Preparations—100 other specialties.

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\$1.00

and You Keep This Superb New Edison

An astounding offer—the great New Edison with the new Diamond Stylus reproducer and your choice of all the brand new Diamond Amberol Records will be sent to you on free trial without a penny down. The finest, the best that money can buy at one-fourth, yes, one-fifth the price at which imitations of the genuine Edison are offered—a rock-bottom offer direct from us.

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Hear all the latest up-to-date song hits of the big cities. Laugh until the tears stream down your face from laughing at the funniest of minstrel shows. Entertain your family and your friends with everything from Grand Opera to Comic Vaudeville—then if you choose, send the outfit back to us at our expense.

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Your name and address on a postal or a letter (or just the coupon) is enough. No obligations in asking for the catalog. Get this offer—while this offer lasts. Fill out coupon today.

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Phonograph Distributors
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Gentlemen: Please send me your New Edison Catalog and full particulars of your free trial offer on the new model Edison Phonograph.

Name.....

Address.....

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GOLD
CASE



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Standard of the World. Endorsed by Government and Railway Officials. Harris-Goar's enlarged Easy Credit Plan now enables you to own one of these superb Elgin Watches or a beautiful Diamond without missing the money. Write for Free Catalog.

17 Jewel Elgin Now, during this Special Holiday Sale, is the time to buy

this elegant 17 JEWEL Elgin. Thoroughly factory tested, fitted in a beautiful Gold Strata Case, Factory stamped and Guaranteed 25 years, hand engraved, plain polished or with your own monogram, and our startling offer is to send you this celebrated 1914 Model free of charge for your approval

No Money Down

Because we want to prove to you that the great volume of our business actually enables us to do better by you than any other Watch or Diamond House in the World, and that on this particular watch we save you nearly half for it sells regularly at about \$20 to \$22. Our

Special Price is Only \$12⁷⁵

We don't want you to send us one cent—not a penny. Merely give us your full name and address that we may send you this superb 17 Jewel Elgin or a Diamond on approval, and if after you receive it, and want to keep it, pay us the sum of

Only \$2 a Month

But if after you have worn it 30 days FREE and don't want to keep it, send it back at our expense. You assume no risk whatever. You do not buy or pay one cent until we have placed the watch or diamond right in your own hands for your decision. We want no security, no interest—no red tape—just common honesty among men. Write for our BIG FREE WATCH AND DIAMOND BOOK today. Do it now!

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The House That Sells More Elgin Watches Than Any Other Firm in the World.

Bank Presidents Endorse Harris-Goar Company.

We take very great pleasure in recommending the Harris-Goar Jewelry Co., to the business public. The company has large financial resources with patrons everywhere throughout the United States. Mr. Harris and Mr. Goar are well and favorably known as men of energy and business integrity, and we believe them worthy of the fullest confidence of the public. (Signed)

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We mean a Daus' Improved Tip Top Duplicator, with "Dausco" Oiled Parchment Back negative roll, that ideal assistant, always ready to quickly make 100 copies from pen-written and 50 copies from type-written original. Complete duplicator, cap size (prints 8 3/4 x 13 in.), costs \$5 but we don't want your money until \$5 you are satisfied, so if interested just write us to send it on 10 DAYS' TRIAL WITHOUT DEPOSIT. That's fair enough, isn't it? Then send today.

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TO EDUCATE your children, support a family, pay off a mortgage, buy a home or dress better. Then do as thousands of others are doing. Make money selling World's Star Hosiery and Klean Knit Underwear in your home town. No previous experience is necessary. We show you how to make money in an easy, congenial and profitable way. Two lady agents began in their home town in California and each made over

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We sell direct from the mill to the home, eliminating the middleman's profit, thereby giving better value for the money. Our lines for men, women and children are famous world over. We have in 18 years grown to be the largest concern in the world manufacturing and selling knit goods direct to the consumer.

Agents wanted in every town. It is a permanent, pleasant and profitable business. Write today for our free catalog. We protect agents in territory and make prompt delivery.

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to its health-giving qualities, it is used in medicine for antiseptic wools and dressing, but its chief value to the physician lies in its employment for peat baths. Properly used, a peat bath is invigorating. Often workmen employed in the peat fields will have a peat poultice applied to some wound, this being considered locally as one of the best healing remedies that can be used.

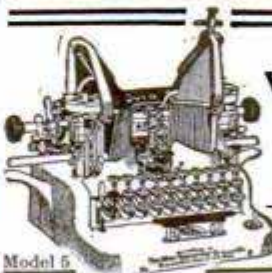
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Red or Black \$1.00 Long or Short
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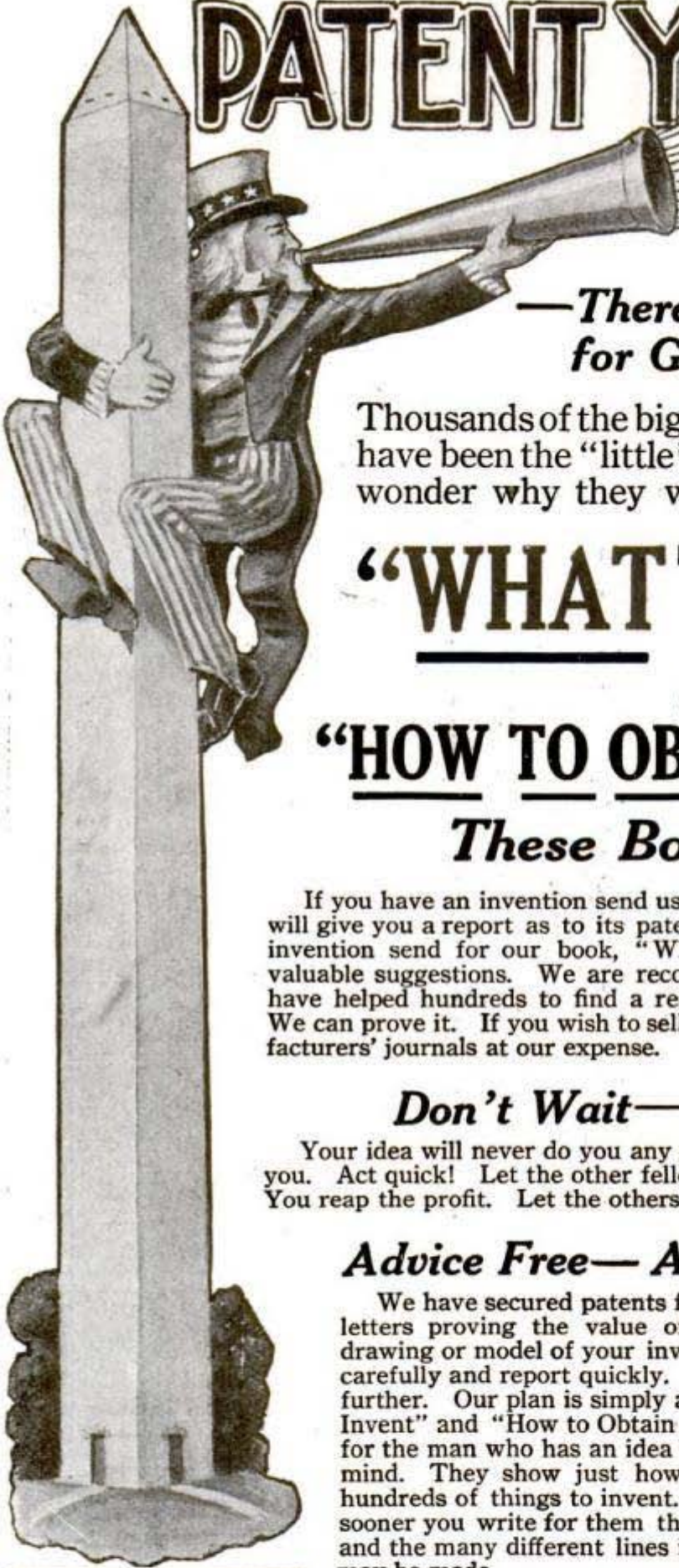
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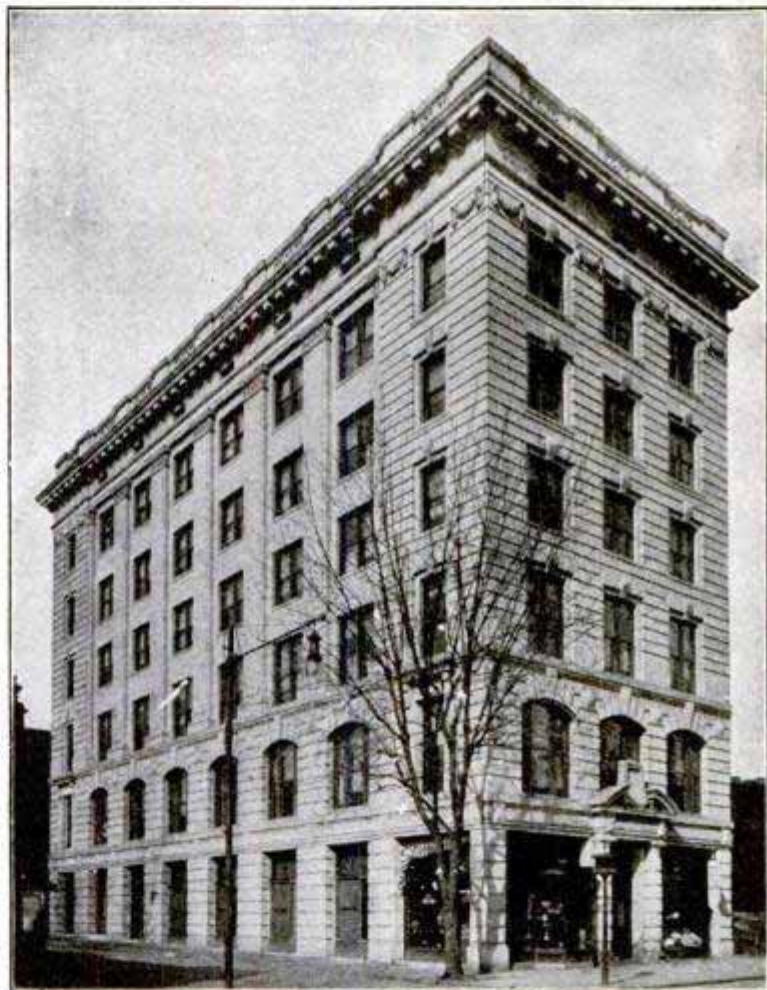
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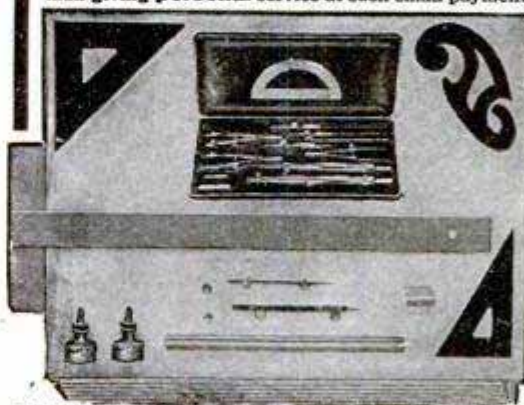
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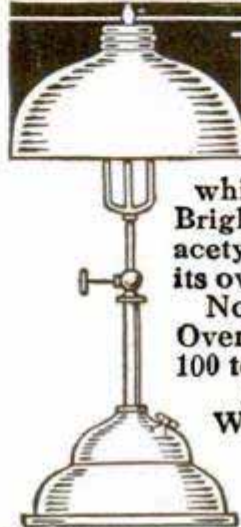
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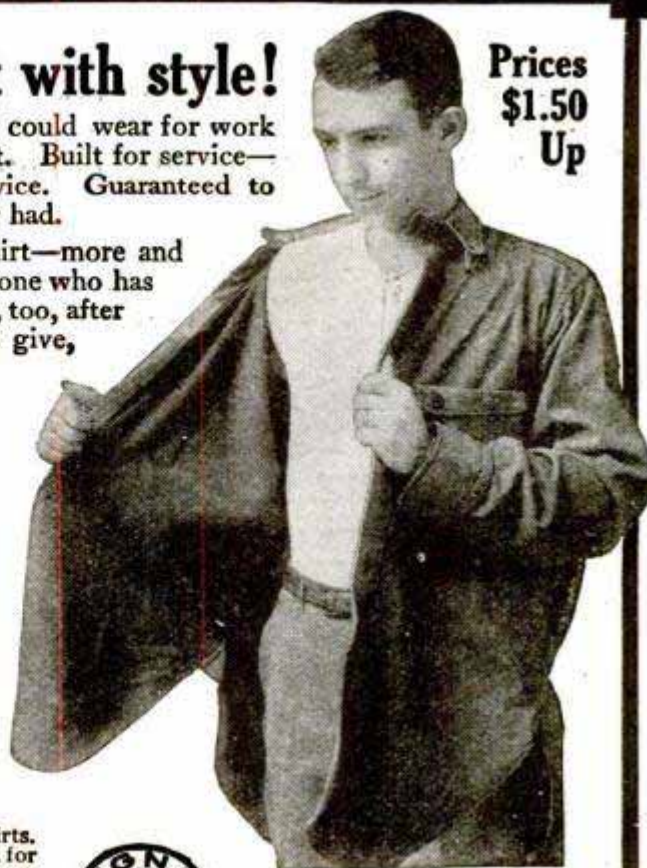
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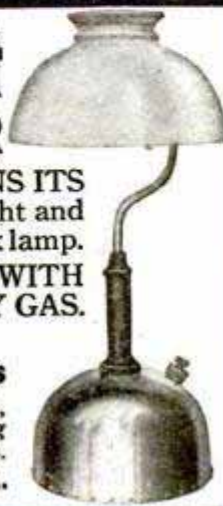
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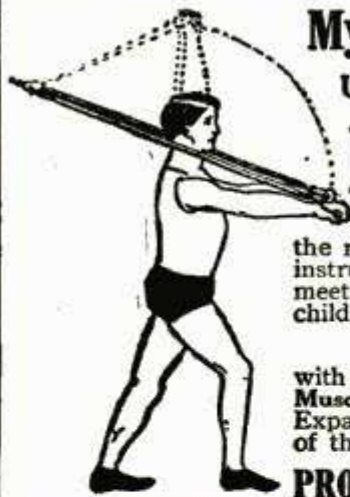
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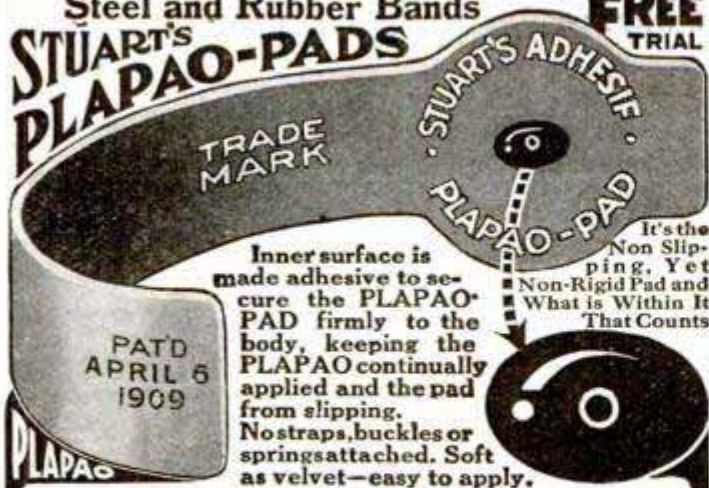
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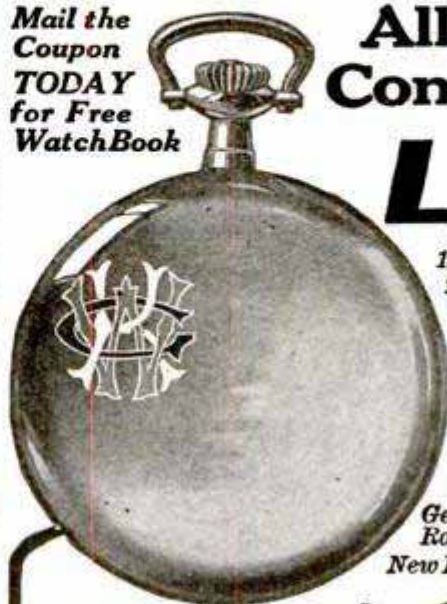


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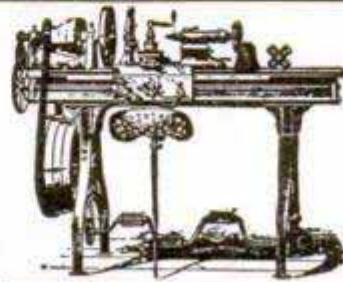


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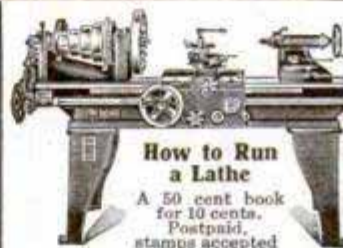
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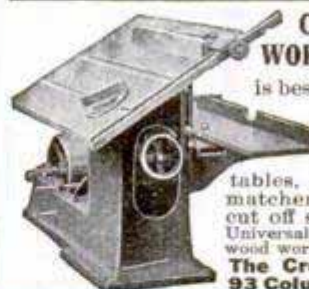
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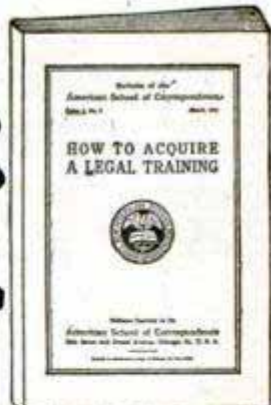
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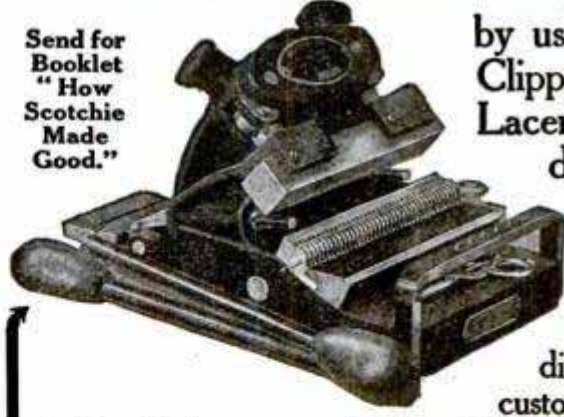
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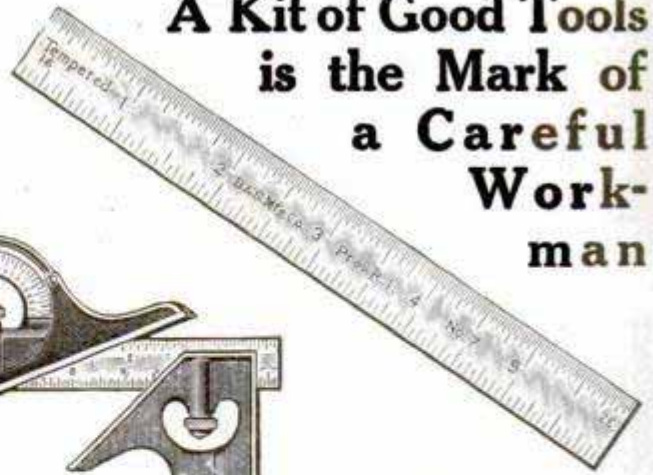
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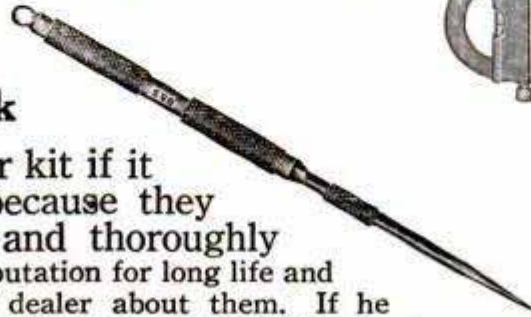
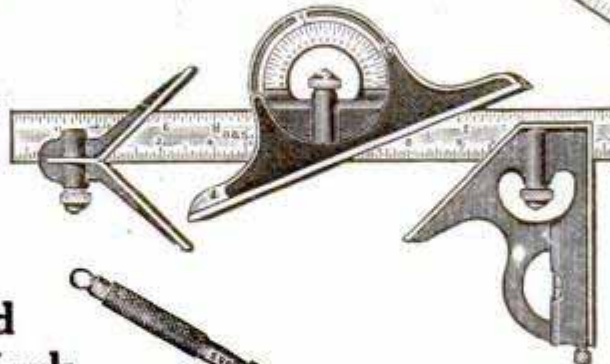
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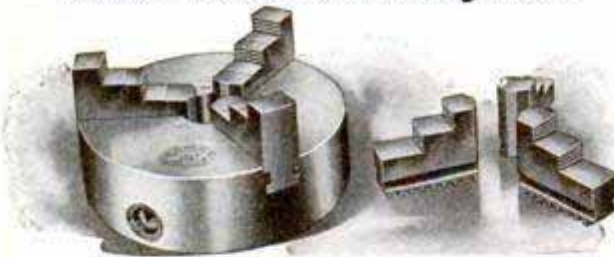


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27	5/16	3/8			7/8		1 & 1 1/8
729			7/16	1/2	1 1/8		1 1/2 & 1 3/4
731B		1/2	9/16	5/8	1 1/4		1 3/4 & 2
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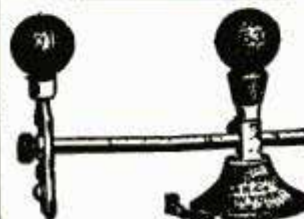


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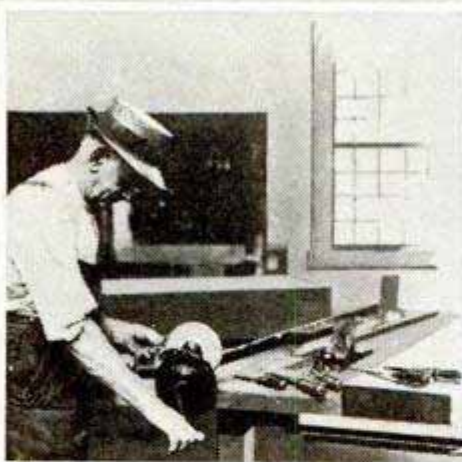
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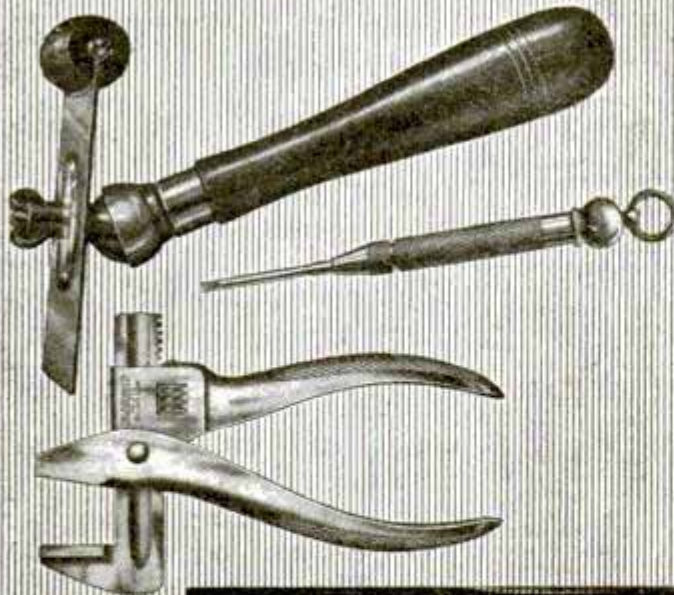
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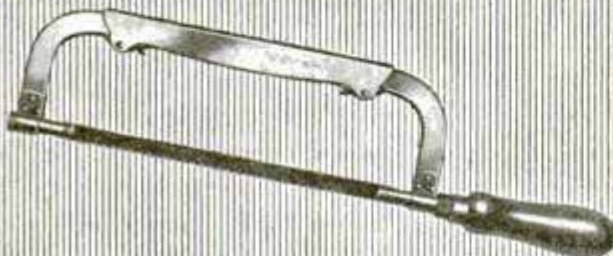
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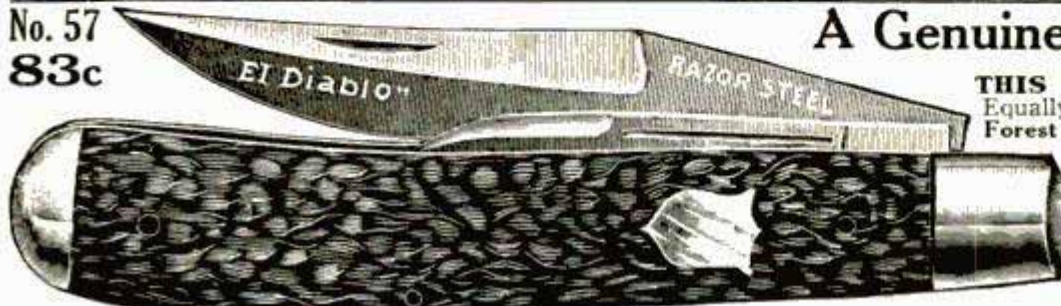
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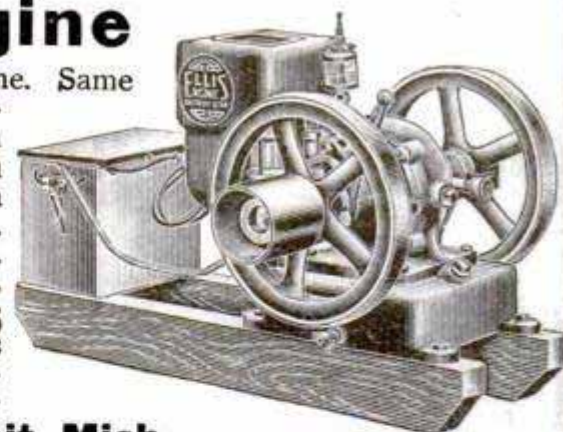
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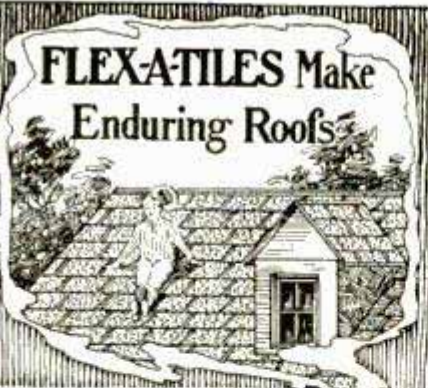
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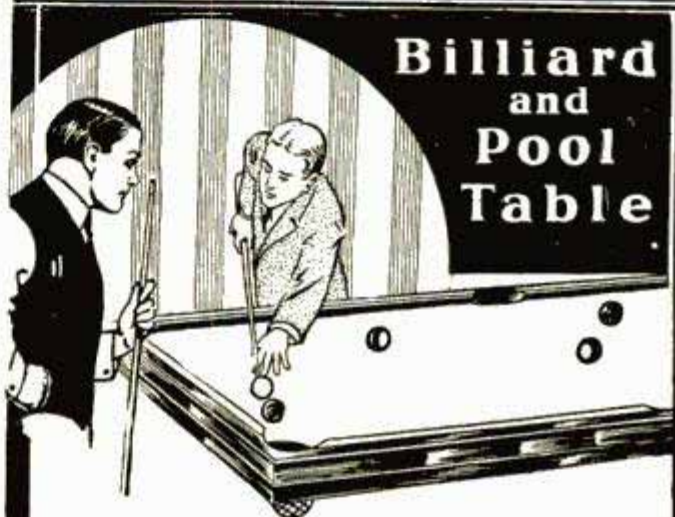
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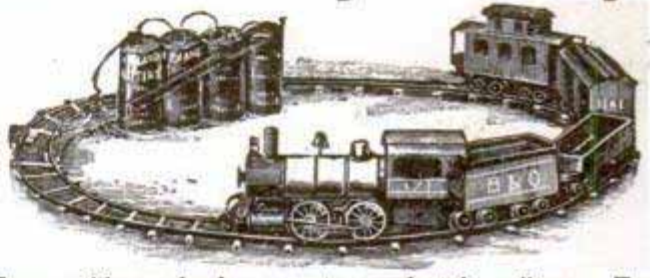
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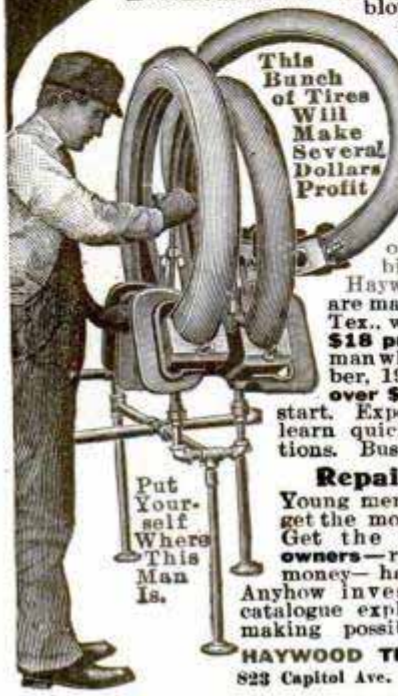
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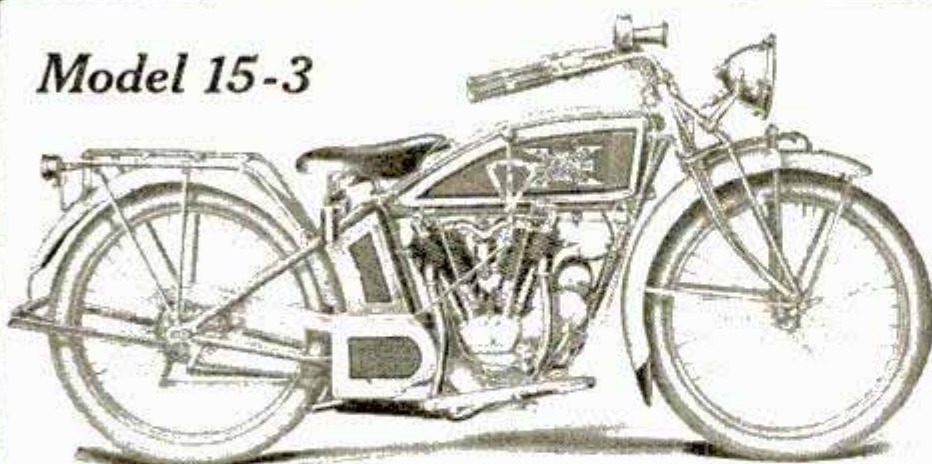
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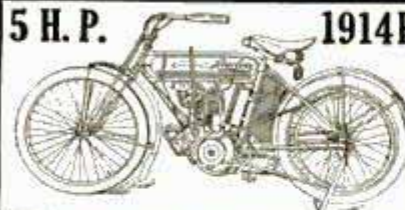
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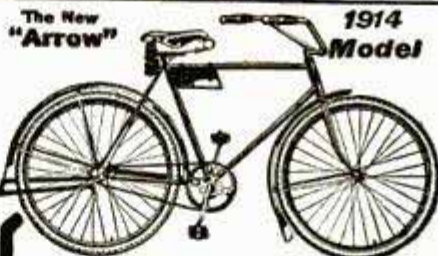
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With Free Engine Idler and Bosch Magneto, together with the best there is in motorcycle construction—Power, Silence, Endurance, and those Wearing Qualities so essential for low cost of maintenance. **6 MILES FOR ONE CENT**
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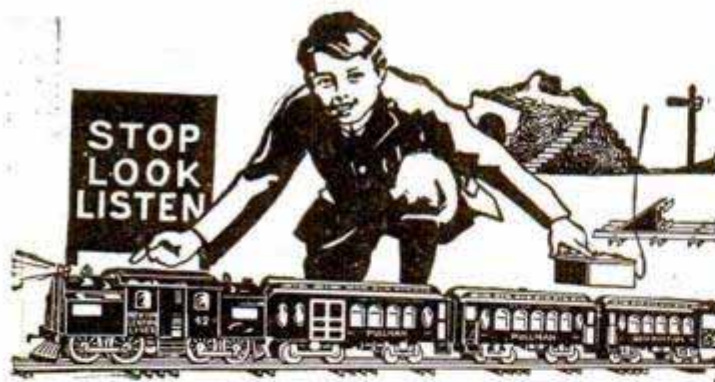
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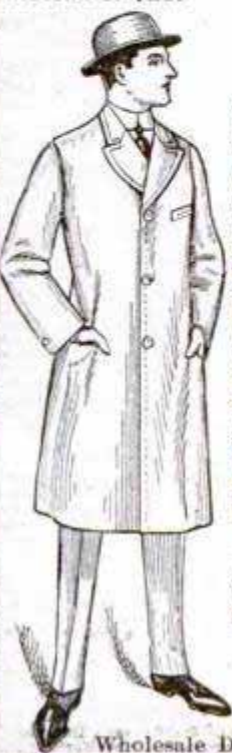
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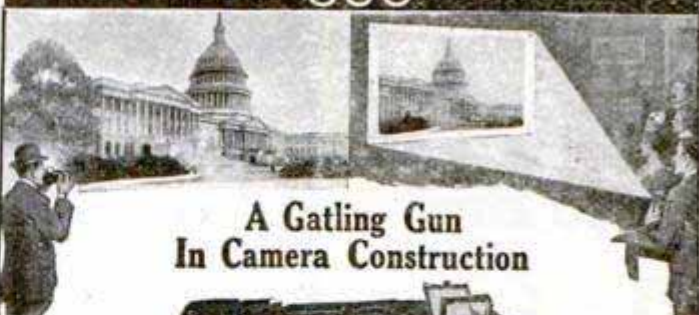
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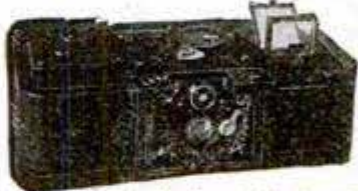
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Gasoline or Kerosene

Speed, regular, or heavy duty. Strong, simple, accessible—absolutely dependable. Built for a lifetime. The boat-builder's stand-by, the boat-owner's pride. Double ignition. Non-backfiring. Heavy brass fittings.

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3 H. P. 1 cyl. complete	\$ 65.00
6 H. P. 1 " "	84.00
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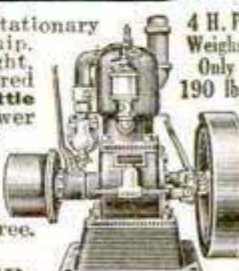
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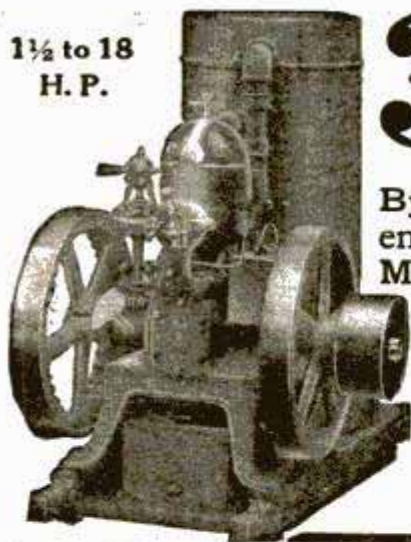
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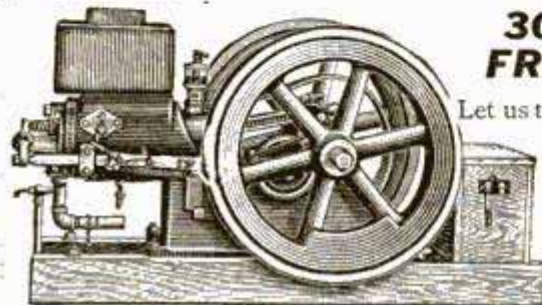
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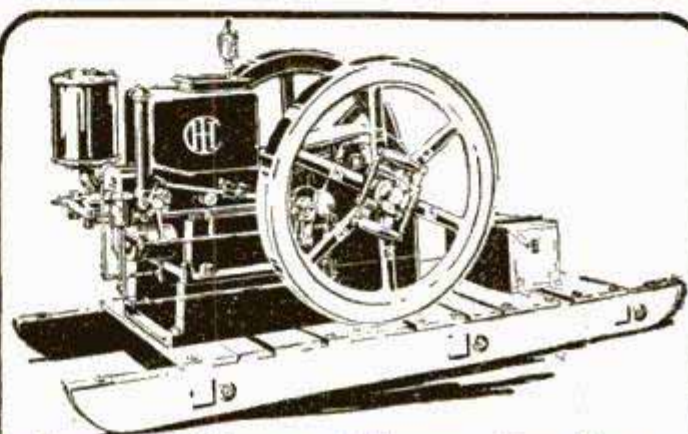
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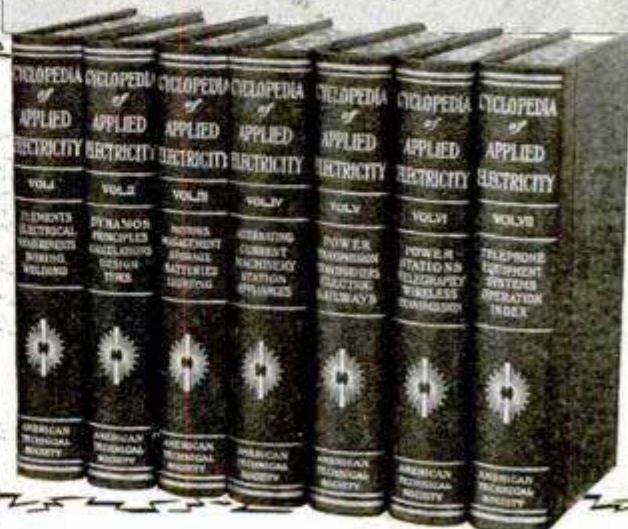
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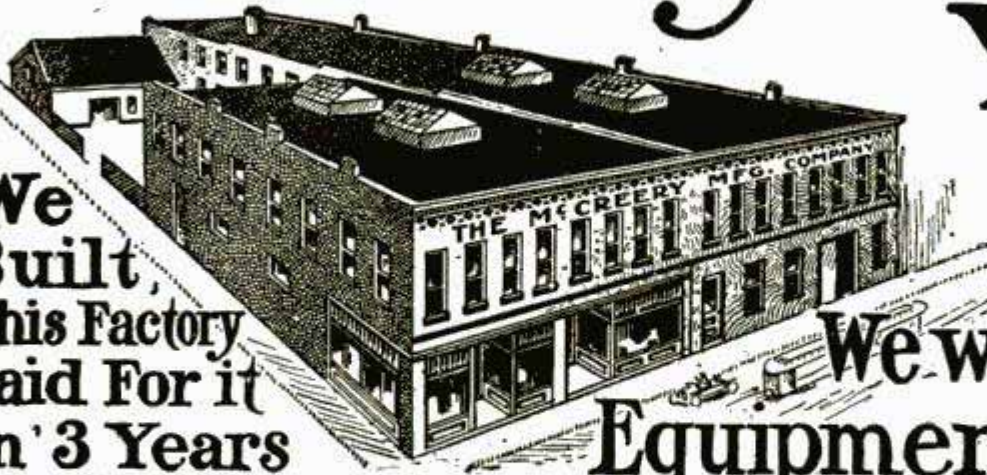
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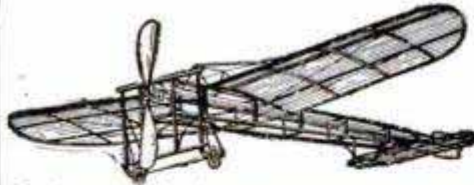
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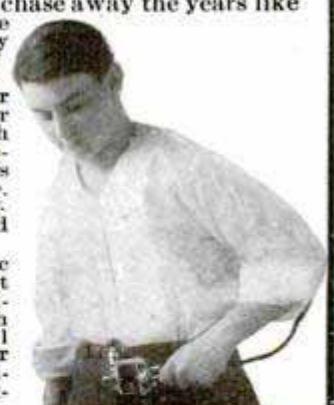
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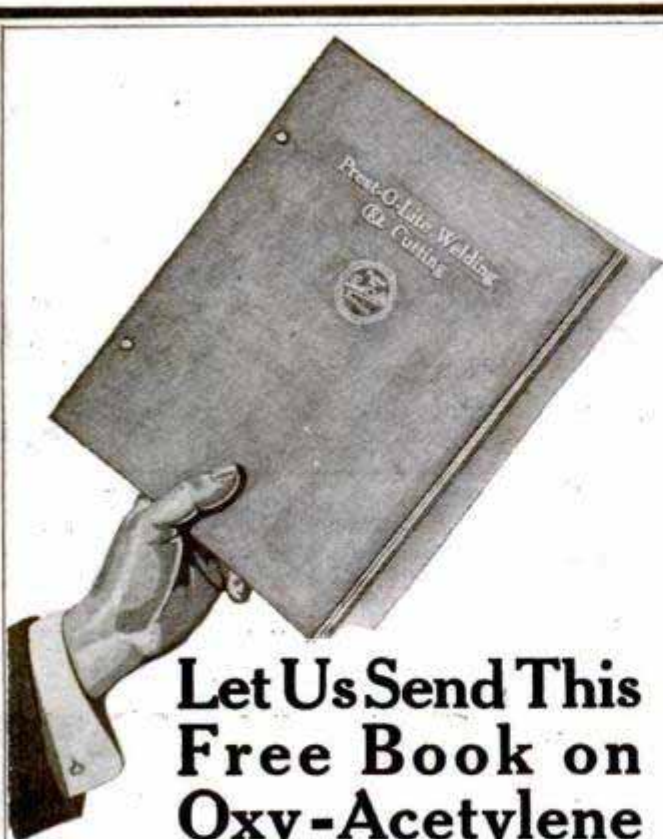


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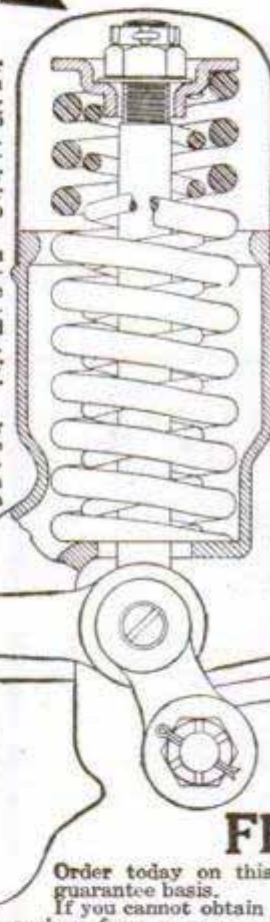
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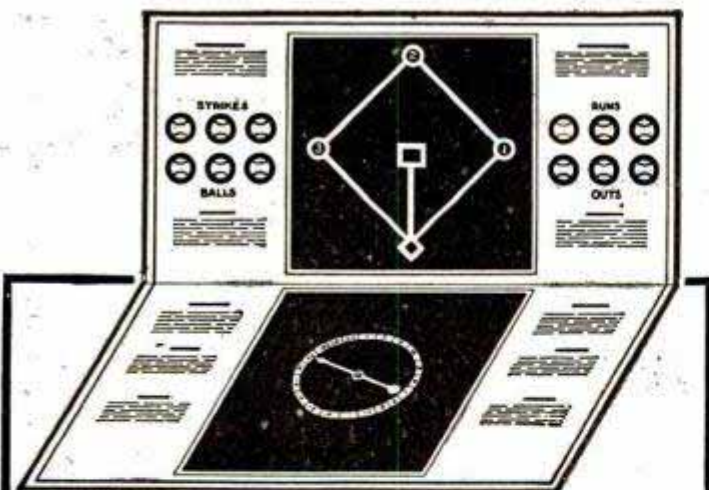
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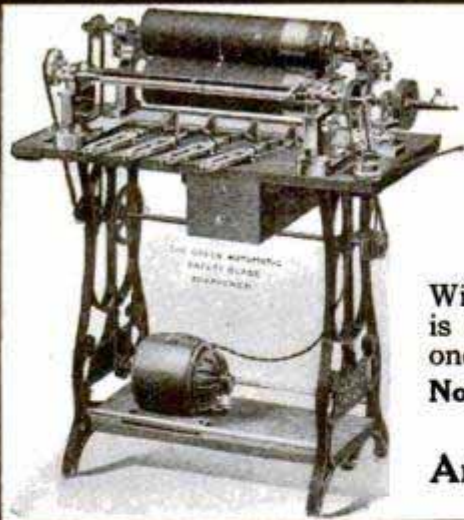
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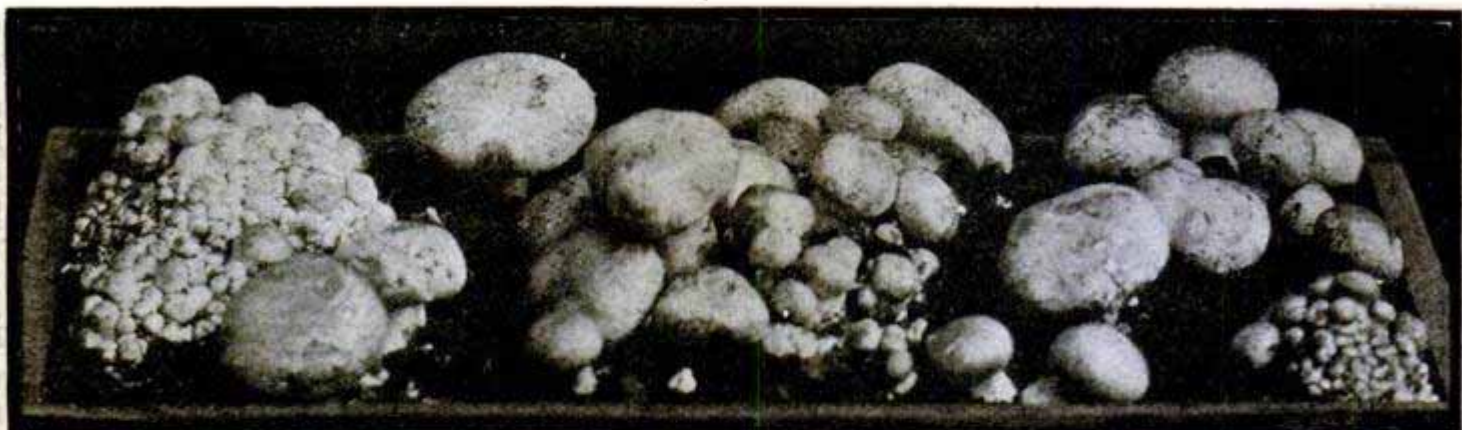
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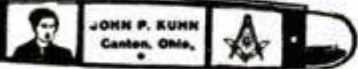
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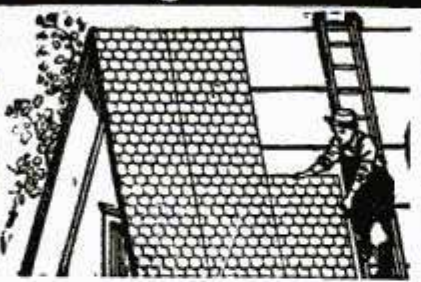
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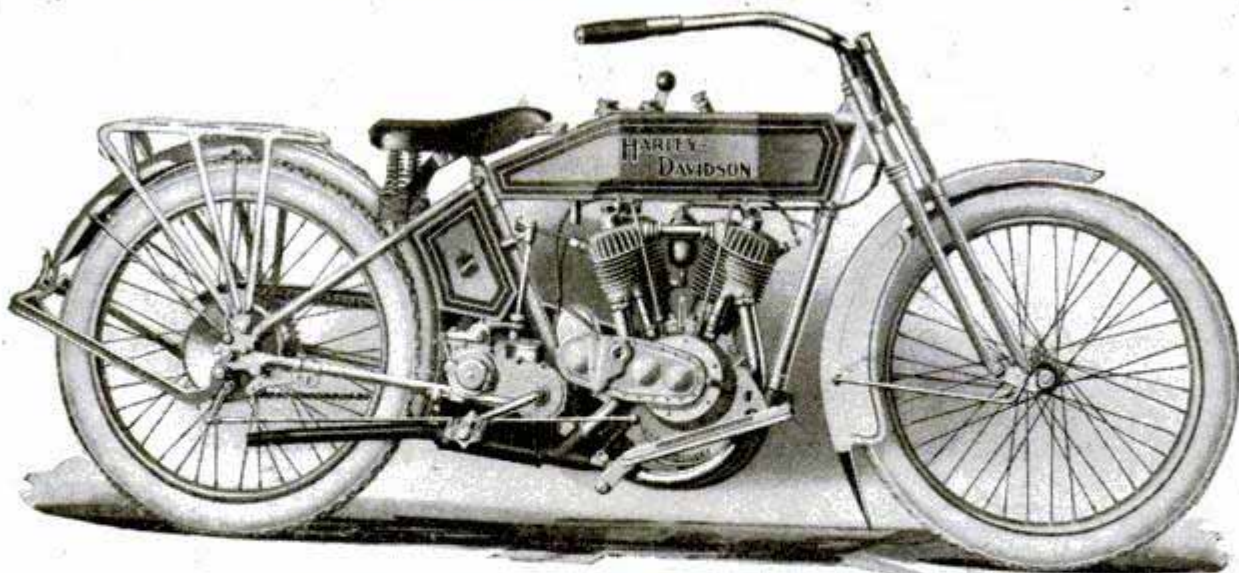
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A 1915 Harley-Davidson stripped stock model won the F. A. M. one-hour National Championship at Birmingham, Alabama, October 5th, 1914. At Sioux City, Iowa, September 2, another stock Harley-Davidson covered 74 miles in one hour without a stop. On October 12th, still another stock Harley-Davidson broke the Boston track record, covering a mile in 49½ seconds. These are but three of a host of records which have proven the 1915 Harley-Davidson to be the fastest stock motorcycle ever built.

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More Dealers for 1915

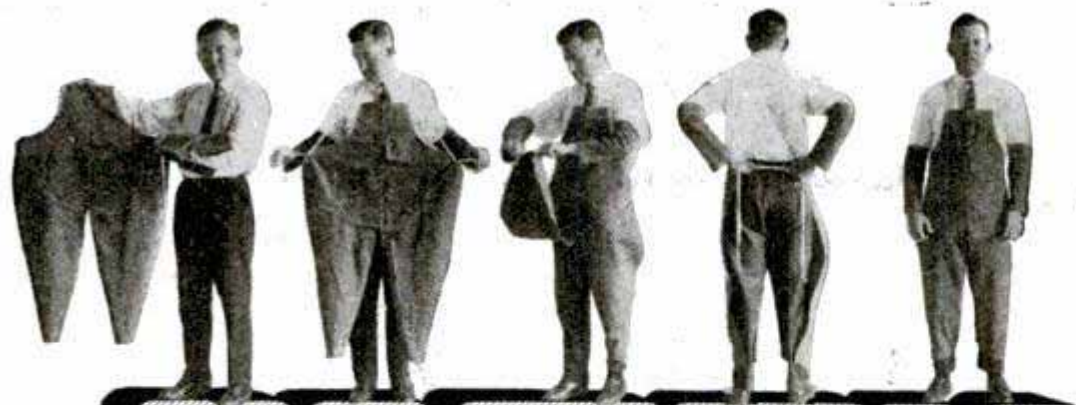
By running our entire south plant and parts of the main factories last year night and day we were able to take care of but 715 of the thousands of new dealers who asked to handle the Harley-Davidson during 1914. A substantial

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- 50c** buys the standard stock of blue denim material.
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Ask your dealer to send for one dozen (special dealer quotations upon request) and give us your name as calling the Jiffy Overall Apron to his attention, and we will ship, with his order, one for you, without charge. Address

JIFFY APRON COMPANY
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in the machine shop



in the work shop



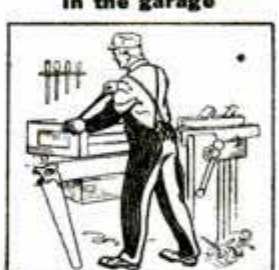
in the laboratory



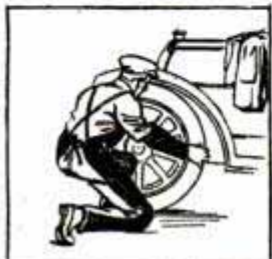
in the store



in the garage



at the bench



on the road



at the furnace

COUPON

JIFFY APRON CO., 1914
Detroit, Michigan

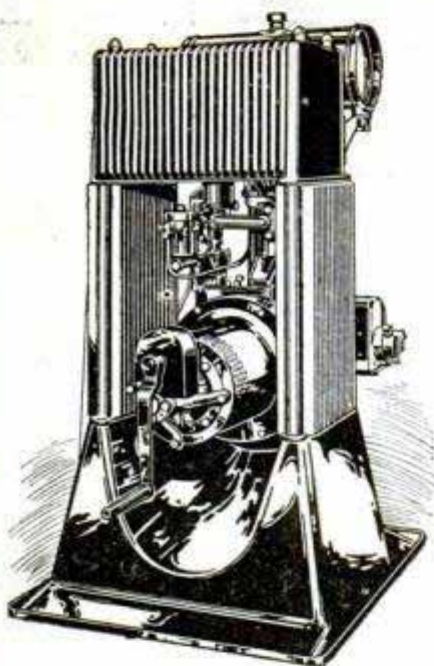
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Name

Address.....

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No Batteries or
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THIS wonderful new electric lighting system, only recently invented, is just what thousands have been wanting for years past—a complete electric lighting outfit for the home located in the country or small town, where city current is not available.

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Turn on one or fifty lights just as you choose. Nothing to look after but the small high-speed engine that works smoothly and silently while the lights are on. Pour in oil, gasoline and water once a week, or as needed—that is all the attention required.

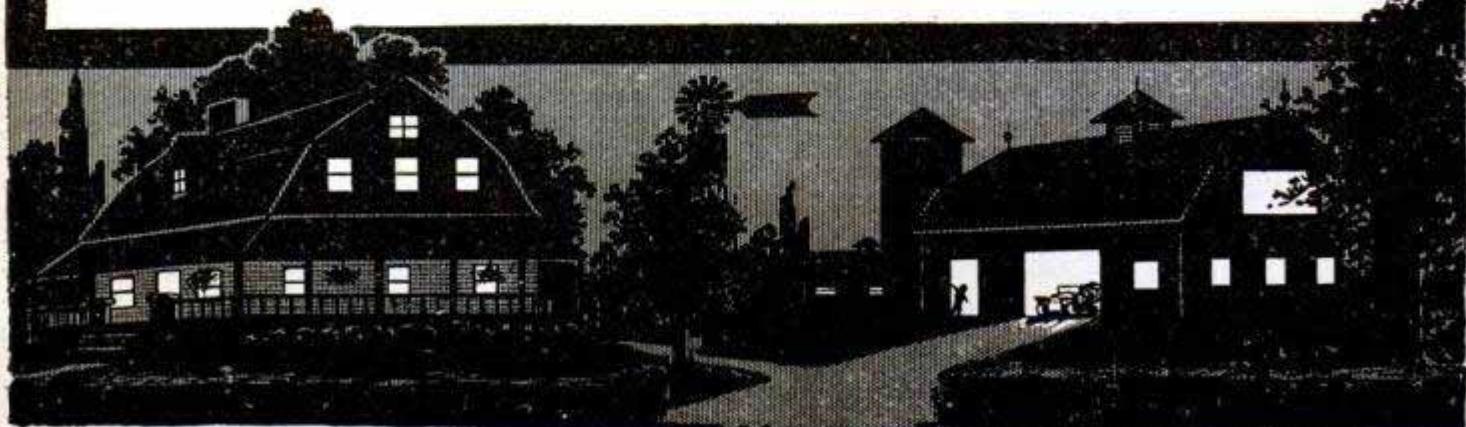


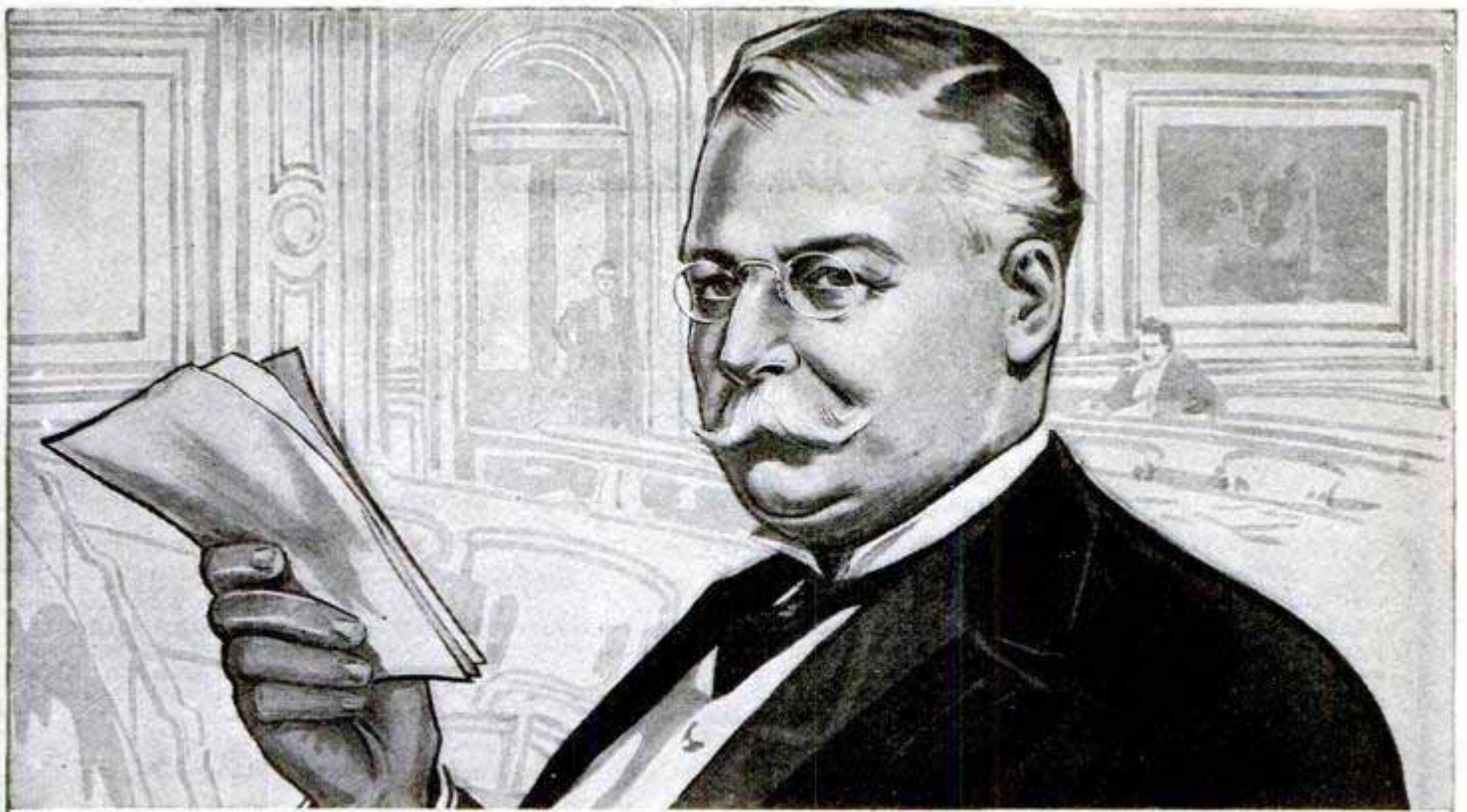
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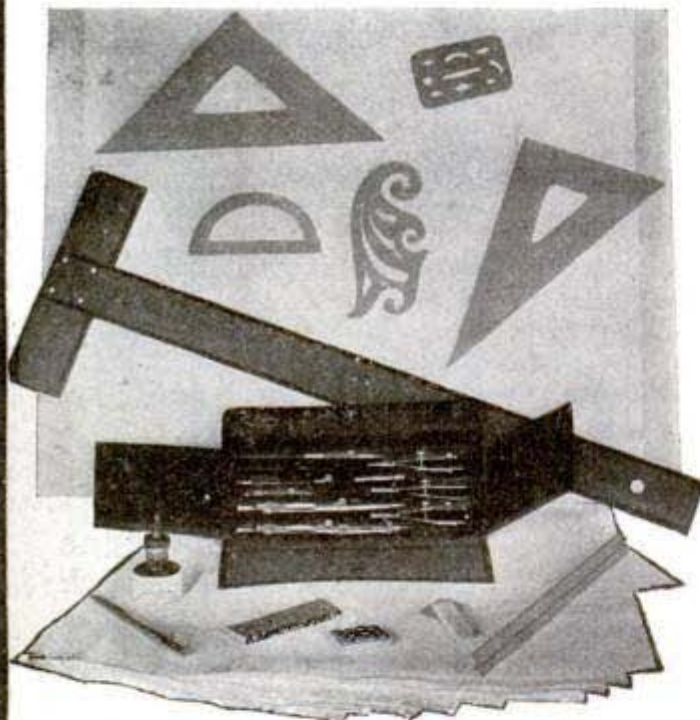
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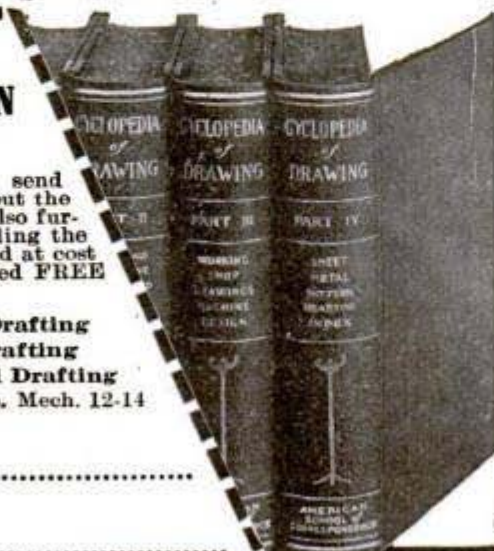
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