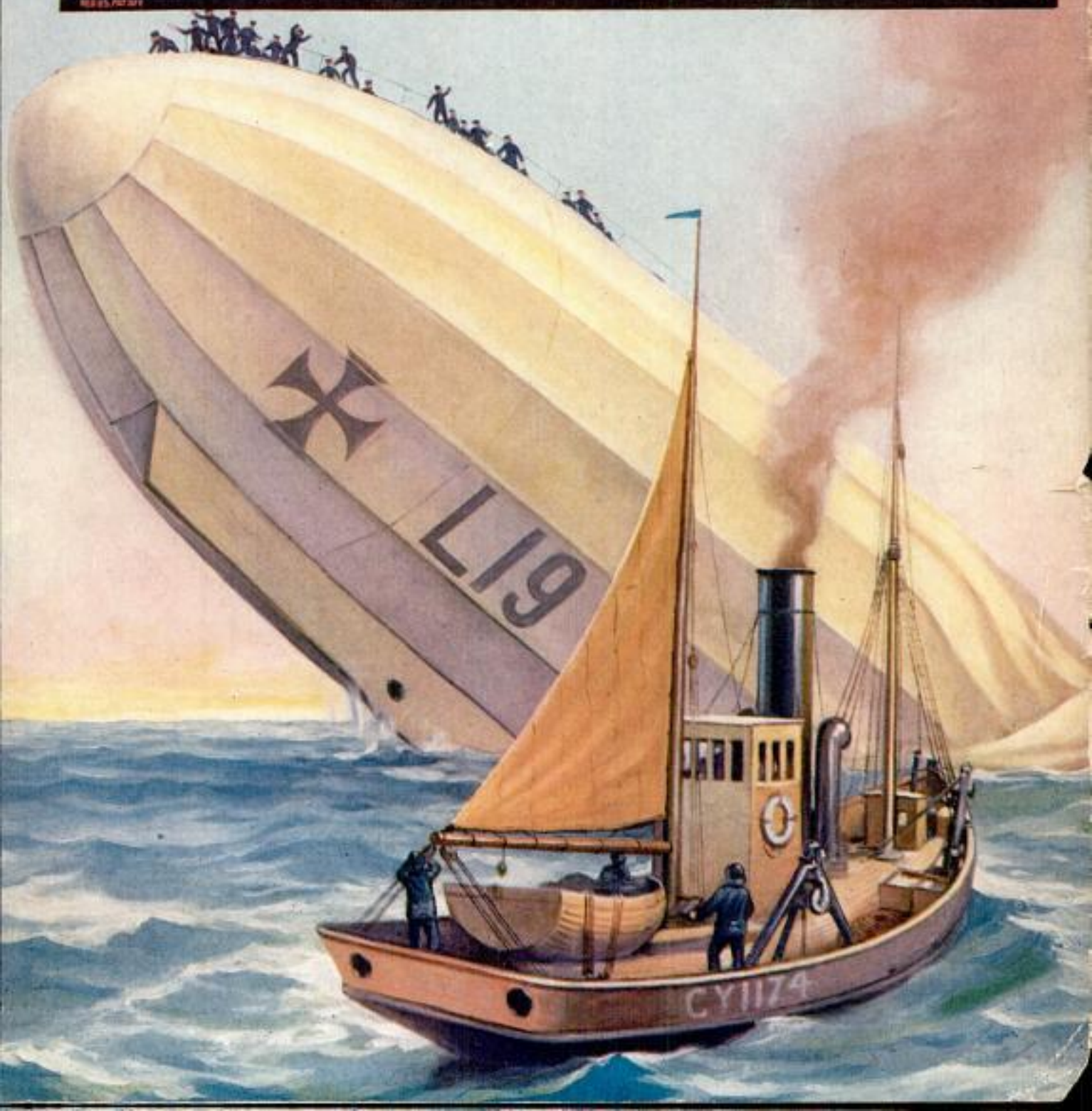


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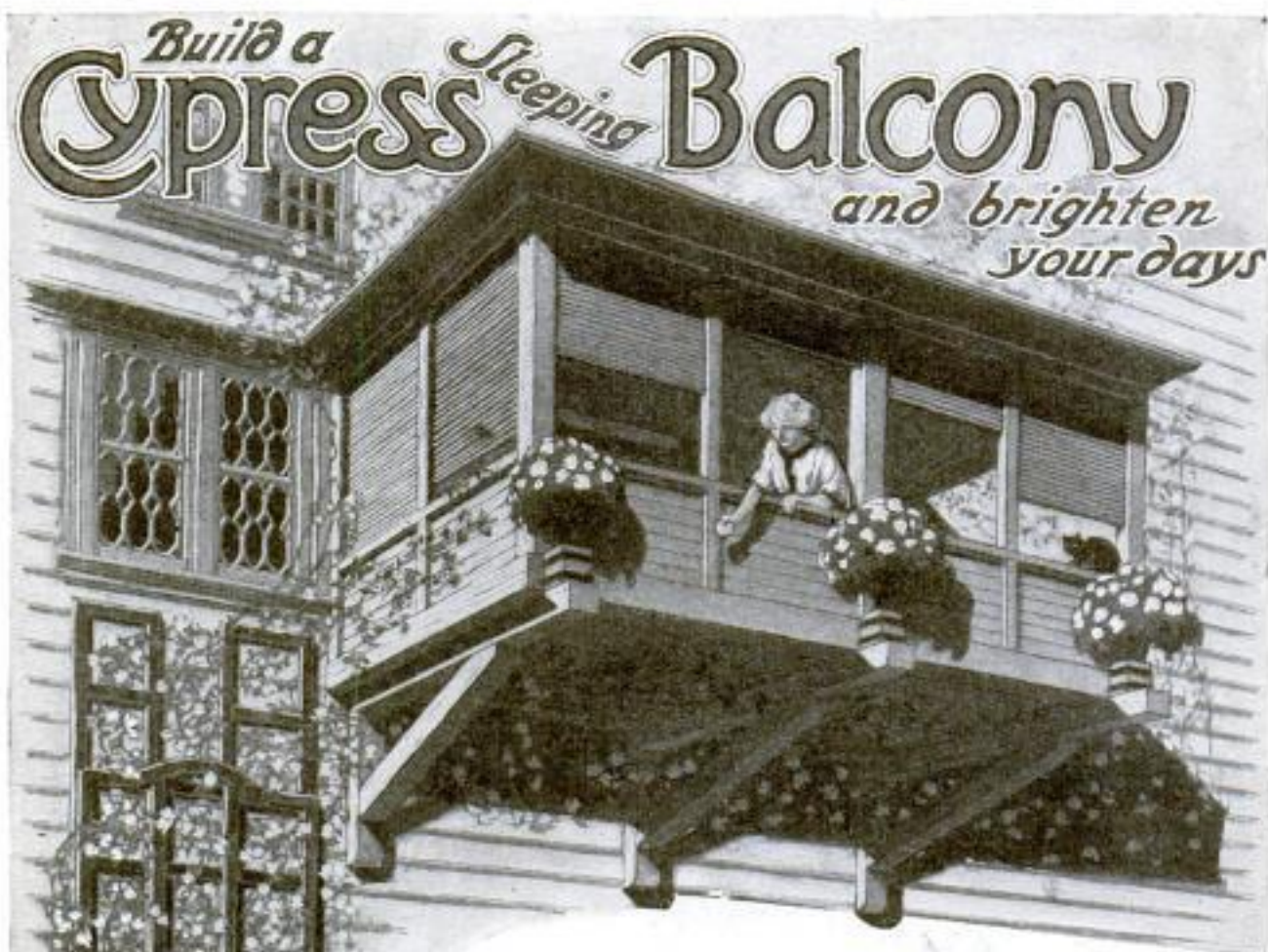
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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, of Popular Mechanics Magazine, published monthly at Chicago, Ill., for April 1st, 1916.

State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared H. H. Windsor, who, having been duly sworn according to law, deposes, and says that he is the editor and business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit: 1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 6 No. Michigan Ave. Editor, H. H. Windsor, 6 No. Michigan Ave. Managing Editor, J. L. Peabody, 6 No. Michigan Ave. Business Manager, H. H. Windsor, 6 No. Michigan Ave. 2. That the owners are (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock): H. H. Windsor, 6 No. Michigan Ave. 3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are (If there are none, so state): None. 4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bond, or other securities than as so stated by him.

H. H. WINDSOR.

Sworn to and subscribed before me this 27th day of March, 1916.

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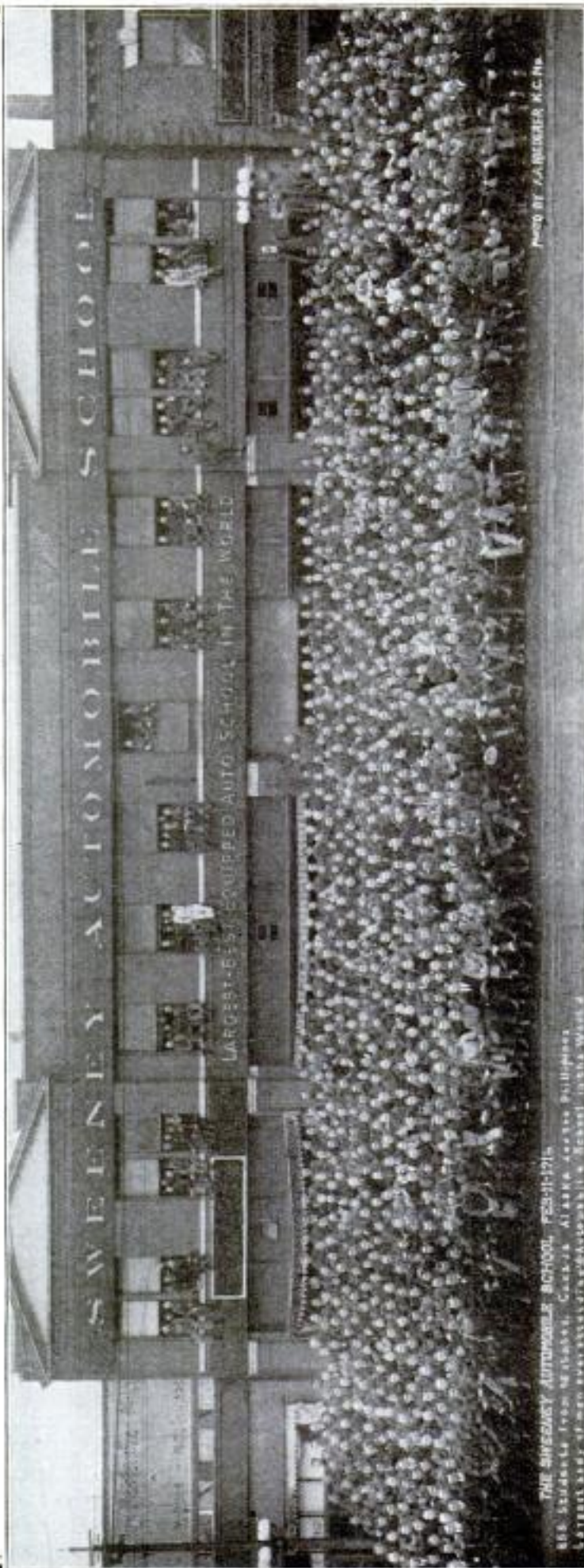
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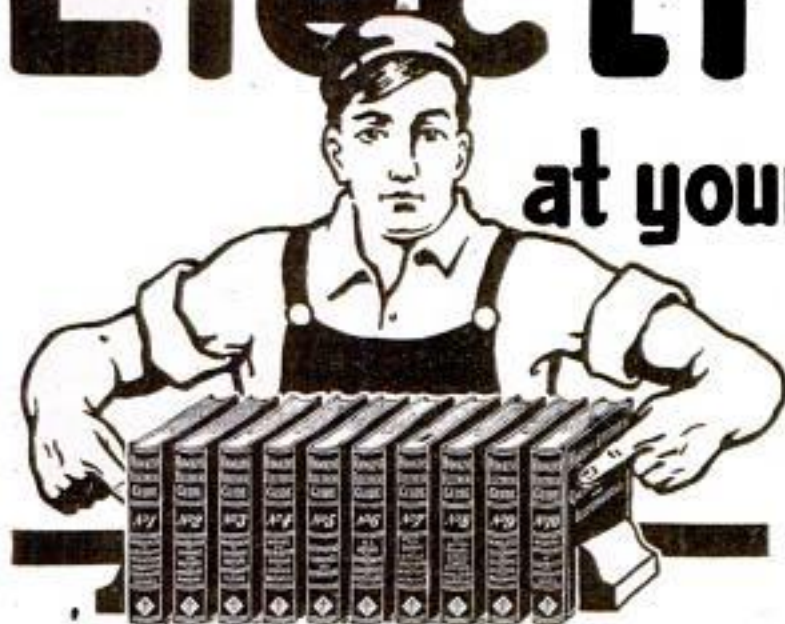
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AGENTS to sell toy soldiers. Sample, 10c. Highland Toy Soldier Mfg. Co., 1015 Hampden St., Holyoke, Mass.

AGENTS—We make two wonderful selling cakes. A 25-ounce Angel Cake—costs 40c. Wholesale \$1.50. A fruit cake costs 10c lb. Sells 25c. As Demand exceeds Supply, your financial independence is assured. Great home work. Full instructions \$1.00. Womens Cake Co., 398 Peery St., Oakland, Calif.

WHO wants to make more money selling brushes that every household needs? Special method of getting entrance to demonstrate. Fuller Sanitary Brushes are nationally advertised—largest output—best terms and prices—western distributing stations. Your territory is valuable. Write, Fuller Brush Company, Hartford, Conn.; Rock Island, Ill.

MONEY-MAKER—Manufacture Puffed Crisp. Delicious confection. Whirlwind seller. One taste wants more. So good, cheap, easy to make. 400% profit. Machine, instruction complete, \$7.50, prepaid. Send 10c for samples. Mohler, Munson Bldg., Chicago.

AGENTS—Send for sample "Fretnot"—the wash day wonder. He convinced you can do a whirlwind business. You can clear at least \$20 to \$100 weekly, according to spare or whole time. You don't have to talk; if she doesn't buy at sight, leave sample; she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory granted to agents who can produce. Credit given. Don't call. P. M. Motter & Sons, 3213 Warren Ave., Chicago.

AGENTS—Men and women; make \$30 to \$50 weekly selling the New Improved Monitor Self-Heating Iron—the "World's Best." Over 750,000 in use. Positively the easiest, fastest selling, lowest priced, best known iron made. Binding Guarantee. Big profits for all or part time. Evans, N. Car., sold two dozen on Saturday. Mrs. Nixon, Va., sold eight first half day. New low terms. Exclusive territory. Sample free to workers. Write today. The Monitor Self-Heating Iron Co., 740 Wayne St., Big Prairie, Ohio.

AGENTS write for 100% proposition and sample. Central Sales Co., 756 Water St., Decatur, Illinois.

SPIRAL spring curtain rods; fit any window; put up in minute; tremendous seller; sample, 10c. Moore Co., 4138 Jerome Ave., Cincinnati.

NEW Gas Saver, fits every Gas Range, saves \$20 yearly; sensational demonstration; costs 25c, sells at sight 50c. Every Gas Consumer buys three. American Gas Reduction Co., Transportation Bldg., Chicago.

RAPID Selling Calculating Instruments. Six kinds, varying from 50 cents to \$5.00. Leishman Telescope & Supply Company, Ogden, Utah.

AGENTS to travel by automobile to introduce our 25¢ fast selling, popular priced Household Necessities. The greatest line on earth. Make \$10 a day easy. Complete outfit and automobile furnished free to workers. Write today for exclusive territory. American Products Co., 3384 3rd St., Cincinnati, O.

AGENTS—Every Mechanic and Automobile Owner needs Speed Nut Wrench. Great time saver. Large profits. Takes instantly all ordinary nuts. Sample one dollar. S. E. Forrest, Far Rockaway, N. Y.

ONE Thousand Dollars Reward—If this is not the greatest money-making house-to-house proposition ever known, N. R. G. Little Wizard Labor Saver washes clothes in 10 minutes, absolutely without rubbing. Contains no Lime, Lye, Paraffin, Wax or other injurious chemical and cannot possibly injure the clothes or hands. There is nothing like it on the market. It is positively the wonder of the age—sells for 15c, enough for 5 family washings. We supply one free sample with every package you buy and guarantee the sale of same. All you do is to leave the free sample with the housewife, and, when you call again, she is eagerly awaiting to become your steady and permanent customer. Secure territorial rights at once, or you will regret it. A 1c postal card brings sample and full particulars. Farquhar-Moon Mfg. Co., Desk D290, 140 W. Van Buren St., Chicago, Ill.

AGENTS our household articles are wonderful sellers. Large profits. Pelham Manufacturing Company, Pelham, N. Y.

GET cash for names, information, ideas, formulas. Turn what you see, hear and know into money. Instructive booklet for stamp. Information System, 163 Marietta, Ohio.

AGENTS are coining money selling our big 10c Packages of 20 Assorted Postal Cards, "5,000 Varieties." "Big Profits." Sell everywhere at sight. Sample Packages 15c. Particulars Free. Sullivan Card Co., 1234 Van Buren St., Chicago, Ill.

AGENTS for "Aladdin" Ice Saving Cloth. Guaranteed to cut ice bills in half. Increases refrigeration. Sanitary. No smell. Enormous demand everywhere; big profits. Thomas G. Dougherty, Manufacturer, 237 East 86th St., New York.

AGENTS—Sell heatless trouser presses; no irons; they work while you sleep; full information free. Dennison Sales Co., Dept. 41, Box 67, Lawrence, Mass.

CARPENTER Agents Get Universal Roof-framing Gauge Free. Never equalled. Eighty pitches; each in five minutes, square or polygonal roofs. Hundreds irregular hips. Prepaid, \$2.15. John Parkhill, Rochester, Minnesota.

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., X, 6 La Crosse, Wis.

EXCLUSIVE selling rights given for our Wonderful Triplex Folding handbag and other sellers. None sold in stores. Write for terms and catalogue. Diamond Bros., 25 West 21st Street, New York.

HOSIERY manufacturer offers permanent position supplying regular customers in home town at mill prices, \$50.00 to \$100.00 per month. All or spare time. For particulars address, D. Parker Mills, 2733 No. 12th St., Phila., Pa.

AGENTS—Amazing, new invention. Marvelous Adding Machine, retails \$7.50. Adds, subtracts, multiplies. Does work of \$200 machine. Immense profit. Offices, stores, factories buy from one to a dozen. Five-year guarantee. Every demonstration sells. Write quick for protected territory. Dept. E, 211, Calculator Sales Co., Grand Rapids, Mich.

OUR agents making \$50 to \$75 weekly. Terms and sample free. Chicago Germicide Co., Ogden, Jackson, Hermitage, Chicago.

ENORMOUS profits putting up your own goods. Great sellers and repeaters. Catalogue free. J. A. Dolman, 609 Hale Bldg., Philadelphia.

NEW \$2.50 pocket sizer. Sell 10 daily easy. Excellent profit. Everyone buys. No competition. A. Bassett, 5021 Indiana Ave., Chicago.

WASHCLEAN smashing agents' profit records. Women, hotels, cafes, laundries delighted reorder buyers. Lifetime business. Abolishes rubbing clothes. Only steam bubble cleaning process known; blows out grit; saves clothes and labor. Big profits. Sample, particulars free. Washclean Co., 305 7th St., Pittsburg, Kans.

DON'T pass this by. If you're looking for a live agent's proposition write. Kayem Sales Co., 1135 Broadway, New York.

GRAB this winner now! Wickersahm's profit \$76.40 first week. Startling, Sensational Invention. Magic Sticky Fly String. Cheapest, Best Fly Catching Device. Season now here. Agents, General Agents, write quick! Rodolph, Northwestern Building, Chicago.

START Baseball Parlor. Beats Pictures, Costs Less, Kyle, Realty, Spokane, Washington.

MIGHTY Repeat Money Making Marrel. 8 men order 47,620 packages first 16 days. Kalomite revolutionizes clothes washing ideas. \$100 weekly repeat order business. Abolishes rubbing washboards, washing machines; \$1,000 guarantee. Absolutely harmless; Kalomite works wonders; women astounded; no experience necessary; credit granted; get overwhelming proof. Equitable Corporation, Dept. 383, 215 W. Superior St., Chicago.

GARTSIDE'S Iron Rust Soap Co., 1051 Lancaster Ave., Philadelphia, Pa., Gartside's Iron Rust Soap (Trade Mark, Print and Copyright registered in the U. S. Patent Office) removes iron rust, ink and all unwashable stains from clothing, marble, etc. Good seller, big margins, agents wanted. The original, 25c a tube. Beware of infringements and the penalty for making, selling and using an infringed article.

A MAN with sales ability and gilt-edge references can establish himself in permanent territory selling high-grade reproductions of the world's best paintings to consumers. New sales plan by which dealer introduces you to his trade and helps you sell them. Commission contract worth \$50 to \$150 weekly to live wire. Proposition solid as a rock, backed by ten million dollar corporation. The Cincinnati Fine Arts Company, 28 Beech St., Cincinnati, Ohio.

WE want capable, live wire General Agents and Crew Managers to sell an absolutely new Household Specialty guaranteed by \$200,000 Corporation. It's a big value household necessity that no woman can resist. Easy sales mean big profits. Our follow-up is unusual, and we give you exclusive territory, and advertise the business for you. Wm. J. Dick, Dept. K-21, 20 W. Lake, Chicago.

AGENTS, \$60 a week to travel by automobile and introduce our 300 candle power coal-oil lantern. Write for particulars of our auto offer. Thomas Co., 862 North St., Dayton, Ohio.

TASCO Polishing Cloth, 10c and 25c. Fast sellers, 100% profit. Particulars Free. Send 4 stamps for sample. Tasco, 1477 N. Rowland St., New York.

SUITS \$3.75, Pants, \$1.00. Made to measure. For even a better offer than this if you live on an R. F. D. route, write and ask for free samples and styles. Knickerbocker Tailoring Co., Dep. 400, Chicago, Ill.

SELLS Like Hot Cakes; New Laundry wax perfumes clothes with lasting violet perfume; working outfit, 5c; new offer. Perfume Gloss, 12 Water St., New York.

OWN your own business. Permanent monthly income. Carry no stock. Just sample. S. O. S. Electric Pulser; new, powerful. Big special Agent's proposition now. Commonwealth Mfg. Co., 460 Bialto, St. Louis, Mo.

AGENTS: Earn big commissions selling \$20 value, all-wool, made-to-measure suits for \$10.75 retail. No experience necessary. Chicago Woolen Mills, Dept. 100, 815 Jackson Blvd., Chicago.

AGENTS—Best Raincoat Proposition. Big Commissions. Write today. Get Free Coat Offer. P. Brookline Co., Springfield, Mass.

AGENTS wanted to sell remarkable money-makers; premiums make sales easy. Write for new catalogue. Duquesne Sales Agency, 311 Colbart Ave., Pittsburgh, Pa.

MEN and Women can earn \$20.00 to \$40.00 per month during spare time by distributing our Free Order Books. No selling. No canvassing. No money or experience needed. Sample order book free. Write today. Kenmore Mfg. Co., 336 Bromide Bldg., Chicago, Ill.

STATE, county and city representatives for auto tire power pump; retails \$3.50. No investment. Liberal commission, exclusive territory. Write quick for proposition. Auto Appliance Company, Indianapolis, Ind.

AGENTS, sell our Big 4 Pilot for Ford cars. Descriptive circular free. C. O. U'rhaupt, 634 West 131st St., New York.

FAST Selling "Kantleak" Raincoat proposition. Cooper earned \$60 in 3 days. Bridge \$88 in 6 days. We deliver and collect. New 1916 watches free. Write today. Comer Mfg. Co., 201 Paige St., Dayton, Ohio.

PHOTO Pillow Tops, Portraits, Frames, Sheet Pictures, Photo Plates, Postcards. Rejects credited. Prompt shipments; samples and catalogues free to agents; 30-days' credit. Jas. C. Bailey Co., Desk A6, Chicago.

AGENTS—\$15 a day profit on two sales. Sell machine to saloons. Write for free sample, salesmanship course proposition. Molar, Monon Bldg., Chicago.

MARVELOUS Expanding Cuff Button spreads two inches; Presto, slip cuffs over elbows without unbuttoning; lower cuffs, they close automatically; stay where placed upon forearm; greatest laundry and shirt saver invented; combines utility with convenience; invisible; endorsed everywhere; no competition; demanded everywhere; high-grade article with merit; DeWille, Sheboygan, Wis., sold 750 10 days, profits \$400. You can do as well. Most sensible cuff button investment; exclusive territory. Money back if not as represented; no fake goods. The demand for this article is unlimited, and the profits large; sells everywhere. We want live, clean specialty agents everywhere. Flexo Mfg. Co., Sheboygan, Wis.

AGENTS for New Ford Accessory; no competition, practical, necessary, \$1.00 each, retails \$2.00. Sells on sight. Gibson Control Co., West Alexander, Pa.

MEN and Women with spare time can earn big weekly profits by our new advertising plan. No investment. No selling. No soliciting. Write today for details for this new money maker. Crown Mfg. Co., Dept. K-1, 20 W. Lake St., Chicago.

GOOD opportunity for "live ones" to sell electrical wonder. Violet ray machine. Operates on both currents. Endorsed by physicians. Wonderful seller. Sells to doctors, dentists, barbers, beauty parlors, homes, etc. Fine proposition for able salesmen. Eastern Electric Company, Cleveland, Ohio.

MAKE good money selling Feeny Vacuum Cleaners and clothes-line reels. Live proposition. Write quick. Feeny Mfg. Co., E-75, Muncie, Ind.

THE Triumph Iceless Refrigerator keeps Milk, Butter, Eggs, and other food fresh without ice during entire summer. Sells when demonstrated, \$2, 100% profit. Triumph Products Corporation, Transportation Bldg., Chicago.

WANTED—Agents, Canvassers, sell Star Cement; 10c sample; particulars, Smith Bros., Cohoes, New York.

HAVING trouble pulling and shaping that necktie of yours? The "Climax" tie-form makes neat tie and saves time, temper and money. Tie and form, 25c; form only, 10c. Live agents wanted everywhere. Noosen Mfg. Co., Hudson Terminal, N. Y. City.

MAKE big money selling Darling Soaps and other daily necessities. No experience required. 100% profit and repeat orders. Auto given away. A permanent business of your own, with us back of you. Write for live proposition. Darling Soap Co., Dept. 14, Washington, D. C.

AGENTS—Newest invention. Converts any pen instantly into fountain pen. Cleverest device marketed. Splendid opportunity to make big money. H. Marul Company, 23 Broadway, New York.

"NERVEASE", the new idea in heel cushions. Actually sells on sight. Our agents make \$10 daily. Your opportunity is now. Write at once for free particulars. W. Beebe Price, 222 N. Wabash Ave., Chicago, Ill.

BIG Kansas Company will start ambitious people in fast growing mail-order business; any locality. Make \$3,000 yearly; spare time; no canvassing; no experience; we furnish everything; new unique selling methods free. Evestone, Pres., 601 W. 5th, Pittsburg, Kansas.

LATEST European Sensation! Midget Folding Automatic Pocket Fan, weighs few ounces, works like electric fan, operates by slight thumb pressure. Everybody just crazy to buy it. Costs 50c; sells \$1. Agents getting rich. Write or wire for Agency. Triumph Products Co., Transportation Bldg., Chicago.

AGENTS—Big Summer Seller. Something New. Concentrated Soft Drinks. Just add water; delicious drinks in a jiffy—any time, anywhere. Big sellers for home, parties, parties, socials, etc. Guaranteed under Pure Food Laws. Carry in pocket. Agents coining money, \$6 to \$12 a day. Write for free outfit offer today. E. M. Feltman, Sales Mgr., 4767 3rd St., Cincinnati, Ohio.

AGENTS—\$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 762 North St., Dayton, Ohio.

AGENTS can make Big Money selling history of exceptional quality at prices that cannot be secured elsewhere. Big repeater. Write for particulars today. Fisher Hosiery Co., Dept. W, 721 Sterling Place, Brooklyn, N. Y.

LOOK—A ball-bearing shear sharpener complete for 25 cents prepaid to agents. This is our latest invention; get territory. Simmons Co., Hicksville, O.

MANAGER wanted in every city and county; send out agents to sell Amber polish to every home, automobile owner, cafe, etc.; repeat orders make you big money; new selling plan. Write only to N. L. Pedersen, 696 Driggs Ave., Brooklyn, N. Y.

AGENTS: A 50c package of Bu-T Crystals dissolved in water only makes 1 quart of elegant, transparent complexion cream. Dandy repeater. Write for circular. Hartman, Box 93, East Boston, Mass.

"**POWER-O**" is the most wonderful money making automobile proposition on the market today. Now is the season. Act quick. This means \$10 profit daily to you. Series Mfg. Co., Decatur, Ill.

AGENTS—Easy sales and big money handling our household specialties. The goods get the orders. The Knights Company, Buffalo, N. Y.

AGENTS Wanted—Agents make 500 per cent profit selling "Novelty Sign Cards." Merchants buy 10 to 100 on sight. 809 varieties. Catalogue free. Sullivan Co., 1234 Van Buren St., Chicago, Ill.

AGENTS to sell Tire Chain Tool. Everybody needs one. Send 30 cents for sample. Featheringill Tire Chain Tool Company, San Diego, California.

AGENTS: Brand new \$1.50 article. 200% profit selling grocers, general stores, restaurants, 30,000 already sold. Great side line for salesmen. Some making \$30 weekly. Sample prepaid. 65c. Eugene Manufacturing Co., Canton, Ohio.

HOUSEHOLD necessity, sells on sight. Send 25c for sample, refund on first order. F. J. Quinby, Scott City, Kansas.

\$72.00 TEN Days! Hedrick's profit. Patented Curtain Rod. Fits any window; no nails, tacks, screws. Sample 10c. Rodolph, 472 Northwestern Building, Chicago.

AGENTS—To take orders for Commercial Printing, Business and Visiting Cards a specialty. Liberal Commission, Outfit Free. Foreman Printery, Box 693 P, Waterbury, Conn.

LARGE manufacturer wants representatives to sell shirts, underwear, hosiery, dresses, waists, skirts, direct to homes. Write for free samples. Madison Mills, 586 Broadway, New York City.

AGENTS Wanted Everywhere—To sell our attractive theatre Brass Poster Frames, Changeable Signs, Building Directories, Brass Signs, Brass Railings, Bank Fixtures, Adjustable Electric Light Brackets. Big demand; easy sales. Established 1882. Newman Manufacturing Company, Cincinnati, Ohio.

READ the Agents Magazine and make more money. 2 issues 10c. Agents Magazine, Chicago.

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.

BIG Profits! New Tactic Mirror Silvering Process opens enormously profitable business. O. Barstow, 514 23rd St., Oakland, Calif.

\$10 DAILY refinishing chandeliers, brass beds, etc., by new method, producing amazing results; no capital or experience necessary; write for information. Gunmetal Co., Ave. H, Decatur, Ill.

"**MAKE Gas-Tonic**" See Miller's Advertisement—Business Opportunities.

AGENTS, Dealers, wonderful new invention. Patent necktie presser, removes wrinkles from neckties, makes them look like new. A time and money saver. Not bulky, fits in your grip. A live one. Retail 50c. Send 25c for sample and terms. Burdett Necktie Presser Co., 20 Park Ave., Claremont, N. H.

RELIABLE People Wanted to place our Orangeade Powder in stores and appoint agents. Makes the most delicious drink you ever tasted by just adding cold water and sugar. Enough for 17 glasses and particulars 10c prepaid. Chas. A. Morrissey Company, 4417 Madison St., Chicago.

SIGN Letter Agents and Painters: 500% Profit Gold and Silver Sign Letters for Stores and Office Windows. Anyone can put on. Big demand. Free samples. Metallic Letter Co., 494 N. Clark St., Chicago.

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.

LUMINOUS Crucifix—Catholics buy on sight. Old Paducah, Paducah, Ky.

AGENTS—Splendid opportunity to make money selling our Egg Testers to Merchants and others. Exclusive territory. Rapid Egg Tester Co., 326 W. Madison St., Chicago.

\$2.50 PER day salary paid one man or woman in each town to distribute circulars and take orders for non-alcoholic flavors in tubes. Permanent—easy work. Ziegler Co., 7P, E. Harrison St., Chicago.

POSTCARDS 90c per 1,000 up; Fountain pens, razors, flycatchers, books, jewelry, etc.; 10c brings samples. P. Gross Ovard Co., 2147 Arthur Ave., New York.

BIG Profits. New Gold and Silver Sign Letters for store and office windows. Anyone can put on. Free samples. Flexible Letter Co., 1642 Division, Chicago, U.S.A.

AGENTS—Our gold window letter proposition beats 'em all. Stalbrite Co., Dept. P., Long Island City, N. Y. Established 1905.

"**GOLDINE**" Sign Letters—1,000% profit. Particulars free. Johnston Co., Quincy, 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.

PORTRAIT Agents: Our goods will make you big profits. Delivery guaranteed. Refunds credited. Prompt shipments. Low prices. Send for latest catalogue and prices. Adam J. Kroll & Co., 602 Blue Island Ave., Chicago, Ill.

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

\$1,000 PER Man per County. 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 in 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 waterworks required. Investigate. Exclusive sale. Credit given. Send no money. Write letter or postal today. Allen Mfg. Co., 121 Allen Bldg., Toledo, Ohio.

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

ACT Quick! Automobile Gasoline going up. Sell Gaso-Tonic. Equals gasoline at 3c a gallon. Eliminates Carbon. Dollar an hour profit. Sales Guaranteed. White Mfg. Co., Dept. M, Cincinnati, Ohio.

\$6 COMMISSION each sale and repeat orders. Traveling salesmen every state. Main or sideline. New, rapid selling automobile accessory used all makes cars. Samples loaned. Weekly settlements. Toledo Cable Co., 119 Dachs Bldg., Toledo, O.

AGENTS—Here's a brand new article, just ready for market. Make over 100% profit with satisfied customers. Every mechanic needs one, sells quickly on sight; no competition. Our proposition is a winner. Don't wait. Write for it now. The Security Aluminum Rule Holder Co., Iransh, Calif.

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, 393 Degraw St., Brooklyn, N. Y.

BIG Profits for You! Manufacture Barley Crisp. New Confection, 5c package costs you 1c. Machine instructions complete \$7.50 prepaid. Send 1c for samples. Barley Crisp Co., 1205 Broadway, San Francisco.

AGENTS—Brand new specialty Alumi- num Triplets Sauce Pan with detachable handle. Cooks 3 different foods on one burner. Saves gas. Lasts lifetime. \$100 to \$300 per month easy. Send for our catalogue of 400 other specialties. American Aluminum Mfg. Co., Div. J, 10, Lemont, Ill.

COULD You Sell Gasoline at 2½ cents a gallon? If so, sell Carbonoid to automobilists for \$1.00; 300% profit. \$1.00 tube equivalent to 40 gallons of gasoline. Removes carbon. Sample \$1.00. Gasoline going up. Carbonoid Chemical Works, Asbury Park, N. J.

MAKE your own Extracts and Perfumes. H. Lake Co., Adair, Ill.

AGENTS—Sell rich-looking imported 36x 68 Rugs. \$1 each. Carter, Tenn., sold 115 in 4 days. Profit, \$57. You can do same. Write for sample offer selling plan; exclusive territory. Sample rug by parcel post prepaid, 86c. H. Coudon, Importer, Stonington, Maine.

NON-BREAKABLE Lamp Chimneys and Smokeless Burners are sure sellers. F. Finch's, Grand Rapids, Mich.

AGENTS—Ho-Ro-Co Skin Soap and Toilet Goods plan beats everything for agents' profits. Rotheo, 212 N. 2nd, St. Louis, Mo.

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.

YOU can make \$888 as our general or local agent. Household necessity; saves 80%; permanent business; exclusive territory; big commission; guaranteed sale. Pitkin Co., 623 Redd Street, Newark, N. Y.

WANTED Agents, Canvassers to sell Packs Pineapple Eresnip. Sample 25c. Schlicher Mfg. Co., Rochester, N. Y.

100% PROFITS easily made taking orders for our new patented Vacuum Sweeper. No traveling; experience unnecessary. Bailey made \$150 last week. Write quick. United Vacuum Sweeper Co., 1315 West Congress, Chicago.

BE independent, let others do the work by handling our perfumes on trust plan. Finest package on the market. A fast seller and big profits. Write for particulars, samples 10 cents. Franklin's Sons Co., Albany, N. Y.

PUSH & Pull Screen Door Plates. New and different, 400% profit. Quick sales. No "outfit" to buy. Sample pair and proposition free. Hardenburgh-Signs, 101 Cedar, Missoula, Montana.

SALESMEN WANTED

STATE Managers Wanted. An unusual opportunity to secure state selling rights on the New Era Rope Machine, a specialty which sells to the farmer, for making rope out of binder twine. 25,000 machines sold. If you have ability to train and manage a sales force, you can make big money. Your earnings will be in proportion to your energy and ability. Write today. New Era Manufacturing Co., Plymouth Bldg., Minneapolis.

SALESMEN Wanted—Men who can sell things. A salesman from Iowa writes: "Sold three orders today, made \$22.00. My carfare and dinner was \$2.60. How is that for a green man's first day, selling paints, lubricating and automobile oils and groceries?" C. Hitchcock Hill Co., Chicago.

SALESMEN—Wanted everywhere by a responsible, established house. If you average sales of one or two machines a week, you make from \$2,000 to \$4,000 a year. Sell Chemical Fire Engines on Wheels to factories, stores, Fire Depts., etc. No capital required; exclusive territory; goods well advertised. Ajax Fire Engine Works, 95 W. Liberty St., N. Y. City.

"**SIDE Lines and Novelties.**" The new paper which tells salesmen of opportunities to add money-making side lines and keeps them posted on new novelties as soon as manufactured. Three months for 10 cents in postage. Byxbee Publishing Company, 208 So. La Salle Street, Chicago.

SALESMEN—Steady employment to high school students and to others who want to earn money in spare time. Big returns for aggressive young men. No triflers. Write for particulars. The Zerkala Co., 248 Zerkala Street, Philadelphia, Pa.

SALESMEN—Sell beautiful 28x38 Artz- kraft felt rugs for \$13.50 per doz. Your profit \$2.50 per doz. Kelso, Battle Creek, Mich., sold 30 doz. last week, his profit \$75. Prepaid sample \$1.00. E. H. Coudon, Mfr., Stonington, Maine.

WANTED—Salesmen to call on toilet goods trade with our Vanity Toilet Powder Glove; also other specialties for shoe, department and leather goods stores. Good commissions. E. T. Gilbert Mfg. Co., Rochester, N. Y.

SIDELINE Salesman acquainted with retail or wholesale cigar trade, to sell new, highly successful utility. If you have an established trade and won't shy at \$10.00 a day on the side, write Universal Mfg. Co., 660 Locust, St. Louis, Mo.

WANTED—Traveling salesmen to sell Art Leather Goods, Dolls, and California Abalone Jewelry. American Art Leather Co., Los Angeles, Cal.

SALESMEN—Acquainted with grocery trade; large demand, liberal commission; pocket sample. With Salesbook Co., Dept. P, Chicago.

TRAVELING Salesmen—Your clothes made to measure without cost for placing tailoring lines featuring six special prices, no extra charges, with merchants. Write for particulars, J. W. Jones, 370 Mid City Bank, Chicago.

HIGH-GRADE Specialty Salesmen—For our large illustrated steel signs. Exclusive or side line. Genuine opportunity for hustlers. Howard Sign Co., 3110 Patterson, Cincinnati, Ohio.

WANTED—500 Salesmen to sell Magic Motor Gas. One quart, price \$2, equals 50 gallons gasoline. Greatest product ever discovered. Large profits. Auto Remedy Co., Eighth Ave., Cincinnati.

EXCLUSIVE county rights. Sell Tankli; modern auto fuel. Profitable. Tankli Chemical Co., Cleveland, Ohio.

NEW auto fuel; one-third cheaper; unlike any other; County and District agencies open; 10-year contract; guaranteed. Ina-Null Fuel Co., Akron, O.

WANTED—Representatives everywhere. Exclusive territory. Good sign letters for stores and office windows. Any one can put on. Write today for free sample. Metallic Letter Co., 403 N. Clark St., Chicago.

SALESMEN wanted to sell Shinson Products to retailers and jobbers. All trades handle. Consumption big. Lowest prices and attractive deals. 18-year quality reputation. Big commissions net handsome income. All or part time. Shinson Co., Rochester, N. Y.

SALESMEN—Make Big Money on our Convex Portraits 38c. Frames 55c. Glass 20c. Largest house in America. Est. 15 years. Samples Free. The Culver Co., Box 104, Westerville, O.

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

EARN \$5,000 to \$20,000 yearly. New business necessity. Retail \$5 to \$200. 100-200% profit. Purchaser satisfied or money refunded. No competition. Exclusive territory. Free samples. Sayers, 408 Wainwright, St. Louis.

HELP WANTED

ENGINEER—Experienced marine engineer to operate two Sterling engines on board 90 ft. yacht on Atlantic Coast during June, July, August and possibly September. Applicant must be thoroughly experienced with Sterling engines. In replying state nationality, age, experience, and names of recent employers. Address "Yacht," care Popular Mechanics Magazine, 6 N. Michigan Ave., Chicago.

STEWARD—Deck steward for above mentioned yacht. Must understand setting and serving table, attending guests on deck, and care of cabins. State nationality, age, experience, and name references. Address "Yacht," care Popular Mechanics Magazine, 6 N. Michigan Ave., Chicago.

\$20 TO \$35 per month extra money to any employed person without interfering with regular work. No selling, no canvassing. Positively no investment. Those employed preferred. Address The Tracey Co., Potsdam, New York.

WANTED—Men, Women, 18 or over, to become Government Clerks. \$75.00 month. Write immediately for free list positions now obtainable. Franklin Institute, Dept K-21, Rochester, N. Y.

WANTED—Men and women to qualify for Government positions. Several thousand appointments to be made next few months. Full information about openings, how to prepare, etc., free. Write immediately for booklet CG, 29. Earl Hopkins, Washington, D. C.

BECOME Detectives. Large salaries; easy work. Write Chief Wagner, 1243 Lexington Avenue, New York.

MEN, become chauffeurs, \$18.00 week. Learn while earning. Sample lessons free. Franklin Institute, Dept K-502, Rochester, N. Y.

I WILL start you earning \$4 daily at home, silvering mirrors; free instructive booklet. G. F. Redmond, Dept. 306, Boston, Mass.

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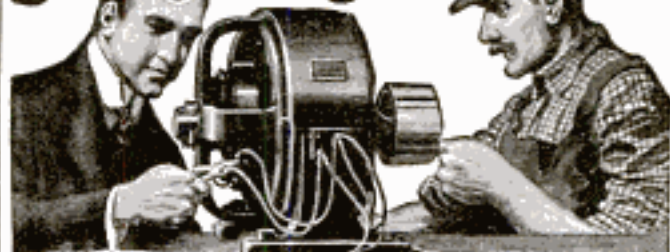
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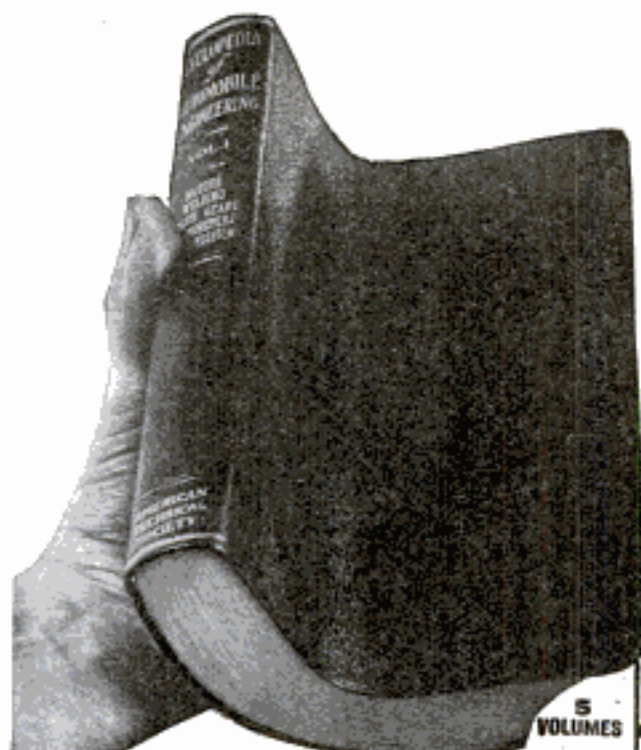
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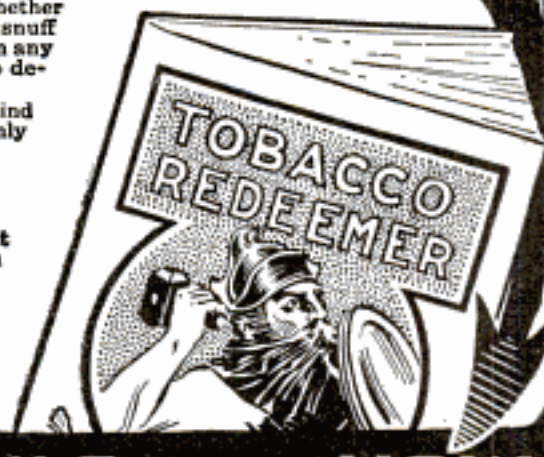
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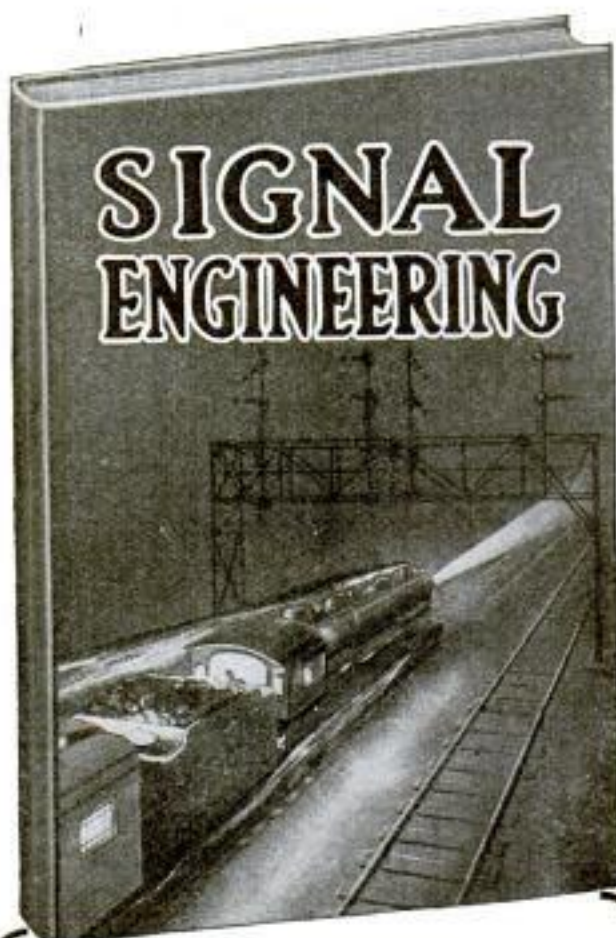
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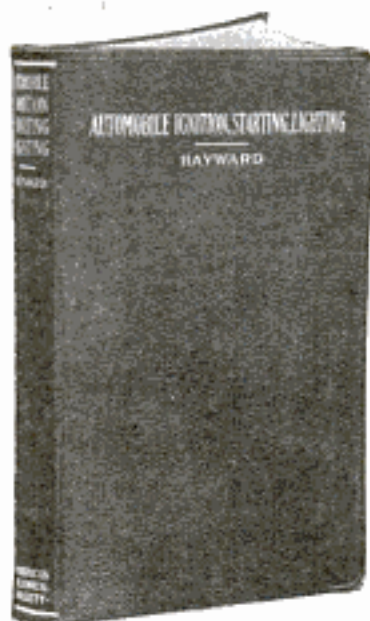
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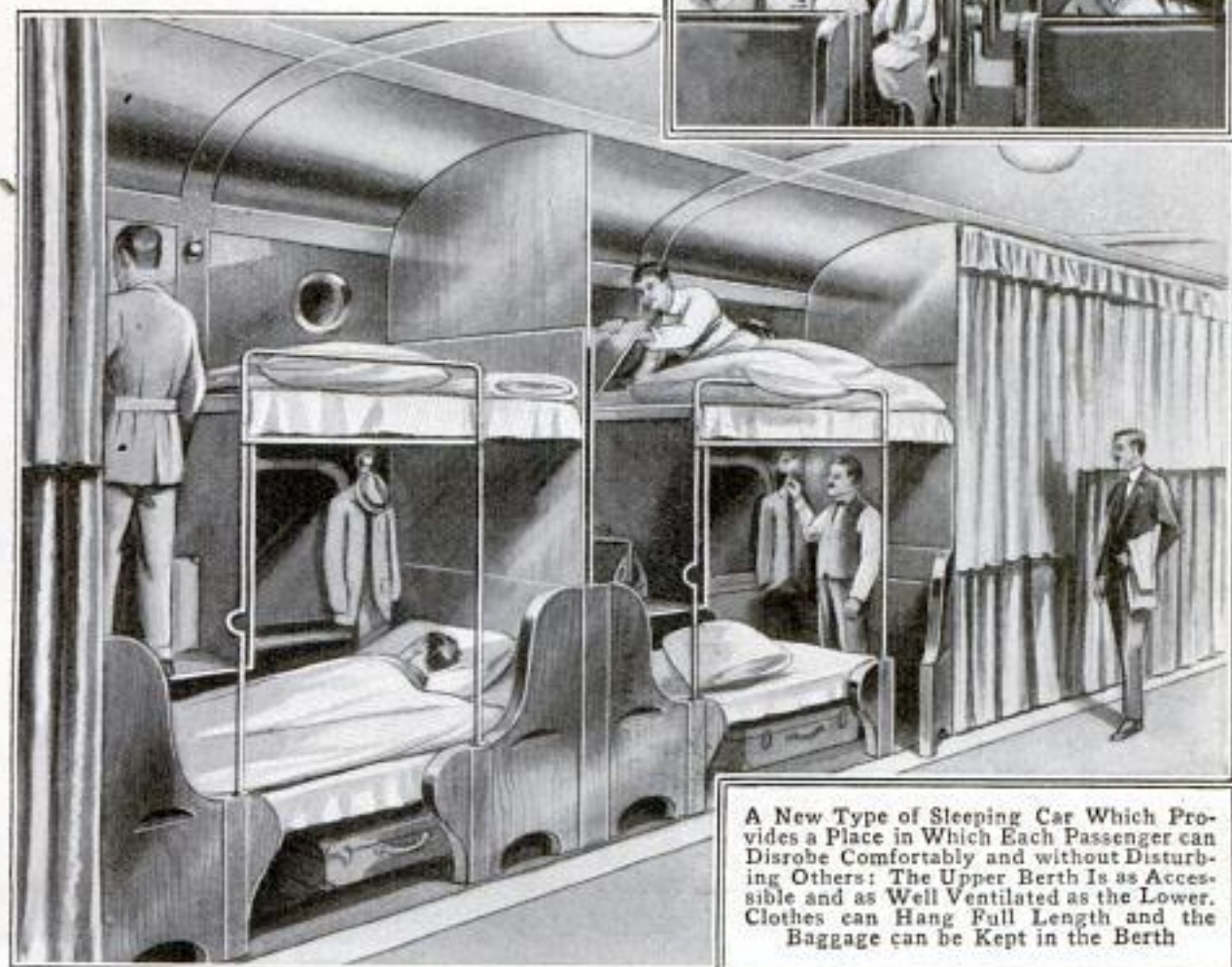
JUNE, 1916

No. 6

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standing upright and hang his clothes, full length, at the end of the hinged section which does not extend quite to the side of the car. When undressed he gets into bed and then turns down the hinged section and puts the pillow



A New Type of Sleeping Car Which Provides a Place in Which Each Passenger can Disrobe Comfortably and without Disturbing Others: The Upper Berth Is as Accessible and as Well Ventilated as the Lower. Clothes can Hang Full Length and the Baggage can be Kept in the Berth

in place. The upper berth is arranged similarly, the head being at the opposite end. Over the foot of the lower berth hangs a narrow platform, inclosed except at the aisle end, to which the upper-berth passenger easily mounts by opening the hinged end of the seat and using a step supplied by the porter. Here one has room to stand upright and prepare for bed in the manner already

described. These berths occupy no more space than the ordinary type. The upper one can be made up without more than temporarily disturbing a passenger sitting below. All bedding, partitions, and platforms fold beneath and behind the seats in the daytime, giving more light and air than in the ordinary sleeper, and the car then looks very much like a day coach.

1733 LOCKED PURSES SAVE TIPS FOR EMPLOYERS

The tips which hotel guests, restaurant patrons, and others, give to cloakroom girls do not become the property of the girls on whom they are bestowed, but, in compliance with strict orders, are deposited in special purses; at the



A Cloakroom Girl in a Uniform Which Affords Little Opportunity for Concealing the Coins Given Her as Tips: All the Gratuities She Receives must be Deposited in a Locked Purse Having a Slot in It. This Purse and Contents She Turns Over to Her Employer

close of the day the purse and its contents are turned over to the employer. Such is the recent declaration of a cloakroom girl in Detroit. She explained that the purse she used was locked and she could not open it. All the coins she received were deposited

through a slot. The purse was carried inconspicuously in a small pocket in the apron. Each girl was required to wear a tight-fitting uniform in which there were no pockets so that it would be a difficult thing for her to conceal a coin on her person.

1805 TYPE-SETTING DEVICE MADE FOR ORIENTAL PRINTERS

According to reliable reports from Hawaii, an apparently successful machine for setting Japanese and Chinese type has been developed and is in use at a Honolulu newspaper plant. Its size seemingly gives it a ludicrous appearance, for it is described as looking like a model of the Brooklyn Bridge. The keyboard extends along the center beneath the "bridge" for its full length, while the operator is provided with a sliding seat on which he can move from one end to the other when working. Rectangular brass tubes are used as cases for the type, and when the latter are released, by pressure upon the keys, they are caught by a belt carrier and conveyed to one end where they are deposited in a holder. The 5,000 or more characters used by oriental printers have been classified into approximately 100 units. These are collected in the brass tubes, which are likewise classified by means of notches on their sides. While it is intended to market the machine in China and Japan, the opinion has been expressed here that its sale will probably be very limited, owing to its cost and the fact that it will have to compete with the cheapest kind of labor in the cities of both these countries.

*Frontenac Cafe and
Hotel Statler
Detroit, Mich.*

1894

BATTLE PLANES EQUIPPED WITH GUN TURRETS

The Sphere 3/25/16

THE artist shows here one of the recent and interesting improvements made by the Germans in aerial armament, a development that, at the outset at least, apparently gave their airmen an advantage over the enemy. The observer—or gunner—is seated in a revolving "turret" to which a high-power machine gun is mounted. The arrangement gives him a wide firing angle rearward, while a tube provided in the nacelle allows him to fire directly through the machine upon enemy craft below. A metal gun rest at the edge of the tube holds the barrel steadily in position. It will also be noted that a light machine gun is mounted above the top plane. To fire forward or upward, the observer swings the "turret" around, stands, grips the handle of this piece, and lets go a stream of bullets.

Mr. R. C. Mayberry

804

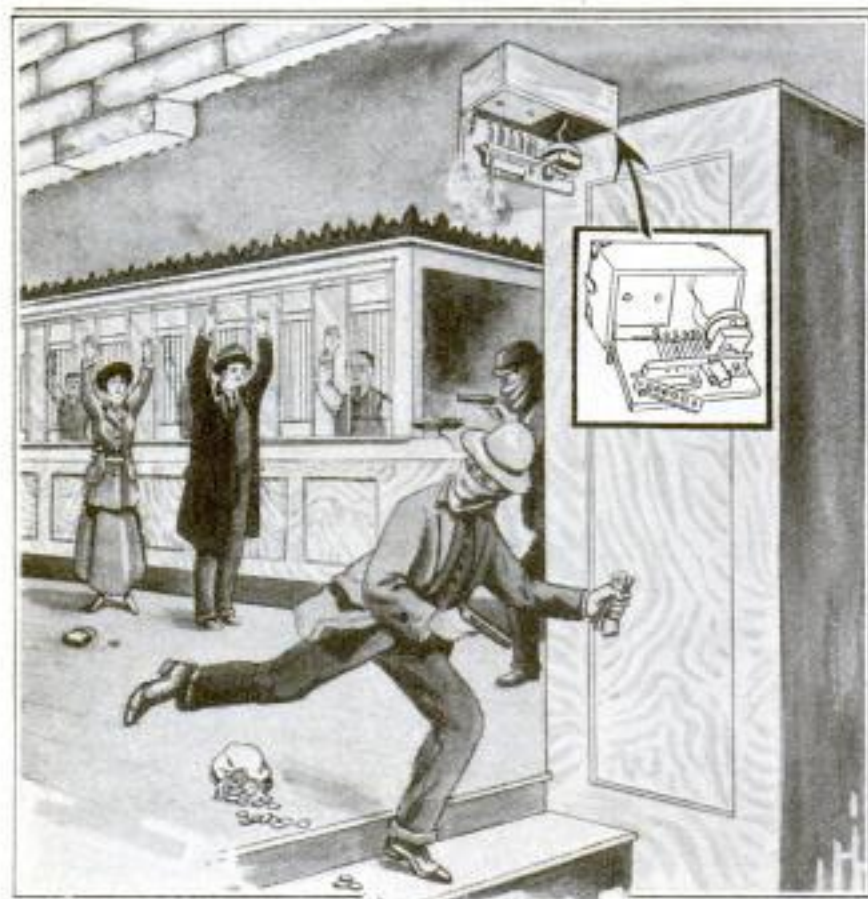
4641 POPULAR MECHANICS 1851
Paris, Ill., Chicago

1556 DEVICE RINGS ALARM GONG AND FIRES FIVE SHOTS
MUNICIPAL HEATING SYSTEM SAVES MONEY FOR CITY

A burglar and robber alarm has been designed which not only sounds a warning gong but also frightens an intruder by discharging five blank cartridges. The device is inclosed in a weather-proof case and fastened to the

For several reasons, in addition to the important economic phase, a low-pressure steam-heating system installed by the municipal authorities at Columbia City, Ind., is worth attention. During the past winter the town

has successfully heated the courthouse and two large school buildings with the exhaust steam previously wasted at its water and light plant. And despite the fact that the steam has to be carried a maximum distance of 3,100 ft., there were only five days during the past season when it was found necessary to help out the system by adding live steam, and then only a small amount was needed. This arrangement has given the trio of buildings more abundant heat than was afforded previously, and furthermore provided it constantly every hour and day in the week. The installation, consisting of 3,100 ft. of 10 and 12-in. pipe, together with a 4½-in. return—



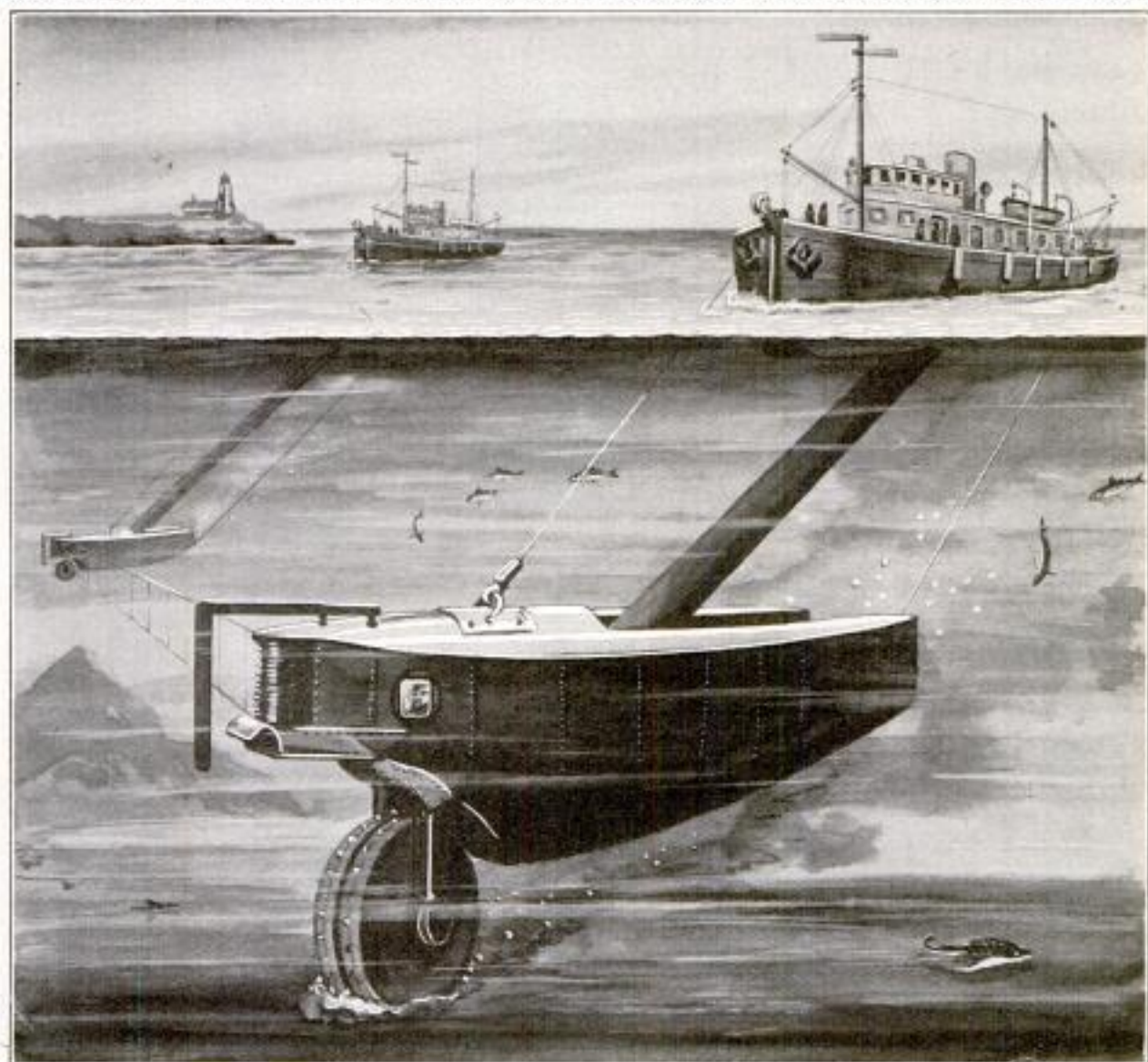
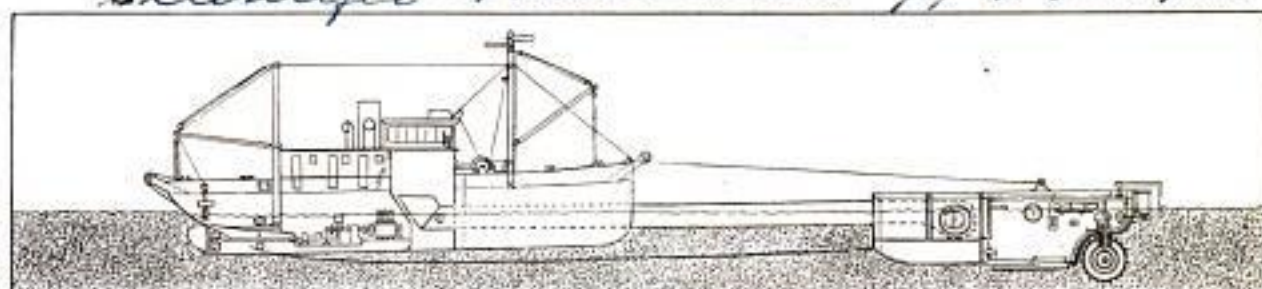
By Pressing an Electric Button the Case of This Robber Alarm is Thrown Open, a Gong is Rung, and Five Blank Cartridges are Discharged in Rapid Succession for the Purpose of Frightening the Robber

ceiling of the entry way of the building protected. It is operated by electric buttons concealed in suitable places indoors, or by cutting the wires connecting these buttons with the device. When contact is made, the hinged bottom of the case drops down, exposing the apparatus attached to it. This consists of a 4-in. gong and five .45-caliber blank cartridges; the latter are attached to a bar with five firing pins operated by strong springs. The opening of the door starts a clockwork which rings the gong for about 20 minutes and fires off the cartridges in rapid succession.

all of which is supported on spool-shaped cast-iron rollers set in concrete so as to permit the line to expand and contract while in service—cost the city \$20,000. It saved, however, the expense of constructing a new heating system and overhauling an old one. All of the piping was laid in a concrete conduit and welded by the oxyacetylene process. No additional help has been needed at the power plant. The city also receives a revenue of \$2,500 from the three buildings for the service it renders. By this arrangement, too, heat is given on days in late spring and early fall.

H. C. Sanders
Supt. Public School
Columbia City,
Ind.
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MAKING ACCURATE SURVEY OF OCEAN'S FLOOR

Scientific American 9/25-1915

Making a Careful and Detailed Survey of the Ocean's Bottom: The Drag Line between the Two Submersible Vessels, Which are Connected to the Surface Ships by Communication Tubes, Locates Rock Pinnacles and Other Obstructions. The Diagram Above Shows How the Boats are Joined and Arranged

One of America's well-known submarine authorities has designed a most interesting hydrographical apparatus for making careful detailed surveys of the ocean's bottom and locating dangerous rock pinnacles and other obstructions to navigation. It works on

a principle very similar to the wire drag which of late years has supplanted the old-fashioned and more or less unsatisfactory sounding system formerly used in making our vast surveys.

By the new plan two submarine boats of special design, each of which

is connected to a surface ship by means of a large tube of sufficient length to permit work to be done at depths varying from 50 to 75 ft., are used. The upper end of each of these access tubes, as they are termed, is flexibly attached to the walls of a well, provided beneath the pilot houses of both ships, that extends out to the bow and gives the fore part of the bottom a grooved shape. This arrangement permits the submersible exploring boats to be raised to the surface and pushed in advance of the larger crafts by the connecting tubes.

When at the bottom, each of the under-water boats is propelled by means of a pair of motor-driven wheels pivotally mounted at the bow. At the lower openings of the connecting tubes are air-lock compartments through which access is gained to diving compartments. A sliding door in the latter chamber of each boat permits divers to leave and enter the craft for the purpose of examining the bottom of the ocean.

These vessels work from a few rods to a mile apart. A sweep cable, cor-

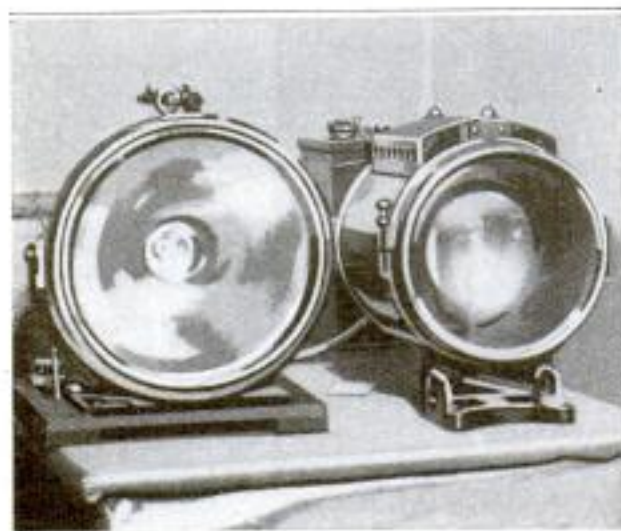
responding to a drag line, and telephone wire extend between them and are wound on drums attached at the bows. These lines are held under a certain stress, while indicating instruments in each vessel show the amount of cable paid out by each respective drum. The contour records are made by apparatus controlled by the tractor wheels, the character of the bottom being reproduced on paper rolls and the depth and distance simultaneously indicated by special instruments.

When at work, the two vessels proceed parallel with each other in the same direction. The crews are in telephonic communication. If the sweep cable strikes an obstruction, such as a pinnacle of rock, the drums let out more line. When the lead extends aft at an angle, the cause is apparent and the boats are stopped. The one whose cable end extends at the sharpest angle is obviously closer to the obstacle and proceeds to investigate it. The exact position of the obstruction is subsequently determined by triangulation, the object charted and its character recorded.

1807

NEW SIGNAL LAMP FOR GEODETIC SURVEY

A powerful electric signal light, designed to supplant the acetylene lamps



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New Electric Signal Lamps to be Used by the Coast and Geodetic Survey, Instead of Acetylene Lamps, in Making Surveys in the Mountains

used in primary triangulation by the Coast and Geodetic Survey, has been constructed by an employe in that branch of the government. Acetylene signal lamps have been observed with the telescope over lines 120 miles in length. This new lamp has been tested and was shown to be 150 times more powerful than the acetylene. The electric light will be used this summer in mountainous regions in Idaho and Oregon, where the distance between stations frequently is as much as 100 miles. The new lamp has an especially designed filament and the power is the ordinary dry cell. It is expected that ordinary haze or smoke will seldom prevent observations with this signal.

CA fusible insulating and filling material for electrical purposes which may be sold in powdered form has been patented recently. It consists of powdered rosin and gypsum.

*Inv: E. G. Fisher
Chief, Instrument Section,
Coast and Geodetic Survey,
Dept. of Commerce, Wash. D. C.*

Military
British
1688

Lewis R Freeman
Hotel Navarre
New York

The AEROPLANE in the GARDEN of EDEN

by R. J. BJURSTEDT



AN account of favoring atmospheric and meteorological conditions—the homogeneity and clearness of the air and the absence of protracted rains and fogs—lower Mesopotamia is rated as the best of all the theaters of war for effective aeroplane work. The first divisions of the Anglo-Indian expeditionary force were very inadequately supplied with aeroplanes, but such machines as they did have rendered incalculable service in reconnaissance flights above the baffling, ill-mapped labyrinths of canals, lagoons, and marshes which constitute the greater portion of the Tigris-Euphrates overflow district, a region which, roughly speaking, corresponds to the triangle inclosed by the two rivers and a line drawn from Kut-el-Amara to Nasire.

As the Turk, who at this stage of the conflict was receiving very little help from the German, had no machines of any power at all, the British fliers came and went unthreatened by anything save a scattering and ill-directed rifle and artillery fire and the danger of engine trouble. There is no record of

any machines being shot down during this period, and the only losses in the early months of the campaign were due to accidents. On several occasions pilots had to descend in enemy territory on account of difficulties with their engines, but only two or three of these were taken captive. One of the latter has since written how, with two or three cylinders "missing" and a damaged wing, he bumped for ten miles across the level floor of the desert, hotly pursued by a troop of Turkish cavalry. Now he was able to lift his machine a few feet from the ground, now it floundered along the earth like a wounded bird; but not until he had splashed all the way across a shallow lagoon and buried the nose of his plane in the crumbling silt of the cut-bank on the farther side did the intrepid aviator give up his efforts to reach the British lines with his precious report. A fellow flier, whose machine had been hopelessly smashed in an enforced landing near a Bedouin encampment, had better luck, for, after setting fire to his useless plane, he persuaded the terrified Arab women—their men were away scouting for the Turks—to sad-



"After setting fire to his useless plane, he persuaded the terrified Arab women to saddle one of their mares for him, on which fine animal he was able to make his way in safety to the nearest British outpost."

dle one of their mares for him, on which fine animal he was able to make his way in safety to the nearest British outpost.

The expeditionary force was short of aeroplanes even after Kut-el-Amara had been occupied last fall, and there is no possible doubt that adequate air reconnaissance would have revealed the presence of the heavy reinforcements the Turks were able to gather at Bagdad, and prevented the costly and almost fatal surprise which awaited General Townshend's impetuous division at Ctesiphon. With the fresh Turkish forces also appeared German aeroplanes and pilots, and during all the week of that desperate but masterly retreat of the British commander to his provisional base at Kut-el-Amara the command of the air—for the first, and probably the last, time in this region—was in the hands of the enemy. Not until a fortnight or more after Townshend's little force had been cut off and surrounded did the arrival of important aerial reinforcements at Basra give the British a really adequate aviation service.

Arriving too late to prevent Townshend's exposing himself to certain defeat, it remained for the strengthened air service to do what it could to extricate the beleaguered force from the dangerous position into which its "blindness"—its lack of aerial scouts—had allowed it to stumble. About all that could be done at first—indeed, about all it was possible to do up to the end of March—was to strengthen Townshend's powers of resistance, but it was in the pursuance of this end that a new page of "air history" has been written in the recent course of the Mesopotamian campaign.

In military circles in England, where it was a matter of common knowledge that Kut-el-Amara—underprovisioned, undermanned, and possessing no natural defensibility save that incident to its location in the bend of a river at its junction with a canal—was in no position to stand a siege, there were grave fears that the news of its capture by the Turks could not be long

deferred; and these fears developed to a near certainty when it became evident that the enemy, besides isolating Townshend, was also able to dispose forces greatly outnumbering those advancing to the relief under General Aylmer. When Aylmer was held, and even compelled to retire once or twice, before superior numbers, things looked blacker still for Townshend, and there was a time when there seemed a possibility that even the relief force itself might be isolated. But as the weeks lengthened to months without further adverse news, confidence gradually returned in London, and now—with Russian pressure increasing to the north and east, and with Aylmer's army steadily growing stronger by reinforcement from the south—there is strong hope that not only will Townshend's brave force be relieved before it is too late, but that the northward march upon the "City of the Arabian Nights" may be resumed at no distant date.

The mystery of how Townshend has been able to hold out for four months on supplies of food and munitions that were never reckoned to be sufficient for even half that time will probably not be entirely solved until after the war, but enough is known to make it certain that the aeroplane and the wireless—those twin wonders of modern science—have been the principal factors in making possible this, in many respects, unprecedented defense against overwhelming odds. The wireless has winged Townshend's most pressing wants to Aylmer, and Aylmer's airmen, by hook or by crook, have supplied them. Indeed, it has even been given us to know how parts of the trick have been turned. The British censor, for instance, has allowed to slip by him a dispatch stating that garden seed and phonograph needles have been dropped into Kut-el-Amara from an aeroplane, while letters received in America from an officer taking part in the Mesopotamian campaign even tell of an organized aeroplane service plying regularly between the beleaguered and the relieving armies.

From these letters—they have es-

caped the English censor entirely and bear but scant marks from the military one at Basra—it is learned that the first thing Aylmer did after his reinforcement of aviators became available was to establish a complete and undisputed command of the air in the vicinity of Kut, this proving no difficult matter, as the British planes were not only more numerous but also swifter and more heavily armed than anything the Germans had been able to transport across the desert to oppose them. This accomplished, several attempts were made to fly into the Kut lines with some of the things—especially shrapnel fuse and anesthetics—Townshend had sent word he was most vitally in need of.

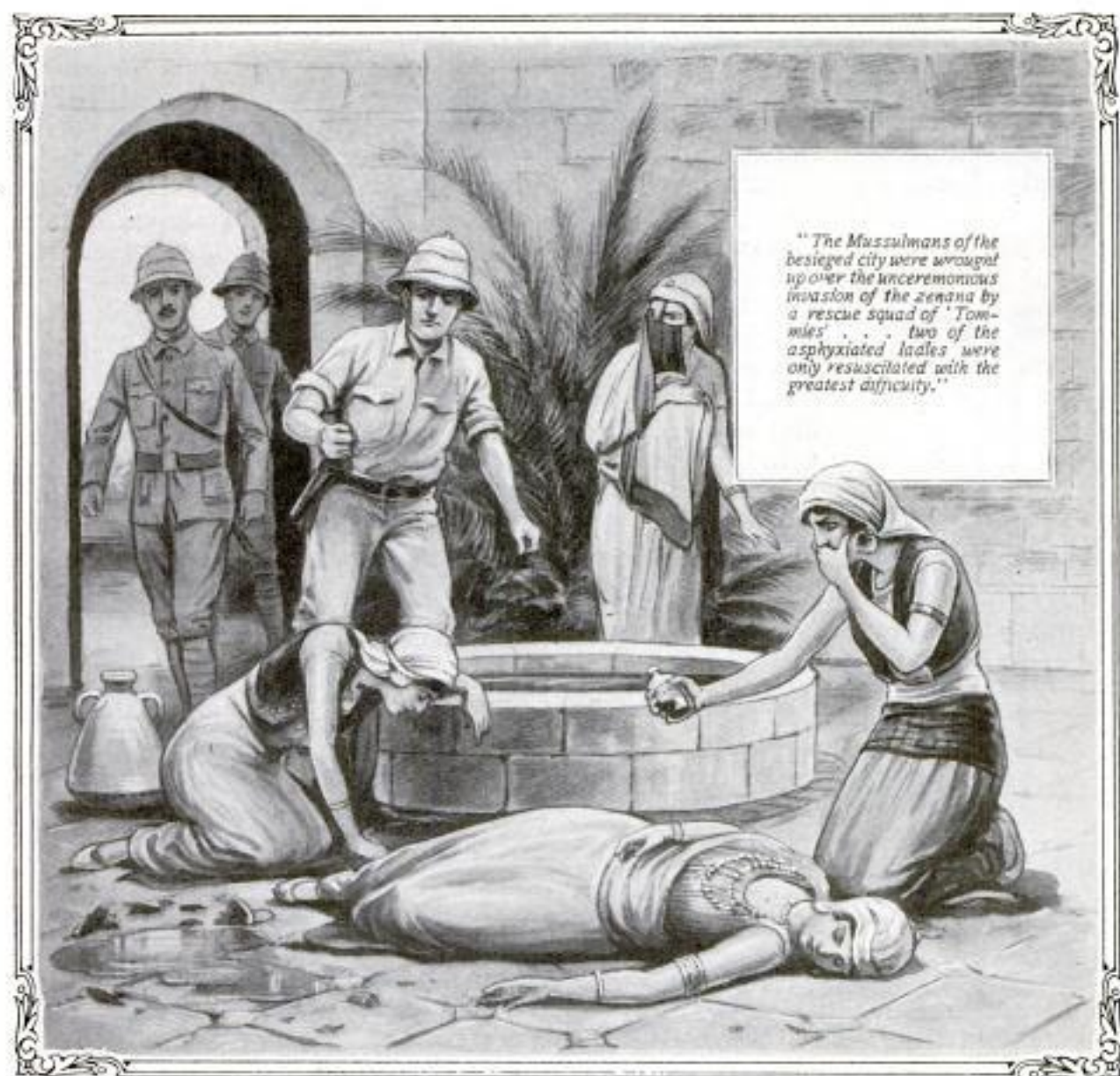
These initial relief flights—all undertaken in the daytime—resulted rather disastrously. One machine was shot down by the Turks and fell outside the British lines, while two others, after running unscathed the gauntlet of artillery fire, came to grief through their pilot's mistaking a dust-veneered stretch of soft mud in the overflow area—there had been a heavy wind-storm a few hours previously, and the impalpable desert silt blows like ashes—for solid ground. Both were brought up short and practically buried in deep mud craters. Neither pilot was killed, but the frameworks of both machines were smashed and—more unfortunate still—their precious "cargoes" were destroyed.

The bringing into action by the Turks of some fairly powerful anti-aircraft guns at this juncture made daylight landings in the rather restricted Kut area almost prohibitively risky, and, while preparations were being made for night flights and landings, the expedient of dropping from a great height some of the things most urgently needed by the besieged army was tried. Here, too, only indifferent success was recorded. A bundle of almost any kind is going very fast by the time it reaches the ground from a height of six or eight thousand feet, and it was found almost impossible adequately to protect by wrappings or

paddings such delicate mechanisms as shrapnel fuses. These were almost invariably rendered useless by the shock of impact. It is, however, interesting to learn that the few that were still serviceable made their descent in the heart of bundles of soft dates sewed up in palm-leaf matting. The mushy mass appeared to absorb almost all of the jar of striking the earth, and had it not been for the fact that many of the fuses were injured by the date seeds being forced into them, this strange expedient might have proved successful. A considerable supply of anesthetics was landed by dropping the volatile liquids in specially prepared iron flasks similar to those used to carry the compressed gas for the "spotter" balloons.

Several flasks, hot and dented but still intact as to contents, were dug up after they had penetrated for several yards into the spongy Mesopotamian silt, but one which struck the brick-paved courtyard of a Mohammedan merchant's home exploded and nearly chloroformed several members of the master's harem who were performing their matutinal ablutions at the pomegranate-shaded pool. The Mussulmans of the besieged city were more wrought up over the unceremonious invasion of the sacred zenana by an emergency rescue squad of thoroughly well-intentioned "Tommies" than by the fact that two of the asphyxiated ladies were only resuscitated with the greatest difficulty, and then only at the cost of a goodly portion of the Red Cross' almost spent supply of oxygen.

It did not take long to establish the fact that these "bombing" methods, while quite satisfactory for such trifles as garden seed and phonograph needles, could never be counted on to supply the beleaguered garrison with any quantity of the things it was really in such desperate need of. There was, therefore, a lull in "aerial relief" until a big level space for night landings had been cleared and lighted in the heart of the Kut area. From that time—about the middle of January—down



"The Mussulmans of the besieged city were wrought up over the unceremonious invasion of the zenana by a rescue squad of 'Tom-mies' . . . two of the asphyxiated ladies were only resuscitated with the greatest difficulty."

to the present, there is good reason to believe, a regular and efficient aeroplane express service has been maintained between Aylmer's relief army and the brave little force of Townshend in Kut-el-Amara. The Turk's searchlight equipment cannot be a very comprehensive one at the best, and the British pilots appear to have had very little difficulty in avoiding almost entirely, if not the questing light shafts, at least the gun fire that these are designed to give direction to. The "aerial expressmen" have come and gone almost as they pleased, and, as there has been ample time to have brought out some of the big tractor planes which were being completed in England many months ago, there is no doubt

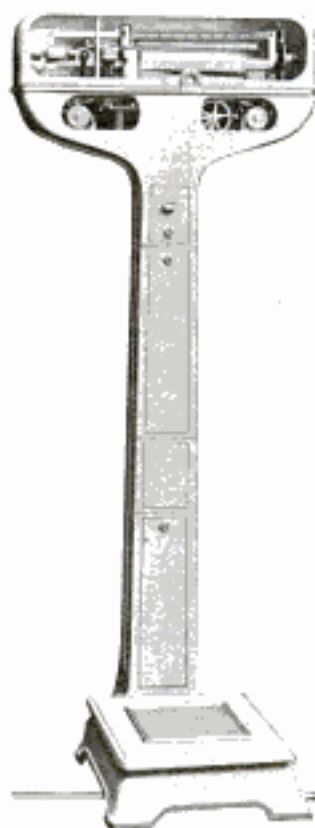
that the British have the means—by confining themselves to the more concentrated forms of food—to provision the besieged force almost indefinitely. Nor does it seem improbable that much may have been done even in replenishing the munition supply, especially that for the smaller arms.

The interesting thing about the prolonged resistance of Kut is the fact that ten years ago, or even in the development of the aeroplane of five years ago, it would have been impossible. Under similar conditions in 1910 Townshend would have been starved out and forced to surrender within two months at the outside. For his success in 1916 he must literally give thanks to "the powers above."

1794

**AUTOMATIC BEAM SCALE HAS
1794 NOVEL FEATURES**

An automatic, electrically operated beam scale is now on the market which not only operates with great exactness



but possesses several novel features. To ascertain his weight a person steps on the scale platform and deposits his coin in the slot indicated. The windowed case inclosing the balance lever is thereupon lighted by a small electric bulb; a large weight moves out on the beam to a point corresponding to the approximate weight of the patron; then a small weight moves out on the

upper portion of the beam, showing pounds and fractions of pounds, and stops at the point where the scale balances, indicating the patron's exact weight. When he steps off, the light is turned off and the weights return to their former positions. An ingenious device in the scale divides the coins on a percentage basis, depositing them in two separate boxes so that the lessee and owner may each make his own collections. The scales will operate with nickels or pennies, according to the desire of the owner and lessee. If the wrong coin is used it is returned; the same is true if a coin is deposited before the patron steps on the platform. If the scale is out of order the coin will be returned. Two persons cannot be weighed in succession by depositing one coin. These scales, being of the beam type, have little in their weighing mechanism to get out of order.

**BATTLESHIPS' BOMBARDMENT
TESTS MOBILE BAY FORT.**

Army & Navy Journal 2/25/16

Tests recently made near the mouth of Mobile Bay constituted the first instance in the history of the United States in which the coast defenses were subjected to gun fire to determine their effectiveness. The fort under fire was of the same construction as the fortifications that now guard the harbors. Though 14-in. shells from the "New York" and 12-in. projectiles from the "Arkansas" struck the fort a number of times the damage was small. It was found that a small herd of goats imprisoned in the fort were unhurt by the bombarding, and dummies which took the place of the gun crew were in such a condition after the test as to indicate that gunners would have survived. The gunners on shipboard showed excellent marksmanship.

**WOMEN'S COATS LIKE THOSE
1908 WORN BY OFFICERS**

Letter 2/1/16

A coat of a new design which is proving popular with English women and others is modeled very closely after the officers' trench coats. It is made of khaki drill in simple yet graceful lines, having a collar that can be fitted well up around the neck, a broad belt, wrist straps, etc. The garment has a detachable fleece lining which makes it adaptable to cold or mild weather. It is interlined with oil silk. It is especially adapted for use



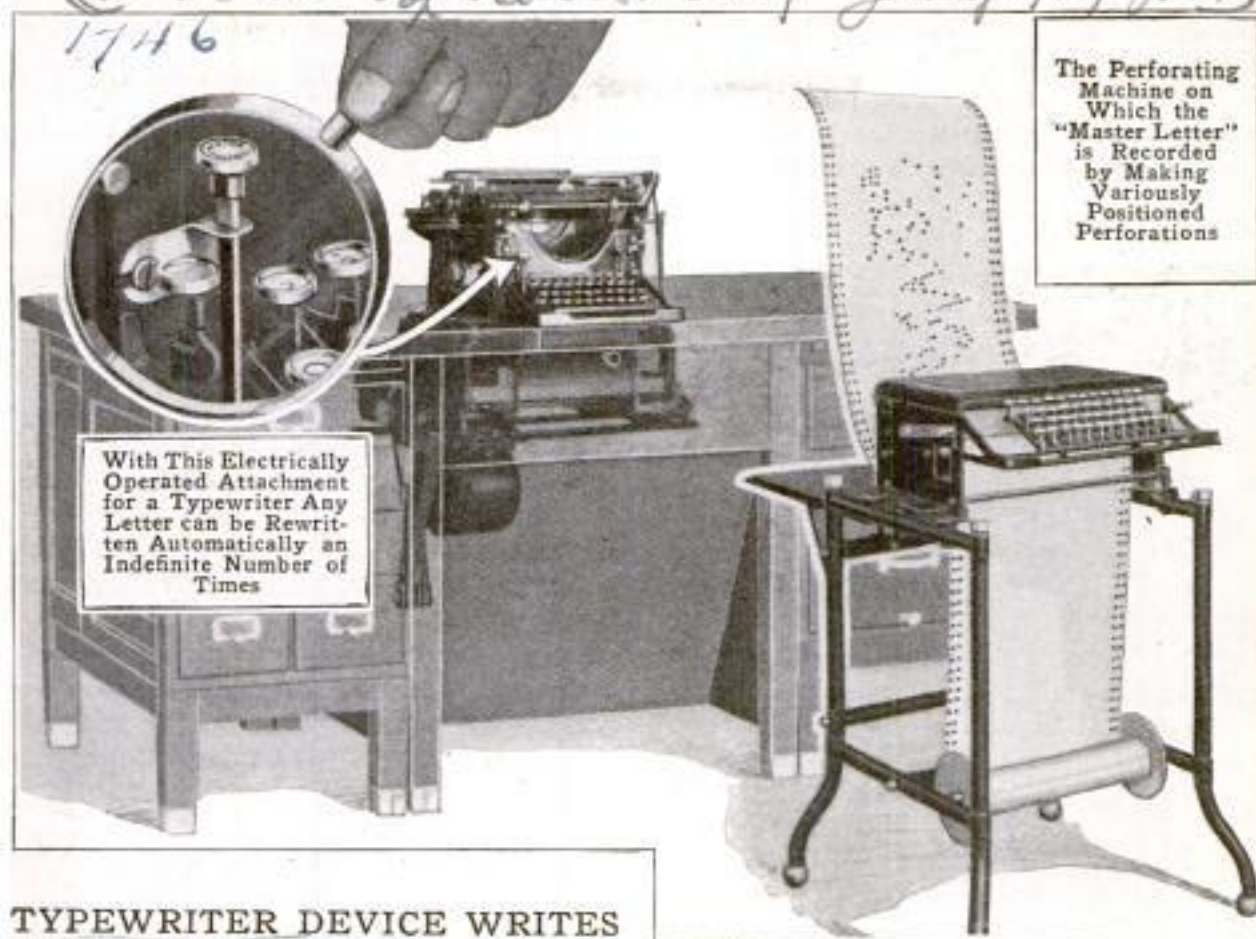
by women serving in unusual capacities, where they are subjected to exposure.

"Aquascutum"

*100 Regent St. W.
7 guineas London, Eng.*

Also in Pop Sci Monthly July 1917 p 21

1746



TYPEWRITER DEVICE WRITES LETTERS AUTOMATICALLY

Letters written on a typewriter automatically by means of a patent attachment are now possible. This is done with the aid of a "master letter" inserted in the attachment. A letter can be copied any number of times. This master letter is really a perforated sheet resembling a piano-player roll; it is made by "writing" the letter with a machine called a perforator which has a standard typewriter keyboard but perforates round holes instead of printing. The perforated roll is then inserted in a device which is attached beneath the typewriter and has a lever connected with each key. A small motor revolves a cylinder over which the roll passes; this cylinder has numerous grooves on its surface extending from end to end. Riding on the paper just over the cylinder are a number of pins, one projecting from each of the levers connected with the keys of the typewriter. When a hole passes beneath one of these pins the pin drops into the groove and the revolving cylinder carries it forward;

this operates a series of levers so that the corresponding typewriter key is tripped and the proper character written. The master letter may be so prepared that the motor will stop at any desired point and permit a stenographer to insert any personal word or paragraph, using the same typewriter. The attachment does the work of several stenographers in that it works continuously and at the rate of 100 to 120 words per minute.

An operator feeds the machine with stationery and types the date, address, and salutation for each letter, before starting the automatic attachment.

1737 —

SINGLE WASHBOWL FAUCET OPERATED BY PEDAL

A single faucet which has no handle and is operated by a pedal fastened to the floor below the washstand is now being used to supply washbowls with hot, cold, and warm water. By pressing the pedal at one end cold water is turned on; pressing the opposite end

H. E. Parmer Jr.,
4626 Wabash Av.
Chicago

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turns on hot water, and moderately warm water is secured by pressing down the whole of the pedal. This arrangement permits one to wash in running water of any desired tempera-



By Properly Pressing This Pedal with One Foot, Water of Any Desired Temperature can be Secured from the One Faucet, Which is Made without a Handle

ture; it is sanitary and it also saves time because one can begin to wash without waiting to fill the bowl. As soon as the pedal is released the water stops flowing. Washbowls of this type have been used by dentists, physicians, and barbers for some time, but are now being installed in residences, office buildings, and public institutions of all kinds. They are particularly convenient for factories where the state law requires a supply of running water.

CA soap bubble blown by a British scientist and displayed at the Royal Institution lasted from February 17 to March 24. The vibrations of engines producing liquid air finally destroyed it.

AMALGAM FILLINGS FALLING INTO SERIOUS DISREPUTE

There is a growing tendency among reputable dentists to avoid the use of amalgam, or silver, in filling cavities in the teeth. The reason for this is that a great deal of the present-day dental trouble is being accredited to old amalgam work. In preparing the metal—consisting largely of silver, with a small amount of tin and copper—for a tooth, it is mixed with mercury and kneaded into a paste. Although it expands when first set, it invariably shrinks in time. This not only forms a crevice in which germs and food particles accumulate, but it also often causes the dental fibrils to be exposed. These run from the nerve centers through the dentine to the enamel, and when open to air and moisture take up the coloring matter from the latter. This eventually causes decay. When the metal shrinks, the tooth is no longer sealed air-tight. The moisture which is thus able to work into a tooth causes trouble. To some persons the mercury itself is injurious. Those who periodically complain of having a metallic taste in their mouths may frequently look to their amalgam fillings for the cause. When silver has been used in one tooth and a considerable amount of gold in another, which comes in contact with it, a very peculiar tingling sensation is sometimes manifested. In certain cases this proves not merely annoying, but serious. If the mouth has strong acidity, the metals and the acid may have formed an electric battery. This has been found true in a number of instances. It is not every amalgam filling that proves injurious, but there seems to be a well-founded reason for the theory that certain diseases of the gums and decay of the teeth are brought about because of them. Some reputable dentists are recommending that their patients have all amalgam fillings replaced. When such fillings are removed, teeth which have given no apparent trouble are frequently found in poor condition.

Dr. E. B. Monteith,
25 E. Washington St.
Chicago

PERILOUS MOTOR-CAR ROUTE MAINTAINED IN OREGON



Placing the Front Wheels of a Bus on the Wagon's Tailboard to Keep the Engine above the Water

TO those travelers who have always been accustomed to the drawing-room comforts of transcontinental express trains, the trip from Eugene to Marshfield, Ore., would prove a thrilling and probably not wholly enjoyable experience. But to those who make the overland journey often, the motor-car dash across miles of quicksands and along bleak, lonesome stretches of beach becomes a sporty, red-blooded race against the tides.

There is a 40-mile mountainous gap in the uncompleted railroad between these two points, with not even so much as a burro trail spanning it. This makes a long, perilous motor route along the water-soaked sands of the ocean beach the quickest means of communication.

Passengers are carried by the railway to the end of its track, which is at a place locally known as South Spit. There they are met by a squadron of four light roadsters, which have been converted into busses. Shifting sand

dunes guard the approach to this terminal. A two-mile track, made of 8-in. planks laid parallel on a frame roadbed, enables the machines to traverse these in a short time. When it rains the plank tracks are partly submerged



Two of the Cars Crossing a Sea Wall on the Long Trip

in the hollows and water stands in small lakes on both sides.

In order to escape being caught by the six-hour tides, the entire drive must be made at high speed, and because of irregular train service the trip frequently has to be undertaken at night.



Long Fords of This Kind, with Breakers Running High Alongside, are Made Three Times on the Perilous Journey

Regardless of rain or darkness, the cars shoot like rockets over the uneven board track, nor do they slacken their speed when plunging across the wet sands of the shore, where the surf smothers the sound of their purring engines. The four cars, loaded with passengers, speed one behind the other around half-buried logs, and other debris cast up by the waves. Their chauffeurs do not dare to pause or even to run slowly, for they traverse some 40 miles of quicksand, and in places a full stop might prove disastrous. In the event of an accident befalling one of the small busses in these dangerous stretches, the others could not stop to help it. In such a case the pilot car returns, circles rapidly about the disabled machine, and hurls his orders through a megaphone as might a sea captain. Rarely does a thing of this kind occur and in no case has a passenger been injured during the trip. In every instance so far, a stalled car has been able to get under way with its own power before it has been too late.

During the long beach drive it is necessary to cross three creeks and the Umpqua River, which is a full mile in width. It is impossible for the machines to ford the streams unassisted, so at each of these creeks a three-horse team is stationed with a broad-wheeled wagon, provided at the rear with a low inclined tailboard, onto which the front wheels of a car can be run and securely locked. With the engine thus raised out of the water and running on "low," the trips across the creeks are made. When the Umpqua River is reached the passengers are ferried to Winchester Head, where they meet a fresh squadron of machines. The second dash ends at Coos Bay, after a drive across a bleak sand spit, and a motorboat completes the trip to Marshfield. When everything goes well, this 140-mile patchwork journey can be completed in 12 hours. When the wind and tides are misbehaving, however, it sometimes requires two or three days to get from one point to the other, and in certain months this is not infrequent.

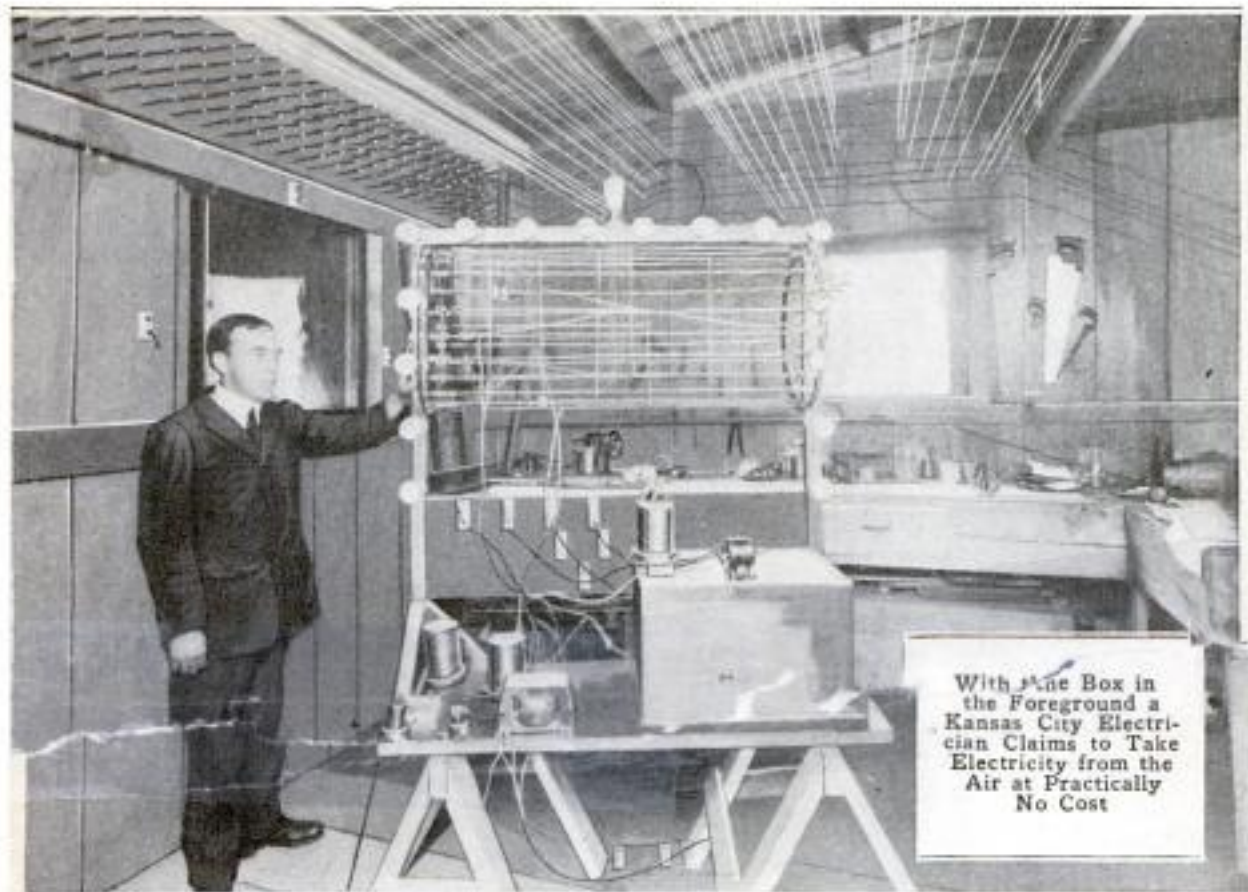
SPECIAL POCKET LIGHTS FOR GERMAN SOLDIERS



A Pocket Flash Light Used by German Soldiers, the Bulb, Lens, and Reflector of Which Move in Unison with the Hood When It is Drawn Up or Down, and a Combination Pocket Lamp and Holder for Compass, Maps, and Dispatches, Used by German Officers

The perils of scouting and reconnoitering during the present war have caused the Germans to devise a pocket flash light which is less dangerous to use than the type employed early in the war, which shed its rays straight ahead and so attracted the enemy's fire. This new lamp has a hood so designed that the incandescent bulb, the lens, and the reflector all move in unison when the hood is raised or lowered. It can be hung from the belt or held on the breast by a loop on the coat. Another type of light, for officers' use, includes a compass in a recess below the bulb and also dividers, fire-making equipment, maps, and dispatch tablets, for all of which a special compartment is provided. By dropping the compass from the recess into a horizontal position it is clearly lighted by the lamp. The cover of the compartment holding the maps, etc., when thrown back, partly shields the bull's-eye.

Elektrizitätswerke Selenitzschneider & Co. in G.H.



With the Box in the Foreground a Kansas City Electrician Claims to Take Electricity from the Air at Practically No Cost

ELECTRICITY AS FREE AS AIR IS INVENTOR'S AIM

An invention which its originator claims will make electricity almost as free as air has been produced after four years of experimenting. The inventor is a Kansas City, Mo., man who has been a practical electrician many years and in recent months has devoted considerable means and practically all his waking hours to constructing what he calls an electrical accumulator. This device consists of a box not more than a foot in each of its dimensions, in which are various connections and coils. The apparatus, he claims, collects and stores electric energy from the air, which by transformers can be reduced to suitable voltages for various purposes, such, for example, as supplying a lighting circuit.

Since no details of the invention have been given out nor any public demonstrations given, it is, of course, impossible at the present time to form an opinion as to its practicability.

1675
LIFE BOARDS PREFERRED BY SAILORS TO LIFE BELTS

A life-saving device to be found on board many vessels plying the Great Lakes is the life board, which consists simply of a 2-in. pine plank, 6 or 7 ft. long, on which are several ropes strung lengthwise. The ends of the ropes are fastened to the plank by passing through holes bored near each end. These boards are preferred by many sailors and others to buoys or life belts. A man in the water, by crawling up on one end of a board of this type, can keep his head and shoulders out of the water and can swim with his feet.



One of the Life Boards to be Found on Many Vessels Plying the Great Lakes

H. Geo. Paterson
 11608 Franklin Ave.
 Cleveland, O.
 Copyrighted material

BIG TOWER AND WATER TANK ABOVE HOSPITAL FALL

Some 1,700 feeble-minded inmates of the Utica State Hospital at Utica,

N. Y., were recently endangered when a 150-ft. steel tower, supporting a 30,000-gal. water tank above the institution, collapsed. The structure stood in a court surrounded by buildings, and in falling smashed through a wall of one of the hos-



At the Top the Tank is Shown as It Appeared When Ablaze. The Photograph Below was Taken After the Tower had Collapsed, and Pictures Its Debris and the Damage Done by It

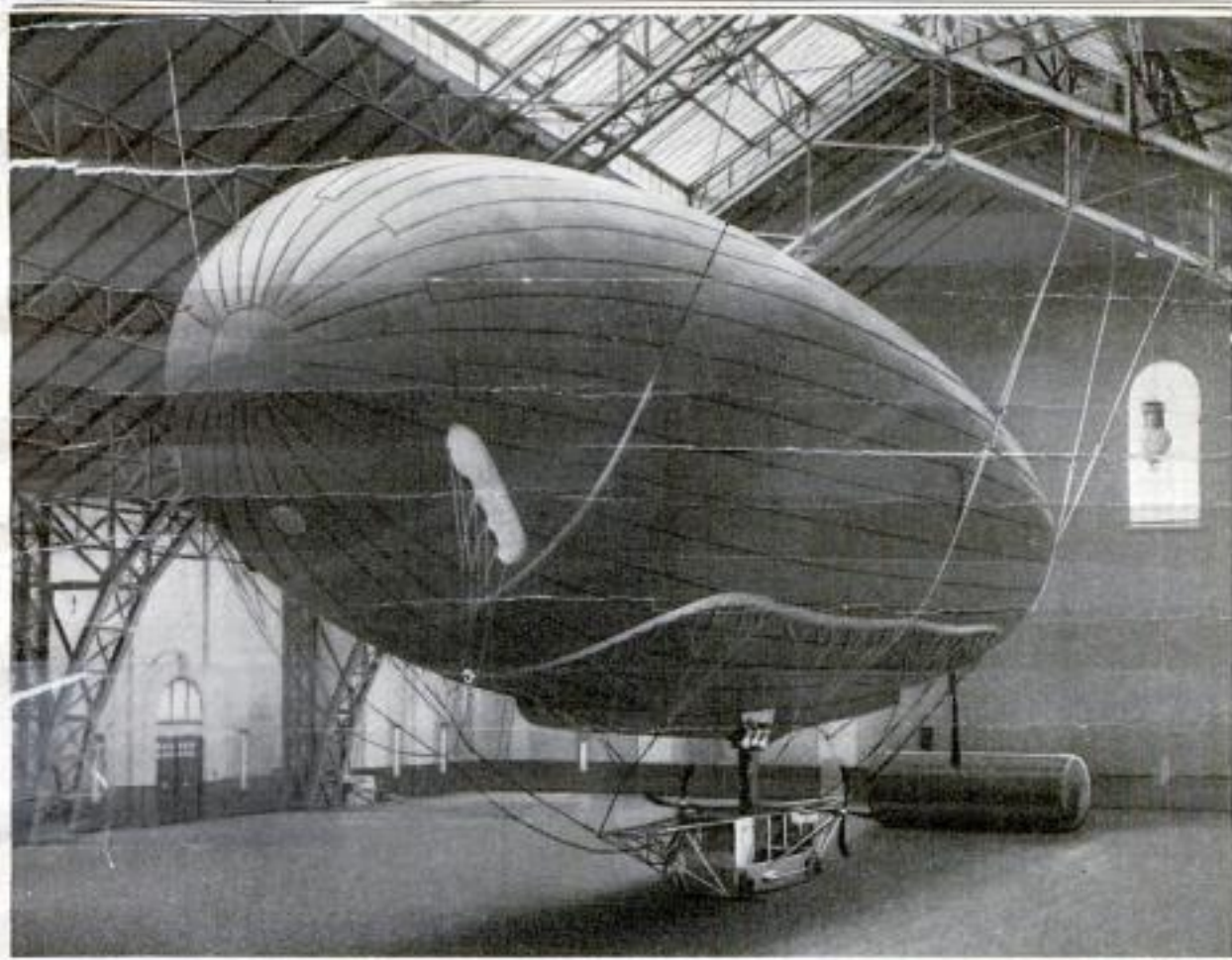
pital wards, doing much damage but injuring no one seriously. The responsibility for the accident no doubt rests with a fire which a few days previously caused considerable anxiety. Some workmen had attempted to thaw the pipes connecting the tank and in so doing ignited the packing in some manner. Before it was noticed, the fire had made much headway, engulfing the wood platform in flames and threat-

ening the upper part of the tank. The first attempts to extinguish the fire were futile. Its height prevented streams of water from ordinary fire hose reaching it, while the location of the tower made it impossible to employ fire ladders advantageously. Finally a Siamese nozzle was attached to two engines and water thrown upon the blaze. A few days later the entire structure crumpled.

1875 "RAINMAKER" PRESENTS BILL FOR CALIFORNIA FLOOD

Quite an amusing situation recently developed at San Diego as an aftermath of the disastrous flood which swept southern California recently. In December of last year a professional "rainmaker" appeared before the city council with several proposals, one of which was an offer to fill the Moora reservoir with water for a \$10,000 fee. Oddly enough the body passed a resolution accepting the terms, but no contract was drawn. The "rainmaker" thereupon set out for the reservoir and commenced his operations. Subsequently rain fell in torrents, a total precipitation of 35.91 in. being recorded for the month of January. The Moora reservoir overflowed, the Otay dam burst, scores of persons were killed, and damage amounting to millions of dollars was worked. Then the "rainmaker" visited the city treasurer and requested that his fee be paid. The matter went to the council, which, upon the advice of the city attorney, refused payment. Local newspapers in the meantime proposed, in a light vein, that the "rainmaker" be sued for damages. The latter, however, claimed that he had produced only 12 in. of the total rainfall.

H. J. Bassett
2805 India St.
San Diego, Calif.
Copyrighted material



The United States Navy's First Dirigible, Which was Recently Completed and Taken to Pensacola, Fla., Where It Broke from Its Moorings during a Gale and was Badly Damaged

NAVY'S FIRST DIRIGIBLE MEETS DISASTER

1780. The first dirigible airship built for the United States Navy, the "DN-1," was recently completed at Hartford, Conn., and shipped to the government hangar at Pensacola, Fla. A few days after its arrival in the South it was torn from its moorings while inflated and carried away by a violent gale without any crew aboard. The rain was falling when the accident happened, but shortly after the sun came out and warmed the gas in the bag, which lifted the craft high in the air. A few hours later it was found about 75 miles east of Pensacola, badly damaged by being wrenched from its moorings and by its fall. The balloon measures 175 ft. long, 35 ft. in diameter, and has a capacity of 114,800 cu. ft. of hydrogen gas. The gondola is 20 ft. long, 5 ft. wide, and is built to float on water; it is designed

to carry a crew of eight. The entire craft stands 50 ft. high, weighs 5,000 lb., and has a lifting capacity of 2,000 lb. useful load. The contract price for the balloon was \$45,636. The company which constructed it is now engaged in working out plans for a larger air craft of the rigid type comparable to those used in Europe.

1137 DRIFT INDICATOR DESIGNED FOR AERIAL NAVIGATOR

In making a flight over strange territory between two distant points the airman has always been at a serious disadvantage and often in danger because of his inability to estimate accurately the drift of his machine, due to a cross wind. Several times this has been responsible for the deaths of prominent aerial navigators. Of late, however, a well-known inventor of aeronautical apparatus has developed an indicator

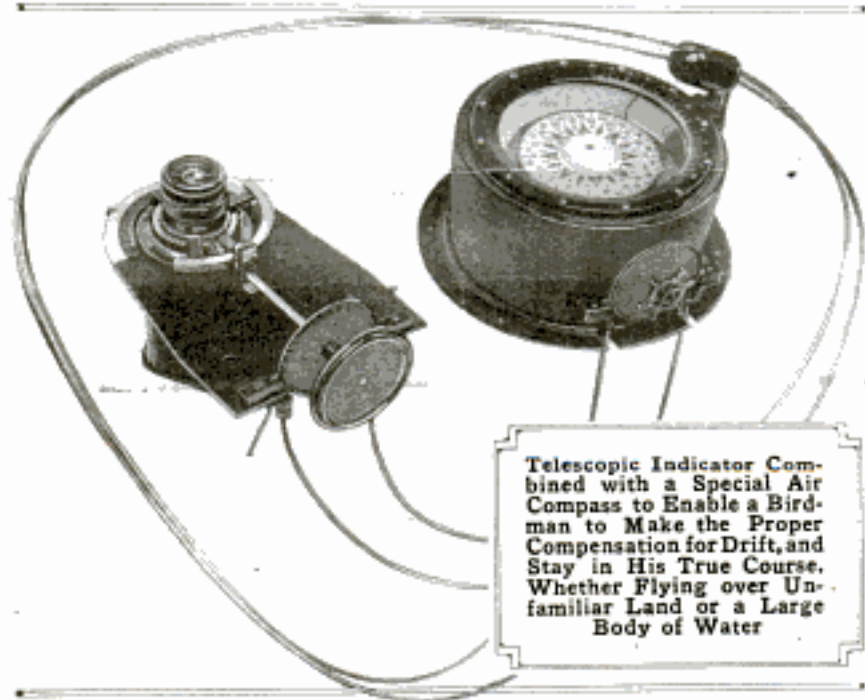
*Connecticut Aircraft Co.
New Haven, Conn.*

*Henry H. Greenleaf
New York, N.Y.*

which enables a pilot to make the proper compensation for drift and maintain his true course. In part the device consists of a prismatic monocular telescope combined with an air compass and mounted in such a way that an observer is given a direct, clear view of the ground or water immediately beneath a craft. This is in focus at all times, while a series of five parallel lines extend across the lens. When an aeroplane is in flight and one looks through the telescope, objects on the surface below appear as streaks be-

cause of the speed at which the machine travels. By means of an adjusting screw the telescope may be turned in a horizontal plane until its lines, and those of the objects below, are parallel. The adjustable lubber's line of a special air compass is connected by flexible cables to the telescope, so that when constantly corrected it compensates at all times for the drift determined by the latter and allows the pilot to follow his predetermined course. Also a pointer hand attached to the telescope moves over a graduated scale and

shows the angle between the longitudinal axis of the craft and its true course. This offers a means of occasionally checking the readings and determining the correctness of the position of the lubber's line. The latter and the compass card are treated with a luminous preparation which enables them to be read easily at night, while an electric lamp is also provided for use in the twilight. The apparatus weighs only 7 lb. and may be employed with any type of machine.



Telescopic Indicator Combined with a Special Air Compass to Enable a Birdman to Make the Proper Compensation for Drift, and Stay in His True Course. Whether Flying over Unfamiliar Land or a Large Body of Water

TWO VALUABLE OILS HELD 1711 BY CHERRY PITS

Investigation by the Department of Agriculture has shown that several valuable products are procurable from the cherry pits and juice now thrown away at American canneries. The kernels of the seeds can be made to yield fixed and volatile oils as well as a meal suitable for cattle feed, while the juice ordinarily wasted in the pitting process may be converted into jelly, sirup, or alcohol. It is thought that it may be possible to manufacture good substitutes for imported almond oil. Some 1,600 tons of cherry pits and 150,000 gal. of juice are wasted an-

nually, it is estimated. While it seems doubtful whether the manufacture of these by-products would be profitable to small concerns, it is believed by the investigators that it would be commercially feasible to ship the raw materials to centrally located refineries. A similar industry, utilizing peach and apricot pits, has become profitably established in California.

Successive baths of boiling lye, cyanide of potassium, and hydrochloric acid—containing ferrous chloride are said to be the means used by a French metallurgist in giving aluminum a surface that will take a durable nickel-plating.

SWIMMING POOLS FOR RECREATION AND SAFETY

by
John Anson Ford

ONE of the most significant features of America's trend, during recent years, toward outdoor recreation and open-air living has been the rapid increase in the number of swimming pools in this country. It was so recently as in 1885 that Philadelphia established what was the first municipal swimming pool in the United States, so far as is known. Today the demand for wholesome outdoor recreation is so widespread that municipal pools are a part of the play facilities of almost every city; schools are equipped with pools; the homes not alone of the rich but of persons of moderate means have indoor and outdoor swimming facilities; great corporations are making similar provision for their employes, and such agencies as the Young Men's and the Young

Women's Christian associations are spending enormous sums to make healthful swimming possible for the young men and women who belong to these organizations.

Aside from the recreative aspect there is another incentive for this movement which has found expression in so many different channels. Estimates based on the census figures of 1913, and previous years, for a majority of the northern states, indicate that persons are meeting death by accidental drowning at the rate of 9,000 or 10,000 annually. This fact in itself is sufficient reason for establishing facilities for supervised swimming in every city and village in the land. Ignorance of the water and ignorant recklessness on the water are the chief factors in this great annual death toll. An index to the swiftly increasing number who



A Homemade
Swimming Pool
Fed by a Near-By
Spring. Constructed
at a Cost of Less
than One Hun-
dred Dollars

get their recreation on the water or in water is found in the growing popularity of lake resorts. The general passenger agent of one of the great railroads of the country declares that his road's summer-resort traffic is now three times as great as it was ten years ago.

It is very natural that this new interest in outdoor life and in physical upbuilding should result in a nationwide effort to bring recreation facilities, particularly swimming facilities, within the reach of the many, including the very poor as well as those having means to go to watering places; not only is it now regarded as desirable that every one should have an opportunity to know the pleasures of water sports, but also that every one should be given a chance to learn the art of self-preservation in the water. One indication of this trend has been the strong agitation in recent years for a requirement that all men in the United States Navy should be able to swim.

The cost of constructing swimming pools—or rather a misconception as to the cost—undoubtedly has prevented many communities from acquiring proper swimming facilities. As a matter of fact the cost of many pools has been very moderate indeed. In some instances they have been so constructed that they have some utility in addition to serving as recreation centers. Oakdale, Cal., is a town of 1,500 which has a pool that cost \$1,400. It is so situated that water from the pool is used from time to time to flush the sewer system. Concrete was used in the construction. The pool is in the form of an ellipse, measuring 40 by 60 ft., and has a maximum depth of 9 ft. The pool holds 100,000 gal. The expense of maintenance has been made very slight by placing it in charge of the fire department. The near-by river, which formerly was a source of anxiety to parents because frequented by the boys, is now deserted.

The town of Grand Rapids, Wis., has a very attractive swimming pool which cost \$5,000. The walls are of concrete and the bottom is covered with sand.

As a special precaution against accidents in the water, large sluice gates, which can be easily thrown open, were constructed, by which the tank can be emptied in two minutes.

Another community which secured a pool at low cost is Ida Grove, Iowa, whose population is about 5,000. Its pool is 100 by 60 ft. and is located right in the business district. A number of merchants joined with the municipal authorities and built the tank on a vacant lot near the center of the town so that they could utilize 25,000 gal. of water which was discharged daily from an ice-making plant near by. Adjoining the pool is a building 24 by 100 ft. containing dressing rooms, a rest room, and lockers. The plant represents an investment of \$10,000, which was raised by popular subscription. Because conveniently located it has become the center for many community activities. It is proposed to erect an arched roof over the pool and so make it serviceable all the year round.

In some instances philanthropic individuals have presented their fellow-townsmen with a pool. This is the case with Saginaw, Mich., which has a fine reservoir 60 by 100 ft., the gift of two men who spent most of their lives in the city. In earlier years they had seen the boys swim in the near-by stream, which periodically claimed its victims and which, as the population increased, became polluted with sewage from the entire city. Today the river has no allurements for the swimmers; instead they use the open-air tank, the water for which is pumped from the river and filtered through sand and a chemical filter. At one end of the tank is a bathhouse, built in California mission style, and containing lockers, shower baths, and other conveniences.

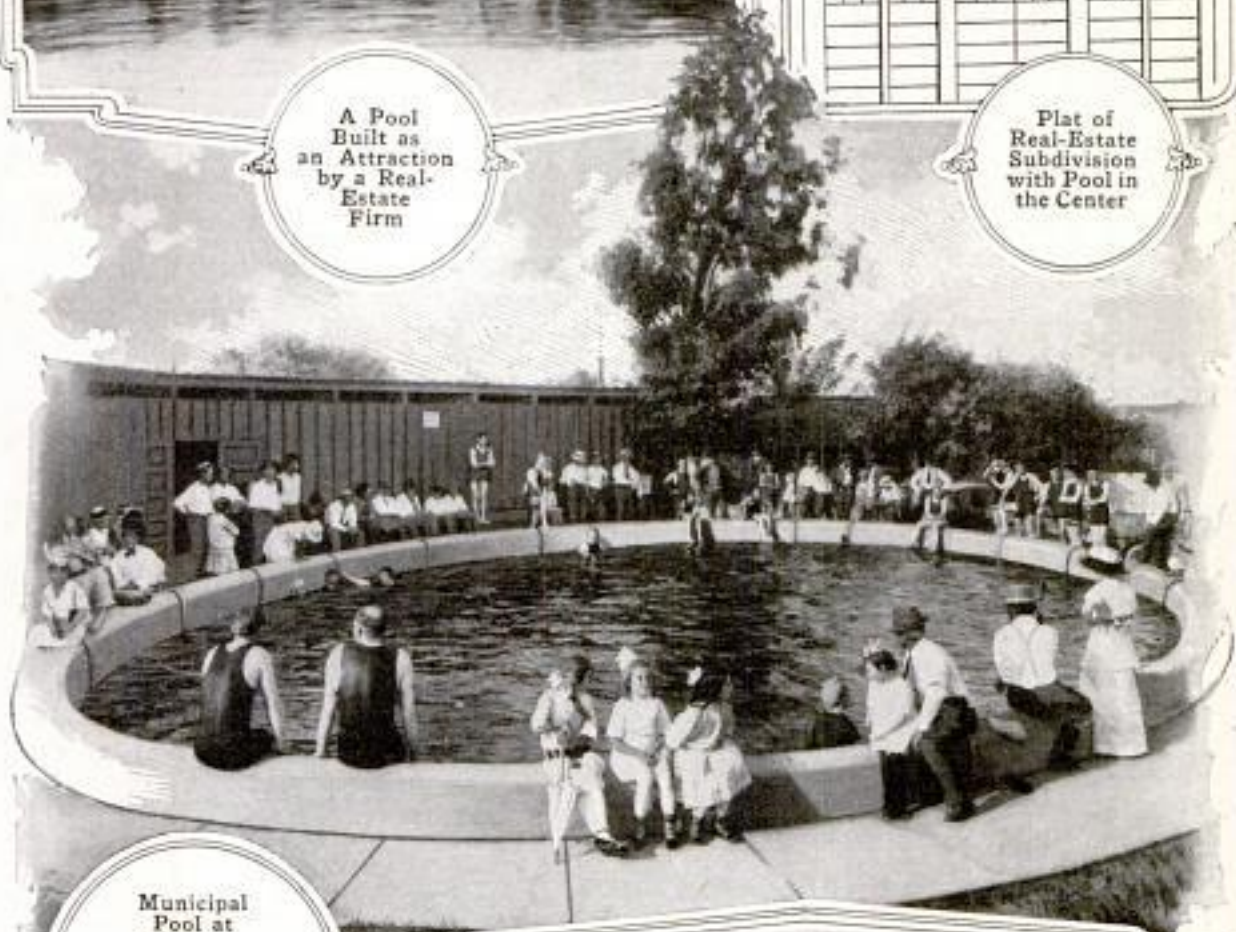
Sensing the trend of modern taste toward aquatic recreation, a real-estate company which is developing a suburban district on Long Island, has built a magnificent swimming pool in the midst of its holdings and partially surrounded it with porticoed buildings which house tea rooms, shower baths, lockers, dressing rooms, etc. The fa-



A Pool Built as an Attraction by a Real-Estate Firm



Plat of Real-Estate Subdivision with Pool in the Center



Municipal Pool at Oakdale, California, Which Cost \$1,400: When Emptied, the Water Flushes the Sewers



The \$10,000 for This Pool at Ida Grove, Iowa, was Raised by Popular Subscription



A Gift to Saginaw, Michigan, from Two Citizens

cilities of both the building and the pool are held out as an inducement to purchase property in that suburb. This pool is located within a few yards of the beach, which offers fine salt-water bathing, but there is a privacy and safety about the pool bathing which the beach does not afford, and so the former has proven very popular. The recreation place, moreover, has become a community center which fosters neighborliness as well as skill in water sports.

The city of Troy, N. Y., has utilized an old power house that once was part of its waterworks system and installed a pool in it at comparatively small expense. Perhaps the most novel of all the swimming pools constructed with a view to economical expenditure is to be found at Sunset Cliffs, Cal. There, on the rugged Pacific shore, the action of the water has hollowed out basins in the rock. One of these has been finished off by lining it with a smooth coating of cement; it is 25 ft. long and 15 ft. wide. Water retained in it is several degrees warmer than the ocean. A trough was cut in the rock leading from the pool to the ocean. The reservoir is refreshed and cleansed by the waves that break over into it at high tide and then drain off through this outlet. In this bowl by the sea children can get the benefit of beach bathing without being in danger of an undertow.

As has been said, every large city, as well as many smaller centers of population, has shared in this movement to make swimming safe. For example Chicago, not content with its 25 miles of lake shore, which includes several bathing beaches, has spent large sums in constructing a score of pools which are supervised by the city or park boards. Three more, costing \$30,000 each, are about to be built. The number that profit by these facilities is shown by the fact that the total attendance at one of these pools was 152,000 for three summer months. St. Louis has what it claimed at the time of its completion was the largest artificial pool in the world. It has a surface area

of nearly 100,000 square feet. Adjoining it is a wading pool with a surface area of 31,000 sq. ft. The attendance at these pools on the opening day was 10,000. Numerous electric lights are suspended over the water so that bathers can come in the evening after spending long hot days in factories or shops. According to the president of the Chicago Board of Education it is now the policy of that body to install indoor pools in all large new school buildings located in neighborhoods which do not have swimming facilities. At the present time there are three high schools and two grammar schools so equipped, and a fourth high school now under construction will have a tank.

When one considers the pleasure and profit derived from the use of a swimming pool, the cost of maintenance is so small as to place the luxury within the reach of any community. The cost per swim in a Philadelphia pool was found to be one-fourth of a cent; in Holyoke, Mass., three and a half cents; in Milwaukee, a little over two cents, including a shower bath for each patron.

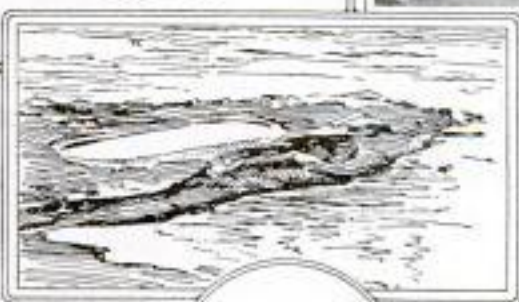
Probably the organized agency which has done more than any other single body to promote aquatic sports and to teach the art of self-preservation in the water is the Young Men's Christian Association. Of this organization's 759 buildings in North America, 400 are equipped with swimming pools. During 1915, a total of 84 buildings were erected, each equipped with a pool; that now being one of the required features of every new association structure. The average cost of these pools is \$4,800, making a total investment of over \$400,000 by this one organization in swimming facilities in one year. There are hundreds of other organizations, local and national, which have shared in this movement, as for example, the Chicago Hebrew Institute, which has two large pools in its new building. Business houses and great corporations have seen the benefits of providing swimming facilities for their employes. A large packing concern in Cincinnati has constructed



Pool in Bessemer Park, Chicago: One of a Score of Swimming Places Built by the City and Park Boards



Winter Bathing in a New \$50,000 Natatorium at Coney Island, New York



A Natural Basin on California's Shore, Finished Off by Man



Bathers from One of Chicago's Crowded Districts Enjoying Pulaski Park's Swimming Pool

a pool, 18 ft. by 30 ft., on the roof of its building, and it has proven one of the most popular features of its recreation equipment. In a few instances mining companies have added swimming pools to the miners' wash houses, and grimy workmen after bathing properly are allowed a refreshing swim in the pool.

But so great has been the demand for recreation in the water that the facilities of cities, schools, etc., have not been able to satisfy it, and in several instances amusement parks have found it profitable to add pools to their equipment. One amusement concern in Louisville, Ky., recently completed a pool measuring 55 by 200 ft. and costing \$200,000. Two Chicago amusement parks have similar attractions. An inclosed \$50,000 pool has recently been installed on Coney Island.

But homes, as well as municipalities, institutions, public and private, and amusement parks, are now being equipped with swimming pools. In some cases these have cost less than \$100. While pools for that sum are not common, many have been built which represent no greater cost than is necessary to build a modest garage. Probably the record for cheap construction of a homemade pool is held by three brothers, the oldest of whom is 13 years. These boys did the excavating themselves for a pool 25 by 10 ft., and 3 ft. deep. On the flat ground around the pool, and along the upper edges of the slanting sides, boards were fastened to a framework which projected down into the earth at the bottom of the pool. The young workmen purchased 2½ bbl. of cement and with the aid of one man covered the earthen walls and floor with a coating of concrete. Their total cash expenditure was only \$7.50. Another home was provided with a back-yard swimming pool by erecting a wooden tank above ground, measuring 20 by 10 ft., and 2½ ft. deep. Heavy pine planks were used, the cracks being thoroughly calked and the inside painted green and the outside white. The tank was supplied with water from the garden hose and proved a source of great

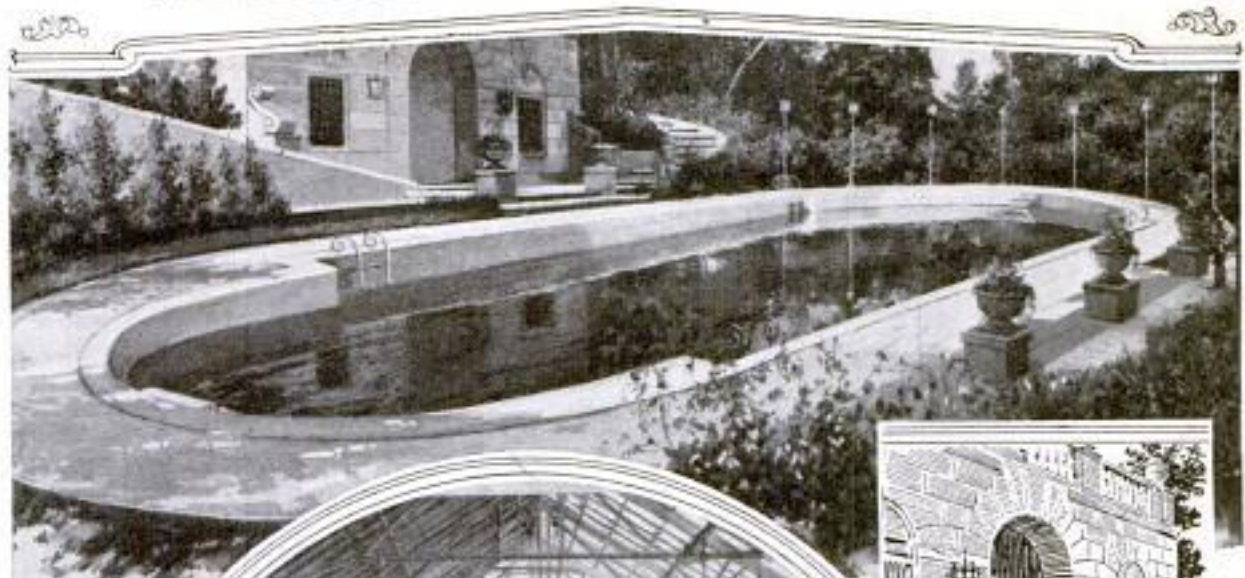
amusement for the children for which it was constructed.

Frequently a residence owner has taken advantage of a creek or spring on his property and has built a pool near such water supply. One pool of this character was built in a meadow not far from a spring and surrounded with shrubs and trees. It measures 12 by 30 ft. The bottom is covered with gravel and the walls with planks. No plumbing was required except an inlet and outlet, both of which were laid practically above ground. The cost of materials was between \$50 and \$100. A more pretentious pool is that belonging to a summer home in Rockledge, Fla. It is 22 ft. wide, 6½ ft. long, and has a diving pool 7 ft. deep. The cost was \$700, including supply and drain pipes.

In contrast to these swimming facilities is the magnificent pool recently completed on an estate at Lake Forest, Ill. At an expense of many thousands of dollars the reservoir was built on the side of a bluff, some distance below the residence and overlooking Lake Michigan. A winding flight of steps leads from the house down to the pool. In addition, a shaft, in which an electric elevator is installed, was sunk directly beneath the house to a depth of 80 ft. From the lower end of the shaft a marble-lined tunnel, 150 ft. long, was constructed to a splendidly appointed bathhouse situated at the edge of the pool.

It is this nation-wide movement for swimming pools—manifesting itself in the great variety of ways shown here—that is rapidly banishing the "menace of the water." The American people are learning that outdoor pastimes, including the many different kinds of water sports, constitute a chief means of rejuvenation. In so far as municipalities, schools, public organizations, and homes provide safe swimming facilities, the children and young people will learn self-reliance in the water without paying an abnormal drowning toll, and every swimmer will be better physically because of these added facilities.

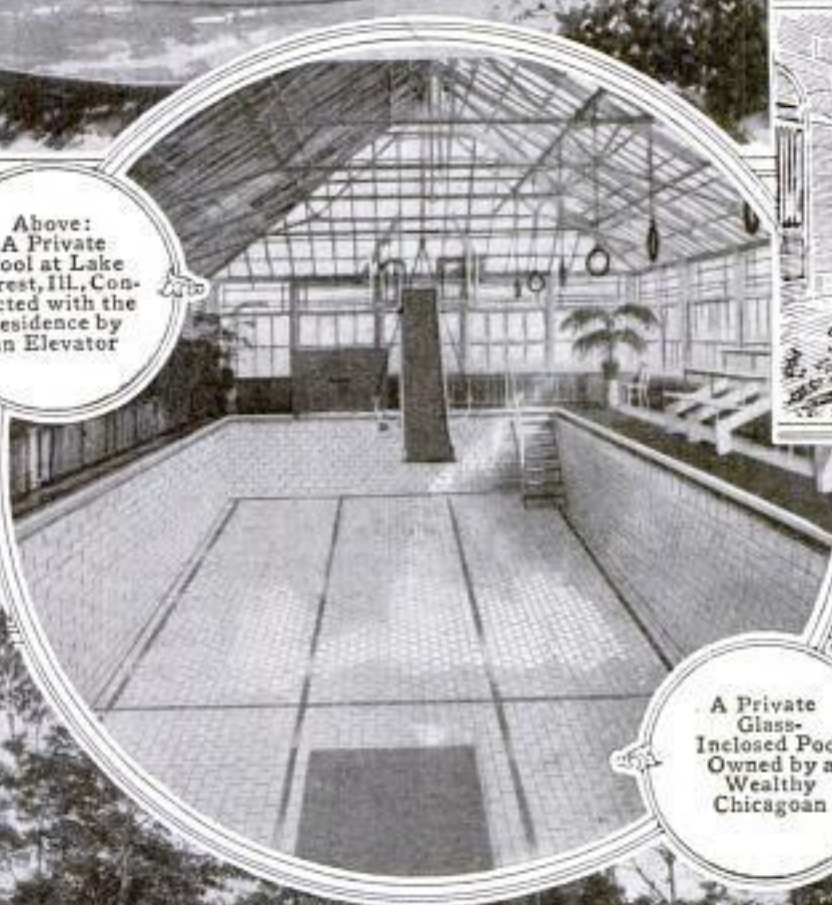
H. F. Mc G.



Above:
A Private
Pool at Lake
Forest, Ill., Con-
nected with the
Residence by
an Elevator



Bath-
house of
Pool Shown
Above and
Entrance to
Elevator
Shaft



A Private
Glass-
Inclosed Pool
Owned by a
Wealthy
Chicagoan

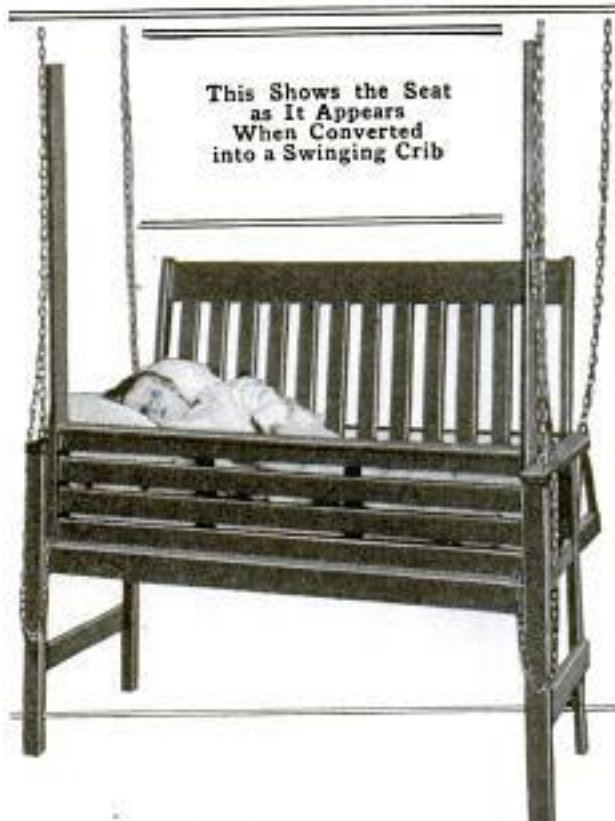


This Bit of
Water Adds
Much to the
Beauty of This
Revinia Park,
Ill., Estate

Iron Glass
People's Gas & Cold
See Page 1915-715

1637
**CONVERTIBLE PORCH SEAT
 THREE ARTICLES IN ONE**

Intended primarily for porch use, a seat has been invented which may readily be converted into either a swing



or a crib suitable for a small child. It has quite the ordinary appearance when used as a bench or chair. To change it into a swing, however, it is suspended on chains and a footboard attached. By removing the latter and placing it across the open front of the chair, a safe, comfortable crib is formed, which may be either stationary or swinging, whichever is desired.

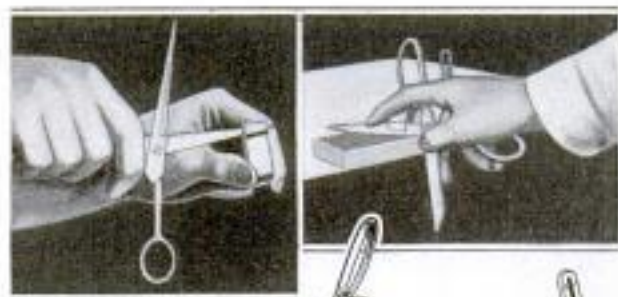
1811
**SCIENTISTS TO STUDY
 ALASKA'S RESOURCES**

That the United States government may have more complete data as to the natural resources of Alaska, 12 investigating parties are being sent out by the Geological Survey to study the regions in which quartz, gold, and copper are found, to ascertain more about the water powers in southeastern Alaska, and to work in sections directly or indirectly tributary to the

government railroad now under construction. One group of scientists will work in the region tributary to Juneau, where much quartz is found; study of the Ketchikan district, where there are gold and copper mines, will be continued; one party will be employed in the Copper River region, and four will make surveys in the region of the government railroad.

1724
**DEVICE FOR SHARPENING
 SHEARS UNIFORMLY**

The difficult problem of keeping a bevel on shears that is uniform and can be duplicated at successive sharpenings is solved by a simple device designed to be attached to any pair of shears while they are being sharpened. It consists of a slender metal bar, about 6 in. long, bent at one end. This end holds a clamp in which either blade may be fastened by adjusting a thumb-screw. At the other end is a cross-piece also fastened by a thumbscrew. When a blade with this device attached is laid against a stone to be sharpened this crosspiece normally rests against the top of the table or desk and holds the blade at an angle which remains unchanged as the sharpening proceeds. The angle can be determined at the start by moving the crosspiece as de-

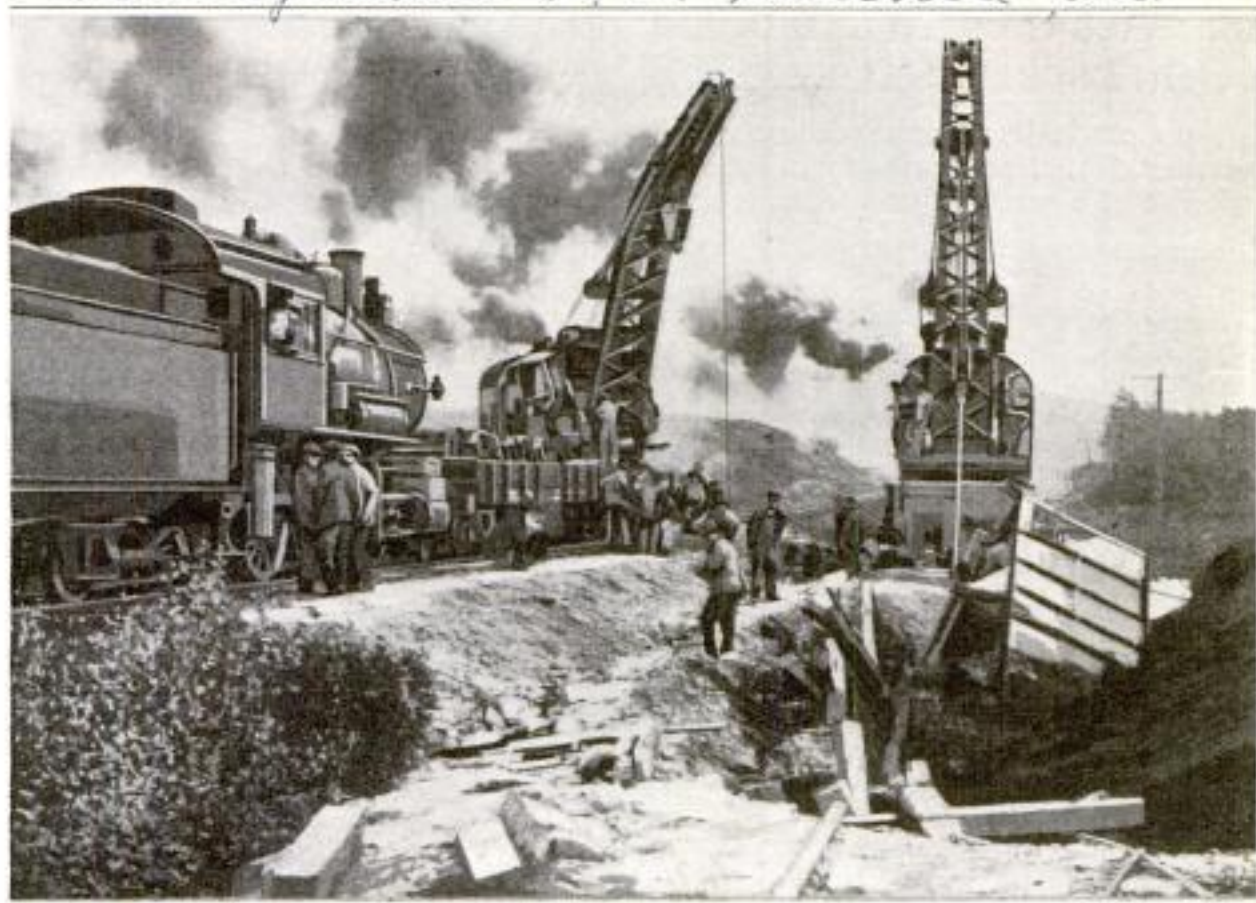


With This Device
 Shears can be
 Sharpened
 Uniformly

sired. When the shears are sharpened the next time, exactly the same bevel can be maintained by using the device and adjusting it to the same angle as before.

A. L. Waddell Co.
 36 S. State
 Chicago

Commerce Report
 2/21/16 p. 1133



Drawing One of Three Freight Cars Out of a Sink Hole under the Roadbed of an Eastern Railway

SINK HOLE UNDER RAILWAY ROADBED CAUSES WRECKS

Near Titusville, Pa., an eastern railway company is experiencing considerable difficulty with a peculiar sink hole which exists immediately beneath its roadbed. Periodically this hole has been a trouble source for many years, and only recently attracted fresh attention when three cars of a freight train, which had been brought to a stand over the place, sank into the ground. In this case they were subsequently recovered. In the past, however, fortune has not been so good. Some 20 years ago five cars settled into the hole and although excavations were made they were never found. On another occasion two horses sank from sight. After the first accident heavy timbers were placed across the ground and the bed rebuilt. A number of years later the track again gave away and as a result was moved to one side. Recently it was brought back to its orig-

inal place. Many cars of crushed stone have been dumped into the hole, but apparently with little effect. So far as is known no geologist has explained the cause of the phenomenon. It is interesting to note, however, that less than a half mile from this place, which is in a hilly district, there is a small lake of considerable depth. In the local vernacular it is termed "The Bottomless Lake," and apparently does have a depth of more than a hundred feet. Because two small fish, neither of which had eyes, were once removed from the sink hole, it is popularly supposed that the latter and the lake have a subterranean connection. The formation in this locality is peculiar, and one correspondent even goes so far as to assert that by thumping upon the ground at a distance of a half mile from the lake, the surface of the latter is disturbed.

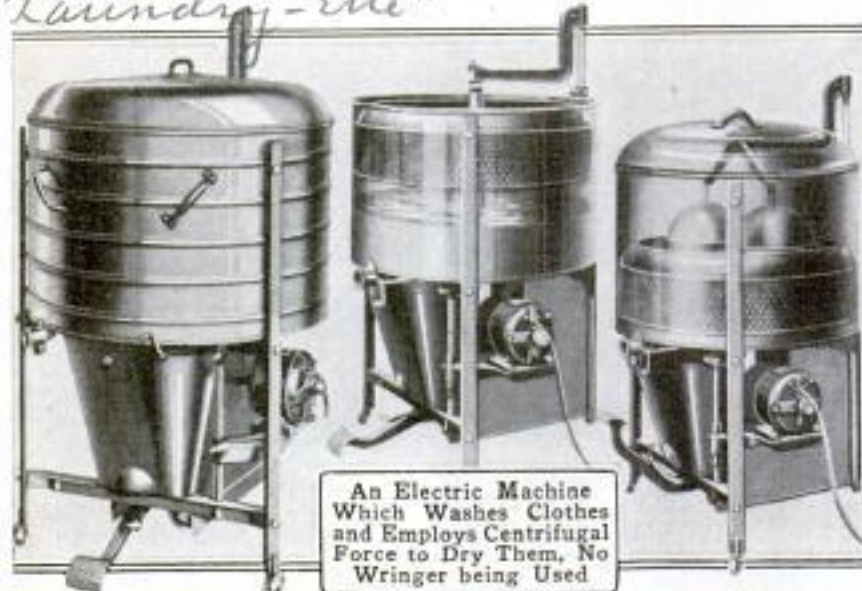
☐ In Norway a smelting plant is being erected to provide for the production of 4,000 tons of aluminum annually.

1781

CLOTHES WASHED AND DRIED IN ELECTRIC MACHINE

An electrically driven machine which washes clothes and dries them without the use of a wringer and without their

"Laundry-ette"



An Electric Machine Which Washes Clothes and Employs Centrifugal Force to Dry Them, No Wringer being Used

being removed from the tub, is now on the market. It consists of a metal tub, with a cover, supported by suitable standards; in this tub is a smaller per-

forated tub in which the washing is placed. An arm extending over the inner tub supports inverted vacuum cups which, with the arm, move up and down, forcing the water among and through the clothes while the inner tub

revolves slowly. Power for these operations is furnished by a 1/8-hp. motor. Fresh water for rinsing may be supplied to the tub through a hose. The vacuum cups are then removed; by pressing a foot lever the perforated tub is raised above the water; by shifting a hand lever it is made to revolve rapidly. Centrifugal force throws the water out through the perforations into the larger tub, and in one or two

minutes the articles are as dry as if they had gone through a wringer. In five or ten minutes, the average flat work is dried enough to be ironed.

1699
TWO COAL BARGES WRECKED IN ATLANTIC STORM

Two of three large barges operated by an eastern coal company and in

The two vessels were the "Ashland" and the "Kohinoor." The former was washed ashore and its crew rescued the following morning after a thrilling night battle to keep the barge afloat.



Rescuing the Crew of the Barge "Ashland" after Its Wild Night at Sea: The Masts were Snapped Off and Only the Superstructure Left above the Water When the Reef was Encountered

tow of the tug "Swartara" were recently wrecked on Smith's Rocks, North Scituate Beach, after leaving Boston and encountering a severe gale.

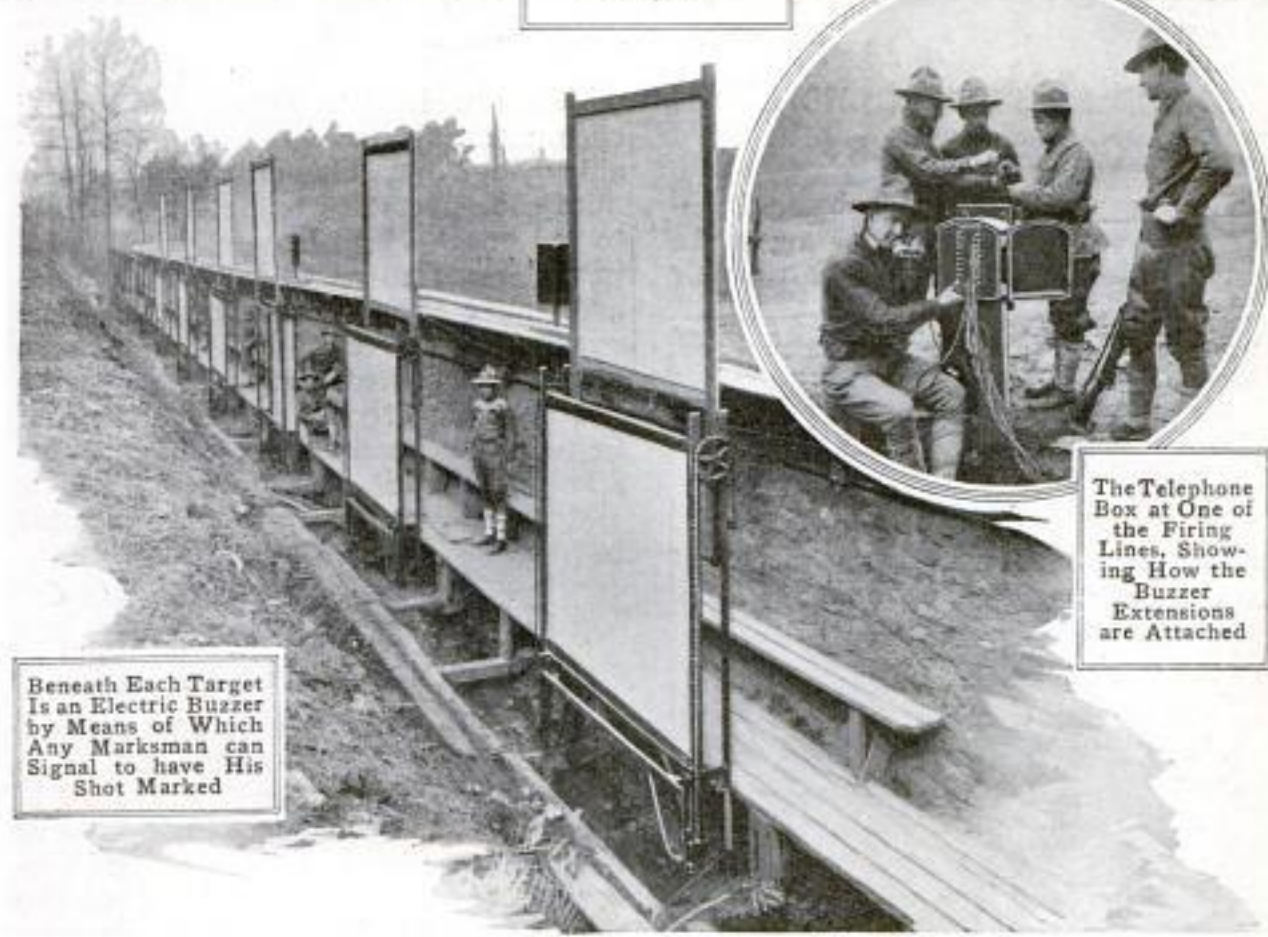
The other craft went to pieces. Its wreckage was strewn for miles along the coast, and its crew of four men lost. These two barges were in tow behind the "Kimberton," when the cable broke and left them alone on a wild sea. The sails were immediately hoisted, but the gale was so strong that it proved impossible even to keep the barges straight.

Smith's Rocks, where the "Ashland" hit, is the reef on which the ship "St. John" went to pieces in 1849 with the loss of some 150 passengers.

TELEPHONE ON RIFLE RANGE AIDS TARGET PRACTICE



The Range, Showing the Box Containing Telephone and Buzzer Connections



Beneath Each Target Is an Electric Buzzer by Means of Which Any Marksman can Signal to have His Shot Marked

The Telephone Box at One of the Firing Lines, Showing How the Buzzer Extensions are Attached

A telephone and signal system which greatly facilitates effective rifle practice is a distinctive feature of the Georgia state military rifle range. There are six firing lines on this range at Fort McPherson, which are 200, 300, 500, 600, 800, and 1,000 yd., respectively, from the targets. Near each of these is a cast-iron telephone box from which communication may be established with a telephone in the target pit. Each

of these telephone boxes near the firing lines is also equipped with several push buttons; each button connects with a buzzer in the pit, there being one beneath each target.

In the pit are frames, each with two movable racks or sashes, which support the targets: Each frame is so constructed that when one sash and target is pulled down from its normal position the other sash and target move up into

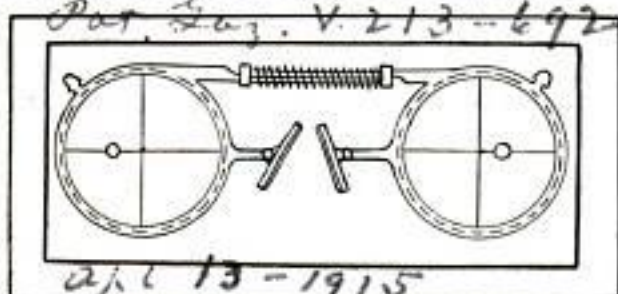
that position. During practice an officer is stationed at the telephone on the firing line, and in the pit a man is assigned to each target. An officer is also stationed at the telephone in the pit.

After a volley has been fired any marksman can inform the officer at the firing-line telephone that he wants to know where his shot hit. The officer then presses the button that operates the buzzer under the target in question. Since the targets are lowered after every volley, the position of the shot is easily observed; it is communicated to the inquiring marksman by holding a

disk against the upper target, in a position corresponding to the position of the hit. In case questions are to be asked, the telephone is used. Where there are several marksmen, many of whom want their targets marked, extension wires are laid from the telephone box to each soldier. These are connected at the telephone box with the proper buzzer wires, and any soldier may operate the buzzer under his target simply by pressing the end of his wire against an iron rod stuck conveniently in the ground. This extension is disconnected and stored away when not in use.

SPECIAL SPECTACLES AID 61 GOLF PLAYERS

To overcome the undesirable tendency to move the head or sway the body while striking a golf ball a pair



Spectacles Designed to Shut Off All but a Straight-Ahead View and so Enable a Golf Player to Avoid Turning His Head When Striking the Ball

of golf spectacles has been patented, the circular lenses of which are opaque; each has a small hole near its center. The lenses fit movably in their frames,

which are held together by a coil spring through which extends a slidable bridge bar. This arrangement permits the spectacles to be fitted firmly to the nose. Each lens may be turned in its frame so as to bring the holes a distance apart that is suited to the eyes of the wearer. These glasses, properly adjusted, permit a player to see only directly in front of him. If he turns his head when about to strike a ball, the ball is shut off from his view and the player is forced to correct his bad form.

1860 SELLING OF PELTS A NEW GOVERNMENT SIDE LINE

The selling of pelts at auction is a side line in which the Department of Agriculture has engaged as a result of the large number of pelts which have been sent in by employes of the Biological Survey. This division of the department has been conducting campaigns to rid various sections of the country of animals harmful to crops, live stock, and timber. More pelts have been sent in than were required for scientific purposes. Skins disposed of include skunk, badger, lynx, gray fox, kit fox, etc., but the majority have been coyote skins. These are growing in popularity for fur and consequently the prices offered for coyote pelts at the auction sales have been increasing steadily.

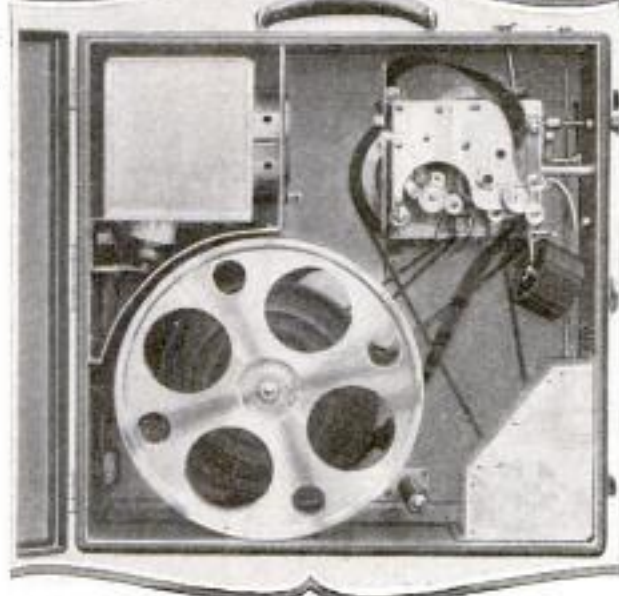
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De Vry Corporation
117 N. 5th Av.
Chicago

833

POPULAR MECHANICS
Main 53-60
PORTABLE MOVIE PROJECTOR BUILT ON NEW LINES

A. J. Harding 825-200 5th Av. New York 5/23/16



Showing the Arrangement of Very Light Traveling-Case Projector for Salesmen: The Machine Is Always Ready for Immediate Use and Never has to be Packed or Unpacked

The Modern Way of Selling Machinery and Other Things Too Large and Heavy to be Carried as Samples

One of the most compact and conveniently arranged portable projectors yet devised for commercial purposes needs only to be connected with a light socket to be ready for use. The machine is one of recent invention and is so arranged that it does not have to be removed from the carrying case and assembled before it can be operated.

It is built within a neat asbestos-lined, leather-covered case, 17 in. in height and length and 7 in. wide. Its total weight is only 19 lb., while it uses

a 1,000-ft. reel of standard film and is motor-driven. It projects a clear, steady picture, 6 by 8 ft. in size when 35 ft. from the screen, and a correspondingly smaller one when the throw is shorter. For illumination, a 250-watt nitrogen-filled incandescent bulb is employed. Because of the efficient ventilation of the lamp house, accomplished by a suction motor that draws air through one side of the case and discharges it at the top, a maximum temperature of only 168° is encountered. The film can be stopped at any time and a still picture obtained.

The machine is regulated entirely from the outside of its housing. After it is connected with a 110-volt circuit it is only necessary to press two buttons—one to ignite the lamp, and the other to actuate the motor—to have it in operation. The two reels are placed side by side, and the rewinding is accomplished without removing or changing either of them. Another model of the same apparatus is refined still further, and eliminates entirely the necessity of rewinding and threading. This is arranged by having the ends fastened together and the film wound about a pair

J. L. Christianson (Inv & can supply)
166 W. Superior St. Chicago

POPULAR MECHANICS

of reels so that it feeds from the inside onto the outside. This permits it to be run continuously without attention.

An entirely different machine has been introduced which is novel in that

it projects the light at right angles instead of throwing it straight ahead. An arc is used for illumination and provision is made for using slides. The machine, however, is operated by hand.

FLAPPING OF WINDOW SHADE STOPPED BY VACUUM CLIP

There are several uses that may be made of a vacuum-cup clip recently invented, but doubtless none of greater



convenience than that of preventing a window shade from flapping when there is a moderate breeze. The rubber part of the device is shaped like a nipple and surrounded by a strong spiral spring. Secured to the tip end of it is a metal clip which will grip things of any thickness from that of a card to a curtain stick. To hold a shade, the clip is fastened to the bottom of it and the vacuum cup then pressed against the glass. The suction force holds it tightly in place and prevents the shade from flapping, even though there be quite a strong air current. The device is also suited for supporting light articles exhibited in show cases, or for holding cards in store windows.

RUST-PROOFING PROCESS

INVENTED BY ITALIAN

A rust-proofing process has been devised by an Italian chemist which is designed to make cast and wrought-iron and steel pieces withstand the corrosive action of the air, of water, and of gases for an unlimited period. Pieces to be treated are cleaned by emery paper, or other means, and then placed in a wire case or framework, which is in turn deposited in an airtight muffle that has previously been heated by gas jets. Superheated steam is turned into the muffle, after it has been closed, to prepare the pieces for the chemical treatment that is to follow. The steam is shut off after about 30 minutes. A chemical substance in the form of a powder is then placed in a retort at the back of the muffle and is heated separately from the latter. Fumes from the powder are forced into the muffle under pressure. This gives the iron or steel pieces a protective coating of oxide.

GERMAN-DUTCH TRAINS NEED UNUSUAL AMOUNT OF OIL

For some time past, according to reports, international trains arriving in Holland from Germany were found to run very noisily and to be in need of more lubricant. Investigation by the Dutch railroad officials revealed the fact, it is said, that the lubricant containers on the trains from across the border had been emptied of oil and grease before leaving Germany, where lubricants are now scarce, or else were provided with just about enough to carry them into Holland. After this discovery the Dutch guards saw to it that they did not supply more than enough oil and grease to carry the trains back over the boundary.

1850
King & Christianson
350 N. Clark St., Chicago
Send letters to J. L. Christianson

1885
Compressed Air Magazine
Jan. F. Blumhagen, President
Boettlinger Rust Proofing Co., 111 Broadway New York

ELECTRIC BULLETIN SYSTEM OPERATED BY KEYBOARD

3251 Broadway, New York.

Electric machines which display news bulletins to the public and in essential respects operate similarly to certain printing-telegraph systems, are being used by a number of representative newspapers in the East. The apparatus, although first patented some six years ago, is just being introduced in an active way. The device is designed for the instantaneous posting of bulletins at one or several different points in a city, and is controlled with a typewriter keyboard in the office providing the service. The bulletin board itself is made in various sizes, one of which offers a printing space of ap-

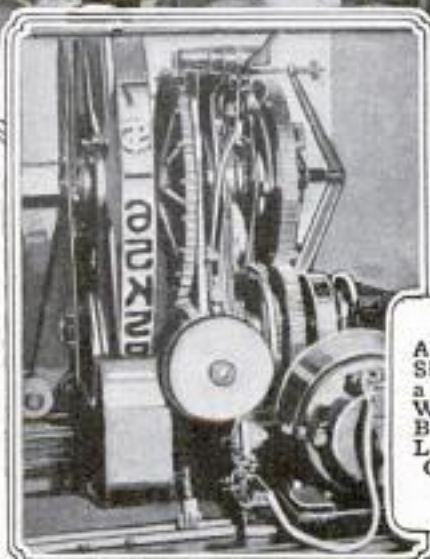
sender and can work at a speed of 70 revolutions a minute, printing 30 let-



Any Number of the Bulletin Machines, Situated Miles Apart, may be Operated Simultaneously by This Keyboard



Above: Crowds Blocking Sidewalk before Office of a Philadelphia Newspaper Where the Electric Bulletin-Board System is Installed. Left: The Type Wheel and Operating Mechanism of Apparatus



proximately 4 by 7 ft. As paper is wound from one roll, carried up the board and down the opposite side to another roll, it comes in contact with a large printing wheel carrying type 1 3/4 in. high. This is controlled by a keyboard

ers and spaces to a line. When operated continuously, it averages 750 words an hour. The bulletins may be displayed anywhere that a 110-volt current is available for operating purposes. At Philadelphia one is installed 25 miles from the newspaper office controlling it. At the instant a printing key is depressed on the sending board, a character is impressed on the paper roll and presented to public view. The paper rolls upward one line at a time, the bulletins appearing at the bottom of the cabinet.

1907 Columbia Highway Commission Portland, Ore.

OREGON'S GREAT HIGHWAY TO BE DEDICATED SOON

One of America's most beautiful roads, the Columbia River Highway in Oregon, is nearing completion and will be dedicated early in June as a special feature of Portland's annual rose festival, according to recent announcements. Extending eastward from Portland for a distance of about 60 miles, this finely built artery of travel follows the shore of the Columbia River. Though it possesses no grades of more than five per cent, it nevertheless rises to several points from which impressive views of the surrounding country may be secured. From Crown Point, for example, the river can be seen stretching away in the distance for many miles. The road passes near a number of waterfalls, among them being the Multnomah Falls, which have a drop of 740 ft. One of the many concrete bridges constructed as a part of this highway is situated in front of these falls, and it is this spot that has been chosen for the scene of the dedication ceremony.

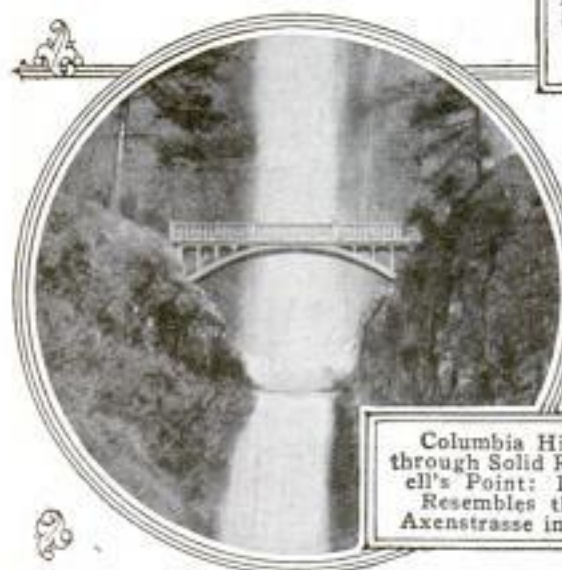
The most striking feature of the whole stretch of roadway is the windowed tunnel through the solid rock at Mitchell's Point. The tunnel proper is 390 ft. long, 18 ft. wide, and 10 ft. high; a long concrete viaduct approaches it. The highway through this region was made possible by an appropriation of \$50,000 from the State Highway Commission and a bond

issue of \$75,000 approved by the citizens of Hood River County. The tunnel has five arched windows overlooking the river valley and closely resembles the famous Axenstrasse, which skirts the shore of Lake Lucerne, Switzerland. A section of the highway, 45 miles long, was completed early in the year and has been used by thousands.

Municipal-gas authorities in the Birmingham district, England, are preparing against possible damage to their works by enemy air craft. The mains of neighboring systems are being connected so that in case one plant is damaged assistance can be rendered by those adjacent to it.



Right: Falls near One of Foot Trails Leading from Highway. Multnomah Falls Shown in Circle Below

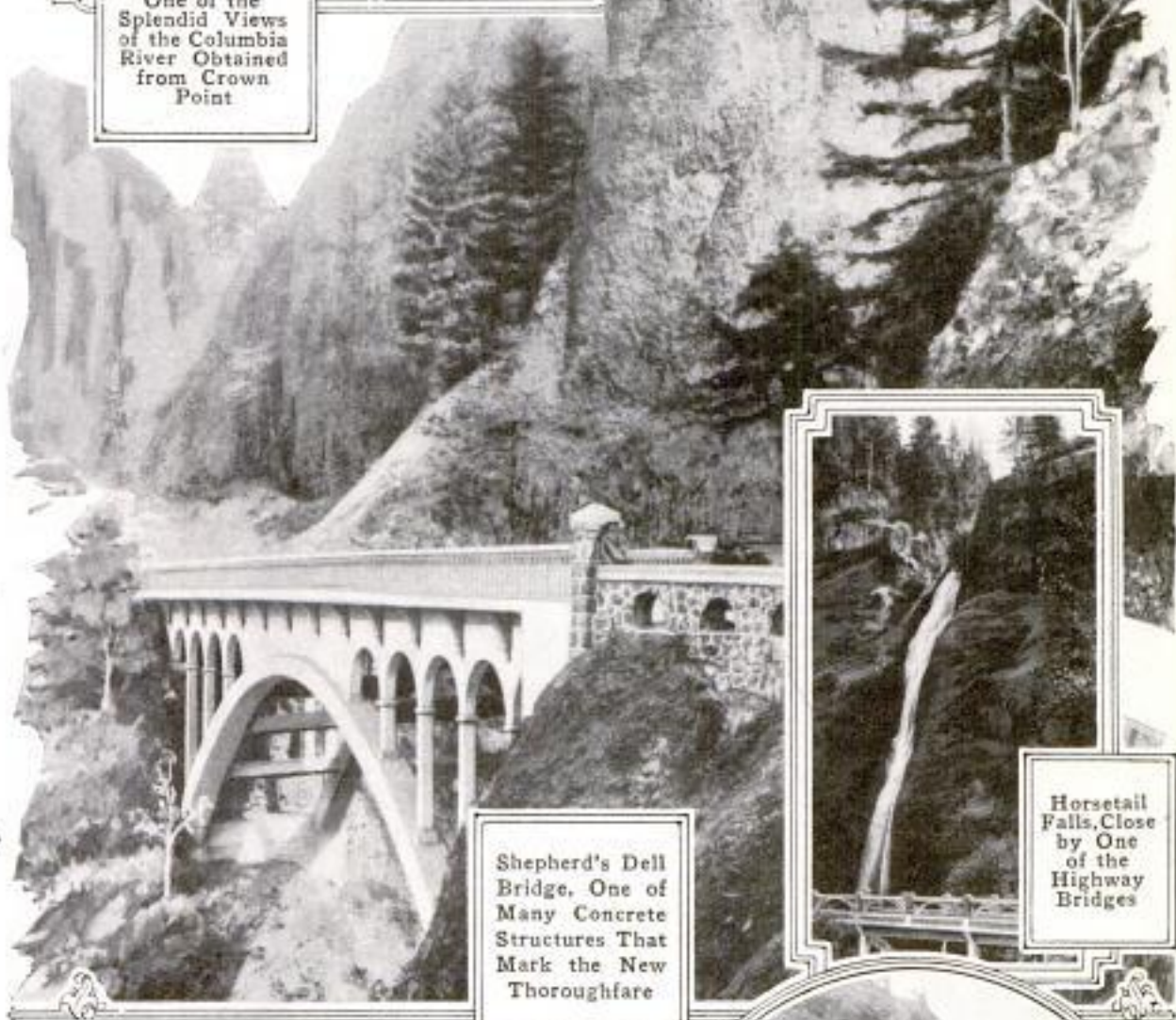


Columbia Highway Cut through Solid Rock at Mitchell's Point: It Strikingly Resembles the Famous Axenstrasse in Switzerland





One of the
Splendid Views
of the Columbia
River Obtained
from Crown
Point



Shepherd's Dell
Bridge, One of
Many Concrete
Structures That
Mark the New
Thoroughfare



Horsetail
Falls, Close
by One
of the
Highway
Bridges



Left: Crown Point and a
View of the Columbia River.
Right: Exterior View of
Tunnel at Mitchell's Point



FORMIDABLE ARMORED CAR FOR NEW YORK TROOPS

The first unit of the armored motor-car train recently presented to the New York National Guard has been constructed. The truck is of the two-ton worm-drive type, protected with 2,400 lb. of armor plate which is proof against rifle fire at 50 yd. Every portion of the chassis is completely housed. The machine complete weighs 9,052 lb. It is equipped with an electric lighting and starting system, disappearing searchlight, and headlamps which are set close to the ground so that their rays cannot carry far. The armament consists of two machine guns mounted on shielded turrets. The driver's seat is placed as low as those in racing cars so that the occupant is given good protection and is out of the way of the gunners. Entrance to the car is gained through a door at the rear. There is no roof. The streamline steel body is designed in four parts: the hood, cab, and two rear portions, the latter being capable of removal when it is wished to transport supplies on the platform. The crank case and radiator are both well protected with armor,

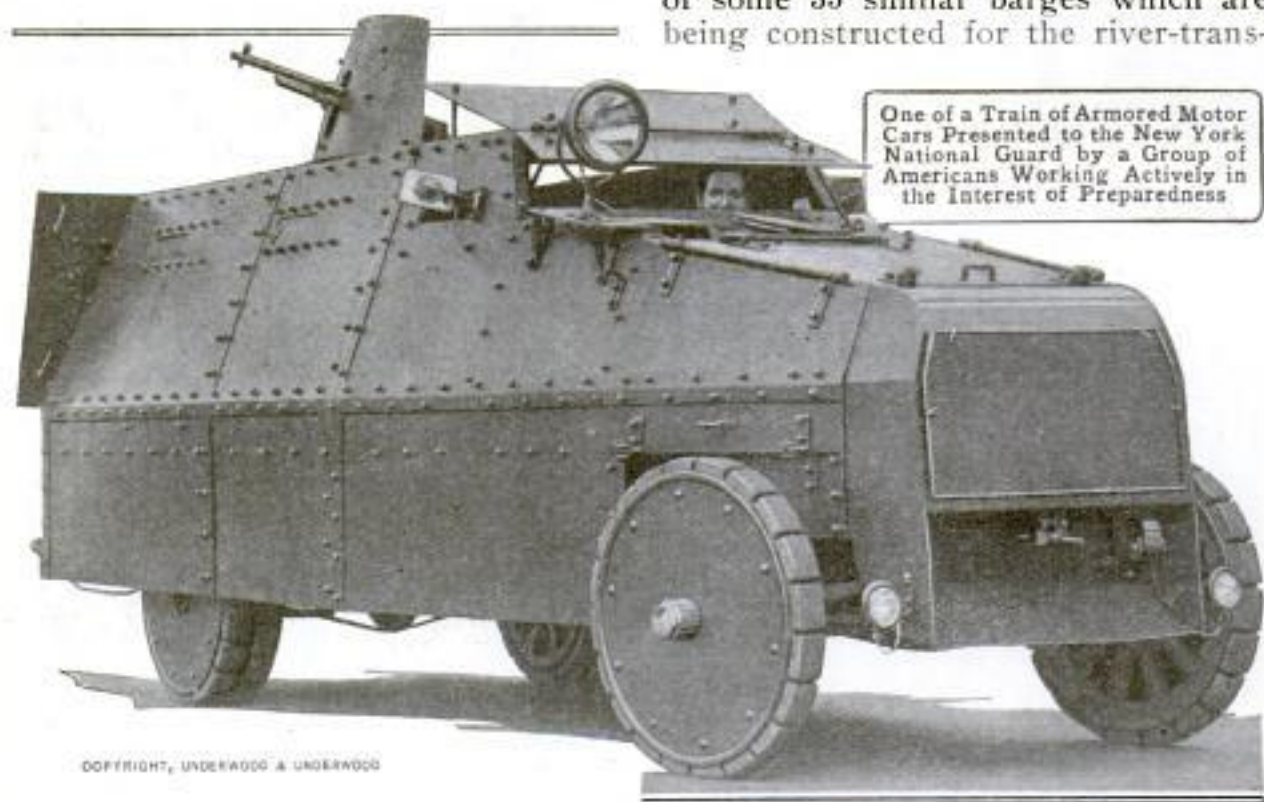
while the hood is so hinged that ready access is given to the motor. The wheels are made of wood and armored with steel disks, those in the rear also being half covered by the sides of the car. A porthole is provided in each side of the driver's cab, two in both sides of the body, and one at the rear. It is understood that essentially the same body design will be used on the other machines for the guard.

1864

BUILD STEEL MOTOR BARGES FOR INLAND SHIPPING

Foreign capital is being employed in launching an apparently well-organized, comprehensive scheme for reviving shipping on the Mississippi River and its major tributaries, which has been practically dormant during the last generation. In case the venture meets with success, however, it will not mean that the picturesque old side and stern wheelers of ante-bellum days will also be restored to our inland waterways. Instead, squatly steel barges of great carrying capacity will be used.

The first of these craft within the last few weeks made its maiden trip to New Orleans. It is the smallest of a fleet of some 35 similar barges which are being constructed for the river-trans-



One of a Train of Armored Motor Cars Presented to the New York National Guard by a Group of Americans Working Actively in the Interest of Preparedness

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John H. Bernhard
 Amsterdam Holland 839
POPULAR MECHANICS
Inland Navigation Co. New Orleans La.
(via Memphis & St. Louis)
Howard Shipyards Co.
Jeffersonville, Ind.



The "Inco No. 1," the First of a Large Fleet of Motor-Driven Steel Barges with Which It is Expected to Restore Shipping on the Mississippi River

portation service. A comparatively low initial cost, reasonable operating expense, and general efficiency are the outstanding features of the craft which make it ostensibly capable of competing with the railroads.

"Inco No. 1," the original unit of the fleet, is 240 ft. in length, 43 ft. across the beam, and when loaded has a draft of $7\frac{1}{2}$ ft. It can handle a cargo of more than 1,000 tons, buck the current of the Mississippi at nine miles an hour, and be operated by a crew of a dozen mechanics and freight handlers. This last item is in striking contrast to the large aggregations required in navigating the old steamboats. A barge of this type costs about \$95,000 to build. It is driven by a set of four oil-burning motors and 51-in. screw propellers, and navigated from a bridge placed amidships. A traveling gantry crane loads and discharges the freight. The vessel is equipped with radio apparatus so that communication can be held with New Orleans, Memphis, or St. Louis while en route.

A corps of U. S. Army engineers recently constructed a pontoon bridge, consisting of seven 20-ft. bays, across a river at Ft. Leavenworth, in $14\frac{1}{2}$ minutes.

UNUSUAL RECORD IS MADE BY MOTOR FIRE ENGINE/703

During a competitive test of motor fire engines at Chicago recently, a machine equipped with a double-acting piston pumping unit made a remarkable showing by delivering a stream of



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Making the Test on the Roof of the Masonic Temple at Chicago: An Engine at the Street Level, 354 Feet Below, is Delivering Water to the Nozzle at a Pressure of 230 Pounds

Ahrens-Trox Fire Engine Co.
Colerain Av.
Cinti, O.

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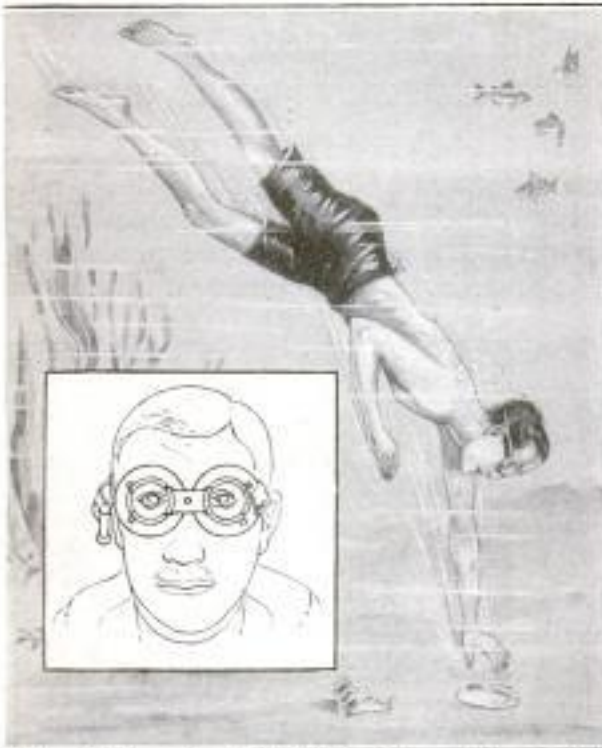
water at the top of the Masonic Temple, 354 ft. above the ground, at a nozzle pressure of 230 lb. to the square inch. The machine is of a distinctive design, having its multiple pump mounted at the extreme front of the chassis immediately ahead of the motor. Power is taken from both ends of the engine's crank shaft, the clutches and transmission elements being separate. The method employed to cool the engine while it is driving the pump is interesting because of its conven-

ience and efficiency. A series of looped tubes is attached to a bronze junction box and extended into the suction chamber. The water from the radiator, as it circulates through these pipes, is cooled by the volume discharged from the pump. Furthermore, the cooling effect can be regulated by increasing or decreasing the flow to the loops. The car has a wheel base of 171 in., its engine develops 100 hp., and a road speed of about 30 miles an hour is possible.

1815 *Q. J. Jones*

DIVER'S SPECTACLES HAVE AIR CHAMBERS IN LENSES

The indistinct appearance which objects have to human eyes when the eyes are submerged and in contact with wa-



Diver's Spectacles Which Have Lenses Containing Air-Filled Chambers: These Spectacles Enable the Wearer to See More Clearly under Water

ter is well known to swimmers and divers. Spectacles have been produced by a European firm which overcome this difficulty, making other eye protection unnecessary. Objects appear indistinct to eyes submerged in water because the human eye is designed to focus light rays entering it from the air; rays entering the eye directly from

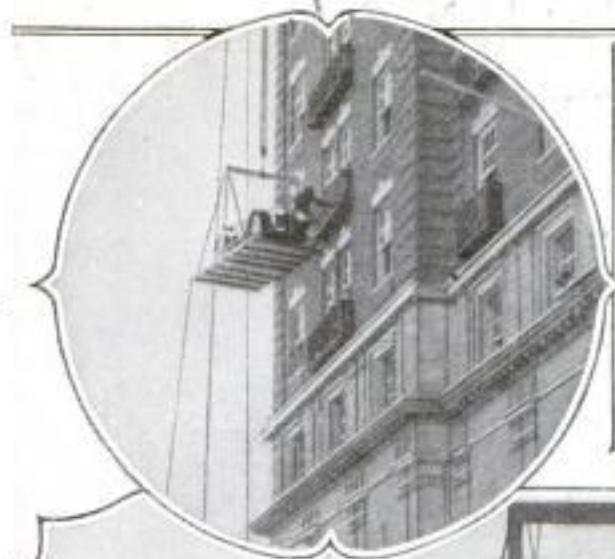
water are not properly refracted, and lack of definition is the result. The new spectacles have large hollow lenses, the outer walls of which are plane and the inner walls concave of practically the same curvature as the cornea, an airtight chamber being in between. With these spectacles a diver has an air chamber always before his eyes and so sees normally. The glasses are fitted with pneumatic rubber rings which are adjusted tightly around each eye, making a chamber between the eye and the lens which is filled with water. Fresh water may be used if the diver is to descend into water so salty that it would be injurious to the eyes. This film of water is very thin, and, having parallel surfaces, does not appreciably refract the light rays, which therefore reach the eyes as if coming from air.

1961 —

MANY TRYING TO OVERCOME POTASH SHORTAGE

Because of the serious shortage of potash in this country caused by the fact that it cannot now be imported from Germany, efforts have been made along various lines to discover ways of securing it in the United States. For the most part these attempts have not met with large success. The most pretentious plant engaged in producing potash is owned by a large packing concern and is located at Marysville, Utah. There about 30 tons of potash salts are extracted daily from alunite. Of course this output is very insignificant compared with the demand. The

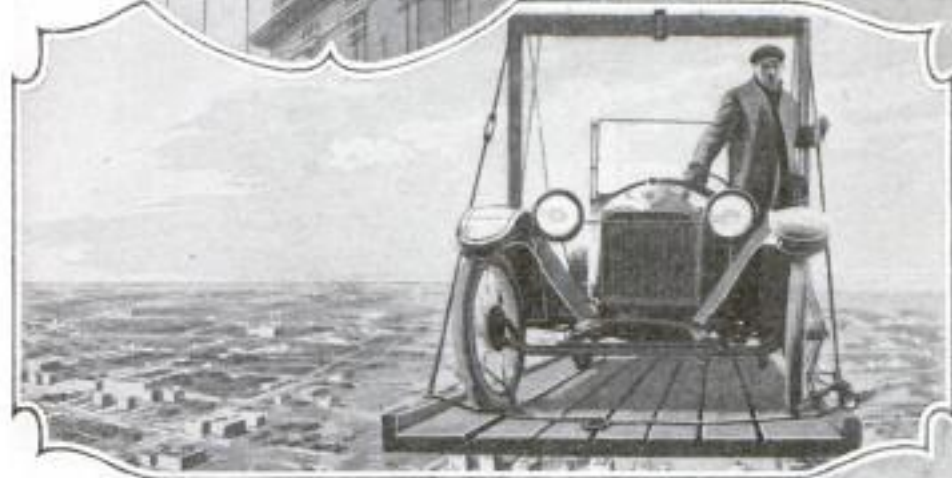
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Left: Workman Guiding Platform Containing an Automobile as It was being Hoisted to the Twelfth Story, Where a Motor-Car Exhibit was to be Held

Below: Close View of the Platform, Showing Manner in Which the Cars were Fastened to It

Right: An Automobile About to be Taken into the Twelfth Story of the Hotel in New Haven, Connecticut



waters of Great Salt Lake are believed to contain potash salts and an extensive experiment is being made by a match company to learn whether or not potash salts, and other chemicals, can be extracted from the water by high concentration methods. A plant in which experiments can be made has been erected, and the company is said to be prepared to spend \$50,000 in this investigation. Should it prove successful, the work will be undertaken more extensively, not alone for the sake of the potash but also for other chemicals of value in the making of matches.

Diamond Match Co. for Evans, Utah.

— 1783 —
MANY MOTOR CARS HOISTED TO TWELFTH FLOOR

The selection of the twelfth floor of a hotel as the place to hold the New Haven, Conn., automobile show necessitated the employment of unusual means of transporting the exhibition cars to the display rooms. The firm which took the contract for this task fastened a heavy beam to the roof,



allowing one end of the beam to project over the street. A cable was passed through a pulley fastened to the beam end and by this means 25 cars were lifted, one at a time, on a special platform to a twelfth-story window, where they were unloaded. Power for the hoisting was obtained from the storage battery of an electric truck. All of the cars were transferred without mishap.

Auto Club of New Haven, Conn.

2513

N. U. 417 7th Ave. New York.
International Film Service, Inc.

AMERICAN TROOPERS ENCAMPED AT THE BORDER

238 William New York City

111



COPYRIGHT INTERNATIONAL FILM SERVICE
Indian Scouts and Guides Who are Following Villa's Trail with Our Boys. Some of Them are Enjoying Their First Motor Ride



The Machine Gun of the 13th Cavalry Which Jammed at the Crucial Moment during Pancho Villa's Raid upon Columbus



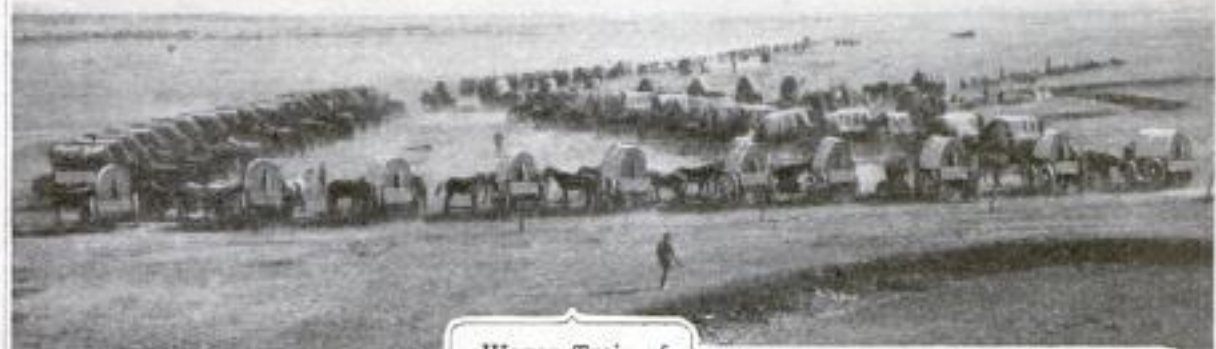
One of a Number of Wounded Members of Villa's Outlaw Band Brought to Columbus and Nursed at Army Field Hospital



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Scene in the Camp of the 5th Cavalry at Columbus, Showing Troopers Throwing Stubborn Horse That Refused to be Shod

H. L. Watson Post, 2513 *War*
Phoenix Army.

AND ON DUSTY DESERT "SOMEWHERE" IN MEXICO"



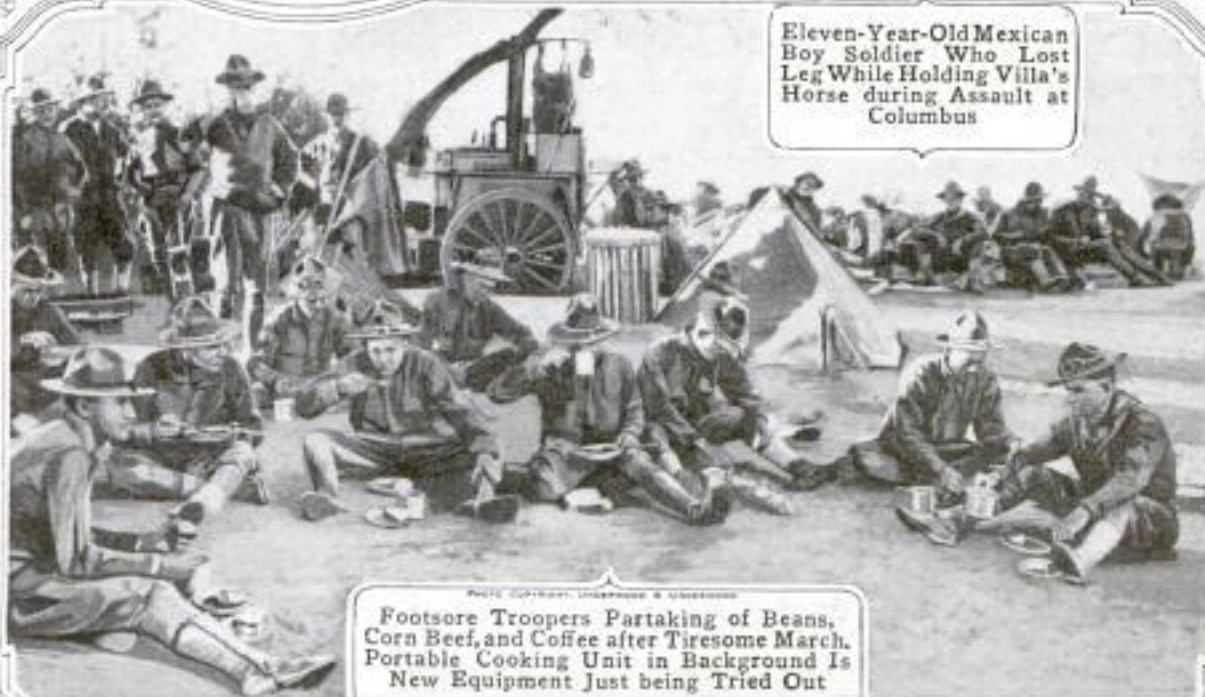
Wagon Train of the Punitive Expeditionary Force Encamped on the Desert after Long March



Enlisting Chauffeurs at Border to Drive Trucks into Mexico: The Number of Applicants Exceeded the Vacancies



Eleven-Year-Old Mexican Boy Soldier Who Lost Leg While Holding Villa's Horse during Assault at Columbus



Footsore Troopers Partaking of Beans, Corn Beef, and Coffee after Tiresome March. Portable Cooking Unit in Background Is New Equipment Just being Tried Out

Chris Smith,
Algona, Minn.

TORPEDO-BOAT SPEEDERS FOR COAST DEFENSE

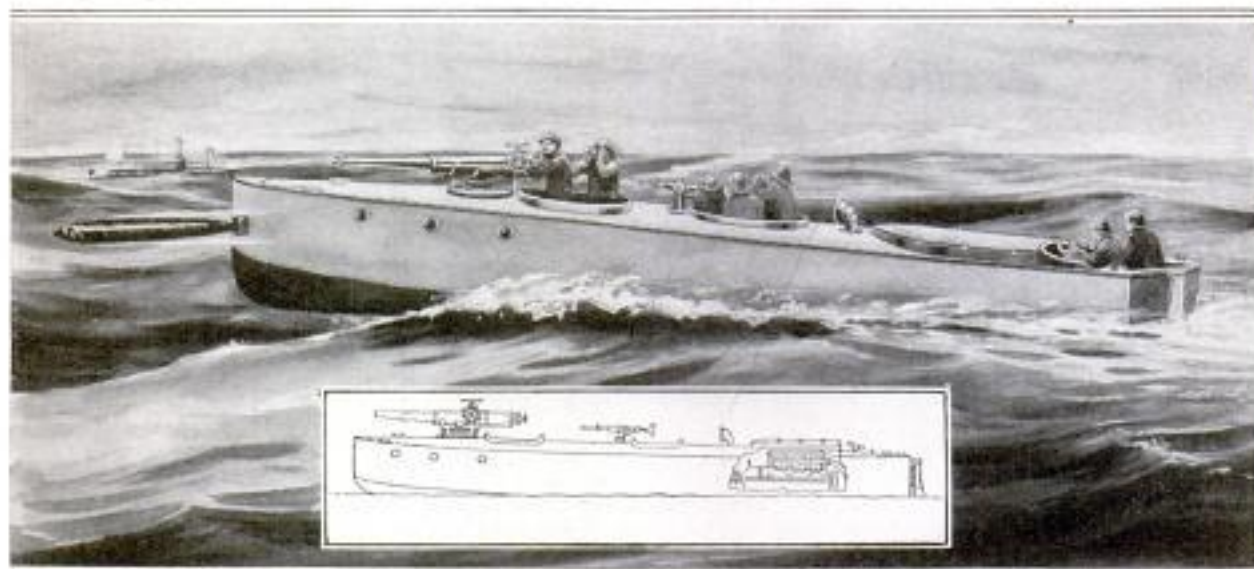
Some interest has been attracted of late by a proposal to construct large fleets of torpedo-carrying speed boats for coast-defense purposes. A Michigan boat designer, who claims the distinction of being the inventor of the first hydroplane, has submitted plans for a fast type of armed craft to the government. He has designed a 70-ft. vessel which would carry one torpedo tube at its bow, two machine guns amidships, a crew of 10 men, and develop a maximum speed of 55 miles an hour. The boat, as planned, is of the twin-screw type and equipped with dual engines, each capable of producing approximately 600 hp. It offers adequate quarters for the officers and men and would be vulnerable only when hit below the water line. It is estimated that the craft could be built in quantities for \$20,000, which means that 500, or more, could be manufactured for the price of one modern dreadnaught. Since the designer of this armed speeder is the builder of many of the world's fastest power boats, his proposal appears to be more than merely visionary. In addition to speed, the craft has been designed for seaworthiness. Theoretically, at least, a large squadron of these boats would

be capable of destroying in short order any enemy fleet that might attempt to attack our coasts. The great speed of the vessels would also make them extremely poor targets, and the crew could easily be protected from machine-gun fire. A heavy sea, however, might render the craft temporarily worthless.

1960—
**PRODUCES A FLAME HOTTER
THAN OXYACETYLENE**

A flame which possesses a higher temperature than oxyacetylene and so may supplant that gas in certain fields has been produced by a Stockholm technical student who has devised a burner that employs powdered aluminum and oxygen as fuel. The inventor proceeded on the chemical law that the maximum temperature depends on the heating value of the combustible material and the point at which a chemical substance may be reduced by means of heat into groups of molecules or atoms which reunite when the temperature is again lowered. Aluminum was chosen because it possesses a higher heating value and yields a combustion product at a higher temperature than other substances used heretofore. With the new combination he is able to produce a flame having a temperature of more than 9,000° Fahrenheit.

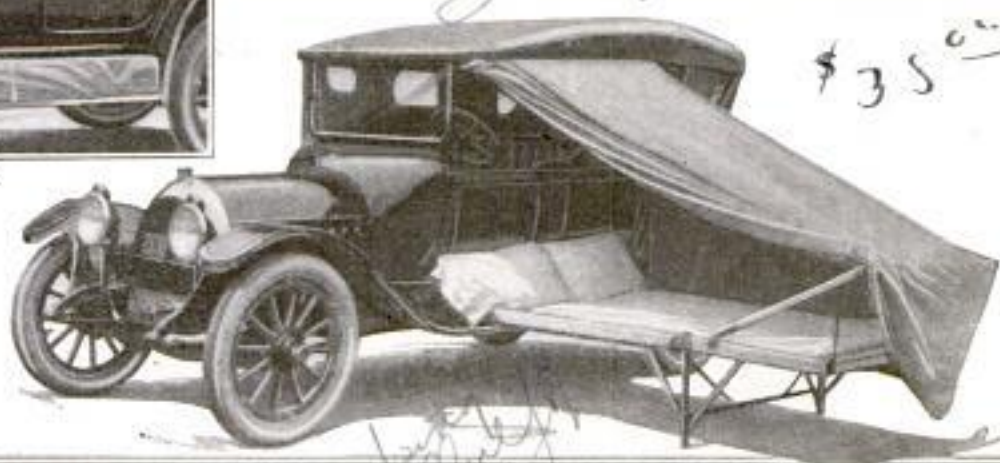
*Olef staklin
7000. This is a cheap burner.*



Proposed Torpedo Speed Boat for Coast-Defense Duty: The 70-Foot Craft is Designed to Carry a Complement of 10 Men and Skim over the Water at 55 Miles an Hour. It is Estimated That Approximately 500 Stanch Vessels of This Type could be Constructed for the Price of One Modern Dreadnaught



A Camp Bed for Motorists That can be Folded into Small Space and Carried on the Running Board as Shown Above



BED CARRIED ON RUNNING BOARD OF AUTOMOBILE

A portable bed which can be folded into very compact form and is designed to be carried on the running board of an automobile has been put on the market. Special effort has been expended to produce for this article a strong and comfortable combination of flexible springs and a mattress fabric that could be rolled, or folded, into small space. The bed is 48 in. wide and of usual length. Its frame is of metal-capped wood and of angle-iron pieces, all of which can be folded together quickly. A heavy khaki fly fastens under the edge of the top and extends downward over the foot of the bed, being supported by a framework fastened to the latter. The head of the bed frame is swiveled to the running board, and the foot supported by braced iron legs. When folded up the bed measures 9 in. wide and 8 in. high; its weight is 65 lb. One advantage of such a bed for motorists is that the car can be used as a dressing room, and that in the daytime it occupies very little room.

1905

HAY BALERS OPERATED BY OLD LOCOMOTIVE

Not deterred by failure to get electric current or ordinary steam boilers for operating a hay-baling plant, an eastern war contractor purchased a 27-year-old locomotive from a railroad and set it up to supply the needed

power. To get the proper draft it was necessary to extend the smokestack to a height of 35 ft. The balers which are operated in this novel way are employed in preparing 50,000 tons of hay for the horses of the allies' armies. The hay contractor selected a site in Philadelphia and began setting up his machinery with the idea of running it electrically. Unforeseen engineering difficulties, however, made it impractical to operate the machinery with electricity, and instead the obsolete engine was secured to furnish power.



COPYRIGHT, INTERNATIONAL FILM SERVICE, INC.
 A Railroad Engine, 27 Years Old, Used to Operate Hay Balers

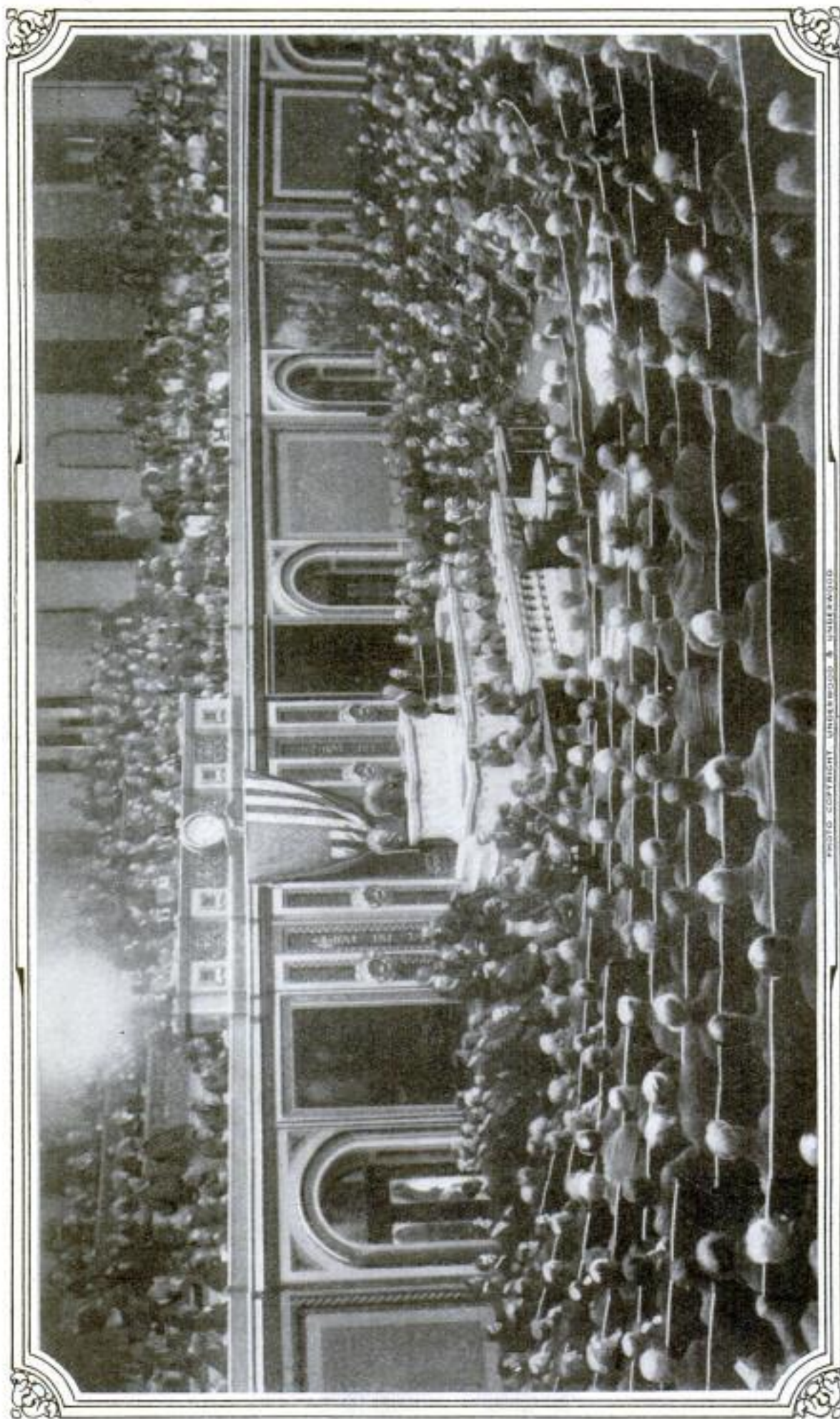
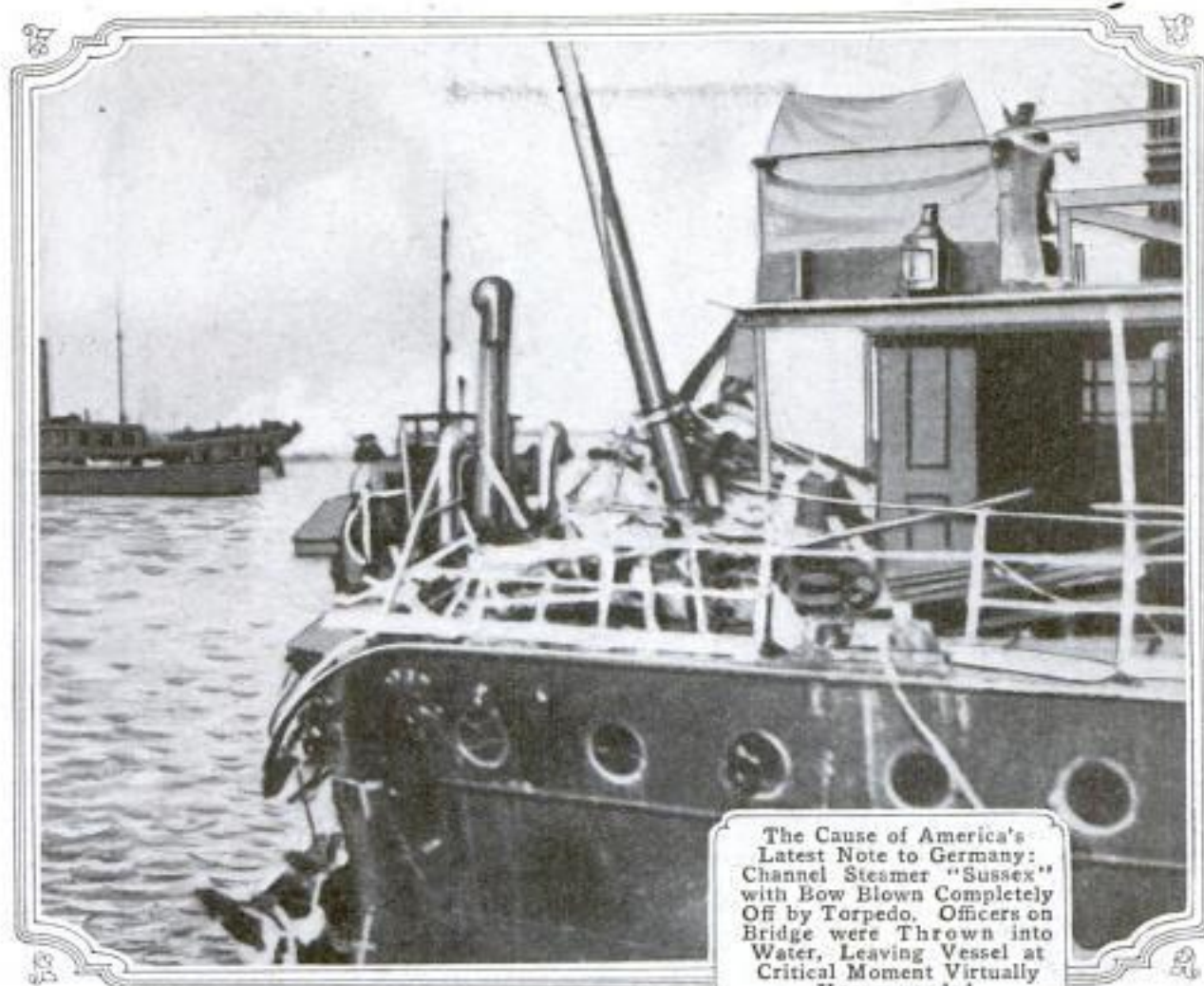


PHOTO-COPYRIGHT, UNDERWOOD & UNDERWOOD

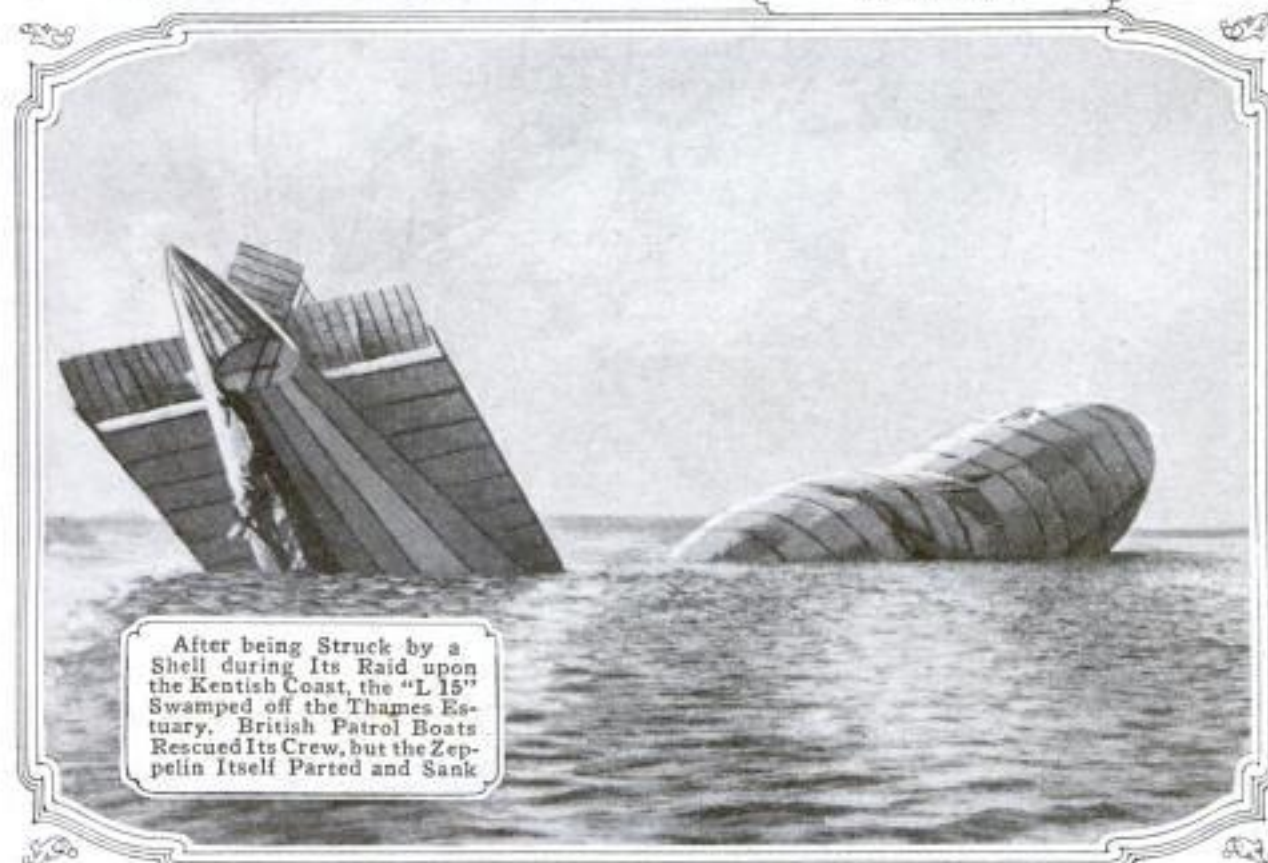
PRESIDENT'S HISTORICAL ADDRESS TO CONGRESS

PRESIDENT WILSON in the House Delivering His Epoch-Making Address before Senators and Representatives in Joint Session after the Dispatch of America's Virtual Ultimatum to the German Government on April 19: The figure of Mr. Wilson, who is in the act of reading, is blurred. This is not true in hardly a single other instance; a thing which comments strikingly upon the tenseness of the great body of listeners. The Vice President and speaker of the House are seated immediately back of the President.

TORPEDOED "SUSSEX" AND WRECKED ZEPPELIN



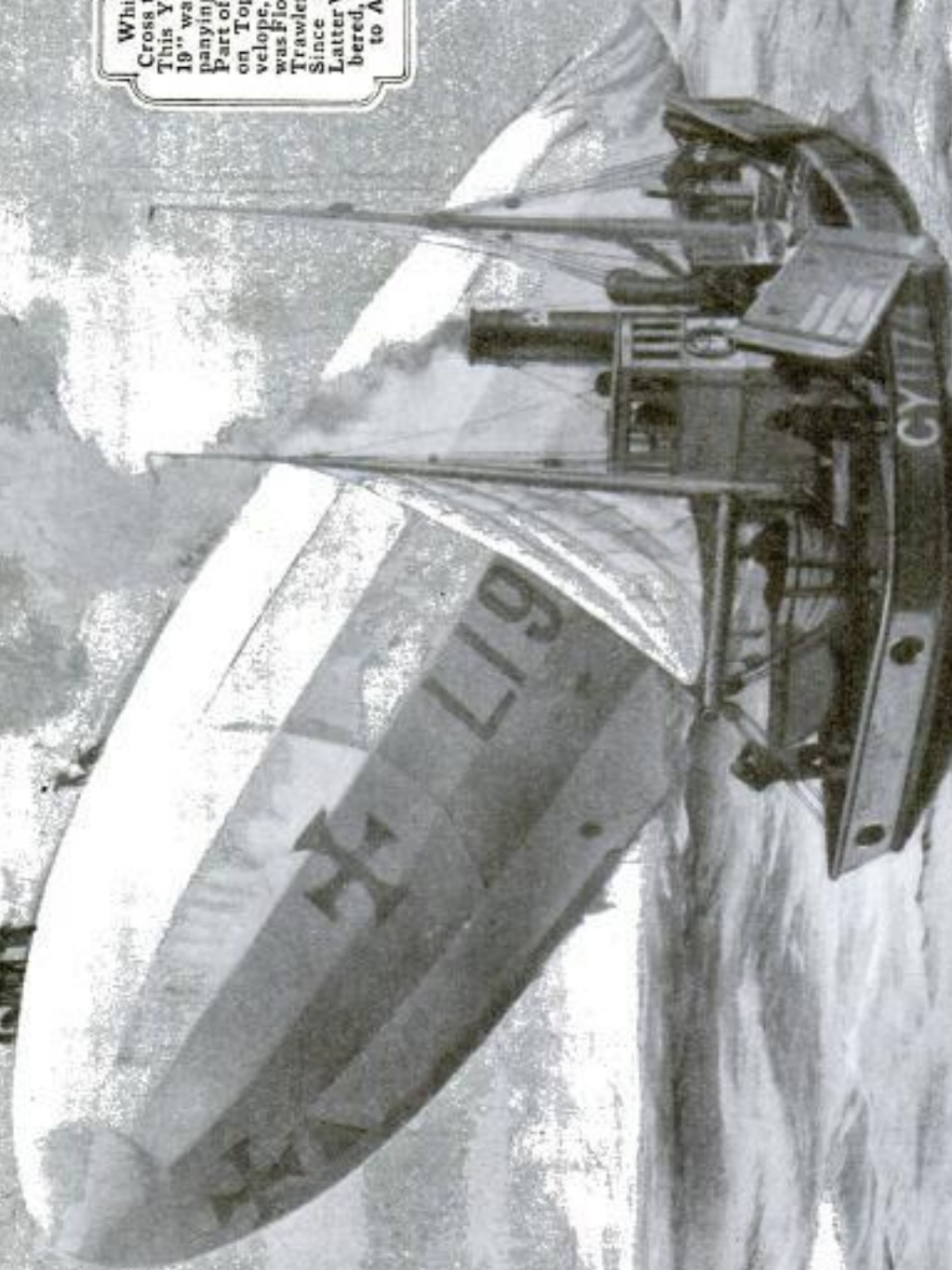
The Cause of America's Latest Note to Germany: Channel Steamer "Sussex" with Bow Blown Completely Off by Torpedo. Officers on Bridge were Thrown into Water, Leaving Vessel at Critical Moment Virtually Uncommanded



After being Struck by a Shell during Its Raid upon the Kentish Coast, the "L 15" Swamped off the Thames Estuary. British Patrol Boats Rescued Its Crew, but the Zeppelin Itself Parted and Sank

GERMAN ZEPPELIN FOUNDERS IN NORTH SEA

While Attempting to Cross the North Sea Early This Year the Zeppelin "L 19" was Lost. The Accompanying Illustration Shows Part of the Crew Marooned on Top of the Great Envelope, One End of Which was Floating When a British Trawler Found the Wreck. Since Those aboard the Latter Vessel were Outnumbered, It Was Impossible to Attempt a Rescue



FROM THE SPHERE, LONDON. COPYRIGHTED IN THE UNITED STATES BY THE NEW YORK HERALD COMPANY

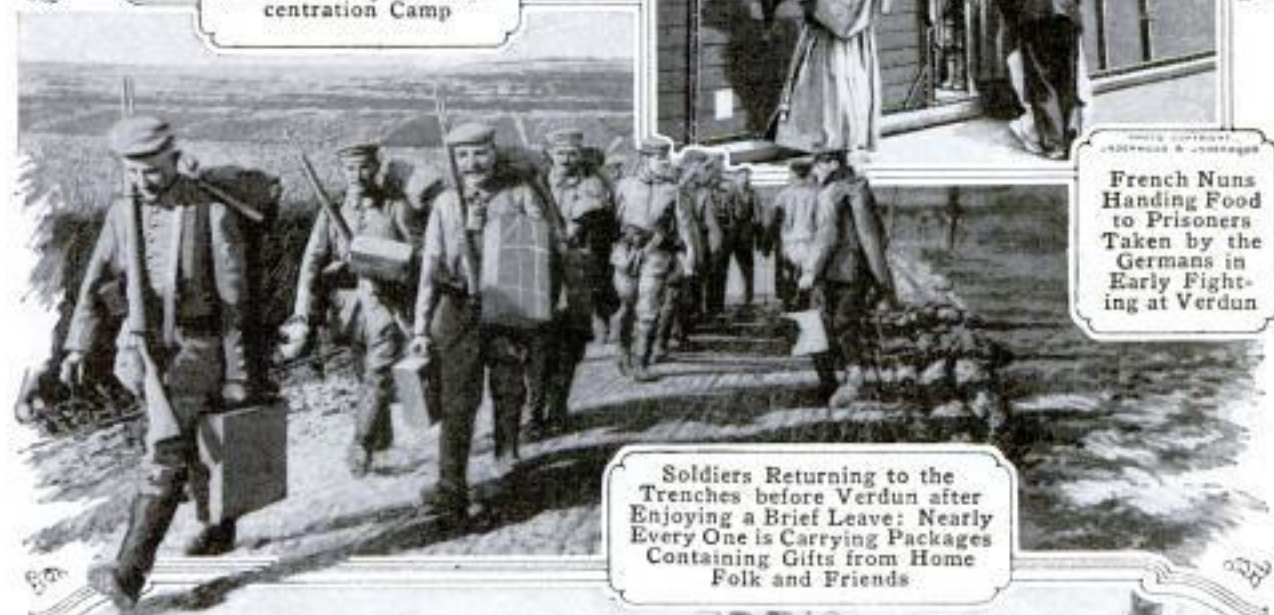
WITH GERMAN FORCES ON VERDUN FRONT



Prisoners Captured by the Germans at Verdun on Their Way to a Concentration Camp



French Nuns Handing Food to Prisoners Taken by the Germans in Early Fighting at Verdun

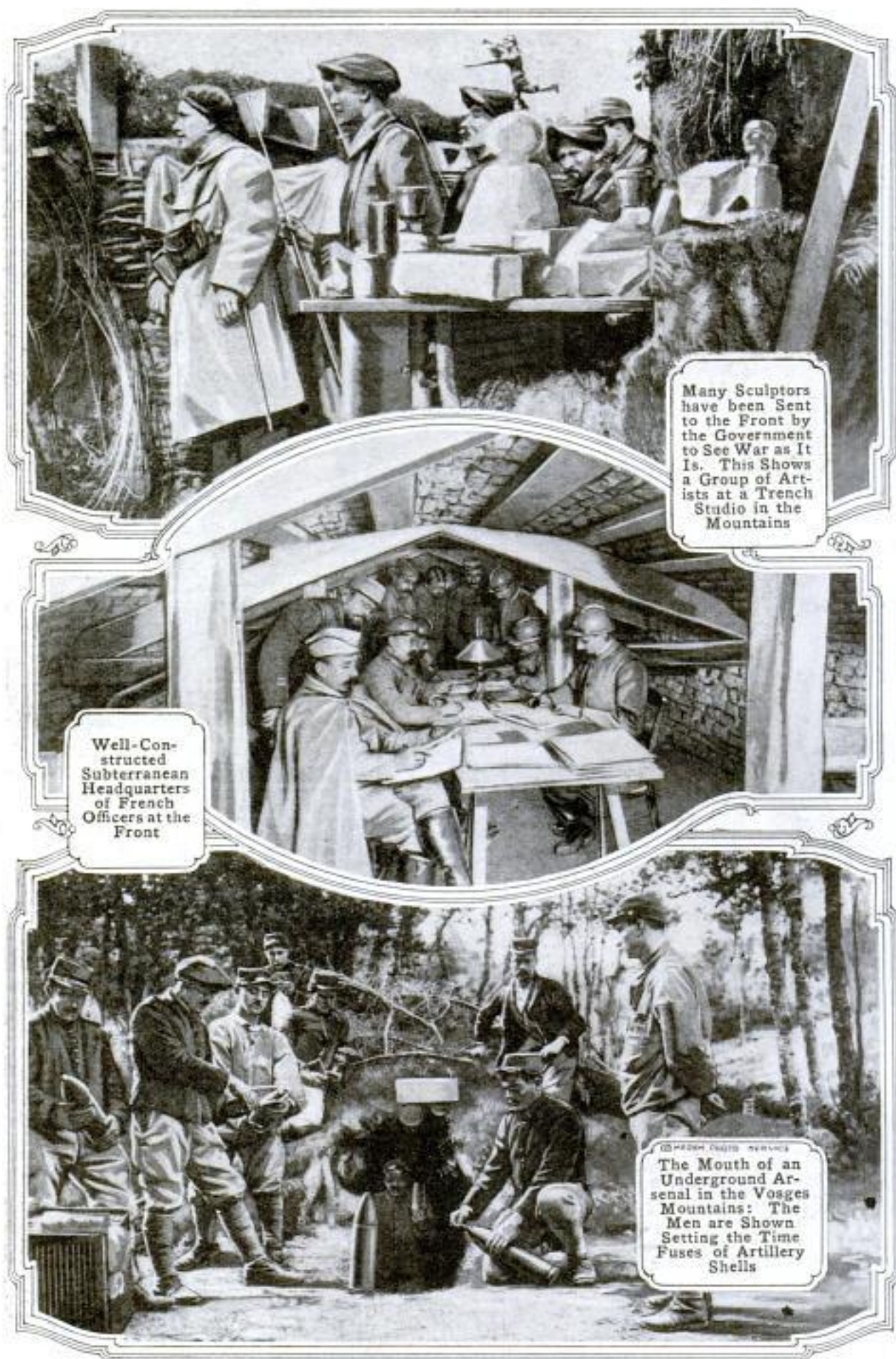


Soldiers Returning to the Trenches before Verdun after Enjoying a Brief Leave: Nearly Every One is Carrying Packages Containing Gifts from Home Folk and Friends



French Soldiers Taken during Fighting around Verdun: The Men are Carrying Their Belongings from Trenches Just Seized by the Enemy

EXTENSIVE SUBTERRANEAN WORKS OF FRENCH



Many Sculptors have been Sent to the Front by the Government to See War as It Is. This Shows a Group of Artists at a Trench Studio in the Mountains

Well-Constructed Subterranean Headquarters of French Officers at the Front

ARMY PHOTO SERVICE
The Mouth of an Underground Arsenal in the Vosges Mountains: The Men are Shown Setting the Time Fuses of Artillery Shells

FIGHTING FORCES IN WESTERN BATTLE ZONE



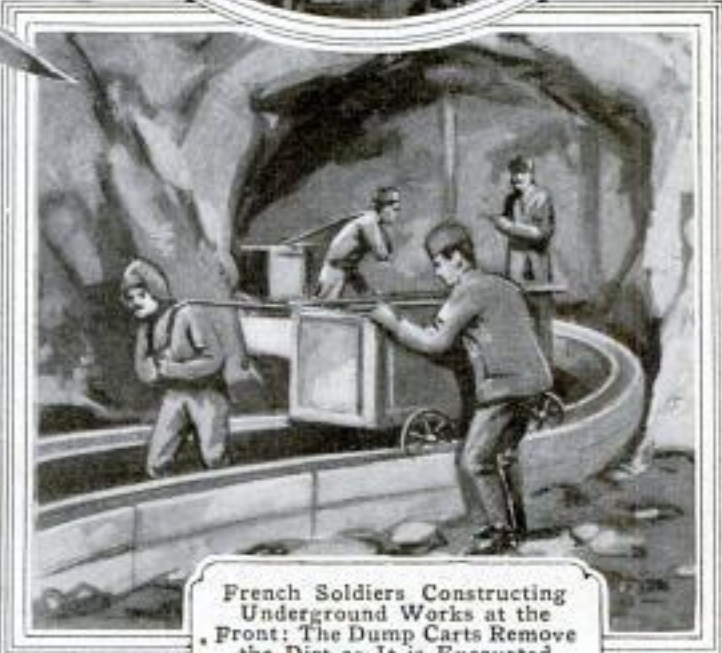
Wounded Arriving at the Rear after being Carried through Underground Passage Connecting Battle Trenches at Verdun



Armed with Knife and Revolver: A Member of Daredevil Band of "Trench Cleaners" Who Occupy Trenches Supposedly Evacuated and Combat Lurking Enemy before Arrival of Regulars

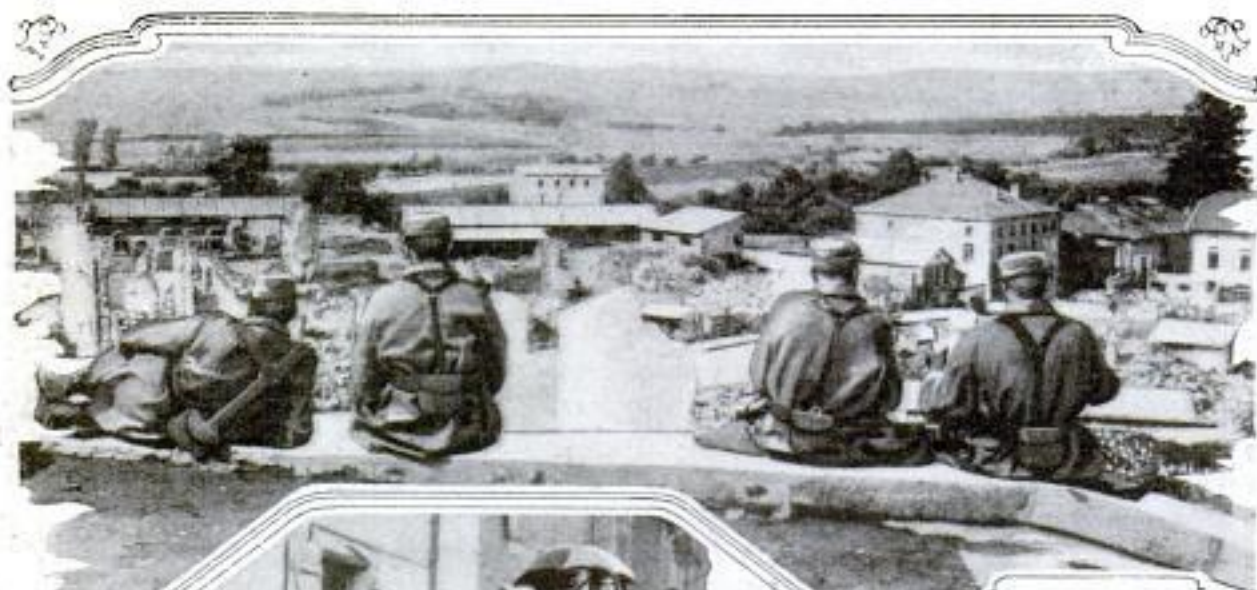


One of the Many Metal-Lined Shelters Constructed by the French Forces in the West



French Soldiers Constructing Underground Works at the Front: The Dump Carts Remove the Dirt as It is Excavated

WAR'S PATHETIC SIDE FROM FRENCH VIEWPOINT



This Village on Western Front has Just Fallen into the Hands of the French: With the Exception of a Few Buildings, the Entire Place has been Laid Low by Shells



Verdun Refugees Arriving at Town in Rear. This Is Merely One Out of Hundreds of Similar Pictures That might have been Taken



French War Widows and Orphans Gathered in Esplanade before Hotel des Invalides at Paris to Receive Legion of Honor Crosses Won by Loved Ones They Mourn

EXPLOSION WRECKS HISTORICAL FRENCH TOWN



Ruins of St. Denis, Industrial Town in Environs of Paris, Famed for Abbey from Which It Gets Its Name



Draft Horses Felled in Street: Not an Unusual Sight after Explosion



Hundreds of Buildings were Battered to Pieces by Flying Shells Which Rained upon the Town When French Arsenal Blew Up



Funeral of Many of the Victims of the Disaster. Naval Engines, Railway Materials, and Chemicals Were Chief Outputs of St. Denis' Big Industrial Plants

IN FIELD AND PALACE WITH WOUNDED AND DEAD



Circassian
Cossacks
Transporting
Wounded on
Stretchers
Slung on Bam-
boo Poles
between Their
Ponies



Russian Soldiers Killed
by Concussion of Large
Shell: Hundreds of
Cases Like This have
Occurred during War



At the Czar's Order the Imperial Winter Palace at Petrograd has been
Converted into an Army Hospital: Here Convalescing Soldiers are Seen
in the Art Galleries of the Palace Viewing Famous Russian War Paintings

**NEW TIRE-FILLING STATION
 INSURES RIGHT INFLATION**

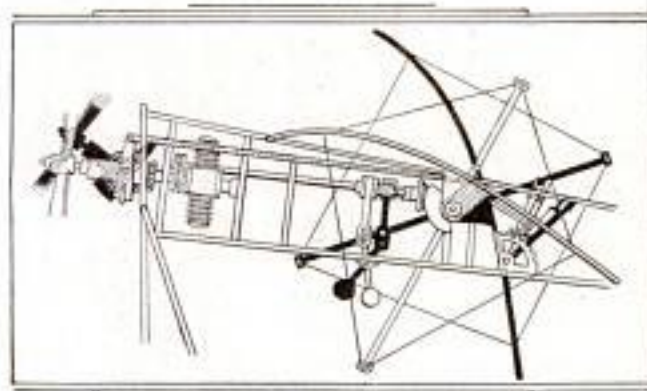
To safeguard the motorist against the danger of either over or under-inflating the tires of his car, a new



air-supply station, intended for installation at public garages, is arranged with an automatic gauge. Before air is forced into a tire the operator must move an indicator hand on a dial until it points to the size of the tubing which is to be inflated. This actuates a mechanism that determines the correct pressure for the respective tires

and provides for the delivery of the proper amount of air. The motorist is thus enabled to inflate a tire to the degree intended by the manufacturer, and do it quickly. The station includes an air compressor and motor. The gauge dials are inclosed in a compact housing, placed at a convenient height on a standard which is surmounted by a lamp.

Improved methods have been found for keeping cooked and raw shrimps in excellent condition while shipping them to distant inland markets.



**SAFETY FLIER IS DESIGNED
 WITH ADJUSTABLE WINGS**

In attempting to develop a monoplane capable of automatically righting itself in case its longitudinal balance should be destroyed, a Denver inventor has designed a machine which embodies a number of novel ideas. The wings and propeller are adjustable to various positions and are controlled by a pendulum arrangement which acts if the machine starts to plunge toward the ground at a dangerous angle. Thus the supporting surface may be pushed up and back to give a parachute effect, and the propeller tilted to any degree between horizontal and vertical so as to cause it to exert its energy in raising the nose of the machine, in the event of an accident. This immediately cuts the falling speed and draws the craft back to a flying position, at which time the wings and propeller may be readjusted to their normal angles by a manual lever.

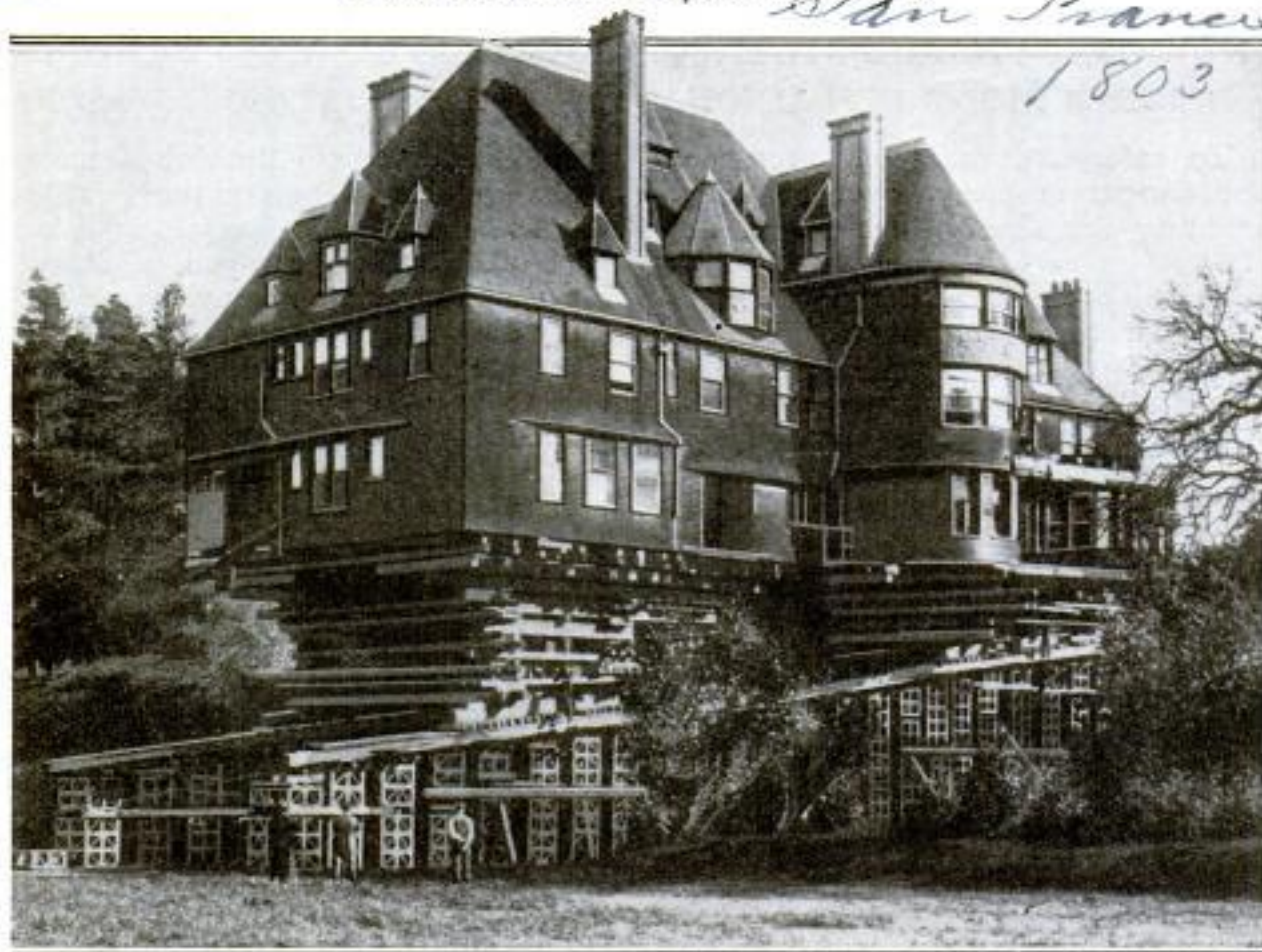
The pilot's seat is suspended from the frame in such a way that it remains horizontal at all times, eliminating the danger of its occupant being thrown out during a downward plunge.



Below, the Monoplane is Shown with Wings Drawn Back and Propeller Thrust Up so as to Bring Craft Back into Longitudinal Balance. The Diagram at the Left Explains the Structural Features Which Make This Possible

Millard Morris (Inventor)
 7018 Ogden St.
 Denver, Colo.

Bureau of Invs. of Wash. DC



The \$250,000 Crocker Mansion at Hillsborough, California, being Moved across a Ravine

The functions performed by the pendulum, which swings below the machine, may also be controlled by the aforementioned lever. Should an airman wish for some reason to prevent temporarily the action of the righting mechanism, the pendulum may be locked back by drawing upon a cord provided near his seat. A transmission shaft extending back from the engine provides the power for shifting the wings when the clutch is moved by a shipper which is actuated by the pendulum.

A very ingenious plan of supporting the wings has been worked out. Bracket plates attached to them are fixed to a transverse axle mounted in the main frame. A mast projecting above and below the plane is also mounted on this axle and carries the stays with which the wings are braced. As may be seen, this arrangement permits the supporting surface to be shifted to different angles of incidence with relation to the body.

GREAT MANSION IS MOVED OVER RUGGED REGION

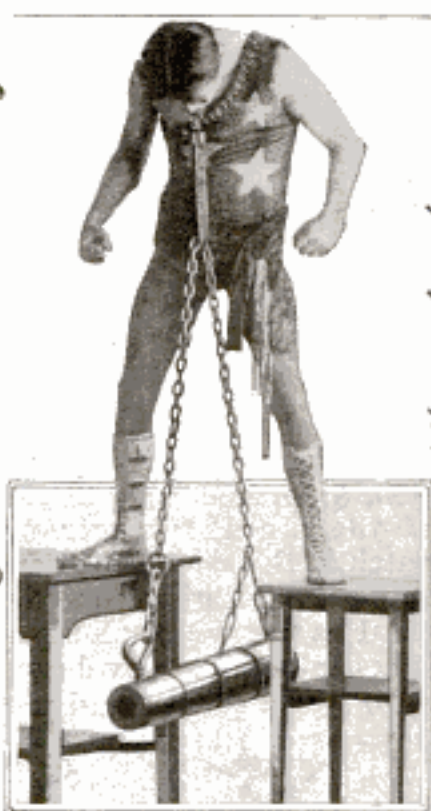
A house-moving operation which involved special difficulties because of the rough topography of the ground to be traversed and the size of the structure was undertaken at Hillsborough, Cal., early in the year. The building is the \$250,000 Crocker mansion, built 38 years ago; the new site is about a quarter of a mile from the old one. After placing heavy wooden needles under the mansion it was jacked up. In passing over depressions it was raised by means of beams and cribs as much as 50 ft. above the ground. About two hundred 8-in. rollers were used in moving it along, horses furnishing the power. In going down an incline of $1\frac{1}{2}$ in. to the foot, cables were required to hold it back. In order that it might be carried over a creek, a 30-ft. bridge of cribs was constructed. At the end of the first two months the crew of 18 men had moved the structure 350 yards.

1837 **MOTION PICTURES USED TO STUDY WRITING METHODS**

Motion pictures are being employed at the University of Chicago in making a scientific study of the various movements in writing with a view to ascertaining how poor writers can best be taught to improve. Motion pictures have been taken of children of two groups: good writers and poor writers. These pictures have been thrown on the screen for the purpose of analyzing the kinds of movements which characterize good as distinguished from poor writers. The investigators are not yet ready to make final deductions as to what the films reveal, but they are of the opinion that differences in rhythm of action and in the coördination of certain strokes are among the characteristics which will form a basis for judging good and bad movements. The advantage of the films is that they can be stopped at any point for detailed examination and comparison, and, of course, they can be repeated any number of times.



The Performer is Caught by Attendants as He is Carried Backward by the Recoil of the Gun



low his feet. The bore has a diameter of $2\frac{1}{4}$ in. and contains a light charge of powder which when touched off causes the gun to recoil. The man is caught by attendants who stand behind

him. The act is more spectacular than actually dangerous.

LENGTH OF JACK CAN BE ALMOST TREBLED 1478

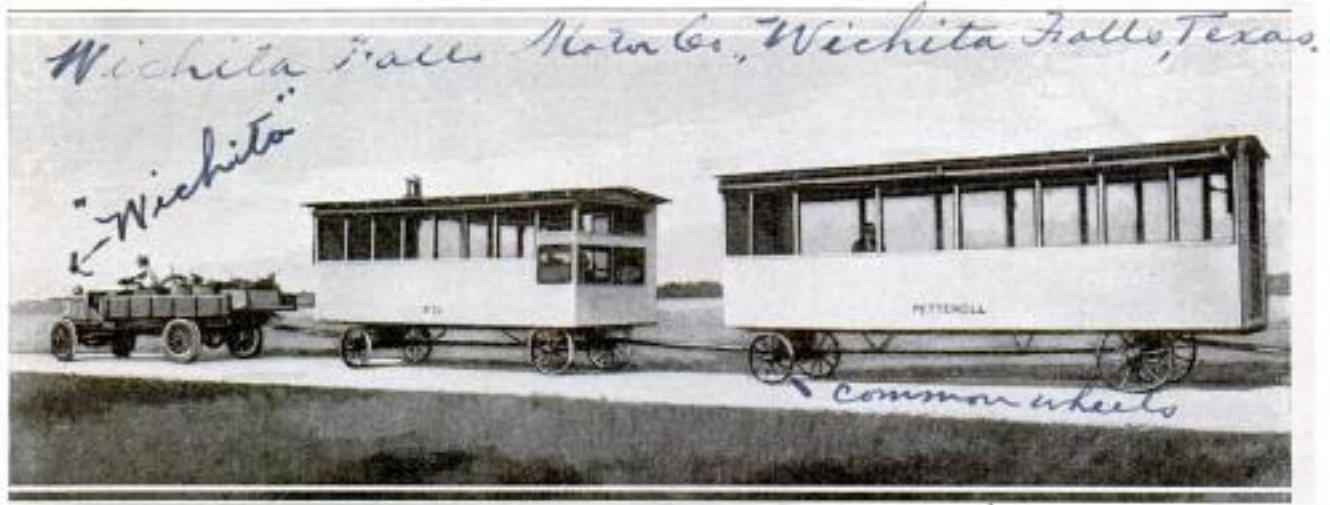
A compact lifting jack, which can be extended almost three times its shortest length, consists of a metal base and housing inclosing two plungers operated by a worm gear. One of these plungers fits movably into a grooved channel extending the length of the other. The narrower plunger has teeth, or cogs, so situated that they are in line with and correspond to rows of cogs on the wider plunger either side of its channel. Near the top of the latter member there are no teeth, so that when the gear is turned by a crank it engages the central plunger only. The latter can be lifted in this manner until it begins to raise the second plunger up to the gearing by means of lugs at its lower end which

Harry Rich. Tills 12th St. Mo. 1919 Kansas City, Mo.

1583 **CANNON IS HELD BY TEETH AND DISCHARGED**

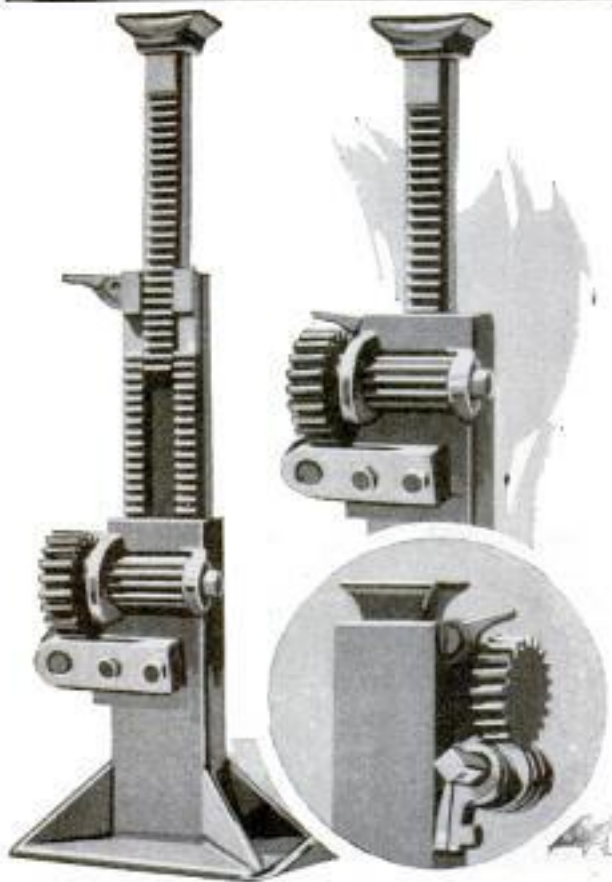
One of the somewhat novel feats exploited by a vaudeville performer now playing small towns throughout the South consists in holding a 200-lb. cannon suspended from his teeth and allowing it to be discharged. The man stands on the tops of two tables placed a number of inches apart. A chain attached at each end of the firing piece is looped through a leather strap to which a bit is fastened. Gripping the latter between his teeth, he holds the cannon, which hangs several inches be-

Invt:
Herbert A. Conners
895 Boylston St.
Boston.



Overland Motor Train Used by a Telephone-Construction Force Operating through Texas: Practically Every Everything Boasted by the Most Palatial Transcontinental Express,

engage shoulders at the upper end of the wider plunger. When in this position, a sprung dog at the upper end of the second plunger snaps into a notch in the side of the narrower member, preventing it from slipping backward as the wider plunger rises. The jack can be set at any desired height by means of a ratchet and pawl.



A Compact Jack, Especially Convenient for Automobiles, Which can be Made to Extend Almost Three Times Its Length

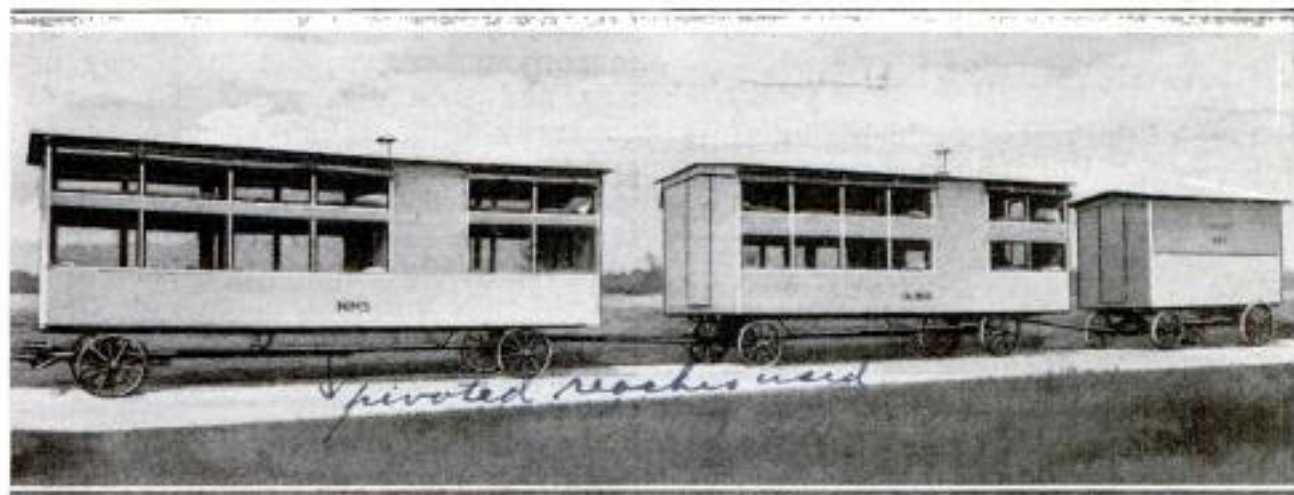
REASON OF MUSEUM FATIGUE LAID TO DISPLAY METHOD

Attention is being directed to the faulty manner in which exhibits are universally displayed in museums. A person visiting such an institution invariably becomes fatigued after a very short time. This is not so much because of the great number of things presented for inspection—for he tires before having gone far—but more especially on account of their arrangement. One moment a person is craning his neck and looking upward, the next instant he is stooping, and so on. The result is that he goes through a series of unaccustomed exercises and soon is affected with "museum fatigue." During the rest of his time in the institution he glances superficially at the exhibits, gaining only hazy impressions of what they are, and finally leaves, dizzy and exhausted. A certain authority, in calling this condition to notice, asserts that at present the contents of our museums are for the most part merely preserved, not truly displayed.

— 1725
COMPLETE AUTOMOBILE TRAIN IN TEXAS

What is undoubtedly entitled to be termed the most modern of prairie schooners, a motor train consisting of a tractor and five enclosed cars, is being used to transport a telephone-con-

Journal of Mechanics
July 16 - 30 22
Southwestern Telegraph & Telephone Co.
Houston, Tex



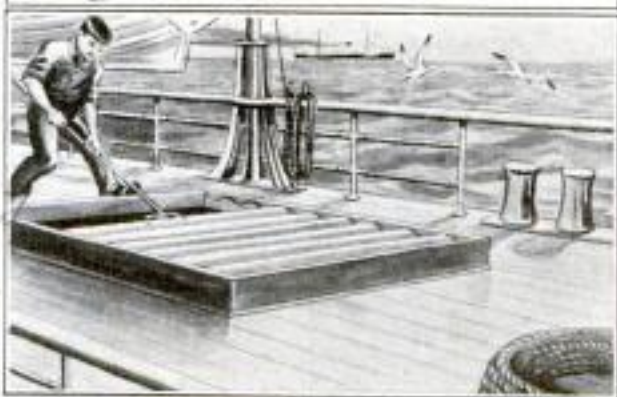
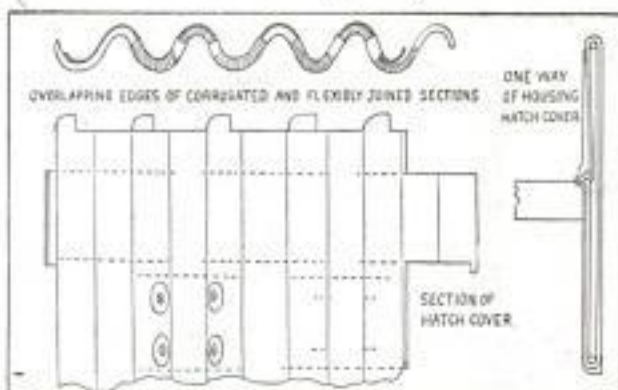
Essential Convenience is Provided for Those Who Live on It, for the Train Has, in the Rough at Least, with the Exception of a Track, and Club and Observation Cars

struction and repair gang through sparsely settled districts in Texas. It provides comfortable living quarters for the men on extended overland trips and hauls their tools and supplies. There are two sleeping cars, a kitchen car, a diner, and, at the rear, a "baggage" car in which everything needed by the workmen, except poles, is carried. The kitchen trailer is equipped with stoves, a sink, shelves for dishes, and other accessories. The diner is provided with one long table and a butler's pantry, having warming ovens in which food may be kept hot until served. The final touch is a telephone, which is installed at one end of the car. The berths in the sleepers, providing accommodations in each car for a dozen men, are arranged in double, crosswise tiers. Small stoves heat each of these cars during chilly weather and keep them dry during damp spells. All of the openings are screened, while heavy drop curtains are fitted to the sides to keep out the rain.

HATCH COVERS OPERATED LIKE ROLL-TOP OF DESK

A flexible hatch cover which operates somewhat after the manner of a roll-top desk has been patented in England. It consists of a series of corrugated metal strips the sides of which overlap. These corrugated strips are held together by bracket pieces, also corrugated and screwed to the strips in

staggered relation over the overlapping edges. These bracket pieces have projecting lugs which interlock with adjoining brackets and thus prevent the corrugated strips from pulling apart. Grooves in the sides of the hatchway guide the cover as it is drawn back or forth. The cover may be provided with



This Flexible Hatch Cover is Made of Overlapping Corrugated Strips, Which Roll Back Like the Roll-Top of a Desk

sector pieces at one end which completely incase it when it is rolled up, or it can be pushed back into a casing at one side of the hatchway.

S. F. Stokes, Alexander St., Rayswater, London.
C. S. Robinson, Royal Colonial Inst., Northern
berland Av.

1785
**WOULD-BE FIREMEN QUAIL
 AT CLIMBING LADDER**

One of the tests to which applicants for a position in the fire department of



Portland, Ore., were subjected recently was to climb an 85-ft. ladder set perpendicularly. There were 125 men who sought appointment by the civil-service authorities, but many of them when they had climbed part way up the ladder and felt it swaying under them lost courage and came down. Those who mounted to the top were required to climb over the top rung and descend on the opposite side. Other tests of nerve and bravery were included in the examination.

1833
**MUSHROOM
 GROWERS
 WARNED**

Growers of mushrooms are warned by specialists in the Department of Agriculture against any abnormal mushrooms which may appear in their beds. A re-

cent case of poisoning in a grower's family has prompted this warning.

Occasionally sporadic forms appear in mushroom beds, persist for a day or two, and then disappear. These are generally manure-inhabiting species and may be observed early, but in the instance cited these fungi appeared at the time the edible variety should have been ready. It is suggested that growers not fully informed on this question purchase a bulletin on the subject which is obtainable from the superintendent of documents at Washington. This will enable one to become thoroughly familiar with the cultivated species of mushrooms by means of both photographs and text prepared especially for needs of this sort.

1584
**INHALING DEVICE FOR NOSE
 AND THROAT TREATMENT**

For the treatment of nose and throat disorders an inhaler has been introduced which is intended to be employed instead of an atomizer. The device is made of brass and consists essentially of a cup that is provided with two nostril tubes and a mouthpiece. Inside of the cup are two small mica valves, one of which controls the nasal tubes and causes air to pass through a purifying chamber, where it is freed from dust particles and medicated before being drawn through the passages leading to the lungs.

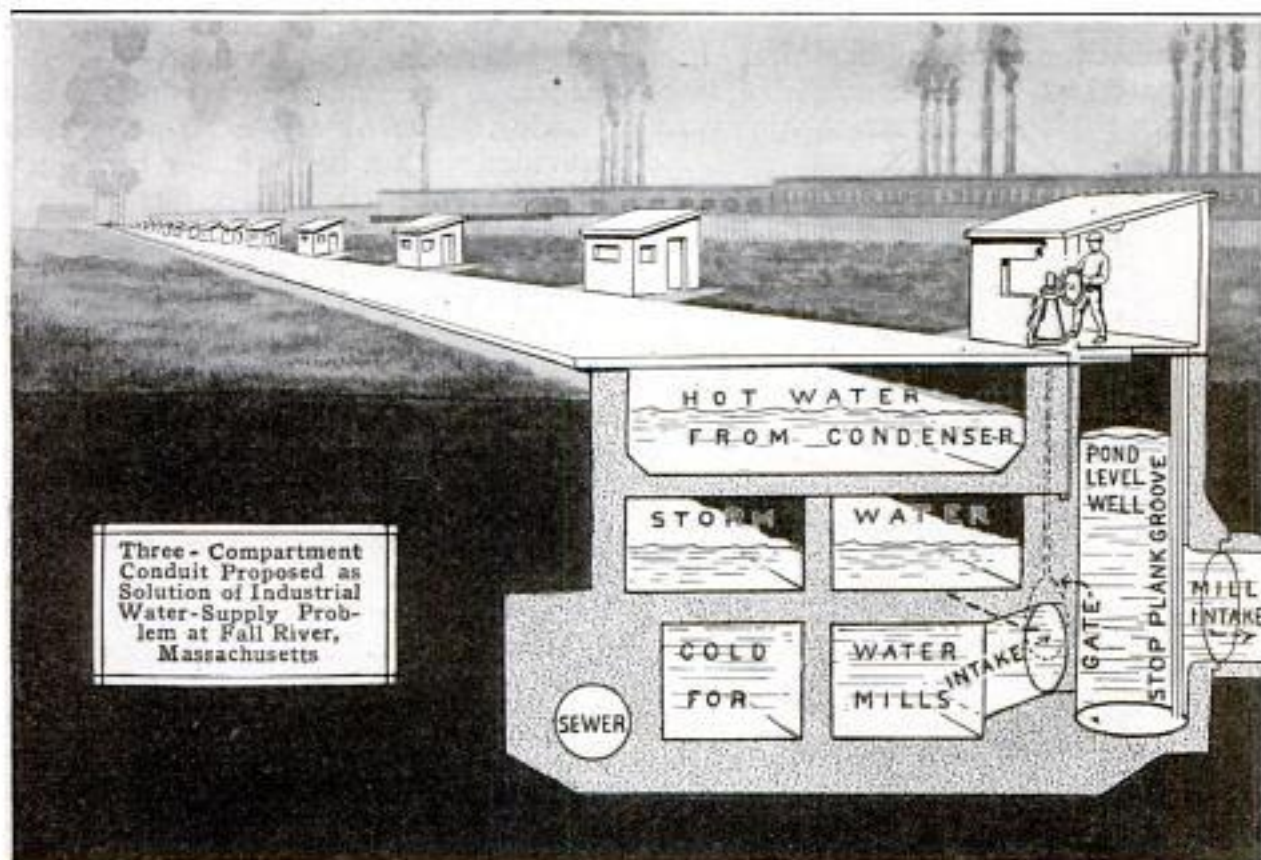


The other one permits the passage out through the mouthpiece of foul air given off by the lungs, preventing at the same time any inhalation through this member. In addition to being designed for either professional or private treatment of laryngitis, rhinitis, and similar diseases, the apparatus may be used to correct mouth breathing after an operation has been performed and a patient continues to inhale improperly because of habit.

Duplex Instrument Co.
 16 Warren St., New York

Dr. Medical Record 1911, 115
 New York
 1911 & 1912, p. 115

TRIPLE CONDUIT PROPOSED TO REPLACE RIVER



Three - Compartment Conduit Proposed as Solution of Industrial Water-Supply Problem at Fall River, Massachusetts

In order to solve a peculiar water-supply problem which confronts the city, Fall River, Mass., is considering an unusual plan of improving the Quequechan River. The stream, an outlet for the Watuppa Ponds, the largest bodies of fresh water in the state, passes through the heart of the community's industrial district and is lined on both banks by some 50 cotton mills. These plants draw millions of gallons of water from it daily, to cool their engine condensers, and return the volume after it has been used. Nearly all the available water is thus employed, and during the summer the temperature of the stream frequently reaches 140°. The river drains part of the city and also receives some sewage. "Flats" are exposed most of the time and the general appearance and sanitary condition of the river are bad. For these and other reasons, which make the execution of some plan imperative, the construction of a triple conduit to accommodate the river flow is proposed. This structure would connect the south

part of Watuppa, which is separated by a dam from the north section representing the city's supply of drinking water, and have three channels, one above the other. It would be a concrete structure $1\frac{1}{2}$ miles long and approximately 25 feet square. The lower level would carry cold water from the south pond to the cotton mills, while the upper one would convey the used, heated water back to the lake, discharging it first into an oil-separating basin and then into a cooling pond. The middle channel would carry surface drainage water and serve as an emergency outlet for the pond. The sewage would be handled through a sewer built in the foundation of the conduit. Narrow three-compartment conduits would be used as connections between the mills and the main conduit. This would permit the reclamation of the "flats," the value of which would repay much of the \$3,000,000 cost of the project. The plan was evolved after an intimate study of the situation.

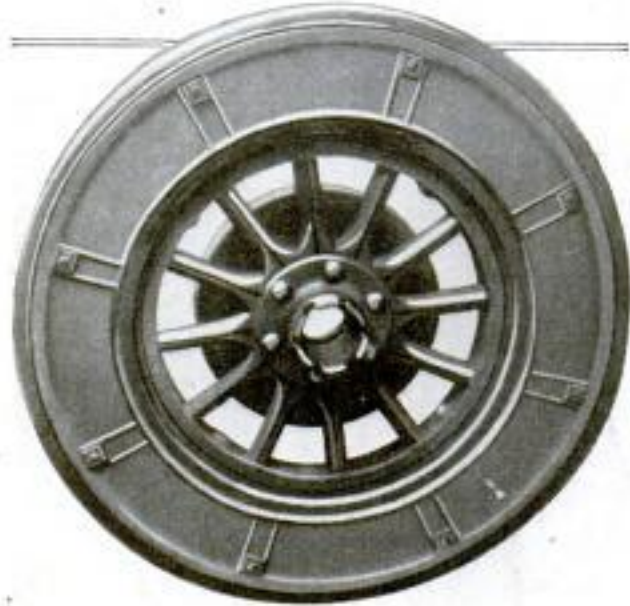
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 Freeman R. Willson, Box 1st 2, Worthington, O.

863

POPULAR MECHANICS

**RESILIENT RIM CAN BE
 1636 FITTED TO ANY WHEEL.**

A substitute for rubber tires has been patented which consists of two concentric rims between which are



This Resilient Rim can be Fitted to Any Wheel by Shortening the Spokes and Reducing the Diameter of the Felly

arranged clusters of springs. This resilient attachment can be placed on any automobile wheel by shortening the spokes and reducing the diameter of the felly. When this has been done, the device is fastened firmly to the wheel. In each group of springs are two springs set radially with reference to the hub, and two pairs extending obliquely from the base of the radial springs, one to the right and the other

to the left. A circular metal piece is fastened over the springs either side of the rim. Suitable packing is provided between the rims and the side-pieces, to prevent dirt getting into the interior. The outer, or larger, rim is provided with a hard-rubber tire, suitably fastened on. That the springs may not buckle when they are compressed by the weight they support, each is provided with a telescoping pivot or core which keeps it straight.

**PURITY FIRST REQUISITE IN
 THIS MODERN DAIRY**

An interesting example of the high degree of perfection attainable in the sanitary handling of milk is found in the establishment of a large milk dealer in Washington, D. C. All milk sold to this dealer comes from farms that are required to maintain certain sanitary standards and are inspected by an expert several times a year. This expert is also in charge of a laboratory connected with the milk depot, where he frequently examines samples of milk covering all the stages through which it passes.

The first process to which the milk is subjected is designed to separate the fat globules so as to make it of even richness. This is accomplished by forcing the fluid through rapidly revolving disks placed close to one another. From this point it passes into large receiving vats and from these it is delivered to vats holding 500 gal. each. Here it is thoroughly pasteurized and then passes immediately to refrigerated pipes below. From these vats the milk is fed into automatic bottling machines which place the right amount in each bottle and put on the caps. Each machine will fill 48 quarts or 60 pints each minute. The bottles are automatically carried in a circle under the feeder and discharged, so that human hands touch them only a very few times. The bottling room is finished in white tile and all the air passing into it is washed by being forced through running water.

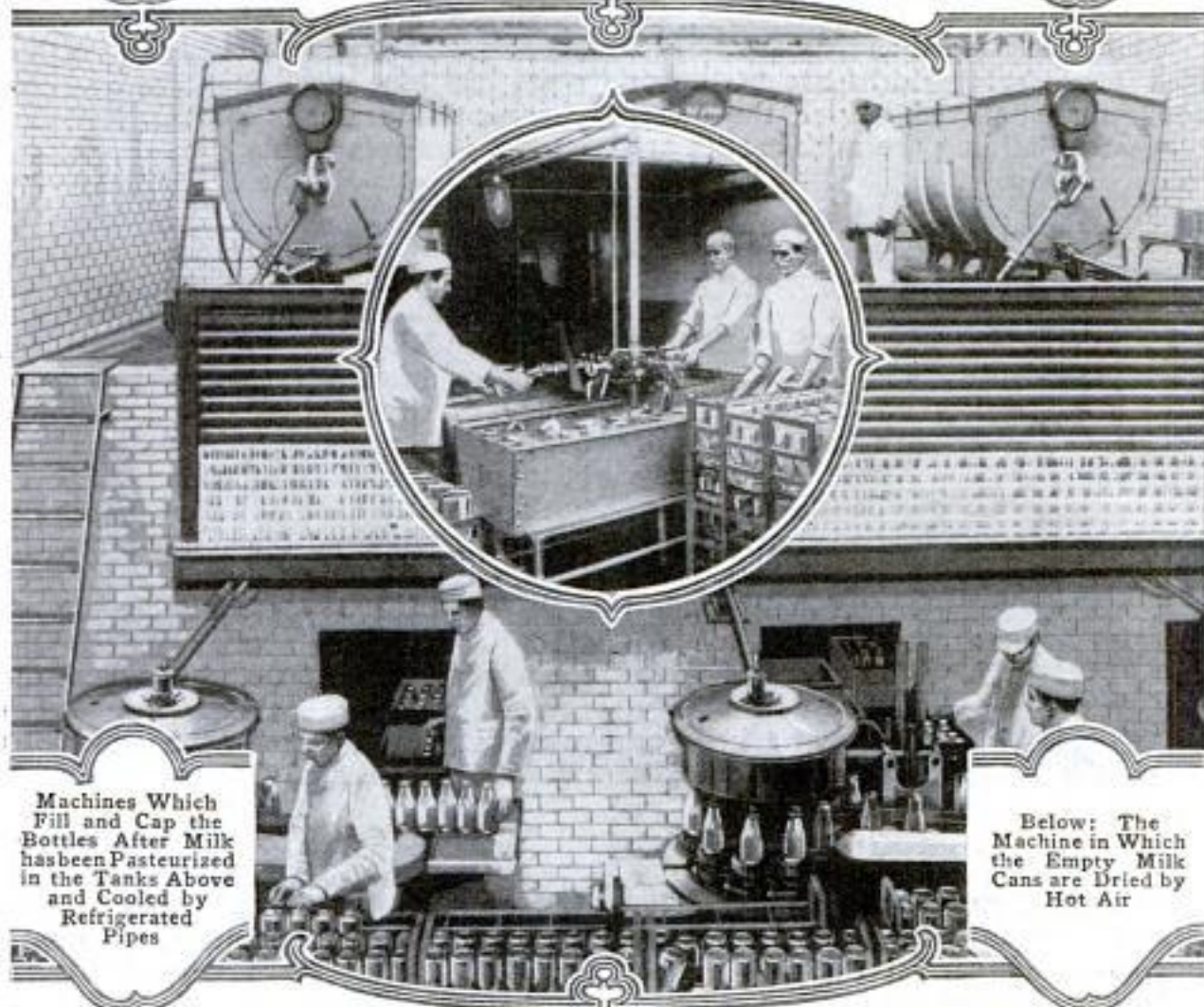
All returned bottles are cleansed in-

Gen. M. Oyster Prop.
100% Pure Dairy
Wash, D.C.

The Laboratory,
Which Is an Important
Adjunct of This Sanitary
Milk Plant: Here Examinations
of the Milk are Made
Frequently

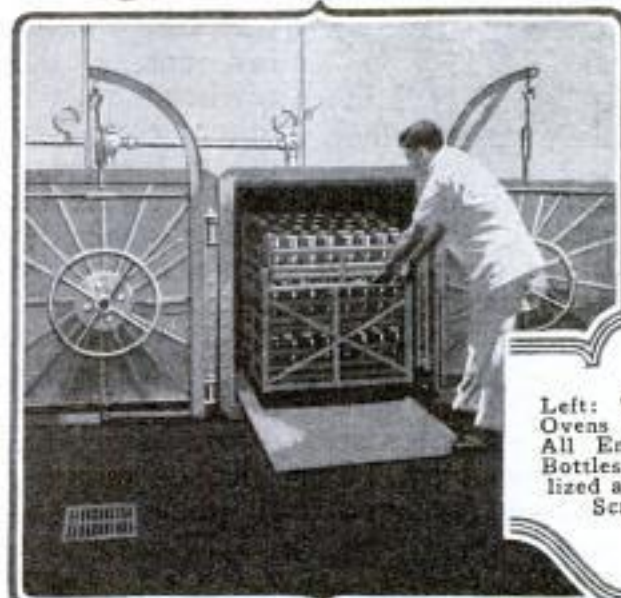


In Circle Below:
Scrubbing Empty
Milk Bottles with
Revolving
Brushes



Machines Which
Fill and Cap the
Bottles After Milk
has been Pasteurized
in the Tanks Above
and Cooled by
Refrigerated
Pipes

Below: The
Machine in Which
the Empty Milk
Cans are Dried by
Hot Air



Left: The Steam
Ovens in Which
All Empty Milk
Bottles are Steri-
lized after being
Scrubbed



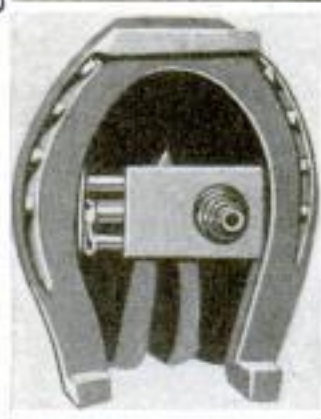
side and out by stiff revolving brushes; they are then rinsed in scalding water. Finally they are loaded on trucks and placed in ovens into which steam is forced at high pressure. The milk cans in which the milk is received from the farmers are given a good scrubbing inside and out as soon as they are empty. No germ-bearing cloths are used, hot air being employed. Even the metal containers holding the milk bottles are

washed after being used. The milk drivers do not take care of the horses and automobiles used in delivering the milk, nor do they collect the bills; in this way they are better able to observe all sanitary precautions. Many of the employes are graduates of dairying schools. Though milk from this dairy costs one cent more than the average charge, this dealer is said to have the largest business in his city.

582

HORSESHOE ATTACHMENT TO PREVENT SLIPPING

In order to save horses from falling when pavements are icy or wet, a Chicago inventor has made an auxiliary



spring spur, or calk, which may be clamped between the inner edges of a shoe and held under the ball of an animal's foot. The device may be attached or removed quickly and when in place does not interfere with a

horse's freedom of movement. The calk is a conical spiral of steel mounted in a plate of special design. When stepped upon, the cone compresses, but its resiliency causes it to exert considerable pressure against a pavement, allowing the sharp edges to take hold before the foot bears the weight of the horse.

1707

HEAD CAVITIES DETERMINE VOLUME OF VOICE

That the reinforcement of a tone produced by the human vocal cords depends not upon lung capacity or the size of the body but upon the size and depth of the resonance cavities in the head, is the claim of a teacher of music who has been studying this question for several years, in which time he has measured the heads of more

than 12,000 persons. This teacher classifies heads into three groups: round, oval, and long. He has found that round heads are best adapted to vocal gymnastics because of the symmetry of the cavities. Persons with oval or long heads have voices less adapted to a variety of dramatic effort, but frequently have sufficient depth of cavity to reinforce the tone so that it can be heard a long distance.

A test of 100 vocal pupils, all of whom were given similar instruction for a year, showed that the voices of persons having particularly large resonating cavities had attained a volume far in excess of those whose head



measurements were less than average. In judging voices four measurements are taken: one from the upper tip of one ear across the forehead to the other ear; the other three are

taken with the hinges of the jaw as the termini, the tape passing over the bridge of the nose in one case, over the upper lip in another, and around the chin in the third.

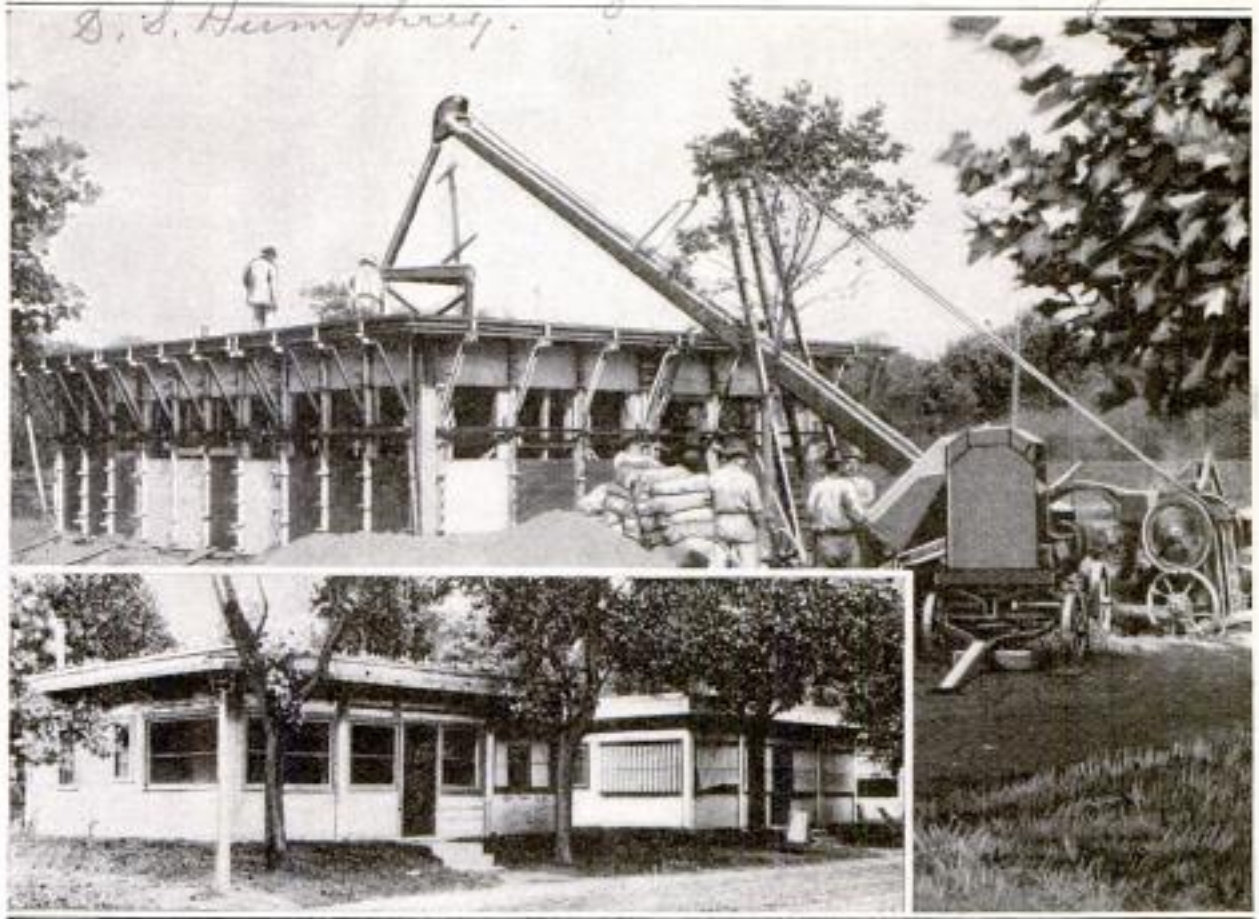
¶The closing date of the Russian government's international competition for inventions by which alcohol may be utilized for industrial purposes has been changed from Jan. 1, 1916, to Sept. 1, 1916. March 1, 1917, is the new date for awarding the prizes.

Prof. Theophilus Fitz.

375 E. Grant St.

Minneapolis, Minn.

*Boom Concrete Conveyor used invented by
D. S. Humphrey.*



One of the Four-Hour Concrete Cottages is Shown Above in the Course of Construction. Below, Two of the Completed Buildings are Illustrated

**CONCRETE SUMMER COTTAGES
BUILT IN FEW HOURS**

Substantial, attractive, and comparatively inexpensive summer cottages are being built of reinforced concrete on the shore of Lake Erie, near Cleveland. The dwellings are particularly interesting because one of them can be erected in approximately four hours. Each is one story in height, 35 ft. long, 21 ft. wide, and provided with a large living room, a bedchamber, kitchen, and toilet room. The roof is flat, bordered by a parapet, and covered with earth or sod to insulate the interior against the heat of the sun's rays. The equipment and method used in erecting these structures explain how they can be completed in such an extremely short time. The foundation, floor, walls, partitions, and roof are poured. Steel-faced forms of a special type which may be set up or removed quickly are used. As the concrete is mixed mechanically it is discharged into an inclined trough, up

which it is conveyed by metal paddles fixed to an endless-chain arrangement. It is delivered at the top of the forms into a spout through which it is chuted whenever needed. The walls are 4 in. thick and the ceilings 9 ft. high. The interior surface of the concrete is smoothed as quickly as the forms are removed, and later painted. The front room in each of the houses is large enough and so arranged that it may be divided, with the aid of screens, into two or three small compartments when emergencies make it necessary.

**DUST FROM MINERS' DRILLS
LAID BY WATER SPRAYS**

The prevalence of pulmonary diseases among miners, due to continual breathing of dust in the mines, has resulted in employing various devices which are attached to drills for the purpose of laying the dust caused by drilling in the rock. These devices have been found necessary in addition

*Ingersoll-Rand Co.
11 Broadway
New York*

*459
Bunch
The Co.*

Copyrighted material

to fans and ventilators, which cannot carry off the dust before it is breathed by the men. One of these attachments employs compressed air which draws water through a hose from a pail and

the drill to the far end of the hole. Not only does it lay the dust but it keeps the end of the drill clean and cool, and makes possible more rapid work. Miners also follow the practice of wetting ore or coal before handling it, to prevent raising a dust.



An Unmounted Drill with Water Spray so Attached as to Dampen the Dust as It Falls from the Hole
Below: A Mounted Drill with Water Spray Attached



Right: A Hollow Drill Which Permits the Water to Pass through the Drill into the Far End of the Hole, Laying the Dust and Keeping the End of the Drill Cool

throws it in a fine spray about the hole where the drill is working. Such a spray is particularly needed when miners are drilling upward and the dust ordinarily sifts down into their faces. Drills of another type are hollow, allowing water to pass through

1740 —
MANY CITIZEN TRAINING CAMPS THIS SUMMER ^{3/8 3/2}
Army & Navy Journal 1916
The War Department has declared that civilian training camps will be held this summer as previously announced, and that the reported abandonment of the plan was entirely an error. Secretary Baker has approved of plans which tentatively call for camps at Plattsburg, N. Y.; Oglethorpe, Ga.; Fort Sam Houston, Texas;



Ludington, Mich.; Fort Sheridan, Ill.; Fort Benjamin Harrison, Ind.; San Diego, Cal.; the Presidio, Monterey, Cal.; the Puget Sound district, and Fort George Wright, Spokane, Wash. The arrangements for Plattsburg, and probably for the other camps, contemplate taking several divisions in succession, so that the instructors from the regular army will be engaged for most of the summer. It is estimated that between 15,000 and 20,000 college

Geo W. Heflin
De Beque Colo.

students and business men will enroll at Plattsburg alone. The proposal in the volunteer-army provision in a bill before the senate, to make these citizen soldiers subject to call in event of war and recipients of regular-army pay has met with opposition from the National Guard Association but has the indorsement of the military authorities. The former believes that all citizen soldiers should come into the national guards, rather than be constituted into a separate body.

1781

PLANS FOR REBUILDING AUTOMOBILES

See Oct 16-501

Plans for rebuilding an automobile body are now being placed on the market so that an owner who desires to alter his car can obtain explicit instructions for doing so, just as one obtains plans for building a house or a boat. The directions so far worked out are for converting a certain low-priced car into one having lines suggesting speed. Paper patterns for the hood and cowl are included so that no mistake can be made. Plans for other popular cars will be brought out soon.

1716

DEVICE AN AID IN MAKING ACCURATE GOLF STROKES

A device that is designed to help beginners make accurate golf strokes consists of a hinged wire which is fastened to the hat and adjusted in front of the eyes so that the wire is in the line of vision between the eyes of the player and the ball when the stroke is to be made.

It is very important to keep the head still and to keep the eyes on the ball when making a shot.



This arrangement is intended to enable a player to realize any deflection of the eye or turning of the head and so check an inaccurate stroke.

GREAT FOUNTAIN OF FIRE IS AN OLD OIL WELL

Near De Beque, Colo., an abandoned oil well has developed into a flaming gas and water gusher which, because of its peculiar actions, has attracted considerable attention. With clocklike regularity a great column of water belches forth every 76 hours, shooting to a height of about 150 ft. and lasting approximately three and a half hours. Especially at night during the periods of these heavy flows, it looks like an enormous pillar of fire. The heat converts some of the spray into steam, which adds materially to the beauty of the fountain, glowing as it does with fire of many colors. The normal flow rises some 10 ft. above the ground, while every 40 minutes, and lasting for about two minutes, the water spouts 30 ft. in the air. The gusher has maintained this odd schedule for more than three years with remarkable regularity.



AUTOMATIC CARD FEEDER FOR TYPEWRITERS

1645

An attachment for typewriters has been devised which automatically feeds envelopes or cards to the machine, thereby enabling the operator to address such material several times as fast as by the ordinary method. This device consists of a metal magazine, fastened to the typewriter carriage, for holding a number of cards or envelopes. The material is fed one piece at a time to the typewriter by the operation of the lever which turns the typewriter roller. This roller is connected by cog-wheels with five rollers situated in the lower part of the magazine. As these

The Memphis Co.,
Dunbar, La.

Golfers Line-Shot Co.,
1002 Donaldson Bldg.,
Mpls, Minn.

J. S. Holladay
Boise
Idaho

turn with the typewriter roller they feed the material through the narrow opening in the bottom of the magazine, whence it is delivered, in proper



With This Attachment Envelopes or Cards are Fed to a Typewriter Automatically so That an Operator can Address Several Times as Many Pieces as by the Old Method

position, to the typewriter roller. The device can be adjusted to materials of various sizes and thicknesses. Under severe tests one operator has been able

to address with this device as many envelopes as from five to seven other operators using ordinary methods.

— 1806

SHALE TO YIELD FUTURE

GASOLINE SUPPLY

Engineering Record 3/13/16

Investigation by the United States Geological Survey indicates that there is sufficient shale in Colorado alone to yield 20,000,000,000 bbl. of crude oil, from which 2,000,000,000 bbl. of gasoline may be extracted by ordinary refining processes. The shale contains materials which when heated may be converted into crude oil, gas, and ammonia. When refined, the shale oil yields an average of 10 per cent gasoline, 35 per cent kerosene, and a large amount of paraffin. Because of the quantity of petroleum produced from wells in the United States little attention has been paid to this shale. But for more than 50 years the oil-shale industry in Scotland has been an important one, and with the decreasing production of our oil fields the shale not alone in Colorado but in Utah and Wyoming ultimately must be utilized.

The Accompanying Photograph Depicts a Novel and Rather Thrilling Feat of Horsemanship in Which a Prominent Washington Sportsman Introduced His Favorite Mount to a Friend's Motor Car. The Horse, Known at the National Capital as "Rabbit," Hurdled the Wide Machine with as Much Ease and Composure as if It were Taking a Well-Cropped Hedge

PHOTO. COPYRIGHT INTERNATIONAL FILM SERVICE



TRAINED HURDLER MAKES SPECTACULAR JUMP

* Mr. Ralph Coffin
Washington D.C.



Waterfall and Drinking Fountain of Natural Appearance Built of Concrete

UNUSUAL WATERFALL BUILT OF CONCRETE BOWLERS

At Riverside, Cal., a drinking fountain of quite unusual character has been constructed for the benefit of dumb animals by the local Audubon and Humane societies. It has been established on one side of a hill adjacent to a road near the entrance of the city and has the appearance of being a natural waterfall. It is built of large concrete boulders and stones, which have been given an acid treatment to render them aged and weathered in looks. Water flows continuously over the stones from the top, ending near the road level in a series of pools of different size and height. The smallest and lowest of these is intended for cats; the next, which is raised somewhat, for small dogs. Basins for large dogs and horses are provided at convenient heights. Midway up the rocks there is a shallow pool serving as a bathing place for birds. A heavy stairway of rustic design leads from the thoroughfare to the mouth of a cave, in which a number of statues have been placed.

1640

HEAVY SIGNPOSTS DESIGNED TO CARRY STREET NAMES

Heavy reinforced-concrete signposts capable of withstanding the attacks of small boys in thickly populated neighborhoods, have been designed to carry the street names at intersections of thoroughfares in Lincoln, Neb. Each is four-sided and near the top pierces a square concrete cap which bears the street names in letters cut a half inch deep in its faces. The post is about seven feet in height and costs approximately \$3. In addition to being of substantial construction it has the added virtue of sightliness. On the other hand, it is of a type which is difficult to read at night unless exceptionally well illuminated.



Designed by St. Comis
T. J. Hensley, Lincoln, Neb.

1178 325 = 20 = 36
 Archie B. Popovsey
 n-840 E. 157th St. New York
 1906 315 4th A
 A. C. 1908

870 POPULAR MECHANICS
 filed 4/17/15 Serial 22150 *Cuzeta* 2223-1, 198

1490 PHONOGRAPH SHOWS SCORE AS RECORD IS PLAYED

One of the novel phonograph attachments recently patented provides a means of displaying the instrumental



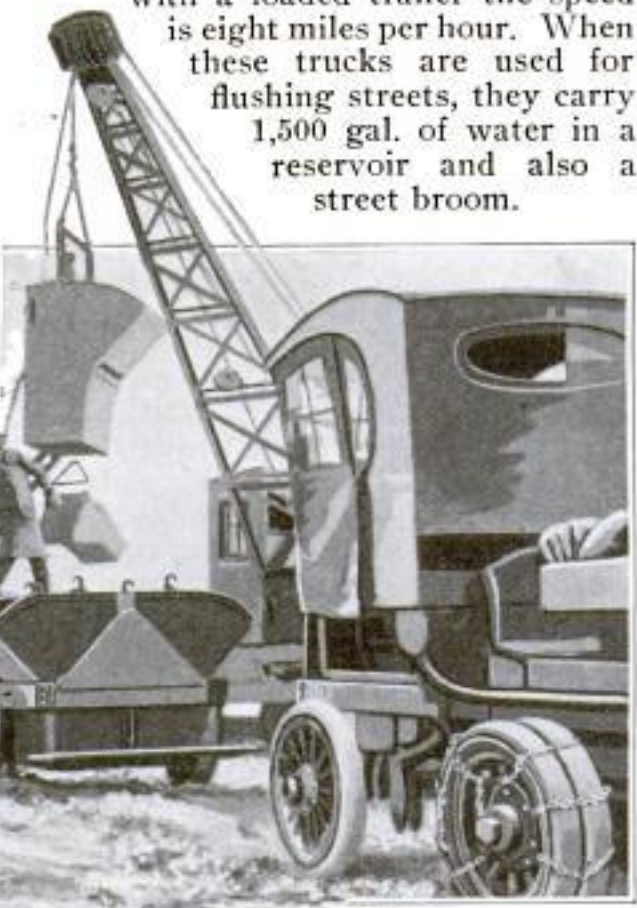
The Music and Words of a Selection Appear on the Tape Which Moves from Right to Left in Synchronism with the Record as This is Played

and vocal scores of a composition as it is rendered. The music and lyrics are printed on a long tape which winds from one spool to another in synchronism with a record. A small section of this moving tape is visible through a longitudinal aperture in the front side of a case mounted on top of the phonograph. The mechanism is very simple. The spools are arranged much like those carrying the ribbon of a typewriter, while motion is given to one of them by a vertical shaft connected by means of a specially designed adjustable sleeve to the spindle extending from the turntable through the

center hole of the record. The attachment can be applied to other mechanical musical instruments, or the tape used to display a series of pictures illustrating a song; the latter making the attachment interesting to children.

1615 GASOLINE-ELECTRIC TRUCKS USED BY NEW YORK CITY

A number of gasoline-electric tractors are used by New York City in hauling trailers with removable containers. These trailers each carry eight containers and are employed in removing rubbish, snow, etc. With the aid of a derrick the load can be dumped very quickly. The engines of these trucks are of the four-cylinder, water-cooled type, having 45 hp. They generate electricity that is stored and drawn upon to drive the two motors which propel the tractor. Without a trailer, one of these trucks can travel over 10 miles per hour with an engine speed of 900 revolutions per minute; with a loaded trailer the speed is eight miles per hour. When these trucks are used for flushing streets, they carry 1,500 gal. of water in a reservoir and also a street broom.



Gasoline-Electric Truck with Trailers Having Removable Containers Which can be Emptied Rapidly. These Tractors Have 45-Horsepower Engines, and with Loaded Trailers can Travel Eight Miles per Hour

General Electric Vehicle Co.
 Long Island City
 N. Y.
 PHOTO BY EDWIN LEVICK, N. Y.
 Copyrighted material

*Ford Bacon & Davis,
921 Canal St., New Orleans.*

1442 **STATE-OWNED COTTON WAREHOUSES AND
TERMINAL ESTABLISHED AT NEW ORLEANS**

IN the hope of displacing foreign markets in the distribution of American cotton and thereby enabling the southern planter to reap the full value of his crop, Louisiana has developed public warehouse and terminal facilities at New Orleans that permit 2,000,000 bales of cotton to be handled in a season.

The port now offers a deposit market where cotton can be shipped by interior buyers and held subject to their orders, and likewise where planters can store their product and await good prices. The project has been carried out at an approximate cost of \$3,500,000 and enables factor's, f. o. b., and through cotton to be cared for with equal efficiency. That the plant may be operated at a maximum earning capacity, it has been designed to permit the storage of coffee, jute, tobacco, sugar, rice, and other commodities, during the part of the year when it is not needed solely for cotton. It is as well equipped for unloading ship cargoes and transferring them to freight trains as it is to receive products by rail and deliver them aboard river and ocean steamers. The operation of the enterprise is under the control of the Board of Directors of the Port of New Orleans, a state agency which is authorized to issue warehouse receipts bearing the guarantee of the commonwealth. The weighing and grading of every bale of cotton is done by experts of the New Orleans Cotton Exchange.

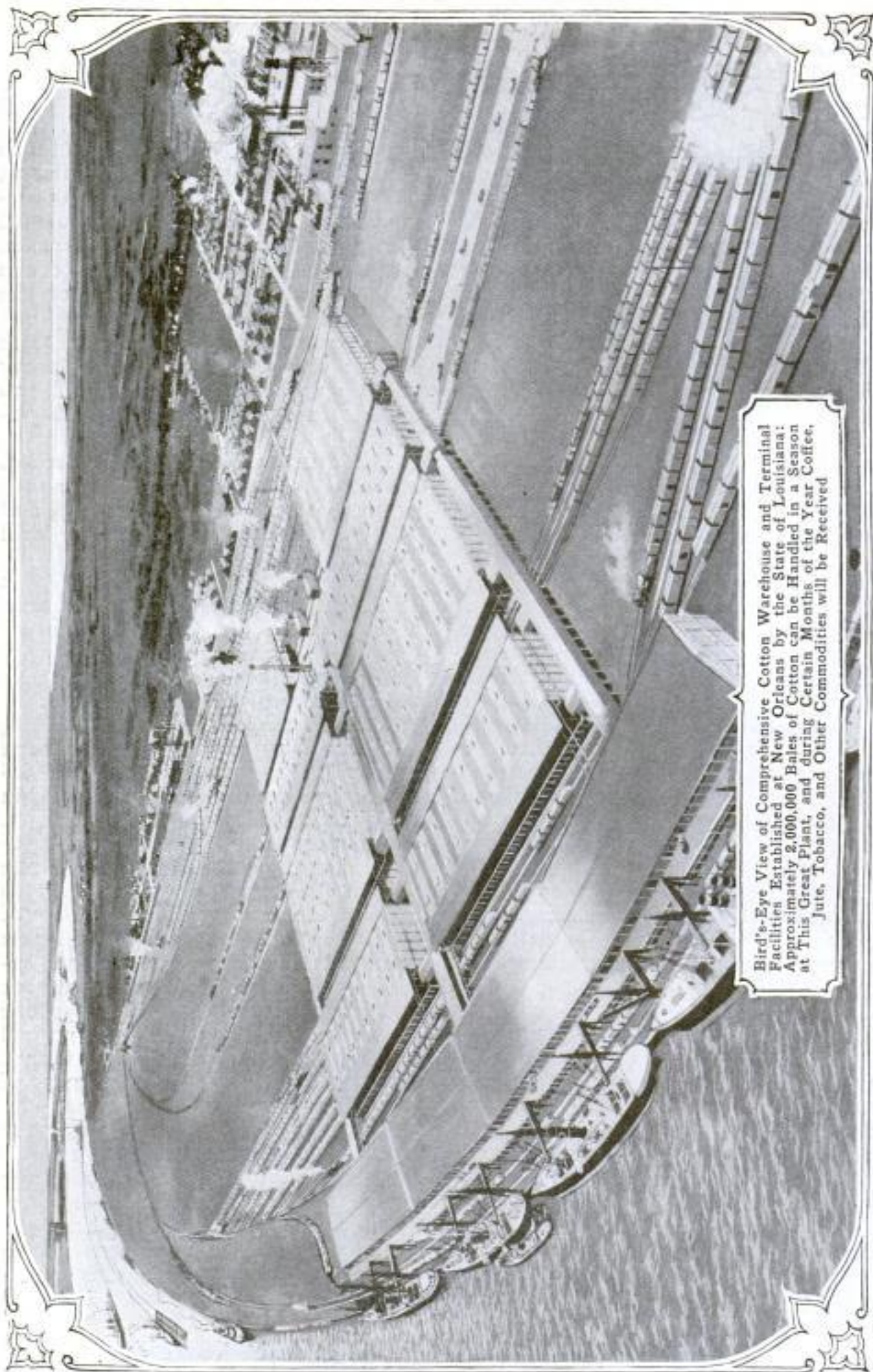
All of the buildings are of reinforced-concrete construction. These warehouses occupy about 24 acres of a 90-acre site fronting on the Mississippi River. An additional plot of some 60 acres is also held to furnish sufficient room for future expansion.

Twenty-two miles of belt-line tracks with a capacity of 2,000 freight cars serve the receiving, sorting, and operating yards that extend the full length of the property adjacent to its inner border. The delivery and receiving tracks accommodating the warehouses

can care for 200 cars at one time. The warehouses, six in number and one story in height, receive different classes of cotton, and for fire-preventive and other reasons are divided into a large number of heavy-walled compartments. Near the middle of the site and about 1,000 ft. back of the river is a large compress building. All of these structures are separated from each other in order to lessen the danger of fire spreading from one building to another in case of a serious conflagration.

The wharf, which is double-decked, has a total length of 2,000 ft., and a depth of 120 ft. on the first level and 100 ft. on the second. The lower level is designed to carry a load of 500 lb. to the square foot, while the other is built for 350 lb. Two railway tracks are supported in front of this structure by a timber apron and trestle, the only thing about the whole plant which is not of fireproof construction.

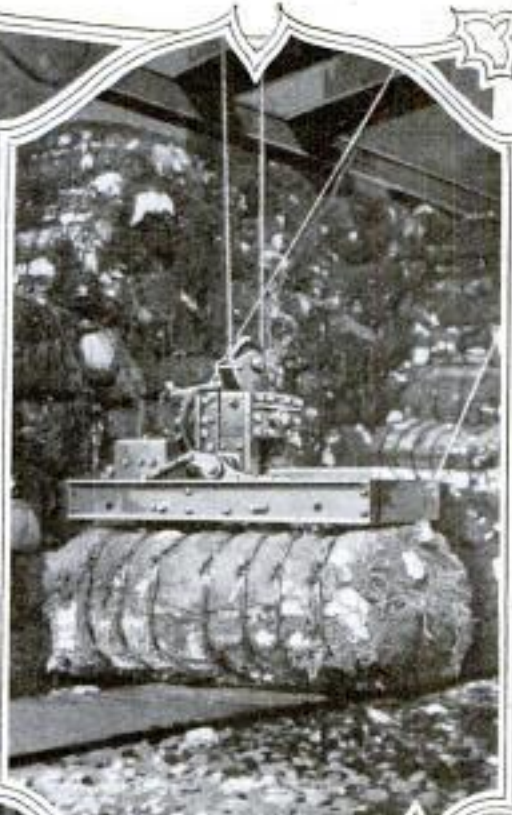
A highly efficient system of handling and conveying the cotton has been evolved. This constitutes the most interesting phase of the plant. To begin with, a mechanical device known as a cotton puller, a contrivance with ability to remove any specific bale from a pile without disturbing those adjacent to it, has been developed. It consists of a portable framework supported by an overhead traveling crane. Arms extending from it are forced between and beneath the bales above the one to be removed. Two hooks are pushed through the pile and their tines turned so as to engage the lower corners of the bale wanted. An adjustment of a block and tackle is made to bring the frame to a horizontal position and allow the cable normally supporting the device to be loosened. A hoisting drum which lowers this cable is then operated to exert a lifting pull which raises the frame and causes its arms to lift the upper bales and relieve the objective one from their weight. This pull forces the frame firmly against the pile and causes the yoke to draw the



Bird's-eye View of Comprehensive Cotton Warehouse and Terminal Facilities Established at New Orleans by the State of Louisiana: Approximately 2,000,000 Bales of Cotton can be Handled in a Season at This Great Plant, and during Certain Months of the Year Coffee, Jute, Tobacco, and Other Commodities will be Received



Mechanical Puller in Position Ready to Withdraw a Bale of Cotton from Bottom of Pile without Disturbing Others



Raising a Bale Preparatory to Conveying It to Another Compartment Where It will be Piled Mechanically



The Grappling Section of the Overhead Conveyor About to Pick Up a Bale That has been Withdrawn from Pile at Left



Here the Bale is being Drawn Out: The Machine Operates with Great Quickness and Saves Much Labor and Expense

engaging hooks outward, thus extracting the bale wanted. When the strain on the cable is relieved, the apparatus swings free. The entire operation is performed in about three minutes and with the services of but two men. By the ordinary method the whole pile must be disturbed, a number of men employed, and a much greater amount of time consumed.

After a bale has been removed in this manner it is picked up by an automatic grapple which moves, lifts, and stacks the cotton. This device is supported by an overhead crane and controlled by an operator who rides the latter. It is able to handle from 75 to 125 bales an hour, lifting them from

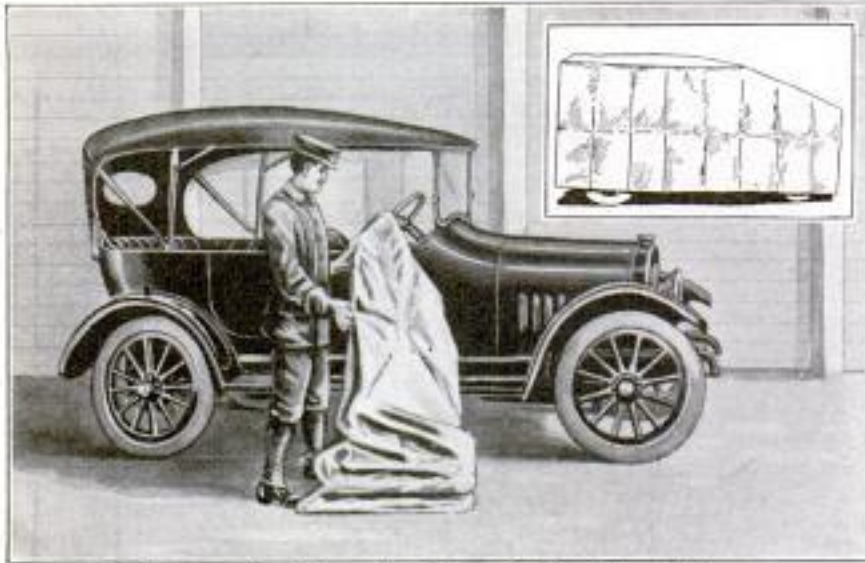
galleries and piling them orderly in the proper compartments. There are some 4½ miles of overhead and ground-level runways. In addition to these facilities motor trucks and trailers are used for carrying the cotton from one compartment to another, from the compressor to the warehouses, and from steamers to trains. Gantry cranes are also provided on the wharf front, for loading and unloading cotton into steamers and taking it from river boats, as well as conveyors for handling the bales at the shipside. It is expected that these mechanical facilities will reduce the expense of handling cotton at the plant fully 40 per cent.

lots access

PAPER COVERS FOR CARS

1733 IN STORAGE

A cover for motor cars in storage is now being manufactured of paper, and is both durable and inexpensive.



An Inexpensive Motor-Car Cover Made of Tough Paper, Reinforced to Prevent Tearing

The material used is heavy, tough paper, reinforced to prevent tearing. With it a car is completely protected from dirt, dust, and moisture. It is said that it is a great help in preventing the polished parts from tarnishing and the finish from checking. This cover is made in sizes that will fit five and seven-passenger cars, electrics, and cars of cheaper grade.

*Kennedy Car Liner & Bag Co.
Shelbyville, Ind.*

LONGEST TELEPHONE LINE

OPENED IN CANADA *1673*

Telephonic communication was inaugurated between Montreal and Vancouver for the first time on February 14.

The occasion marked the opening of the longest ear-to-ear circuit in the world. The voice was transmitted distinctly over 4,227 miles of wire. This feat surpassed that accomplished when communication between San Francisco and New York, a distance of 3,400 miles, was previously established. The Montreal-Vancouver connection is made through the United States, the line extending from Montreal to

Buffalo, thence to Chicago, Omaha, Denver, Salt Lake, Portland, and Vancouver. The initial demonstration was witnessed by many prominent persons at both terminals and was carried out similarly to that which marked the first oral communication between the Atlantic and Pacific coasts in this country. Patriotic music, played in Vancouver, was heard in Montreal.

*Sell Telephone Co.
Montreal, Quebec.*



Games Combining Features Similar to Lacrosse, Tennis, Handball, and Basketball can be Played with These Nets, Which Require the Use of Both Hands

1548 MANY GAMES PLAYED WITH NET-AND-SLING DEVICE

A New York inventor has recently patented a device which can be employed in playing a great number of outdoor and indoor games. It consists essentially of a net approximately $3\frac{1}{2}$ ft. long and 15 in. wide, woven like a tennis net with whipcord edges and fastened at either end to slings having handles like those of a tennis racket. One of these is held in each hand. The net is stretched taut by holding the slings wide apart. In the center of the net is a wire pocket large enough to hold a tennis ball; reinforcing cords extend from the pocket to the sides of the net. All the games played with these nets involve throwing a tennis ball, or a heavier ball, by suddenly drawing the net taut, and also skillfully catching a ball by slackening the

net when the ball strikes it so that the ball will not bounce out. All the games exercise many muscles, particularly those of both arms.

1480 SANITARIUM PATIENTS LIVE IN OLD STREET CARS

The Free Hospital for Consumptives in Toronto, Ont., has as an unusual feature several abandoned street cars of antiquated types set on foundations and each used by a patient as his living quarters. Some of these have been fitted up quite luxuriously with rugs, curtains at the windows, and benches under the canopies at the entrances. These cars, with their numerous windows, allow an abundance of fresh air and sunshine to enter the made-over rooms. Adjoining the strange row of dwellings is a garden cultivated by the consumptives.



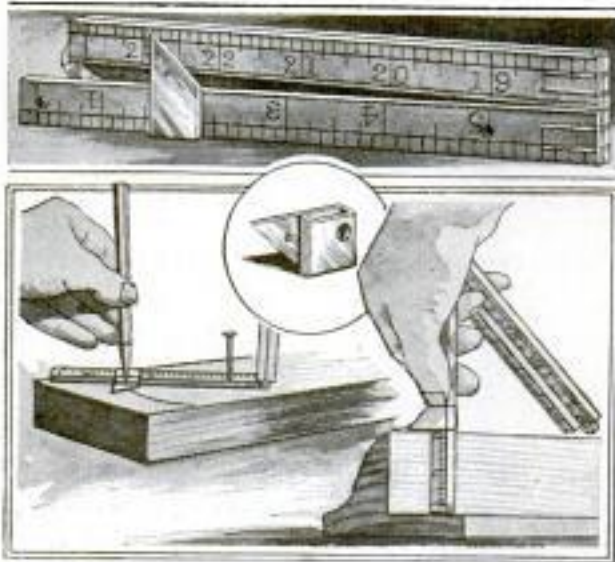
These Antiquated Street Cars have been Fitted Up as Comfortable Dwellings for Patients of the Free Hospital for Consumptives in Toronto, Ontario

Free Hospital for Consumptives
Toronto, Ont.

ATTACHMENT FOR RULER

1516 HAS MANY USES

A simple attachment for a carpenter's ruler which has many uses consists of a small metal collar that can



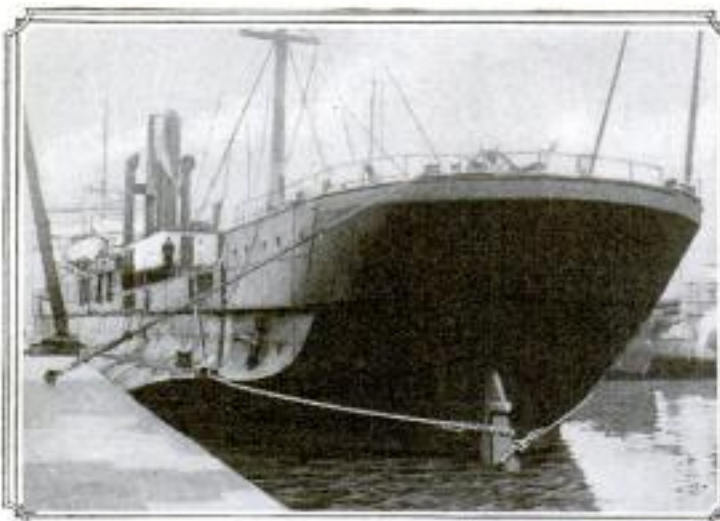
This Simple Attachment for a Carpenter's Ruler can be Used in Drawing Circles; for Measuring Depths of Mortise Holes; as a Caliper Gauge, and in Many Other Ways

be fitted to the ruler so that it slides up and down. A projecting portion of this device is shaped like a right-angle triangle with its base lying against the ruler. The upper angle, or point, forms an angle of 45° . The

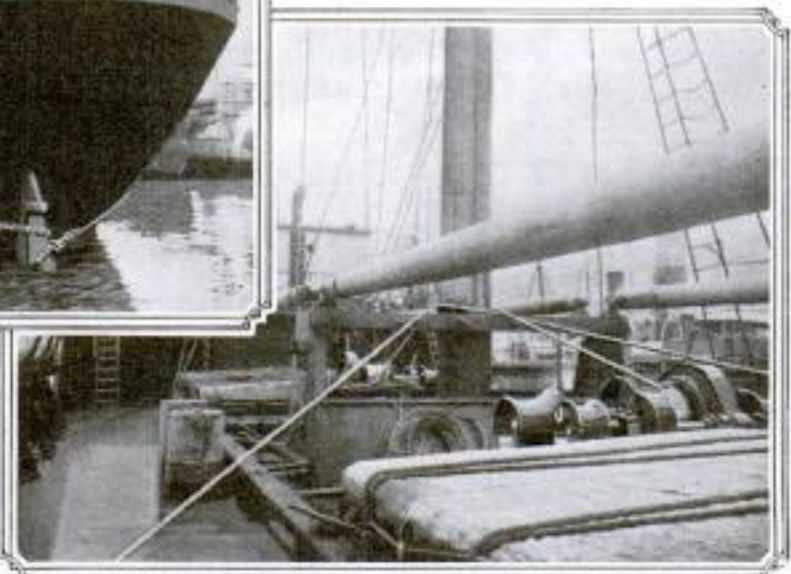
attachment may be used, for example, as a caliper gauge; to ascertain the depth of mortise holes; as a 45° bevel square for cutting miter joints; as a gauge to mark boards to be stripped, etc. By boring small holes in the ruler at various places the ruler and attachment can be employed to draw circles of various sizes, by inserting a pencil in a hole in the projecting triangle. The device may be so set on the ruler that the point will overlap a section of the ruler when the latter is folded, and so not be a source of annoyance.

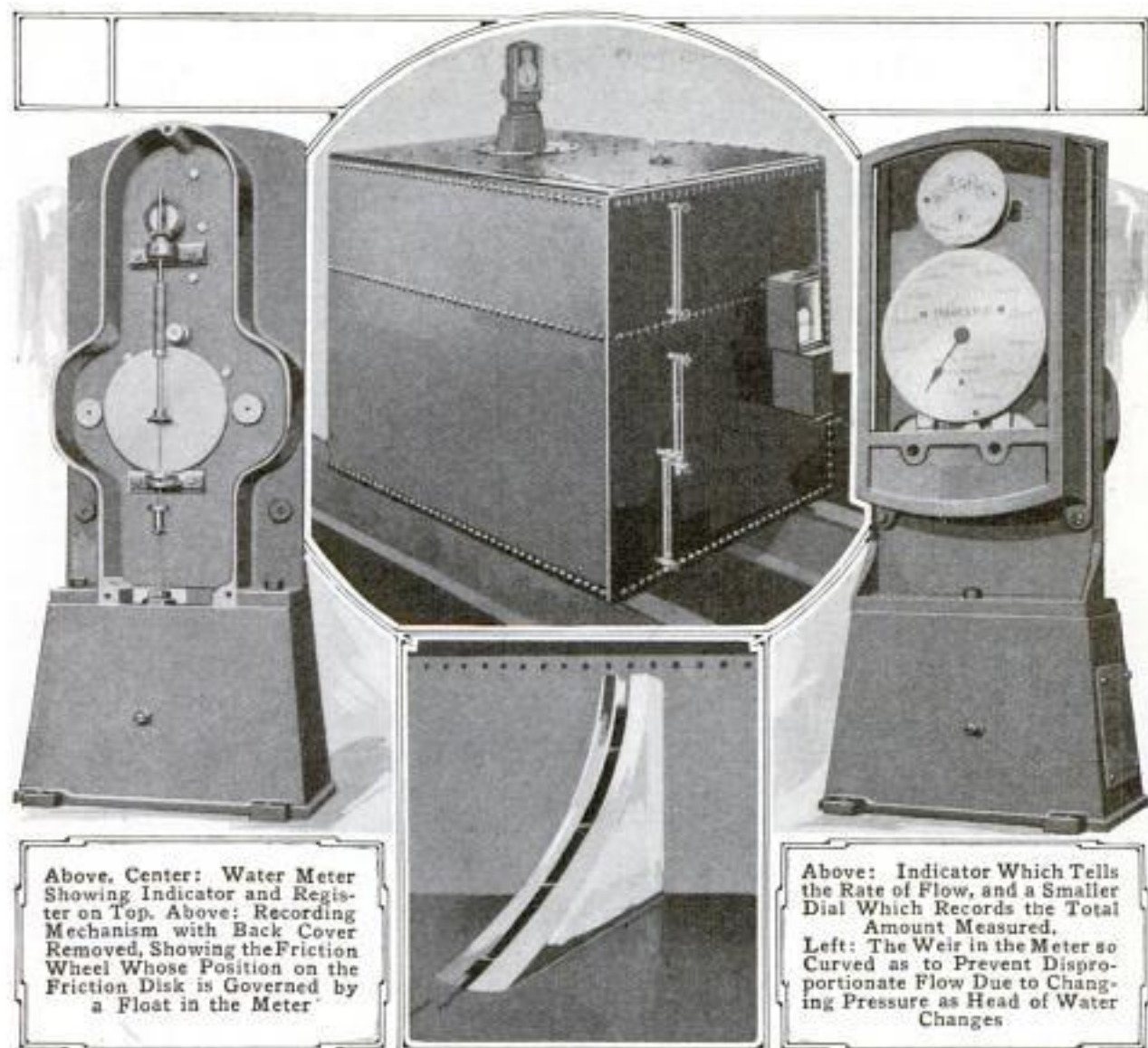
SHIP'S RUDDER REPAIRED DURING STORM AT SEA

When 450 miles off Newfoundland, the steamship "Hogland," bound from New York to Gothenburg, Sweden, recently broke its rudder control during a heavy storm and for two days and nights drifted about helplessly. All attempts to repair the break from the inside proved futile. At last, when all other measures had failed, the ship's carpenter was lowered over the stern into the sea, where, buffeted by the waves, he managed to pass a chain through the rudder and make it fast before finally being knocked unconscious. Cables were subsequently secured to the free ends of this and extended for some distance around each side of the boat and carried for-



The "Hogland" Docked at St. John's, Showing Chain and Cables in Place; The Lines were Extended around the Mast and Attached to the Windlasses, as Shown at the Right





Above, Center: Water Meter Showing Indicator and Register on Top. Above: Recording Mechanism with Back Cover Removed, Showing the Friction Wheel Whose Position on the Friction Disk is Governed by a Float in the Meter

Above: Indicator Which Tells the Rate of Flow, and a Smaller Dial Which Records the Total Amount Measured. Left: The Weir in the Meter so Curved as to Prevent Disproportionate Flow Due to Changing Pressure as Head of Water Changes

ward onto the deck, where they were passed about the mast and wound on the windlasses used in handling freight. With this temporary steering arrangement in service, the boat was headed for St. John's, where it later put in for repairs.

1561
CURVED WEIR METERS WATER ACCURATELY AT ANY HEAD

Engineers have long found it difficult, in measuring water, to compute the flow under a varying head accurately because of the resulting variation in pressure. This variation is automatically compensated for in a meter recently invented which contains a weir that describes a cycloid. As the water rises in the meter chamber containing this curved weir the

flow through this outlet does not increase at a more rapid rate than the increase in depth, despite increasing pressure, because of the curve of the weir. Its lower end is almost parallel with the floor of the chamber, but it curves upward with increasing steepness, so that as the depth of water increases the increase in the length of the aperture through which the water flows is proportionately less.

The recording mechanism includes a float which causes a friction wheel to rise and fall against a friction disk, set vertically and revolved by clockwork. As the water rises in the chamber the wheel is carried closer to the edge of the disk and hence made to turn faster, thus keeping up with the increasing flow. A circular rack on the shaft of this wheel operates a gear connected

with an indicator, which is graduated to indicate the flow of water per hour at any and all depths. This indicator, therefore, shows at a glance the rate of flow at any instant. The whole device makes unnecessary any calculations to ascertain the variations in flow due to varying pressure. The lower half of these meters consists of a storage chamber into which the water flows from the meter proper.

1301 ———
**VEST-POCKET DEVICE ADDS,
 SUBTRACTS, MULTIPLIES**

A pocket-size mechanical calculator with which problems in addition,



subtraction, and multiplication can be quickly solved, has been patented. It consists of a thin aluminum case, on the lower half of one face of which are seven parallel slits; between these are printed in columns the nine digits, 1 being at the bottom and 0 being omitted. Seven aluminum strips as long as the case fit mov-

ably into it, a portion of one being visible through each narrow slit. Each strip is perforated almost its full length with a row of holes, those in the upper half being round and in the lower square. Beside the holes are printed figures; the strips are so placed that the figures are not visible except through a series of small openings at the bottom of the case, or when the strips project from the case.

Addition is performed by "registering" the sums to be added. This is done by successively placing a pencil, or stylus, in holes opposite the digits in the device that correspond to the digits making up the sum being

registered. In each case the operator starts with the left-hand digit and, after placing the stylus in position, moves the strip up or down as far as the slit will permit. After all the digits of the first sum have been registered the remaining sums are registered in a similar manner without, of course, resetting the mechanism at zero as should be done at the outset. In case an amount is to be "carried" from one column to the next, a small brass signal appears in the column having the surplus. This is a signal to register the additional amount in the next column on the left. One simple rule must be observed: When the stylus is placed in a round hole the strip should be pushed upward; when placed in a square hole it should be pushed downward. After all the sums have been registered the result will appear in the "total" row at the bottom. Subtraction and multiplication are performed in a somewhat similar manner except that the individual numbers registered are arrived at by simple operations in mental arithmetic in connection with each digit of the sums involved. The mechanism, being practically all aluminum and simple in construction, will last for years.

Used Acetylene
**PECULIAR TIRE VULCANIZER
 MADE FOR MOTORISTS**

In an attempt to simplify the process of repairing the inner tubes of motor-



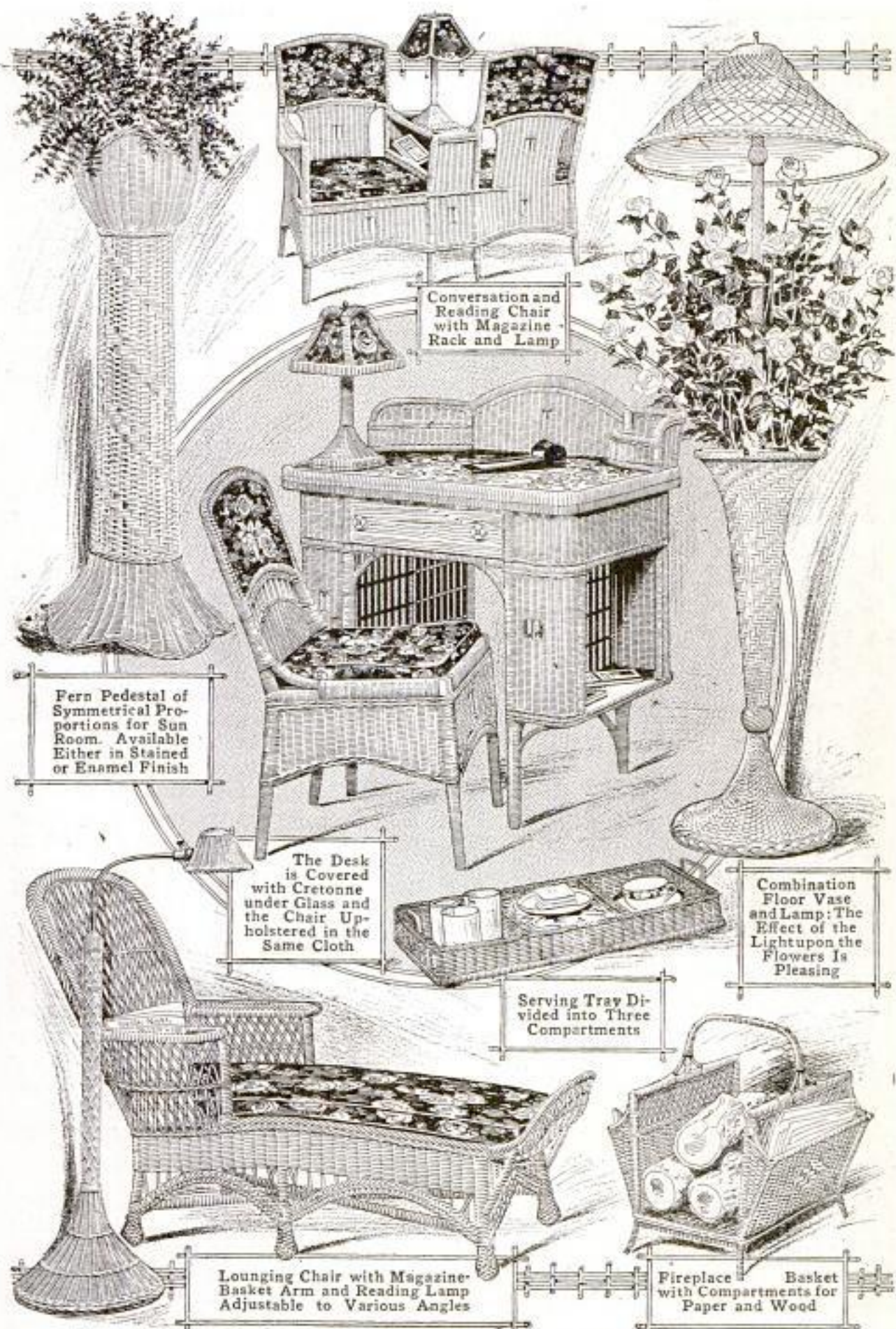
2.00 - patch + 1.00 - patch
1.00 - 1 day patch
"Low's" mends a break in a few minutes without requiring the use of cement, acid, or gasoline. It comprises a clamp and a number of prepared patches, each of which consists of a metal pan that has a piece of raw rubber on one side and holds a combustibile material. When the latter is ignited, after being placed over a puncture, it vulcanizes the rubber to the tube.

Harmon Adder Co.
Cambridge Springs, Pa.
Post paid 72 85

1103 - 1st Mar. or later
These figures by Geo. W. (Lynch)
Cambridge Springs, Pa. (611976)

1692 Reed

ATTRACTIVE DESIGNS IN SUMMER FURNITURE



Conversation and Reading Chair with Magazine Rack and Lamp

Fern Pedestal of Symmetrical Proportions for Sun Room. Available Either in Stained or Enamel Finish

The Desk is Covered with Cretonne under Glass and the Chair Upholstered in the Same Cloth

Combination Floor Vase and Lamp; The Effect of the Light upon the Flowers is Pleasing

Serving Tray Divided into Three Compartments

Lounging Chair with Magazine-Basket Arm and Reading Lamp Adjustable to Various Angles

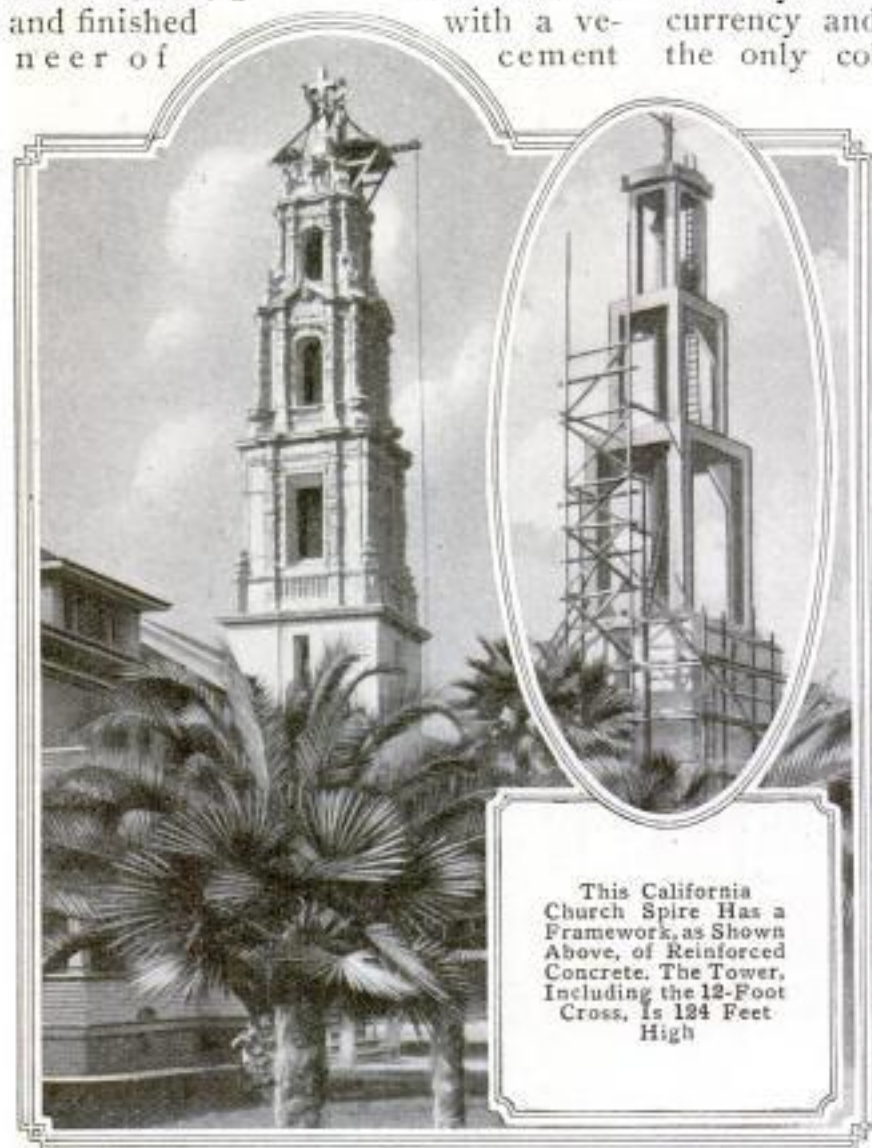
Fireplace Basket with Compartments for Paper and Wood

Wm. A. Reed Hardware, N.Y.

Ficks Reed Co., Cincinnati, O. Copyrighted material

REINFORCED-CONCRETE CHURCH SPIRE

Evangelical
There has recently been completed in Riverside, Cal., a church tower, 124 ft. high, having a framework of reinforced concrete and finished with a veneer of cement



This California Church Spire Has a Framework, as Shown Above, of Reinforced Concrete. The Tower, Including the 12-Foot Cross, Is 124 Feet High

stone. The framework was cast in five sections, the lower one being 20½ ft. wide and 48 ft. high; the heights of the other sections are 24 ft., 20 ft., 20 ft., and 12 ft., respectively. The 12-ft. section is a cross. The framework consists merely of four uprights and connecting top and base pieces. Around the frame have been set 1,047 pieces of ornamental cement stone, in 267 designs and weighing 400 tons. Because of its height the tower will be used as an observation point, and a passenger elevator is being installed.

STAMP AND CURRENCY INKS MADE WITH HOME DYES

Domestic manufacturers are now producing practically all of the dye-stuffs required for the various inks used by the government in printing currency and stamps. Red is about the only color that the Bureau of

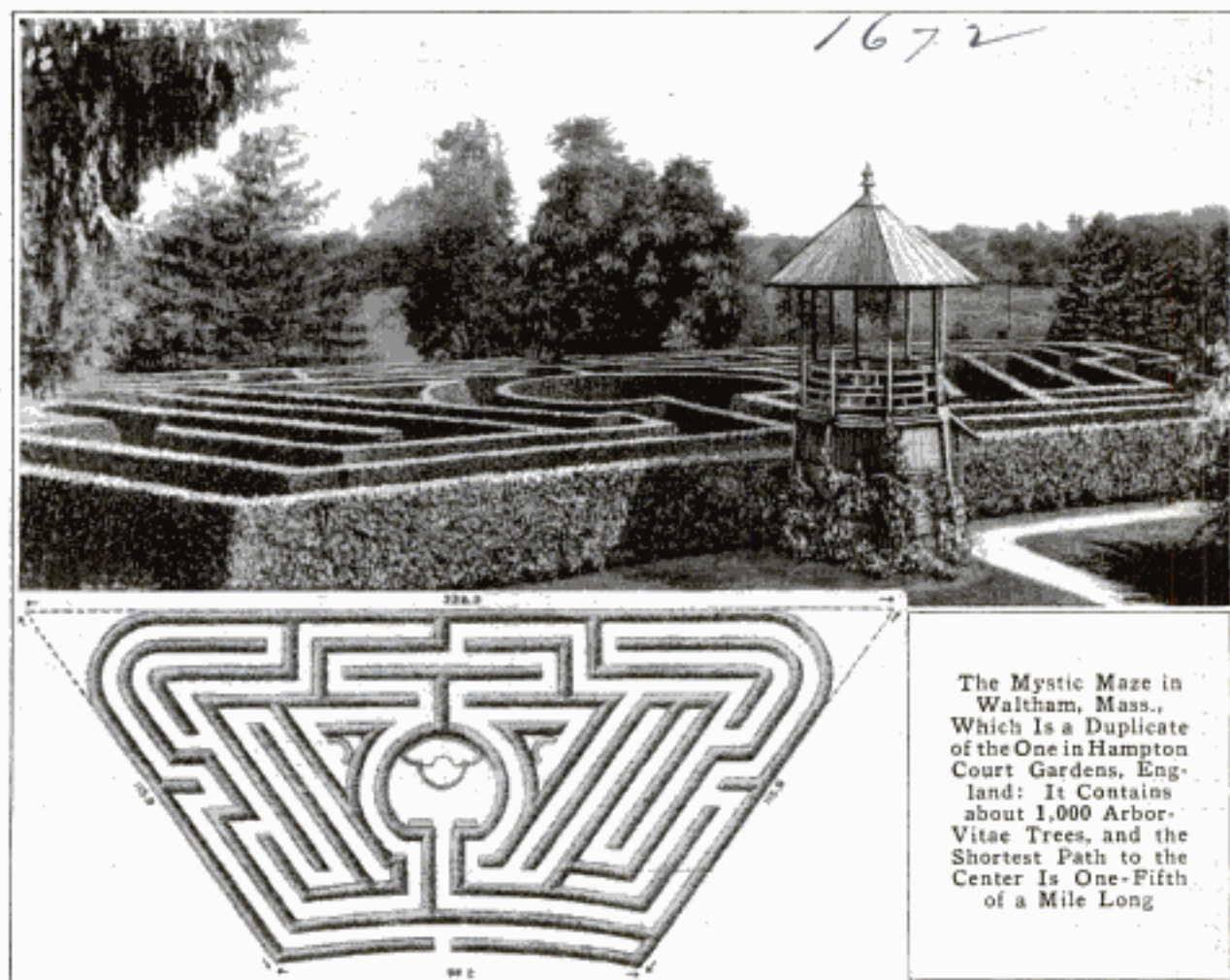
Printing and Engraving is unable to get at home. This has a base of aluminum hydrate, or barytes, or both, blended with a coal-tar dye which has always been imported. The shortage of this ink is noticeable to all users of two-cent postage stamps, for in order to conserve the limited supply available, the color has been used sparingly with the result that stamps recently "run off" look pale. In place of Prussian blue, which is obtained from potash, a substitute is now being made from soda salts. A black-earth deposit in Kentucky and a form of cellulose derived as a by-product in the manufacture of wood pulp for paper are providing the blacks. Yellow dye, which is mixed with blue to

obtain the green used in printing "greenbacks," is being made by treating lead with nitric acid. About 3,000,000 lb. of ink is used annually.

—1672 HEDGED LABYRINTH A COPY OF ENGLISH MAZE

The "mystic maze," a labyrinth whose winding and confusing paths are bounded by high and impenetrable arbor-vitæ hedges, is one of the interesting sights of Waltham, Mass. This maze is a duplicate of the historic one

Owned by
Miss Cornelia Warren, Waltham, Mass.



The Mystic Maze in Waltham, Mass., Which Is a Duplicate of the One in Hampton Court Gardens, England: It Contains about 1,000 Arbor-Vitae Trees, and the Shortest Path to the Center Is One-Fifth of a Mile Long

in the gardens of Hampton Court palace, near London. The American replica is composed of about 1,000 trees which were planted in 1896. The total length of its paths is about one-third of a mile and the shortest path to the pool in the center is about a fifth of a mile. The outer hedges form a quadrangle whose sides are 222, 115, 96, and 115 ft., respectively. Visitors sometimes spend an hour or more trying to find their way to the center, and then experience equal difficulty in getting out. Sometimes they give up and call upon the attendant to show them the way out.

Patented 1540
**TUG HELD TO SINGLETREE
SECURELY BY NEW CLIP**

Convenient features for the driver of work horses are presented in a self-locking, springless singletree clip of comparatively recent invention. The device consists of two ring-shaped

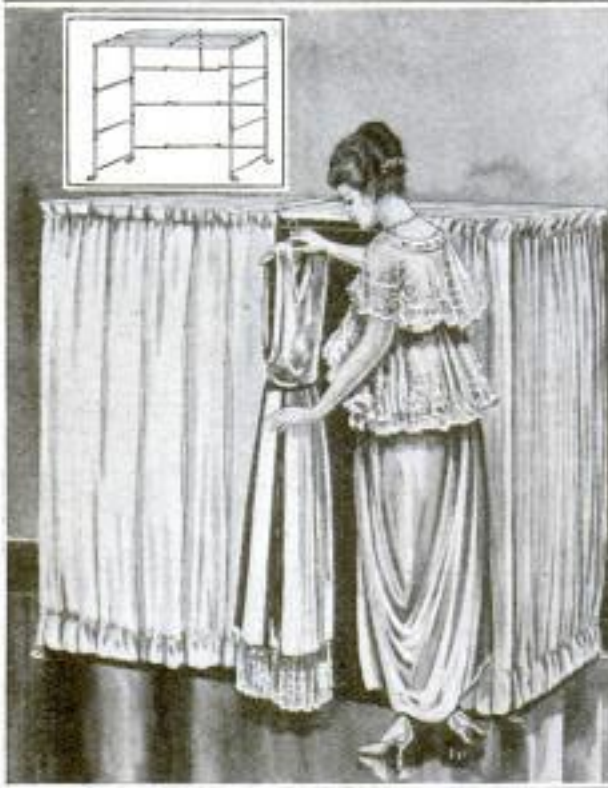
castings, each having a flattened, hook-like member projecting from its circumference. One of these rings slips over the other so that the upper of the two hooks, which are faced in opposite directions, lies on top of the lower one and with it forms a loop. The inner ring fits over the end of the singletree. By giving the other, or inside casting, a backward turn, the clip is opened sufficiently to allow the eye of a tug to be inserted. It is then turned back to its normal position. It is evident



Simple and Convenient Locking Singletree Clip Which Holds Tug Securely

that there is no chance for a tug to be detached from this clip accidentally.

*J. W. Chambers, Middleton, Mich.
(Mfr. & Inv.)*



A Metal Wardrobe Frame to be Draped with Cloth:
 It Is Made in Sections and Is Extensible

SECTIONAL WARDROBE FRAME MAY BE ENLARGED EASILY

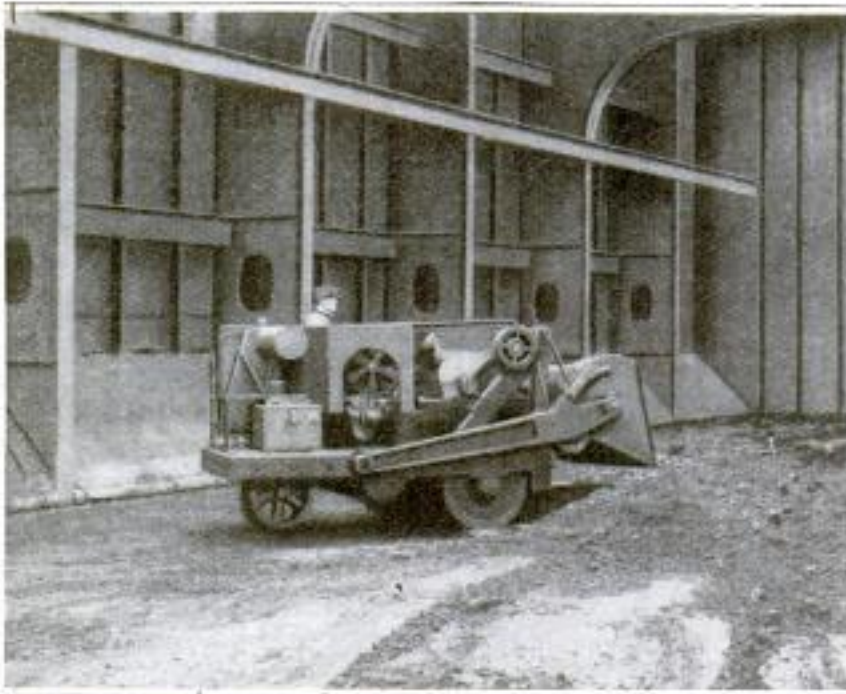
A sectional wardrobe frame has been patented which consists of interchangeable units so fastened together that the size of the frame can be increased when desired by adding more parts. The four uprights of this frame consist of sections of twisted wire with ends fashioned in such a way that they interlock rigidly. Crosspieces of lighter construction, that join together by means of hooks and eyes, extend between the uprights. The top of the frame is so constructed as to assist in holding the sides firmly in position and will support garments which may be hung from it. The article is designed to be draped with cloth selected to harmonize with the surroundings of the room in which it is placed. When not in use the wardrobe may be taken apart and stored in small space.

1571 Cargo

SHOVELERS IN SHIP'S HOLD REPLACED BY MACHINE

In clearing the holds of ore and coal vessels, time and expense are both

saved by the use of a new power-driven scraper which accomplishes quickly the work commonly done by gangs of hand shovelers. The apparatus, operated by one man, moves material, lying between the hatches, to the openings, where it can be reached by the big unloading buckets. It is able to deliver the product fast enough to keep the dock machinery busy, and at the same time eliminates the need of some 30 or 40 men. The device consists of a heavy, three-wheeled steel truck propelled by a 40-hp. gasoline motor and provided at its head with a broad scraper shovel. When the latter is raised to its top limit it assumes a dumping position and discharges its load. It



Motor Shovel Working in the Hold of an Ore Vessel Moving the
 Material to a Point under the Hatches Where It can be
 Reached by the Big Scoops of the Unloading Machine

Brown Hoisting Machinery Co.
 Cleveland, O. Copyrighted material

Welder Mfg. Co.
Germantown & Stenton Ave.

Revised 6-
SIMPLE ILLUMINATING SET
145V HAS MANY USES

can be used either as a scraper or as a scoop. All of the operations are controlled by means of levers in front of the driver's seat. When working at the bow, stern, or against the bulkheads of a vessel, the apparatus is used as a shovel to scoop up the material and carry it to a point beneath one of the hatches. In addition to the work the machine is capable of doing in the hold of a ship, it will also handle bulk materials in yards, warehouses, and similar places. As an illustration of what it accomplishes, the steamer "Ontario," carrying 8,115 tons of cargo, was unloaded in 14 hours and 10 minutes with the aid of hand shovelers. Later, with the scraper in use, the same boat, carrying this time 8,316 tons, was unloaded in 12 hours and 30 minutes.

ROUGH FLOWER BOXES MADE
13 **TO ENCIRCLE TREES**

In order to add an odd and pleasing touch to the effect of a row of trees



extending along one side of his residential grounds, a Westerner designed a number of rustic flower baskets which he fastened about their trunks. Each of these is made of a series of short, heavy palm branches, wired in place and forming a receptacle for a small quantity of soil. They are placed at a height which allows the flowers planted in them to be watered without serious inconvenience. The effect is unusual and harmonizes with other landscape features.

Alvar Marple

An inexpensive and compact surgeon's illuminating set has been placed on the market. It consists of a flash *"De Lyte" Diagnostic Set.*



A Physician's Illuminating Set, Designed as an Aid in Making Throat, Aural, or Other Examinations: It can be Carried in the Coat Pocket



light, quite similar to an electric pocket flash light, and several attachments, the former being so designed that the attachments can be quickly fastened to it. They are a tongue depressor, with the aid of which a strong light can be so directed as to give a clear view of a patient's throat; an ear speculum and a nasal speculum, which are used in a similar manner, and a magnifying glass designed for ocular examinations especially. By means of a headband the light can be fastened to the user's forehead, permitting free use of both hands. The light is also a convenience when working around an automobile. The outfit can be carried in the pocket.

ⓄThe new letter carriers' satchels are to be lighter than the all-leather ones now used; they will have leather backs and fronts and flaps of canvas.

1814
B. B. Stokely

BARNEY HAULS WAGONS OUT OF PIT

A contractor in an eastern city recently employed a barney for hauling dirt from a foundation pit up to the



With This Barney, Drawn by a Hoisting Engine, It Was Possible to Haul Full Loads Out of a Foundation Pit without Extra Horses

COURTESY ENGINEERING NEWS

level of the street. Its use made it possible to take out full loads without employing extra teams. The barney was heavily built, strongly braced, and ran on a narrow track up the incline. It was just high enough to push against the rear axle of a wagon. A cable extended from the car up the incline to a snatch block near the top, where it passed through a decking and to one side and downward to a hoisting engine.

MAHOGANY AS CHEAP AS QUARTERED OAK

1745

Mahogany for house trim, which costs no more than quarter-sawed oak, is now a possibility because of considerable quantities of Philippine mahogany which are being imported to this country. This wood is lighter in weight than the Mexican or African mahogany and is easier to work. It is claimed that it takes a stain better, and after it is once kiln-dried, it does not warp. This lumber is produced chiefly by one large modern mill in the Philippines. The upper grades of the lumber are shipped to the United States and the inferior stock is sold locally.

SYNTHETIC MILK MADE FROM PEANUTS

British Medical Journal

Successful experiments have recently been made in Europe in the production of a synthetic milk from peanuts.

After being shelled the nuts are crushed, forming a gruelli-like mass which is mixed with distilled water and starch meal. This mixture is then boiled, being continually stirred during the process, and finally filtered. After a period of about two hours it is transformed into a kind of milk. The flavor is not particularly agreeable, but it is suitable for use in coffee, cocoa, etc.

If allowed to stand it will assume a thick consistency, but on being stirred returns to a fluid state. It costs about half as much as cow's milk.

— 1403 —

TOMB BROUGHT FROM EGYPT IS FORTY CENTURIES OLD

An Egyptian tomb, approximately 4,500 years old, which arrived in New York in August, 1913, has finally been reconstructed in the Museum of Art in that city. It is the tomb of Perneb, a chamberlain of one of the Pharaohs. Only two other tombs of this character and of equal importance have ever been taken out of the Nile country, it is said. This monument is a valued art treasure because of its profuse and remarkably well preserved mural decorations, and because most other tombs of similar age in the vicinity from which this came have been destroyed.

The structure in the museum consists of 601 stones which were especially treated for a year to protect their surface and the paintings on them from the humidity of New York atmosphere, which is a great contrast to the dry air of Egypt. As each stone was taken from its original position it was

Metropolitan Museum of Art
New York

Indiana Quartered Oak Co.
7 E. 42d St., New York

Architects' Samples Co., Inc.,

Passaic + 40th
New York

Copyrighted Material

marked, wrapped, and placed in a strong box. Most of the blocks were brought by camel from Memphis, the site of the tomb, to Cairo. The heavier ones were carried on hand cars over especially laid track to the nearest railway. The original monument consisted of a superstructure and a burial chamber far beneath, reached by a shaft. The two latter features have not been reproduced. The superstructure measures 54 by 40 ft., and is 18 ft. high. It consists of two rooms: an offering chamber where was placed

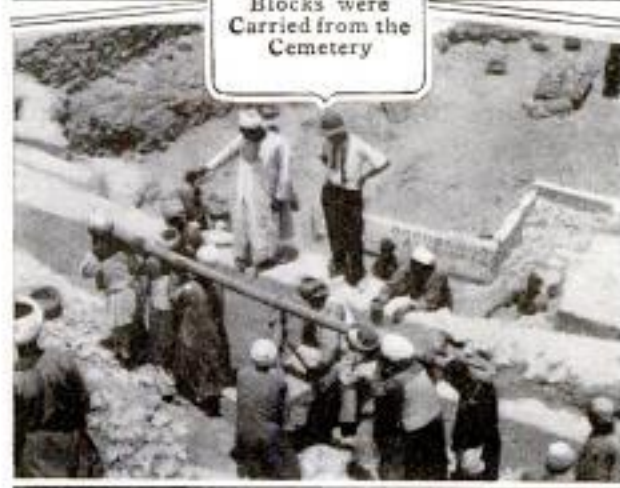
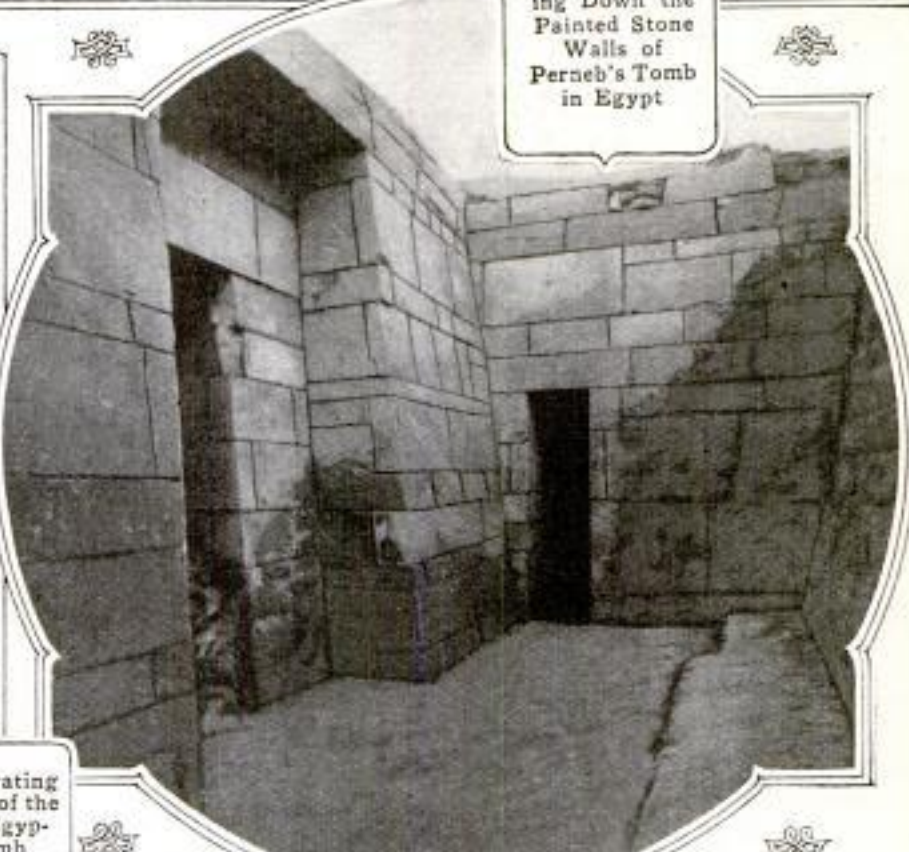


Above:
Carefully Tak-
ing Down the
Painted Stone
Walls of
Perneb's Tomb
in Egypt



Above: Crating
the Stones of the
Ancient Egypt-
ian Tomb

Below: How the
Blocks were
Carried from the
Cemetery



A Portion of the Tomb of Perneb as It Now Appears
in New York: These Walls Are 18 Feet High

food for the "ka," or "double," of the immortal inhabitant of the tomb; and the secret chamber, or "serdab," where the inhabitant of the tomb was supposed to dwell. A narrow slit, instead of a door, leads from the outer chamber to this serdab. The many symbolical paintings on the walls are still bright after 45 centuries. These and the carvings tell of Perneb's life and virtues, and exhort his descendants to do him honor faithfully.

**EARTH-BORING MACHINE
RUN BY AUTOMOBILE**

An earth-boring machine has been patented which will drill four holes at once. It is operated by the engine of



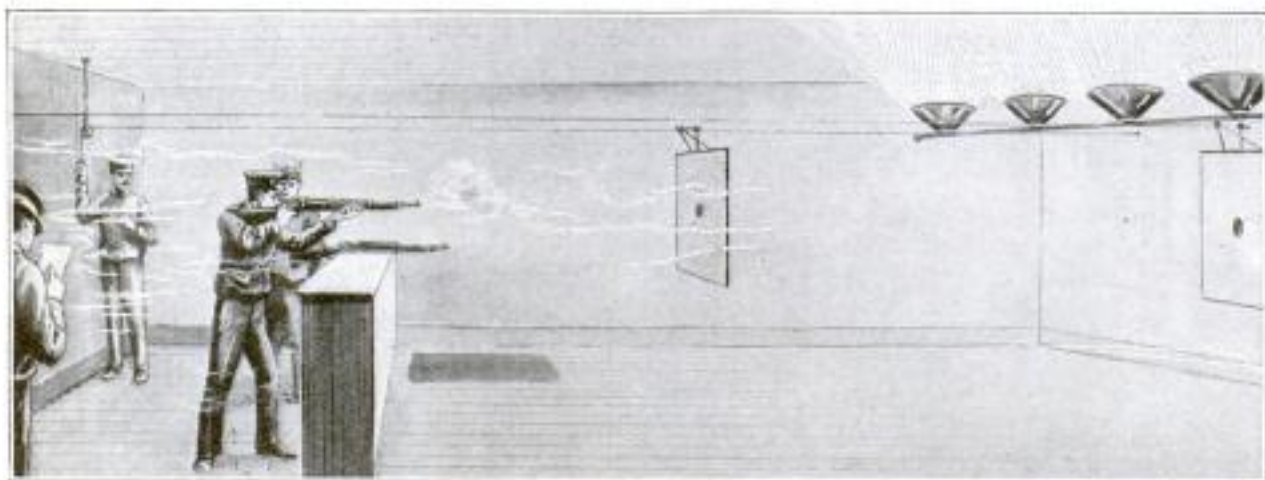
The Driver of the Machine can Bore Four Holes at Once with This Device, Then Withdraw the Augers from the Earth, and Move on to a New Position without Leaving His Seat

the automobile used in carrying it. The machine is designed especially for breaking up land with dynamite. A framework of iron tubing, 15 ft. long and 4½ ft. wide, is mounted on an automobile running gear. A hinged framework at each corner holds a long auger; this portion is folded against the sides of the car when on the road or passing through gates. By pulling cables operated from the driver's seat these four hinged portions may be swung out so that the drills are 15 ft. apart. The engine is employed to

drive a shaft by means of a chain and cogwheel, located at the forward end of the frame. The shaft is connected by bevel gears with other shafts which drive the drills. By holding the threaded end of a pivoted lever against the threaded drill shank, each auger may be made to work evenly whether in hard or light soil. Cable connections enable the driver to withdraw the drills from the earth quickly.

**MOVABLE TARGET MAKES
RIFLE RANGE SAFE** / 274

Indoor rifle ranges, each fitted with a target which can be brought up close to the marksmen for inspection, are being considered for the use of the Washington, D. C., high-school cadets. By means of a wire running over pulleys from the firing stand to the target the latter may be drawn up to the stand, thus making unnecessary the dangerous practice of stepping out in front of the firing stand to determine the score. As a safeguard against bullets rebounding it is proposed to back the targets by two thicknesses of board, behind which sand will be packed. The targets will be lighted by electric globes and reflectors hung from the ceiling.

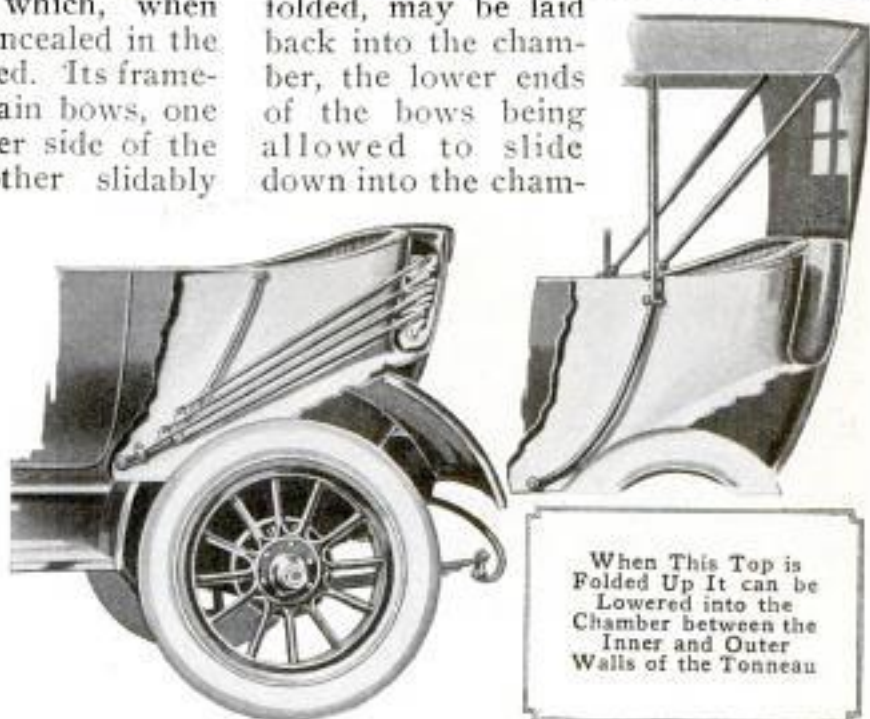


The Target in This Rifle Range can be Drawn Up to the Marksmen, Thus Making It Unnecessary to Walk Out in Front of the Firing Stand to Determine the Score

1654 **AUTOMOBILE TONNEAU MADE FOR DISAPPEARING TOP**

An automobile top which, when folded, can be wholly concealed in the tonneau, has been patented. Its framework consists of two main bows, one removably fastened either side of the front seat and the other slidably fastened either side of the back seat to rods extending downward into a chamber formed between the inner and outer walls of the tonneau. This chamber extends from immediately back of the rear doors to and across the rear end of the car. At the rear it is not as deep as at the sides, but wider. By means of a bracing bow, removably fastened high up on the forward main bow, the top is extended out even with the windshield. Another bracing bow, extending diagonally backward from the rear main bow, holds up the back end of

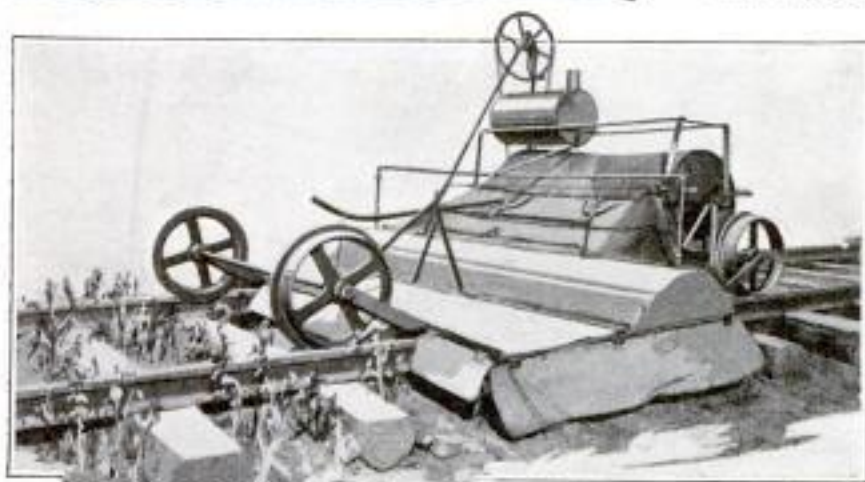
the top. All of this framework can be folded together much as an ordinary folding top. The entire device, when folded, may be laid back into the chamber, the lower ends of the bows being allowed to slide down into the cham-



ber, guided by the rods to which the main rear bow is fastened by eyelets. A suitable covering can be buttoned over the chamber, concealing the top entirely from view.

1519 **NOVEL WEED BURNER USED ALONG RAILWAY TRACK**

In order to check the growth of vegetation along the tracks of the Soo Line between Whitetail and Flaxton,



Long Stretches of Track can be Cleared of Weeds in a Day's Time with This Burner, Which is Pushed Slowly by a Locomotive

N. D., a weed burner has been designed which accomplishes the work reasonably quickly, and at an expense that is not prohibitive. Gasoline is used as fuel and supplied from a tank mounted at the top of the contrivance, which is carried on a low truck. Burners arranged so that they extend across and along the track are held very close to the ground, enabling the flames to come in contact with the weeds. The central part of the device is covered by a shield which fits over the burners and prevents the heat from escaping into the atmosphere. When in use it is pushed by a locomotive.

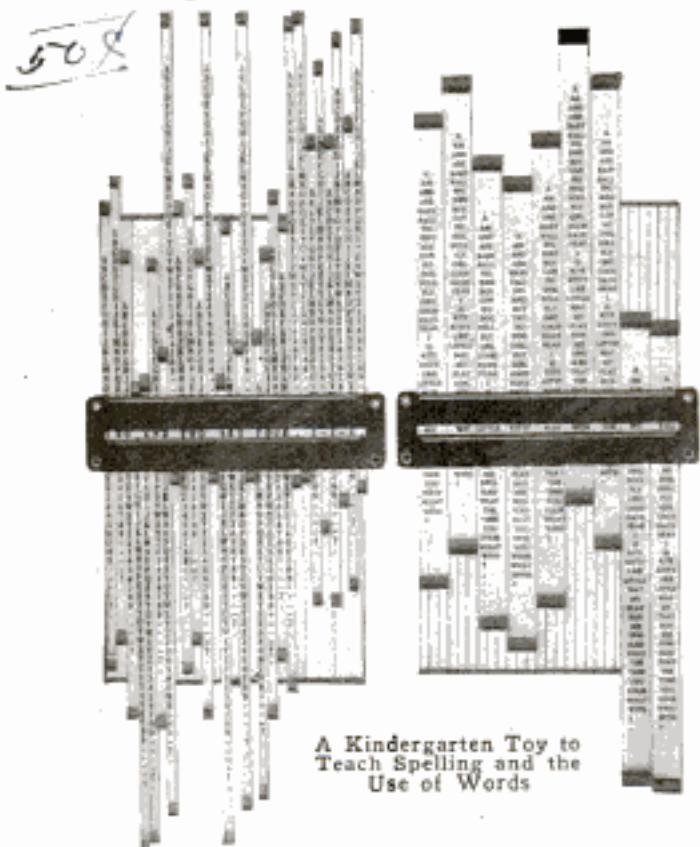
Louis Nelson, Noonan, N. D.

*Mfr. Slade & Miller, 1024 W. Van Buren St.
Sole Selling Agts Geo. Boyfeldt 16th & Irving Pl
New York*

888 1228 POPULAR MECHANICS

Thin-O-Board *les. 875-536 So. Canal*
USE OF WORDS AND LETTERS ELECTROLYTIC DAMAGE CUT
TAUGHT BY TOY BY CURRENT REVERSAL *1804*
Engineering 3-36-16

An educational toy adapted to the kindergarten age consists of two sets of long, narrow wooden strips. Each



A Kindergarten Toy to Teach Spelling and the Use of Words

set is fastened to a rectangular board, as shown, by a frame, beneath which the strips can be slid up and down. On the upper surface of each strip of one of these sets the alphabet, digits, etc., are printed vertically. There are 28 strips in this set. By sliding these pieces of wood up and down, various letters are exposed through a slot which extends across the frame that holds the pieces in place. A child using this toy learns the real purpose of the alphabet by trying to spell out various words while sliding the pieces up and down. The other set of 10 wooden pieces is operated similarly but contains simple words which can be combined into short sentences.

ⒸThe children of Vancouver, Wash., who skate on the paved streets protect themselves from passing automobilists by wearing small bells whose ring serves as a warning.

In an attempt to find a practical way of reducing the damage done in cities by stray currents from street railways, the Bureau of Standards has conducted an exhaustive investigation which has brought out a number of important and highly interesting facts. One observation shows that the destruction of subsurface metallic structures by electrolysis can be materially minimized by periodically reversing the trolley polarity. This presents a means of bringing about the conditions encountered with alternating currents and doing it without causing traction companies to abandon the use of direct current. During any half cycle when iron is positive, and an alternating current is passing from it into the ground, corrosion takes place. But on the succeeding half cycle, or reversal, when the polarity is negative, this corroded metal is dissolved and redeposited so that there is theoretically, at least, no loss. The government's experiments have disclosed that this effect to a large extent is attainable with reversals of even very low frequency. If the polarity is changed once daily, electrolysis troubles are reduced appreciably. This of course in many instances would have the objectionable feature of interfering with street-car operation, but in a city of medium size where there were but one substation, practically no trouble of this kind would be occasioned. It is believed that if this practice were carried out regularly, the corrosion of underground iron pipes and similar structures of the same metal would be reduced fully 75 per cent.

ALASKAN VILLAGE IS SWEEPED BY RIVER OF MUD *1/36*

During a rainy season some time ago, Klukwan, a small Alaskan village, was deluged by a flood of mud which covered it to a depth of from one to two feet. Although no life was lost, considerable damage was



Glimpse of One Part of the School Yard Showing the Field of Rocks Left by the Sweeping River of Mud

done and the natives terrified. They are still fearful of another visitation, for tradition tells that years ago the whole settlement was wiped out by a great black river.

In the mountains, some two and a half miles back of the village, there is a large natural basin which is drained by a small stream that cuts through a gorge formerly not more than 6 ft. wide. During incessant rains this outlet became clogged by alluvium and the great bowl was almost completely filled with mud and rocks. Then one afternoon the natives were turned into panic by a fearful rumbling, grinding roar. A lake of slime carrying huge boulders and tons of small rocks belched forth and plowed its way through the narrow gorge, tearing it wide open and making in a direct line for the village. It swept on at a rate of about eight miles an hour, and in some places dug paths 10 ft. deep.

Within a few feet of the uppermost building of the village the black river divided into two streams. For 17 minutes the roaring continued. The mud and rocks spread out, covering almost the entire town, so that only here and there could one find a sprig of green where a few minutes before there had been well-kept gardens. As soon as the water drained off, the mud hardened, becoming like asphalt interspersed with jagged rocks. A government schoolhouse stands at the point where the black torrent branched into two rivers. Here the mud broke through a barred door, rolled through



Before the Great Slide Occurred This Gorge Was Only About Six Feet in Width



Boulders as Large as This One were Carried Down from the Mountains by the Terrifying Black Torrent

a kitchen and dining room, and spread itself out to a depth of 18 in. in the classroom. Picks and shovels were used to clear the place, and finally, after an expenditure of approximately \$500, the building was rendered habitable. Many dwellings fared similarly, and weeks were consumed in cleaning.

DEVICE ON WINDSHIELD HOLDS SIDE CURTAINS

1603

A homemade windshield attachment which furnishes protection against wind striking a motor-car passenger from either side consists of a band of iron capable of being folded into small space and fitted with clamps for attaching it to the windshield posts. On the outside of this band are curtain pegs which serve as supports for the regular forward curtains of an automobile. The band is hinged at either



The Curtains are Held in Place by a Hinged Iron Band Clamped to the Windshield Posts

side so that the curtain can be swung outward on entering or leaving the car. These curtains, so supported, furnish excellent protection against the wind, and eliminate the inconvenience of a closed top.

Dr. W. V. Gage
Worland, Wyo.
A Home made Device

Copyrighted material

1536 ESCAPING GAS WRECKS KITCHEN STOVE

An example of the possible serious consequences of allowing gas burners to be turned on without their being



A Kitchen Stove Which was Wrecked by the Explosion of Gas Which had Escaped through an Open, Unlighted Burner for Several Hours

lighted is furnished by a recent experience in an Iowa home. It is believed that the evening before the accident the small child in the family, playing in the kitchen, turned on the oven burner of the kitchen stove. The following morning one of the family lighted one of the other burners and did not notice that the oven burner was open and unlighted. Nothing unusual

occurred for some minutes. Then the escaped gas came in contact with the blaze and the stove exploded, covering the floor with a mass of wreckage. Fortunately no one was hurt.

USING WATER ECONOMICALLY IN PLACER MINING / 1458

When common methods are employed, placer mining is rendered a difficult and rather unprofitable undertaking unless plenty of water is easily available. What is termed a dry placer machine, however, is being used quite successfully in some of the western states where water is obtainable only in relatively small quantities. Water is employed, but not so much of it is required as in hydraulic and some other processes. A steam shovel is used to deliver the dirt into the machine. The gravel is broken up by a disintegrator and then passed through a trommel where water is added and coarse, worthless rock eliminated. The gold-bearing dirt is worked over riffles in the usual way, the water being supplied by feed pipes. The pulp is discharged through a pipe to a dump, and the water drained into a place from which it can be recovered with pumps and reused.

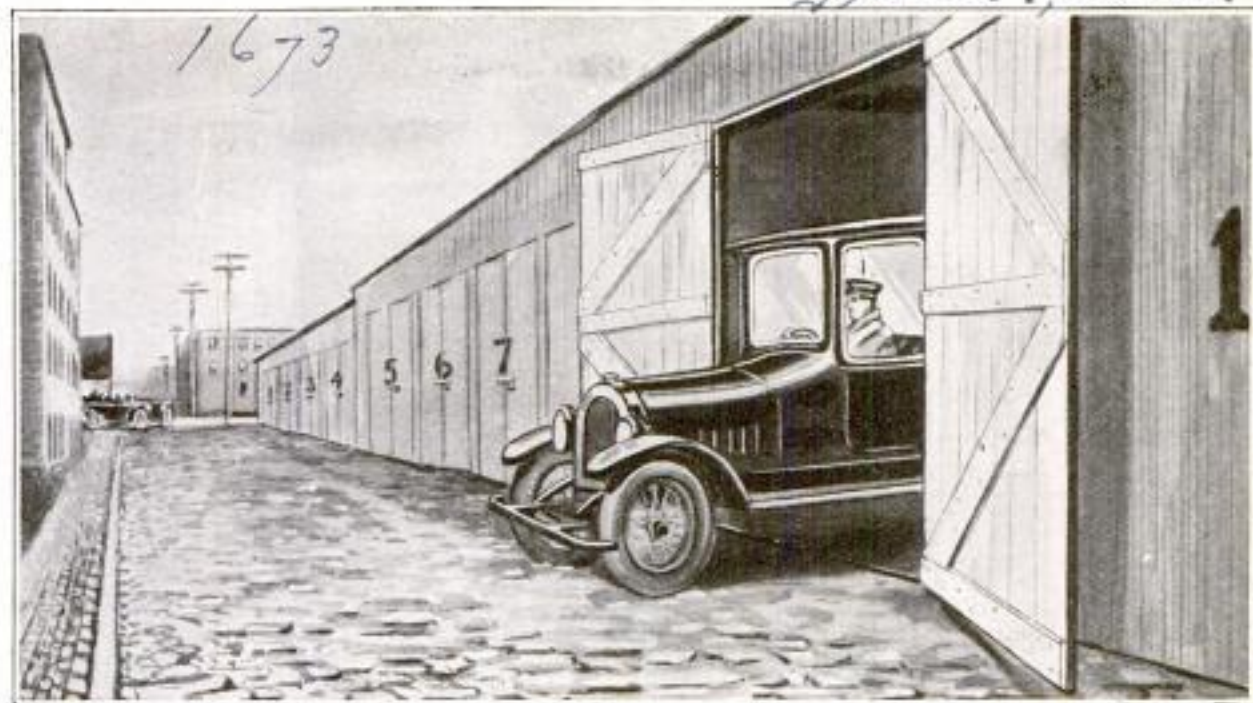


This Machine, Which Uses a Comparatively Small Amount of Water, Works Placer Deposits Profitably Where Streams Are Scarce

*Marion Steam Shovel Co.
Marion, O.*

Geo. B. Thomas

1313 Fidelity Bldg
POPULAR MECHANICS 891
Balto., Md.



A Structure Built at the Rear of a Row of Residences in Baltimore, Comprising 20 Private Garages Heated by One Plant and Cared For by One Man

Private
COMMUNITY GARAGES CARED
1673 FOR CHEAPLY

The problem of storing private automobiles in residence sections of Baltimore has been solved by the construction of what may be called community garages. Enterprising persons have secured from the owners of a row of houses the right to use the rear portion of their back yards, on which has been constructed a building divided into 20 garages. This method of concentration makes it possible to heat the whole 20 from one heating plant, and one man can act as caretaker for the whole group.

provided with folding sides and a roll top. A shelved compartment, 15 in. high and 9 in. deep, is provided at the rear for stationery and supplies. The rear legs are permanently mounted on casters, while those in front normally rest on wooden tips. Auxiliary casters

1482
TYPEWRITER DESK DESIGNED FOR CROWDED OFFICE

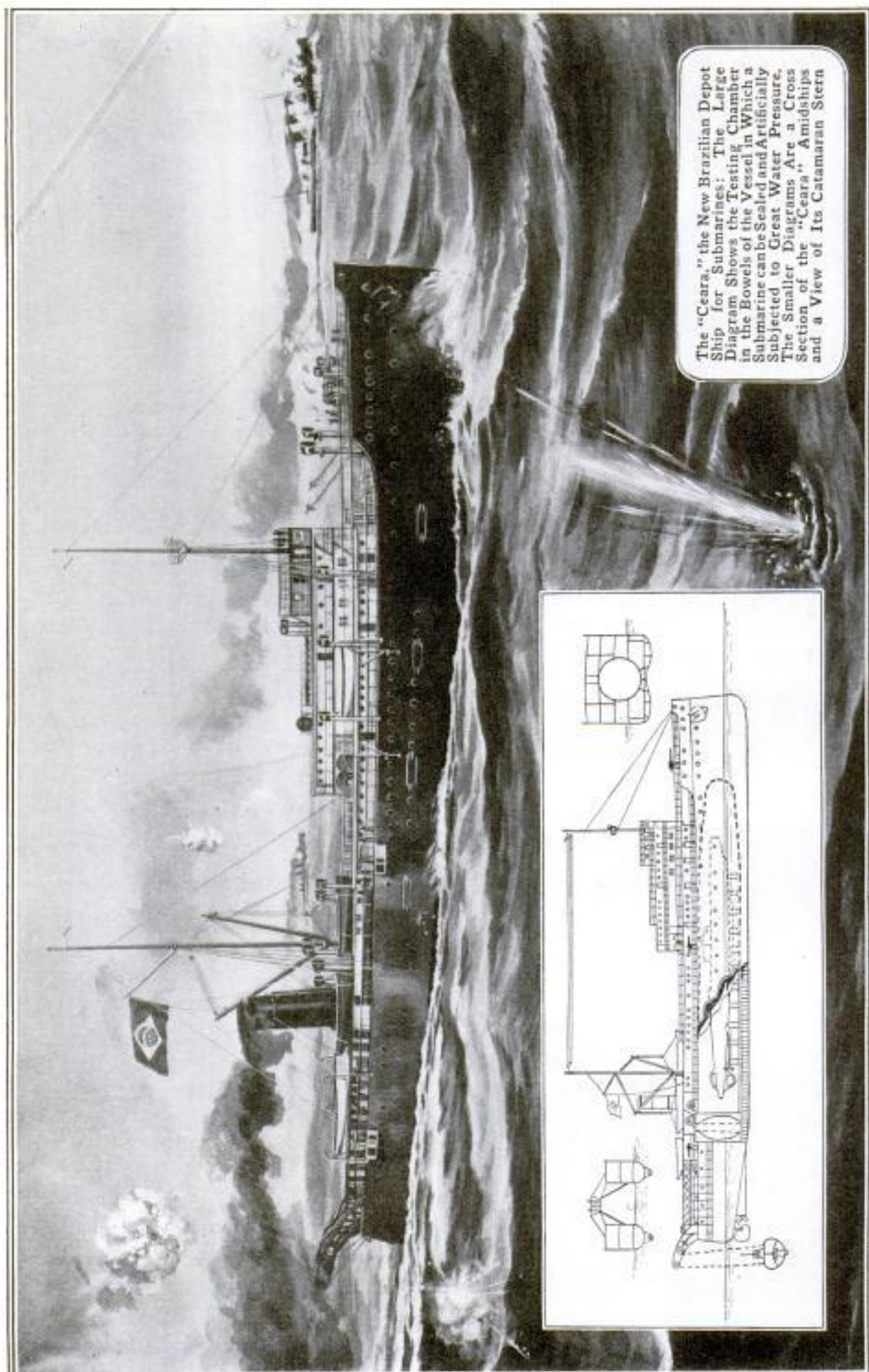
Compactness and convenience of arrangement are two of the good features of a folding typewriter cabinet which has been brought out to meet the needs encountered in cramped city offices. When not in use it occupies a floor area of only 18 by 26 in., but when opened it presents a working space of 18 by 44½ in. The stand is made of strong steel tubing, while the cabinet which it supports is constructed of oak and



When Closed the Cabinet Occupies Very Little Space, but When in Use It Affords an Operator Liberal Working Room

are supplied, however, and brought into position whenever needed by moving a small lever fixed beneath the center board of the desk.

Belina Specialty Co.
Belina, O.



The "Ceara," the New Brazilian Depot Ship for Submarines: The Large Diagram Shows the Testing Chamber in the Bowels of the Vessel in Which a Submarine can be Sealed and Artificially Subjected to Great Water Pressure. The Smaller Diagrams Are a Cross Section of the "Ceara," Amidships and a View of Its Catamaran Stern

Inw: Majo Cesare Laurenti,
Technical Director, Fiat,
San Giorgio,
Spezia, Italy. 893

SUBMARINE TENDER PER- FORMS MANY FUNCTIONS

The functions of a "mother ship" for submarines and those of a testing dock in which a submarine may be sealed and subjected to water pressure as great as obtains in the ocean at a depth of 200 or more feet, are combined in a vessel recently completed for the Brazilian government. The "Ceara," as the ship is named, was built at Spezia, Italy. It is claimed that craft of this type will greatly increase the mobility and range of submarines.

Both the functions of "mother ships" and the dock at Spezia, in which submarines are subjected to high pressure artificially, have been commented on in Popular Mechanics Magazine, but the "Ceara" is one of the first ships—if not the first—in which so many functions have been combined. This boat is designed as a seagoing base of supplies for six submarines. It carries reserve crews to relieve under-water craft, is a floating hospital, a repair shop, acts as a salvage boat having great derricks at its stern with which it can lift sunken craft, and by emptying its testing tube, can be used as a floating dry dock. Especially in an emergency this is a great advantage.

The testing tube, or dock, is a steel cylinder of high tensile strength situated in the bowels of the vessel, partly below the normal water line, and having its entrance at the rear between portions of the stern, which is of the catamaran type. The open end of the testing tube may be closed by means of a globular caisson which fits into the opening tightly. The tube, after a submarine has been floated into it, is filled with water by a powerful pump which produces a pressure equivalent to that found at a depth of 200 or more feet. In some navies many submarines are given high-pressure tests but once, namely, at the time they are being inspected before final acceptance is made. In some cases that has sufficed until an accident, as in the case of the "F-4," has proven that fatal deterioration has taken place. With

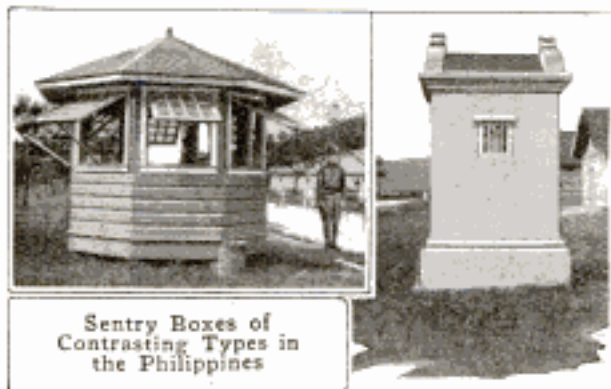
the means provided in the Brazilian ship, tests can be made frequently and pressure can be applied gradually, under observation, so as not to work any unnecessary injury to the submarine. The pressure can be relieved almost instantly by opening the valves. There is little danger for persons inside a submarine during such a test, for they are in constant telephonic communication with those outside.

The "Ceara" is 326 ft. long, has a 51-ft. beam, and a normal displacement of 3,800 tons. It is driven by twin screws operated by two Diesel two-cycle motors capable of developing 6,400 hp. These are among the biggest marine oil engines yet built. They are capable of producing a cruising speed of 11½ miles an hour, which can be raised to 16 miles in an emergency. This depot ship can carry enough fuel to undertake a journey of 4,000 miles, in addition to supplying fuel to its flotilla. The "Ceara" is equipped with a number of rapid-fire rifles of good size capable of standing off torpedo-boat destroyers or armed merchantmen.

— 1648

CONTRAST IN SPANISH AND AMERICAN SENTRY BOXES

An index to the difference between Spanish and American military methods is furnished in the contrast between the types of sentry houses used in the Philippine Islands by the respective armies. At Olongapo, where a naval station is located, is a Spanish sentry house, built about 1850, in the sides of which are small barred win-



Sentry Boxes of
Contrasting Types in
the Philippines

Lieut. H. Delano

dows. The American sentry house near by is octagonal and larger in diameter. Almost half of each wall is taken up by a window, which arrangement gives the guard a clear view in all directions. Shelter from the rain can be had along with good ventilation by swinging the windows out on the hinges fastened to the top.

**TWO-WHEELED WINDMILLS
IRRIGATE AT LOW COST**

1659

For the purpose of pumping water for irrigation at little cost a two-wheeled windmill is employed in parts

eters of pump cylinders commonly used range from 8 to 16 in. Each mill is equipped with a governor which automatically swings the wheels out of the face of the wind when the blast is too violent; or, at a somewhat less velocity, it swings the wheels so that they are set at an angle toward the wind. A mill with 12-ft. wheels, lifting water 50 ft. with a 12-in. pump having a 16-in. stroke, will pump 200 gal. per minute, it is said. Such a mill can irrigate from 15 to 20 acres. Having twice the ordinary wind-resisting surface, a very slight breeze will run these mills.



This Mill is Operated at Practically No Cost and can Irrigate from 15 to 20 Acres

of Kansas, and other irrigated regions. The wheels of these mills range from 6 to 12 ft. in diameter. The two wheels face the wind side by side and power is transmitted from each wheel shaft to the pitman shaft by a roller chain. The stroke of one of the larger mills can be adjusted from 8 to 16 in. Diam-

1813
HOW GERMAN ARMY HORSES

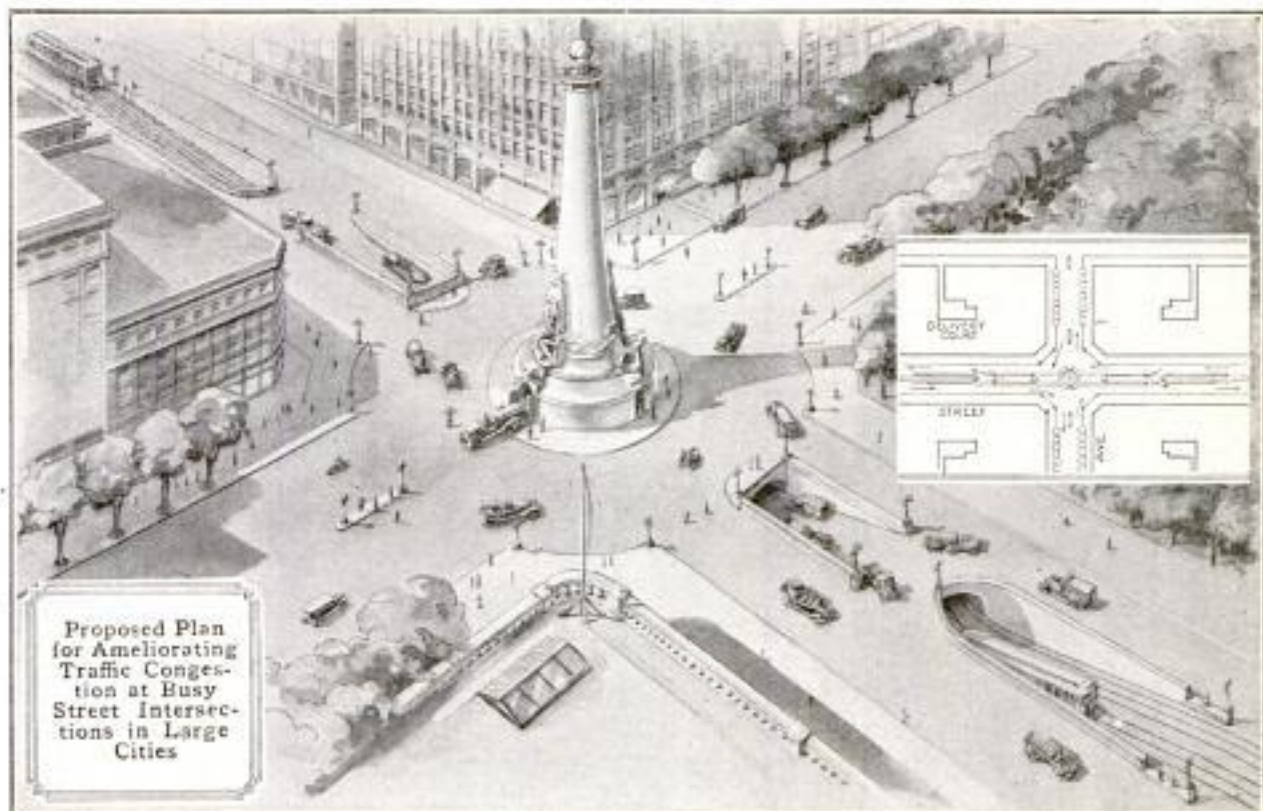
ARE DYED

Prometheus 2/26/16

Because of the shortage of horses in Germany it has been found expedient to dye white and dappled horses a field-gray, as already noted in Popular Mechanics Magazine, thereby giving them the same protective coloring as the soldiers' uniforms and making them available for military purposes. The coloring when first applied gives the horse a violet hue, which later changes into greenish-brown by reason of the chemical action of the sweat retained in the hair. A staff apothecary of the German army has found that the best dye is a one-per-cent solution of permanganate of potassium. This is applied to the head, legs, and upper part of the body with a brush and to the more sensitive parts with a sponge. The coloring is permanent, harmless, and costs about 50 cents per horse.

1498
**END OF TRAFFIC JAMS AIM
OF ODD STREET PLAN**

In the hope of finding a practical means of relieving traffic congestion in large cities, an art society at New York recently offered prizes for the best-planned arrangements of street and avenue intersections. In the problem given, an avenue extending north and south was assumed to be crossed by a



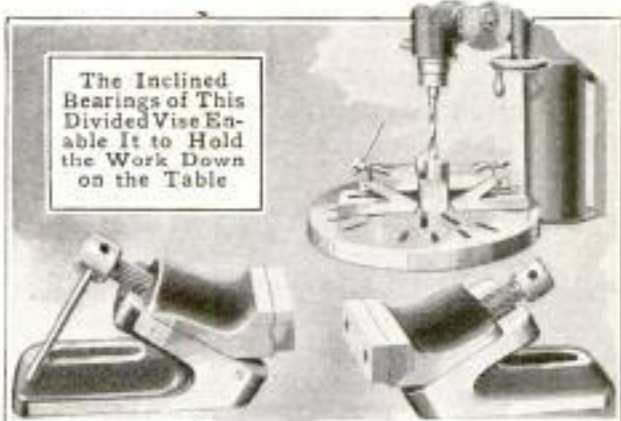
Proposed Plan
 for Ameliorating
 Traffic Conges-
 tion at Busy
 Street Intersec-
 tions in Large
 Cities

street carrying a two-track car line, but having only one-half the traffic volume of the other. Both thoroughfares were of the same width, 100 ft. The winning design offers a scheme whereby all of the vehicles crossing the avenue pass beneath it through two tunnels, the lower of which is reserved for the transportation line. The openings of these bores are placed one ahead of the other so that sufficient space is left for traffic to turn from one artery into the other. By rounding the corners of the buildings and curbs, and providing a tower in the center of the intersection to act as a hub, rotary circulation is provided. The avenue traffic all remains on the surface. The plan provides for the beautifying of the intersection and requires the condemnation of only a relatively small amount of private property.

clamping work, has two jaws with vertical gripping surfaces, as in other vises, but the supporting bearings of these jaws incline downward. This downward inclination overcomes any tendency on the part of the work to rise from the table, and so makes unnecessary the sometimes harmful practice of hammering down the material in the vise. Because entirely separate, these jaws can be used to hold any piece within the capacity of the machine. By setting the jaws at an angle they can be used for holding

**DIVIDED MACHINE VISE
 SAVES TIME**

A divided machine vise which can be used to advantage on planers, drill presses, and other types of machine tools provided with tables having the usual arrangement of T-slots for



The Inclined Bearings of This Divided Vise Enable It to Hold the Work Down on the Table

tapering or angular work without mutilating the material or subjecting it to undue strain.

Schuchardt & Schutte
90 West St., New York.

Inv. W. L. McInish,
Talussee, Ala.

1550 **NOVEL CHURN IS OPERATED WITH LITTLE EFFORT**

Butter is churned quickly and easily with an apparatus, lately designed by



an Alabama inventor, which is similar in principle to some types of mechanical egg beaters, although built on a much larger scale. The cream is agitated by means of two large paddles revolved in opposite directions by a manually operated gear. The container is intended to be set on a floor adjacent to a wall. The handles of both paddles pass through holes in the cover of the churn and connect with the shafts of two small horizontal gears that mesh on opposite sides with the teeth of the propulsion wheel, which, with them, is mounted in an iron bracket attached to a wall.

1790 **MILK USED AS CUTTING OIL IN DRILLING BLIND NUTS**

Milk is being employed as a cutting lubricant in one of the large gear factories at Chicago. Although amusing, this application of the fluid draws attention to the peculiar qualities of certain natural products and the difficulty often met when attempts are made to duplicate them artificially. Some time ago the company began manufacturing blind nuts out of a soft machine steel. The bore was 2 in. in diameter and approximately a half inch deep. Lard oil, as well as screw and cutting oils and compounds, thick and thin, were tried, but regardless of what lubricant

was used, the threads were torn. Experts were called on to find an oil suited for the work. Many experiments were made, but without overcoming the difficulty. Finally, as a last resort, milk was tried. It proved to be apparently the sole material suited for the particular grade of open-hearth steel that was being used. Since then no difficulty has been encountered. Milk is used when the threads are being drilled. For boring out, a cutting compound is used. The milk is caught and used over and over until it sours or becomes mixed with too much oil. Recently difficulty was encountered in cutting keyways into gears made of a special nickel steel, the teeth of the broaching machine breaking off after being used only a day. When milk was tried as a cutting oil it obviated the trouble. The discovery has proved valuable to the company.

TENNIS SCORER DESIGNED TO BE WORN ON HAND 618

For those tennis players who experience difficulty in keeping mental records of the points won and lost as fast games progress, a scoring device has been introduced which is intended to be strapped to the back of one's left hand when in use. It is arranged like some card and golf scorers, and registers points and games for opposing teams. Some little pressure is required to turn the counting disks, and this gives reasonable assurance that they will not be moved out of place when a player inadvertently falls.



COPYRIGHT, H. F. QUICK

CA large number of women plan to go into a military encampment in San Francisco this summer to learn "first-aid" work.

Wm Ganschow & Co
A. F. Boissoneau Supr.
1001 Wash. Blvd, Chicago

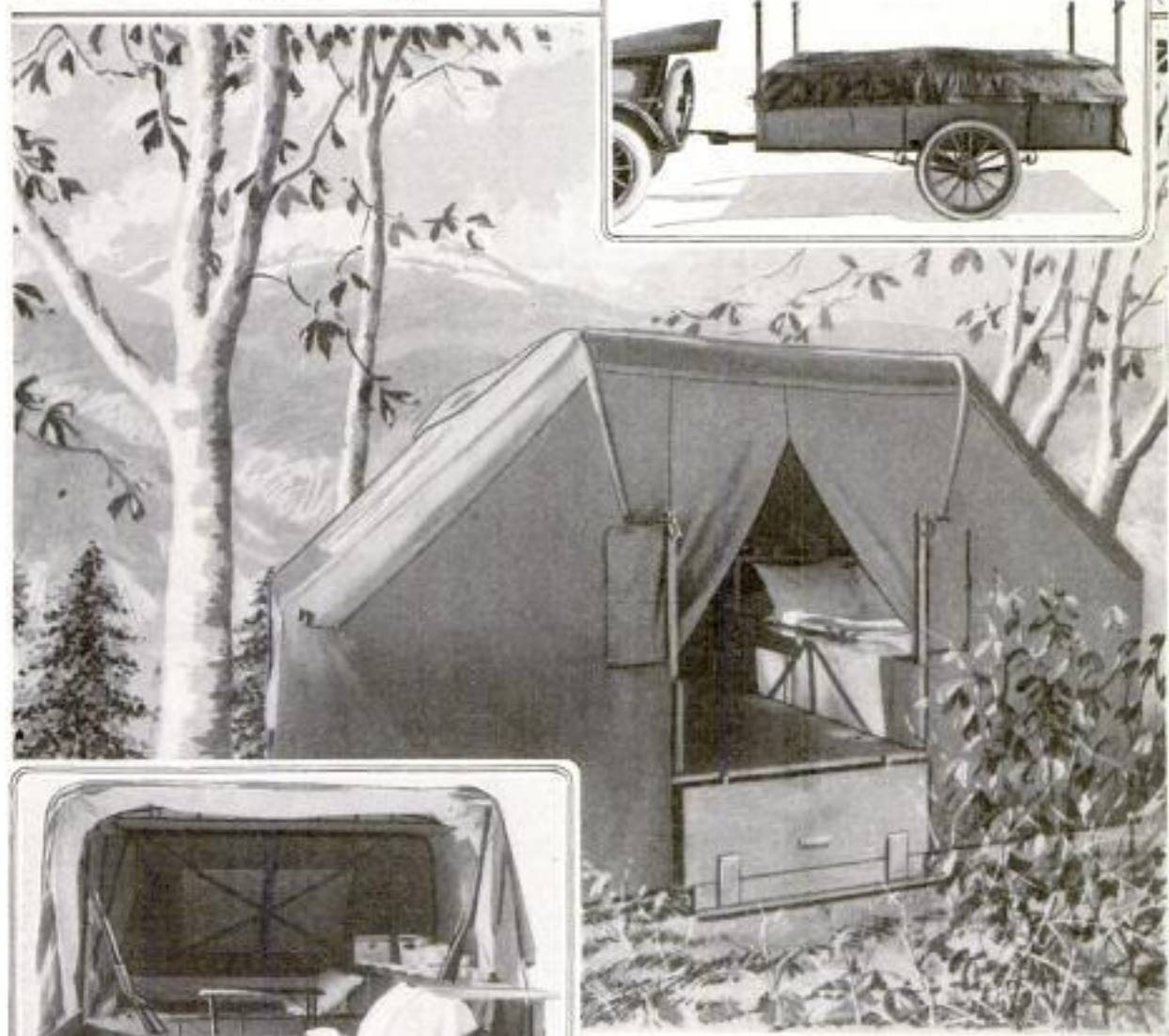
2901 165 Broadway New York

1525-*Antes*

MOTOR-CAR TRAILER FOR OUTINGS OR BUSINESS

One of the camping outfits which has been produced in response to the rapidly increasing popularity of the au-

sired. When not being used for outings, the camp equipment can be removed in seven or eight minutes and the vehicle can be used as a commercial trailer; as such it has a capacity of



The Upper Picture Shows the Trailer on the Road. The Larger View Shows the Trailer Opened Up and Covered with Tent

The Automobile Trailer Ready for Campers, with Canopy Folded Back, Showing Two Beds, Table, and Shelf

tomobile as a vehicle for outing purposes, is a convertible trailer carrying two double beds, a stove, table, ice box, etc. A hunting boat can be suspended on a framework above the trailer if de-

1,500 lb. It measures 7½ ft. long, 44 in. wide, has 9-in. flare boards, and weighs 700 lb. with camp equipment. The two beds, which are situated either side of the trailer's box when open, have coil springs and, with their bedding, can be folded so as to lie in the bottom of the box. A part of the tent-like cover is used as a tarpaulin when on the road. When set up on its collapsible frame there are screened openings in the slanting sides of the covering; over these extend flies which can

Shattuck Trailer Co.
140 S. 10th St. Minneapolis, Minn.
Hernepin Ave.

be rolled back if desired. The two artillery wheels are fitted either with solid rubber or pneumatic tires. The device by which the trailer is hitched to a car is such that there is no disconcerting play between the two vehicles.

radio storage battery may be properly charged, a special charging panel has been designed which seems to fulfill the requirements. It is so equipped as to disconnect automatically the charging circuit when the battery has been charged. In case the lights are used for other than emergency purposes, they are automatically cut out by a special instrument when the discharge reaches a certain point, thereby reserving the necessary emergency supply. These lights are placed in the main passageways, over doors leading to decks, on the boat deck near the rafts, lifeboats, etc. They are arranged in three circuits, one for each deck. In case of emergency an officer or wheelsman simply throws one switch or presses a button located close at hand, and all of these lights are turned on.

SHIP'S EMERGENCY LIGHTS

1808 **USE RADIO BATTERY**

A number of passenger vessels at Baltimore, Md., have been equipped with emergency lights which use the emergency radio storage battery as an auxiliary source of power to operate these lights. This arrangement has been devised in order to comply with the regulations of the United States Steamboat Inspection Service which require that passenger vessels have auxiliary lights with an independent source of power. In order that the

1002 **JETTIES MAKE ASTORIA GREAT INLAND HARBOR**

Sharon G. Styles, 522

At the mouth of the Columbia River a curious and interesting work, begun in 1885, is now nearing completion. Miles of trestles and piling stretch far out into the ocean, forming jetties which are to free the region from sand-bars. Already a seven-mile barrier has been erected on the south side of the channel, and a shorter one to the north is now receiving finishing touches. The space between piles is filled with

11th St. Astoria Ore.
row-gauge railroad. Nearly 9,000,000 tons of rock will be used in the whole project, the placing of which, together with other expenses, represents an expenditure of \$15,500,000. The port of Astoria, Ore., situated eight miles from the mouth, will be made one of the largest fresh-water harbors in the world at the final completion of the work. The river there is about six miles wide, the city possessing a protected harbor 20 miles long. Dredges have been installed to assist currents created by the jetties in keeping the channel free from sand accumulations.



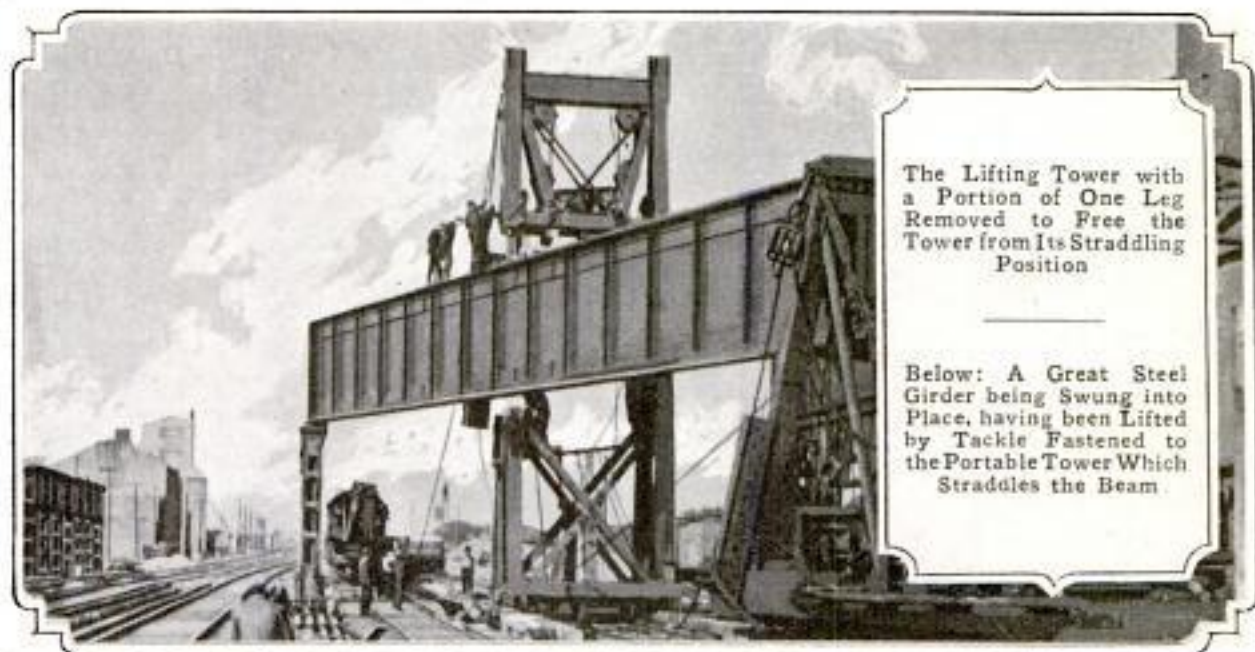
The Seven-Mile Breakwater Extending into the Sea from near the Mouth of the Columbia River is Shown Above



Trainload of Stone being Hauled over Trestle during Construction of North Breakwater. With These Structures and Dredges, a Deep Channel is being Provided into the River

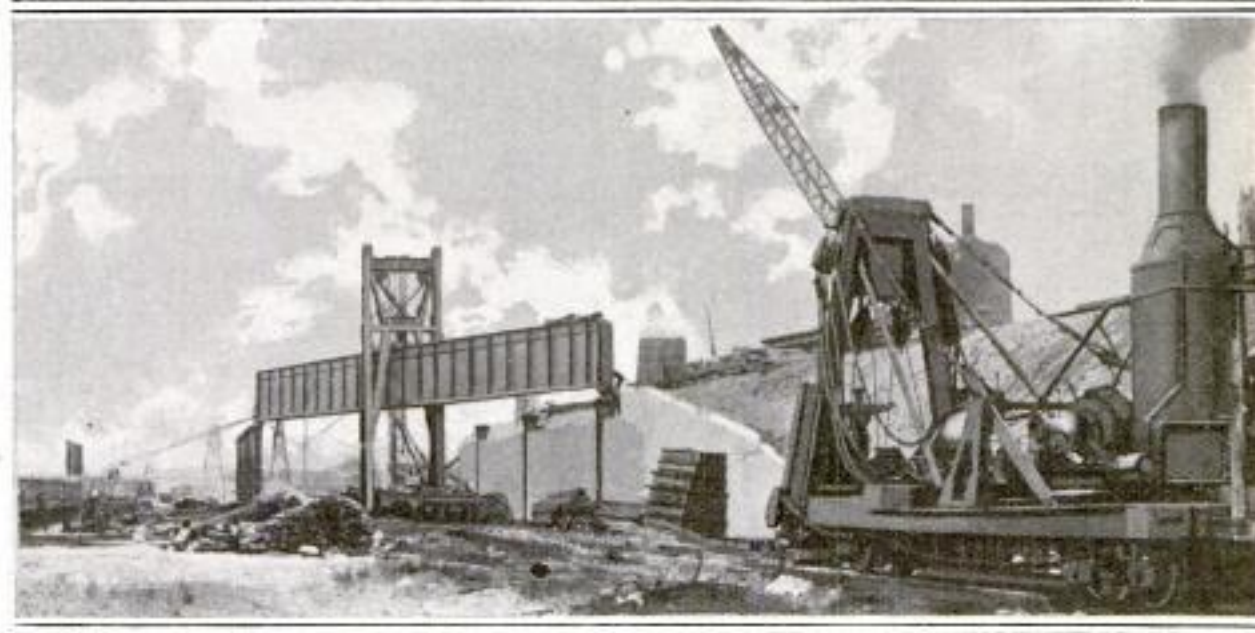
rock, the material being carried out over the trestles by means of dump cars on a nar-

BIG STEEL GIRDERS LIFTED INTO PLACE QUICKLY



The Lifting Tower with a Portion of One Leg Removed to Free the Tower from Its Straddling Position

Below: A Great Steel Girder being Swung into Place, having been Lifted by Tackle Fastened to the Portable Tower Which Straddles the Beam.



While building a long viaduct over several railway tracks in Chicago unusual methods were employed in raising the long steel girders, the heaviest of which weighed $130\frac{1}{2}$ tons and was 125 ft. long. The builders were not allowed to block some of the tracks more than two hours. A tower wide enough to straddle a railway track was constructed, placed on trucks, and moved to a point midway between the piers of the first girder. It was then blocked up, the lower cross beams were removed, and flat cars bearing the girder were brought directly beneath

it. The girder, after being carefully balanced, was raised by a derrick engine operating a cable which ran through tackle fastened to the top of the tower. When at the proper height the beam was swung around into place. The tower was freed from its straddling position by removing a portion of one side and then moving the structure along. Three parallel beams were raised in this way. Then, to move the tower across the tracks to the adjacent span, it was blocked up, placed on greased rails, and slid quickly into its new position.

Ill. C. Ry 79th St. Chicago
Pennsylvania Steel Co.

Pittsburgh, Pa.

DEVICE LOCATES TROUBLE IN ELECTRIC SYSTEMS

For automatically determining the class of trouble present in the electric lighting and starting equipment of any



Determining the Class of Trouble Present in the Electric System of a Car by Using the "Fault Finder"

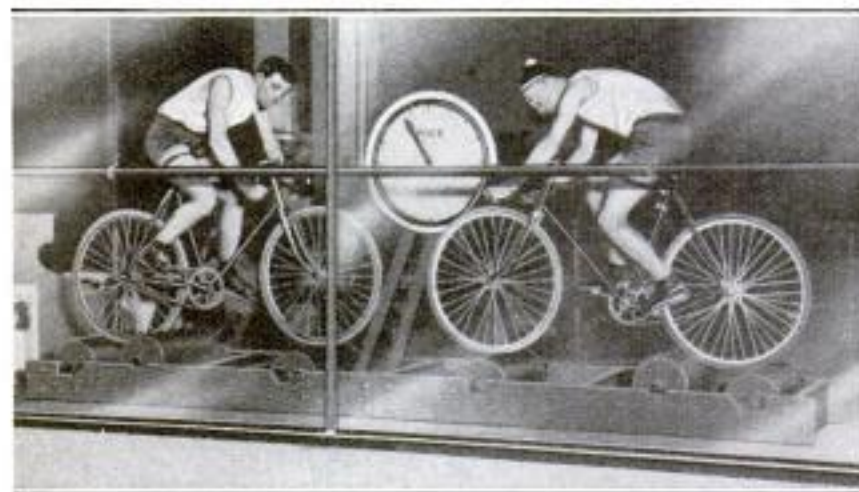
American motor car, an instrument of apparently much value to repairmen in public garages has been developed. It

makes it possible to locate the exact cause of a disorder in a very few minutes, thus accomplishing quickly and accurately a thing that otherwise often requires hours of work. It is used in connection with a simply arranged but elaborate chart system which gives concise, thorough directions for remedying any specific fault in the particular car at hand. The instrument has some of the characteristics of the ammeter and also some of those of the voltmeter, but serves a much broader function than both of them. An adjustment which may be made momentarily fits it for testing any one of some 70 different types of electric systems. It works according to a plan which brings all of the many possible causes of trouble under 11 heads, each of which is designated by number. To use it, the device is connected with the batteries of a car. When the tests are made the nature of the trouble is shown by a number appearing in one of the openings provided in the instrument's dial and designated by a pointer which moves across the latter's face. This number refers to a chart which gives explicit instructions for correcting the trouble.

ENDURANCE BICYCLE RACE IN STORE WINDOW

For the purpose of stimulating interest in bicycle riding a firm in San

Francisco recently conducted an endurance bicycle race in its store window. The wheels which the two racers used were mounted on ball-bearing rollers, or "home trainers," and fastened in an upright position. The race lasted six hours. The mileage was measured by an indicator properly geared and connected with the rollers by chains. The final score was approximately 130 miles. A great throng witnessed the finish.



These Bicyclists, with Their Wheels Mounted on Ball-Bearing Rollers, "Traveled" Approximately 130 Miles in a Six-Hour Endurance Race

Goodyear Tire & Rubber Co., Akron O.
Sutter & Van Ness St. San Francisco
 Copyrighted material

Bronckhurst & Potter Cos.

50



Glimpse of Banquet Room, 100 Feet below the Ground, Arranged in New Sewer, Recently Completed at St. Louis

DINNER IS HELD IN TUNNEL

1604 UNDER ST. LOUIS

When the Mill Creek sewer at St. Louis was completed recently, a short section of it was temporarily converted into a banquet room, where a large dinner was given and the structure formally turned over to the city. Covers were laid for some 200 guests, including the mayor, city officials, representative business men, and the contractors. The tunnel, which is slightly less than four miles in length, is built in the form of a horseshoe and is 16½ by 16½ ft. in height and width. It was driven through solid rock, the material hoisted to the street level through shafts, and the walls and floor concreted by the compressed-air method. The work was finished eight months ahead of the contract date for its completion. At the point where the banquet was served the bore was draped with flags and banked with

greenery. Long tables, a platform for the entertainers, and a piano were installed. When the guests took their places there was little about the room to suggest that they were in a sewer 100 ft. below the surface of the ground.

— 1667

ATTACHMENT DOES WORK OF TELEPHONE BOOTH

A telephone attachment has been invented which is designed so to regulate the vibrations of the transmitter as to make the voice sound distinctly, whether the speaker be close to the transmitter or some distance from it, and to make private telephone conversation possible though other persons are close by.



CRYPTOPHONE

Dr. Arthur Saxe
2035 Chestnut
Phila.
Invo.)

350

The device consists of a circular metal casing that can be easily attached to a transmitter. It contains a diaphragm mounted on a spring so that it can magnify the voice without rendering it incoherent. When the user holds his mouth close to this device his voice, while clear to the one addressed, cannot be understood by those near him.

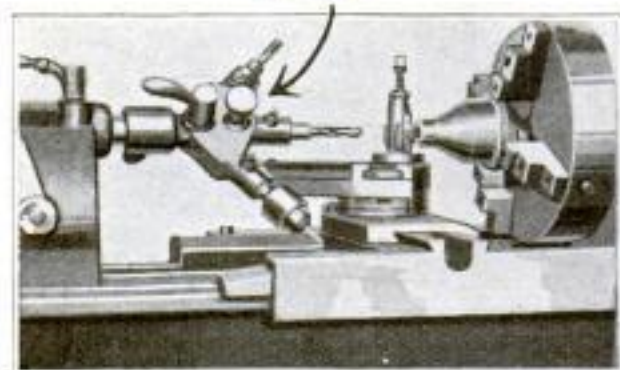
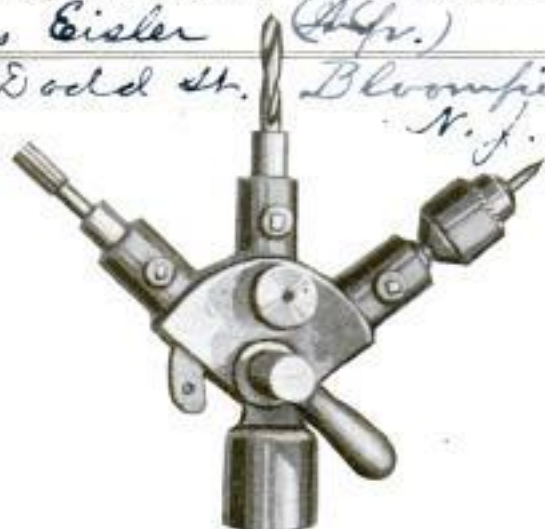
Foreign sounds which often are magnified by passing through the transmitter and receiver of the same instrument, are shut out if the speaker holds his mouth close to the attachment. Discordant vibrations due to rebounding of the breath are eliminated by this device, which has an air passage through which the breath escapes.

SCREW-MACHINE WORK DONE

1546 WITH LATHE TURRET

With the aid of a turret head recently designed by a New Jersey in-

Chas Eister (Invr.)
43 Dodd St. Bloomfield N. J.



The Turret is Designed to Handle Drill-Jig and Die Bushings, Screws, Studs, Nuts, and for Recessing Holes of Various Kinds

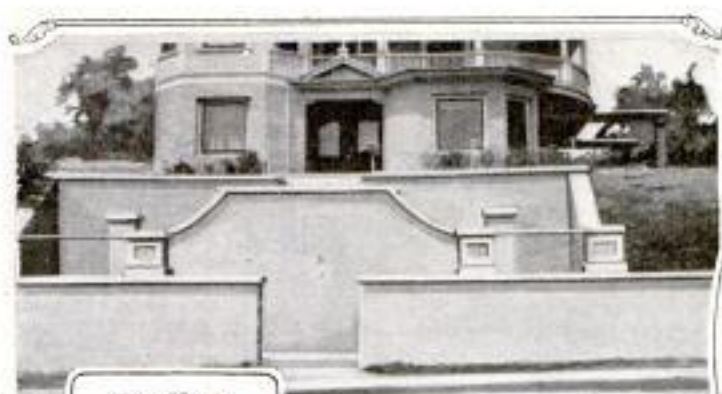
ventor, ordinary screw-machine work can be done on an engine lathe. The attachment is intended to meet the demands of shops unprovided with screw machines. It can be put in working position as quickly as a lathe center or chuck, and with the use of a taper plug may be employed on different lathes. Contrary to the usual

case, the head does not revolve, but instead swings to cover the tool settings, of which there are three. In order to change the position of one of the tools it is only necessary to draw out a knob, and as soon as the tool is in place, a plunger automatically locates it in the proper position. The tool is kept rigid by a clamp. A screw holds the turret, which may be turned to any angle, on the tailstock spindle.

MANY TYPES OF APPROACHES FOR CALIFORNIA HOMES

In the cities of southern California are to be found many solutions to the problem of designing a serviceable and artistic approach to a house that is situated high above the street. Owing to the irregular topography of the sites of many of these cities, homes have been erected 15 and even 20 ft. higher than the sidewalk. Where a large number of steps has been required one or more landings have been included to break the long climb. If the lawn is steep and terraced, it furnishes an opportunity to divide the walk, having one part turn to the right and the other to the left. In some cases two homes have utilized the same steps in the lower part of their approaches, producing a very symmetrical effect. Concrete, or concrete and cobblestones, are the materials almost universally used. Ordinarily, where walls are more than 5 ft. high, reinforcing is used. The average height of each step is 7 in., though in some flights it is 10 in., and in others only 5½ in. A few flights have steps with treads but 8 in. wide; other steps have treads 12 and even 14 in. wide.

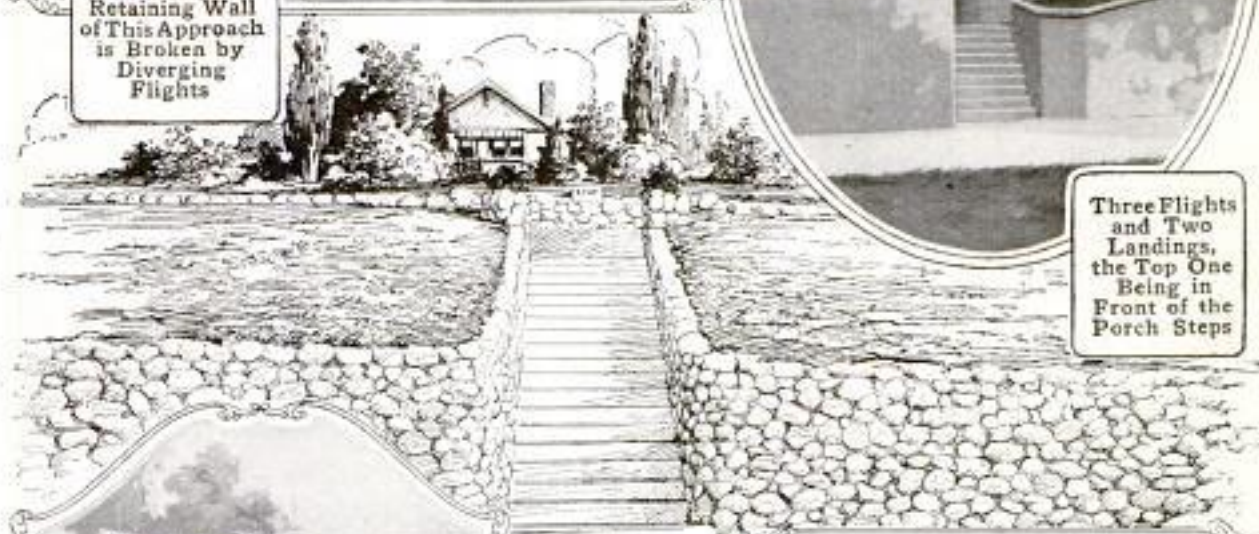
Marple



The High Retaining Wall of This Approach is Broken by Diverging Flights



Three Flights and Two Landings, the Top One Being in Front of the Porch Steps



A Long Flight of Steps with Which Cobblestones have been Used Effectively



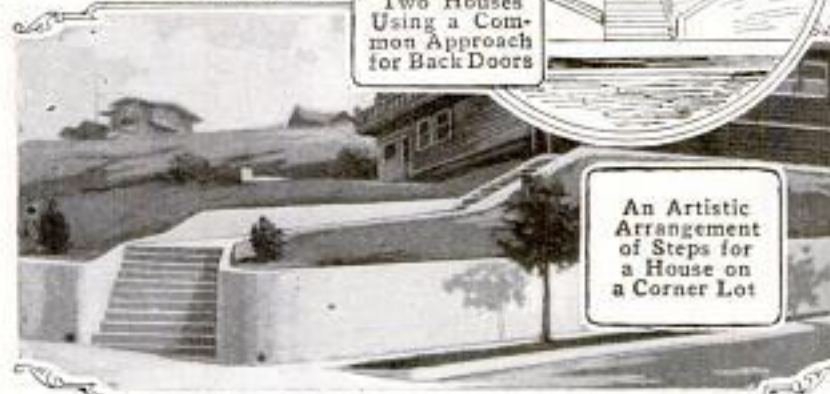
These Retaining Walls and Entrance Serve Two Houses



An Inviting Direct Approach with Plain Walls



Two Houses Using a Common Approach for Back Doors



An Artistic Arrangement of Steps for a House on a Corner Lot



Approach with Three Landings and a Winding Flight at the Top

COLLOIDS AS INDUSTRIAL AIDS

BY DANIEL T. PIERCE

To Barber Asphalt Cement Co.,
London, England

COLLOIDS to most of us are a strange dish, yet the chemists are now having them for breakfast, luncheon, and dinner. Colloids and colloidal chemistry are not new; they are simply the fashion. The biologists are explaining the origin of life in the terms of colloidal chemistry; nutrition is similarly explained and our understanding of it enlarged. But, as might be expected, it is the industrial chemist—he who invents and improves processes and products and on whom the manufacturer depends for his “reason why”—who is busiest tracking the ultramicroscopic colloid to its lair, and finding out how it can be put to work.

Among other familiar industrial processes in which colloids play a part are the setting of concrete, tanning, dyeing, and asphalt paving. In all these cases the colloids with which we are concerned are the “disperse solid” variety; that is to say, matter of such infinite fineness that it remains suspended indefinitely in liquids, does not settle out, and cannot even be filtered out of a solution. Another characteristic of colloids is the so-called Brownian movement; they are never at rest, but pursue an endless oscillatory motion. Under a magnification of 1,600 times, colloidal particles in a solution of benzol resemble tiny spheres that are being shaken about with a rotary movement. Colloids of the largest dimension are no more than $\frac{1}{10,000}$ of a millimeter in size. A millimeter is, of course, $\frac{1}{25,400}$ of 39 inches, so one of these colloids is about four millionths of an inch in diameter.

Matter in such a state of division and dispersion cannot be seen with an ordinary microscope. It can only be observed with an instrument having means for illumination and known as an ultramicroscope. Under this instrument colloids assume the size of pin points. They have even been photographed by placing the lens of a cinematograph camera over the eyepiece of the microscope. When projected on a

screen the colloids appear as large as marbles and exhibit amazing activity.

Now that we know what colloids are, the next question is, what good are they? The answer is easier than one might suppose, and can be made plainest by showing the office that colloidal matter performs in an asphalt-paving mixture.

This mixture ordinarily consists of 90 per cent of sand and dust and 10 per cent of asphalt. The finer the mineral aggregate the greater is the surface area to which the asphalt cement can adhere, and cement is of course the life of the pavement. The sand alone would blow away.

Now suppose we have a cube of stone one inch in diameter. It will have a surface area of 6 sq. in. Cut it up into eight $\frac{1}{2}$ -in. cubes (each having six sides or $1\frac{1}{2}$ sq. in. of surface) and we have increased the surface area of the original cube from 6 to 12 sq. in. Go further and reduce this same cube to particles of colloidal size and these particles will together have a surface area of over 1,000,000 square inches!

Not only is the surface area increased, but the colloidal particles show an adsorptive quality; that is to say, they hold about themselves a thicker film of asphalt and hold it more tenaciously than is the case with non-colloidal matter, however fine it may be. It is easy to see from this that a paving mixture containing colloidal matter will be tougher and more stable than one in which colloids are absent.

Asphalt from the island of Trinidad has been used for paving for nearly 40 years. Something like 175,000,000 square yards of pavement have been laid with it, but nobody knew why it built the most durable pavements until a chemist, Clifford Richardson, heard the great German expositor of colloidal chemistry, Wolfgang Ostwald, explain the theory of surfaces and films as applied to colloids. This at once suggested to Richardson that Trinidad asphalt contained colloidal matter. It

was known to carry in its natural state a uniform percentage of unidentified mineral matter. Examination under the ultramicroscope proved that this matter consisted of solid colloids dispersed throughout the bitumen—the colloids providing the surfaces and the bitumen the films upon which the lasting qualities of the asphalt depend.

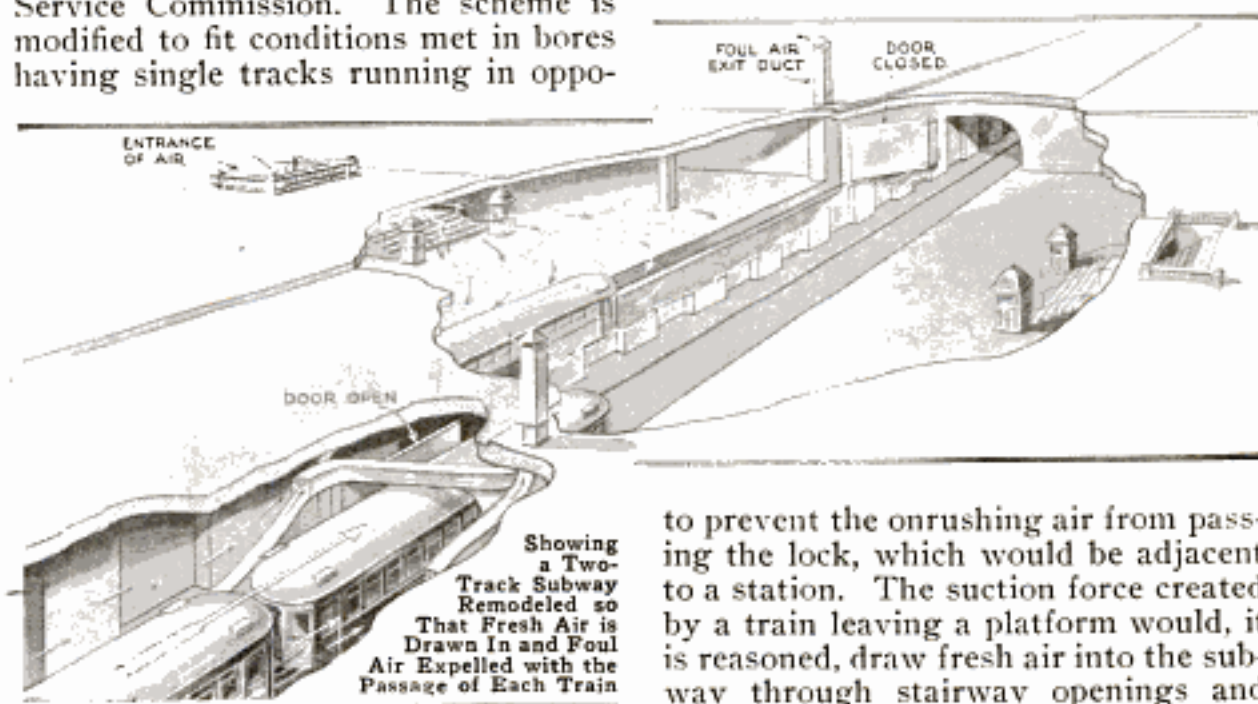
Not only was the unique character of the Trinidad asphalt explained; the formulation of paving mixtures was put upon a scientific basis—a great change from the method of observing that one pavement proved durable and for this reason laying another like it without knowing why the first one was a success.

This is only one of many instances in which the chemist is employing the properties of colloidal matter to explain and improve industrial processes and to aid in the solution of problems that have up to this time defied investigation.

NEW VENTILATING SCHEME FOR NEW YORK SUBWAYS

1139 In attempting to solve the ventilation problem encountered in existing tunnels of the New York subway system, an eastern inventor has evolved a plan which has been submitted to the Public Service Commission. The scheme is modified to fit conditions met in bores having single tracks running in oppo-

site directions, double tracks each way, and in four-track tubes with central stations at which both local and express trains stop. The general principle adhered to in all three cases is to divide a subway into separate tunnels reserved respectively for trains running in the same direction. It is proposed to do this by erecting a sheet-iron partition lengthwise of a tube. The two tunnels thus formed would be further divided into chambers, each including a station and its platforms, by building transverse partitions. These would be placed obliquely across the tunnels so that at the rear of each an acute angle would be formed with the subway wall on the near side of the track. Adjacent to this angle would be a duct into which the foul air, drawn along by a train as far as the partition, would be divided and then discharged into the open. The air following the cars on the side next the sheet-iron partition would be caught back of the oblique wall and carried through an inclined duct and likewise discharged outside. A hinged door, operated either electrically or pneumatically, would be placed in each transverse partition to permit the trains to pass. This would be opened upon the approach of a train and closed immediately after its passage in order



to prevent the onrushing air from passing the lock, which would be adjacent to a station. The suction force created by a train leaving a platform would, it is reasoned, draw fresh air into the subway through stairway openings and

John Berg, 28

Macombs Plan, New York

other channels at a station. Thus the movement of the trains would cause the air to be circulated instead of merely churned, as is now largely the case.

**REPAIR UNDERGROUND CANAL
1683 IN UNUSUAL MANNER**

Drainage engineers at New Orleans recently accomplished an interesting piece of work when they repaired a serious leak in an underground canal by the grouting process. A break had occurred in a main that feeds into the covered waterway and, because of the sandy nature of the soil, had caused the latter to settle somewhat and develop cracks through which sand and water were pouring from the outside. After mending the break in the pipe and damming and fluming the canal so that the walls could be examined,

pumps were set to work to carry off the water that was spouting in from the ground. Owing to the status of the river, which is above city datum, the level of the water in the surrounding soil was higher than that in the canal, and it soon became evident that the pumps were withdrawing so much sand from around the waterway that the latter was settling more than ever. This caused the engineers to calk the fissures in the walls with lead wool and stop the pumps. Holes were then drilled through the bottom of the canal near the various cracks and a cement mixture forced into the surrounding sand under pressure with a grouting pipe. This was continued until it was impossible to feed more of the material into the ground. In this way the breaks in the floor and walls were sealed on the exterior and further leakage from without stopped.

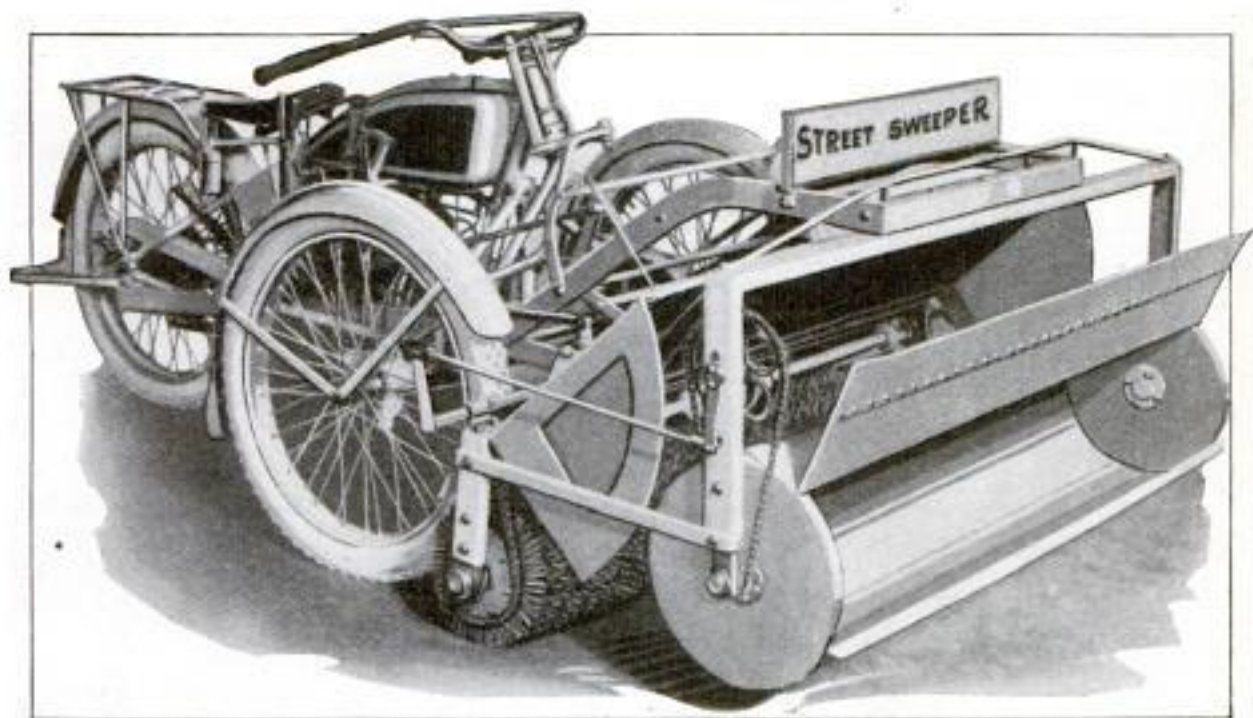
1700



COPYRIGHT, UNDERWOOD & UNDERWOOD

NEW YORK POLICE SELL UNCLAIMED PROPERTY

SOME 10,000 unclaimed articles held by the custodian of the New York police were recently offered for sale to the public at the annual auction conducted by the department. Things of almost every kind, from garden hose and phonographs to diamonds and watches, were disposed of to the highest bidders. Some of the articles are shown on the improvised table pictured above. The sale was the largest ever held by the department.



This Motorcycle Street Sweeper Weighs 600 Pounds. Its Average Speed Is 10 Miles per Hour

1537
**EFFICIENT STREET SWEEPER
 DRIVEN BY MOTORCYCLE**

A street sweeper has been tested by the Los Angeles city authorities which is constructed from a standard motorcycle. The front fork of the motorcycle is cut off at the head, and two wheels, on a special frame, are used instead of one. A 52-in. revolving brush, under a metal cover, sweeps the dirt into a cylindrical dirt container. These parts are supported in front of the wheels by a steel frame which is fastened to the motorcycle by the bolts ordinarily used to attach a sidecar; the sweeper can be quickly detached. The brush is driven by an auxiliary sprocket on the engine, through a clutch controlled by a pedal. One of three levers is used to raise and lower the sweeper; another is for the purpose of revolving and dumping the dirt container, which has a capacity of $\frac{1}{2}$ cu. yd. About 10 miles per hour is the ordinary sweeping speed. Where dirt is especially difficult to take up, the engine can be run at low speed and the brush held close to the pavement by pressure on the proper lever. The machine weighs 600 lb. without the driver. It can be turned around within its own length.

*Girton, Hoffer Co.
 938 S. Main
 Los Angeles*

**RUBBER DISKS FOR MENDING
 INNER-TUBE PUNCTURES** / 356

A simple device for repairing inner-tube punctures not more than $\frac{3}{4}$ in. in diameter, which does not employ any rubber solution or other liquid, has been put on the market. It consists of two metal disks jacketed with rubber casings having tapering edges. One of the two disks is fastened like a swivel to the end of a threaded wire; the other is screwed on the wire. A steel tool which accompanies each outfit is employed in spreading the puncture so as to allow the swiveled disk to be inserted through the opening. The two disks are then screwed tightly together by turning the wire. In this way the hole is completely sealed. It is claimed the disks will not injure the tire. (644)



*Brown Bros. Ltd.,
 22-24 W. Eastern St.
 Sold by: London E. C.
 Stevens 19375 Broadway
 New York*

**TOY CALCULATING DEVICE
 FOR YOUNG CHILDREN**

1413

To assist children in making elementary mathematical calculations, an ingenious device of novel form has been

Learn how to make this device



A Child can Make Simple Calculations Quickly by Adjusting the Device

introduced. It consists of a mechanical monkey which will multiply, divide, factor, or extract the square roots of small numbers. To operate it, one needs only to move the feet of the tin animal, to which pointers are attached, along a scale extending from 1 to 12. A table is printed in triangular form on a square piece of metal to which the monkeylike figure is fastened. As the device is adjusted, different figures on this chart become visible through an aperture between the ape's two hands. A number appearing in this hole is the product of the two scale numbers at which the indicators are pointing at the time.

1744

NAME "CALIFORNIA" GIVEN TO ANOTHER DREADNAUGHT

A. N. J. 3-18-16

The first dreadnaught which is to be built in the state of California at the Mare Island navy yard, has heretofore been designated as "Number 44," but now Secretary Daniels has announced

that it will be named "California" in response to requests from California congressmen and the legislature of that state. The name had previously been bestowed on dreadnaught "Number 40" which is being constructed in the New York navy yard, but that vessel will be given another name. Dreadnaught "Number 43," now under construction in the latter navy yard, will be called the "Tennessee," and the armored cruiser bearing that name will become the "Memphis." With the selection of "Tennessee" for the name of a fighting ship, all of the states are represented in the navy either by dreadnaughts or armored cruisers.

MUNICIPAL SEWER CLOGGED BY ROOTS OF POPLAR

1544

Because of their prolific root growth, poplar trees are working considerable damage to the sewers and other underground utilities at Schenectady, N. Y., and some adjacent cities. Recently a sewer was clogged by a great mass of roots which worked beneath a conduit and exerted an upward pressure sufficient to produce a fracture through which the rootlets forced their way. The subsequent growth finally closed the sewer.



It proved difficult to locate the exact point where the main was stopped, but after this was accomplished the roots were removed and the break mended. The roots are shown, just as they were when removed from the sewer, in the accompanying illustration.

Exam. Report 3-13-16/1994

Research Work under Prof T.A. Taggart
Mass. Inst. of Tech.

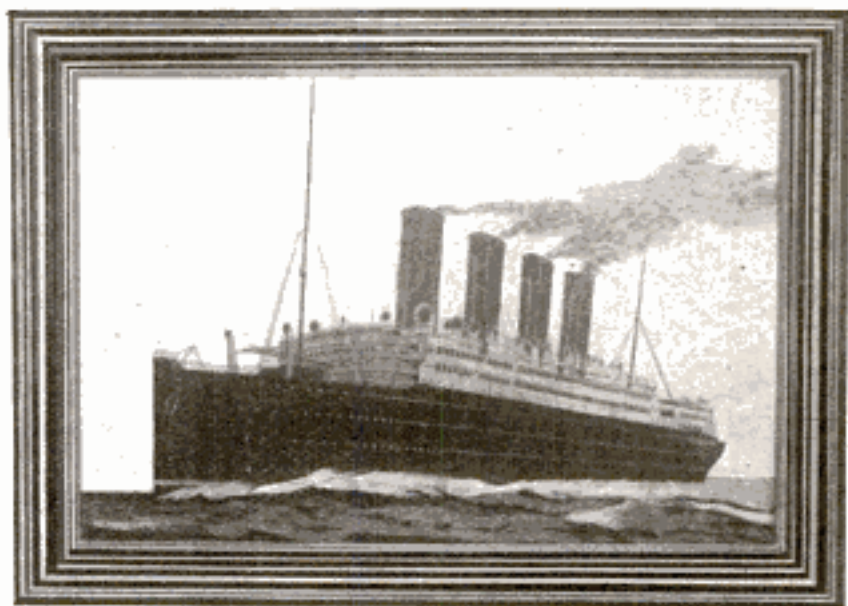
Lava Bricks Co Honolulu, T.H. POPULAR MECHANICS Boston. 909

MOLTEN LAVA AS MATERIAL FOR SEWER PIPES

PICTURE OF "LUSITANIA" MADE OF HUMAN HAIR

Considerable interest has been developed in Hawaii over a suggestion that the molten lava available in the active volcano Kilauea, 32 miles from Hilo, be used for manufacturing sewer pipes and bricks. For some 10 years a Honolulu company has been making bricks from lava rock, and has a plant in the Kaimuki district. These are of gray color and have been used extensively for general building purposes and sewer and manhole work. The proposal that the molten lava be employed, however, is new. The idea has been received favorably partly because of the economic phase of the matter. The lava could be carried out of the pit by bucket conveyors capable of withstanding a temperature of about 2,000° F. The plant would be established near the edge of the crater and the material hoisted into it and poured directly into molds. The cheapness of the products would make them popular.

One of the most unusual pictures of the "Lusitania" is that which has been skillfully worked in human hair by a



Picture of the "Lusitania" Worked in Human Hair of Various Colors by a Belgian Hairdresser

Belgian hairdresser. The likeness is 30 in. long and 20 in. wide. In portraying the funnels of the ship red hair was used; black hair was employed for the hull, and white hair for the bridge deck. Other portions of the picture, including the sea and streams of smoke issuing from the funnels, are of brown and gray hair.

1581

SCIENTIFIC FARMING RECLAIMS GREAT TRACT

One of the largest and most scientific agricultural enterprises in the eastern part of the United States is a farm in western New York, which has been in the course of development for the last three years. This farm comprises 11,000 acres, and is two miles long and nine miles wide. A trip of 60 miles is required to pay off all the help. The undertaking is backed by New York financiers and is managed by a civil engineer who is also a scientific farmer.

The land comprising this farm was originally a vast, undrained swamp, and its reclamation was accomplished

only by employing a dredge which cut a deep main canal, with many lateral branches, through the tract. As the land was drained, lumbermen were put on it to clear off the trees and stumps with axes and dynamite. These workmen were followed by others with five-gang plows, etc., drawn by caterpillar tractors of light construction. These light engines have almost wholly supplanted horses on the farm, and are a source of special interest to the boys of the farmers. One tractor has eight times the pulling power of a horse.

Of the 4,000 acres of muck land in the tract, only about 1,000 acres have

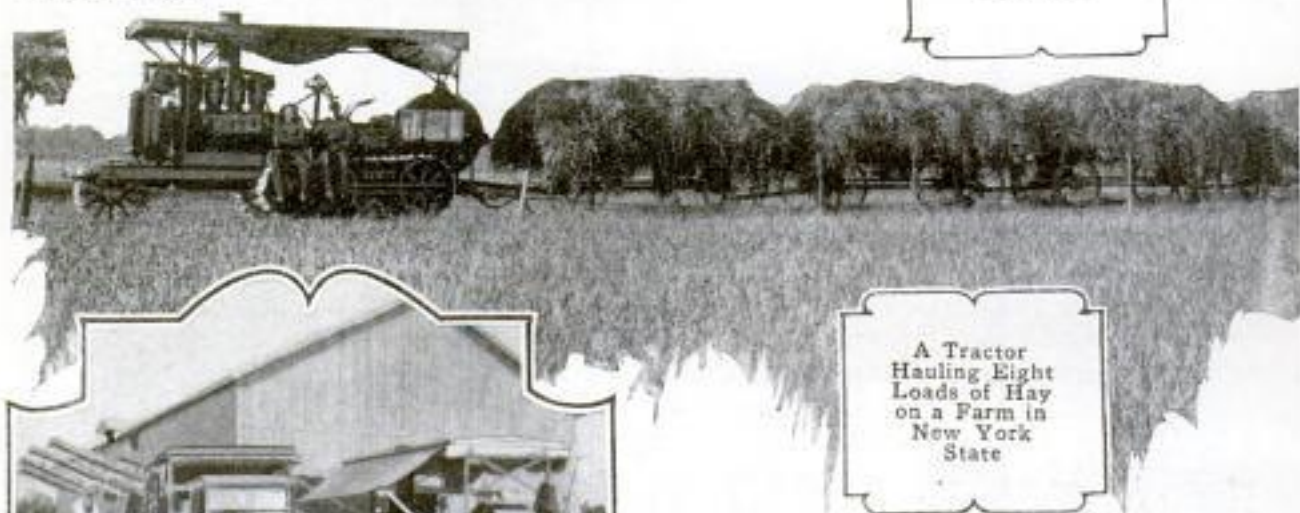
Oak Orchard Farm
Elba, N. Y.

A. Boornmaelting; "Beifflem"
Specialist 5-8; "Bliffingen"
"Reuening, Reuening"



Pea-Shelling
Viners at Work

An Outing
for the Farmers
and Their
Families



A Tractor
Hauling Eight
Loads of Hay
on a Farm in
New York
State

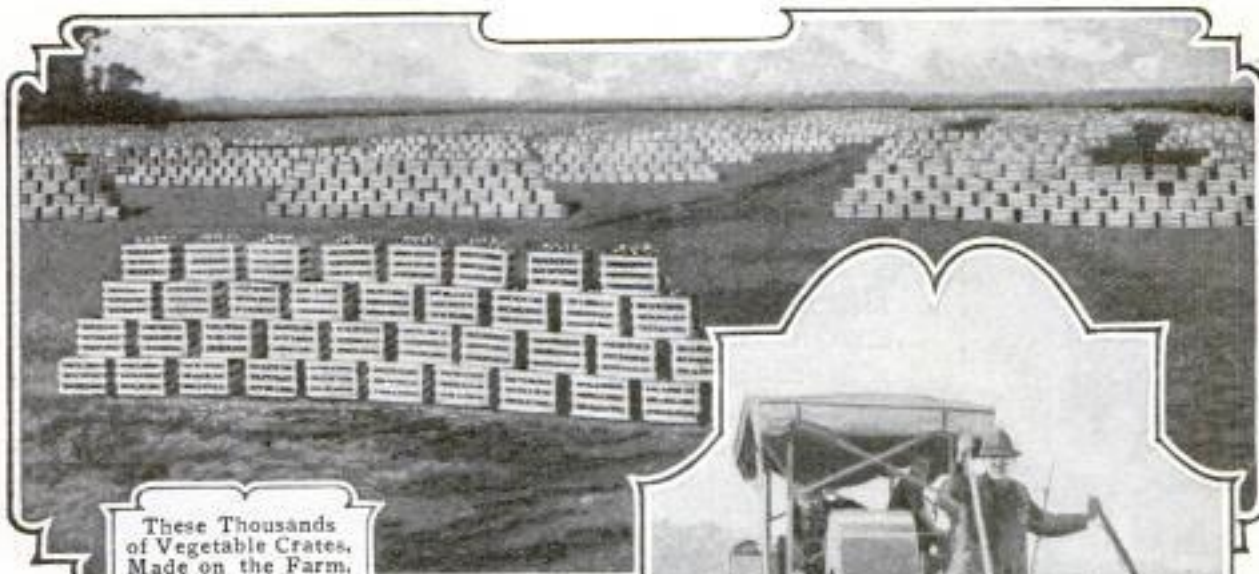


A Heavy
Caterpillar
Tractor Used
to Supply Power
to the Pea
Viners

been reclaimed and are now in use. Much of the farm is devoted to truck gardening conducted on a strictly scientific basis. A cost system is maintained and it is possible to know just what each crop cost. The various acreages for the past season were: Hay and alfalfa, 683 acres; potatoes, 237 acres; peas, 273 acres; wheat, 252 acres; red kidney beans, 173 acres; white beans, 139 acres; lettuce, 120 acres; spinach, 170 acres; string beans,

99 acres; celery, carrots, and other vegetables, in similar quantities.

All the produce is prepared for shipment according to factory methods. The crates are made on the farm, a special nailing machine being one of the labor-saving devices used in their construction. Onions, for instance, are packed in the field, loaded on trucks, and pulled to the railroad station in tractor trains. The produce is shipped by freight direct to the farm's representative in the city. The workmen are well provided for with bungalows of modern type and with modern social conveniences, and such improvements as telephones, electric lights, etc. An evidence of the success of the enterprise is that much of the land is now valued at \$500 per acre.



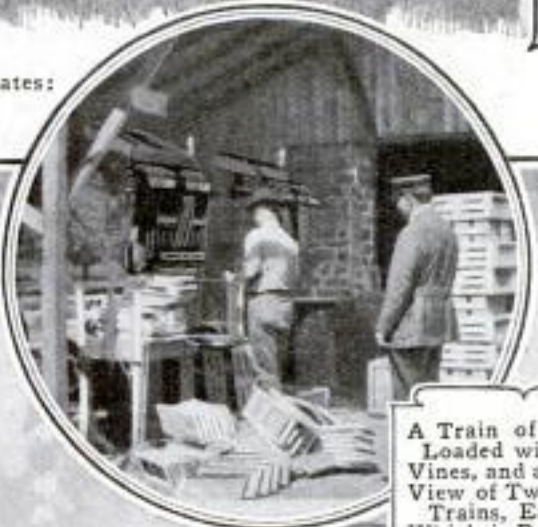
These Thousands of Vegetable Crates, Made on the Farm, are Packed in the Fields and Then Taken Direct to the Railway Cars by Tractor Trains



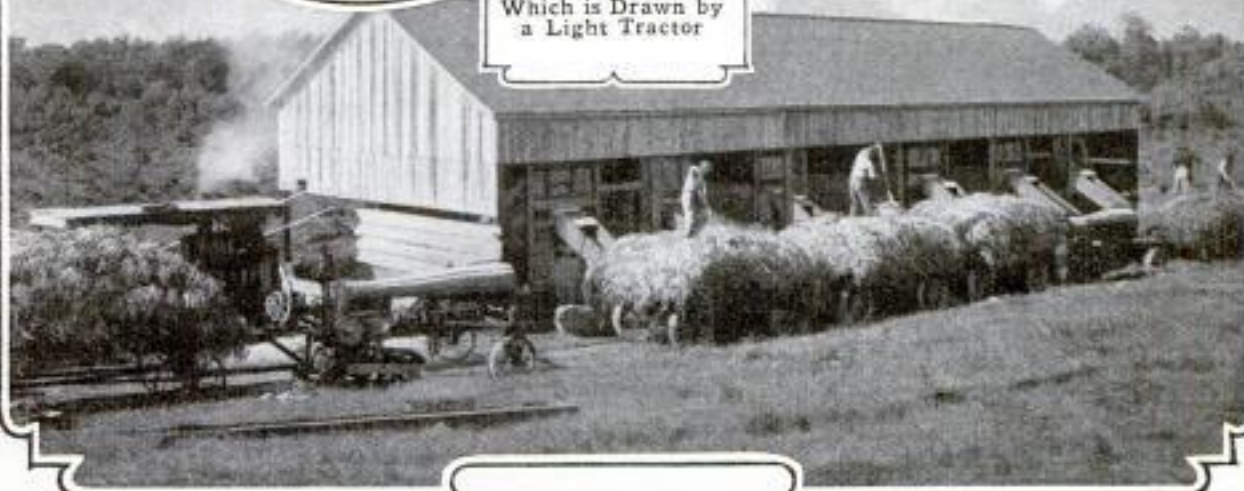
A Five-Gang Plow, Hauled by a Caterpillar Tractor, Cultivating Some of the Reclaimed Muck Soil Which has Recently been Cleared of Timber



Making Crates: A Nailing Machine is Used

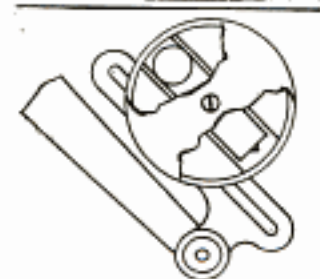


A Train of Trucks Loaded with Pea Vines, and a Partial View of Two Other Trains, Each of Which is Drawn by a Light Tractor



1308 ACCURATE SPEED REGULATOR
FOR CREAM SEPARATORS

A simple speed regulator for cream

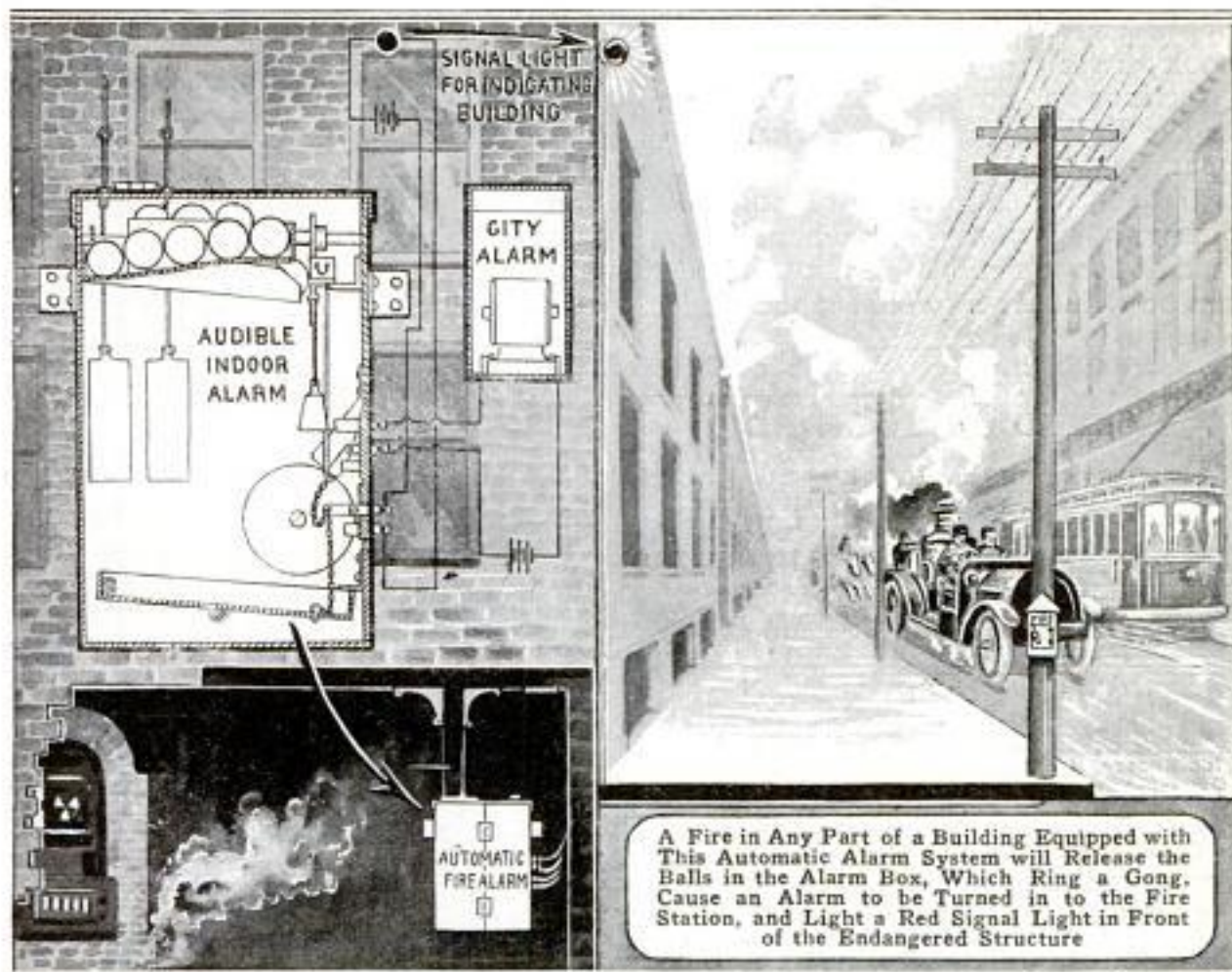


separators consists of a bell inclosing a tubular shaft slightly shorter than the bell's diameter, and an attaching member. This tube, which contains a small metal ball, is closed at one end and open at the other. The whole device is bolted to the crank handle. By means of two screws the bell can be set on the attaching member at the desired distance from the center of the crank's rotation; furthermore the bell must be so set that the open end of the tube points toward the center of rotation. When the crank is rotated to the top center the ball falls to the open end of the tube, ringing the bell. As the crank continues to turn toward low center, the ball rolls and strikes the closed end of the tube, causing a clicking sound. When more centrifugal force has been generated the ball, while passing top center, is prevented from falling and ringing the bell, which indicates that the right speed has been attained. However, slightly increased speed stops the "click" also, showing that the crank is moving too fast. When set 7 in. from the crankshaft the bell will remain silent at 60 revolutions per minute; at 6 in., it will be silent at 65 revolutions, and so on.

CA prize contest is announced for St. Louis sculptors for the best three designs of a drinking fountain, the cost not to exceed 2,500 dollars.

DANGER OF BEING POISONED
BY PLATED SILVER

In view of the apparently increasing frequency of ptomaine poisoning cases, it may not be amiss to consider one danger source which probably only few persons really appreciate. In the past, much of our silverplated ware was made over copper or bronze, and some of it still is. Platters, tureens, and similar dishes of this kind, are perfectly safe if intelligence is shown in using them. Otherwise they are dangerous. A platter, for instance, cannot be used long without being lined with cuts inflicted by one's carving knives. Although it may not always be especially noticeable, these slits in the silver expose the base metal. If meat—especially chicken—is then allowed to remain on such a receptacle for a few hours, verdigris will in all probability be formed. Should this contaminated food subsequently be eaten, the probability of its proving disastrous is almost certain, even though one have a cast-iron stomach, which in these days of poorly cooked and hastily eaten food is exceptional. Also when one's plated silver is worn, great care must be exercised in using it. If the edges of a plated spoon, for example, turn green after being left for a short time in a dish of potatoes, or some other vegetable, it should either be thrown away or thenceforth used only with extreme care. Frequently a non-corrosive white metal is employed as a base for ware of this kind. When this is actually noncorrosive there is no danger in using it. It is a simple matter, however, to test such articles and know in advance whether they are absolutely safe or should be used discriminatingly. Such precautions may prevent serious illness and even death. The most painstaking care should be observed when cheap silverplated articles are used either in a kitchen or at a table. And in any event it is an unwise practice to leave vegetables or meats in plated dishes for long periods. It is in doing this that one encounters the real danger.



A Fire in Any Part of a Building Equipped with This Automatic Alarm System will Release the Balls in the Alarm Box, Which Ring a Gong, Cause an Alarm to be Turned in to the Fire Station, and Light a Red Signal Light in Front of the Endangered Structure

MANY FUNCTIONS PERFORMED
1674 **BY AUTOMATIC ALARM**

An automatic fire-alarm system has been patented by a Louisiana inventor which embodies features so different from those ordinarily found in such devices that extensive tests may be required to determine fully its practicability. In the rooms to be protected by this system are strung wires in which are metal sections that fuse at a low temperature. All such wires connect through pulleys with an alarm box centrally located in the house. When heat has melted any one of the fuses, weights are automatically released which cause a gate to open in the alarm box. Behind the gate, in a tilted trough, are several heavy balls, which, when released by the gate, fall in rapid succession against a bell, sounding a loud alarm. The movement of the gate also closes an electric switch, thereby starting a motor in a neighborhood fire-alarm box,

which summons the firemen. As the balls fall they collect on a tray that tilts, when laden, opening the switch which operates the alarm motor and closing another switch that lights a red electric bulb in front of the house. This light shows the firemen at a glance just where the fire is.

1672
USEFUL CHAIN CONNECTOR FOR AUTOMOBILISTS

A chain connector which is of great assistance in inserting repair links in an automobile chain, or other chains, consists of two principal parts: A bar on which are two rows of teeth situated back to back, and a pawl-fitted handle extending through a slot in the bar. At one end of the bar and also at the

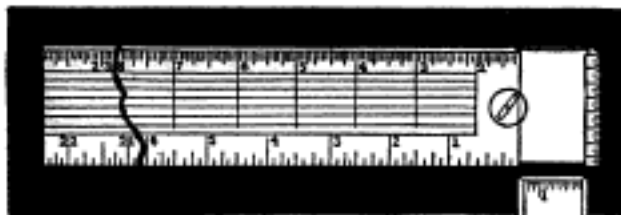


Stewart Accessories Co.
Detroit, Mich.
 Copyrighted material

upper end of the handle is a strong hook; these two hooks face in opposite directions and are designed to be placed in the broken ends of the chain. By operating the pawl-fitted handle the two ends can be drawn together. A pin inserted through the handle, and fastened to a chain so as not to be lost, can be withdrawn to release the device.

**TAKE-DOWN SQUARE MAY BE
655 PACKED IN TOOL BOX**

By providing a tongue-and-groove joint at the angle where the two legs

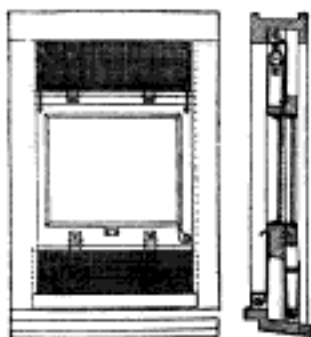


This Square, Suitable for Carpenters and Other Workmen, may be Disjointed and Packed with Tools in a Small Bag

of a carpenter's square joint, a manufacturer has brought out a square that may be taken apart and packed in a small space. At the joint a button, which works on a cam, is placed. This holds the two parts firmly together when in use. The take-down feature of the square permits its being packed in tool kits otherwise too small to accommodate it.

**116 SCREEN ROLLS UP WHEN
WINDOW IS CLOSED**

A screen consisting of two parts which are automatically wound up on



rollers by closing the window to which they are attached, has been patented. This screen is fitted to an ordinary window with very little alteration. The patent provides

a means of balancing the upper and lower sashes, one on the other, by using a simple system of ropes and pulleys,

so that when the lower sash is moved upward the upper one moves downward, leaving openings at the top and bottom of the window. By means of detachable hooks and links a piece of screen of proper size is fastened to the inner side of the lower rail of the bottom sash. The other end of the screen is wound on a hollow spring roller. This is inclosed in a case which, by cutting off the lower ends of the inner window stops, may be fitted on the sill and set so as to be close up to the sash when the latter is closed. The other half of the screen is fastened by similar hooks to the inner side of the upper rail of the upper sash. The roller and its case for this portion of the screen are attached to the inside of the upper end of the window.

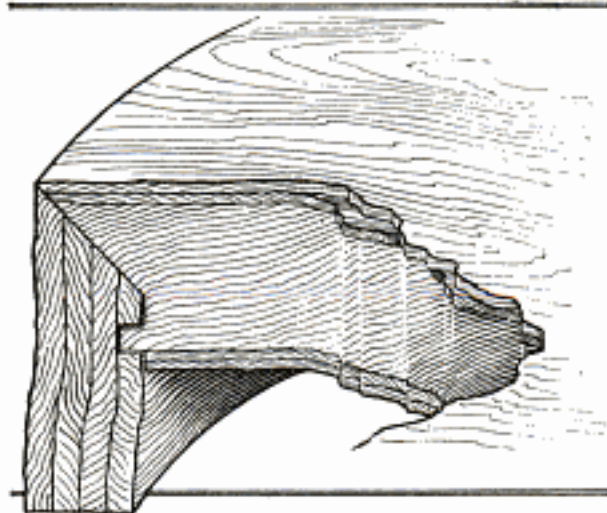
**1631 WASTE IN FISH CANNERIES
SHOULD BE UTILIZED**

Dept. of Agric.
Investigation of the canning industry on the Pacific coast shows that there is an average waste of at least 30 per cent of the material that comes to the canning factories, through discarding heads, tails, viscera, and roe, which at present are commonly thrown through openings in the floor into the water beneath, where the refuse often causes insanitary conditions. As a matter of fact this discarded material contains more than three per cent of both ammonia and bone phosphate and over 10 per cent of fish oil. The average cannery produces in the neighborhood of 50,000 cases of canned salmon in a season; its output of dry fish scrap might be at least 115 tons and of fish oil 19,000 gal., which material is now largely wasted. Fish scrap, if cooked and dried, as often can be done with waste heat from the factory boilers, is worth about \$40 per ton for fertilizer purposes and as hog and poultry food it is worth even more. Salmon oil has been worth 30 cents per gallon and was recently quoted at 47 cents. About 27 gal. can be extracted from a ton of raw waste. By installing a small reduction plant it is believed that a great saving could be effected by many a factory.

*Inv. Jos. A. Bridges
117 Cong. San Francisco.*

ROUND VENEER TABLE TOPS MADE IN NEW WAY

In devising a new method of constructing round, built-up table tops, a southern inventor has developed a plan for concealing and supporting the edges of the veneer plies so as to prevent the entrance of moisture between them and the core to which they are applied. In addition to protecting the veneering against chipping and warping, it is said that the finished article is given the appearance of being cut from solid material. The top is built with two plies of veneer of equal thickness on both the top and bottom. It is then cut to the desired shape and beveled around its circumference. This miter cut touches the outer edge of the top ply and extends into the core to a locking bead. The rim of the work is made up of any number of plies, the outer of which is considerably thicker than the two layers of veneering used on the top. This part is then cut on a bevel to fit with the top, and on the inner side is provided with a groove to receive the locking bead of the core. The relatively heavy outer ply of rim veneering thus covers and supports the two thicknesses applied to the top and also extends under the edge of the core. From this it will be seen that an object

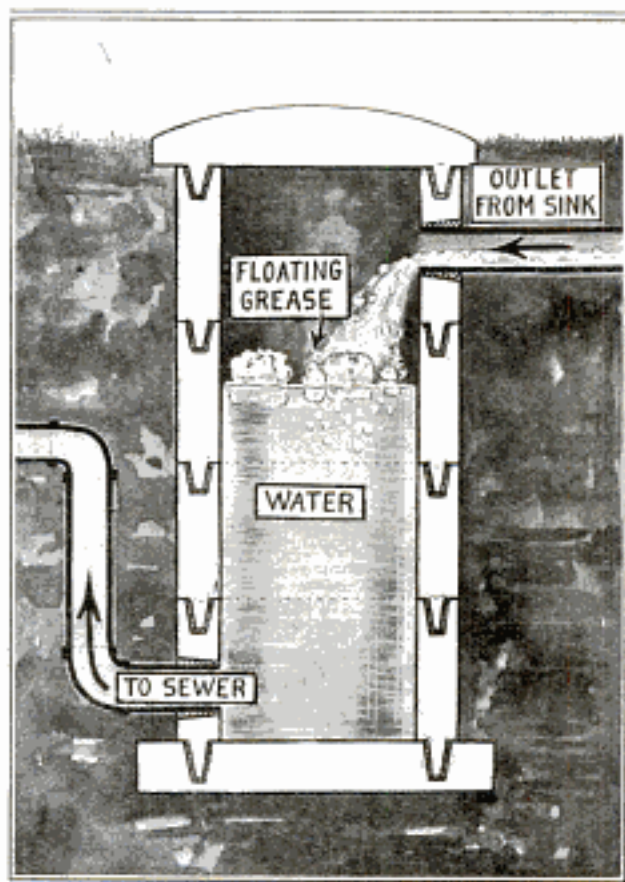


The Round Top of the Veneered Table is Given the Appearance of being Cut from Solid Material

striking the marginal edge of the table will not be liable to dent or chip the veneering.

SANITARY CONCRETE GREASE TRAP 1573

A grease trap has been invented that is more sanitary than the ordinary



A Grease Trap Composed of Concrete Sections Especially Designed to be Cemented Together so as to Be Water-Tight and Sanitary

device employed to arrest grease from the kitchen sink before it flows into the sewer. The trap, being water-tight, can be located in the basement, where it can be cleaned as occasion arises. It consists of a base, 30 in. in diameter, four cylindrical sections, and a top. By means of especially designed grooves and narrowed edges, the parts can be fitted tightly together and cemented so as to be water-tight. Loam or other loose material is placed in the groove into which the removable cover is designed to fit, thus keeping the gas from escaping. The inlet is located near the top and the outlet opposite it near the bottom; the outlet curves upward just outside the trap. The grease rises to the top of the sewage which stands in the trap.

See: Geo. H. Fruehlein, 1100 W. Main St., Denver, Colo.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



Small Refrigerator, Requiring Only 15 Pounds of Ice Daily, Suitable for Sick Room



Ornamental Dachshund Shoe Scraper Made of Solid Cast Iron and Provided with a Steel-Blade Spine



Neat and Practical Pedal Extension Intended for Young Piano Pupils



By Removal of Cranks All Hand-Operated Kitchen Appliances are Driven Electrically with This Power Plant



Waste Matter Caught in Prongs is Automatically Removed on Back Stroke When Head Bears Flatly on Ground



Initial Napkin Holder Stamped from Silver is Shown in Illustration Above



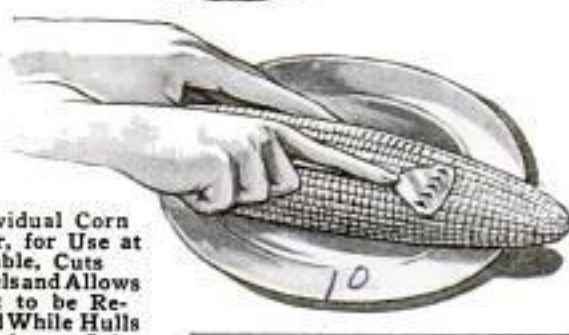
Receptacle Discharges One Teaspoonful of Sugar Each Time It is Turned

Lock on Spring-Opening Knife Prevents Accidental Closing



Very Attractive Electric Perfume Burner Made of Decorated Porcelain and Brass

Individual Corn Slitter, for Use at Table, Cuts Kernels and Allows Meat to be Removed While Hulls Remain on Cob



- 917 SUCTION FLOWER HOLDERS-- Mandel Bros., Chicago.
- 917 "VANITY CAP"-- Los Angeles Trib., 2-24-'16.
- 917 ICE CUTTER-- Silver & Co. *304 Hewes St. Brooklyn, N. Y.*
- 917 TOE-TRIP CRIB-- Foster Bros. Mfg. Co., Utica N.Y., St. Louis.
- 917 "SO-HANDY" POCKET KIT-- ¹⁰⁰ Bridgeport Hdwe. Mfg. Corp., Bridgeport, Conn.
- 917 UMBRELLA FASTENER-- Reliance Rubber & Hardwood Co., London, Eng.
216 Upper Thames St., E. C.
- 917 MAGAZINE PENCIL-- J. C. Vickery, Jeweller, 177 Regent St., London, W.
sterling silver 10/6 15/6 22 dolo
Sold 63/- 79/6
- 917 DISHWASHING BRUSH-- Fuller Brush Co., Hartford, Conn. *150*
- 917 PINEAPPLE EYER-- R. L. Howland, 268 3ra. St., Niagara Falls, N. Y.
- 917 MILK-BOTTLE HANDLE-- W. E. Hoffman, Sunbury, Penn., patentee.
1166209 172815 Rev 51810 35 N. 8th. Street.
- 917 EGG SERVICE-- Gorham *Mfg. Co., Providence R.I.*
- 917 SATIN GOLF GRIP-- Satin Golf Grip Co., *6600 Greenwood Ave., Chicago.*
425 Spalding + Box 508 pr.
- 916 DACHSHUND SCRAPER-- W. H. Hoops & Co., Chicago, *{531 to Walnut av.}*
{618 Michigan Blvd.}
- 916 SMALL REFRIGERATOR-- *Marshall Field Co.*
- 916 PEDAL EXTENSION-- Lyon & Healy, Chicago, Ill. *245 to. Wob. av.*
- 916 KITCHEN POWER UNIT-- Reynolds Electric Co., 422 ^{S.} Talman Ave., Chicago.
- 916 NAPKIN HOLDER-- The Georgian Co., ^{Jr.} Salem, Mass.
- 916 GARDEN RAKE-- *infield* W. H. Smith, Buffalo, N. Y. Mfg & Sold By.
- 916 SUGAR SHAKER-- Albert Pick & Co., *912* 208 W. Randolph, Chicago.
- 916 PUSH-BUTTON KNIFE-- Schrade Cutlery Co., Walden, N. Y. ✓
- 916 PERFUME BURNER-- NEW YORK EDISON COMPANY-
- 0-916 CORN SLITTER-- Imperial Mfg. Co., N. Y.

APR 10 1916

APR 10 1916

1691

INTENDED FOR THE HOME AND ITS MEMBERS



New Novelty Cap for Men Has a Light-Weight Mirror Fastened Inside



Suction-Tube Flower Holders as Used on Goblets and Finger Bowls



Machine Cuts Ice in Small Diamond-Shaped Pieces for Table Purposes without Wasting It or Chilling One's Hands



A Slight Pressure with the Toe of One's Shoe Releases a Catch and Allows the Side of the Crib to Drop Noiselessly



Pocket Tool Kit, Consisting of Knife, Chisel, Gimlet, Screwdriver, File, Reamer, Bottle Opener, and Rule



A Soft-Rubber Device Holds the Ribs Firmly Together and Gives Neat Appearance to Umbrella When Closed



Magazine Pencil Available in Gold, Silver, or Enamel: It Carries an Abundant Supply of Lead for Travelers



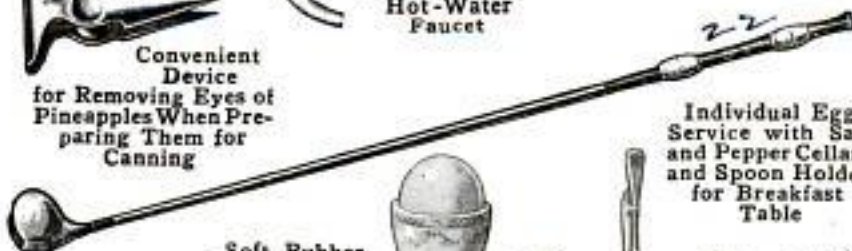
Sanitary Dishwashing Brush for Domestic Use: It is Provided with a Soap Chamber and Attaches to a Hot-Water Faucet



Metal Handle, Pouring Spout, and Cap Designed for Milk Bottles



Convenient Device for Removing Eyes of Pineapples When Preparing Them for Canning



Individual Egg Service with Salt and Pepper Cellars and Spoon Holder for Breakfast Table

Soft-Rubber Grips for Preventing Hook and Slice by Causing Golf Player to Hold Stick Properly



**ELECTRIC STOVES RESEMBLE
 1664 FIRELESS COOKERS**

Electric cooking stoves are now on the market which embody in their



These Electric Stoves are Built Somewhat Like Fireless Cookers and Need Current Only a Part of the Time during Which Food is being Cooked. By Attaching a Special Clock to the Electric Wire the Current can be Shut Off Automatically at Any Predetermined Hour

construction the principle of the fireless cooker. This makes it possible

to use the current only part of the time required to cook the food; this

manner of cooking also results in a saving of the juices of the food. The stoves may be connected by flexible wire with any electric-light socket. An especially designed clock may be attached to the wire if desired. This clock will automatically shut off the current at any predetermined hour, making it unnecessary to stay in the kitchen until the food is cooked or the heat turned off. These stoves are built with one or two aluminum-lined compartments having tightly fitting covers. Several kettles are sold with each stove. Each of the larger kettles fits snugly into the cooking compartments; the smaller ones are of the semicircular pattern so

that two can be set into a compartment at once, with a shallow dish above.

**SEPARATOR REMOVES CREAM
 1311 ONLY FROM MILK BOTTLE**

A utensil for removing cream from a milk bottle consists of a cylinder about half the length of a quart bottle and of a diameter slightly less than



A Simple Utensil with Which Cream may be Removed from a Milk Bottle without Mixing the Cream with the Milk

that of the mouth of the ordinary milk container. The device is held in one hand, the index finger passing through a small looped handle at the upper end. Projecting from the otherwise closed upper end of the cylinder is a small tube. A screen extends across the cylinder's lower end. After inserting the separator into the bottle to the depth of the cream, the thumb is placed over the end of the tube. The separator may now be lifted from the bottle filled with cream, the screen and suction combining to keep the fluid from flowing downward.

Ⓒ Russia has recently bought back from Japan three warships which the latter country captured in the Russo-Japanese War.

*Ess-Bee Mfg Co.,
 905 Belmont Av.,
 Chicago.*



A Durable Metal Substitute for Cloth Tape or Lime for Marking Tennis Courts

1262 METAL TAPE FOR MARKING TENNIS COURTS

Galvanized sheet-iron tape for marking tennis courts has been invented as a substitute for cloth tape, which stretches and shrinks, and for lime markings, which the rain quickly obliterates. The metal tape is fitted with vertical teeth, as shown, that are driven into the ground and hold it firmly in place. This form of marker offers no hindrance to a player or obstruction to a lawn mower, as it fits closely to the earth. It is made in sections of convenient length, and in case a portion becomes damaged a new piece can be substituted easily. At the end of the season this tape can be taken up and stored until the following year.

☞The lost-and-found statistics of an eastern railway show that eyeglasses are among the articles most commonly lost by travelers.

9572 SQUARE FUNNEL PERMITS RAPID FLOW OF LIQUID

Liquids in passing through an ordinary round funnel assume a rotary motion. The tendency to maintain this circular path hinders quick flow down the spout, hence the funnel's capacity to handle a due amount of liquid in a given time is lessened. A new funnel has lately appeared which tends to eliminate the rotary motion, securing thereby much quicker passage of a liquid. The funnel is rectangular in cross section, and the corners, besides hindering the formation of eddies, make the contrivance fit much more snugly into a tool box or other container.



Whitehead Non-siphon
 Funnel Co.
 1509 Arch St. Phila.
 Copyright Material

1670 **BIT FOR GIVING MEDICINE
TO ANIMALS**

A drenching bit which overcomes the difficulties ordinarily encountered in administering medicine to beasts



A Drenching Bit through Which Medicine can be Easily Administered to Animals without Causing Them Discomfort



consists of a hollow mouthpiece, or bit, to one end of which is attached a slender funnel. The device is held in the animal's mouth by a strap extending over the head behind the ears. Normally the funnel is in an upright position. Medicine poured into the funnel flows into the animal's throat through a small hole in the bit's side. A metal loop is fastened to either end of the bit; to this may be attached a rope by which the beast's head may be drawn high into the air, making it necessary for the animal to swallow the potion administered.

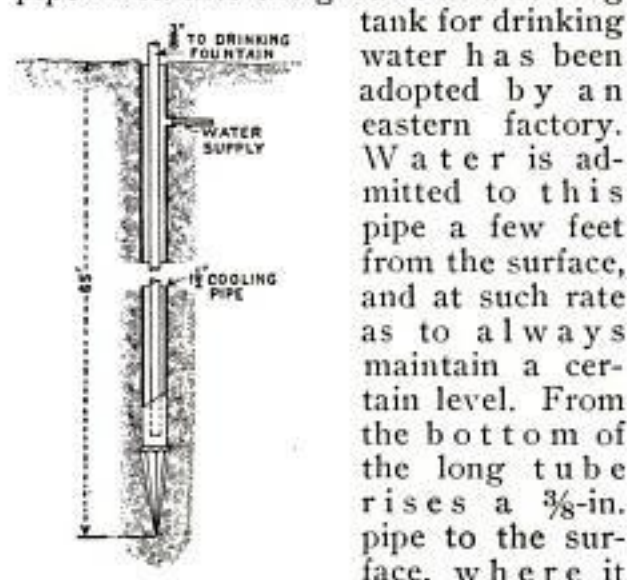
1643 **WOOL GIVEN KHAKI COLOR
BY NITRIFYING PROCESS**

Wool fabrics are being given a satisfactory khaki color without the use of either natural or artificial dyes. This is being accomplished in England by a special process that has lately been patented. The chemical change which takes place in wool when it is exposed to the action of nitric acid forms the foundation of the treatment. Briefly, the method consists in immersing the

fabric in a weak solution of nitric acid at a temperature of about 180° F. for approximately one minute. The cloth, then possessing a pale yellowish tint, is thoroughly wrung and placed in an alkaline bath which gives it an orange-yellow shade. When this latter solution is of ammonia a fiery color is produced that is not fast to acids, but which may be regenerated by subsequent alkaline treatments. Dull shades, however, that are fast and altogether quite desirable for general purposes are attained by treating the nitrified wool in a solution made with one of the ordinary mordants. The nitric-acid bath determines the depth of the shade produced; stronger acid, a higher temperature, or a longer immersion intensifying it. It is announced by the Department of Commerce that the method may be modified in a number of ways and is so simple and apparently effective that it is worthy of serious consideration by American dyers.

— 9973
**UNDERGROUND PIPE COOLS
FACTORY DRINKING WATER**

The novel plan of driving a 1½-in. pipe 65 ft. into the ground as a cooling tank for drinking water has been adopted by an eastern factory.



Water is admitted to this pipe a few feet from the surface, and at such rate as to always maintain a certain level. From the bottom of the long tube rises a ¾-in. pipe to the surface, where it connects with the ordinary type of drinking fountain. Thus the water is cooled by passing down the outer pipe and up the inner one. By using such a scheme ice for cooling drinking water is no longer necessary.

Toledo Pipe & Machinery Works
Copyright © material

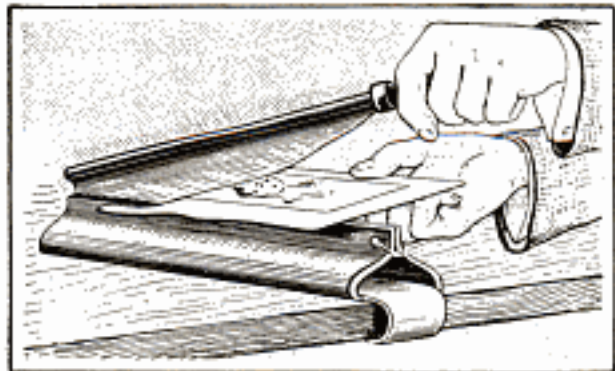
x H. A. Garand
Los Angeles
1501

GREAT AREA IS PATROLLED BY LONE POLICEMAN

x Credit is given to a Los Angeles patrolman for covering what is termed, and unquestionably is, the world's largest municipal beat. Some time ago when the San Fernando Valley, embracing a number of villages and ranchos, was annexed to the city the people in that territory were promised adequate police protection. Accordingly, a traffic officer who had spent a number of years at a street intersection in the business zone and was anxious for a change, was given the job of watching over the new section of the city, which includes some 756 miles of streets. With the aid of a motor car he is able to make his rounds about once a month. The area guarded is approximately 100 miles in circumference and larger in square mileage than the remaining part of the city, which is patrolled by hundreds of bluecoats.

PHOTO TRIMMER CLAMPS TO TABLE TOP

The ordinary photo-trimming device being fastened to a board and rather unhandy to carry, a French concern has recently brought out a new style, of which portability is a special feature. The contrivance is made entirely of metal and clamps readily to a table top. The knife descends between a pair of upturned metal edges, shearing off in neat manner anything placed in its



This Photo-Trimming Knife Is Very Compact and may be Attached in an Instant to the Top of a Table path. When not in use the knife may be left permanently between the edges, protecting the blade from injury.

Kratz-Boussac
1st rue Martel,
Paris.

CHAIR AND TRAY COMBINED FOR RESTAURANT USE / 386

A new type of furniture for a quick-lunch restaurant which has been introduced into eastern cities, consists of a



A New Type of Furnishing for Quick-Lunch Restaurants

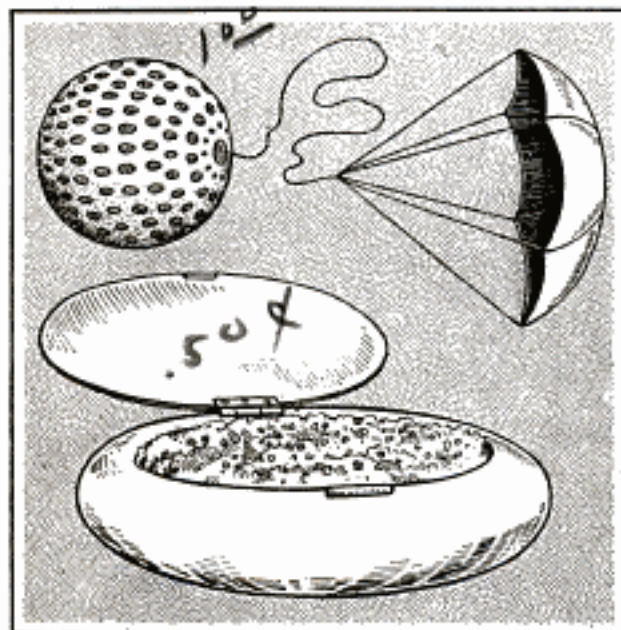
combined chair and table. The seat is supported by a single metal column which spreads at its base and may be fastened to the floor. Two curved metal supports are fastened perpendicularly to a projecting side of the seat and, at a height of about 30 inches above the floor, support a rectangular tray, the edges of which are slightly raised. The tray and seat are of polished wood. The user may sit astride the seat facing the tray, or sit sideways with the tray at his right or left hand. Four seats are sometimes set close together, the trays forming a table, in the center of which is a square opening. This is filled by a smaller tray supported by brackets.

According to the Department of Agriculture, California's raisin yield is three times greater than that of Spain. Last year it amounted to 250,000,000 pounds.

Frankling's Sewing, 10 1/4 Boynton, 1900
H. B. Ruggles Co., 853 O'Connell St., Boston.

GOLF BALL WITH PARACHUTE FOR HOME PRACTICE

A golf ball to which is attached by a cord a miniature parachute is being



A Parachute Attachment for Golf Balls Which Makes Possible Practice of All Strokes in a Restricted Area, and a Convenient Golf-Ball Cleaner

used by golfers who must confine their practice to small areas. With this attachment a ball given a hard blow will travel only a short distance, thus making it possible to practice all the strokes in a back yard or garden. Another convenience for golfers is a golf-ball cleaner consisting of a flat aluminum case which can be carried in the pocket and contains a cleaning substance that quickly removes dirt and restores a ball to its original color.

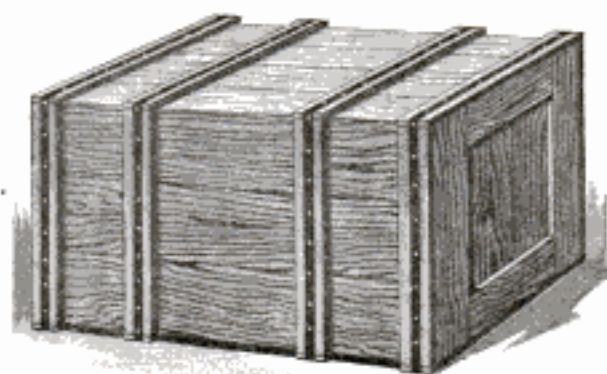
INQUIRY SHOWS MOUNT HOOD 1653 REMAINS INACTIVE

In view of the fact that reports are periodically circulated to the effect that smoke has been seen issuing from the crater of Mount Hood in Oregon, an explanation of this so-called phenomenon coming from the Weather Bureau is worthy of attention. It seems that three distinct kinds of "smoke" are given out, none of which is really what it appears to be. When the wind is blowing in a certain direction it carries snow, covering the cliffs forming the

crater's rim, into the air. This is often mistaken for smoke. Likewise, clouds that drift into the crater through the open side of its rim are caught by rising air currents and thrown out in a great column which lifts high into the atmosphere. Within the crater there are patches of rock that are hot enough to vaporize almost any amount of moisture brought into contact with them. It is thought possible that snowslides occur on the cliffs, precipitating large quantities of snow onto the heated rocks with the result that steam issues forth in massive clouds.

DURABLE CASE MADE FOR FOREIGN SHIPMENTS

Commerce Reports 1/5/14
1/18/11
An especially satisfactory container in which to ship general merchandise to foreign ports, particularly such ports as Valparaiso, Chile, where all cases must be lightered and handled twice in slings, is now used by several English exporters. It is a zinc-lined case, 3 ft. 4 in. long, and 2 ft. 4 in. wide and high. The ends are of 1 1/4-in. boards, and the sides 1 in. The case is encircled with battens at each end and either side of the center. Rigidity is given the container by end blockings, which with the end battens entirely cover the joinings.



Zinc-Lined Container for General Merchandise Which Many English Exporters are Using Because of Its Ability to Withstand Especially Rough Usage

Iron-hoop bindings are placed around the battens. The case is not only durable but difficult for thieves to break into, and because of its lining is practically waterproof. This is important where packages may be rain-soaked.

F. D. Young
U. S. Weather Bureau
Wash. D. C.



Time Variations of a Watch Explained

By EDWIN L. POWELL

216 Spruce Av. Topeka Park, Mo.

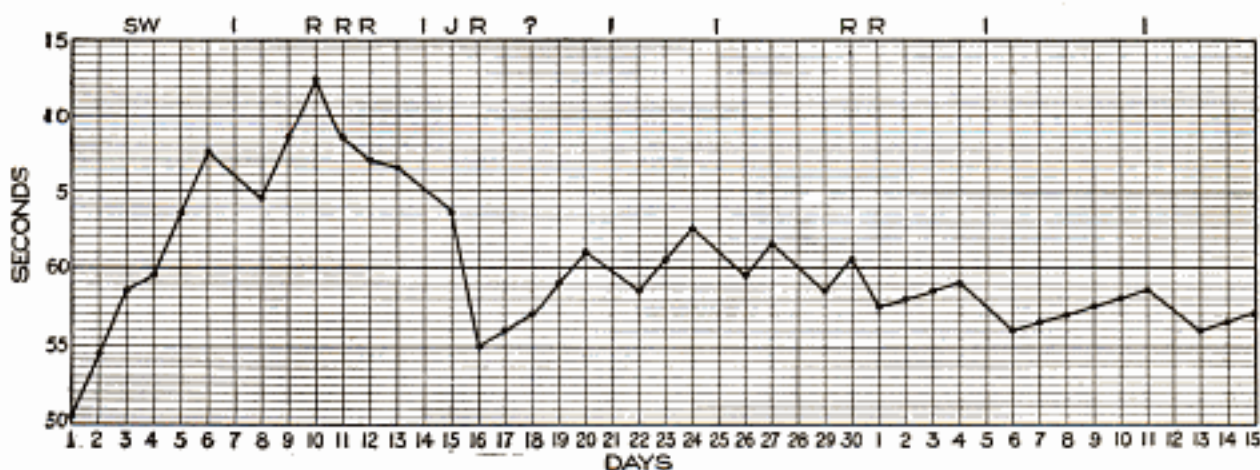
COMPLAINT that a watch varies in timekeeping apparently without special cause is quite common. The series of experiments outlined here-with may be performed readily at home, and will demonstrate that a watch of substantial quality will keep time correctly if properly handled. It should be apparent also, that a reason may be found for each of these ordinarily unaccountable variations in the performance of a watch.

The record of a watch from the first of one month to the 15th of the following month, illustrated graphically, is shown in the diagram. It was a seven-jeweled instrument, cost \$8, and had been in use four years.

The watch was carried upright during the day in the upper vest pocket, and placed, not suspended, on a dresser or shelf in the same position at night.

Two windings every 24 hours were found to give the steadiest results; one at 8 o'clock each morning and the other at 10 o'clock each night. The watch was usually carried between these hours in the day, and left on the dresser during the night. Skipping a winding or permitting the watch to remain on the shelf longer than usual caused a perceptible slowing up, which is shown in the chart.

The record was begun shortly after the watch had been repaired and regulated by a jeweler. It kept time to within one-quarter second a day while hanging upright on his desk. Note the variation of four seconds each day as soon as it was carried in the pocket. This condition was permitted to continue for nine days to ascertain if the gain was consistent. This proved to be the case, with an exception when



Nearly All of the Variations Shown in the Diagram were Traced to Definite Causes, as Regular Position in Pocket, Permitting Dust to Enter, in Holder Overnight, Shock, and Placed Horizontal

one of the regular windings was skipped, as indicated on the chart by the letters SW.

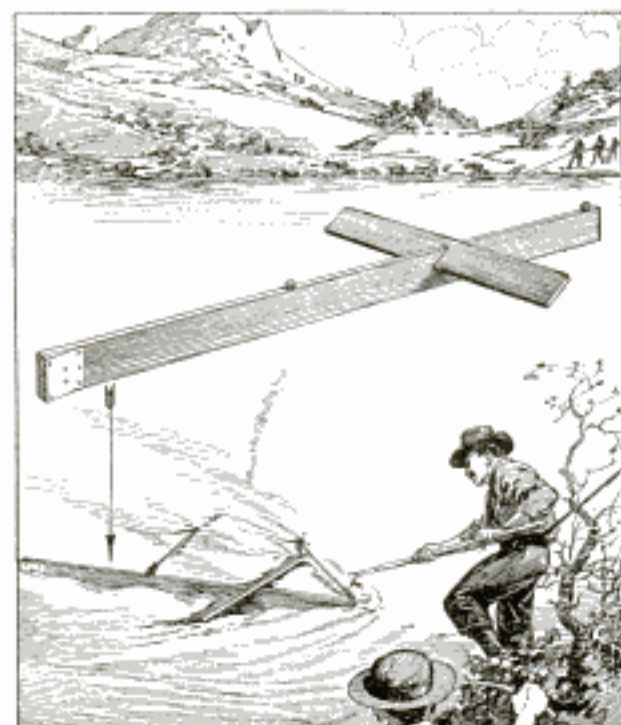
Regulation was then begun, each adjustment being indicated on the diagram by the letter R. No screw set was attached to the regulator, as the watch was an inexpensive one. Even with the aid of a glass, minute adjustment of the controlling arm was difficult, and usually resulted in moving it too far. This caused a rapid variation of the record, and a great number of adjustments was necessary before a satisfactory result was obtained.

Of the other letters used, J stands for a slight jar, which the watch received on the 15th, resulting in a loss of $8\frac{1}{2}$ seconds. Irregularity of treatment, which occurred on Sundays and

holidays when the watch remained on the shelf until past the noon hour before being placed in the pocket, is indicated at I. No check was made on these days, but readings on the following days showed a loss of from $2\frac{1}{2}$ to 3 seconds, in each instance the variation being recorded at nearly the same angle. It will be noted that the adjustment finally obtained nearly compensates for this loss for the rest of the week, thus keeping the watch almost correct on the average. One unaccountable variation occurs in the record, indicated by the question mark on the 18th day. This was caused probably by a jar too slight to have been noticed at the time. Readings were taken at noon, United States Naval Observatory time at Washington, D. C.

Hydroplane for Carrying a Line across a Stream

The simple hydroplane shown in the illustration was the means of carrying



The Swift Current Drove the Hydroplane Onward and the Tension on the Line Forced It to the Bank

a line across a swollen stream after bridges and telephone wires had been torn away, in an Arizona valley. Cannon and rockets failed to carry a line

over and two swimmers gave up the task. When a light line had been taken across by the hydroplane, rigged as shown in the sketch, a cable was drawn over and a ferry attached to it. In a short time reconstruction work was under way.

An Inexpensive Universal Joint

In the case of light and medium-heavy machinery, a very cheap, durable, and efficient universal joint may be made from three straight chain links of round section. In connecting this form of a joint, one end of each shaft, the driving and driven, must be slotted, to receive the end link, and a bolt put through the shaft to prevent the link from pulling out. A reinforcing collar is shrunk over the end of the shaft to strengthen the slotted part.

Such a joint will drive at almost right angles and with very little friction. It is especially recommended for mining, lumbering, agricultural, and similar classes of machinery.

Aluminum castings may be ground on a disk grinder without filling the abrasive material if a coat of paraffin is applied to the wheel.

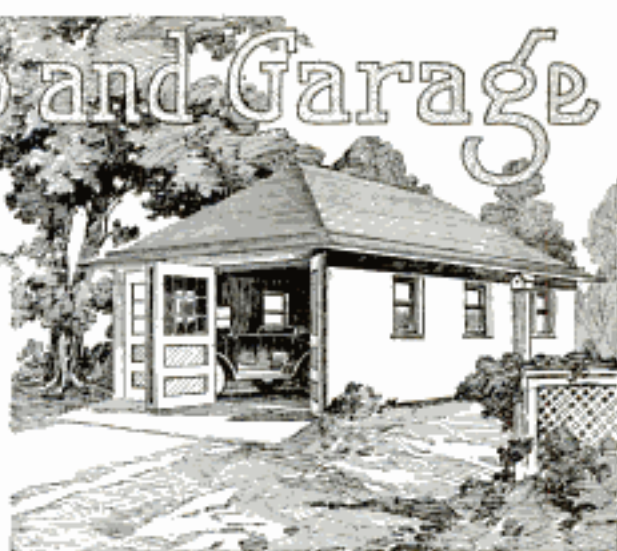
A Farm Shop and Garage

by W. E. Frudden

AUTOMOBILES and other self-propelled machines are almost indispensable to modern farming and are in general use. Proper equipment for their storage and repair is not so common, hence the farm shop and garage described should prove suggestive as a means of economy in the maintenance and housing of these valuable machines. They will be good investments only if proper care is given them. The plant described is in use on a farm in Iowa and was designed to fit the particular needs of the owner. It has a number of features that are adaptable to similar buildings, of various sizes and materials, and in other climates.

The construction of the building is standard and may be carried out in frame with a rough cement exterior finish, as shown in the illustration, or in a variety of materials. Clapboards, shingles, sheet metal, or a prepared sheet-roofing material may be used. The walls may be built up of concrete blocks or brick, and the upper portion finished in less substantial material. No details are shown for the framing and the general finishing of the openings and trim, as they are standard. The roof is of the hip type, with a shortened ridge.

The building is set on a slight knoll so that good drainage is afforded. Light is available from all sides, as shown in the ground-floor plan, and the window openings are distributed to give adequate light in all parts of the interior, particularly at the workbench, where a double window is shown. The entrances are large, giving easy access for the machines, and aiding in lighting the interior. The doors at each end of the building make it possible to drive through, avoiding the necessity of backing out in some instances. The double sliding doors in the center par-



tion shut off the garage from the workshop, which may be used for general farm repair and construction work.

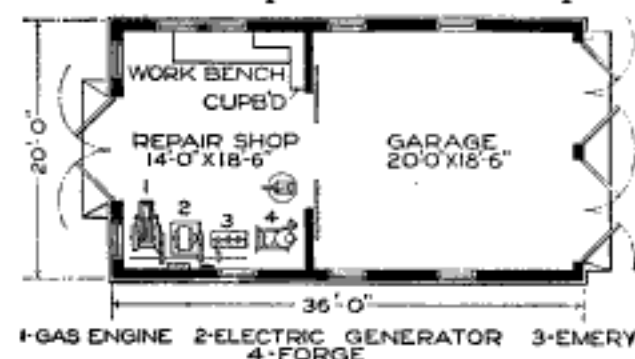
The garage will house three cars, and the large doors, extending almost the full width of the building, afford easy ingress and egress. Floor drainage is not shown in the ground-floor plan but should be installed to conform to the disposal facilities available. For washing the machines a concrete area, on a level with the floor and extending in front of the large doorways, will be found convenient. This may be built when the concrete foundation is made.

It is important that the doors be hung strongly, as they are of considerable width and height. The main doors should all be swung outward so as not to use interior space unnecessarily. The sliding doors in the partition will be found to have an advantage over other types in ease of construction and economy of space. The center partition may be made lightly and only high enough to separate the garage and shop, or built up into the roof structure. In the latter case it will be found convenient to heat the shop for winter use, when the garage is not so much used, except for storage.

It is intended that practically all repair work on the machines is to be done in the shop rather than in the garage. The car on which the work is to be done may be moved into the shop, where the arrangement of the machinery, workbench, and tool and supply cupboards is such that a minimum of effort is necessary to reach

them. This practice also tends to keep the garage uncluttered, and in the best condition for the proper storage of the cars or other machines, such as a farm tractor.

The lighting and interior arrangement of the shop should be noted par-



1-GAS ENGINE 2-ELECTRIC GENERATOR 3-EMERY
4-FORGE
Ground-Floor Plan, Showing the Well-Lighted Shop and Garage, the Workbench, Cupboards, and Machinery Arranged Compactly

ticularly, as these features offer valuable suggestions. The windows are arranged to advantage in that the workbench is afforded light from two windows on the rear and from another window at the vise end, where most of the close work is done. Two windows on adjacent walls afford plenty of light for the machinery, and by opening the doors additional light may be permitted to enter.

Machinery essential to a shop of this type is included in the equipment. A gas engine produces power for driving the electric generator, from which current is derived for a lighting system, and also drives a line shaft, from which belts are carried to the emery grinder and to a fan for the forge. Storage of current is also provided for, so that when the gas engine is in use, primarily to drive the machinery, its excess power may be applied to the generation of current. Other machines may be substituted for those shown in the illustration, to meet the particular needs of the owner, and to conform to the facilities.

Compactness, simple construction, and utility are the considerations in the designing of the workbench and the cupboards, shown in detail in the upper sketch. The close proximity of the cupboards and bench will be found especially convenient. The storage

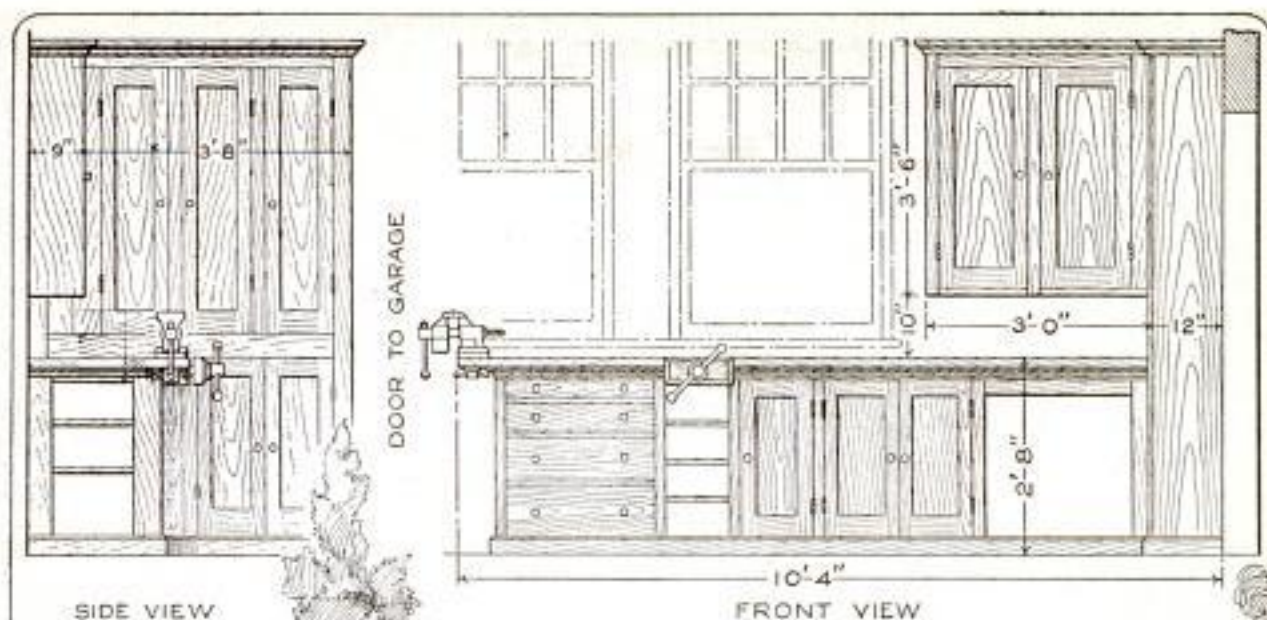
space is inclosed with doors, or made in the form of drawers, as far as is practicable, for proper care and storage of tools and materials demand that they be inclosed. This adds to the orderliness of the shop and is conducive to better care of the tools and supplies, as well as affording security by locks, when desired.

The workbench is built up of frames of 2 by 4-in. stock, supporting a top of $1\frac{3}{4}$ -in. planks. A floor shelf braces the supports $3\frac{1}{2}$ in. from the shop floor, and is fitted between the frames, flush with their front edges, to form the lower casing of the doors and lower drawers. A baseboard, 3 in. wide, trims the bench at the bottom, and a narrower strip, together with a cove molding, finishes the joint between the top and the framework. A variety of cupboards and drawers is shown in the sketch, but these are suggestive only and may be arranged to suit individual needs.

Instead of extending the bench to the wall at both ends, the working end was provided with a $3\frac{1}{2}$ -ft. space, affording access from the end as well as the front. This will be found convenient, as often work can be handled readily only at parts inaccessible from the front of the workbench. Jobs of this type are the cutting and threading of pipes, and the handling of long pieces of stock, at the end of which joints are to be made, or fittings attached.

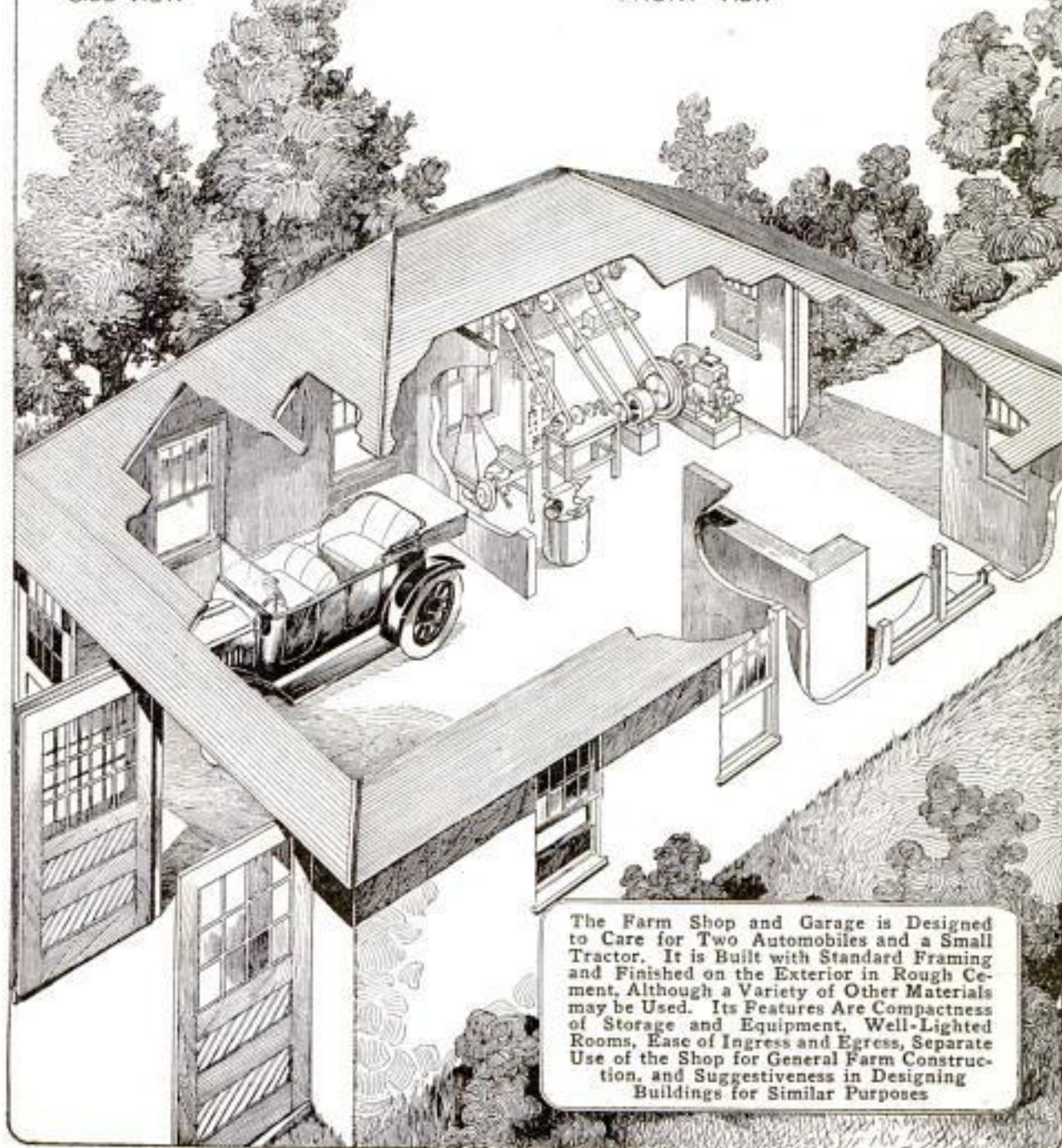
Two vises are provided, and these may be arranged to suit the individual convenience. The machine vise shown is of the pivot type, which will be found useful, since it may be set to face on the front or the end of the bench. The other vise is of the cabinetmaker's type, and is for use in woodworking. With the arrangement of the vises as shown, two persons may work at them conveniently and with a minimum of interference.

Other features, which may not have a general appeal but which will be found desirable in some instances, may be added. If the roof and headers over the doors are built heavily enough,



SIDE VIEW

FRONT VIEW

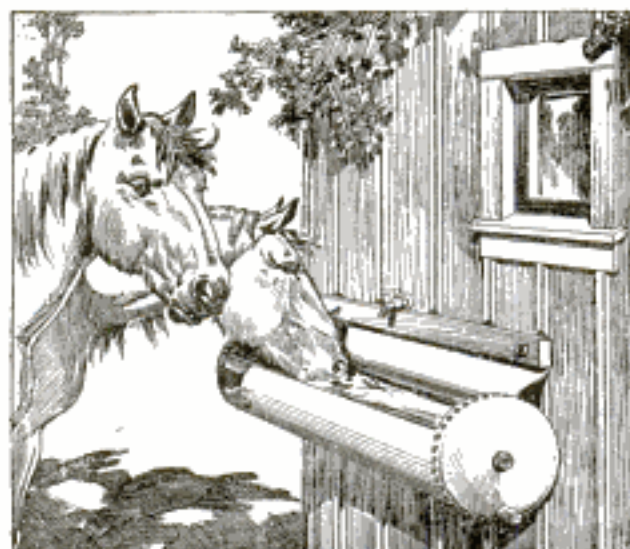


The Farm Shop and Garage is Designed to Care for Two Automobiles and a Small Tractor. It is Built with Standard Framing and Finished on the Exterior in Rough Cement. Although a Variety of Other Materials may be Used. Its Features Are Compactness of Storage and Equipment, Well-Lighted Rooms, Ease of Ingress and Egress, Separate Use of the Shop for General Farm Construction, and Suggestiveness in Designing Buildings for Similar Purposes

arrangement may be made to suspend blocks and tackle so that a car chassis may be raised at one end to permit work under it. This rigging may be used also in lifting heavy parts of the motor from the chassis. A turntable may be built into the floor of the garage or into the washing platform, suggested as an outdoor feature to be an extension of the garage floor, in front of the main entrance.

Watering Trough Made of an Old Boiler

A substantial watering trough was made by a California farmer of an old boiler fitted to the side of the barn, as



A Discarded Kitchen Boiler was Made into a Substantial Watering Trough

shown in the sketch. The openings were plugged and a section was cut on three sides and bent back to form a support, giving an opening at which the animals could drink.—Contributed by John Hoeck, Alameda, Cal.

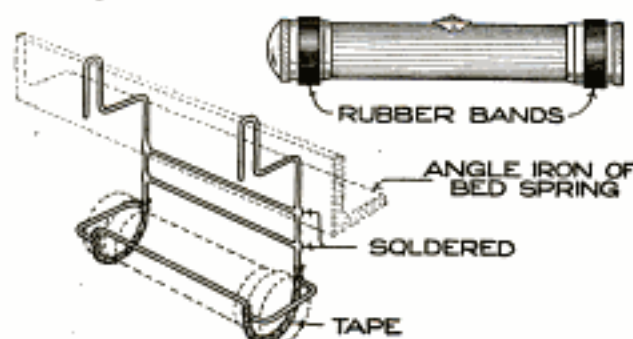
To Prevent Flash Lamp from Short-Circuiting

It was not long after purchasing a small flash lamp before I learned a few interesting facts about them. After using it in the basement one morning to locate some misplaced articles, the lamp was carelessly placed on the top of a cast-iron radiator. The construction of the majority of these

lamps is such that if a circuit is made by any conductor touching the two metallic ends of the lamp, the light will burn and the battery be taxed just as if the circuit had been made by pushing forward the contact button. As it was daylight and the room brightly illuminated, the burning of the lamp was not noticed, and when it was picked up that evening the battery was exhausted.

To prevent a recurrence due to thoughtlessness, I procured two short and heavy rubber bands and stretched them around the lamp, one over each end. It was an easy matter to remove them for renewal of the battery and it safeguarded the lamp from short-circuiting when the circuit snap was not applied.

Before retiring I usually laid the torch down by the bedside to have it handy for finding the switch of the electric lamp; for, being a railroad man, calls for duty during the night are frequent. Sometimes I had to grope around on the floor before laying hold of the torch, so I decided to make a permanent place for it where it could be easily found. A few pieces of fairly heavy brass wire were bent and soldered, as shown. The device was hung over the head end of the side spring support of the bed, which made the lamp easy to find and take hold of in a dark room. The arrangement was wrapped on the lower end with a tape



Protecting the Ends of a Flash Lamp to Prevent Short-Circuiting, and a Holder for the Lamp

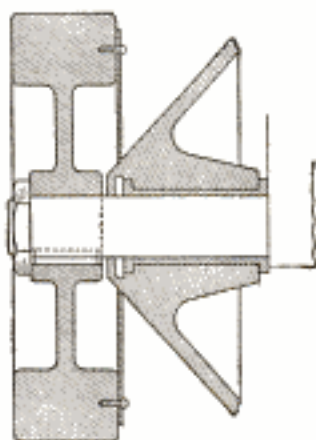
to prevent it from short-circuiting in any way. The shape and size of the hanger were such that during the day the bedspread covered it.—Contributed by F. W. Bentley, Jr., Missouri Valley, Iowa.

Automobile Spring Inserts to Prevent Squeaking

Lubricated inserts between the leaves of automobile leaf springs will prevent squeaking when traveling over rough roads. The motorist may prepare the inserts by cutting strips of light canvas, or similar material, and filling them with graphite grease, heated in a pan placed in another pan of boiling water. The strips should be immersed in the melted grease and permitted to absorb it until saturated. Lay them on a board to dry, and cut of a size to fit between the leaves of the spring.

To Prevent Dust Entering Flywheel Bearing of Marine Engine

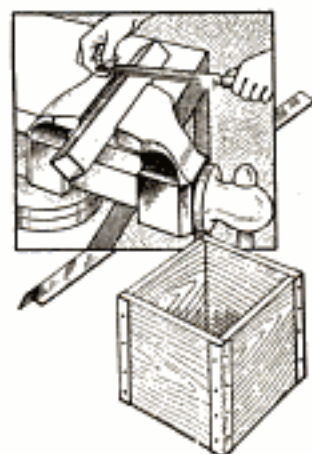
Considerable trouble was experienced in the bearing of a marine gasoline engine. The troublesome bearing was the one close to the flywheel, and the peculiar design of the crank case permitted dust and grit to enter. These particles of dust evidently played havoc with the bearing, for it was found necessary to replace it quite often. The repair illustrated in the sketch was suggested and found to be entirely satisfactory when completed.



A piece of $\frac{1}{16}$ -in. sheet metal was cut in the form of a ring, its outside diameter being almost that of the flywheel, and the inside diameter of sufficient size to fit easily the walls of the crank case when the engine was in operation. The disk was fastened to the inner face of the flywheel rim with machine screws. The disk prevented, to a great extent, the dust and grit from collecting on the inner side of the flywheel rim, and the trouble was entirely eliminated.

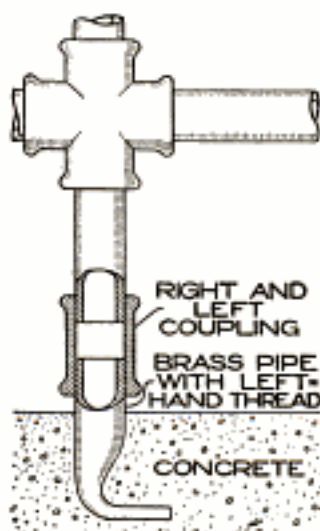
Brass Box Corners Made of Square Tubing

Attempts to make corners with which to reinforce boxes, or other constructions, usually result badly when they are made of sheet metal bent from a flat piece. A better method is to obtain square tubing of the proper size and to cut off opposite corners, as shown in the illustration. When the cut edges are filed smooth and the corners fitted into place they will give strong reinforcement, since tubes of this kind are accurate in cross section and their corners are square without rounding at the angle.—Contributed by B. E. Dobree, Battleford, Sask., Can.



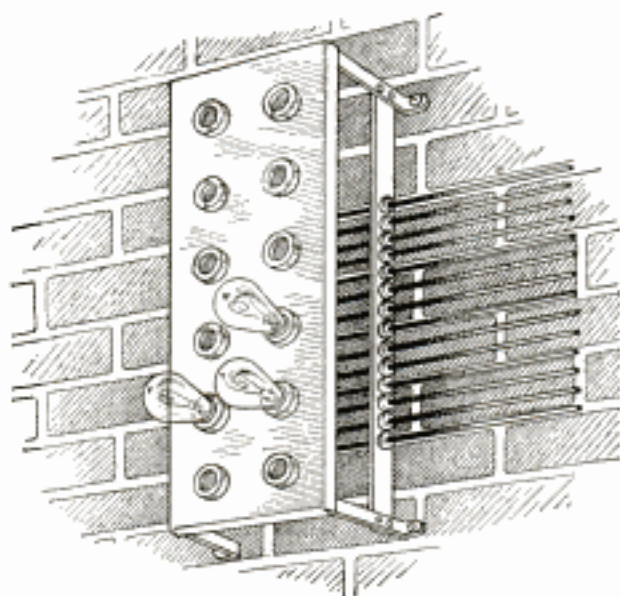
Removable Dock Railing

The illustration shows the method used for readily erecting and dismantling the railing on a yacht-club concrete dock which was subjected to the force of severe winter storms. By unscrewing the right and left couplings the rail is easily taken as a unit from the brass-pipe stubs which are anchored in the concrete. Before this scheme was adopted the railing required extensive repairs at the opening of each yachting season. The interior of the brass-pipe stubs were filled with concrete grout, which stiffened and strengthened them.—Contributed by J. J. O'Brien, Buffalo, N. Y.



Electric-Lamp Board of Sheet Metal

A substantial lamp bank may be readily made of a piece of sheet metal,



Various Groups of Connections may be Made on the Back of the Board

band iron, and a number of sign receptacles, as shown in the sketch.

The gauge and size of the metal will depend on the size of the bank desired. The metal should be cut to a size large enough to permit the bending over of its edges, $\frac{1}{2}$ in. all around. This gives rigidity to the board and improves its appearance. Holes should be stamped out to fit the receptacles, which are of the ordinary type.

The supporting legs are made of $\frac{1}{8}$ -in. band iron, bent to fit under the board and drilled for rivets and bolts. Various groups of connections may be made on the back of the board. A crosspiece of metal or wood, drilled and insulated, should be riveted to the legs on one side as a support for the wires.—Contributed by H. W. Walter, Delaware, Ohio.

Pointers on Cleaning and Polishing an Automobile

High-polish finish on an automobile may be ruined by inexperienced persons in washing the car. The following suggestions will aid in producing good results and prolonging the wear of the finish.

Clear water should be used in washing a car, and when it is necessary to use soap, one that has no acid in it is best. Do not attempt to scrape off the mud and dirt, for the varnish surfaces may thus be scratched. Pour water over the dirty parts of the car from a small vessel or from a hose, in the latter case using no nozzle. The mud and dirt will be washed away slowly but without injury to the varnished surfaces. If water is not plentiful, a spray nozzle may be used.

The full force of the stream of water from a hose with a nozzle may be directed against the under side of the fenders, as this is not a highly finished varnished surface, but care must be taken that the nozzle does not strike the surfaces. After all the mud has been washed off, go over the car with a soft sponge, using plenty of water. Then dry it with a soft, clean chamois skin. It is best to use one chamois skin and sponge for the body, and another chamois skin and sponge for the running gear. The chamois skin should be rinsed frequently in clear water and wrung as dry as possible. If there is grease on any parts of the car, it should be removed first with a dry rag and then with soap and water.

The car must be wiped dry immediately after washing, as otherwise spots will appear as it dries. When a car has been out in the rain and the hood is hot, there will be more likelihood of spots forming on it. Wiping the car dry when it is taken in out of the rain will prevent such spots. They may be removed by applying a varnish polish.

Occasionally some of the openings in the radiator become filled with mud, decreasing its efficiency. This may be removed by forcing water through the radiator from the rear; otherwise the water may splash upon the engine and into the magneto.

Mohair tops should be brushed off frequently, and may be cleaned with a sponge dipped in a warm lather of Castile soap. Go over it several times with clear water so as to prevent alkali spots. Composition tops and curtains

may be cleaned with water to which a little ammonia has been added. Leather tops may be washed and then treated with leather dressing. Never fold the top while it is wet, but stretch it in its raised position and permit it to dry.

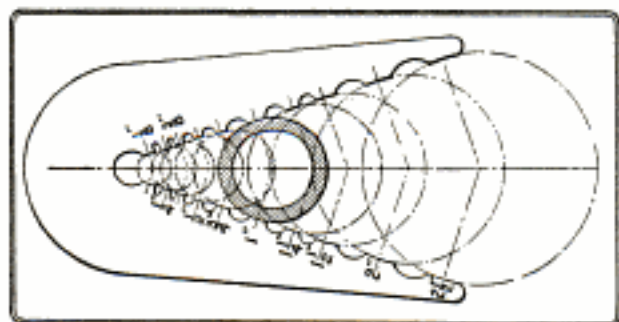
The upholstery should be cleaned each time that the car is washed. If it is of leather, the dirt may be removed by rubbing it with a woolen or flannel cloth, dipped in water containing a small quantity of ammonia. Finish with leather dressing to insure pliability. Cloth cushions may be cleaned with a whisk broom and spots removed from them with soap and water.

The brass parts of the car may be cleaned with a brass polish. Do not permit the latter to come into contact with the varnished surfaces.

Lampblack, or silver polish, should be used in cleaning nickel parts. Rub all of the metal parts with an oily rag after they are polished. This prevents them from tarnishing easily in damp weather and also aids in cleaning them.—Contributed by P. D. Norem, Chicago, Ill.

Homemade Pipe Gauge

The standard pipe gauge shown in the illustration was made of a piece of sheet brass, $\frac{1}{16}$ in. thick. The various standard pipe sizes are represented and are indicated in figures beside the proper points on the gauge. It will be observed that the indications for



Standard Pipe Gauge Made of a Piece of Sheet Brass

the pipe sizes are opposite openings wider than the inside diameter of the pipes. It is necessary that the circles be laid out carefully to insure accuracy.

Hoop for One-Man Truck

Barrels or boxes containing heavy material may be handled easily on a truck by one man if the hoop shown in



The Hoop Prevents the Load from Tipping off the Truck

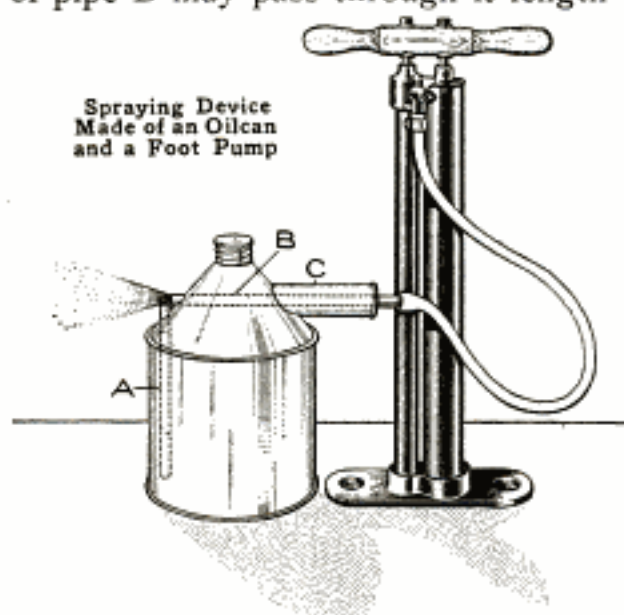
the sketch is attached. It may be made of heavy wire so that it can be released when not needed, or of band iron, permanently fixed to the sides of the truck and of a size to fit the barrels or other containers used. This simple device was found useful in a foundry and finishing room for castings, as it prevented undue effort on the part of men handling heavy loads on trucks and often saved the labor of an extra man. It may be adapted for use in stores or other places where crates or boxes are handled on a truck.—Contributed by Wilfred A. Cramer, Watertown, N. Y.

Painting an Automobile Radiator

Painting an automobile radiator quickly and thoroughly with a brush is difficult. A homemade spraying outfit similar to the one shown in the illustration made the job easy.

The outfit consists of a $\frac{1}{2}$ -gal. oil can, made into an atomizer by attaching a tire pump to the end of the air pipe B. A piece of small brass pipe, A, was mounted in one side of the can, the upper end of it extending a short distance outside of the top. A second piece of pipe was mounted in a horizontal position in the top of the

can, as shown at B. If a handle is attached to the can, as at C, the piece of pipe B may pass through it length-



wise and extend a short distance beyond the end of the handle. Both pipes were soldered to the top of the can, and the screw top was provided with a gasket to make it tight.

When the air is forced through the horizontal tube B and caused to pass across the opening in the upper end of the vertical tube A, the liquid in the can is drawn up and forced out in a fine spray. A mixture for spraying the radiator may be made of lampblack and turpentine. A sheet of paper should be placed back of the radiator to protect the engine, and around the outer edge, to prevent the liquid from bespattering the brass finish.—Contributed by A. E. Andrews, Chicago.

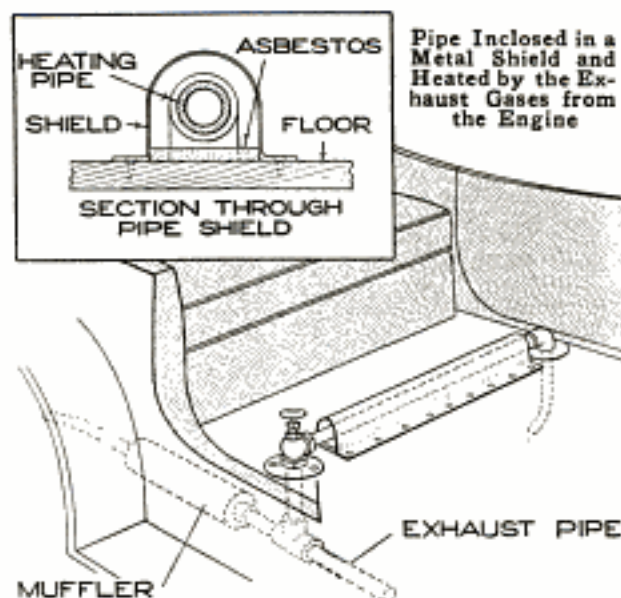
Brush Finish for Brass

Brass and similar metals may be given a brush finish by rubbing them with steel wool. Care should be taken that the rubbing is done in one direction, otherwise a scratched surface will result. A lacquer should be applied to prevent tarnishing. A thin solution of white shellac in alcohol applied with a brush is satisfactory as a lacquer for large work, and small pieces may be dipped in the solution.—Contributed by Claude C. Soots, North Salem, Ind.

An Automatic Exhaust Heater

The heater consists of a pipe, about two-thirds the size of the exhaust pipe, but never larger, connected to the latter anywhere between the motor and the muffler by means of a tee fitting, which may be threaded or clamped in place. The back pressure from the muffler will cause the hot exhaust gases to pass through the heater pipe and out at the open end. To prevent the open end from being too noisy it should be swaged down, to make it smaller than the body of the pipe. The frictional resistance of the heating pipe is sufficient to muffle the noise to some extent.

The heat is regulated by means of an angle valve which should have a metal-to-metal seat. A discarded steam-radiator valve will answer the purpose well. The shield shown serves both as a protection for the shoes and as a flue to provide a circulation of air. The strip of asbestos acts as an insulator between the hot pipe and the floor board. The metal washers and clear-



ance space protect the floor board where the pipe enters.—Contributed by W. Burr Bennett, Bridgeport, Conn.

White woodwork may be kept fresh by rubbing it with a moistened cloth dipped in whiting. The surface should then be washed with clear water and dried.

Remedy for Overheating of Bearings

Persistent overheating of bearings which are in constant duty may be overcome by applying a mixture of flour of sulphur and lubricating oil to a consistency permitting use in an oil cup. This mixture will also be found useful on heavy-duty bearings in cam rolls, and similar machine parts.

Sootless Cap for Removing Stovepipes

Removing stovepipe was an exceedingly distasteful job, because of the



soot and dirt that accompanied it, until I devised the cloth cap shown in the sketch. It is fitted over the end of the stovepipe and held in place

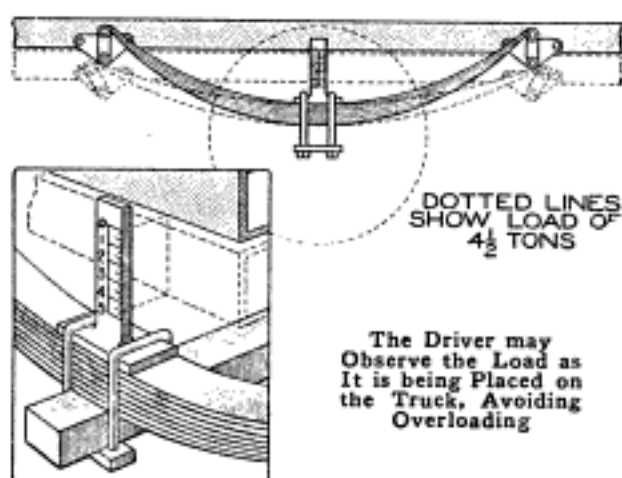
by a piece of elastic provided with fasteners. The cap prevented the soot from falling out of the pipes while they were carried, and took most of the unpleasantness from the task.—Contributed by H. L. Schlegel, Birmingham, Alabama.

Load Scale for Trucks

Overloading, one of the severe abuses to which motor trucks are subjected, may be eliminated by the use of the device shown in the illustration. It consists of two vertical metal pieces, graduated and attached to the centers of the rear springs. They extend above the lower edge of the truck frame, by which the load is indicated on the scale, as shown by the dotted lines in the sketches. When the truck is empty the lower edge of the frame should register at zero, and when it is loaded to capacity it should be opposite the maximum-load indication, which is five tons in the device illustrated.

The scale markings are determined by placing the truck level and loading its platform evenly with loads of 1 ton, 1½ tons, etc., the indications on the scales being made at the lower edge of

the frame. The graduations will not be spaced equally because of the

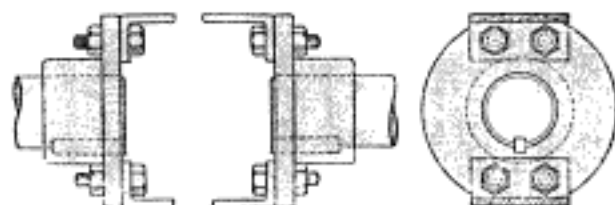


smaller spring deflection under light loads.—Contributed by Joseph Husson, New York, 41 Pimberst av.

(Pen name Jos. Brinker)

A Temporary Shaft Coupling

It was necessary to connect two shafts for a temporary job, the ends of the shafts having a space of about 12 in. between them. One shaft was connected to an electric motor and the other to a centrifugal blower, and both machines were bolted permanently to the floor. A rough and ready form of coupling was rigged up in the following manner: Two pieces of cold-rolled steel, 14 in. long, 4 in. wide, and ⅜ in. thick, were procured and bent over at the ends as shown, after which



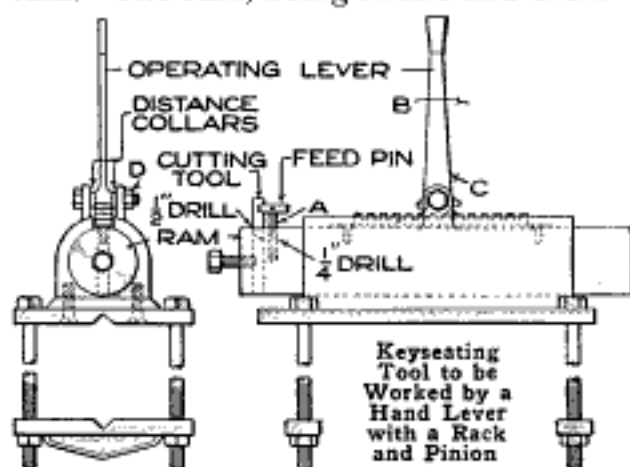
Connection Made of Two Bars between Two Flanges on Shaft Ends a Distance Apart

two holes were drilled in each end, equal in size to those in the flanges. The coupling was assembled, and needless to say it operated perfectly.

¶To obtain the distance between centers of two gears, add the number of teeth together and divide half the sum by the diametral pitch

A Portable Keyseater

The main feature of the keyseating tool illustrated is the design of the ram. The ram, being round and extra-



long, presents a very large wearing surface, which greatly increases the durability of the machine. The "up and down" feed arrangement of the cutting tool is also very handy, though not new. The tool is round, with a flat surface ground on one side, against which the setscrew shown bears, to prevent it from turning. A notch is cut on the opposite side for the circular feed disk. This disk is $1\frac{1}{8}$ in. in diameter and forms the head of the feed screw A. Further details of the feed device are shown in the illustration. The position of the ram is varied by pushing the operating lever down in the direction of the arrow B, and when the part C reaches the rack, the rack and pinion will be out of mesh. The ram may then be moved to any position by hand, and, when set as desired, an upward movement of the operating arm in the direction opposite to the arrow B reengages the rack, and the stroke of the ram begins. As shown, the rack is set into the ram and securely bolted.

Bushings are not used because the very large surface reduces the wear to a minimum, and a little take-up is provided by tightening the nut D. The distance collars should be a loose fit for the reason that, as shown, the machine straddles the work and is securely clamped by the long bolts and straps.

Cleaning Paint on Engines

A compound with which engines or other oily machinery may be cleaned thoroughly is made as follows:

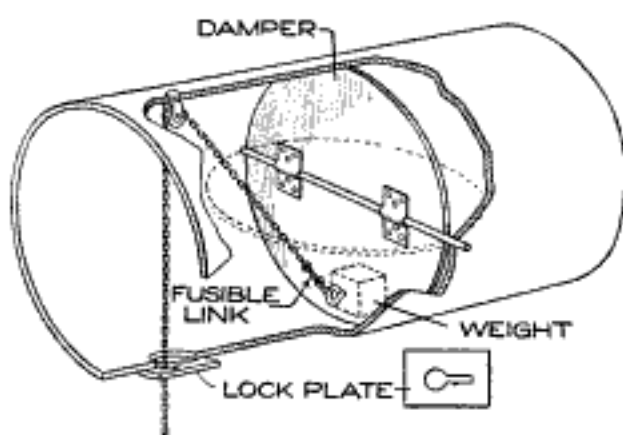
To one gallon of water add $\frac{1}{4}$ lb. of borax and $\frac{1}{2}$ pint of lard oil. Mix them thoroughly, forming an emulsion. Rub the painted surfaces with the compound applied on waste or soft cloth, and with a clean cloth remove it before it dries.

Wrapping a Pair of Shoes

A neater package may be made in wrapping shoes without a box by placing the heels against the soles instead of placing the uppers together. The latter method exposes the heels, and, if they are high, may cause the wrapping to be broken.

Automatic Fire Damper in a Ventilating Duct

The illustration shows a damper for use in a ventilating duct which passes through a fire wall. As may be seen, a fusible link is incorporated in the actuating chain. This link will open when heated to about 140° , allowing the damper to be closed by the action of the weight which is attached to it. The damper may be locked in any posi-



A Fuse When Overheated Releases the Chain and the Weight Closes the Damper

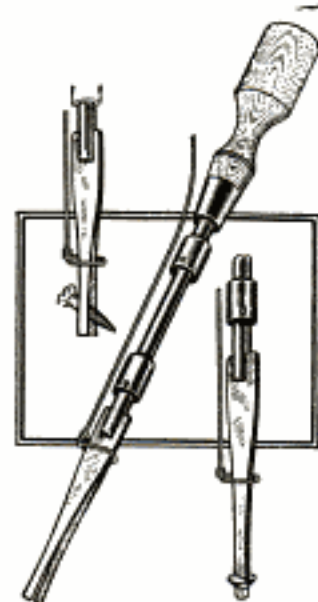
tion by drawing the chain into the narrow end of the lock-plate slot which holds the chain from slipping.

Surface Whiting for Laying Out Work

In laying out work on structural iron or castings, chalking the surface is the usual method, but a better way is to mix whiting and benzine to the consistency of paint and apply the mixture with a brush. The benzine will soon evaporate and leave a fine white surface for the lines.

Screwdriver Grips Small Screws

The screwdriver shown in the sketch was devised when I found that I could



not reach into a corner of a cash register with an ordinary screwdriver. The tip was made from a pair of tweezers. The shank may be provided in various lengths, and the wire shown may be used to clamp the tweezers when it is desired to lift a screw out of an otherwise inaccessible place. If the strips of the tweezers are given the proper spring they will hold small screws firmly while they are put into place. The tips should be kept sharp and square.—Contributed by W. C. Loy, Rochester, N. Y.

A Belt Dressing

About as good a belt dressing as can be had is made by melting beeswax in neat's-foot oil in proportion of $\frac{1}{2}$ lb. of wax to $\frac{1}{2}$ gal. of the oil. To secure a good mixture, melt the wax first, then add the oil slowly, stirring constantly to get it thoroughly compounded.

Erasers may be kept in good condition by rubbing them on a piece of fine sandpaper provided for the purpose.

Outdoor Rack for Auto Tires

Motorcycle, bicycle, or other tires may be displayed to good advantage in front of motor-accessory shops by



The Tires are Displayed Out of Doors in the Rack

the use of the rack shown in the sketch. By extending the upper support, several tires of different size or style may be displayed. They are locked into place by the chain which closes the upper opening in the rack.—Contributed by Donald A. Kahn, South Bend, Ind.

To Prevent a Chain from Rattling

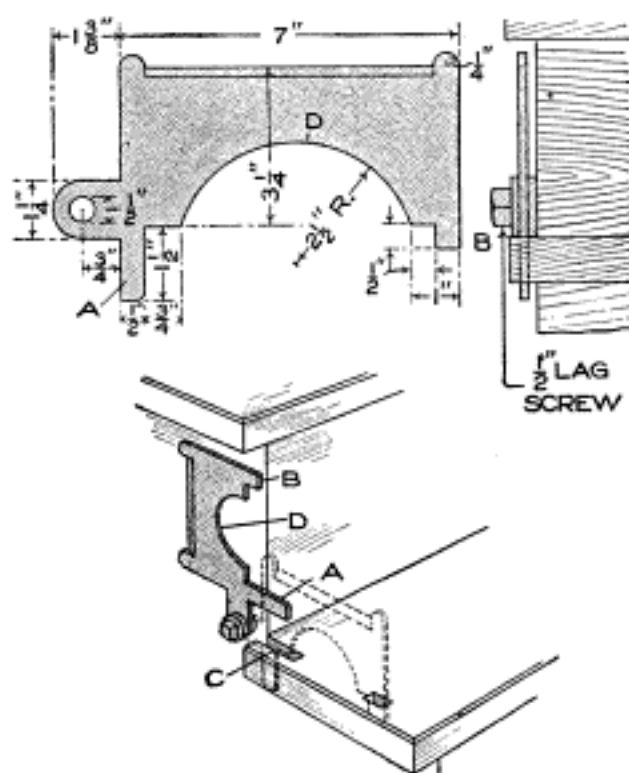
Where it is necessary to prevent a chain from rattling, as with those used on elevators, weave a rope into the links, as shown, and they will run noiselessly. The rope is woven in so that it will not get under or between the links where they bear on one another.



Small bulbs may be grown early in the spring by inserting them into holes in corks and floating them in a dish of water, in a shady place. As the roots sprout, moss and earth may be added, and the dish placed in a sunny spot.

Safety Boot Scraper for a Doorstep

The ordinary cast-iron blade boot scraper, located on or near the door-



Boot Scraper That can be Turned Out of the Way When Not in Use

step, is a dangerous thing, and many a child bears a disfigured countenance as a result of falling over one of them. One placed on a step of a certain schoolhouse was responsible for injuries to three children during one term.

The sketch shows a good, substantial, and above all, a safety scraper that can be attached to a step. The detail of the blade is shown so that it can be easily cut out with a hacksaw from $\frac{3}{16}$ or $\frac{1}{4}$ -in. sheet iron. It is fastened to the step so that it will drop readily into position. When not in use, it is pushed out of the way. When necessary to use it, the leg A is touched with the toe and the scraper drops down, the smaller leg B falling into a small ferrule sunk into the step. It may be necessary to cut a small piece out of the shelf, or footboard, if it projects over the frame, to let the small piece in, as shown at C. When the scraper has been used the toe is placed under the arch D, and the device is quickly thrown back into a safety position.

Corking Painted Ironwork

Sweating or condensation of vapor on the surface of ironwork is prevented on ships, and other structures which are in or near the water, by applying a layer of powdered cork over the paint. Several coats of red lead are first applied, and, while the last coat is still undried, finely ground cork is dusted on until the paint will absorb no more. When this is dry a coat of paint mixed with turpentine is applied. This process is also used in protecting iron or steel roofs from moisture on the under side.

Keeping a Record Map Up to Date

A wall map in the office of an electric-light company was used to indicate changes and extensions in the overhead lines. It was found difficult to make the alterations on the map satisfactorily. This was overcome by placing it in a picture frame having a glass front, and indicating the changes from time to time, on the surface of the glass, with several colors of waterproof ink.

Tamper Made of Concrete

A tamper for use in the garden or in home concrete construction may be made as follows: Procure a tomato can, about $4\frac{1}{2}$ in. in diameter, and remove the top. Drive nails part way into the end of a broomstick, or other round wooden rod, so as to form radiating projections. Insert the broomstick with the nails in it into the can and pour concrete around it. Care should be taken that the handle fits in the center of the can, and that its lower end does not touch the bottom while the concrete is being poured into place. Permit the mixture to harden, and a tamper that will be substantial will result.—Contributed by W. W. Baldwin, Washington, D. C.

Several turns of tape around the middle of a pulley face will prevent a belt from working away from the center.

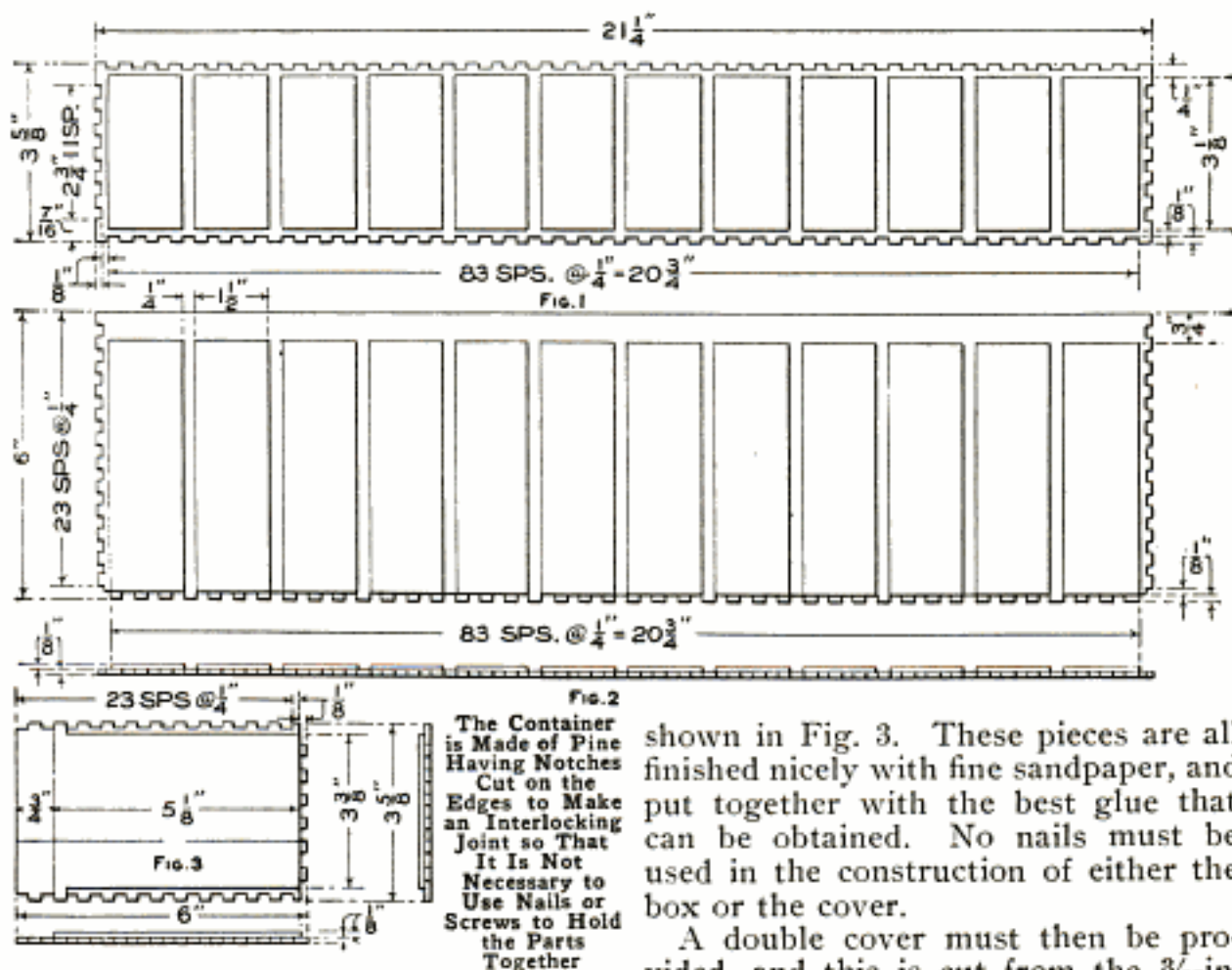


How To Make A STORAGE BATTERY

BY LEWIS B. LAWRENCE

IN the making, or handling, of a storage battery it must be understood that one cell will have an electromotive force of about two volts, and the length of time, or ampere-hours, it will run depends on the size of the cell and the surface of the plates. The description is for a 24-volt, 20 ampere-hour battery, which means that 12 cells are in the battery, and that they have such a size that they will deliver 20 amperes for one hour, or two amperes for 10 hours. It is of the lead-zinc type,

stock of white pine, $\frac{3}{8}$ in. thick, and cut one piece $21\frac{1}{4}$ in. long by $3\frac{5}{8}$ in. wide, plane it, rabbet the edges and cut notches for an interlocking joint, as shown in Fig. 1. This piece is for the bottom of the box. The sides are made in a similar manner, the size of each being $21\frac{1}{4}$ in. long and 6 in. wide, as shown in Fig. 2, two pieces being required. Cut 11 pieces, $5\frac{1}{8}$ in. long and $3\frac{3}{8}$ in. wide, from $\frac{1}{4}$ -in. stock, which form the separations in the box. The ends for the box are made as



the 12 cells being assembled in a box. To build the container, select the

shown in Fig. 3. These pieces are all finished nicely with fine sandpaper, and put together with the best glue that can be obtained. No nails must be used in the construction of either the box or the cover.

A double cover must then be provided, and this is cut from the $\frac{3}{8}$ -in. stock, which after planing will be reduced to $\frac{1}{4}$ in. The dimensions given

in Fig. 4 are for the top part, and 12 pieces are cut like the one shown in Fig. 5 and mounted on the upper piece, Fig. 4, as shown in Fig. 6, with glue only. Drill $\frac{1}{4}$ -in. holes and cut slots, $\frac{1}{4}$ in. square and $\frac{1}{4}$ by $\frac{3}{8}$ in., $\frac{5}{16}$ in. from the edges and on the center line of the $1\frac{1}{2}$ by $3\frac{1}{8}$ -in. pieces, as shown. A second cover is cut, as shown in Fig. 7, to form a water-tight box, which makes it possible to carry the battery around without spilling the acid. A few nails could be used in the construction of this cover, but it is best to put the whole box together with a good glue.

The mounting of the main box must be done carefully, and the parts fit snugly, so that when they are glued together the joints will hold water, if necessary. Join and glue together the bottom of the container and the two long sides; then, after applying glue to the edges of the 11 separators, slide these into their respective grooves and finish by gluing the two end pieces to the sides and bottom. The box is then bound tightly with strong cord and left to dry for about 12 hours. The mounting of the second cover is very similar to the making of the main box.

When the container and covers are dry, they must be immersed for about

the acid. As an additional precaution the box may be painted inside with an acid-proof paint. The binding is then removed and the outside of the box sandpapered to remove all roughness left by the wax and rosin mixture.

Glass tubes, $\frac{3}{4}$ in. long, are fitted in the $\frac{1}{4}$ -in. holes drilled in the cover, so that their upper ends will extend about $\frac{1}{4}$ in. above the surface, as shown in Fig. 6. The holes in the glass tubes allow the gases to escape without wasting the liquid. Two binding posts are fastened in a convenient place, Fig. 7 showing a good location for them.

The elements for each cell must now be constructed. Each one consists of five plates, three of them sheet zinc, and the other two of lead. The plates are cut from $\frac{3}{32}$ -in. metal, $2\frac{1}{2}$ by 4 in. in size, with a projection, 2 in. long by $\frac{1}{4}$ in. wide, on one corner of each as a connector, as shown in Fig. 8. The lead plates are roughened with vertical striations, by laying them on a soft piece of wood and hammering the teeth of a single-cut file into them. A $\frac{1}{2}$ -in. hole, A, is drilled through the center of each plate to allow for a free circulation of the electrolyte. The plates are mounted as shown in Fig. 9, separating strips, about $\frac{1}{4}$ in. wide by $\frac{1}{8}$ in. thick, being used between the plates. The

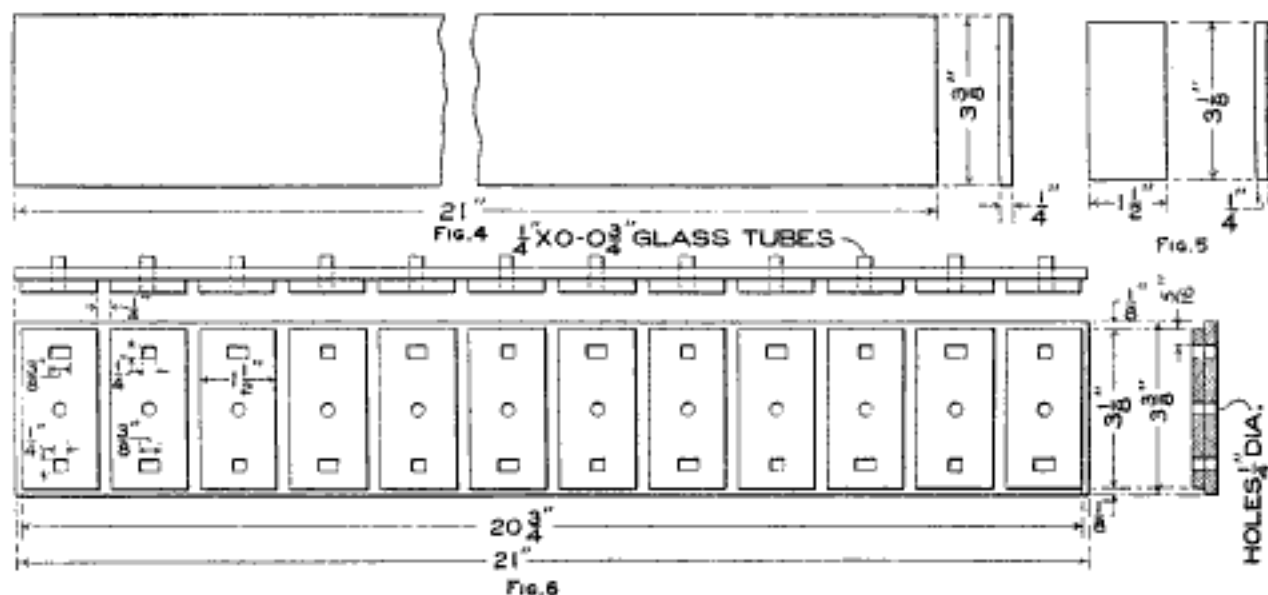


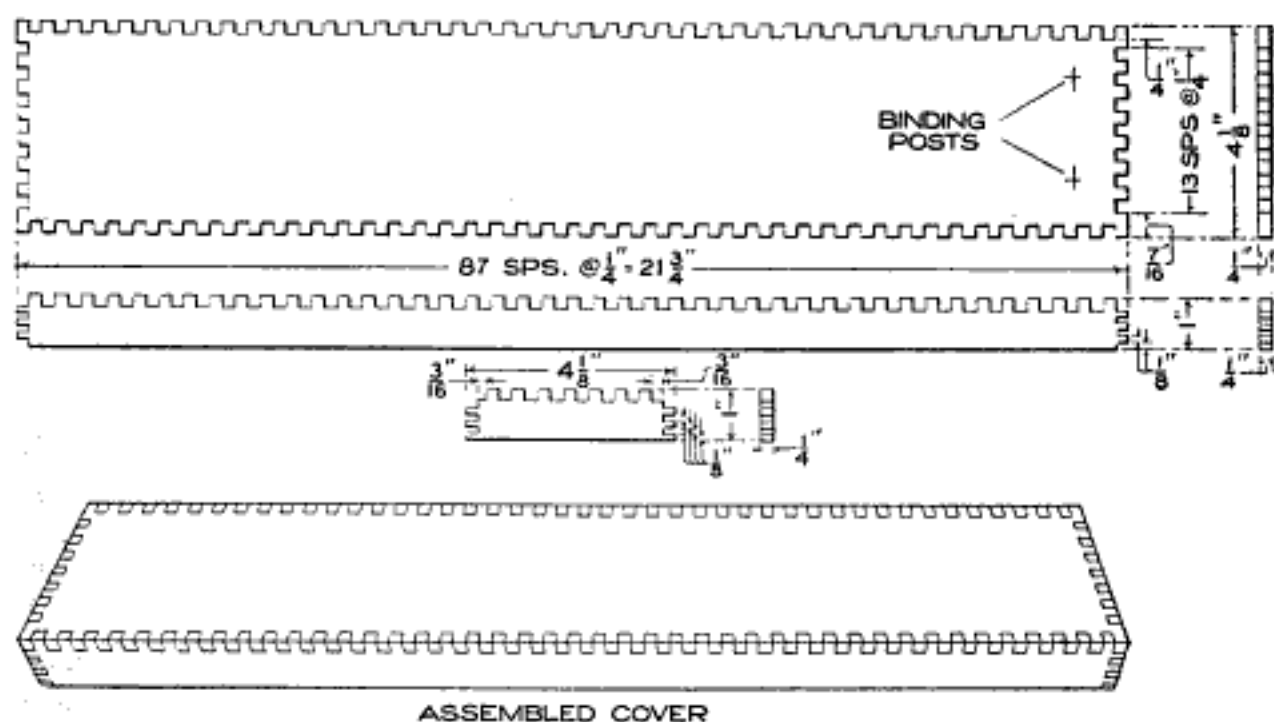
Fig. 6
A Cover is Made to Fit over the Tops of the Cells to Prevent the Solution from Spilling When the Battery is Moved, and to Provide a Place for the Connections to the Plates

10 minutes in a boiling mixture of beeswax and rosin, 2 parts of wax to 1 part rosin, to make it impervious to

best material to use for these strips is celluloid, but sheet rubber, such as is used for steam packing, will answer the

purpose quite well. Each element is held together with six clamps, made as shown in Fig. 10 and cut from hard

tank. Connect these plates together. Then connect the plates to be formed to the negative terminal, and the lead



ASSEMBLED COVER

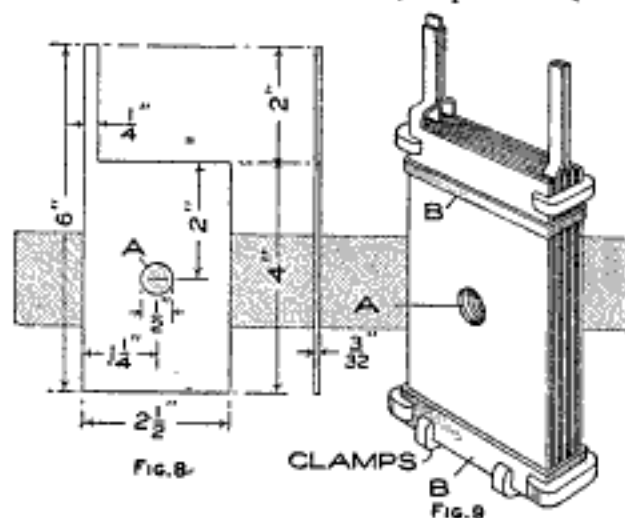
FIG. 7

A Second Cover is Constructed the Same as the Main Container so That All Terminals, with the Exception of the Two Outlet Binding Posts, will be Covered and the Outside Present the Appearance of a Neat Box

rubber, the two at the bottom serving as feet upon which the element stands in the cell. Rubber bands, B, assist in holding the parts together firmly. The corner strips are bent together, as shown in Fig. 9, and brought out through the slots in the wood cover, Fig. 6.

The capacity of the battery will be considerably increased if the lead plates are made up electrochemically before being mounted, and this can be accomplished as follows: Make a small wood tank, $12\frac{1}{2}$ in. long, $2\frac{3}{8}$ in. wide, and $4\frac{1}{2}$ in. deep, and place the 24 roughened plates in it so that they will be $\frac{1}{2}$ in. apart, leaving a space of $\frac{1}{2}$ in. between the first and last plates and the end of the tank. Steady the plates by means of small strips of wood, laid across the top of the tank, and connect them together in a strong but temporary manner. Cut 25 sheets of pure lead, using the pattern for the plates and not forgetting the $\frac{1}{2}$ -in. hole in the center, and place these "dummies" halfway between the plates to be formed, and one at each end of the

sheets to the positive terminal, of an electrical circuit, with a switch, rheostat, ammeter, and fusible plug in the line, as shown in Fig. 11. Next prepare a solution of distilled water, 2 qt., commercial sulphuric acid, 1 pt., and concentrated nitric acid, 1 pt. In pre-



Pattern for Cutting the Plates, and Location of Clamps to Hold Them Together in the Cell

paring the solution, put the water in an earthen vessel, or porcelain basin, and add the sulphuric acid slowly while stirring the mixture constantly. This

mode of operation is important to avoid a sudden rise of temperature which will throw acid on the hands, or clothes, and the possible breaking of the vessel, or container, if glassware is used. Allow the mixture to cool, and then add

the nitric acid slowly.

With the switch open, pour the solution in the tank—avoiding any drip or particles falling on the hands or clothes,

as it burns very badly—until the surface of the liquid is about $\frac{1}{4}$ in. above the plates. Adjust the rheostat so that a very small current can pass; then close the switch, and decrease the resistance until the ammeter shows that a current of three amperes is flowing through the forming tank. Allow it to run for 10 hours, and then disconnect the plates from the source of energy. Remove the plates and dummies from the tank, taking care not to break their connections; then empty the tank and rinse it carefully. Set up the plates and dummies in the tank as before and pour in it the following solution: Distilled water 5 pt., and commercial sulphuric acid, 1 pt. This so-

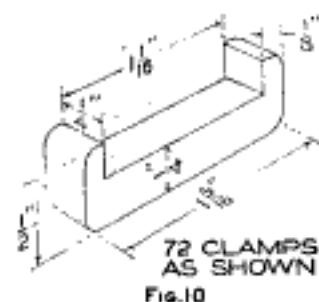


Fig. 10

used for all lead storage batteries. Then connect up the plates to the positive terminal of the source of energy, and the dummies, to the negative terminal, as shown in Fig. 12, which is in the opposite direction of the connections made when the plates were in the former bath. Pass through them a current of three amperes until the liquid boils vigorously. This charge must last at least eight hours, and if the cells boil too hard before that time, reduce the current to two amperes by means of the rheostat. The connections can then be cut off, and the

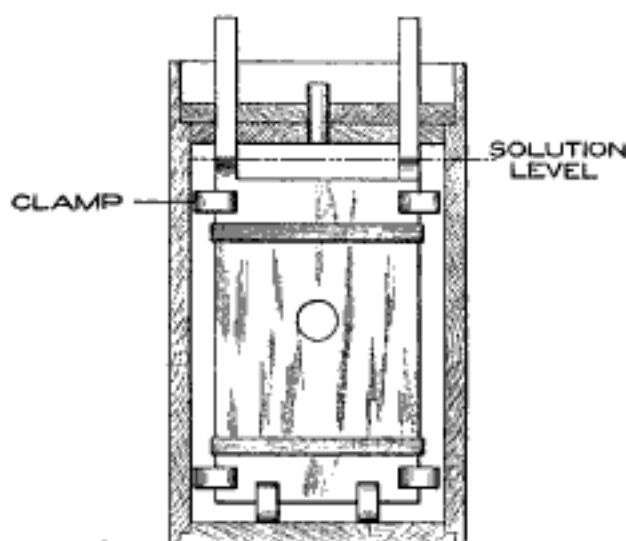


Fig. 13

Pour In the Electrolyte Solution to the Depth Indicated, Just Covering the Plates

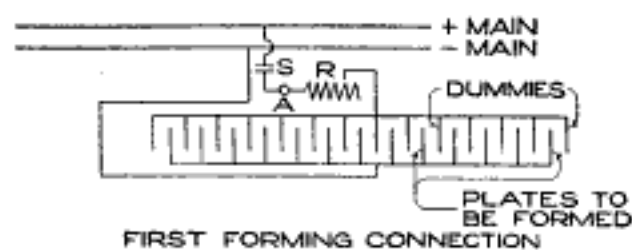


Fig. 11

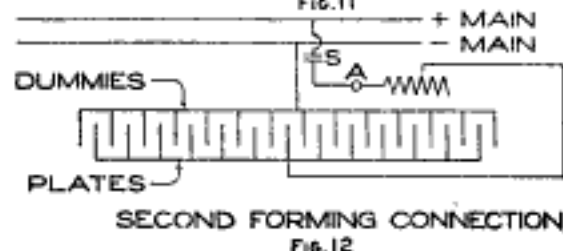


Fig. 12

Wiring Diagram for the First and Second Connections to Form the Plates

lution can be obtained already mixed from anyone recharging storage batteries, as it is the normal electrolyte

plates, which are now entirely formed, dipped for a few minutes in cold water, allowed to dry, and then mounted with the zinc plates to form the elements of the battery cells.

The corner strips of the elements, brought out through the slots in the cover, are connected together. These can be joined with lead, but the following plan is much better: The strips are bent over and interlaced, then wrapped with a few turns of small wire and thoroughly soldered. The surface of all the strips should be dusted with powdered rosin before they are interlaced, to facilitate the soldering, or a good soldering paste should be used. The soldering iron must not be too hot, for this will melt the terminals. Great care must be exercised in doing the

soldering, to produce a good job. After soldering, the visible parts of the strips should be given a coat of good acid-proof paint, or a thick, black asphalt varnish.

The electrolyte solution for the cells is made as follows: Distilled water, 1 gal.; zinc sulphate, 2 lb.; cadmium sulphate, 2 lb., and magnesium sulphate, 4 oz. This fluid is poured into the cells until it stands about $\frac{1}{4}$ in. above the upper surface of the plates, as shown in Fig. 13.

If the lead plates, which are positives, have been formed by the process mentioned, a first charge, of about eight hours, will bring the cells to full capacity. If not, the plates have to be formed by successive charging and discharging. About 20 charges and discharges will be necessary to obtain the best working conditions, and even then the capacity of the battery will not be quite as large as if the positive plates had been formed before being mounted with the zinc plates.

In charging, a current of three amperes should be used, and the charge

kept up until the terminal pressure across the cells amounts to 28 volts. Never force it above this amount. Full

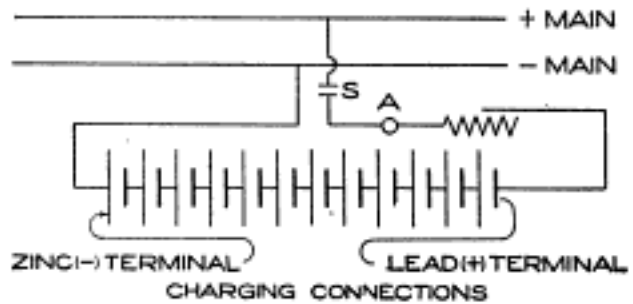


FIG. 14

Wiring Diagram for Charging the Battery When It is Run Down by Use

charge is always indicated by a vigorous boiling in the cells. The current should never be kept on after the cells begin to boil.

The charging connections are shown in Fig. 14. For charging as well as for forming the plates, a resistance must be used in series with the battery, but on account of the great variation in voltages available, it is impossible to give any data regarding the proper size to use. A direct current is always used in charging.

File Used as Countersink

Satisfactory countersunk recesses for screws may be made in sheet metal by using a file, the thick portion of the tang where it meets the file being used to cut the recess. This will be found useful in an emergency, or when a countersink is not available.

A Dutch Clock

Those in charge of a number of workmen in a factory or shop will appreciate the device shown in the illustration and known as a "Dutch clock." It consists of a circular disk of stiff paper laid out in triangular portions radiating from the center. The names of the various departments are placed in these spaces and an indicator is fastened at the center. When the person at whose place the clock is, goes to any of the various rooms or departments he places the indicator on the appropriate space

on the dial. This informs others where he may be found.

The device has proved especially valuable to foremen or superintendents, but by inserting names instead of

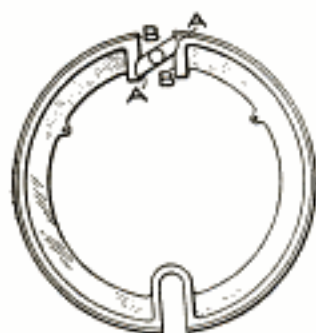


When the Foreman Leaves His Desk He Indicates Where He may be Found

places or otherwise varying the indications the clock may be adapted to a variety of uses.—Contributed by John F. Long, Springfield, Mo.

Reversing Automobile Brake Shoes for Wear

Brake shoes on old automobiles require relining oftener than those on new cars, and when the lining is taken out, it may be observed that although it is worn only slightly, the brake loses its power. This is caused by wear of the cam and the surface on which it operates. In a certain small car, which had been in use several seasons, and had been provided with a brake relining many times, it was noted that the surfaces AA were worn concave, so that the cam could be moved around to its full-pressure position without bringing much force on the brake drum. Turning the shoe over, causing the unworn surfaces BB to engage the cam ends, more than doubled the life of the lining.—Contributed by Morris G. Miller, New Rochelle, N. Y.



Removing Hard Spots on Lathe Spindle

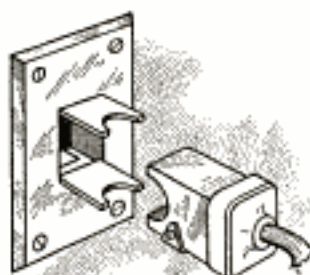
Mechanics who have operated lathes with cast-iron headstock bearings appreciate the difficulty of dressing up a worn lathe spindle. The small particles of iron which adhere to the surface of the steel are so hard that a Swiss file cannot cut them. A small chisel is unsatisfactory for this work and grinding off the spots with a portable grinder gives poor results. A good method is to lap off the hard spots with a medium-grain oil-stone. When almost down to the spindle surface use a fine-grain stone to



finish. A fine bearing surface results, particularly if the stone is rubbed around the circumference, as shown in the sketch.

Curbing Borrowers of Electric Flatirons

To live agreeably among borrowing neighbors is a serious problem even for a good-natured housekeeper. One so situated experienced difficulty in keeping the electric iron at home. Its severe duties finally resulted in burning it out. A new one was about to be purchased, and in order to keep it at home the usual type of screw plug was removed from the end of the cord and replaced with a push plug. This necessitated a change in the wall outlet plate, but proved a great convenience. With this form of receptacle a connection may be made more quickly than with a screw plug. The first time the new iron was borrowed, it was promptly returned and not borrowed again by the same or any other neighbor.—Contributed by John D. Adams, Phoenix, Ariz.



Exit Lights That Illuminate

Red electric-light bulbs that were placed in the aisles and near the exits of the stock rooms of a large factory were found to cast annoying shadows and prevented the reading of orders without additional lights. I placed globes that were colored red on the upper portions only, in the sockets. This permitted the light to be given off from the lower part of the bulbs so that orders and papers might be read, and still provided the danger and exit lights required under the law. The expense of providing double lights was also overcome.—Contributed by F. W. Ward, Jersey City, N. J.



A Portable Folding Boat

BY STANLEY L. SWIFT

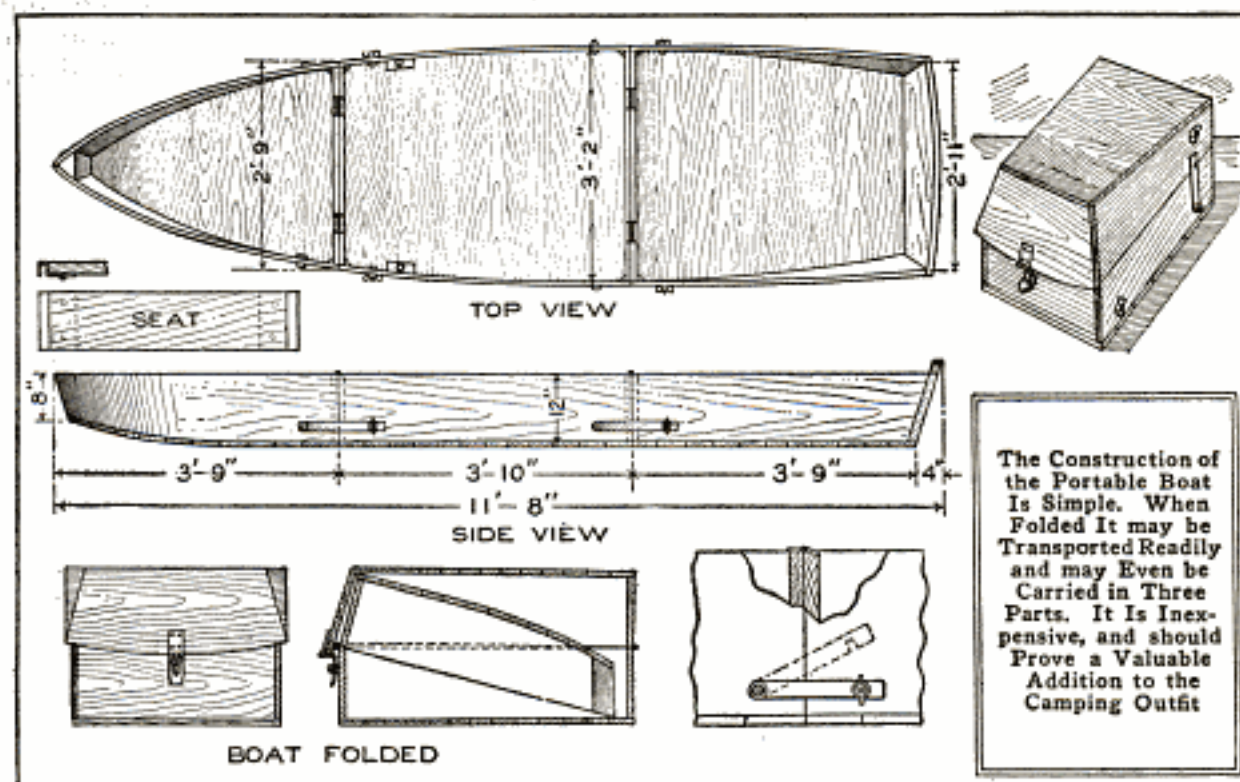
A BOAT that is inexpensive, easily made, and readily transported is shown in the illustration. Since the bow section folds inside of the stern portion, it is important that the dimensions be followed closely. The material used is $\frac{7}{8}$ -in. throughout.

Make a full-size diagram of the plan to determine the exact sizes of the pieces. Brass screws are best for fastening this type of work, but copper-plated nails may be used. Tongued-and-grooved stock is best for the bottom. The joints should not be driven together too firmly, to allow for expansion, and all joints in the boat should be packed with red lead or pitch.

The adjoining ends of the sections should be made at the same time, to

insure a satisfactory fit when joined. Braces are fixed into the corners.

Metal straps hold the sections together at the bottom of the hinged joints. These should be fitted so that there is little possibility of their becoming loosened accidentally. The front end of each strip is pivoted in a hole, and the other end is slotted vertically on the lower edge. Their bolts are set firmly into the side of the boat, being held with nuts on both sides of the wood. A wing nut, prevented from coming off by riveting the end of the bolt, holds the slotted end. Sockets for the oars may be cut into hardwood pieces fastened to the gunwales. The construction of the seats is shown in the small sketch at the left.



Nontangling Pasture Stake

An old carriage wheel and axle were used to good advantage in the making of the pasture stake shown in the

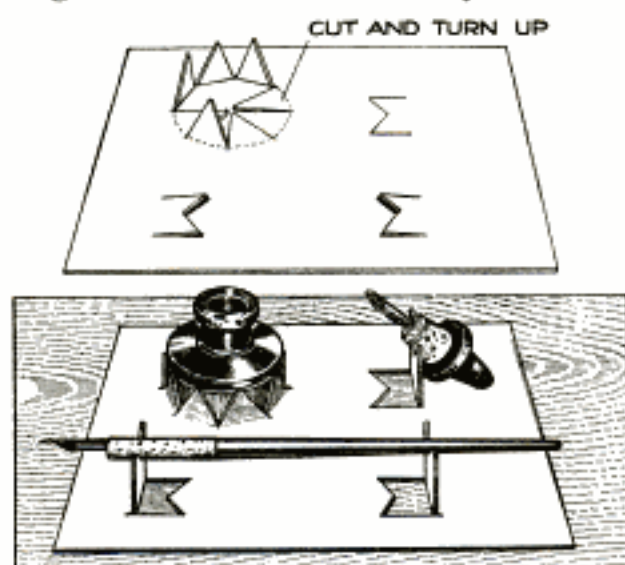


The Wheel Revolves on the Stake, Preventing the Rope from Tangling

sketch. When the animal tethered to the wheel walks around the stake, it is practically impossible for the rope to become tangled, as the wheel revolves on the axle.—Contributed by W. F. Quackenbush, New York, N. Y.

Inkstand Made of a Sheet of Paper

Drawings are not infrequently ruined by the spilling of ink, which might have been averted by the use



A Sheet of Heavy Paper Quickly Transformed into a Holder for Ink Bottle and Pen

of the simple inkstand cut from a sheet of heavy paper, as shown in the

sketch. The upper illustration shows the method of cutting the paper to fit the ink bottle and stopper, and to produce a pen rack. The device will be found especially useful when materials for drawing are used away from a place especially fitted for the purpose, since the inkstand can be made in a few minutes from material readily available.—Contributed by Henry C. Franke, Jr., Philadelphia, Pa.

How to Wind Wire on Electrical Apparatus

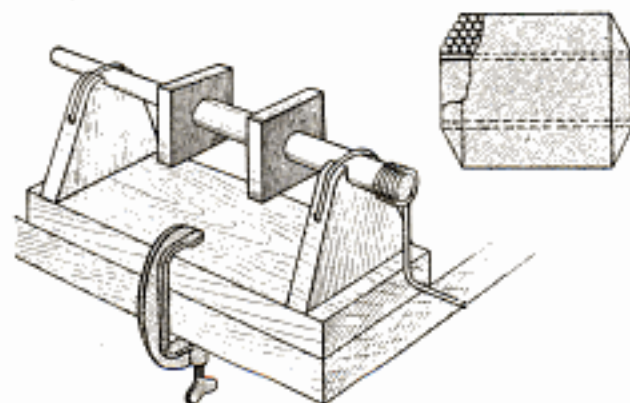
When a beginner, it was the despair of the writer to try to produce in his homemade apparatus the mathematical regularity and perfection of the winding on the coils of electrical instruments in the supply stores, but when he found that this professional and workmanlike finish could be obtained by means of a simple contrivance, and a little care and attention to details before beginning, experimental work took on a new interest.

At the outset let it be stated that wire should never be wound directly on the iron core, not only because it cannot be done satisfactorily in that manner, but for the reason that it is often desired to remove a coil from a piece of apparatus after it has served its purpose. It is therefore advisable to make a bobbin, which consists of a thin, hard tube with two ends. The tube may be easily formed by wrapping a suitable length of medium-weight paper on the core, having first coated it with ordinary fish glue, excepting, of course, the first 2 or 3 in. in direct contact with the core. Wind tightly until the thickness is from $\frac{1}{32}$ in. to $\frac{1}{16}$ in., depending upon the diameter of the core, and then wrap with string until the glue hardens, after which the tube may be sandpapered and trimmed up as desired.

Where the wire is not of too small a gauge and is not to be wound to too great a depth, no ends will be necessary if each layer of wire is stopped one-half turn before the preceding one, as indicated in the accompanying

sketch, and is also thoroughly shellacked. With ordinary care magnet wire may be wound in this manner to a depth of over one-half inch.

The tube having been made ready, with or without ends as may be necessary, the small winding jig illustrated is to be made. All that is essential is to provide a suitable means for rotating by hand a slightly tapering wood spindle, upon which the tube is to be pushed. The bearings can be just notches made in the upper ends of two standards, through each of which a hole is drilled at right angles to the length of the spindle, so that some string or wire may be laced through in order to hold the spindle down. A crank may be formed by winding a piece of heavy wire around the larger end of the spindle. A loop of wire, or string, is to be attached at some convenient point, so that the crank may be held from unwinding while adjusting matters at the end of each layer, or while making a connection. There should also be provided a suitable support for the spool of wire, which is generally placed below the table to good advantage. Much depends, in this sort of work, upon attention to these small details, after which it will be found that



Winding a Coil of Wire so That the Layers will be Even and Smooth

the actual winding will require very little time.—Contributed by John D. Adams, Phoenix, Ariz.

☞ A No. 10 gauge shotgun cartridge shell telescoped with a No. 12 gauge shell forms a convenient match safe for campers, or other persons out of doors, and is moisture-proof.

Hourglass Sewing Basket

Two oblong peach baskets, their bottoms fastened together and the whole covered with silk, formed the



Artistic Effects may be Produced by the Inventive Woman

hourglass sewing or darning basket shown in the sketch. Square plum baskets and other forms trimmed in cretonne, linen, or inexpensive goods, depending on the intended use, may also be utilized. Ornamental details may be added to suit the individual taste.

The basket was made as follows: The peach baskets were wired together at their bottoms. A piece of silk was cut, wide enough to reach from the top to the bottom of the joined baskets and to permit the folding over of a portion at the top and bottom. One long edge of the piece was glued to the inner edge of the bottom and drawn in around the sides to form neat folds. The upper edge of the silk was then glued in the top, being folded over the edge.

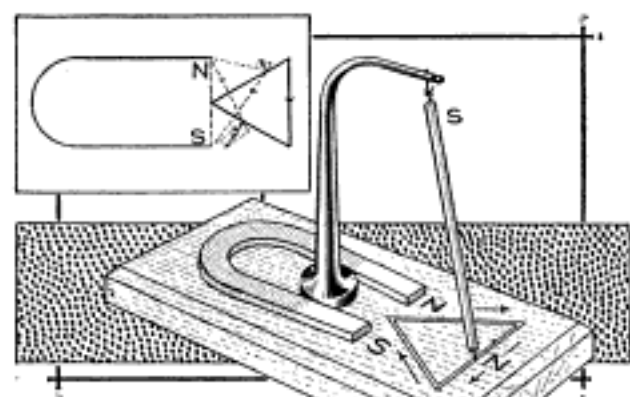
A cord was fixed around the middle of the basket, as shown in the sketch.

A lining was glued into the top and bottom. It was folded and stitched along its edges to prevent raveling and to give a smooth finish. The bottom need not be lined, but it is desirable to have it so.

The pincushion was made by padding a block with cotton and then covering it with silk. A cardboard box may be used instead. The cushion was nailed into place from the bottom. Ribbon may be used to draw the silk to the sides of the basket at the middle, and a cushion may be made entirely of cotton or cloth and attached with ribbons.—Contributed by Thomas J. Macgowan, Mount Vernon, N. Y.

A Perpetual-Motion Puzzle

The fallacy of perpetual motion is now so generally understood that the description of a new scheme for attain-



The Interaction between Poles of the Magnets Causes the Traveler to Move around the Triangle

ing it is only justified in so far as it may be instructive. The sketch illustrates such a device, apparently successful, and the discovery of the error in it is both instructive and interesting.

Mount a horseshoe magnet on a wooden base, and into the latter cut a continuous groove along the three sides of a triangle opposite the poles of the magnet, N and S. Suspend a long, narrow bar magnet on a universal joint from a standard. A pin projects into the groove from the lower end, which is its north pole, and can move only along the triangular course.

Start the device with the suspended magnet in the position shown. The

lower end will tend to move in the direction of the arrows, because in so doing it is getting farther away from the repelling north pole of the horseshoe magnet and nearer the attracting south pole, which action will bring it to the corner of the triangle in the foreground. It will next move down the side as indicated by the arrow, because along that line it is nearer the attracting south than the repelling north pole. When it reaches the end of its trip, at the angle between the poles of the magnet, the attraction and repulsion will be balanced, but a slight jar will carry the traveler beyond the angle.

The third leg of the triangle will be covered similarly, the north pole repelling the traveler. On this basis the motion should continue indefinitely, but a test will show that it will not do so.

The corners of the triangle should be rounded slightly and it would be better to use several hanging magnets, flexibly connected, so that when one is at the dead center the others will carry the traveler on.

How to Transfer Drawings

Soiling of drawings transferred with carbon paper may be avoided by substituting a piece of unfinished paper, the surface of which has been covered with a thin coating of lead rubbed from the pencil. If any errors are made in the tracing, or undue pressure is applied with the hand, the resulting impressions may be removed readily with an eraser.

If a copy of a drawing is desired, and it is not necessary that the same relative left and right position be maintained, the original pencil drawing may be placed face downward on a sheet of paper and the back of it rubbed with a bone paper knife, or other smooth, rounded object. By going over the impression and making a reverse of it in the same way a copy of the original in the same relations may be obtained.—Contributed by J. E. Pouliot, Ottawa, Canada.

Homemade Electric Locomotive Model and Track System



Part II
627
By A. E. ANDREW

PART II—Construction of the Locomotive Truck and Cab

SUCCESSFUL operation and construction that is feasible, yet of a reasonable standard of workmanship, are the essentials of the locomotive truck and cab described as the second feature of the locomotive and track system under consideration. The materials suggested are those found to be satisfactory, but substitutes may be used if caution is observed. The completed locomotive is shown in Figs. 1 and 2. The outward aspect only is presented, and, for the sake of clearness, the portions of the motor and driving rigging attached to it, that project below the cab, are omitted. These parts are shown assembled in Fig. 12, and in detail in the succeeding sketches.

The locomotive, apart from the motor, consists of two main portions, the truck and the cab. Consideration will be given first to the building of the truck and the fitting of the motor into it. The mechanical and operative features are to be completed before beginning work on the cab, which is merely a hood fixed into place with screws, set into the wooden cab base.

Begin the construction with the wheels, shown in Fig. 3. Make the axles of $\frac{1}{8}$ -in. round steel rod, cut $3\frac{3}{16}$ in. long.

Turn four wheels of $\frac{3}{8}$ -in. brass. Drill a $\frac{1}{8}$ -in. hole in two of them so that they may be forced on the slightly tapered ends of the axle. Drill a $\frac{1}{4}$ -in. hole in each of the other wheels, and

solder a collar, A, Fig. 3, on the inside surfaces of them. Two fiber bushings, B, should be provided to fit in the $\frac{1}{4}$ -in. openings in the wheels and to fit tightly on the ends of the axles. This insulates the wheels on one side of the truck from those on the other. If the rails forming the track are insulated from each other, the current supplied to the motor may pass in on one rail to the two insulated wheels, then to a brush, which bears on the brass collar A, through the windings of the motor, through the reversing switch to the other set of wheels, and back to the source of energy over the other rail, as shown in Fig. 15.

The wheels of the truck should fit on the axles tightly, since no means other than the friction will be employed in holding them in position. If the ends of the axles are tapered slightly, the wheels may be forced into place and will stay firmly. Do not force them on until the truck is finally assembled.

The truck frame should be constructed next, and its details are shown in Figs. 4 and 5. Make two sidepieces of $\frac{1}{16}$ -in. brass, $9\frac{3}{4}$ in. long and $1\frac{5}{8}$ in. wide, cutting out portions, as shown, in order to reduce the weight. This also gives the appearance of leaf springs.

The two rectangular openings are to accommodate the axle bearings. They should be cut to precise dimensions, and their edges should be squared off. Extensions, $\frac{1}{16}$ in. wide, are provided at the middle of the upper edges of each of these openings. They are to hold the upper end of the coil springs,

which are to rest in the holes cut into the bearings, as shown at G, Fig. 7, and also in assembled form, Fig. 6.

Next drill four $\frac{1}{8}$ -in. holes in each of the sidepieces, as indicated at the letters H₁ to H₄, Fig. 5. For the cross supports use four pieces of brass rod, $\frac{1}{4}$ in. square, and square off the ends to a length of $2\frac{3}{4}$ in. Drill holes in the center of the ends and tap them for $\frac{1}{8}$ -in. machine screws. Join the side and crosspieces as shown in Fig. 4. Two fiber washers about $\frac{1}{16}$ in. thick should be placed on each axle at E and F, to hold the wheels from contact with the sidepieces.

Details of a bearing for the axles are shown in Fig. 7. The hole G carries the lower end of the coil spring, and the hole J is the bearing socket for the axle. Four spiral springs, having an outside diameter of $\frac{1}{8}$ in. and a length of $\frac{1}{2}$ in. when extended, should be provided. The extensions on the sides of the bearings fit against the inner faces of the sides of the truck. They hold the bearings in position and prevent them from falling out.

The base of the cab is made of wood, dimensioned as in Fig. 10. The center of the piece is cut away so as to provide a space for the motor, which extends above the upper edge of the truck, as shown in Fig. 12. This block is fastened in place by four screws through the upper crosspieces at the ends of the truck. The base should be made and fitted into place temporarily so as to be available in observing how the motor and its fittings are placed in relation to it. For convenience in assembling the parts of the truck and setting the motor, it may be removed readily.

Assembling the truck, including the motor, probably requires the most painstaking effort of any part of the construction of the locomotive. Too great care cannot be taken with it, as the dimensions are carefully worked out and failure to observe them may cause errors sufficient to make the locomotive unserviceable. Before undertaking this work it would be well to examine carefully the arrangement of

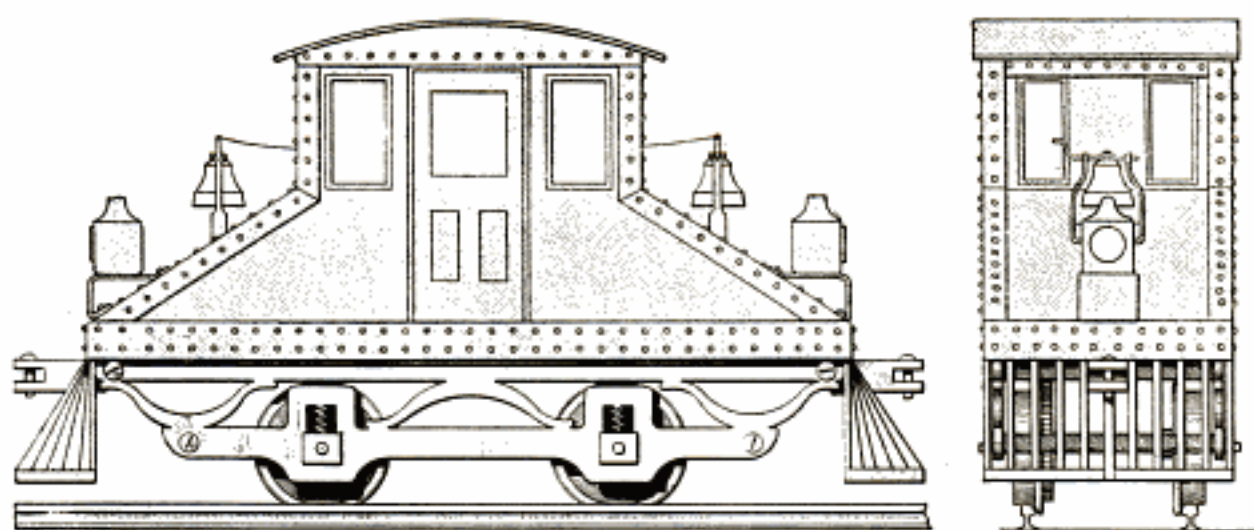
the parts as shown in Fig. 12. The upper view shows the relation of the driving gears in mesh and the lower view shows the machinery of the truck as seen from above.

The power from the motor is transmitted to one set of wheels by means of a small gear on the armature shaft engaging an intermediate gear, which in turn engages a large gear attached to the inside of one of the truck wheels. The center of the armature shaft is $1\frac{5}{16}$ in. from the center of the power axle, when both axles are in the slots provided in the motor frame, Fig. 12. The gears for the transmission may now be selected. The gear on the armature shaft should be as small, and that on the axle as large, as practicable. The intermediate gear should be of such a size that it will close the space between the small gear on the armature shaft and the large one on the axle. Gears suitable for the transmission may be purchased at a clock store for a small sum. If gears of exactly the proper size cannot be obtained readily, the position of the intermediate gear may be adjusted to produce a proper meshing of the gears.

Mount the small gear on the end of the armature shaft away from the commutator, so that there will be about $\frac{1}{16}$ -in. clearance between the outside surface and the shoulder at the end of the shaft. Fit it on tightly so that no other means of fastening will be necessary. Mount the large gear on the inside surface of one of the truck wheels, as shown in Figs. 3 and 12. Place the axle of the truck into the proper grooves in the motor frame, and mark the position of the center of the intermediate gear, when it engages the other gear. Drill a hole in the extension on the motor frame, provided as a support, to fit a small bolt with which the intermediate gear is fastened.

Place a washer between the gear and the piece upon which it is mounted, and a locknut on the threaded end of the bolt, drawing it up so that the gear has only sufficient play.

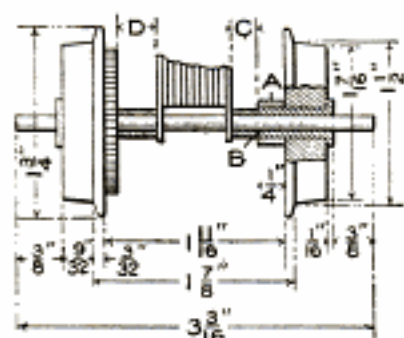
The slots in the motor frame to fit



SIDE AND FRONT VIEW OF COMPLETED LOCOMOTIVE

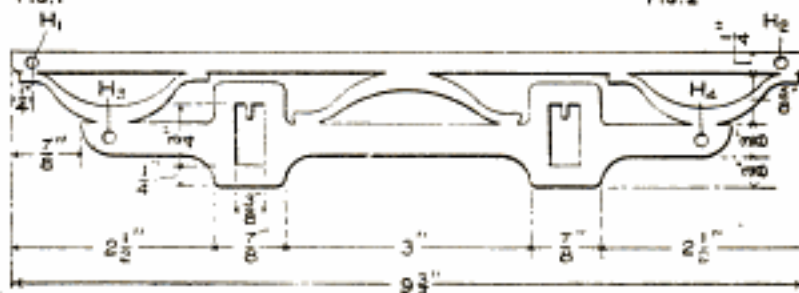
Fig. 1

Fig. 2



CONSTRUCTION OF WHEELS

Fig. 3



SIDE OF TRUCK

Fig. 5

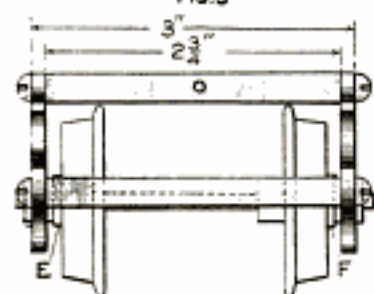


Fig. 4

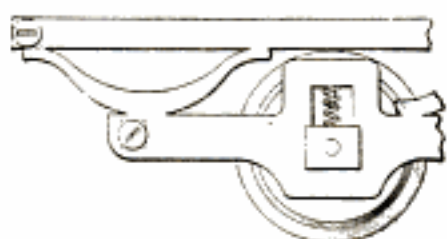
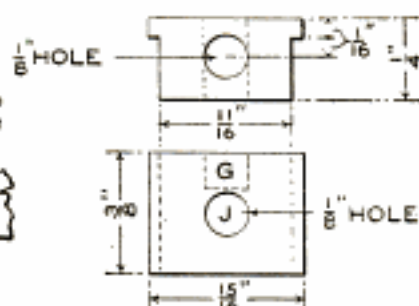


Fig. 6



TOP AND SIDE VIEW OF BEARING

Fig. 7

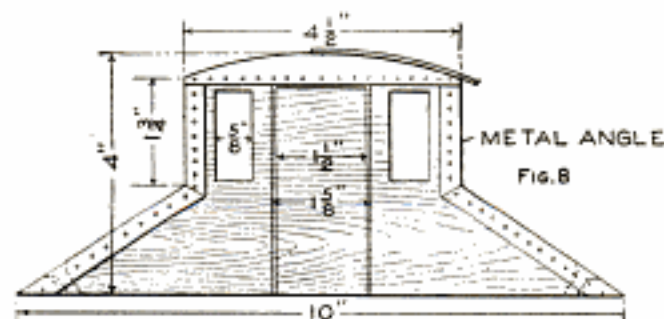


Fig. 8

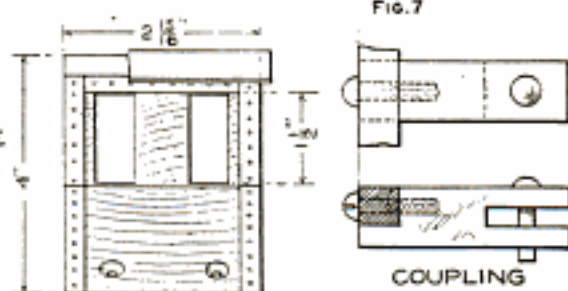
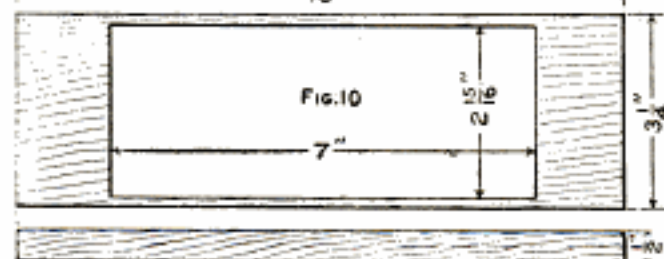


Fig. 9

COUPLING

Fig. 11



BOTTOM OF LOCOMOTIVE CAB

Successful Operation, Based on Feasible Construction and a Reasonable Standard of Workmanship, Is the First Consideration in the Locomotive. The Dimensions should be Observed Closely in Order That the Parts may be Assembled Satisfactorily. The Construction of the Cab Is Suggestive Only, and the Inventive Builder may Design One in Conformity with the Materials Available or the Individual Taste

the free axle may now be cut, as shown in Fig. 12. Place the motor in position on the axle so that the gears

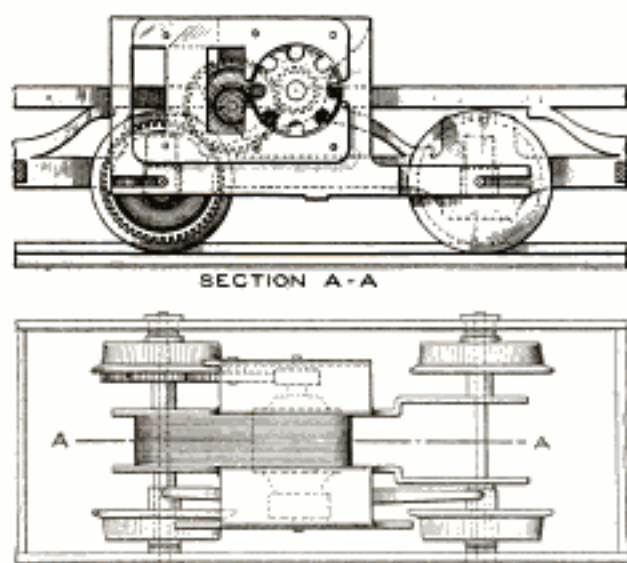


Fig. 12. Installation of the Motor, Showing Gears and Switch Contact Spring

all mesh properly. Fit tubes of insulating material with an outside diameter of $\frac{3}{8}$ in. at C and D, Fig. 3, and as also shown in Fig. 12. Insulation tubes should be provided for the second axle so as to hold the motor in position, and to keep the wheels in line. In mounting the various parts sufficient play should be allowed to prevent excessive friction.

The reversing switch, which is to be mounted on the under side of the motor frame, is shown in Figs. 13 and 14. It is provided with a control lever which projects out from under the

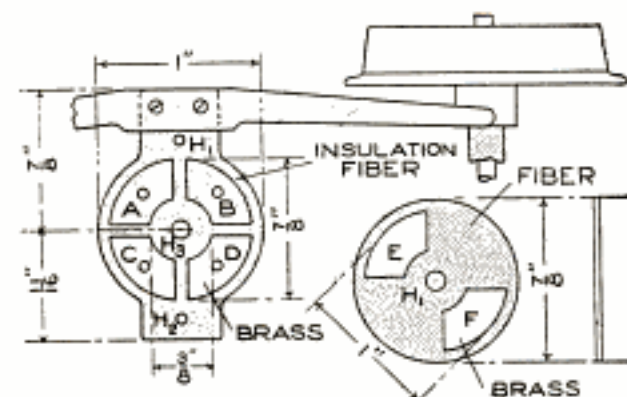


Fig. 13. Details of the Switch, Shaded Portions Being of Fiber Insulation

truck frame. A small movement of the lever will produce the necessary changes in the connections. The operation of the switch may be understood

readily from the diagram shown in Fig. 15. The moving element of the switch carries two pieces of copper, E and F, which connect the four stationary pieces of copper, A, B, C, and D, when the lever attached to E and F is moved to either side of its central position. The pieces of copper which are moved—E and F—are shown outside of the stationary pieces in Fig. 15 for purposes of a diagram only, and are actually directly over the ring formed by the stationary pieces.

The operation of the switch is as follows: Assuming that the current enters at the terminal marked 1 and leaves at the terminal marked 2, then the direction of the current in the armature and series field will be as indicated in the diagrams. The direction of the current in the series-field winding is different in the two cases, which will result in opposite rotation of the armature.

The base of the switch is made of $\frac{1}{16}$ -in. fiber insulation; its dimensions are shown in Fig. 13. It is to be mounted on the two pieces projecting outward on the under side of the motor frame, as shown in Fig. 14. Drill a small hole in each of these projections, as indicated by the letters H_1 and H_2 , and tap them to take a small machine screw. Next drill two holes, H_1 and H_2 , Fig. 13, in the piece of insulation, with centers the same distance apart as those drilled in the projections. One end of this piece of insulation is extended to form a mounting for a thin brass spring, the ends of which bear on the brass collars insulated from the axles, as shown in Figs. 12 and 13. The form of this spring and the method of mounting it are also shown in Fig. 13.

The sections which come into contact in the switch are made as follows: Mount four pieces of thin copper or brass on the fiber base with rivets having their heads countersunk. Cut a disk, 1 in. in diameter, from a piece of sheet insulation and drill a hole H_1 in the center of it. Also drill a similar hole H_2 in the center of the switch base. Mount two pieces of copper or

brass, E and F, on the under side of this disk. The edges and ends of all six pieces of metal should be rounded off so that the pieces E and F will move freely over those on the base. The disk, or upper part of the switch, may be attached to the base by means of a small bolt placed through the holes at the center. A small spiral spring should be placed between the disk and the lower end of this bolt so as to keep the pieces of metal in contact with those on the base. Attach a small handle to the disk so that it will extend out on one side of the truck. Fix the switch into place by bolts through the holes H_1 and H_2 , Fig. 14, on the bottom of the motor frame. The electrical connections should be made as shown in Fig. 15.

The detail of the couplers is shown in Fig. 11. They are made of brass, fitted to the upper crosspieces and fixed to them by machine screws. "Cowcatchers" may be made for the ends of the locomotive. Sheet metal, corrugated appropriately and bent to the proper shape, will afford the easiest method of making them. Those shown in Figs. 1 and 2 are made of strips soldered together, and also to the upper crosspieces; they are strengthened by a cross strip at the bottom, opposite the point.

The cab is to be made apart from the truck and is to fit upon the base,

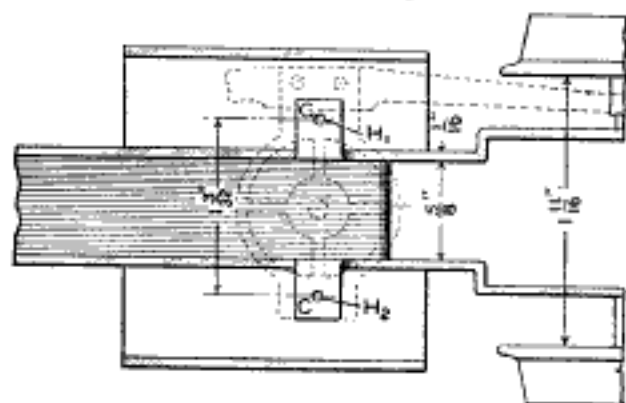


Fig. 14. View of the Under Side of the Motor, Showing How Switch is Fixed into Place

as shown in Figs. 1 and 2. It is fixed into place by four screws and can be removed easily for examination of the locomotive mechanism. The dimensions for the cab are shown in Figs. 8

and 9, and may be varied by the builder.

Sheet metal or wood may be used

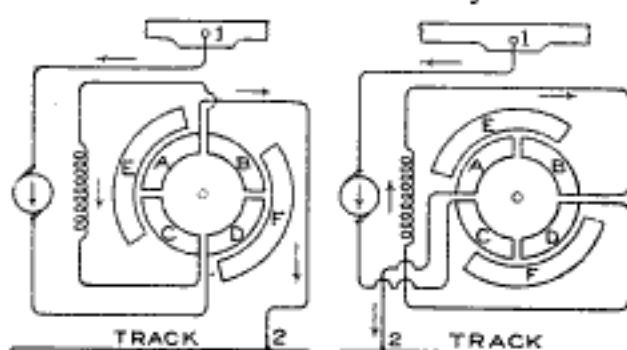


Fig. 15. Diagrams of the Reversing of Motor by Shifting Switch to Form Contact between Pairs of Brass Sectors Set in the Fiber Switch Base

in the construction, and the joints soldered on the inside or riveted, as shown in the illustration. The window and door openings may be cut out or painted on. Small bells may be mounted on the ends of the cab, adding to its appearance. The headlights shown in Figs. 1 and 2 may be cut from wood or made of sheet metal. Light bulbs may be installed, and their voltage should correspond to that of the motive energy. The terminals for the sockets of the headlight lamps should be connected to the frame of the truck and to the spring, which bears upon the brass collars on the wheels, which are insulated from the axles, as shown at A, Fig. 3.

This completes the locomotive in all essential details and it is ready to be placed upon the track to be tested. The track system will be considered in a subsequent article.

Mixing Paste

When flour paste becomes watery upon cooling, it is evidence that the mixture has been boiled too long. Only the best flour should be used for making paste. Many paper hangers do not boil paste. They make a stiff batter with lukewarm water, stirring out all lumps, and then briskly stir in boiling water. When the mass thickens continue stirring, but add no more hot water. Pour a little cold water on top and set the paste away to cool.—Contributed by A. A. Kelly, Malvern, Pa.

Trap for Coyotes

Two coyotes, resisting capture in a hole under a lava ledge, were hauled forth quickly when the device shown



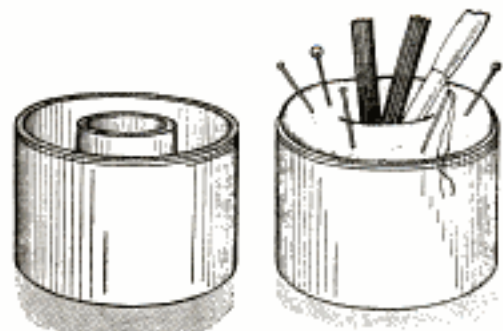
By Drawing on the Wire the Coyotes were Brought under Control and Forced from Their Lair

in the sketch was used, after other means had proved ineffective.

I made a snare of baling wire and attached it to a pole, 6 ft. long, running the wire down from the loop to the end of the handle. The loop was made about twice the size of the coyote's head, and, by drawing on the wire at the handle, the animals were placed under control and held at a safe distance.—Contributed by Milton Barth, Geyserville, Cal.

Utilizing an Empty Paste Pot

The type of paste pot that contains a central well to hold the paste brush is not always cast aside when empty. A pincushion built to fit the outer ring,



A Pincushion Built to Fit the Empty Paste Compartment Makes a Useful Article of the Paste Pot

or paste-holding section, is added and the brush holder is used to hold pens and pencils.

CA magnet may be used to advantage in picking up tacks or small nails which have been scattered on a floor.

A Colonial Mirror Frame

Black walnut, or mahogany, is the most effective wood to use in making this simple but artistic frame. It requires a very small amount of stock, and what is used should be of a good quality and carefully worked to the given dimensions with keen tools. The stock required for the frame is as follows:

- Black walnut, or mahogany:
- 2 pieces, 27½ in. long, 1¾ in. wide, and ¼ in. thick.
 - 1 piece, 22 in. long, 1¾ in. wide, and ¼ in. thick.
 - 1 piece, 9¼ in. long, 1¾ in. wide, and ¼ in. thick.
- White holly:
- 1 piece, 27½ in. long, 1¾ in. wide, and ¼ in. thick.
- Picture board:
- 1 piece, 25 in. long, 9 in. wide, and ¼ in. thick.

The dimensions for the walnut or mahogany pieces are rough sizes, over-size to allow for the planing to the dimensions given in the sketch. The white holly may be procured smoothly planed on both sides and of the exact thickness required. The picture backing may be purchased in almost any store that sells frames. It is usually rough pine and inexpensive.

The first operation is to plane the frame pieces on one side and edge, using great care to insure both being perfectly straight and the edge square with the face. Gauge for, and plane to the thickness required, although this need not be exactly ⅝ in. as called for, but if the stock will stand 1⅛ in. or ¾ in. do not take the time to cut it down to ⅝ in. The little cross rail must be exactly ⅛ in. thick, as it is to be let ⅛ in. into the rabbet cut for the glass, which makes it come ⅛ in. back from the face of the frame when it is in place. Plane all of these pieces to the width, 1⅛ inch.

For cutting the rabbet, a plow, or a ¾-in. grooving, plane is the best tool to use, but if neither is available a rabbet plane can be used. Be sure to plane the rabbet square and to the lines gauged for the depth and width.

To groove the pieces for the holly strips a special tool is required. This may be made of a piece of soft sheet

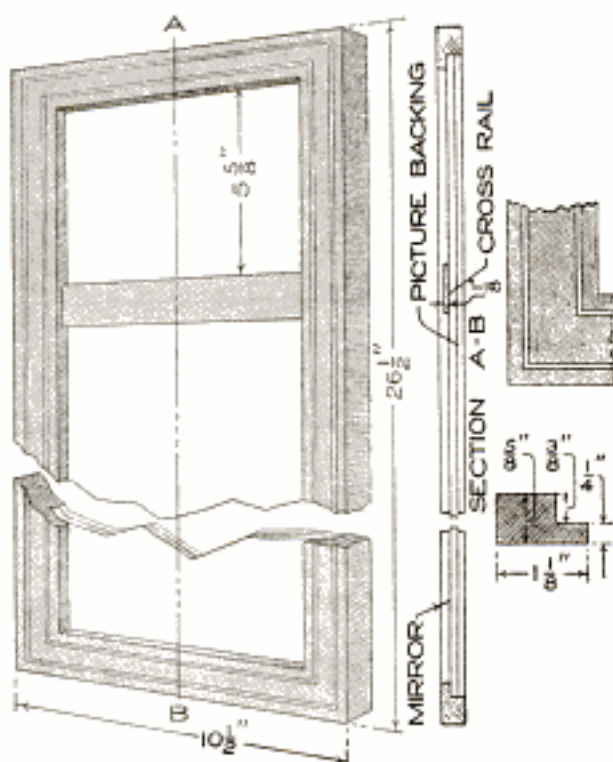
steel or iron, which must be of a thickness to correspond to that of the holly. A piece $2\frac{1}{2}$ in. long, and of almost any width, will answer the purpose. File one edge of the metal straight, and cut saw teeth in it by filing straight across with a small saw file. Remove the burr raised by the filing by rubbing each side on an oilstone. Drill two holes in it for fastening with screws to a piece of hard wood. The wood serves as a fence, and if properly fastened to the metal, the teeth should cut a groove $\frac{1}{16}$ in. deep and $\frac{3}{16}$ in. from the edge. The holly strip should fit the groove tightly so that it can be driven home with light taps of a hammer. It is well to try the tool on a bit of waste wood first to see if it cuts the groove properly.

The holly is cut into strips, $\frac{1}{8}$ in. wide, with a slitting gauge. An ordinary marking gauge, with the spur filed flat on each side to make a sharp, deep line, will do very well for this work. The gauging is done from both sides of the piece to make the spur cut halfway through from each side. Before the slitting is attempted, one edge of the piece is first straightened. This is readily accomplished with a fore plane, laid on its side and used as a shoot plane. The strip to be planed is laid flat on a piece of $\frac{7}{8}$ -in. stock with one edge projecting slightly. This raises it above the bench and allows the fore plane to be worked against the projecting edge.

The strips should be applied to the groove to test the fit, and if found to be tight, they must be tapered slightly by filing or scraping the sides. If the fit is good, hot glue may be run into the grooves with a sharp stick, and the strips driven into place. They will project above the surface slightly, but no attempt should be made to plane them off flush until the glue has become thoroughly hardened; then use a sharp plane, and finish with a scraper and No. 00 sandpaper.

The miters are cut in a miter box, or planed to the exact 45° angle on a miter shoot board. Before gluing the corners, the recesses are cut for the

cross rail, but it must not be put in place until the corners of the frame



An Inlay of Holly Makes an Exceedingly Pretty Frame of Colonial Design for a Mirror

have been fastened and the glue given time to dry.

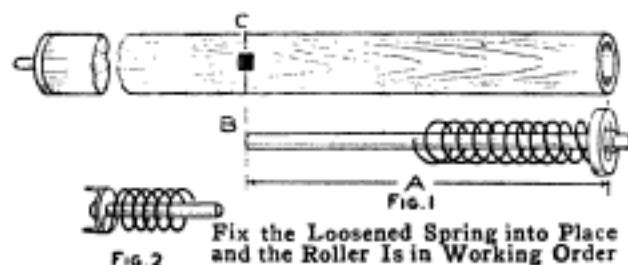
The frame may be given either a dull or bright finish. The dull finish gives a rich appearance and is very easy to apply. Give the completed frame one coat of white shellac, and when it is dry, rub the surface with very fine sandpaper until it has a smooth finish. Finish with any of the prepared waxes, being careful to follow the directions furnished.

Before putting the board back of the mirror, be sure to place two or three sheets of clean paper on the silvered surface. The picture board is fastened with glazier's points, or with small bung-head wire nails. The back is finished by gluing a sheet of heavy wrapping paper to the edges of the frame. If the wrapping paper is moistened with a damp cloth before it is applied, it will dry out smooth and tightly drawn over the back.

☞ An emergency penholder may be made by fixing the pen on the end of a pencil with a clip, or small rubber band.

Repairing Shade-Roller Springs

Springs of window-shade rollers, which usually break at the tin cap by which they are fastened inside the rod,

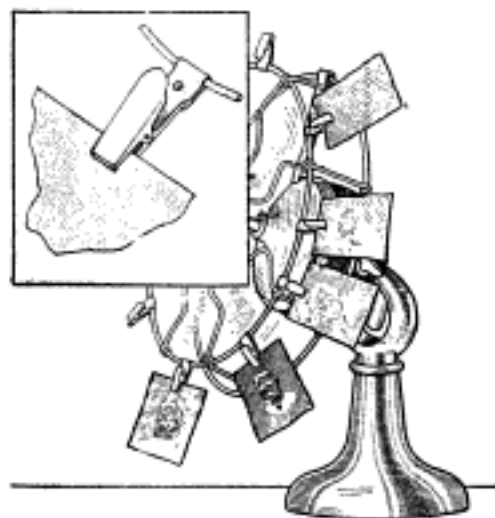


can be quickly repaired in the following manner:

Remove the ferrule and dogs from the end of the roller and pull out the stick to which the spring is attached. Measure the length of the stick A, Fig. 1, on the roller, and at C cut a small square hole through to the hollow center. Remove the metal cap thus exposed. Fix the cap on the end of the stick at B and fasten the spring around one point of the metal cap, Fig. 2. Insert the stick into the roller and tap it gently, driving the cap points in; then replace the ferrule and dogs, and the roller is in condition for use.

Drying Photo Films Rapidly

Waiting for photographic films to dry is often tedious, particularly when



the photographer is in haste to see the results of his efforts at picture taking.

The method of drying the films shown in the sketch will aid materially in the process. The films are held by small spring clips attached to the wire frame surrounding the fan, and when the current is turned on, the films are blown away from the fan and held suspended in a diagonal position.—Contributed by W. J. Clausius, Chicago, Ill.

Applying and Drying Bronze Powders

Surfaces may be coated readily with bronze powder by applying a thin coat of shellac and quickly dusting the powder over it. Speed is important in dusting on the powder, as if the shellac hardens it will not hold the bronze. Surfaces which have been bronzed in this way may be polished if additional coats of shellac or varnish are applied over them.

Forceps for Weeding Garden

Difficulty in removing small weeds around plants in the garden may be overcome by the use of a forceps made of a piece of wire, as shown in the illustration. The wire is formed into two loops by which the weeds are grasped, and the portion held in the hand is bent to form a circular spring. Its tension may be regulated so that the hand will not be tired in using the device.—Contributed by Irving McEwen, New Westminster, B. C., Canada.



Shielding Pictures from Damp Walls

Injury to pictures from dampness of walls may be prevented by fixing small disks of cork to the lower edge of the frame so as to form a contact with the wall only at the cork. This permits a current of air to pass between the wall and frame.

A Pigeon House

By Robert Baker



PIGEON houses need not be eyesores, as is often the case, but may be made to harmonize with the surroundings, adding beauty to a dull spot, and even making the grounds of a home more attractive. The house described will accommodate 20 pigeons, and additional stories of the same type may be added to provide for more. Nearly all of the wood necessary may be obtained from boxes, and the other materials are also readily available at small cost. The construction is such that a boy handy with ordinary carpentry tools may undertake it successfully.

The house is constructed in general on principles used in buildings, having a framed gable roof, rough-boarded and shingled. The interior arrangement is original, being based on the Indian swastika or good-luck sign. While the construction is simple, it must be carried out systematically. The process outlined also follows in general the typical methods in building construction.

The foundation need not be considered, since the house rests upon a post, and the construction thus begins with the lower story. The floor and the ceiling are similar in construction, as shown in Fig. 1. In framing them into the lower story, as may be observed in Fig. 8, the cleats are placed below on the floor and above in the ceiling. The construction is identical, however. The cleats are fastened to the boards with screws, although nails, clinched carefully, may be used. The 4-in. hole at the center should be made accurately, so as to fit the shoulder portion at the top of the post, shown in Fig. 2. The latter may be cut of a length to suit; about 9 ft. will be

found convenient. The notches in the top of the post are to fit the ridge pole and center rafters of the roof frame, as shown in Fig. 10. They should not be made until the house is ready for the roof boards.

The pieces for the compartments, as arranged on the floor in Fig. 3, are made next. Figs. 4 and 5 show the detailed sizes of these pieces, of which four each must be made. The sizes shown must be followed exactly, as they are designed to give the proper space for entrances and to fit around the 4-in. square hole, through which the post is to fit. The pieces marked A, B, and C, in Figs. 4 and 5, correspond to those similarly marked in Fig. 3.

The pieces are nailed together to form the swastika in the following manner:

Mark the pieces A, B, and C, as shown. Measure 4 in. from one end of each piece marked A, and square a pencil line across, 4 in. from the end. Arrange the pieces in pairs. Place one end of one piece against the side of the other piece in the pair, so that the pencil line is even with the end, permitting the 4-in. portion to project. Nail both pairs in this position. Then fit the two parts together to form a 4-in. square in the center, as shown in Fig. 3.

Fit the pieces C to the pieces B at an angle, as shown in Fig. 3, trimming off the projecting corners where the pieces are joined. Nail them together, and they are ready to be fixed to the

end of the pieces A, already nailed. By nailing the joined pieces B and C to the end of the pieces A, as shown in Fig. 3, the swastika is completed. Fix it into place, with the center hole exactly over the square hole in the floor, by means of nails or screws driven through the floor.

Two small strips must now be nailed to the floor at each side of the swastika. They should be exactly $4\frac{1}{2}$ in. long, and are to hold the slides, Fig. 9, which shut off the various compartments. The slides are shown hanging by chains in the headpiece of this article, and are shown in place in Fig. 8.

Fix the ceiling into place in the same manner, being careful that the square holes fit together, and that the cleats are on the upper side. Turn the construction over and fix into place the small strips for the slides, as was done on the floor.

The fixed screens, Fig. 6, and the doors, Fig. 7, are constructed similarly. They are built up of $\frac{1}{2}$ -in. wood, and vary in size to fit their respective places in the framework. Observe that the fixed screens are $\frac{1}{4}$ in. higher than the doors, and that they are fastened between the ceiling and floor, bracing them. The wire grating is $\frac{1}{2}$ -in. square mesh, and is fixed between the pieces of the doors and the screens when they are built up.

The doors are shown secured by combination strap hinges, bent over the baseboard. Plain butts may be used and the lower portion of the hinge covered by the baseboard, a recess being cut to receive the part covered. In the latter instance the doors should be fixed into place immediately after the screens are set. Catches and chains may then be placed on the doors. Next nail the baseboards into place. They are $2\frac{1}{2}$ in. wide and may be mitered at the corners, or fitted together in a square, or butt, joint. The latter joint may be nailed more readily.

The slides, shown in Fig. 9, may now be made and fitted into their grooves. The handles are made of

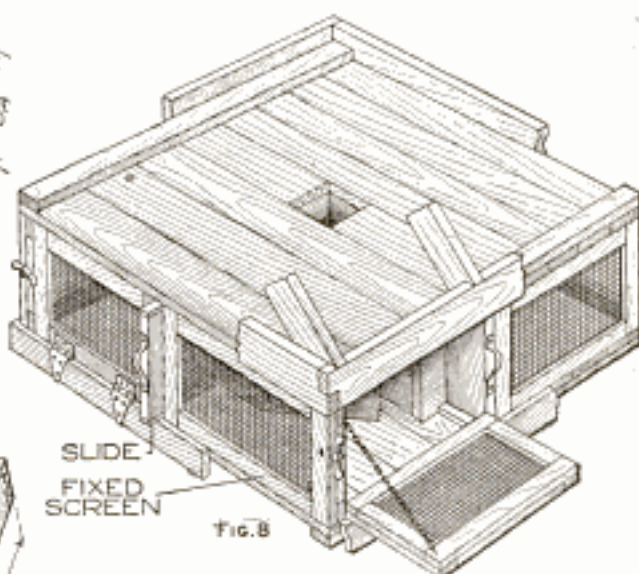
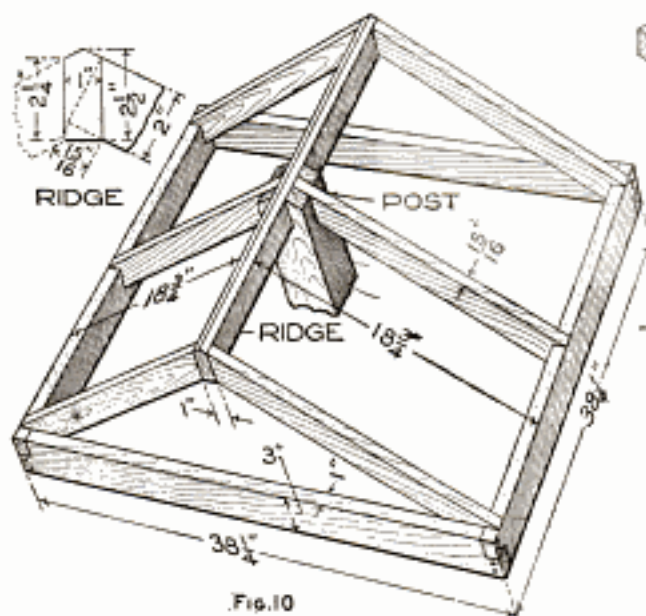
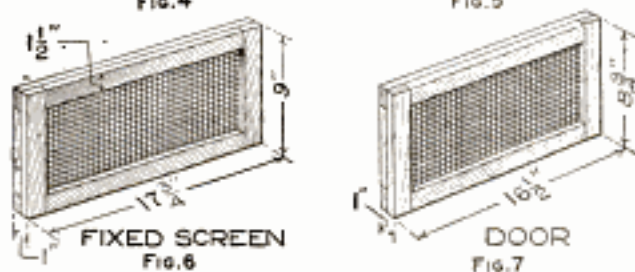
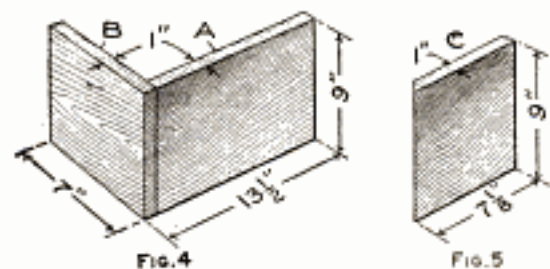
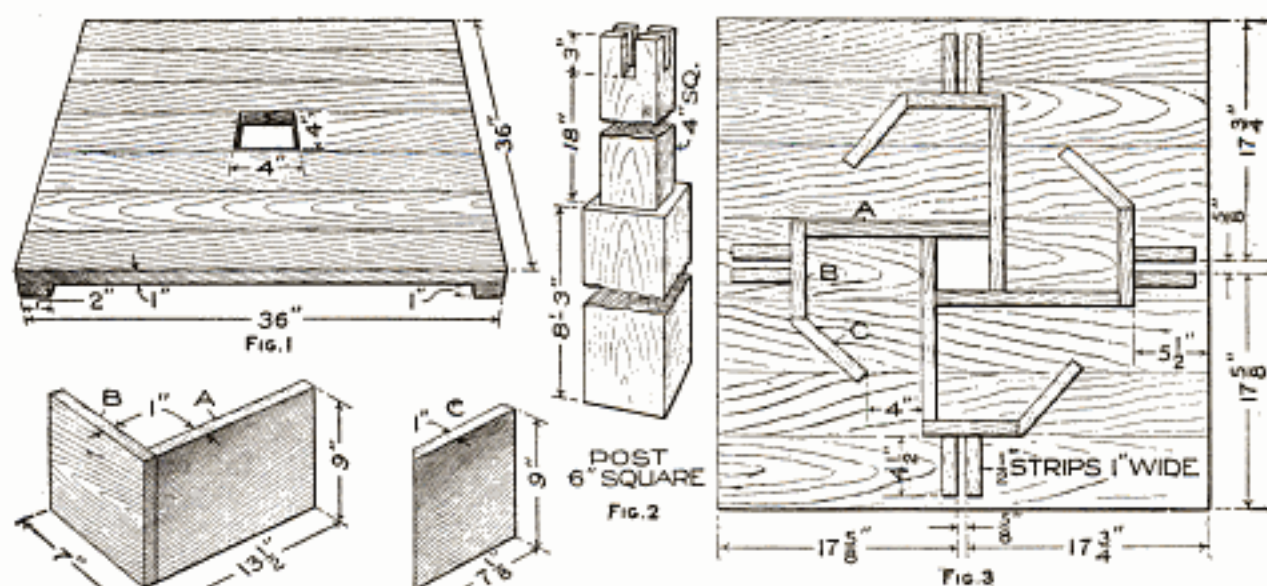
strips of band iron, drilled for screws and bent into the proper shape. It is important that the slides be constructed of three pieces, as shown, so that they will not warp or curve from exposure. The main piece is cut $7\frac{3}{4}$ in. long, and the strips, $\frac{1}{2}$ in. square, are nailed on the ends.

The construction of the framing for the roof should next be taken up. This probably requires more careful work than any other part of the pigeon house, yet it is simple, as shown in Fig. 10. Note that the rafters are set upon a frame, or plate as it is called, built up of pieces 3 in. wide. It should be made $\frac{1}{4}$ in. wider and longer on the inside than the ceiling board, so as to fit snugly over it. The joints at the corners are "halved" and nailed both ways. This gives a stronger structure than butting them squarely and nailing them. The end rafters should be fitted in before fixing the others. It is best to make a diagram of the end of the roof framing on a sheet of paper, or a board, and to fit the rafter joints in this way before cutting them. The rafters are then nailed into place.

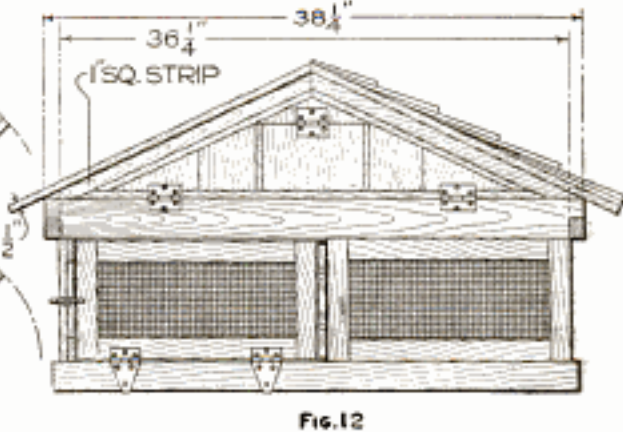
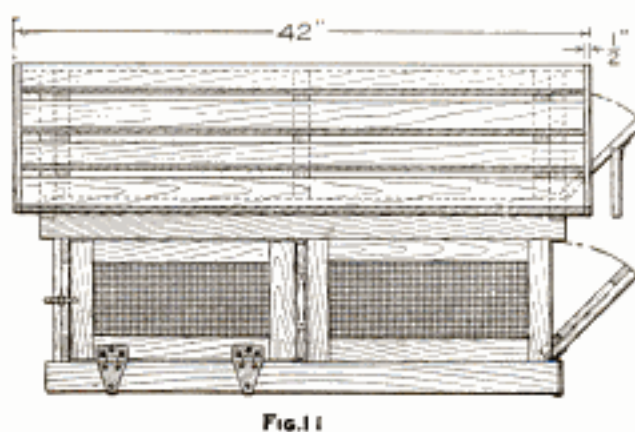
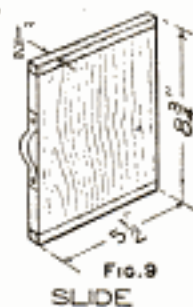
The "rough boards" to cover the rafters may now be nailed down. They are spaced $\frac{1}{2}$ in. apart so as to permit thorough drying, as is done in larger buildings. They project 2 in. beyond the ends of the plate frame, supporting the rafters. A $\frac{1}{2}$ -in. strip is nailed over the ends to give a neat finish. The roof may be shingled, or covered with tar paper, or any roofing material.

Nail a 1-in. strip under each end of the roof and nail the gable ends into place. One gable end is provided with a door, as shown, and the other has an opening fitted with a wire screen of the same size as the door.

The gable story rests on the lower story, and the notches in the top of the post should fit snugly to the ridge and center rafters, as shown in Fig. 10. This will aid in supporting the house firmly. If additional stories are added it would be well to place a post at each corner of the house. The upper story may be removed for cleaning, or for transporting the house.



The House Accommodates 20 Pigeons; Additional Stories may be Added. Fig. 1, Floor and Ceiling; Fig. 3, Arrangement of Compartments; Fig. 8, Lower Story Assembled Ready for Roof Story; Fig. 10, Framing of the Roof; Fig. 11, Side View, Showing Spacing of Roof Boards; Fig. 12, End View, Showing Trim and Door on Gable End



The post should be sunk into the ground about $2\frac{1}{2}$ ft. and set into a concrete foundation, if convenient. This will insure a more nearly permanent as well as a more rigid support. Care should be taken that the post is set plumb and this can be accomplished if a plumb bob is used. The post should be braced to keep it vertical, particularly if a concrete foundation is poured and tamped around it.

The construction should be painted two coats, inside and out, of a color to harmonize with buildings or other surroundings.

Roses Tinged Blue by Chemicals

Roses may be colored without any detrimental effect by placing their



stems in a solution of 100 cubic centimeters of water, 2 grams of saltpeter, and 2 grams of an aniline dye. A centerpiece of roses colored to represent the national colors was made in this way and proved very effective as a table decoration. A convenient way to color the flowers is to place their stems in a test tube containing the mixture.—Contributed by Chester Keene, Hoboken, N. J.

Making Photographic Trays

Serviceable trays for use in developing and printing photographs may be made quickly of cardboard boxes of suitable sizes. Where one is unable to transport readily a full photographic equipment these trays will prove convenient as well as inexpensive. They are made as follows:

Procure boxes of proper sizes and

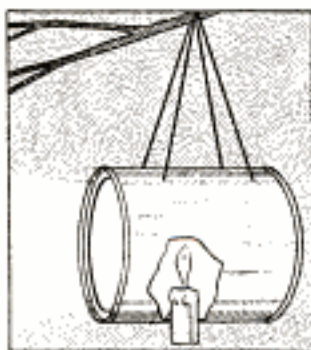
The cost of building the house shown in the illustration was \$3.50, and by using tar paper for the roof, and discarded wire mesh, hinges, and other fittings, this may be reduced considerably.

¶In matching molding into corners it is often difficult to make miter joints. The molding may then be "coped" together by matching the end of the piece to be joined to it with the curves or surface of the molding. A coping saw is used in sawing the irregular end.

see that they have no holes or openings at the corners. Melt paraffin and pour it into the box, permitting it to cover both outside and inside surfaces. If the paraffin hardens too rapidly the box may be heated and the work completed.—Contributed by Paul A. Baumeister, Flushing, N. Y.

Camp Lantern Made of a Tin Can

Campers, and others who have need of an emergency lantern, may be interested in the



contrivance shown in the sketch, which was used in preference to other lanterns and made quickly when no light was at hand. It consists of an ordinary tin can, in

the side of which a candle has been fixed. A ring of holes was punched through the metal around the candle and wires were placed at the opposite side for a support. The glistening interior of the can reflects the light admirably.—Contributed by F. H. Sweet, Waynesboro, Va.

¶Interior woodwork may be made proof against ordinary flame by coating it with silicate of soda, known as water glass.

Checking a Rip in Tire Tubes

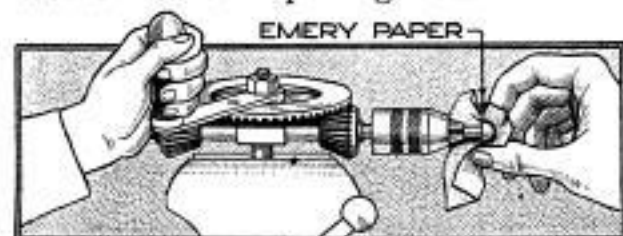
It is often difficult to prevent a small rip in an inner tube of a tire from becoming longer, even though a patch has been applied. An effective remedy is to punch a small round hole at each end of the rip before applying the patch. This stops the tendency to rip farther when pressure is applied.—Contributed by George H. Holden, Chesterfield, England.

Protecting Wall Back of Range or Sink

A simple and attractive protection for the wall back of the range or sink in a kitchen was provided by fixing a piece of plate glass to the wall by means of round-headed brass screws. The glass may be washed easily and can be removed when new wall covering is applied.—Contributed by Jennie E. McCoy, Philadelphia, Pa.

Polishing with a Hand Drill

There are certain desired effects in polishing metal that can only be obtained with a true rotary motion. There is no amount of handwork that will produce a proper finish on the round head of a brass screw. Therefore, when small pieces of metal are to be shaped up with the file and polished, simply set them in a three-jaw chuck of a hand drill, and then clamp the drill in a vise, as shown in the illustration. Operate the drill with the left hand and hold the file, or emery paper, with the right, and a finish will be obtained that can in no wise be distinguished from lathe work. It is surprising how different

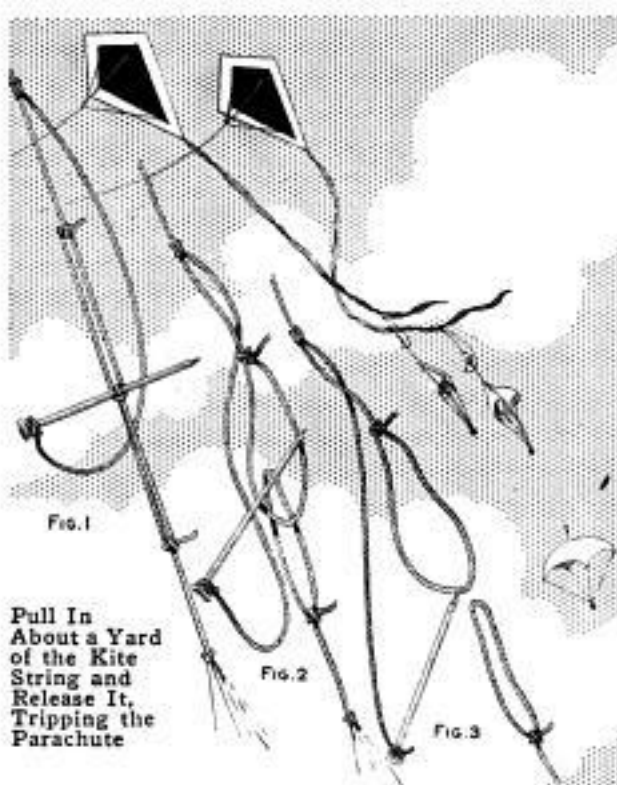


A Hand Drill Clamped in a Vise and Used to Polish Round-Head Screws

round-head brass screws appear when treated in this manner.

Releasing a Parachute from a Kite

Parachutes may be released from suspended kites readily by providing tripping loops on the kite tail, as shown



Pull In About a Yard of the Kite String and Release It, Tripping the Parachute

in the illustration. Form a loop on one end of a piece of cord, and tie the other end to the kite tail. Make a loop in one end of another piece of cord and tie the other end to the top of the parachute. Tie a piece of cord around a nail close to its head and fix this also to the kite tail. Pass one loop through the other and insert the nail, as shown in the sketch. To trip the parachute, pull in about a yard of string and release it quickly. The parachute will trip without fail. The end of the string may be fastened to a stake driven into the ground or it may be held in the hand.

A Trick Blotter

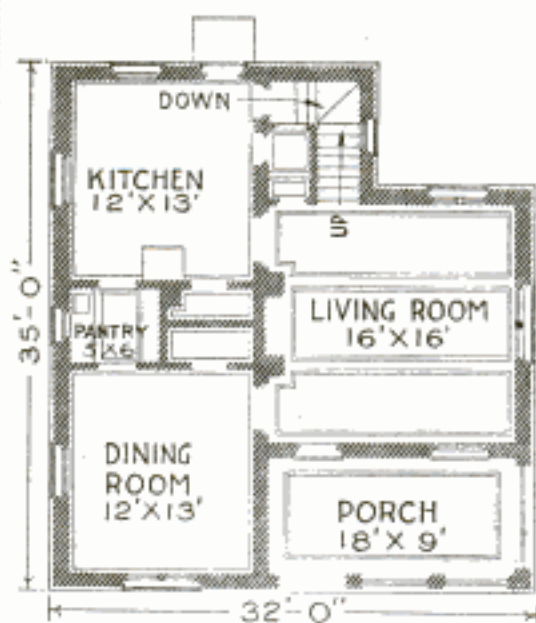
An ordinary blotter may be transformed easily so that it will remove ink completely when applied instead of leaving sufficient to recognize the script, by steeping it in a solution of oxalic acid. Permit it to dry after several applications of the acid. It will be the source of much amusement, and is useful as well.

1773 *Plan* E. C. Redstone, Architect.
25 Arch St., Boston, Mass.

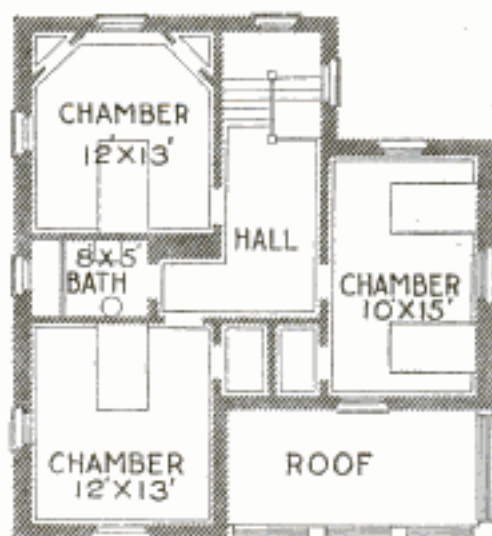
HOUSE OF DISTINCTIVE TYPE AND MODEST COST



FIRST FLOOR



SECOND FLOOR



E. C. REDSTONE, ARCHITECT

IN addition to being of moderate cost, this six-room brick residence embodies features which tend to give it a quiet, homelike atmosphere and make it quite desirable for the average small family. None of its rooms is large, yet all are light, airy, and comfortable. On the inner wall at the middle of the living room, which has a beamed ceiling, there is a large, brick fireplace that, in view of the window arrangement, gives splendid symmetry to the room. The woodwork throughout is white pine, the floors are yellow pine, the walls white and stenciled in monotone panels. There is an adequate basement, the kitchen has an ample pantry and two built-in closets, and the ceilings are uniformly 8 ft. high. The exterior is finished in rough red brick. The cost is estimated at approximately \$3,500 by the architect.

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\$237

for this **Sovereign**

Readi-Cut

Summer Cottage

Price Includes all
Material Complete



SAXON ROADSTER



See what you now get in this fine quality "Four"

Dismiss from your mind—for a moment—all thought of price. Consider only the actual value of Saxon Roadster from the standpoint of feature attractions.

Note well the Saxon high-speed motor; the three-speed transmission, (Saxon "Four" is the only roadster under \$400 with a three-speed sliding gear transmission); the Timken axles; the Hyatt Quiet bearings; the honey-comb radiator; the beautiful streamline body; the roomy seat, 40 inches wide; the lustrous finish; the dry-plate clutch; the ventilating windshield; the signal lamps at sides; the adjustable pedals; and the fifteen additional improvements.

Then read these records established under hardest conditions;—an average operating cost of one-fourth cent per mile per passenger;—an average of 30 miles to the gallon of

gasoline;—an average of 125 miles to the pint of oil; an average of 3500 to 5000 miles on a set of tires.

Add now the impressions you gain while at the wheel of Saxon "Four"—of utter flexibility; of velvety smoothness; of snappy acceleration; of eager speed; of resistless power; of rugged, dependable strength.

Now remember—if you will—what we asked you to forget—the thought of price. Then put this question to yourself—"can any car in its class compare?"

	"Sixes"	
Touring Car	.	\$815
Roadster	.	815
	"Fours"	
Roadster	.	\$395
Delivery Car	.	395

Canadian Prices f. o. b. Windsor, Ont.

Standard equipped six-cylinder car, \$1115; detachable top, \$200; standard equipped four-cylinder roadster, \$530; electric equipment \$70 additional; detachable top, \$75 additional.

Write for interesting booklet *Saxon Days*. Address Dept. J

Saxon Motor Car Co., Detroit

*The Saxon Motor Car Company
does not announce yearly models*

(447)

BLUE STREAKS

GOODYEAR
AKRON
Motorcycle Tires



Blue Streaks Lead Everywhere

GOODYEAR Blue Streak Motorcycle Tires are standard equipment on all leading makes of motorcycles. *Three out of every four* new motorcycles in 1916 will be Goodyear equipped.

Goodyear Blue Streak Motorcycle Tires are the choice of the majority of motorcycle riders in this country.

Goodyear Blue Streak Motorcycle Tires hold most important world's records for speed and endurance — amateur and professional.

These are the three *big* reasons why you should use Goodyear Blue Streaks.

In size, in looks, in comfort, in speed, in endurance — they give you the best value for your money.

Motorcycle manufacturers proved them best; riders have proved them best. What more can be said?

You can get Goodyear Blue Streaks from your motorcycle dealer. Use them on your old machine. Get them on the machine you buy.

The Goodyear Tire & Rubber Company
Akron, Ohio

Please Mention Popular Mechanics



The best tire is none too good for your bicycle

The biggest rubber factory in the world *knows* this is the best bicycle tire, for it is a smaller size of the Goodrich black safety tread automobile tire, and is made of the same rubber as the famous Silvertown Auto Tire that broke the *world's record* at 105 miles per hour. The

Goodrich "GIANT"

With the Black Safety Tread

is the strongest Bicycle Tire ever made, with actually heavier, stronger fabric than many small sized auto tires. This fabric is loosely woven—different from any other bicycle fabric—allowing the rubber layers to sink through its mesh so that when cured they are welded together into a single piece of solid rubber from tread to lining.

Like the best of everything it is really cheaper in the end for it is guaranteed for a year and will outlast several ordinary tires.

Boys all over the United States are getting these two gifts free with "Giants"

First—A Goodrich "Boys' Guide Book". How to make a boomerang, how to make a camping tent, semaphore signaling, and many other "pointers."

Second—A rich Maroon or Blue Felt Pennant with sparkling frosted letters.

If the tire dealer near you does not sell Goodrich Tires, write us and we will tell you where you can get them.

Address

The B. F. Goodrich Co.
Advertising Dept. AKRON, OHIO
Makers of the Celebrated Goodrich
Automobile Tires—
"Best in the Long Run"



Please Mention Popular Mechanics

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The B.V.D. Company

Night or Day, at Work or Play, B.V.D. Conserves Your Comfort

NOTHING is so typical of the American "level head," as the nation-wide popularity of B.V.D. It is the Summer Underwear of Efficiency—of the man who conserves his comfort at work or at play, just as he conserves his health—as an asset.

Loose fitting, light woven B.V.D. Underwear starts with the best possible fabrics (specially woven and tested), continues with the best possible workmanship (carefully inspected and re-inspected), and ends with complete comfort (fullness of cut, balance of drape, correctness of fit, durability in wash and wear).



If it *hasn't*
This Red
Woven Label



It *isn't*
B. V. D.
Underwear

(Trade Mark Reg. U. & Pat. Off. and Foreign Countries)

B.V.D. Closed Crotch
Union Suits (Pat.
U. S. A.) \$1.00 and
upward the Suit.

B.V.D. Coat Cut Under-
shirts and Knee Length
Drawers, 50c. and
upward the Garment.

The B. V. D. Company, New York.



Three Different Machines —Each One An

Indian

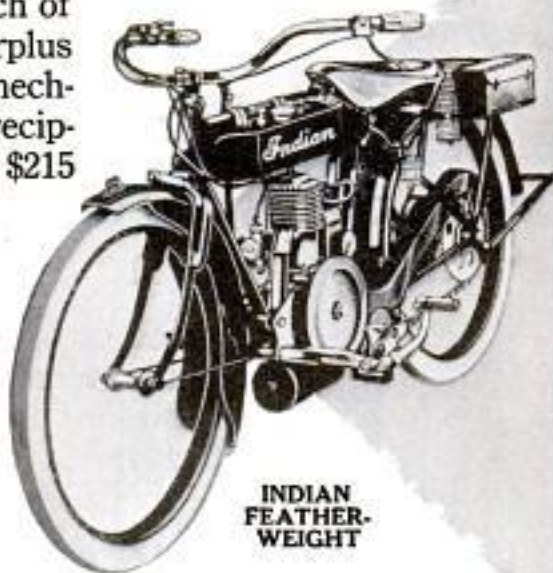


INDIAN
BIG TWIN

EVERY man and boy can now ride an Indian — can choose either a big, powerful, swift Indian motorcycle; an Indian Featherweight of less but ample power and speed, or an Indian Bicycle! And he gets for his money in whatever form of Indian riding he prefers the utmost in certified value and service protection. Twin cylinder motor advancement has reached its highest point in the new Indian

Powerplus Motor

Develops 15 to 18 horsepower, dynamometer test. Long stroke. The greatest producer of power per cubic inch of piston displacement. The 1916 Indian Powerplus motor has fewest parts, least wear. All moving mechanism enclosed; clean, silent power. Light reciprocating parts. Instant getaway. Four models, \$215 to \$275.



INDIAN
FEATHER-
WEIGHT

1916 Featherweight

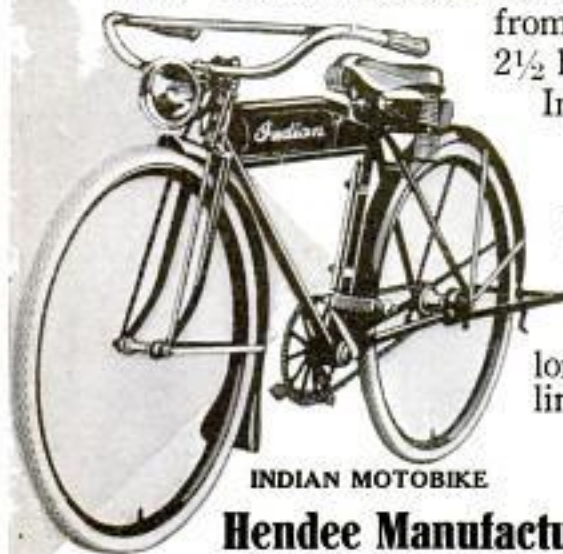
Not a motor-bicycle — a thoroughbred motorcycle. Simple mechanism; light, easy to handle. Speed and power in modified form at moderate initial cost. Comfortable, convenient, practical. Indian construction and quality

from tip to tip.
2½ h. p., 3 speed,
Indian starter, \$150.

1916 Indian Motobike

Little brother of the big Indian Motorcycle. The electrically equipped model of the 1916 bicycle line. Indian gasoline tank style of battery container, electric light with reflector, double forks, long braced handlebars — real motorcycle style lines. Price \$40. 10 other models, \$25 to \$40.

Send for beautiful 1916 Indian Motorcycle
or Bicycle Catalog



INDIAN MOTOBIKE

Hendee Manufacturing Co., 711 State St., Springfield, Mass.

(Largest Motorcycle Manufacturers in the World)




Tough, Sturdy Tires That Never Slip

Now that Bicycle days are with us again, and each Saturday and holiday sees more folks a-wheel, the question of what tire to ride on is well worth considering.

United States 'Chain' Tread Bicycle Tires

are sturdy, tough and well-nigh puncture-proof — effective anti-skids as well. Good-looking tires too. Tires that you will be proud to have on your bicycle. Ride on 'Chain' Treads this Summer and forget the usual tire troubles.

Good tire dealers everywhere sell United States Single Tube and the genuine  Indianapolis Brand Double Tube 'Chain' Tread Tires.

Ask your tire dealer for Dan Beard's newest book "Camping Hints for Hike and Bike." It's free. If he cannot supply you, send us his name and address.

United States Tire Company

'Chain' Tread Single Tube 'Chain' Tread G. & J. Double Tube
BICYCLE TIRES





It's a Boy

—and your wife's doing splendidly



thanks to the fine reserve strength we gave her beforehand with Malt-Nutrine. And now to build her up quickly and to help nature supply food for this little one, we will continue the same splendid liquid-food-tonic.

ANHEUSER-BUSCH'S
Malt-Nutrine

REG. U.S. PAT. OFF.

TRADE MARK

Liquid-Food-Tonic

is recommended for expectant mothers and for nursing mothers. Nourishing and an aid to digestion—it is a great aid in building up the convalescent, the weak and the tired.

There are cheaper preparations calling themselves malt preparations—they are beverages, not tonics. Malt-Nutrine is rich in malt—that's what gives it its value to you. Insist.

All Druggists—Most Grocers

Malt-Nutrine declared by U. S. Internal Revenue Department to be a pure malt product, not an alcoholic beverage. Contains 14.50 per cent malt solids—1.9 per cent alcohol.

Interesting Booklet on Request

Anheuser-Busch St. Louis, U. S. A.



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*At a time like this
how would a check for \$150 help?*

LAID up in the hospital—with his income stopped—with big expenses for nurses and doctors—this man was helped towards recovery by the check for \$150 that came to him promptly each four weeks from the Aetna Life. He had been careful in time. He had taken out an Aetna Disability Policy that made his income safe in case of either sickness or accident.



AETNA-IZE



You may feel fine today—tomorrow a sudden illness may come. The strongest is more liable than the weakest because the strongest takes the least care. Protect yourself now. If you are in a "Preferred" occupation, and pay \$60 a year for an Aetna Disability Policy you will get:

\$25 a week up to 52 weeks while you are ill. \$25 a week for 100 weeks—nearly two years—if you lose the sight of both eyes by disease, or the use of both hands or feet or one hand and one foot by paralysis. Also payment of hospital charges up to \$12.50 per week for ten weeks, or for a surgical operation.

Or you will get **\$50 a week** as long as you are disabled by a railway, steamship or burning building accident. \$25 a week if disabled by an ordinary accident. If you are killed in an accident, or lose two limbs or both eyes, we will pay from \$5,000 to \$15,000. Half as much for loss of one hand, foot or eye.

This is only one of the Aetna's big line of Disability, Accident and Health policies, which meet every need of every man. You can get an Accident Policy for as little as three cents a day.

This coupon brings you the whole story—then you can judge for your self whether you can go one day longer without this means of safety.

Send the coupon now, while it is at your hand.

AETNA LIFE INSURANCE COMPANY

Drawer 1341 HARTFORD, CONN.

The largest Company in the world writing Life, Accident, Health and Liability Insurance

Agency opportunities for all Casualty and Bonding Lines

An Aetna Agent has a national advertising campaign working for him all the time.

Name
Occupation
Bus. Address
AETNA LIFE INSURANCE COMPANY
Drawer 1341 HARTFORD, CONN.
I have marked the kinds of insurance
I wish to know about: Accident
Health Disability My age
is years. I am
in good health.

P. M. 6-16

2

Please Mention Popular Mechanics



"Go After Villa!" Said The General

RIGHT then things began to happen. Within 24 hours a telegram was flashed over the wires from Fort Sam Houston to Milwaukee calling for twelve Harley-Davidsons and the same day the twelve machines were shipped. The

Harley-Davidson

makes good in peace as in war. Among the sand-swept hills and plains of Mexico—in the palm-bordered avenues of South America—on the military roads of all Europe and on the

SPEED—Harley-Davidson records are famous the world over.

EFFICIENCY—Those telegrams from Fort Sam Houston and the medal of honor awarded at the Panama-Pacific Exposition, speak for themselves.

boulevards and by-ways of our own fair land—everywhere you will find the Harley-Davidson motorcycle giving service, pleasure and recreation.

To ride a Harley-Davidson motorcycle is to find a new interest in outdoor life. It is to sound the key-note of outdoor sport. No one can tell you how you will enjoy owning a Harley-Davidson—you must ride one—then you will understand.

Telephone your local dealer for a demonstration or write for catalog.

There are now 34 Harley-Davidson Motorcycles in Mexican frontier service.

HARLEY-DAVIDSON MOTOR COMPANY

Producers of High-Grade Motorcycles for More than Fourteen Years

472 B STREET, MILWAUKEE, WIS.

Please Mention Popular Mechanics

Compensating Vapor Plug

Proved Savings—Or Your Money Back

"30% More Speed"
"30% More Power"
"40% More Mileage"
LESS CARBON

\$5 Parcel Post
 Prepaid
\$7.00
 In Canada



600,000
 Compensating Vapor
 Plugs Sold Since Jan-
 uary. This Means a
 Total Business in Four
 Months of \$3,000,000

61,873 Letters—1,183
Telegrams in 120 Days

All this done because of our famous guarantee—Proved Savings, or Your Money Back—and because the Compensating Vapor Plug is adding speed, power and gasoline mileage to every automobile, wherever it is used. It is the biggest money saver that has ever been offered automobile owners, and it is the biggest guarantee of better service from your motor cars.

The quantity of mail has been so great that we have been compelled to send it to our distributors by EXPRESS so that they could take care of the orders immediately.

600,000 orders in the Winter season, when the majority of cars are laid up, is tremendous. One dealer wired: "Last shipment 500 Vapor Plugs gone in a week—rush 1,000 by express." Another wired: "Sending certified check for \$1,000—rush order." And the majority of users are writing us, saying that our figures are not high enough—that they are getting greater economy than we claim.

Here Is What Users of the Compensating Vapor Plug Say—Read Their Letters

You Can Attach It in Five Minutes—It Fits Any Car—Never Wears Out—You Simply Tap Hole in Manifold and Screw in Plug

Enough Said

Automatic Carburetor Co.
 Chicago, Ill.
 Green Lake, Wis.
 Gentlemen: Your statements for the plug in re-
 gards to speed, power and mileage are true.
 B. F. DE HOSSON

Results Exceed Claims

Chicago
 I find that the results exceed your claims in the
 flexibility of the motor, mileage per gallon of gaso-
 line and power.
 H. M. POWER

Pronounces It O. K.

Detroit, Mich.
 On a straightaway drive over country made I
 covered 32 miles on three-quarters of a gallon of
 gasoline. But the thing that impresses me most is
 the increased flexibility—slowing down to 5 miles
 an hour, and picking up without an effort, and with
 no fear of stalling. That of itself makes the device
 worth while.
 LEN G. SHAW

Saves \$4.65 Per Month

St. Louis, Mo.
 Just two months ago I bought one of your Com-
 pensating Vapor Plugs for my Ford Truck, and all
 during the severe weather we had this spring aver-
 aged \$4.65 saving on gasoline each month.
 Besides, my motor has more power and a better
 get-a-way, and can throttle down to a much lower
 speed. This truck runs 16 hours a day, and I have
 no trouble of any kind, so you see it works under
 all conditions.
 JANTZEN'S PHARMACY

La Porte, Ind.

I tested out your carburetor yesterday on my
 Overland car, making a 24-mile run before attach-
 ing the plug, using nine quarts of gasoline; speed
 with top up and side curtains on, 37 miles.
 I attached the plug, made the same run, using
 six quarts of gasoline, speed 42 miles.
 C. E. WOLFE

Gasoline Consumption Cut in Half

Kansas City, Mo.
 I must tell you that the little device you sent is
 eminently satisfactory, and although my Ford has
 covered some 25,000 miles since putting on the
 Compensating Vapor Plug, the engine runs really
 better than it did when the car was new. My gaso-
 line consumption has been cut half in two on the
 same mileage as I was getting before using your
 plug.
 UNION BANK NOTE CO.
 Leo B. Crabbs, Treas.

Will Benefit Any Car

Barre, Mass.
 I am convinced from the way my motor starts and
 the smoothness with which it runs, the Vapor Plug
 is a great benefit to any motor car.
 D. A. BREEN

Results Beyond Expectations

Ashland, Ohio
 I am pleased to say that it gives results beyond
 anything I expected. Three or four car owners
 have already asked for your address and I feel sure
 that they are ready to purchase.
 R. T. SCANTLEBURY

Does More Than Promised

Elgin, Ill.
 I have given thorough tryout to your Compensat-
 ing Vapor Plug under the most severe weather and
 find that it does more than promised.
 GEO. H. ANDRESEN

Here's Real Economy

St. Johns, Portland, Ore.
 It increased our mileage nine and one-half miles
 per gallon of gasoline.
 WHITNEY ROBE

42 Per Cent More Mileage

Athens, Ga.
 I personally tested this plug for mileage with and
 without the plug, and it shows about 42 per cent
 more mileage.
 L. J. FLUKER

Up Pike's Peak Road

Manitou, Colo.
 Without plug I got 11.3 miles on two quarts of
 gasoline, then under the same conditions with the
 plug, I got 13.6 miles on two quarts of gasoline; then
 the conditions not being changed, except that I cut
 down my carburetor, and made the same run and
 got 16.7 miles on two quarts of gasoline. I took
 witness along with me each time and started from
 our garage on Main St. I will say that I am more
 than satisfied with it.

I went up Pike's Peak Auto Road with a steady
 grade of about 15 per cent and the longest single
 stretch of grade is one-half mile of low gear work,
 and I passed 8 cars that were stopped to cool off.
 I had no trouble of any kind, so you see it works
 under all conditions.
 S. R. FRANCISCO

You Want This Money-Saver for Your Car

The price is \$5 to you and to everybody—and all we ask is that you send us the coupon with a \$5 check, P. O. or express order attached—as a deposit—until you are more than satisfied. \$7 in Canada. If after a 30-day trial you decide you can do without the Compensating Vapor Plug, simply send it back and we will refund your full deposit.

Tear or cut off the coupon—mail it now—today.

Automatic Carburetor Co.
 Dept. R, 2021 Michigan Avenue
 CHICAGO, ILLINOIS

Makers of famous Automatic Carburetors
 Specialists in Gasoline Devices for Motors
 Canadian Distributing Co.,
 125 Pacific Avenue, Winnipeg, Manitoba

Cut This Out—Mail Today

AUTOMATIC CARBURETOR CO.

Dept. R, 2021 Michigan Ave., Chicago, Ill.

Enclosed find \$5 (\$7 in Canada) in full payment for one Compensating Vapor Plug—with the understanding that you guarantee it for life and will refund my full deposit in full if I return your device to you collect within 30 days.

I use a..... sized carburetor; name of car

.....model.....year.....

Name.....

Address.....

I recommend as a good dealer.....

.....of.....

Wanted Exclusive Dealers

The Compensating Vapor Plug will sell like wildfire to every car owner. Exclusive contracts for counties. As soon as you get your contract we will prove results on cars in your territory—ready for you to start sales. We will back you with big national and local advertising. Prove to us that you are the best equipped and responsible. Write, wire, phone or jump the first train for Chicago—get this fastest selling accessory—a money-saver for any car owner and a money-maker for you.

Best Outdoor Friend

THE Smith Motor Wheel wins friends quickly. One

short ride is your introduction and in a few moments you are on friendly terms with this new travel comrade.

It attaches in five minutes to any bicycle.

Two easy turns of the pedals send the power flowing into the steel sinews of your wheel and you coast magically along.

There is a simple "grip" control—a turn of the wrist gives you 4 to 20

Smith Motor Wheel
DETACHABLE

miles, as you choose. No troublesome levers, belts, clutch or transmission. Your new steed needs but

a gallon of gasoline for up to 125 miles, and any bicycle road—uphill or down—invites you.

No special riding togs are needed—you travel the clean way.

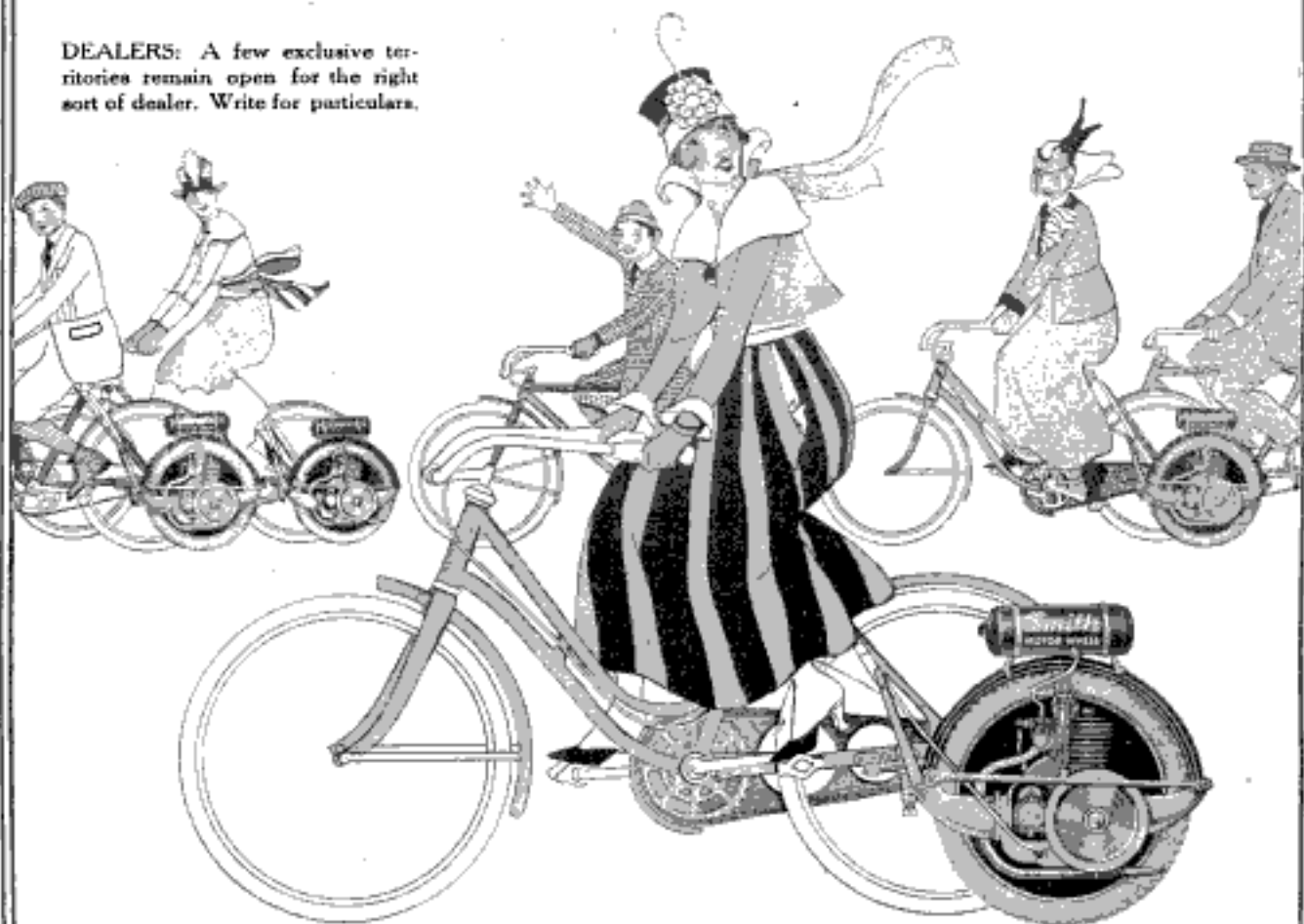
Get acquainted with the "Smith" at your dealer's, or write for free illustrated catalog. More than 10,000 Motor-Wheelists have found this new pleasure, and the same outdoor joy may be yours.

MOTOR WHEEL DIVISION

A. O. SMITH COMPANY, Milwaukee, Wisconsin

World's Largest Manufacturers of Automobile Parts

DEALERS: A few exclusive territories remain open for the right sort of dealer. Write for particulars.



Please Mention Popular Mechanics

How Do You Change Your Tires?

Still doing it the old, back-breaking, time-killing way? Still pulling, hammering, jerking your rims off? The way that invariably twists them all out of true and makes them harder than ever to put back again? Or are you carrying rim-removing **Insurance** by relying on the never-failing Friestedt Rim Contractor?

This is the little device you need in **your** tool box! With it handy there are no more long, tiresome, money-wasting tie-ups along roadsides. No more fear of sudden punctures and blow-outs. Tire-changing has, at last, been made **quick**, dependable under all circumstances, and almost as **easy** as putting water in your radiator. Hundreds of women are now doing their own tire-changing.

FRIESTEDT RIM CONTRACTOR

Opens, Contracts and Relocks Rims Instantly

A light, efficient tool, combining convenience, speed and simplicity. It supports **both** flanges of the rim, operates **at the split**; and is the only device providing a leverage of 20 inches to break the rust, open the lock and overlap the rim ends. Applied, operated and removed with tire in UPRIGHT position (see picture).

See Illustration of Locks—Order by Number

Price \$3.00. If you are using Baker, Kelsey, Stanweld or Firestone split demountable rims, either straight side or clincher, you can't afford to be without the Friestedt Rim Contractor.

Try it ten days at our risk. Sold on money-back guarantee. Send coupon today. Be sure to mention rims you are using.

DEALERS! Here's a big, year-around profit-maker for you. Every motorist wants one. Write for attractive proposition.

FRIESTEDT RIM CONTRACTOR CO.

2909 West Lake St.

CHICAGO, U. S. A.

10 Days Free Trial

Friestedt Rim Contractor Co.
2909 W. Lake St., Chicago, Ill.

I enclose herewith Three Dollars (check, money order or stamps) for one Friestedt Rim

Contractor, number..... My car is

equipped with.....rims.

If, at the end of 10 days, I am not entirely satisfied I have the privilege of returning the Contractor and having my money refunded immediately.

Name.....

Address.....

The Old Way



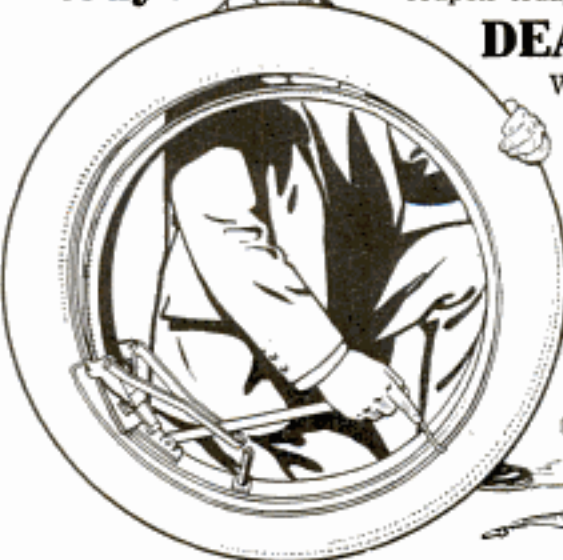
This Is How You Twist Your Rims Out of Shape



1 2 3 4 5 6
OPENS, CONTRACTS AND RELOCKS THESE RIM LOCKS

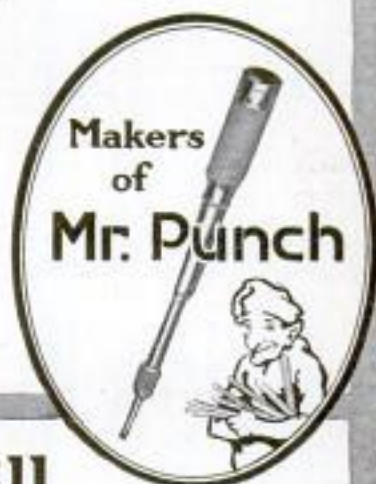
Order by Number

The New, Quick, Easy Way!



Please Mention Popular Mechanics

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High Speed Hand Drill

No. 385

This high speed hand drill is made to drill large numbers of small holes very rapidly. It is particularly adapted for the use of wood finishers or floor layers.

It is absolutely new—different from any other drill previously made—in fact, it is the only high speed hand drill ever manufactured, except a very clumsy German affair.

A series of gears causes the spindle to make 7 revolutions to every turn of the crank. The gears are completely enclosed in an aluminum casing. This casing not only protects the gears from dirt and breakage but also forms a receptacle for the heavy grease with which the gears are packed. Ball bearings and the great care with which the drill is assembled make it very easy of operation.

The three jawed chuck holds round shank drills. Capacity 0 to $\frac{1}{4}$ inch. List Price **\$5.00**

WRITE FOR CATALOGUE

Goodell-Pratt Company, *Technique*, Greenfield, Mass.

GODELL PRATT

1500 GOOD TOOLS



"PIPER" Is Always Above Par

Always a reliable, pleasing, satisfying, wholesome chew. Big brokers, financiers, operators in all lines which tax man's nervous energy to the limit, know this—they use "PIPER" constantly to give them poise and soothing, helpful comfort—and "PIPER" never fails them.

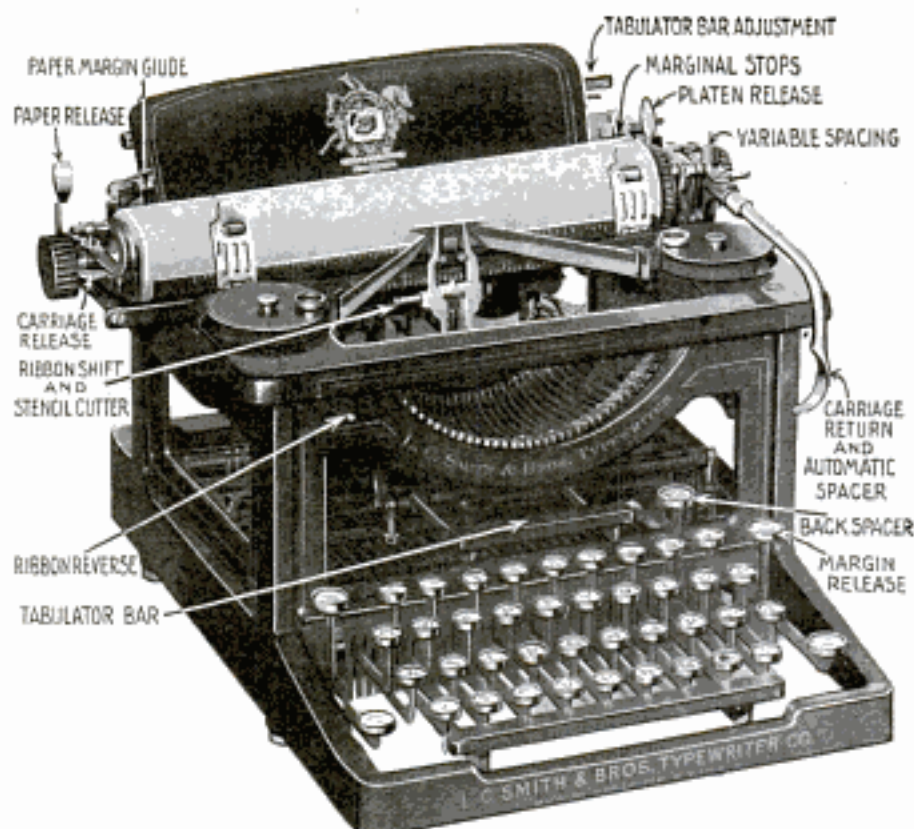
PIPER Heidsieck

CHEWING TOBACCO

The choicest, ripest leaves of the finest crops of white Burley tobacco are used in "PIPER"—and the juicy mellowness of this superb tobacco is enhanced by the wonderful, appetizing, "PIPER" taste. This famous flavor distinguishes "PIPER" from all other chews. Compare "PIPER" with any other tobacco you're now using and learn how much *more* enjoyment "PIPER" affords you.

5c and 10c cuts, foil-wrapped, in slide boxes. Also 10c cuts, foil-wrapped, in metal boxes. Sold everywhere

THE AMERICAN TOBACCO COMPANY



I want, through this advertisement, to establish as friendly business relations with you as I possibly can. I want you to realize also, that it is my earnest effort and intention to give you full honest value for every dollar that you spend with me. This is the only way I can succeed. The publisher of this magazine will vouch for my square dealings during the four years and more my advertising has appeared.

I am building up my business on the foundation of good value and square dealings. I am saving thousands of satisfied customers thousands of dollars, by supplying, perfect—late style—visible writing—typewriters, at remarkably low prices.

All my transactions are handled throughout by personal correspondence. I assure you every courtesy and consideration, in your dealings with me. Your order will have my prompt, careful, personal attention. I will be glad to do business with you.

Harry A. Smith

TYPEWRITER SENSATION

Free TRIAL—Use As You Pay

Send me only \$2.50 a month until the low total price of \$48.80 is paid, and the machine is yours

This is absolutely the most generous typewriter offer ever made. Do not rent a machine when you can pay \$2.50 a month and own one. Think of it—Buying a \$100.00 machine for \$48.80. Cash price, \$45.45. Never before has anything like this been attempted.

Standard Visible **L. C. Smith** Model Number 2

Perfect machines, Standard Size, Keyboard of Standard Universal arrangement writing 84 characters—universally used in teaching the touch system. The entire line of writing completely visible at all times, has the tabulator, the two color ribbon, with automatic reverse, the back spacer, ball bearing carriage action, ball bearing shift action, in fact every late style feature and modern operating convenience. Comes to you with everything complete, tools, cover, operating book and instructions, ribbon, practice paper—nothing extra to buy.

H. A. SMITH
Room 510-231 N. Fifth Ave.
CHICAGO, ILL.

Ship me a No. 2 L. C. Smith F. O. B. Chicago, as described in this advertisement. I will pay you the \$40.00 balance of the SPECIAL \$48.80 purchase price, at the rate of \$2.50 per month. The title to remain in you until fully paid for. It is understood that I have five 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.

You cannot imagine the perfection of this beautiful reconstructed typewriter until you have seen it. I have sold several thousand of these perfect latest style Model No. 2 machines at this bargain price and every one of these thousands of satisfied customers had this beautiful, strictly up-to-date machine on five days' free trial before deciding to buy it. I will send it to you f. o. b. Chicago for five days' free trial. It will sell itself, but if you are not satisfied that this is the greatest typewriter you ever saw, you can return it at my expense. You won't want to return it after you try it—you cannot equal this wonderful value anywhere.

You Take No Risk—Put In Your Order Now

When the typewriter arrives deposit with the express agent \$8.80 and take the machine for five days' trial. If you are convinced that it is the best typewriter you ever saw, keep it and send me \$2.50 a month until my bargain price of \$48.80 is paid. If you don't want it, return it to the express agent, receive your \$8.80 and return the machine to me. I will pay the return express charges. This machine is guaranteed just as if you paid \$100.00 for it. It is standard. Over one hundred thousand people own and use these typewriters and think them the best ever manufactured.

The supply at this price is very limited, the price will probably be raised when my next advertisement appears, so don't delay. Fill in the coupon today—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 \$48.80 is paid. You cannot lose. It is the greatest typewriter opportunity you will ever have. Do not send me one cent. Get the coupon in the mails today—sure.

HARRY A. SMITH, 510-231 N. Fifth Ave., Chicago

Name

Address

.....Pop. Mech. June

HAYWOOD'S

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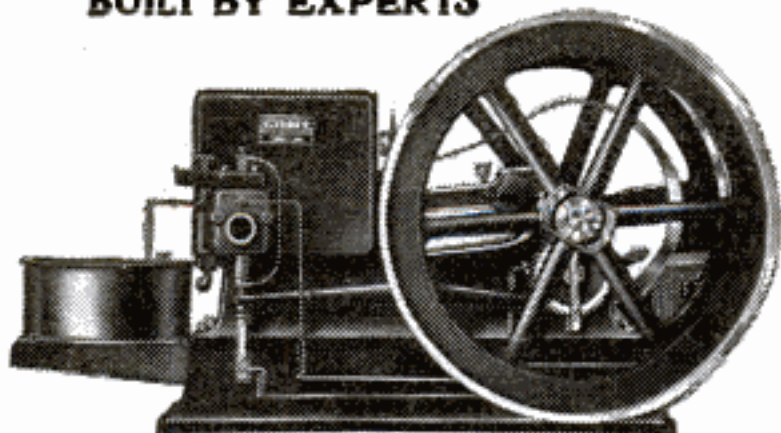
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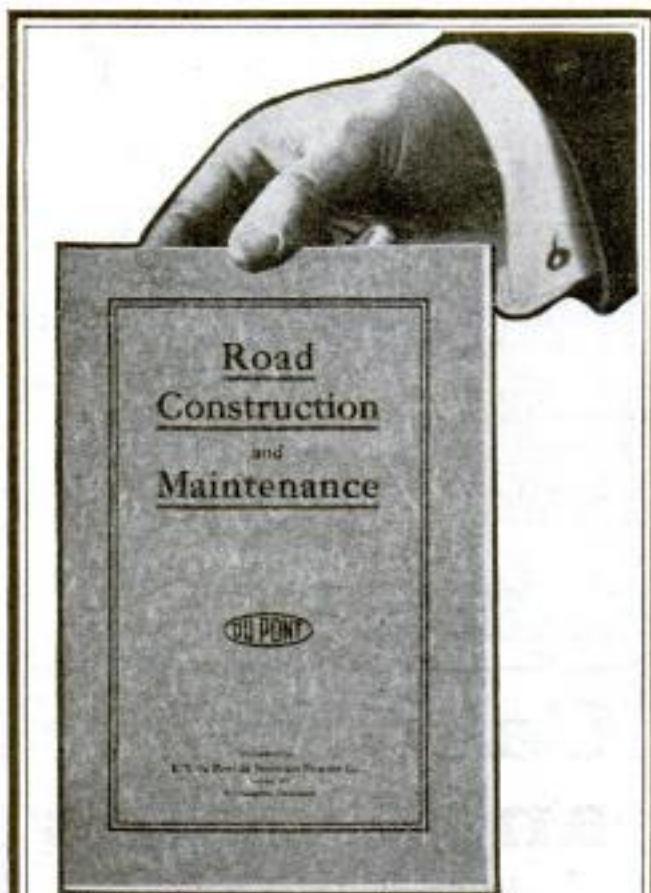
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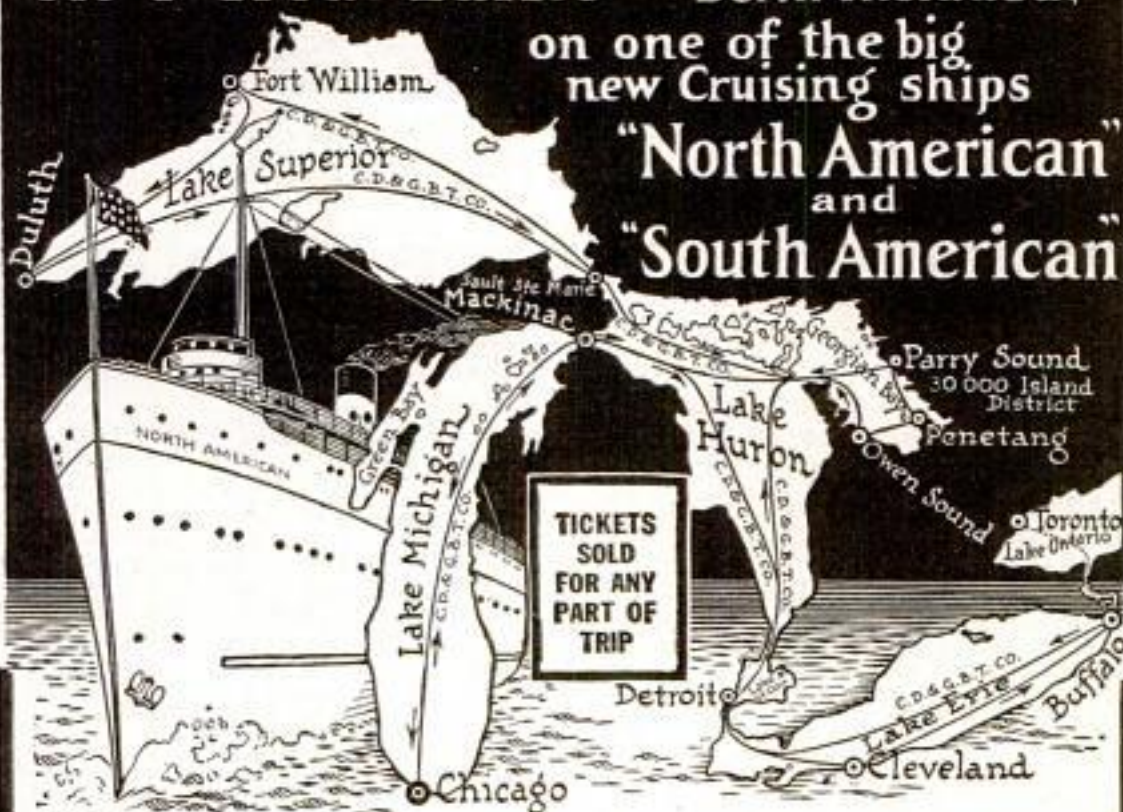
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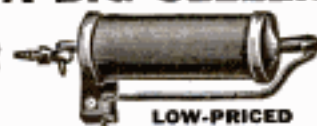
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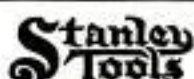
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A tool for **Pattern Makers**—**Carpenters**—**Cabinet Makers**—in fact, for any workers in wood who have nice fitting to do.

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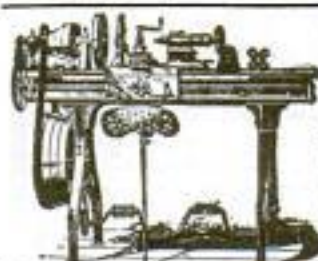


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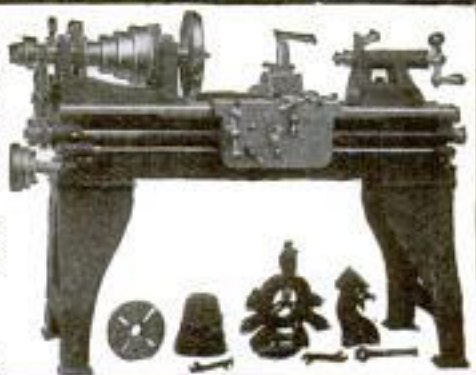
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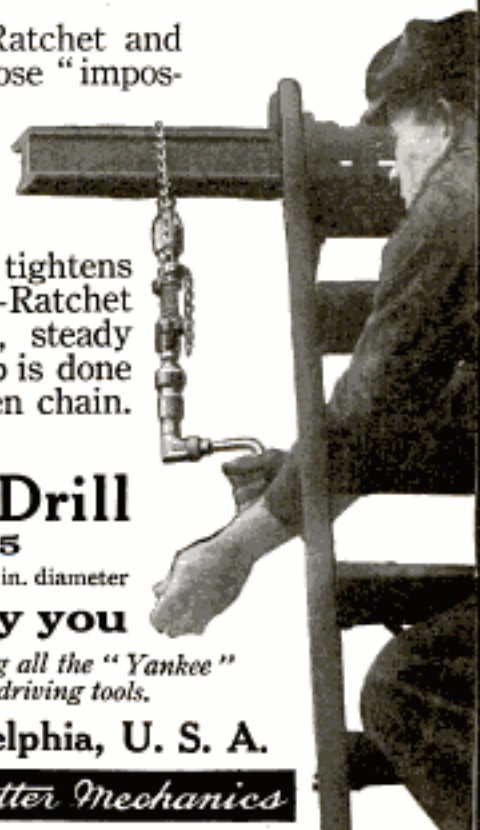
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are good tools in the strictest sense of the word. They eliminate the uncertainties of groping in the dark with inferior tools, yet they cost no more.

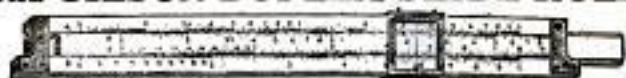
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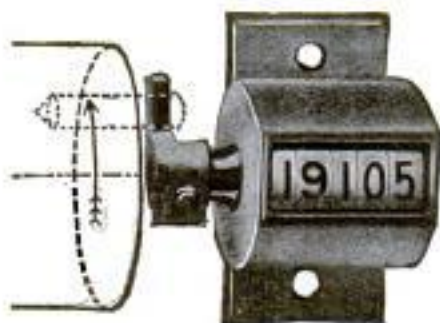
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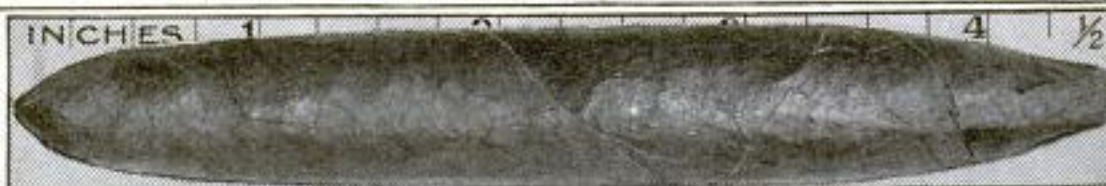
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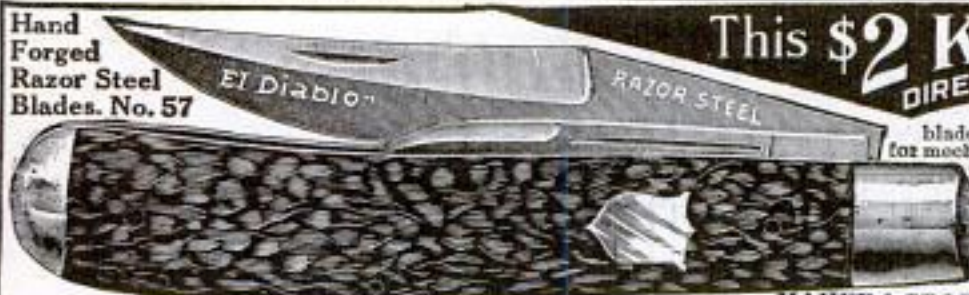


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Motorcycles are built for the red blooded, outdoor man who appreciates the throb of a powerful motor; the unhesitating sweep up and over the worst sort of hills; the unfailing, faithful drive that sends the Emblem without faltering through sandy and treacherous roads.

The Emblem has a stout heart—it will take you where no other machine will attempt to go, and will bring you back. It is the motorcycle for you. Your name on a postal NOW will bring our Motorcycle Book and a full description of the Emblem by return mail.

EMBLEM BICYCLES are made by the same organization that builds the Emblem Motorcycle. They embody the same sturdiness of construction; the same ability to stand up and perform under every sort of hard work and abuse. Bicycles are once more coming into their own—and the Emblem is leading the way. We have an Emblem Bicycle Book here for you and will send it as soon as we get your name—a postal will do.

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Station A

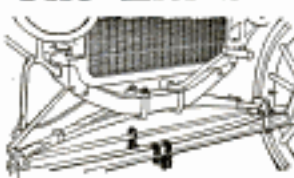
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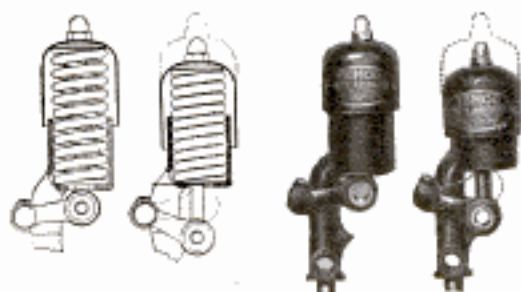
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This permits us to make the tallest shock absorber for Ford cars — which means longer and stronger springs.

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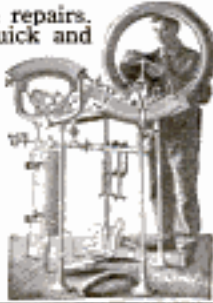
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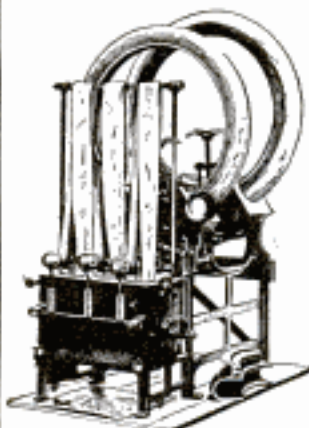
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CUTS GASOLINE COST ONE-THIRD. Removes carbon deposits, improves lubrication, increases efficiency. **Non-injurious. Guaranteed.** Get $\frac{1}{4}$ to $\frac{1}{2}$ more power—more mileage—more speed, at a cost of less than 1c per gallon of gasoline. One tablespoonful of this **Wonderful Fluid** added to every five gallons of gasoline energizes the sleepy, choked-up motor with new life—new vitality. Acts instantly—Keeps motor in a well lubricated and oily condition. Price Low, **\$2.00 a Quart.** Treats 150 gallons. Money refunded if not satisfied.

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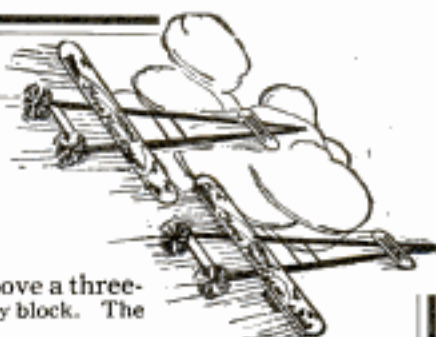
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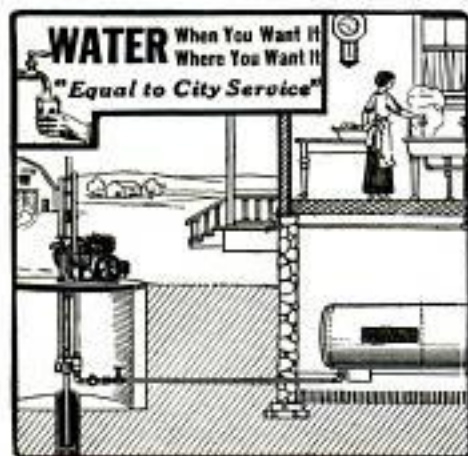
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Gray Motor Company
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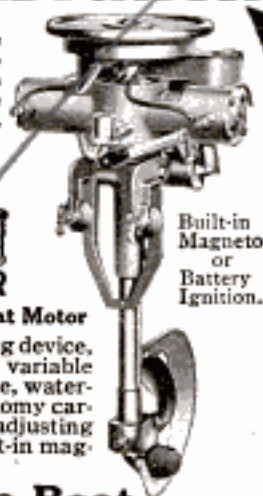
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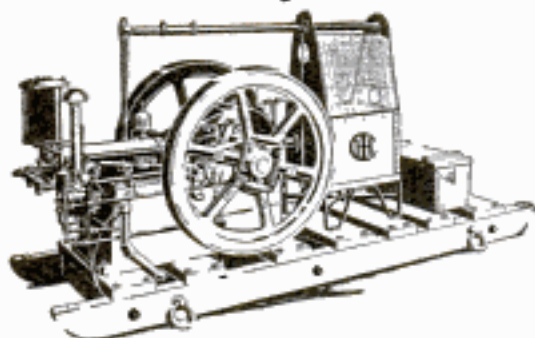
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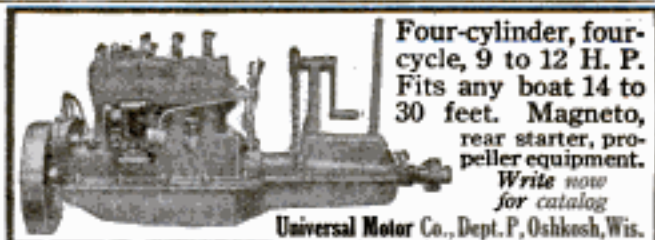
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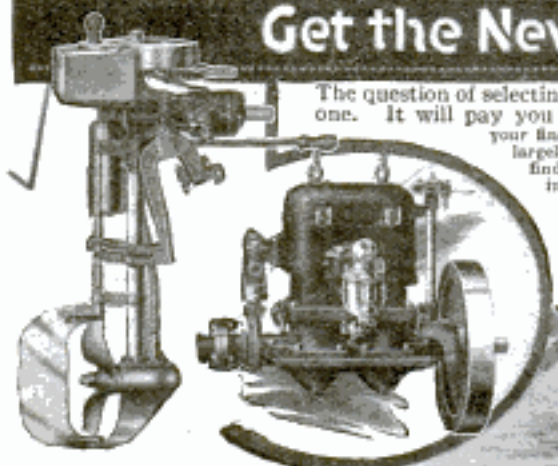
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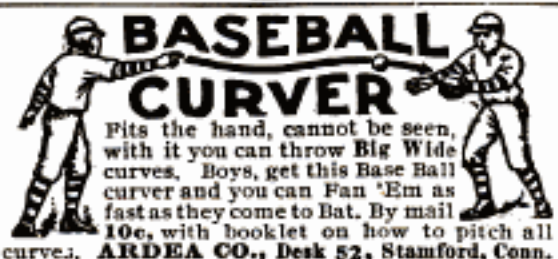
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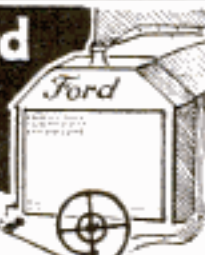
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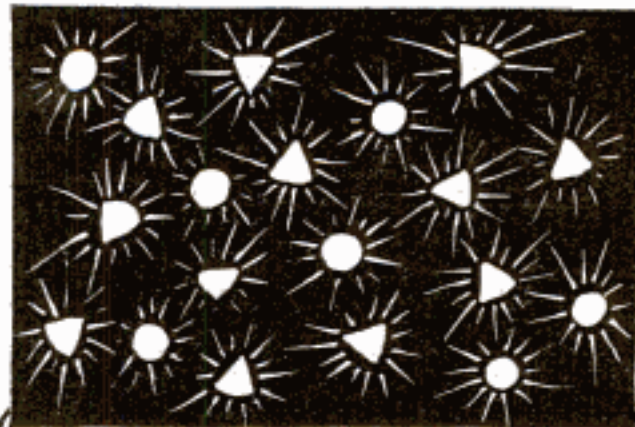
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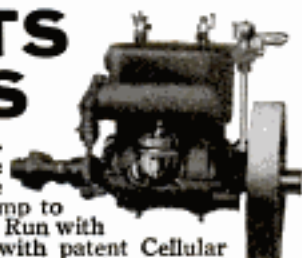
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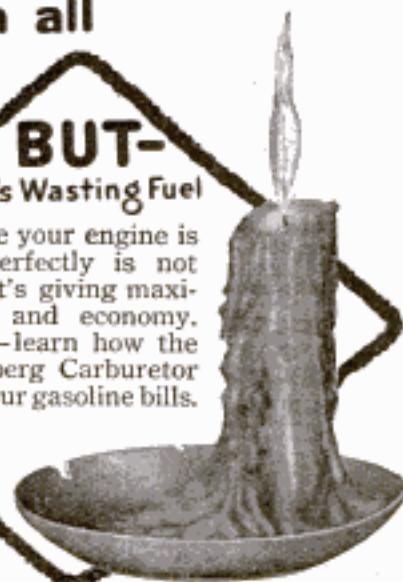
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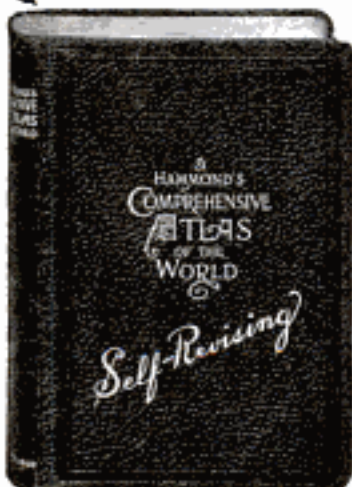
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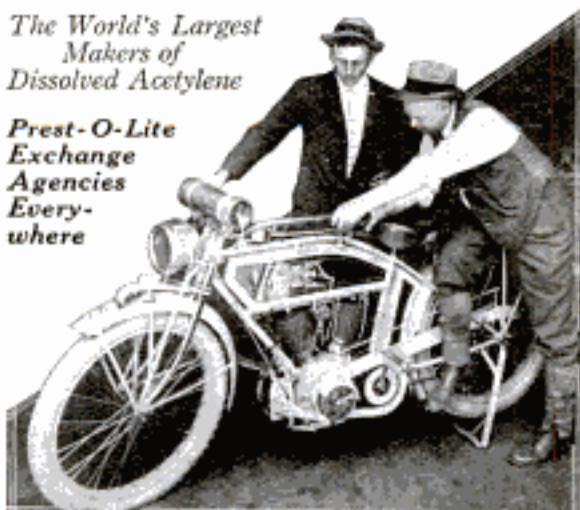
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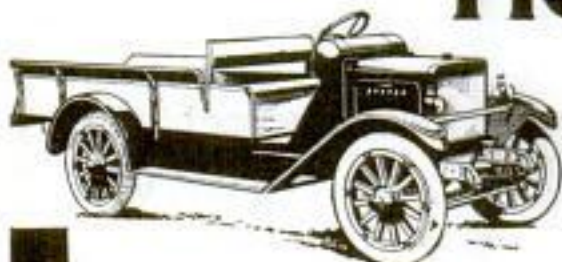
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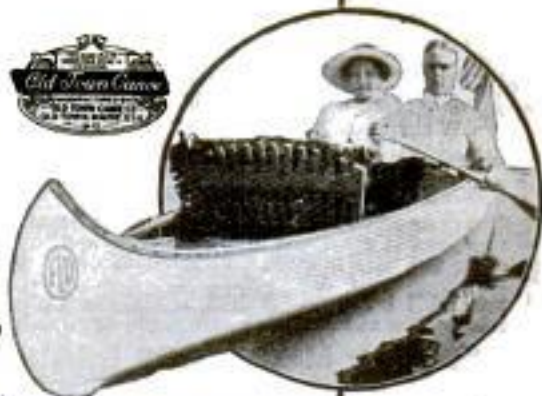
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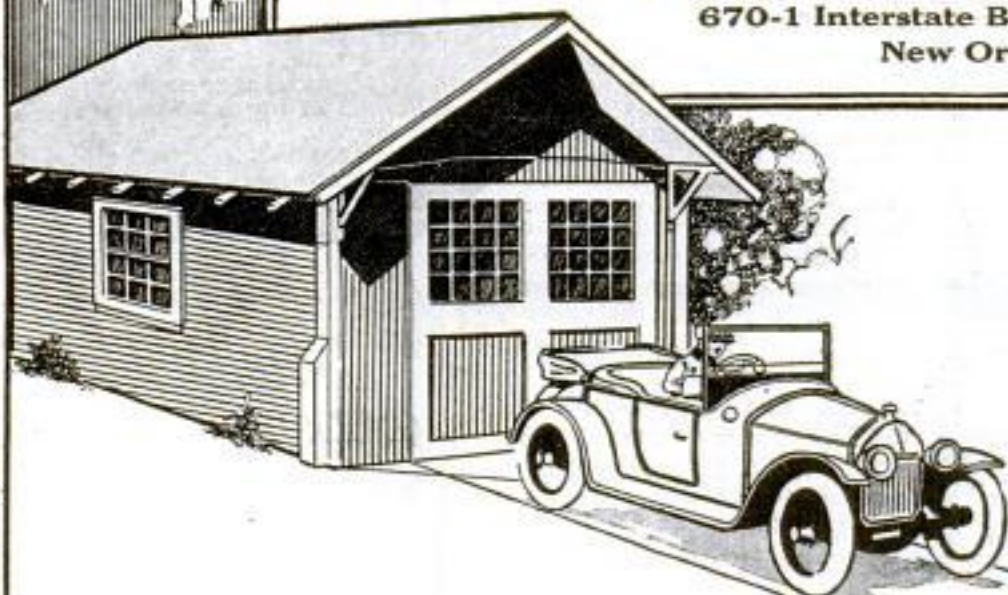
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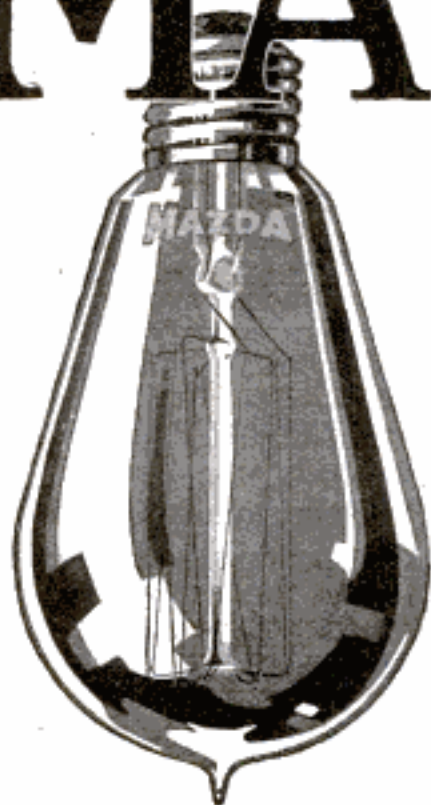
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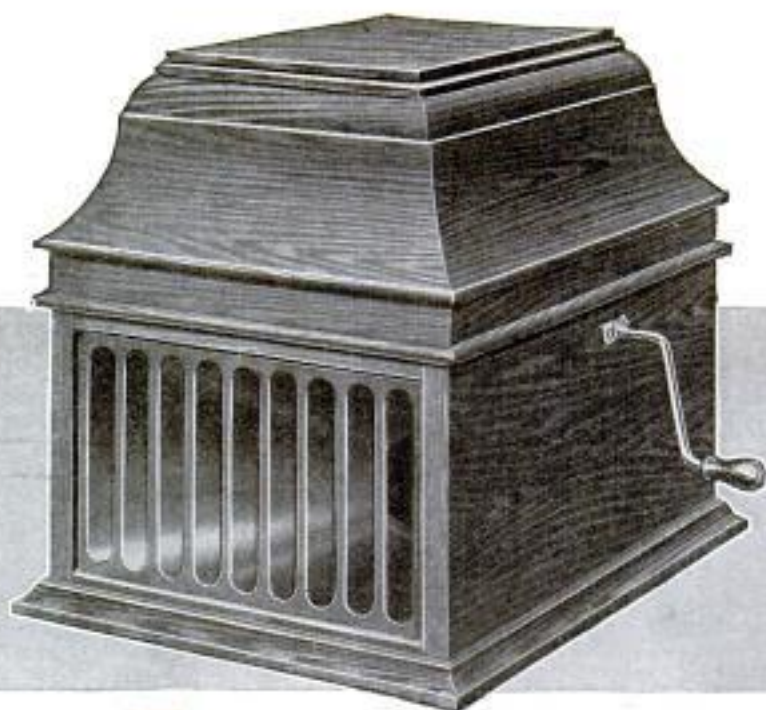
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