

Popular Mechanics Magazine

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EDITED BY H. H. WINDSOR

ISSUED MONTHLY

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IT has been said that a regiment is simply a multiplication of its Colonel. The same thing is true of any kind of management. To multiply himself—to duplicate his own efficiency in every unit of his force—that is the manager's ideal.

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"Let me show you what I mean—and your own case is most important because if you are slowed down your force is likely to reflect you. Take your lighting. You yourself have poor light. You go after people or send after them, when a button in your desk would do the thing better and save hours of your high-priced time every week. A moment ago you got up and opened your window. A little electrical help here would purify that air fuel your human engines are stoking up on. You're not using electricity for any of the mailing or adding machines—and that clerk who is mounting photographs, for instance, could do it in one-quarter of the time with an electric flatiron. I venture to say that you could accomplish 80% more work here with half the wear and tear if you made use of electricity in even a fraction of the ways in which it can be used."

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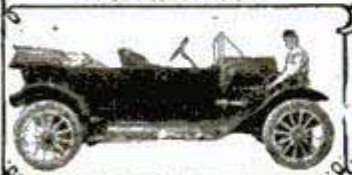
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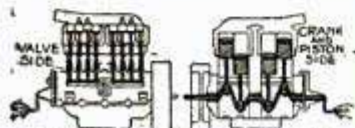


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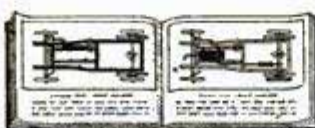
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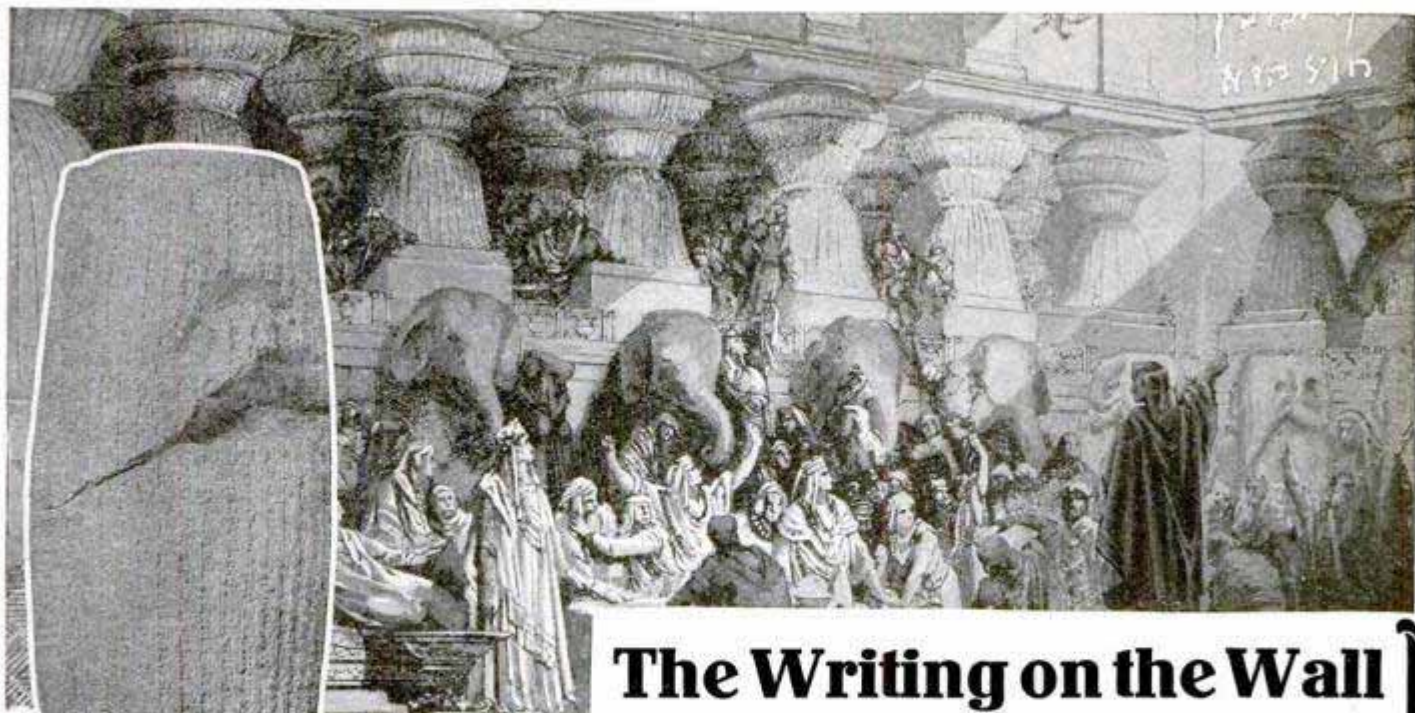
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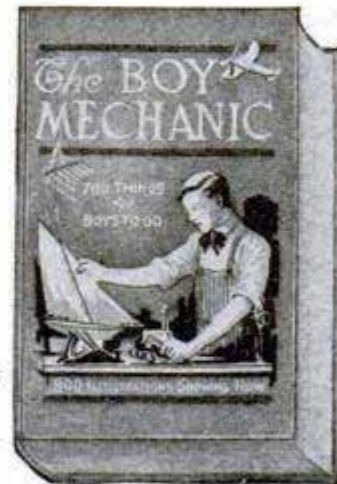
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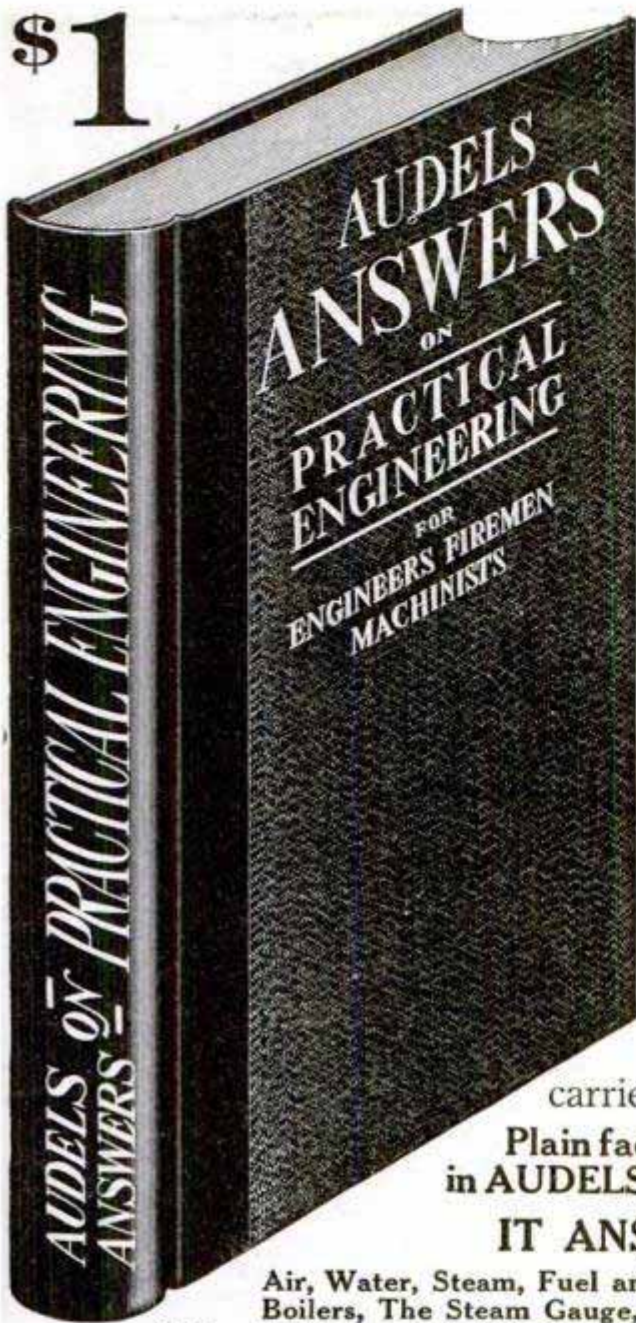
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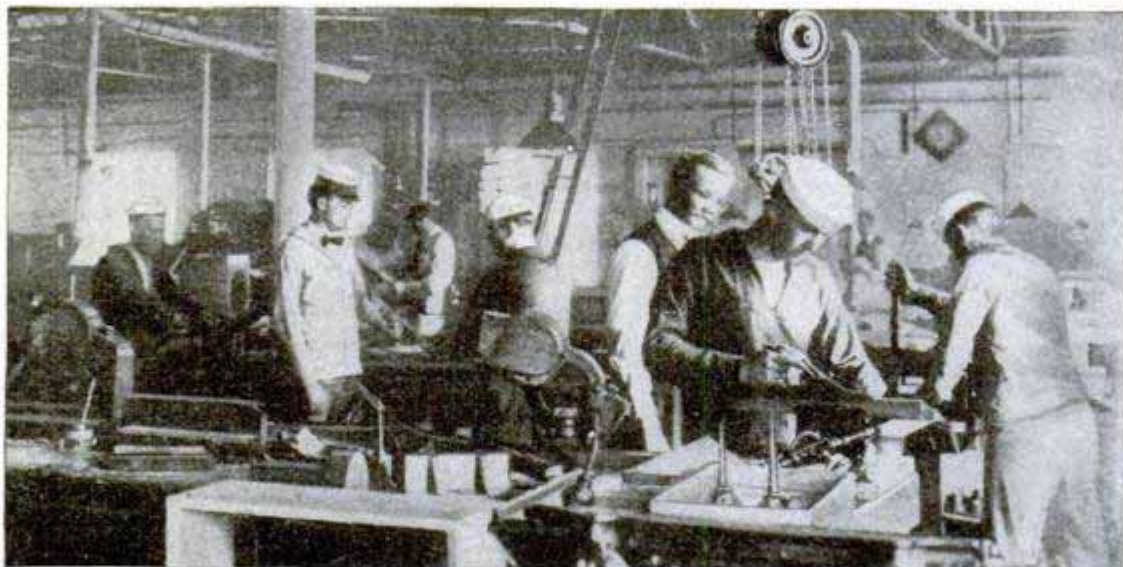
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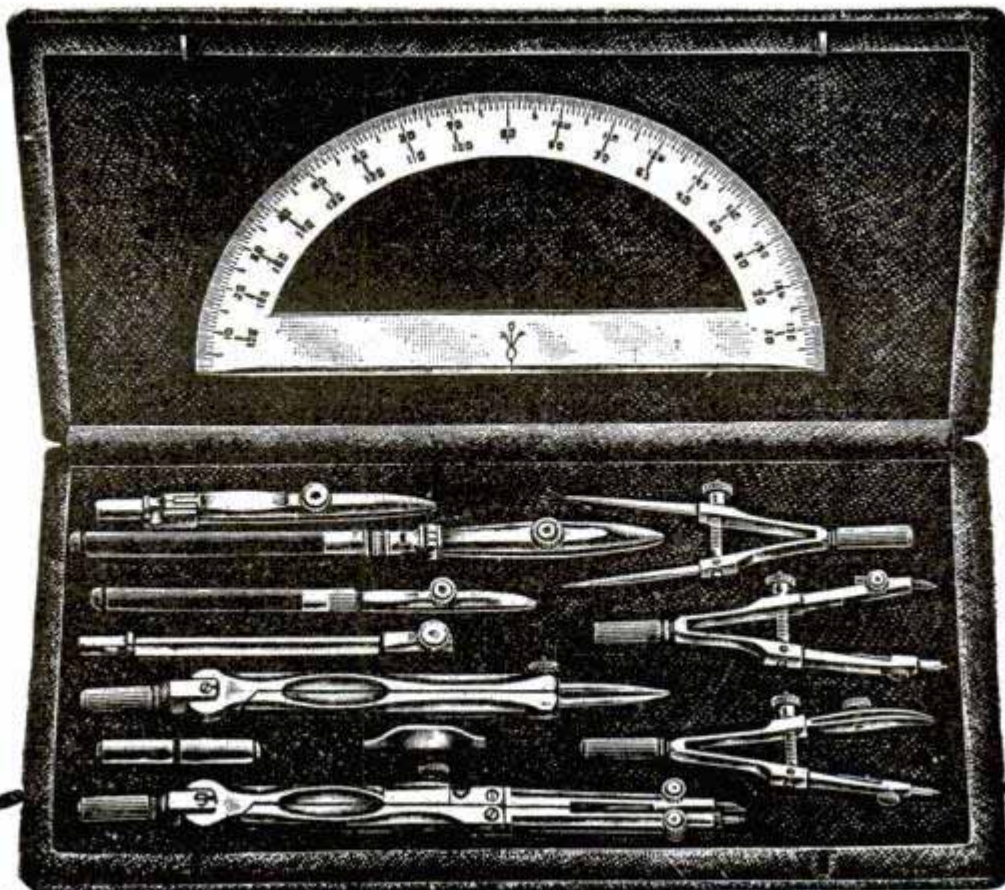
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AGENTS, be your own boss. Start a factory in your own home on less than \$5 capital, manufacturing rugs and floor coverings from odd material. Imitating any colors or designs desired. A 9x12 rug can be made in less than one hour at a cost of less than \$1. We expect our patent on or about Jan. 1, 1914, then we will mail free pictures, circulars and particulars to all, in the order inquiries are received by us. First come first served; so mail your inquiry today. Be first to learn of this wonderful protected home manufacturing business. A postal will do. Address, Novelty Rug Manufacturing Co., Toledo, O.

TRANSFORMERS—Agents make large profits selling and installing "Everlasting" transformers. Operates on alternating-current lighting circuit. Rings bells, operates door-openers, signals, night lights. Can be installed most instances where dry batteries are used. Transformer comes complete with six feet of cord and plug, has two secondary voltages, six and twelve volts. Price, \$2. (Sells for \$3.50.) Agent's demonstration set, carrying case, transformer, bell, push, and night lamp, price, \$3.50. By parcel post, 15 and 25 cents extra. Remit by money order. The Electric Star Devices Co., Pittsfield, Mass.

SIGN Agents—Every professional man and dealer a likely prospect. Our complete line of high-quality, low-priced Window Letters, Glass Signs, Name-Plates, Clo. h and Wood Signs sell easily to real estate men, doctors, lawyers, dentists, grocers, druggists, hardware, meat market men, etc. Big profits and exclusive territory to responsible agents. Write today for new catalogs. Attracto Sign Co., 2656 North Clark St., Chicago.

AGENTS—A free course in General Salesmanship is given to every man of our sales organization. This organization is a body of successful men selling the Handy Light, that unique electrical device which cuts the cost of electric lighting in half. Sells for \$3.50, is used in home, office, store, factory; weighs only one pound. Sold by demonstration. All agents furnished with well-planned methods for gaining interviews. A high-grade business for a man of ability and standing in his community. General agents preferred. Inquire for our full proposition by addressing The Handy Light Co., 1109 Handy Light Block, Cincinnati, Ohio.

AGENTS—A device that saves money, increases efficiency, adds to comfort, convenience; beautifies the home, office and store—and is electrical; is the kind of device to sell. Show these features on an article, to the people today, and your sale is made. I have that article. If you are alive, wide-awake and want to handle a general agency for the most unique electrical specialty, which will cut lighting bills in half, write for my proposition. Stanley B. Freiberg, 197 Station F, Cincinnati, Ohio.

HERE'S a live proposition. Big money for you. Staple articles; sell quickly to every home. Let us help you build a profitable business. Write now for free illustrated folders. Aluminum & Housewares Specialty Co., Suite 203, 115 S. Dearborn St., Chicago.

SELL Bank Check Protector every home and business place needs; Christmas is coming—urge your trade to buy something business men can use. Your profit \$8 per doz. Sample, fifty cents. Ajax Supply Co., 411 Bulletin Bldg., Phila., Pa.

AGENTS—Your profit \$4 each sale. Just out, new gasoline saver for automobiles and motor boats. Guaranteed to save 25 per cent on gasoline bills. Auto owners buy on sight; nothing like it; a sensation. Territory now being placed; write quick. The Parsons Mfg. Co., 153 Michigan St., Toledo, O.

MINIATURE Velvet Rugs. Catchy, use ful, ornamental, absolutely new idea. Millions will be sold. Be the early bird. 10 cents for 5 samples and selling plan. O'Brien & Co., 1334 McCormick Bldg., Chicago.

AGENTS—Salesmen: Reasonable seller, latest \$3.50 electric invention fills demand never before supplied; home, office, store, everywhere eagerly sought. Repeat orders outnumber first sales; you control territory, no competition, unlimited possibilities. Write Frank W. Alden, Agency Manager, 149 Station F, Cincinnati, Ohio.

WE manufacture the most complete assortment of novelties, tricks, and puzzles in the world. Agents, dealers, supply houses and jobbers are making big money with our line. Fast sellers. Low quantity prices. Large illustrated catalogue free. Oaks Magical Co., Dept. 17, Oshkosh, Wis.

SPECIALTY Salesmen: Something new, latest electrical wonder, a substitute for medicine, the High Frequency Violet Ray machine. Relieves all chronic disorders due to faulty nutrition or poor circulation. Sells to every home, massage or beauty parlors, also professional people. No competition, big money. Machine and results guaranteed. Good territory open. The Eastern Electric Company, Cleveland, O.

GENERAL Agents, capable of calling on the big trade themselves and handling canvassers for the house to house and office to office business, to sell the newest electric specialty on the market; sold everywhere there is electricity, in the home, office, factory, store, hotel; liberal profits; sales-driving sample, weighs a pound; no experience or knowledge of electricity required; shows how to use one light instead of two and get the same results; sells for \$2.50, \$3.50, \$5, and saves the purchaser an investment of \$25. Write for particulars. The Handy Light Co., 161 Handy Light Block, Cincinnati, Ohio.

HERE'S your opportunity to make a killing with a real "live wire" proposition of unlimited possibilities, universal appeal, low price and clean profit. We have a dozen "good things." All winners. No need to read further. This is "the dope." Write Now and "cash in." Mack-Andrew Co., 709 Rand-McNally Bldg., Chicago.

GENTLEMEN or lady Agents to sell our Pencil Sharpener to stores, schools, banks, offices or homes, liberal commission allowed. Beebe Co., 338 York, New Haven, Conn.

VACUUM Cleaner Agents: Do not take an agency until you see the "U. S." Just out! Wheel-operated. Powerful bellows. Nickled visible nozzle. Popular price. The U. S. Manufacturing Company, Warren, O.

AGENTS are coming money with our Improved Keyless Padlock. 150 per cent profit. Sample postpaid, 75c. Get busy. Wm. J. Dick, Mgr., Dept. D-51, 20 W. Lake St., Chicago.

100% PROFIT selling Specialty Rugs. Colored illustrations and information of success free. Sample rug forwarded prepaid \$1. Reference: Boylston Nat'l Bank, Boston. Dundee Mfg. Co., 46 Chauncy St., Boston, Mass.

WE start you in a big paying business that grows larger every month; fine opportunity for ambitious agents; generous sample free. Morgan Supply Co., S. Louis.

SALESMEN—Send your name and address to Raymond E. Wood, 125 Dreyer Bldg., Cincinnati, Ohio. I am the manufacturer's Sales Manager for the best household and office electric specialty ever invented. Sells for \$3.50 and \$2.50. Guarantee for credit or deposit required. Capable men only need apply. I want only a few men; the work is permanent, profitable and high-grade. You will be given territory and expected to produce business.

"BOOSTER" will show you how to make more money! Operate a good, substantial "Income Mail Business." Our "Silent Salesman" system can easily be worked during spare time. Don't invest any money until you read "Booster"—the magazine that has, for years, actually and accurately placed others like you in business for themselves by publishing money-making propositions that get the dollars. Send 10c today for two months' trial—it's worth cold cash to you. Booster Magazine, Northwestern Building, Chicago.

AGENTS—A 10c package of my Compound makes a quart of standard ink. Excellent seller. Good profits. Particulars, samples, three colors, 6c. A. D. Meiler, New Brunswick, N. J.

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

MANUFACTURE "Substitute for Eggs" enormous profit; eggs are high; supply bakeries, restaurants, groceries, etc. Secret formula with instructions, \$1. Particulars free. W. C. Deibel, 309 S. Fickett, Los Angeles, Cal.

AGENTS Wanted for "Election." Best card game. Write Election Card Co., Wichita, Kan.

SOAP Agents: Our Vegetable Soap, Toilet Articles, Flavorings, Remedies, excel and outsell. Sample free. Buchanan & Co., 54 N. Main St., St. Louis, Mo.

AGENTS: Let us show you how to earn \$10 daily with rapid-selling household article. Rocky Mountain Sales Co., Dept. A, Steamboat Springs, Colo.

MAKE and sell your own goods. Formulas by Expert Chemists. We obtain your Government Serial Number. Catalogue for stamp. B. Mystic Company, Washington, D. C.

AGENTS, make big money selling my new remedy for burns and scalds. Every household needs it. Act quick. R. F. Flint, Berkeley, Cal.

AGENTS—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office; liberal profits; sales-driving sample, weighs a pound; no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results; sells for \$3.50 and saves the purchaser an investment of \$25. Write for particulars. The Handy Light Co., 113 Handy Light Block, Cincinnati, Ohio.

\$61.50 WEEKLY introducing and selling a new Gas Light Burner for Kerosene Lamps. Beautiful light. No chimney. No mantle. Perfectly safe. Simple in construction. Nothing to get broken or out of order. Will not burn out. Durable. Will last for years. Low price. Easy to sell. 200 per cent profit. Experience not necessary. Sample free. Why not try one on your lamp? Beware of imitations. No branch offices. Luther Manufacturing Co., Dept. 255, Cincinnati, Ohio.

AGENTS—Drop dead ones! Awake! Grab this New invention. Low-priced, water-power home Massage Machine. Magical, marvelous, mysterious. New field; big profits; sold on money-back guarantee. "Marg-walker sold 5 in 10 minutes; 31 in 2 days." "Parker sells 8 first day." Vaughan: "Your machine has merit. Express six dozen. Certainly wonderful." Big surprise awaits you. Address Blackstone Company, 829 Meredith Building, Toledo, Ohio.

AGENTS—Would you take a steady job where you can clear \$20 to \$30 weekly and work up to yearly profits of \$3,000 or more? My line is snappy household goods. Quick sellers. Get busy with postal, asking particulars. E. M. Davis, R 64, Davis Block, Chicago.

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

AGENTS make 500% profit selling our gold window letters, novelty signs and changeable signs. 800 varieties in enormous demand. Catalogue free. Sullivan Co., 1238 Van Buren St., Chicago, Ill.

WE want enterprising and hustling agents everywhere to handle our artistic Sign Letters—best made—anyone can apply. Free working outfit and instruction furnished; make sales as fast as you solicit. Forest Letter Company, Parisen Building, South Amboy, N. J.

FREE—Moving-Picture Machines, Electric Engines, Printing Press, Rifles, Watches, Gold Jewelry, for selling one dozen Quix Shine Polishing Cloths. Write for particulars. Quix Specialty Company, 2754 Germantown Ave., Philadelphia, Pa.

AGENTS, men or women, \$50-\$75 weekly. New invention. Greatest household labor-saver since the sewing machine. Housewives can't resist. \$1.50 sample free to workers. Lifetime opportunity! Frederick Mfg. Co., Dept. C, Marbridge Bldg., New York.

AGENTS—Let us send you a \$2 sample outfit with our new line of specialties. We are manufacturers, giving you largest profits. Staple sellers, proven successful. Barker Chemical Co., 20 Center, Auburn, Maine.

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.

A BUSINESS of your own, \$15 a day, making name plates, house numbers, signs. Write for my big, free illustrated book; tells how. E. E. Palmer, Wooster, O.

AGENTS—New automatic gas burners and gas lighters. No chemicals or flint. Every gas user a purchaser. Sample 20c; particulars free. Automatic Gas Appliance Co., 42 Union Sq., New York.

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

MEN, with Ford Cars, to sell Sandbo Starter; only live ones need apply; big proposition. Write. The Sandbo Starter Co., Bennett, Iowa.

LIVE agents make big money selling our new patented office convenience. Salesmen desired capable of earning fifty dollars a week. Box 376, Clarksburg, W. Va.

TO sell our new high-grade specialties. Quick sellers. All money-makers. For particulars, write The Geanee Sales Co., 167 W. Washington St., Chicago.

AGENTS Wanted—Agents are coining money selling our big 10c packages of 20 assorted Holiday Postal Cards. "5,000 varieties." "Big profits." Sell everywhere at sight. Sample package 10c. Particulars free. Sullivan Card Co., 1234 Van Buren St., Chicago, Ill.

AGENTS: A wonderful stove polish; just out. Sells at every house. Big profits. Write for free sample and general agents' terms. Milwaukee Specialty Co., 231 7th Street, Milwaukee, Wis.

AGENTS—\$6 to \$10 per day. Fast sellers. Retailing 10c to \$10. \$5 safety razor 25c. Particulars free. Thomas & Page, 421 E. 41st St., Chicago.

BOYS to act as our agents, selling local school and fraternity pennants. No investment necessary. Write Illinois Pennant Co., 1105 Webster Ave., Chicago.

REMNANT Store, 1331-E. Linn, Cincinnati. Greatest Dry Goods Bargains on Earth. For agents and store-keepers.

AGENTS—Sales Companies—Send for Booklet on Suds, greatest washing compound. Guaranteed harmless. With free trial box; easy seller, sure repeater, splendid profit. The Franklin Company, Desk K, 303 Fifth Ave., N. Y.

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

AGENTS: Our line of sixty specialties the best ever offered. Many repeaters. Get our proposition. Seymour Specialty Co., Dept. N, Box 21, Syracuse, N. Y.

AGENTS—\$7 daily taking orders; get busy now; big winter business for you; cannot fail; free sample. L. Bennett, Utica, N. Y.

AGENTS—All or spare time; increasing, permanent trade. Indian Medicine Co., Grand Rapids, Mich.

MANUFACTURER of new exclusive linen heel and toe guaranteed hosiery wants agent in every county. Sales enormous. Re-orders insured; permanent, increasing income. Protected territory. Credit. N. Parker Mills, 720 Chestnut St., Philadelphia, Pa.

AGENTS—150% Profit on Each Sale. Show housewives how to do an hour's hard work in a jiffy. Unique household preparation and our original "Entering Wedge" plan makes easy sales and big profits. Excellent opportunity to control this in your territory. Jiffy-Brite Laboratories, Dept. M, Boston, Mass.

A SALES company with a capital of \$500,000 building up a national sales organization, wants a live representative in every city and town. Big cash returns and steady yearly income guaranteed. Write today for full particulars. Fesler Sales Company, 256 West 23d St., New York City.

AGENTS, 100 per cent. A new novelty for women, never been sold in stores; 15 cents brings sample and catalogue with special prices to agents. J. C. Mendenhall, 1717 North Illinois St., Indianapolis, Ind.

WANTED! Enterprising American agents! Invention for drying films and prints without trouble! Simple, practical attachments, instantly adjusted anywhere. Holds 6 dozen negatives—No clips. (Good seller Xmas sales.) Send 25c for sample-particulars. "Richarda," 4 Moscow Road, Bayswater, London, England.

AGENTS—We want a real live salesman in every town to push a staple line of household necessities. A permanent, big-paying business for the successful. No novelty, but standard articles that are always needed. Exclusive territory. Consumers Supply & Brush Co., 66 Devonshire St., Boston, Mass.

400 PER CENT profit selling "Rabbit-foo" sewing machine attachment. Sample free to agents. Bunnell, 605 Blake-McFall Bldg., Portland, Ore.

AGENTS: Hair-O-Zone Powder, added to water only, makes greatest of hair tonics. Profits enormous. A. S. Bucknam, 187 Madison St., Brooklyn, N. Y.

AGENTS Wanted—Right here is the one big chance of your life. If you want to make good money—\$10 a day or more, as easy as rolling off a log, and get your swell clothes free besides, you can do it by acting as our agent. We are the biggest people in the business and want our agents to make big money and be nifty, stylish dressers. Send a postal today for free \$10 outfit, including a big book of nobby suiting samples to select your swell agent's suit from. Then take orders from people who admire your nifty clothes. They come to you—not you to them. This is the way to get rich—the sure, easy way. Remember you need no money—everything is furnished by us free. We pay express on everything. Just send a postal, but do it today. You can't get started too quick, making this big money and wearing these stylish clothes. Address card to Paragon Tailoring Co., Dept. 1214, Chicago, Ill.

\$1,200 COLD Cash—Made, Paid, Banked in 30 days by Stoneman; \$15,000 to date. Join our famous \$1,000 class, which absolutely insures \$1,000 per man, per county. Korstad, a farmer, did \$2,200 in 14 days. Schleicher, a minister, \$195 first 12 hours after appointment. Ten inexperienced men divided \$40,000 within 18 months. Strange invention startles world. Agents amazed. Think what this invention does: Gives every home a bathroom with hot and cold running water for \$6.50. Abolishes plumbing, water works. Self-heating. No wonder Hart sold 16 in 3 hours—\$5,000 altogether; Lodewick 17 first day. Credit given—Come now—Investigate. Postal will do. Exclusive sale—requires quick action, but means \$1,000 and more for you. Allen Mfg. Co., 3806 Allen Bldg., Toledo, Ohio.

HAMMER attachment, plants nails with single hand; "striking invention," delish and fascinates. 300 to 900% profit. State territory to general agents, supply dealers; no canvassing. Street demonstrators make \$5-\$10 hour. Sample free. L. Guillemet Mfg. Co., 3529 Mission St., San Francisco.

TRY our Christmas and New Year big money maker. Our silent salesman method does all the work; investigate quick. Sample and particulars, 10 cents. Pioneer Supply Company, Paterson, N. J.

AGENTS—Our aluminum ware, silverware, cutlery and holiday specials will clear you \$35 to \$60 a week. Write Sterling Aluminum Company, Canal Station 77, Chicago.

\$30 WEEKLY Selling "Easy" Suction Sweeper. Wheels operate cylinder, creating powerful suction. All metal. No pump. No bellows. Low price. Guaranteed. Sample Free. Write quick. Foote Sweeper Co., Box 2060, Dayton, Ohio.

SANITARY Appliance for telephone mouth-pieces. Sells everywhere \$1; profits 150%. One company purchased over 1,200. Exclusive agencies open. Phondate Company, 521 Nasby Bldg., Toledo, Ohio.

TEN Cents brings wholesale prices and sample razor guaranteed to shave, equal to \$5 razor. Morgan, 312 Madison, Chicago.

WANTED—Men, Women, Boys and Girls to appoint agents for a good selling article. Send 15c coin for sample and full particulars. A. S. Mankin & Co., Alexandria, Va.

\$100 IN Gold to man getting most shaves from "Prestoblades." Write immediately for particulars. International Razor Company, Indianapolis, Ind.

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

AGENTS: Sell best Iron Rust, Ink and Stain Remover made, 300% profit; 25c tube mailed, 10c. Particulars free. W. B. Williams, Dept. 18, Montclair, N. J.

WRITE quick for list of practical mail order sellers which you manufacture at home. "All Winners." P. Benson, Stewartville, Minn.

CHRISTMAS Post Cards. Send for 20 packages Christmas post cards to sell at 10c pkg. When sold send us \$1 and keep \$1. Hodges & Wilbur, 13 Rockland St., Taunton, Mass.

GREATEST Christmas seller out. Absolute necessity. Positively sells in every home. Particulars free. M. J. Logan Mfg. Co., 2311 Lyndale St., Chicago.

NEW Patent Burglar Alarm. Agents make \$5 to \$10 per day. Sample postpaid, 38c. Lee Mfg. Co., 1417 Belleplaine Ave., Chicago.

AGENTS Wanted—If you know a chance when you see it you'll see one now. Big money—stylish, nifty clothes—little work—no experience or capital needed—can you beat that? We want agents everywhere to take care of our business in their localities and to advertise our nobby, nifty suits by wearing them. We furnish everything complete and charge nothing for agents' outfit. The swellest dressers everywhere are our agents and all we ask is that you tell people who inquire about your fine clothes where and how they can get them. You make big money—\$10 a day—without trouble. Just a postal brings you full outfit free. Big, new sample book of up-to-the-minute suitings sent so you can pick out your first suit; also measuring blanks and everything you need. We pay express on everything—not a penny for you to pay. Send quick before some one else gets the agency there—mail postal today to American Woolen Mills Co., Dept. 1214, Chicago, Ill.

AGENTS—Every household on farm, in small town or suburbs where oil lamps are used needs and will buy this wonderful mantle lamp; burns kerosene, gives a light five times as bright as electric; one farmer cleared over \$500 in 6 weeks; hundreds earning \$100 to \$300 per month. Write quick for wholesale prices, territory and sample lamp for free trial. Mantle Lamp Co., 351 Aladdin Bldg., Chicago, Ill.

BE Our Agent. We make the best Vacuum Sweeper manufactured. Women are crazy for them. We will sell you one at lowest agent's prices. Test it at home. Show it to other women tired of sweeping, dusting, etc. Take their orders and make money for yourself. Write at once for agency terms. The Junior Vacuum Cleaner Co., Dept. A, Bradford, Pa.

YOUNG Man, would you accept and wear a fine tailor made suit just for showing it to your friends? Or a Slip-on Raincoat free? Could you use \$5 a day for a little spare time? Perhaps we can offer you a steady job. Write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Co., Dept. 560, Chicago.

AGENTS, Canvassers, Crew Managers. Salesmen wanted in every community for our famous 7 and 8 cake \$1 soap assortments; advertising price 25c; costs 12½c; attractive premiums given; everybody buys; lose no time getting our list money-getters. Moore Bros. Co., manufacturers (established 1890), 289 Greenwich St., New York.

We start you in big money-making business. We trust you for outfit. It costs money for you the minute you get it. 85c profit on every dollar. Circulars free. F. P. C. C. Works, Desk 47, 2231 W. 12th St., Chicago.

650% PROFIT—Earn \$25 to \$100 weekly. Families buy 12 to 40 sets. Hotels hundreds. Gliding Casters. Anyone can attach. Save carpets, furniture, floors. Carry in pocket. Free sample. Evergrip Co., 20H, Warren St., N. Y.

WHEN you sell Feeny Vacuum Cleaners you make pleased customers. New principle—creates wonderful suction. One general agent's total commissions 1912 were \$18,498. Write today for our attractive propositions. Feeny Mfg. Co., 1-28, Muncie, Ind.

AGENTS: Kerosene (Coal Oil) Self-Heating Iron. Brand new. Absolutely safe, odorless. A winner. Every home needs it. Low priced. Big profits. Your territory open. Thomas Iron Co, 162 Neal St., Dayton, O.

PHOTO Pillow Tops, Portraits, Frames, Sheet Pictures, Photo China Plates. Rejects credited. Prompt shipments; samples and Cat. free to agents. 30 days' credit. Jas. C. Bailey Co., Desk P6, Chicago, Ill.

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

If you want 100% to 500% profit quick, sell our assortment of practical and necessary articles for the home. Not found in any stores. Entirely new line at popular prices. Send today for descriptive catalog and terms to agents. Specialty Mfg. Co., 20 Brigham St., Westboro, Mass.

AGENTS Wanted—Salesmen financially able to deal in popular-priced Domestic Electric Refrigerators. Fred Winter Wolf, Gen'l Agent, 243 Railway Exchange, Chicago.

STRICTLY high-class article for automobiles—nearly every car owner buys—our representatives making good money. 100% profit. Sta-Brite Mfg. Co., West Unity, Ohio.

\$5 TO \$20 daily to agents who are hustlers, selling our new and wonderful line of goods. Our big capital backs you. Exclusive territory. Wm. J. Dick, Manager, Dept. D-4, Chicago.

SOMETHING to think about: An engine that has no cams or valves; no supply or exhaust. Heat alone makes it run. Made in toy size 7" high. Will run toy fans or small toy machines. Most wonderful invention of the age. Agents wanted. Send \$3.50 for agent's sample. Address Sandage Foundry Company, Oregon, Ill.

BE independent. Work for yourself with our new invention. Just patented. No canvassing. 8c profit on every dime. Free circulars. International Metal & Ferro Co., Desk 48, Chicago.

AGENTS—Postal brings free illustrated Directory. Contains details newest, best-selling specialties, money-making propositions of responsible concerns. Philip Butler Publishing Co., 123 Cedar St., New York.

PORTRAIT Agents—Deal direct with the artist; better picture, better terms; send for price list and samples. The Combined Artists, 519 New Era Bldg., Chicago, Ill.

AGENTS—Two of the best sellers on the market; sell at every house. Send 25 cents for samples. Old Colony Supply Co., 15 Court Square, Boston, Mass.

"START Right!"—magic words to success; booklet 10c. Why waste time selling something unsold to your taste and location? We start you right. Associated Factories, Statesville, N. C.

AGENTS—Snappiest household line on earth. Red-hot sellers, steady repeaters. Over 150 different articles. Goods guaranteed. 100% profit. Write quick—hurry. E. M. Feltman, Sales Mgr., 6718 Sycamore St., Cincinnati, O.

AGENTS—Amazing invention, \$8 daily! 100% profit. New business. No competition. Presto cleans and polishes silverware like magic. No rubbing or scrubbing—makes tarnish vanish. Whirlwind seller; exclusive territory. Write quick. International Factories Co., 17 East Erie St., Chicago.

NEW, Red-Hot Office Specialty. Sells quick. 25 cents. Sample and particulars 10 cents. G. Mack Supply Co., Milwaukee, Wis.

GENERAL Agents and Mail-Order Dealers: Get our proposition on the greatest seller for next five years. Patented. Phelps Specialty Company, Dept. M, Caro, Mich.

AGENTS \$50-\$75 weekly selling guaranteed knit goods for largest manufacturer in America. Established 30 years. Complete outfit free. Madison Mills, Dept. 7A, 484 Broadway, New York City.

AGENTS, you can sell our raincoats. Anyone will buy. Best Christmas gift. Outfit free. "Dept. 1," Temple Raincoat Co., Templeton, Mass.

EMBOSSED metallic gold sign letters—Instructions for making. Material cost, 100 ¼-inch, 38c. Why pay more? Johnston Co., Quincy, Ill.

AGENTS: Big pay. Goods on credit. Write for plan. Rochelle Mercantile Agency, Rochelle, Ill.

AGENTS. Write for particulars regarding our tire repair kits. Big profits—easy sales. Tire Repair Co., Racine, Wis.

AGENTS—Cracking good proposition—\$35 to \$60 a week for you with our exclusive extract, spice and toilet goods line. Ask us what's doing. Western Laboratories Co., 1910 Van Buren, Chicago.

"SERVES You Right," this machine absolutely new; make \$150 each sale. "It serves all." Serve-All Co., Chelsea, Mass.

SOAP agents make more money selling the celebrated Linro line. Coffee, flavorings, spices, soaps, perfumes, and 125 other items. Big commissions to you. Exclusive territory. Freight allowed. Handsome premiums to your customers. Free sample case. No deposit required. Free catalog. Linro Company, 13 Linro Bldg., St. Louis, Mo.

BE Independent—Start a mail order business in your own home; we tell you how and furnish everything needed, wholesale; an honorable and profitable business for man or woman. Many make \$3,000 a year. Particulars free. Murphy Mfg. Co., East Norwalk, Conn.

AGENTS—Splendid money-maker. Sell chewing gum to dealers. Clean, profitable business established quickly with our new brands. Four flavors. Novel packages. Write for exclusive territory proposition. Helmet Gum Factory, 39 Opera Place, Cincinnati, O.

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

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

I NEED one energetic, dependable representative in every county to take orders for our new Popular Mechanics book for boys called "The Boy Mechanic." This is not a story book, but a wonderful and interesting collection of 700 things boys love to make and experiment with. A very large attractive book for the price, \$1.50. Every boy's father or mother will want to buy it for their son. Right now is the most opportune time to start on account of the approaching holiday season as this is an unusually attractive gift book. It sells itself. Good liberal commission and exclusive territory. You don't have to be a professional agent to be successful with this highly meritorious proposition. Work in and around your home town during spare time only if you cannot devote all your time to it. Write today for full particulars to Manager Book Dept., Popular Mechanics Co., 318 W. Washington St., 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.

AGENTS, best seller in Christmas season; very rare and newest Japanese novelties that we have ever seen. Sample 25c. Osuka Co., 223 So. Hill St., Los Angeles, Calif.

AGENTS—Our Wonderful Luminous Crucifix Solves that Christmas Gift Worry. Each crucifix will be put up in an attractive holly box, making same a most appropriate present. Thousands will be sold during the next two months. Let us show you our new "Dark Room" Demonstrating Carrying Case. Write or wire for prices and territory and start the New Year with a nice bank account. Pioneer Portrait Co., 1259 W. 63rd St., Chicago.

WE furnish you capital to run a profitable business of your own. Become one of our local representatives and sell high grade custom made shirts, also guaranteed sweaters, underwear, hosiery and neckties, direct to the homes. Write Steadfast Mills, Dept. 10, Cohoes, N. Y.

AGENTS—\$200 monthly distributing Newell's needle cases. Sell 115 needles in book for 10c and make 200% profit. Approval Plan envelopes make talking unnecessary. Crew managers write. Send 10c for sample book and particulars. Newell Company 509 N. Grand St., St. Louis, Mo.

1,000% PROFIT selling our un tarnishable gold and silver sign letters. Hundred 4 1/2" letters 90c. Thousand \$8.00. Other sizes accordingly low. Dime brings five 4 1/2" samples. Instructions, etc. Particulars free. H. Alexander, Manufacturer, 980 Third Ave., New York. Established 1905.

AGENTS—Are you interested in 250% profit in an article used in every home weekly? Send 6c for 2 weeks supply and terms. L. V. Washing Tablet Co., Dept. B, Philadelphia.

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

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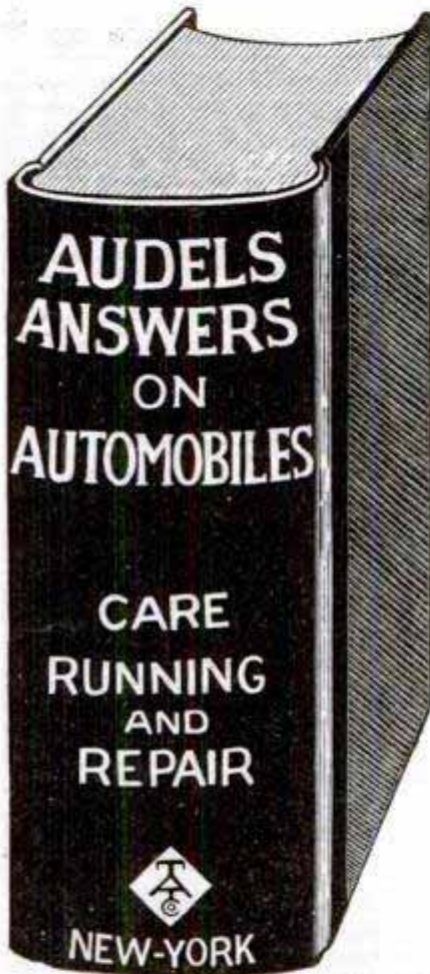
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- First Prize—FRED B. STONER, Masontown, Pa. \$10**
"Temporary Leather Bearing Replaces Babbitt in Automobile Engine"
- Second Prize—JAMES E. McCORMACK, Haliburton, Ont. \$5**
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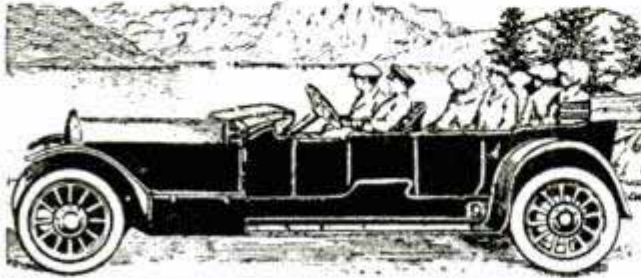
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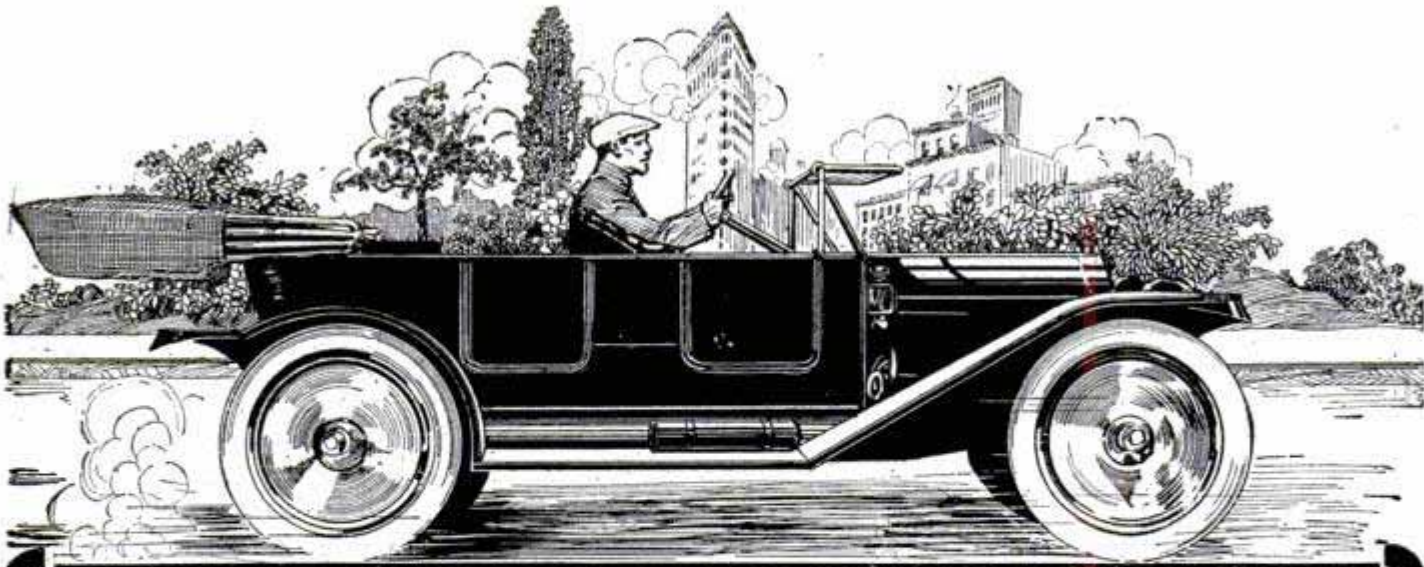
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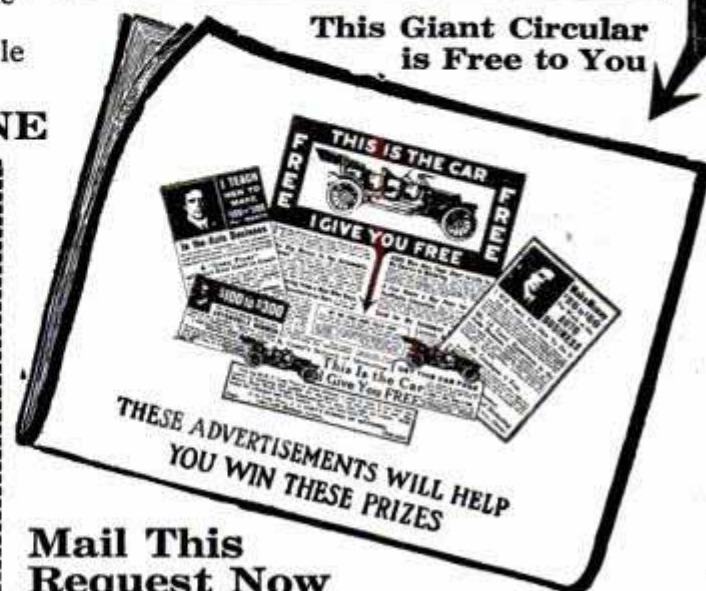
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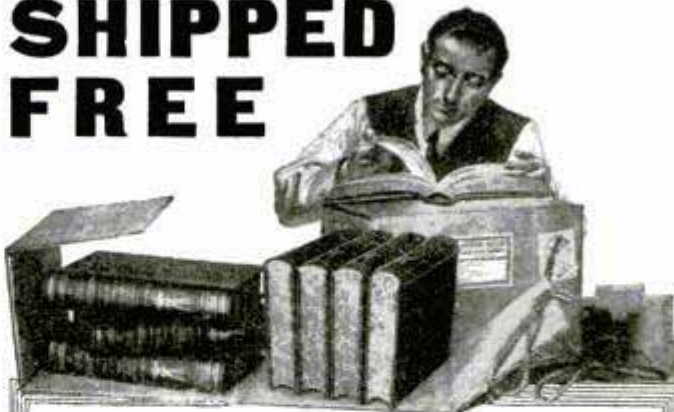


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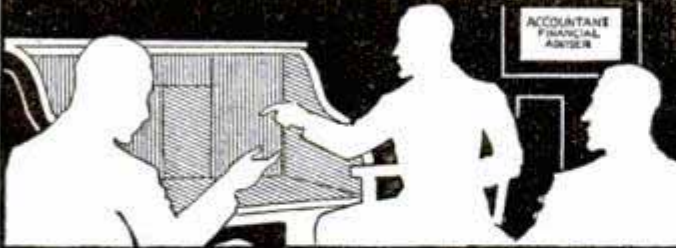
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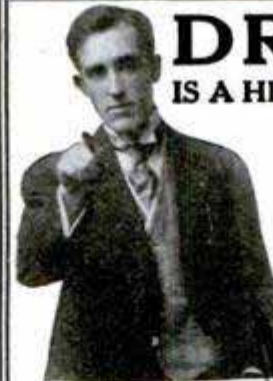


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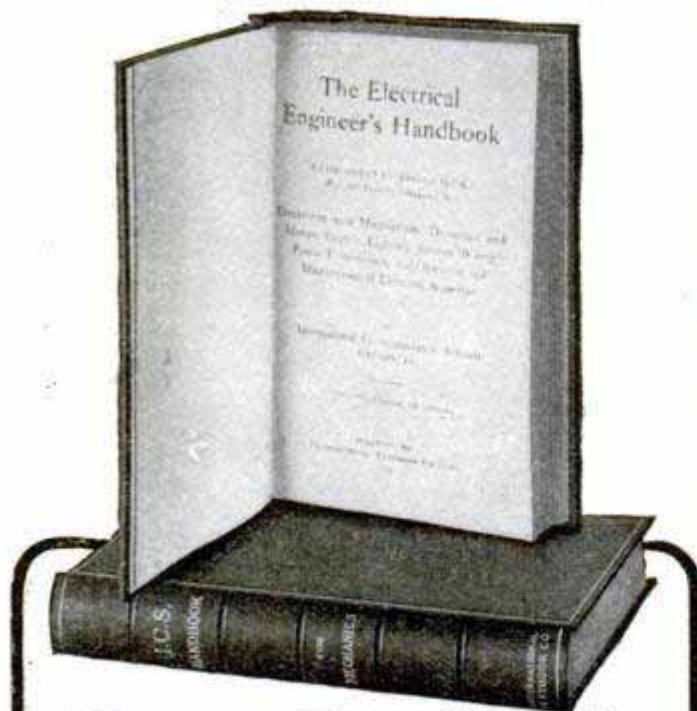
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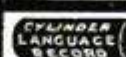


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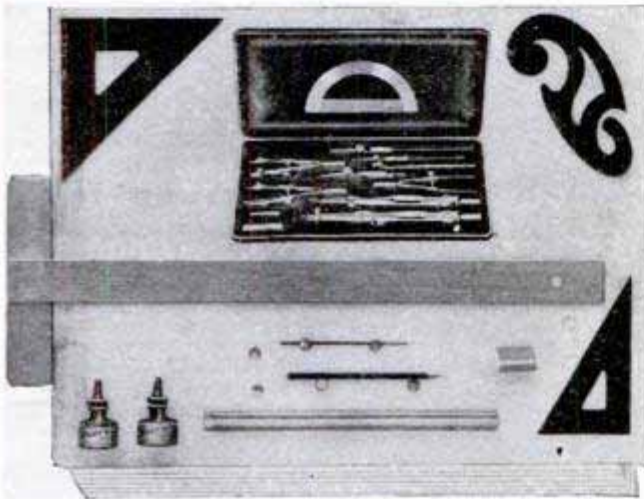
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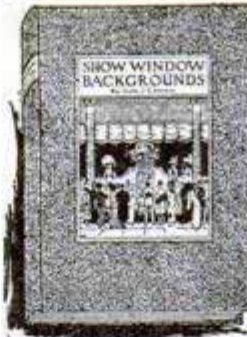


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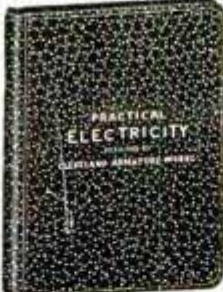
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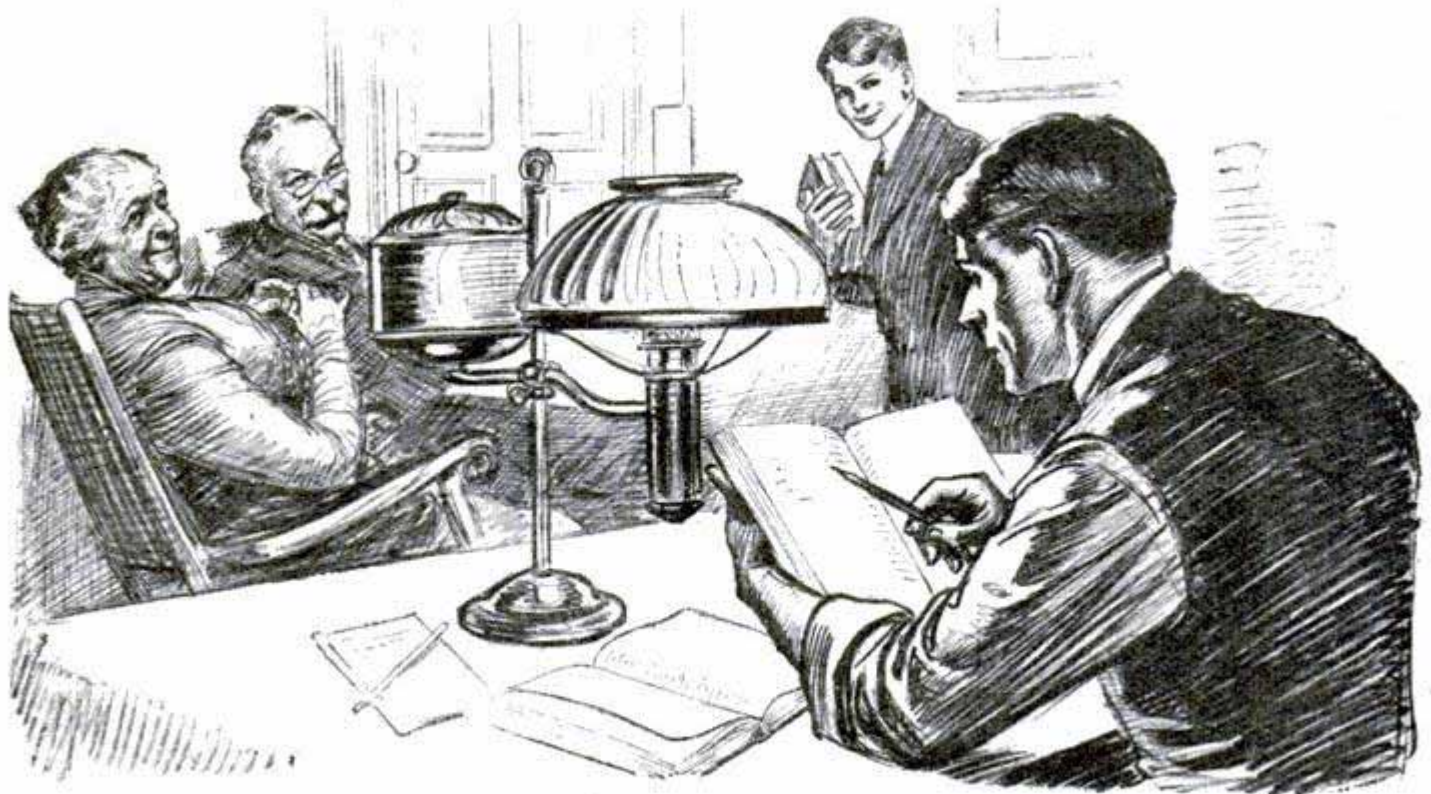
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Resolve, then, to become specially trained. Decide today to fit yourself for a trade or profession and make your mark in it. Remember, it all depends on *you*. If you have the *determination* to get ahead, *reasonable ability* and a *willingness* to learn, training will start you on the road to success—a better job—bigger pay.

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Vol. 20

DECEMBER, 1913

No. 6

A Shipwreck with Many Unusual Features

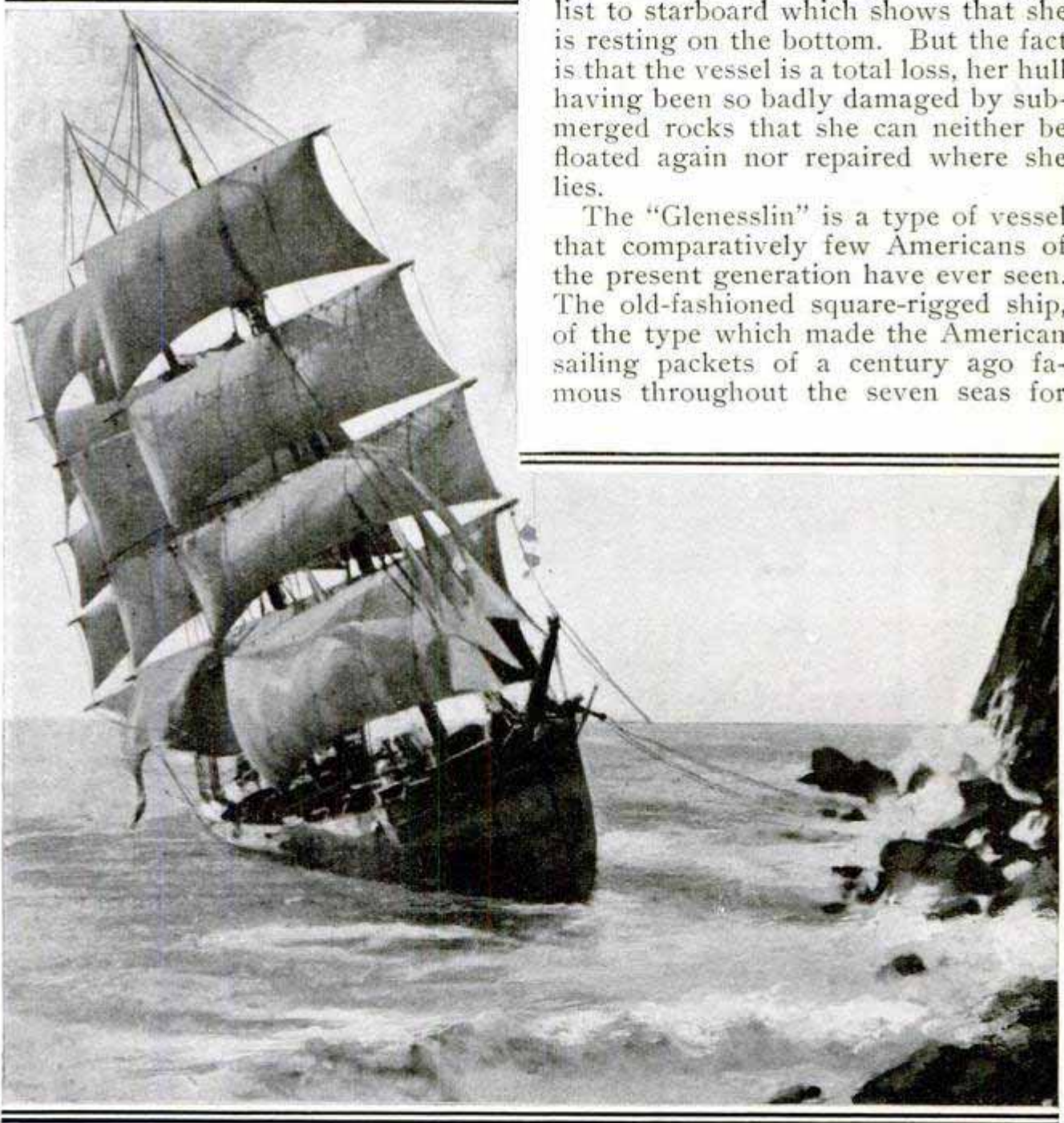
Sam Raddon, Jr., 894 E. 9th St., Portland, Ore.

ON the afternoon of October 1, 1913, the British three-masted sailing ship "Glenesslin" went ashore near Nehalem, on the Oregon coast, in a very heavy fog with all her cru-

ing sails set. Her officers and crew were taken ashore on a life line.

To the landlubber the excellent photograph of the wrecked "Glenesslin" reproduced herewith does not indicate her serious situation beyond the slight list to starboard which shows that she is resting on the bottom. But the fact is that the vessel is a total loss, her hull having been so badly damaged by submerged rocks that she can neither be floated again nor repaired where she lies.

The "Glenesslin" is a type of vessel that comparatively few Americans of the present generation have ever seen. The old-fashioned square-rigged ship, of the type which made the American sailing packets of a century ago famous throughout the seven seas for



A British Ship Wrecked on the Oregon Coast in Daylight

their speed and seaworthiness, has almost disappeared from the "Western Ocean," as seafaring men call the Atlantic. When a square-rigger does occasionally come into port at New York, Boston, or Baltimore it is an event worth chronicling on the first pages of the newspapers. In the Pacific trade the square-rigged ship is more common and a score or more may often be seen at anchor at one time in San Francisco Bay or any of the Puget Sound ports. Even here, however, the more easily handled schooner, often with

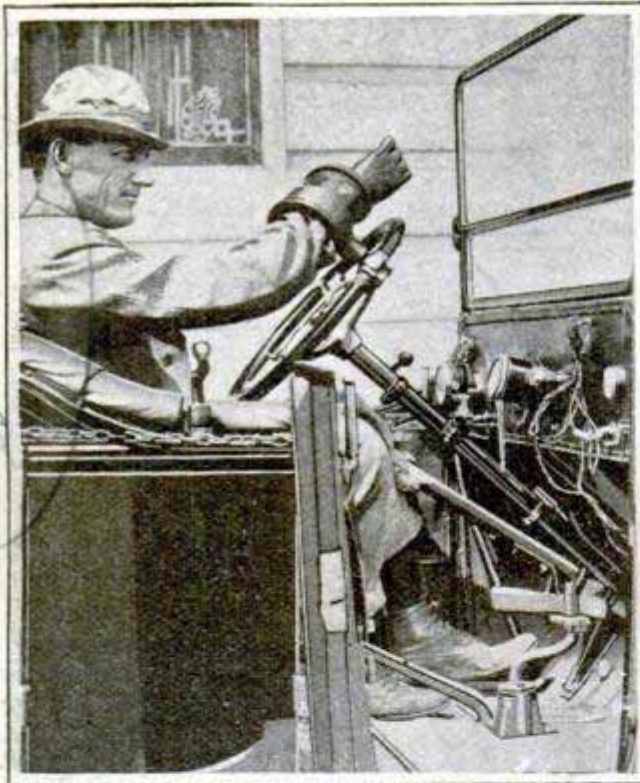
five or six masts rigged with fore-and-aft sails, is beginning to crowd out the square-rigged ship except on the trade-wind routes.

When the "Glenesslin" struck she was carrying, as the photograph shows, her courses, topsails, topgallant sails, and royals. Under full sail she would also carry topgallant-royal sails, her topmasts being of unusual height. She carried no cargo at the time, being bound in ballast from Santos, Brazil, around the Horn to Portland, Ore., for a cargo of wheat.

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Although he lost his left arm, left leg, and right hand in a railway accident a few years ago, a citizen of



Ingenious Arrangement by Which Cripple Drives Auto

Fresno, Cal., drives his car every day by an ingenious arrangement shown in the accompanying illustration. With one foot and the stump of his right arm he controls the automobile without difficulty, and is able to thread his way through the crowded streets to all intents as well as the next man.

ROOF AS PLAYGROUND FOR EMPLOYEES

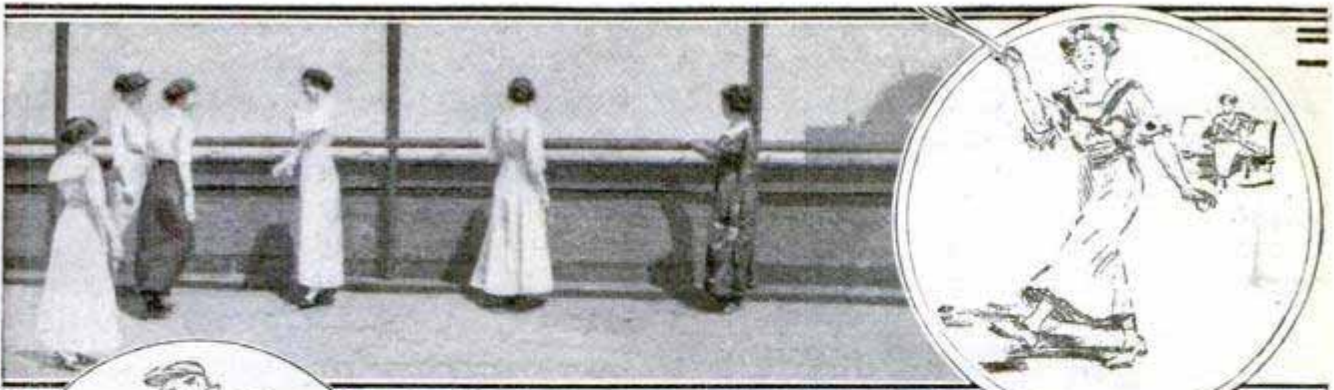
Utilizing the roof of their new building as a playground and recreation spot for their employes, a Chicago concern located in the downtown district has solved a problem which confronts many large business houses. One section of the space set apart is fenced in with strong wire netting, heavily reinforced. In this section the men and boys play indoor baseball. Next to this is a lounging room and smoker, merely a continuation, which is roofed over and furnished with plenty of comfortable porch chairs and settees, and the room is made attractive with flower stands and palms. This lounge opens into the dining room. On the opposite side are rooms for the use of women employes, a library and rest room, and an emergency hospital. Opening from this section is another roof garden exclusively for women's use. Here, amid flowers and palms, they may walk, rest or exercise and from the beautiful view of lake and city obtain relaxation from the office grind which is so largely the basis of "nerves."

ⒸThe heaviest railway construction ever undertaken in British Columbia is the 38-mile section of the Kettle Valley Railway from the Hope Range summit to Hope. This line, which includes 12 tunnels, is estimated to cost \$3,000,000.

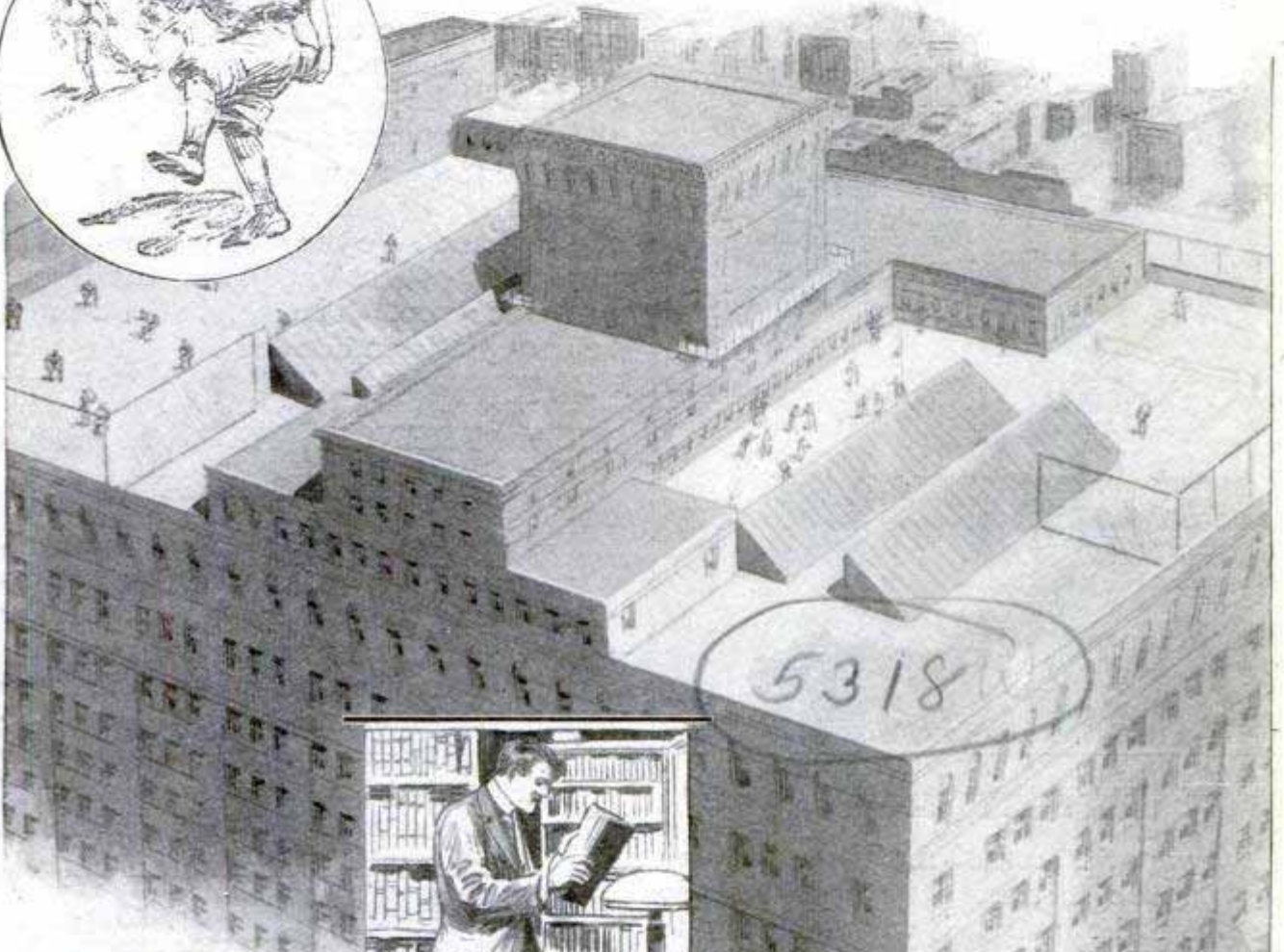
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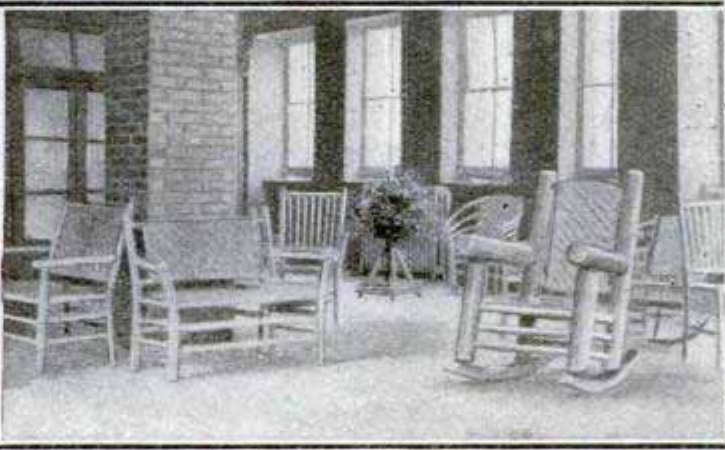
Buller...



Promenade on Roof of City Block



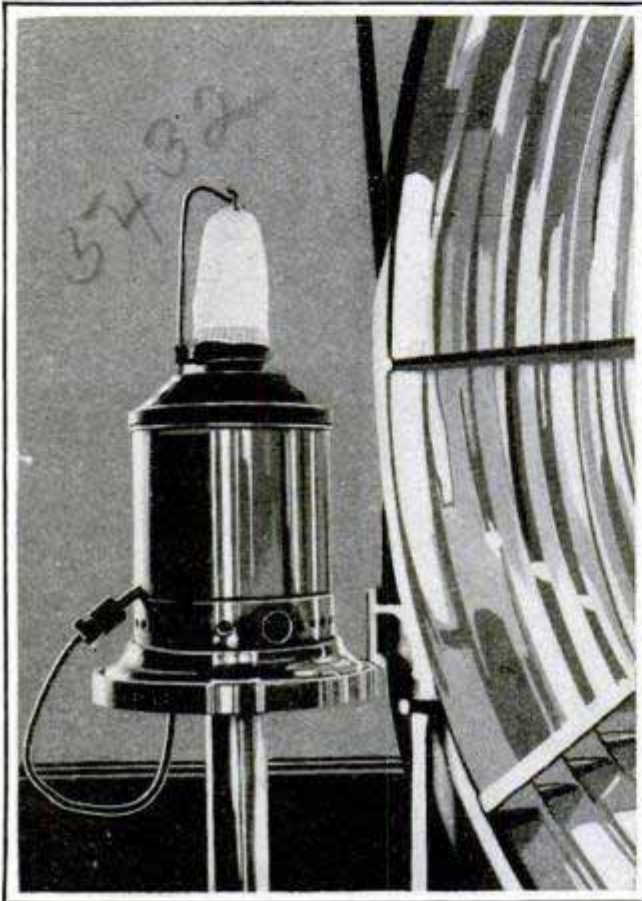
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KEROSENE-VAPOR LAMPS FOR U. S. LIGHTHOUSES

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New Type of Kerosene-Vapor Lamp Used in United States Lighthouse Service

sene-vapor lamps of the United States lighthouse service. The first of these lamps to be installed, which is the one shown in the accompanying illustration, is the near-range light of the Ambrose Channel in New York Harbor. In this lamp the kerosene, after being vaporized, is burned in a mantle similar to the ordinary gas mantle. This mantle, which is 4 in. high and 3 in. in diameter, has a candlepower of 15,000. The kerosene is vaporized by applying heat to a small feed pipe that runs up the center of the lamp and supplies the fuel to the burner. As long as the lamp is burning this pipe is kept hot by the flame, a small portion of which is diverted for this purpose, and there is a constant supply of the kerosene vapor. For starting the lamp, it is necessary to vaporize the fluid by

heating this pipe with a small alcohol burner, which is turned off as soon as the light is well started. The liquid kerosene is forced up to the vaporizing tube by air under a pressure of 60 lb. to the square inch.

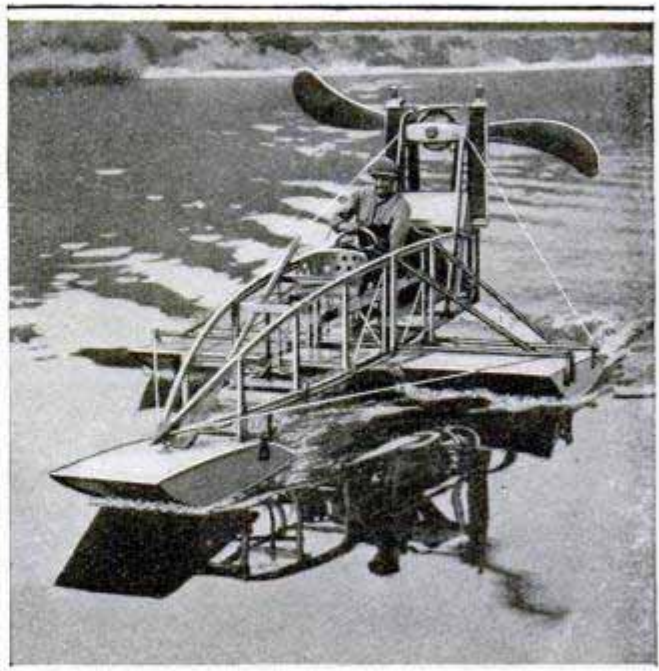
TELEPHONE FROM HOLLAND TO ENGLAND

Sci. Am. 9/27/13

A submarine telephone is to be laid between Holland and England. The cable will be 105 miles in length and the total expense is estimated at more than \$3,000,000, which will be borne conjointly by the two countries. On the Holland side the starting point will probably be Westkapelle on the island of Walcheren. The English terminal has not yet been decided on.

NEW FRENCH HYDROPLANE OF CURIOUS DESIGN

Fifty horsepower developed in a gasoline engine drives this French hydroplane over the water at an amazing speed. Power is transmitted by chain drive to the air propeller, and the three pontoons, or floats, which form the "boat" draw but very little water. The rudder is placed a little to the rear of the front pontoon.



Late Application of Air Propeller to Watercraft

*Meurisse,
9, Faubourg Montmartre,
Paris*

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Store Improvement Co. 147-6 Broadway & 42nd St., N.Y.C.



Plain Window Shows Confusing Reflections



Curved Window Reveals Interior Plainly

55-09 W

A show window which renders objects on display as clearly visible as though there were no glass at all has recently been installed in one of the big New York department stores. The new "shadow-box" window eliminates all reflection and thus avoids the common and annoying fault in the ordinary display window which reflects sky, buildings, street traffic, etc., more brilliantly than it displays the merchandise the store offers for sale. The new type of window, which is patented, is divided into an upper and a lower light, the latter extending to a height well above the head of a very tall person, and each glass is curved inward. The curve, which has been determined after careful study of optical laws, diverts the rays of light from the street, downward or upward, at an angle at which the diverted light rays strike a black plate which absorbs them. In the ordinary window on bright sunny days it is necessary to stand so close to the mirrorlike surface in order to see clearly the goods on display that one's nose must flatten against the plate glass. Window dressers have been obliged to resort to

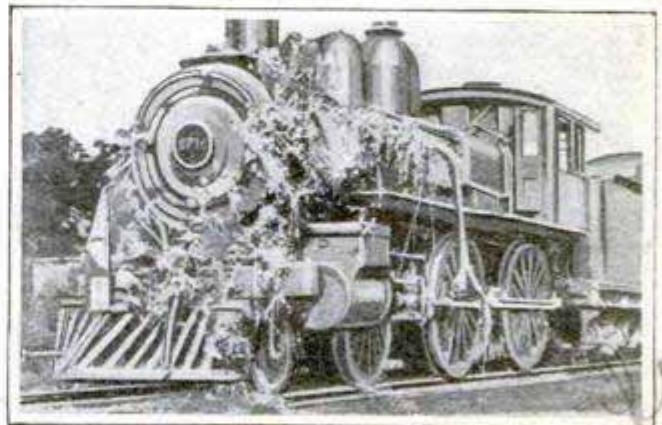
expedients of various colored backgrounds, wide awnings, and interior illumination, with only partial success. In case of shops which wish to display their entire interiors, as piano and automobile stores, the window-box arrangement gives full range of vision, requiring no background.

Imagination

ENGINE COVERED WITH DEBRIS BY FLOOD

5871 W

Unprecedented rain caused a rapidly rising flood in Duck Creek, Ohio, and caught two trains of the Pennsylvania Railroad, extinguishing their fires and



This Train had been Submerged by Flood in Ohio. The Engine was Struck by a Bridge Adrift

J.W. Lee, Jr. Penna. R.R. Co. Broad St. Sta.

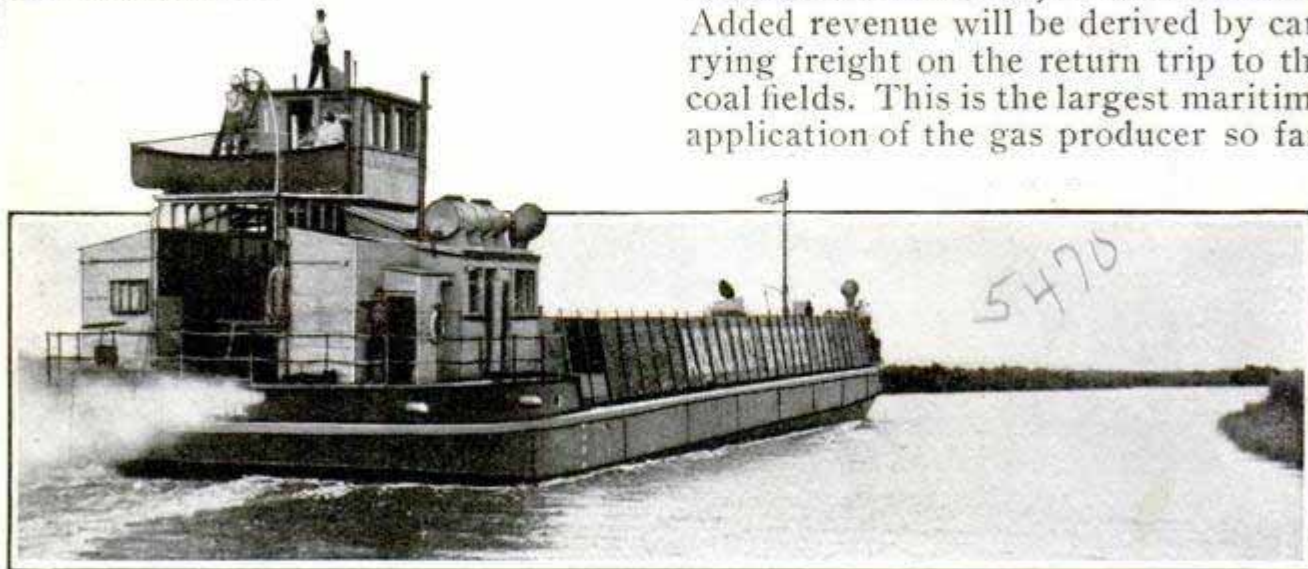
overwhelming them with water and floating debris. The photograph shown tells the story of the passenger train. The headlight was torn from the engine by a covered bridge which whirled down in the current. All the passengers and crew were rescued, and mail matter, express, and most of the baggage escaped unhurt. The freight train was literally torn to pieces, the cars overthrown and scattered by the swift current.

SELF-PROPELLED BARGES FOR INLAND WATERWAYS

Barges of large capacity, driven by producer gas that is made on the vessel as needed, are the latest development in freight transportation on inland waterways. A fleet of 15 such barges is now being built at the rate of one a month to convey coal over the 500 miles of connected waterways between the coal fields of northern Alabama and New Orleans. These barges are said to be the first craft of their kind to be propelled by producer-gas engines. The route traversed by the barges comprises the Black Warrior, Warrior, and Tombigbee Rivers in Alabama, Mobile Bay, Mississippi Sound off the coast of Mississippi, and Lake Borgne, Lake Borgne Canal and Mississippi River in Louisiana. The barges have a draft of 7 ft. when fully loaded, a draft that is safe and practicable over the entire route.

Each of the barges is of steel construction and similar in design to those in use on the canals of Holland. All are of the same dimensions, the length being 240 ft.; width on deck, 32 ft.; width at bottom, 28 ft., and depth of sides, 8 ft. The weight of each barge with its equipment is 240 tons and the cargo capacity 1,000 tons. Each barge is propelled by twin screws and makes a speed of about 7 miles an hour when fully loaded. The screws are driven at 300 revolutions per minute by two 75-hp. vertical producer-gas engines, the gas for which is supplied by a 150-hp. gas producer. The fuel used for the producer is what has heretofore been a waste coke from the ovens of the Birmingham district, which is secured, consequently, at a low price. Approximately 1 lb. of this fuel is required for each horsepower-hour. An auxiliary power plant consisting of a 9-hp. gasoline engine supplies power for driving the pumps and a generator that furnishes current for electric lights and other purposes.

A decided advantage of the self-propelled barge is that it passes through a lock, of which there are many on the Warrior and Tombigbee Rivers, in about 20 minutes, whereas more than an hour is required for a towed barge. The trip from the coal fields to New Orleans is made in 72 hours, and it is estimated that with 15 barges in service coal will be moved into New Orleans at the rate of 50,000 tons a month. Added revenue will be derived by carrying freight on the return trip to the coal fields. This is the largest maritime application of the gas producer so far.



Self-Propelled Barge Operating between New Orleans and the Coal Fields of Alabama

5490 M
 V.P. 11, German
 Ala. & N. O. Trans. Co.
 15-06 Hibernia Bk. Bldg.
 New Orleans, La.

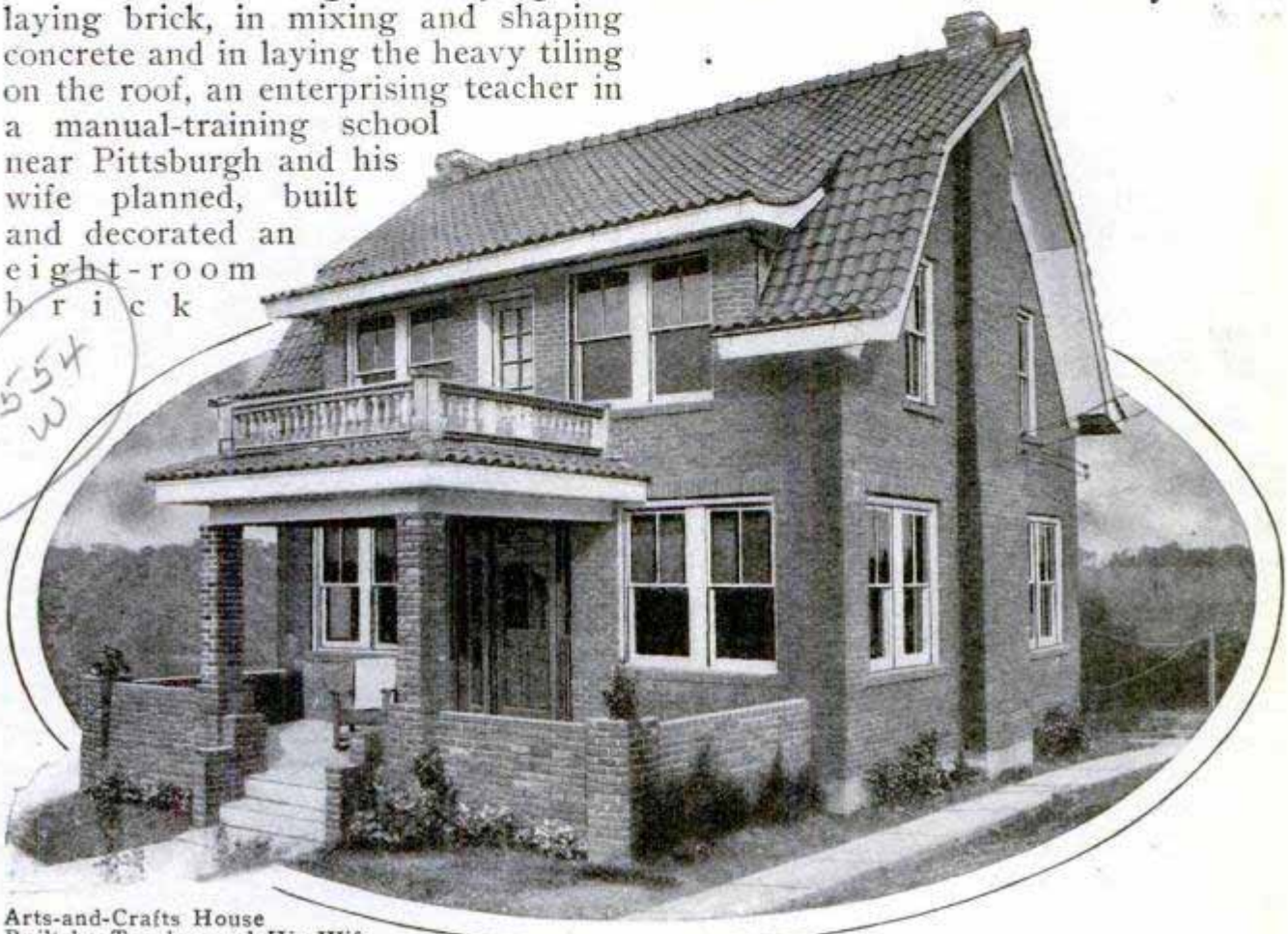
MARRIED COUPLE PLAN AND BUILD HOMEMADE HOUSE

Unusual

Sharing equally the hardest labor involved in excavating, in carrying and laying brick, in mixing and shaping concrete and in laying the heavy tiling on the roof, an enterprising teacher in a manual-training school near Pittsburgh and his wife planned, built and decorated an eight-room brick

the school, had only the hours before and after his work, and holidays. The

5554
W



Arts-and-Crafts House
Built by Teacher and His Wife

house, which is a model of convenience and of artistic designing. No outside help was employed save that a plumber and an electrician were called in to conform to the building laws of the state. Every piece of furniture, from kitchen table to library chairs, was designed and made by the competent hands of this resourceful couple. The heavy chandeliers and candelabra, ornamented with massive brass domes, with large chains and with quaint border designs; the inlaid pieces of great artistic value, and labor-saving devices in kitchen and laundry are their handiwork. Two years were spent in the building of this homemade house, and the result is a constant source of pleasure. The work was equally divided, for while the husband was the stronger and could do more work in a short time, the wife had all day to devote to her tasks, while he, being employed in

total cost of the house was \$3,500 and the lot cost \$1,500. An offer of \$10,000 for the property has been refused, so that this industrious couple earned \$5,000 in their spare time in two years, besides enjoying themselves.

PRECOOLED FRUITS REACH DISTANT CITIES

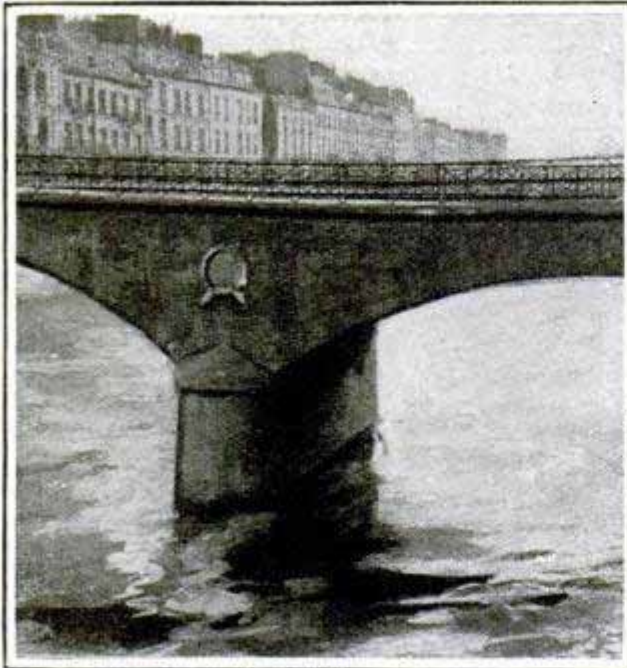
5329 W

Under the supervision of the U. S. Department of Agriculture, definite results have been obtained in precooling berries and other fruits which heretofore have shown marked deterioration when shipped long distances. Two methods have been tried, one in which the fruit was precooled from one to three days in a warehouse, under conditions which are familiar in ordinary cold-storage plants, and in the other method the fruit was first packed in refrigerator cars, and then cooled from

H. W. Stebbins
U. S. Dept of Agric.
Bureau of Plant Industry

5381W

Headline



Bridge Across the River Loire Closed to Traffic, Large Cracks Showing

24 to 72 hours before shipment, by blowing chilled air through the cars with fan and exhaust. Small fruits, such as berries and unwrapped peaches, gave good results when loaded in cars before pre-cooling, but oranges, lemons, and apples, especially when wrapped in paper, are best handled by being treated in pre-cooling rooms in the warehouse before loading into cars. After loading, both large and small fruits are handled exactly in the same way as the ordinary refrigerator shipment of perishable freight, being iced at regular icing stations, but taking appreciably less ice than usual shipments. On arrival at eastern markets, the fruit showed greatly reduced deterioration, the loss being about one-half that sustained under old shipping conditions.

SPECTACULAR COLLAPSE OF FAMOUS FRENCH BRIDGE

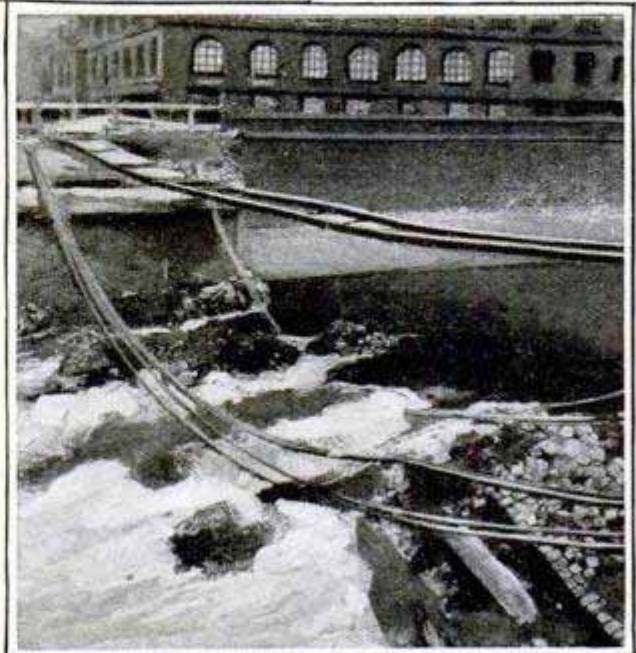
L'Illustration 7-26-13

A bridge spanning the river Loire, at Nantes, France, and known since its construction, in 1779, as the "accursed" bridge, collapsed completely last summer, leaving only the street-car tracks and service cables suspended above the river. No life was lost in the accident. The bridge, which was of stone masonry, was reconstructed in 1841. For some time previous to the collapse the bridge had been closed to traffic, large cracks showing. The peculiar name given to the bridge was due to the high feeling which ensued when its cost was laid upon neighboring merchants.

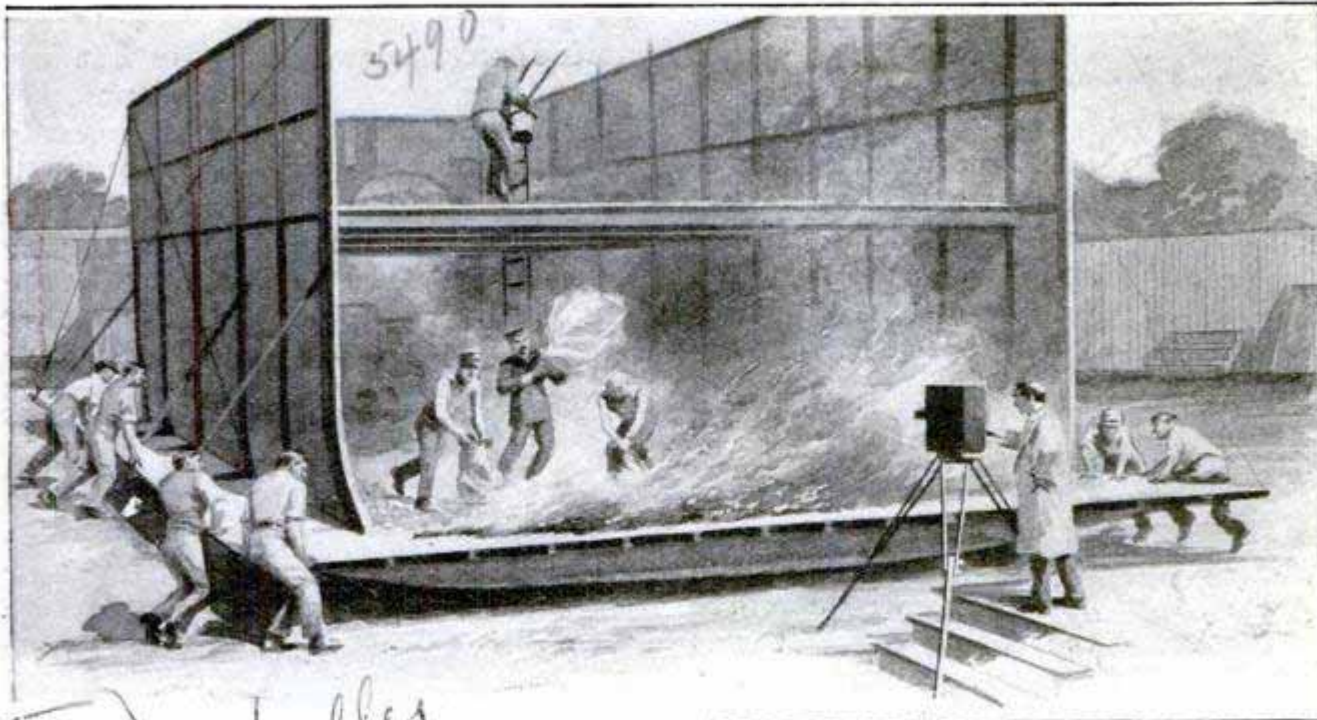


Courtesy L'Illustration
Fall of the Last Pier

After the Collapse: Street-Car Tracks, Electric Cables and Water Pipes Connect the Two Sides of the River



Ⓢ Panama Canal equipment, including drills, steam shovels, dredges, dump cars, locomotives, etc., having an estimated total value of \$25,000,000, is to be sold at public auction by the government as soon as the work at the Isthmus is finished.



Burning of an Ocean Liner Staged for the "Movies"

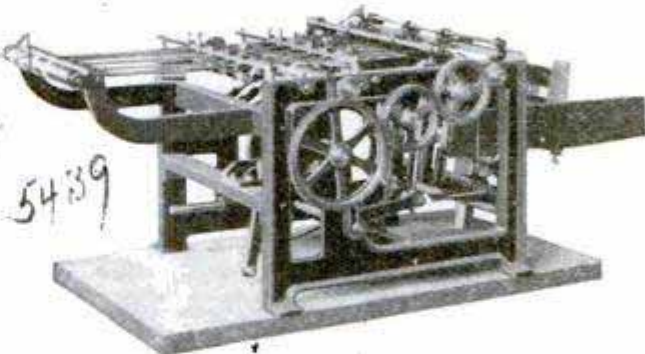
5490W
MOTION PICTURE REPRESENTS BURNING SHIP

Thriller
Reclam Universalism
 Plenty of life and action is secured by the wide-awake makers of films for the "movies." Here is represented the production of a sensational film, "Fire on an Ocean Liner." The scene shows a fire in a boiler room, a realistic copy of that of a large steamer. Flames rise in great volume, smoke pours in torrents, the firemen fight frantically, and all the time the vessel rocks in the struggle of the storm. The picture shows how the illusion is produced. The section is mounted on huge rockers, and is set in motion by workmen on either side.

flexing machine is designed to work in unison with folding machines and with presses which deliver folded sections. The flexer receives the folded section, carries it through the open jaws of a pair of grippers until the back of the section meets an adjustable stop, when the grippers close and carry the section over rollers which bend the section in a line parallel with the closed back. On the return trip over the rollers, the section is again bent in the same place but in the opposite direction and is then discharged into a stacking box. At the point where the

Bookbinding machinery
MAGAZINE FLEXER SOLVES PROBLEMS AT LOW COST

5439W
 Two big problems that have confronted printers and bookbinders are promised a successful solution in a flexing machine recently patented. One of these problems is to secure a flat-opening book that does not involve the expense of sewing, and the other is to produce a book of coated paper that is free from the danger of tearing apart between sections. This new



Machine Which Makes Flat-Opening Book Possible at Low Cost

section is bent it sustains a permanent flex, and when the sections are gathered and bound by wire side stitching, the book opens flat in the reader's hand, the pages falling readily to right or left as desired.

Chas. W. Neare, Adv. Mgr.
Winton Motor Carriage Co.

#1062-108 - May 20-1915
Rev. Aug. V. 190 p 603

NITROGLYCERIN CRUMPLED THIS PIPE

Extraordinary toughness in a Bessemer-steel casing, used in drilling an oil well at Gore, Ohio, was demonstrated when a length was left by accident in the bore, into which 170 qt. of nitroglycerin had been placed for a shot. It was decided to fire the shot anyway, in the belief the explosion would force the casing out. It was not driven out, however, but stuck about 1,500 ft. from the surface, and was later pulled out by getting a bell socket over it. The casing joint, originally 18 ft. in length, was found crumpled and crushed by the force of the explosion, but not fractured. It was reduced to 8 ft. in length, twisted, distorted, and crushed, but unbroken.

National Tube Co. Pittsburgh, Pa.

BARGES DRIVEN BY AERIAL PROPELLERS

One of the latest uses of the aerial propeller is that of driving barges in small canals and rivers where, by reason of the slight depth, the marine propeller is uneconomical and often impracticable. The efficiency of the aerial propeller at high speeds has apparently been proved, the greatest speed that has yet been made on water, 55.8 miles an hour, having been attained by the use of such a propeller

for the British Ass'n, Eng'g Sec. at Birmingham 1913.

The Engineer, London 19/1/13

coil data letter 1/1/13

worked by a motor of only 82 hp. A marine propeller working in shallow water loses much of its efficiency and recent British experiments indicate that the problem of navigating economically the small canal or river may be solved by the use of the aerial propeller. In waterways that are obstructed by weeds the aerial propeller also appears to solve what has heretofore been a difficult problem. It is now easy to build an aerial propeller that will give a thrust of 250 lb. when driven by a 16-hp. motor. This is sufficient to drive at a speed of 4 miles an hour a barge loaded with 30 or 40 tons and towing an additional barge of equal weight and lading. The operating cost is only about half that of horse-towed barges.

EXCAVATION FOR THE GREAT ARROWROCK DAM

The Arrowrock dam, being built by the United States Reclamation Service for irrigation storage purposes, is located 20 miles from Boise, and will be 350 ft. high, one of the highest dams in the world. From 60 to 80 ft. below the river bed lies the granite bedrock upon which the foundation of this huge wall of reinforced concrete is to be erected. The width of the canyon at the river bed is about 200 ft., and the thickness of the dam at the bottom will be about 240 ft. Since floods of varying magnitude occur at somewhat regular periods in the year, the building of this dam presented difficulties of moment. It was finally decided to build diversion works to take care of about 20,000 cu. ft. of flow per second, and build first a section of the dam only 100 ft high. Thus it was not necessary to complete all the excavation at once, the plan being to finish the work in sections between flood periods. Bedrock was first reached October 18, 1912, excavation amounting to 170,000 cu. yd. being completed and concrete brought up to its full height April 15, 1913, well in advance of the spring floods. Some five years' more work remains to be done.



5332 W

531 W

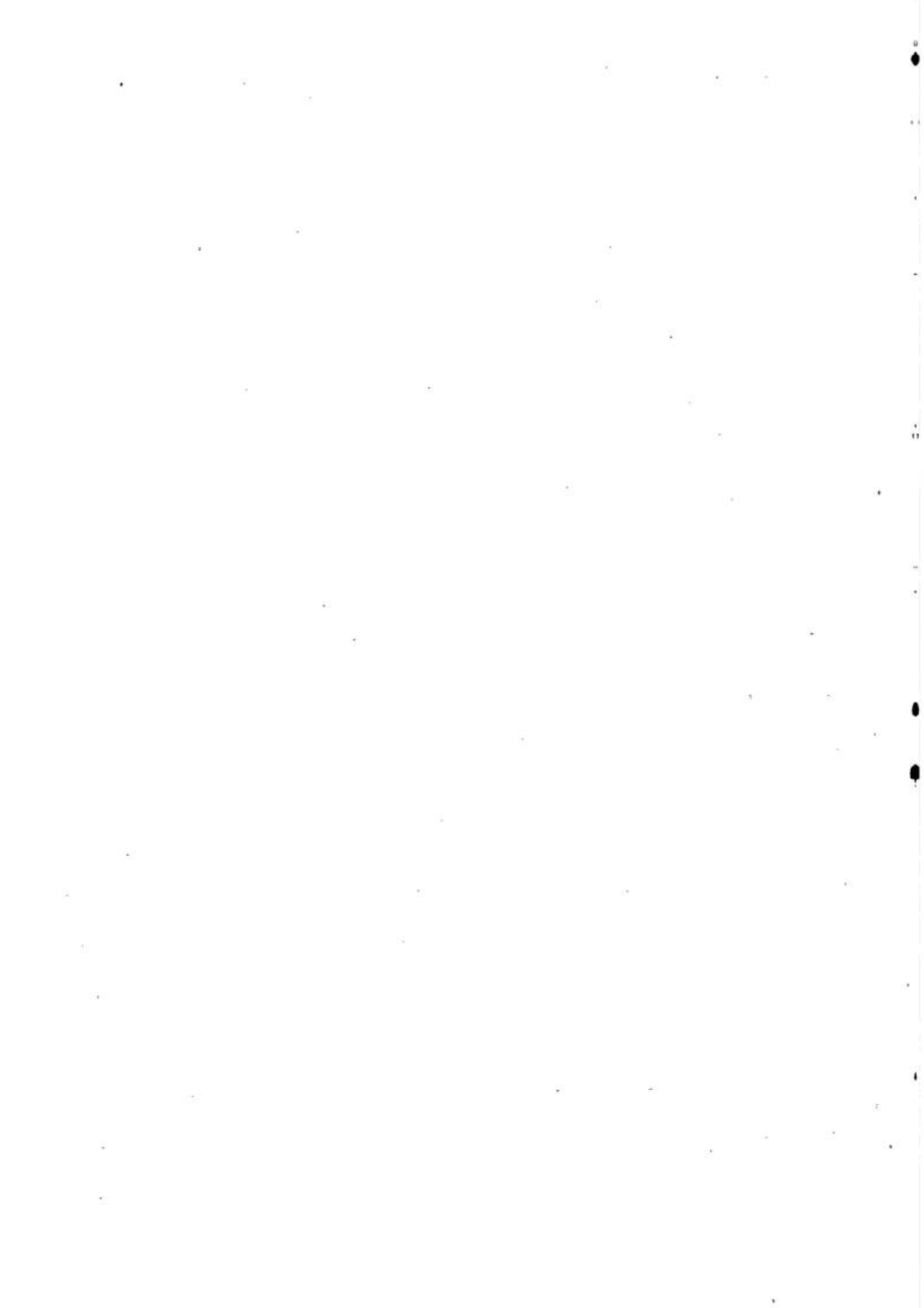
5518 M

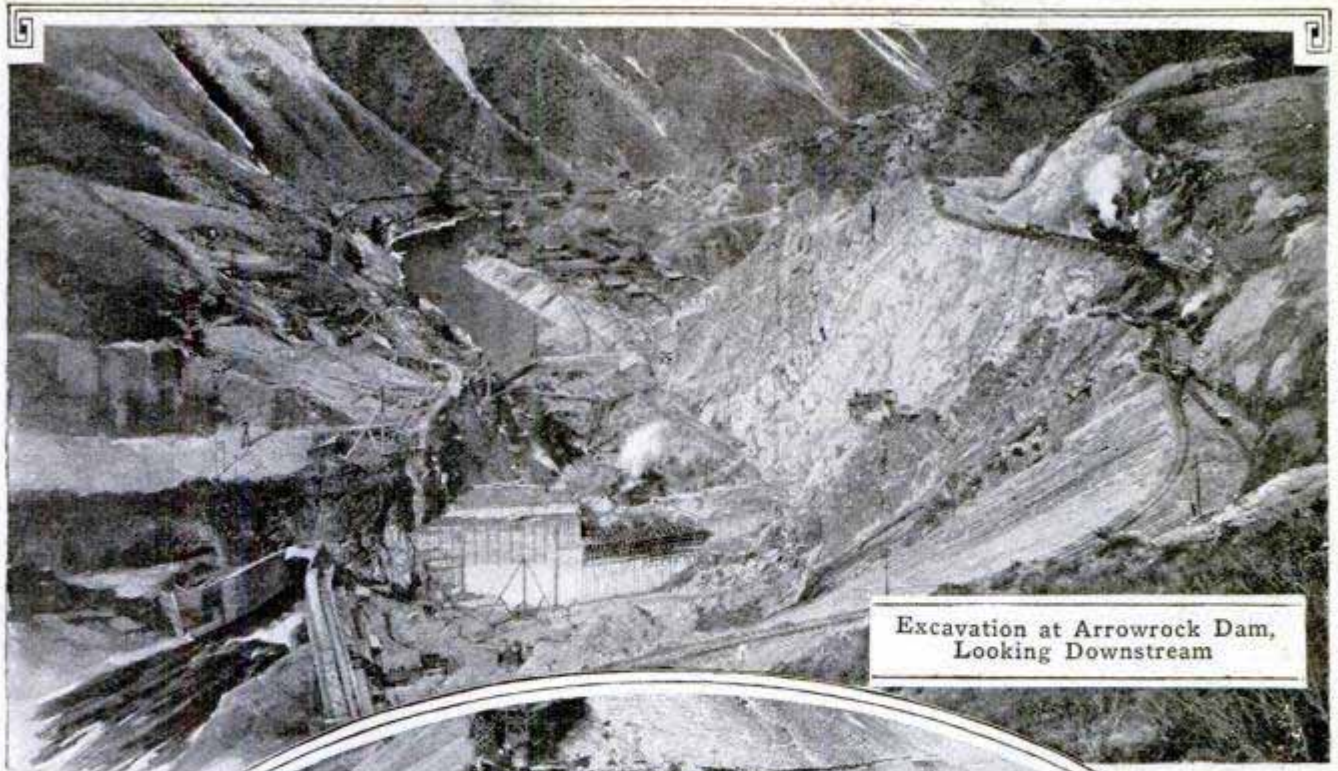
Do you know if there have been any tests made to determine the difference in efficiency of an air propeller and a water propeller for a motor boat? Could you give me the address of anyone who has had experience along this line?

Chicago, Ill.

C. F. S.

We do not know of any direct tests made on a given boat to find out whether an air propeller or the ordinary marine propeller is the more efficient as applied to the boat. The few boats driven by air propellers have shown themselves to be universally inefficient. This is very probably due to the fact that the propellers used were of limited diameter and the boats of comparatively slow speed, a condition which would militate against the maximum possible efficiency being obtained. F. W. Lanchester, the English authority on aerodynamics, states that the efficiency of a properly designed airplane propeller ranges from 80 to 85 percent, and that these efficiencies are checked by experimental results. The maximum efficiency obtainable with a marine propeller is about 78 to 80 percent., but the conditions under which this maximum efficiency can be obtained are hardly ever met with in marine work, so that the average efficiency of a highly developed and properly designed marine propeller will range from about 65 to 72 percent. According to these figures the aerial propeller would seem to have the better of it, but practically there is very much doubt that this would be the case when applied to boat work.

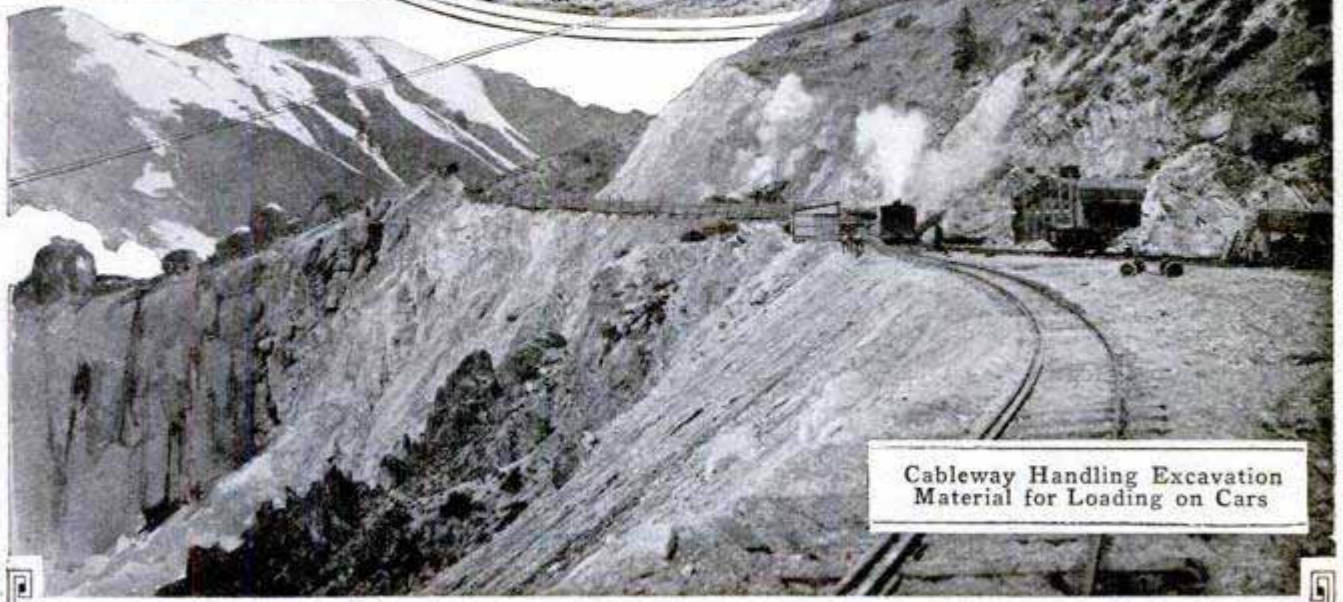




Excavation at Arrowrock Dam,
Looking Downstream



5386
First Section Nearing Completion.
This Portion Only 100 Ft. High



Cableway Handling Excavation
Material for Loading on Cars

*Chas. H. Paul, Const'n Engineer,
Arrow Rock Dam, U. S. Recl. Service,*

POST-CLIMBING DEVICE WITHOUT SPIKES

A friction post-climbing apparatus to take the place of the usual line-men's spikes has been invented in

England. It is safer than spikes, does not deface the posts, and with it a metal post as well as a wooden one can be climbed. Two clamps, one with toe holds for the feet and the other with handles and a strap to go around the body,



This Man is Standing on One of the New Post Climbers Clinging to an Iron Lamp-Post

are used in the outfit; and each clamp, consisting of two semicircular steel straps, bolted to an extension arm, is constructed so that weight applied to the end of the extension arm causes the straps to grip the post, as is shown in the picture of the man on a lamp-

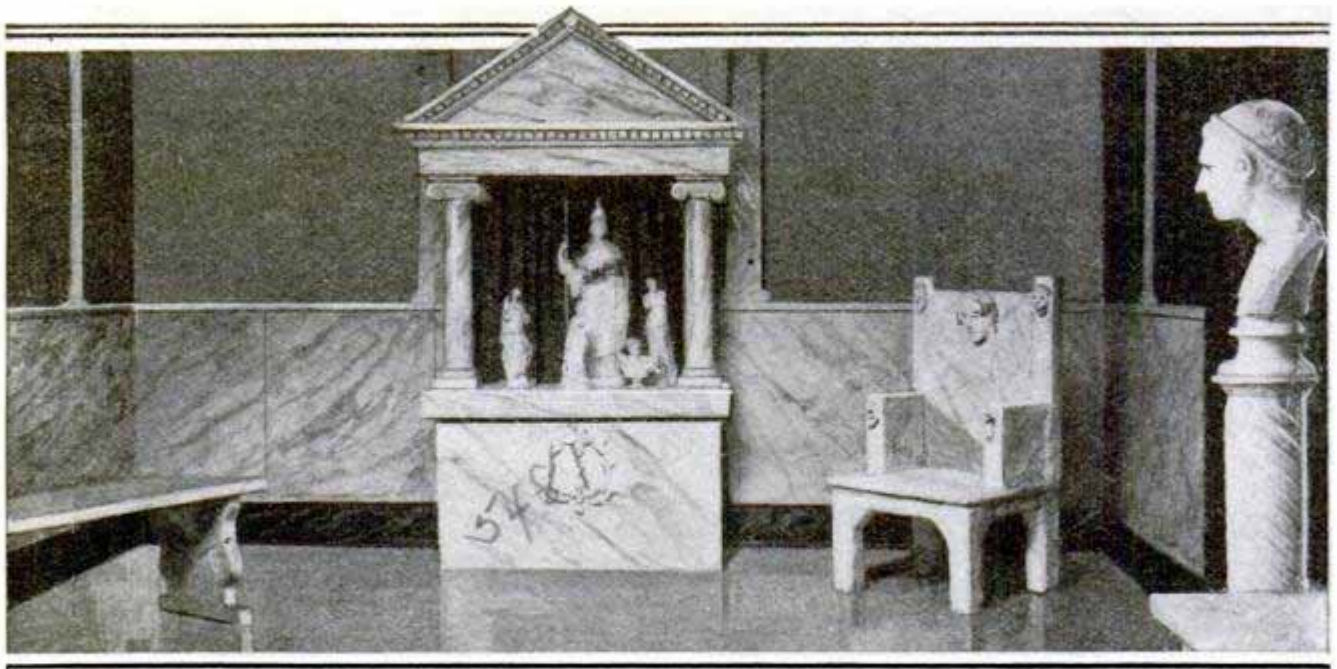
post. When the weight is removed, the clamp slides easily on the post. With this apparatus a lineman goes up a post like a measuring worm, moving one clamp while his weight is on the other and taking upward steps 2 ft. long. The outfit will support two tons and the heavier the man, the better it holds. Two screws must be adjusted to fasten the clamps about the post.

B. L. Edholm

ROMAN ROOM FOR TEACHING LATIN

Believing that pupils will more quickly learn Latin, the language of the ancient Romans, when reciting in a room modeled after the principal room in the house of a Roman family, the school board has fitted up such a room in the Hollywood High School, Los Angeles, a picture of which is shown. Interest in the study of Latin is increased by a sense of reality regarding the Romans, and their language seems alive and not dead when one thinks of it being spoken by human beings like ourselves. The significance of each object is explained, and a feature is a great banquet given by each class in the Roman style, at which the toga is adopted as the dress, and the viands are served after the manner of the ancients.

624 Figueroa Los Angeles Cal.



Los Angeles High School Has Roman Room for Teaching Latin

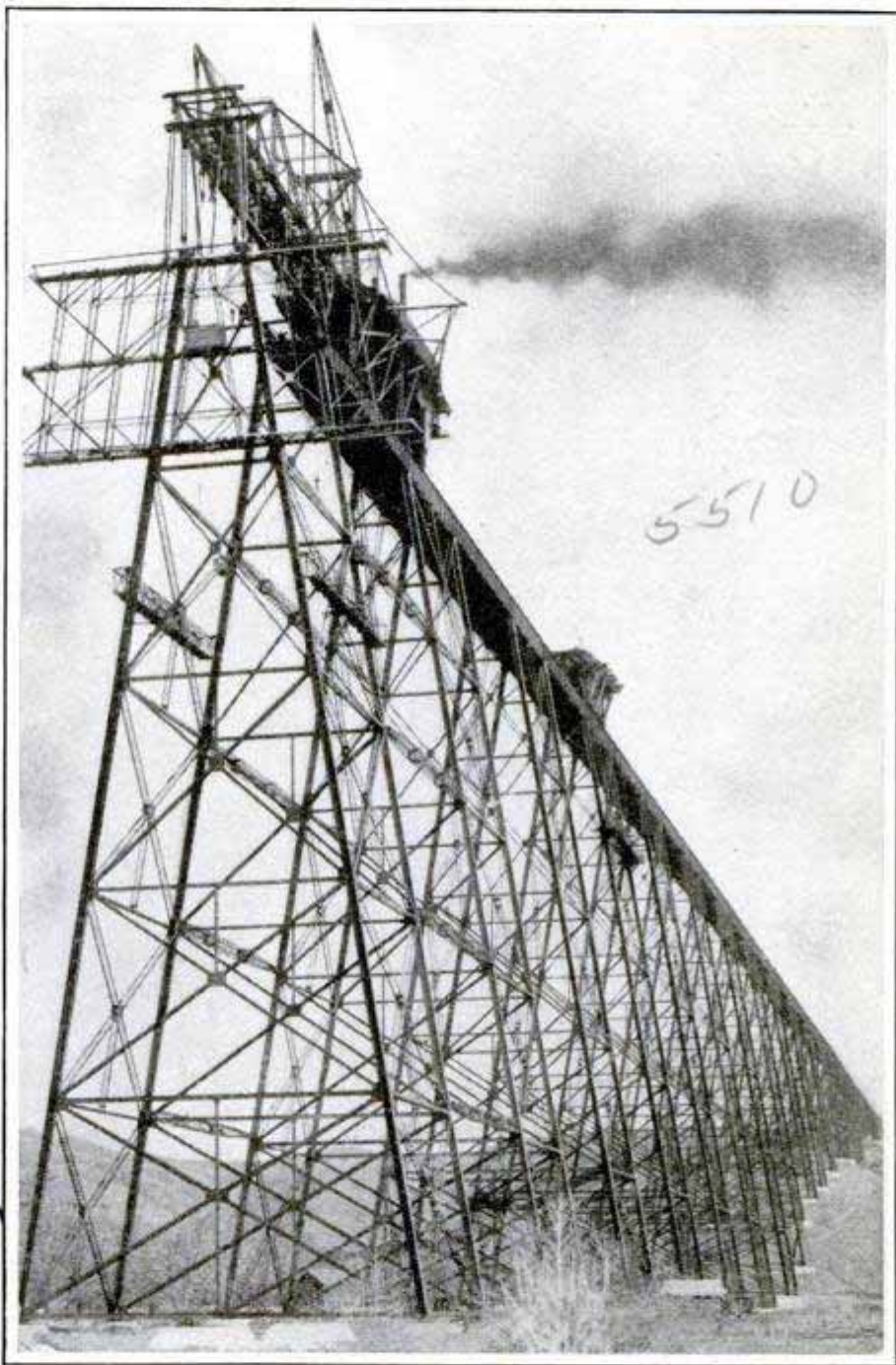
NEW SYSTEM OF COOLING REFRIGERATOR CARS

GREAT STEEL VIADUCT IN CANADA A MILE LONG

3510W

Refrigeration methods in use by rail-ways do not measure up in efficiency to those adopted by ship owners. Re-frigerator cars in which beef is transported rarely maintain an even temperature and meat reaches the market often in poor condition. A new type of refrigerator car has been built under Eng-lish patents which, it appears, accomplishes relatively the same re-sults as found on ocean liners equipped for handling frozen beef. The system has been tried out on the govern-ment railways in France successfully. The car, of the ordinary refrigerator type, is heavily insulated with cork, the insulation being carried all around the car. Two specially constructed and ar-ranged tanks with siphon pipes are fitted, one in each end of the car, these being charged with a cheap and simple refrigerat-ing mixture, and this simple equipment af-fords such satisfactory refrigeration that the temperature as record-ed by automatic de-vices in the car at the end of a long journey shows that a practically steady temperature is maintained throughout. In a recent test not only did the thermometer show a steady and even temperature of 33 deg., but the consumption of ice was only 350 lb., as against 600 lb. in an ordinary refrigerator car loaded exactly the same, and attached to the same train.

Big things are being done in Canada along the line of the Canadian Pacific, and one which will interest engineers



5510

One of the Longest and Highest Steel Viaducts in the World

everywhere is seen west of Lethbridge City, Alberta, where 20 old wooden bridges across the Belly and Old Man Rivers have been replaced by two steel viaducts. One is 99 ft. over a mile in length, and has a maximum height of 314 ft. above the bed of the river. The other is 1,900 ft. long and 146 ft. high.

C. K. Etheridge, A. S. Inat, N. A. 19, Leathery, Hones, Byward St. & C. C.

55-06 W

It required 645 cars to transport the steel used in the construction of these viaducts, and the cost was over \$2,000,000. In spite of the fact that the work was hazardous, owing to the great height of the structures, and the extreme length, only one life was lost during the building.

FRENCH INVENT LAMP TO PENETRATE FOG

L'illustration

Experiments with a new fog-penetrating lamp have been conducted recently in France. The new lamp is an ordinary incandescent light, in front of which is placed a glass screen, giving the rays a greenish-yellow light. In addition, a silvered reflector behind the lamp throws out, beside the light rays, enough heat to prevent moisture from collecting on the screen.

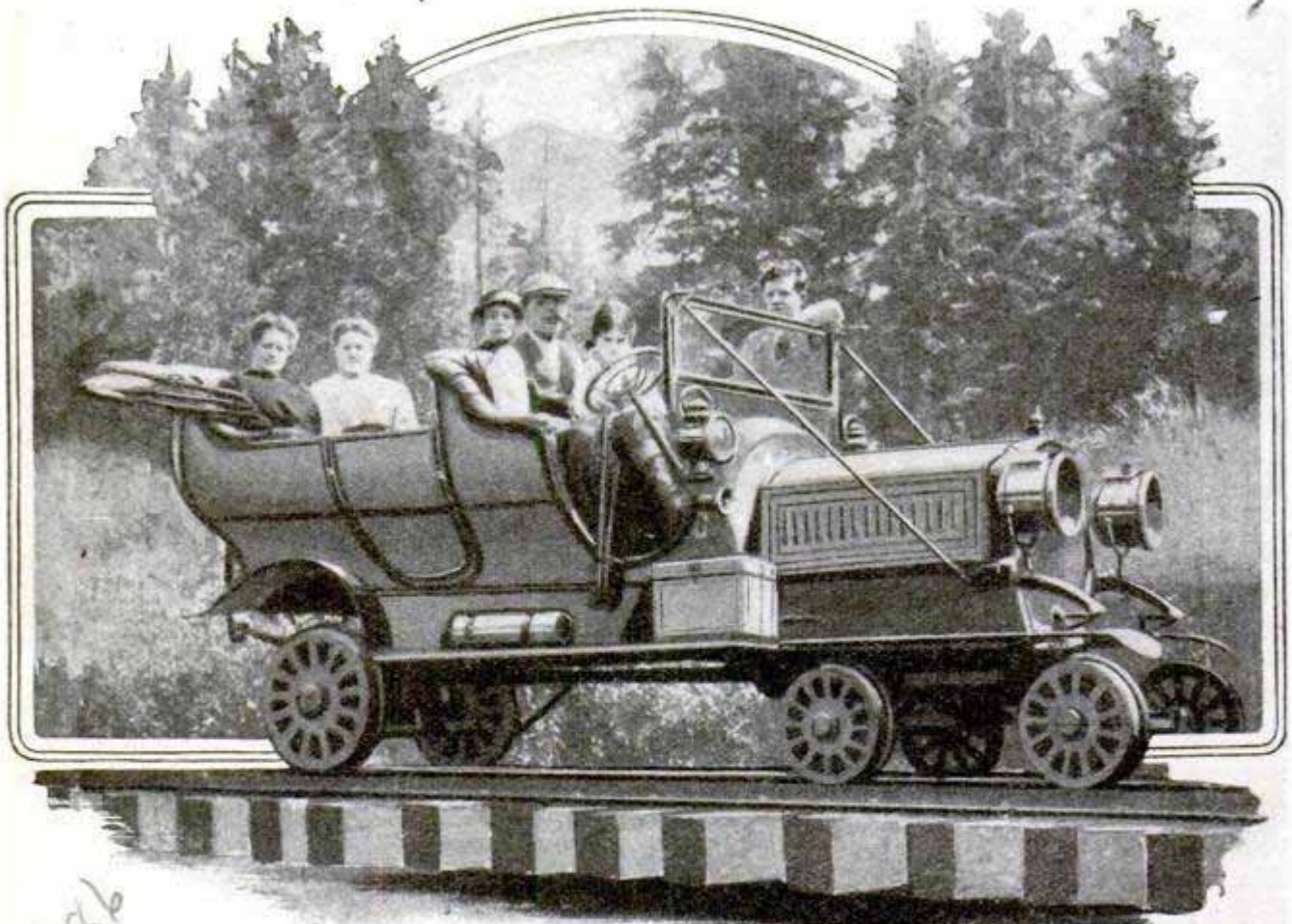
MAKING CEMENT IN THE PHILIPPINES

A corporation has been formed for the manufacture of cement in the Philippines, and a large plant is being built in the province of Rizal, where huge deposits of limestone and silica have been found. The machinery, of German type, will produce 1,000 bbl. of cement a day, and samples submitted test up to a high standard. The manufacture of cement in the Philippines will save not only ocean freights, but a duty of \$1.60 per metric ton on non-American cement.

AUTOMOBILING BY RAIL

A rebuilt automobile, with wheels adapted to use on narrow-gauge track, is in operation in California, making the 70-mile round trip between Caldor and Diamond Springs in two and a half hours. A more convenient and comfortable observation car for use in a country where the scenery is a big asset, it would be hard to imagine.

*Commercial Reports
C.S. Geo. 9/12-13
H. B. King
H. B. King
H. B. King*



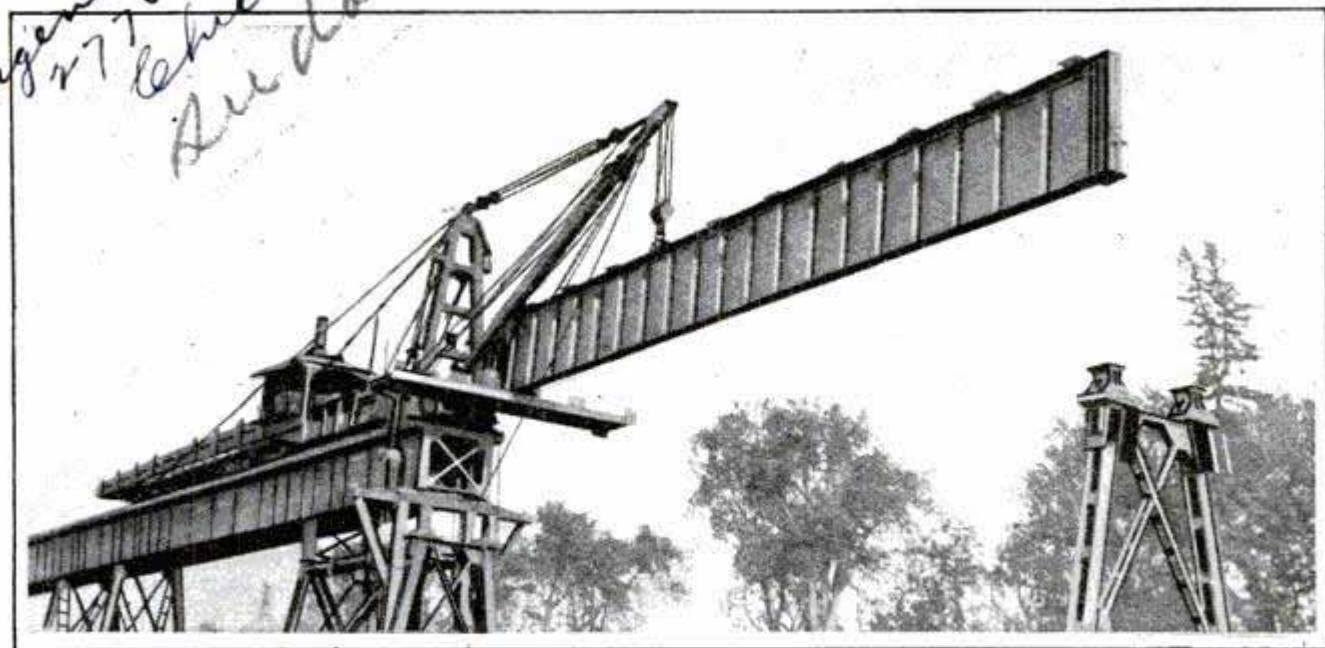
5486

A California Car Line Uses Auto with Ordinary Car Wheels as "Train"

*Frank W. Lane
1303 1/2 Waller St.*

Frank W. Lane

*Eugene 3 Chicago
Audette*



Huge Girder Handled by Derrick Car Designed for about Half Its Weight

HOISTING LARGE GIRDER UNDER DIFFICULTIES

5478W

Railway-bridge building presents some problems which must be overcome by rough and ready methods. An interurban line in Wisconsin was confronted by the necessity of using a small derrick car for swinging a steel girder, 103 ft. long and weighing 36 tons. The boom on the derrick car was too short to handle the girder, but a counterweight of 15 tons was put on to balance it. The derrick car was designed for 20-ton capacity, but stood the overload, although a special boom was designed for the extra load.

INCREASING USE OF OXYGEN AND HYDROGEN

5393

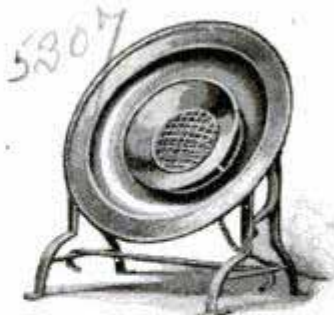
Since the introduction of the modern practice of autogenous welding, the consumption of oxygen has increased enormously. It is estimated that in Germany alone for this year 370,000,000 cu. ft. have already been consumed. A large portion of this oxygen is made by the electrolytic decomposition of water, and there are enormous quantities of hydrogen made at the same time. A few years ago there was difficulty in disposing of this hydrogen, but at the present time it is used in glass blowing, in balloons, and in the incan-

descent-lamp industry. New uses have been found for it and now there are several industries which utilize large quantities. Among its recent uses is the application in the soap industry for hardening or hydrogenating oils. Several soap plants in England, Belgium, Japan, and Australia have installed additions for the production of hydrogen for hardening palm oil.

GLOWING ELECTRIC FIRE WITH REFLECTOR

5307W

English electric-cooking and heating devices have an individuality distinguishing them from the manufactures of other countries. The electric fire, shown in the illustration, contains an 880-watt heating element carried in an aluminum or copper reflector with a polished-brass stand. The heating element, which can be replaced in one piece, consists of a special-alloy resistance wound in the open slots of a circular base composed of highly refractory fire clay, which quickly becomes red hot, presenting a cheerful appearance and throwing off great heat.



*W.C. Dumas
A.M. Lloyd Laboratory,
1111 Peachtree St.*

*Journshend's Art Metal Co. Ltd.
Ernest St., Birmingham
Eng.*

FACE OF ROCK CLIFF BLOWN OFF WITH DYNAMITE

Alpha Portland Cement Co., Easton, Pa.

Bringing down from 75,000 to 100,000 tons of rock with a single blast of dynamite is the method of quarrying used at the cement-rock quarries at Martin's Creek, Pa. The face of the cliff is 170 ft. high, and the rock was formerly taken down in benches. The method now used is to bore 6-in. holes down the face of the cliff from top to bottom. These are charged with dynamite, a total of 10½ tons of the explosive being used. All the

charges are fired simultaneously and the explosive force is so great that the entire face of the cliff is blown off.

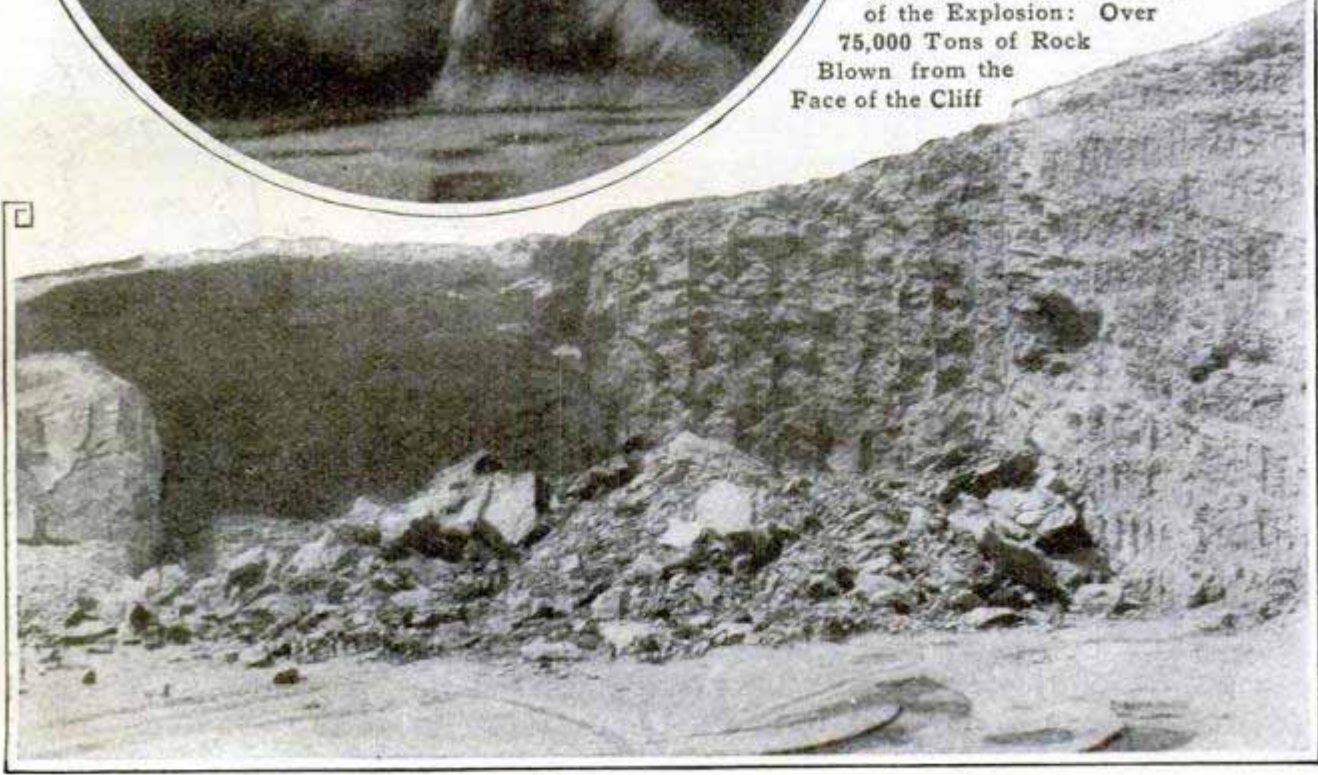
VENEERED FLOORS NOW A THREE-PLY JOB

Veneers 10/1913 5546W

Veneered flooring, which has become a vogue since the introduction of rotary veneer, has progressed to the point where heavy veneer or thin resawed lumber is used for the first back and is cross-banded with rotary-cut veneer, on top of which is laid the floor proper, the whole being glued together in patterns, then fastened with nails to the sub-floor. This gives excellent results. The use of the rotary-sawed veneer for borders has increased considerably in the past few years. The blocks which are used for paving in the fields of parquetry are



Firing a 10½-Ton Charge of Dynamite. Below, Effect of the Explosion: Over 75,000 Tons of Rock Blown from the Face of the Cliff



475

copy 5475 copy

held together with thin canvas or scrim on the back. There is a tendency to use, in some cases, a floor of very thin hardwood slats which unroll on top of a regulation floor, with perhaps some deadening felt or prepared paper between. But the best and most substantial use of rotary-cut veneer is in backing up border work and fancy floors laid in block pattern.

PIN THRUST THROUGH HAND WITHOUT PAIN

Stick pins usually hurt when thrust through one's hand, but here is a case where a young man submitted to this test before a class in a southern college, and declared he felt no pain.

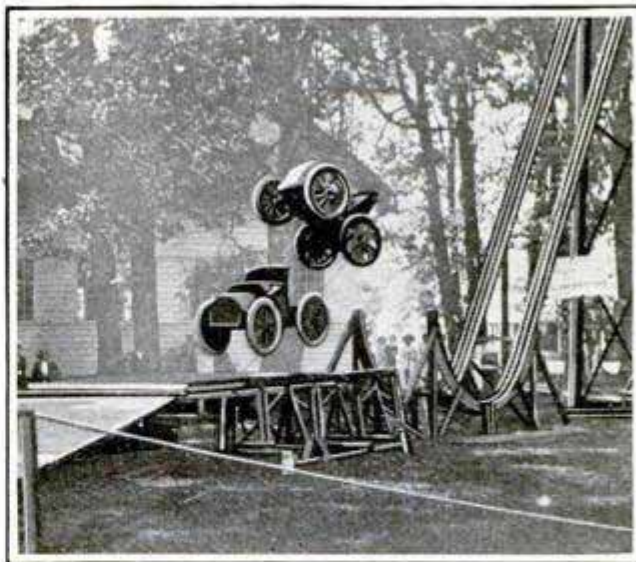


Hand Pierced with Scarf Pin

Abnormal freedom from pain is not so unusual, but a photograph of such a test is interesting. Eyewitnesses state that it required a good hard pull to remove the pin, and that no blood followed the extraction, nor did any soreness result.

PLUNGING AUTOS SOMERSAULT IN MID-AIR

These two automobiles were drawn up to the top of the tower to the right of the picture and held in position by a trap. The cars when in position are 4 ft. apart. When all is ready, the trap is sprung and both machines shoot down the chute at 100 miles an hour. One makes three complete somersaults before striking the platform, and the second car shoots through underneath, while the first auto is whirling in the air. There is a driver in each car, but



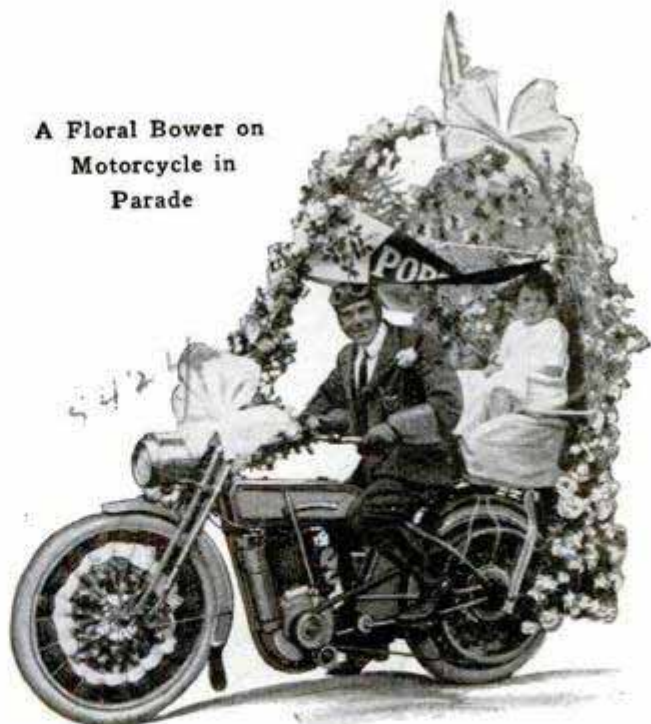
Copyrighted by F. C. McLain
Autos Chasing Each Other through the Air

they are seated so low they do not show in the picture. This protects them from injury when the cars overturn, as they sometimes do.

DECORATED MOTORCYCLE IS FEATURE OF PARADE

The decorative possibilities of the motorcycle were shown in a recent floral parade in Portland, Oregon,

A Floral Bower on Motorcycle in Parade



when citizens vied with each other to display gaily decorated vehicles. The machine shown in the picture attracted favorable attention.

*F. C. McLain,
1748 E. 13th St.,
Portland, Ore.*

*Ray Jernaleton
170 E. 15th St.,
Portland Ore.*

*D. K. Earnest
State Normal School, Athens, Ga.*

5435 W

5424 W

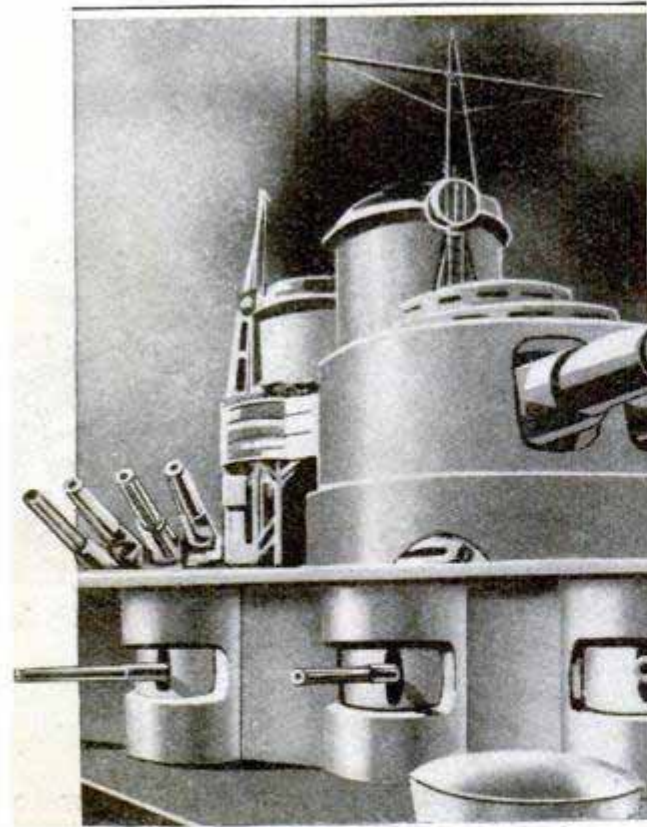
5424 W

5398 W

STEEPLE JACK SAVES COST OF SCAFFOLDING

Using two loops of half-inch rope, Edmond von Kaenel, a Chicago steeple jack, scales copper-cable lightning rods, flag poles and such airy supports, and draws up his ropes, hooks and other apparatus to enable him to paint, repair or construct, as the nature of the job demands. The old way was to build a scaffolding of timber, a long, laborious and expensive process, the cost

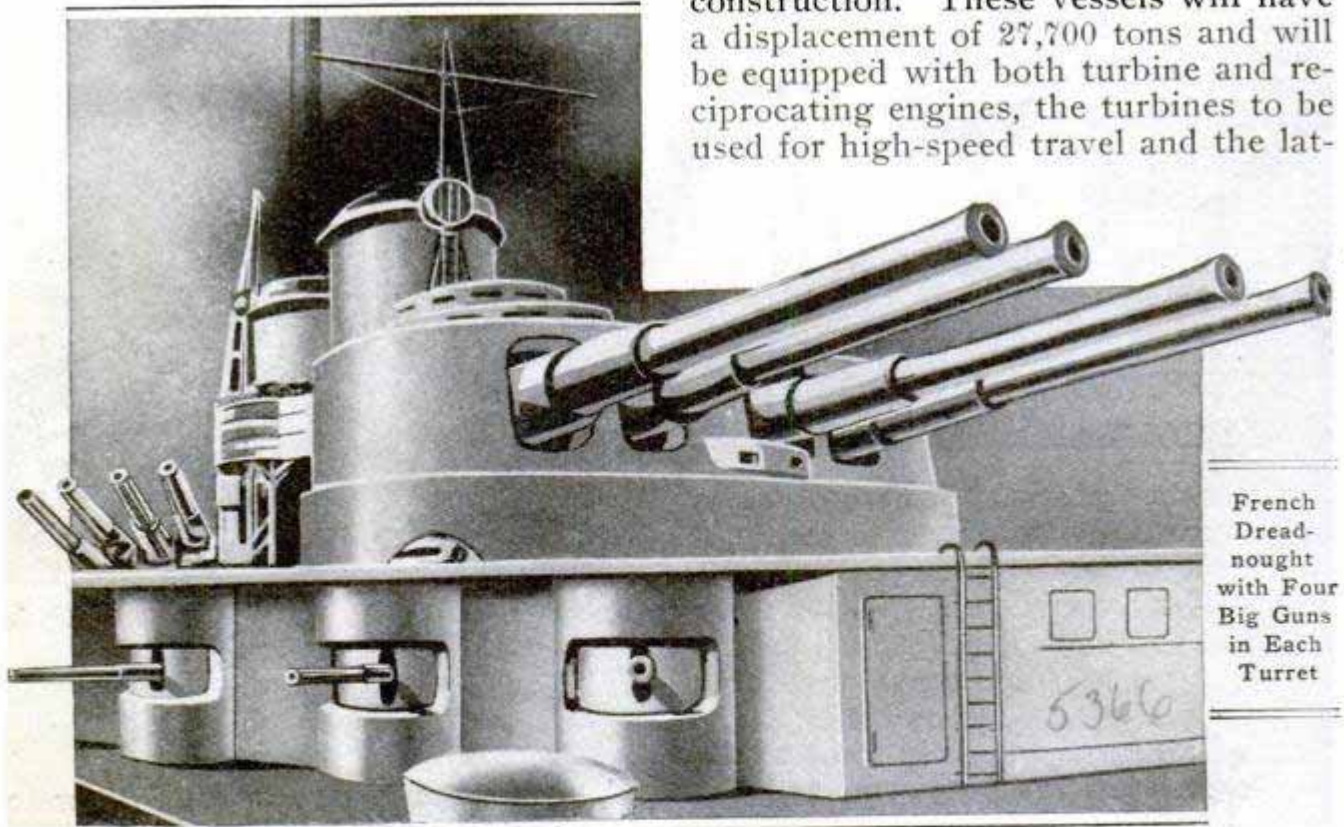
of which was out of all proportion to the work to be accomplished. The ropes used in this plan are spliced into a large and a



the support and the steeple jack sits in the larger loop, and places another and similar rope as far above him as he can conveniently reach. He then stands in the lower loop, and climbs up, releasing the lower loop as soon as he leaves it, and again raises it to a higher position. This is repeated alternately until he scales the summit.

FRENCH CRUISERS BUILT WITH FOUR-GUN TURRETS

With five battleships under construction, French naval designers have inaugurated a new system of gun disposition which has given rise to much discussion among experts. It is the four-gun turret. The heavy armament will consist of twelve 13½-in. guns in three turrets, which can be turned within a total arc of 280 deg. In addition to these heavy guns there will be twenty-four 5½-in. guns, so that the total amount of metal thrown will be enormous. The four-gun turret weighs only about one and one-half times as much as the two-gun turret, and there is considerable economy in this type of construction. These vessels will have a displacement of 27,700 tons and will be equipped with both turbine and reciprocating engines, the turbines to be used for high-speed travel and the lat-



French
Dread-
nought
with Four
Big Guns
in Each
Turret

smaller loop, the large end is then thrust through the smaller loop around

ter for usual conditions. Hence an additional economy in coal.

5012 m

5234

FIREPROOF CELLULOID USED IN AUTOMOBILES

Horseless Age 8-6-13

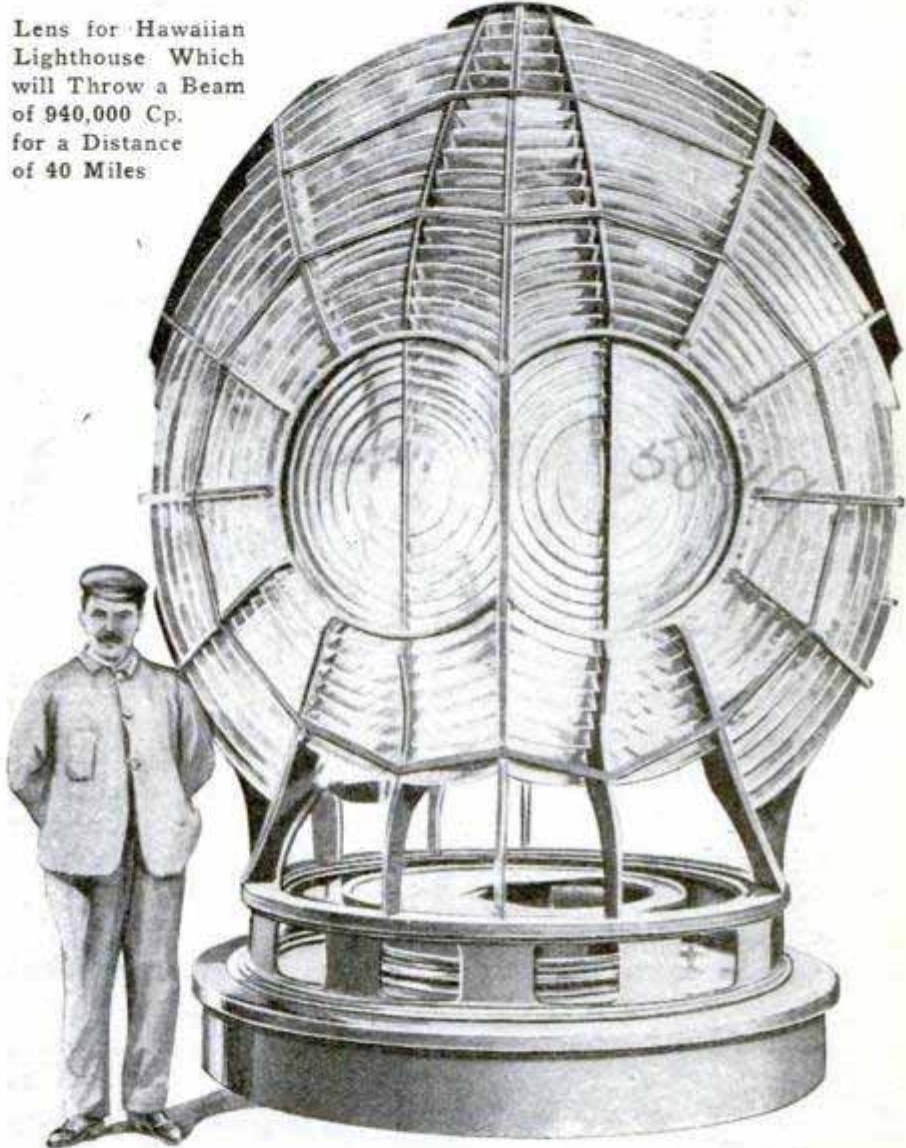
Fireproof celluloid, which was invented in Germany some time ago, is finding many new uses in the automobile industry as a substitute for glass. Windshields and windows of glass in automobiles have always been a serious source of danger in case of accident, but no substitute could be found except celluloid which could be used only to a limited extent on account of its inflammability. A lighted cigar might explode one window with sufficient heat to ignite the others and surround the car with flame. Fireproof celluloid has proved to be not only a safer substitute, but a better one on account of its toughness. Made in plates ranging from .06 to .08 in. in thickness it can be used in motor cabs without any danger of breakage and sheets as large as 100 sq. ft. can be manufactured. It is softer and more leathery than celluloid and can be bent, rolled, or sewed into the material of an automobile top. It is not only transparent, but is not turned yellow by the sunlight, as is the case with celluloid.

ⒸThe enormous development that has taken place in motor cars in recent years is indicated by the statement, made on apparently good authority, that the aggregate horsepower developed by all the motor engines in the United States is greater than that generated by all the commercial steam-power plants in the country.

HAWAIIAN LIGHTHOUSE TO HAVE POWERFUL LENS

A lighthouse nearing completion at the extreme western point of the Hawaiian Islands is to be equipped with

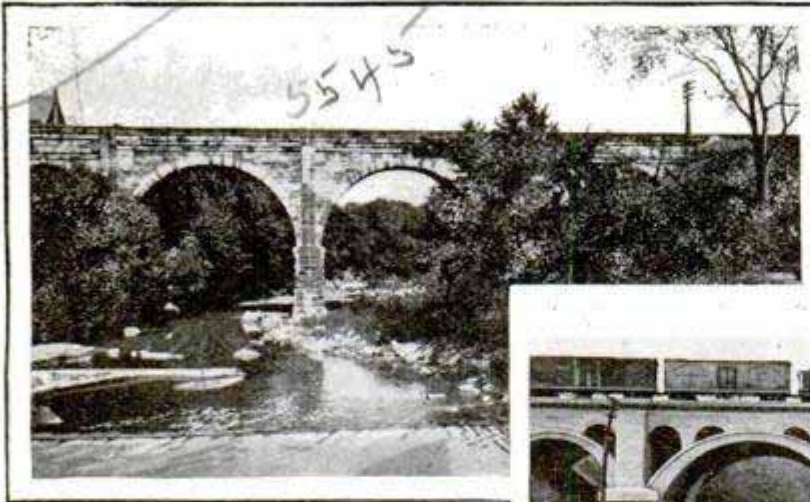
Lens for Hawaiian Lighthouse Which will Throw a Beam of 940,000 Cp. for a Distance of 40 Miles



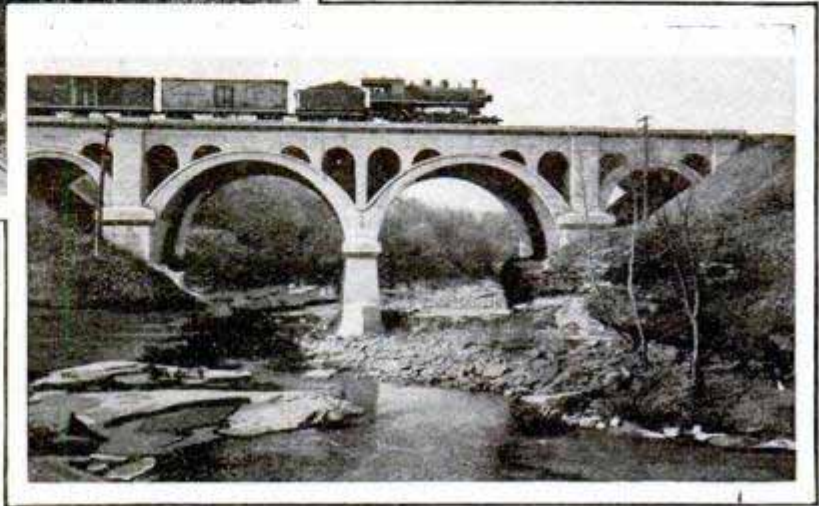
one of the largest revolving lenses ever built. This lens, shown in the accompanying illustration in comparison with a 6-ft. man, weighs four tons and is about 12 ft. high. It was constructed in France at a cost of \$12,000. Hundreds of glass prisms accurately cut and polished were used, and these are so fitted into the metal frame as to concentrate the light from the central lamp into two powerful beams which come into view every 10 seconds as the lens revolves on its mercury float. The light will be of 940,000 cp. and will be visible at a distance of 40 miles.

Rheinisch-Westfälische Sprengstoff-Fabrik
 "Cellon"
 1888

WIDENING BRIDGE WITH CONCRETE



old stone bridge was converted into a modern four-track structure by building a reinforced-concrete extension on each side of the old bridge, forming a strong and handsome viaduct.



When a railway decided to increase its main line to four tracks, it was confronted with the serious problem of widening its two-track stone bridges. Concrete solved this problem as it has solved many others. The

Old Stone Bridge Converted into Modern Structure with Concrete

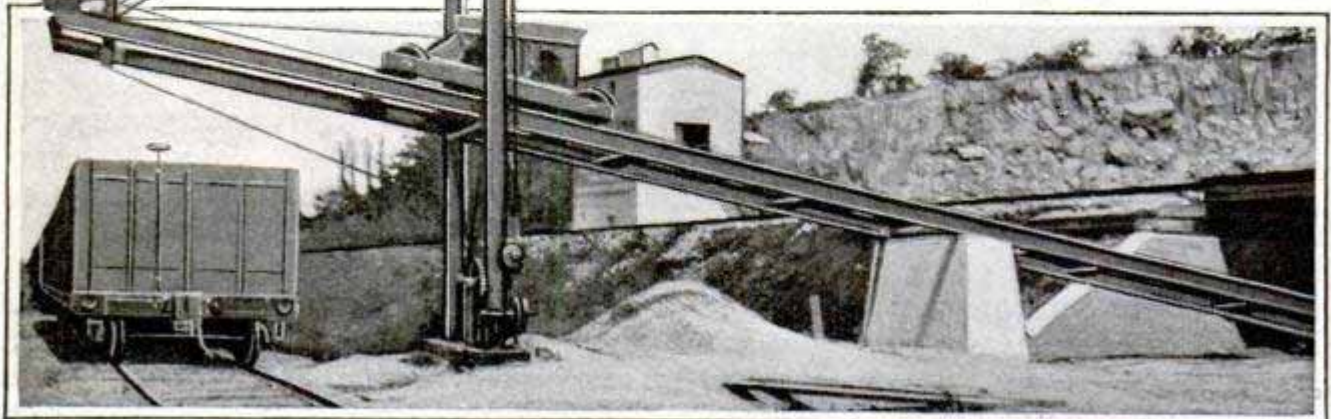
Mr. H. Rubenbach, 10 Waverly St., Jersey City, N.J.

INGENIOUS ARRANGEMENT FOR LOADING STONE

An ingenious arrangement is in use at a New Jersey stone-crushing plant for conveying the stone from the crusher to the railroad track and loading it into the cars. The crusher is lo-

cated some distance from the track at an elevation considerably above the top of a car standing on the railroad track. This situation is taken advantage of for conveying the stone to the loading point without the use of power of any kind. A sharp incline leads down from the crusher to the level of the track and an incline with a smaller rise lifts the stone car to such a height that the stone may be dumped into the railroad car. After leaving the crusher, a loaded car gains enough momentum not only to mount the incline at the lower end, but to pull an empty car

Lower Incline Where Stone is Dumped into Railroad Car for Shipment



William ... Trenton, N.J.

on a parallel track up to the crusher. The two cars are connected by means of a cable that runs through pulleys at the crusher.

SAFE HOUSING OF MILITARY

DIRIGIBLES

British

5526m

Army & Navy Journal 9-27-13

A series of hangars arranged radially around a central turntable much after the fashion of a railroad roundhouse is one of the plans proposed by an expert of the British army for housing military dirigibles. Since it is probable that the hangars for aircraft will be one of the principal points of aerial attack in future wars, it is proposed to make these hangars bomb-proof and to cover them with earth in such a way as to make them as inconspicuous as possible. A dirigible would face the wind in lighting on the turntable, and would then be turned and hauled into the proper hangar by an electric car operating on a railroad track, while the entrances to the shelters would be protected from cross winds by means of side walls. In leaving the shelter, a dirigible would either be hauled back to the turntable, or would go out through an opening at the rear of the hangar, if the direction of the wind permitted. With the present range of action of airships of the rigid type, locations sheltered from the gun fire of an enemy's fleet would be entirely practicable even with an airship fleet designed to act as an auxiliary to the coast defenses.

ARTIFICIAL LAVA FOR

INSULATION

5586w

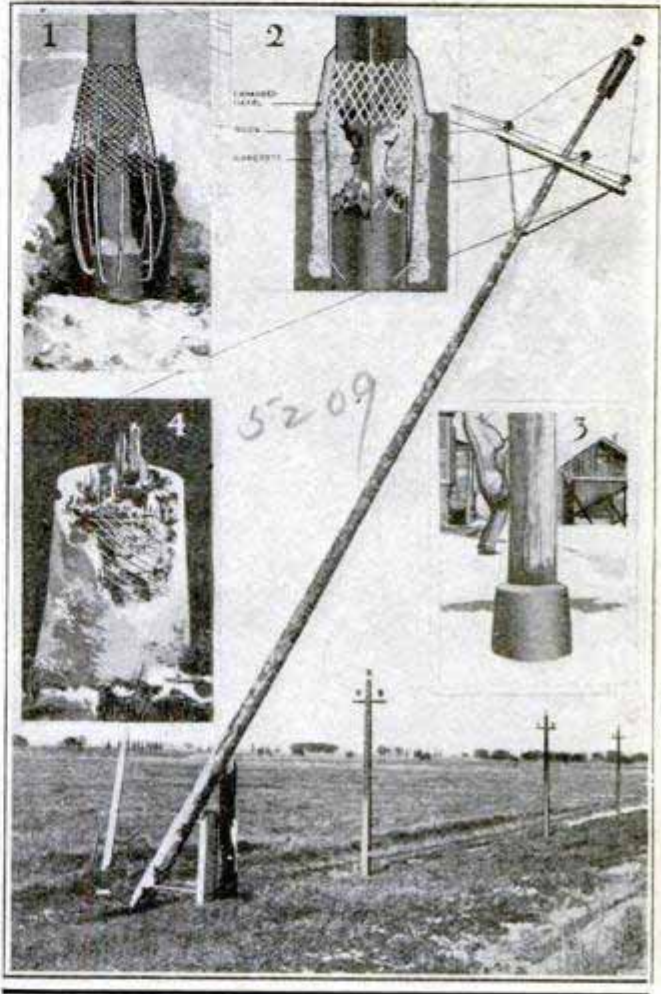
Prometheus 8/30/13

A method of making an insulating material known as "artificial lava" was recently patented. Talcum with a binding material of magnesium silicate is put under high pressure and simultaneously heated until it melts. At a temperature of 1,832 deg. F., the mass is pressed into the desired shape. On cooling, it is a nonconductor, and withstands high temperatures as well as natural lava.

SAVING DECAYED WOODEN POLES

5209

Concrete reinforcement of decayed telephone and telegraph poles is coming into use as a means of saving and



Concrete Repair of Telephone Pole: 1, Reinforcement; 2, Concrete Filled In; 3, Completed Repair; 4, The Repair is Stronger Than Pole

utilizing old poles instead of replacing them with new ones. As the first decay in a wooden pole usually appears at the point where the pole enters the ground, the strengthening process is concerned with only a short section just above and below the ground's surface. When this decayed section has been reinforced, the pole is as good as new. The method employed consists in setting steel rods to tie together the sound portions above and below the decayed section and molding a collar of reinforced concrete about them. The work can be done without a transfer of wires or crossarms, and only a small excavation about the pole is necessary.

*Pittsburgh Reinforcing Pole Co.
Pittsburgh Pa.
Pacific States Electric Co.
San Francisco Cal.*

NEW SCALES FOR WEIGHING MONEY

Bankers and bank examiners, who have occasion to weigh money in bulk, find in a new money scale a device



Automatic Scale for Use of Bankers in Weighing Gold and Silver Coin

which saves time and gives them assurance of precision, enabling them to calculate money values of gold and silver coin rapidly and with exactness. The illustration shows the standard scale with a banker's chart showing troy and avoirdupois weights, and, in addition, denominations in gold and silver coins. Thus the bulk weight of silver, for example, may be obtained, and by separating the coins by denominations, the correct money value of a given weight indicated at once.

SPEED LIMIT OF LONDON MOTOR BUSES

London's attempt to limit the speed of motor omnibuses to 12 miles an hour has proved impracticable. When they are geared for a maximum speed of 12 miles on a level road, they have no reserve, it has been found, for climbing hills or getting out of tight places, and traffic is consequently impeded. As a motor omnibus with a full load

cannot go faster than 16 to 18 miles an hour and ordinarily stops in its own length, 23 ft., a speed limit on the gear is not considered necessary. In emergencies, a bus can stop within 14 or 17 ft., a shorter distance than is required by a tramcar traveling at a speed of 12 miles an hour. The only safety measure suggested as a substitute for a speed limit is some kind of a fender.

NOVEL REVERSING DEVICE FOR MOTORBOAT

One of the prize winners in the recent motorboat races at Toledo, Ohio, was equipped with a unique reversing device that appeared to work satisfactorily and eliminated entirely the necessity for reversing gear on the propeller shaft. This boat carried two aeroplane motors placed one ahead of the other. At the stern of the boat was a peculiar dish-shaped device hinged to the transom, with controlling apparatus so that it could be readily raised and lowered. When this disk is lowered into the water, it comes directly aft of the propeller. The disk

Motor Boat 8-10-13



New Reversing Device does Away with Necessity for Reversing Gear on Propeller Shaft of Motorboat

causes the water to react against the propeller in such a way that the boat is propelled slowly backward.

** Hazel II
Curtiss Aeroplane Co
Hammondsport*

The Computing Scale Co. Dayton,

49974

*Christian Science Monitor
Boston, Mass.*

Weymouth Heights, Mass.

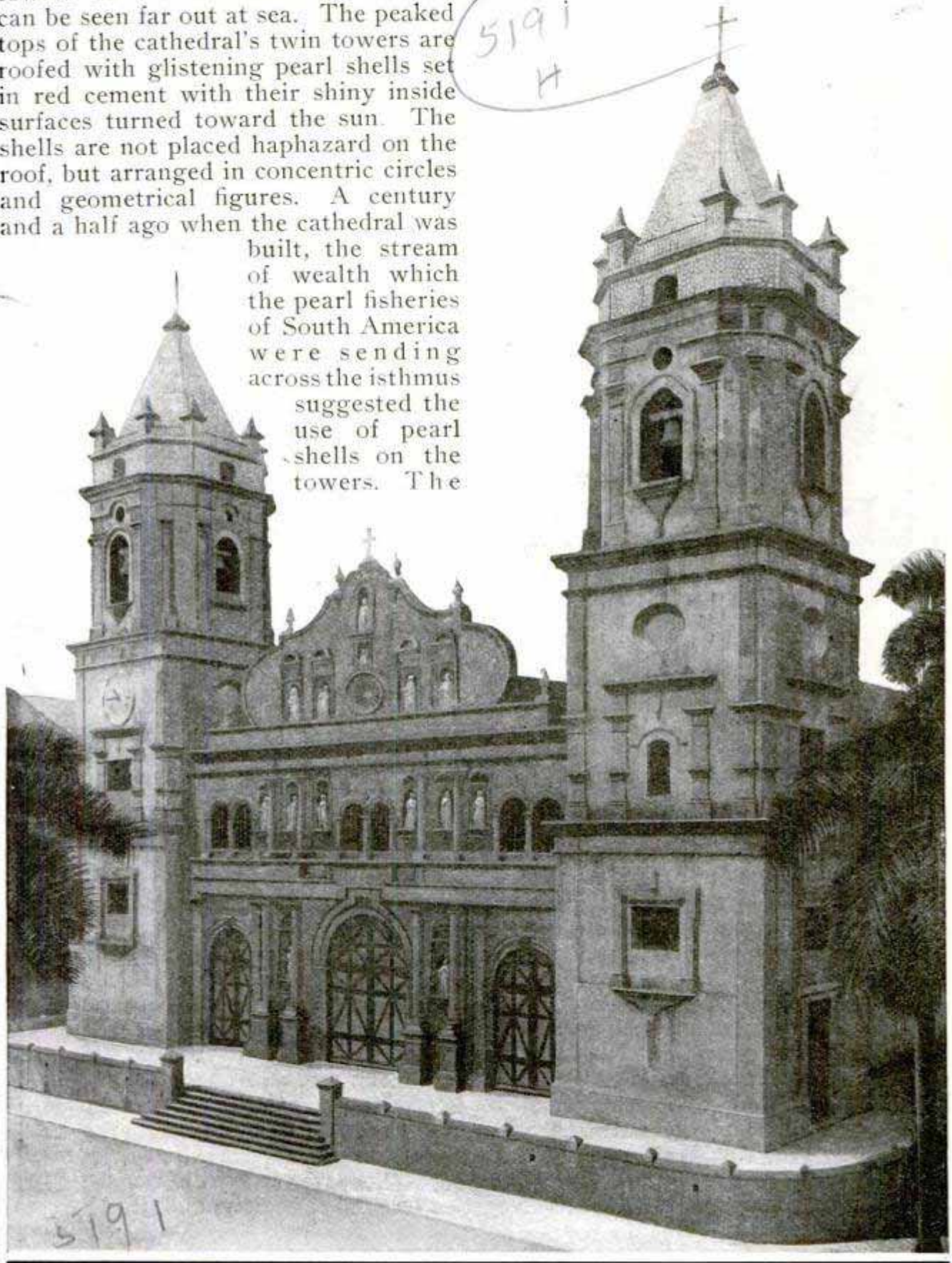
CATHEDRAL TOWERS ROOFED WITH SHELLS

brilliant effect was in accord with the other lavish decorations of the structure which was built with the private funds of the bishop.

The glint of the sun shining on the towers of the Cathedral of Panama can be seen far out at sea. The peaked tops of the cathedral's twin towers are roofed with glistening pearl shells set in red cement with their shiny inside surfaces turned toward the sun. The shells are not placed haphazard on the roof, but arranged in concentric circles and geometrical figures. A century and a half ago when the cathedral was

built, the stream of wealth which the pearl fisheries of South America were sending across the isthmus suggested the use of pearl shells on the towers. The

5191
H



5191

The Cathedral of Panama Whose Towers are Roofed with Glistening Pearl Shells

COMMENT AND REVIEW

IF a "Titanic" sank every week in the year the horror of even so terrible an event would shortly lose its force, save only for immediate relatives and friends. What happens constantly we grow to regard as more or less inevitable. Scarcely a day passes without motor vehicles killing one or more persons in each of our large cities. The small space devoted to these accidents in daily papers merely reflects the apathy which prevails among their readers. When the first few airmen lost their lives, whether here or abroad, columns were devoted to each event, with full description of the struggle in the air and minutest details of what followed. Your evening paper tonight may devote perhaps four or five lines to record the death of one or two aviation-corps officers. The local press will devote space to the accident, but only because it was strictly home news.

Indifference to Danger

This complacent or at least indifferent view of what passes as inevitable goes on for a time, until conditions become so bad that somebody wakes up and calls on everybody to stop and view the awful wreck. Then there is a chance to improve or remedy things.



A YOUNG nation, like a young person, is apt to value human life lightly, at least to the extent of needless, and often reckless, exposure to danger. Important city offices have been used as rewards for political activity, with perhaps the one general exception of selecting a fireman for chief of the fire department. Everybody seemed agreed that when fires burn up buildings there is a real, monetary loss; but until recent years there has been a certain indifference regarding the chief of the health department: a branch which can lose more lives in 10 days than would perish in all the fires in 10 years.

Training Health Officers

Cities of the first class are able to pay enough to command a doctor of ability in his profession, yet it has not always followed that a good physician was also as capable an executive. Of the two qualifications the executive is really the more important. It is interesting therefore to consider the announcement from Harvard University of the opening of a specialized school for the express purpose of training young men for the useful and important office of health officer. The graduates will receive the degree of C. P. H.—Certificate of Public Health—and be fitted to occupy such positions as health officers, members of boards of health, secretaries and inspectors. Instruction will be on the broadest lines, including generous laboratory work and lectures by officials from national, state and city health departments. Students are urged, but not required, to take the degree of M. D. before entering the School for Health Officers. To the ambitious young man who is not afraid of work, the profession offers an honored position, the reward which comes to those who are specially useful to society, and a very fair remuneration.

WITH the finding of a vast stretch of land within the Arctic circle to the north of Siberia comes the announcement that this marks the last great discovery of new land.

*Has
Discovery
Ended?*

It is true that some years ago a very belligerent gentleman was credited with tears because there were no more worlds to conquer, and that since his day such incidents as the discovery of North and South America, and other places, have transpired. However, it looks as though the geographers really were right this time, for however much we explore the little known wilds of Africa, South America, Asia and Australia, our increasing knowledge of those places cannot enlarge the boundary line that separates the land from the sea.

Jules Verne was a scientific man, and many regard his fiction stories of submarine and aerial flight—which at the time they were published seemed wild dreams—as a serious prediction of what he believed would be accomplished. As a matter of fact he did live to see the submarine an accepted arm of two navies, and the Wrights were well advanced toward success before he died. There remains his "Trip to the Moon" which seems absolutely impossible of accomplishment. Nevertheless there are scientific men who dare to reach out into space and chart a pathway to other worlds. One of these, M. Ernest Archdeacon, who ranks among the foremost authorities in France on aviation, predicts our present aviation machines, which at best could not encircle the earth in less than eight days, will be abandoned for air craft which will girdle the globe in 66 minutes. "All the peoples of the earth will then form a sole and single nation."

Man, insatiable in his ambition, is contemplating interplanetary flight, and M. Esnault Pelterie believes the vehicle will be a self-propelled rocket (Verne again) with a speed of seven miles a second, which is estimated to be sufficient velocity to carry the projectile beyond the zone of terrestrial attraction. At this rate the moon would be reached in less than ten hours—assuming, of course, the vehicle was not melted long before by the heat generated in its terrific flight. Radium is suggested as a possible motive power. The idea of interplanetary flight, from our present viewpoint seems of course impossible. However, the submarine was 400 years in developing. Mr. Archdeacon says, "I am convinced that in a certain number of centuries the inhabitants of all the planets will have made acquaintance with one another, and I foresee the day when a world's interplanetary congress will be held."

H. H. WINDSOR

5427 W
**VINE-CLAD LAMP-POSTS IN
 WASHINGTON STREETS**

Washington, D. C., is striving to be a city beautiful, and every possible use is made of growing vines and shrubbery. Lamp-posts are at best a prosaic unit in a decorative scheme, but when shrouded in a mass of foliage, even a lamp-post may become a thing of beauty. The illustration shows a common iron lamp-post on a concrete base covered with vines, which have been planted back of and close to the post.



5293 H
**THE USE OF ALUMINUM
 INCREASING**

Because of the development of many new uses for aluminum, the consumption of that metal in the United States amounted to more than 65,000,000 lb. in 1912, as compared with 46,125,000 lb. consumed during the previous year. Although the domestic production of bauxite, the ore from which aluminum is obtained, reached 159,865 long tons in 1912, representing an increase of 4,247 long tons over 1911, the supply was not sufficient and a large amount of bauxite was imported. One of the most significant uses for aluminum recently developed is the substitution of reinforced aluminum cables for copper wires in long-distance power-transmission lines. Cables made of six strands of aluminum wire wound about a steel wire of high tensile strength possess sufficient strength and electrical con-

ductivity to replace costly copper wire. Out of the use of aluminum in cooking utensils is growing an increased employment of the metal for tanks, cooking vats, and vessels used by preserve factories and similar industries. Aluminum foil is now replacing tin foil in many of its uses, and quite recently there has been an increase in the manufacture of powdered aluminum to be used in explosives, in lithographing and printing, and as a paint pigment. A large amount of aluminum tubing is now being used, and the employment of the metal in everyday articles is becoming very common.

5308 W
**AN IMPROVED CORN DRIER
 FOR MODERN FARM**

The first step in scientific corn growing is proper selection and care of seed corn. An advance in the construction

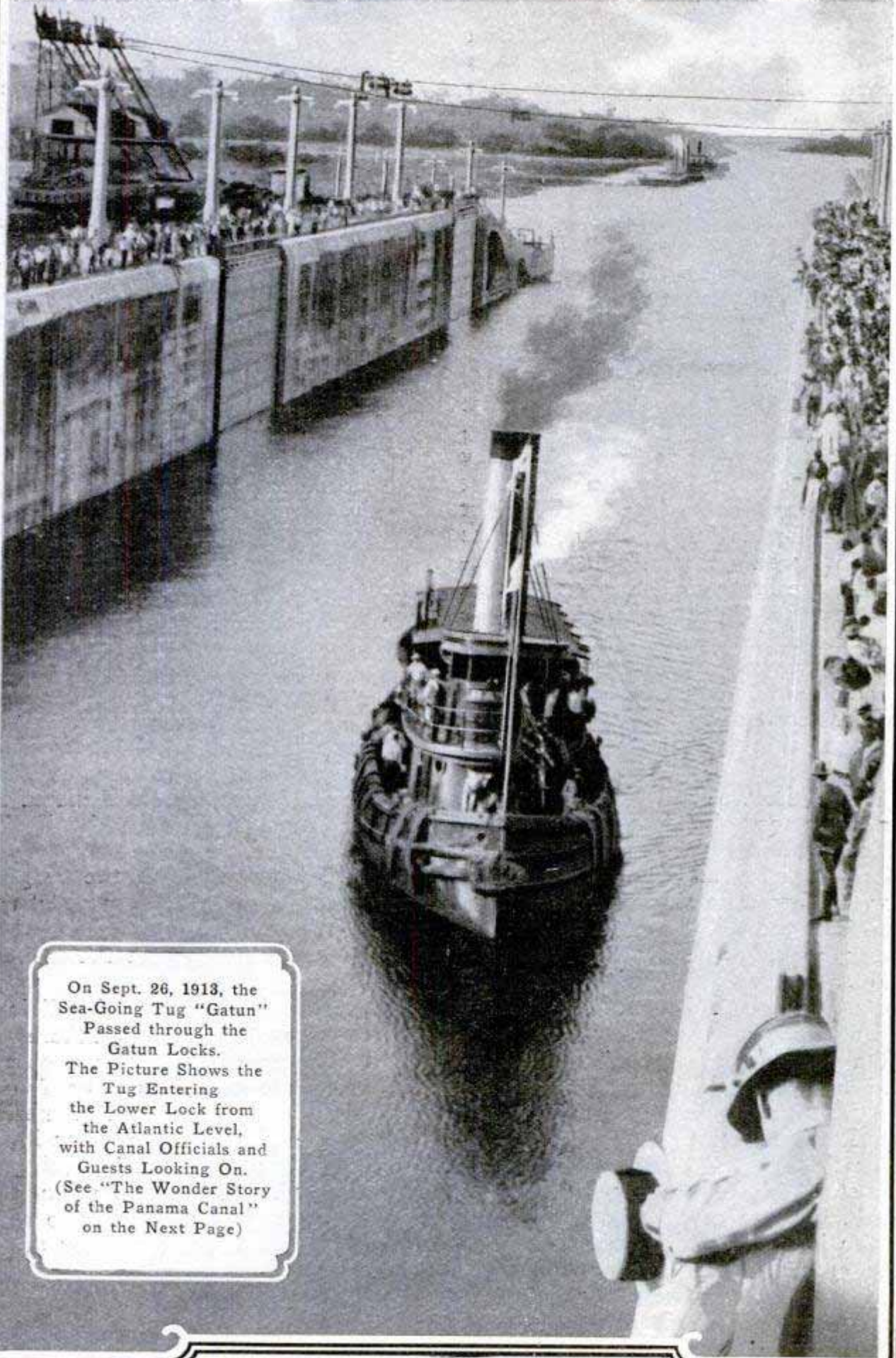


of scientific corn driers is made of 50 strands of No. 10 galvanized wire so woven that the opposite wires lock, and each drier holds 100 ears of seed corn, from which one bushel of shelled seed corn may be obtained. The ends of the wires are blunt, the ears slip on easily and the wires do not pierce the cob nor pack the pith. A long handle makes a convenient hanger for spike or hook, and a lower handhold en-

ables one to carry the loaded drier with ease. It is so constructed that by numbering the eight vertical rows the corn may be tested by the latest methods and one can know from just what ear each kernel came.

Combination Mfg. Co.
 Tarkenton, Mo.

Albert W. Niess
 R. 230, Langley Dept.
 Washington, D.C.



On Sept. 26, 1913, the
Sea-Going Tug "Gatun"
Passed through the
Gatun Locks.
The Picture Shows the
Tug Entering
the Lower Lock from
the Atlantic Level,
with Canal Officials and
Guests Looking On.
(See "The Wonder Story
of the Panama Canal"
on the Next Page)

The Wonder Story of the Panama Canal

By FRANK PARKER STOCKBRIDGE

FOR more than 400 years the vision of a canal across the Isthmus of Panama has fired the imagination of the world. The vision became a reality on October 10, 1913, when President Woodrow Wilson, in the White House at Washington, pressed a button which sent the electric current 2,000 miles to explode 40 tons of dynamite which blew up the last barrier to a free waterway across the isthmus.

"Gamboa's busted!" exclaimed the President, as he pressed the telegraph key. The casualness of his remark was a tribute to the engineers of the United States army, to whom the digging of the canal has been simply "another job" in the routine of their regular work, and one that called for no brass bands or special ceremonies to glorify it. With the same simplicity, the first vessel to pass through the famous Culebra Cut, after the breaking of the Gamboa dike had let in the water, was an ordinary rowboat, while a humble but useful tugboat was the first craft of any kind to make the passage through the great Gatun Locks.

While the work at Panama is still far from completed, yet the canal which the first Spanish explorers visualized is today an accomplished fact. For the first time since the mountains rose from the sea, there is a continuous water passage across the isthmus. Ships as large as most of those of Balboa's day can already be floated from ocean to ocean.

On September 25, 1513, Vasco Nuñez de Balboa climbed the peaks of the Continental Divide and discovered the Pacific Ocean, which he named "The South Sea." From where Balboa stood his new ocean lay directly south, because of the S-shaped twist of the isthmus, which brings the Pacific entrance to the canal not only southward but eastward of the Atlantic terminal. When Balboa's report of his discovery reached Spain, it was accompanied by the recommendation

that a canal be immediately dug across the isthmus. What the explorer had in mind was a sea-level canal, for although Leonardo da Vinci, the great Italian painter-engineer, had recently invented the hydraulic lock now generally used for lifting vessels over elevations, it had not become widely known. However, alluring as it seemed, the canal project was dismissed. According to some historians its rejection was due mainly to the influence of the church. To the simple faith of that day it appeared clear that if God had intended the waters to flow across the isthmus, He would have created a channel there.

The Isthmus of Panama became, almost at once after its discovery, the great trade route between the oceans. The gold of Peru, brought up the west coast in vessels, was transported by mule trains north across the isthmus to Limon Bay, where it was loaded into the waiting galleons for transportation to Spain. Out of this traffic grew the first European settlement on the mainland of America, the old city of Panama, founded in 1519. For more than 150 years Panama remained the chief city on the Pacific coast until its destruction in 1671 by Sir Henry Morgan, the English buccaneer. But throughout all of this period, the canal project continually came up, as traffic across the isthmus grew.

It was, indeed, extremely difficult for Europeans to believe that there was not some natural channel across the isthmus, if it could only be found. Some of the early maps of America, published in Europe, showed an imaginary "Strait of Panama."

Charles V, early in his reign, had ordered a survey with a view to canal construction, but the governor of the province of Darien had reported that the project was impossible. In 1551, the Spanish historian F. L. de Gomara, again forcibly urged the canal project in a memorial to Philip II. By this

time, however, the Spanish government had concluded to devote all its energies to maintain a monopoly of communication between Europe and the New World, and the improvement of communications by land was discouraged. To seek or make known any better route from Porto Bello to Panama was forbidden under penalty of death.

This served effectually to put a quietus on Panama Canal projects for nearly 150 years. Then, in 1698, William Paterson, the famous Scotchman who founded the Bank of England, organized "The Company of Scotland Trading to Africa and the Indies," for which he obtained a charter from the Scottish parliament. Paterson's project was to establish a settlement on the Isthmus of Darien, cut a canal across the isthmus and "thus hold the key of the commerce of the world." The plan appealed to the national pride of the Scots and the subscriptions that flowed in, as a contemporary historian stated it, "sucked up all the money in the kingdom." In Paterson's vision, which his compatriots so enthusiastically shared, this scheme was by one supreme stroke to change Scotland from the poorest to the richest of nations. There was to be free trade with all the world, the ships of all nations were to find refuge unmolested in the harbor of the new colony, differences of race and religion were to be overlooked. On July 26, 1698, the pioneers set sail from Leith amid the cheers of a great multitude assembled to see them off. On the fourth of November they reached Darien. Here they laid out the sites for two cities, New Edinburgh and New St. Andrews, while to the country they gave the name of New Caledonia. In less than a year, lack of provisions, illness, and anarchy had reduced the settlers to a miserable condition, and in June, 1699, they embarked, to sail wherever the winds might take them. Six more shiploads of colonists had been sent out from Scotland, but they were met by a Spanish force and driven out of the country. A year later, the Spanish

expelled the last remaining handful of the Scottish settlers. Not a single sod had yet been turned toward the actual digging of a canal.

In 1771, more than 250 years after the discovery of the isthmus, the Spanish government again changed its policy and ordered a survey for a canal at Tehuantepec. This route was reported as impracticable and, in 1779, other surveys were made at Nicaragua, but political disturbances in Europe prevented further action.

During the next hundred years the Panama Canal idea began to attract more attention. Steam power was now available and great engineering feats were being done everywhere. Several canal projects were discussed early in the nineteenth century, but no work was started.

The discovery of gold in California, in 1848, was followed by a tremendous volume of traffic between the Atlantic and Pacific coasts and for 15 years practically all of this traffic was by way of the isthmus, over the Panama Railroad, opened in 1855 by Americans under a concession from the republic of New Granada, now known as Colombia. The explorations and surveys for the railroad, a work that is said to have cost the life of a man for every tie, led to a much more accurate knowledge of the topography and geology of the isthmus than had previously been available. President Grant, in 1869, asked Congress to take up the matter of a canal. The only action was a resolution providing for an exploration by officers of the navy and the creation of a commission, in 1872, to consider their reports. Then, in May, 1876, the republic of Colombia granted a concession for the construction of a canal from Colon to Panama, the terminals of the Panama Railroad, to Lieut. Lucien Napoleon Bonaparte Wyse, an officer of the French army.

Count Ferdinand de Lesseps, in 1869, had completed the greatest canal ever dug up to that time, across the Isthmus of Suez, connecting the Red Sea with the Mediterranean and thus giving the ships of Europe the direct

route to Asia for which the explorers of 500 years had been seeking. The Suez Canal had presented no great engineering difficulties. It was a simple problem of a sea-level excavation through flat, sandy country. Yet the commercial and military importance of its accomplishment had raised de Lesseps, in the popular imagination, to the rank of the world's greatest engineer, while the French people, with patriotic enthusiasm, were as ready to pour their treasure into any new enterprise to which he might lend his name as had been the people of Scotland, nearly 200 years earlier, to invest their savings in Paterson's Darien scheme.

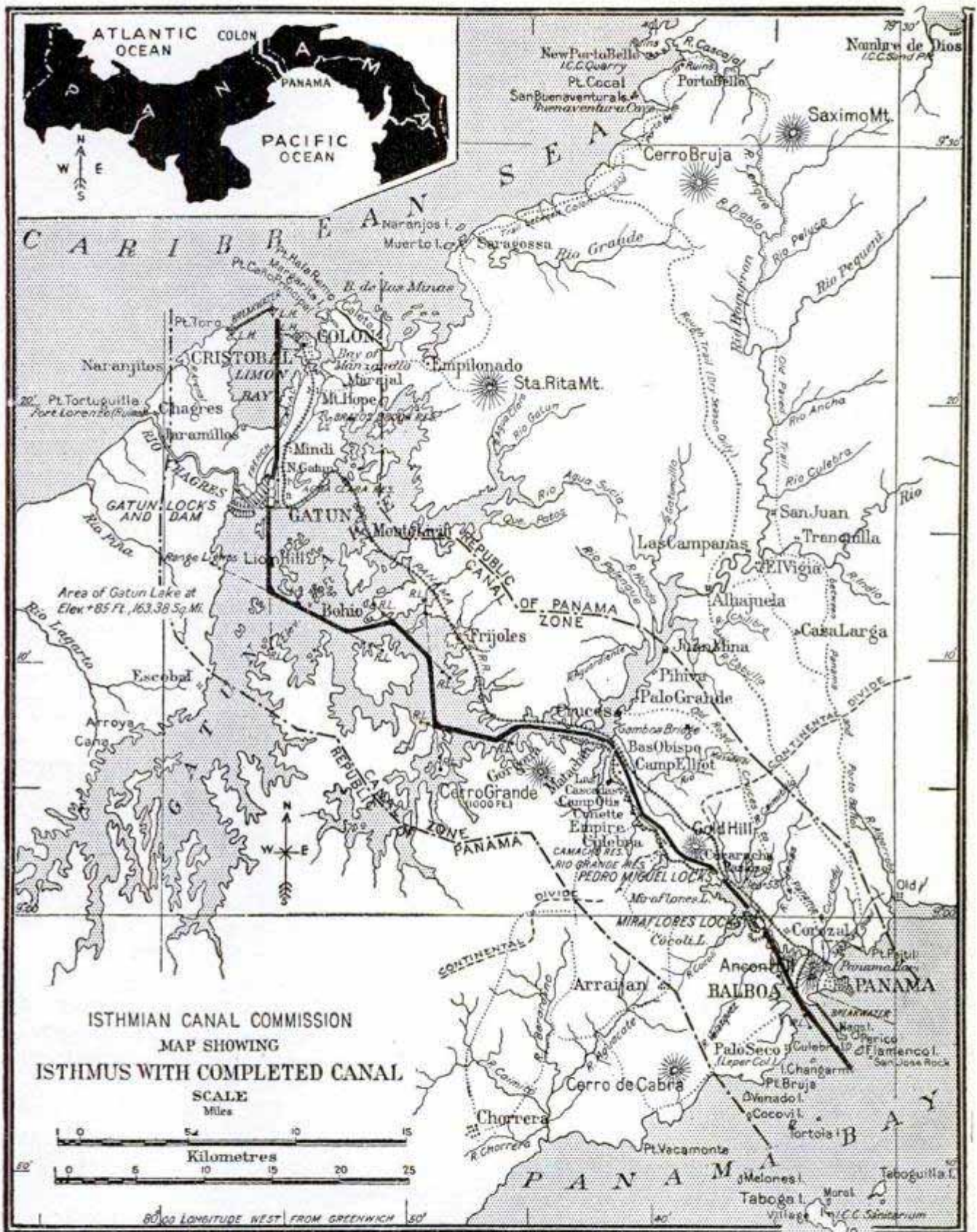
So the group of French financiers to whom Lieutenant Wyse sold his Panama Canal concession shrewdly persuaded Count de Lesseps to become their chief engineer. The Panama Canal Company was organized at once under the general laws of France. Six million shares at 500 francs (\$100) each were sold to the French people, but in 1889, after eight years of work, the company was bankrupt and hardly a fair beginning of a canal had been constructed. By 1887, too, it had become apparent that the original project for a sea-level canal was impractical, and the plans were changed for a canal with locks.

In 1894, a new French company was organized and work was resumed. In 1899, the United States Congress created the Isthmian Canal Commission, to examine all practicable routes and to report which was the most practicable and feasible for a canal "under the control, management and ownership of the United States." The commission reported two alternative plans, one for a canal at Panama and the other across Nicaragua. It estimated the cost of a Panama Canal at \$156,378,258 and of the Nicaragua Canal at \$200,540,000. But because the route from New York to San Francisco would be several hundred miles shorter by way of Nicaragua, and considering existing French concessions in Panama, the commission gave it as its belief that the Nicaragua route was

more desirable under the circumstances. The effect of this report was to induce the French Panama Company to offer its concession to the United States for \$40,000,000, in January, 1902. The Isthmian Canal Commission advised the purchase and Congress authorized the President to buy all the property of the Panama Company, including a majority of the stock of the Panama Railroad Company, and to obtain from Colombia perpetual control of a strip of land six miles wide, through which to build the canal. Colombia refused to grant this control, but in November, 1903, ten months later, the state of Panama declared itself independent. Within a month a treaty had been negotiated with the new republic by which the United States was given control of a strip of land 10 miles wide for the purposes of a canal. The French company's property was bought and, in February, 1904, a commission for the construction of a canal was appointed. In May of that year, work was begun where the French company had abandoned it. In June, 1905, a board of consulting engineers was appointed to consider whether the canal should be at sea level or with elevating locks.

By a vote of eight to five the board reported, in January, 1906, in favor of a sea-level canal. The minority, together with the chief engineer, favored the high-level plan, on the ground that it would provide a quicker passage for ships and an equally safe one; that it furnished the best solution of the vital problem of how to care for the flood waters of the Chagres River; that it would cost less and could be built quicker, and would be less expensive to operate and maintain. When these conflicting reports were submitted to the Isthmian Canal Commission, it voted almost unanimously in favor of a canal with locks, and this plan was adopted by Congress in June, 1906.

The plan of having the canal built by contract was considered, but none of the bids was satisfactory, and President Roosevelt decided to place the work under the control of the Engineer



Official Map of the Panama Canal: In the Upper Left-Hand Corner is a Map of the Isthmus Showing the "S"-Shaped Twist That Brings the Atlantic Terminus North and West of the Pacific End

Corps of the Army. Maj. G. W. Goethals was appointed chief engineer and chairman of the commission, and in April, 1907, work was begun under the plan which proved successful.

The greatest and most difficult prob-

lem which the American builders of the canal had to solve was not one of engineering, but of health. Under the French company's operations more than 60 per cent of the workmen were continually incapacitated by disease.

In one year the death rate among them reached 60 per cent. To Col. W. C. Gorgas, of the Army Medical Corps, was intrusted the sanitation of the Canal Zone. Recent medical research had proved that yellow fever and malaria alike were transmitted only by mosquitoes and Colonel Gorgas organized a sanitary corps, the main object of which was to exterminate every mosquito and every fly on the isthmus. As a result the Canal Zone death rate is lower than in most American cities.

Having made the Canal Zone a safe place in which to work, the commission went farther and made it a comfortable place in which to live. Quarters for the working force were constructed at a number of convenient points and for the married men comfortable houses were provided, and the commission's commissary department arranged for regular shipments of food supplies, which were sold to the employes at cost. Nor was the social life of the workers overlooked. Club houses were built and furnished at the principal settlements along the route of the canal, mostly operated under the direction of the Y. M. C. A., and a little later, women's clubs were organized in the principal towns.

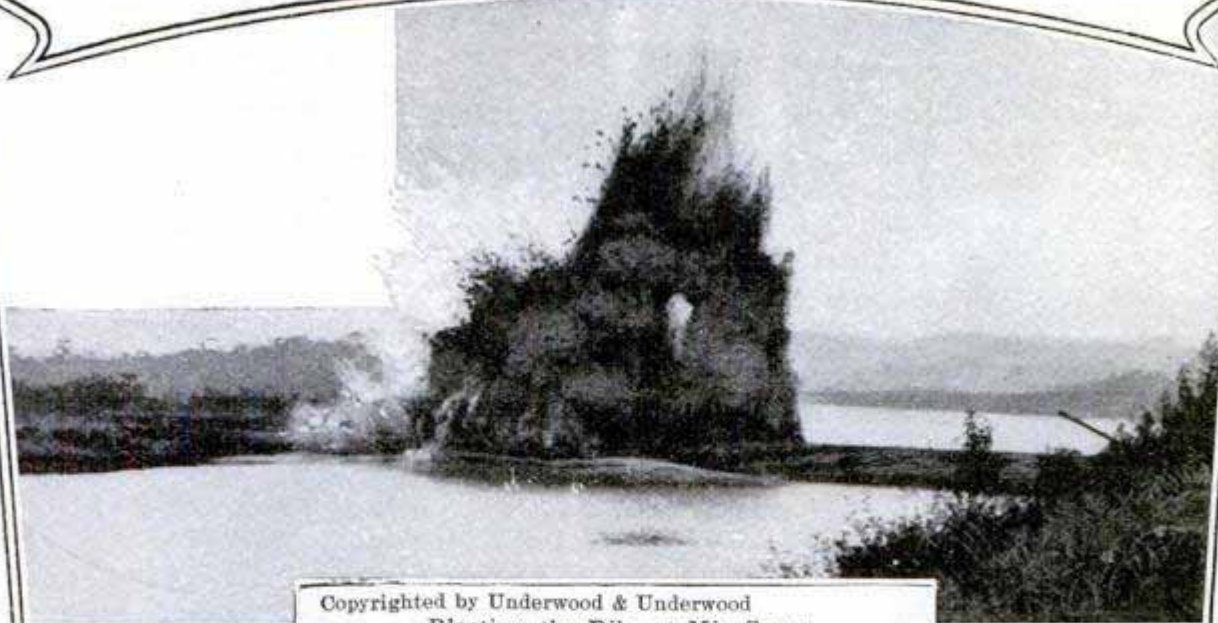
The net result of this attention to details which the French company had omitted to provide for, was a healthy, contented working force, without which the canal never could have been built. The largest number of men ever employed by the French at one time was 10,854. A recent report of the Canal Commission gave the number employed as 42,885, of whom about 4,000 were white Americans.

The work which this army of laborers has now practically completed is justly termed the greatest engineering feat mankind has ever accomplished. The problems involved have called into play all the resources of modern science, and the result has justified the confidence of the American people in the engineering and administrative skill of the Army Engineer Corps. The operations of the French company were attended by extravagance and

corruption to an extent probably unparalleled in the world's history. Efficiency and economy have marked the work under American control, and there has not been even a whisper of improper influences or corruption of any sort.

The canal itself, from deep water to deep water, is 50 miles long. Its general direction from the Atlantic entrance to the Pacific end is from northwest to southeast, the northern terminal being about 22½ miles farther west than the southern entrance from the Pacific. The first seven miles of the canal, beginning at the Atlantic end, are at sea level. Five miles of channel, 500 ft. wide, have been dredged to a depth of 41 ft. directly south through Limon Bay, and two miles of this sea-level section has been cut through low-lying land to the entrance to the Gatun Locks, where the ships are raised, in three steps, to a height of 85 ft. above sea level, into the great body of fresh water called Gatun Lake. This lake was formerly the valley through which the Chagres River flowed into the sea. The most difficult engineering problem that confronted the canal builders was the control of the flood waters of this river. The heavy tropical rains flow down the mountain sides and through the narrow valley with tremendous force and, in the space of 24 hours, the river has been known to rise more than 25 ft. To control the flood water the Gatun Dam was built. This is an artificial embankment of rock and earth, which holds the waters back to form Gatun Lake. The islands which appear on the lake were formerly the tops of hills that rose from the bottom of the Chagres Valley.

By thus providing a basin for the river to flow into, the largest volume of flood water ever known can be safely disposed of. Among the most valuable assets purchased by the United States from the French canal company were the data of the water flow on the isthmus. The greatest known discharge from the Chagres River is 137,500 cu. ft. per second. The spillway



Copyrighted by Underwood & Underwood
Blasting the Dike at Miraflores



Copyrighted by Underwood & Underwood
First Vessel through the Culebra Cut



Photo by Underwood & Underwood
"Gamboa's Busted!"

of the Gatun Dam, constructed of concrete on a rock foundation, will permit the flow of 154,000 cu. ft. per second, and regulating weirs have been provided so that a much greater excess flow can be carried off safely into the old bed of the Chagres River and out to sea. The highest known flood of the Chagres River would raise the level of Gatun Lake only 1 ft. in 9½ hours, even though the spillway and weirs were all closed. In the rainy season, the water will be impounded to a depth of 87 ft., providing a reserve supply for the operation of the locks throughout the dry season.

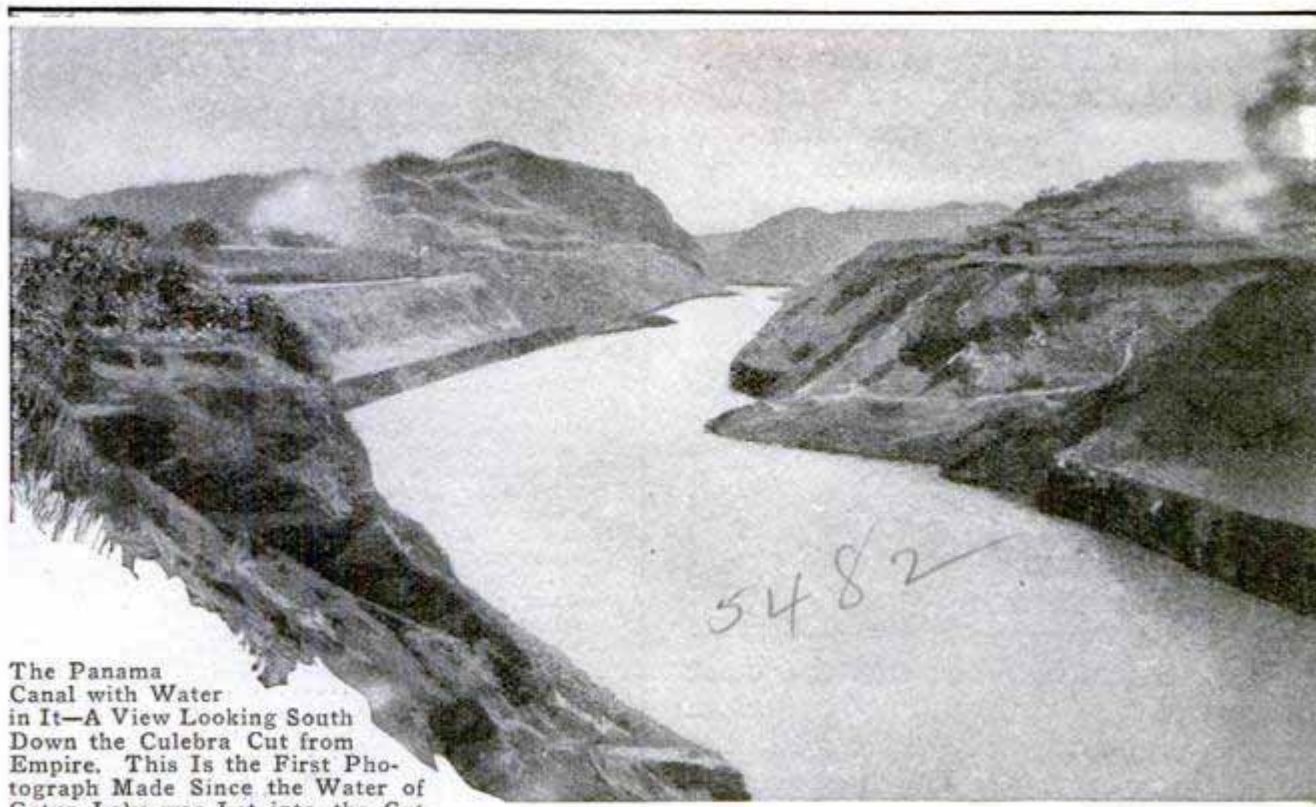
The normal flow of water through the Gatun spillway operates the hydroelectric plant which supplies power and light for the operation of the canal. With a head of 75 ft., to a tailrace 8 ft. above sea level, there is enough power available for any probable demand for years to come. The equipment now being installed consists of three 2,250-kw. water turbines, operating three 2,000-kw. generators, while a steam generating plant at Miraflores is coupled to the same transmission line.

To lift ships from the sea into Gatun Lake, over the dam, the great Gatun Locks have been constructed. Although these locks are perhaps the most wonderful engineering feature of the entire canal, no new principles were involved in their construction—they are simple hydraulic locks, working in the same manner as the first hydraulic locks designed by Leonardo da Vinci, more than 400 years ago. A vessel entering from the sea passes first into the lower chamber. The great gates are closed behind the ship by electric power, two leaves, each 65 ft. long, swinging in to form a V-shaped gate, the point of the "V" being toward the stern of the ship, while ahead of it another gate towers high above the level of the water in the second chamber. The ponderous gates once closed, the powerful electric machinery, operated from pits left in the solid concrete of the lock walls, turns the valves that let the water from the higher levels flow into the lower cham-

bers. Culverts formed in the concrete—tunnels large enough to let a railroad locomotive through—carry the water down. Through "wells," or openings in the floor of the lock chamber, the water flows in, filling the chamber to the level of the next higher one, and lifting the ship with it. The second set of gates is then opened, the ship floated into the second chamber, the gates closed behind it, and again it is lifted. Once more this process is repeated before the ship reaches the level of Gatun Lake.

These Gatun Locks are not only the largest of their kind, but together comprise the largest monolithic concrete structure ever built, exceeding in volume the great Assouan Dam and bulking two-thirds as large as the Great Pyramid, which is still the world's largest masonry structure. These locks, like the ones at the Pacific end of the canal, are built in pairs, so that the danger from accident is halved and the efficiency doubled. Since 95 per cent of ocean-going ships are less than 600 ft. long, and it would be a waste of water and of time to use the entire 1,000-ft. lock for short vessels, each lock is provided with intermediate gates, so that any one of five different lengths of chamber may be used. In all there are 46 lock gates at Panama. These are made of steel plates riveted to structural-steel frames, and so strongly have they been constructed and so carefully braced that the largest of them, weighing 1,483,700 lb., droops less than one-eighth of an inch at the extreme end, 65 ft. from its pintle, or hinge. The total weight of the gates is 118,488,100 lb., and their cost, including the cost of erection, was \$5,374,474, or more than 4 cents a pound.

Vessels will be lifted or lowered in the locks at the rate of 3 ft. a minute, and the total time for passing the Gatun Locks will be about an hour and a half. Ships will not be allowed to pass through the locks under their own power, for fear of damaging the lock gates by collision. Instead, they will first tie up at piers formed by the ex-



The Panama Canal with Water in It—A View Looking South Down the Culebra Cut from Empire. This Is the First Photograph Made Since the Water of Gatun Lake was Let into the Cut

Copyrighted by Underwood & Underwood

tension of the center wall of the locks, where electric locomotives will take them in tow, four locomotives to a ship, two on each side, one forward and one astern. These locomotives will run on tracks laid on the lock walls, and have gear wheels operating on racks between the rails, to keep them from being pulled off the tracks by the towing strain. Forty of these locomotives are being built at a cost of \$13,217 each. Should a ship for any reason become unmanageable while in a lock chamber, through the breaking of a towing line or otherwise, it can be prevented from bumping into the gates by the chain fenders 100 ft. ahead of each gate. These are 24 heavy chains, resting in grooves in the bottom of the lock, which can be quickly hauled taut by electric winches so as to form a barrier across the bow of any ship and effectually stop its drift. And in the event of damage to the gates from any cause, emergency dams can be swung into place. These are swing bridges which can be thrown across the lock chambers, from which wickets are let down filling the width of the lock.

Once in Gatun Lake the ocean-going

ship finds itself in fresh water—as, indeed, it has been since entering the second lock chamber. Instead of 40 ft. of water over the sills, the upper lock chambers have $41\frac{1}{2}$ ft., since a ship drawing 40 ft. in salt water will sink under the same load to about $41\frac{1}{2}$ ft. in fresh. Ships loading for the passage through the Panama Canal will have to carry two “Plimsoll marks.” These are marks painted on ships’ sides indicating the depth to which it is safe to load. The fresh-water load line is from 8 to 15 in. below that for salt water, depending on the draft of the vessel. Another effect of the fresh water in Gatun Lake will be to remove the barnacles from the ship’s bottom. One of the most troublesome and expensive drawbacks to salt-water navigation is the accumulation of these marine molluscs, which in time may seriously retard the speed even of a high-powered steamship unless it is sent to dry dock and scraped after each voyage. But barnacles die and drop off in a few hours in fresh water, and before the ship has passed through the canal to the Pacific Ocean it will have lost this outboard burden.

In Gatun Lake a ship may steam at full speed for 24 miles, to Bas Obispo, where it enters the Culebra Cut. The channel through the lake is not a straight line, but passes around and between many islands. It is marked

by buoys which are to be lighted at night. In fact, the entire length of the canal will be so brilliantly lighted as to make the passage by night almost as safe as by day. The Culebra Cut,



nine miles long, through the mountains, was the most difficult part of the canal construction. At the highest point, Gold Hill, the mountain rose nearly 580 ft. above sea level. Here more of the work done by the French company was utilized than at any other point along the canal. They had taken out about 20,419,720 cu. yd. of earth and rock, but there still remained, for the American forces to excavate, 89,794,493 cu. yd. to which frequent "slides" of earth from the mountain slopes have added another 22,000,000 cu. yd. In the removal of this tremendous mass of earth and rock new standards for steam-shovel work were set by the American engineers. Much of the machinery installed by the French company has been used in the Culebra Cut, especially 104 locomotives used to haul the dirt trains to remove the "spoil." The excavation was a less difficult problem than the disposal of the material excavated. The plan for this part of the work was developed by John F. Stevens, the former chief engineer, and has been followed under the administration of Colonel Goethals. An average of 75 dirt trains, each running continuously to and from the cut, has been in use night and day since the canal work got under way. Each train consisted of 20 or 21 cars of capacity from 10 to 19 cu. yd., the material excavated in the Culebra Cut averaging about 3,600 lb. to the cu. yd. Much of the

PANAMA CANAL FACTS

Total Length of Canal.....	50 miles
Salt Water, Channel to Gatun Locks	7 miles
Fresh Water, Gatun Lake and Culebra Cut	33 miles
Fresh Water, Pedro Miguel Lock to Miraflores Locks.....	1½ miles
Salt Water, Miraflores Locks to Pacific	8½ miles
Width of Channel.....	300 to 1,000 ft.
Minimum Depth, Salt Water.....	40 ft.
Minimum Depth, Fresh Water.....	41½ ft.
Total Angles in Canal.....	600° 51'
Sharpest Angle, Tabernilla.....	67° 10'
Total Excavation to Sept. 30, 1913	211,048,198 cu. yd.
Remaining to be Done.....	21,304,802 cu. yd.
Total Concrete Construction	5,000,000 cu. yd.
Time of Passage Through Canal.....	10 hrs.
Time of Passage Through Locks.....	3 hrs.
Work Begun by Americans.....	May, 4, 1904
Number of Men Employed, Average.....	40,000
Steam Shovels Employed.....	101
Locomotives Employed.....	307
Drills Employed.....	553
Railway Cars Employed.....	4,572
Dredges Employed.....	20
Cranes, Pile Drivers, Barges, Tugs, and Miscellaneous Machines Employed.....	263
Cost to June 1, 1913.....	\$295,587,538.41
Estimated Total Cost.....	375,000,000.00
First Vessel through Gatun Locks.....	Sept. 26, 1913
Water Let into Culebra Cut.....	Oct. 1, 1913
Gamboa Dike Blown Up.....	Oct. 10, 1913
First Vessel through Miraflores Locks.....	Oct. 14, 1913
Official Date of Opening.....	Jan. 1, 1915

CULEBRA CUT

Length	9 miles
Width at Bottom.....	300 ft.
Width at Top.....	¼ to ½ mile
Deepest Excavation.....	495 ft.
Average Depth of Excavation.....	120 ft.
Excavated by the French.....	20,419,720 cu. yd.
American Excavation, Original Estimate	89,794,493 cu. yd.
Added Excavation, Account of Slides, about.....	22,000,000 cu. yd.
Total Excavation by Americans to Date, about.....	105,000,000 cu. yd.
To be Removed by Dredges	6,000,000 cu. yd.
Greatest Month's Work, March, 1911	1,728,748 cu. yd.
Day's Record for One Steam Shovel	4,823 cu. yd.
Largest Slide, Culebra.....	10,000,000 cu. yd.

GATUN DAM

Length	8,000 ft.
Width at Base.....	2,100 ft.
Width at Water Level.....	400 ft.
Width at Top.....	100 ft.
Height	115 ft.
Volume of Rock and Clay.....	22,100,000 cu. yd.

GATUN LAKE

Area	164 sq. miles
Height of Surface above Sea Level.....	85 ft.
Water Capacity.....	183,000,000,000 cu. ft.
Area of Watershed.....	1,320 sq. miles
Minimum Depth, Rainy Season.....	47 ft.
Minimum Depth, Dry Season.....	39 ft.

GATUN LOCKS

Length Over All.....	3,500 ft.
Width Over All.....	350 ft.
Volume of Concrete Construction	2,043,730 cu. yd.
Width of Side Walls at Base	52 ft.
Width of Side Walls at Top	8 ft.
Width of Center Walls.....	60 ft.
Height of Walls.....	81 ft.
Dimensions of Lock Chambers.....	1,000x110 ft.
Depth of Water in Lower-Lock Chambers	40 ft.
Depth of Water in Upper-Lock Chambers	41½ ft.
Length of Lock-Gate Leaves.....	65 ft.
Height of Lock-Gate Leaves.....	47.4 to 82 ft.
Weight of Largest Gate.....	1,483,700 lb.



Profile of the Panama Canal, Showing the Different Levels from Ocean to Ocean

excavated material was used in building the Gatun Dam. The speed with which the work was pushed is indicated by the fact that the average time for unloading a train of flat cars was from 7 to 15 minutes. Along most of the nine miles of the Culebra Cut the banks have found their "angle of repose" at which there is no danger of further slides. The excavation in the cut represents about one-half of all the digging done under American direction. The total excavation in the completed canal is approximately 232,000,000 cu. yd., of which 21,000,000 cu. yd. remains to be taken out.

To keep the rising waters of Gatun Lake out of the unfinished Culebra Cut, the Gamboa dike was located across the northern end of the cut. On Oct. 1, 1913, the first water was let into the cut through four 24-in. pipes, and on October 10 the dike was exploded by the pressing of a button at Washington. There still remains about 6,000,000 cu. yd. of material to be taken from the cut before the channel is finished, but this will be done by dredges while the canal is in use by ships. When finished, the passage of the canal will take about 10 hours.

At the southern end of the Culebra Cut is the Pedro Miguel Lock, with a lift of 30 ft. 4 in. A ship passing through this must proceed two miles farther to Miraflores, through another fresh-water lake, about two square miles in area, with a surface 55 ft. above mean sea level. At the lower end of this lake are the Miraflores Locks, similar in every respect to those at Gatun except that they are of but two steps instead of three. Dropping down through these a distance of 54 ft. 8 in., the ship finds itself again in

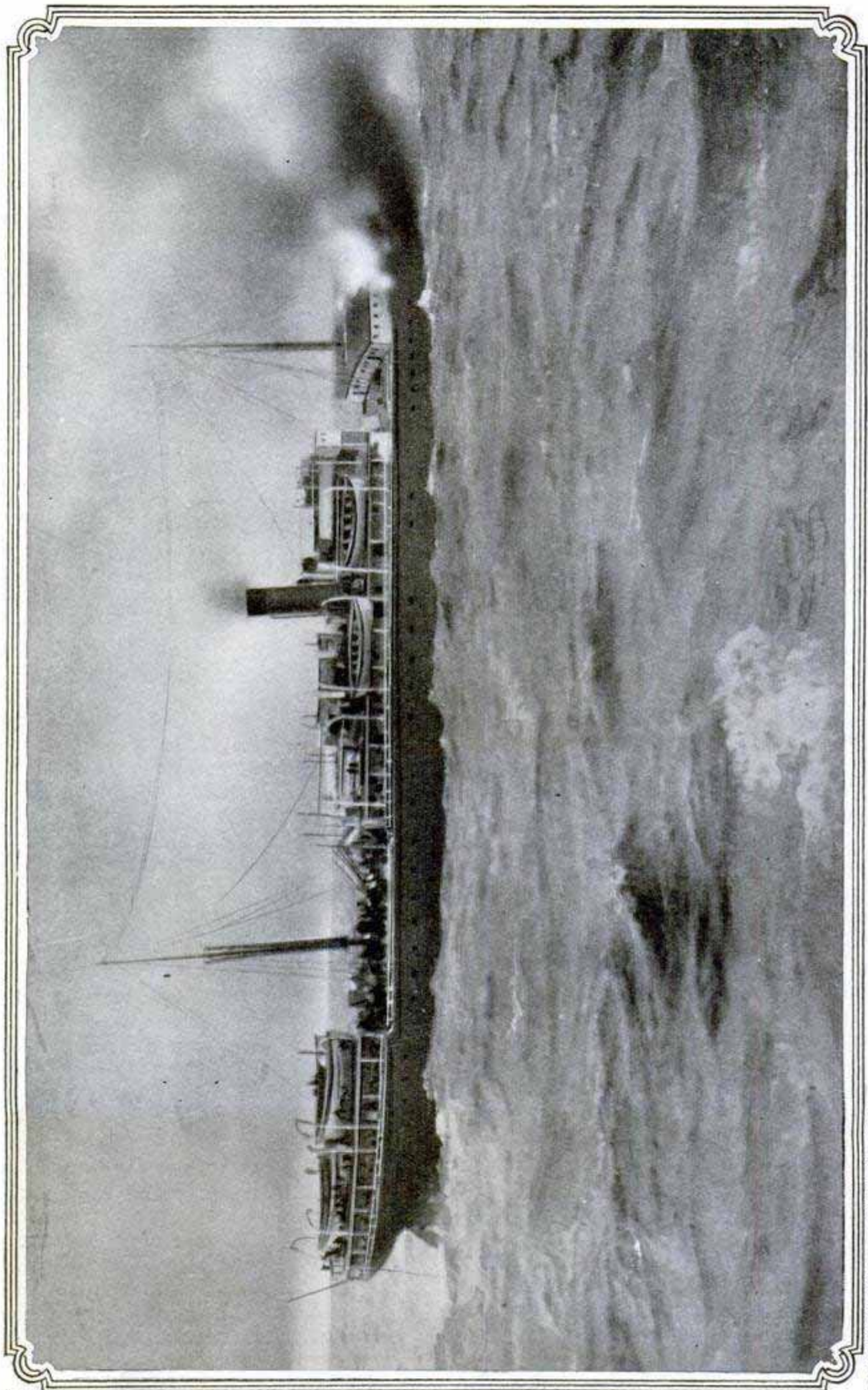
salt water and at the level of the Pacific Ocean. Here a channel 500 ft. wide and 8 miles long leads to deep water and the open sea. Water was first admitted to the Miraflores Locks on August 31, 1913, when the temporary dike that had kept the locks dry was blown up, and, on October 14, the tug "Miraflores," with three barges and two other vessels, was raised from the Pacific level to the surface of Miraflores Lake.

There has been space here only to sketch briefly the more interesting phases of the wonder story of the Panama Canal. To all intents and purposes it is finished—its completion is merely a matter of details. It had cost, to June 1, 1913, \$295,587,538.41, and may cost another \$90,000,000 before the last touch is added to its beautification, the last gun mounted in its fortifications. But as it stands today it is a permanent monument to American enterprise and engineering genius—the greatest victory over the forces of nature yet won by the hands and brain of man. The world-dream of 400 years has been realized and the world's commerce has a new highway from sea to sea.

HIGH SCHOOL HAS EARTH FLOORS

When the mechanics building of a California high school was rebuilt after a fire which partly destroyed it, the authorities determined to install earthen floors instead of wood. The earth was rolled, hand-tamped and oiled, then covered with fine gravel and screenings. The floors are fireproof and cost only about half as much as wooden ones.

*M. Ravine
900 E. 29th St.*



Copyrighted by Underwood & Underwood
The Burning "Volturno." Photograph Taken from Deck of Rescue Ship "Grosser Kurfürst"

"VOLTURNO" RESCUE LATEST TRIUMPH OF WIRELESS*Daily Papers - see Data*

The day of the "mystery of the sea," when a vessel might sail from port and never be heard from again, is past. With the wireless equipment, without which no vessel is now permitted to leave any port in a civilized country, a ship, no matter how isolated, can quickly spread the news of disaster or the call for help broadcast over the sea, and the call is sure to be heard by every ship within a radius of 500 miles. The latest triumph of this marvel of modern science took place when the "Volturno" burned in mid-ocean on October 9, 1913. Fire started in the forward part of the hold of this vessel at about seven in the morning. By 10 o'clock the fire was beyond control, it was realized that the destruction of the ship was inevitable, and the "S. O. S." distress signal was flashed from the doomed vessel. Within an hour 10 ships had abruptly changed their courses and were rushing to the rescue.

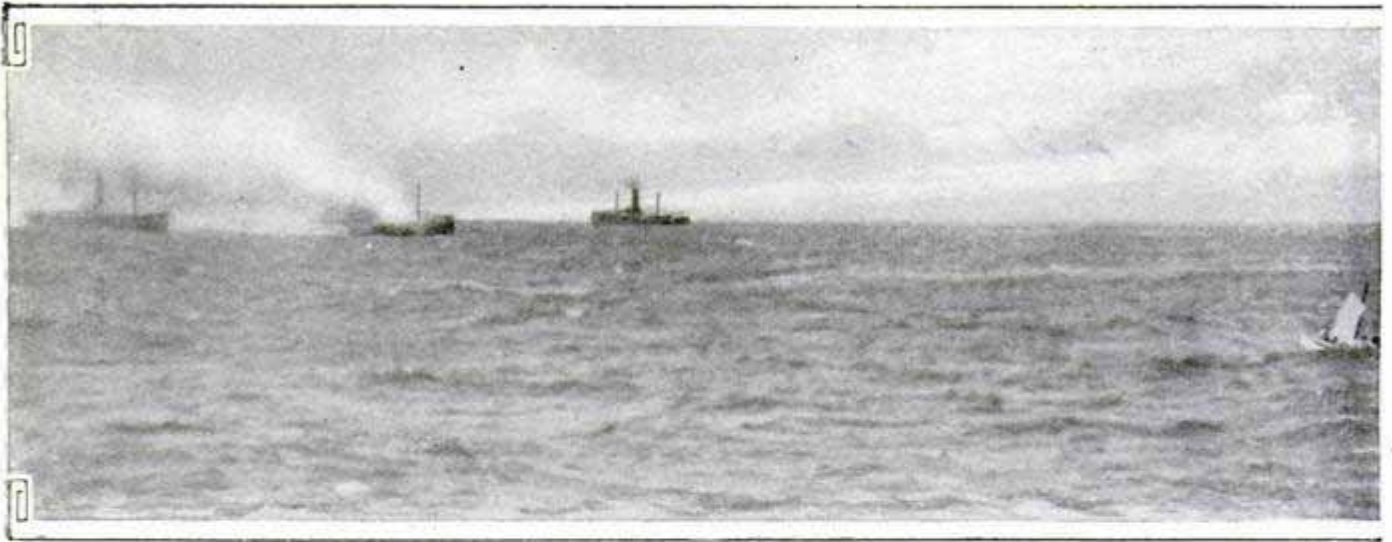
Although wireless apparatus was not fully developed until 1909, it is estimated that over 5,000 lives had been saved by it prior to the burning of the "Volturno." Without the wireless, both the "Volturno" and the "Titanic" would probably have been noted in marine history simply as ships that put out to sea and failed to come into port.

The destruction of the "Volturno" took place during a violent gale while the vessel was on a voyage from Rotterdam, Holland, to Halifax and New York. At the time the fire started, the ship had reached the middle of the Atlantic, the position being given in the wireless call as latitude $49^{\circ} 12'$ north and longitude $34^{\circ} 51'$ west, and was about 700 miles northeast of the point where the "Titanic" sank in 1912.

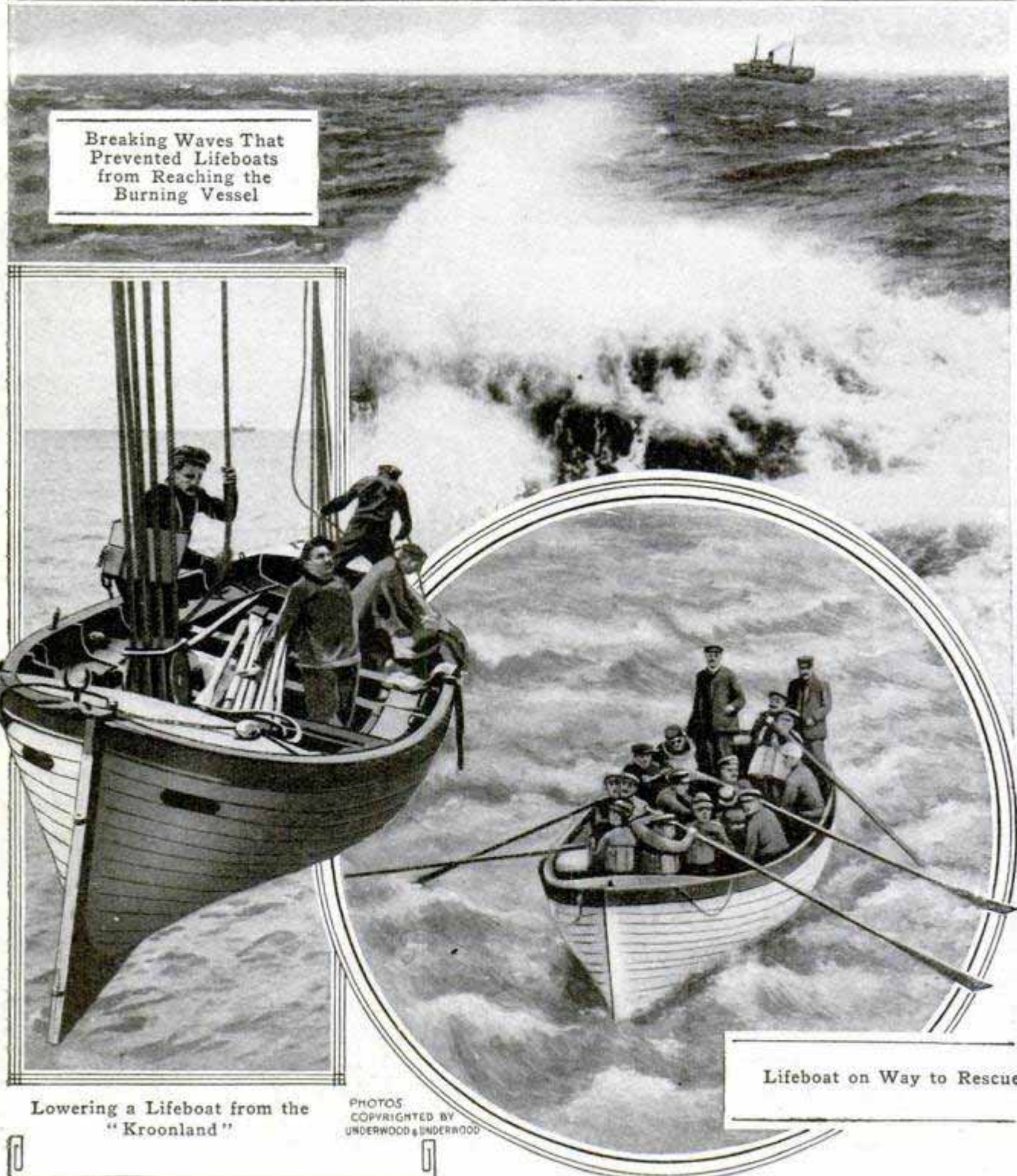
The entire fire-fighting equipment was brought into service. In spite of this the flames spread rapidly, and in a short time a series of explosions occurred which wrecked the forward part of the ship, put the compass and steer-

ing gear out of commission and, according to reports, killed over 50 passengers and members of the crew. Attempts were made to launch three lifeboats filled with passengers. The tackle of the first boat became fouled while it was being lowered, the boat was upset, and the occupants were thrown into the sea and drowned. The second boat got away safely, but was evidently lost in the storm. The third boat was launched successfully, but was carried by the wash under the stern of the ship and crushed and all on board were drowned.

The first ship to reach the "Volturno's" side was the "Carmania," which had picked up the wireless signal when about 75 miles west of the burning vessel. The gale was then at its height and the "Carmania" was unable to give any relief, since no boat could approach or leave the "Volturno" safely. One by one, other vessels came up and, by midnight, 10 ships were standing by, ready to give help but unable to do so on account of the fury of the storm. Shortly before daybreak two tank steamers, the "Narragansett" and the "Czar," arrived on the scene. The "Narragansett" took a position to the windward of the "Volturno" and began to spray the sea with oil, and this with a slight abatement in the storm made it possible for boats from the rescuing ships to approach the stern of the "Volturno." While the oil did not prevent the waves from running as high as before, it formed a skin over the water that kept the waves from breaking. The oil used was lubricating oil, which, on account of its high ignition point, was in practically no danger of being set on fire by the burning ship. Life lines were rigged from the stern of the ship and the passengers and crew were lowered into the lifeboats. The "Volturno" was a Uranium-Line steamer, flying the British flag. The ship carried 560 passengers and a crew of 93, and of these 143 are reported missing.



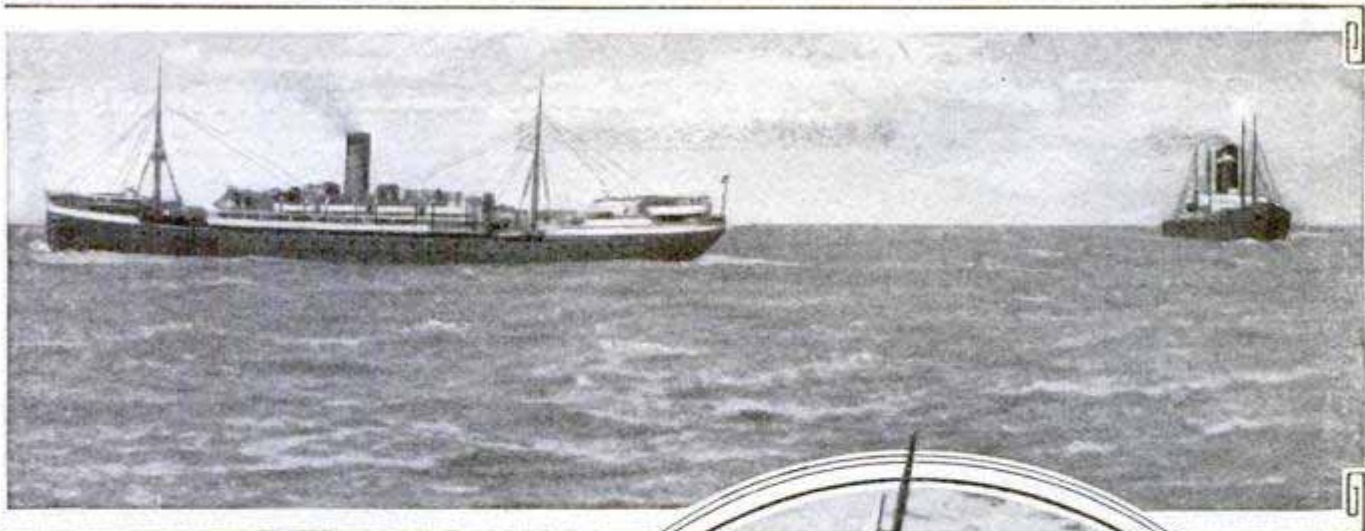
Breaking Waves That
Prevented Lifeboats
from Reaching the
Burning Vessel



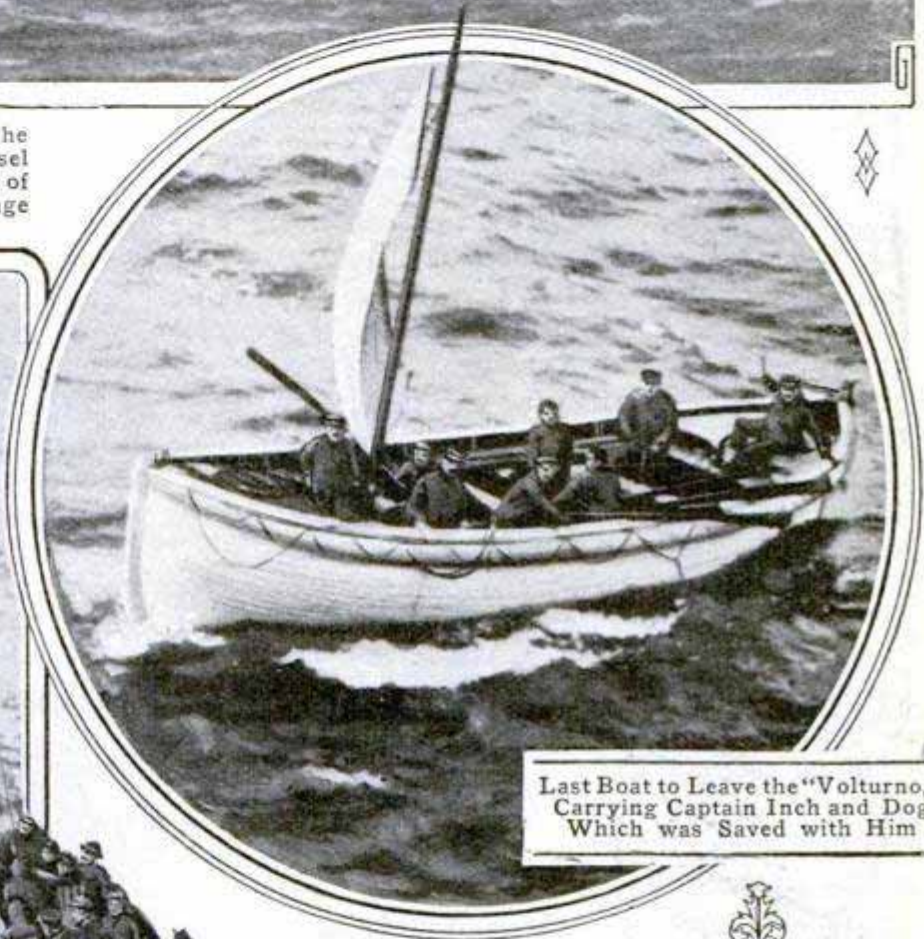
Lifeboat on Way to Rescue

Lowering a Lifeboat from the
"Kronland"

PHOTOS
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Arrival of the Rescue Ships: The "Volturno" is the Second Vessel from the Left in the Portion of the Picture on the Opposite Page



Last Boat to Leave the "Volturno," Carrying Captain Inch and Dog Which was Saved with Him



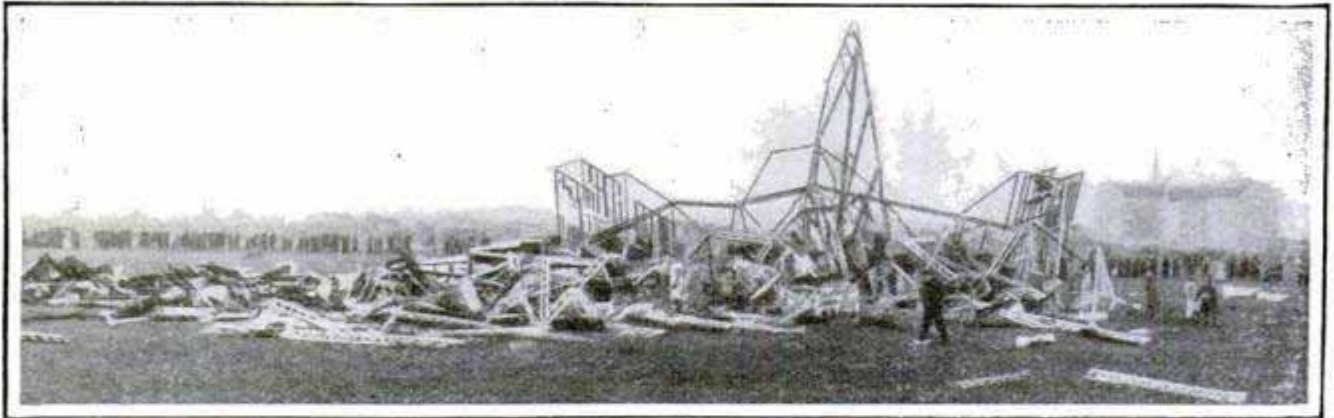
Taking "Volturno" Passengers on Board the "Grosser Kurfürst"



Fire Drill on Board the "Volturno"

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LONG PREDICTED CATASTROPHE OCCURS TO AIRSHIP



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All That was Left of the German Dirigible "L 2" after the Explosion 500 Ft. in the Air

On Oct. 17, 1913, the newest and largest of the Zeppelin war airships, the "L 2," was destroyed in mid-air by an explosion while the dirigible was making a trial trip, preliminary to its acceptance as flagship of the new German aerial navy. The disaster occurred at Johannisthal, and the crew, and all members of the admiralty trial board, perished. Spectators watching the maneuvers saw the big bag burst into flame. A moment later the blaz-

ing framework plunged downward. When the rescuers reached the debris, of 28 men on board but one was found alive, and he shortly succumbed. The official report of the accident states, a partial vacuum due to new type of wind shield formed in center gondola, sucking escaping gas into the gondola, where a motor spark ignited it. The "L 2" was a sister ship of the "L 1," wrecked in a hurricane on the North Sea, September 9.

5678 A REMARKABLE PHOTOGRAPH OF SINKING SHIP

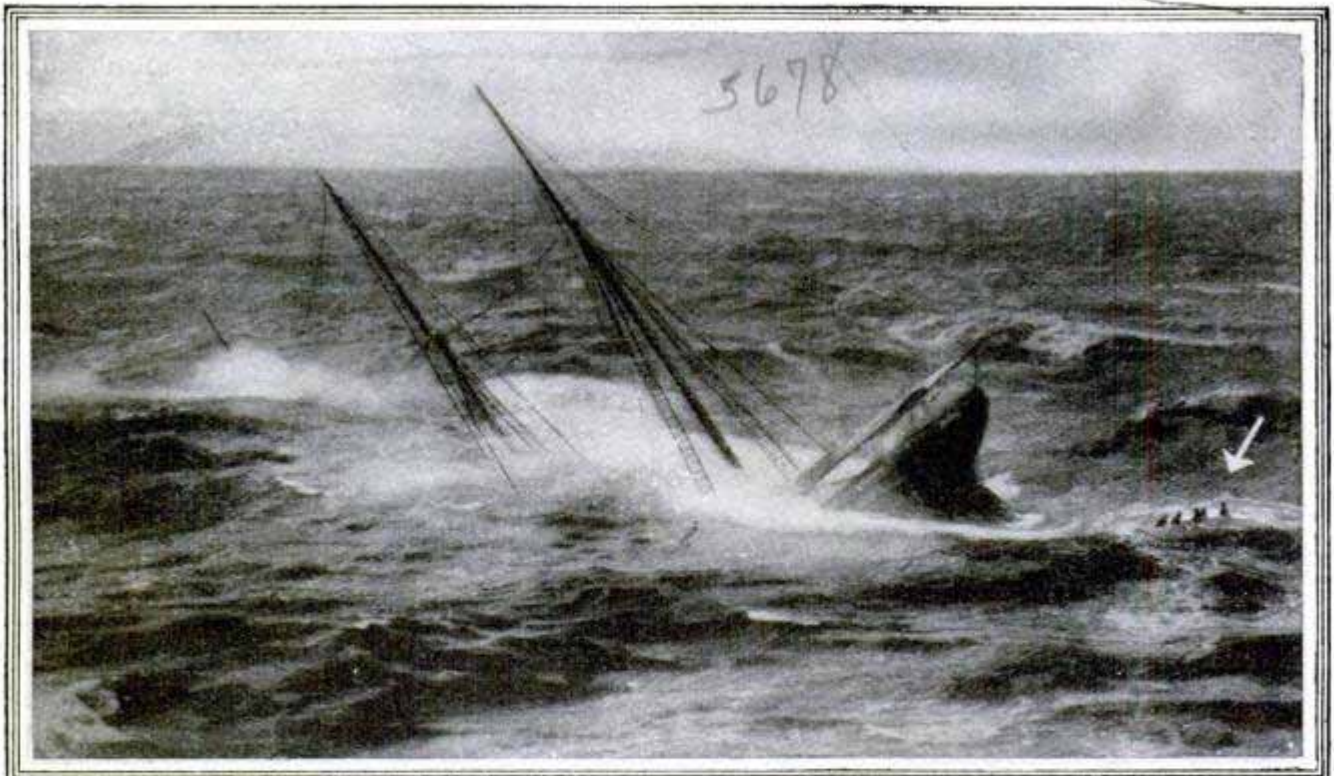


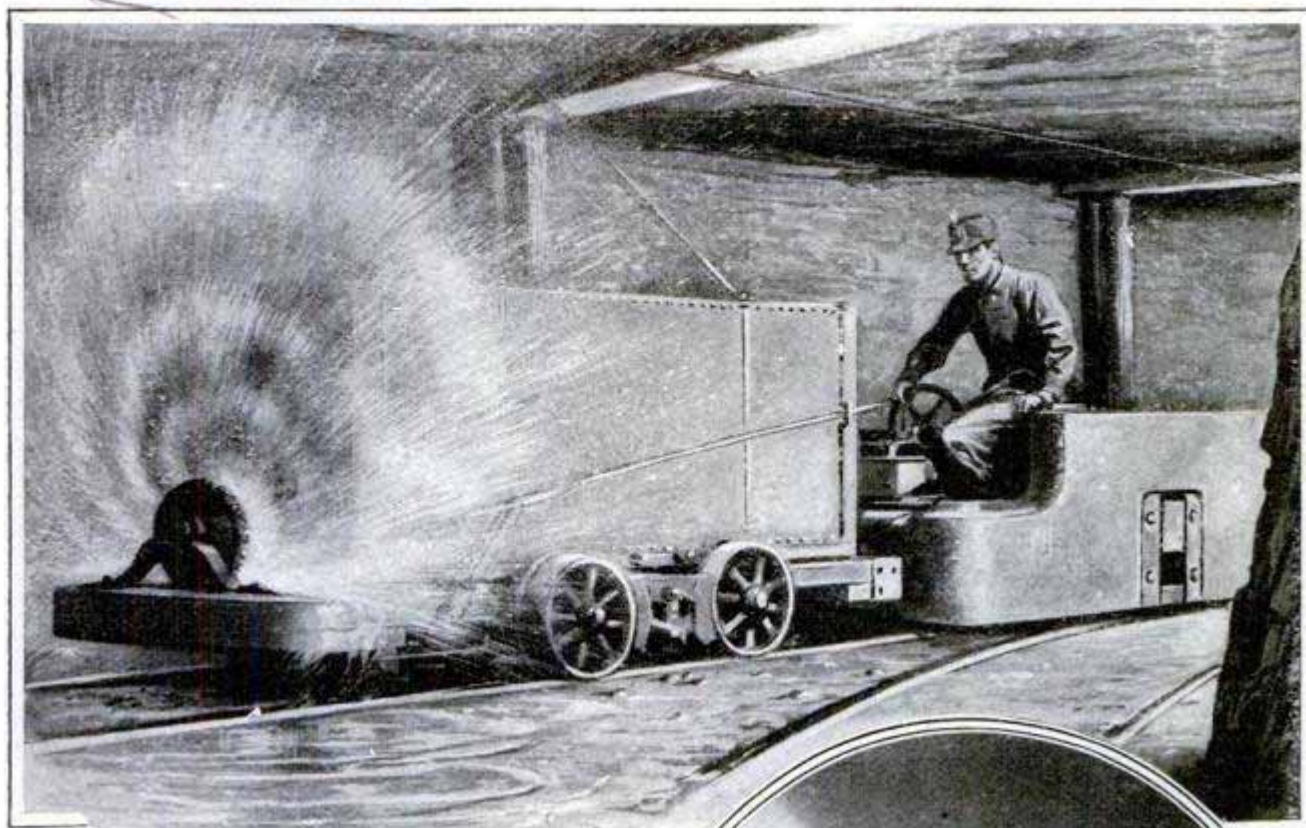
Photo by Underwood & Underwood N.Y.

The Four-Masted Freighting Schooner "Marjory Brown" was Sunk in a Gale When 200 Miles Off Sandy Hook. The Crew Took to the Lifeboat and Got Away Barely in Time to Escape the Terrific Suction as the Vessel Plunged beneath the Sea. In this Photograph, Made from the Deck of the Steamer "Berlin" and One of the Most Remarkable in Marine History, the Lifeboat is Indicated by Arrow

mfd by

Superior Supply Co., Bluefield, W. Va.

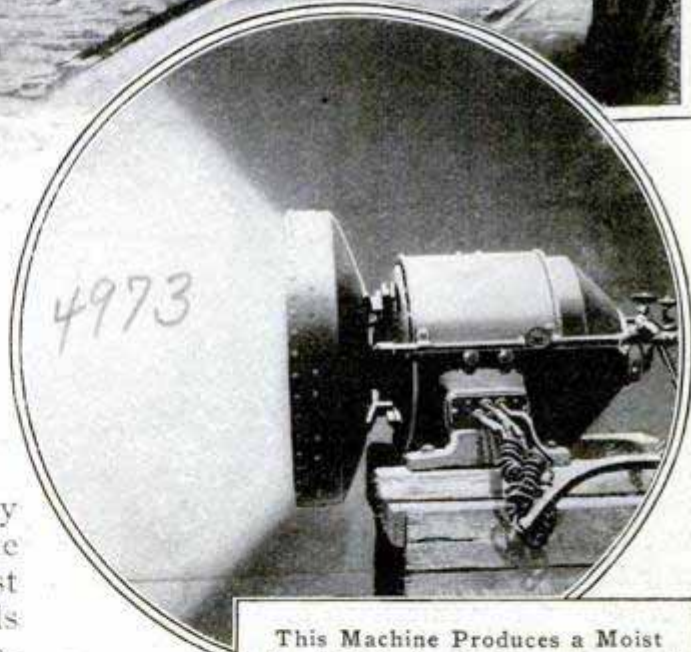
WASHING MINES TO PREVENT DUST EXPLOSIONS



Rotary-Spray Mine Washer Which Cleans the Air as Well as the Walls and Ceiling

4473
H

"Mine washing" is coming to be an accepted means for preventing explosions in coal mines. Since the discovery that coal dust is highly inflammable and that a great many mine explosions are caused by the presence of a curtain of coal dust hanging in the air, many methods have been suggested and a few machines have been invented for eliminating the coal dust. One method consists in flooding the mine with a moist fog produced by a machine called the humidifier. By centrifugal action, the machine changes water into vapor and drives it into the mine in the shape of a heavy fog which absorbs and precipitates the dust particles suspended in the air. The machine is driven by an electric motor and vaporizes 1.65 gal. of water an hour. Another machine which has recently been invented actually washes the walls, ceiling, floor, and air of a mine entry with a



This Machine Produces a Moist Fog Which Precipitates Any Coal Dust That is in Suspension in the Air

solid sheet of water, carrying away all the dust that is held in the air or clinging to crevices and ledges in the walls. It consists of a large tank of water, mounted on a car that can be pushed through the entries by a mine engine. A rotary spray on the front end sends a flood of water in all directions.

⌘ Almost all the automobiles imported into Russia are of American or German make.

ROLLER SKATES FOR STOCK-ROOM EMPLOYEES

Speeding up employes in a Massachusetts railway stock room was accomplished by putting them on roller

5375
Electrical World 5/30/13
Union Street Railway



An Attendant in Storeroom Using Roller Skates to Facilitate Quick Handling of Orders

skates. Sometimes distances traversed in central stations are considerable, and storeroom attendants who are fitted with skates accelerate their movements to such an extent that the time saved is a big factor in efficiency. The use of skates is found not to hamper employes in mounting ladders for the purpose of reaching elevated bins, as a little practice enables them to reach such places easily and quickly and without removing their skates.

EXPLOSION OF PAPER DUST WRECKS FACTORY

Comos 9-11-13

Explosion of paper dust occurred recently in a paper-tube factory in Tourcoing, the first recorded in France, and investigation developed the fact that the ends of the tubes were trimmed by forcing them against cylin-

5430
W

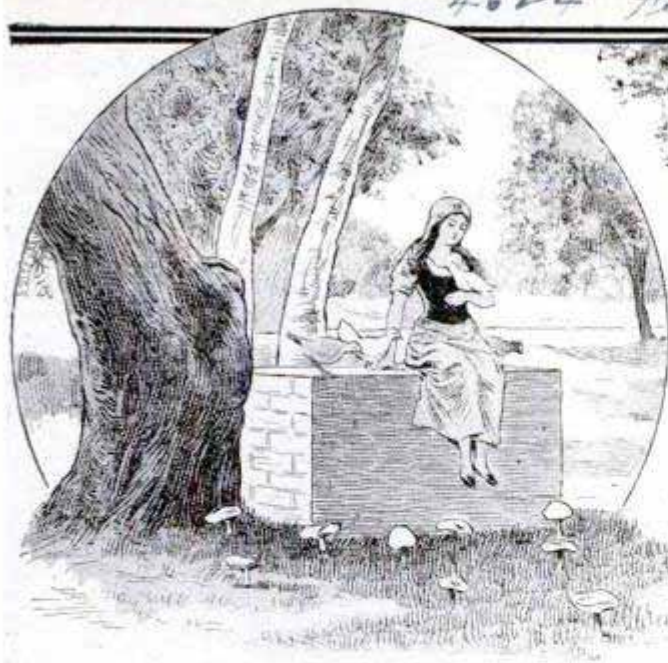
drical grindstones, and hundreds of pounds of dust were produced every day. This dust was drawn by suction to filter chambers where it settled and the filters were cleaned each week. Laborers entering this room, which was dark, carried ordinary lanterns, and the dust, which was found to contain 83 per cent combustible matter, exploded with fatal results.

A FAIRY GARDEN FOR A PLAYGROUND

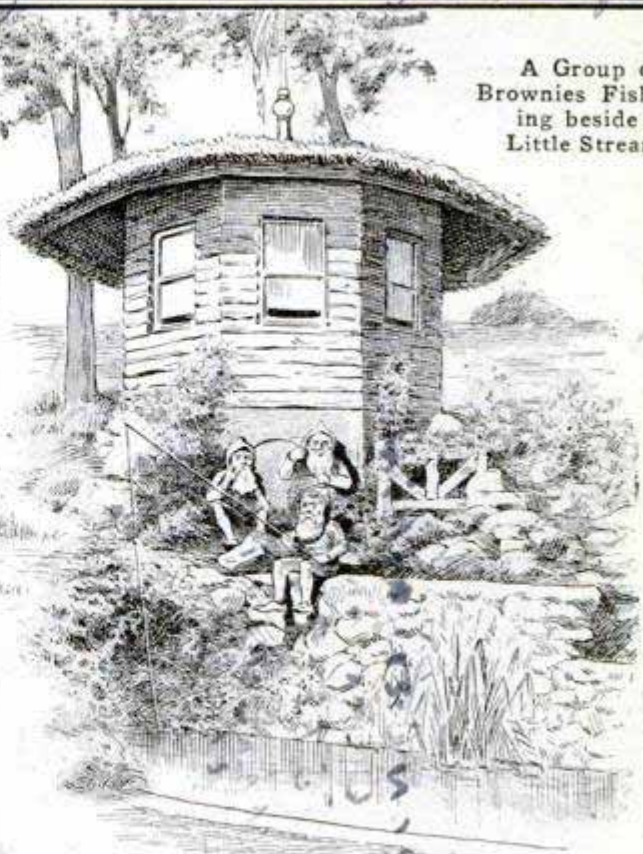
5044 H

There is a fairy garden in Pasadena, California, which is inhabited by the beloved little people who have lived so long in children's stories. The heroes and heroines of all the fairy stories, from Hans and Gretel up to Br'er Rabbit, have been gathered together and can be found somewhere on its sloping lawns or under its trees. Cinderella is there, and Snow White, Little Red Riding Hood and Br'er Fox, and all the other favorites, with the brownies and fairies that make their stories interesting. The owner of the garden is very fond of fairy stories and has laid it out as a fairy playground for his grandchildren. The little people with which he has filled it are life-size terra-cotta figures, arranged in characteristic attitudes and groups. They are not gathered together in an orderly exhibit, but scattered here and there among the trees, engaged in all kinds of work or play. Down behind a log playhouse, beside a small stream in one part of the garden, is a group of brownies fishing on the bank. Over in another corner a little shrine has been erected to Saint Hubert, and all the animals of the wood are taking part in the service before it—a fawn, a squirrel, woodpeckers, rabbits, brownies, and a fox dressed up as a monk to read the service. The gingerbread house is there and the home of Br'er Fox. Sometimes the figures and scenes are hidden behind trees or bushes where they may easily be overlooked, but hunting them out and remembering the homes of their favorites only adds to the children's delight.

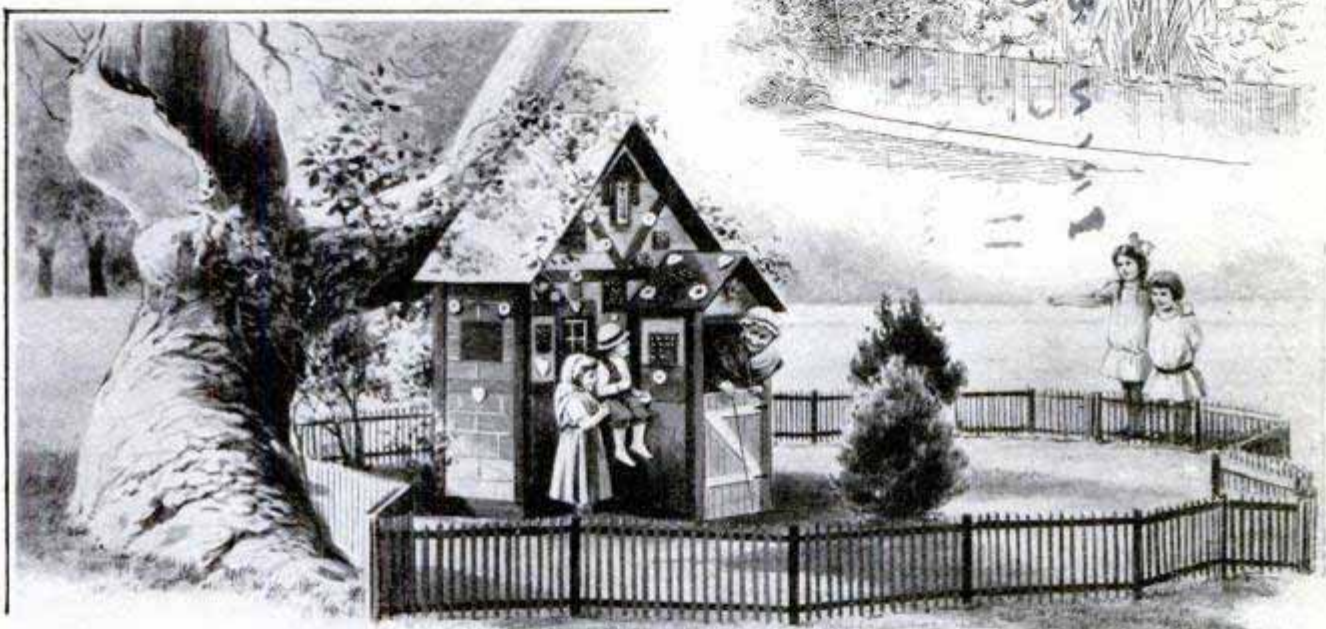
M. Edholm 42nd Figueroa Los Angeles, Cal.



Cinderella Sitting with Her Pets



A Group of Brownies Fishing beside a Little Stream



Hans and Gretel Feasting on the Cottage of Cakes

5344



Br'er Rabbit and Br'er Fox Alone on a Hillside



Two Brownies Cleaning the Garden

CORNCRIB THAT EXPANDS TO FIT THE CROP

Along with other old-style farm utilities the wooden corncrib is soon to become a thing of the past. At an ex-

SIGNS FOR FRENCH ROADS

SAVE TIME

N.Y. American 9-17-13
It will not be hard to find where one is in France when the new system of numbered roadways is perfected. For

some years there has been a partial numbering of the principal thoroughfares and so satisfactory has it been that authorities are determined to extend the benefits of the system throughout the republic. Every kilometer post in France will bear the name and number of the road on which it stands, painted in big letters and figures. Under the new system a motorist wishing to make a straight run from Havre to Nice, crossing France at its greatest length, would need no other instruction than "R. N. 14, Paris.

R. N. 7, Nice." He would keep on R. N. 14 (Route Nationale 14) until it brought him to Paris; on leaving the capital he would pick up R. N. 7, and follow it until it brought him to Nice.

Between 500,000 and 600,000 tons of steel rails are taken up every year in America and rerolled into lighter rails.



Latest Type of Corncrib Made of Cement and Galvanized Iron

perimental farm in Hamilton County, Ohio, successful experiments have been made with a corncrib made of concrete and galvanized iron. This crib is made in sections, and, like a sectional bookcase, can be enlarged to suit the crop. A cement base is provided which makes the bin dry and vermin-proof without the necessity of raising it high off the ground.

REEF USED AS A SHELTER FOR FERRYBOATS

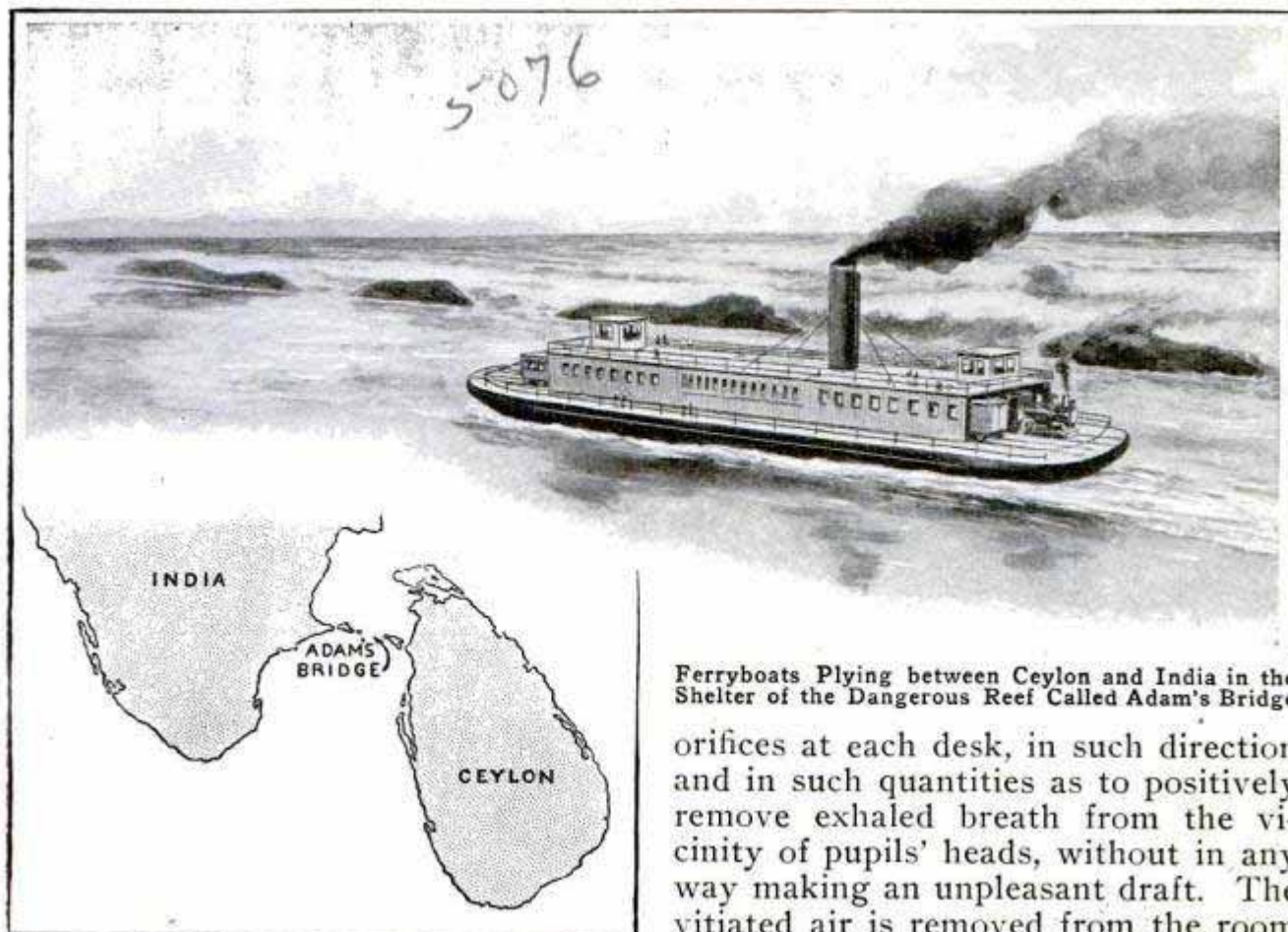
Adam's Bridge, the reef which has always been the serious obstacle to traffic between the Island of Ceylon and the coast of India, is now being used as a natural breakwater to shelter a line of shallow-draft ferryboats across Palk Strait. The reef is part of what was evidently once an isthmus between India and Ceylon. For 20 or 30 miles out from either shore the old isthmus is high and dry, but the middle section,

over 22 miles long, has sunk until nothing remains but a chain of rocks and sand shoals, some dry, and none more than 3 or 4 ft. below high water. Two tortuous channels have been cut through the reef so that ships can avoid going entirely around Ceylon. Up to the present time the only communication across the strait was by steamer from Colombo, Ceylon, to Tuticorin, the terminus of the South Indian Rail-

*Daily Consular & Trade Report 7/21/13
No. Consul Henry S. Barker.*

*5347
L. H. ...
St. Charles Pl. Hyde Park
Cincinnati, O.*

*95459 W
9-17-13*



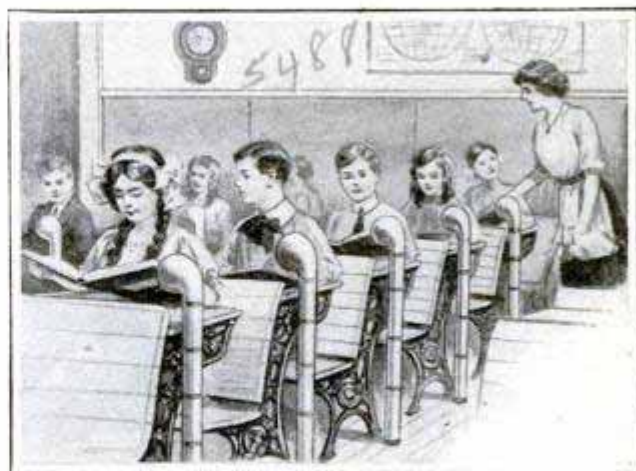
Ferryboats Plying between Ceylon and India in the Shelter of the Dangerous Reef Called Adam's Bridge

way, but vessels had to lie out six miles and transfer passengers and freight to launches. Now railway lines have been run out on each end of the isthmus to Adam's Bridge and ferryboats ply between the terminals, using the reef as a natural breakwater and making the trip in 1 1/4 hours. Most of the travel is by coolies going to and from the tea and rubber plantations of Ceylon. Eventually car ferries or a railway viaduct like the Key West extension will probably make further use of the reef.

orifices at each desk, in such direction and in such quantities as to positively remove exhaled breath from the vicinity of pupils' heads, without in any way making an unpleasant draft. The vitiated air is removed from the room by means of an exhaust fan which draws the air through numerous openings in the ceiling. Later trials convinced the school authorities that air may be used over and over without any disagreeable results when kept moving and delivered at the level of the pupils' shoulders steadily and in proper volume. In the latter experi-

NEW IDEA IN SCHOOLROOM VENTILATION

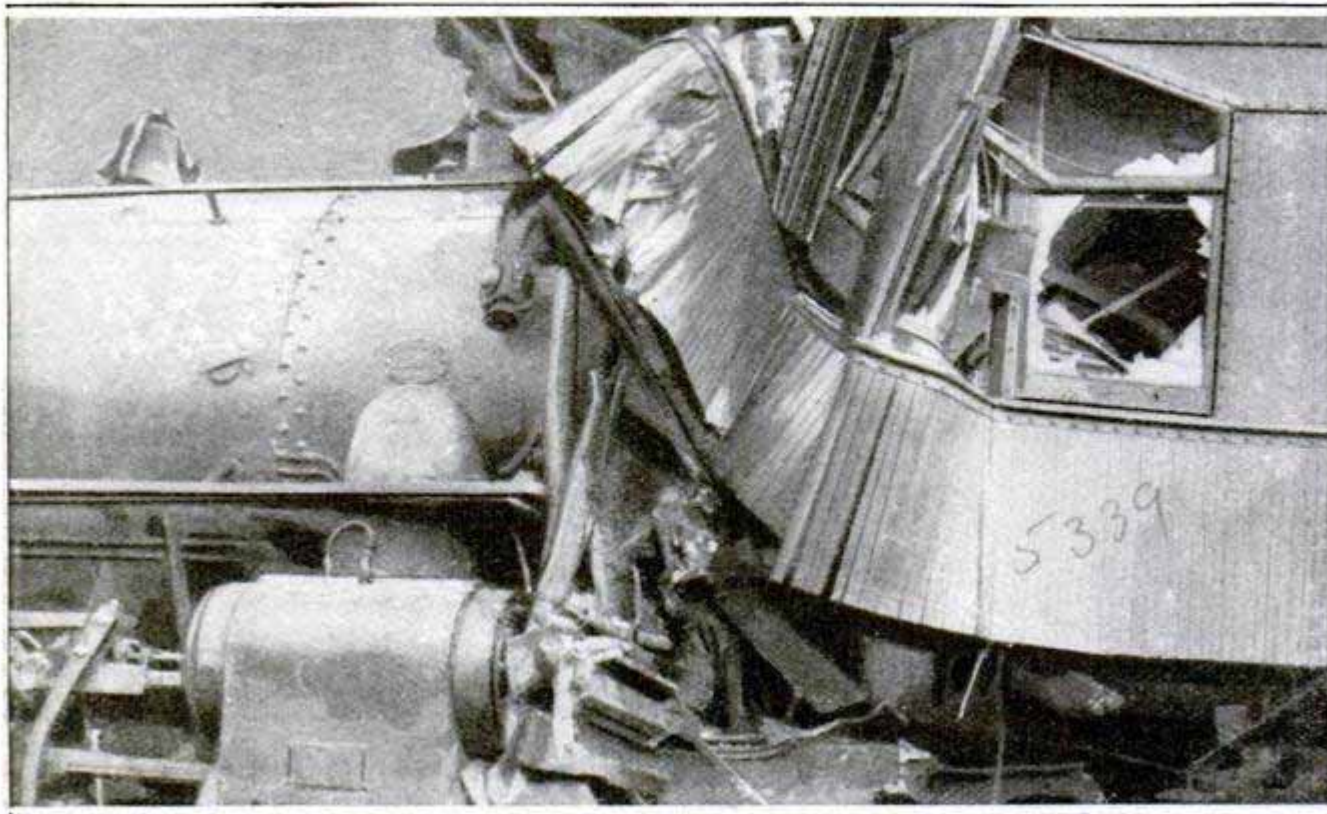
Delivering the air to each individual desk by means of blowers and funnels is a step taken by authorities in a Minneapolis school to overcome "stiffness" in the schoolroom and is an interesting departure in ventilation practice. The air, taken from a window in the basement and humidified, washed and heated, is blown through main ducts to individual funnel-shaped



New Method of Ventilating Schoolrooms

ments, however, a standard ozone generator delivered one part in 1,000,000 to the returned air, to the satisfaction of pupils and teachers.

The Heating & Ventilating Magazine
Frederick Bass



When Steel Meets Steel Then Comes the Crumpled Car

**SEAT MADE TO HOOK OVER
EDGE OF BATHTUB**

One of the latest of bathroom conveniences is a portable seat provided with supporting hooks that fit over the edge of the bathtub. The seat can be hung outside the tub for convenience in dressing, or inside the tub for use while bathing, and can be folded com-

*Bath-tub -
21 W. Lancaster Pa.
Servant on*



New Bathtub Seat a Handy Accessory in Bathing or Dressing

pactly when not in use. It is easy to manipulate and can be handled by a child, but is so strongly built that it will support the heaviest adult.

**HOW A MODERN STEEL CAR
ACTS IN COLLISION**

The tremendous impact of a powerful locomotive rushing along at 40 or 50 miles an hour, drawing after it 10 or 15 loaded cars and striking an obstruction, is almost beyond comprehension. Mere imagination utterly fails to picture the result. Here is a telling photograph showing how such a force crumples up a modern steel coach, although—be it said in passing—the old wooden passenger coach which the steel car supercedes would have been reduced to splinters. The old axiom still appears to hold good: "In the middle of the car one is safest!"

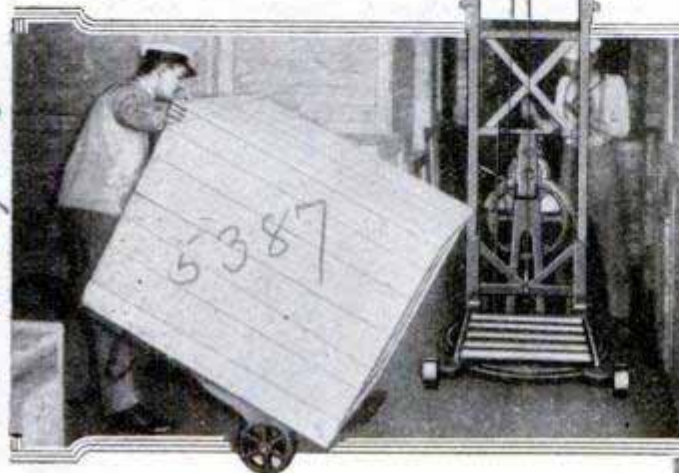
**ENGLISH THE TECHNICAL
WORLD LANGUAGE**

A Swedish firm, manufacturing a specialty with a world-wide market, exporting all over the globe, uses English in its correspondence, except for Germany, Russia, Switzerland, and Italy, where German is used. By far the greater number of letters and orders are written in English.

*American Machinist
6-25-13*

5472 m
**GENERAL PUBLIC TO USE
 PRECANCELED STAMPS**

Stamps bearing the name of the issuing postoffice and known as "precanceled stamps" are now to be issued to the general public instead of being confined to the use of business firms. Under a new order signed by the postmaster-general these stamps may be used in posting newspapers, pack-



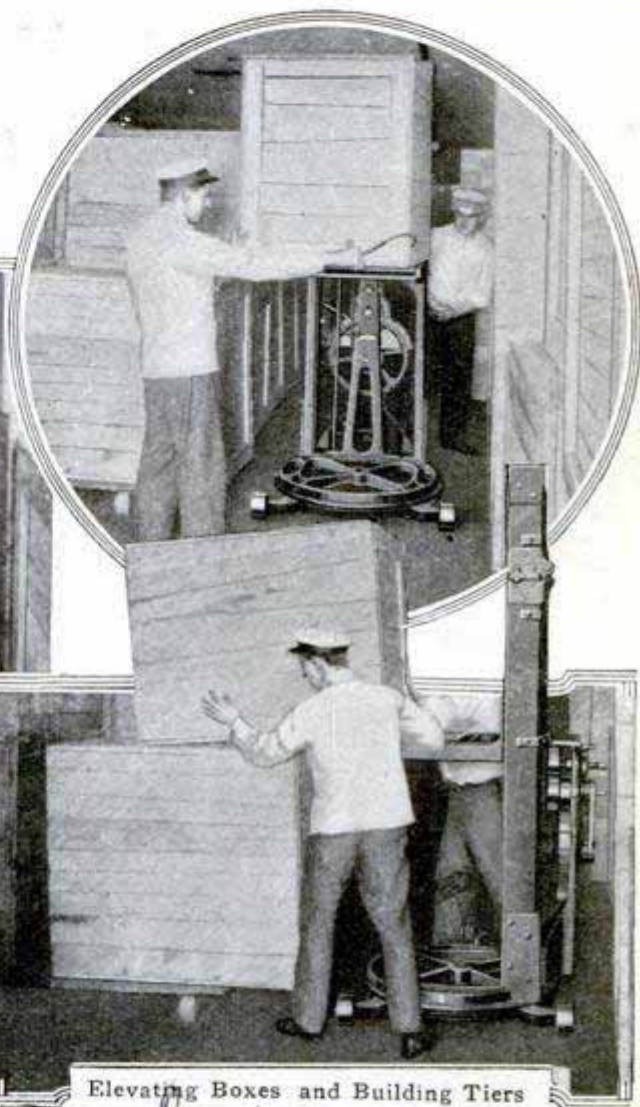
Trucking Packing Cases to Revolving Elevator, No Lifting Required

ages, and all kinds of second, third, and fourth-class mail, and will be honored, as heretofore, only at the issuing office. Their use by the general public is expected to expedite the transportation of the mails and to save expense by eliminating a large percentage of the labor of cancellation.

5387W
**REVOLVING ELEVATOR FOR
 WAREHOUSE USE**

By the use of the revolving and elevating truck which is shown in the accompanying illustrations, tiers of boxes or crates can be built up in a warehouse by two men more rapidly than seven men can handle the crates without one. The revolving base gives added adaptability, and heavy or bulky goods up to 1,500 lb. can easily be elevated by one man and stored close to the ceiling, thus utilizing space ordinarily left vacant, and increasing warehouse capacity in some cases 25 to 50 per cent. In this elevator the lower

base remains stationary on the floor, while the upper framework revolves on ball bearings. The machine is supplied with an automatic lock which holds it rigid to the floor, while a second lock secures the two bases to-



Elevating Boxes and Building Tiers

Revolver
 together in any desired position, so that when the load is being elevated or a case is being shoved off the machine, there is no liability of its moving on the floor, or swinging around on its center between the bases.

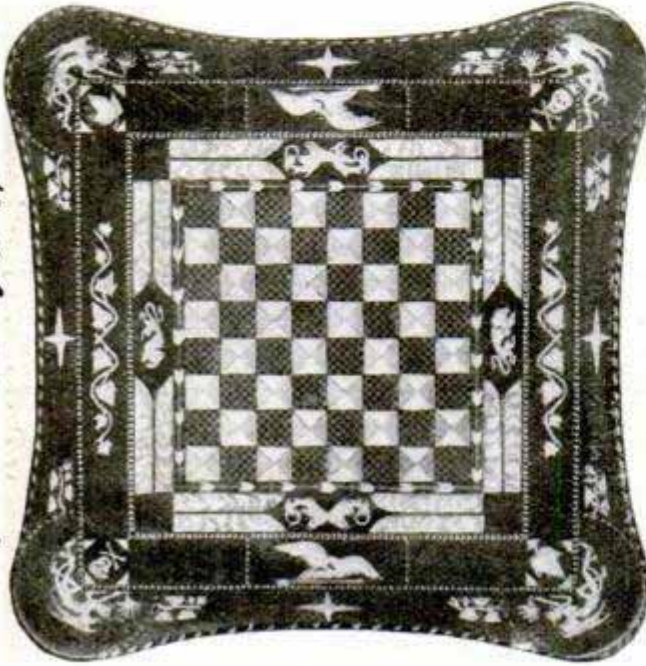
Completing the improvements in a conquered town is an unusual occupation for an invading army, but this is what happened in Uskub, Macedonia. When the Balkan war broke out the electric street-lighting system was almost completed. The town was then taken by the Servian army, and the engineering staff completed the system and put it in working order.

N. Y. Revolving Portable Elevator Co.
 Photo Geo. H. Gibson Co., N. Y. c.
 Tribune Bldg.

Christian Science Monitor
 8-29-13

**ODD TABLE TOP CONTAINS
13,000 PIECES**

A table top which does not contain a nail, but which is composed of 13,000 pieces of wood inlaid to form a checker-



Checkerboard Table Wrought by Pennsylvania Workman from Odd Bits of Wood

board, is the work of a Farrell, Pa., craftsman of more than usual skill and patience. The top contains mahogany, walnut, maple, oak, and other kinds of wood, as well as ivory. Each black square in the checkerboard is a complete checkerboard in itself.

*Made by John J. Solare,
Iron Clerk Farrell, Pa.*

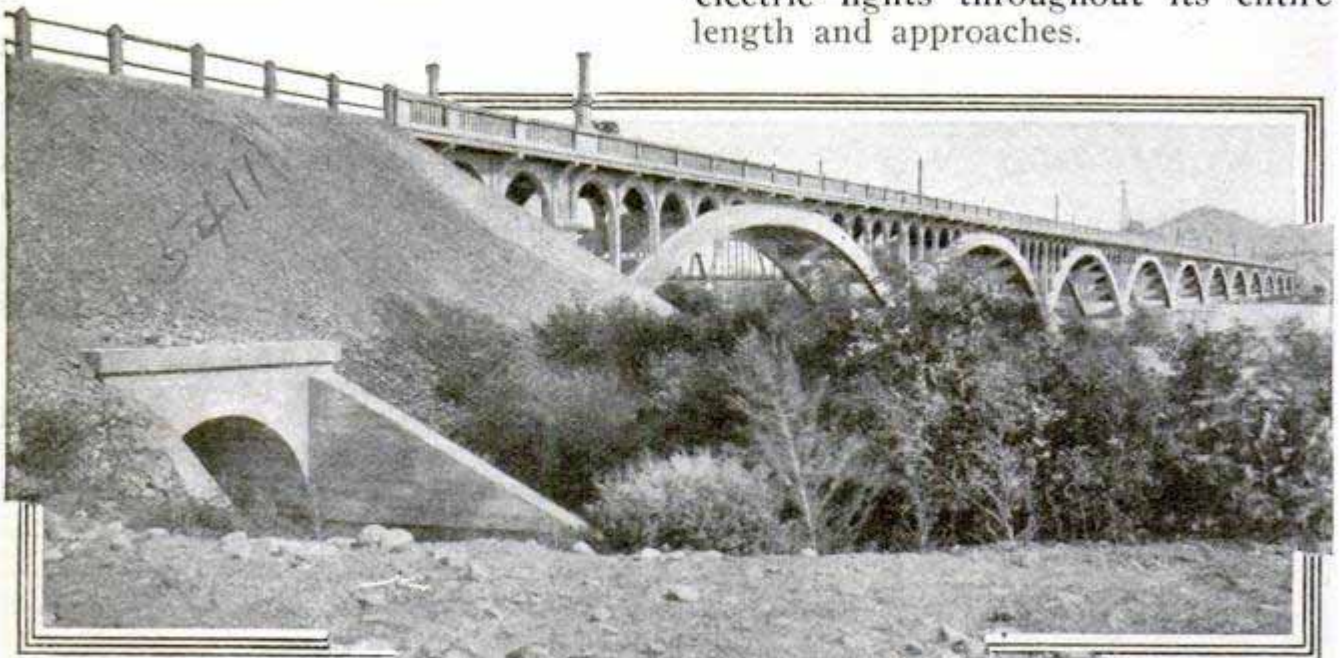
**SCIENTISTS PREDICT GREAT
ERUPTION OF VESUVIUS**

Associated Press, Naples, Italy

Predicting that a great reawakening of Vesuvius is at hand, several Italian scientists emerged from an eight-hour stay within the crater of the famous volcano in September last, where they had been studying new volcanic activity. In the midst of asphyxiating gases, threatened by explosions, standing where a misstep might plunge them into a lake of fire, these scientists made observations which convinced them a new outbreak of subterranean forces might be looked for in the not far distant future.

**BRIDGE BUILT BY CONVICT
LABOR**

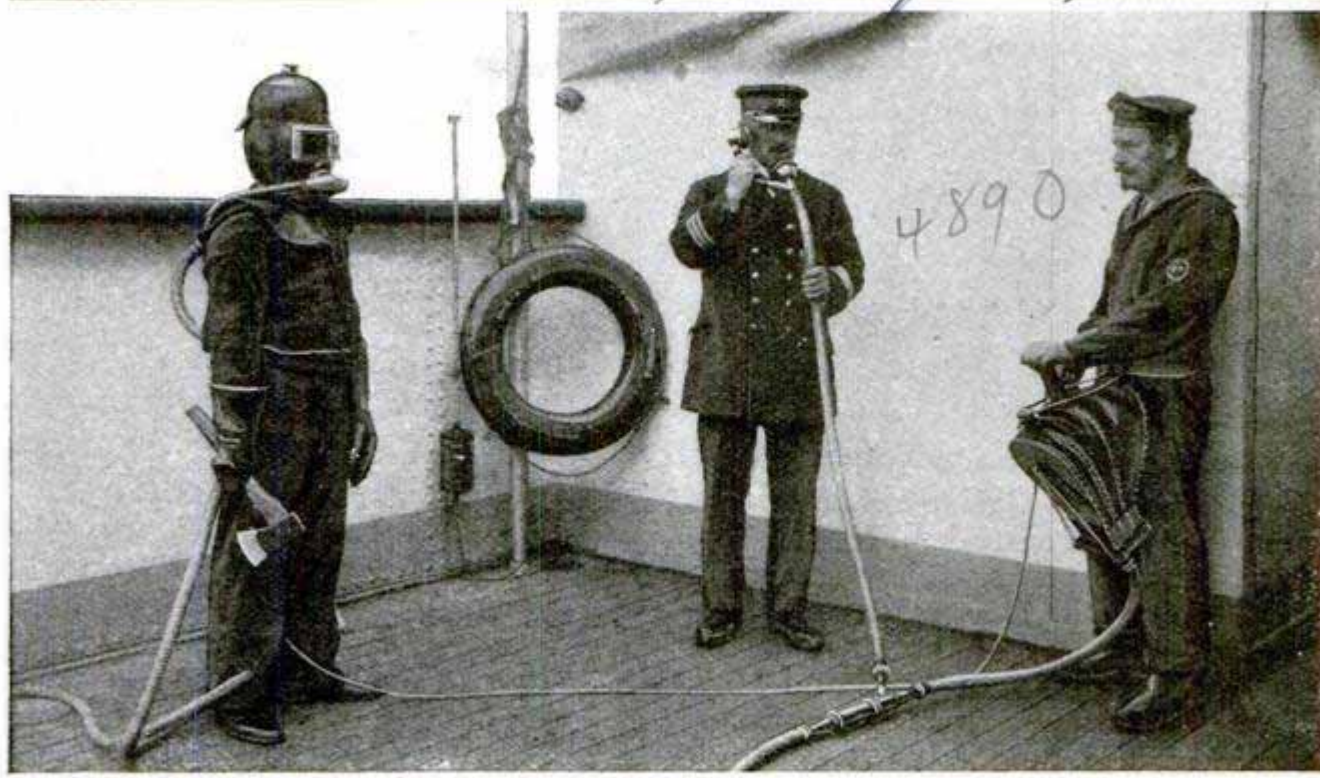
The bridge across the Salt River, at Tempe, Arizona, a notable example of reinforced-concrete construction, was built in 27 months by convict labor. The bridge is 1,508 ft. in length, and 18 ft. between curbs. Two hundred and forty tons of rod steel and wire enter into its construction; it is floored with reinforced concrete with a 2-in. bitulithic dressing. Eleven piers, each 125 ft. in length, support the structure, and the bridge is well equipped with electric lights throughout its entire length and approaches.



The Tempe Bridge, Built by Convicts of the Arizona State Prison

*J. J. Sanders, Parole Clerk,
Arizona State Prison.*

Brown & Dawson, Stamford, Conn.



Copyrighted by Brown & Dawson, Stamford, Conn.

Protective Apparatus for Fire Fighters on the "Imperator." Communication with the Bridge is Provided by Means of a Speaking Tube Connected to an Air Hose

4890 M
PROTECTING FIRE FIGHTERS ON THE "IMPERATOR"

The latest type of fire fighter's protective helmet and oxygen apparatus has been installed on the "Imperator" for use in investigating and fighting fires in portions of the ship that are likely to become filled with smoke. Fresh air is constantly supplied by means of the bellows, while the investigator is always in communication with one of the officers on the bridge

through a speaking tube connected with the air hose. An essential part of the equipment is a rope tied around the man's waist by which he can be hauled out in case he is overcome or injured. This type of equipment will probably be installed on all the modern transatlantic steamships.

ⒸA new building stone has been found in Oregon which resembles a mixture of clay and sand and hardens after exposure to the air.

5139
STUDYING ICEBERGS IN THE NORTH ATLANTIC

The Sun, Sunday July 20-13, Photos from Revenue
 After three months' study of the icebergs in the North Atlantic steamship lanes, the ice patrol sent out last spring by the United States government has brought back valuable data on the location and movements of floating ice. Two revenue cutters, the "Seneca" and the "Miami," took turns scouring the ocean between the 44th and 50th parallels of north latitude and the 40th and 49th meridians of west longitude, until every iceberg in the region had been located and identified. All passing vessels reported by wireless any bergs

sighted and the ice patrol sent daily reports to the New York hydrographic office. Subsequent checking of the location of the known bergs furnished the data on the rate and direction of the floating ice.

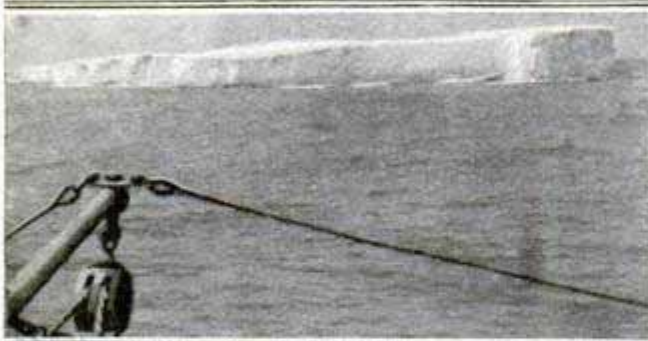
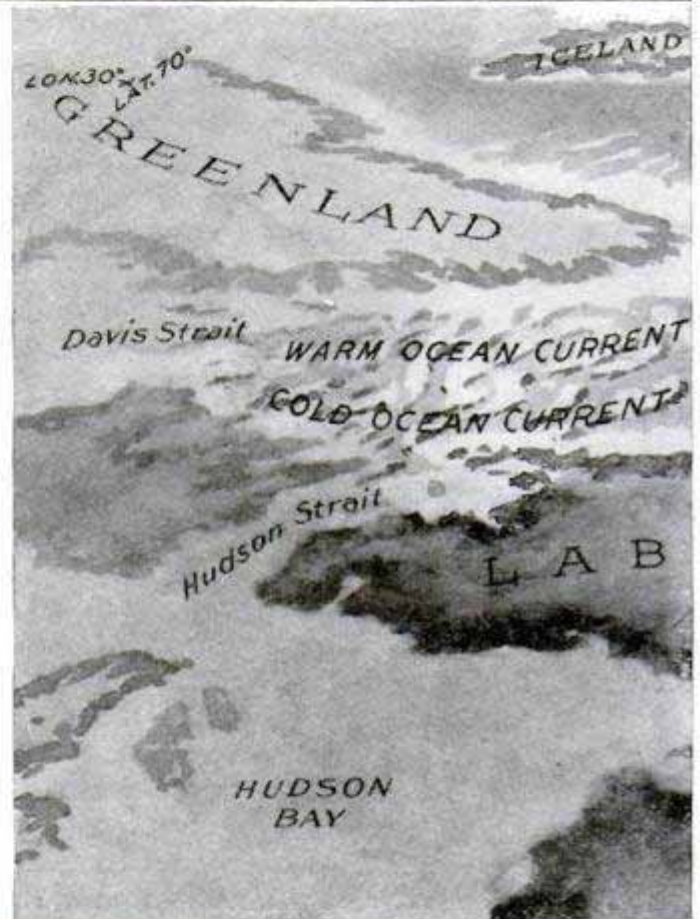
April and May were found to be the months of greatest ice danger. The icebergs, it was found, are brought south along the coast of Labrador and the Grand Banks by the Labrador Current, until they reach the point where the flow from the Gulf of St. Lawrence and the Gulf Stream intercepts them.

*Outter
 Washburn & Co.*



How an Iceberg Looms Up beside a Ship

From there the Gulf Stream sweeps them in a northeasterly direction into the steamship paths. They are never a menace until they reach the Gulf Stream and many of them ground on the Grand Banks. In April and May, when they usually reach the paths of the liners, the danger is increased by fogs during 30 to 60 per cent of the time. Their speed in the Labrador Current varies from nothing to 32 miles a day, depending upon the winds blowing from the Labrador coast. As the same winds which break away and carry down the icebergs also cause cold winters in the North Atlantic states, a severe winter can be taken as an indication of serious ice menace in the spring. After the bergs reach the Gulf Stream they melt very rapidly and soon disappear. The patrol estimated the rate of melting at 5 per cent a day; some of the bergs melt so rapidly that



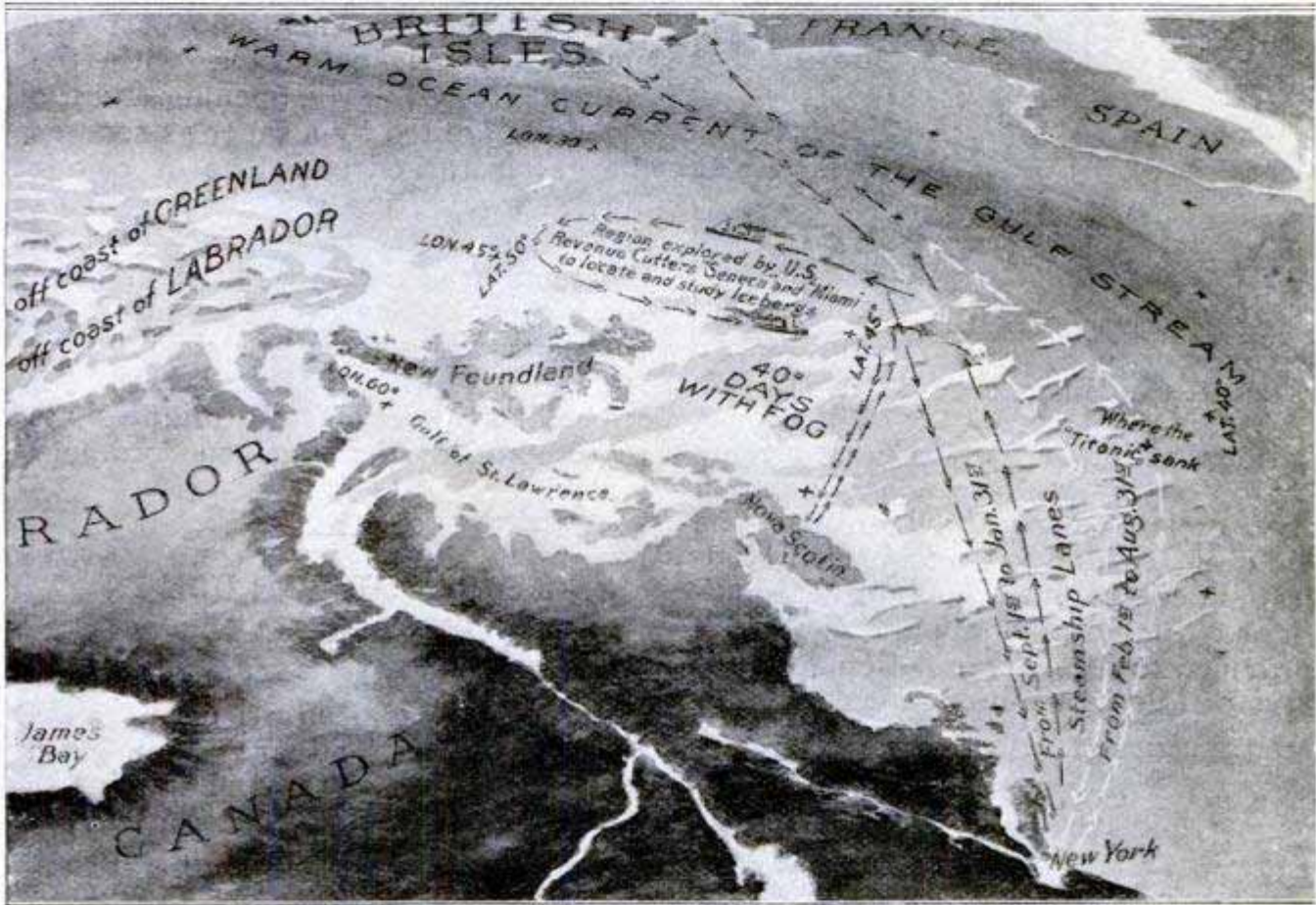
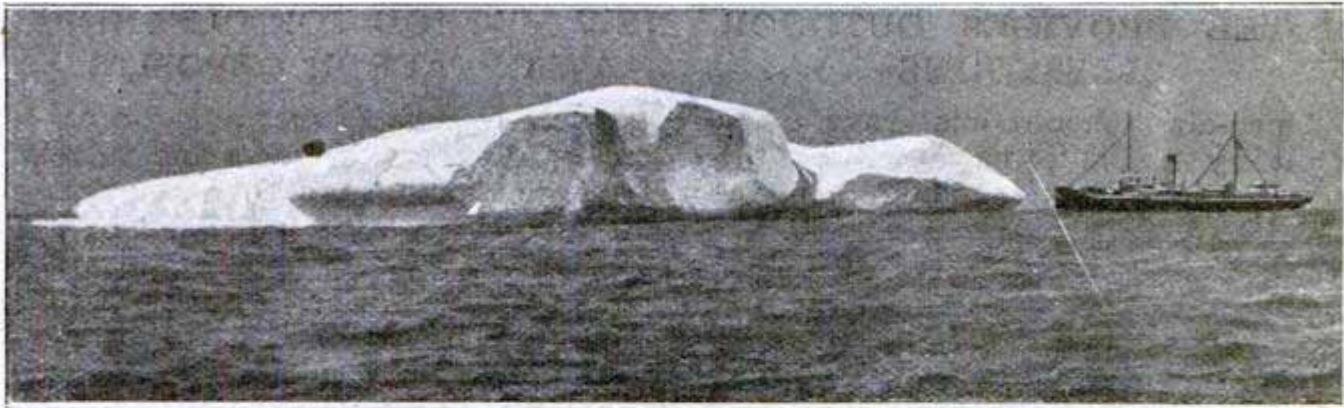
Small Bergs Close By

waterfalls can be seen on their surfaces and others turn over daily as their center of gravity changes.

The only safeguards against icebergs, as the report indicates, are slow speed and a sharp lookout in the dan-

This Perspective Chart Shows the Results of the 1913 by the U. S. Revenue Cutters "Seneca" to Navigation of the

ger zone. Attempts to locate bergs by echo proved unsuccessful in 90 per cent of the tests and the temperature of the water was found to be no sure indication of danger. Searchlights focused to a point were of some advantage at night if the lookout stood at some distance to one side of the ray. Night or day, glasses doubled the distance at which the ice could be seen, and it was found best to place the lookout on deck so that he could see the waves at the base of the bergs and would not overlook small bergs close by. On clear days, a lookout on the



Iceberg Investigations Made during the Summer of and "Miami" and Indicates Clearly the Menace Bergs the Year Around

masthead can see an iceberg 18 miles away and a man on deck can distinguish one 12 to 15 miles away. In a light fog they are visible about two miles, but in a dense fog not more than 200 yd. In moonlight they can be seen about $2\frac{1}{2}$ miles, looming up as bright spots, but on overcast nights they appear as black masses visible about $\frac{1}{2}$ mile through the glasses. Starlight makes them visible a mile away to the naked eye and perhaps twice that distance through glasses. In rough weather, the waves dashing against them can be heard for some distance.



Waterfall Caused by the Melting of the Ice

But under the best conditions they are difficult to discover. The largest berg seen by the ice patrol was 400 ft. long, 300 ft. wide, and rose 70 ft. above the water. The smallest was 225 ft. long, 100 ft. wide, and 35 ft. high.

HOTEL PROVIDES OUTDOOR CLASSROOMS

Open-air schoolrooms have been built by a California hotel for the children of guests spending their va-



Tents Used as Open-Air Classrooms for Children of Guests at a California Resort

at the resort. In two tents set up on the sandy beach in front of the hotel to serve as classrooms, the children are able to keep up their studies under the most delightful conditions. Playground apparatus is also provided to furnish recreation and take care of idle moments.

*W. H. Cochran
4624 Figueroa St.
Los Angeles, Cal.*

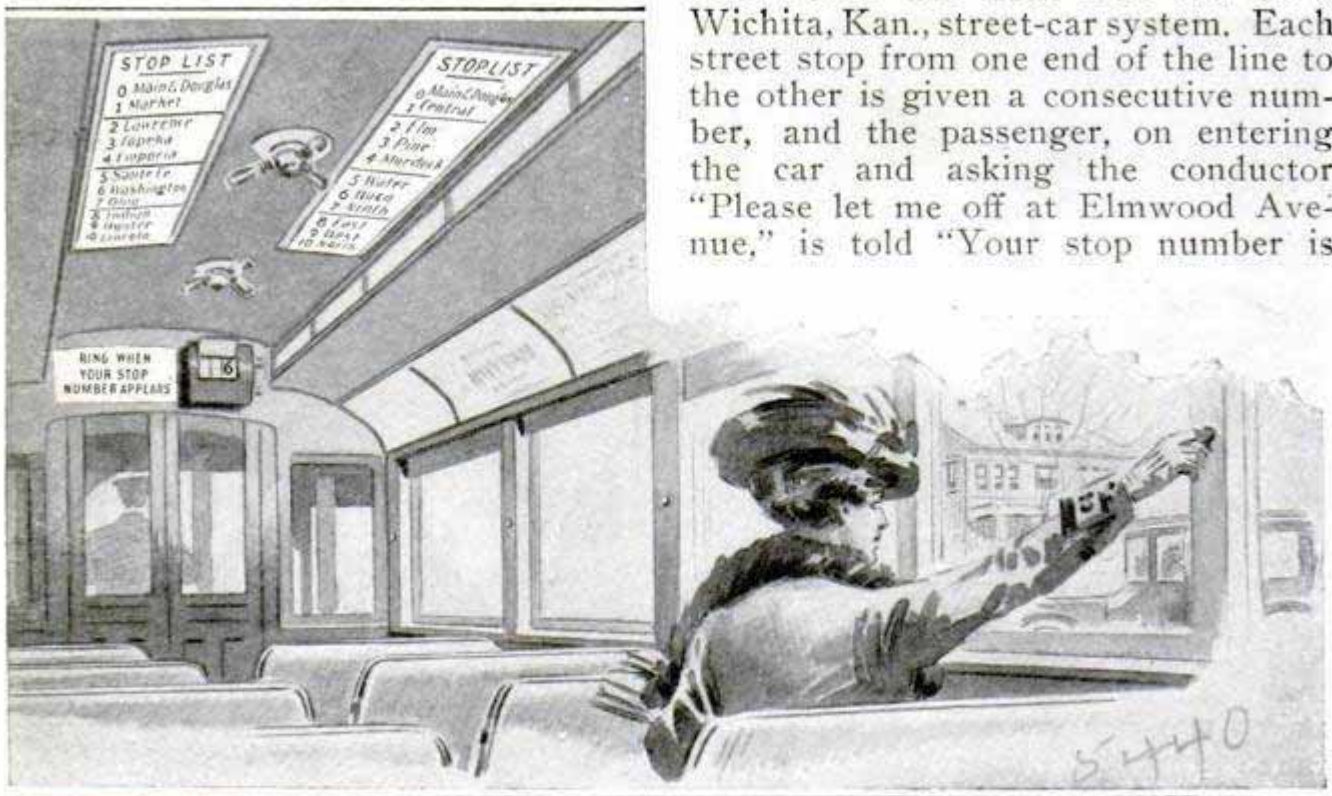
NEW METHOD FOR CLEANING AWAY CARBON DEPOSITS

The Engineer London 9-19-13 - 3.57
A new method of cleaning the carbon deposit from cylinders and valves of internal-combustion engines apparently does away with one of the greatest disadvantages in the use of this class of motive power. The apparatus employed consists of a tank of oxygen with appliances of such a nature that all parts of the motor can be reached after opening the valve cap or spark plug. A nozzle connected with the tank is inserted in the opening and the carbon is ignited by a taper as soon as the gas is turned on. The deposit is burned away from the metal rapidly, and when all the carbon is consumed the combustion ceases automatically, since the gas has no effect after the cylinders and valves are clean. The metal parts, it is stated, are not affected, and only a few minutes are required for cleaning an ordinary motor.

Swat

INDICATOR FOR USE IN STREET CARS

5440
A device showing the number of the next street has been tried out on a Wichita, Kan., street-car system. Each street stop from one end of the line to the other is given a consecutive number, and the passenger, on entering the car and asking the conductor "Please let me off at Elmwood Avenue," is told "Your stop number is



Street Indicator for Use in Street Car

*Lincoln Mc Kinley,
Harper Fireless Cooker Co.,*

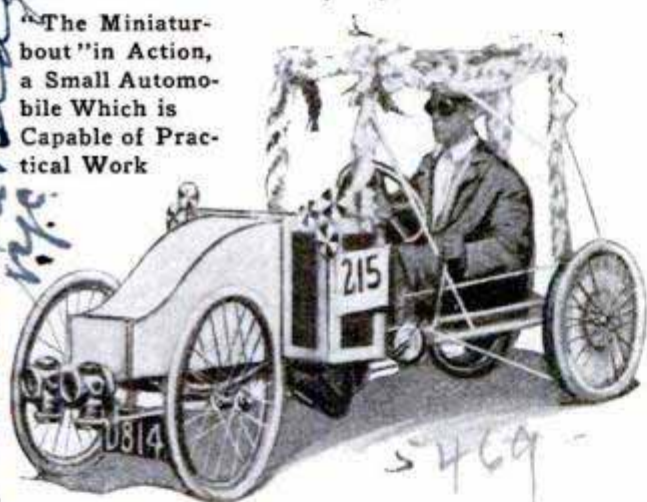
5440

30." The indicator in the front of the car shows at a glance just where the car is with reference to the desired stop, and the passenger rings the bell as number 30 appears. For strangers, and for regular travelers at night or in stormy weather, the device has proved useful. A card with street names and their corresponding numbers is fixed at each end of the car, and small cards with information are distributed by the company. The system is adapted for use by interurban and steam railroads.

A REAL MOTOR CAR IN MINIATURE

This small automobile is the result of several years' experimenting on the part of two Brooklyn youths, and it is

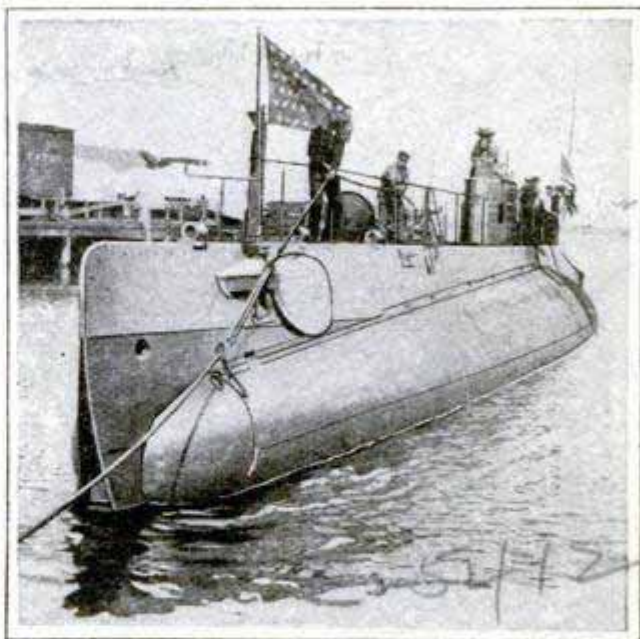
"The Miniatur-
bout" in Action,
a Small Autom-
obile Which is
Capable of Prac-
tical Work



a practical pleasure car, weighing only 100 lb., but developing a speed of 35 miles an hour, and can make that distance on 1 gal. of gasoline. It is shown in the illustration decorated for parade in the Coney Island Mardi Gras, where it won first prize on its first public appearance.

A BIGGER SUBMARINE FOR OUR NAVY

The largest submarine yet built for the United States navy was recently launched from the Fore River shipyards at Quincy, Mass. It is the first of nine similar boats whose construction is being watched with interest by naval men. "K 1" is the name by which



Most Powerful Submarine in Our Navy

this latest addition to our submarine fleet will be known. The boat has crude-oil engines instead of the usual gasoline type, and is equipped with the new-style conning tower and rudders. These latter spread out from the sides at the bow and stern when the boat is submerged.

A SHELTERED WATERING TROUGH

A concrete watering trough which protects the animal seeking to drink from winds, sun, and beating storm, was built recently on the public highway of a Maine town and has attracted considerable attention. On the side containing the fountain a high wall of solid concrete is built and wings extending several feet flank the trough.



Drinking Place for Animals Which Protects Them from Wind and Sun

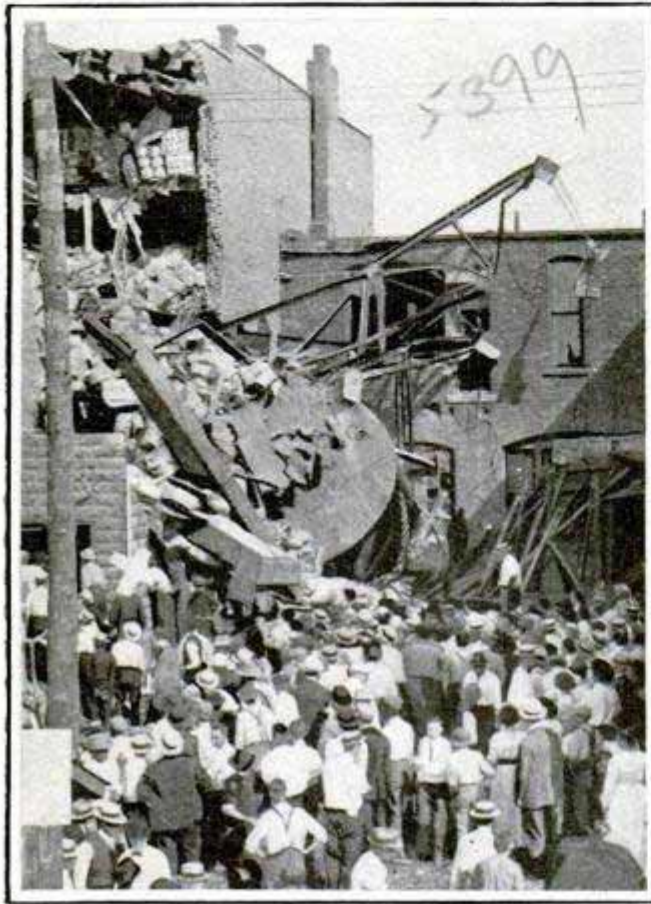
5469 W
Wm L. Schweitzer
1317 44th Street
Brooklyn N.Y.

Geo. A. Walton,
3 Jemmy's Court

Inc. E. Taylor
St. Howegon, Me
5468

HAVOC WROUGHT BY FALLING WATER TANK

The tank used for a sprinkler system, weighing when filled 50 tons, overweighted a wall in a Mankato,



Huge Water Tank Falls in Minnesota Warehouse

Minn., warehouse, and crashed through to the ground, bringing ruin in its wake. Fortunately only one man was injured. The picture was taken before the rescue party had removed the injured man.

LOCOMOTIVE WASTE DRIVES ELECTRIC PLANT

The fuel dust which collects in the smokeboxes of locomotives, and which is usually thrown away, is used on a Prussian railway in generating current for furnishing light and power for two of the most important stations on the line. The fuel is placed in gas producers and the resulting gas is used for driving motor generators. A three-phase current of 5,000 volts is generated and this is transformed into a continuous current of 230 volts.

THE MOUNT ROYAL TUNNEL AT MONTREAL

The double-track railway tunnel under Mount Royal at Montreal, Canada, a preliminary account of which was given in the May, 1912, issue of Popular Mechanics Magazine, is now practically completed, and the accompanying illustrations show some of the typical features of the actual construction work. This tunnel is three miles long. It will not only serve as a direct gateway from the west for one of the leading transcontinental railways, but will remove the greatest obstacle to the expansion of the city by making available for suburban purposes a section of land that was formerly inaccessible on account of the barrier formed by the mountain. Both in plan and in methods used in construction this tunnel represents the most modern ideas in the art of tunnel building.

After the excavation has been completed the tunnel is to be divided into two central tunnels, or tubes, by means of a central concrete wall, through which there will be openings at regular intervals. This arrangement of twin tubes was adopted not only in the interest of safety, but because the pistonlike action of the trains in running always in the same direction through a single-track tube is an important aid in ventilation. A walkway is supported on each side of the central wall, at about platform level, and of such width that passengers can get out and walk along it in single file in case of trouble. Underneath each of these platforms is a continuous niche where trackmen may find protection from passing trains, while larger niches are placed at convenient intervals for hand cars and repair equipment. The clear tunnel opening before the dividing wall is in place is 28½ ft. wide and about 20 ft. high.

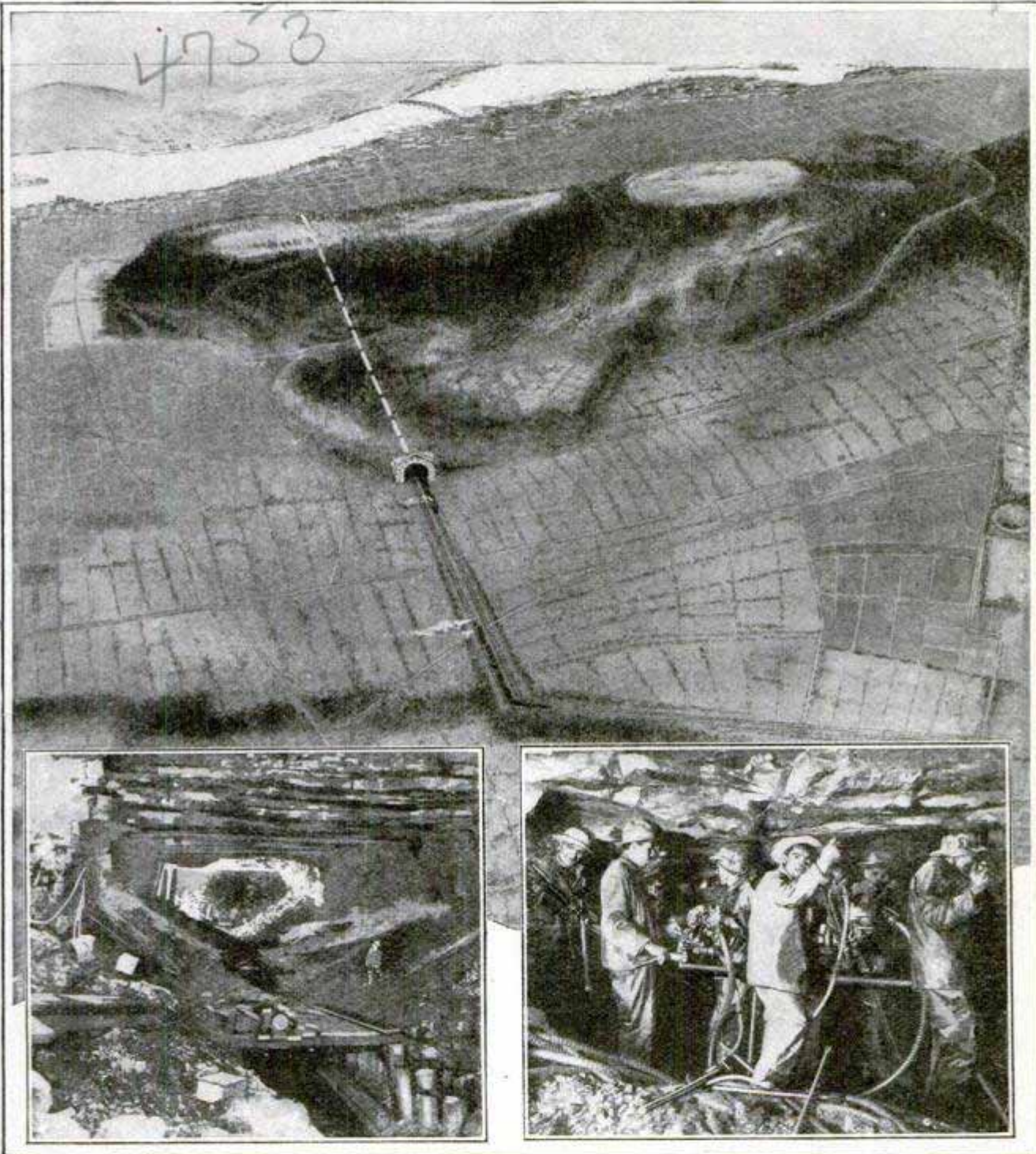
The tunnel is being excavated by what is known among tunnel builders as the "bottom-heading" method. By this method a small tunnel or "heading," about 12 ft. wide and 8 ft. high, is first driven along the bottom

Edward Suggsberg.
Mankato, Minn.

Engineering 9-5-13
London

of the tunnel section. The real progress of the tunnel construction depends mainly on the progress of the heading, and for this reason six drills are kept working day and night in excavating

the work has been through the hardest of volcanic rock. This, while it may make progress slow, is regarded by tunnel builders as a favorable condition, since such a formation does not usually



Courtesy Engineering News

Above, Birds-Eye View of Montreal and Vicinity, Showing How Mount Royal has Acted in the Past as a Barrier to the Expansion of the City; Left, Enlarging Tunnel to Full Section after Completion of Heading; Right, Driving the Heading for the Mount Royal Tunnel

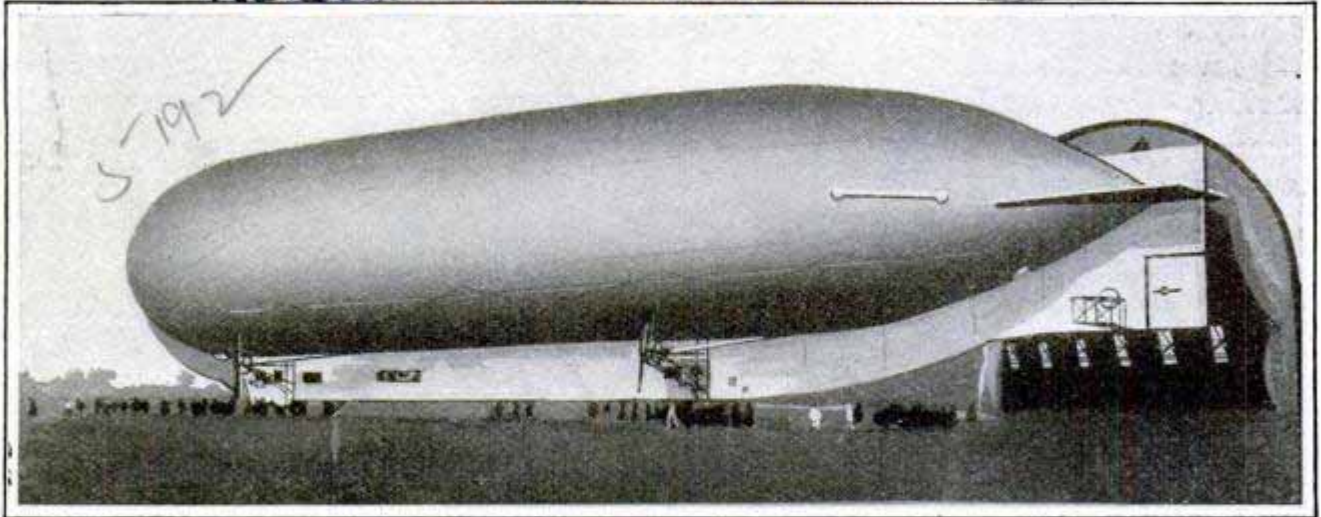
the heading, the men working in three shifts of eight hours each. Following the advance of the heading, and so planned as to keep about 500 ft. behind it, is the work of stoping, or excavating the tunnel to its full section. Most of

require lining or support of any kind, and there is little danger of rock falls. During the 31 days of May, 810 ft. of headings were driven. This is an average rate of over 26 ft. per day, the world's record for hard-rock tunneling.

Clyde A. Mann, Belmont, N. H.

GERMANY'S STORM-PROOF DIRIGIBLE

Reclam's Universum 2333



New German Dirigible Whose Steel Framework is Expected to Make It Storm-Proof

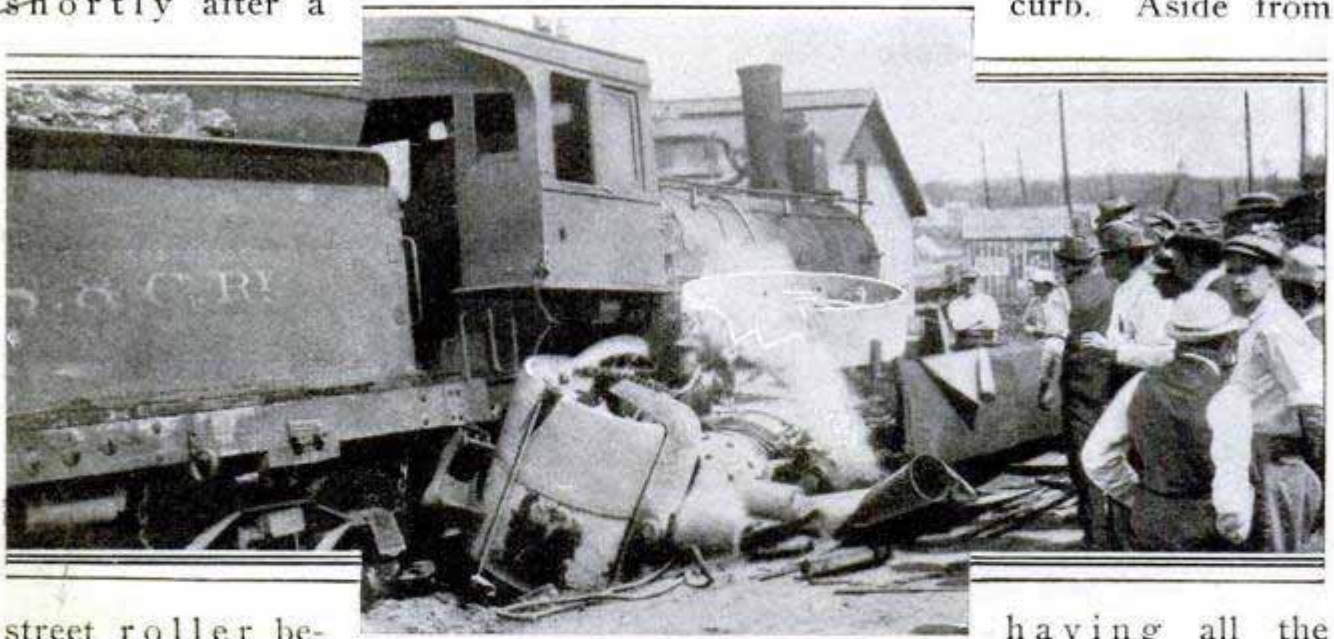
The new semirigid type of airship construction is represented by Germany's new steel dirigible "V-1" which is expected to be strong enough to weather any storm. Its framework is built entirely of seamless, drawn-steel tubing and is arranged so that it can easily be disassembled. The envelope is made of metallized fabric. The dir-

igible is 262½ ft. long and has a gas content of 282,500 cu. ft. Each of the two gondolas, which are connected by an inclosed passageway containing a cabin, houses a 130-hp. engine. The strength of the steel framework is thought to be sufficient to permit anchoring the airship so securely that no storm can tear it loose or damage it.

Callahan
LOCOMOTIVE HITS STEAM ROLLER

433W
This is not a political cartoon, but a photograph taken shortly after a

and its engineer badly jarred by being tossed 15 ft. to the curb. Aside from



Street Roller Vanquished by Locomotive

street roller belonging to the city of South Haven, Mich., was struck by a railway engine. The street roller was reduced to scrap,

having all the wheels derailed, the locomotive suffered no damage. The train was running at reduced speed.

*M. J. Douglas
461 Kalamazoo St.,*

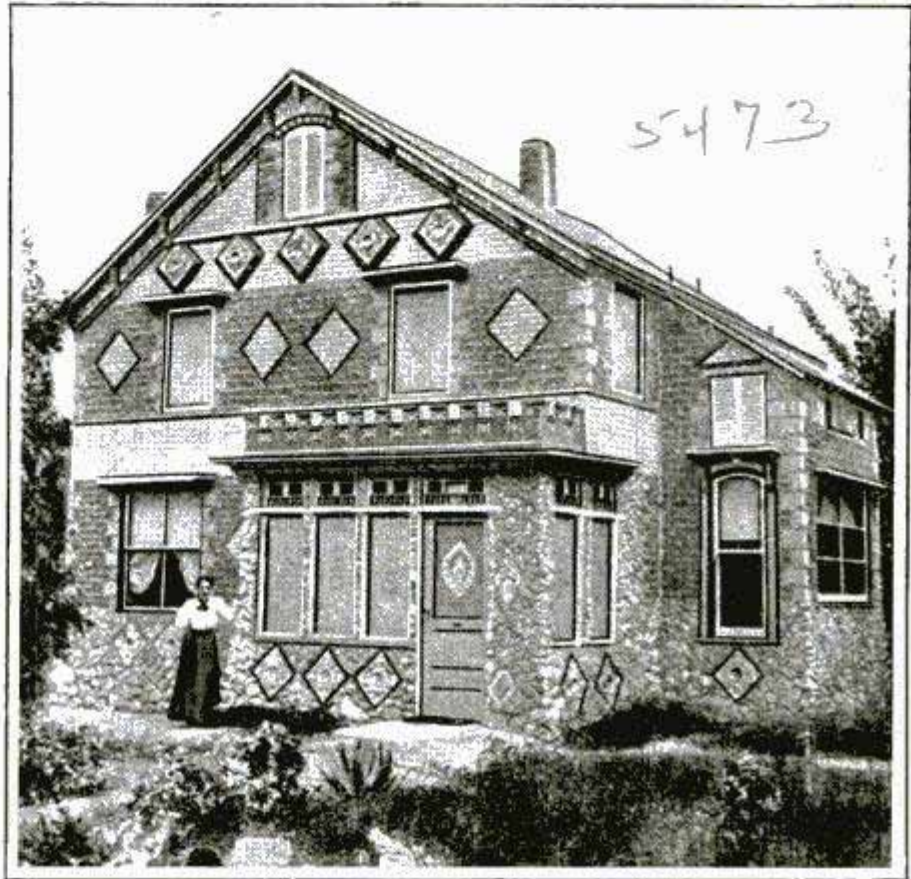
Press Report from Department of Commerce.

WIRELESS REGULATIONS FOR SAFETY AT SEA

5541W

The committee on radiotelegraphy appointed by the secretary of commerce to prepare recommendations for use of the American delegation to the International Conference on Safety at Sea has made its report. It recommends that efficient apparatus for radio communication be required on all ships in foreign trade which carry 50 persons, or more, on the ocean between ports more than 200 miles apart; that such apparatus must be of sufficient power to be received at sea over a distance of at least 100 miles, and that an auxiliary power supply be provided, independent of the vessel's electric power plant, which will enable the sending of such wireless communications for at least four hours. The committee insists that two first-grade operators be required on all such ships maintaining constant service, as well as on all ships carrying 100 passengers, or more, and one first-grade and one second-grade operator on all such other passenger ships, and one operator, either first or second grade, on all cargo boats, as well as a cargo operator and watcher. The recommendations of the committee are based not alone on the laws of the United States, but also in principle on the London International Convention and the laws of Canada and Australia. The latter countries do not specifically require a constant wireless watch on cargo boats, but authorize the administrations of those colonies to impose that requirement. The second operator, or watcher, will rarely be required for the safety of his ship, but

the constant watch is to be maintained for the purpose of enabling the master of a cargo boat to be at all times in position to receive radio distress calls and to render the assistance within his power.



House of a Thousand Shells Built by Aged California Woman

UNIQUE SHELL HOUSE BUILT BY WOMAN

5711W

Architect, builder, and decorator of her eight-room house, a California woman has erected a remarkable residence at an age when most women, and men, too, for that matter, consider themselves past accomplishment. With the exception of the frame, roof, and floors, this house, at Santa Ana, was built entirely by a woman 73 years old. She built two chimneys, constructing a fireplace under one, mixed all the mortar, carried the brick and stone, and decorated the structure within and without in original fashion. Its ornamentation consists of cobblestones, sea shells, brick, galvanized iron, and bits of bric-a-brac gathered from all sources. Above the front door is a row of fruit-jar caps imbedded in

*Miss Della Phillips,
Balboa Orange Co.*

the shell and glass-studded mortar. Near the base of the house is a row of family portraits set in diamond-shaped frames of cobblestones. There are bits of broken dishes, children's toys, pictures painted on glass, etc., cleverly worked into the decorative scheme with shells and pebbles.

DWELLING HOUSE MADE FROM OLD WATER TANK

On the Trenton cut-off of the Pennsylvania Railroad stands a house made



Home, Sweet Home, Even in an Old Water Tank

from an old water tank which had done service in its original capacity for many years. It was finally bought and converted into a double dwelling house, where two families find a cozy home. Warm in winter and thoroughly waterproof, this curious residence is one of the "sights" of that part of the country. It is a two-story affair, and the iron bands which bound it in the days of railway service are still seen on its sides.

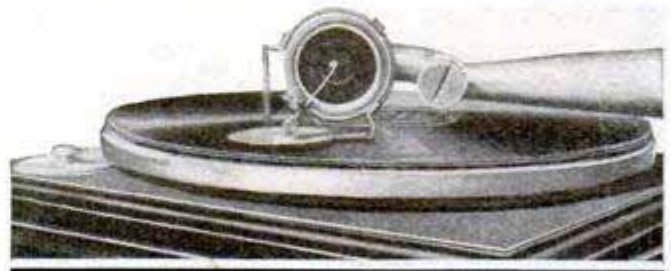
Milk in ordinary cans cannot be sent by parcel post, but the department hopes to arrange eventually to handle such shipments, according to a recent announcement by the postmaster-general.

INTENSIFYING THE VOLUME OF PHONOGRAPHS

This simple little phonograph attachment, consisting of a celluloid disk mounted near the end of the needle, clarifies and amplifies the volume of sound to a remarkable degree. While testing out a number of records two years ago the inventor happened to touch the needle and noticed that it vibrated. The needle in question was a particularly fine straight-sided one, which produced a low, sweet tone but lacked the power to propel the sound from the horn in sufficient volume. The inventor argued with himself that if he could add power to the vibration of this fine needle it would produce all there was in the record in a volume equal to that of heavier needles and without the heavy needle's defects, such as scratch, the aftertones which produce the mechanical effect, and the excessive wear.

After trying many devices to increase these vibrations he found that a disk of certain diameter, thickness and weight, attached to the needle near its point, not only increased the volume tenfold, but retained all the purity of the fine needle, and, at the same time, by its vibratory action, eliminated the aftertones. The device is attached to the sound box by means of a spring clip, and then is sprung over the point of the needle. The disk does not come in contact with the record, but rides a fraction of an inch above it, with the point of the needle perforating it in the center.

The device may also be used with



The Disk in Position on the Needle of the Phonograph

fiber needles, the result being a volume much greater than that ordinarily produced by the heavy steel needles.

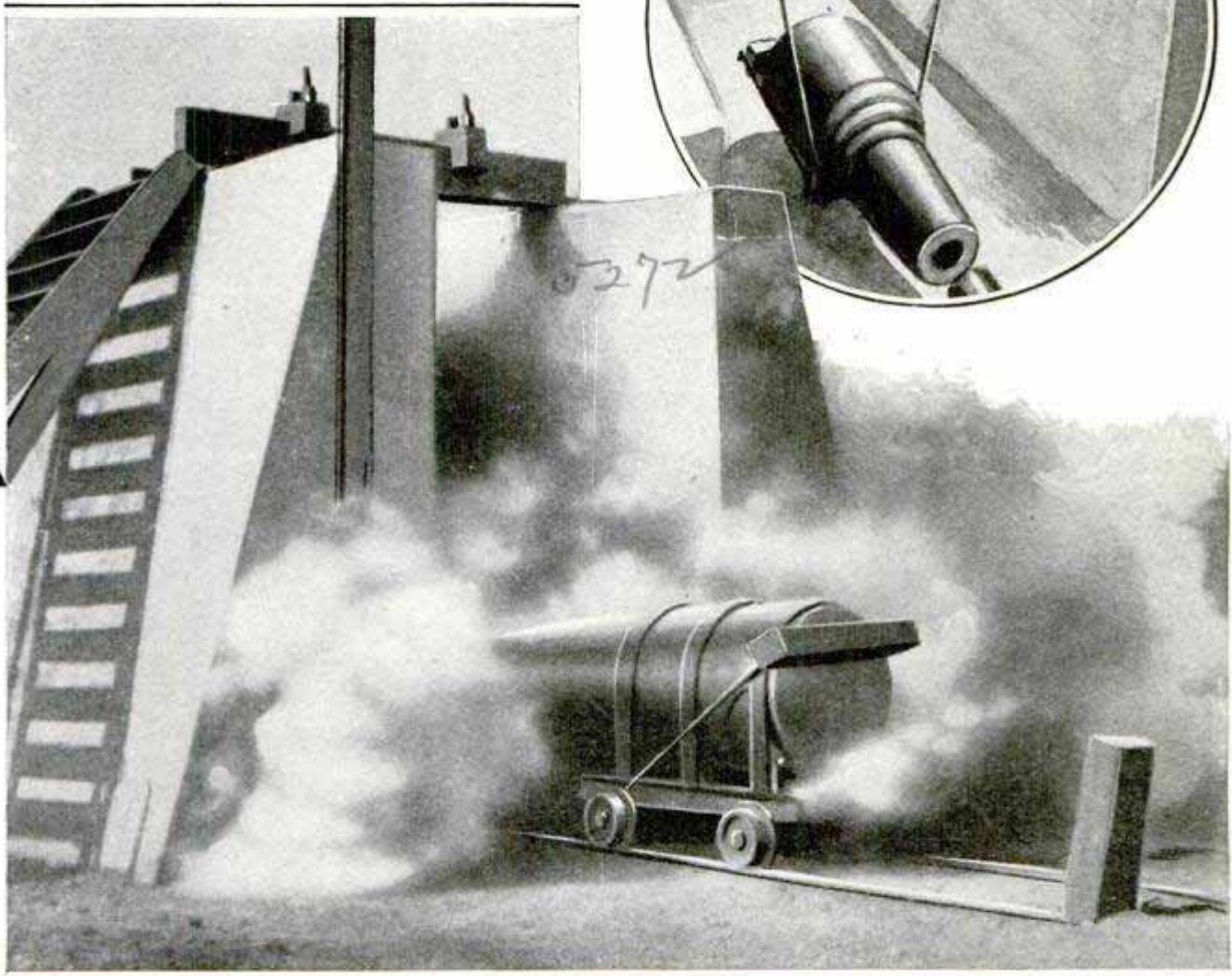
*5-55-0
C.A. Homey,
902 Sivede St.,
Norristown, Pa.*

*45-37
Blum
187
Masterson
Corbin*

SIMPLE TEST SHOWS FORCE OF EXPLOSIVES

In testing the safety qualities and the explosive force of the various explosives used in mining operations the U. S. Bureau of Mines employs a method that is both simple and effective. The method used is that of the ballistic pendulum, which, in spite of its hard-looking name, is simply a pendulum with a heavy wooden or metal bob which by the amount of its swing measures the force of projectiles fired against it. In the tests made by the Bureau of Mines a cannon fastened

fired, the resulting swing of the mortar is measured by an automatic recording device, and the amount of this swing is compared with that produced by the discharge of 1/2 lb. of a standard dynamite.



Firing a Charge against a Swinging Mortar to Test Explosive Force

by straps and rods to a truck that runs on a 30-in. gauge track is loaded with a measured quantity of the explosive, and is then run up to within 1/16 in. of the muzzle of a 12.2-in. United States army mortar which weighs 31,600 lb. and swings in a steel stirrup suspended from an overhead beam. The charge is

mite. The results of these tests are published and the coal miners are thus provided with reliable information as to the qualities of any explosive.

Passengers on air craft who land in the Holland district of Lincolnshire, Eng., must pay threepence apiece.

Prometheus 5533 W

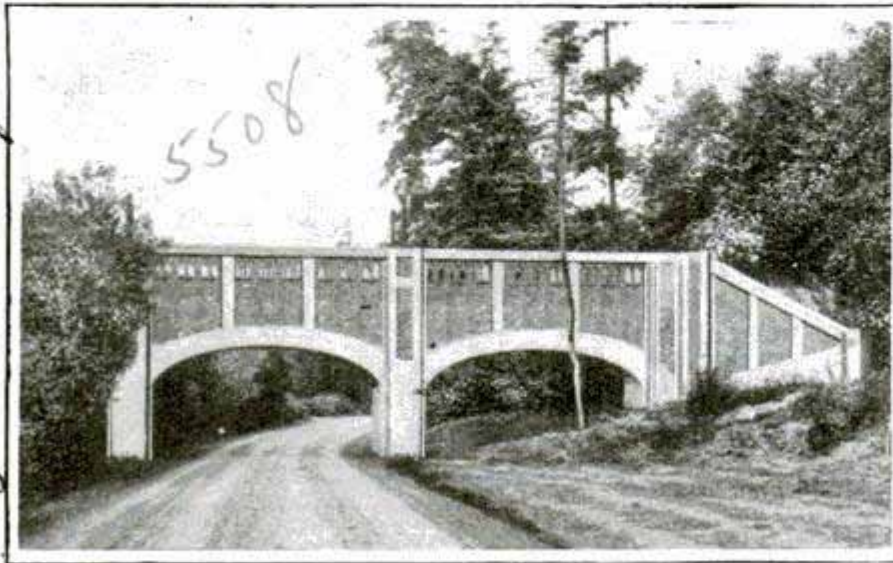
GRACEFUL CONCRETE BRIDGE HIDES SEWER

TO STUDY WIRELESS WAVES HUNDREDS OF MILES LONG

Concrete has again solved the problem of making attractive a strictly utilitarian object. The picture shown

For the study of wireless waves, several hundred miles in length, a French engineer proposes to construct an antenna 25 kilometers

(over 15 miles) long, with 10 wires, the whole thus containing some 150 miles of wire. This antenna will be erected on a series of five mountain peaks which rise almost parallel with each other to a height of about 7,000 ft., and at an average distance of about three miles apart. No difficulties are anticipated in using such long spans. The length of the waves sent out by an antenna is directly



Dignified Structure in Park Masks Sewer Line

is part of a sewer line which runs through a park in Seattle. A 66-in. pipe is carried over a ravine by a viaduct designed after an old Roman aqueduct. The bridge is of reinforced-concrete construction, faced with dark red brick, the piers are of solid concrete on a hardpan bottom, which is about 16 ft. deep in the center. The arches are made in one piece, adding strength to the structure. There is a 5 1/2-ft. walk over the bridge from one side of the ravine to the other. The cost of this ornamental bridge was \$16,485.

proportional to the length of the latter. Waves of such exceptional length as are proposed permit the use of a much simpler sending apparatus. It is thought possible that apparatus with a frequency of only 1,000 oscillations a second may be found practicable. The projected antenna would cost about \$5,000.

ROCK BLASTING ON LARGE SCALE IN GERMANY

Recently 156,000 cu. yd. of stone was broken out by a single blast in a German quarry, when 25,200 lb. of powder was used in three borings, about 100 ft. apart. The charge was exploded by electrical means. The cost of preliminary work and of the powder was about \$7,500, but nevertheless the method was found so economical that all blasting at this quarry will hereafter be done in this manner.

Prometheus 8-30-13

NEW MUSEUM OF DEVICES TO PREVENT FATIGUE

Aiming to gather in a permanent exhibit all kinds of factory devices that affect the physical well-being of the worker, a museum has been established in Providence, R. I., which has as its nucleus factory stools and chairs of various kinds adapted to many lines of work and for both men and women employes. The scope is broader than mere machine safeguards and mechanical or sanitary arrangements, although it designs to include many of these.

Initiated by Frank B. ...

ⒸAn electrical power plant having a capacity of about 40,000 kilowatts, which will be the largest in South America, is to be built in Chile to furnish power for mining operations.

4624 Figueroa St. Los Angeles, Calif.

54 **FLAME WELDING GAINING IN ACTUAL PRACTICE**

Modern practice seems to tend toward the elimination of rivets and the use of flame welding in joining two pieces of metal together. Aluminum tanks for brewer's use are flame welded, as it has been shown that such welding costs but 40 per cent of riveting on the same piece. In construction work flame welding is being used by plumbers and pipe fitters, who are putting in entire pipe installations without a single threaded joint. An instance is cited, in the Palace of Justice in Cologne, put up in 1910, where five miles of iron pipe was put together with flame-welded joints.

5305 **NEW LIFE PRESERVER OF UNIQUE DESIGN**

Worn under the coat, uninflated, a new French invention for preserving life may be inflated by means of a

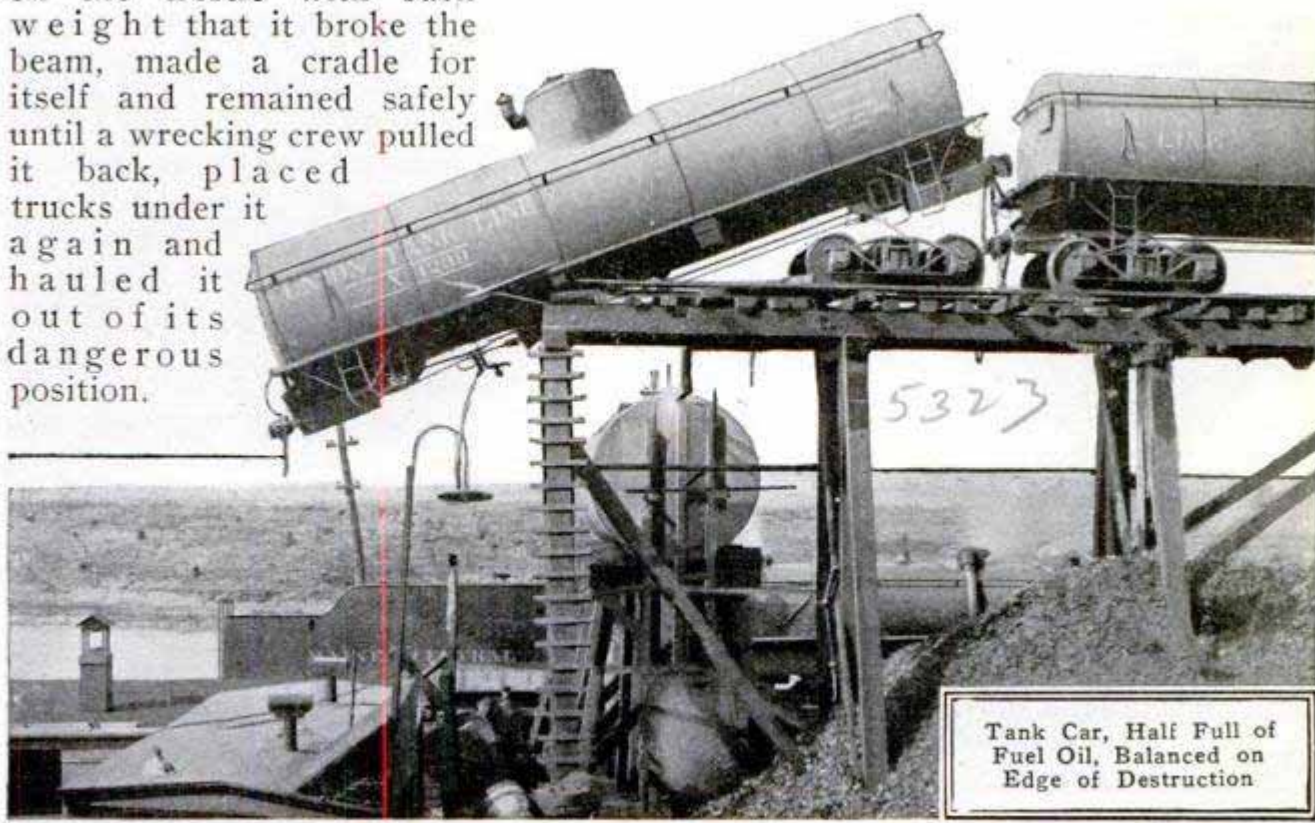


Comfortably Shaped Life Preserver Inflated from a Sparklet

5323 **SPECTACULAR ACCIDENT TO TANK CAR**

An extra-hard bump by a switching engine caused a tank car which was being unloaded upon a trestle to topple perilously on the ragged edge. Half full of fuel oil, it was pushed off its trucks, which fell upon a storehouse below, barely missing two electricians working there, but the car came down on the trestle with such weight that it broke the beam, made a cradle for itself and remained safely until a wrecking crew pulled it back, placed trucks under it again and hauled it out of its dangerous position.

large sparklet, a tube, some 4 or 5 in. long, containing air, highly compressed. The device, made of rubber, may be worn as a waistcoat, buttoning when not in use, beneath the coat. A receptacle in the corner of the belt holds the sparklet cylinder, and the pressure of an outside lever suffices to puncture the cylinder's cap and allow its contents to expand into the bag.

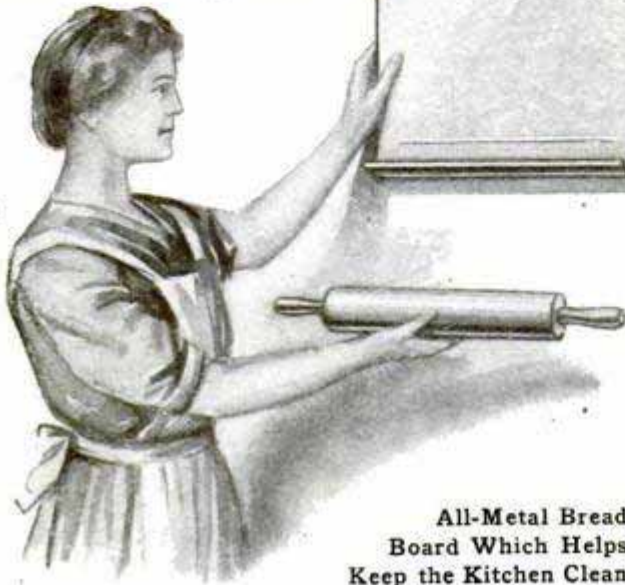


Tank Car, Half Full of Fuel Oil, Balanced on Edge of Destruction

A. T. Coffin, 2 Fowler St., Portland, Me.

METAL BREAD BOARD FOR HOUSEKEEPERS

In a metal bread and pastry board recently patented, highly polished sheet tin forms the board, which is equipped with a 5/8-in. bead, extending below the level of the lower edge, and



All-Metal Bread Board Which Helps Keep the Kitchen Clean

serving as a brace against the edge of the table when placed thereon. The farther end of the board is curved upward, forming a holder for the rolling pin when the board is hung up. A small steel wire along the edge strengthens the board against warping or bending, and helps keep the flour off the table.

WHERE THE EARTH IS THICKEST

That the earth has its largest diameter at the equator is commonly known, but the two points on its surface between which the solid part of the earth is thickest have only recently been agreed upon by scientists. At first thought one of the points would naturally be supposed to be somewhere in the Himalayan mountains, but an imaginary line drawn through a point there would emerge on the opposite side of the earth in one of the deep basins of the southern Pacific Ocean. Therefore the top of Chimborazo, in

Ecuador, has been selected as the most likely terminal on one side, as it rises to an elevation of 20,498 ft. above sea level, 1 1/2 deg. south of the equator, and its antipodal point is found at a fairly high level on the north coast of the island of Sumatra, near the Straits of Malacca.

AN INTERESTING FIND ON TUNIS COAST

The wreck of an ancient vessel which, it is believed, was lost about 86 B. C. has been discovered on the Tunisian coast by Greek sponge fishers, lying at a depth of 130 ft. The craft seems to have been of about 400 tons, with a length of 100 ft., and a beam of 25 ft., but the most interesting part of the discovery is that she was laden with many valuable art treasures, bases and capitals for columns, effigies, statuary, furniture, tiles, leaden piping, lamps, etc. Sixty columns of bluish-white marble, each 13 ft. high, were stowed in the hold. It is believed her cargo was part of the spoil taken from Athens by Sulla in the year 86 B. C.

WHERE DO ALL THE OLD CARS GO?

An ingenious employe of the Pennsylvania Railroad secured one of the wooden passenger cars discarded in favor of steel coaches, and enlisting the aid of several of his fellows, transformed it into a commodious clubhouse for vacationing. The serious feature of the undertaking was getting the car from the railway tracks to the point selected for the camp. This obstacle overcome, it was simply play to remove the seats, fix up a kitchen in one end of the car, install beds, tables, chairs, and a stove, and a ready-made clubhouse, weather-proof and thoroughly enjoyable, was the result. A porch was built which, when screened, gave the necessary touch of outdoors to the "car bungalow," and a delightful vacation was spent.

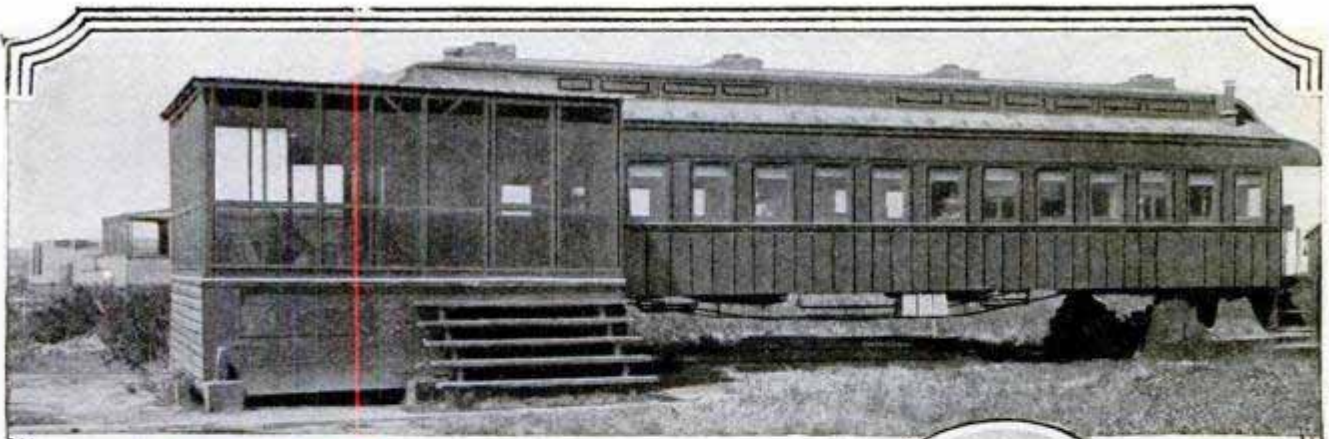
H. D. Jones,
908 Walnut St.

Monroe Mfg. Co.
Cambridge, O.

Cosmos
9-11-13

Harlem Journal 9-27-13

W. H. ...

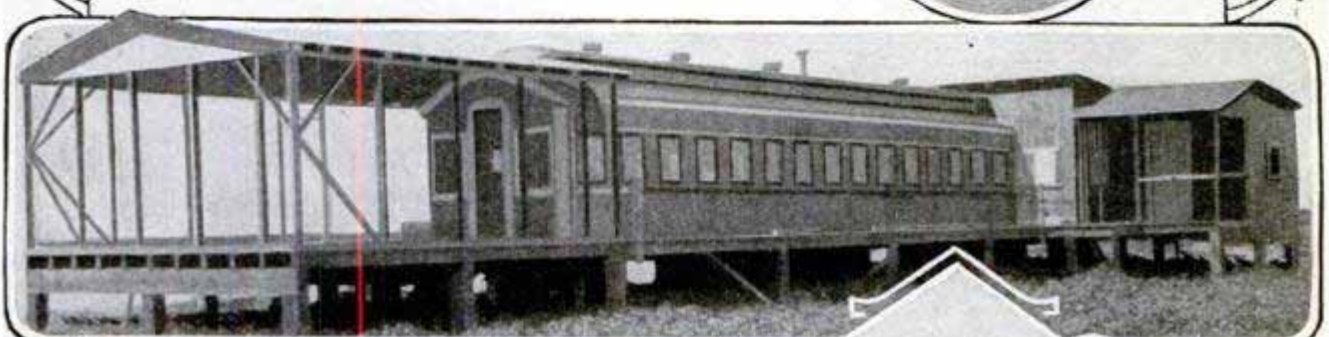


Lakeside Bungalow Made Out of Old Passenger Car

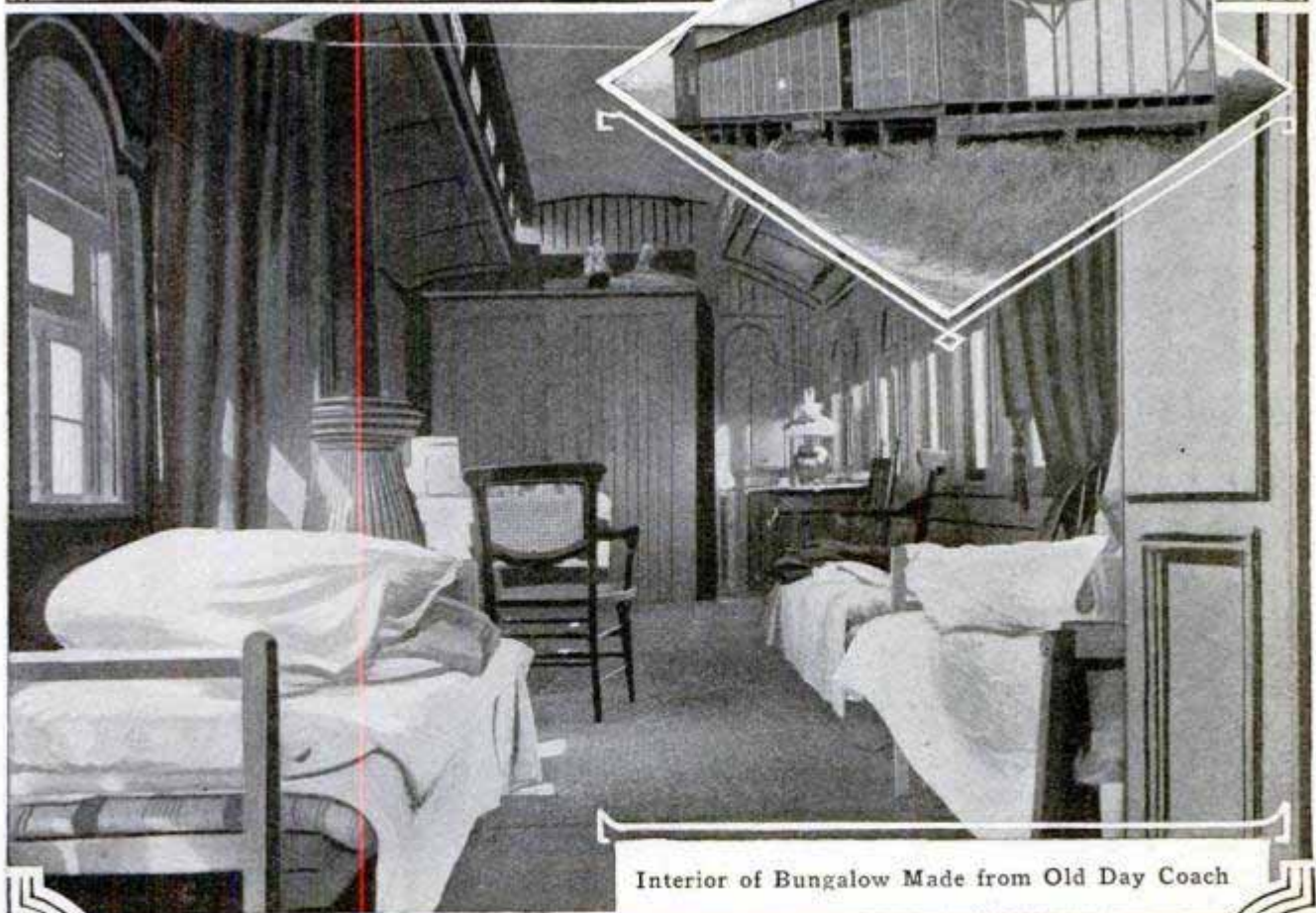
5415



Screened Porch Gives Protection from Mosquitoes



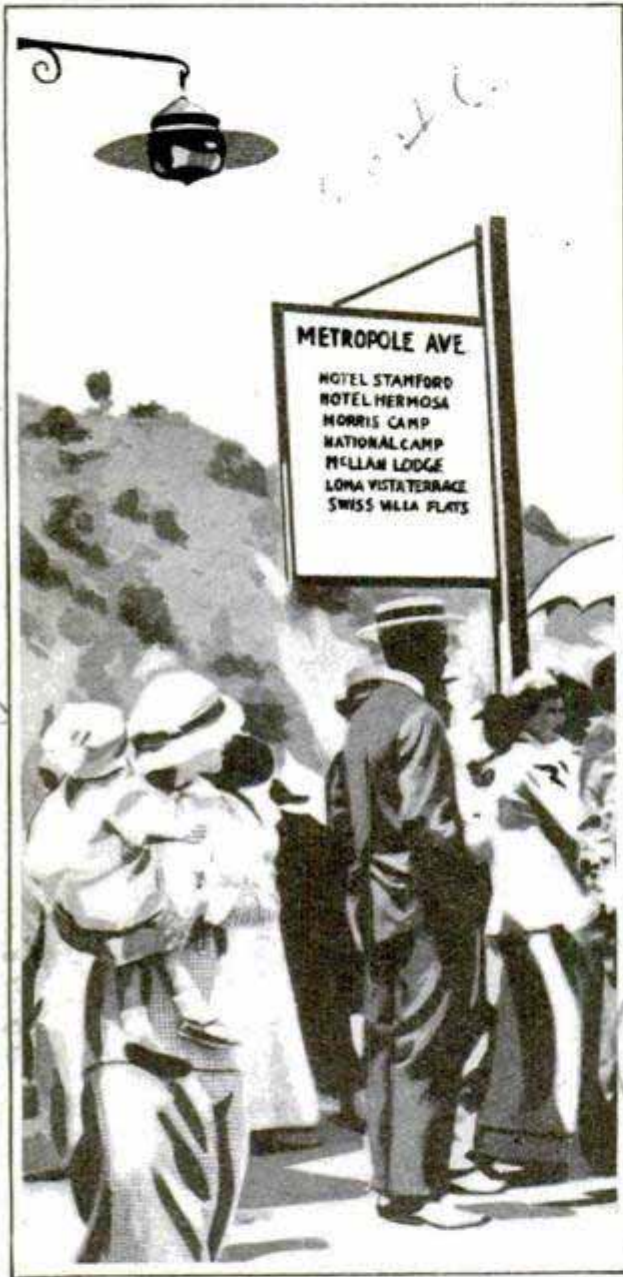
Shooting Club's Headquarters, with Attached Kitchen and Storeroom



Interior of Bungalow Made from Old Day Coach

STREET SIGN SERVES AS A DIRECTORY

Street signs that are a real convenience to strangers are in use in the town of Avalon on the island of Santa



Street Sign at California Seaside Resort Gives Locations of Hotels and Restaurants

Catalina, Cal. Each of these signs is about 3 ft. high and 18 in. wide, and gives not only the name of the street but a list of the hotels and restaurants on the street. This town is a beach resort, and hotels and restaurants are naturally the chief items of interest to visitors, but the idea is an ingenious one that might be employed in cities generally for giving the locations of the principal office buildings and other business establishments.

ST. LOUIS BECOMES WORLD'S SEAL-FUR CENTER

By the action of the United States government through the Department of Commerce, in deciding that government seal furs shall be sold at auction in St. Louis, the world's fur center is transferred from London to an American city. Two years ago Congress passed a law providing that no seals on U. S. islands should be killed for the next five years except those seals needed by the natives for food. The skins of seals so killed are known as "government catch," and will amount to several thousand for the 1913 season. Under the protection of laws favoring the increase of the herds the number will increase largely in the next few years. The next step will be the removal of the dyeing and tanning establishments from London to St. Louis, and the establishment of a great new industry. The economy effected by this home industry and by the elimination of the heavy duties paid on dressed and dyed skins, will mean the saving of a hundred dollars or more on each garment in the purchase of sealskin coats.

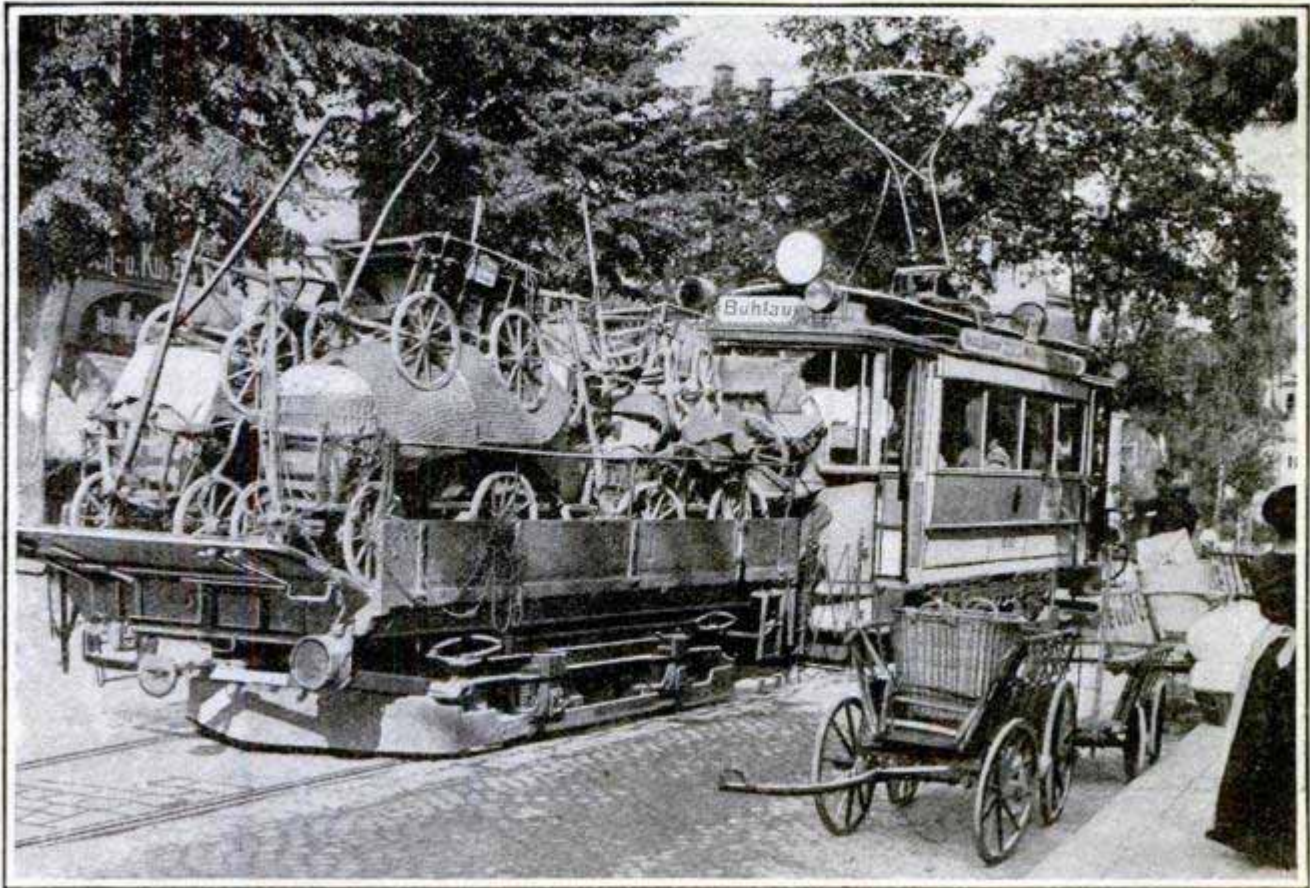
NITROGEN LAMP SHOWS HIGH EFFICIENCY

Large models of the new and not yet entirely perfected nitrogen lamp, or more correctly the nitrogen-filled electric lamp, were exhibited recently. The new lamp is a tungsten incandescent lamp of high efficiency with the lamp filaments set in nitrogen gas instead of in a vacuum. Not so very long ago the tungsten light was hailed as a modern wonder in economy, giving three times as much light for the same amount of current as was consumed by the carbon bulb. Now the new "nitro" bids fair to cut the tungsten consumption almost in half. The new lamp will be adapted to outdoor lighting, gives a whiter light than any other commercial form, and may be had in globes rated as high as 5,000 candle-power.

*New York Edison Co.
Editorial Bureau,
126 W. 42nd St.*

*H. 6 2-4 Figueroa St.
Los Angeles, Calif.*

500W



Conveniences Afforded by Street-Car Company in German City

BAGGAGE CAR ON TROLLEY
LINE IN DRESDEN

5543W

When a family in the German city wish to forward baggage they direct the street-car officials to have a baggage car stop at the nearest point to their home. This simplifies the shipment of household goods, articles of everyday need and bulky packages which here are usually sent by express or light freight. This solves the express problem for the thrifty Dresden

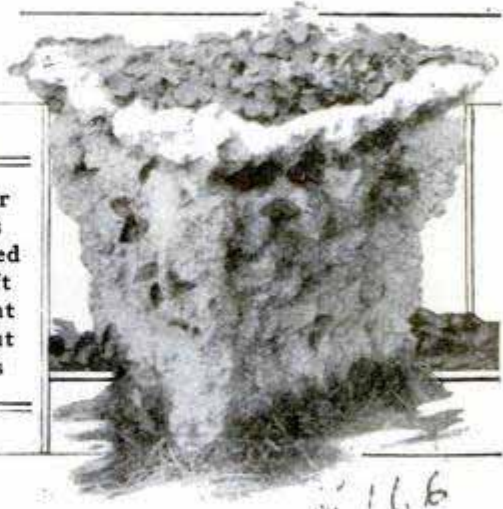
IMITATION-STONE FLOWER
BOXES

5166H

Artistic vases and flower boxes can be made, a Cincinnati man has discovered, by piling up soft concrete without a mold. He has made several of them successfully. When the concrete dries, the boxes are as rough and irregular as uncut stone, and practically as indestructible. The concrete which he



Flower
Boxes
Modeled
in Soft
Cement
without
Molds



5166

housewives, one of whom may be observed in the foreground. The rates and service furnished by the trolley lines, while both inexpensive and satisfactory, enable the company to earn a fair return upon the investment.

Paul Thompson,
10 Spruce St.,
Dresden

uses is an ordinary mixture of cement, sand, and coarse gravel, more plastic

J. R. Schmidt,
3557 St. Charles Pl. Hyde Park
Cincinnati, O.

than liquid. A handful at a time, it is piled up in the general shape desired and then allowed to dry. As no molds are used, no two boxes are exactly alike. A variety of colors or a mottled effect can be produced by mixing different coloring matters in the soft cement.

BUILDING CONVERTED INTO SKYSCRAPER

Many of the modern steel-frame buildings erected in recent years have been built to a moderate height, to suit the business conditions as they existed at the time, but have had their foundations and steelwork so designed and constructed as to permit the addition of a considerable number of stories at some future time. Few of these extensions have been built, but in the

case of a national bank building in Pittsburgh, the original structure, which was built to a height of five stories in 1907, was extended in 1912 to a height of 26 stories without interrupting the service of the building or disturbing its tenants. The fifth-story columns projected above the temporary roof to provide for splicing on the new sixth-story columns without any change in the structure below, and the new work was thus executed very much as if it were a separate building starting from a foundation platform. The sidewalks on both fronts of the building were covered by heavy bridges to serve both as protection and as storage and working platforms. All hoisting was done at night, facilitating the work of erection, which was carried on at the rate of about four stories a week.

Engineering Review 8-16-13

LARGEST MOVING-PICTURE THEATER

A moving-picture theater with a seating capacity of 3,000 has recently

Ventilation is taken care of by a complete plant, in which the outside air is washed, dried and heated or cooled to the requisite temperature, and then introduced through ventilators, while the vitiated air is with drawn through openings near the roof. A complete lighting system has been installed, a pipe organ, costing \$30,000, built

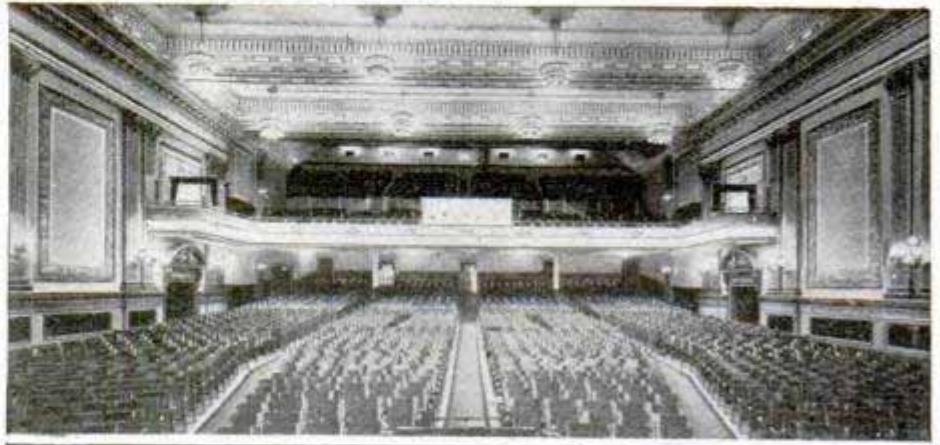
5429 W

Liberty Theater Co., Salt Lake City, Utah.



Showing Stage of Largest Moving-Picture Theater

been opened in Salt Lake City, containing all the adjuncts and conveniences of a properly equipped amusement house for a metropolis. Built of reinforced concrete, the building is absolutely fireproof, and cost over \$150,000.



Auditorium of Motion-Picture Theater That Seats 3,000

in, and the operating room, constructed of metal, asbestos and reinforced concrete, has been given special attention. In case of accident or fire, the operating room is shut off absolutely from the rest of the house. Two machines are provided with full equipment so that there need be no waits in this new playhouse. The manager's office is equipped with a small projecting machine, so that the main room need not be used when testing films.

FOUR BIG ELECTRIC SYSTEMS TO OPERATE AS ONE

5525

Gen. 9-28-13

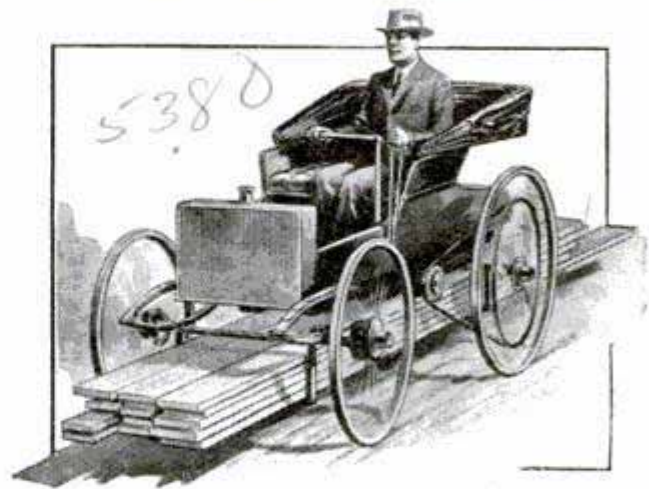
By connecting the lines of four of the biggest electric-power companies in the southern states a combined system comprising nearly 800 miles of 100,000-volt lines, 200 miles of 120,000-volt lines and hundreds of miles of lower-voltage branch lines is to be created. The Southern Power Company, a large network in itself, is already "tied in" with the Yadkin River Power Company and is contemplating a connection with the Georgia Power Company, which, in turn, is to be connected with the Tennessee Power Company. These four systems cover a large section of country in which there are big variations in power requirements and climatic conditions. The physical combination of these four systems into one large system will undoubtedly result in great economies, particularly in taking care of the peak loads, which do not occur at the same time in all sections, and in disposing of surplus power caused by local conditions on any one of the systems.

NOVEL LUMBER CARRIER HAULS LIGHT LOADS

5380

An old motor buggy was rigged up by an ingenious carpenter to carry light loads of lumber to his various jobs. A frame made of band iron was hung to each axle, forming a crosspiece some 10 in. from the ground, and on these crosspieces he loaded some 500 lb. of dressed lumber. For city jobs, where

grades are light and the smooth pavements make going easy, the novel car-



Motor Buggy Used to Carry Lumber

rier made good. Obviously sharp turns are out of the question, but as a handy help to a busy man the idea is a good one.

ENGLISH RAILWAY SUPPLIES PLAYTHINGS

5356

Playthings are supplied free by the London and Northwestern Railway to all children who are traveling first class and have a long journey before them. These playthings consist of miniature locomotives, cars, and other railroad equipment, which are delivered to the children without the making of any record,



English Railway Relieves Tedium of Travel by Supplying Playthings to the Children

but with the understanding that they are to be left in the car at the end of the journey.

Motor Age

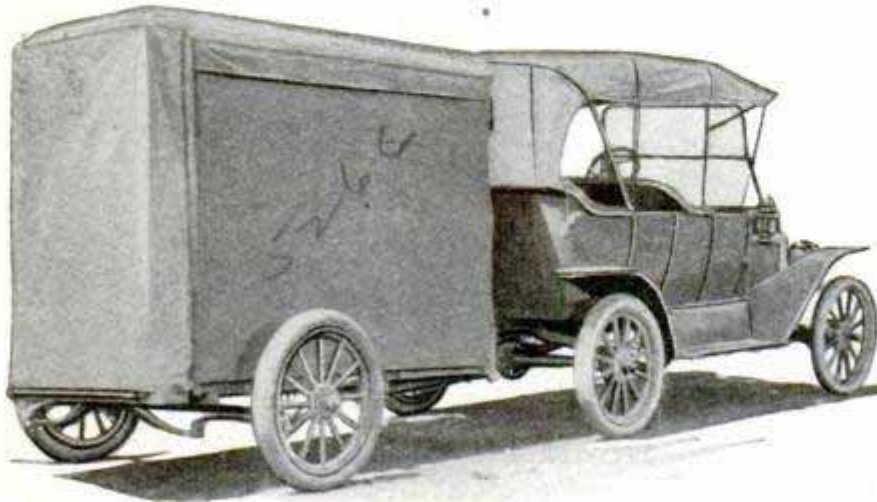
8-28-13

La Nature - 8-9-13

A PIANO DEALER'S MOTOR

TRUCK

used by piano dealer in Santa Rosa
A two-wheeled trailer attached to a touring car is used by a piano dealer in Santa Rosa, Cal., for delivering



Automobile Trailer Used for Carting Pianos

pianos to his customers. Two old automobile wheels, and an axle and springs, put together at a local shop, constitute the running gear of the trailer, and the canvas-covered platform is just large enough to hold one piano. The front end is held up by a jointed tongue attached to an angle bar under the automobile. A rigid standard, firmly attached to the platform, furnishes a support to which the instrument is strapped. The trailer is so low that one man can load or unload a piano, and the outfit can get over country roads at surprising speed without damaging the instrument.

STEAM TURBINE OF GREAT POWER

The largest steam turbine in Europe is now under construction for the central power station in Mark, Germany. It is of the Parsons type, of 40,000 hp., running at a speed of 1,000 revolutions per minute. It uses high-pressure, superheated steam and drives a tri-phase, 50-cycle, 10,000-volt alternator. The manufacturers of this engine do not hesitate to predict the manufacture of turbines of 50,000 to 60,000 hp. in the future.

NOVELTY WHICH PREVENTS

THIEVING

A novel burglar alarm has been placed on the market in Germany, composed of a small metal disk, circular in shape, which may easily be carried in the vest pocket. It is so arranged that a detonating cap may be inserted and, so loaded, it becomes a terror to sneak thieves. Suppose a traveler is staying in a strange hotel and finds that he cannot lock his door. He places a chair against the door, and slips the disk under one of its legs. Should anyone attempt to enter the

room the chair is forced out of position, the disk flies open and the cap explodes, awakening the sleeper. The disk may be used under baggage, in purses, under bicycle or automobile tires, and in many other ways.

PHONOGRAPH FOR TEACHING FOREIGN LANGUAGES

Teaching the pronunciation of a foreign language by means of the phonograph is a method that has been in use



for some time, but this, heretofore, has presupposed a somewhat advanced knowledge of the grammatical rules and vocabulary of the language. A French firm has brought out a machine which is adapted to the needs of

the beginner and by which it seems possible to acquire a working knowledge of any foreign language without the assistance of a teacher. This machine contains a disk phonograph by which

Pathégraph, 30 Boulevard des Nations

La Nature 9-13-1913

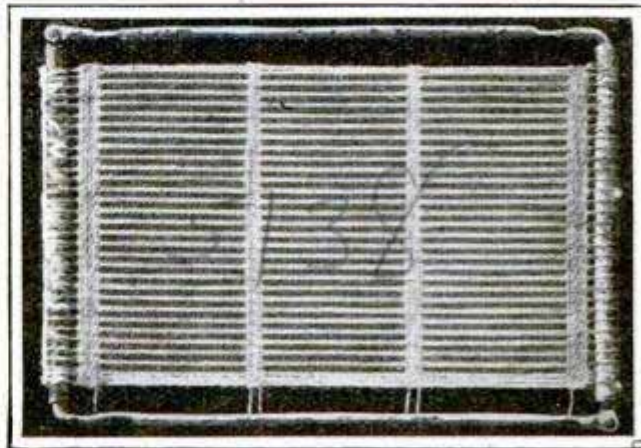
Playthings 9/13/13 46

473

words and phrases are pronounced, and an additional mechanism which works simultaneously with the disk and displays the words and phrases in printed form in both the foreign and the native language. By a simple mechanism the machine can be set back to repeat whenever desired.

NEW RESISTANCE NETS FOR ELECTRIC STOVES

A new kind of heating unit for electric stoves, car heaters, foot warmers, hotplates, incubators, and all sorts of



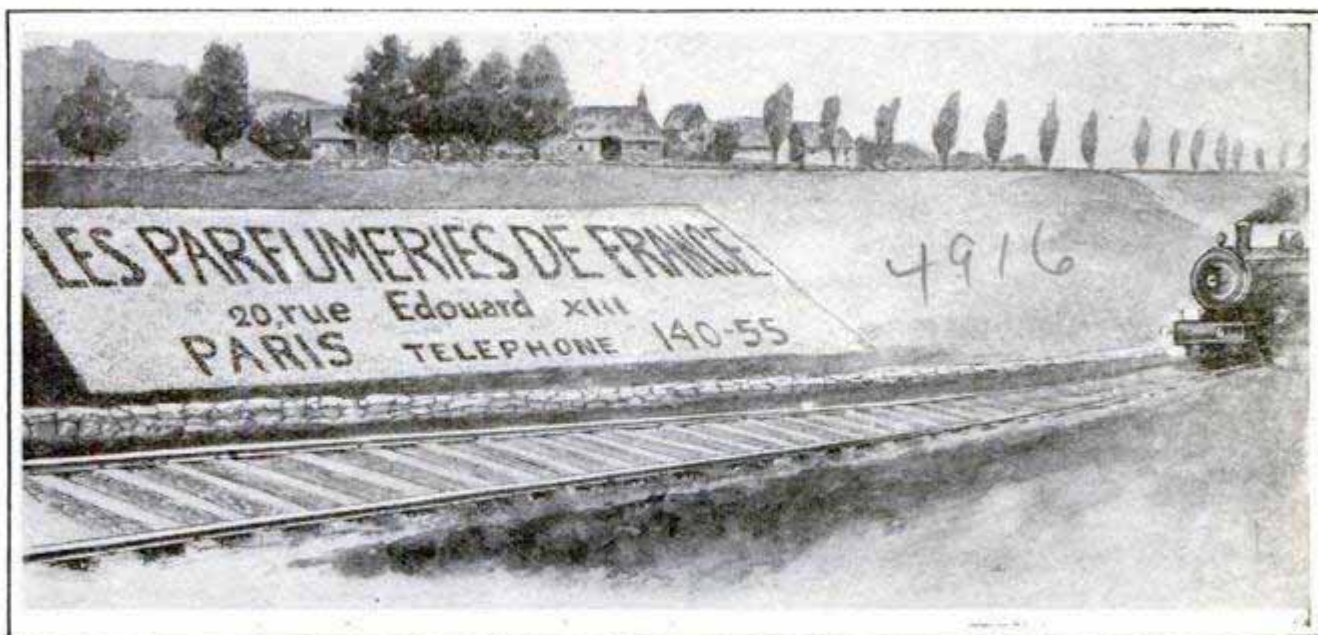
New Heating Net for Electric Stoves

SPEED OF HERTZIAN WAVES DETERMINED

Experiments with Hertzian waves between Toulon and Paris by French scientists show that the waves travel with a speed of 183,810 miles per second. The speed of light is 186,300 miles per second. Further experiments are being made to determine whether the speed of Hertzian waves over the sea is the same as over the land.

FLOWER BEDS TO SERVE AS SIGNBOARDS

Advertising signs made of beds of brilliant-colored flowers have been laid out in the fields beside the tracks of several of the French railroads to call travelers' attention to various commercial products. Bright-hued flowers of various colors spell the names of the product and the manufacturer without seriously disfiguring the landscape.



A Substitute for the Unsightly Signboard: Advertising Flower Beds Laid Out along the Lines of French Railways

Scientific American 5-27-13 529 W

Chicago Tribune

Value

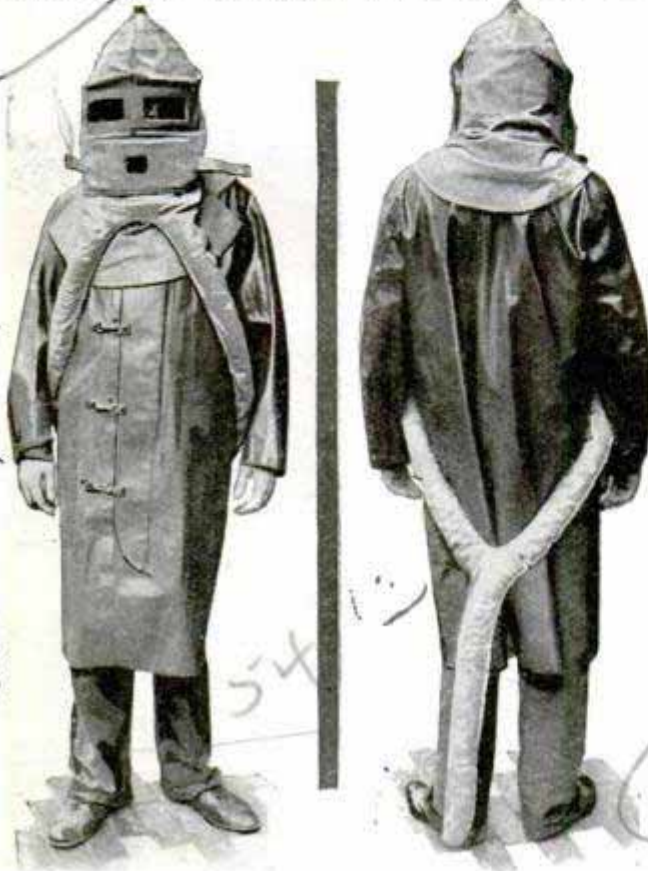
*See also
Engineer C. Schmeidler
Neuenrade, Westphalia, Prussia*

DM

NEW BREATHING APPARATUS FOR FIREMEN

Utilizing the oxygen of the air, rather than carrying a bulky tank on

smoke-filled room for an indefinite length of time. A canvas hood, somewhat similar in appearance to a diver's helmet, fits closely over the head and shoulders. From it trails a hose which reaches down to the floor where cool air with life-giving oxygen naturally collects. Smoke, fumes, and heated gases may fill the room, but at the floor a cooler stratum is found, capable of sustaining life. As the wearer of this apparatus walks about the smoke-filled rooms he breathes the air taken from the floor by the trailing hose, and air valves in the top of the helmet afford escape for the exhaled air. Small mica windows admit light and the helmet is of sufficient size to fit any man or woman. It is inexpensive and is being installed in factories and stores alongside the chemical fire extinguishers, ready for instant use.



*J. N. Schmidt
3557 St. Charles Place, Hyde Park,
Cincinnati, Ohio.*

New-Style Breathing Helmet and Smoke Protector the back, a new apparatus for fire fighters enables men to remain in a

CABINS OF ROUGH LOGS AND CONCRETE

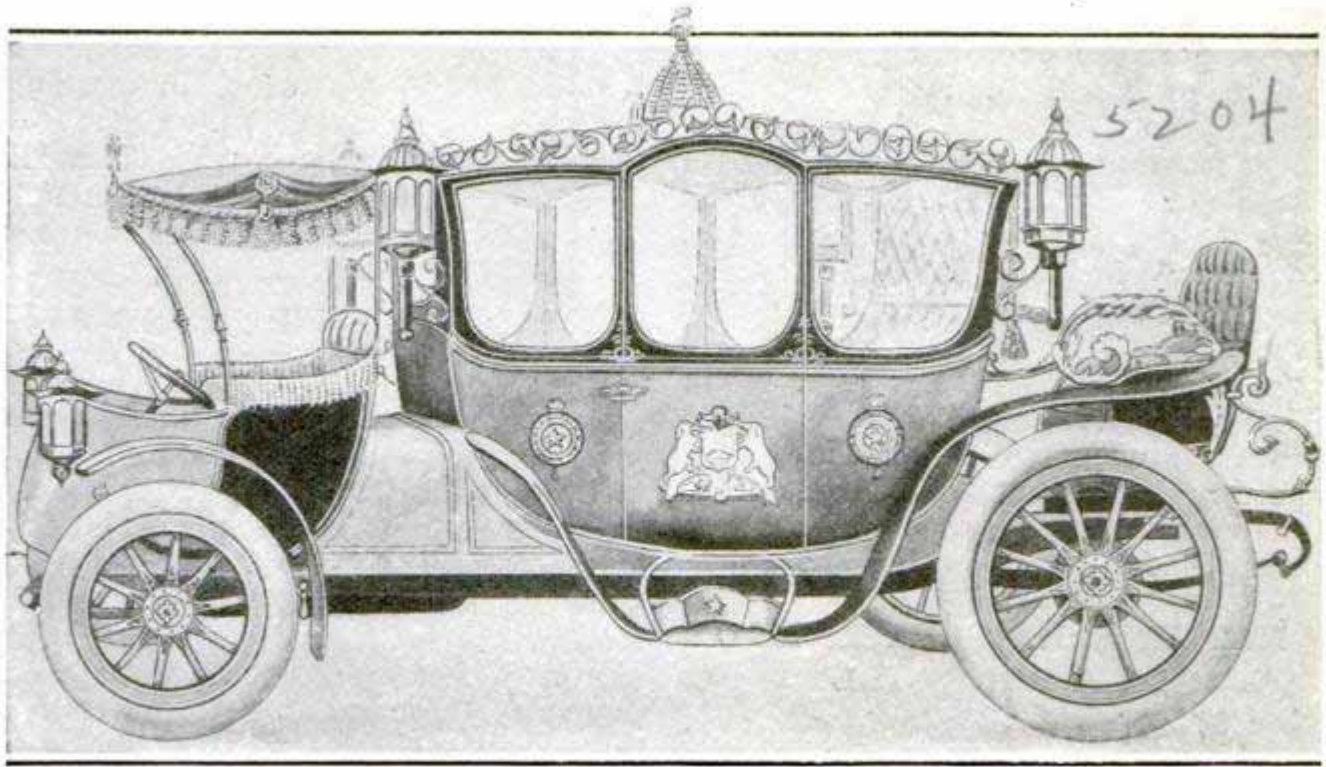
Concrete log cabins, combinations of one of the earliest kinds of home building with one of the most modern, are becoming very popular in Cincinnati. Many of them are being built on the premises of wealthy residents as play-houses for children or dens for grown-



Concrete Entrance to a Log Cabin as Built upon the Lawn of a Wealthy Cincinnati

A Concrete Log Cabin in Which the Earliest Form of Home Building is Combined with the Most Modern

*J. N. Schmidt
3557 St. Charles Pl., Hyde Park,
Cincinnati, Ohio.*



Sumptuous Automobile That an English Firm is Building for an Indian Potentate

ups. The odd beauty of the log cabins is gained by a combination of the woodcraftsman's skill with finishings of rough concrete. Not only is the concrete used to give weight to the lower part of the buildings and to fill the chinks between the logs, but rough-surfaced masses are piled up about the entrances and the porch columns in imitation of natural rocks. The log cabins are not only picturesque, but firm and solid as a rock; all woodwork near the ground is cased in a protecting mass of concrete so that the structures can be built very low without danger of decay. The concrete used is a simple composition of sand, coarse gravel, and cement. Natural-rock effects are obtained by breaking off huge chunks of hardened concrete and setting them in place with fresh cement.

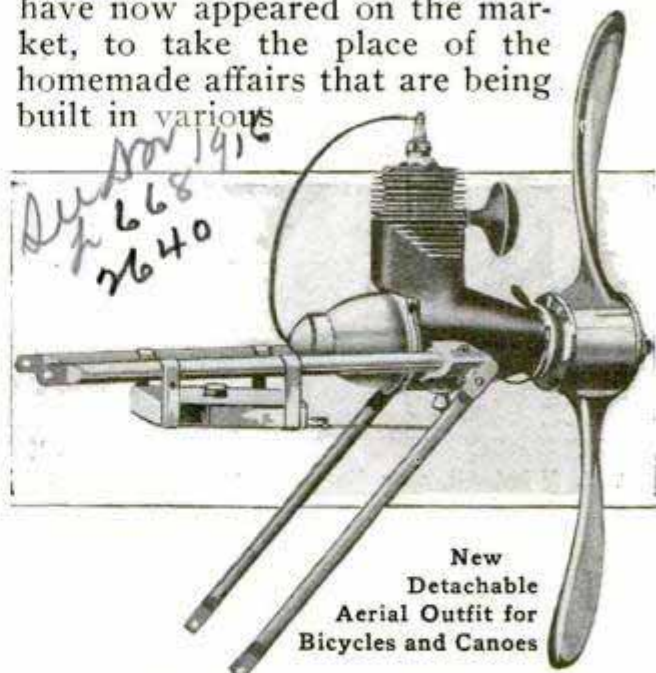
GORGEOUS AUTOMOBILE FOR USE IN INDIA

The use of the automobile in India has not broken Oriental potentates of their love for gorgeous equipages; they must have elaborate motor cars in imitation of their former horse-drawn vehicles. One is being built now in England for an Indian gentleman who

sent in his own design. Besides an elegant coach body, it has outside seats for driver and footman. And all this is carried on a chassis with 128-in. wheel base and 56-in. tread. Its motor is 16 to 20 horsepower.

NEW READY-MADE AERIAL OUTFITS

Portable aerial outfits for propelling bicycles, canoes, boats and ice craft, have now appeared on the market, to take the place of the homemade affairs that are being built in various



New Detachable Aerial Outfit for Bicycles and Canoes

parts of the country. Each outfit consists of a one-cylinder, 4-hp., high-

Aerotherm Engine Co.
815 H

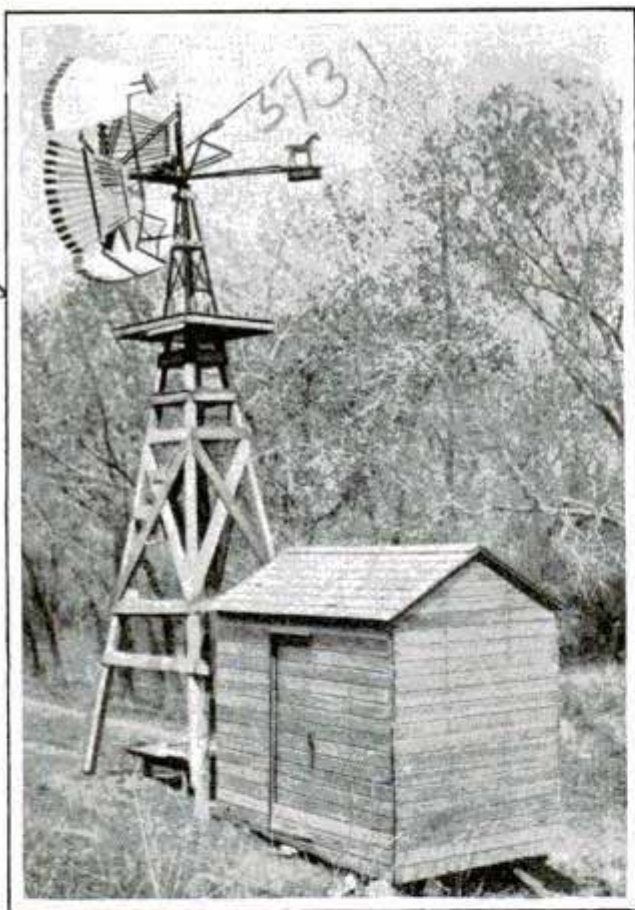
Car - London
7-23-13

La Porte, Ind.

speed gasoline engine, an aerial propeller of small diameter attached directly to the engine shaft, and fittings for mounting the machine on a bicycle or a canoe. The engine weighs only 11 lb., is very compact, and is completely inclosed so that it cannot easily get out of order. The propeller is not large enough to be cumbersome or dangerous, but has a high pitch. The outfit will drive a bicycle 100 miles on a gallon of gasoline, at a speed ranging from a walk to 60 miles an hour, and it will propel a small boat or canoe about 8 miles an hour.

NATION'S CENTER MARKED BY A WINDMILL

The exact geographical center of the United States is located on a farm



This Windmill, on a Farm 12 Miles Northeast of Smith Center, Kan., Marks the Exact Center of the United States

about 12 miles northeast of Smith Center, Kansas. According to the United States Geological Survey, its position is at latitude 39° 55' and longitude 98° 50'. A photographer who went out armed with these figures to find the

exact spot, discovered that it was occupied by an old windmill standing beside a wooden shed. The tenant of the farm, when he learned that his windmill had such distinction, feared that the landlord might raise the rent.

DAMAGED SHIP SAVED BY OIL CARGO

A cargo of oil, because of its lightness in comparison with water, saved a damaged ship from foundering, according to reports circulated in Calcutta, India. The ship was a tank steamer, laden with 6,300 tons of oil, and was bound from New York to Calcutta. When off Point de Galle, Ceylon, and three miles out from shore, the ship struck an uncharted rock and it was found that two of the tanks in the middle of the vessel were letting in water. The water lifted the oil to the tops of the tanks and then stopped coming in. In this condition the vessel was navigated up to Calcutta, a journey that took five days. The full extent of the damage was only discovered after the cargo of oil had been pumped out and the vessel placed in dry dock. Fore and aft were two big rents in the steel plates; in the middle of the hull was a gash 20 ft. long and 1 in. wide, and at various parts of the hull were holes big enough for a man to put his head through. The explanation of this incident is found in the two facts that water and oil will not mix, and that crude oil weighs only about four-fifths as much as water. As a result the oil was forced to the tops of the damaged tanks and formed a seal that prevented the water from flooding the ship. *The Marine Review*

Portable houses that can be stowed away in an automobile, and set up in two hours at any convenient camping place, have been placed on the market in France. These houses are composed of interchangeable panels made of a compound of cement and asbestos and cost from \$190 to \$250, according to size.

*N. C. Walker
12.5 W. 57th. St. Terraer,
Kansas City, Mo.*

*Sararac - Owned by Tank Storage
& Carriage Co.*

EVERYDAY USES OF THE METRIC SYSTEM

By FRED TELFORD

Normal, 2ll 5410

FEW people realize how widely the metric system of weights and measures is employed in this country. Yet sportsman and scientist, druggist and jeweler, farmer and physical director, housewife and health officer, librarian and manufacturer, even the Federal government—all know and use the metric system.

The scientific farmer no longer wonders at "calories" and "grams" and "liters" and "centimeters;" he knows that the science upon which his agriculture is based depends upon investigations in which only metric units are employed. For instance, in the Babcock milk test, which is familiar to every dairy farmer, 17.5 cubic centimeters of sulphuric acid is added to 17.6 cubic centimeters of milk. Certified milk must, among other things, have less than 10,000 bacteria per cubic centimeter; and milk classified as "Grade A" must contain less than 100,000 bacteria per cubic centimeter before pasteurization, and less than 10,000 afterward.

The health officer determines the fitness of water for use by the number and kind of bacteria. He seldom approves of water containing more than a few hundred bacteria per cubic centimeter, regardless of the kind; and water is labeled "good" only if it contains less than a hundred bacteria per cubic centimeter. It is worth mention that in case of serious illness the bulletins issued by the physicians for public information now usually give the number of leucocytes and phagocytes per cubic centimeter of blood.

Scientific housekeepers use metric units constantly. A balanced diet is of extreme importance in reducing the cost of food; and in figuring dietaries metric units only are employed. These figures are copied from a card giving the food value of a thick slice of white bread:

Weight.....	38.6	grams
Proteid.....	3.6	grams
Fat.....	.46	gram
Carbohydrates.....	20.39	grams
Total calories.....	100	
Cost.....	.486	cent

All tables of foods, it may be added, whether for man or beast, express fuel values in the metric unit called the calorie.

On July 1, 1913, American jewelers began using the international karat, defined as 200 milligrams, for weighing jewels. Druggists have been us-

(U.S. Bureau of Standards)

THE METRIC SYSTEM

The fundamental unit of the metric system is the METER (the unit of length). From this the units of mass (GRAM) and capacity (LITER) are derived. All other units are the decimal subdivisions or multiples of these. These three units are simply related, so that for all practical purposes the volume of one kilogram of water (one liter) is equal to one cubic decimeter.

PREFIXES	MEANING	UNITS
MILLI-	= one thousandth 1000	.001
CENTI-	= one hundredth 100	.01
DECI-	= one tenth 10	.1
UNIT	= one	1
DEKA-	= ten 10	10.
HECTO-	= one hundred 100	100.
KILO-	= one thousand 1000	1000

The metric terms are formed by combining the words "METER," "GRAM," and "LITER" with the six numerical prefixes.

LENGTH		
10 milli-meters	mm = 1 centi-meter	cm
10 centi-meters	= 1 deci-meter	dm
10 deci-meters	= 1 METER (about 40 inches)	m
10 meters	= 1 deka-meter	dkm
10 deka-meters	= 1 hecto-meter	hm
10 hecto-meters	= 1 kilo-meter (about 1/2 mile)	km

MASS		
10 milli-grams	mg = 1 centi-gram	cg
10 centi-grams	= 1 deci-gram	dg
10 deci-grams	= 1 GRAM (about 15 grains)	g
10 grams	= 1 deka-gram	dkg
10 deka-grams	= 1 hecto-gram	hg
10 hecto-grams	= 1 kilo-gram (about 2 pounds)	kg

CAPACITY		
10 milli-liters	ml = 1 centi-liter	cl
10 centi-liters	= 1 deci-liter	dl
10 deci-liters	= 1 LITER (about 1 quart)	l
10 liters	= 1 deka-liter	dkl
10 deka-liters	= 1 hecto-liter (about a barrel)	hl
10 hecto-liters	= 1 kilo-liter	kl

The square and cubic units are the squares and cubes of the linear units. The ordinary unit of land area is the HECTARE (about 2 1/2 acres).

ing the metric system for some years. In some parts of the country doctors are slow to give up scruples and drams; but in eastern sections, and in the army and navy, metric weights are generally employed. Druggists throughout the country have the metric equipment.

Opticians and oculists generally now use the metric system in measuring glasses. Lens diameters and thick-

U.S. Bureau of Standards
TABLE OF
METRIC EQUIVALENTS

METER = 39.37 INCHES

LEGAL EQUIVALENT ADOPTED BY ACT OF CONGRESS, JULY 28, 1896

LENGTH	
Centimeter	= 0.3937 inch
Meter	= 3.28 feet
Meter	= 1.094 yards
Kilometer	= 0.621 statute mile
Kilometer	= 0.5596 nautical mile
Inch	= 2.540 centimeters
Foot	= 0.305 meter
Yard	= 0.914 meter
Statute mile	= 1.61 kilometers
Nautical mile	= 1.853 kilometers

AREA	
Sq. centimeter	= 0.155 sq. inch
Sq. meter	= 10.76 sq. feet
Sq. meter	= 1.196 sq. yards
Hectare	= 2.47 acres
Sq. kilometer	= 0.386 sq. mile
Sq. inch	= 6.45 sq. centimeters
Sq. foot	= 0.0929 sq. meter
Sq. yard	= 0.836 sq. meter
Acre	= 0.406 hectare
Sq. mile	= 2.59 sq. kilometers

VOLUME	
Cu. centimeter	= 0.0610 cu. inch
Cu. meter	= 35.3 cu. feet
Cu. meter	= 1.358 cu. yards
Cu. inch	= 16.39 cu. centimeters
Cu. foot	= 0.0283 cu. meter
Cu. yard	= 0.765 cu. meter

CAPACITY	
Milliliter	= 0.0338 U. S. liq. ounce
Milliliter	= 0.0706 U. S. apoth. dram
Liter	= 1.057 U. S. liq. quarts
Liter	= 0.2642 U. S. liq. gallon
Liter	= 0.908 U. S. dry quart
Dekaliter	= 1.135 U. S. pecks
Hectoliter	= 2.838 U. S. bushels
U. S. liq. ounce	= 29.57 milliliters
U. S. apoth. dram	= 3.70 milliliters
U. S. liq. quart	= 0.946 liter
U. S. dry quart	= 1.101 liters
U. S. liq. gallon	= 3.785 liters
U. S. peck	= 0.881 dekaliter
U. S. bushel	= 0.3524 hectoliter

WEIGHT	
Gram	= 15.43 grains
Gram	= 0.772 U. S. apoth. scruple
Gram	= 0.2672 U. S. apoth. dram
Gram	= 0.0353 avoir. ounce
Gram	= 0.03216 troy ounce
Kilogram	= 2.205 avoir. pounds
Kilogram	= 2.205 troy pounds
Metric ton	= 0.984 gross or long ton
Metric ton	= 1.102 short or net tons
Grain	= 0.0648 grams
U. S. apoth. scruple	= 1.299 grams
U. S. apoth. dram	= 3.89 grams
Avoir. ounce	= 28.35 grams
Troy ounce	= 31.10 grams
Avoir. pound	= 0.4536 kilogram
Troy pound	= 0.373 kilogram
Gross or long ton	= 1.016 metric tons
Short or net ton	= 0.907 metric ton

nesses are expressed in millimeters and the distance between pupils, in fitting spectacles is almost always written on oculists' prescriptions as "65" or "68," or whatever the case may be, the optician understanding that millimeters are meant.

The new wireless law of the United States uses terms of the metric system exclusively. The wave lengths permitted for amateur and commercial use are expressed in meters, while the daily time signals sent out from the government wireless stations are of 2,500 meters wave length and instruments must be adjusted to that scale in order to receive them.

Physical directors in colleges and gymnasiums have been taking measurements of men and women for years in metric units. Weights are expressed in kilograms, height and chest girth in centimeters, lung capacity in liters, and so on. No large gymnasium of the country now keeps these records in English units.

Printers and librarians frequently express the size of books in centimeters instead of using words like octavo and duodecimo. The following description is taken verbatim from an advertisement in a school paper:

"Elementary Arithmetic. Pages, 388+xxii. 14x19 cm."

Many a sportsman received a shock in 1912 when he learned that all distances in the Olympic Games are expressed in metric units. The 100-meter dash displaced the 100-yd. dash and the 1,500-meter run the mile run; jumps were measured in meters and centimeters; and so on through the list. Only recently a French airman made a new altitude record; and all the press reports gave the height attained in meters.

Recently the metric system has engaged the attention of exporters of machinery. Except for the English-speaking peoples, nearly every civilized or semicivilized country in the world uses metric units only. These nations naturally dislike to buy machinery whose dimensions are in English units. Formerly they had little choice, as

English and Americans controlled the markets. Now, however, Germany is an active competitor; and the employment of metric units in their machines has given the Germans a great advantage. In fact, they have compelled English and American manufacturers who wish to retain South American

may dominate the world's markets and force their units upon other countries; they may retire from the export trade; or they may adopt the metric system. The first and second of these alternatives seem equally improbable; and the installation of a second set of machinery in many factories, turning out

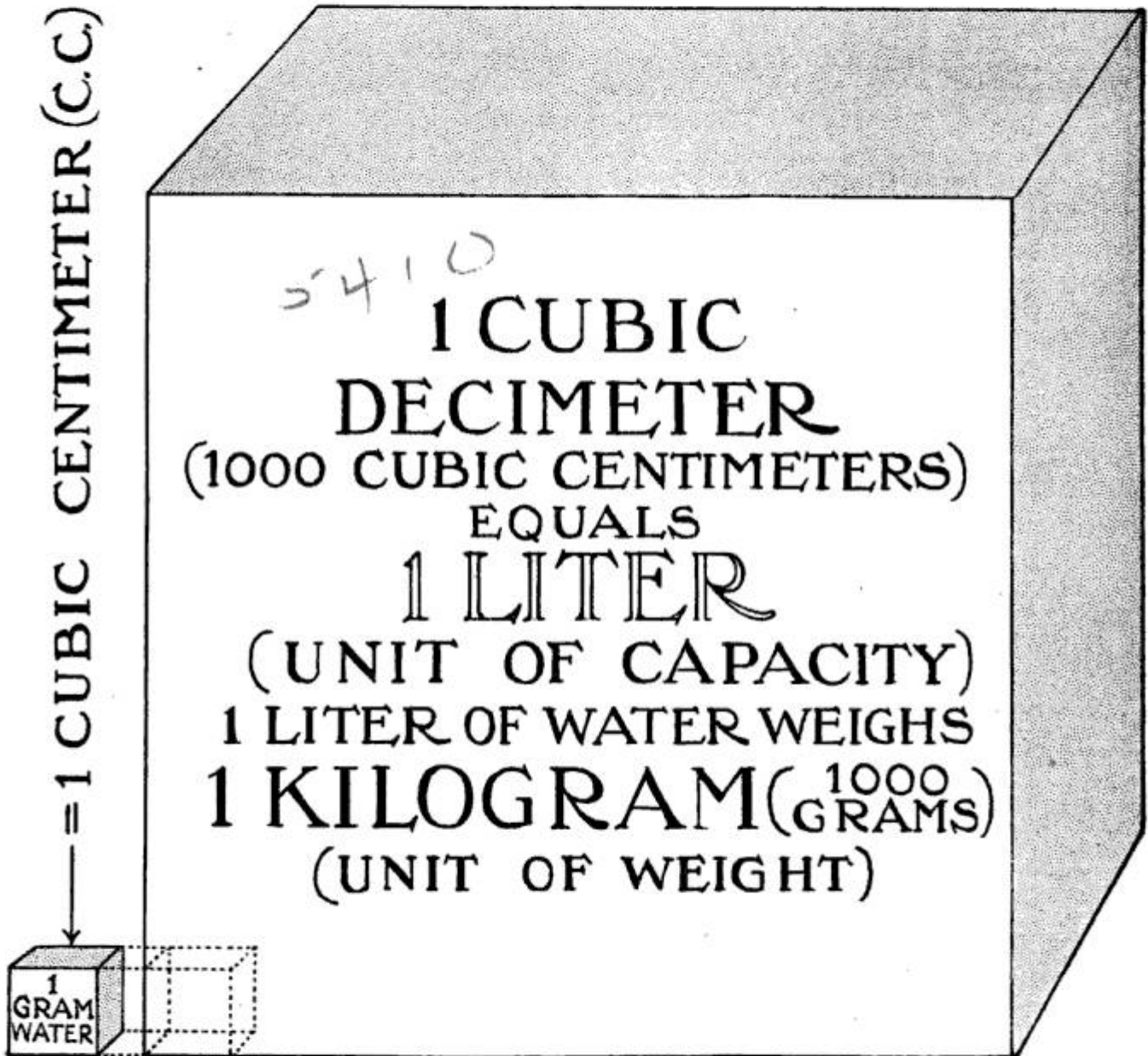


Chart from U. S. Bureau of Standards

trade to install in their factories a second set of machines based on the metric system.

It is evident that the fight for the world's trade will have far-reaching effects upon weights and measures. Standardization has gone so far that it seems impossible to have in one country two sets of machinery with different dimensions. Three possibilities are open: English and Americans

parts measured in metric units, seems to show which way the wind blows.

The metric system has become a matter of some moment to politicians and statesmen. Bills have been before Congress providing for the use of metric units in all government work. Some have proposed the universal employment of the metric system. None of these bills has become a law, but some have had enough support to

cause concern to the interests affected and to bring about a sharp alinement in committees.

The government has been driven to rely upon metric units. The legal def-

country employ metric units more or less, and that the number is constantly growing.

There are three reasons that account for the increasing use of the metric

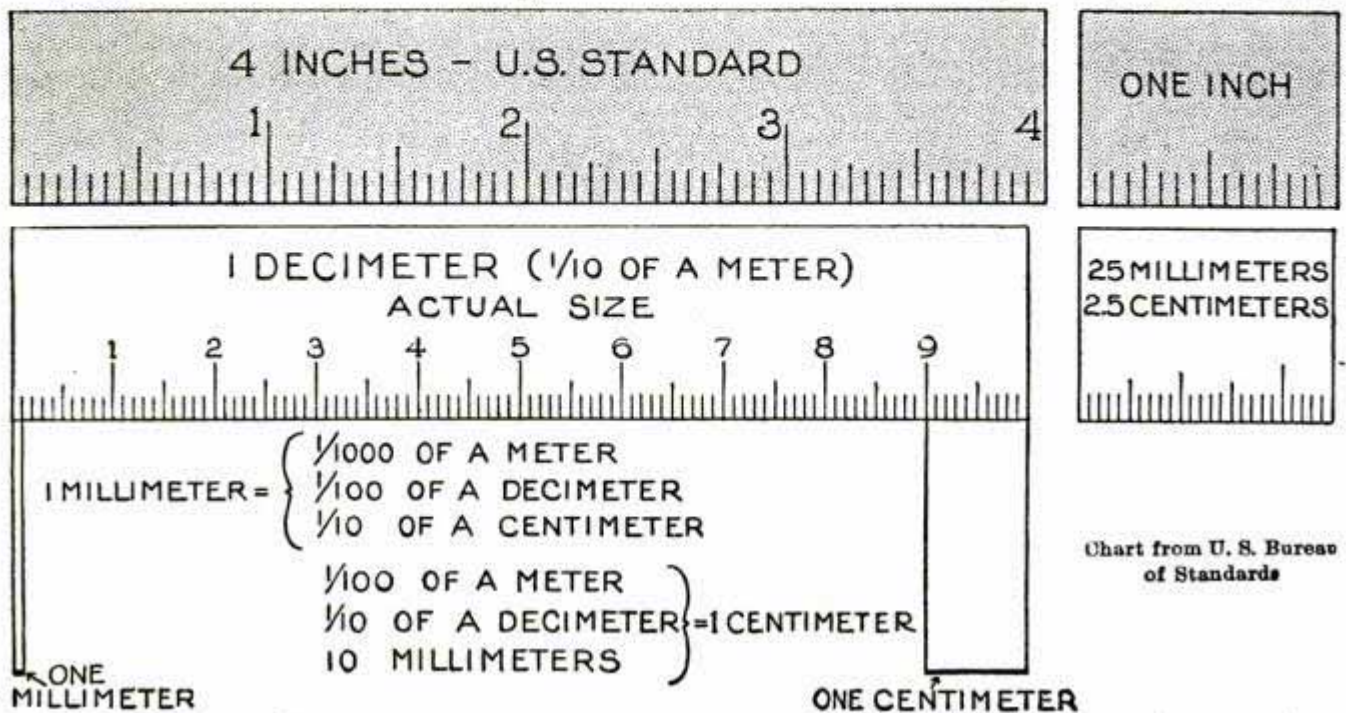


Chart from U. S. Bureau of Standards

inition of our fundamental units of length and weight, the yard and the pound, are today based upon the international meter and kilogram. Because of the lack of other worthy standards, it was provided by executive order in 1893 that the yard is $3,600/3,937$ of the international meter, and the pound $10,000/22,046$ of the international kilogram.

The metric system has been used for years in all scientific work except engineering. Textbooks of physics, chemistry, and other sciences, employ metric units almost exclusively. The focal length of lenses in compound microscopes, formerly expressed in inches, are now almost invariably given in centimeters. Graduates can now hardly be secured to measure cubic inches. Nearly all the scientific work of students and teachers, even in the high school, is done with metric units.

Metric units are employed by many other classes of people in the United States. In the field of electricity, for instance, all the units are metric. Enough has been given, however, to show that millions of people in this

system. The simplicity that makes it popular with scientists also appeals to the wayfaring man. In the English system there are 74 units having 56 names (18 of which, like "mile" and "ton," are ambiguous). The metric system has only five root words and seven prefixes. Moreover, it is based on a decimal system. Just as we wonder why the Englishman clings to his cumbersome pounds, shillings, pence, and farthings, the German wonders at our high regard for feet, yards, and rods. A French schoolboy can tell in an instant that 3,756 meters make 3.756 kilometers; but it takes pencil, paper, time, and mathematical ability for an American to change 136 rods to feet or inches.

The metric system also has the advantage that its fundamental standards have been prepared with painstaking care and accuracy, and are as nearly invariable as possible. Now that accurate standards and gauges are demanded in nearly all trades, this is an important point. The United States never had a standard pound worthy of the name; and none of the

standard yards prepared has been sufficiently accurate for modern purposes. With the metric standards, on the other hand, a body of eminent scientists worked nearly 10 years merely in preparing the metal; and a still longer time was consumed in making and graduating the standards. It is not chance that our legal definitions of the yard and pound are based upon the international meter and kilogram.

It is in new fields, however, that the metric system is advancing most rapidly in this country. The English units are displaced but slowly wherever well established. Scientific agri-

culture and housekeeping, for instance, are of recent origin; so is electrical science. Scientists investigating in these fields use the metric units, and their units are taken up by the practical workers. As science is constantly opening up new fields, this means a rapid increase in the number of people using metric units.

It seems within the bounds of probability that within the next hundred years the American people will reach that stage of advancement where they will give up their present illogical and cumbersome system in favor of the simpler metric system.

EAR-DRUM PROTECTORS FOR GUNNERS

5108 H

Deafness is so common among gunners who load and fire large modern artillery that an ear-drum protector has been invented to save their ears during the terrific concussion which accompanies the firing of a large gun. It consists of a celluloid tube with two rubber disks, small enough to be inserted in the ear. While it furnishes a perfect protection against the concussion, it does not prevent the wearer from hearing ordinary conversation without difficulty.

MOVING ADVERTISING SIGNS

5179 H IN STREET CARS

Moving signs which bring every advertisement past every passenger once



Moving Street-Car Signs Which Travel from One End of the Car to the Other, Driven by Electric Power

every few minutes have appeared as a substitute for the rows of pasteboard advertising cards which occupy the space over street-car windows. Every advertisement in the row travels slowly from one end of the car to the other and all preference in space is eliminated. The moving signs consist of long lines of advertising cards carried by moving belts in a glass case, occupying the space now taken by stationary signs. Small motors in the motorman's vestibule, connected with the belts by flexible shafts, furnish the motive power.

A USEFUL TOOL FOR THE MACHINIST

3612 W

One of the latest attachments for milling machines is a dog, designed for general index-head work and spiral work on tapers. It is claimed to insure absolutely accurate spacing and also to prevent all lost motion during the progress of the work.



ⓄThe highest hotel in the United States is to be built at Corona, Cal., 12,000 ft. above sea level.

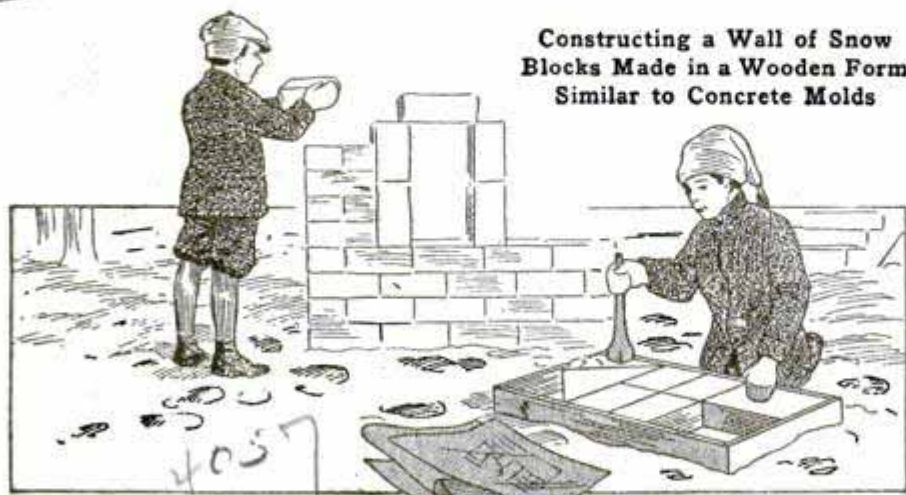
* James A. R. Elliott # Miss Sarah C. Gibson
No. 7404 Third 912 Summit Av.

See Carol. Car collection for these info.
India Rubber Wood 8-1-13
Key at on Mobily Car. sign Co. City of Pittsburg
Peary Tool Co. Bridgeport, Conn.

MAKING BUILDING BLOCKS OF SNOW

An ingenious novelty on the German market is an adjustable wooden

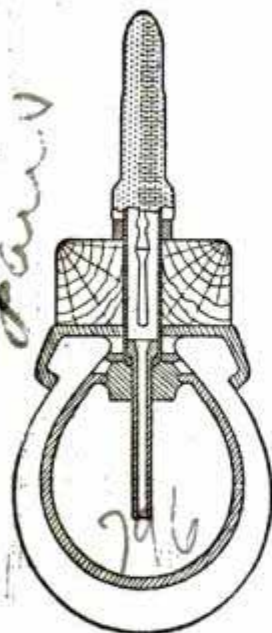
Constructing a Wall of Snow Blocks Made in a Wooden Form Similar to Concrete Molds



form, of the kind used in concrete molding, by means of which children can construct blocks of snow for various kinds of snow structures, such as Eskimo igloos, castles, forts, and the like. The manner of using the forms is simply to fill them with snow and tamp it firmly.

DEFLATED-TIRE ALARM

A new type of soft-tire alarm is here shown. The valve is fitted with a pin which projects a measured distance into the interior of the tire. When the tire becomes soft this pin is pushed upward by the rubber tread, a contact is made inside the valve, and a whistle blows.



Testing the voice of an opera singer by means of the long-distance telephone was a method recently employed by a New York theatrical booking firm before engaging a singer for one of its principal plays.

EXPANDED CORK FOR COLD-STORAGE INSULATION

Expanded cork slabs are being marketed by a London concern for use in cold-storage insulation. Natural cork is expanded by a special process to more than double its original volume, with a corresponding enlargement of the minute cells in the cork which contain the insulating cushions of still air. The result is a much greater volume of still air for a given quantity of solid matter, which increases the insulating capacity quite considerably.

NEW YORK'S COMMERCE NOW LEADS THE WORLD

New York City is now the world's greatest port, according to recent statistics on the imports and exports of 10 of the largest ports. In the fiscal year ended June 30, 1913, \$1,973,981,693 worth of shipping passed through New York, giving her a lead of almost \$200,000,000 over London. After New York and London, the other ports rank as follows: Hamburg, Liverpool, Antwerp, Marseilles, Havre, Bremen, Buenos Aires, Calcutta. New York's position as the center of the world's trade will be strengthened by the Panama Canal, which will bring her 1,600 miles nearer Yokohama than Liverpool, 2,500 miles nearer Sydney, 4,000 miles nearer Wellington, and 2,574 miles nearer Valparaiso. Five times as much commerce goes through New York today as was carried on by the entire country 50 years ago. Her harbor, bordered by five great cities joined in one metropolis, has a shore-front of 748 miles, equipped with the latest machinery for handling freight. Of this straight water front, 555 miles belong to Greater New York and 193 to New Jersey. In one instance in New York, 100 miles of straight wa-

Islington London No. 411 Cold 4/17/13 Refrigerator

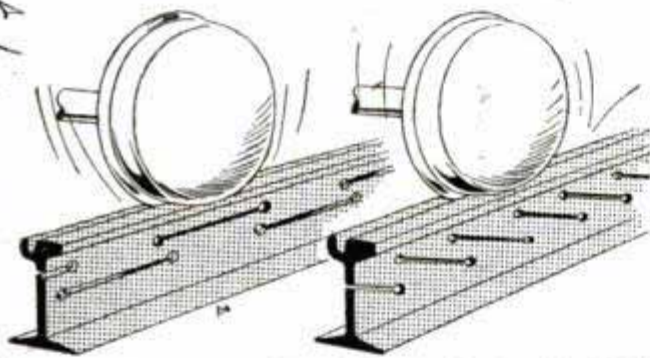
Leipzig 4057 B Johann Klepper 5242 H 112 Blair Ave 976

The Harms Review 8/13 + New York 7-28-13 + Greater New York

ter front have been developed into 224 miles of wharfage. On the New Jersey shore, 133 miles of wharfage have been built along 20 miles of straight water front.

SLOTS IN WEB INCREASE LIFE
39807M OF RAIL

Perforating the web of a street-car rail with narrow slots is a plan that is being tried successfully in Gothenburg, Sweden, for increasing the resiliency of the rail and reducing the wear when the rail is laid in a concrete or other rigid foundation. The slots may be placed either horizontally or inclined, as shown in the illustration, the effect in either case being that of bridging the head over the space occupied by



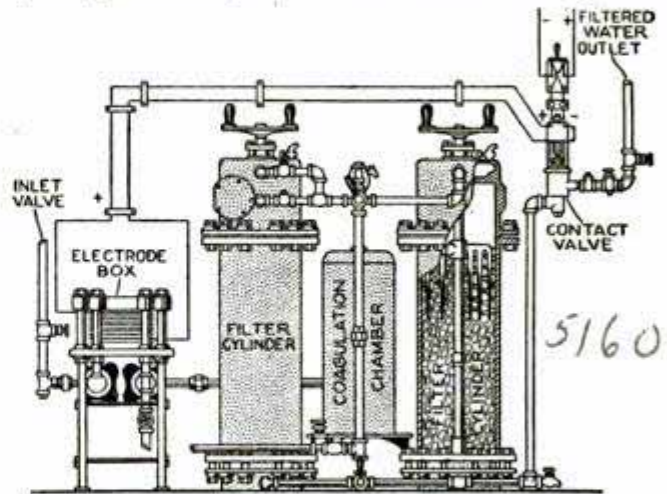
Method of Increasing Life of Rail by Perforating Web

the slot. It is claimed that irregularities in the rail head wear smooth when the rail is slotted in this way.

NEW ELECTRICAL WATER
5160H **STERILIZER**

The process of electrical purification of water has been made available commercially by a sterilizing machine of a size adapted to hotel, apartment-house, and factory use. Besides being automatic and inexpensive to operate, it is effective in removing all bacteria and other matter in the water. The machine operates on city pressure and city current and is in operation only when water is being drawn through it. In passing through the sterilizer, water first enters an electrode box and circulates among a series of pure-iron plates which transmit

current through the thin sheets of water between them. The current partly decomposes the water and gives



Automatic Sterilizer for Purifying Water by Electricity

off free oxygen, which kills the animal and vegetable matter, and iron hydroxide, which forms a film about all matter in suspension. Then the water passes through a coagulation chamber where the heavier material settles to the bottom. Two filter chambers next remove the remaining particles of solid matter. The current is controlled by a contact valve through which the water passes after it leaves the filter beds.

TOWEL HOOKS ATTACHED TO
HOT-WATER TANK 4474

The warmth of a hot-water tank in kitchen or bathroom can be utilized for drying towels or wet clothes by the use of a ring of hooks that has appeared on the market. The patented towel drier is made of a galvanized-steel band which clamps around the boiler near the top and has a number of hooks protruding from it. The bands will fit standard boilers of 30, 35, or 40-gal. capacity and are strong enough to support a heavy, wet overcoat.



Electric Water Sterilizer Co.
Scottsdale, Pa.

G. H. & E. S. Goldberg,
11. B'way, Reade & Hudson

Illustration - No. 1217 - page 336

Daily + Credit 8-19

ROPE-FILLED HORSESHOE FOR CITY STREETS

5151 m

A rope-filled horseshoe that is new in this country, but is in common use in Germany, may solve one of the



Howe Manufacturing - Lowell, Mass. Hartford, Conn.

greatest problems in shoeing city horses, that of providing a shoe that will grip slippery asphalt and paved street surfaces. The tread surface of the shoe is made with raised edges and in the groove thus formed tar-soaked rope is securely fastened so that it projects slightly below the metal edges. The rope center makes a cushion for the horse and quickly picks up sand and small stones, which become permanently imbedded in the surface and supply the friction necessary to prevent slipping.

LARGE COAL FIELDS NEAR THE SOUTH POLE

Deposits of coal, which may prove to be the most extensive unworked coal fields in the world, were discovered in the Antarctic by the Shackleton and Scott expeditions. In one sandstone and shale cliff, the Shackleton party found seven outcropping seams of coal which were 7 ft. thick, including a few clay bands, and tests of specimens have shown the coal to be of workable quality. The same field extends 650 miles northward from the head of the Beardmore Glacier, according to Scott's geologists.

Construction & Diesel motor 8-27-13

Patternmakers' foot rules are 12 1/8 in. long because the expansion of molten cast iron is 1/8 in. to the foot.

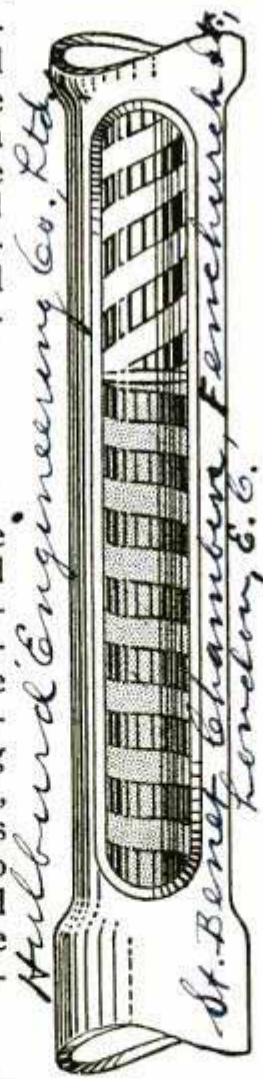
LARGEST EGGS PRODUCED IN MANCHURIA

The largest eggs in the world are produced in Manchuria, where eggs weighing as much as 4 1/4 oz. are sometimes found, and where an average of six to the pound is common, says a consular report. The highest American average is about seven to the pound. The Manchurian eggs are often poor in flavor and sometimes objectionable, but this is due to the character of the food that the hens are compelled to consume for want of better, and to the fact that they receive practically no attention from their owners.

INGENIOUS "SAFETY" WATER GAUGE

3211 B

Serious accidents have been caused by the fact that a water-gauge glass looks very much the same when empty as when completely full. Any possibility of mistaking an empty glass for a full one is done away with in this gauge by means of the spiral marking on the back of the glass. Due to refraction, this spiral marking becomes practically horizontal when seen through water.



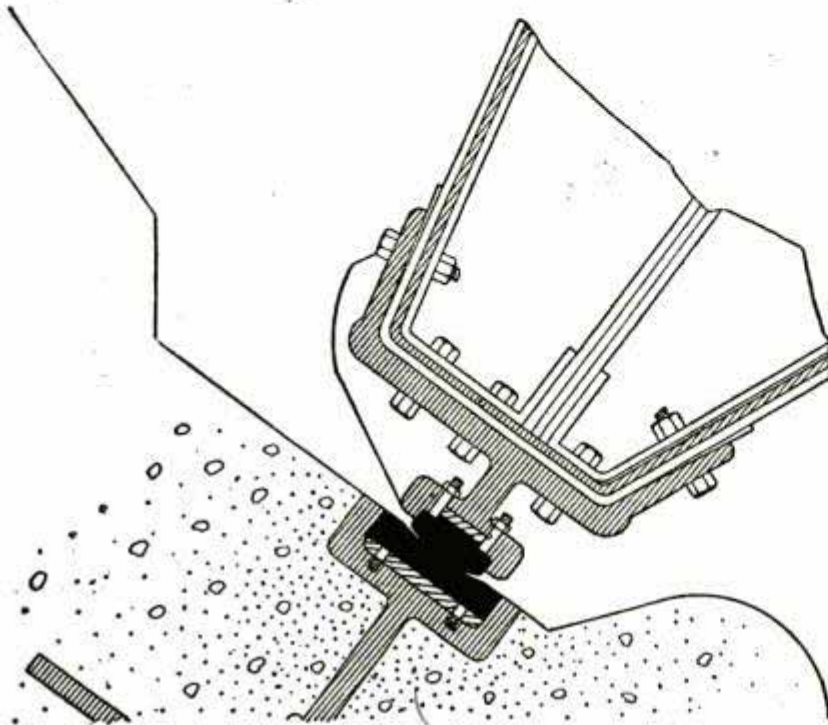
Hulburd Engineering Co., Ltd. St. Benedict Chamber, Fenchurch St. London, E.C.

The Pennsylvania Railroad is planning the installation of wireless telephone apparatus on its trains for preventing accidents and for the convenience of the train crews. This system will permit the conductor in the caboose of a freight train to converse with the engineer and will eliminate, to a great extent, the necessity of having the brakemen climb over the tops of the cars.

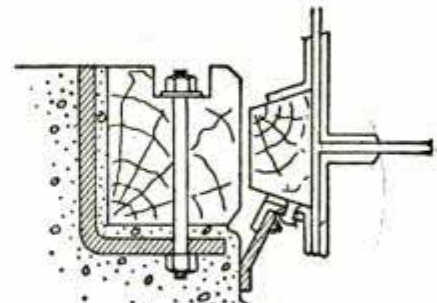
The Canal 8-6-1
HOW PANAMA CANAL LOCKS ARE MADE WATER-TIGHT

For preventing leakage around the ends of the lock gates of the Panama Canal the most careful fitting and adjustment is required. The lower guard

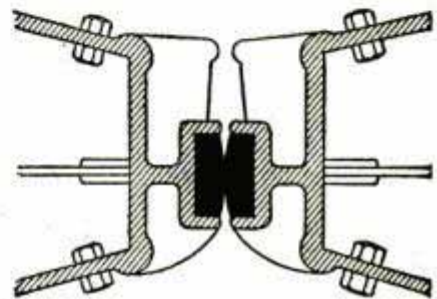
at the bottom of the leaves is prevented by means of a rubber strip 5 in. wide and 1/2 in. thick, which serves to make a water-tight joint between the wooden



Hinged Joint of Panama Canal Lock Gate



How Leakage is Prevented at Bottom of Gate



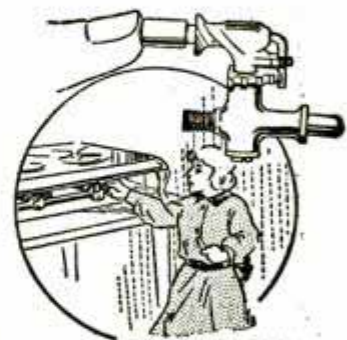
Close Fit of the Swinging Ends

locks at Gatun are completed and in service, and the way of securing water-tight joints at the hinged and swinging ends of the steel leaves is shown in the illustrations. Each of the four leaves of these gates is 65 ft. long, 47 ft. 4 in. high, and 7 ft. thick, and weighs 390 tons. The leaves swing on heavy steel upright pins anchored in the floor of the lock. To make a water-tight joint with the wall a heavy steel casting with a recess in its outer surface was set in the lock wall as it was built. A bearing plate was then set in the recess of the casting and held in place by 1-in. bolts. The end of the leaf was prepared in the same way, the steel casting being permanently attached by means of bolts. After the plates were closely adjusted, hot babbitt metal was poured into the spaces between the bearing plates and the castings, forcing them together to form a water-tight joint. The same method was followed in securing an exact fit in the swinging ends of the leaves. Leakage

beam carried by the leaf and the wooden sill imbedded in the floor of the lock.

A SAFETY STOP COCK FOR GAS RANGES

Accidental opening of the gas cocks on gas ranges is made impossible by a safety gas cock that has just appeared. It cannot be opened by a swish of the cook's skirt, by the cat, or by mischievous children; it locks in whatever position it is placed. The locking is accomplished by a notched plate below the handle and a spring catch, which slips into the various notches to hold it open, closed, or at any angle. A slight pressure on the end of the handle releases the catch.



A. W. C. Burnfield,
 331 B...

NEW MOTOR COAT WITHOUT BUTTONS



The new motor coat shown in the accompanying picture is being worn extensively by English automobilists. It has no buttons, but is drawn tightly about the body by a single strap-and-buckle fastening. The fullness of the front makes it possible to wear this coat

over another topcoat and to lap it over so as to keep out the rain very effectually.

SERIOUS FIRE IN A PILE OF STEEL CHIPS

The belief that iron will not burn was exploded recently by a fire in a pile of scrap iron which gave the Plainfield, N. J., fire department several hours' hard work. Behind a machine shop there was a large heap of steel chips from automatic turret and screw machines—a pile 8 ft. high, containing several car loads. Considering the heap fireproof, the yard gang started a rubbish fire against one side of it. Long after the rubbish had burned out, smoke and flame began to come from the pile of steel chips and in several places the bottom was found to be glowing white hot. Twice during the next 12 hours the fire department had to be called to fight the fire, and each time after it had been flooded with two powerful streams the fire in the steel chips sprang up again. It burned with a weird, hissing sound, little smoke and only thin yellowish flames, but tremendous heat. The chips had been put through a centrifugal separator and very little oil was left upon them. Hence it must have been the iron that burned. Evi-

dently the metal was so finely divided and presented so much surface to be oxidized in proportion to the radiating surface of the pile that combustion proceeded exactly as in a pile of coal, only faster. The pile sank to one-third its height, but the metal had not melted; where the fire had been hottest the chips simply turned dark blue.

OIL CUP MAKES CASTER ANT-PROOF

For eliminating one of the most common annoyances of the housewife, an ant-proof caster has been invented for use on kitchen cabinets. The upper part of the caster is in the form of a cup which entirely encircles the wooden leg of the cabinet, and which is intended to be filled with oil. The oil serves as a barrier which the ants cannot pass.



ELECTRIC FOUNTAINS FOR THE HOME

Small electric fountains, designed particularly for sun parlors, halls, corridors, and like places, in private residences, hotels and stores, are being featured by a fountain concern. The equipment consists of a self-contained motor and pump, and mechanism for producing variable-color light effects.



To determine whether oil exists in profitable quantities, the United States government is planning to drill a series of test wells in different sections of the Philippine Islands.

Richmond Dynamometer Co. Plainfield, N. J.
Erwin
Richmond Dynamometer Co. Plainfield, N. J.
Erwin

Edwards & Berg Co.

Erwin
Richmond Dynamometer Co. Plainfield, N. J.

COOLER FOR HOT JOURNALS ON RAILWAY CARS

Several railroads have recently adopted a new safety device for cooling hot journals on railway cars without crystallizing the metal. Ordinarily when a car develops a "hot box," the train crew puts out the fire and cools the journal by throwing cold water on it. This usually crystallizes the metal and sooner or later the journal "burns off" and perhaps causes a wreck. But the real cause of the hot box is a rough place in the journal or the brass above it and the best way to treat it is to cool it slowly until the journal runs down to a proper bearing. The new device accomplishes this by dripping water on the hot journal while the train is running. It is hung on the car in such a way that the heat of the journal and the motion of the train keeps it from freezing.

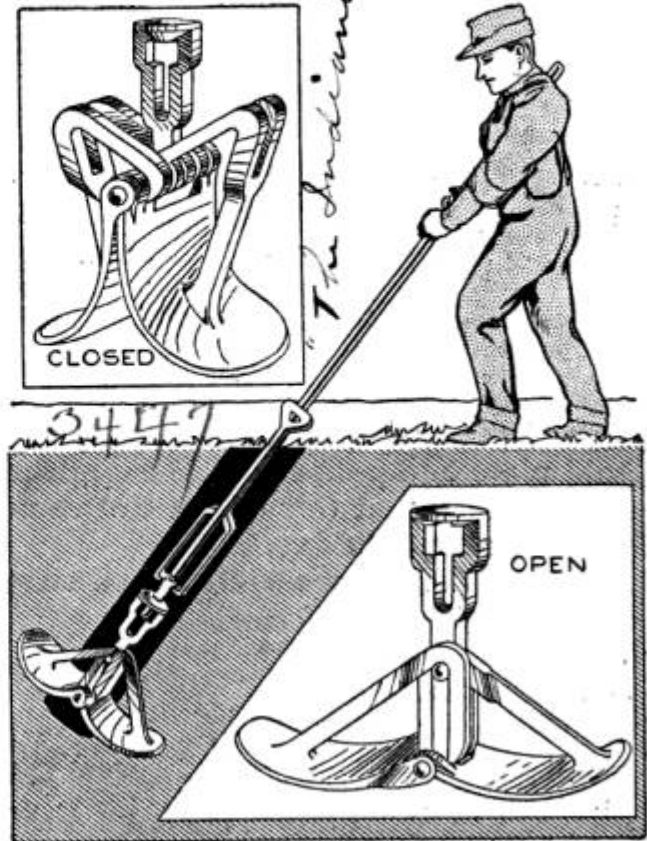
GREENHOUSE HEATED BY A HOT SPRING

In Yellowstone Park the caretaker of a hotel has taken advantage of nature's waste heat by building a greenhouse over a boiling-hot spring. Even while the temperature outside is far below zero his vegetable garden in the natural hothouse flourishes, and at certain times of the year the heat inside becomes dangerously intense. The greenhouse is built of old windows discarded when a hotel was remodeled and its soil was brought from the hills some distance away, because there was nothing but mineral matter and lava about the spring.

EXPANDING ANCHOR FOR TELEPHONE POLES

An expanding anchor for holding telephone and other poles in an upright position is so constructed that the two jaws of the device are expanded in solid earth at the bottom of the hole and securely locked in place by the upward movement of the an-

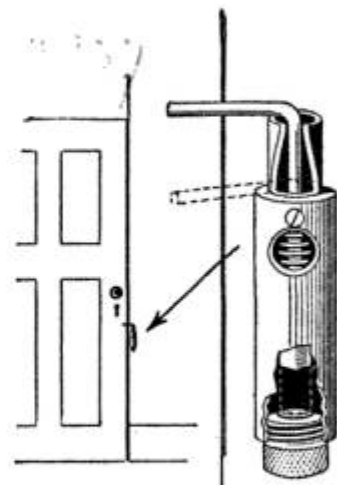
chor bar when the strain is applied. The anchor is made of malleable iron



An Anchor for Holding Telephone Poles and the only tools required to set it in position are an auger and a common tamping bar.

EXPLODING CAP GIVES BURGLAR ALARM

A novel burglar alarm is shown in the accompanying illustration. In the screw cap at the bottom of the device a percussion cap or small blank cartridge is placed. The device is permanently attached to the door jamb, and the arm set to engage the door, as shown. As the door is opened the arm swings outward till it falls in the slotted opening, the bottom of the pin, of which it is a part, exploding the cartridge.



The Detonating Burglar Alarm Co.
82 North Ford St.

Railway Conductor

The Florida Review
9-4-18

Chicago Manufacturing Co.
1856 North Dearborn
Chicago, Ill.

Copying from
E. L. ...

is turned on. When, when the lantern is set down the light is turned off if the bail is dropped to one side, but is left on if it is dropped to the other side. Current is supplied by a three-cell battery.

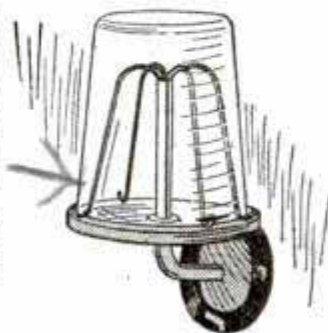


In This Electric Lantern Light is Turned Off or On According to Position of Bail

A recently invented nozzle for use in emptying barrels containing liquid is shaped like the mouth of a pitcher and is designed to be inserted in a bung hole in the side of the barrel. A hook, which forms part of the device, bears against the upper edge of the bung hole and is secured in place by means of a screw that is forced into the wood.

In a new type of sanitary tumbler holder, recently brought out, the glass is held face downward by four spring wires which easily adjust themselves to the ordinary variations in the size of glasses, and project upward into the glass in such a way as to give it firm support. This device is brass throughout with nickel-plated finish.

To prevent children and delirious patients from throwing off the ice bag which is a necessity in the treatment of fevers a new ice-bag holder, shaped much like a cap, is being brought into use. The ice bag is inserted through an opening in the top of the holder and this is



A New Type of Sanitary Glass Holder

then fastened to the head by means of straps.



A Convenient Nozzle for Emptying Barrels Containing Liquid

Dressing the hair without the aid of an assistant is made easy by means of a French novelty recently brought out. This device consists of a small mirror having a handle for insertion between the teeth. It is designed to be used in conjunction with a large mirror for giving a view of the back hair.

The holder is simply placed between the teeth, as shown, and the mirror is turned to such a position that it catches the reflection from the large mirror. The device is used in exactly the same way as the ordinary hand mirror, but leaves the hands free.



Convenient Accessory for Use in Dressing the Hair

A swinging seat supported on the leg of the kitchen sink is a new device designed to make easier the work of the housewife, who often finds it tiresome to stand at the sink while "doing" the dishes.

The seat is carried on a strong swinging bracket consisting of two metal tubes, one placed above the other. Each of these tubes is attached to the leg of the sink by means of journal-like bearings, the whole device being very strong.



Swinging Seat That Makes the Housewife's Work Easier



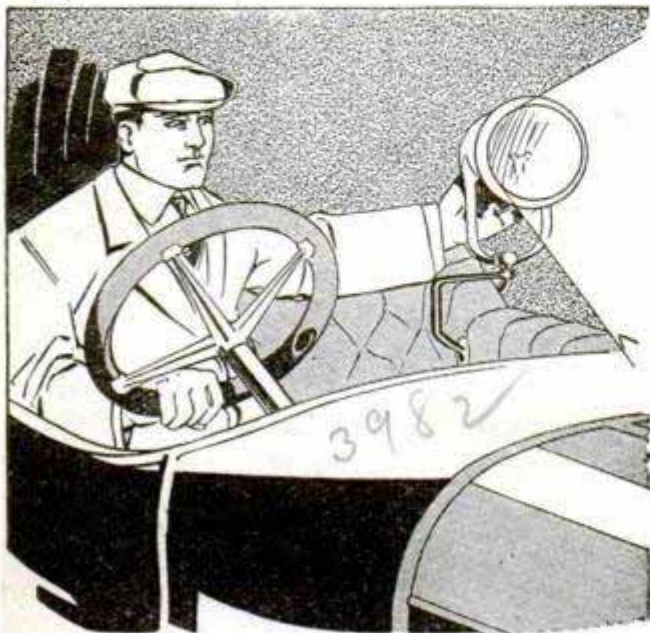
Cap for Securing Ice Bag to Head of Fever Patient

Vertical text on the left margin:
 424 St. Clair, Chicago
 559 W. Quincy
 Benjamin - Sellar mfg Co
 1111 N. Dearborn St. Chicago
 1111 N. Dearborn St. Chicago
 1111 N. Dearborn St. Chicago

Vertical text on the right margin:
 Sachetache Gummie
 Industrie, Johannes Steinberg
 M. 43 Boulevard Strasbourg
 Paris
 Cahill Iron Works
 1111 N. Dearborn St. Chicago

AUTOMOBILE HEADLIGHT IN NOVEL POSITION

A number of advantages have been secured by an automobile driver by placing the headlight on the back of



Headlight Where Driver can Direct Its Rays

the seat, as shown in the illustration. The light can be placed as high as desired without obstructing the view, and, while the direct light is thrown far ahead, the front of the car is sufficiently illuminated to enable the driver to read the speedometer and see the mechanism. The lamp is electric, current being supplied by a battery carried in the back of the car.

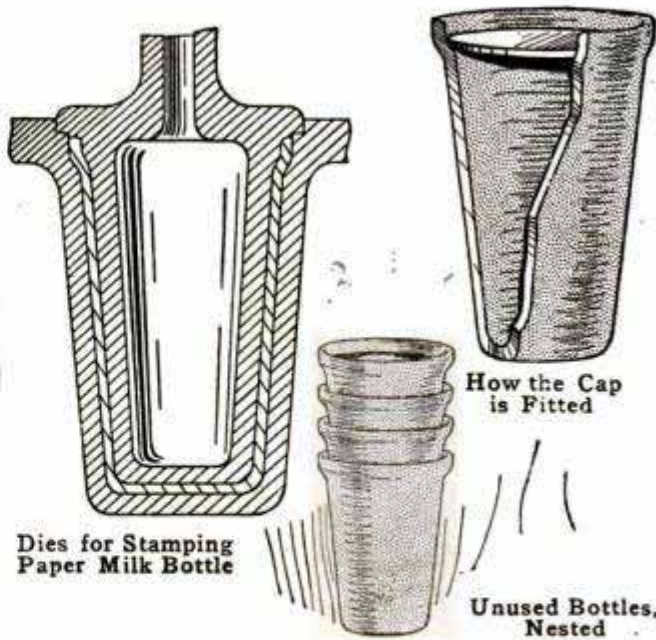
NEW COMPOSITION FLOORING FOR SHIPS

A composition flooring has at last been invented which seems to meet the requirements demanded by ship builders for waterproof deck and floor coverings. The chief difficulty with other composition floorings has been that they are too hard and cannot be kept from cracking under the strains and stresses of a floating structure. The new composition has sufficient resiliency and power of expansion to take up the vibrations of a ship and all changes in temperature, from 30 below zero in winter to 100 deg. in the summer. In addition, the flooring

forms a perfect bond with wood, steel, and concrete—so perfect that it cannot be removed except with a hammer and chisel. As it is entirely mineral in character, it is absolutely proof against cold, fire, or water. The composition is a mixture of asphalt, powdered stone, and other ingredients, which is cooked in a mass for many hours. It is applied boiling hot and solidifies quickly. While it is perfectly impervious, it is slightly soft like an asphalt pavement and yields to pressure and strains without cracking or loosening. Nails driven into it will hold quite as well as in wood.

MILK BOTTLES MADE OF PAPER

Milk bottles, made out of waxed cardboard, are being advocated as the most sanitary receptacles for the delivery of milk. Such bottles are only used once, and then should be thrown away by the housewife. The bottles come from the manufacturer nested as shown in one of the drawings, and wrapped in dust-proof paper. The milk dealer breaks the wrapping, sets out the paper bottles, fills them, and



snaps the cardboard caps in place. There is no expense due to breakage, or of collecting again, and no washing labor.

*Byerley + Sons
2484 W. 4th St.*

*Has been tried out on
passenger St. City of Grand*

*Motor 4-13
page 98*

*The Marine Review
9-13*

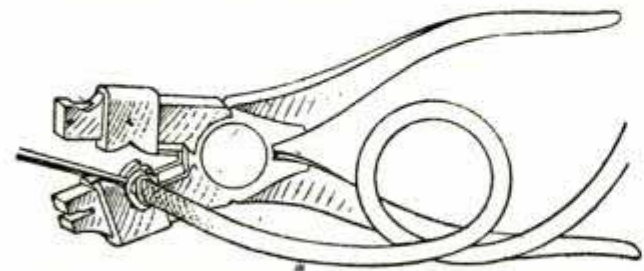
*Kramer C. Revient
Bella W.*

Chgo

3229 B

WIRE PLIERS WITH KNIVES FOR REMOVING INSULATION

These wire-skinning pliers have knives on both sides of the tongues, for cutting the insulation, a knife for splitting the insulation lengthwise of the wire, still another knife for scraping the wire, and a slot for bending loops in



Particularly Complete Insulation-Removing Pliers

the ends of the wire. The jaws are crosshatched to give a good grip in pulling off the insulation.

NEW WOOD-PAVING BLOCKS ARE CUT WITH LUGS

Three advantages are claimed for a new form of wood blocks for paving purposes having lugs running with the grain. The projections provide for expansion, it is said, the open joints give better footing for horses, espe-



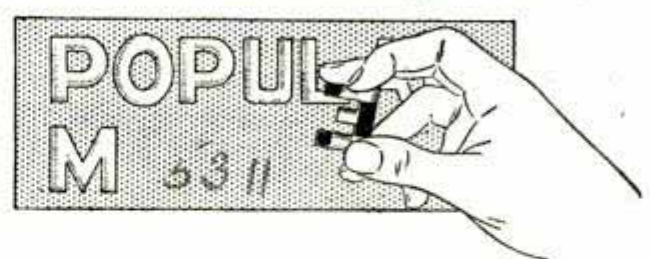
A Pavement of Lugged Blocks

cially on grades, and workmen are guided by the points in laying the pavement with the blocks properly spaced.

MAGNETIC SIGNS AND STORE CARDS

Magnetic letters are one of the latest devices for making show-window and counter signs quickly and easily. The letters are simply arranged in the proper order on a metal background—they stick wherever they are placed.

Each letter is made of metal and has one or two small flat magnets soldered

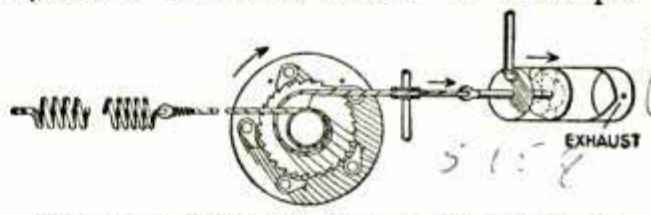


Magnetic Letters Used in Forming Changeable Signs and Show Cards

in the concave spaces on the back. The background of the sign is a thin sheet of iron, painted black, and the letters cling to it in whatever position it is held.

MECHANICAL CRANKER FOR GASOLINE ENGINES

Among the latest self-starters for gasoline engines, is a mechanical cranker which imitates the accelerated speed of the hand crank. It is simple



Mechanical Cranker for Gasoline Engines Which Imitates Hand Cranking

in design and can be operated from an automobile seat. The cranker itself consists of a disk mounted so as to revolve with the engine shaft and carrying a number of pawls which engage the teeth of a small wheel which turns loosely on the same shaft. A cable, attached to the piston rod of a cylinder for compressed air or gas, passes around a spiral drum on the toothed wheel, and is fastened to a spiral spring at the other end. When compressed air is turned into the cylinder, the piston unwinds the cable from the drum, the toothed wheel catches a pawl on the disk, and the engine shaft is revolved; the spring then returns the cable to its former position. The spiral shape of the drum gives the accelerated speed of hand cranking. When the engine is running, centrifugal force swings the pawls away from the toothed wheel.

Engineering news page 567

Auto Access

Official Journal of Patents

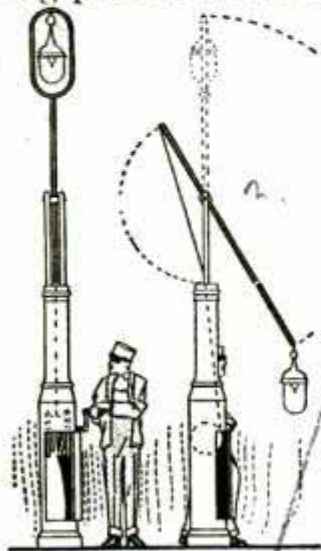
Pat 1,067,257

Arthur Douglas Henry on Emerson below Thayer

Interchangeable Magnetic Sign Co., Inc. 215 322 W 187th St

LAMP-POST THAT REQUIRES NO LADDER

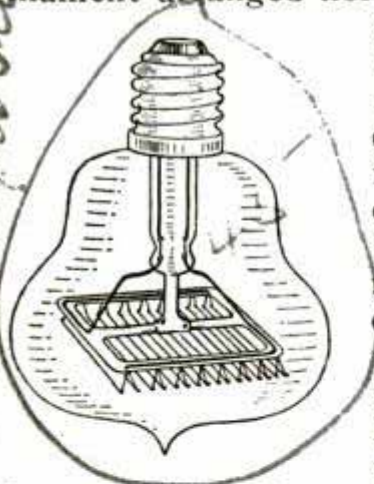
A jointed lamp-post, the lamp-carrying part of which is hinged to the base, thus eliminating the use of a ladder for cleaning or other purposes, has been introduced in Germany. The upper section of the post is held upright by means of a wire rope wound over a drum or reel contained in the base, and is operated by a crank which cannot be turned until a small door on the side of the post is opened.



Courtesy Die Export Woche

HORIZONTAL METAL-FILAMENT ELECTRIC LAMP

An electric lamp having the metal filament arranged horizontally instead of perpendicularly has recently appeared on the European market. It is claimed that the horizontal mounting produces 50 per cent more illumination directly below the lamp than is provided by a vertical filament consuming the same amount of current.



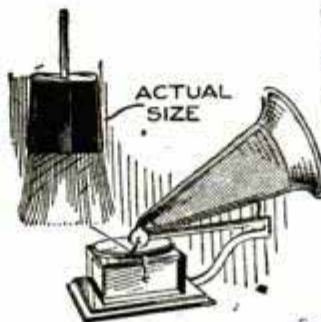
TREES FOUND NOT TO CONTAIN NATURAL GAS

When woodsmen cut hardwood trees in the Ozarks, a peculiar phenomenon sometimes was observed. Cavities near the base were often found to contain gas. When these cavities are cut into by the oak-tie cutters of

the region the gas escapes with a whistling sound, showing it to be under pressure, and if lighted it burns with a yellow flame. People in the Ozarks contended the gas was piped by the roots from subterranean chambers of natural gas. Recent investigation by university professors tends to show that the gas is caused by decomposition of the heartwood.

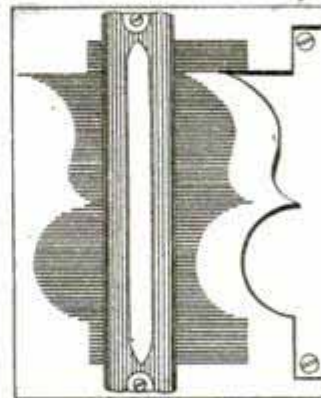
MINIATURE SWEEPER FOR PHONOGRAPH RECORDS

A miniature broom designed for keeping phonograph records clean has been invented and placed on the market. This broom has a shank similar to that of a phonograph needle and is intended to be fastened in the needle holder on the sound box. With the machine in motion it cleans out of the grooves all the fine dust formed by the scraping of the needle on the record.



GAUGE FOR IRREGULAR SURFACES

This gauge for carpenters, builders, cabinet and patternmakers, is designed for use in taking reproductions of a molding, cornice, trim, or other irregular curve or surface. In using the gauge, it is placed perpendicularly against the irregular surface, and the rods are pressed with the fingers until an exact profile of the object is obtained. The gauge is then placed on paper and the outline taken with a pencil.



Warren Supply Co.
85 Warren St.

Fontana made - and Träger & Seillecht Berlin, Luckwitz, Germany
Firenze - Via Colletta 7
Concession for Italy
the American

Silburg, Holland

4783
Warren Supply Co.

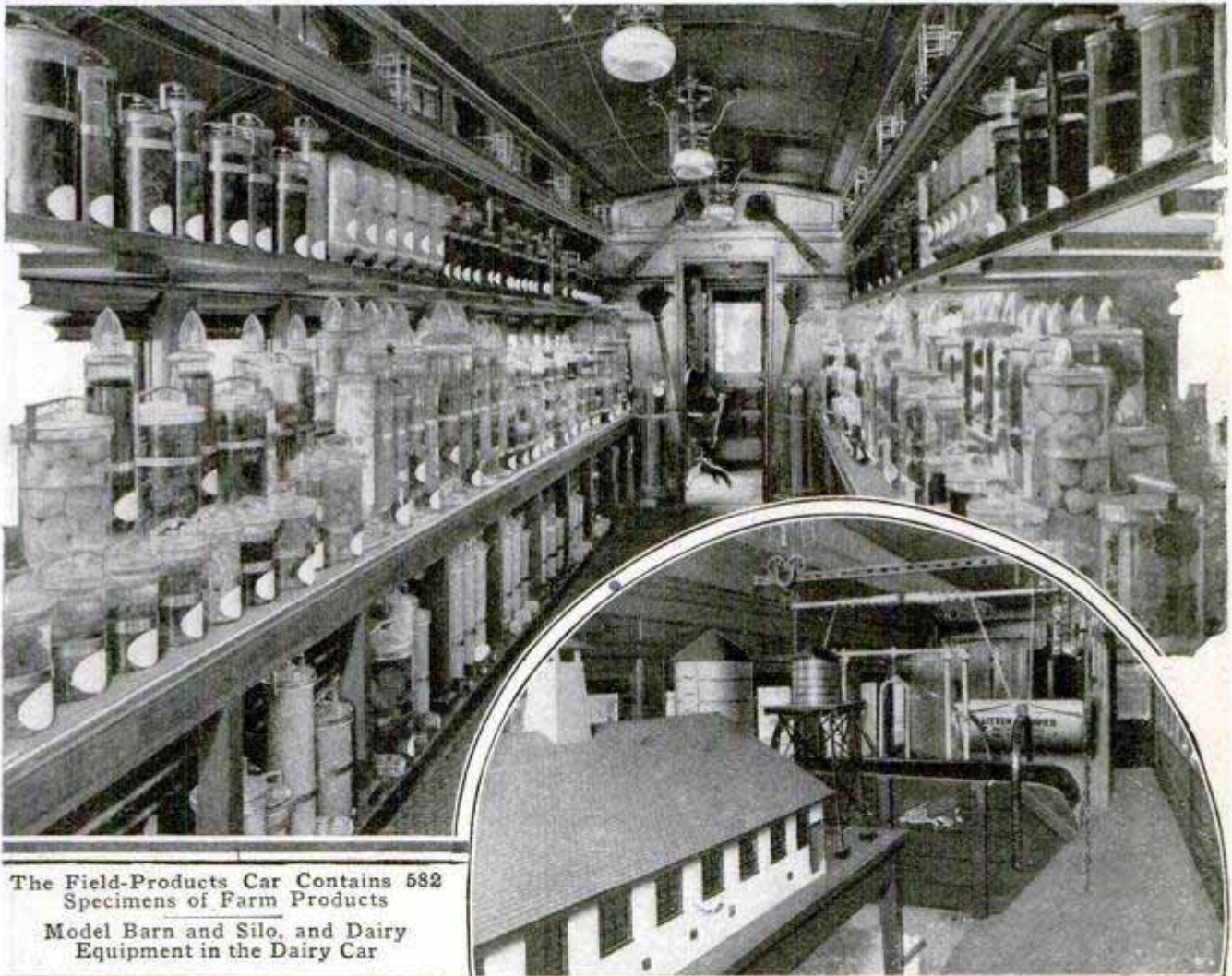
A FARMERS' INSTRUCTION TRAIN

To teach the farmers along its line how to increase the yield of their farms and raise the standard of their products, the Pennsylvania Railroad is sending an agricultural-instruction train over all its eastern divisions. The

specimens of fruits, vegetables, grains, hay, cotton, and tobacco, designed to show the farmers the competition they must meet. The dairy car contains a working model of a silo, a modern dairy barn in miniature, a sanitary con-



Agricultural-Exhibit
Train Sent Out by
the Pennsylvania
Railroad to
Instruct Farmers
Along Its Lines



The Field-Products Car Contains 582
Specimens of Farm Products
Model Barn and Silo, and Dairy
Equipment in the Dairy Car

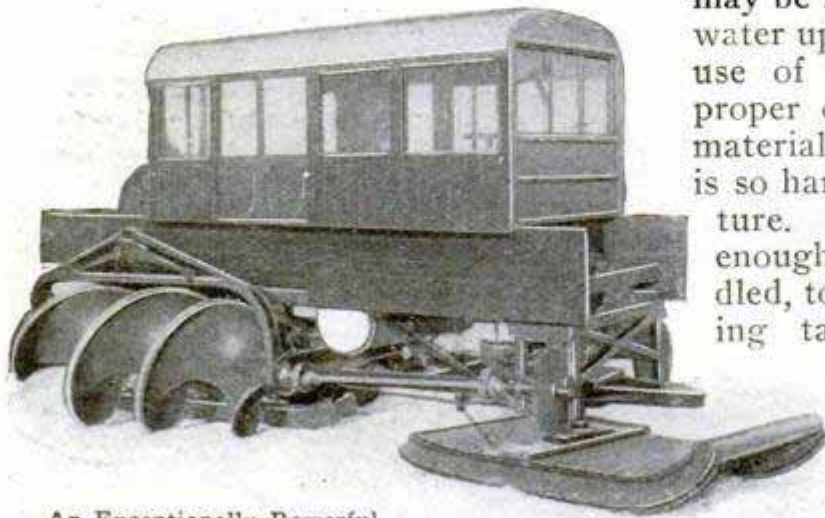
action is a part of its work of agricultural experiment, started in 1905, to develop farming in the East and thereby increase its business. The train consists of two cars—a field-products car and a dairy-exhibit car. In the first there is an agricultural exhibit of 582

crete stall, equipped with stanchion, feed car and litter carrier, and a dairy house with complete apparatus for weighing, testing, and cooling milk. The cars spend two days or more in each of the principal towns and are open all day to inspection.

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manuscript
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page*

POWERFUL MOTOR SLEIGH BUILT IN THE YUKON

This big motor sleigh was built by an inventor at Lake Bennett, Yukon, Canada, for a New York concern which

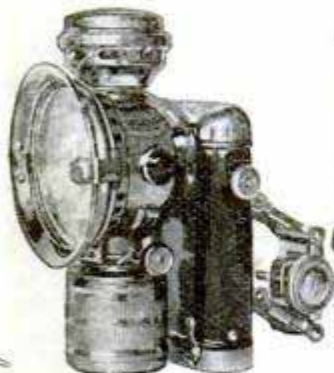


An Exceptionally Powerful Motor Sleigh Built in Yukon

intends to introduce it into Siberia. An 80-hp. engine, located in the cab, is connected by a succession of gears to the two huge spiral screws, which, revolving in opposite directions, bite into the running surface and force the machine ahead. The machine has made a speed of 40 miles an hour, hauling three loaded sleds.

AUXILIARY ELECTRIC LIGHT FOR BICYCLE

A headlight for bicycles and motorcycles just placed on the market consists of an ordinary oil lamp, which is



to be used regularly and a dry-cell battery, with a small light bulb set in the focus of the reflector, can be used as an auxiliary light if oil gives out or extra illumination is desired. While a continuous light from the dry cell could not be obtained for a long period without exhausting the battery, the use of the light for short intervals would be practical.

IMPERVIOUS CONCRETE FROM DENSE MIXTURE

According to tests recently made by the United States Bureau of Standards, Portland-cement mortar and concrete may be made practically impervious to water up to a head of 40 ft. without the use of waterproofing compounds, if proper care is taken in selecting the materials and if the concrete or mortar is so handled as to obtain a dense mixture. The mixture should be wet enough for the particles, when puddled, to flow into position without being tamped, and should be well spaded against the forms to prevent the formation of pockets on the surface. It was found that the addition of waterproofing compounds did not compensate for poor materials or poor workmanship.

GERMANS MAKE SUBSTITUTE FOR HORN *

There has recently been introduced in Germany a product made from hides which combines the properties of leather and celluloid. The hair is first removed from the hide, and then in order to remove fleshy matter and fats, and also to harden it, the hide is treated with a mixture of amyl acetate and acetone. The clean hide is next put into a solution of celluloid in amyl acetate and acetone whereby it is coated with celluloid. Next it goes to vats containing shellac dissolved in alcohol, where it receives a coating of shellac. The product is very similar to horn, having its elasticity and strength. It is used in the manufacture of trunks, boats, and insulating material, and is admirably suited to these purposes, as it is strong and light.

Clignite, which costs about \$1.75 a ton, is now being tested as a locomotive fuel by two of the leading American railroads. The present cost of coal is from \$5 to \$6 a ton.

White Horse, Yukon, Can.

1349 La Salle Ave., Chicago

W. C. Dumas, A. M. Lloyd Laboratory, 104 1/2 Peachtree St., Atlanta, Ga.

*

HOW EIGHTY TEXAS TOWNS CLEANED HOUSE

By CHARLES W. HOLMAN

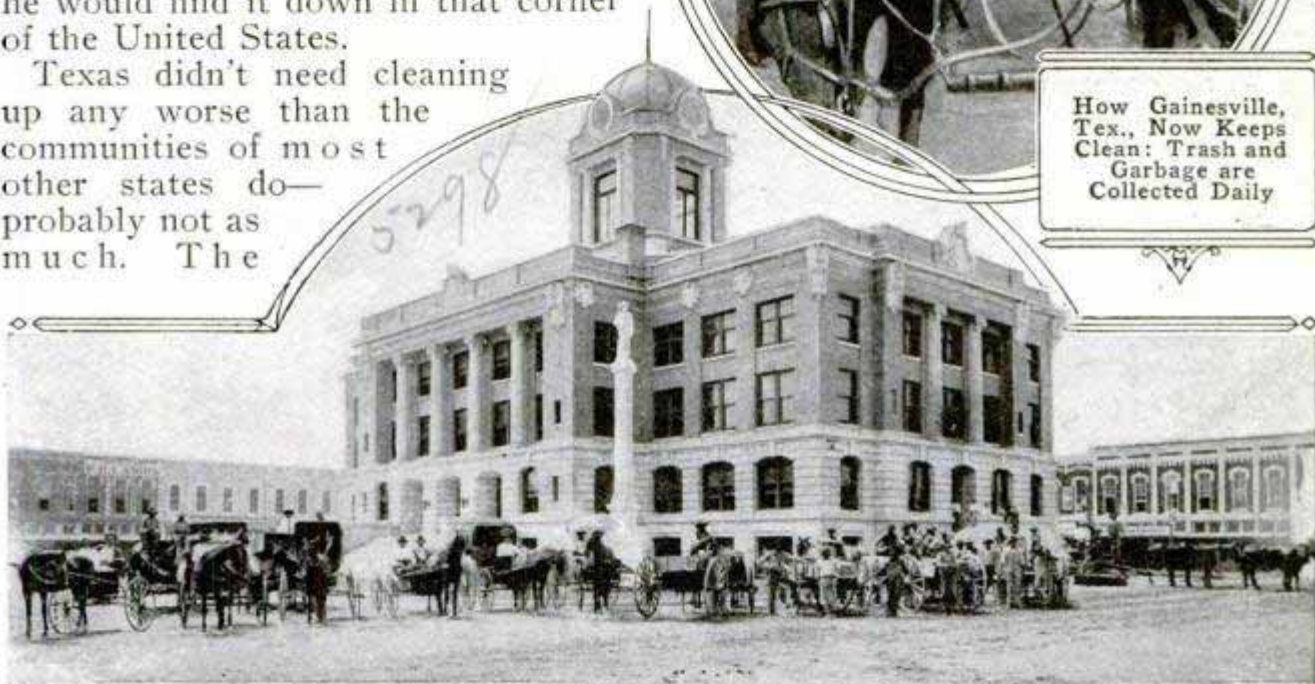
Univ. of Wisconsin, Madison, Wis.

298
TEXAS is cleaning house. All over the Lone Star State cities and towns are paying more attention than ever before to the suppression of dirt and disease and the beautification and sanitation of their communities. The honor of being known as "The Cleanest Town in Texas" was the goal for which they started. Now all Texas has got the habit of cleanliness, and if one were to set out on a search for "The Cleanest Town in America," the chances are he would find it down in that corner of the United States.

Texas didn't need cleaning up any worse than the communities of most other states do—probably not as much. The



How Gainesville, Tex., Now Keeps Clean: Trash and Garbage are Collected Daily



"Clean-Up Day" in Gainesville: Workers and Teams Starting from the Public Square



Texas Club Women were the Real Leaders in the Movement

point is that Texas towns discovered that they were dirty, while most towns elsewhere haven't found it out yet.

Up to a year or so ago Texas towns were very much like towns in other parts of the country where folks are too busy with private affairs to take much thought of public appearances. They dragged along until health conditions became bad and an epidemic would come, like an avenging angel. Then there would be spasms of cleaning up, but as soon as the immediate death danger had passed the people always

dropped back into their accustomed ruts. Municipal officers slackened their watch, and within two months the towns were just as dirty and unkempt as before the epidemic.

Such was the threatening condition in Texas, after the Southwest had just come out of a great meningitis panic. Spurred by fright, the cities cleansed themselves, and not a few of the smaller towns followed the lead, but they might have relapsed into the ways of the past if an encourager of health had not appeared.

Stephenville was one of the frightened little towns that cleaned up. While the whole population was at work, an enterprising young man photographed the activity and sent the picture to Col. Frank P. Holland of Dallas. Now, Colonel Holland, who is distinctively a Texan with a proclivity for thinking and doing big things, had been studying this very problem. His intimate knowledge of Southwestern life told him the people were ready for a change. He offered through his publications \$1,000 in cash to the town in each of three classes that would keep cleanest during the summer months of 1912.

"Three months of decent streets will make them get the habit," reasoned Colonel Holland.

Conditions of the contest were simple. Entries could be made by the mayor or health officer of a town, by any civic organization, commercial or women's club, or by petition of citizens. Towns of under 1,000 and above 10,000 inhabitants were barred. The prize money was to be expended by each winning town for the establishment or maintenance of some permanent public utility.

Towns were inspected and scored on conditions of streets, parks and alleys; collection and disposal of garbage; water supply and drainage; general appearance of homes; condition of vacant lots; ventilation and care of public buildings and public conveniences, especially schools; presence of flies, mosquitoes and other disease-carrying insects; handling and exposure of

meat, fruit, pickles, and other food products offered for sale, and such other special conditions as might affect directly the health or cleanliness of the towns.

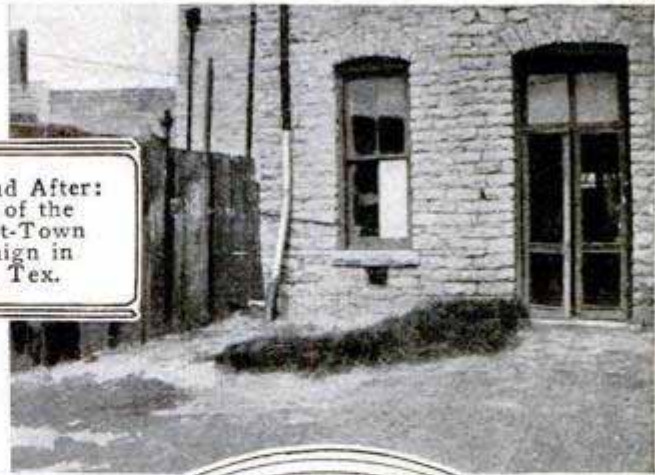
Twenty-four hours after the contest was announced, the mayor and health officer of Hico telegraphed notice of entrance. In a short time 85 other towns had complied with the requirements and their residents engaged in the first wholesale effort to clean their towns and keep them clean for a length of time.

When the entries closed, interest was at white heat. Society women and club workers canceled their summer vacations to help. Professional men sacrificed personal comfort and merchants their private profit. Stores and offices closed their doors. Money to hire street gangs was raised. School children volunteered. Everybody went to work. Through the long summer months the "first citizens" of these 86 towns were sweating with pick and shovel, or hauling trash in order to keep their communities in trim for the inspection.

Very early in the contest Colonel Holland saw that it would be necessary to employ a medical director, not only for inspection, but to give advice how to clean a town and keep it spotless, for the people, with all their good intentions, did not know how.

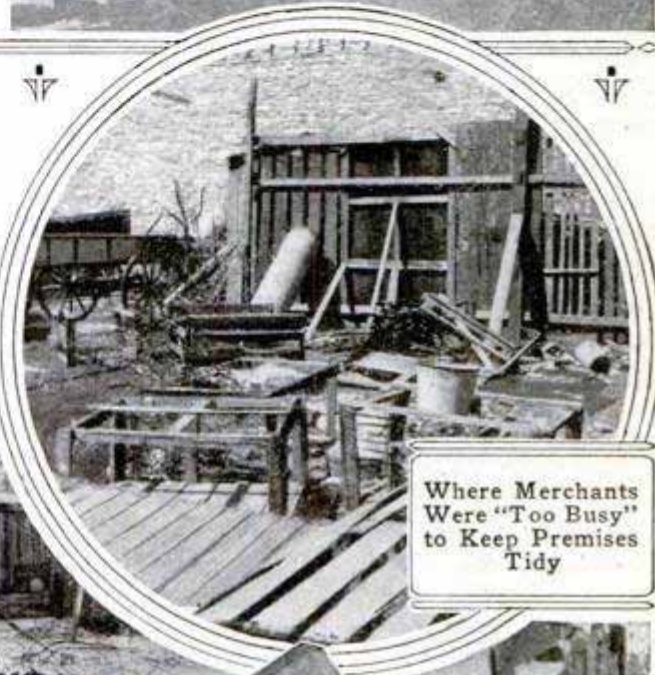
The man who measured up to the job was Dr. Manton M. Carrick, a young physician of Dallas. Doctor Carrick started on his trip of inspection armed only with power to rule towns from the contest, but with a highly developed faculty of persuasion. He left Dallas August 15, and continued his first inspection until November 16th. In this time he overhauled the 80 towns which remained in the contest and used every form of vehicle for transportation, except a wheelbarrow. He wore out four pairs of shoes.

He appeared in a town without notice and made every effort to complete his scoring before the people found out his business. But at every place they were on the lookout for him. Some

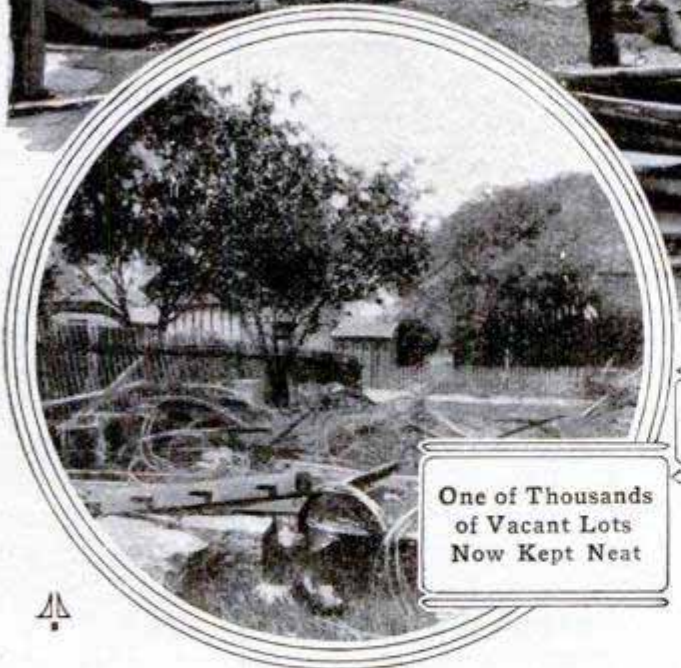


Before and After:
Result of the
Cleanest-Town
Campaign in
Hico, Tex.

towns endeavored to keep up with his movements by long-distance telephone. If the doctor seemed to be headed their way, schools suspended and the whole population worked



Where Merchants
Were "Too Busy"
to Keep Premises
Tidy



One of Thousands
of Vacant Lots
Now Kept Neat

A Texas Barnyard Before the Clean-Up,
Typical of Almost Every Small Town

overtime to be ready. At Memphis the schools closed two days prior to his arrival.

Notwithstanding that this was a voluntary crusade against dirt, Holland's inspector came to be regarded as an emissary of health with official powers to condemn and reject. The citizens' committees which accompanied him through the various towns, took notes of every criticism.

"The fronts of your bakeries are in good condition, but the back shops are unhealthy," said the inspector. Forthwith the committee made it plain to the bakers that they must fall in line if they expected to sell bread.

When he pronounced milk, meats, or foodstuffs dangerous to health, municipal action followed. When he condemned the care of the public buildings, town councils, boards of education and county commissioners met to consider improvement. The record of his inspection is preserved in 2,782 newspaper clippings in the doctor's collection.

He told school superintendents that the principal faults of the school buildings visited were those of construction or overcrowding. In those towns the people will build no more without a regard to the health of pupils and the social needs of the whole population.

Many school superintendents have already taken steps to remedy defects in lighting, heating, and ventilation. At the time of inspection most of the schools had already complied with suggestions to abolish the public drinking cup, the feather duster and the custom of children keeping lunches on the floor or in their desks. But he was forced to recommend to nearly every school the installing of proper bathing facilities.

"Have you seen our athletic field?" asked the principal of a high school, in evident pride.

"No," answered the inspector. "There is so much dirt on the windows I cannot see through."

The window was raised for the doctor to see the field, but the janitor got busy inside of five minutes.

Doctor Carrick overhauled the State Juvenile Training School at Gatesville and turned to light a deplorable condition. His investigations were reported in the Southwestern press as being a case of "dust, dirt, and death." The negro dormitory was foul. In the lavatory used by white boys, a dirty rag served as towel for 73. After he left, state officials took immediate steps to rectify sanitary crimes.

Residents, who invariably accompanied the inspector on his tours, were frequently shocked to hear him brand meats as "touched up with saltpeter;" sausage as adulterated; meat blocks "unfit for their purpose;" utensils "too dirty;" floors "terrible;" ceilings "cobwebby;" but he used other and stronger adjectives of incrimination.

One restaurant keeper did not know how to clean his refrigerator, and said so. Doctor Carrick sent for a bucket of hot water and a cake of scouring soap. He took a butcher knife and peeled green mold from the inside. He scraped and he scoured. He transformed that foul-smelling place into one of sweet cleanliness. The restaurant keeper's eyes opened wide with amazement. "You've taught me something, Doctor," he exclaimed. "Will you show me how to clean the kitchen?" And the doctor did.

The Hill County courthouse was in bad shape. Windows, floors, benches, chairs, stools, office fixtures—everything was dirty, evil-odored, and dingy. Accompanied by the secretary of Hillsboro's commercial club and a reporter from the Hillsboro Mirror, the inspector went over that building from bottom to top. He pronounced it vile. On his second inspection, he found the building one of the best-kept in the state. A force of 12 men had been hard at work for 17 days cleaning up. In another town he criticized the roof of a jail. Flying in and out of the roof were disease-carrying bats. On his second inspection a modern roof graced the jail.

In the daytime he inspected towns; at night he addressed mass meetings and advised with town councils, suavely explaining what should be done. Dozens of sanitary ordinances followed in his wake. One town completely changed its water supply. Several have reconstructed sewage-disposal plants. In others the housewives organized health leagues and boycotted certain merchants until they complied with the inspector's suggestions.

By invitation of the owner of a dairy,

near a little town in the black lands, the inspector visited the farm. Before going out he told the local health officer that the dairyman really did not desire inspection. Arriving, he discovered a primitive cow shed, ill-ventilated and dirty. Unwashed milk buckets were being used over and over again, while the milk strainer was conspicuous by its absence. The dairyman was selling skimmed milk for whole milk and using formaldehyde and boric acid instead of refrigeration. The dairy scored 25 out of a possible 100 points; and it developed that the dairy owner really

the sale and distribution of milk. At all times the club women of the state were champions of the crusade and to them

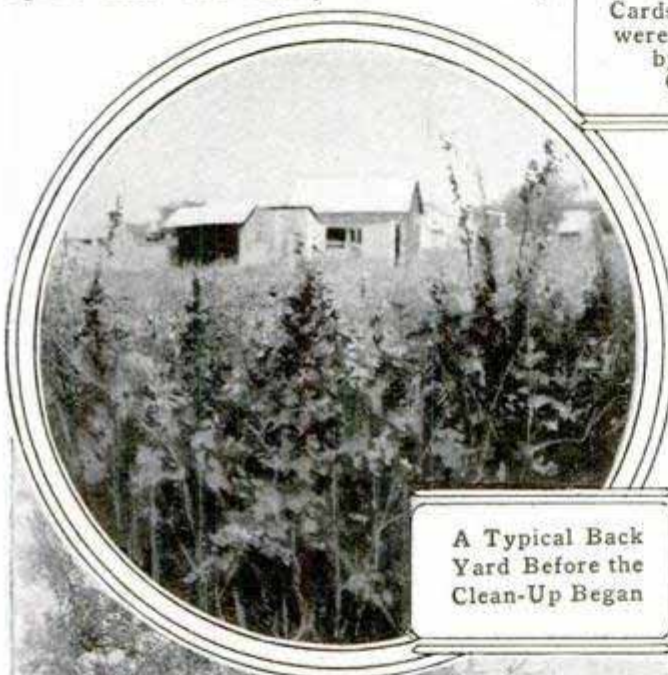
**PLEASE TAKE THE TIME
TO USE SOME LIME
IT'LL HELP KILL THE FLIES
THAT WE ALL DESPISE**

*A Work in Which we all Should Help
THE PUBLIC HEALTH DEPARTMENT*

Cards Like This
were Distributed
by Health
Officers

goes much of the credit for civic progress. In Gonzales, a little Mexican lad assured Doctor Carrick that a certain active woman was governor of the state. In Gainesville a negro bell boy was certain that another club woman was mayor of the town.

While he was inspecting a little town in east Texas, a traveling man approached the doctor and said, "I desire to thank you, sir, for coming here. Since your arrival the hotel has changed lavatory towels every hour and we have a new tablecloth for every meal!"



A Typical Back
Yard Before the
Clean-Up Began



One of Eight Piles of Rubbish Gathered in the
Cleaning Up of Ballinger, Tex.

thought he had been supplying pure, wholesome milk. That night the town passed a stringent ordinance governing

Memphis and Gonzales won the prizes as the cleanest towns in Texas in their respective classes. Gainesville

and Brownwood tied for first place among towns of between 4,000 and 10,000 inhabitants.

The fact that 80 towns, through voluntary coöperation, kept clean for seven months, has already led to civic

revivals in other towns of the Southwest. And the campaign for health and beauty has just begun.

"We are going to clean up the whole Southwest," was Colonel Holland's new-year resolution.

SAWED-OFF CHURCH WITH THREE PEWS

Steeple, entrance, pulpit, and three pews are all that is left of a sawed-off church at LeLoup, Kan. The other

the property for religious worship. The larger portion of the building was moved across the road and converted into a residence, but the front end, a section 30 ft. wide and 15 ft. long, was left in its place.

FLYING RECORD BROKEN IN FRENCH CONTEST

The winner in the international flying contest held at the Betheny aerodrome at Rheims, France, Sept. 29, 1913, flew over the course of 124.27 miles in 59 min. 49 sec., or at an average speed of over two miles a minute. This record-breaking flight was made at midday, a time usually avoided by airmen, and in a Deperdussin machine in which the wings had been cut down considerably to reduce the resistance of the air. The airman kept low throughout the flight, passing over the stands at a height of about 35 ft. After the race was over, the airman described the flight as being painful work, owing to the pressure of the wind against his face.

SEEKING A REMEDY FOR GLARING HEADLIGHTS

Getting rid of the glare and still keeping a good driving light is a knotty problem that motorists in all the large cities are having to face, and this problem is rapidly becoming acute since the use of an effective dimming device is being more and more insisted on by municipalities all over the country. At recent public tests held in Chicago a number of schemes and devices were submitted, none of which met the requirements under all conditions. One scheme, which was ruled out as impracticable, consisted in frosting the glass of the headlight with soap, paint,



The Front End of a Church Left Standing to Satisfy the Law: The Rest of It was Sawed Off and Moved Away

three-quarters of the edifice serve as a dwelling house across the road. The church was originally 30 ft. wide and 60 ft. long, and its present abbreviated condition is the result of a sheriff's sale and many law suits. The owner, who won it after much litigation, feared to invalidate the title by making a move that would incapacitate

*N. C. Walker
25 W. 57th St. Denver
Kansas City, Mo.*

5703

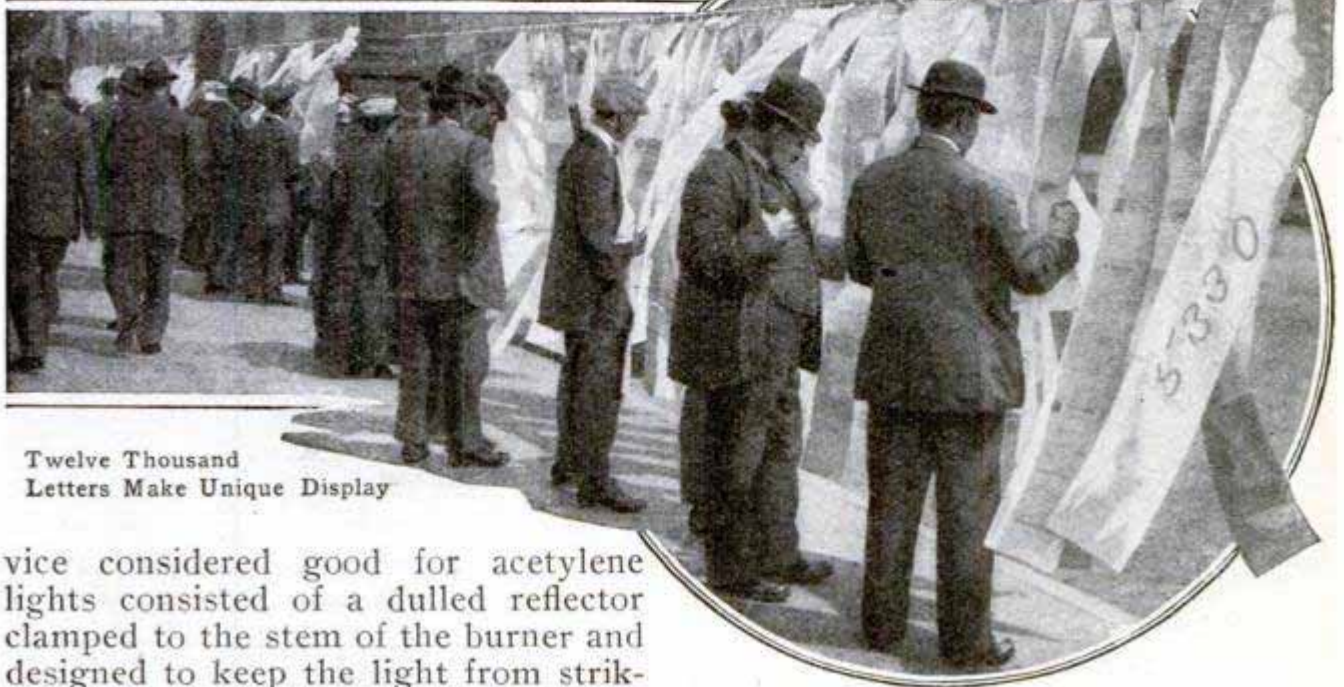
Chicago Daily Tribune 9/30/13

Auto

*5/18-19
Motor Age*

or metal polish. A cloth curtain to be drawn down over the light by a foot pedal was objected to on the ground that it spoiled the driving light. A de-

in strings of eight or ten and hung on a wire at the edge of the sidewalk, for



Twelve Thousand Letters Make Unique Display

vice considered good for acetylene lights consisted of a dulled reflector clamped to the stem of the burner and designed to keep the light from striking the polished parabolic reflector. The main difficulty was with electric lights, the only device giving any degree of satisfaction being a cup-shaped cover fitted over the lamp to shade the reflector from the light. An apparatus, still being considered, enables the driver to turn the light downward and thus confine the light to the zone where it is most needed.

a distance of an entire block, so that the citizens of Tacoma might realize the results of advertising the city.

LETTERS STRUNG ON LINE LIKE WASHING

This photograph is not a scene on washday in Tacoma, but a feature of a city development campaign undertaken by the Tacoma Commercial Club and Chamber of Commerce. The club sent to a long list of persons living outside the State of Washington a booklet advertising the city, accompanying each with a letter advising the name of the Tacoma citizen who had requested the forwarding of the booklet. The letters received in reply to this unique campaign, from eastern and southern parts, were so earnest in approval of the scheme that it was decided to give them the publicity of general reading, and they were pasted

HE HAS ONE FOOT IN THE GRAVE

When one citizen of Winchester, Ind., was robbed of his limb in an operation, he had the severed member interred in a tiny grave in the cemetery near that city, and reared a simple shaft upon which is inscribed the words, "The Foot of David Fudge." The grave is well cared for and some day the owner expects to be laid to rest beside his departed foot.

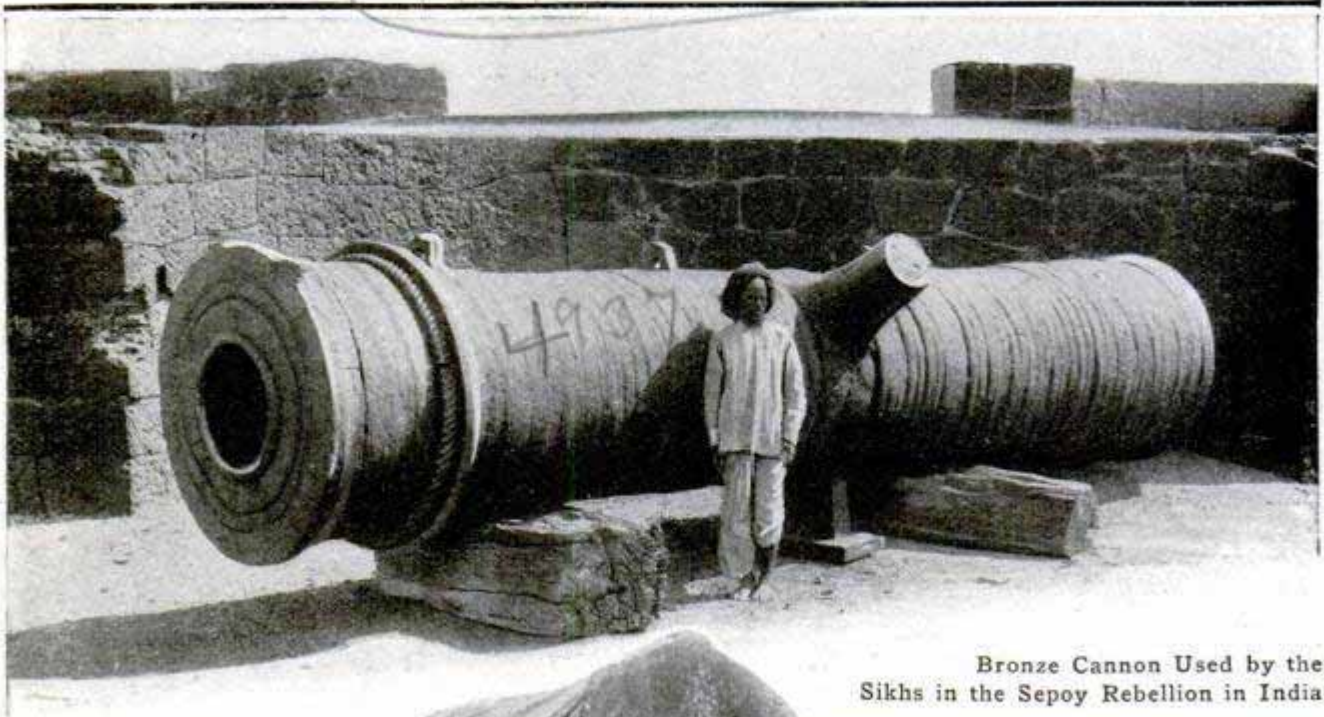


By the use of steel instead of brass in army-rifle cartridges, Germany has increased the number of rounds of ammunition that a soldier can carry from 120 to 160.

*Town Development, Aug 1913
118 E. 28th St.*

SIKH CANNON THE LARGEST EVER MADE

4937W



Bronze Cannon Used by the Sikhs in the Sepoy Rebellion in India



A Half-Grown Boy can Sit in the Muzzle in a Comfortable Position

A gun cast by the Sikhs of the Punjab, in India, 60 or 70 years ago, and used by them in their wars with the other Indian states and finally against the English, is the largest cannon ever built, and has a considerably greater caliber than any of the modern high-power guns that are now being produced. The bore of this cannon is over 3 ft., so large that a half-grown boy can sit in the muzzle in a comfortable position. In comparison with this, the 16-in. bore of the guns that are to defend the Panama Canal seems small. The Sikh gun is made of cast bronze and is lined on the inside with steel bars, while the

metal around the bore is 18 in. thick. It has a length of 25 ft., which is less than that of many of the guns found on modern battleships. This gun is elaborately decorated with figures of winged elephants in high relief, and has a number of ring bolts for attaching the ropes by which it was moved.

Although a gun of such apparent power was of some use on account of the moral effect on the enemy, it proved ultimately to be a source of weakness rather than of strength. It was too large to be fired with any great effect, and was too unwieldy to be moved about the battlefield. It was mounted on a ponderous carriage, and the combined exertions of over 500 men were required in moving it.

A special machine for nailing the tops on shipping cases is electrically driven and is mounted on rollers so that it can be pulled or pushed anywhere around a warehouse.

W. S. D. Org. and div. St. Indus

FLOATING SHOP TO SERVE BRITISH WARSHIPS

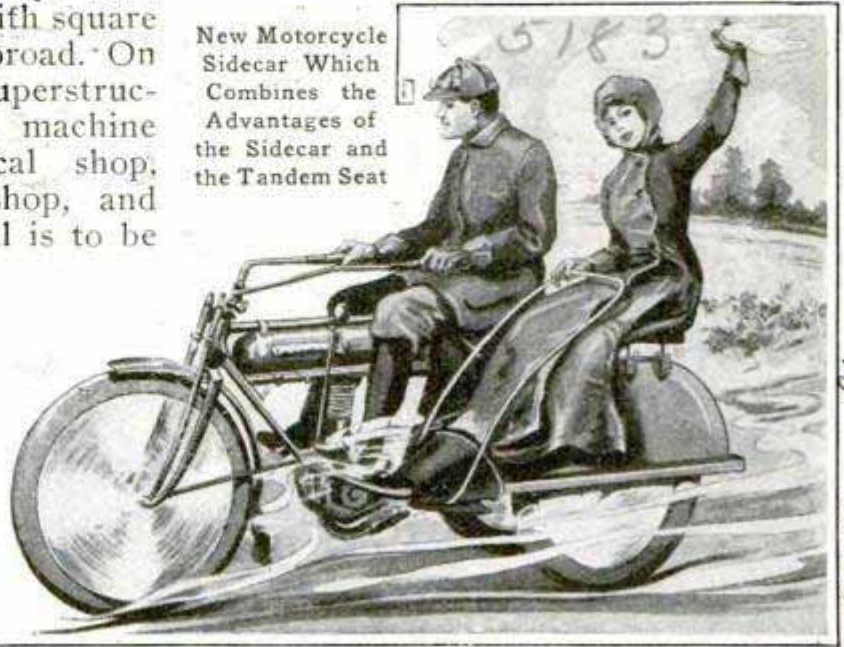
A floating shop for ship-repair work, for which bids are now being taken, is one of the latest plans for adding to the efficiency of the British navy. This vessel will consist of a hull with square ends, 450 ft. long and 90 ft. broad. On this hull will be carried a superstructure containing a foundry, machine shop, boiler shop, electrical shop, blacksmith shop, pattern shop, and other departments. The hull is to be divided into watertight compartments which will be used for coal storage and as a location for the steam-power station that is to furnish electric current for the operation of the various shops. Above the working portion of the boat, living quarters will be provided for about 136 officers and men.

Engineering news 9/18/13

NARROW-GAUGE MOTORCYCLE SIDECAR

One of the new motorcycle sidecars is built so close to the motorcycle that its passenger sits astride the third

New Motorcycle Sidecar Which Combines the Advantages of the Sidecar and the Tandem Seat



wheel, rather than in a seat slung low between the two rear wheels. It is designed to take the place of the tandem seat without being as cumbersome as the usual wide-gauge sidecar. The third wheel is mounted in a light frame which holds it close beside the rear wheel of the motorcycle, and its upper half is completely covered by a metal mudguard which protects both the driver and the passenger. A cushioned seat directly over the wheel, a long handlebar, and a comfortable footboard, make it an easier riding outfit than the tandem seat, and a speedier arrangement than the sidecar.

*Motorcycling 7/31/13
Patentee Fendall & Edwards
Chas. J. Winter*

SIGN REGULATES CROSSING TRAFFIC

A small city in Georgia has found a sufficient solution of the crossing problem in wooden signs set up at the centers of street intersections and bearing the words "Keep to the Right." This sign has reference to all vehicles, but is particularly designed to prevent confusion and possible collision among the vehicles that turn from one street into the other.

Speer Atlanta



Crossing Sign Warns Drivers to "Keep to the Right"

Smithsonian Institution

AN AIR PROPELLER DRIVES THIS BUGGY

4669

THE FIRST STAR-SPANGLED BANNER

4542

An air-propelled buggy, made of an old automobile chassis equipped with light wire wheels and aerial driving

The original "Star-Spangled Banner," which inspired Francis Scott Key to write the song by that name during

the bombardment of Fort McHenry on Sept. 13 and 14, 1814, is now on exhibition in the National Museum at Washington. This flag, much faded and torn, which flew over Fort McHenry during the British attack, is now 27 ft. 6 in. wide and 32 ft. 10 in. long—almost 8 ft. shorter than it was in 1814. Because it was made before the standardization of the American emblem, it has 15 stars and 15 stripes. It was made by the wife of Col. Henry S. Pickersgill of Baltimore,



This Air-Propelled Buggy has Made 30 Miles an Hour

gear, is shown in this picture. The 15 hp. engine, weighing 400 lb., and the 6-ft. homemade propeller drove the buggy at a speed of over 30 miles an hour on the first try-out. The method of changing an automobile into a "buzz buggy" is clearly shown in the photograph.

and after the bombardment of the fort was kept by the commandant, Maj. George Armistead. His grandson, Eben Appleton, of New York, gave it to the government in 1912.

The famous song was written by Francis Key while he and two friends were held on the ship "Minden" during the bombardment of Fort McHenry. They watched the flag through the battle smoke all during the day and into the night. When morning showed it still flying over the fort, Key wrote the poem on the back of an old envelope, to be sung to the air of "Anacreon in Heaven." It was quickly printed and is supposed to have been first sung by Ferdinand Durang in a tavern near Holliday Street Theater, Baltimore. The first newspaper to print it was The Baltimore Patriot and Evening Advertiser, on Sept. 20, 1814.

GOLD-MIRROR REFLECTORS FOR SEARCHLIGHTS

52514

Gold-backed mirrors have been suggested as an improvement on the silver-backed reflectors used in searchlights on warships, and the plan is now being tested in England. The greater percentage of red and yellow rays in the light reflected from gold is expected to eliminate halos and make a searchlight more effective in foggy weather. Gold, it is thought, will also produce a light better fitted for distinguishing shades of gray. In the matter of durability, gold would be less affected by chemical and climatic conditions.

Germany recently bought almost all available British-made radium for her hospitals and medical institutions. The price paid was about \$80,000 a gram (about 15 grains).

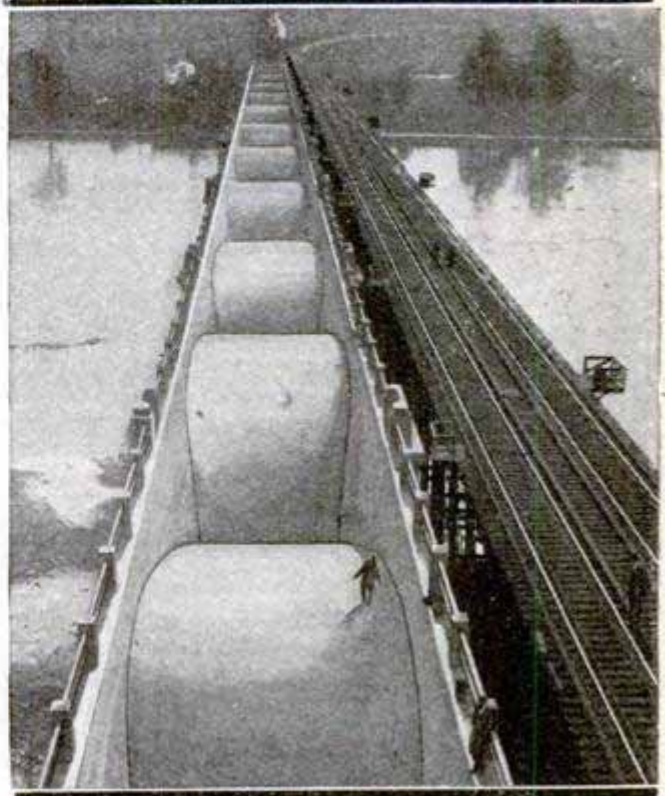
G. K. Culler, Culler & Sallee, 120 E. Russell St., Orangeburg, S.C.

Army & Navy Journal 8-20-13

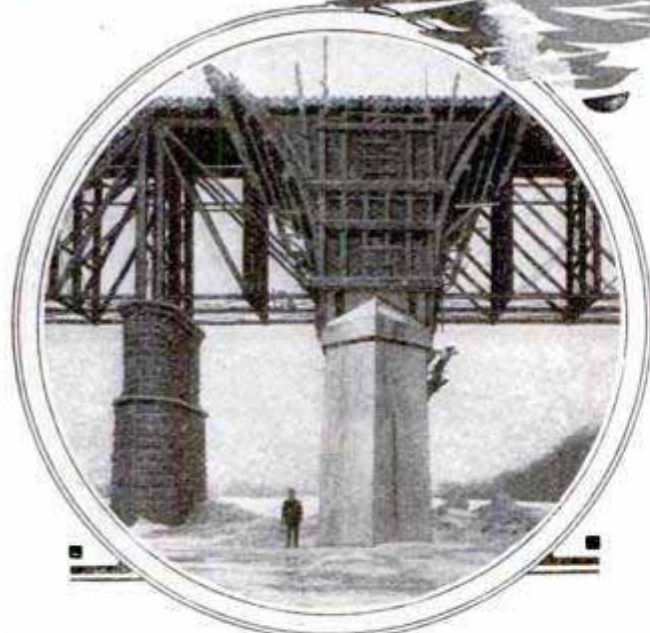
4675
CONCRETE RAILWAY BRIDGE OF FOURTEEN SPANS

Phila. & Reading R.R. Co., Phila., Pa.

One of the largest two-track concrete railway bridges in existence was completed recently by the Philadelphia and Reading Railway to carry its New York-Philadelphia line across the Delaware River near Yardley, Pa. It is 1,445.5 ft. long, 70 ft. high, and made up of 14 reinforced-concrete arches with clear spans varying from 85 to 90 ft. The new bridge is built beside a wrought-iron deck truss bridge that has been in use since 1876. In accordance with the latest construction, the bridge consists of a concrete shell, filled with stone and dirt. The concrete piers, rising in solid plinths from bedrock 10 ft. below the water's surface to the spring points of the arches, are stable only under a balanced load. Resting upon them are the floors of the arches, ranging from 3.6 ft. in



Double-Track Concrete Bridge, 1,445 Ft. Long, across the Delaware River at Yardley, Pa., Old Wrought-Iron Bridge behind It; Above, Top View of New Bridge Showing Concrete Shell Before It was Filled with Rock and Dirt and Old Iron Bridge beside It



Umbrella-Shaped Falsework Used in Molding the Base of an Arch

thickness at the crown to 13 ft. at the junction with the piers. The concrete side walls, extending from the arches

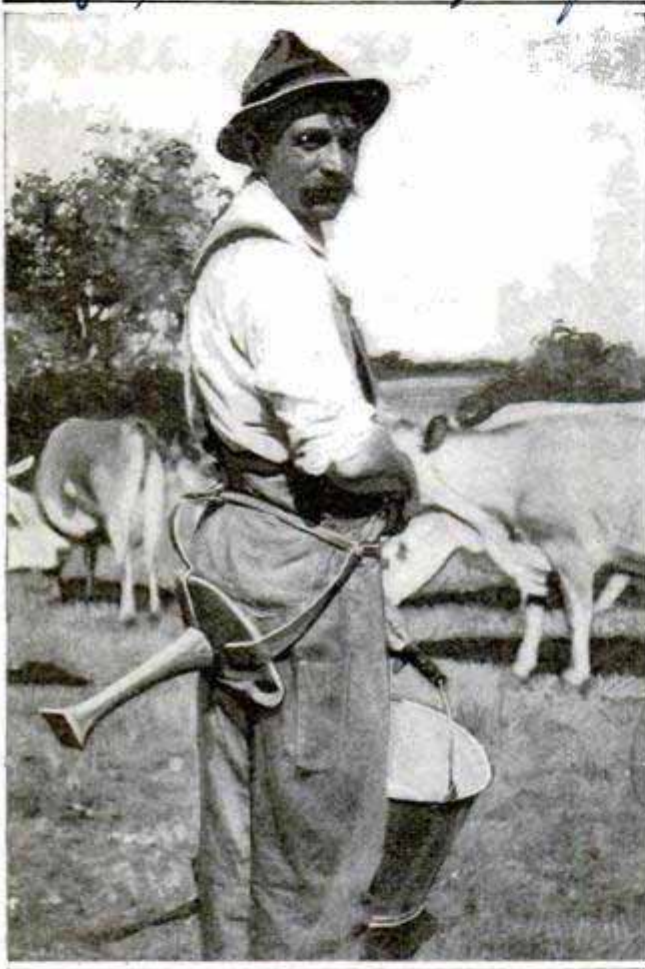
to the rails, are double, and serve as retaining walls to hold the rock fill on which the tracks are built. The construction was carried on from duplicate plants on each side of the river and the materials were carried out on temporary trestles and an aerial cableway built on the line of the bridge. Each arch was built separately and from both sides at once so that the load was balanced. After each pier was finished an umbrella-shaped framework was built upon it to support the spring of the arches on either side. A frame tower was then built under the center of the arch to support

the falsework on which the arch floor was laid. As each arch was finished, the same framework was used for the next. About 34,670 cu. yd. of concrete were used in the bridge, and 7,500 tons of rock fill.

MILK STOOL THAT STRAPS TO BODY

A one-legged milk stool that is always in position for instant use is one of the conveniences employed on a

R. E. Hodges, Santa Rosa, Calif.



Milk Stool That is Proving Great Convenience on California Dairy Farm

California dairy farm. This stool is provided with straps that fasten around the waist of the milker and hold the stool in the proper place. It requires no adjustment or attention of any kind, and is always ready as the milker moves from one cow to another.

Nebraska has a new law providing for the dragging of all country roads under the direction of township superintendents.

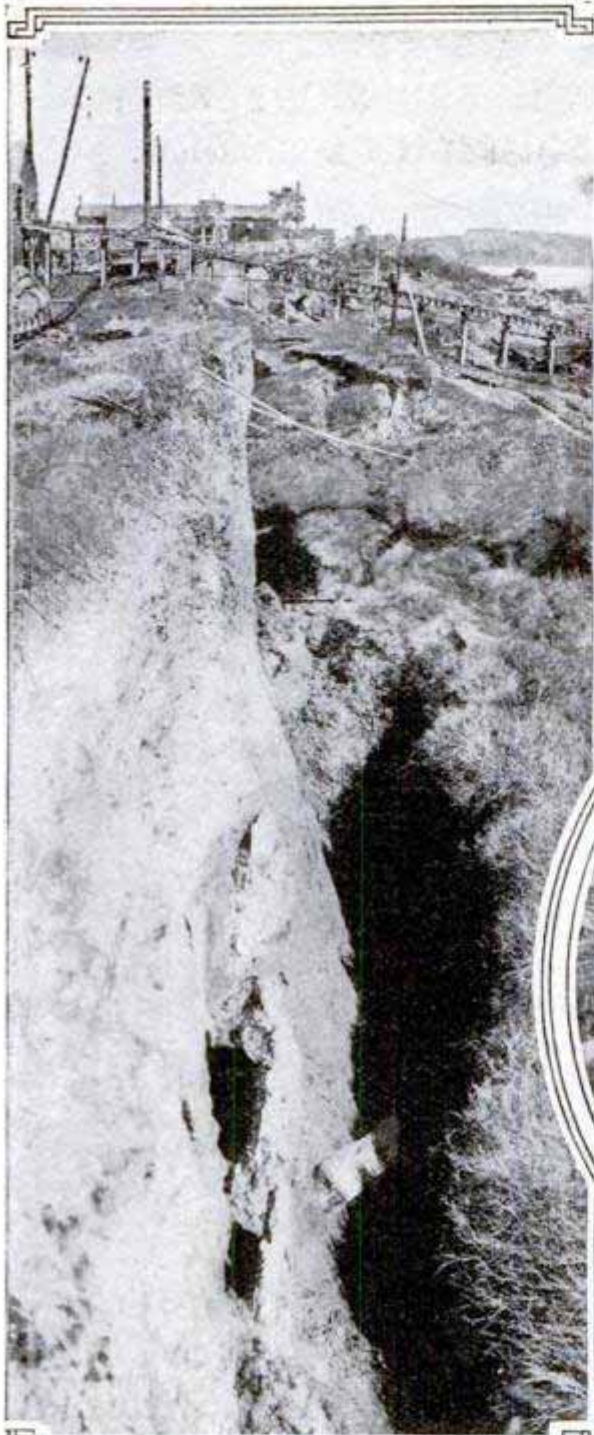
SELF-SUPPORTING MANUAL-TRAINING SCHOOL

Owing to conditions under which no school funds are available for the purpose, arrangements are being made to place on a self-supporting basis the manual-training school that is to be established at Grand Saline, Texas. A canvass is being made among business men and among carpenters and other mechanics to secure a donation of such tools as will be needed in the courses, and following this, funds will be raised in the same way for erecting a small frame building. After this preliminary work is done, the school will be made entirely self-supporting. At the present time a great deal of building of concrete walks and curbs is going on in the city. It is planned to teach the students concrete construction first and then take contracts for doing this class of work. Following this, and as the students become adept at different trades, contracts in other lines will be taken, all profits being turned into a fund for supporting and developing the school.

A HALF-MILLION-DOLLAR CAVE-IN

After withstanding a high-water pressure of 55½ ft. during the spring floods, the levee at Helena, Ark., gave way in a 1,000-ft. section four months later when the river gauge measured only 4 ft. This was one of the largest and most substantial levees in the whole Mississippi Valley, and the money loss, measured in rebuilding the levee, will approximate \$500,000. The caved-in section protected the mill district of Helena, and the damage was caused by an "undermine," where a straight current, coming down the river for five miles, struck a sharp bend. The cave-in crippled important mills and lumber districts, but contracts have already been let for rebuilding and strengthening the levee. The old levee will be used as a backing for the new levee.

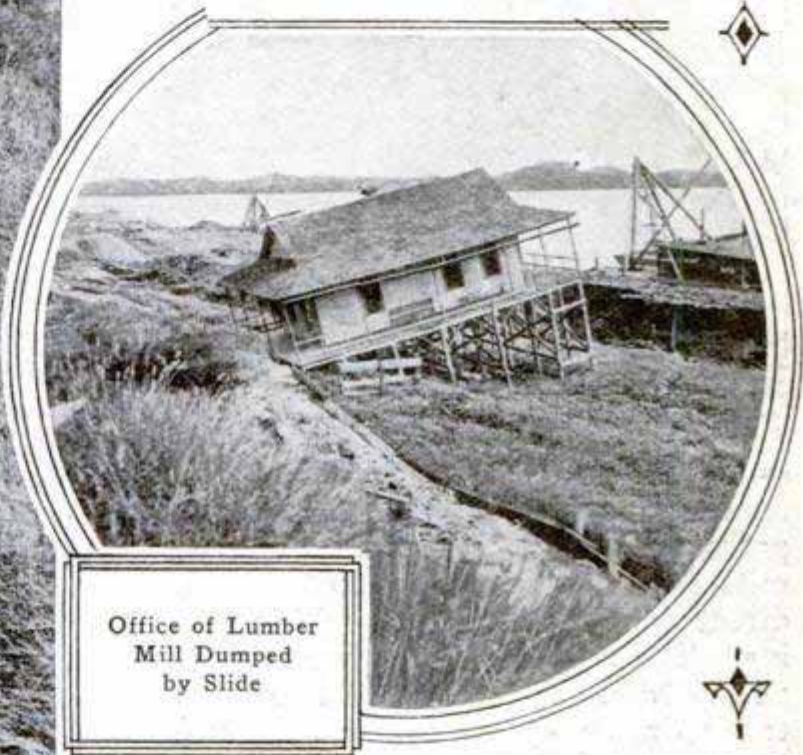
*C. V. W. Miller,
221 Miller St.,*



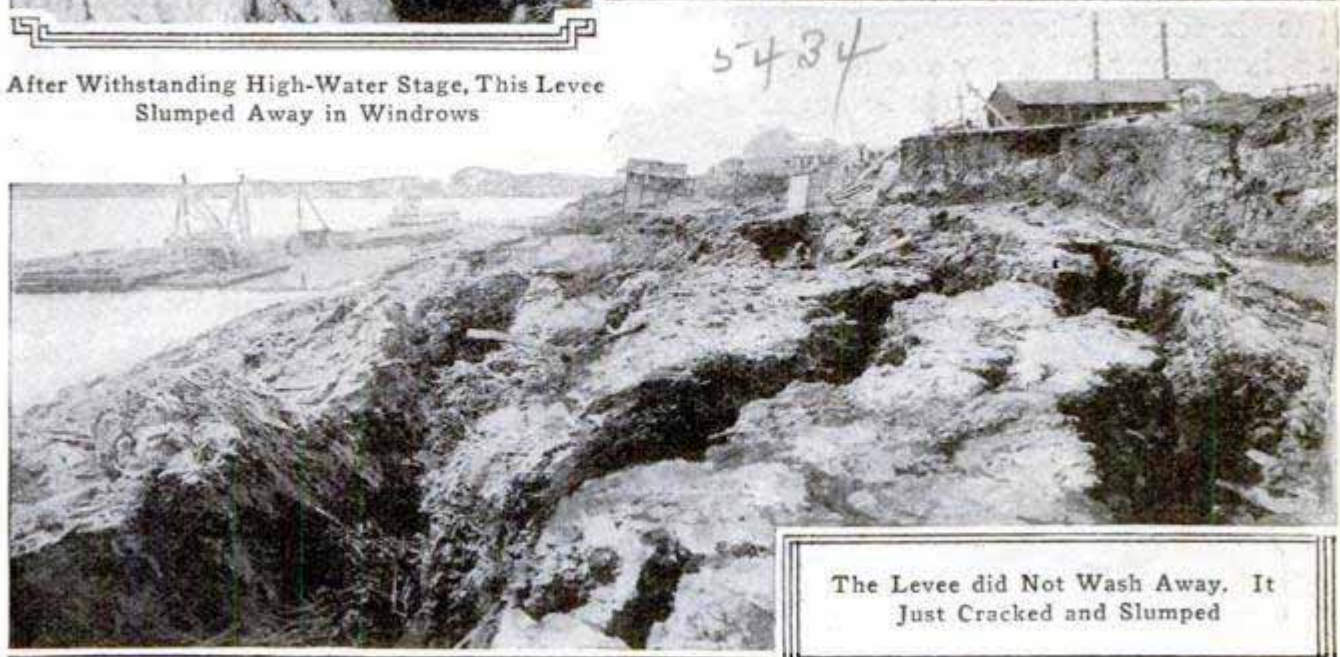
After Withstanding High-Water Stage, This Levee Slumped Away in Windrows



A Big Slough Compared in Size with River Steamer



Office of Lumber Mill Dumped by Slide

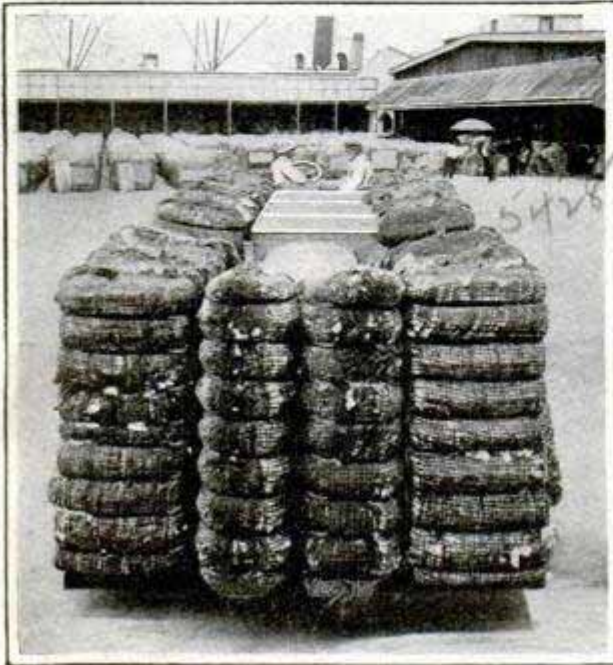


The Levee did Not Wash Away. It Just Cracked and Slumped

*Paul
& Loren
Refer
9-27
2-27*

"COTTON SADDLE" MAKES FOR EFFICIENCY

A 20-hp. motor truck equipped with a "cotton saddle" is being tried out on the wharves of Galveston. The cotton

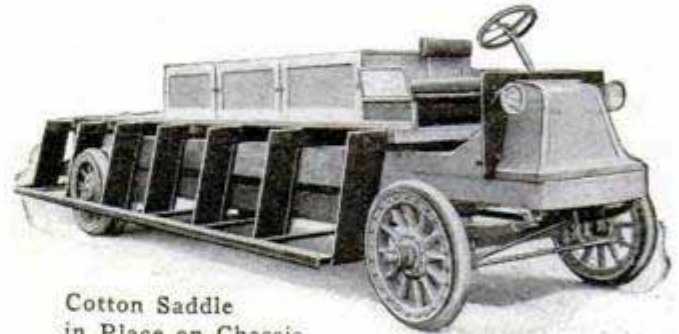


Handling Cotton by Electric Truck

saddle is designed and built by the superintendent of one of the big compress companies of that city, and permits 25 bales of cotton to be loaded direct from hand trucks without lifting. The capacity of the new truck is nearly double that of the ordinary truck drawn by three mules, and its 20-hp. electric motor walks away with the six-ton load at a gait of eight miles an hour over ordinary roads. This is claimed to be better both in speed and in capacity than has heretofore been accomplished.

MODERN SHIPYARD FOR MANILA HARBOR

Far-eastern shipping interests are to be materially benefited by the shipyards and slipway soon to be built in

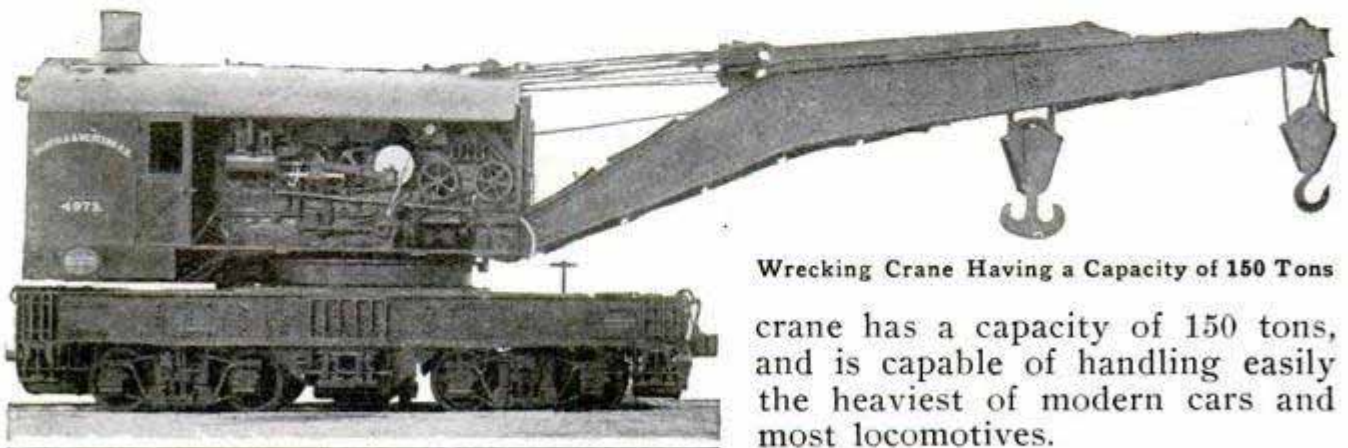


Cotton Saddle in Place on Chassis

the inner basin of Manila Harbor. This plant, which it is expected will care for most of the shipping in the Philippines, will be equipped for handling vessels of any size up to 3,000 tons dead weight. The slipway will be 460 ft. long and will be able to take any of the vessels engaged in traffic among the islands as well as most of those on the regular Hongkong-Philippine run. The plant is to be equipped with foundry, carpenter shop, machine shop with all modern machinery, and with the latest appliances in the way of electric and hydraulic cranes.

LARGEST WRECKING CRANE HAS 150-TON CAPACITY

What is claimed by its makers to be the largest wrecking crane ever built is manufactured in America and duplicates of it are in use on several of the leading American railways. This



Wrecking Crane Having a Capacity of 150 Tons

crane has a capacity of 150 tons, and is capable of handling easily the heaviest of modern cars and most locomotives.

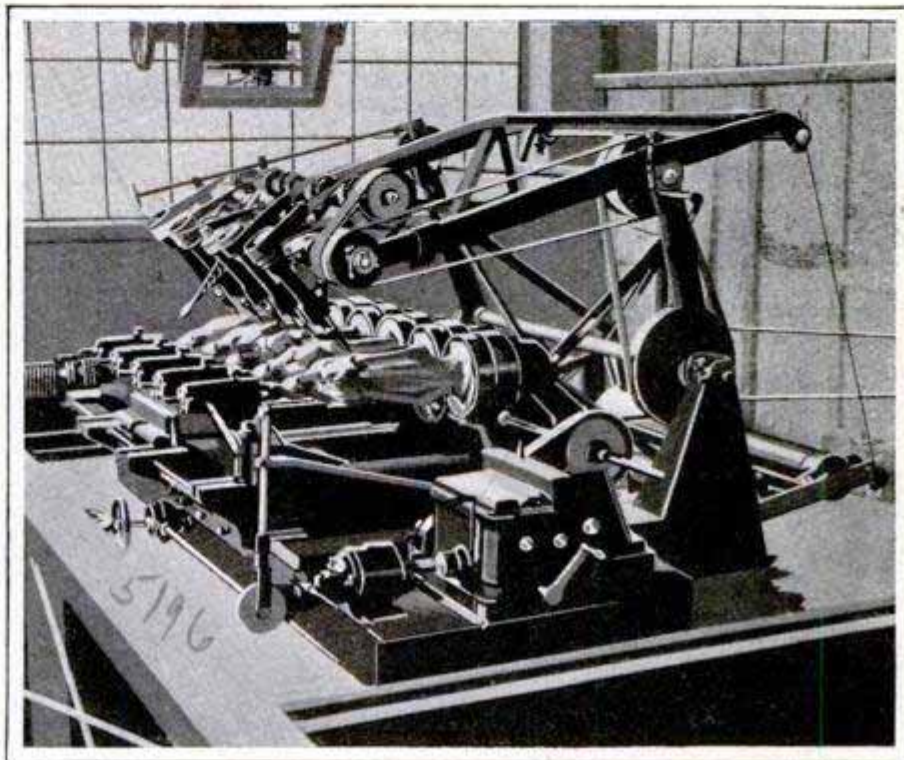
*Industrial Works,
New City*

*Paul
& Loren
Refer
9-27
2-27*

NEW MACHINE FOR COPYING
STATUARY

Cutters and shapers of various grades are used, the heaviest cutters being used for the rough shaping and the most delicate shapers for the finishing touches. The machine is driven by a

5196m
A sculpturing machine has been invented which takes a rough block of stone and forms it into an exact reproduction of any piece of statuary that it is desired to copy. The valuable feature of this machine is that it performs the two operations, the rough shaping and the finishing, and it is therefore thought to be a great improvement over the ordinary sculpturing machine which is capable of doing only the finishing and for which it is necessary to reduce the block to the approximate dimensions of the original. This machine, like other sculpturing machines, works on the principle of the copying lathe. The original piece of statuary is placed on a rotating holder, and the cutting tools are controlled by guides which bear against the original.

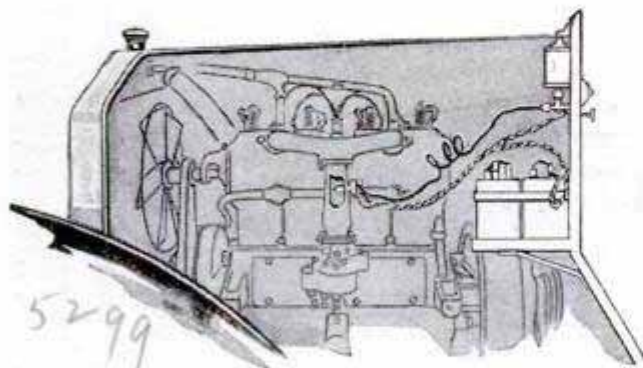


Sculpturing Machine That Takes Rough Block of Stone and Forms It into Exact Reproduction of Original

1-hp. motor. The framework is strong enough to stand the heaviest cutting, but is delicately counterweighted to make it suited to the work of finishing.

ELECTRIC PRIMER FOR GAS
ENGINES

5299
For the automobilist who has difficulty in starting his engine in cold



An Electric Primer Which Starts an Automobile Engine by Supplying Hot Vapor in the Manifold

a hot, explosive mixture on the first or second turn of the crank. The vaporization of gasoline in the cold engine is accomplished without the agency of the carburetor by an electrically heated plate. The principal part of the primer is a small metal cup set into the intake manifold, just above the carburetor, and connected by a tube with a small tank of gasoline on the dashboard. Above the priming cup is a metal plate heated by current from the car's batteries. As soon as gasoline strikes the hot plate, it is instantly vaporized and is sucked into the cylinders on the first turn of the crank. The electric button for turning current into the hot plate and the plunger to force gasoline into the priming cup are placed on the dashboard.

Volcano Electric Primer Works,

Volcano 7-13

THE OPEN-AIR SCHOOL IN LOUISVILLE

The open-air school, started last year in one of the centrally located school buildings in Louisville, Ky.,

butter, milk, and a dessert; or meat or eggs, two vegetables, bread, butter and milk. The dinner is followed by a half hour of play, after which the children go to their cots to rest and sleep until three o'clock, when they go

C. O. Holland, Super. Louisville Public Schs. Louisville, Ky.



Louisville's Open-Air Schoolroom for Anemic Children from Second and Third Grades

for the accommodation of anemic children, has shown remarkable results. The children are from eight to 13 years of age, and are taken only from the second and third grades.

Studying in the open air, however, is only part of the care and routine which resulted in an average gain in weight of 2 1/2 lb. when the school had been running but five weeks. The children arrive at the school at eight o'clock, and are given a cold shower bath and a brisk rub. Breakfast, consisting of a cereal and milk, or graham crackers and milk, is served in a cozy dining room at nine o'clock. After breakfast, the school suits are donned, and the pupils are ready for work in the open-air schoolroom. Like Eskimo children, the boys and girls dress exactly alike, in Eskimo suits consisting of a belted coat with cowl and long trousers, which are tucked into felt boots. The morning is divided into two work periods, with a 20-minute recess between. At 12 o'clock the heavy meal of the day is served, consisting of soup, two vegetables, bread,

back to the schoolroom for a short period, followed by the afternoon lunch of milk and crackers. They leave for home at 3:45 p. m.

The nurse, who watches the temperature, weight, and the physical condition of the children, gives the baths, sees that the children brush their teeth properly, and relieves the teacher through the rest period, is furnished by one of the philanthropic associations of the city.

PAPER DISHCLOTH IS A SUCCESS

New paper products are brought out from time to time which are most interesting. One of the latest offerings is the paper dishcloth, made of stiff parchment, which in water becomes as soft and pliable as fabric and will not go to pieces. It is used as an ordinary piece of cloth and then washed, wrung out and dried, and used again. It has a smooth surface which absorbs no grease. It is equally good for scouring pots and pans and may be used with

Christian Science Monitor

Kalamazoo Vegeta...

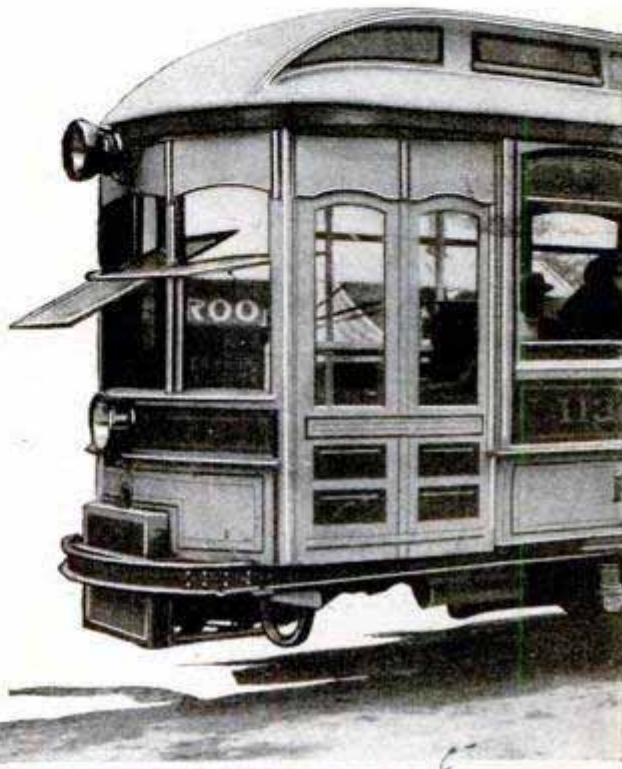
5517W

POPULAR MECHANICS

GASOLINE STREET CAR TRIED

IN THE SOUTH

Gasoline-driven street cars are operating experimentally on one of the outlying lines at Hendersonville, N. C.,



Gasoline-Driven Street Car with Mechanism Similar to That of Automobile

any of the cleaners marketed for that purpose. One dishrag of paper is sufficient for any dishwashing from cut glass to skillet. Then it is washed off, and is again fresh and clean. When it dries it again becomes stiff, but is not yellow or soiled, but fresh and white as when new. A new form of cooker is a metal frame which is lined with a prepared paper. This cooker acts equally well with roasts, vegetables, bread, or cake. The metal frame prevents the paper from breaking when removed from the oven, and the paper lining retains all the juices and flavors, and gives the slow, thorough cooking so much desired. The food never touches the metal; there are no greasy pans to wash and simply the lining to be thrown away.

GREAT CIRCLE OF BABY CHICKENS

Over 1,700 chicks are grouped about the brooder stove in the accompanying picture. It is a night scene in a brooder in Petaluma, Cal. The great circle of baby chickens is a good indicator of the heat radiations from the stove. It marks the zone of temperate heat most favorable to the chicks. Only two have ventured into the torrid zone near the stove, and very few have wandered into the frigid zone beyond. A thermometer placed among the chicks would register the temperature best suited to them.

where the grade is as heavy in places as 7 ft. to 100 ft. These cars are of 40 hp. and have much the same mechanism as an automobile, being chain-driven with four speeds, three forward and one reverse. They are of the pay-as-you-enter type with both entrance and exit at the front, and require only a motorman for operating.



Over 1,700 Chicks Gathered in the Temperate Zone of Heat around a Brooder Stove

Hilton A. Bailey, 2607 Virginia St.

Asheville 4
879
cars in use in Hendersonville, N. C.
4-73721

NEW LIFE PRESERVER CAN BE WORN LIKE A VEST

Many advantages over ordinary life preservers are claimed for a new type that has just made its appearance in



France and is being subjected to practical tests. It is known as a "life jacket" and consists simply of a garment shaped like a vest to which are attached inflatable rubber tubes passing over the shoulders and down

under the arms. These tubes are made of flexible material and when not inflated lie close to the garment, so that

it can be worn under a coat like an ordinary vest without attracting any attention. A leather belt is attached at the waist to secure the jacket firmly in place. To each of the tubes is attached a small rubber tube provided with a pneumatic valve. When the jacket is to be used as a life preserver the wearer simply strips off his coat and inflates each of the supporting tubes by blowing into the corresponding small tube, and is thus provided with two air-filled cushions capable of sustaining him in the water. At recent trials the demonstrator put on the jacket and inflated it completely in 1 minute 27 seconds. It was found that the jacket, when fully inflated, has a lifting power of 37½ pounds.

ⓄThe machinery of a British naval airship became disabled recently and an army dirigible towed it home.

SNOW-CATCHING GAUGES FOR MEASURING PRECIPITATION

By J. CECIL ALTER,

*U. S. Weather Bureau
Salt Lake City, Utah*

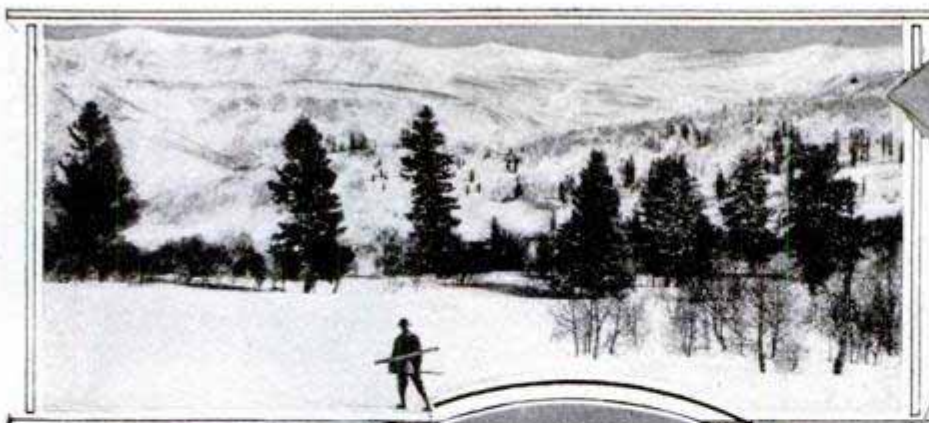
Gauges for measuring snowfall have been the subject of much experiment in the high mountain regions of the West, in the work of obtaining data on the amount of winter precipitation for the benefit of irrigation engineers. The usual snow gauge—an 8-in. can, 2 ft. high, mounted on spring-balance scales—which is accurate when there is no wind, has proven inadequate in the mountains. The problem which confronts the meteorologists is to devise a gauge that will catch an accurate depth of snow in spite of wind eddies which tend to blow away about 20 per cent of the catch. Recent experiment has been concerned with devising a windshield which will produce a known eddy downward and from left to right in the mouth of the gauge and leave a steady, eddyless current of air flowing across the top through which snowflakes may fall at a uniform rate and angle. Two kinds of shields are now being tested. One of them stands 9 ft. above the ground, to escape wind

eddies near the earth's surface, and consists of an eight-sided horn-shaped steel reflector which rises a few inches above the top of the gauge and 2 ft. away from its sides. Another vertical rectangular shield inside prevents snow from glancing from the large reflector into the mouth of the gauge. The measuring can has an inside diameter of 11.85 in., and the size of its catch can easily be converted into pounds by scales below, since water or melted snow to a height of 3 in. in the can weighs 10 lb. The can is 42 in. deep so that it will hold several days' catch. Its only fault is that the shield piles high in a fall of wet snow. This difficulty is avoided in the other form of shield which consists of a cloth skirt, 12 in. long, hung from a hoop about the mouth of the gauge and weighted down with a chain. In an ordinary wind, it blows into the shape of a perfect metal shield and, while costing less than a metal deflector, breaks up wind eddies quite as successfully.

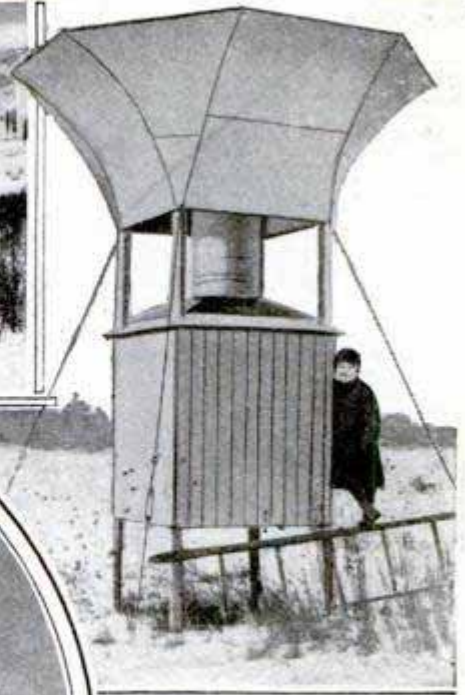
Daily Consultant & Trade Reporter

8-1-13

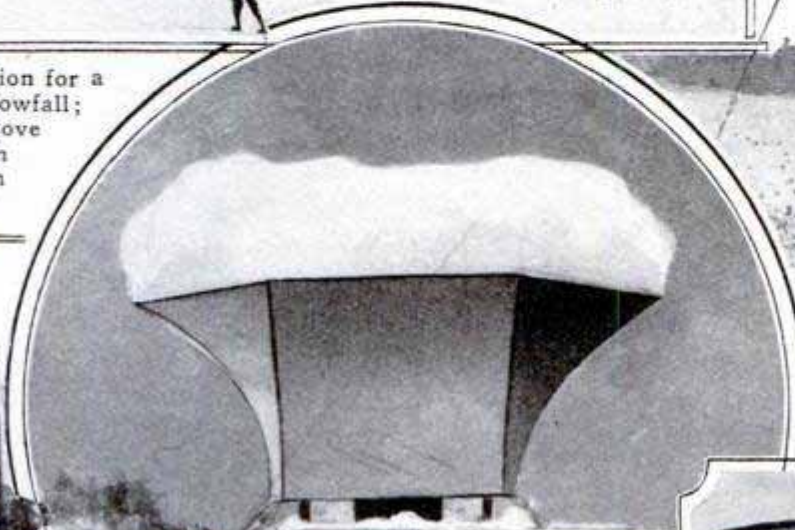
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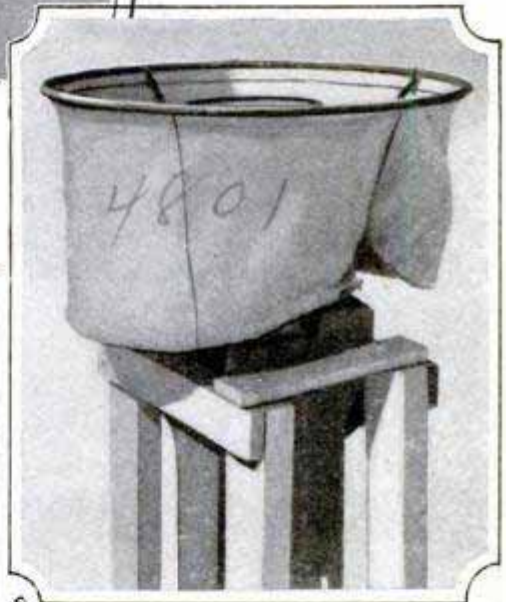
Good Location for a Study of Snowfall; 9,000 Ft. above Sea Level in the Wasatch Mountains



Snow Gauge with Reservoir for Measuring a Winter's Precipitation, to be Read Only in the Spring



How Wet Snow Piles Up in Metal Snow Catchers



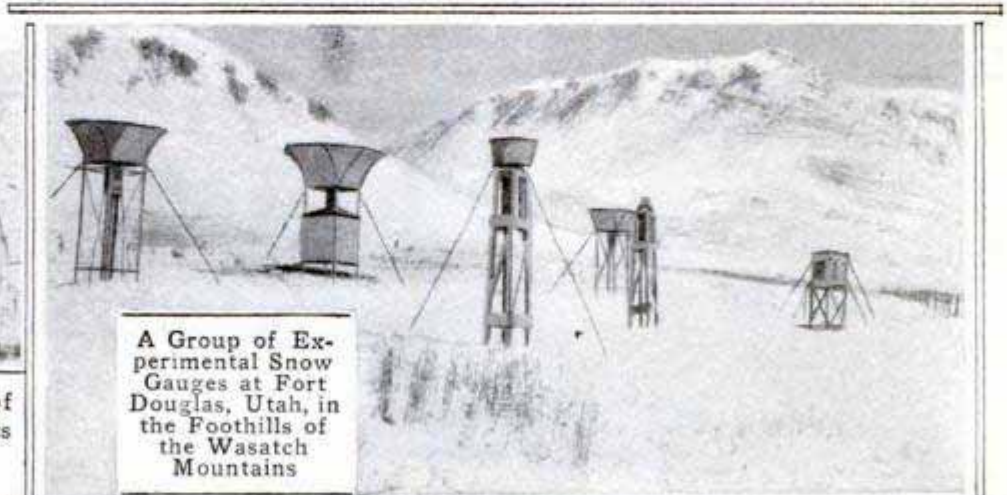
Ordinary Snow Gauge Protected by a Cloth Shield Which does Not Clog with Snow



A Metal Gauge on a Windy Slope at 9,500-Ft. Elevation on Black Mountain, near Salt Lake City



Highly Developed Type of Metal Gauge with Two Sets of Windshields

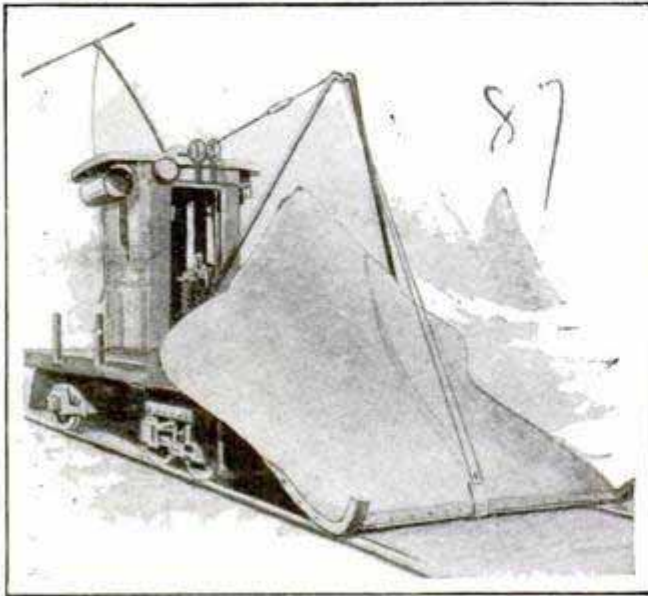


A Group of Experimental Snow Gauges at Fort Douglas, Utah, in the Foothills of the Wasatch Mountains

5227
The Auto 8-28-13

SQUARE-BLADED SNOWPLOW FOR ELECTRIC RAILWAYS

A snowplow of unusual shape, in that it is square across the front, with a very small rise from the front edge



This Snowplow Clears Heavy Drifts without Danger of Derailment

to about the center, is being successfully used by an electric railway in Lincoln, Neb. From about the middle point upward, the plow is so shaped as to deliver the snow on both sides of the single-track line. The fact that this plow strikes a drift squarely, and, on account of the small pitch, gets under it, tends to hold the car to the track, thus doing away with the danger of derailment.

CA Russian prince has a wonderful \$60,000 toy—a mechanical theater which will produce a number of popular operas.

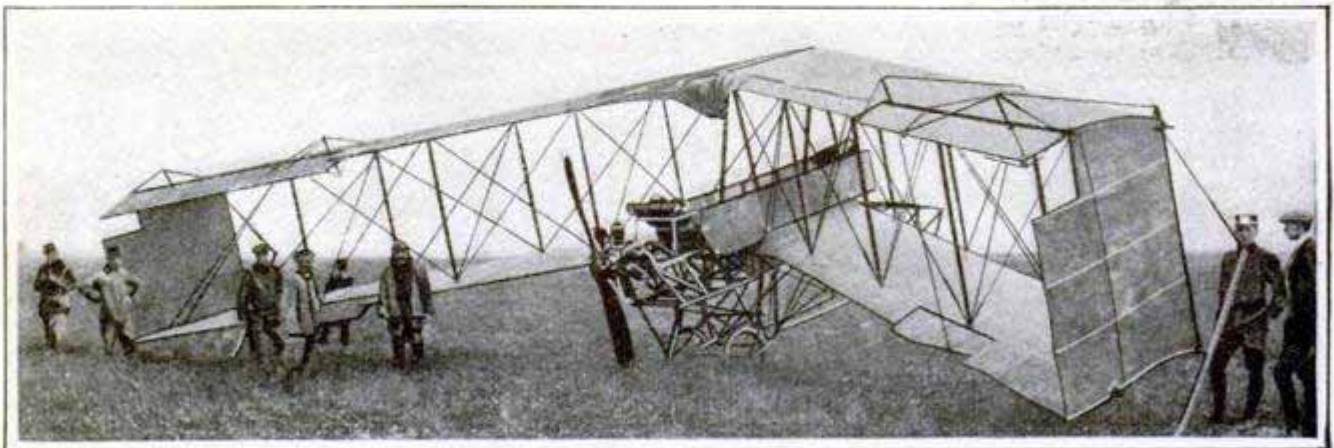
AUTOMOBILE SERVICE RUN ON RAILWAY SCHEDULE

An automobile service that is maintained with the regularity and precision of railway service is in operation through the mountains of Benguet, north of Manila, in the Philippine Islands. This system is used for transporting both passengers and freight over the 25 miles between the terminus of the railway from Manila at Camp One and the summer capital at Baguio. The equipment consists of high-power 8-cylinder cars for passenger service and 4-cylinder cars for freight service. These cars run on a regular schedule and make connection with all trains at Camp One.

A NONCAPSIZABLE FLYING MACHINE

Automatic stability in the air seems, according to competent authorities, to have been reached in the Dunne "dart" aeroplane which was recently tested in France. The machine is tailless, and its wings form a wide-open V, with the angle in front. Lateral balancing is due to the shape of the aeroplane, which prevents it from turning over to a dangerous angle in the air. When a gust of wind blows it up on one side, the same gust passes through and blows it up on the other side, causing it to roll gently and maintain an almost even keel instead of rocking violently and dropping a considerable distance before it rights itself. The longitudinal

The Sphere 8-25-13
Illustrated London News 8-23-13
Aircraft 9/13



The Dunne "Dart" Aeroplane Which Has Automatic Stability: It is Tailless and V-Shaped

Inventor: Lieut. G.W. Dunne
British Patent

stability is also greatly improved by the backward slope of the wings. Hence, the pilot does not have to fly the machine; he simply guides it. The entire control consists of two levers manipulating horizontal flaps and vertical side curtains at the wing ends. As the tests continued in France, the V-shaped aeroplane maintained its claim to automatic stability, but as yet it is very heavy and slow. The most interesting fact in connection with the Dunne "dart" is that it was invented by a British army officer and offered to the British authorities several years ago. It was rejected because the English did not believe at that time that any heavier-than-air machine could fly, and it is now being developed in France.

SIGN SPURS CONTRACTOR TO FINISH WORK

A novel and effective way of inducing a culvert contractor to finish his work properly was used in a small



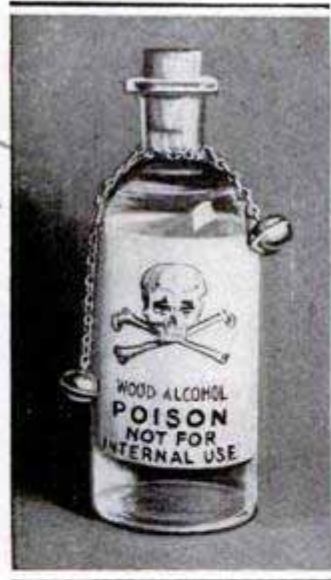
Sign Placed at End of Improperly Finished Culvert

town in Maine recently. The contractor had repaired the culvert and had left the dirt piled over it in such a way as to interfere with the passage of vehicles. Some one saw the resemblance to a newly made grave, and a sign was erected bearing the words, "Here Lies the Sense of the Maker of this Culvert." This gentle reproof had an immediate effect. In a short time not only this culvert but all the other culverts built or repaired by this contractor were cleaned off and put in good condition.

Ⓒ In a new country clubhouse, located on Long Island, meals are conveyed from the kitchen to the dining room by an electric trolley operating in a subway. Meals are ordered through a speaking tube, while a touch on an electric button brings the food, steaming hot and arranged on individual trays, to the dining table.

THE "RATTLESNAKE" BOTTLE MAY SAVE LIVES

It is no uncommon occurrence to confuse bottles, especially in the dark, and to pour out a poisonous dose of something or other by mistake, frequently with fatal results. A bottle which carries its own warning has been designed and, if widely adopted, would make such fatalities infrequent, if not impossible. In one hospital all bottles containing such substances that any dose of them



likely to be administered would prove fatal or extremely serious, are now required to be provided with small bells attached by chains, and the tinkling sound gives warning when the bottle is picked up. Another plan requires needles driven through the cork, so that when the stopper is taken out, the fingers are sharply pricked. The striking name of "rattlesnake" bottle has been given to the device.

The Traveler Standard page 229

Poison

5476W

*Mr. E. Taylor
Newburgh Maine*

4524

LIVERY STABLE CARRIES BIBLICAL QUOTATION

A biblical quotation displayed in a conspicuous place on the front of the building is a remarkable feature of a

BIGGER GUNS FOR GERMAN DREADNOUGHTS

It seems pretty certain that the latest German dreadnoughts will be armed with 15-in. guns. The early German

"HOW DO THE BEASTS GROAN!"

Quotation from Book of Joel Feature of Livery-Stable Front

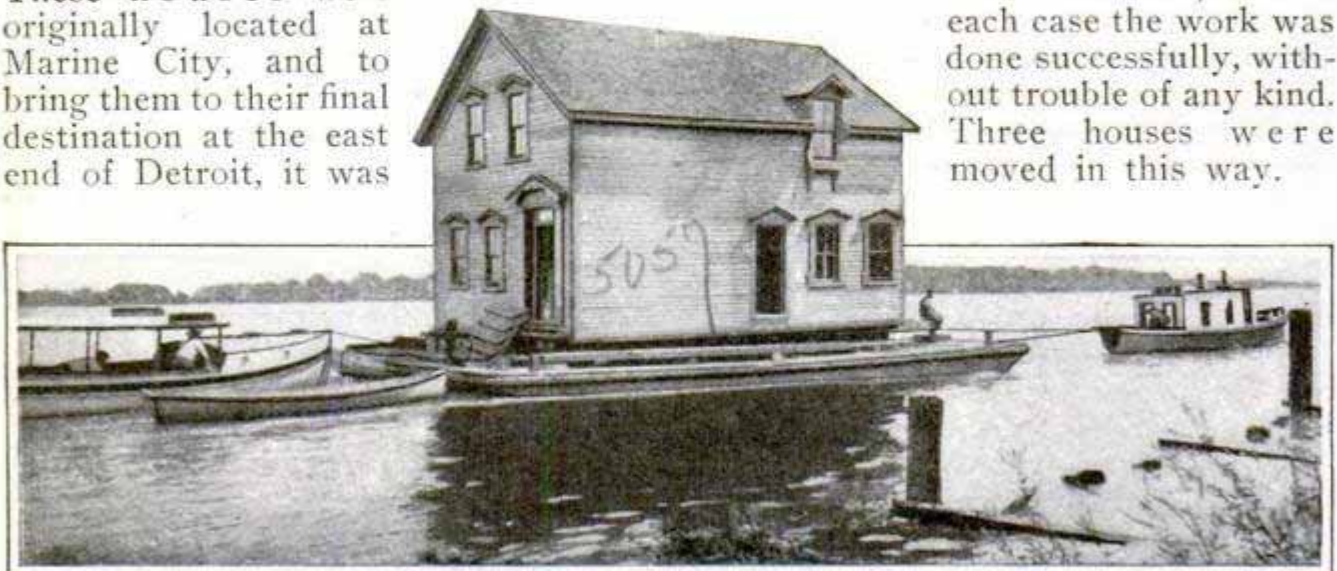
livery stable in the East. At the time the building was erected the owner refused to allow any decoration other than a terra-cotta panel which he would furnish. When this was installed it was found to bear the inscription: "How Do The Beasts Groan!" a quotation from Joel I:18. In spite of repeated questioning, the owner has never offered any explanation as to his purpose in placing the inscription on the building.

battleships, corresponding to our "Oregon," were armed with guns of 9 1/2-in. caliber. The next advance was to an 11-in. piece; then to a 12-in., which is the gun with which the ships of the current program are armed. The increase to a 15-in. piece will be much larger than the mere enlargement of caliber would indicate, for whereas the 12-in. gun throws a shell weighing 870 lb., the shell for a 15-in. gun would weigh some 1,800 pounds.

HOUSES TOWED ALONG GREAT LAKES HIGHWAY

Towing houses on lighters for a distance of 54 miles is the unusual method adopted by a Detroit, Mich., contractor in carrying out a job of house moving. These houses were originally located at Marine City, and to bring them to their final destination at the east end of Detroit, it was

necessary to tow them down the St. Clair River for a distance of 30 miles and then straight across Lake St. Clair. The actual towing time varied from 14 to 18 hours, and in each case the work was done successfully, without trouble of any kind. Three houses were moved in this way.



House Coming Down the St. Clair River to New Location

*H. W. Patton Detroit News
St. Clair Mich*

*4449
The Providence Sunday Journal
Henry Miller, R. I.
C. J. J.*

3528 W

THE MECHANICS OF GRAND OPERA

By GRATTAN McCAFFERTY

47-24

WHO associates mechanics with grand opera?

The thousands of men and women who throng the magnificent auditorium of the Metropolitan Opera House in New York during the grand-opera season surely would not. Few in the audience know of the work of the mechanic in the busy world behind the curtain, or of the mechanical contrivances without which the magnificent scenes could not be produced.

On account of the magnitude of the productions and the care of detail work, the Metropolitan has from 80 to 100 men around the stage during the production of an opera, each aiding in the mechanical success of the opera. An idea of the wonderful mechanical training of the men directing things behind the curtain is given in the production of "The Magic Flute." This has been called the most difficult opera in the world to stage. There are 15 changes of scenes, but the longest wait at the Metropolitan is from 50 seconds to 1 $\frac{1}{4}$ minutes. The Metropolitan has never seen a hitch in the production of this opera.

Each side of the stage is divided into eight entrances and each entrance on either side has six drops or curtains. On the prompt side, the raising and lowering of the drops and border lights is done by hand, the counter-weight system being used. On the opposite side the hoisting and lowering is done by electricity controlled by a switchboard on the prompt side.

The stage of the Metropolitan is cut everywhere into sections. The rear part of the stage can be raised, either in part or altogether, so as to form an incline or part of a hill. The sections can be raised or lowered as traps, or can be taken out altogether.

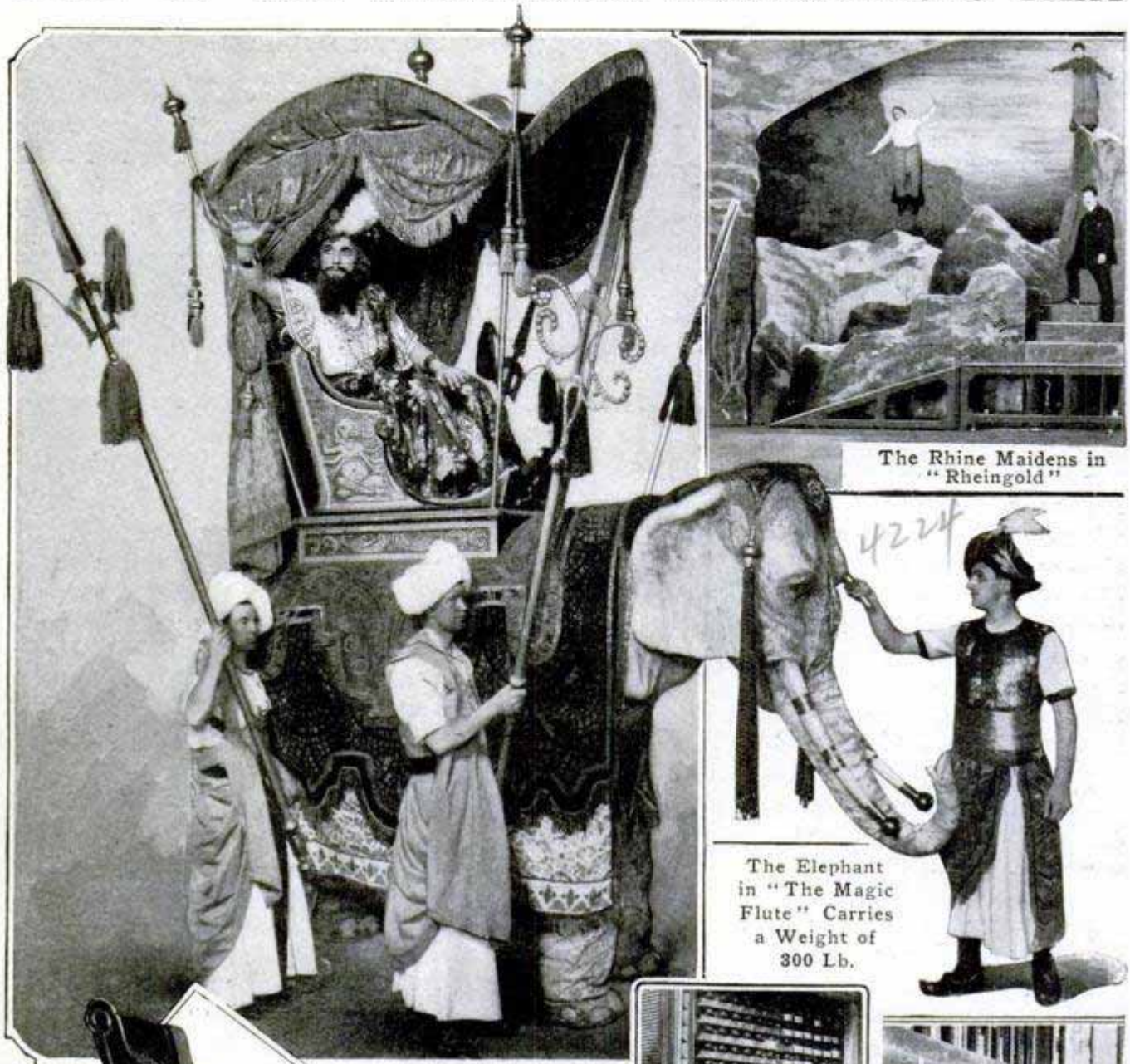
The electrical mechanism of the opera house has naturally much to do with the successful arrangement of the stage settings. The electrician's stronghold is down under the stage, where, in a small room that seems like a ship's cabin, is a switchboard, ar-

ranged with four colors — amber, white, red, and blue. Any shade of light that can be desired is produced by means of dimmers. They have different steps and control, either individually or together, the different lights.

From the little cabin, which is directly under the center of the footlights, is a small hole in the stage floor just at the prompter's box. A few steps lead to a platform on which sits one of the electricians during a performance. Through the opening in the floor the electrician can see the entire stage and, by a wheel below, has full control over the dimmers. Down in the cabin, day and night, sunset and dawn are manufactured on short notice. The border lights and the "fullups" used when setting a scene are also controlled from here.

The chief electrician has his post at the switchboard on the prompter's side of the stage. This is the most important post on the stage during a performance. Besides the chief electrician, the stage director takes post here and from this spot all the orders for the running of things on the stage go forth. There are electrical signals and bells of all kinds, and telephones connecting with all parts of the house. Here also, thunder, and lightning, and wind are made. The chief electrician opens a switch and turns a controller marked "lightning," "thunder," or "wind," and his order is filled in a second. The thunder machines are located in the second fly lofts. They consist of a large drum, with beaters worked by electricity, and a series of octagonal wheels revolving over wooden sounding boards. There is also a thunder chute running from the roof to the subcellar. Down this, small iron balls are allowed to roll, the operation being so controlled by means of wiring in the chute that the rolling sound is not always of the same volume. The big wind machine is also up in the lofts. Electricity whirls around a large paddle wheel with

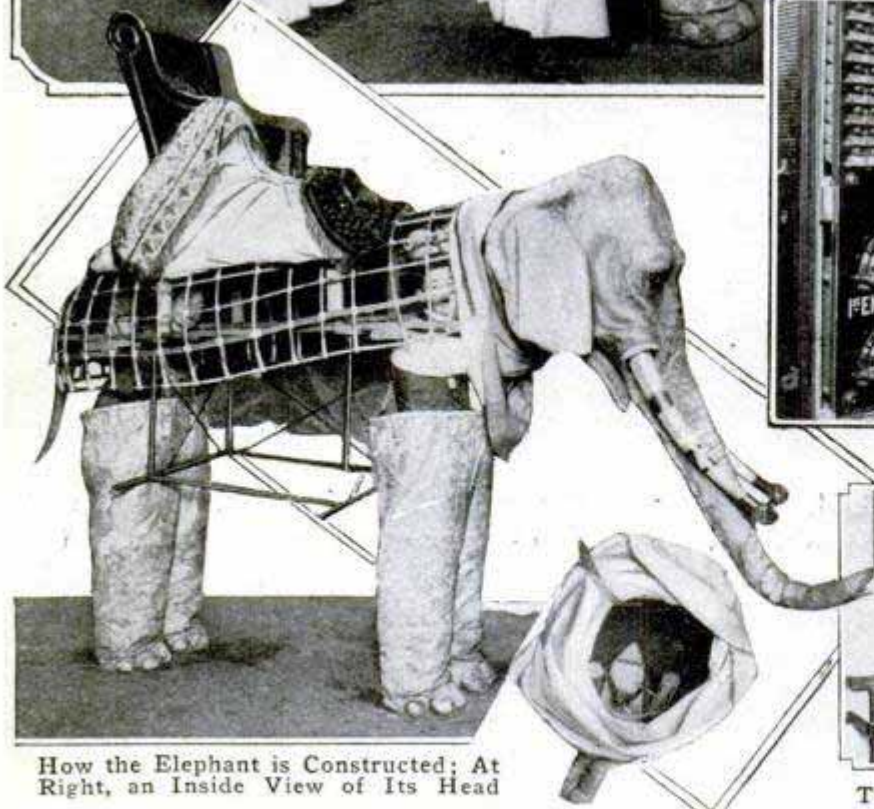
SOME OF THE MECHANICAL CONTRIVANCES THAT



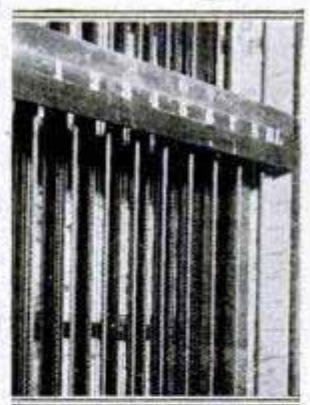
The Rhine Maidens in "Rheingold"



The Elephant in "The Magic Flute" Carries a Weight of 300 Lb.



How the Elephant is Constructed: At Right, an Inside View of Its Head

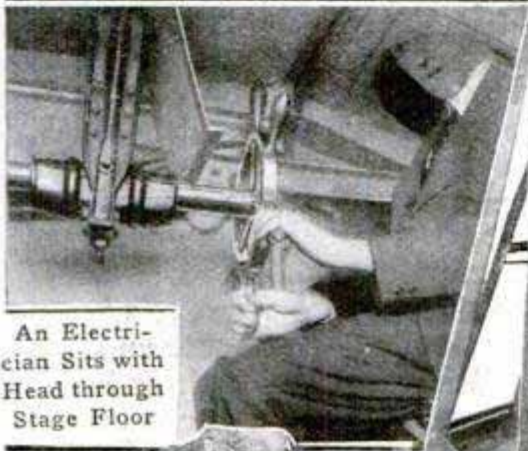
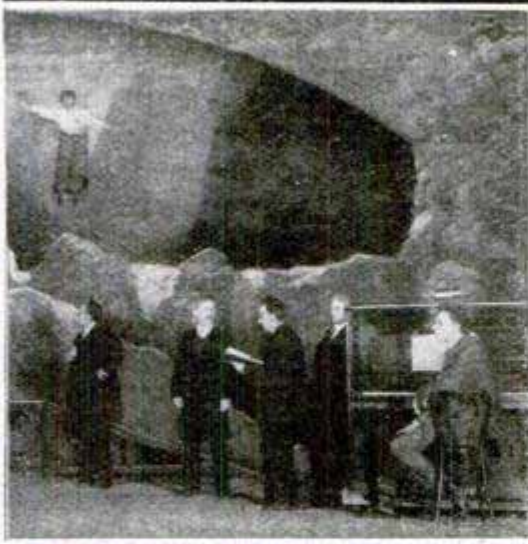


Switches and Cables That Raise and Lower Scenery

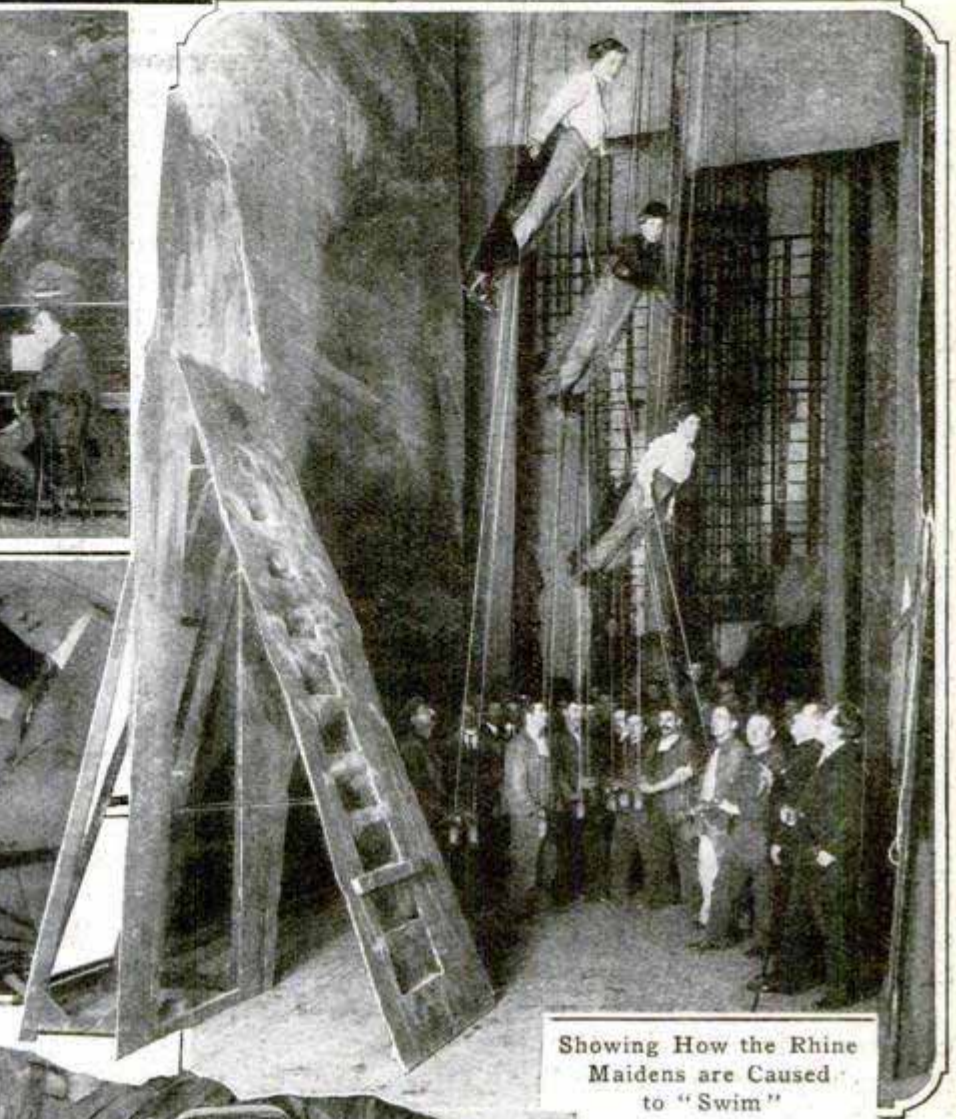


Thunder, Lightning and Wind Controls

ENTER INTO A PRODUCTION OF GRAND OPERA



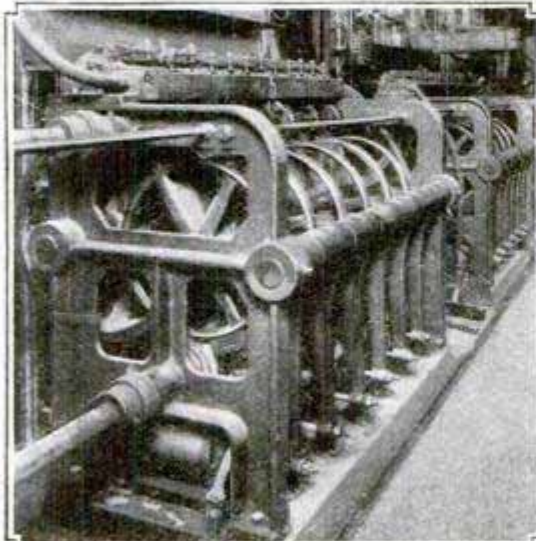
An Electrician Sits with Head through Stage Floor



Showing How the Rhine Maidens are Caused to "Swim"



The Worm in "Rheingold;" An Uncomfortable Part to Play



Hoisting Machinery for Heavy Drops



Head of the Dragon in "Siegfried;" At Left, the Dragon's Head, Showing Tube through Which It Spouts "Fire"

metal flanges, which come in contact with silk.

From his post, also, the chief electrician can, through a chute running through the wall to the orchestra, see the conductor and take his signals from him. In the electrical room below, there are telephones and "acousticons," the latter being telephones with megaphone attachments so that the listener need not take down a receiver to hear the message.

The orchestra pit can be raised or lowered by means of a mechanical contrivance formed by jacks worked by electricity. When the heavy German operas are produced and there is an unusually large orchestra, the pit is lowered so as to control the volume of musical sound. When light operas are given and the orchestra is smaller the pit is raised. During the Sunday-night concerts at the Metropolitan, the orchestra is on the stage and then the pit is raised to conform to the slope of the orchestra floor, and chairs are placed for the audience.

One of the most interesting mechanical devices in the Metropolitan is the panorama barrels. There are ten of these, five on each side. The barrel is a hollow wooden post running from the stage to the second fly top. An iron spike in the bottom is set in a socket in the stage floor on a ball bearing, and a similar arrangement is at the other end, 45 ft. up in the air. Thus the barrel can be turned with comparative ease. On the top is set a bull wheel through which runs the operating rope, connecting with pulleys overhead and then going down through a hole in the loft to the wings where the rope is used to operate the panorama scenery. In "Parsifal," eight of these barrels work in unison controlled by one pull line.

A difficult mechanical problem was presented to the stage director in the ascension scene in "Faust." In this scene Marguerite is supposed to be taken up to Heaven under the care of angels. The apparatus by means of which this is accomplished, consists of a steel framework equipped with

saddles and stirrups at irregular intervals, to insure the proper balance. In each of the six saddles sits a girl representing an angel. Marguerite lies with her head on the cushioned head-piece and her feet in the foot rests at the other end of the apparatus. She and the angels are securely strapped to the framework. The apparatus is entirely hidden by gauze. Steel wires attached to the framework connect with a head above. By a system of pulleys and light cables the apparatus is drawn along tracks running across from loft to loft. The group is seen going slowly across the stage and upward at the same time, finally disappearing in the top of the wings. This movement is controlled by counterweights in the wings and is so worked that for every foot the apparatus moves forward it rises 6 in., so that the combined motion is continuous and in harmony.

Some of the "props" present a most interesting study in mechanical effects. In "Rheingold," the three beautiful water nymphs, daughters of the river god, dart among and about the jagged rocks of the river protecting the treasure, which, according to the legend, is hidden in the Rhine. The nymphs are seen by the audience swimming about in the water. The marine effect here is obtained by an ingeniously decorated drop of shimmery green gauze hanging between the nymphs and the audience. The nymphs seem to float without any support. But the support is there.

Away up in the flies, 40 ft. above, three stout cables run from one side of the stage to the other, securely attached to the wall on both sides. On each of these cables runs a traveling carriage suspended by other cables. From the carriage two wires run down to a swivel head and from here a number of slim and colorless piano wires support a harness composed of stout frames and an apron of stout sacking. In this the nymphs perform. The apron reaches the waistline, leaving the upper part of the body free for the swimming motions. Over this a costume of green gauze is worn, made

quite full so as to conceal the harness. In the wings three men hold wires that control the working of the apparatus and just back of the ledge of rocks in the foreground three others stand. By the arrangement of the wires the nymphs can be lowered or raised or given the impetus for other rapid motions through the "water."

Beside the men who control the wires stand prompters, who give the signal to the men for the movements of the nymphs. The same principles of wires and counterpoises apply in "Faust" at the ascension, and, in a great measure, to the flying ballet and other spectacular effects, although in the flying ballet the performers have to depend almost entirely on a rigging of one stout piano wire for their support.

In "The Magic Flute," one of the principal scenes shows the sacred white elephant striding majestically onto the stage bearing the howdah and its passenger. The "elephant" presents an interesting mechanical "prop." The head and trunk form one section. Inside the head, there is a system of wires and springs by which the trunk can be made to work in any direction. The trunk is constructed around a series of rings and springs, all controlled by a lever and wires in the head. The task of working the trunk falls to the man who plays the front feet of the elephant. There is another man in the hind feet and together they bear the wicker framework that forms the elephant's body. The elephant, with the howdah and passengers, weighs nearly 300 lb. so that the task of the human motive power is no easy one. In order to assist the men inside, the attendants marching beside the elephant have hold of straps on the iron framework. There are two attendants on each side so that they materially aid the men inside in bearing the weight.

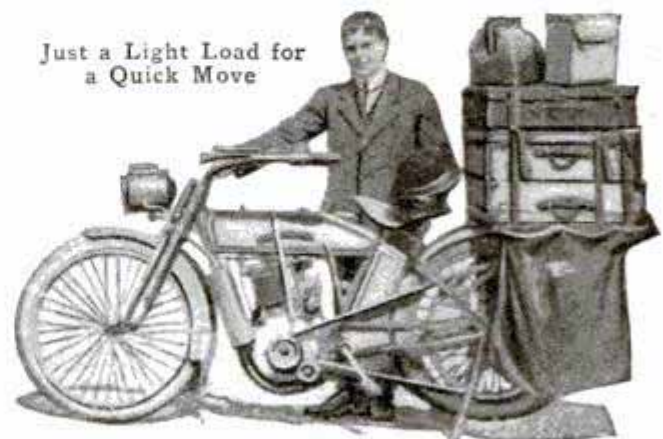
In "Siegfried," playing the dragon is an interesting part. The "dragon" also has two men to work him and they form its front and hind feet. The man in the front feet manipulates the

apparatus in the dragon's head which give the mechanical device the appearance of being real. Connecting with the nostrils of the dragon and running through the 25 ft. of its body into the wings is a long rubber tube through which is sent the steam that comes from the dragon's nostrils as fire. An insulated wire also runs from a battery in the wings through the body and lights a lamp behind each green glass eye. The wiring in the dragon's head is controlled by the man in his front feet. By means of the wire the great mouth can be opened or closed and the tongue and wings moved at will. These mechanical arrangements give the dragon its real, lifelike motion.

But playing the dragon and the elephant are not nearly so hard as being the "worm" in "Rheingold." The worm naturally is not very large—although in this case it is supposed to be of unusual size. Only one man can get inside of it. So he has to work the worm around the stage on a small four-wheeled traveler, supplying the motive power with his arms. By wires running from the head into the paws the man inside is able to open and close the mouth of the "worm."

A MOTORCYCLE USED AS A MOVING VAN

The adaptability of the motorcycle to everyday uses aside from a pleasure vehicle is exemplified in the illus-



Just a Light Load for
a Quick Move

tration showing a citizen of Portland, Ore., transporting his bag and baggage

Ray Templeton

*Albert Casady, Mgr. of Publica
tion
Baltimore, Md.*

by means of his motorcycle to his new home. Whether household goods would prove too cumbersome would depend, perhaps, on the ingenuity of the rider.

TURNING SAND DUNES INTO BUILDING BRICKS

The sand hills of Cape Henry, Va., have now found a use; with the assistance of a grinding machine they are being turned into bricks at the rate of 1,000 to 2,000 tons a day. Over an area of 1,000 acres, there is nothing on the surface of the cape but a bed of clean, pure, white sea sand, at least 12 ft. thick and, in some places, piled up into hills 70 ft. high. Formerly the sand was considered useless because the waves and wind have rounded off the edges and corners of the sand particles until they are not sharp enough to be used even for plaster in houses. Proper grinding, it has been found, resharpens the sand particles, and a plant located on the cape is now turning out 18,000 bricks a day. The process involves mixing 10 per cent of rock lime with 90 per cent of sea sand thoroughly dried in a kiln. After the mixture has been finely ground, it is run into a silo to slake the lime. Then it is ready to be forced into molds under great pressure, the result being neat, white, durable bricks. By the use of the latest labor-saving machinery, the plant has already utilized thousands of tons from the five or ten acres about it, but the supply of sand seems inexhaustible, for it is estimated that there are at least 1,000,000,000,000 tons on the cape.

*W. O. Bailey
A. in Va. clean Va. in Md. cleaning*

DWARF AMONG PHOTOGRAPH GALLERIES

The entire front of the smallest photograph gallery in the United States is shown in this picture. It looks like a doorway, but it is a complete shop. The little gallery, 23 in. wide and 11 ft. long, is wedged in between two 16-story concrete buildings in Seattle, Wash. Its owner pays \$60 a month rent for its 21.08 sq. ft. of floor space, the highest relative rent paid by any business man in the city.



*C. A. Dyer
1007 Stewart St.
Seattle, Wash.*

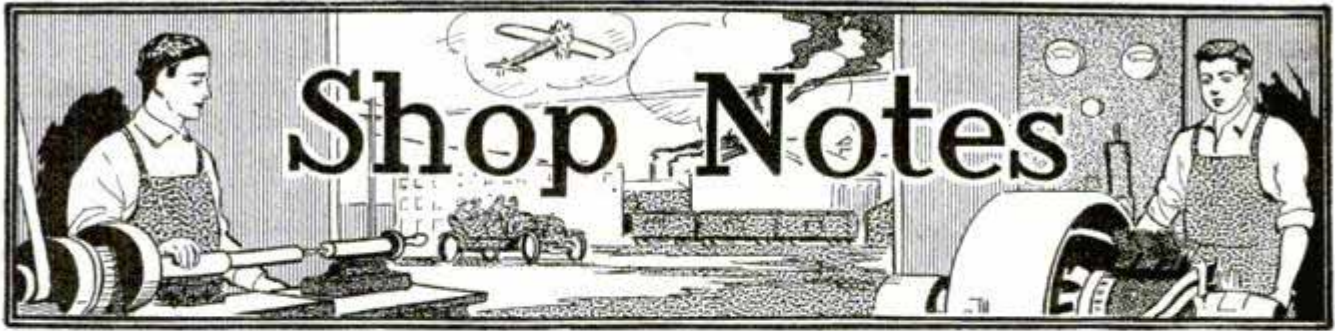
Large deposits of coal have been found at Udi, Southern Nigeria, which, according to tests made at the Imperial Institute in London, has two-thirds the value of the best Welsh coal.

Thief-proof electric lamp bulbs are a recent addition to electric-lighting equipment. The bulb is readily screwed into the socket, but can only be removed after the globe is broken, a process that makes accessible a catch for releasing the lamp.

WIRELESS SERVICE FOR BRAZIL

The beginning of a network of wireless communication connecting South America, the United States, and Europe, is seen in the arrangements that are being made for the establishing of wireless telegraphy between the United States and several South American states. The first step has been taken in the granting of a 50-year concession to the Marconi Company by the Brazilian government for wireless service between that country and New York.

Army + Navy Journal - 8-30-13

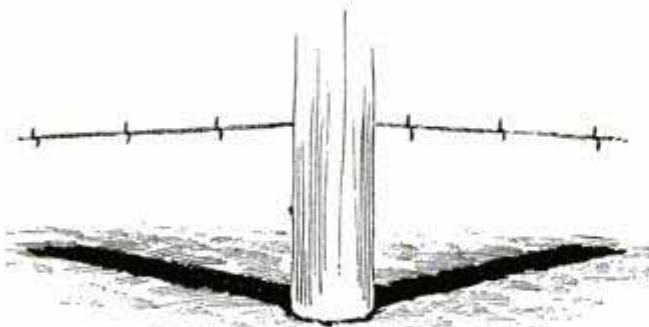


Preparing a Plastered Wall for Paint

The usual method of preparing a plastered wall for painting is to fill all cracks with plaster of Paris, or a mixture of the plaster and whiting, but a better way is to add some plaster of Paris to some of the paint and make a putty of it with which to fill the cracks. This will not absorb the paint as plaster alone will do. Very large cracks must be filled with plaster of Paris and whiting, to which some glue size has been added.

Bracing a Corner Post with Concrete

Dig the hole in the usual manner, then in the directions opposite to the pull of the wires dig trenches, 10 in. wide and 2 ft. long. Put in some broken stones or brick and pour cement over it, first a layer of stone, then some cement, and so on until the trenches are filled. The trenches, of course, connect with the post hole and are filled as the post is being held in place by a temporary brace. After the filling is done, a better brace cannot



The Concrete around the Base of the Post Has Two Connecting Concrete Extensions

be had, and the unsightly corner brace is not needed.—Contributed by Harriette I. Lockwood, Philadelphia, Pa.

A Safety Stepladder

The ordinary factory-made stepladder may be considered a complete and ready-to-use product, but it is so in ap-



The Strips Hinged to the Back-Support Sides Prevent the Ladder from Tipping Over Sideways

pearance only. Anyone who has had experience with a stepladder knows that, while working on its top, it has a decided tendency to tip over, especially when one is leaning too far to one side or the other.

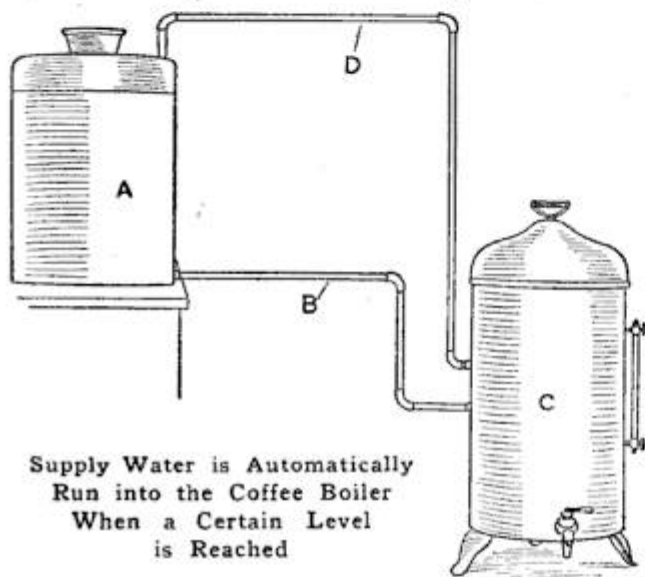
The sketch herewith shows a very simple appliance to render a stepladder safe. As shown, two strips of wood are fastened by means of hinges to the sides of the back supports. Blocks are fastened to the supports at the ends of these strips to prevent them from spreading too far. These will hold the ladder quite rigid and keep it from tipping when the load becomes top-heavy.

As the sides of the back support are usually about 6 or 8 in. shorter than

the front when the ladder is closed, the strips will come about even with the front sides when they are closed against the back support. The blocks should not be put on until after the strips and hinges are in place.—Contributed by James E. Cooley, Hartford, Conn.

Automatic Water Supply to a Coffee Boiler

A useful method of keeping the water in coffee boilers at a constant level is shown in the diagram. The



supply tank A is filled with water and securely corked. The water flows through the pipe B into the boiler C. When the water rises in the boiler to the opening of the pipe D it cuts off the air, causing a vacuum in the tank A. This prevents the water from flowing into the boiler. When the water boils down below the end of the pipe D, a fresh charge of water is automatically admitted to the boiler.—Contributed by F. E. Purser, Winnipeg, Canada.

Rear-End Signals on Trains

The adoption of the double-track system which has become almost universal on the railroad highways has reduced collisions to the rear-end class only. Automatic block systems, the employment of rear flagmen, and a sharp lookout by the engineer of the rear train constitute about all the pro-

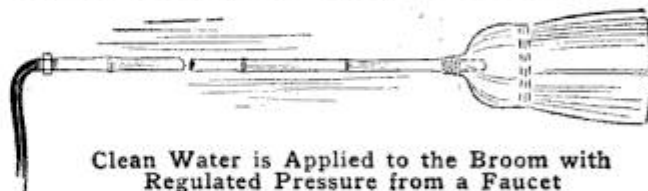
tection now in use. A large percentage of the serious accidents are rear-end collisions. Block systems occasionally fail and men are not infallible; hence a need for better protection if possible.

Many accidents could be avoided by automatic means other than the block system, one of which is as follows: On the rear end of each train carry a tank of acetylene gas and connect it to a double searchlight, one directing a pencil, or ray, of light vertically and the other horizontally to the rear. The light, or jet, is regulated by a valve operated by a centrifugal governor, which in turn is run from an idler that can be dropped on the axle of the rear car at will. The governor is adjusted so that when the speed of the train falls below a certain fixed value the valve controlling the flow of acetylene gas will open. The valve is of the kind allowing a small flow of gas at all times when in service, thus acting as a pilot light.

The minor construction details of this device are so simple that any good mechanic can easily install it without further description.—Contributed by F. B. Lambert, Chicago, Ill.

A Fountain Scrub Broom

A very serviceable scrub broom can be made by attaching the brush to a piece of bamboo pole for a handle and forcing water through it with a hose connection. As the joints of the bamboo are closed, a hole must be bored through them all. The brush is attached to the end of the pole in the same manner as it is fastened to



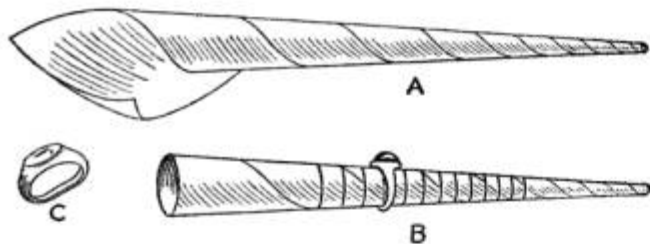
the ordinary handle, or the handle of the broom may be cut off close to the brush and a hole bored through the stub, in which the bamboo is attached. A hose connection is fastened to the other end.—Contributed by Leroy Bradley, Lorain, O.

Cleaner for a Soldering Copper.

To keep the point end of a soldering copper clean use a 1-in. pipe cap for a cup and fill it a little above the rim with No. 0 steel wool for a wiper. The threads in the cap will hold the wool in place, and by drawing the hot copper over it, the point will always be bright and clean. After the exposed part of the wool becomes matted down, it can be taken out and turned over. A hole can be bored in the center of the cap for fastening it to the bench.—Contributed by A. R. Cuning, West New Brighton, N. Y.

A Flexible Finger-Ring Gauge

Roll a tapering tube around the regular jewelers' ring gauge, using Manila paper, and glue the edges together to give it the form shown at A. Cut off the ends and slip on different-sized



The Gauge being Flexible, Rings Bent Out of Shape can be Accurately Measured

rings, friction-tight, marking the places for each size and half size plainly in ink as shown at B. Rings bent out of shape, as shown at C, can be accurately gauged on the paper taper.

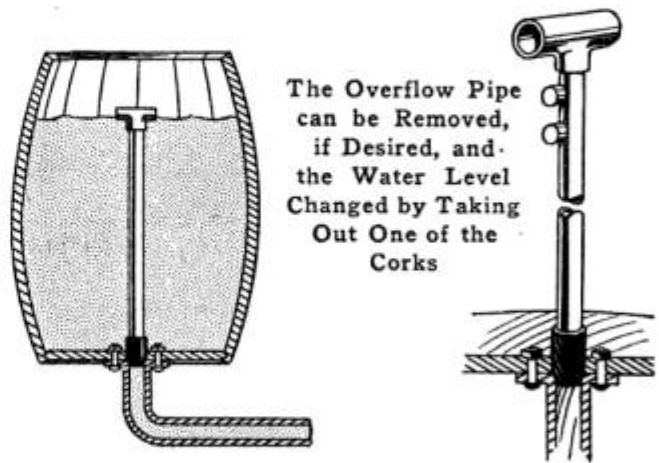
To Clean Articles of Steel

An excellent method of cleaning steel articles which have become rusted or oxidized, consists in rubbing the surfaces with pure sweet, or olive, oil, applying several coats, then laying them aside for several days, after which they are thoroughly rubbed with unslaked lime.—Contributed by Ralph W. Jones, St. Louis, Mo.

¶Isinglass, or mica, in stoves can be cleaned by soaking and washing it in vinegar.

A Detachable Overflow for a Tank

Deeming it unnecessary to add an overflow to a barrel section which I had fitted up for a tank and not car-

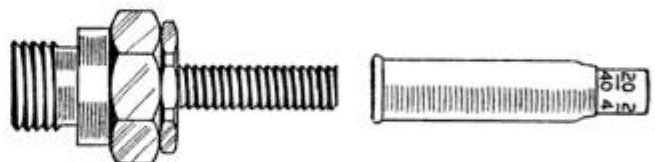


The Overflow Pipe can be Removed, if Desired, and the Water Level Changed by Taking Out One of the Corks

ing to remove any of the attached pipes, I slipped a piece of rubber tubing over the end of a piece of pipe so as to make a water-tight fit, and inserted it in the outlet in the manner shown. Holes were drilled in the pipe at intervals and plugged with corks. The water can be made to overflow at any height by removing a cork in the pipe at that level. The rubber tubing can be discarded and the pipe threaded to fit into the waste nut at the bottom.—Contributed by James M. Kane, Doylestown, Pa.

A Compression Pressure Gauge

Desiring to test the compression, to find the trouble in a two-cylinder engine, and being unable to secure a pressure gauge, I made one as shown in the sketch, which is nothing more than the lower part of an old spark plug, with the core taken out and a



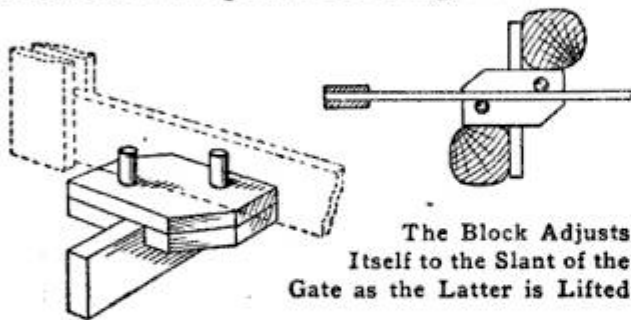
A Compression Gauge Made of a Tire Gauge, an Old Spark Plug, and a Tire Valve

bicycle clamp valve soldered in the place of it.

The plug is screwed into the cylinder and any tire-pressure gauge used to test the compression.—Contributed by S. J. Pearson, Bennettsville, S. C.

Block for a Sliding Gate

The most commonly used gate is that which slides on a crosspiece nailed between two posts set diagonally with

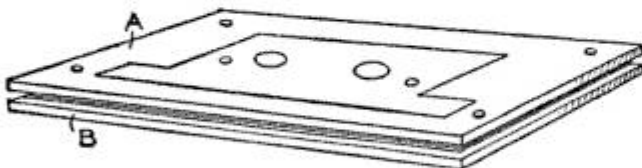


the line of the fence. Such a gate can be handled very well, but the sliding may be greatly improved by placing a block, shaped as shown, on the crosspiece. A little grease applied from time to time will make the gate work almost as easily as if it were on rollers.—Contributed by A. S. Thomas, Gordon, Canada.

Cutting Liners for Babbitted Bearings

One of the most difficult things about babbitting bearings is the cutting of the liners, especially if it is desired to have them very thin for fine adjustment. The cutting of the liners can be easily done in the following manner: Lay a piece of paper on the bearing face and press it down firmly with the fingers around the edge, also around the holes for the bolts or studs. This will leave an exact impression of the bearing face which can be traced with a lead pencil. This makes the pattern.

Two boards, A and B, are cut a little larger than the pattern, and an old magazine or other paper, having leaves that lie evenly and flat, is placed between



The Boards Hold the Paper Leaves Together While They are Cut to the Right Shape

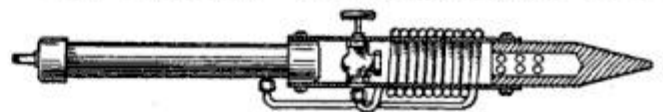
the boards. The pattern is placed on top of the board A, and a few small nails are driven through the pattern, paper, and boards, to hold them together. A band or scroll saw is used to

cut around the edge of the pattern. The holes for the bolts can be bored to the right size with an ordinary bit. The edges can be finished with a coarse file or sandpaper. The liners will come out neatly cut to shape and in a pile that can be roughly handled.—Contributed by H. F. Hopkins, N. Girard, Pa.

A Self-Contained Gasoline Soldering Torch

The handle of the torch constitutes the reservoir for the gasoline. It is made of a piece of 1-in. gas pipe, 6 in. long, fitted with a cap on each end. The cap on the rear end is drilled centrally and tapped for an ordinary bicycle-tire valve. A heavy leather gasket should be placed in this cap so that the joint will hold air and gasoline without being turned up tightly. The cap at the other end is put on after filling the threads with glycerin and litharge.

An ordinary soldering-copper end



This Soldering Iron is Exceptionally Good for Use in the Wind on Roofs

is bored out, leaving the walls about $\frac{3}{16}$ in. thick, and $\frac{1}{8}$ -in. holes are drilled through the walls for vents. The connection for holding the copper to the handle consists of two pieces of strap iron, each $\frac{1}{8}$ in. thick, $\frac{3}{4}$ in. wide, and $4\frac{1}{2}$ in. long. One end of each piece is hammered concave so that it will fit over the outside of the cap. Holes are drilled in both ends of each piece to admit $\frac{5}{16}$ -in. machine screws, and corresponding holes are drilled opposite each other on the circumference of the cap and copper and tapped to fit the screws. The parts are then put together as shown.

A $\frac{1}{8}$ -in. needle valve is fitted between the two pieces of strap iron, as shown, and connected to the reservoir with an 18-in. length of $\frac{1}{8}$ -in. copper tubing such as is used on an automobile carburetor. Small unions are soldered to the ends of the tubing which make connections with two

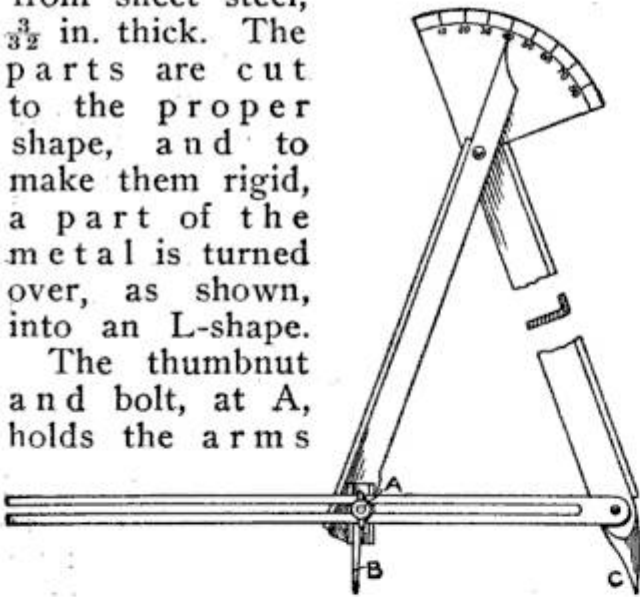
short nipples, one soldered into a hole drilled in the pipe and the other turned into the needle valve. The tubing is given several coils around the two pieces of strap iron where they will be near the flame that comes from the vent holes in the copper.

Fill the handle about two-thirds full, with gasoline, replace the cap and attach a bicycle hand pump to the valve and pump up a fairly good pressure. Pour a little gasoline in a pan and ignite it and hold the coil over the flame, or place the coil in the flame of a lamp for about one minute, then open the needle valve.—Contributed by A. H. Waychoff, Lyons, Colo.

A Disk Cutter

The cutter is made similar to a pair of dividers—in fact, it can be used as dividers and as a bevel protractor—from sheet steel, $\frac{3}{8}$ in. thick. The parts are cut to the proper shape, and to make them rigid, a part of the metal is turned over, as shown, into an L-shape.

The thumbnut and bolt, at A, holds the arms



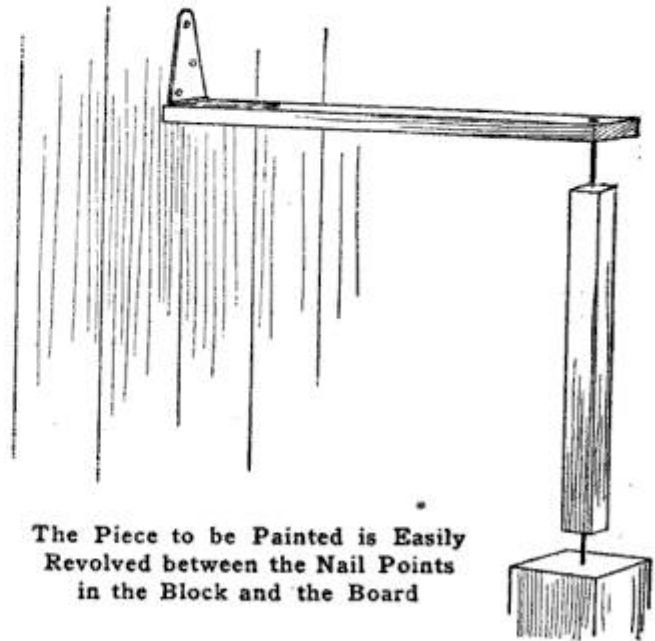
A Disk Cutter That can be Used Also as Dividers or as a Bevel Protractor

firmly for heavy work and will also hold the cutter B, which can be set at any angle. The end C is filed to a sharp point. A protractor scale is laid out and marked with a sharp-pointed tool.

The tool I made had 9-in. arms and a connecting slot bar, 6 in. long. It cuts disks or washers from cardboard, leather and wood boards of soft pine or poplar.—Contributed by John V. Loeffler, Evansville, Ind.

Painting Small Stakes

Having a large number of pieces to paint, for use in staking out a newly platted addition to a city, I found that



The Piece to be Painted is Easily Revolved between the Nail Points in the Block and the Board

the device shown in the sketch saved considerable time and made it much easier to do the work. A piece of board was fastened to the side of a building, at a convenient height, with a strap hinge. A nail was placed in the end of the board so that its point projected on the under side, then a block was set firmly in the earth with a nail projecting upward in its upper end. Each piece to be painted was placed between the two nails as shown, and in painting the stick could be revolved.—Contributed by P. F. Noyes, Ft. Myers, Fla.

Preparing a Cracked Wall for Painting or Papering

When a plaster wall or ceiling is so badly cracked that it will not do to paint or even paper the surface, cover it with strong muslin or light canvas. Use a strong paste made of flour in the ordinary way with a little glue added to give it stronger holding qualities. Press out any air bubbles that may occur and make the surface quite smooth. Either water or oil colors, as well as paper, may be applied to this surface, and it will make a very smooth and a sure job.

Telephone-Receiver Holder

Finding it necessary to devise something that would accommodate a one-armed salesman in receiving orders



over a telephone I devised the stand shown, which consists of an old ceiling plate procured from a discarded gas chandelier, and pieces of brass pipe. The ceiling plate was $3\frac{3}{4}$ in. in diameter and $2\frac{3}{4}$ in. high. A piece of $\frac{1}{2}$ -in. brass pipe was cut 10 in. long, and a cap was fastened to one end, the other being inserted through the hole in the plate from the under side. The plate was then filled, two-thirds full, with solder, covering the cap. When the solder had hardened I bent the upper end of the pipe and cut it to straddle a piece of pipe of equal size. Then another piece of pipe was cut $3\frac{1}{4}$ in. long; two $\frac{1}{4}$ -in. holes, $2\frac{3}{4}$ in. apart, were drilled through it, and two pieces of $\frac{1}{4}$ -in. wire inserted in the holes, the ends of the wires being then bent upward to fit the receiver snugly. The short piece of pipe was soldered to the upper, bent end of the upright.

This device proved to be very satisfactory, inasmuch as it not only served the purpose mentioned, but was also very handy for those with two hands, since they could write and talk at the same time and refer to catalogs without delaying the customers.—Contributed by Jno. F. Gleaser, Cincinnati, O.

Silver Paste for Coating Brass Articles

The marks and figures on scale beams, scales for thermometers, steam gauges, etc., can be finished in the following manner: Fill the marks and numbers in the brass with japan and

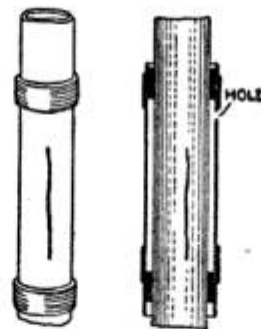
clean the surface to be finished, after which the article is placed in an oven to bake the japan.

The surface of the metal is thoroughly cleaned with a fine grade of emery cloth and a paste, made as follows, then applied and well rubbed on the metal: Mix $\frac{1}{2}$ oz. of chloride of silver, 5 lb. of ordinary salt and $\frac{1}{4}$ lb. of cream of tartar thoroughly in a dry state, then add enough cold water to make a paste. Do not add too much water. As light affects the silver, the mixture should be kept in a dark place or in a covered earthen vessel. After thoroughly rubbing this paste on the metal surface this will take on a dirty yellow tinge. It is brightened by again rubbing the surface with a mixture, in a dry state, of $\frac{1}{4}$ lb. of cream of tartar and 5 lb. of salt. When this is finished, the metal is thoroughly washed to remove any trace of salt, then dried and lacquered.

Repairing a Split in a Water Pipe

A lead pipe burst one Sunday noon leaving a split about $1\frac{1}{2}$ in. in length. This required a wipe joint, but we could not get a plumber at that time and would have been without water if repairs had not been made that were intended at the time to be temporary only.

Having dried the pipe well and cleaned it, I wrapped the pipe with adhesive tape, about 5 turns each, above and below the split. Then I placed a piece of stiff paper around the pipe on the two bands of tape so that the paper was held a little distance from the pipe. The ends of the paper were held with another turn of tape. A hole was stabbed in the paper near the top and the space filled with hot lead. After removing the paper and lead it left a neat-looking job which has proved to be as good as a wiped joint.—Contributed by Chas. H. Richards, Toronto, Can.



tool.

The tool I made had 9-in. arms and a connecting slot bar, 6 in. long. It cuts disks or washers from cardboard, leather and wood boards of soft pine or poplar.—Contributed by John V. Loeffler, Evansville, Ind.

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the paper and lead it left a neat-looking
job which has proved to be as good as
a wiped joint.—Contributed by Chas.
H. Richards, Toronto, Can.

Practical Telephony

By HAROLD HINTON

Part IX—Telephone Construction

Open Wire

This construction deals with the placing of wires on insulators fastened to pins on the crossarms which are fastened by a bolt through the

length of the pole to be placed, depth of the hole and, if it is to be guyed, in what direction and the kind of anchor to be used. Poles whose ultimate capacity will never exceed two

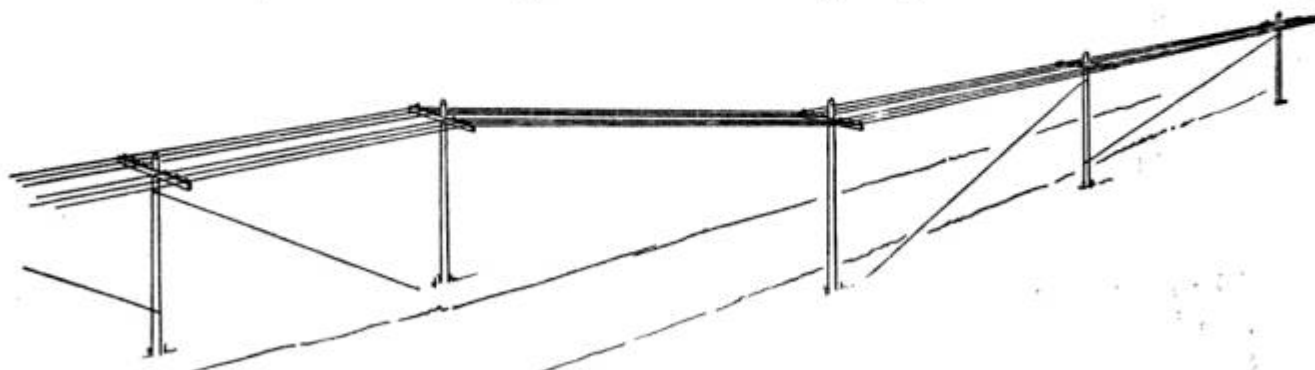


FIG. 48

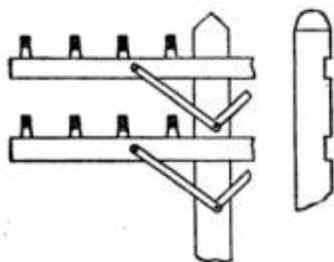


FIG. 49



FIG. 50

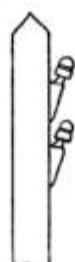


FIG. 51

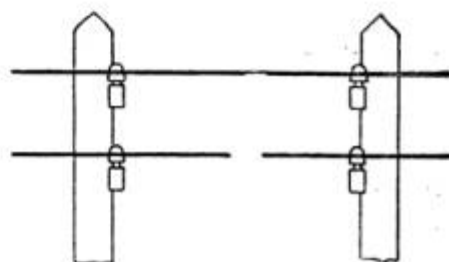


FIG. 52

A Pole Line Crossing from One Side of a Roadway to the Other and the Manner of Shaping the Top End of Each Pole. Crossarm and Bracket Construction and Method of Attaching to the Pole

pole with iron braces. In considering this subject there are several points which must be taken into account, both before starting to lay out the pole line and after the erection of the poles has been started.

A careful examination of all possible routes for the main line and branch lines to houses should be made and the shortest and most direct route possible selected. Avoid all abrupt turns, long detours, large trees, sudden breaks in the grade of the wires, and all serious obstacles. Locate the line so that the least possible amount of guying is required. Obtain a permanent right-of-way for every pole, attachments and fixtures.

In laying out the run for the pole line, locate the position of each pole with a stake, either sighting them into a direct line or by using a transit. Upon the stake should be marked the

wires should be placed 260 ft. apart, poles for six wires, 170 ft. apart, and those for a 20-wire line, not over 130 ft. apart, except under unusual conditions. The last span—the distance be-

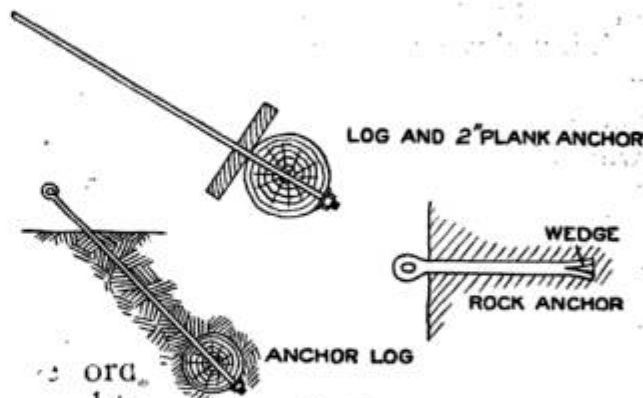
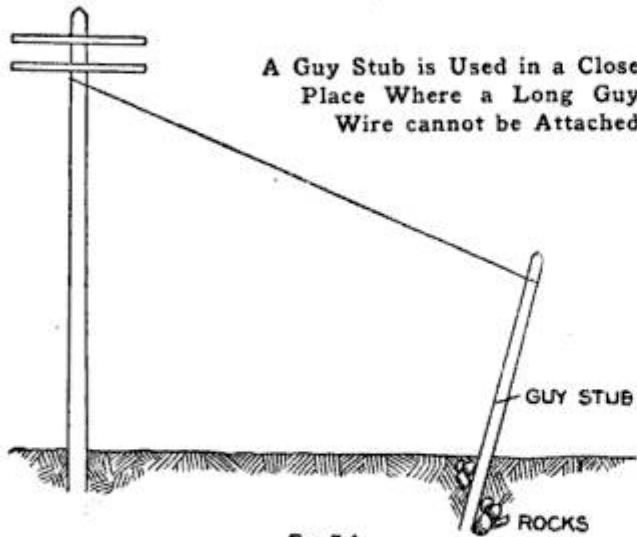


FIG. 53

Three Methods of Anchoring the Guy Wires from the Poles, the Kind Depending on the Soil

tween two poles—should be a little over half the length of the other sections. When extra-long sections are absolutely necessary, as when crossing

a stream or narrow ravine, the sections on either side of the long section



A Guy Stub is Used in a Close Place Where a Long Guy Wire cannot be Attached

FIG. 54

should not exceed half as much as the length of the average span. Crossings from one side of the road to the other should be avoided, but, when neces-



FIG. 55

The Line Wires are "Tied In" on the Glass Insulators Which are Set on the Pins

sary, they should be made as shown in Fig. 48.

When crossing or running parallel

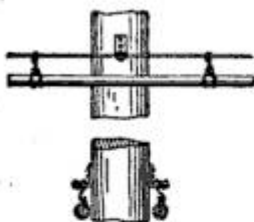


FIG. 56

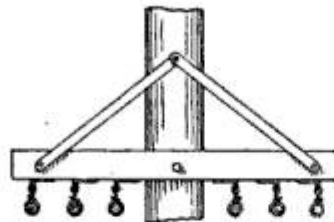


FIG. 57

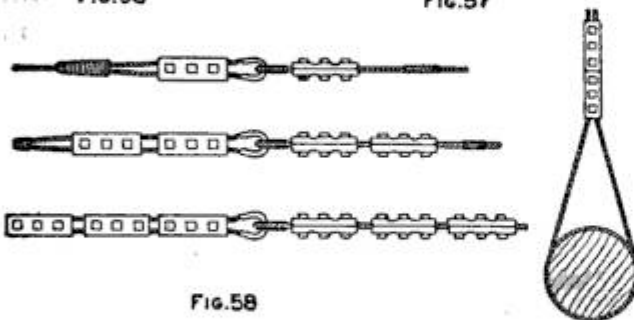


FIG. 58

FIG. 59

The Fastenings for the Messenger Strand on Which the Cable is Strung, the Splicing and Dead End

with a railroad right-of-way, the poles should not be set closer than 12 ft. from the rail, and the bottom of the

lowest crossarm should be at least 22 ft. above the web or top of the rail. In placing poles and stubs on streets, they should be set as close to the inside of the curb as possible. If the curb is not set, the correct curb lines should be obtained from the town authorities, and the poles and stubs set as close to it as possible. Poles placed in alleys should be set as close as possible to one side or the other. In crossing a road no wire should be less than 18 ft. above the crown of the pavement. The heaviest poles should be always used at the corners.

The crossarms should be fully equipped with braces and pins before they are distributed, except in cases where there will be only two wires on the arm, when the brace may be omitted. The braces, when used, should be 30 in. long and attached to the arm with 3/8-in. carriage bolts having a galvanized washer under each head.

All the poles should be topped, gained, and crossarmed, Fig. 49, before they are raised, and the gains and tops should be painted with creosote or carbolineum. When brackets are used instead of crossarms, they should be attached as shown in Fig. 50, except when used on curves and corners, where they should be placed on the outside of the curve, one above the other, as shown in Fig. 51.

Poles should be set to the depth given in the following table:

Length of Pole	Depth in Ground	Depth in Solid Rock
18 Ft.	3 Ft. Straight.	3 Ft. on Corners
20 "	4 Ft.	3 "
22 "	4 "	3 "
25 "	5 "	3 "
30 "	5 1/2 "	3 1/2 "
35 "	6 "	4 "
40 "	6 "	4 "
45 "	6 1/2 "	4 1/2 "
50 "	7 "	4 1/2 "

The holes for poles should be dug large enough to admit the pole without cutting, and also large enough at the bottom to permit the use of tampers after the pole has been set.

Crossarms should be placed at right angles to the direction of the line and facing each other, as shown in Fig. 52, except on long sections when they should be placed on the side of the pole away from the long section, so

that the strain will be against the pole and not have a tendency to pull the arm from the pole.

Various styles of anchors are shown in Fig. 53, while Fig. 54 illustrates the use of guy stubs. The line wires should be "tied in" as shown in Fig. 55.

Aerial Cable

In the construction of aerial-cable runs the method of setting the poles is

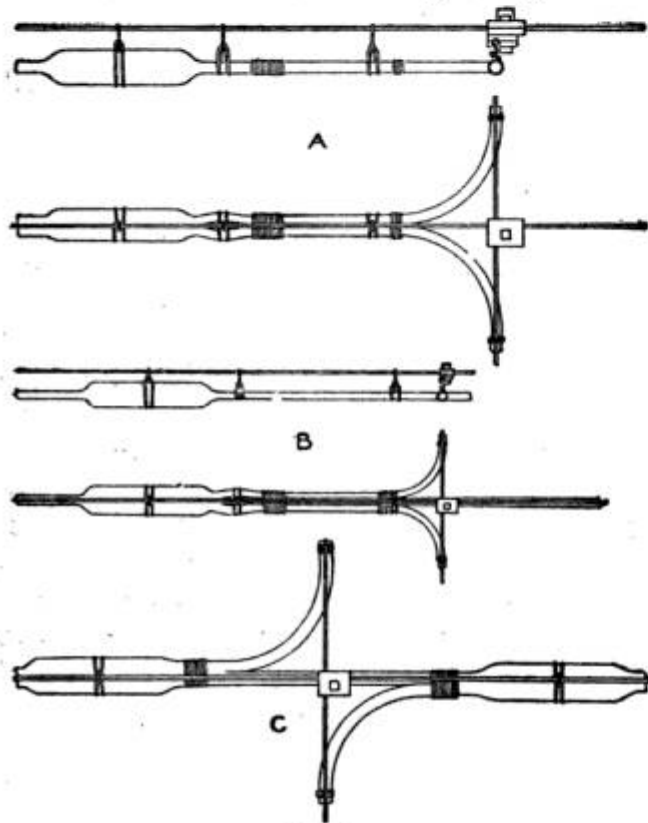


FIG. 60

The Manner of Supporting a Cable at a Three-Way, Four-Way and a Two-Way Splice

almost the same as that described, except that, where the pole line is to be used for cable only, the crossarms are omitted and all guys are attached to the pole just above the cable. Instead

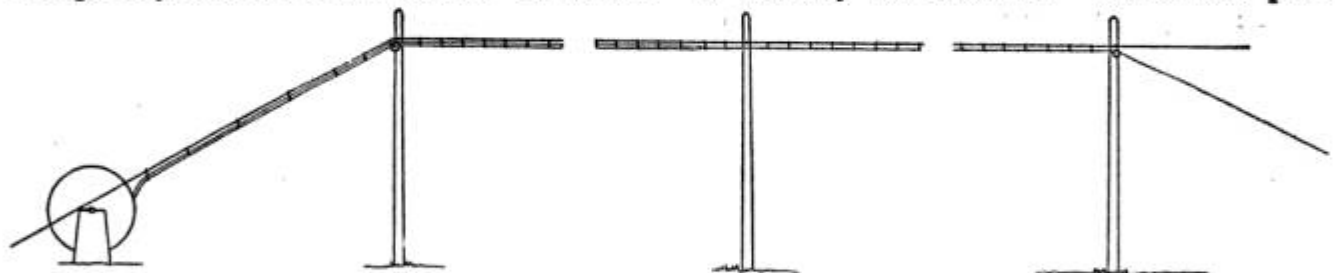


FIG. 64

The Manner of Drawing the Cable through the Rings Applied to the Messenger by Linemen Riding in Safety Straps Used for Cable Cars, the Cable Usually Starting from an Underground Cable Box

of the crossarms, the messenger strand upon which the cable is hung, is fastened to the pole as shown in Fig.

56, or, when cable crossarms are used, as in Fig. 57. The method of splicing

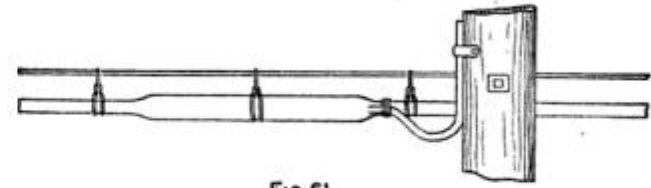


FIG. 61

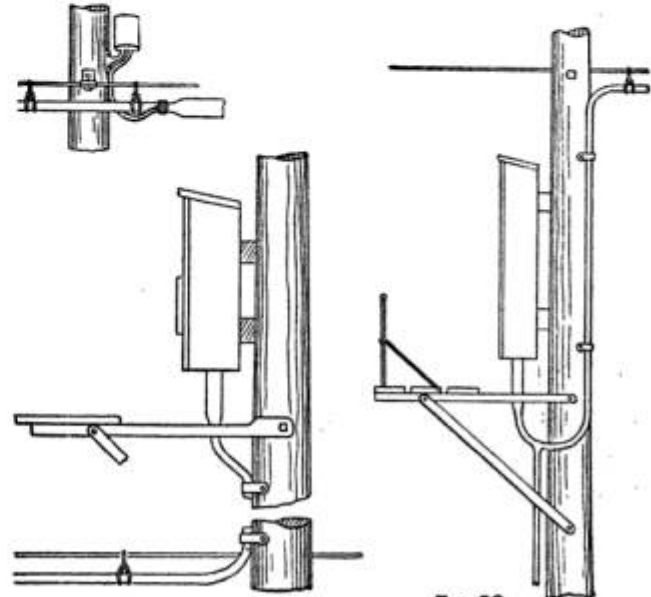


FIG. 62

FIG. 63

A Splice and Terminal-Tap Support, Two Aerial Terminal Cables, and a Cross-Connecting Underground Cable Box

the suspension strand is shown in Fig. 58, and the dead end, in Fig. 59.

In Fig. 60, at A, is shown a method of supporting cable at a three-way splice; B shows a four-way splice, and C shows a two-way splice, while Fig. 61 shows the method of supporting a splice and terminal tap. Two styles of aerial-cable terminals are illustrated in Fig. 62, and Fig. 63 shows a cross-connecting underground cable box which feeds the aerial cable.

The construction for the aerial-cable is usually as follows: After the pole

line is set and properly guyed, the messenger strands are run up, hauled taut and securely fastened on each pole.

One or more linemen then start "riding" the messenger, usually using

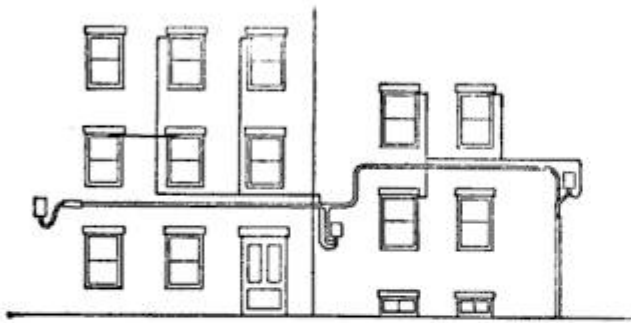


FIG. 65

Block-Cable Construction to Do Away with Exposed Wires Running from House to House

safety straps for cable cars, and crimp on the cable rings, after which the cable is drawn through, as shown in Fig. 64. The aerial cable usually starts from an underground cable box, but sometimes

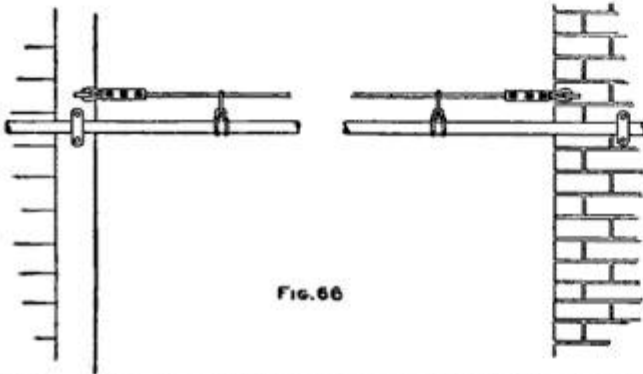


FIG. 66

Where It is Absolutely Necessary the Cable may be Carried Across between Two or More Houses

the aerial runs direct from one point to another. Terminals are placed on poles as near together as required, and the cable is spliced up.

Block Cable

The block-cable construction or interior block distribution is used to do away with exposed wires running from house to house, over roofs, and passing

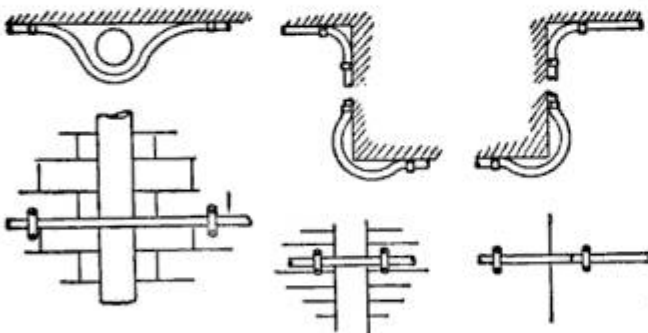


FIG. 67

The Way to Carry a Block Cable around an Obstruction or Inside and Outside Angles

windows from one place to another. A good illustration of this construction is given in Fig. 65, where underground and block cable is used to the terminals and where a twisted-pair outside wire is run, through "ring runs," from the terminals to the instruments. This method of construction is used exten-

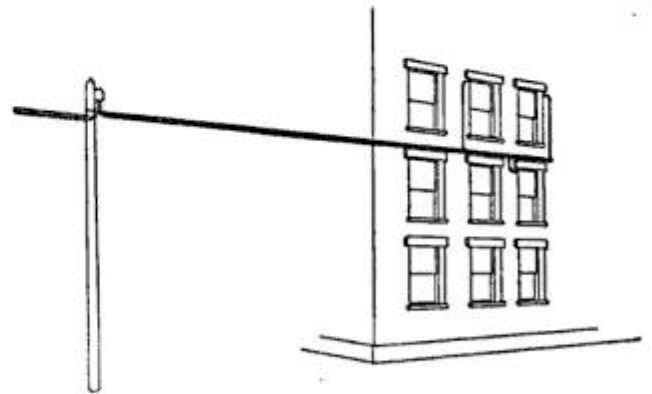


FIG. 68

Wiring a Building without Running the Cable to It, Using Twisted-Pair Drop Wires for the Connections

sively in the business sections when wiring old buildings. In wiring new buildings and apartment houses, it is customary, if the number of tenants will warrant the expense, to carry an underground cable directly into the building, usually to the elevator shaft, and run it up to the roof, taking a tap

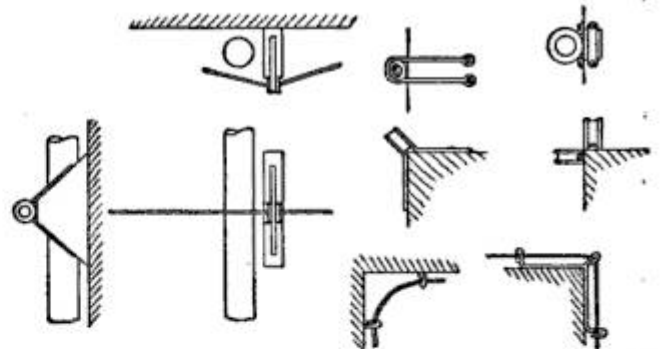


FIG. 69

A Ring Run Used for the Distribution of the Drop Wires for Passing Obstructions

off and putting in a cable box at each floor so that the wires may be run from these boxes to the instruments as they are installed on any floor.

Sometimes it is desirable to carry a cable across a space between two or more houses, and, while this may not be good practice as a rule, there are exceptions, and when absolutely necessary, the work may be done as shown in Fig. 66. A method of carrying a

block cable around an obstruction and of turning projecting and inside corners is shown in Fig. 67. A building may be wired without the expense of running a cable over to it as shown in Fig. 68. The twisted pair of drop wires are bundled together and taped, then run through rings between the terminal pole and the building and carried through ring runs to the various

parts of the building. Methods of passing obstructions, corners, etc., with a ring run for the distribution of the drop wires is shown in Fig. 69.

The principal thing in up-to-date telephone construction is to get everything concealed as much as possible while still having ready access to it in case of trouble, and at the same time to reduce the cost of construction.

(To be continued)

Black Mat Surface on Steel

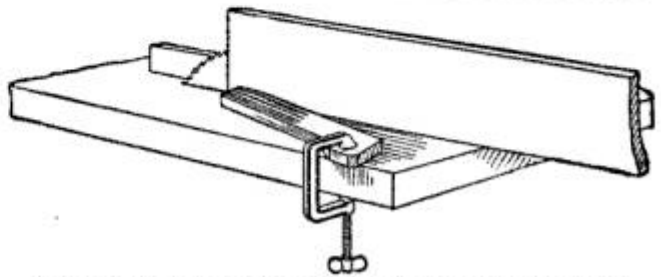
Metal parts on cameras must be colored a dead black, that will produce no reflection and should be rust-proof. A secret process that has been used for this work successfully is as follows: The metal parts are boiled in a solution of 1 oz. of pulverized tartar to 10 oz. of water. Use a porcelain-lined or earthen vessel. The parts are then immersed in a saturated solution of blue vitriol until they take on a coat of copper, after which they are immersed in a saturated solution of sulphur-ammoni- ac until they become black, when they are taken out and rinsed in clear water.

A quantity of clean and dry beechwood sawdust is mixed with sufficient olive oil to make the whole slightly oily, after which sufficient powdered graphite is added to make it black. The metal parts are then placed in this and put in a receptacle to be burned or baked. Some sort of an oven that can be closed, to exclude all air, is used and heated with its contents in a flame until the sawdust is burned to a charcoal. The parts are then taken out and cooled.

Wood Spring for Use on a Saw Table

Where it is necessary to hold work up to a shaper or a saw in resawing stock, a spring made of wood is very handy. Any kind of material may be used, but some woods have more spring in the grain than others. The spring is formed by making several saw cuts in a selected piece of wood, as shown

in the sketch. It is clamped to the table with a hand screw so as to hold



The Slots Cut in the Wood Make a Spring That will Keep the Stock against the Gauge

the work against the gauge.—Contributed by Ernest S. Yawger, Ithaca, New York.

Pencil Points for Drawing Even Lines

A soft, white bond paper has a surface that will cause trouble in drawing pencil lines of even width and shade for drafting-room purposes. Where blueprints are made direct from the bond-paper drawing without

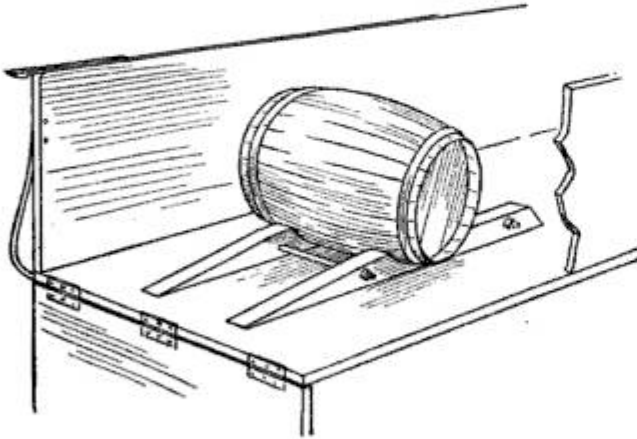


the lines being inked in, they will not be printed evenly. In order to get clear and neat prints it is necessary to have all lines of an even width and shade. If a pencil is sharpened as shown, such lines can be drawn. A pencil sharpened in this manner will work equally well on other grades of paper, and the pencil requires less sharpening.—Contributed by Wm. Wareing, Pittsfield, Mass.

Ⓒ Large taps, broken off in metal, can be removed by attaching a stem with an oxyacetylene-welding apparatus.

Loading Barrels in a Wagon Box

A barrel loaded in a wagon box is apt to roll about unless pieces are placed under the edges, but even then,



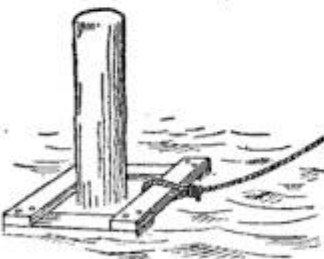
The Curved Parts Cut into the Pieces Keep the Barrel from Rolling About

if the barrel is a large one and full, the pieces will not hold it. A simple device for keeping the barrel from rolling is made of two pieces of 2 by 4-in. wood, about 3½ ft. long, with a concaved place cut out near the center, as shown, and the ends cut to a point so that the barrel may be easily rolled up on them. Join the pieces together with strong pins. Roll the barrel into the notches and it will remain there until ready to unload.

For hauling a number of barrels, remove the wagon box, make the pieces of heavy timbers extending from one bolster to the other and cut as many notches as there are barrels to be hauled.—Contributed by J. G. Allshouse, Avonmore, Pa.

A Floating Mooring

By making a boat fast to a loose collar of wood placed about a conveniently located pile, the boatman



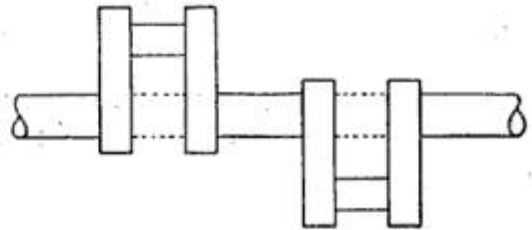
will always find the knot in the end of the painter upon the surface of the water instead of submerged to a depth of several feet, which often happens when the rope is tied to the pile itself. The collar of wood can be

made of material 2 in. thick and 4 in. wide, and of such a size that it will easily slip over a pile. The joints should be securely fastened with bolts.—Contributed by Forrest Clark, Coronado, Cal.

A Built-Up Crankshaft

In making a crankshaft for a twin-cylinder engine I was fully aware of the difficulty in making a built-up shaft to secure a perfect alinement as well as having the parts equally spaced. I overcame the difficulty in the following manner:

The engine being a small one, the crank webs, or arms, were made of a cold-rolled steel bar, ¾ by 1 in., and two pairs were marked off on this material, a line being scribed through the center of one face on each piece with a gauge, whereupon the location for the holes was center-punched. All eight holes were then drilled in a lathe



After the Pieces are Located and Fastened the Unnecessary Parts are Sawn Out

for a ¾-in. shaft; the pieces were piled one on the other and a perfectly straight piece of ¾-in. steel rod was inserted through the holes in the ends to be used for the crankpins, thus adjusting this series of holes in perfect alinement. The holes in the other ends, being ¾ in. in size, had to be enlarged to ½ in. or the size of the shaft. This is where the wisdom of the scheme became apparent, for, in spite of careful laying out, marking and drilling, when the holes at one end were in perfect alinement, those at the other end showed such variation as to make proper and accurate assembling out of the question. The next step was to bolt the stack of four pieces to a slotted faceplate, after first soldering along each joint as a temporary binder, and centering the hole in the outer

piece as true as possible, then boring all holes to the $\frac{1}{2}$ -in. size in the manner of ordinary boring on a lathe.

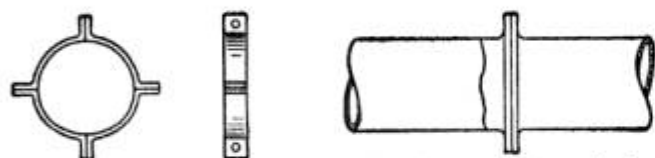
After removing the pieces from the faceplate and separating them, they were mounted on the shaft in the proper locations; the rod for the crankpins was inserted, and both crankpins and shaft pieces were fastened as desired with screws or pins, driven, soldered or brazed. The portions of the shaft shown by the dotted lines are sawn out and the parts filed and polished.—Contributed by Harry F. Lowe, Washington, D. C.

Repairing a Break in a Suction Line

A serious break that occurred in a 14-in. suction line to a condenser, and also the clamp that was made for temporarily repairing the pipe, are shown in the sketch, which is redrawn from the *Southern Engineer*. The clamp was made of iron, $2\frac{1}{2}$ in. wide, with holes in the lugs for $\frac{3}{4}$ -in. bolts. The clamp was made $16\frac{1}{2}$ in. inside diameter.

About 5 lb. of white lead was procured and thinned down a little with gasoline. A quantity of asbestos wicking was unraveled and pulled apart. The asbestos was mixed with the white lead so as to form a putty, which was put around the pipe in a layer about 3 in. thick, over the crack. The clamp was then put on and drawn up tightly.

A vacuum was maintained for two weeks without any trouble, and when the clamp was finally removed, to put



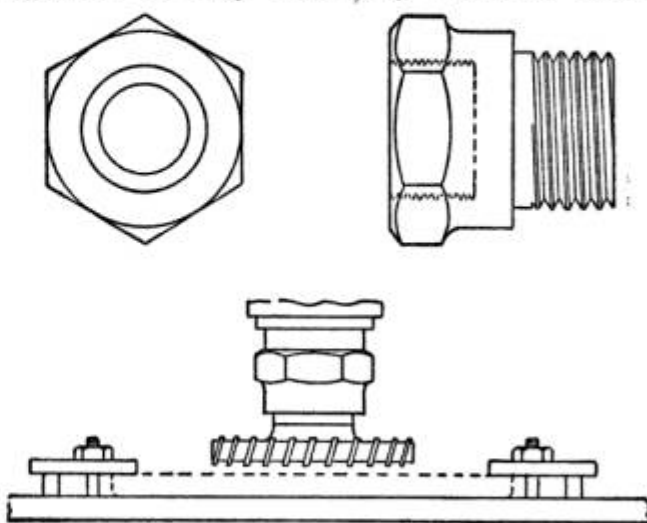
The Break in the Pipe and the Construction of the Clamp for Holding the Special Packing

in a new suction pipe, the putty was found to be firm and perfectly tight, and doubtless would have remained so indefinitely.

CA grape-juice or milk bottle will serve admirably as a rolling pin or potato masher.

Collet for a Vertical-Shaft Milling Machine

The illustration shows a simple form of collet which can be fitted to the spindle of any ordinary vertical mill-



A Collet of Special Construction for Holding Cutters in Vertical-Spindle Milling Machines

ing machine. The collet is made from a machine-steel forging, machined hexagon in shape so that a large wrench may be used to tighten it in place.

The inside thread of the collet is cut to fit the thread of the spindle on which it is to be used. The outside thread is cut to fit that of the milling cutter used. Due care should be used in cutting the threads, as a good fit to both spindle and cutter is necessary.

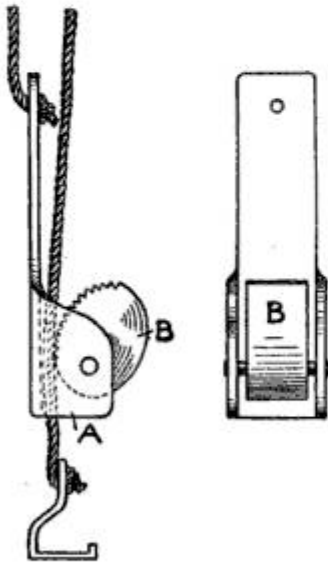
In machine shops where several makes of vertical milling machines, each having a different size of spindle, are in use, a standard cutter might be employed if the machines are equipped with a collet of this kind, each having the same size outside thread, thereby making a saving in the cost of cutters.—Contributed by C. E. Bradley, Fall River, Mass.

To Keep Varnish in Jars

Dip the cover, rubber, and top of a screw-top fruit jar in melted paraffin, then pour the varnish, left over from a finishing job, into the jar and seal tightly. The paraffin will prevent the cover from sticking and, by excluding the air, preserve the varnish indefinitely.—Contributed by Alice M. Smith, Tacoma, Wash.

An Adjustable Stock Holder

In handling considerable work that required bars of stock to be held horizontally as they were fed into the machines, one of the men devised a holder that was suspended from the ceiling and adjustable for height to suit different classes and sizes of stock.



This holder is shown in the illustration. A piece of flat steel with two wings bent at right angles to the back is formed as shown at A. At its upper end a length of sash cord passes through a hole and is knotted. The free end runs up and through an eye fastened in the ceiling and back down again where it passes between the wings and down to the foot of the holder which is an L-shaped piece in which the stock is laid. To prevent slipping a toothed roller, B, is inserted between the wings. This roller is drilled eccentrically as shown and permits the passage of the cord when it is in one position and holds the cord when in another position. The notches help to hold the cord, and as the weight increases the grip will be greater.

Paint for Steam-Gauge Hands

Steam and other gauges placed in dark places are very hard to read correctly. This trouble can be overcome to some extent by painting the hands with a coat of brilliant aluminum powder mixed with good, clear varnish to the thickness of syrup. The varnish will protect the bright surface and prevent it from becoming soiled or dirty. The hand can be seen in a very dark place when coated with this paint.—Contributed by C. R. Dreese, Kansas City, Kan.

Cleaning a Gun of Lead

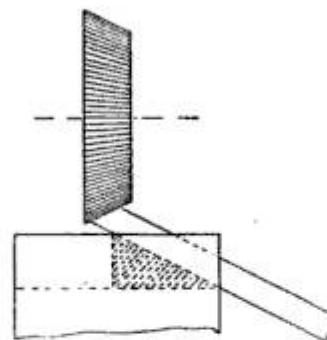
There is nothing that will keep a gun or other steel or iron articles in so good a condition as mercurial ointment. It has been used for years by surgeons to prevent their instruments from rusting. Do not grease the article, simply wipe it with a cloth saturated with the ointment.

In caring for a gun, wipe it out well, then run a wiper through saturated with the ointment, and there will be no rusting whatever. Neither will the outside of the gun rust if the ointment is applied there. The ointment will not only prevent rust, but will also loosen any lead in the barrel.

If a gun has become leaded and is wiped as described, it will appear to be full of rust or dirt after standing a few days. If wiped again, the wiper will be found covered with minute particles of lead which have been loosened by the mercury, and the barrel will be clean. The mercury has no affinity for iron, but has for lead.—Contributed by J. H. Beebe, Rochester, N. Y.

Cutting Bars on an Angle

On a job where a large number of bars were to be faced at an angle of 60 deg. and only a 30-deg. cutter was at



hand, the work was accomplished in the manner shown in the sketch. A wood block was sawed at an angle of 30 deg., laid in the vise of the milling machine and used as a guide against which the bars were clamped. The 30-deg. cutter was placed on the arbor of the machine, and the pieces were thus finished to the required angle.

☞An earthenware cement can be made of 1 part powdered lime, 2 parts grated cheese, and the white of an egg mixed to form a paste.

To Strengthen Scaffold Boards

A simple and effective method of stiffening thin boards used for treads on scaffolding is shown in the sketch. Two pieces of timber, about 1 in. thick, 3 in. wide, and as long as the boards are wide, are placed between them near the ends. The boards are then nailed together at their ends and the braces nailed between them. This



A Board Used on Scaffolding Strengthened to Prevent Sagging in the Center

will be found to make a stiffer tread than a single board of double thickness.—Contributed by C. K. Theobald, Vicksburg, Miss.

Repairing a Broken Connecting Rod

Owing to the construction of the ordinary two-bar connecting rod, shown in the illustration, the breakage of one of the rods is by no means an uncommon occurrence. The breaking of a rod, either the upper or lower, generally occurs at a point near the box, which makes almost any form of temporary repair an impossibility. However, a piece of pipe and a long rod threaded at both ends can be utilized in an efficient way to take the place of the broken bar of the rod.



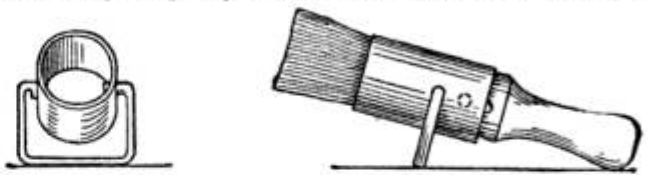
A Piece of Pipe and a Long Rod Taking the Place of a Broken Bar

The writer has seen one of this type of rods repaired in this manner which gave good service for a period of two years.—Contributed by F. W. Bently, Milwaukee, Wis.

Sleeve for a Marking Brush

It is necessary to have the bristles of a marking brush short and stiff, and in order to keep them uniform, one user fitted a sleeve on the brush that could be adjusted as the bristles became shorter by wear. The sleeve, as shown, slips over both brush and

handle and is set for its different positions with a U-shaped wire spring having a projection at one end to en-

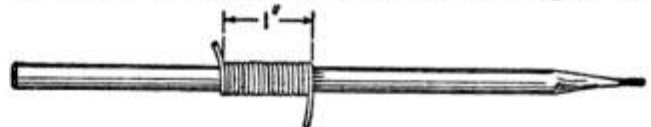


The Close-Fitting Sleeve Holds the Ends of the Bristles to Make Them Compact

ter a hole in the handle after passing through the sleeve. Several holes in the handle provide the range of positions for the sleeve.

Measuring Wire Diameters without a Gauge

A simple way of ascertaining the diameter of wires, when no wire gauge is at hand, and a method used by a German engineer, is to wind a number of coils close together around a lead pencil or other round object for 1 in., more or less, and divide the length of



A Simple Problem: Find the Wire Diameter When the Number of Coils and Length are Known

the wound part by the number of coils, thus obtaining the diameter of wire in fractions of 1 in. This method is applicable and gives quite reliable results for diameters as small as .005 in.

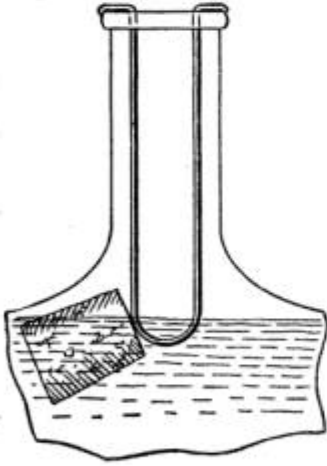
Fasteners for Small Metal Tubes

A handy fastener for small wires, copper and brass tubing can be formed by using links taken from a brass key-ring chain. Each link is bent as shown and fastened with upholsterers' tacks or brass screws with round heads. This makes a neat fastener for bell wires and, if well insulated in the bend, can be used on wires carrying considerable current for experimental purposes.—Contributed by C. R. Dreese, Kansas City, Kansas.



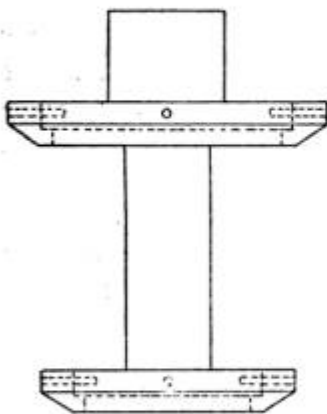
Keeping Cork in a Bottle Away from Opening

When trying to extract a cork without the aid of a corkscrew it often happens that the cork is forced into the bottle. The result is that every time the bottle is inverted the cork is drawn into the neck of the bottle and stops the liquid from running out. To prevent this, bend a piece of spring wire into the shape shown, and insert it in the bottle neck. The wire form should be long enough to extend slightly into the bottle. When the bottle is inverted the cork will be kept back from the neck and there will always be an opening, regardless of the position taken by the cork. Of course, this cannot be used in bottles containing corrosive liquids or acids.—Contributed by J. J. Kolar, Maywood, Ill.



Temporary Repair on a Governor Valve

The seats and valve of a well-known type of a governor had become so badly worn that throttling the engine down was an impossibility. After facing the seats off in good shape the valve was too small, and in order to run the engine while a new valve was being procured it was decided to fix up the old one temporarily.



Each flange was turned off to make a shoulder, as shown by the dotted lines in the sketch. Brass rings were made and pressed up to this shoulder, and

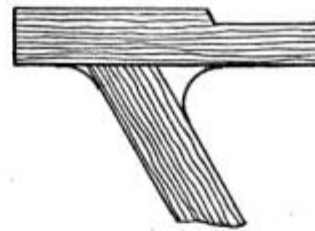
four small pins put in as shown. The valve was then ready to be turned off on a bevel to fit the newly dressed seats.—Contributed by Donald A. Hampson, Middletown, N. Y.

A Window Card

A novel window card may be made by painting one side of a double-strength piece of glass with black iron varnish and lettering the desired inscription with a sable brush, using ink made by mixing oxide of zinc and mucilage. This is much cheaper than cardboard, and the writing can be easily washed off and the glass used over and over again.—Contributed by T. F. Monaghan, Philadelphia, Pa.

To Make a Pattern Fillet Quickly

Having a hanger-bracket pattern to make in a hurry, I saved considerable time by making the fillets as follows:



The fillets were on a $2\frac{1}{2}$ -in. radius and $2\frac{3}{4}$ in. wide. A tube was made of a tin piece, 15 in. long, rolled to a diameter of 5 in.

This was cut into six equal parts and each part fastened into the corners of the patterns with small nails. The space between the tin and the wood was filled with old putty and waxed over the outside surface. As there were 16 corners to be filled in, I found that the time was reduced considerably by using this method instead of cutting the fillets from wood.—Contributed by E. A. Butler, Meriden, Conn.

Lifter for Opening Boxes

A simple tool to use in opening boxes is made by hammering one end of a short piece of $\frac{3}{4}$ or $\frac{1}{2}$ -in. pipe closed and smoothing the chisel end thus made on a grindstone. This tool serves all the purposes of a cold chisel in box opening and is inexpensive.

An Electric Cigar Lighter

By J. H. MILLER

One of the later electric heating devices is the electric cigar lighter, and for those who desire to make their own apparatus this description is given. The heating coil of the lighter is the important part and should be constructed and tested out before the handle is fitted to it.

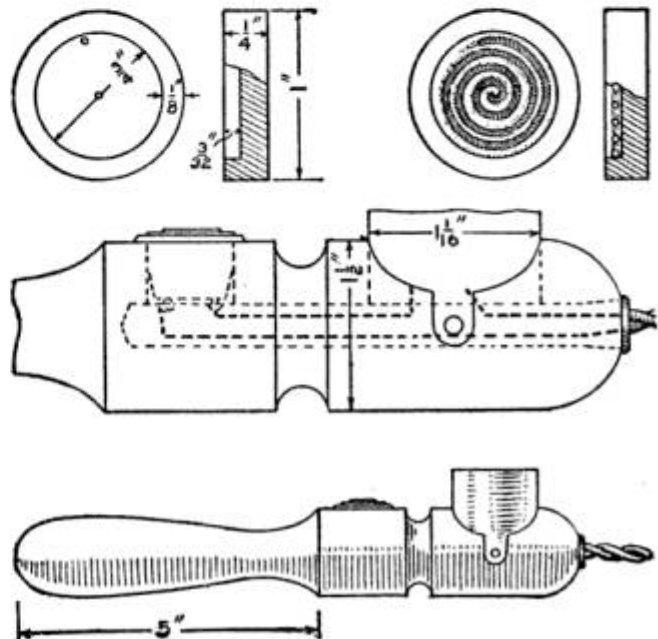
The coil is made of the finest resistance wire that can be procured, No. 39 nichrome wire being used in the one described. About 30 in. of this wire is sufficient for a 110-volt circuit. Wind this wire on a mandrel, made of No. 14 gauge steel wire, slip the coil thus made from the mandrel and insert a piece of asbestos string that will fill the inside of the coil. Be sure to have all the turns separated from each other. The finished coil should be about 3 in. long.

A piece of transmitter asbestos board, $\frac{1}{4}$ in. thick, is procured, and a circular recess, $\frac{3}{4}$ in. in diameter, and $\frac{3}{8}$ in. deep, is cut into it with a small chisel. The outside is trimmed down to 1 in. in diameter, whereupon a small hole is drilled in the center, and one at the circumference. Insert one end of the coiled wire in the center hole and wind the coil spirally on itself with another asbestos cord between the turns. The coil should about fill the recess cut into the asbestos board. The other end of the coil is inserted through the small hole at the circumference. This brings the ends of the coil out on the back of the board. A piece of thin mica is fitted over the face of the coil, to hold it in place when the coil and board are fitted into the socket on the handle. A piece of wire, wrapped around the parts, will serve to hold them together temporarily and while making the tests.

Connect the leads to the supply from a 110-volt circuit. If the wire is the proper length, the coil will heat up sufficiently to char wood through the mica covering. If in doubt about the length of the wire, make it of plentiful length

so that, when testing, a little can be cut off at a time until the right heat is obtained.

The handle is made up as follows: Procure a small metal can, 1 in. in inside diameter, and cut it off $\frac{3}{4}$ in.



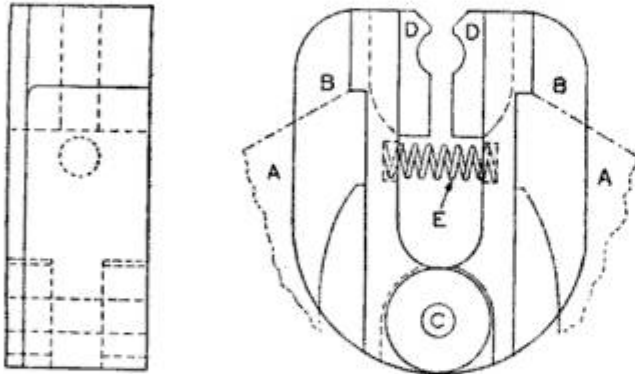
Detail of the Parts for the Construction of an Electric Cigar Lighter

long, making the cut on a curve so that it will fit snugly on the surface of a cylinder $1\frac{1}{2}$ in. in diameter. Cut a hole in the bottom of the can, $\frac{3}{4}$ in. in diameter, and place the coil with its base and mica covering into the can end. Fill in all unoccupied space with asbestos fiber, taking care to keep the leads to the coil well insulated from each other and from the box.

Turn up a handle, as shown. If there is no lathe at hand, this work can be done at a local shop, or by a person owning a lathe. A $\frac{1}{4}$ -in. hole is bored centrally through the handle and a $1\frac{1}{16}$ -in. hole bored to meet it from one side, over which the can part holding the coil is attached. Another hole is bored of such size as to admit a flush push button into the side of the handle, and on a line with the heating coil. The connections are made from the push button and the heater to the flexible lamp cord, as shown. Direct or alternating current can be used if it is 110 volts.

Stamping Fixture for Small Tools

The illustration shows a fixture designed to take care of the stamping of special drills, reamers, taps, etc. The



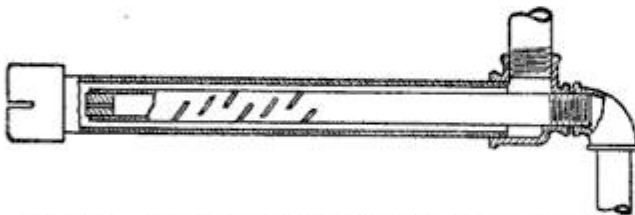
A Holder for Small Round-Shank Tools While Marking Them with Hand Stamps

jaws AA are those of a quick-action cam-and-lever vise, and BB are the two jaws of the fixture, which are held together by the hinge pin C and have a recess cut in their upper ends to take various-sized jaws, DD. The jaws are held apart for the insertion and removal of the work by the action of the spring E.

For stamping special taps, reamers, drills, and all round-shank tools, when only a few of a kind or size are made at one time, this method is quick, accurate and very efficient, as the operator soon learns to do a neat job in locating the stamps by hand.—Contributed by Chas. F. Scribner, Hartford, Conn.

A Homemade Oil Burner

The oil burner illustrated was designed by a correspondent of Power who claims that it gives very good re-



Detail of the Oil Burner Made Entirely of Pipe and Fittings for Use in Boilers

sults. The burner is constructed entirely of pipe and fittings. The manner of its construction is clearly shown. The inner pipe has slots cut in it with a hacksaw, the number of slots cut be-

ing governed by the amount of work required of the burner. A small hole is drilled in the plug at the end to make a miniature nozzle. The roughness caused by cutting the slots should be filed away and the edges peened down so that a flat jet of steam from each cut will strike the oil.

An opening is cut in the cap on the end of the outside pipe with a hacksaw. The size of this opening will be governed by the amount of fire required. For a small boiler, a coarse saw cut is sufficient with four cuts in the small inside pipe for the steam. For a larger boiler, make more cuts on the inner pipe and a larger opening on the outside cap. Use a needle valve on the oil-supply pipe and let the oil to the pipe under 40 or 50 lb. pressure at about 140 deg. temperature.

The burner is inserted through the fire doors where it will be near the center of the fire box. Do not let the blaze strike the boiler and keep a bright incandescent fire by applying the proper amount of steam and oil, and keep the stack damper almost closed. The ash-pit dampers should be left from 4 to 6 in. open, or sufficiently to feel a draft of air entering.

Removing Dents from Aluminum Ware

An aluminum coffee percolator had several dents in the sides which resulted from the natural wear in domestic use. With only a few simple tools at hand I was at a loss to know how to remove the dents. It finally occurred to me to pour a small ladleful of melted lead inside the pot, in a spot where the shape was perfect, after covering the surface of the metal with oil to prevent the lead from sticking to it.

This lead form was placed over the dent on the inside and the outside surface tapped lightly with a hammer until it assumed the original shape. The whole time taken was less than a half hour and the job proved a success.—Contributed by Edwin M. Davis, Philadelphia, Pa.

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Painting Wood

By A. ASHMUN KELLEY

Painting wood is not the simple matter it was years ago. Then the wood was almost exclusively select white pine, and that is a wood very easy to paint. But now we have many kinds of wood to paint, such as cypress, redwood, hard pine, etc., and each of them requires a specific treatment.

Broadly speaking, all hard woods should be primed with a penetrating fluid, with little pigment. Linseed oil is penetrating enough on certain soft woods, but not so on hard woods. It will scarcely enter some. In this latter case the thinning fluid should be turpentine or benzol, with little or no oil. On some woods benzol does better than turpentine. Another feature of these liquids in the priming coat is that they, being antiseptics, will resist the attacks of the fungus called mildew. Mildewing occurs in the presence of dampness, or of linseed oil and pigments, being worse with some pigments, ocher for instance, than with others, such as white lead or zinc oxide. But observe that it will not do to add any benzol to the second or other succeeding coats, because benzol attacks oil as a solvent. A coat of benzol alone on cypress makes a good preparation for the priming coat of paint. A little benzol in the priming coat on shutters or blinds will prevent the mildewing of the chrome-green paint with which these fixtures are often painted. Cypress would be in better condition for receiving the priming coat of paint if left exposed to the weather for some months, because in running through the planer under great pressure it receives a hard glaze, through which paint can enter only with difficulty, and then only partly. If the surface cannot be weathered, go over it with water, to raise the grain, or add some water to the paint, and beat it well into the paint, which will help the paint to enter the wood; and as it afterward evaporates, it can do no harm. Redwood is rather easy to paint, and certainly much easier than cypress.

For barns and other country buildings, where the work is rather rough, nothing is better in the way of a protective paint than simple iron-oxide paint. It holds its color well, and if the trim is in some suitable color—even white will do, or dark sage green, but nothing gaudy—the brown will look sober and appropriate to the surroundings. An oxide is always a more durable paint material than a carbonate. For instance, iron oxide is almost unchangeable in color and wears extremely well, and so also zinc oxide, although the latter is rather too hard and brittle to stand without scaling or cracking, but it holds its oil and whiteness well. On the other hand, a carbonate, say, of lead, or of lime, which is whiting, will chalk and lose its color.

To paint a porch floor, what is called "dust color" is very good, as it will not show the dust as other colors will. It may be made from this formula: Zinc white, 21 lb.; best whiting, 8½ lb.; lampblack, 3 oz.; French yellow ocher, 1½ lb.; all dry colors. Mix thoroughly in the dry state. Add enough raw linseed oil to form a paste, then a little good varnish to act as a binder, thinning with turpentine, and adding driers enough to dry the paint in a few hours on a dry, warm day.

To paint an inside or room floor that must be used soon, mix some shellac varnish with the desired color, then thin down the mass with alcohol, the denatured article answering. Apply two coats, an hour between coats. If done in the evening, the floor will be dry and hard enough by morning. In fact, it will be hard enough to use in a few hours.

As a rule, painters use too little oil on outside work, and they also rub out too little. If sure that the oil is really boiled, all right, for it is better for second and last coats than raw oil. But it is difficult to get the genuine article oil, and the other kind is not desirable.

Prime cypress with white lead, well

thinned with turpentine or benzol, the latter preferred. About 20 per cent of the mass may be one of these fluids. Never guarantee a job of painting on cypress.

Linseed oil should never be used in the priming coat on redwood. Thin out white lead with turpentine. The addition of about 20 per cent of turpentine to the priming coat on exterior work is generally conceded to be better than all oil. Two coats of exterior paint, well brushed out, will wear better than two coats of paint not well brushed out. Two coats of heavy paint will not wear as well as two coats of thinner paint.

Imitation spirits of turpentine have not as strong a solvent action as the pure gum spirits. Turpentine from wood distillation is not as good in painting as gum-turpentine spirits. To test turpentine, place a few drops on white paper and expose to the air for

a few minutes. If pure, it will leave no traces, but will leave some slight spot if adulterated.

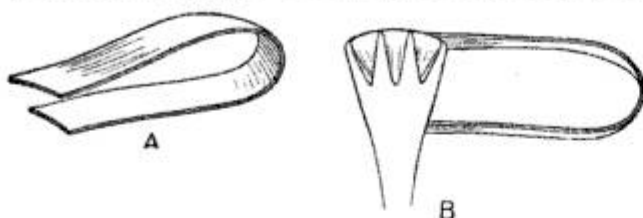
It is best to prime a new frame building before the plasterer gets to work. He causes a great deal of moisture with his wet plaster, which acts on the wood before painting, while if primed beforehand, the moisture will have little or no effect on the woodwork.

To paint spruce siding, use white lead thinned with raw linseed oil and with little or no driers. If the wood is quite new, add a little water to the paint.

To find the number of gallons of paint that can be made from a mix of white lead in oil, say, 100 lb. of lead, consider that this weight of lead alone equals $2\frac{2}{3}$ gal. To this add the amount of oil, turpentine, driers, etc., mixed with it, and the result will be the total number of gallons of mixed paint.

Soldering a Setting without Removing the Stone

Sometimes it is impossible to remove a stone from a ring in order to solder a break near it. Bend a piece of No. 15



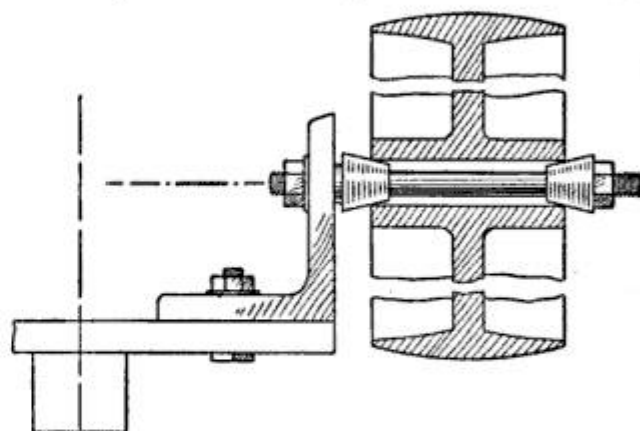
The Copper Clamp Cools Gradually, Preventing Any Sudden Change of Temperature in the Stone

gauge copper plate, 3 in. long, to the shape shown at A. Clamp the top lightly down on the stone, as at B, and heat the setting gradually until the solder flows. Stones break in heating on account of the sudden cooling. The copper strip retains the heat and keeps the stone from cracking.

This does not apply, of course, with pearls, opals, turquoise, jade, or similar soft stones. In heating diamonds do not allow anything to touch the stone while hot, and, in cooling, do not place it in a draft or move it.—Contributed by W. A. Jones, Raleigh, N. C.

Drill Jig for Making Oil Holes in Pulleys

An angle plate is used for the support on the drill-press table and a mandrel is attached to the vertical part and carries two cones having an angle of 30 deg. This makes it adjustable to the diameter of the bore on any pulley within reasonable dimensions. A pulley is clamped between the cones as shown, and the drill press table turned



The Jig can be Quickly Attached to the Table of the Drill Press

to bring the right location for the hole directly under the drill point.—Contributed by G. Barrett, Hamilton, Ont.



Homemade Cut Press

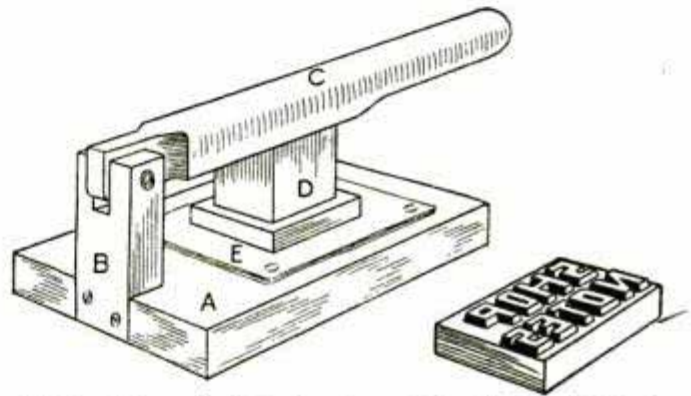
The person who has a little ability in making wood cuts with a knife will find it very interesting to make the press shown in the sketch. A fair job of printing can be done with the press, using printer's ink spread on a piece of glass with a hand ink roller, such as can be purchased cheaply of any dealer in printing supplies.

The press may have a base, A, of any size to suit, but one $1\frac{1}{2}$ in. thick, 6 in. wide, and 12 in. long will be found to serve best for most purposes. It must be smooth and level. Hard wood, such as maple, beech, or birch, is best for all parts. The post B is $1\frac{1}{4}$ in. thick, 2 in. wide, and 5 in. long. Before setting it, slot the upper end for the end of the lever. This is done by making a saw cut, $1\frac{3}{4}$ in. deep, $\frac{5}{8}$ in. from either side and cutting out the core to make a slot $\frac{3}{4}$ in. wide. A $\frac{1}{4}$ -in. hole is then bored through the prongs to receive a stove bolt that connects them with the lever. The post is fastened with screws and glue in a notch cut in the center of the base end.

The lever C is made of a piece of wood $\frac{1}{4}$ in. square and 10 in. long. At the forward end the sides are pared away to form a tongue, or tenon, that will pass between the prongs of the upright, and a hole is bored through it to match those in the prongs. The entire upper surface of the lever is rounded and the under surface is rounded, beginning 6 in. from the tenon end. Glue to the under side of the lever a block, D, at the end of the under, flat surface. The block should be about $1\frac{1}{4}$ in. square by $1\frac{1}{2}$ in. long. If the

under side of the base is crowning, either level it with a plane or nail cleats across the ends for feet. A washer is used with the stove bolt in connecting the lever and post.

The cuts are made of small blocks



A Hand Press for Printing from Cuts Made of Wood, Using Ordinary Printer's Ink

of wood, about $\frac{3}{4}$ in. thick and of a size to take the characters desired. These blocks must be level and the printing side made smooth with very fine sandpaper, or a scraper, before the characters are laid out. Boxwood is best for cuts, but pearwood, applewood, birch, or maple will do very well. Mark out the characters backward, using the pencil very lightly. Then, with the small blade of a knife, made as sharp as possible, cut around the outlines, holding the knife slanting, and remove the adjacent wood by cutting in at a reverse angle to meet the boundary cut. Gradually deepen the cuts around the characters until they stand in relief about $\frac{1}{8}$ in., then score V-shaped grooves, checkerboard fashion, across the remaining high surface that is not a part of the design, and chip out the resulting small blocks to bring the entire secondary

surface of the block to a uniform level with the portions adjoining the characters.

A touch of glue to the back of the cut will set it securely enough to the bottom of the block D for printing, and allow its removal without injury when desired. To get a uniform impression

in printing, place paper on the base, as at E, to the thickness required. For controlling the printing position on the stock paper, pins or tacks can be stuck into the base and each sheet to be printed laid against these guides.—Contributed by Chelsea Curtis Frazier, Saginaw, Mich.

An Electrical Testing Instrument for Experimenters

The amateur having an ordinary flash light can make an instrument that will serve for a variety of purposes. It is only necessary to solder a piece



An Instrument Made of an Electrical Pocket Flash Light for Testing Circuits and Instruments

of lamp cord to the spring of the battery which comes in contact with the lamp, and pass the end through a hole drilled in the top of the case. The end can be fitted with a cord tip.

To test batteries, take the flash light in the right hand and press the button, lighting the lamp, then place the bottom of the flash light on one binding post and the cord on the other. If the light burns brilliantly, the battery is dead, but if it burns dimly or goes out the battery is good.

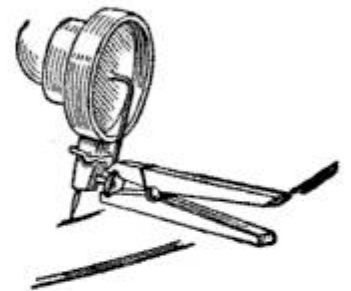
It may happen that the experiment-

er's telegraph line is out of order and the trouble cannot be found. The sounder may be tested out by disconnecting the wires from the instrument and placing the bottom of the flash light on one binding post and the cord on the other. If the light goes out, the trouble does not lie in the sounder, but in some other part of the line. The line may be tested in a similar manner if one end is short-circuited and the flash light connected to the other.

A tester of this kind cannot be used on long lines, or on instruments of much resistance, as their resistance will overcome that of the light. Keep in mind the fact that the lamp will always burn on an open circuit and go out on a closed circuit.

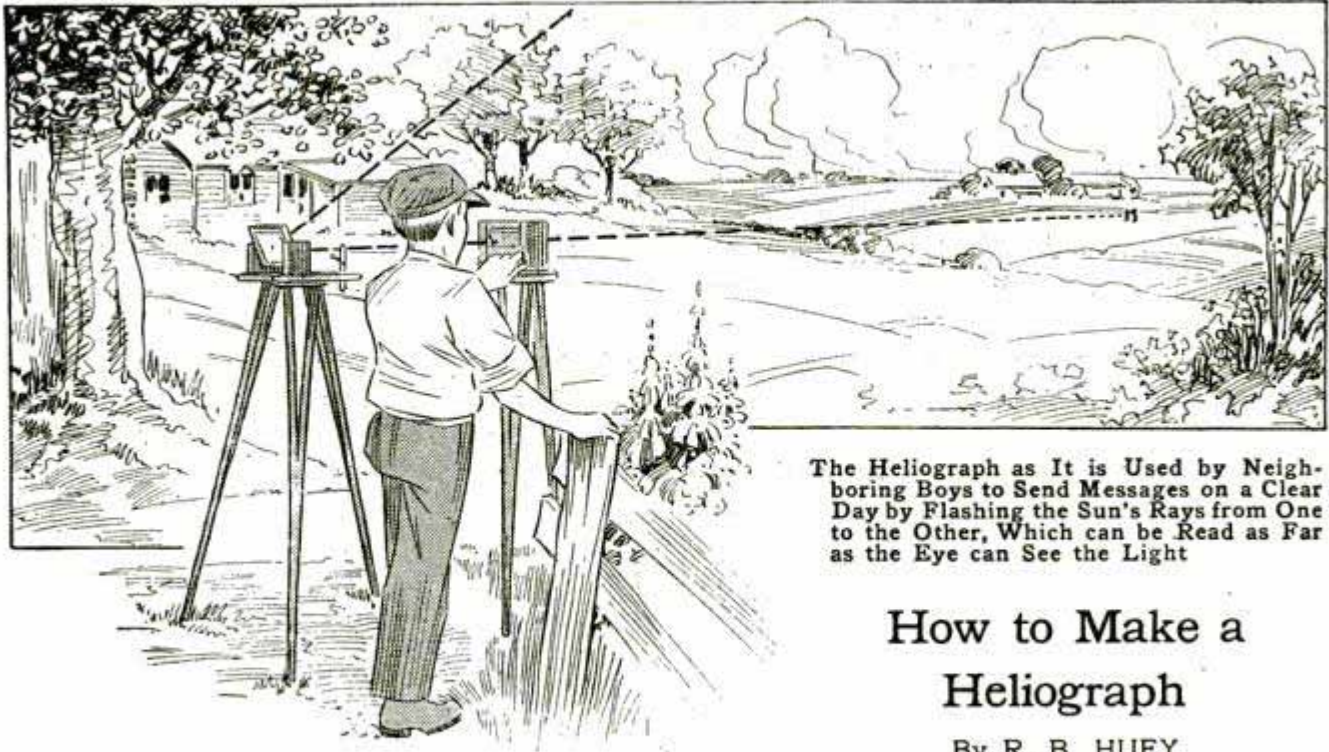
Softening the Tone of a Talking Machine

An effective mute, for use on any disk talking machine, can be made by clamping an ordinary wood clothespin on the head of the setscrew that holds the needle. Thus the tone will be softened a great deal more than by the use of a wood needle.



The record of a stringed instrument, such as a violin, will be almost exactly reproduced. It will also eliminate almost all the scratching sound caused by a steel needle.—Contributed by C. M. Reeves, Los Angeles, Cal.

ⒸAn antenna should be made of wire larger than No. 14 gauge.



The Heliograph as It is Used by Neighboring Boys to Send Messages on a Clear Day by Flashing the Sun's Rays from One to the Other, Which can be Read as Far as the Eye can See the Light

How to Make a Heliograph

By R. B. HUEY

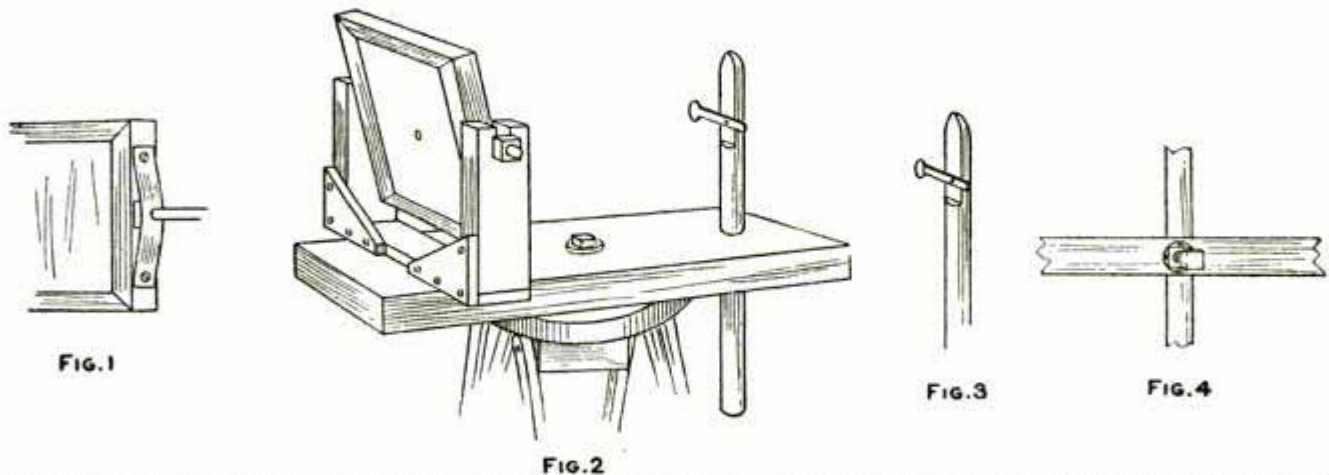
The heliograph which is used in the army provides a good method of sending messages by the reflection of the sun's rays. In the mountains there are stations from which messages are sent by the heliograph for great distances, and guides carry them for use in case of trouble or accident. The wireless telegraph delivers messages by electricity through the air, but the heliograph sends them by flashes of light.

The main part of the instrument is the mirror, which should be about 4 in. square, set in a wood frame and swung on trunnions made of two

firmly held to the frame with brass strips, $\frac{1}{2}$ in. wide, and 3 in. long. The strips are drilled centrally to admit the bolts, and then drilled at each end for a screw to fasten them to the frame. This construction is clearly shown in Fig. 1.

A hole is cut centrally through the backing of the frame and a small hole, not over $\frac{1}{8}$ in. in diameter, is scratched through the silvering on the glass. If the trunnions are centered properly, the small hole should be exactly in line with them and in the center.

A U-shaped support is made of wood strips, $\frac{3}{8}$ in. thick and 1 in. wide,



Detail of the Parts for Making the Mirror and Sight Rod Which are Placed on a Base Set on a Tripod Top, the Whole being Adjusted to Reflect the Sun's Rays in Any Direction Desired

square-head bolts, each $\frac{1}{4}$ in. in diameter, and 1 in. long, which are

the length of the uprights being $3\frac{1}{2}$ in. and the crosspiece connecting their

lower ends a trifle longer than the width of the frame. These are put together, as shown in Fig. 2, with small

upper unnailed ends are spread to slip over the blocks on the tripod top. These ends are bored to loosely fit over



FIG. 5



FIG. 6

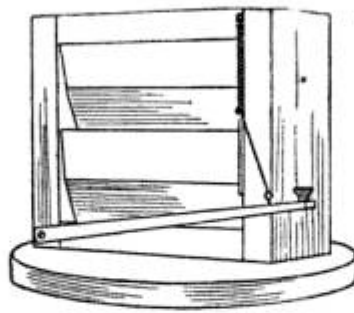


FIG. 7

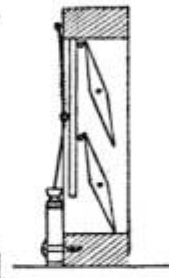


FIG. 8

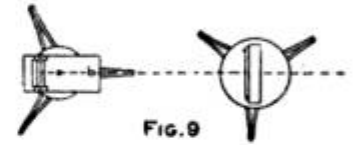


FIG. 9

The Parts in Detail for Making the Tripods and the Shutter for Flashing the Light, and Diagram Showing the Location of the Tripods to Direct the Light through the Shutter

brackets at the corners. A slot, $\frac{1}{2}$ in. deep and $\frac{1}{4}$ in. wide, is cut into the upper end of each upright to receive the trunnions on the mirror frame. Nuts are turned on the bolt ends tightly, to clamp the standard tops against the brass strips on the mirror frame. The cross strip at the bottom is clamped to the base by means of a bolt, $1\frac{1}{2}$ in. long. The hole for this bolt should be exactly below the peep-hole in the mirror and run through one end of the baseboard, which is $\frac{3}{4}$ in. thick, 2 in. wide and 10 in. long.

At the opposite end of the base, place a sighting rod, which is made as follows: The rod is $\frac{1}{2}$ in. in diameter and 8 in. long. The upper end is fitted with a piece of thick, white cardboard, cut $\frac{1}{4}$ in. in diameter and having a projecting shank 1 in. long, as shown in Fig. 3. The rod is placed in a $\frac{1}{2}$ -in. hole bored in the end of the baseboard, as shown in Fig. 2. To keep the rod from slipping through the hole a setscrew is made of a small bolt with the nut set in the edge of the baseboard, as shown in Fig. 4.

The tripod head is formed of a wood disk, 5 in. in diameter, with a hole in the center, and three small blocks of wood, 1 in. square and 2 in. long, nailed to the under side, as shown in Fig. 5. The tripod legs are made of light strips of wood, $\frac{3}{8}$ in. thick, 1 in. wide and 5 ft. long. Two of these strips, nailed securely together to within 20 in. of the top, constitute one leg. The

the headless nails driven part way into the block ends. One tripod leg is shown in Fig. 6.

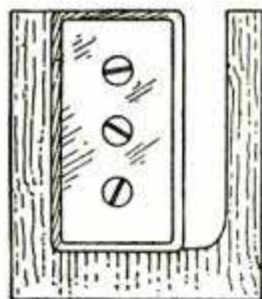
The screen, or shutter, is mounted on a separate tripod and is shown in Fig. 7. Cut out two slats, $\frac{3}{8}$ in. thick, $2\frac{1}{2}$ in. wide and 6 in. long, from hard wood, and taper both edges of these slats down to $\frac{3}{16}$ in. Small nails are driven into the ends of the slats and the heads are filed off so that the projecting ends will form trunnions for the slats to turn on. Make a frame of wood pieces, $\frac{3}{4}$ in. thick and $2\frac{1}{2}$ in. wide, the opening in the frame being 6 in. square. Before nailing the frame together bore holes in the side uprights for the trunnions of the slats to turn in. These holes are $1\frac{3}{4}$ in. apart. The frame is then nailed together and also nailed to the tripod top. The shutter is operated with a key very similar to a telegraph key. The construction of this key is shown in Fig. 7. A part of a spool is fastened to a stick that is pivoted on the opposite side of the frame. The key is connected to the slats in the frame with a bar and rod, to which a coil spring is attached, as shown in Fig. 8. Figure 9 shows the positions of the tripods when the instrument is set to flash the sunlight through the shutter. The regular telegraph code is used in flashing the light.

To set the instrument, first turn the cardboard disk down to uncover the point of the sight rod, then sight through the hole in the mirror and ad-

just the sight rod so that the tip end comes squarely in line with the receiving station. When the instrument is properly sighted, the shutter is set up directly in front of it and the cardboard disk is turned up to cover the end of the sight rod. The mirror is then turned so that it reflects a beam of light with a small shadow spot showing in the center made by the peephole in the mirror, which is directed to fall on the center of the cardboard sighting disk. It will be quite easy to direct this shadow spot to the disk by holding a sheet of paper 6 or 8 in. in front of the mirror and following the spot on the paper until it reaches the disk. The flashes are made by manipulating the key operating the shutter in the same manner as a telegraph key.

Twine Cutter for Use at a Wrapping Counter

A cutter for use at the wrapping counter in a drug or confectionery store may be easily made from a double-edged razor blade and a piece of thin board—a piece of cigar box will do. Cut the wood in the shape shown, with a protecting piece over the edge of the razor.



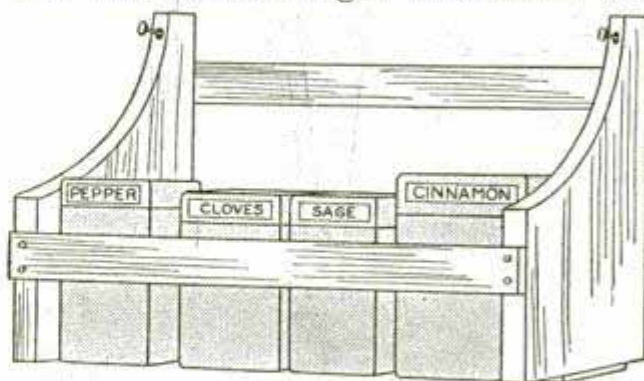
Screws are turned through the holes in the blade and into a support on the paper holder or any other convenient place.—Contributed by T. F. Managhan, Philadelphia, Pa.

Frosting Brass

A very fine ornamental finish, resembling brushed work, may be applied to brass articles by boiling them in a caustic-potash solution, then rinsing in clear water, whereupon they are dipped into dilute nitric acid until the oxide is removed, then rinsed quickly and dried in sawdust. The surface should be lacquered while the metal is hot.

A Cupboard-Door Spice-Box Shelf

To keep the spice boxes in a handy place where they would be together and not behind larger articles on the



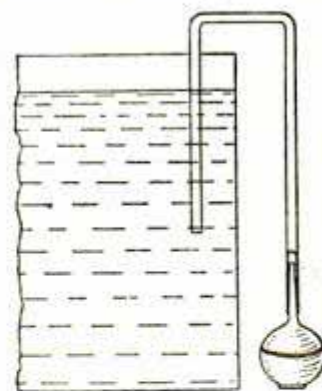
The Shelf will Hold All the Spice Boxes and Keep Them Handy

cupboard shelves, I made a special spice-box shelf, as shown, to hang on the inside of the cupboard door. The shelf swings out with the door as it opens, and is made of two bracket ends to which a bottom board and front crosspiece is nailed. The size of the shelf and its capacity are only limited by the space on the door.—Contributed by Austin Miller, Santa Barbara, California.

Starting a Siphon

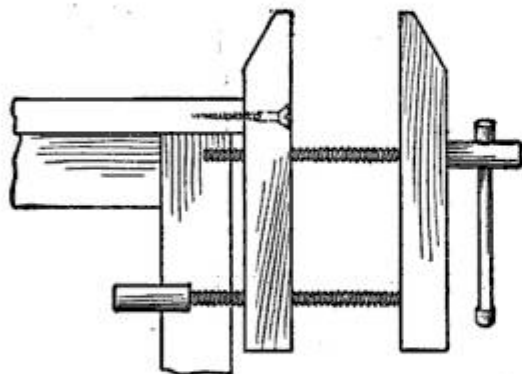
It is often necessary in a laboratory to siphon acids and poisonous liquids. If a pump is used there is always danger of the liquid

entering the pump and damaging it, and, besides, a pump is not handy for this purpose. To fill a siphon by suction from the mouth, great care must be taken to keep from drawing the liquid into the mouth. One of the best ways to fill a siphon is to procure a large dropper and having pressed all the air out of the bulb insert the end in the siphon. Releasing the pressure on the bulb will cause it to draw the liquid into the siphon.—Contributed by Bedell M. Neubert, Newtown, Conn.



Clamp Used as a Vise

A carpenter's wood clamp fastened to the edge of a bench, as shown in the sketch, makes a good substitute for

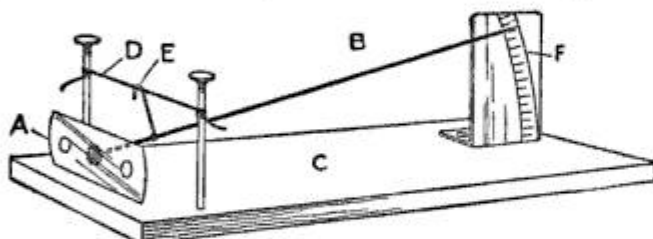


The Clamp Attached to a Bench Top will Serve the Purpose of a Vise in Many Instances

a vise for many kinds of light work. If the clamp is located over or in front of the bench post, holes must be bored in the latter to admit the ends of the clamp screws. A hole is bored through the shoulder screw and a handle attached as shown.—Contributed by H. W. J. Langlet, Harrisburg, Pa.

Wire Expansion Meter

When there is a current of electricity in an electrical conductor a certain amount of heat is generated due to the opposition or resistance of the conductor to the free passage of the electricity through it. The heat thus generated causes a change in the temperature of the conductor and as a result there will be a change in its length, it contracting with a decrease in temperature and expanding with an increase in temperature. The tempera-



Meter for Measuring the Expansion of Metal Wires Which are Heated by Electricity

ture of the conductor will change when the current in it changes, and hence its length will change, and it will reach a constant temperature or a constant length when the current in it is constant in value and the rate at which it

is giving off heat is exactly equal to the rate at which heat is being generated in it.

The fact that there is an actual change in the length of the conductor due to a change in current in it constitutes the fundamental principle of the following simple instrument.

The parts needed in its construction are as follows: An old safety-razor blade; one 8-in. hatpin; two medium-size nails; a short piece of German-silver wire; a small piece of sealing wax; a $\frac{1}{2}$ -in. board for the base, approximately $3\frac{1}{2}$ in. by 10 in., and a small piece of thin sheet brass. Remove the head from the hatpin and fasten the blunt end in the center of the safety-razor blade A with a piece of sealing wax so that the pin B is perpendicular to the blade as shown. Now drive the two nails into the board C, so that they are about $\frac{1}{4}$ in. from the edges and $1\frac{1}{2}$ in. from the end. Fasten the piece of German-silver wire D to these nails as shown. The size of this wire will depend upon the value of the current to be measured. Make a small hook, E, from a short piece of rather stiff wire and fasten it to the hatpin about 1 in. from the razor blade. The length of this hook should be such that the pointed end of the hatpin will be at the top of the scale F when there is no current in the wire, D. The scale F is made by bending the piece of sheet brass so as to form a right angle and fastening it to the base. A piece of thin cardboard can be mounted upon the surface of the vertical portion of the piece of brass and a suitable scale inked upon it. The instrument is now complete with the exception of two binding posts, not shown in the sketch, that may be mounted at convenient points on the base and connected to the ends of the German-silver wire, thus serving as terminals for the instrument.

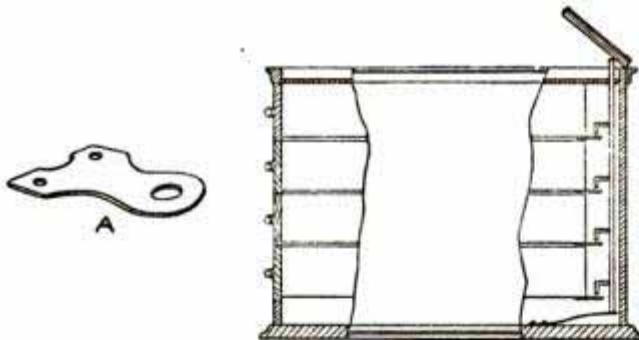
The completed instrument can be calibrated by connecting it in series with another instrument whose calibration is known and marking the position of the pointer on the scale for different values of current.

Making Pins with a Hand Drill

To make a pin with a true taper or point, or to make a shoulder on it without the aid of a lathe, clamp a hand drill in a vise with the chuck to the right and the turning crank upward, and insert the pin as a drill. While turning the wheel with the left hand use a file just as if the work were in a lathe. Move the file as if filing a stationary object and a round pin will be the result. The top surface of the pin should turn toward the operator, and as the pin has a tendency to become loose or work out, the chuck should be occasionally tightened.—Contributed by A. L. Osborne, Cleveland, O.

Automatic Lock for a Tool Chest

An automatic lock for a tool chest having a compartment under the cover and one or more drawers can be made as follows: A curtain-shade hanger, straightened out as shown at A, is



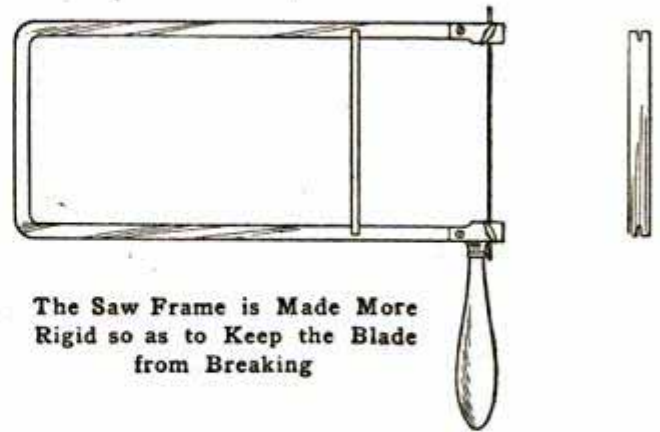
The Lock for the Drawers is Actuated by the Raising and Lowering of the Cover

fastened at the back of each drawer where it will receive the end of a screw hook which is turned into an upright piece of hard wood. The latter piece is forced upward at all times by a flat spring fastened to the bottom of the chest. The piece is $\frac{1}{2}$ in. thick, $\frac{3}{4}$ in. wide, and as long as the height of the chest less the thickness of the spring.

When the cover is raised, it automatically unlocks the drawers. The lowering of the cover forces the upright piece down, and the screw hooks are engaged in the brackets on the drawer ends. The cover is locked from the outside.—Contributed by A. S. Roberts, Knoxville, Tenn.

Sawing Metal with a Hand Scroll Saw

Desiring to do some sawing on copper and brass with a hand scroll saw, I stiffened the frame in the manner

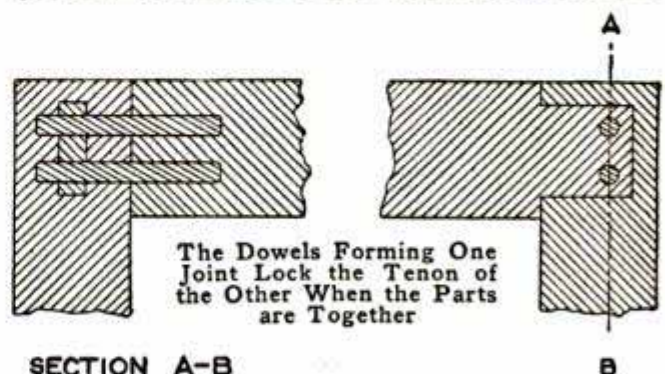


The Saw Frame is Made More Rigid so as to Keep the Blade from Breaking

shown so that it would keep the saws from breaking. A notch was cut in each end of a strip of wood, just long enough to fit tightly in the saw frame. The tension of the saw blade can be varied by changing the location of the strip of wood.—Contributed by L. L. Llewellyn, Hayward, Cal.

A Locked Tenon-and-Dowel Joint

One of the members of a three-membered joint can be locked as illustrated by using dowels in one member and a tenon in another, the third member acting as a recipient for both. While a joint of this kind is particularly effective on post and box-rail joints in chair construction, the mechanic will find many kinds of work where it can be used. The advantage of the locking principle is that, should the glue give way, as it often does in tenon joints where the parts are subjected to considerable strain, the dowel

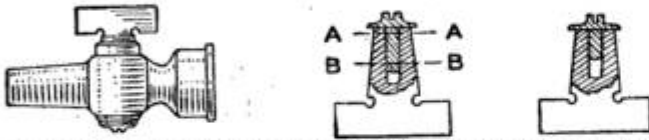


The Dowels Forming One Joint Lock the Tenon of the Other When the Parts are Together

pins passing through the holes bored in it will securely hold the tenon.

Repairing a Worn Stop Cock

The plug of a worn stop cock, or one that has been reground, of the type shown in the illustration will project



Removing a Portion of the Plug and Shortening the Screw Allows the Parts to be Drawn Tightly Together

beyond the bottom so that the ring, or washer, and screw will not draw it tightly into place.

To remedy this trouble, file off a portion of the plug on the line AA and also file off a sufficient amount of the screw on the line BB. When the plug is replaced and the washer and screw drawn up, the stop cock will be as good as a new one.—Contributed by James M. Kane, Doylestown, Pa.

Tool Holders Made of Brass Clips

Hangers to grip tool handles can be easily formed of sheet metal in any desired material. The clips are shaped as shown at A in the sketch. Any



The Clips can be Set So That They will Grip Any Size Tool Handle

number of the clips may be fastened with screws to a wood crosspiece or a wall in such a manner as to make openings into which the handles of the tools are pressed. Before fastening the clips they should be spaced for the widths of the handles.—Contributed by F. H. Tillotson, Sycamore, Ill.

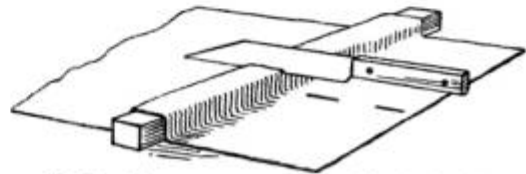
Removing Perspiration Stains from Delicate Cloth

Lay the stain in the cloth over some blotting paper, and sponge the cloth with a grain-alcohol and ether solution, which should be made by mixing equal portions of each. The sponging should be quite vigorous and kept up until the cloth is dry, then the spot should be

touched lightly with ammonia water, which can be purchased at any drug store. This will leave a slight blur, which can be removed by rubbing with French chalk on the wrong side. The chalk is cheap and can be procured with the ammonia water. Do not forget the blotting paper, as it keeps the solution from forming a ring around the spot.

Buttonhole Cutter

If the buttonhole scissors are mislaid or there are none at hand, the holes may be cut in the manner shown in the sketch. Place a piece of wood, having a width equal to the length of the buttonhole, on the table and lay the cloth over it in the line where the holes are required, then draw a sharp knife



Sharp Knife Drawn across the Cloth Laid over a Piece of Wood Cuts the Holes

across the cloth on the wood where the holes are marked. This will cut the cloth neatly and accurately.—Contributed by A. S. Thomas, Gordon, Can.

Filing Small Rods in a Lathe

Reducing the diameter of a small rod by filing while it is turning in a lathe is a difficult thing to do, as the pressure of the file on one side bends the rod. The filing may be easily accomplished by using two files, as shown in the sketch. In this manner almost any amount of pressure can be applied by



The Pressure of One File Against the Other Prevents the Rod from Bending

squeezing the files together without danger of bending the rod.—Contributed by J. F. Tholl, Detroit, Mich.

☞ Young sleepwalkers may be cured if watched and given a good switching until they are wide awake.

How to Make an Electric Heater

The electric heater described in this article is very simple to construct, its operation exceedingly satisfactory, and the necessary material easily procured at a small cost at most electrical-supply stores. The few tools needed are usually found about every home, and the heater may be constructed by any ingenious person.

Procure 6 porcelain tubes, 20 in. long and approximately $\frac{1\frac{3}{8}}$ in. in diameter. On each of these tubes wind 25 ft. of bare No. 26 gauge "Climax" resistance wire. The various turns should be uniformly distributed along the tubes and not allowed to come into contact with each other, which can be prevented by placing a thin, narrow coat of plaster of Paris along the side of each of the tubes immediately after the winding has been put on. Several inches of free wire should be allowed at each end, for making connections, and the first and last turns on each tube should be securely fastened to the tube by several turns of binding wire. It would be best not to extend the winding nearer the ends of the tubes than $\frac{3}{4}$ in.

Cut from some heavy tin, or other thin sheet metal, two disks, 6 in. in diameter, and punch six $\frac{5}{16}$ -in. holes in each of the disks at equal distances and within $\frac{3}{4}$ in. of the outer edge. Punch two $\frac{1}{8}$ -in. holes in one of these disks, to be used in mounting a porcelain socket, and also one $\frac{1}{2}$ -in. hole through which the wires may be led to the socket, as shown in Fig. 1. In the other disk punch four $\frac{1}{8}$ -in. holes, for mounting two porcelain single-pole snap switches, and two $\frac{1}{2}$ -in. holes, for leading the wires through to the switches, as shown in Fig. 2.

Cut off six lengths of $\frac{5}{16}$ -in. iron rod, 22 in. long, and thread both ends of each piece for a length of $1\frac{1}{4}$ in. Fasten the porcelain tubes between the metal disks, by placing one of the rods through each of the tubes and allowing the ends to extend through the $\frac{5}{16}$ -in. holes in the outer edge of the disks. A nut should be placed on each end of all the rods and drawn up so that the

length of rod protruding at each end is the same. Obtain two single-pole snap switches and a porcelain socket, and mount them on the ends by means of some small stove bolts.

The windings on the porcelain tubes should be connected as follows: Let

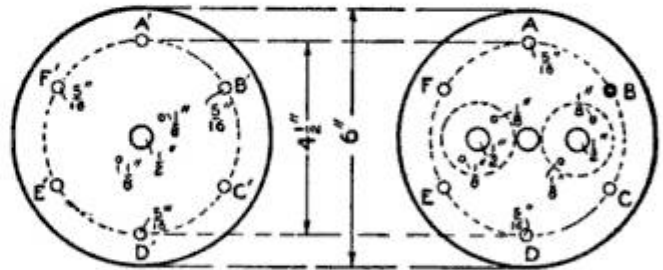


FIG. 1

FIG. 2

Detail of the Two Ends on the Heater Giving Dimensions and the Location of Parts

the windings be designated by the letters A, B, C, D, E, and F, and their position be that indicated in Figs. 1 and 2. The primes indicate the ends of the windings at the socket end, and the letters without the primes indicate the ends of the windings at the switch end of the heater. The ends A and D should be connected directly together. The ends B and C to the clips of the right-hand snap switch, and E and F, to the clips of the left-hand snap switch. The ends F', A', and B' should be connected to one terminal of the socket, and C', D', and E' to the other terminal of the socket. Electrical connection is made to the winding by means of a plug and piece of lamp cord. It is obvious that the windings A and D will be connected as soon as the plug is screwed into the socket, if the circuit is closed at all other points, and the windings B and C, and E and F are controlled by the right and left-hand snap switches, respectively. Make sure all the connections are properly insulated, and that there is little chance of a short circuit occurring.

After the socket and snap switches have been connected to the windings, two more thin disks, the same diameter as the first, may be fitted over the ends and held in place by two units on the end of each rod, a nut being placed on

each side of the disks. A better way of mounting these disks would be by small machine screws that enter threaded holes in the ends of the rods. These last disks are not absolutely necessary, but they will add some to the

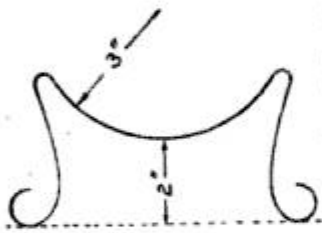


FIG. 3

appearance of the completed heater. Four small ears, about $\frac{7}{8}$ in. square, should be cut on the outer edge of the outside or inside disks and bent over at right angles to the main portion, to be used in mounting the outside case of the heater.

Cut from a sheet of $\frac{1}{8}$ -in. asbestos a piece just long enough to fit between the inside disks and wide enough to cover the three lower windings C, D, and E. The object of this piece of asbestos is to protect the surface upon which the heater will stand from excessive heat, since it is to rest in a horizontal position.

Obtain a piece of perforated, thin

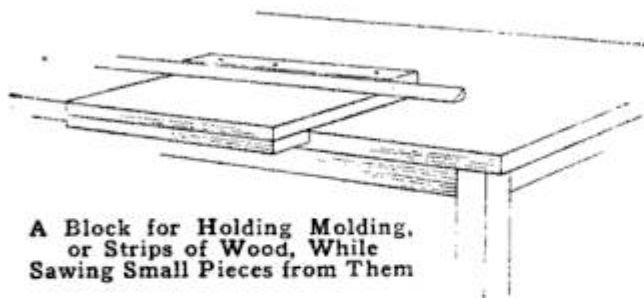
sheet metal, $19\frac{1}{2}$ in. wide and long enough to reach from one outside disk to the other. Bend this into a cylinder and fasten it to the lugs on the disks by means of small screws or bolts.

The legs may be made of $\frac{1}{8}$ -in. strap iron, $\frac{5}{8}$ in. wide, bent into the form shown in Fig. 3. These pieces may be attached to the perforated cylinder, before it is mounted on the heater proper, by means of several small bolts. The piece of asbestos should be wired to the cylinder after the heater is all assembled, so that it will always remain in the lower part of the cylinder and serve the purpose for which it is intended.

The heater, as described above, is constructed for a 110-volt circuit, which is the voltage commonly used in electric lighting. The total consumption of the heater will be approximately 600 watts, each part consuming about $\frac{1}{3}$ of the total, or 200 watts. If it is desired to wind the heater for a 220-volt circuit, 25 ft. of No. 29 gauge "Climax" resistance wire should be used on each tube.

A Molding-Sawing Block Used on a Bench

Having occasion to saw some short pieces of molding, I experienced considerable trouble in holding them



A Block for Holding Molding, or Strips of Wood, While Sawing Small Pieces from Them

without a vise until I made a block, as shown in the sketch. This answered the purpose as well as a vise. The block is not fastened in any manner, but is simply pushed against the edge of the bench or table and held with the hand. It should be about 9 in. wide and 1 ft. long, with strips 2 in. thick at each edge.—Contributed by W. F. Brodnax, Jr., Bethlehem, Pa.

Pipe Caps Used as Castings for Engine Pistons

Desiring to make a small piston for a model engine and not caring to make a pattern and send it away to have a casting made, I thought of using ordinary pipe caps, these being both inexpensive and of a quality adapted to machining.

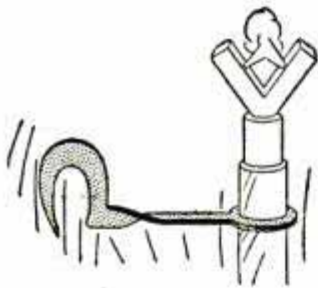
The cylinder bore was $1\frac{1}{2}$ in. in diameter, so I secured a standard pipe cap for $1\frac{1}{4}$ -in. pipe which gave an outside diameter of about $1\frac{5}{8}$ in. The cap, not having sufficient depth for holding in a chuck, was screwed on a short piece of pipe and then trued in the lathe chuck. The outside surface was turned to a diameter of $1\frac{1}{2}$ in., then removed from the pipe, reversed and chucked again, and the threads bored out to reduce the walls to $\frac{1}{8}$ in. This made an excellent piston for a single-acting engine.—Contributed by Harry F. Lowe, Washington, D. C.

Preserving Paints and Pastes

White lead, thick shellac, and pastes that are used occasionally may be preserved by laying a piece of leather over the exposed surface. When these materials are kept in cans, cut a piece of leather from the upper of a heavy boot of such a size that it will drop freely into the container. Form a handle on the leather disk by driving a nail through its center from the under side. Press the disk down smoothly over the surface of the contents and a thin film of oil will soon form over the disk, effectually excluding the air. A loose cover is placed over the container, to keep out dust.—Contributed by Luther McKnight, Colorado City, Col.

A Burner for Soldering Small Work

As it was necessary for me to solder the joints of fine wires on electrical instruments, and other small work, I

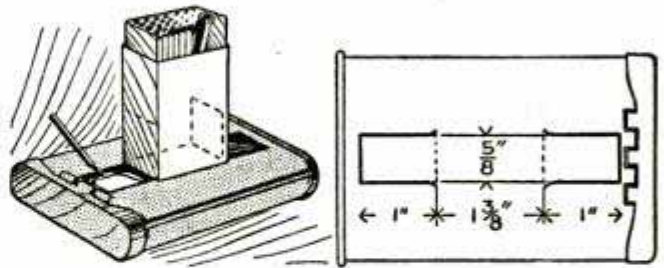


found myself in need of a blow-pipe that gave a small but very hot and easily directed flame, was automatic in its operation and required no blast. I tried an ordinary acetylene burner on coal or city gas, and found it gave an intensely hot, nonluminous flame, due to the forced draft of air through the small holes. This flame will melt silver, copper and, also, silver solder. Its great advantage lies in the fact that it may be used for sweating together small articles rapidly and with great neatness. I always keep this blowpipe burning, as the gas it consumes is very small, and the burner is kept within easy reach by using a hanger, as shown in the illustration.

A single jet of flame is obtained by stopping up one of the tips, which is very useful in many ways. This flame may contain a small luminous spot on some city gas, but it does not interfere with the heat.—Contributed by Arthur Worischek, New York City.

A Safety-Match-Box Holder

A holder, as well as a tray, for safety matches can be made from any ordinary tobacco can. The metal on one



The Match Box is Held Upright between Standards Formed from the Tin of the Tobacco Box

side is cut as shown and the pieces bent up to form standards for holding the match box in an upright position. The openings left where the metal was raised are used for dropping the burned matches into the box. The hinged cover is used for emptying the tray.—Contributed by David B. Lutz, E. St. Louis, Ill.

Removing Ink Stains from Book Leaves

When the leaves of a book are accidentally stained with ink it can be removed quite readily by the following process: After removing as much of the ink as possible with a camel's-hair brush dipped in water, soak the stained parts in a solution of oxalate of potash, or better still, oxalic acid. This will remove all the ink. Treat again with water, as before, so that when it dries out no salt will appear on the paper. This process does not affect printer's ink.—Contributed by S. G. Thompson, Owensboro, Ky.

A Needle-Spray Nozzle

To make a needle-spray nozzle, either insert a 22-caliber cartridge in a small tube, or place a 45-caliber shell over the end of the tube and solder it in place. The end is perforated to make one or more small holes, as desired.



Aug 26/13
POPULAR MECHANICS
INTERESTING NEW PATENTS

*1.071.110
 727.050
 (C 56-19)*

*Donald J. Campbell
 Worcester, Mass.*

*Johnston
 Cleveland
 748,935 (Cl. 3)
 1,069,673
 Walter E. Clausen
 Hartford Conn.
 3-9-12
 684,801 (Cl. 229-1)*

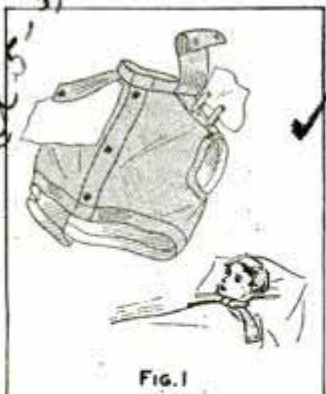


FIG. 1

SLEEPING SHIRT WITH BLANKET CLASPS (Fig. 1)—This shirt, intended especially for outdoor sleepers, has metal clasps at the shoulders for holding blankets and bed clothing tightly about the chest and neck. Shoulder flaps, sewed under the collar band, button down over the clasps after the blankets have been fastened in the proper position.



FIG. 3

LAWN TRIMMER (Fig. 2)—For trimming the odd corners of lawns, around trees, along walls, and in other places which the lawn mower misses, this trimmer takes the place of garden shears. It consists of a pair of heavy shears mounted on a wheel and operated by a cam running in a spiral groove on the inside of the wheel's rim.

CHEST PROTECTOR ON WAISTCOAT (Fig. 3; British patent)—When the lapel is folded back and buttoned on the front of the waistcoat, it is only slightly larger than the usual vest lapel. Turned up and buttoned across the V-shaped opening below the collar, it forms a snug, warm chest and throat protector. The lapel may be made in one piece with the body of the waistcoat.

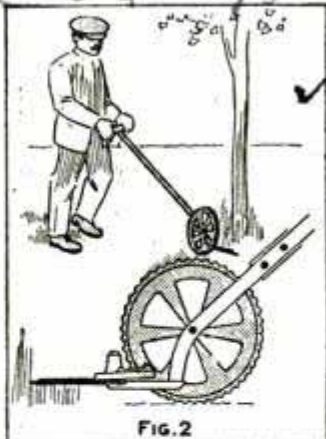


FIG. 2



FIG. 4

SMOKE FILTER FOR CIGARETTES (Fig. 4; American patent by an Englishman)—Filtering fabric stretched across a ring is inserted in the mouthpiece of this patent cigarette to keep particles of tobacco and nicotine from being drawn into the mouth. The filter is part of a tubular mouthpiece over which the wrapper is rolled when the cigarette is made. The reinforcement also keeps the end of the cigarette from crushing.

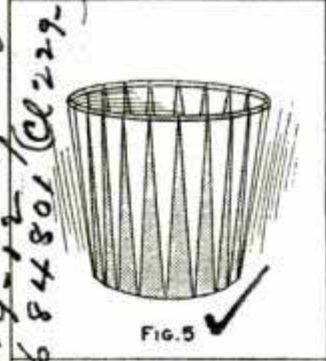


FIG. 5

PAPER DRINKING CUP (Fig. 5)—The interesting feature of this paper drinking cup is that it is formed from a single circular sheet of paper folded in such a way that the sides are plaited. The increased thickness given by the plaits makes the cup stronger and more rigid. At the top edge the paper plaits are rolled over to form a reinforced brim.

NEW KIND OF WATER METER (Fig. 6)—A four-spoked wheel with cup-shaped buckets at the end is used in this water meter to measure the flow of liquid. The housing in which the wheel is mounted is simply an enlargement set into a water feed pipe so that the stream rotates the wheel on its way through the pipe. Gears outside the housing actuate a pointer to indicate the wheel's speed.

*1070470 Aug 19-
 Edward Hixon
 Chas. Stauber
 assignors to
 Hixon Automatic
 Filed June 26, 12
 Ser. 70,946 Cl. 73-3*

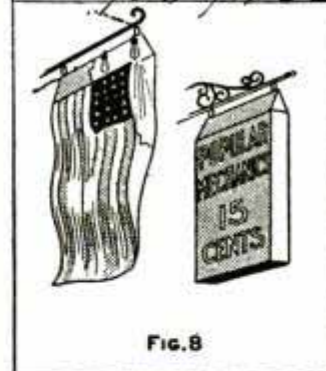


FIG. 8

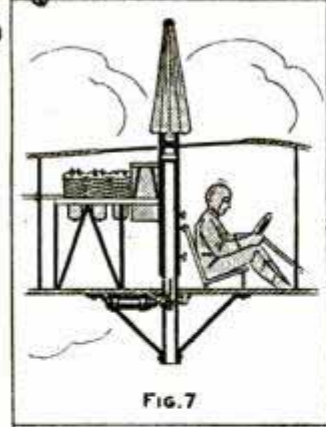


FIG. 7

PARACHUTE-LAUNCHING DEVICE (Fig. 7)—By shooting the parachute up into the air, this launching device attempts to solve the problem of getting a parachute free from a falling aeroplane. The stem of the parachute is a hollow tube which fits tightly over a tubular standard in such a way as to form an air-tight cylinder in which compressed air can be released or an explosive gas fired.

ILLUMINATED BANNERS (Fig. 8)—Translucent fabric is used in the banners, and they are hollow. An electric light with a reflector, which is fitted in the open end of each banner, floods the inside with light which streams through the fabric as the banners flutter in the wind. In one form the banner is stiffened and made in the shape of a box so that lettering on its surface will be illuminated.



FIG. 9

AUTOMOBILE ROBE LOCK (Fig. 9)—To prevent the loss or theft of an automobile robe left folded over the rail on the back of the front seat is the use for which this lock is designed. Its jaws are just large enough to fit over the top and bite into the robe below the rail so that the robe cannot be taken from its place. The jaws are adjustable and held by a spring snap which cannot be released without the key.

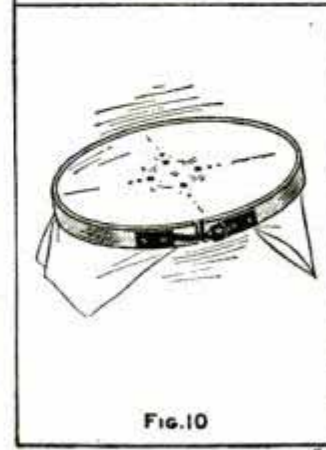


FIG. 10

EMBROIDERY HOOP (Fig. 10)—Cloth cannot slip in this embroidery hoop because it can be adjusted to any thickness of fabric. The outer hoop is divided and is held together by a small pivoted clamp with a flanged head which slips into a U-shaped collar. The head of the clamp is a thumbscrew which can be tightened or loosened to adjust the hoop.

*1,072,687
 (Fig. 10) Victor Beauregard, Boston, Mass.
 filed Feb 13-13 Serial 748075
 (Cl. 44-24)*



Fig. 11

ONE-PIECE GARMENT (Fig. 11)—The advantages of a union suit are combined with the adjustability of two-piece underwear in this garment, to insure a good fit. The trousers portion is sewed to the coat along the waistline of the back. The front bib, which extends upward from the trousers, buttons to two flaps on the breast of the coat.

STICK CANDY (Fig. 12)—An entirely new flavor is given to this stick candy by a core of peanut butter spun into a coating of the usual pulled candy. A quantity of soft candy, with the same flavor as the outer coating, is mixed into the peanut-butter core to give it body.



Fig. 12

FUNERAL CAR (Fig. 13)—The rear end of the car is an inclosed coach, with entrance at the back, for pallbearers or mourners. In the forward end, back of the driver's seat, is a compartment for the coffin. The side walls of this compartment are arranged to fold down to the level of the floor to form a platform outside the car with tracks for the coffin to slide on. The whole car is mounted on a large motor chassis.



Fig. 13

TOY CATAPULT (Fig. 14)—The old-fashioned homemade sling shot appears here in very refined form. A rectangular wire frame with a strong handle replaces the forked wooden branch and a sighting ring is soldered to the top of the frame. Durable spiral springs are used to supply elasticity and power instead of the large rubber band that is always breaking.

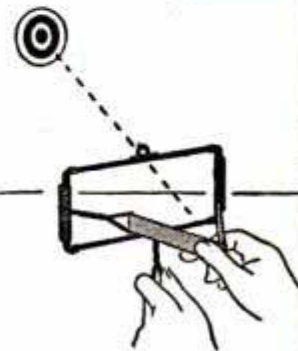


Fig. 14

HAT FASTENER (Fig. 15)—This is intended to be a substitute for the hatpin. It fits in the crown of the hat and is held in place by two pins, which pass through the sides of the hat and have ornamental heads screwed on the ends. To put on a hat with this fastener the wearer pulls out on the two knobs so that the pronged frames inside are drawn apart. When they are released, the spiral springs which connect them draw the prongs into the hair.

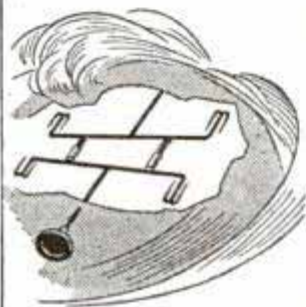


Fig. 15

SLEEPING HAMMOCK (Fig. 16)—Bed, hammock, and sleeping bag are combined in this hammock for outdoor sleepers. There is a deep pocket for the feet at one end and a pillow rest and head covering at the other. The coverlets are made in the form of flaps attached to each side of the hammock and arranged to be spread across and buttoned to the other side. With the extra flaps to tuck about the neck, the whole hammock is made as snug as a sleeping bag.



Fig. 16

WATER BICYCLE (Fig. 17)—The bicycle is closely imitated in this swimming apparatus. Both foot pedals and hand cranks are used to drive the propeller and speed is necessary to maintain its buoyancy, for its only supports are short planes on each side of the body and a cut-water in front. The rudder is placed under the front end of the frame and is controlled by the rider's chin.



Fig. 17

PEDAL-PROPELLED VEHICLE (Fig. 18)—The rider sits on a small seat supported by an upright post and guides his little vehicle with a vertical steering rod connected with the front wheel. Power is supplied by foot pedals and a ratchet mechanism connected with the central pair of wheels. The motion might be compared to walking in a sitting position.



Fig. 18

HEAD PROTECTOR FOR BABIES (Fig. 19)—This is a pneumatic mask to save a baby's head from bumps and bruises. It is made of soft rubber tubes which fit about the head. The air valve for inflating the protector is in the center of the top where it is least likely to be knocked off.



Fig. 19

TREE PROTECTOR (Fig. 20)—The cover is made of cloth or canvas and is adjustable so that it can be let down at night to protect young trees from frost, and can be drawn back in the daytime without difficulty. It is supported by a tubular metal mast which stands beside the tree's trunk and a series of booms supported by a pivoted ring at the top of the mast. Cords run through the cover to draw it up to the top of the mast.

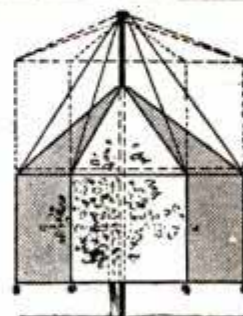


Fig. 20

Pat. M. Lawrence
Sh. C. M. V. Co.
Pat. 2,208,222
1.072,284
752,359
3-6-13
Patent 2,178,444

A PICTURESQUE COTTAGE OF MODERATE COST



Mink & Carson, Architects, New York



First-Floor Plan



Second-Floor Plan

This picturesque six-room cottage, which has an appearance of richness far in excess of its actual cost, is an example of what may be done by good planning when only moderate funds are available. The keynote of the plan, both in the exterior and the interior, is simplicity. The exterior facing consists of wide shingles stained white or gray, with white trim and pea-green shutters. The chimneys, of which there are two, are laid up with common brick with wide joints. The plan is one that leads naturally to the picturesque gable treatment of the roofs, while leaving ample space for the bedrooms on the second floor.

The planning of the rooms was carried out with the idea of securing an arrangement that would be not only unusual and attractive but convenient as well. The convenience of the housewife was considered throughout the plan, and particularly in the provision of ample closet room. Two points worthy of special note in the plan of the first floor are the large and well lighted living room and the complete separation of the dining room and kitchen from the remainder of the floor. The living room, dining room and main hall all have oak floors, while the remainder of the first story and all of the second story have floors of yellow pine. The interior trim is mainly chestnut. A soft dark stain is applied to all the trim with the exception of that in the service portions of the house, where the trim is varnished. The two fireplaces are, like the chimneys, laid up with common brick with wide joints. In order to keep the cost as low as possible, no attic is included in the plan, but this is offset by the provision of unusually complete closet facilities. The total cost of the building, complete with plumbing, heating, and lighting facilities, is \$4,000.

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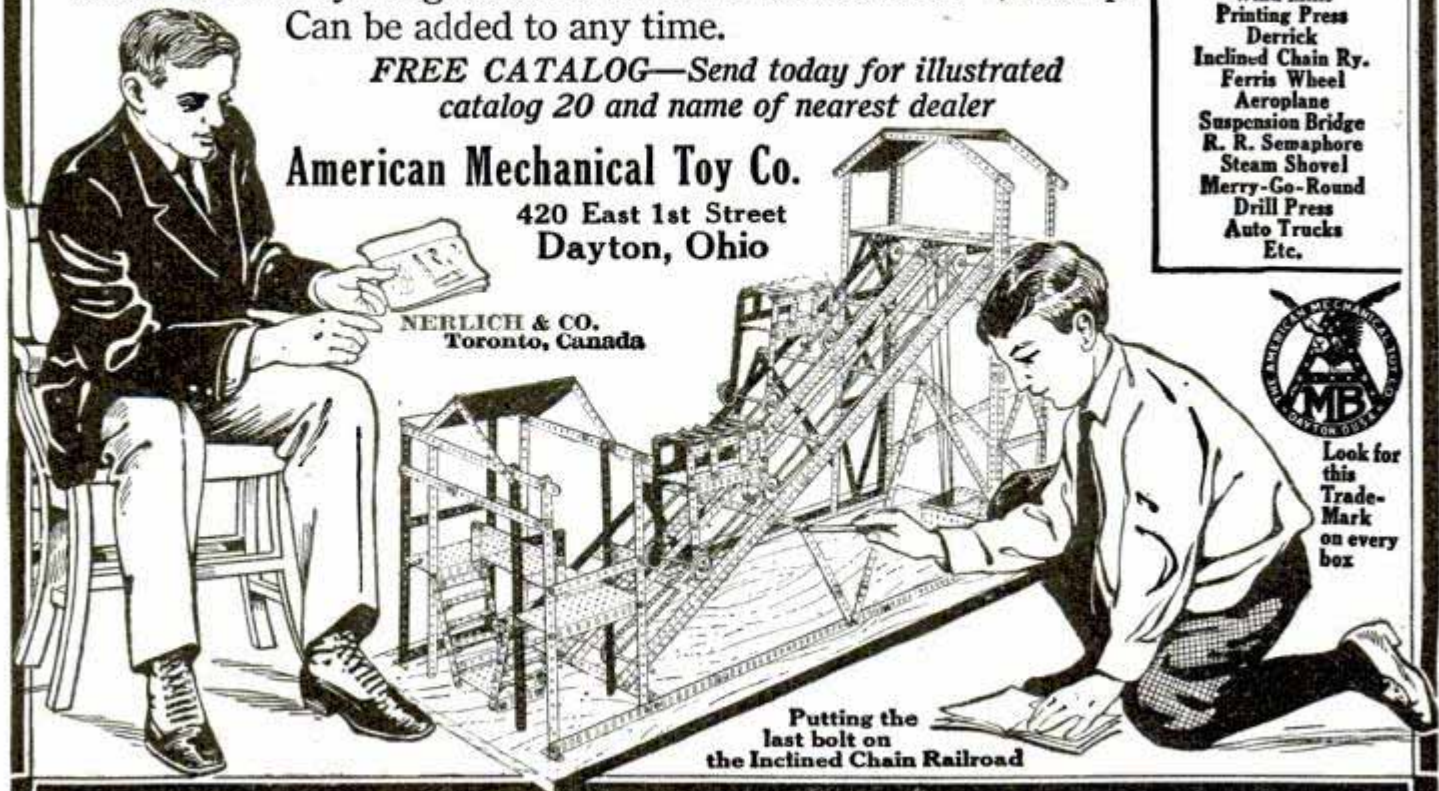
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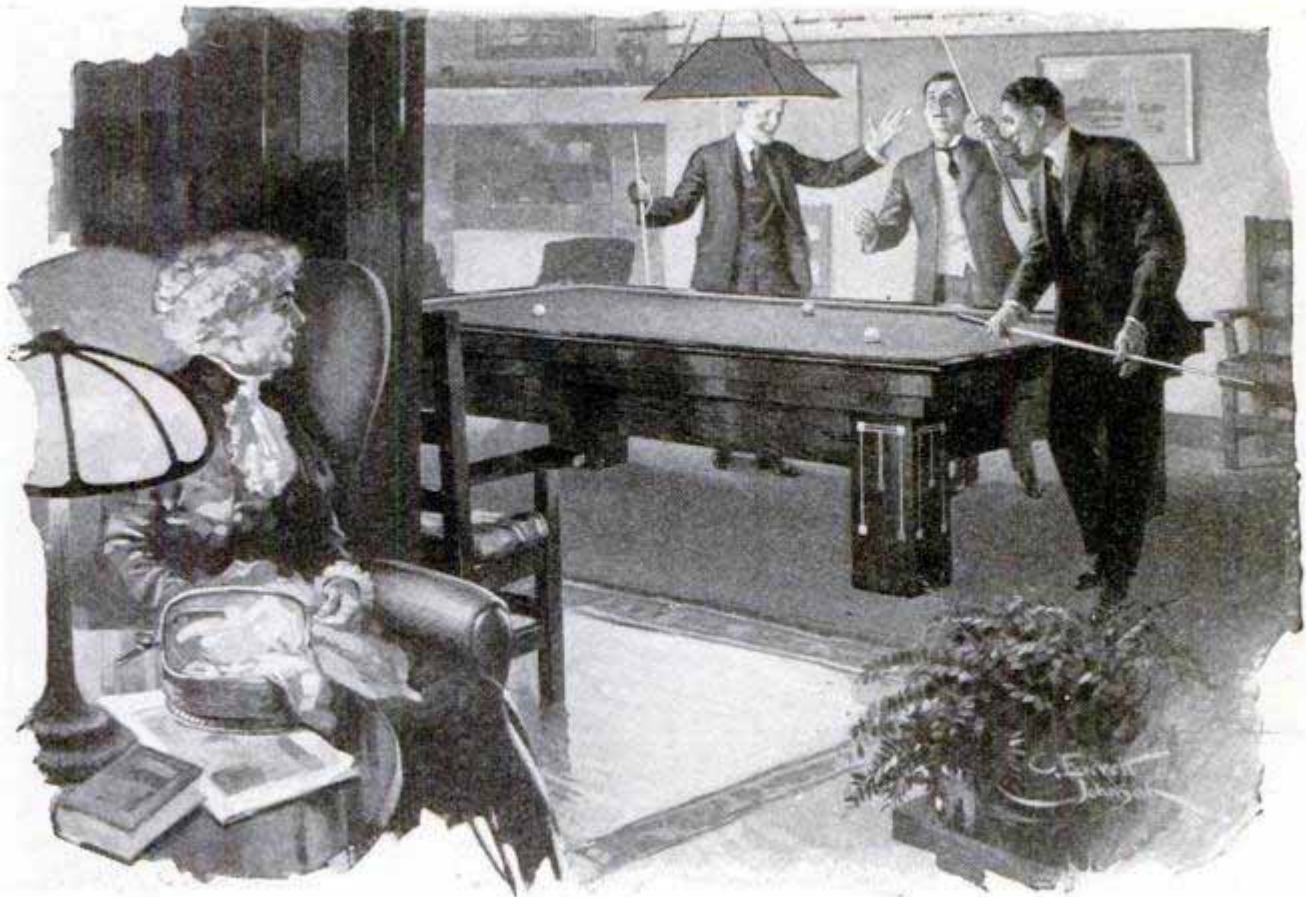
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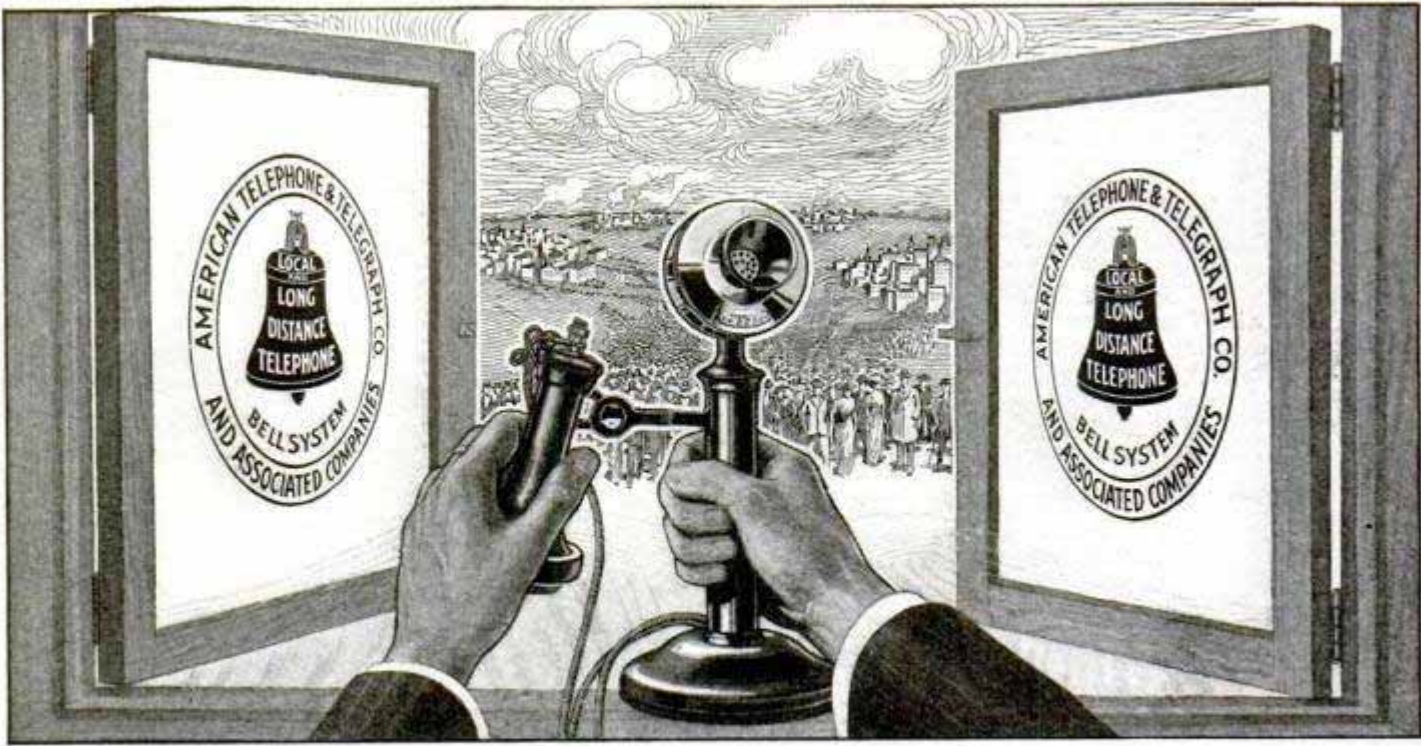
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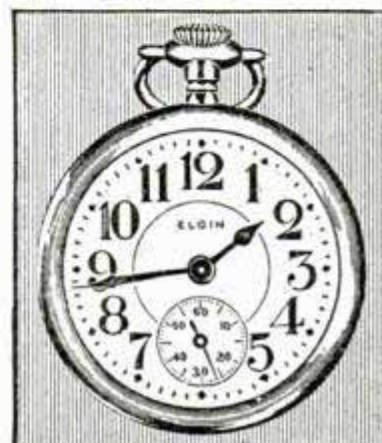
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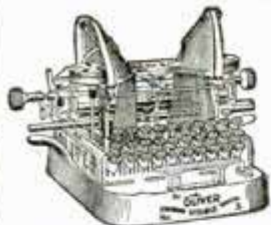


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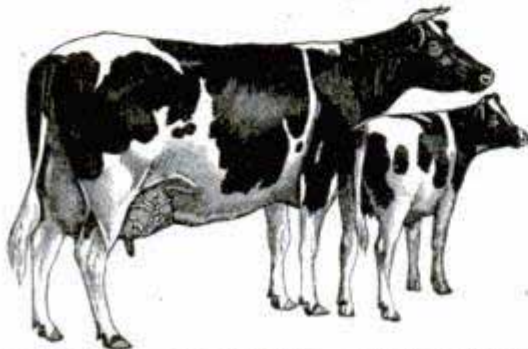
In Holstein milk as in breast milk there is only a moderate amount of cream (or butterfat) and it is in the form of small even globules that yield quickly to the action of the digestive fluids. The curds formed from Holstein milk are small, soft, flaky and easy to digest.

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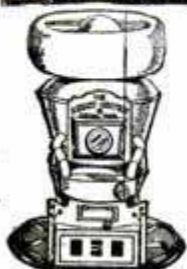


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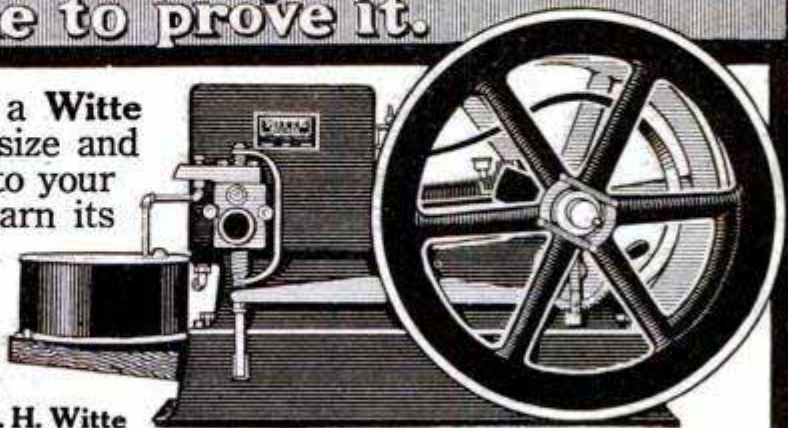
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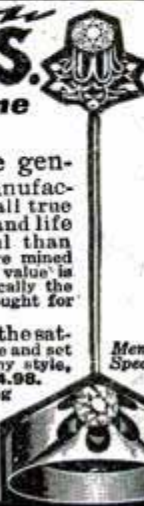
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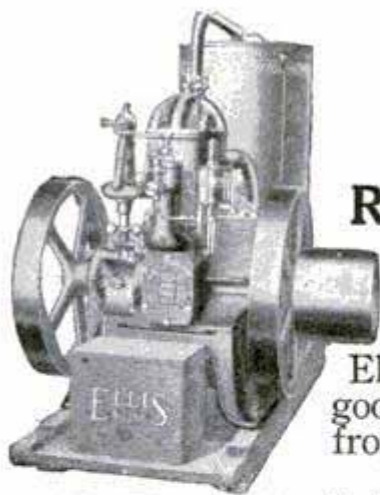
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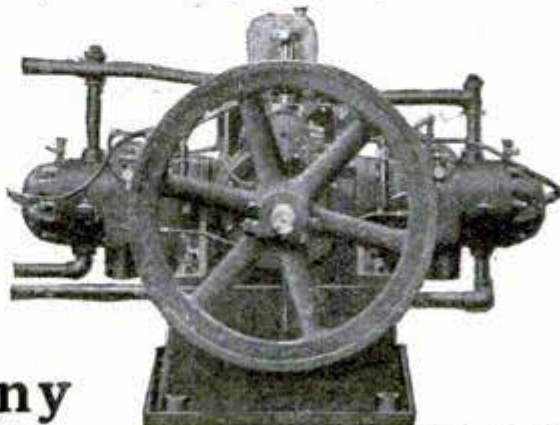
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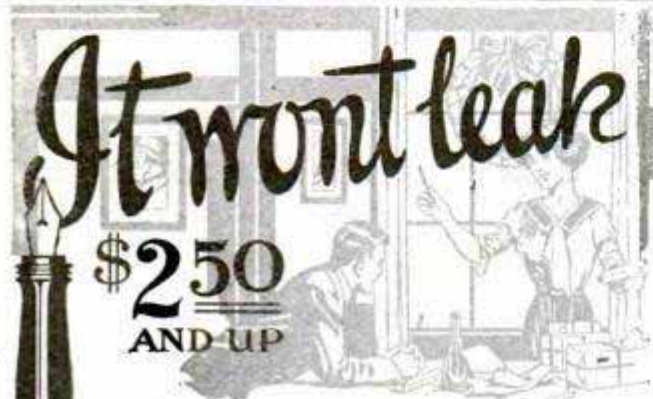
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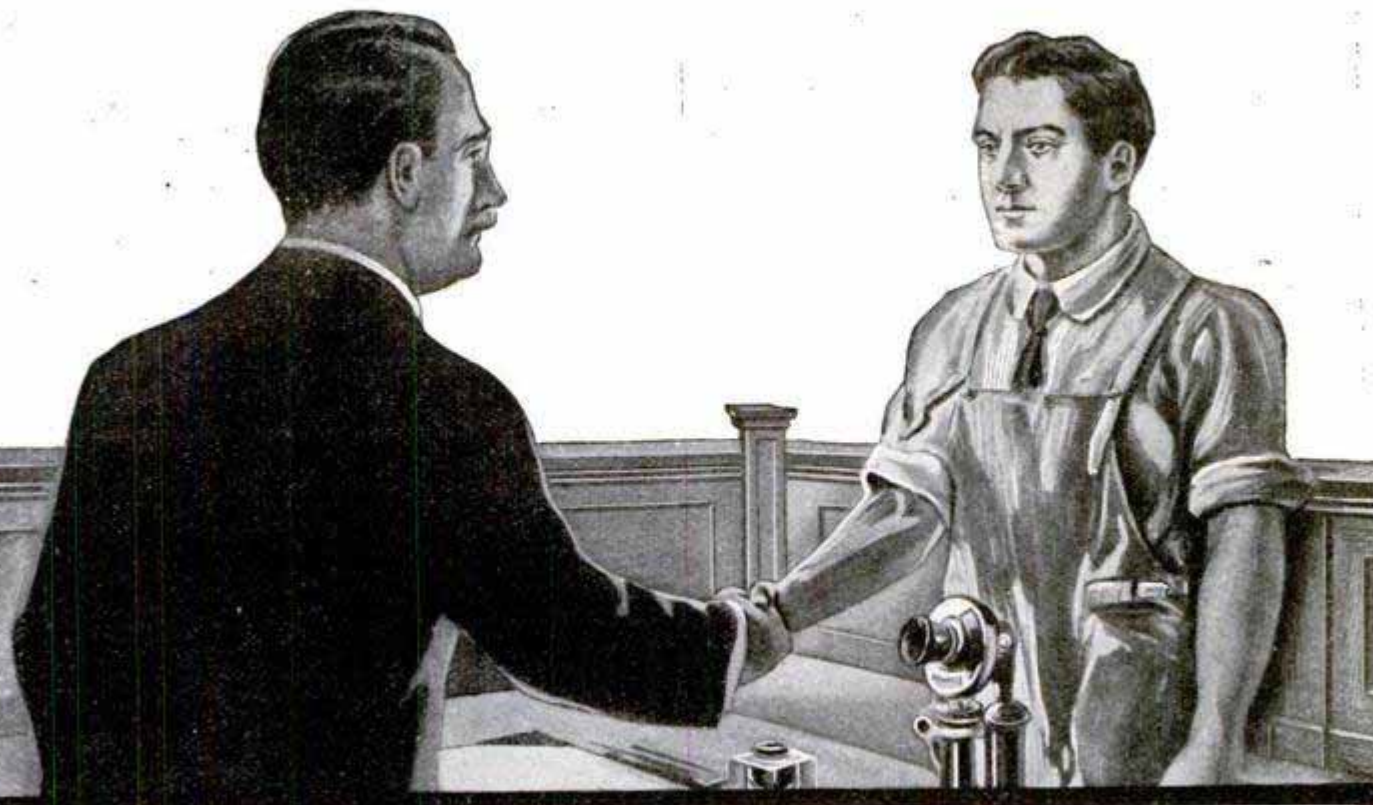
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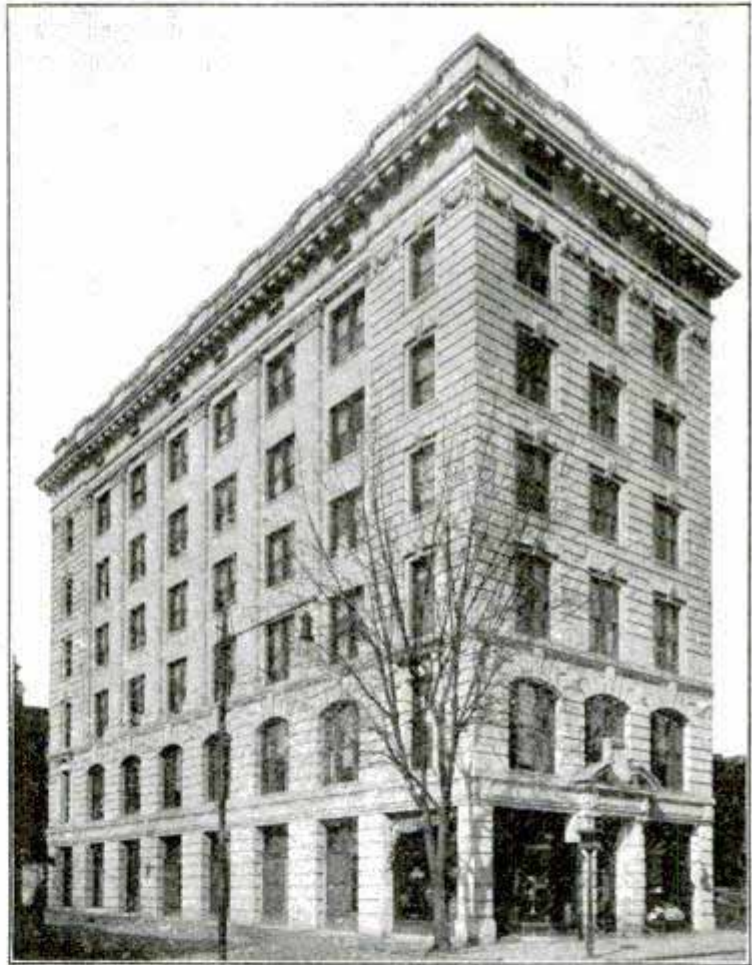
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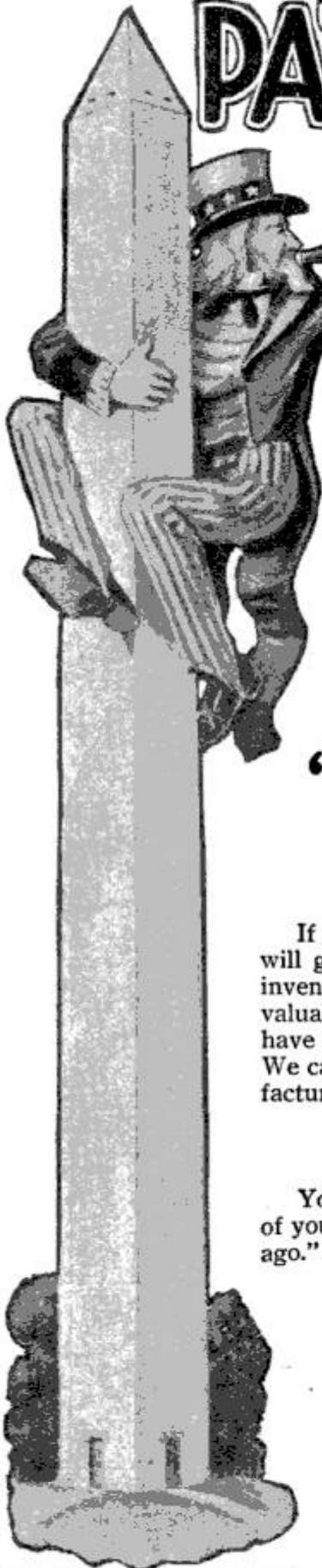
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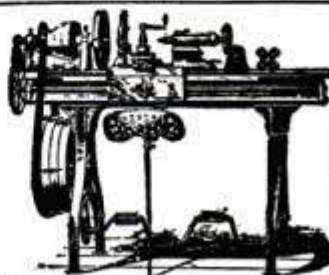


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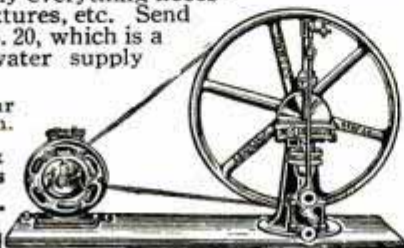
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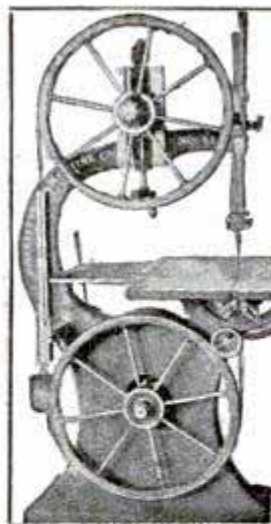
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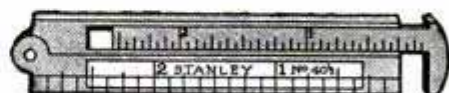
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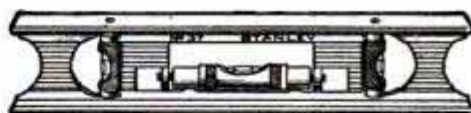
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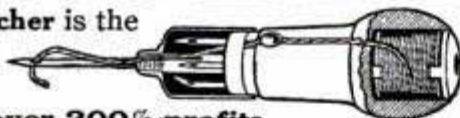
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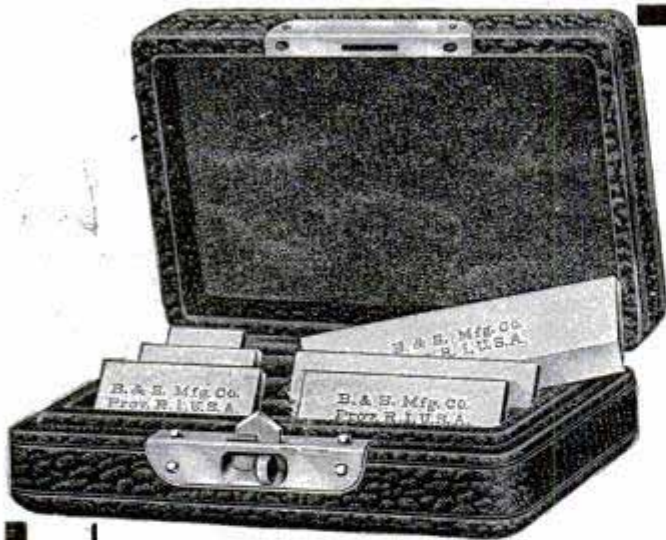
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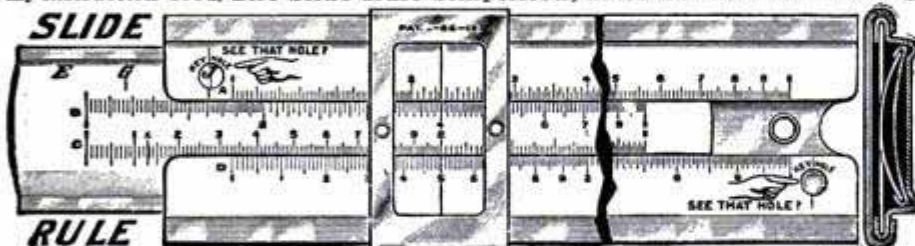
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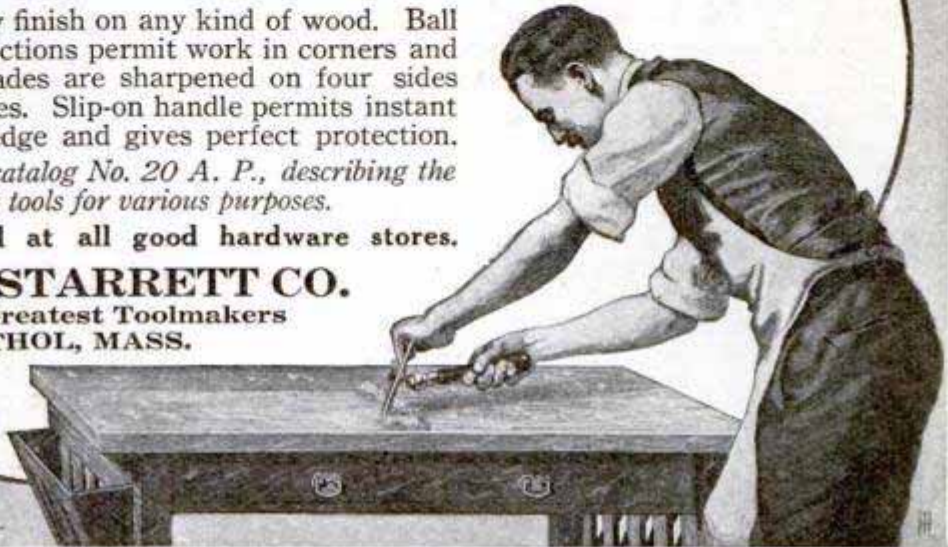
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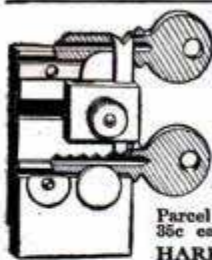


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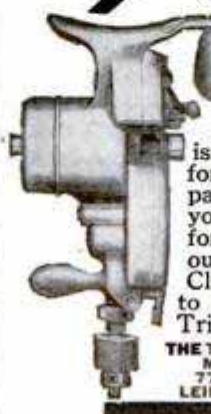
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Mends all leaks in graniteware, hot water bags, cooking utensils, etc. No heat, solder, cement or rivet. Fit any surface. Sample box, 10c. Complete box, assorted sizes, 25c. Wonderful opportunity for live agents. Write today.
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above the timber line, and it has neither springs nor streams of sufficient size or accessibility to be used for stock-watering purposes. The grazing season lasts from June 15 to October 31, and during this period of four and a half months the animals do not get a drink.



Rich "Velour" Hat FREE

This rich imported Austrian Velour Hat—very finest hare fur; Softer and glossier than plush—Extra heavy pure grosgrain silk band—has fashionable ¾ bow. Russia Leather sweat band—Silk Lined, absolutely newest and swellest style \$7 value. We give it

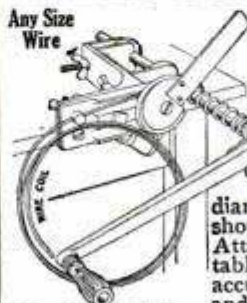
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Be practical in your giving this Christmas—give "him" something that will be of constant usefulness—a Keen Kutter Tool Cabinet, Safety Razor or a Pocket Knife.

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quality tools and cutlery have a nation-wide service and satisfaction. Every article money back from your dealer.

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reputation for long guaranteed or

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Tool Cabinet No. K7, complete with 44 tools. Price \$27.50

Keen Kutter Junior Safety Razor No. KJ10. In neat traveling case. Price \$1.00

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Whenever a new blade came on the market, I gave it a fair trial, but always came back to a "Star" because I could never find a blade that equalled it in uniformity. That's been my experience—and it's why I always recommend Star Blades. You will find the "Star," 14 teeth per inch, the most reliable all-around hack saw blade you can lay your hands on. For 1-16" tubing or less, use Star Blade, 24 teeth to the inch.

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Carborundum Sharpening Stones

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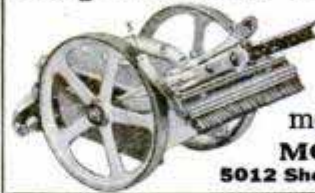
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gles to free themselves kept a crowd roaring with laughter. To cap it all, a County Council official walked up to take particulars of the accident; he obtained the information he wanted, but when he tried to move away he could not. He had stood in the glue, and the soles of his boots were firmly affixed to the wooden paving. Two conductors, regardless of their own discomfort, rushed to the rescue, and by dint of great tugging, the official was released, but part of his shoe leather refused to leave the pavement.

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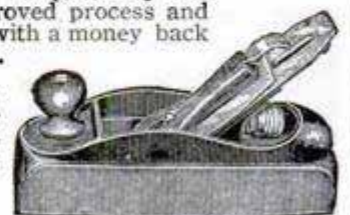
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UNION MADE

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Manufacturers of Famous Signal Brand Service Clothing



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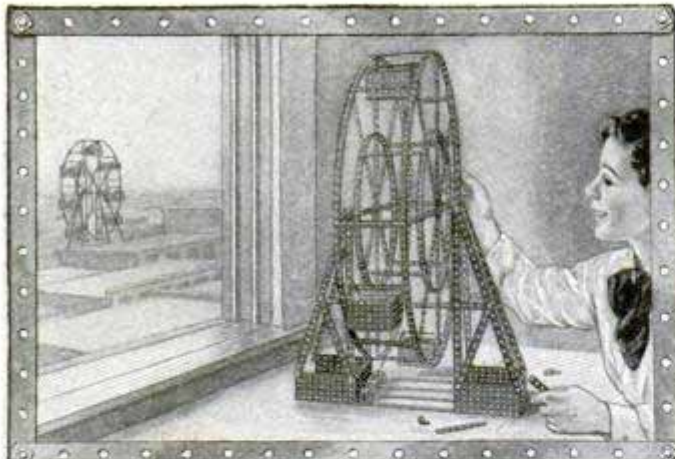
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Quality Furniture Co.
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 GRAND RAPIDS, MICH.

STATUS OF AMERICA'S SHIPBUILDING INDUSTRY—The decline in shipbuilding during the five-year period between 1904 and 1909 is clearly brought out by the latest census report, according to which there was a decrease for all classes of vessels of five tons and over, with the exception of motorboats, which formed a small part of the total number reported. The decline in the iron and steel branch of the industry is no doubt due to the decrease in government work done in private shipyards. The increase in the number of small boats constructed is perhaps the most note-

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Scientific American.

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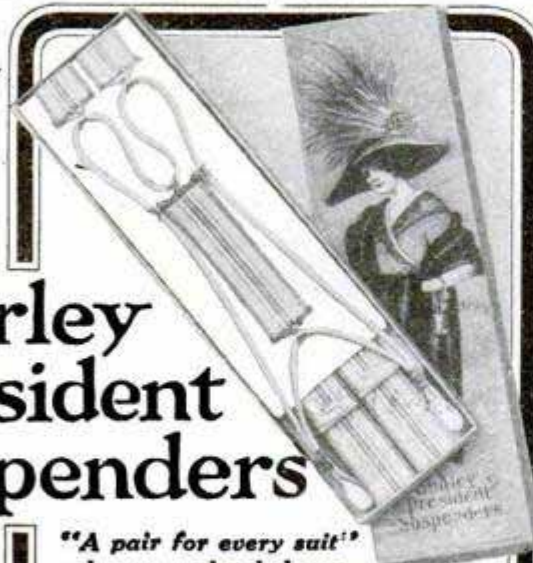
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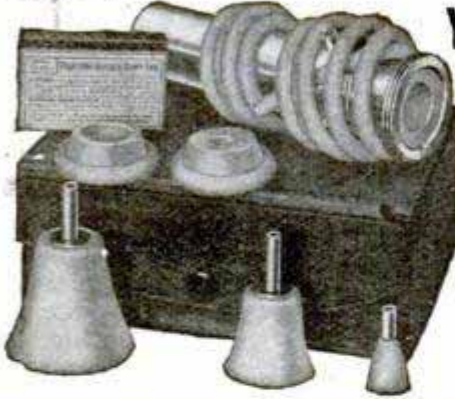
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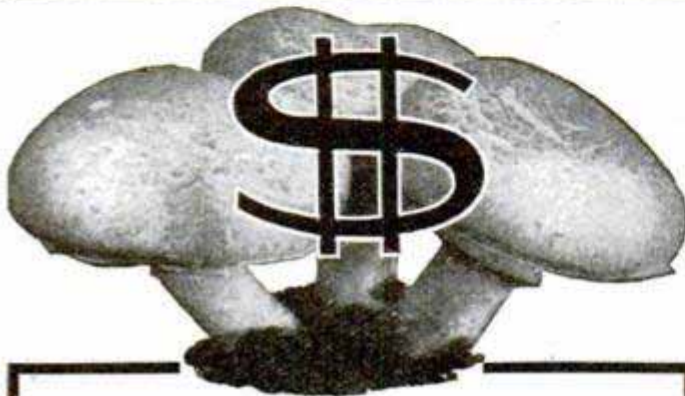


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The Home Maker

WE will make you a long-time loan - you will have 20 years to pay for the land and repay the loan - you can move on the land at once - and your Canadian farm will *make you independent*.

20 Years to Pay

Rich Canadian land for from \$11 to \$30 per acre. You pay only one-twentieth down - balance in 19 equal annual payments. Long before your final payment comes due your farm will have paid for itself over and over. This advertisement is directed only to farmers or to men who will occupy and improve the land.

We Lend You \$2000 for Improvements

The \$2,000 loan is used only for erecting your buildings, fencing, sinking well and breaking. You are given twenty years in which to fully repay this loan. You pay only the banking interest of 6 per cent.

Advance of Live Stock on Loan Basis

The Company, in case of approved land purchaser who is in a position and has the knowledge to take care of his stock, will advance cattle, sheep and hogs up to the value of \$1,000 on a loan basis, so as to enable the settler to get started from the first on the right basis of mixed farming. If you do not want to wait until you can complete your own buildings and cultivate your farm, select one of our Ready-Made farms - developed by C. P. R. Agricultural Experts - with buildings complete, land cultivated and in crop, and pay for it in 20 years. We give the valuable assistance of great demonstration farms - free.

This Great Offer Based on Good Land

Finest land on earth for grain growing, cattle, hog, sheep and horse raising, dairying, poultry, vegetables and general mixed farming, irrigated lands for intensive farming - non-irrigated lands with ample rainfall for mixed and grain farming. These lands are on or near established lines of railway, near established towns.

Ask for our handsome illustrated books on Manitoba, Saskatchewan and Alberta - mention the one you wish. Also maps with full information *free*. Write today.

G. E. THORNTON, Colonization Agent

Canadian Pacific Railway

Colonization Department 112 W. Adams St., Chicago

FOR SALE - Town lots in all growing towns - Ask for information concerning Industrial and Business openings in all towns.

AGENTS - 200% PROFIT

Foot Scraper and Cleaner



Needed on every porch and outside door-step. Right now is the time to sell it - A winner. C. P. Draper, Mass., first order for 200. C. A. Johnson sold 40 in 1 1/2 days. W. W. Harpster, Pa., made \$27.45 in 4 evenings, spare time work. Write quick for terms of free sample. A postal will do.


THOMAS CO., 3048 West St., DAYTON, OHIO

\$15.00 to \$35.00 Per Day Easily Made

Taking photographs with our **ONE MINUTE TINTYPE and POSTCARD CAMERAS**. Pictures made direct without use of negatives. Toned, fixed and developed in one solution. No experience or dark room necessary. **Cameras from \$10.00 up to \$35.00 each**. Complete photos cost 1c to 2c each, sell for 10c, 15c and 25c each. Send for Free Catalogue and Price List today.

NEW YORK FERROTYPE CO., 168 Delancy St., New York City, Dept. III
Branch 1113 S. Halsted Street, Chicago, Ill.





We Start You
in the
**Motion Picture
Business**

With Our Assistance and Small Capital you can begin at once and share in the ever-increasing profits of the **GREATEST OF ALL INDUSTRIES—**

Motion Picture Business

Any man or woman can succeed in their home town, or as a traveling exhibitor. The business is still in its infancy—the possibilities unlimited.

\$35 to \$50 and More Daily Profit

We manufacture and furnish everything—**Machine, Film, Lighting, etc.**—and teach you the business. No experience necessary. Many good locations are just waiting for the right exhibitor to come.

We've Helped Make Hundreds Rich—Why Not YOU?

This is unquestionably the greatest money-making opportunity you will ever have. A postal card or letter is all it costs to get full particulars. **WRITE TODAY!**

ATLAS MOVING PICTURE COMPANY

Room 203 508 S. Dearborn St., Chicago

Get Full Information by Return Mail

**The AutoStop Safety Razor
Guarantees 500 Shaves
Ask Your Dealer About It**

We have
**NO
AGENTS**

FREE This Big Book Of
**BLACK AND BLUE
WOOLENS**



Of course you are going to have a black or blue suit this fall—but why pay \$20 to \$30 for merely ordinary ready-made garments when you can get a classy

Made-to-measure, all-wool **\$15**
BLUE SERGE SUIT for only

the greatest value ever offered in a high-grade blue serge suit, tailored to your individual measure, up to the minute in style, guaranteed perfect fitting, for only **\$15.**

Tailoring and Materials Guaranteed

We guarantee to please you absolutely or you don't pay us one cent. We want your business and to get it we are going to put in the first suit you order of us, a regular \$5

SATIN LINING FREE

Send today for our handsome big book of "blue and black" woolen samples and new fall styles, all **FREE.** Get our big special offers which can't be duplicated, as we are the only exclusive "blue and black" tailors in America.

We will save you **BIG MONEY**

BERNARD, HEWITT & CO., Tailors, 564 West Monroe Street Dept. PM. CHICAGO, ILL.

YOU want work—I want YOU

\$30 a week to start, steady work all year and a chance to work up to local manager at \$3,000 a year

You need no experience or training. My agents were farmers, mechanics, clerks, doctors, merchants, school teachers, laborers, railroad men, barbers, teamsters, and some were just out of school. I make the swellest line of Soaps, Perfumes and Toilet Articles you ever saw.

Will you take this job?



My goods sell at half ordinary retail price, and they are well known. I have customers in every town, and my sales are growing bigger every day. I've simply got to have more agents to supply my customers. I need a hundred new agents right away and this is **YOUR** chance to make big money quick.



To
get
the
Job—
Write
me
TODAY

Don't lay this offer aside. Just take a pen or pencil **NOW** and on a postal or in a letter simply write, "I am looking for steady employment as agent. Please mail full particulars." Address

**E. M. DAVIS, Pres., E. M. DAVIS SOAP CO.
Dept. 0 14, Davis Block, Chicago, Ill.**

ECONOMIC VALUE OF INDUSTRIAL-ACCIDENT PREVENTION—The gratifying result of systematic accident-prevention devices was brought out in the recent government inquiry of a large manufacturing corporation. In 1911 and 1912, this corporation spent \$1,363,367 on safety devices, and since 1906 the fatal accidents among employes have been reduced 40 per cent, which, in this case, means that the safety devices have saved the lives of about 8,000 men—a remarkably good return on the investment.

AGENTS WANTED

To sell our guaranteed Automatic Razor Strop, Safety Razor, and novelty Sewing Companion. Complete information free; or send \$2.00 for line of samples. Write today. Make from \$50 to \$100 a week.

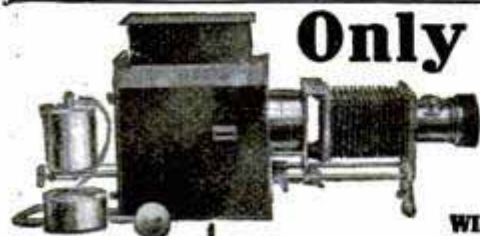
THE UNIVERSAL MFG. CO., FREMONT, O.



Your Picture in a Postal Card IN ONE MINUTE

The pictures are developed, toned and finished in a single developing solution. No experience is necessary. Price of machines \$7.50 and \$15.00—circulars describing our machines sent free. We are also headquarters for supplies for all minute picture machines.

AMERICAN MINUTE PHOTO COMPANY
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The largest manufacturers and distributors of minute picture machines and supplies in the world.



Only \$36.00 The Wonderful ILLUSTRATOR LANTERN

With our improved famous **ALCO RADIANT LIGHT.**

This new 1912 Model has many improvements and double brilliancy. Write for illustrated circular of this and Lanterns of all styles and lights at bottom prices.

IF YOU OWN A LANTERN we should have your name to mail to you our regular announcements of new slides and lecture sets. 75,000 Lantern Slides to rent.

POST CARD MAGIC LANTERN reflects image of postcard or any other picture or object. Prices, \$2.75, \$12.50, \$25.00, \$60.00, express paid.

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Engineering, Microscope, Optical, Scientific, Photo Lantern Slide Supplies

Diamonds Watches

2000 CHRISTMAS SUGGESTIONS

SEND FOR CHRISTMAS CATALOG

FOR HER CHRISTMAS PRESENT

This handsome 100-page illustrated Catalog is brim full of suggestions for Christmas presents, as well as for personal wear. All the new, popular styles in Jewelry—gorgeously beautiful Diamonds, artistic solid gold and platinum mountings—exquisite things—ideal gifts—that sell in some cash stores at double our prices. Select anything desired and let us

The Loftis "Perfection" Diamond Ring is our great special. It stands alone as the most perfect Diamond Ring ever produced. Only the finest quality pure white diamonds, perfect in cut and full of fiery brilliancy, are used. Skillfully mounted in our famous Loftis "Perfection" 14k solid gold 6-prong ring, which possesses every line of delicate grace and beauty. Sent in velvet ring box, ready for presentation.



Send It to You on Approval.

If satisfactory, send us one-fifth of purchase price as first payment, balance divided into eight equal amounts, payable monthly. We pay all delivery charges. Send for Catalog.

Credit Terms: \$5 a Month

The Loftis Credit System is a great convenience at Christmas time. By opening a charge account with us you can make a very little ready money supply handsome, lasting gifts for all.

LOFTIS BROS. & CO., Diamonds, Watches, etc.

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 (Established 1868) STORES IN PITTSBURGH: ST. LOUIS: OMAHA. (56 Years of Success)



1914

CATALOG

\$513 Clear Profit First 51 Days From an Investment of \$175

is the result of operating one American Box Ball Alley. Four others took in \$8,540 first 16 months. Many pay for themselves first month. Go into this business yourself. You can start with \$75. No gambling device, but most practical and popular bowling game in existence. Splendid for high-class amusement and physical exercise. Liberal patronage by good people everywhere. Many sales to churches, schools, homes. Quickly installed—easily portable. No helpers required—really automatic—small expense—receipts nearly all profit. We sell only one person in each locality. Get this monopoly now. Easy payments. Catalog free.

AMERICAN BOX BALL COMPANY, 126 Van Buren St., Indianapolis, Ind.



MONEY SAVED OR MADE. Print Your Own Cards. Circulars, Book, Newspaper. Press \$5. Larger \$18. Rotary \$60. Saves money. Print for others. All easy, rules sent. Write factory for Press catalog, TYPE, Cards, Paper, Outfits, Samples printing. **THE PRESS CO., Meriden, Conn.**

I WILL START YOU

earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. REDMOND, Dept. 306-A, BOSTON, MASS.



Be Your Own Boss

Do as many others have—Operate a Kingery Peanut Roaster and Corn Popper. Over 30 styles. Liberal terms, excellent profits. Kingery's book of possibilities and No. 41 catalog tell you all about it.

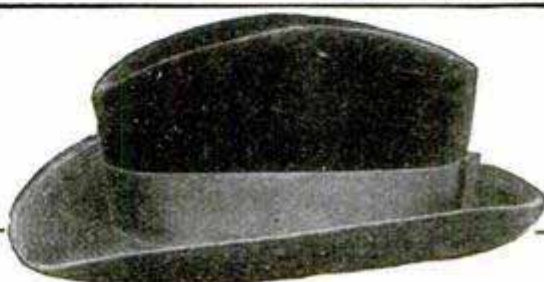
KINGERY MFG. CO., Pearl, east of Broadway, Cincinnati, Ohio

AGENTS \$6 a Day

Should be easily made selling our Concentrated Non-Alcoholic Food Flavors, Soaps, Perfumes and Toilet Preparations. Over 100 kinds, put up in collapsible tubes. Ten times the strength of bottle extracts. Every home in city or country is a possible customer. Entirely new. Quick sellers. Good repeaters. Not sold in stores. No competition. 100 per cent profit to agents. Little or no capital required. Elegant sample case for workers. Start now while it's new. Write today—a post card will do—for full particulars **Free**



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"THE TEXVELOUR" — a different velour.

An absolutely original design, worked out in finest velvet-velour, the hat-material of the hour. Stitched brim, silk lining; silk band—with bow at back. Colors: Dark Brown; Black; Dark Gray; Dark Green. Easily worth \$3. We charge \$2 PREPAID. Money back if you don't like it. Order now—simply state size and color and enclose \$2. Write for "1913 Fall and Winter Style Book"—FREE.

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with 75 illustrations for making Batteries, Dynamos, Motors, Telegraph apparatus, Telephone, Lights, Bells, Alarms, Coils, "Wireless" Current Reverser, Electric Engine, Etc. By Electrical Experts so that anyone can understand it. With Cat. All 10c Ppd. **J. C. DORN, 705 So. Dearborn St., Dept. 21, Chicago, Ill.**



Big Entertainer

320 Jokes and Riddles, 153 Parlor Games and Magic, 15 Tricks with Cards, 73 Toasts, 7 Comic Recitations, 3 Monologues, 22 Funny Readings. Also Checkers, Chess, Dominoes, Fox and Geese, 9 Men Morris. All 10c. postpaid. **J. C. DORN, 708 So. Dearborn Street, Dept. 17, Chicago, Ill.**



Boys' Own Toy Maker

Tells how to make a Talking Machine, Camera, Electrical Motor, Bicycle Boat, Canoe, Boomerang, Bobbed, Wind Mill, Microscope, Water Wheel and Motor, Stilts, Toboggan, Snow Coaster and Sail Boat, Telephone, Electric Bell, Railroad Wind Mobile, Paddle Raft, Traps, Kites, etc. All 10c, postpaid. **J. C. DORN, 707 So. Dearborn St., Dept. 38, Chicago, Ill.**

Greatest Sweater Bargain Ever Offered

SUITABLE FOR MEN OR WOMEN

Coat Sweater

with roll collar

\$1.69 Postpaid by Parcel Post

Finest and most comfortable garment made. Retailers ask \$3 to \$4 for exactly the same coat. Made with a roll collar, two outside pockets and close fitting cuffs. Most popular garment ever made. They fit perfectly and are suitable for men or women. *Sizes 36 to 44*

COLORS RED—WHITE GRAY—BLUE



Send your order to-day, stating size and color wanted. Money cheerfully returned if you are not satisfied that it is the greatest sweater bargain ever offered.

Oxford Mfg. Co., Dept. 53, Williamsport, Pa.

New KEROSENE LIGHT BEATS ELECTRIC OR GASOLINE

10 Days FREE—Send No Money



We don't ask you to pay us a cent until you have used this wonderful modern light in your own home for ten days, then you may return it at our expense if not perfectly satisfied. We want you to prove for yourself that it gives five to fifteen times as much light as the ordinary oil lamp; beats electric, gasoline or acetylene. Lights and is put out just like the old oil lamp; costs

ONLY 1 CENT FOR 6 HOURS

Gives a powerful white light, burns common coal oil (kerosene), no odor, smoke or noise, simple, clean, won't explode. Guaranteed.

\$1000.00 REWARD

will be given to the person who shows us an oil lamp equal to this Aladdin in every way (details of offer given in our circular). Would we dare make such a challenge to the world if there was the slightest doubt as to the merits of the Aladdin? We want one person in each locality to whom we can refer customers. Write quick for our 10 Day Absolutely Free Trial Proposition, Agents' Wholesale Prices, and learn how to get **ONE FREE**.

MANTLE LAMP CO., 448 Aladdin Bldg., Chicago, Ill.

AGENTS WANTED

to demonstrate in territory where oil lamps are in use. Experience unnecessary. Many agents average five sales a day and make \$300.00 per month. One farmer cleared over \$800.00 in 6 weeks. You can make money evenings and spare time. Write quick for territory and sample.

Sunshine Lamp 300 Candle Power FREE

To Try in Your Own Home

Turns night into day. Gives better light than gas, electricity or 18 ordinary lamps at one-tenth the cost. For Homes, Stores, Halls, Churches. A child can carry it. Makes its light from common gasoline. Absolutely Safe.

COSTS 1 CENT A NIGHT

We want one person in each locality to whom we can refer new customers. Take advantage of our Special Free Trial Offer. Write today. Agents Wanted.

SUNSHINE SAFETY LAMP CO. 711 Factory Bldg., Kansas City, Mo.



Beacon Burner FREE!

Fits Your Old Lamp 100 Candle Power Incandescent pure white light from (kerosene) coal oil. Beats either gas or electricity.

COSTS ONLY 1 CENT FOR 6 HOURS

We want one person in each locality to whom we can refer new customers. Take advantage of our Special Offer to secure a Beacon Burner FREE. Write today. AGENTS WANTED.

HOME SUPPLY CO., 11 Home Bldg., Kansas City, Mo.

BUY PLUMBING and HEATING SUPPLIES



at WHOLESALE

Will Save You 30%

Don't pay retail prices. Full stock on hand for prompt shipment. Send for free catalog.

B. P. KAROL, 768 to 772 W. Harrison St., CHICAGO



Agents Wanted Everywhere

A gold mine for crew managers. Make big money the year round. Every Home Needs Our Specialties Vacuum Sweepers, Gasoline Irons Lamps and Lighting Systems

SECURE TERRITORY—WRITE TODAY

P. M. YALE MFG. CO., 20 S. Clinton St., CHICAGO

A PERFECT LIGHT



Ninety-five per cent of fuel required is ordinary air, costing nothing. Beautiful white light of 400 candle power. Our eighteen years' experience is your guarantee that this lamp is perfect. WRITE FOR CIRCULARS AND PRICES American Gas Machine Co. 318 Clark St., ALBERT LEA, MINN.

AGENTS WANTED

There are more than 200 different styles of

The BEST LIGHT

Any one of them is as great an improvement over the gas-jet, as the ancient kerosene lamp was over the tallow-dip. Brighter and lower in cost than electricity, acetylene, gas or oil. Agents make money easily selling "Best Lights." Write for Catalog.

THE BEST LIGHT CO. 324 East 5th St. Canton, O.

WHITE FLAME

BURNERS make your old kerosene lamps and lanterns give a brilliant white light better than electricity or gas. Doubles your light. Saves oil. **NO MANTLE TO BREAK.** Guaranteed Safe and Reliable. Delights every user. Send now for complete sample postpaid 35 cts., stamps or coin. 3 for \$1. **MONEY BACK IF NOT SATISFACTORY.** Live Representatives Wanted. Exclusive Territory.

WHITE FLAME LIGHT CO., 68 Clark Bldg., Grand Rapids, Mich.



Standard LAMP 300 Candle Power

New Patented Automatic Features. Turns night into day. Gives better light than gas, electricity or 18 ordinary lamps. **Costs 1 cent a night.** A miniature portable lighting plant for every purpose. Makes its own light from common gasoline. **Absolutely safe.** Write today for **FREE** our special offer and secure this lamp

STANDARD LAMP CO. 614 Standard Bldg., Kansas City, Mo.



AGENTS STEADY INCOME

Wide Awake Men and Women. You can secure protected Territory to sell International Portable Lamps and Lighting Systems. Our Self-Heating Sad-Iron is positively the simplest and most practical Iron on the market. We challenge competition. **Your Chance.** Territory is being rapidly taken. If you want a good steady income write to us Today.

International Light, Novelty & Specialty Co., 311 River Street, Dept. 36, Chicago, Ill.



KEROSENE AND GASOLINE

LIGHTING SYSTEMS

Our WIZARD and "DREADNAUGHT" lamps and lighting systems are constructed to burn kerosene and gasoline.

The lamps constructed to burn kerosene are an achievement surpassing all other known methods of artificial lighting. Besides being very attractive in design and of very simple construction, same are very convenient to operate and reliable. The cost of operating a kerosene lamp is very small, as a single mantle inverted lamp will only consume one gallon of kerosene in about 62 hours.

Our gasoline lamps are the most perfect and up-to-date on the market, while certain styles can be lit with an ordinary match and operated with almost the same convenience as city gas.

For exclusive agency and further particulars, also complete illustrated catalog, describing the above and other styles of lamps and systems, address

The Nagel-Chase Mfg. Co., The largest manufacturers of artificial lighting devices in the world, **158 E. Erie St., Chicago**



AGENTS WANTED



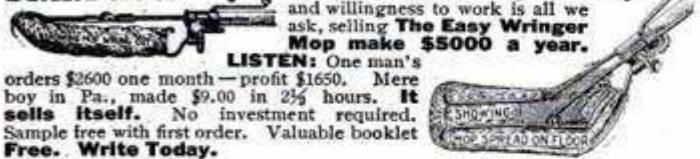
POSTPAID \$2.00

A Gift for Him
An Automatic
Razor Stropper
for Old Style or Safety Blades

He will remember you with gratitude every time he shaves. Strop is specially treated and sharpens blade with diagonal stroke.
AUBURN SUPPLY CO., Dept. RS12, 7745 Peoria St., Chicago

WORK FOR US—\$50 to \$75 EVERY WEEK

START NOW



Experience not necessary. Honesty and willingness to work is all we ask, selling **The Easy Wringer Mop** make \$5000 a year.
LISTEN: One man's orders \$2600 one month—profit \$1650. Mere boy in Pa., made \$9.00 in 2½ hours. **It sells itself.** No investment required. Sample free with first order. Valuable booklet **Free. Write Today.**

THE U. S. MOP CO., 140 Main Street, Toledo O.

WASH WITH COMPRESSED AIR



THE RAPID VACUUM WASHER

THE NEW WAY

No wear, no tear. Daintiest articles washed without injury. Tub of clothes washed in 5 to 10 minutes. A child can operate it. It is well made and as light as a washboard.

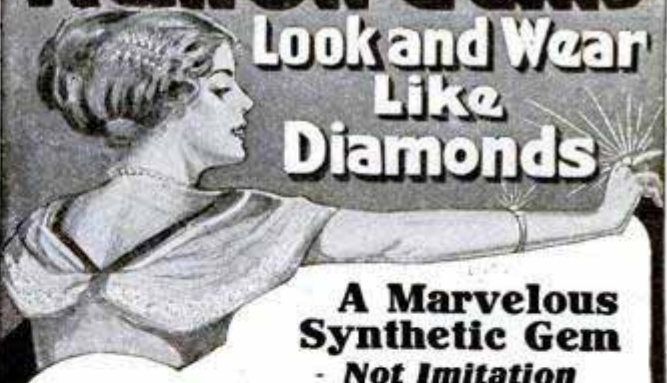
Price \$1.50 and \$3.00

Instantaneously attached to any stationary, ordinary wooden or sheet metal tub. Send for 30 day trial offer and terms to agents.

STEWART-SKINNER CO.
26 Cherry Street, Worcester, Mass.

Remoh Gems

Look and Wear
Like
Diamonds



A Marvelous
Synthetic Gem
- Not Imitation

—the greatest triumph of the electric furnace. **Will cut glass**—stands filing, fire and acid tests like a diamond—guaranteed to contain no glass. Remoh Gems have no paste, foil or backing—their brilliancy is guaranteed forever. One-thirtieth the cost of a diamond. These remarkable gems are set only in 14 Karat Solid Gold Mountings.

Sent On Approval Anywhere In U. S.

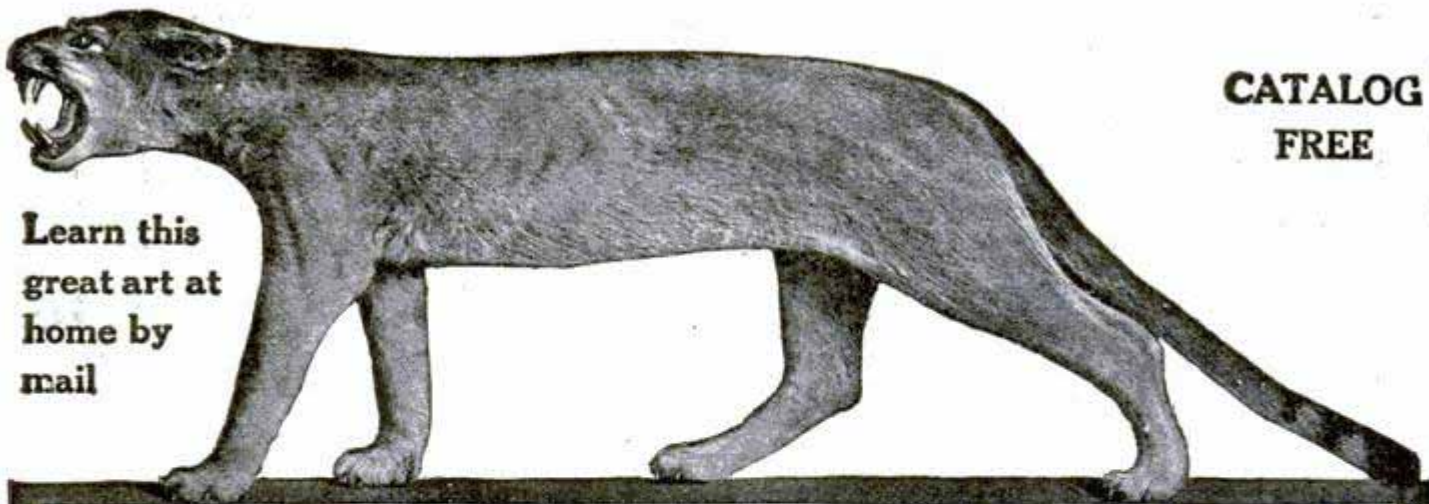
—your money cheerfully refunded if not perfectly satisfactory. Write for our 4-color

De Luxe Jewel Book—yours for the asking. Address

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great art at
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Mount Animals, Game Heads and Birds

The Splendid Art of Taxidermy can now be Learned Quickly in Your Own Home

SPORTSMEN, HUNTERS, ANGLERS, NATURALISTS—It is no longer necessary to lose your fine trophies nor to pay taxidermists exorbitant prices for stuffing them. You can now learn this great art for yourself easily and quickly during your spare time. We teach you by mail in your own home to successfully stuff and mount all trophies. Also to tan all kinds of hides and furs and make them into beautiful rugs and robes. Easy to learn by men, women and boys.

By taking our course of fifteen lessons you will soon be able to do perfect mounting and can decorate your home, office or den with the choicest of art. Thousands of men and women of every vocation, bankers, lawyers and business men, are members of our school and endorse it in the highest terms.

Big Money in Taxidermy

Professional taxidermists earn from \$2,000 to \$3,000 a year and there are not half enough taxidermists to supply the demand. Mounted specimens sell readily for big prices. Many birds and animals now killed and thrown away can be turned into cash.

TAXIDERMY BOOKS FREE—We will send FREE postpaid our beautiful catalog, a copy of the Taxidermy Magazine, pictures of mounted game, sample diploma and hundreds of letters from students, all free. Write for these books today—now while you think of it. Remember you learn at home during your spare time. Write today.

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We mount or sell all kinds of animals or game heads. Price list on request. Write today for our beautiful catalog and magazine.



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Free Trial For Xmas

Moth-Proof
Red Cedar Chest
15 DAYS'
FREE TRIAL



A Piedmont Southern Red Cedar Chest makes the finest Xmas, birthday or wedding gift. Charmingly useful and beautiful.

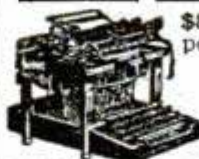
Protects furs and woollens from moths, mice, dust and damp. Shipped from factory at factory prices. Freight prepaid. Write for illustrated catalog and book "Story of Red Cedar." Postpaid free. Write today.

Piedmont Red Cedar Chest Co., Dept. 422, Statesville, N. C.

The trade of the world has more than doubled in the last 20 years, and three countries—the United Kingdom, Germany, and the United States—have each a larger foreign commerce than that of the whole world in 1850. Half of the commerce of the world consists of the imports and exports of five countries—the United Kingdom, Germany, United States, France, and Holland.

The national forests of Chile cover about 7,000,000 acres.

Rebuilt Remington—Like New, \$35.00



\$8.00 down, balance same as rent, \$3.00 per month, buys this Remington Rebuilt. Works like new, looks like new. This is only one of our many bargains. We carry all Standard Makes. Our machines are FACTORY REBUILT and guaranteed for 2 years.

THE M. & M. TYPEWRITER CO., 116 N. La Salle St., CHICAGO

VIOLET BLUE WHITE DIAMONDS 12% Yearly Increase In Value GUARANTEED

LB4901. 18K. Lewy Solitaire. Platinum Setting. Violet Blue Diamond..... \$48.50

LB4909. 14K. Ear Screws. Platinum Setting. Two matched Blue White Diamonds. \$90.00

LB4906. 14K. Scarf Pin. Platinum Setting. Steel Blue Diamond..... \$48.50

Your Choice from Our \$1,000,000.00 Stock Sent to You for FREE Examination without obligation to purchase! Here's your opportunity to secure a diamond of guaranteed quality at our IMPORTERS' PRICES before the new 20% tariff goes into force.

LEWY BROS. CO. GUARANTEE is in writing; states color, perfection, carat weight. Guarantees to you

12% Per Year More Than You Paid

in exchange, any time. No similar guarantee given by any other house. Full price refunded if not satisfied. Protect your investment with our guarantee.

Diamonds of Quality Approved by Our Experts. We carry nothing less fine in color than BLUE WHITE. Our 78 year established reputation for reliability assures you that when we say a diamond is "STEEL BLUE" or "PERFECT" you can depend on it.

FREE! LEWY DIAMOND BOOK fully illustrated. Contains expert facts about diamonds acquired by our experts during 78 years. A style book of the newest fashions in diamond jewelry. Write for a free copy right away!

LEWY BROS. CO., Dept. F27, STATE AND ADAMS STS. CHICAGO



LB4904. Lewy Tooth Ring. 14K Solid Gold Mounting. Steel Blue Diamond. \$125.00



LB4901. Special Lewy Solitaire. Blue White Diamond. \$100.00

LB4911. 14K. Solitaire Stud. Platinum Setting. Violet Blue Diamond..... \$40.00

Successful Egg Farming

200 Eggs a Year Per Hen



HOW TO GET THEM

THE eighth edition of the book, "200 Eggs a Year Per Hen" is now ready. Revised, enlarged, and in part re-written, 96 pages. Contains among other things the method of feeding by which Mr. S. D. Fox, of Wolfboro, N. H., won the prize of \$100 in gold offered by the manufacturers of a well-known poultry food for the best egg record during the winter months. Simple as a. b. c.—and yet it will start hens to laying earlier and to induce them to lay more eggs than any other method under the sun. The book also contains a recipe for egg making food used by Mr. Fox, which brought him in one winter day 68 eggs from 72 hens; and for five days in succession from the same flock 64 eggs a day. Mr. E. F. Chamberlain, of Wolfboro, N. H., says: "By following the methods outlined in your book I obtained 1,496 eggs from 91 R. I. Reds in the month of January, 1902." From 14 pullets picked at random out of a farmer's flock the author got 2,999 eggs in one year—an average of over 214 eggs apiece. It has been my ambition in writing "200 Eggs a Year Per Hen" to make it the standard book on egg production and profits in poultry. Tells all there is to know, and tells it in a plain, common-sense way.

You can get this book with a year's subscription to the AMERICAN POULTRY ADVOCATE, both for 75 cents; two years' subscription and book for \$1.00, or given free as a premium for two yearly subscriptions at 50 cents each. Book alone for 50 cents.

Our paper is handsomely illustrated, 44 to 124 pages, 50 cents per year, 3 months' trial 10 cents. Sample Free. CATALOGUE of poultry books free.

AMERICAN POULTRY ADVOCATE
312 Hodgkins Block SYRACUSE, N. Y.

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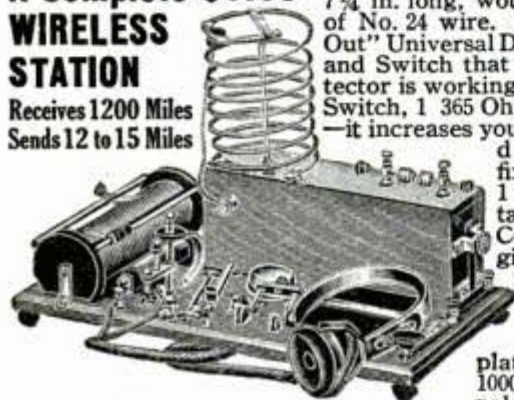
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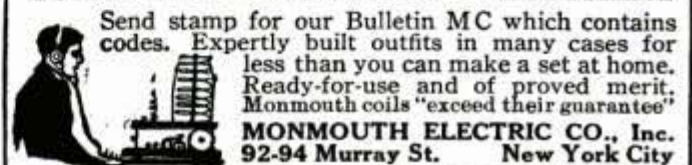
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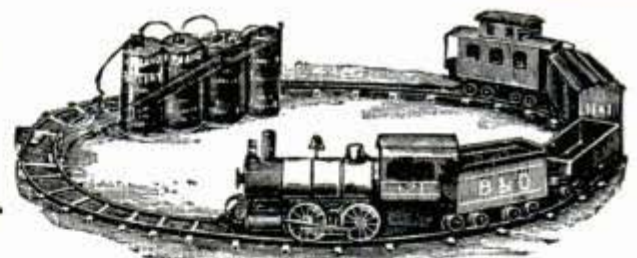
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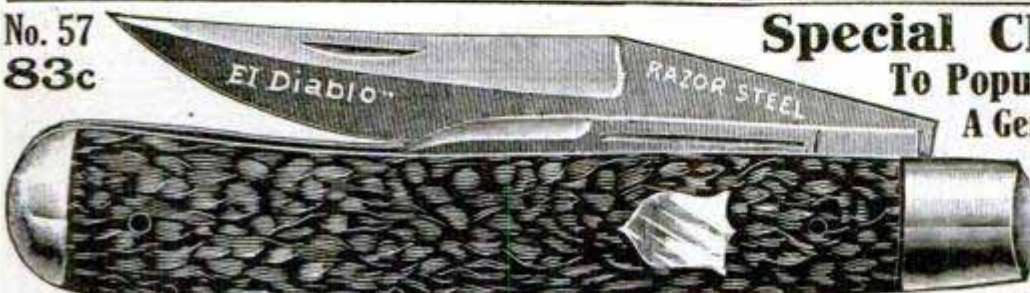
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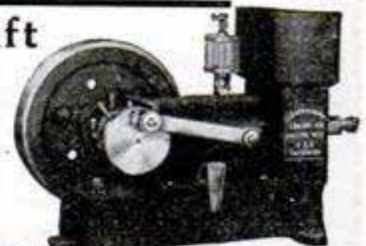


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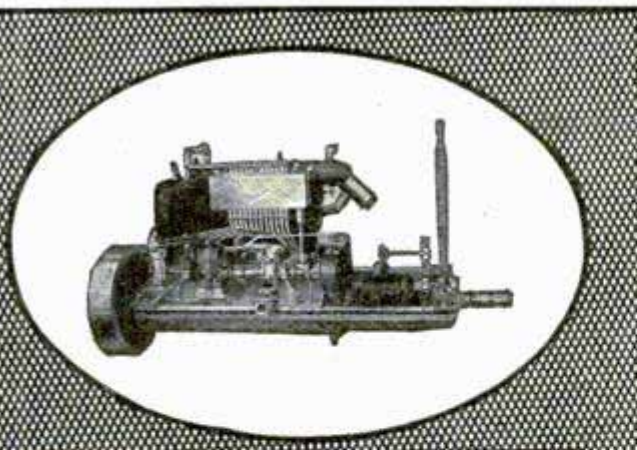
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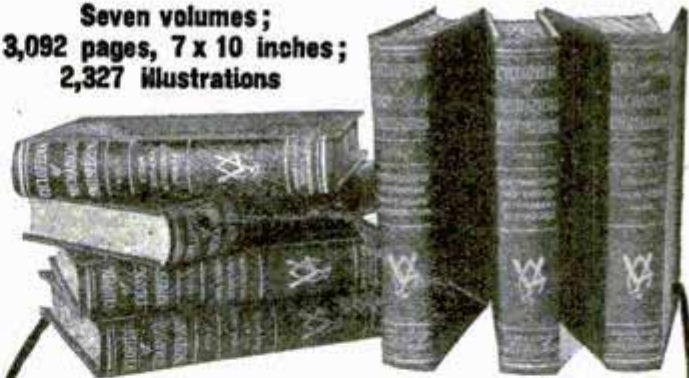
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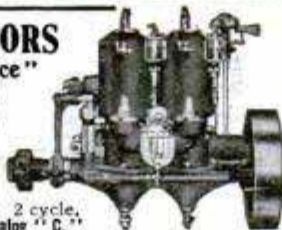
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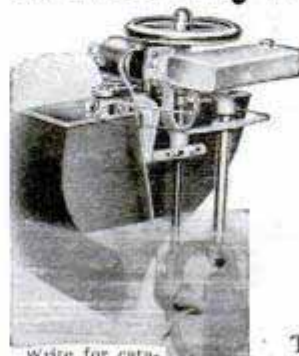
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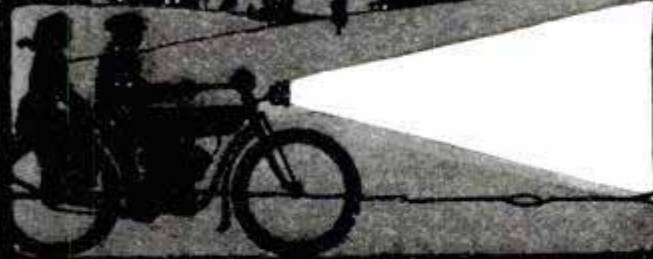
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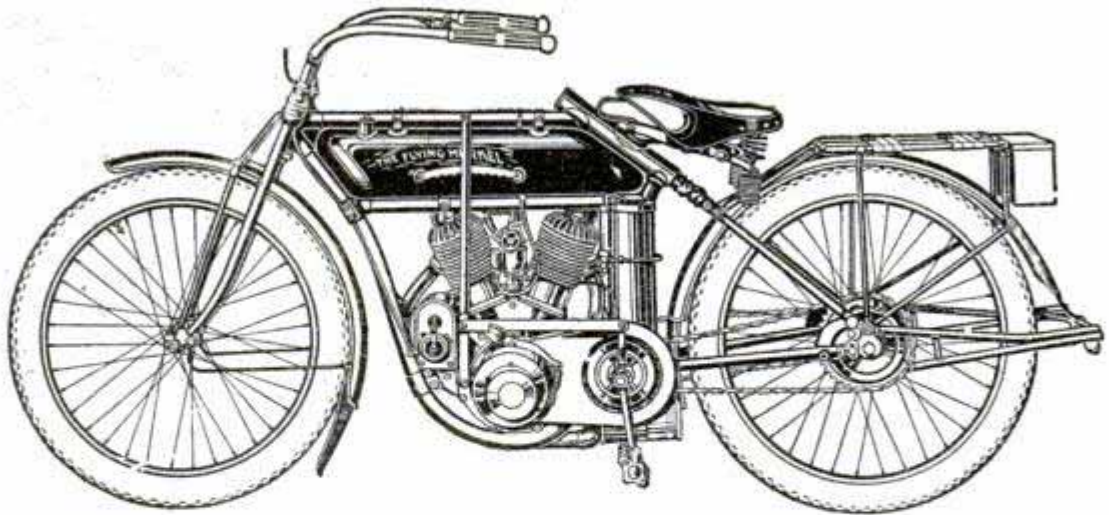
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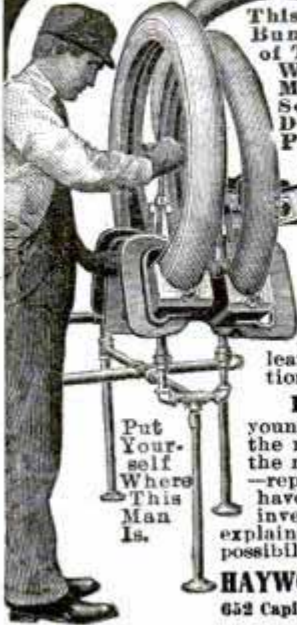
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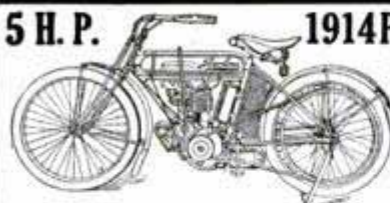
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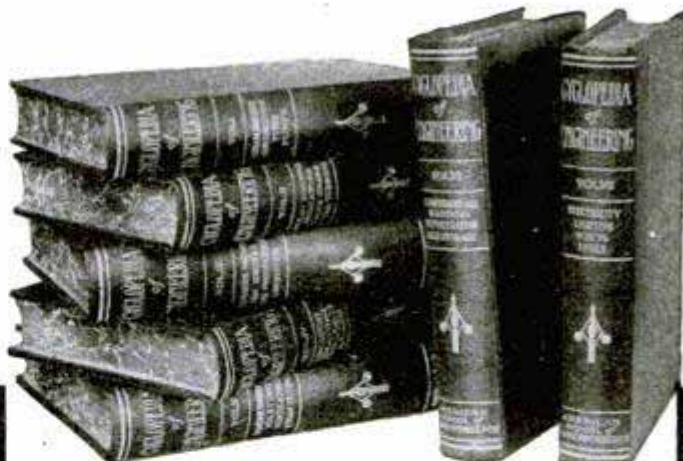
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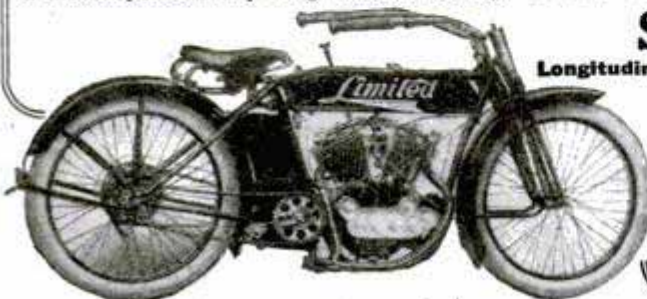
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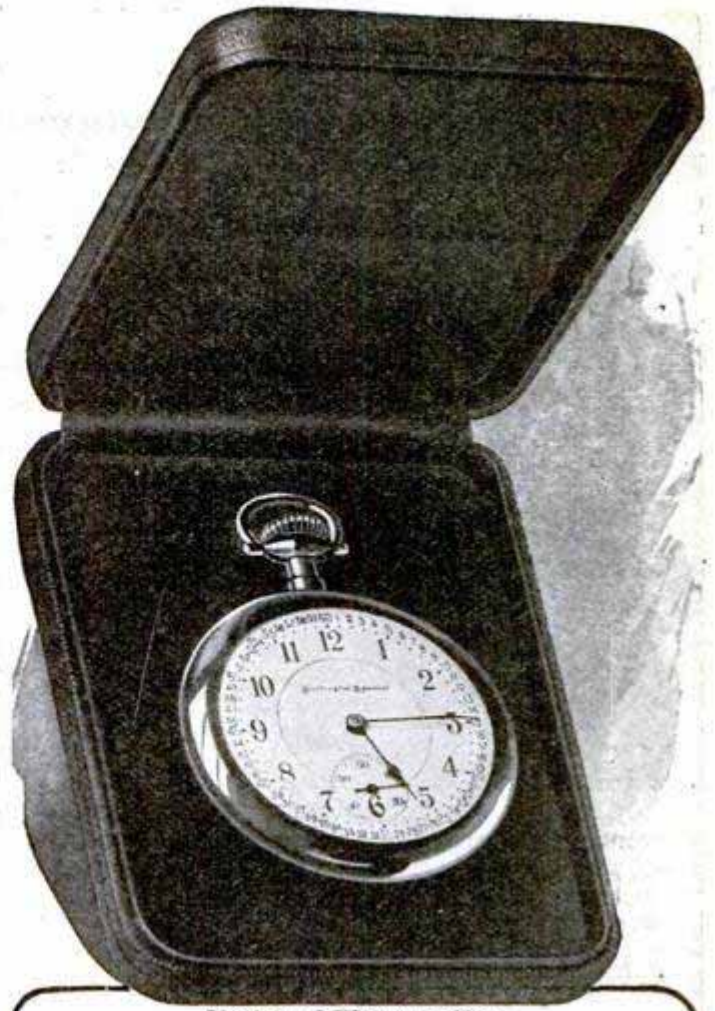


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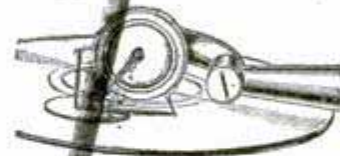
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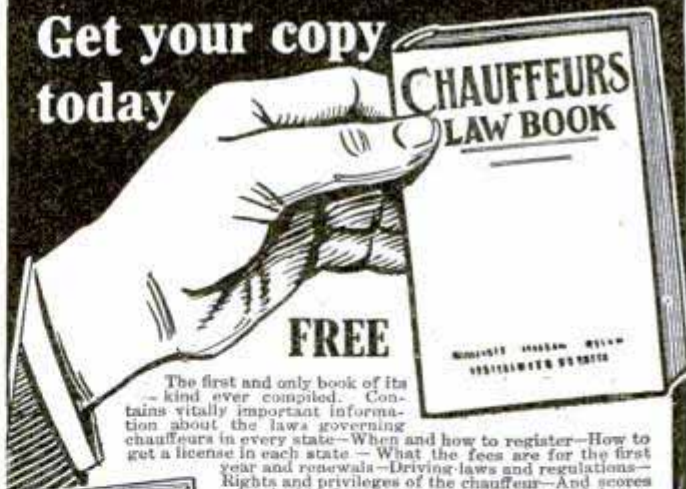
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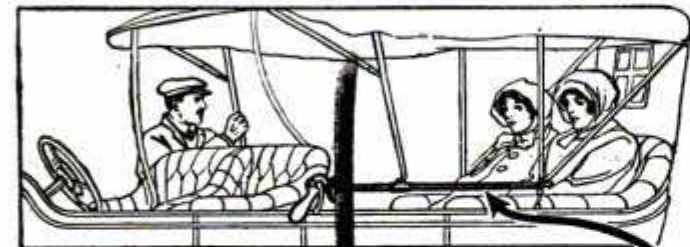
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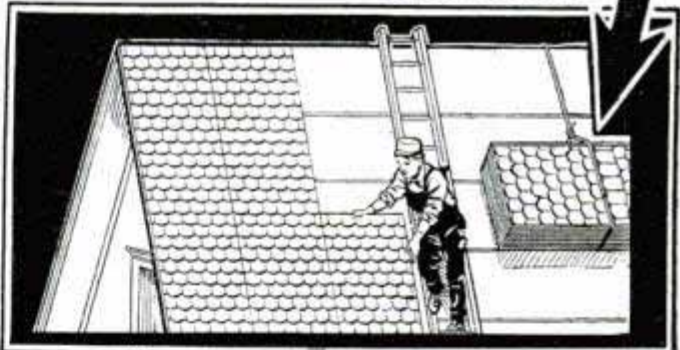
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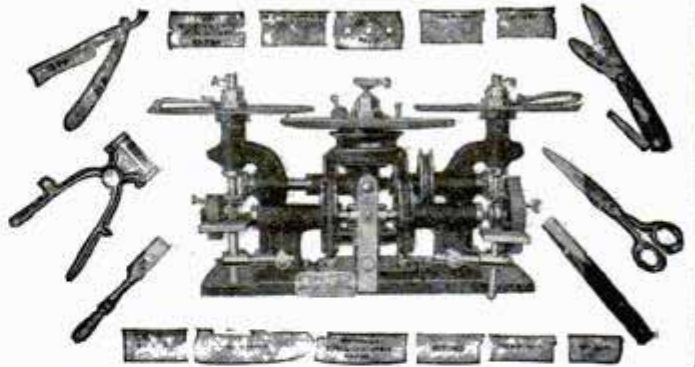
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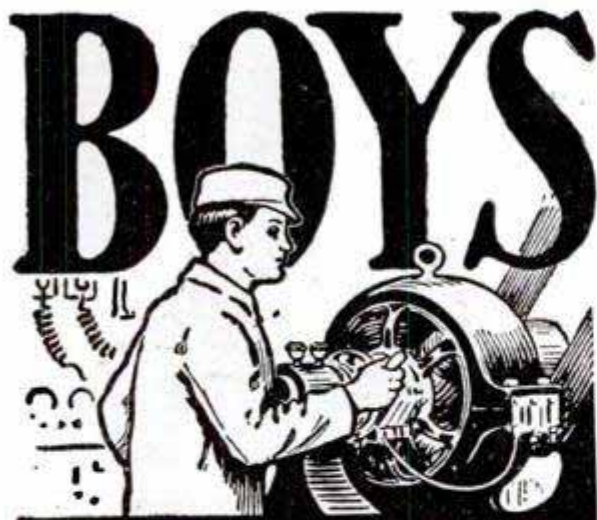
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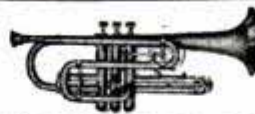
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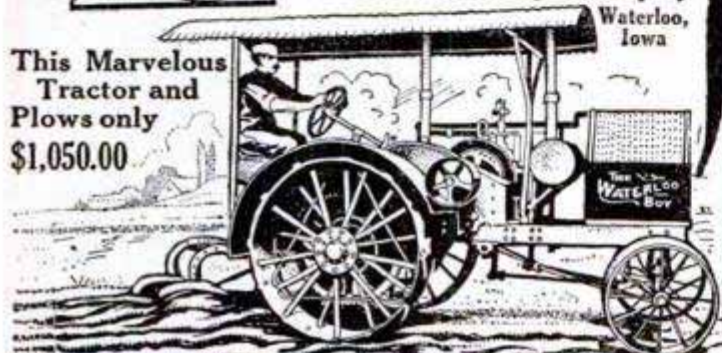
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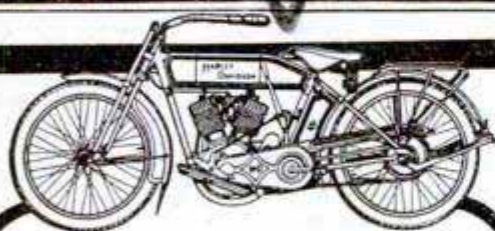
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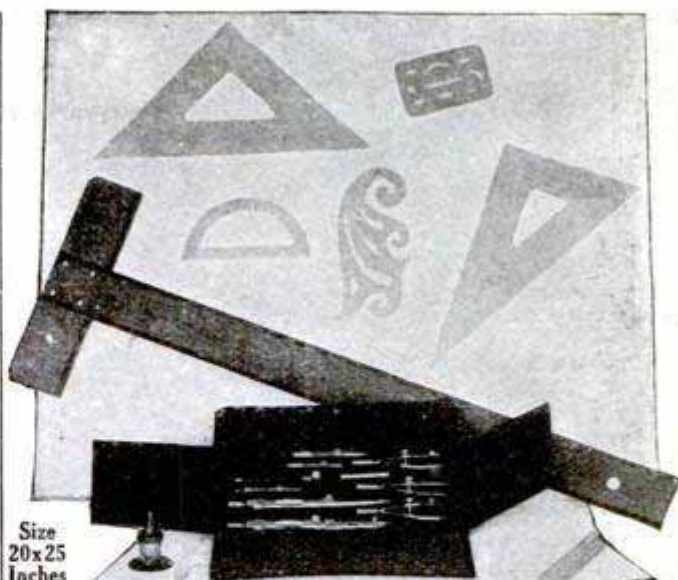
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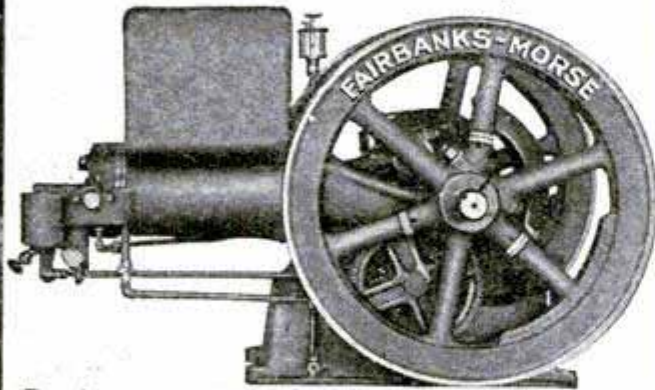
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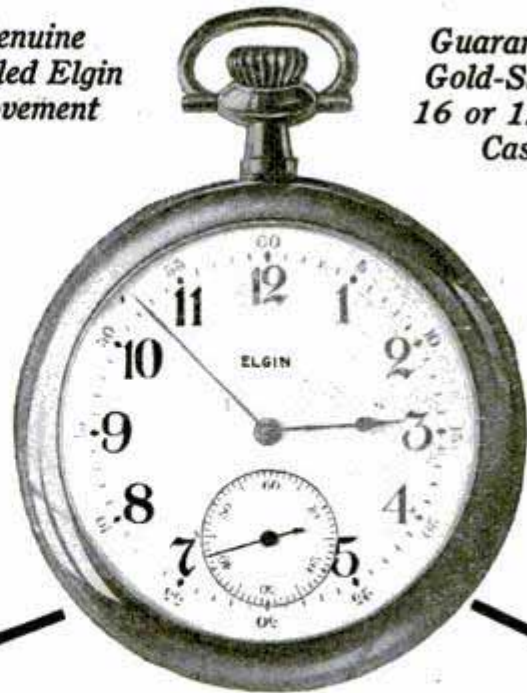
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Right here where grapefruit and orange groves alone, as the U. S. Government report shows, are paying over \$680,000.00 a year! Where fruit, vegetables and poultry mean a mint of money— several big crops of garden truck each year. Our latest Florida book (coupon below will bring yours, free) tells you "What you can do with one acre in Hillsboro County." Tabulates actual yield of each crop; cost of clearing, planting and harvesting; even includes a Handy Calendar of planting and marketing dates. Send today for yours—it enables you to choose crops that will yield you a handsome income.

Right here where 3 big railroads cross each of our tracts—a dozen R. R. stations right on these lands. Get the point! Suburban advantages at country prices!

This is no "pig in a poke" purchase—you'll have 60 days to fully investigate the farm you reserve. Your money back if you want it. We want you to know just what you are getting—by special arrangement even more time may be taken. And what's more, any time within a year you may exchange your farm for any other unsold land of the same acreage.

When you buy a farm, insist on getting tried and proved land. Buy it through a tried and proven land company. During the past 3 years the North Tampa Land Company has boosted over 2,500 happy families toward independence—made them farm-owners in thriving Hillsboro County. Just ask what the Mayor of Tampa says of this land—or the President of the Tampa & Gulf Coast R. R.—or any of the contented, prosperous settlers who are now developing their farms. Ask us to send you letters from all these folks—Start the New Year right! Mail this coupon quick.

North Tampa Land Co.

Bruen Webb Bldg. Tampa, Fla.

North Tampa Land Co. Pop. Mech. 12-13

Bruen Webb Bldg., Tampa, Fla.

Please send me, FREE, your latest and best book on Florida land.

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Buys this genuine
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Takes post card size pictures; equipped with famous Naco shutter, working up to 1/100th of a second; one inch rapid symmetrical lens. Can be loaded and unloaded in daylight, no dark room necessary. New method of inserting roll films. Non-reversible winding key. Covered with the best genuine seal grain leather. Guaranteed for one year against all mechanical and structural defects.

Sign the coupon below, mail it to us and we will send you this beautiful instrument on ten days' trial. Test it in every way. Compare it with other similar priced cameras now on the market. If you do not want it at the end of the trial period send it back at our expense; you take no risk.

This is the Greatest Camera Offer Ever Made in America

The standard price of the Naco 3-A Camera is \$20.00 cash anywhere. This is the first time you have ever had the opportunity to buy this high grade camera on the easy payment plan. We do not know how long we will continue to sell these cameras on such liberal terms but we can and will fill all orders received in answer to this advertisement. You cannot afford to miss this remarkable trial offer.

The most extreme care and precision are used in the manufacture of the Naco 3-A Camera and we are sure that you will be more than pleased with the results obtained and the general character of the instrument.

As to our responsibility, we refer you to either Dun's or Bradstreet's Commercial Agencies, and would ask that, in order to expedite shipment, you send us as references the names of two business men or firms who have been established for some time. We do not care how rich or poor a prospective purchaser may be as we do business strictly on the "honor system."

Fill out coupon below and send it today. Orders will be shipped as they are received; first come, first served.

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You will need one or more rolls of films to try out this camera, and we are making a special offer: Send us 50c extra and we will send you a roll of films that will take six pictures. After you have taken the pictures, send the roll to us and we will develop and print them and send them to you without any additional charge. Fill Out This Coupon today and try the wonderful Naco 3-A Camera for ten days free. We will send it to you prepaid. You take no risk at all. Your money refunded if not satisfactory.

NATIONAL CAMERA
COMPANY,
1415 Chestnut
Street
ST. LOUIS,
MO.

Name.....

Address.....

City..... State.....

Occupation.....

Are you of legal age.....

COUPON

To the NATIONAL
CAMERA CO.
1415 Chestnut St.
ST. LOUIS, MO.

I enclose first payment of \$2.00 (and 50c for film offer) for which send post prepaid the Genuine Folding Naco 3-A Camera, described in your ad. If I keep it I will pay you \$2.00 each month until \$20.00 in all has been paid. Title to this instrument is not to pass until full amount of \$20.00 is paid. If I return it within the ten day limit period you are to send me back my \$2.00.

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BING'S Trains work mechanically as well as electrically. They are modelled after the real thing, and guaranteed to work perfectly. In fact, the Miniature Railway System as produced by BING is complete in every detail—Stations, Switches, Signals, etc.

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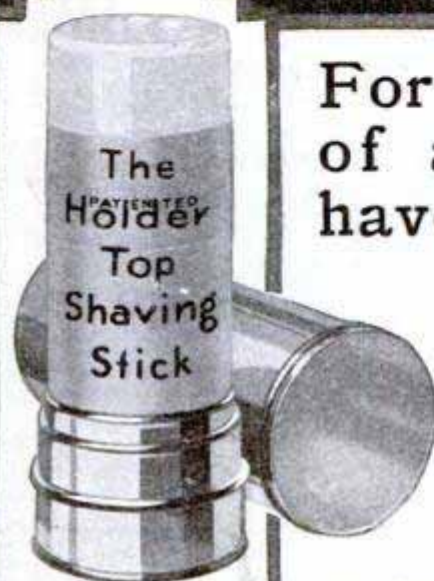
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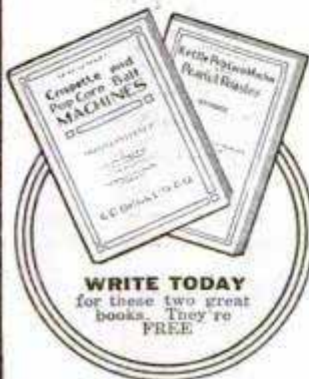
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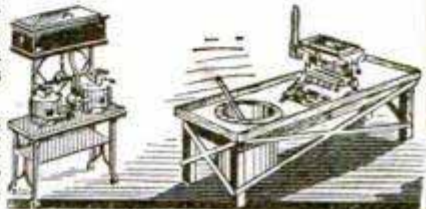
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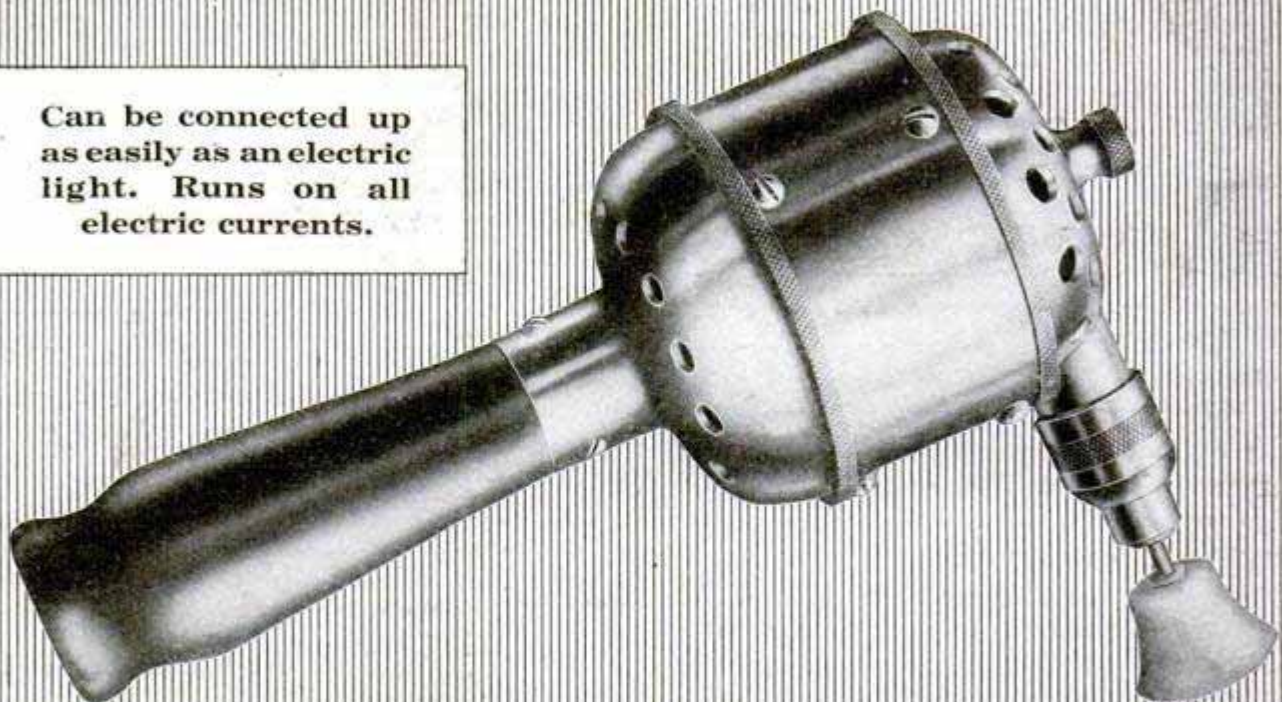
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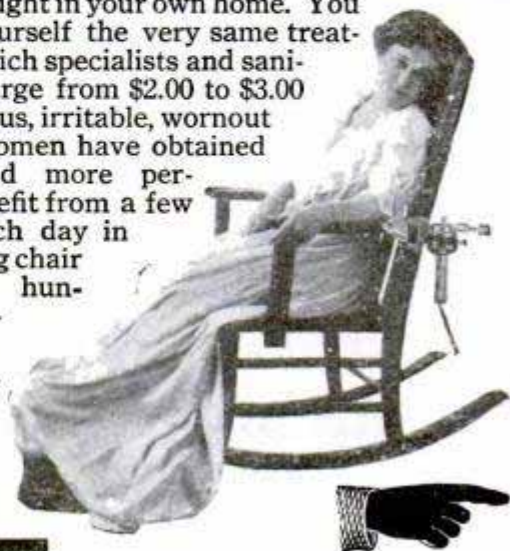
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Power from within! Strength that is *more* than mere muscular strength—the strength of perfect health, abundant nerve force—the strength of the *perfect man* now within your reach through *vibration*! Nine people out of every ten are only *half alive*. They exist—they do not really live. How about yourself? Read about the great instrument that is restoring the strength of robust youth to men who have neglected their bodies in the cultivation of their brains.



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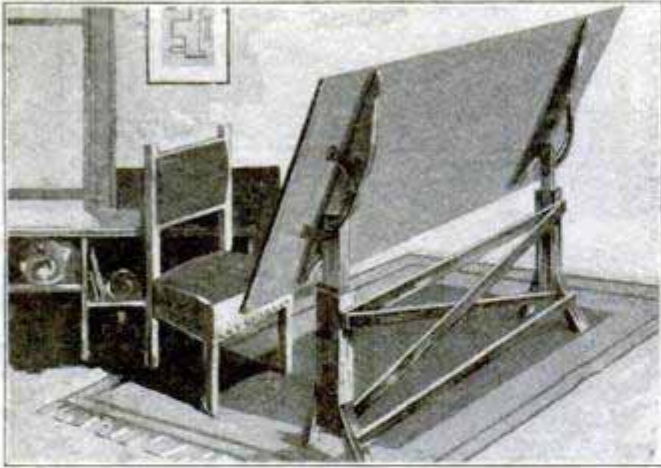
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I'll tell you just exactly how I train you personally. If you could know of all the chairs like this to be filled you wouldn't hesitate. You can have a money making future if you will let me show you how to do it.

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how I do it. For 20 years I have been doing the highest paid expert drafting work as Chief Draftsman of a large and well known Company. One day the manager said to me, "Why is it that there are not more high quality men like you? *I would pay thousands of dollars a year if I could get them.*" Right there I made up my mind that I would give to ambitious men the highest quality, personal instruction in the very things which had enabled me to earn my big salary. So the kind of training I will give you is the **practical** kind. The kind you need to hold one of the big paying positions.

I'll teach you drafting in your own home. I'll teach you personally— give you private instruction. This instruction is given to you by me. I make you see



I know what the big firms demand and this is what I teach you. I do it all during your spare time in your own home. Remember you get my personal training. Don't hesitate about sending me your name—just cut out the coupon below—write in your name and you'll hear from me at once.



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Right now—this very minute—there are many positions open which pay \$3,000 and more per year to the right men who have learned drafting. There is lots of room at the top. I got there myself but have found all around incompetent men holding poor positions. They had not been trained right. The thing I want to do is to train you in the practical way you ought to be trained; to show you what to avoid and how to do things right. **YOU** can get into one of these chairs soon if you will merely send me your name on the free coupon below.

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I have even perfected a plan which gives you an opportunity to begin earning money as soon as you have enrolled as one of my personal and private students. This enables a few young men or older men who could not otherwise take up this prac-

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